



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	09-Apr-16				
Rig Bit Number	0100				
Bit Size (in)	8.500				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	1,951.98				
Log End Depth (TVD, ft)	6,692.48				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	07-Apr-16 09:13				
Drill/Wipe End Date and Time	09-Apr-16 10:00				
Min Inc (deg) @ Depth (TVD, ft)	0.13 @ 3,573.93				
Max Inc (deg) @ Depth (TVD, ft)	91.96 @ 6,696.07				
Bit TFA(in2) / Bit Type	1.53 / PDC				
Flow Rate (gpm)	595.29				
Max AV (fpm) / CV (fpm) @ MWD	550.0 / N/A				
Fluid Type	Diesel Mud Base				
Density (ppg) / Viscosity (spqt)	9.19 / 43.00				
Filtrate CL (ppm)	42,500.00				
pH / Fluid Loss (mptm)	N/A / N/A				
PV (cP) / YP (lhf2)	12 / 8.00				
% Solids / % Sand	8.00 / 0				
% Oil / Oil:Water Ratio	67.00 / 74:26				
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	222.00 / 20.00				

Max Tool Temp (degF) / Source	230.30 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Mason Smith				
Customer Representative	Johnny Sanchez				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11382329				
Insert Serial Number	12230080				
Date and Time Initialized	07-Apr-16 03:56				
Date and Time Read	09-Apr-16 18:15				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	57.96				
Software Version	6.33				
Sub Serial Number	11382329				
Sonde Serial Number	11478016				
Sensor ID Number	N/A				
Toolface Offset (deg)	149.60				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	47.84				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11382329				
Insert/Sonde Serial Number	11293354				

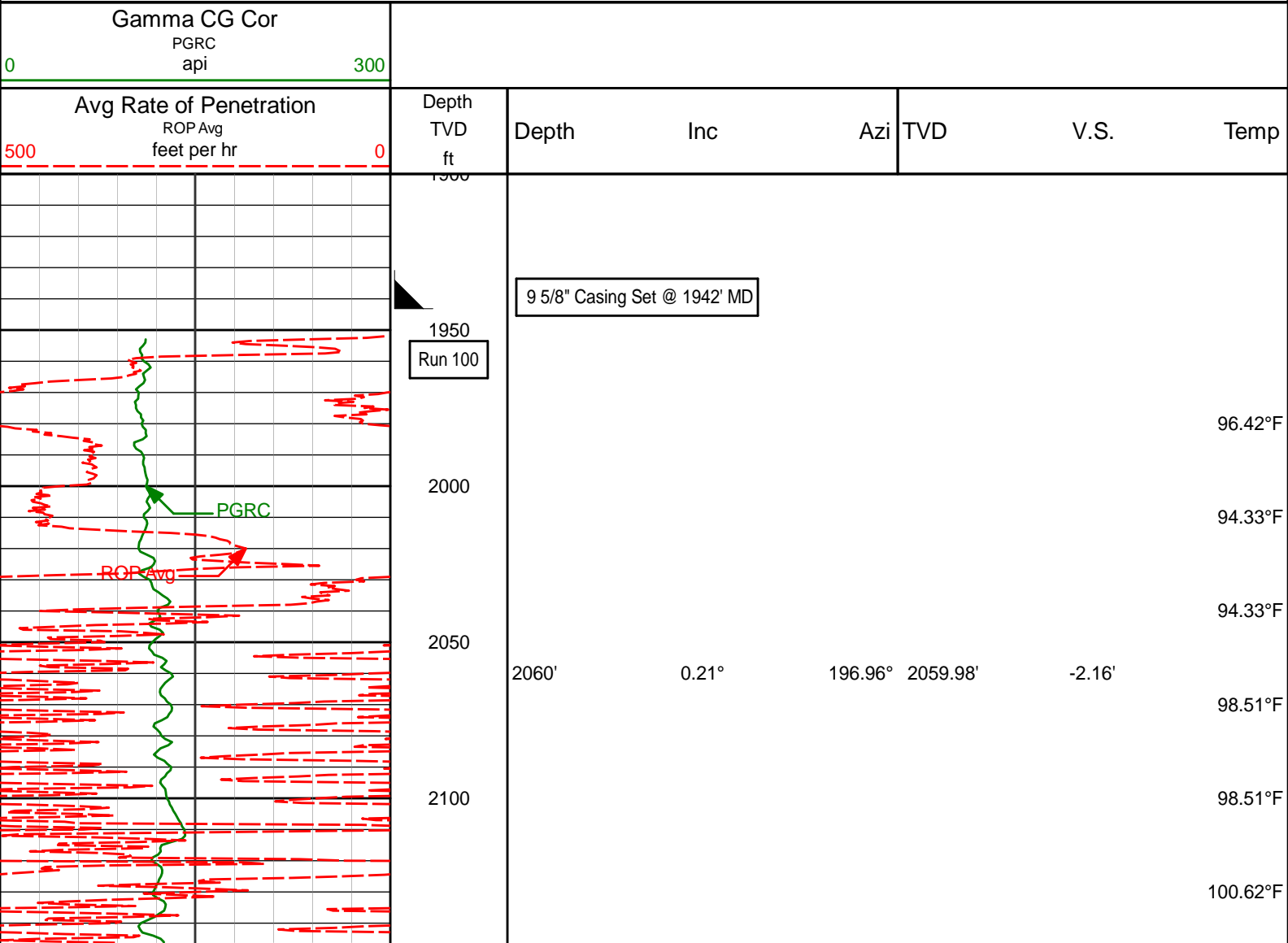
REMARKS

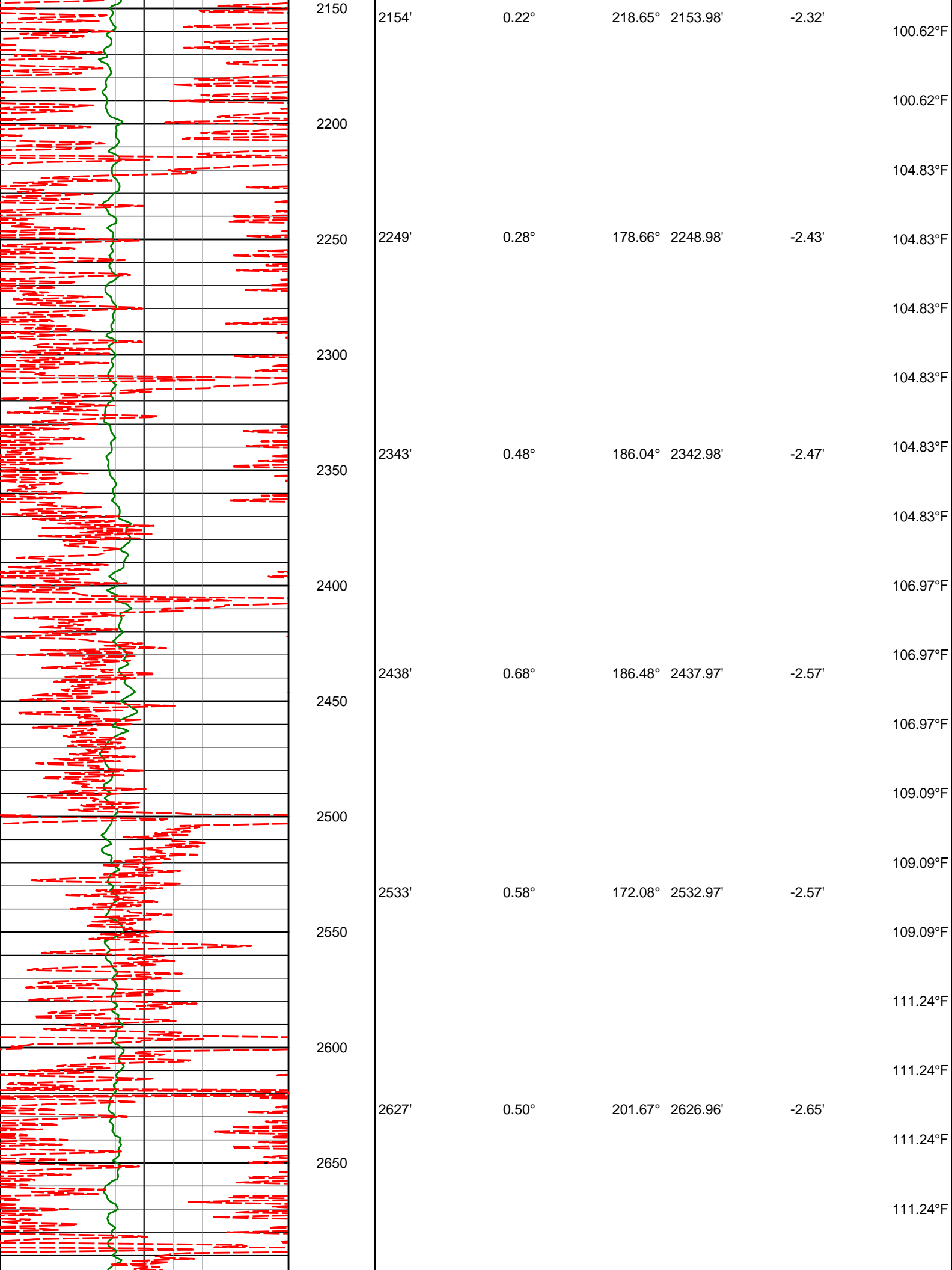
1. All depths are calibrated to driller's pipe tally and are true vertical depths from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The following smoothing parameters have been applied 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)
5. Final survey is a projection to the bit.

