



WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	02-Mar-15	03-Mar-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.870	6.870			
Log Start Depth (MD, ft)	848.00	6,140.00			
Log End Depth (MD, ft)	6,140.00	7,252.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	01-Mar-15 03:50	02-Mar-15 10:07			
Drill/Wipe End Date and Time	02-Mar-15 02:48	03-Mar-15 00:22			
Min Inc (deg) @ Depth (MD, ft)	0.67 @ 1,545.00	8.29 @ 6,184.00			
Max Inc (deg) @ Depth (MD, ft)	12.98 @ 3,816.00	83.61 @ 7,198.00			
Bit TFA(in2) / Bit Type	1.16 / PDC	1.38 / PDC			
Flow Rate (gpm)	596.00	586.92			
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)	9.55 / 36.00	10.30 / 37.00			
Filtrate CL (ppm)	2,100.00	2,100.00			
pH / Fluid Loss (mptm)	8.40 / 7	8.00 / 8			
PV (cP) / YP (lbf2)	9 / 11.00	9 / 13.00			
% Solids / % Sand	6.00 / 0.30	9.20 / 0.30			
% Oil / Oil:Water Ratio	N/A / N/A	1.00 / 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 Fluid Temp (degF)	144.50 / 150.00	122.00 / 150.00			

Max Tool Temp (degF) / Source	144.50 / PCM	163.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 144.50	N/A @ 163.20			
Lead MWD Engineer	Kyle Wass	Kyle Wass			
Customer Representative	Stetson Nielson	Stetson Nielson			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11404302	11404302			
Insert Serial Number	11680738	11680738			
Date and Time Initialized	28-Feb-15 17:56	01-Jan-70 00:00			
Date and Time Read	03-Mar-15 06:37	03-Mar-15 06:31			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	55.00	54.00			
Software Version	6.21	6.21			
Sub Serial Number	11404302	11404302			
Sonde Serial Number	11478053	11478053			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	46.00	84.70			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.90	46.82			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404302	11404302			
Insert/Sonde Serial Number	11681051	11681051			

## REMARKS

1. All depths are calibrated to driller's pipe tally and are true vertical depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham 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 Log  
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)  
Interval Resolution: 1.0 ft  
Interval Distance: 3.0 ft
  - 1:240 Log  
PGRC (Gamma CG):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft
  - ROPA (Average Rate of Penetration):  
Interval Resolution: 0.5 ft

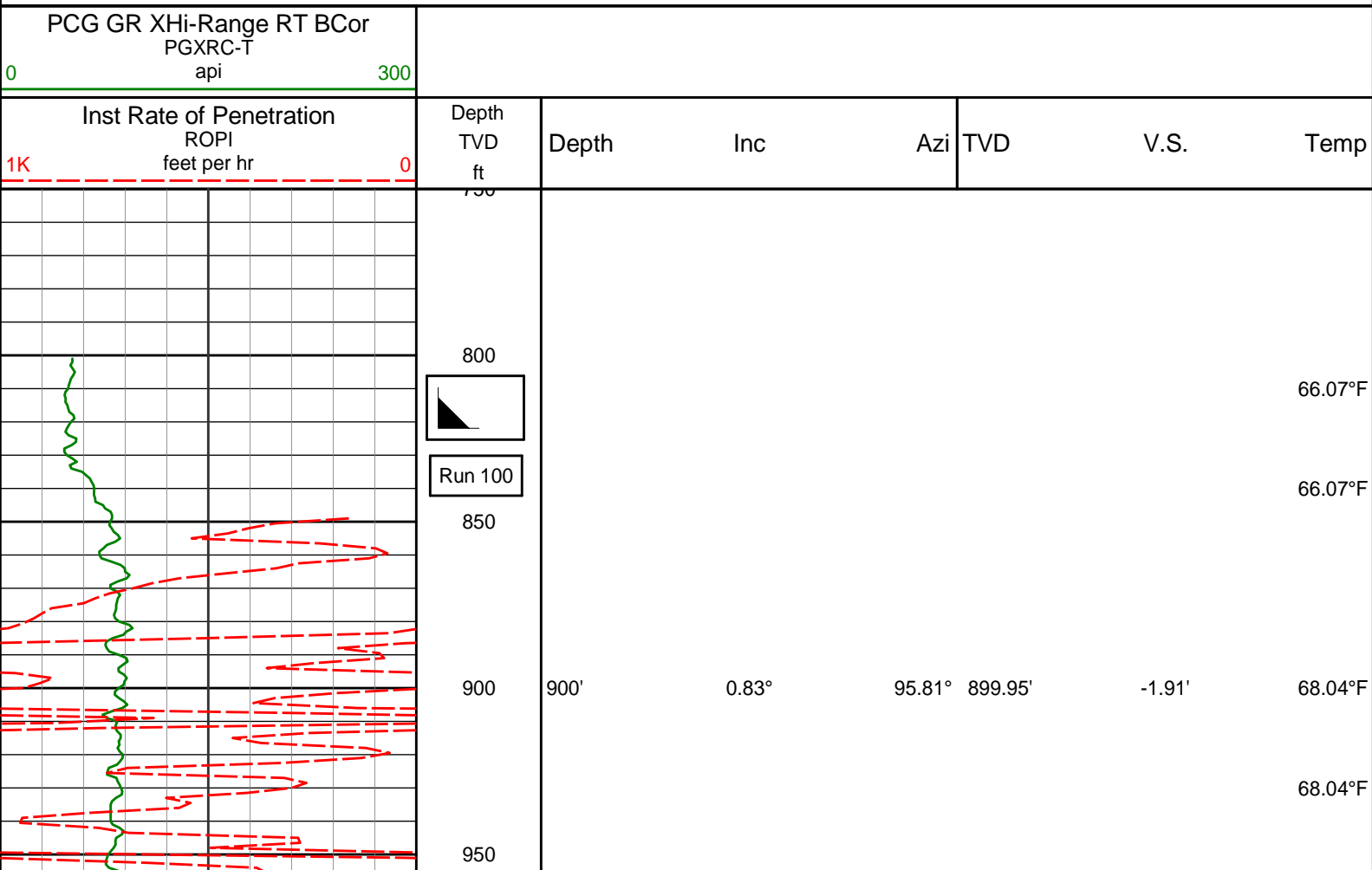
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft

