



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	14-Aug-15	17-Aug-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,145.00	6,243.00			
Log End Depth (MD, ft)	6,243.00	10,569.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	13-Aug-15 05:30	15-Aug-15 05:00			
Drill/Wipe End Date and Time	14-Aug-15 05:45	17-Aug-15 05:30			
Min Inc (deg) @ Depth (MD, ft)	0.10 @ 5,220.00	88.00 @ 7,449.00			
Max Inc (deg) @ Depth (MD, ft)	83.61 @ 6,187.00	93.36 @ 10,502.00			
Bit TFA(in2) / Bit Type	0.98 / PDC	0.65 / PDC			
Flow Rate (gpm)	586.63	296.40			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	10.30 / 39.00	10.40 / 45.00			
Filtrate CL (ppm)	900.00	900.00			
pH / Fluid Loss (mptm)	8.70 / 0	9.00 / 0			
PV (cP) / YP (lbf2)	15 / 12.00	21 / 16.00			
% Solids / % Sand	12.3 / .2	5.7 / .1			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (in F) / S	171.00 / PDM	200.00 / PDM			

Max Tool Temp (degF) / Source	171.20 / PCM	209.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Paul Kock	Paul Kock			
Customer Representative	Dave Nielson	Dave Neilsen			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11404289	11404289			
Insert Serial Number	11145577	11145577			
Date and Time Initialized	12-Aug-15 21:17	14-Aug-15 19:31			
Date and Time Read	14-Aug-15 10:29	17-Aug-15 12:48			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	67.00			
Software Version	6.33	6.33			
Sub Serial Number	11404289	11404289			
Sonde Serial Number	11062074	11062074			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	284.40	79.40			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	44.09	55.33			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404289	11404289			
Insert/Sonde Serial Number	11292594	11292594			

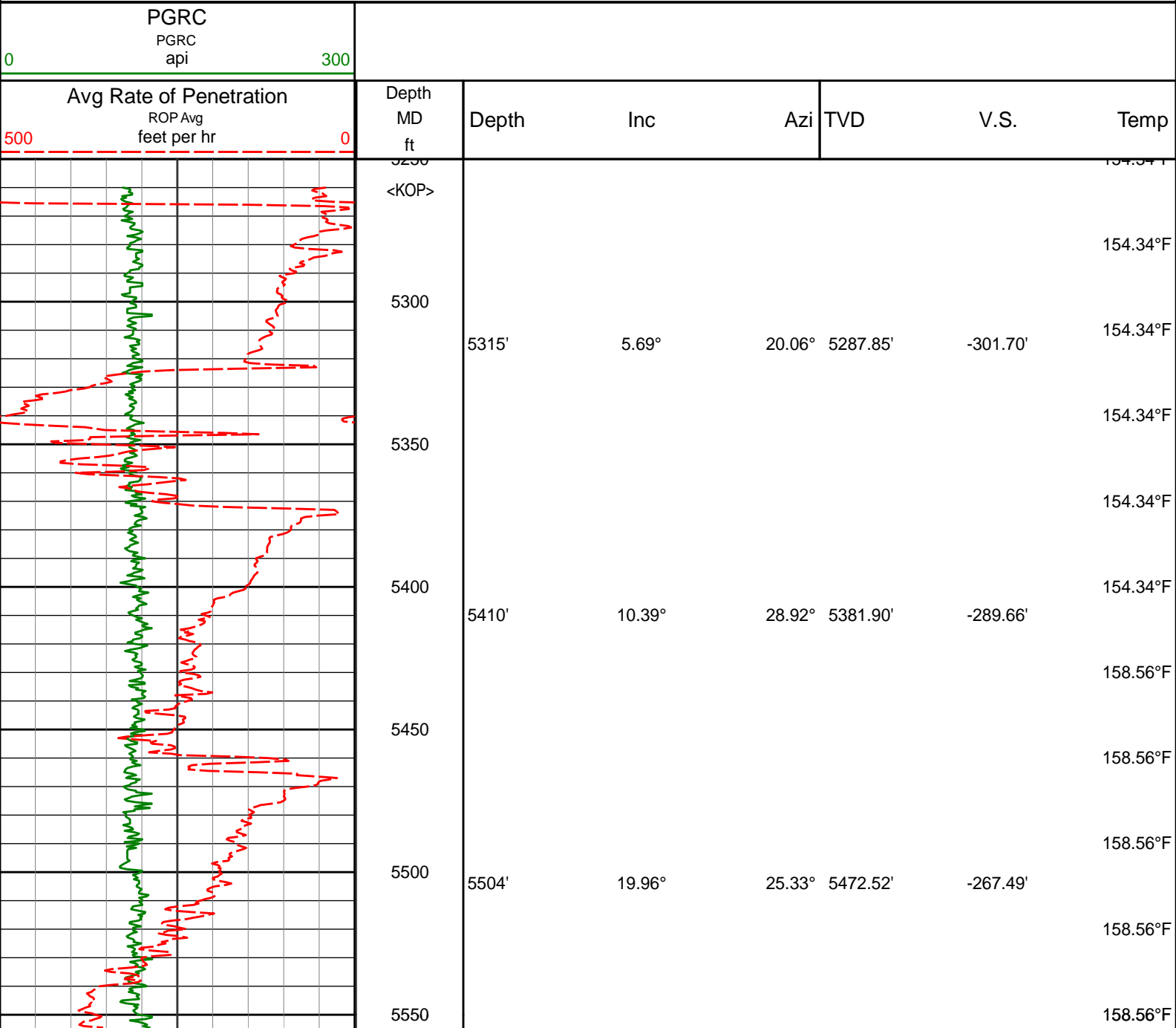
REMARKS

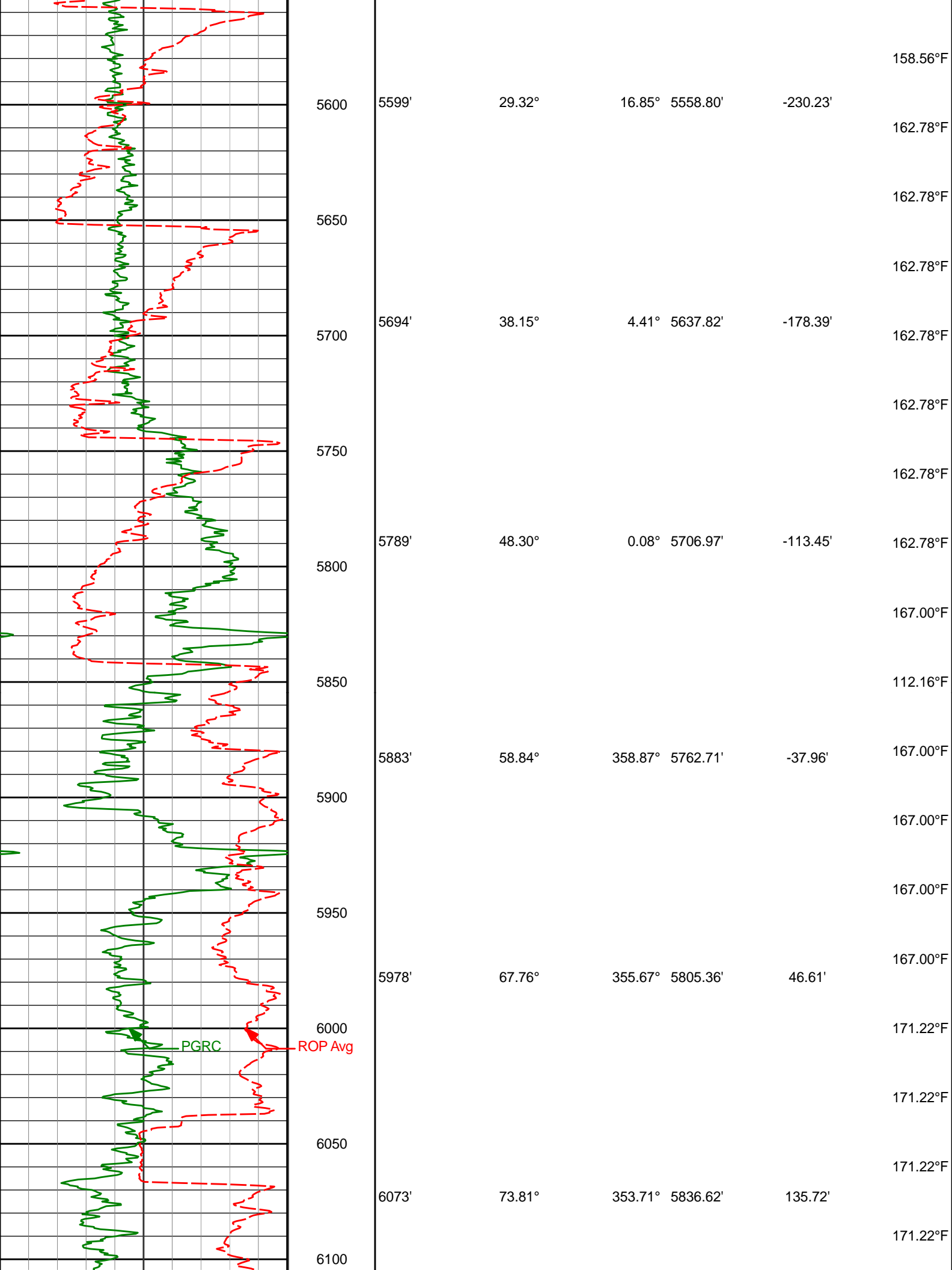
1. All depths are calibrated to the driller's pipe tally and are measured from the rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
 - All ROP in logs - 0.5 ft interval, 1.2 ft coercion distance.
 - Gamma in 2" (1:600) logs - 1 ft interval, 3 ft coercion distance.
 - Gamma in 5" (1:240) logs - 0.5 ft interval, 0.6 ft coercion distance.
5. INSITE version 8.3.0
6. Gamma presented inside casing/cement from 6199 ft. MD to 6243 ft. MD.

