



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100				
Date run completed	22-Jun-16				
Rig Bit Number	2				
Bit Size (in)	8.5				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	1,921.95				
Log End Depth (TVD, ft)	5,914.13				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	21-Jun-16 01:00				
Drill/Wipe End Date and Time	22-Jun-16 13:00				
Min Inc (deg) @ Depth (TVD, ft)	0.16 @ 1,962.95				
Max Inc (deg) @ Depth (TVD, ft)	91.47 @ 5,919.20				
Bit TFA(in2) / Bit Type	1.302 / PDC				
Flow Rate (gpm)	597.69				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Diesel Mud Base				
Density (ppg) / Viscosity (spqt)	10.00 / 63.00				
Filtrate CL (ppm)	3,500.00				
pH / Fluid Loss (mptm)	N/A / 53				
PV (cP) / YP (lbf2)	23 / 14.00				
% Solids / % Sand	13.30 / 0.01				
% Oil / Oil:Water Ratio	63.00 / 74:25				
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 / PGM				

Max Tool Temp (degF) / Source	189.99 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Brian Neu				
Customer Representative	Charles Culver				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11341339				
Insert Serial Number	11400840				
Date and Time Initialized	20-Jun-16 19:19				
Date and Time Read	22-Jun-16 18:32				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	61.00				
Software Version	6.33				
Sub Serial Number	11341339				
Sonde Serial Number	11478012				
Sensor ID Number	N/A				
Toolface Offset (deg)	331.80				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	49.24				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11341339				
Insert/Sonde Serial Number	11293344				

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:

Main Log 1:600 (2"):

(ROPA - Avg Rate of Penetration)

Interval: 1.0 ft, Coercion Distance: 3.0 ft, Gap fill: 5.0 ft

(PGRC - Gamma Ray Cor)

Interval: 1.0 ft, Coercion Distance: 3.0 ft, Gap fill: 5.0 ft

Detail Log 1:240 (5"):

(ROPA - Avg Rate of Penetration)

Interval: 0.5 ft, Coercion Distance: 1.2 ft, Gap fill: 3.0 ft

(PGRC - Gamma Ray Cor)

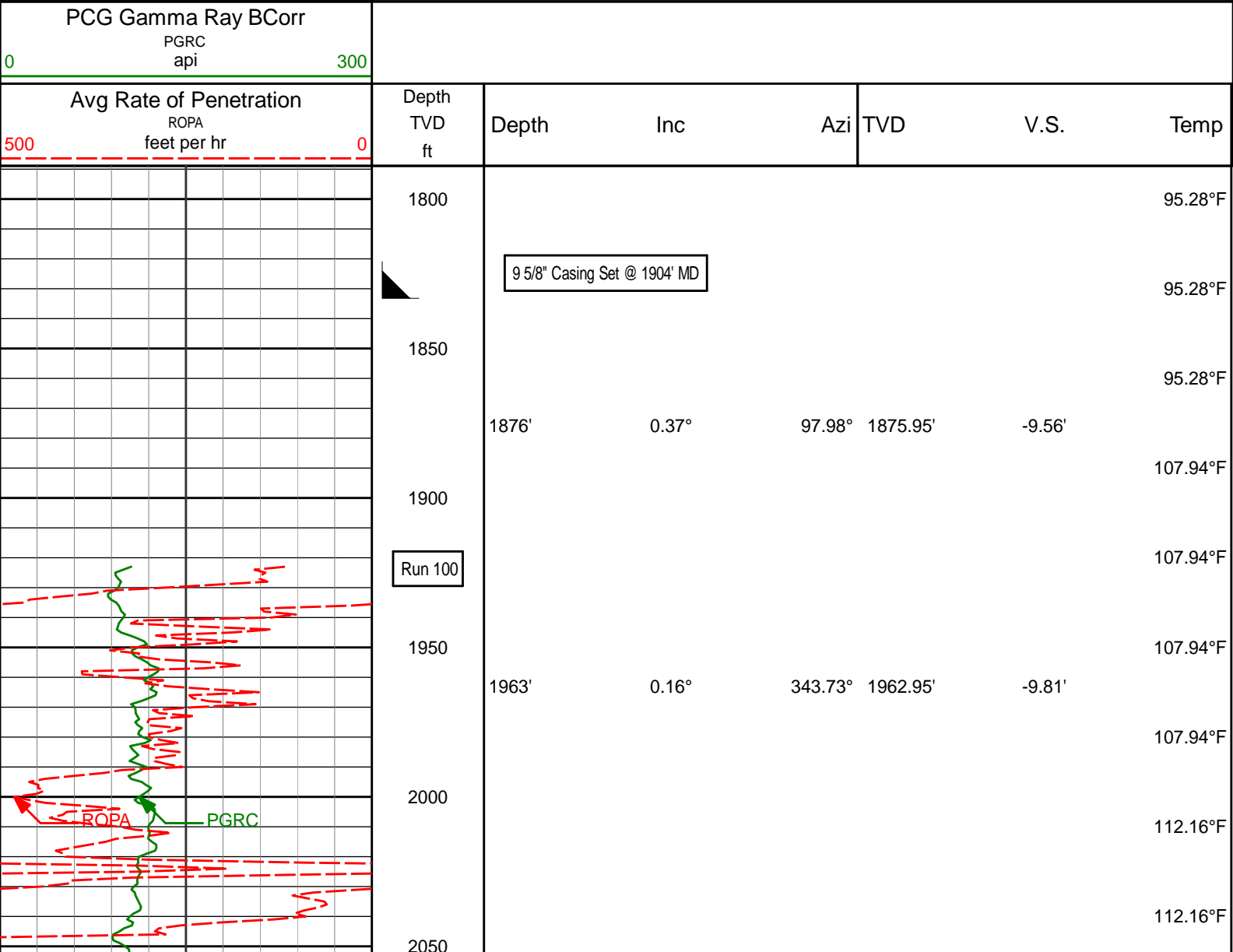
Interval: 0.5 ft, Coercion Distance: 0.6 ft, Gap fill: 3.0 ft

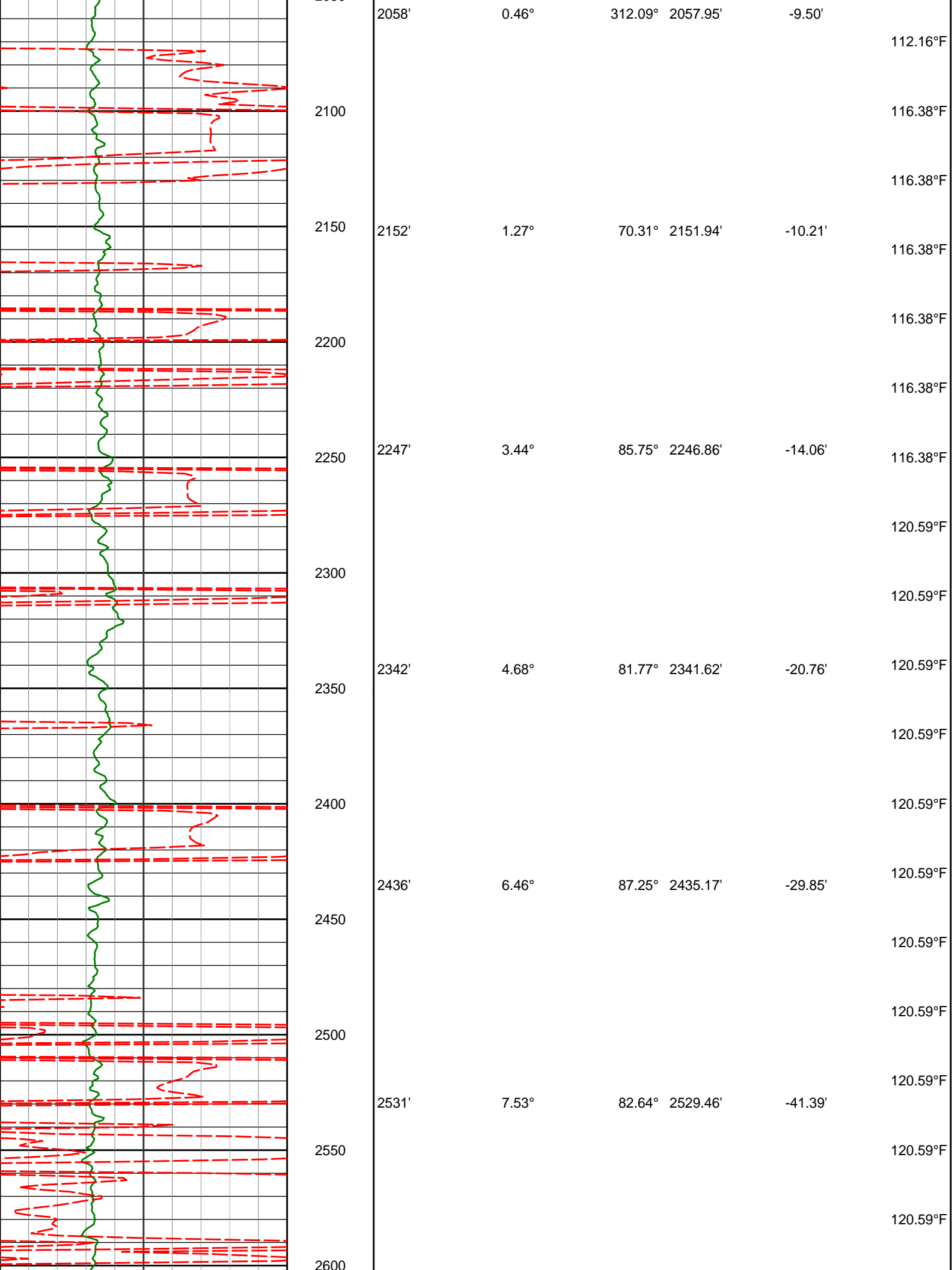
5. Surveys corrected by Surcon starting at 1983 ft.

