



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	05-Jul-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	764.97				
Log End Depth (TVD, ft)	6,567.39				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	04-Jul-15 02:00				
Drill/Wipe End Date and Time	05-Jul-15 01:15				
Min Inc (deg) @ Depth (TVD, ft)	0.55 @ 5,498.04				
Max Inc (deg) @ Depth (TVD, ft)	83.15 @ 6,560.66				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	593.03				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	10.40 / 28.00				
Filtrate CL (ppm)	1,600.00				
pH / Fluid Loss (mptm)	10.90 / 33				
PV (cP) / YP (lhf2)	4 / 5.00				
% Solids / % Sand	2.7 / .5				
% 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	168.00 / PDC				

Max Tool Temp (degF) / Source	180.09 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Brian Neu				
Customer Representative	JW Irwin				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11342292				
Insert Serial Number	11680771				
Date and Time Initialized	03-Jul-15 15:08				
Date and Time Read	05-Jul-15 05:37				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	65.00				
Software Version	6.33				
Sub Serial Number	11342292				
Sonde Serial Number	11477975				
Sensor ID Number	N/A				
Toolface Offset (deg)	209.80				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	58.19				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11342292				
Insert/Sonde Serial Number	11120592				

REMARKS

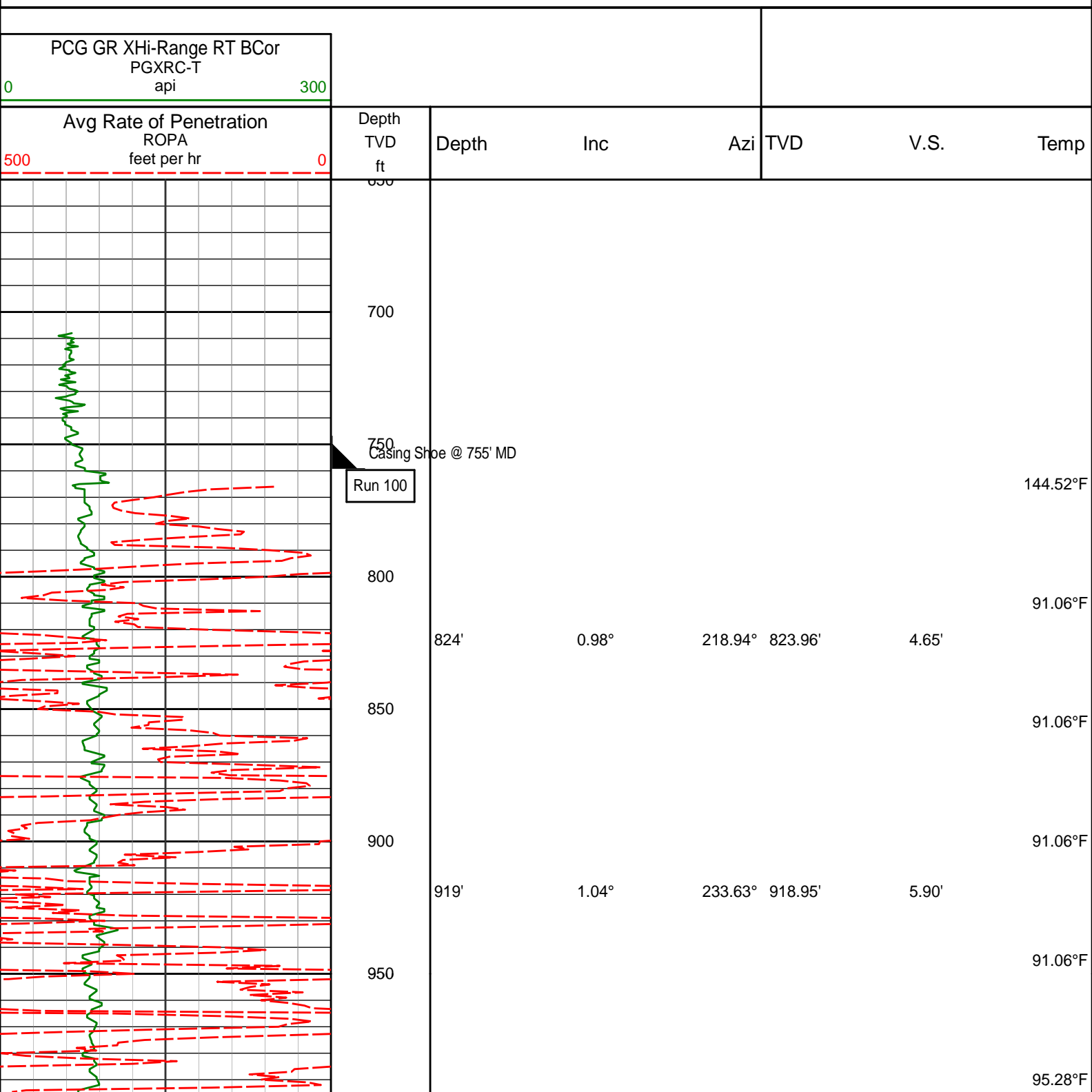
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance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

