



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	18-Jan-15	19-Jan-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,234.00	5,815.00			
Log End Depth (MD, ft)	5,815.00	6,077.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	17-Jan-15 13:40	18-Jan-15 18:00			
Drill/Wipe End Date and Time	18-Jan-15 12:00	18-Jan-15 23:25			
Min Inc (deg) @ Depth (MD, ft)	0.68 @ 4,955.00	72.57 @ 5,903.00			
Max Inc (deg) @ Depth (MD, ft)	59.32 @ 5,808.00	87.47 @ 6,024.00			
Bit TFA(in2) / Bit Type	0.91 / PDC	0.91 / PDC			
Flow Rate (gpm)	565.11	515.00			
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)	10.55 / 45.00	10.70 / 39.00			
Filtrate CL (ppm)	375.00	375.00			
pH / Fluid Loss (mptm)	9.10 / 0	8.90 / 8			
PV (cP) / YP (lbf2)	15 / 11.00	12 / 11.00			
% Solids / % Sand	12.3 / 0.2	10.60 / 0.15			
% 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	150.45 / PDM	150.47 / PDM			

Max Tool Temp (degF) / Source	158.47 / PCM	158.47 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Jual Pablo Centeno	Jual Pablo Centeno			
Customer Representative	Justin Fields	Justin Fields			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11303511	11303511			
Insert Serial Number	11399998	11399998			
Date and Time Initialized	17-Jan-15 04:05	01-Jan-70 00:00			
Date and Time Read	19-Jan-15 05:48	19-Jan-15 05:54			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	57.00	53.00			
Software Version	6.21	6.21			
Sub Serial Number	11303511	11303511			
Sonde Serial Number	11638501	11638501			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	104.80	143.80			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	50.22	46.72			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11303511	11303511			
Insert/Sonde Serial Number	11120599	11120599			

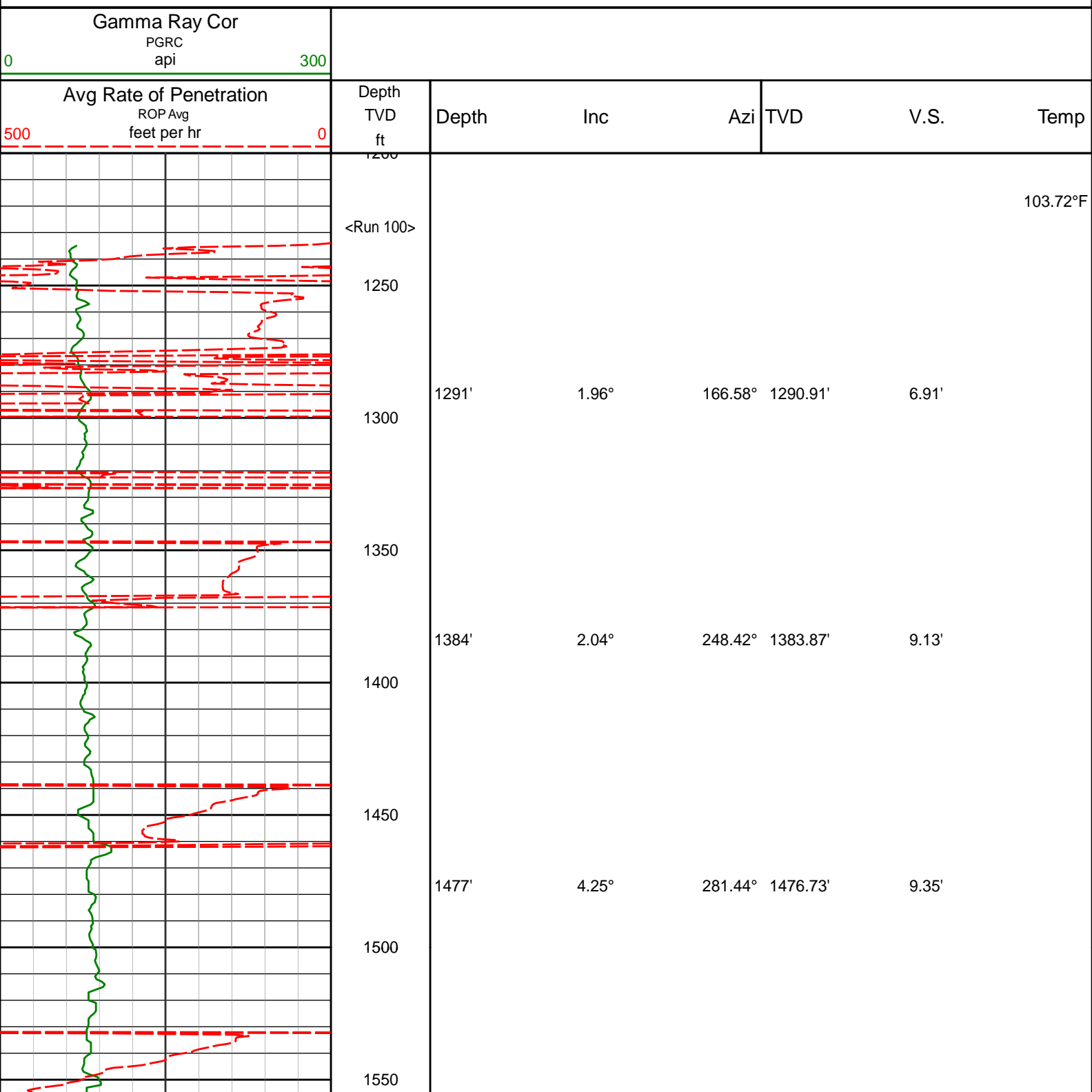
REMARKS

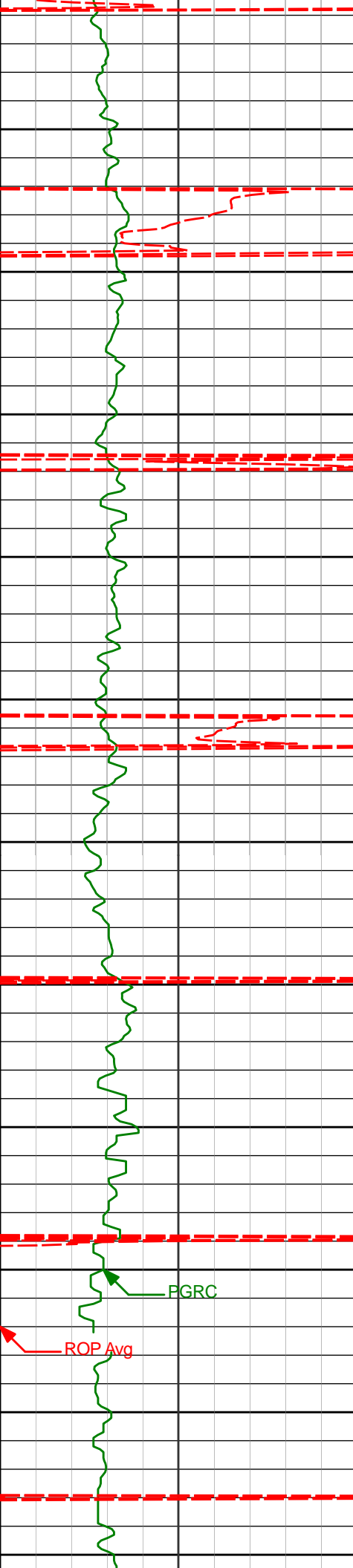
1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - 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.

WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR

TVD Detail 1:600 Scale





1600

1650

1700

1750

1800

1850

1900

1950

2000

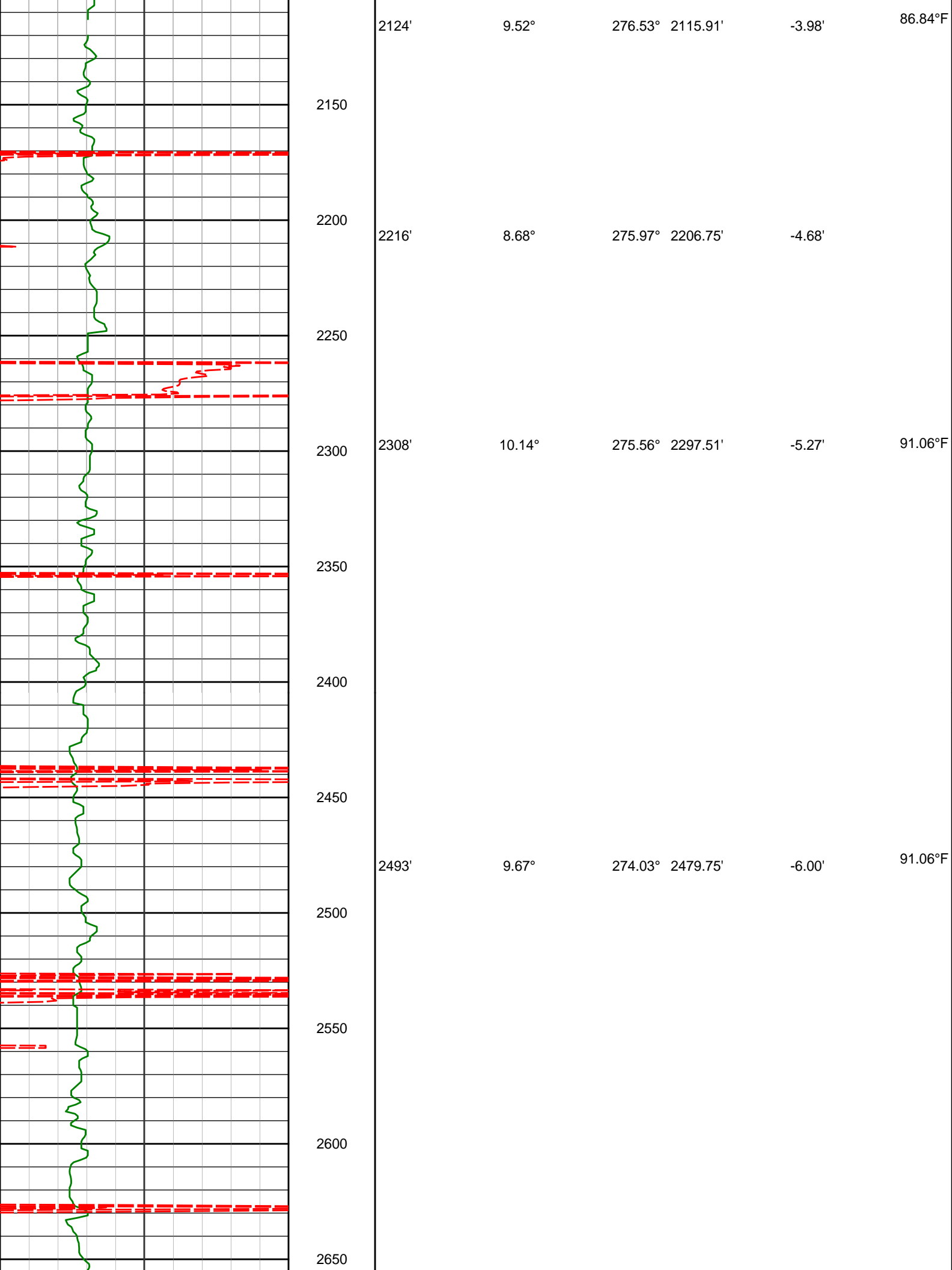
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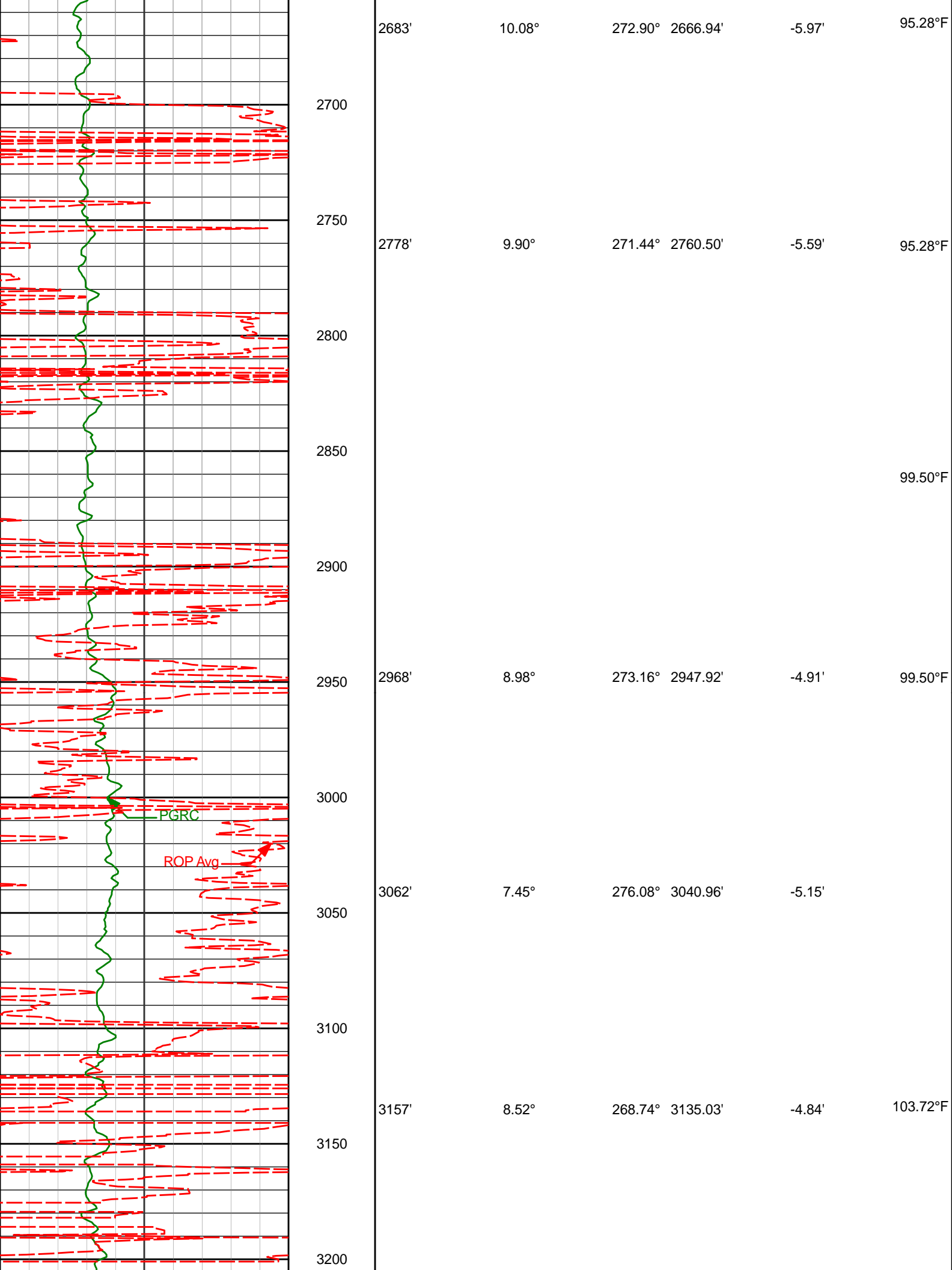
2100

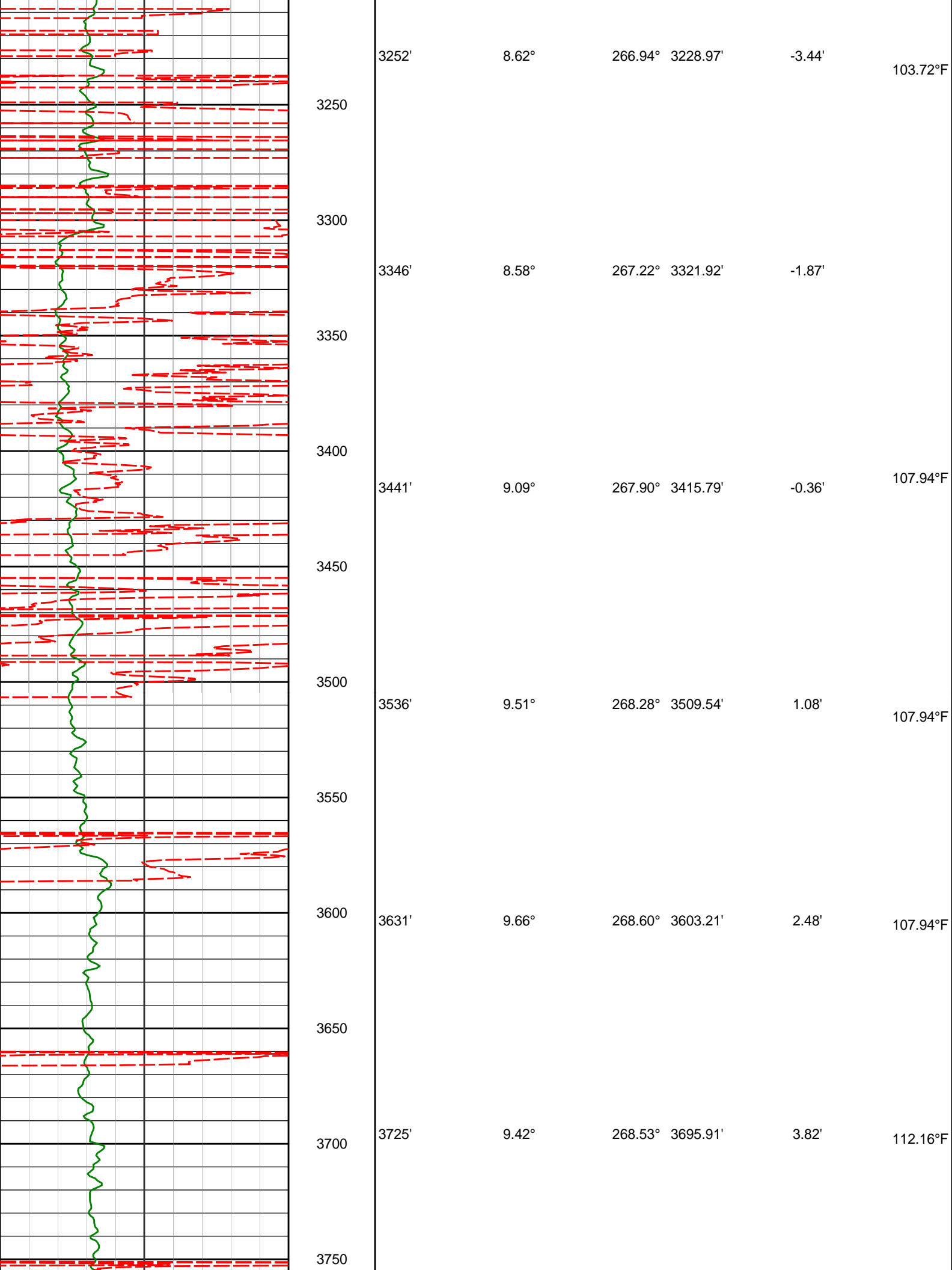
1569'	7.28°	283.11°	1568.25'	7.90'	
1662'	9.28°	285.31°	1660.28'	5.38'	82.62°F
1754'	9.02°	281.90°	1751.11'	2.81'	
1847'	9.95°	281.30°	1842.84'	0.66'	82.62°F
1939'	9.79°	279.58°	1933.48'	-1.25'	82.62°F
2031'	9.46°	279.15°	2024.18'	-2.82'	86.84°F

