



WELL INFORMATION					
MWD Run Number	100				
Date run completed	07-Jun-15				
Rig Bit Number	2				
Bit Size (in)	8.75				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	615.99				
Log End Depth (TVD, ft)	6,701.79				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	05-Jun-15 22:30				
Drill/Wipe End Date and Time	07-Jun-15 20:30				
Min Inc (deg) @ Depth (TVD, ft)	0.37 @ 1,667.94				
Max Inc (deg) @ Depth (TVD, ft)	86.48 @ 6,698.38				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	586.49				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	8.90 / 27.00				
Filtrate CL (ppm)	1,600.00				
pH / Fluid Loss (mptm)	9.80 / 32				
PV (cP) / YP (lhf2)	2 / 2.00				
% Solids / % Sand	10.7 / 0.70				
% Oil / Oil:Water Ratio	N/A / N/A				
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) / S	107.07 / PDC				

Max Tool Temp (degF) / Source	167.97 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 167.97				
Lead MWD Engineer	Brian Neu				
Customer Representative	JW Ewrin				

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404299				
Insert Serial Number	11680801				
Date and Time Initialized	05-Jun-15 13:39				
Date and Time Read	07-Jun-15 02:37				
ECMB SW Version	N/A				

### Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	63.00				
Software Version	6.21				
Sub Serial Number	11404299				
Sonde Serial Number	11833212				
Sensor ID Number	N/A				
Toolface Offset (deg)	320.20				

### Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	56.11				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404299				
Insert/Sonde Serial Number	11579761				

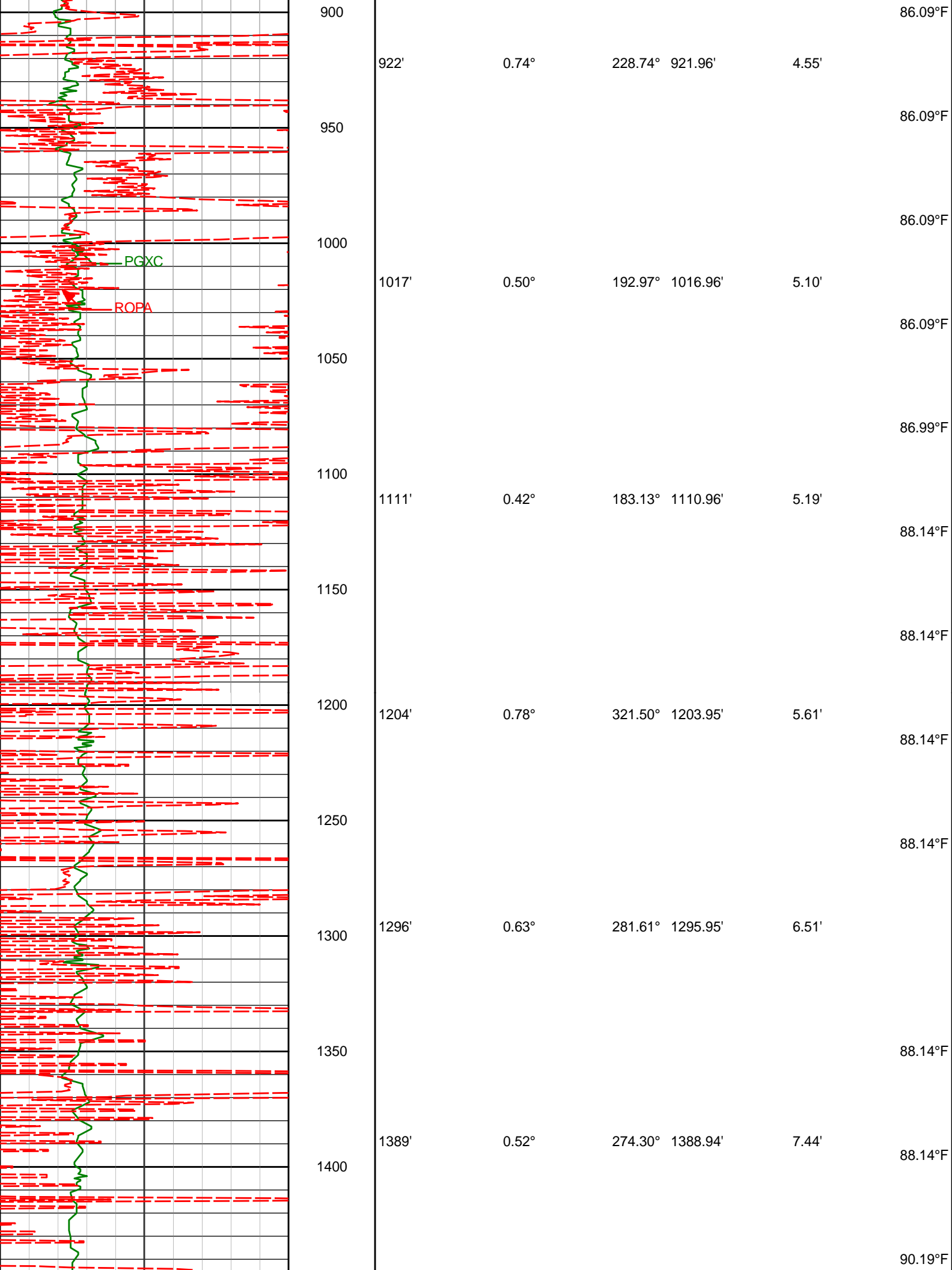
## REMARKS

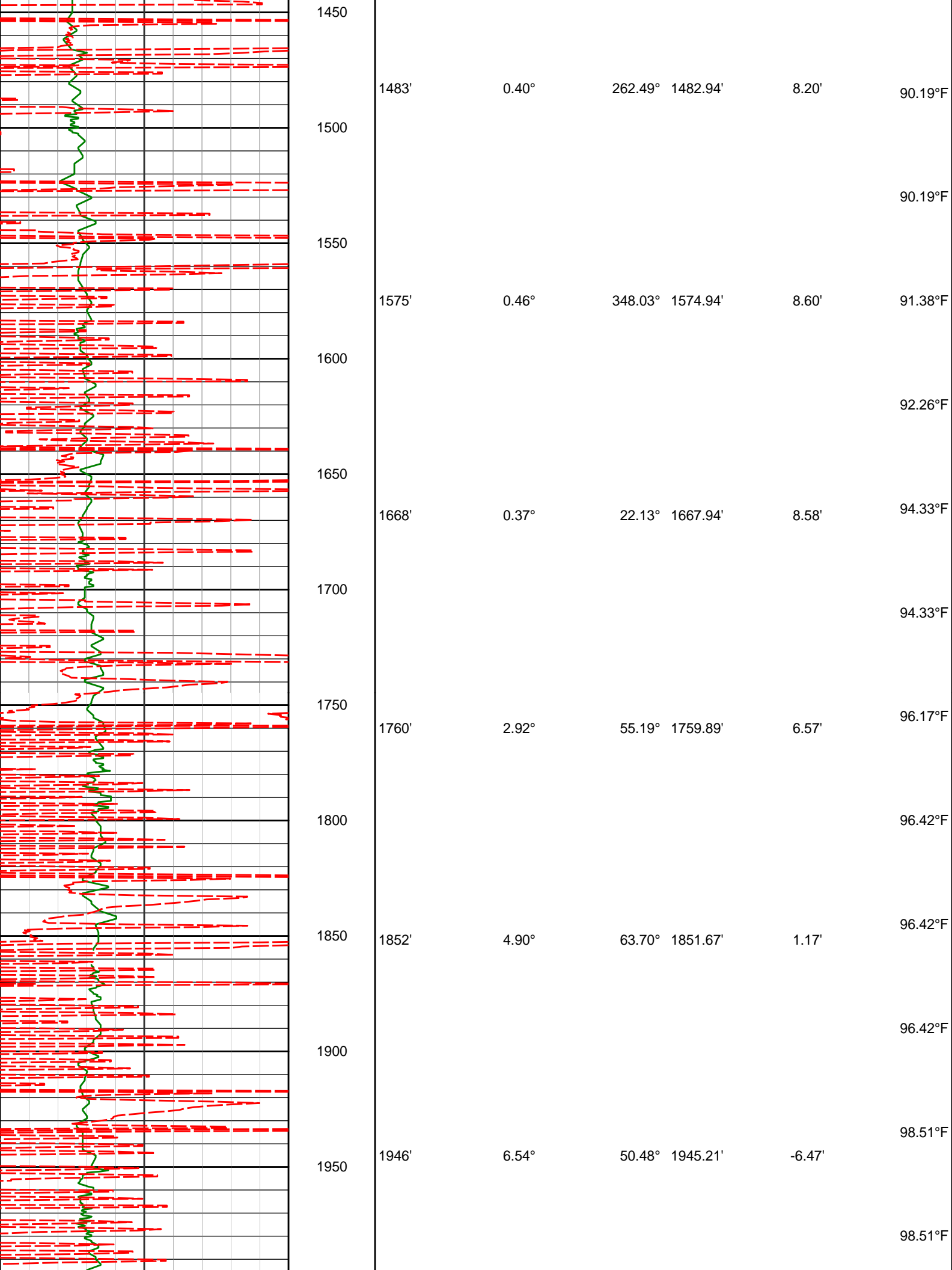
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:  
Hole Size: 8.75"  
Mud Density: 9.9-11.0
5. The following smoothing parameters have been applied to the data:  
Interval: 0.5 ft  
Coercion Distance: 1.2 ft (ROPA)  
Interval: 0.5 ft  
Coercion Distance: 0.6 ft (Gamma Ray)

