



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300	400	
Date run completed	27-Feb-15	28-Feb-15	28-Feb-15	03-Mar-15	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.750	6.750	4.750	
Log Start Depth (MD, ft)	951.00	6,416.00	6,662.00	7,017.00	
Log End Depth (MD, ft)	6,416.00	6,662.00	7,017.00	11,298.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	26-Feb-15 12:50	27-Feb-15 17:35	28-Feb-15 10:00	02-Feb-15 00:30	
Drill/Wipe End Date and Time	27-Feb-15 07:20	28-Feb-15 02:10	28-Feb-15 20:00	03-Feb-15 11:15	
Min Inc (deg) @ Depth (MD, ft)	0.11 @ 1,082.00	30.94 @ 6,456.00	46.27 @ 6,645.00	86.64 @ 7,382.00	
Max Inc (deg) @ Depth (MD, ft)	24.12 @ 6,361.00	42.15 @ 6,598.00	88.49 @ 6,963.00	92.68 @ 10,506.00	
Bit TFA(in2) / Bit Type	1.21 / PDC	0.98 / PDC	0.90 / PDC	0.75 / PDC	
Flow Rate (gpm)	595.04	565.62	585.00	300.05	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	8.60 / 27.00	10.40 / 38.00	10.80 / 35.00	9.70 / 36.00	
Filtrate CL (ppm)	1,100.00	1,200.00	1,200.00	1,200.00	
pH / Fluid Loss (mptm)	8.60 / 0	7.90 / 9	9.20 / 9	8.50 / 9	
PV (cP) / YP (lbf2)	1 / 9.00	10 / 9.00	9 / 9.00	10 / 11.00	
% Solids / % Sand	0.50 / 0.10	11.30 / 0.30	11.60 / 0.30	7.40 / 0.30	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	

Max Tool Temp (degF) / Source	145.90 / PCM	150.10 / PCM	167.00 / PCM	230.30 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Paul Kock	Paul Kock	Paul Kock	Paul Kock	
Customer Representative	Charles Collver	Dave Nielsen	Dave Nielsen	Dave Nielsen	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.93	5.93	5.93	5.93	
Sub Serial Number	11107081	11107081	11107081	11107081	
Insert Serial Number	11680742	11680742	11680742	11680771	
Date and Time Initialized	25-Feb-15 23:56	25-Feb-15 23:56	25-Feb-15 23:56	28-Feb-15 21:41	
Date and Time Read	01-Mar-15 00:52	01-Mar-15 00:52	01-Mar-15 00:52	03-Mar-15 21:45	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	52.62	53.53	51.56	63.36	
Software Version	6.33	6.33	6.33	6.33	
Sub Serial Number	11107081	11107081	11107081	11107081	
Sonde Serial Number	11638559	11638559	11638559	11477956	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	226.30	111.80	28.30	14.90	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	42.50	43.41	41.44	58.63	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11107081	11107081	11107081	11107081	
Insert/Sonde Serial Number	11293411	11293411	11293411	11121362	

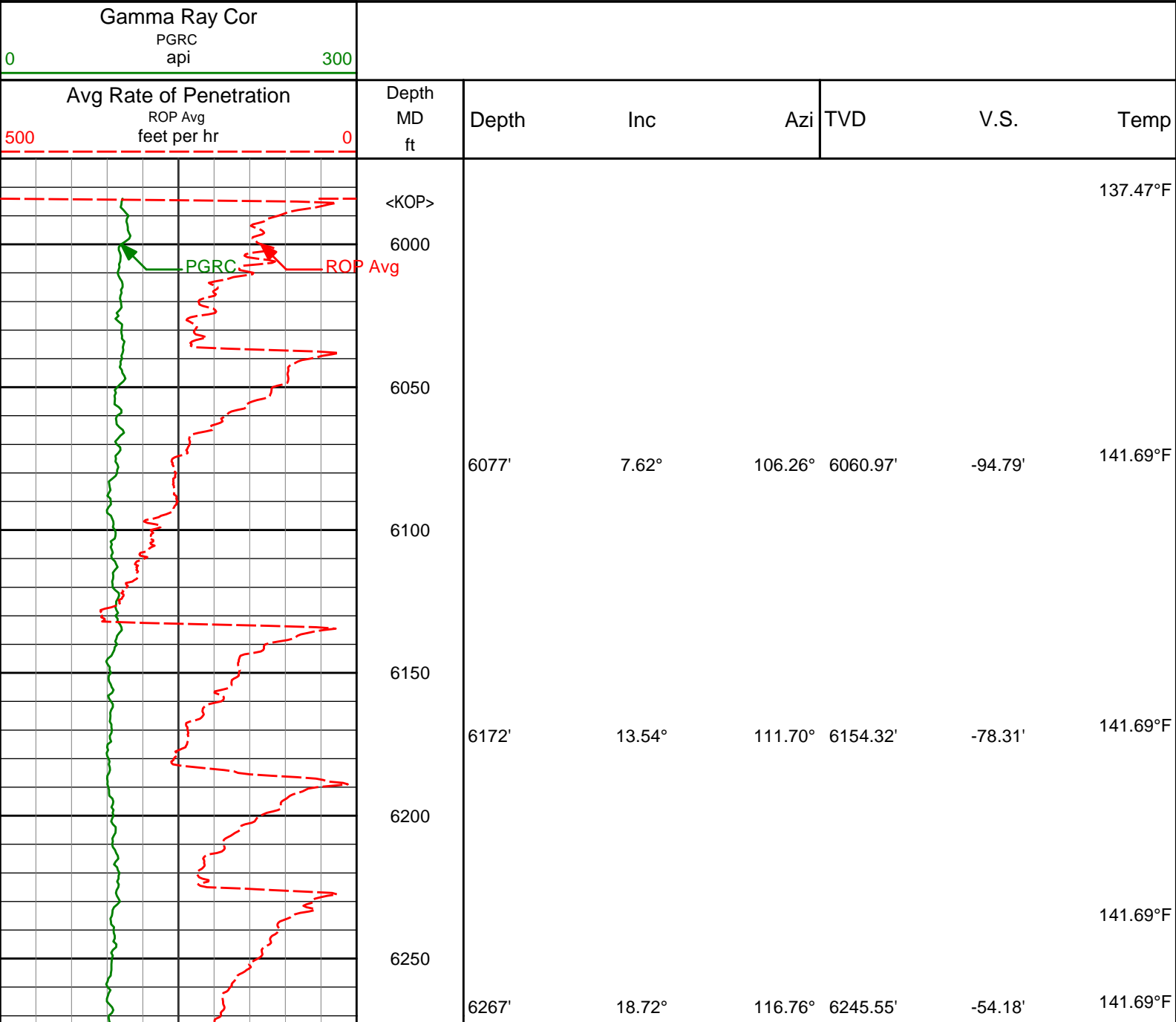
REMARKS

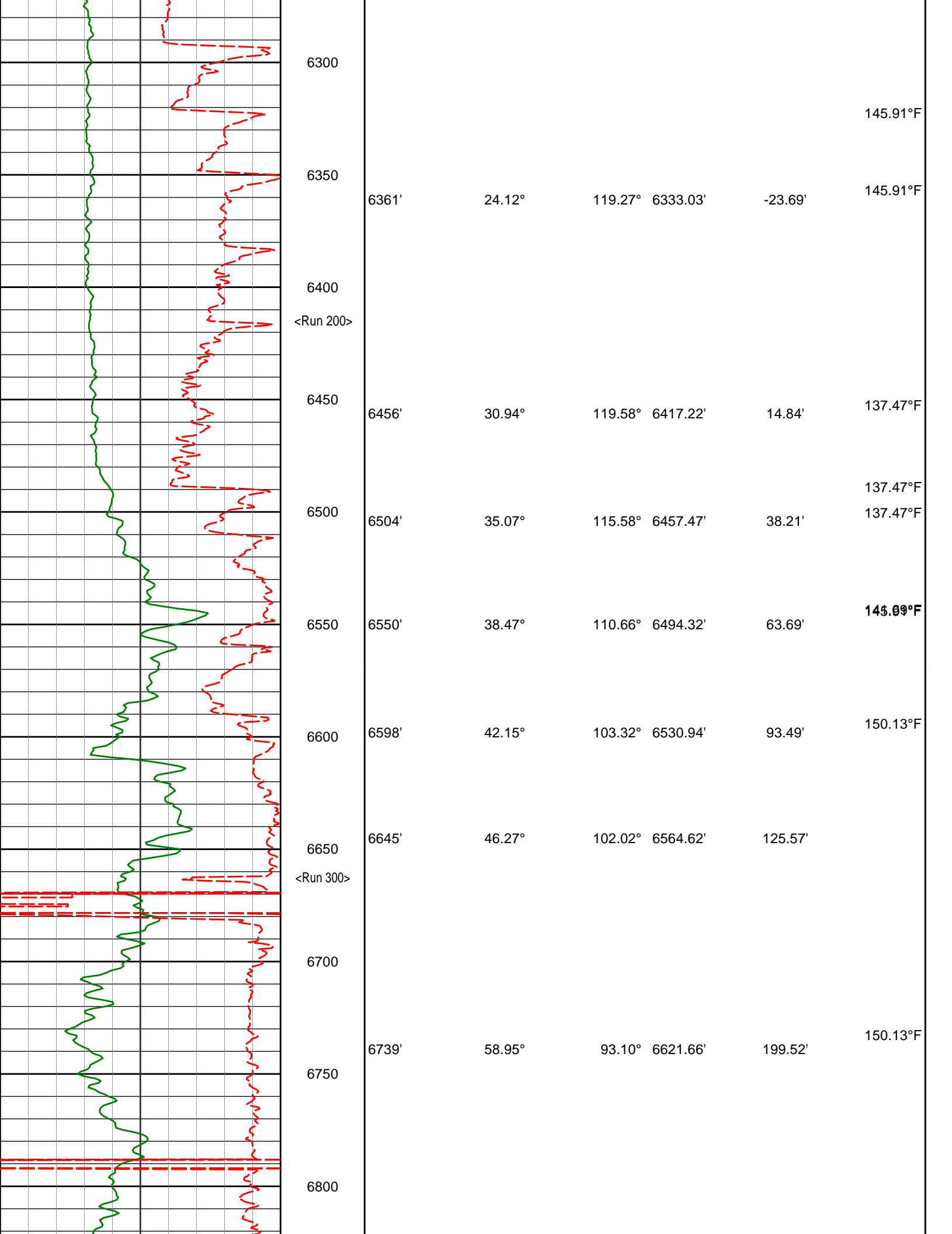
1. All depths are calibrated to the driller's pipe tally and are measured from the rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - 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 8.1.10
6. Gamma presented inside casing/cement from 6976 ft. MD to 7017 ft. MD.