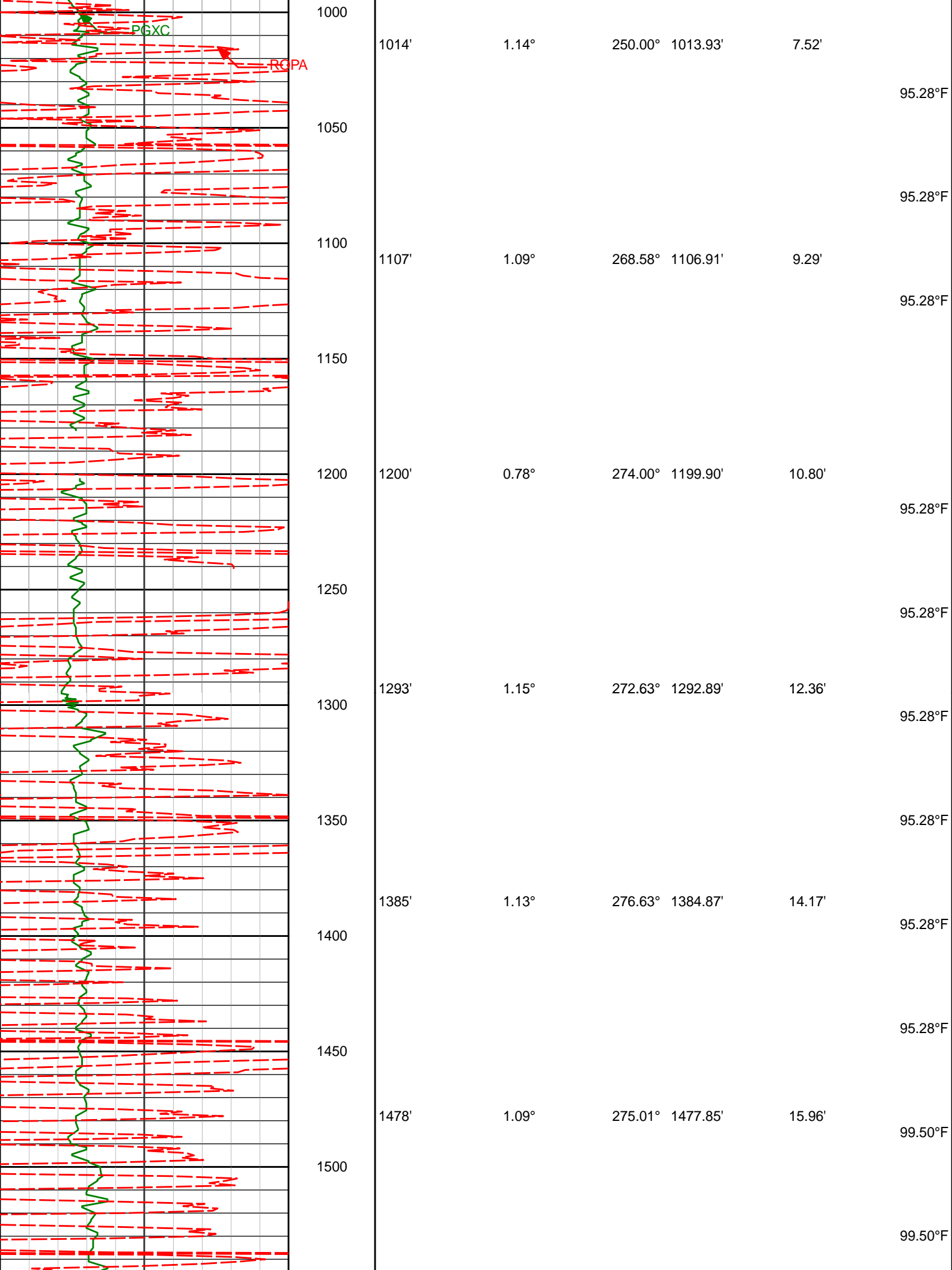
WARRANTY

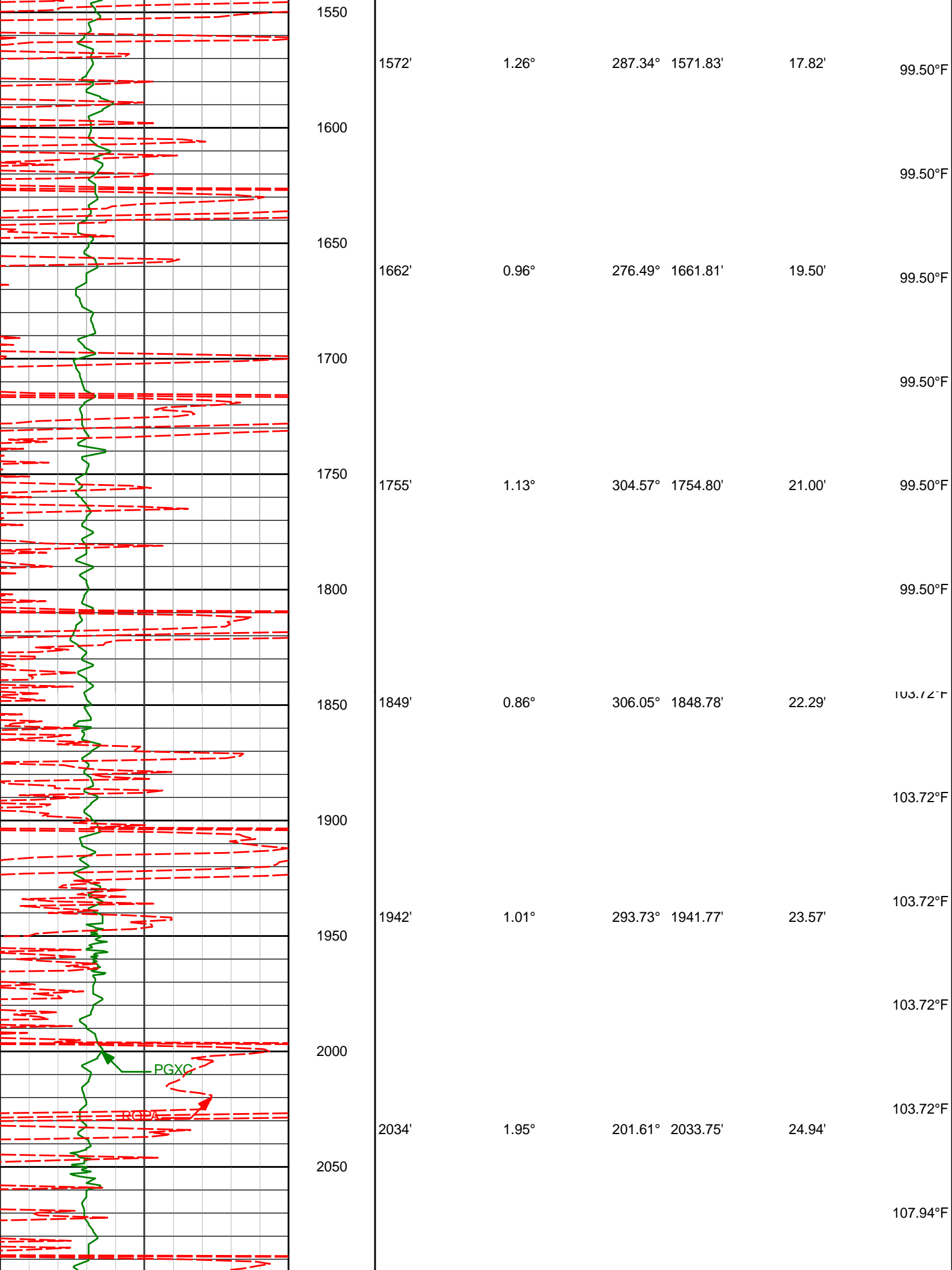
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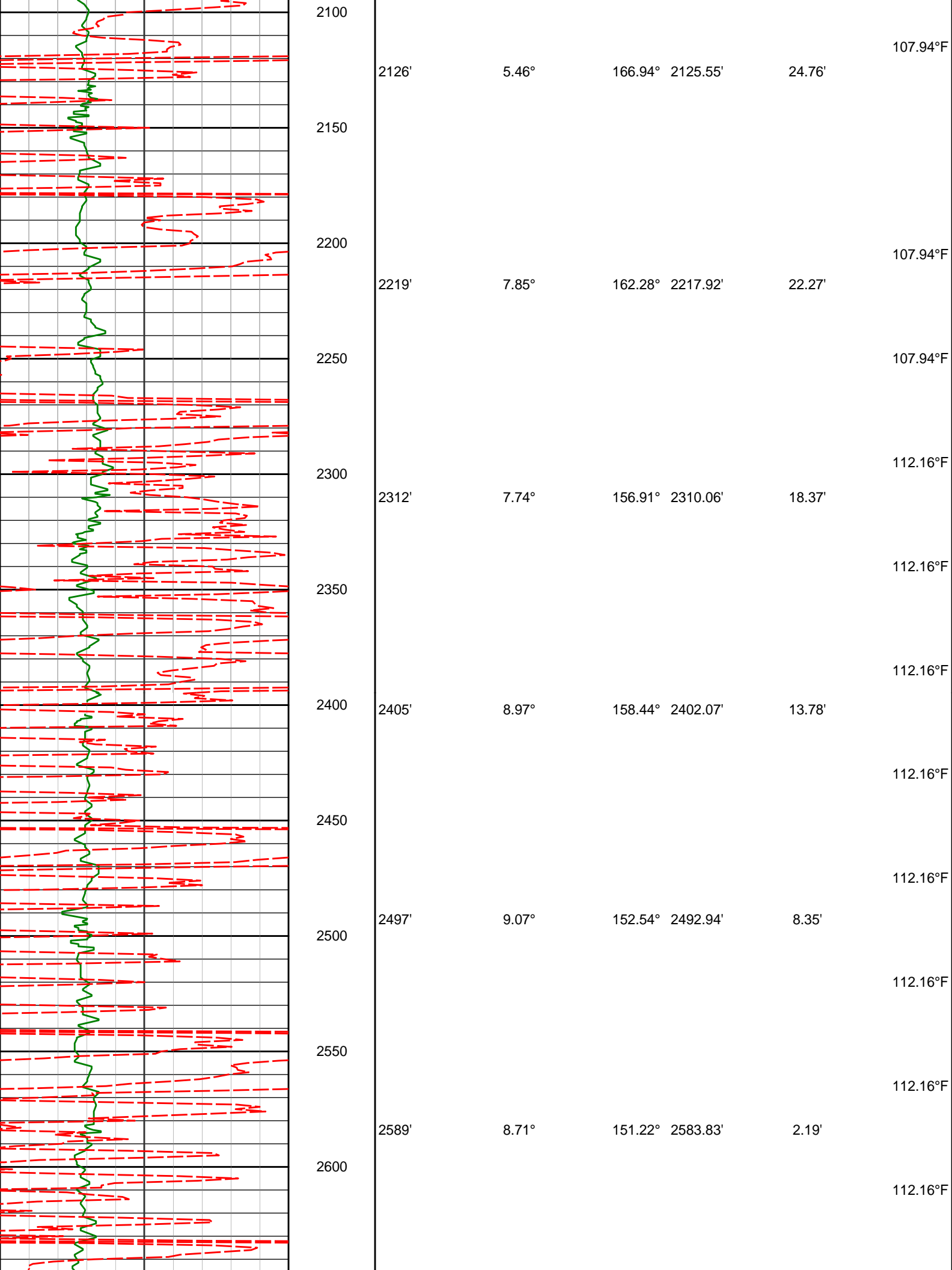
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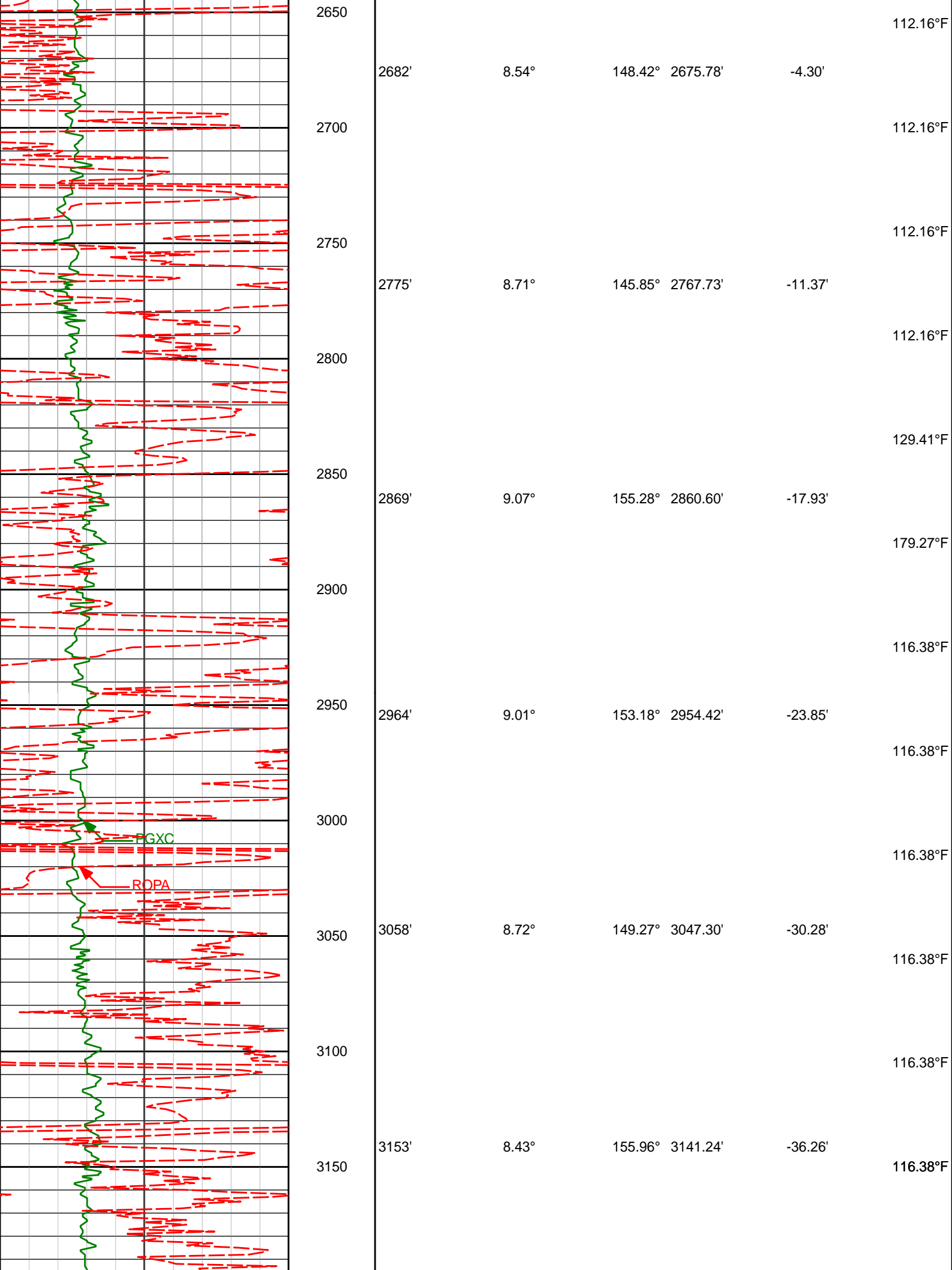
TVD Detail 1:600 Scale