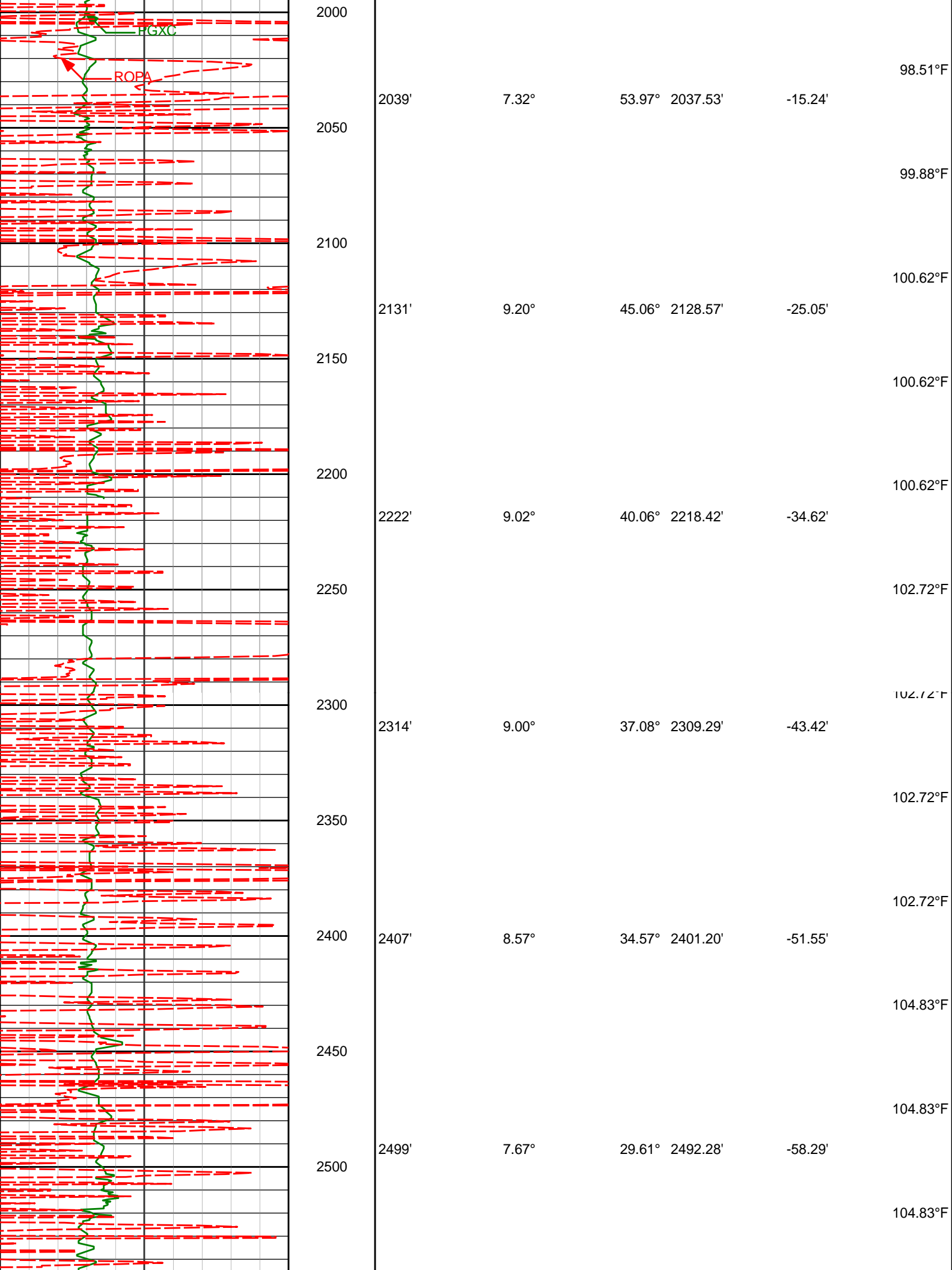
## WARRANTY

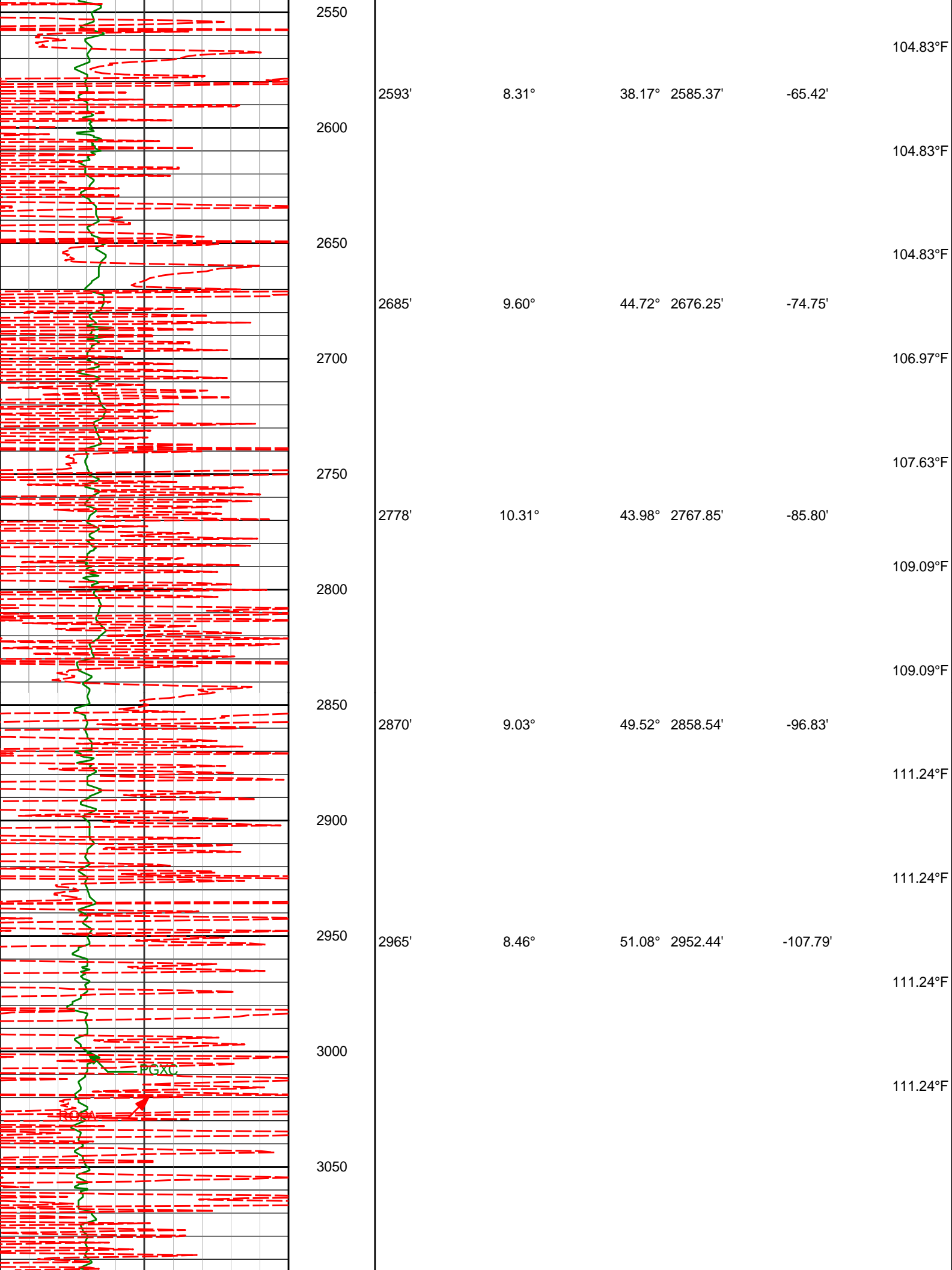
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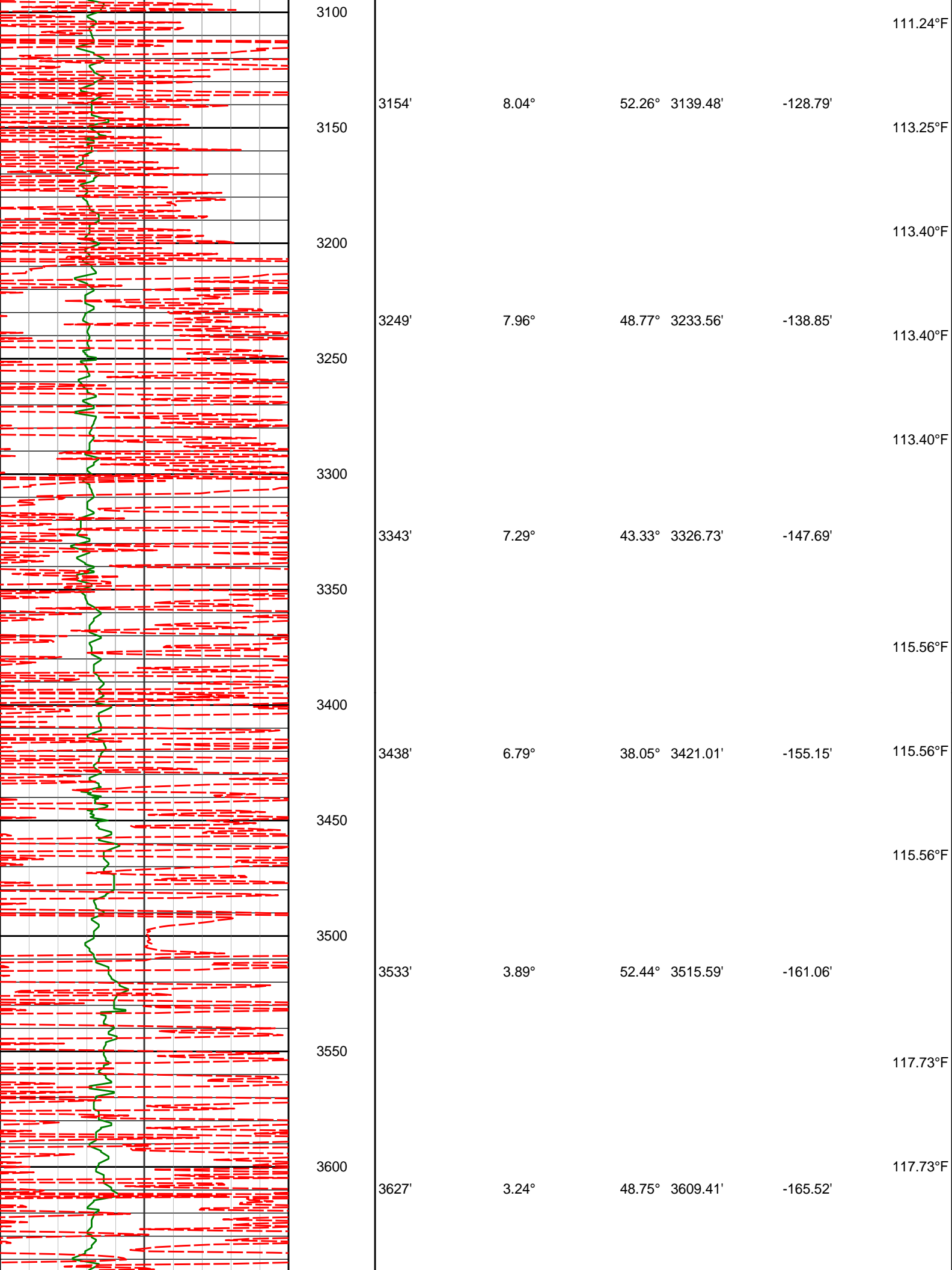
# TVD Detail 1:600 Scale



