



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	25-Jan-15	27-Jan-15	28-Jan-15		
Rig Bit Number	1	2	3		
Bit Size (in)	13.500	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750	6.750		
Log Start Depth (MD, ft)	90.00	2,258.00	6,562.00		
Log End Depth (MD, ft)	2,258.00	6,562.00	7,000.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	25-Jan-15 01:15	26-Jan-15 17:15	28-Jan-15 01:45		
Drill/Wipe End Date and Time	25-Jan-15 10:45	27-Jan-15 15:30	28-Jan-15 06:45		
Min Inc (deg) @ Depth (MD, ft)	0.16 @ 518.00	0.22 @ 2,502.00	30.02 @ 6,644.00		
Max Inc (deg) @ Depth (MD, ft)	1.00 @ 1,439.00	19.20 @ 6,549.00	84.01 @ 6,928.00		
Bit TFA(in2) / Bit Type	0.90 / PDC	1.21 / PDC	1.24 / PDC		
Flow Rate (gpm)	621.04	576.95	514.29		
Max AV (fpm) / CV (fpm) @ MWD	100.0 / 150.0	350.3 / 400.0	342.4 / 400.0		
Fluid Type	Native/Spud Mud	Diesel Mud Base	Diesel Mud Base		
Density (ppg) / Viscosity (spqt)	8.50 / 27.00	10.00 / 73.00	10.00 / 86.00		
Filtrate CL (ppm)	600.00	67,500.00	69,000.00		
pH / Fluid Loss (mptm)	8.70 / 92	N/A / -15	N/A / -30		
PV (cP) / YP (lbf2)	2 / 3.00	25 / 26.00	24 / 30.00		
% Solids / % Sand	1.20 / 0.25	8.00 / N/A	9.40 / 0		
% Oil / Oil:Water Ratio	N/A / N/A	52 / 58:42	53 / 61:39		
Rm @ Measured Temp (degF)	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		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Max Tool Temp (degF) @ Depth (MD, ft)	22.54 / 518.00	122.22 / 2,502.00	122.22 / 6,644.00		

Max Tool Temp (degF) / Source	98.51 / PCM	163.20 / PCM	163.20 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Brad West	Brad West	Brad West		
Customer Representative	Seth Mulherin	Seth Mulherin	Seth Mulherin		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	246473	246473	246473		
Insert Serial Number	11400880	11680783	11680783		
Date and Time Initialized	24-Jan-15 14:12	25-Jan-15 19:47	01-Jan-70 00:00		
Date and Time Read	25-Jan-15 15:41	28-Jan-15 16:39	28-Jan-15 16:46		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58.00	56.00	51.00		
Software Version	6.33	6.33	6.33		
Sub Serial Number	246473	246473	246473		
Sonde Serial Number	10993517	10835193	10835193		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	350.00	43.90	85.30		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	51.19	49.33	44.73		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	246473	246473	246473		
Insert/Sonde Serial Number	11293261	11579845	11579845		

REMARKS

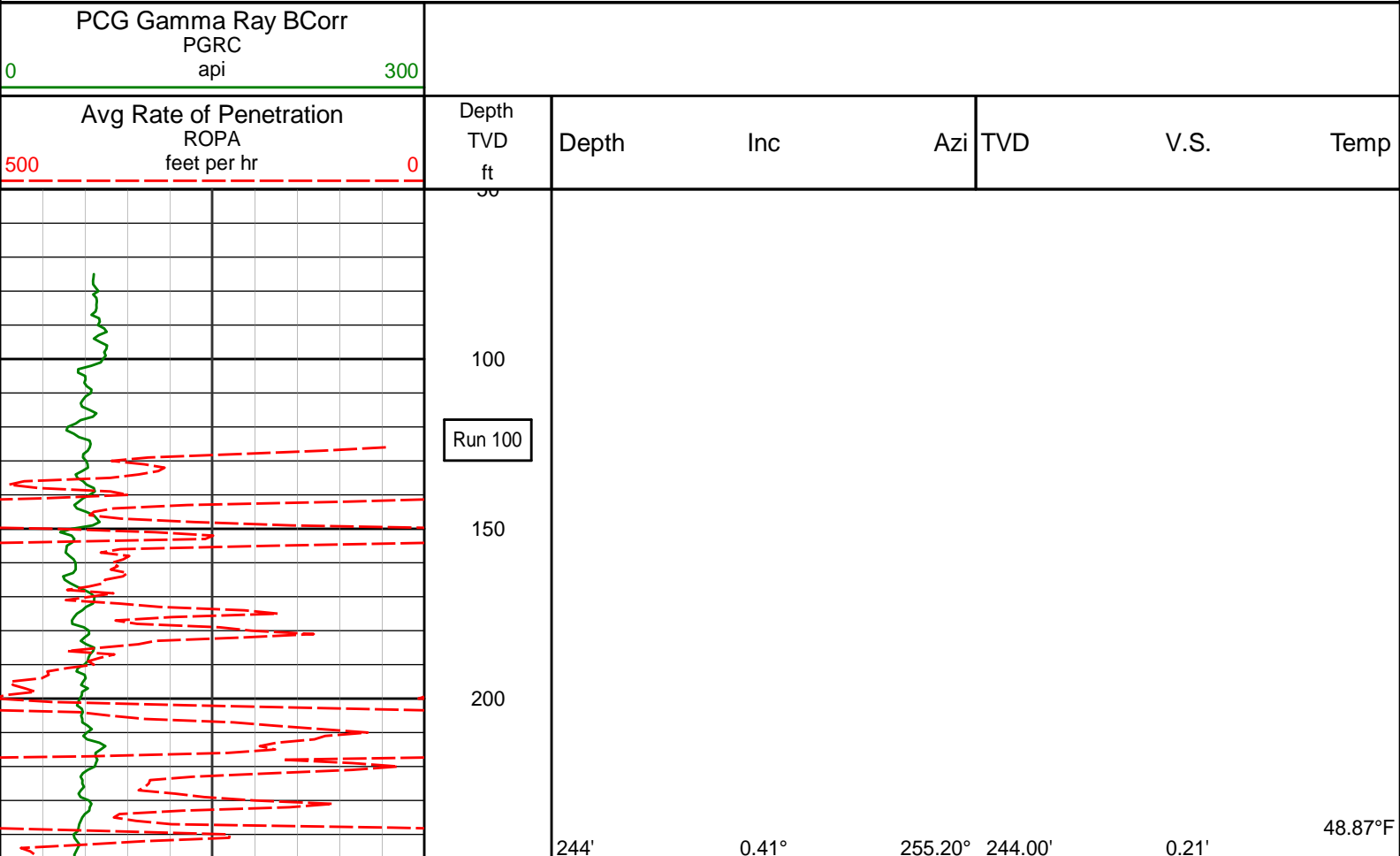
1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
1: 600
PGRC (Corrected Gamma Ray):
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
Gap Fill: 5.0 ft
ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
Gap Fill: 5.0 ft
1: 240
PGRC (Corrected Gamma Ray):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

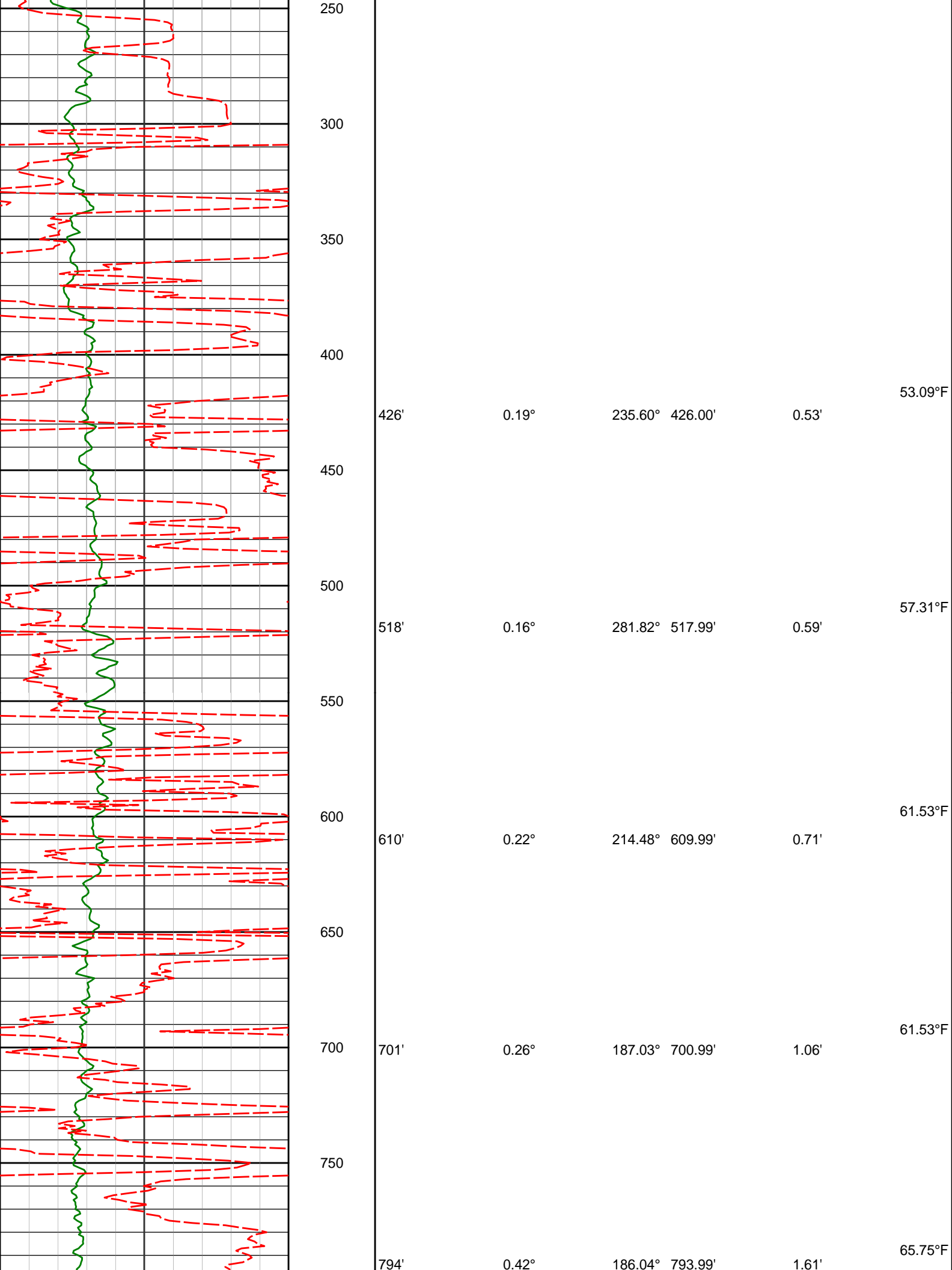
Gap Fill: 3.0 ft
ROPA (Average Rate of Penetration)
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft
6. INSITE version 8.1.1