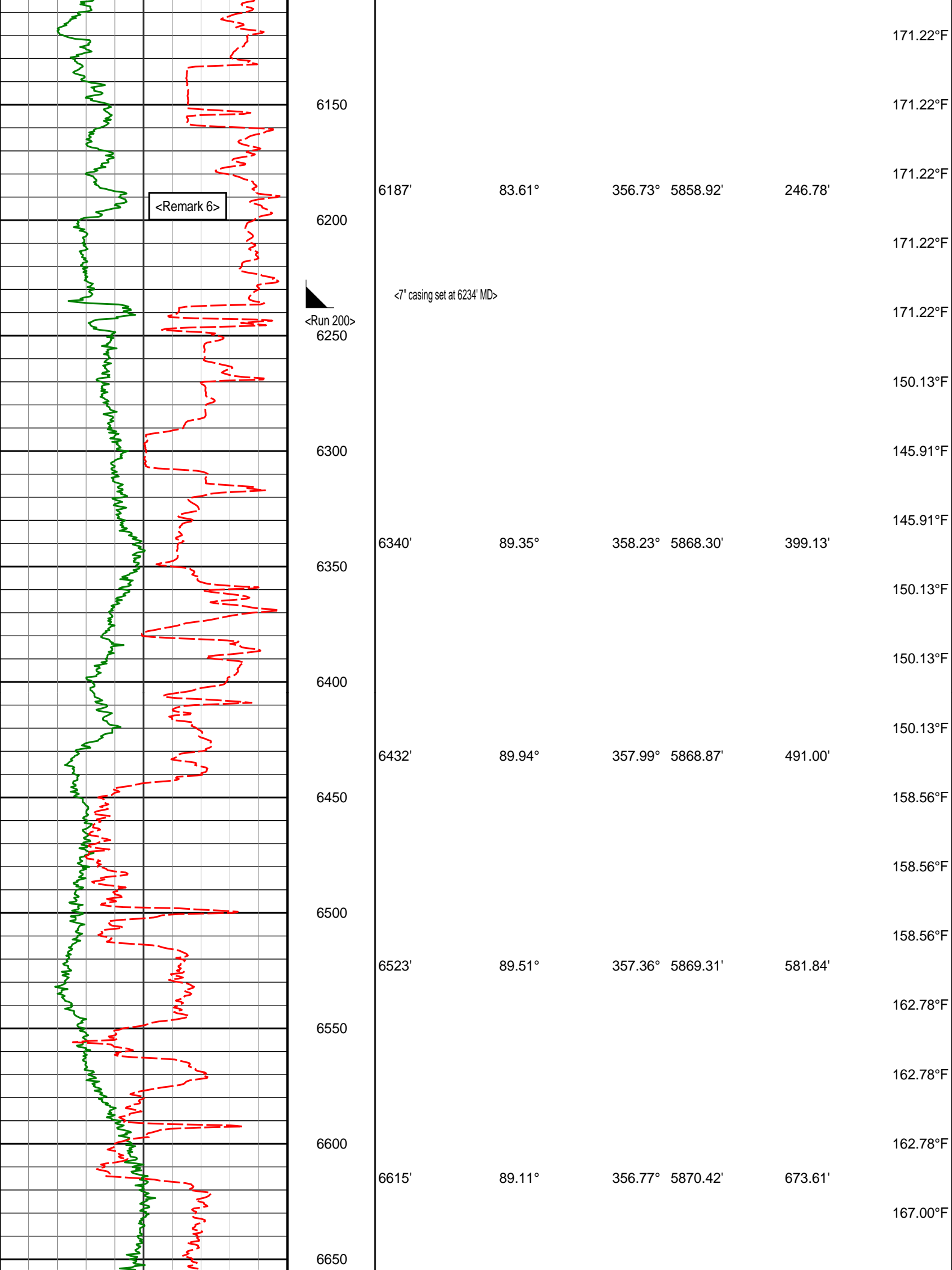
WARRANTY

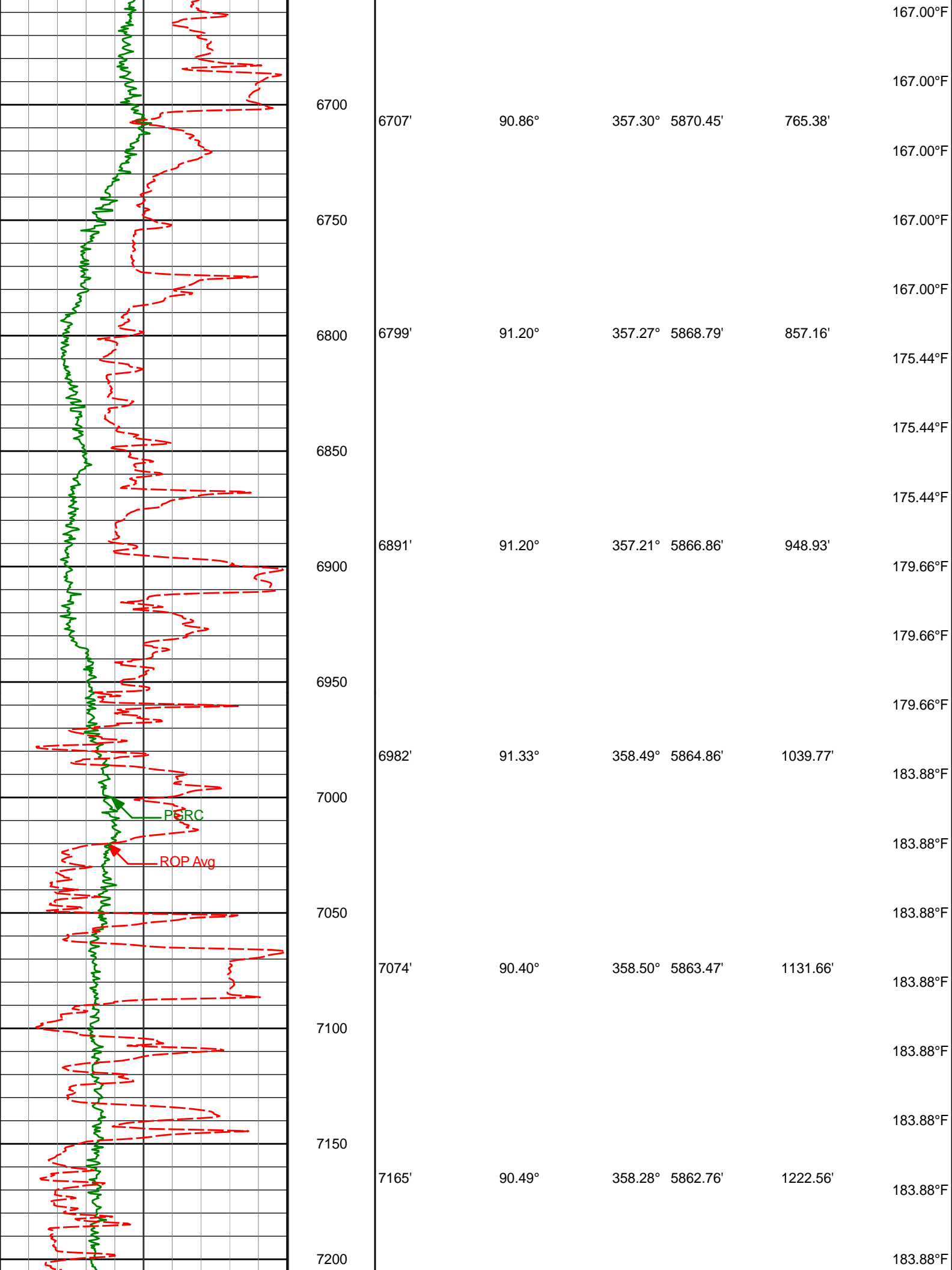
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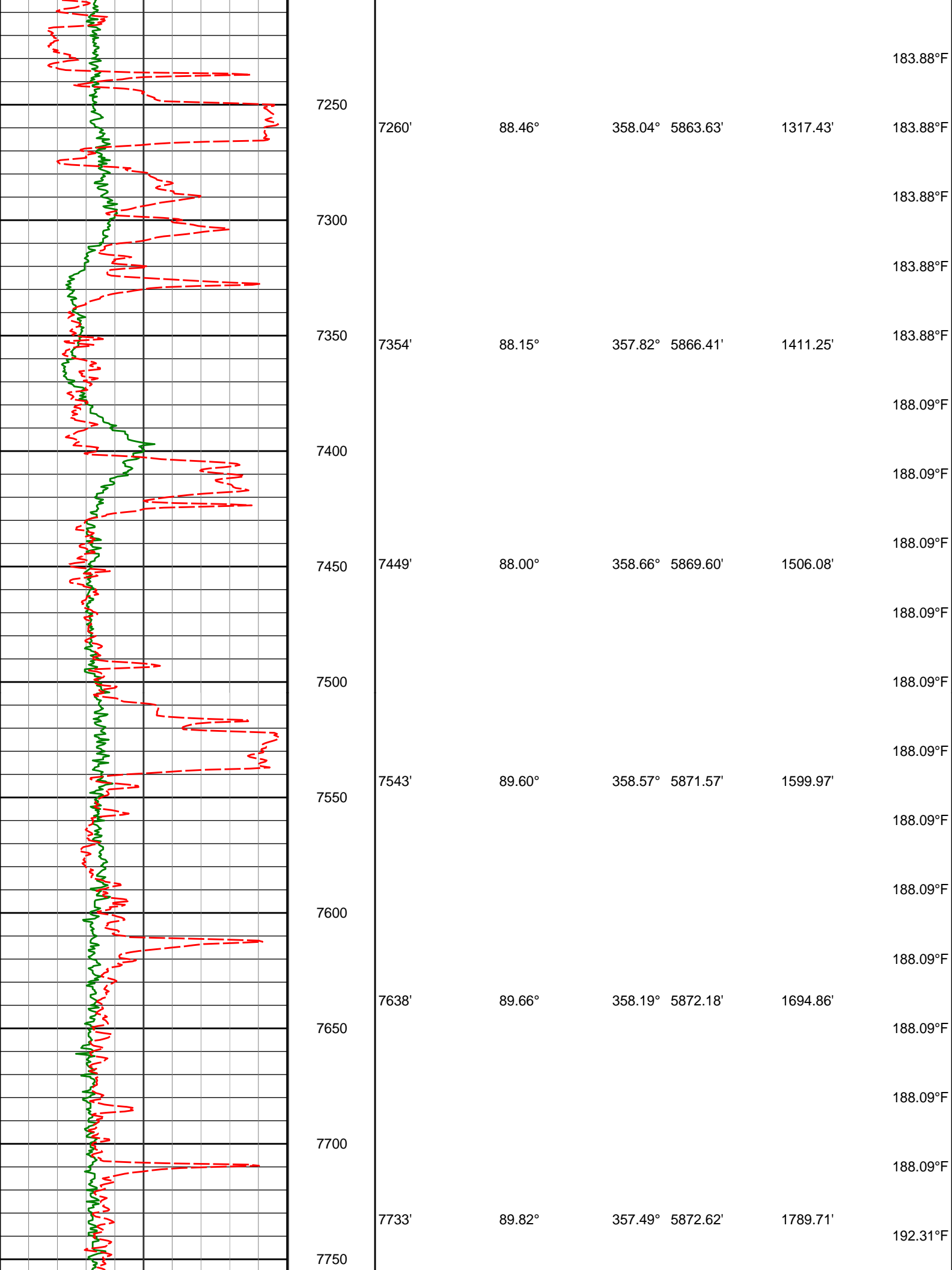
MD Detail 1:600 Scale