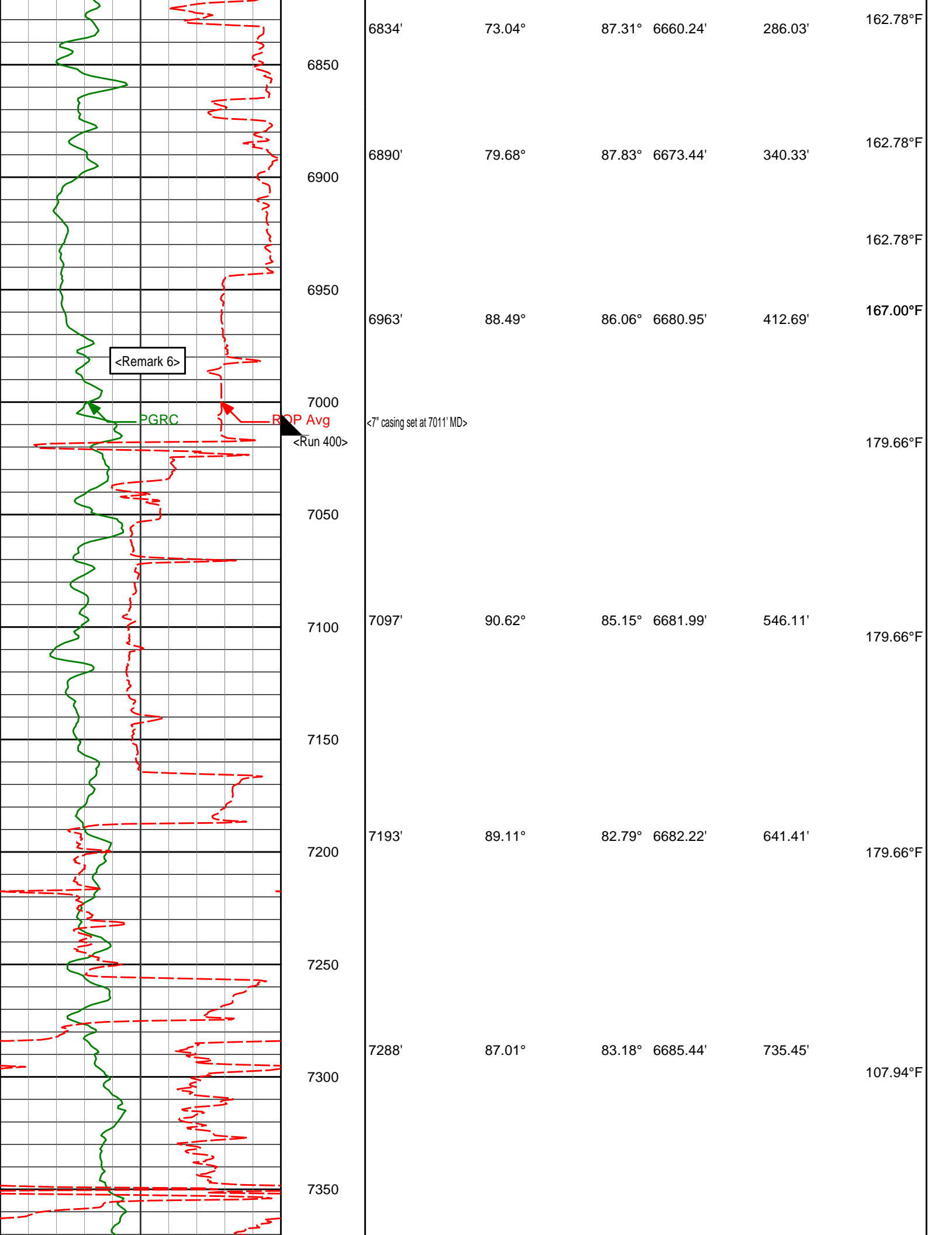
WARRANTY

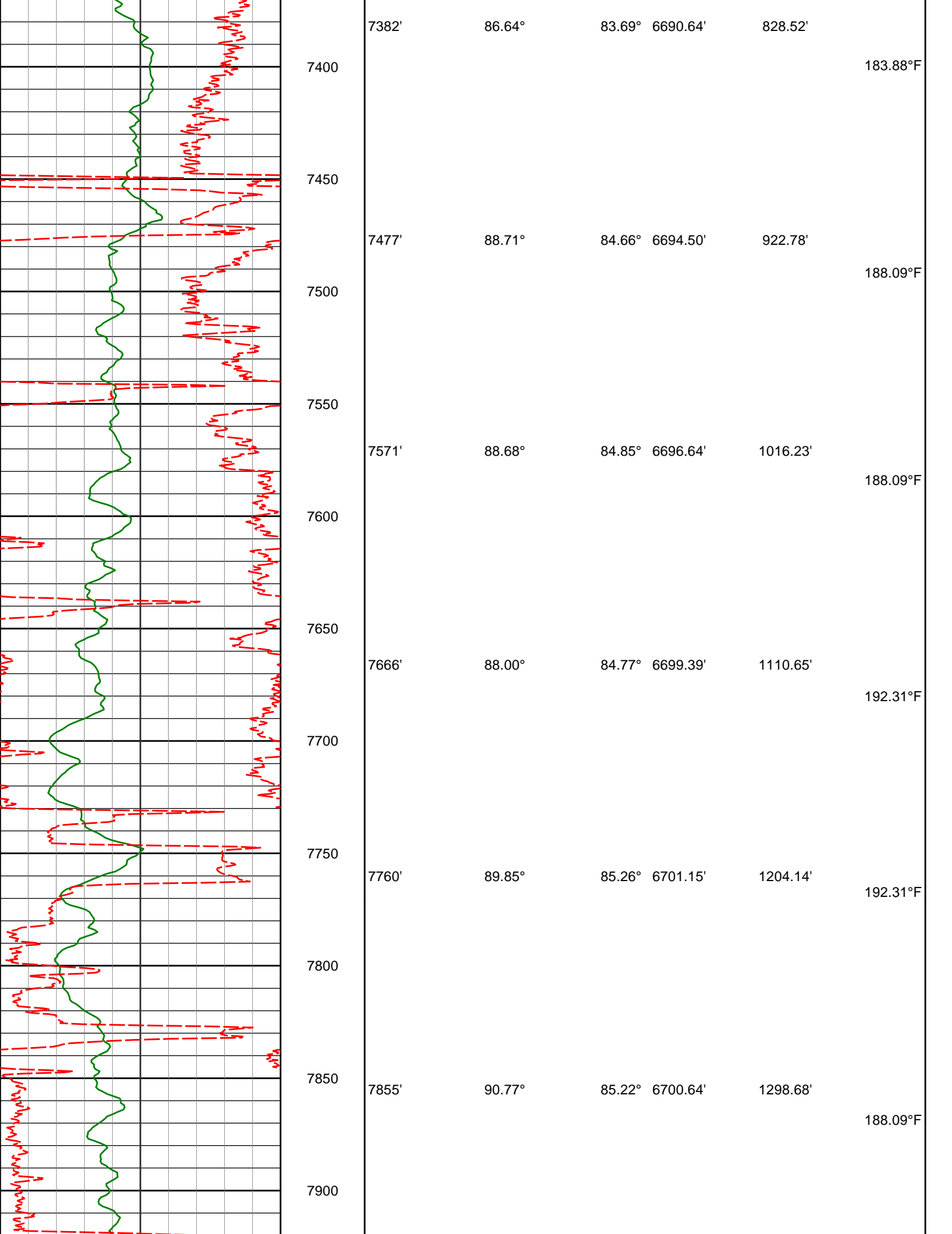
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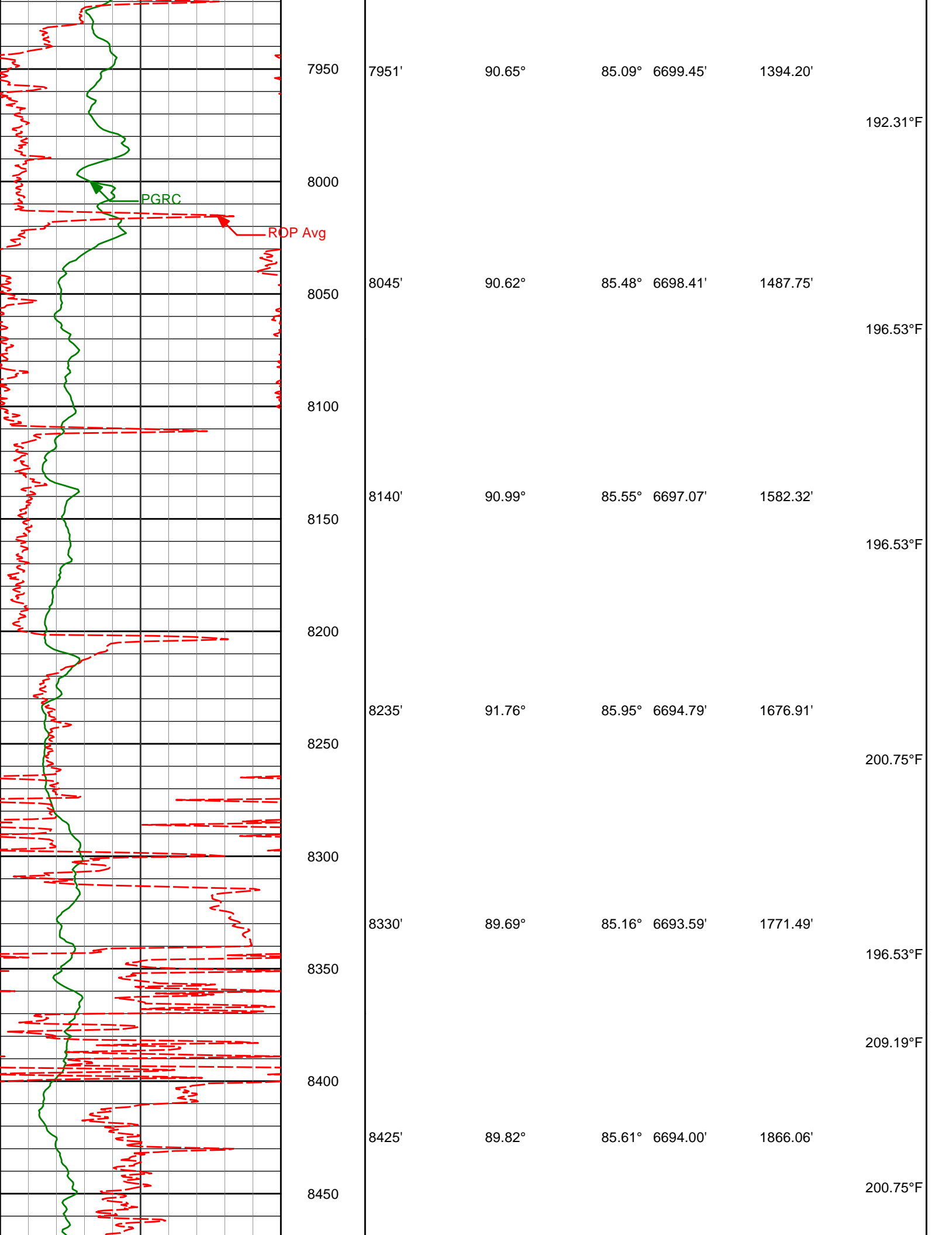
MD Detail 1:600 Scale