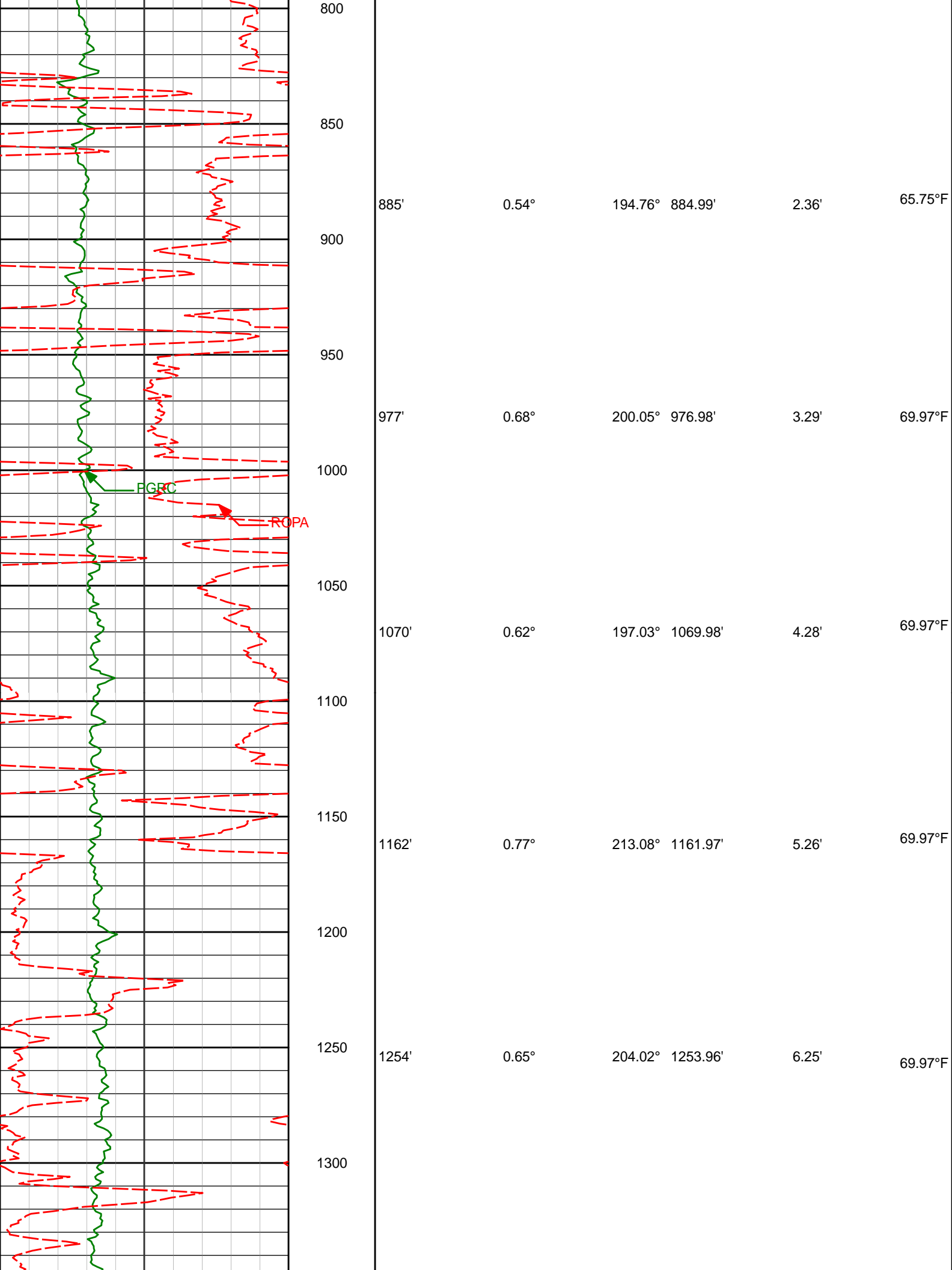
WARRANTY

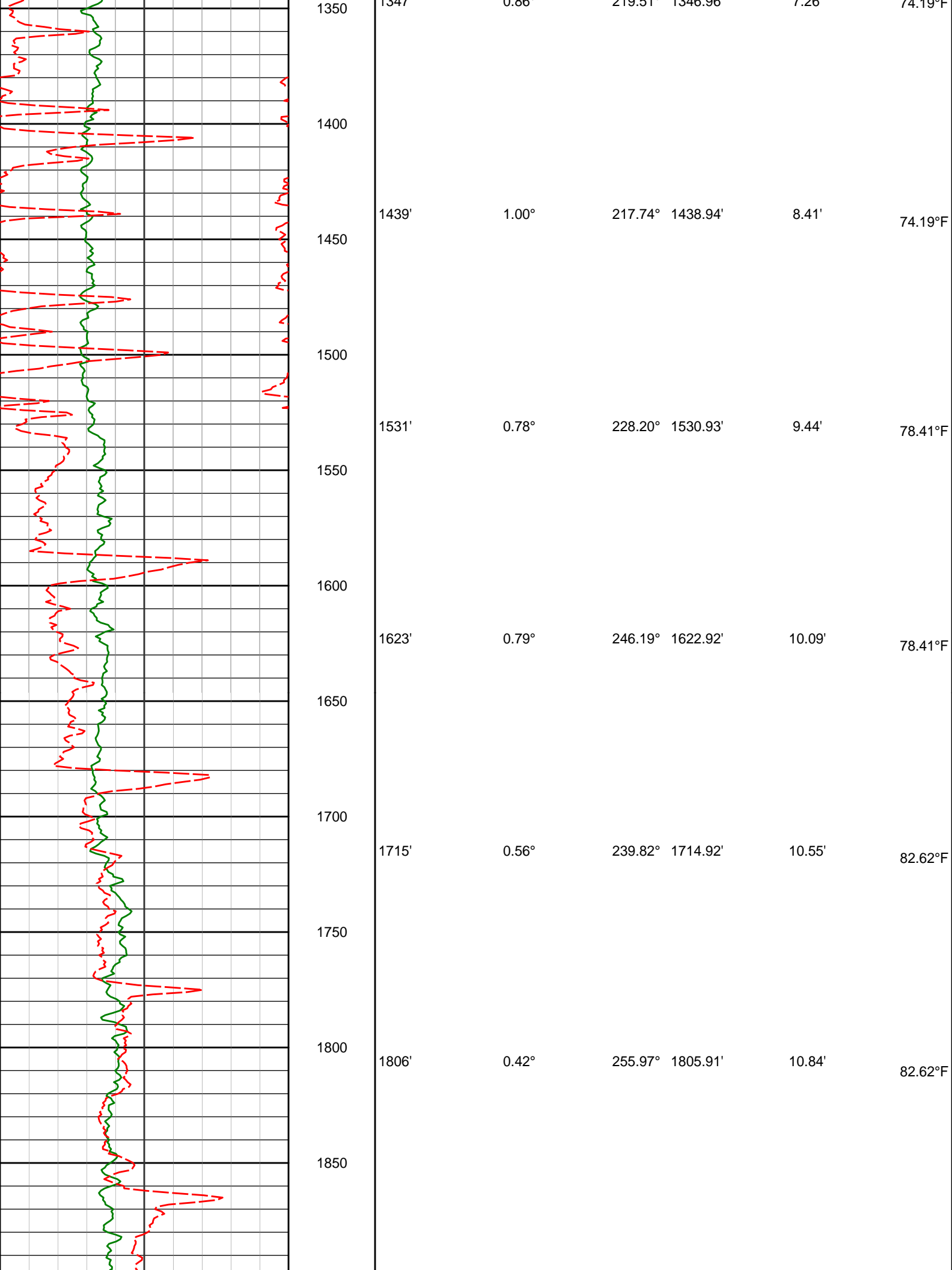
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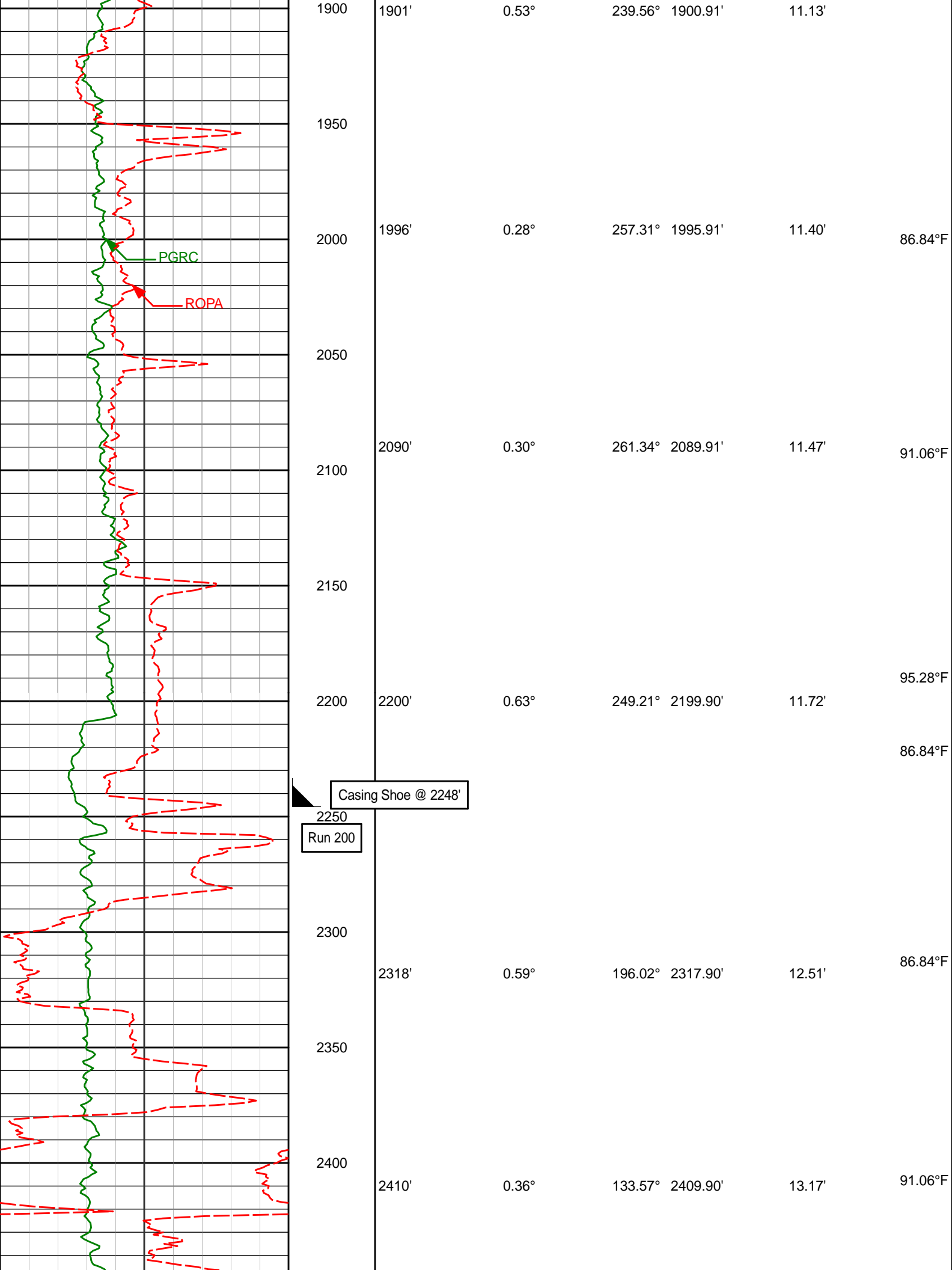
TVD Detail 1:600 Scale