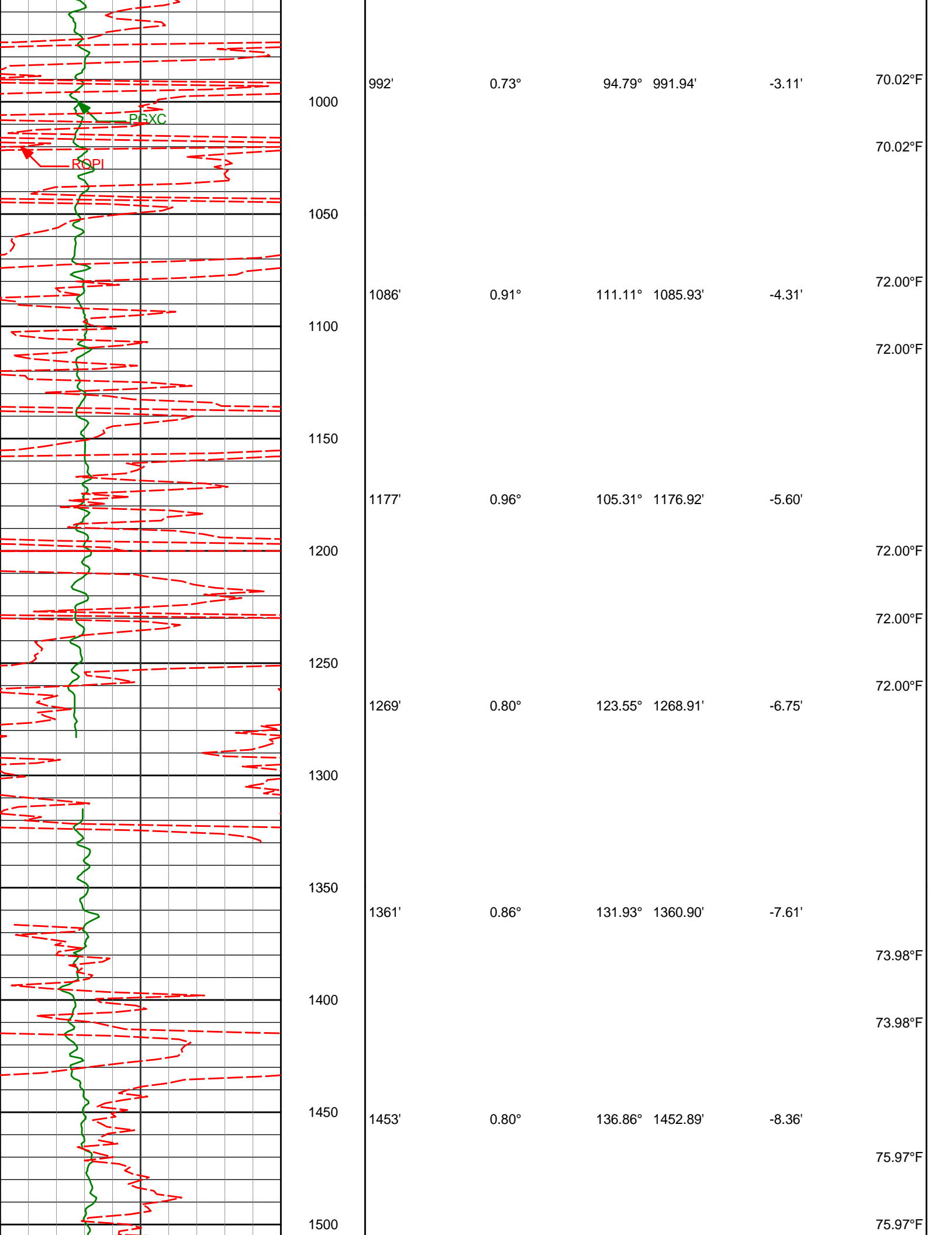
6. Insite Version v8.1.10

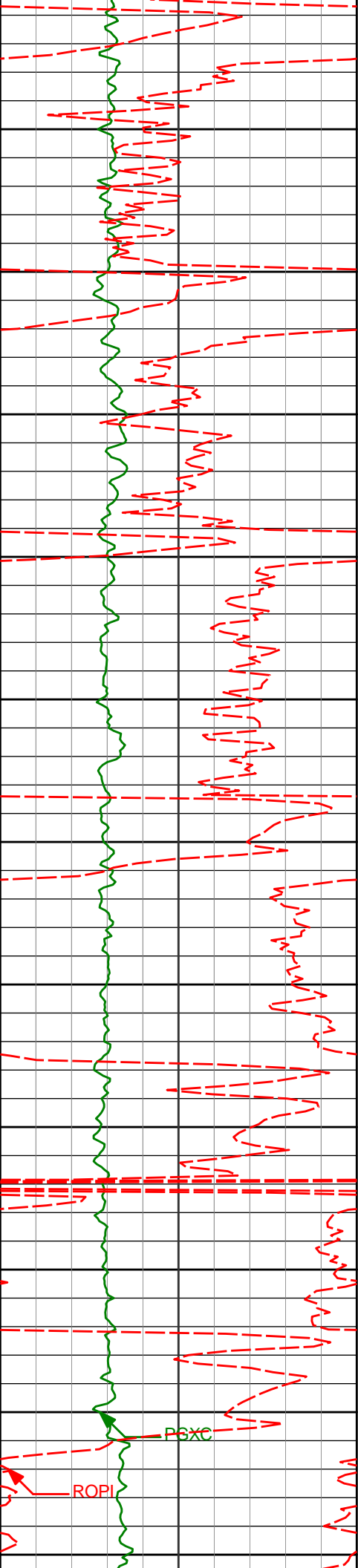
WARRANTY

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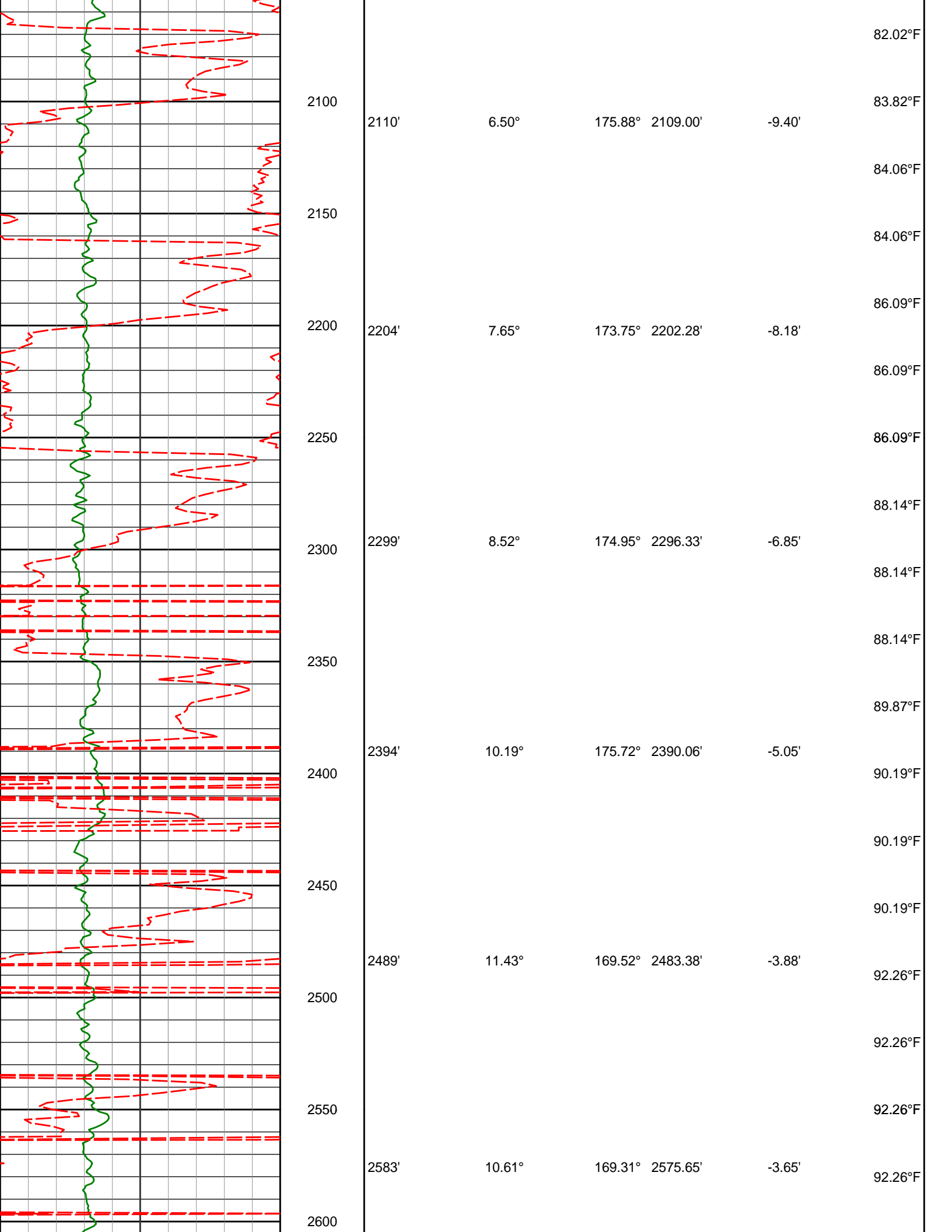
TVD Detail 1:600 Scale