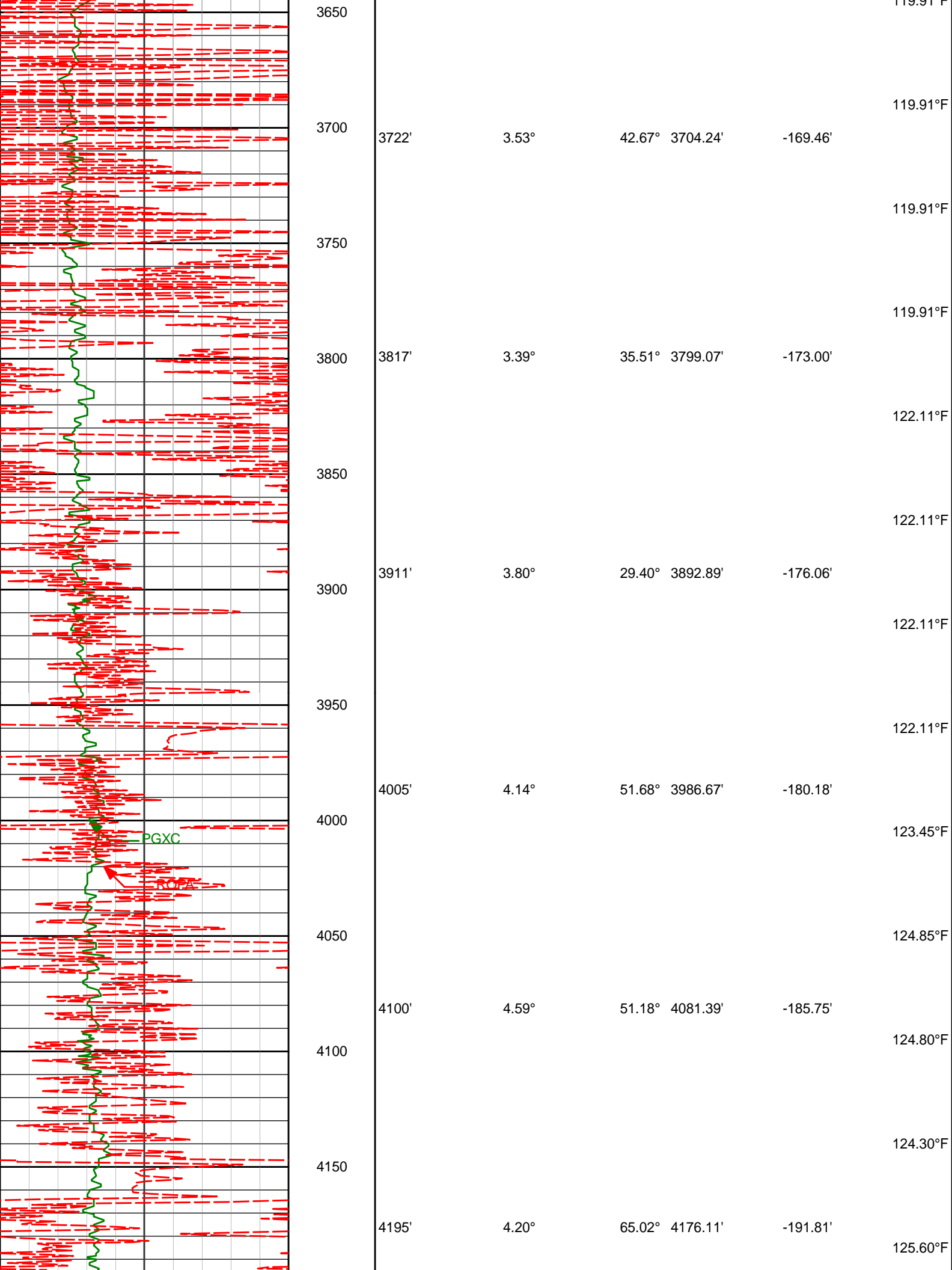


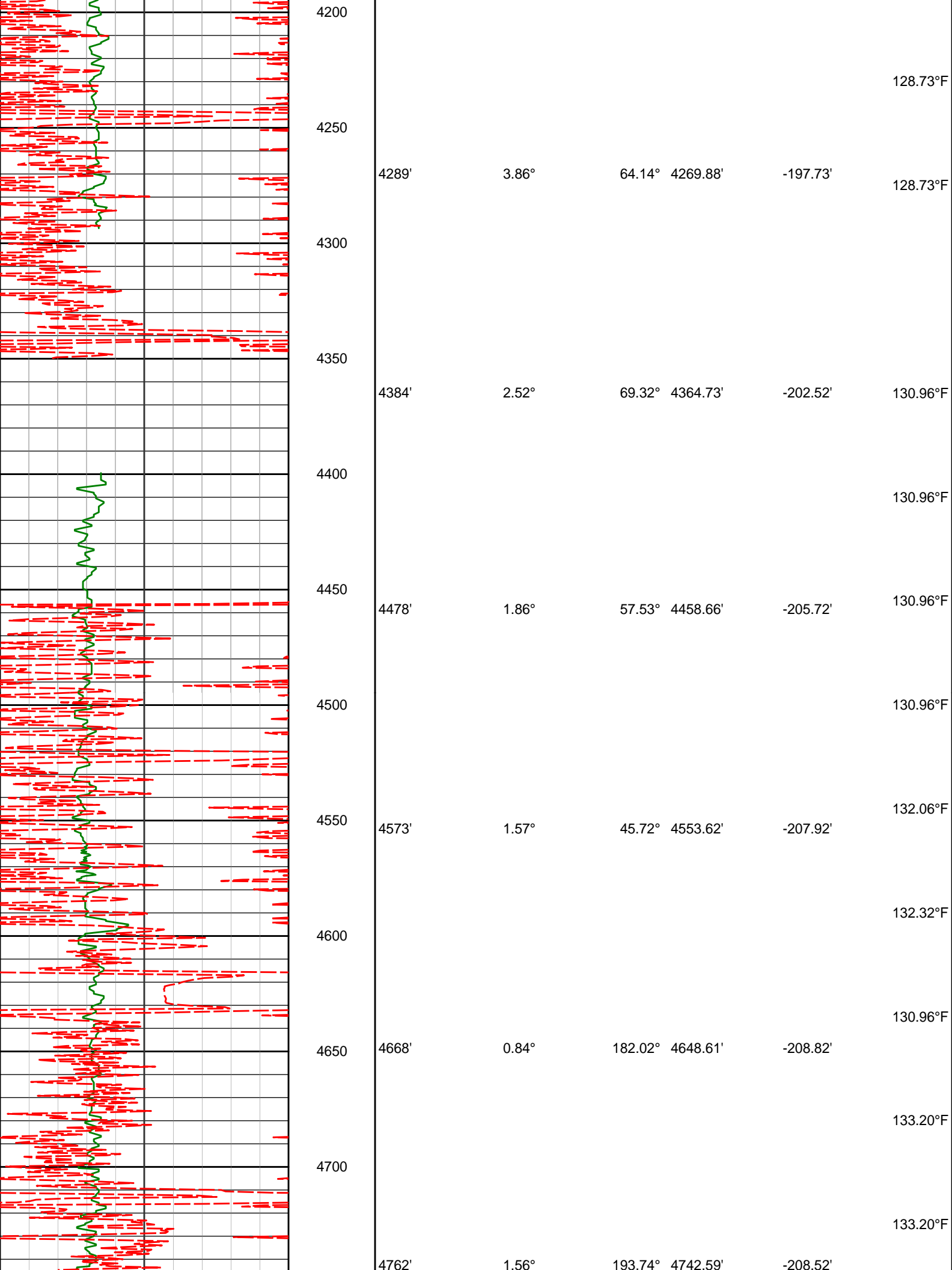


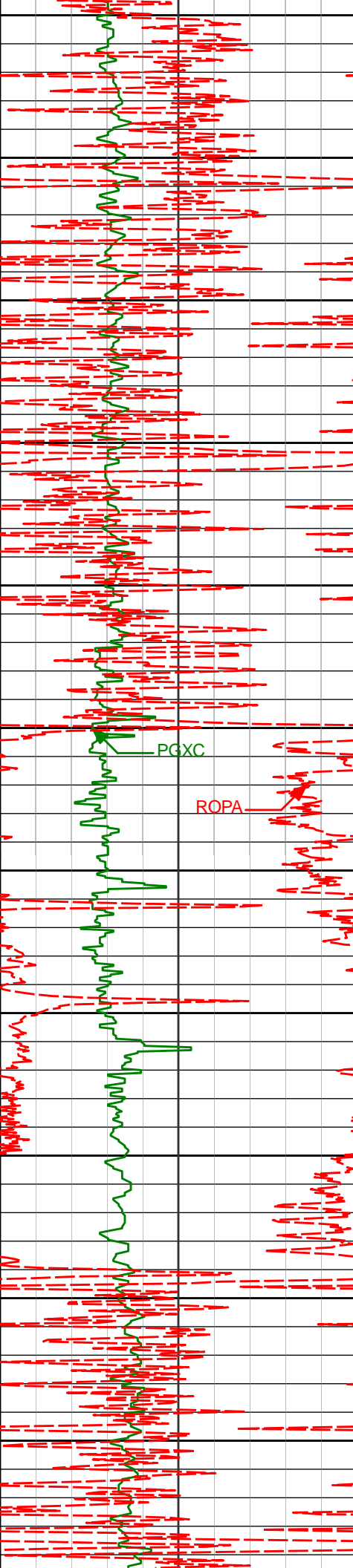












4750

4800

4850

4900

4950

5000

5050

5100

5150

5200

5250

4857'	1.74°	212.12°	4837.55'	-207.49'
4951'	1.77°	217.00°	4931.51'	-205.89'
5046'	1.82°	205.13°	5026.46'	-204.41'
5141'	1.91°	201.03°	5121.41'	-203.25'
5235'	2.10°	191.32°	5215.35'	-202.40'

134.94°F

135.45°F

135.45°F

135.45°F

137.14°F

137.70°F

137.70°F

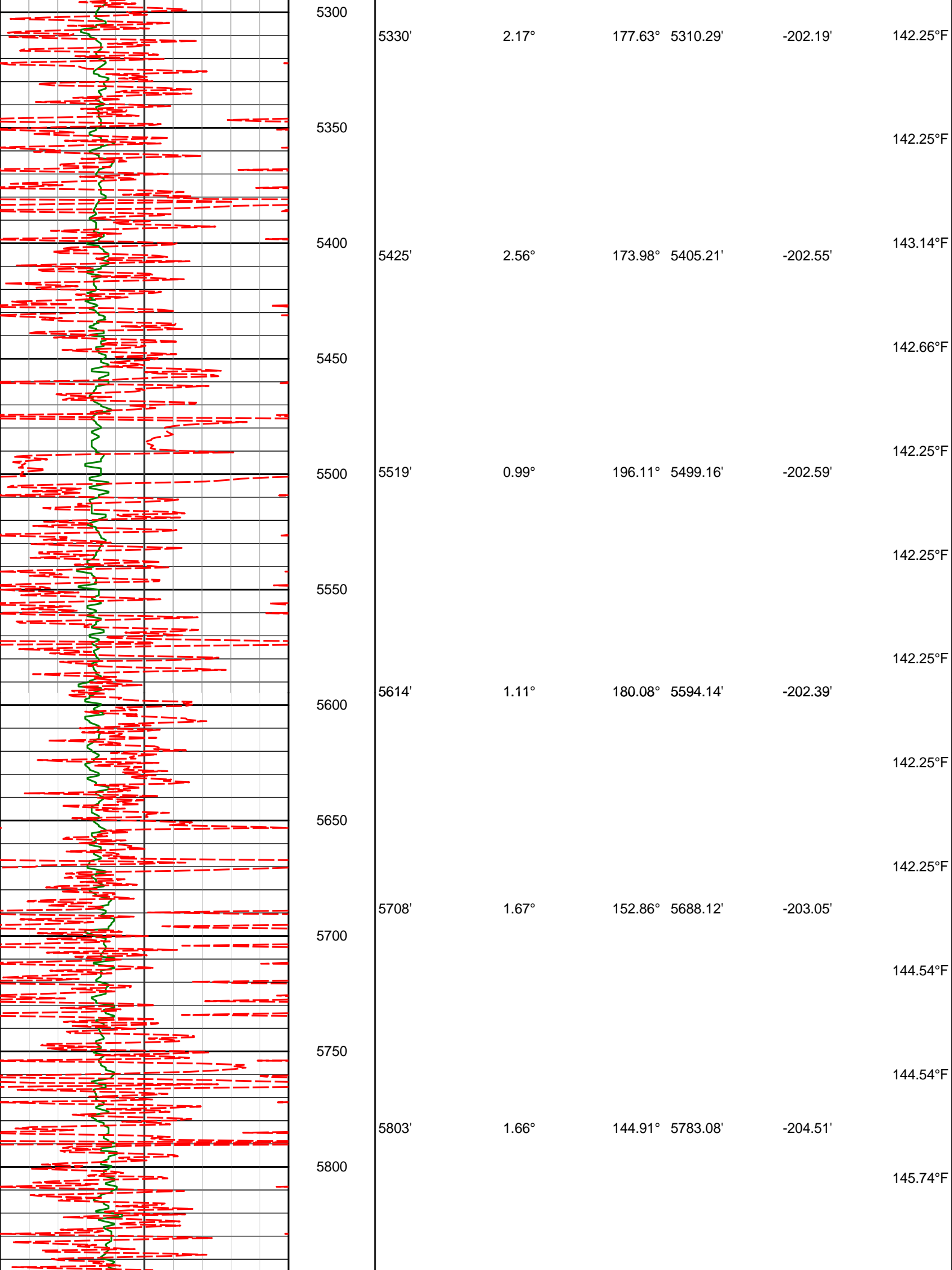
137.93°F

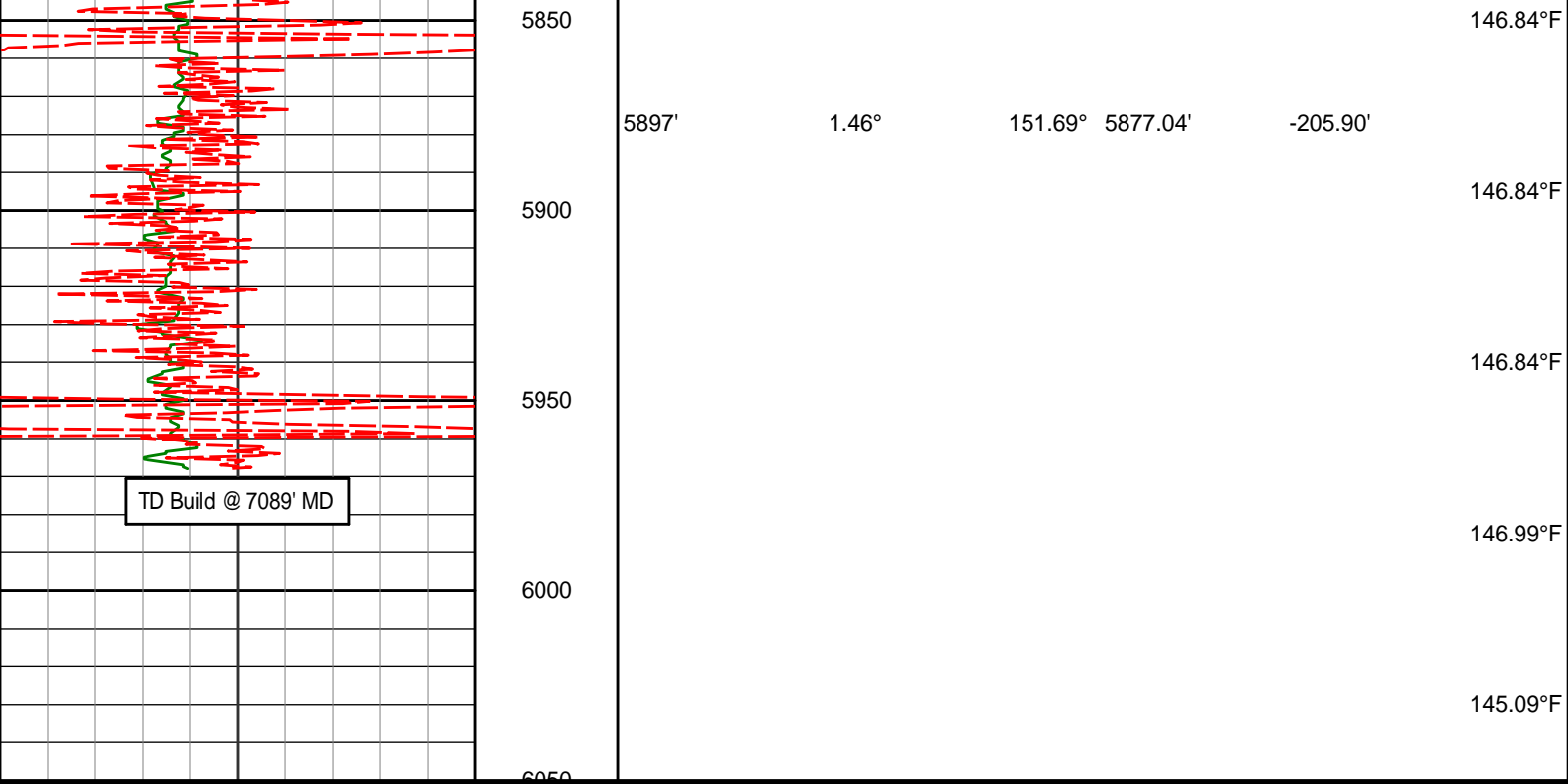
139.72°F

139.96°F

140.11°F

142.25°F

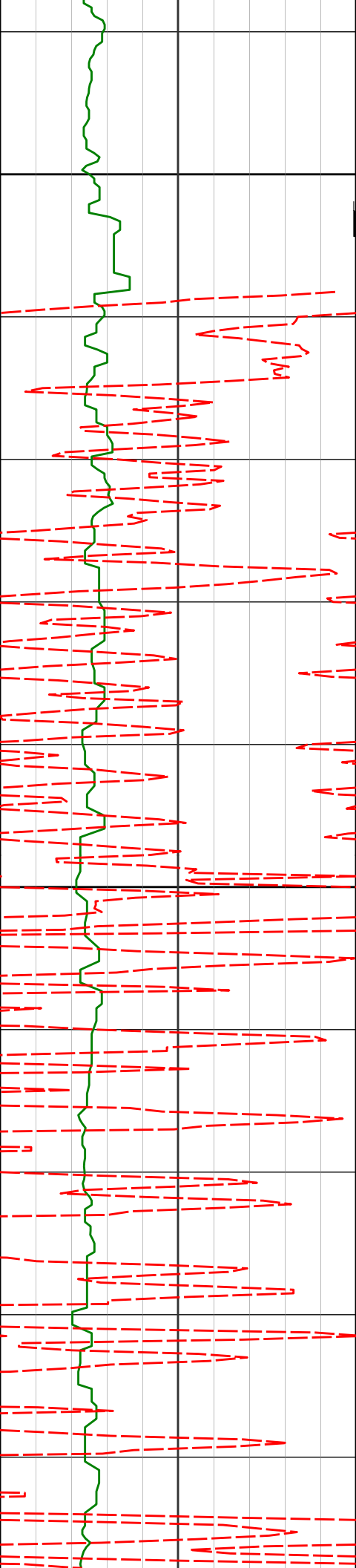




Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
500		0						
PCG GR XHi-Range RT BCor PGXRC-T api		0						
300								