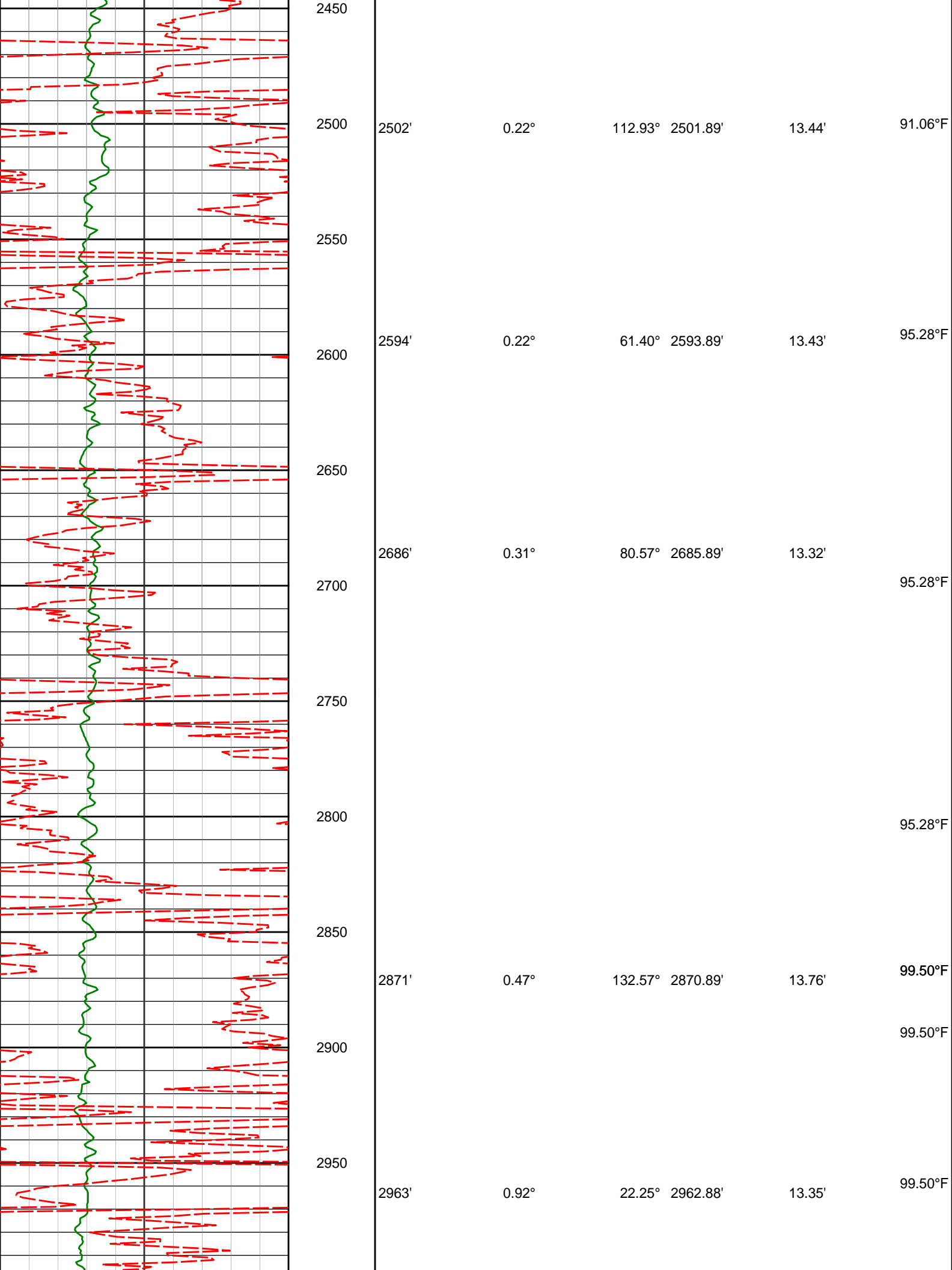


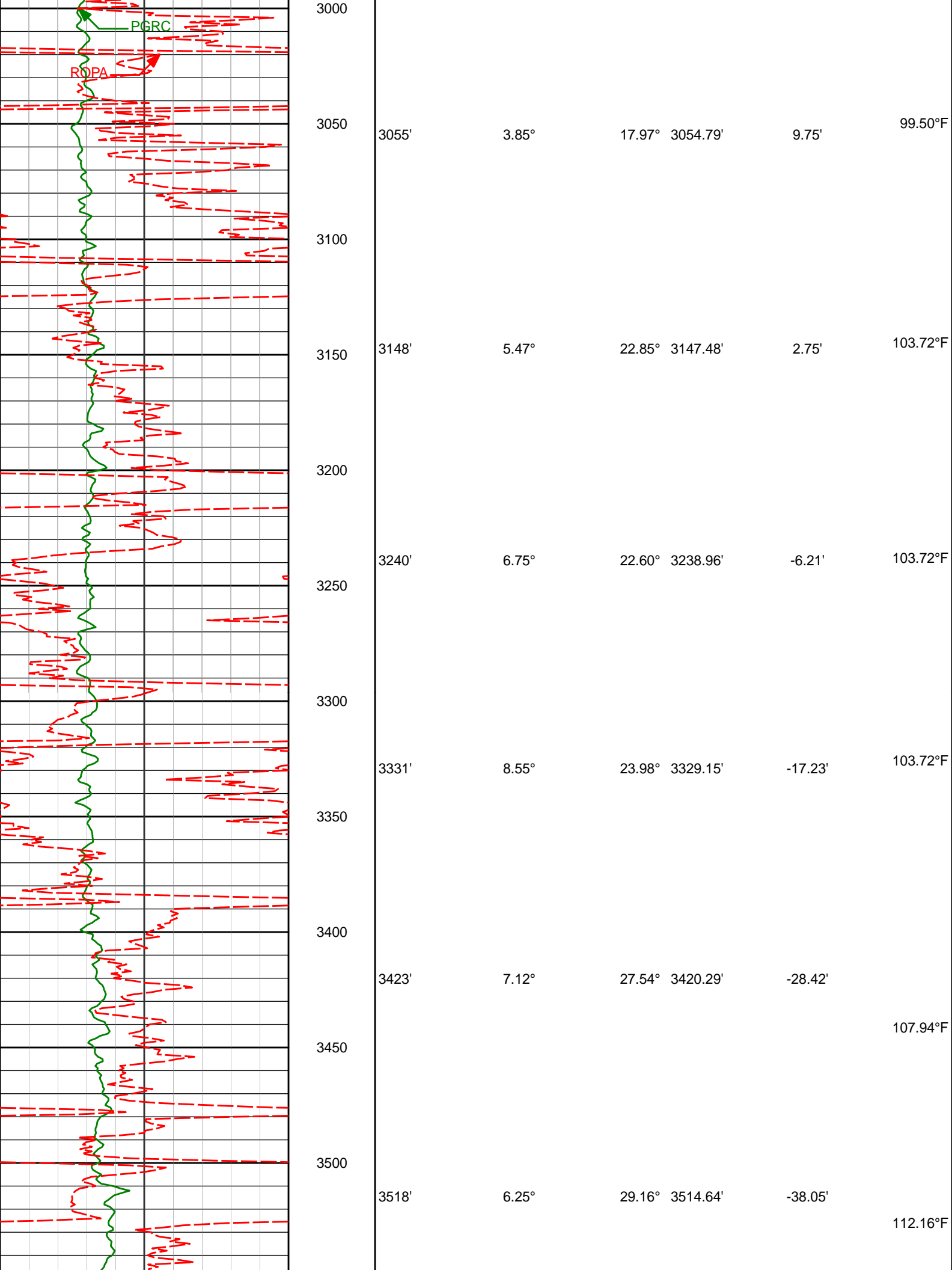


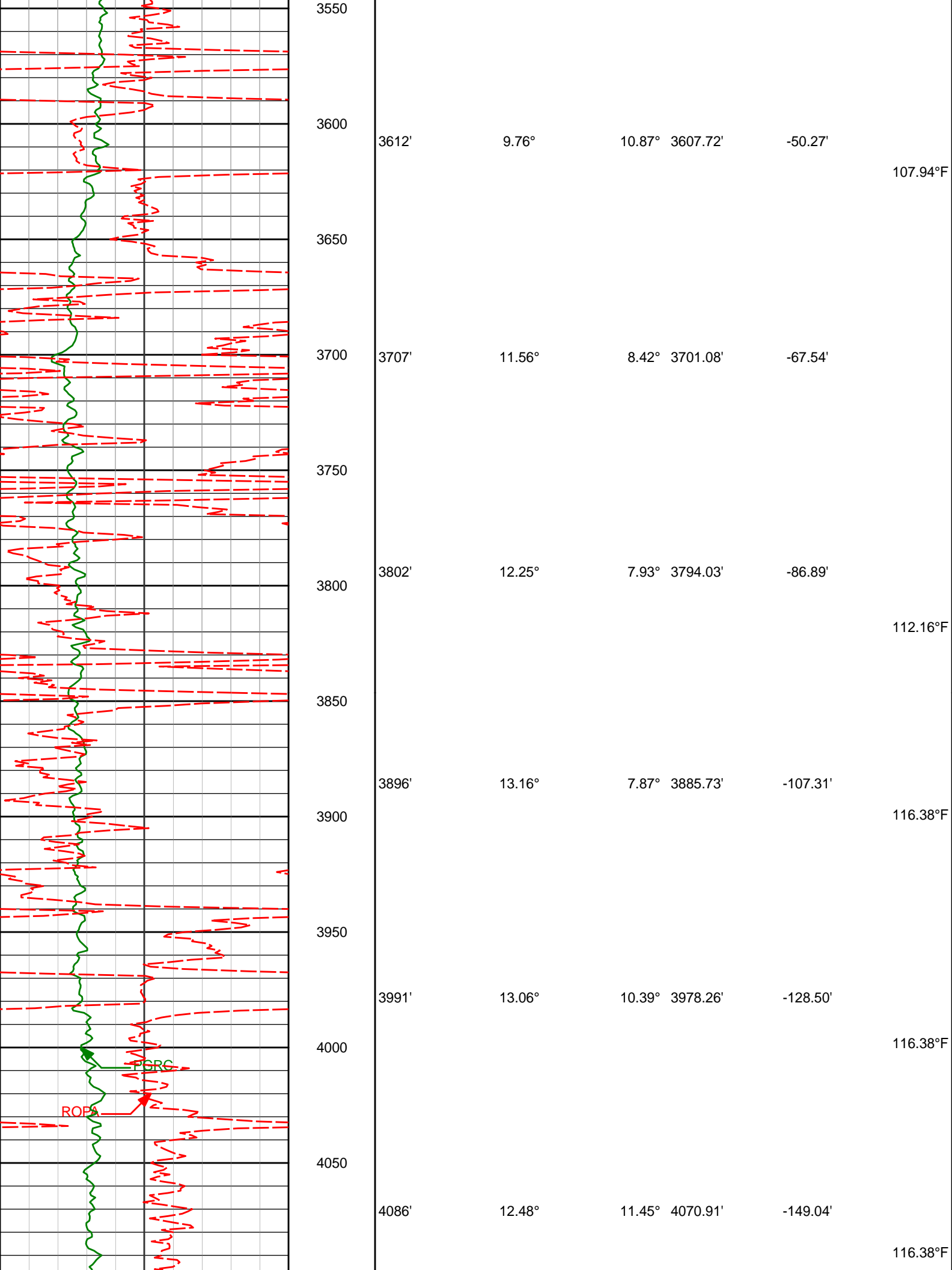


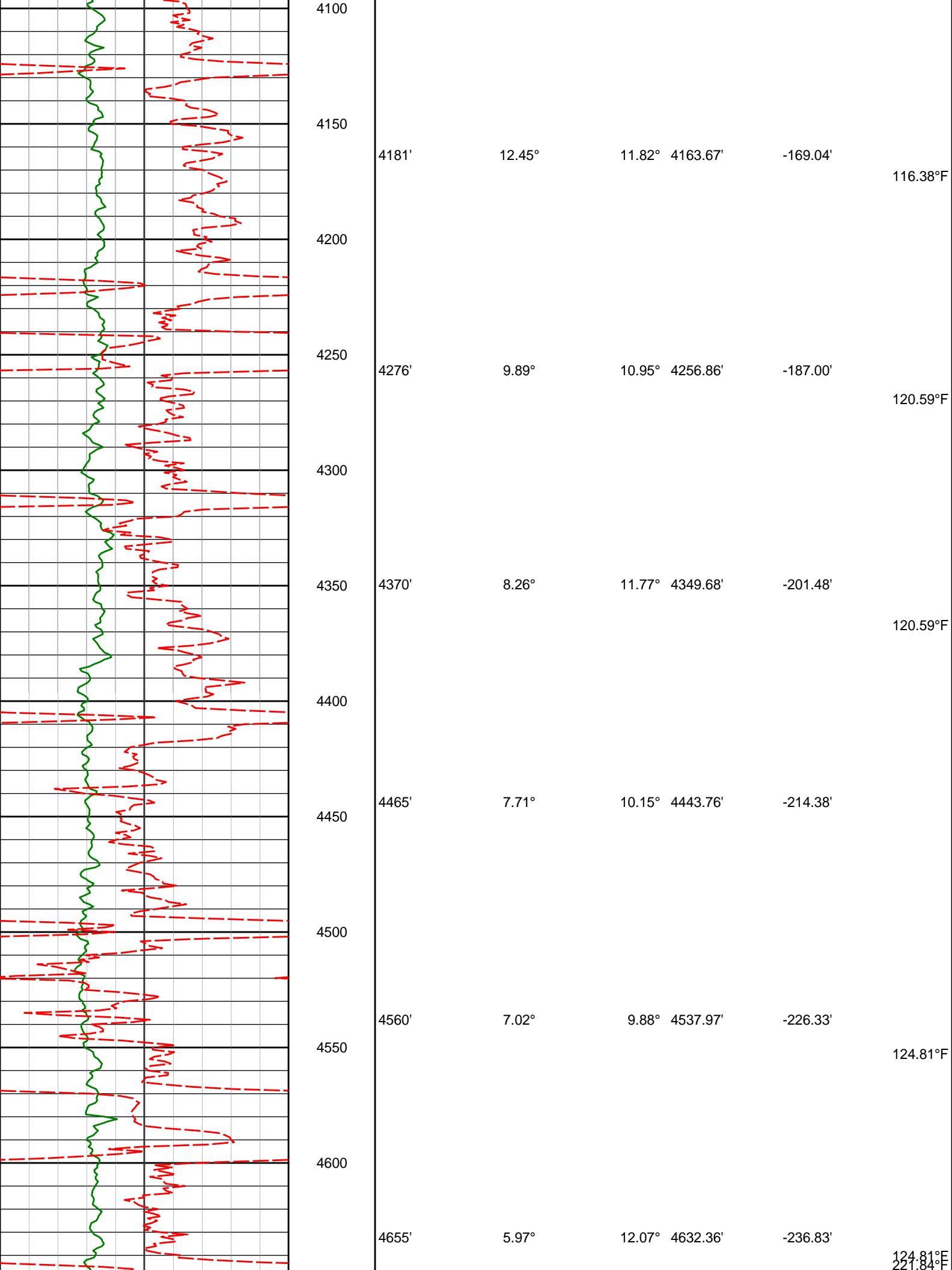


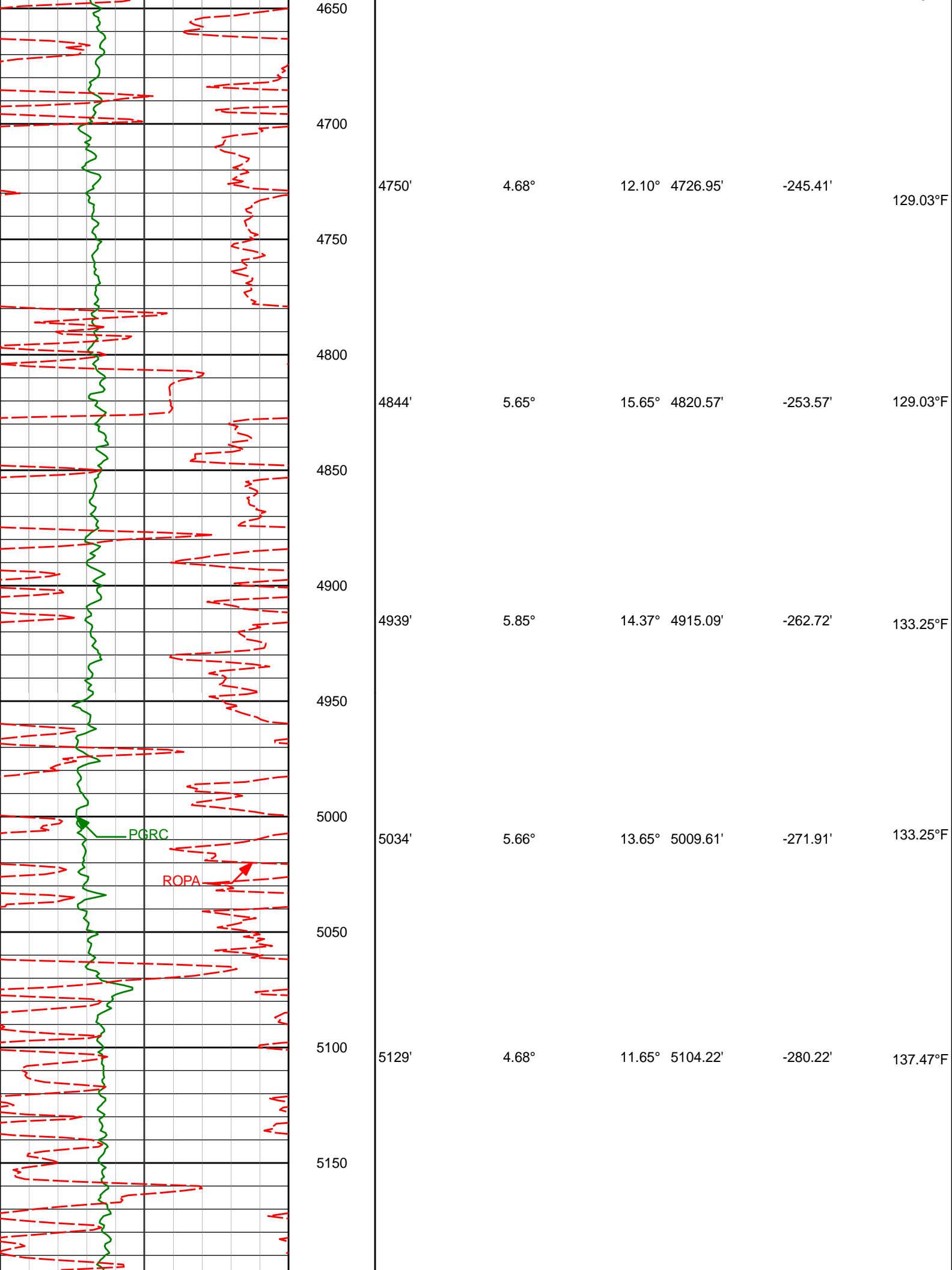


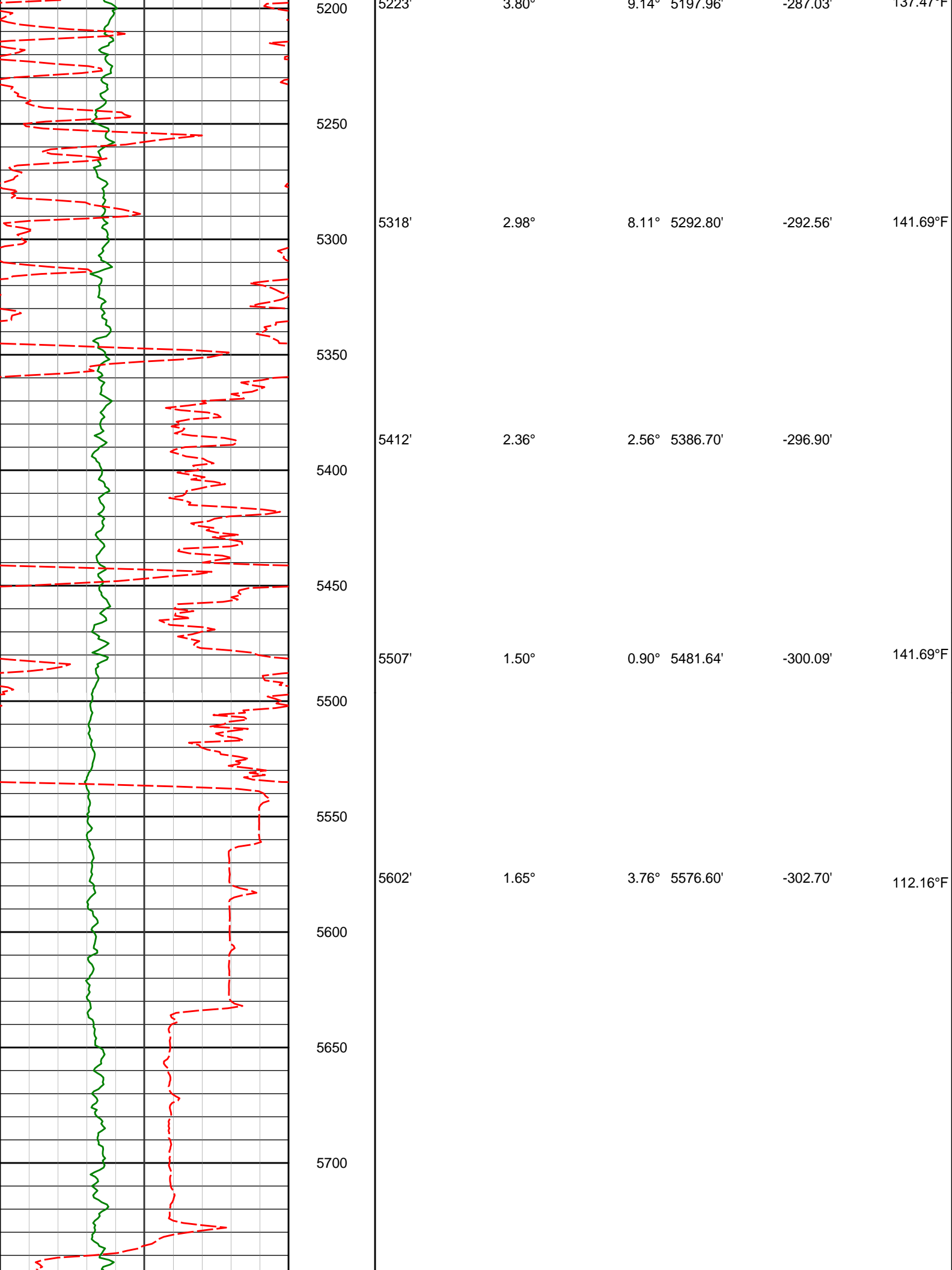


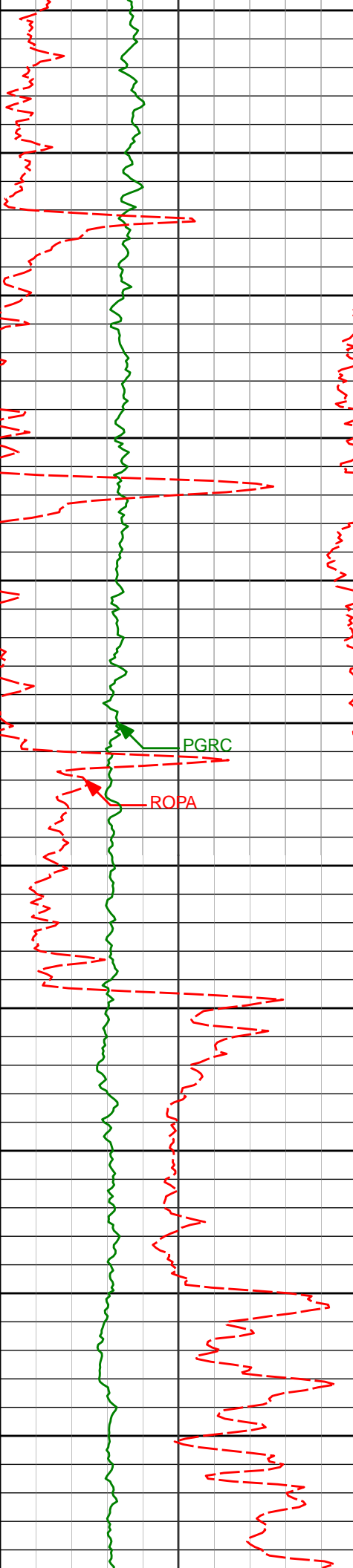






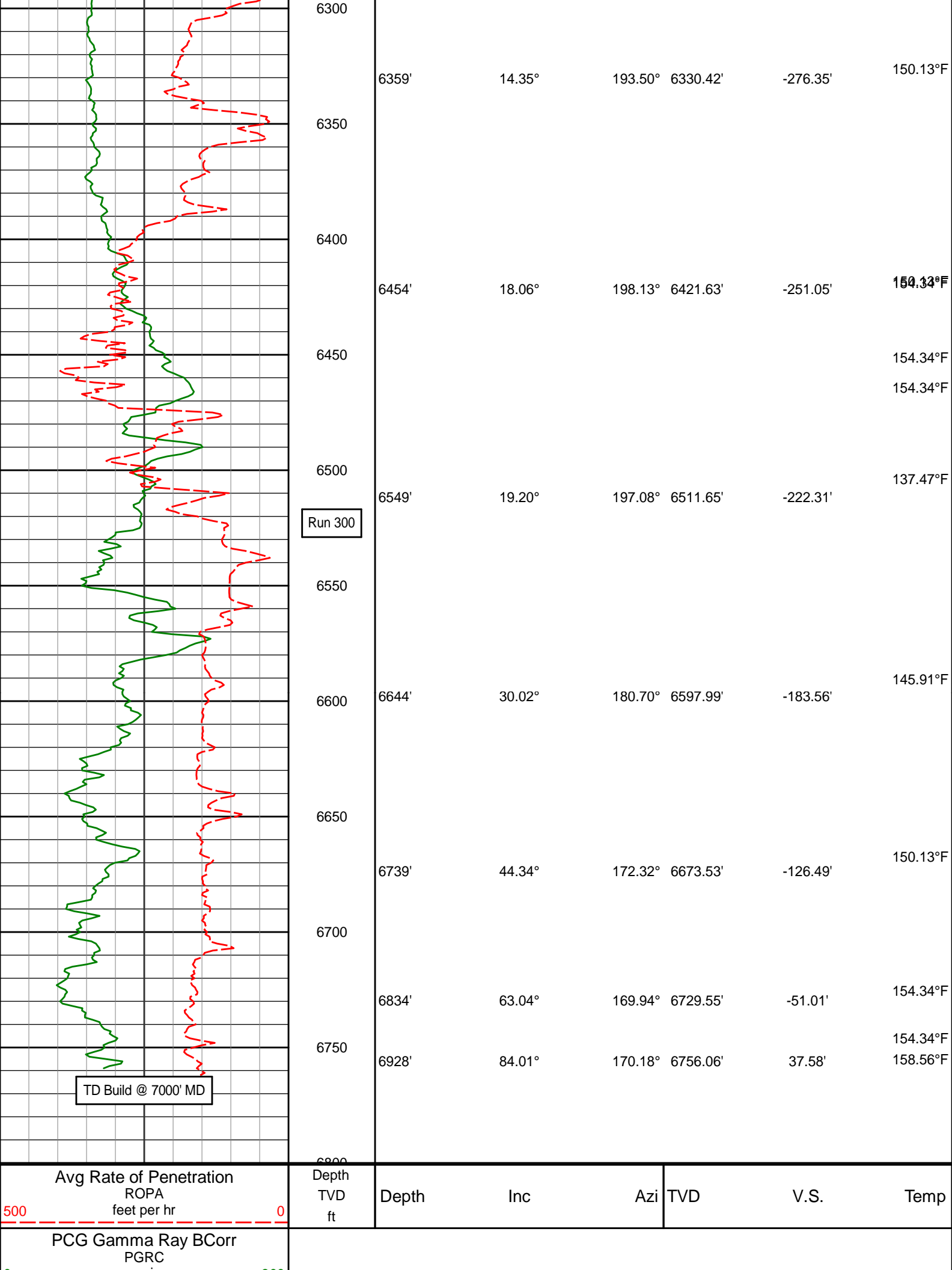




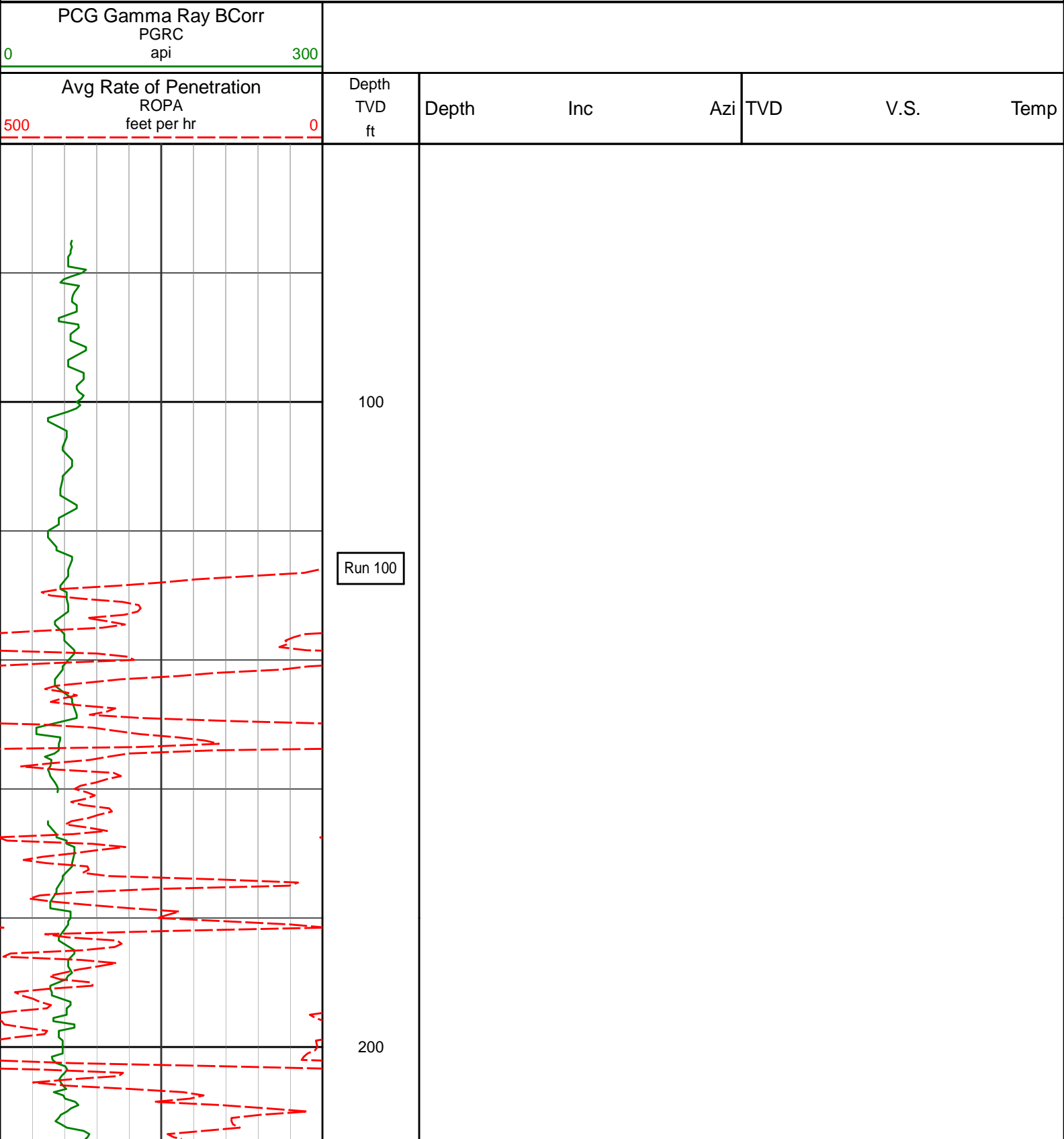


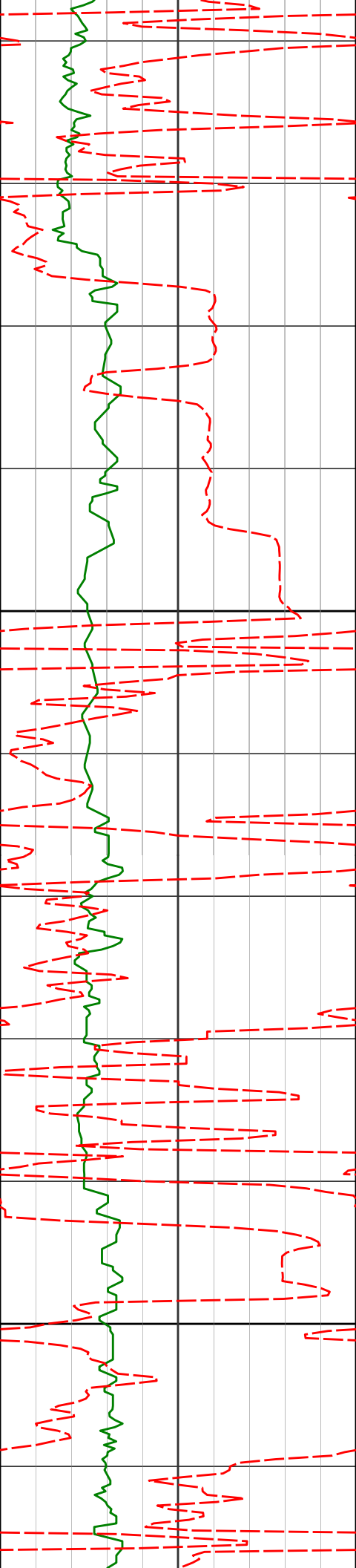
5750
5800
5850
5900
5950
6000
6050
6100
6150
6200
6250

5791'	1.26°	9.51°	5765.54'	-307.46'	124.81°F
5886'	0.83°	20.96°	5860.53'	-309.12'	133.25°F
5981'	0.52°	46.03°	5955.52'	-310.06'	137.47°F
6075'	0.76°	70.89°	6049.52'	-310.54'	141.69°F