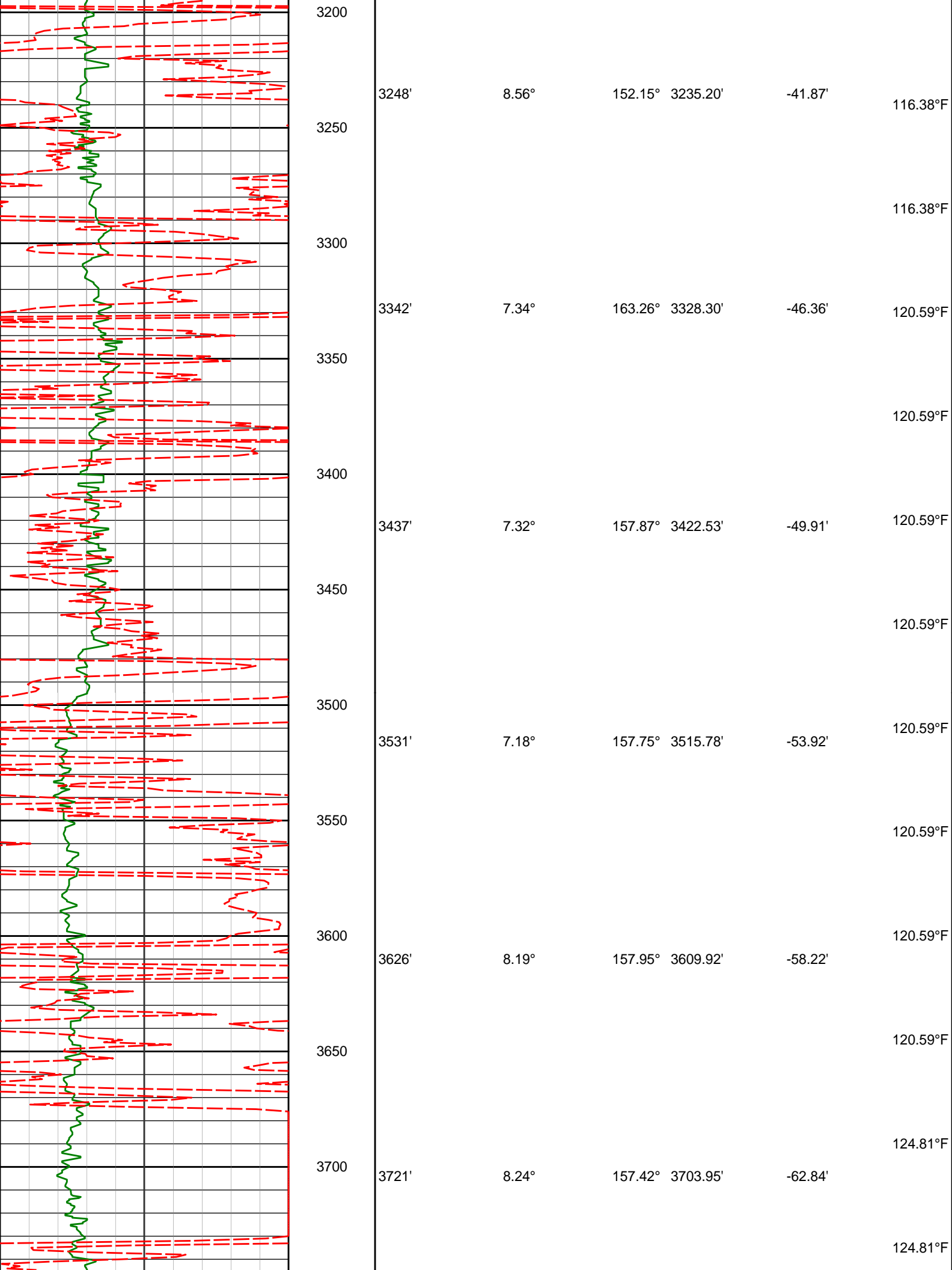


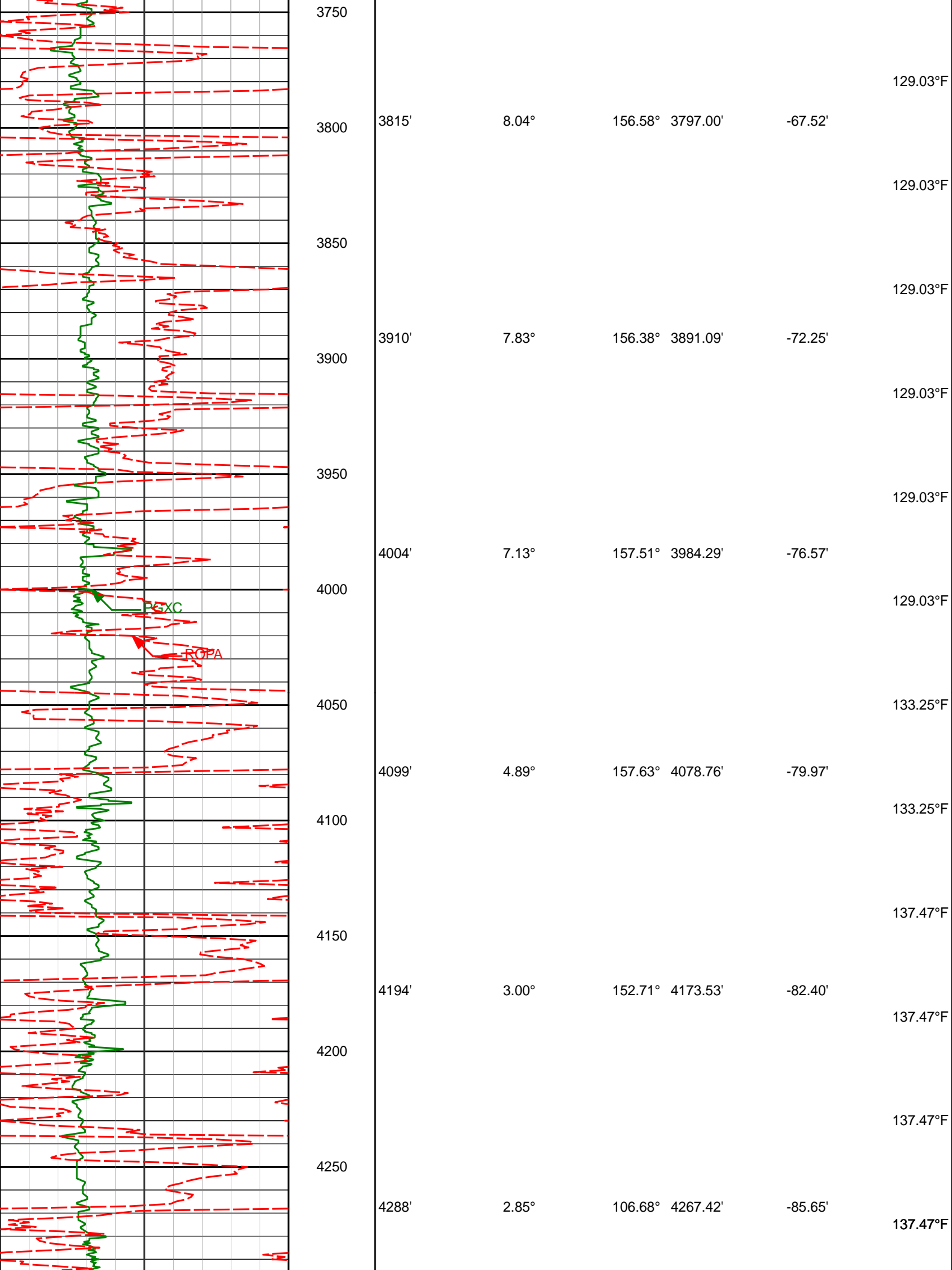


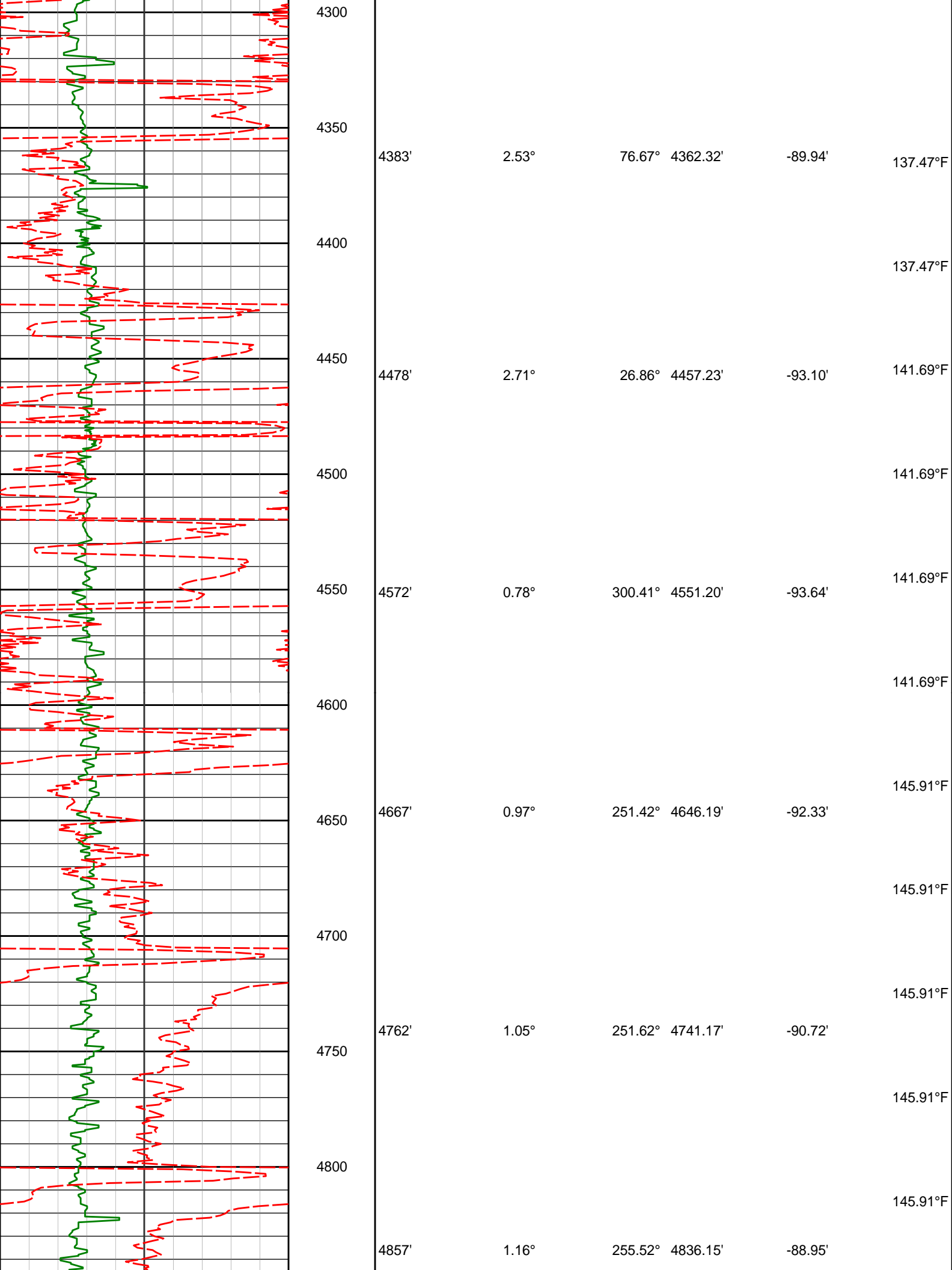


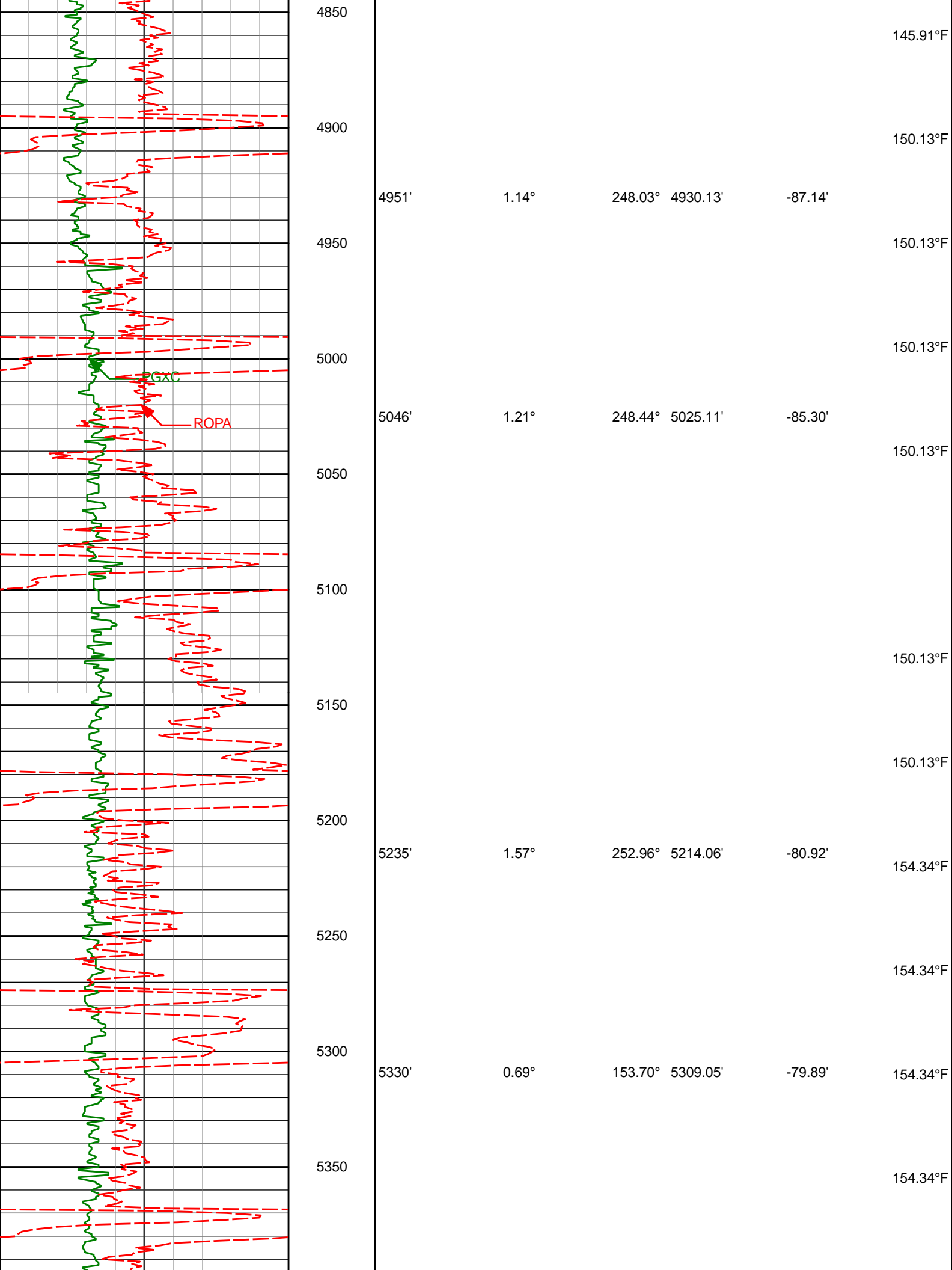


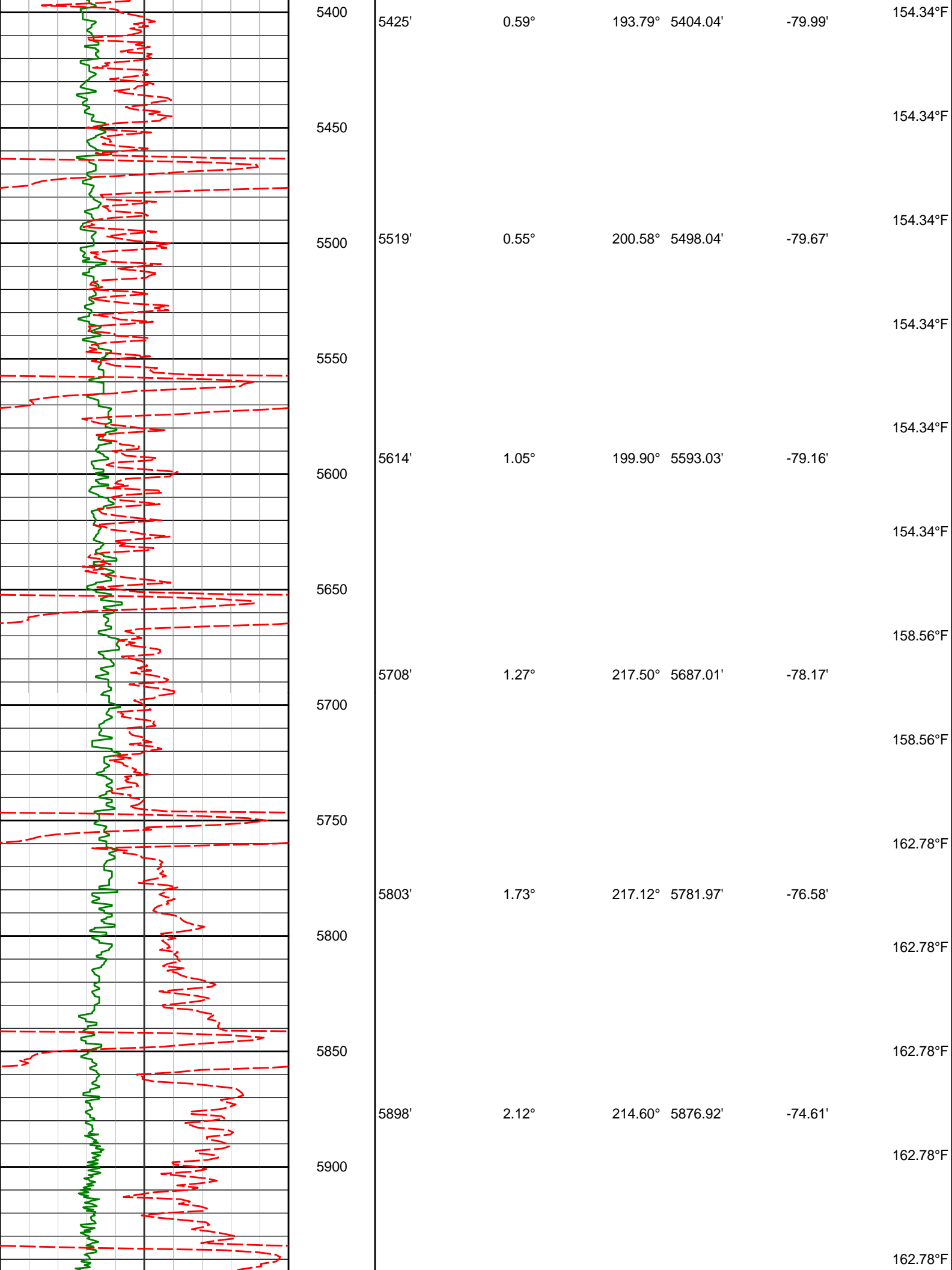


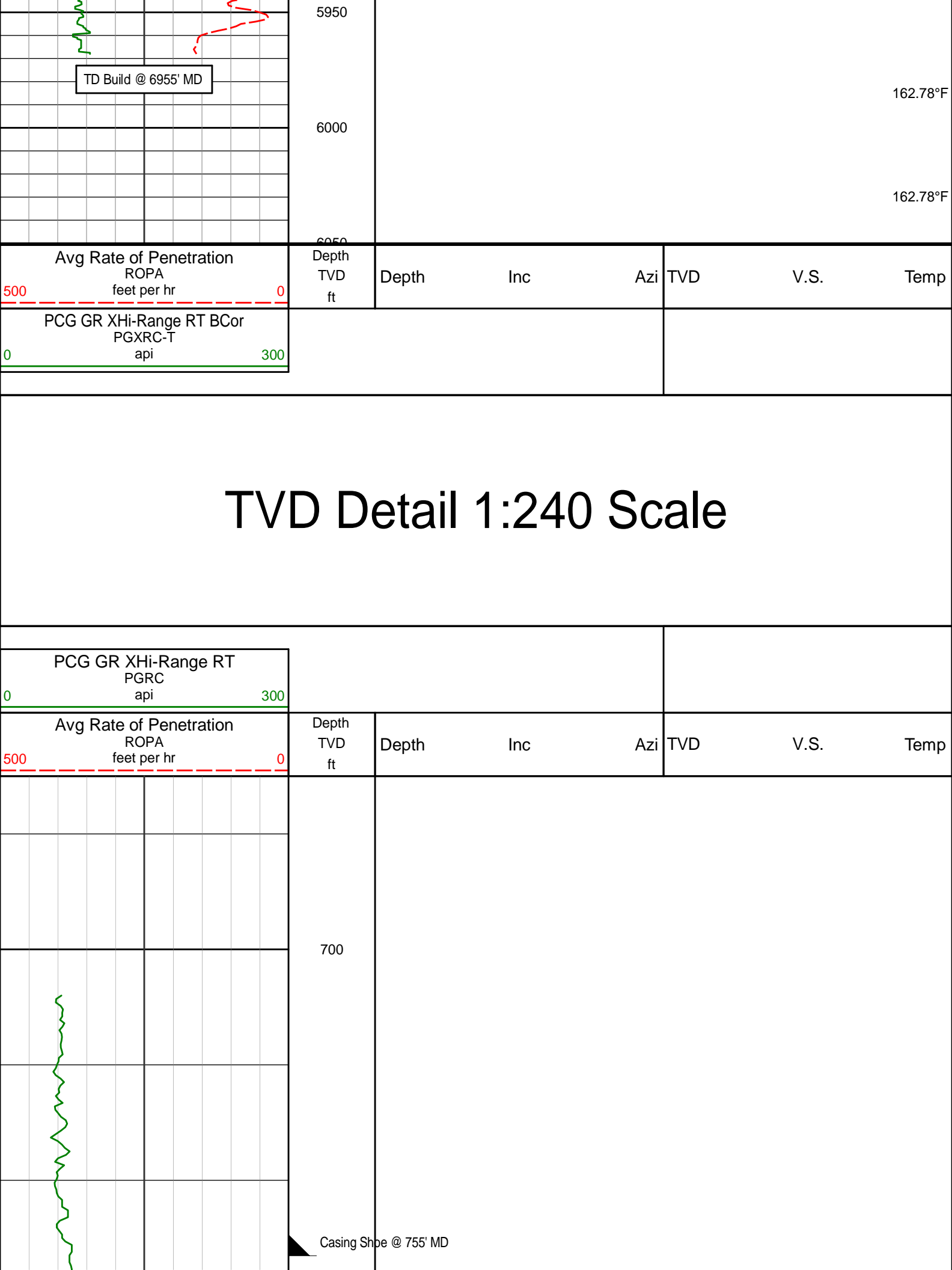


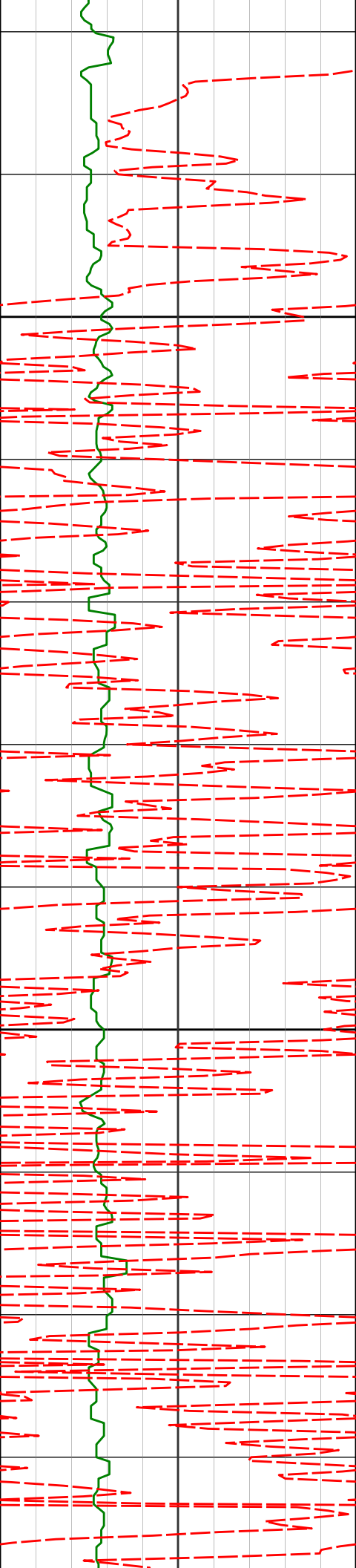












Run 100

800

824'

0.98°

218.94° 823.96'

4.65'

900

919'

1.04°

233.63° 918.95'

5.90'

