

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100				
Date run completed	18-Feb-20				
Rig Bit Number	1				
Bit Size (in)	8.500				
Tool Nominal OD (in)	6.500				
Log Start Depth (MD, ft)	1,616.00				
Log End Depth (MD, ft)	14,476.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	16-Feb-20 11:00				
Drill/Wipe End Date and Time	18-Feb-20 00:16				
Min Inc (deg) @ Depth (MD, ft)	0.00 @ 0.00				
Max Inc (deg) @ Depth (MD, ft)	92.35 @ 11,970.00				
Bit TFA(in2) / Bit Type	0.61 / PDC				
Flow Rate (gpm)	650.00				
Max AV (fpm) / CV (fpm) @ MWD	577.7 / 577.7				
Fluid Type	Diesel Mud Base				
Density (ppg) / Viscosity (spqt)	9.90 / 56.00				
Filtrate CL (ppm)	52,000.00				
pH / API Filtrate (mptm)	N/A / 21				
PV (cP) / YP (lbf2)	18 / 9.00				
% Solids / % Sand	11.50 / 0.02				
% Oil / Oil:Water Ratio	68.00 / 77:23				
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 Temp (degF) @ Depth (MD, ft)	257.22 @ 5447.00				

Max Tool Temp (degF) / Source	257.00 / EMT				
Rm @ Max Tool Temp (degF)	N/A @ 257.00				
Lead MWD Engineer	Jonathan Davis				
Customer Representative	Manny Parra				

SENSOR INFORMATION

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	53.00				
Software Version	6.43				
Sub Serial Number	12149266				
Sonde Serial Number	11833218				
Sensor ID Number	N/A				
Toolface Offset (deg)	123.86				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	46.47				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	12149266				
Insert/Sonde Serial Number	11579760				

Electro Magnetic Downhole Terminal Unit Sensor Information

Tool Type	EMT-DTU				
Distance From PWD To Bit (ft)	N/A				
Hardware Type	EMT Sonde				
Electronics Hardware Rev	Phase 3.0				
Software Version	4.48				
Telemetry Type	Carrier Wave				

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (Tool memory data) unless otherwise stated.
4. EMT was used on Run 100.
5. Environmental parameters used to process gamma ray are as follows:
Hole Size: 8.50 in.
Mud weight: 9.6 - 10 ppm
6. The following smoothing parameters have been applied to the data:
Main Log 1:240 (5"):
ROPA: 0.5 ft interval, 1.2 ft coercion distance, 3.0 ft gap fill
PGRC: 0.5 ft interval, 0.6 ft coercion distance, 3.0 ft gap fill
7. Gaps in gamma are due to high ROP.
8. Gap in gamma from 3869' MD to 3910' MD and ROP from 3923' MD to 3954' MD due to 3rd party depth tracking.
9. Gap in gamma from 4023' MD to 4057' MD due to loss of

signal with EM tool.

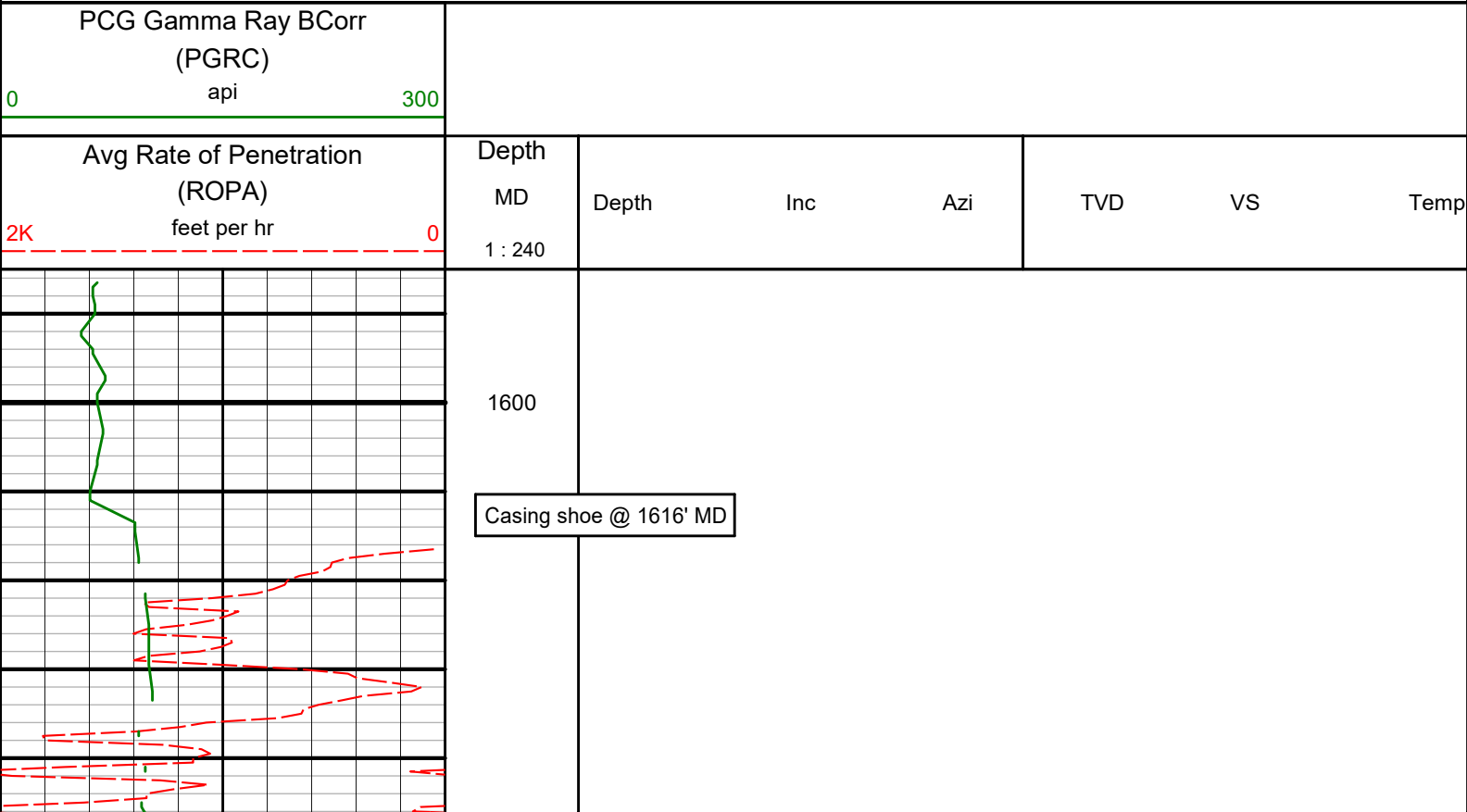
10. Insite version 9.2.0

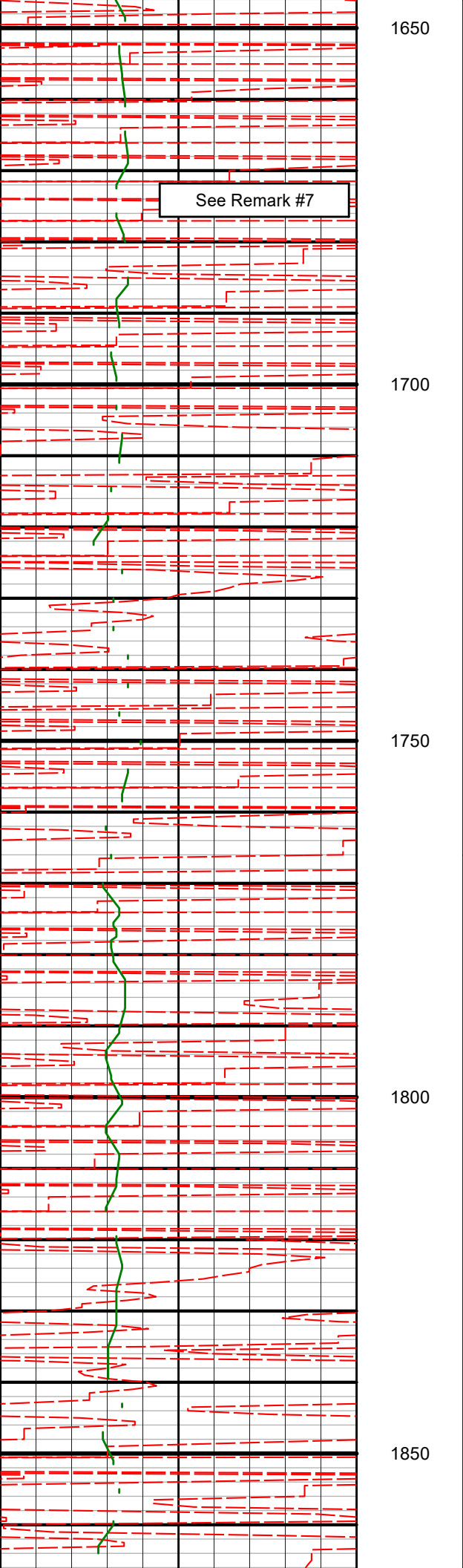
WARRANTY

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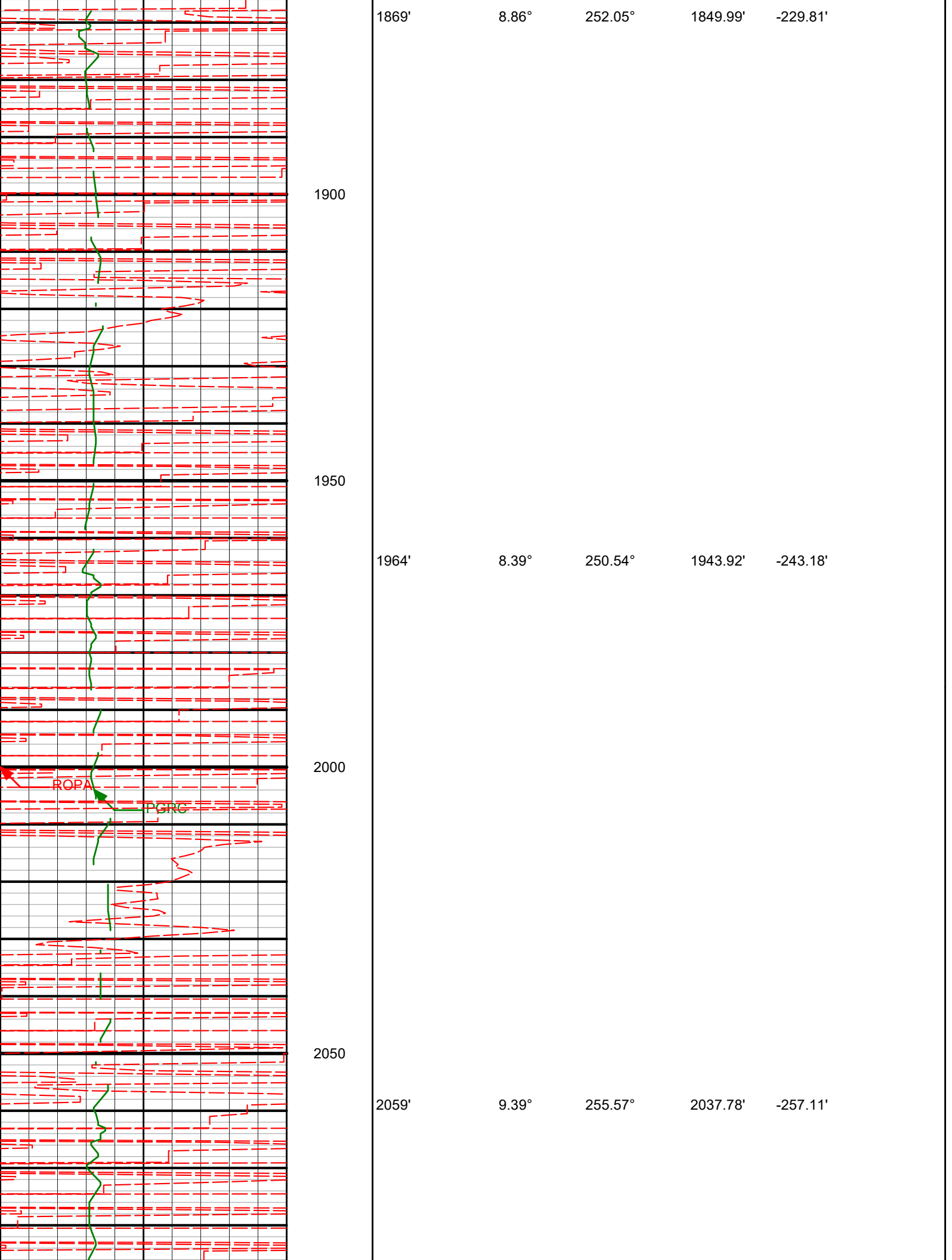
1:240 Main Log

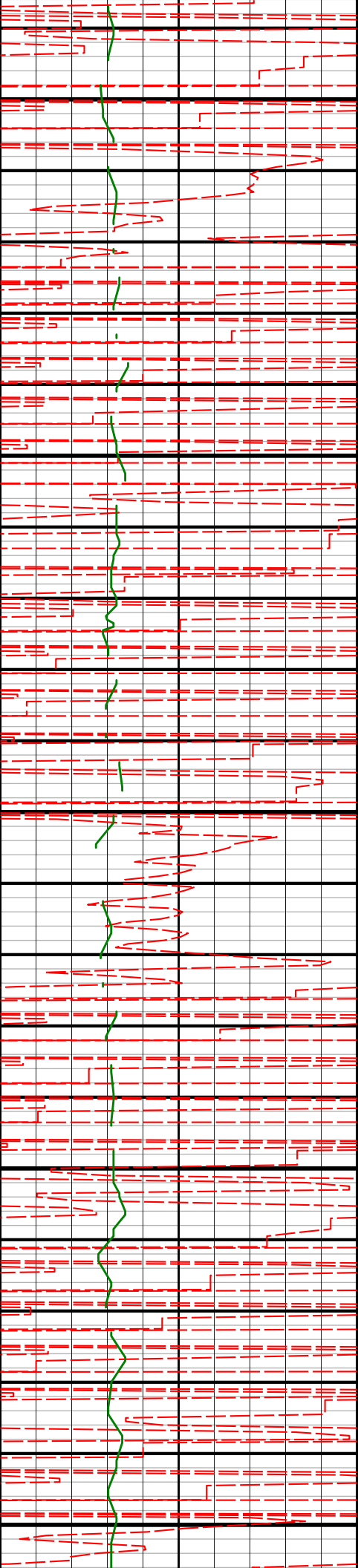




9.11° 254.42° 1661.33' -201.51'

8.97° 253.29° 1755.15' -215.73'





2100

2150

2200

2250

2300

2155'

9.10°

255.40°

2132.53'

-271.93'

2250'

10.03°

259.19°

2226.21'

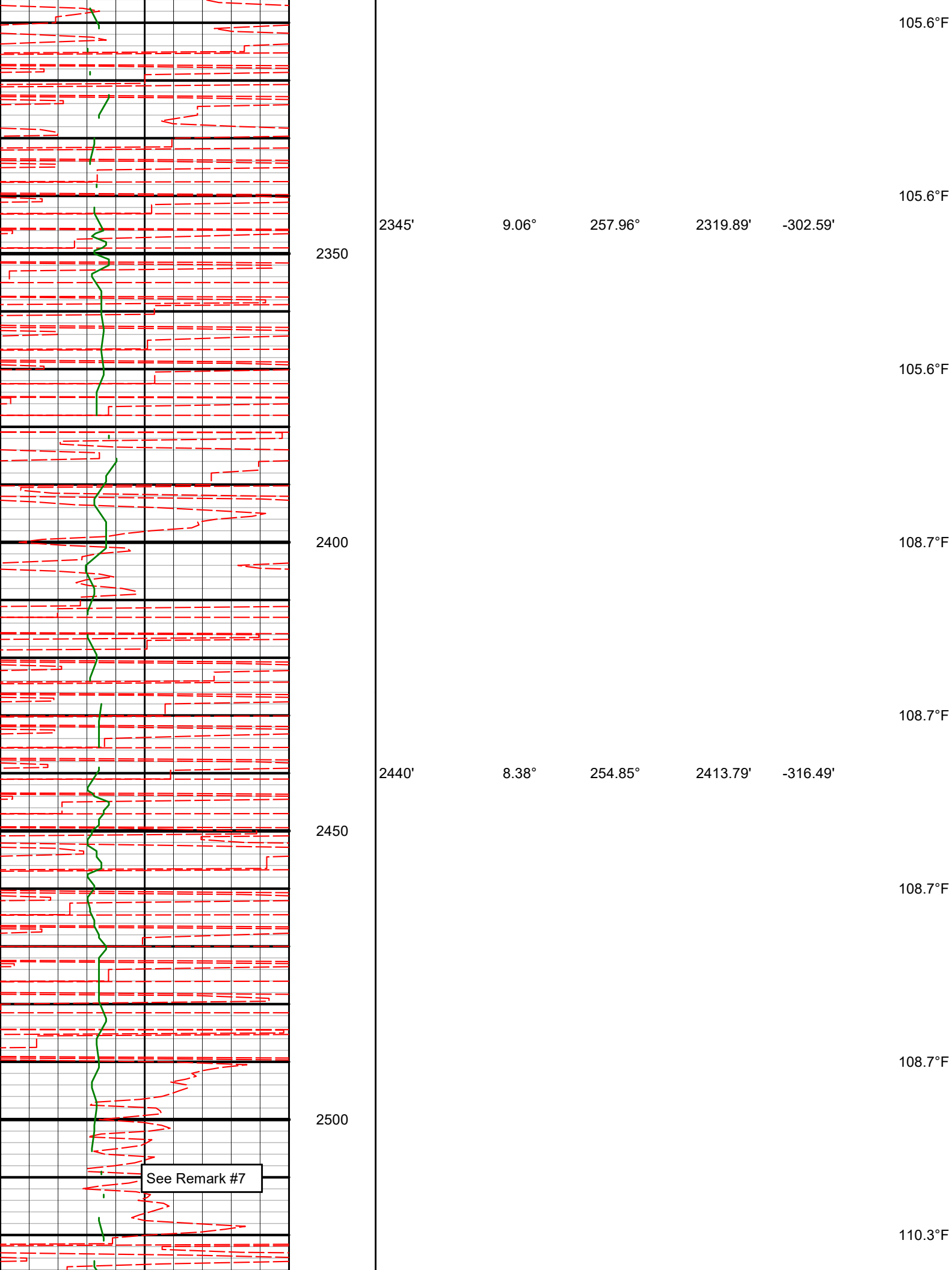
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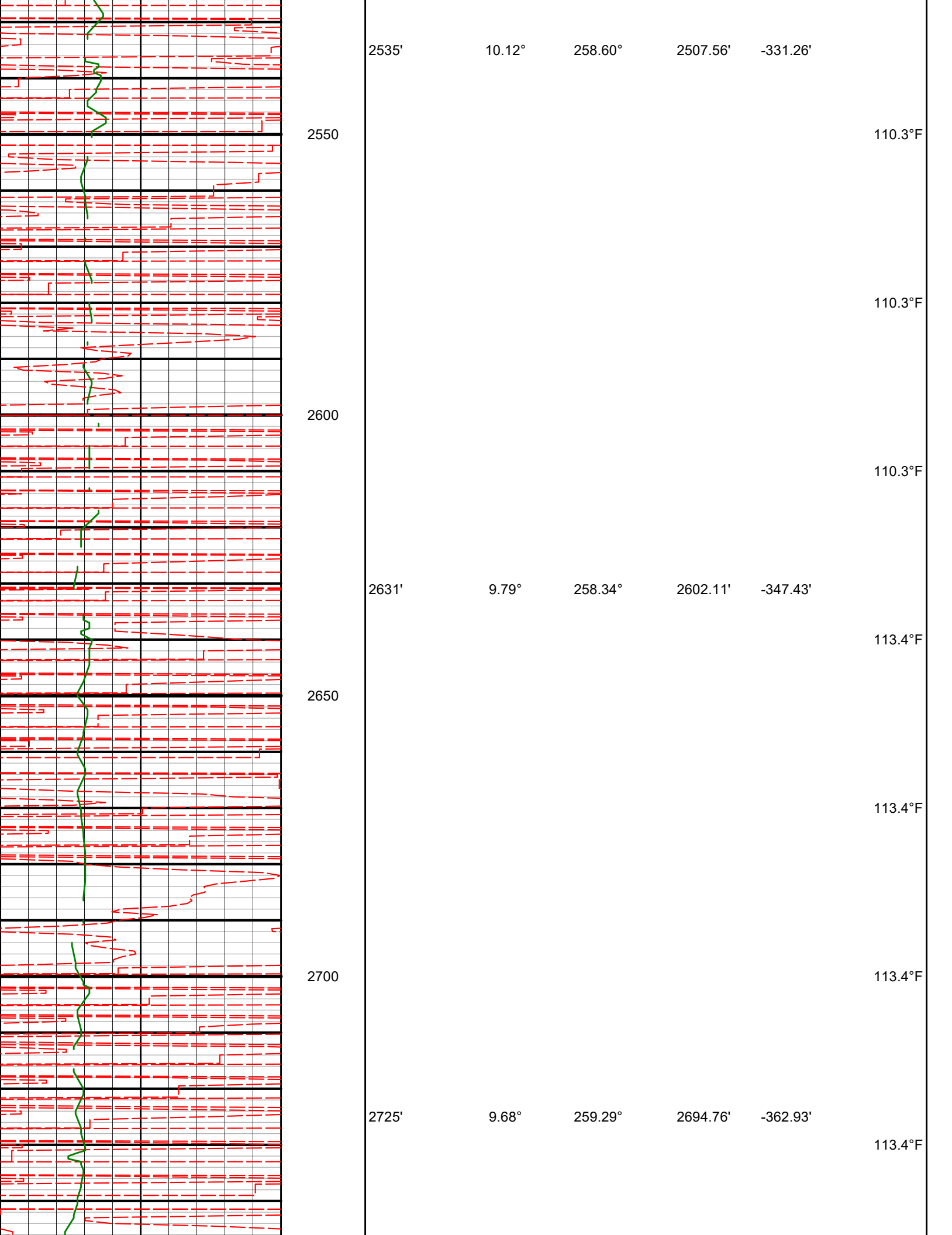
104.0°F

