



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	24-Sep-15	29-Sep-15			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	623.00	6,975.00			
Log End Depth (MD, ft)	6,975.00	16,122.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	23-Sep-15 03:30	24-Sep-15 02:30			
Drill/Wipe End Date and Time	24-Sep-15 02:20	24-Sep-15 17:00			
Min Inc (deg) @ Depth (MD, ft)	0.15 @ 1,953.00	87.84 @ 13,464.00			
Max Inc (deg) @ Depth (MD, ft)	88.00 @ 6,975.00	93.21 @ 10,373.00			
Bit TFA(in2) / Bit Type	1.04 / PDC	0.98 / PDC			
Flow Rate (gpm)	591.94	318.82			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	10.60 / 28.00	9.80 / 33.00			
Filtrate CL (ppm)	1,900.00	2,500.00			
pH / Fluid Loss (mptm)	9.60 / 62	9.00 / 36			
PV (cP) / YP (lbf2)	2 / 3.00	10 / 9.00			
% Solids / % Sand	3.40 / 0.15	8.2 / .10			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (degF) @ Depth (MD, ft)	478.75 @ 6,975.00	340.00 @ 10,373.00			

Max Tool Temp (degF) / Source	172.78 / PCM	242.28 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler			
Customer Representative	Cliff Kester	Cliff Kester			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11404299	12334773			
Insert Serial Number	11055866	11055866			
Date and Time Initialized	22-Sep-15 20:12	24-Sep-15 19:25			
Date and Time Read	24-Sep-15 07:22	29-Sep-15 09:00			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	65.00	67.00			
Software Version	6.33	6.33			
Sub Serial Number	11404299	12334773			
Sonde Serial Number	11062113	11062113			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	331.90	86.20			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	58.06	60.59			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404299	12334773			
Insert/Sonde Serial Number	11293345	11293345			

REMARKS

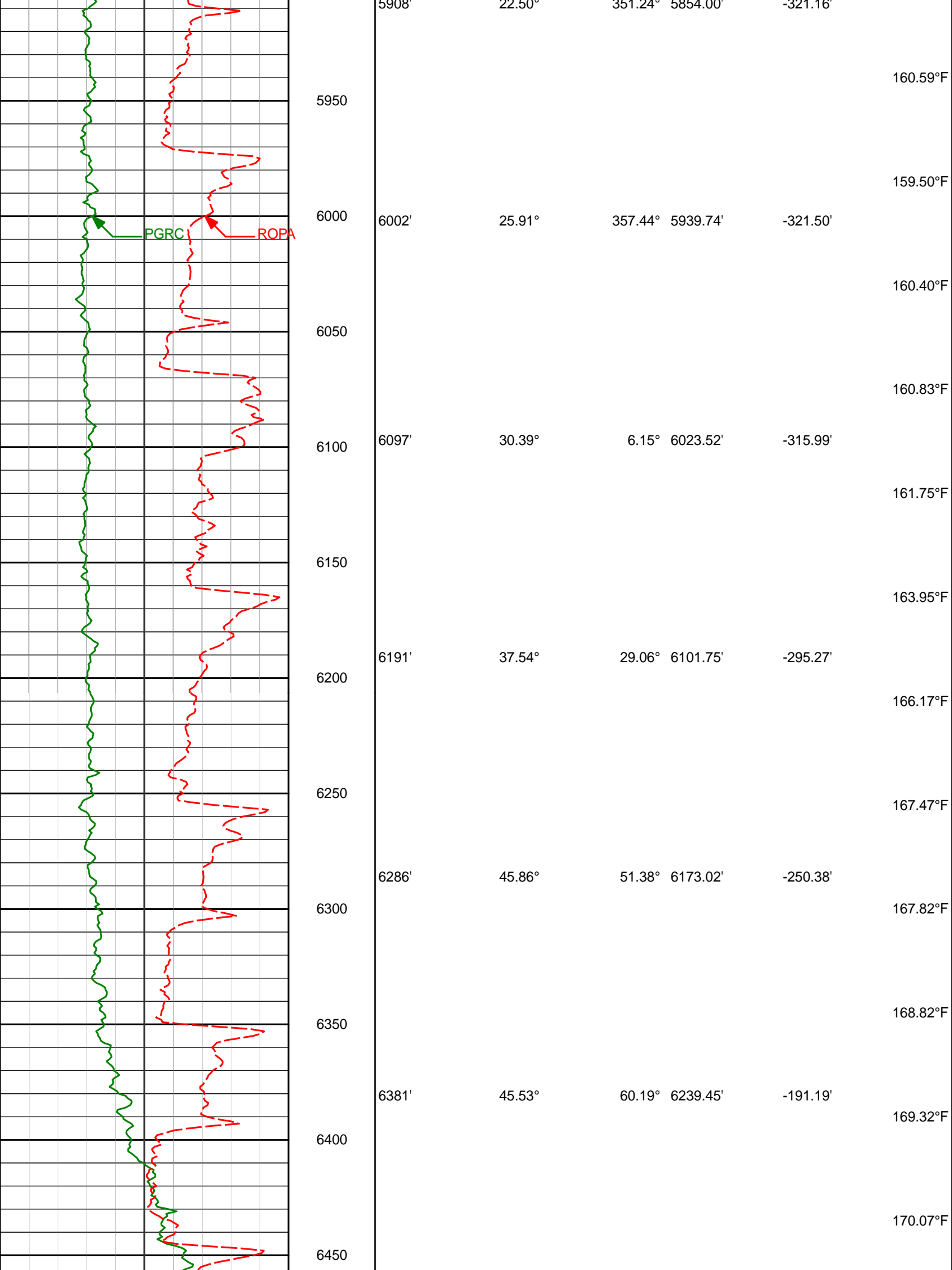
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:
Hole Size: 6.125"
Mud Density: 9.9-10.3
5. The following smoothing parameters have been applied to the data:
1: 600 (2"):
Interval: 1.0 ft
Coercion Distance: 3.0 ft (ROPA)
Interval: 1.0 ft
Coercion Distance: 3.0 ft (Gamma Ray)
1: 240 (5")
Interval: 0.5 ft
Coercion Distance: 1.2 ft (ROPA)
Interval: 0.5 ft
Coercion Distance: 0.6 ft (Gamma Ray)

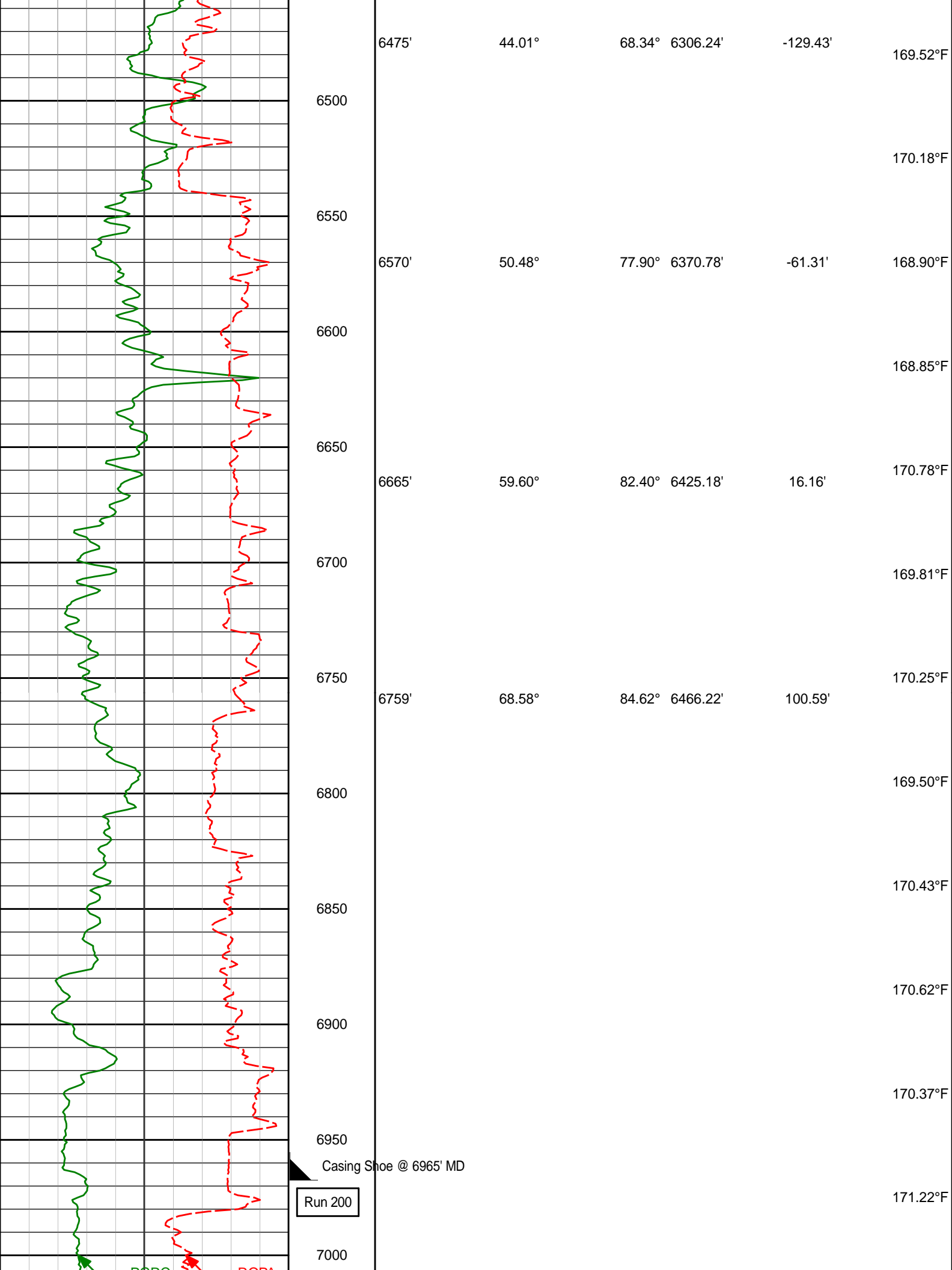
WARRANTY

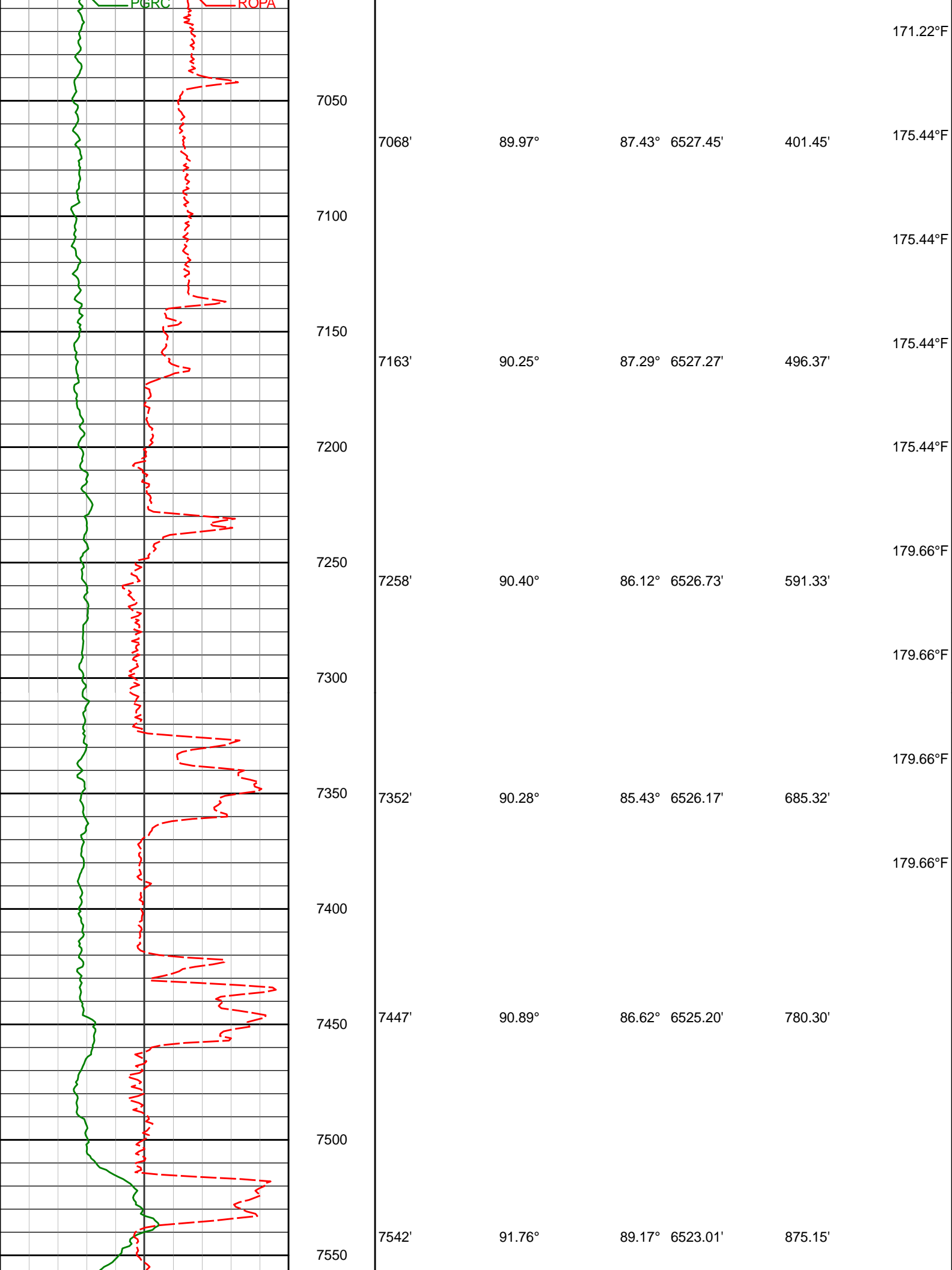
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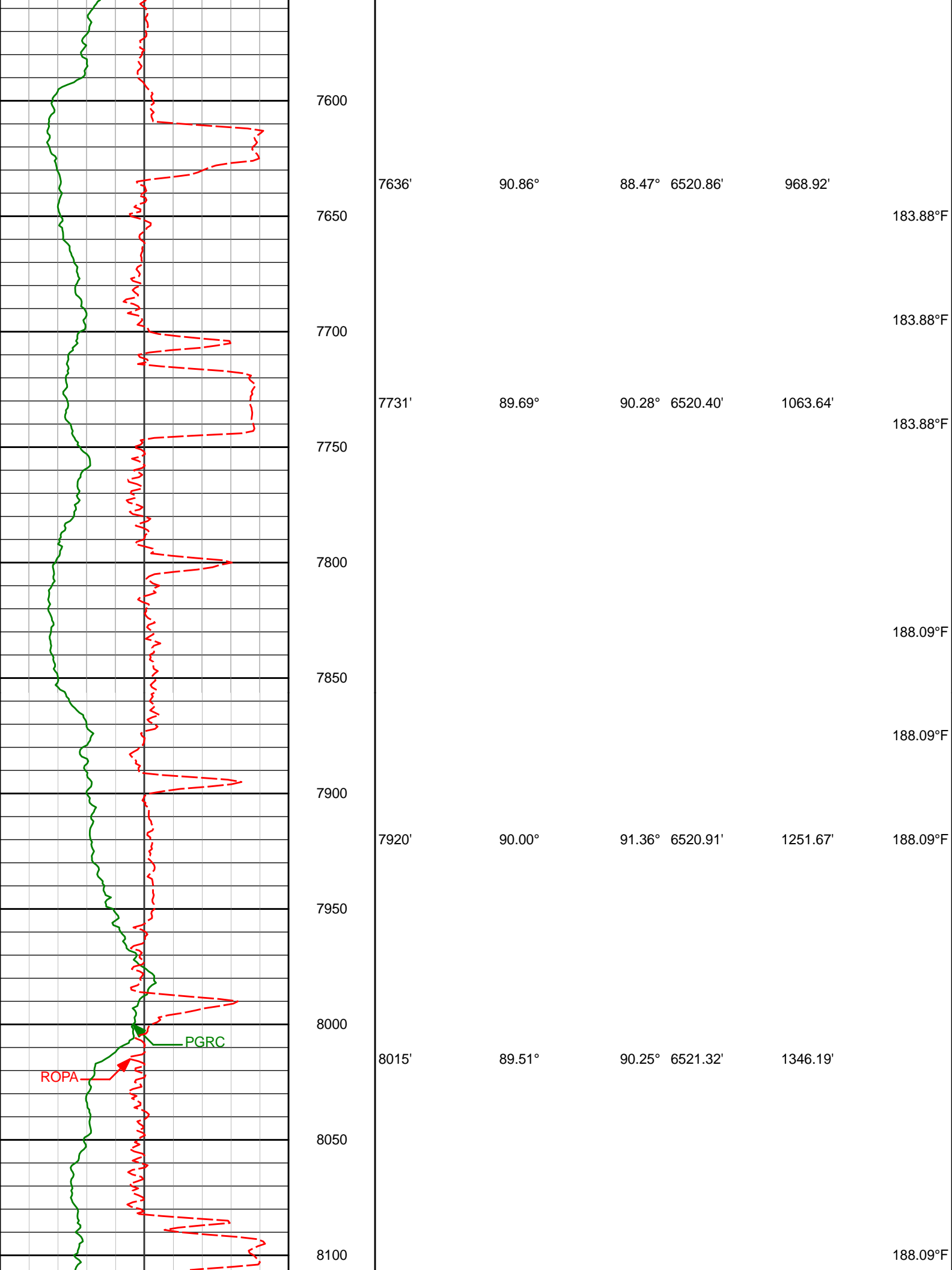
MD Detail 1:600 Scale

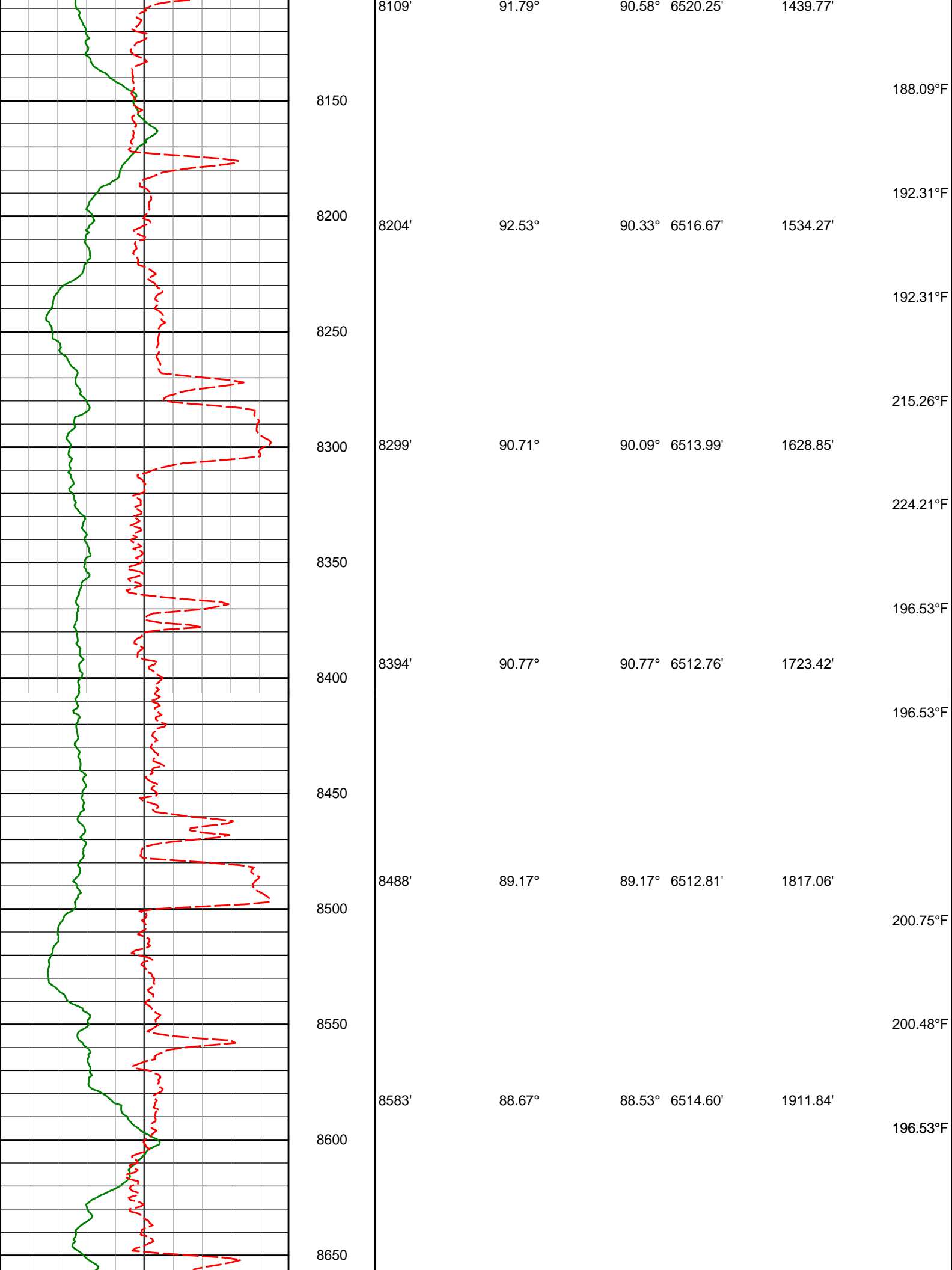
PCG Gamma Ray BCorr PGRC api										
0300										
Avg Rate of Penetration ROPA feet per hr				Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K0					5624'	12.12°	310.94°	5587.07'	-300.24'	149.45°F
				5650						
				<KOP>						151.38°F
				5700						
					5719'	20.44°	340.67°	5678.33'	-311.33'	151.77°F
				5750						
										155.08°F
				5800						
					5813'	21.83°	347.59°	5766.02'	-317.67'	157.36°F
				5850						
										156.13°F
				5900						
										158.84°F

