



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	26-Jan-15	27-Jan-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (MD, ft)	1,224.00	4,813.00			
Log End Depth (MD, ft)	4,813.00	6,016.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	26-Jan-15 11:00	27-Jan-15 04:00			
Drill/Wipe End Date and Time	26-Jan-15 20:00	27-Jan-15 14:30			
Min Inc (deg) @ Depth (MD, ft)	0.17 @ 1,267.00	3.55 @ 4,853.00			
Max Inc (deg) @ Depth (MD, ft)	7.26 @ 2,583.00	79.60 @ 5,962.00			
Bit TFA(in2) / Bit Type	0.91 /	0.91 / PDC			
Flow Rate (gpm)	582.19	537.88			
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)	10.80 / 32.00	11.75 / 36.00			
Filtrate CL (ppm)	475.00	475.00			
pH / Fluid Loss (mptm)	9.50 / 0	8.40 / 0			
PV (cP) / YP (lbf2)	7 / 4.00	12 / 7.00			
% Solids / % Sand	7.2 / 0.1	12.60 / 0.10			
% 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	100.00 / PCM	100.00 / PCM			

Max Tool Temp (degF) / Source	133.30 / PCM	162.30 / 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	22-Jan-15 11:54	22-Jan-15 11:54:00			
Date and Time Read	27-Jan-15 20:04	27-Jan-15 20:10			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	54.00	54.00			
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)	217.70	109.40			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.58	46.86			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11303511	11303511			
Insert/Sonde Serial Number	11120599	11120599			

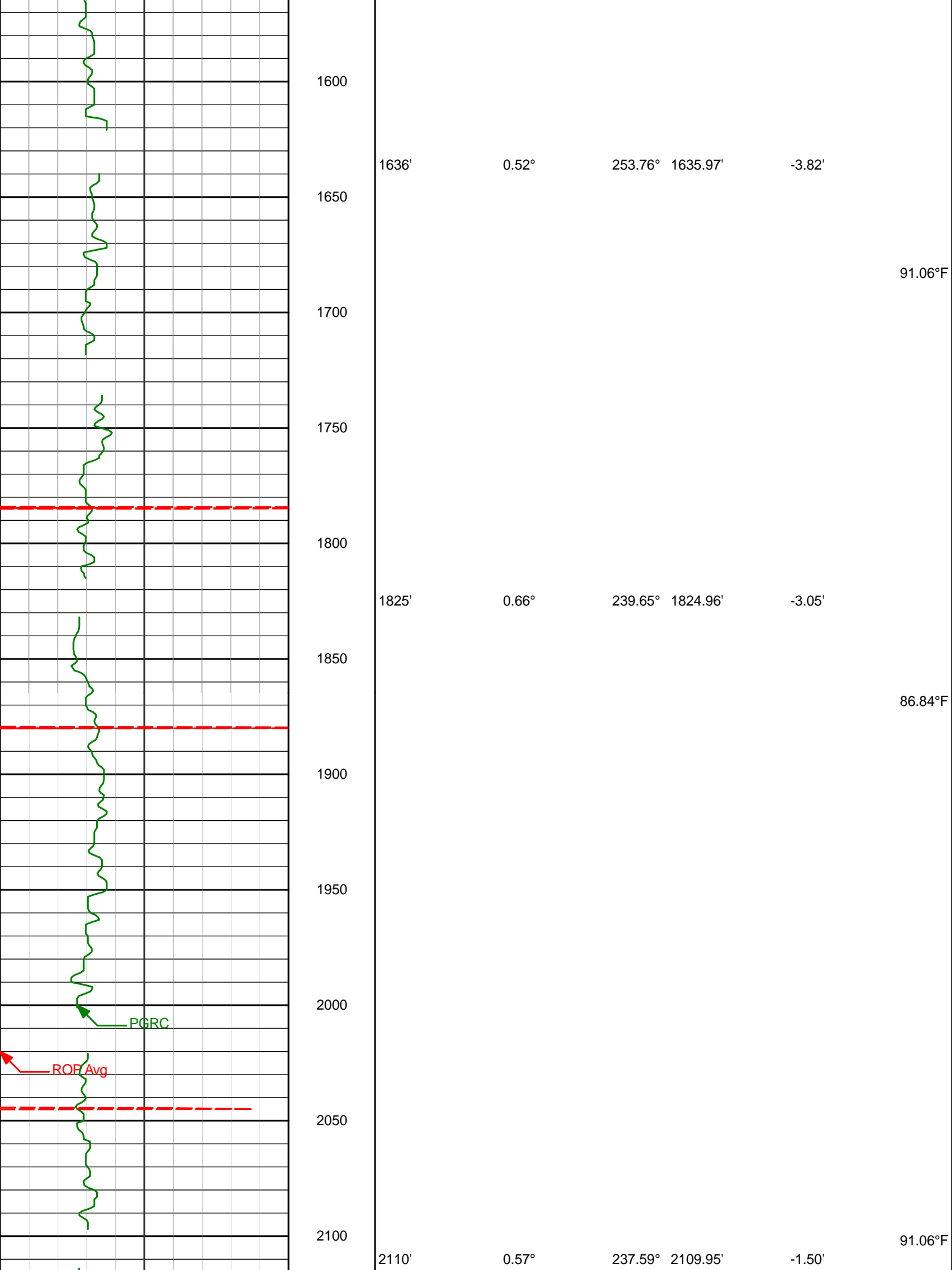
REMARKS

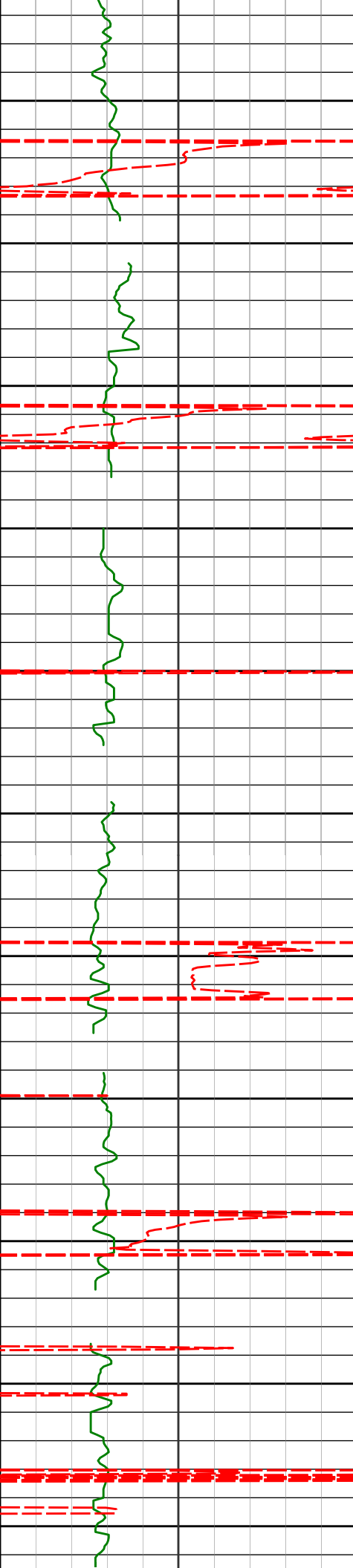
1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.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

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TVD Detail 1:600 Scale





2150

2200

2250

2300

2350

2400

2450

2500

2550

2600

2650

2204'

2.96°

242.34° 2203.90'

-0.15'

2299'

4.48°

238.27° 2298.69'

2.88'

91.06°F

2394'

4.52°

235.93° 2393.40'

6.87'

95.28°F

2488'

5.78°

235.60° 2487.02'

11.54'

95.28°F

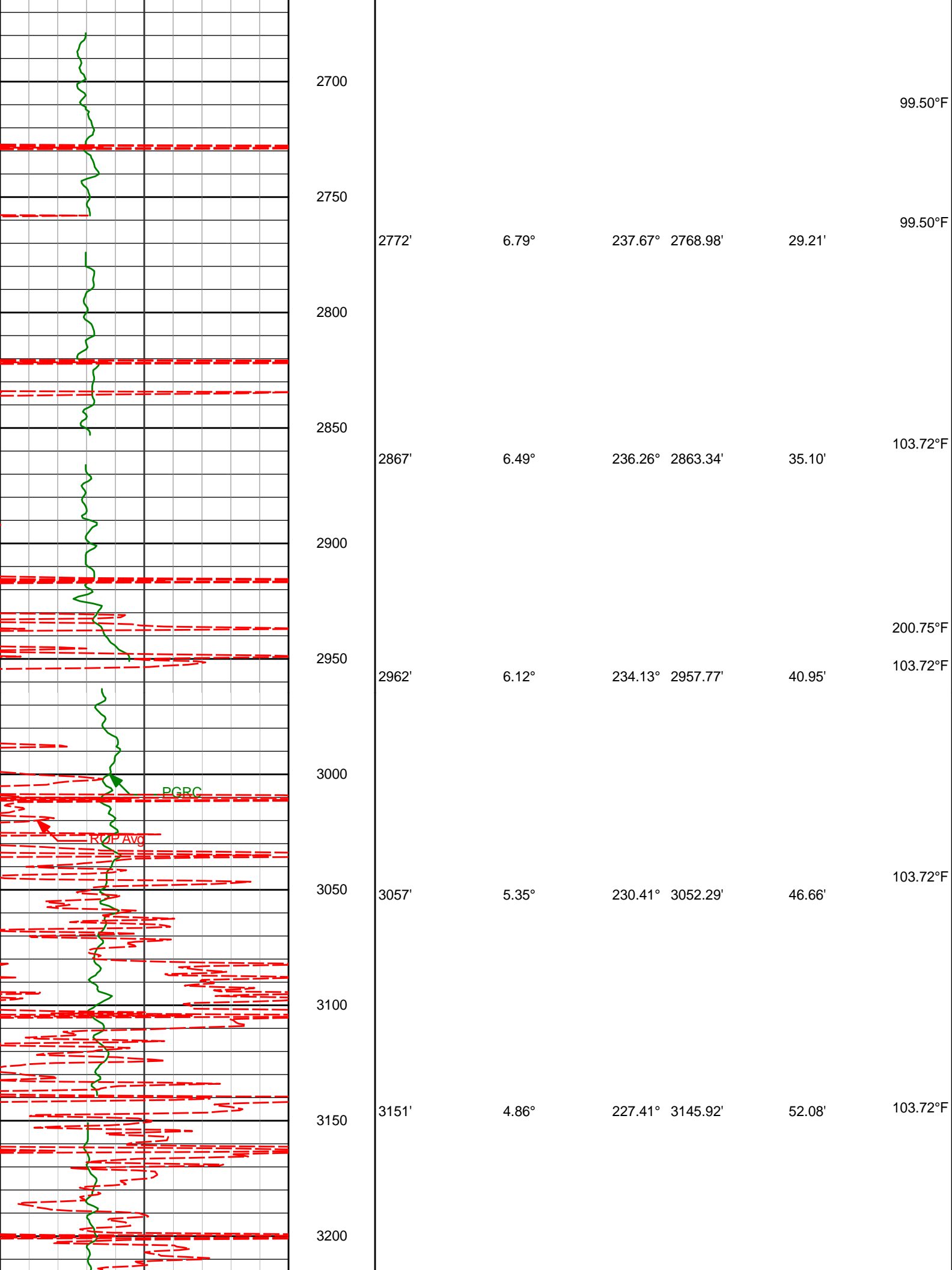
2583'