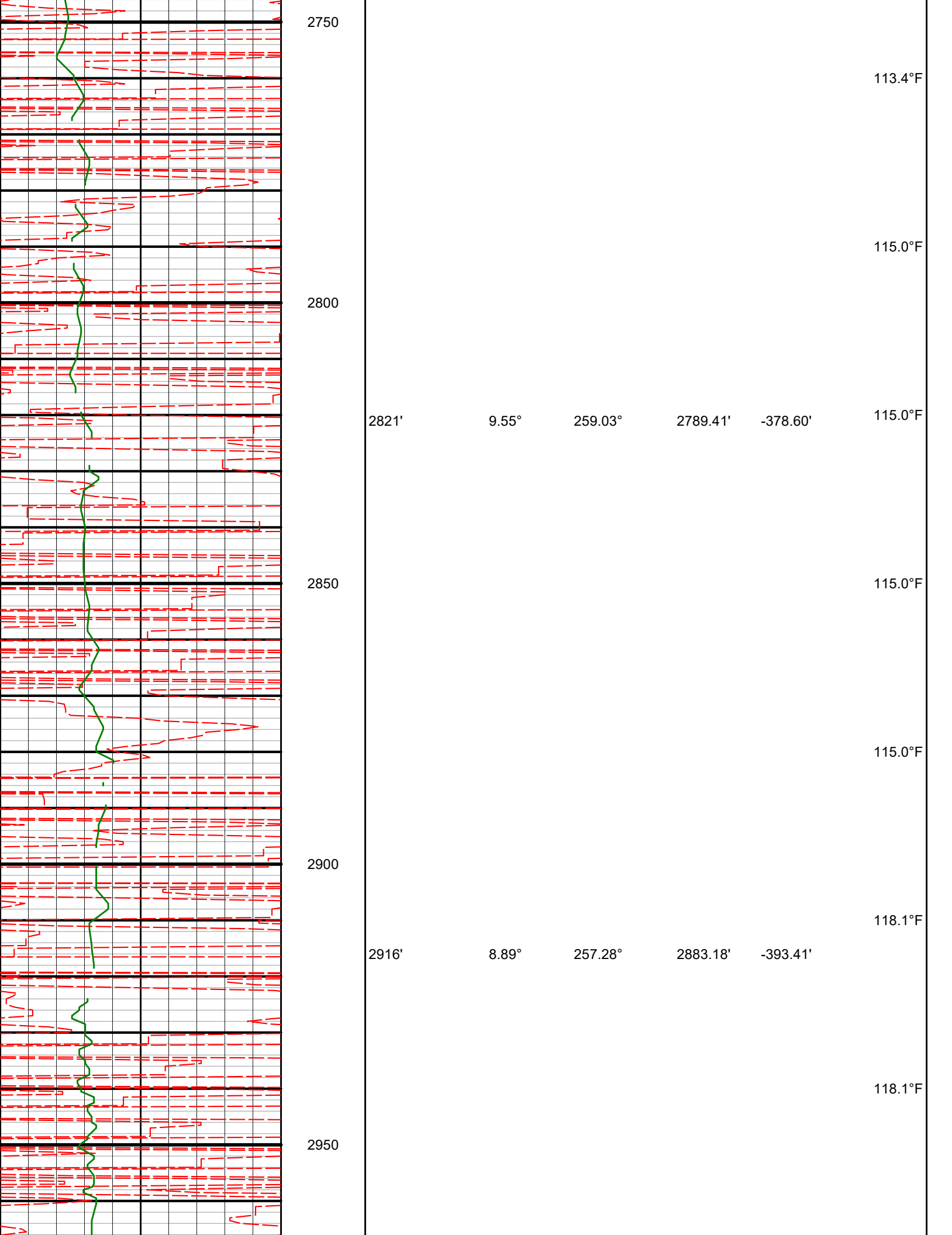
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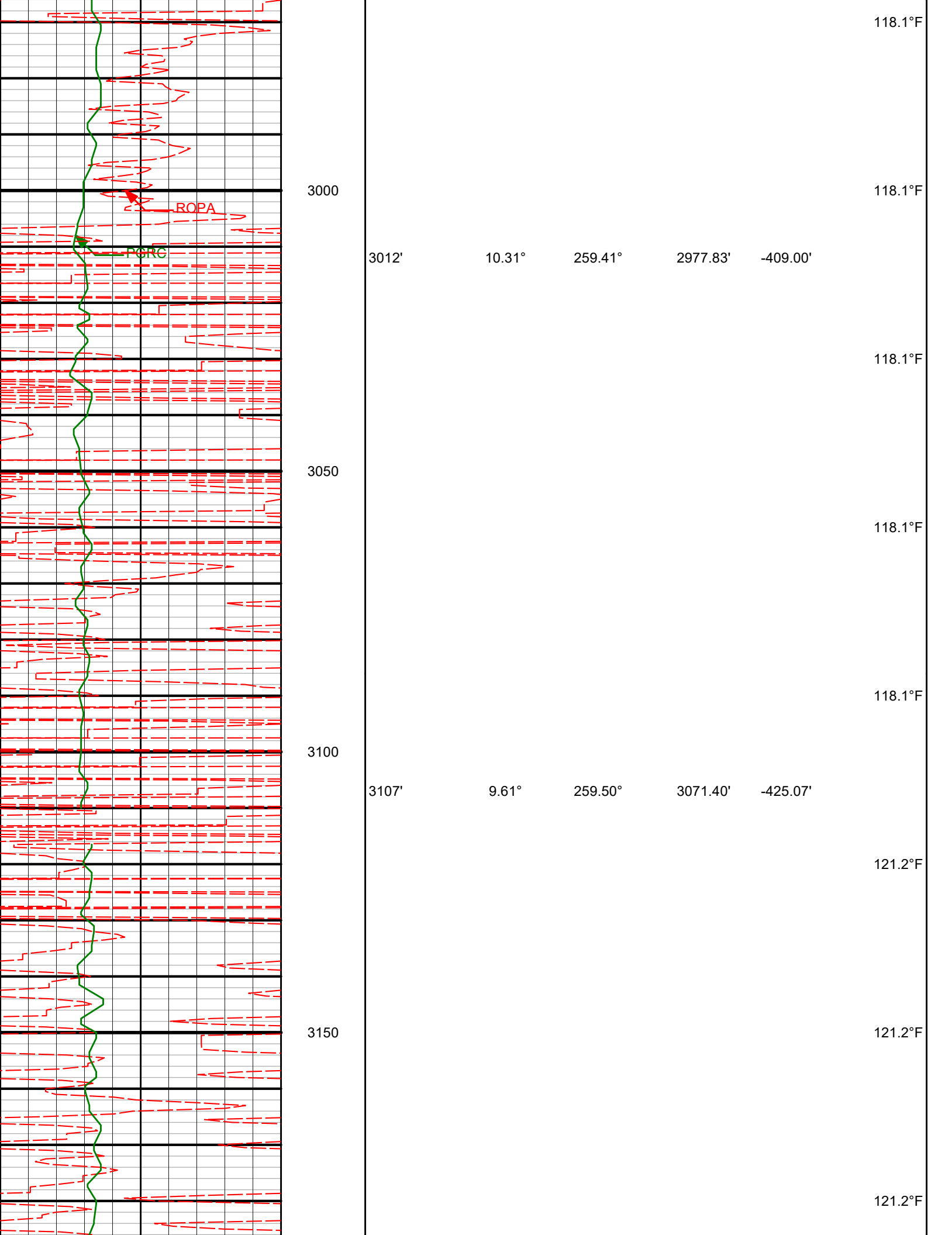
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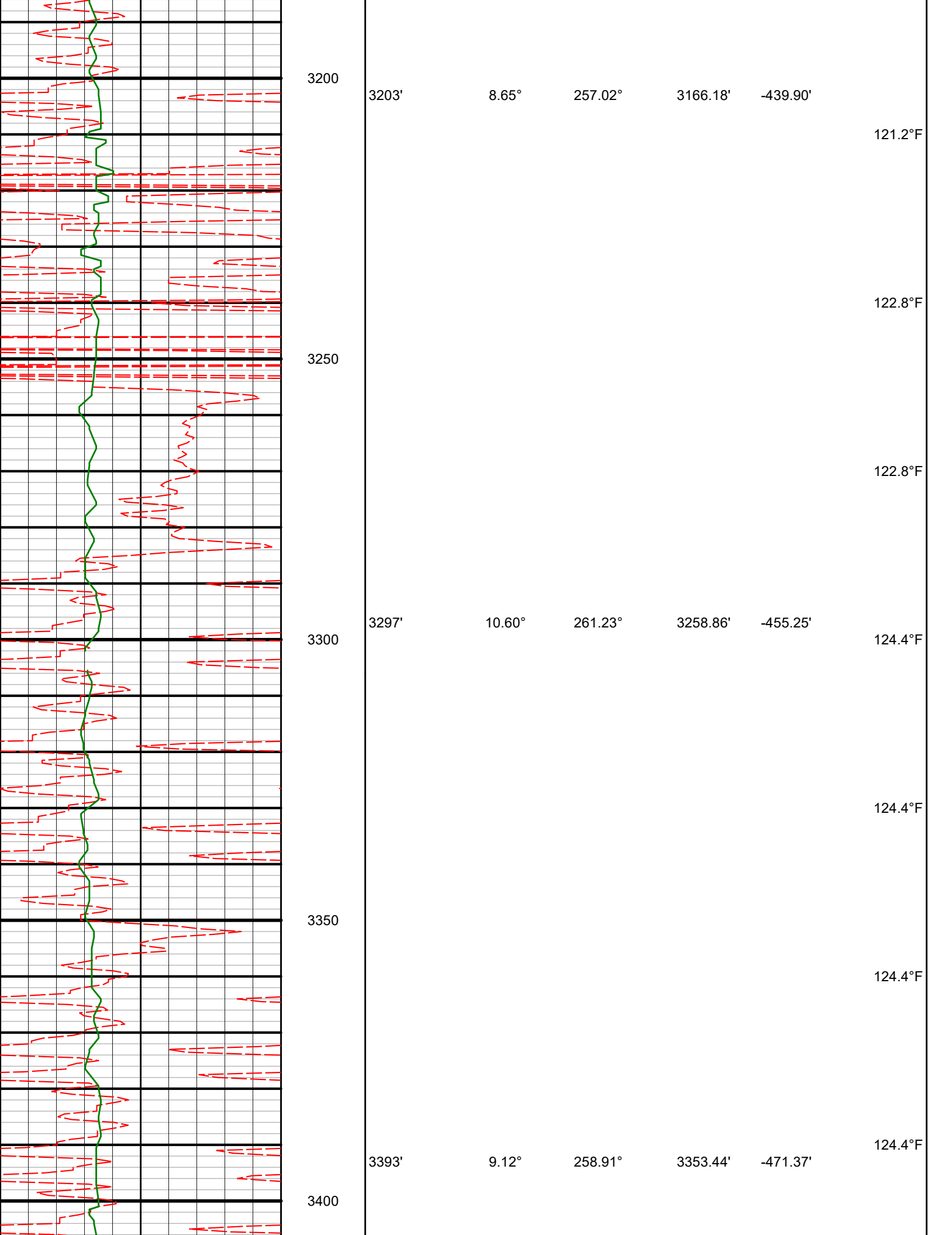
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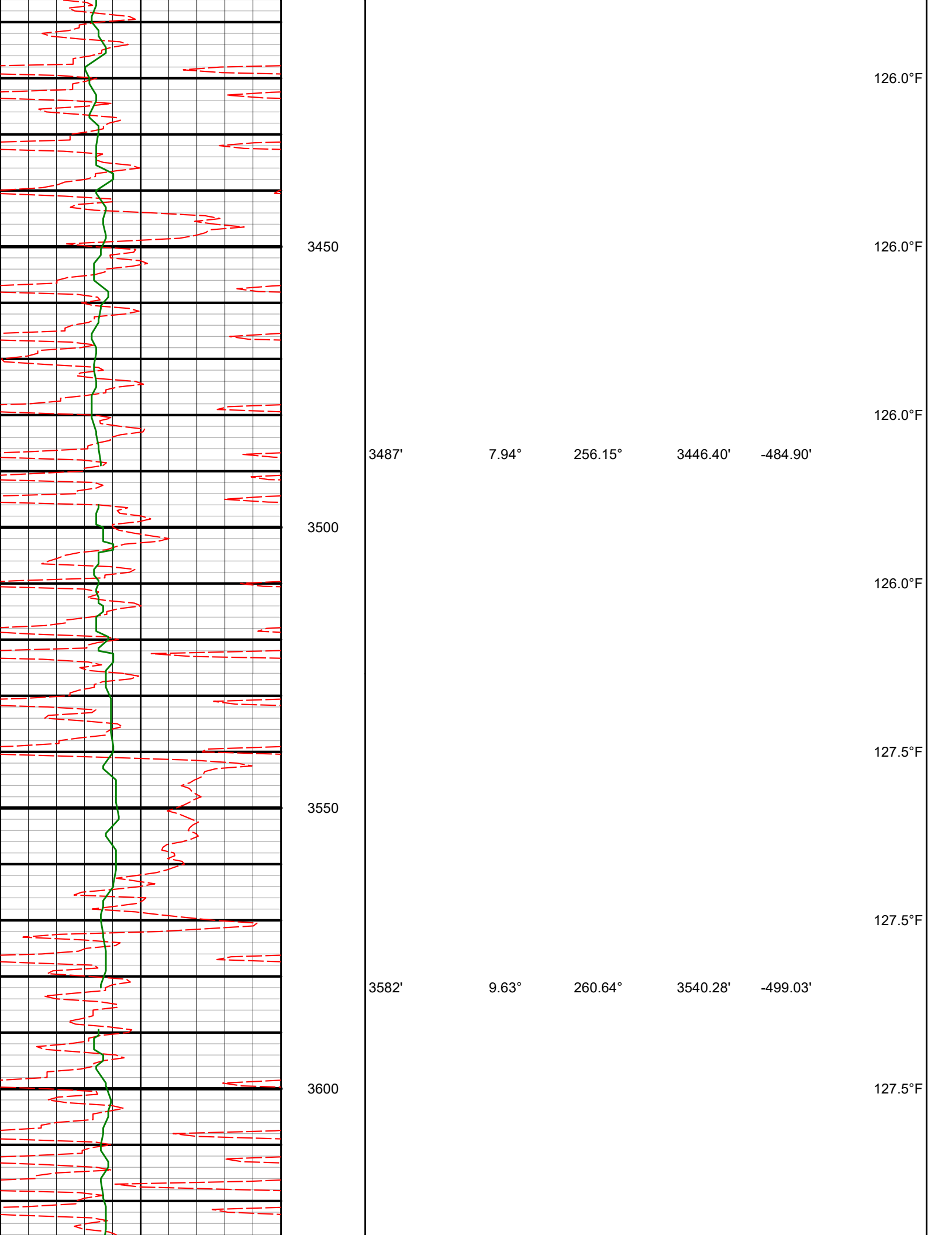


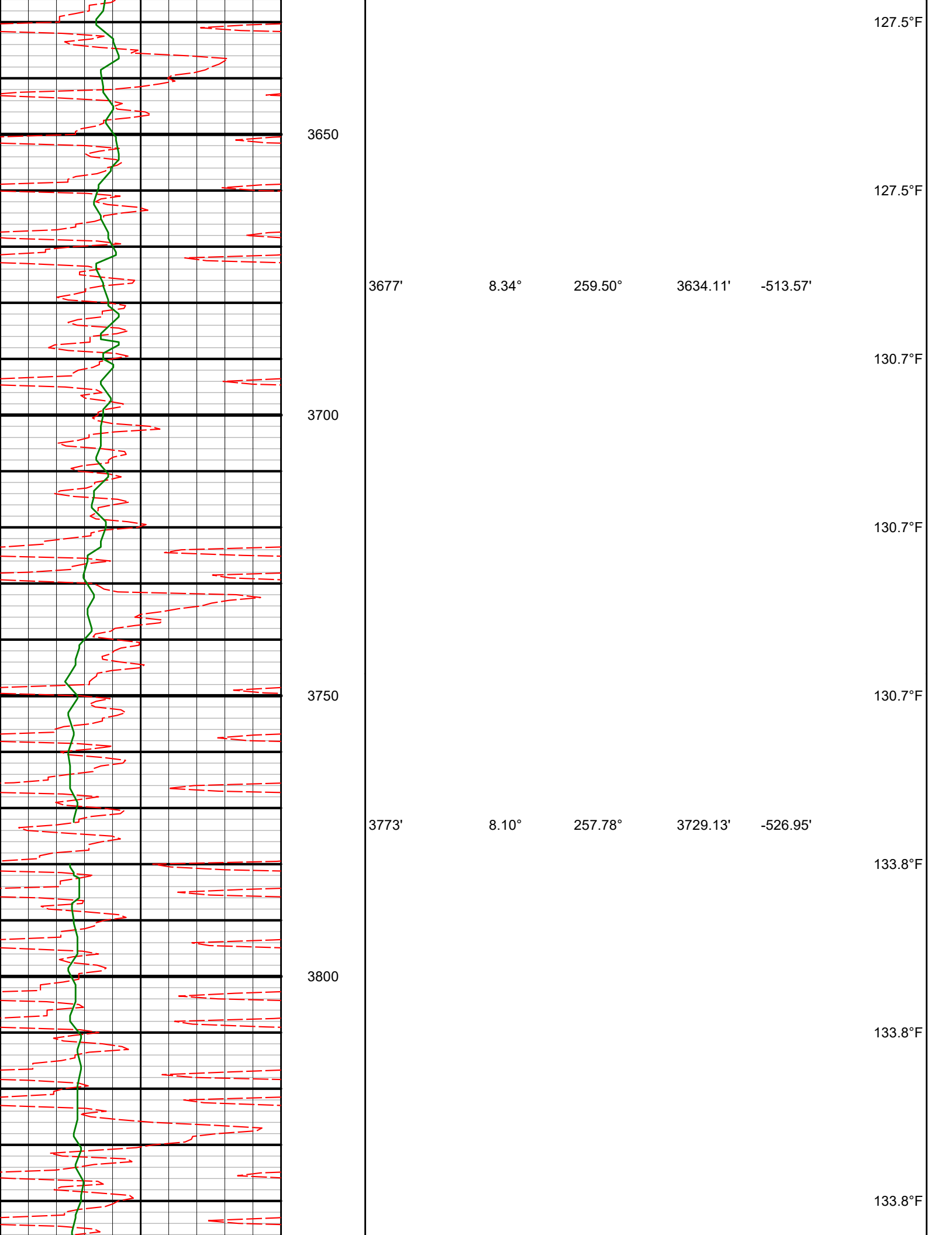


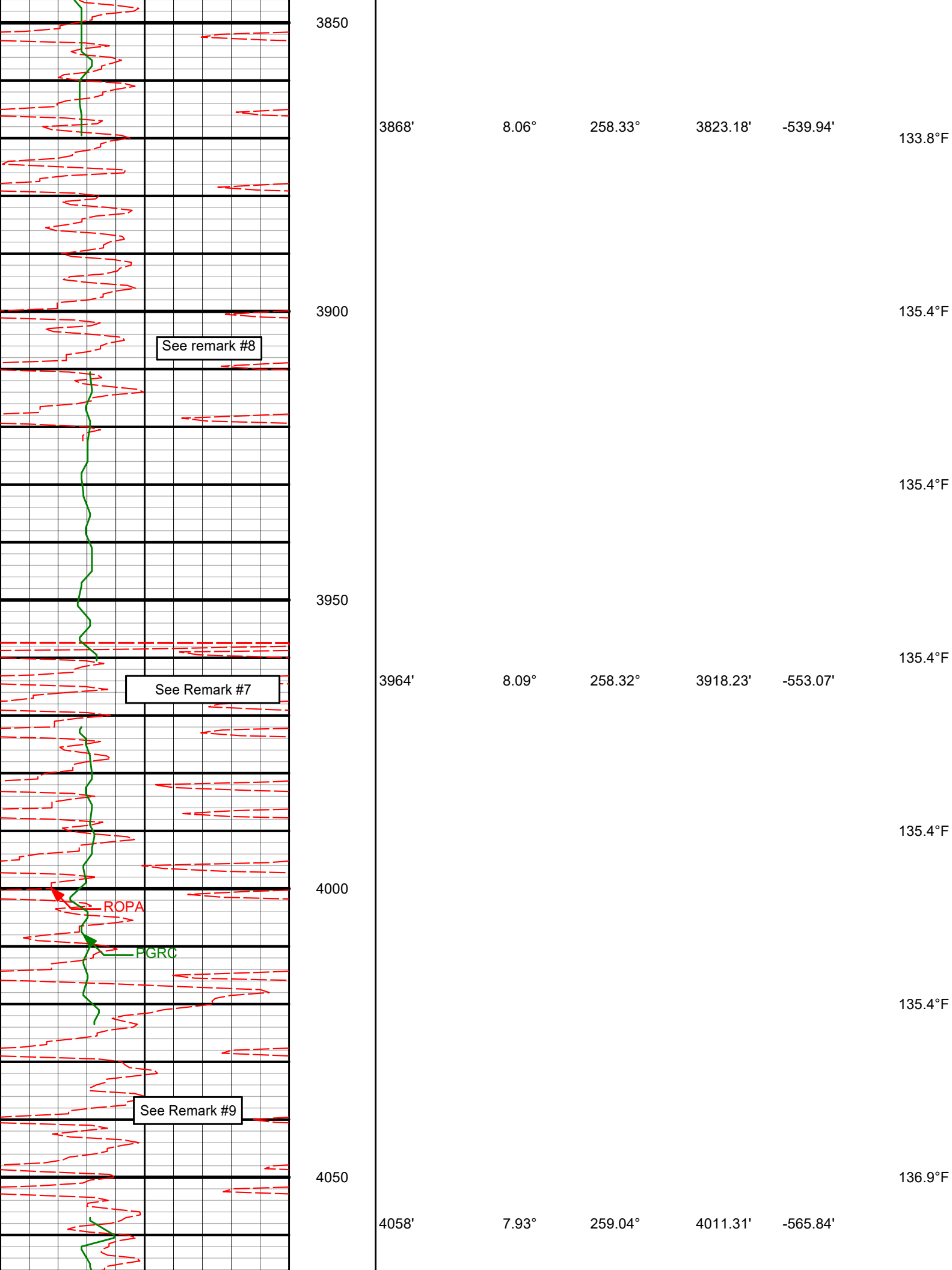


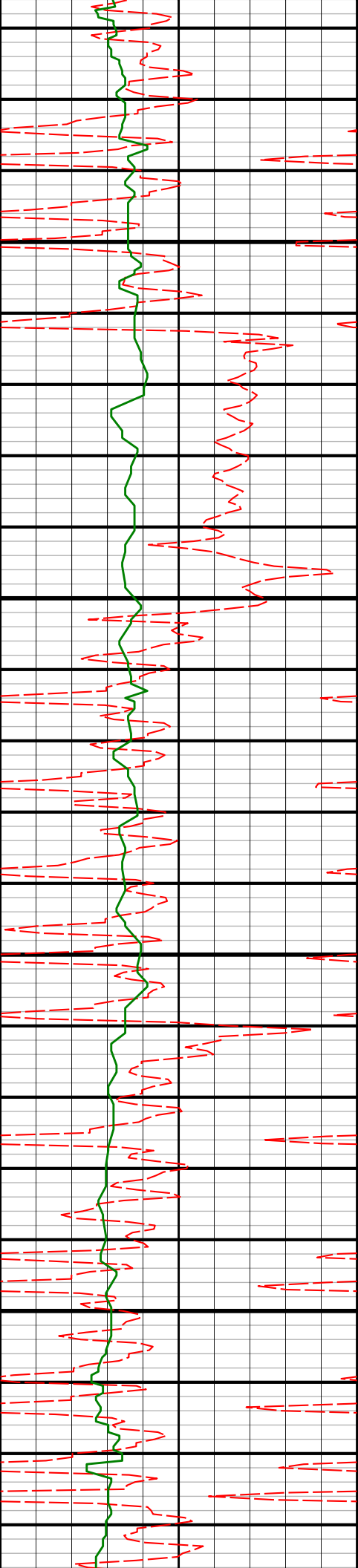












4100

4150

4200

4250

4154'

4248'

10.06°

8.70°

263.28°

265.31°

4106.13'

4198.87'

-580.61'

-595.80'

136.9°F

136.9°F

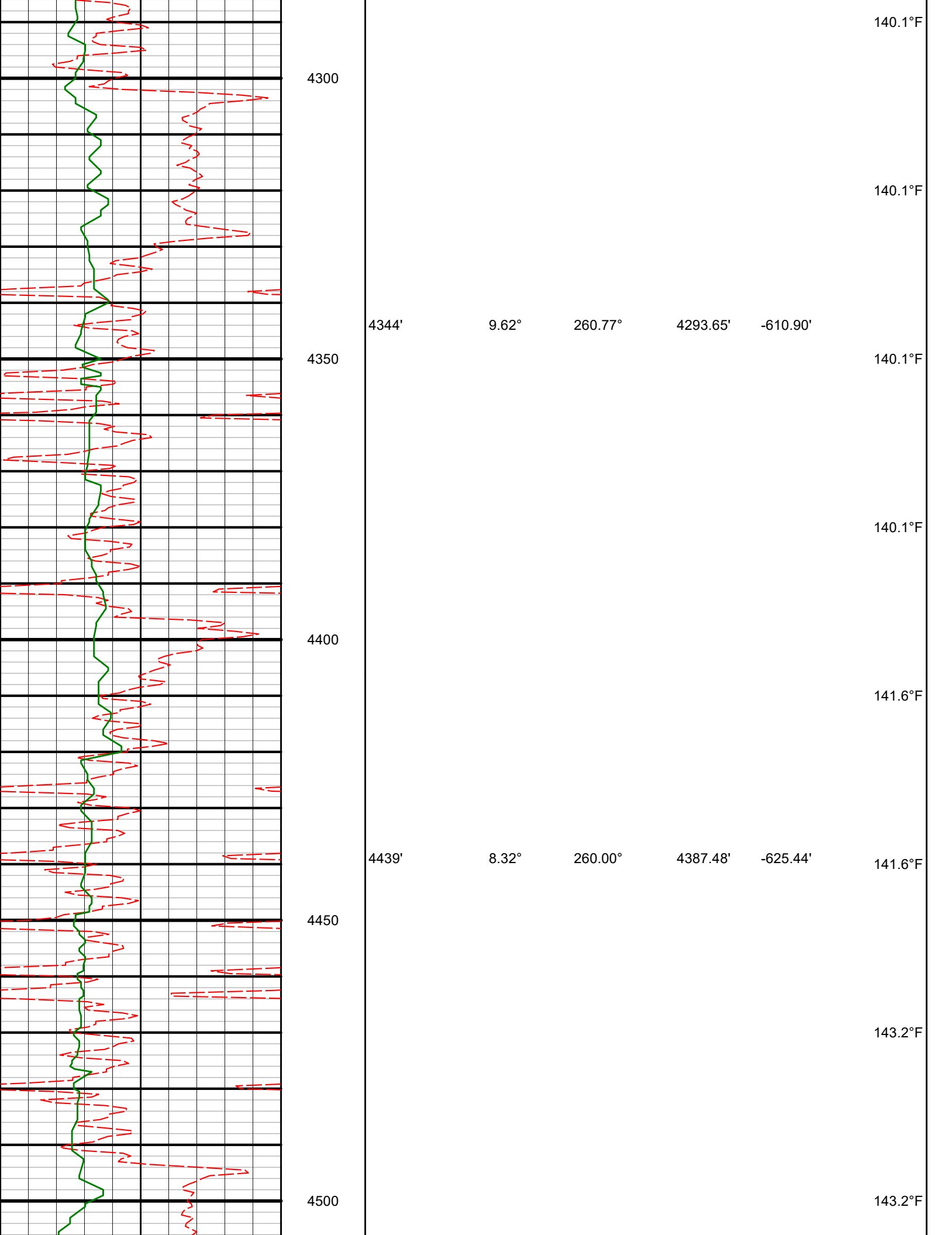
136.9°F

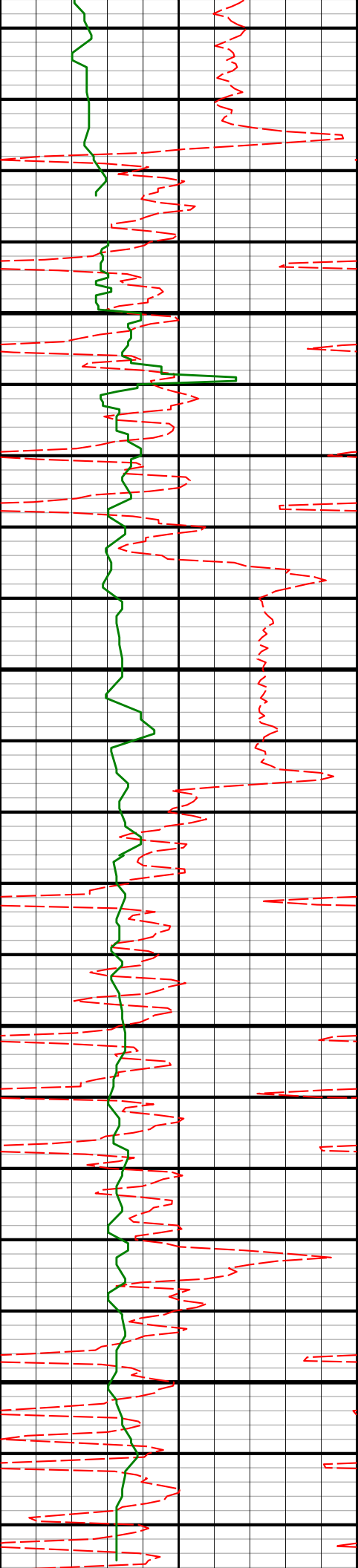
136.9°F

136.9°F

136.9°F

140.1°F





4534'