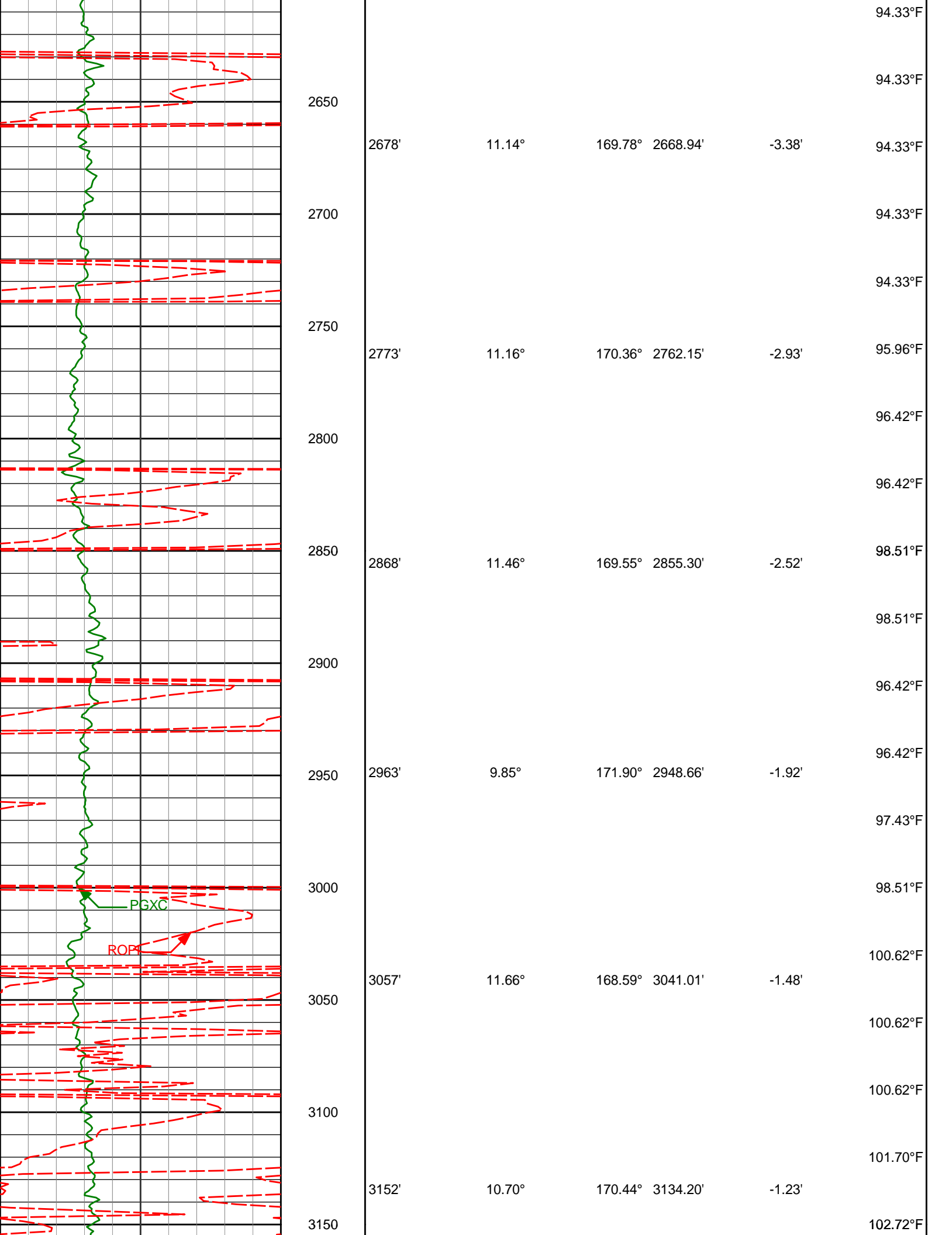


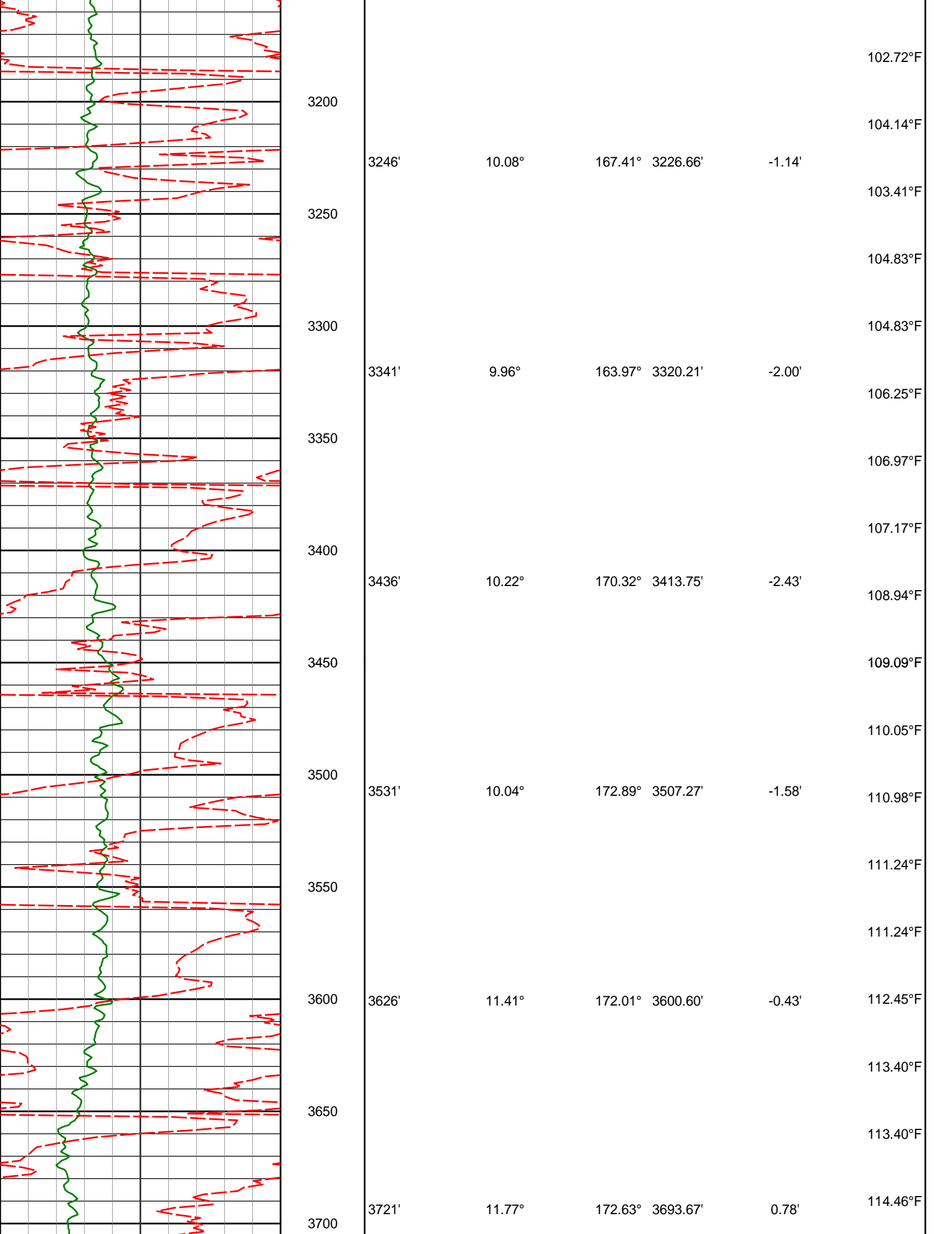




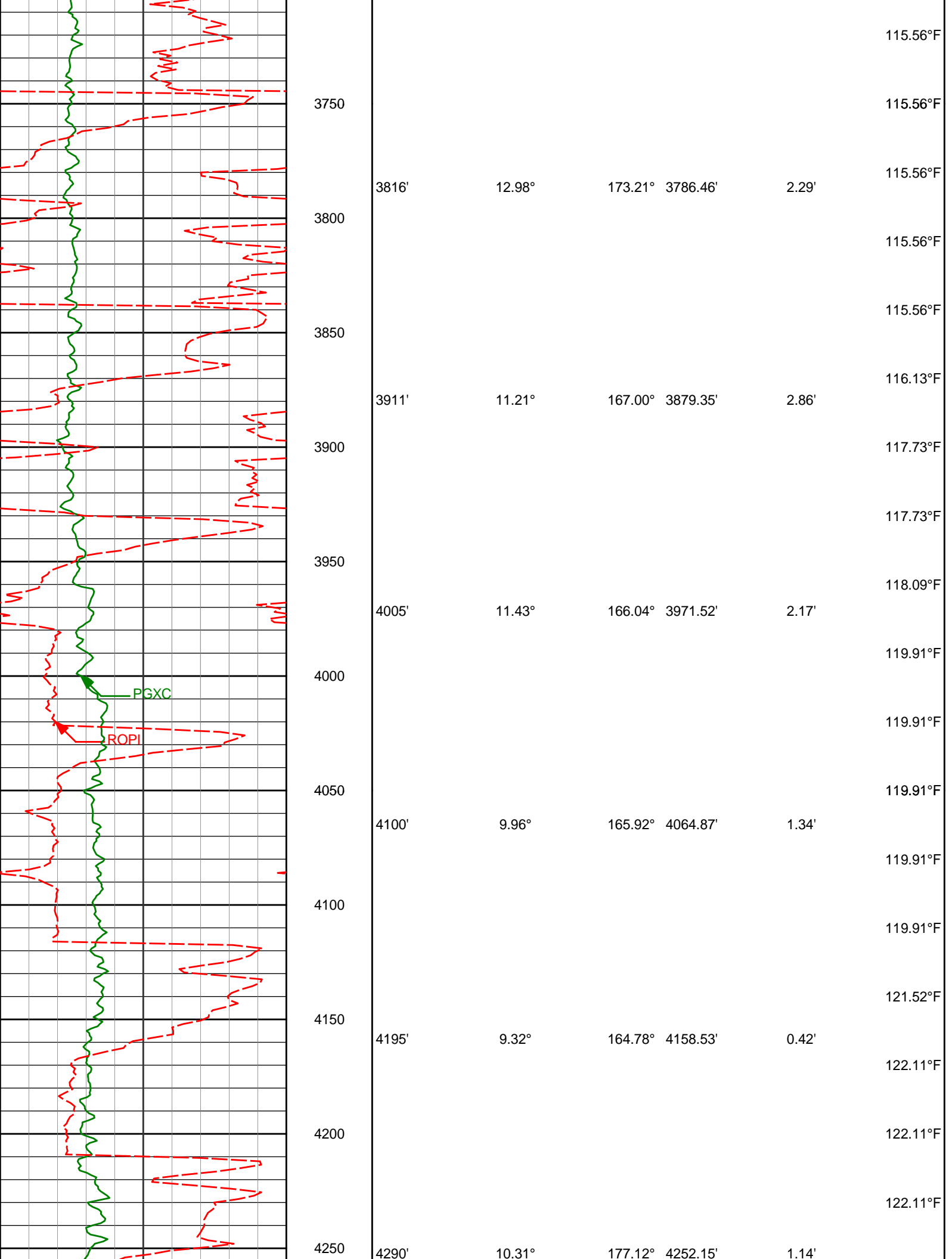
1550	1545'	0.67°	123.03°	1544.88'	-9.09'	75.97°F
1600						75.97°F
1650						77.99°F
1700						77.99°F
1731'		0.76°	92.07°	1730.87'	-11.06'	77.99°F
1750						77.99°F
1800						78.27°F
1826'		1.94°	160.71°	1825.84'	-11.90'	80.01°F
1850						80.01°F
1900						80.01°F
1920'		3.43°	180.00°	1919.74'	-11.57'	80.01°F
1950						
2000						82.02°F
2015'		5.03°	175.18°	2014.48'	-10.54'	82.02°F
2050						

