

<div>Powered by INSITETM</div> <div>1 : 600 / 1 : 240</div> <div>PCG Pressure Case Gamma PCDC Pressure Case Directional PWD Pressure While Drilling</div> <div>HALLIBURTON Sperry Drilling</div>									
Country : USA		Field : Wattenburg		Location : Lat: 40° 25' 24.02" North Long: 104° 21' 18.94" West		Well : Wells Ranch BB01-615		Company : Noble Energy	
Rig : H&P 343		LOCATION		Latitude : 40° 25' 24.02" North Longitude : 104° 21' 18.94" West UTM Easting = 3,318,703.024 usft UTM Northing = 1,399,119.858 usft		Other Services Directional Drilling			
Permanent Datum : Ground Level		Elevation : 4662.00 ft		Elev. KB N/A		DF 4686.00 ft		GL 4662.00 ft	
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum		MD LOG		WD N/A			
Drilling Measured From : Drill Floor									
Depth Logged : 1,955.00 ft To 16,386.00 ft		Unit No. : 11610115		Job No. : CA-XX-0903054511					
Date Logged : 09-Feb-16 To 17-Feb-16									
Total Depth MD : 16,386.00 ft TVD: 6,487.32 ft		Plot Type : Final							
Spud Date : 06-Feb-16		Plot Date : 18-Feb-16							
Run No.		Borehole Record (MD)		Size		Weight		Casing Record (MD)	
		From To		9.625 in		36.60 lbpf		SURFACE 1,945.00 ft	
0100		8.750 in 1,955.00 ft							
0200		8.500 in 5,600.00 ft							
0300		8.500 in 12,166.00 ft							
0400		8.500 in 12,498.00 ft							
0600		8.500 in 12,932.00 ft							

Max Tool Temp (degF) / Source	156.13 / PCM	229.65 / HCIM	223.41 / PCM	223.41 / PCM	223.41 / PCM
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Lead MWD Engineer	Brian Neu	Brian Neu	Brian Neu	Ryan Elliott	Ryan Elliott
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Charles Culver	Charles Culver
SENSOR INFORMATION					
Downhole Processor Information					
Tool Type	PCM	HCIM	PCM	PCM	PCM
Software Version	5.93	88.58	5.93	5.93	5.93
Sub Serial Number	11404286	11380150	11404286	11404286	11404286
Insert Serial Number	11400950	11199528	11400880	11400880	11400880
Date and Time Initialized	09-Feb-16 03:58	10-Feb-16 10:53	12-Feb-16 15:50	12-Feb-16 15:50	12-Feb-16 15:50
Date and Time Read	10-Feb-16 08:57	12-Feb-16 20:32	15-Feb-16 03:37	15-Feb-16 03:37	15-Feb-16 03:37
ECMB SW Version	N/A	N/A	N/A	N/A	N/A
Directional Sensor Information					
Tool Type	PCDC	PCDC	PCDC	PCDC	PCDC
Distance From Bit (ft)	70.00	36.00	57.00	63.00	60.00
Software Version	6.33	6.33	6.33	6.33	6.33
Sub Serial Number	11404286	11677168	11404286	11404286	11404286
Sonde Serial Number	12174582	11297555	12177531	12177531	12177531
Sensor ID Number	N/A	N/A	N/A	N/A	N/A
Toolface Offset (deg)	132.50	0.00	32.68	83.00	187.20
Gamma Ray Sensor Information					
Tool Type	PCG	PCG	PCG	PCG	PCG
Distance From Bit (ft)	63.26	25.00	49.82	56.74	53.54
Recorded Sample Period (sec)	10	10	10	10	10
Software Version	8.15	8.15	8.15	8.15	8.15
Sub Serial Number	11404286	11964672	11404286	11404286	11404286
Insert/Sonde Serial Number	11579843	11681055	11681001	11681001	11681001
Pressure Sensor Information					
Tool Type	N/A	PWD	N/A	N/A	N/A
Distance From Bit (ft)	N/A	44.01	N/A	N/A	N/A
Recorded Sample Period (sec)	N/A	1	N/A	N/A	N/A
Software Version	N/A	3.70	N/A	N/A	N/A
Collar Serial Number	N/A	11661468	N/A	N/A	N/A
Insert Serial Number	N/A	10815263	N/A	N/A	N/A
Rotary Steerable Information					
Tool Type	N/A	GP	N/A	N/A	N/A
Distance From Bit (ft)	N/A	3.20	N/A	N/A	N/A
Software Version	N/A	7.07	N/A	N/A	N/A
Sub Serial Number	N/A	0	N/A	N/A	N/A
Pulser Controller Sensor Information					
Tool Type	PCM	PCM	PCM	PCM	PCM
Software Version	5.93	8.21	5.93	5.93	5.93
PIC Software Version	1.70		1.70	1.70	1.70
Sub/HOC Serial Number	11404286	220316	11404286	11404286	11404286
Insert/Probe/Module SN	11400950	11680860	11400880	11400880	11400880
Battery Serial Number	N/A	N/A	N/A	N/A	N/A
Valve Insert SN	N/A	N/A	N/A	N/A	N/A

Valve Insert SN	N/A	N/A	N/A	N/A	N/A
DC Insert Serial Number	N/A	N/A	N/A	N/A	N/A
Choke Size (32nd)	N/A	N/A	N/A	N/A	N/A
Driver Current (amps)	N/A	N/A	N/A	N/A	N/A
Driver SMI Current (amps)	N/A	N/A	N/A	N/A	N/A
Boot Strap Version	4,146.00	4,146.00	4,146.00	4,146.00	4,146.00
DDSr-HCIM Sensor Information					
Tool Type	N/A	DDSr-HCIM	N/A	N/A	N/A
Distance From Bit (ft)	N/A	0.00	N/A	N/A	N/A
Recorded Sample Period (sec)	N/A	12	N/A	N/A	N/A
Software Version	N/A	20.88	N/A	N/A	N/A
Sub Serial Number	N/A	11380150	N/A	N/A	N/A
Insert Serial Number	N/A	11032891	N/A	N/A	N/A
Sensor ID Number	N/A	5615	N/A	N/A	N/A
DDSr-GP Sensor Information					
Tool Type	N/A	DDSr-GP	N/A	N/A	N/A
Distance From Bit (ft)	N/A	0.00	N/A	N/A	N/A
Recorded Sample Period (sec)	N/A	12	N/A	N/A	N/A
Software Version	N/A	30.88	N/A	N/A	N/A
Sub Serial Number	N/A	446	N/A	N/A	N/A
Insert Serial Number	N/A	11839439	N/A	N/A	N/A
Sensor ID Number	N/A	11270	N/A	N/A	N/A
WELL INFORMATION					
MWD Run Number	600				
Date run completed	17-Feb-16				
Rig Bit Number	0600				
Bit Size (in)	8.500				
Tool Nominal OD (in)	6.750				
Log Start Depth (MD, ft)	12,932.00				
Log End Depth (MD, ft)	16,386.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	15-Feb-16 15:32				
Drill/Wipe End Date and Time	16-Feb-16 23:46				
Min Inc (deg) @ Depth (MD, ft)	88.40 @ 14,239.00				
Max Inc (deg) @ Depth (MD, ft)	92.22 @ 13,199.00				
Bit TFA(in2) / Bit Type	1.05 / PDC				
Flow Rate (gpm)	513.51				
Max AV (fpm) / CV (fpm) @ MWD	475.0 / N/A				
Fluid Type	Diesel Mud Base				
Density (ppg) / Viscosity (spqt)	9.80 / 49.00				
Filtrate CL (ppm)	35,000.00				
pH / Fluid Loss (mptm)	N/A / N/A				
PV (cP) / YP (lhf2)	18 / 14.00				
% Solids / % Sand	12.5 / N/A				
% Oil / Oil:Water Ratio	59 / 69:31				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (degF) / Source	236.82 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Ryan Elliott				
Customer Representative	Charles Culver				
SENSOR INFORMATION					

Sensor Information					
Downhole Processor Information					
Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404286				
Insert Serial Number	11400994				
Date and Time Initialized	15-Feb-16 07:00				
Date and Time Read	17-Feb-16 14:30				
ECMB SW Version	N/A				
Directional Sensor Information					
Tool Type	PCDC				
Distance From Bit (ft)	60.00				
Software Version	6.33				
Sub Serial Number	11404286				
Sonde Serial Number	11297555				
Sensor ID Number	N/A				
Toolface Offset (deg)	187.20				
Gamma Ray Sensor Information					
Tool Type	PCG				
Distance From Bit (ft)	53.54				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404286				
Insert/Sonde Serial Number	11579843				
Pressure Sensor Information					
Tool Type	N/A				
Distance From Bit (ft)	N/A				
Recorded Sample Period (sec)	N/A				
Software Version	N/A				
Collar Serial Number	N/A				
Insert Serial Number	N/A				
Rotary Steerable Information					
Tool Type	N/A				
Distance From Bit (ft)	N/A				
Software Version	N/A				
Sub Serial Number	N/A				
Pulser Controller Sensor Information					
Tool Type	PCM				
Software Version	5.93				
PIC Software Version	1.70				
Sub/HOC Serial Number	11404286				
Insert/Probe/Module SN	11400994				
Battery Serial Number	N/A				
Valve Insert SN	N/A				
DC Insert Serial Number	N/A				
Choke Size (32nd)	N/A				
Driver Current (amps)	N/A				
Driver SMI Current (amps)	N/A				
Boot Strap Version	4,146.00				

DDSr-HCIM Sensor Information

Tool Type	N/A				
Distance From Bit (ft)	N/A				
Recorded Sample Period (sec)	N/A				
Software Version	N/A				
Sub Serial Number	N/A				
Insert Serial Number	N/A				
Sensor ID Number	N/A				

DDSr-GP Sensor Information

Tool Type	N/A				
Distance From Bit (ft)	N/A				
Recorded Sample Period (sec)	N/A				
Software Version	N/A				
Sub Serial Number	N/A				
Insert Serial Number	N/A				
Sensor ID Number	N/A				

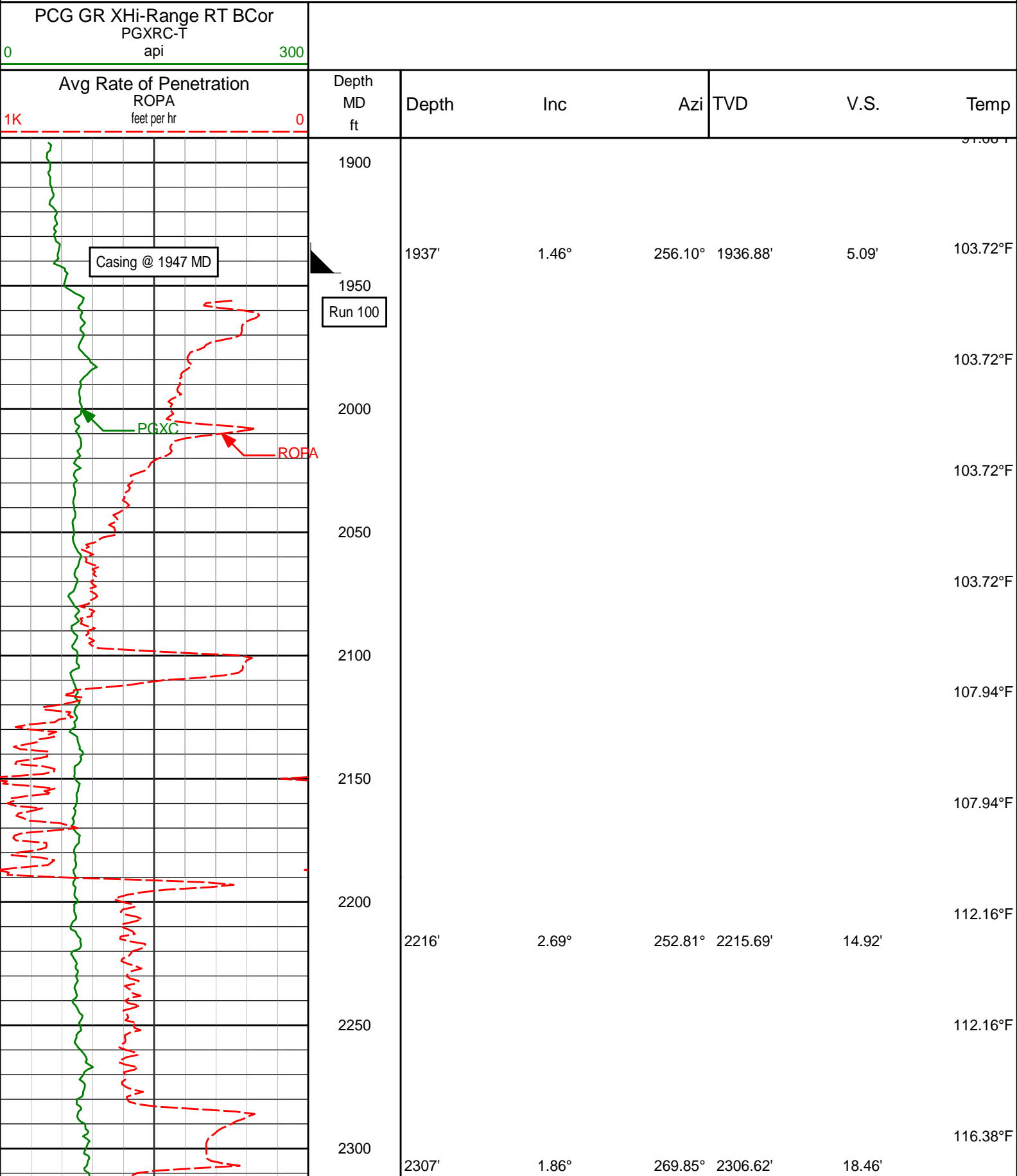
REMARKS

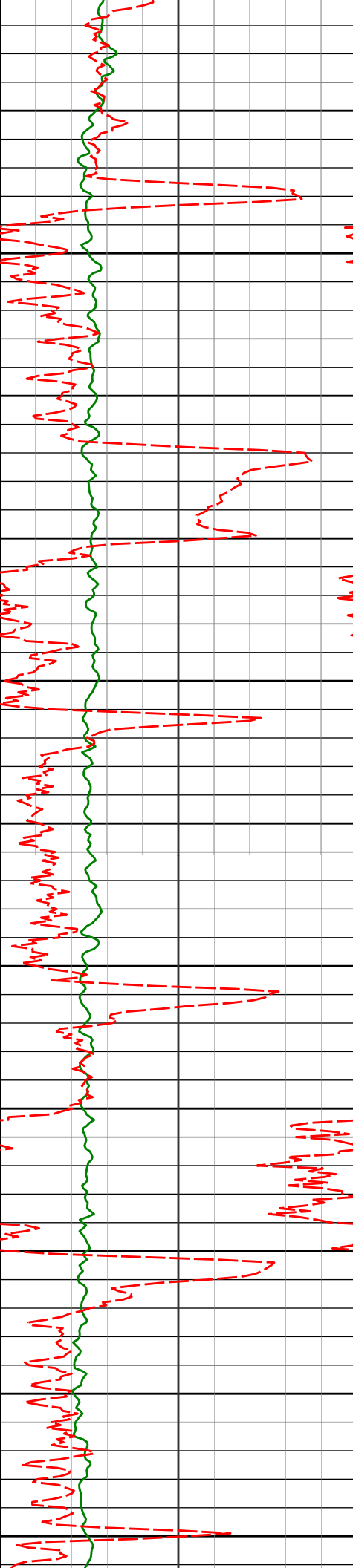
1. All depths are calibrated to driller's pipe tally and are measured depths from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The following smoothing parameters have been applied to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

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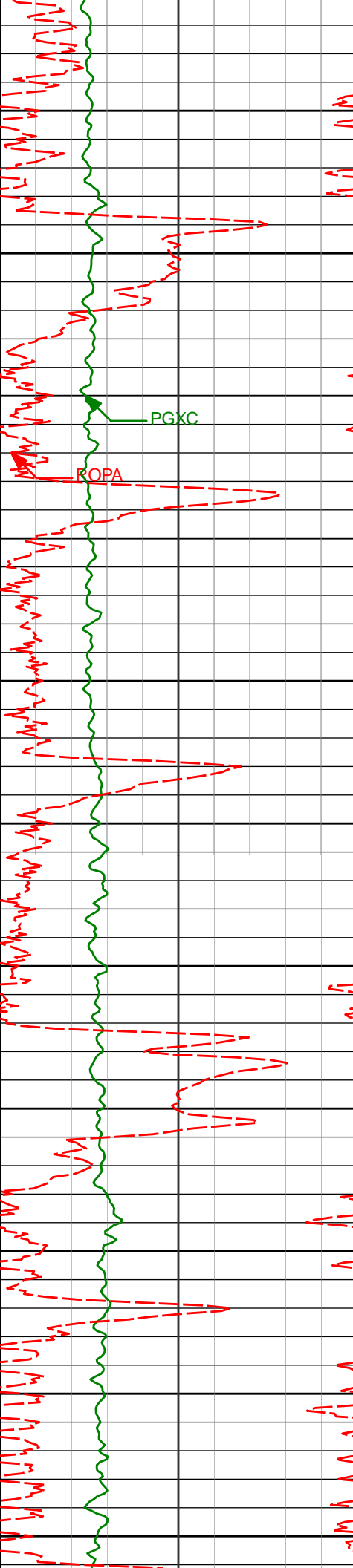
MD Detail 1:600 Scale



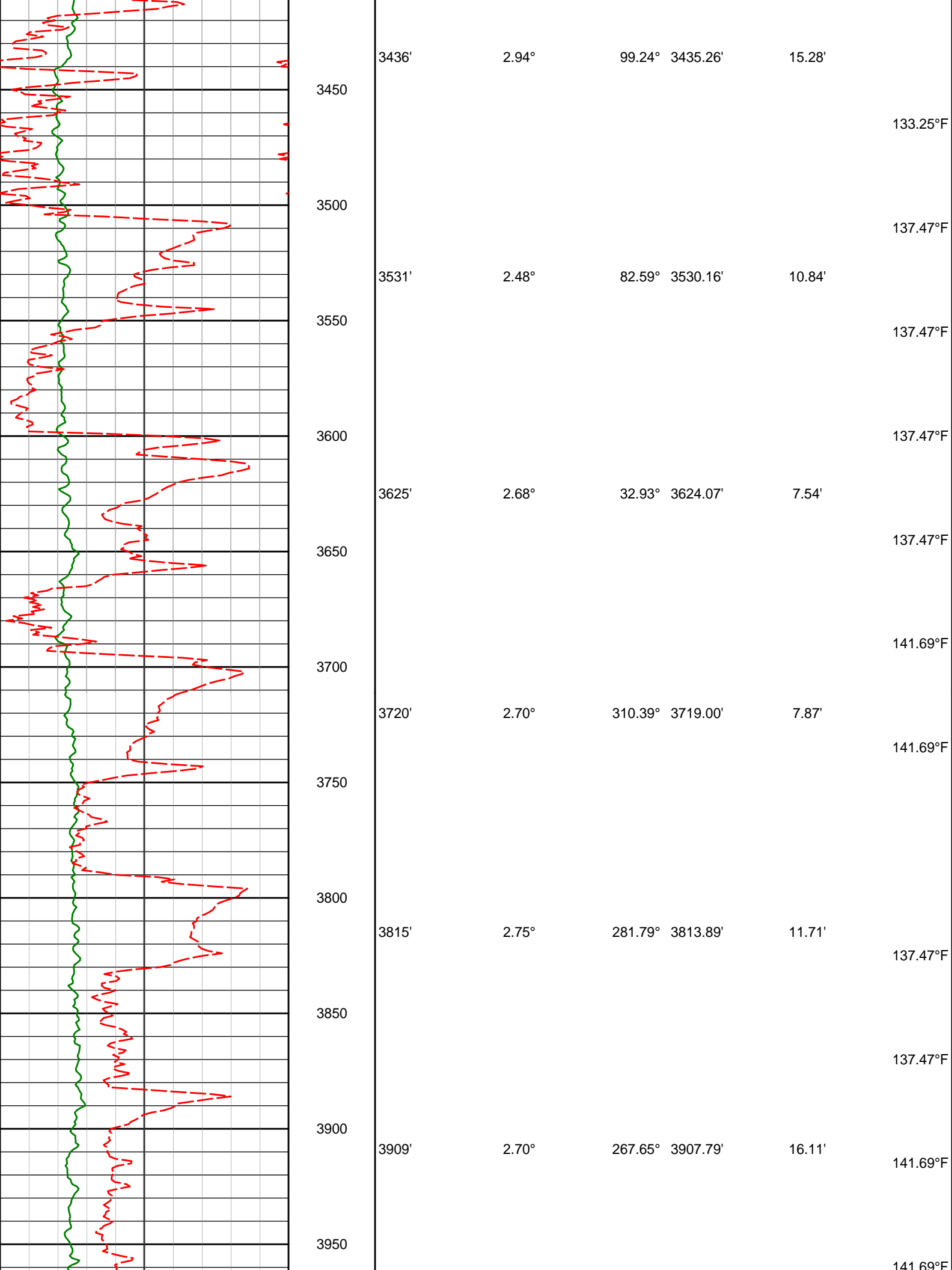


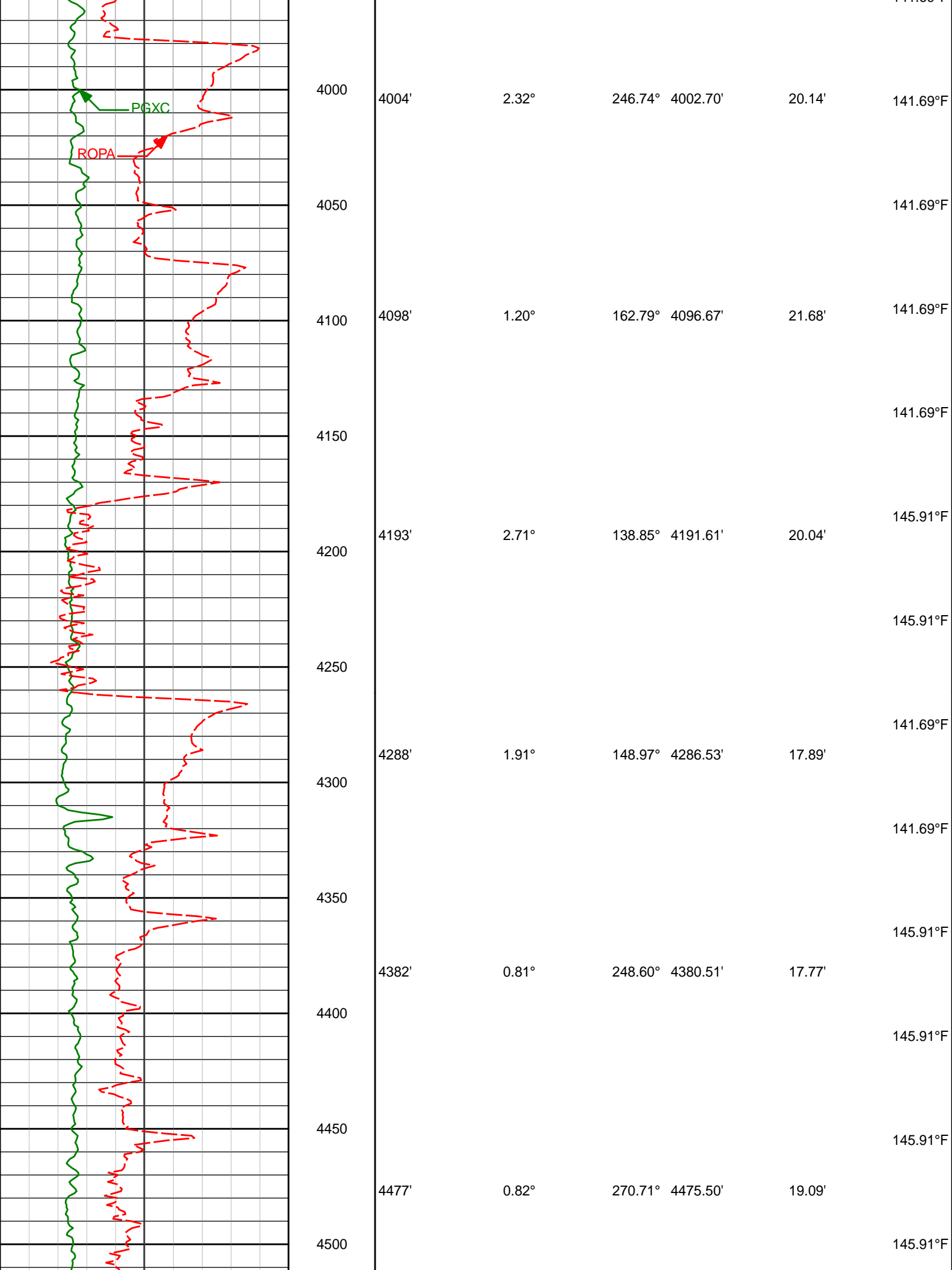
2350
2400
2450
2500
2550
2600
2650
2700
2750
2800
2850

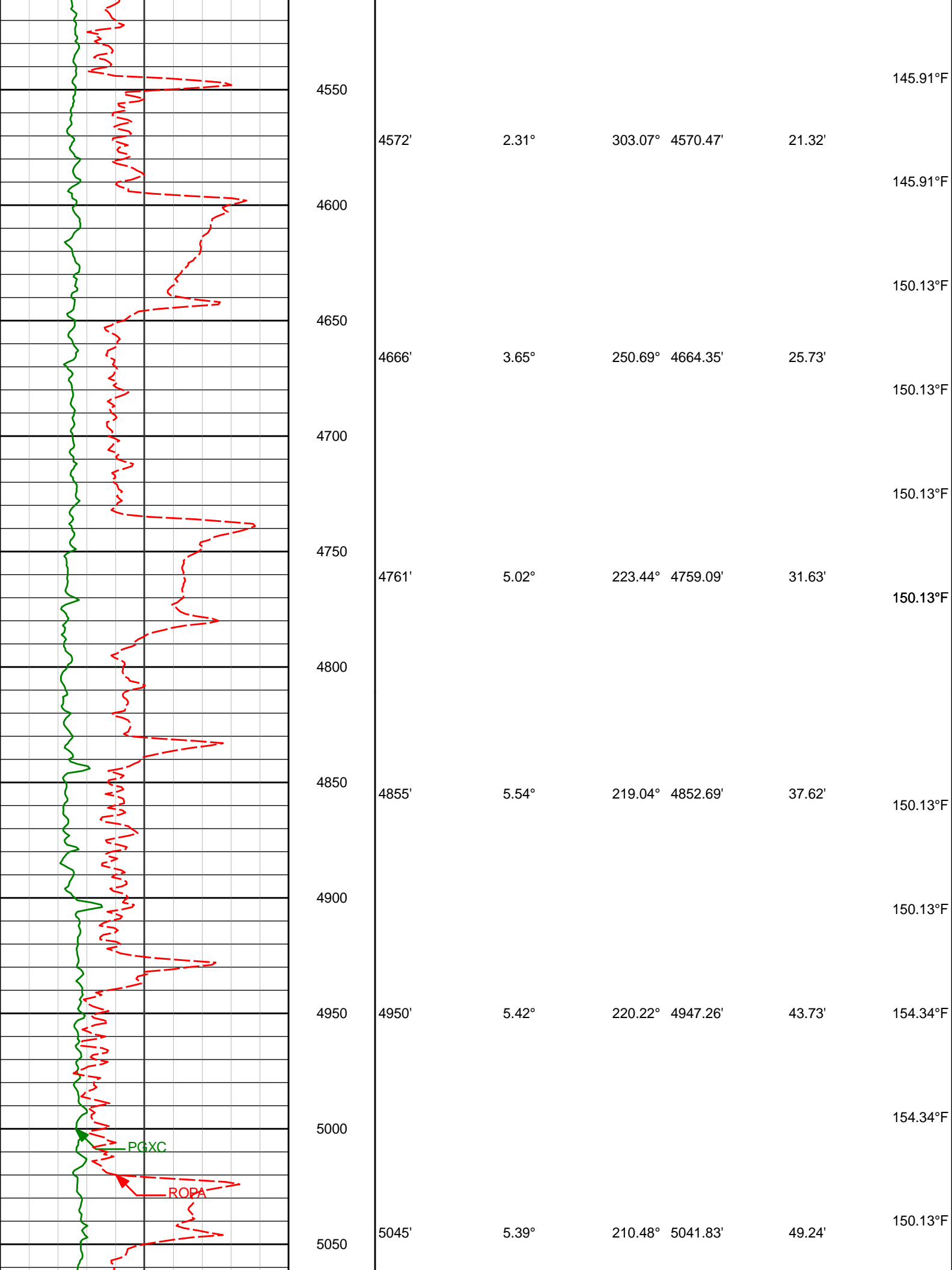
				116.38°F
				116.37°F
2398'	2.47°	268.31°	2397.55'	21.89'
				116.38°F
				116.38°F
2490'	1.19°	253.91°	2489.51'	24.79'
				116.38°F
				116.38°F
				116.38°F
				120.59°F
2680'	0.47°	196.85°	2679.49'	26.97'
				120.59°F
				120.59°F
2774'	0.25°	336.86°	2773.49'	27.18'
				120.59°F
				124.81°F

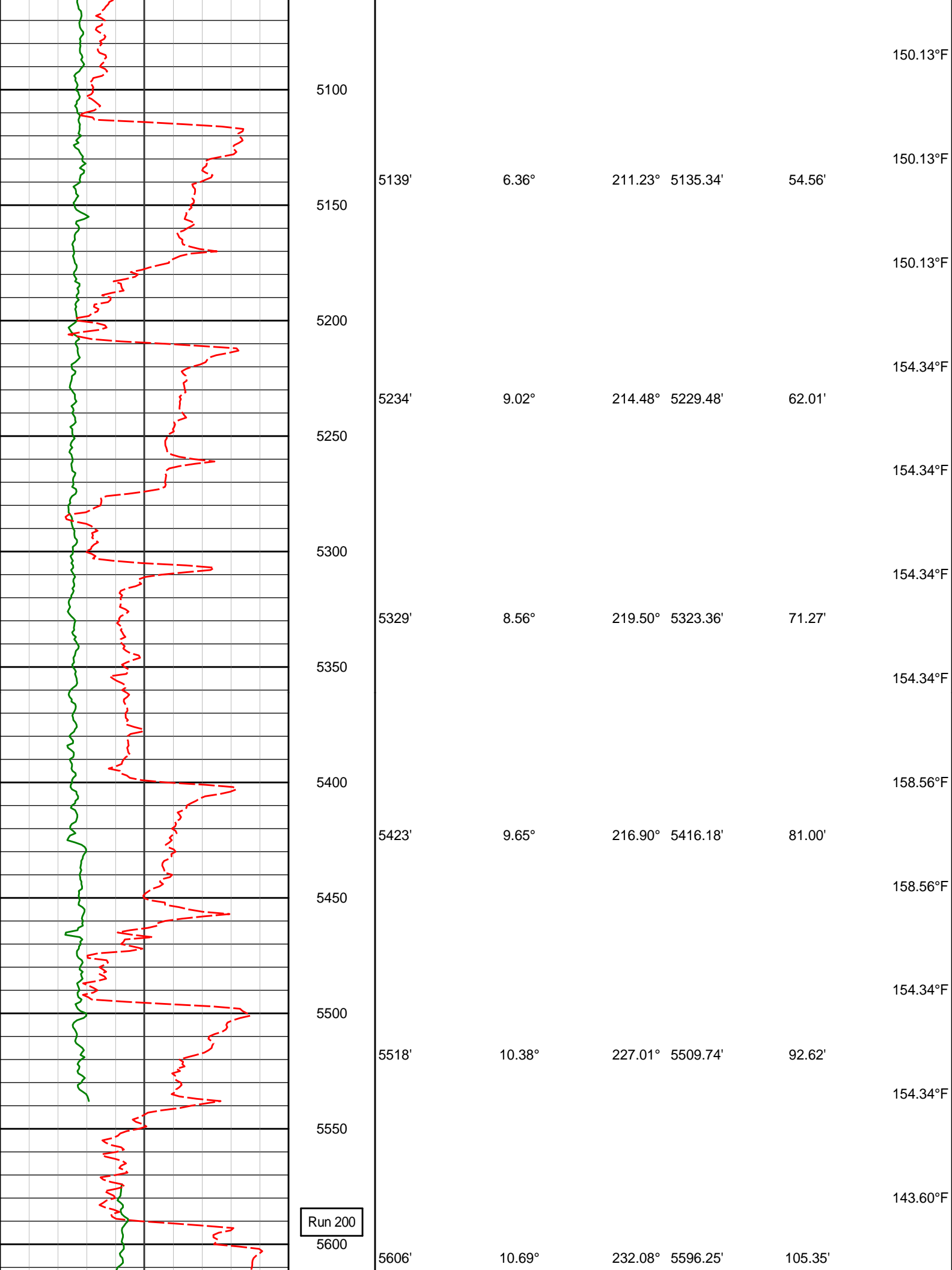


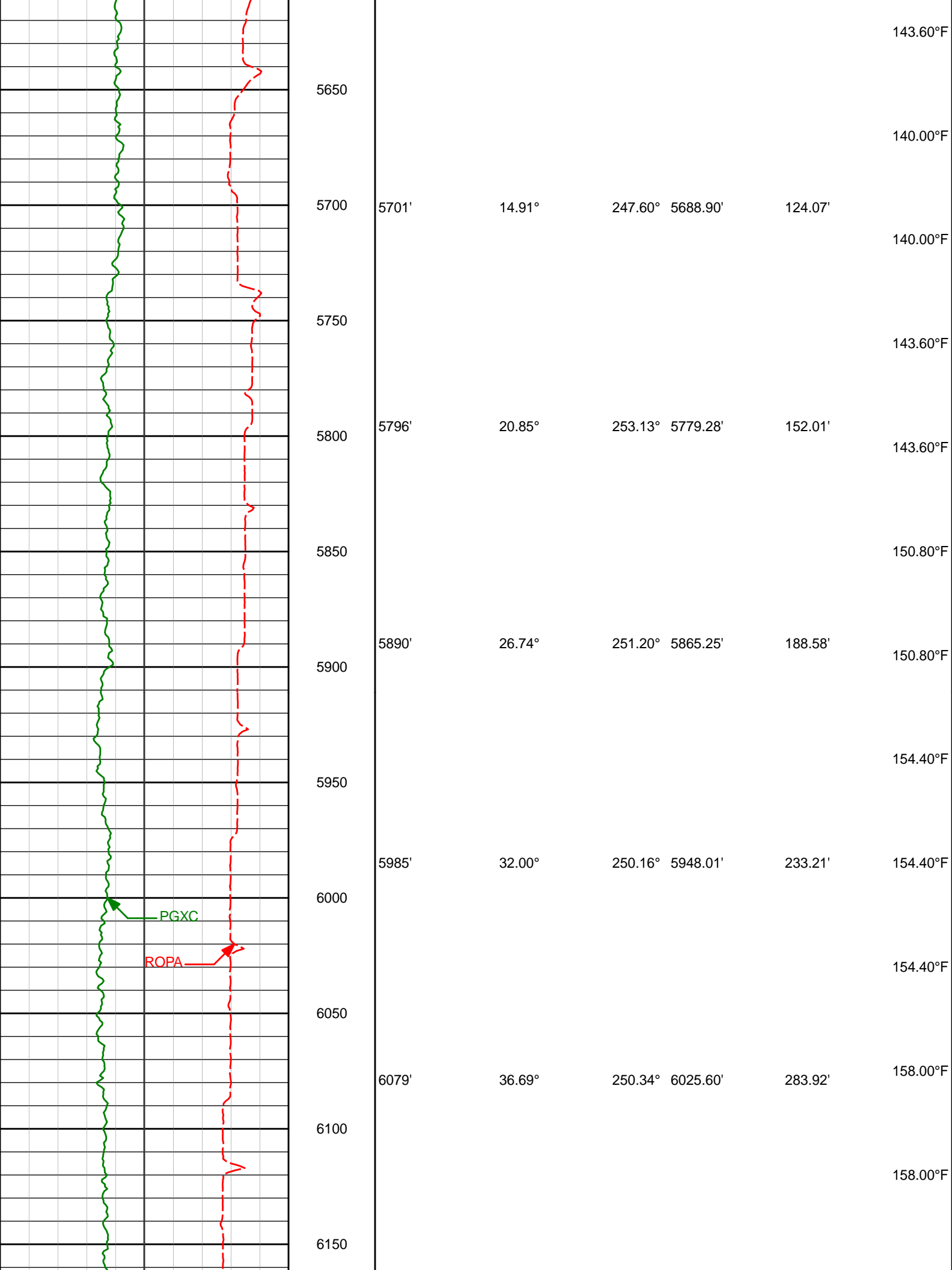
2868'	0.53°	10.03°	2867.48'	27.15'	124.81°F	
2900						
2950						
2963'	0.20°	8.09°	2962.48'	27.02'	124.81°F	
3000					124.81°F	
3050						
3058'	0.93°	101.98°	3057.48'	26.25'	129.03°F	
3100					129.03°F	
3150	3152'	1.94°	136.52°	3151.45'	24.47'	129.03°F
3200					129.03°F	
3250	3247'	1.49°	110.47°	3246.41'	22.29'	129.03°F
3300					129.03°F	
3350						
3400						