10.01°

260.50°

4481.27'

-640.28'

143.2°F

4550

143.2°F

4600

143.2°F

4629'

10.71°

257.05°

4574.72'

-656.93'

144.8°F

4650

146.3°F

4700

146.3°F

146.3°F

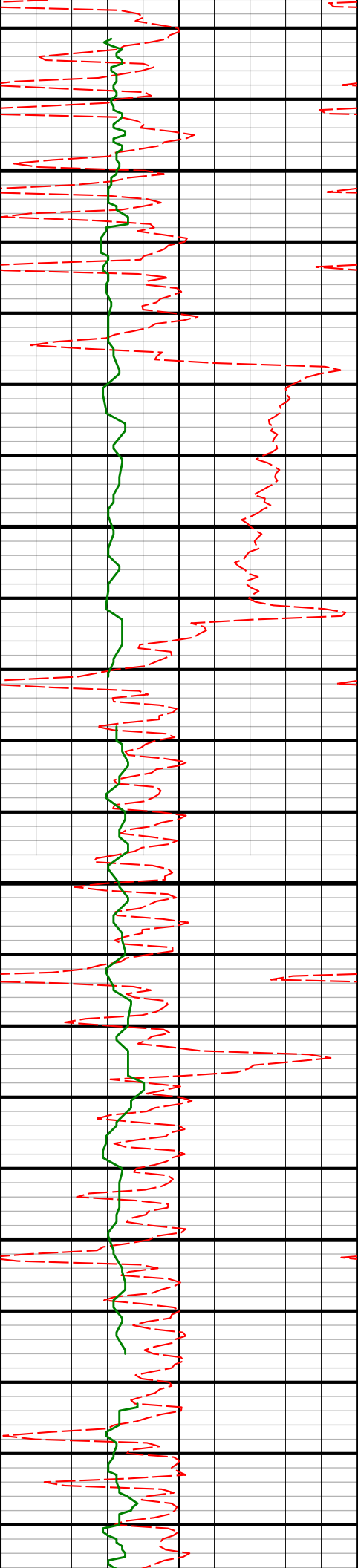
4725'

8.76°

256.22°

4669.33'

-672.62'



4750

4800

4850

4900

4819'

4913'

10.92°

9.00°

259.25°

253.52°

4761.94'

4854.52'

-688.23'

-703.93'

147.9°F

147.9°F

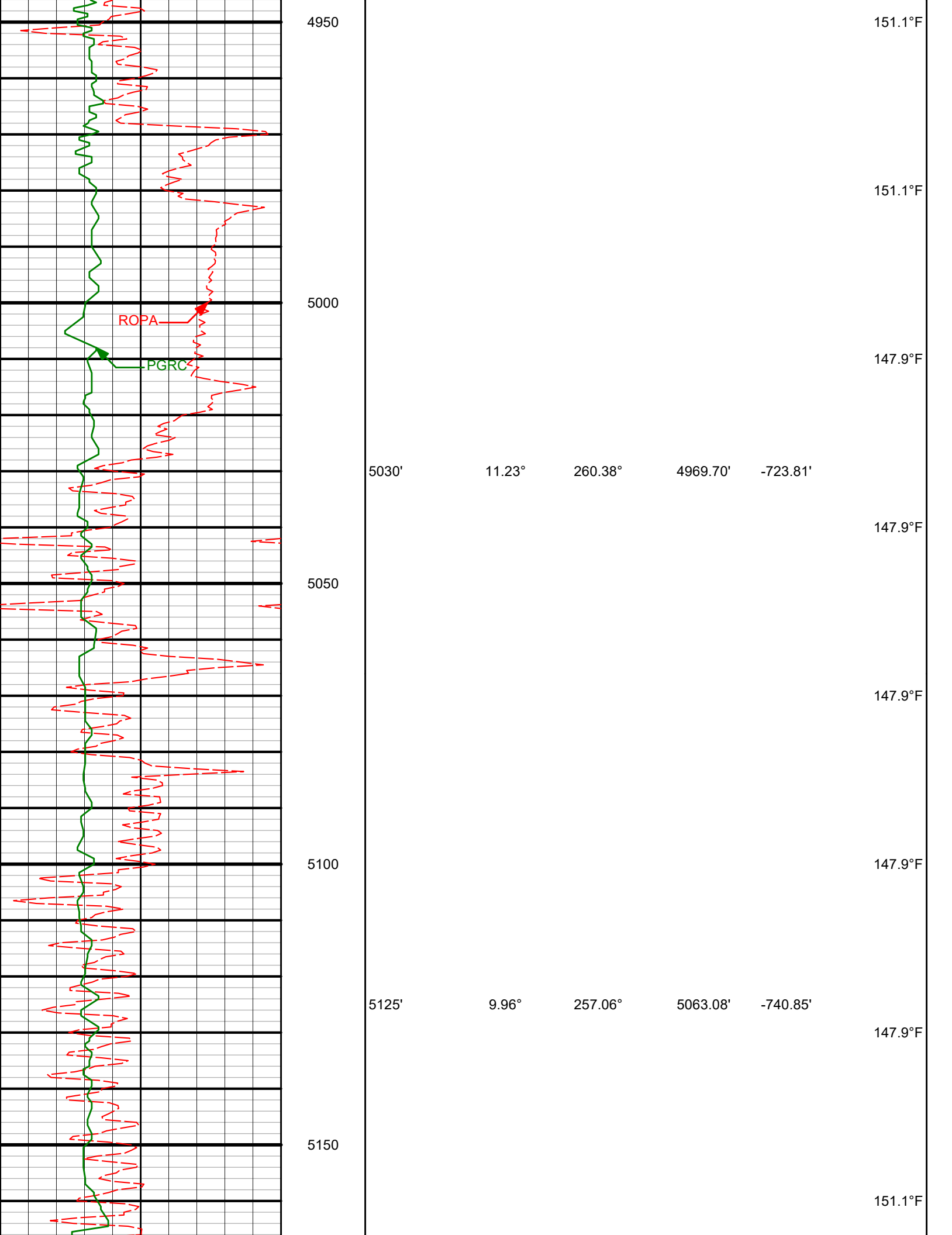
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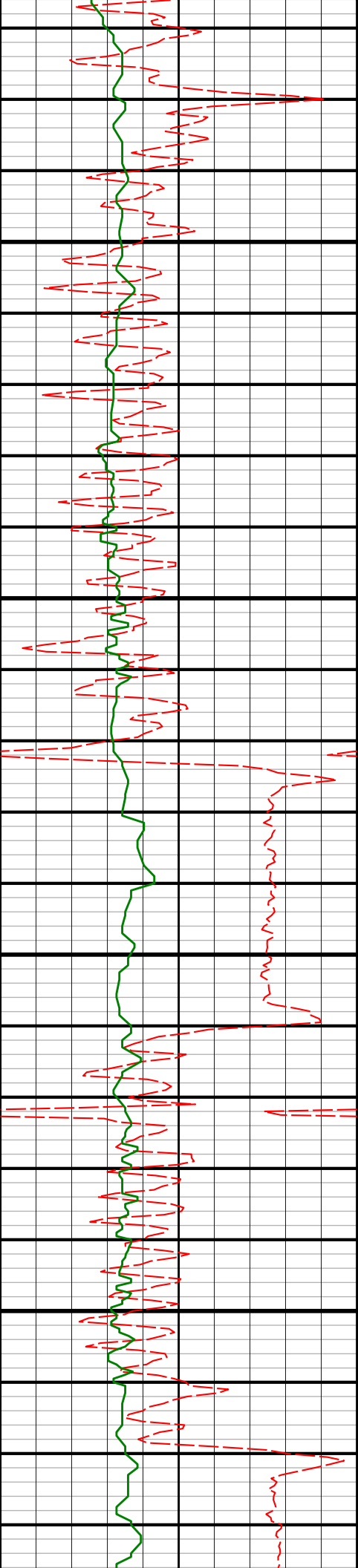
147.9°F

149.5°F

149.5°F

149.5°F





5200

5250

5300

5350

5220'

5315'

8.43°

9.25°

250.55°

256.09°

5156.86'

5250.73'

-755.31'

-769.17'

151.1°F

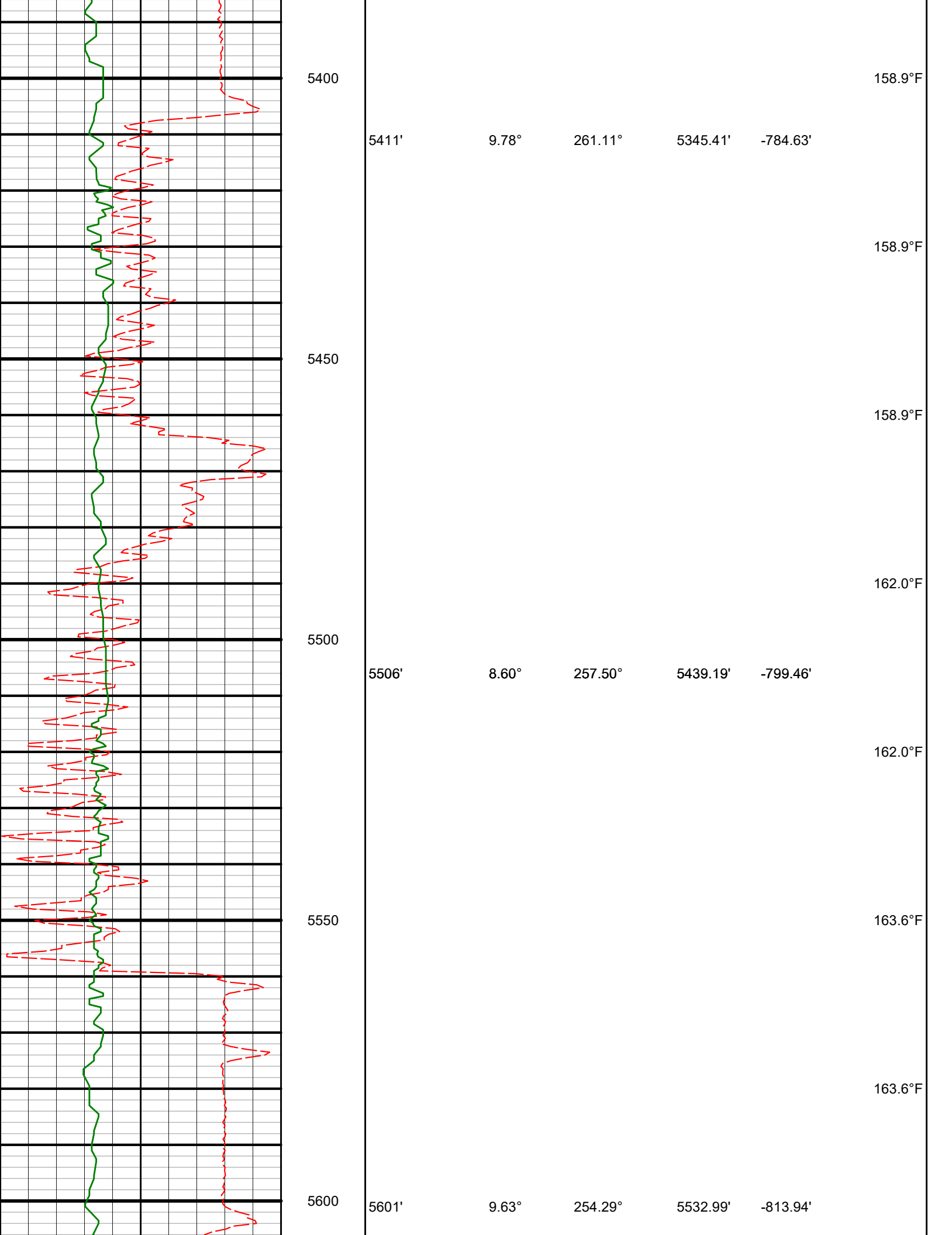
154.2°F

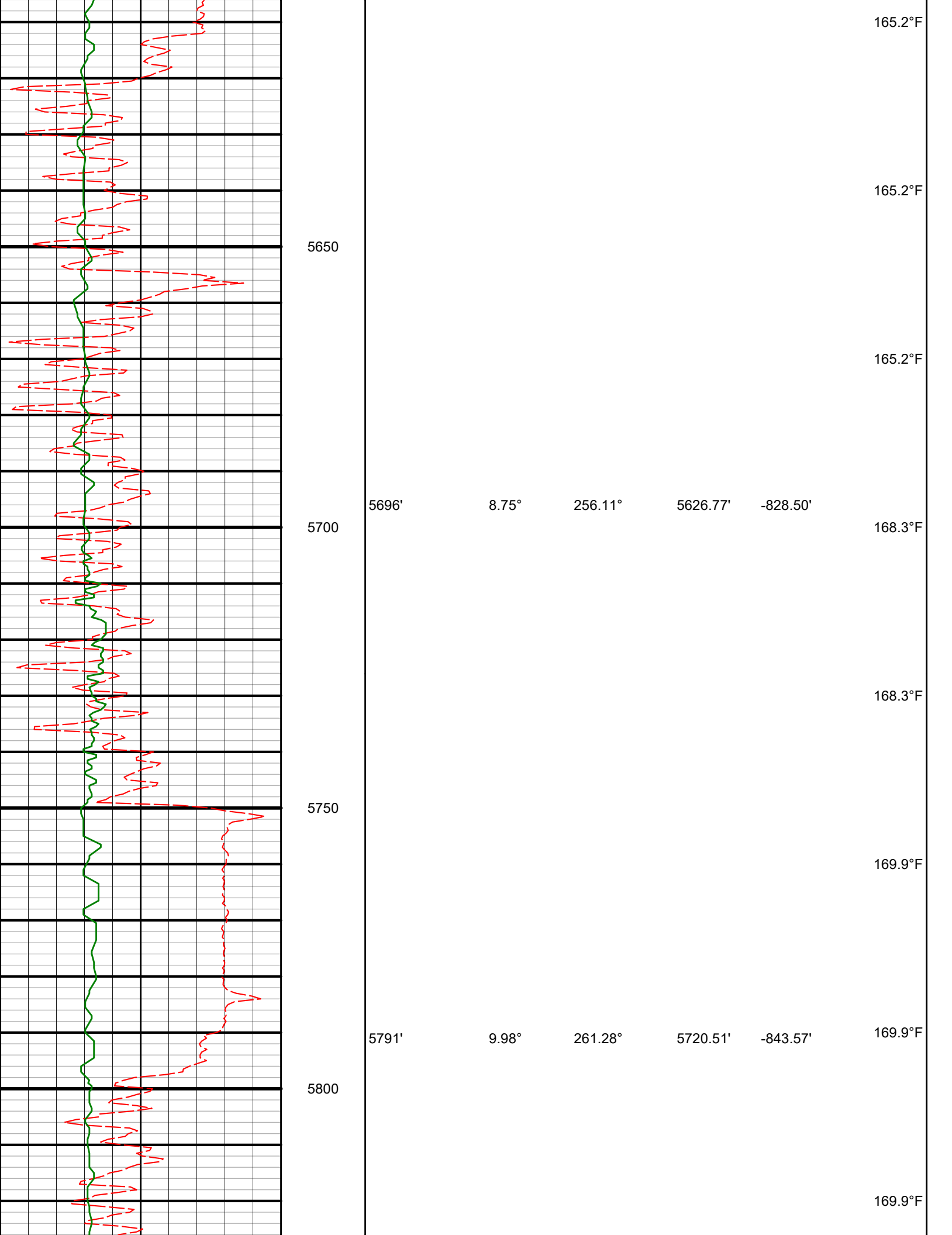
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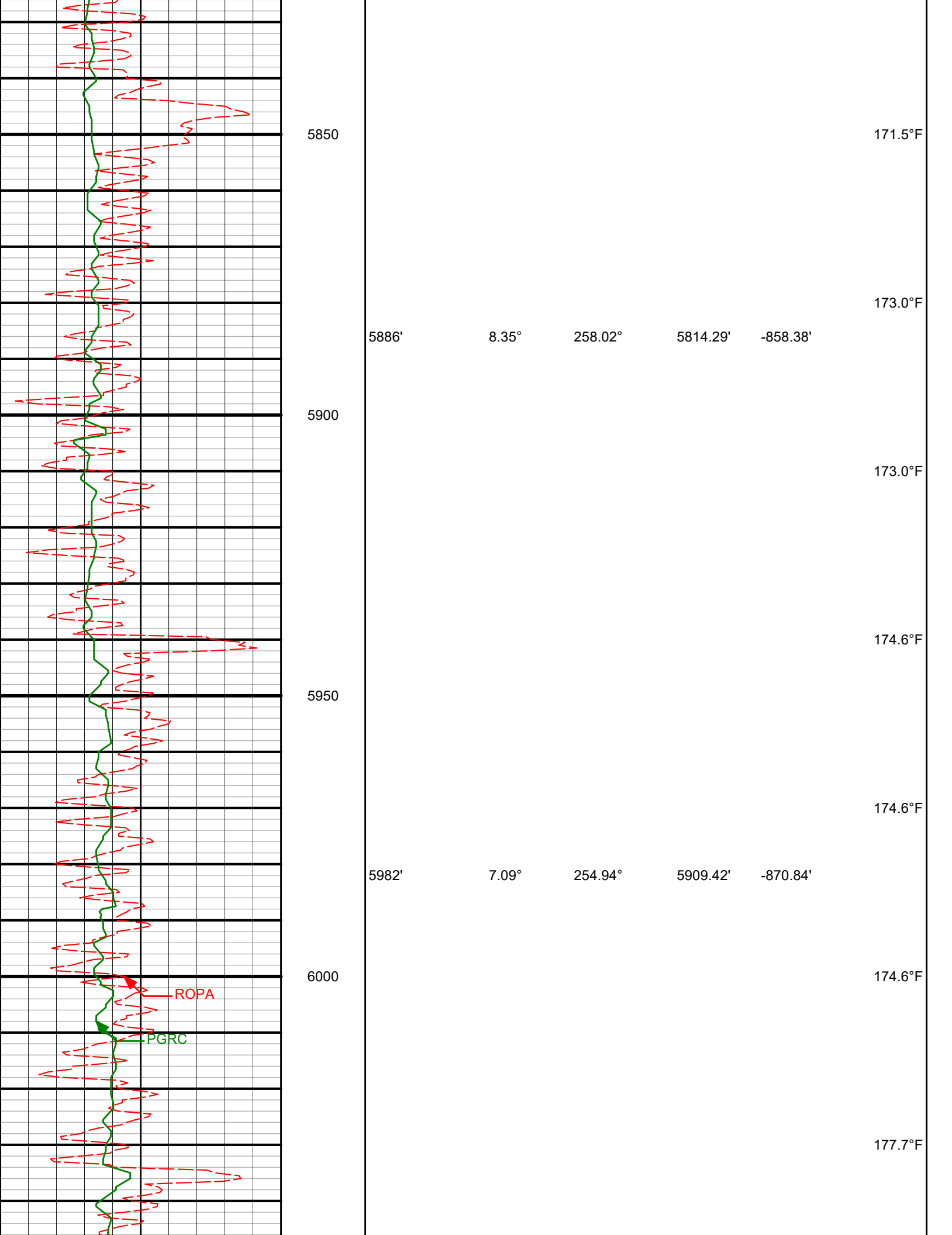
155.8°F

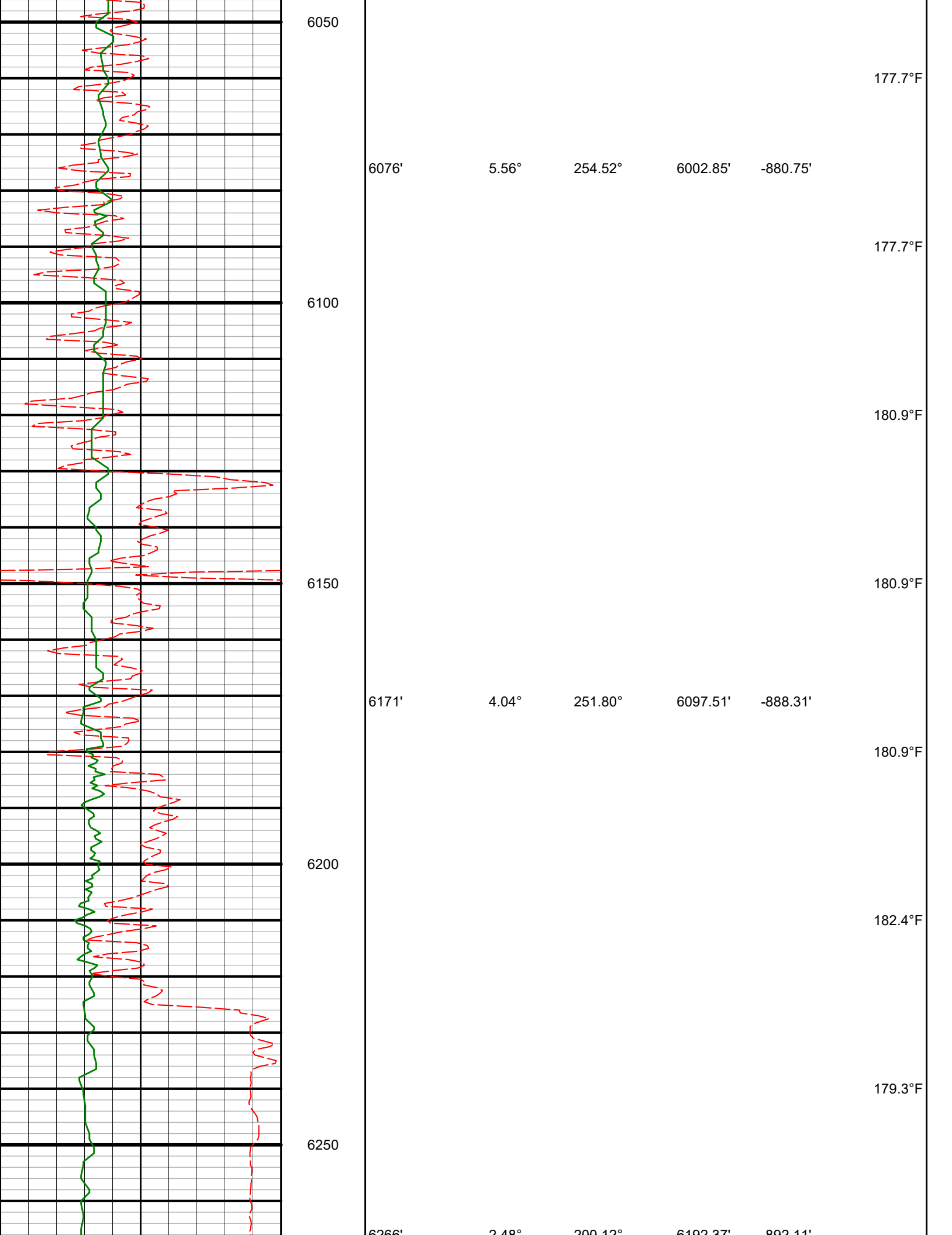
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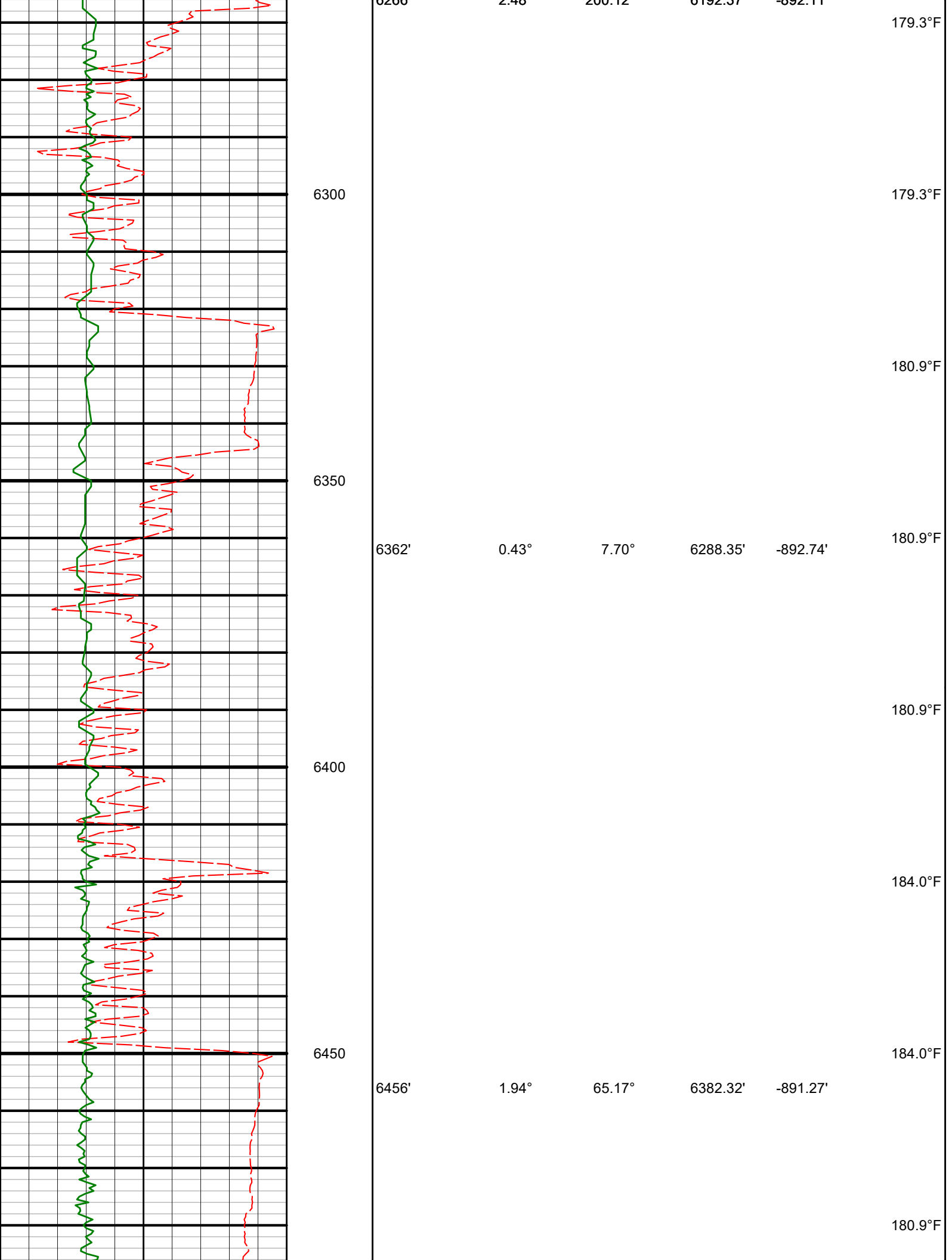
157.3°F