# TVD Detail 1:240 Scale

PCG Gamma Ray BCorr PGRC api																																			
0										300																									
Avg Rate of Penetration ROPA feet per hr										Depth TVD ft		Depth				Inc				Azi				TVD				V.S.				Temp			
500										0																									



600

Casing Shoe @ 627'

Run 100

638'

0.58°

221.99° 637.99'

2.14'

700

733'

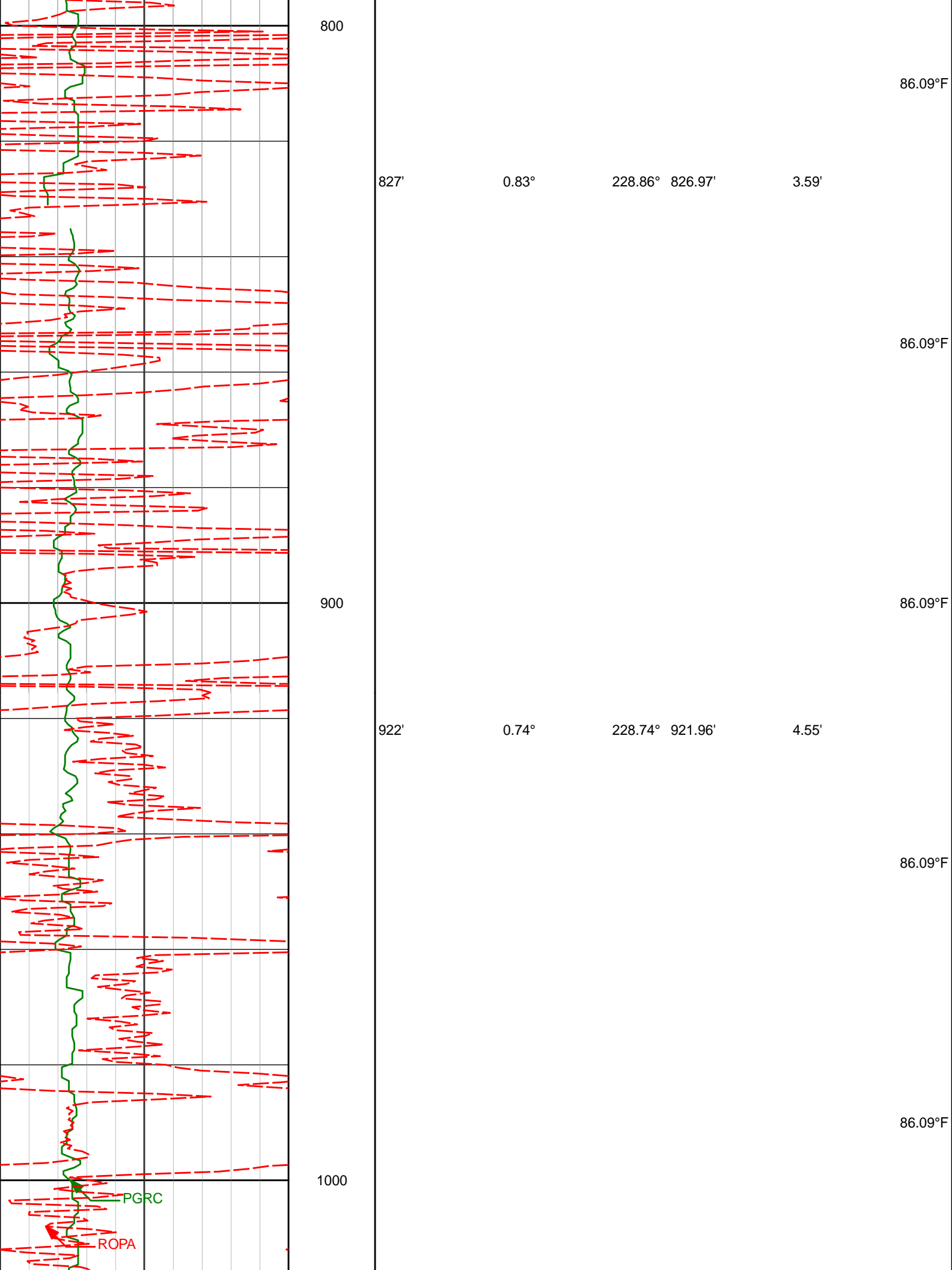
0.75°

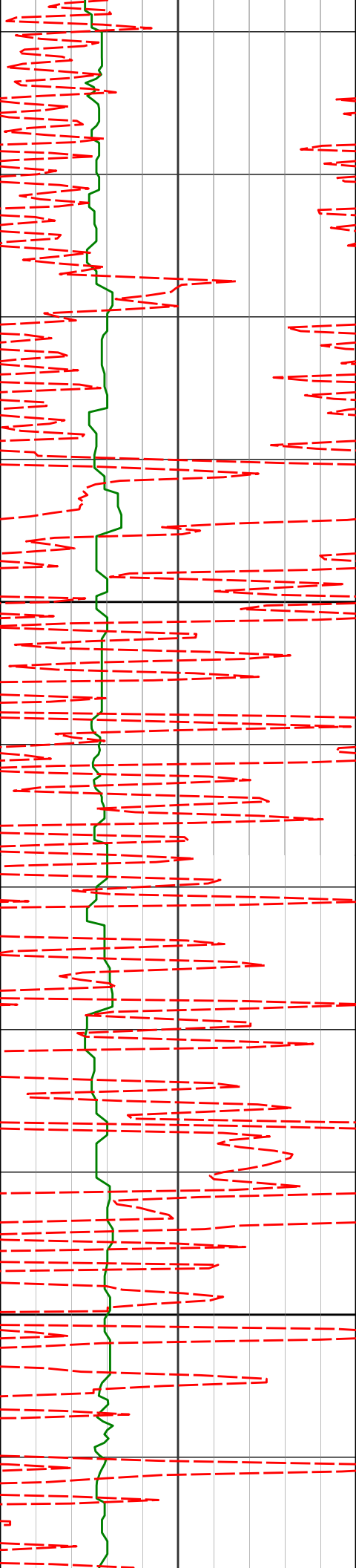
211.70° 732.98'

2.77'

85.47°F

86.09°F





1100

1200

1017'

1111'

1204'

0.50°

0.42°

0.78°

192.97°

183.13°

321.50°

1016.96'

1110.96'

1203.95'

5.10'

5.19'

5.61'

86.09°F

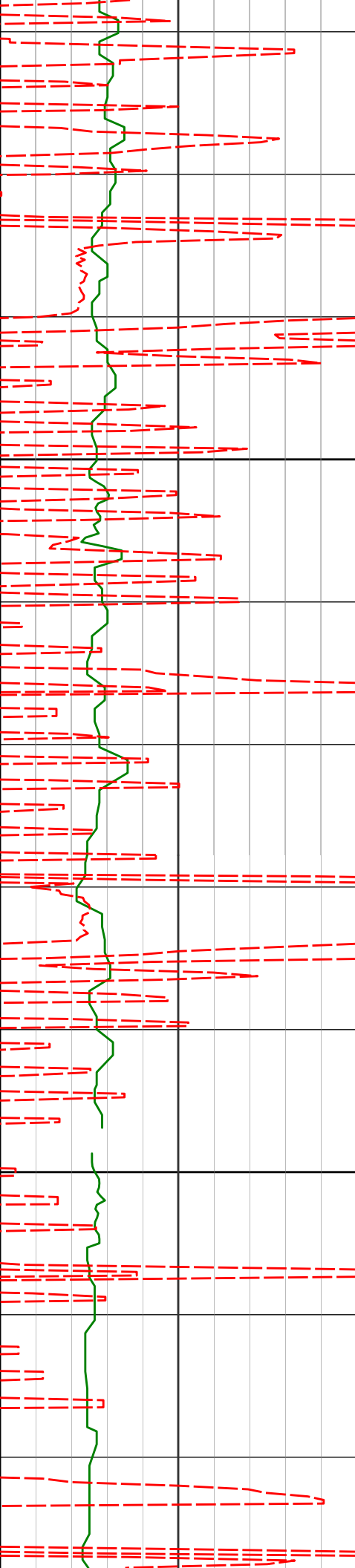
86.99°F

88.14°F

88.14°F

88.14°F





1300

1400

1296'

1389'

0.63°

0.52°

281.61° 1295.95'

274.30° 1388.94'

6.51'

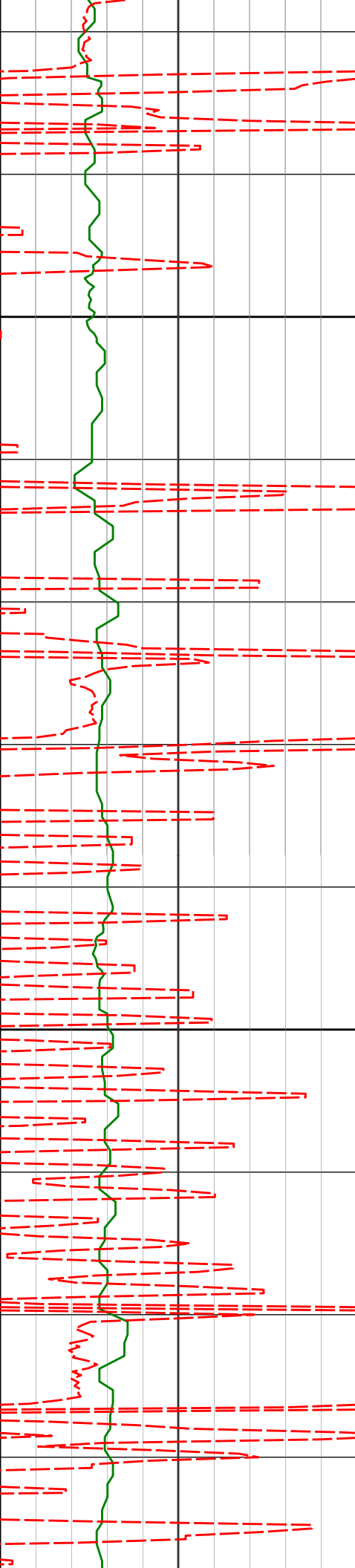
7.44'

88.14°F

88.14°F

88.14°F

90.19°F



1500

1600

1483'

0.40°

262.49° 1482.94'

8.20'

90.19°F

1575'

0.46°

348.03° 1574.94'

8.60'

91.38°F

1668'

0.37°

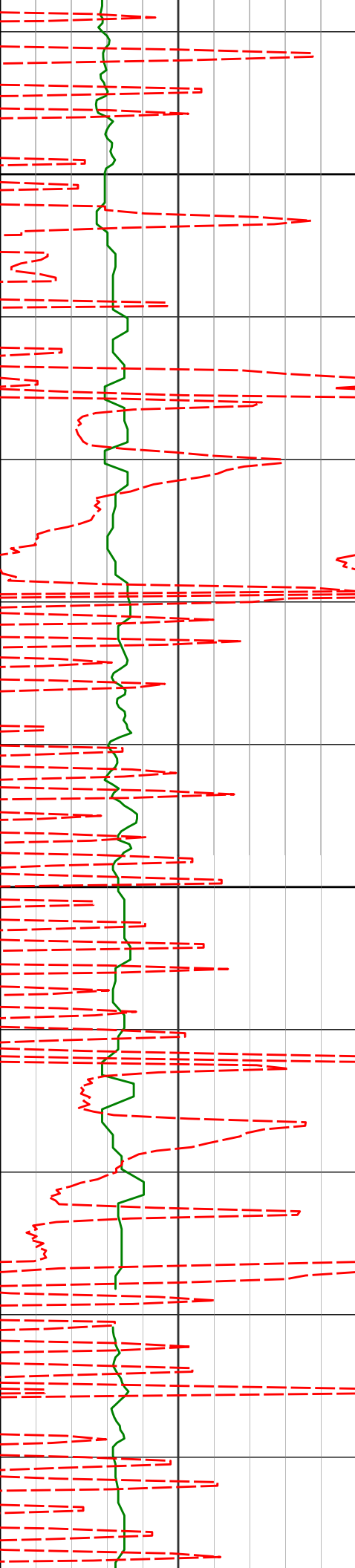
22.13° 1667.94'

8.58'

94.33°F

90.19°F

92.26°F



1700

94.33°F

96.17°F

1760'

2.92°

55.19°

1759.89'

6.57'

1800

96.42°F

96.42°F

1852'