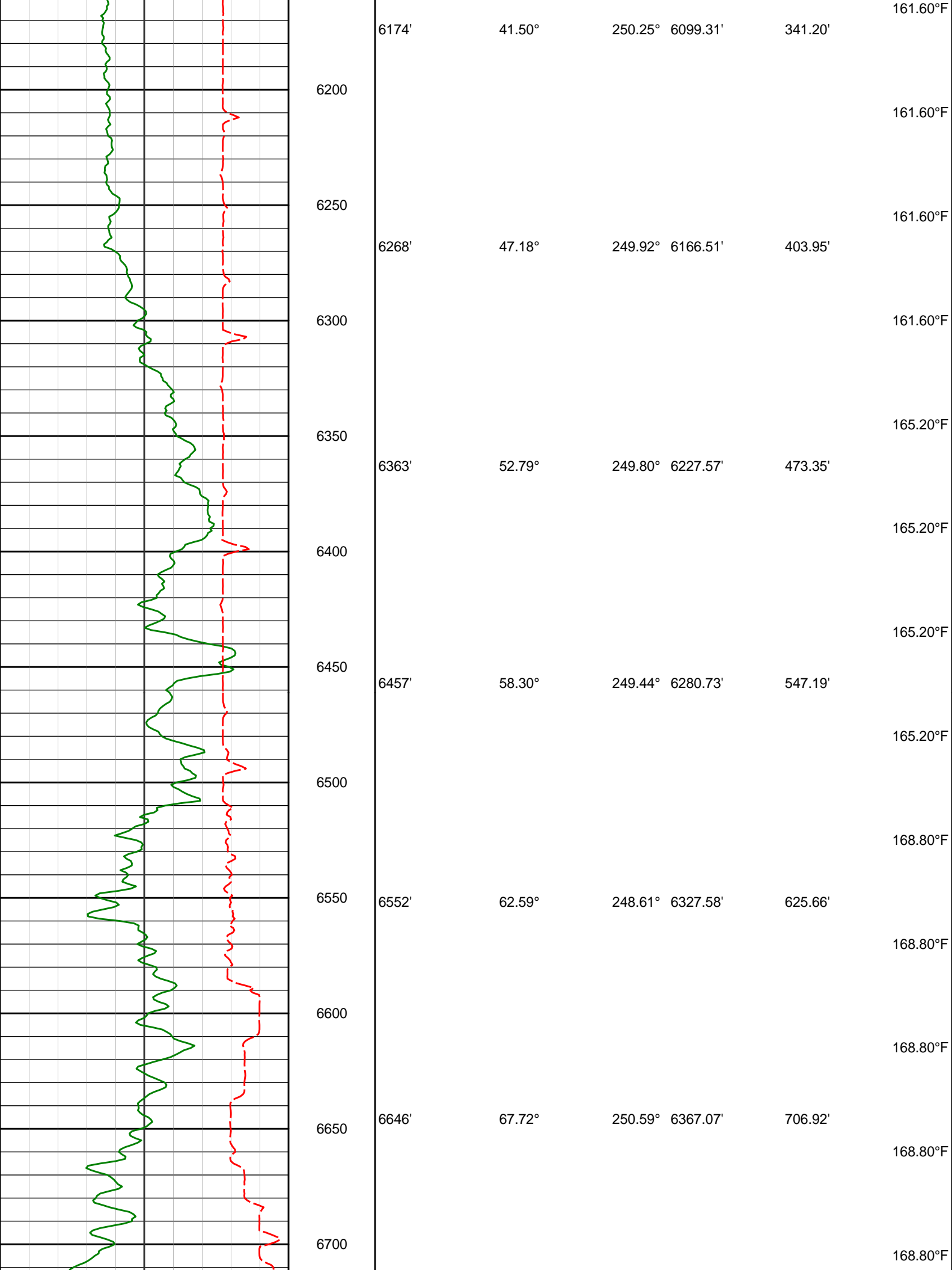


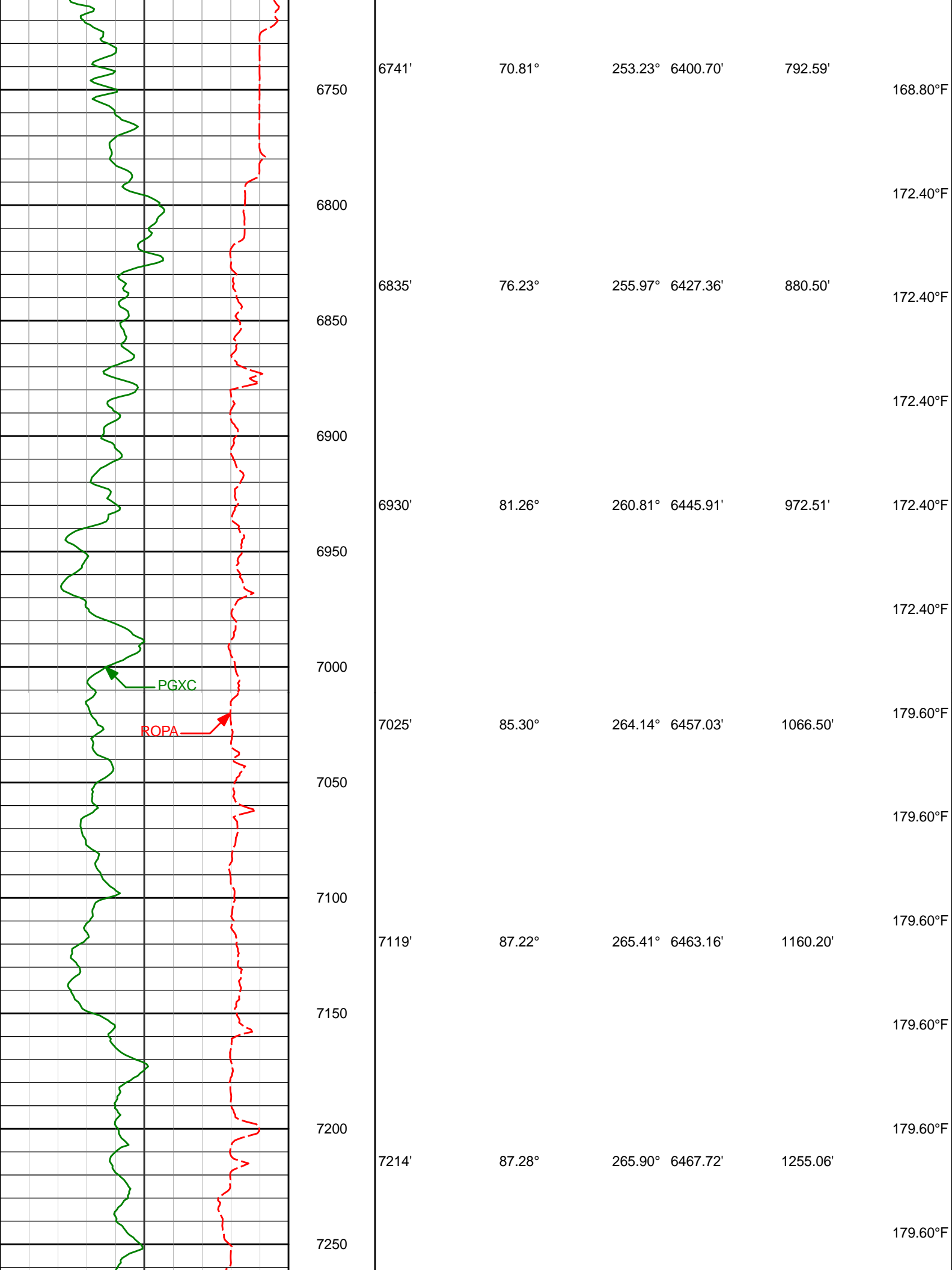


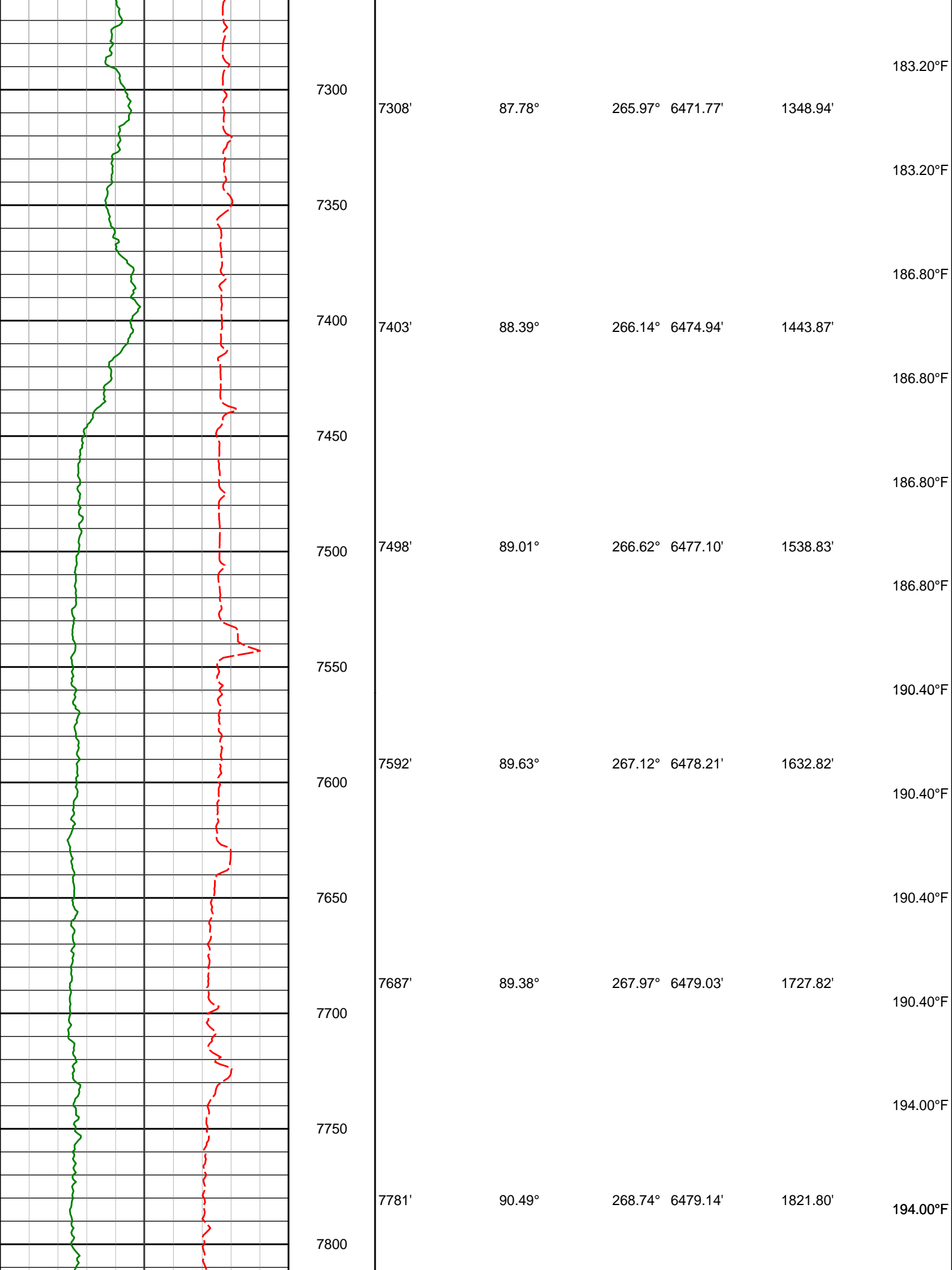


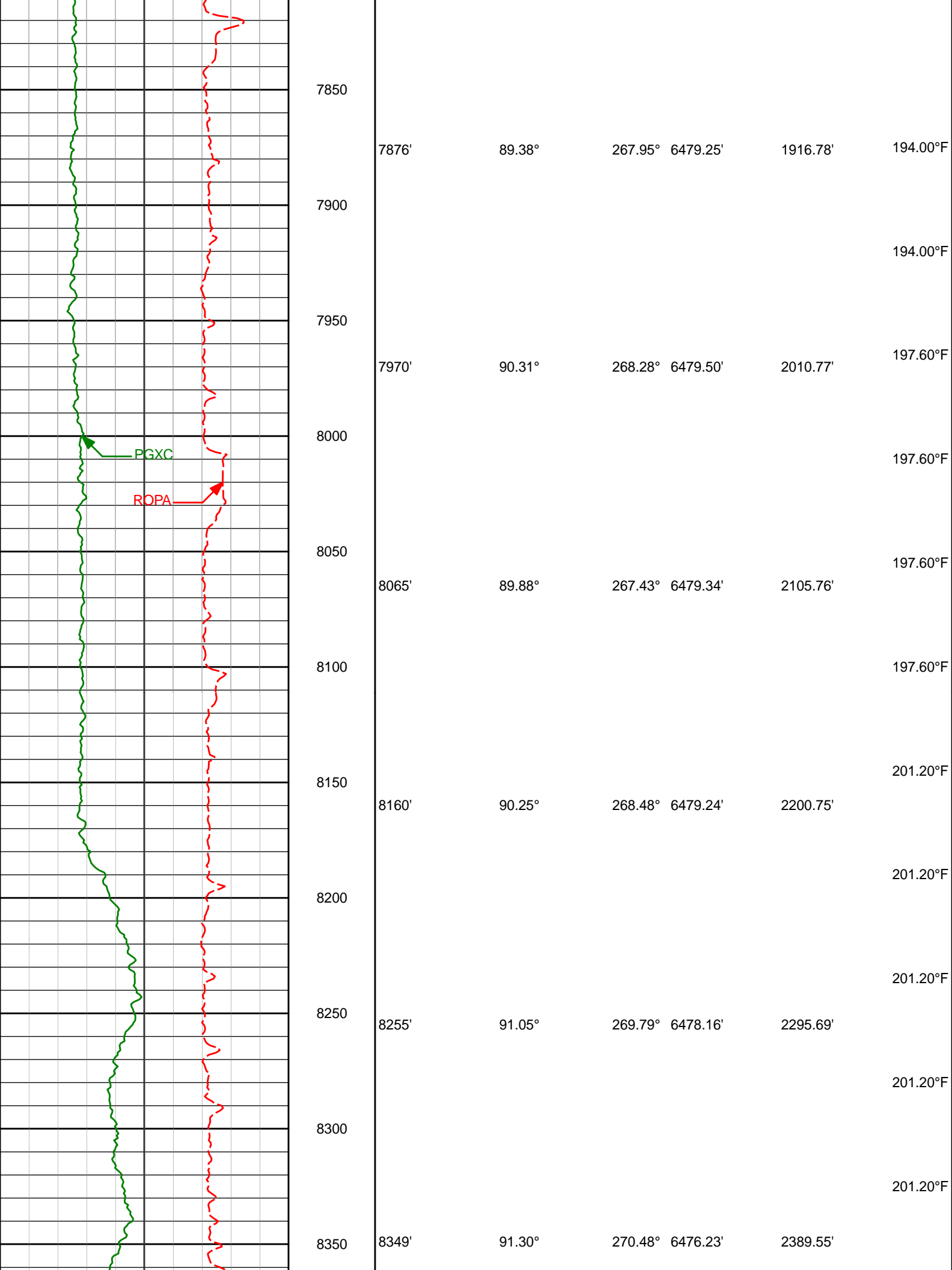


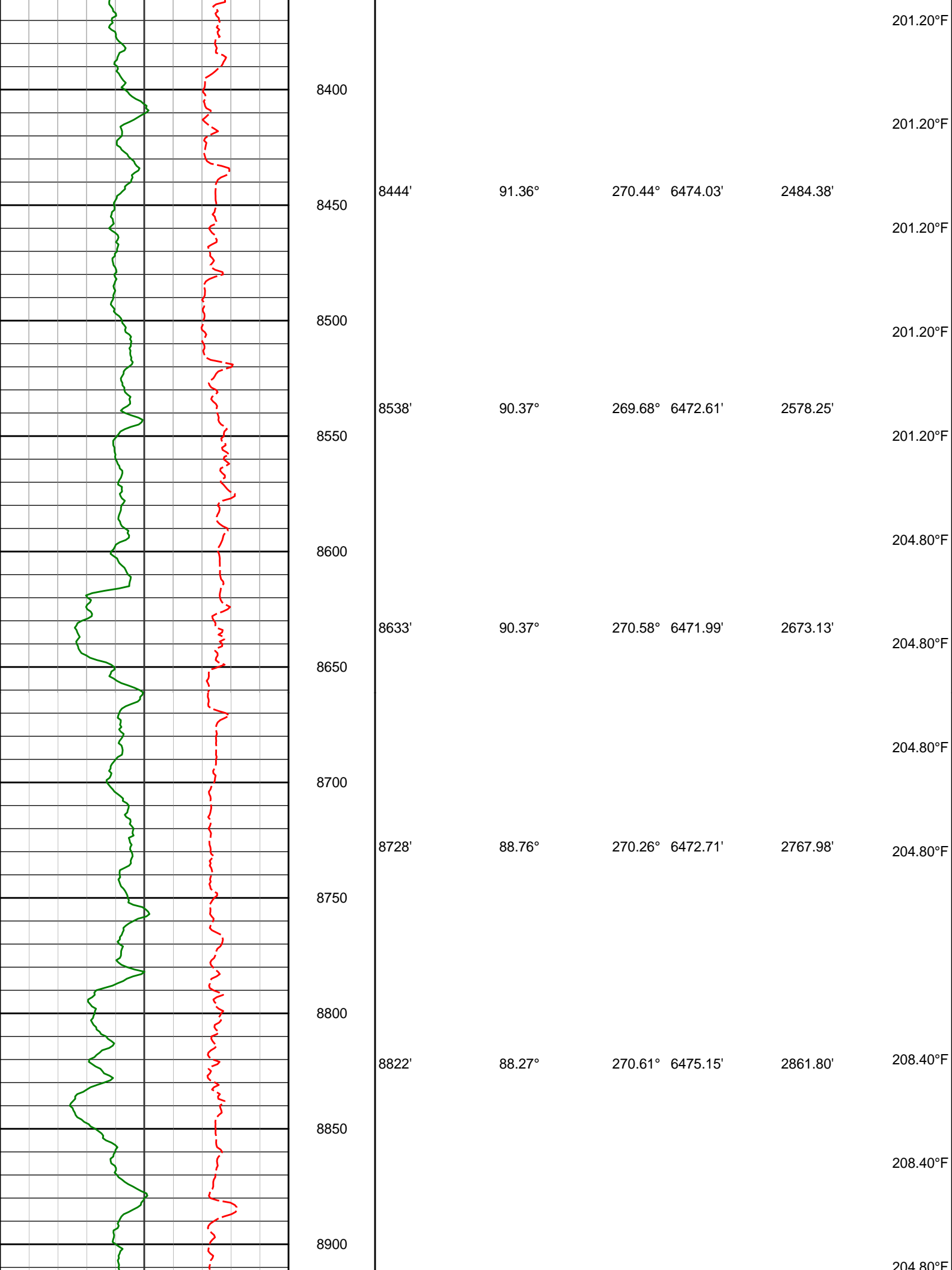


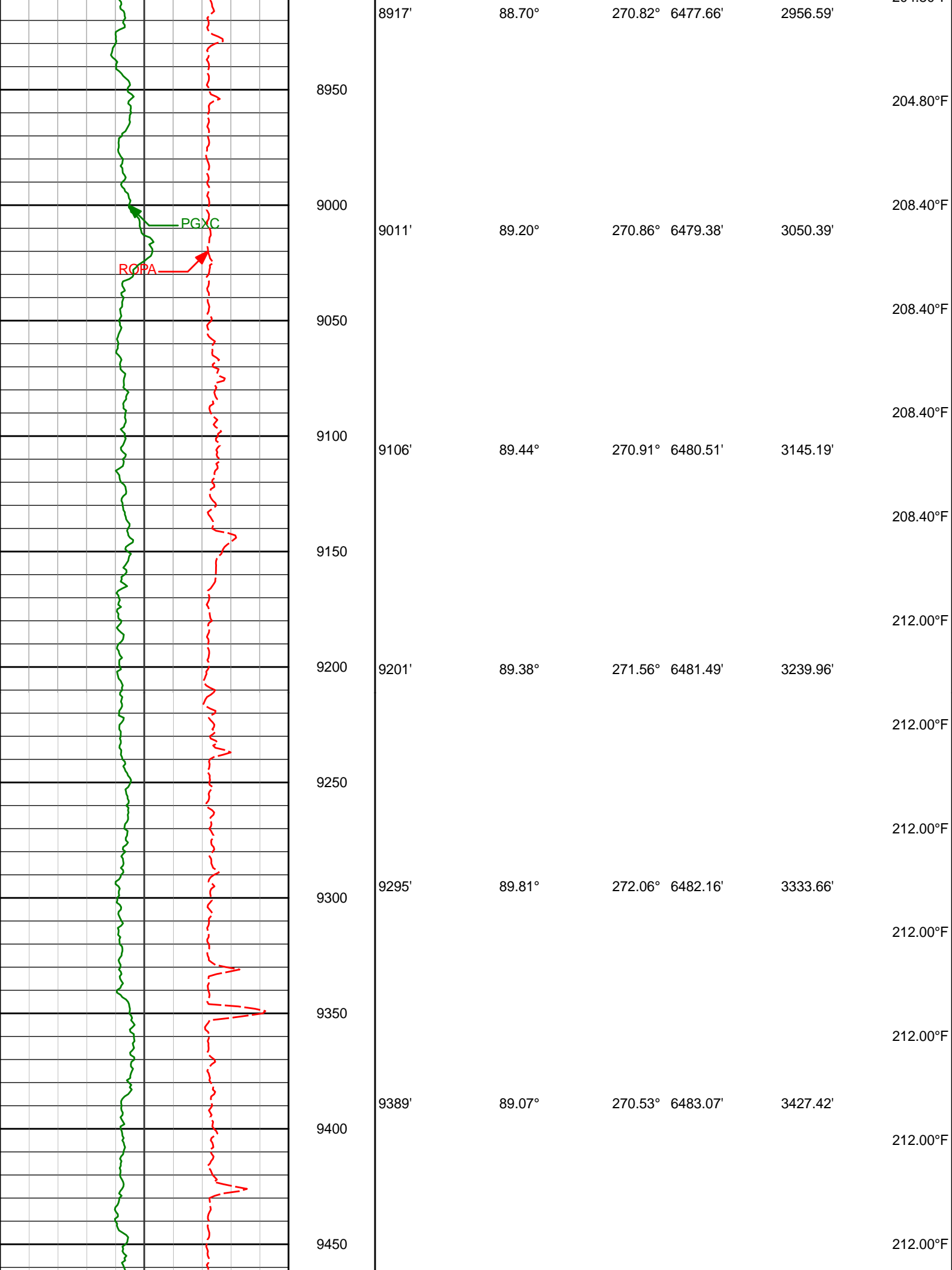


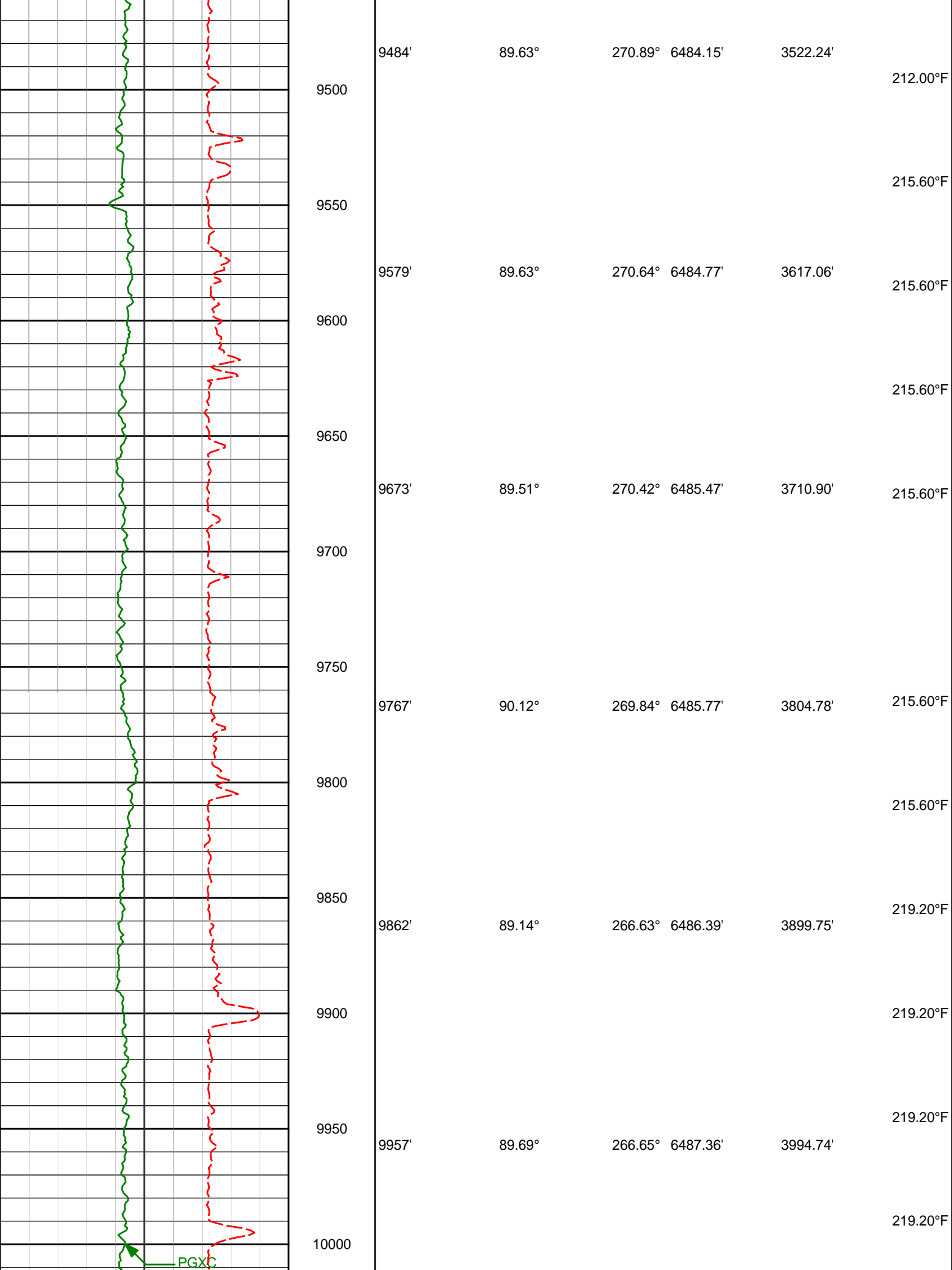


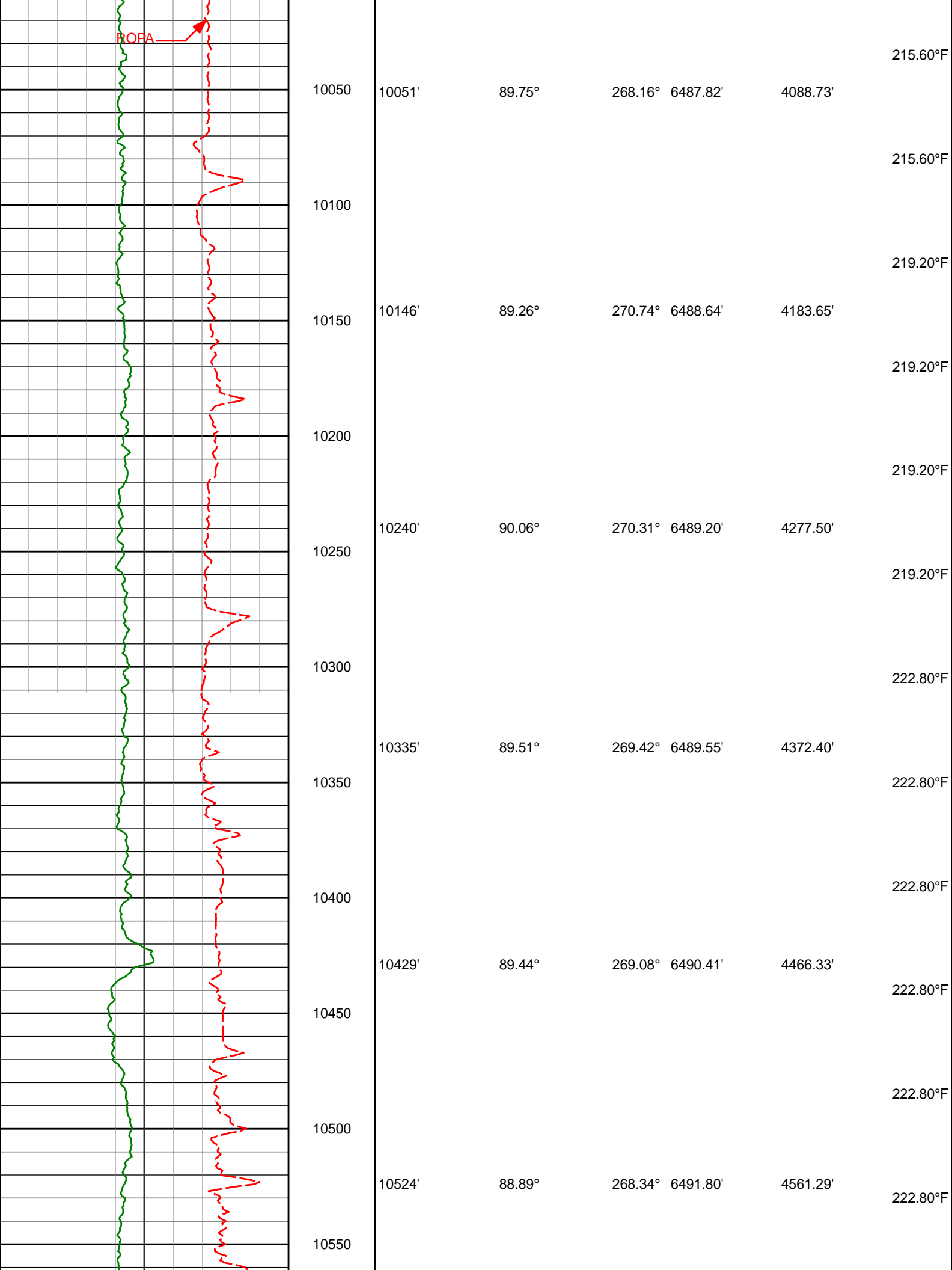


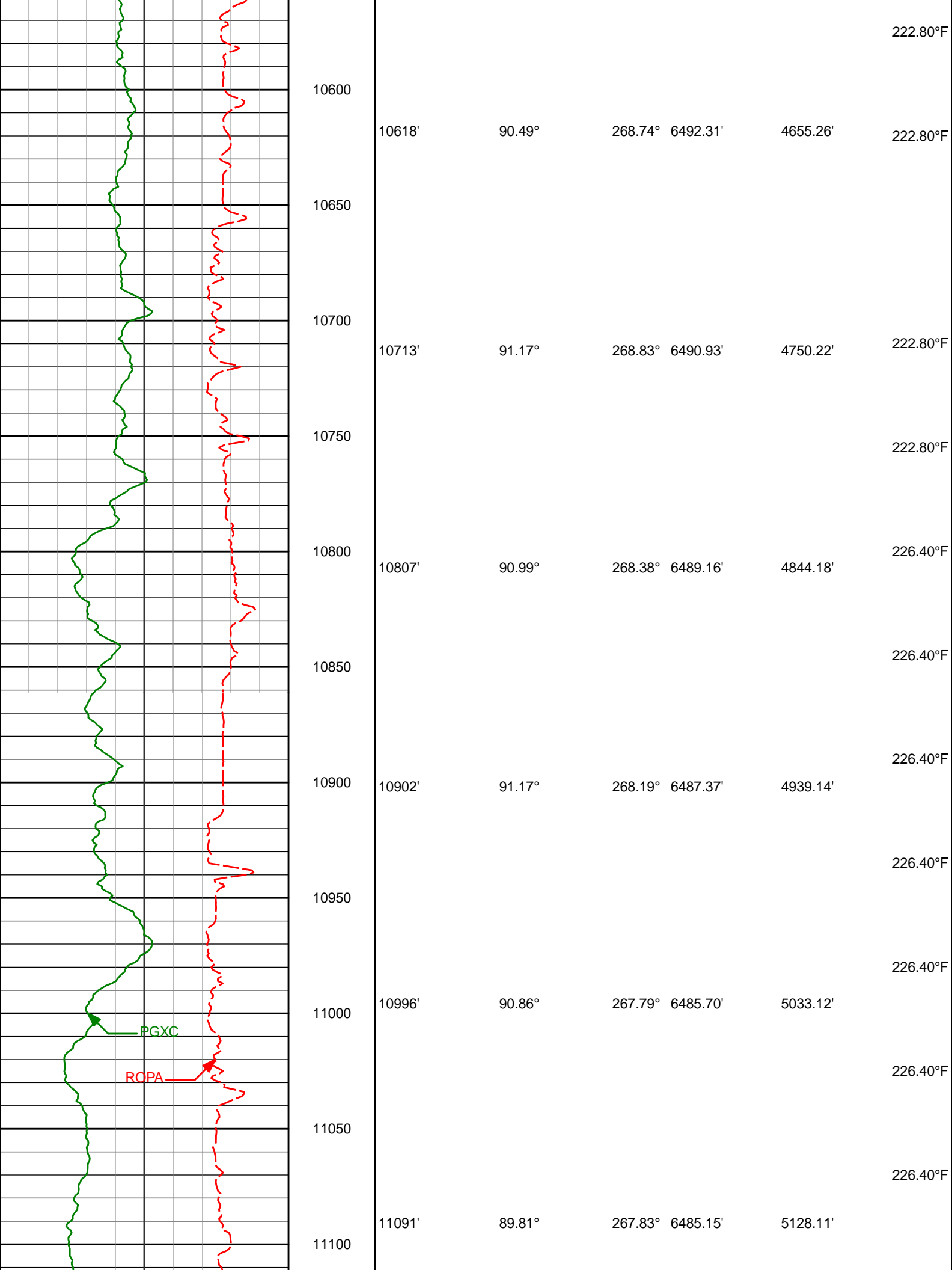


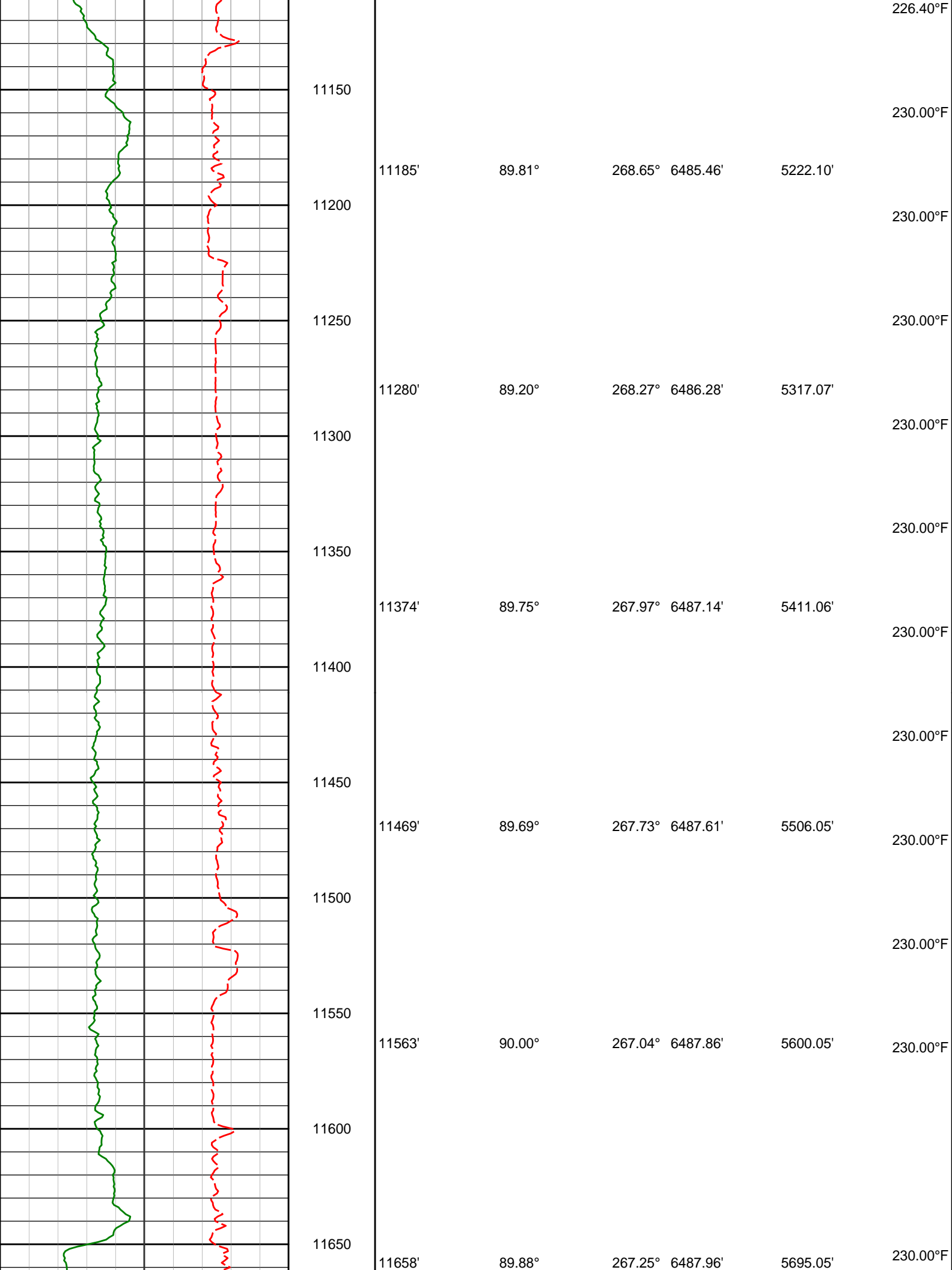


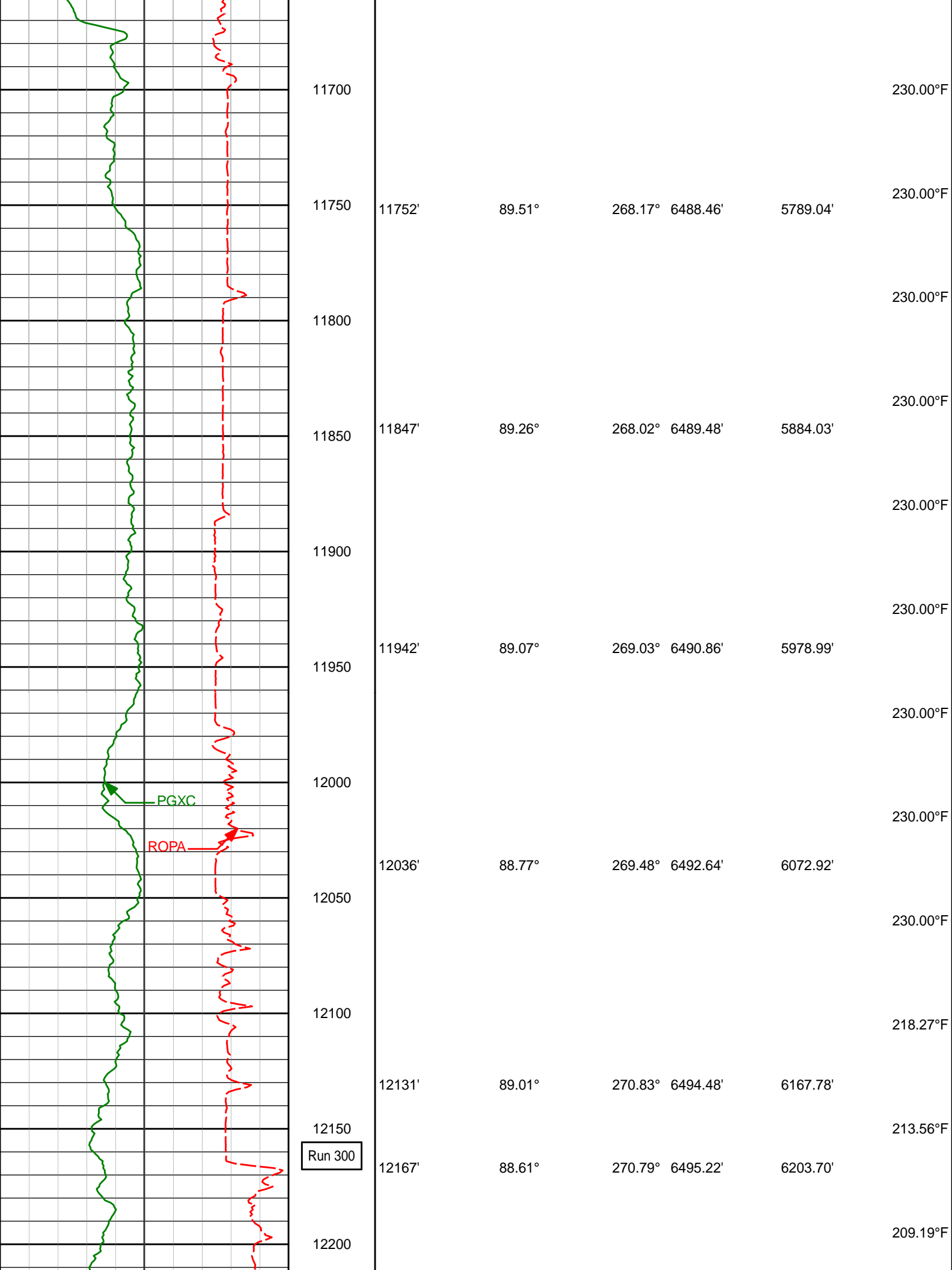


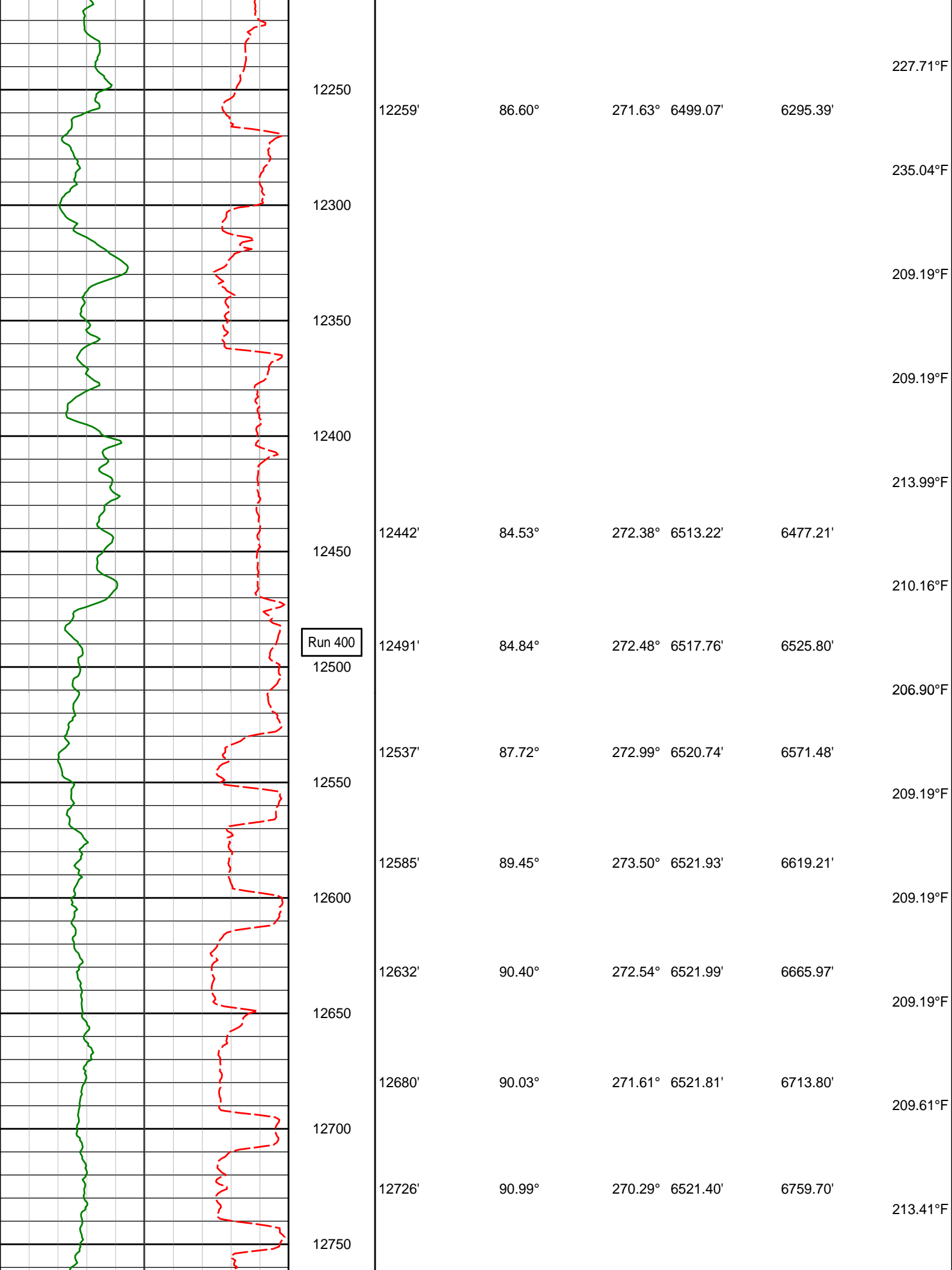


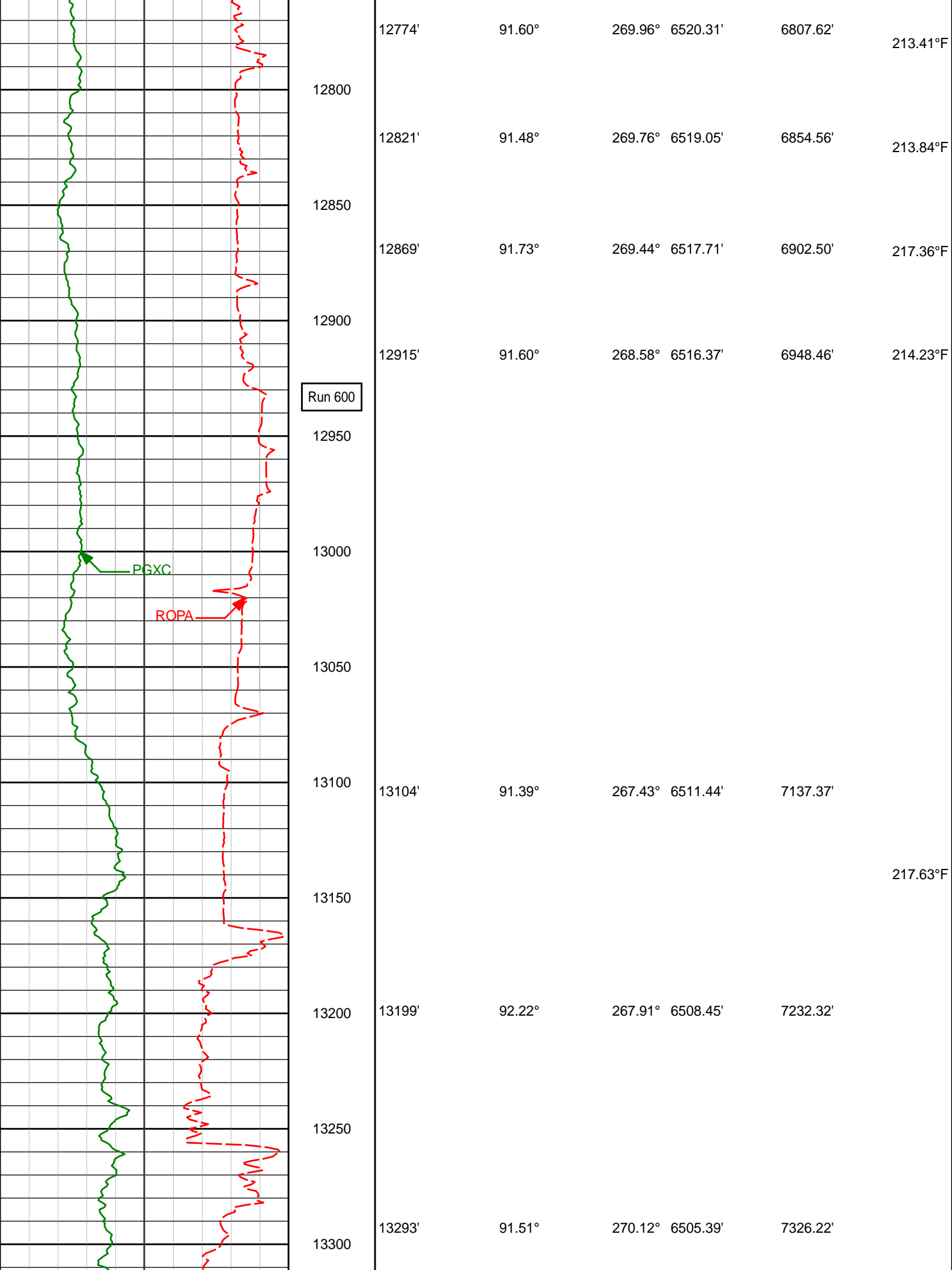


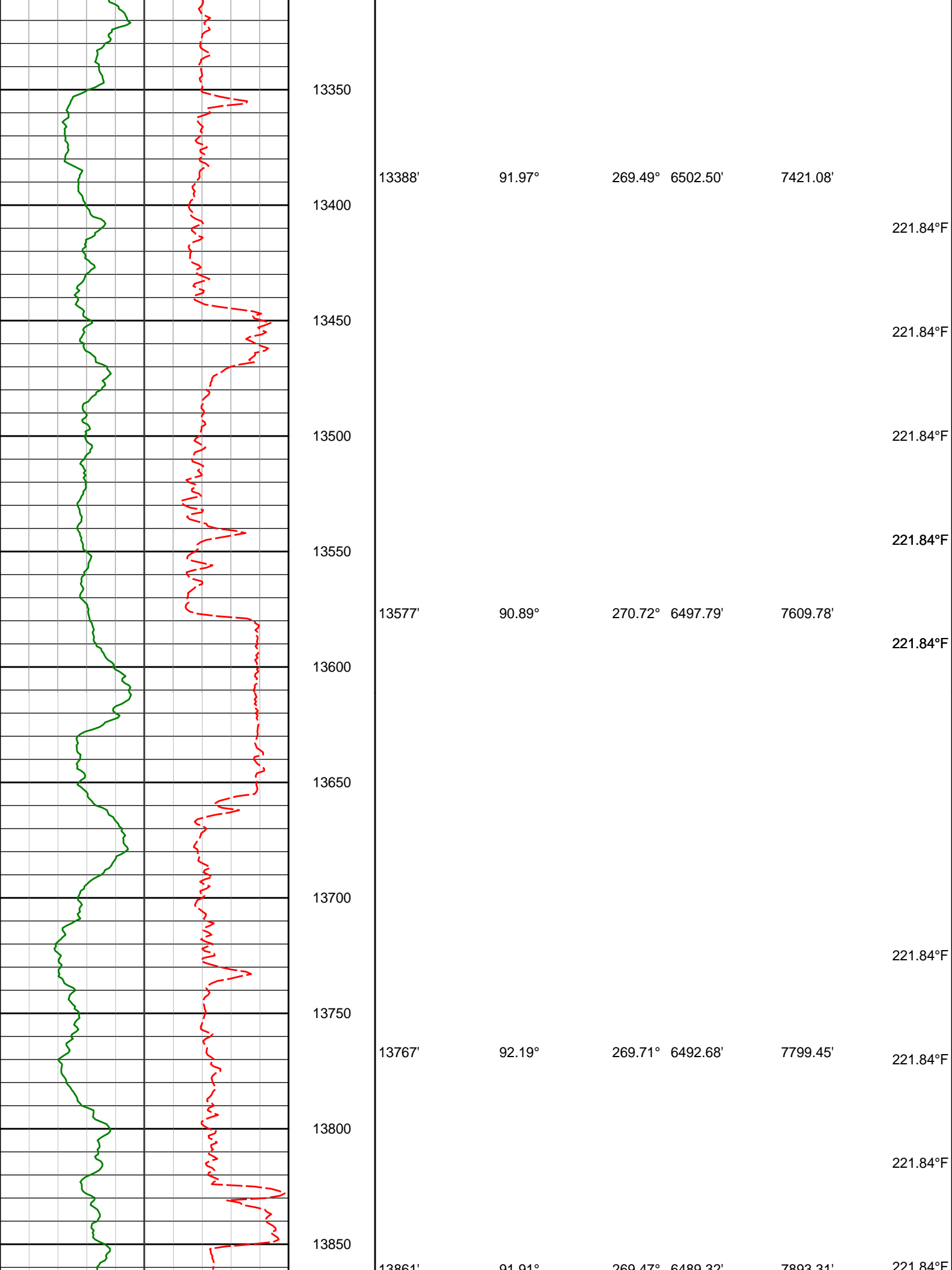


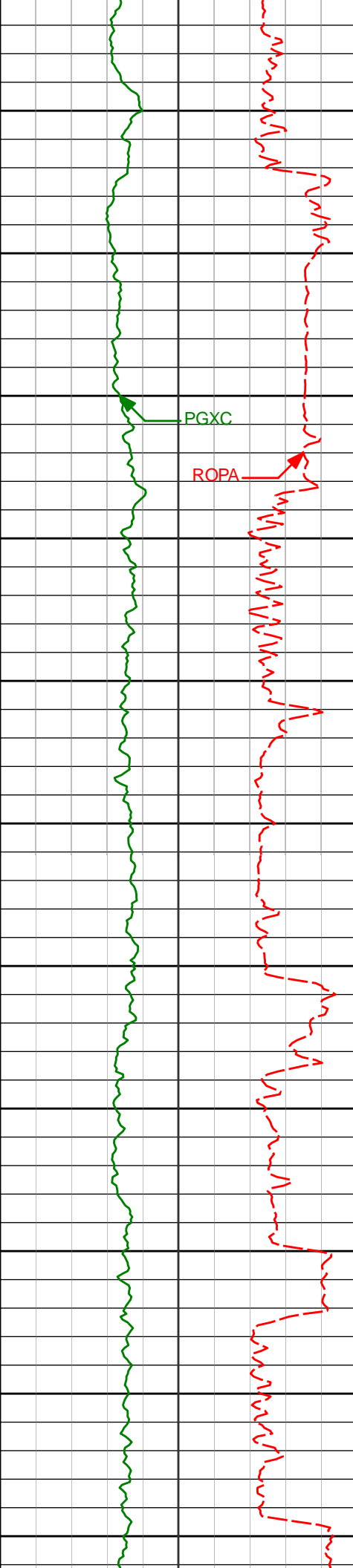




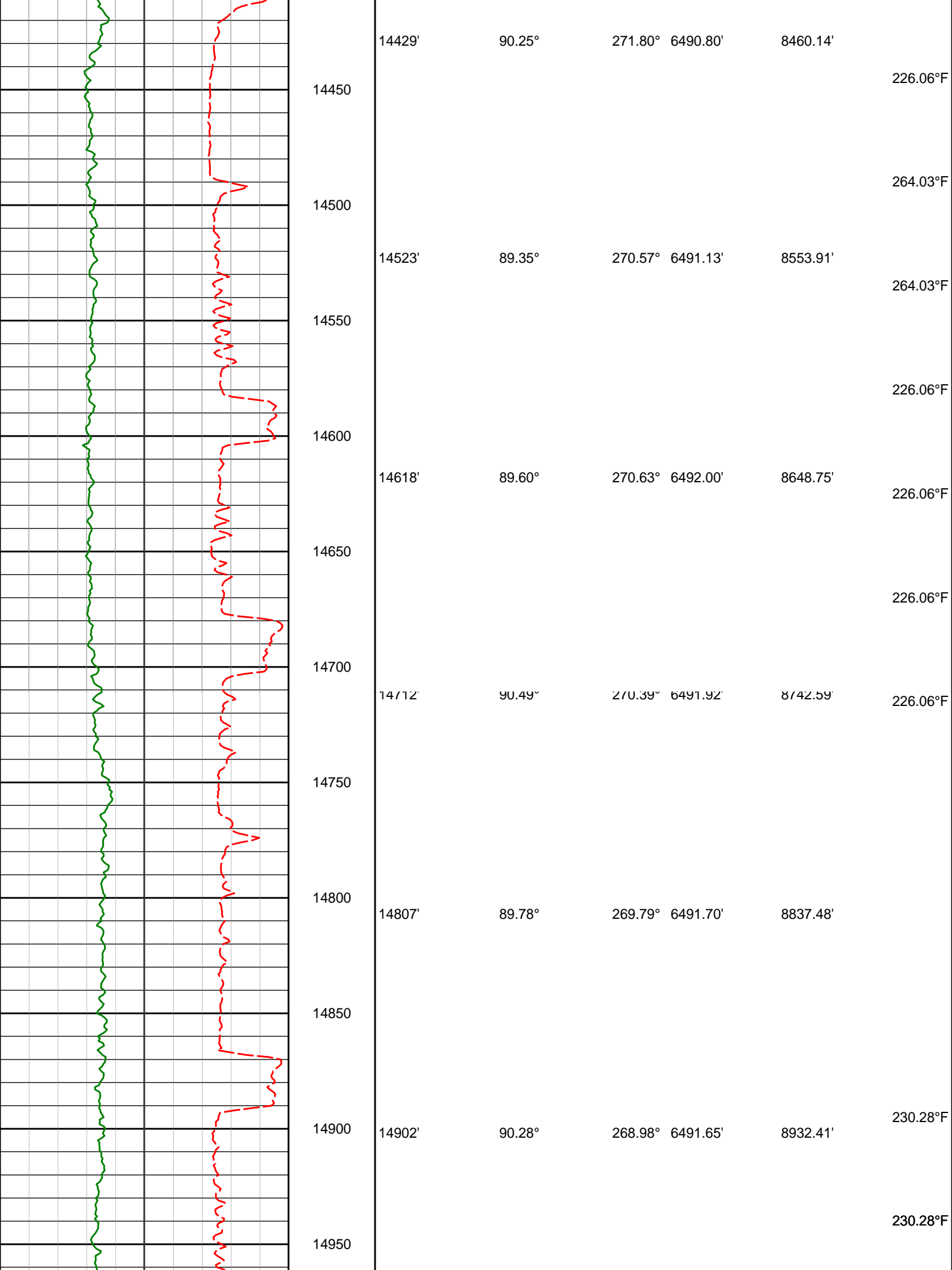