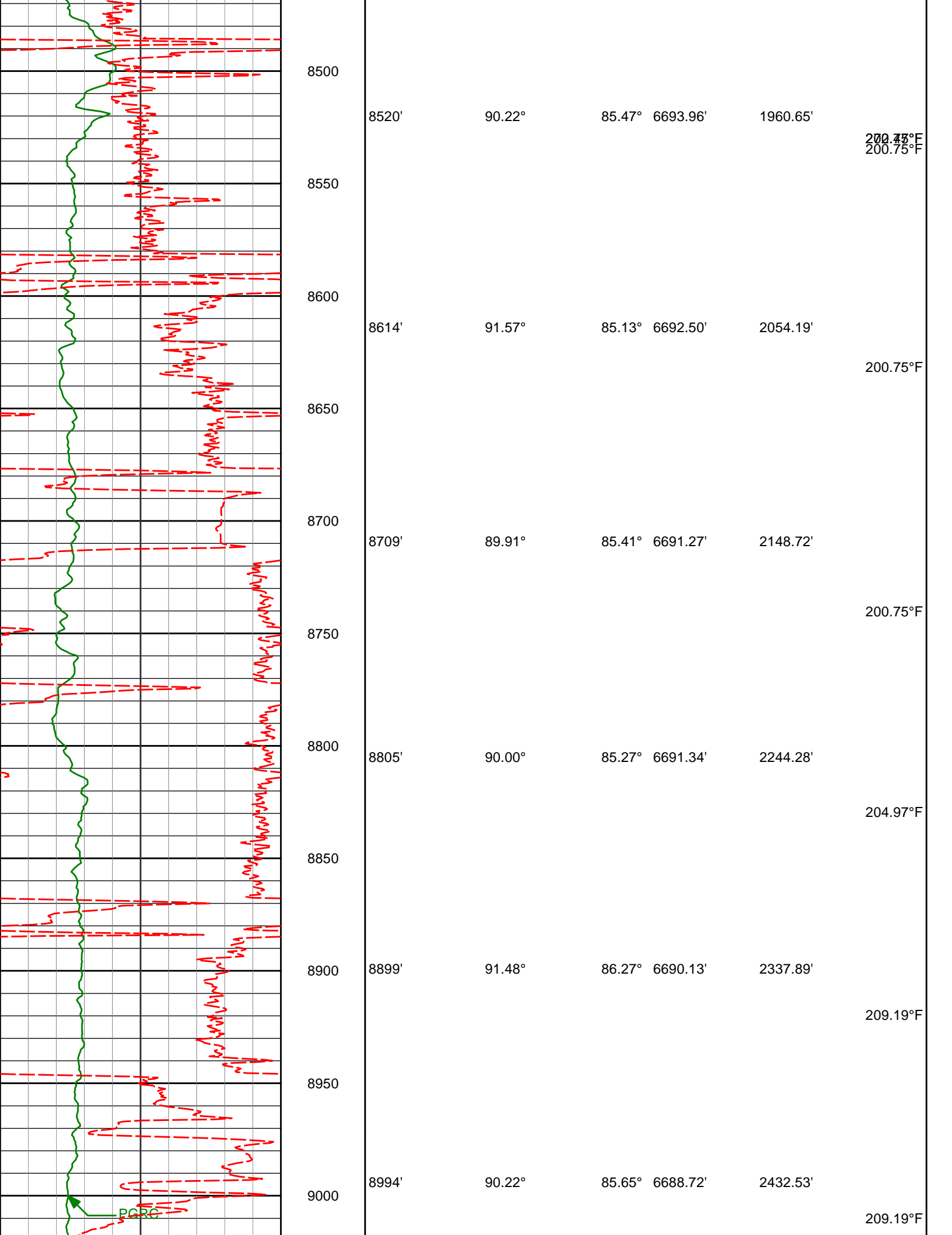


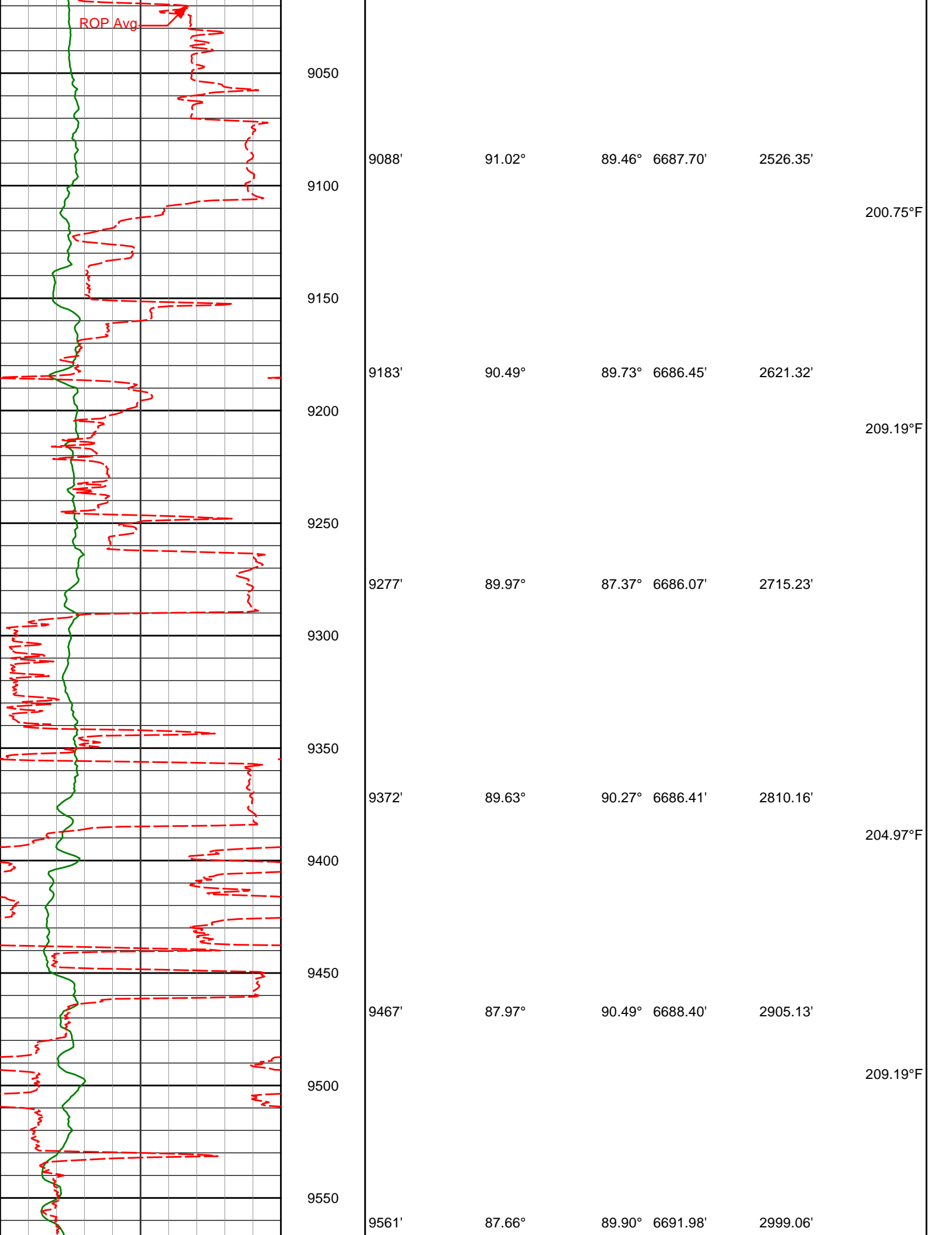


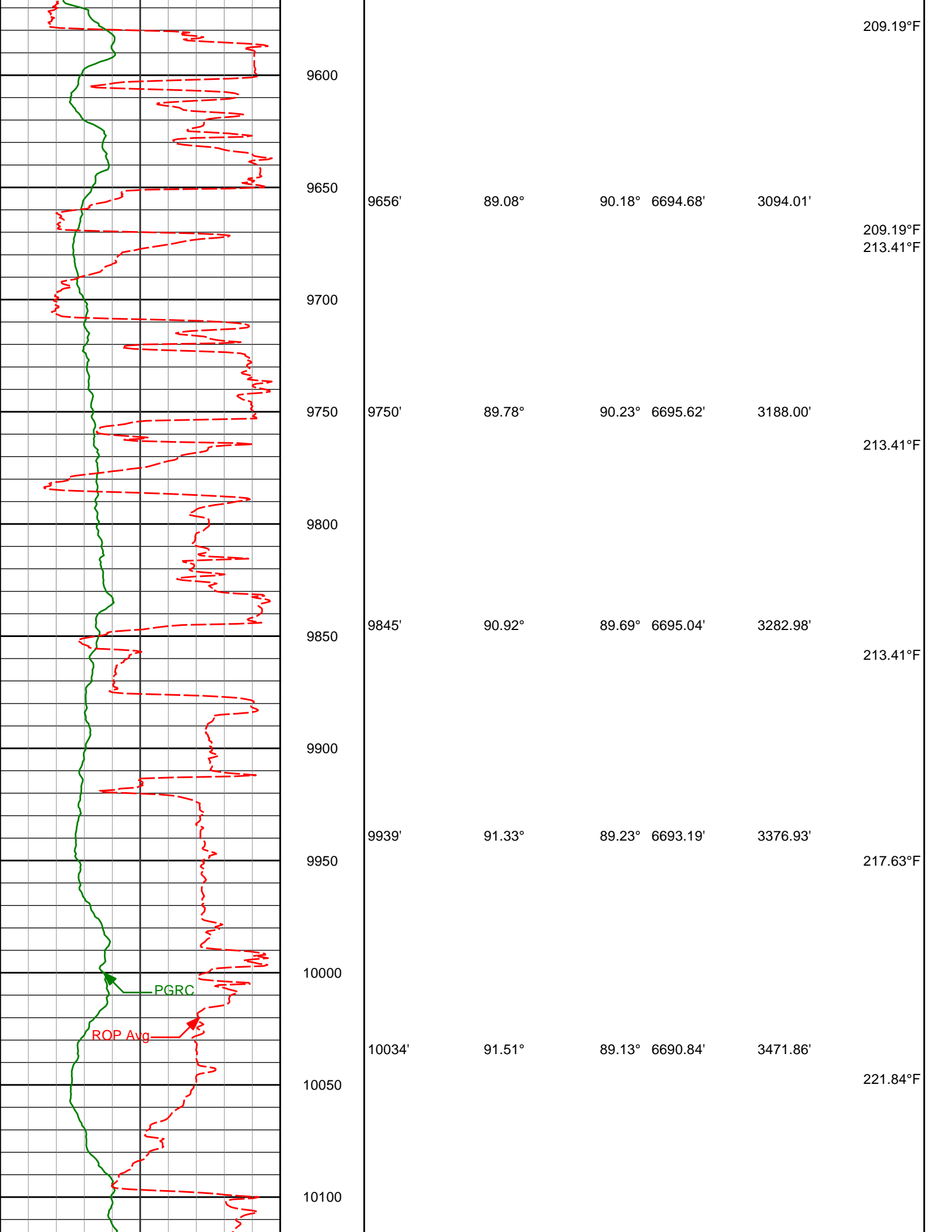


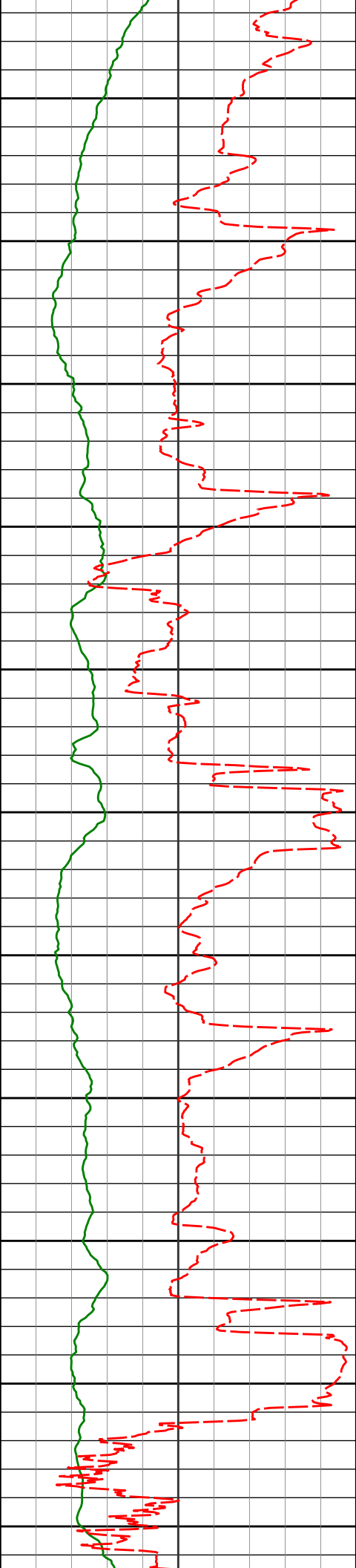












10150

10200

10250

10300

10350

10400

10450

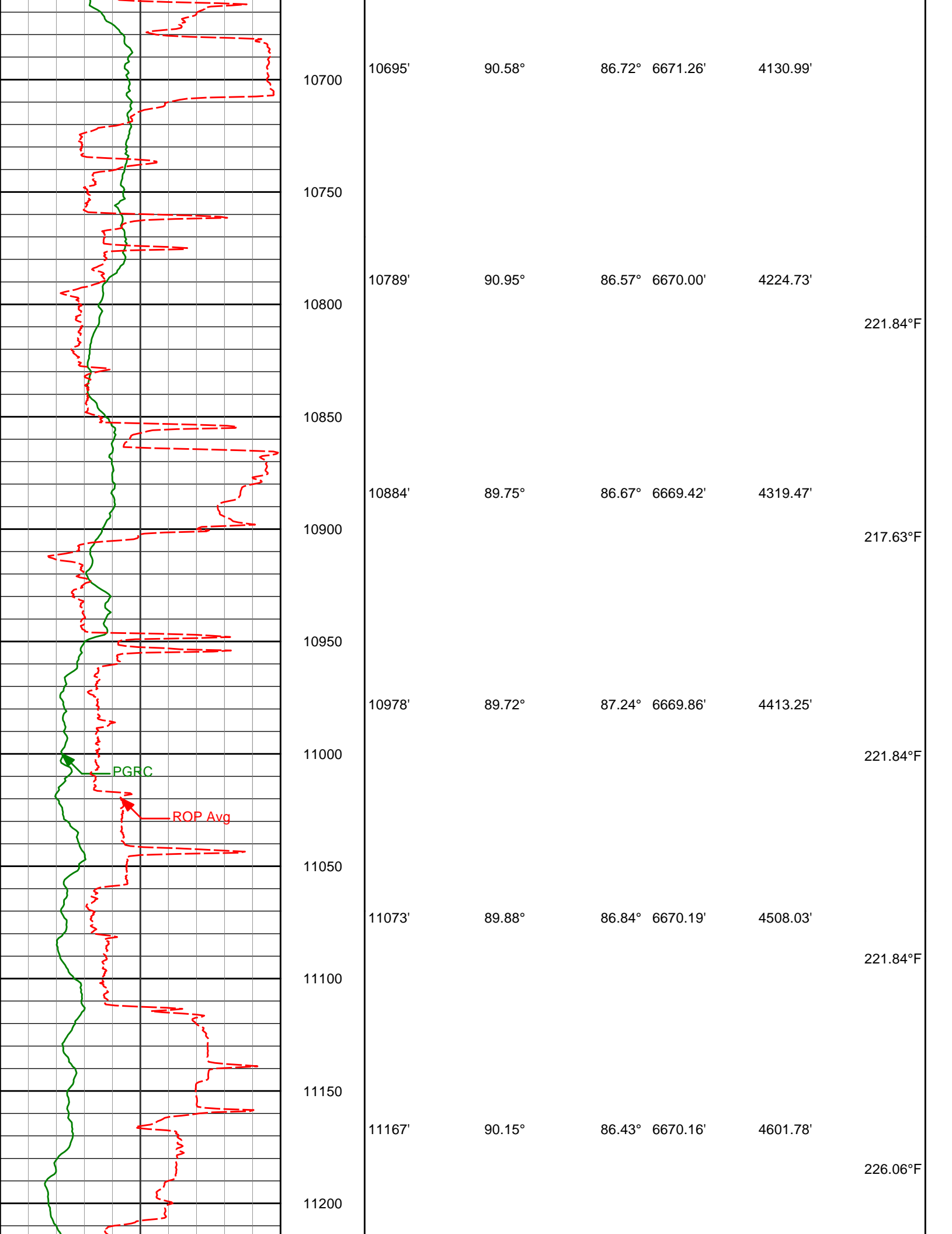
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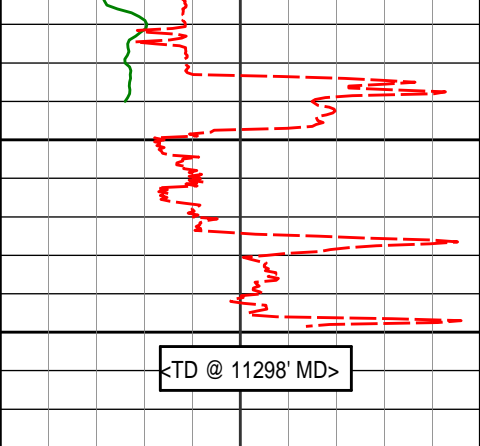
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10600