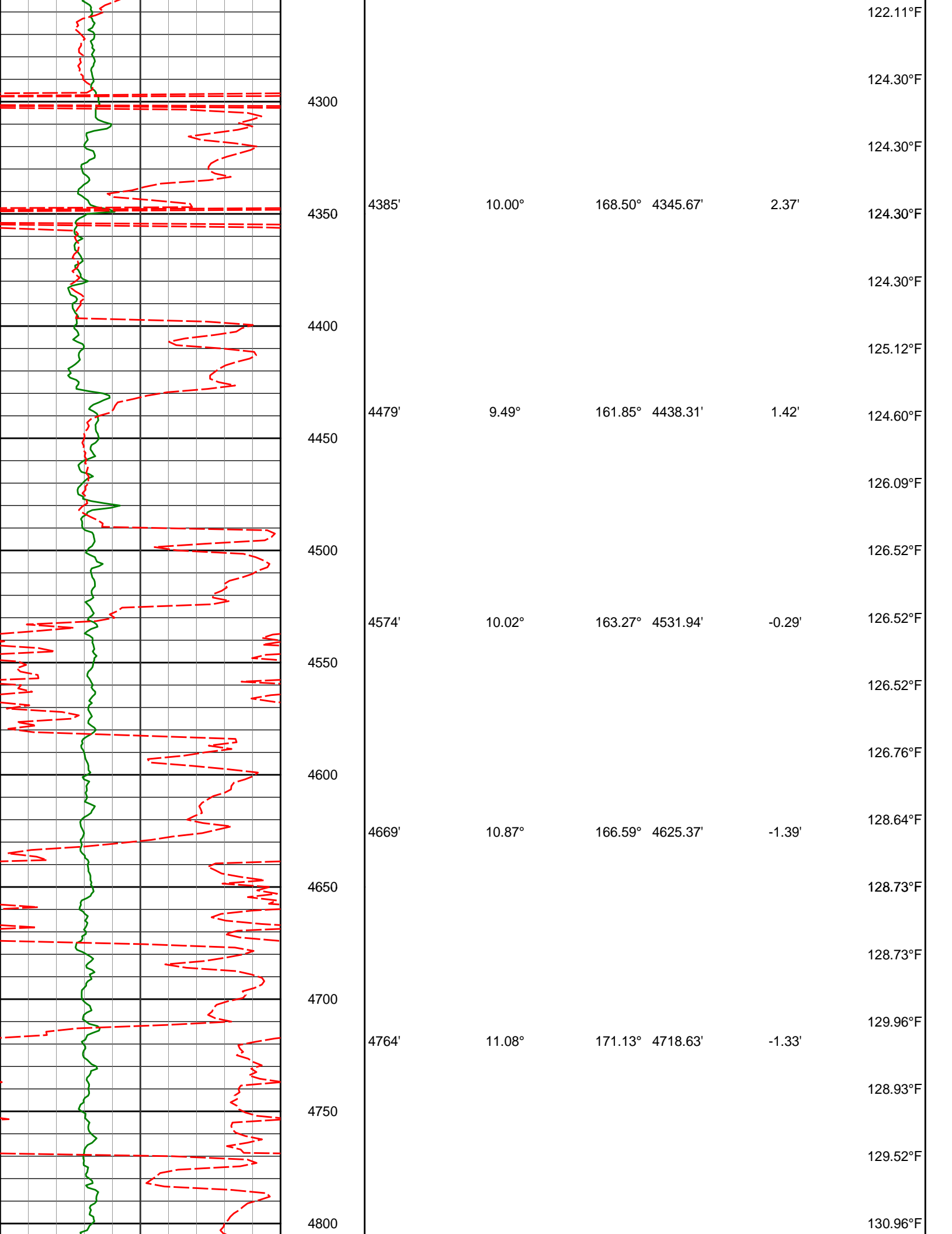


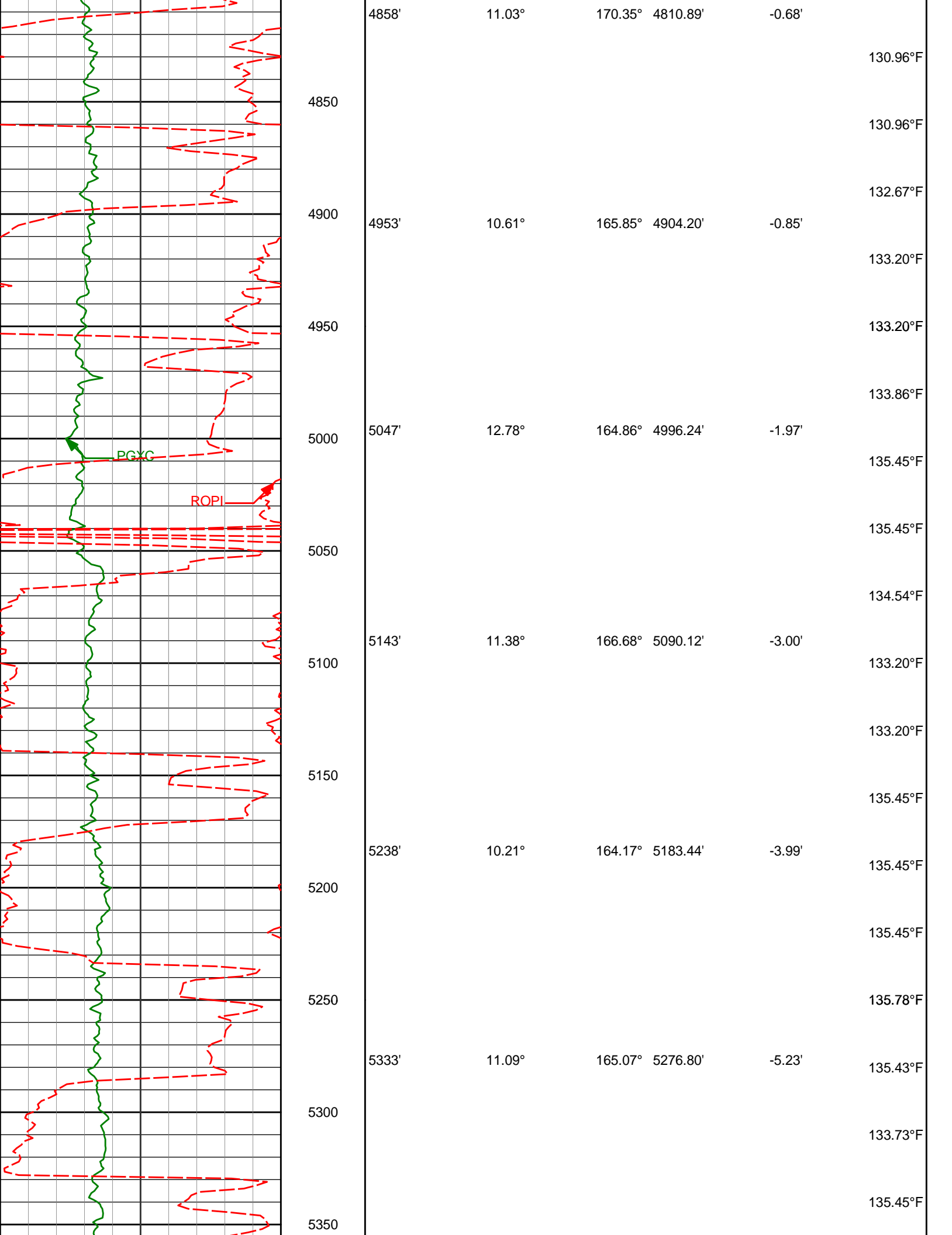


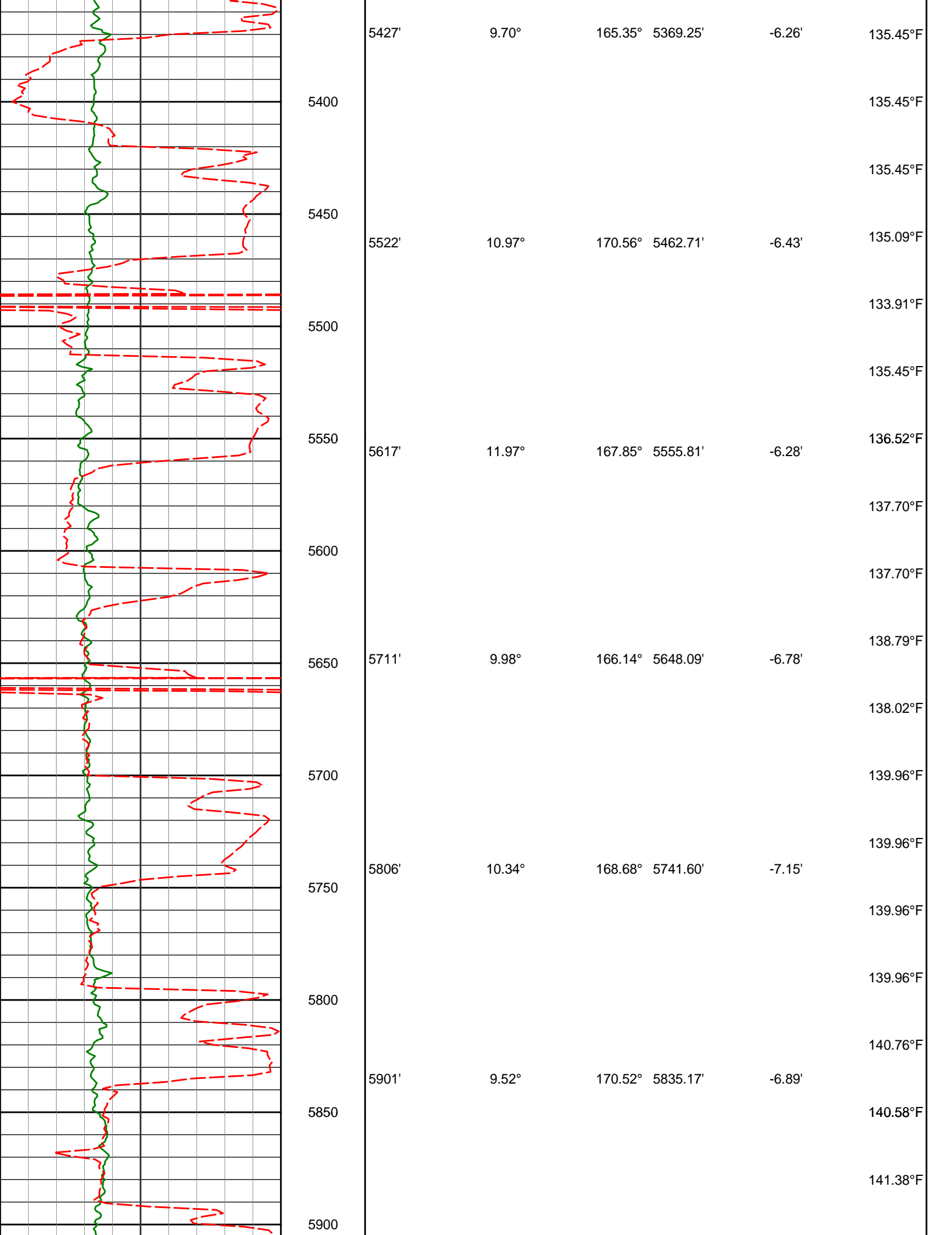


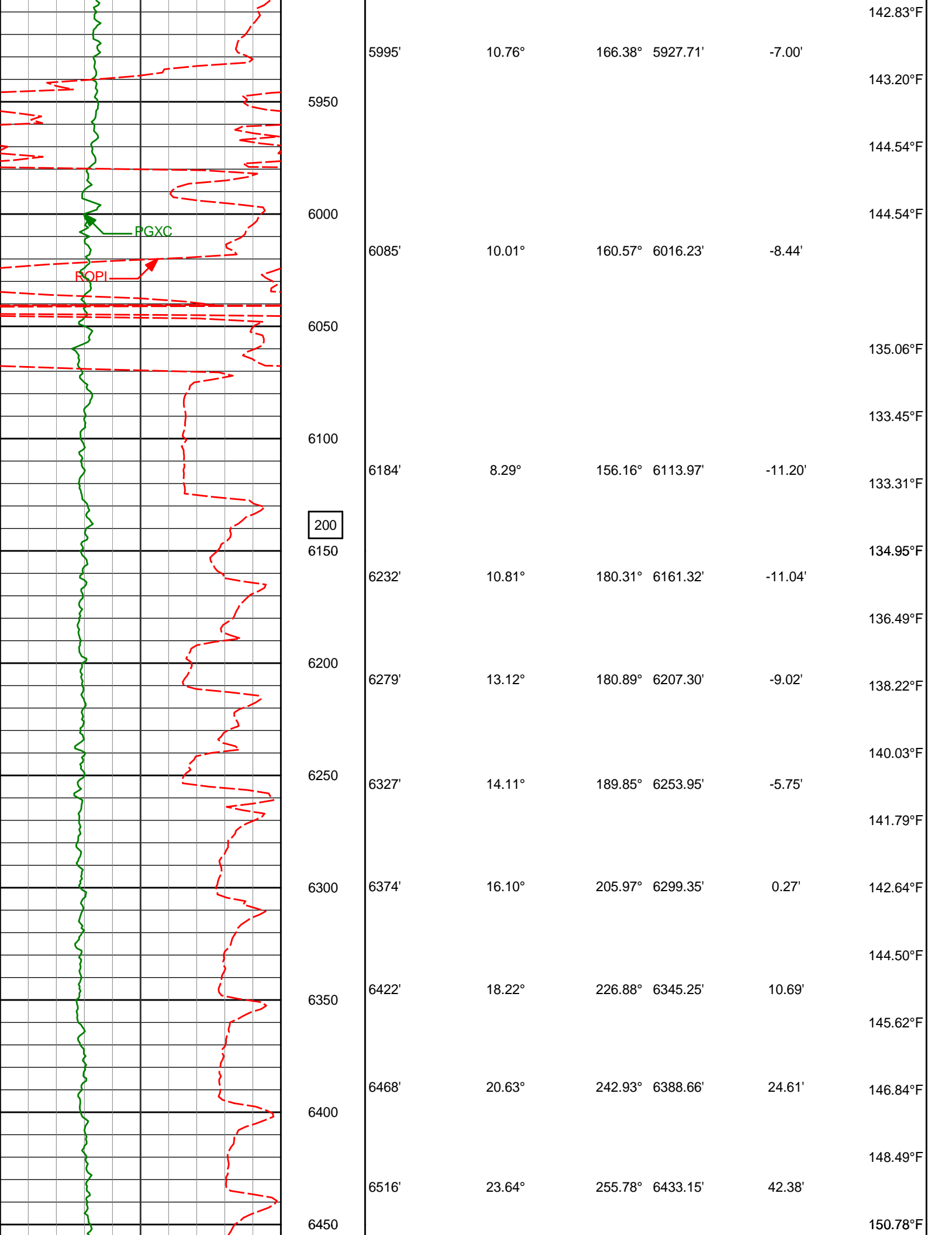


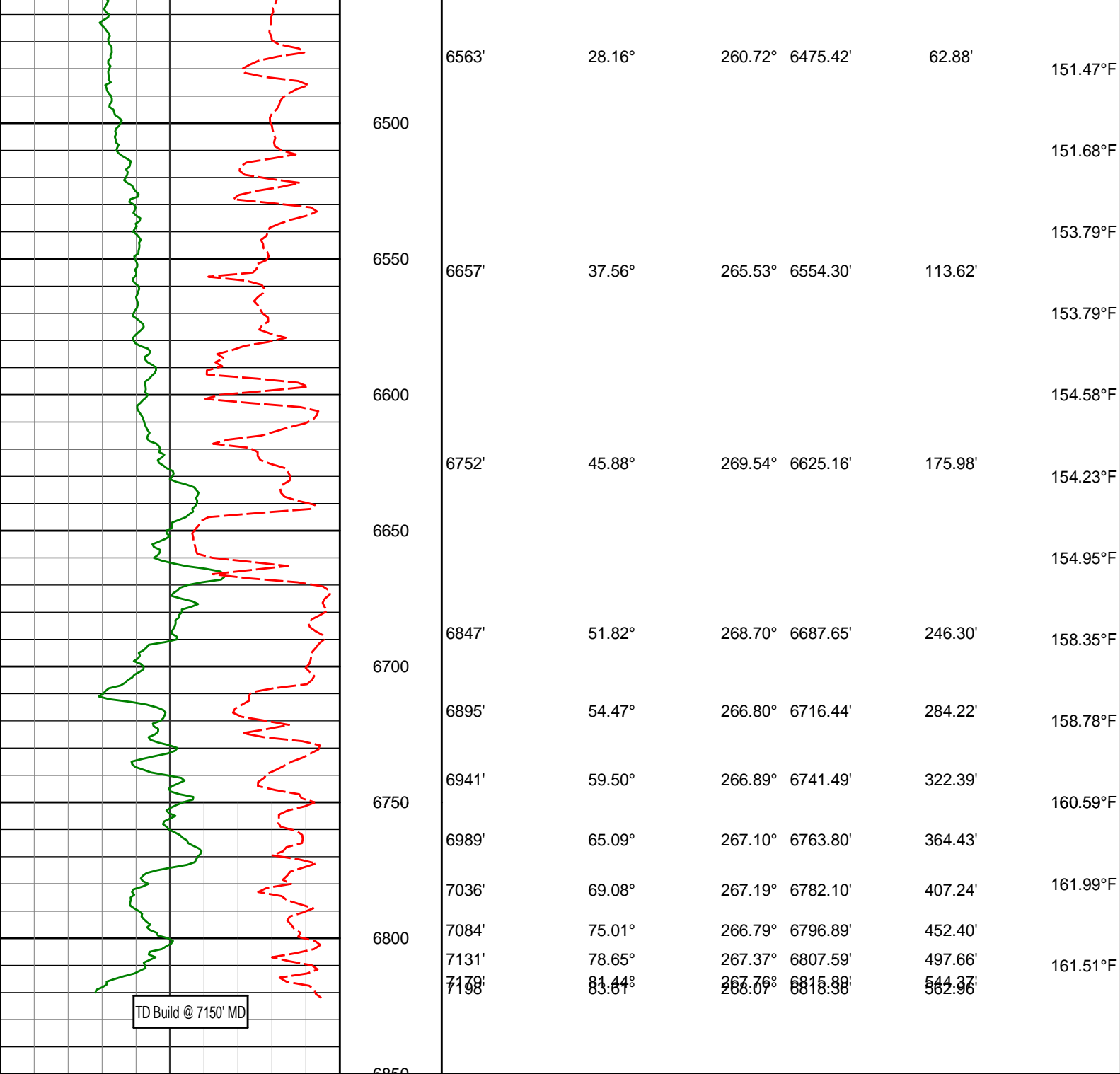






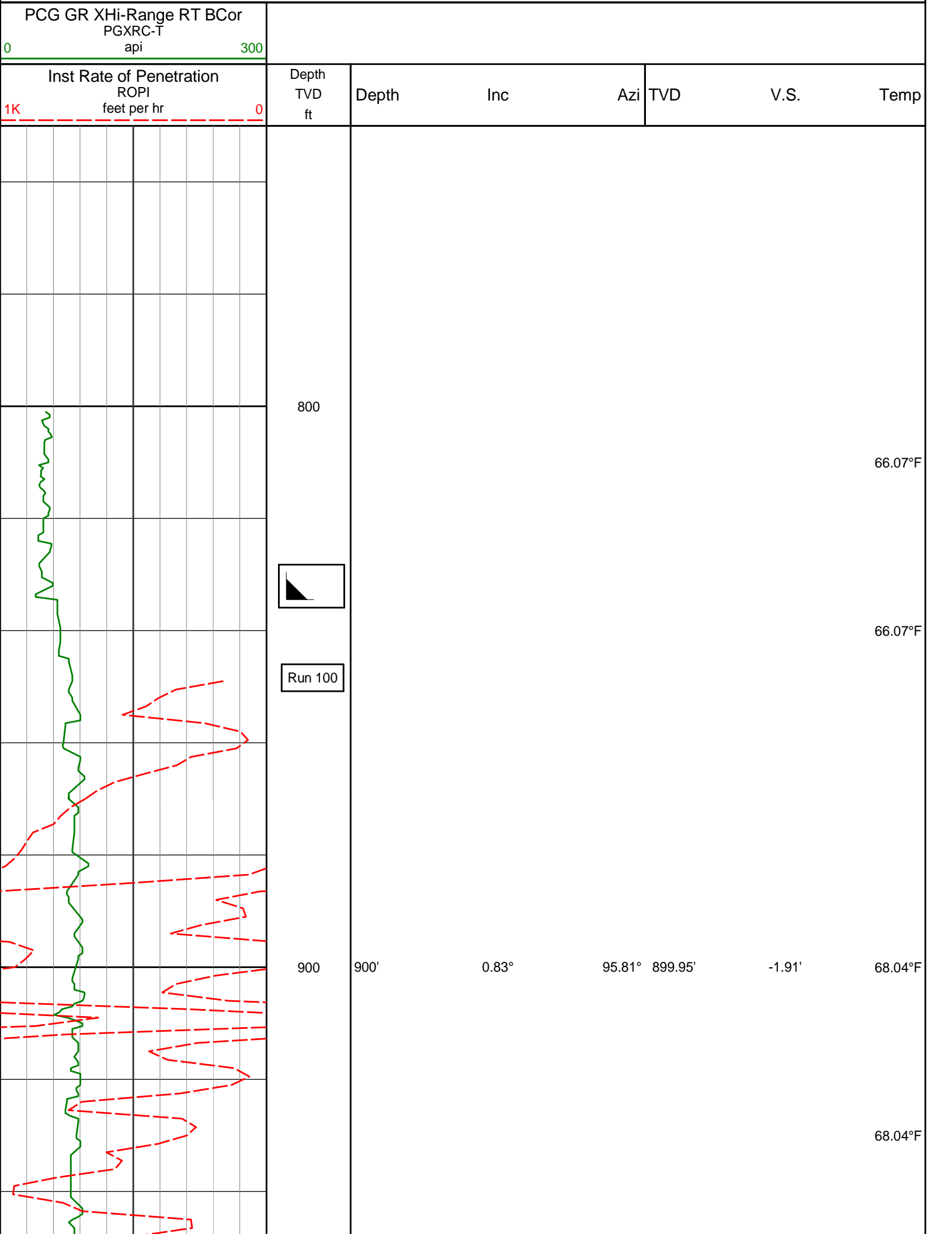