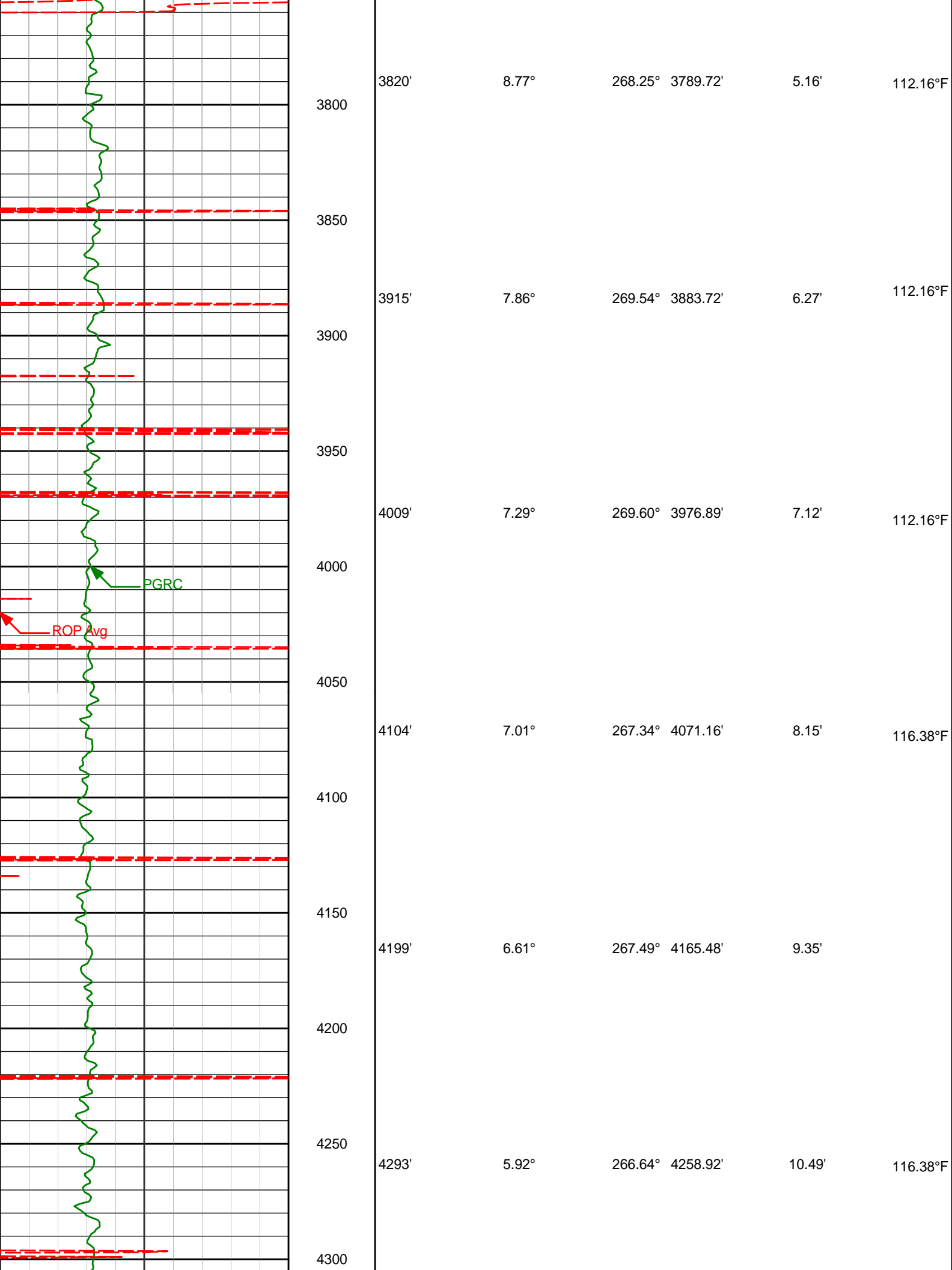
FGRC

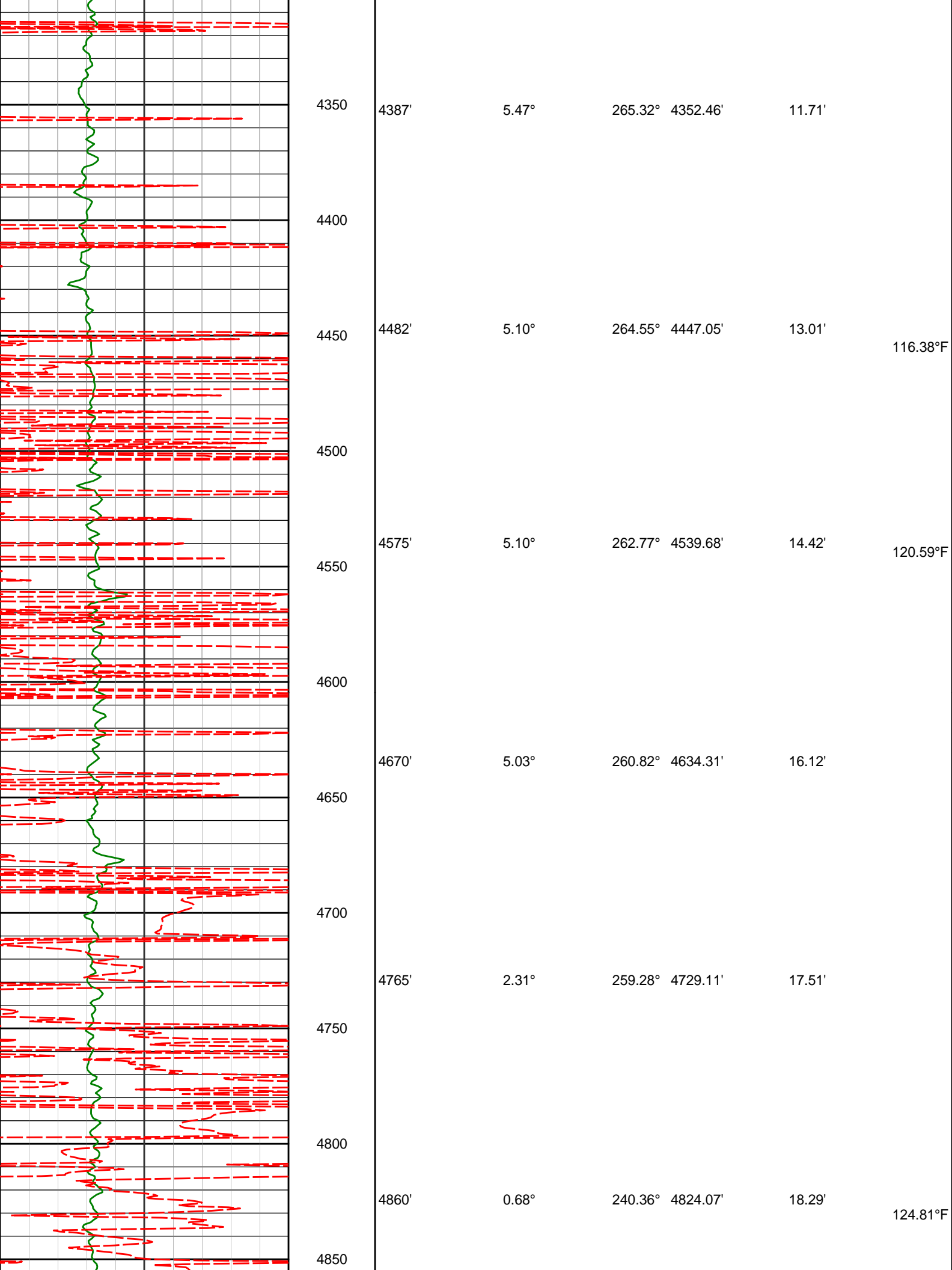
ROP Avg

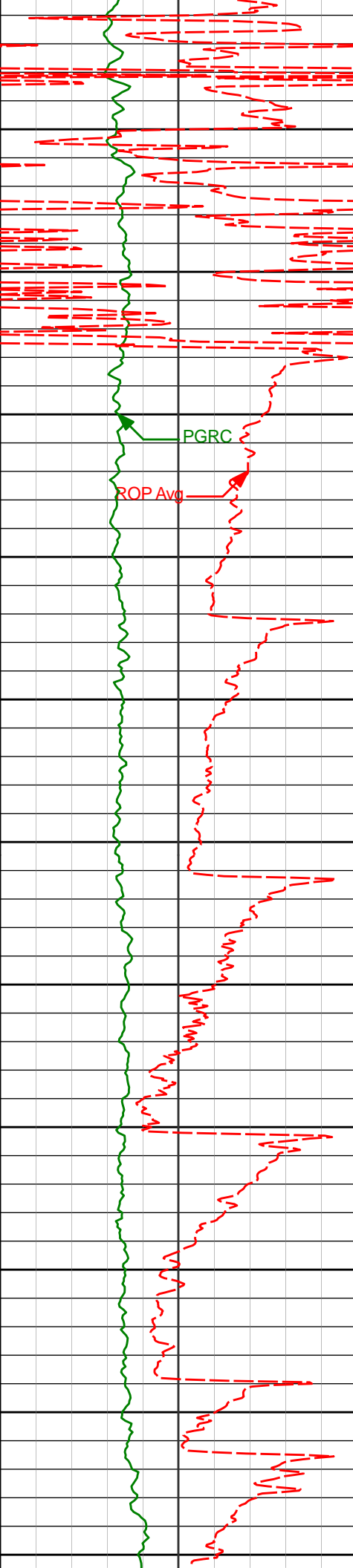












4900

<KOP>

4950

5000

5050

5100

5150

5200

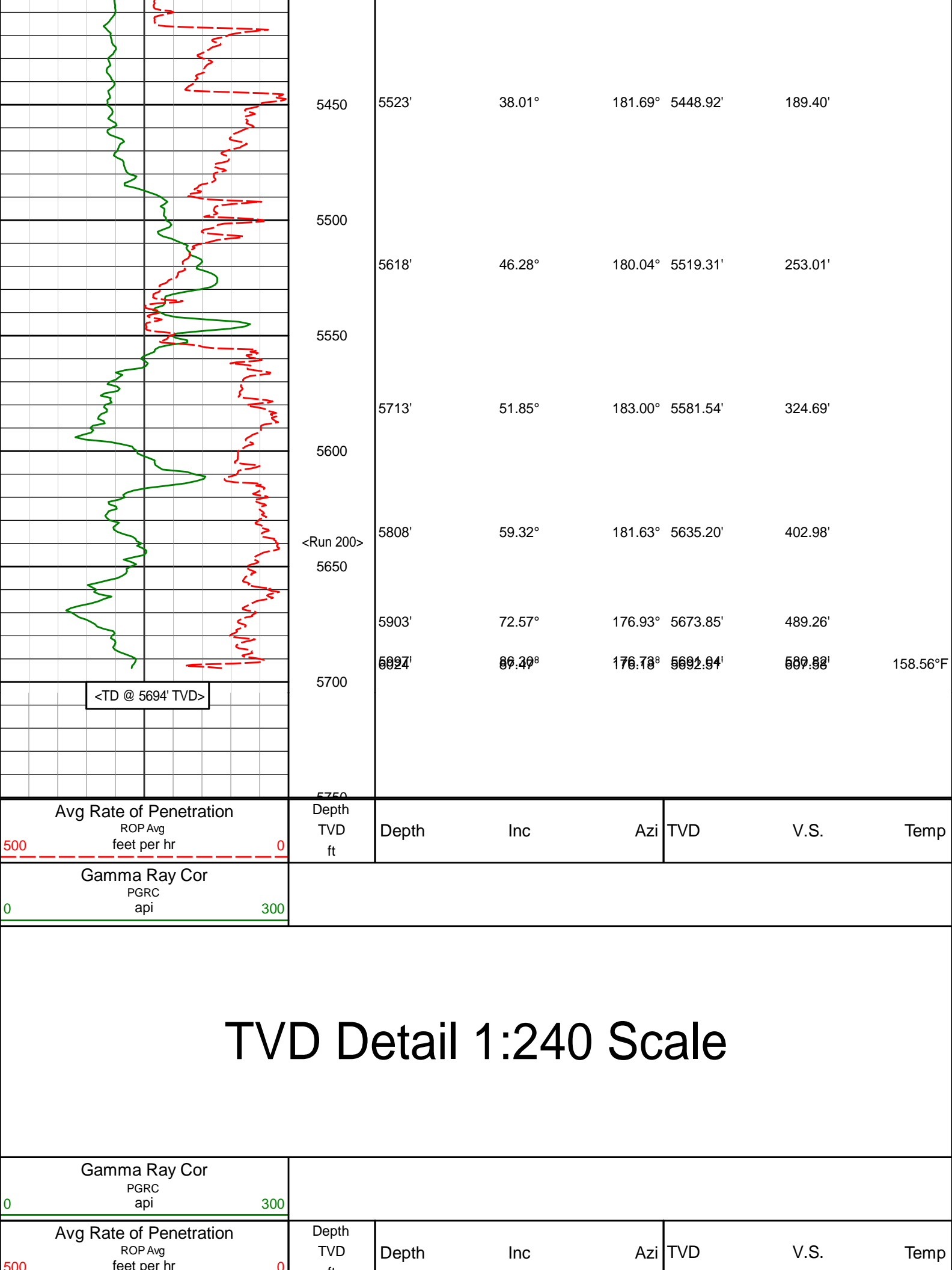
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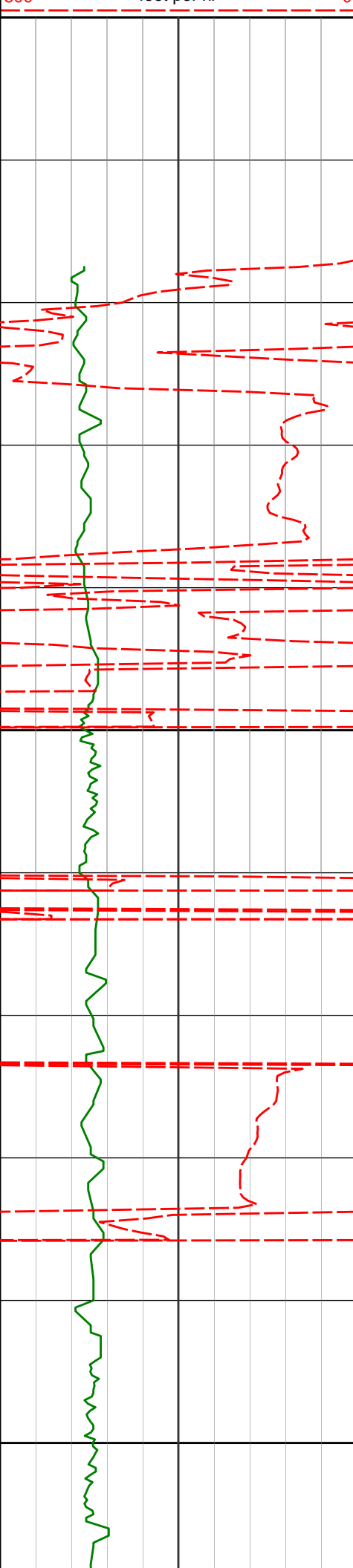
5300

5350

5400

4955'	0.68°	260.09°	4919.07'	18.73'
5049'	3.68°	184.39°	5013.00'	21.88'
5144'	10.96°	179.77°	5107.16'	33.95'
5238'	17.87°	179.41°	5198.15'	57.28'
5333'	24.31°	179.66°	5286.74'	91.36'