10650

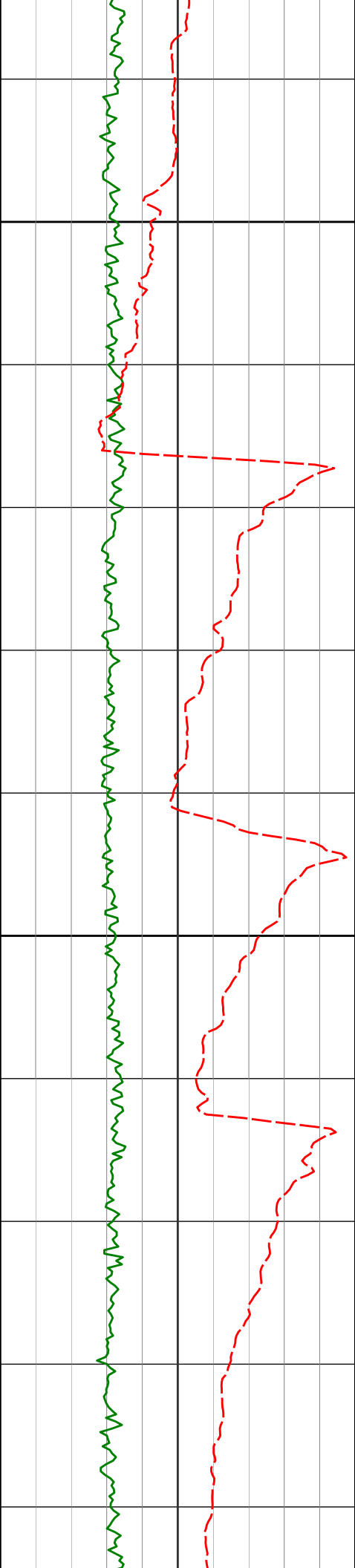
10128'	91.32°	88.75°	6688.52'	3565.78'	221.84°F
10222'	91.60°	87.45°	6686.12'	3659.64'	221.84°F
10317'	92.12°	86.88°	6683.04'	3754.39'	221.84°F
10412'	91.42°	86.31°	6680.10'	3849.08'	221.84°F
10506'	92.68°	85.47°	6676.74'	3942.66'	221.84°F
10600'	91.70°	86.72°	6673.15'	4036.26'	217.63°F



	11250 11300	11233' 89.91° 86.35° 6670.13' 4667.57'					230.28°E 221.84°E 230.28°E 221.84°E
Avg Rate of Penetration ROP Avg feet per hr	Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp
500 							

MD Detail 1:240 Scale

Gamma Ray Cor PGRC api				TVD	V.S.	Temp
0300						
Avg Rate of Penetration ROP Avg feet per hr		Depth MD ft	Depth	Inc	Azi	
5000						
						137.47°F



6100

6077'

7.62°

106.26°

6060.97'

-94.79'

141.69°F

6172'

13.54°

111.70°

6154.32'

-78.31'

141.69°F

6200

6267'

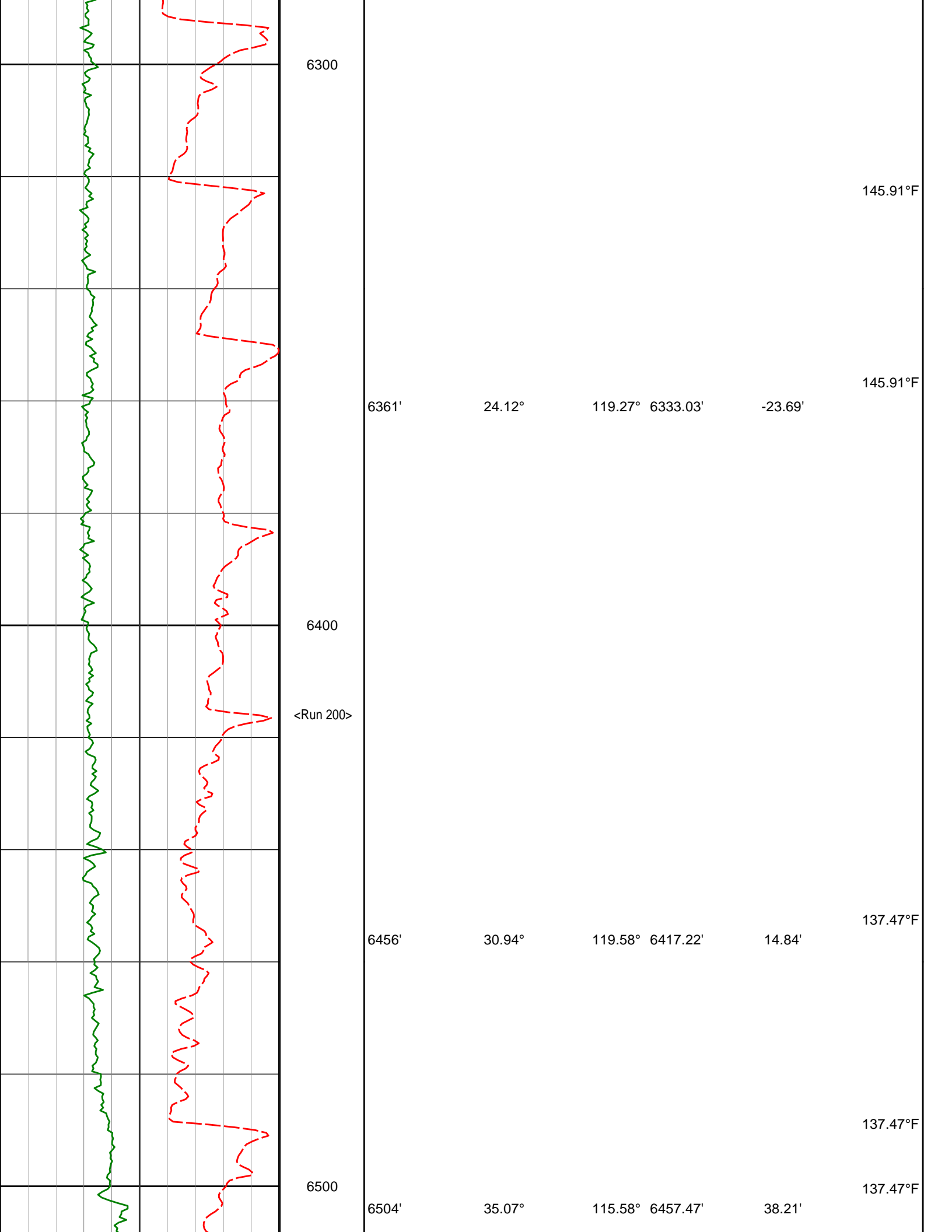
18.72°

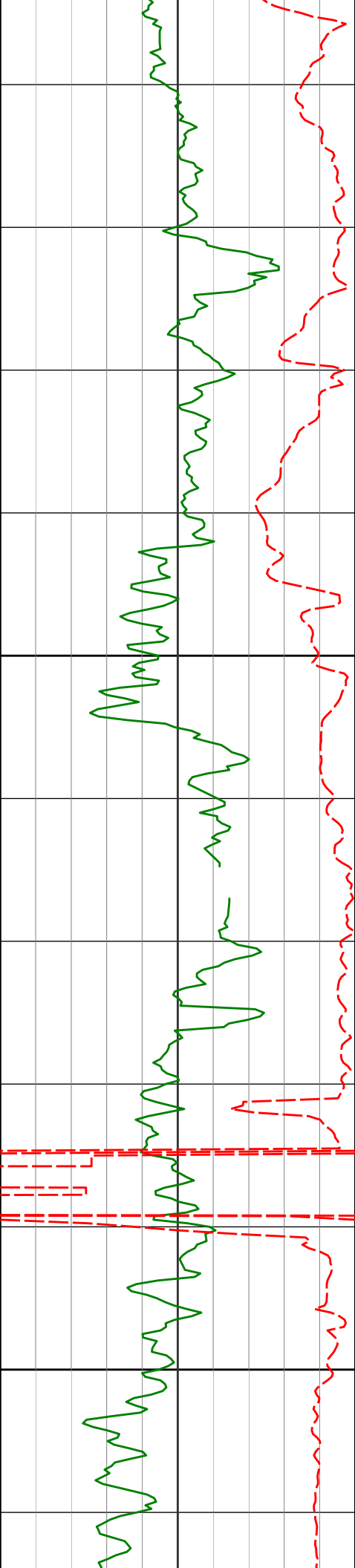
116.76°

6245.55'

-54.18'

141.69°F





<Run 300>

6700

6550'

38.47°

110.66° 6494.32'

63.69'

145.99°F

6600

6598'

42.15°

103.32° 6530.94'

93.49'

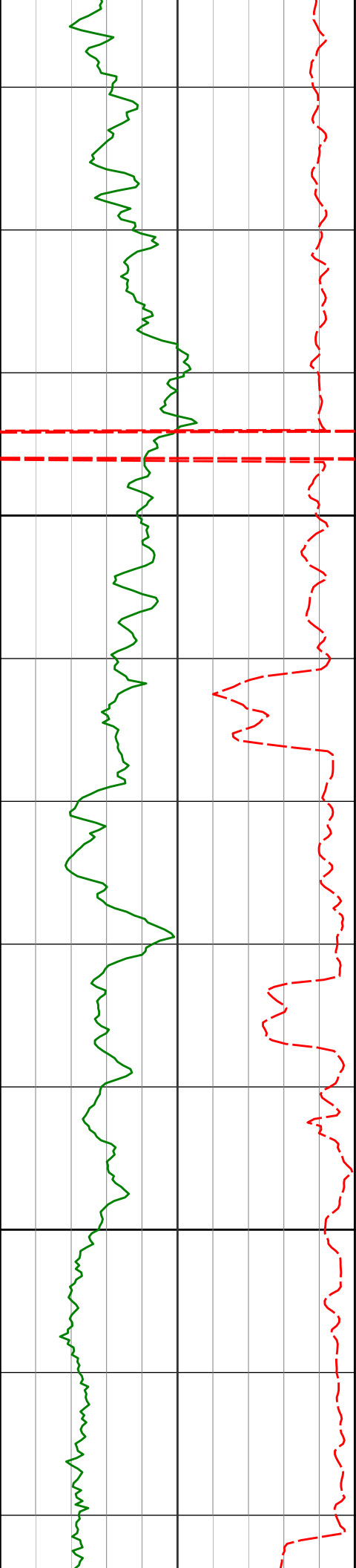
150.13°F

6645'

46.27°

102.02° 6564.62'

125.57'



6800

6900

6739'

6834'

6890'

58.95°

73.04°

79.68°

93.10°

87.31°

87.83°

6621.66'

6660.24'

6673.44'

199.52'

286.03'