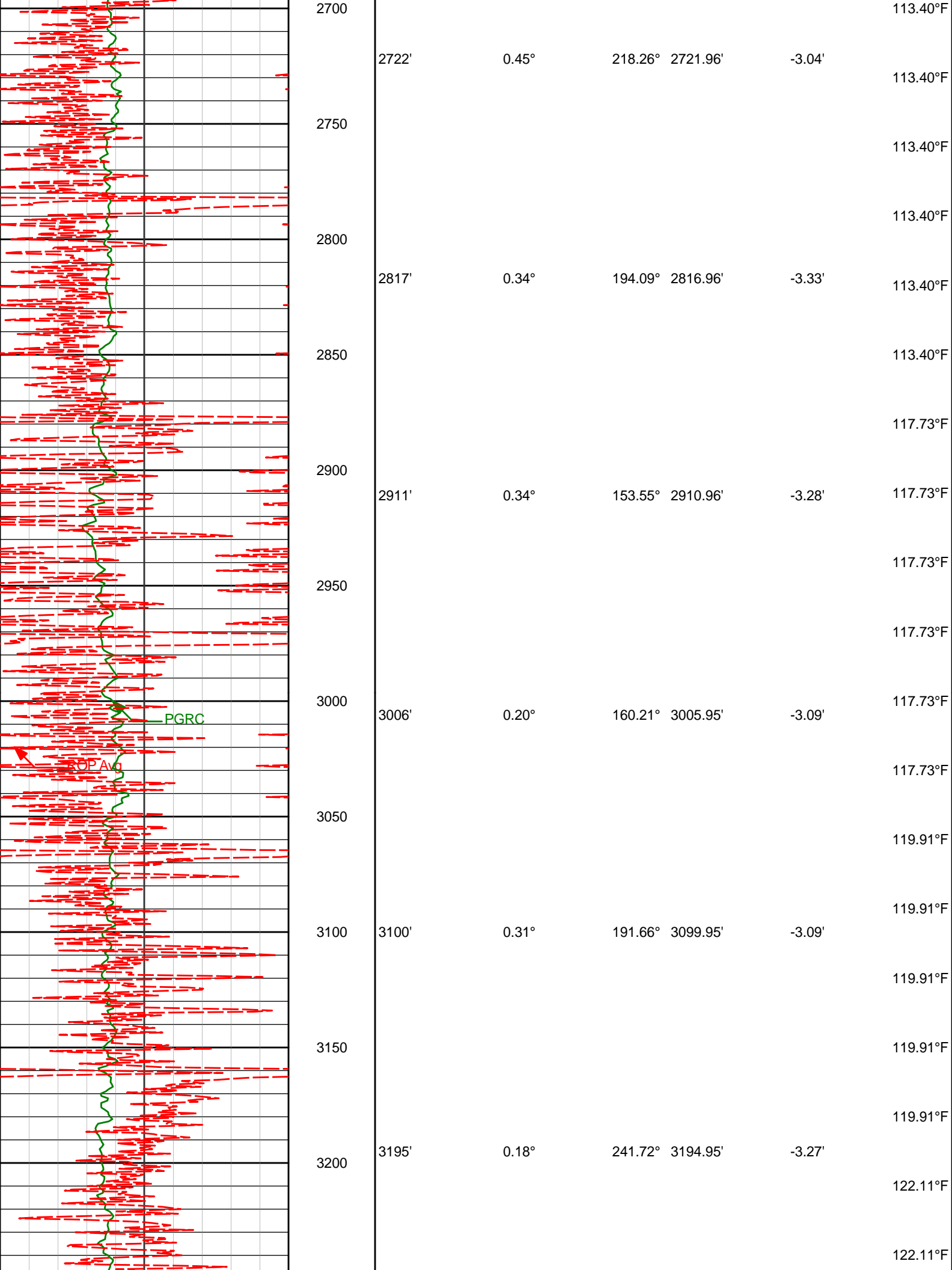
WARRANTY

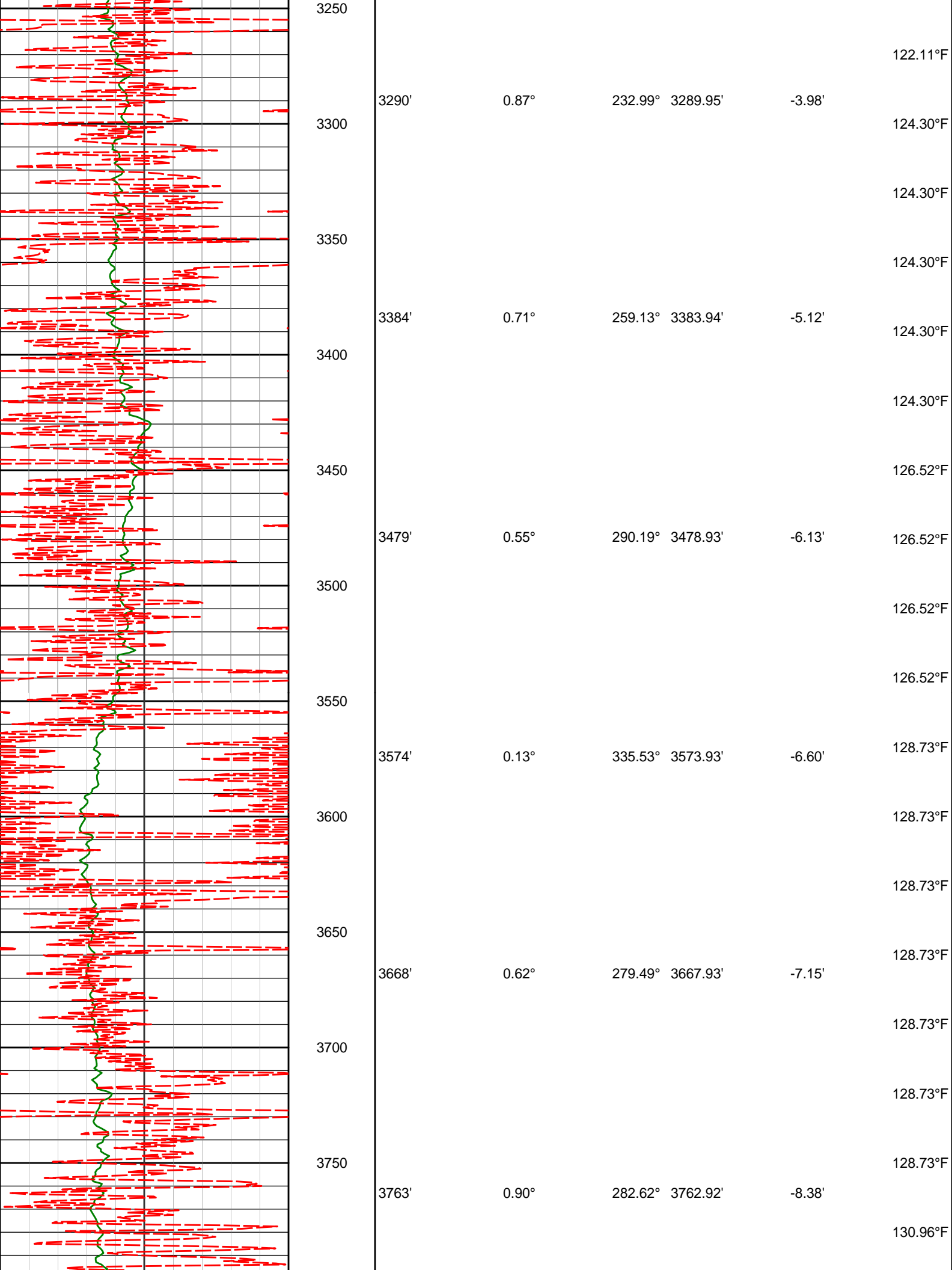
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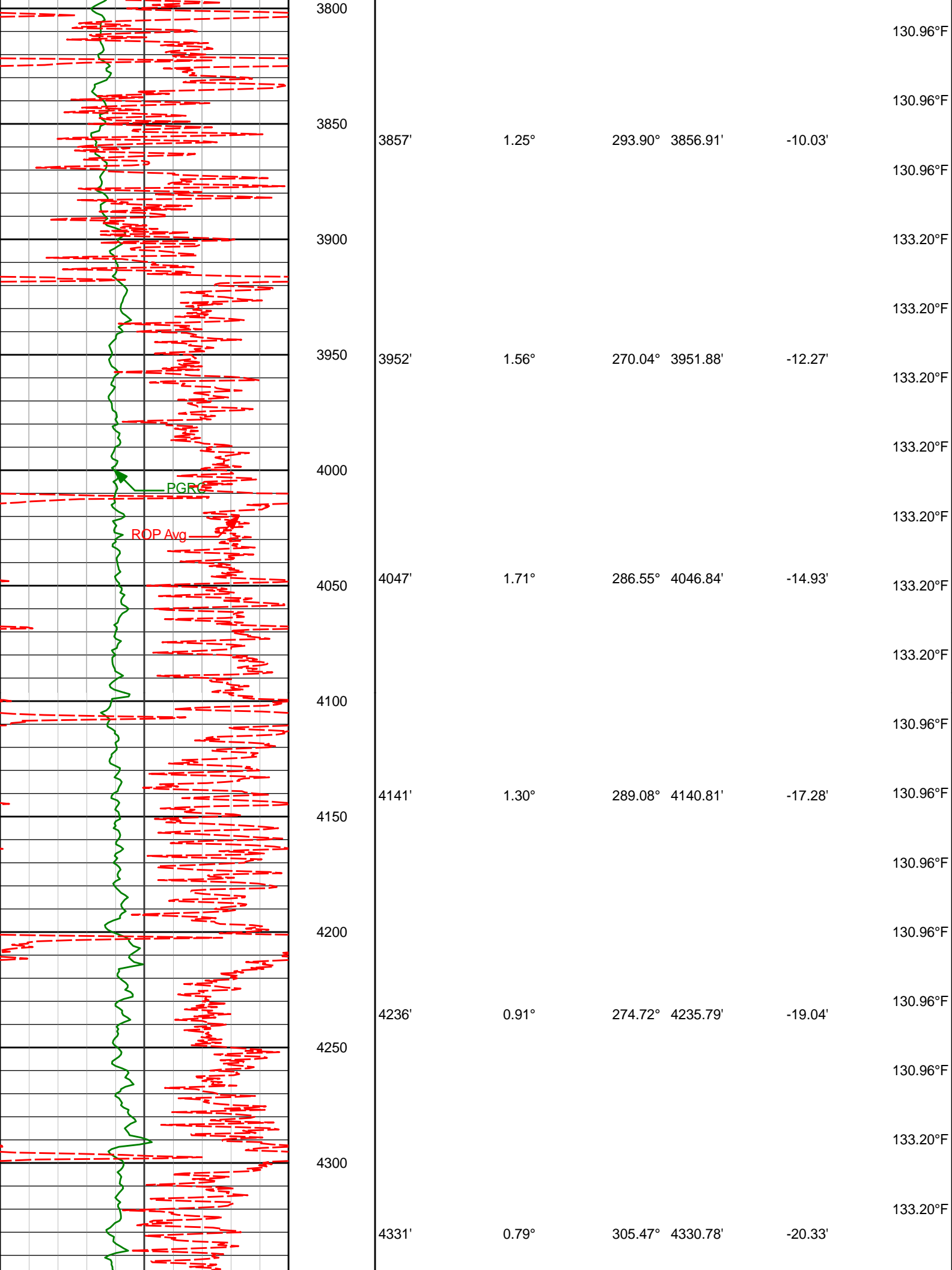
TVD Detail 1:600 Scale