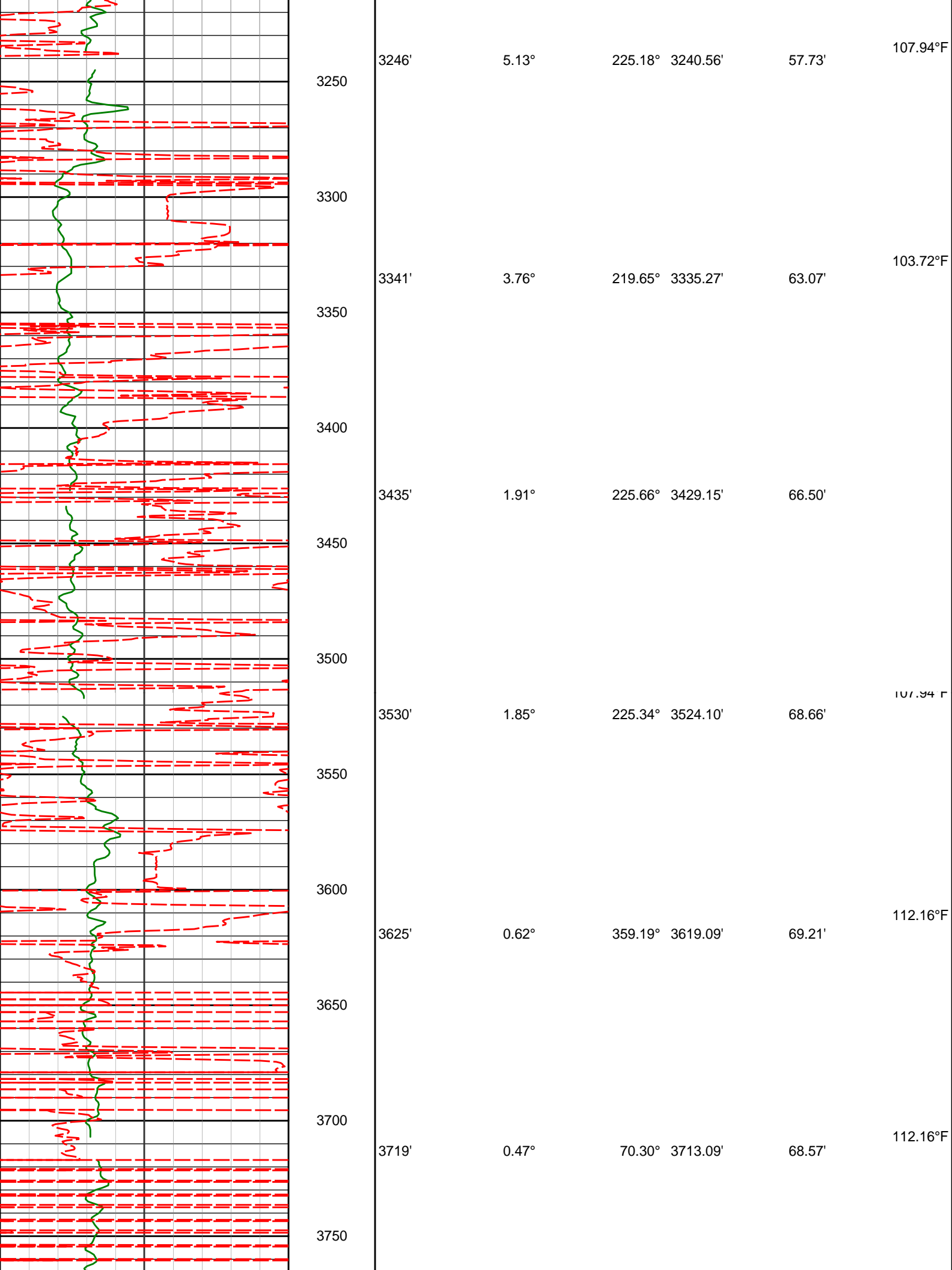
7.26°

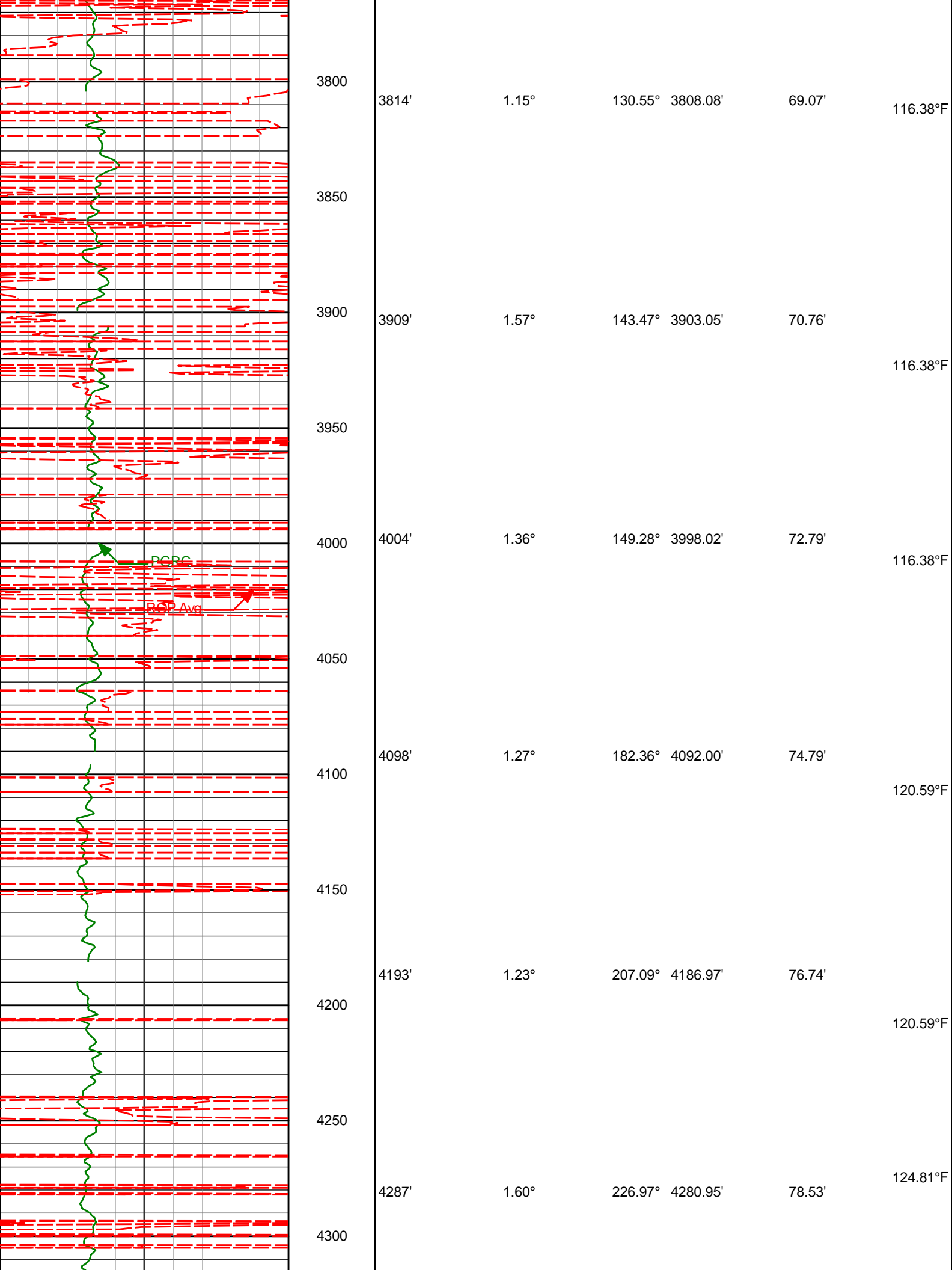
238.82° 2581.40'

