



**1 : 600 / 1 : 240**

WELL INFORMATION					
MWD Run Number	100				
Date run completed	06-Aug-15				
Rig Bit Number	2				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	1,145.97				
Log End Depth (TVD, ft)	5,902.89				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	05-Aug-15 20:00				
Drill/Wipe End Date and Time	06-Aug-15 15:30				
Min Inc (deg) @ Depth (TVD, ft)	0.31 @ 1,201.97				
Max Inc (deg) @ Depth (TVD, ft)	81.40 @ 5,897.29				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	597.40				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	8.75 / 28.00				
Filtrate CL (ppm)	14.00				
pH / Fluid Loss (mptm)	9.40 / 91				
PV (cP) / YP (lhf2)	2 / 3.00				
% Solids / % Sand	3.00 / 0.15				
% 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) @ Depth (ft)	105.50 / 5,897.29				

Max Tool Temp (degF) / Source	165.58 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Brian Neu				
Customer Representative	Beau				

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11303511				
Insert Serial Number	11400870				
Date and Time Initialized	05-Aug-15 12:12				
Date and Time Read	06-Aug-15 21:49				
ECMB SW Version	N/A				

### Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	64.00				
Software Version	6.21				
Sub Serial Number	11303511				
Sonde Serial Number	11478016				
Sensor ID Number	N/A				
Toolface Offset (deg)	181.40				

### Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	57.03				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11303511				
Insert/Sonde Serial Number	12037418				

## REMARKS

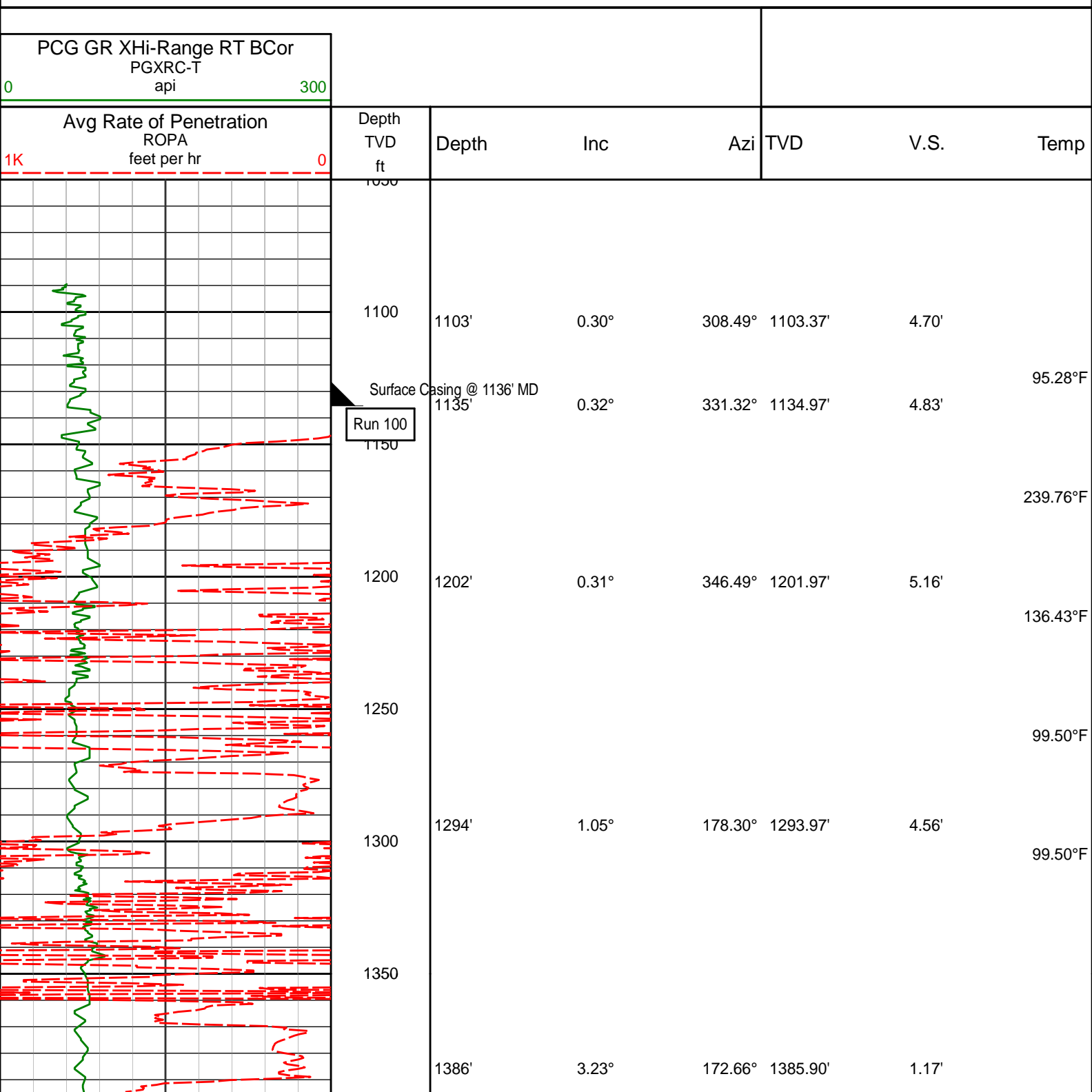
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance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