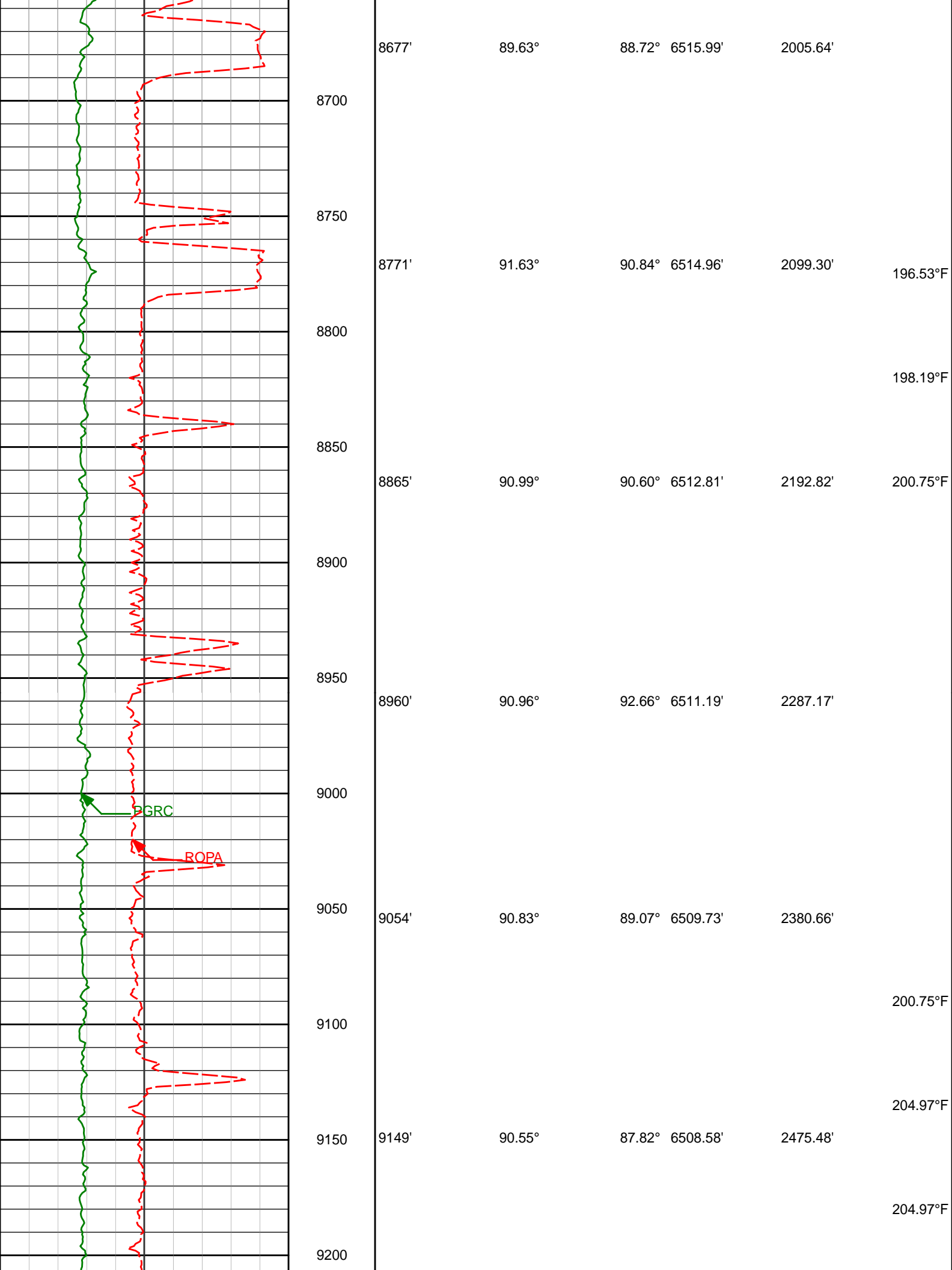


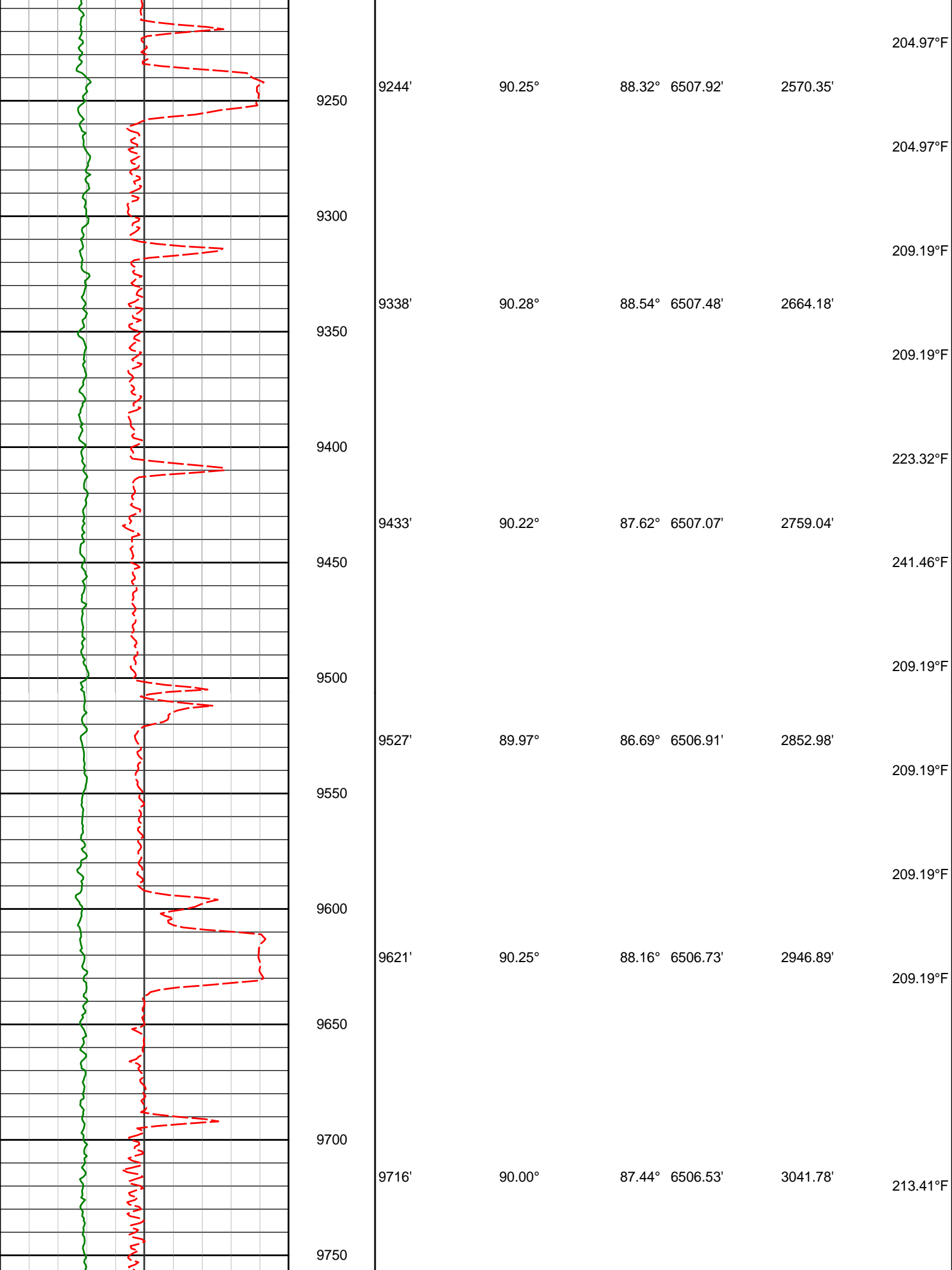


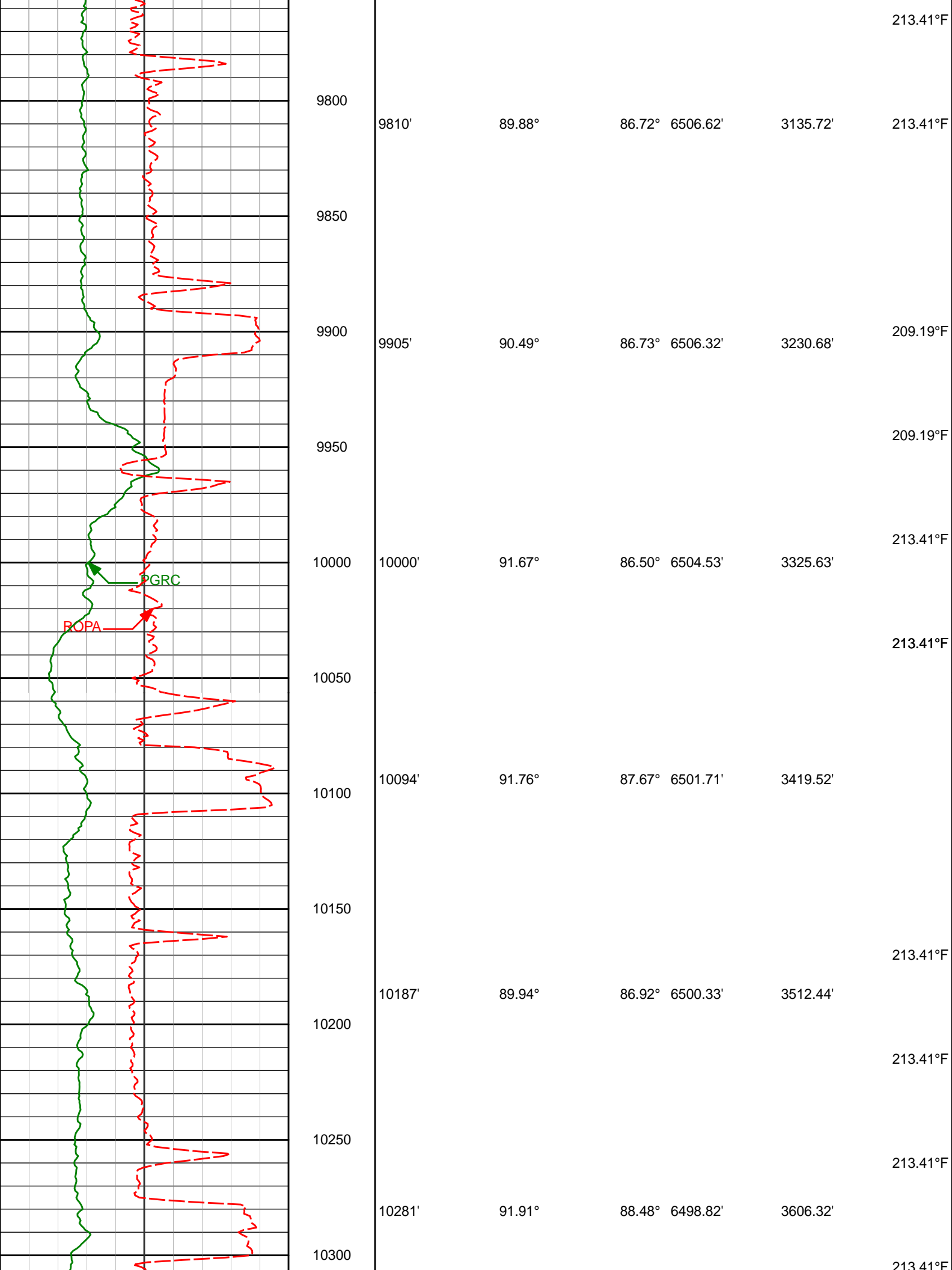


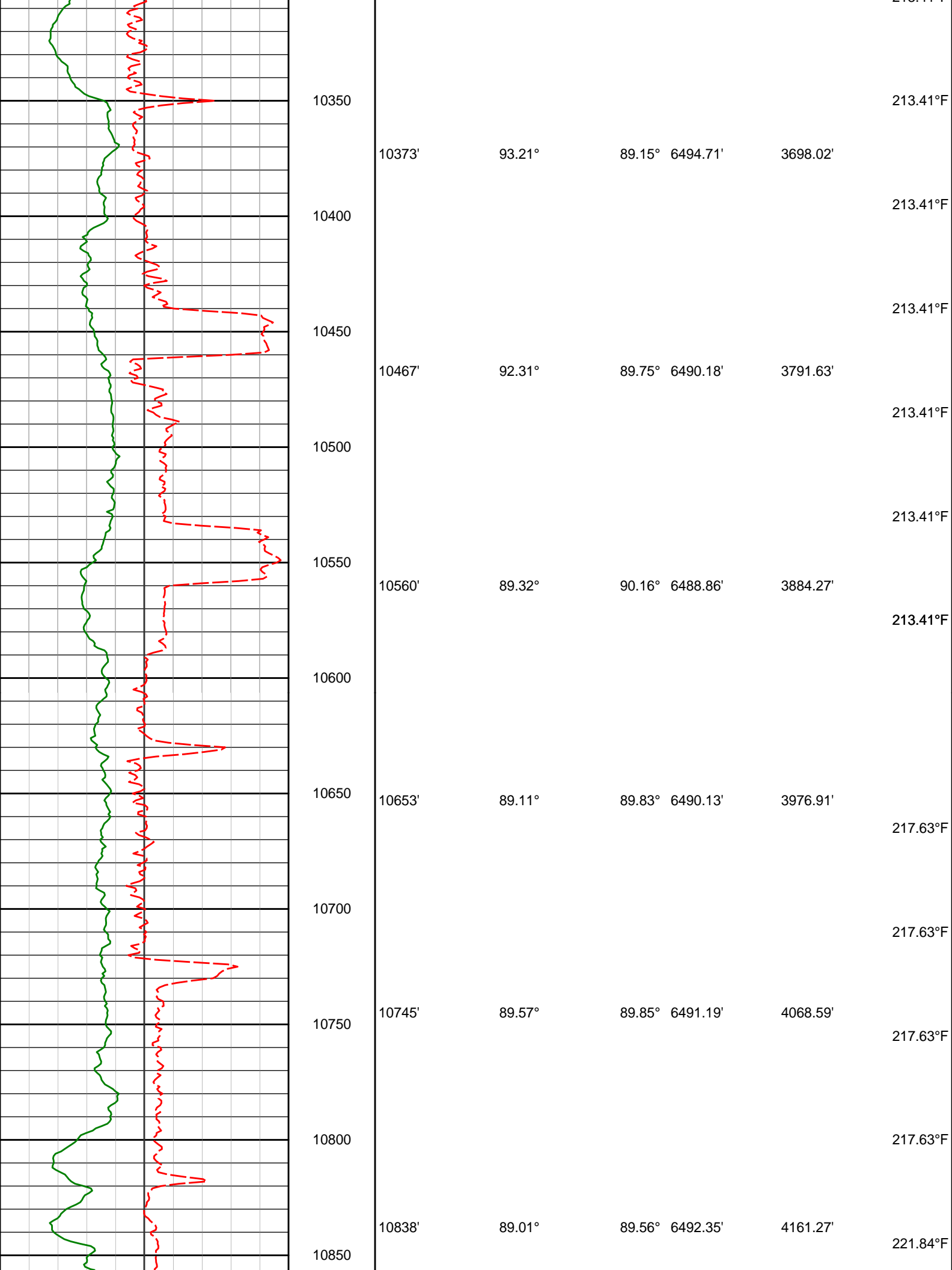


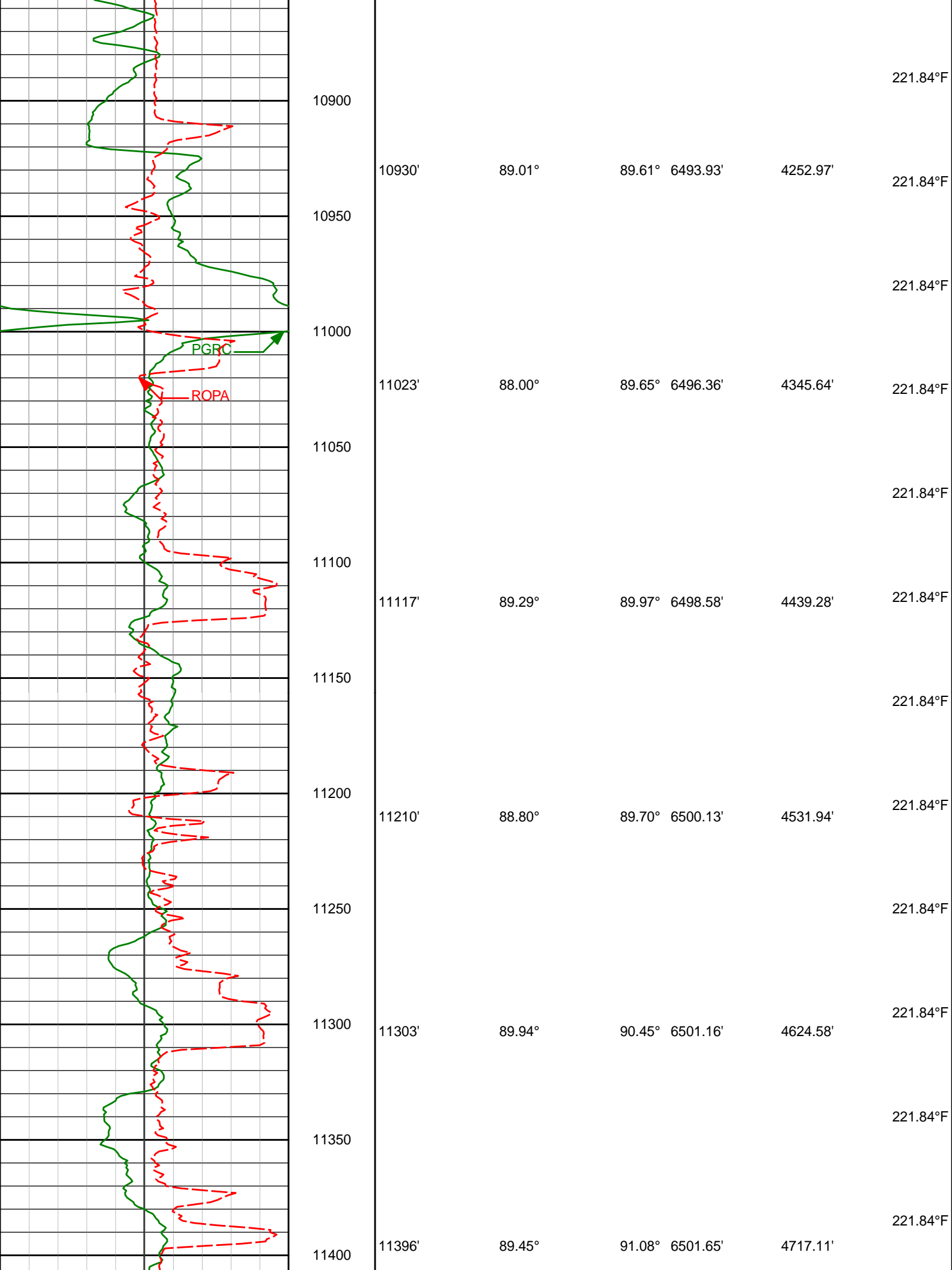


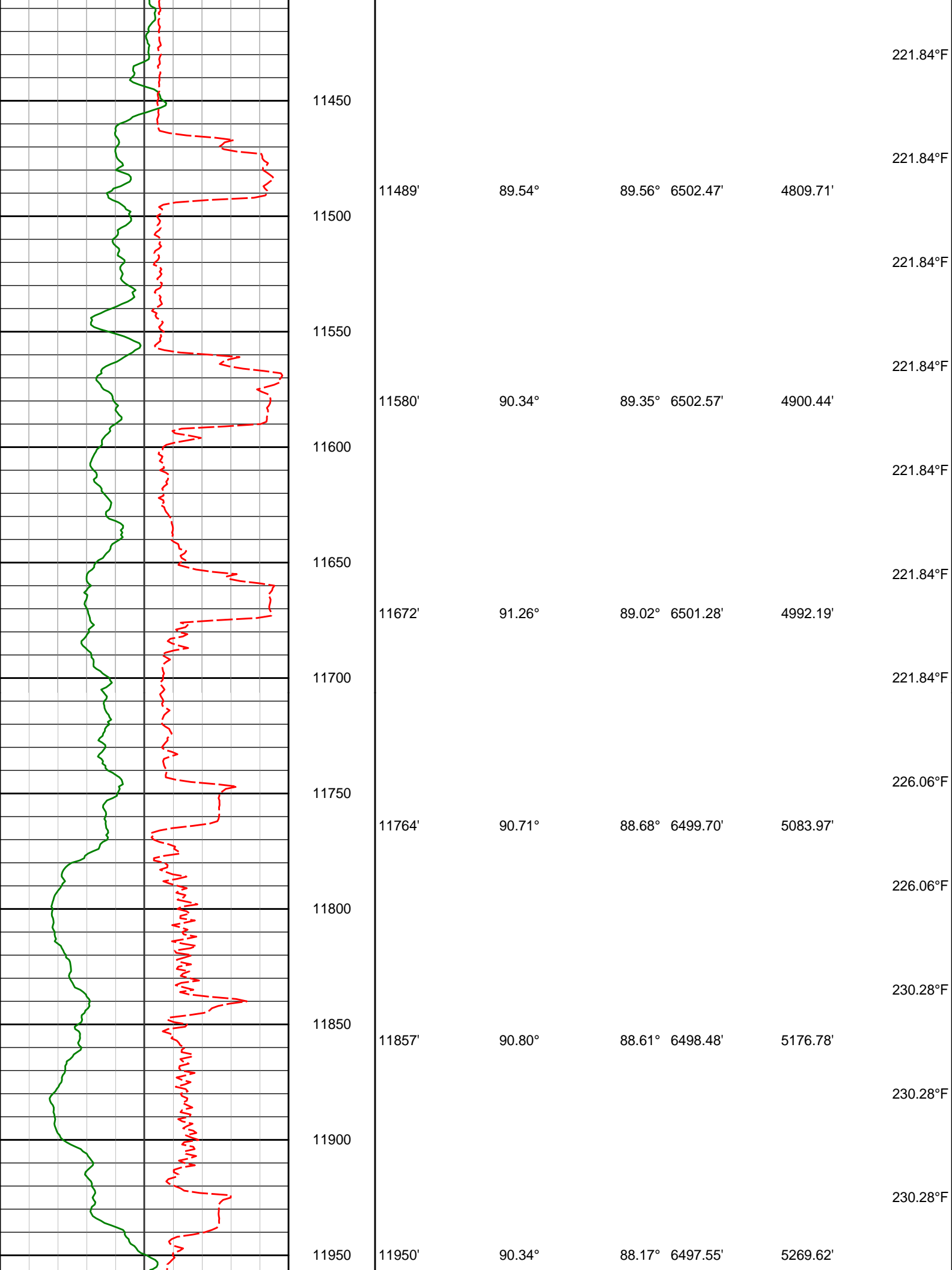


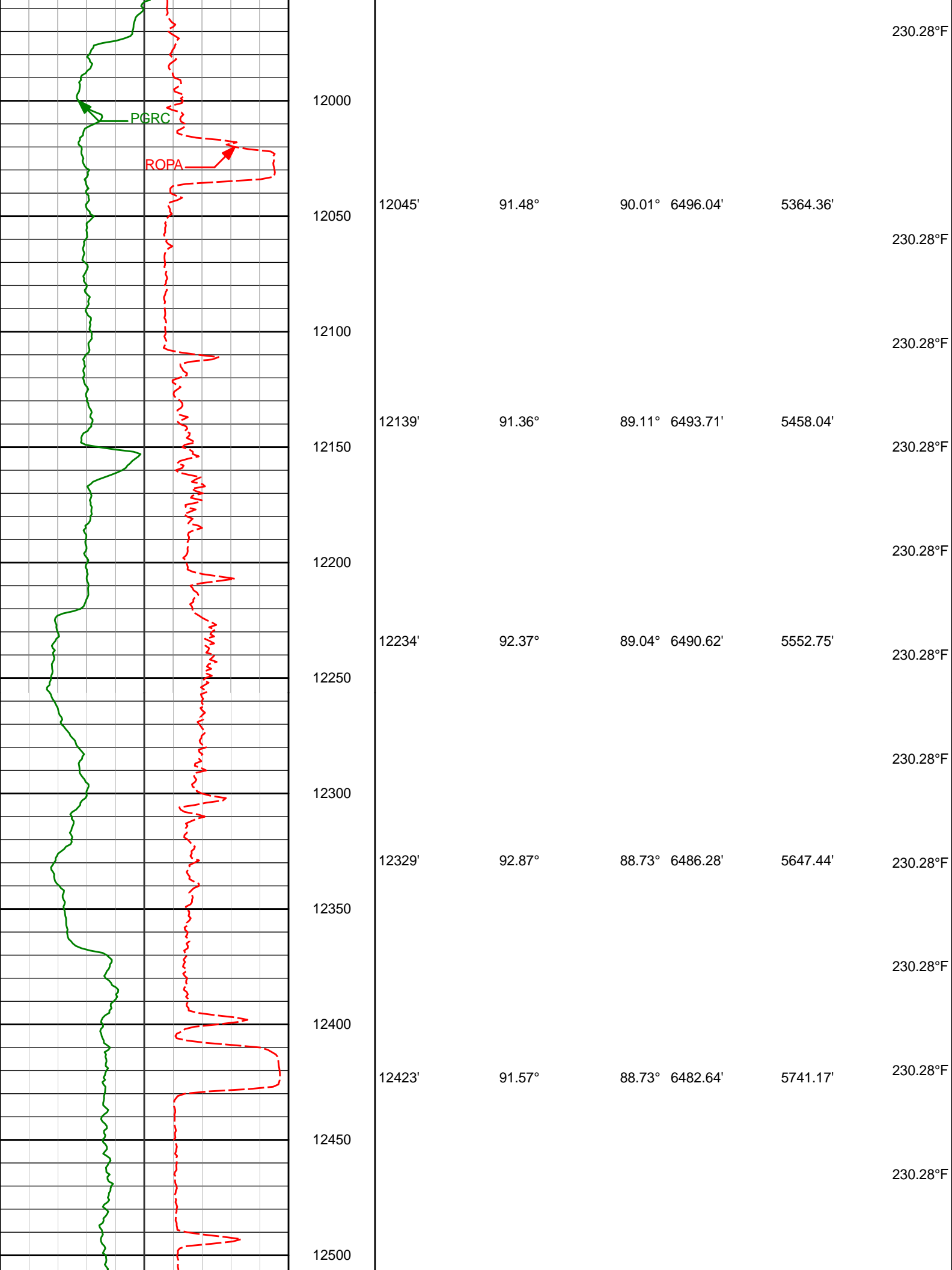


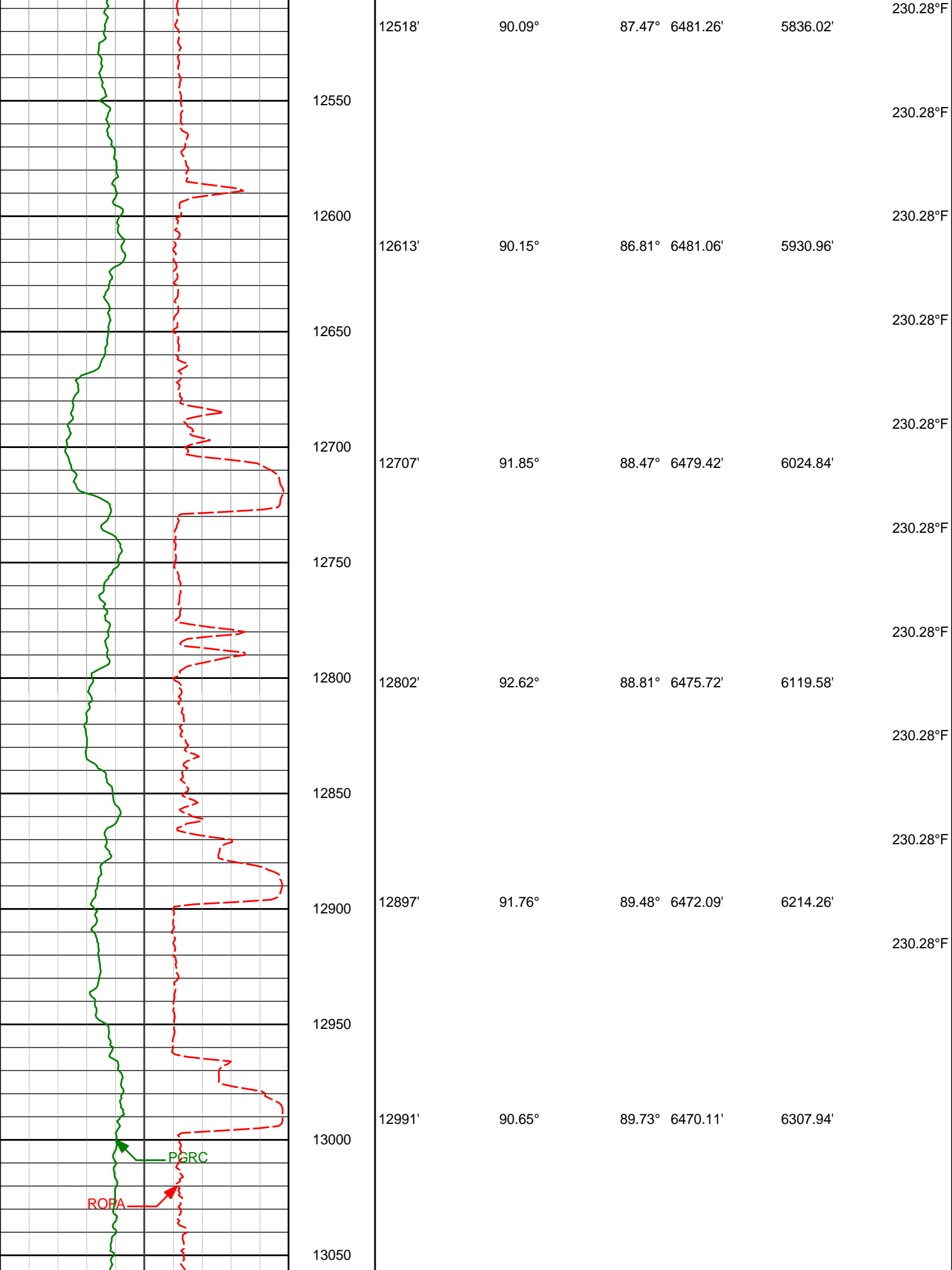


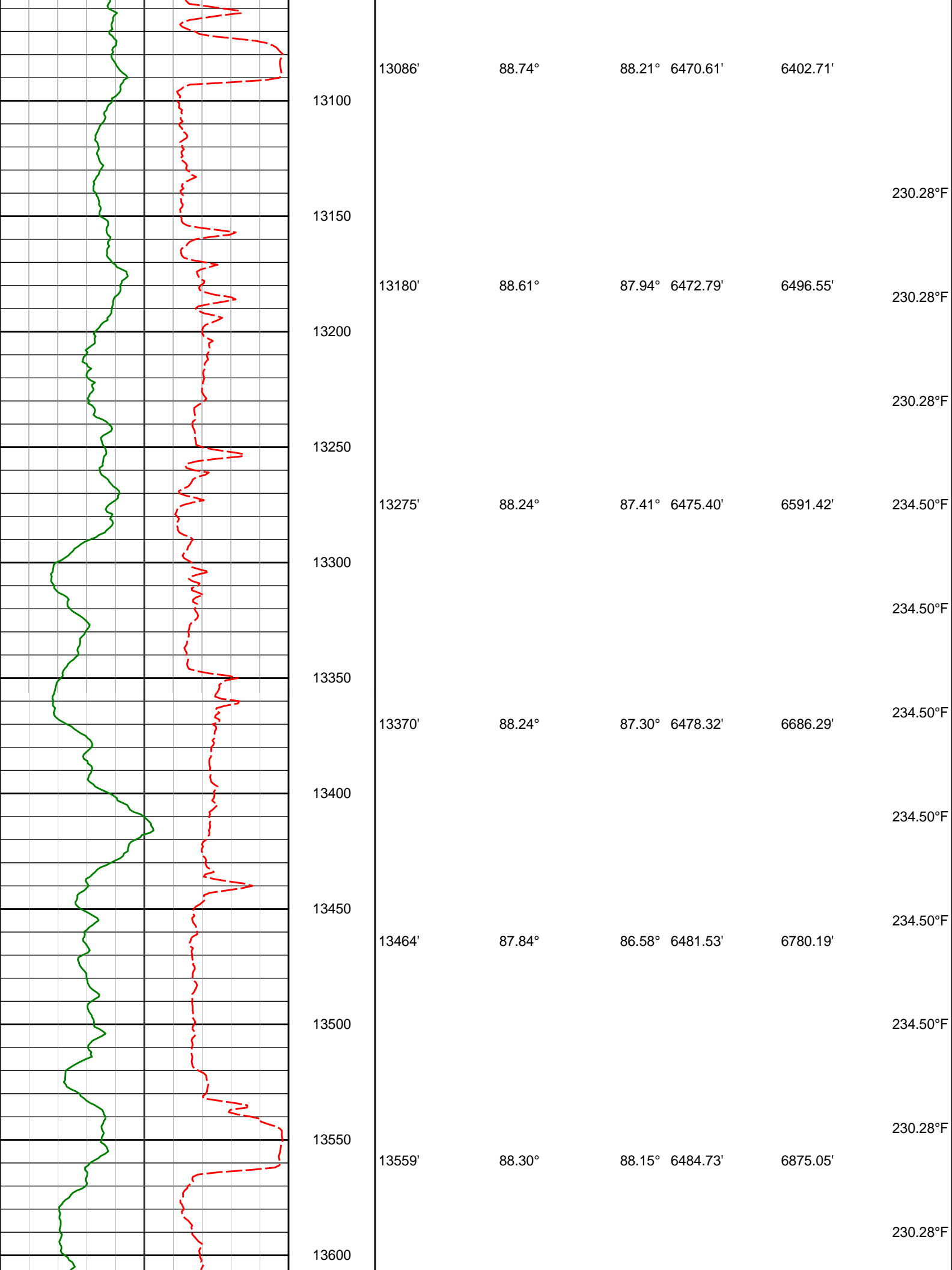


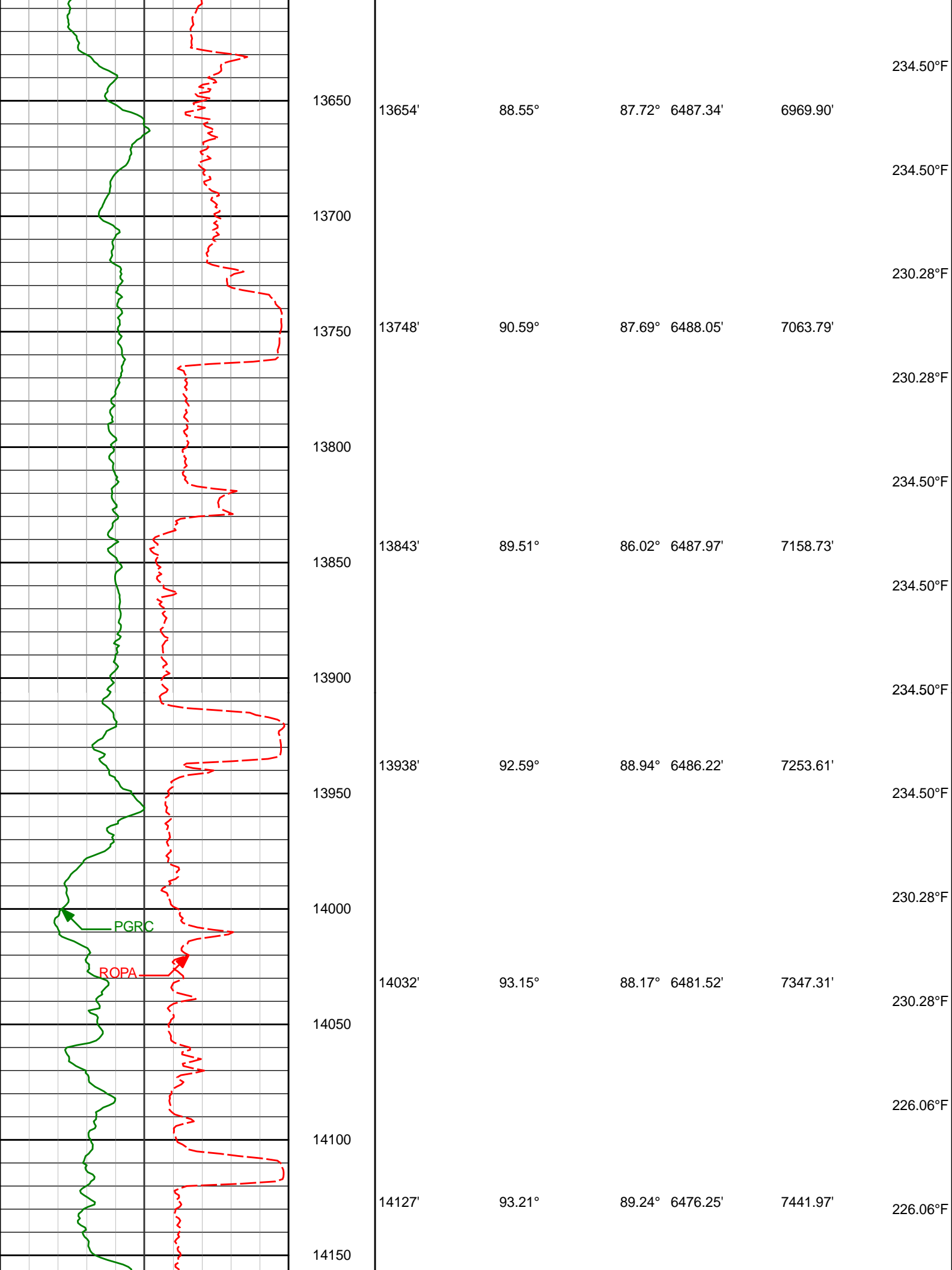


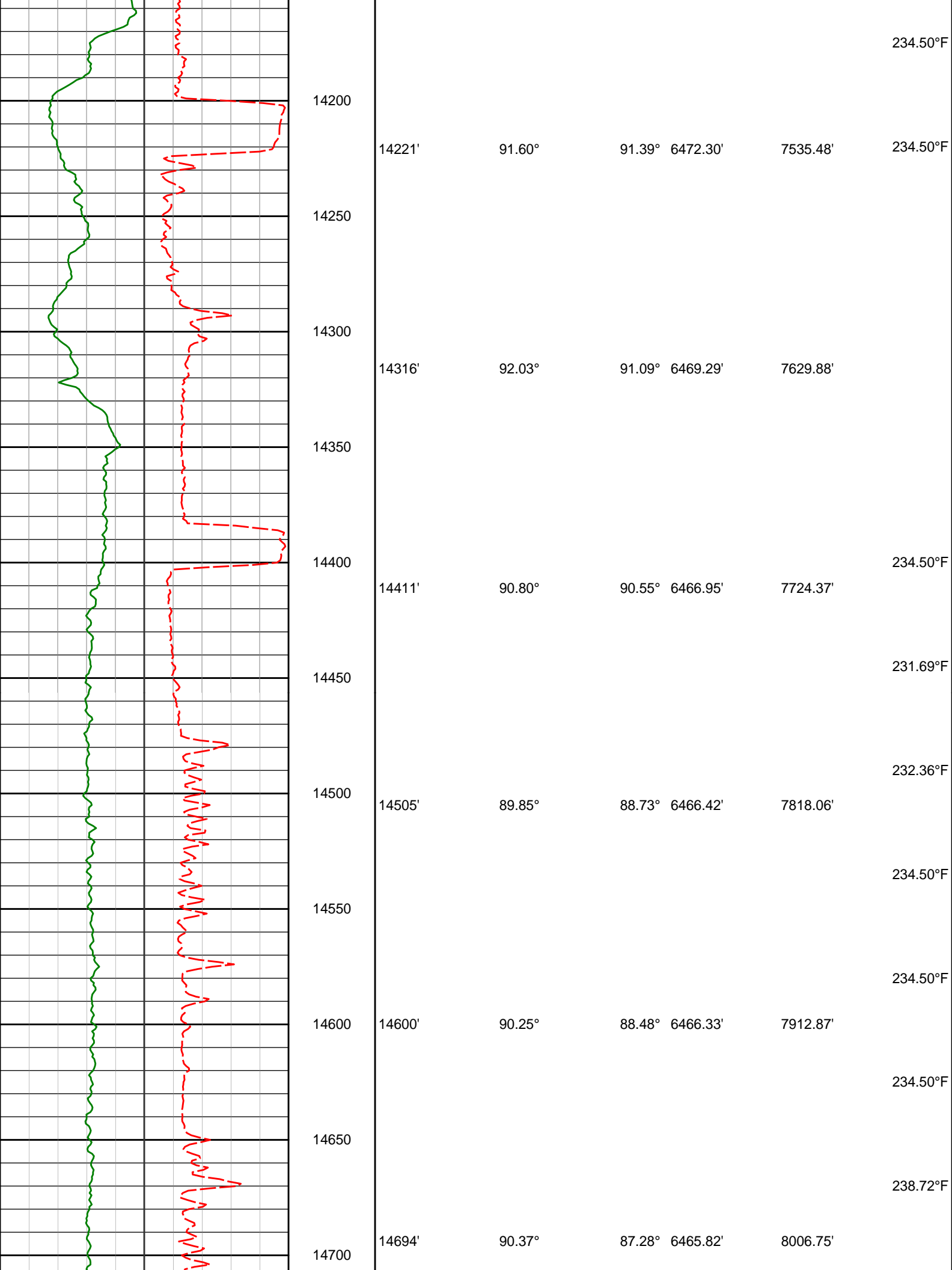


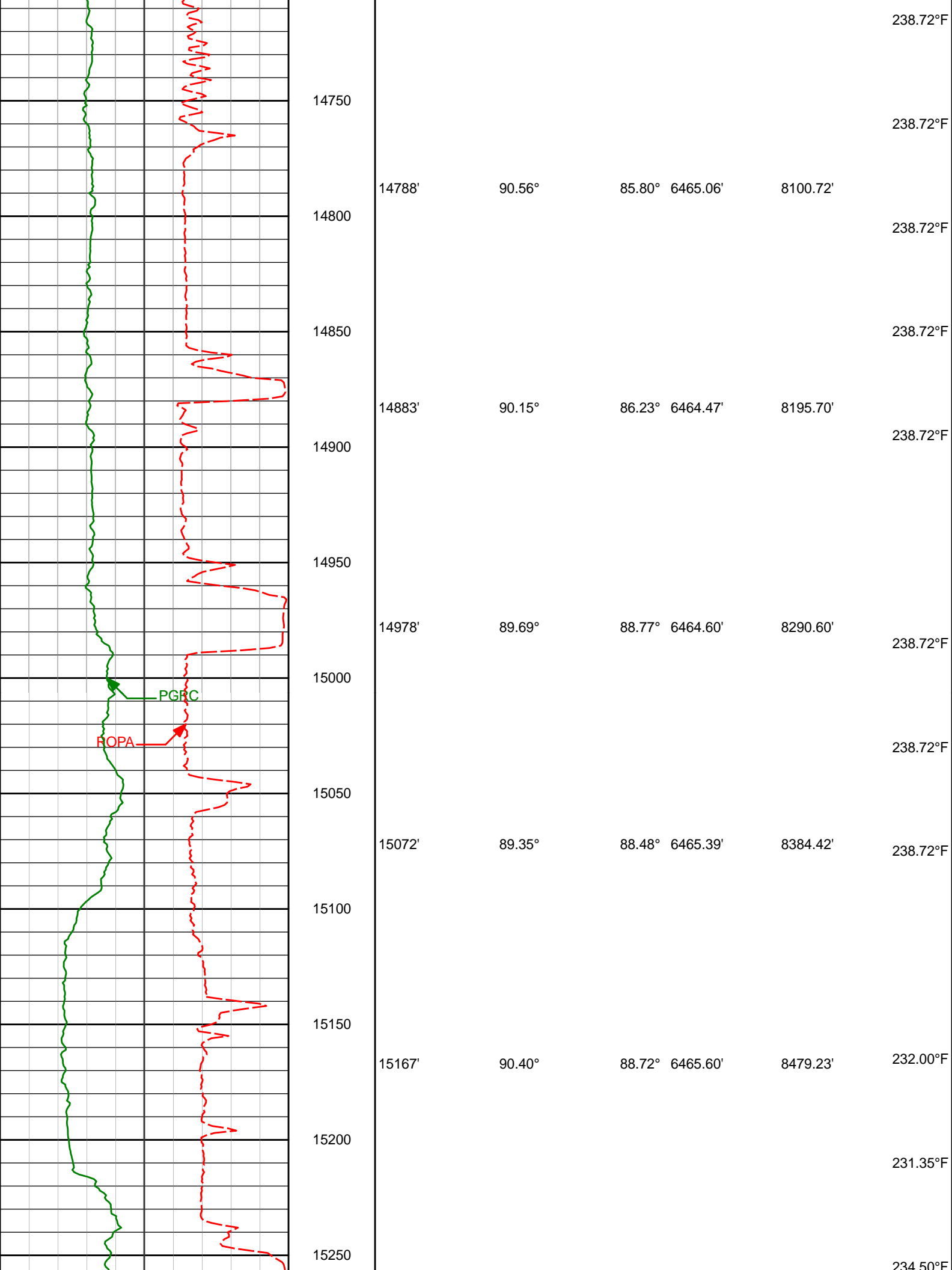


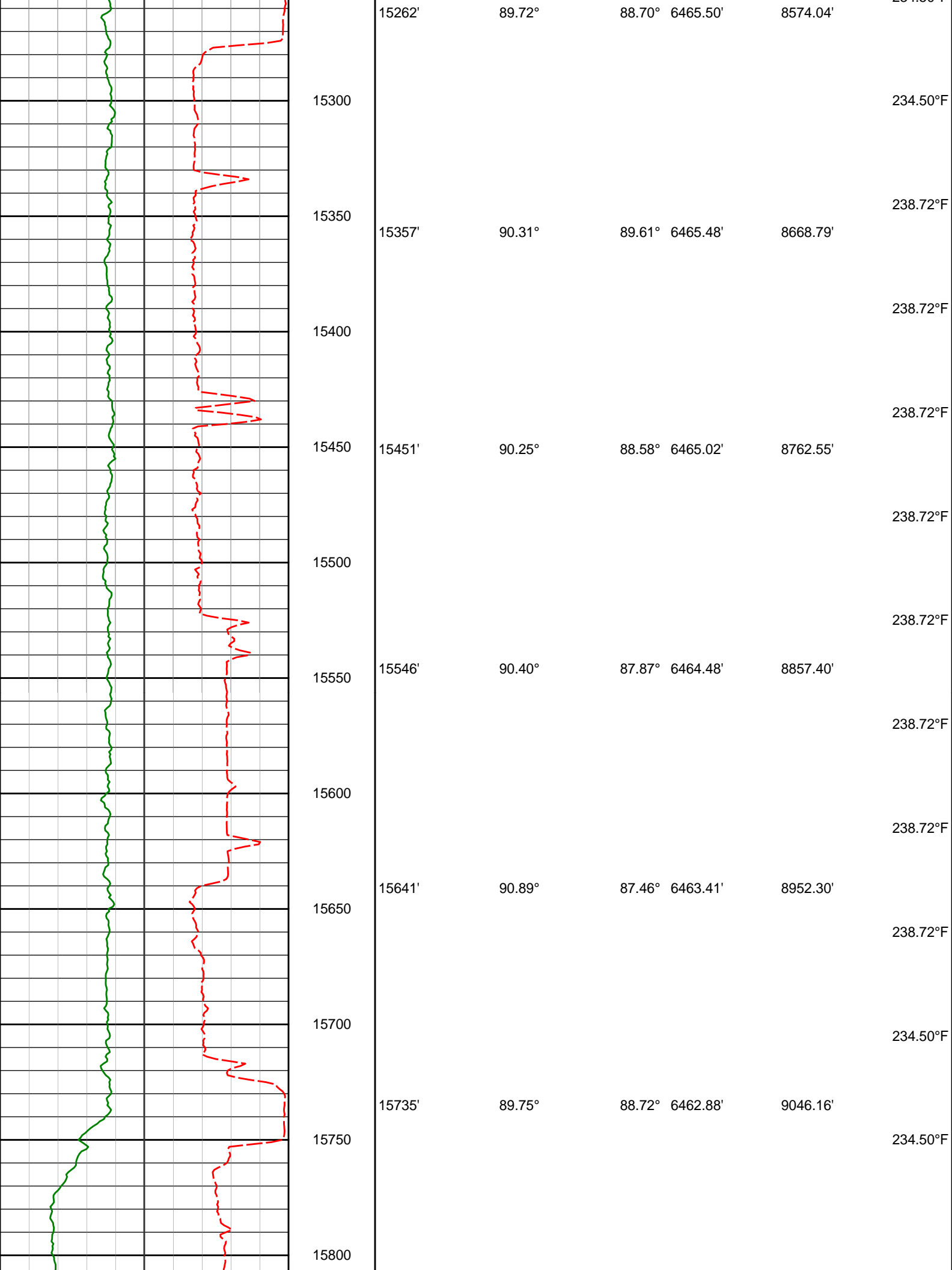


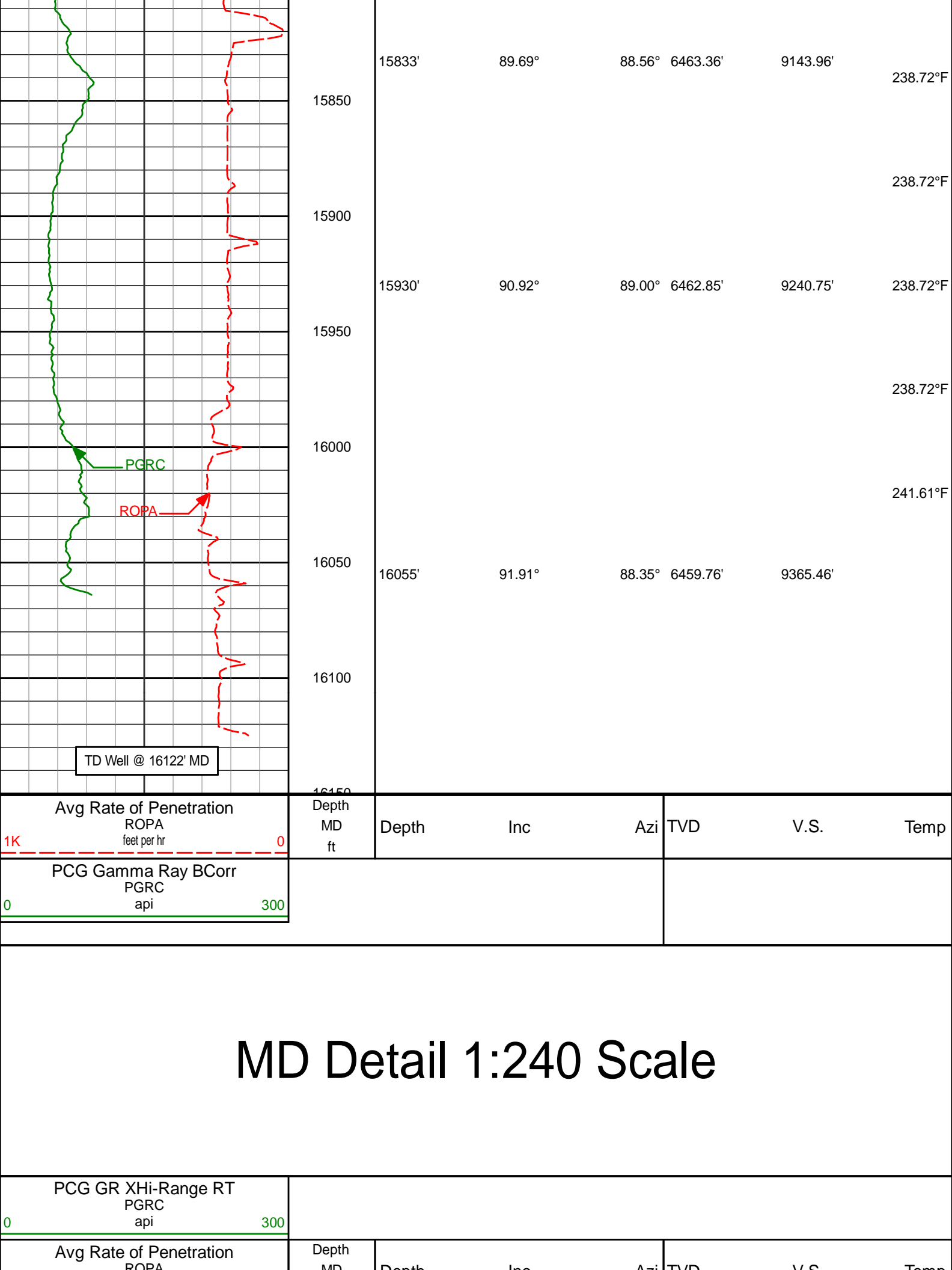




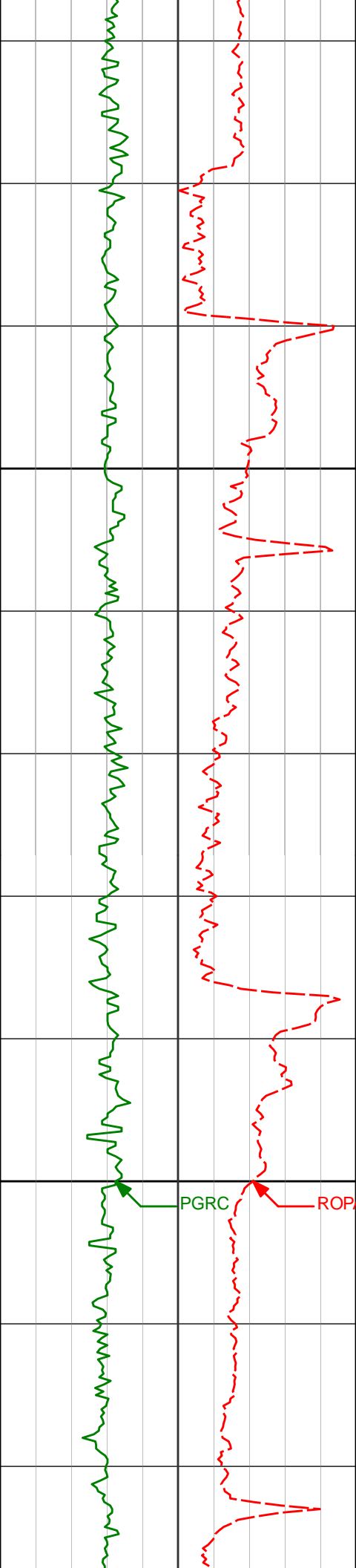








ROA feet per hr								MD ft	Depth	Incl	Azi	TVD	V.S.	Temp
									5624'	12.12°	310.94°	5587.07'	-300.24'	149.45°F
								<KOP>						151.38°F
								5700						
									5719'	20.44°	340.67°	5678.33'	-311.33'	151.77°F