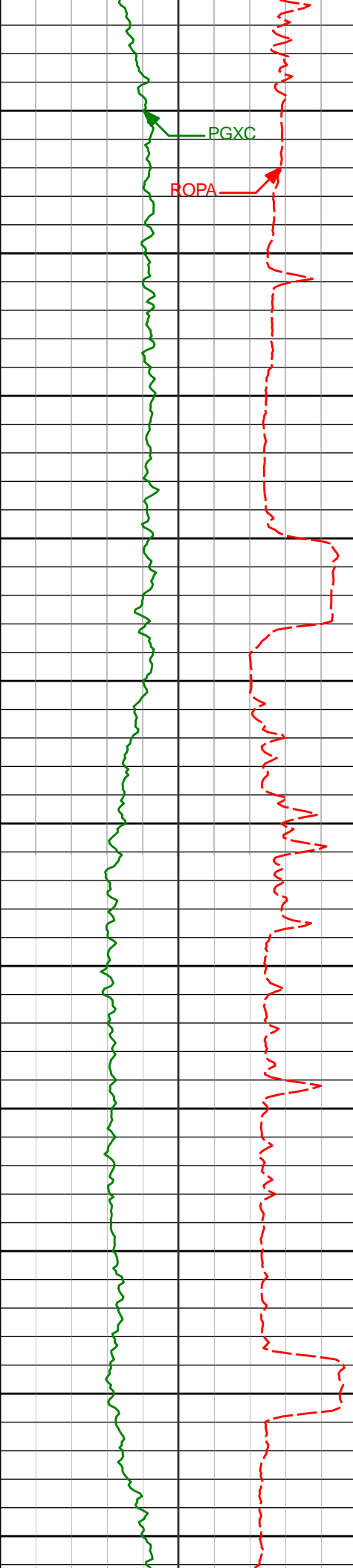






13900						221.84°F
13950	13956'	90.52°	270.15°	6487.30'	7988.19'	207.22°F
14000						124.81°F
14050	14050'	90.46°	269.92°	6486.50'	8082.08'	221.84°F
14100						221.84°F
14150	14145'	89.01°	268.64°	6486.94'	8177.02'	221.84°F
14200						221.84°F
14250	14239'	88.40°	271.85°	6489.06'	8270.85'	221.84°F
14300						
14350	14334'	89.63°	272.47°	6490.70'	8365.49'	
14400						226.06°F





15000
15050
15100
15150
15200
15250
15300
15350
15400
15450
15500

14996'
15091'
15186'
15280'
15375'
15469'

90.31°
89.20°
91.02°
89.91°
89.51°
90.96°

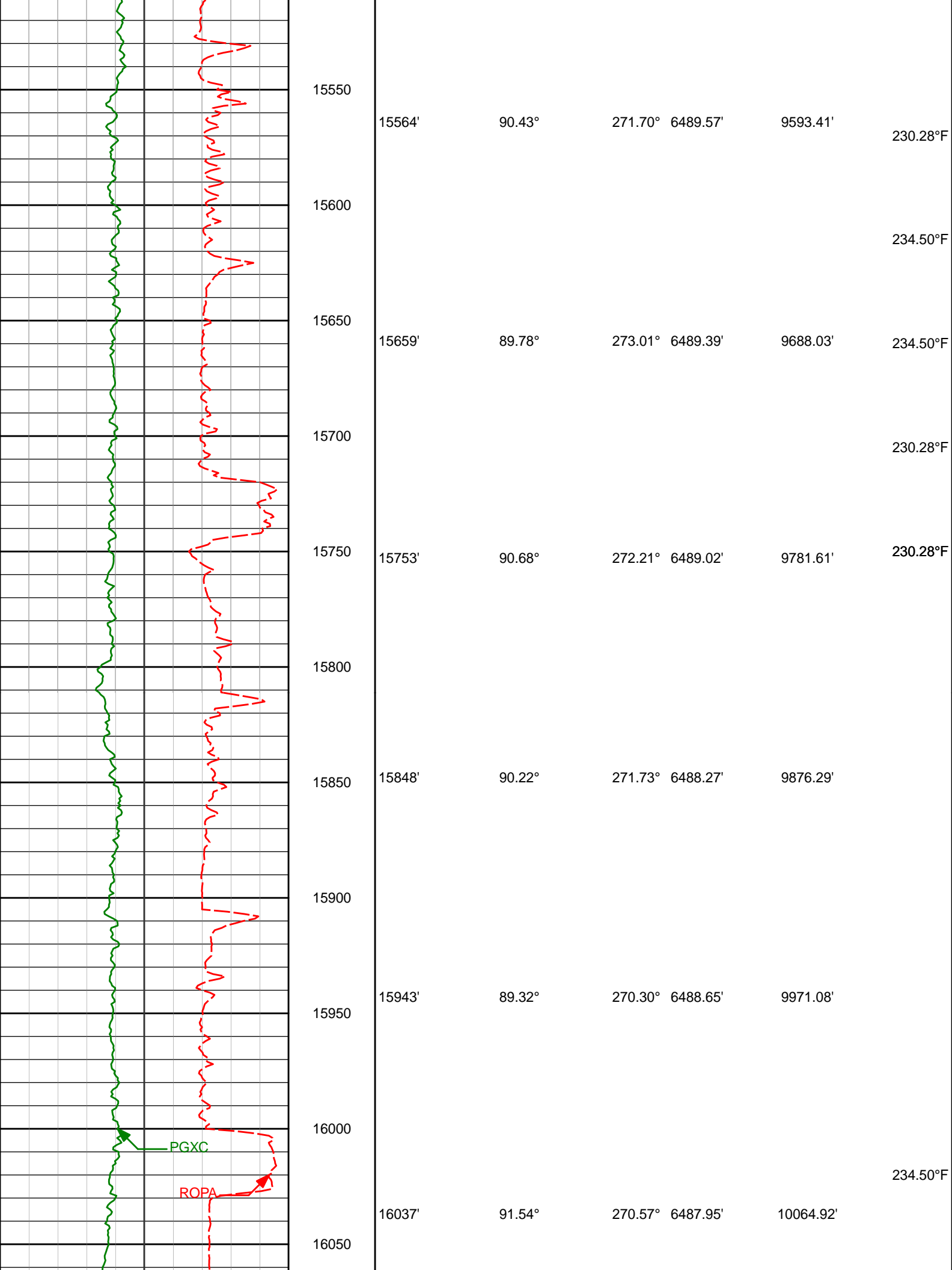
269.13° 6491.16'
267.85° 6491.57'
270.84° 6491.39'
269.88° 6490.63'
270.73° 6491.11'
272.06° 6490.72'