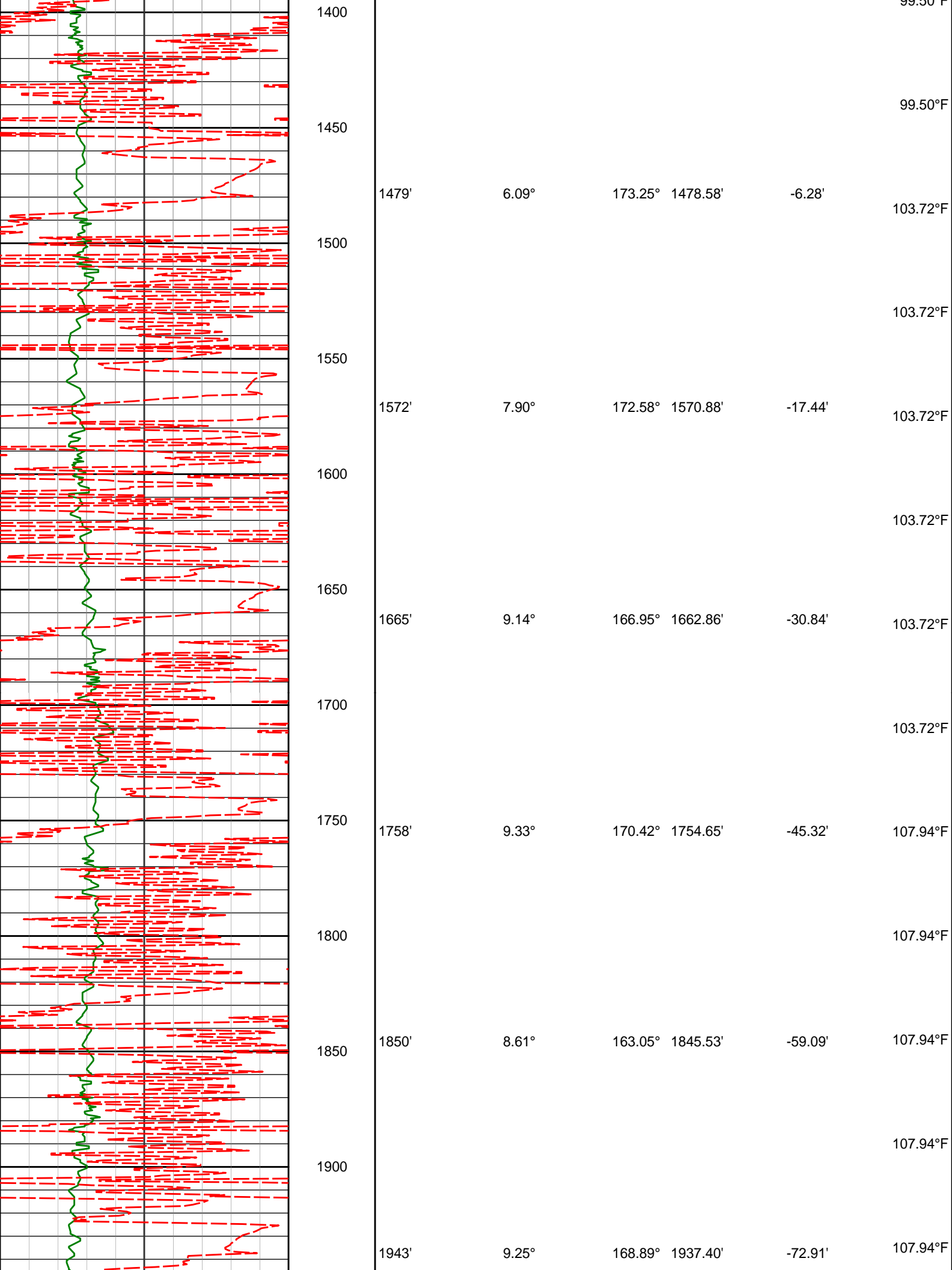
## WARRANTY

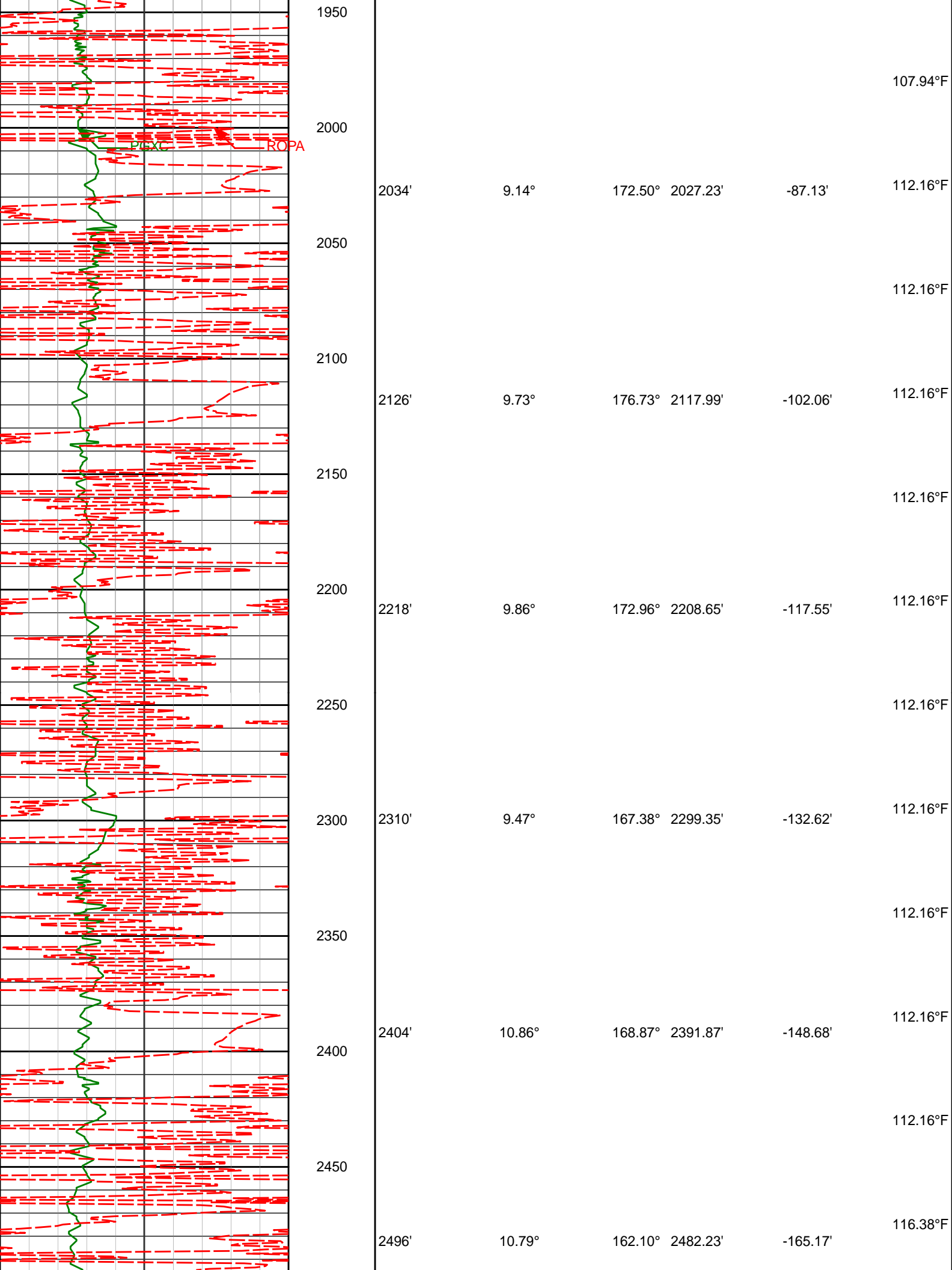
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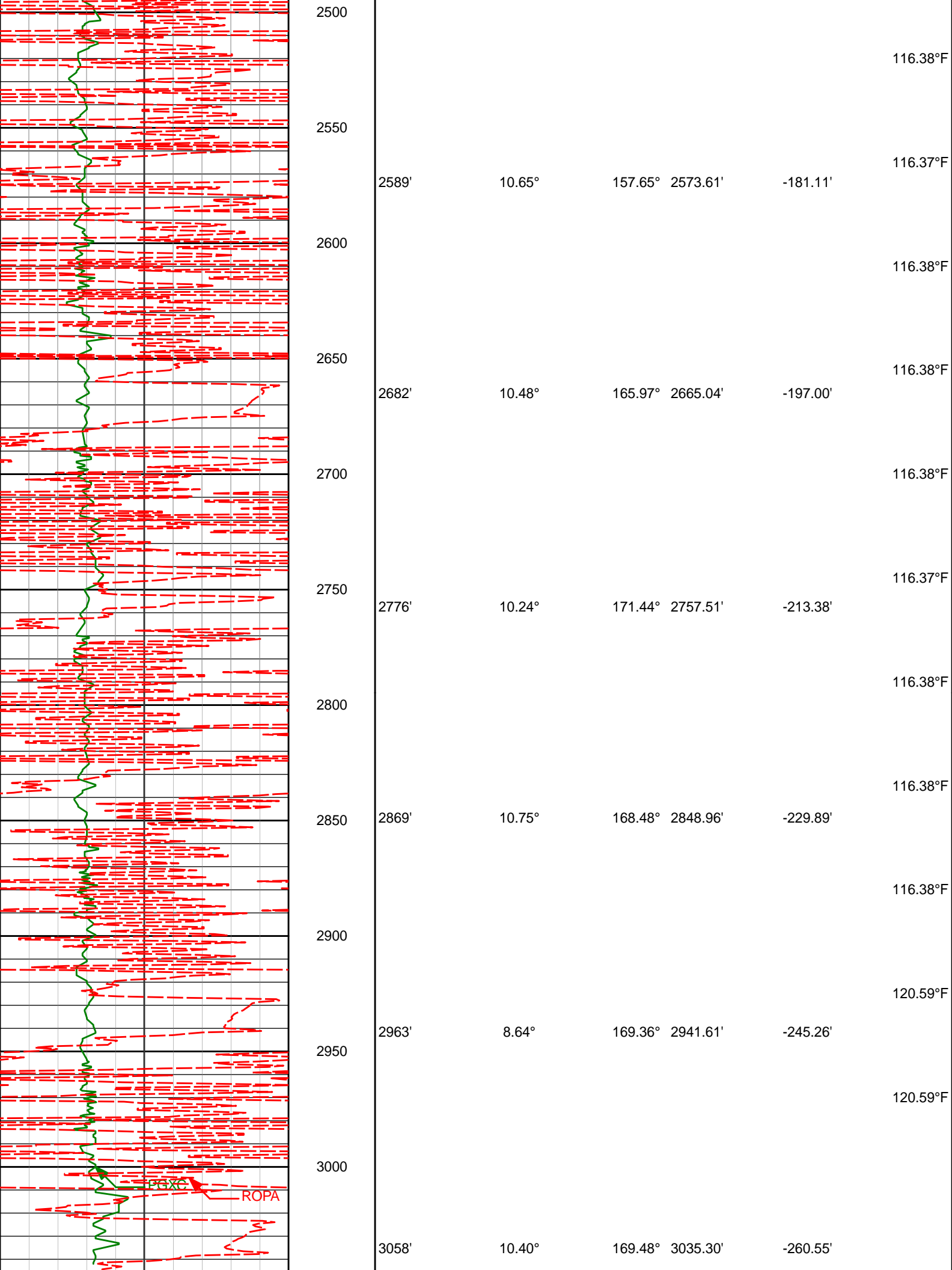
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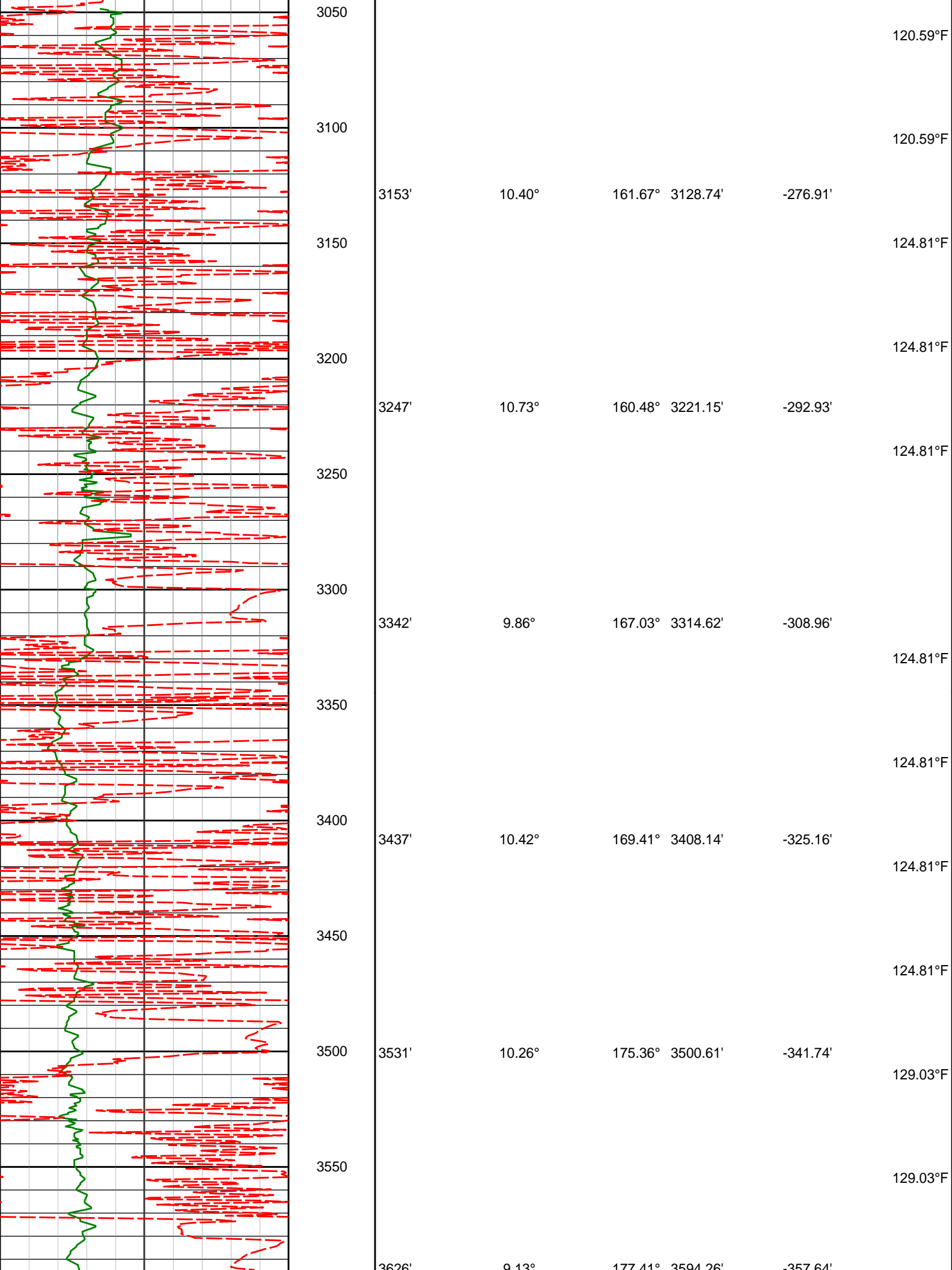
# TVD Detail 1:600 Scale