														155.08°F
								5800						
														157.36°F
									5813'	21.83°	347.59°	5766.02'	-317.67'	



5900

5908'

22.50°

351.24° 5854.00'

-321.16'

156.13°F

158.84°F

160.59°F

159.50°F

6000

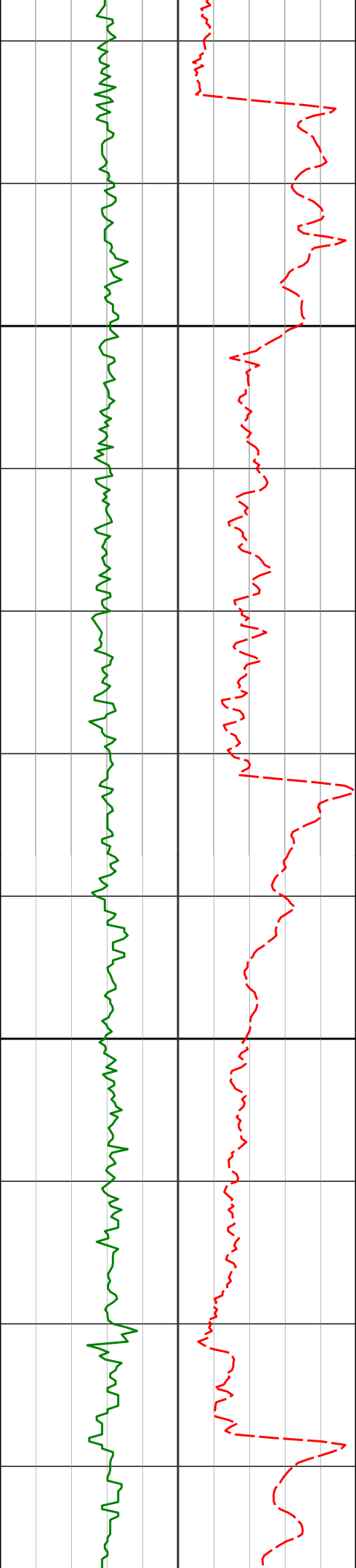
6002'

25.91°

357.44° 5939.74'

-321.50'

160.40°F



6100

6200

6097'

6191'

30.39°

37.54°

6.15° 6023.52'

29.06° 6101.75'

-315.99'

-295.27'

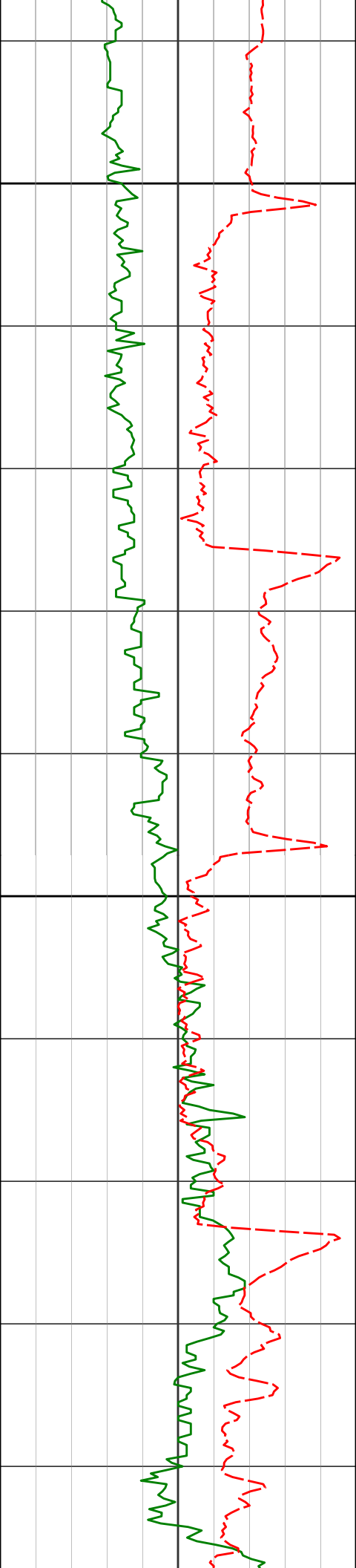
160.83°F

161.75°F

163.95°F

166.17°F

167.47°F



6286'

45.86°

51.38° 6173.02'

-250.38'

6300

167.82°F

168.82°F

6381'

45.53°

60.19° 6239.45'

-191.19'

6400

169.32°F

170.07°F

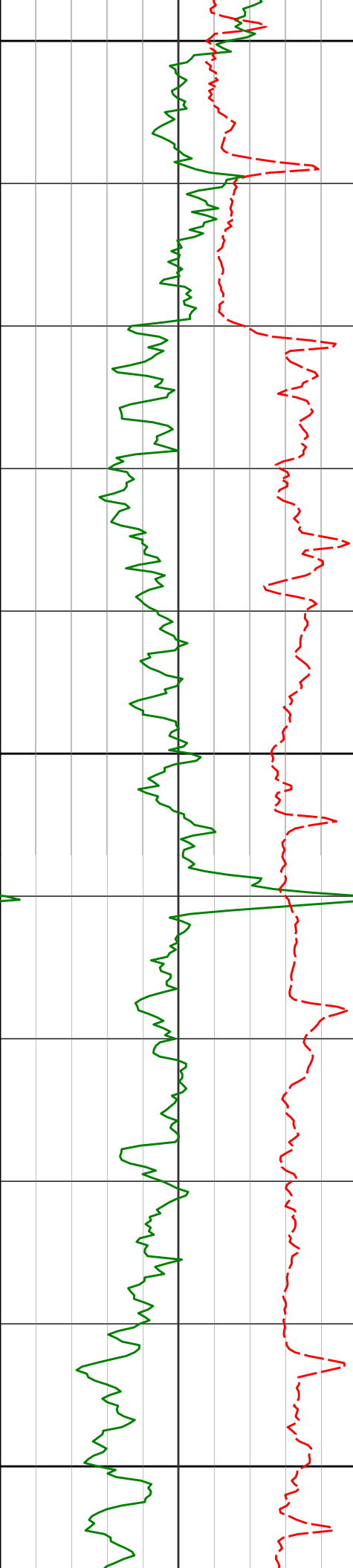
6475'

44.01°

68.34° 6306.24'

-129.43'

169.52°F



6500

170.18°F

6570'

50.48°

77.90°

6370.78'

-61.31'

168.90°F

6600

168.85°F

6665'

59.60°

82.40°