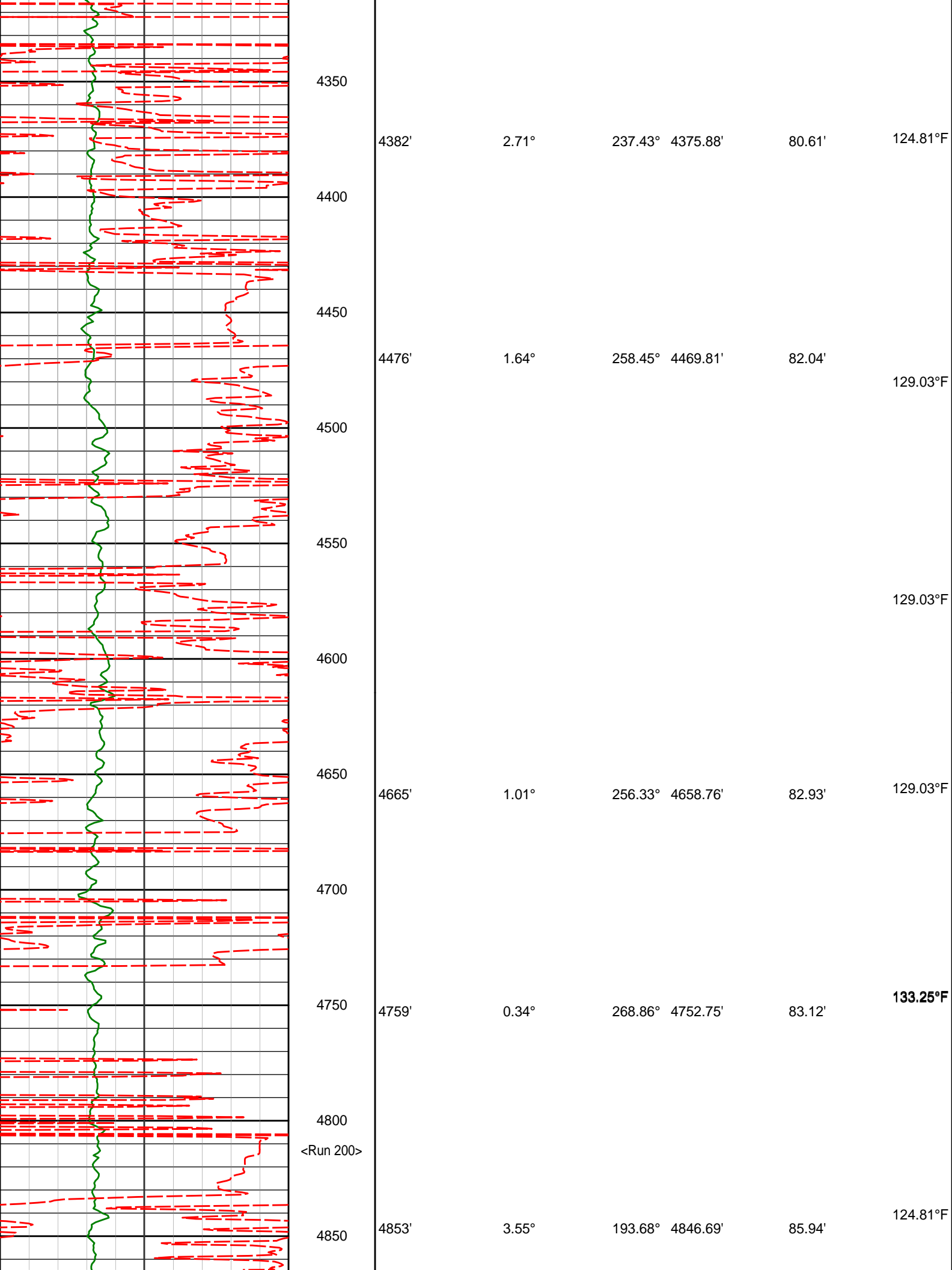
17.26'