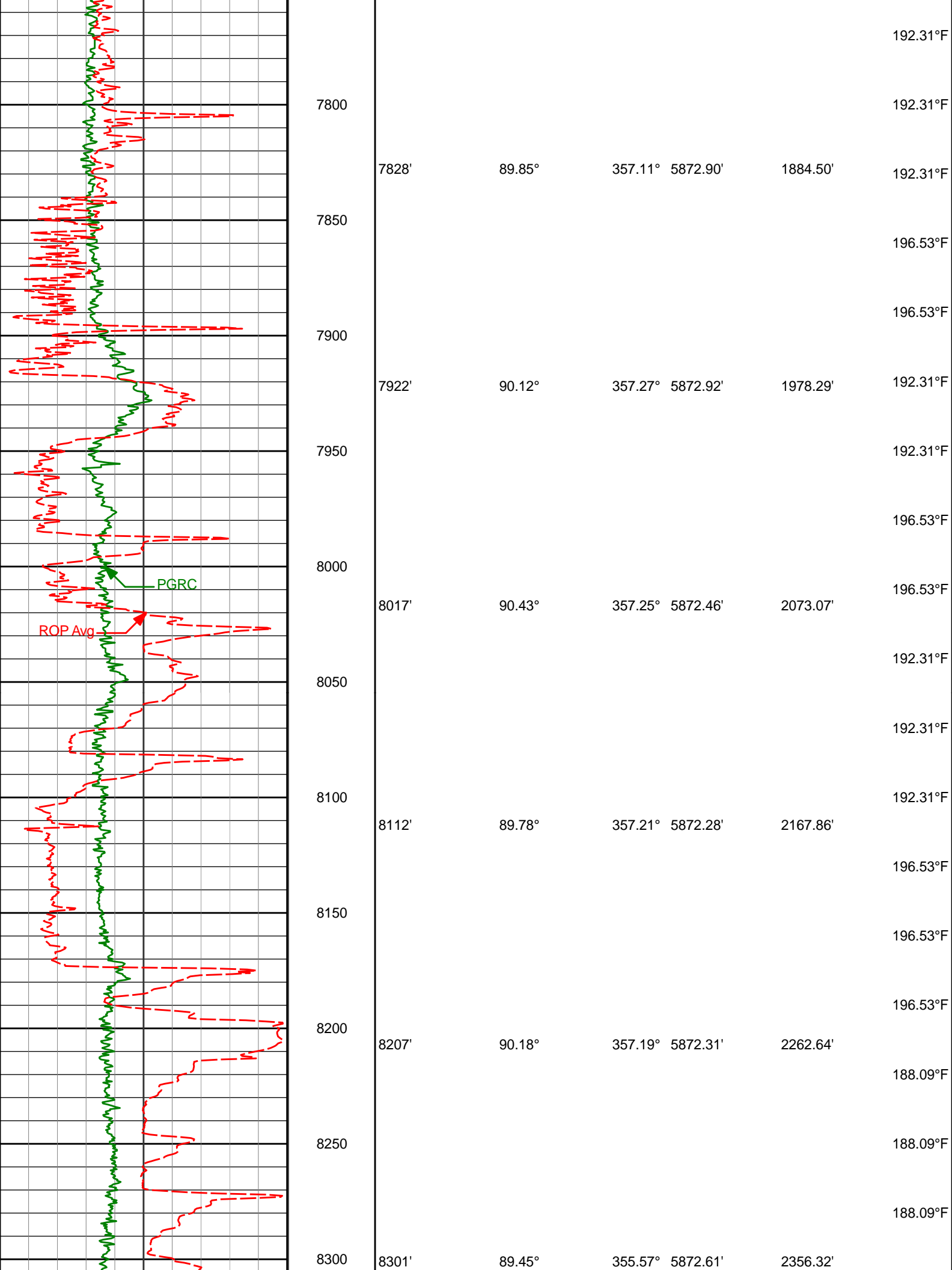


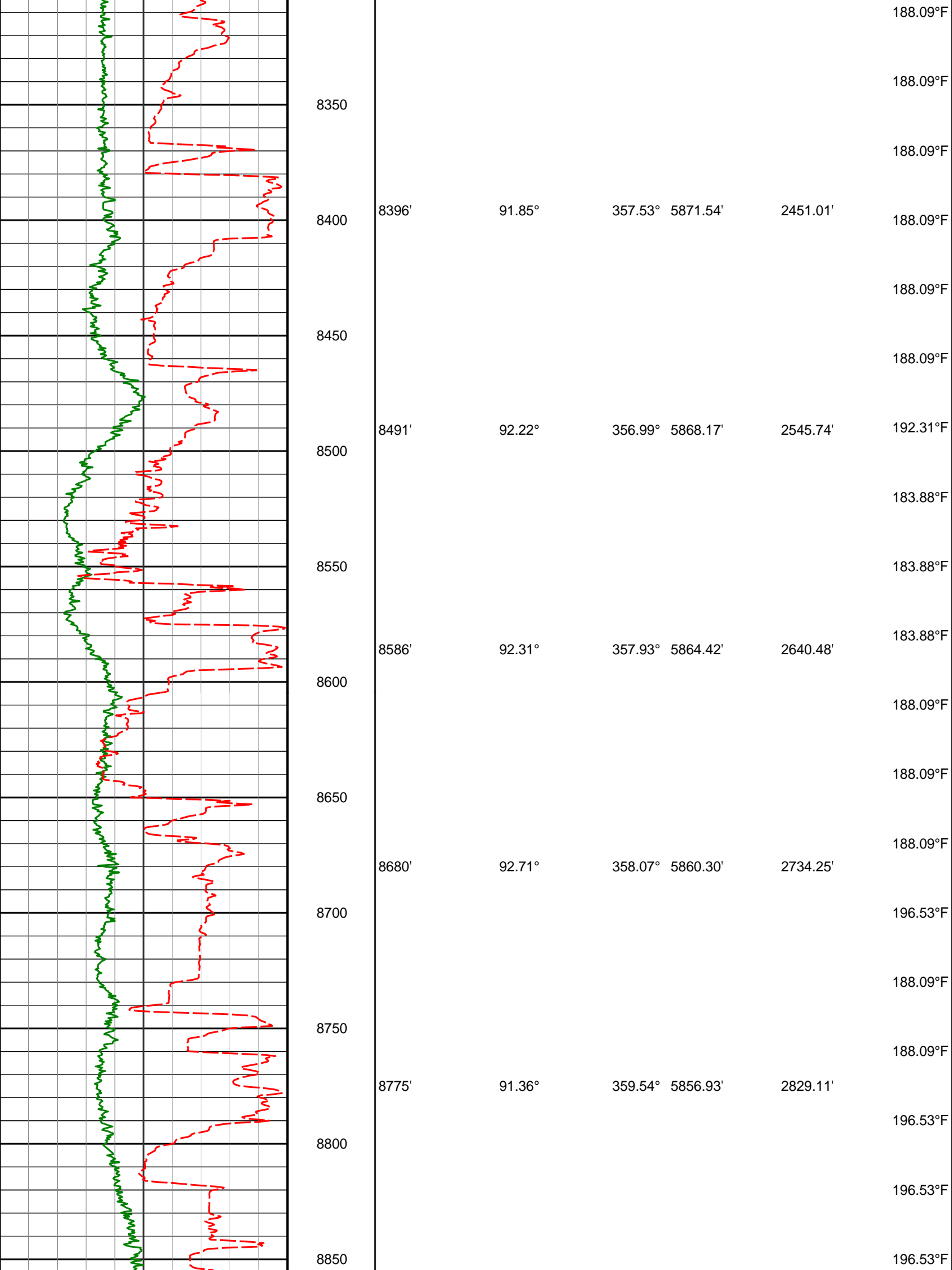


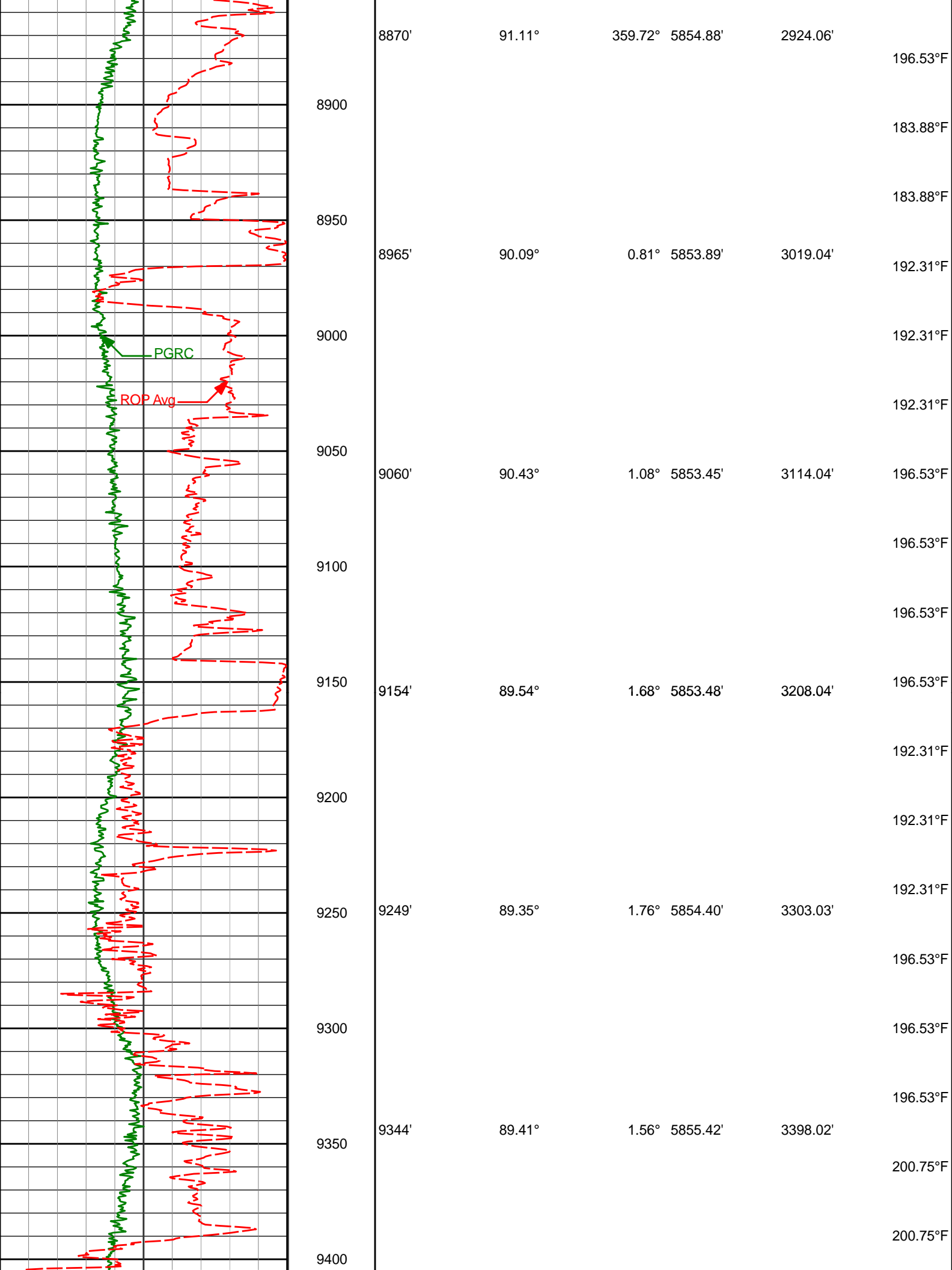


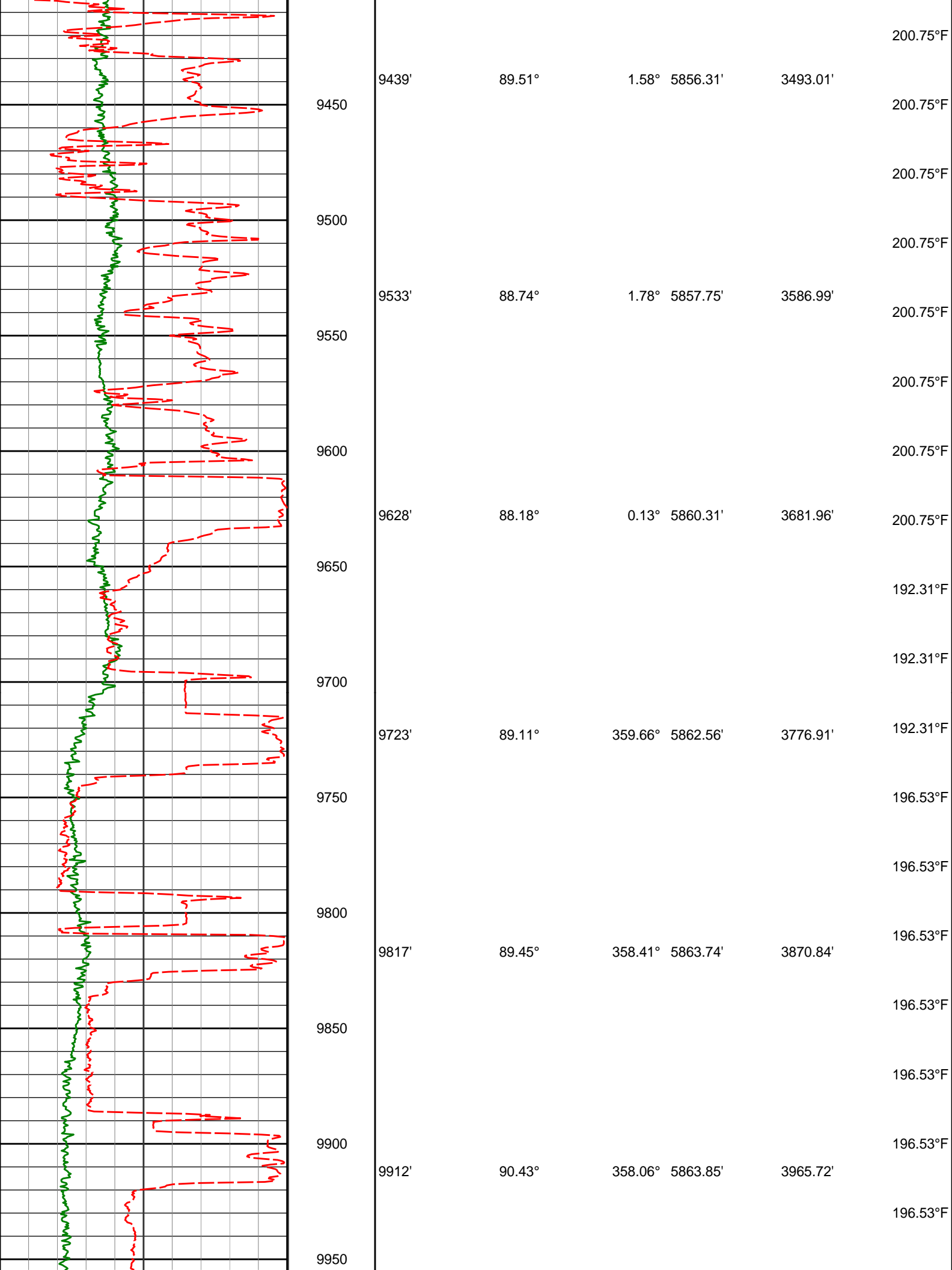


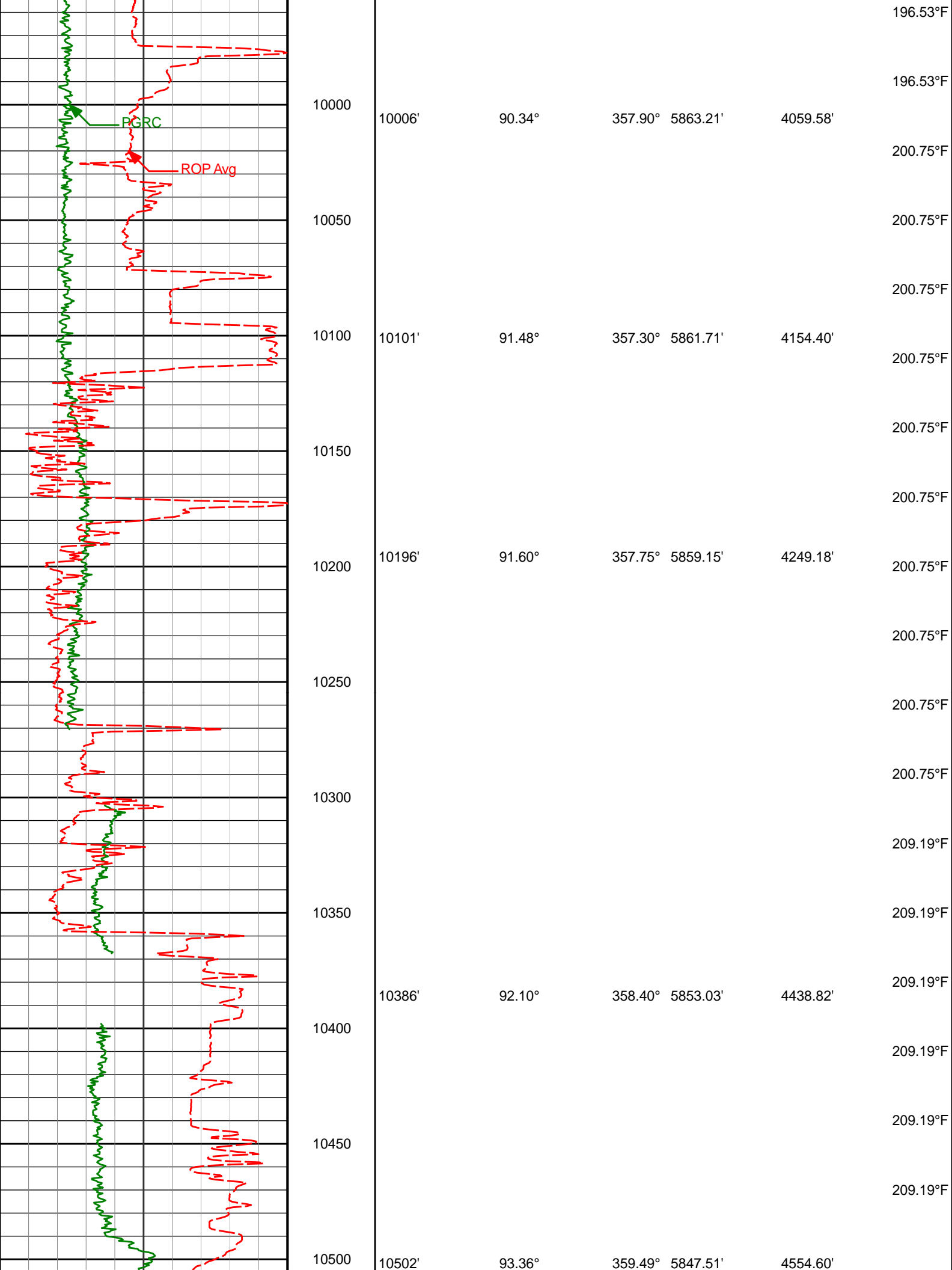


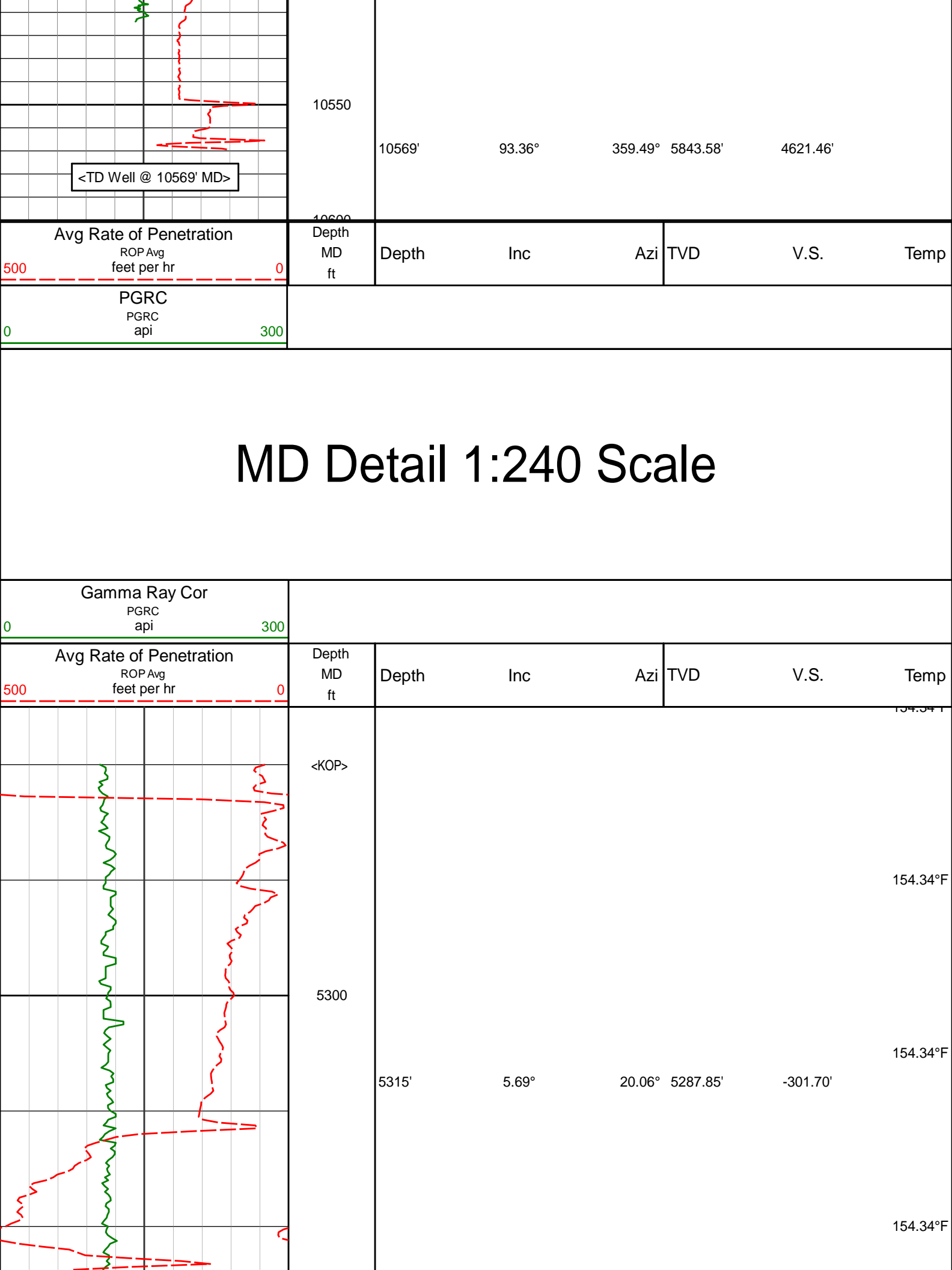


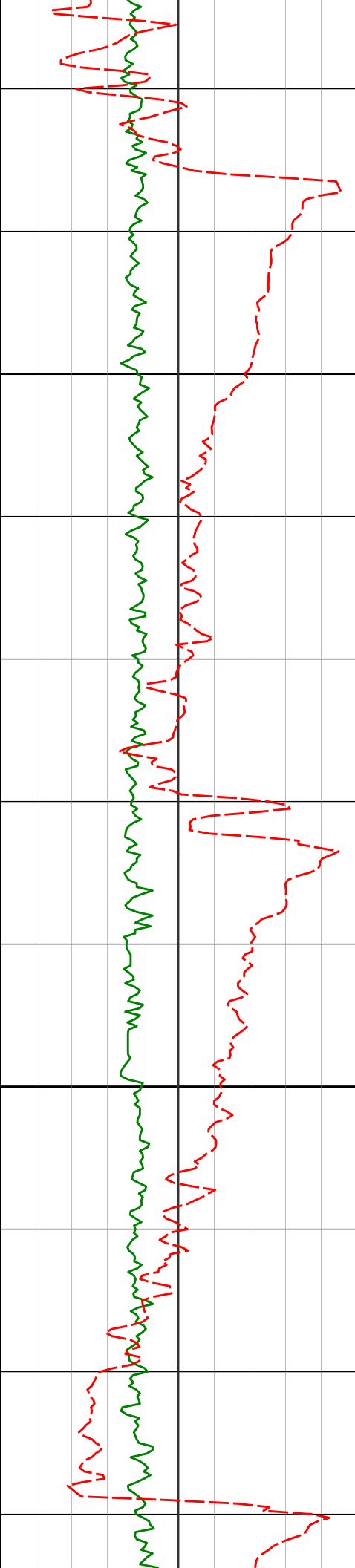












5400

5410'

10.39°

28.92°

5381.90'

-289.66'

154.34°F

154.34°F

158.56°F

158.56°F

158.56°F

5500

5504'

19.96°

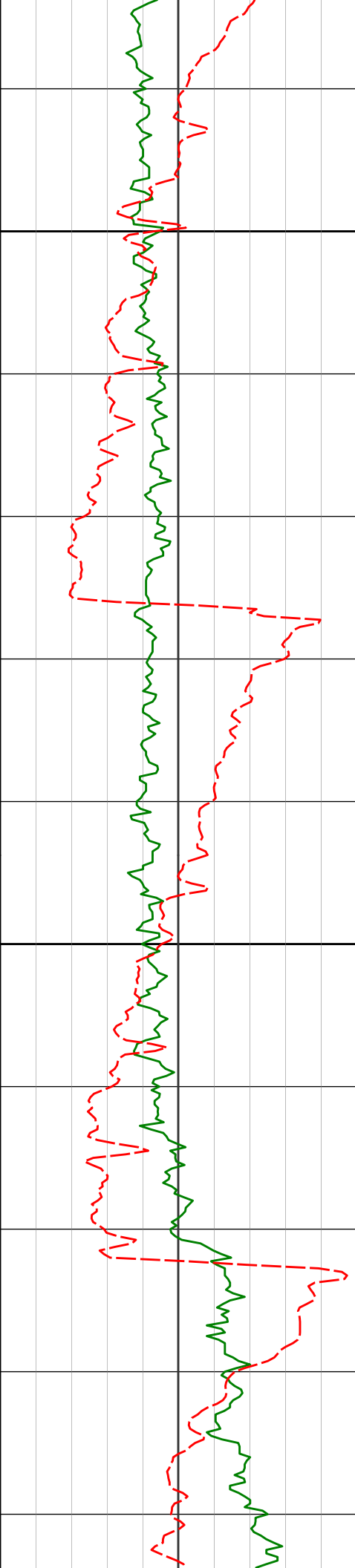
25.33°

5472.52'

-267.49'

158.56°F

158.56°F



5600

5599'

29.32°

16.85°

5558.80'

-230.23'

158.56°F

162.78°F

162.78°F

162.78°F

5700

5694'

38.15°

4.41°

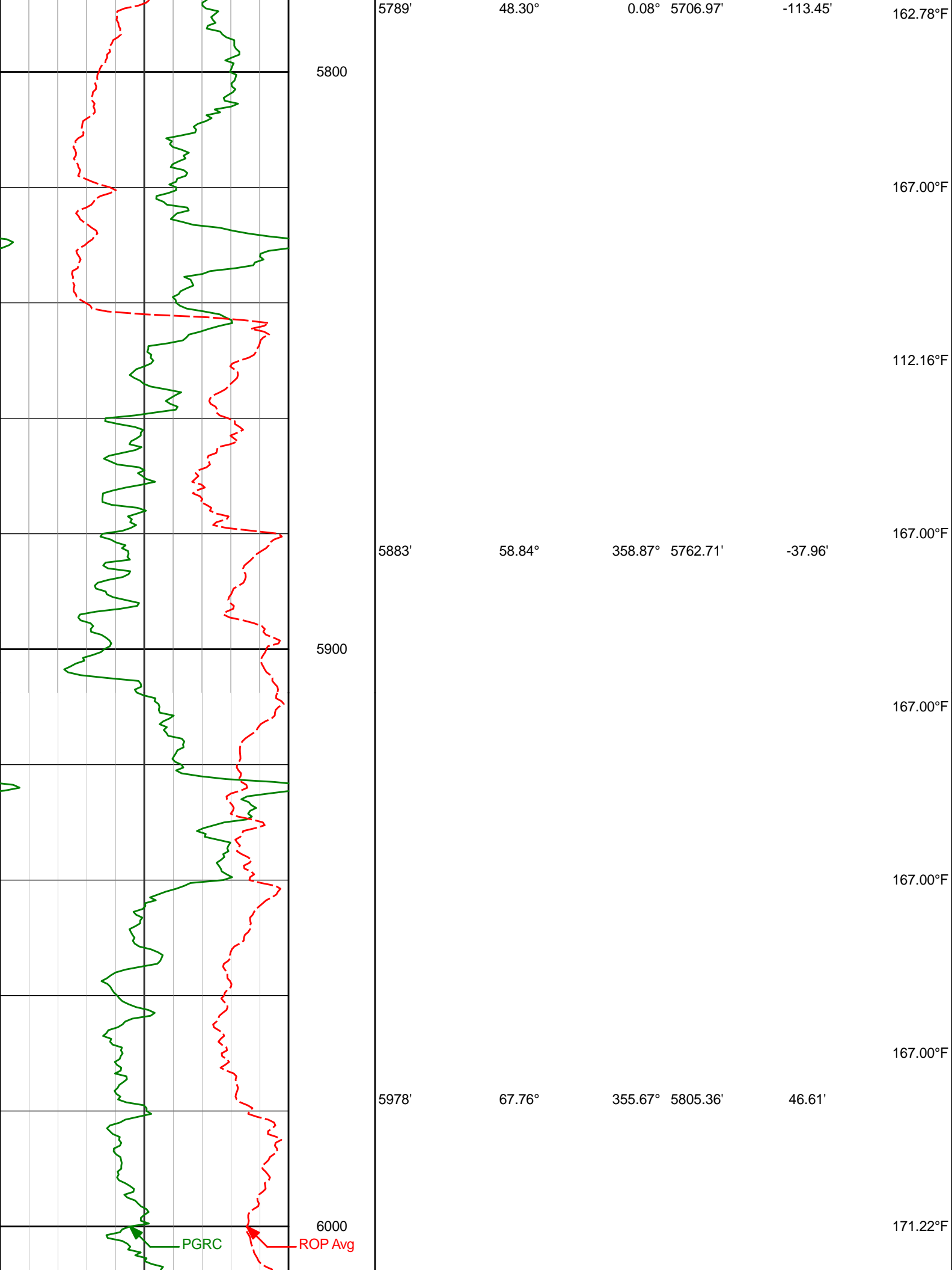
5637.82'