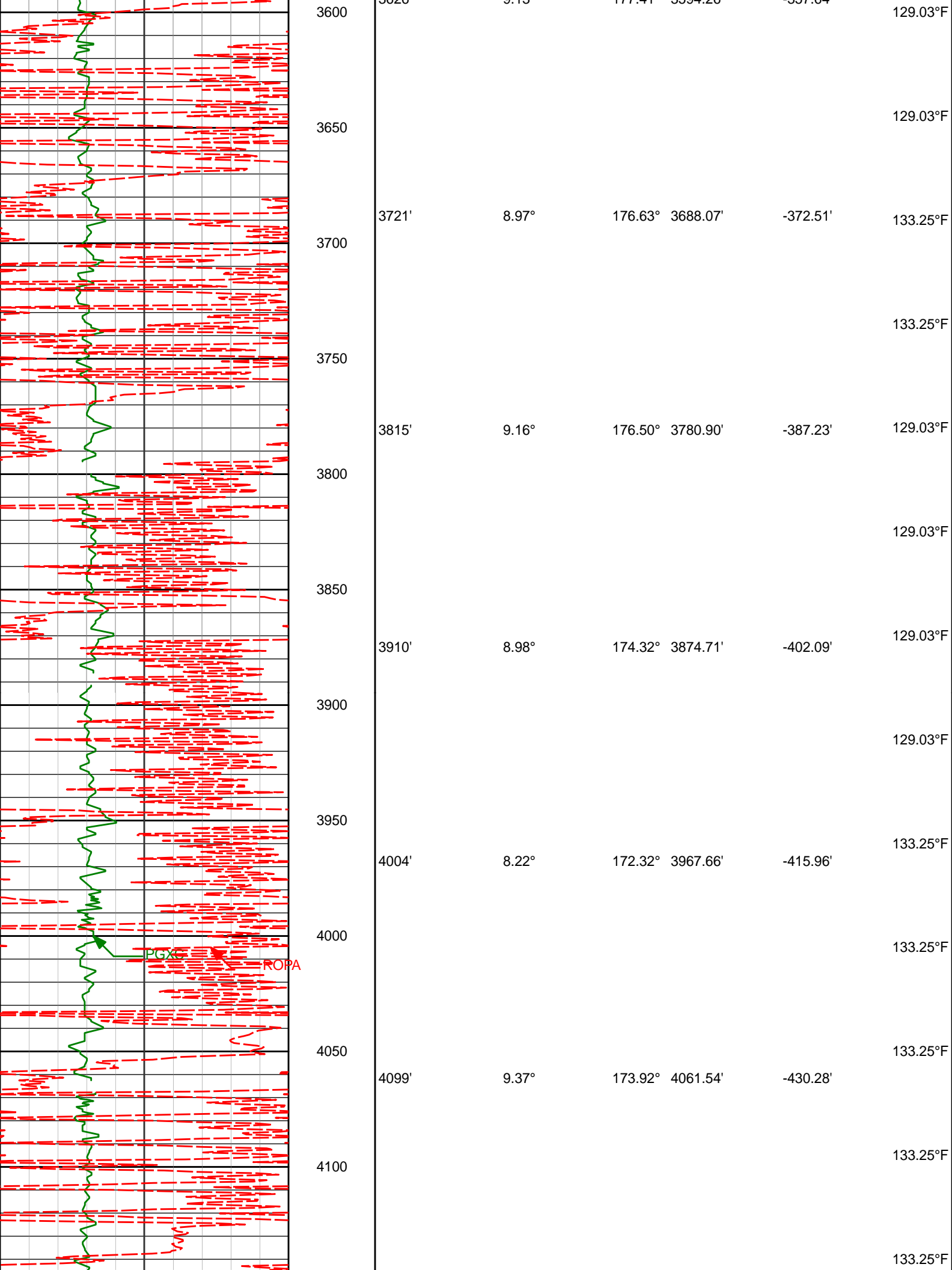




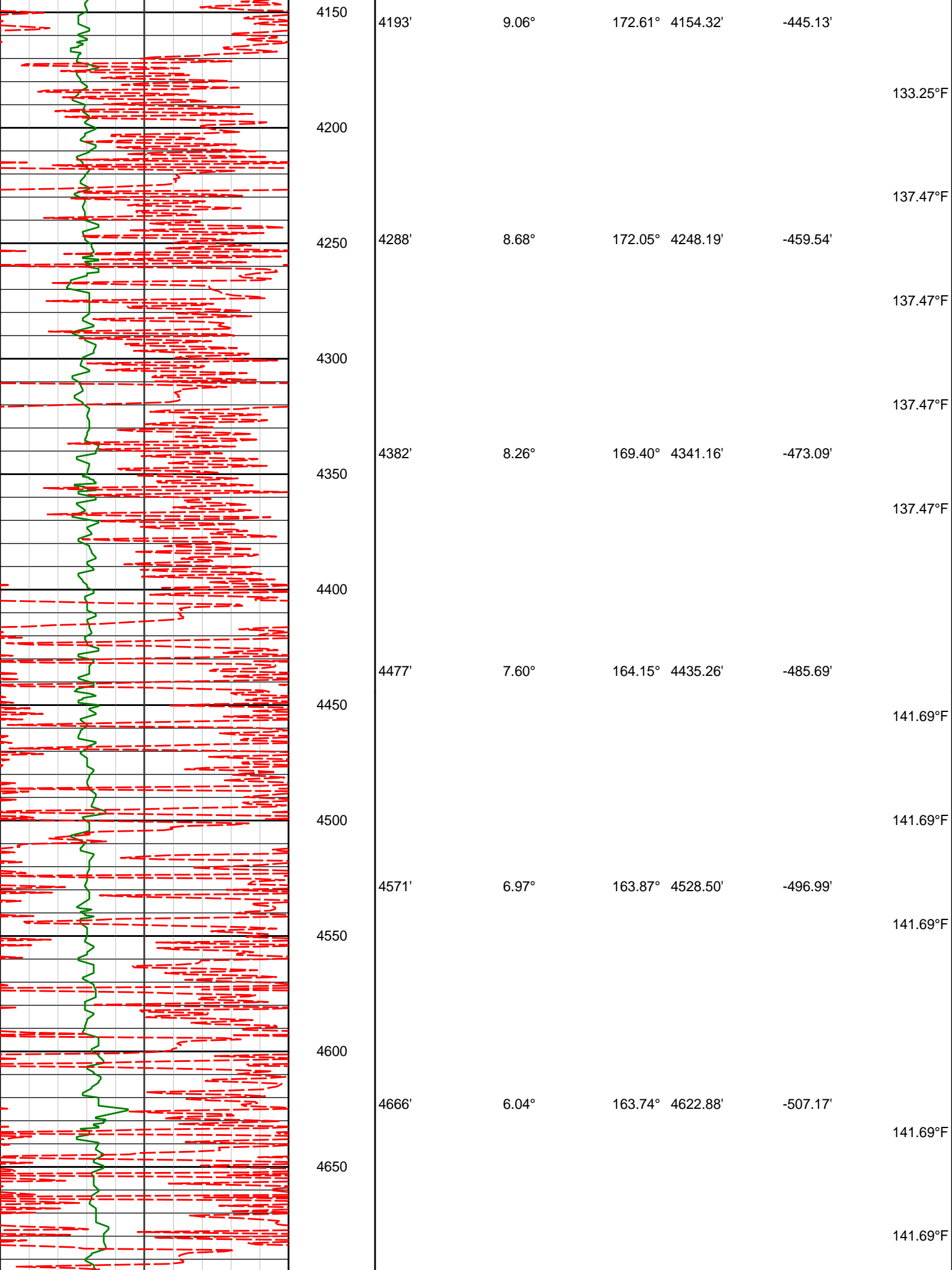


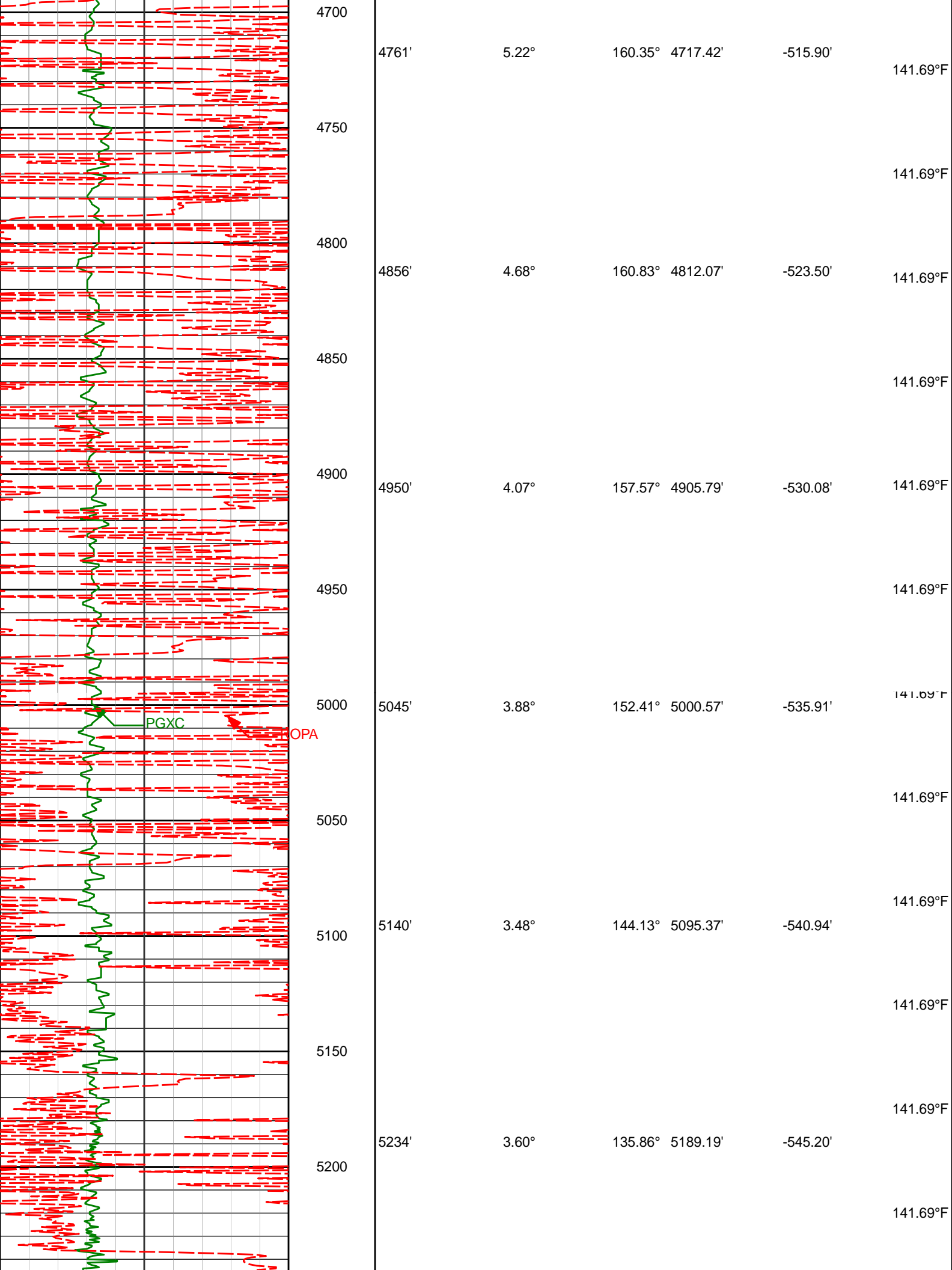


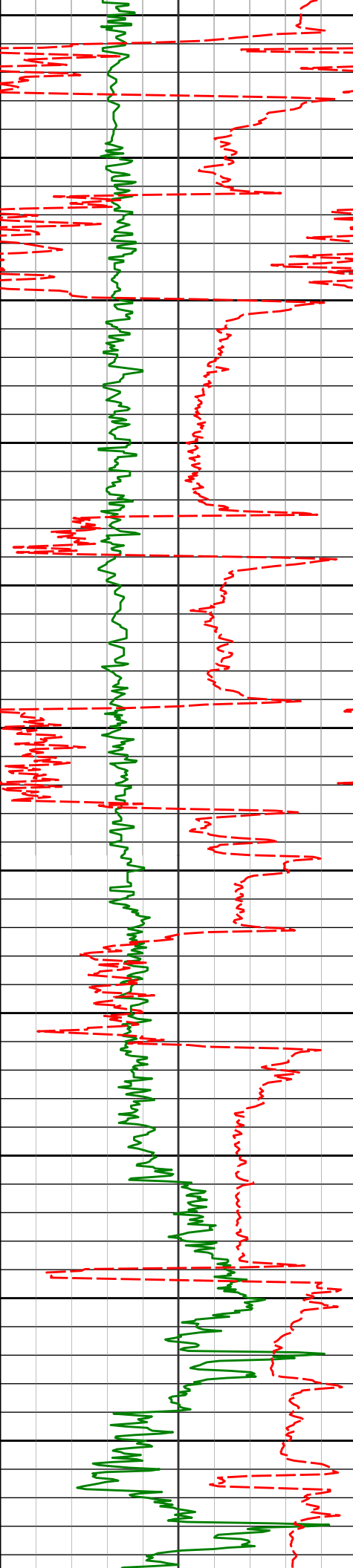




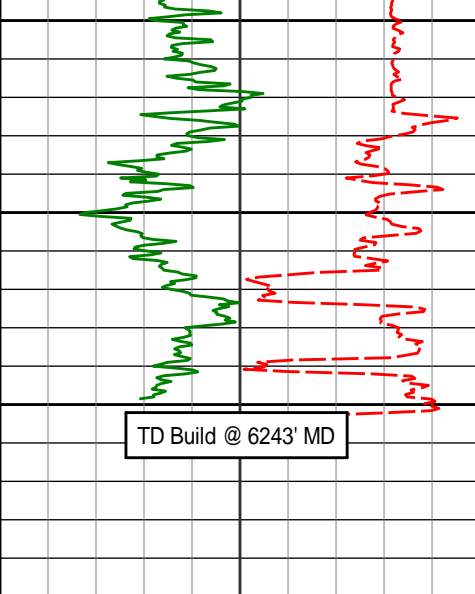








					141.69°F
5329'	2.18°	63.54°	5284.10'	-546.36'	
					141.69°F
5350					145.91°F
5423'	9.44°	6.62°	5377.60'	-537.79'	
5400					145.91°F
					145.91°F
5450					145.91°F
5518'	22.37°	3.15°	5468.77'	-511.83'	
5500					145.91°F
					150.13°F
5550	25.46°	354.87°	5555.63'	-473.51'	
					150.13°F
5600					150.13°F
5707'	28.39°	357.05°	5639.43'	-431.24'	
5650					151.51°F
					154.34°F
5700	39.01°	3.44°	5718.38'	-378.70'	
					154.34°F
5750					154.34°F
5896'	48.24°	4.07°	5786.35'	-313.93'	



Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
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PCG GR XHi-Range RT BCor PGXRC-T api	0	300
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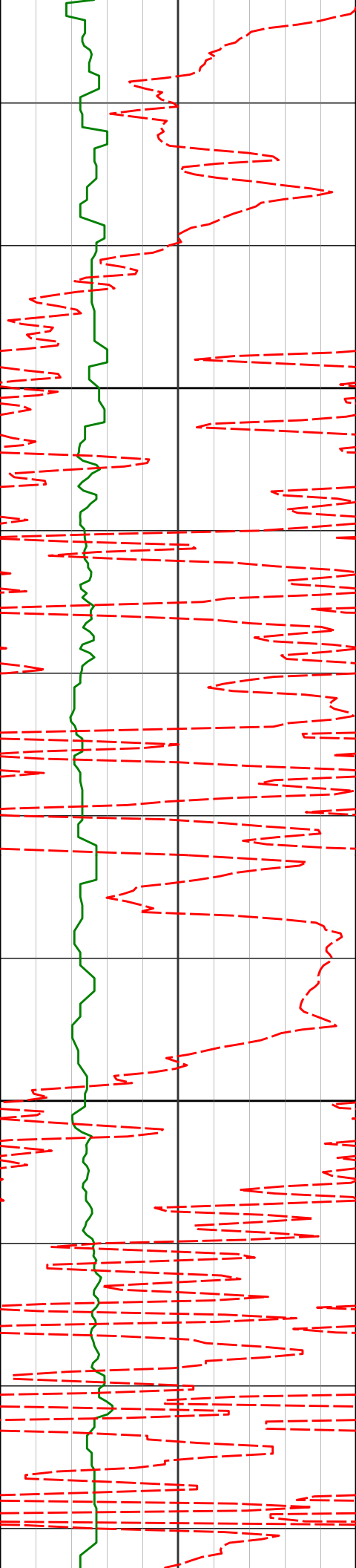
# TVD Detail 1:240 Scale