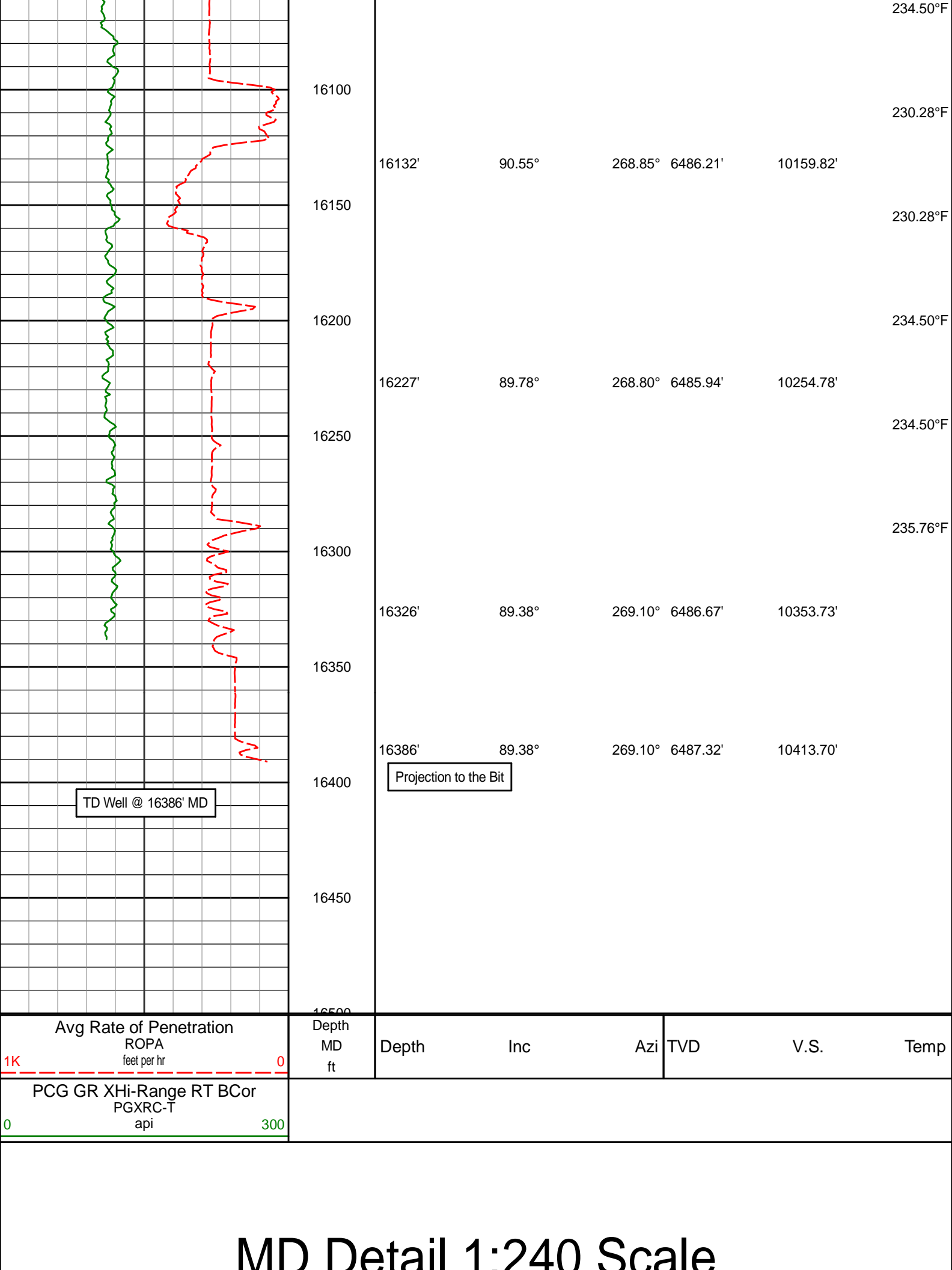
9026.36'
9121.33'
9216.26'
9310.11'
9404.98'
9498.72'

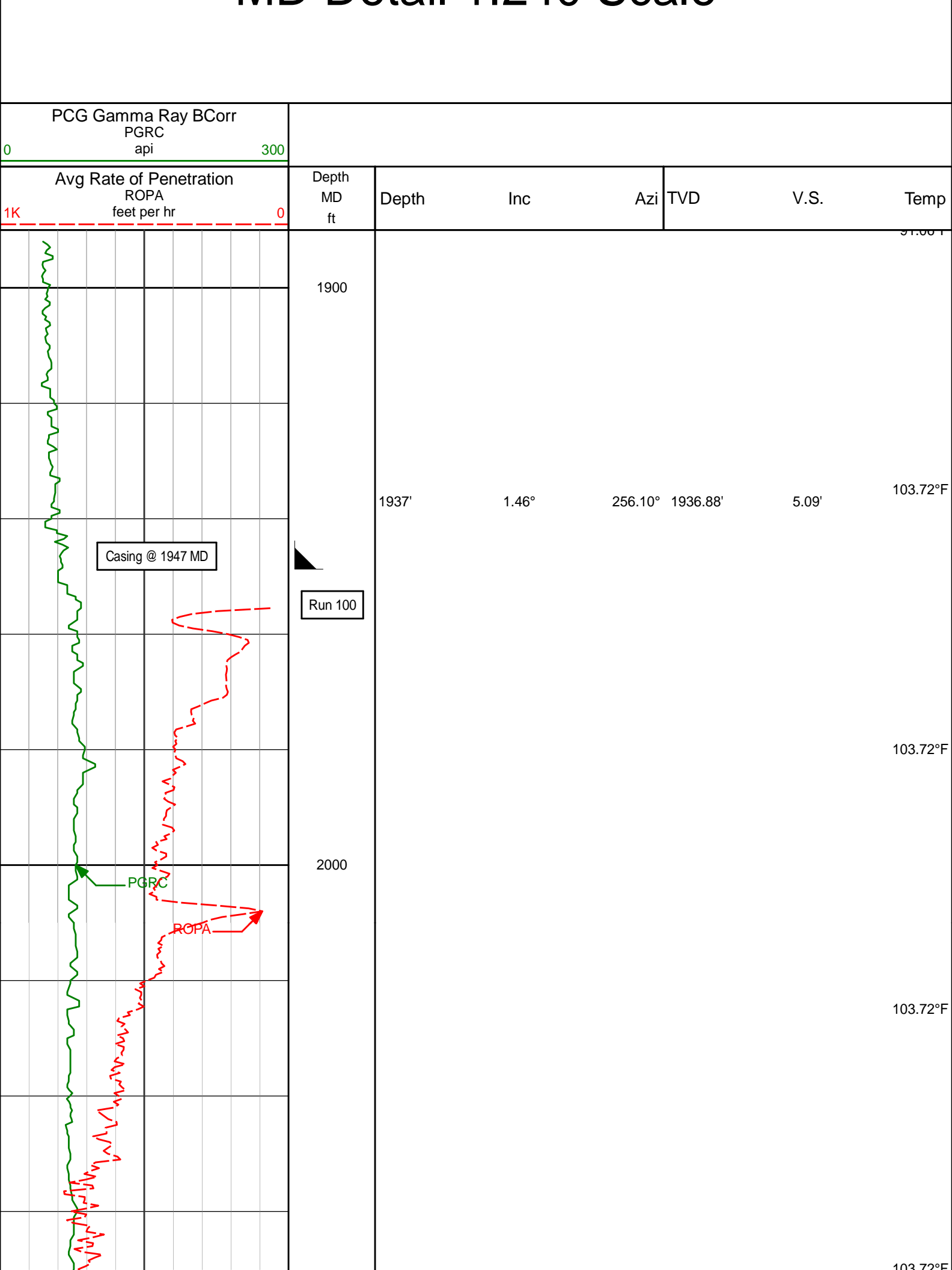
230.28°F

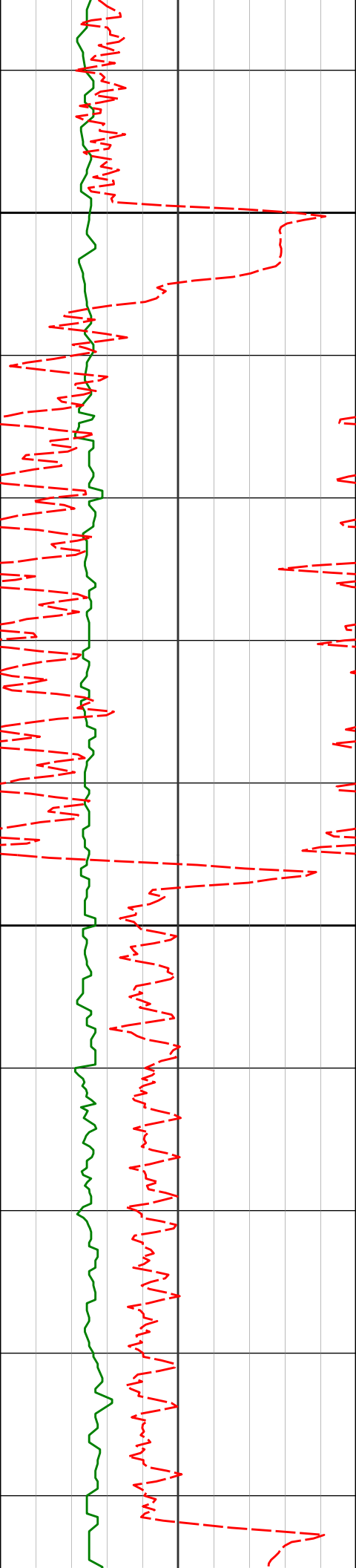
230.28°F

230.28°F









2100

2200

2216'

2.69°

252.81° 2215.69'

14.92'

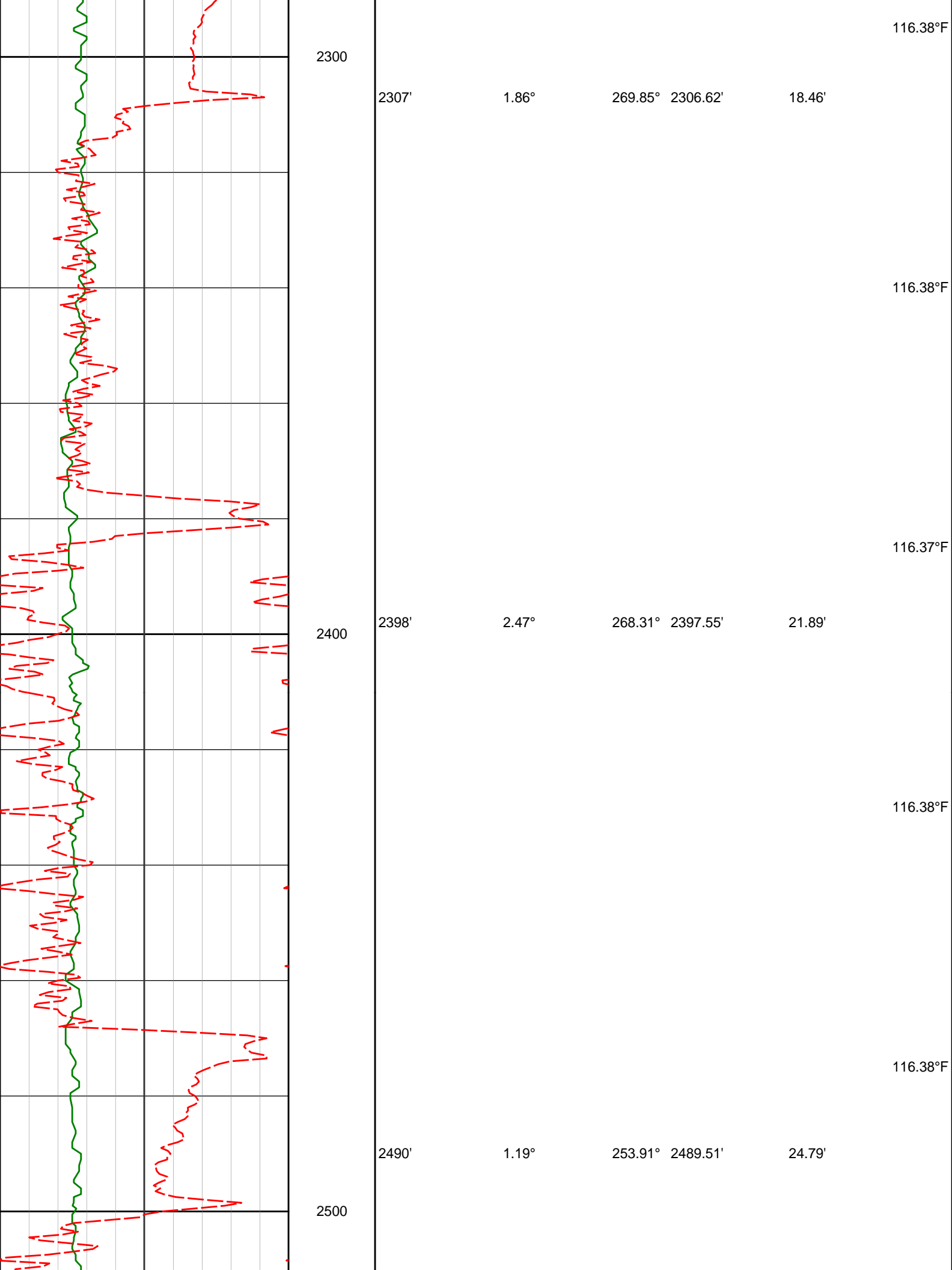
103.72°

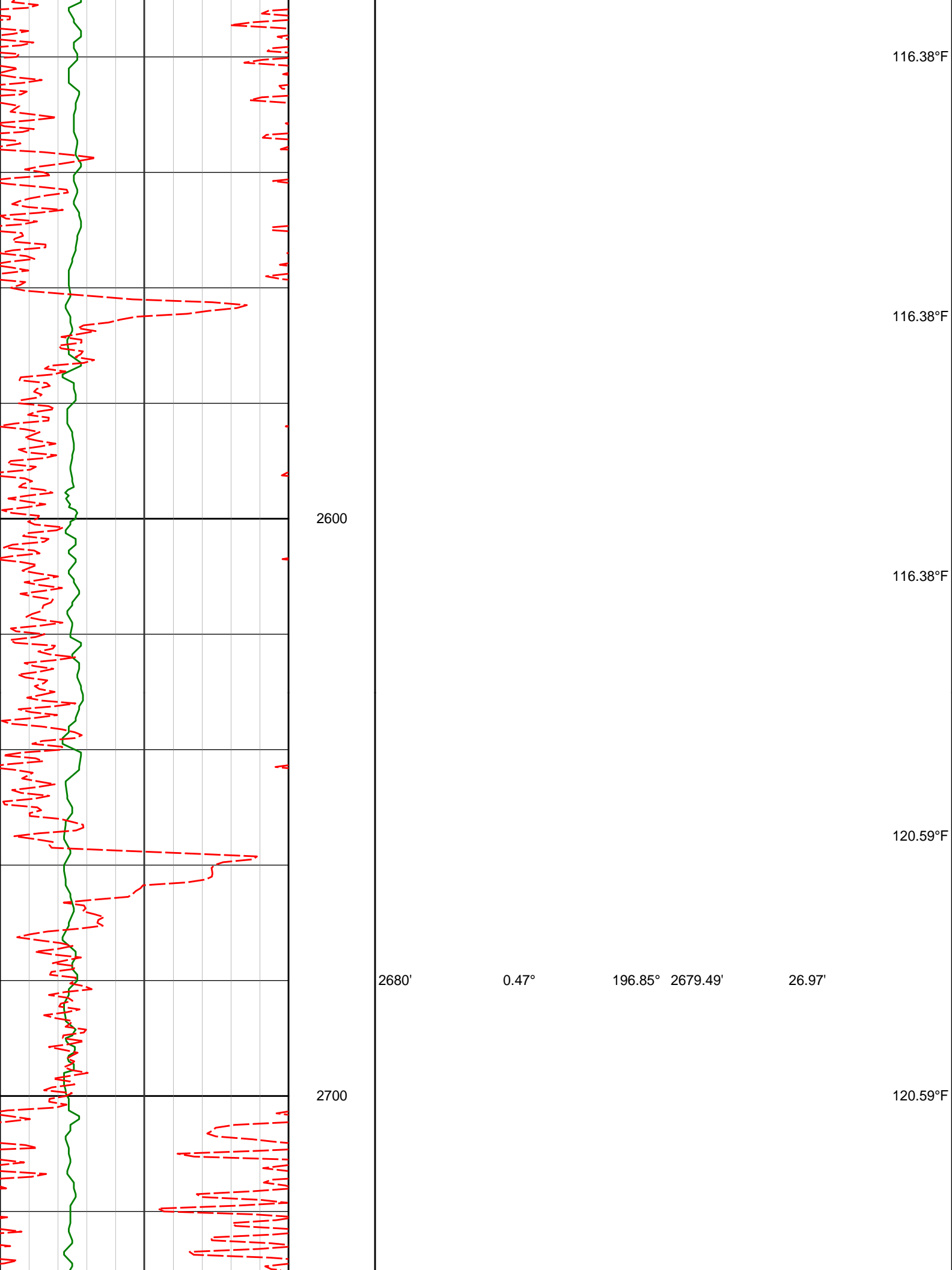
107.94°F

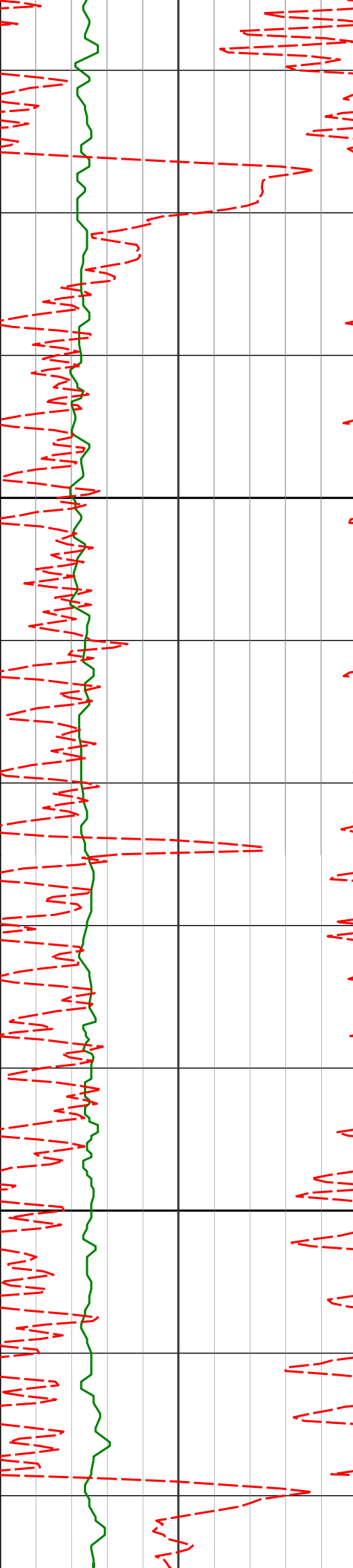
107.94°F

112.16°F

112.16°F







2800

2900

2774'

0.25°

336.86° 2773.49'

27.18'

2868'

0.53°

10.03° 2867.48'

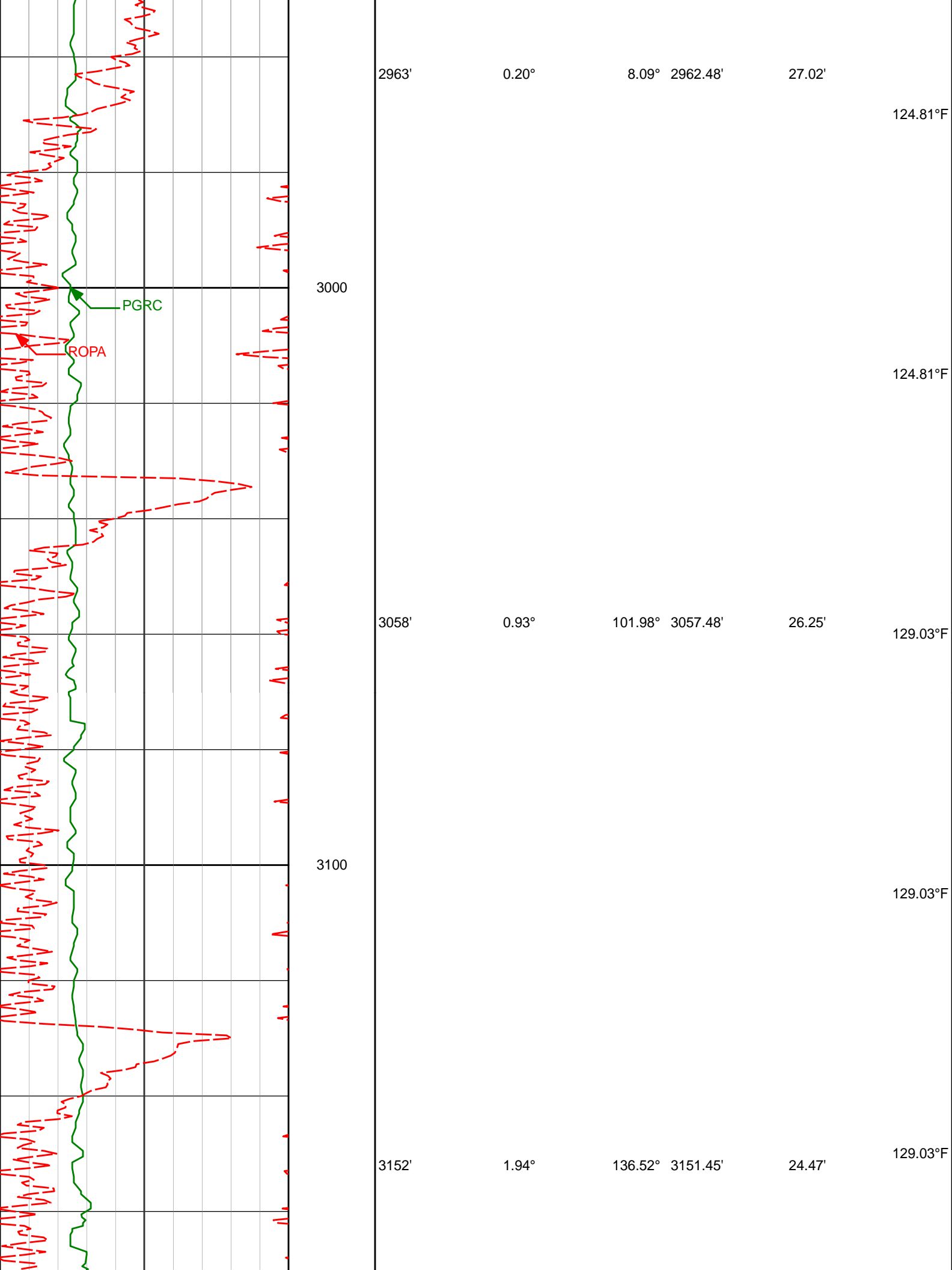
27.15'

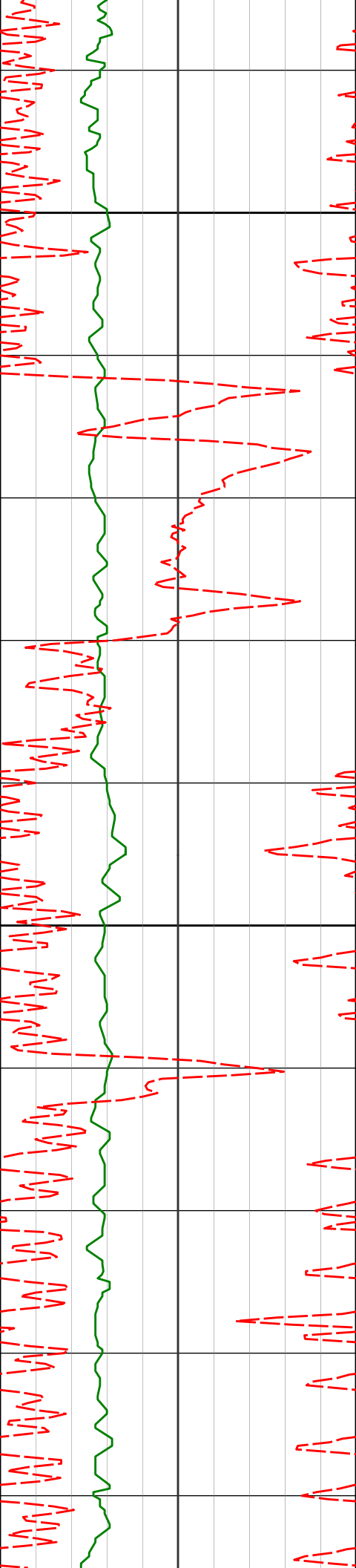
120.59°F

120.59°F

124.81°F

124.81°F





3200

3300

3247'

1.49°

110.47°

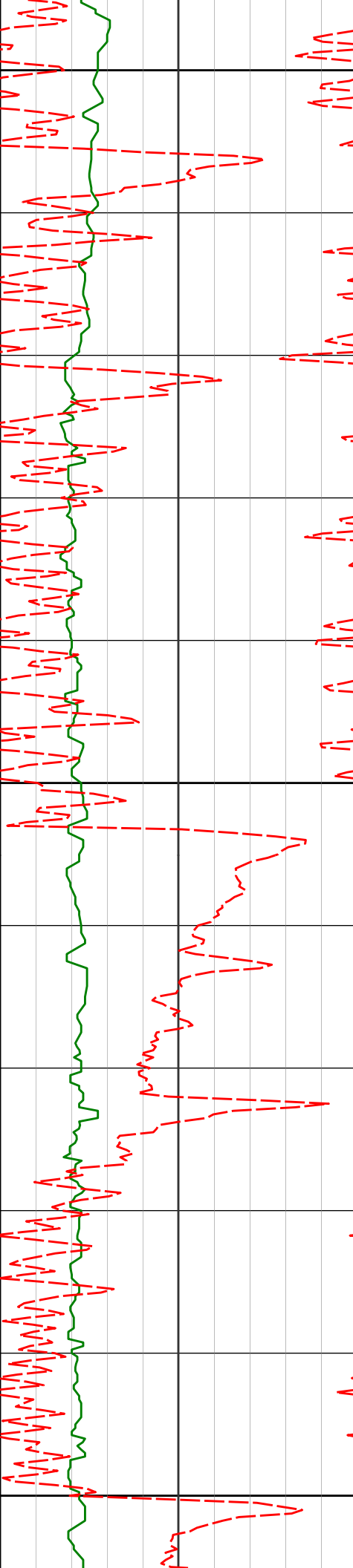
3246.41'

22.29'

129.03°F

129.03°F

129.03°F



3400

3436'

2.94°

99.24°

3435.26'

15.28'

133.25°F

3500

3531'

2.48°

82.59°

3530.16'

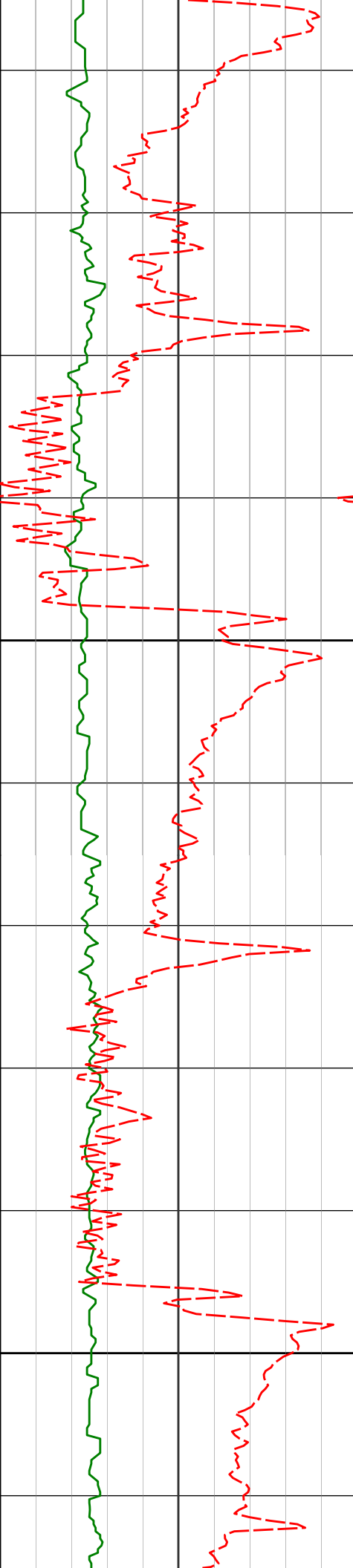
10.84'

137.47°F

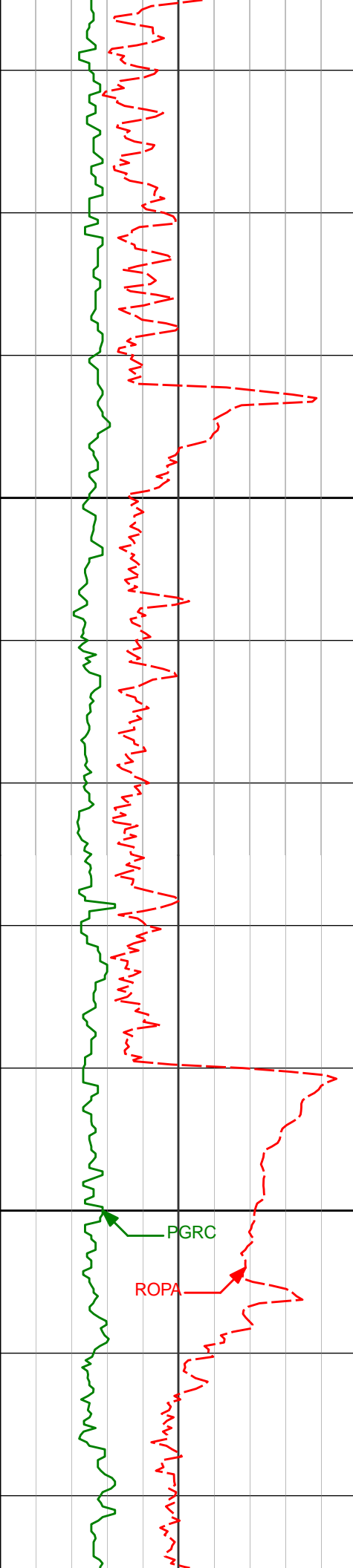
137.47°F

3600

137.47°F



3625'	2.68°	32.93°	3624.07'	7.54'	137.47°F
3700	2.70°	310.39°	3719.00'	7.87'	141.69°F
3720'	2.75°	281.79°	3813.89'	11.71'	137.47°F



3900

4000

3909'

4004'

2.70°

2.32°

267.65° 3907.79'

246.74° 4002.70'

16.11'

20.14'

137.47°F

141.69°F

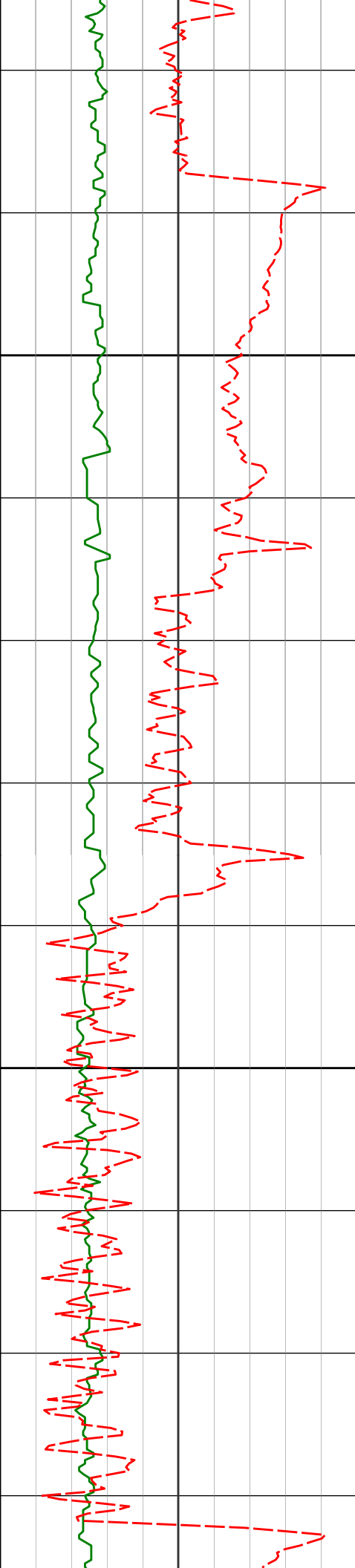
141.69°F

141.69°F

141.69°F

PGRC

ROPA



4100

4200

4098'

4193'

1.20°

2.71°

162.79°

138.85°

4096.67'

4191.61'

21.68'

20.04'

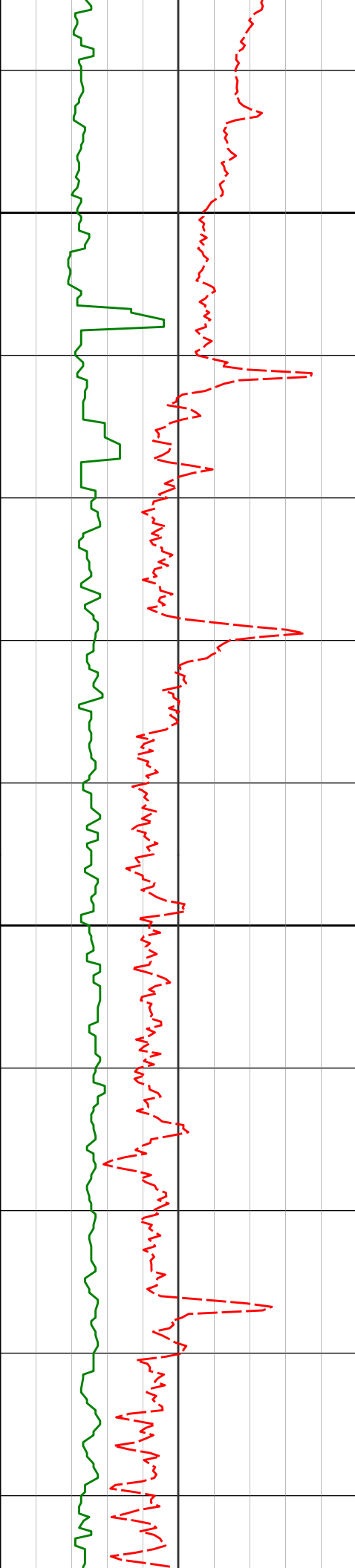
141.69°F

141.69°F

145.91°F

145.91°F

141.69°F



4300

4400

4288'

1.91°

148.97° 4286.53'

17.89'

4382'

0.81°

248.60° 4380.51'