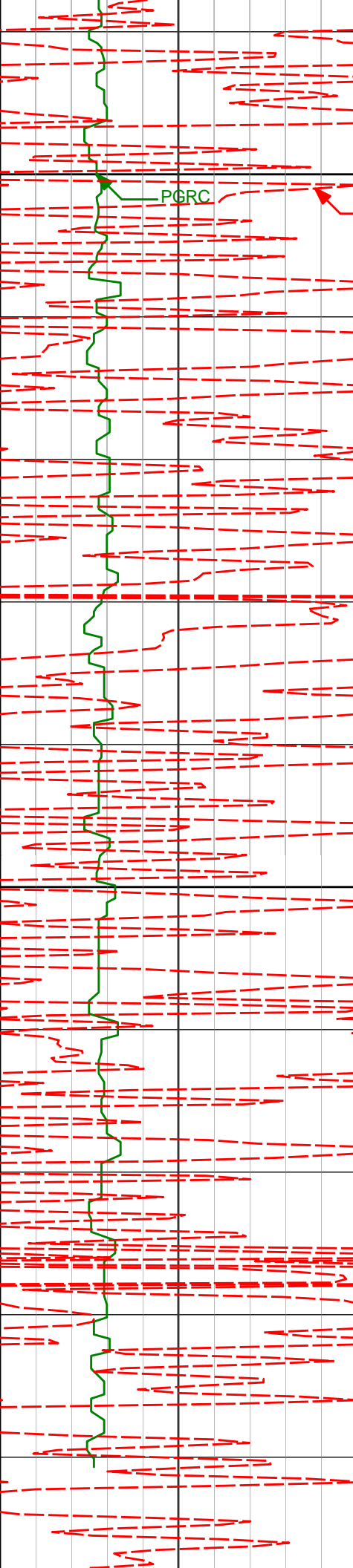
144.52°F

91.06°F

91.06°F

91.06°F

91.06°F



1000

PGRC

ROPA

1014' 1.14° 250.00° 1013.93' 7.52'

1100

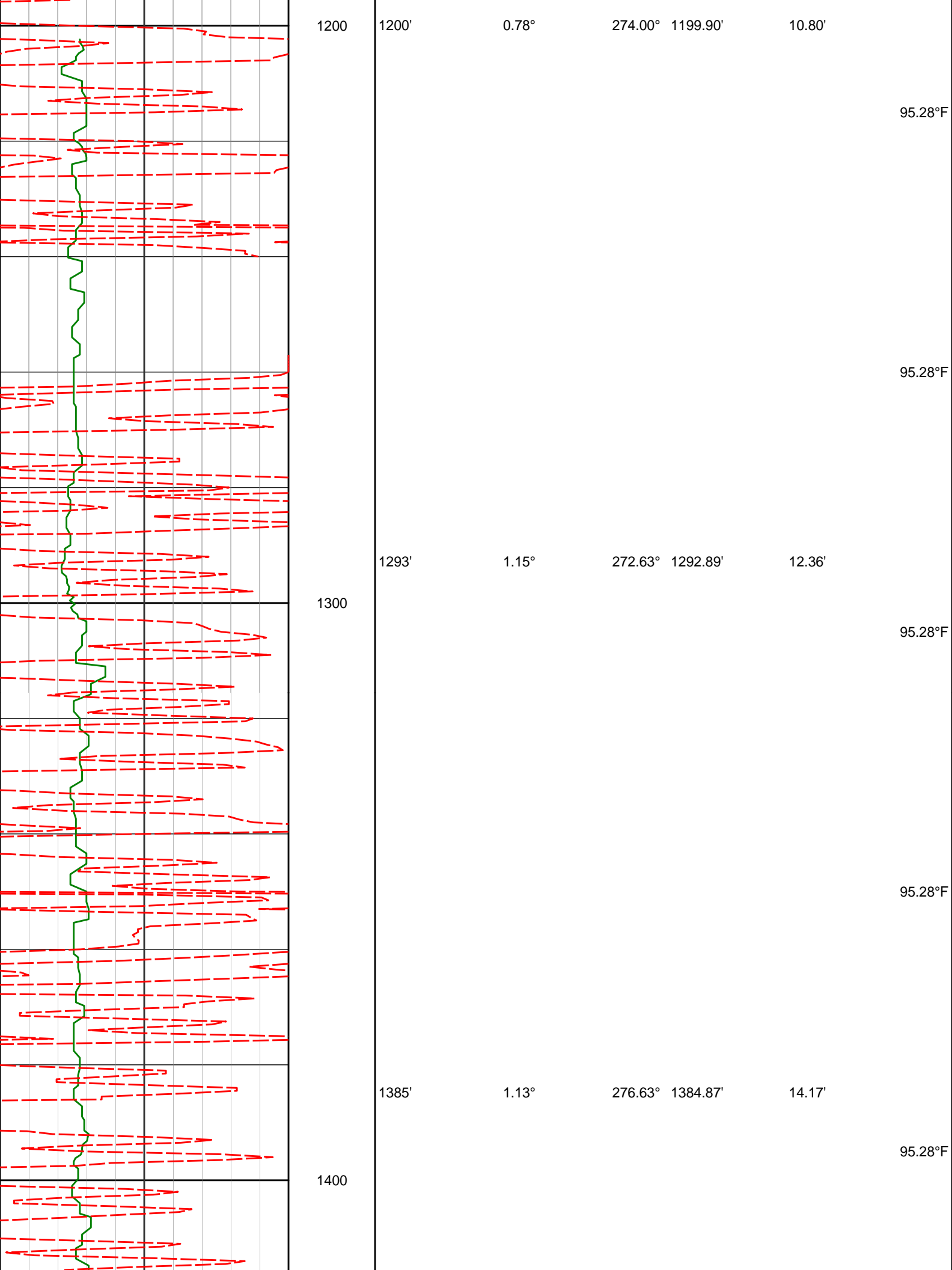
1107' 1.09° 268.58° 1106.91' 9.29'

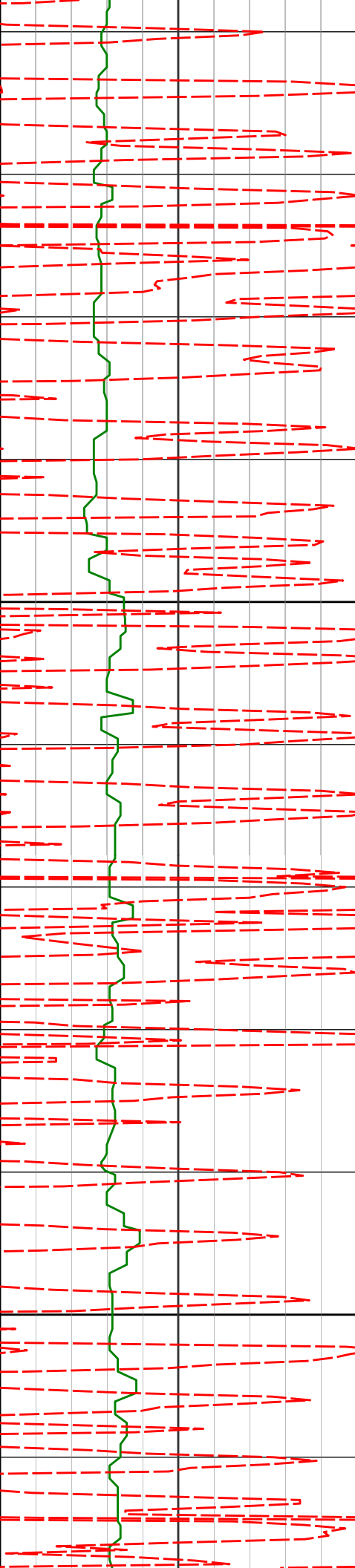
95.28°F

95.28°F

95.28°F

95.28°F





1500

1600

1478'

1.09°

275.01° 1477.85'

15.96'

1572'

1.26°

287.34° 1571.83'

17.82'