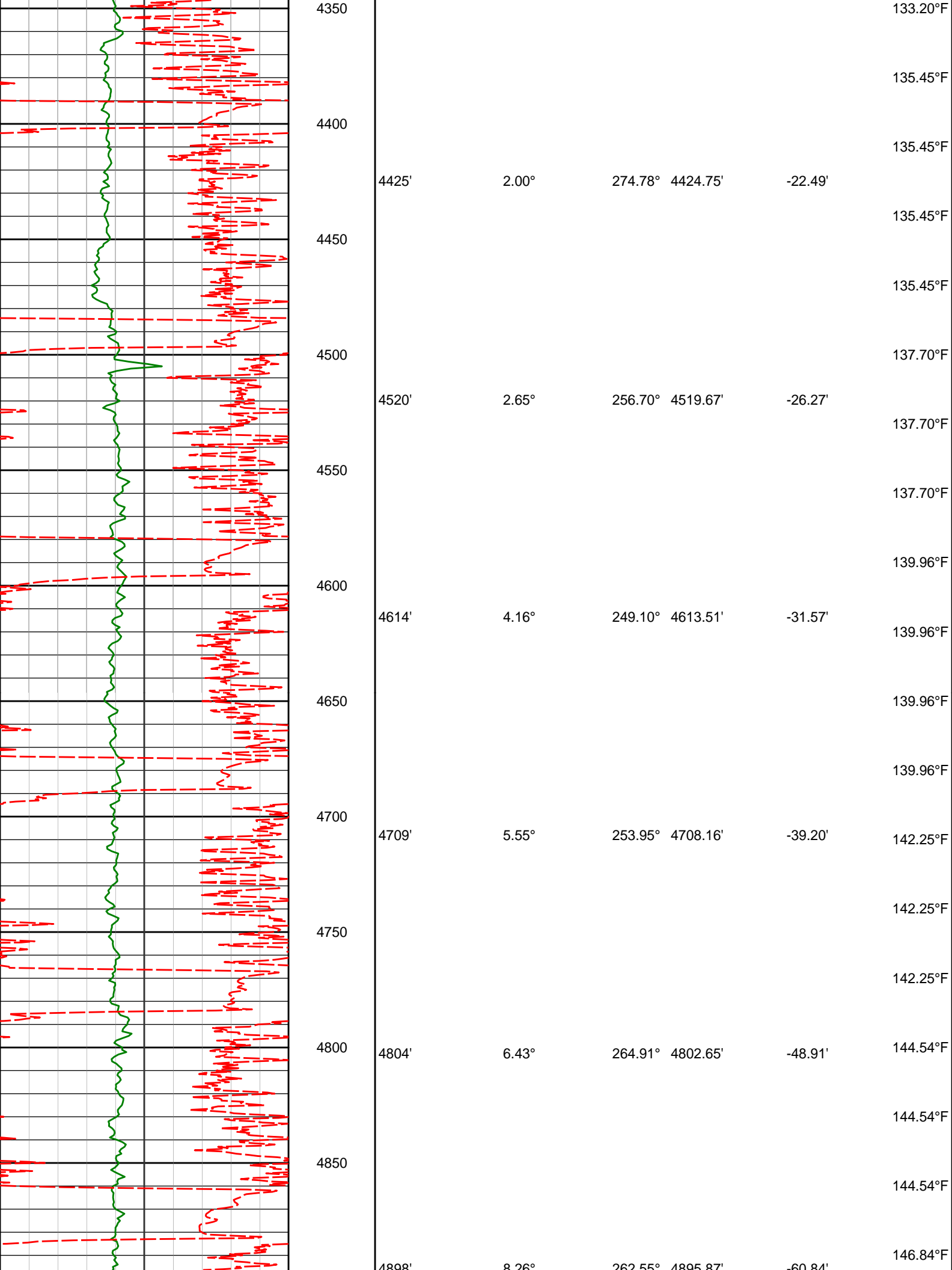


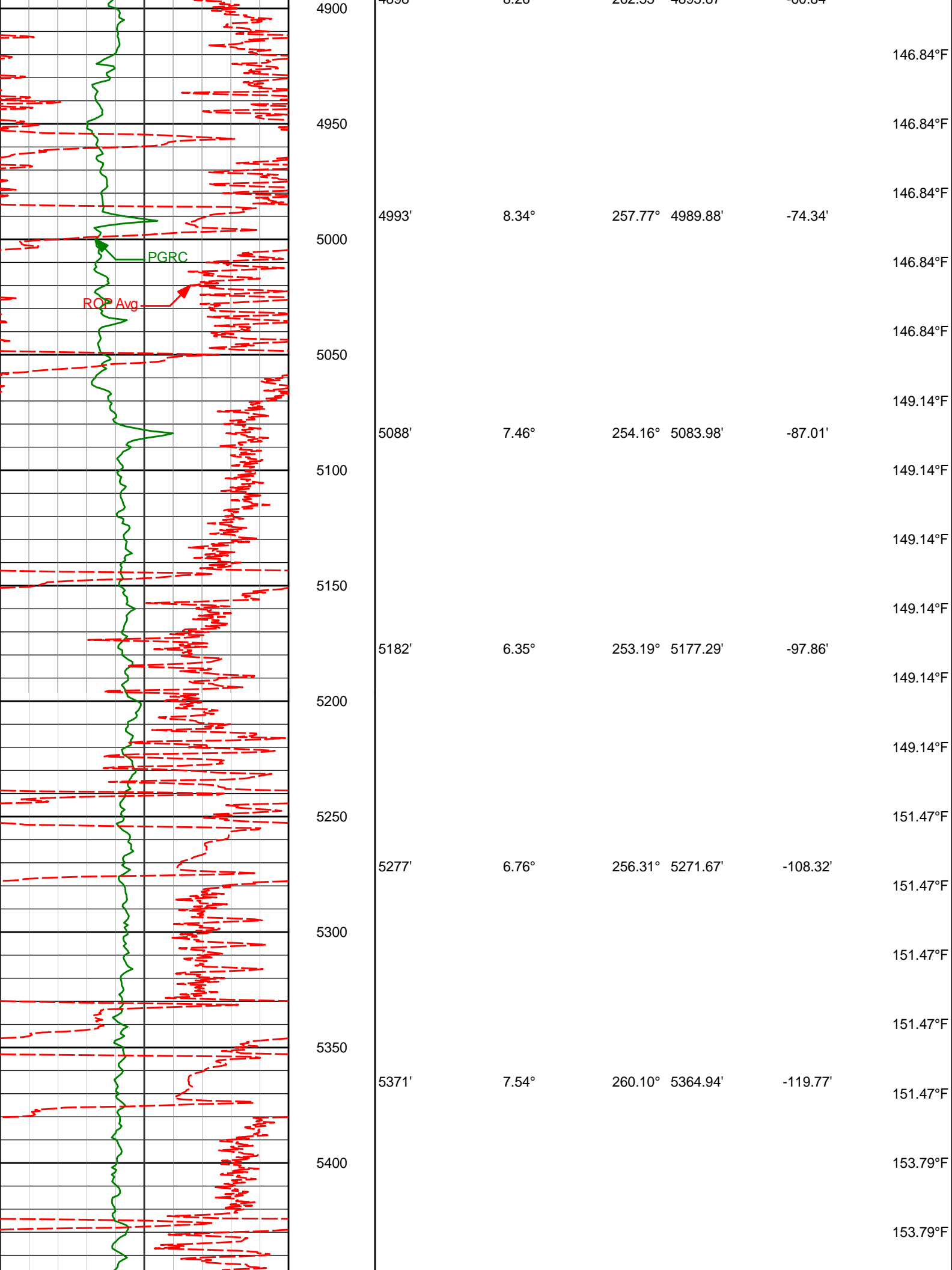


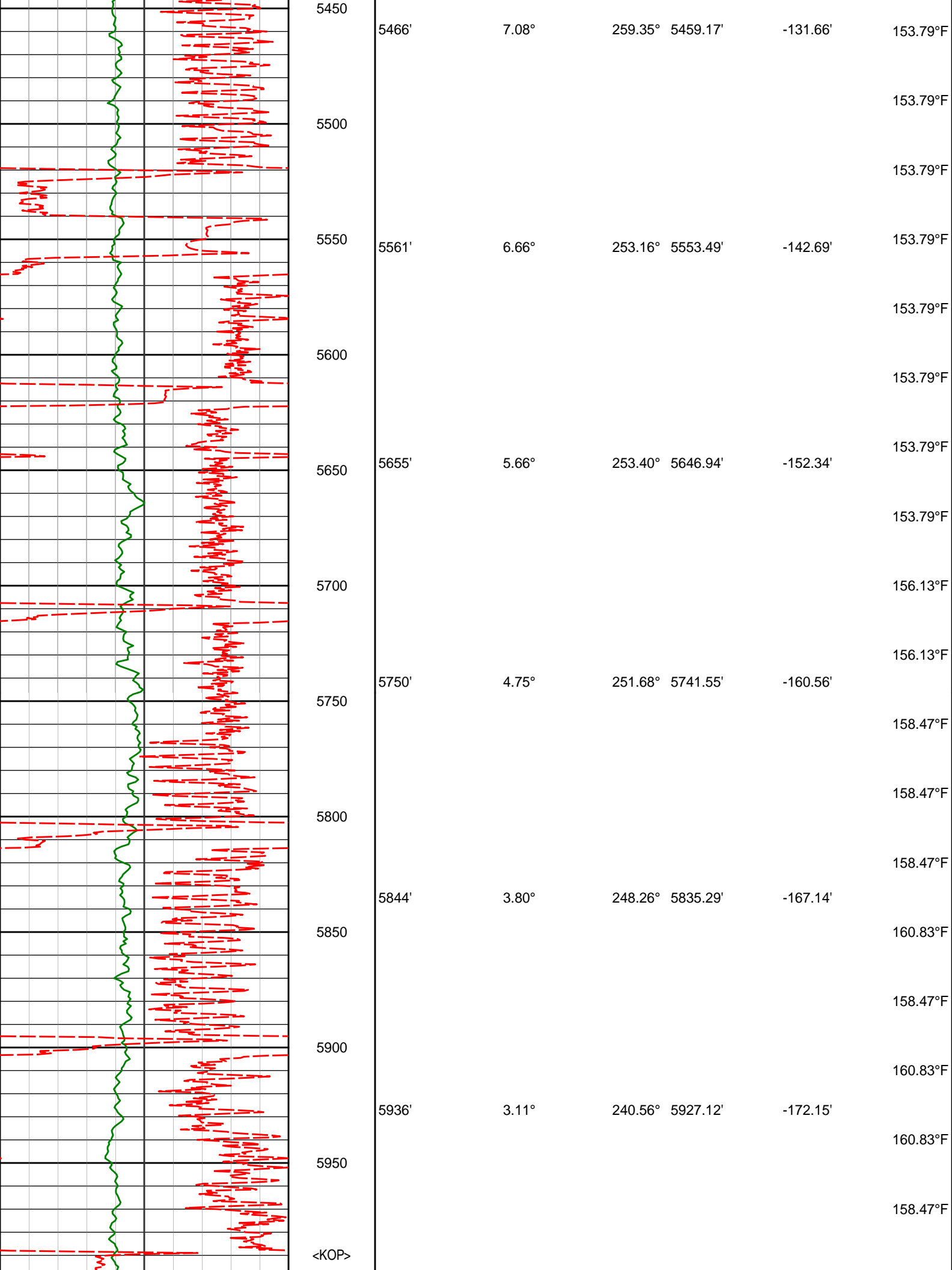


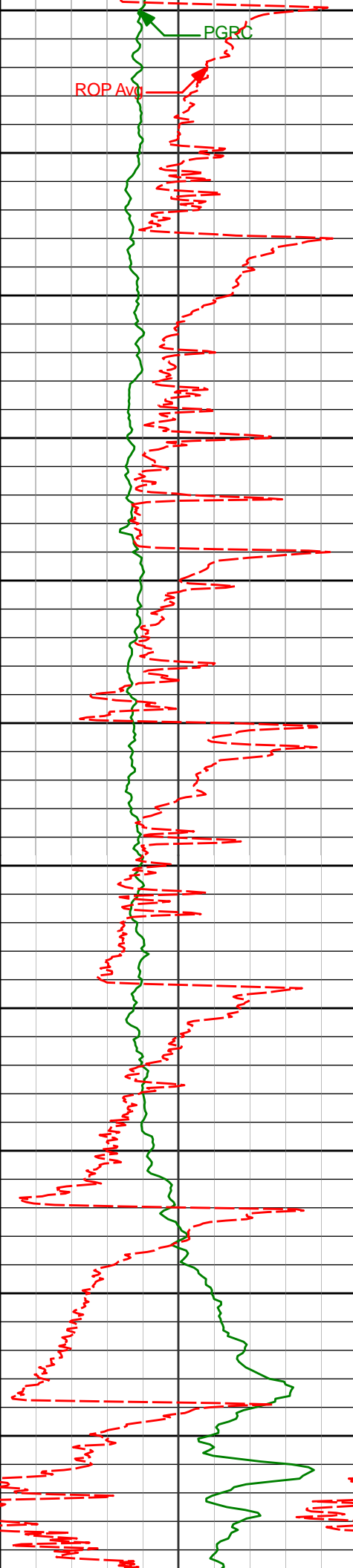




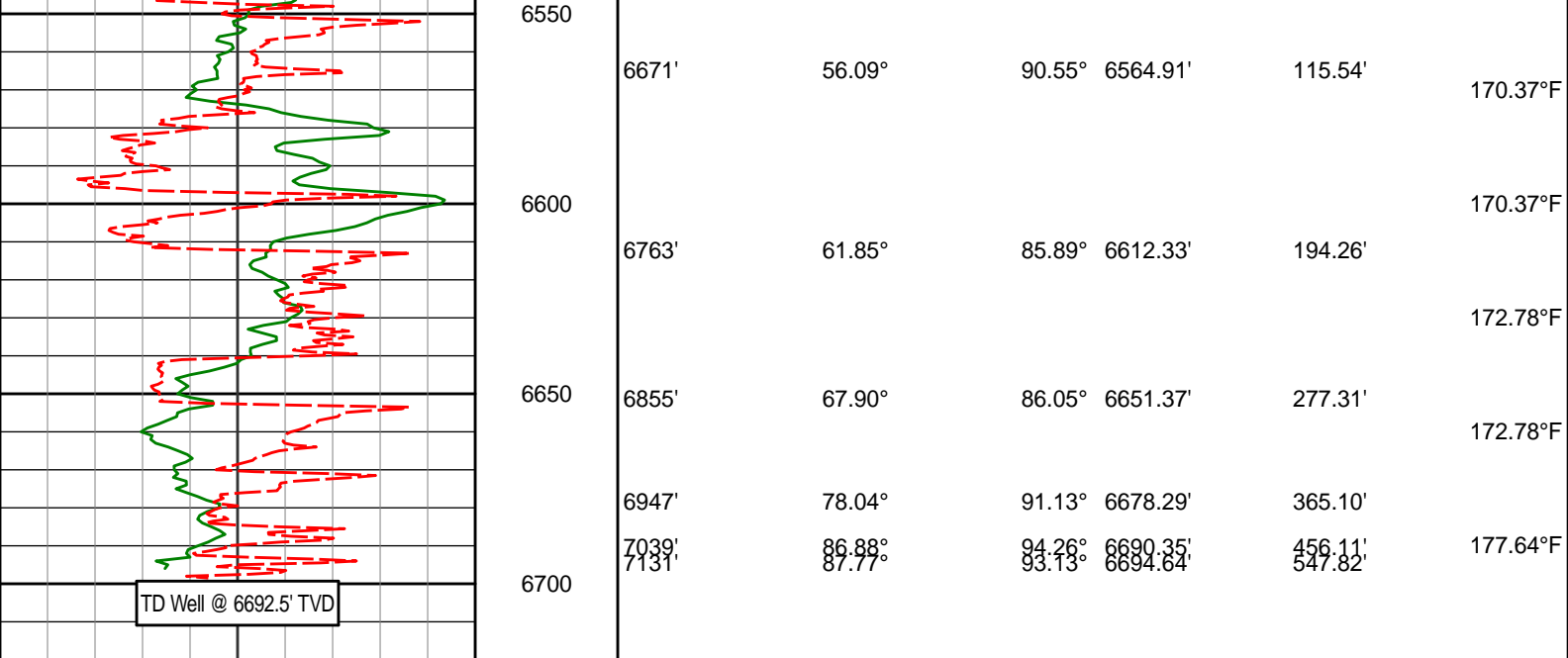






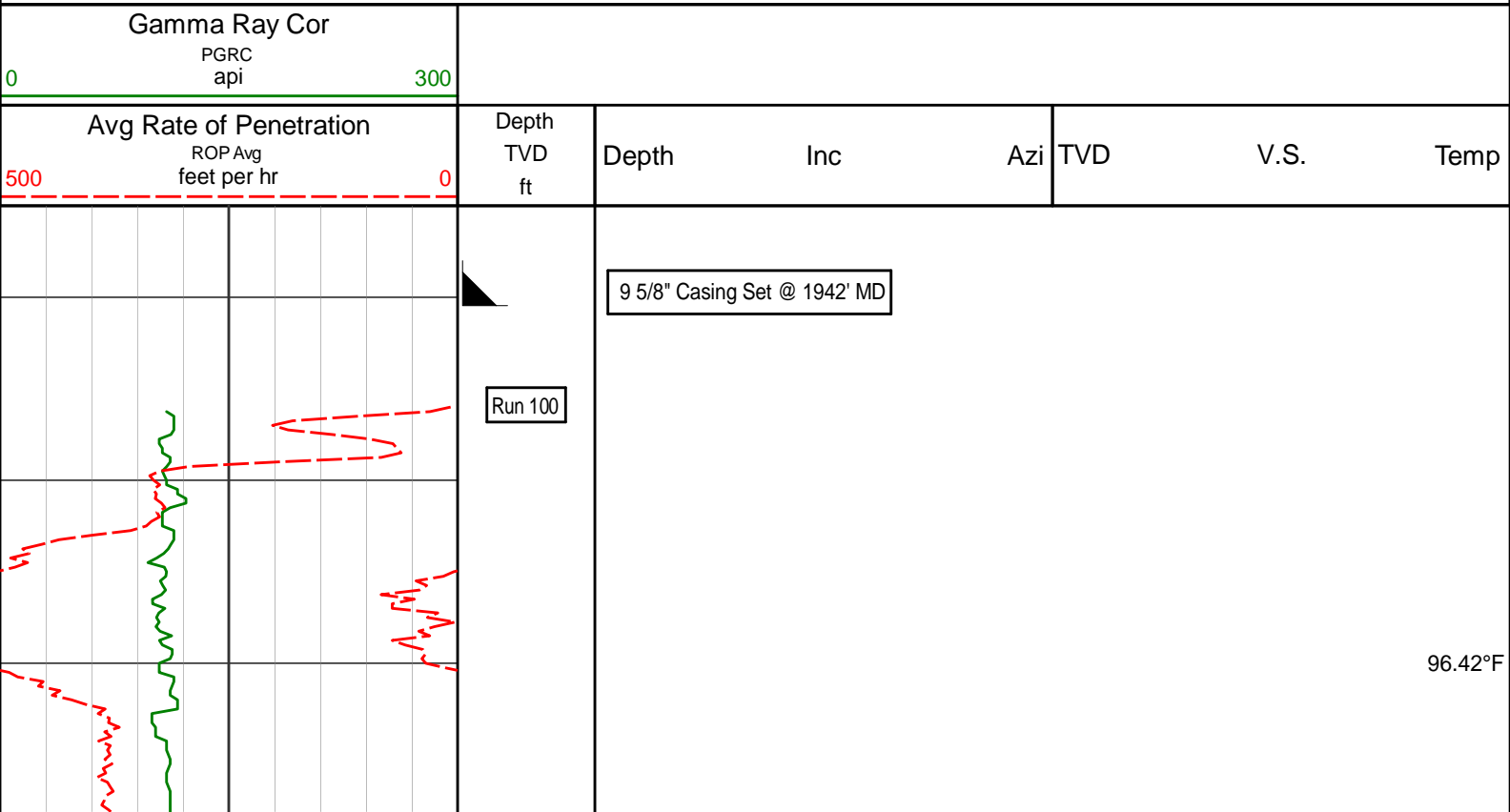


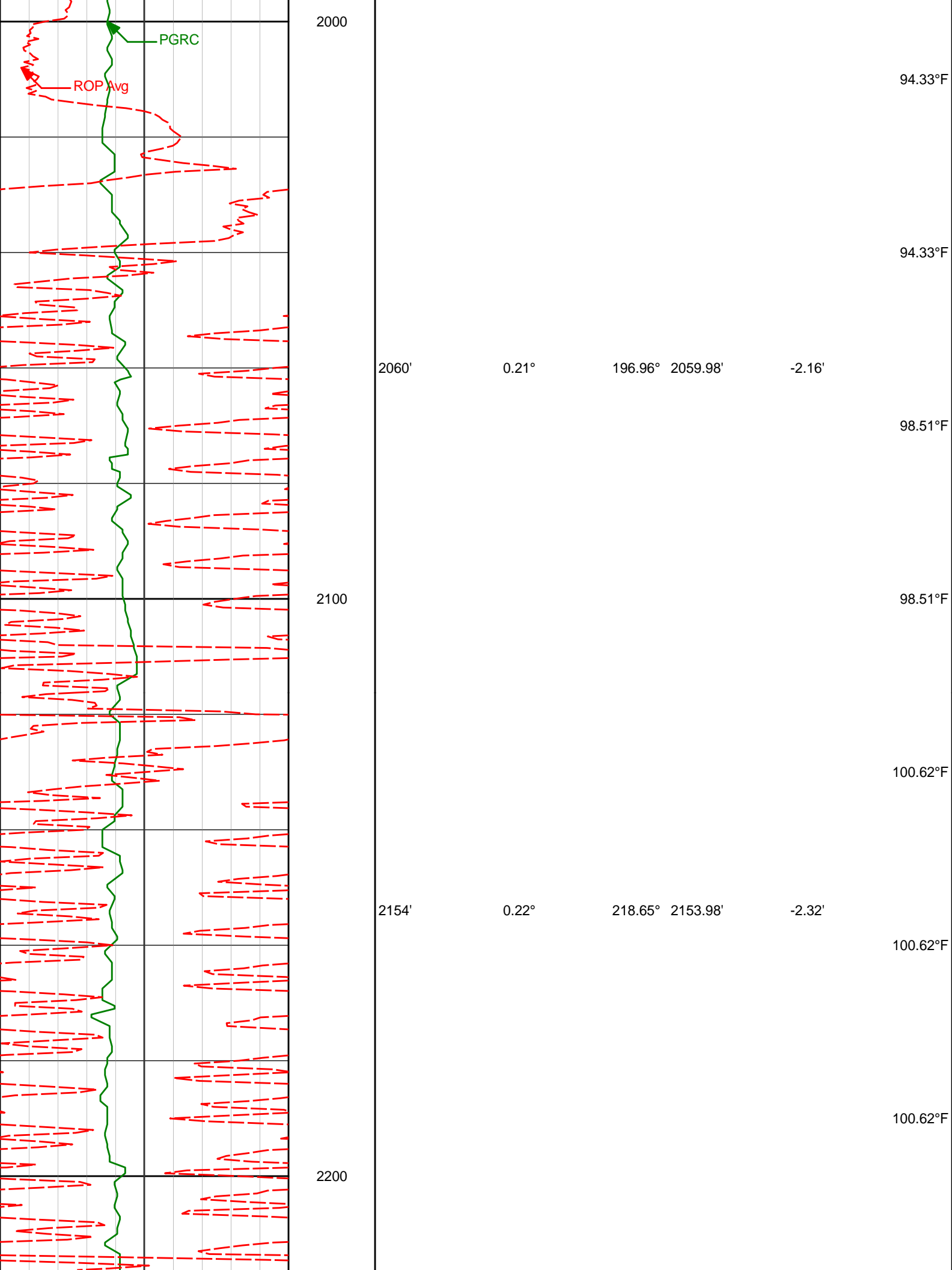
					158.47°F
6028'	0.75°	144.78°	6019.07'	-173.97'	158.47°F
					160.83°F
					160.83°F
6121'	9.66°	96.26°	6111.61'	-165.85'	160.83°F
					160.83°F
6213'	16.12°	92.76°	6201.24'	-145.39'	160.83°F
					163.20°F
					163.20°F
6304'	22.58°	90.55°	6287.06'	-115.27'	163.20°F
					163.20°F
6396'	30.98°	89.54°	6369.12'	-73.86'	163.20°F
					165.58°F
					163.20°F
6488'	39.62°	93.34°	6444.14'	-20.78'	165.58°F
					165.58°F
6579'	49.18°	95.70°	6509.09'	42.60'	167.97°F
					167.97°F