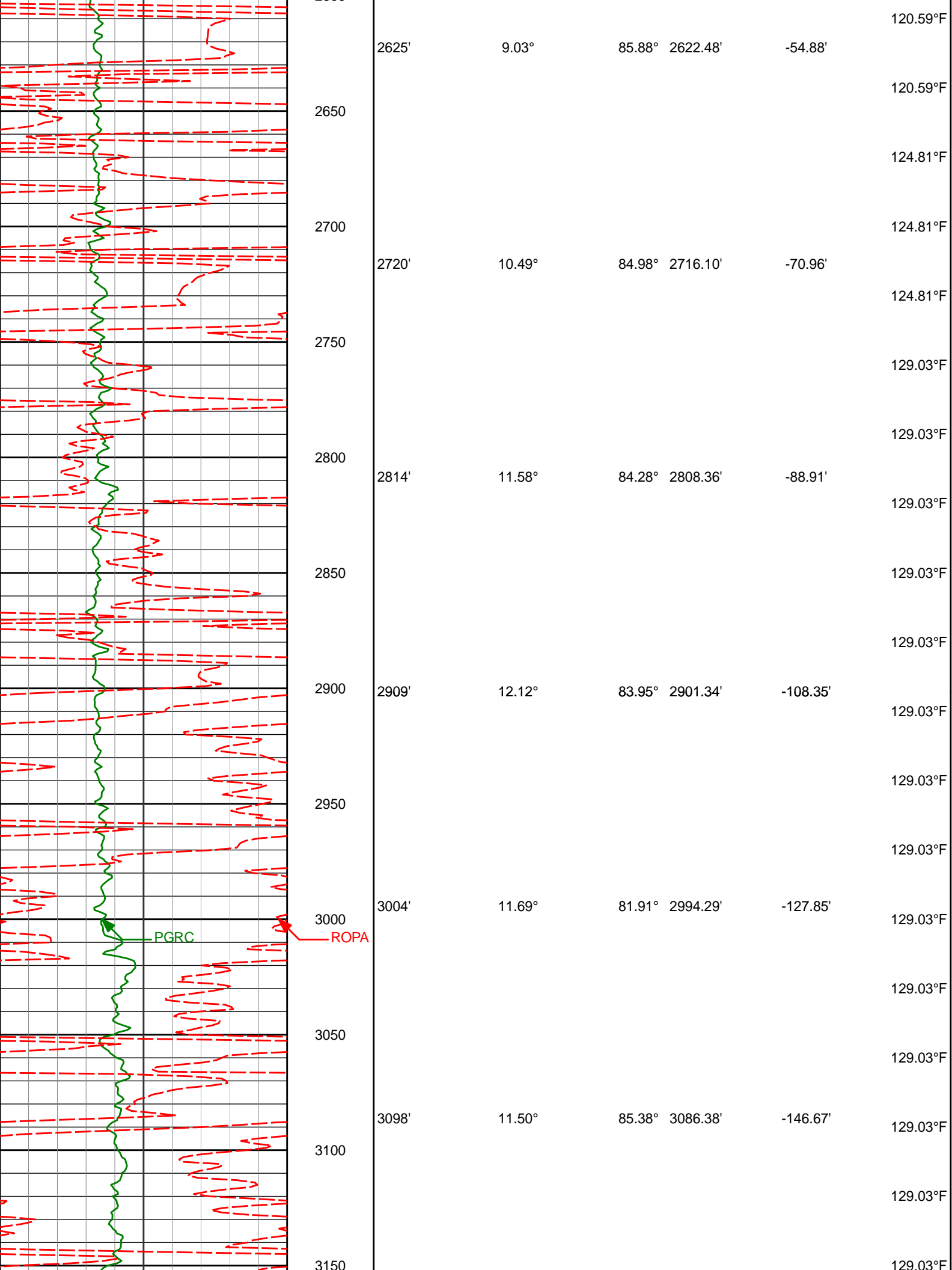
WARRANTY

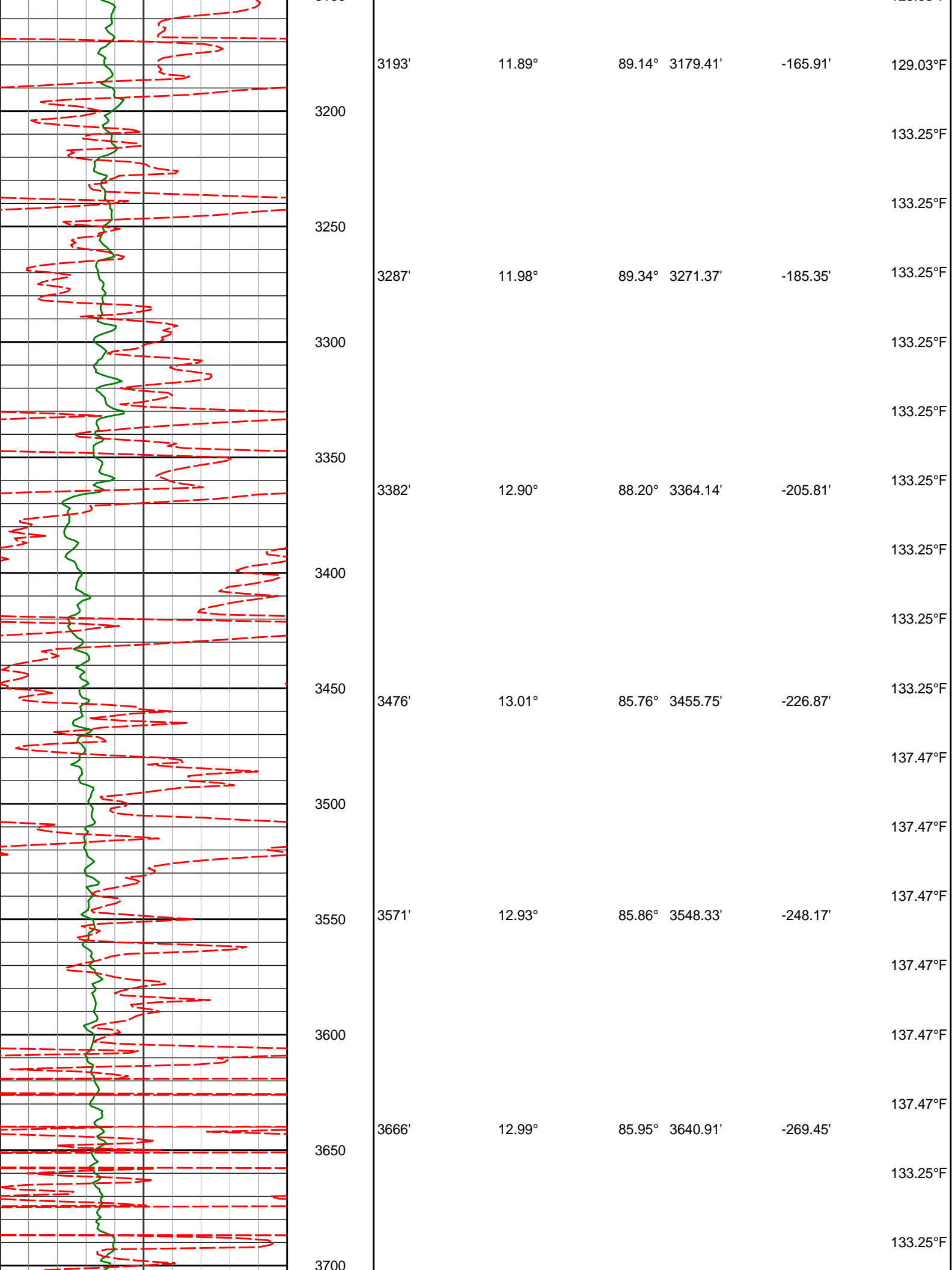
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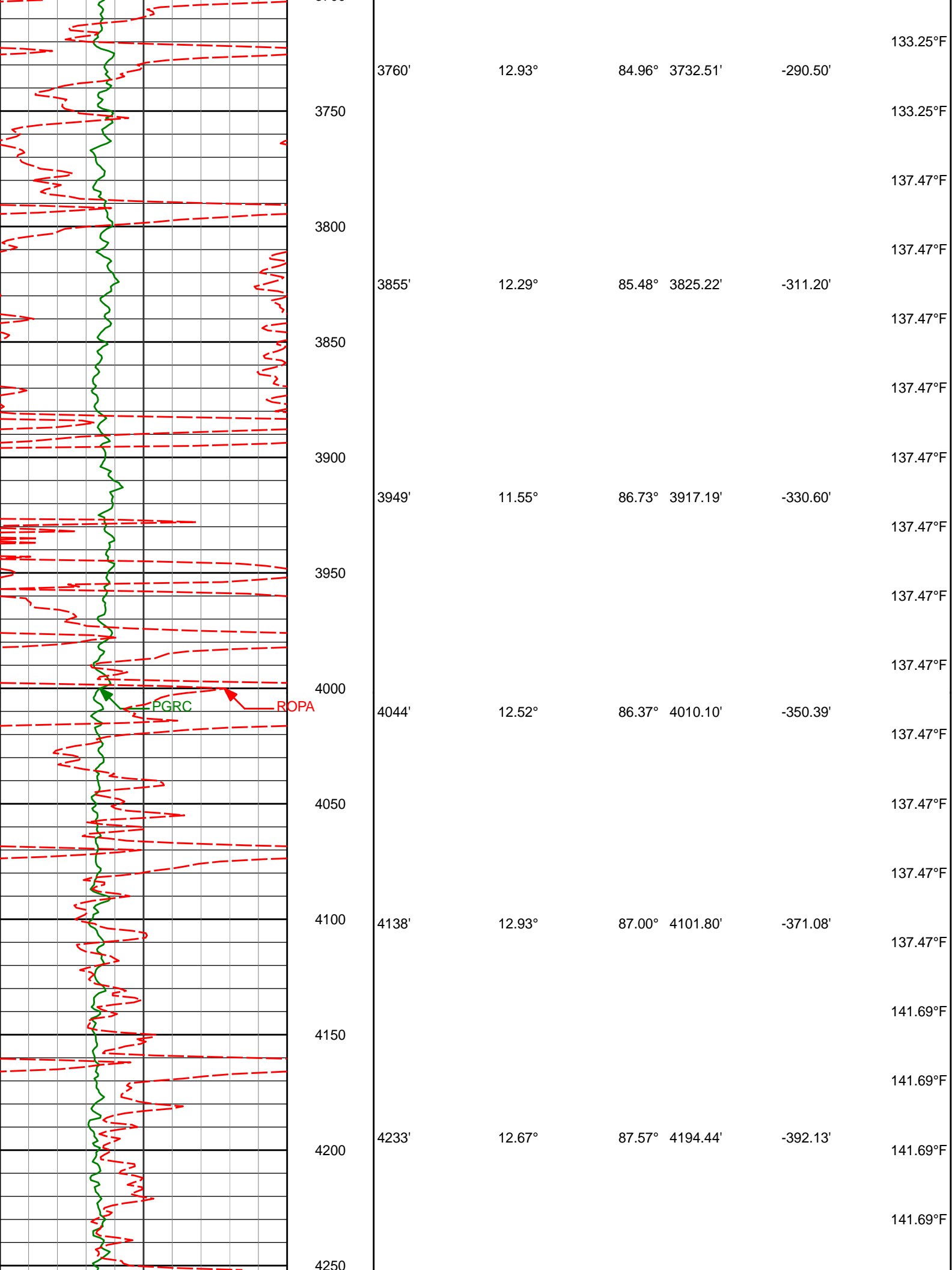
TVD Main Log 1:600 Scale