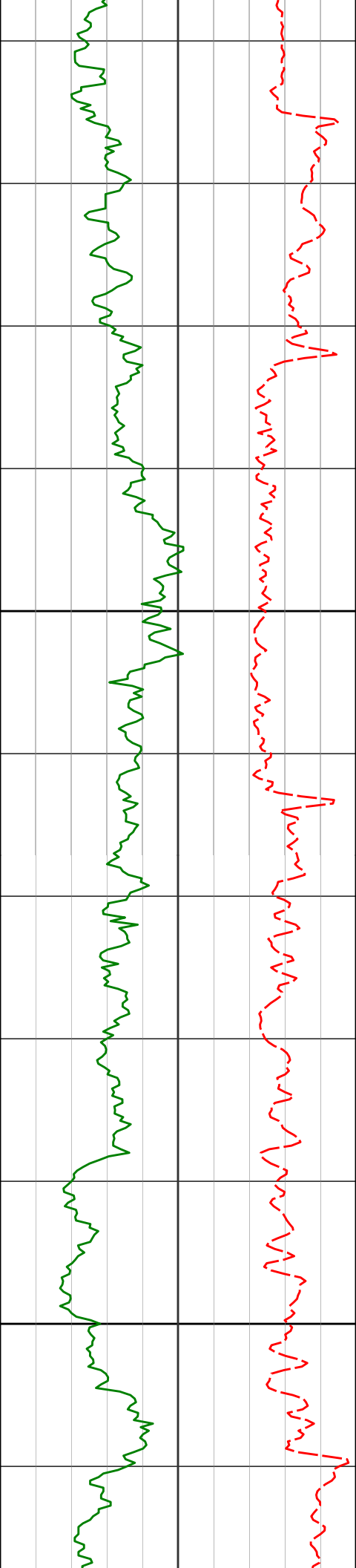
6425.18'

16.16'

170.78°F

6700

169.81°F



6800

6900

6759'

68.58°

84.62° 6466.22'

100.59'

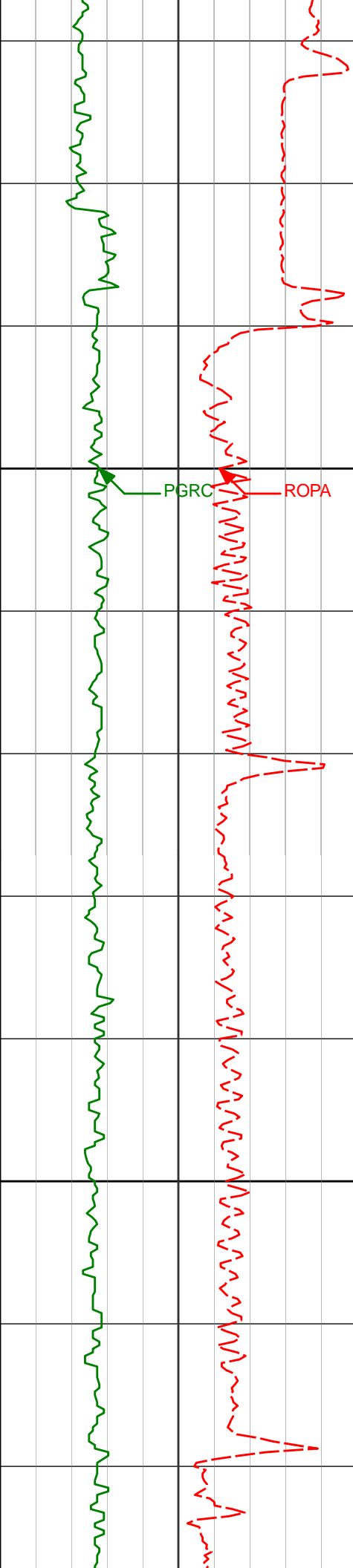
170.25°F

169.50°F

170.43°F

170.62°F

170.37°F



Casing Shoe @ 6965' MD

Run 200

7000

PGRC

ROPA

171.22°F

171.22°F

7068'

89.97°

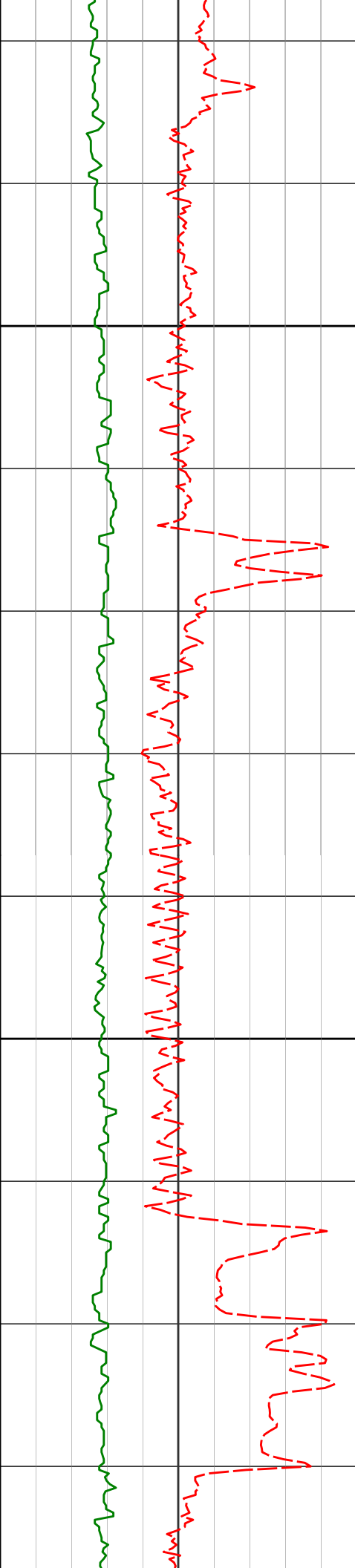
87.43° 6527.45'

401.45'

175.44°F

7100

175.44°F



7200

7300

7163'

90.25°

87.29° 6527.27'

496.37'

175.44°F

175.44°F

179.66°F

7258'

90.40°

86.12° 6526.73'

591.33'

179.66°F

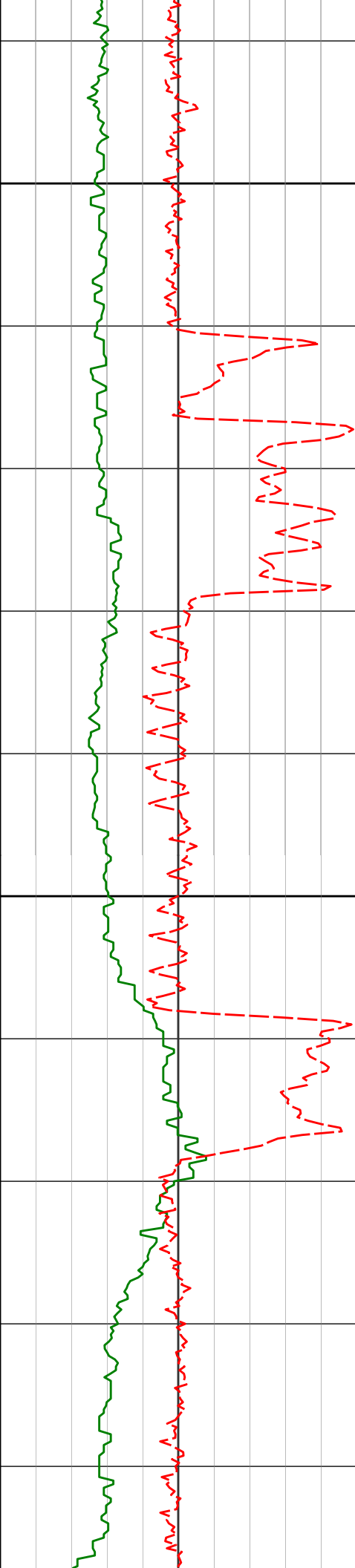
179.66°F

7352'

90.28°

85.43° 6526.17'

685.32'



7400

7447'

90.89°

86.62° 6525.20'

780.30'

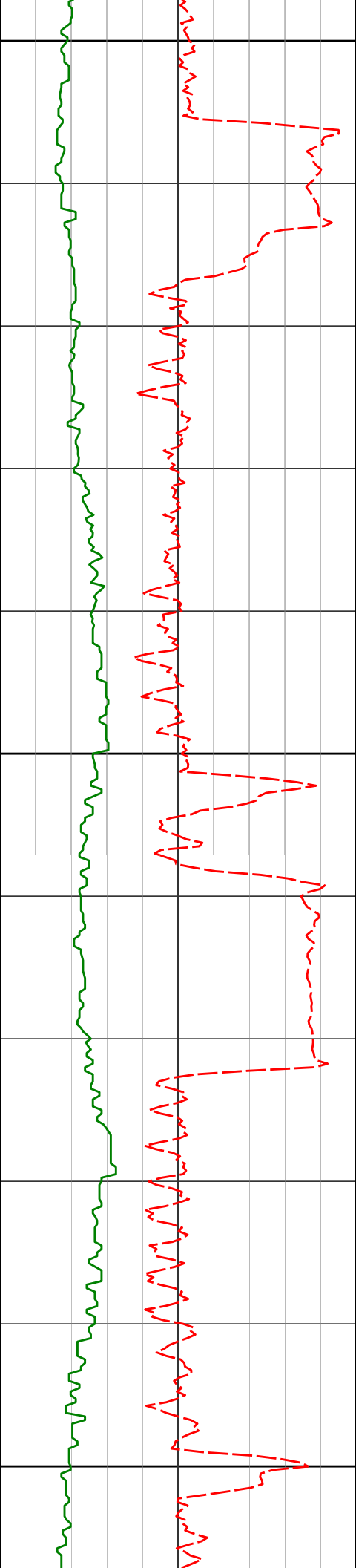
7500

7542'

91.76°

89.17° 6523.01'

875.15'



7600

7636'

90.86°

88.47° 6520.86'

968.92'

183.88°F

7700

7731'