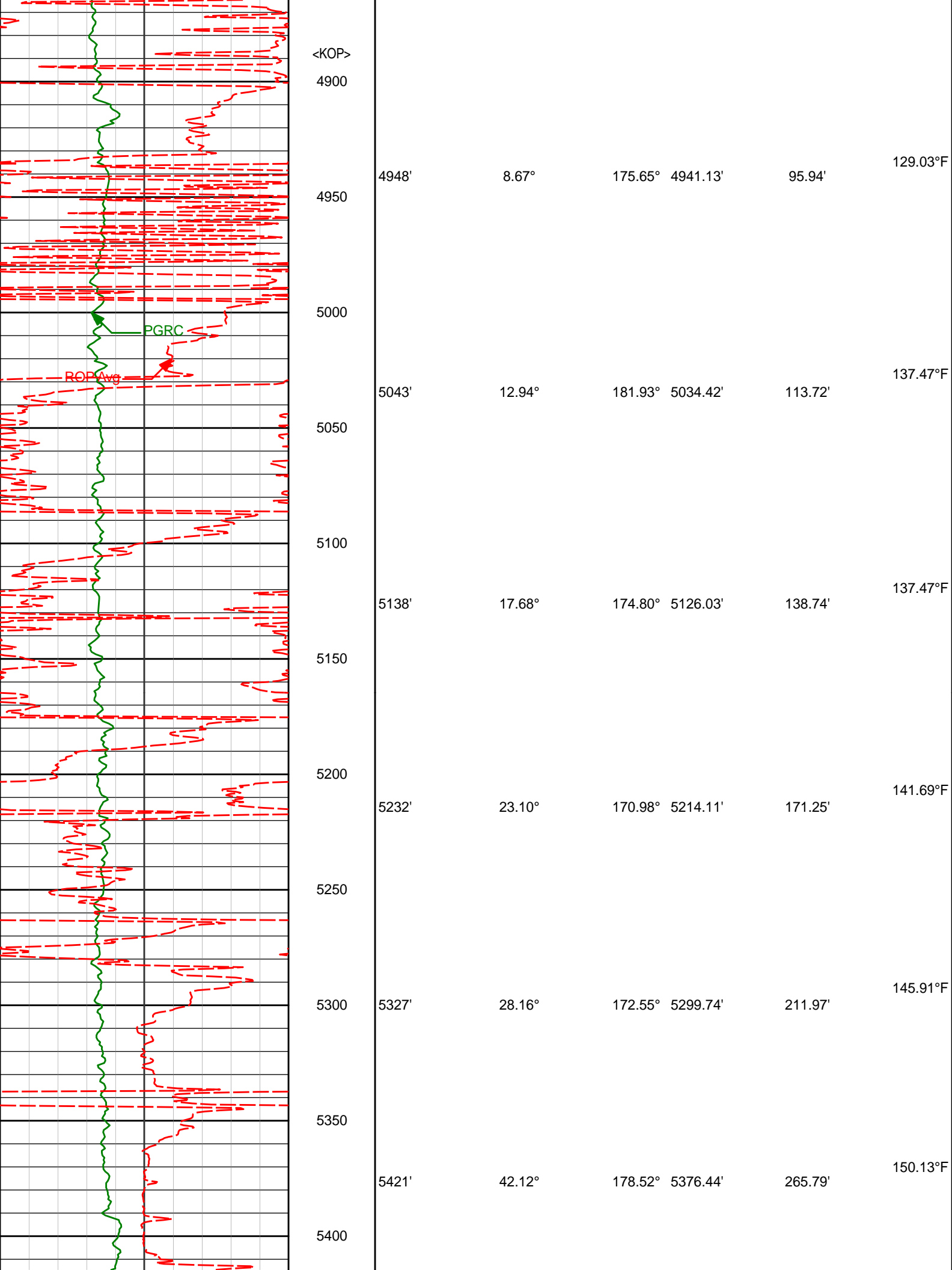
95.28°F

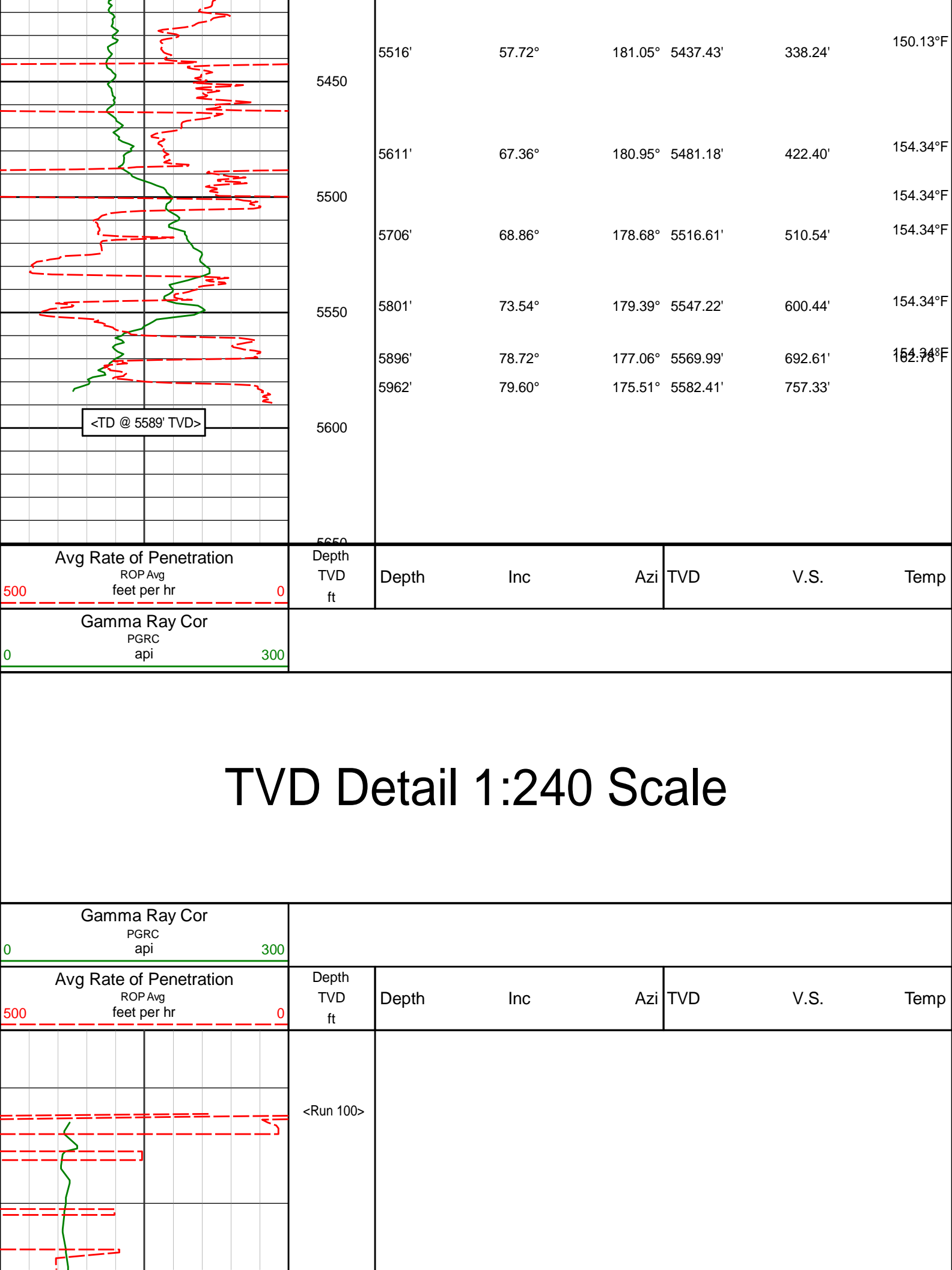


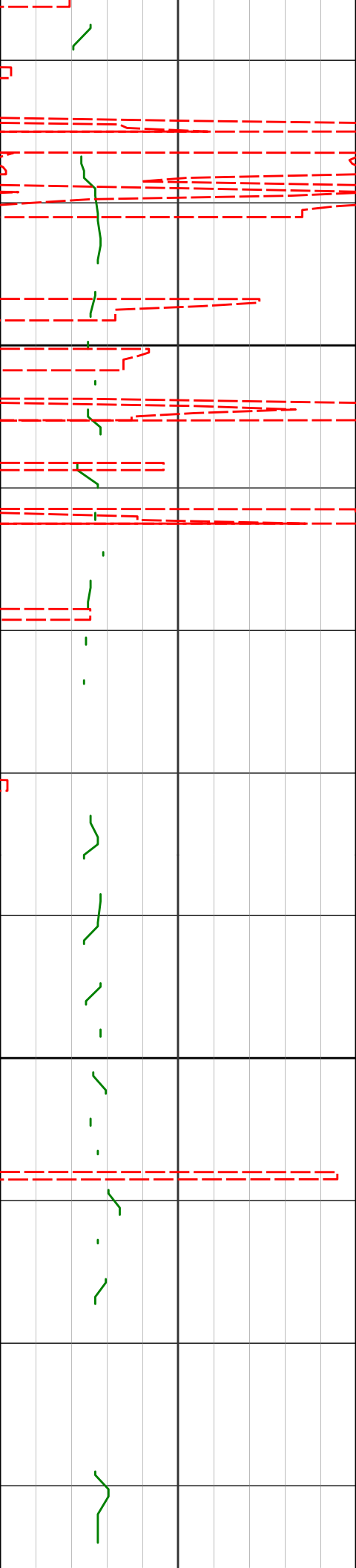












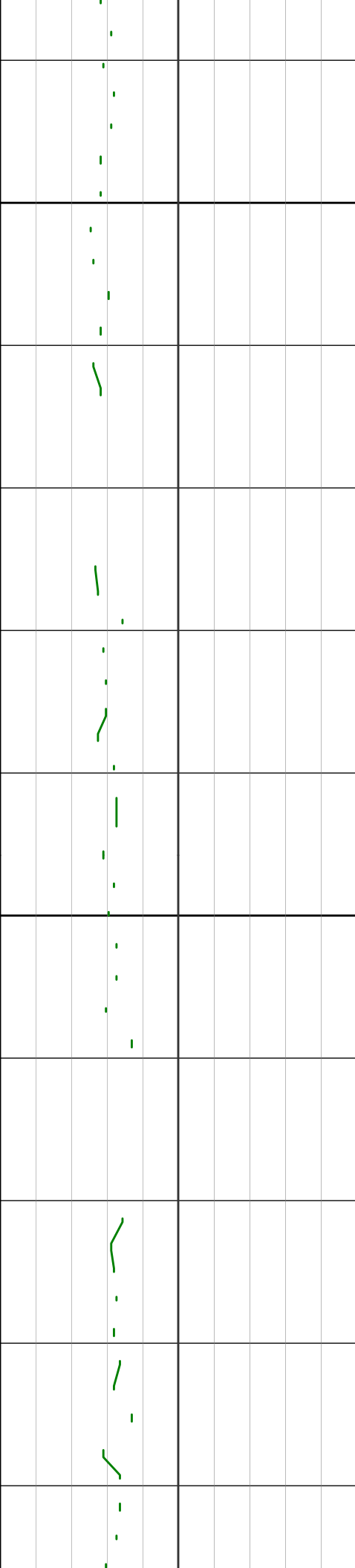
1267'

0.17°

208.12° 1266.98'

-4.79'

78.41°F



1500

1600

1544'

0.50°

251.17° 1543.98'

-4.06'

1636'

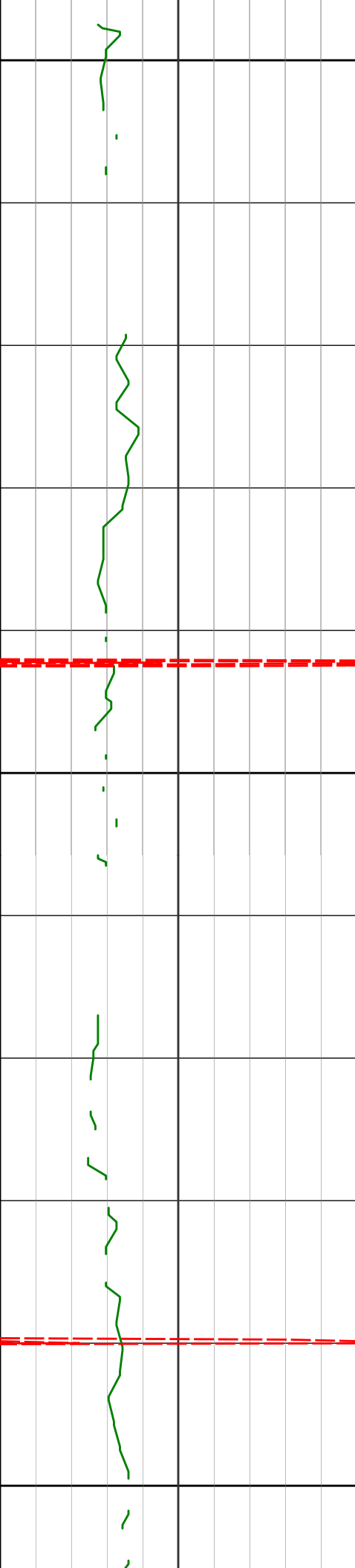
0.52°

253.76° 1635.97'

-3.82'

82.62°F

91.06°F



1700

1800

1900

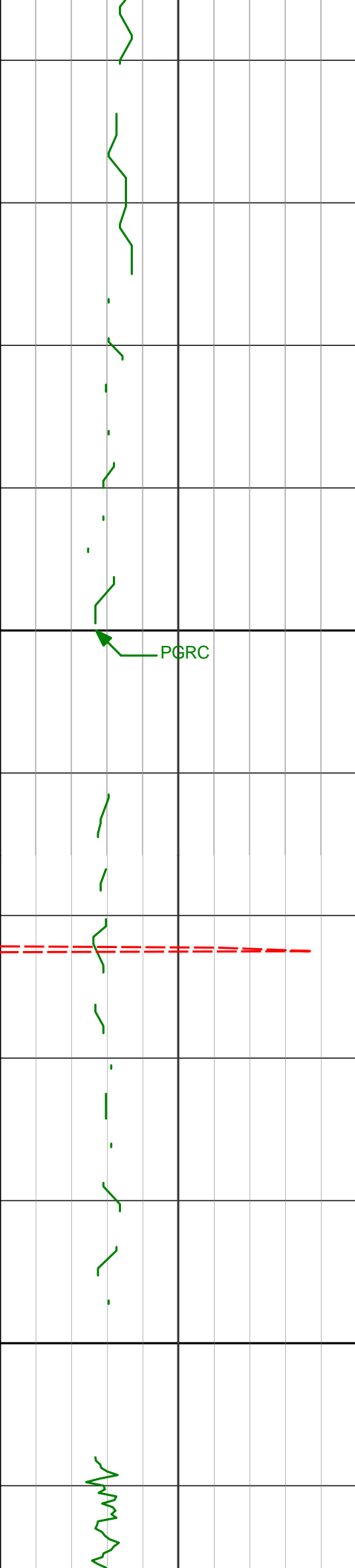
1825'

0.66°

239.65° 1824.96'

-3.05'