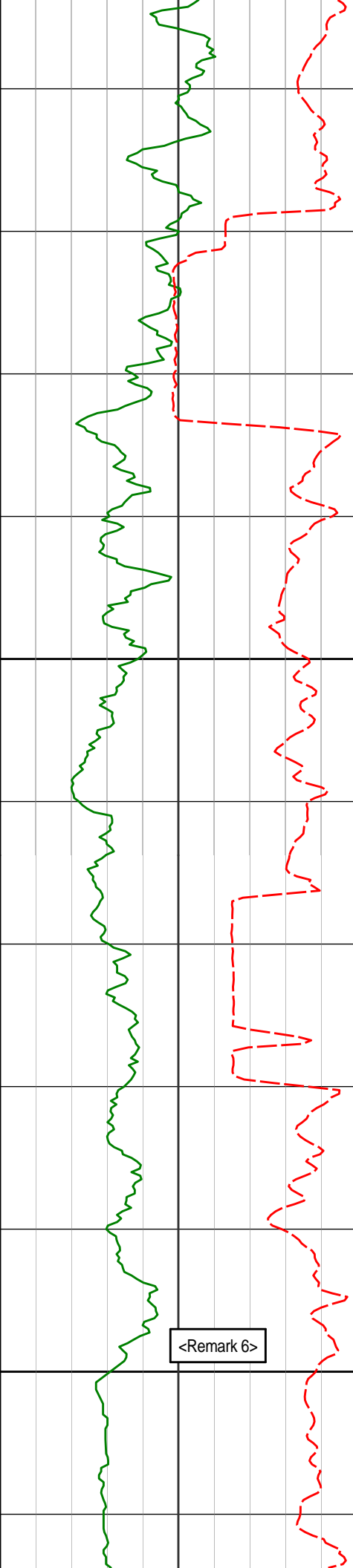
-178.39'

162.78°F

162.78°F

162.78°F





6100

6200

6073'

6187'

73.81°

83.61°

353.71° 5836.62'

356.73° 5858.92'

135.72'

246.78'

171.22°F

171.22°F

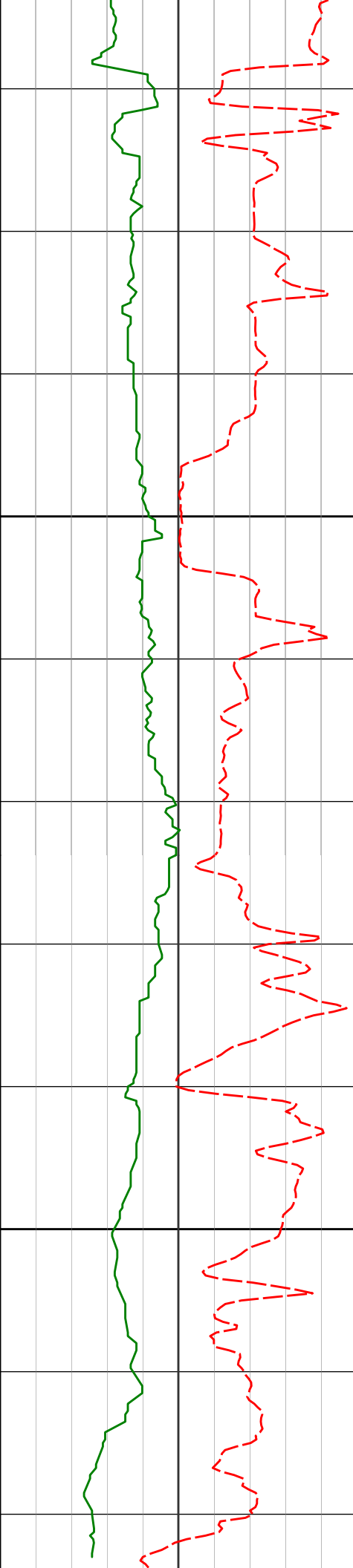
171.22°F

171.22°F

171.22°F

171.22°F

171.22°F



<Run 200>

6300

6340'

6400

6432'

<7" casing set at 6234' MD>

89.35°

358.23° 5868.30'

399.13'

89.94°

357.99° 5868.87'

491.00'