6170'	5.02°	187.74°	6144.40'	-306.63'	141.69°F
6265'	10.08°	204.78°	6238.56'	-295.03'	145.91°F



TVD Detail 1:240 Scale





244'

0.41°

255.20° 244.00'

0.21'

48.87°F

300

400

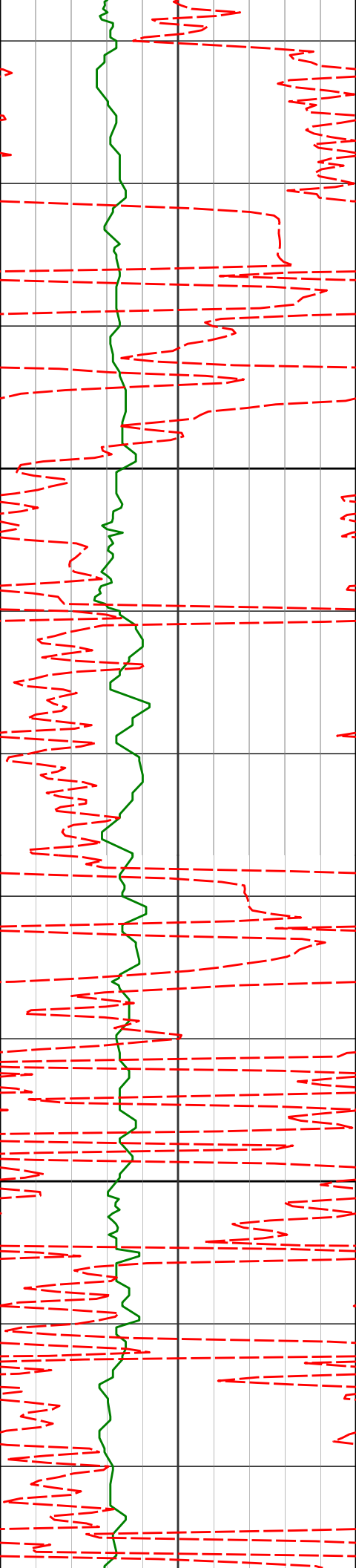
426'

0.19°

235.60° 426.00'

0.53'

53.09°F



500

518'

0.16°

281.82° 517.99'

0.59'

57.31°F

600

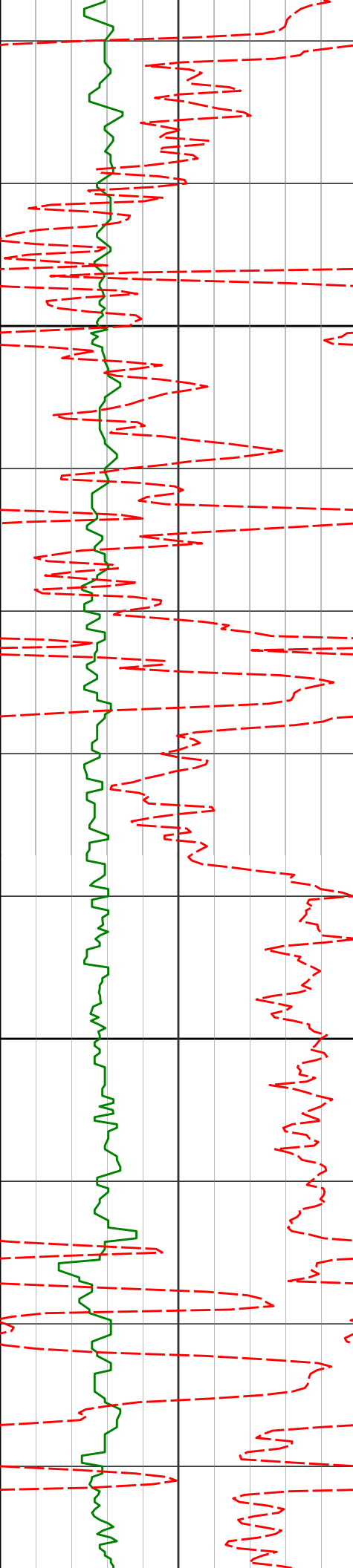
610'

0.22°

214.48° 609.99'

0.71'

61.53°F



700

701'

0.26°

187.03° 700.99'

1.06'

61.53°F

800

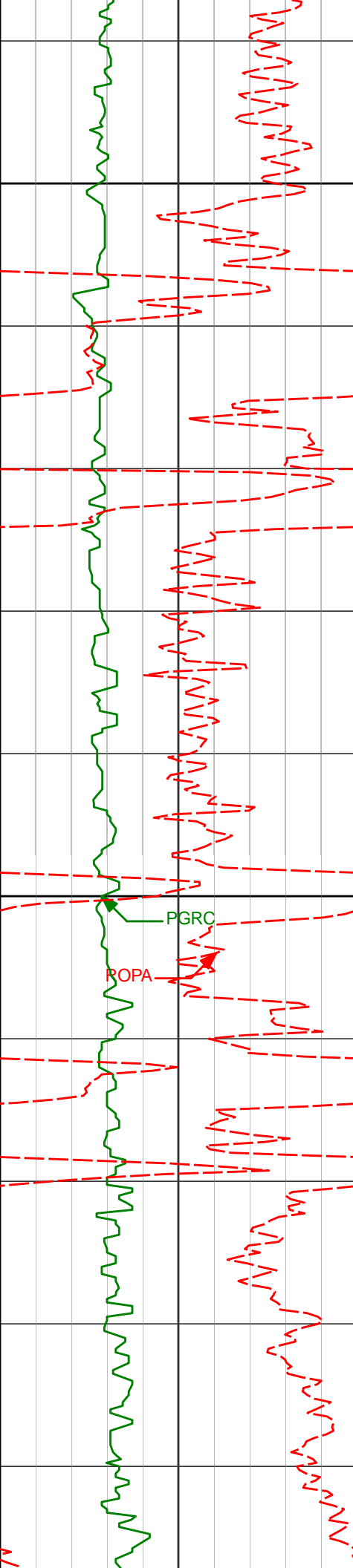
794'

0.42°

186.04° 793.99'

1.61'

65.75°F



885'

0.54°

194.76° 884.99'

2.36'

65.75°F

900

977'

0.68°

200.05° 976.98'

3.29'