86.84°F



2000

2100

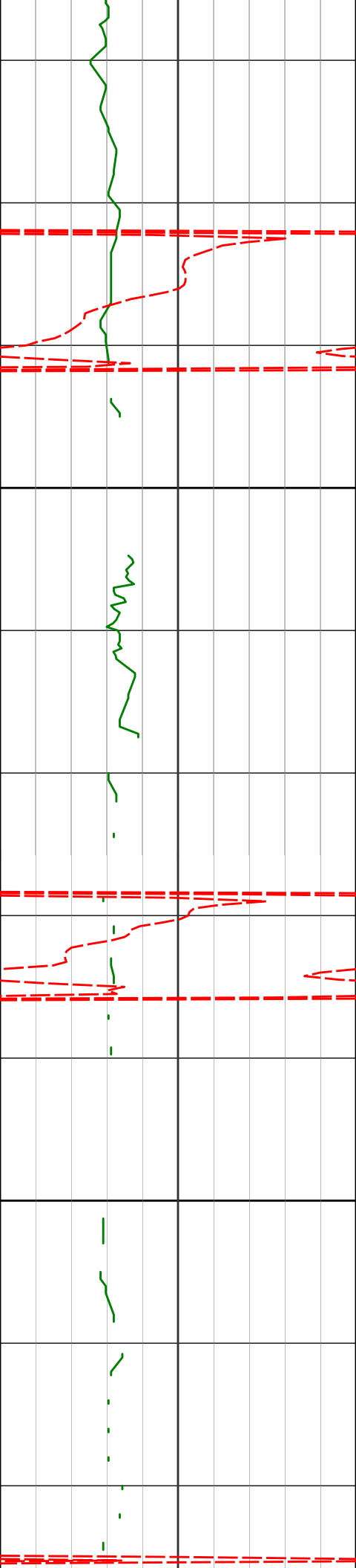
2110'

0.57°

237.59° 2109.95'

-1.50'

91.06°F



2200

2204'

2.96°

242.34° 2203.90'

-0.15'

2300

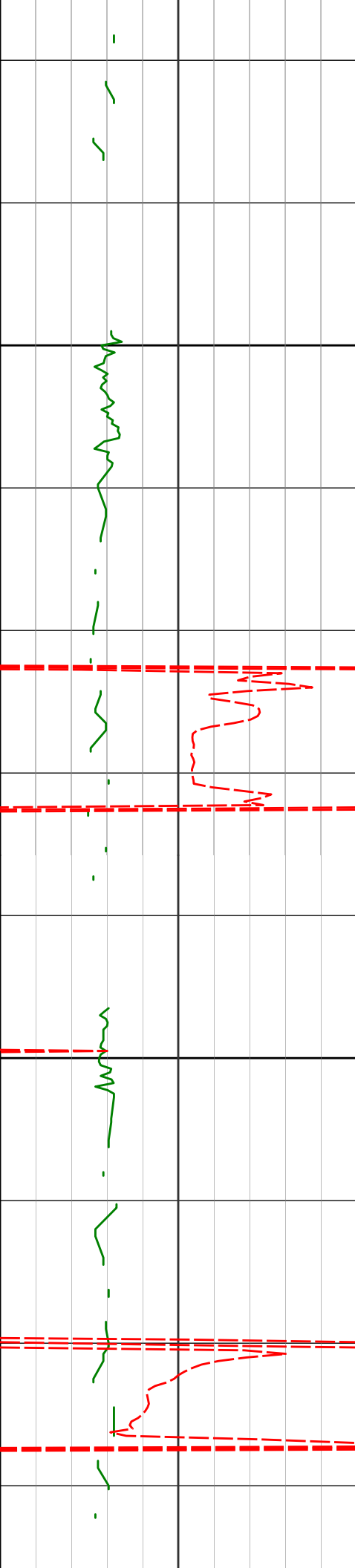
2299'

4.48°

238.27° 2298.69'

2.88'

91.06°F



2400

2500

2394'

4.52°

235.93° 2393.40'

6.87'

95.28°F

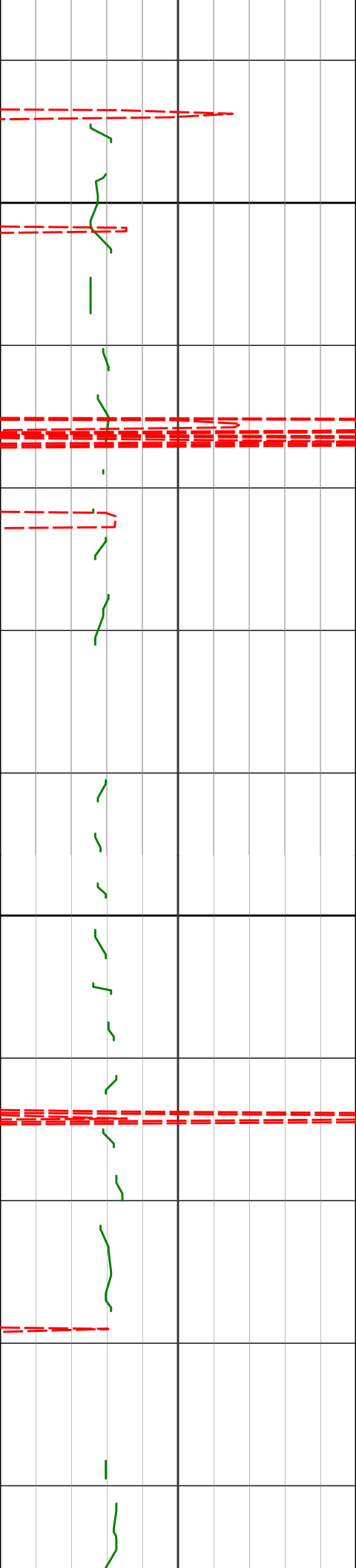
2488'

5.78°

235.60° 2487.02'

11.54'

95.28°F



2583'

7.26°

238.82° 2581.40'

17.26'

95.28°F

2600

2700

99.50°F

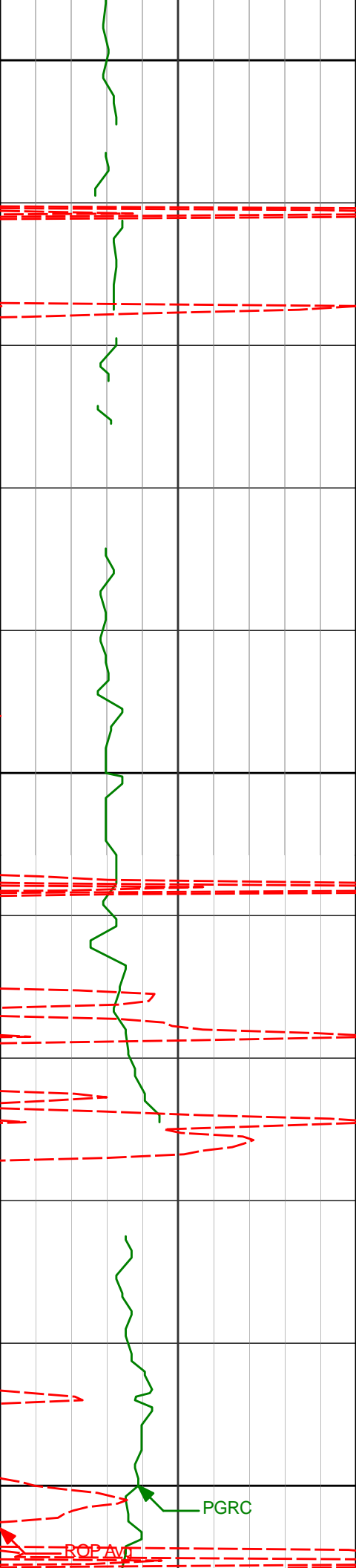
99.50°F

2772'

6.79°

237.67° 2768.98'

29.21'



2800

2867'

6.49°

236.26°

2863.34'

35.10'

103.72°F

2900

2962'

6.12°

234.13°

2957.77'

40.95'

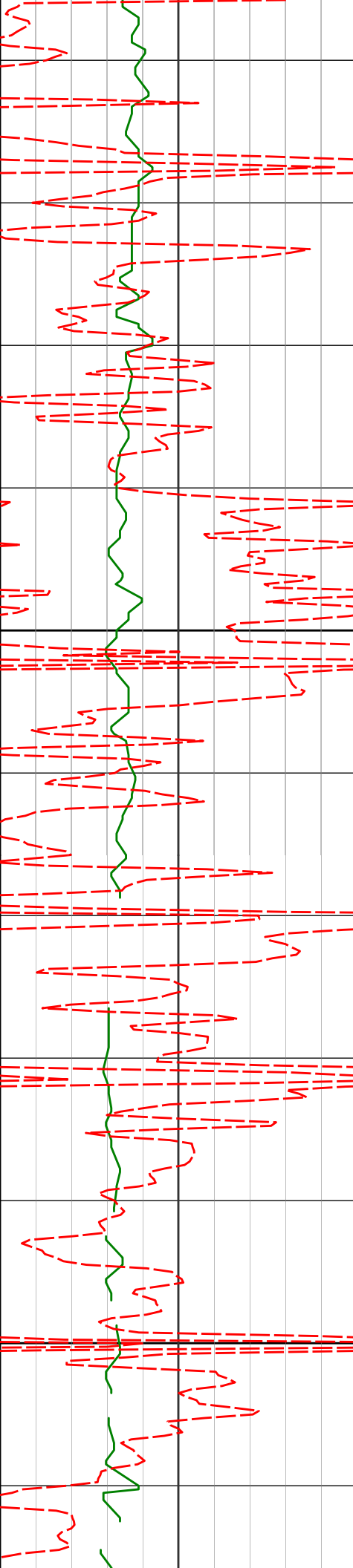
200.75°F

103.72°F

3000

PGRC

ROP ADV



3100

3200

3057'

5.35°

230.41° 3052.29'

46.66'