171.22°F

150.13°F

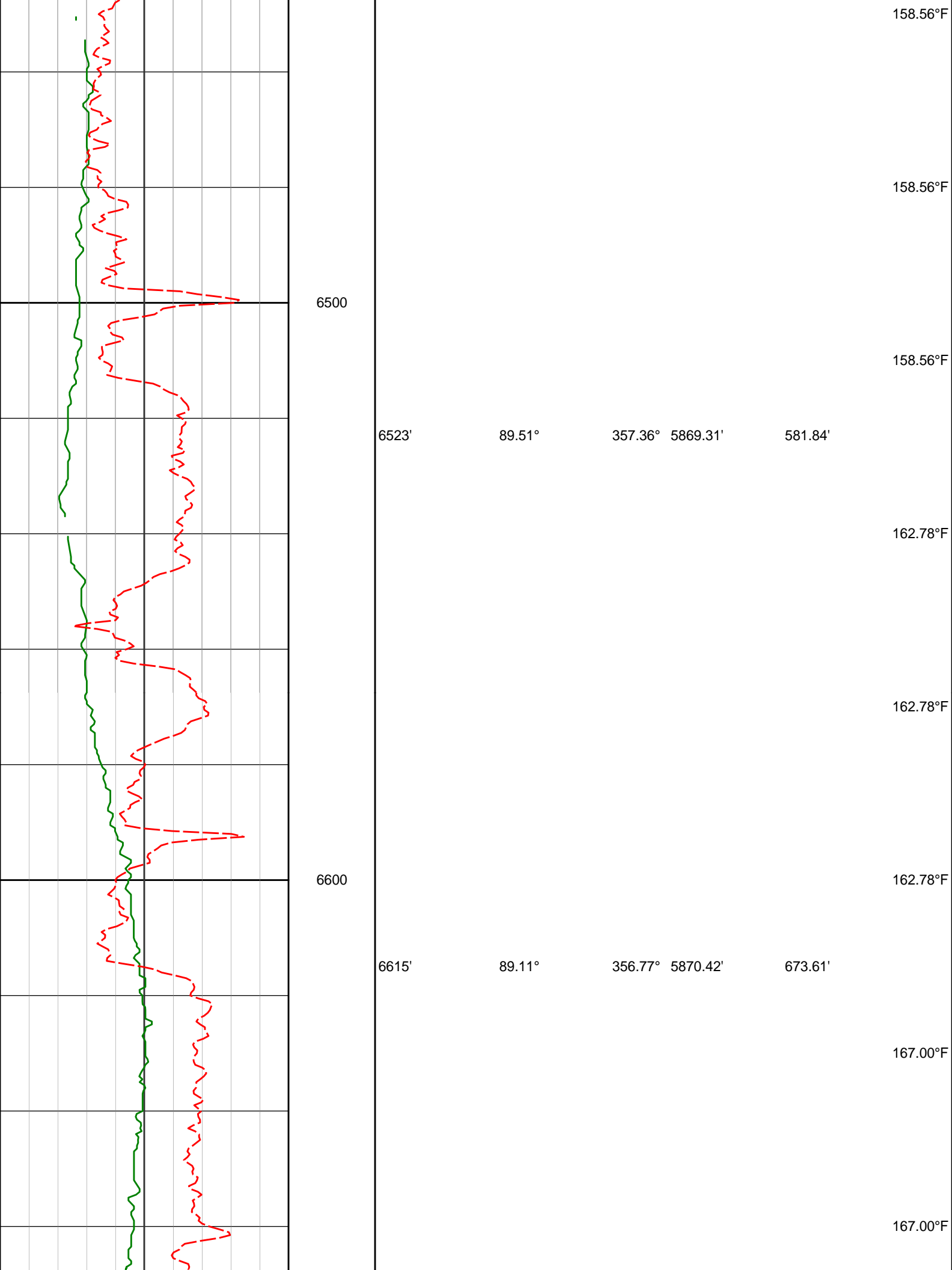
145.91°F

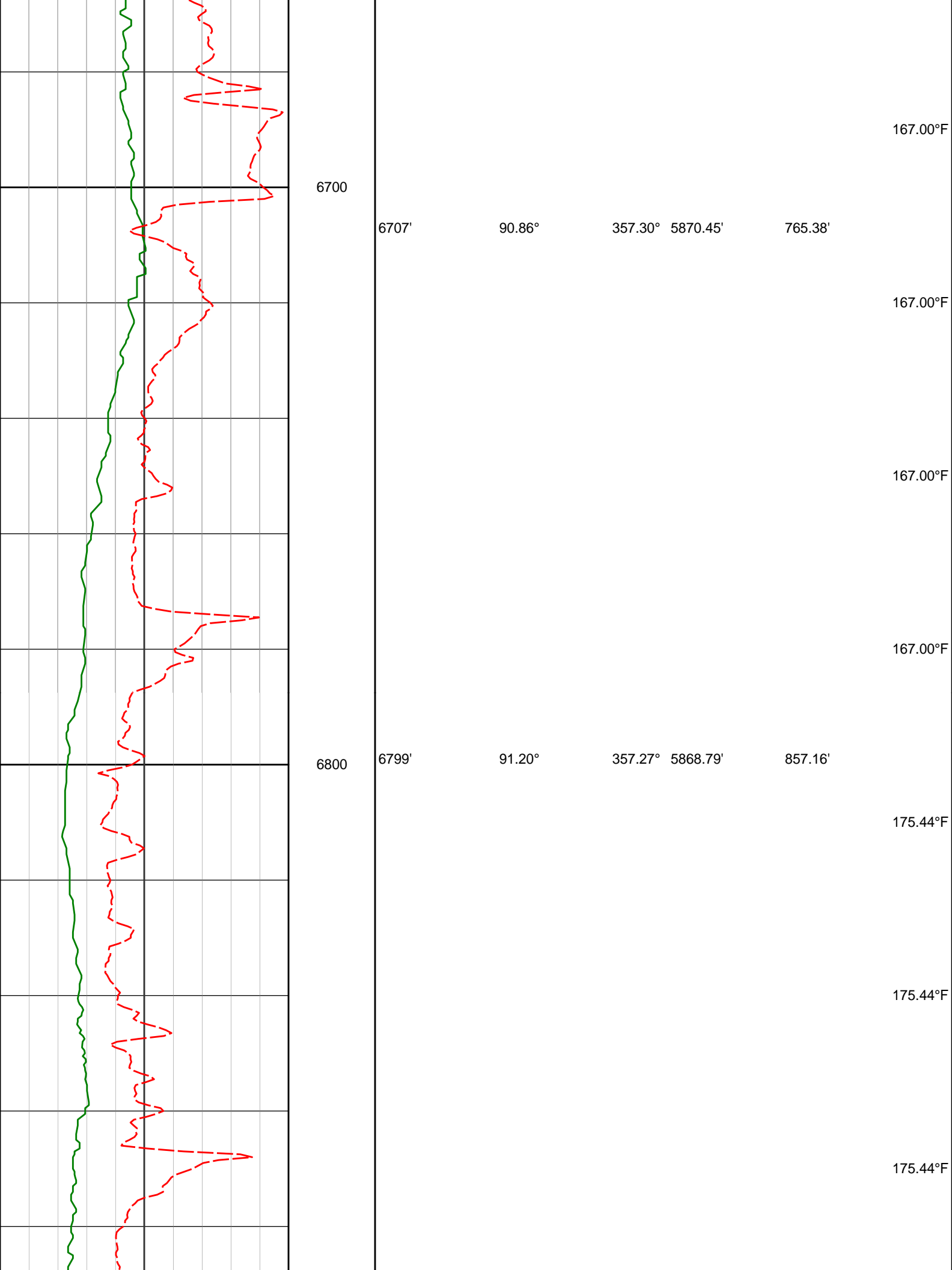
145.91°F

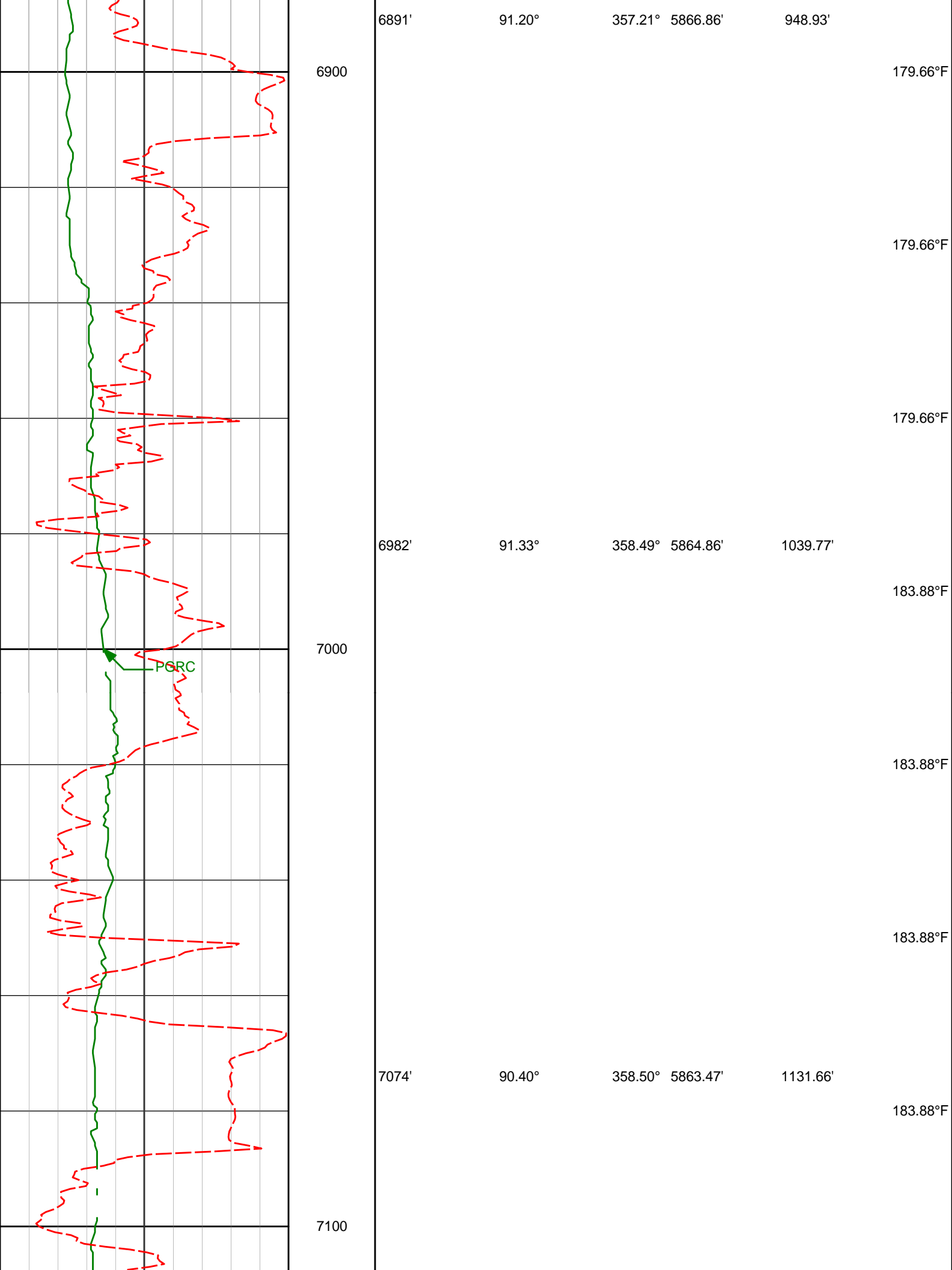
150.13°F

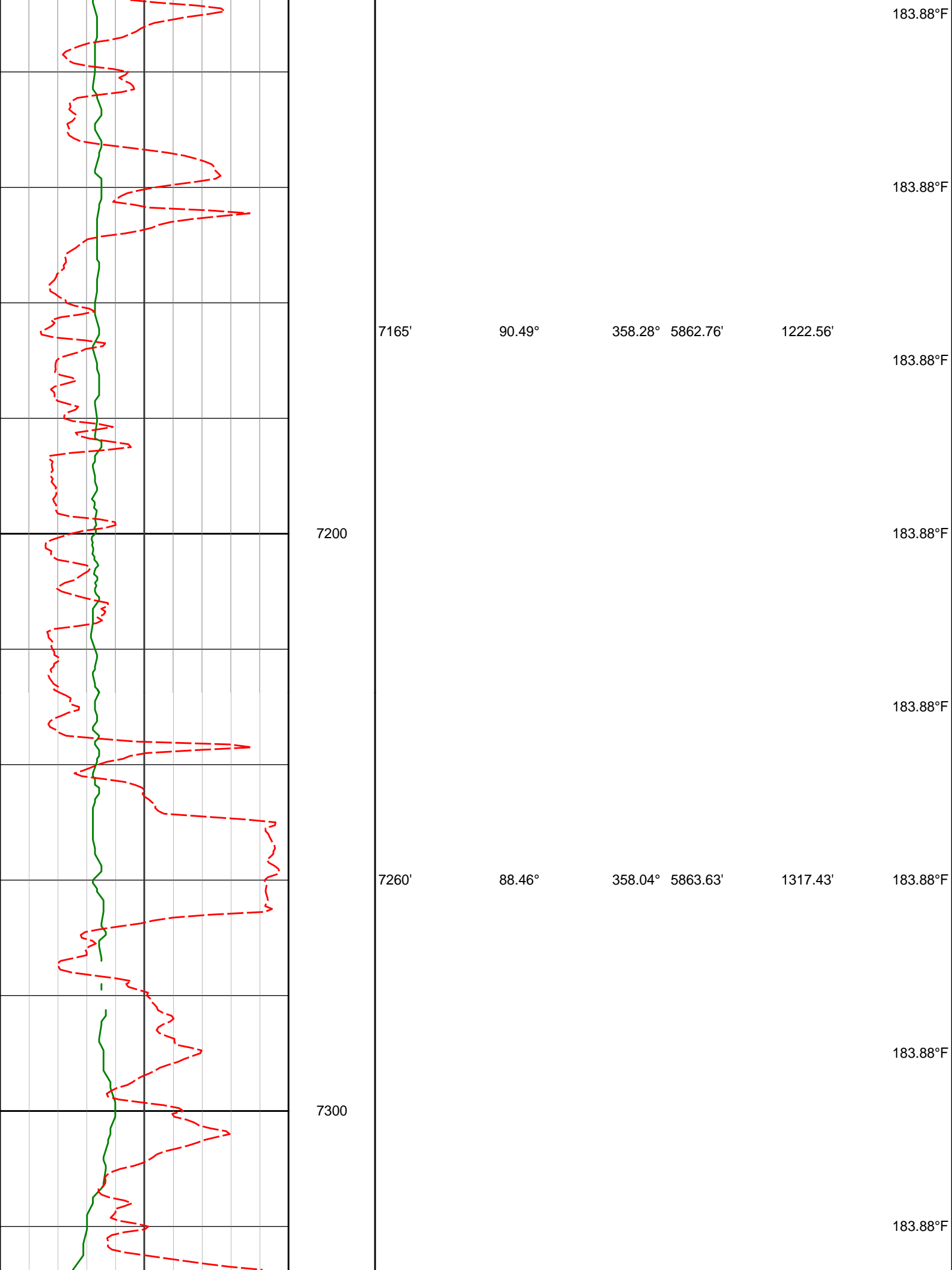
150.13°F

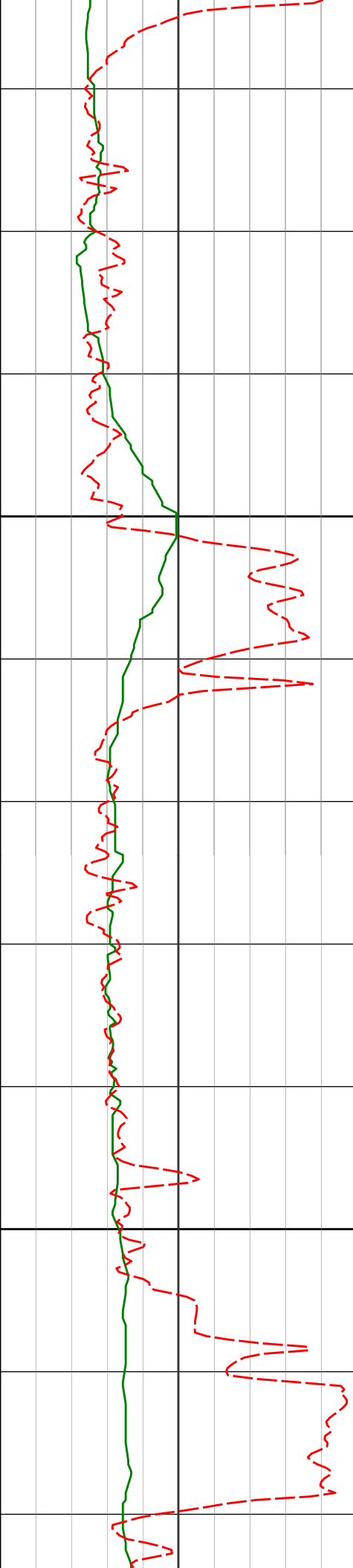
150.13°F











7400

7500

7354'

88.15°

357.82° 5866.41'

1411.25'

183.88°F

188.09°F

188.09°F

188.09°F

7449'

88.00°

358.66° 5869.60'

1506.08'

188.09°F

188.09°F

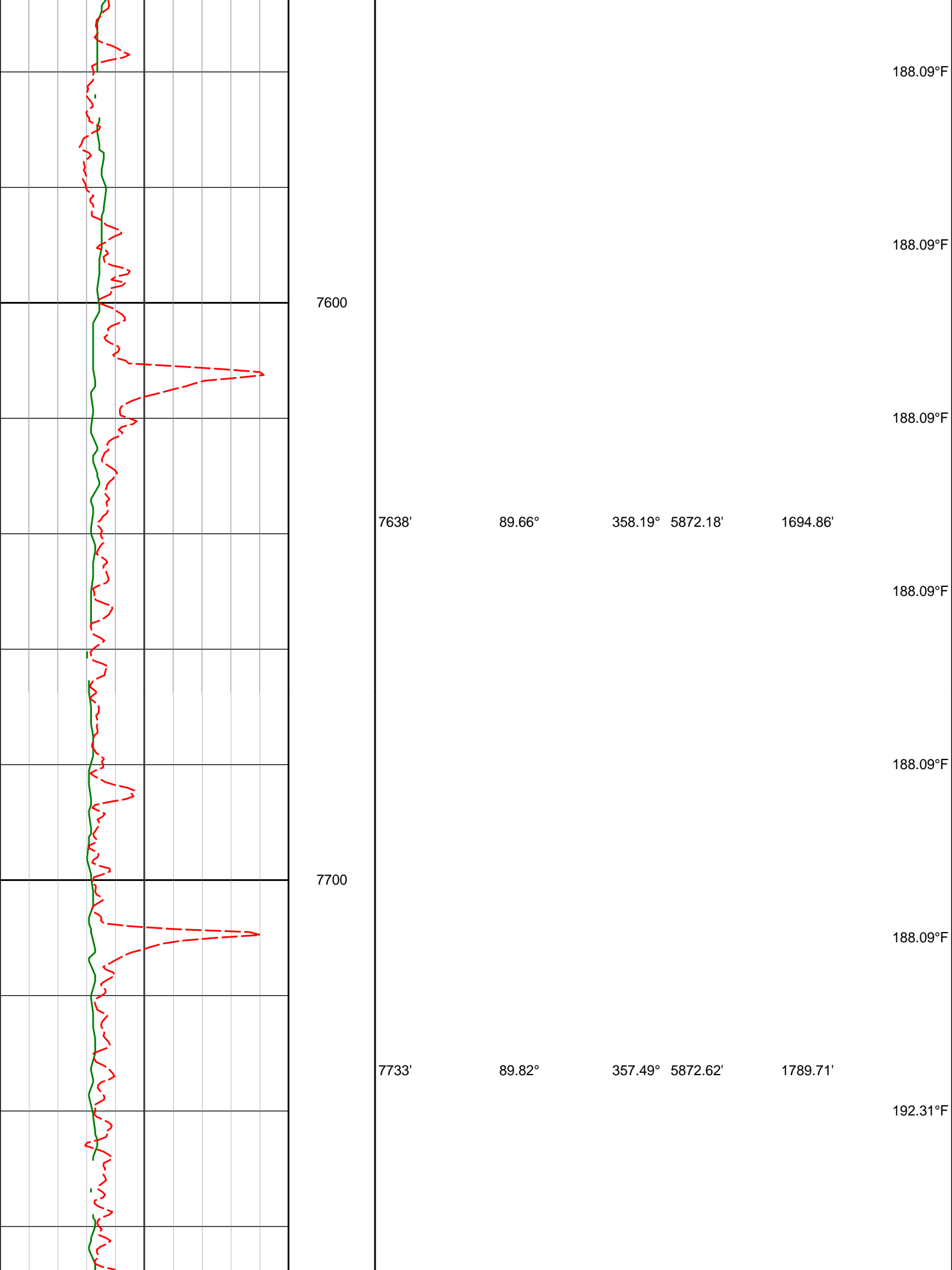
188.09°F

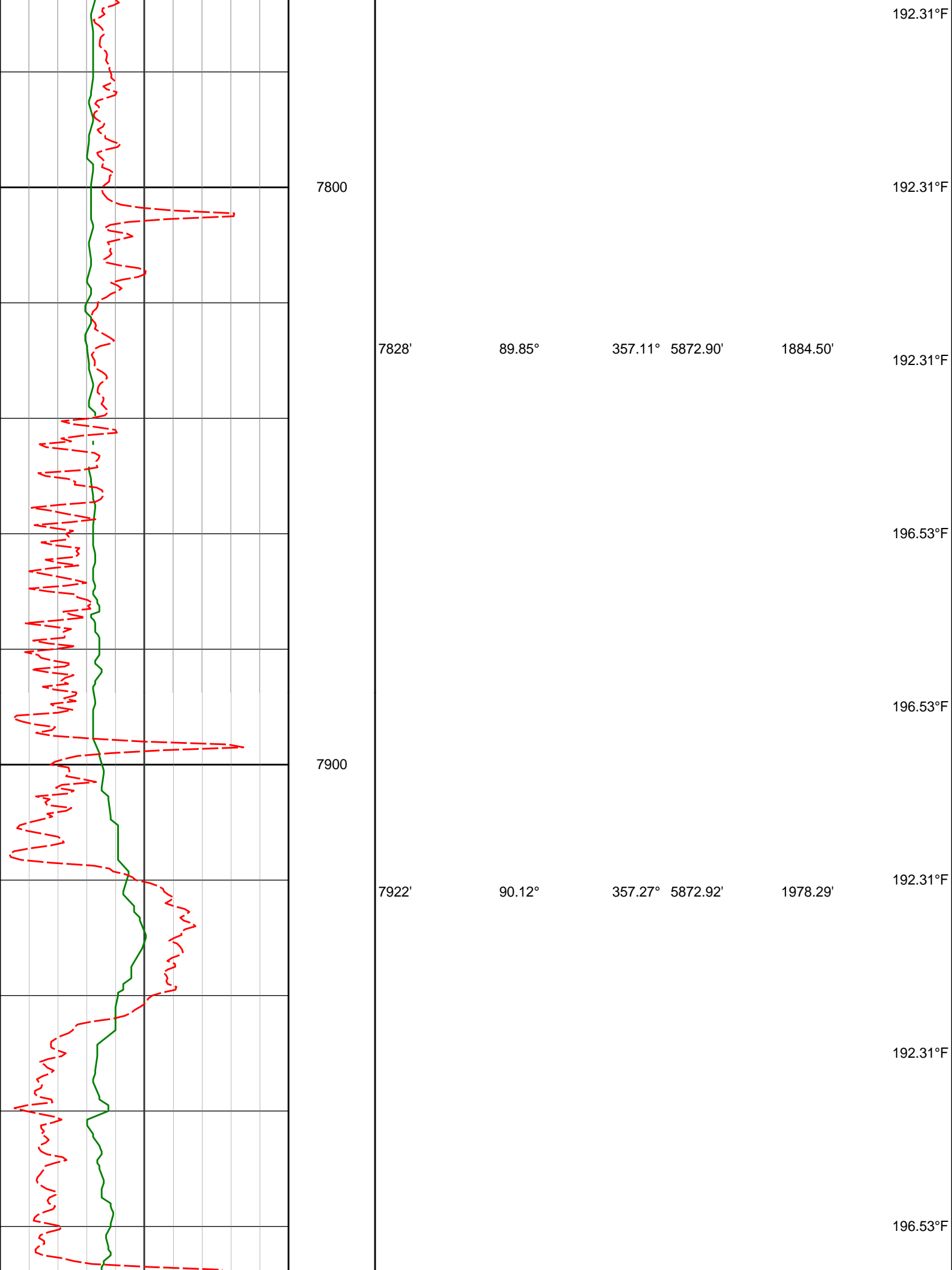
7543'