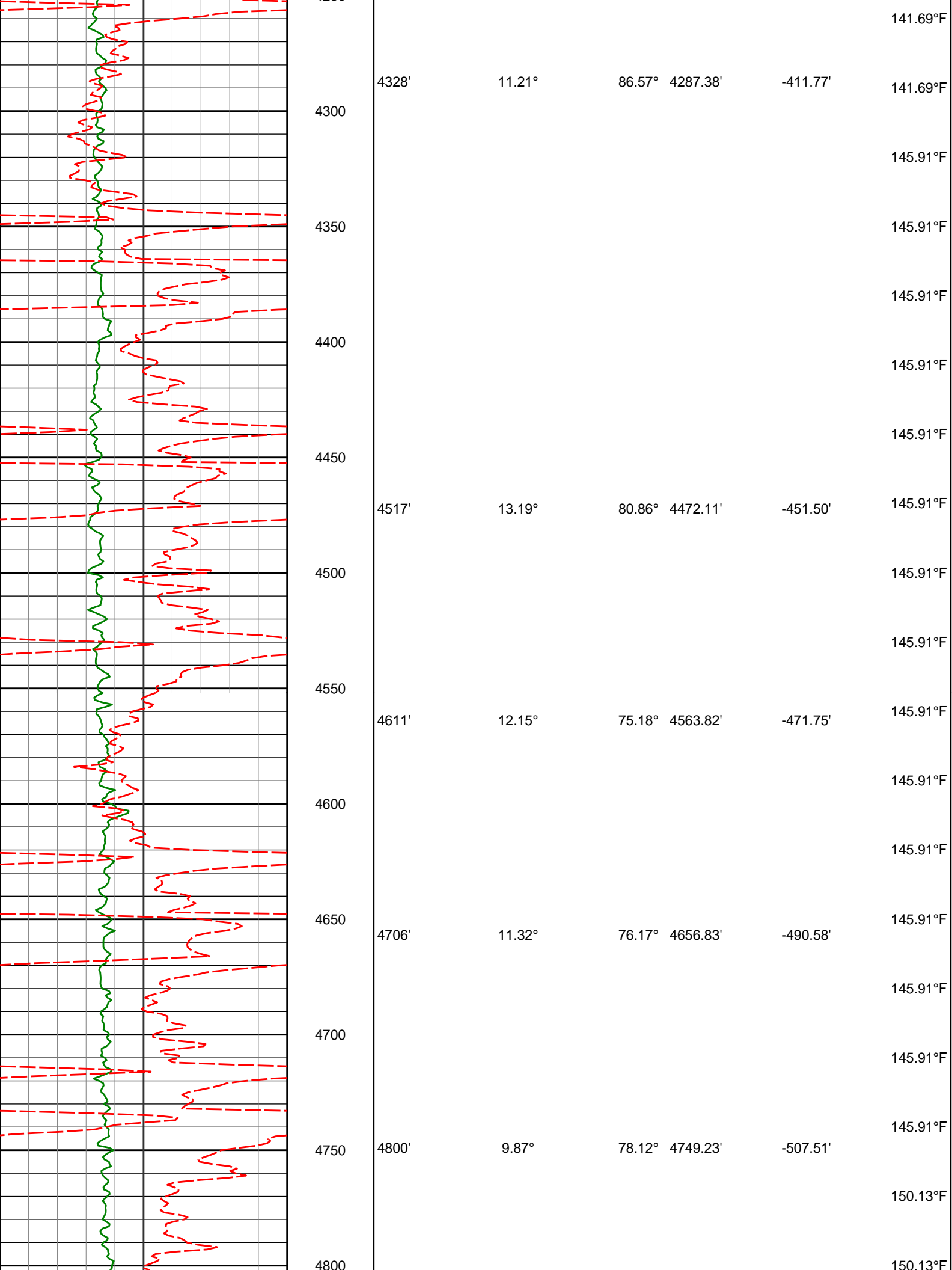


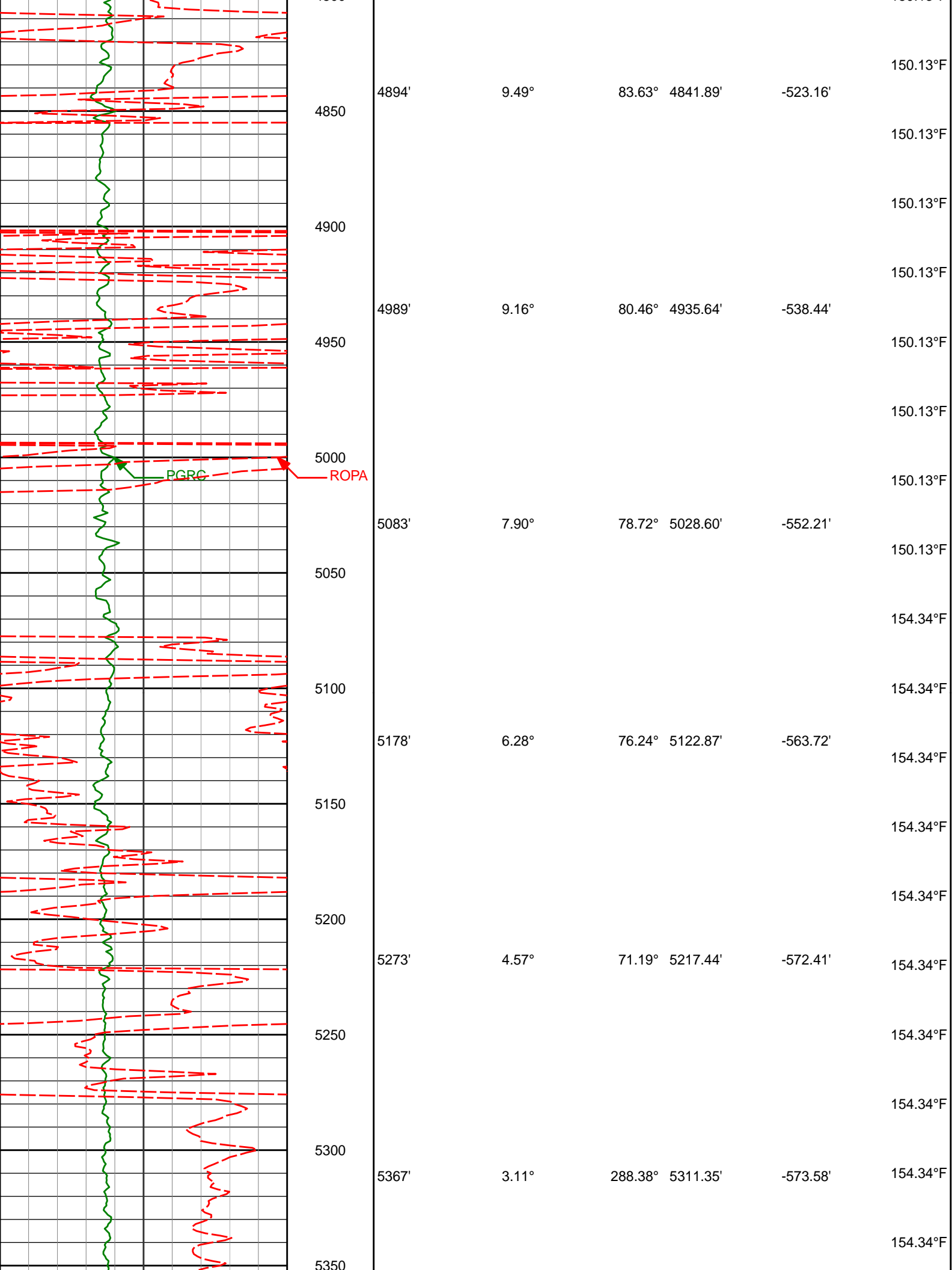


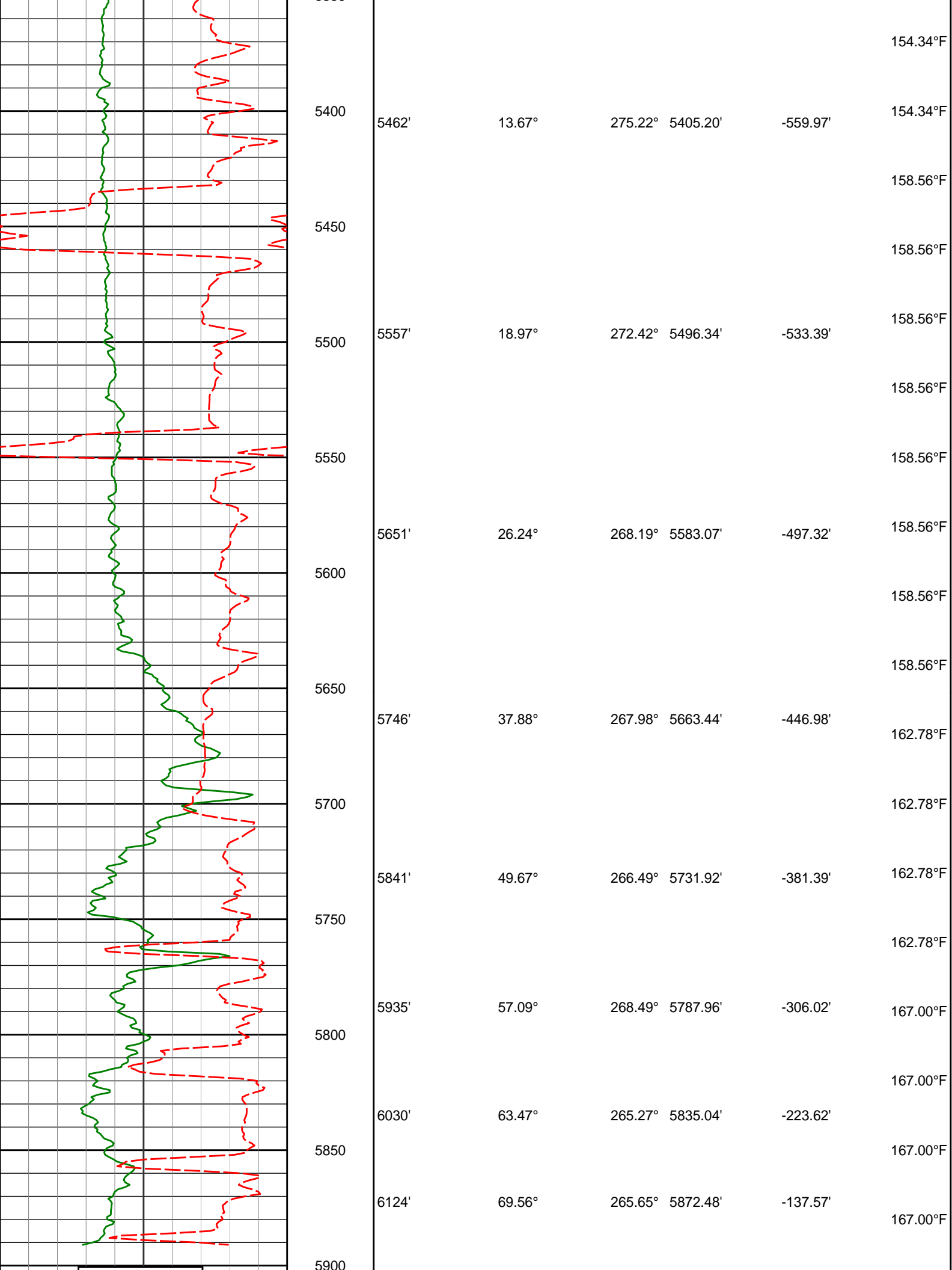


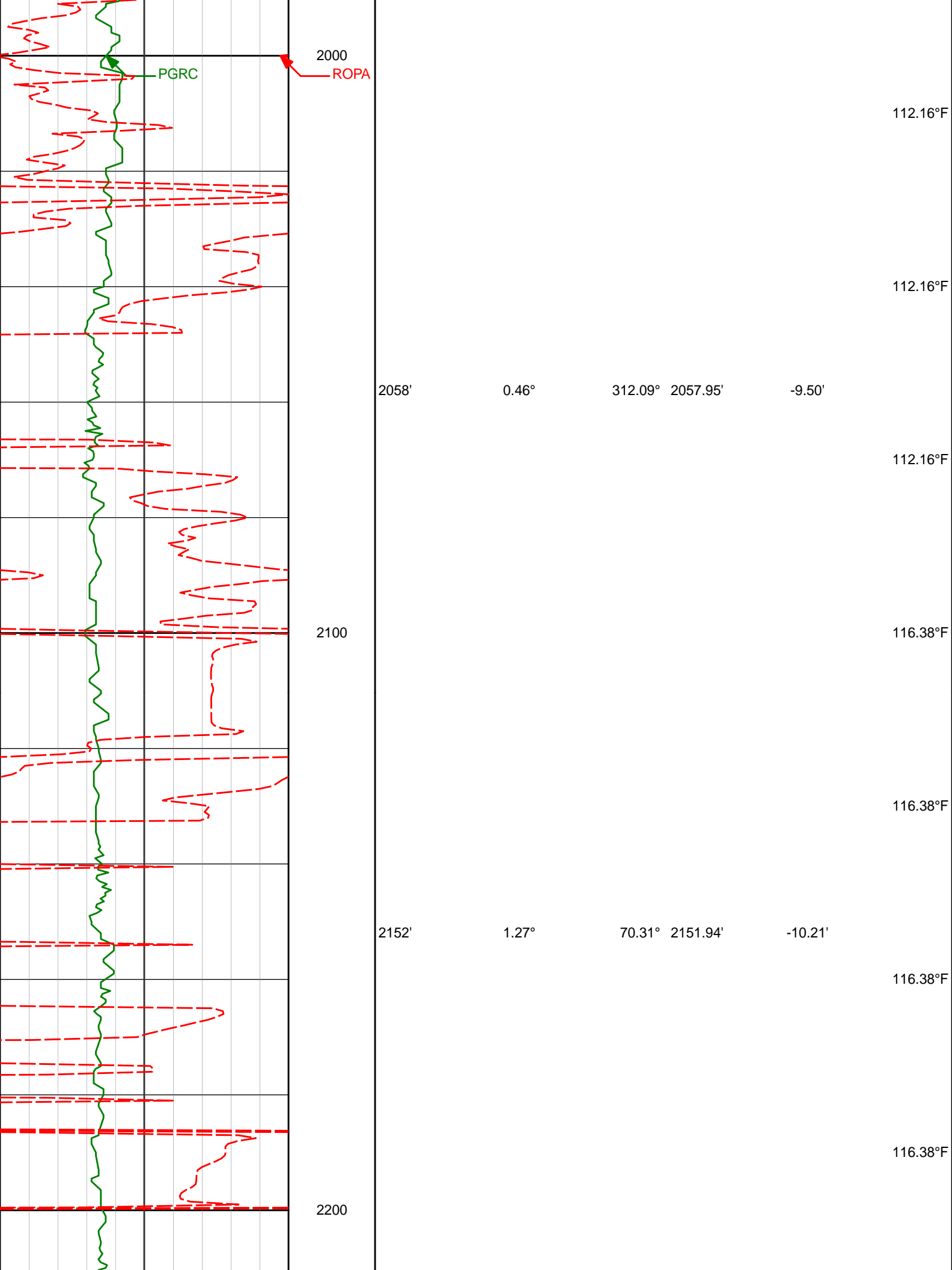


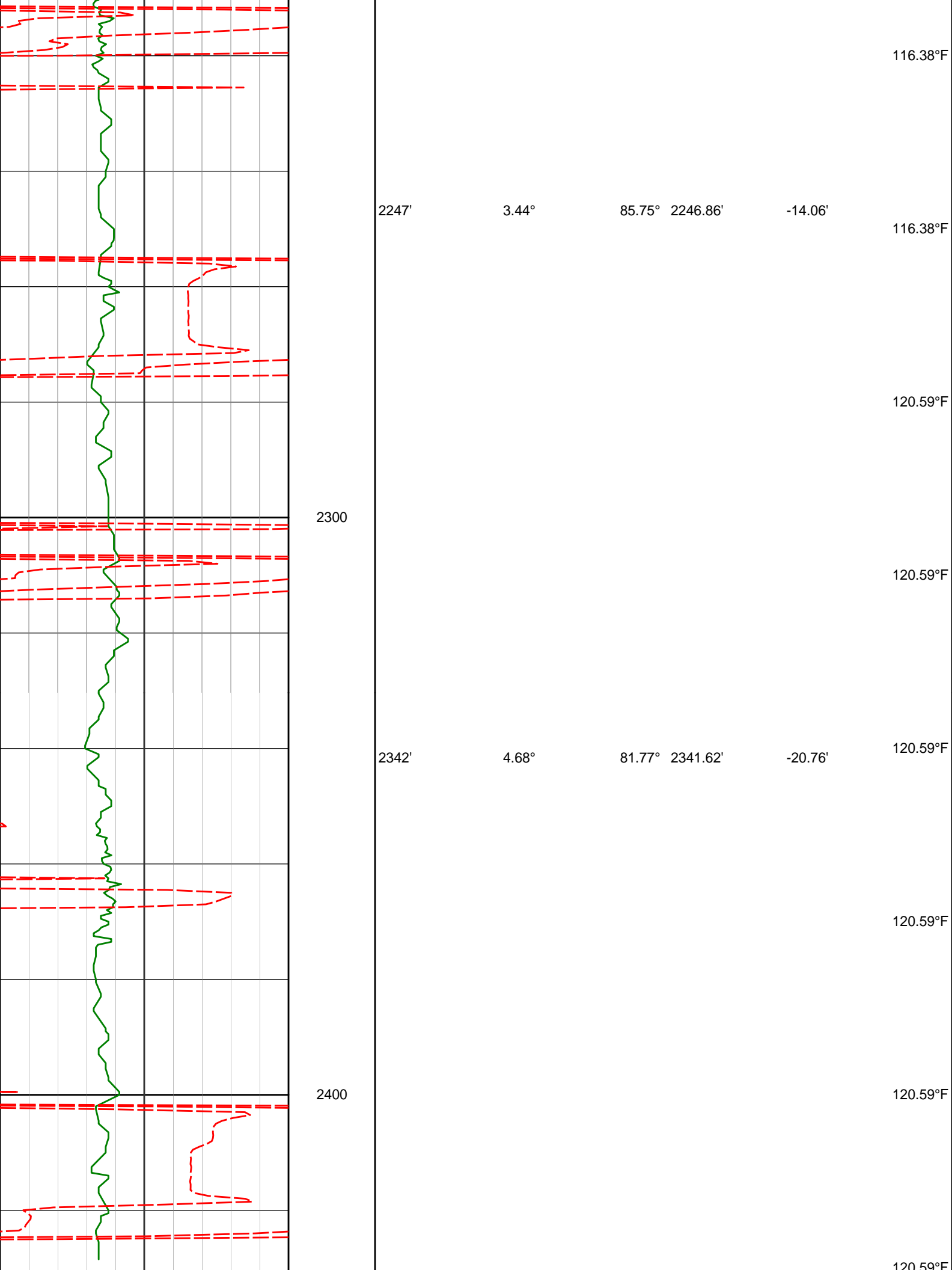