103.72°F

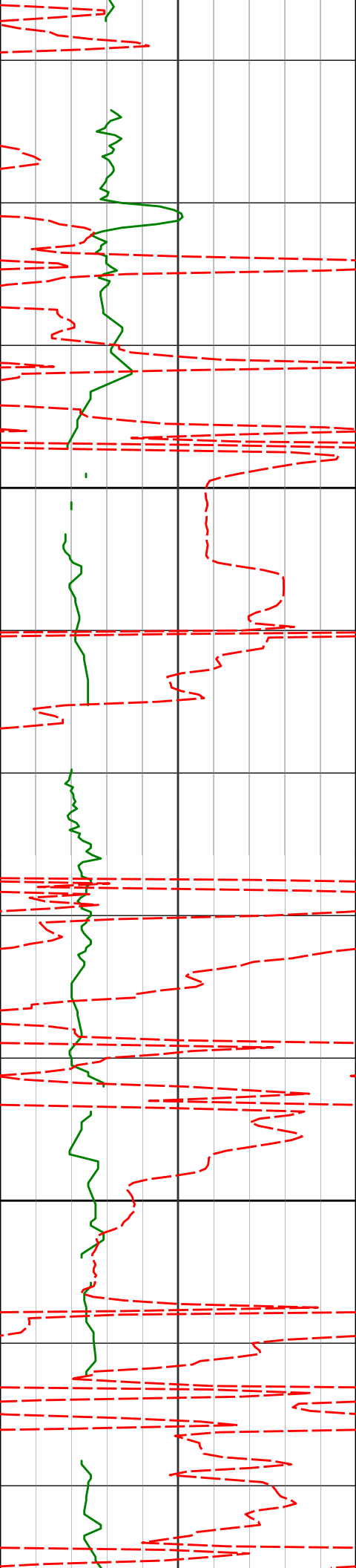
3151'

4.86°

227.41° 3145.92'

52.08'

103.72°F



3246'

5.13°

225.18° 3240.56'

57.73'

3300

3341'

3.76°

219.65° 3335.27'

63.07'

3400

3435'

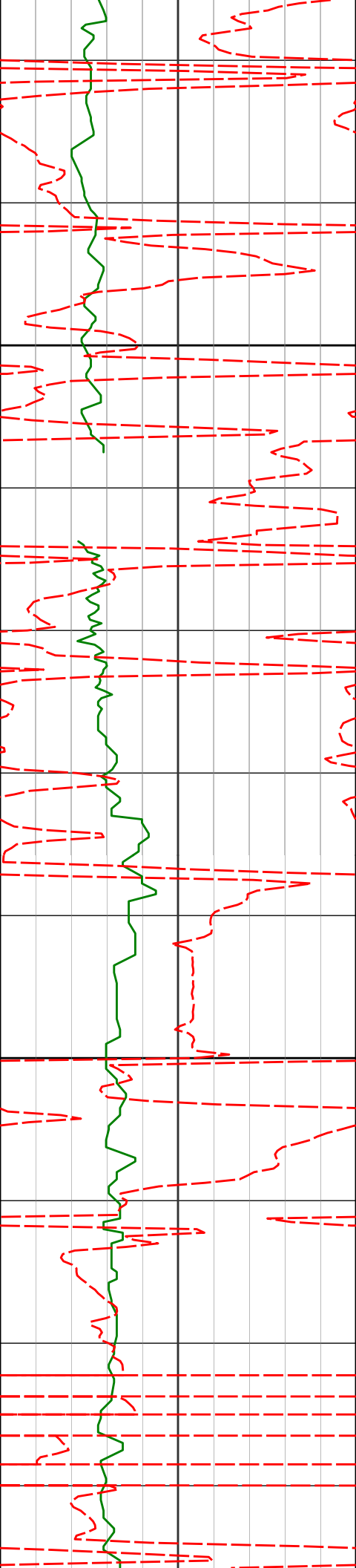
1.91°

225.66° 3429.15'

66.50'

107.94°F

103.72°F



3500

107.94°F

3530'

1.85°

225.34° 3524.10'

68.66'

3600

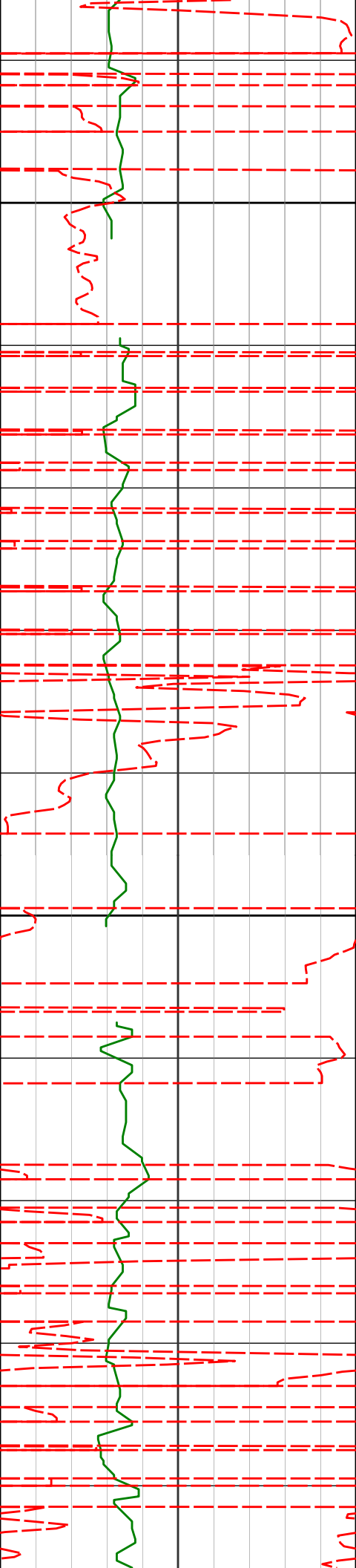
112.16°F

3625'

0.62°

359.19° 3619.09'

69.21'



3700

3719'

0.47°

70.30° 3713.09'

68.57'

112.16°F

3800

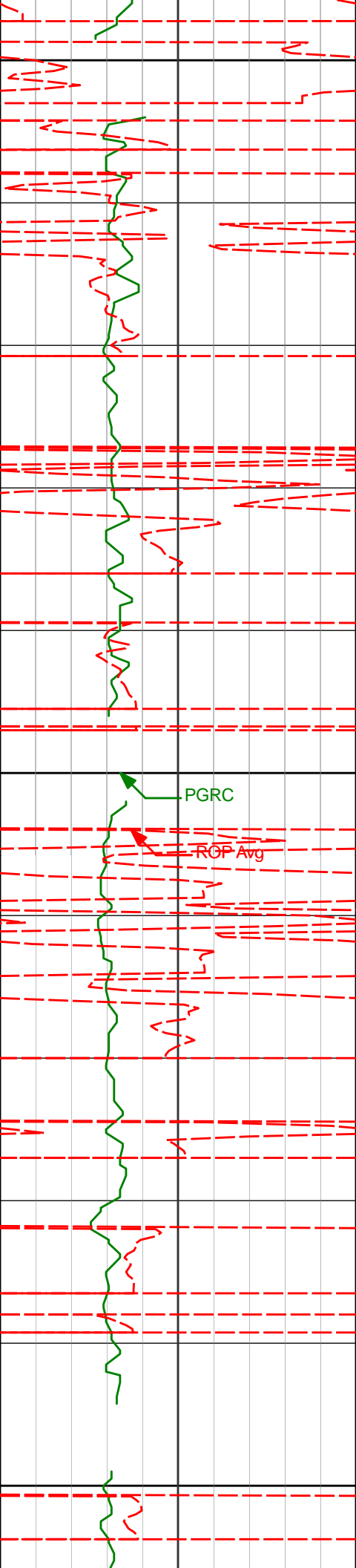
3814'

1.15°

130.55° 3808.08'

69.07'

116.38°F



3900

3909'

1.57°

143.47°

3903.05'

70.76'

116.38°F

4000

4004'

1.36°

149.28°

3998.02'

72.79'

116.38°F

4100

4098'

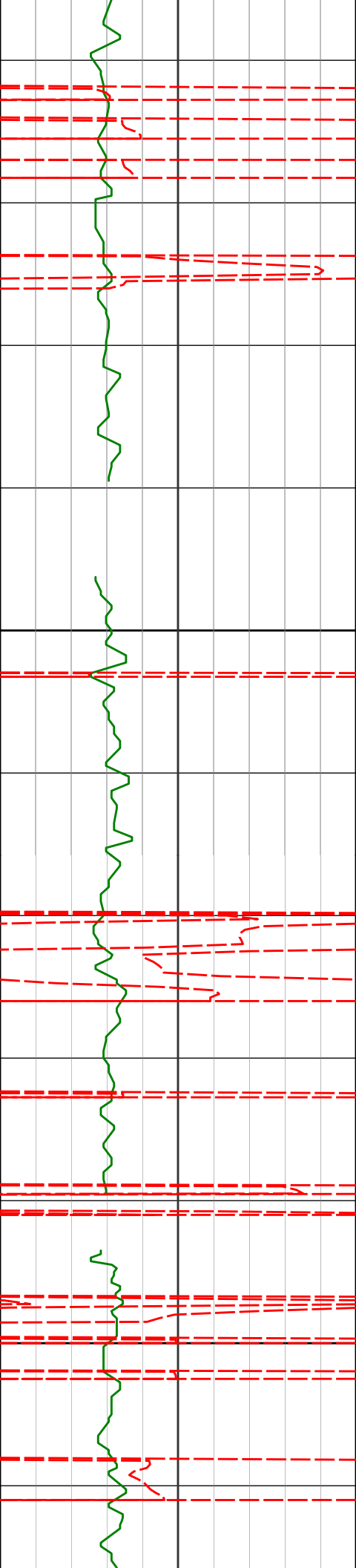
1.27°

182.36°

4092.00'