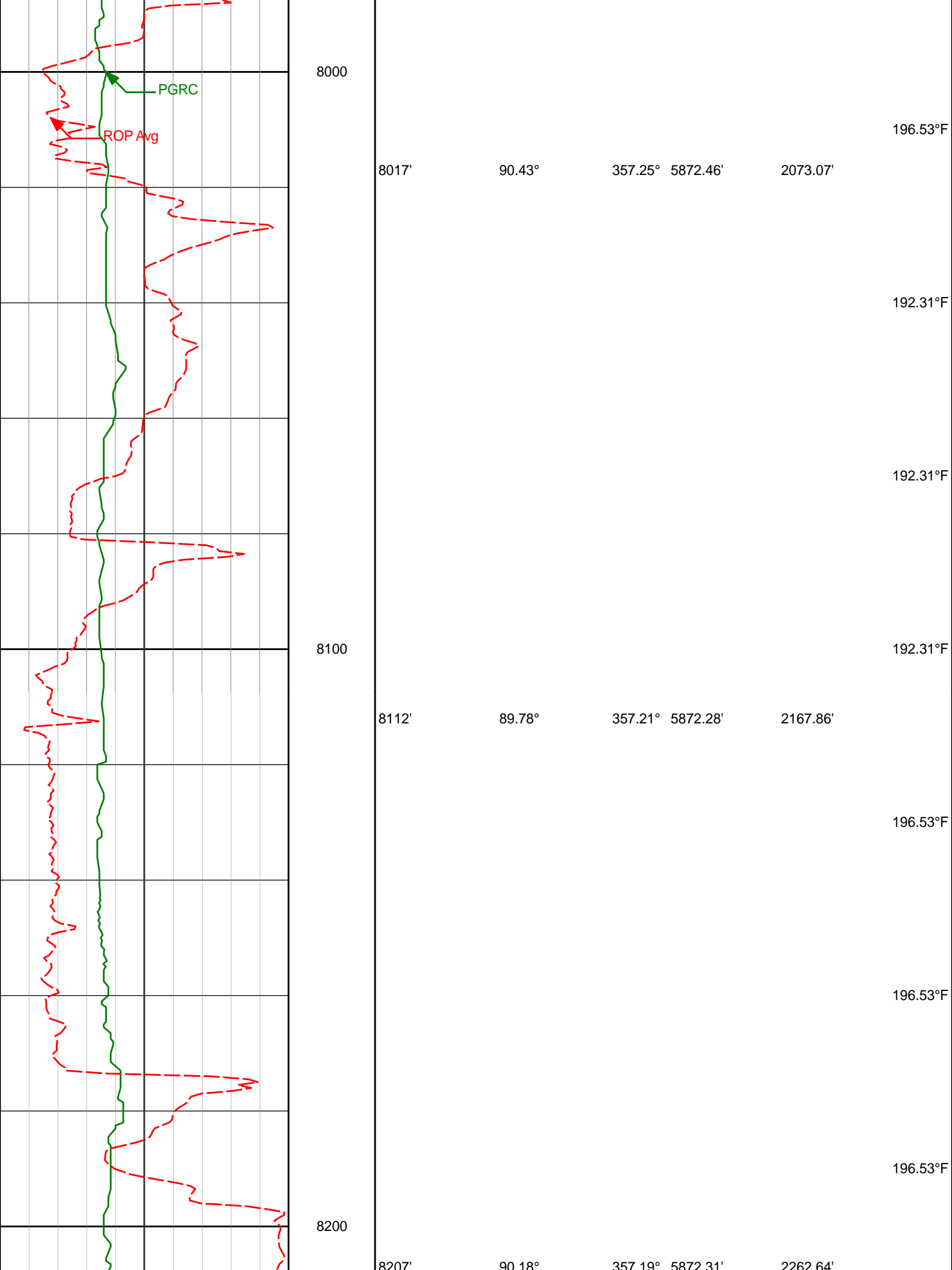
89.60°

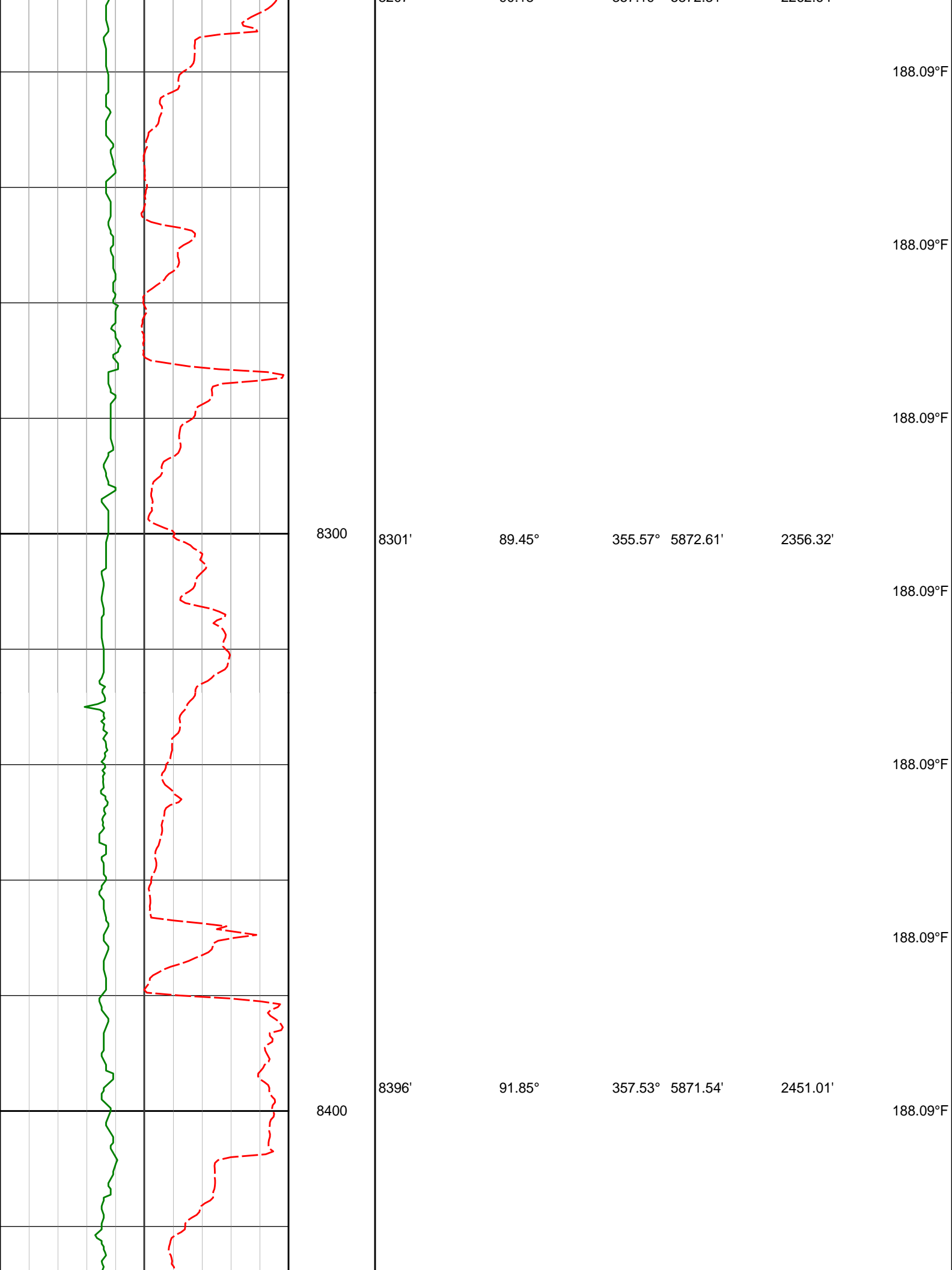
358.57° 5871.57'

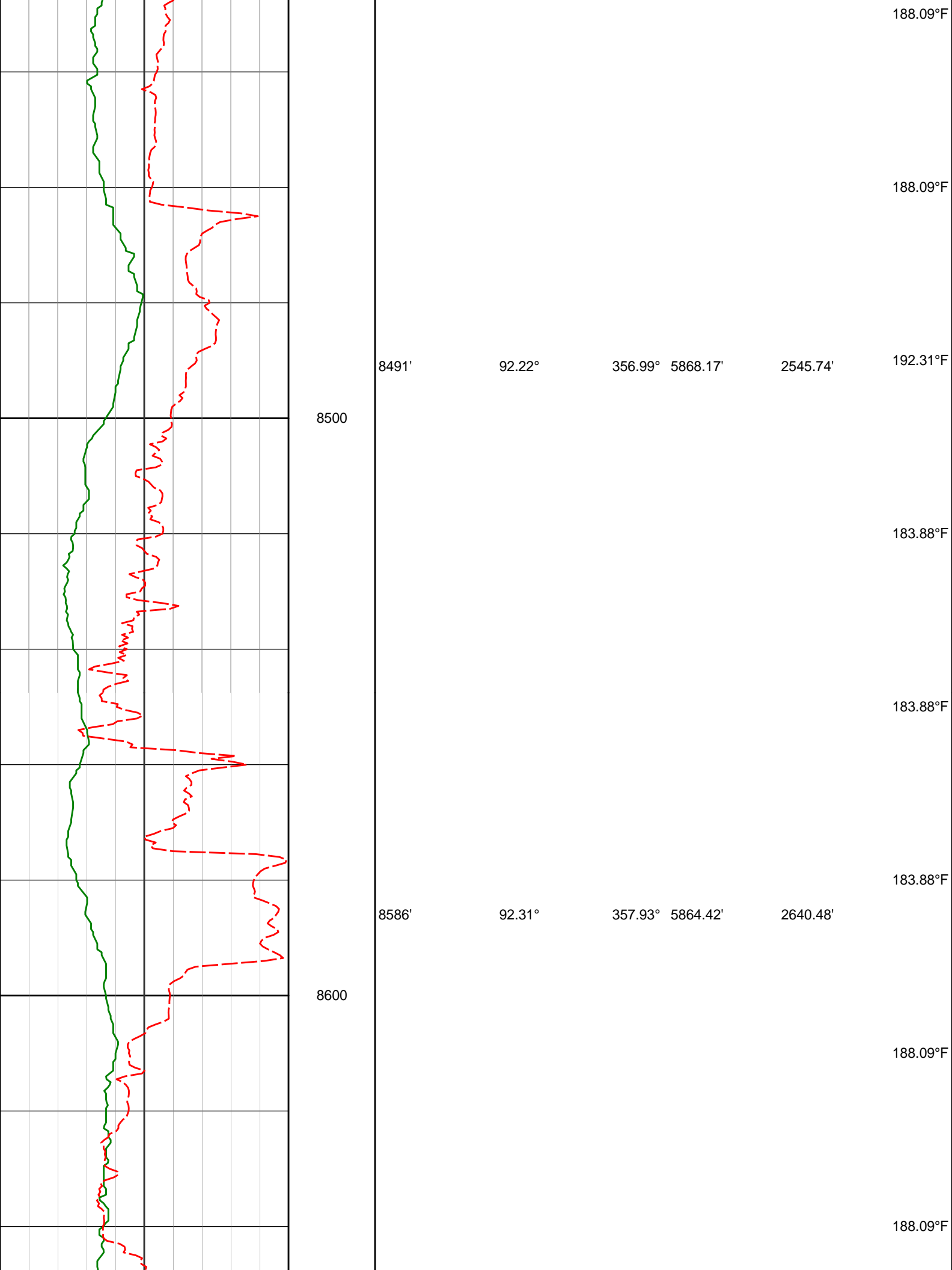
1599.97'