PCG GR XHi-Range RT		
0	PGRC	
	api	300

Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Inc	Azi	TVD	V.S.	Temp
1K	0						

Surface Casing @ 1136' MD

Run 100



1200

1200

1202'

0.31°

346.49°

1201.97'

5.16'

239.76°F

136.43°F

99.50°F

1300

1294'

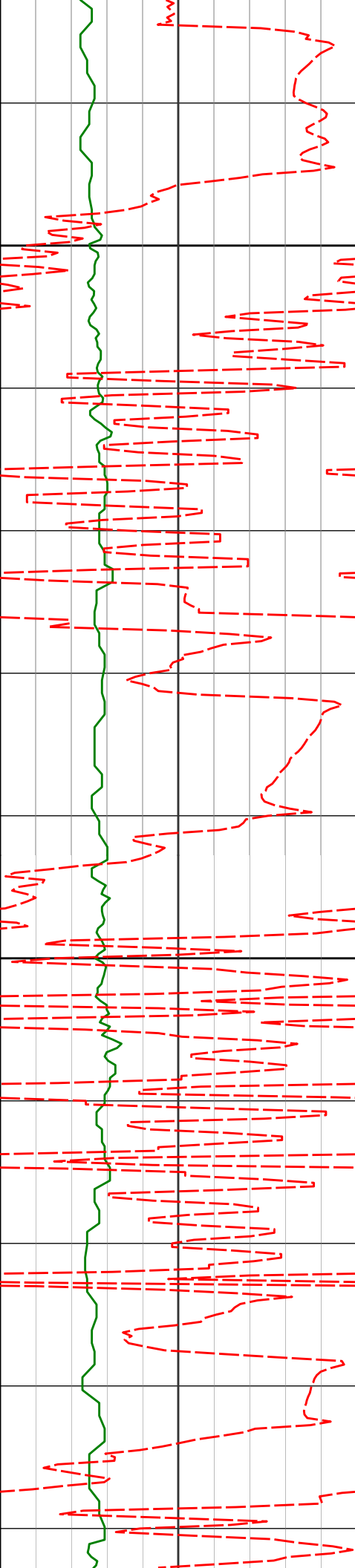
1.05°

178.30°

1293.97'

4.56'

99.50°F



1386'

3.23°

172.66° 1385.90'

1.17'

1400

99.50°F

99.50°F

1479'

6.09°

173.25° 1478.58'

-6.28'

103.72°F

1500

103.72°F

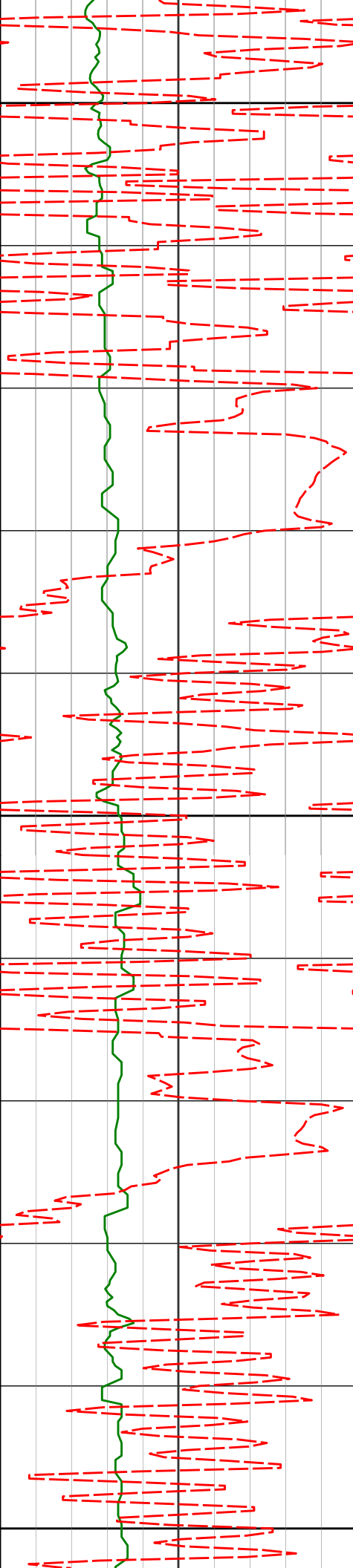
1572'

7.90°

172.58° 1570.88'

-17.44'

103.72°F



1600

103.72°F

1665'

9.14°

166.95°

1662.86'

-30.84'

103.72°F

1700

103.72°F

1758'

9.33°

170.42°

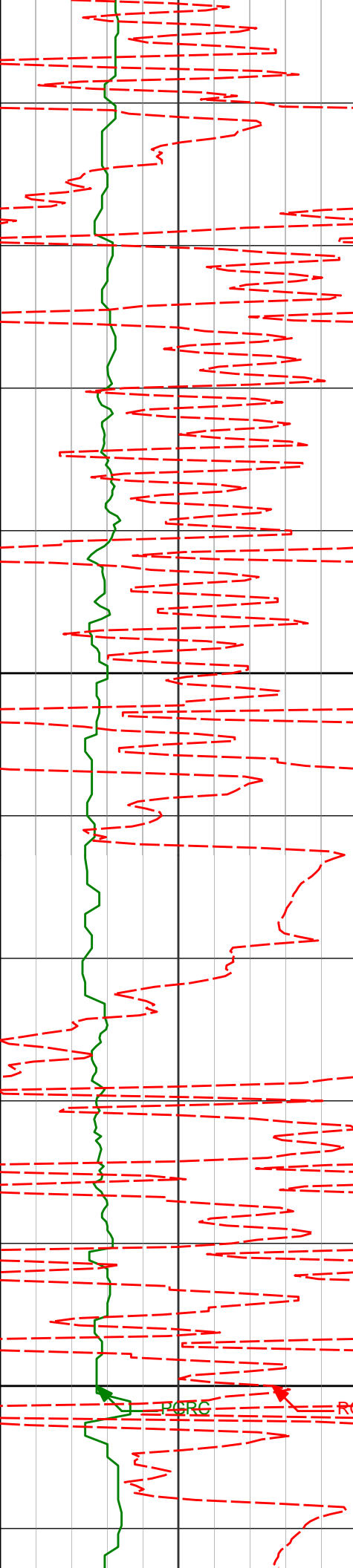
1754.65'

-45.32'

107.94°F

1800

107.94°F



1850'

8.61°

163.05°

1845.53'

-59.09'

107.94°F

1900

1943'

9.25°

168.89°

1937.40'

-72.91'

107.94°F

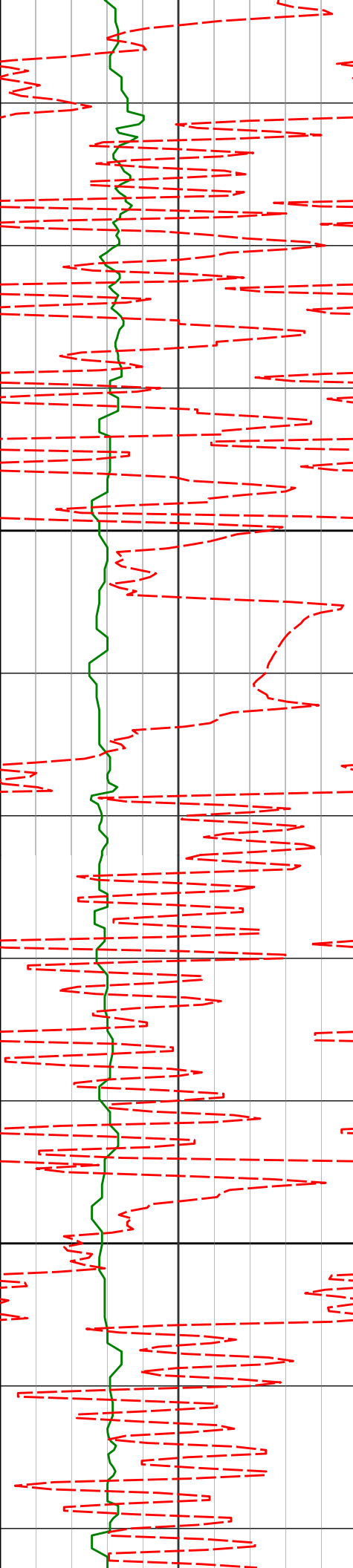
2000

PCRC

ROPA

112.16°F

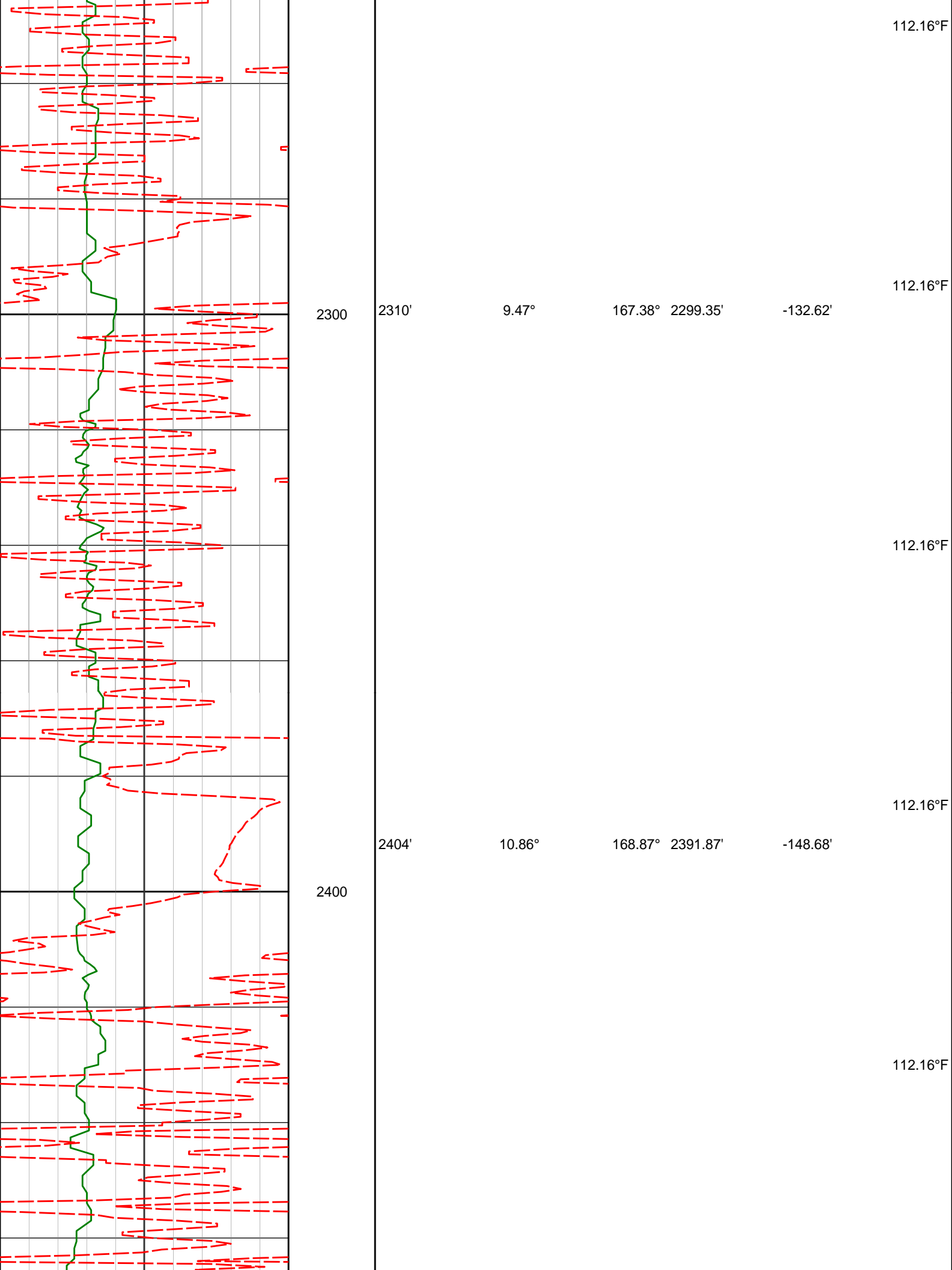


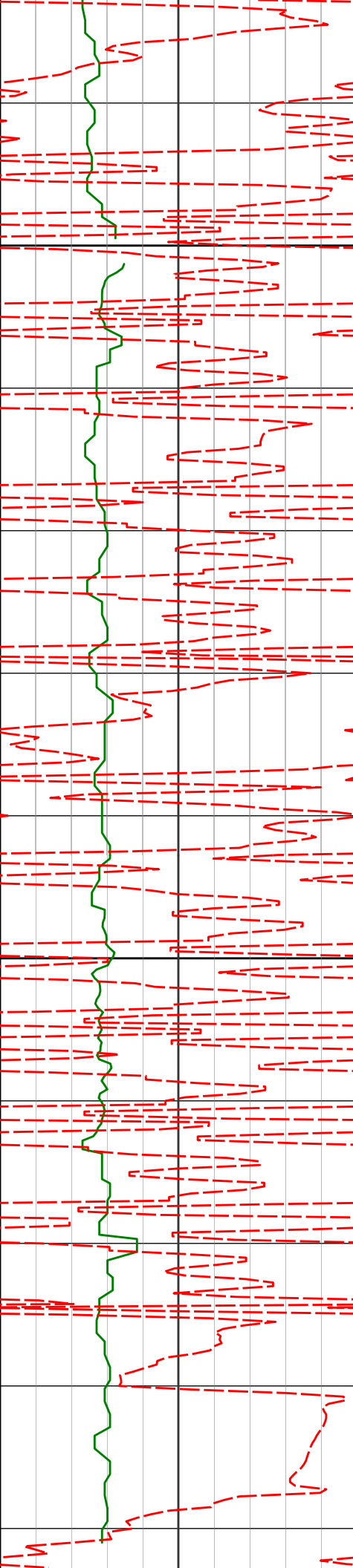


2100

2200

2034'	9.14°	172.50°	2027.23'	-87.13'	112.16°F
2126'	9.73°	176.73°	2117.99'	-102.06'	112.16°F
2218'	9.86°	172.96°	2208.65'	-117.55'	112.16°F