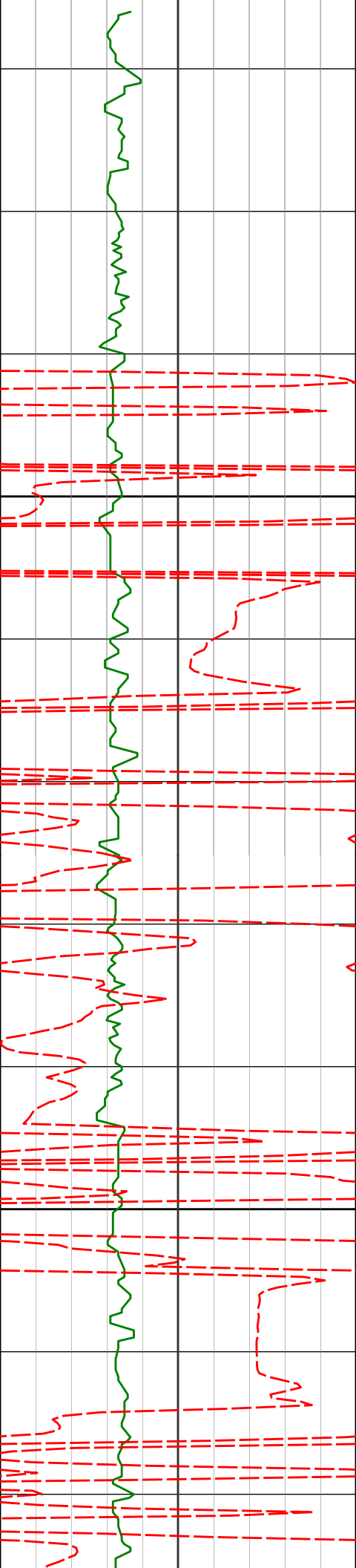












2500

2600

2436'

6.46°

87.25° 2435.17'

-29.85'

2531'

7.53°

82.64° 2529.46'

-41.39'

2625'

9.03°

85.88° 2622.48'

-54.88'

120.59°F

120.59°F

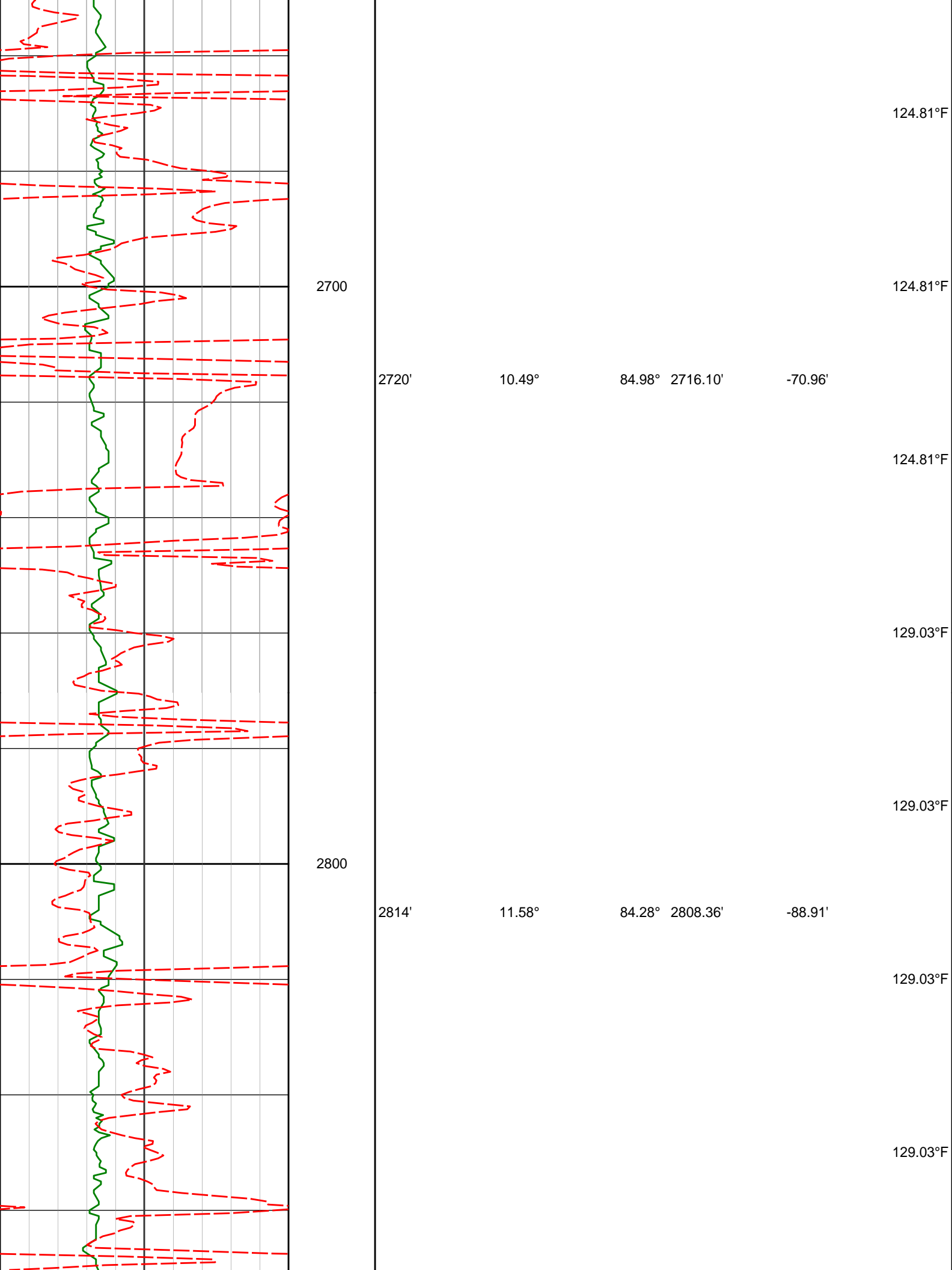
120.59°F