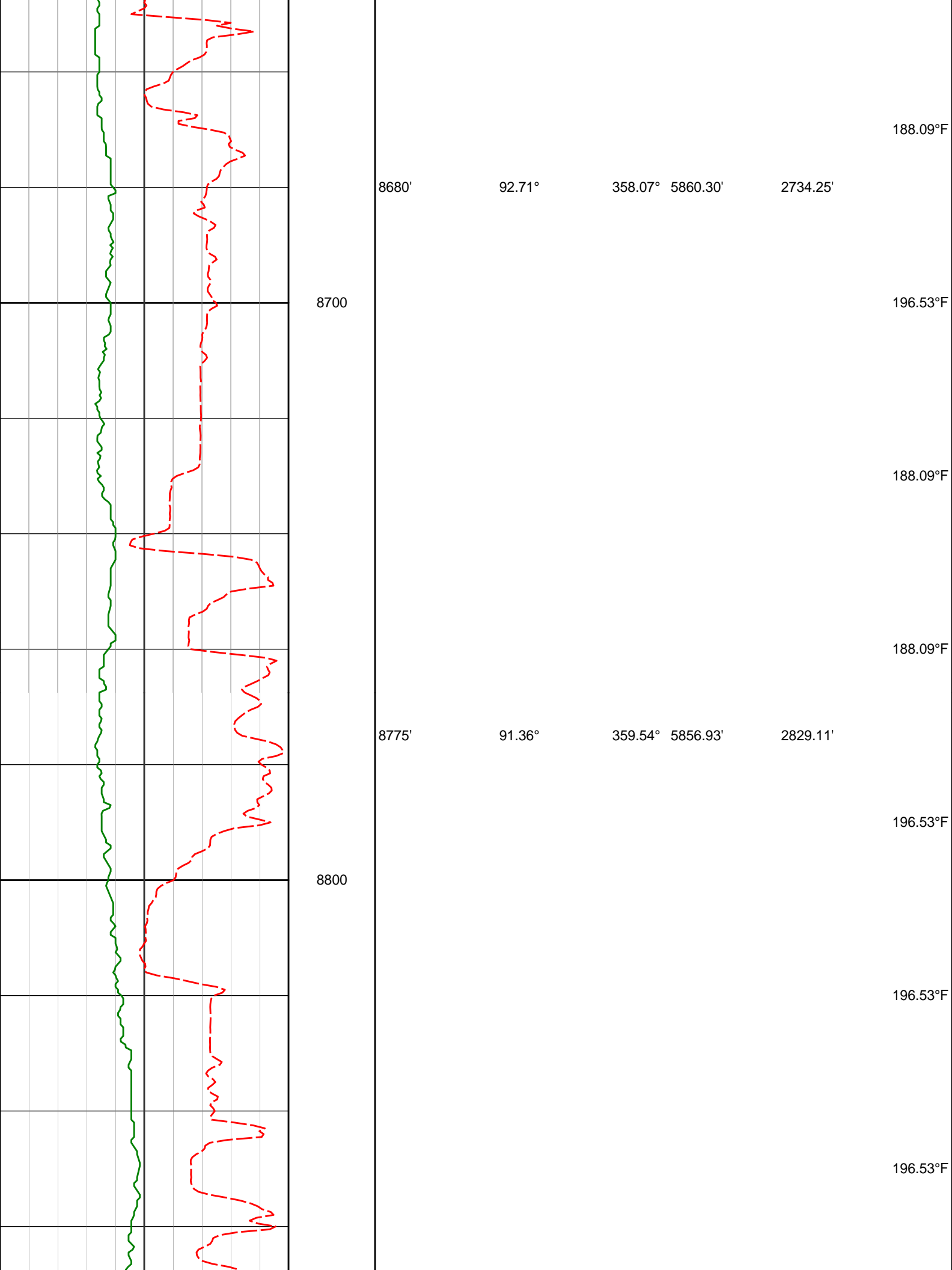


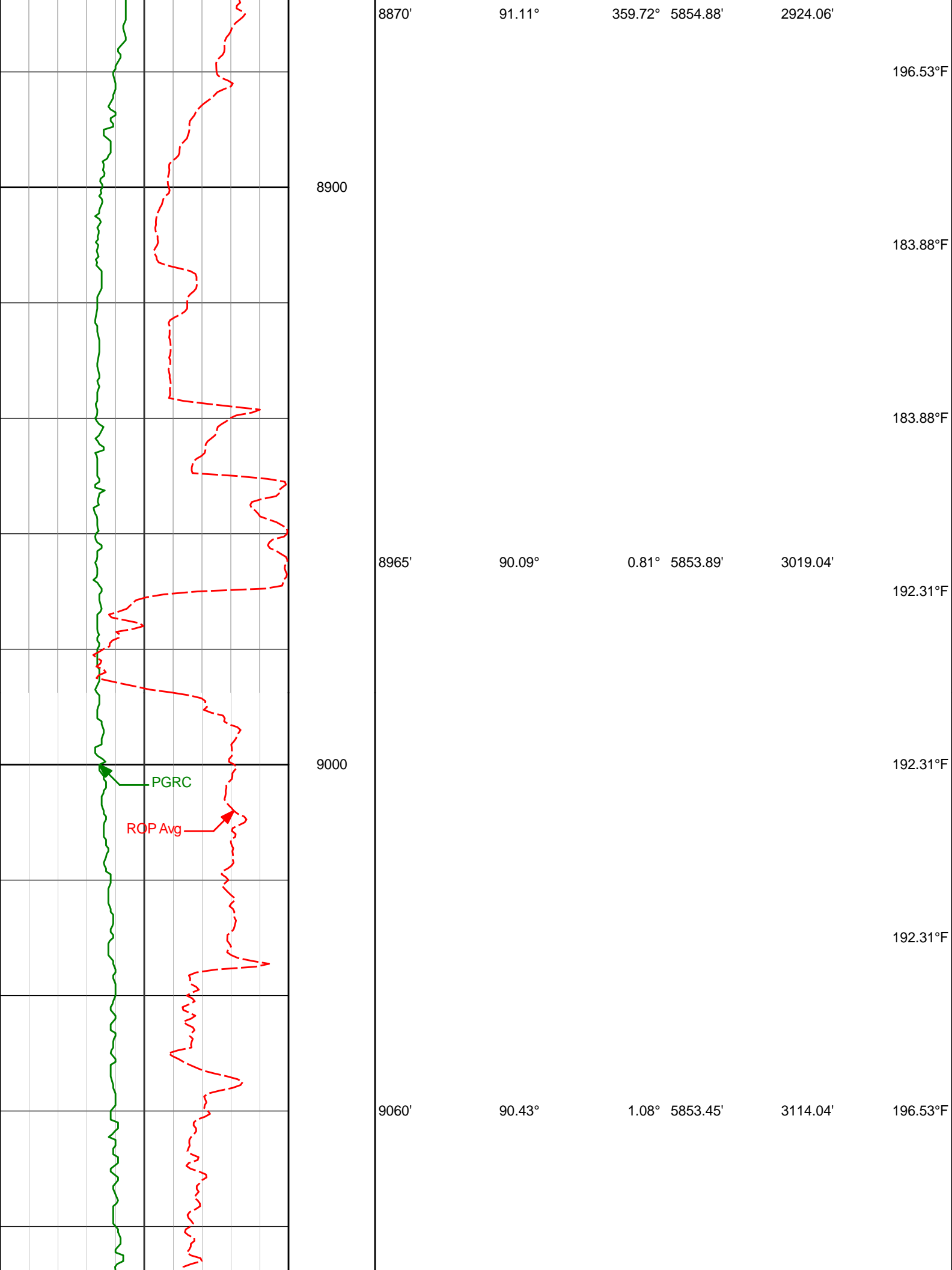


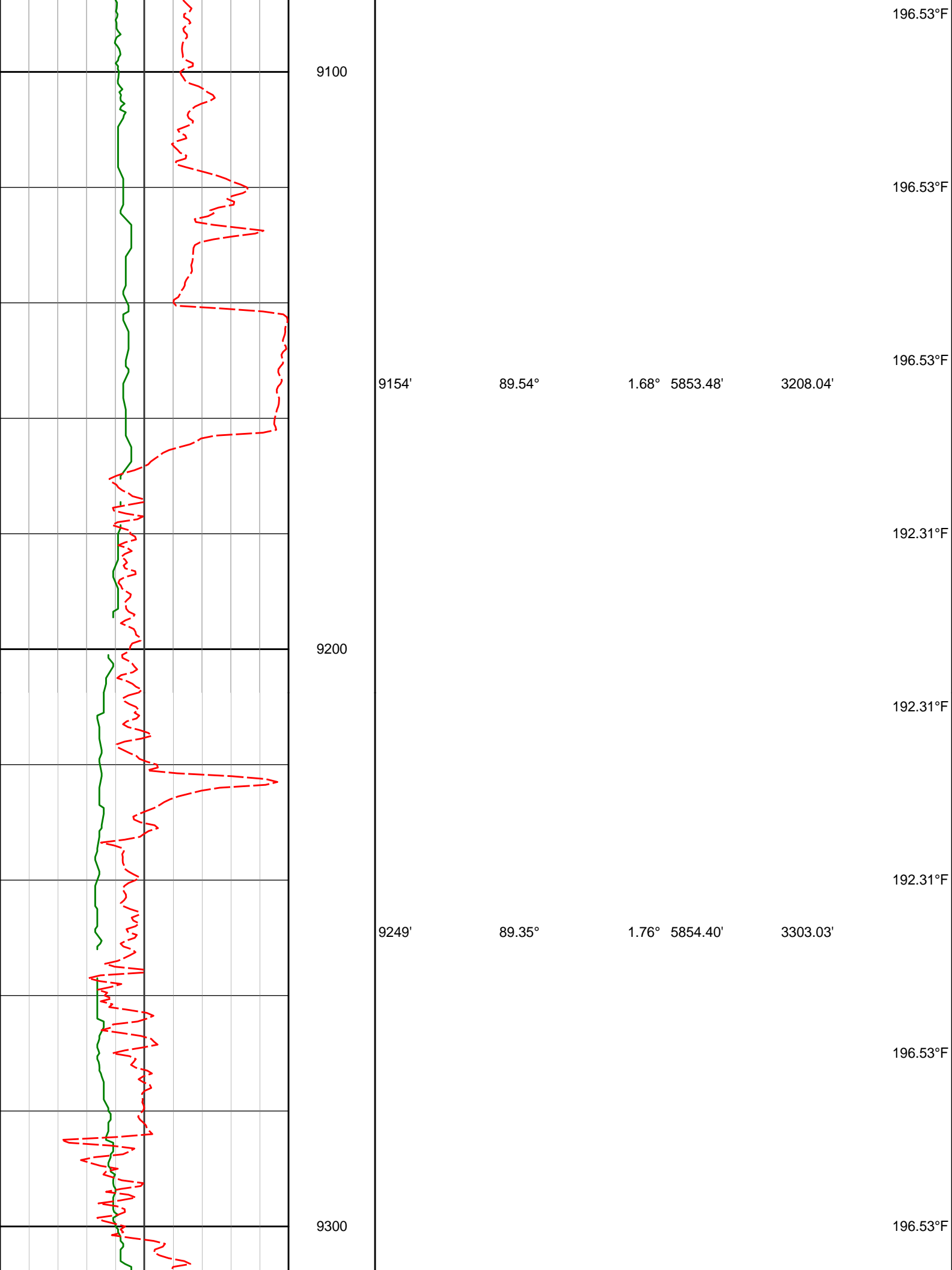


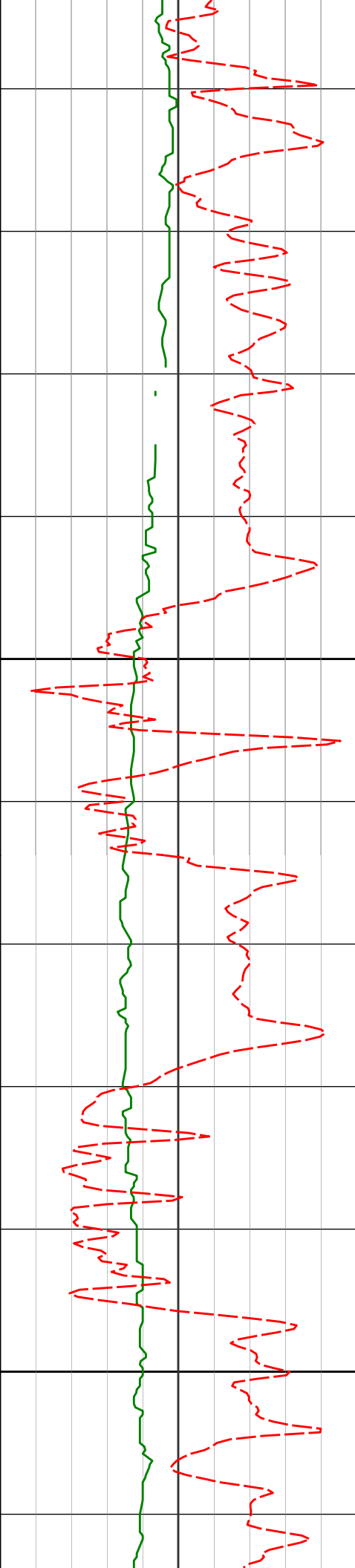












9400

9500

9344'

89.41°

1.56° 5855.42'

3398.02'

9439'

89.51°

1.58° 5856.31'

3493.01'

196.53°F

200.75°F

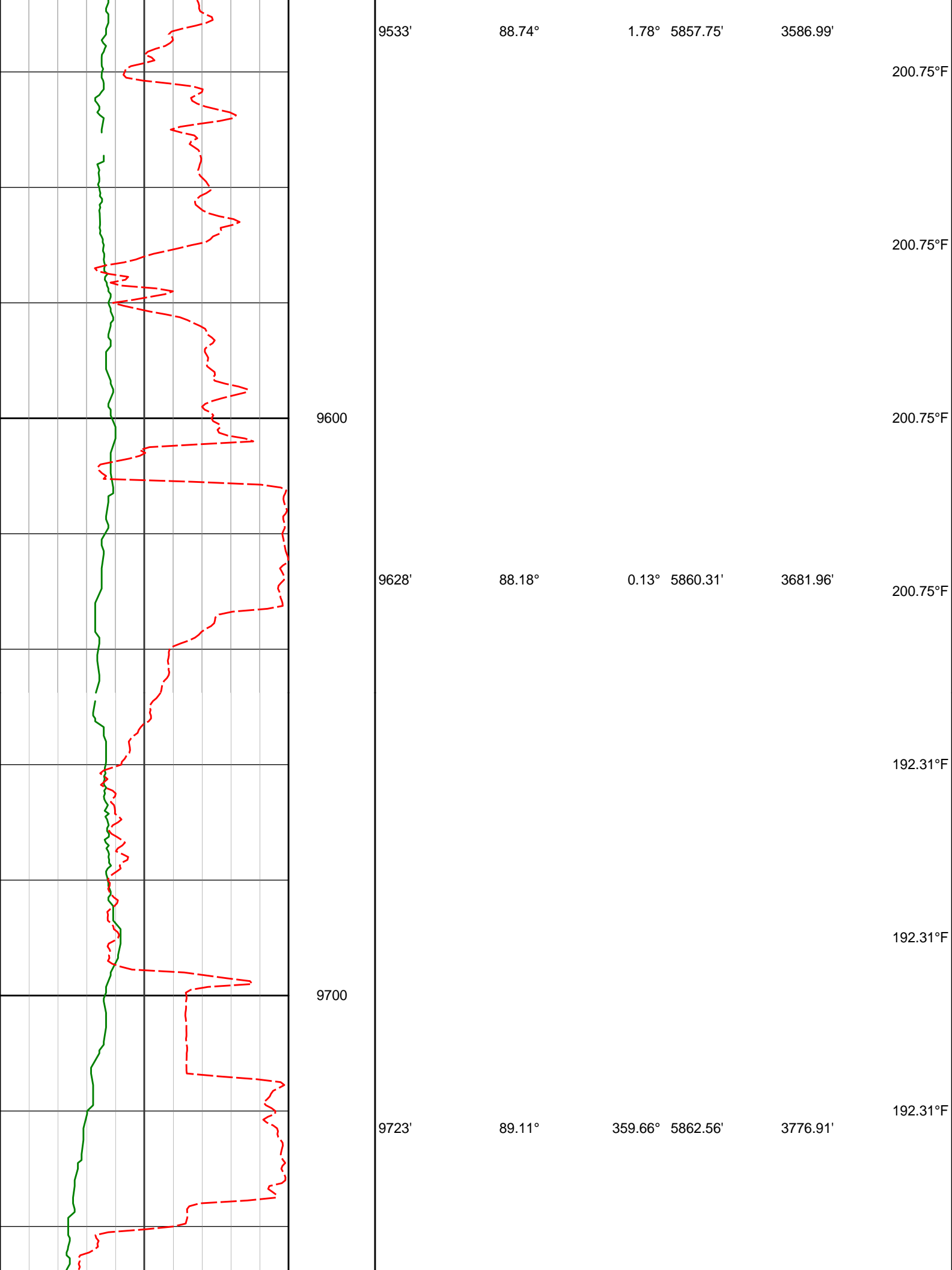
200.75°F

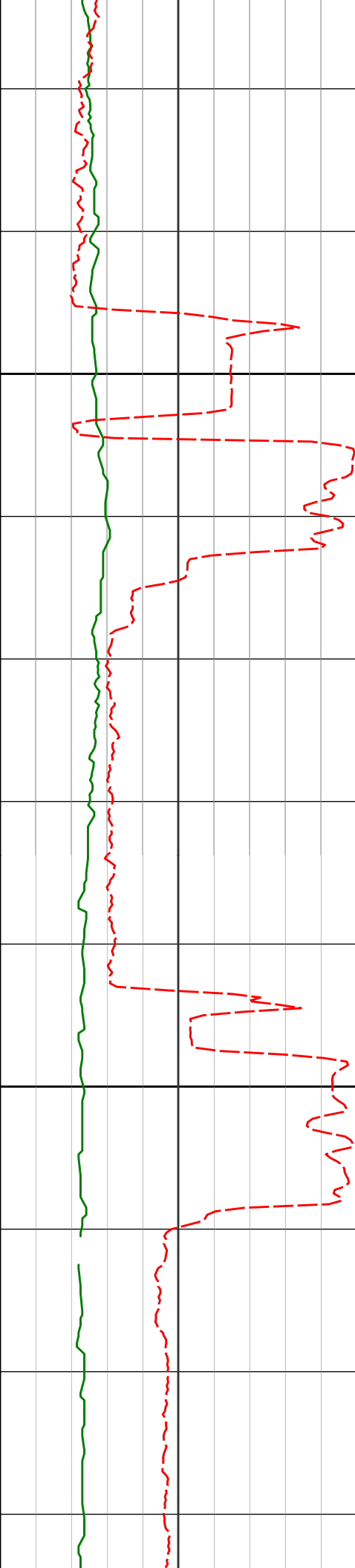
200.75°F

200.75°F

200.75°F

200.75°F





9800

9817'

89.45°

358.41° 5863.74'

3870.84'

9900

9912'

90.43°

358.06° 5863.85'

3965.72'