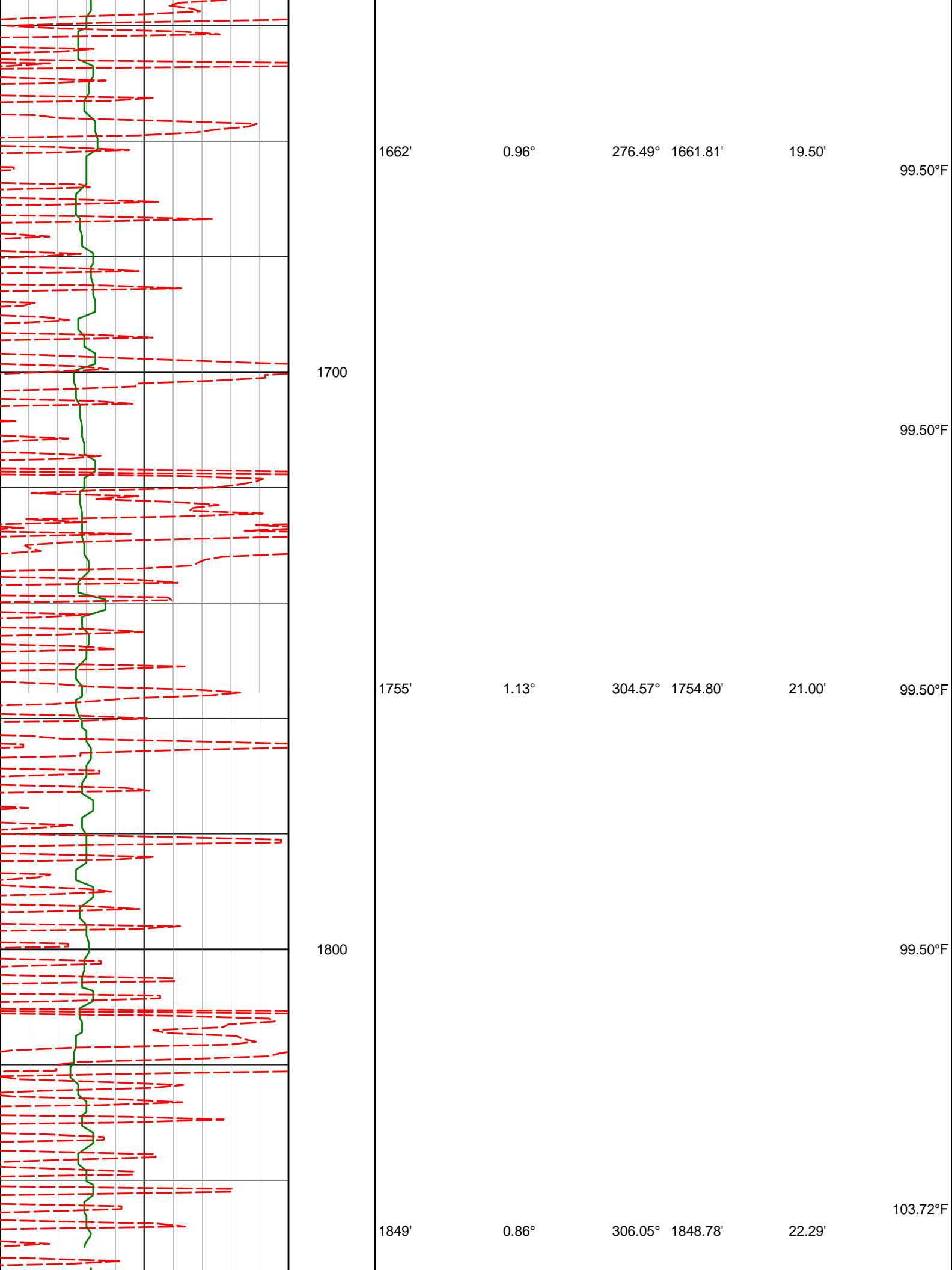
95.28°F

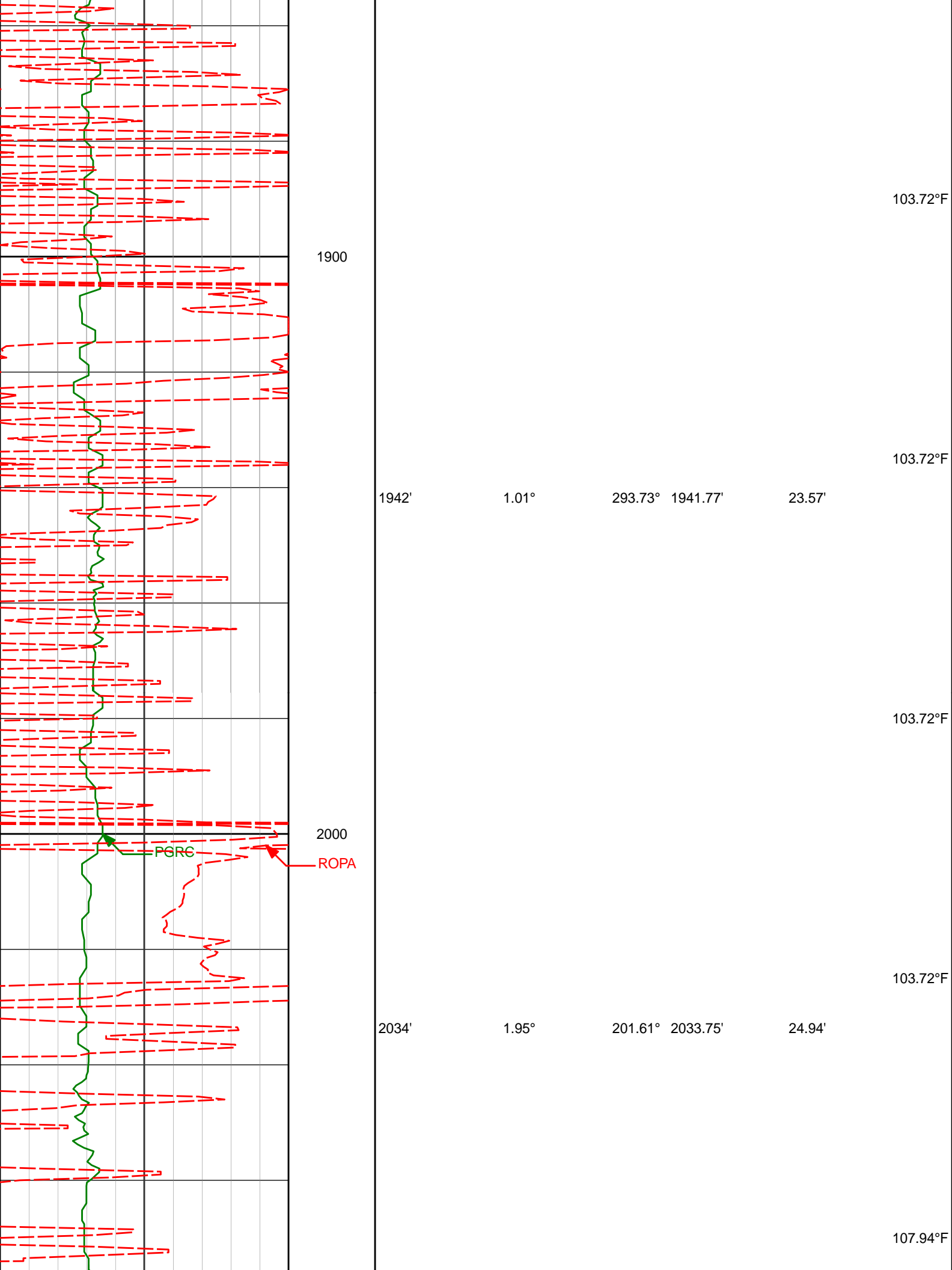
99.50°F

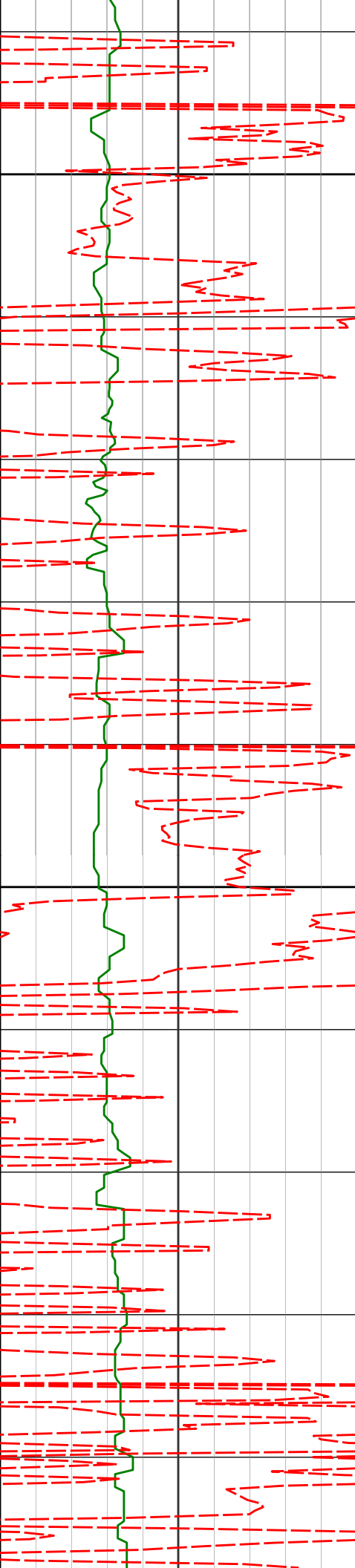
99.50°F

99.50°F

99.50°F







2100

107.94°F

2126'

5.46°

166.94°

2125.55'

24.76'

2200

107.94°F

2219'

7.85°

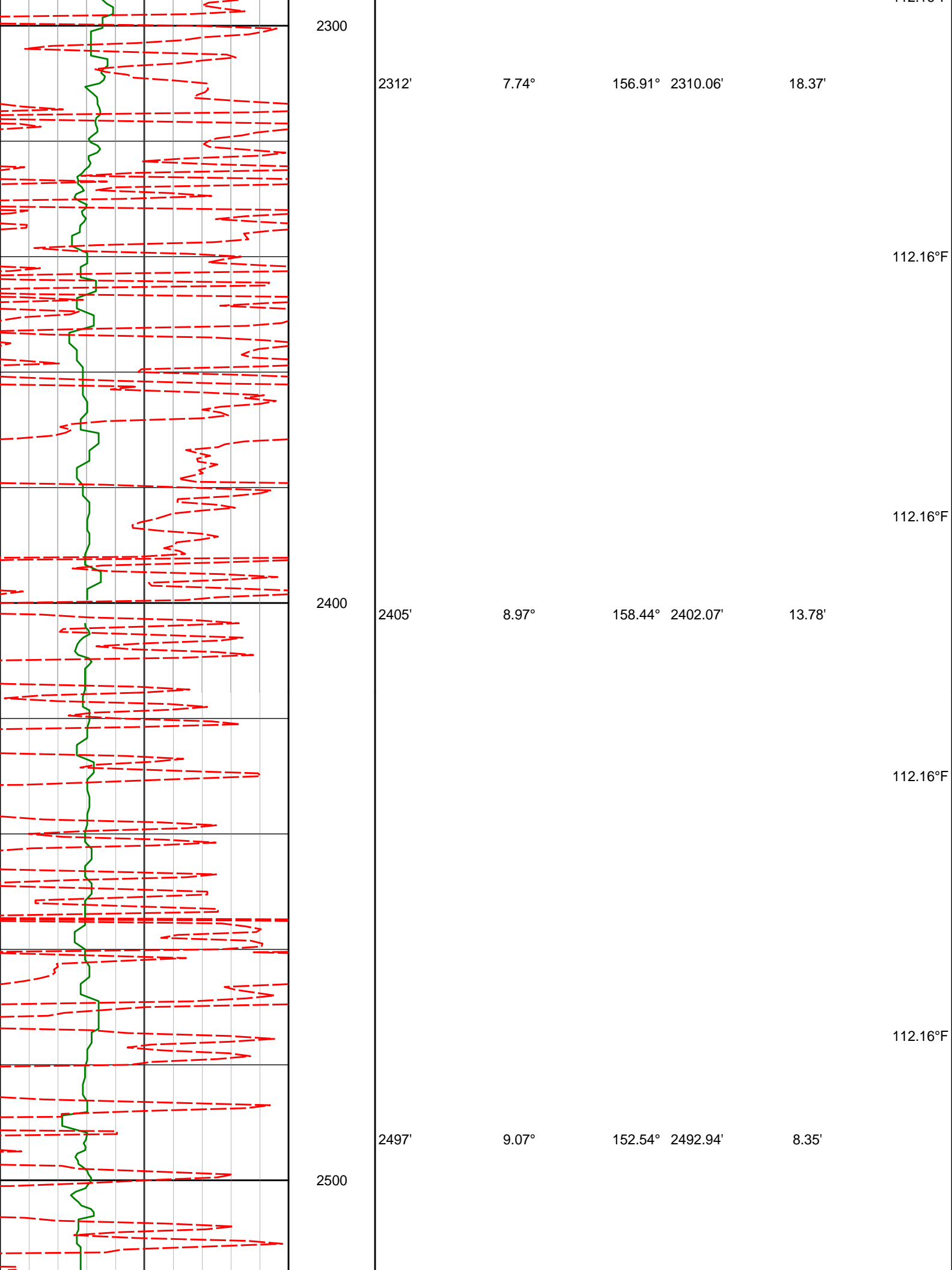
162.28°

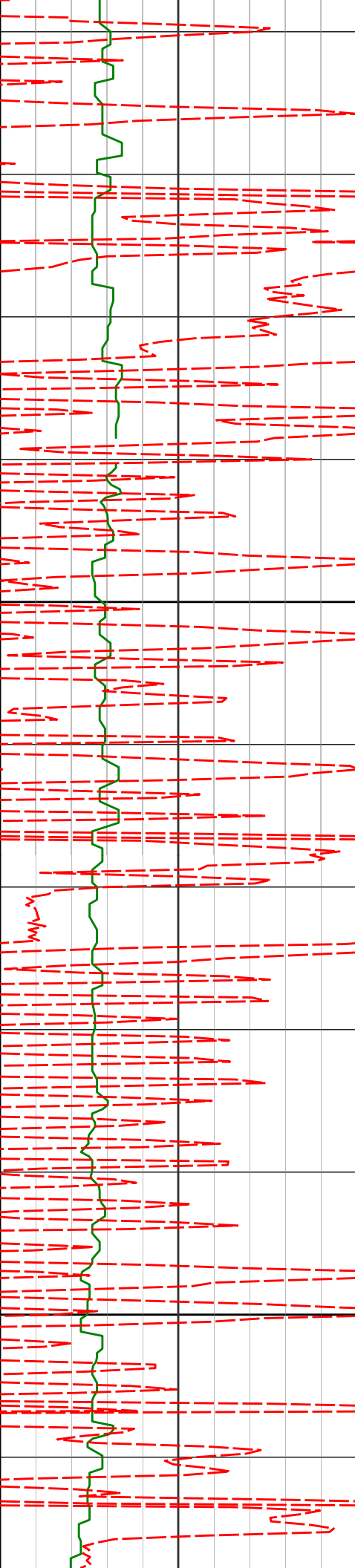
2217.92'

22.27'

107.94°F

112.16°F





2600

2700

2589'

8.71°

151.22°

2583.83'

2.19'

2682'

8.54°

148.42°

2675.78'

-4.30'