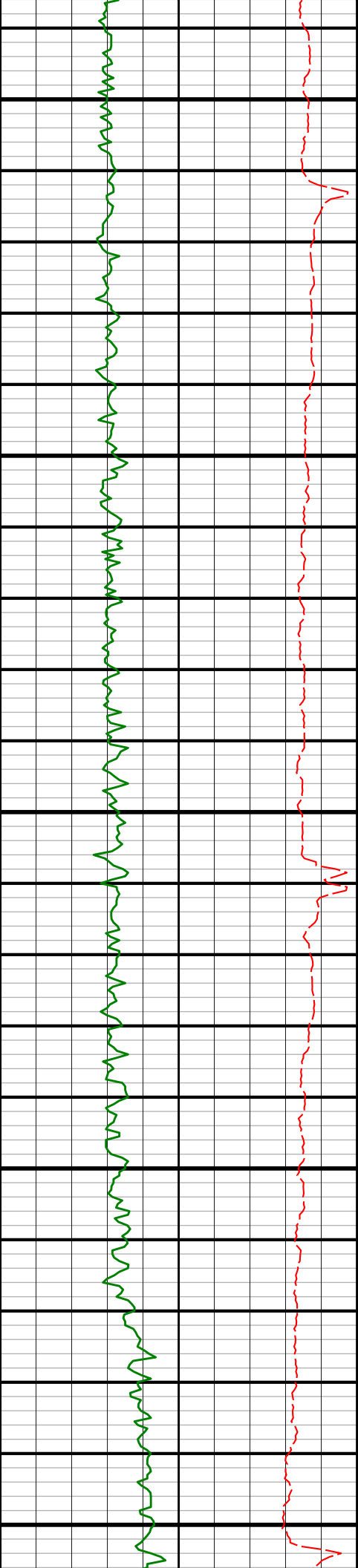












6500

182.4°F

182.4°F

6550

6551'

11.92°

91.70°

6476.52'

-879.99'

182.4°F

6600

184.0°F

6650

6646'

19.55°

93.85°

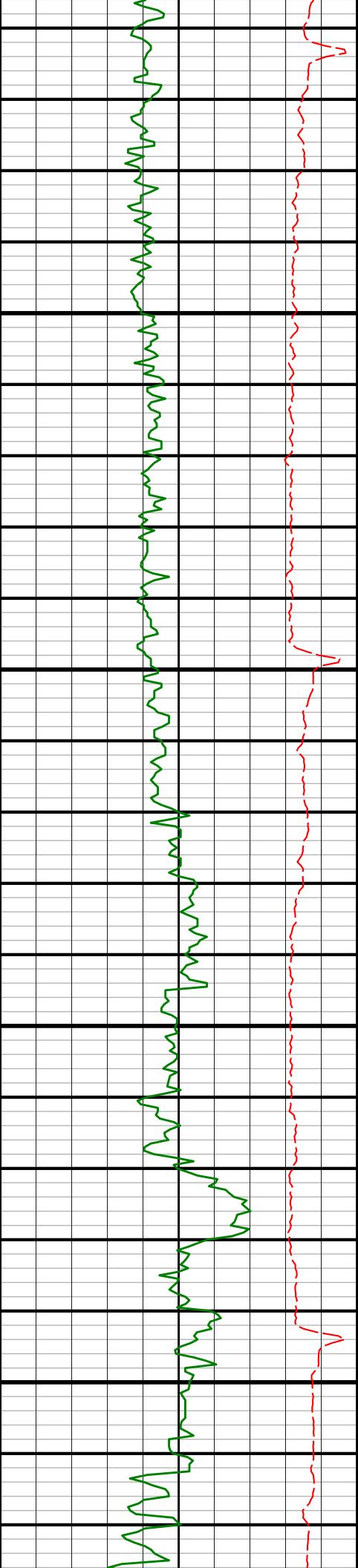
6567.90'

-854.26'

184.0°F

184.0°F

6700



6750

6800

6850

6900

6742'

28.09°

92.98°

6655.64'

-815.55'

6836'

36.40°

92.40°

6735.07'

-765.45'

185.6°F

185.6°F

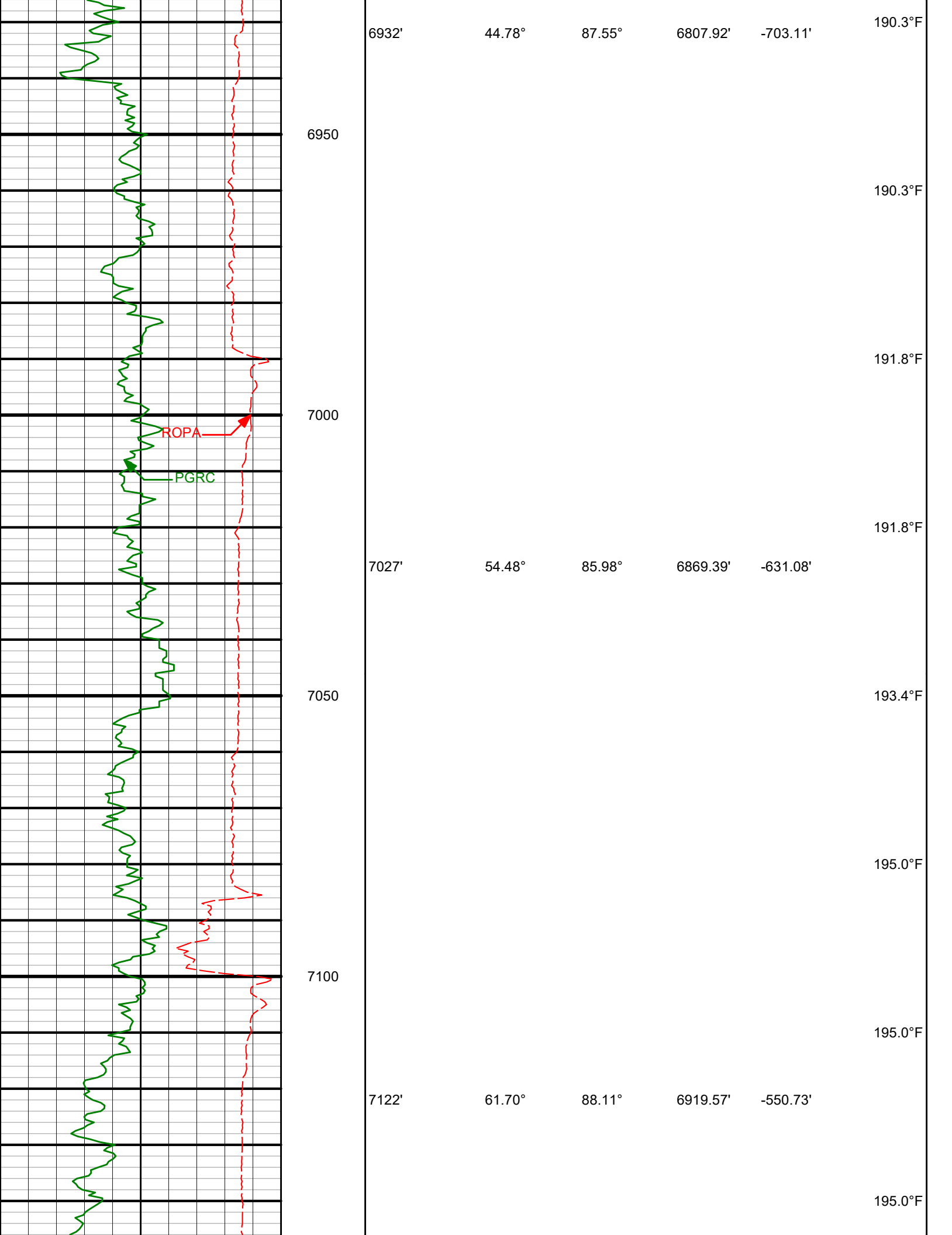
185.6°F

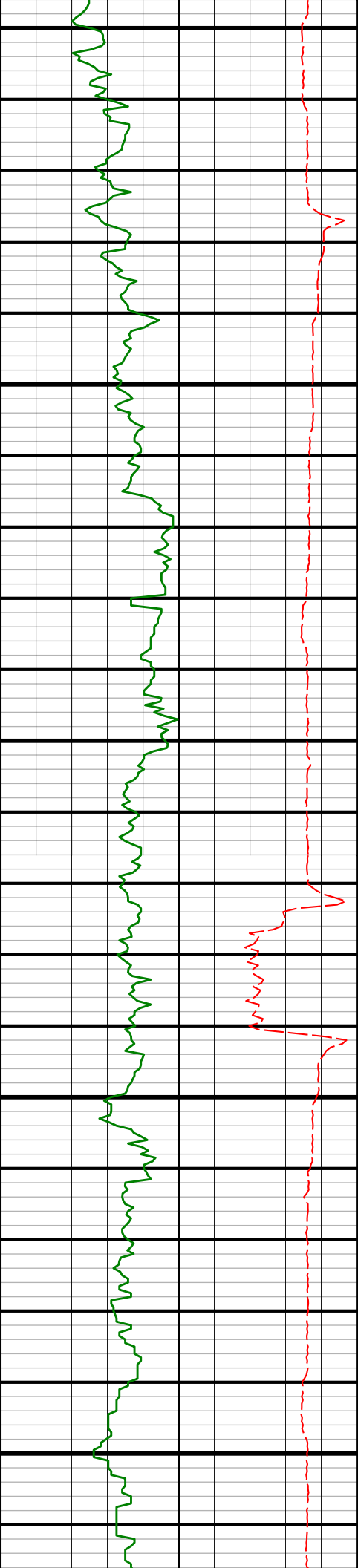
187.1°F

188.7°F

188.7°F

190.3°F





7150

196.6°F

7200

196.6°F

7217'

72.43°

90.54°

6956.54'

-463.44'

196.6°F

7250

198.1°F

7300

199.7°F

7312'

81.50°

90.67°

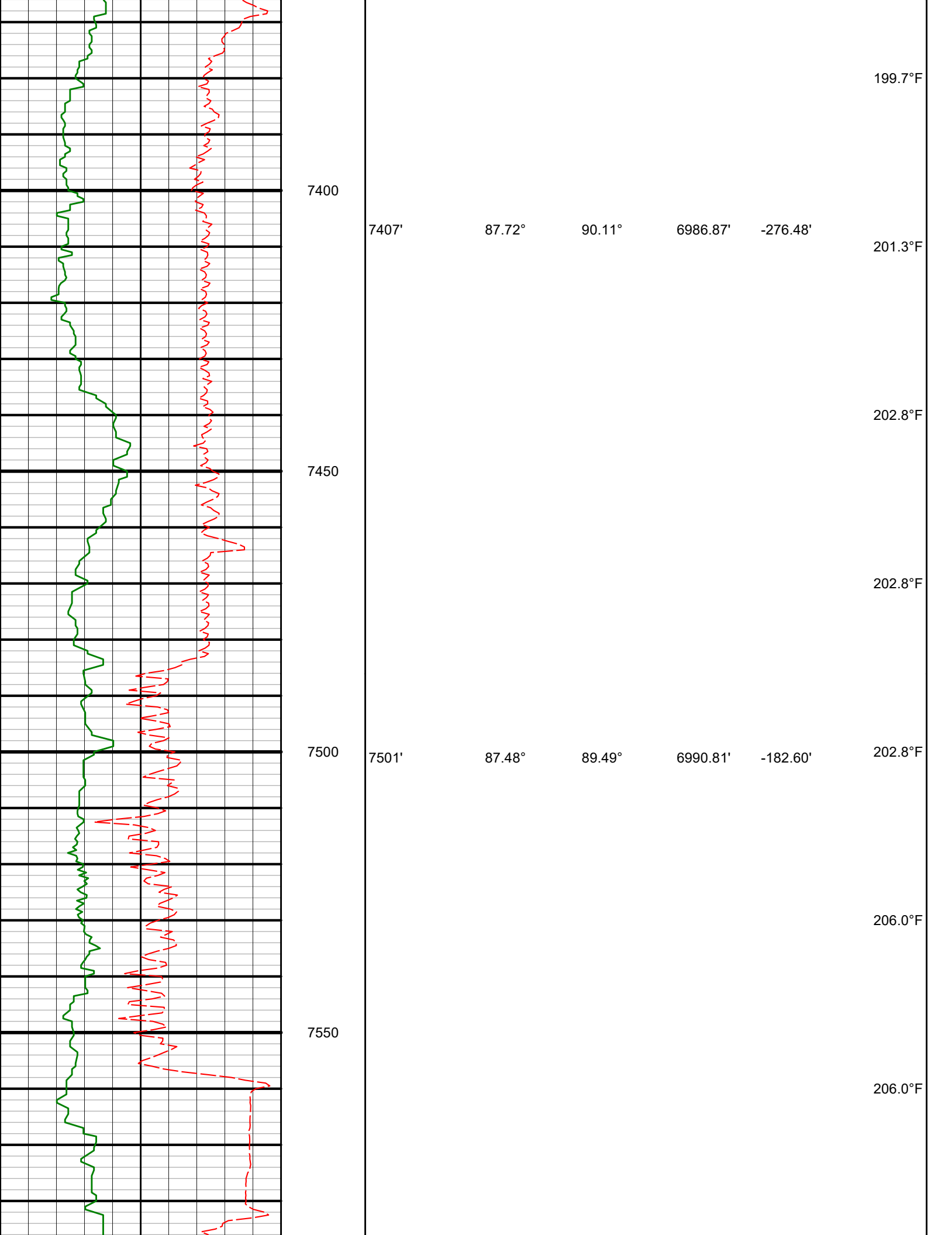
6977.95'

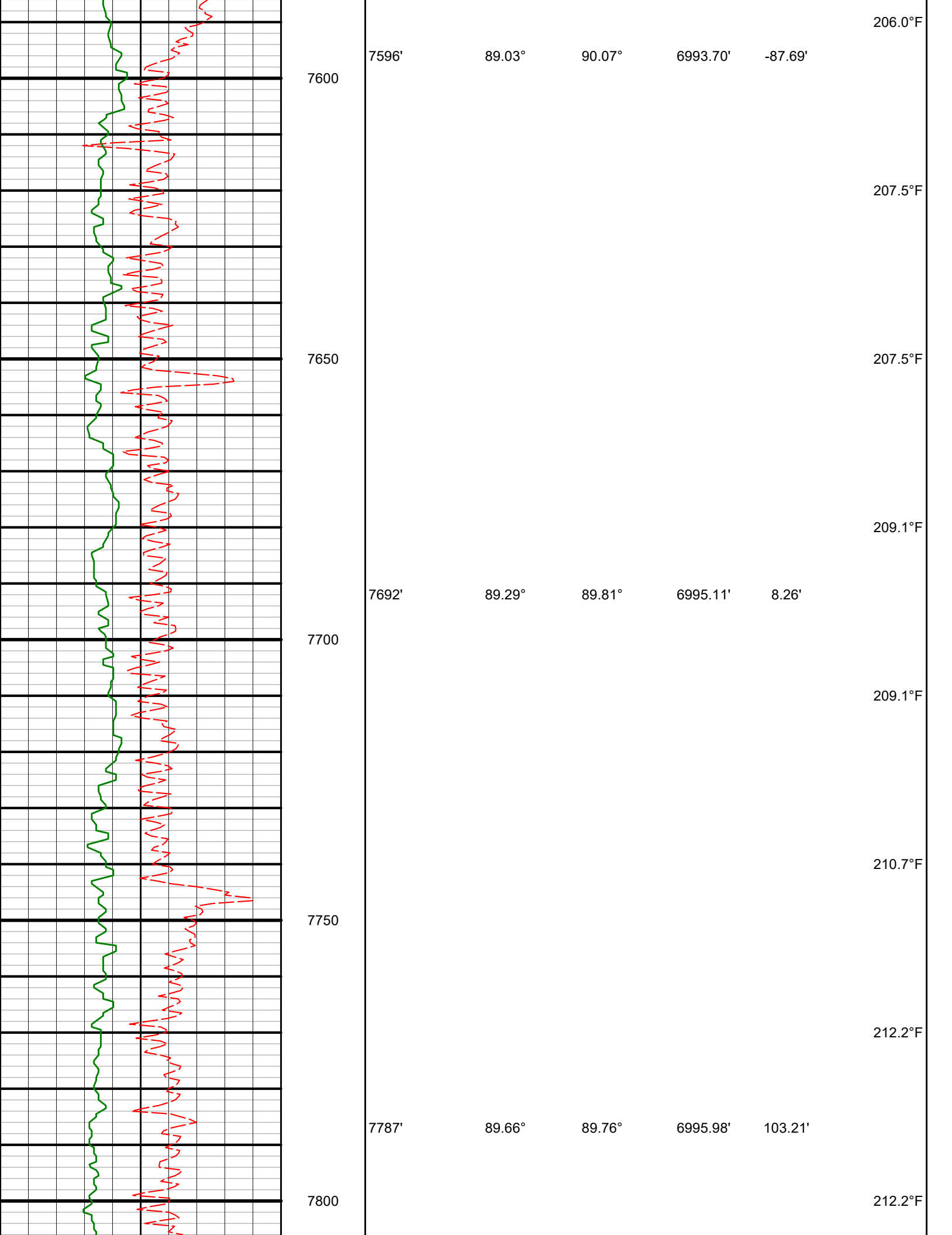
-370.99'

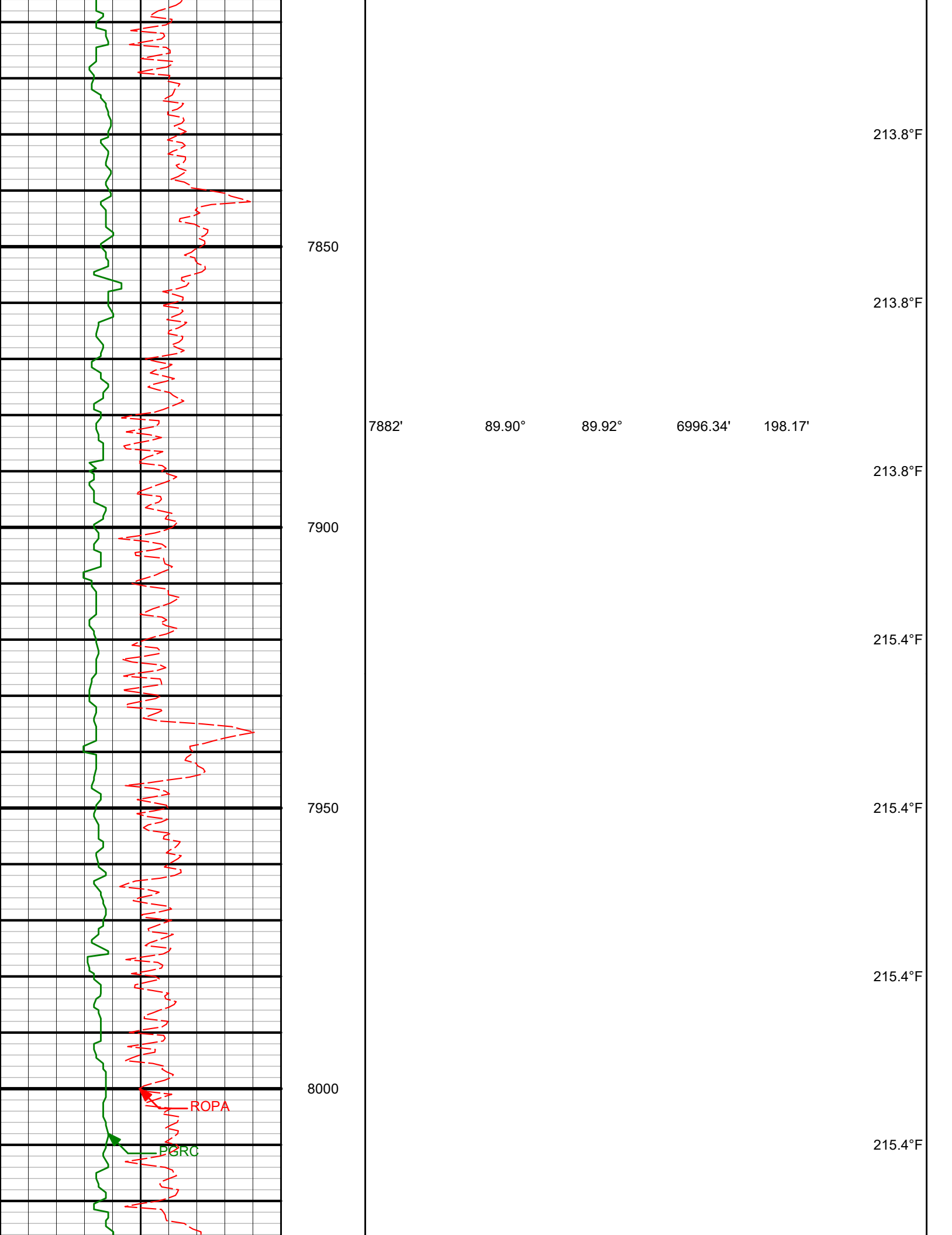
199.7°F

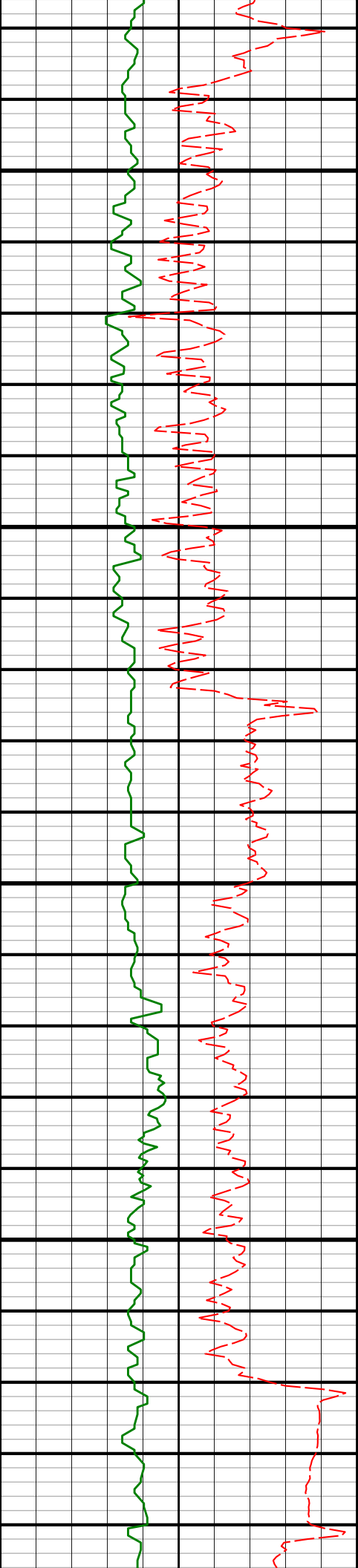
7350

199.7°F









8050

8100

8150

8200

8072'

91.11°

89.05°

6994.67'

388.04'

8167'

91.38°

89.05°

6992.60'

482.93'