2500

2600

2496'

10.79°

162.10° 2482.23'

-165.17'

2589'

10.65°

157.65° 2573.61'

-181.11'

2682'

10.48°

165.97° 2665.04'

-197.00'

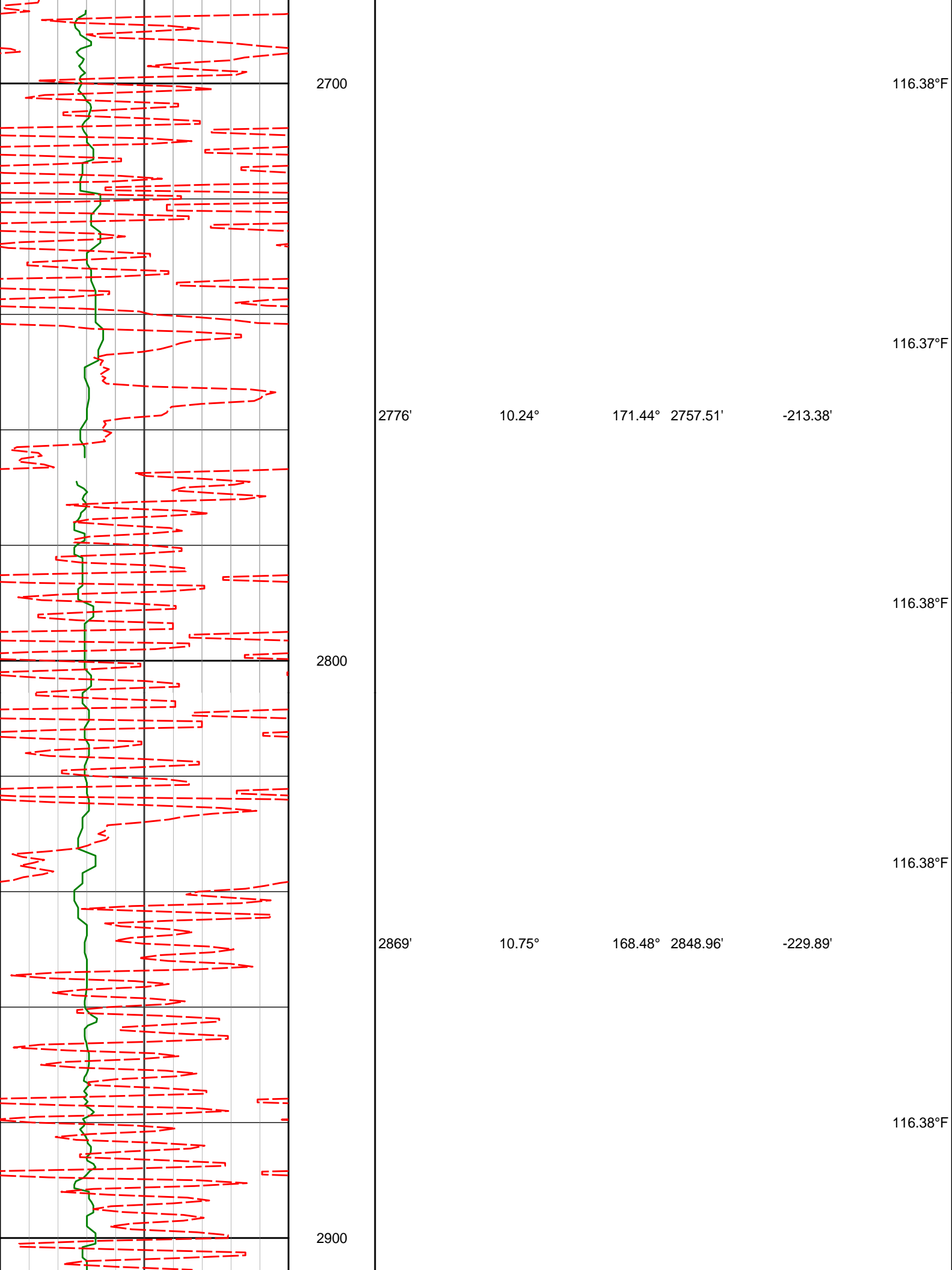
116.38°F

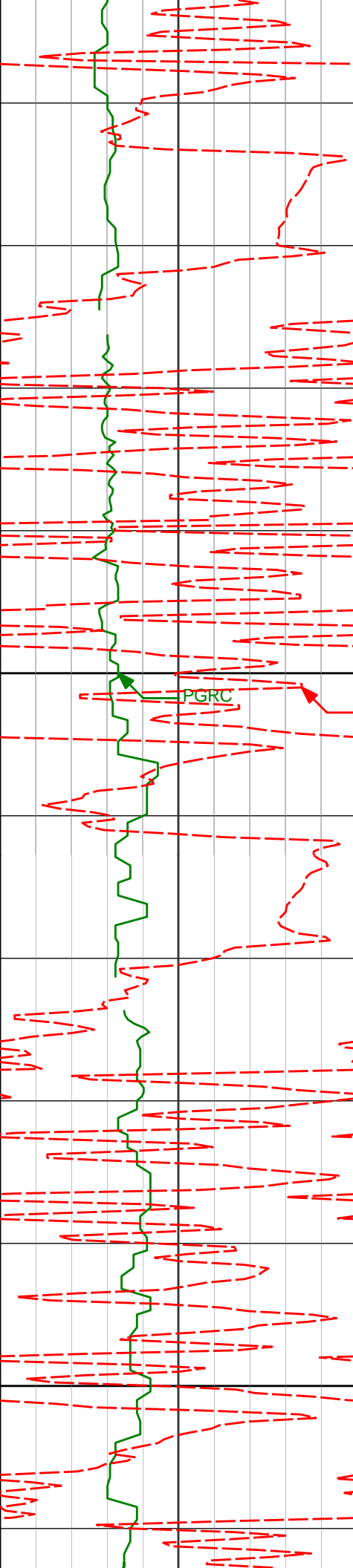
116.38°F

116.37°F

116.38°F

116.38°F





2963'

8.64°

169.36° 2941.61'

-245.26'

3000

PGRC

ROPA

3058'

10.40°

169.48° 3035.30'

-260.55'

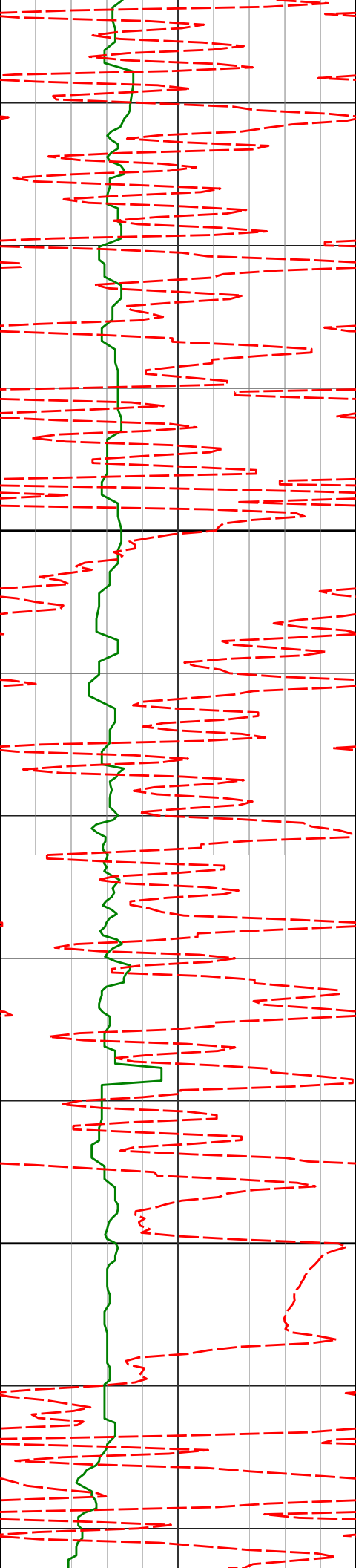
3100

120.59°F

120.59°F

120.59°F

120.59°F



3153'

10.40°

161.67° 3128.74'

-276.91'

124.81°F

124.81°F

3200

3247'

10.73°

160.48° 3221.15'

-292.93'

124.81°F

3300

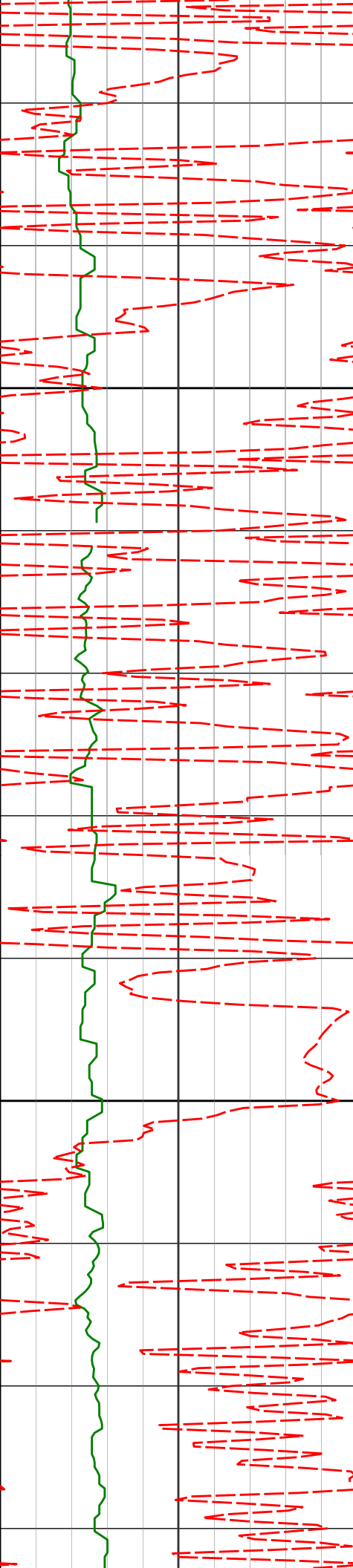
3342'

9.86°

167.03° 3314.62'

-308.96'

124.81°F



3400

3437'

10.42°

169.41°

3408.14'

-325.16'

124.81°F

124.81°F

124.81°F

3500

3531'