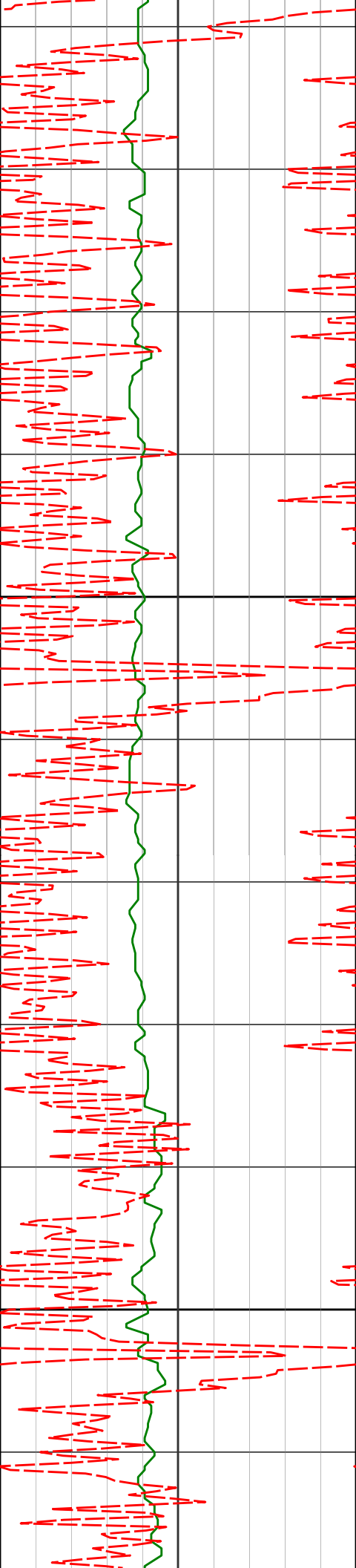


Avg Rate of Penetration ROP Avg feet per hr		Depth TVD ft	Depth		Inc	Azi	TVD	V.S.	Temp
500 0									
Gamma CG Cor PGRC api									
0 300									

TVD Detail 1:240 Scale







2249'

0.28°

178.66° 2248.98'

-2.43'

104.83°F

2300

104.83°F

104.83°F

2343'

0.48°

186.04° 2342.98'

-2.47'

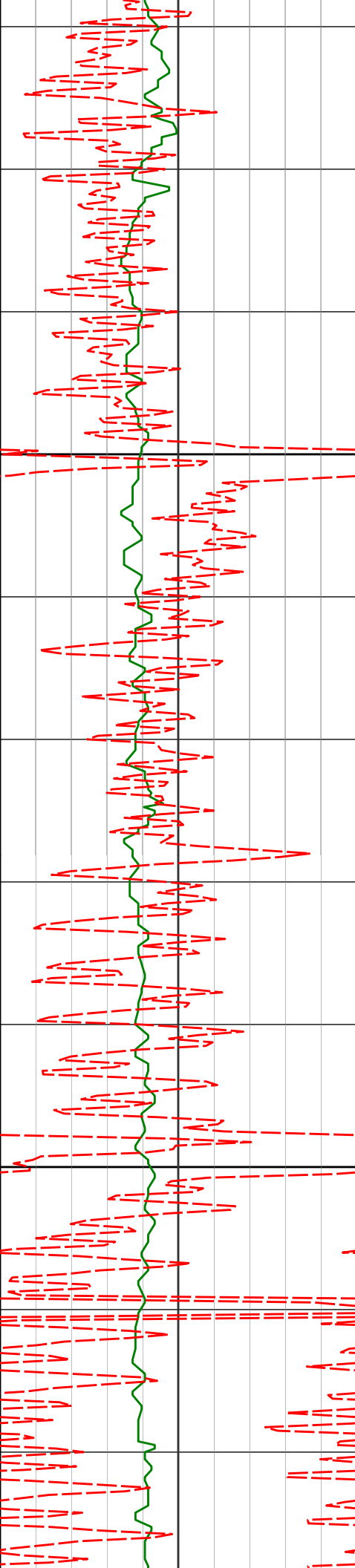
104.83°F

104.83°F

2400

106.97°F

106.97°F



2500

2600

2438'	0.68°	186.48°	2437.97'	-2.57'
2533'	0.58°	172.08°	2532.97'	-2.57'
2627'	0.50°	201.67°	2626.96'	-2.65'