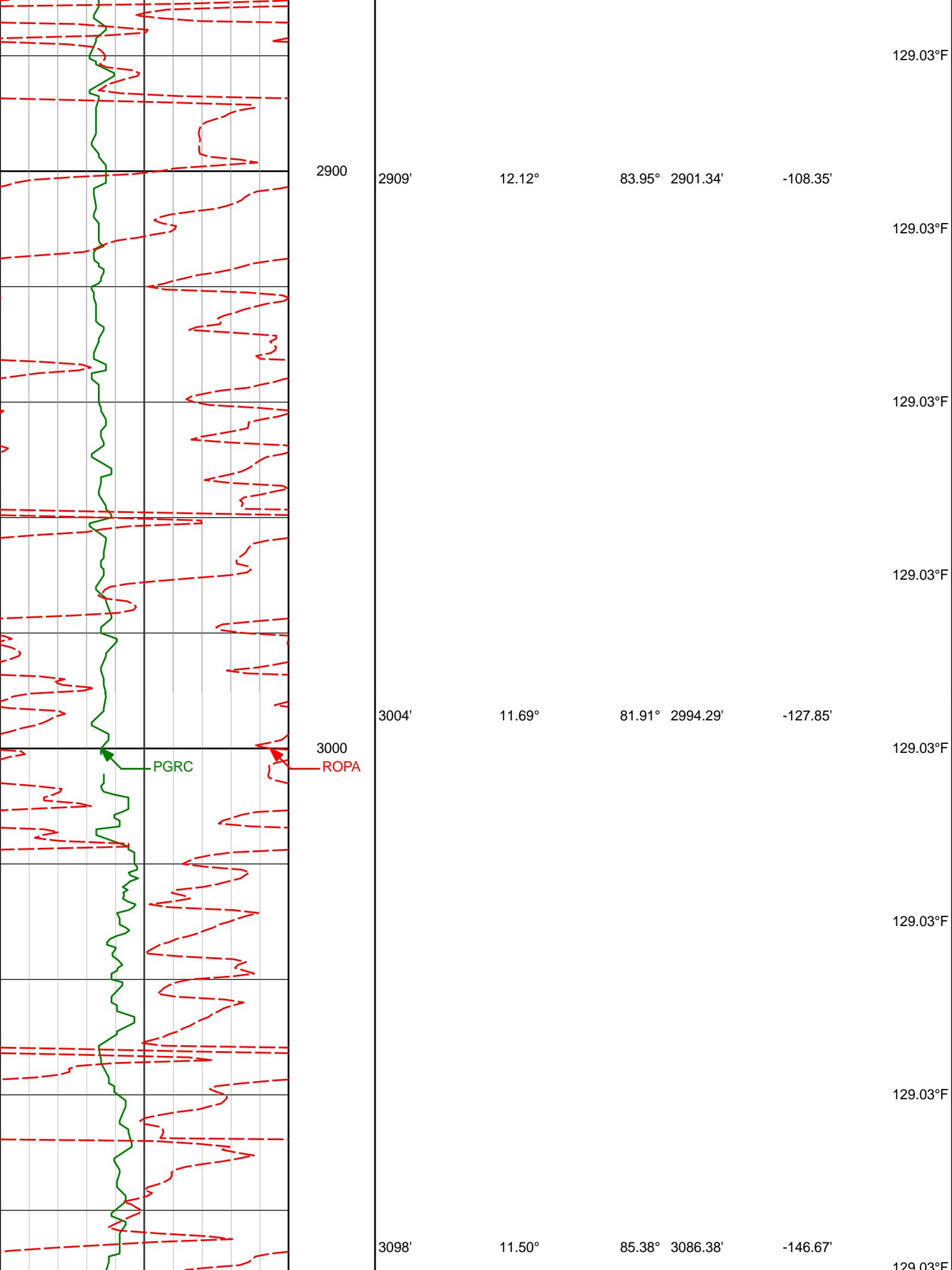
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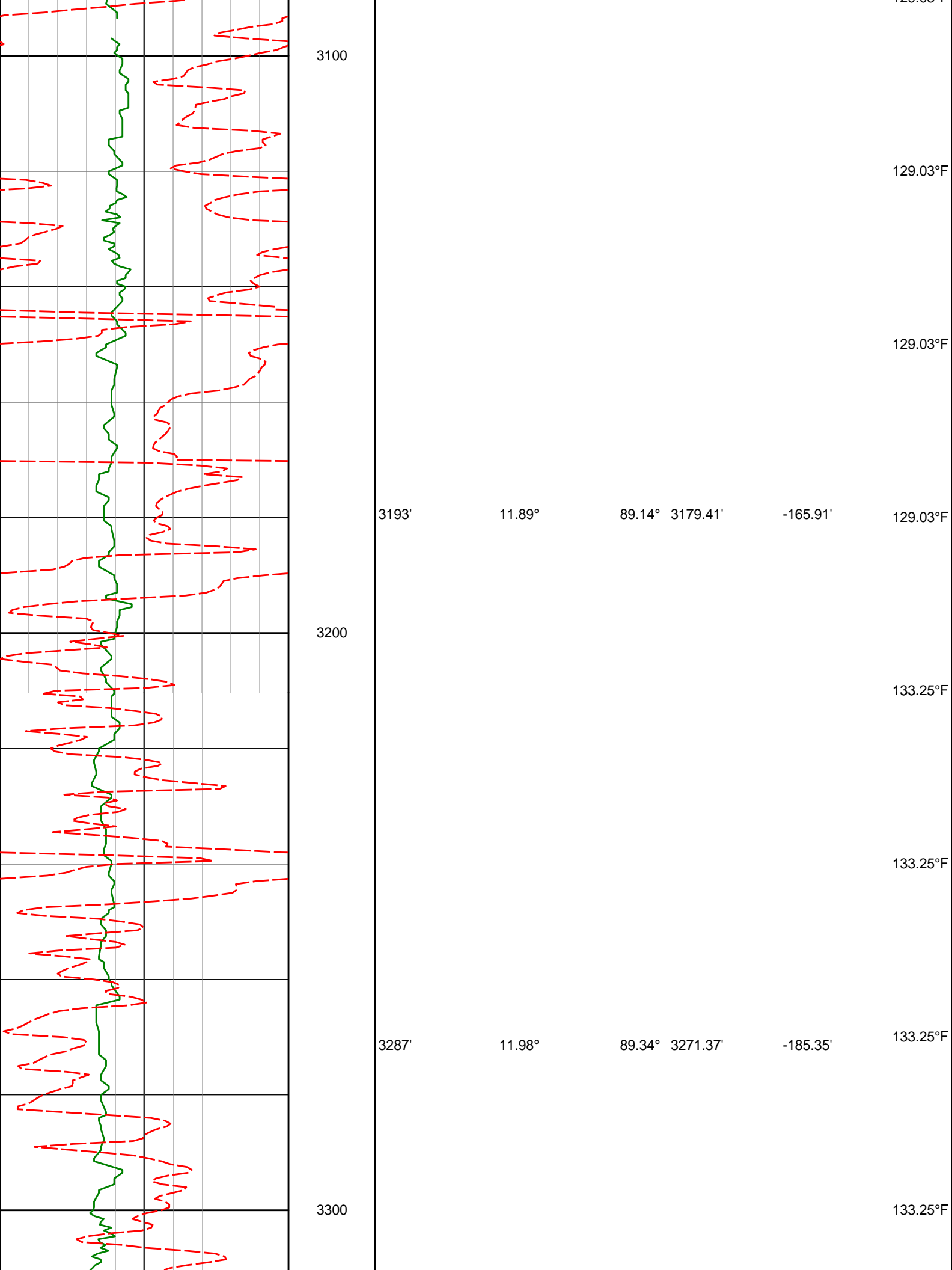
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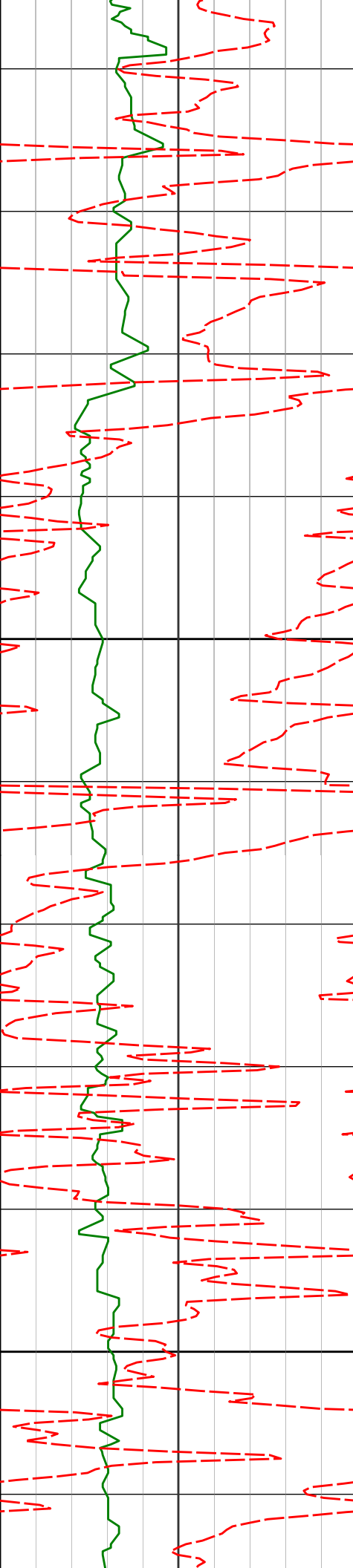
120.59°F