17.77'

4477'

0.82°

270.71° 4475.50'

19.09'

141.69°F

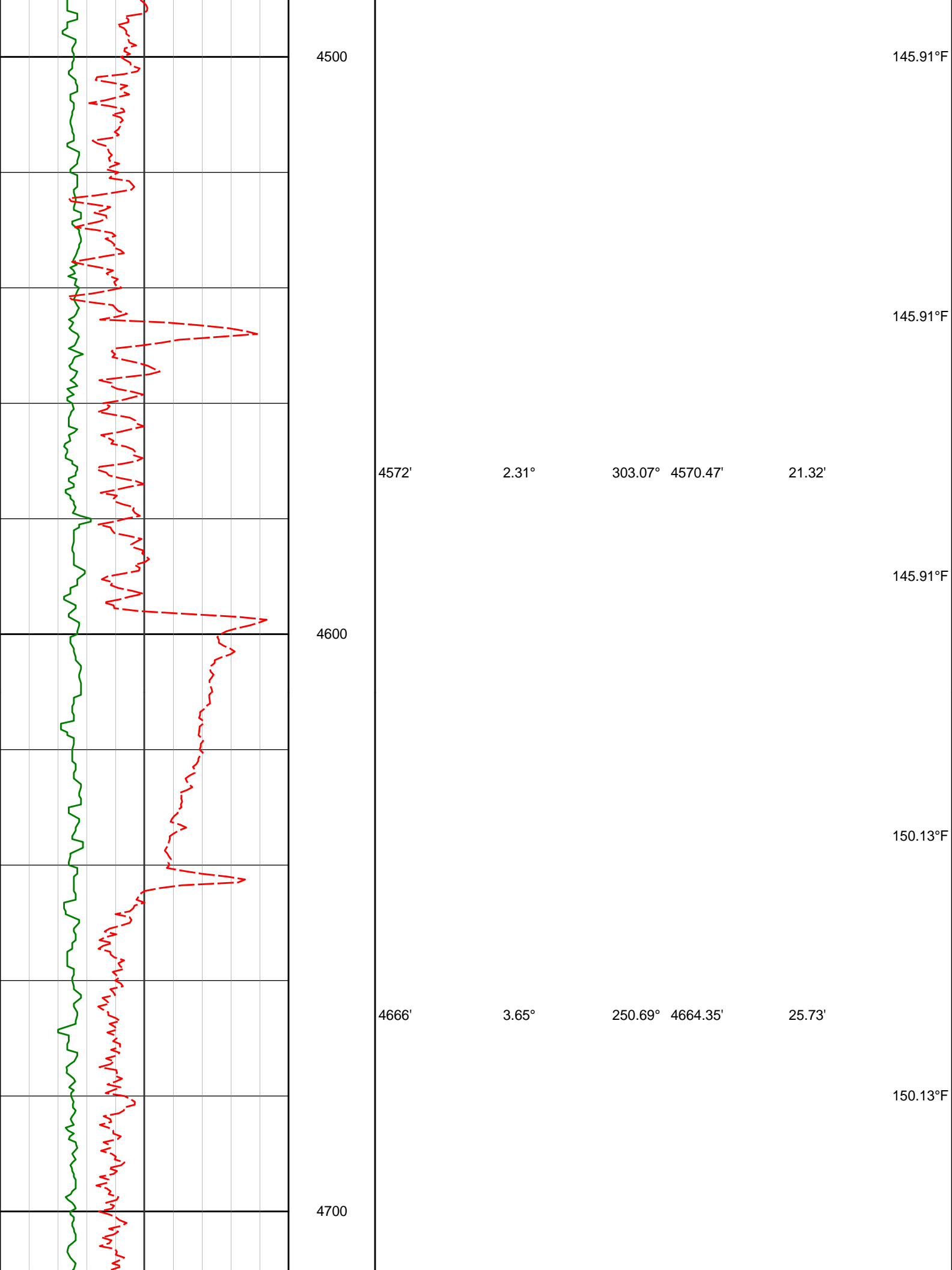
141.69°F

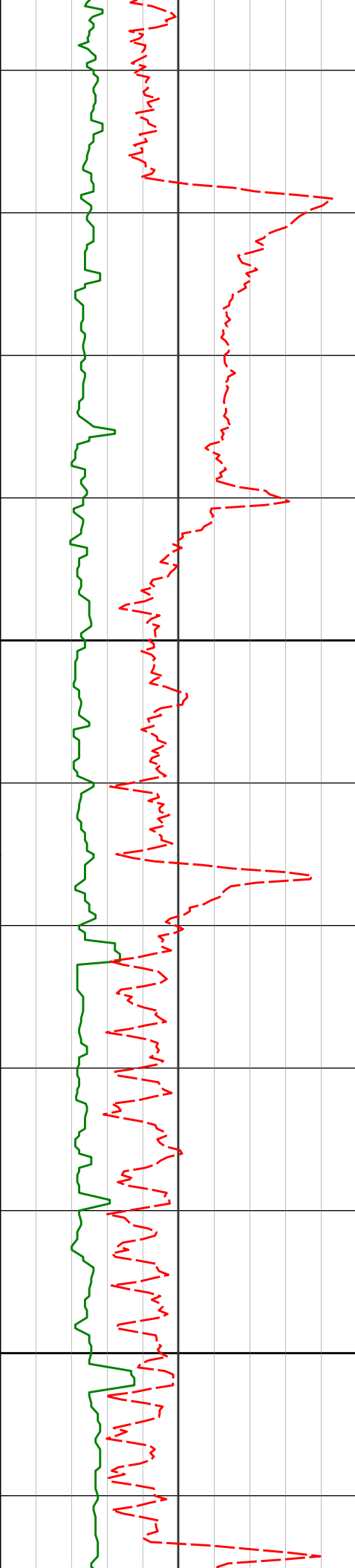
145.91°F

145.91°F

145.91°F

141.69°F





4800

4900

4761'

5.02°

223.44° 4759.09'

31.63'

4855'

5.54°

219.04° 4852.69'

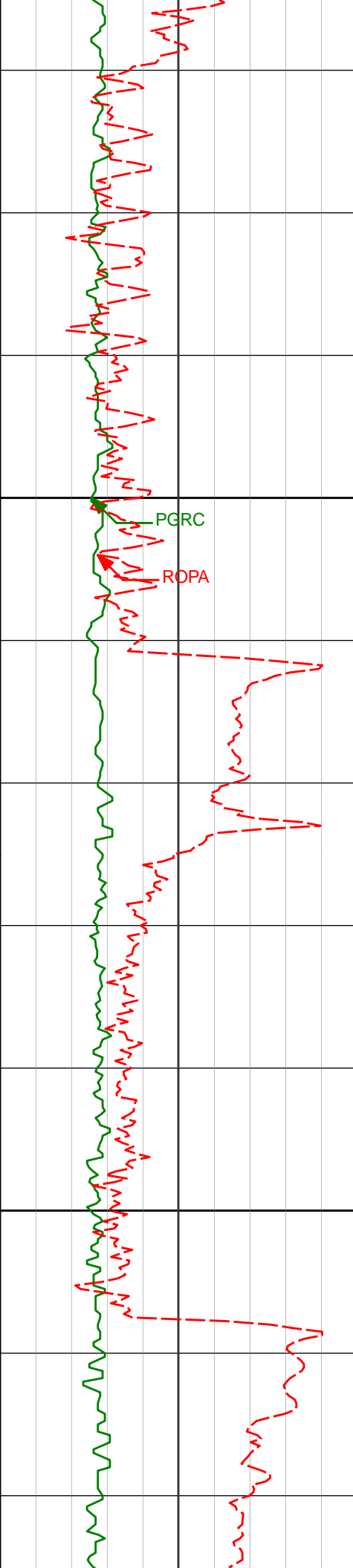
37.62'

150.13°F

150.13°F

150.13°F

150.13°F



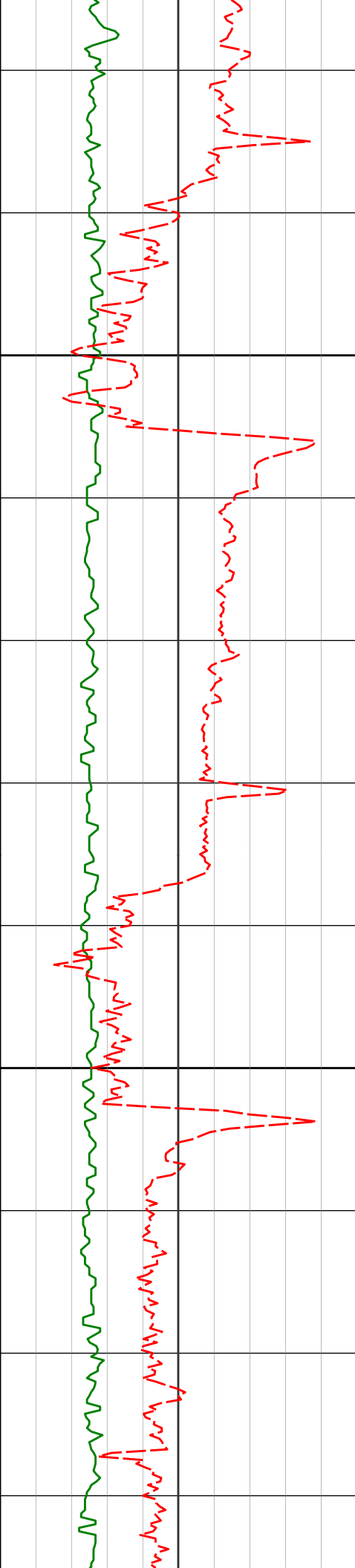
5000

5100

PGRC

ROPA

4950'	5.42°	220.22°	4947.26'	43.73'	154.34°F
154.34°F					
5045'	5.39°	210.48°	5041.83'	49.24'	150.13°F
150.13°F					
5139'	6.36°	211.23°	5135.34'	54.56'	150.13°F



5200

5300

5234'

9.02°

214.48° 5229.48'

62.01'

5329'

8.56°

219.50° 5323.36'

71.27'

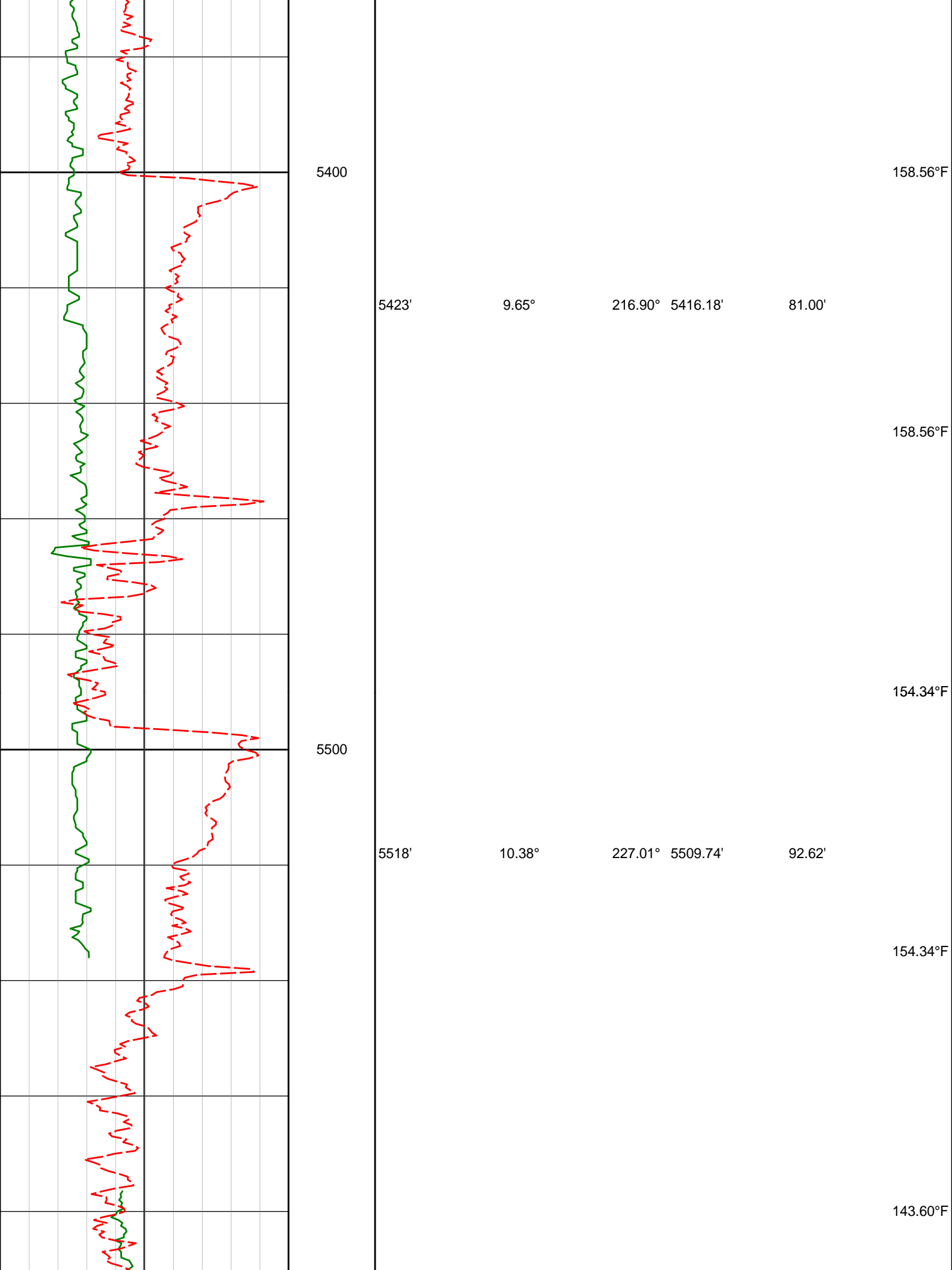
150.13°F

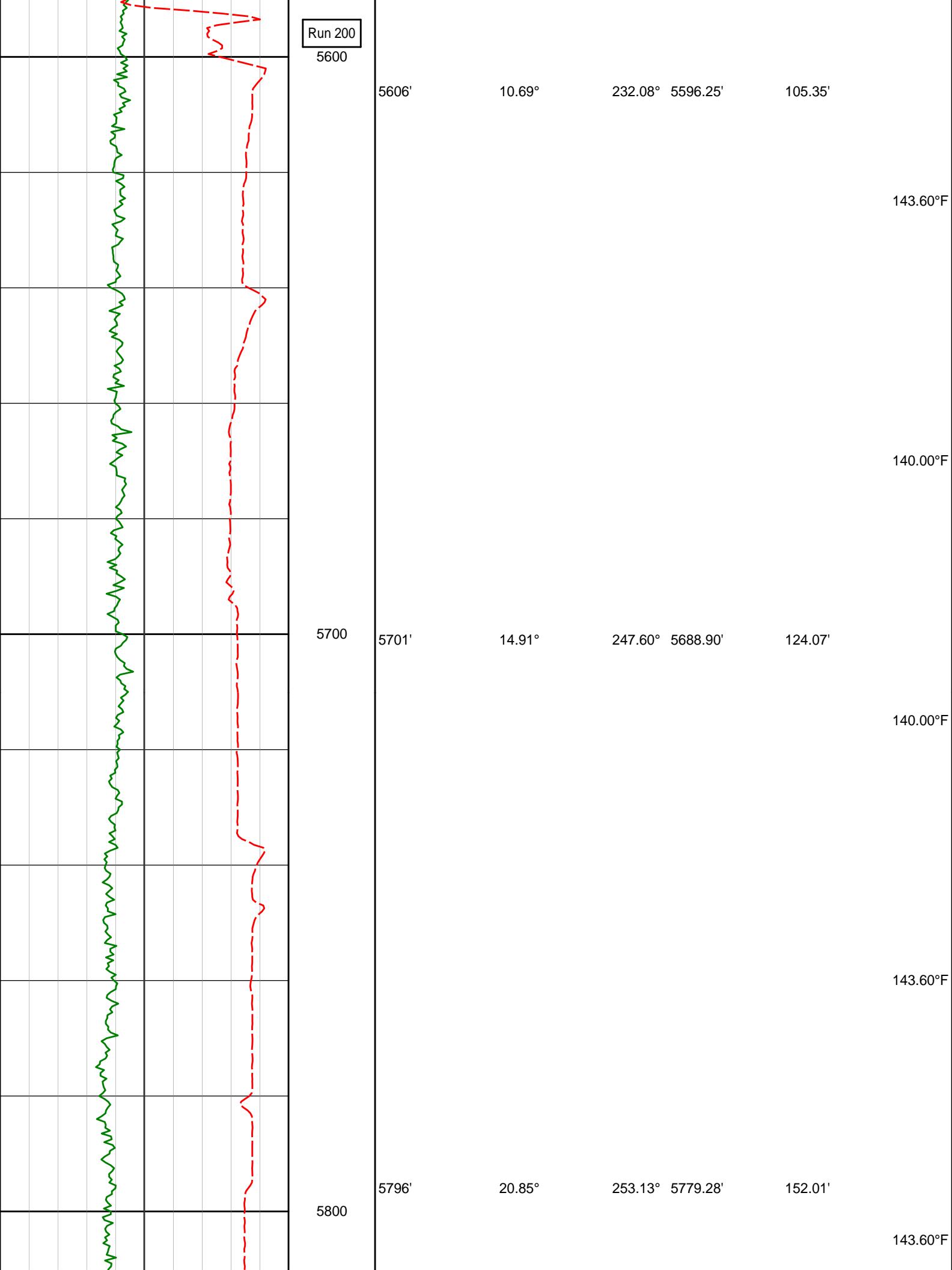
154.34°F

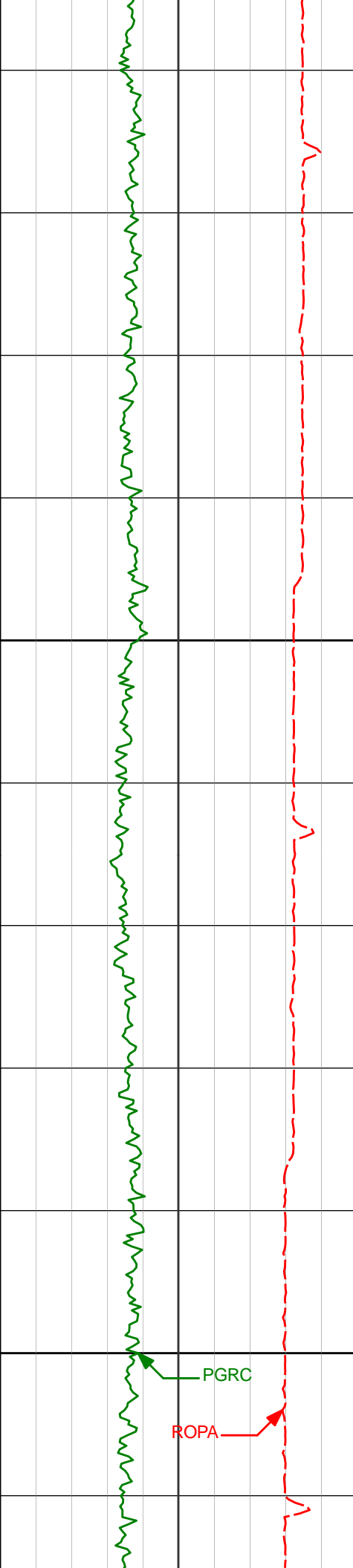
154.34°F

154.34°F

154.34°F







5900

6000

5890'

26.74°

251.20° 5865.25'

188.58'

150.80°F

150.80°F

154.40°F

5985'

32.00°

250.16° 5948.01'

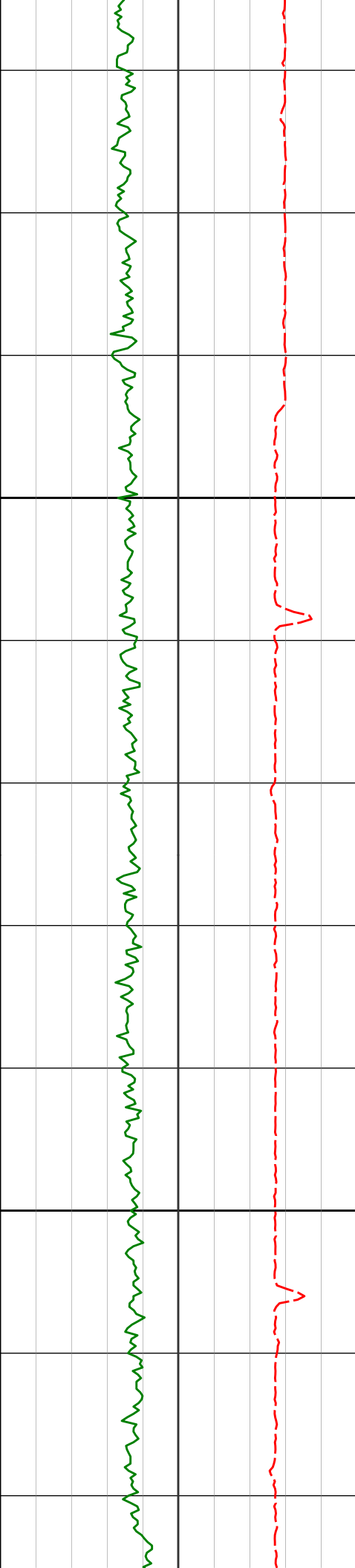
233.21'

154.40°F

PGRC

ROPA

154.40°F



6100

6200

6079'

36.69°

250.34° 6025.60'

283.92'

158.00°F

158.00°F

161.60°F

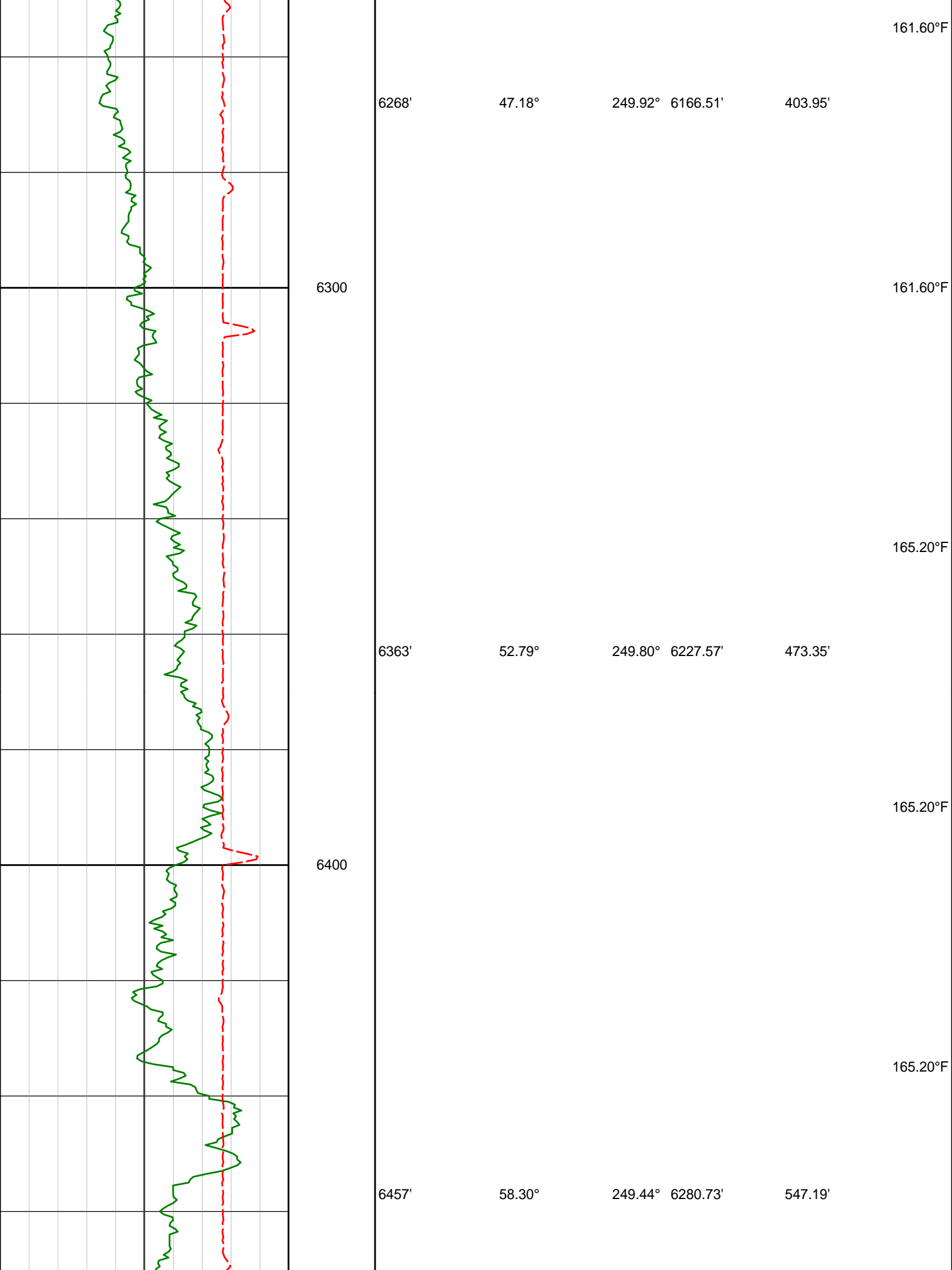
6174'

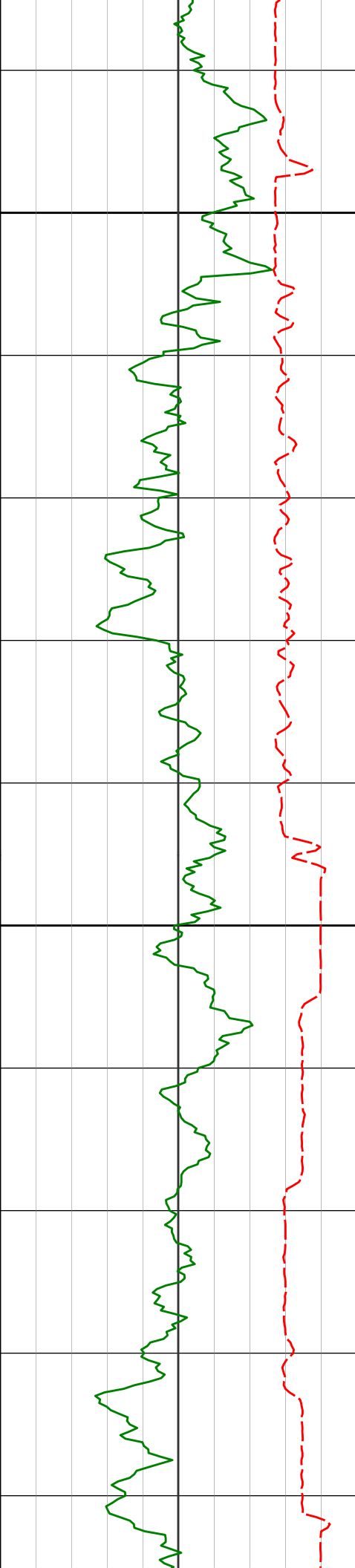
41.50°

250.25° 6099.31'

341.20'

161.60°F





6500

6600

6552'

62.59°

248.61°

6327.58'

625.66'

6646'

67.72°

250.59°

6367.07'

706.92'

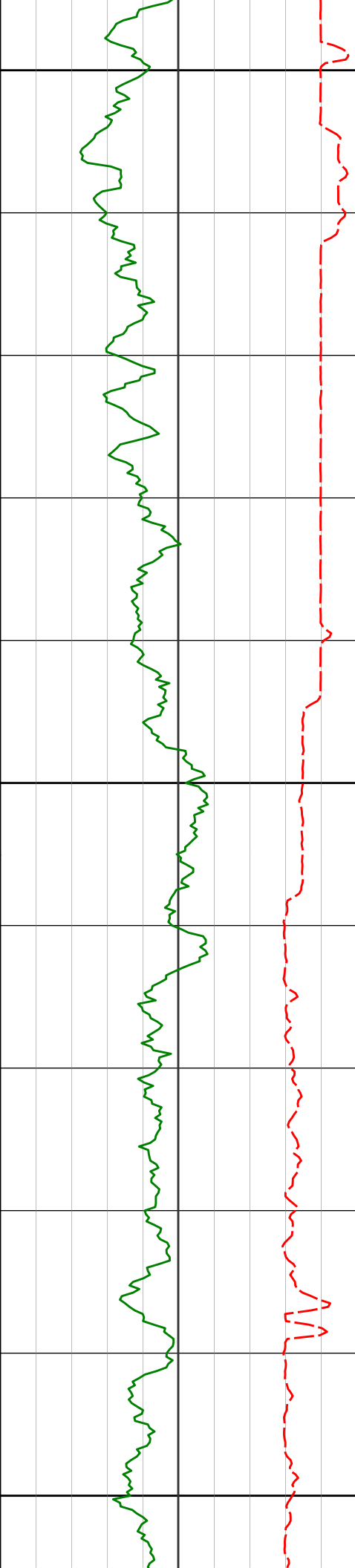
165.20°F

168.80°F

168.80°F

168.80°F

168.80°F



6700

6741'

70.81°

253.23°

6400.70'

792.59'

6800

6835'

76.23°

255.97°

6427.36'

880.50'

6900

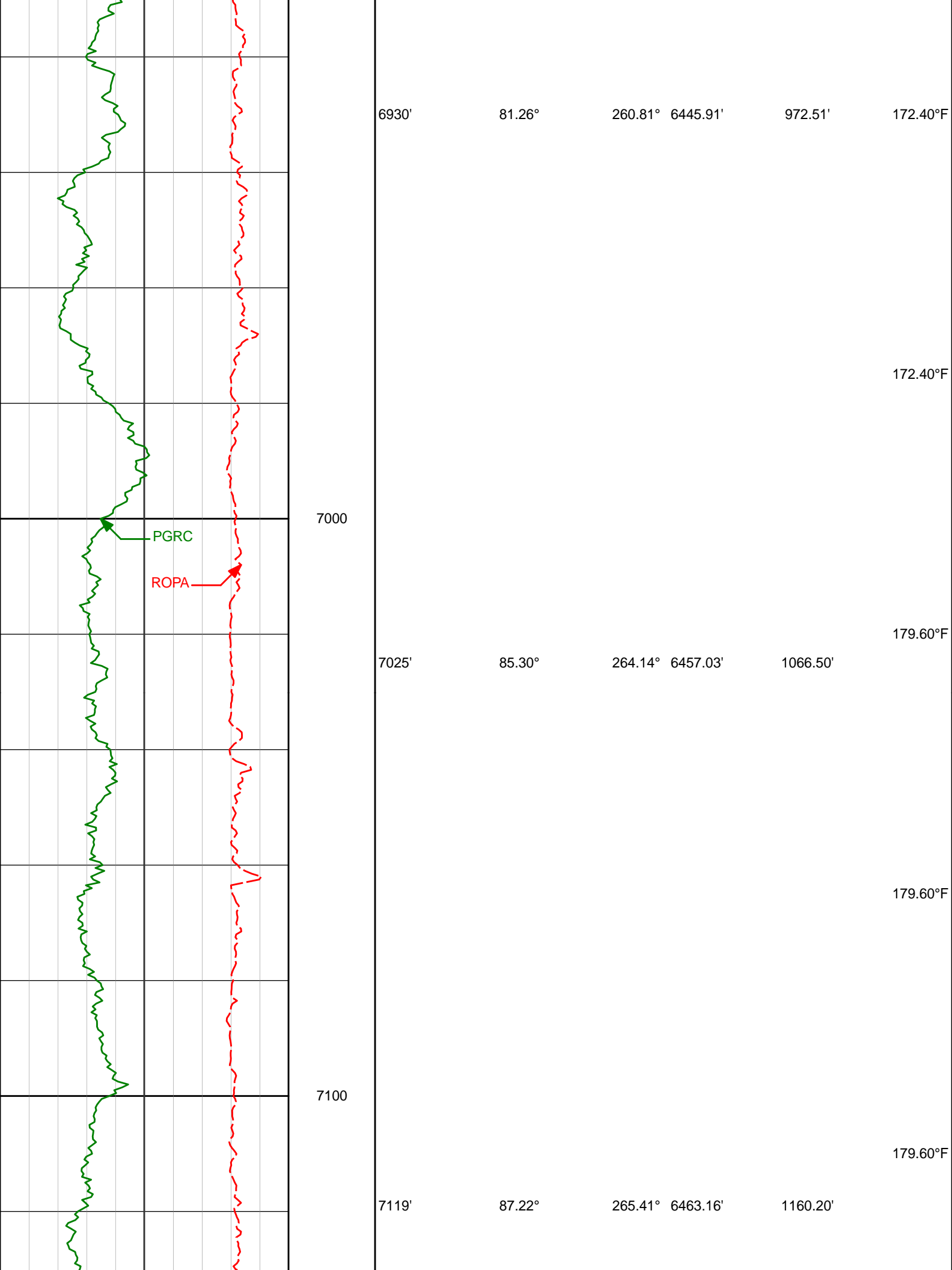
168.80°F

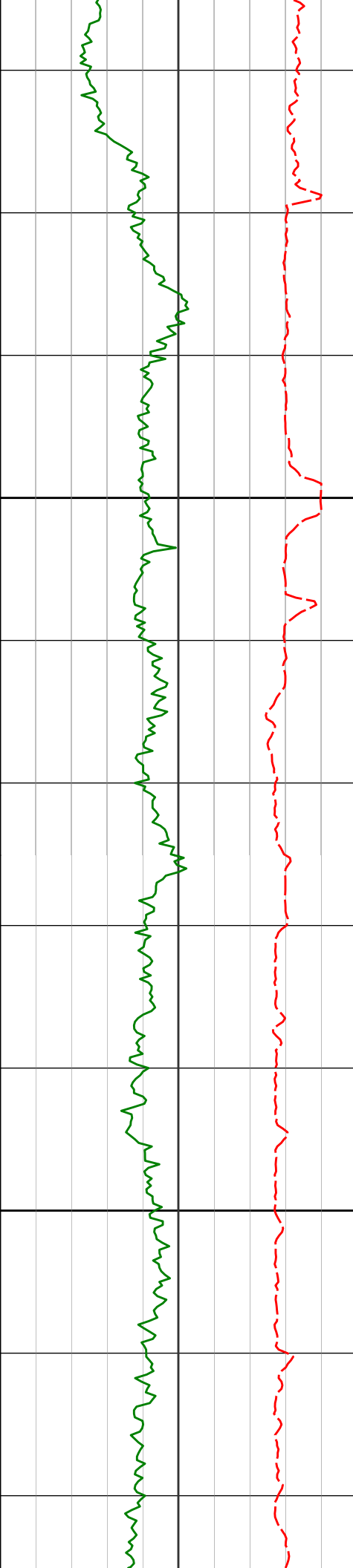
168.80°F

172.40°F

172.40°F

172.40°F





7200

7214'