10.26°

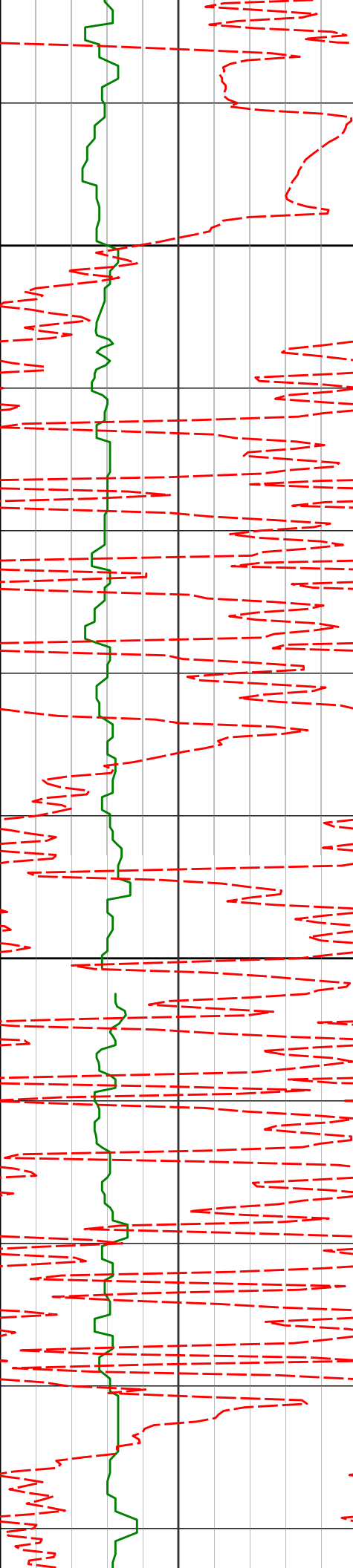
175.36°

3500.61'

-341.74'

129.03°F

129.03°F



3600

3700

3626'

9.13°

177.41°

3594.26'

-357.64'

129.03°F

129.03°F

3721'

8.97°

176.63°

3688.07'

-372.51'

133.25°F

133.25°F

3815'

9.16°

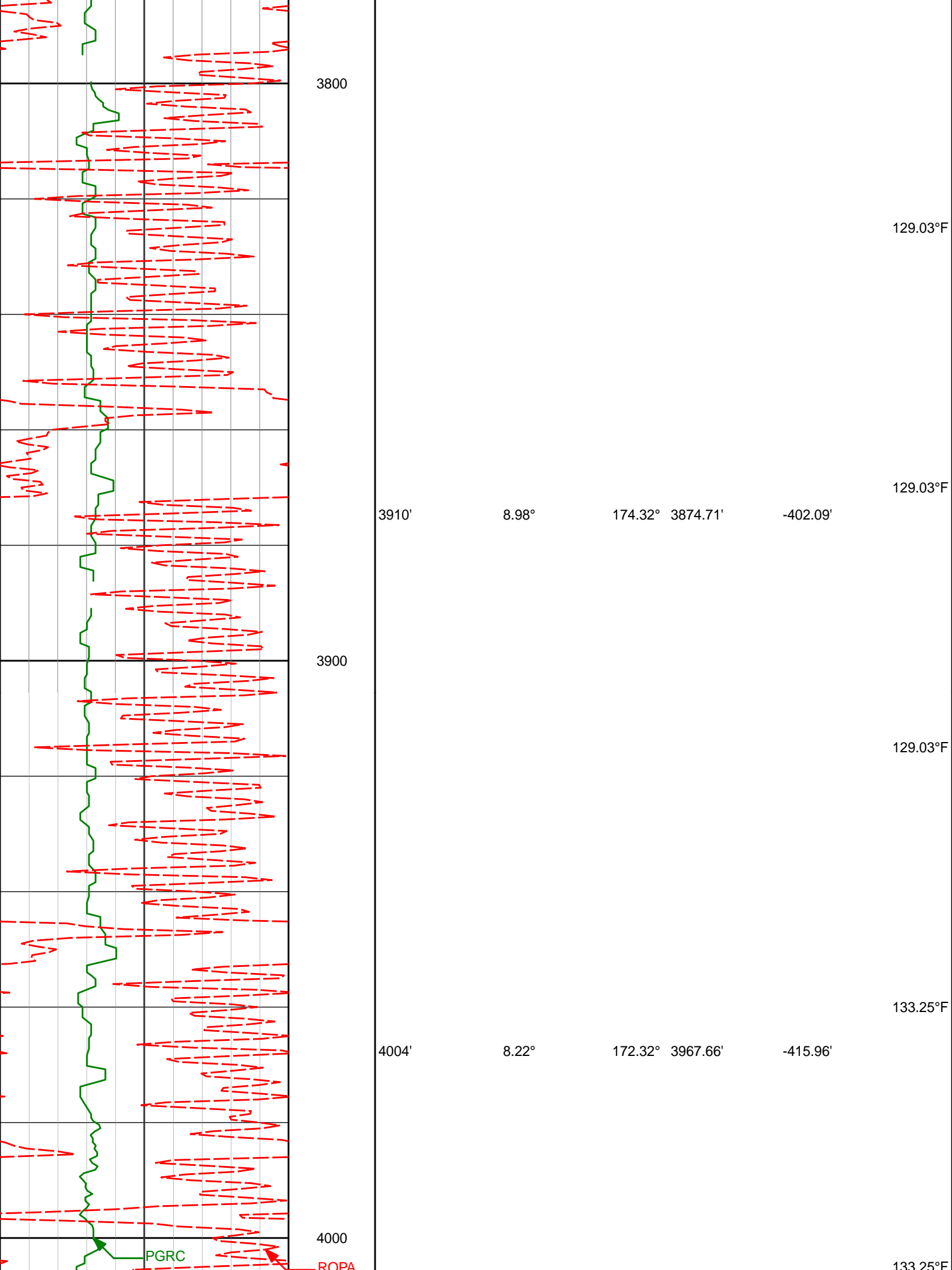
176.50°

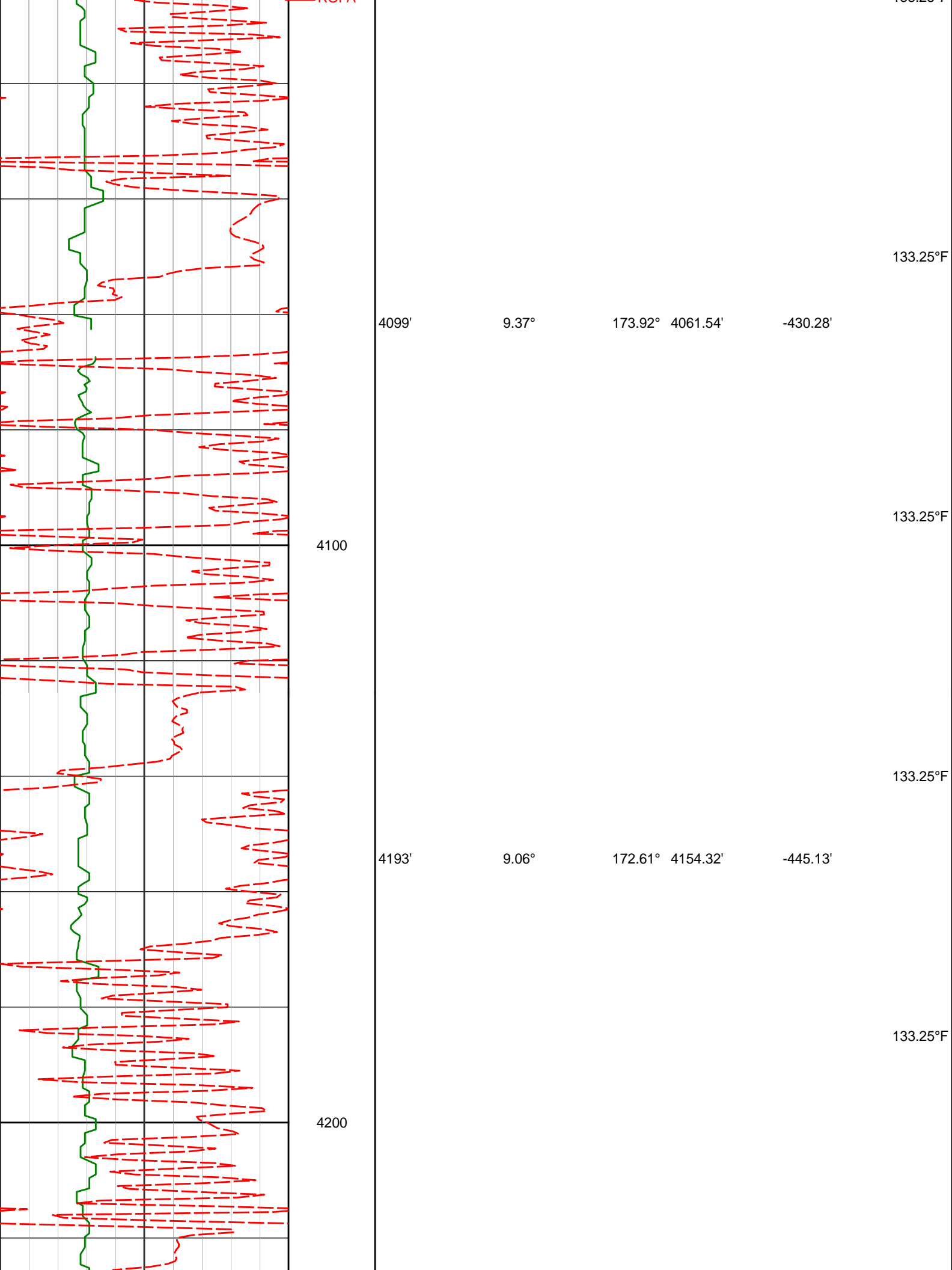
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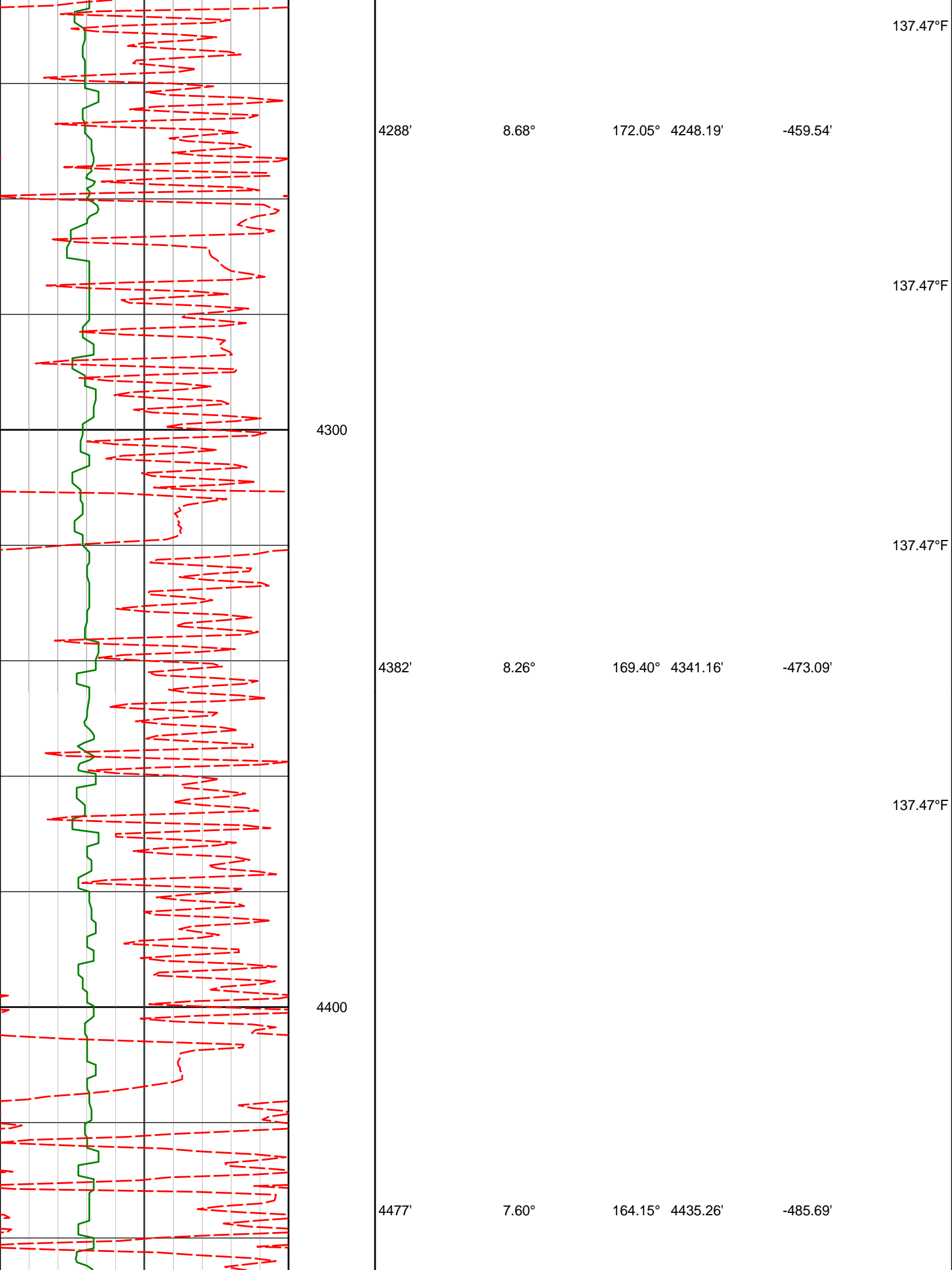
-387.23'