69.97°F

1000

PGRC

POPA

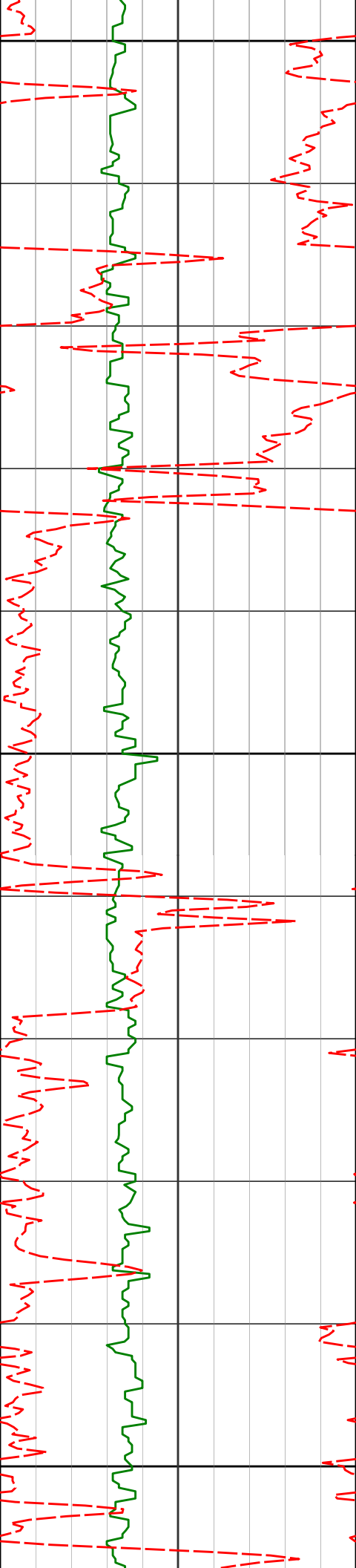
1070'

0.62°

197.03° 1069.98'

4.28'

69.97°F



1100

1200

1300

1162'

0.77°

213.08°

1161.97'

5.26'

69.97°F

1254'

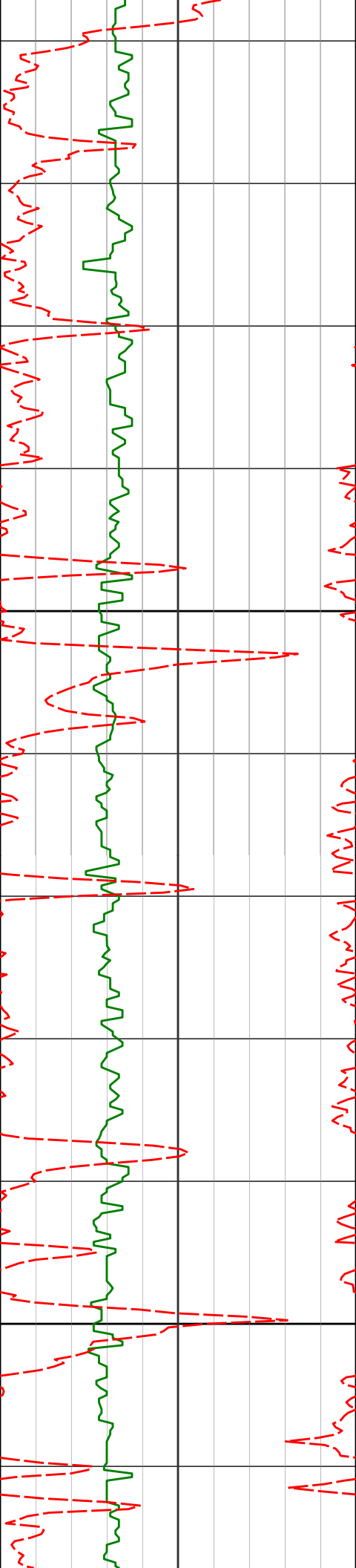
0.65°

204.02°

1253.96'

6.25'

69.97°F



1347'

0.86°

219.51°

1346.96'

7.26'

74.19°F

1400

1439'

1.00°

217.74°

1438.94'

8.41'

74.19°F

1500

1531'

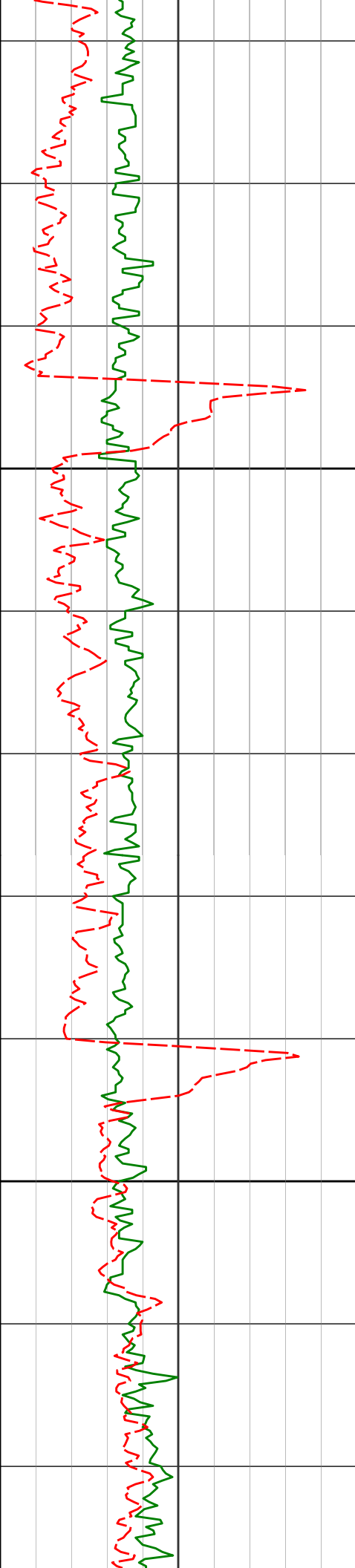
0.78°

228.20°

1530.93'

9.44'

78.41°F



1600

1623'

0.79°

246.19° 1622.92'

10.09'

78.41°F

1700

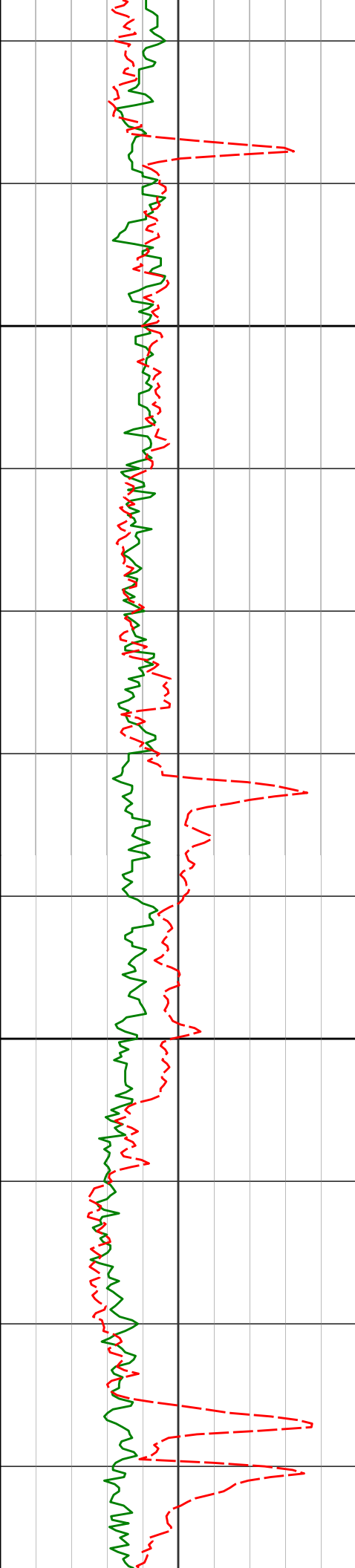
1715'

0.56°

239.82° 1714.92'

10.55'

82.62°F



1800

1806'

0.42°

255.97° 1805.91'

10.84'

82.62°F

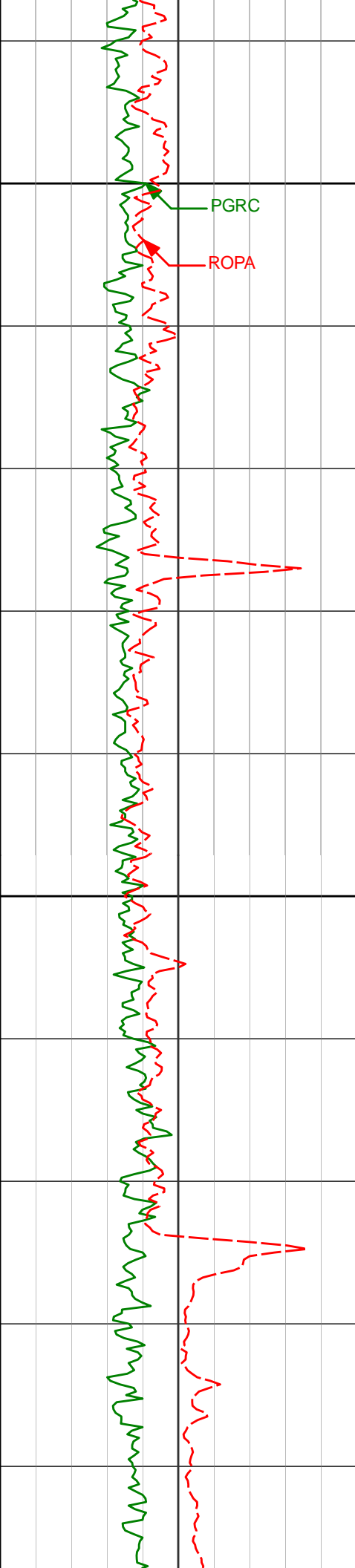
1900

1901'

0.53°

239.56° 1900.91'

11.13'



2000

2100

1996'

0.28°

257.31° 1995.91'

11.40'

86.84°F

2090'

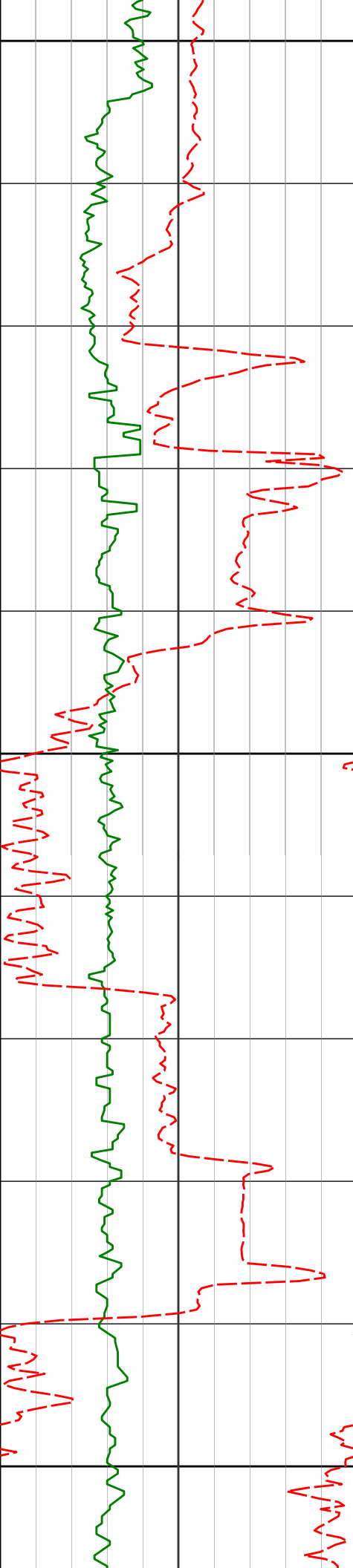
0.30°

261.34° 2089.91'

11.47'

91.06°F

95.28°F



2200

2200'

0.63°

249.21° 2199.90'

11.72'

86.84°F



Casing Shoe @ 2248'

Run 200

2300

86.84°F

2318'

0.59°

196.02° 2317.90'

12.51'

2400

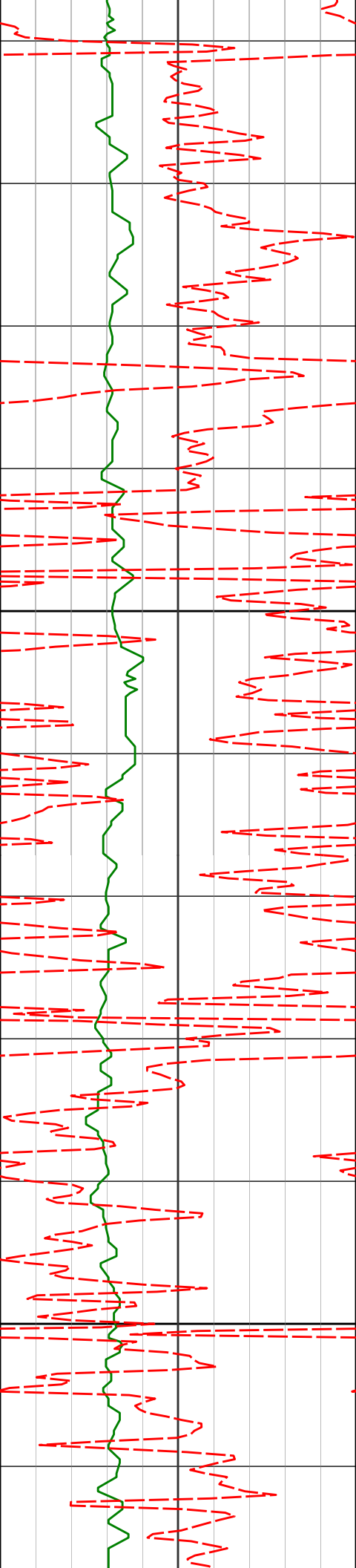
91.06°F

2410'

0.36°

133.57° 2409.90'

13.17'



2500

2502'

0.22°

112.93° 2501.89'

13.44'

91.06°F

2600

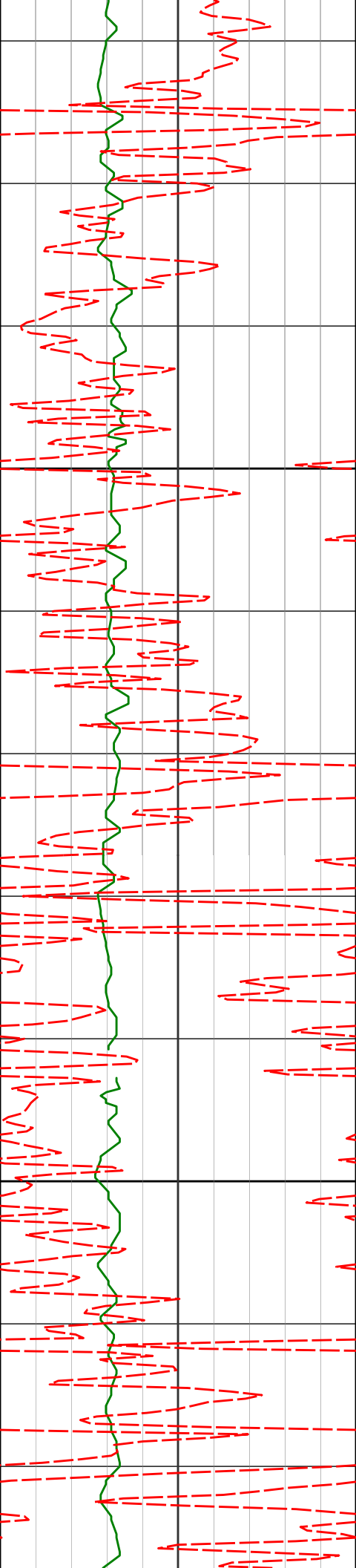
2594'

0.22°

61.40° 2593.89'

13.43'

95.28°F



2686'

0.31°

80.57° 2685.89'