106.97°F

109.09°F

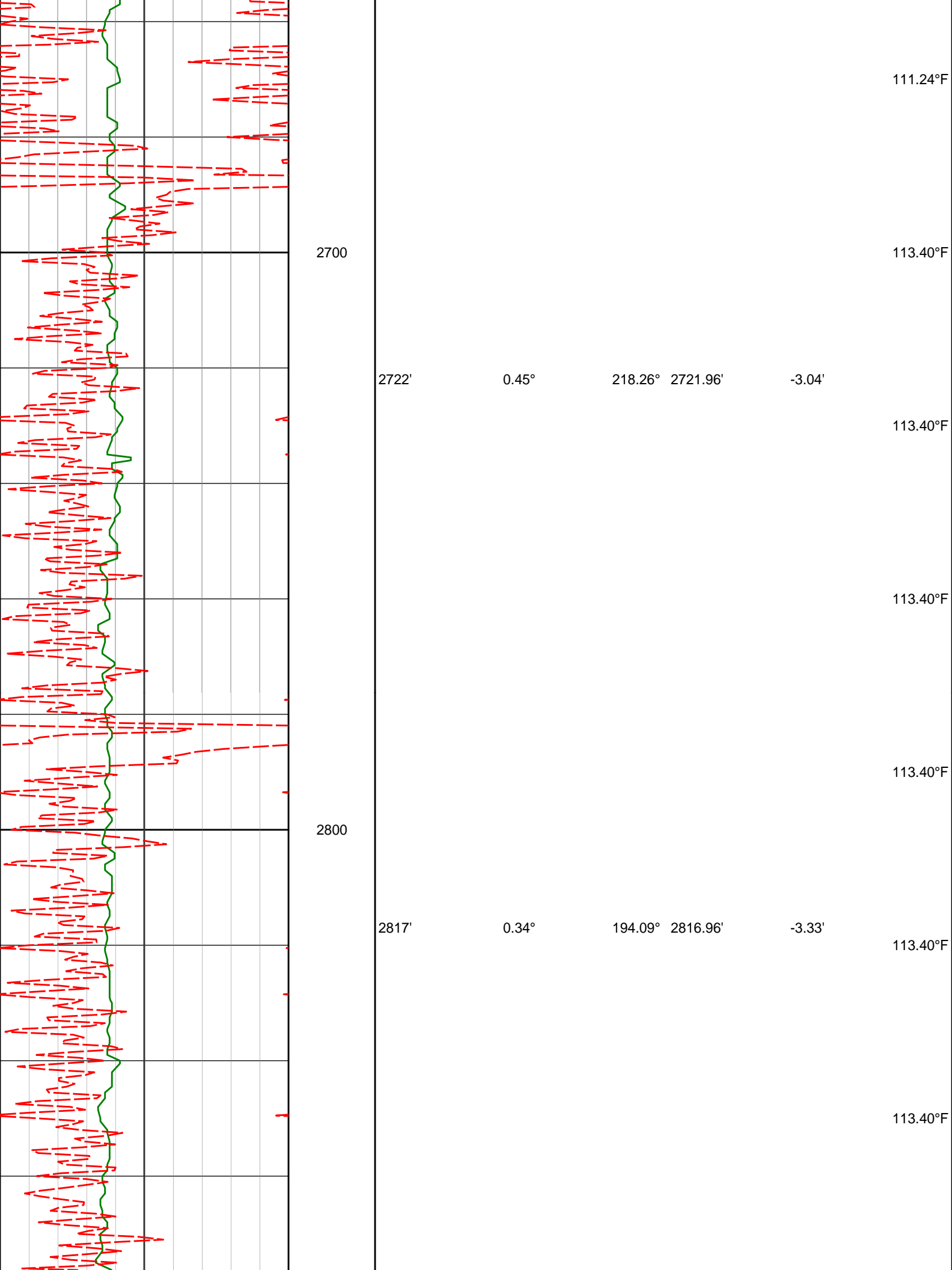
109.09°F

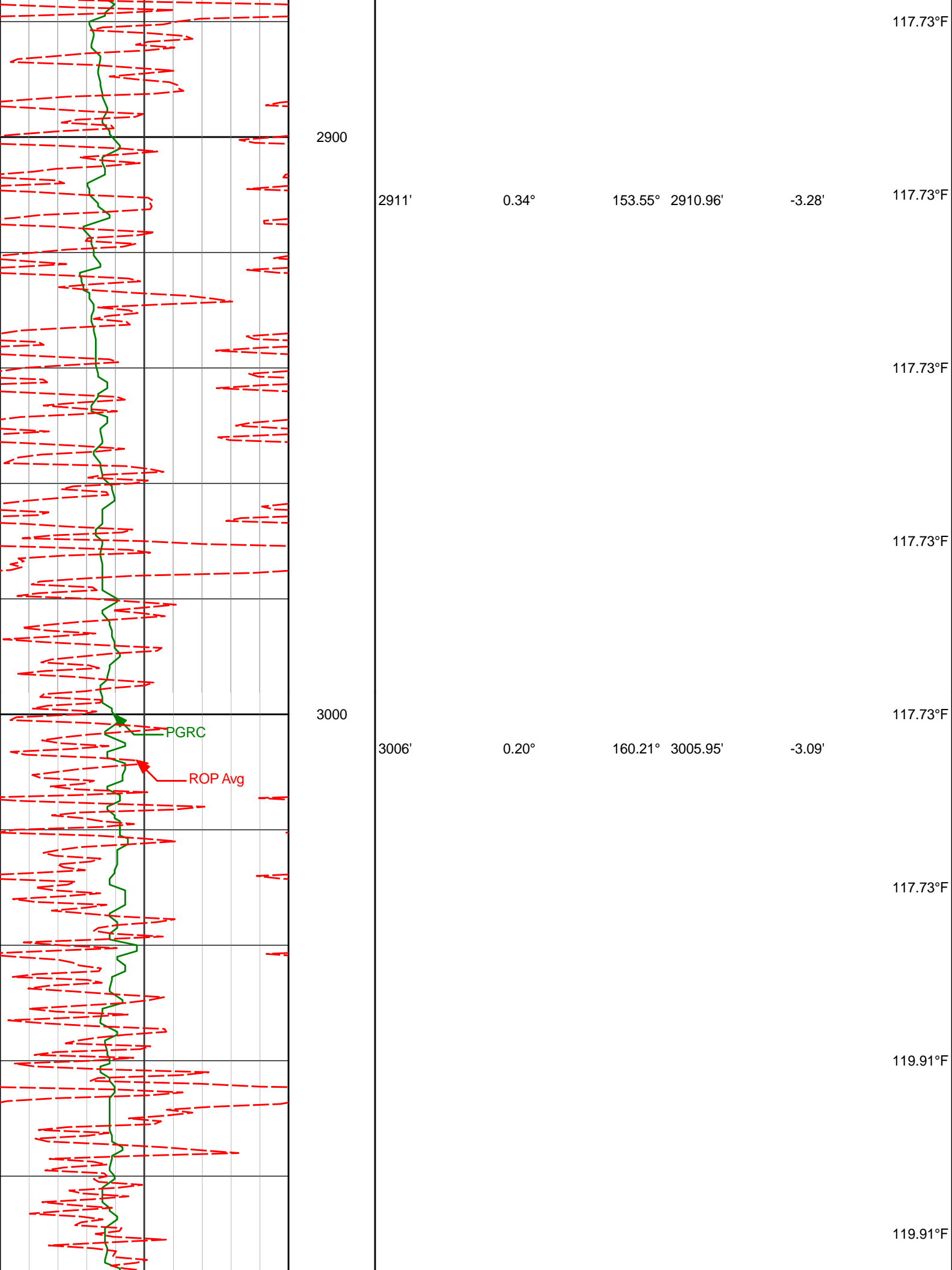
109.09°F

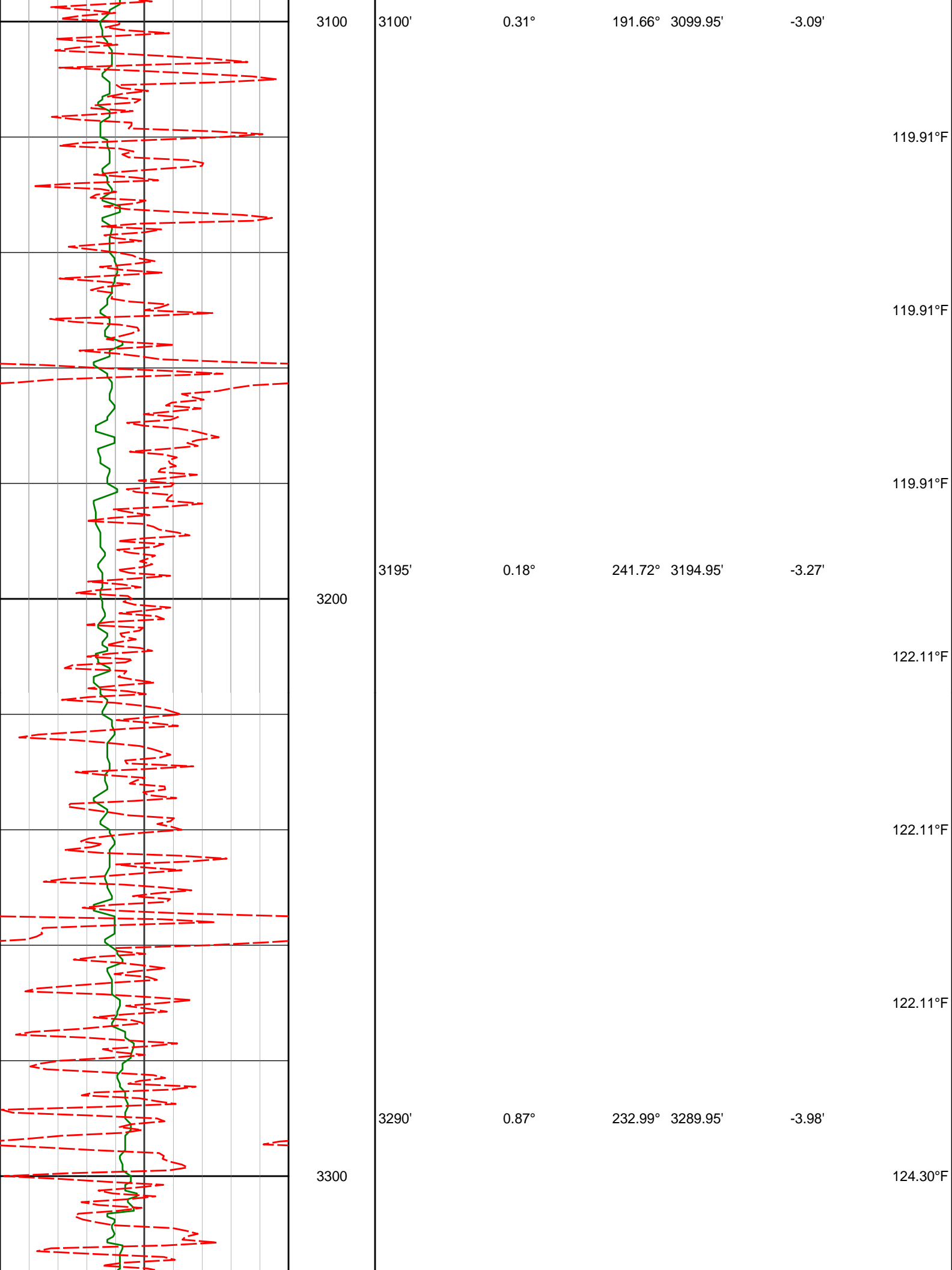
111.24°F

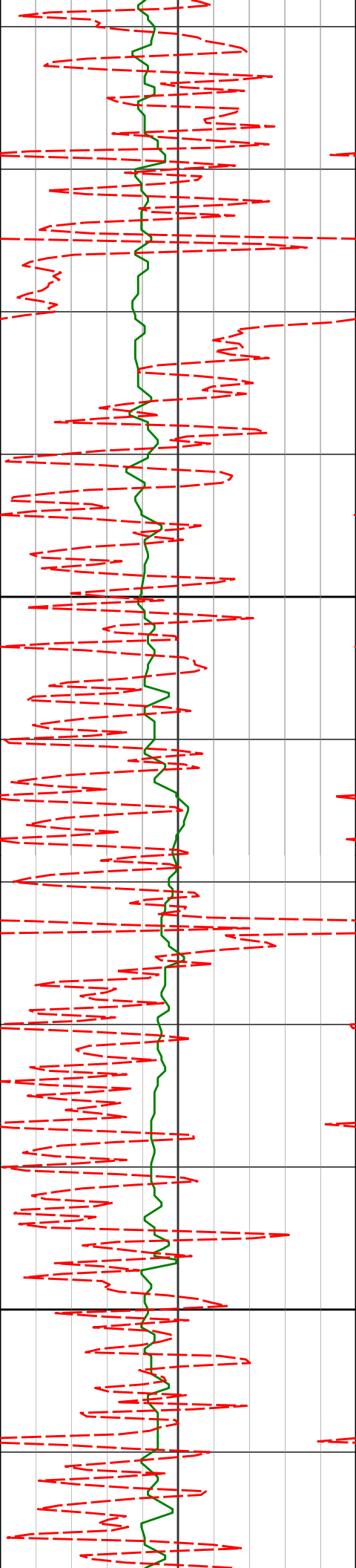
111.24°F

111.24°F









3400

3500

3384'

0.71°

259.13°

3383.94'

-5.12'

3479'

0.55°

290.19°

3478.93'

-6.13'

124.30°F

124.30°F

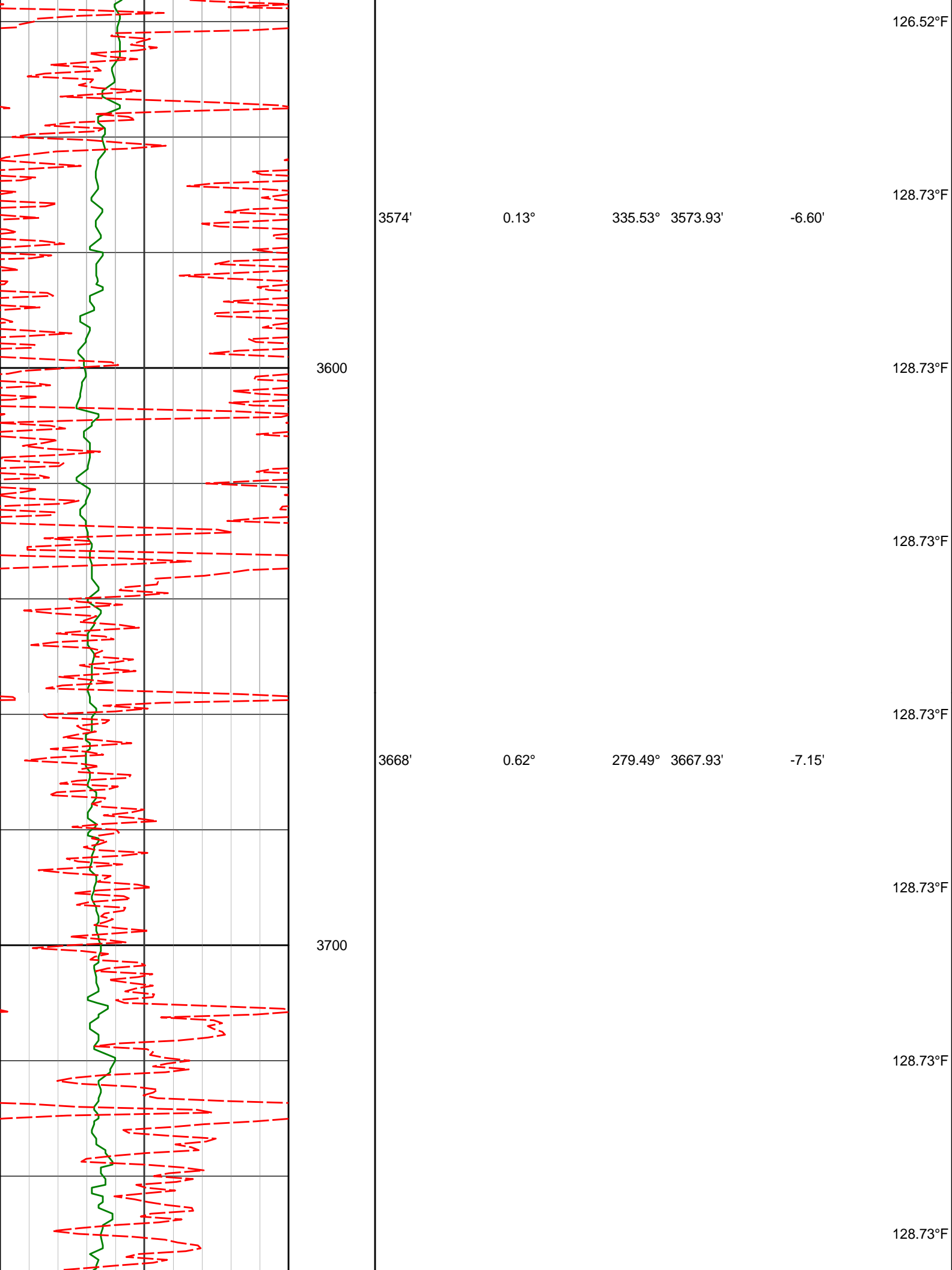
124.30°F

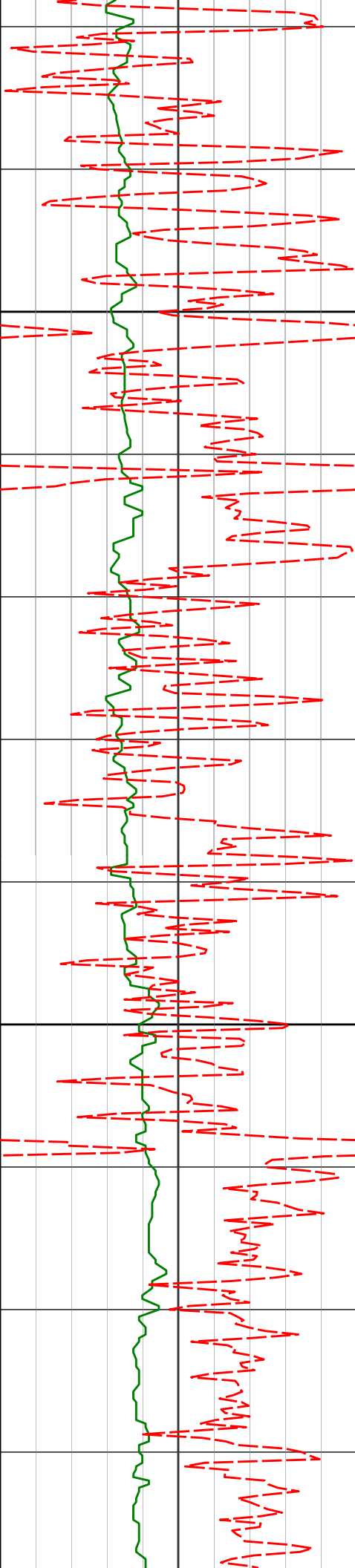
124.30°F

126.52°F

126.52°F

126.52°F





3763'

0.90°

282.62° 3762.92'

-8.38'

3800

130.96°F

130.96°F

130.96°F

3857'

1.25°

293.90° 3856.91'

-10.03'

130.96°F

3900

133.20°F

133.20°F

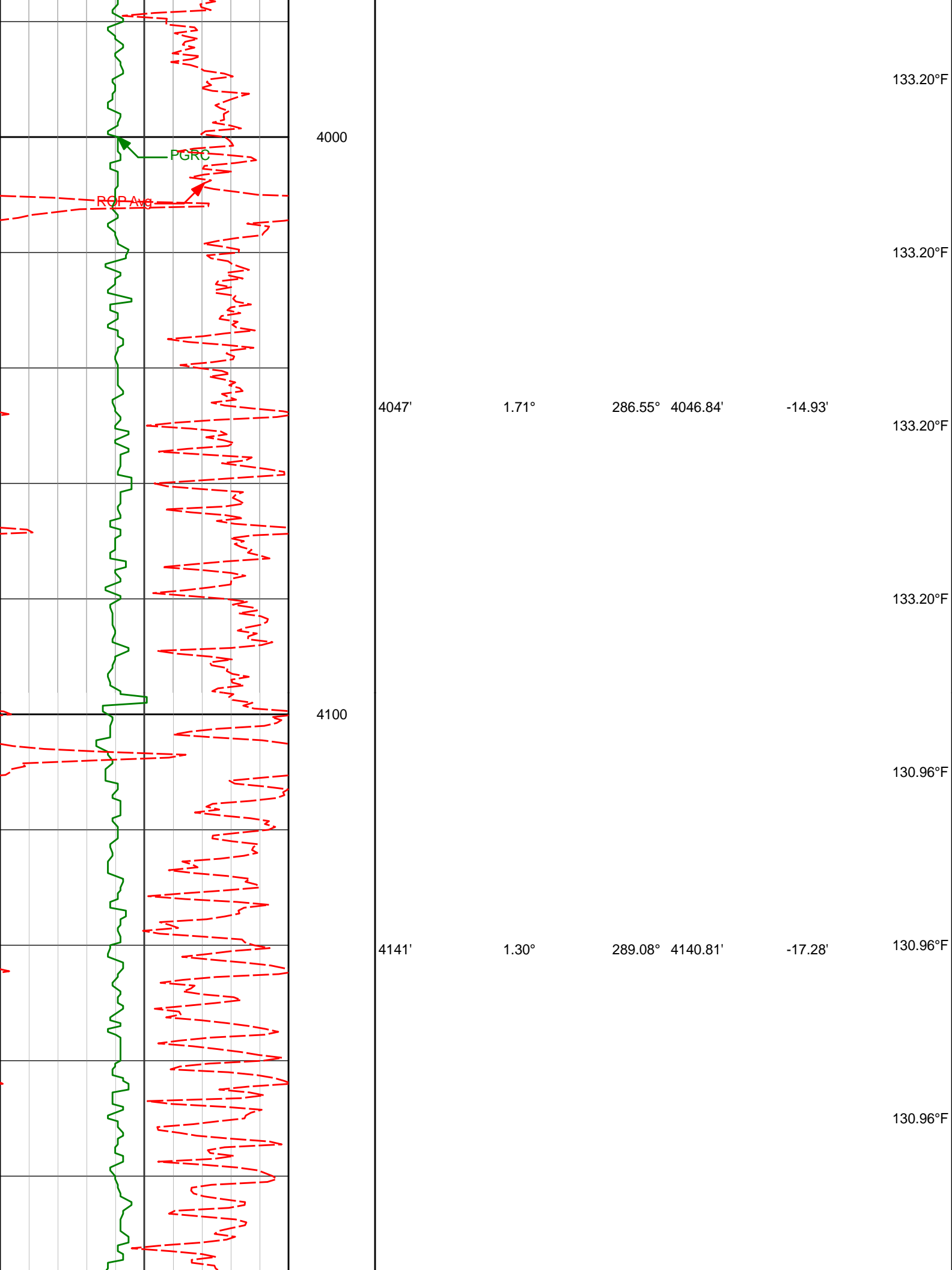
3952'