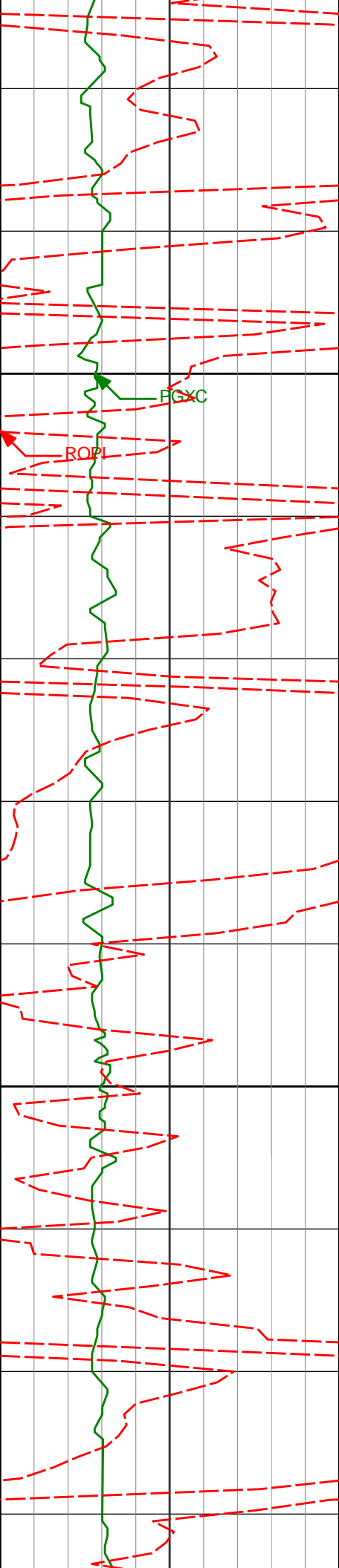




Inst Rate of Penetration ROPI feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
PCG GR XHi-Range RT BCor PGXRC-T api								

TVD Detail 1:240 Scale





992'

0.73°

94.79°

991.94'

-3.11'