216.9°F

216.9°F

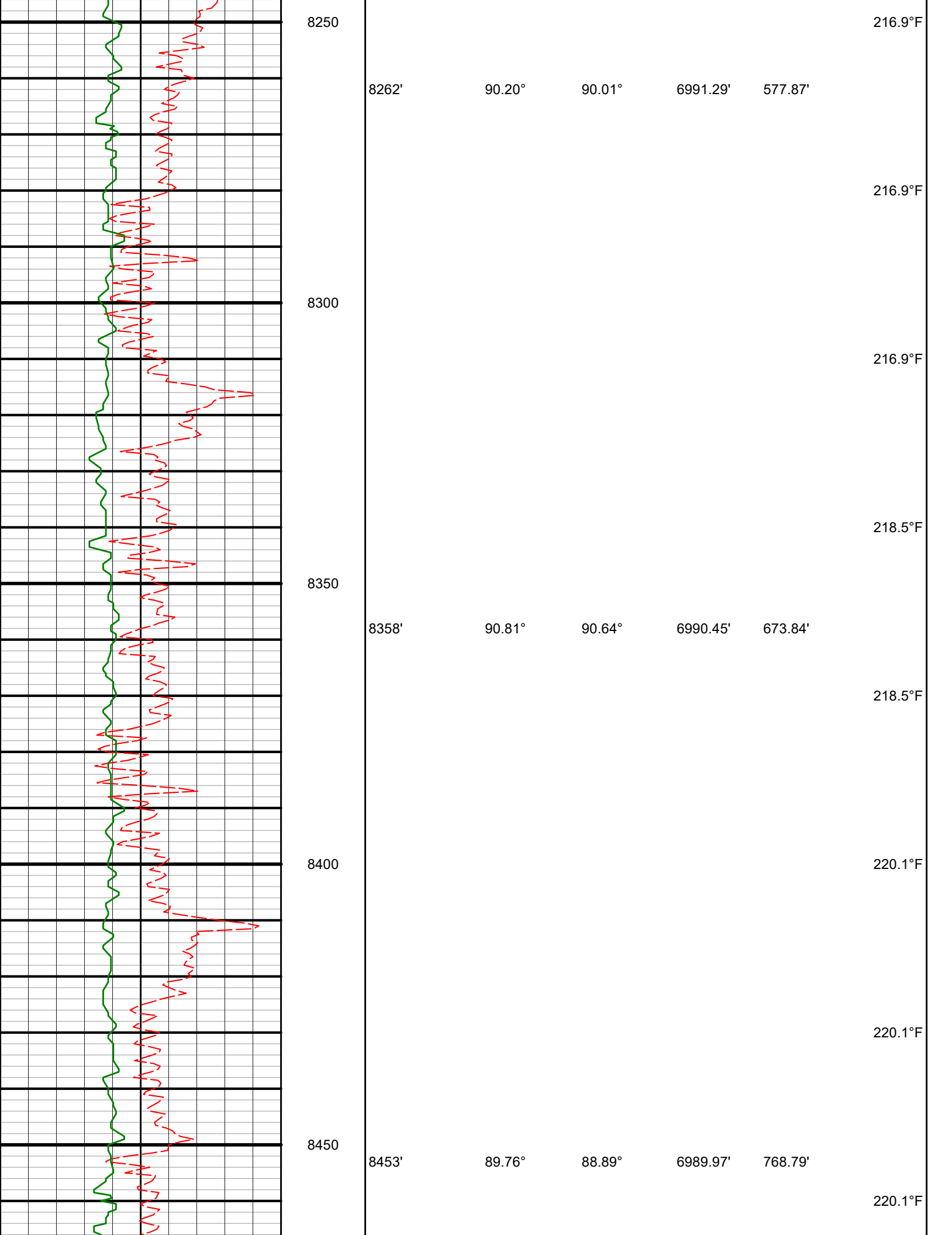
218.5°F

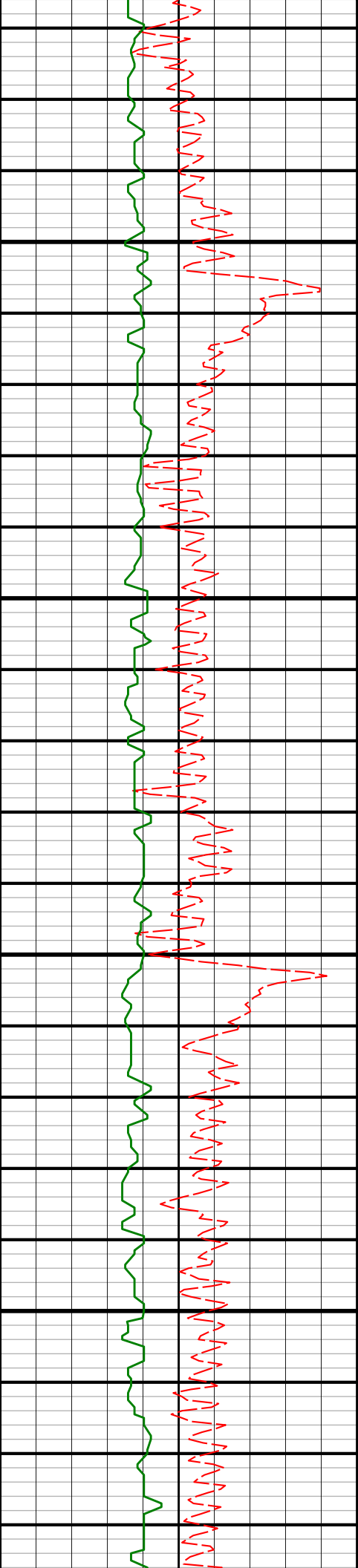
218.5°F

218.5°F

218.5°F

218.5°F





8500

220.1°F

220.1°F

8550

8548'

89.97°

89.14°

6990.20'

863.70'

221.7°F

8600

221.7°F

221.7°F

8650

8643'

90.27°

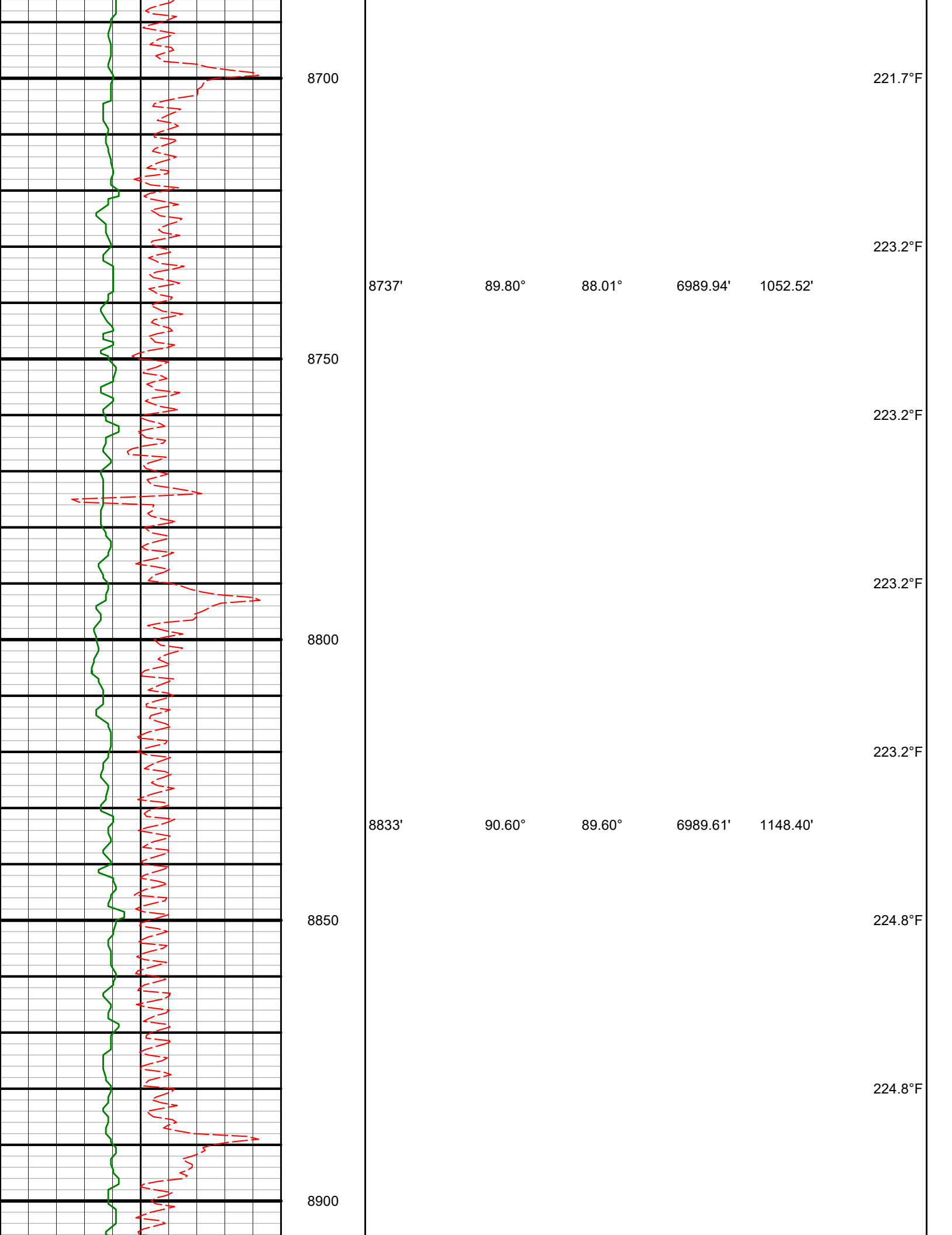
89.41°

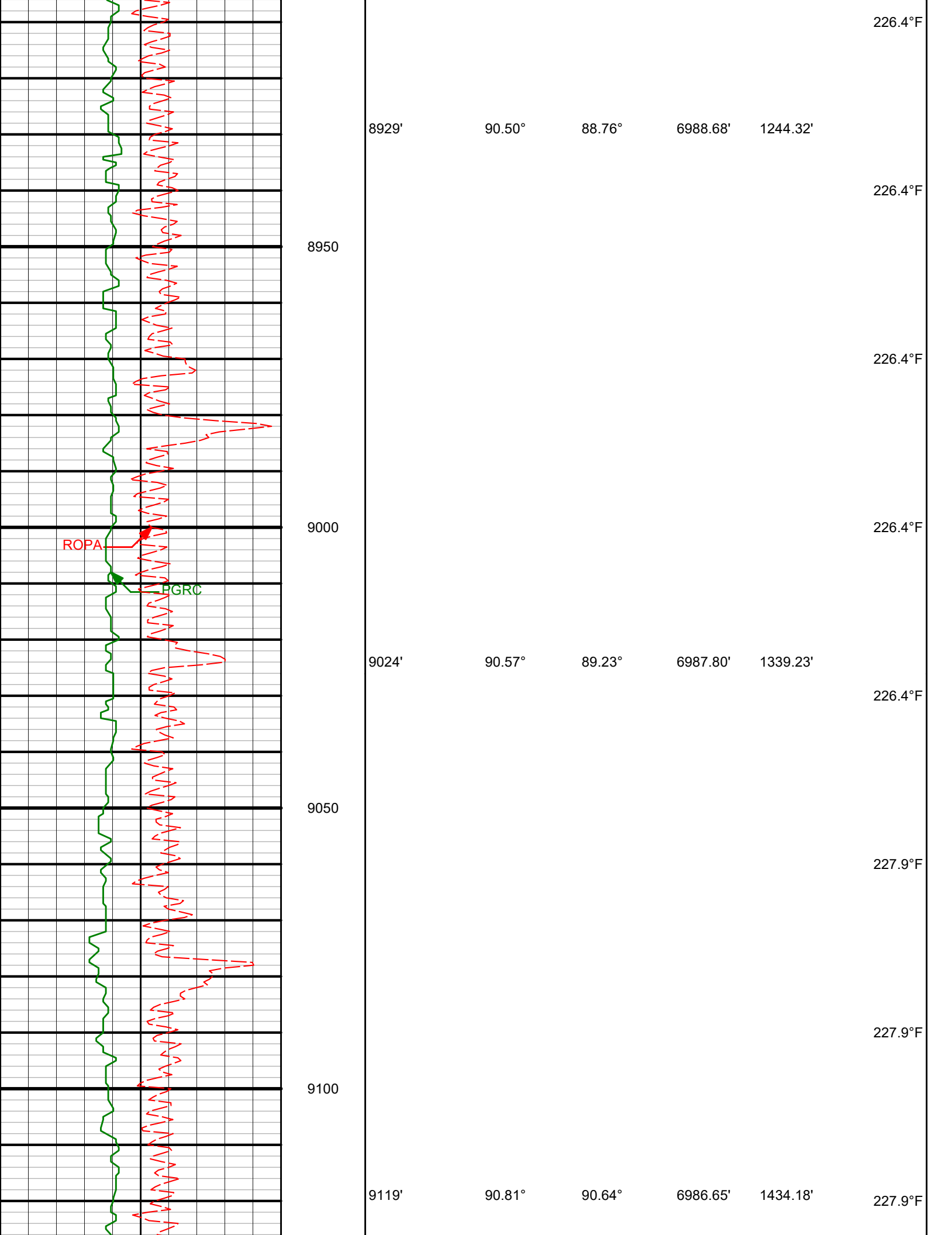
6990.00'

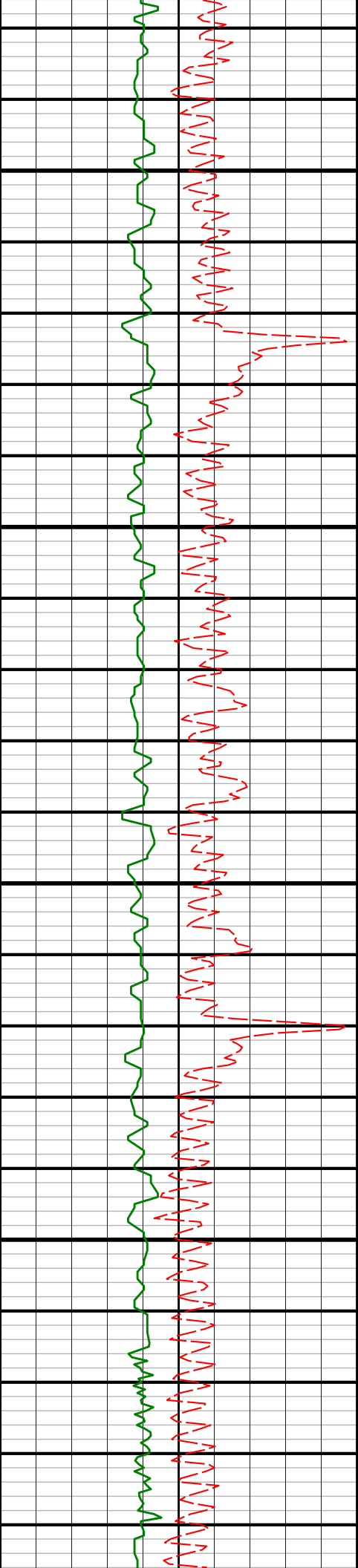
958.63'

221.7°F

221.7°F







9150

227.9°F

227.9°F

9200

227.9°F

9213'

90.71°

89.11°

6985.41'

1528.13'

229.5°F

9250

229.5°F

9300

229.5°F

9308'

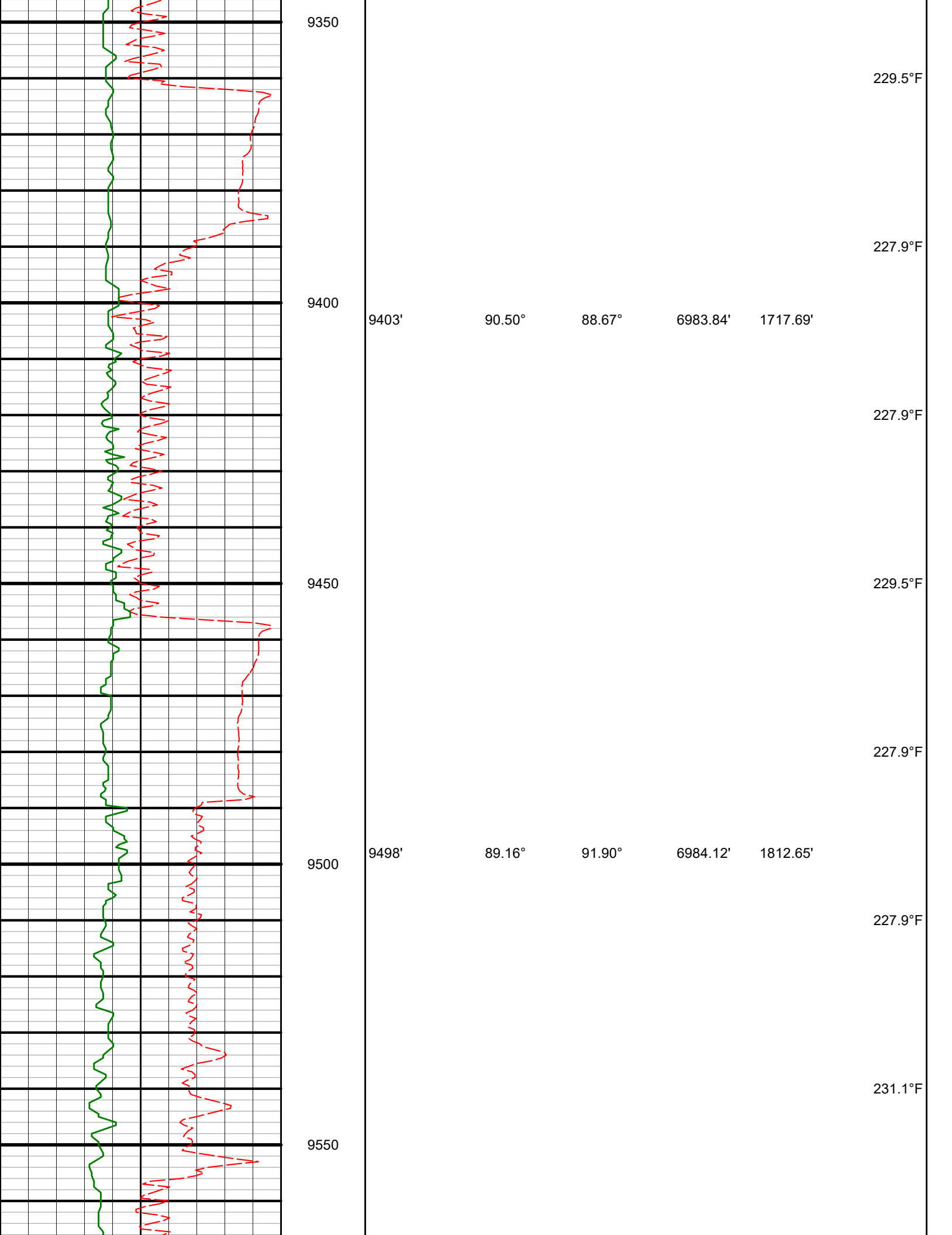
90.34°

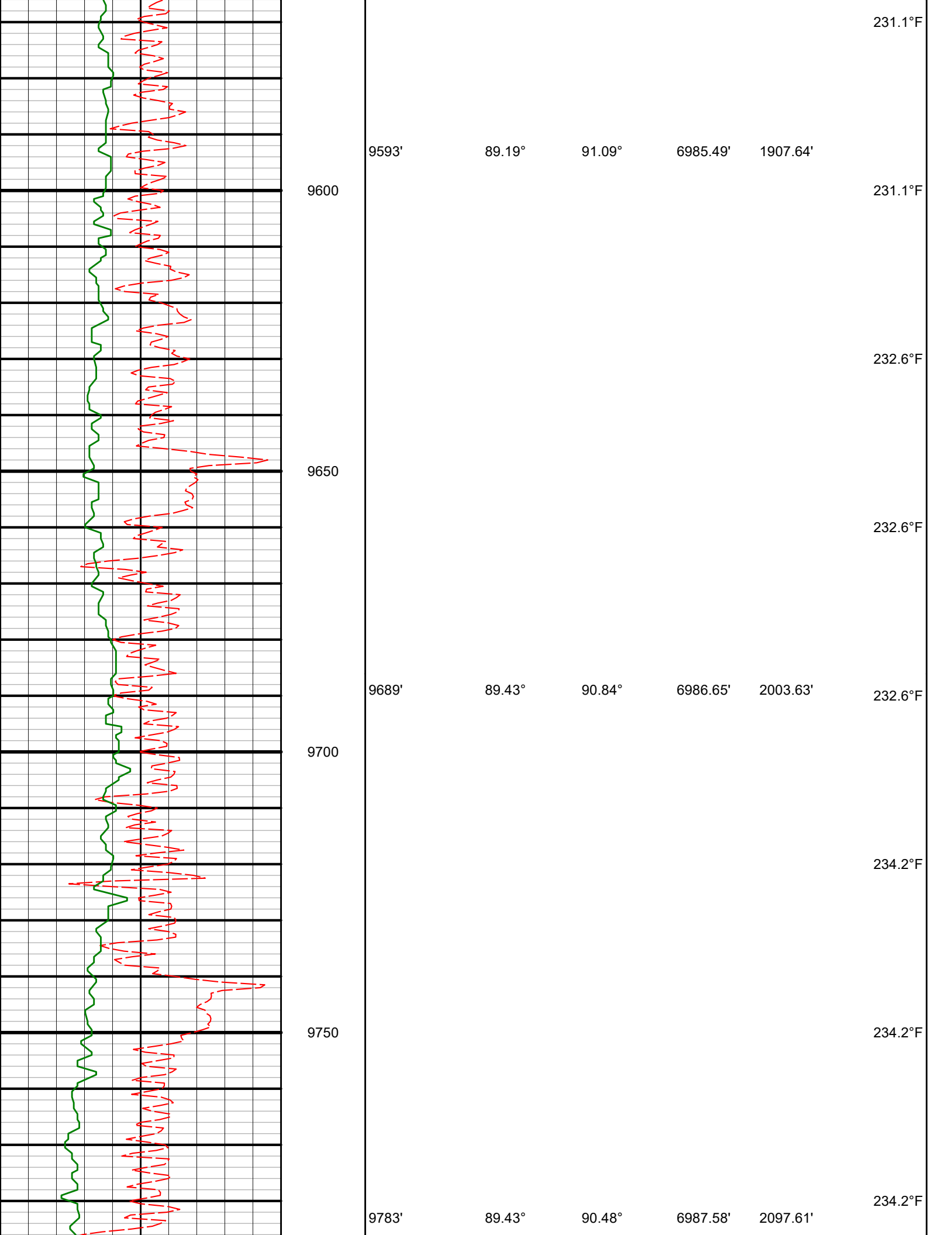
86.46°

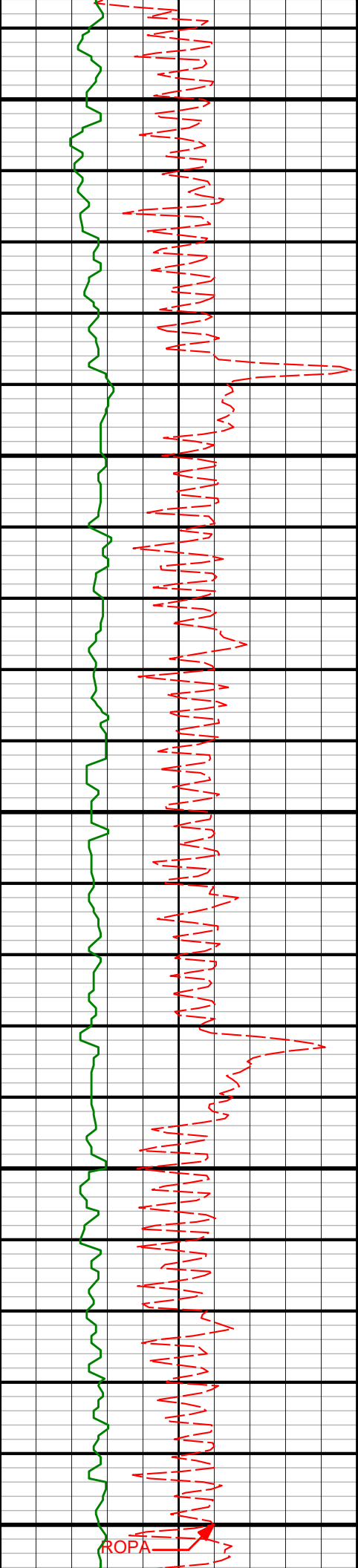
6984.54'

1622.92'

229.5°F







9800

234.2°F

235.8°F

9850

235.8°F

9878'

89.53°

90.15°

6988.44'

2192.59'

9900

235.8°F

235.8°F

9950

237.3°F

9973'

89.50°

89.25°

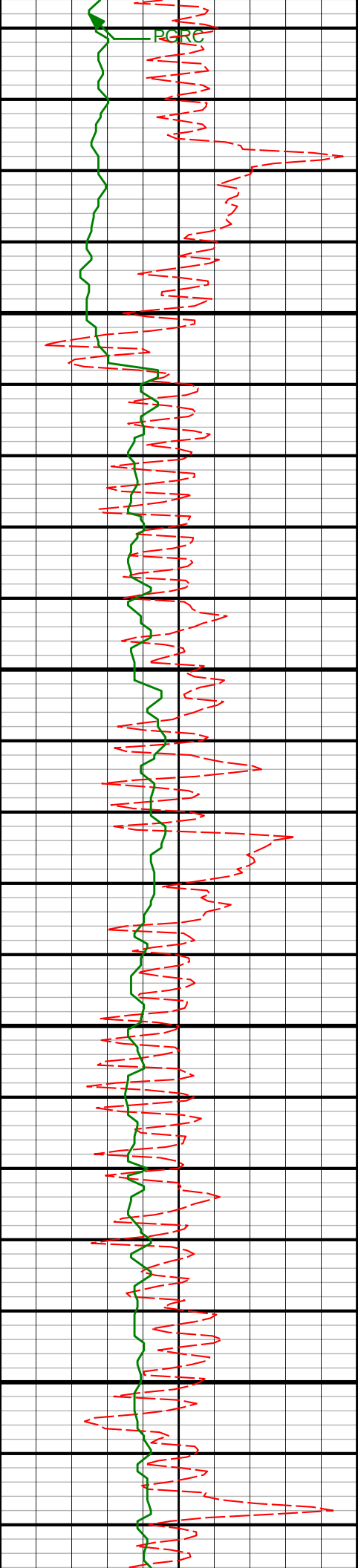
6989.25'