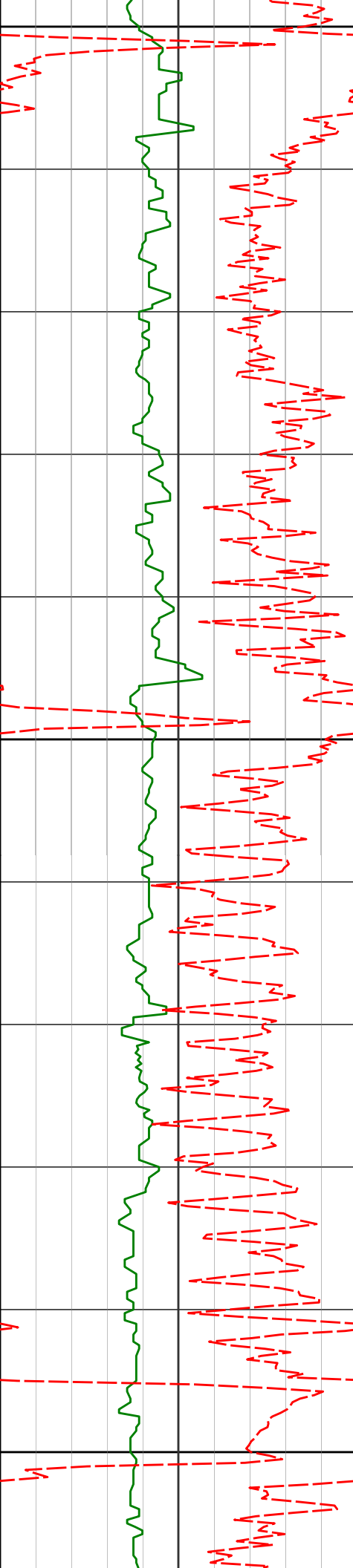
1.56°

270.04° 3951.88'

-12.27'

133.20°F





4200

130.96°F

130.96°F

4236'

0.91°

274.72° 4235.79'

-19.04'

130.96°F

133.20°F

4300

133.20°F

4331'

0.79°

305.47° 4330.78'

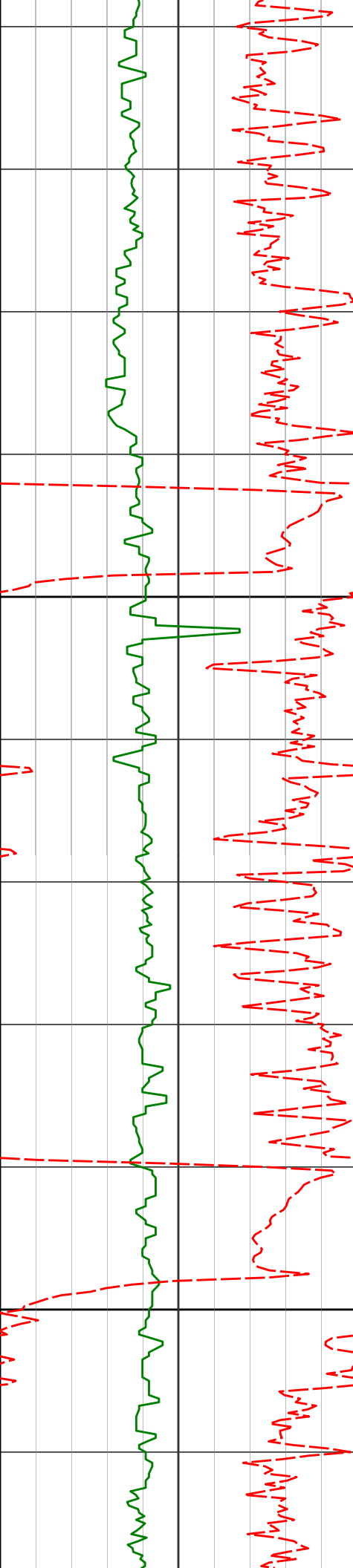
-20.33'

133.20°F

135.45°F

4400

135.45°F



4500

4600

4425' 2.00° 274.78° 4424.75' -22.49'

4520' 2.65° 256.70° 4519.67' -26.27'

4614' 4.16° 249.10° 4613.51' -31.57'

135.45°F

135.45°F

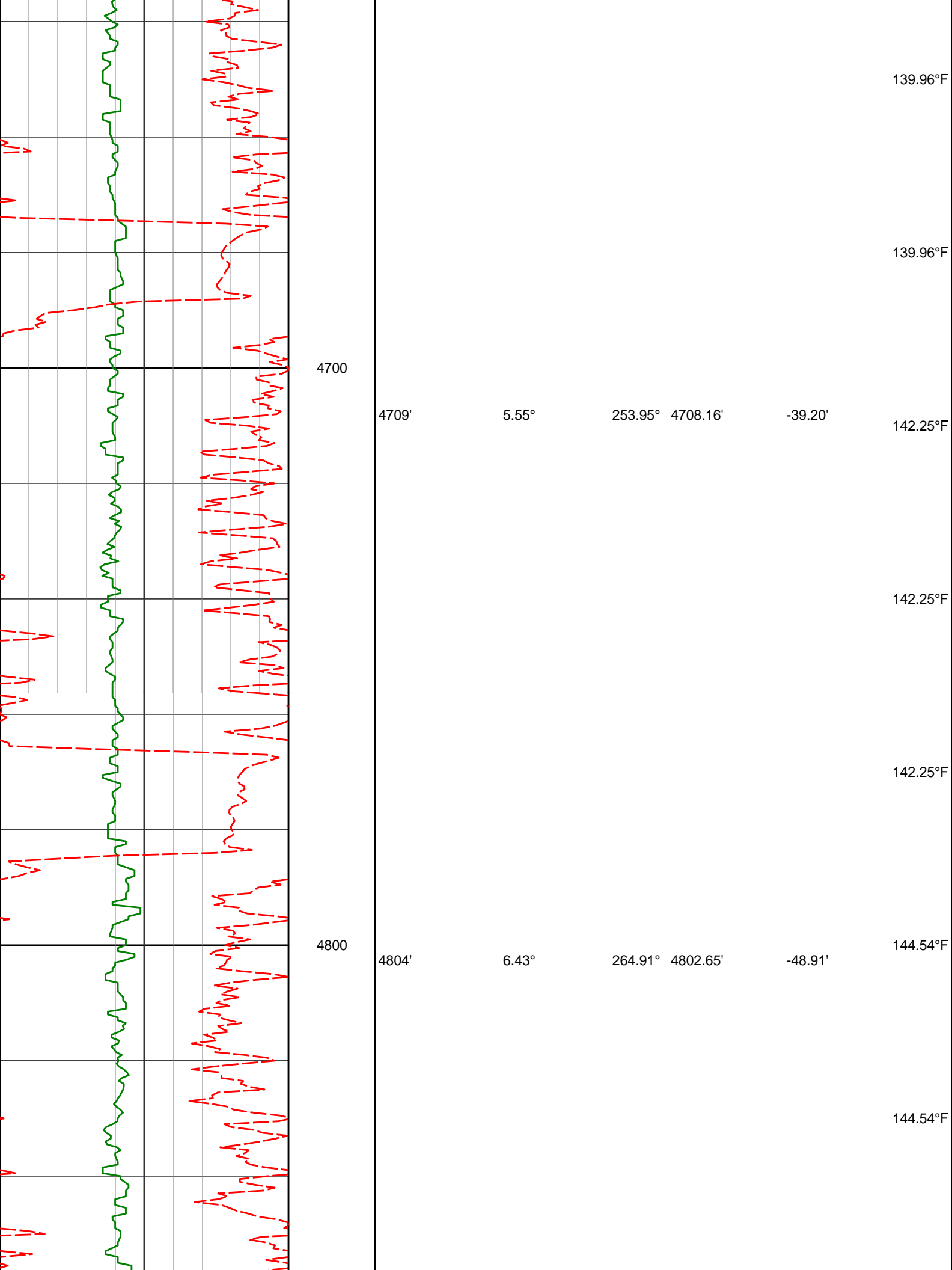
137.70°F

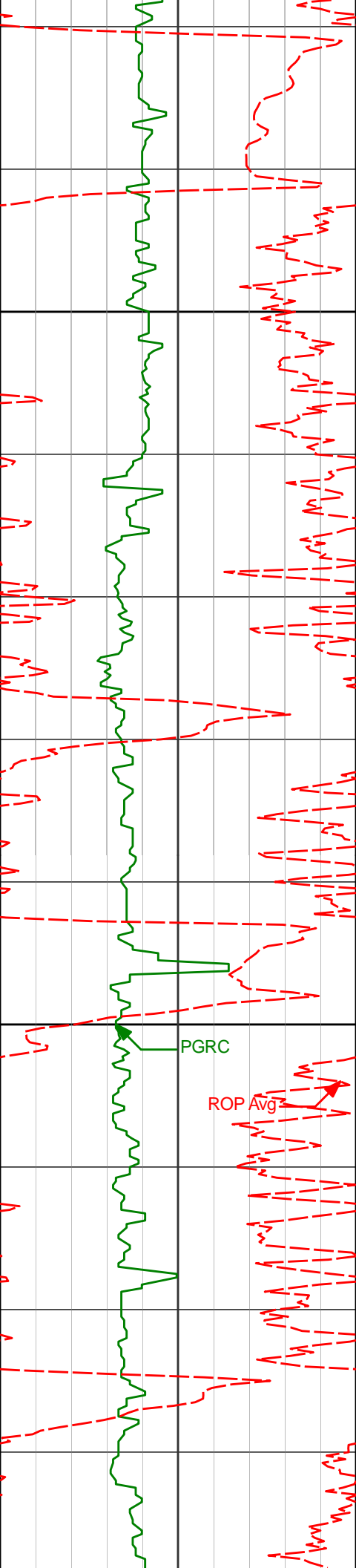
137.70°F

137.70°F

139.96°F

139.96°F





4900

5000

PGRC

ROP Avg

4898'

8.26°

262.55°

4895.87'

-60.84'

4993'

8.34°

257.77°

4989.88'

-74.34'

144.54°F

146.84°F

146.84°F

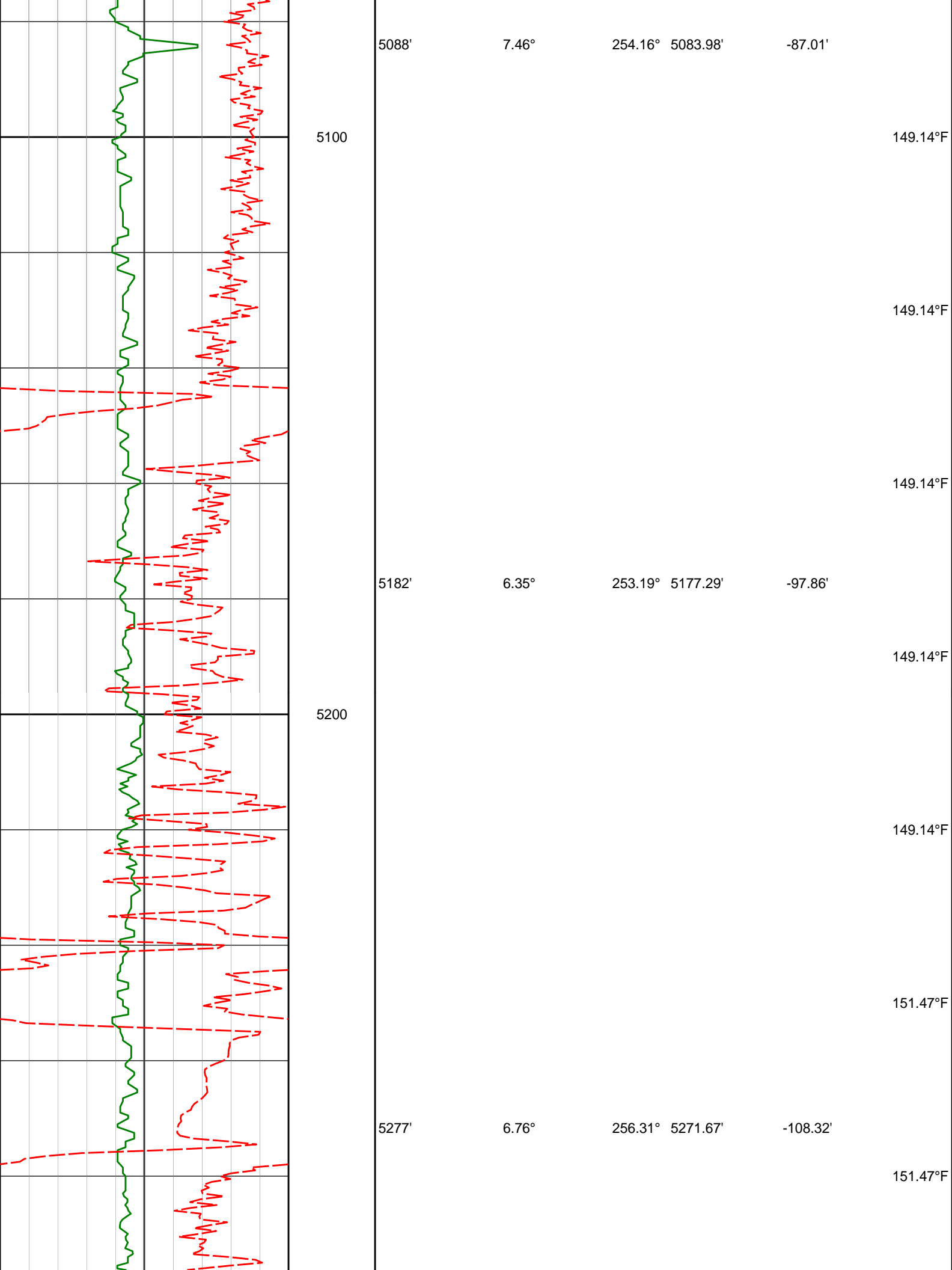
146.84°F

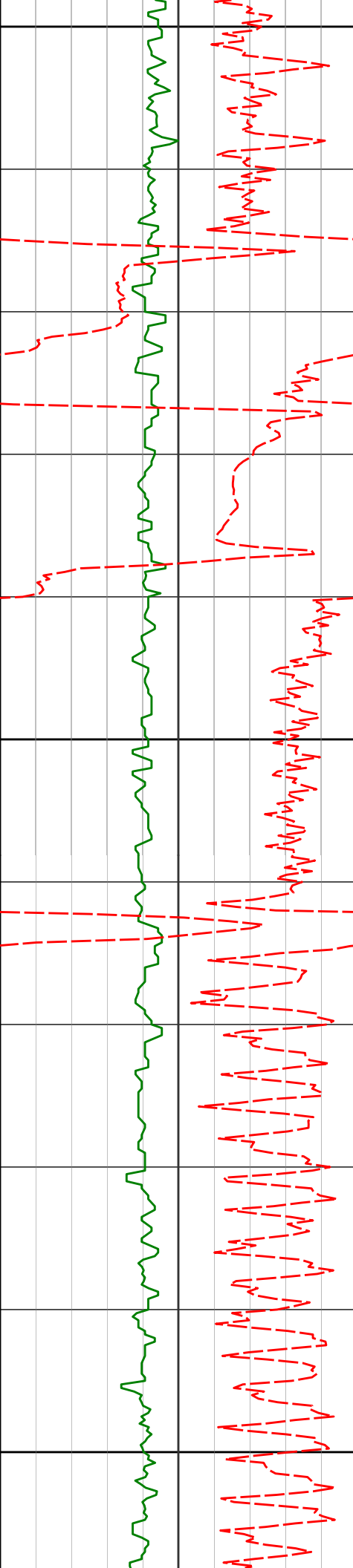
146.84°F

146.84°F

146.84°F

149.14°F





5300

151.47°F

151.47°F

5371'