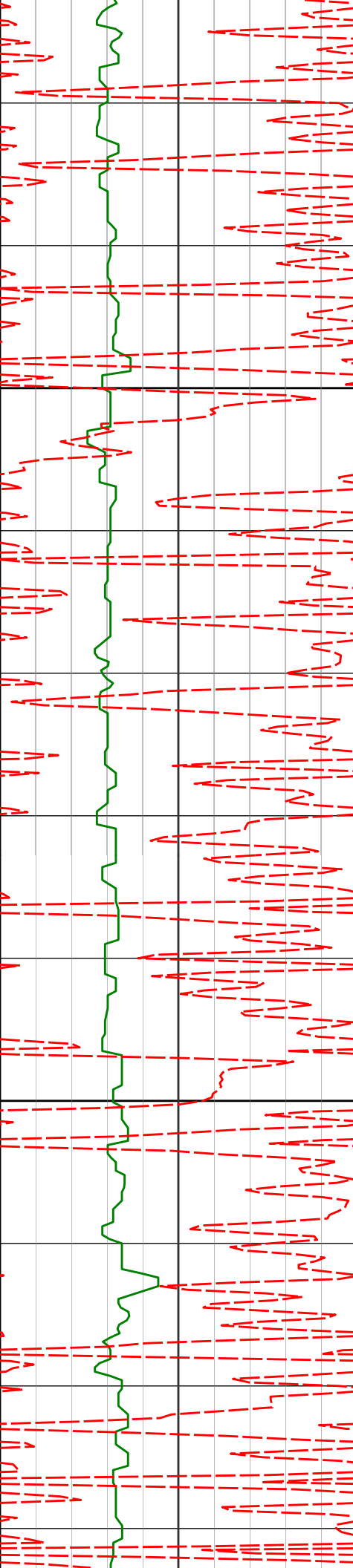
129.03°F











4500

4571'

6.97°

163.87°

4528.50'

-496.99'

4600

4666'

6.04°

163.74°

4622.88'

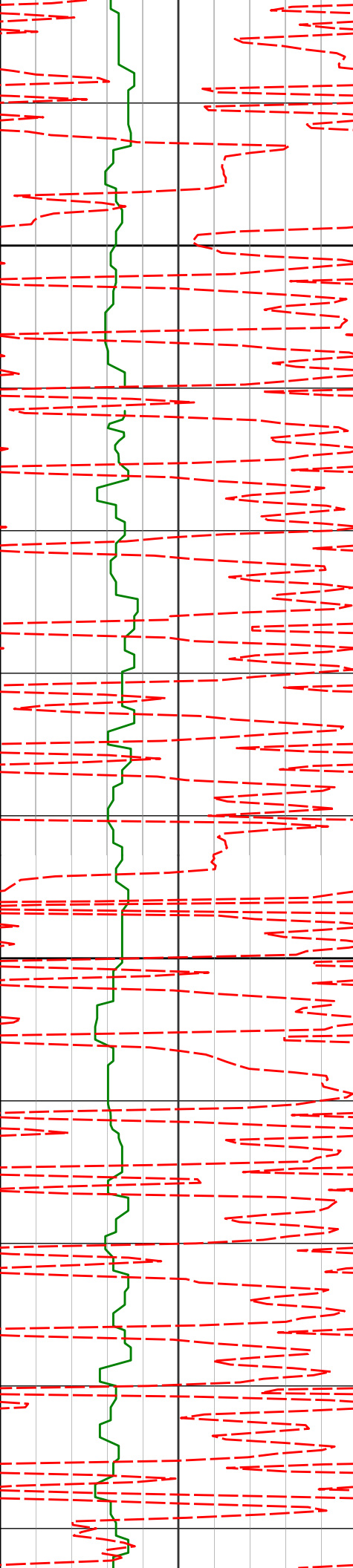
-507.17'

141.69°F

141.69°F

141.69°F

141.69°F



4700

4761'

5.22°

160.35°

4717.42'

-515.90'

4800

4856'

4.68°

160.83°

4812.07'

-523.50'

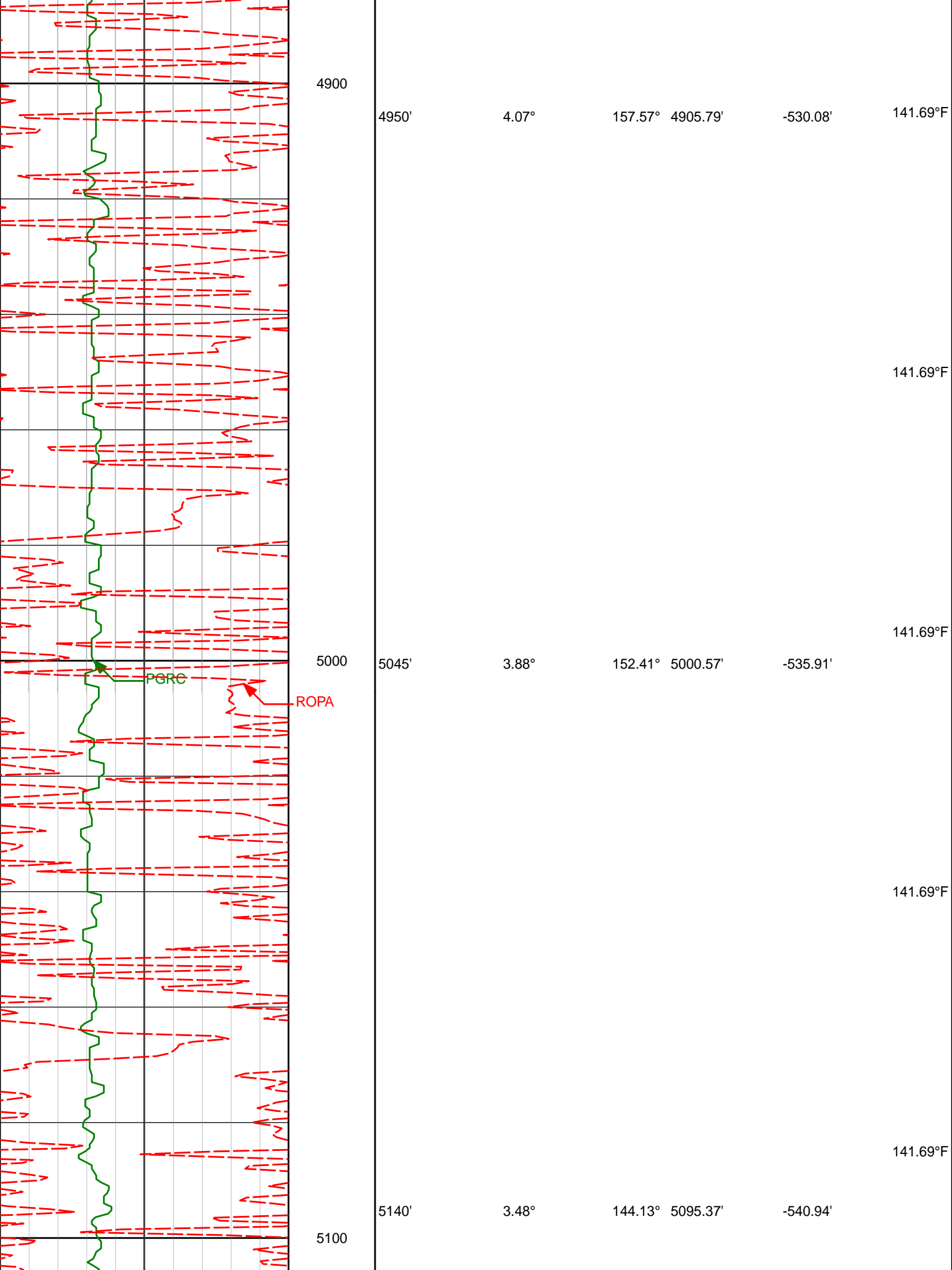
141.69°F

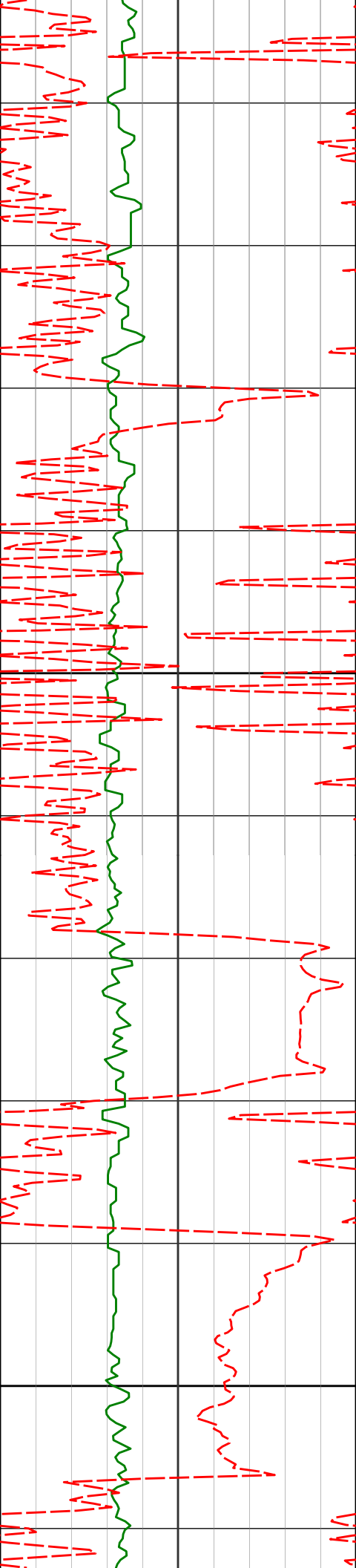
141.69°F

141.69°F

141.69°F

141.69°F





5200

5300

5234'

3.60°

135.86°

5189.19'

-545.20'

5329'

2.18°

63.54°

5284.10'

-546.36'

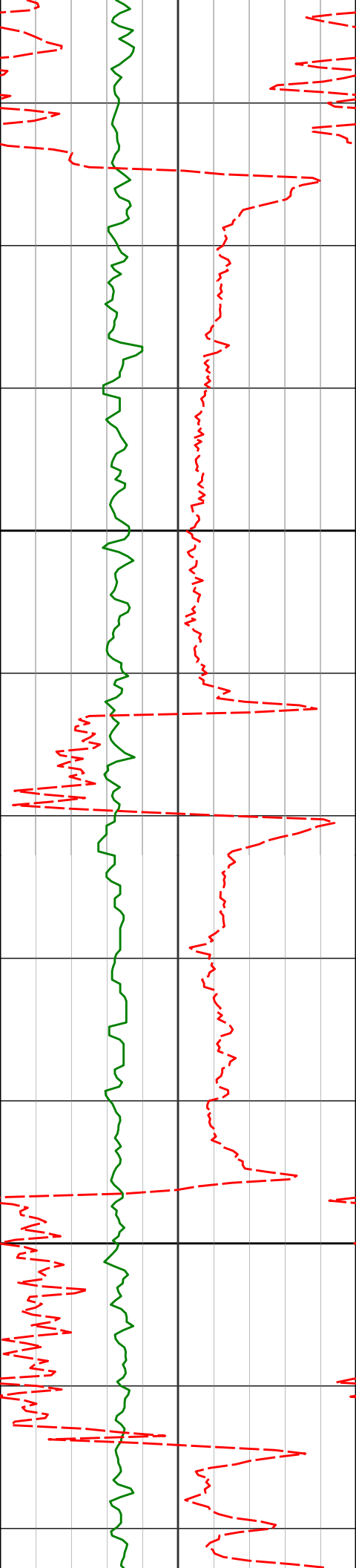
141.69°F

141.69°F

141.69°F

141.69°F

141.69°F



5423'

9.44°

6.62° 5377.60'

-537.79'

5400

145.91°F

145.91°F

145.91°F

5518'

22.37°

3.15° 5468.77'