2287.54'

237.3°F

10000

ROPA



10050

10100

10150

10200

10068'

10163'

89.93°

90.60°

89.03°

88.71°

6989.72'

6989.28'

2382.46'

2477.35'

237.3°F

237.3°F

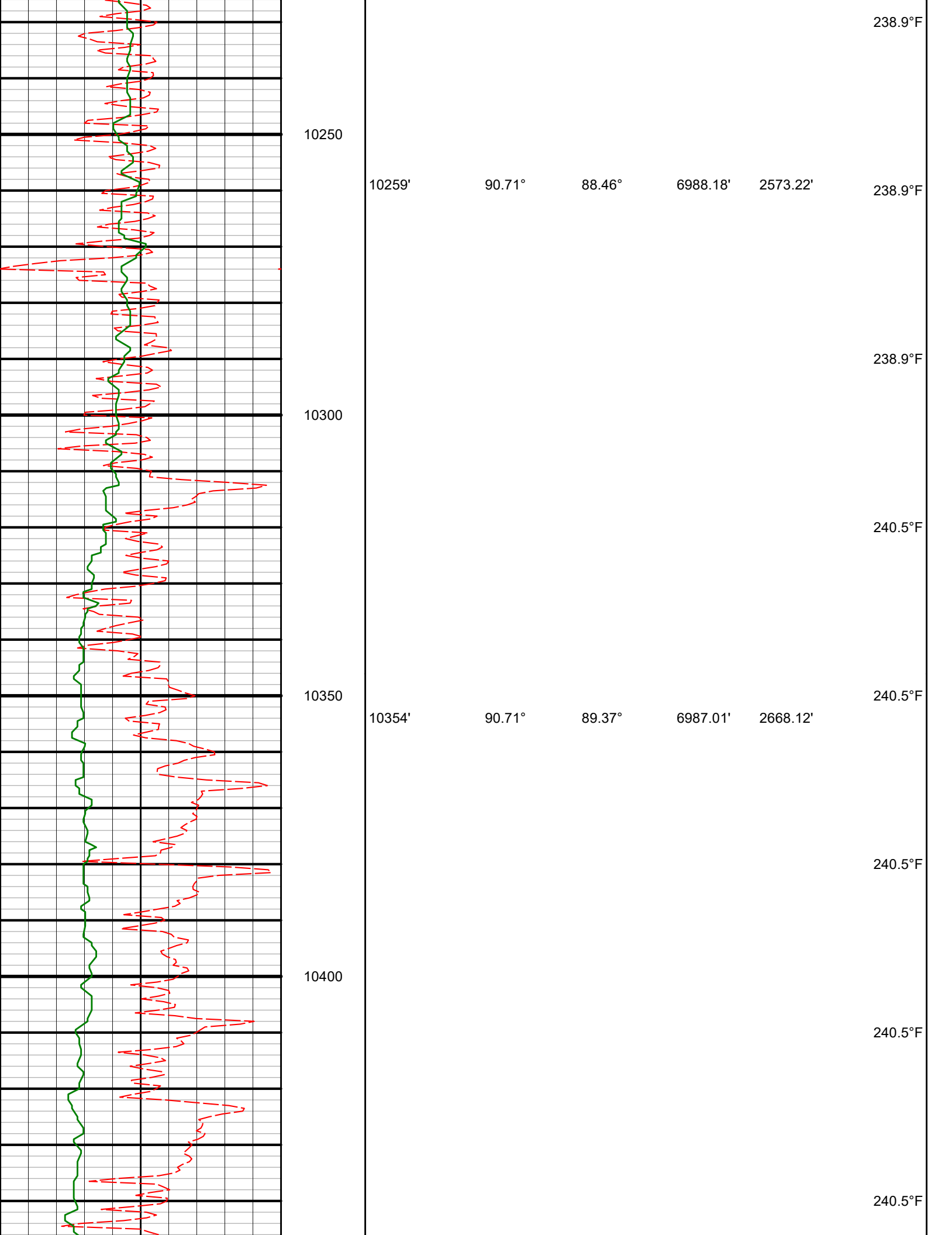
237.3°F

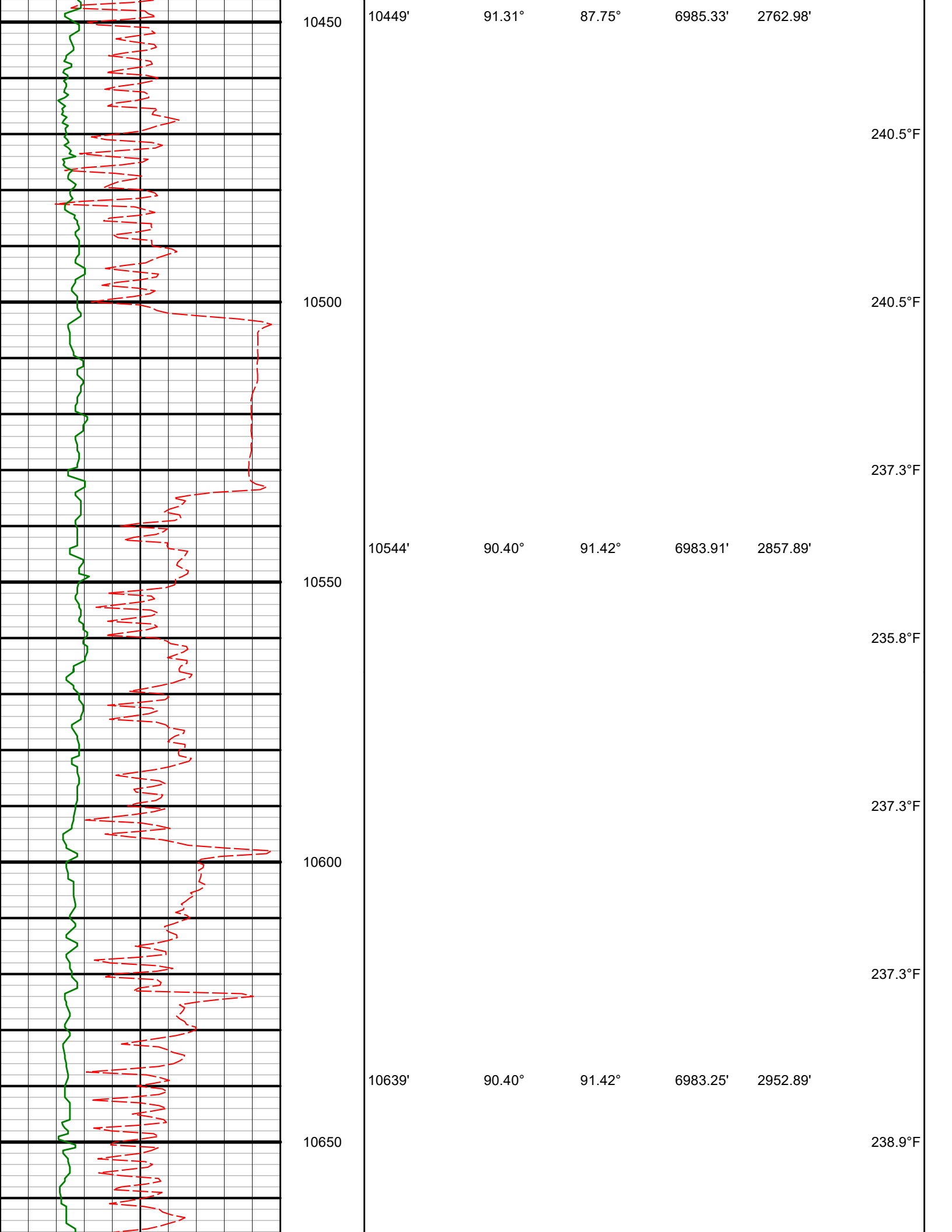
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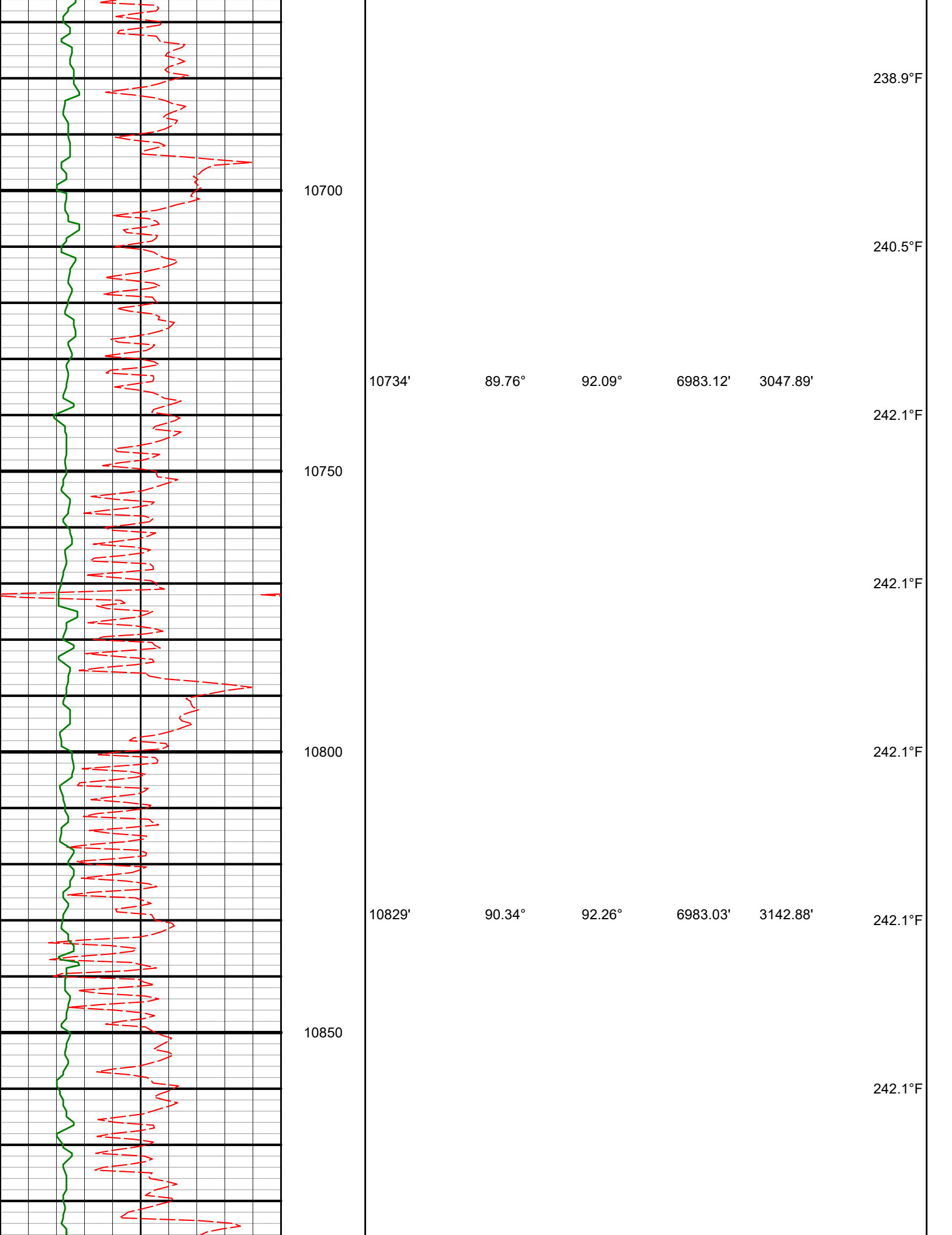
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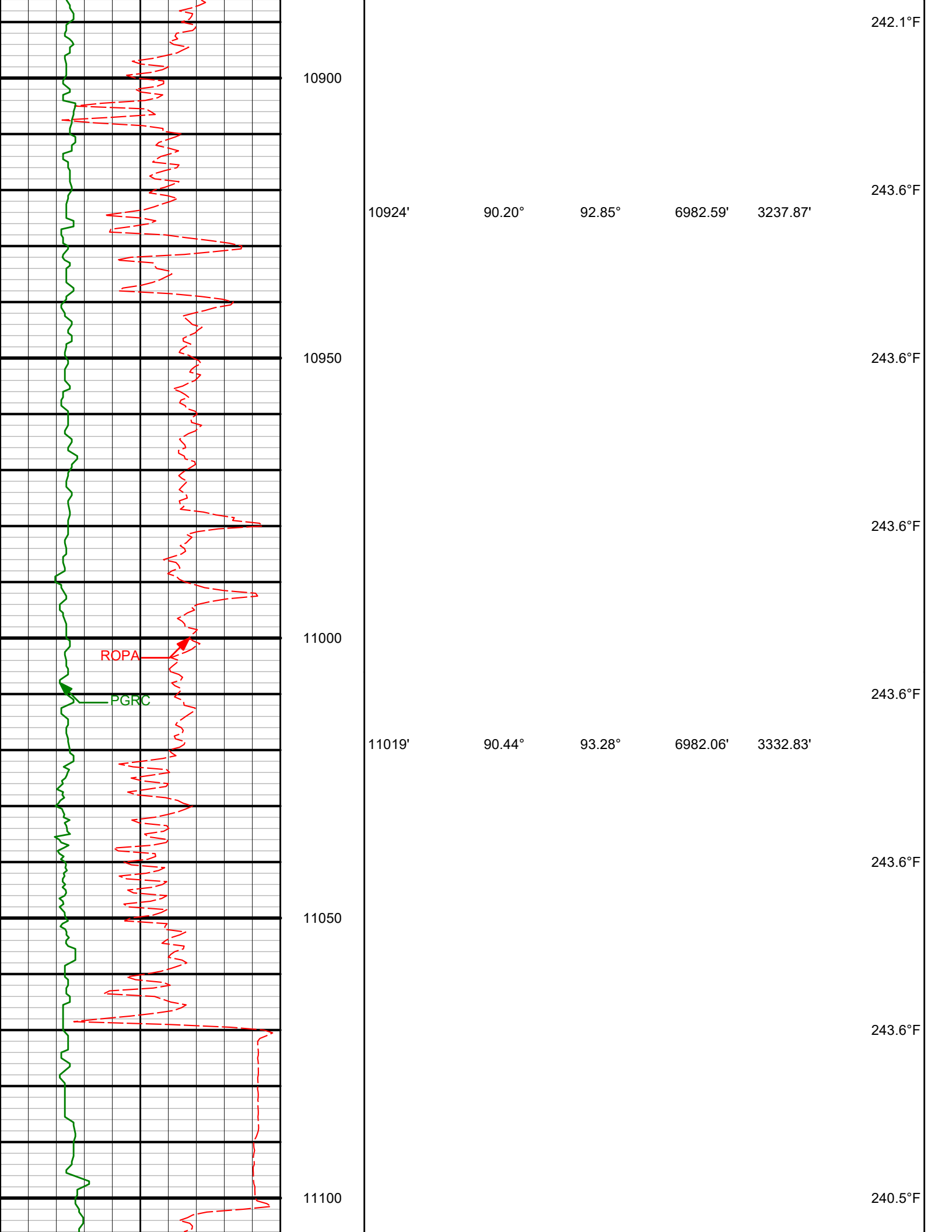
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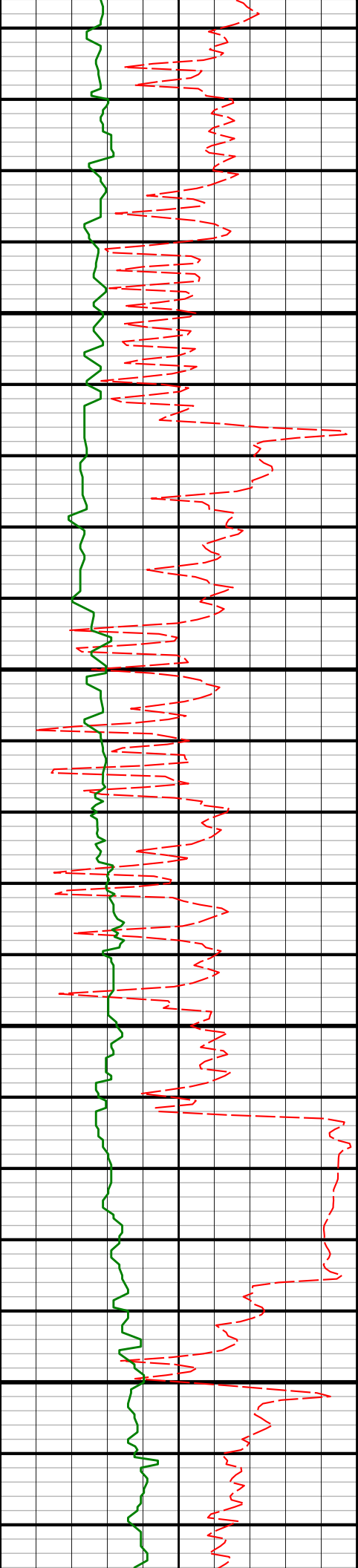
238.9°F











11150

11200

11250

11300

11114'

11209'

11304'

88.39°

87.95°

89.43°

90.23°

89.54°

89.84°

6983.03'

6986.06'

6988.23'

3427.81'

3522.72'

3617.64'

240.5°F

240.5°F

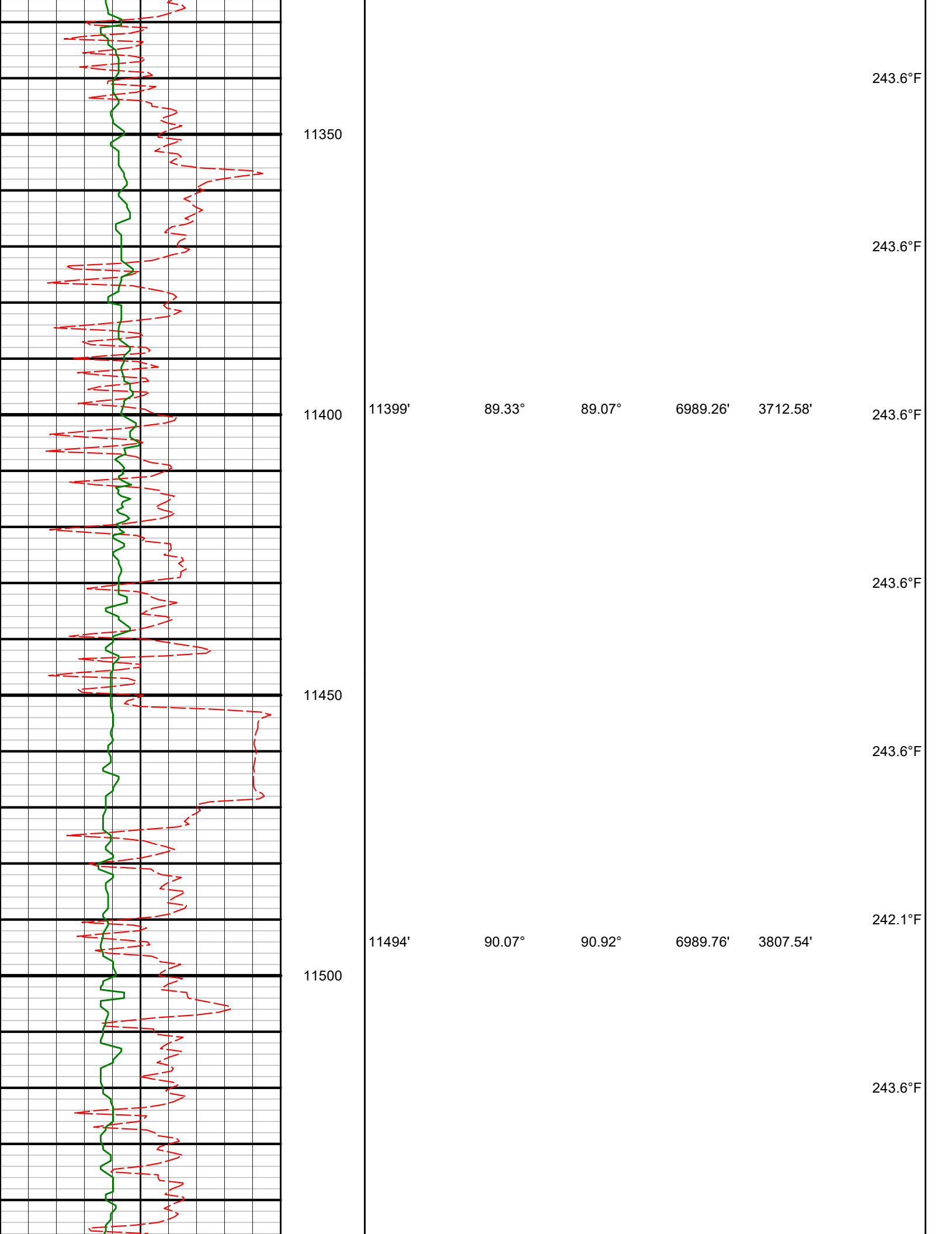
242.1°F

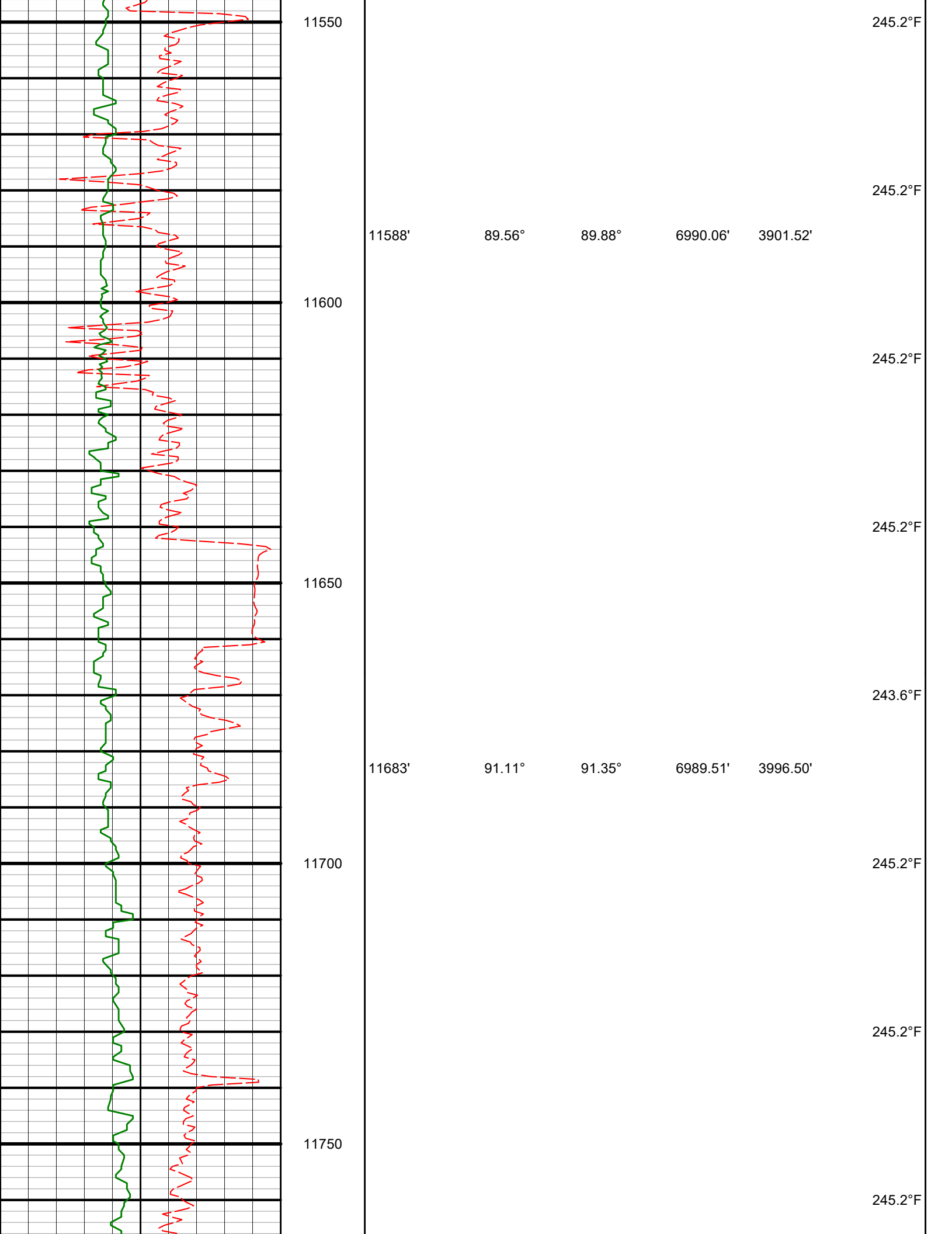
243.6°F

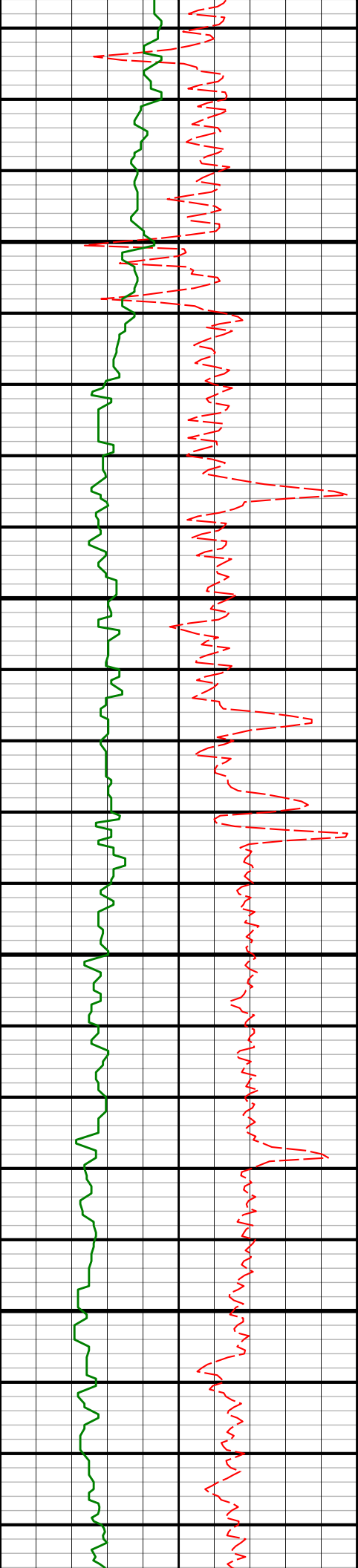
243.6°F

242.1°F

240.5°F







11800

11850

11900

11950

11779'