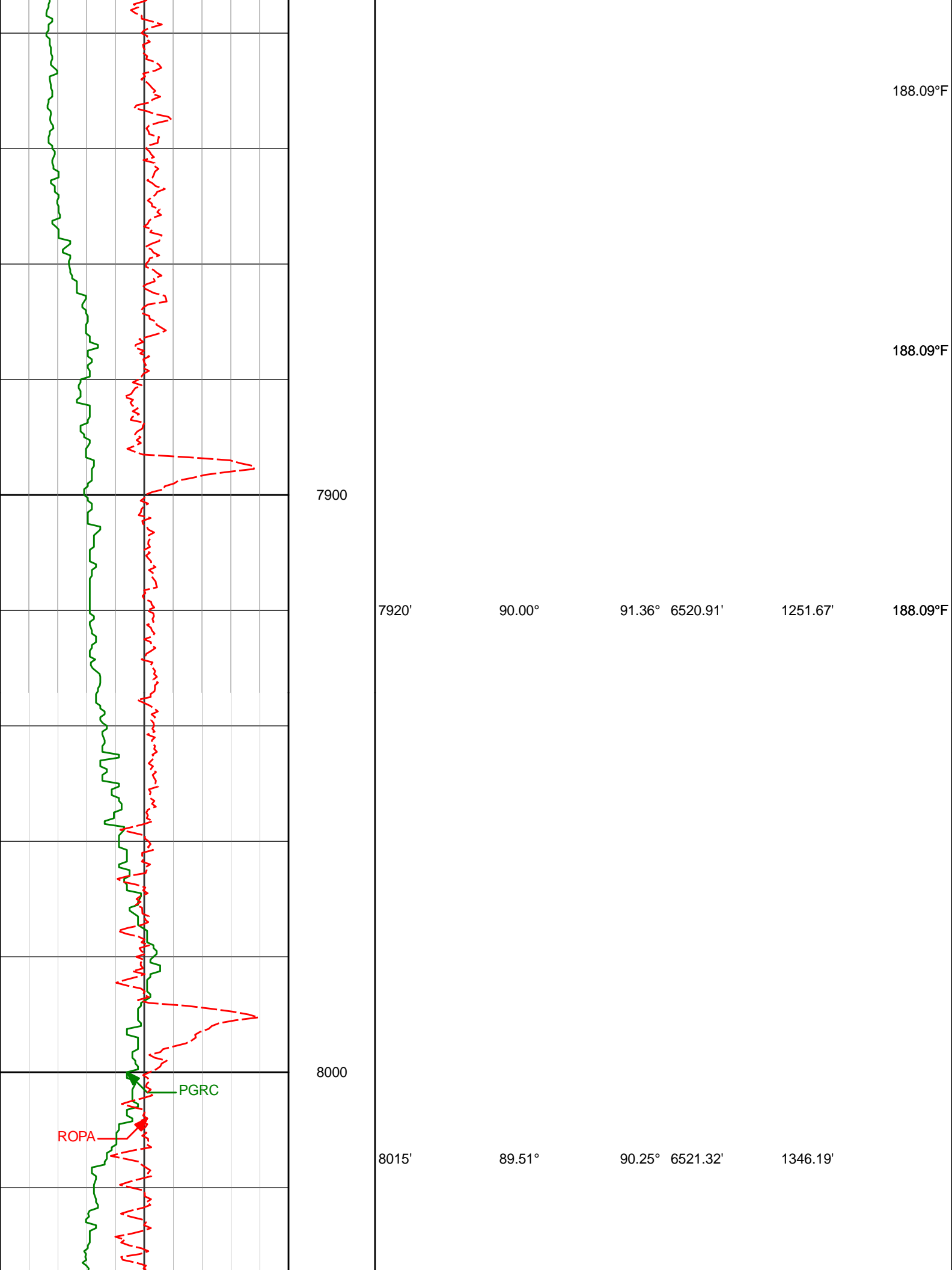
89.69°

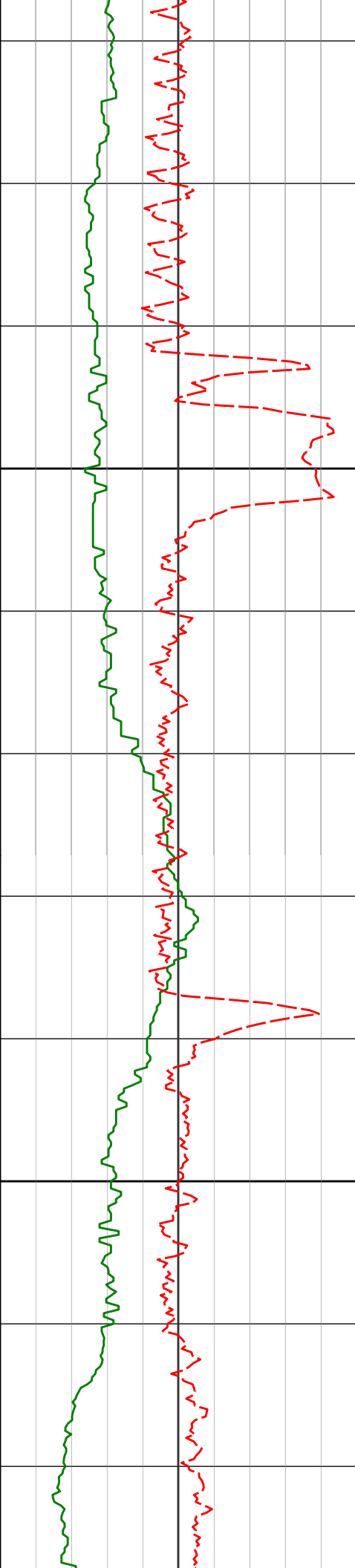
90.28° 6520.40'

1063.64'

183.88°F

7800





8100

8109'

91.79°

90.58° 6520.25'

1439.77'

188.09°F

8200

8204'

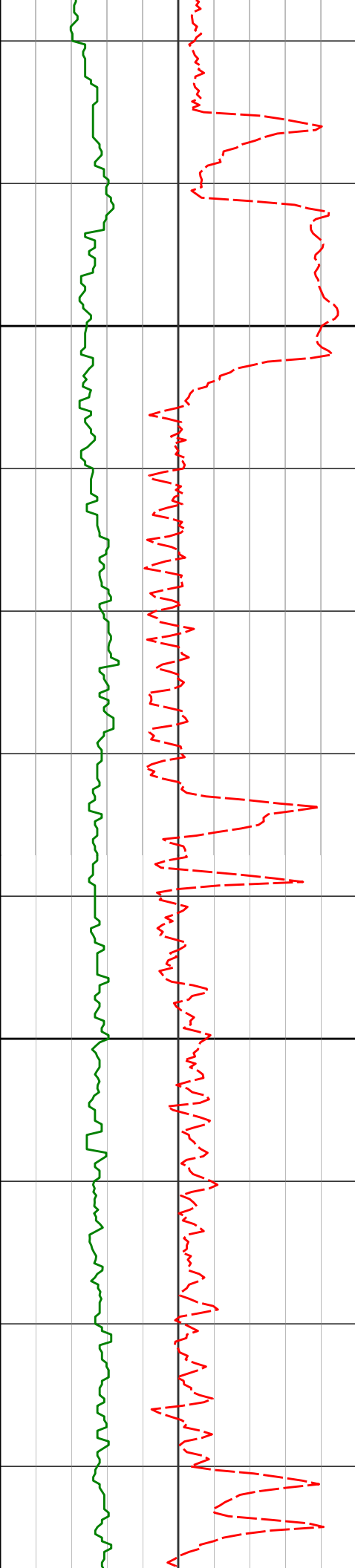
92.53°

90.33° 6516.67'

1534.27'

192.31°F

192.31°F



8300

8299'

90.71°

90.09° 6513.99'

1628.85'

215.26°F

224.21°F

196.53°F

8400

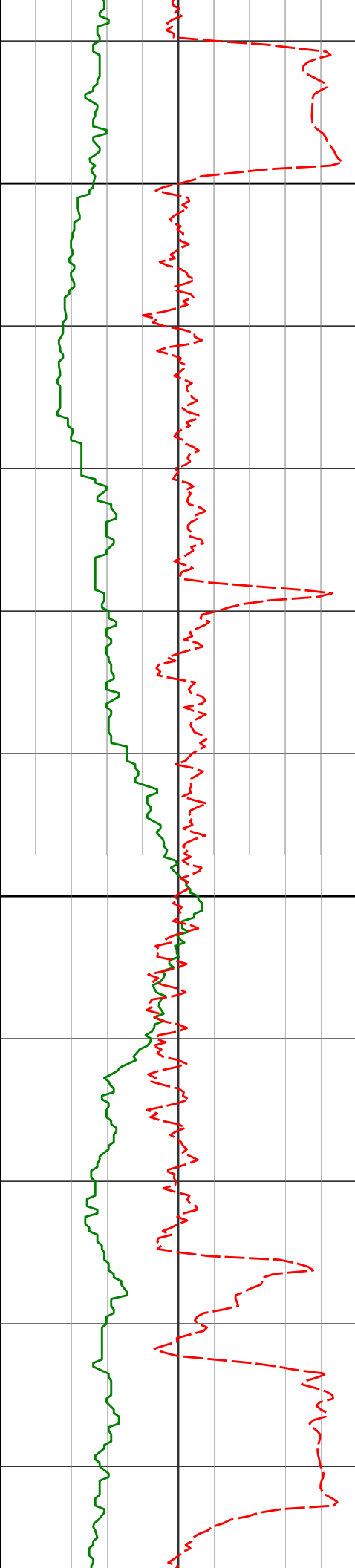
8394'

90.77°

90.77° 6512.76'

1723.42'

196.53°F



8488'

89.17°

89.17° 6512.81'

1817.06'

8500

200.75°F

200.48°F

8583'

88.67°

88.53° 6514.60'

1911.84'

8600

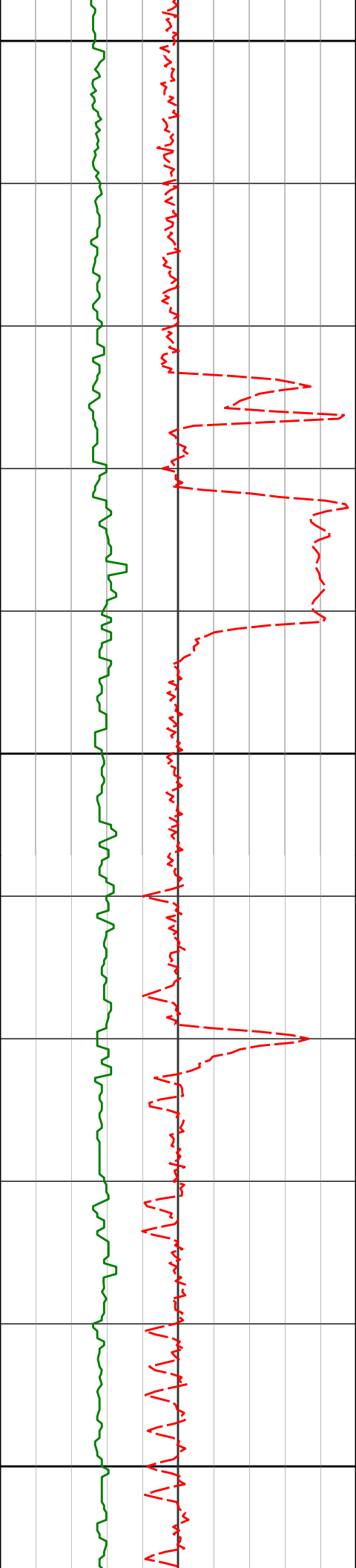
196.53°F

8677'

89.63°

88.72° 6515.99'

2005.64'



8700

8771'

91.63°

90.84° 6514.96'

2099.30'

8800

198.19°F

8865'

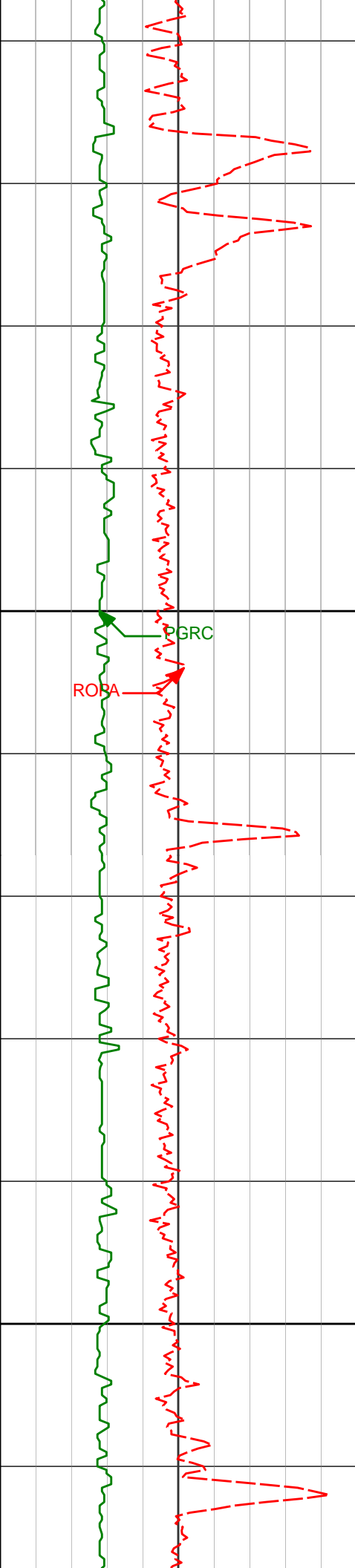
90.99°

90.60° 6512.81'

2192.82'

200.75°F

8900



9000

9100

8960'

90.96°

92.66° 6511.19'

2287.17'

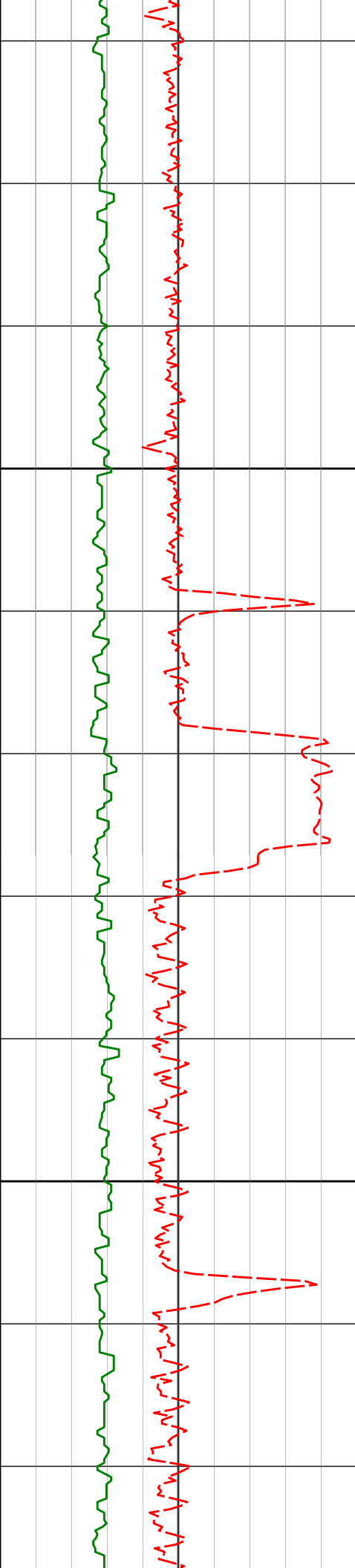
9054'

90.83°

89.07° 6509.73'

2380.66'

200.75°F



9200

9300

9149'

90.55°

87.82° 6508.58'

2475.48'

9244'

90.25°

88.32° 6507.92'

2570.35'

9338'

90.28°

88.54° 6507.48'

2664.18'

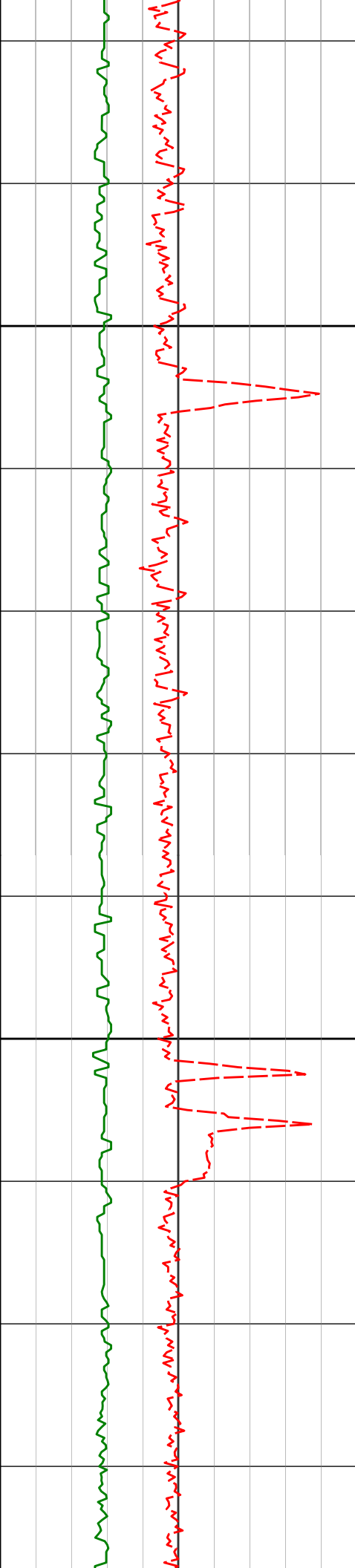
204.97°F

204.97°F

204.97°F

204.97°F

209.19°F



9400

9433'

90.22°

87.62° 6507.07'

2759.04'

9500

9527'

89.97°

86.69° 6506.91'

2852.98'

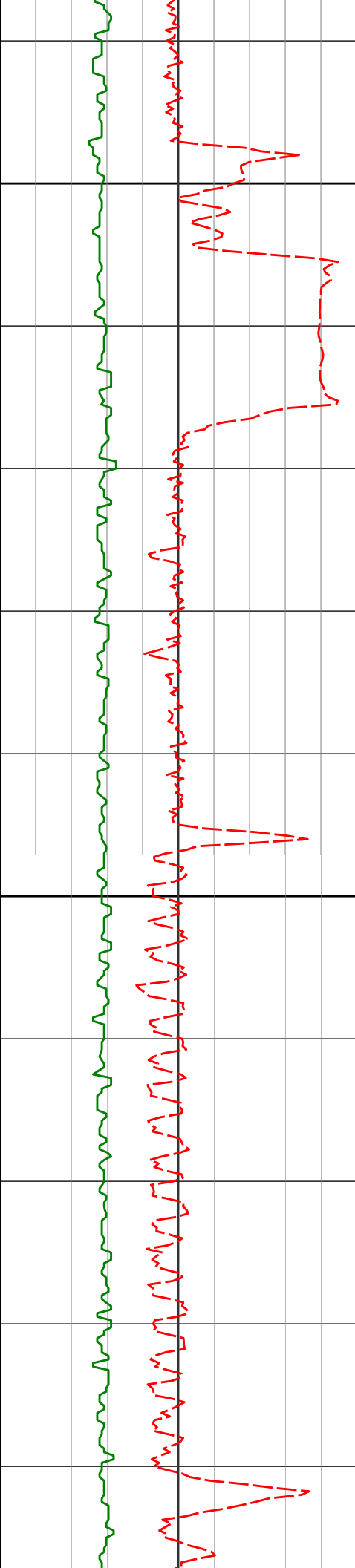
209.19°F

223.32°F

241.46°F

209.19°F

209.19°F



9600

9621'

90.25°

88.16° 6506.73'

2946.89'

9700

9716'

90.00°

87.44° 6506.53'

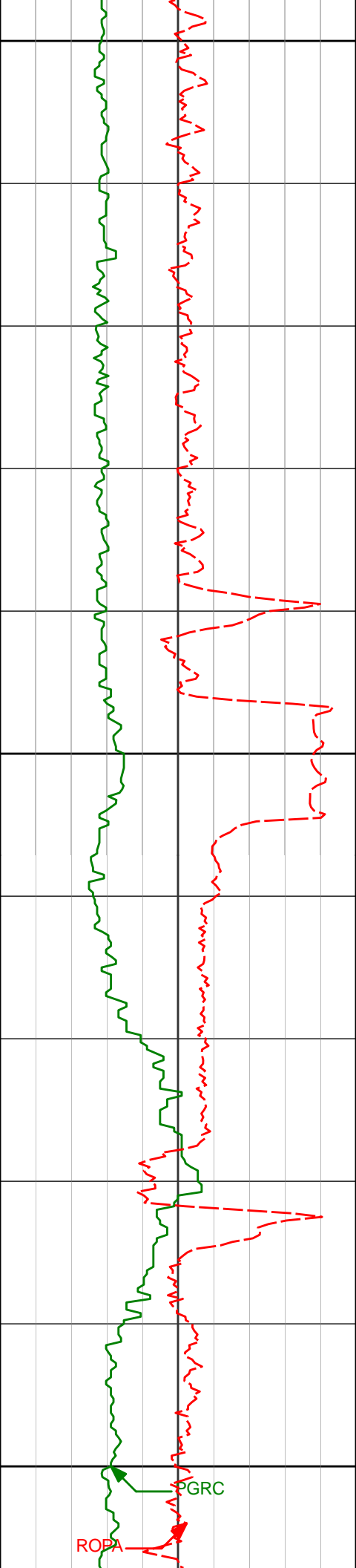
3041.78'

209.19°F

209.19°F

213.41°F

213.41°F



9800

9810'

89.88°

86.72° 6506.62'

3135.72'

213.41°F

9900

9905'

90.49°

86.73° 6506.32'

3230.68'

209.19°F

209.19°F

213.41°F

10000

10000'

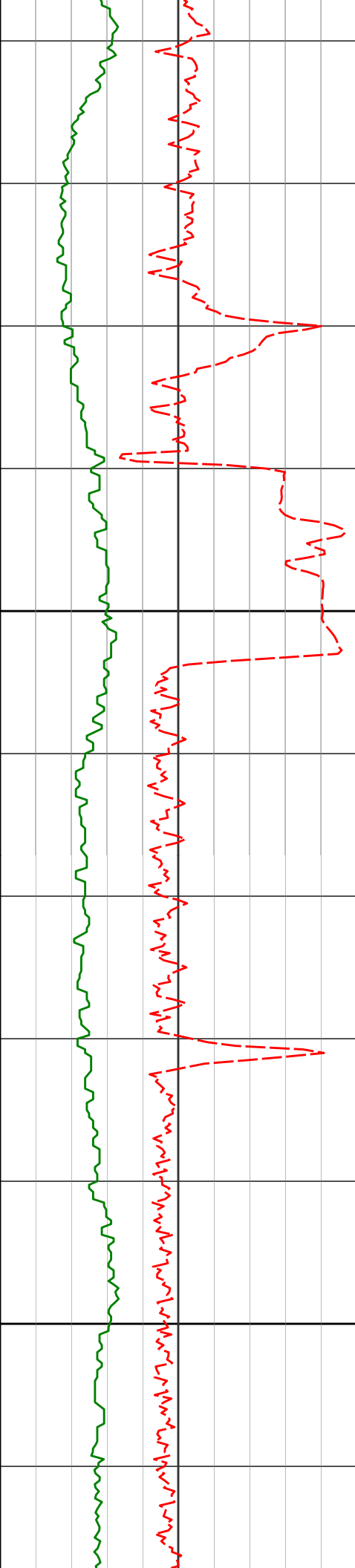
91.67°

86.50° 6504.53'

3325.63'

ROPA

GRC



10100

10094'

91.76°

87.67° 6501.71'