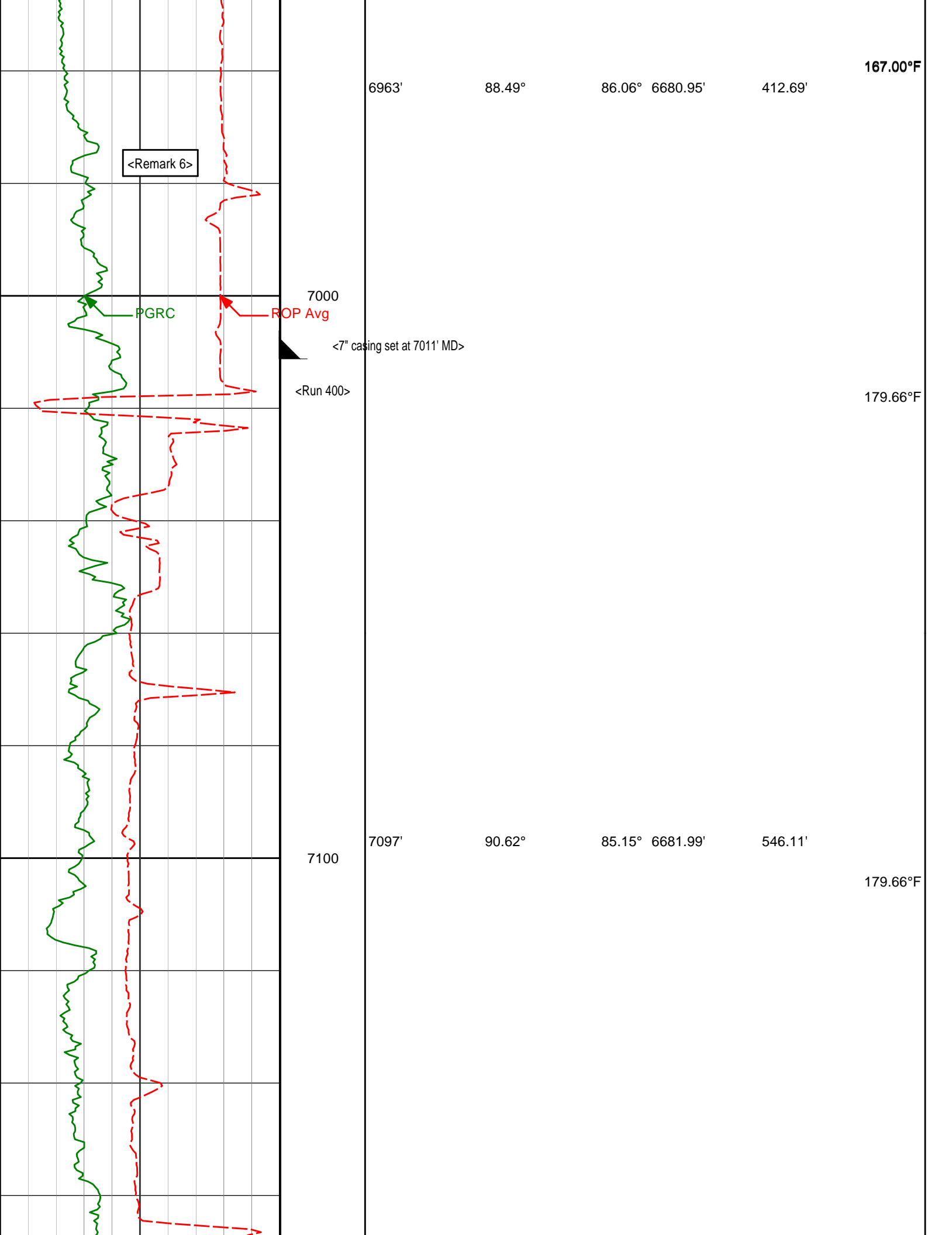
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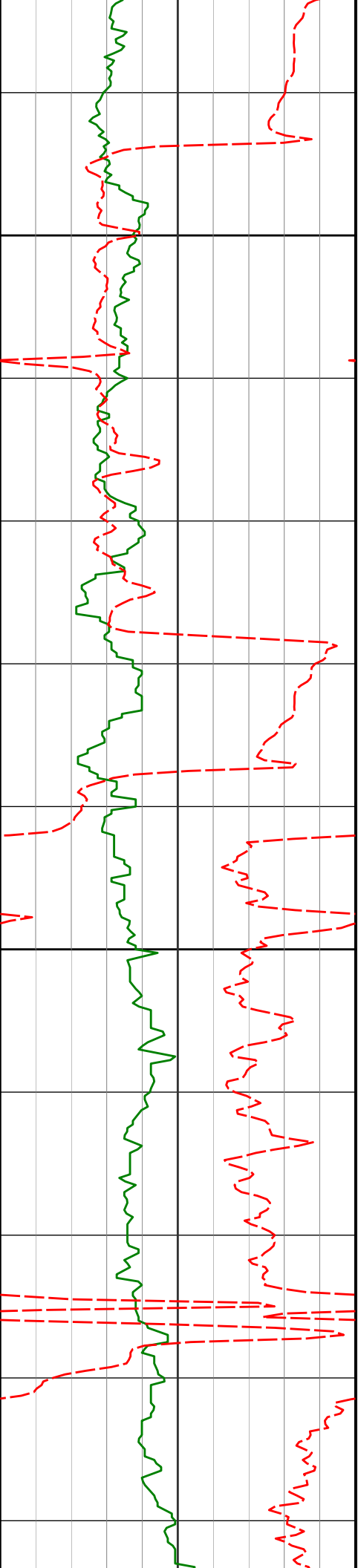
150.13°F

162.78°F

162.78°F

162.78°F





7200

7193'

89.11°

82.79° 6682.22'

641.41'

179.66°F

7300

7288'

87.01°

83.18° 6685.44'

735.45'

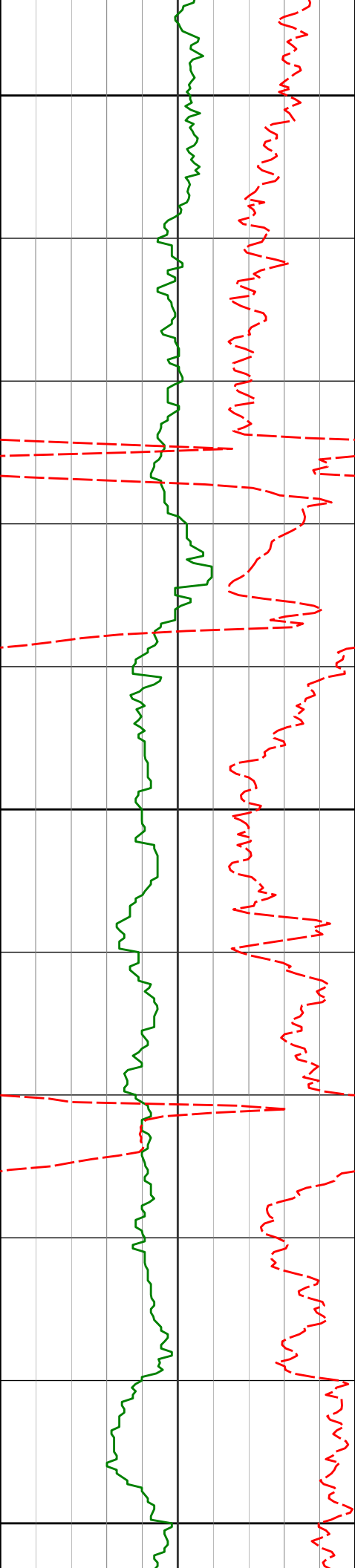
107.94°F

7382'

86.64°

83.69° 6690.64'

828.52'



7400

183.88°F

7500

188.09°F

7600

188.09°F

7477'

88.71°

84.66° 6694.50'

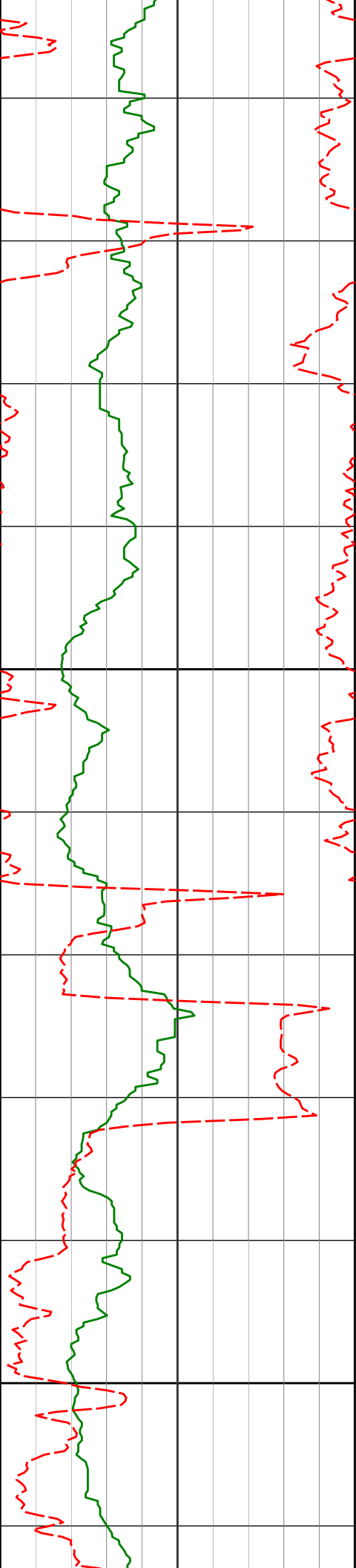
922.78'

7571'

88.68°

84.85° 6696.64'

1016.23'



7700

7800

7666'

7760'

88.00°

89.85°

84.77° 6699.39'

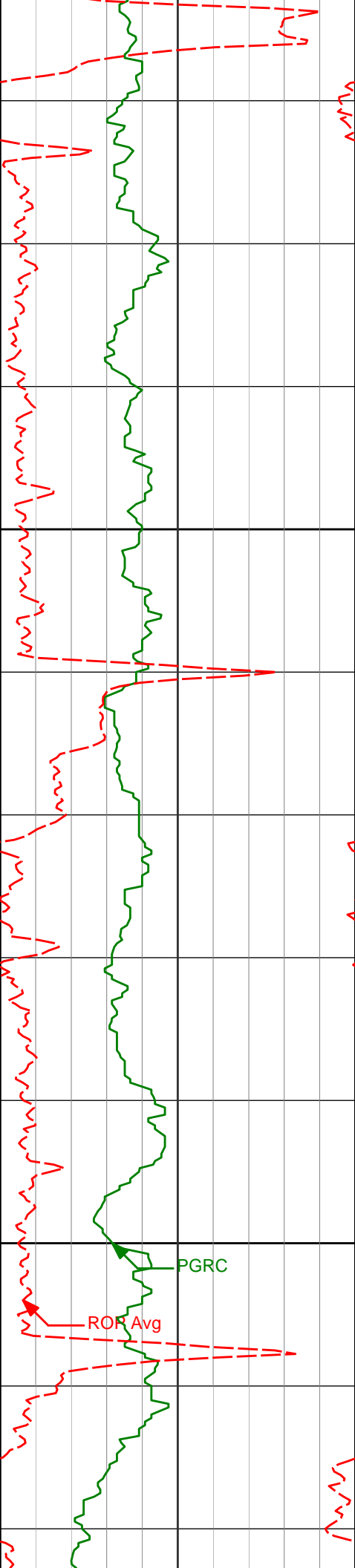
85.26° 6701.15'

1110.65'

1204.14'

192.31°F

192.31°F



7855'

90.77°

85.22° 6700.64'

1298.68'

7900

7951'

90.65°

85.09° 6699.45'

1394.20'

8000

PGRC

ROP Avg

8045'

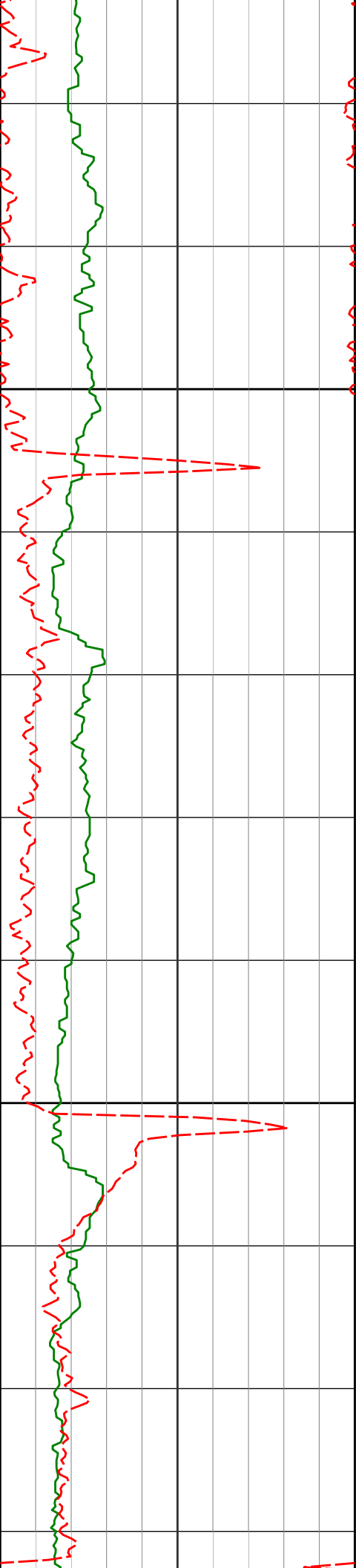
90.62°

85.48° 6698.41'

1487.75'

188.09°F

192.31°F



8100

8140'

90.99°

85.55° 6697.07'

1582.32'

8200

8235'