120.59°F









3400

3500

3382'

12.90°

88.20°

3364.14'

-205.81'

3476'

13.01°

85.76°

3455.75'

-226.87'

133.25°F

133.25°F

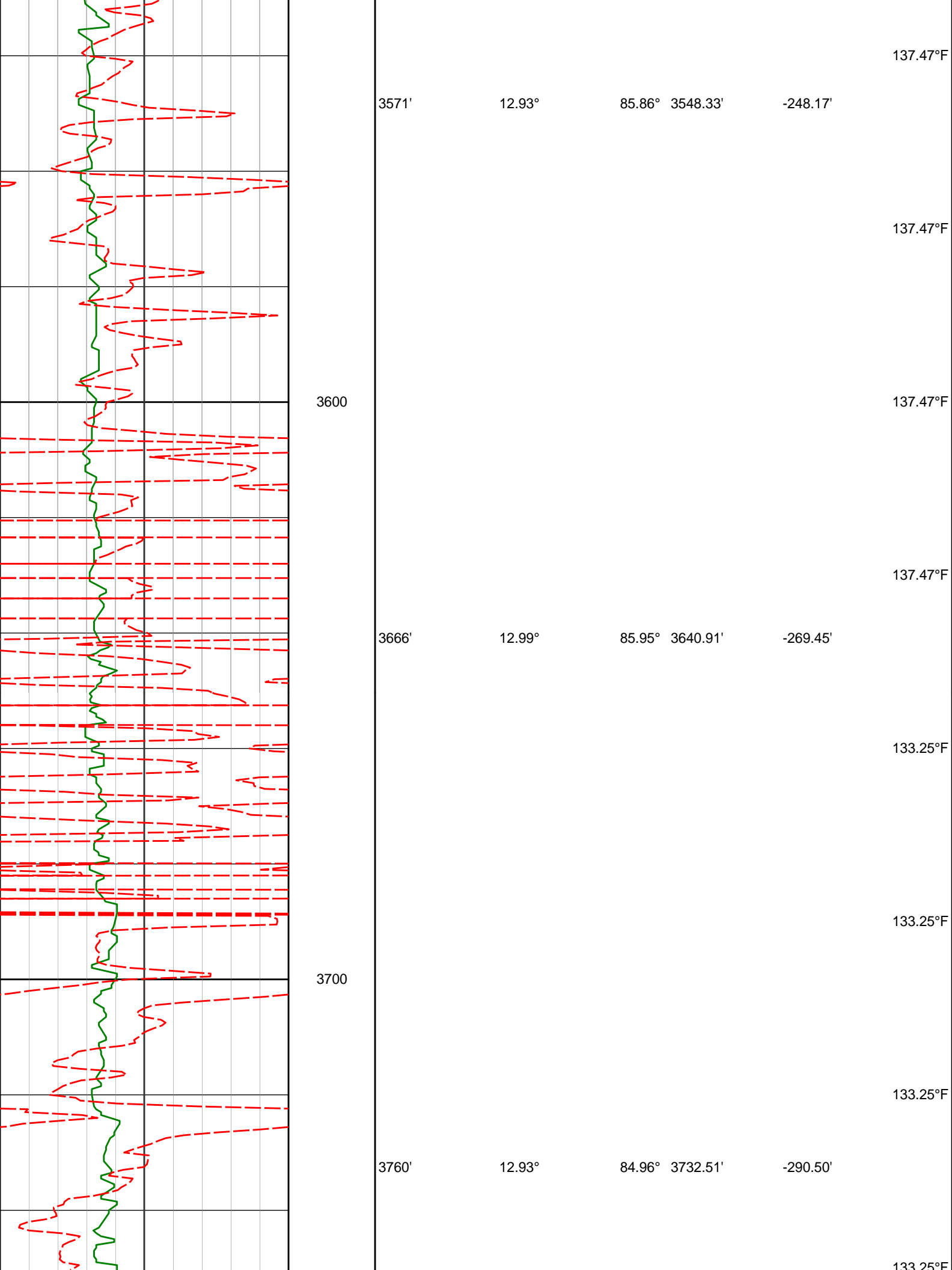
133.25°F

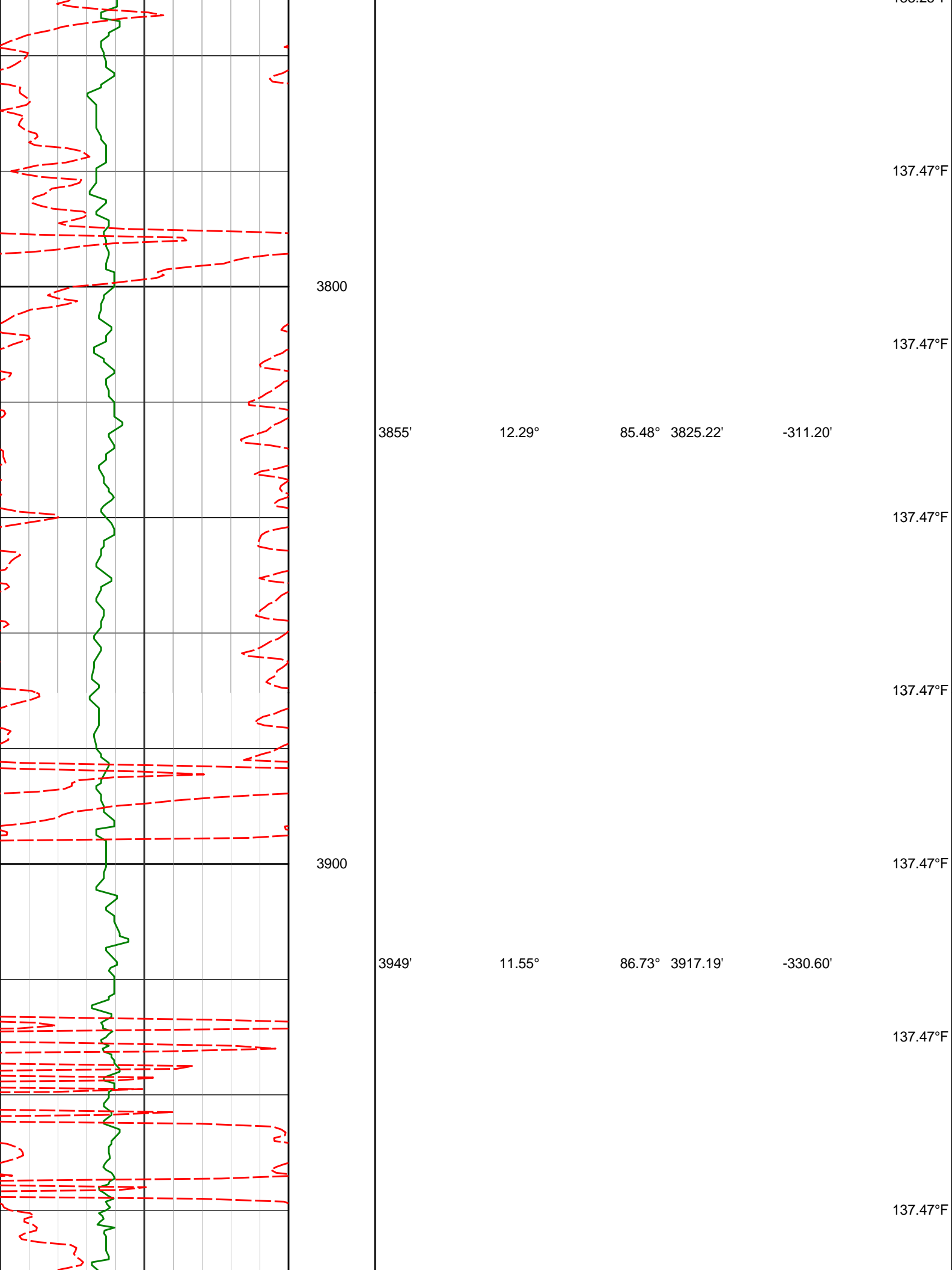
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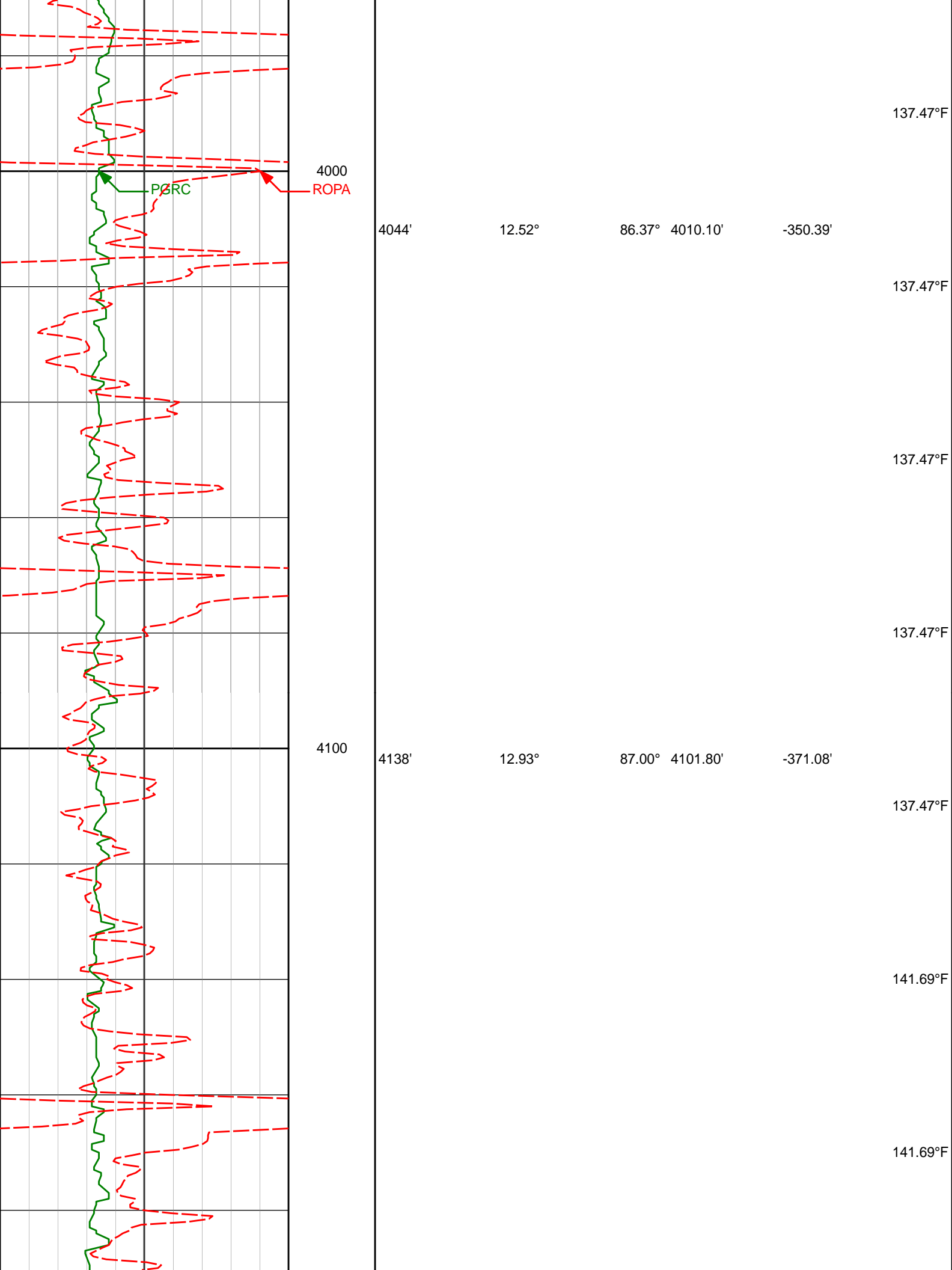
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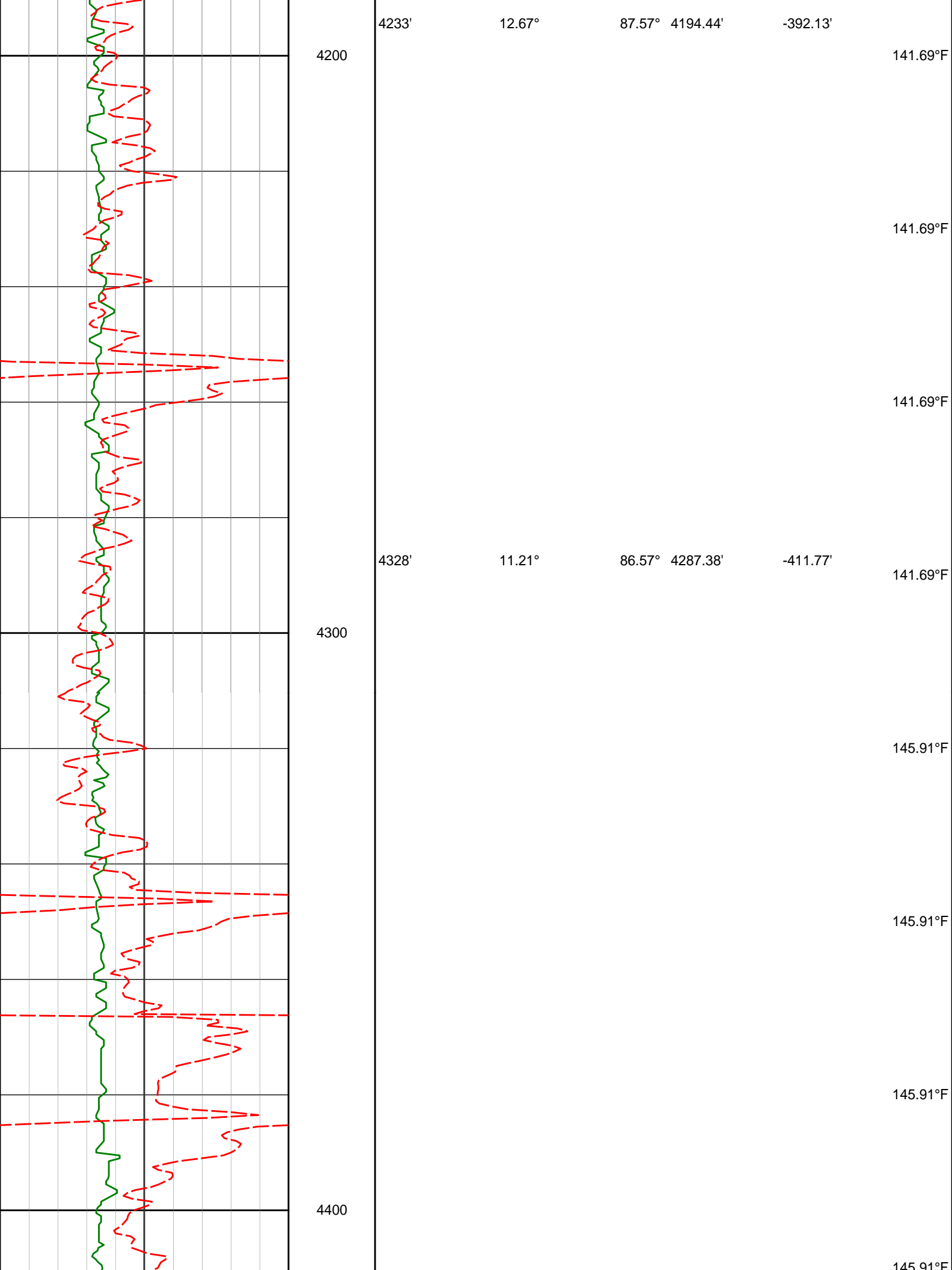
137.47°F