5428'	31.18°	182.11°	5370.77'	135.51'





<Run 100>

1300

1400

1291'

1.96°

166.58°

1290.91'

6.91'

1384'

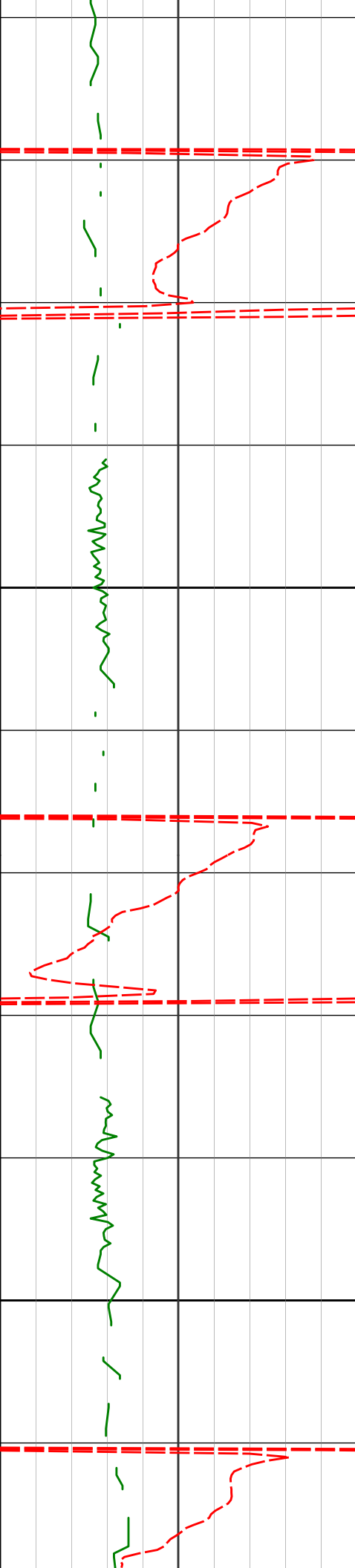
2.04°

248.42°

1383.87'

9.13'

103.72°F



1500

1600

1477'

4.25°

281.44° 1476.73'

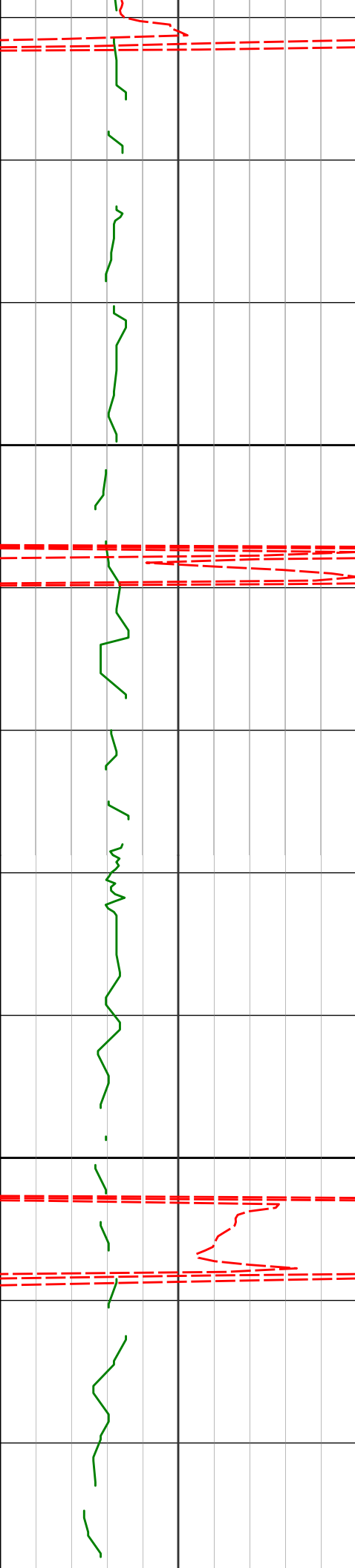
9.35'

1569'

7.28°

283.11° 1568.25'

7.90'



1700

1800

1662'

1754'

1847'

9.28°

9.02°

9.95°

285.31°

281.90°

281.30°

1660.28'

1751.11'

1842.84'

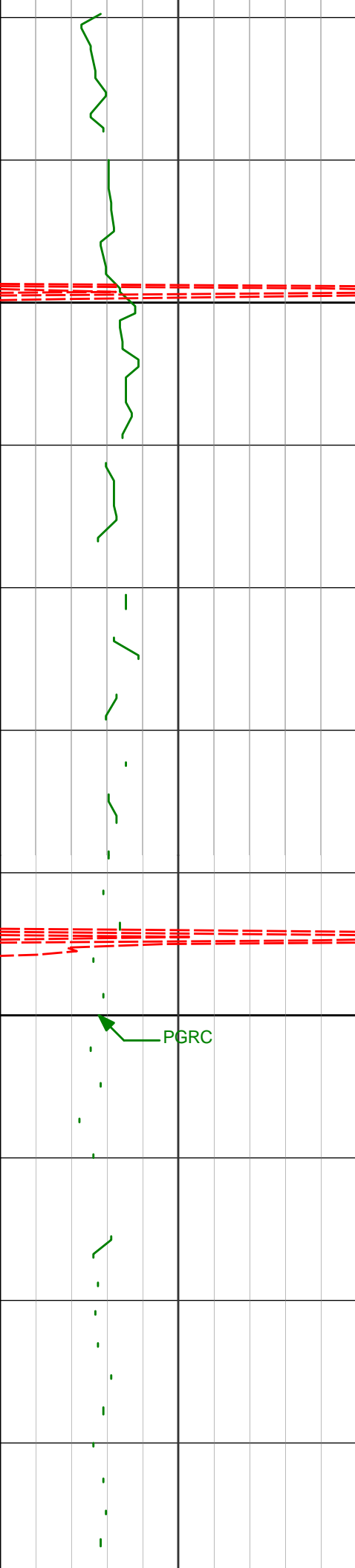
5.38'

2.81'

0.66'

82.62°F

82.62°F



1900

1939'

9.79°

279.58° 1933.48'

-1.25'