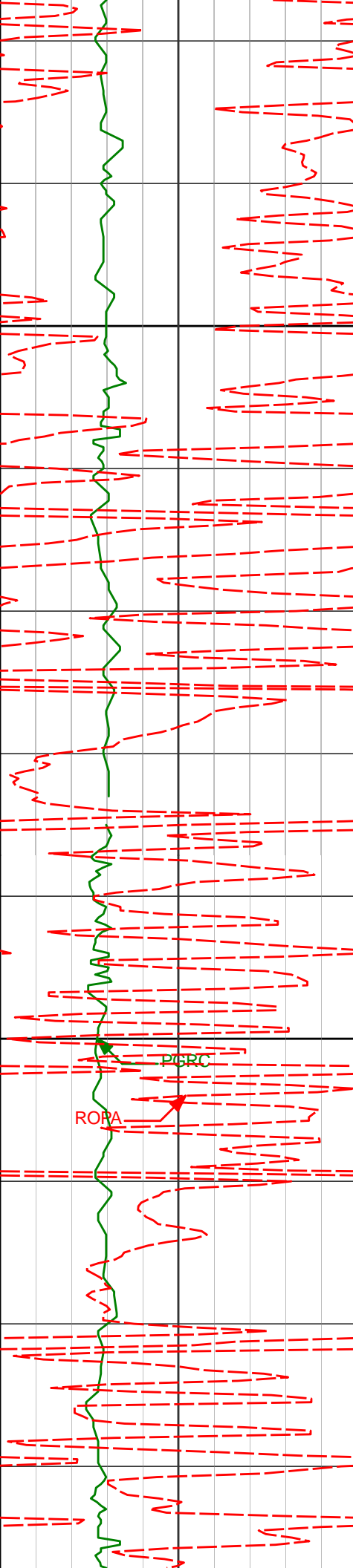
13.32'

2700

95.28°F

2800

95.28°F



2900

3000

2871'

0.47°

132.57° 2870.89'

13.76'

99.50°F

2963'

0.92°

22.25° 2962.88'

13.35'

99.50°F

3055'

3.85°

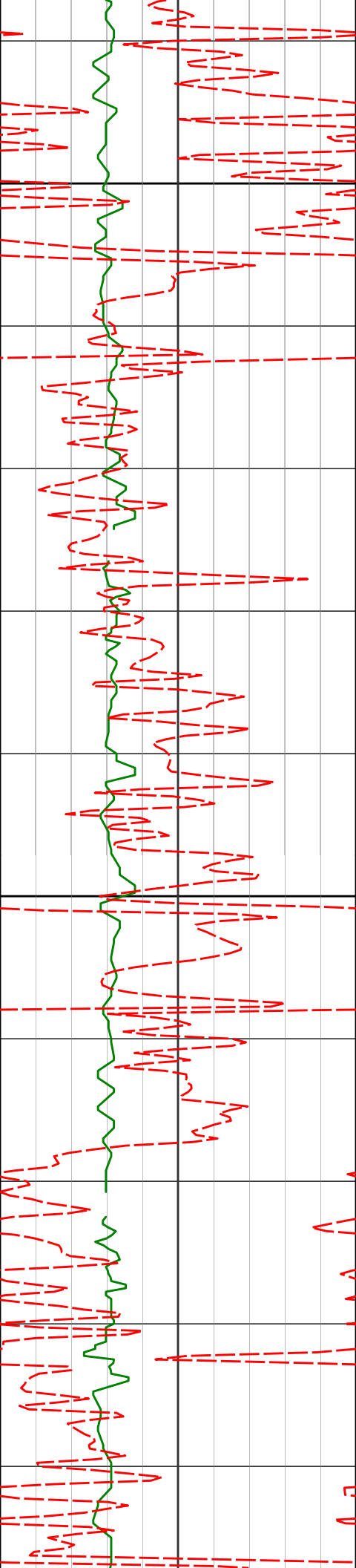
17.97° 3054.79'

9.75'

99.50°F

PGRC

ROBA



3100

3148'

5.47°

22.85°

3147.48'

2.75'

103.72°F

3200

3240'

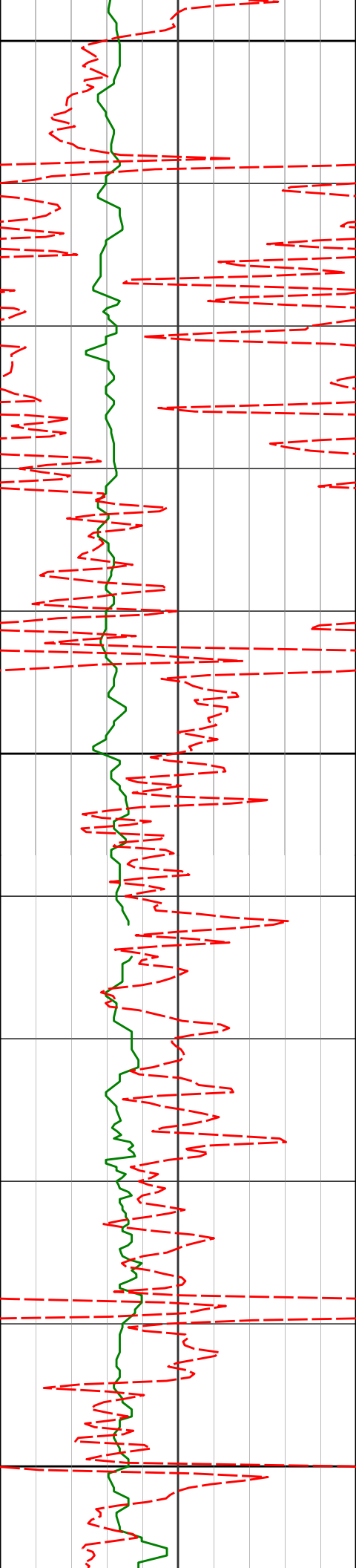
6.75°

22.60°

3238.96'

-6.21'

103.72°F



3300

3331'

8.55°

23.98°

3329.15'

-17.23'

103.72°F

3400

3423'

7.12°

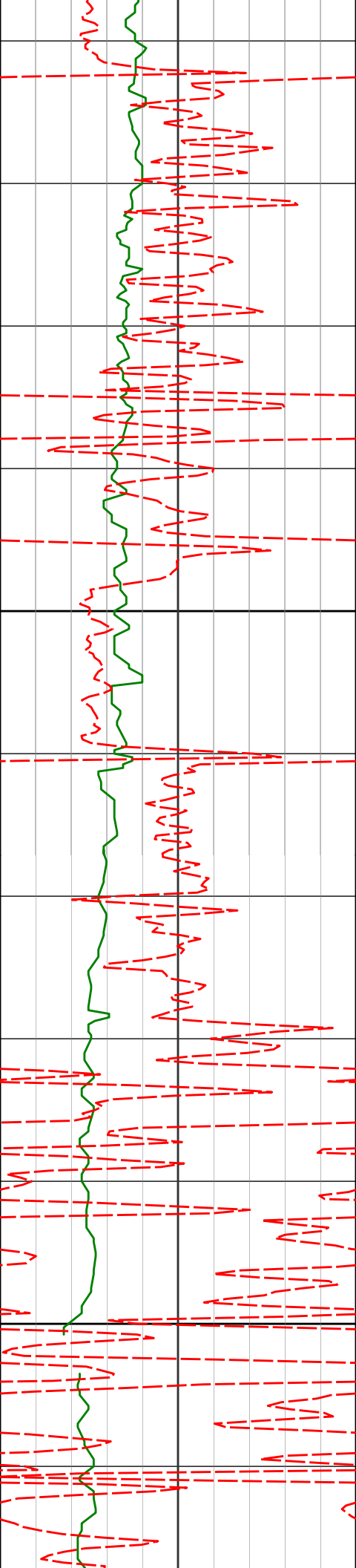
27.54°

3420.29'

-28.42'

107.94°F

3500



3600

3612'

9.76°

10.87°

3607.72'

-50.27'

107.94°F

3700

3707'

11.56°

8.42°

3701.08'

-67.54'

112.16°F

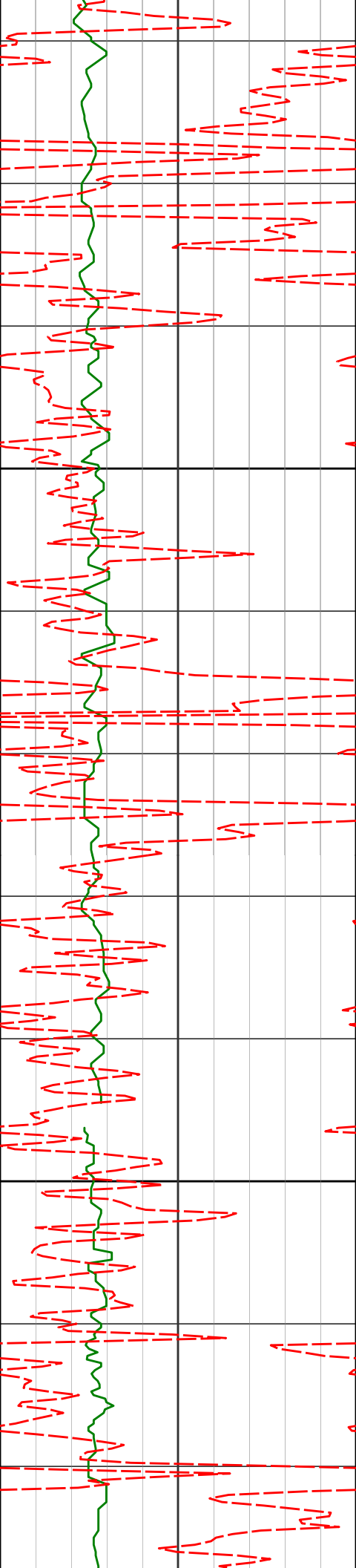
3518'

6.25°

29.16°

3514.64'

-38.05'



3802' 12.25° 7.93° 3794.03' -86.89'

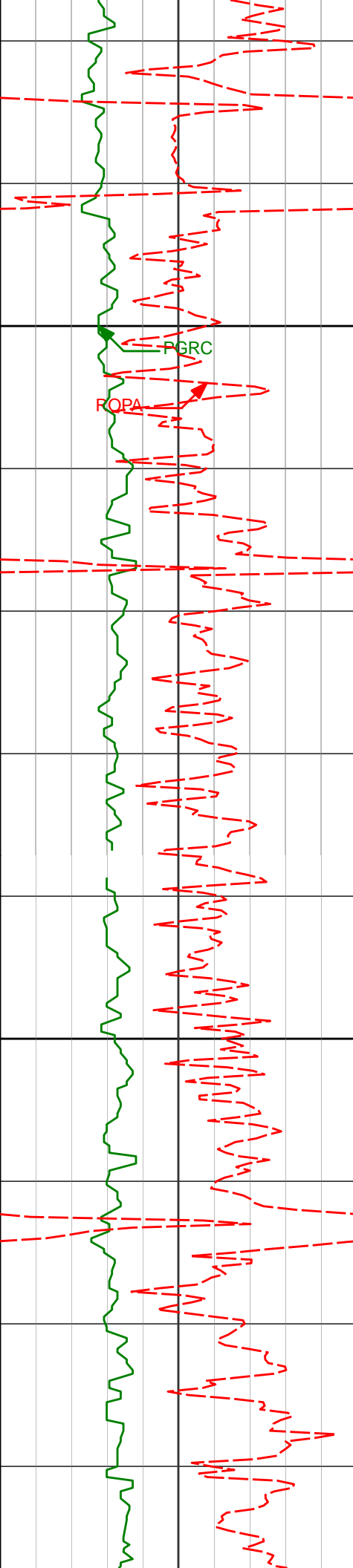
3800

112.16°F

3896' 13.16° 7.87° 3885.73' -107.31'

3900

116.38°F



3991'

13.06°

10.39° 3978.26'

-128.50'

4000

116.38°F

4086'

12.48°

11.45° 4070.91'

-149.04'

4100

116.38°F

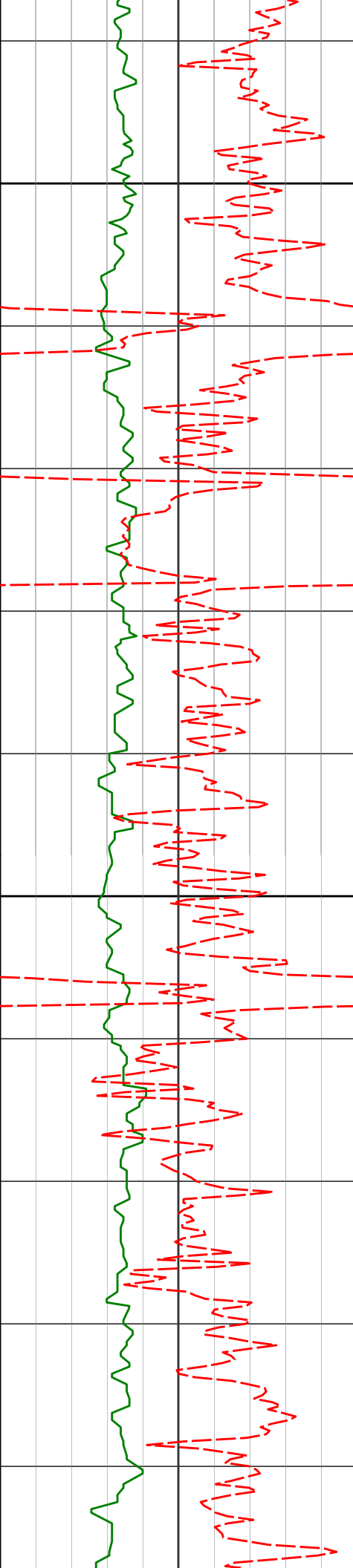
4181'

12.45°

11.82° 4163.67'

-169.04'

116.38°F



4200

4276'

9.89°

10.95° 4256.86'

-187.00'

120.59°F

4300

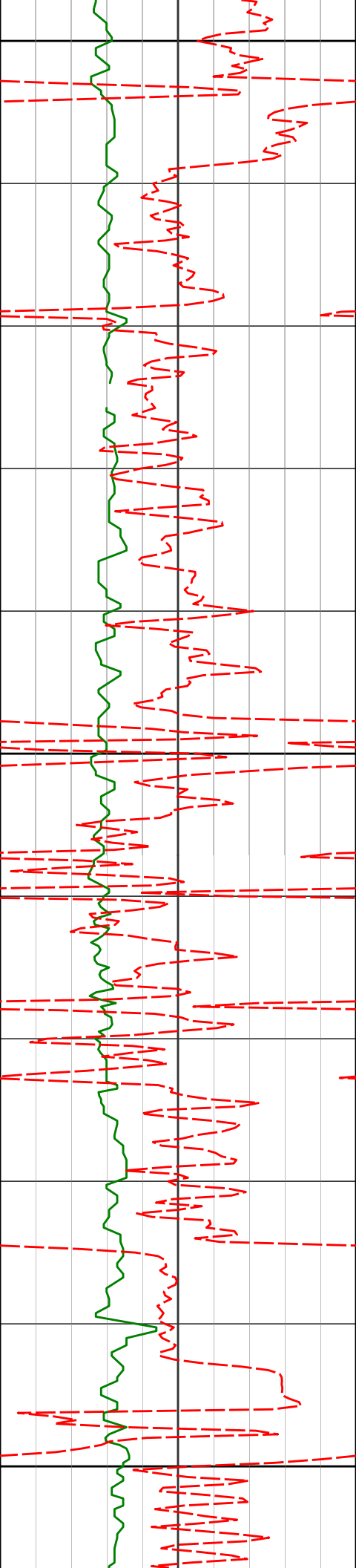
4370'

8.26°

11.77° 4349.68'

-201.48'

120.59°F



4400

4465'

7.71°

10.15° 4443.76'

-214.38'

4500

4560'