196.53°F

196.53°F

196.53°F

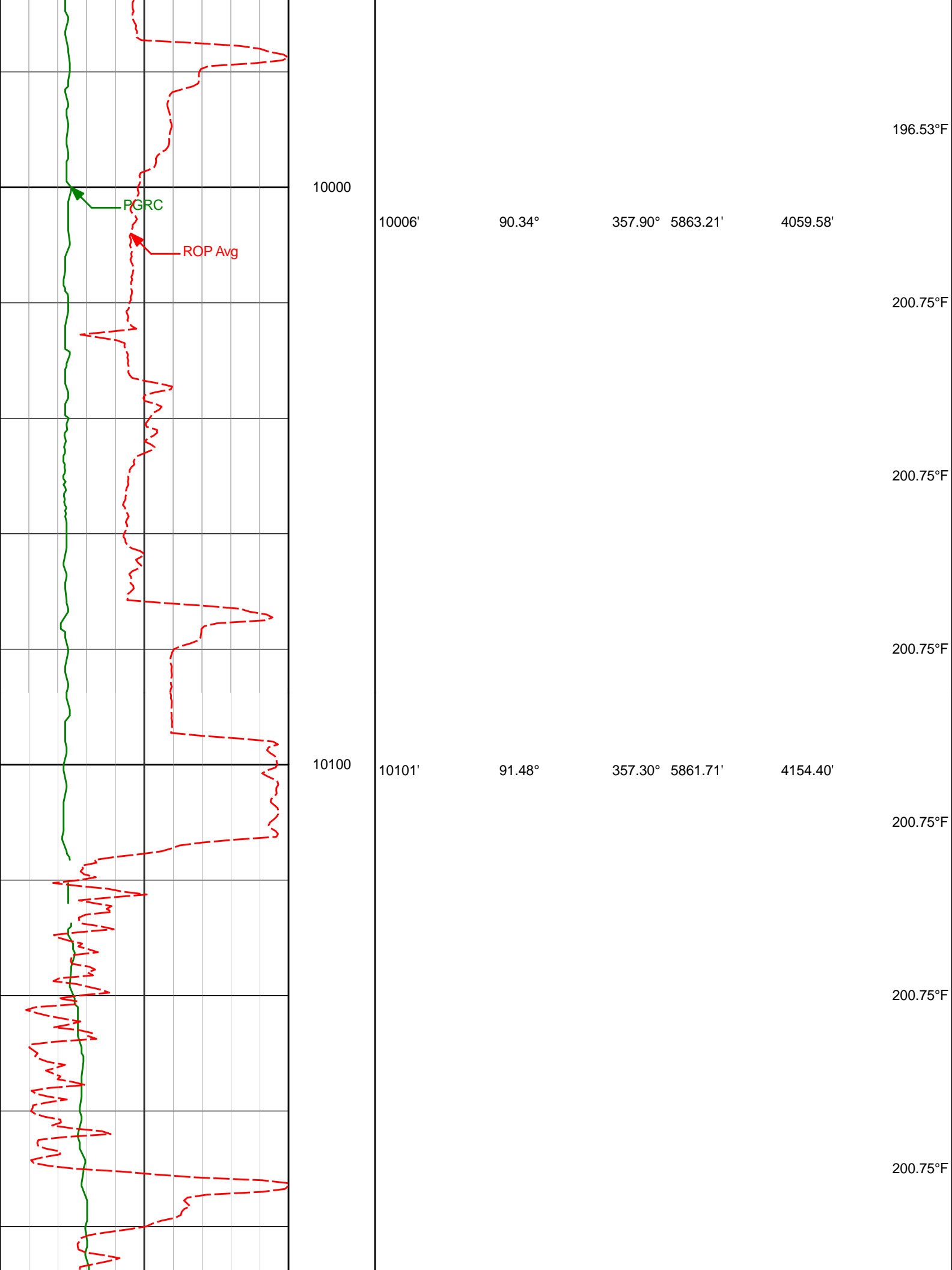
196.53°F

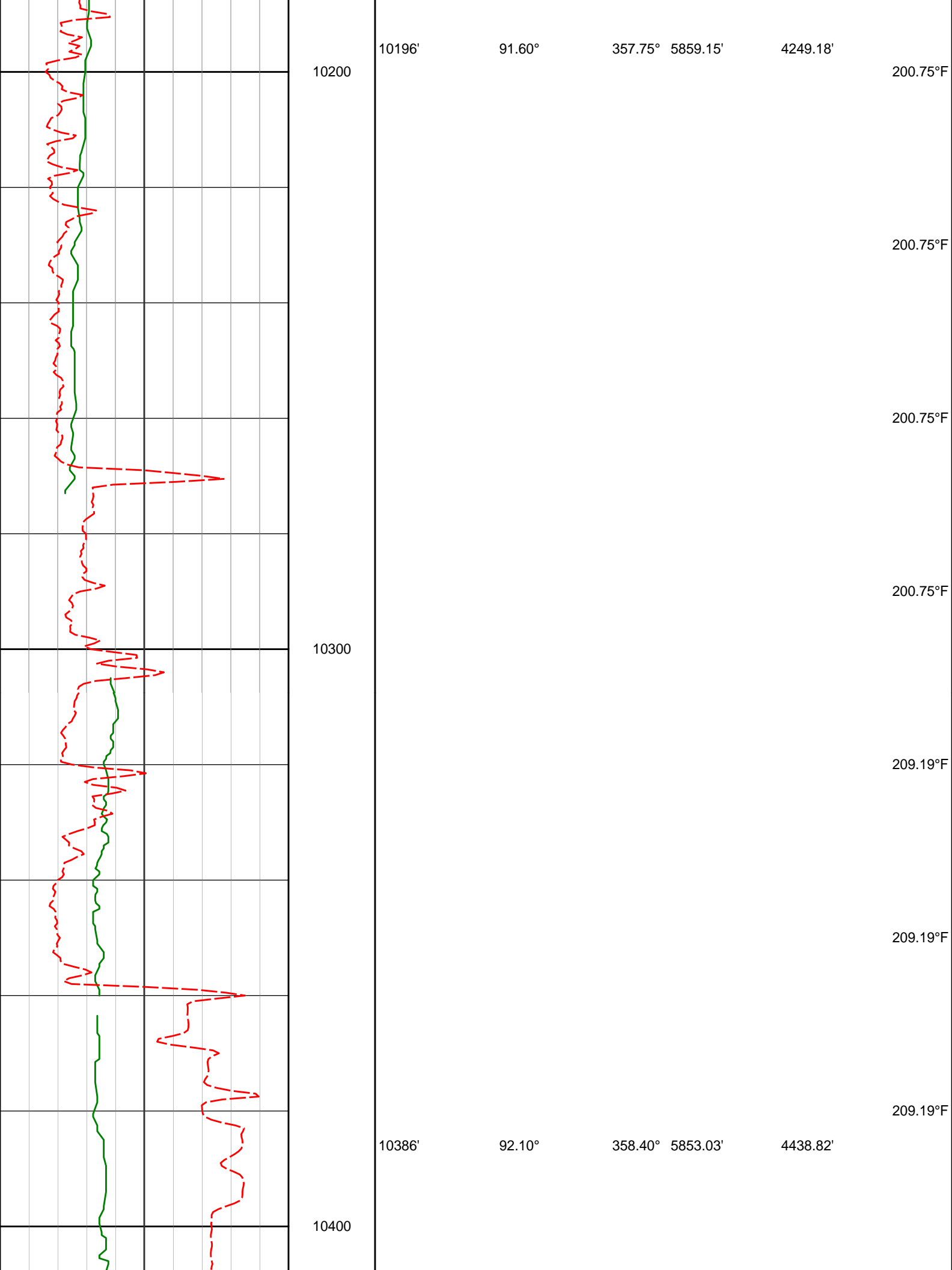
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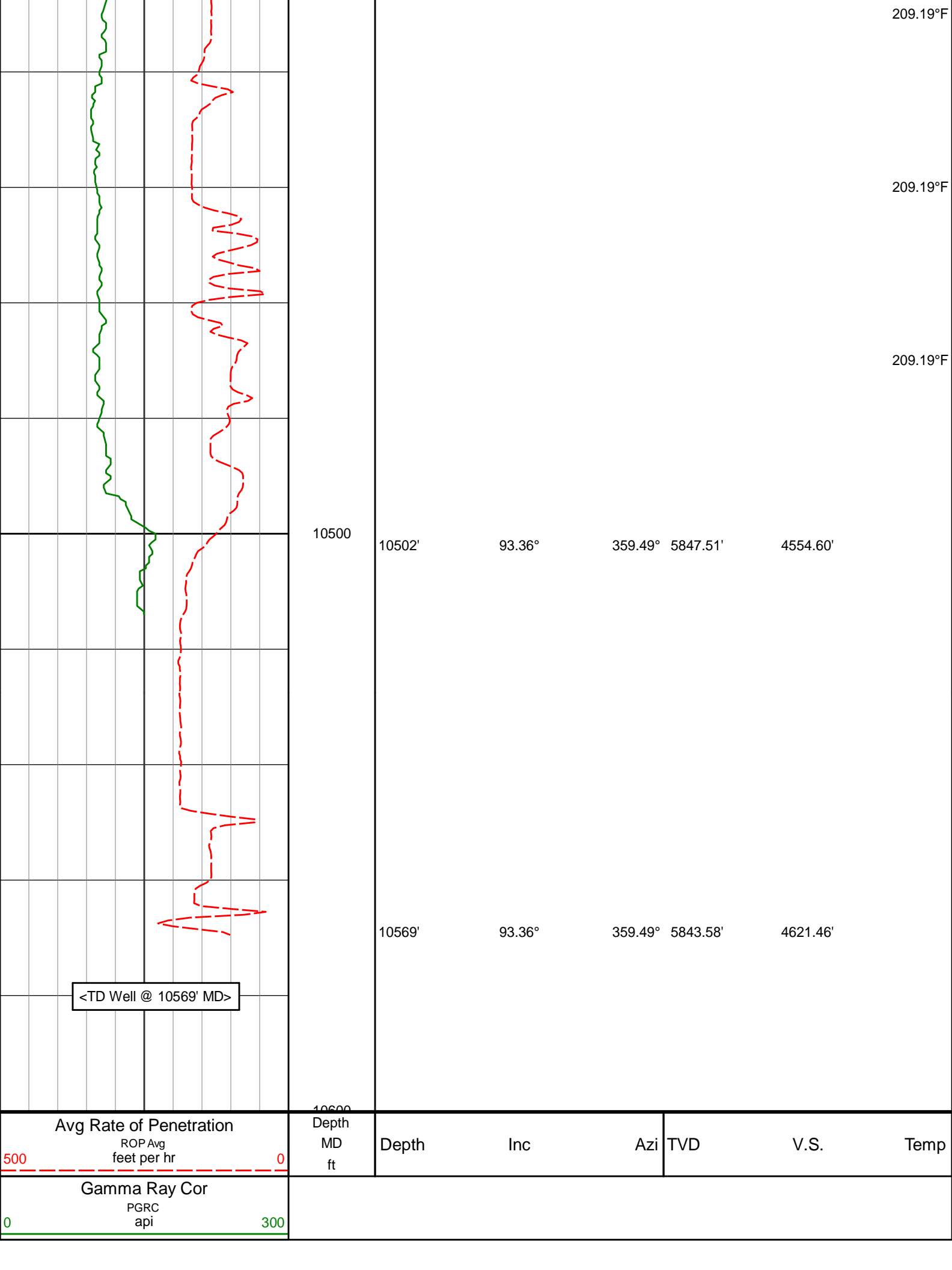
196.53°F

196.53°F

196.53°F







DIRECTIONAL SURVEY REPORT

Noble Energy
Brecken LD28-734
Wattenberg
Weld Colorado
USA
CA-XX-0902606365

<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
89.42	0.38	133.49	89.42	0.20 S	0.21 E	-0.20	0.42
180.20	0.22	81.35	180.20	0.38 S	0.60 E	-0.37	0.33
270.98	0.23	44.98	270.98	0.23 S	0.90 E	-0.21	0.15
361.76	0.16	83.59	361.76	0.09 S	1.16 E	-0.06	0.16
452.54	0.47	92.15	452.54	0.09 S	1.66 E	-0.05	0.35
543.32	0.41	85.64	543.31	0.07 S	2.36 E	-0.03	0.09
634.10	0.45	99.12	634.09	0.11 S	3.03 E	-0.05	0.12
724.88	0.38	94.29	724.87	0.19 S	3.68 E	-0.12	0.08
815.66	0.53	95.98	815.65	0.25 S	4.40 E	-0.17	0.17
906.44	0.32	86.00	906.42	0.28 S	5.08 E	-0.18	0.24
997.22	0.54	93.07	997.20	0.28 S	5.76 E	-0.18	0.24
1088.00	0.41	89.67	1087.98	0.30 S	6.51 E	-0.18	0.14
1198.00	0.36	335.37	1197.98	0.01 N	6.76 E	0.14	0.59
1290.00	0.41	323.99	1289.97	0.54 N	6.45 E	0.66	0.10
1381.00	0.48	328.23	1380.97	1.12 N	6.06 E	1.23	0.09
1472.00	0.39	336.30	1471.97	1.73 N	5.74 E	1.84	0.11
1564.00	0.25	345.84	1563.97	2.21 N	5.56 E	2.32	0.17
1747.00	0.62	63.71	1746.96	3.04 N	6.35 E	3.15	0.34
1838.00	2.75	177.01	1837.93	1.07 N	6.91 E	1.20	3.35
1930.00	3.87	188.23	1929.77	4.21 S	6.58 E	-4.09	1.40
2021.00	5.14	180.08	2020.49	11.33 S	6.13 E	-11.21	1.55
2113.00	5.71	161.72	2112.09	19.80 S	7.56 E	-19.65	1.97
2205.00	6.86	145.21	2203.54	28.65 S	12.13 E	-28.42	2.32
2297.00	8.16	152.73	2294.75	38.97 S	18.26 E	-38.62	1.77
2389.00	7.54	148.61	2385.89	49.93 S	24.40 E	-49.46	0.91
2480.00	8.71	159.42	2475.98	61.48 S	29.93 E	-60.91	2.11
2572.00	10.04	157.82	2566.75	75.43 S	35.41 E	-74.76	1.47
2663.00	9.56	157.16	2656.42	89.74 S	41.34 E	-88.96	0.55
2758.00	9.56	157.66	2750.10	104.31 S	47.40 E	-103.41	0.09
2853.00	10.07	158.92	2843.71	119.36 S	53.39 E	-118.34	0.58
2947.00	11.29	143.78	2936.10	134.46 S	61.78 E	-133.28	3.24
3042.00	10.01	143.27	3029.46	148.58 S	72.21 E	-147.21	1.35
3137.00	9.05	143.32	3123.14	161.19 S	81.62 E	-159.64	1.01
3232.00	9.69	141.99	3216.88	173.48 S	91.00 E	-171.76	0.71
3326.00	9.80	143.89	3309.52	186.18 S	100.59 E	-184.27	0.36
3421.00	10.21	144.29	3403.08	199.55 S	110.27 E	-197.45	0.44
3516.00	9.44	140.04	3496.68	212.36 S	120.19 E	-210.08	1.11
3611.00	9.33	140.96	3590.41	224.31 S	130.04 E	-221.84	0.20
3705.00	8.04	136.45	3683.33	234.99 S	139.37 E	-232.35	1.55
3800.00	7.07	136.00	3777.51	244.01 S	148.01 E	-241.21	1.02
3989.00	6.67	145.36	3965.15	261.42 S	162.33 E	-258.34	0.63
4084.00	5.83	144.28	4059.59	269.88 S	168.29 E	-266.69	0.90
4179.00	6.29	148.61	4154.06	278.24 S	173.82 E	-274.94	0.68
4273.00	6.61	153.36	4247.46	287.47 S	178.92 E	-284.07	0.66
4368.00	5.69	149.30	4341.92	296.40 S	183.78 E	-292.92	1.07
4463.00	4.65	146.90	4436.53	303.68 S	188.29 E	-300.11	1.12
4557.00	4.17	147.66	4530.25	309.76 S	192.20 E	-306.12	0.51
4652.00	1.74	132.65	4625.12	313.66 S	195.11 E	-309.96	2.66
4747.00	1.27	67.75	4720.09	314.24 S	197.15 E	-310.50	1.75
4842.00	1.05	53.39	4815.07	313.32 S	198.82 E	-309.56	0.38
4936.00	1.15	58.15	4909.05	312.32 S	200.30 E	-308.52	0.14
5031.00	1.15	60.83	5004.03	311.35 S	201.94 E	-307.52	0.06
5126.00	0.96	62.73	5099.02	310.52 S	203.48 E	-306.67	0.21
5220.00	0.10	28.91	5193.01	310.09 S	204.22 E	-306.22	0.93
5315.00	5.69	20.06	5287.85	305.59 S	205.87 E	-301.70	5.89
5410.00	10.39	28.92	5381.90	293.67 S	211.63 E	-289.66	5.10
5504.00	19.96	25.33	5472.52	271.70 S	222.62 E	-267.49	10.23
5598.00	29.22	46.95	5558.88	234.69 S	226.22 E	-232.22	18.54

5599.00	29.32	16.85	5558.80	234.68 S	236.33 E	-230.23	10.51
5694.00	38.15	4.41	5637.82	183.01 S	245.36 E	-178.39	11.76
5789.00	48.30	0.08	5706.97	118.10 S	247.67 E	-113.45	11.13
5883.00	58.84	358.87	5762.71	42.58 S	246.93 E	-37.96	11.25
5978.00	67.76	355.67	5805.36	42.09 N	242.79 E	46.61	9.87
6073.00	73.81	353.71	5836.62	131.36 N	234.47 E	135.72	6.65
6187.00	83.61	356.73	5858.92	242.62 N	225.21 E	246.78	8.98
6340.00	89.35	358.23	5868.30	395.11 N	218.51 E	399.13	3.88
6432.00	89.94	357.99	5868.87	487.06 N	215.48 E	491.00	0.69
6523.00	89.51	357.36	5869.31	577.99 N	211.79 E	581.84	0.84
6615.00	89.11	356.77	5870.42	669.86 N	207.09 E	673.61	0.78
6707.00	90.86	357.30	5870.45	761.73 N	202.33 E	765.38	1.99
6799.00	91.20	357.27	5868.79	853.61 N	197.97 E	857.16	0.37
6891.00	91.20	357.21	5866.86	945.49 N	193.54 E	948.93	0.06
6982.00	91.33	358.49	5864.86	1036.40 N	190.13 E	1039.77	1.42
7074.00	90.40	358.50	5863.47	1128.35 N	187.71 E	1131.66	1.01
7165.00	90.49	358.28	5862.76	1219.32 N	185.15 E	1222.56	0.26
7260.00	88.46	358.04	5863.63	1314.26 N	182.10 E	1317.43	2.15
7354.00	88.15	357.82	5866.41	1408.16 N	178.71 E	1411.25	0.40
7449.00	88.00	358.66	5869.60	1503.06 N	175.79 E	1506.08	0.90
7543.00	89.60	358.57	5871.57	1597.00 N	173.52 E	1599.97	1.71
7638.00	89.66	358.19	5872.18	1691.96 N	170.83 E	1694.86	0.40
7733.00	89.82	357.49	5872.62	1786.90 N	167.25 E	1789.71	0.75
7828.00	89.85	357.11	5872.90	1881.79 N	162.78 E	1884.50	0.40
7922.00	90.12	357.27	5872.92	1975.68 N	158.17 E	1978.29	0.34
8017.00	90.43	357.25	5872.46	2070.57 N	153.63 E	2073.07	0.33
8112.00	89.78	357.21	5872.28	2165.45 N	149.04 E	2167.86	0.68
8207.00	90.18	357.19	5872.31	2260.34 N	144.40 E	2262.64	0.42
8301.00	89.45	355.57	5872.61	2354.15 N	138.46 E	2356.32	1.89
8396.00	91.85	357.53	5871.54	2448.96 N	132.75 E	2451.01	3.26
8491.00	92.22	356.99	5868.17	2543.79 N	128.21 E	2545.74	0.69
8586.00	92.31	357.93	5864.42	2638.62 N	124.00 E	2640.48	0.99
8680.00	92.71	358.07	5860.30	2732.47 N	120.72 E	2734.25	0.45
8775.00	91.36	359.54	5856.93	2827.39 N	118.74 E	2829.11	2.11
8870.00	91.11	359.72	5854.88	2922.37 N	118.13 E	2924.06	0.32
8965.00	90.09	0.81	5853.89	3017.36 N	118.57 E	3019.04	1.57
9060.00	90.43	1.08	5853.45	3112.34 N	120.14 E	3114.04	0.46
9154.00	89.54	1.68	5853.48	3206.31 N	122.40 E	3208.04	1.14
9249.00	89.35	1.76	5854.40	3301.27 N	125.25 E	3303.03	0.21
9344.00	89.41	1.56	5855.42	3396.22 N	128.00 E	3398.02	0.22
9439.00	89.51	1.58	5856.31	3491.18 N	130.60 E	3493.01	0.10
9533.00	88.74	1.78	5857.75	3585.13 N	133.35 E	3586.99	0.84
9628.00	88.18	0.13	5860.31	3680.08 N	134.93 E	3681.96	1.83
9723.00	89.11	359.66	5862.56	3775.05 N	134.76 E	3776.91	1.09
9817.00	89.45	358.41	5863.74	3869.03 N	133.17 E	3870.84	1.38
9912.00	90.43	358.06	5863.85	3963.98 N	130.24 E	3965.72	1.10
10006.00	90.34	357.90	5863.21	4057.92 N	126.93 E	4059.58	0.19
10101.00	91.48	357.30	5861.71	4152.82 N	122.96 E	4154.40	1.36
10196.00	91.60	357.75	5859.15	4247.70 N	118.86 E	4249.18	0.48
10386.00	92.10	358.40	5853.03	4437.49 N	112.47 E	4438.82	0.43
10502.00	93.36	359.49	5847.51	4553.34 N	110.34 E	4554.60	1.44
10569.00	93.36	359.49	5843.58	4620.22 N	109.74 E	4621.46	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 1.07 DEGREES (GRID)
A TOTAL CORRECTION OF 6.96 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10569.00 FEET
IS 4621.52 FEET ALONG 1.36 DEGREES (GRID)**

Tied in to VES surveys at 1088 ft MD.

Last survey is a projection from 10502 ft MD to TD at 10569 ft MD.