91.34°

90.43°

6987.45'

4092.47'

245.2°F

246.8°F

246.8°F

11874'

91.78°

89.86°

6984.87'

4187.41'

246.8°F

248.3°F

248.3°F

11970'

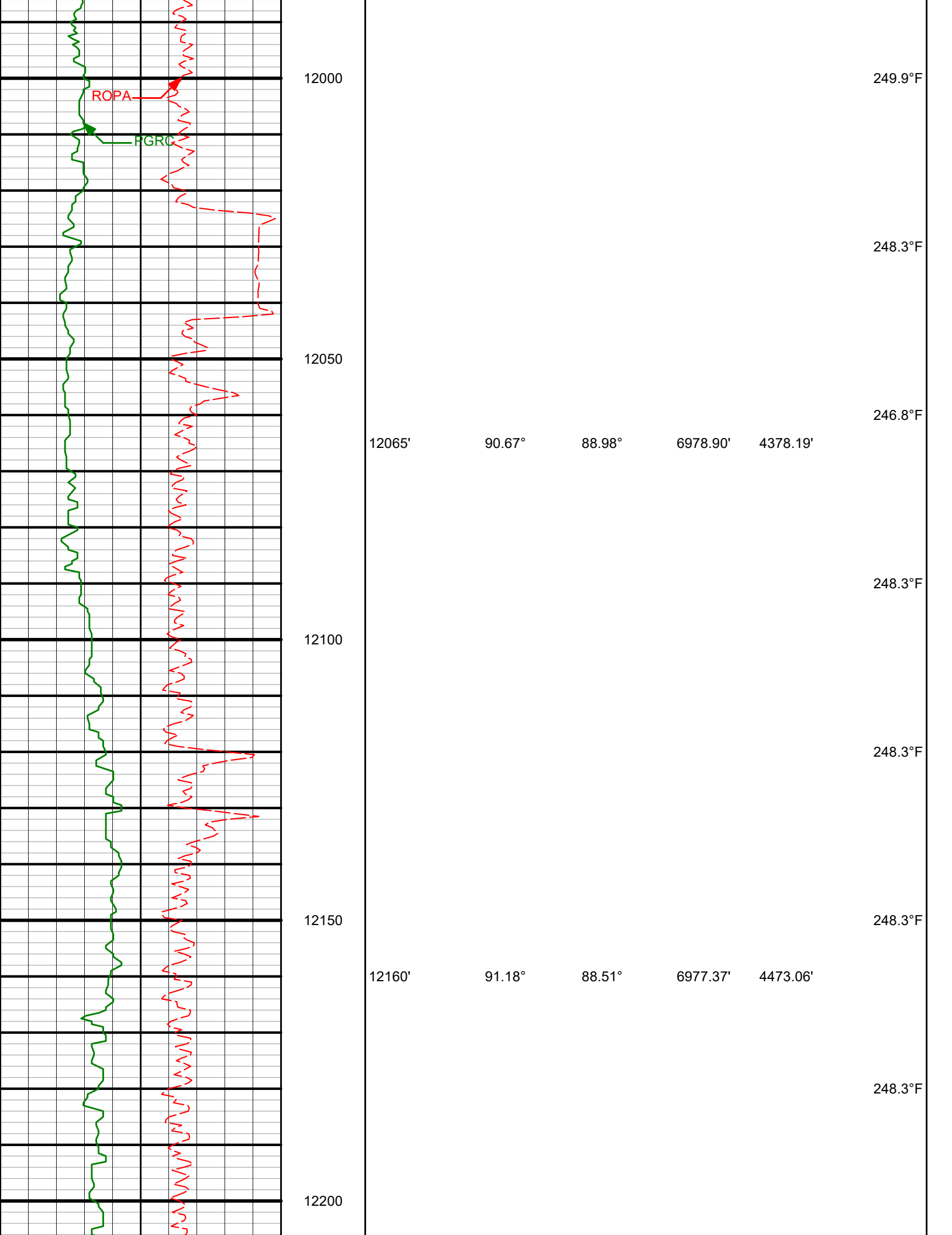
92.35°

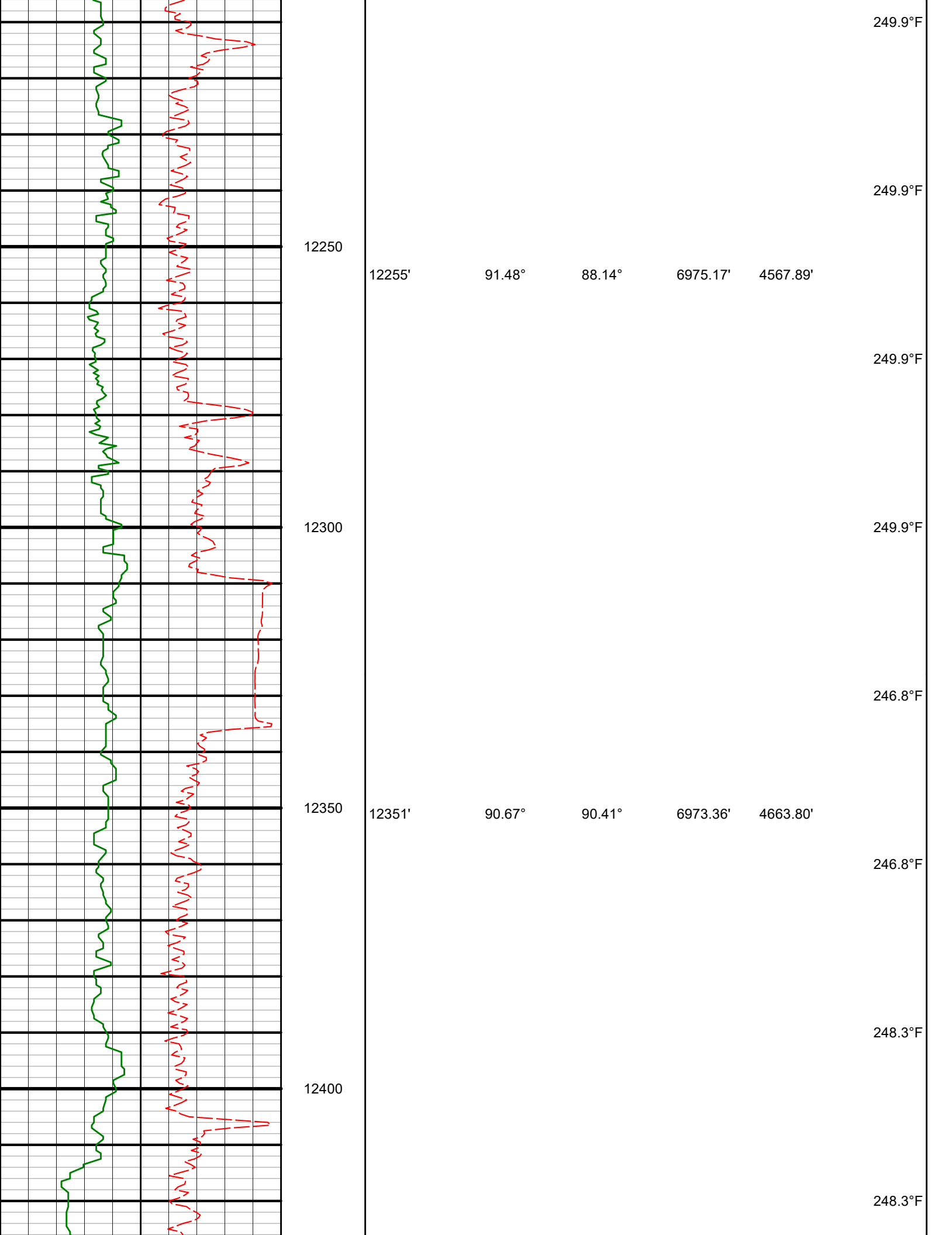
89.49°

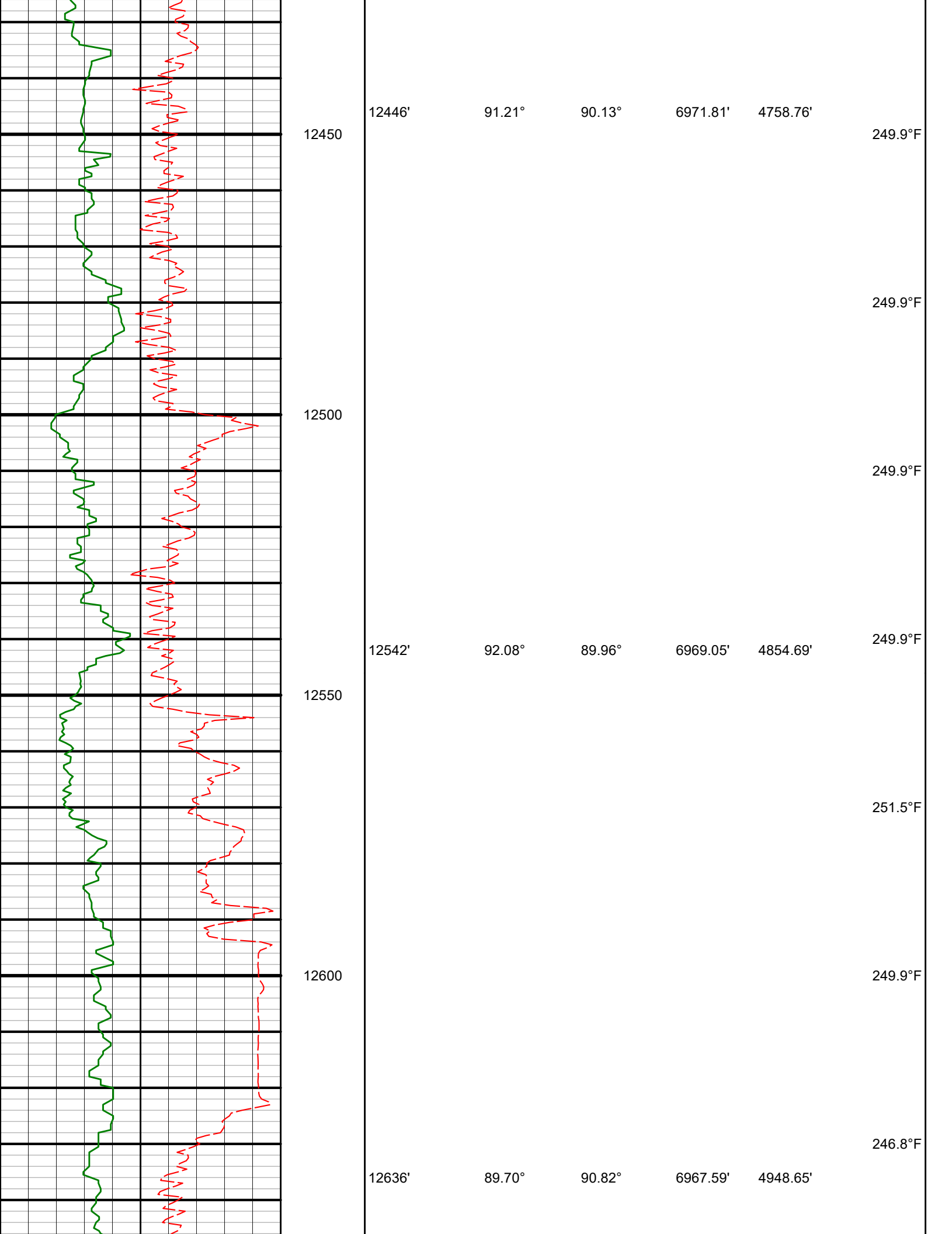
6981.41'

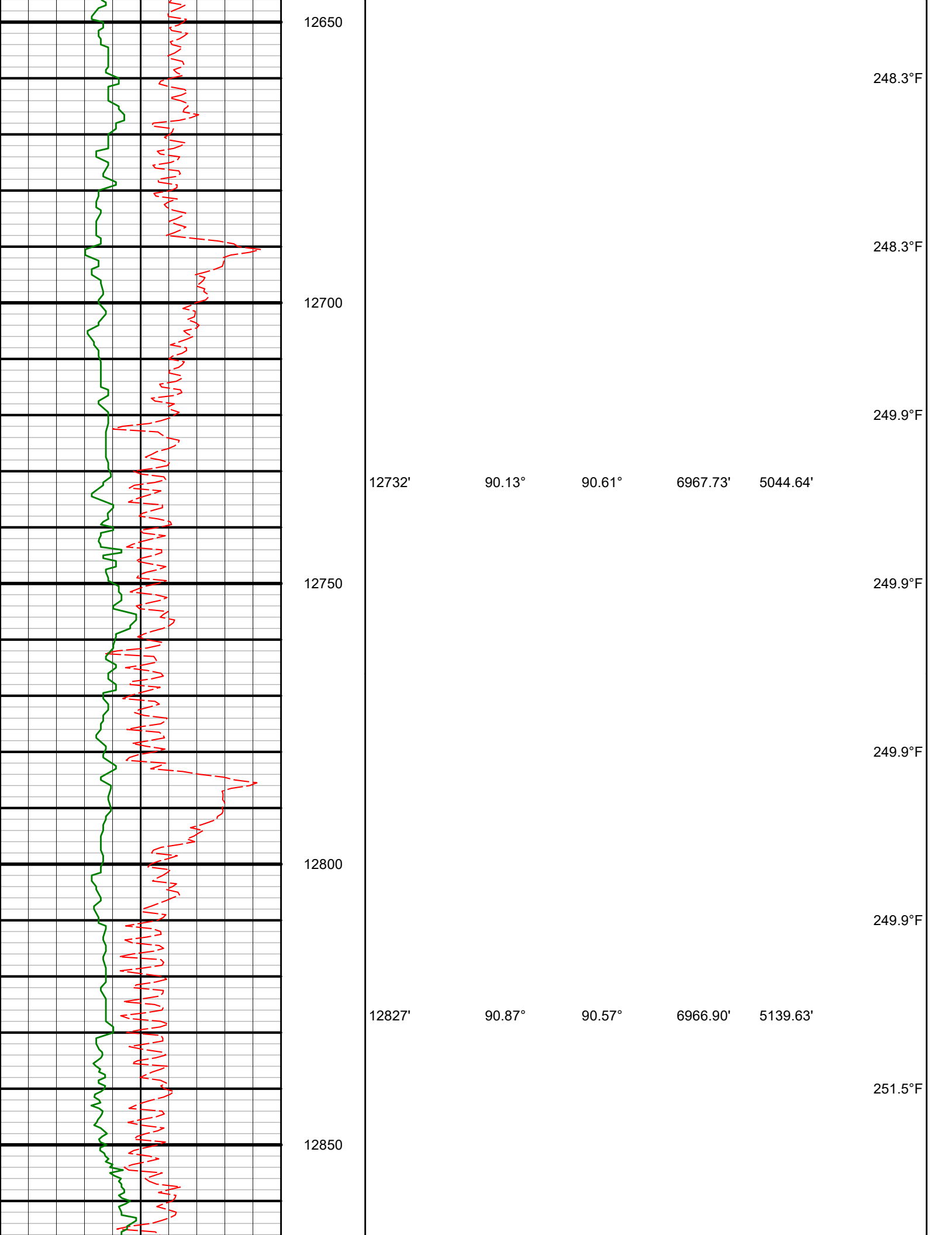
4283.30'

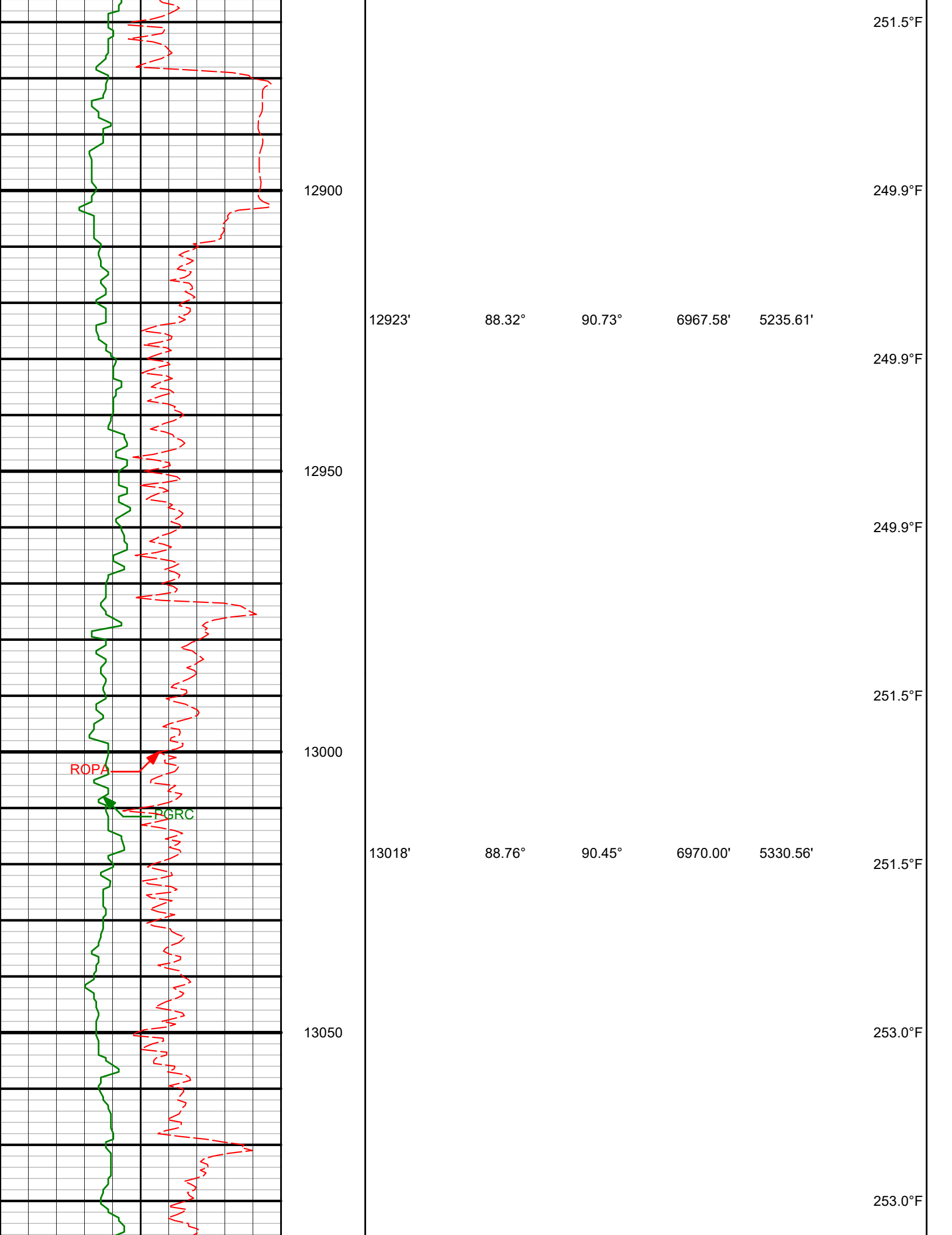
248.3°F

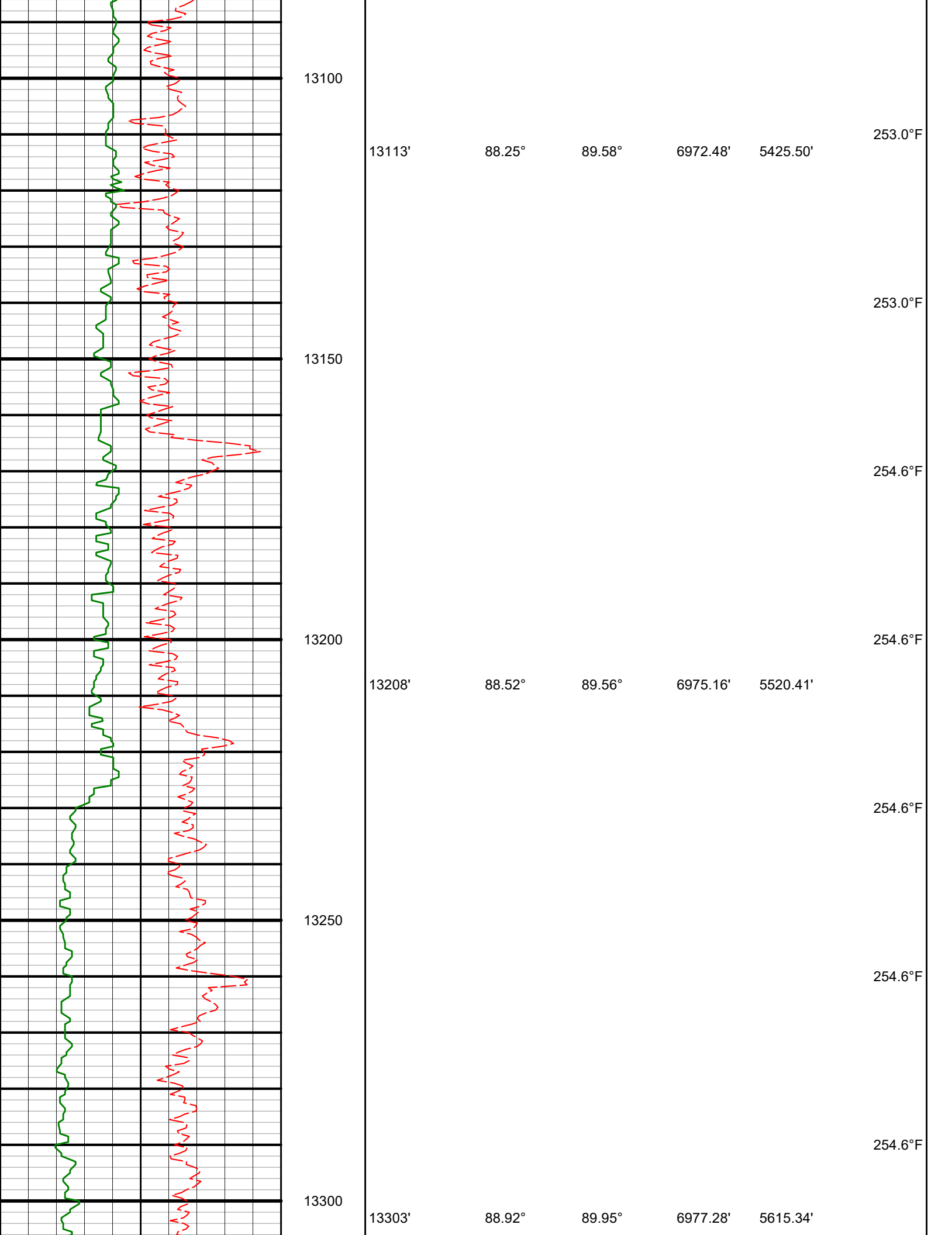


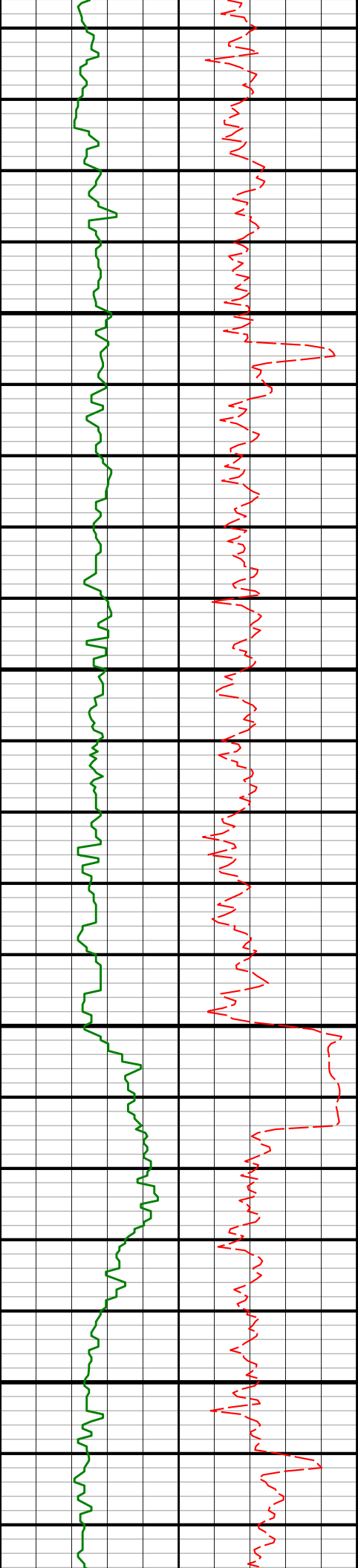












13350

13400

13450

13500

13397'

88.96°

89.70°

6979.02'

5709.28'

13493'

90.10°

89.40°

6979.81'

5805.22'