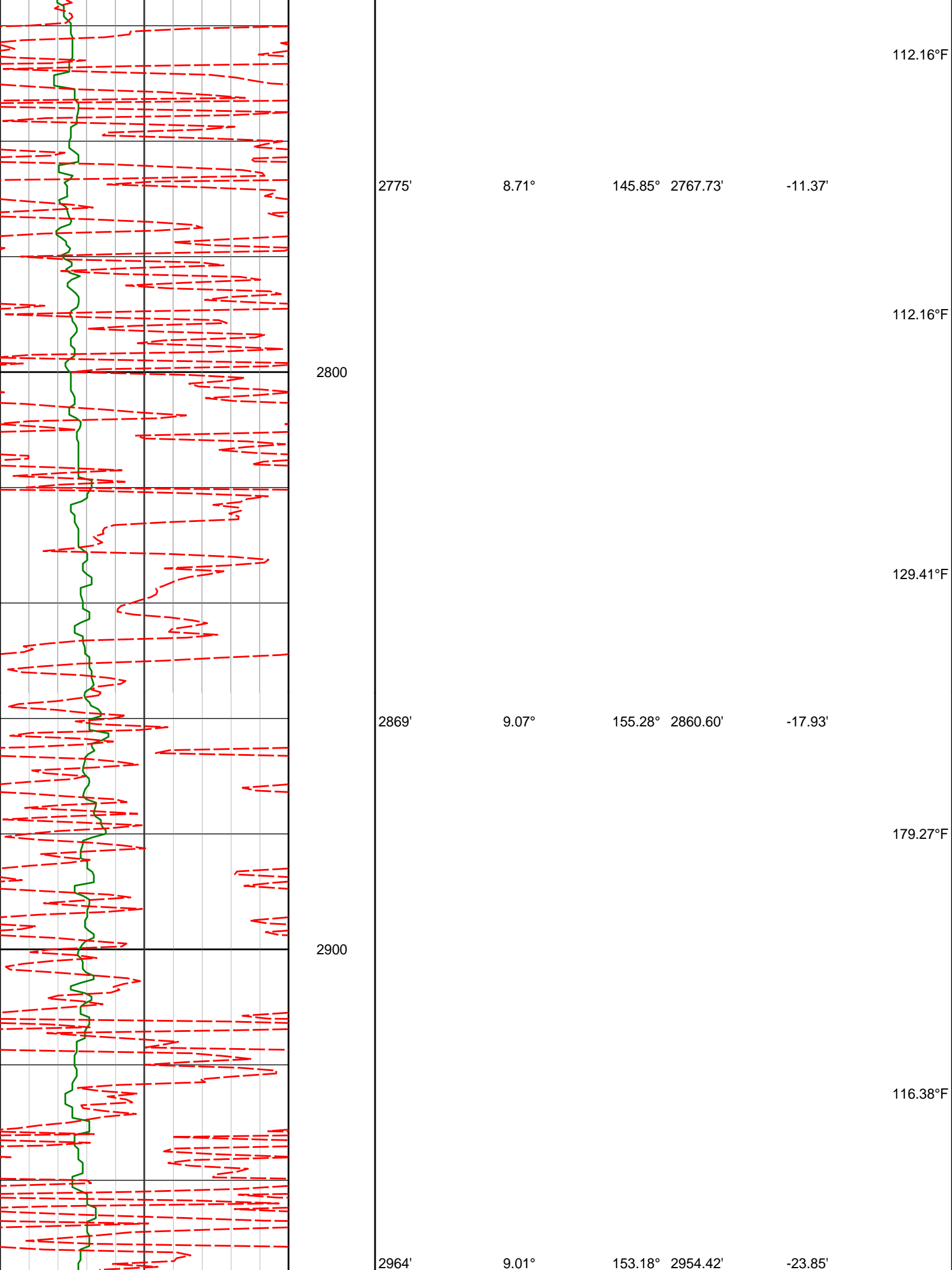
112.16°F

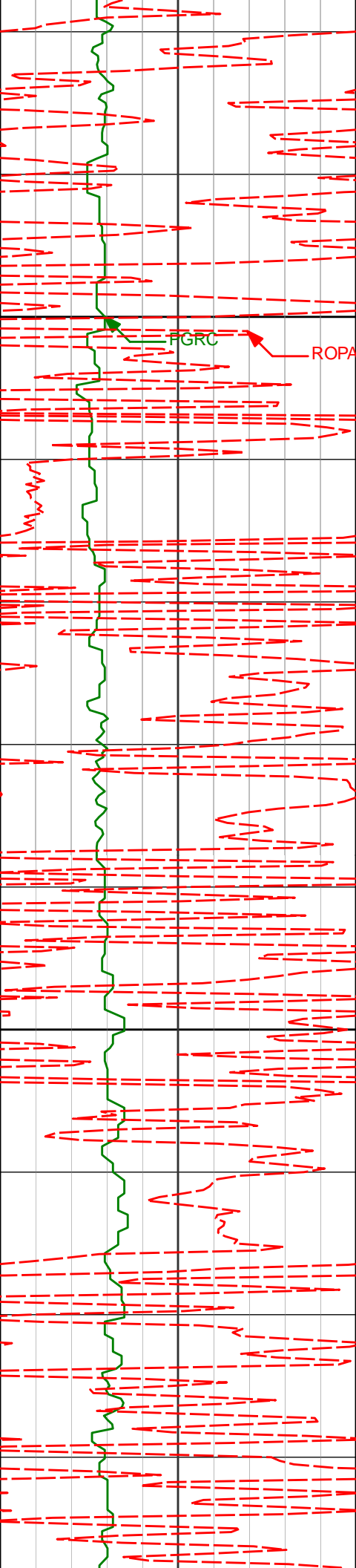
112.16°F

112.16°F

112.16°F

112.16°F





3000

FGRC

ROPA

116.38°F

116.38°F

3058'

8.72°

149.27° 3047.30'

-30.28'

116.38°F

3100

116.38°F

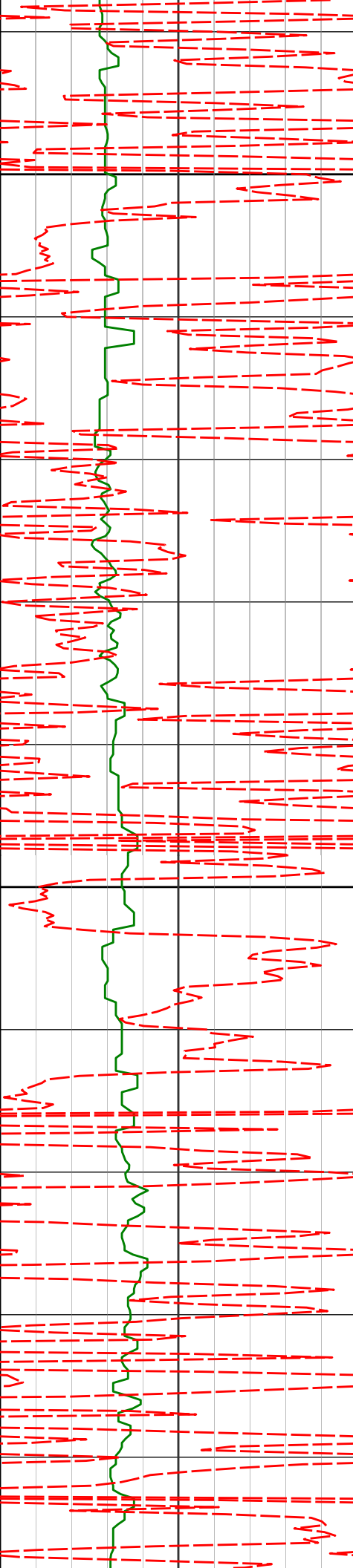
3153'

8.43°

155.96° 3141.24'

-36.26'

116.38°F



3200

3248'

8.56°

152.15°

3235.20'

-41.87'

116.38°F

3300

3342'

7.34°

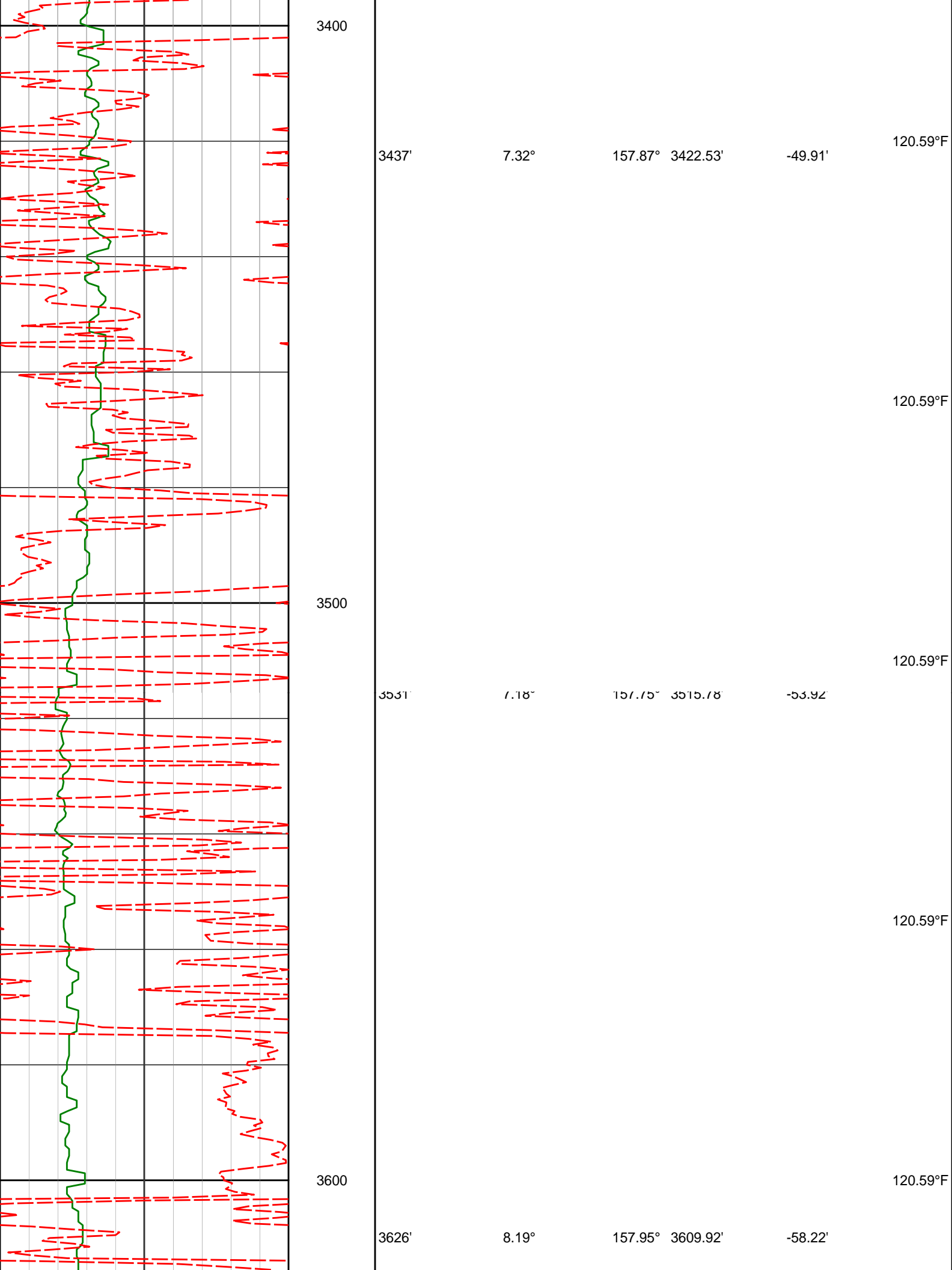
163.26°

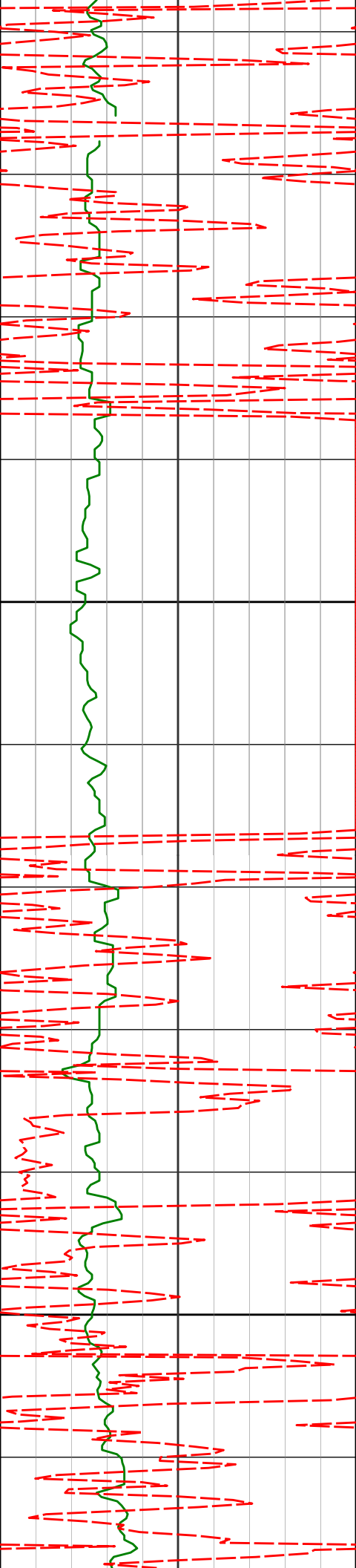
3328.30'

-46.36'

120.59°F

120.59°F





3700

3721'

8.24°

157.42° 3703.95'

-62.84'

3800

3815'

8.04°

156.58° 3797.00'

-67.52'

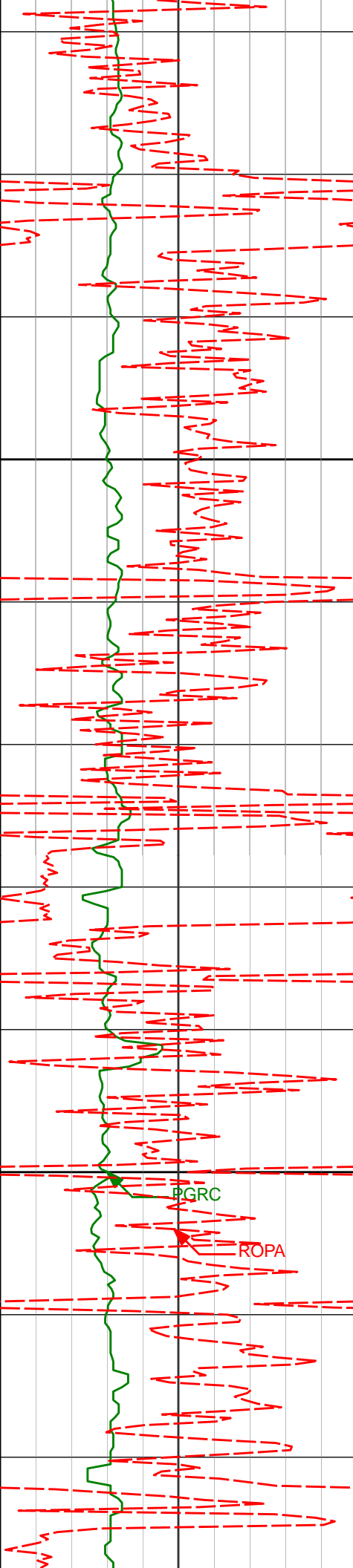
120.59°F

124.81°F

124.81°F

129.03°F

129.03°F



3900

4000

3910'

4004'

7.83°

7.13°

156.38°

157.51°

3891.09'

3984.29'

-72.25'

-76.57'