7.54°

260.10° 5364.94'

-119.77'

151.47°F

5400

153.79°F

153.79°F

5466'

7.08°

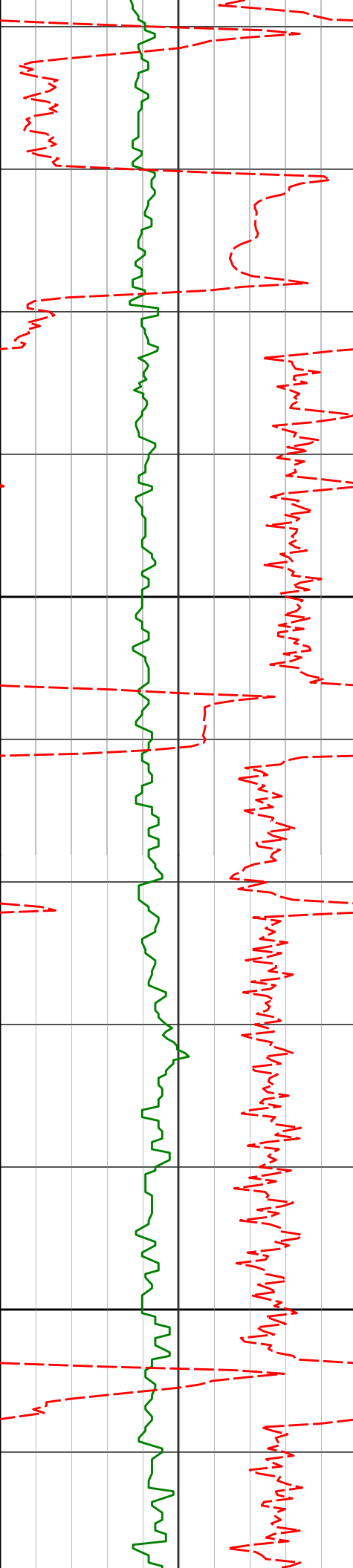
259.35° 5459.17'

-131.66'

153.79°F

153.79°F

5500



5600

5700

5561'

6.66°

253.16°

5553.49'

-142.69'

5655'

5.66°

253.40°

5646.94'

-152.34'

153.79°F

153.79°F

153.79°F

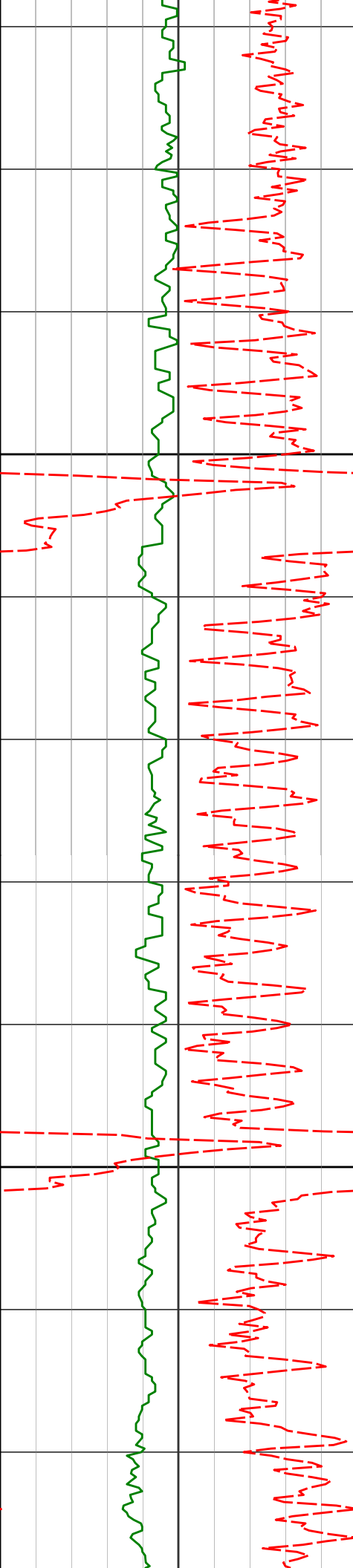
153.79°F

153.79°F

153.79°F

156.13°F

156.13°F



5800

5900

5750'

4.75°

251.68° 5741.55'

-160.56'

158.47°F

158.47°F

158.47°F

5844'

3.80°

248.26° 5835.29'

-167.14'

160.83°F

158.47°F

160.83°F

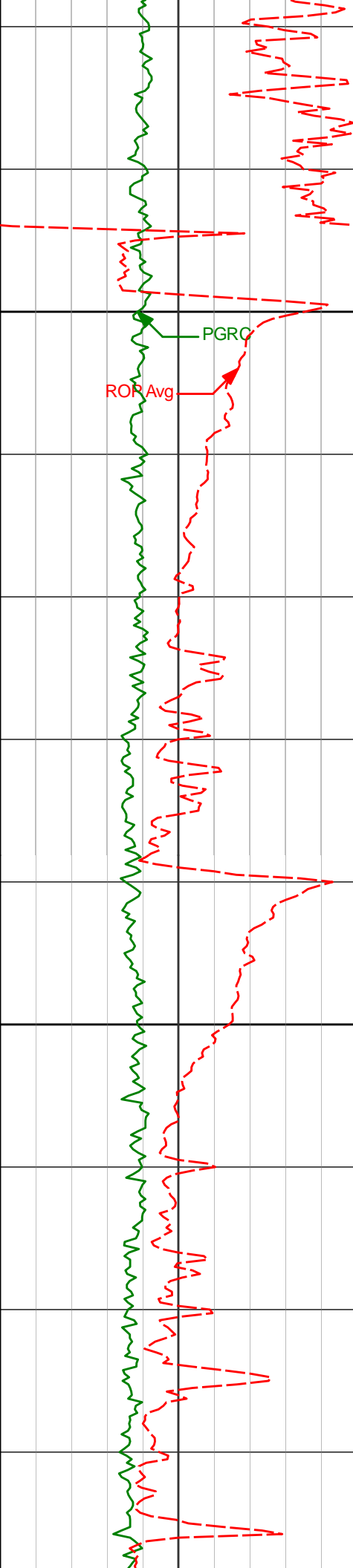
5936'

3.11°

240.56° 5927.12'

-172.15'

160.83°F



<KOP>
6000

PGRC

ROP Avg

6100

6028'

0.75°

144.78°

6019.07'

-173.97'

6121'

9.66°

96.26°

6111.61'

-165.85'

158.47°F

158.47°F

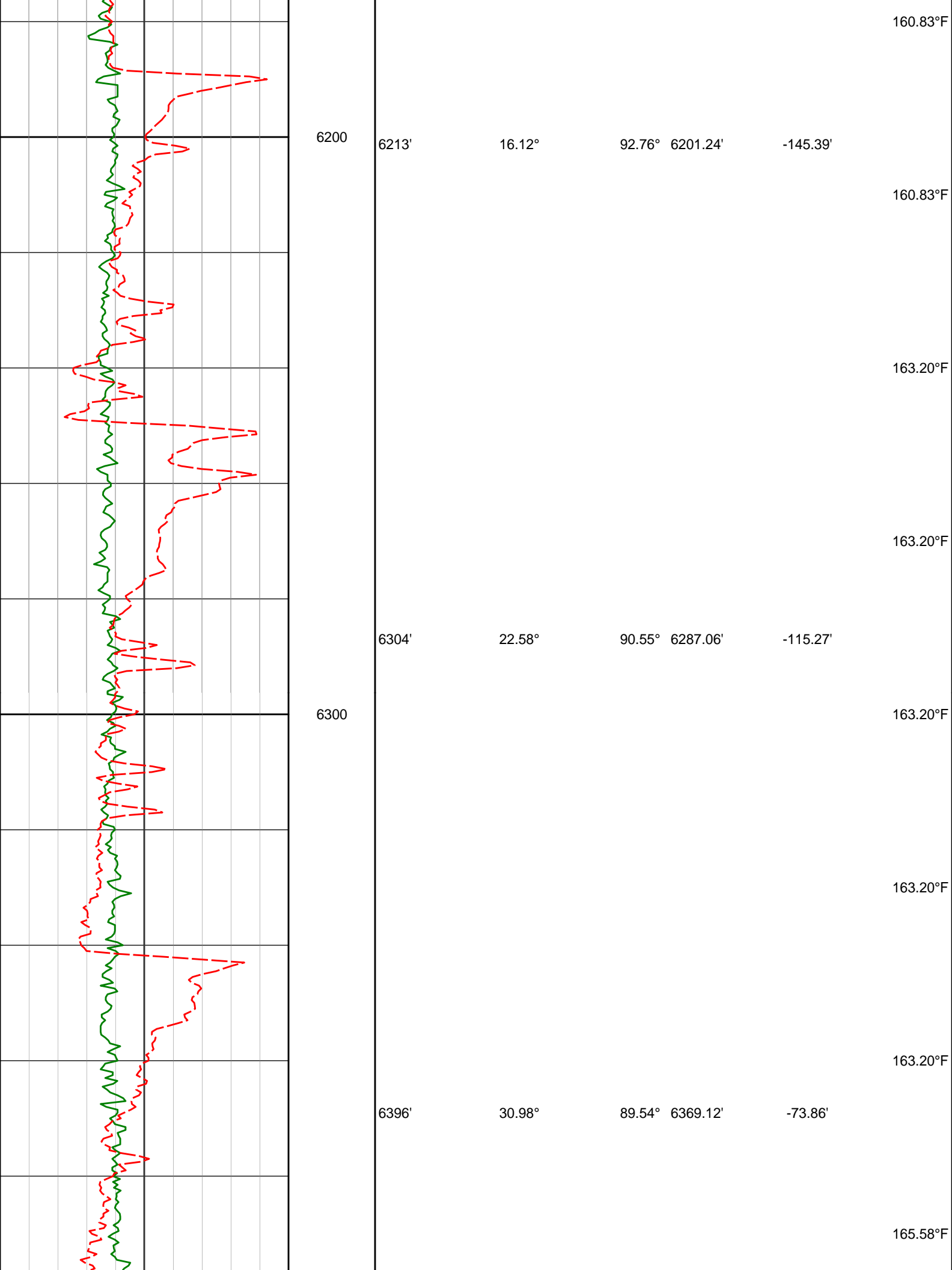
158.47°F

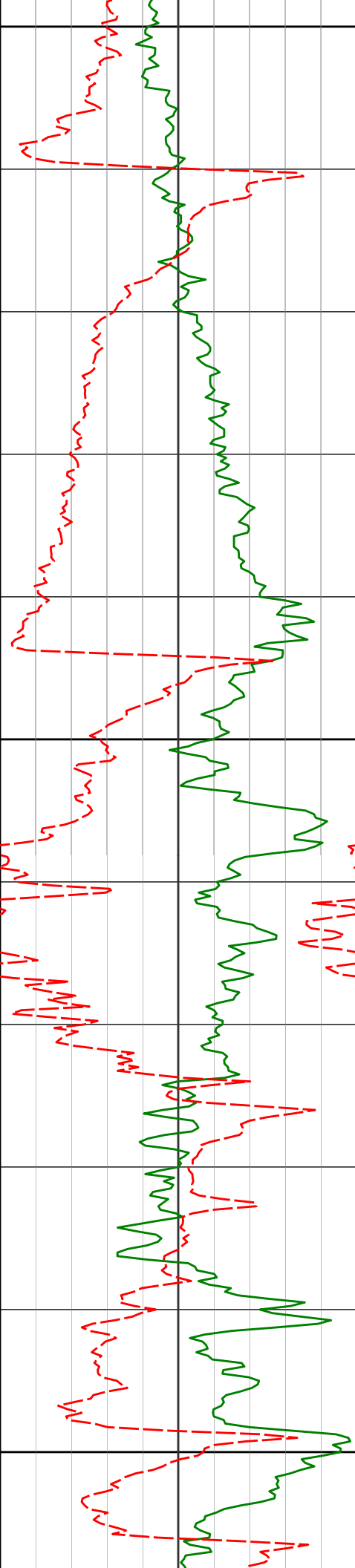
160.83°F

160.83°F

160.83°F

160.83°F





6400

163.20°F

6488'

39.62°

93.34°

6444.14'

-20.78'

165.58°F

165.58°F

6500

6579'

49.18°

95.70°

6509.09'

42.60'

167.97°F

167.97°F

6671'

56.09°

90.55°

6564.91'

115.54'