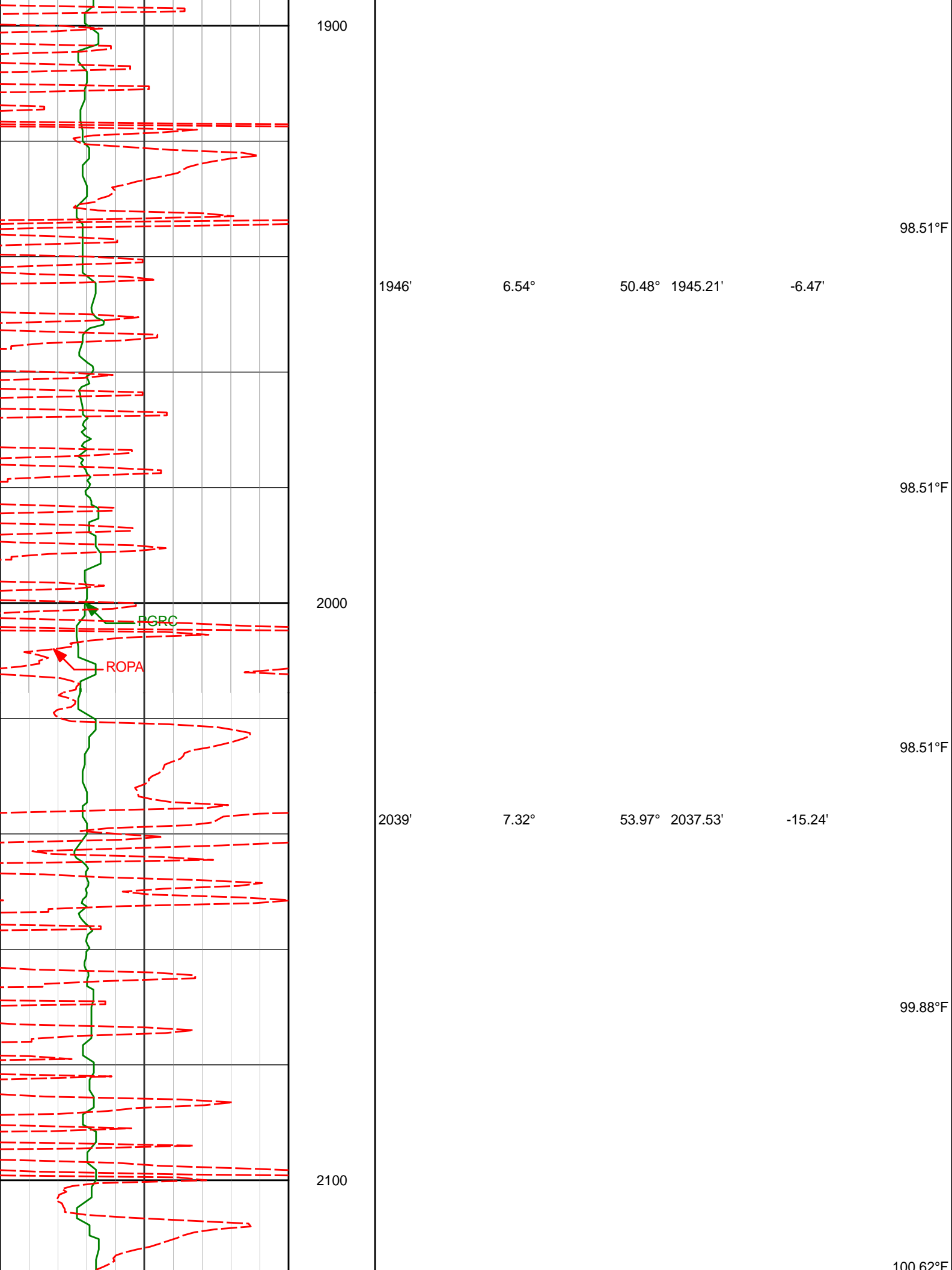
4.90°

63.70°

1851.67'

1.17'

96.42°F





2131'

9.20°

45.06° 2128.57'

-25.05'

2200

2222'

9.02°

40.06° 2218.42'

-34.62'

2300

2314'

9.00°

37.08° 2309.29'

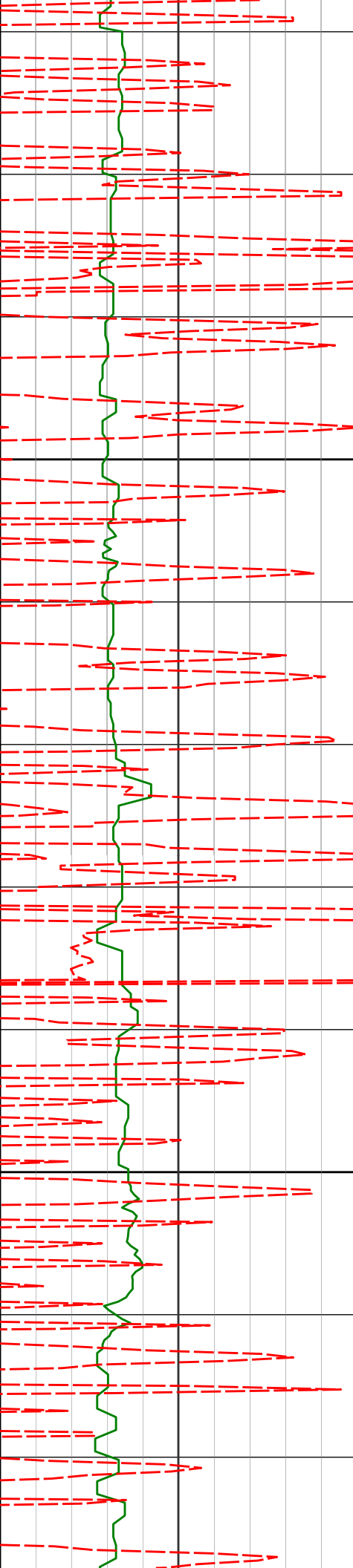
-43.42'

100.62°F

100.62°F

102.72°F

102.72°F



2400

2407'

8.57°

34.57° 2401.20'

-51.55'

2500

2499'

7.67°

29.61° 2492.28'

-58.29'

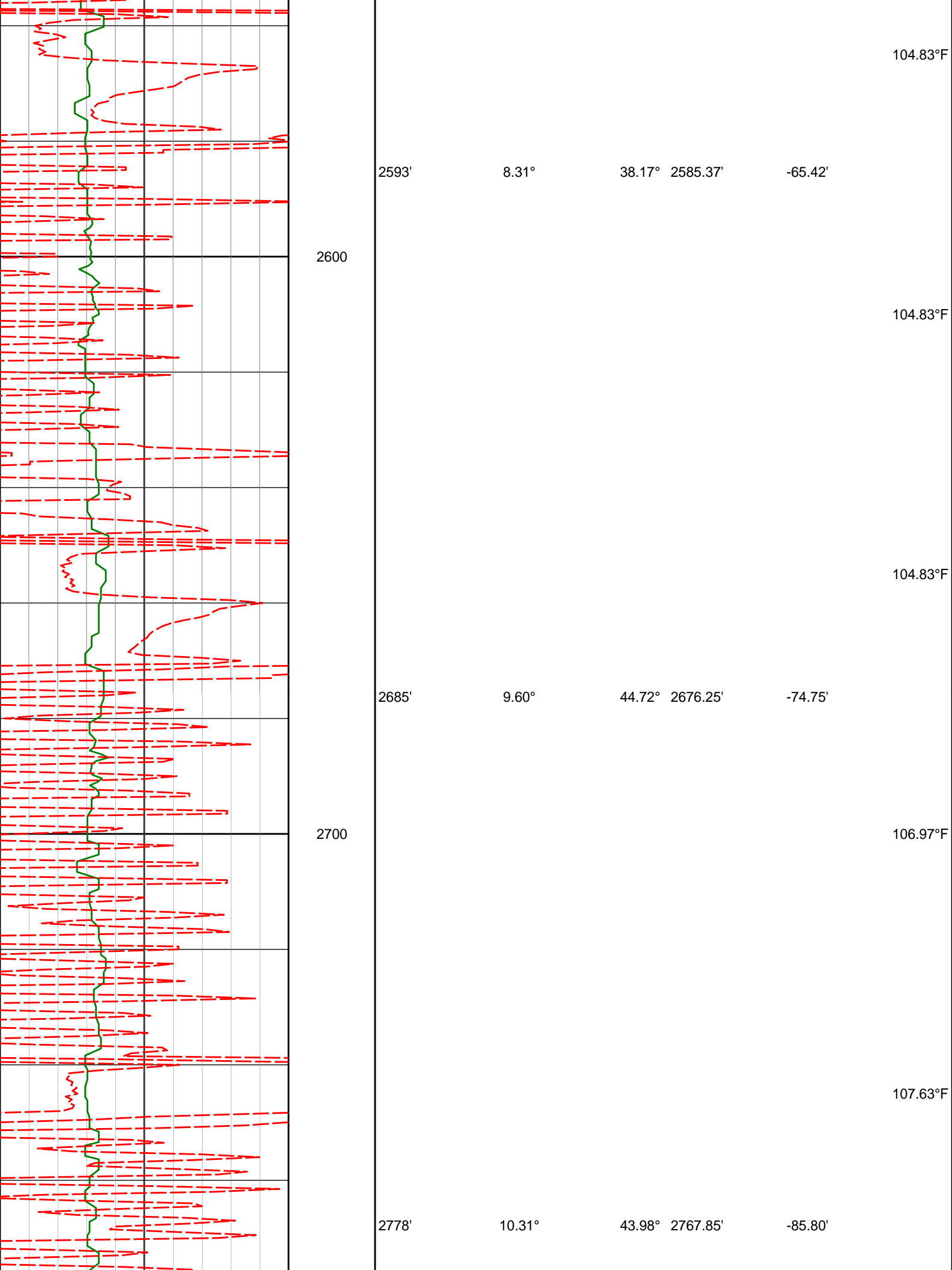
102.72°F

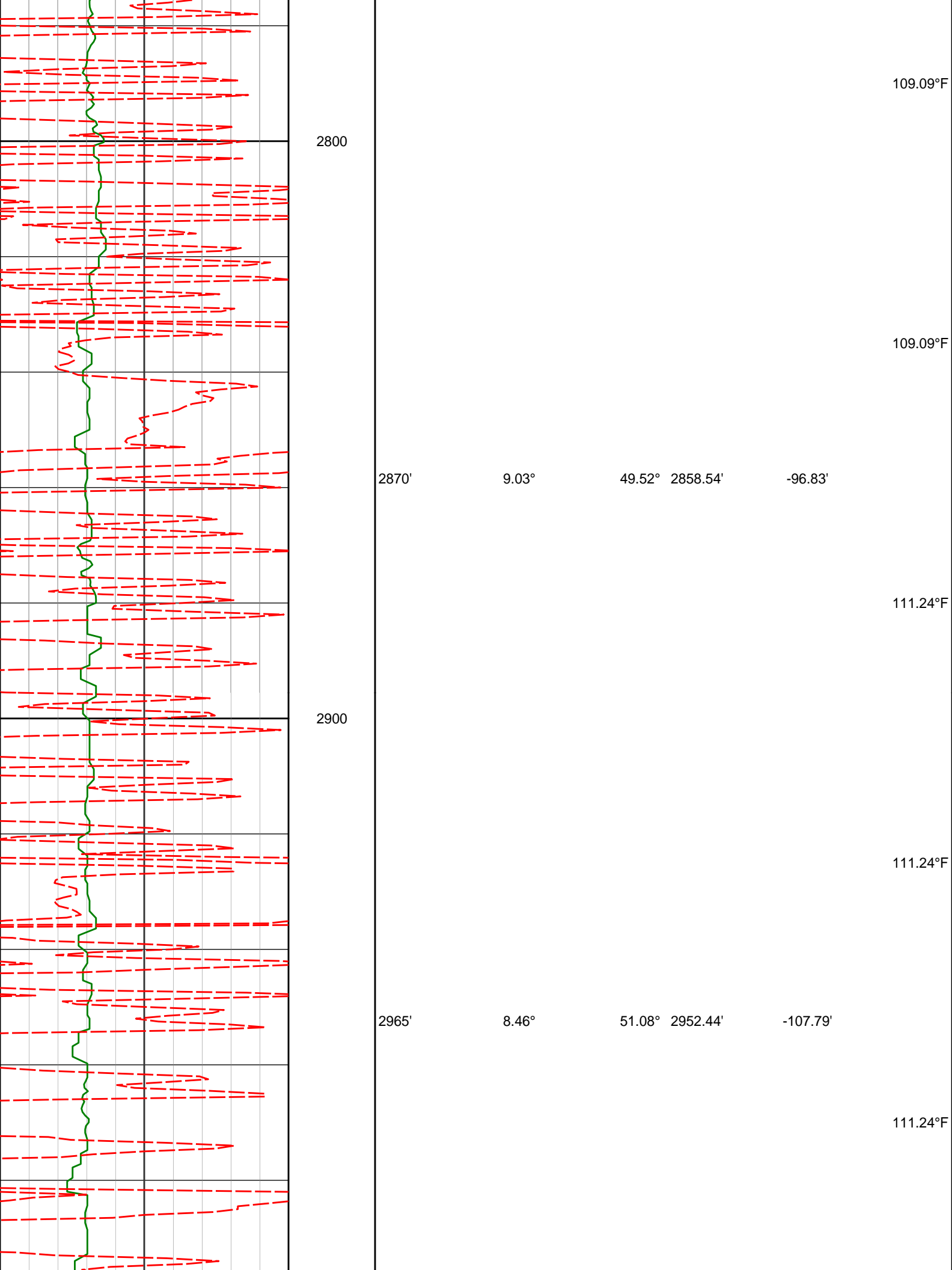
102.72°F

104.83°F

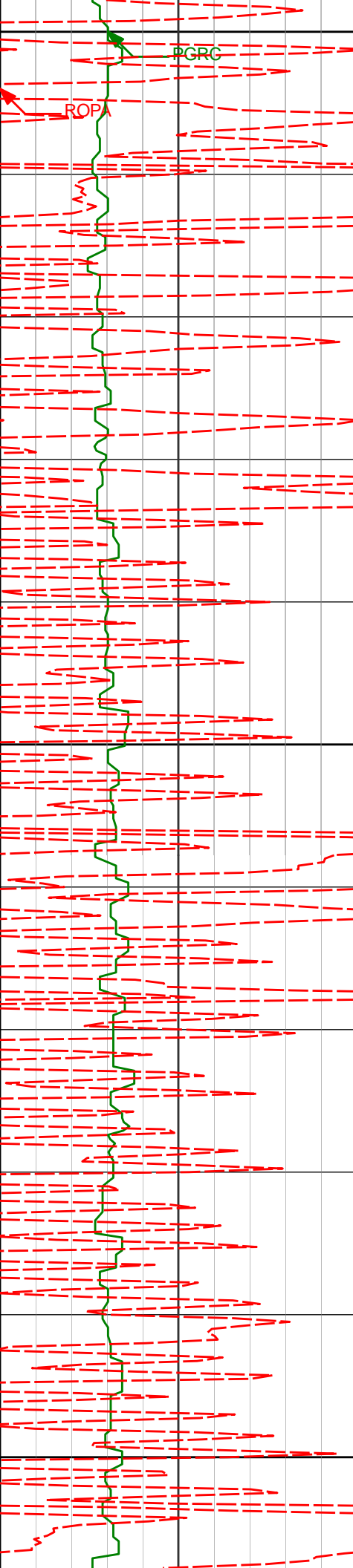
104.83°F

104.83°F









3000

PGRC

ROPA

111.24°F

3100

111.24°F

3154'