254.6°F

254.6°F

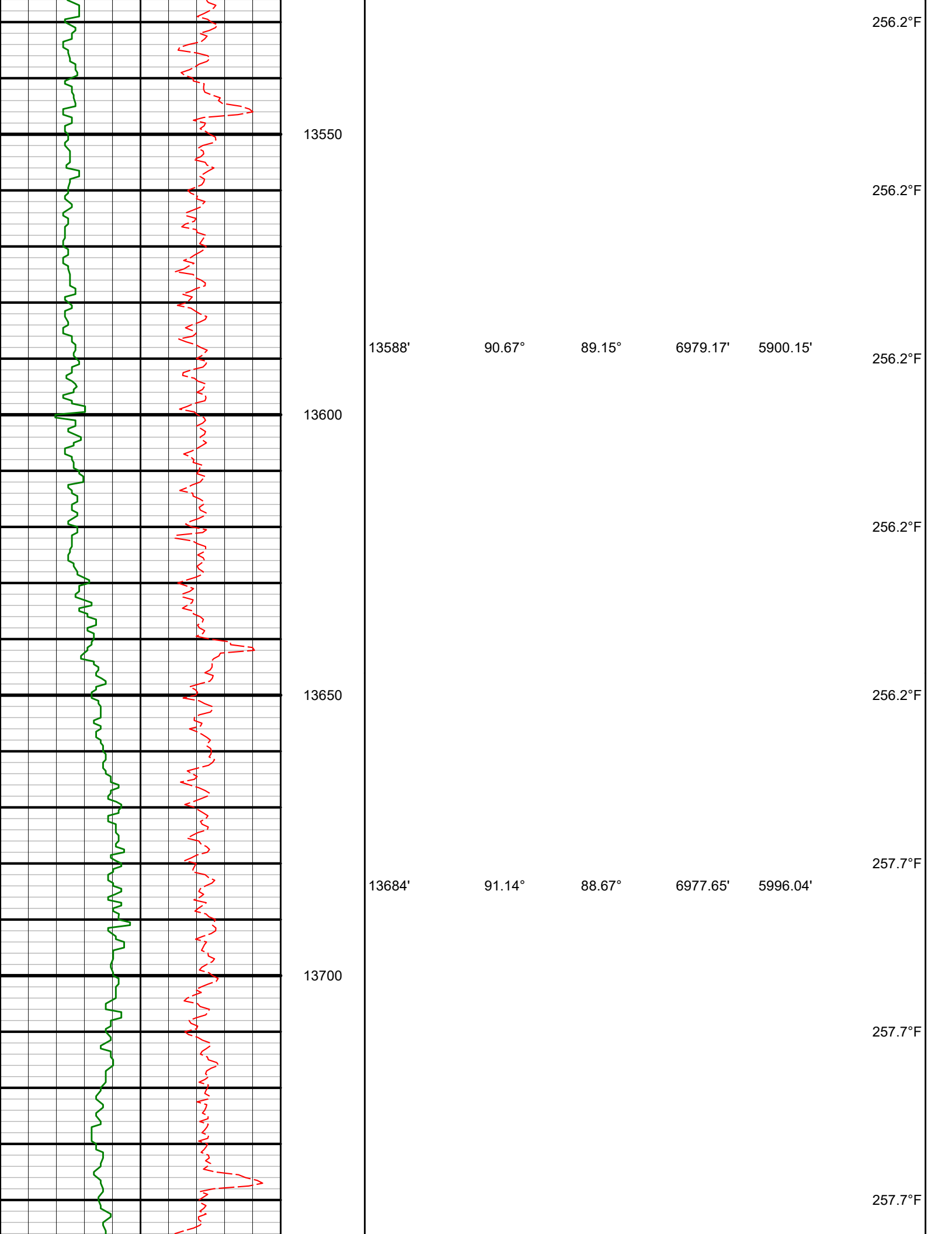
256.2°F

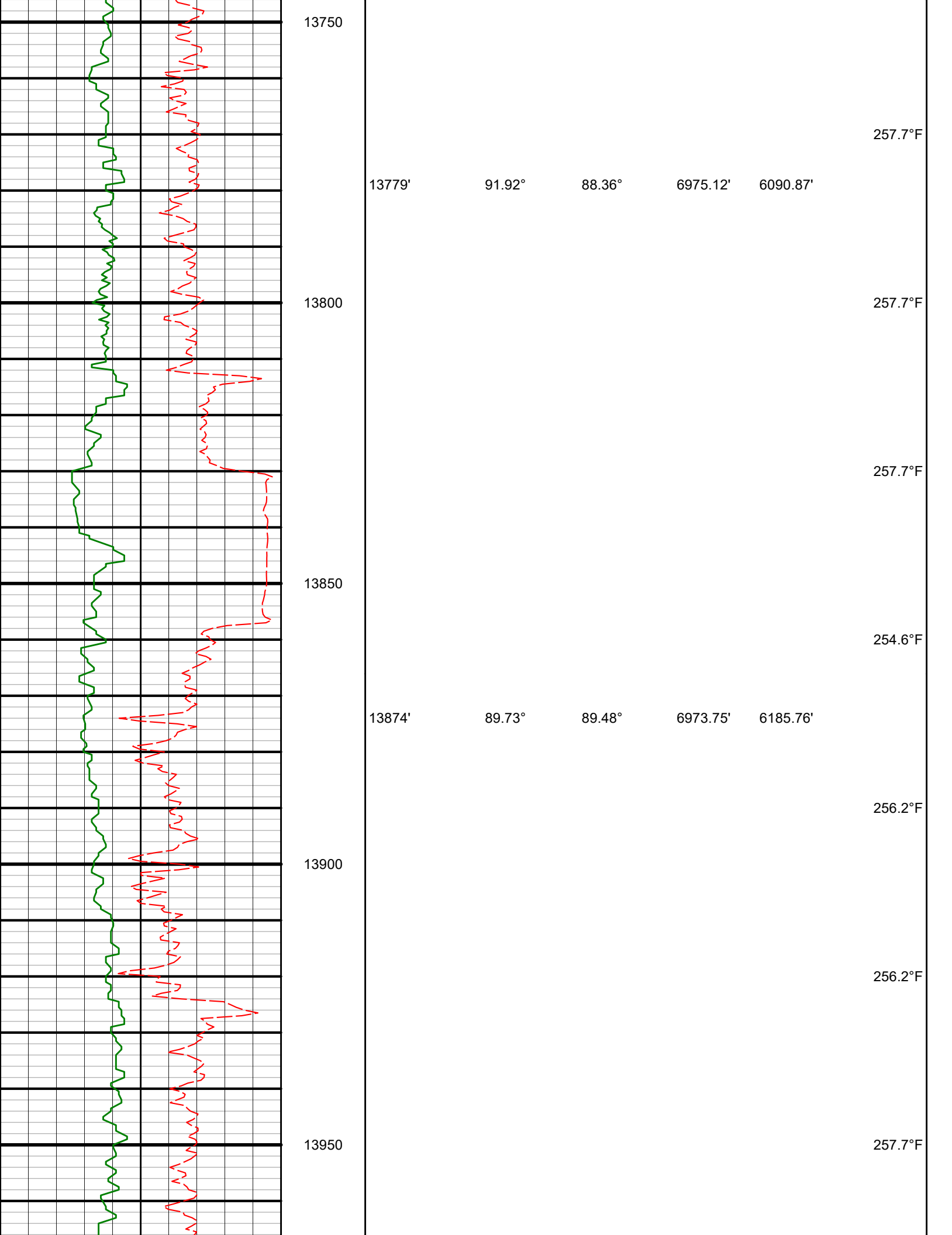
256.2°F

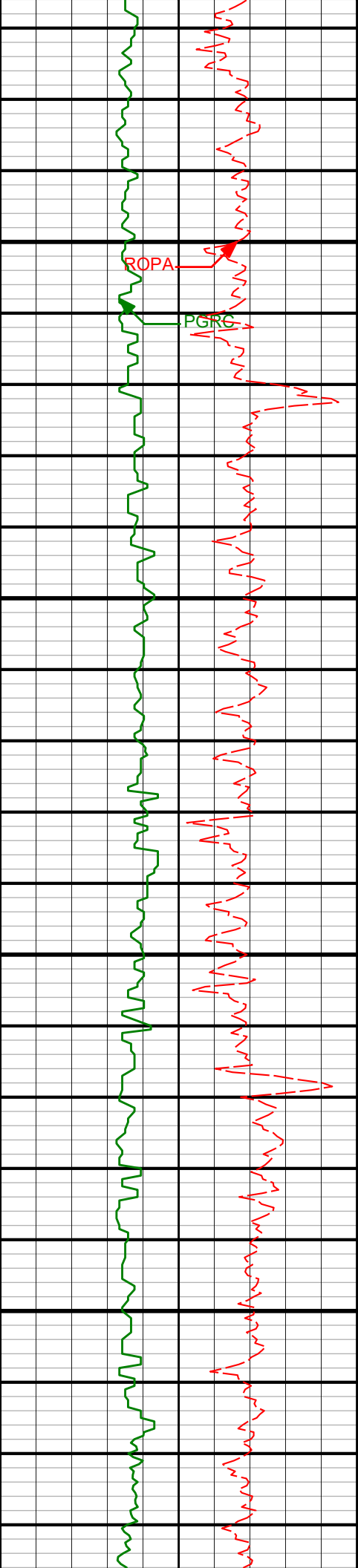
256.2°F

254.6°F

254.6°F







14000

14050

14100

14150

13970'

90.10°

88.96°

6973.89'

6281.68'

257.7°F

257.7°F

257.7°F

14065'

90.77°

88.64°

6973.17'

6376.57'

259.3°F

259.3°F

259.3°F

14160'

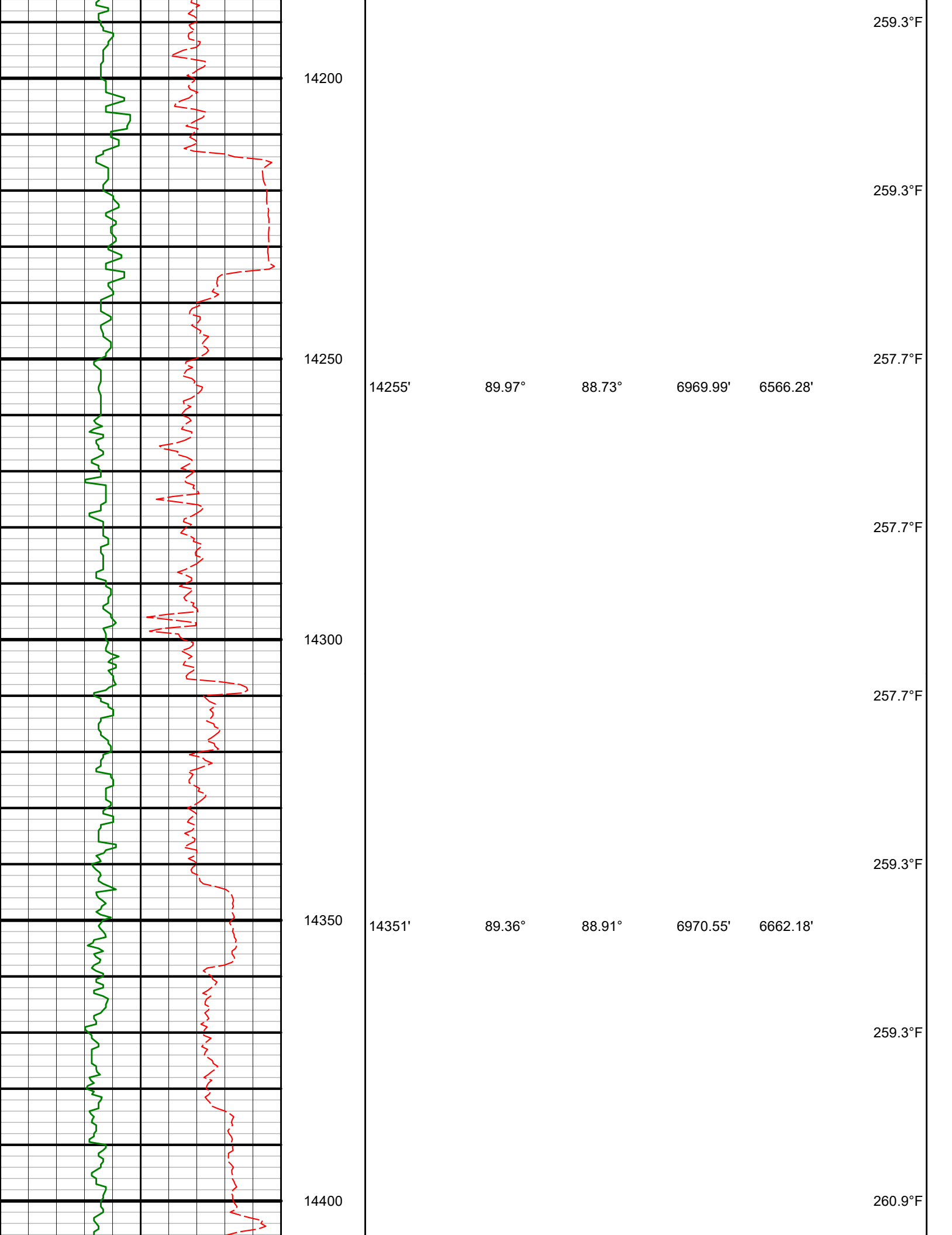
91.55°

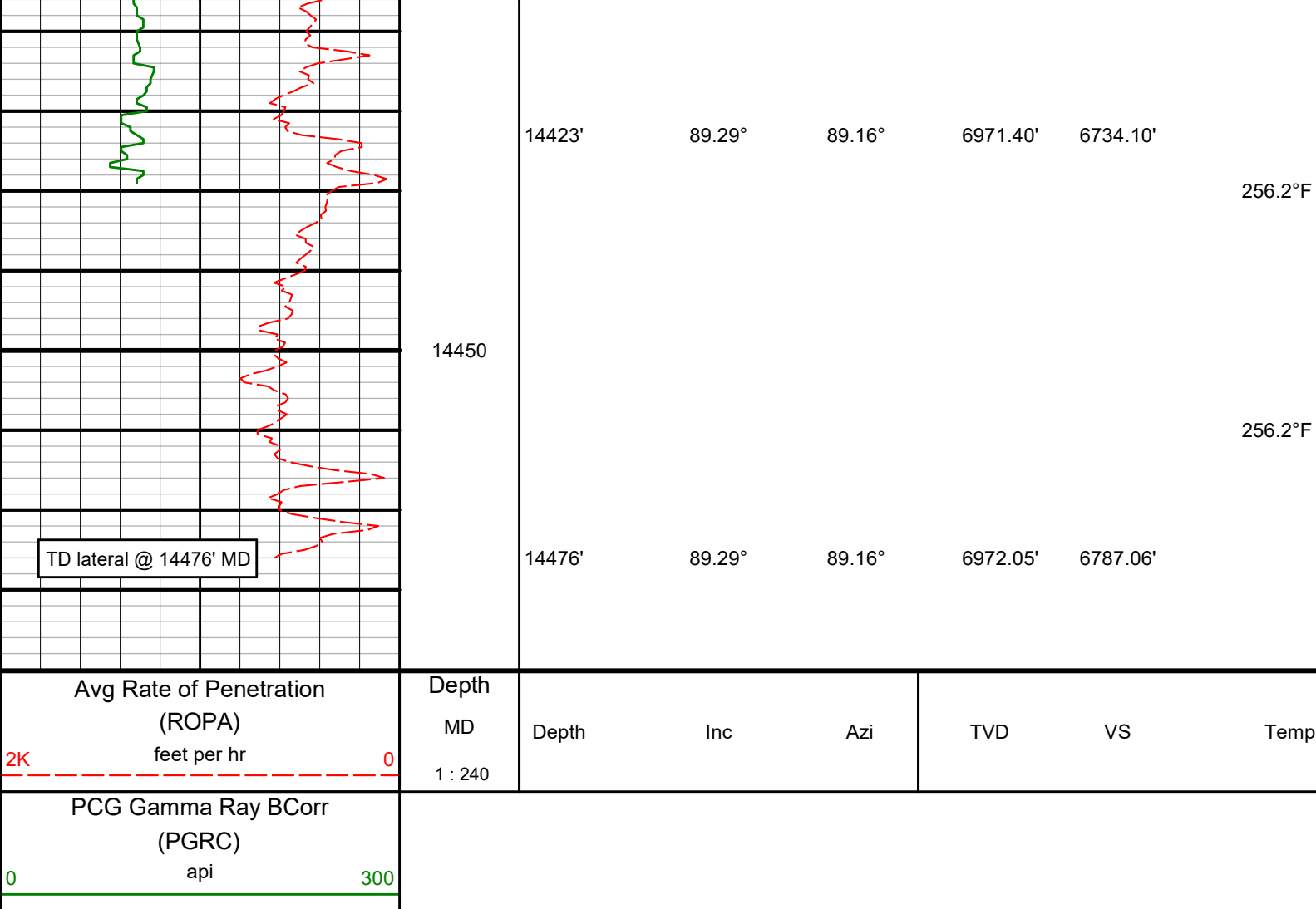
88.32°

6971.25'

6471.42'

259.3°F





HALLIBURTON

DIRECTIONAL SURVEY REPORT

Extraction Oil _Gas
GP-Cody Fed 20E-15-4
Wattenberg
Weld Colorado
USA
CA-XX-0906221578
Third party surveys are from 142' MD to 1563' MD
First Sperry survey @ 1678' MD

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
142.30	0.26	62.92	142.30	0.15 N	0.29 E	0.28	0.18
229.30	0.31	302.69	229.30	0.36 N	0.27 E	0.26	0.57
316.30	1.85	265.51	316.28	0.38 N	1.33 W	-1.34	1.86
403.30	3.96	262.43	403.16	0.12 S	5.71 W	-5.71	2.43
491.30	6.28	263.40	490.81	1.08 S	13.51 W	-13.47	2.64
578.30	7.73	261.11	577.16	2.53 S	24.01 W	-23.94	1.70
665.30	8.96	260.94	663.23	4.50 S	36.49 W	-36.36	1.41
752.30	10.02	257.86	749.04	7.16 S	50.58 W	-50.37	1.35
840.30	10.46	251.80	835.64	11.26 S	65.65 W	-65.33	1.32
927.30	9.71	250.39	921.30	16.19 S	80.06 W	-79.61	0.91
1014.30	9.49	256.81	1007.08	20.29 S	93.96 W	-93.39	1.26
1102.30	10.33	257.42	1093.77	23.67 S	108.72 W	-108.06	0.96
1189.30	9.89	258.13	1179.42	26.90 S	123.65 W	-122.90	0.53
1276.30	9.76	256.63	1265.14	30.14 S	138.13 W	-137.30	0.33

1364.30	9.45	257.86	1351.91	33.39 S	152.45 W	-151.53	0.42
1451.30	9.93	259.88	1437.67	36.21 S	166.82 W	-165.81	0.68
1538.30	9.18	256.37	1523.46	39.16 S	180.95 W	-179.86	1.09
1562.30	9.44	256.02	1547.14	40.09 S	184.72 W	-183.61	1.11
1678.00	9.11	254.42	1661.33	44.84 S	202.75 W	-201.51	0.36
1773.00	8.97	253.29	1755.15	48.99 S	217.09 W	-215.73	0.24
1869.00	8.86	252.05	1849.99	53.42 S	231.29 W	-229.81	0.23
1964.00	8.39	250.54	1943.92	57.98 S	244.78 W	-243.18	0.55
2059.00	9.39	255.57	2037.78	62.22 S	258.82 W	-257.11	1.33
2155.00	9.10	255.40	2132.53	66.09 S	273.75 W	-271.93	0.30
2250.00	10.03	259.19	2226.21	69.53 S	289.15 W	-287.23	1.18
2345.00	9.06	257.96	2319.89	72.65 S	304.59 W	-302.59	1.04
2440.00	8.38	254.85	2413.79	76.02 S	318.59 W	-316.49	0.87
2535.00	10.12	258.60	2507.56	79.48 S	333.45 W	-331.26	1.94
2631.00	9.79	258.34	2602.11	82.79 S	349.72 W	-347.43	0.35
2725.00	9.68	259.29	2694.76	85.88 S	365.31 W	-362.93	0.21
2821.00	9.55	259.03	2789.41	88.89 S	381.06 W	-378.60	0.14
2916.00	8.89	257.28	2883.18	92.01 S	395.95 W	-393.41	0.75
3012.00	10.31	259.41	2977.83	95.22 S	411.63 W	-409.00	1.52
3107.00	9.61	259.50	3071.40	98.23 S	427.79 W	-425.07	0.74
3203.00	8.65	257.02	3166.18	101.31 S	442.70 W	-439.90	1.08
3297.00	10.60	261.23	3258.86	104.22 S	458.14 W	-455.25	2.20
3393.00	9.12	258.91	3353.44	107.03 S	474.33 W	-471.37	1.60
3487.00	7.94	256.15	3446.40	110.01 S	487.94 W	-484.90	1.33
3582.00	9.63	260.64	3540.28	112.88 S	502.16 W	-499.03	1.92
3677.00	8.34	259.50	3634.11	115.42 S	516.77 W	-513.57	1.37
3773.00	8.10	257.78	3729.13	118.12 S	530.23 W	-526.95	0.36
3868.00	8.06	258.33	3823.18	120.89 S	543.29 W	-539.94	0.09
3964.00	8.09	258.32	3918.23	123.62 S	556.50 W	-553.07	0.03
4058.00	7.93	259.04	4011.31	126.19 S	569.34 W	-565.84	0.20
4154.00	10.06	263.28	4106.13	128.43 S	584.17 W	-580.61	2.32
4248.00	8.70	265.31	4198.87	129.97 S	599.41 W	-595.80	1.49
4344.00	9.62	260.77	4293.65	131.85 S	614.56 W	-610.90	1.22
4439.00	8.32	260.00	4387.48	134.32 S	629.17 W	-625.44	1.37
4534.00	10.01	260.50	4481.27	136.87 S	644.08 W	-640.28	1.78
4629.00	10.71	257.05	4574.72	140.22 S	660.83 W	-656.93	0.98
4725.00	8.76	256.22	4669.33	143.96 S	676.62 W	-672.62	2.04
4819.00	10.92	259.25	4761.94	147.32 S	692.32 W	-688.23	2.36
4913.00	9.00	253.52	4854.52	151.07 S	708.12 W	-703.93	2.30
5030.00	11.23	260.38	4969.70	155.57 S	728.14 W	-723.81	2.16
5125.00	9.96	257.06	5063.08	158.96 S	745.26 W	-740.85	1.48
5220.00	8.43	250.55	5156.86	163.11 S	759.84 W	-755.31	1.95
5315.00	9.25	256.09	5250.73	167.27 S	773.82 W	-769.17	1.24
5411.00	9.78	261.11	5345.41	170.38 S	789.36 W	-784.63	1.03
5506.00	8.60	257.50	5439.19	173.17 S	804.27 W	-799.46	1.38
5601.00	9.63	254.29	5532.99	176.86 S	818.85 W	-813.94	1.21
5696.00	8.75	256.11	5626.77	180.74 S	833.52 W	-828.50	0.98
5791.00	9.98	261.28	5720.51	183.73 S	848.67 W	-843.57	1.57
5886.00	8.35	258.02	5814.29	186.41 S	863.55 W	-858.38	1.80
5982.00	7.09	254.94	5909.42	189.39 S	876.09 W	-870.84	1.38
6076.00	5.56	254.52	6002.85	192.12 S	886.09 W	-880.75	1.63
6171.00	4.04	251.80	6097.51	194.39 S	893.70 W	-888.31	1.62
6266.00	2.48	200.12	6192.37	197.37 S	897.59 W	-892.11	3.34
6362.00	0.43	7.70	6288.35	198.96 S	898.25 W	-892.74	3.02
6456.00	1.94	65.17	6382.32	197.94 S	896.76 W	-891.27	1.86
6551.00	11.92	91.70	6476.52	197.56 S	885.47 W	-879.99	10.76
6646.00	19.55	93.85	6567.90	198.92 S	859.76 W	-854.26	8.05
6742.00	28.09	92.98	6655.64	201.17 S	821.09 W	-815.55	8.90
6836.00	36.40	92.40	6735.07	203.50 S	771.04 W	-765.45	8.85
6932.00	44.78	87.55	6807.92	203.24 S	708.67 W	-703.11	9.32
7027.00	54.48	85.98	6869.39	199.09 S	636.51 W	-631.08	10.29
7122.00	61.70	88.11	6919.57	195.00 S	556.03 W	-550.73	7.83
7217.00	72.43	90.54	6956.54	194.04 S	468.68 W	-463.44	11.54
7312.00	81.50	90.67	6977.95	195.02 S	376.23 W	-370.99	9.55
7407.00	87.72	90.11	6986.87	195.66 S	281.70 W	-276.48	6.57
7501.00	87.48	89.49	6990.81	195.33 S	187.78 W	-182.60	0.71
7596.00	89.03	90.07	6993.70	194.97 S	92.83 W	-87.69	1.74
7692.00	89.29	89.81	6995.11	194.87 S	3.16 E	8.26	0.38
7787.00	89.66	89.76	6995.98	194.51 S	98.16 E	103.21	0.39
7882.00	89.90	89.92	6996.34	194.25 S	193.15 E	198.17	0.30
8072.00	91.11	89.05	6994.67	192.54 S	383.13 E	388.04	0.78

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 91.50 DEGREES (TRUE)
A TOTAL CORRECTION OF 7.76 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 14476.00 FEET
IS 6787.07 FEET ALONG 91.40 DEGREES (TRUE)

Final survey is a projection to bit.

Date Printed:26 February 2020