82.62°F

2000

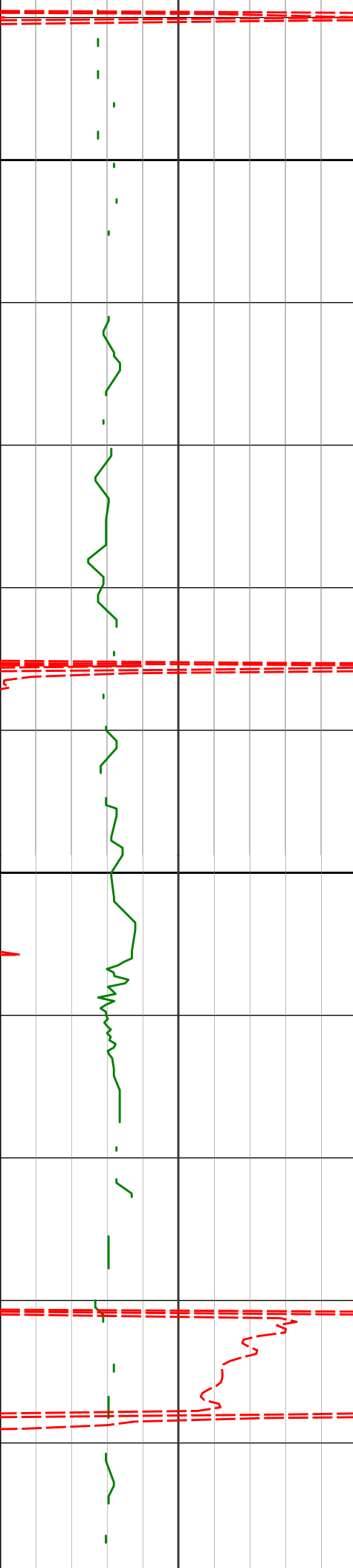
2031'

9.46°

279.15° 2024.18'

-2.82'

86.84°F



2100

2124'

9.52°

276.53°

2115.91'

-3.98'

86.84°F

2200

2216'

8.68°

275.97°

2206.75'

-4.68'

2308'

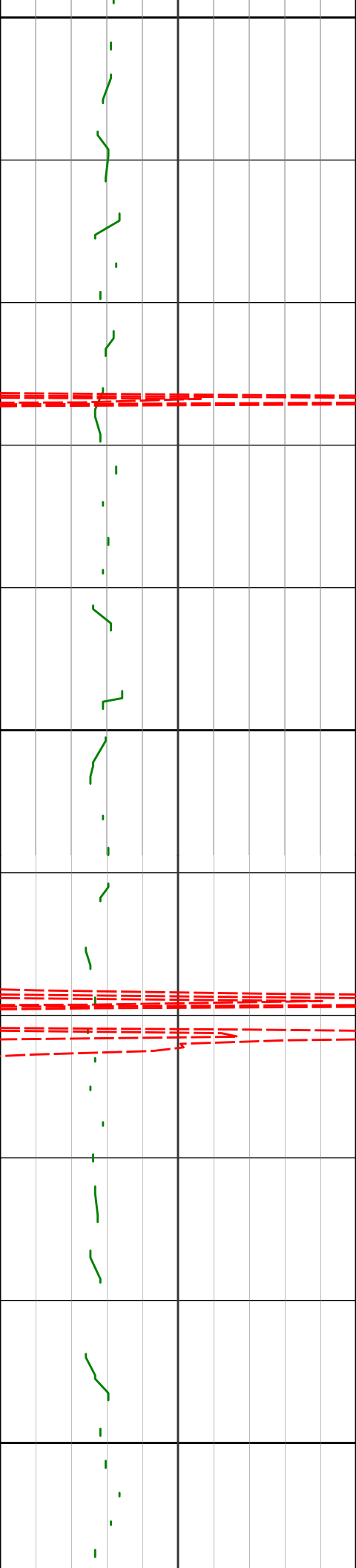
10.14°

275.56°

2297.51'

5.27'

91.06°F

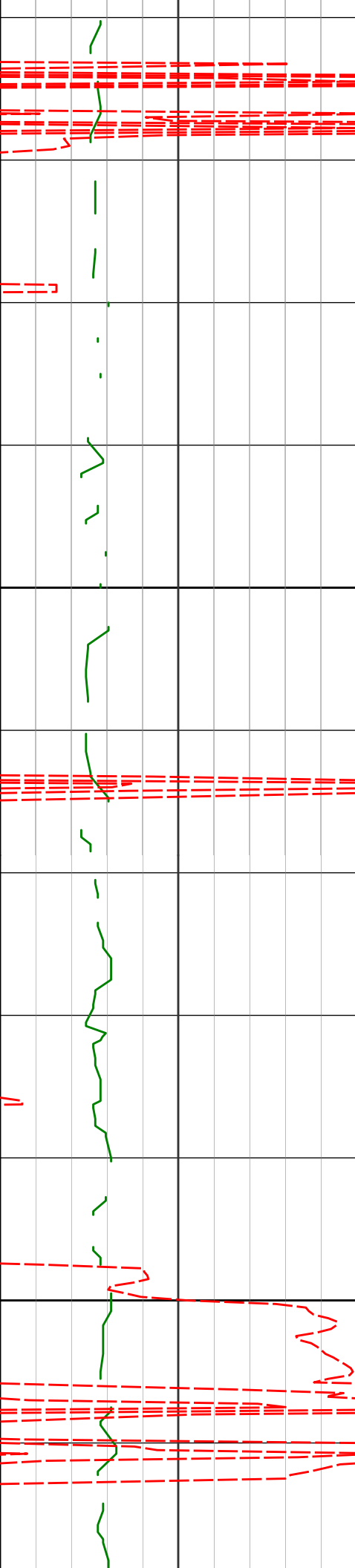


2300

2400

2500

2300	10.14	273.36	2297.31	-3.27	
2493'	9.67°	274.03°	2479.75'	-6.00'	91.06°F



2600

2683'

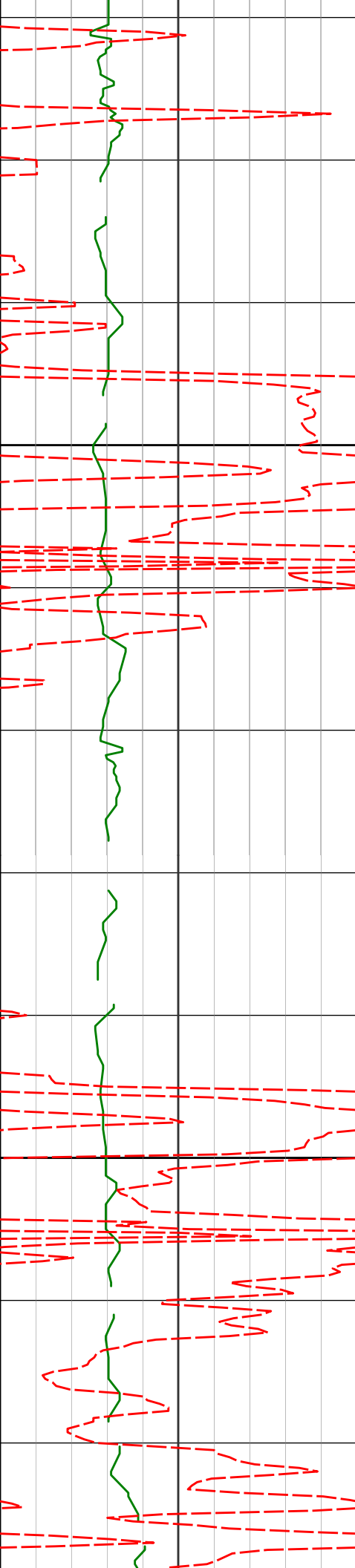
10.08°

272.90° 2666.94'

-5.97'

95.28°F

2700



2778'

9.90°

271.44° 2760.50'

-5.59'

95.28°F

2800

2900

99.50°F

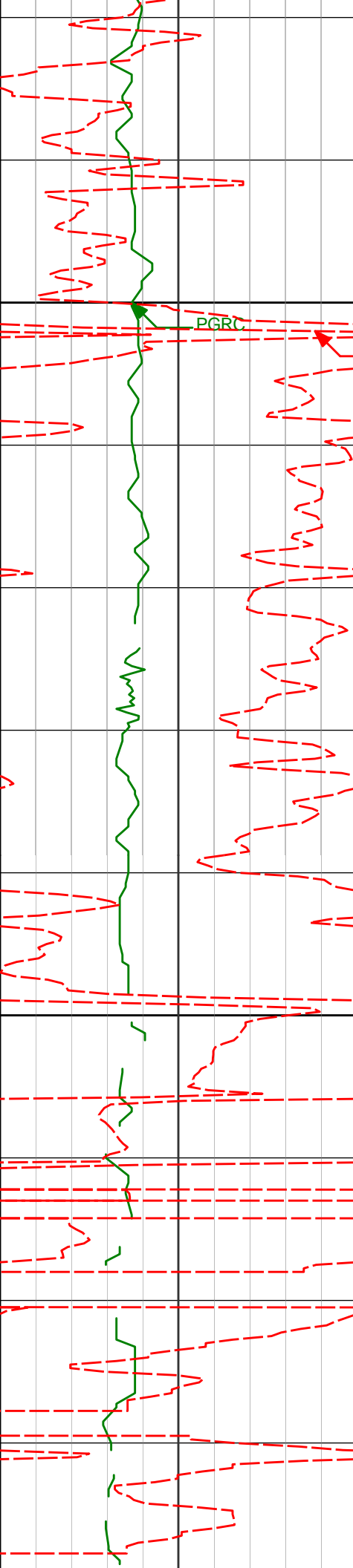
2968'

8.98°

273.16° 2947.92'

-4.91'

99.50°F



3000

PGRC

ROP Avg

3062'

7.45°

276.08°

3040.96'

-5.15'

3100

3157'

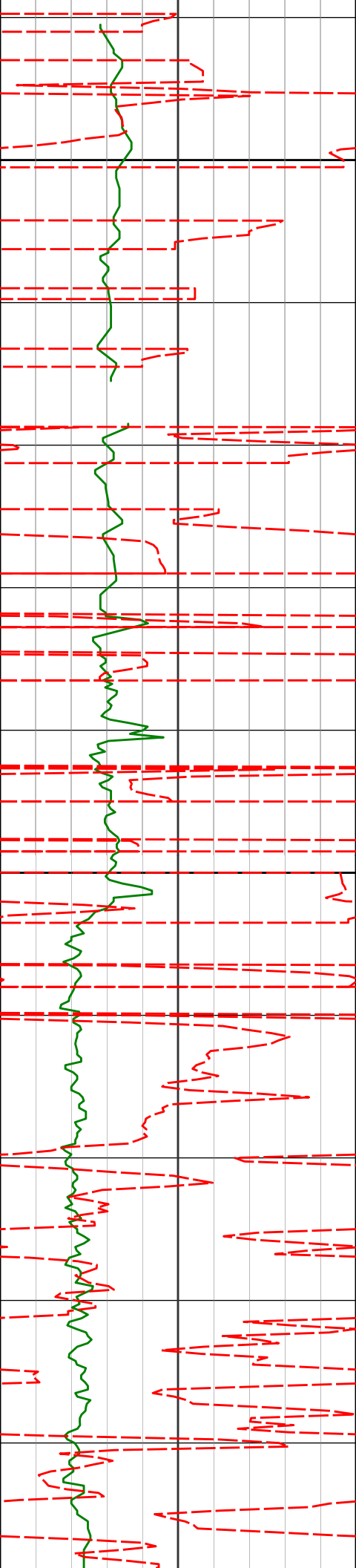
8.52°

268.74°

3135.03'