8.04°

52.26°

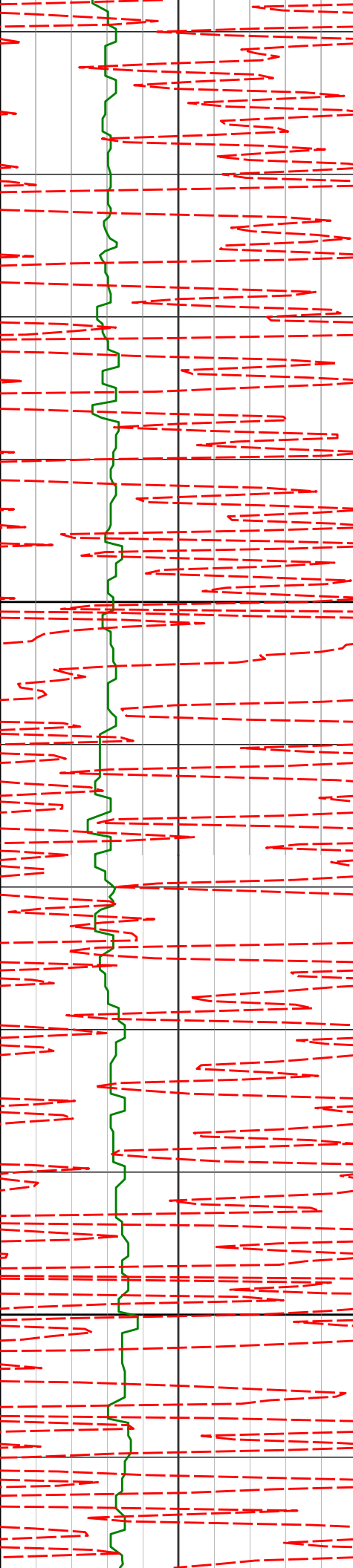
3139.48'

-128.79'

113.25°F

3200

113.40°F



3300

3400

3249'

7.96°

48.77°

3233.56'

-138.85'

113.40°F

113.40°F

3343'

7.29°

43.33°

3326.73'

-147.69'

115.56°F

3438'

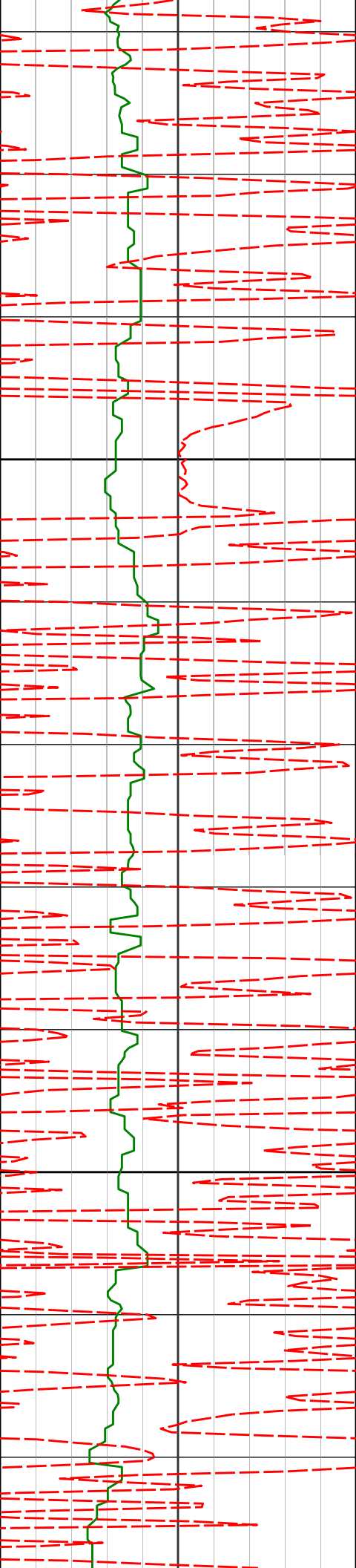
6.79°

38.05°

3421.01'

-155.15'

115.56°F



3500

3533'

3.89°

52.44°

3515.59'

-161.06'

115.56°F

3600

3627'

3.24°

48.75°

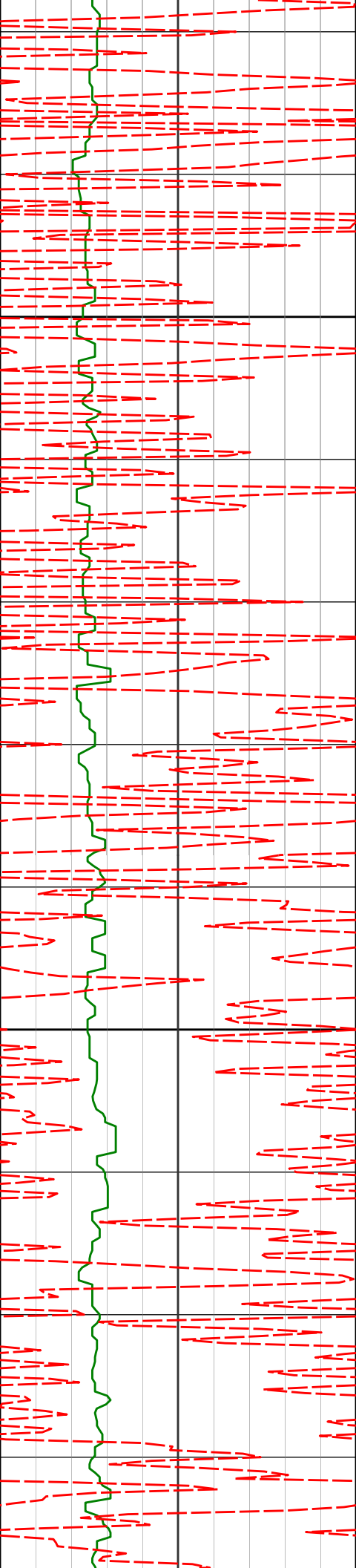
3609.41'

-165.52'

117.73°F

117.73°F

119.91°F



3700

3722'

3.53°

42.67°

3704.24'

-169.46'

119.91°F

119.91°F

119.91°F

3800

3817'

3.39°

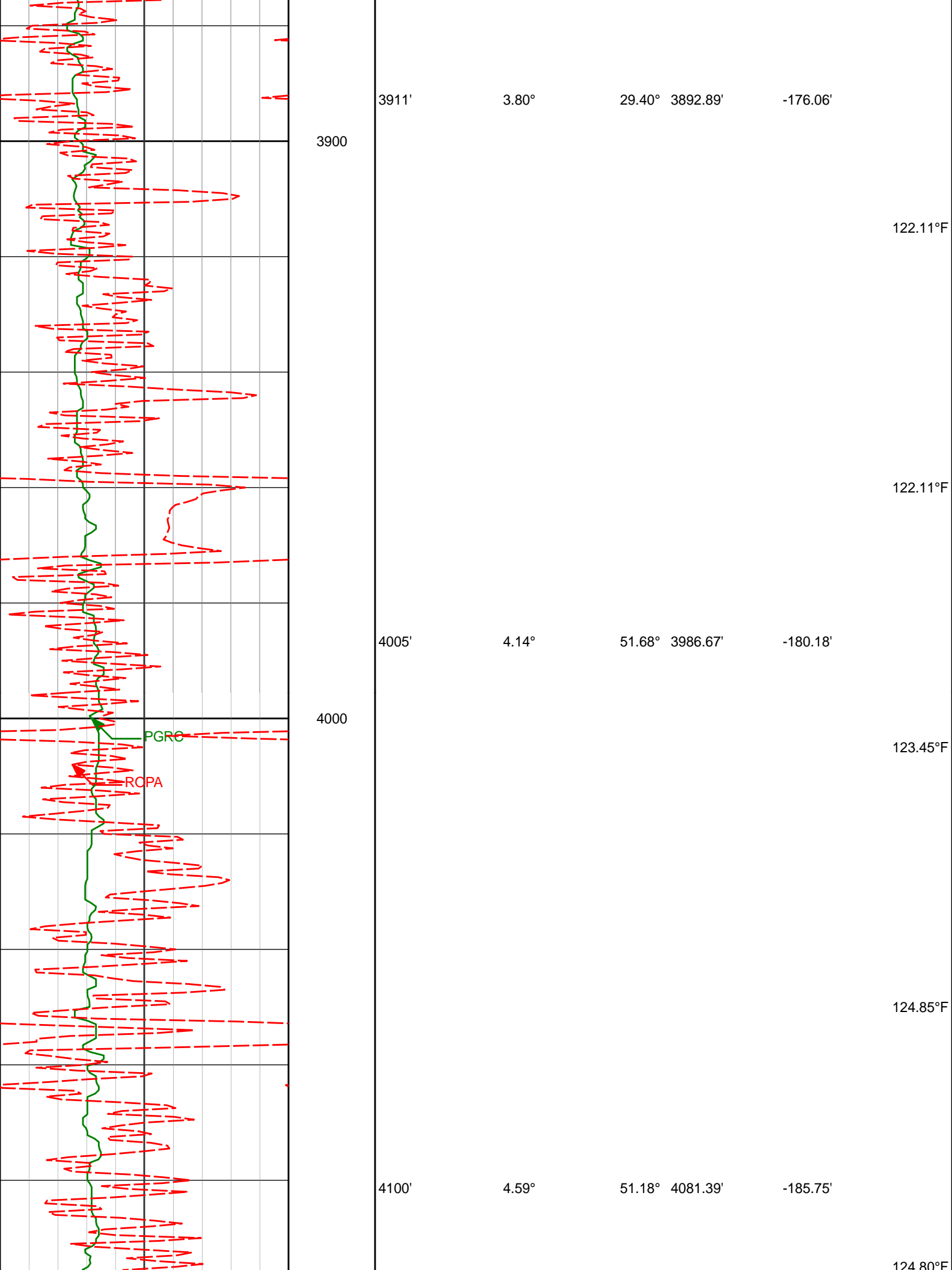
35.51°

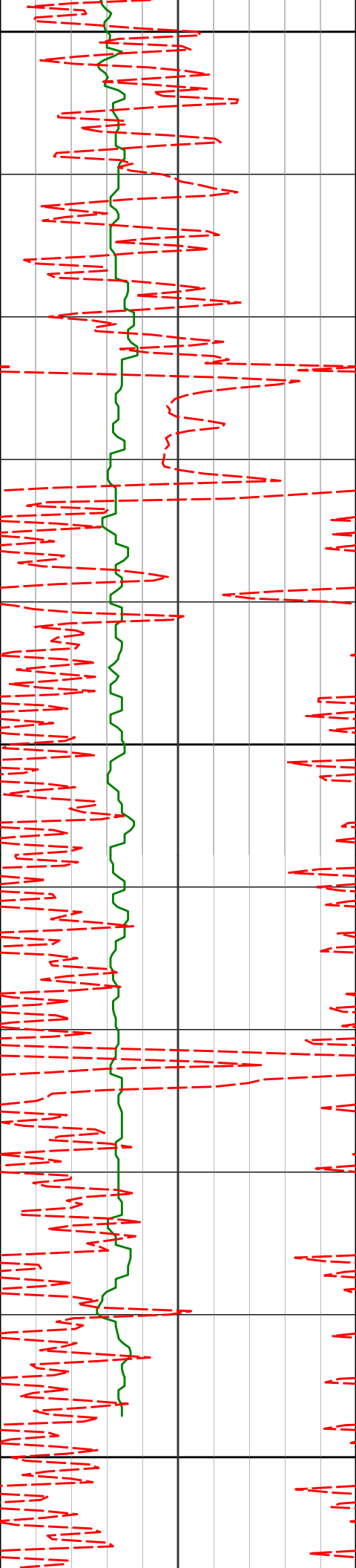
3799.07'

-173.00'

122.11°F

122.11°F





4100

124.30°F

4195'