70.02°F

1000

FCXC

ROPI

70.02°F

72.00°F

1086'

0.91°

111.11°

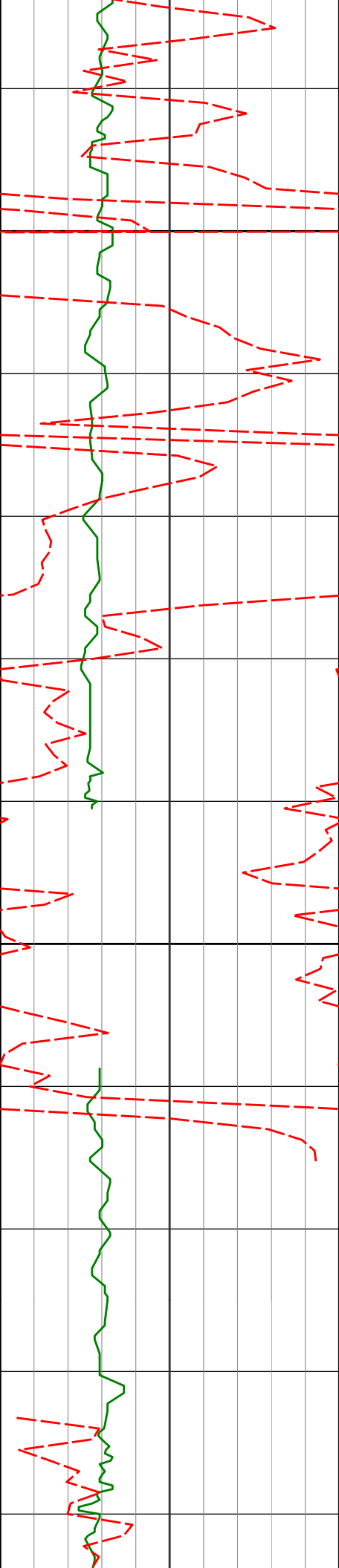
1085.93'

-4.31'

1100

72.00°F





1177'

0.96°

105.31° 1176.92'

-5.60'

1200

72.00°F

72.00°F

72.00°F

1269'

0.80°

123.55° 1268.91'

-6.75'