74.79'

120.59°F



4193' 1.23° 207.09° 4186.97' 76.74'

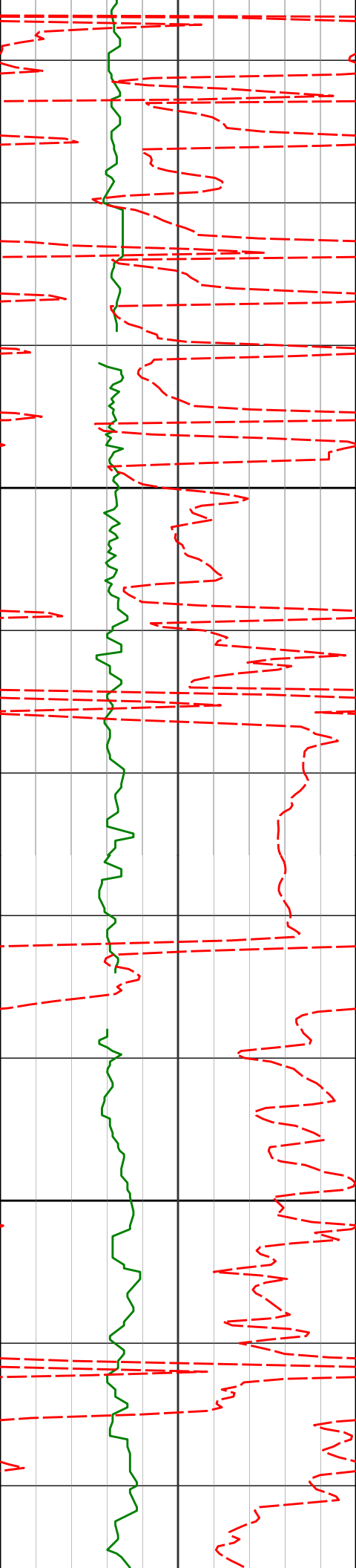
4200

120.59°F

4287' 1.60° 226.97° 4280.95' 78.53'

124.81°F

4300



4400

4500

4382'

2.71°

237.43°

4375.88'

80.61'

124.81°F

4476'

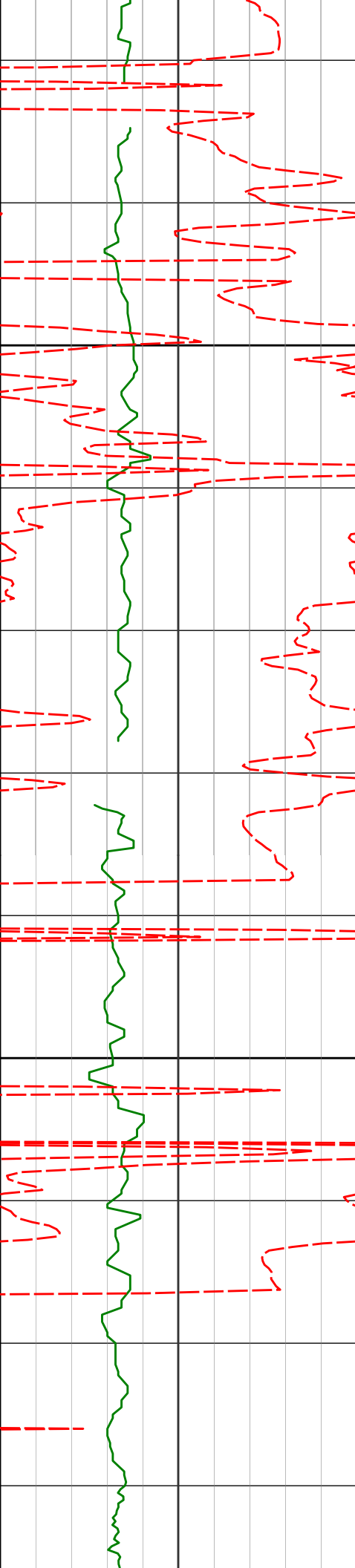
1.64°

258.45°

4469.81'

82.04'

129.03°F



4600

4665'

4700

4759'

1.01°

256.33°

4658.76'

82.93'

129.03°F

129.03°F

133.25°F

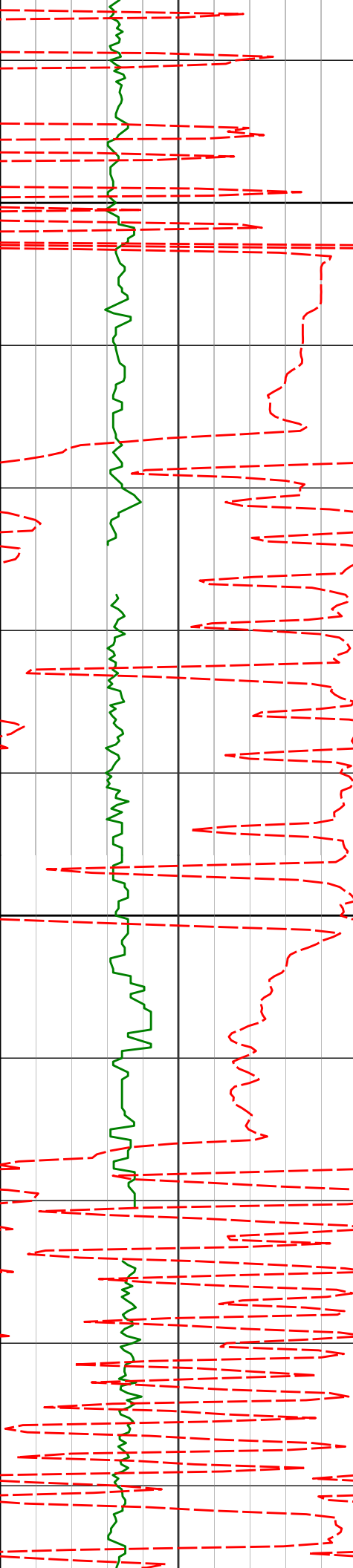
0.34°

268.86°

4752.75'

83.12'

133.25°F



4800

<Run 200>

4853'

3.55°

193.68°

4846.69'

85.94'

124.81°F

<KOP>

4900

4948'

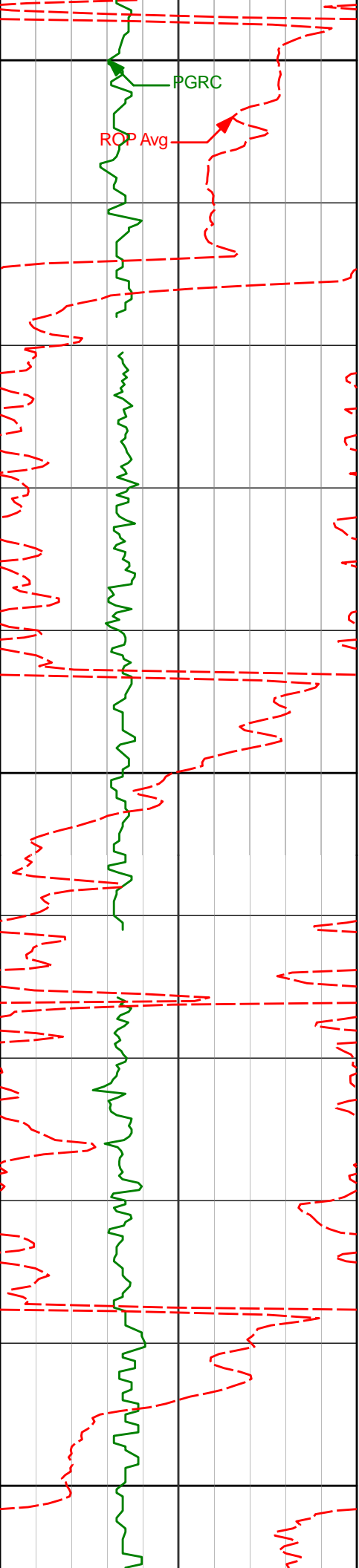
8.67°

175.65°

4941.13'

95.94'

129.03°F



5000

PGRC

ROP Avg

5043'

12.94°

181.93° 5034.42'

113.72'

137.47°F

5100

5138'

17.68°

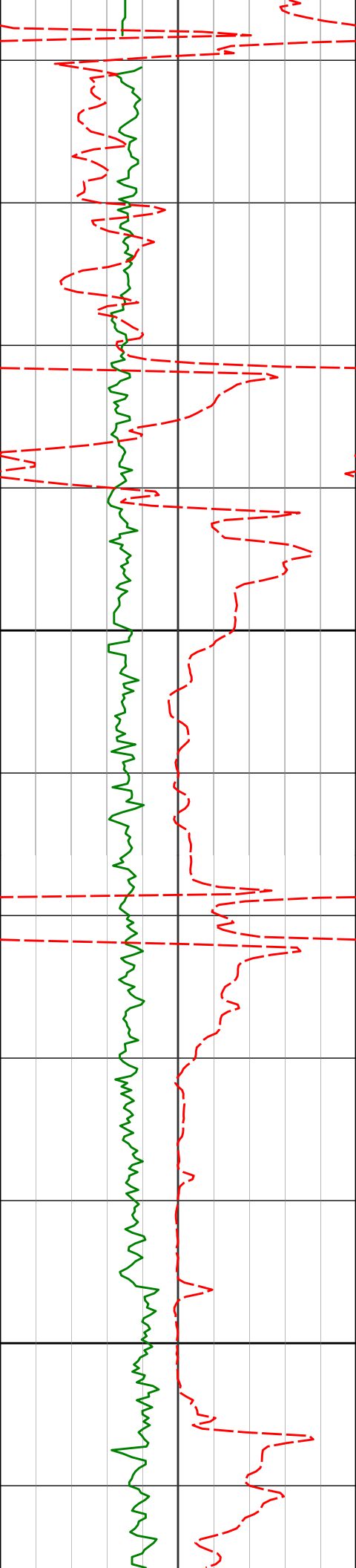
174.80° 5126.03'