-4.84'

103.72°F



3200

3252'

8.62°

266.94° 3228.97'

-3.44'

103.72°F

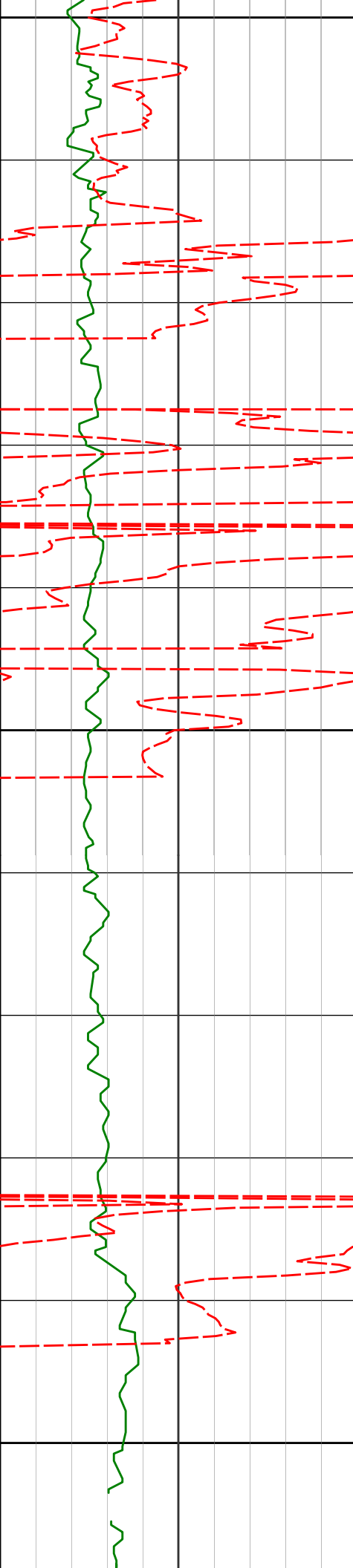
3300

3346'

8.58°

267.22° 3321.92'

-1.87'



3400

3441'

9.09°

267.90°

3415.79'

-0.36'

107.94°F

3500

3536'

9.51°

268.28°

3509.54'

1.08'

107.94°F

3600

3631'

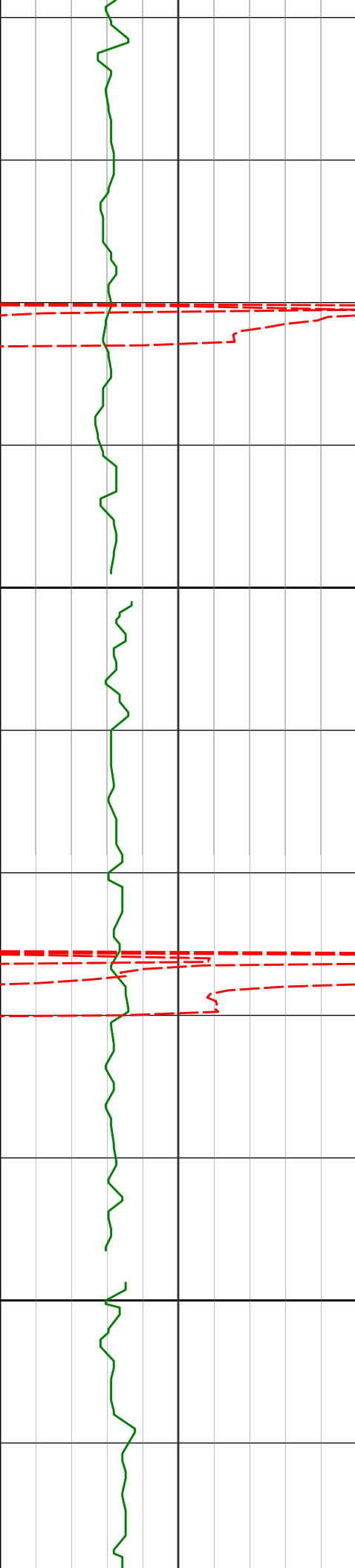
9.66°

268.60°

3603.21'

2.48'

107.94°F



3700

3725'

9.42°

268.53° 3695.91'

3.82'

112.16°F

3800

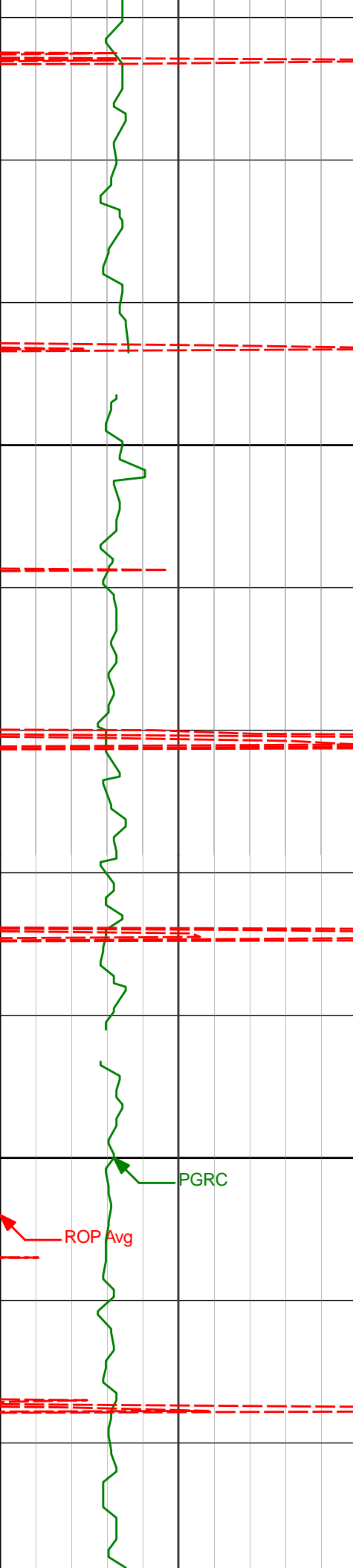
3820'

8.77°

268.25° 3789.72'

5.16'

112.16°F



3900

4000

3915'

7.86°

269.54° 3883.72'

6.27'

112.16°F

4009'

7.29°

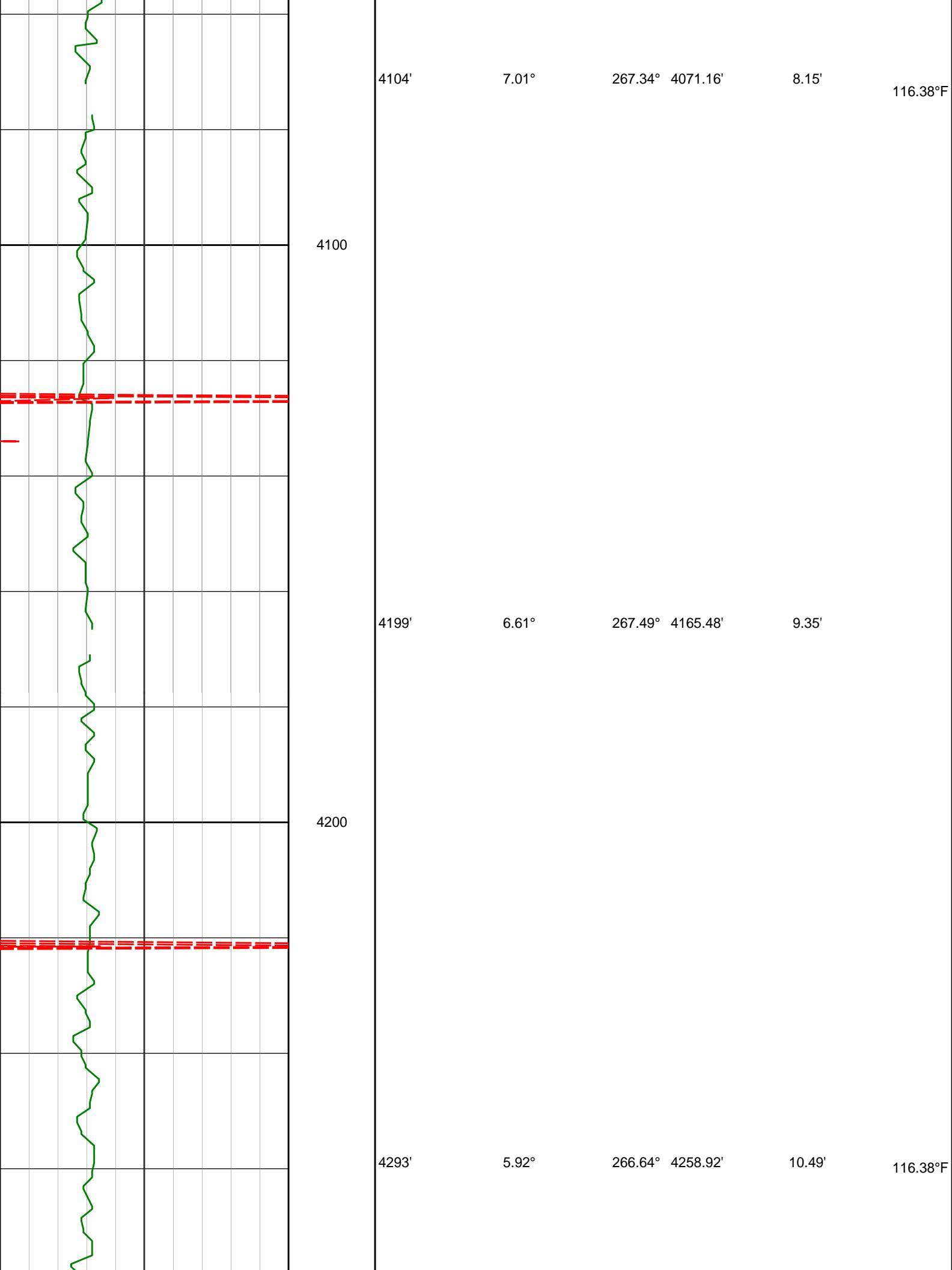
269.60° 3976.89'