129.03°F

129.03°F

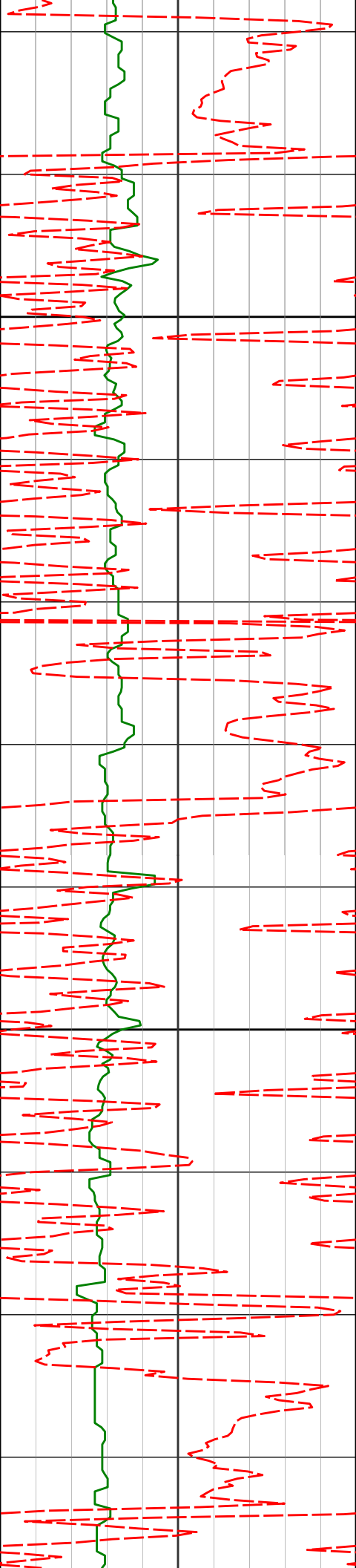
129.03°F

129.03°F

133.25°F

PGRC

ROPA



4099'

4.89°

157.63° 4078.76'

-79.97'

4100

133.25°F

4194'

3.00°

152.71° 4173.53'

-82.40'

4200

137.47°F

137.47°F

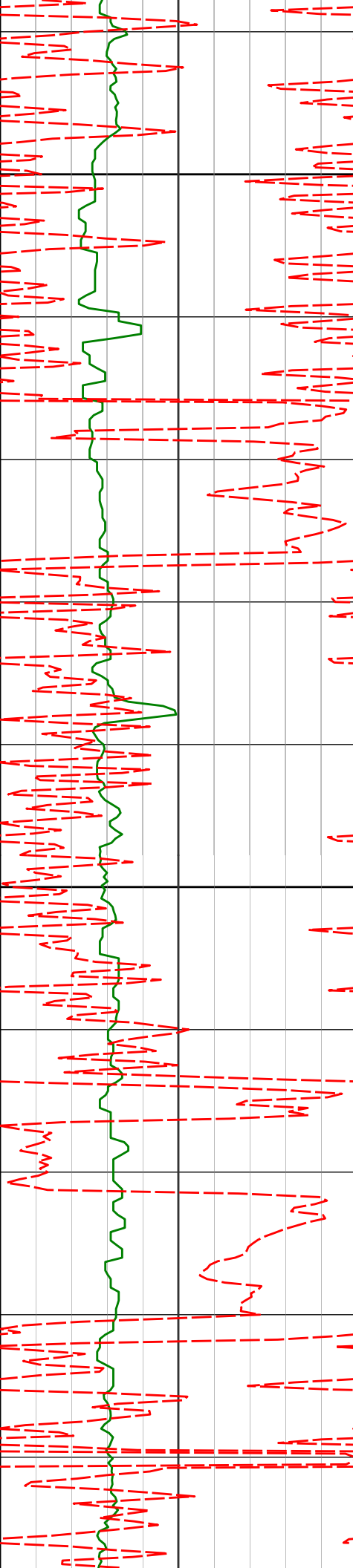
4288'

2.85°

106.68° 4267.42'

-85.65'

137.47°F



4300

4383'

2.53°

76.67° 4362.32'

-89.94'

137.47°F

4400

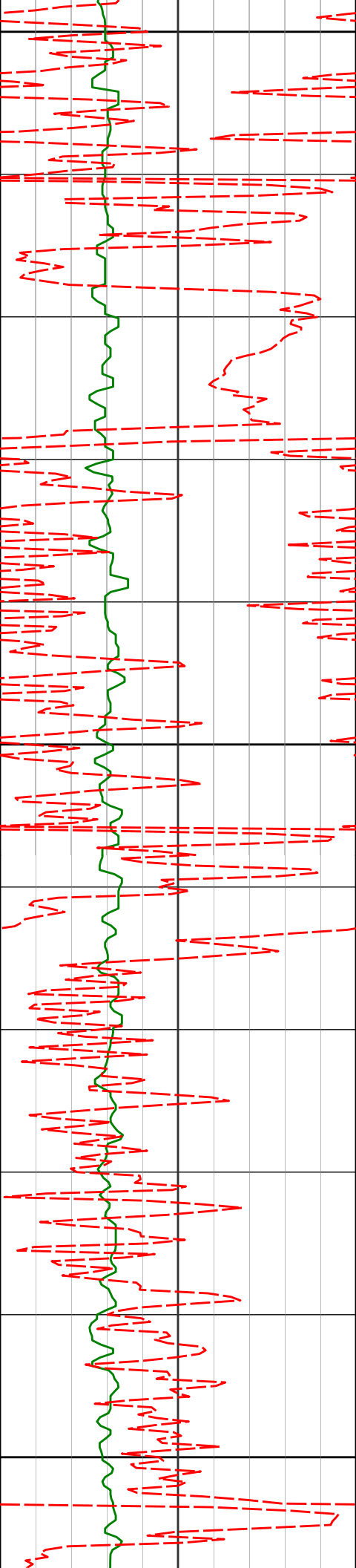
4478'

2.71°

26.86° 4457.23'

-93.10'

141.69°F



4500

141.69°F

4572'

0.78°

300.41° 4551.20'

-93.64'

141.69°F

141.69°F

4600

145.91°F

4667'

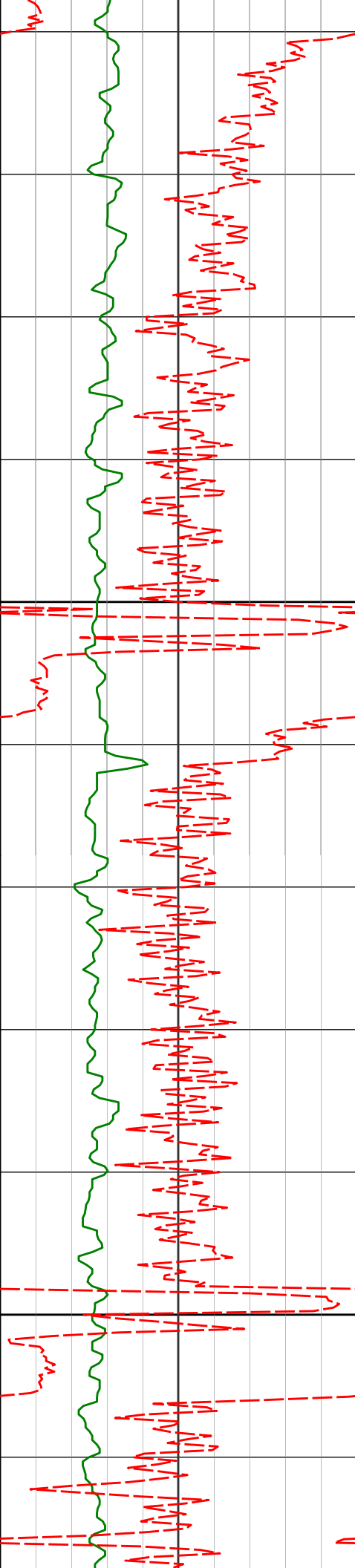
0.97°

251.42° 4646.19'

-92.33'

145.91°F

4700



4800

4900

4762'

4857'

4951'

1.05°

1.16°

1.14°

251.62°

255.52°

248.03°

4741.17'

4836.15'

4930.13'

-90.72'

-88.95'

-87.14'

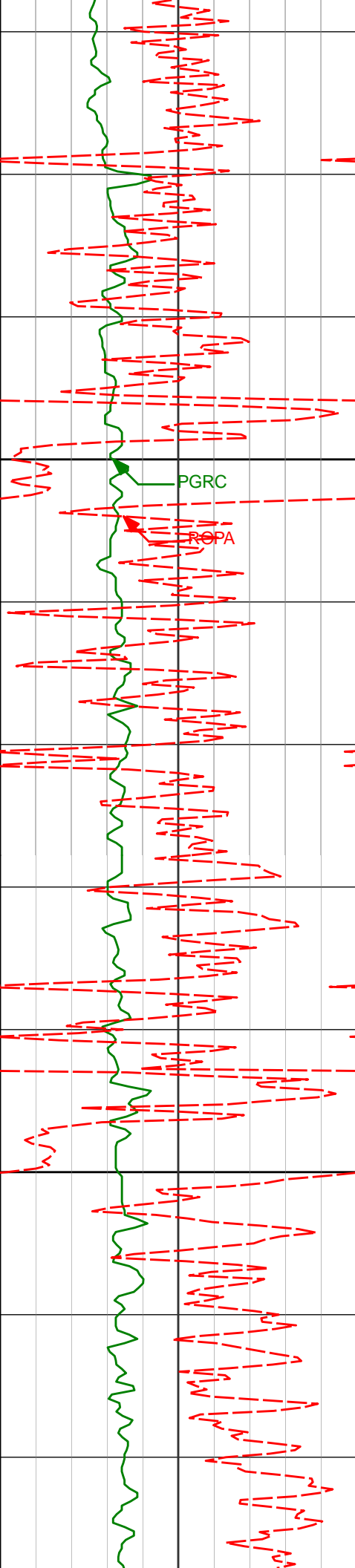
145.91°F

145.91°F

145.91°F

145.91°F

150.13°F



5000

5046'

1.21°

248.44° 5025.11'

-85.30'

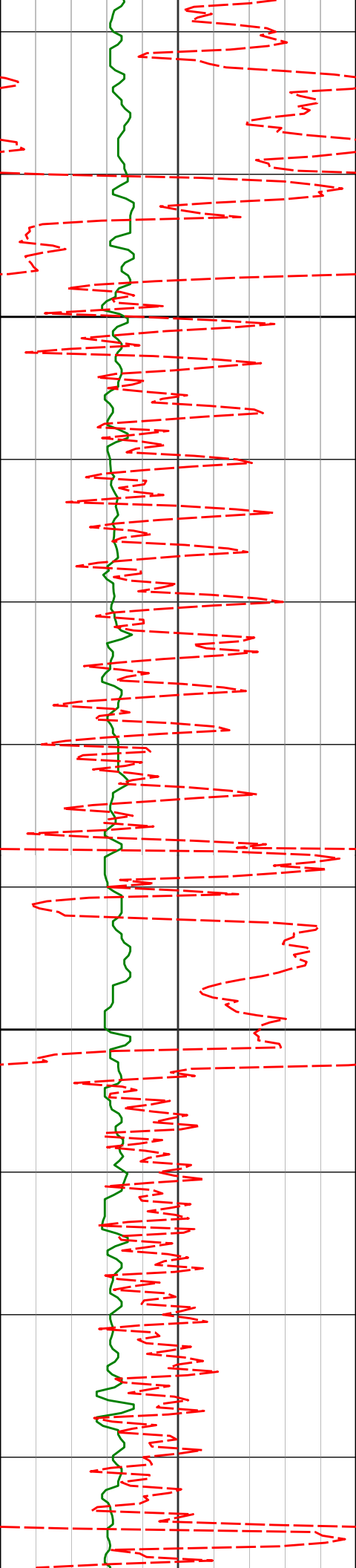
5100

150.13°F

150.13°F

150.13°F

150.13°F



5200

5300

5235'

5330'

1.57°

0.69°

252.96° 5214.06'

153.70° 5309.05'

-80.92'

-79.89'