3419.52'

10200

10187'

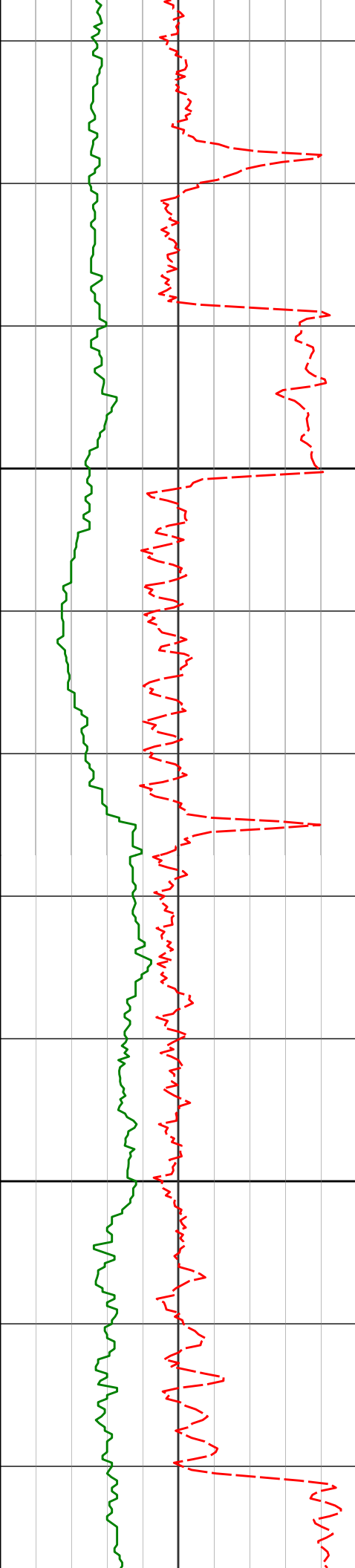
89.94°

86.92° 6500.33'

3512.44'

213.41°F

213.41°F



10300

10400

10281'

10373'

91.91°

93.21°

88.48° 6498.82'

89.15° 6494.71'

3606.32'

3698.02'

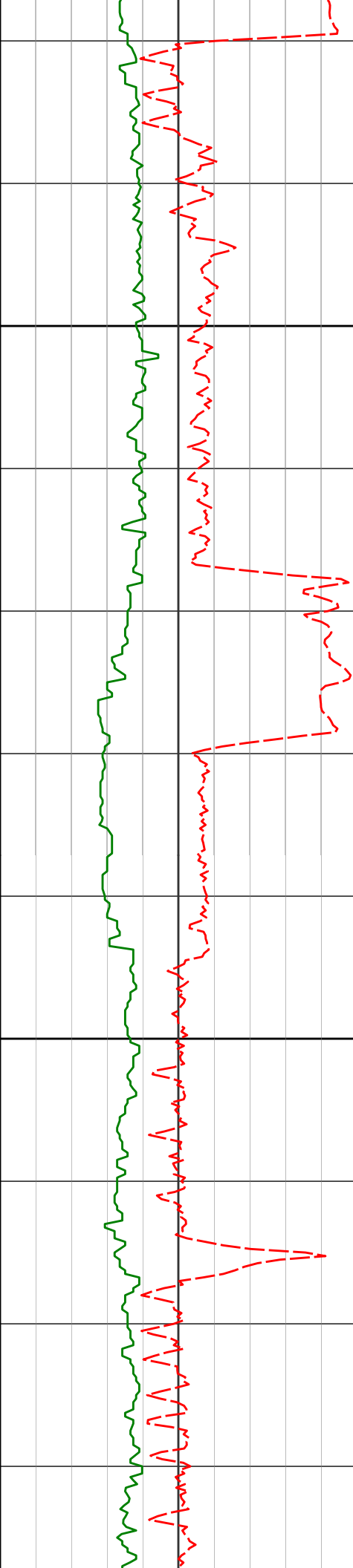
213.41°F

213.41°F

213.41°F

213.41°F

213.41°F



10500

10600

10467'

92.31°

89.75° 6490.18'

3791.63'

10560'

89.32°

90.16° 6488.86'

3884.27'

10653'

89.11°

89.83° 6490.13'

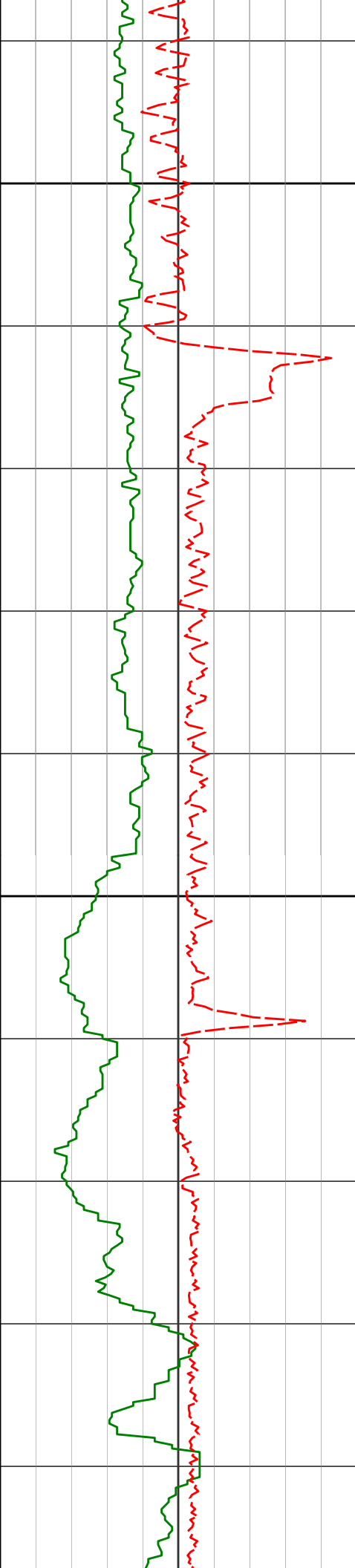
3976.91'

213.41°F

213.41°F

213.41°F

217.63°F



10700

217.63°F

10745'

89.57°

89.85° 6491.19'

4068.59'

217.63°F

10800

217.63°F

10838'

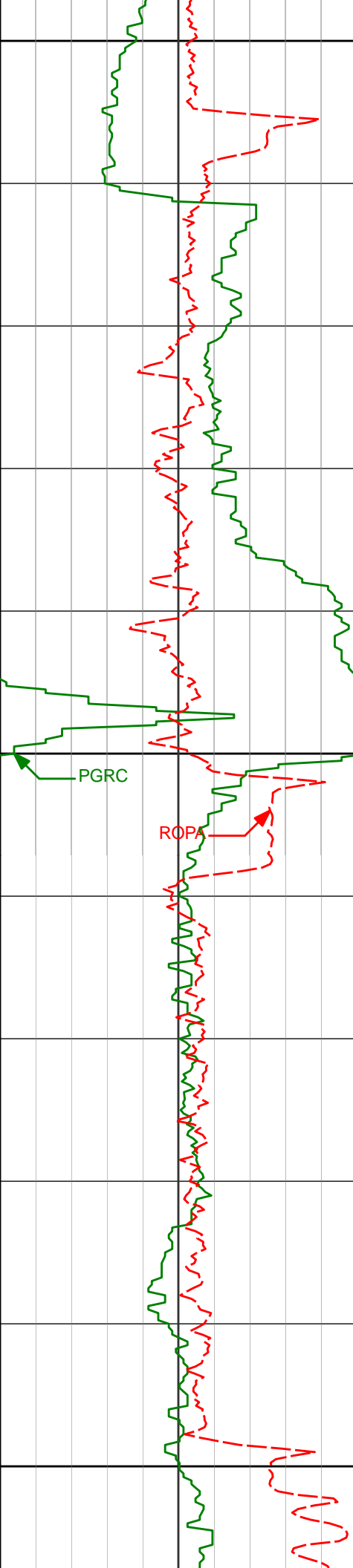
89.01°

89.56° 6492.35'

4161.27'

221.84°F

221.84°F



10900

10930'

89.01°

89.61° 6493.93'

4252.97'

221.84°F

221.84°F

11000

PGRC

ROPA

11023'

88.00°

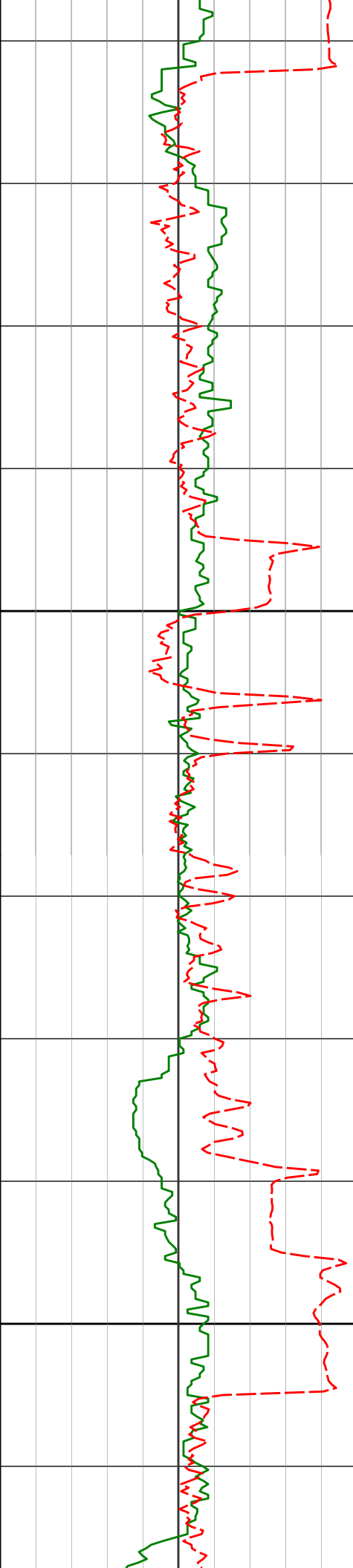
89.65° 6496.36'

4345.64'

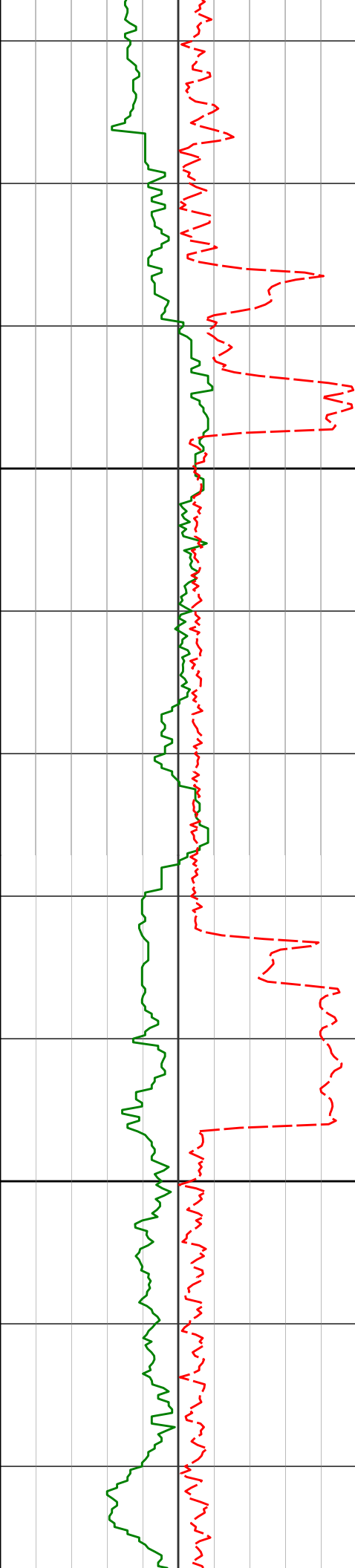
221.84°F

221.84°F

11100



Depth (m)	Temperature (°C)	Salinity (PSU)	Specific Volume (10 ⁻⁶ m ³ /kg)	Sound Speed (m/s)	Stress (Pa)	Strain (10 ⁻⁶)
11117'	89.29°	89.97°	6498.58'	4439.28'	221.84°F	
11200					221.84°F	
11210'	88.80°	89.70°	6500.13'	4531.94'	221.84°F	
					221.84°F	
11300					221.84°F	
11303'	89.94°	90.45°	6501.16'	4624.58'		



11400

11500

11396'

89.45°

91.08° 6501.65'

4717.11'

11489'

89.54°

89.56° 6502.47'

4809.71'

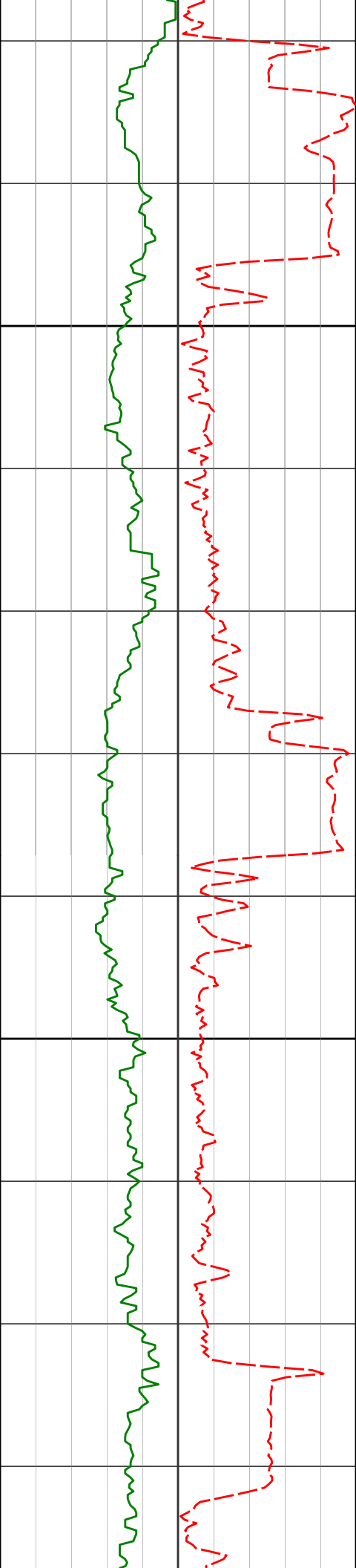
221.84°F

221.84°F

221.84°F

221.84°F

221.84°F



11580'

90.34°

89.35° 6502.57'

4900.44'

11600

221.84°F

221.84°F

221.84°F

11672'

91.26°

89.02° 6501.28'

4992.19'

11700

221.84°F

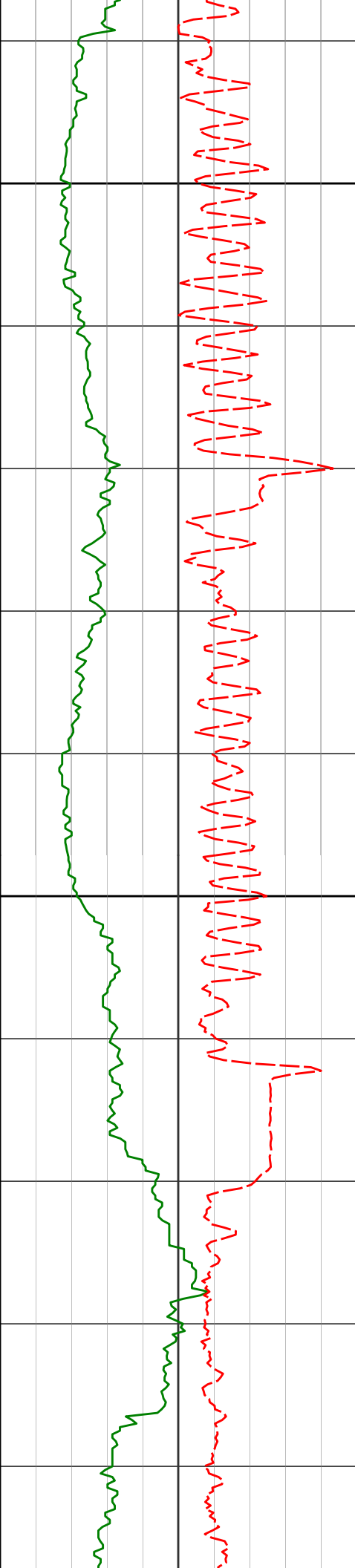
226.06°F

11764'

90.71°

88.68° 6499.70'

5083.97'



11800

11900

11857'

11950'

90.80°

90.34°

88.61° 6498.48'

88.17° 6497.55'

5176.78'

5269.62'

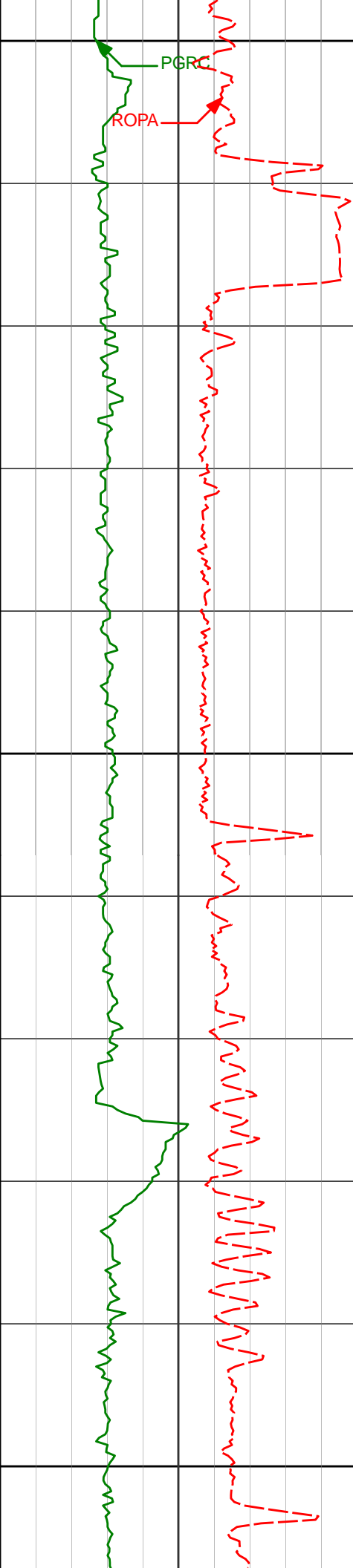
226.06°F

230.28°F

230.28°F

230.28°F

230.28°F



12000

12045'

91.48°

90.01° 6496.04'

5364.36'

230.28°F

12100

230.28°F

12139'

91.36°

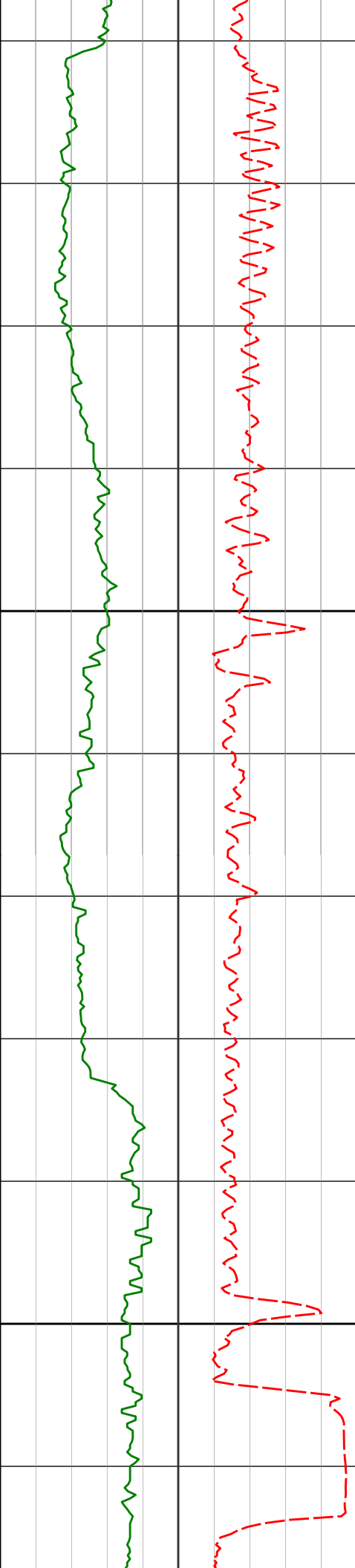
89.11° 6493.71'

5458.04'

230.28°F

12200

230.28°F



12300

12400

12234'

92.37°

89.04° 6490.62'

5552.75'

230.28°F

230.28°F

12329'

92.87°

88.73° 6486.28'

5647.44'

230.28°F

230.28°F

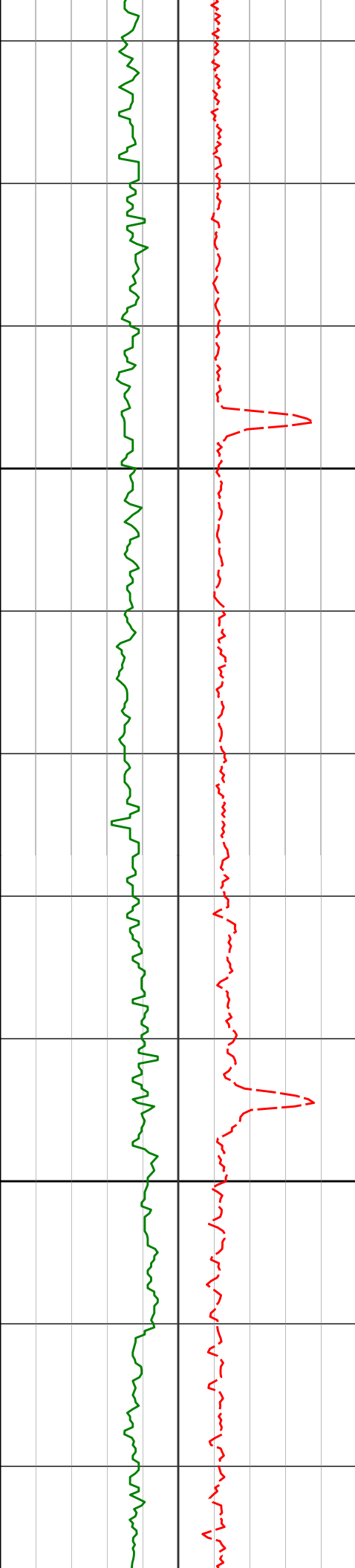
12423'

91.57°

88.73° 6482.64'

5741.17'

230.28°F



12500

12600

12518'

12613'

90.09°

90.15°

87.47° 6481.26'

86.81° 6481.06'

5836.02'

5930.96'

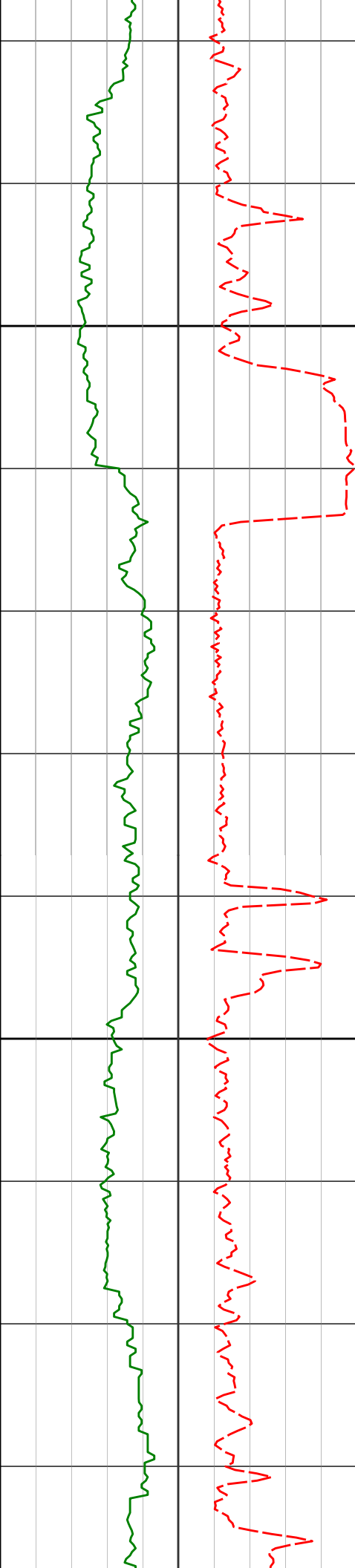
230.28°F

230.28°F

230.28°F

230.28°F

230.28°F



12700

12707'