4.20°

65.02°

4176.11'

-191.81'

125.60°F

4200

128.73°F

4289'

3.86°

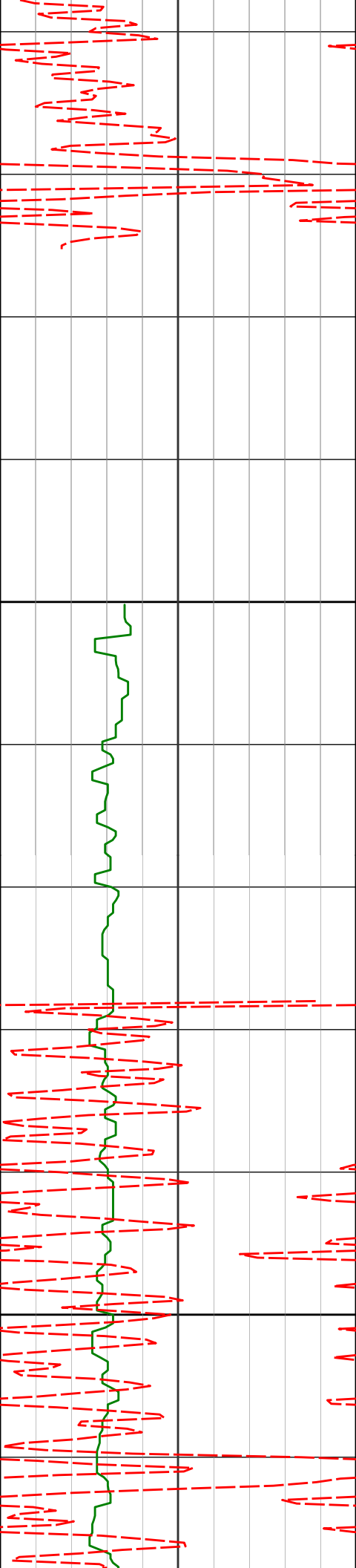
64.14°

4269.88'

-197.73'

128.73°F

4300



4400

4500

4384'

2.52°

69.32°

4364.73'

-202.52'

130.96°F

130.96°F

4478'

1.86°

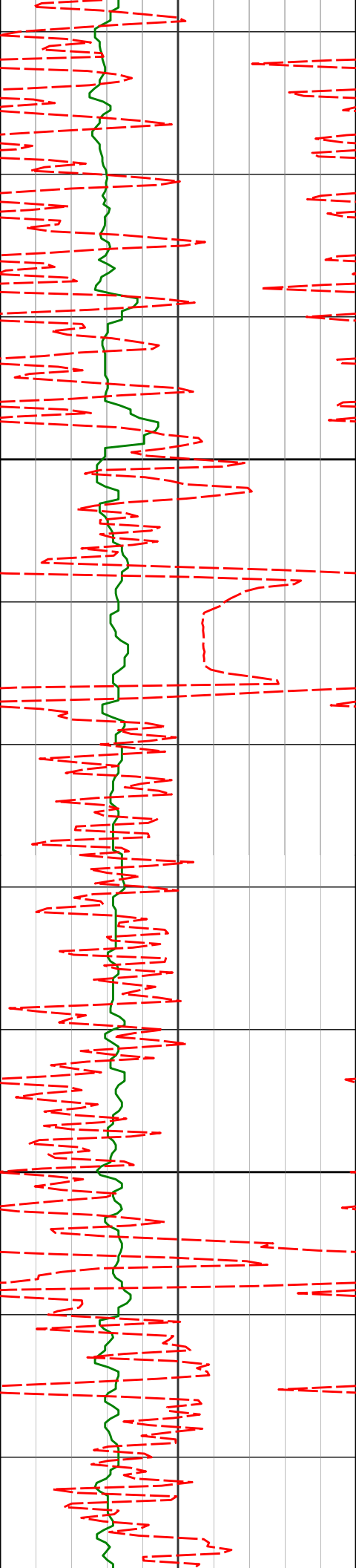
57.53°

4458.66'

-205.72'

130.96°F

130.96°F



4600

4700

4573'

1.57°

45.72° 4553.62'

-207.92'

4668'

0.84°

182.02° 4648.61'

-208.82'

4762'

1.56°

193.74° 4742.59'

-208.52'

132.06°F

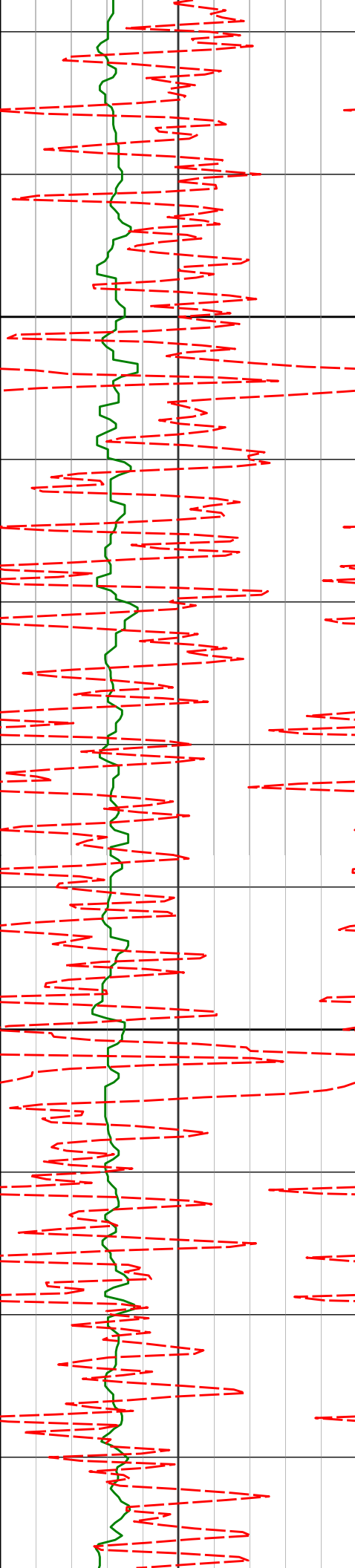
132.32°F

130.96°F

133.20°F

133.20°F





4800

4900

4857'

4951'

1.74°

1.77°

212.12°

217.00°

4837.55'

4931.51'

-207.49'

-205.89'

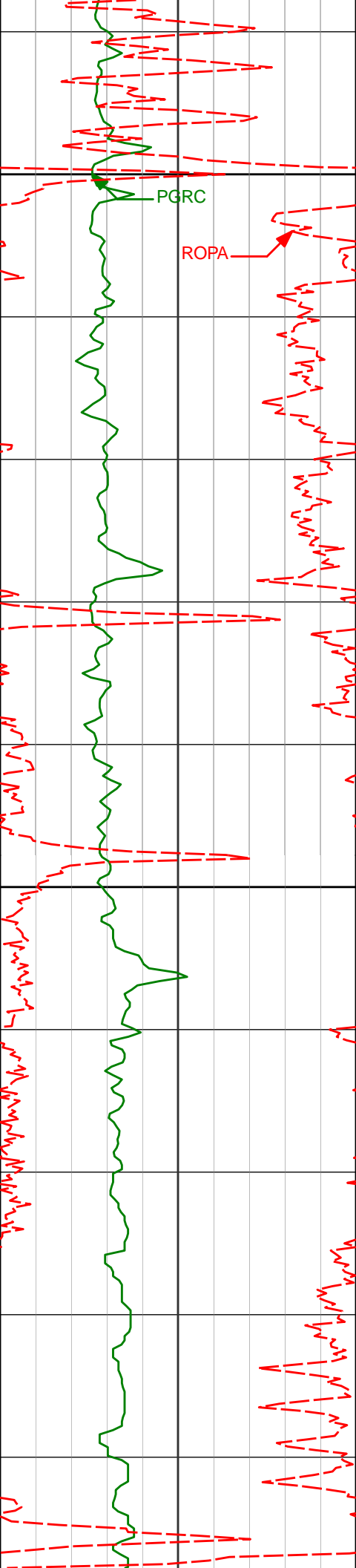
134.94°F

135.45°F

135.45°F

135.45°F

137.14°F



5000

PGRC

ROPA

5046'

1.82°

205.13° 5026.46'

-204.41'

137.70°F

137.70°F

137.93°F

5100

5141'

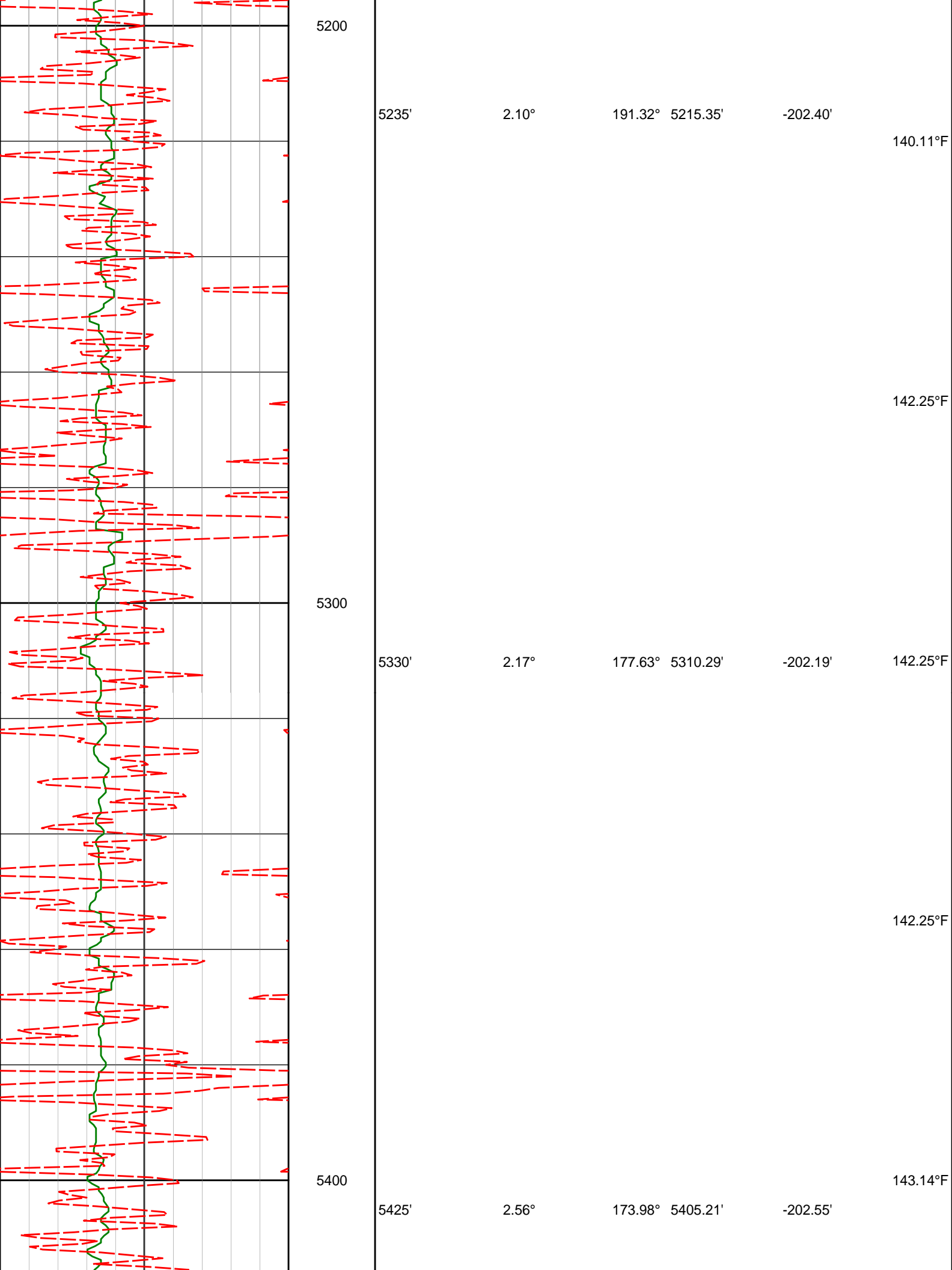
1.91°

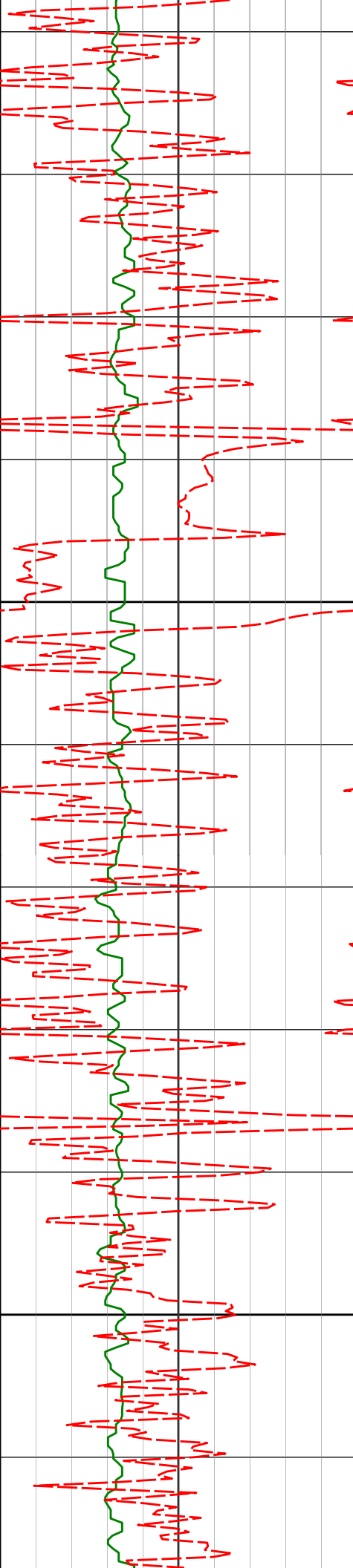
201.03° 5121.41'