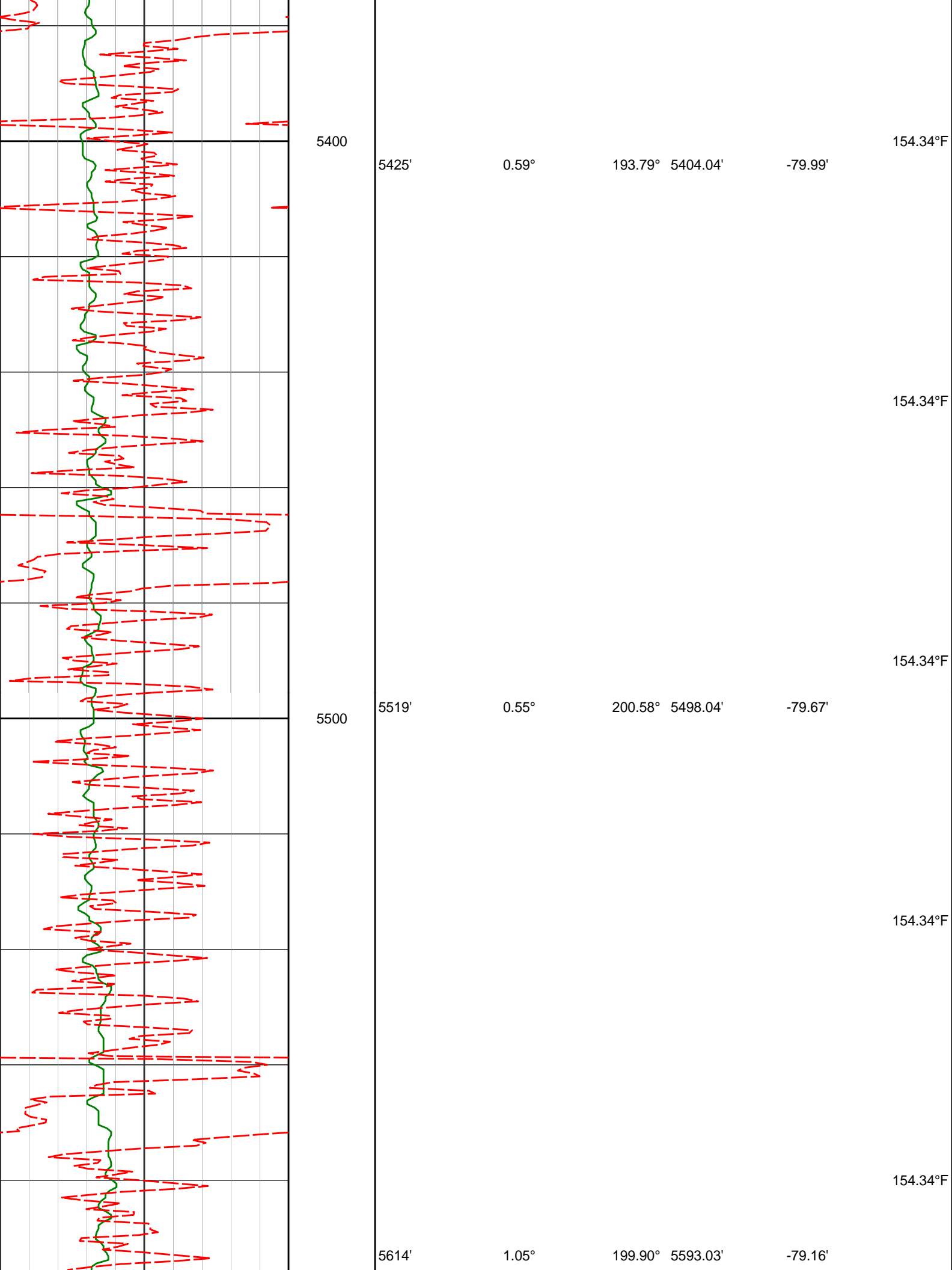
150.13°F

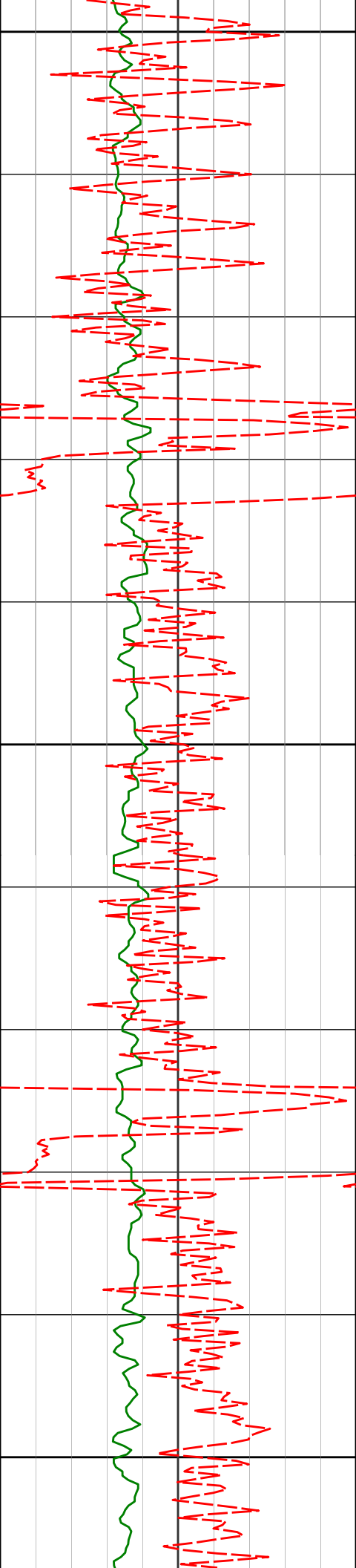
154.34°F

154.34°F

154.34°F

154.34°F





5600

154.34°F

158.56°F

5708'

1.27°

217.50°

5687.01'

-78.17'

5700

158.56°F

162.78°F

5803'

1.73°

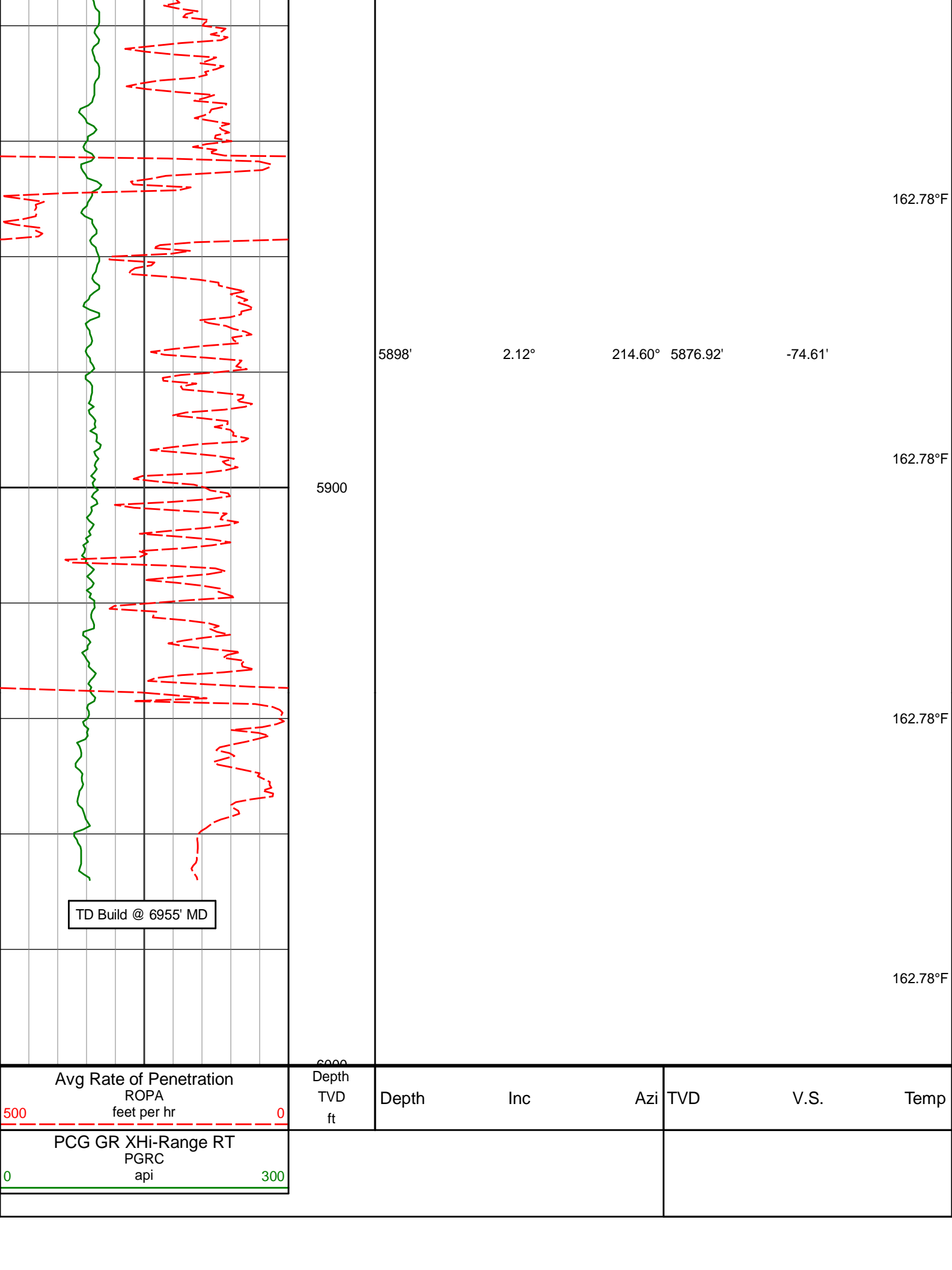
217.12°

5781.97'

-76.58'

5800

162.78°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
70 Ranch State BB18-615
Wattenburg
Weld Colorado
USA
CA-XX-0902500204

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
824.00	0.98	218.94	823.96	5.47 S	4.42 W	4.65	0.12
919.00	1.04	233.63	918.95	6.62 S	5.63 W	5.90	0.28
1014.00	1.14	250.00	1013.93	7.45 S	7.22 W	7.52	0.34
1107.00	1.09	268.58	1106.91	7.79 S	8.97 W	9.29	0.39
1200.00	0.78	274.00	1199.90	7.77 S	10.48 W	10.80	0.34
1293.00	1.15	272.63	1292.89	7.68 S	12.04 W	12.36	0.40
1385.00	1.13	276.63	1384.87	7.54 S	13.87 W	14.17	0.09
1478.00	1.09	275.01	1477.85	7.35 S	15.67 W	15.96	0.05
1572.00	1.26	287.34	1571.83	6.97 S	17.54 W	17.82	0.32
1662.00	0.96	276.49	1661.81	6.59 S	19.24 W	19.50	0.40
1755.00	1.13	304.57	1754.80	5.98 S	20.77 W	21.00	0.57
1849.00	0.86	306.05	1848.78	5.04 S	22.10 W	22.29	0.29
1942.00	1.01	293.73	1941.77	4.30 S	23.41 W	23.57	0.27
2034.00	1.95	201.61	2033.75	5.43 S	24.73 W	24.94	2.42
2126.00	5.46	166.94	2125.55	11.15 S	24.32 W	24.76	4.36
2219.00	7.85	162.28	2217.92	21.51 S	21.38 W	22.27	2.63
2312.00	7.74	156.91	2310.06	33.32 S	16.99 W	18.37	0.79
2405.00	8.97	158.44	2402.07	45.83 S	11.87 W	13.78	1.34
2497.00	9.07	152.54	2492.94	58.93 S	5.89 W	8.35	1.01
2589.00	8.71	151.22	2583.83	71.47 S	0.80 E	2.19	0.45
2682.00	8.54	148.42	2675.78	83.52 S	7.81 E	-4.30	0.49
2775.00	8.71	145.85	2767.73	95.23 S	15.38 E	-11.37	0.45
2869.00	9.07	155.28	2860.60	107.85 S	22.47 E	-17.93	1.59
2964.00	9.01	153.18	2954.42	121.29 S	28.96 E	-23.85	0.35
3058.00	8.72	149.27	3047.30	133.99 S	35.92 E	-30.28	0.71
3153.00	8.43	155.96	3141.24	146.54 S	42.44 E	-36.26	1.09
3248.00	8.56	152.15	3235.20	159.14 S	48.57 E	-41.87	0.61
3342.00	7.34	163.26	3328.30	171.08 S	53.57 E	-46.36	2.08
3437.00	7.32	157.87	3422.53	182.50 S	57.60 E	-49.91	0.72
3531.00	7.18	157.75	3515.78	193.48 S	62.08 E	-53.92	0.15
3626.00	8.19	157.95	3609.92	205.25 S	66.87 E	-58.22	1.07
3721.00	8.24	157.42	3703.95	217.81 S	72.02 E	-62.84	0.09
3815.00	8.04	156.58	3797.00	230.06 S	77.22 E	-67.52	0.24
3910.00	7.83	156.38	3891.09	242.09 S	82.46 E	-72.25	0.23
4004.00	7.13	157.51	3984.29	253.35 S	87.25 E	-76.57	0.76
4099.00	4.89	157.63	4078.76	262.53 S	91.05 E	-79.97	2.36
4194.00	3.00	152.71	4173.53	268.49 S	93.73 E	-82.40	2.01
4288.00	2.85	106.68	4267.42	271.34 S	97.10 E	-85.65	2.44
4383.00	2.53	76.67	4362.32	271.54 S	101.40 E	-89.94	1.50
4478.00	2.71	26.86	4457.23	269.05 S	104.46 E	-93.10	2.33
4572.00	0.78	300.41	4451.20	266.74 S	104.90 E	-93.64	2.95
4667.00	0.97	251.42	4646.19	266.67 S	103.58 E	-92.33	0.78
4762.00	1.05	251.62	4741.17	267.20 S	102.00 E	-90.72	0.09
4857.00	1.16	255.52	4836.15	267.71 S	100.25 E	-88.95	0.14
4951.00	1.14	248.03	4930.13	268.30 S	98.46 E	-87.14	0.16
5046.00	1.21	248.44	5025.11	269.02 S	96.65 E	-85.30	0.07
5235.00	1.57	252.96	5214.06	270.51 S	92.33 E	-80.92	0.20
5330.00	0.69	153.70	5309.05	271.41 S	91.34 E	-79.89	1.91
5425.00	0.59	193.79	5404.04	272.41 S	91.47 E	-79.99	0.48
5519.00	0.55	200.58	5498.04	273.31 S	91.20 E	-79.67	0.08
5614.00	1.05	199.90	5593.03	274.56 S	90.74 E	-79.16	0.53
5708.00	1.27	217.50	5687.01	276.19 S	89.81 E	-78.17	0.44
5803.00	1.73	217.12	5781.97	278.17 S	88.31 E	-76.58	0.49
5898.00	2.12	214.60	5876.92	280.76 S	86.44 E	-74.61	0.42
5992.00	5.93	266.89	5970.69	282.46 S	80.60 E	-68.70	5.24

6087.00	18.12	277.61	6063.44	280.77 S	60.98 E	-49.17	12.99
6181.00	23.29	275.61	6151.34	277.01 S	27.97 E	-16.35	5.55
6276.00	30.20	267.40	6236.15	276.26 S	14.65 W	26.21	8.23
6370.00	36.18	265.79	6314.79	279.38 S	65.99 W	77.63	6.42
6465.00	44.06	266.89	6387.38	283.23 S	127.03 W	138.78	8.34
6559.00	50.84	271.19	6450.92	284.25 S	196.21 W	207.94	7.96
6654.00	63.73	271.47	6502.15	282.38 S	275.95 W	287.53	13.57
6748.00	74.85	271.26	6535.34	280.29 S	363.71 W	375.13	11.83
6843.00	81.84	269.17	6554.52	279.96 S	456.69 W	468.01	7.67
6890.00	83.15	266.73	6560.66	281.63 S	503.25 W	514.60	5.84

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 267.60 DEGREES (GRID)
A TOTAL CORRECTION OF 7.71 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6890.00 FEET
IS 576.70 FEET ALONG 240.77 DEGREES (GRID)**

Final survey is a straight line projection to TD.