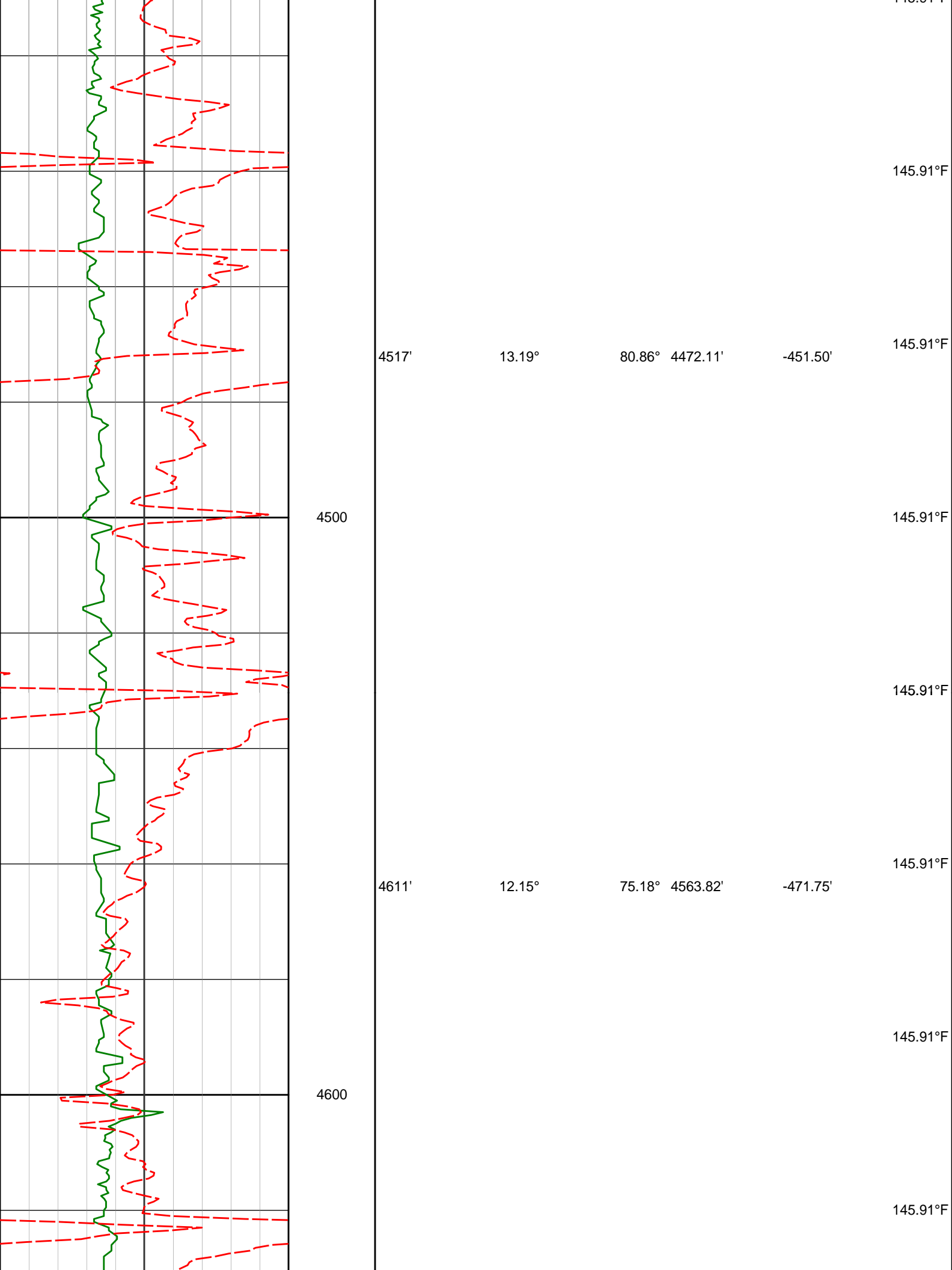
137.47°F

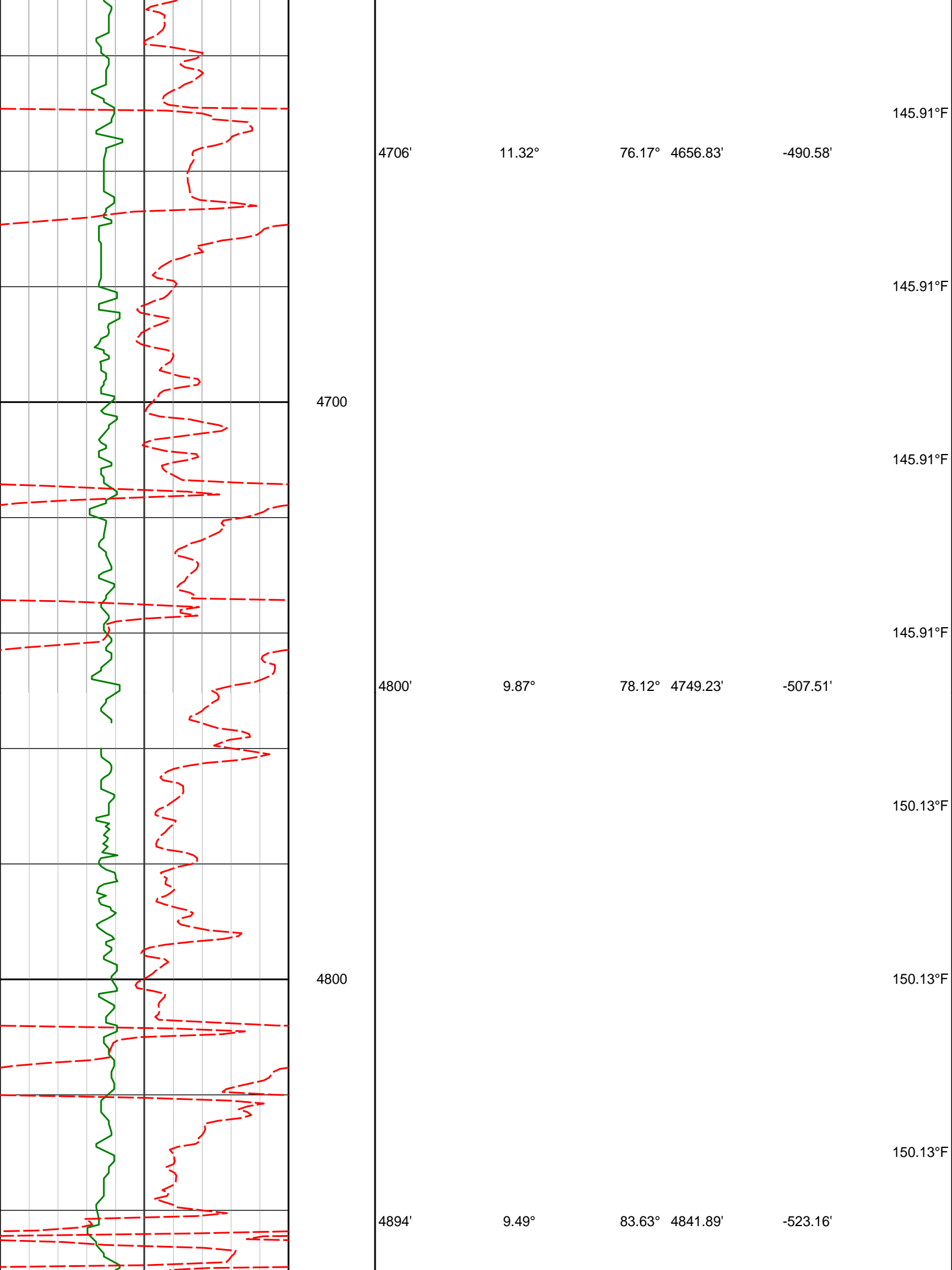


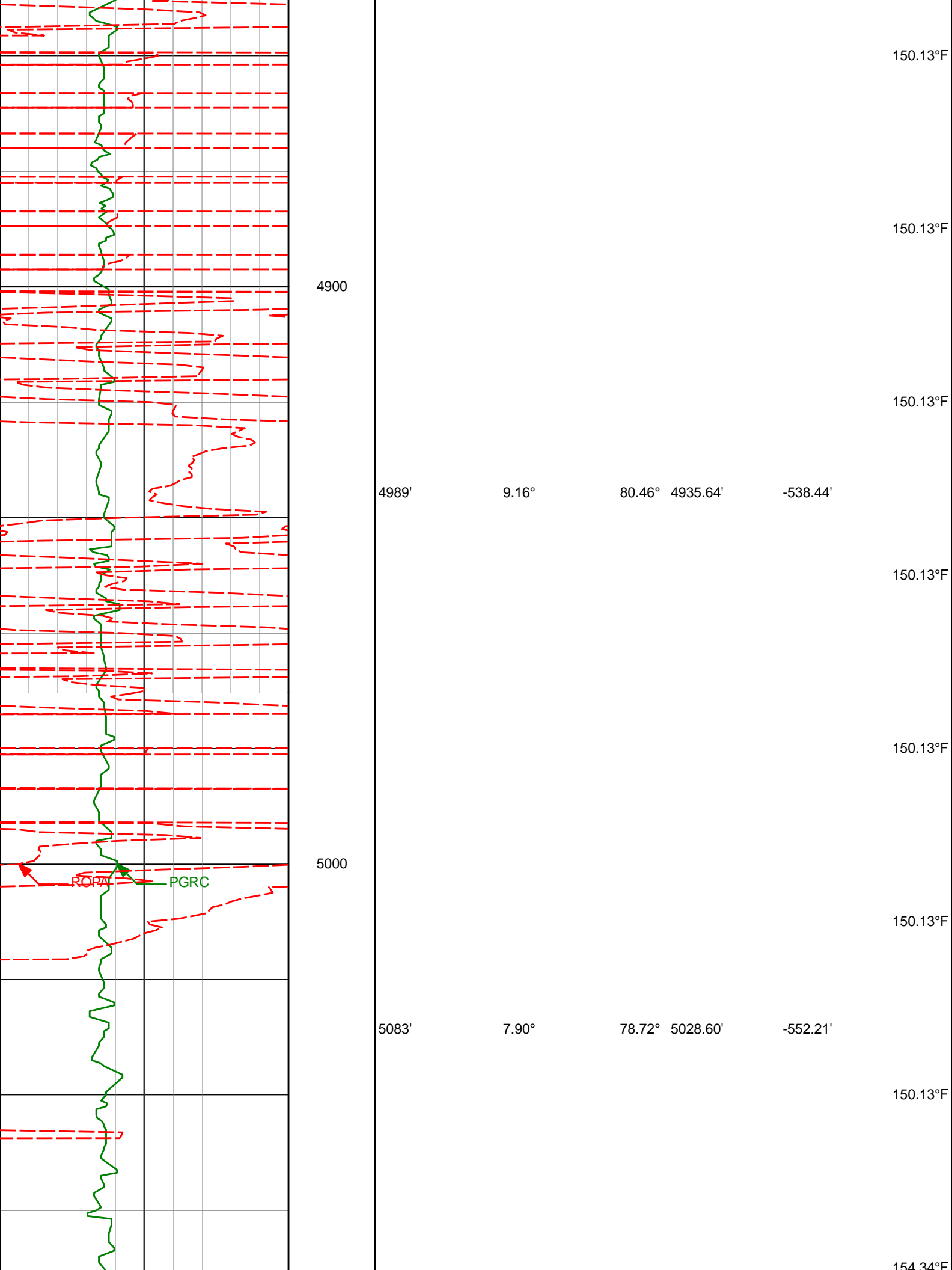


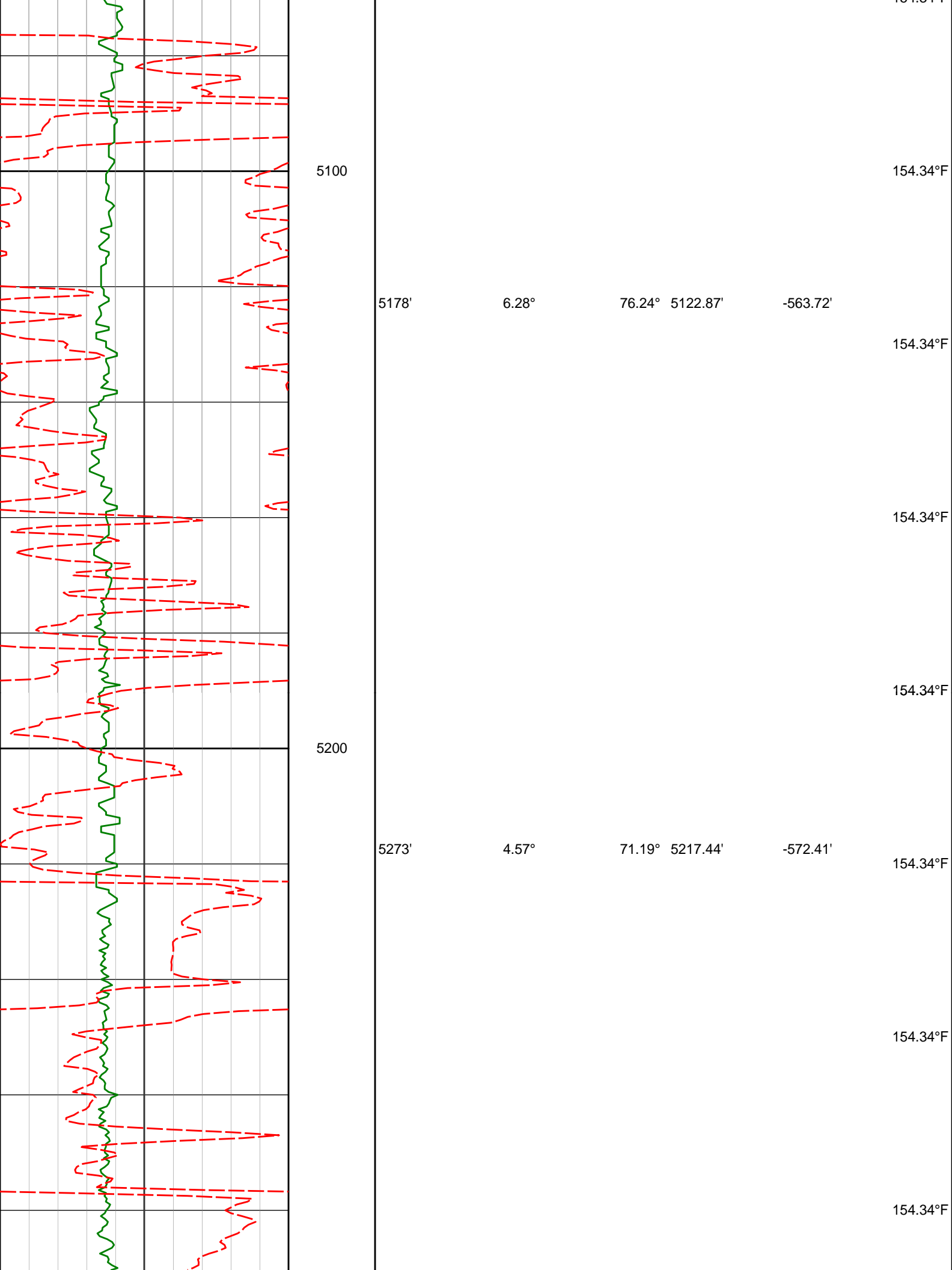


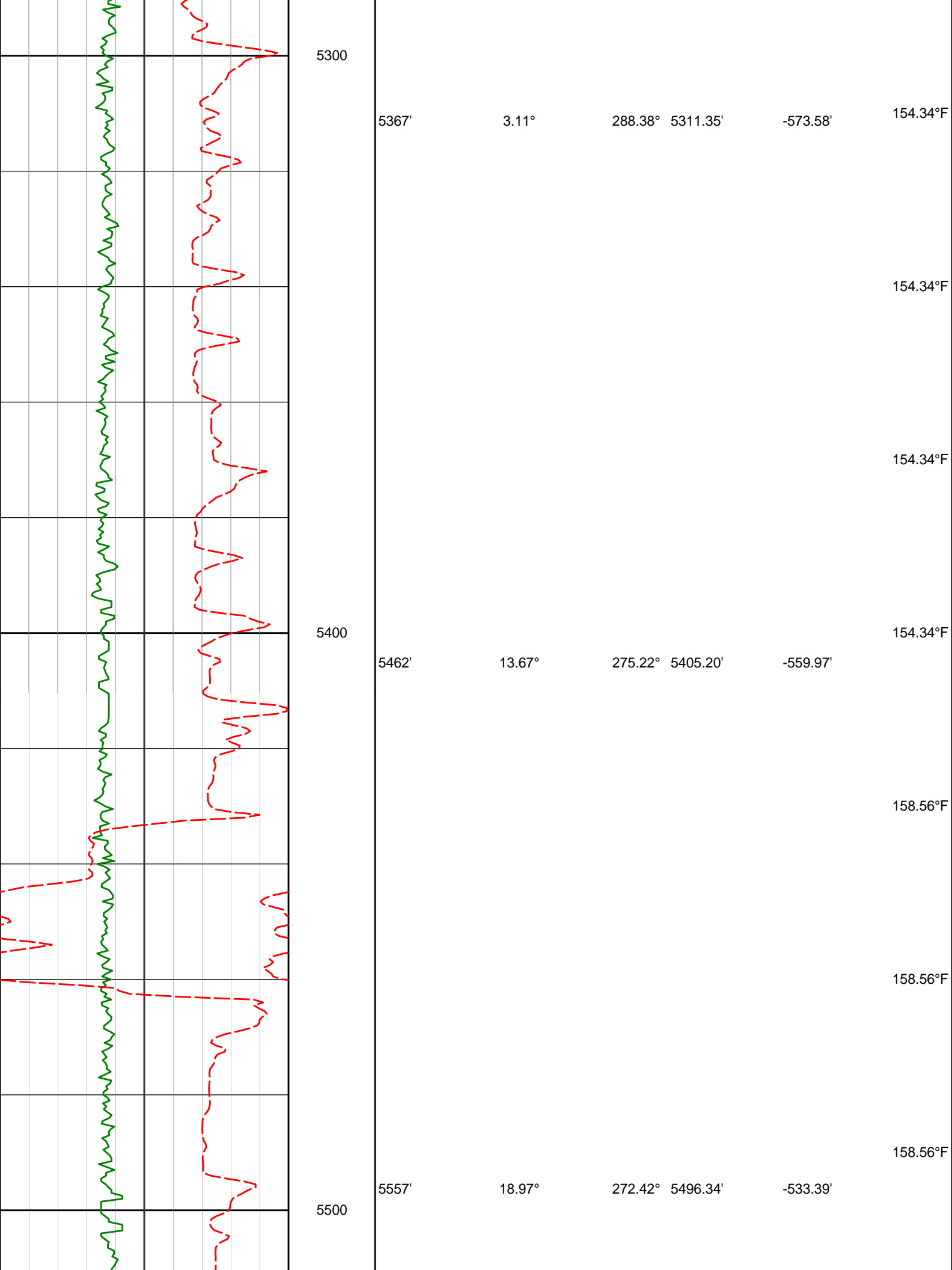


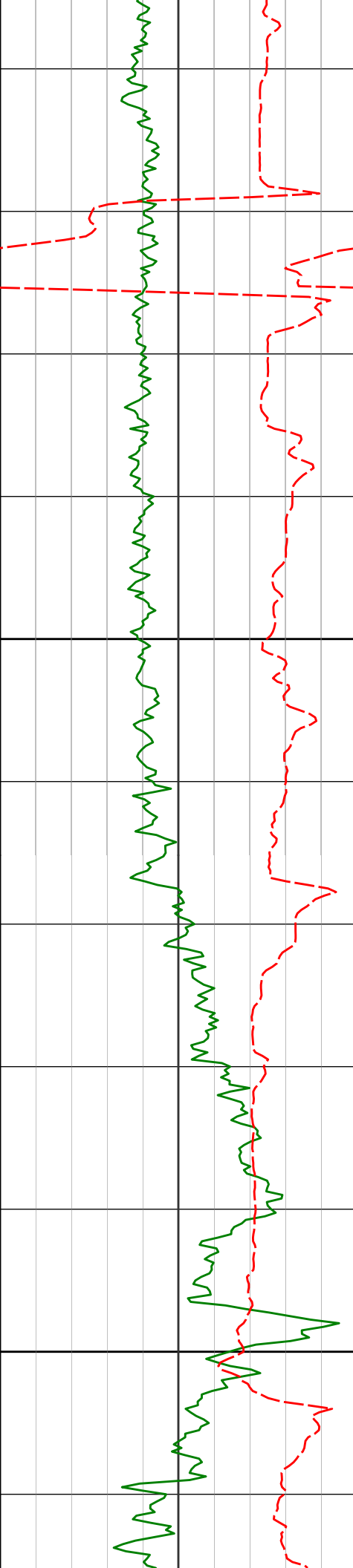












5600

5700

5651'