91.76°

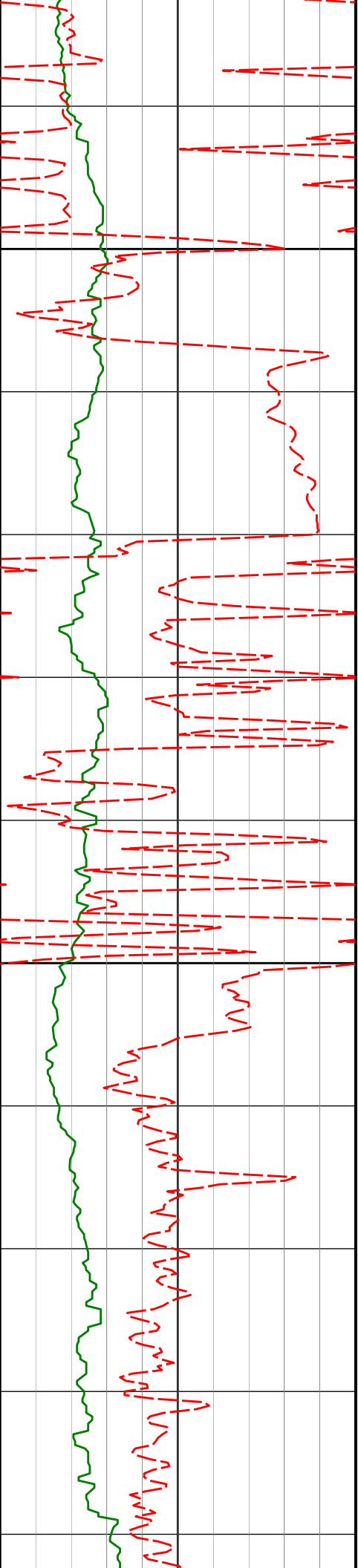
85.95° 6694.79'

1676.91'

196.53°F

196.53°F

200.75°F



8300

8330'

89.69°

85.16° 6693.59'

1771.49'

196.53°F

8400

8425'

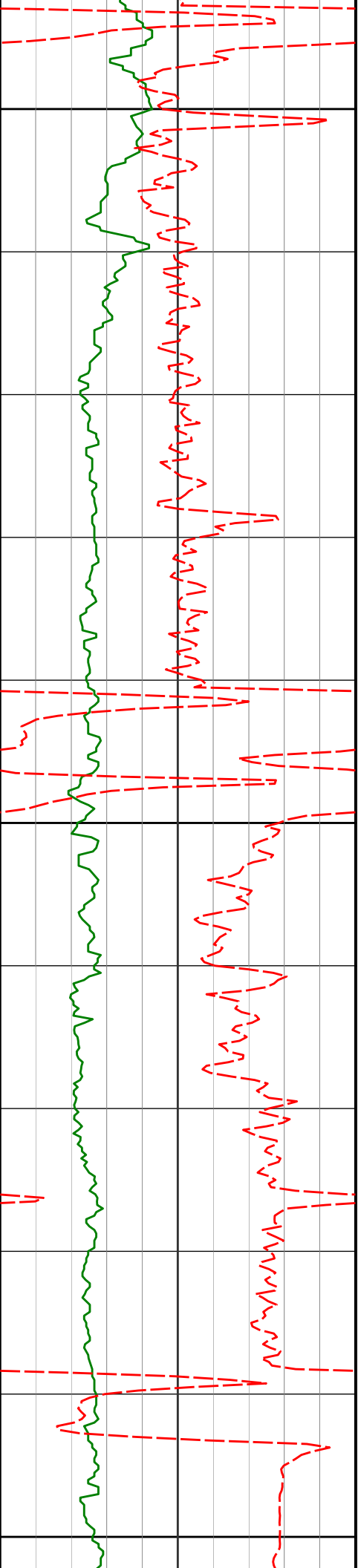
89.82°

85.61° 6694.00'

1866.06'

209.19°F

200.75°F



8500

8520'

90.22°

85.47° 6693.96'

1960.65'

200.75°F

200.75°F

8600

8614'

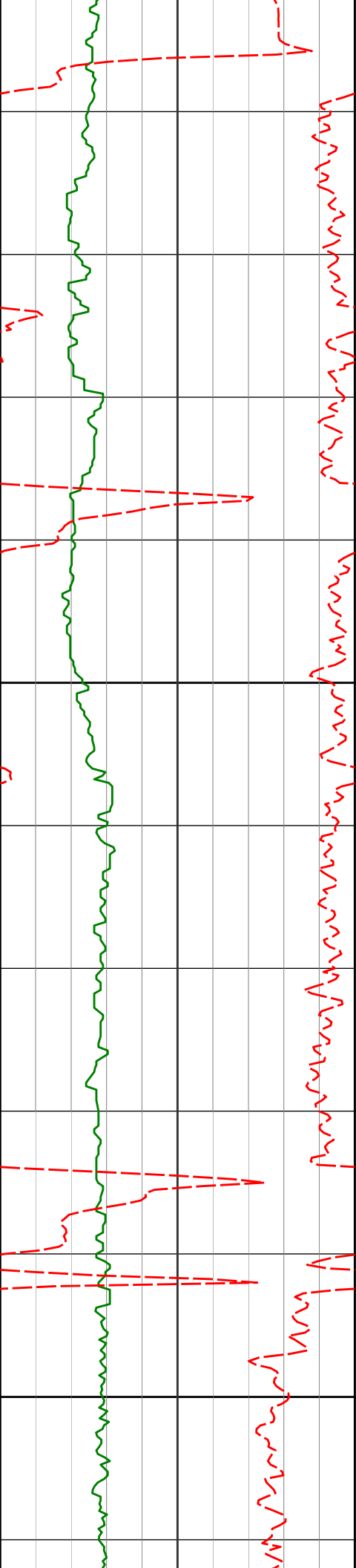
91.57°

85.13° 6692.50'

2054.19'

200.75°F

8700



8800

8900

8709'

8805'

8899'

89.91°

90.00°

91.48°

85.41° 6691.27'

85.27° 6691.34'

86.27° 6690.13'

2148.72'

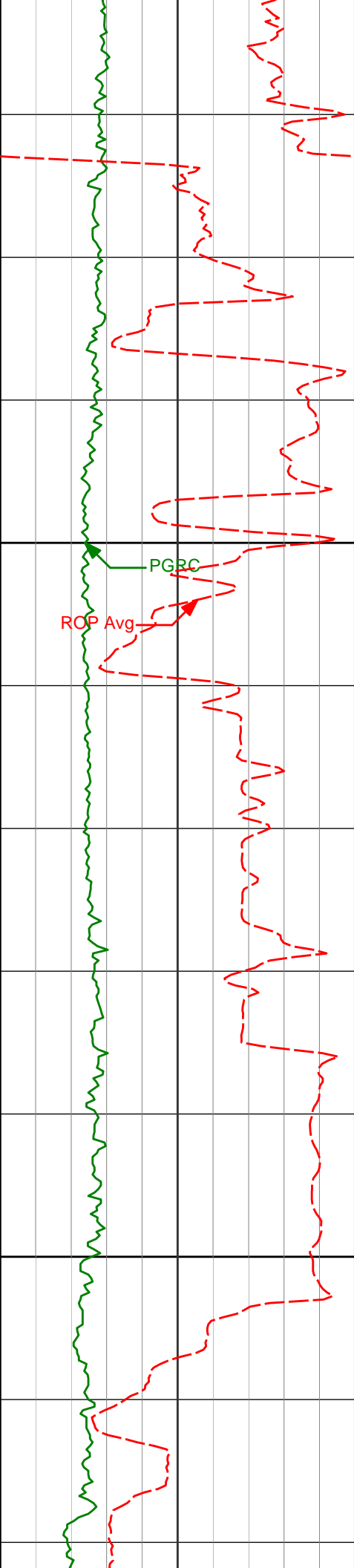
2244.28'

2337.89'

200.75°F

204.97°F

209.19°F



9000

8994'

90.22°

85.65° 6688.72'

2432.53'

209.19°F

9100

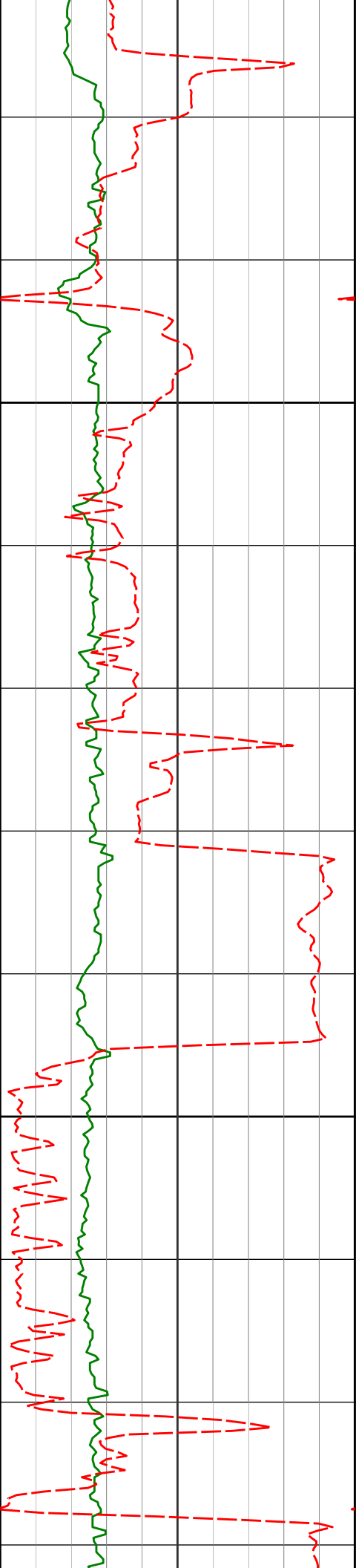
9088'

91.02°

89.46° 6687.70'

2526.35'

200.75°F



9200

9300

9183'

9277'

90.49°

89.97°

89.73° 6686.45'

87.37° 6686.07'

2621.32'

2715.23'

209.19°F



9400

9500

9372'

89.63°

90.27° 6686.41'

2810.16'

9467'

87.97°

90.49° 6688.40'

2905.13'

9561'

87.66°

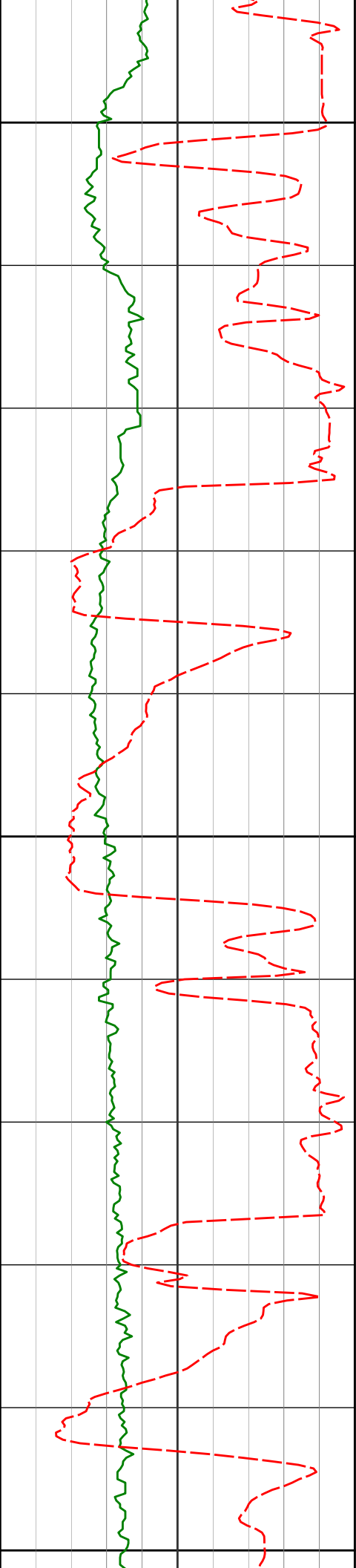
89.90° 6691.98'

2999.06'

204.97°F

209.19°F

209.19°F



9600

9656'

89.08°

90.18° 6694.68'

3094.01'

209.19°F

213.41°F

9700

9750'