138.74'

137.47°F

5200

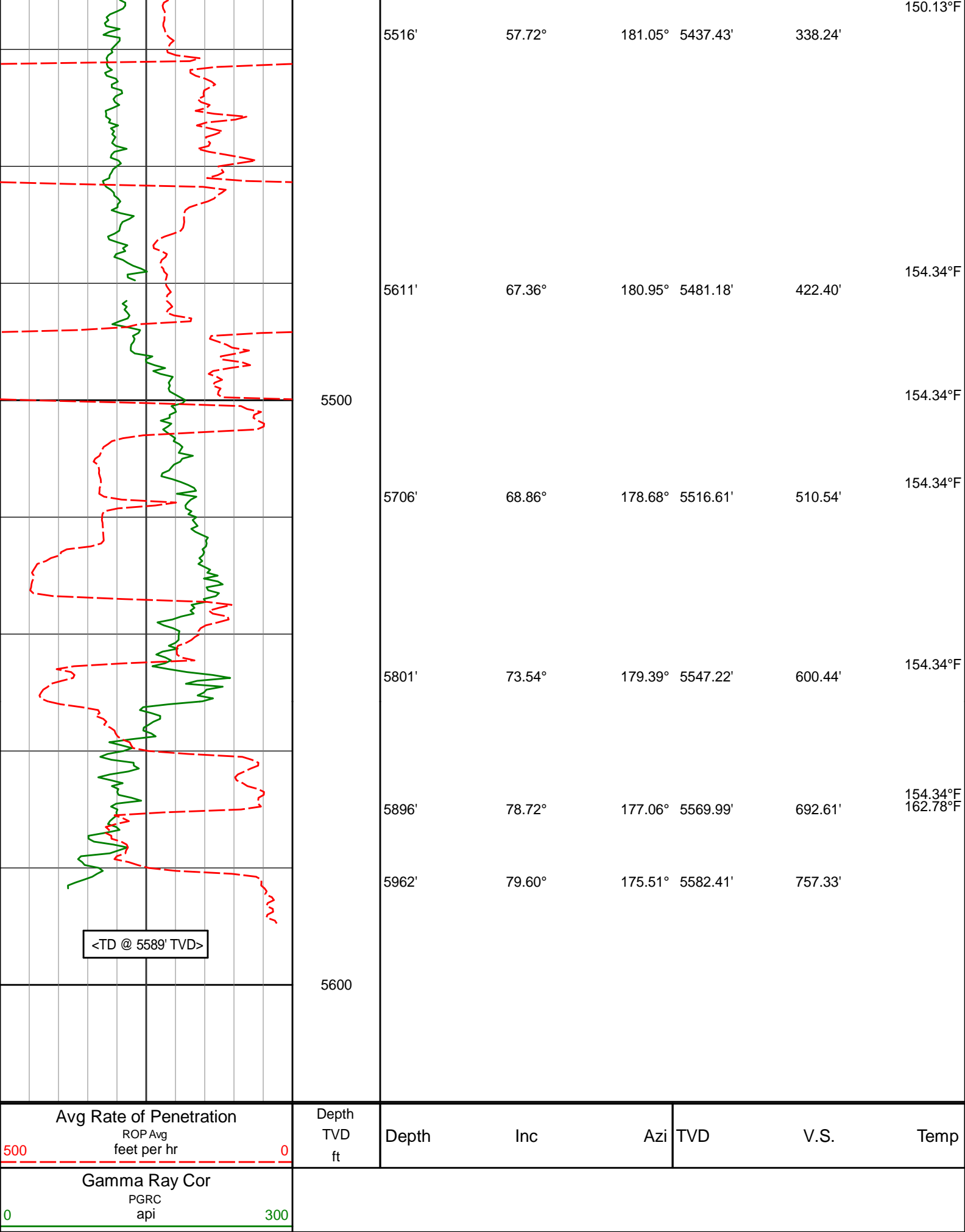
141.69°F



5300

5400

5232'	23.10°	170.98°	5214.11'	171.25'	
					145.91°F
5327'	28.16°	172.55°	5299.74'	211.97'	
5421'	42.12°	178.52°	5376.44'	265.79'	150.13°F



<TD @ 5589' TVD>

Avg Rate of Penetration

ROP Avg
feet per hr

Depth
TVD
ft

Depth

Inc

Azi

TVD

V.S.

Temp

Gamma Ray Cor

PGRC
api

300

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy Inc
Moses State LD11-78-1BHN
Wattenberg
Weld Colorado
USA
CA-XX-0902008583

<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
425.00	0.50	27.22	424.99	1.65 N	0.85 E	-1.64	0.12
800.00	0.10	75.92	799.99	3.18 N	1.91 E	-3.16	0.12
1200.00	0.50	36.32	1199.98	4.67 N	3.29 E	-4.64	0.11
1267.00	0.17	208.12	1266.98	4.82 N	3.41 E	-4.79	0.99
1544.00	0.50	251.17	1543.98	4.08 N	2.08 E	-4.06	0.14
1636.00	0.52	253.76	1635.97	3.83 N	1.30 E	-3.82	0.03
1825.00	0.66	239.65	1824.96	3.05 N	0.46 W	-3.05	0.11
2110.00	0.57	237.59	2109.95	1.47 N	3.06 W	-1.50	0.03
2204.00	2.96	242.34	2203.90	0.09 N	5.60 W	-0.15	2.55
2299.00	4.48	238.27	2298.69	3.00 S	10.93 W	2.88	1.63
2394.00	4.52	235.93	2393.40	7.05 S	17.18 W	6.87	0.20
2488.00	5.78	235.60	2487.02	11.80 S	24.16 W	11.54	1.35
2583.00	7.26	238.82	2581.40	17.61 S	33.25 W	17.26	1.60
2772.00	6.79	237.67	2768.98	29.77 S	52.91 W	29.21	0.26
2867.00	6.49	236.26	2863.34	35.76 S	62.12 W	35.10	0.36
2962.00	6.12	234.13	2957.77	41.71 S	70.69 W	40.95	0.47
3057.00	5.35	230.41	3052.29	47.50 S	78.20 W	46.66	0.90
3151.00	4.86	227.41	3145.92	52.98 S	84.51 W	52.08	0.59
3246.00	5.13	225.18	3240.56	58.70 S	90.49 W	57.73	0.35
3341.00	3.76	219.65	3335.27	64.09 S	95.49 W	63.07	1.51
3435.00	1.91	225.66	3429.15	67.55 S	98.57 W	66.50	1.99
3530.00	1.85	225.34	3524.10	69.74 S	100.79 W	68.66	0.06
3625.00	0.62	359.19	3619.09	70.30 S	101.89 W	69.21	2.45
3719.00	0.47	70.30	3713.09	69.66 S	101.54 W	68.57	0.69
3814.00	1.15	130.55	3808.08	70.15 S	100.44 W	69.07	1.06
3909.00	1.57	143.47	3903.05	71.81 S	98.94 W	70.76	0.55
4004.00	1.36	149.28	3998.02	73.83 S	97.59 W	72.79	0.28
4098.00	1.27	182.36	4092.00	75.83 S	97.07 W	74.79	0.80
4193.00	1.23	207.09	4186.97	77.79 S	97.58 W	76.74	0.57
4287.00	1.60	226.97	4280.95	79.58 S	99.00 W	78.53	0.65
4382.00	2.71	237.43	4375.88	81.70 S	101.86 W	80.61	1.23
4476.00	1.64	258.45	4469.81	83.16 S	105.05 W	82.04	1.40
4665.00	1.01	256.33	4658.76	84.10 S	109.31 W	82.93	0.34
4759.00	0.34	268.86	4752.75	84.30 S	110.39 W	83.12	0.72
4853.00	3.55	193.68	4846.69	87.13 S	111.37 W	85.94	3.70
4948.00	8.67	175.65	4941.13	97.14 S	111.52 W	95.94	5.69
5043.00	12.94	181.93	5034.42	114.91 S	111.33 W	113.72	4.65
5138.00	17.68	174.80	5126.03	139.93 S	110.38 W	138.74	5.36
5232.00	23.10	170.98	5214.11	172.39 S	106.19 W	171.25	5.94
5327.00	28.16	172.55	5299.74	213.05 S	100.36 W	211.97	5.37
5421.00	42.12	178.52	5376.44	266.83 S	96.65 W	265.79	15.28
5516.00	57.72	181.05	5437.43	339.28 S	96.56 W	338.24	16.54
5611.00	67.36	180.95	5481.18	423.47 S	98.03 W	422.40	10.15
5706.00	68.86	178.68	5516.61	511.61 S	97.74 W	510.54	2.73
5801.00	73.54	179.39	5547.22	601.50 S	96.23 W	600.44	4.98
5896.00	78.72	177.06	5569.99	693.64 S	93.36 W	692.61	5.95
5962.00	79.60	175.51	5582.41	758.33 S	89.16 W	757.33	2.67
6016.00	85.00	174.00	5589.64	811.59 S	84.26 W	810.65	10.38

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 179.39 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 6016.00 FEET
IS 815.95 FEET ALONG 185.93 DEGREES (GRID)

Surface surveys at 425 ft, 800 ft and 1200 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 5962 ft MD to TD at 6016 ft MD.

Date Printed:28 January 2015