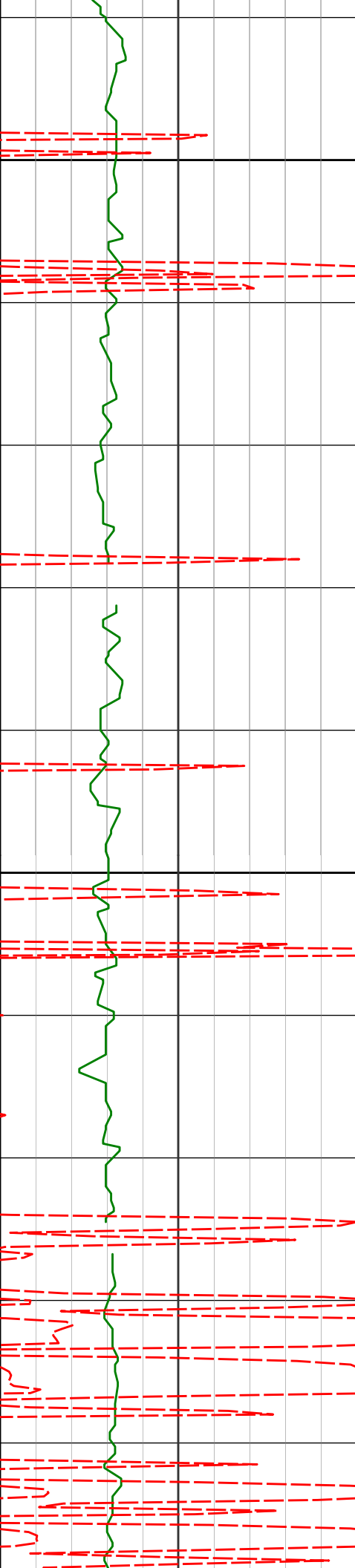
7.12'

112.16°F

PGRC

ROP Avg





4300

4387'

5.47°

265.32° 4352.46'

11.71'

4400

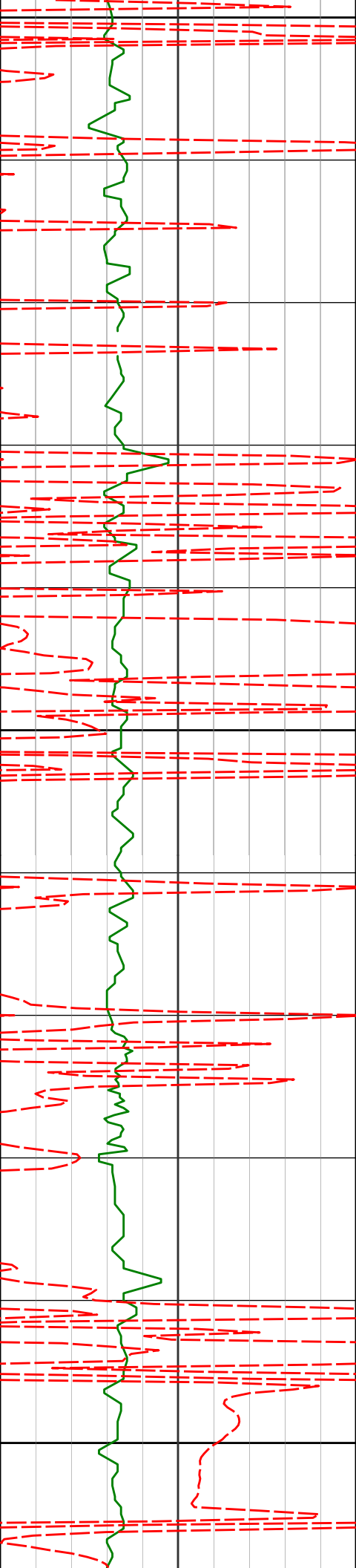
4482'

5.10°

264.55° 4447.05'

13.01'

116.38°F



4500

4575'

5.10°

262.77° 4539.68'

14.42'

120.59°F

4600

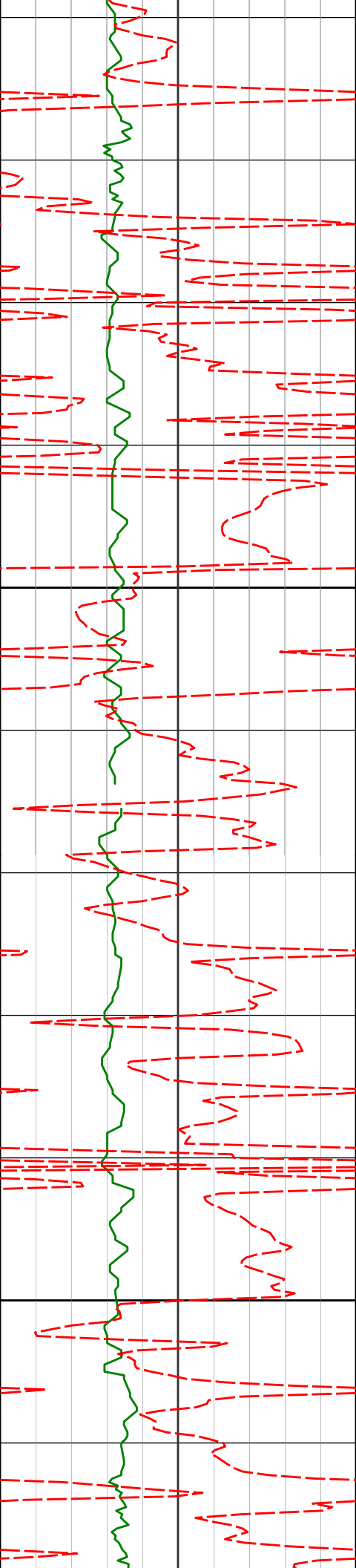
4670'

5.03°

260.82° 4634.31'

16.12'

4700



4800

4900

<KOP>

4765'

2.31°

259.28° 4729.11'

17.51'

4860'

0.68°

240.36° 4824.07'

18.29'

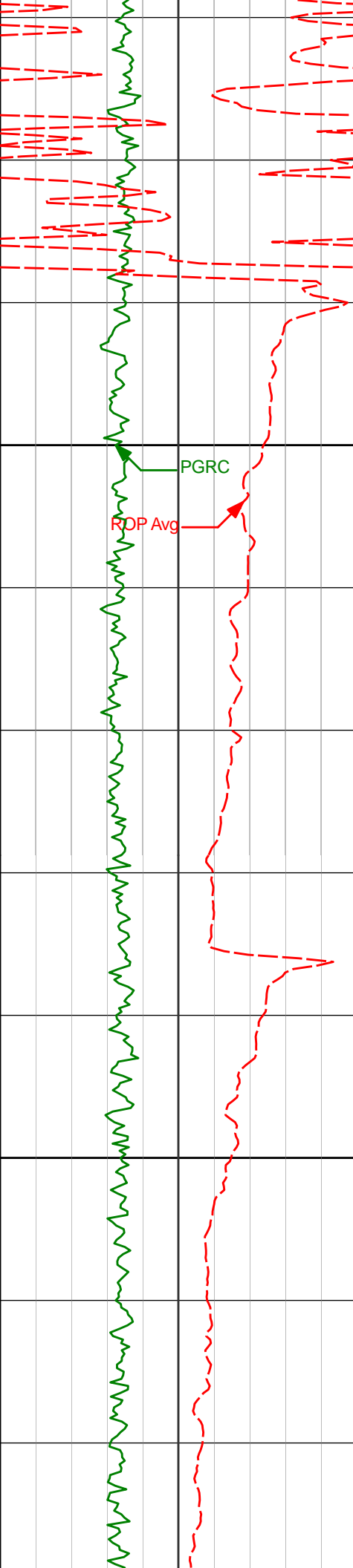
124.81°F

4955'

0.68°

260.09° 4919.07'

18.73'



5000

5100

5049'

3.68°

184.39°

5013.00'

21.88'

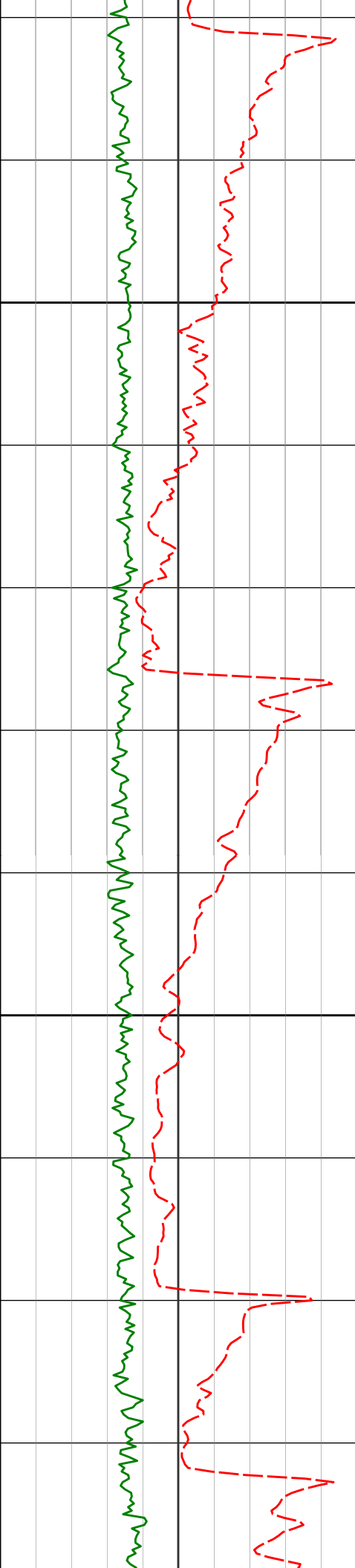
5144'

10.96°

179.77°

5107.16'

33.95'



5200

5238'

17.87°

179.41° 5198.15'

57.28'

5300

5333'

24.31°

179.66° 5286.74'