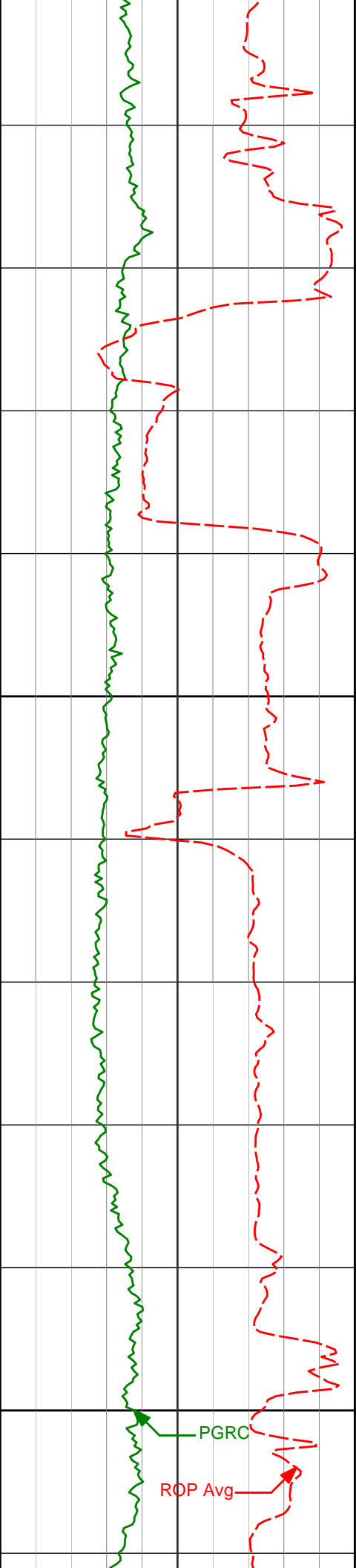
89.78°

90.23° 6695.62'

3188.00'

213.41°F

9800



9900

10000

PGRC

ROP Avg

9845'

90.92°

89.69° 6695.04'

3282.98'

213.41°F

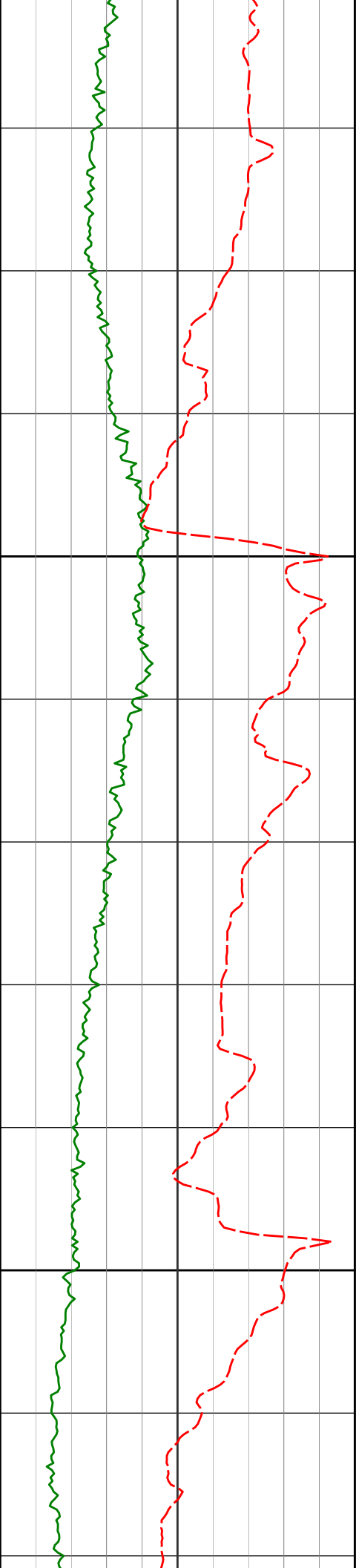
9939'

91.33°

89.23° 6693.19'

3376.93'

217.63°F



10100

10200

10034'

91.51°

89.13°

6690.84'

3471.86'

10128'

91.32°

88.75°

6688.52'

3565.78'

10222'

91.60°

87.45°

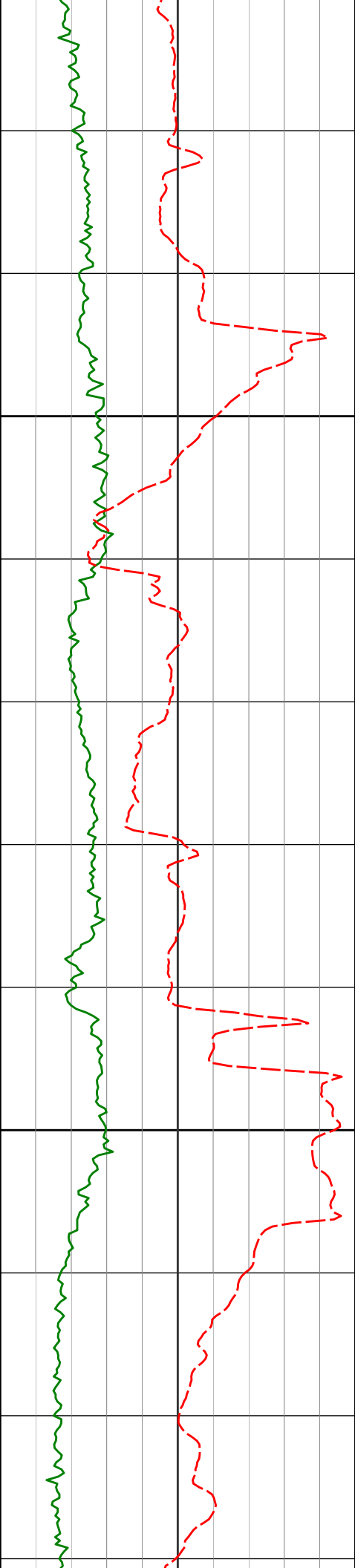
6686.12'

3659.64'

221.84°F

221.84°F

221.84°F



10300

10317'

92.12°

86.88° 6683.04'

3754.39'

221.84°F

10400

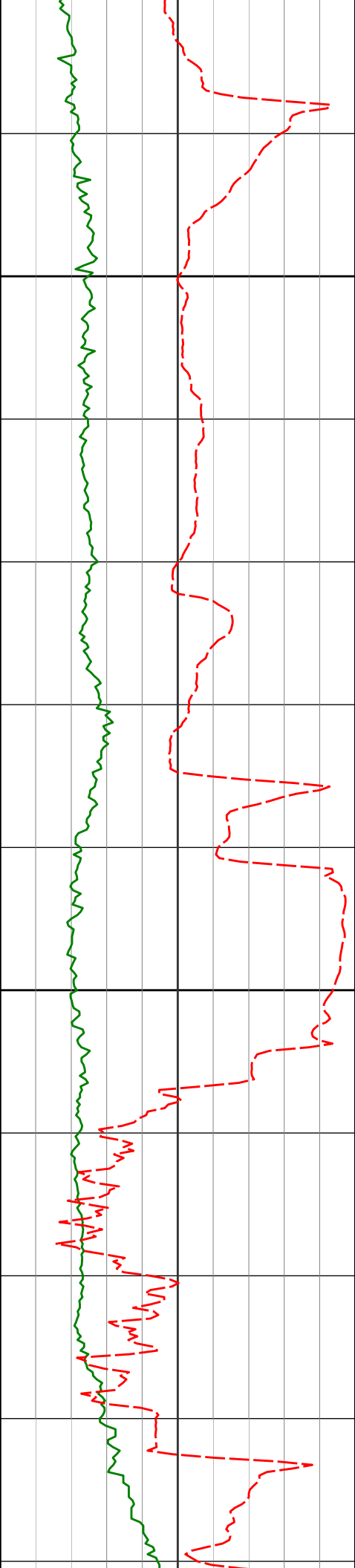
10412'

91.42°

86.31° 6680.10'

3849.08'

221.84°F



10500

10506'

92.68°

85.47° 6676.74'

3942.66'

221.84°F

10600

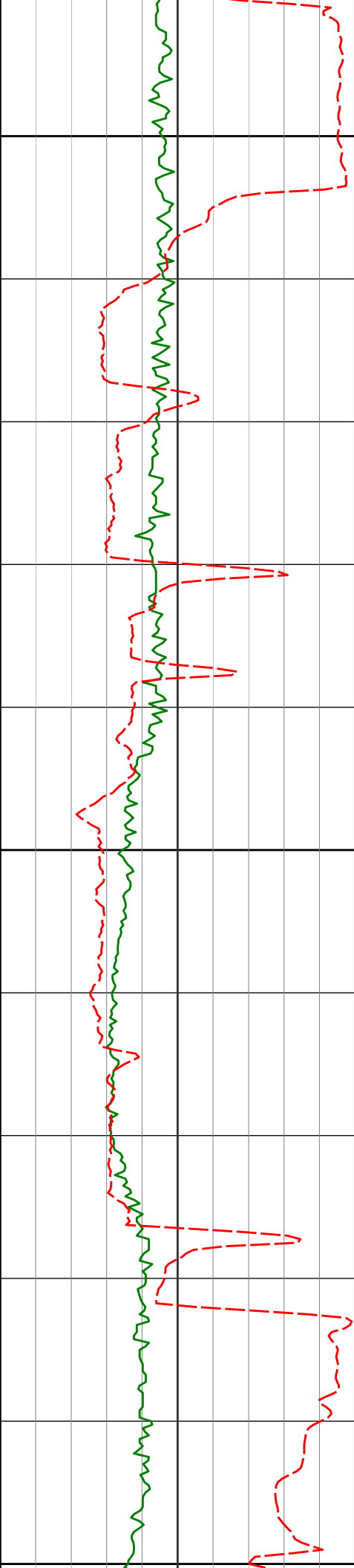
10600'

91.70°

86.72° 6673.15'

4036.26'

217.63°F



10700

10695'

90.58°

86.72° 6671.26'

4130.99'

10800

10789'

90.95°

86.57° 6670.00'

4224.73'

10900

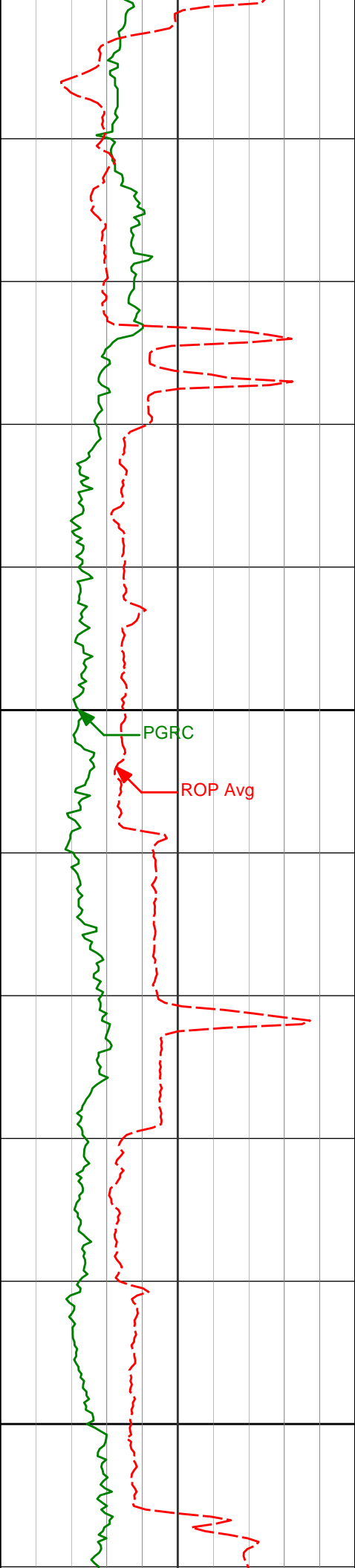
10884'

89.75°

86.67° 6669.42'

4319.47'

221.84°F



10950

11000

11100

10978'

11073'

89.72°

89.88°

87.24° 6669.86'

86.84° 6670.19'

4413.25'

4508.03'