87.28°

265.90° 6467.72'

1255.06'

179.60°F

179.60°F

179.60°F

183.20°F

7300

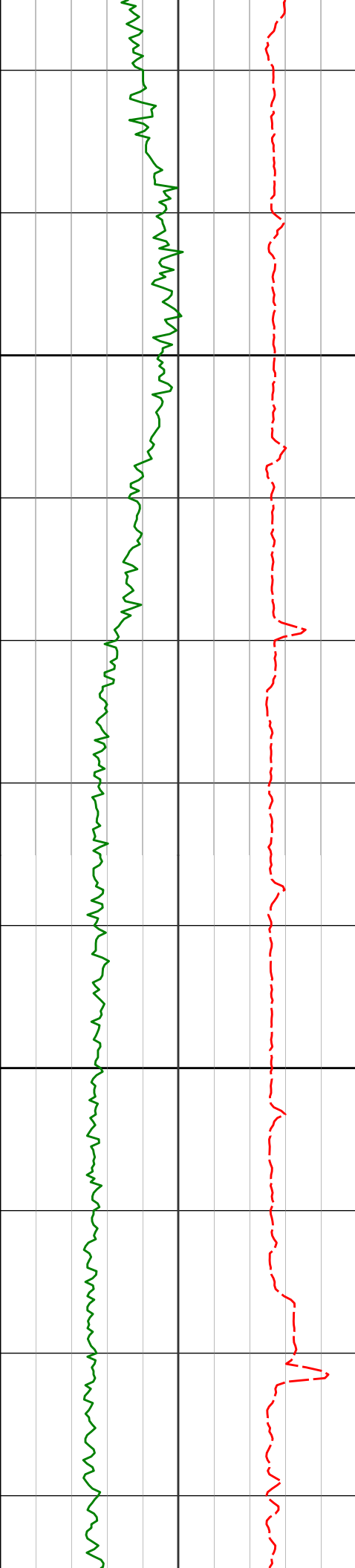
7308'

87.78°

265.97° 6471.77'

1348.94'

183.20°F



7400

7403'

88.39°

266.14° 6474.94'

1443.87'

186.80°F

186.80°F

186.80°F

7500

7498'

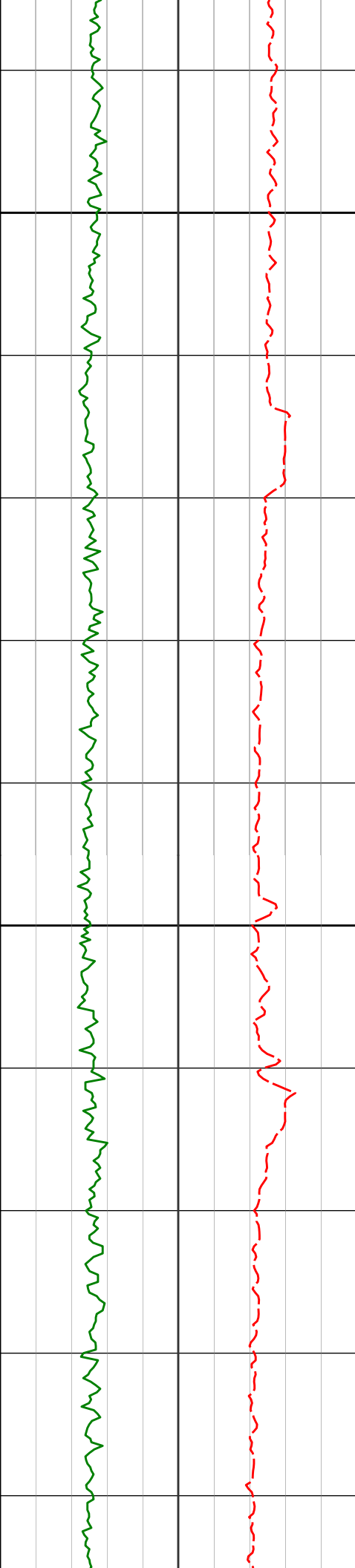
89.01°

266.62° 6477.10'

1538.83'

186.80°F

190.40°F



7600

7700

7592'

89.63°

267.12° 6478.21'

1632.82'

190.40°F

190.40°F

7687'

89.38°

267.97° 6479.03'

1727.82'

190.40°F

194.00°F

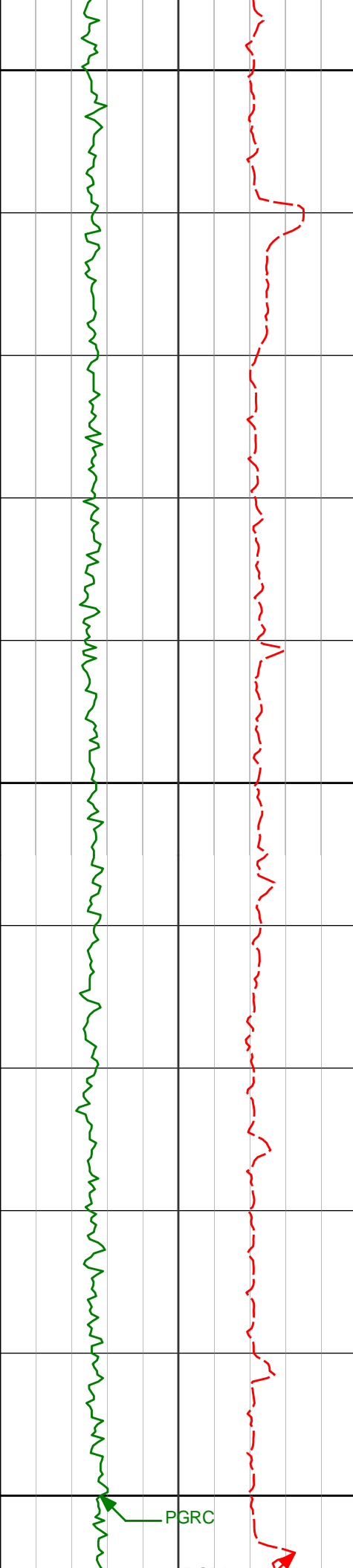
7781'

90.49°

268.74° 6479.14'

1821.80'

194.00°F



7800

7900

8000

7876'

89.38°

267.95° 6479.25'

1916.78'

194.00°F

194.00°F

7970'

90.31°

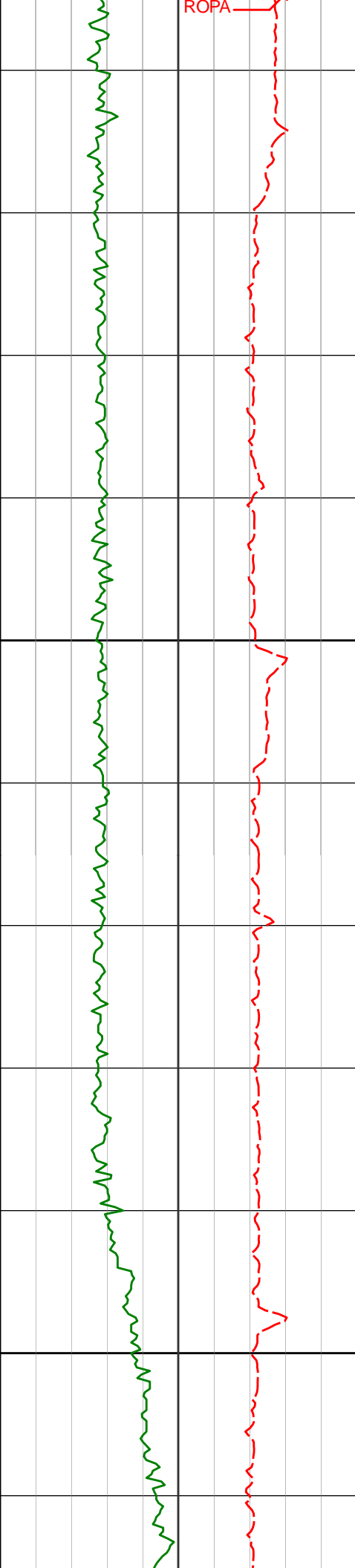
268.28° 6479.50'

2010.77'

197.60°F

197.60°F

PGRC



8100

8200

8065'

89.88°

267.43° 6479.34'

2105.76'

8160'

90.25°

268.48° 6479.24'

2200.75'

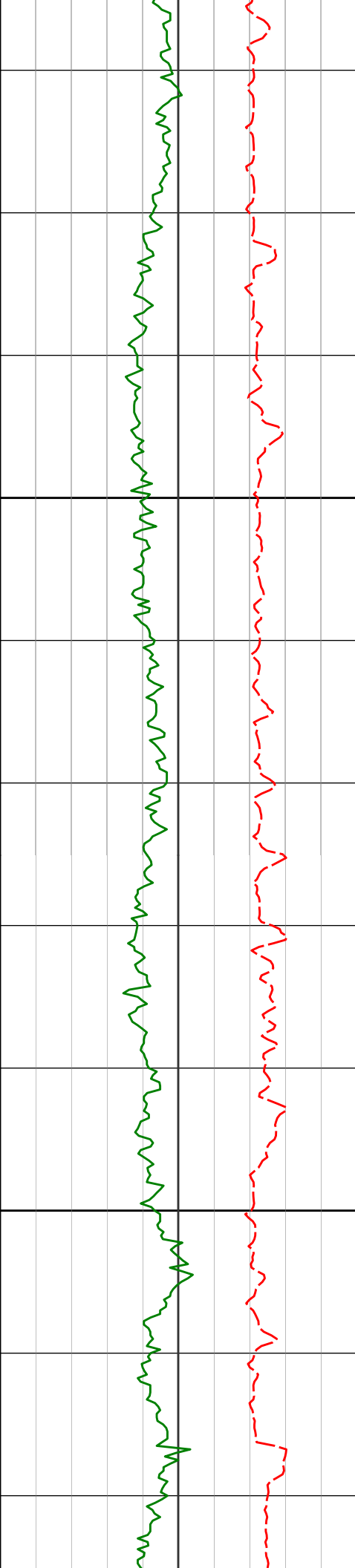
197.60°F

197.60°F

201.20°F

201.20°F

197.60°F



8300

8400

8255'

91.05°

269.79° 6478.16'

2295.69'

8349'

91.30°

270.48° 6476.23'

2389.55'

8444'

91.36°

270.44° 6474.03'

2484.38'

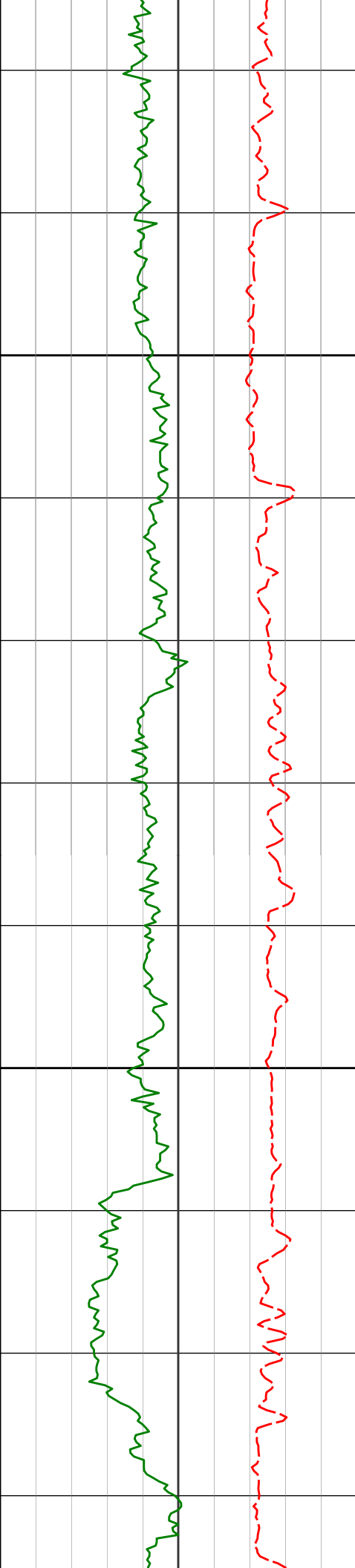
201.20°F

201.20°F

201.20°F

201.20°F

201.20°F



8500

8600

8538'

90.37°

269.68° 6472.61'

2578.25'

8633'

90.37°

270.58° 6471.99'

2673.13'

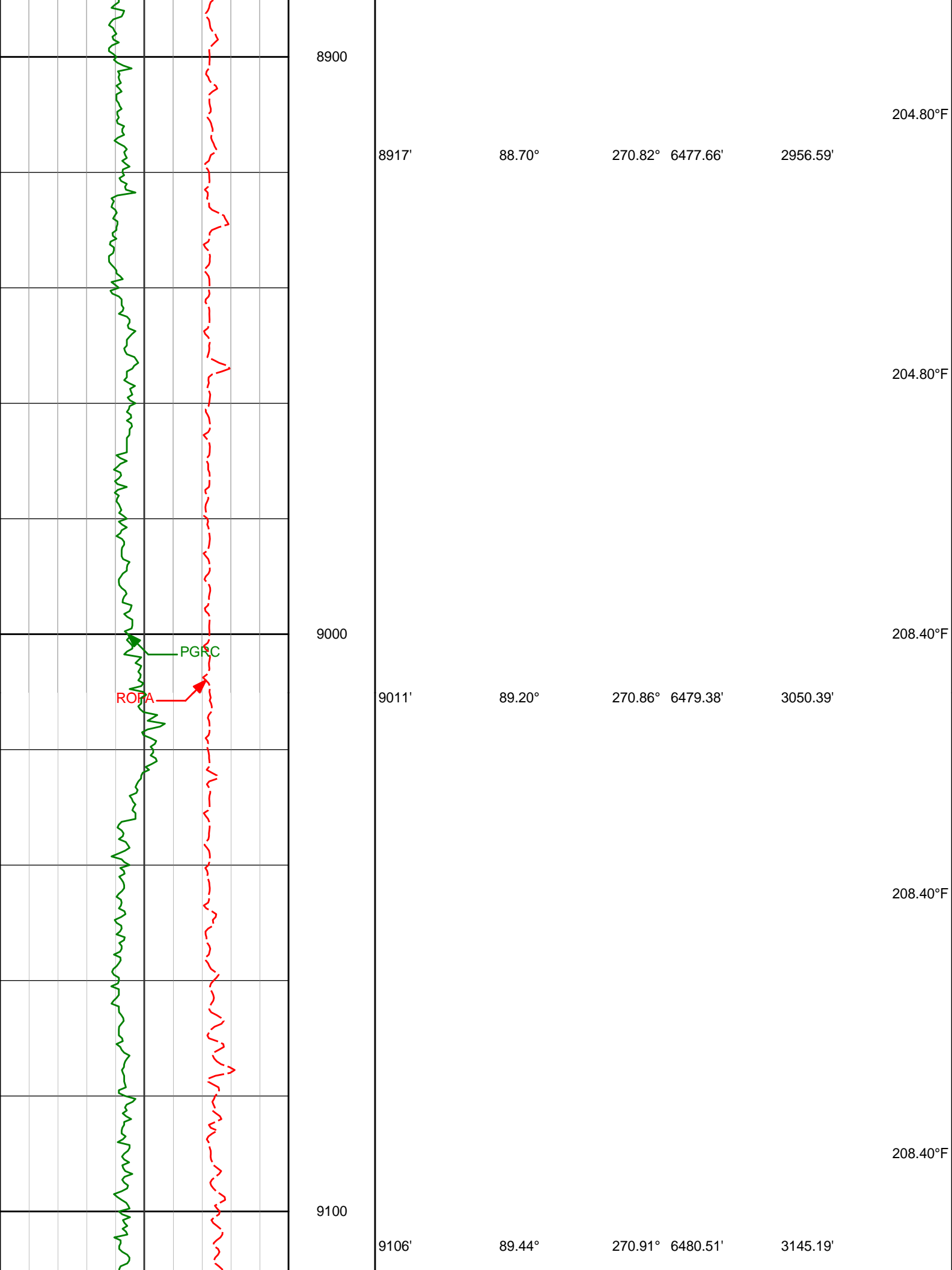
201.20°F

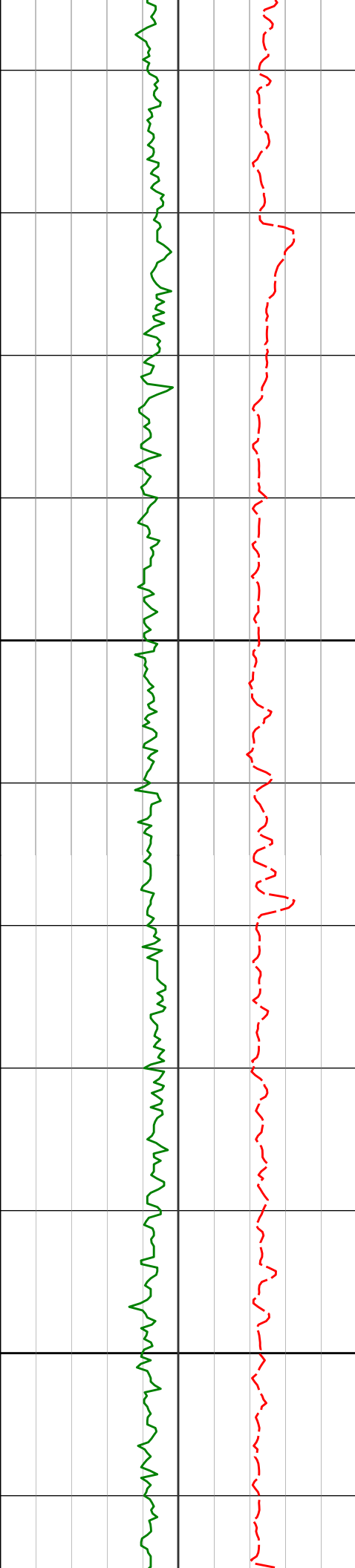
201.20°F

201.20°F

204.80°F

204.80°F





9200

9300

9201'

9295'

89.38°

89.81°

271.56° 6481.49'

272.06° 6482.16'

3239.96'

3333.66'

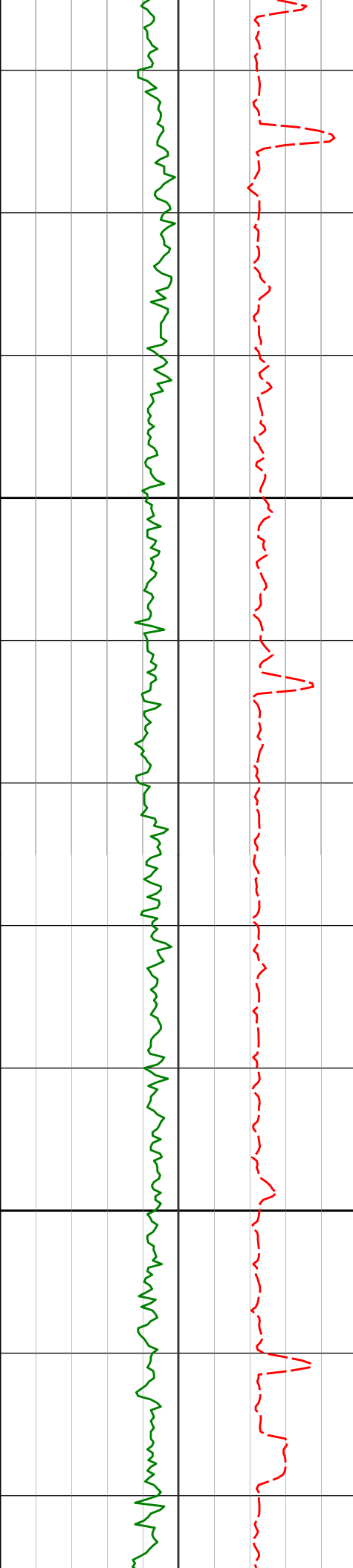
208.40°F

212.00°F

212.00°F

212.00°F

212.00°F



9400

9500

9389'

89.07°

270.53° 6483.07'

3427.42'

9484'

89.63°

270.89° 6484.15'

3522.24'

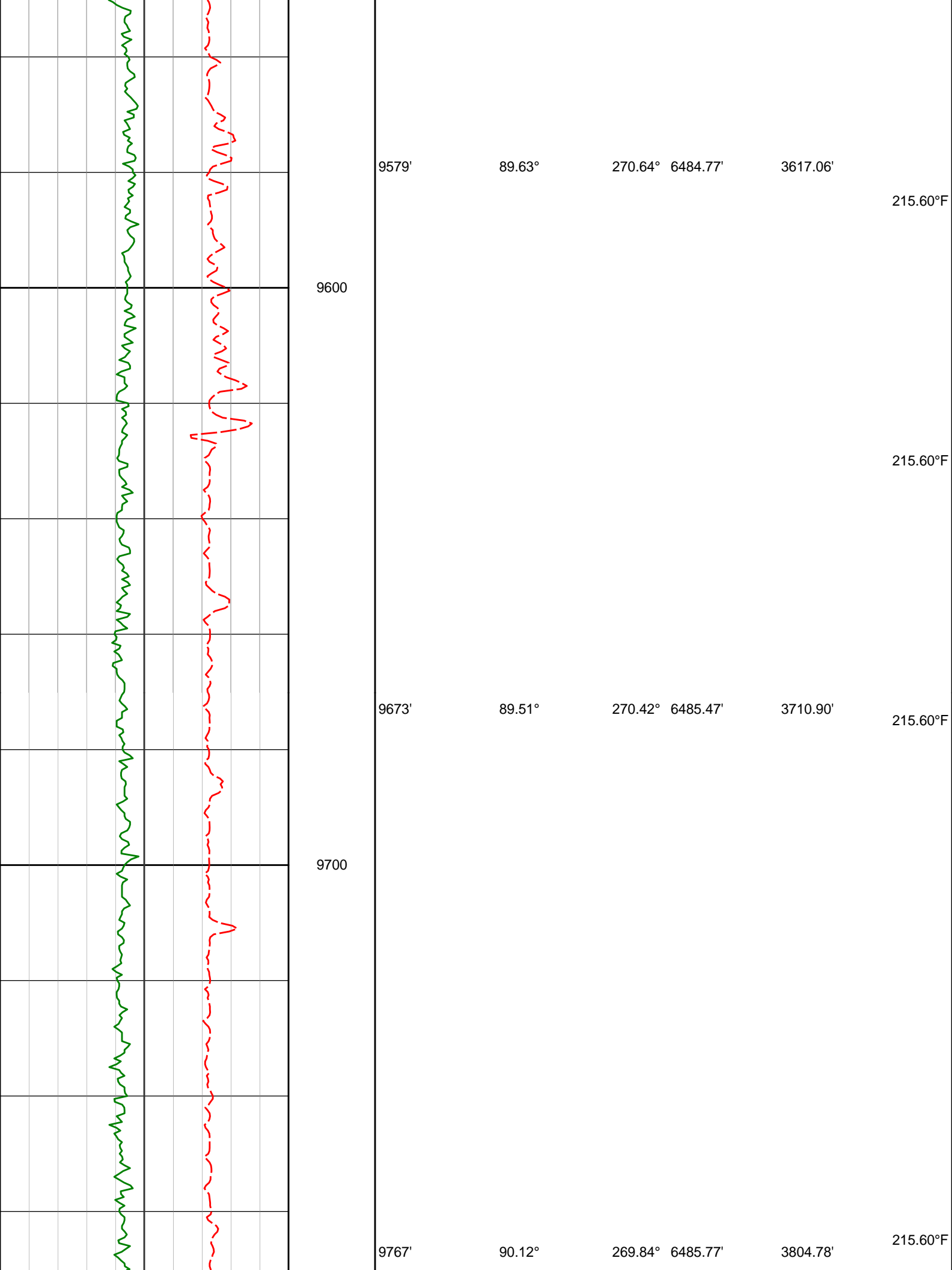
212.00°F

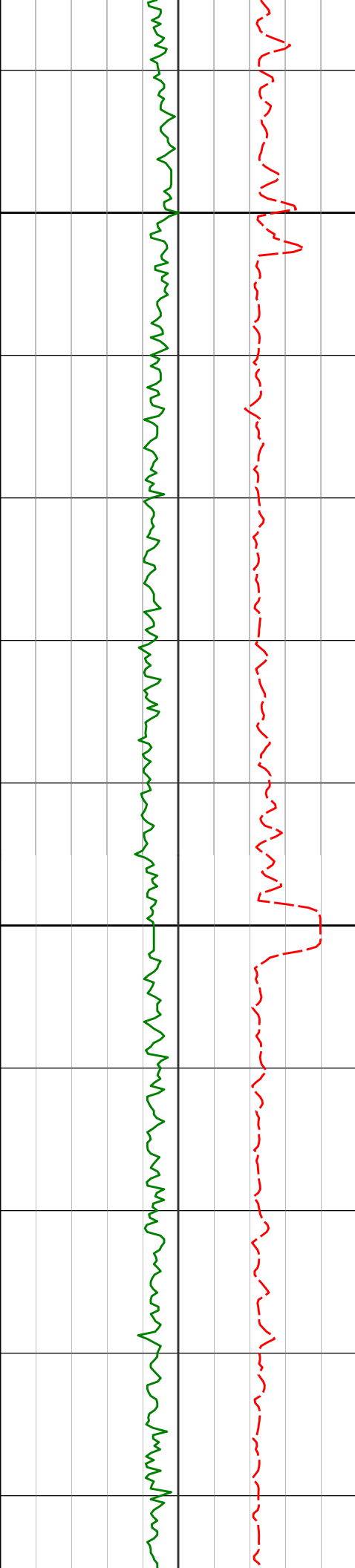
212.00°F

212.00°F

212.00°F

215.60°F





9800

215.60°F

219.20°F

9862'

89.14°

266.63° 6486.39'

3899.75'

9900

219.20°F

219.20°F

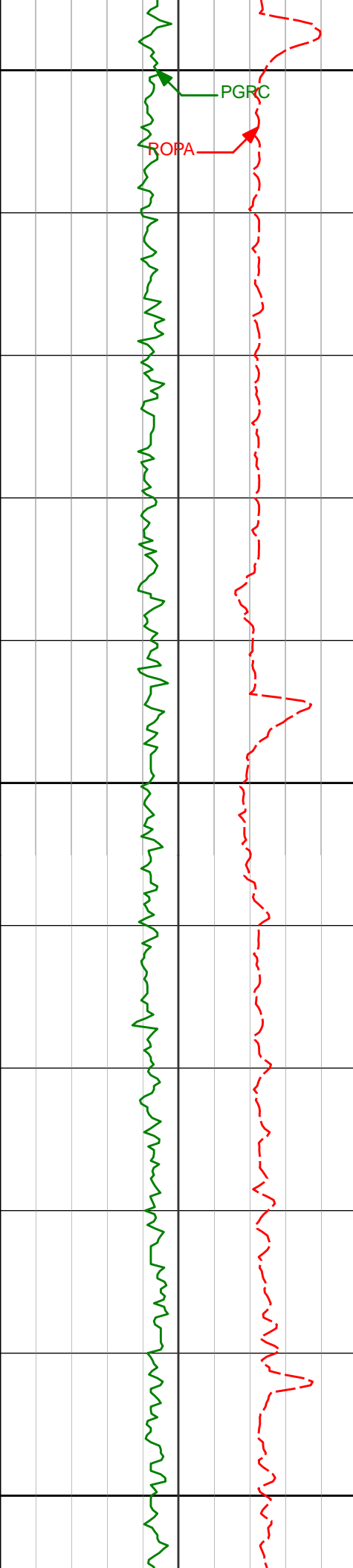
9957'

89.69°

266.65° 6487.36'

3994.74'

219.20°F



10000

10100

10200

10051'

89.75°

268.16° 6487.82'

4088.73'

10146'

89.26°

270.74° 6488.64'

4183.65'

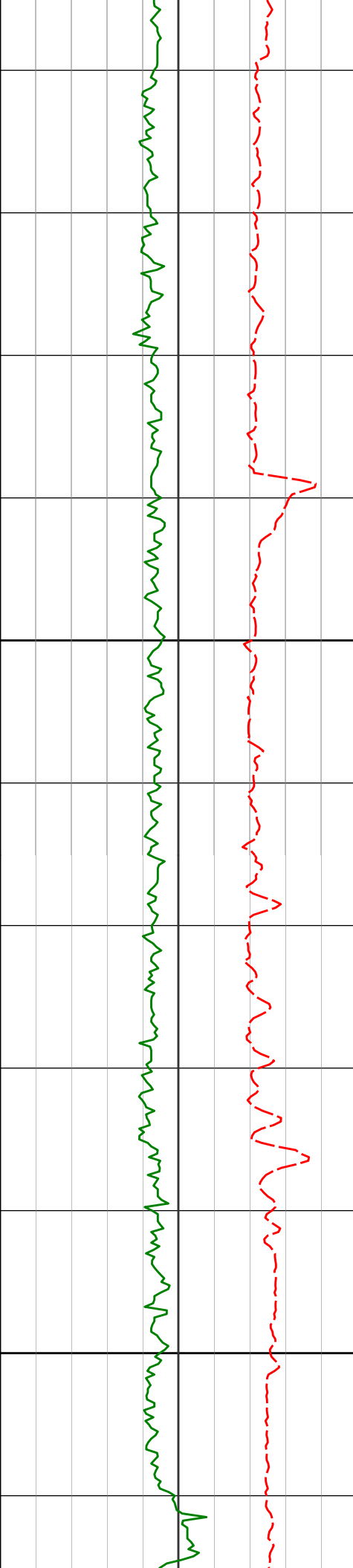
215.60°F

215.60°F

219.20°F

219.20°F

219.20°F



10300

10400

10240' 90.06° 270.31° 6489.20' 4277.50'

10335' 89.51° 269.42° 6489.55' 4372.40'

10429' 89.44° 269.08° 6490.41' 4466.33'

219.20°F

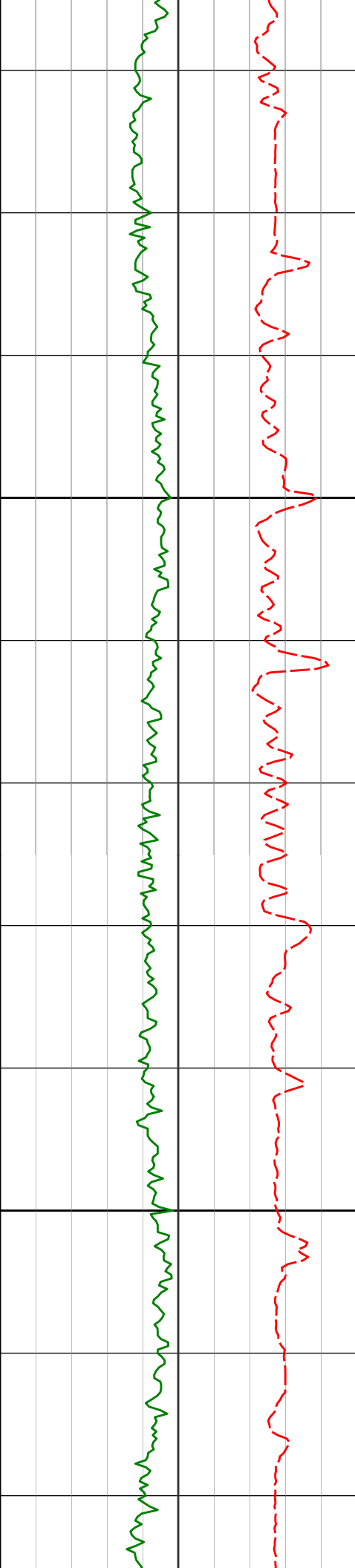
219.20°F

222.80°F

222.80°F

222.80°F

219.20°F



10500

10600

10524'

88.89°

268.34° 6491.80'

4561.29'

10618'

90.49°

268.74° 6492.31'

4655.26'

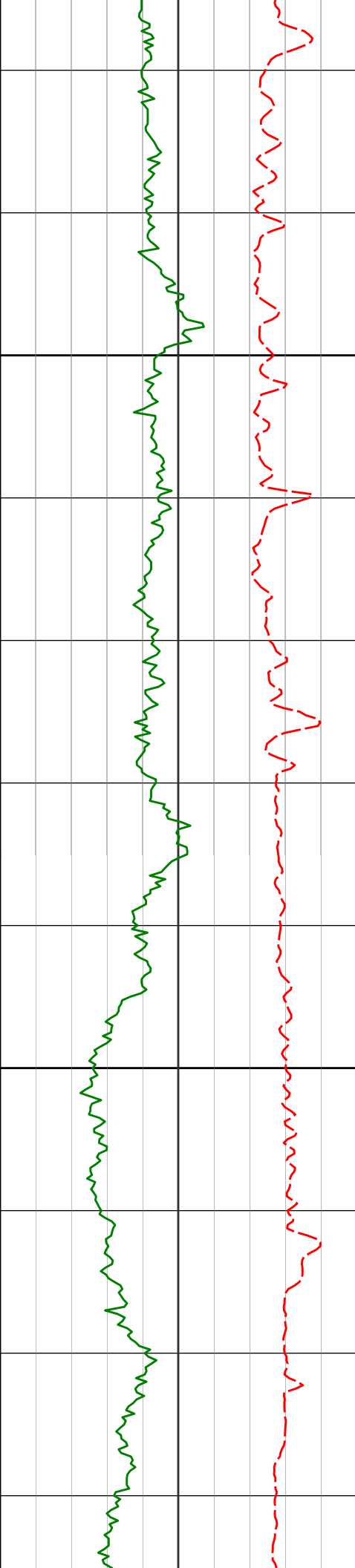
222.80°F

222.80°F

222.80°F

222.80°F

222.80°F



10700

10713'

91.17°

268.83° 6490.93'

4750.22'

222.80°F

222.80°F

10800

10807'