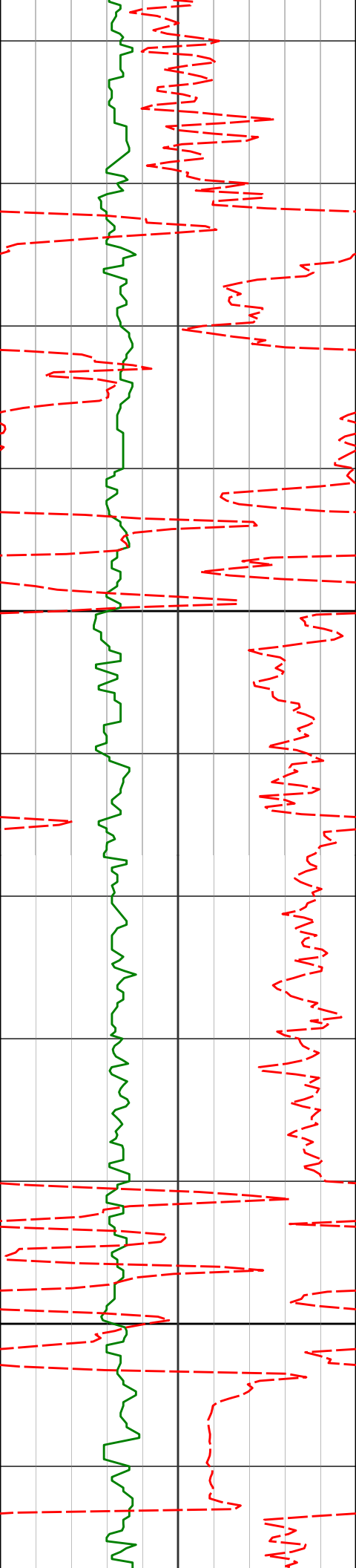
7.02°

9.88° 4537.97'

-226.33'

4600

124.81°F



4655'

5.97°

12.07° 4632.36'

-236.83'

124.81°F

221.84°F

4700

4750'

4.68°

12.10° 4726.95'

-245.41'

129.03°F

4800

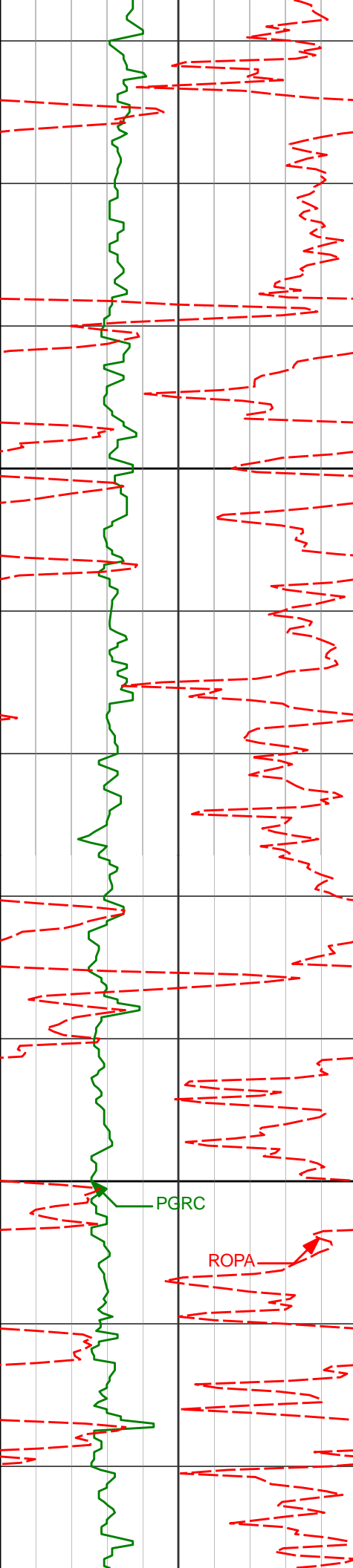
4844'

5.65°

15.65° 4820.57'

-253.57'

129.03°F



4900

4939'

5.85°

14.37° 4915.09'

-262.72'

133.25°F

5000

PGRC

ROPA

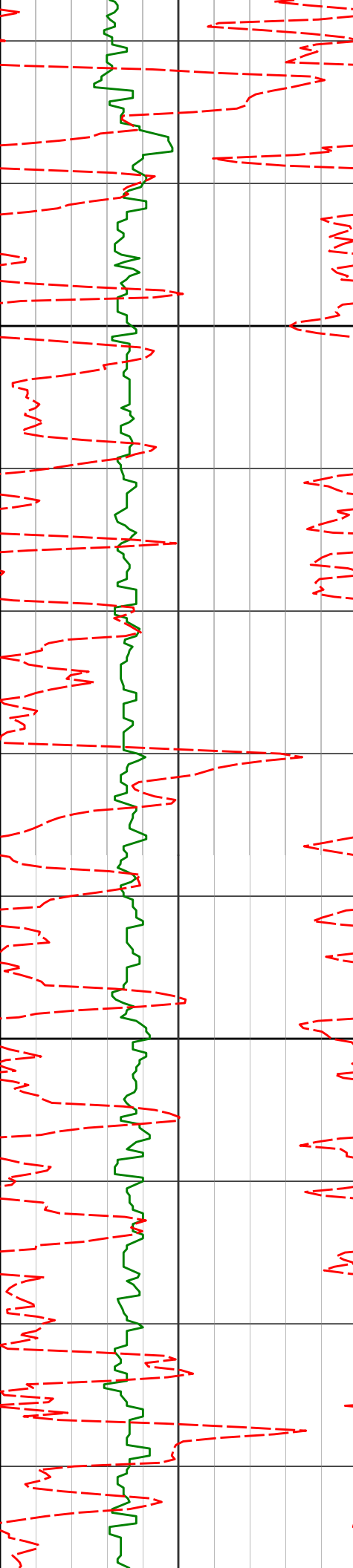
5034'

5.66°

13.65° 5009.61'

-271.91'

133.25°F



5100

5129'

4.68°

11.65°

5104.22'

-280.22'

137.47°F

5200

5223'

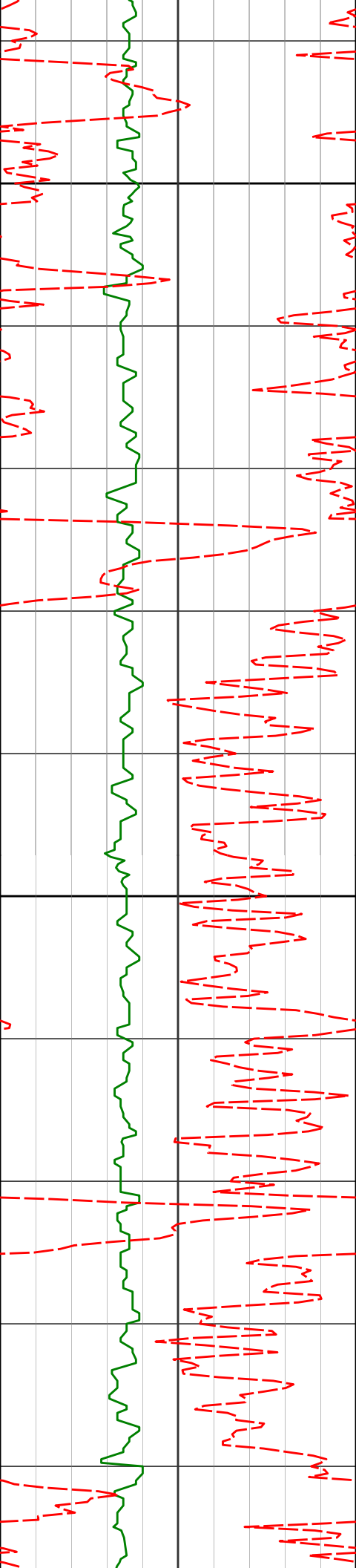
3.80°

9.14°

5197.96'

-287.03'

137.47°F



5300

5400

5318'

2.98°

8.11° 5292.80'

-292.56'

141.69°F

5412'

2.36°

2.56° 5386.70'

-296.90'

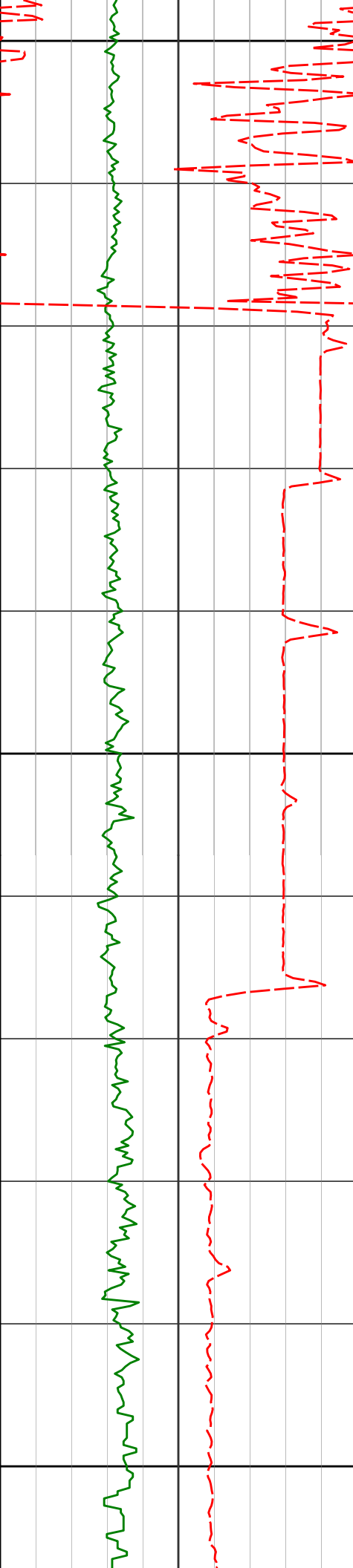
5507'

1.50°

0.90° 5481.64'

-300.09'

141.69°F



5500

5600

5700

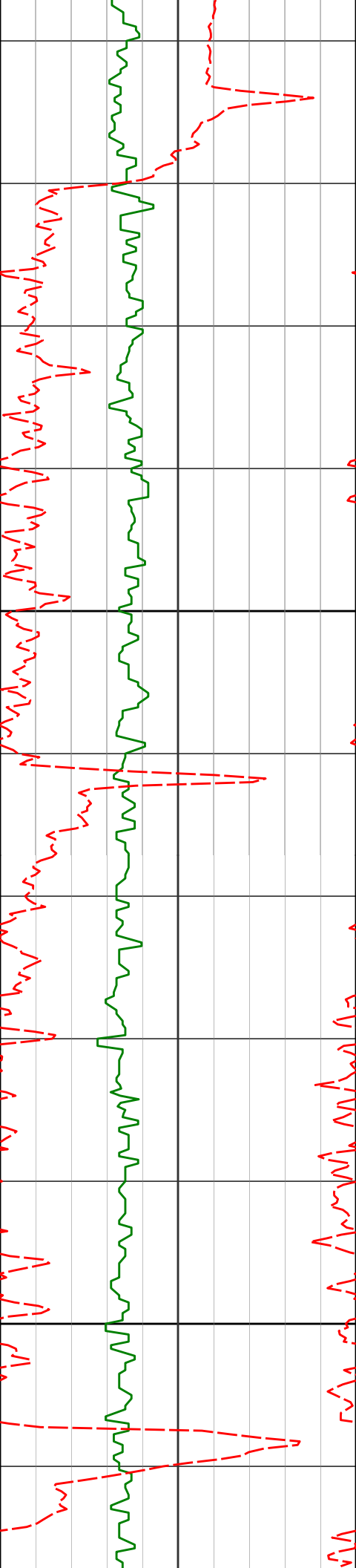
5602'

1.65°

3.76° 5576.60'

-302.70'

112.16°F



5800

5900

5791'

1.26°

9.51° 5765.54'

-307.46'

124.81°F

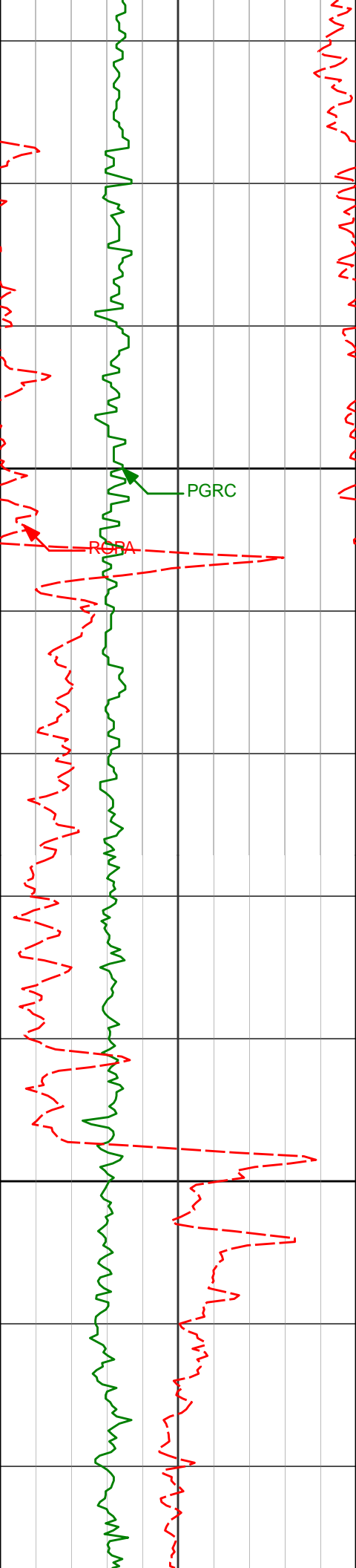
5886'

0.83°

20.96° 5860.53'

-309.12'

133.25°F



6000

6100

5981'

0.52°

46.03° 5955.52'

-310.06'

137.47°F

6075'

0.76°

70.89° 6049.52'

-310.54'

141.69°F

6170'

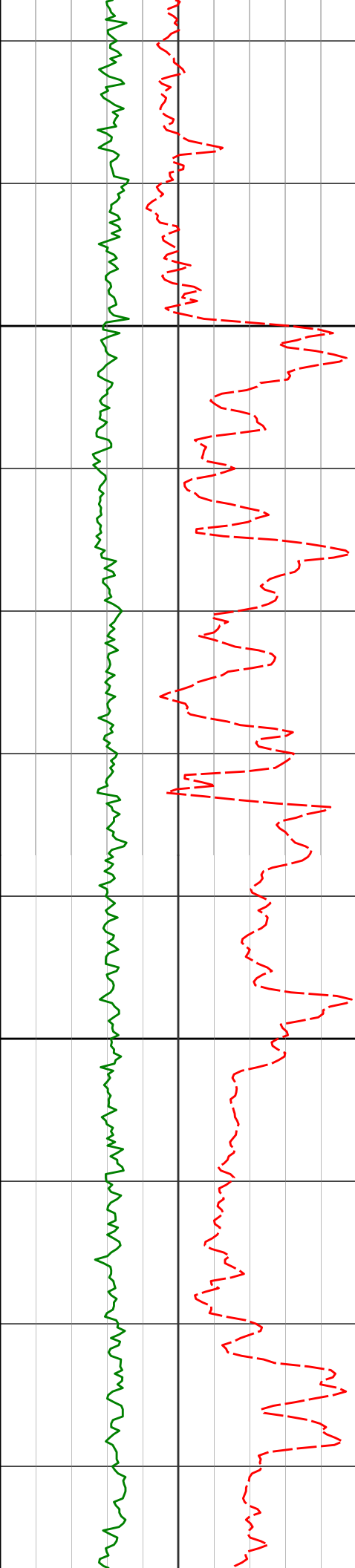
5.02°

187.74° 6144.40'

-306.63'

141.69°F

141.69°F



6200

6265'

10.08°

204.78°

6238.56'

-295.03'

141.69°F

150.13°F

145.91°F

145.91°F

145.91°F

6300

6359'