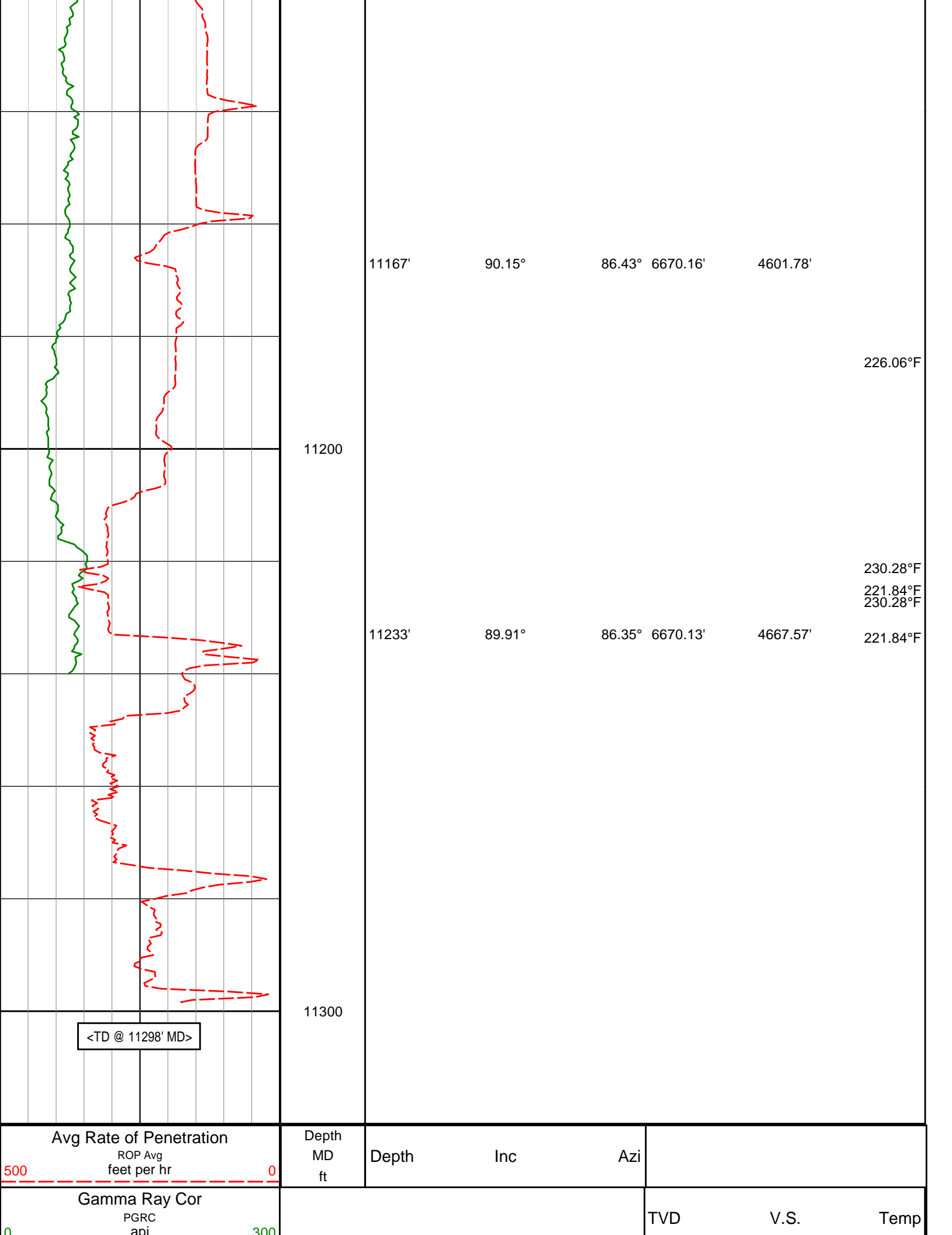
217.63°F

221.84°F

221.84°F

PGRC

ROP Avg



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Aggie State AA17-623
Wattenberg
Weld Colorado
USA
CA-XX-0902102301

<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
366.00	0.10	137.04	366.00	0.23 S	0.22 E	0.22	0.03
613.00	0.60	329.64	613.00	0.72 N	0.29 W	-0.30	0.28
859.00	0.20	282.04	858.99	1.93 N	1.36 W	-1.39	0.20
1082.00	0.11	204.87	1081.99	1.81 N	1.83 W	-1.86	0.09
1358.00	0.18	196.62	1357.99	1.16 N	2.07 W	-2.08	0.03
1451.00	0.47	234.33	1450.99	0.79 N	2.42 W	-2.43	0.37
1543.00	2.69	228.49	1542.95	0.86 S	4.34 W	-4.33	2.42
1636.00	4.78	213.41	1635.75	5.54 S	8.11 W	-8.02	2.46
1730.00	6.60	209.80	1729.28	13.50 S	12.95 W	-12.74	1.97
1919.00	7.06	204.09	1916.94	33.52 S	23.09 W	-22.58	0.43
2013.00	7.92	209.25	2010.14	44.45 S	28.61 W	-27.93	1.16
2108.00	7.28	206.65	2104.30	55.54 S	34.51 W	-33.66	0.76
2202.00	8.80	214.23	2197.38	66.81 S	41.23 W	-40.21	1.97
2297.00	8.09	216.87	2291.35	78.16 S	49.33 W	-48.13	0.85
2391.00	7.60	216.90	2384.47	88.43 S	57.03 W	-55.68	0.52
2485.00	9.38	211.42	2477.44	99.94 S	64.75 W	-63.23	2.08
2581.00	8.95	208.27	2572.21	113.19 S	72.37 W	-70.64	0.69
2675.00	8.85	208.43	2665.08	125.99 S	79.27 W	-77.35	0.11
2770.00	9.10	208.27	2758.92	139.03 S	86.31 W	-84.19	0.26
2865.00	9.32	210.16	2852.69	152.30 S	93.73 W	-91.41	0.39
2959.00	7.77	197.86	2945.65	164.93 S	99.51 W	-96.99	2.54
3053.00	6.76	181.37	3038.91	176.51 S	101.59 W	-98.90	2.45
3148.00	5.45	180.01	3133.37	186.61 S	101.72 W	-98.88	1.39
3243.00	3.69	169.89	3228.06	194.13 S	101.19 W	-98.23	2.03
3337.00	2.71	132.24	3321.92	198.60 S	99.01 W	-95.98	2.41
3432.00	2.12	75.86	3416.85	199.69 S	95.64 W	-92.60	2.46
3526.00	1.02	359.32	3510.82	198.42 S	93.97 W	-90.94	2.26
3621.00	1.02	353.52	3605.81	196.74 S	94.07 W	-91.08	0.11
3716.00	0.97	348.53	3700.79	195.11 S	94.33 W	-91.36	0.11
3810.00	1.21	340.19	3794.78	193.40 S	94.82 W	-91.88	0.31
3905.00	1.23	333.69	3889.76	191.54 S	95.61 W	-92.70	0.15
3999.00	1.40	336.21	3983.73	189.58 S	96.53 W	-93.64	0.19
4093.00	1.18	338.35	4077.71	187.63 S	97.35 W	-94.49	0.24
4187.00	0.94	337.14	4171.69	186.02 S	98.00 W	-95.17	0.26
4282.00	1.03	343.74	4266.68	184.49 S	98.54 W	-95.73	0.15
4376.00	1.09	349.40	4360.66	182.80 S	98.95 W	-96.16	0.13
4470.00	1.10	0.70	4454.64	181.01 S	99.10 W	-96.34	0.23
4564.00	0.96	268.25	4548.63	180.14 S	99.87 W	-97.13	1.59
4658.00	1.17	271.89	4642.62	180.13 S	101.62 W	-98.87	0.23
4753.00	1.05	275.84	4737.60	180.01 S	103.46 W	-100.71	0.15
5037.00	0.82	285.16	5021.56	179.21 S	108.01 W	-105.27	0.10
5131.00	1.52	188.23	5115.55	180.27 S	108.83 W	-106.08	1.93
5319.00	1.56	167.90	5303.48	185.24 S	108.65 W	-105.83	0.29
5509.00	1.07	171.71	5493.43	189.52 S	107.86 W	-104.97	0.26
5698.00	0.84	166.69	5682.40	192.62 S	107.28 W	-104.35	0.13
5793.00	0.42	145.14	5777.40	193.58 S	106.92 W	-103.97	0.50
5929.00	0.24	280.98	5913.40	193.94 S	106.92 W	-103.96	0.45
6077.00	7.62	106.26	6060.97	196.63 S	97.79 W	-94.79	5.31
6172.00	13.54	111.70	6154.32	202.51 S	81.39 W	-78.31	6.31
6267.00	18.72	116.76	6245.55	213.49 S	57.43 W	-54.18	5.64
6361.00	24.12	119.27	6333.03	229.69 S	27.19 W	-23.69	5.83
6456.00	30.94	119.58	6417.22	251.26 S	11.03 E	14.84	7.18

6504.00	35.07	115.58	6457.47	263.31 S	34.21 E	38.21	9.72
6550.00	38.47	110.66	6494.32	274.07 S	59.53 E	63.69	9.77
6598.00	42.15	103.32	6530.94	283.06 S	89.20 E	93.49	12.51
6645.00	46.27	102.02	6564.62	290.23 S	121.17 E	125.57	8.98
6739.00	58.95	93.10	6621.66	299.53 S	194.99 E	199.52	15.43
6834.00	73.04	87.31	6660.24	299.60 S	281.51 E	286.03	15.83
6890.00	79.68	87.83	6673.44	297.30 S	335.85 E	340.33	11.89
6963.00	88.49	86.06	6680.95	293.42 S	408.28 E	412.69	12.31
7097.00	90.62	85.15	6681.99	283.16 S	541.88 E	546.11	1.73
7193.00	89.11	82.79	6682.22	273.07 S	637.34 E	641.41	2.92
7288.00	87.01	83.18	6685.44	261.48 S	731.56 E	735.45	2.25
7382.00	86.64	83.69	6690.64	250.75 S	824.80 E	828.52	0.67
7477.00	88.71	84.66	6694.50	241.11 S	919.23 E	922.78	2.41
7571.00	88.68	84.85	6696.64	232.52 S	1012.81 E	1016.23	0.20
7666.00	88.00	84.77	6699.39	223.93 S	1107.38 E	1110.65	0.72
7760.00	89.85	85.26	6701.15	215.77 S	1201.01 E	1204.14	2.04
7855.00	90.77	85.22	6700.64	207.88 S	1295.68 E	1298.68	0.97
7951.00	90.65	85.09	6699.45	199.78 S	1391.33 E	1394.20	0.18
8045.00	90.62	85.48	6698.41	192.05 S	1485.00 E	1487.75	0.42
8140.00	90.99	85.55	6697.07	184.62 S	1579.70 E	1582.32	0.40
8235.00	91.76	85.95	6694.79	177.58 S	1674.41 E	1676.91	0.91
8330.00	89.69	85.16	6693.59	170.22 S	1769.11 E	1771.49	2.33
8425.00	89.82	85.61	6694.00	162.58 S	1863.80 E	1866.06	0.49
8520.00	90.22	85.47	6693.96	155.19 S	1958.52 E	1960.65	0.45
8614.00	91.57	85.13	6692.50	147.49 S	2052.19 E	2054.19	1.48
8709.00	89.91	85.41	6691.27	139.66 S	2146.85 E	2148.72	1.77
8805.00	90.00	85.27	6691.34	131.86 S	2242.53 E	2244.28	0.17
8899.00	91.48	86.27	6690.13	124.92 S	2336.27 E	2337.89	1.90
8994.00	90.22	85.65	6688.72	118.23 S	2431.02 E	2432.53	1.48
9088.00	91.02	89.46	6687.70	114.22 S	2524.91 E	2526.35	4.14
9183.00	90.49	89.73	6686.45	113.55 S	2619.90 E	2621.32	0.63
9277.00	89.97	87.37	6686.07	111.17 S	2713.86 E	2715.23	2.57
9372.00	89.63	90.27	6686.41	109.22 S	2808.83 E	2810.16	3.07
9467.00	87.97	90.49	6688.40	109.85 S	2903.80 E	2905.13	1.76
9561.00	87.66	89.90	6691.98	110.17 S	2997.73 E	2999.06	0.71
9656.00	89.08	90.18	6694.68	110.23 S	3092.69 E	3094.01	1.52
9750.00	89.78	90.23	6695.62	110.57 S	3186.69 E	3188.00	0.75
9845.00	90.92	89.69	6695.04	110.50 S	3281.68 E	3282.98	1.33
9939.00	91.33	89.23	6693.19	109.62 S	3375.66 E	3376.93	0.66
10034.00	91.51	89.13	6690.84	108.26 S	3470.62 E	3471.86	0.22
10128.00	91.32	88.75	6688.52	106.52 S	3564.57 E	3565.78	0.45
10222.00	91.60	87.45	6686.12	103.40 S	3658.49 E	3659.64	1.41
10317.00	92.12	86.88	6683.04	98.71 S	3753.32 E	3754.39	0.81
10412.00	91.42	86.31	6680.10	93.07 S	3848.11 E	3849.08	0.95
10506.00	92.68	85.47	6676.74	86.34 S	3941.81 E	3942.66	1.61
10600.00	91.70	86.72	6673.15	79.94 S	4035.52 E	4036.26	1.69
10695.00	90.58	86.72	6671.26	74.50 S	4130.34 E	4130.99	1.18
10789.00	90.95	86.57	6670.00	69.00 S	4224.17 E	4224.73	0.42
10884.00	89.75	86.67	6669.42	63.40 S	4319.00 E	4319.47	1.27
10978.00	89.72	87.24	6669.86	58.41 S	4412.87 E	4413.25	0.61
11073.00	89.88	86.84	6670.19	53.50 S	4507.74 E	4508.03	0.45
11167.00	90.15	86.43	6670.16	47.99 S	4601.58 E	4601.78	0.52
11233.00	89.91	86.35	6670.13	43.83 S	4667.45 E	4667.57	0.38
11298.00	89.91	86.35	6670.23	39.69 S	4732.31 E	4732.37	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 90.87 DEGREES (GRID)
A TOTAL CORRECTION OF 7.44 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11298.00 FEET
IS 4732.48 FEET ALONG 90.48 DEGREES (GRID)**

Surface surveys at 366 ft, 613 ft and 859 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 11233 ft MD to TD at 11298 ft MD