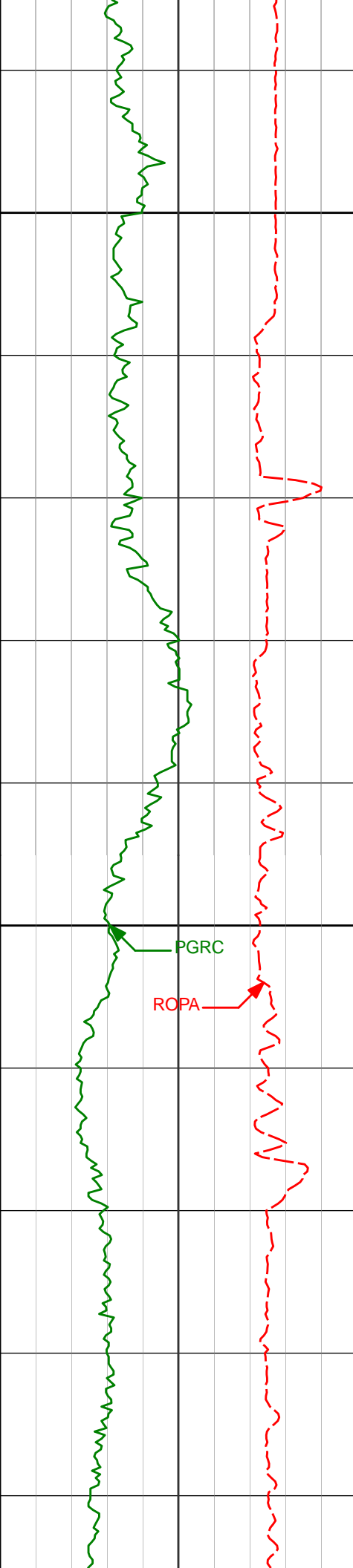
90.99°

268.38° 6489.16'

4844.18'

226.40°F

226.40°F



10900

10902'

91.17°

268.19° 6487.37'

4939.14'

226.40°F

226.40°F

226.40°F

11000

10996'

90.86°

267.79° 6485.70'

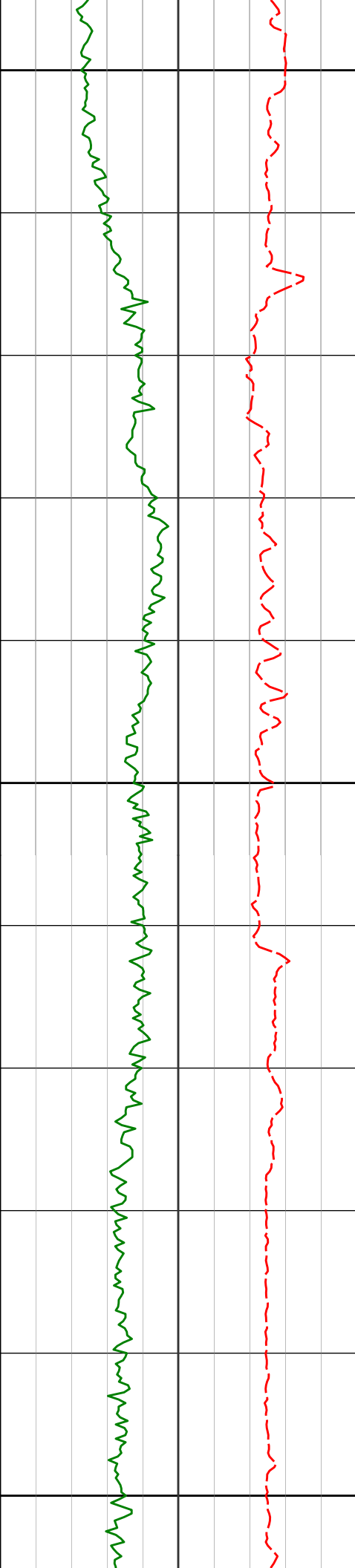
5033.12'

226.40°F

226.40°F

PGRC

ROPA

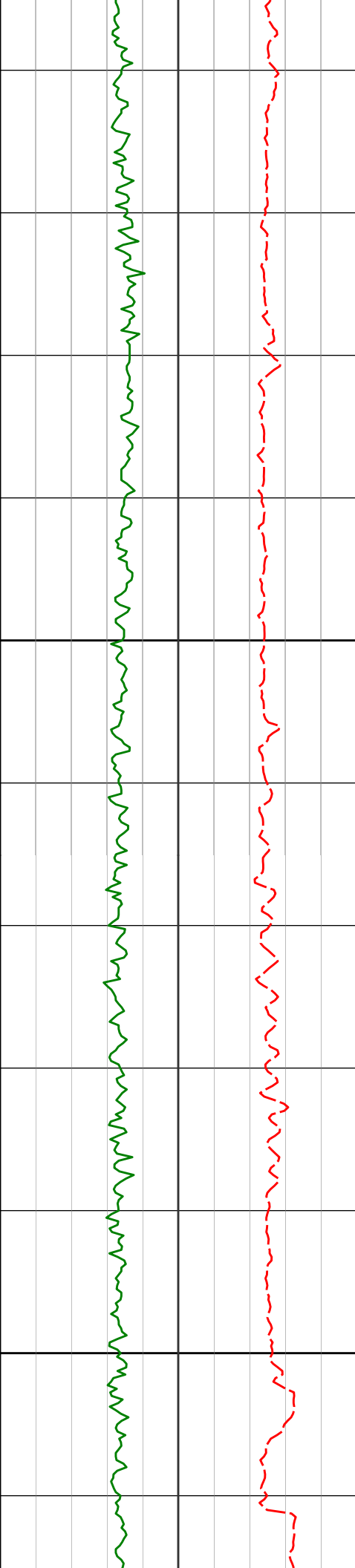


11100

11200

11300

11091'	89.81°	267.83°	6485.15'	5128.11'	
					226.40°F
					230.00°F
11185'	89.81°	268.65°	6485.46'	5222.10'	
					230.00°F
					230.00°F
11280'	89.20°	268.27°	6486.28'	5317.07'	
					230.00°F



11400

11500

11374' 89.75° 267.97° 6487.14' 5411.06'

11469' 89.69° 267.73° 6487.61' 5506.05'

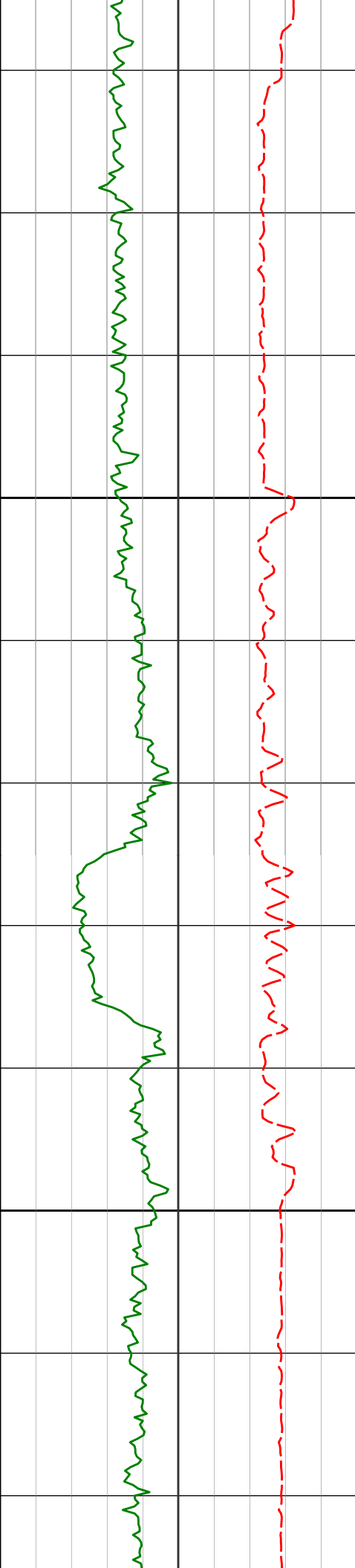
230.00°F

230.00°F

230.00°F

230.00°F

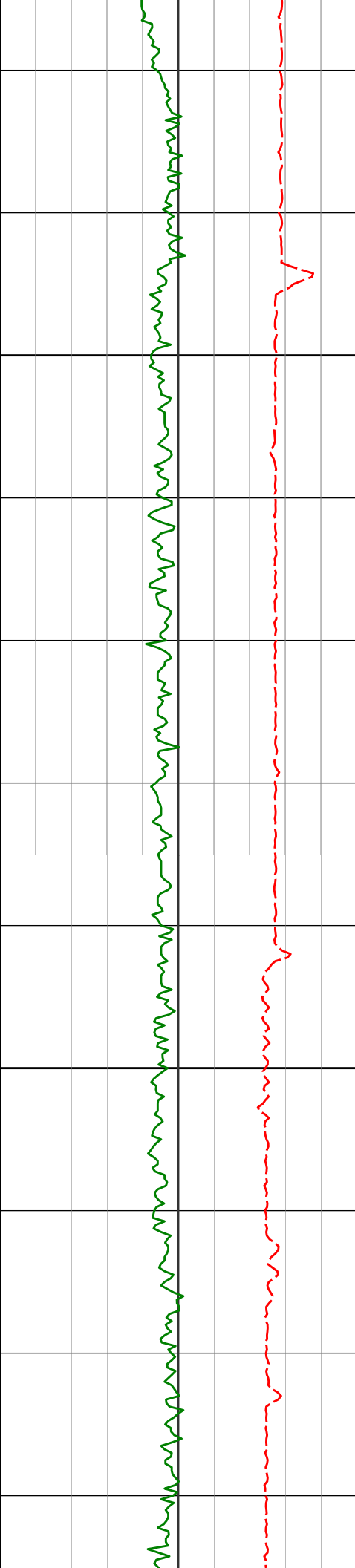
230.00°F



11600

11700

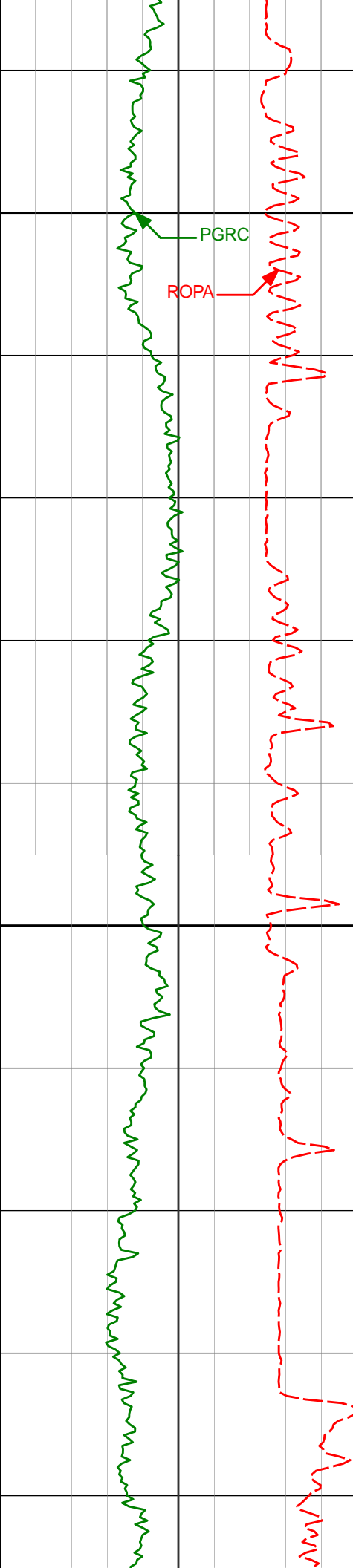
11563'	90.00°	267.04°	6487.86'	5600.05'	230.00°F
11658'	89.88°	267.25°	6487.96'	5695.05'	230.00°F
					230.00°F
					230.00°F



11800

11900

11752'	89.51°	268.17°	6488.46'	5789.04'	
					230.00°F
					230.00°F
11847'	89.26°	268.02°	6489.48'	5884.03'	
					230.00°F
					230.00°F
11942'	89.07°	269.03°	6490.86'	5978.99'	
					230.00°F



12000

PGRC

ROPA

12100

Run 300

12036'

88.77°

269.48° 6492.64'

6072.92'

12131'

89.01°

270.83° 6494.48'

6167.78'

12167'

88.61°

270.79° 6495.22'

6203.70'

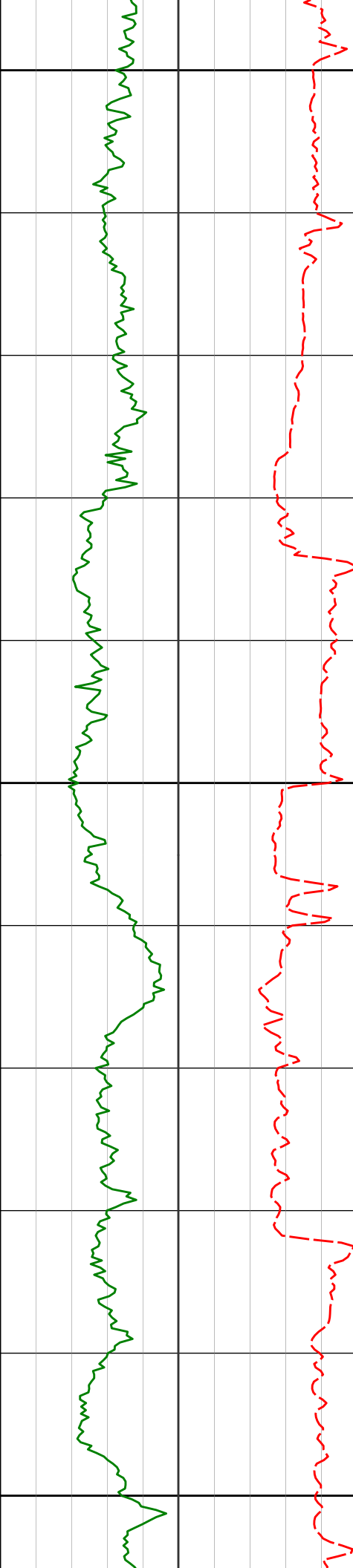
230.00°F

230.00°F

218.27°F

213.56°F

230.00°F



12200

12300

12400

12259'

86.60°

271.63° 6499.07'

6295.39'

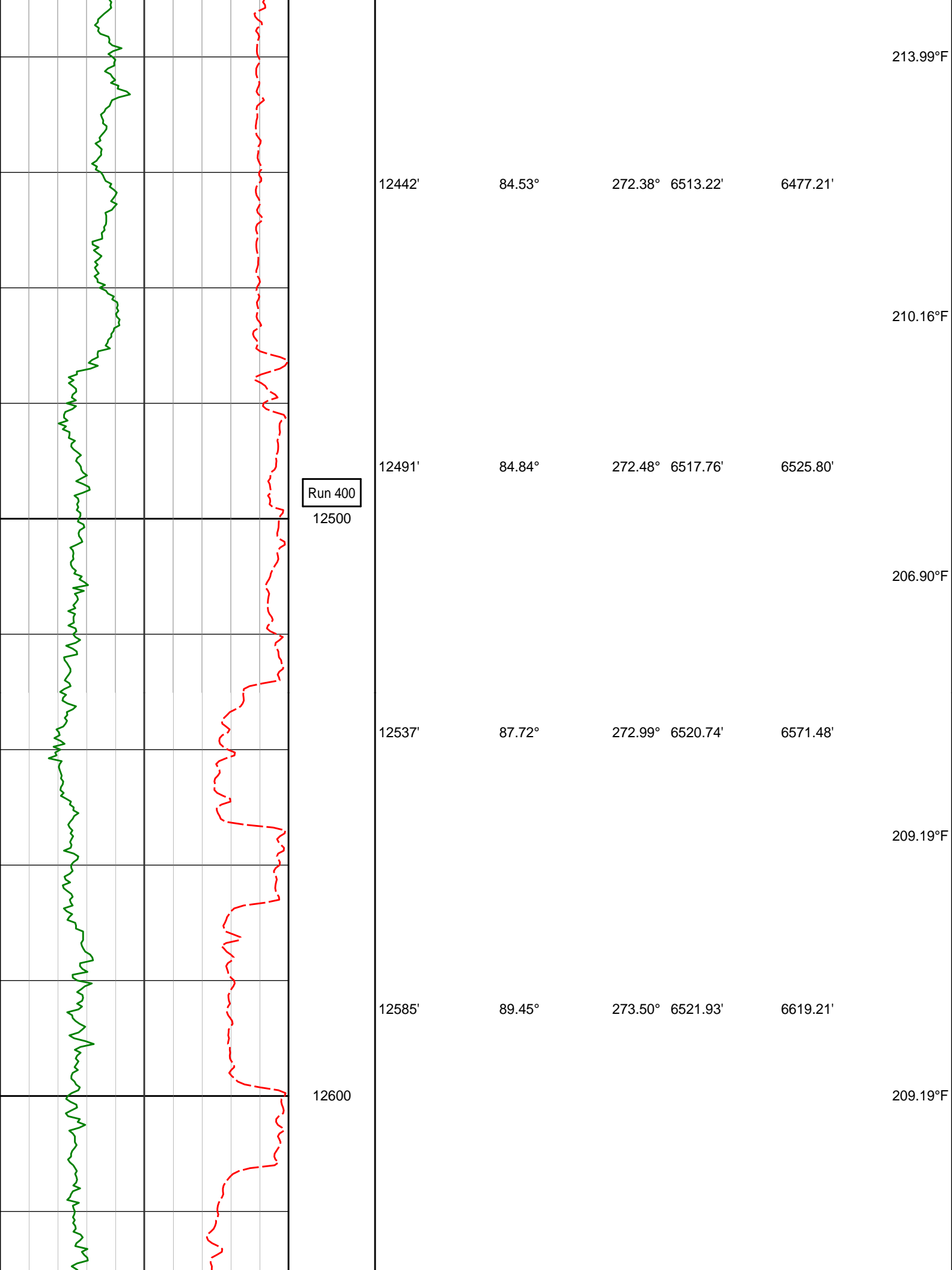
209.19°F

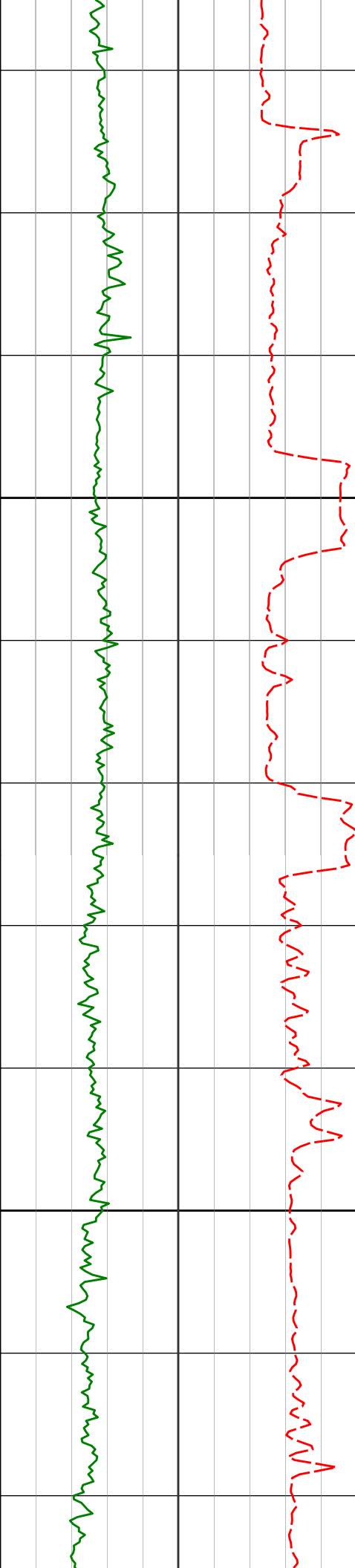
227.71°F

235.04°F

209.19°F

209.19°F

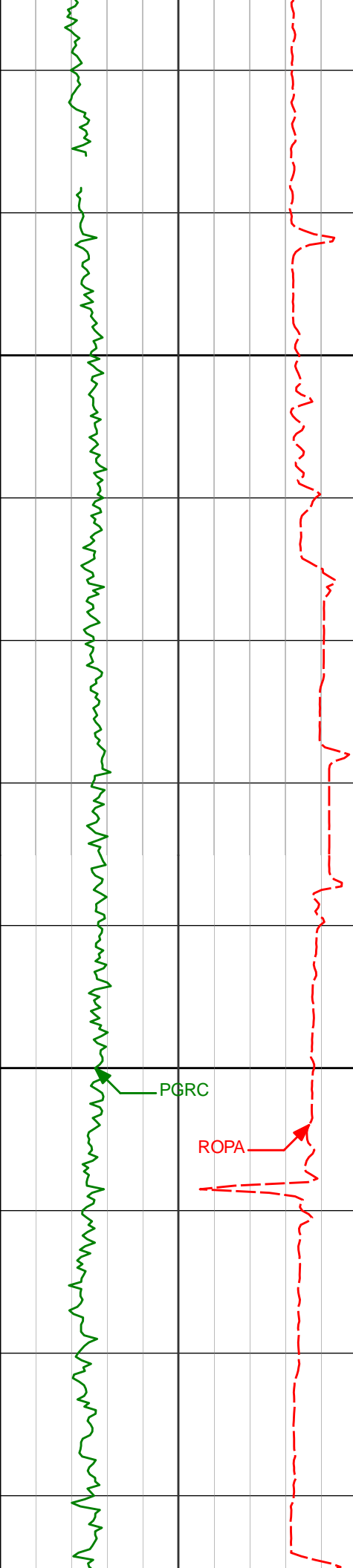




12700

12800

12632'	90.40°	272.54°	6521.99'	6665.97'	
					209.19°F
12680'	90.03°	271.61°	6521.81'	6713.80'	
					209.61°F
12726'	90.99°	270.29°	6521.40'	6759.70'	
					213.41°F
12774'	91.60°	269.96°	6520.31'	6807.62'	
					213.41°F
12821'	91.48°	269.76°	6519.05'	6854.56'	
					213.84°F



Run 600

13000

12900

PGRC

ROPA

12869'

91.73°

269.44°

6517.71'

6902.50'

217.36°F

12915'

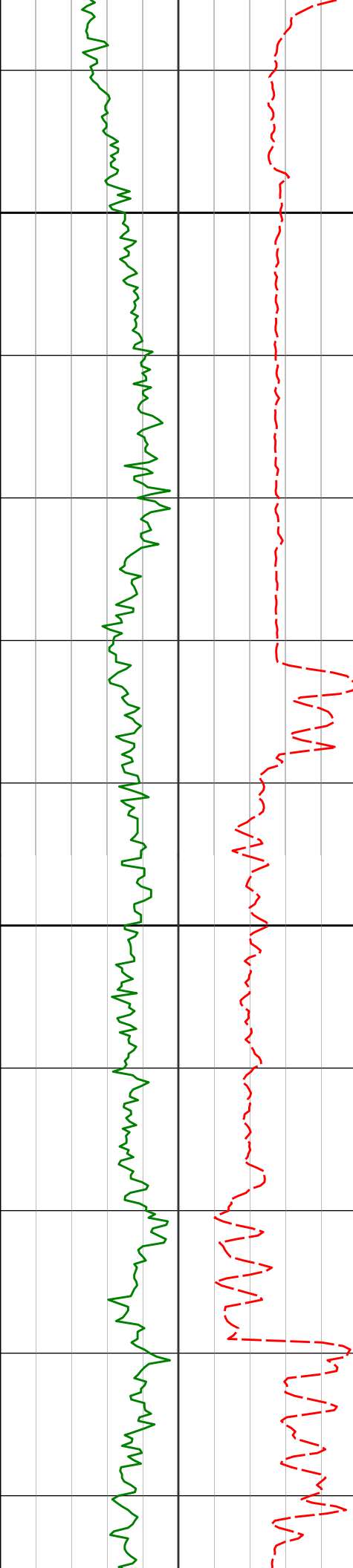
91.60°

268.58°

6516.37'

6948.46'

214.23°F



13100

13104'

91.39°

267.43° 6511.44'

7137.37'

13200

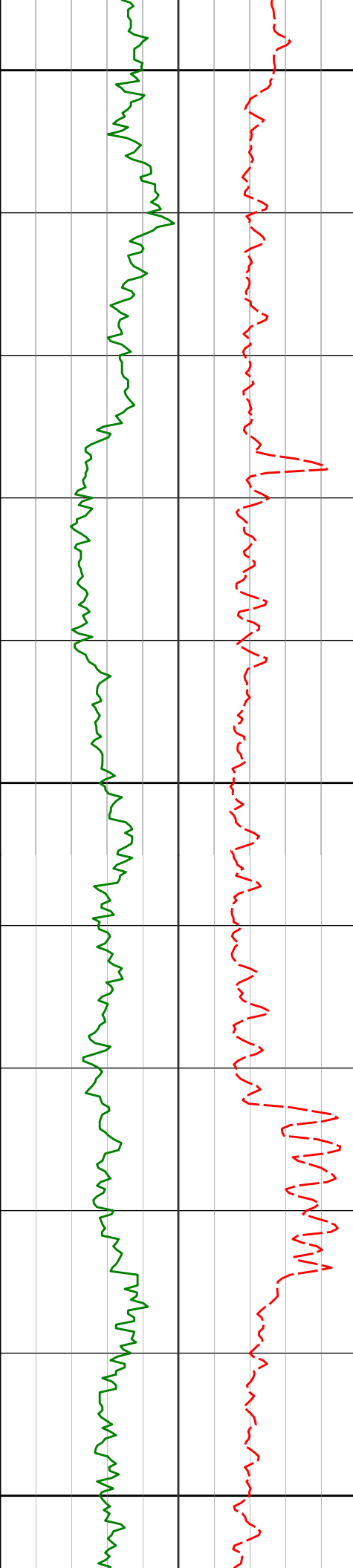
13199'

92.22°

267.91° 6508.45'

7232.32'

217.63°F



13300

13400

13500

13293'

13388'

91.51°

91.97°

270.12° 6505.39'

269.49° 6502.50'

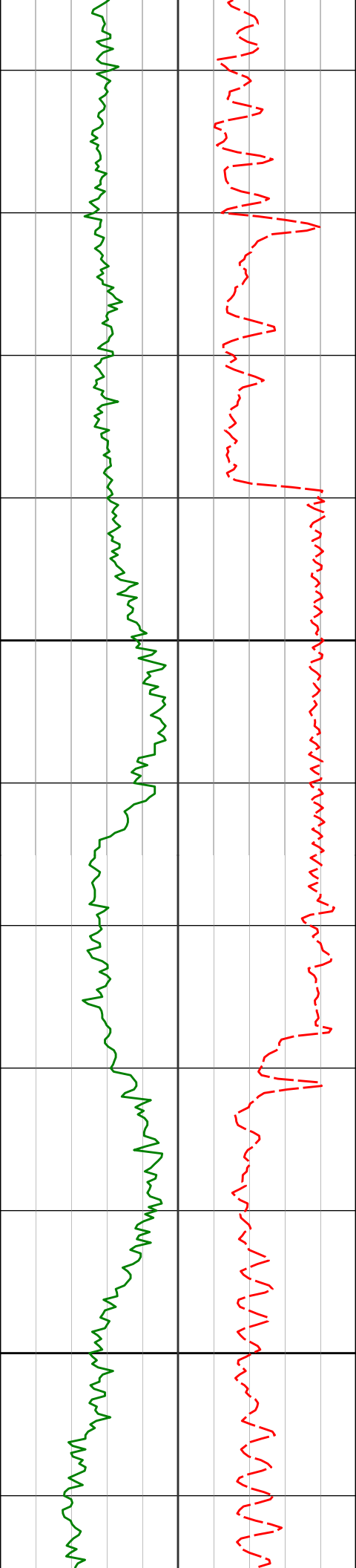
7326.22'

7421.08'

221.84°F

221.84°F

221.84°F



13600

13700

13577'

90.89°

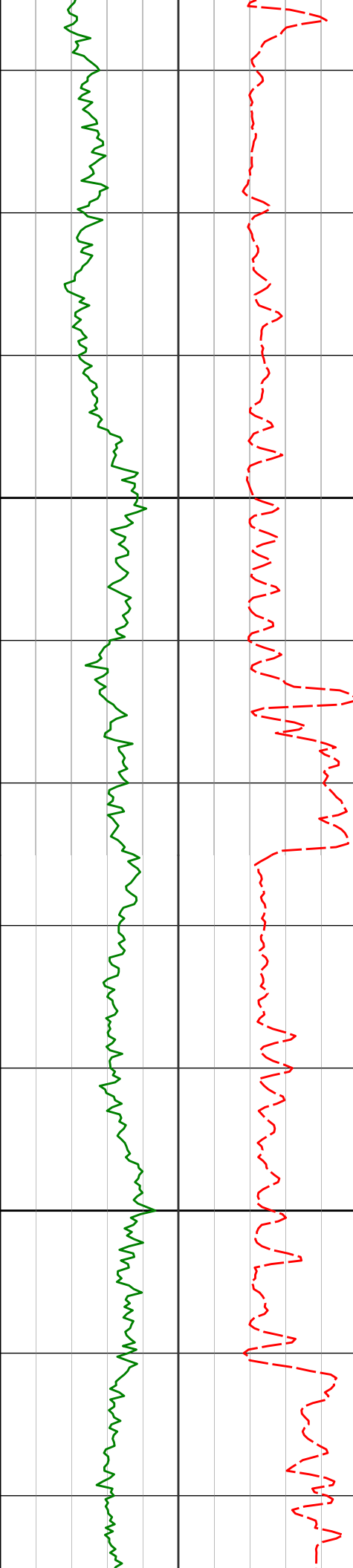
270.72° 6497.79'

7609.78'

221.84°F

221.84°F

221.84°F



13800

13900

13767'

92.19°

269.71° 6492.68'

7799.45'

221.84°F

221.84°F

13861'

91.91°

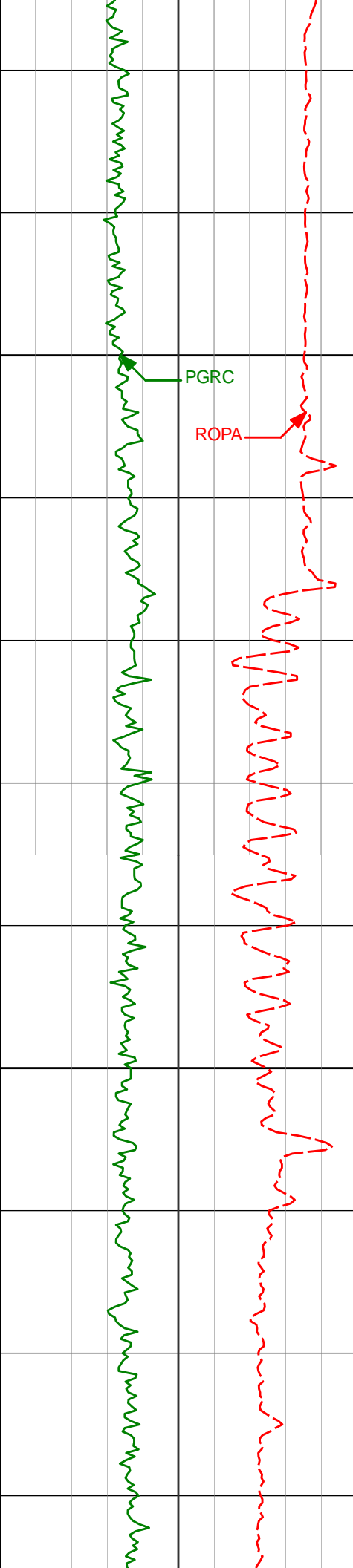
269.47° 6489.32'

7893.31'

221.84°F

221.84°F

207.22°F



14000

14100

13956'

90.52°

270.15° 6487.30'

7988.19'

124.81°F

221.84°F

14050'

90.46°

269.92° 6486.50'

8082.08'

221.84°F

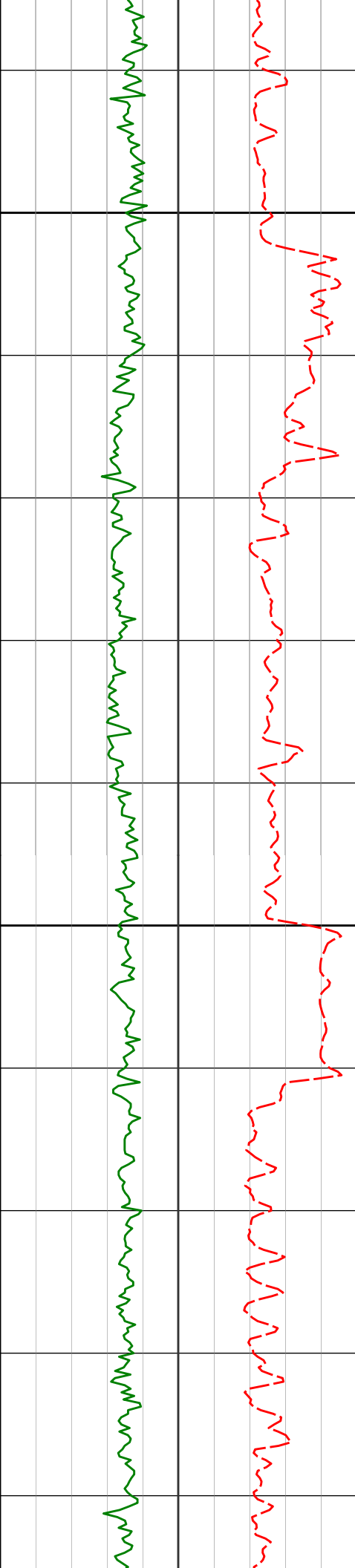
221.84°F

14145'

89.01°

268.64° 6486.94'

8177.02'



14200

14300

14239'

88.40°

271.85° 6489.06'

8270.85'

14334'