26.24°

268.19°

5583.07'

-497.32'

5746'

37.88°

267.98°

5663.44'

-446.98'

158.56°F

158.56°F

158.56°F

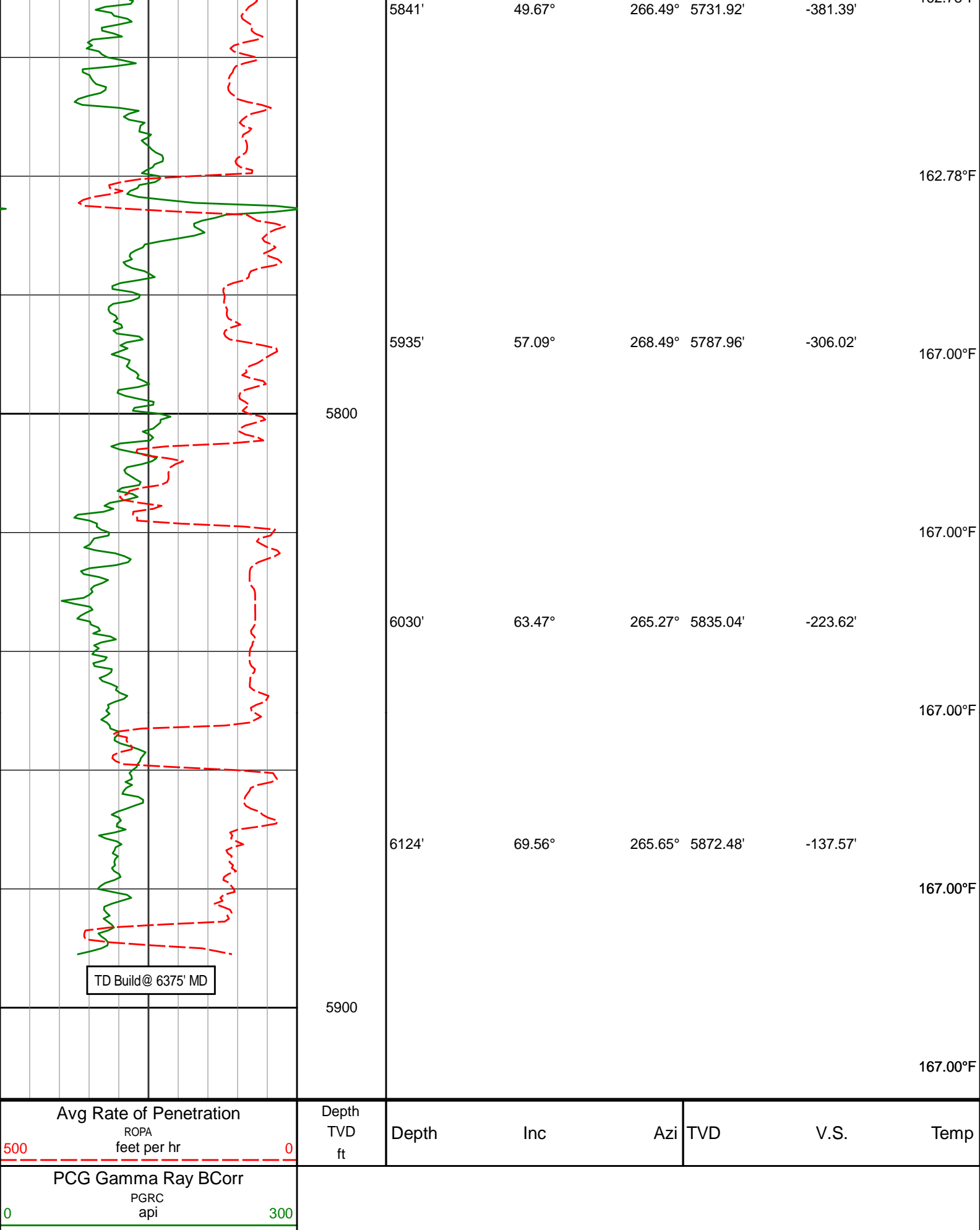
158.56°F

158.56°F

162.78°F

162.78°F

162.78°F



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DIRECTIONAL SURVEY REPORT

Noble Energy
Heston LD06-625
Wattenberg
Weld Colorado
USA
CA-XX-0903356502

<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
84.00	0.63	143.60	84.00	0.37 S	0.27 E	-0.26	0.75
179.00	0.61	126.56	178.99	1.09 S	0.99 E	-0.96	0.19
273.00	0.62	142.74	272.99	1.80 S	1.70 E	-1.66	0.18
367.00	0.65	128.51	366.98	2.53 S	2.43 E	-2.36	0.17
462.00	0.61	124.49	461.98	3.15 S	3.26 E	-3.19	0.06
557.00	0.39	162.85	556.97	3.75 S	3.78 E	-3.68	0.41
651.00	0.39	155.82	650.97	4.35 S	4.00 E	-3.89	0.05
745.00	0.32	139.03	744.97	4.84 S	4.30 E	-4.19	0.13
840.00	0.22	111.80	839.97	5.11 S	4.65 E	-4.52	0.17
934.00	0.33	137.28	933.97	5.37 S	5.00 E	-4.87	0.17
1029.00	0.11	80.98	1028.97	5.56 S	5.27 E	-5.14	0.30
1123.00	0.17	104.55	1122.97	5.58 S	5.50 E	-5.36	0.09
1218.00	0.29	68.59	1217.96	5.53 S	5.86 E	-5.72	0.19
1312.00	0.31	110.96	1311.96	5.53 S	6.32 E	-6.18	0.23
1407.00	0.45	109.61	1406.96	5.75 S	6.91 E	-6.77	0.15
1501.00	0.59	109.95	1500.96	6.04 S	7.71 E	-7.56	0.15
1596.00	0.32	116.51	1595.95	6.32 S	8.41 E	-8.25	0.29
1691.00	0.35	110.18	1690.95	6.54 S	8.92 E	-8.76	0.05
1785.00	0.21	46.14	1784.95	6.52 S	9.31 E	-9.15	0.34
1876.00	0.37	97.98	1875.95	6.45 S	9.72 E	-9.56	0.32
1963.00	0.16	343.73	1962.95	6.37 S	9.97 E	-9.81	0.53
2058.00	0.46	312.09	2057.95	5.99 S	9.65 E	-9.50	0.35
2152.00	1.27	70.31	2151.94	5.38 S	10.35 E	-10.21	1.64
2247.00	3.44	85.75	2246.86	4.82 S	14.18 E	-14.06	2.36
2342.00	4.68	81.77	2341.62	4.05 S	20.86 E	-20.76	1.34
2436.00	6.46	87.25	2435.17	3.25 S	29.94 E	-29.85	1.97
2531.00	7.53	82.64	2529.46	2.19 S	41.45 E	-41.39	1.27
2625.00	9.03	85.88	2622.48	0.87 S	54.92 E	-54.88	1.67
2720.00	10.49	84.98	2716.10	0.42 N	70.97 E	-70.96	1.55
2814.00	11.58	84.28	2808.36	2.11 N	88.88 E	-88.91	1.17
2909.00	12.12	83.95	2901.34	4.11 N	108.29 E	-108.35	0.57
3004.00	11.69	81.91	2994.29	6.51 N	127.73 E	-127.85	0.63
3098.00	11.50	85.38	3086.38	8.61 N	146.50 E	-146.67	0.77
3193.00	11.89	89.14	3179.41	9.52 N	165.73 E	-165.91	0.90
3287.00	11.98	89.34	3271.37	9.78 N	185.16 E	-185.35	0.11
3382.00	12.90	88.20	3364.14	10.22 N	205.62 E	-205.81	1.00
3476.00	13.01	85.76	3455.75	11.34 N	226.66 E	-226.87	0.59
3571.00	12.93	85.86	3548.33	12.89 N	247.93 E	-248.17	0.09
3666.00	12.99	85.95	3640.91	14.42 N	269.18 E	-269.45	0.07
3760.00	12.93	84.96	3732.51	16.09 N	290.19 E	-290.50	0.24
3855.00	12.29	85.48	3825.22	17.82 N	310.86 E	-311.20	0.68
3949.00	11.55	86.73	3917.19	19.14 N	330.23 E	-330.60	0.83
4044.00	12.52	86.37	4010.10	20.34 N	350.00 E	-350.39	1.02
4138.00	12.93	87.00	4101.80	21.53 N	370.67 E	-371.08	0.46
4233.00	12.67	87.57	4194.44	22.53 N	391.69 E	-392.13	0.30
4328.00	11.21	86.57	4287.38	23.52 N	411.32 E	-411.77	1.55
4517.00	13.19	80.86	4472.11	28.05 N	450.96 E	-451.50	1.23
4611.00	12.15	75.18	4563.82	32.28 N	471.11 E	-471.75	1.73
4706.00	11.32	76.17	4656.83	37.07 N	489.83 E	-490.58	0.90
4800.00	9.87	78.12	4749.23	40.93 N	506.67 E	-507.51	1.59
4894.00	9.49	83.63	4841.89	43.45 N	522.25 E	-523.16	1.06
4989.00	9.16	80.46	4935.64	45.57 N	537.50 E	-538.44	0.64
5083.00	7.90	78.72	5028.60	48.08 N	551.21 E	-552.21	1.37
5178.00	6.28	76.24	5122.87	50.59 N	562.66 E	-563.72	1.74
5273.00	4.57	71.19	5217.44	53.05 N	571.29 E	-572.41	1.87
5367.00	3.11	288.38	5311.35	55.06 N	572.42 E	-573.58	7.76
5462.00	13.67	275.22	5405.20	56.90 N	558.75 E	-559.97	11.23

5557.00	18.97	272.42	5496.34	58.57 N	532.13 E	-533.39	5.64
5651.00	26.24	268.19	5583.07	58.56 N	496.04 E	-497.32	7.92
5746.00	37.88	267.98	5663.44	56.87 N	445.73 E	-446.98	12.25
5841.00	49.67	266.49	5731.92	53.61 N	380.21 E	-381.39	12.46
5935.00	57.09	268.49	5787.96	50.37 N	304.89 E	-306.02	8.08
6030.00	63.47	265.27	5835.04	45.81 N	222.57 E	-223.62	7.33
6124.00	69.56	265.65	5872.48	39.00 N	136.67 E	-137.57	6.49
6219.00	77.21	264.09	5899.63	30.84 N	46.07 E	-46.81	8.20
6314.00	83.78	268.49	5915.31	24.81 N	47.35 W	46.74	8.29
6408.00	91.47	268.28	5919.20	22.17 N	141.17 W	140.59	8.18
6503.00	91.38	268.58	5916.84	19.57 N	236.10 W	235.56	0.33
6598.00	90.45	268.17	5915.33	16.87 N	331.05 W	330.54	1.07
6692.00	89.53	268.10	5915.34	13.81 N	425.00 W	424.54	0.98
6787.00	88.88	267.73	5916.66	10.36 N	519.92 W	519.52	0.79
6881.00	89.74	268.63	5917.79	7.37 N	613.87 W	613.51	1.32
6976.00	89.34	268.12	5918.55	4.68 N	708.83 W	708.50	0.68
7070.00	90.30	267.87	5918.85	1.39 N	802.77 W	802.50	1.06
7165.00	89.96	267.87	5918.63	2.14 S	897.70 W	897.49	0.36
7259.00	90.17	268.91	5918.53	4.78 S	991.66 W	991.49	1.13
7354.00	91.31	269.41	5917.30	6.18 S	1086.64 W	1086.47	1.31
7448.00	91.13	269.33	5915.30	7.21 S	1180.62 W	1180.44	0.21

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 268.61 DEGREES (GRID)
A TOTAL CORRECTION OF 6.92 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7448.00 FEET
IS 1180.64 FEET ALONG 269.65 DEGREES (GRID)**

**Surveys from 0' to 1876' are Gyro surveys.
Surveys corrected by Surcon starting at 1983 ft.**