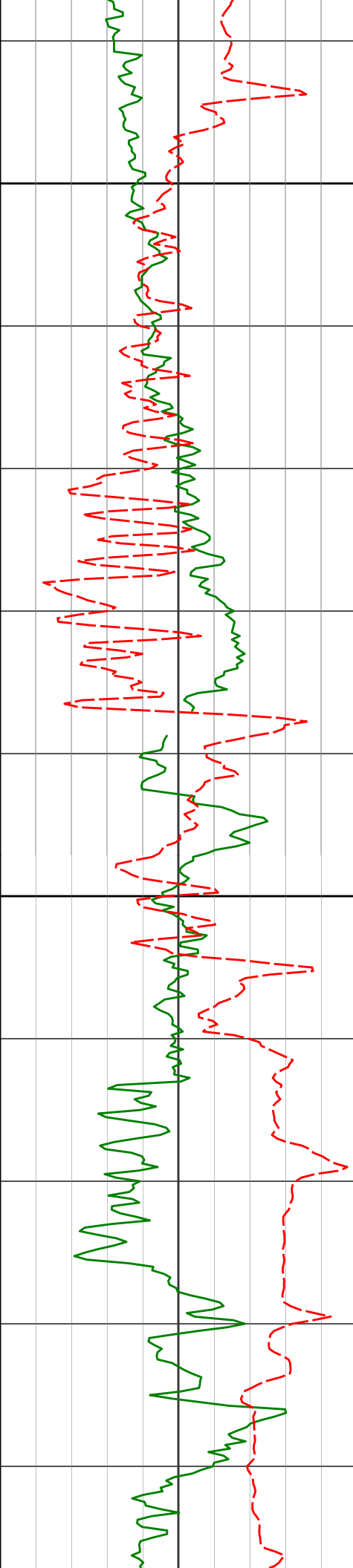
14.35°

193.50°

6330.42'

-276.35'

150.13°F



6400

6454'

18.06°

198.13° 6421.63'

-251.05'

150.34°F

154.34°F

154.34°F

6500

6549'

19.20°

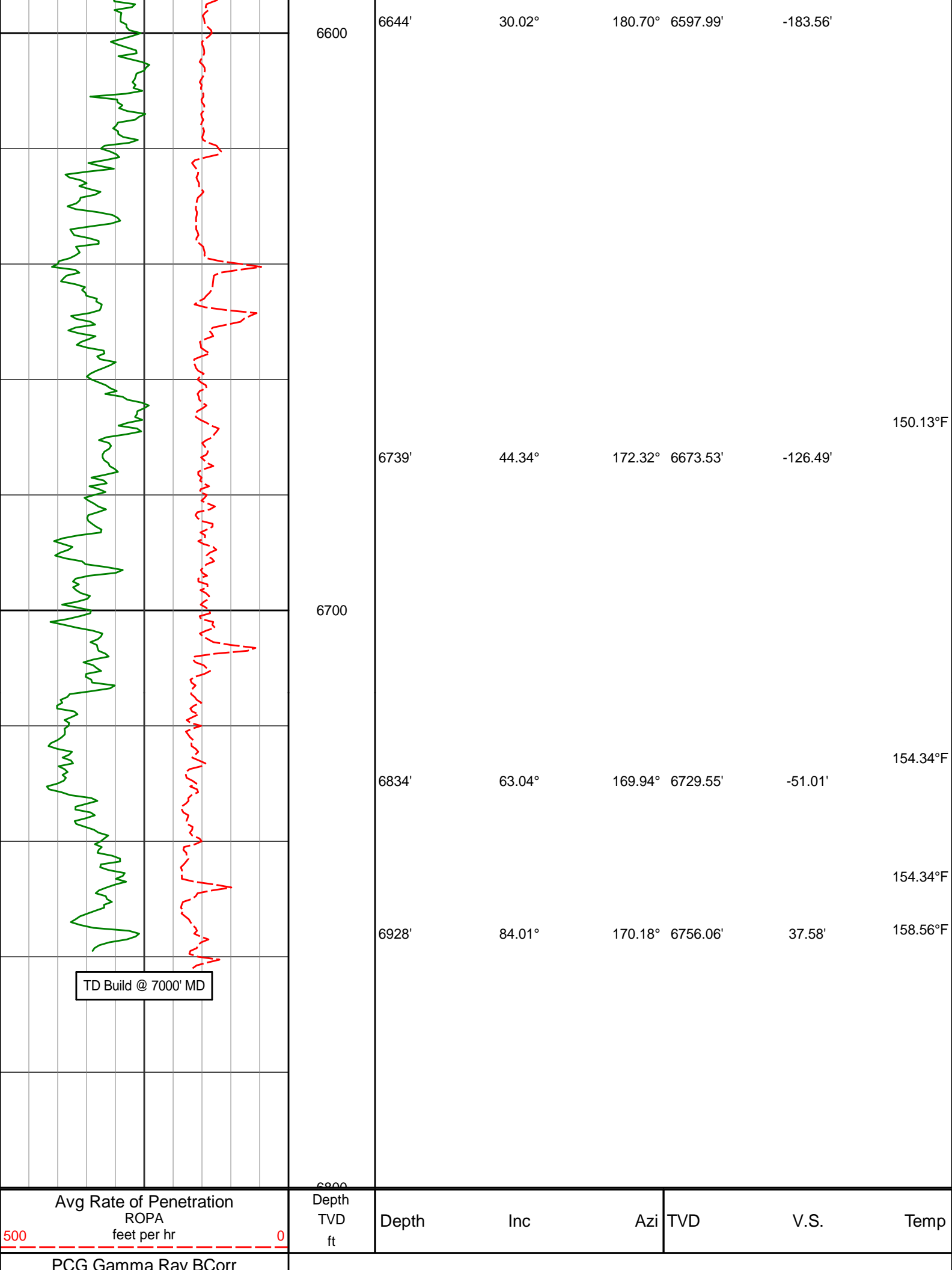
197.08° 6511.65'

-222.31'

137.47°F

Run 300

145.91°F



TD Build @ 7000' MD

Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
500		0	PCG Gamma Ray BCORR					

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Crow Creek AA01-743
Wattenberg
Weld Colorado
USA
CA-XX-0901938451

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
244.00	0.41	255.20	244.00	0.22 S	0.85 W	0.21	0.17
426.00	0.19	235.60	426.00	0.57 S	1.74 W	0.53	0.13
518.00	0.16	281.82	517.99	0.63 S	1.99 W	0.59	0.15
610.00	0.22	214.48	609.99	0.75 S	2.22 W	0.71	0.24
701.00	0.26	187.03	700.99	1.11 S	2.34 W	1.06	0.13
794.00	0.42	186.04	793.99	1.66 S	2.41 W	1.61	0.17
885.00	0.54	194.76	884.99	2.41 S	2.55 W	2.36	0.16
977.00	0.68	200.05	976.98	3.35 S	2.85 W	3.29	0.16
1070.00	0.62	197.03	1069.98	4.35 S	3.19 W	4.28	0.08
1162.00	0.77	213.08	1161.97	5.34 S	3.67 W	5.26	0.27
1254.00	0.65	204.02	1253.96	6.33 S	4.22 W	6.25	0.18
1347.00	0.86	219.51	1346.96	7.35 S	4.88 W	7.26	0.32
1439.00	1.00	217.74	1438.94	8.53 S	5.82 W	8.41	0.15
1531.00	0.78	228.20	1530.93	9.58 S	6.77 W	9.44	0.30
1623.00	0.79	246.19	1622.92	10.25 S	7.82 W	10.09	0.27
1715.00	0.56	239.82	1714.92	10.73 S	8.78 W	10.55	0.26
1806.00	0.42	255.97	1805.91	11.03 S	9.48 W	10.84	0.21
1901.00	0.53	239.56	1900.91	11.34 S	10.20 W	11.13	0.18
1996.00	0.28	257.31	1995.91	11.61 S	10.80 W	11.40	0.29
2090.00	0.30	261.34	2089.91	11.70 S	11.27 W	11.47	0.03
2200.00	0.63	249.21	2199.90	11.96 S	12.13 W	11.72	0.31
2318.00	0.59	196.02	2317.90	12.77 S	12.90 W	12.51	0.46
2410.00	0.36	133.57	2409.90	13.43 S	12.82 W	13.17	0.58
2502.00	0.22	112.93	2501.89	13.69 S	12.45 W	13.44	0.19
2594.00	0.22	61.40	2593.89	13.68 S	12.13 W	13.43	0.21
2686.00	0.31	80.57	2685.89	13.55 S	11.73 W	13.32	0.13
2871.00	0.47	132.57	2870.89	13.98 S	10.69 W	13.76	0.20
2963.00	0.92	22.25	2962.88	13.55 S	10.13 W	13.35	1.27
3055.00	3.85	17.97	3054.79	9.93 S	8.90 W	9.75	3.19
3148.00	5.47	22.85	3147.48	2.87 S	6.21 W	2.75	1.79
3240.00	6.75	22.60	3238.96	6.16 N	2.43 W	-6.21	1.39
3331.00	8.55	23.98	3329.15	17.28 N	2.37 E	-17.23	1.99
3423.00	7.12	27.54	3420.29	28.59 N	7.79 E	-28.42	1.65
3518.00	6.25	29.16	3514.64	38.32 N	13.03 E	-38.05	0.93
3612.00	9.76	10.87	3607.72	50.62 N	17.03 E	-50.27	4.57
3707.00	11.56	8.42	3701.08	67.95 N	19.94 E	-67.54	1.96
3802.00	12.25	7.93	3794.03	87.36 N	22.73 E	-86.89	0.73
3896.00	13.16	7.87	3885.73	107.84 N	25.57 E	-107.31	0.97
3991.00	13.06	10.39	3978.26	129.10 N	28.98 E	-128.50	0.61
4086.00	12.48	11.45	4070.91	149.72 N	32.96 E	-149.04	0.65
4181.00	12.45	11.82	4163.67	169.81 N	37.09 E	-169.04	0.09
4276.00	9.89	10.95	4256.86	187.85 N	40.74 E	-187.00	2.70
4370.00	8.26	11.77	4349.68	202.39 N	43.65 E	-201.48	1.74
4465.00	7.71	10.15	4443.76	215.34 N	46.17 E	-214.38	0.63
4560.00	7.02	9.88	4537.97	227.33 N	48.28 E	-226.33	0.72
4655.00	5.97	12.07	4632.36	237.88 N	50.31 E	-236.83	1.14
4750.00	4.68	12.10	4726.95	246.50 N	52.16 E	-245.41	1.36
4844.00	5.65	15.65	4820.57	254.70 N	54.21 E	-253.57	1.09
4939.00	5.85	14.37	4915.09	263.90 N	56.67 E	-262.72	0.25
5034.00	5.66	13.65	5009.61	273.14 N	58.98 E	-271.91	0.22
5129.00	4.68	11.65	5104.22	281.49 N	60.87 E	-280.22	1.04
5223.00	3.80	9.14	5197.96	288.32 N	62.14 E	-287.03	0.96
5318.00	2.98	8.11	5292.80	293.87 N	62.98 E	-292.56	0.87

5316.00	2.36	0.11	5292.80	299.07 N	62.98 E	-292.56	0.87
5412.00	2.36	2.56	5386.70	298.22 N	63.41 E	-296.90	0.71
5507.00	1.50	0.90	5481.64	301.42 N	63.52 E	-300.09	0.90
5602.00	1.65	3.76	5576.60	304.03 N	63.63 E	-302.70	0.18
5791.00	1.26	9.51	5765.54	308.80 N	64.15 E	-307.46	0.22
5886.00	0.83	20.96	5860.53	310.47 N	64.57 E	-309.12	0.50
5981.00	0.52	46.03	5955.52	311.42 N	65.13 E	-310.06	0.44
6075.00	0.76	70.89	6049.52	311.92 N	66.03 E	-310.54	0.38
6170.00	5.02	187.74	6144.40	308.00 N	66.06 E	-306.63	5.69
6265.00	10.08	204.78	6238.56	296.33 N	62.02 E	-295.03	5.77
6359.00	14.35	193.50	6330.42	277.52 N	55.85 E	-276.35	5.19
6454.00	18.06	198.13	6421.63	252.06 N	48.51 E	-251.05	4.13
6549.00	19.20	197.08	6511.65	223.14 N	39.34 E	-222.31	1.25
6644.00	30.02	180.70	6597.99	184.28 N	34.44 E	-183.56	13.36
6739.00	44.34	172.32	6673.53	127.29 N	38.61 E	-126.49	15.96
6834.00	63.04	169.94	6729.55	52.02 N	50.55 E	-51.01	19.78
6928.00	84.01	170.18	6756.06	36.27 S	66.01 E	37.58	22.32
7022.00	87.91	173.16	6762.68	129.02 S	79.59 E	130.58	5.21
7117.00	92.06	176.34	6762.71	223.59 S	88.27 E	225.30	5.51
7212.00	92.40	175.79	6759.01	318.29 S	94.78 E	320.11	0.68
7307.00	91.85	176.80	6755.48	413.03 S	100.92 E	414.95	1.20
7401.00	91.69	177.59	6752.58	506.87 S	105.52 E	508.87	0.86
7496.00	91.05	178.86	6750.31	601.79 S	108.46 E	603.83	1.50
7591.00	89.82	180.68	6749.59	696.78 S	108.85 E	698.81	2.31
7685.00	90.31	179.72	6749.49	790.78 S	108.52 E	792.78	1.14
7780.00	90.31	180.75	6748.98	885.78 S	108.13 E	887.75	1.08
7875.00	90.80	180.62	6748.06	980.77 S	106.99 E	982.70	0.54
7969.00	89.72	181.88	6747.63	1074.74 S	104.94 E	1076.61	1.77
8064.00	89.91	182.33	6747.94	1169.67 S	101.45 E	1171.46	0.51
8159.00	89.26	182.10	6748.63	1264.60 S	97.77 E	1266.30	0.72
8254.00	89.26	182.49	6749.85	1359.52 S	93.96 E	1361.12	0.41
8348.00	89.17	181.05	6751.14	1453.46 S	91.06 E	1454.98	1.54
8443.00	89.75	180.71	6752.04	1548.44 S	89.61 E	1549.92	0.71
8538.00	90.46	180.34	6751.86	1643.44 S	88.74 E	1644.88	0.84
8632.00	89.01	180.68	6752.29	1737.43 S	87.90 E	1738.84	1.58
8727.00	89.63	180.93	6753.41	1832.42 S	86.56 E	1833.77	0.70
8822.00	89.91	180.48	6753.80	1927.41 S	85.38 E	1928.72	0.56
8917.00	89.82	178.68	6754.03	2022.40 S	86.08 E	2023.71	1.90
9011.00	89.63	177.60	6754.48	2116.35 S	89.13 E	2117.70	1.16
9106.00	90.22	177.10	6754.61	2211.25 S	93.52 E	2212.67	0.81
9201.00	90.37	176.73	6754.12	2306.11 S	98.64 E	2307.61	0.41
9295.60	89.66	178.33	6754.10	2400.61 S	102.71 E	2402.18	1.84
9390.00	90.18	178.89	6754.22	2494.99 S	105.00 E	2496.58	0.82
9485.00	91.39	179.21	6752.92	2589.96 S	106.58 E	2591.57	1.31
9580.00	90.86	178.48	6751.06	2684.92 S	108.49 E	2686.55	0.94
9674.00	92.16	179.29	6748.58	2778.87 S	110.32 E	2780.52	1.62
9769.00	88.46	178.22	6748.07	2873.83 S	112.39 E	2875.50	4.05

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 178.86 DEGREES (GRID)
A TOTAL CORRECTION OF 7.56 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 9769.00 FEET
IS 2876.03 FEET ALONG 177.76 DEGREES (GRID)

Final survey is a straight line projection to TD.