89.63°

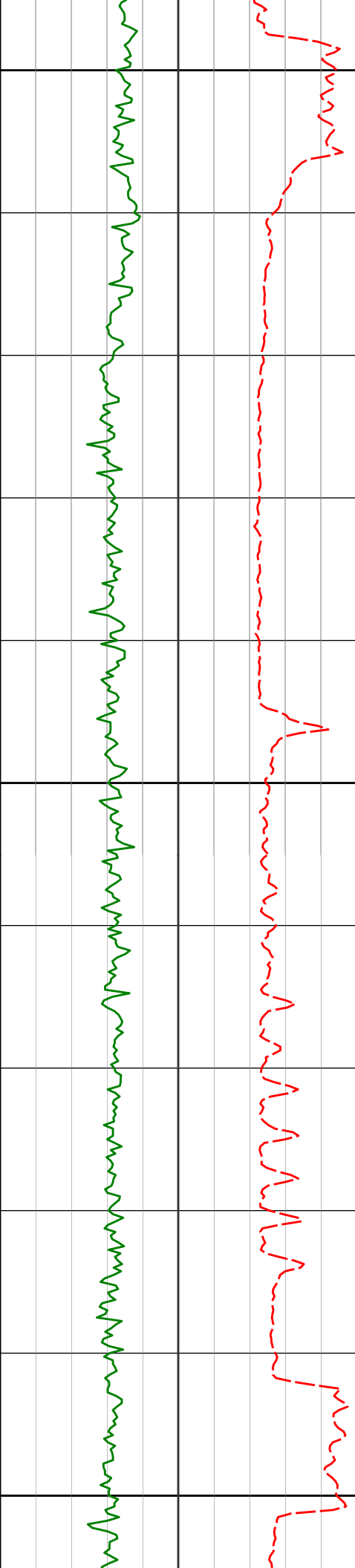
272.47° 6490.70'

8365.49'

221.84°F

221.84°F

221.84°F



14400

14429'

90.25°

271.80° 6490.80'

8460.14'

14500

14523'

89.35°

270.57° 6491.13'

8553.91'

14600

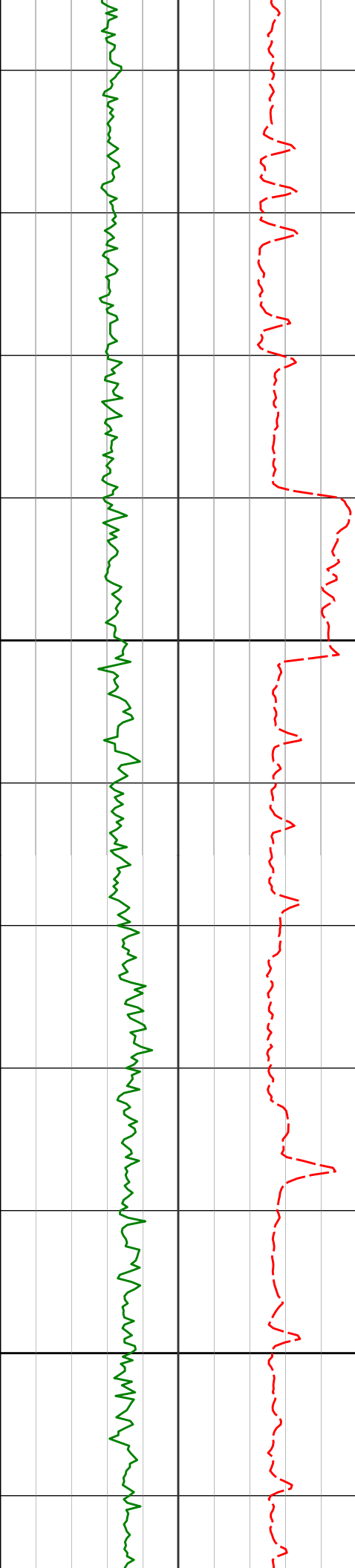
226.06°F

226.06°F

264.03°F

264.03°F

226.06°F



14700

14800

14618'

89.60°

270.63° 6492.00'

8648.75'

226.06°F

14712'

90.49°

270.39° 6491.92'

8742.59'

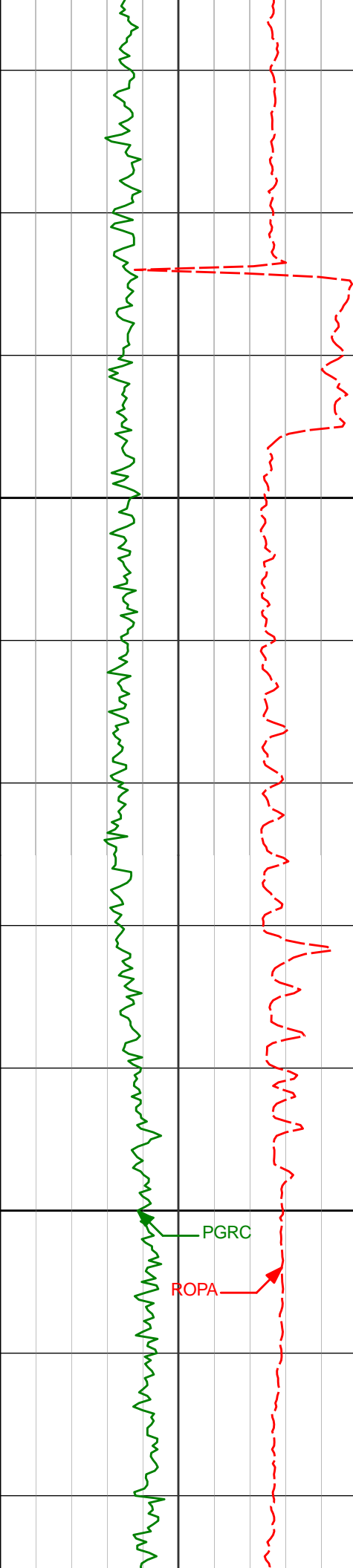
226.06°F

14807'

89.78°

269.79° 6491.70'

8837.48'



14900

14902'

90.28°

268.98° 6491.65'

8932.41'

230.28°F

15000

14996'

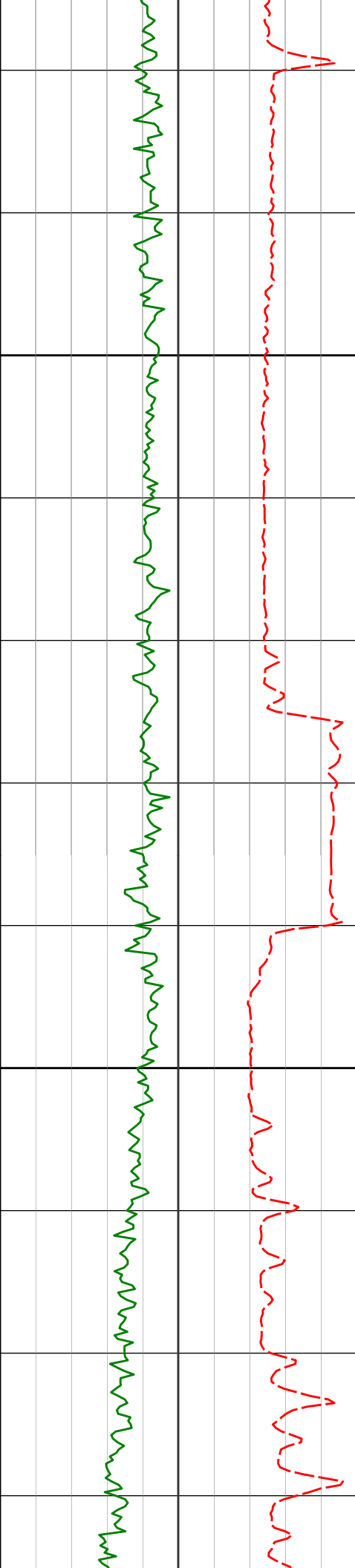
90.31°

269.13° 6491.16'

9026.36'

PGRC

ROPA



15100

15200

15091'

89.20°

267.85° 6491.57'

9121.33'

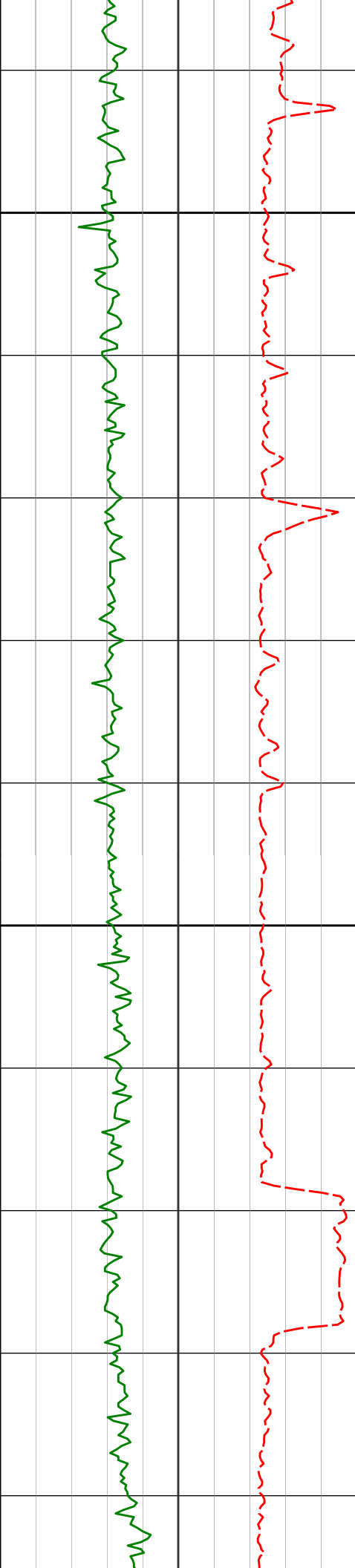
15186'

91.02°

270.84° 6491.39'

9216.26'

230.28°F



15300

15400

15280'

89.91°

269.88° 6490.63'

9310.11'

15375'

89.51°

270.73° 6491.11'

9404.98'

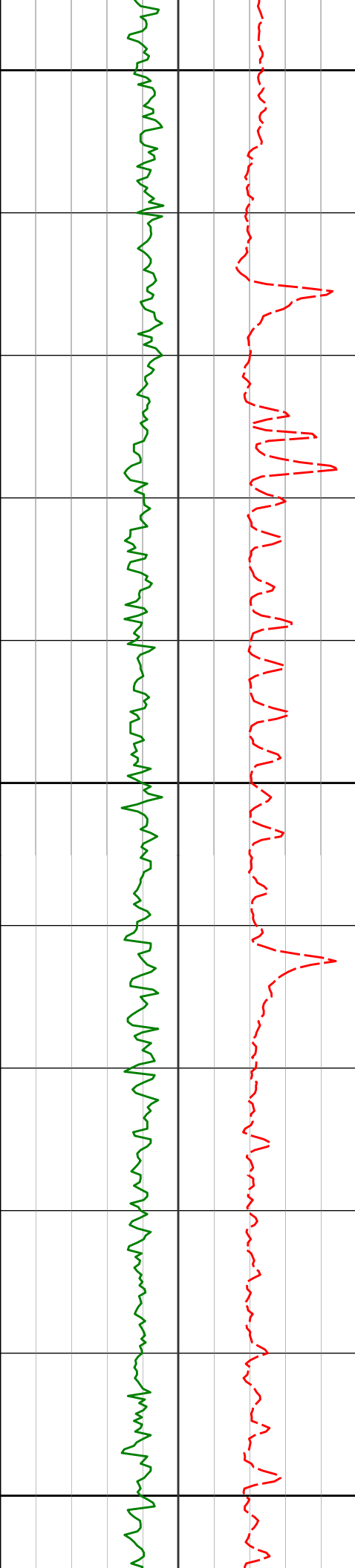
15469'

90.96°

272.06° 6490.72'

9498.72'

230.28°F



15500

15564'

90.43°

271.70° 6489.57'

9593.41'

230.28°F

15600

15659'

89.78°

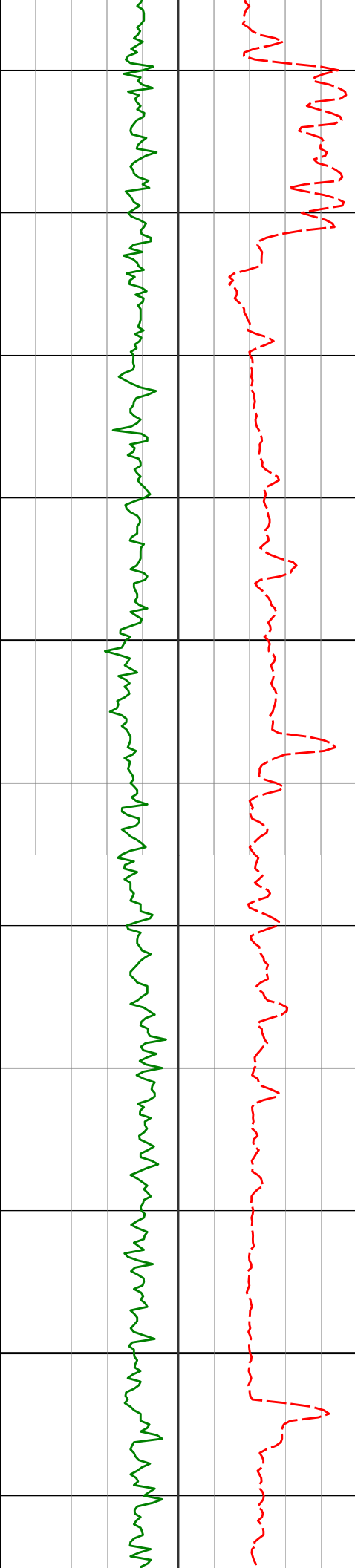
273.01° 6489.39'

9688.03'

234.50°F

15700

230.28°F



15753'

90.68°

272.21° 6489.02'

9781.61'

230.28°F

15800

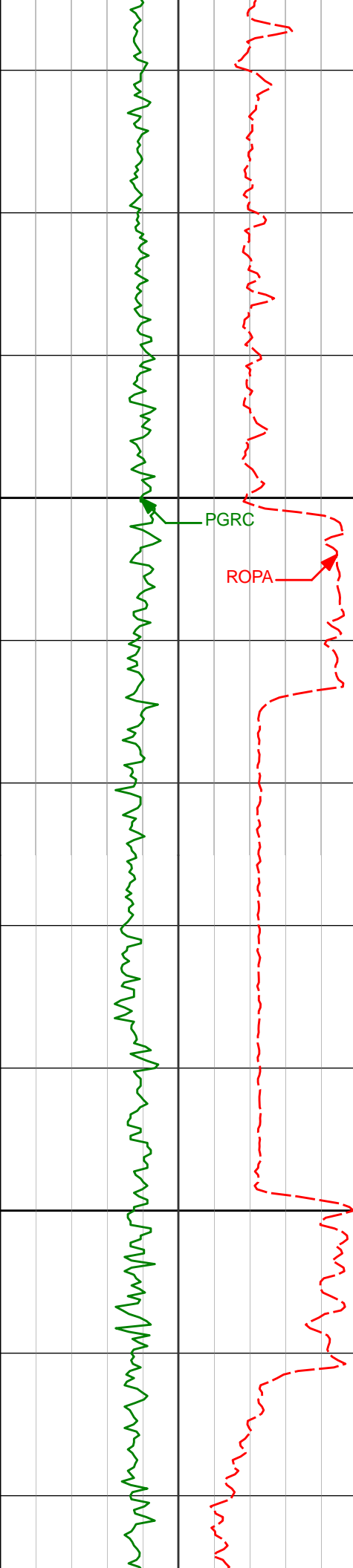
15848'

90.22°

271.73° 6488.27'

9876.29'

15900



16000

16100

15943'

89.32°

270.30° 6488.65'

9971.08'

16037'

91.54°

270.57° 6487.95'

10064.92'

16132'

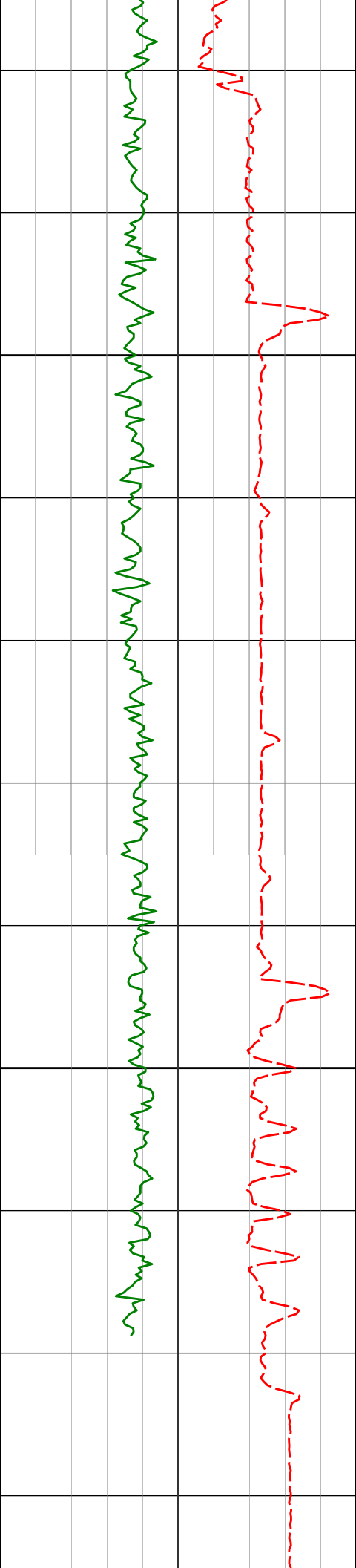
90.55°

268.85° 6486.21'

10159.82'

234.50°F

230.28°F



16200

16227'

89.78°

268.80° 6485.94'

10254.78'

16300

16326'

89.38°

269.10° 6486.67'

10353.73'

230.28°F

234.50°F

234.50°F

235.76°F

<div>TD Well @ 16386' MD</div>						<div>Projection to the Bit</div>					
						16386'	89.38°	269.10°	6487.32'	10413.70'	
						16400					
Avg Rate of Penetration ROPA feet per hr						Depth MD ft	Inc	Azi	TVD	V.S.	Temp
PCG Gamma Ray BCorr PGRC api											
						Depth	MD	ft			

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch BB01-615
Wattenburg
Weld Colorado
USA
CA-XX-0903054511

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
84.00	0.15	263.81	84.00	0.01 S	0.11 W	0.11	0.18
178.00	0.10	331.05	178.00	0.05 N	0.27 W	0.27	0.15
273.00	1.30	286.31	272.99	0.42 N	1.35 W	1.32	1.30
367.00	1.03	275.51	366.97	0.80 N	3.21 W	3.17	0.37
462.00	1.11	287.56	461.96	1.16 N	4.94 W	4.88	0.25
556.00	0.89	317.28	555.94	1.97 N	6.30 W	6.20	0.59
651.00	0.43	253.07	650.94	2.41 N	7.14 W	7.02	0.84
746.00	0.81	270.04	745.93	2.31 N	8.15 W	8.03	0.44
840.00	0.46	344.04	839.93	2.67 N	8.92 W	8.78	0.87
935.00	0.18	44.51	934.92	3.14 N	8.92 W	8.76	0.42
1029.00	0.28	141.11	1028.92	3.07 N	8.68 W	8.52	0.37
1124.00	0.41	124.32	1123.92	2.70 N	8.25 W	8.11	0.17
1219.00	0.25	144.77	1218.92	2.34 N	7.85 W	7.73	0.21
1313.00	0.19	136.11	1312.92	2.06 N	7.62 W	7.51	0.07
1407.00	0.32	63.27	1406.92	2.06 N	7.28 W	7.17	0.34
1502.00	0.46	94.89	1501.92	2.15 N	6.66 W	6.55	0.26
1597.00	0.61	51.96	1596.91	2.43 N	5.88 W	5.76	0.44
1691.00	0.90	53.61	1690.90	3.18 N	4.90 W	4.74	0.31
1786.00	0.74	43.49	1785.90	4.06 N	3.87 W	3.67	0.23
1880.00	0.91	285.30	1879.89	4.70 N	4.18 W	3.95	1.51
1937.00	1.46	256.10	1936.88	4.65 N	5.32 W	5.09	1.40
2216.00	2.69	252.81	2215.69	1.86 N	15.02 W	14.92	0.44
2307.00	1.86	269.85	2306.62	1.22 N	18.54 W	18.46	1.17
2398.00	2.47	268.31	2397.55	1.16 N	21.97 W	21.89	0.67
2490.00	1.19	253.91	2489.51	0.84 N	24.86 W	24.79	1.46
2680.00	0.47	196.85	2679.49	0.46 S	26.98 W	26.97	0.53
2774.00	0.25	336.86	2773.49	0.64 S	27.18 W	27.18	0.72
2868.00	0.53	10.03	2867.48	0.02 S	27.18 W	27.15	0.37
2963.00	0.20	8.09	2962.48	0.57 N	27.08 W	27.02	0.35
3058.00	0.93	101.98	3057.48	0.57 N	26.30 W	26.25	1.02
3152.00	1.94	136.52	3151.45	0.74 S	24.46 W	24.47	1.36
3247.00	1.49	110.47	3246.41	2.34 S	22.20 W	22.29	0.93
3436.00	2.94	99.24	3435.26	3.98 S	15.10 W	15.28	0.80
3531.00	2.48	82.59	3530.16	4.11 S	10.66 W	10.84	0.96
3625.00	2.68	32.93	3624.07	2.00 S	7.45 W	7.54	2.31
3720.00	2.70	310.39	3719.00	1.32 N	7.95 W	7.87	3.74
3815.00	2.75	281.79	3813.89	3.23 N	11.88 W	11.71	1.42
3909.00	2.70	267.65	3907.79	3.60 N	16.30 W	16.11	0.72

4004.00	2.32	246.74	4002.70	2.75 N	20.30 W	20.14	1.03
4098.00	1.20	162.79	4096.67	1.05 N	21.75 W	21.68	2.66
4193.00	2.71	138.85	4191.61	1.59 S	19.98 W	20.04	1.77
4288.00	1.91	148.97	4286.53	4.64 S	17.69 W	17.89	0.93
4382.00	0.81	248.60	4380.51	6.23 S	17.50 W	17.77	2.34
4477.00	0.82	270.71	4475.50	6.46 S	18.80 W	19.09	0.33
4572.00	2.31	303.07	4570.47	5.41 S	21.09 W	21.32	1.76
4666.00	3.65	250.69	4664.35	5.37 S	25.50 W	25.73	3.08
4761.00	5.02	223.44	4759.09	9.39 S	31.21 W	31.63	2.56
4855.00	5.54	219.04	4852.69	15.89 S	36.90 W	37.62	0.70
4950.00	5.42	220.22	4947.26	22.88 S	42.68 W	43.73	0.17
5045.00	5.39	210.48	5041.83	30.15 S	47.84 W	49.24	0.97
5139.00	6.36	211.23	5135.34	38.41 S	52.78 W	54.56	1.04
5234.00	9.02	214.48	5229.48	49.05 S	59.73 W	62.01	2.84
5329.00	8.56	219.50	5323.36	60.65 S	68.44 W	71.27	0.94
5423.00	9.65	216.90	5416.18	72.35 S	77.62 W	81.00	1.24
5518.00	10.38	227.01	5509.74	84.56 S	88.67 W	92.62	2.00
5606.00	10.69	232.08	5596.25	94.98 S	100.91 W	105.35	1.11
5701.00	14.91	247.60	5688.90	105.06 S	119.17 W	124.07	5.69
5796.00	20.85	253.13	5779.28	114.63 S	146.67 W	152.01	6.50
5890.00	26.74	251.20	5865.25	126.31 S	182.73 W	188.58	6.32
5985.00	32.00	250.16	5948.01	141.75 S	226.67 W	233.21	5.56
6079.00	36.69	250.34	6025.60	159.66 S	276.58 W	283.92	4.99
6174.00	41.50	250.25	6099.31	179.86 S	332.96 W	341.20	5.06
6268.00	47.18	249.92	6166.51	202.24 S	394.70 W	403.95	6.05
6363.00	52.79	249.80	6227.57	227.28 S	462.98 W	473.35	5.91
6457.00	58.30	249.44	6280.73	254.27 S	535.61 W	547.19	5.87
6552.00	62.59	248.61	6327.58	283.86 S	612.74 W	625.66	4.58
6646.00	67.72	250.59	6367.07	313.55 S	692.67 W	706.92	5.78
6741.00	70.81	253.23	6400.70	341.11 S	777.12 W	792.59	4.16
6835.00	76.23	255.97	6427.36	365.01 S	863.98 W	880.50	6.41
6930.00	81.26	260.81	6445.91	383.71 S	955.20 W	972.51	7.28
7025.00	85.30	264.14	6457.03	396.05 S	1048.70 W	1066.50	5.50
7119.00	87.22	265.41	6463.16	404.59 S	1142.11 W	1160.20	2.45
7214.00	87.28	265.90	6467.72	411.78 S	1236.72 W	1255.06	0.52
7308.00	87.78	265.97	6471.77	418.44 S	1330.40 W	1348.94	0.54
7403.00	88.39	266.14	6474.94	424.97 S	1425.12 W	1443.87	0.67
7498.00	89.01	266.62	6477.10	430.97 S	1519.91 W	1538.83	0.83
7592.00	89.63	267.12	6478.21	436.10 S	1613.76 W	1632.82	0.85
7687.00	89.38	267.97	6479.03	440.17 S	1708.67 W	1727.82	0.93
7781.00	90.49	268.74	6479.14	442.87 S	1802.63 W	1821.80	1.44
7876.00	89.38	267.95	6479.25	445.61 S	1897.58 W	1916.78	1.43
7970.00	90.31	268.28	6479.50	448.71 S	1991.53 W	2010.77	1.05
8065.00	89.88	267.43	6479.34	452.26 S	2086.46 W	2105.76	1.00
8160.00	90.25	268.48	6479.24	455.65 S	2181.40 W	2200.75	1.17
8255.00	91.05	269.79	6478.16	457.09 S	2276.38 W	2295.69	1.62
8349.00	91.30	270.48	6476.23	456.86 S	2370.36 W	2389.55	0.78
8444.00	91.36	270.44	6474.03	456.10 S	2465.33 W	2484.38	0.08
8538.00	90.37	269.68	6472.61	456.00 S	2559.32 W	2578.25	1.33
8633.00	90.37	270.58	6471.99	455.79 S	2654.32 W	2673.13	0.95
8728.00	88.76	270.26	6472.71	455.09 S	2749.31 W	2767.98	1.73
8822.00	88.27	270.61	6475.15	454.38 S	2843.27 W	2861.80	0.64
8917.00	88.70	270.82	6477.66	453.19 S	2938.23 W	2956.59	0.50
9011.00	89.20	270.86	6479.38	451.82 S	3032.21 W	3050.39	0.53
9106.00	89.44	270.91	6480.51	450.35 S	3127.19 W	3145.19	0.26
9201.00	89.38	271.56	6481.49	448.30 S	3222.16 W	3239.96	0.69
9295.00	89.81	272.06	6482.16	445.33 S	3316.11 W	3333.66	0.70
9389.00	89.07	270.53	6483.07	443.21 S	3410.08 W	3427.42	1.81
9484.00	89.63	270.89	6484.15	442.03 S	3505.07 W	3522.24	0.70
9579.00	89.63	270.64	6484.77	440.76 S	3600.05 W	3617.06	0.26
9673.00	89.51	270.42	6485.47	439.89 S	3694.05 W	3710.90	0.27
9767.00	90.12	269.84	6485.77	439.68 S	3788.05 W	3804.78	0.90
9862.00	89.14	266.63	6486.39	442.61 S	3882.99 W	3899.75	3.53
9957.00	89.69	266.65	6487.36	448.17 S	3977.82 W	3994.74	0.58
10051.00	89.75	268.16	6487.82	452.43 S	4071.72 W	4088.73	1.61
10146.00	89.26	270.74	6488.64	453.34 S	4166.70 W	4183.65	2.76
10240.00	90.06	270.31	6489.20	452.48 S	4260.69 W	4277.50	0.97
10335.00	89.51	269.42	6489.55	452.70 S	4355.69 W	4372.40	1.10
10429.00	89.44	269.08	6490.41	453.93 S	4449.68 W	4466.33	0.37
10524.00	88.89	268.34	6491.80	456.07 S	4544.64 W	4561.29	0.97
10618.00	90.49	268.74	6492.31	458.47 S	4638.61 W	4655.26	1.75
10713.00	91.17	268.83	6490.93	460.48 S	4733.58 W	4750.22	0.72
10807.00	90.99	268.38	6489.16	462.77 S	4827.53 W	4844.18	0.52
10902.00	91.17	268.19	6487.37	465.61 S	4922.47 W	4939.14	0.28

10996.00	90.86	267.79	6485.70	468.91 S	5016.40 W	5033.12	0.54
11091.00	89.81	267.83	6485.15	472.54 S	5111.33 W	5128.11	1.11
11185.00	89.81	268.65	6485.46	475.43 S	5205.28 W	5222.10	0.87
11280.00	89.20	268.27	6486.28	477.98 S	5300.24 W	5317.07	0.76
11374.00	89.75	267.97	6487.14	481.06 S	5394.19 W	5411.06	0.67
11469.00	89.69	267.73	6487.61	484.63 S	5489.12 W	5506.05	0.26
11563.00	90.00	267.04	6487.86	488.92 S	5583.02 W	5600.05	0.80
11658.00	89.88	267.25	6487.96	493.65 S	5677.90 W	5695.05	0.25
11752.00	89.51	268.17	6488.46	497.40 S	5771.83 W	5789.04	1.05
11847.00	89.26	268.02	6489.48	500.56 S	5866.77 W	5884.03	0.31
11942.00	89.07	269.03	6490.86	503.01 S	5961.73 W	5978.99	1.08
12036.00	88.77	269.48	6492.64	504.23 S	6055.70 W	6072.92	0.58
12131.00	89.01	270.83	6494.48	503.97 S	6150.68 W	6167.78	1.44
12167.00	88.61	270.79	6495.22	503.46 S	6186.67 W	6203.70	1.12
12259.00	86.60	271.63	6499.07	501.52 S	6278.56 W	6295.39	2.37
12442.00	84.53	272.38	6513.22	495.14 S	6460.89 W	6477.21	1.20
12491.00	84.84	272.48	6517.76	493.07 S	6509.64 W	6525.80	0.66
12537.00	87.72	272.99	6520.74	490.88 S	6555.48 W	6571.48	6.36
12585.00	89.45	273.50	6521.93	488.17 S	6603.39 W	6619.21	3.76
12632.00	90.40	272.54	6521.99	485.69 S	6650.32 W	6665.97	2.87
12680.00	90.03	271.61	6521.81	483.95 S	6698.29 W	6713.80	2.09
12726.00	90.99	270.29	6521.40	483.19 S	6744.28 W	6759.70	3.55
12774.00	91.60	269.96	6520.31	483.08 S	6792.27 W	6807.62	1.44
12821.00	91.48	269.76	6519.05	483.20 S	6839.25 W	6854.56	0.50
12869.00	91.73	269.44	6517.71	483.53 S	6887.23 W	6902.50	0.85
12915.00	91.60	268.58	6516.37	484.33 S	6933.20 W	6948.46	1.89
13104.00	91.39	267.43	6511.44	490.91 S	7122.02 W	7137.37	0.62
13199.00	92.22	267.91	6508.45	494.77 S	7216.89 W	7232.32	1.01
13293.00	91.51	270.12	6505.39	496.38 S	7310.82 W	7326.22	2.47
13388.00	91.97	269.49	6502.50	496.70 S	7405.78 W	7421.08	0.82
13577.00	90.89	270.72	6497.79	496.36 S	7594.71 W	7609.78	0.79
13767.00	92.19	269.71	6492.68	495.65 S	7784.64 W	7799.45	0.87
13861.00	91.91	269.47	6489.32	496.32 S	7878.57 W	7893.31	0.39
13956.00	90.52	270.15	6487.30	496.63 S	7973.55 W	7988.19	1.63
14050.00	90.46	269.92	6486.50	496.57 S	8067.55 W	8082.08	0.25
14145.00	89.01	268.64	6486.94	497.77 S	8162.53 W	8177.02	2.04
14239.00	88.40	271.85	6489.06	497.37 S	8256.50 W	8270.85	3.48
14334.00	89.63	272.47	6490.70	493.79 S	8351.41 W	8365.49	1.45
14429.00	90.25	271.80	6490.80	490.25 S	8446.34 W	8460.14	0.96
14523.00	89.35	270.57	6491.13	488.30 S	8540.32 W	8553.91	1.62
14618.00	89.60	270.63	6492.00	487.31 S	8635.31 W	8648.75	0.27
14712.00	90.49	270.39	6491.92	486.47 S	8729.31 W	8742.59	0.98
14807.00	89.78	269.79	6491.70	486.32 S	8824.31 W	8837.48	0.98
14902.00	90.28	268.98	6491.65	487.34 S	8919.30 W	8932.41	1.00
14996.00	90.31	269.13	6491.16	488.89 S	9013.29 W	9026.36	0.16
15091.00	89.20	267.85	6491.57	491.40 S	9108.25 W	9121.33	1.78
15186.00	91.02	270.84	6491.39	492.48 S	9203.23 W	9216.26	3.68
15280.00	89.91	269.88	6490.63	491.89 S	9297.22 W	9310.11	1.56
15375.00	89.51	270.73	6491.11	491.39 S	9392.22 W	9404.98	0.99
15469.00	90.96	272.06	6490.72	489.10 S	9486.18 W	9498.72	2.09
15564.00	90.43	271.70	6489.57	485.98 S	9581.12 W	9593.41	0.67
15659.00	89.78	273.01	6489.39	482.08 S	9676.04 W	9688.03	1.54
15753.00	90.68	272.21	6489.02	477.80 S	9769.94 W	9781.61	1.28
15848.00	90.22	271.73	6488.27	474.53 S	9864.88 W	9876.29	0.70
15943.00	89.32	270.30	6488.65	472.85 S	9959.86 W	9971.08	1.78
16037.00	91.54	270.57	6487.95	472.14 S	10053.85 W	10064.92	2.38
16132.00	90.55	268.85	6486.21	472.62 S	10148.83 W	10159.82	2.09
16227.00	89.78	268.80	6485.94	474.57 S	10243.81 W	10254.78	0.81
16326.00	89.38	269.10	6486.67	476.38 S	10342.79 W	10353.73	0.51
16386.00	89.38	269.10	6487.32	477.32 S	10402.78 W	10413.70	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 267.25 DEGREES (GRID)
A TOTAL CORRECTION OF 7.30 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16386.00 FEET
IS 10413.72 FEET ALONG 267.37 DEGREES (GRID)

Tied onto Surface @ 1937'. Surveys from 5606' to TD have IFR correction applied. Final Survey is a Straight Line Projection to the Bit

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