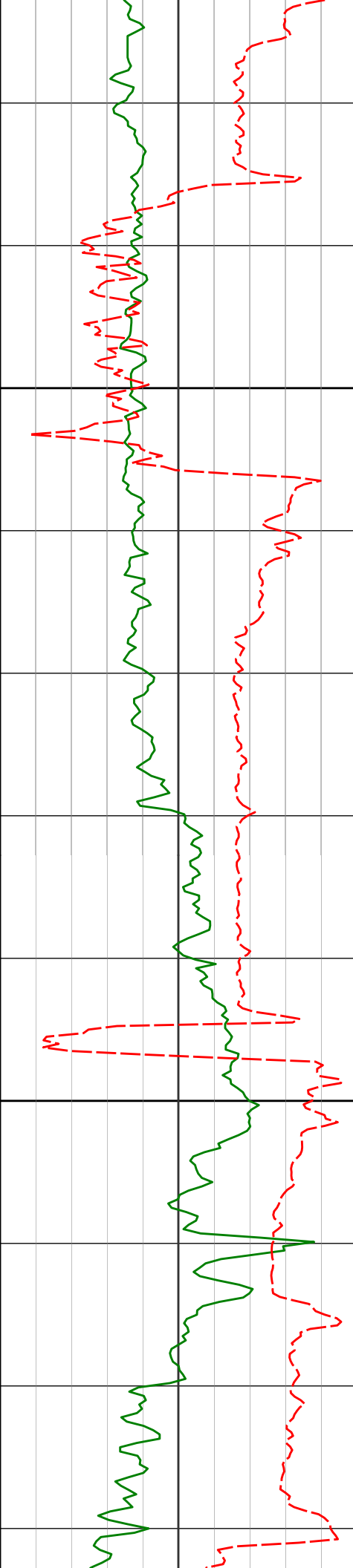
-511.83'

5500

145.91°F

150.13°F





5613'

25.46°

354.87° 5555.63'

-473.51'

5600

150.13°F

150.13°F

5707'

28.39°

357.05° 5639.43'

-431.24'

151.51°F

5700

154.34°F

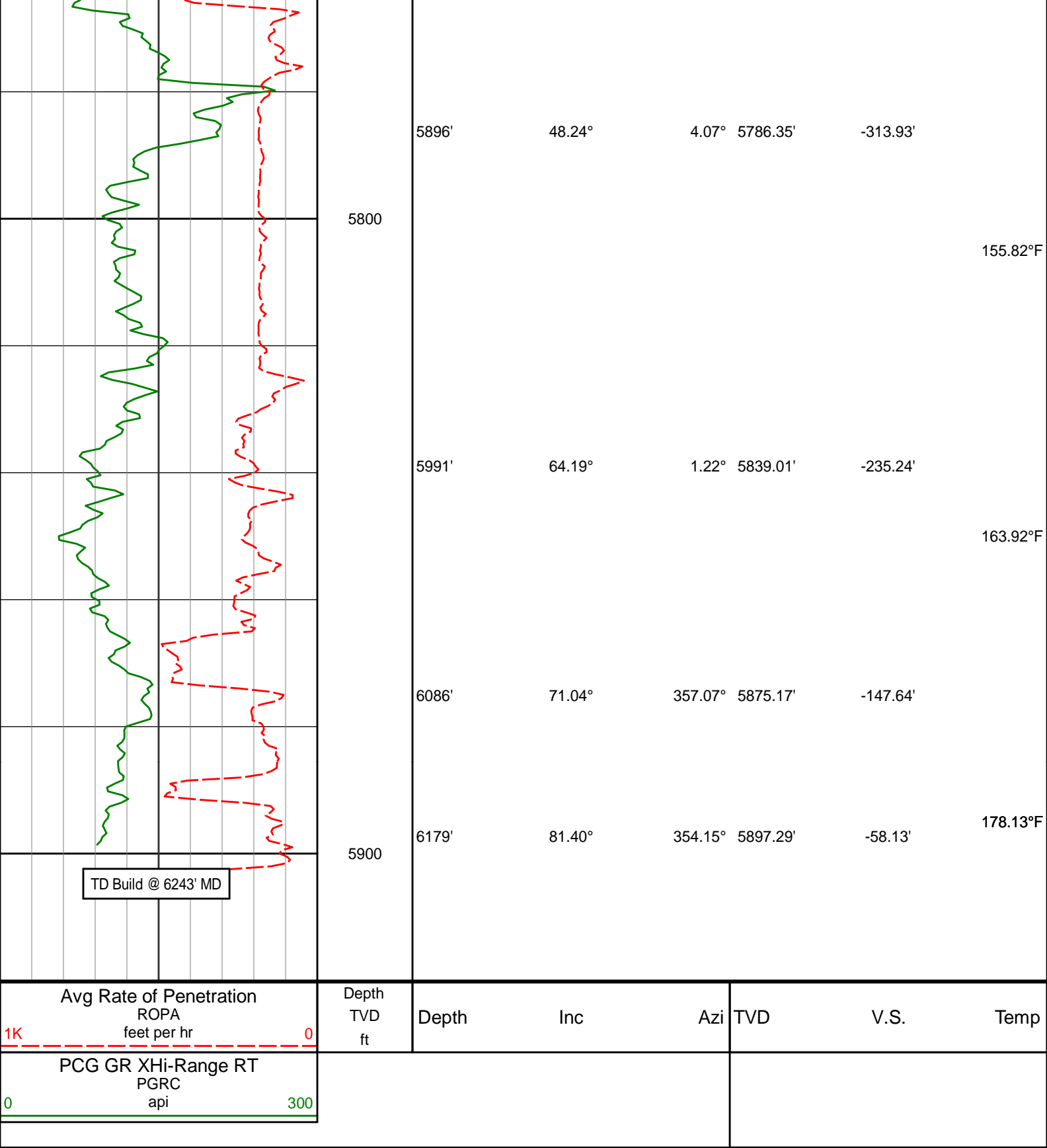
5802'

39.01°

3.44° 5718.38'

-378.70'

154.34°F



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Noble Energy  
Greyson LD28-760  
Wattenburg  
Weld Colorado  
USA

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
91.51	0.32	160.69	91.51	0.24 S	0.08 E	-0.24	0.35
183.50	0.46	101.94	183.50	0.56 S	0.53 E	-0.54	0.44
275.49	0.40	59.31	275.49	0.47 S	1.17 E	-0.42	0.34
367.48	0.15	340.46	367.47	0.20 S	1.41 E	-0.13	0.44
459.47	0.09	29.11	459.46	0.02 S	1.40 E	0.04	0.12
551.46	0.32	344.57	551.45	0.29 N	1.37 E	0.36	0.29
643.45	0.58	8.83	643.44	1.00 N	1.37 E	1.07	0.34
735.44	0.67	16.18	735.43	1.98 N	1.59 E	2.05	0.13
827.43	0.73	15.20	827.41	3.06 N	1.90 E	3.14	0.06
919.42	0.46	339.66	919.39	3.97 N	1.92 E	4.05	0.48
1011.41	0.23	300.47	1011.38	4.41 N	1.63 E	4.48	0.34
1103.40	0.30	308.49	1103.37	4.65 N	1.29 E	4.70	0.08
1135.00	0.32	331.32	1134.97	4.78 N	1.18 E	4.83	0.40
1202.00	0.31	346.49	1201.97	5.12 N	1.05 E	5.16	0.13
1294.00	1.05	178.30	1293.97	4.52 N	1.02 E	4.56	1.47
1386.00	3.23	172.66	1385.90	1.11 N	1.37 E	1.17	2.38
1479.00	6.09	173.25	1478.58	6.39 S	2.29 E	-6.28	3.08
1572.00	7.90	172.58	1570.88	17.63 S	3.69 E	-17.44	1.95
1665.00	9.14	166.95	1662.86	31.16 S	6.18 E	-30.84	1.61
1758.00	9.33	170.42	1754.65	45.79 S	9.11 E	-45.32	0.63
1850.00	8.61	163.05	1845.53	59.73 S	12.36 E	-59.09	1.47
1943.00	9.25	168.89	1937.40	73.72 S	15.82 E	-72.91	1.20
2034.00	9.14	172.50	2027.23	88.07 S	18.18 E	-87.13	0.65
2126.00	9.73	176.73	2117.99	103.08 S	19.57 E	-102.06	0.99
2218.00	9.86	172.96	2208.65	118.65 S	20.98 E	-117.55	0.71
2310.00	9.47	167.38	2299.35	133.85 S	23.60 E	-132.62	1.10
2404.00	10.86	168.87	2391.87	150.09 S	27.00 E	-148.68	1.51
2496.00	10.79	162.10	2482.23	166.80 S	31.32 E	-165.17	1.38
2589.00	10.65	157.65	2573.61	183.03 S	37.27 E	-181.11	0.90
2682.00	10.48	165.97	2665.04	199.18 S	42.58 E	-197.00	1.65
2776.00	10.24	171.44	2757.51	215.73 S	45.90 E	-213.38	1.08
2869.00	10.75	168.48	2848.96	232.40 S	48.86 E	-229.89	0.80
2963.00	8.64	169.36	2941.61	247.92 S	51.91 E	-245.26	2.25
3058.00	10.40	169.48	3035.30	263.37 S	54.80 E	-260.55	1.86
3153.00	10.40	161.67	3128.74	279.94 S	59.06 E	-276.91	1.48
3247.00	10.73	160.48	3221.15	296.24 S	64.65 E	-292.93	0.42
3342.00	9.86	167.03	3314.62	312.51 S	69.43 E	-308.96	1.53
3437.00	10.42	169.41	3408.14	328.88 S	72.84 E	-325.16	0.73
3531.00	10.26	175.36	3500.61	345.58 S	75.08 E	-341.74	1.15
3626.00	9.13	177.41	3594.26	361.54 S	76.11 E	-357.64	1.25
3721.00	8.97	176.63	3688.07	376.46 S	76.88 E	-372.51	0.21
3815.00	9.16	176.50	3780.90	391.25 S	77.77 E	-387.23	0.21
3910.00	8.98	174.32	3874.71	406.18 S	78.97 E	-402.09	0.41
4004.00	8.22	172.32	3967.66	420.14 S	80.59 E	-415.96	0.87
4099.00	9.37	173.92	4061.54	434.55 S	82.32 E	-430.28	1.24
4193.00	9.06	172.61	4154.32	449.50 S	84.08 E	-445.13	0.39
4288.00	8.68	172.05	4248.19	464.02 S	86.03 E	-459.54	0.42
4382.00	8.26	169.40	4341.16	477.68 S	88.25 E	-473.09	0.61
4477.00	7.60	164.15	4435.26	490.43 S	91.22 E	-485.69	1.03
4571.00	6.97	163.87	4528.50	501.89 S	94.51 E	-496.99	0.68
4666.00	6.04	163.74	4622.88	512.23 S	97.51 E	-507.17	0.97
4761.00	5.22	160.35	4717.42	521.10 S	100.36 E	-515.90	0.93
4856.00	4.68	160.83	4812.07	528.83 S	103.09 E	-523.50	0.57
4950.00	4.07	157.57	4905.79	535.54 S	105.62 E	-530.08	0.70
5045.00	3.88	152.41	5000.57	541.50 S	108.39 E	-535.91	0.43
5140.00	3.48	144.13	5095.37	546.69 S	111.57 E	-540.94	0.70
5234.00	3.60	135.86	5189.19	551.12 S	115.30 E	-545.20	0.56
5329.00	2.18	63.54	5284.10	552.45 S	118.99 E	-546.36	3.78
5423.00	9.44	6.62	5377.60	543.99 S	121.48 E	-537.79	8.98
5518.00	22.37	3.15	5468.77	518.09 S	123.38 E	-511.83	13.64
5613.00	25.46	354.87	5555.63	479.69 S	122.55 E	-473.51	4.80
5707.00	28.39	357.05	5639.43	437.23 S	119.59 E	-431.24	3.29
5802.00	39.01	3.44	5718.38	384.67 S	120.23 E	-378.70	11.77
5896.00	48.24	4.07	5786.35	320.03 S	124.50 E	-313.93	9.83
5991.00	64.19	1.22	5839.01	241.41 S	127.95 E	-235.24	16.97
6086.00	71.04	357.07	5875.17	153.65 S	126.56 E	-147.64	8.26
6179.00	81.40	354.15	5897.29	63.73 S	119.61 E	-58.13	11.55

**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 2.65 DEGREES (GRID)  
A TOTAL CORRECTION OF 6.97 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6179.00 FEET  
IS 135.53 FEET ALONG 118.05 DEGREES (GRID)**

**Surveys from surface to 1135' MD are flexi-shot surveys.  
Final survey is a straight line projection to TD.**

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