-203.25'

139.72°F

139.96°F





5500

5519'

0.99°

196.11° 5499.16'

-202.59'

142.66°F

142.25°F

142.25°F

142.25°F

5600

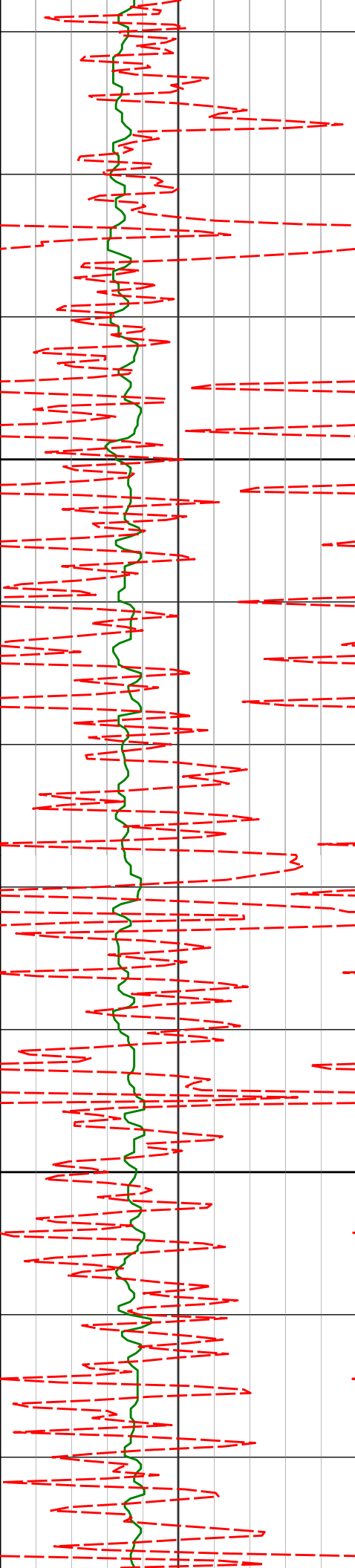
5614'

1.11°

180.08° 5594.14'

-202.39'

142.25°F



5700

5800

5708'

5803'

1.67°

1.66°

152.86° 5688.12'

144.91° 5783.08'

-203.05'

-204.51'

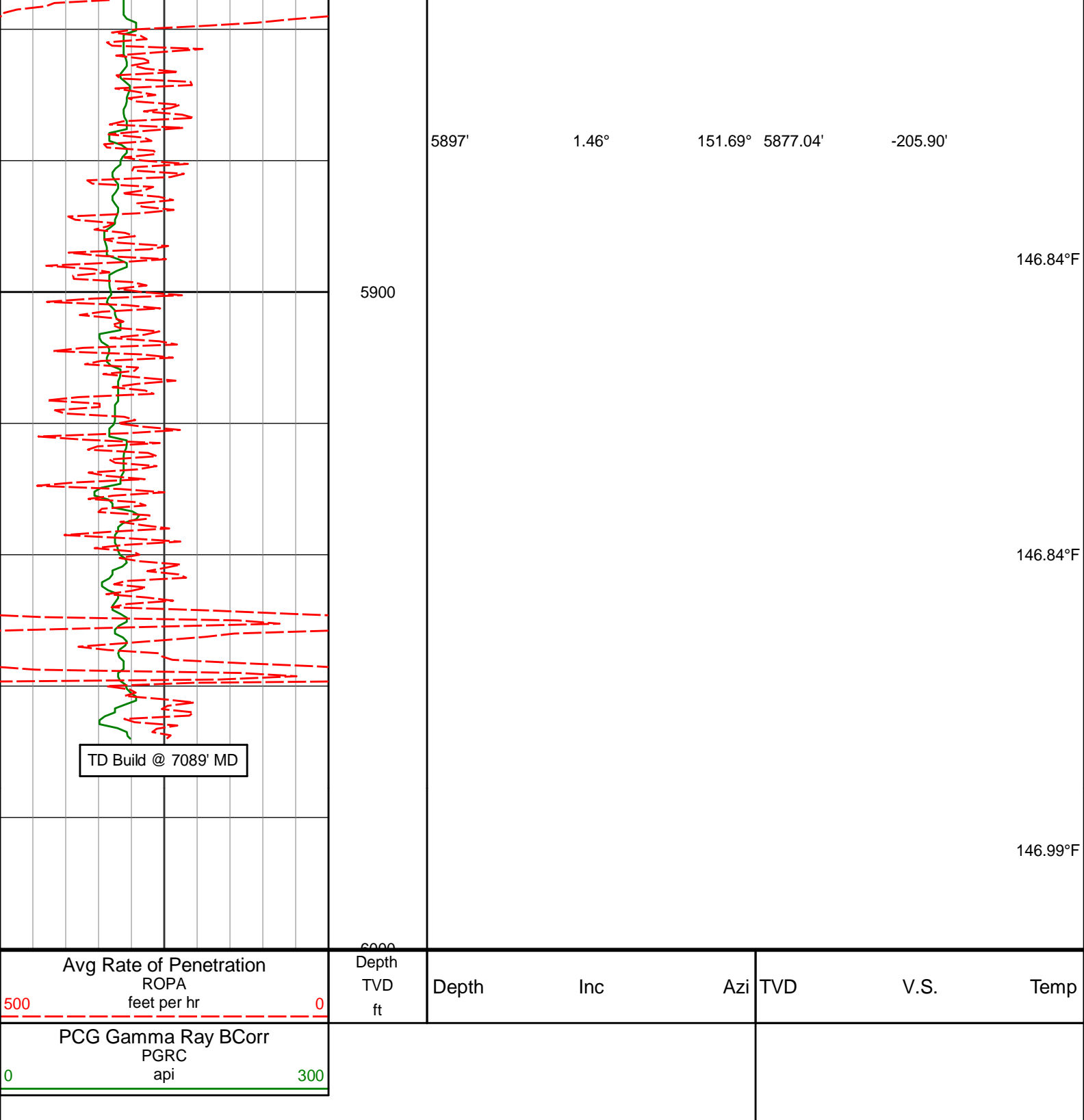
142.25°F

144.54°F

144.54°F

145.74°F

146.84°F



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Wells Ranch AA11-623  
Wells Ranch  
Weld Colorado  
USA  
CA-XX-0902260221

Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
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0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
638.00	0.58	221.99	637.99	2.42 S	2.18 W	2.14	0.09
733.00	0.75	211.70	732.98	3.31 S	2.83 W	2.77	0.21
827.00	0.83	228.86	826.97	4.27 S	3.66 W	3.59	0.26
922.00	0.74	228.74	921.96	5.13 S	4.64 W	4.55	0.09
1017.00	0.50	192.97	1016.96	5.94 S	5.19 W	5.10	0.47
1111.00	0.42	183.13	1110.96	6.68 S	5.30 W	5.19	0.12
1204.00	0.78	321.50	1203.95	6.52 S	5.72 W	5.61	1.22
1296.00	0.63	281.61	1295.95	5.92 S	6.61 W	6.51	0.55
1389.00	0.52	274.30	1388.94	5.79 S	7.54 W	7.44	0.14
1483.00	0.40	262.49	1482.94	5.80 S	8.29 W	8.20	0.16
1575.00	0.46	348.03	1574.94	5.48 S	8.69 W	8.60	0.64
1668.00	0.37	22.13	1667.94	4.84 S	8.66 W	8.58	0.28
1760.00	2.92	55.19	1759.89	3.22 S	6.62 W	6.57	2.84
1852.00	4.90	63.70	1851.67	0.15 S	1.17 W	1.17	2.24
1946.00	6.54	50.48	1945.21	5.04 N	6.56 E	-6.47	2.22
2039.00	7.32	53.97	2037.53	11.90 N	15.44 E	-15.24	0.96
2131.00	9.20	45.06	2128.57	20.54 N	25.39 E	-25.05	2.46
2222.00	9.02	40.06	2218.42	31.14 N	35.12 E	-34.62	0.89
2314.00	9.00	37.08	2309.29	42.40 N	44.10 E	-43.42	0.51
2407.00	8.57	34.57	2401.20	53.91 N	52.42 E	-51.55	0.63
2499.00	7.67	29.61	2492.28	64.89 N	59.34 E	-58.29	1.24
2593.00	8.31	38.17	2585.37	75.69 N	66.64 E	-65.42	1.43
2685.00	9.60	44.72	2676.25	86.36 N	76.14 E	-74.75	1.78
2778.00	10.31	43.98	2767.85	97.86 N	87.38 E	-85.80	0.78
2870.00	9.03	49.52	2858.54	108.47 N	98.59 E	-96.83	1.72
2965.00	8.46	51.08	2952.44	117.70 N	109.70 E	-107.79	0.65
3154.00	8.04	52.26	3139.48	134.52 N	130.96 E	-128.79	0.24
3249.00	7.96	48.77	3233.56	142.92 N	141.16 E	-138.85	0.52
3343.00	7.29	43.33	3326.73	151.55 N	150.15 E	-147.69	1.05
3438.00	6.79	38.05	3421.01	160.35 N	157.74 E	-155.15	0.86
3533.00	3.89	52.44	3515.59	166.74 N	163.76 E	-161.06	3.34
3627.00	3.24	48.75	3609.41	170.43 N	168.28 E	-165.52	0.74
3722.00	3.53	42.67	3704.24	174.35 N	172.28 E	-169.46	0.49
3817.00	3.39	35.51	3799.07	178.79 N	175.89 E	-173.00	0.48
3911.00	3.80	29.40	3892.89	183.76 N	179.04 E	-176.06	0.60
4005.00	4.14	51.68	3986.67	188.58 N	183.23 E	-180.18	1.67
4100.00	4.59	51.18	4081.39	193.09 N	188.88 E	-185.75	0.47
4195.00	4.20	65.02	4176.11	196.94 N	194.99 E	-191.81	1.19
4289.00	3.86	64.14	4269.88	199.78 N	200.96 E	-197.73	0.37
4384.00	2.52	69.32	4364.73	201.91 N	205.79 E	-202.52	1.44
4478.00	1.86	57.53	4458.66	203.46 N	209.01 E	-205.72	0.85
4573.00	1.57	45.72	4553.62	205.19 N	211.24 E	-207.92	0.48
4668.00	0.84	182.02	4648.61	205.40 N	212.15 E	-208.82	2.37
4762.00	1.56	193.74	4742.59	203.47 N	211.82 E	-208.52	0.80
4857.00	1.74	212.12	4837.55	200.99 N	210.74 E	-207.49	0.59
4951.00	1.77	217.00	4931.51	198.63 N	209.11 E	-205.89	0.16
5046.00	1.82	205.13	5026.46	196.09 N	207.59 E	-204.41	0.39
5141.00	1.91	201.03	5121.41	193.25 N	206.38 E	-203.25	0.17
5235.00	2.10	191.32	5215.35	190.10 N	205.48 E	-202.40	0.41
5330.00	2.17	177.63	5310.29	186.59 N	205.21 E	-202.19	0.54
5425.00	2.56	173.98	5405.21	182.69 N	205.51 E	-202.55	0.44
5519.00	0.99	196.11	5499.16	179.83 N	205.50 E	-202.59	1.79
5614.00	1.11	180.08	5594.14	178.12 N	205.28 E	-202.39	0.34
5708.00	1.67	152.86	5688.12	175.99 N	205.90 E	-203.05	0.90
5803.00	1.66	144.91	5783.08	173.63 N	207.32 E	-204.51	0.24
5897.00	1.46	151.69	5877.04	171.46 N	208.68 E	-205.90	0.29
5992.00	1.42	153.78	5972.01	169.34 N	209.77 E	-207.02	0.07
6087.00	1.22	163.27	6066.99	167.32 N	210.58 E	-207.87	0.31
6181.00	12.06	276.64	6160.32	167.49 N	201.08 E	-198.36	13.40
6276.00	15.93	279.30	6252.48	170.75 N	178.35 E	-175.59	4.13
6371.00	19.11	271.88	6343.07	173.36 N	149.93 E	-147.13	4.09
6466.00	28.19	270.63	6430.00	174.12 N	111.87 E	-109.06	9.56
6560.00	38.20	273.51	6508.57	176.15 N	60.53 E	-57.69	10.78
6655.00	48.26	272.32	6577.70	179.39 N	4.38 W	7.26	10.63
6749.00	59.27	268.35	6633.19	179.65 N	80.05 W	82.93	12.19
6844.00	75.07	268.94	6669.93	177.62 N	167.31 W	170.14	16.65
6938.00	81.19	268.72	6689.26	175.74 N	259.24 W	262.03	6.51
7023.00	86.48	270.04	6698.38	174.83 N	343.71 W	346.47	6.42

CALCULATION BASED ON MINIMUM CURVATURE METHOD

DEPTH OF 2024 TIE-IN DATA RELATIVE TO WELL LOG SYSTEM REFERENCE POINT

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 270.92 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.38 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7023.00 FEET  
IS 385.62 FEET ALONG 296.96 DEGREES (GRID)

Final survey is a straight line projection to TD.

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