170.37°F

6600

170.37°F

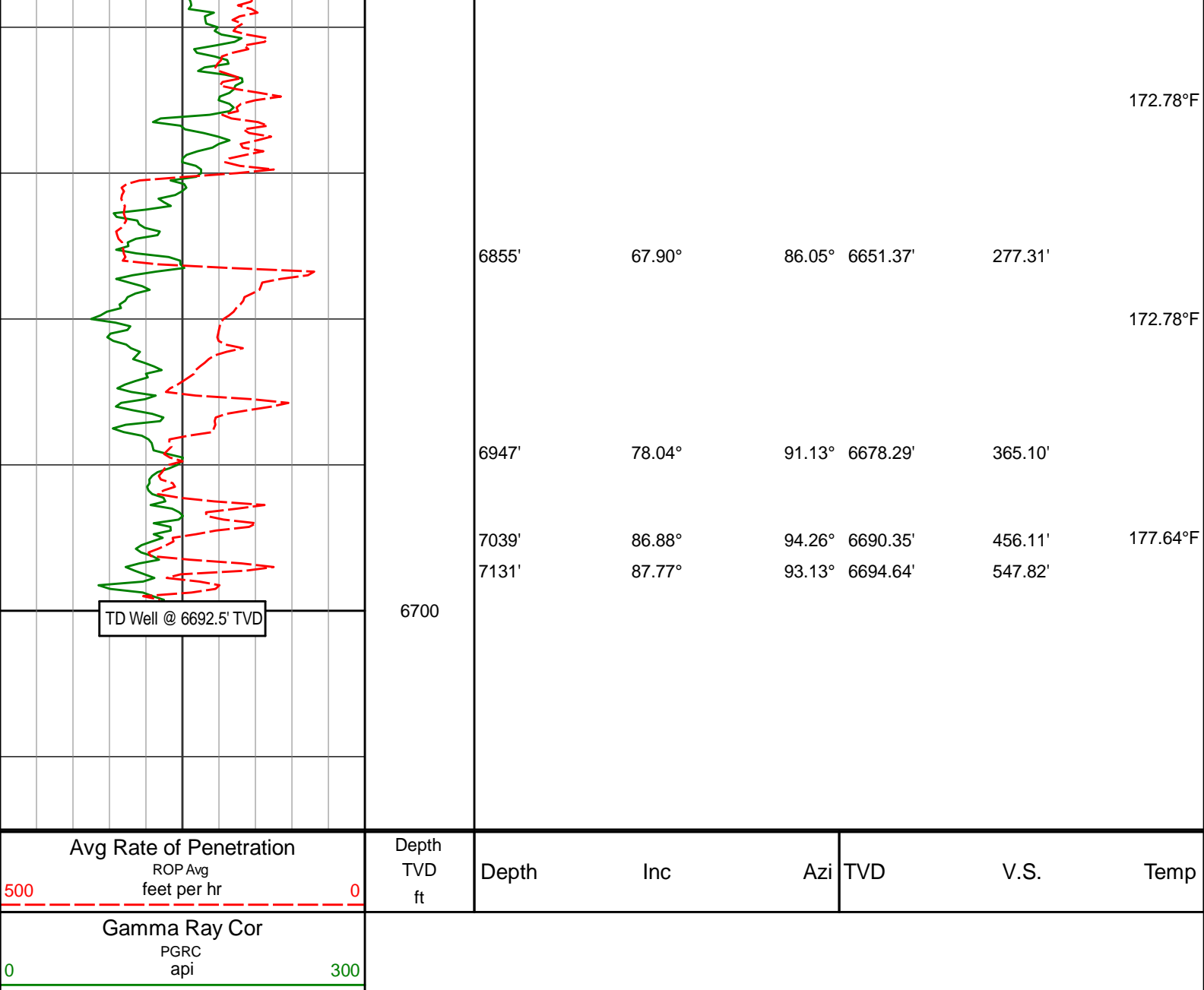
6763'

61.85°

85.89°

6612.33'

194.26'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA22-645
Wattenberg
Weld Colorado
USA
CA-XX-0903206505

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
84.00	0.26	178.91	84.00	0.19 S	0.00 E	0.00	0.31
178.00	0.29	169.38	178.00	0.64 S	0.05 E	0.05	0.06
270.00	0.45	136.99	270.00	1.13 S	0.34 E	0.34	0.28
362.00	0.19	188.52	362.00	1.55 S	0.56 E	0.57	0.40
455.00	0.19	210.80	454.99	1.83 S	0.46 E	0.46	0.08
549.00	0.15	200.16	548.99	2.08 S	0.34 E	0.34	0.05
644.00	0.26	256.65	643.99	2.25 S	0.09 E	0.09	0.23
738.00	0.44	239.86	737.99	2.48 S	0.43 W	-0.43	0.22
833.00	0.19	232.70	832.99	2.76 S	0.87 W	-0.87	0.27

928.00	0.19	260.37	927.99	2.88 S	1.15 W	-1.15	0.10
1022.00	0.20	267.27	1021.99	2.91 S	1.47 W	-1.47	0.03
1117.00	0.11	268.40	1116.99	2.92 S	1.73 W	-1.72	0.09
1211.00	0.24	307.98	1210.99	2.80 S	1.97 W	-1.97	0.18
1306.00	0.24	327.99	1305.99	2.51 S	2.23 W	-2.23	0.09
1400.00	0.09	42.76	1399.99	2.29 S	2.29 W	-2.29	0.25
1495.00	0.08	56.76	1494.99	2.20 S	2.18 W	-2.18	0.02
1589.00	0.36	42.21	1588.99	1.94 S	1.93 W	-1.93	0.30
1684.00	0.15	193.91	1683.99	1.84 S	1.76 W	-1.76	0.52
1779.00	0.15	165.33	1778.99	2.09 S	1.76 W	-1.76	0.08
1873.00	0.38	197.80	1872.98	2.50 S	1.82 W	-1.82	0.28
1933.00	0.47	196.52	1932.98	2.93 S	1.95 W	-1.95	0.15
2060.00	0.21	196.96	2059.98	3.64 S	2.17 W	-2.16	0.21
2154.00	0.22	218.65	2153.98	3.94 S	2.33 W	-2.32	0.09
2249.00	0.28	178.66	2248.98	4.32 S	2.44 W	-2.43	0.19
2343.00	0.48	186.04	2342.98	4.95 S	2.47 W	-2.47	0.22
2438.00	0.68	186.48	2437.97	5.90 S	2.58 W	-2.57	0.20
2533.00	0.58	172.08	2532.97	6.94 S	2.57 W	-2.57	0.19
2627.00	0.50	201.67	2626.96	7.80 S	2.66 W	-2.65	0.31
2722.00	0.45	218.26	2721.96	8.48 S	3.04 W	-3.04	0.16
2817.00	0.34	194.09	2816.96	9.04 S	3.34 W	-3.33	0.21
2911.00	0.34	153.55	2910.96	9.56 S	3.28 W	-3.28	0.25
3006.00	0.20	160.21	3005.95	9.98 S	3.10 W	-3.09	0.16
3100.00	0.31	191.66	3099.95	10.38 S	3.10 W	-3.09	0.18
3195.00	0.18	241.72	3194.95	10.70 S	3.28 W	-3.27	0.25
3290.00	0.87	232.99	3289.95	11.20 S	3.99 W	-3.98	0.72
3384.00	0.71	259.13	3383.94	11.74 S	5.13 W	-5.12	0.41
3479.00	0.55	290.19	3478.93	11.70 S	6.14 W	-6.13	0.39
3574.00	0.13	335.53	3573.93	11.44 S	6.61 W	-6.60	0.49
3668.00	0.62	279.49	3667.93	11.26 S	7.16 W	-7.15	0.60
3763.00	0.90	282.62	3762.92	11.01 S	8.39 W	-8.38	0.29
3857.00	1.25	293.90	3856.91	10.44 S	10.04 W	-10.03	0.43
3952.00	1.56	270.04	3951.88	10.02 S	12.28 W	-12.27	0.69
4047.00	1.71	286.55	4046.84	9.61 S	14.94 W	-14.93	0.52
4141.00	1.30	289.08	4140.81	8.87 S	17.29 W	-17.28	0.44
4236.00	0.91	274.72	4235.79	8.45 S	19.05 W	-19.04	0.50
4331.00	0.79	305.47	4330.78	8.01 S	20.33 W	-20.33	0.49
4425.00	2.00	274.78	4424.75	7.50 S	22.50 W	-22.49	1.46
4520.00	2.65	256.70	4519.67	7.87 S	26.28 W	-26.27	1.03
4614.00	4.16	249.10	4613.51	9.58 S	31.58 W	-31.57	1.67
4709.00	5.55	253.95	4708.16	12.08 S	39.21 W	-39.20	1.52
4804.00	6.43	264.91	4802.65	13.82 S	48.92 W	-48.91	1.51
4898.00	8.26	262.55	4895.87	15.16 S	60.86 W	-60.84	1.97
4993.00	8.34	257.77	4989.88	17.51 S	74.36 W	-74.34	0.73
5088.00	7.46	254.16	5083.98	20.65 S	87.03 W	-87.01	1.07
5182.00	6.35	253.19	5177.29	23.82 S	97.88 W	-97.86	1.19
5277.00	6.76	256.31	5271.67	26.66 S	108.34 W	-108.32	0.57
5371.00	7.54	260.10	5364.94	29.03 S	119.80 W	-119.77	0.97
5466.00	7.08	259.35	5459.17	31.19 S	131.69 W	-131.66	0.50
5561.00	6.66	253.16	5553.49	33.86 S	142.72 W	-142.69	0.90
5655.00	5.66	253.40	5646.94	36.77 S	152.37 W	-152.34	1.07
5750.00	4.75	251.68	5741.55	39.34 S	160.59 W	-160.56	0.97
5844.00	3.80	248.26	5835.29	41.72 S	167.18 W	-167.14	1.04
5936.00	3.11	240.56	5927.12	44.07 S	172.19 W	-172.15	0.91
6028.00	0.75	144.78	6019.07	45.79 S	174.01 W	-173.97	3.55
6121.00	9.66	96.26	6111.61	47.14 S	165.89 W	-165.85	9.88
6213.00	16.12	92.76	6201.24	48.60 S	145.44 W	-145.39	7.07
6304.00	22.58	90.55	6287.06	49.37 S	115.32 W	-115.27	7.15
6396.00	30.98	89.54	6369.12	49.35 S	73.90 W	-73.86	9.15
6488.00	39.62	93.34	6444.14	50.87 S	20.83 W	-20.78	9.68
6579.00	49.18	95.70	6509.09	55.99 S	42.55 E	42.60	10.66
6671.00	56.09	90.55	6564.91	59.82 S	115.48 E	115.54	8.73
6763.00	61.85	85.89	6612.33	57.27 S	194.21 E	194.26	7.61
6855.00	67.90	86.05	6651.37	51.42 S	277.26 E	277.31	6.58
6947.00	78.04	91.13	6678.29	49.36 S	365.06 E	365.10	12.22
7039.00	86.88	94.26	6690.35	53.67 S	456.06 E	456.11	10.18
7131.00	87.77	93.13	6694.64	59.59 S	547.77 E	547.82	1.57
7222.00	89.56	91.39	6696.76	63.18 S	638.66 E	638.72	2.73
7314.00	90.45	91.40	6696.75	65.42 S	730.64 E	730.69	0.97
7408.00	90.54	90.09	6695.94	66.64 S	824.62 E	824.68	1.40
7503.00	90.39	89.09	6695.17	65.96 S	919.62 E	919.67	1.06
7598.00	90.15	89.40	6694.72	64.71 S	1014.61 E	1014.66	0.41
7692.00	91.28	89.67	6693.55	63.94 S	1108.59 E	1108.65	1.24
7787.00	90.39	88.09	6692.16	62.09 S	1203.56 E	1203.62	1.91
7881.00	89.77	87.31	6692.03	58.31 S	1297.48 E	1297.53	1.06

7976.00	89.96	86.72	6692.25	53.37 S	1392.35 E	1392.40	0.65
8070.00	89.37	88.38	6692.80	49.35 S	1486.26 E	1486.31	1.87
8165.00	90.17	88.80	6693.19	47.01 S	1581.23 E	1581.27	0.95
8260.00	90.66	88.23	6692.50	44.55 S	1676.20 E	1676.24	0.79
8354.00	90.82	88.08	6691.28	41.52 S	1770.14 E	1770.18	0.23
8449.00	91.77	87.76	6689.14	38.08 S	1865.05 E	1865.09	1.06
8544.00	91.00	87.83	6686.84	34.42 S	1959.95 E	1959.98	0.81
8638.00	88.47	88.74	6687.28	31.61 S	2053.90 E	2053.93	2.86
8733.00	87.61	88.61	6690.52	29.41 S	2148.82 E	2148.85	0.92
8828.00	87.95	88.71	6694.20	27.19 S	2243.72 E	2243.75	0.37
8922.00	88.29	89.60	6697.29	25.81 S	2337.66 E	2337.68	1.01
9017.00	89.28	90.04	6699.30	25.51 S	2432.64 E	2432.66	1.14
9112.00	90.33	90.50	6699.63	25.96 S	2527.64 E	2527.66	1.21
9206.00	91.71	90.68	6697.95	26.92 S	2621.61 E	2621.64	1.48
9301.00	90.60	89.23	6696.04	26.85 S	2716.59 E	2716.61	1.92
9396.00	89.71	89.26	6695.78	25.60 S	2811.58 E	2811.60	0.94
9490.00	88.69	89.53	6697.09	24.61 S	2905.56 E	2905.58	1.12
9585.00	89.25	89.36	6698.80	23.69 S	3000.54 E	3000.56	0.62
9680.00	89.80	89.53	6699.59	22.76 S	3095.54 E	3095.55	0.61
9774.00	90.48	89.39	6699.36	21.88 S	3189.53 E	3189.55	0.74
9869.00	90.78	89.33	6698.31	20.82 S	3284.52 E	3284.54	0.32
9963.00	91.96	89.37	6696.07	19.75 S	3378.48 E	3378.50	1.26
10058.00	89.99	89.33	6694.45	18.67 S	3473.46 E	3473.47	2.07
10152.00	90.85	89.35	6693.76	17.59 S	3567.45 E	3567.46	0.92
10247.00	89.83	88.88	6693.20	16.12 S	3662.44 E	3662.45	1.18
10342.00	90.04	88.77	6693.31	14.18 S	3757.42 E	3757.43	0.25
10436.00	90.42	89.29	6692.93	12.58 S	3851.40 E	3851.41	0.69
10531.00	89.28	89.11	6693.18	11.26 S	3946.39 E	3946.40	1.21
10625.00	89.22	89.10	6694.41	9.79 S	4040.37 E	4040.38	0.06
10720.00	89.43	88.89	6695.53	8.12 S	4135.35 E	4135.35	0.31
10815.00	89.95	89.00	6696.04	6.37 S	4230.33 E	4230.33	0.56
10909.00	91.28	89.39	6695.03	5.05 S	4324.31 E	4324.32	1.47
11004.00	89.15	89.99	6694.68	4.54 S	4419.31 E	4419.31	2.33
11098.00	89.34	89.89	6695.91	4.44 S	4513.30 E	4513.30	0.23
11193.00	89.22	89.89	6697.11	4.26 S	4608.29 E	4608.29	0.13
11288.00	90.20	89.85	6697.59	4.04 S	4703.29 E	4703.29	1.03
11382.00	90.26	89.63	6697.21	3.62 S	4797.29 E	4797.29	0.24
11477.00	91.41	89.55	6695.83	2.94 S	4892.27 E	4892.27	1.21
11572.00	88.76	88.88	6695.69	1.64 S	4987.25 E	4987.25	2.88
11761.00	90.60	89.40	6696.74	1.20 N	5176.22 E	5176.22	1.01
11860.00	91.96	89.64	6694.53	2.03 N	5275.19 E	5275.19	1.39
11920.00	91.96	89.64	6692.48	2.41 N	5335.15 E	5335.15	0.00

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 90.05 DEGREES (GRID)
A TOTAL CORRECTION OF 7.60 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11920.00 FEET
IS 5335.15 FEET ALONG 89.97 DEGREES (GRID)**

Tie onto gyro surveys @ 1933' MD.

Last survey is a projection to the bit at TD.