91.85°

88.47° 6479.42'

6024.84'

230.28°F

230.28°F

230.28°F

12800

12802'

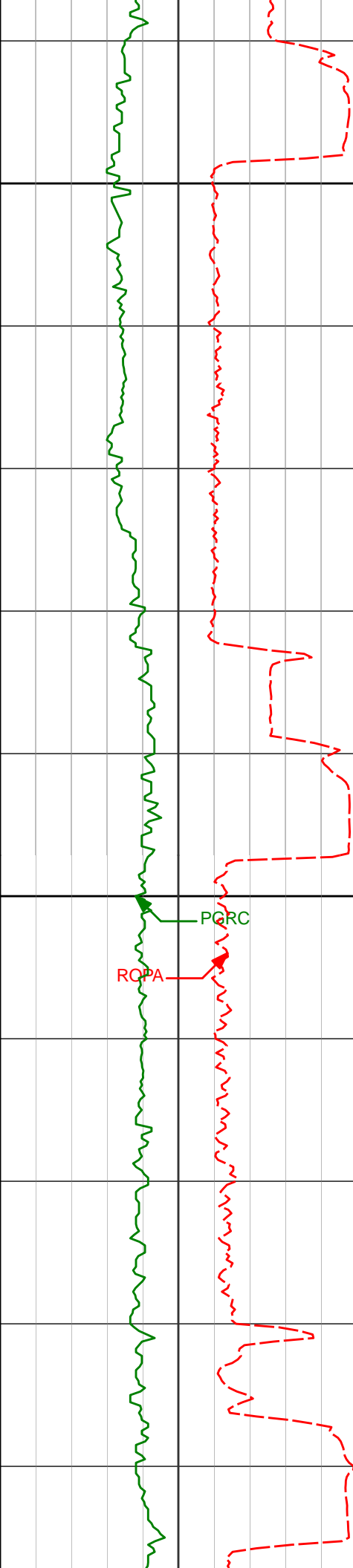
92.62°

88.81° 6475.72'

6119.58'

230.28°F

230.28°F



12900

13000

12897'

12991'

13086'

91.76°

90.65°

88.74°

89.48° 6472.09'

89.73° 6470.11'

88.21° 6470.61'

6214.26'

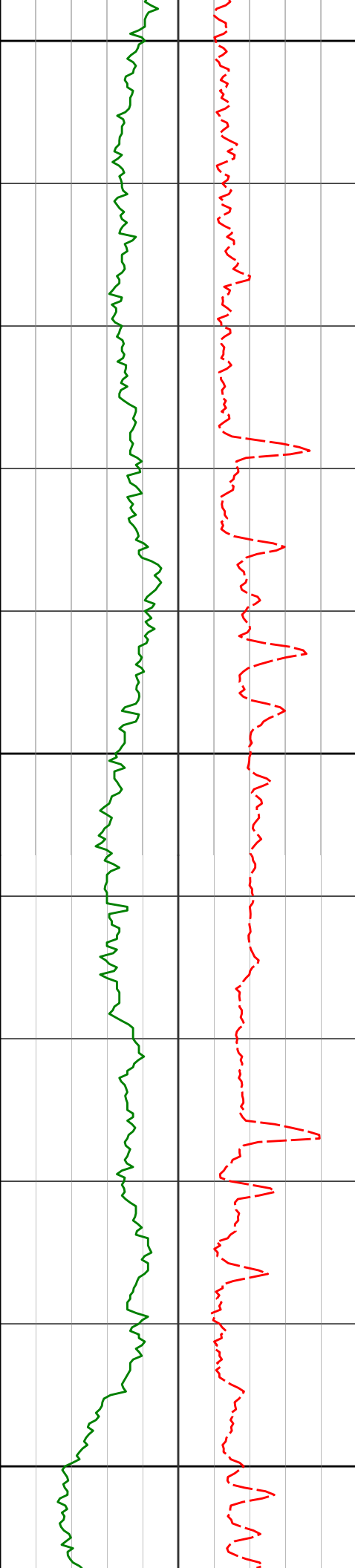
6307.94'

6402.71'

230.28°F

PORC

RCPA



13100

13180'

88.61°

87.94° 6472.79'

6496.55'

13200

13275'

88.24°

87.41° 6475.40'

6591.42'

13300

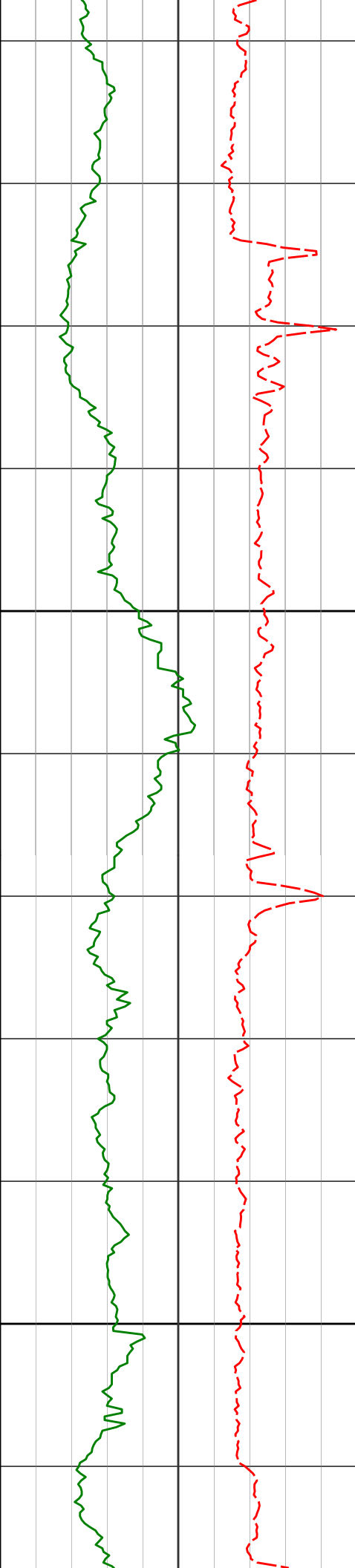
230.28°F

230.28°F

230.28°F

230.28°F

234.50°F



13400

13500

13370'

88.24°

87.30° 6478.32'

6686.29'

13464'

87.84°

86.58° 6481.53'

6780.19'

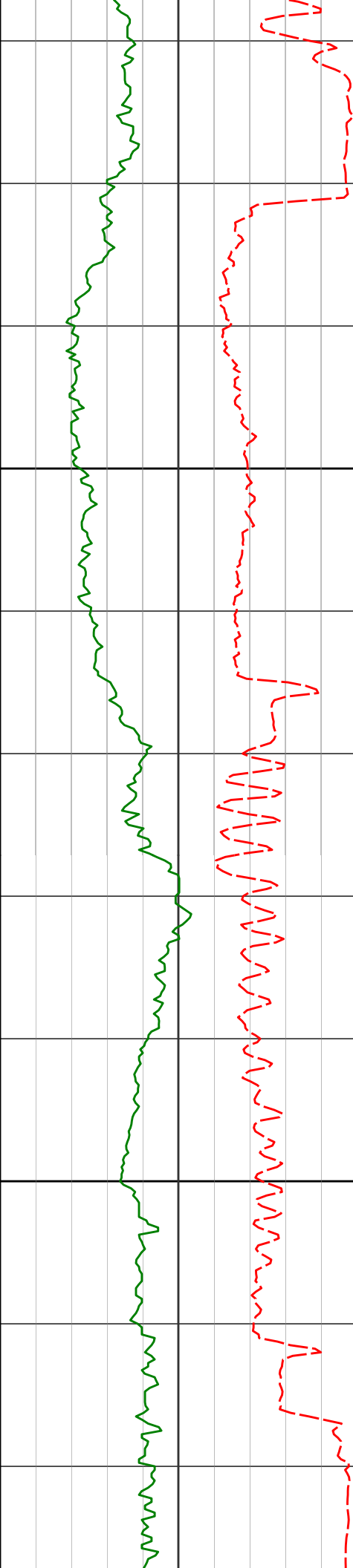
234.50°F

234.50°F

234.50°F

234.50°F

234.50°F



13600

13700

13559'

13654'

13748'

88.30°

88.55°

90.59°

88.15°

87.72°

87.69°

6484.73'

6487.34'

6488.05'

6875.05'

6969.90'

7063.79'

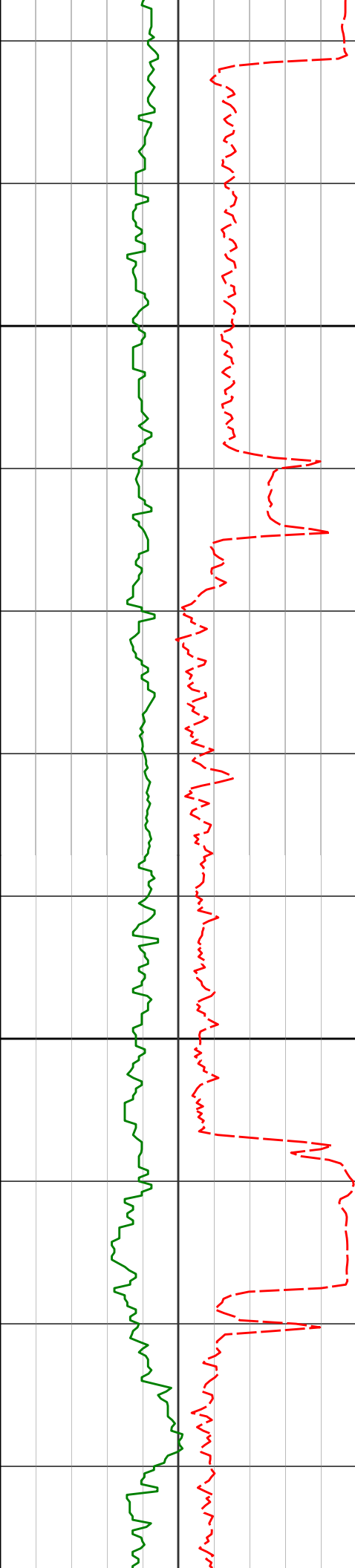
230.28°F

230.28°F

234.50°F

234.50°F

230.28°F



13800

13900

13843'

13938'

89.51°

92.59°

86.02° 6487.97'

88.94° 6486.22'

7158.73'

7253.61'

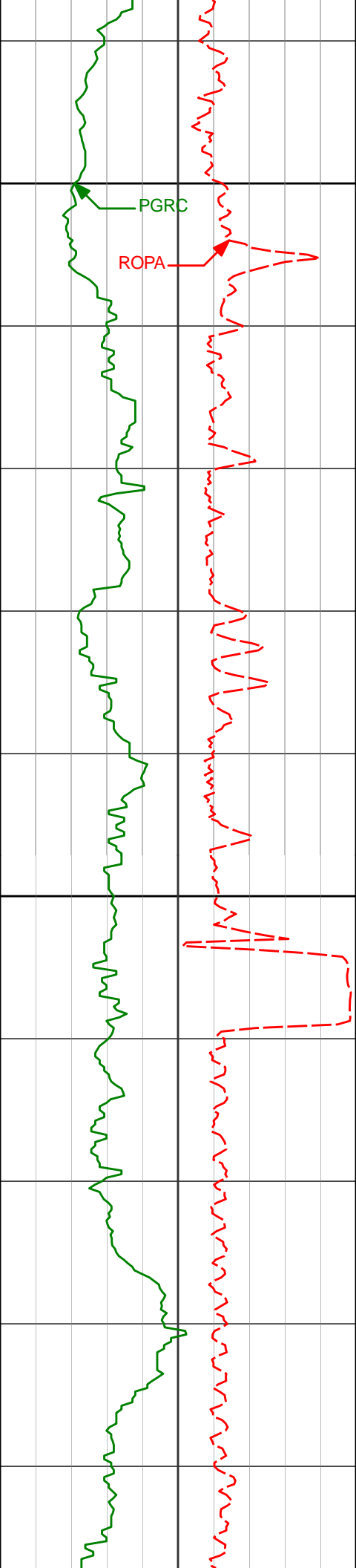
230.28°F

234.50°F

234.50°F

234.50°F

234.50°F



14000

14032'

93.15°

88.17° 6481.52'

7347.31'

14100

14127'

93.21°

89.24° 6476.25'

7441.97'

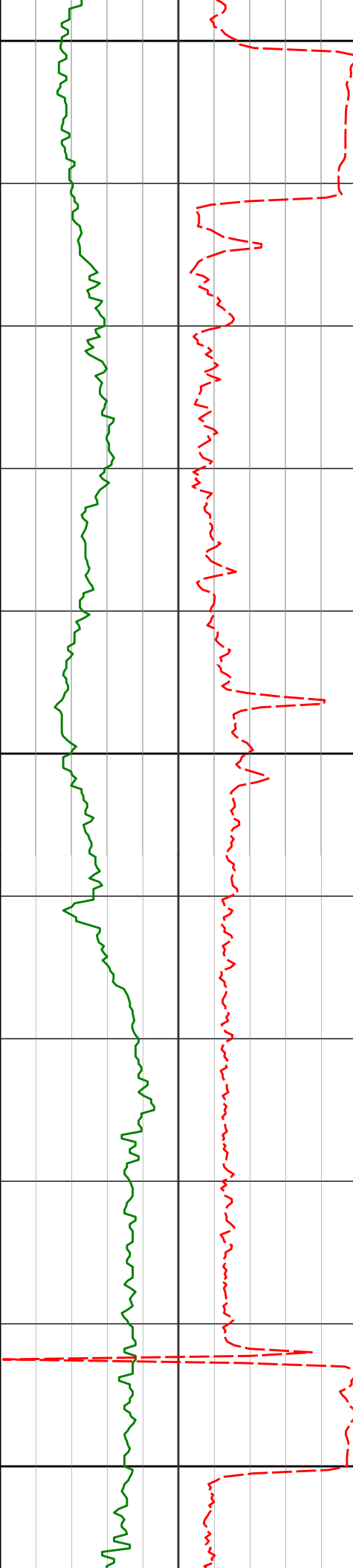
230.28°F

230.28°F

226.06°F

226.06°F

234.50°F



14200

14221'

91.60°

91.39° 6472.30'

7535.48'

234.50°F

14300

14316'

92.03°

91.09° 6469.29'

7629.88'

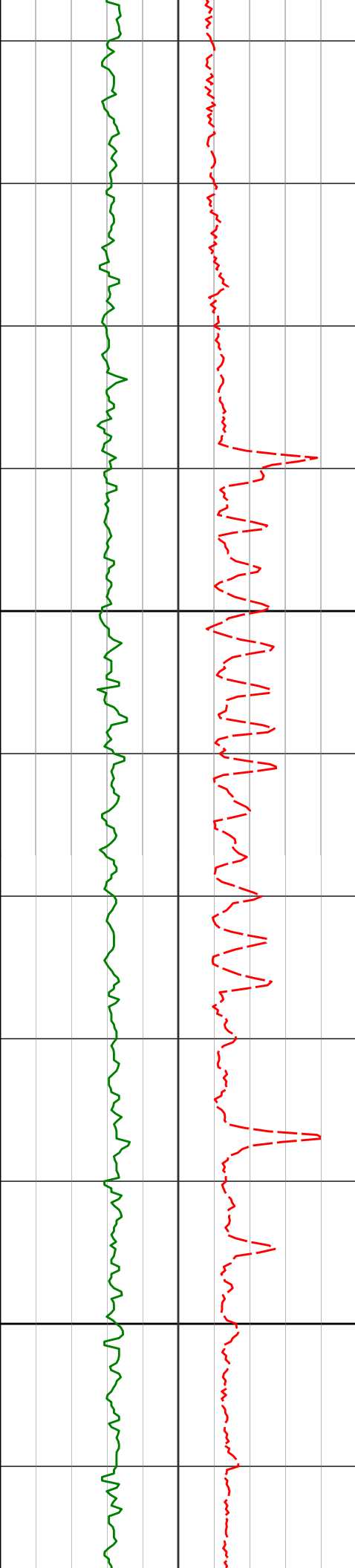
14400

14411'

90.80°

90.55° 6466.95'

7724.37'



14500

14505'

89.85°

88.73° 6466.42'

7818.06'

231.69°F

232.36°F

234.50°F

234.50°F

14600

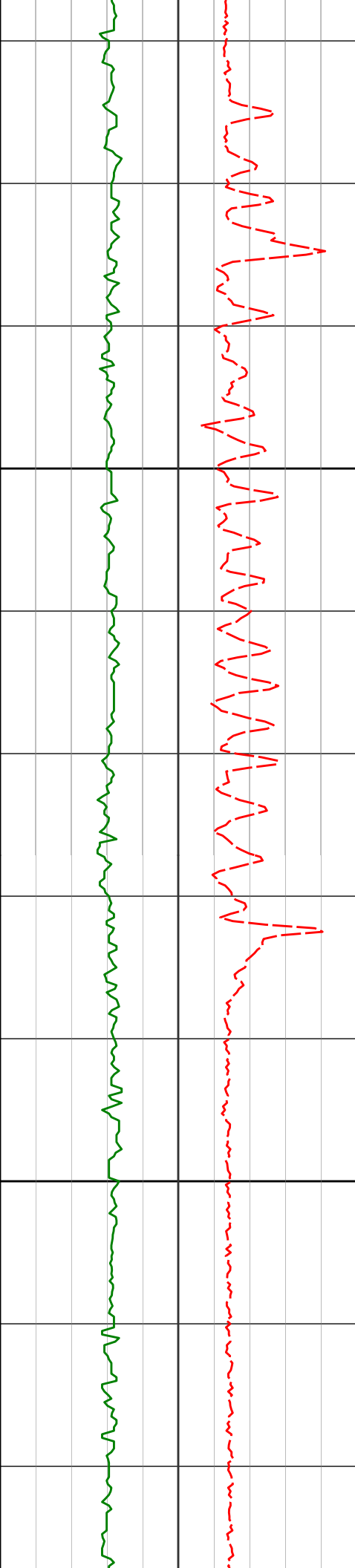
14600'

90.25°

88.48° 6466.33'

7912.87'

234.50°F



14700

14800

14694'

90.37°

87.28° 6465.82'

8006.75'

14788'

90.56°

85.80° 6465.06'

8100.72'

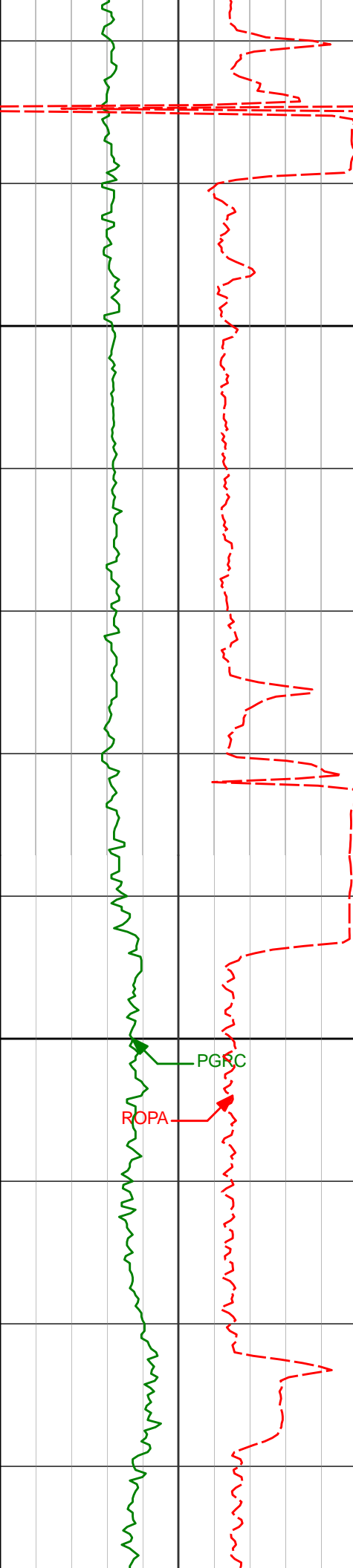
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



14900

15000

14883' 90.15° 86.23° 6464.47' 8195.70'

14978' 89.69° 88.77° 6464.60' 8290.60'

15072' 89.35° 88.48° 6465.39' 8384.42'

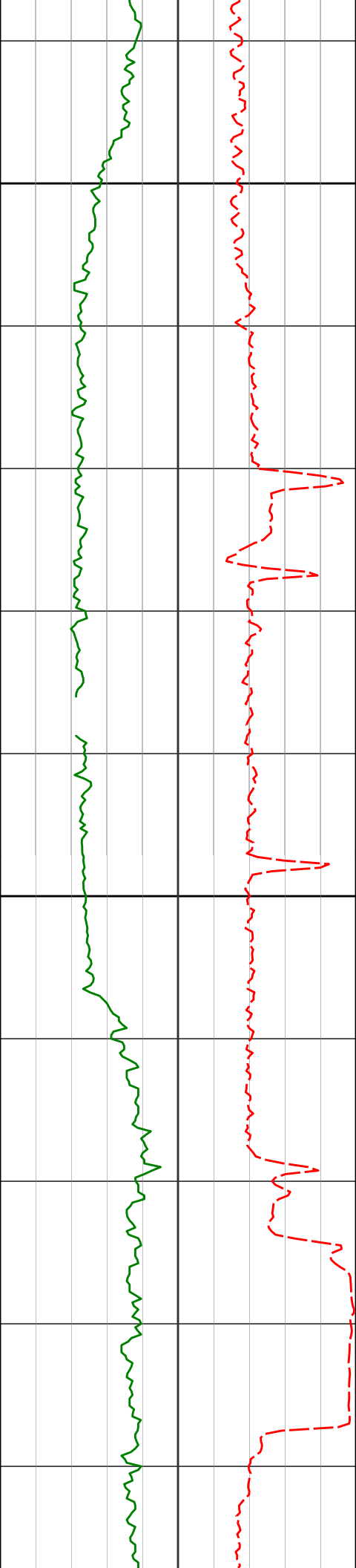
238.72°F

238.72°F

238.72°F

PGRC

ROPA



15100

15200

15167'

90.40°

88.72° 6465.60'

8479.23'

232.00°F

15262'