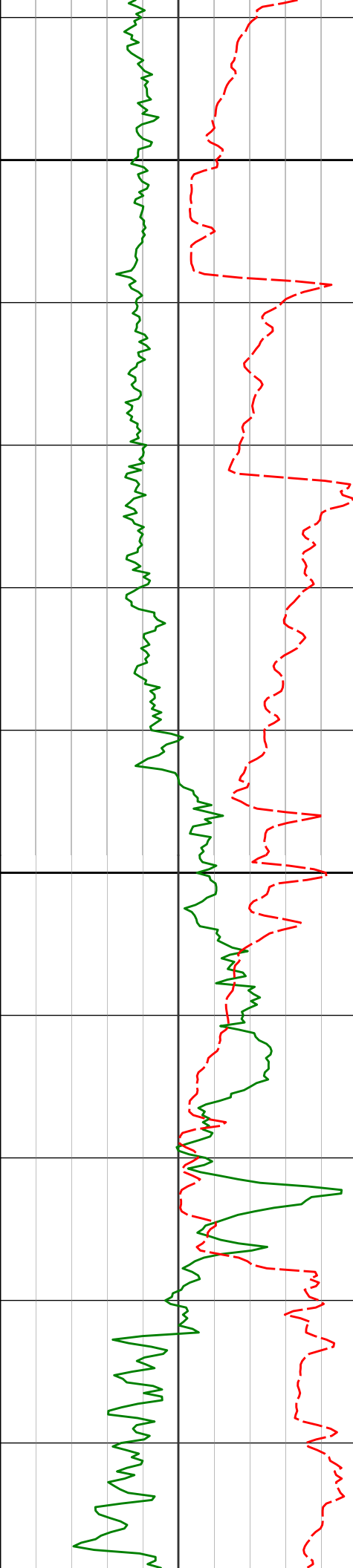
91.36'

5428'

31.18°

182.11° 5370.77'

135.51'



5400

5500

5523'

38.01°

181.69°

5448.92'

189.40'

5618'

46.28°

180.04°

5519.31'

253.01'

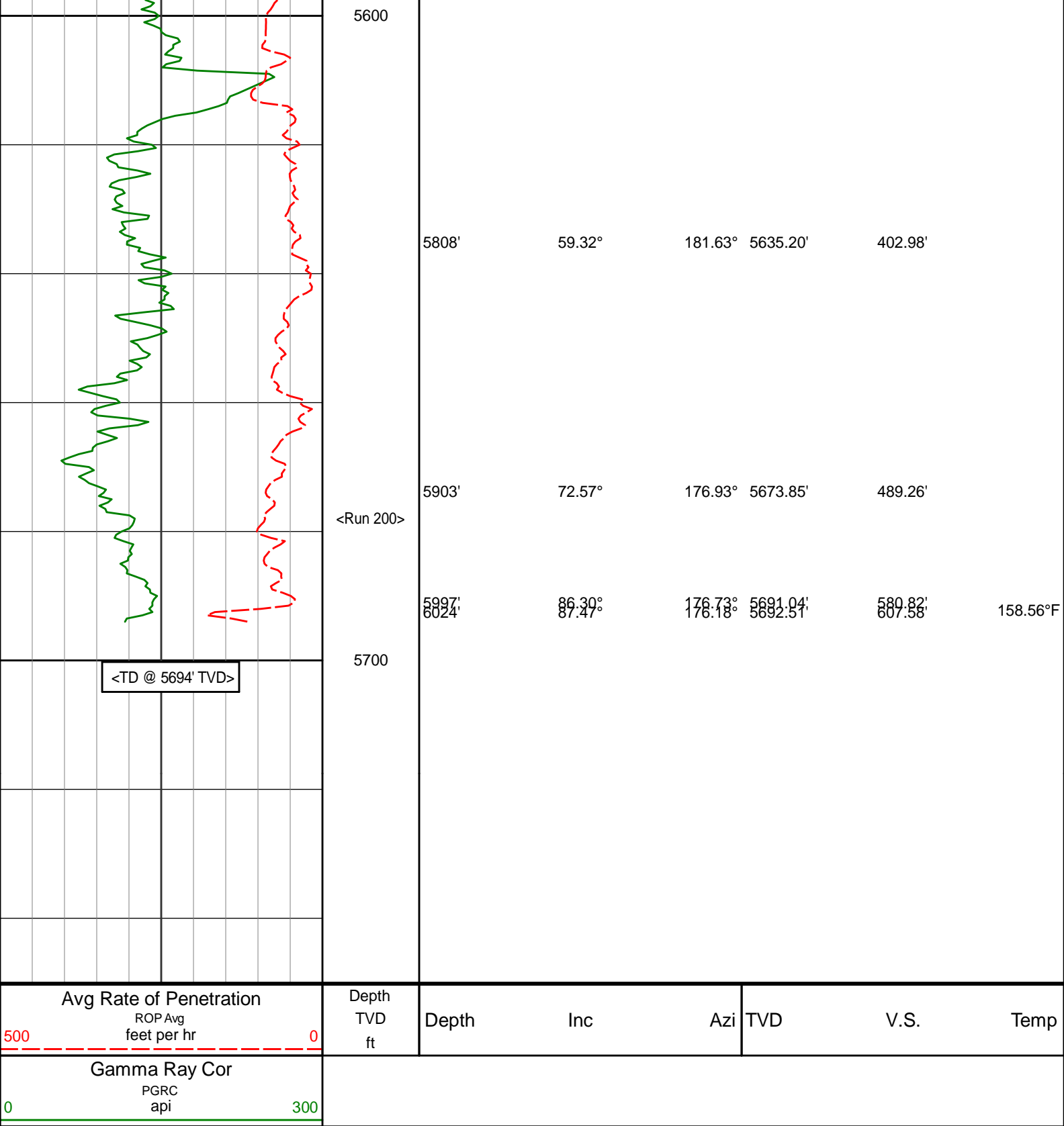
5713'

51.85°

183.00°

5581.54'

324.69'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy Inc
Moses State LD11-78HN
Wattenberg
Weld Colorado
USA
CA-XX-0902009415

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
475.00	0.20	282.52	475.00	0.18 N	0.81 W	-0.13	0.04
847.00	0.20	88.92	847.00	0.33 N	0.79 W	-0.28	0.11
1291.00	1.96	166.58	1290.91	7.03 S	1.74 E	6.91	0.43
1384.00	2.04	248.42	1383.87	9.18 S	0.57 E	9.13	2.81
1477.00	4.25	281.44	1476.73	9.10 S	4.35 W	9.35	2.99
1569.00	7.28	283.11	1568.25	7.10 S	13.37 W	7.90	3.30
1662.00	9.28	285.31	1660.28	3.78 S	26.35 W	5.38	2.17
1754.00	9.02	281.90	1751.11	0.34 S	40.56 W	2.81	0.66
1847.00	9.95	281.30	1842.84	2.74 N	55.57 W	0.66	1.01
1939.00	9.79	279.58	1933.48	5.60 N	71.07 W	-1.25	0.36
2031.00	9.46	279.15	2024.18	8.10 N	86.25 W	-2.82	0.36
2124.00	9.52	276.53	2115.91	10.19 N	101.43 W	-3.98	0.47
2216.00	8.68	275.97	2206.75	11.78 N	115.89 W	-4.68	0.92
2308.00	10.14	275.56	2297.51	13.28 N	130.85 W	-5.27	1.59
2493.00	9.67	274.03	2479.75	15.95 N	162.56 W	-6.00	0.29
2683.00	10.08	272.90	2666.94	17.91 N	195.09 W	-5.97	0.24
2778.00	9.90	271.44	2760.50	18.54 N	211.56 W	-5.59	0.33
2968.00	8.98	273.16	2947.92	19.77 N	242.70 W	-4.91	0.51
3062.00	7.45	276.08	3040.96	20.82 N	256.08 W	-5.15	1.68
3157.00	8.52	268.74	3135.03	21.32 N	269.24 W	-4.84	1.56
3252.00	8.62	266.94	3228.97	20.78 N	283.39 W	-3.44	0.30
3346.00	8.58	267.22	3321.92	20.07 N	297.43 W	-1.87	0.06
3441.00	9.09	267.90	3415.79	19.45 N	312.01 W	-0.36	0.55
3536.00	9.51	268.28	3509.54	18.94 N	327.36 W	1.08	0.44
3631.00	9.66	268.60	3603.21	18.51 N	343.17 W	2.48	0.17
3725.00	9.42	268.53	3695.91	18.12 N	358.75 W	3.82	0.26
3820.00	8.77	268.25	3789.72	17.69 N	373.77 W	5.16	0.68
3915.00	7.86	269.54	3883.72	17.42 N	387.51 W	6.27	0.98
4009.00	7.29	269.60	3976.89	17.33 N	399.91 W	7.12	0.61
4104.00	7.01	267.34	4071.16	17.02 N	411.73 W	8.15	0.42
4199.00	6.61	267.49	4165.48	16.51 N	422.99 W	9.35	0.42
4293.00	5.92	266.64	4258.92	15.99 N	433.24 W	10.49	0.74
4387.00	5.47	265.32	4352.46	15.34 N	442.55 W	11.71	0.50
4482.00	5.10	264.55	4447.05	14.57 N	451.27 W	13.01	0.40
4575.00	5.10	262.77	4539.68	13.65 N	459.48 W	14.42	0.17
4670.00	5.03	260.82	4634.31	12.46 N	467.78 W	16.12	0.19
4765.00	2.31	259.28	4729.11	11.44 N	473.78 W	17.51	2.87
4860.00	0.68	240.36	4824.07	10.80 N	476.16 W	18.29	1.77
4955.00	0.68	260.09	4919.07	10.42 N	477.20 W	18.73	0.25
5049.00	3.68	184.39	5013.00	7.32 N	477.98 W	21.88	3.80
5144.00	10.96	179.77	5107.16	4.77 S	478.18 W	33.95	7.68
5238.00	17.87	179.41	5198.15	28.15 S	477.99 W	57.28	7.36
5333.00	24.31	179.66	5286.74	62.31 S	477.73 W	91.36	6.78
5428.00	31.18	182.11	5370.77	106.50 S	478.52 W	135.51	7.33
5523.00	38.01	181.69	5448.92	160.38 S	480.28 W	189.40	7.19
5618.00	46.28	180.04	5519.31	224.05 S	481.17 W	253.01	8.78
5713.00	51.85	183.00	5581.54	295.75 S	483.15 W	324.69	6.31
5808.00	59.32	181.63	5635.20	374.00 S	486.27 W	402.98	7.96
5903.00	72.57	176.93	5673.85	460.51 S	485.00 W	489.26	14.66
5997.00	86.30	176.73	5691.04	552.56 S	479.89 W	580.82	14.61
6024.00	87.47	176.18	5692.51	579.46 S	478.23 W	607.58	4.78
6077.00	87.47	176.18	5694.85	632.29 S	474.70 W	660.09	0.01

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 183.50 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 6077.00 FEET
IS 790.66 FEET ALONG 216.90 DEGREES (GRID)**

Surface surveys at 475 ft and 847 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6024 ft MD to TD at 6077 ft MD.