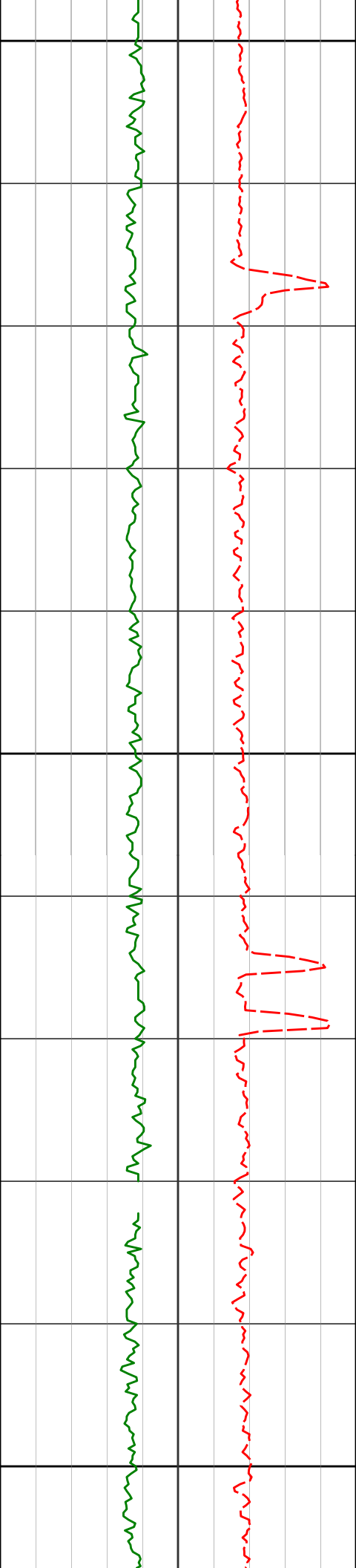
89.72°

88.70° 6465.50'

8574.04'

234.50°F

238.72°F



15300

234.50°F

15357'

90.31°

89.61° 6465.48'

8668.79'

238.72°F

15400

238.72°F

15451'

90.25°

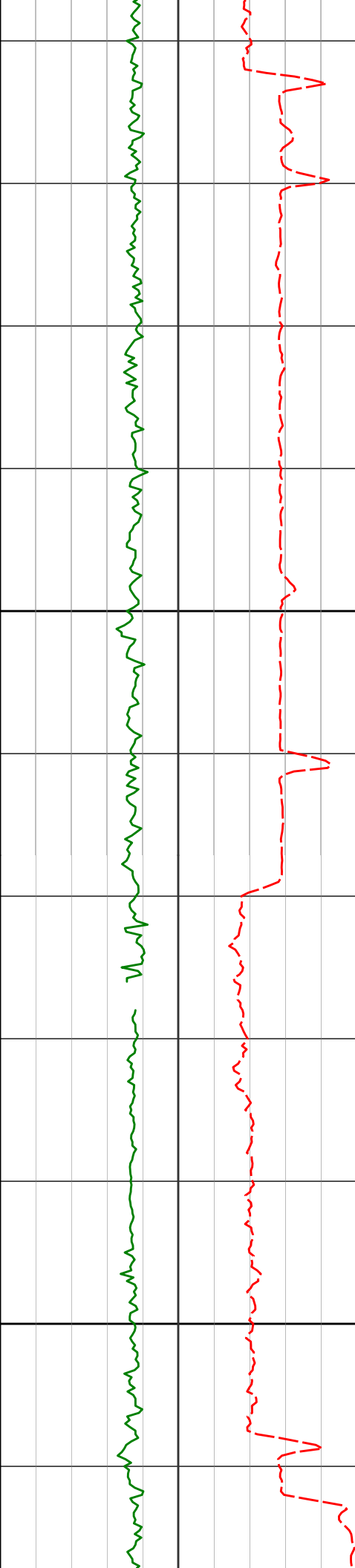
88.58° 6465.02'

8762.55'

238.72°F

15500

238.72°F



15600

15700

15546'

90.40°

87.87° 6464.48'

8857.40'

15641'

90.89°

87.46° 6463.41'

8952.30'

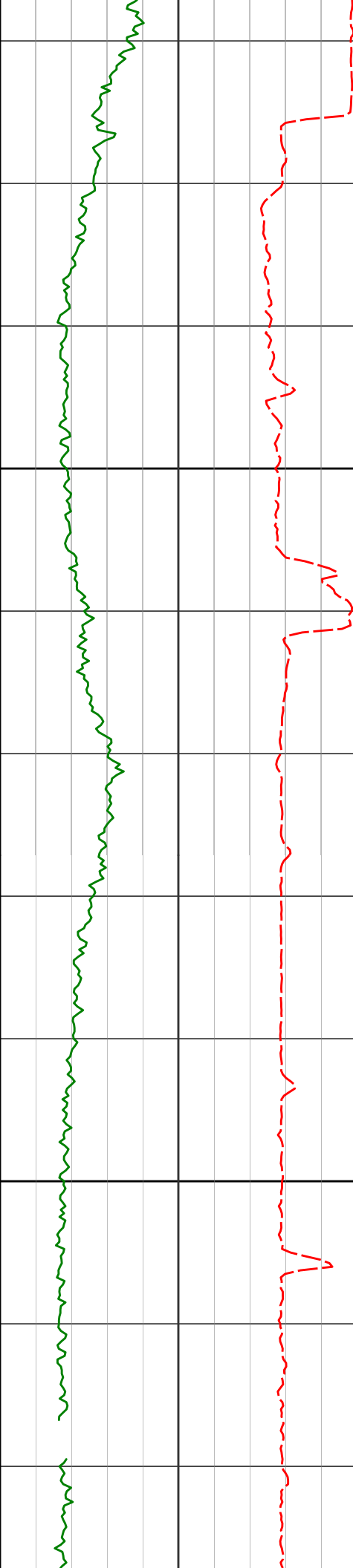
238.72°F

238.72°F

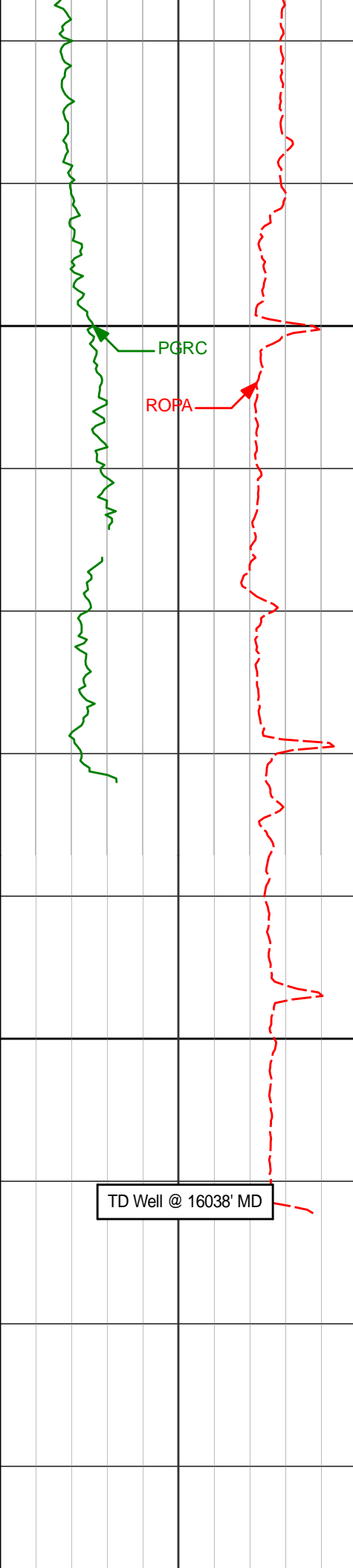
238.72°F

238.72°F

234.50°F



15735'	89.75°	88.72°	6462.88'	9046.16'	234.50°F
15833'	89.69°	88.56°	6463.36'	9143.96'	238.72°F
15930'	90.92°	89.00°	6462.85'	9240.75'	238.72°F



16000

16055'

16100

TD Well @ 16038' MD

238.72°F

241.61°F

91.91°

88.35° 6459.76'

9365.46'

[illegible]

HALLIBURTON

DIRECTIONAL SURVEY REPORT

**Noble Energy
Wells Ranch AE32-650
Wattensburg
Weld Colorado
USA
CA-XX-0902674377**

Surveys in the Lateral Section (Starting at 7068) have had IFR/MSA Corrections applied.

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
646.00	0.38	190.56	646.00	2.11 S	0.39 W	-0.57	0.06
836.00	0.44	207.16	835.99	3.38 S	0.84 W	-1.13	0.07
931.00	0.44	202.60	930.99	4.04 S	1.15 W	-1.49	0.04
1025.00	0.59	230.07	1024.98	4.68 S	1.66 W	-2.05	0.30
1118.00	0.48	215.38	1117.98	5.31 S	2.25 W	-2.70	0.18
1212.00	0.25	240.41	1211.98	5.73 S	2.65 W	-3.14	0.29
1304.00	0.26	231.35	1303.98	5.96 S	2.99 W	-3.49	0.05
1491.00	0.51	261.49	1490.97	6.35 S	4.15 W	-4.68	0.17
1584.00	0.39	281.61	1583.97	6.35 S	4.86 W	-5.39	0.21
1676.00	0.47	304.25	1675.97	6.07 S	5.48 W	-5.98	0.20
1768.00	0.30	5.46	1767.97	5.62 S	5.76 W	-6.23	0.46
1861.00	0.25	47.30	1860.96	5.24 S	5.59 W	-6.02	0.22
1953.00	0.15	29.67	1952.96	4.99 S	5.39 W	-5.80	0.12
2048.00	0.32	248.25	2047.96	4.98 S	5.57 W	-5.98	0.47
2141.00	0.47	265.53	2140.96	5.11 S	6.18 W	-6.60	0.20
2234.00	0.65	253.13	2233.96	5.29 S	7.07 W	-7.50	0.24
2327.00	0.86	244.47	2326.95	5.74 S	8.20 W	-8.67	0.26
2420.00	0.70	235.20	2419.94	6.37 S	9.30 W	-9.82	0.22
2511.00	0.79	233.30	2510.93	7.06 S	10.26 W	-10.83	0.10
2603.00	0.77	231.02	2602.92	7.82 S	11.24 W	-11.88	0.04
2695.00	1.00	52.63	2694.92	7.72 S	11.08 W	-11.71	1.93
2788.00	0.65	69.74	2787.91	7.05 S	9.94 W	-10.51	0.46
2881.00	0.54	72.21	2880.91	6.73 S	9.02 W	-9.57	0.12
2975.00	0.62	94.29	2974.90	6.63 S	8.09 W	-8.64	0.25
3070.00	0.93	78.56	3069.89	6.52 S	6.83 W	-7.37	0.39
3164.00	1.75	354.73	3163.87	4.94 S	6.22 W	-6.62	2.01
3259.00	2.13	328.52	3258.82	1.99 S	7.27 W	-7.42	1.00
3353.00	1.92	329.00	3352.76	0.85 N	8.99 W	-8.89	0.23
3448.00	4.56	306.64	3447.60	4.46 N	12.84 W	-12.41	3.03
3543.00	6.47	305.35	3542.16	9.81 N	20.24 W	-19.31	2.02
3637.00	9.66	308.67	3635.22	17.81 N	30.72 W	-29.07	3.43
3732.00	12.44	307.75	3728.45	29.06 N	45.04 W	-42.36	2.93
3827.00	13.26	307.62	3821.07	41.97 N	61.76 W	-57.90	0.86
3921.00	12.62	314.45	3912.69	55.74 N	77.63 W	-72.52	1.76
4016.00	12.12	315.15	4005.48	70.08 N	92.07 W	-85.67	0.54
4110.00	12.02	315.62	4097.40	84.07 N	105.87 W	-98.21	0.16
4205.00	11.27	315.50	4190.45	97.77 N	119.30 W	-110.40	0.78
4300.00	10.32	315.43	4283.76	110.45 N	131.78 W	-121.74	1.00
4394.00	9.75	315.46	4376.33	122.12 N	143.27 W	-132.17	0.61
4489.00	10.72	320.26	4469.82	134.64 N	154.55 W	-142.33	1.36
4583.00	9.13	315.55	4562.41	146.69 N	165.37 W	-152.06	1.89
4678.00	9.30	306.55	4656.19	156.64 N	176.81 W	-162.61	1.52
4772.00	9.72	298.21	4748.90	164.92 N	189.91 W	-174.94	1.53
4867.00	9.16	296.21	4842.61	172.05 N	203.76 W	-188.12	0.68

4962.00	11.05	300.60	4936.14	180.03 N	218.38 W	-202.00	2.14
5056.00	9.15	295.73	5028.68	187.86 N	232.87 W	-215.76	2.21
5151.00	9.53	297.50	5122.42	194.77 N	246.66 W	-228.89	0.50
5246.00	10.57	297.25	5215.96	202.40 N	261.39 W	-242.91	1.10
5340.00	11.55	302.38	5308.21	211.39 N	277.00 W	-257.69	1.48
5435.00	10.16	294.02	5401.51	219.90 N	292.70 W	-272.59	2.21
5530.00	10.78	305.49	5494.94	228.47 N	307.59 W	-286.68	2.28
5624.00	12.12	310.94	5587.07	240.03 N	322.20 W	-300.24	1.83
5719.00	20.44	340.67	5678.33	262.30 N	335.26 W	-311.33	12.14
5813.00	21.83	347.59	5766.02	294.86 N	344.45 W	-317.67	3.03
5908.00	22.50	351.24	5854.00	330.08 N	351.02 W	-321.16	1.62
6002.00	25.91	357.44	5939.74	368.39 N	354.68 W	-321.50	4.51
6097.00	30.39	6.15	6023.52	413.05 N	353.03 W	-315.99	6.39
6191.00	37.54	29.06	6101.75	461.98 N	336.48 W	-295.27	15.48
6286.00	45.86	51.38	6173.02	508.89 N	295.49 W	-250.38	17.81
6381.00	45.53	60.19	6239.45	547.05 N	239.39 W	-191.19	6.64
6475.00	44.01	68.34	6306.24	575.80 N	179.89 W	-129.43	6.31
6570.00	50.48	77.90	6370.78	595.71 N	113.23 W	-61.31	10.03
6665.00	59.60	82.40	6425.18	608.84 N	36.61 W	16.16	10.35
6759.00	68.58	84.62	6466.22	618.32 N	47.31 E	100.59	9.79
6854.00	73.61	85.32	6496.99	626.19 N	136.81 E	190.44	5.34
7068.00	89.97	87.43	6527.45	639.45 N	347.47 E	401.45	7.71
7163.00	90.25	87.29	6527.27	643.82 N	442.37 E	496.37	0.33
7258.00	90.40	86.12	6526.73	649.28 N	537.21 E	591.33	1.24
7352.00	90.28	85.43	6526.17	656.21 N	630.95 E	685.32	0.75
7447.00	90.89	86.62	6525.20	662.79 N	725.71 E	780.30	1.41
7542.00	91.76	89.17	6523.01	666.28 N	820.61 E	875.15	2.84
7636.00	90.86	88.47	6520.86	668.22 N	914.57 E	968.92	1.21
7731.00	89.69	90.28	6520.40	669.25 N	1009.56 E	1063.64	2.27
7920.00	90.00	91.36	6520.91	666.55 N	1198.53 E	1251.67	0.59
8015.00	89.51	90.25	6521.32	665.21 N	1293.52 E	1346.19	1.28
8109.00	91.79	90.58	6520.25	664.53 N	1387.51 E	1439.77	2.45
8204.00	92.53	90.33	6516.67	663.78 N	1482.43 E	1534.27	0.82
8299.00	90.71	90.09	6513.99	663.43 N	1577.39 E	1628.85	1.93
8394.00	90.77	90.77	6512.76	662.72 N	1672.38 E	1723.42	0.72
8488.00	89.17	89.17	6512.81	662.77 N	1766.37 E	1817.06	2.41
8583.00	88.67	88.53	6514.60	664.67 N	1861.34 E	1911.84	0.85
8677.00	89.63	88.72	6515.99	666.93 N	1955.30 E	2005.64	1.04
8771.00	91.63	90.84	6514.96	667.29 N	2049.28 E	2099.30	3.10
8865.00	90.99	90.60	6512.81	666.11 N	2143.25 E	2192.82	0.73
8960.00	90.96	92.66	6511.19	663.41 N	2238.19 E	2287.17	2.17
9054.00	90.83	89.07	6509.73	661.99 N	2332.16 E	2380.66	3.82
9149.00	90.55	87.82	6508.58	664.57 N	2427.11 E	2475.48	1.35
9244.00	90.25	88.32	6507.92	667.77 N	2522.05 E	2570.35	0.61
9338.00	90.28	88.54	6507.48	670.34 N	2616.02 E	2664.18	0.24
9433.00	90.22	87.62	6507.07	673.52 N	2710.96 E	2759.04	0.97
9527.00	89.97	86.69	6506.91	678.19 N	2804.85 E	2852.98	1.02
9621.00	90.25	88.16	6506.73	682.41 N	2898.75 E	2946.89	1.59
9716.00	90.00	87.44	6506.53	686.06 N	2993.68 E	3041.78	0.80
9810.00	89.88	86.72	6506.62	690.85 N	3087.55 E	3135.72	0.78
9905.00	90.49	86.73	6506.32	696.27 N	3182.40 E	3230.68	0.64
10000.00	91.67	86.50	6504.53	701.88 N	3277.21 E	3325.63	1.27
10094.00	91.76	87.67	6501.71	706.66 N	3371.05 E	3419.52	1.25
10187.00	89.94	86.92	6500.33	711.05 N	3463.93 E	3512.44	2.12
10281.00	91.91	88.48	6498.82	714.82 N	3557.83 E	3606.32	2.67
10373.00	93.21	89.15	6494.71	716.72 N	3649.72 E	3698.02	1.59
10467.00	92.31	89.75	6490.18	717.62 N	3743.61 E	3791.63	1.15
10560.00	89.32	90.16	6488.86	717.70 N	3836.59 E	3884.27	3.25
10653.00	89.11	89.83	6490.13	717.70 N	3929.58 E	3976.91	0.42
10745.00	89.57	89.85	6491.19	717.96 N	4021.57 E	4068.59	0.50
10838.00	89.01	89.56	6492.35	718.44 N	4114.56 E	4161.27	0.68
10930.00	89.01	89.61	6493.93	719.11 N	4206.55 E	4252.97	0.05
11023.00	88.00	89.65	6496.36	719.71 N	4299.51 E	4345.64	1.09
11117.00	89.29	89.97	6498.58	720.02 N	4393.48 E	4439.28	1.41
11210.00	88.80	89.70	6500.13	720.29 N	4486.47 E	4531.94	0.60
11303.00	89.94	90.45	6501.16	720.16 N	4579.46 E	4624.58	1.47
11396.00	89.45	91.08	6501.65	718.92 N	4672.45 E	4717.11	0.86
11489.00	89.54	89.56	6502.47	718.40 N	4765.44 E	4809.71	1.64
11580.00	90.34	89.35	6502.57	719.27 N	4856.44 E	4900.44	0.91
11672.00	91.26	89.02	6501.28	720.58 N	4948.42 E	4992.19	1.06
11764.00	90.71	88.68	6499.70	722.42 N	5040.38 E	5083.97	0.70
11857.00	90.80	88.61	6498.48	724.62 N	5133.35 E	5176.78	0.12
11950.00	90.34	88.17	6497.55	727.24 N	5226.31 E	5269.62	0.68
12045.00	91.48	90.01	6496.04	728.74 N	5321.28 E	5364.36	2.28
12139.00	91.36	89.11	6493.71	729.47 N	5415.25 E	5458.04	0.97

12234.00	92.37	89.04	6490.62	731.00 N	5510.18 E	5552.75	1.07
12329.00	92.87	88.73	6486.28	732.85 N	5605.07 E	5647.44	0.62
12423.00	91.57	88.73	6482.64	734.93 N	5698.97 E	5741.17	1.38
12518.00	90.09	87.47	6481.26	738.08 N	5793.90 E	5836.02	2.05
12613.00	90.15	86.81	6481.06	742.82 N	5888.78 E	5930.96	0.70
12707.00	91.85	88.47	6479.42	746.69 N	5982.68 E	6024.84	2.53
12802.00	92.62	88.81	6475.72	748.94 N	6077.58 E	6119.58	0.89
12897.00	91.76	89.48	6472.09	750.36 N	6172.50 E	6214.26	1.15
12991.00	90.65	89.73	6470.11	751.00 N	6266.48 E	6307.94	1.21
13086.00	88.74	88.21	6470.61	752.71 N	6361.45 E	6402.71	2.57
13180.00	88.61	87.94	6472.79	755.87 N	6455.37 E	6496.55	0.32
13275.00	88.24	87.41	6475.40	759.72 N	6550.26 E	6591.42	0.68
13370.00	88.24	87.30	6478.32	764.10 N	6645.11 E	6686.29	0.12
13464.00	87.84	86.58	6481.53	769.12 N	6738.92 E	6780.19	0.88
13559.00	88.30	88.15	6484.73	773.48 N	6833.77 E	6875.05	1.72
13654.00	88.55	87.72	6487.34	776.90 N	6928.67 E	6969.90	0.52
13748.00	90.59	87.69	6488.05	780.67 N	7022.59 E	7063.79	2.17
13843.00	89.51	86.02	6487.97	785.88 N	7117.44 E	7158.73	2.09
13938.00	92.59	88.94	6486.22	790.06 N	7212.31 E	7253.61	4.47
14032.00	93.15	88.17	6481.52	792.42 N	7306.16 E	7347.31	1.01
14127.00	93.21	89.24	6476.25	794.57 N	7400.99 E	7441.97	1.13
14221.00	91.60	91.39	6472.30	794.05 N	7494.90 E	7535.48	2.86
14316.00	92.03	91.09	6469.29	792.00 N	7589.82 E	7629.88	0.55
14411.00	90.80	90.55	6466.95	790.64 N	7684.78 E	7724.37	1.41
14505.00	89.85	88.73	6466.42	791.23 N	7778.78 E	7818.06	2.18
14600.00	90.25	88.48	6466.33	793.54 N	7873.75 E	7912.87	0.50
14694.00	90.37	87.28	6465.82	797.02 N	7967.68 E	8006.75	1.28
14788.00	90.56	85.80	6465.06	802.69 N	8061.50 E	8100.72	1.59
14883.00	90.15	86.23	6464.47	809.29 N	8156.27 E	8195.70	0.63
14978.00	89.69	88.77	6464.60	813.44 N	8251.17 E	8290.60	2.72
15072.00	89.35	88.48	6465.39	815.69 N	8345.14 E	8384.42	0.48
15167.00	90.40	88.72	6465.60	818.01 N	8440.11 E	8479.23	1.13
15262.00	89.72	88.70	6465.50	820.15 N	8535.09 E	8574.04	0.72
15357.00	90.31	89.61	6465.48	821.55 N	8630.08 E	8668.79	1.14
15451.00	90.25	88.58	6465.02	823.04 N	8724.06 E	8762.55	1.10
15546.00	90.40	87.87	6464.48	825.98 N	8819.01 E	8857.40	0.76
15641.00	90.89	87.46	6463.41	829.85 N	8913.93 E	8952.30	0.67
15735.00	89.75	88.72	6462.88	832.98 N	9007.87 E	9046.16	1.81
15833.00	89.69	88.56	6463.36	835.31 N	9105.84 E	9143.96	0.17
15930.00	90.92	89.00	6462.85	837.37 N	9202.82 E	9240.75	1.35
16055.00	91.91	88.35	6459.76	840.26 N	9327.74 E	9365.46	0.95

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 85.04 DEGREES (GRID)
A TOTAL CORRECTION OF 7.32 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16055.00 FEET
IS 9365.51 FEET ALONG 84.85 DEGREES (GRID)**

Final survey is a straight line projection to TD.