1300

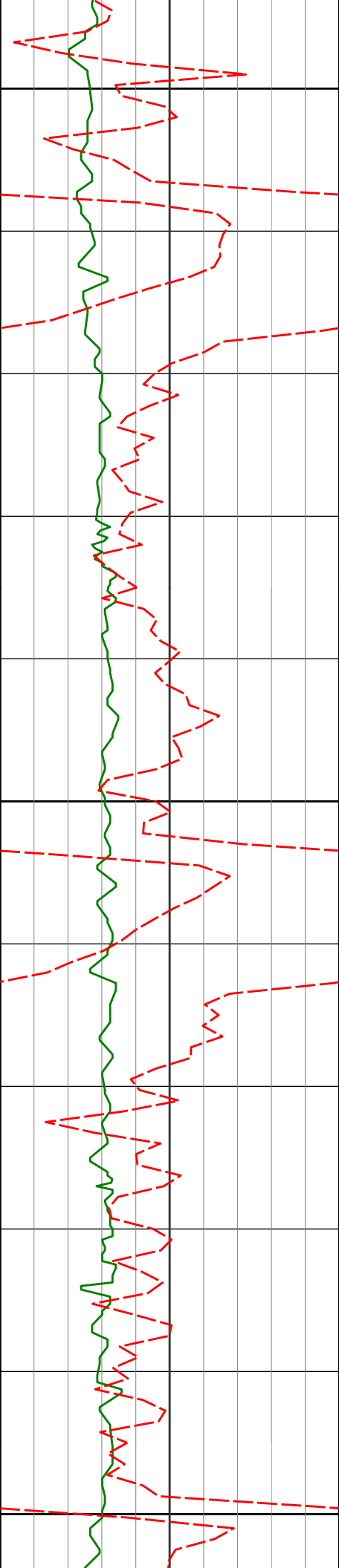
1361'

0.86°

131.93° 1360.90'

-7.61'

73.98°F



1400

1453'

1500

1545'

1600

0.80°

136.86°

1452.89'

-8.36'

0.67°

123.03°

1544.88'

-9.09'

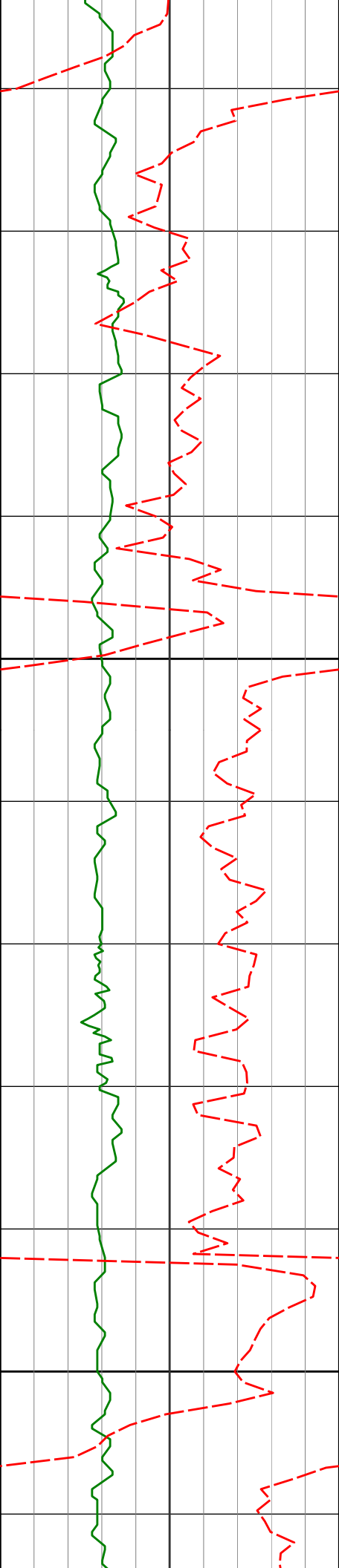
73.98°F

75.97°F

75.97°F

75.97°F

75.97°F



1700

1731'

1800

1826'

0.76°

1.94°

92.07°

160.71°

1730.87'

1825.84'

-11.06'

-11.90'

77.99°F

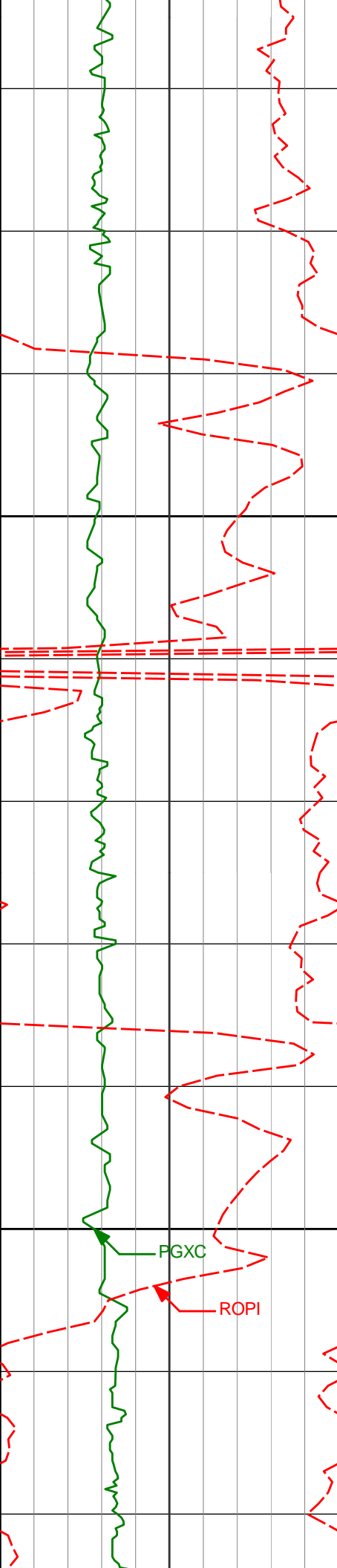
77.99°F

77.99°F

77.99°F

77.99°F

78.27°F



1900

1920'

2000

2015'

3.43°

5.03°

180.00°

175.18°

1919.74'

2014.48'

-11.57'

-10.54'

80.01°F

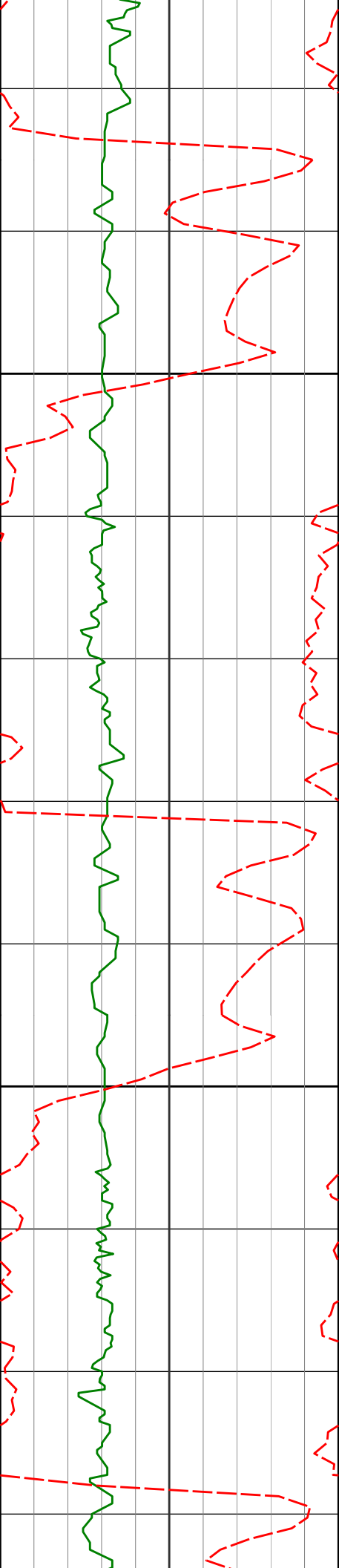
80.01°F

80.01°F

80.01°F

82.02°F

82.02°F



2100

2110'

6.50°

175.88°

2109.00'

-9.40'

2200

2204'

7.65°

173.75°

2202.28'

-8.18'

82.02°F

83.82°F

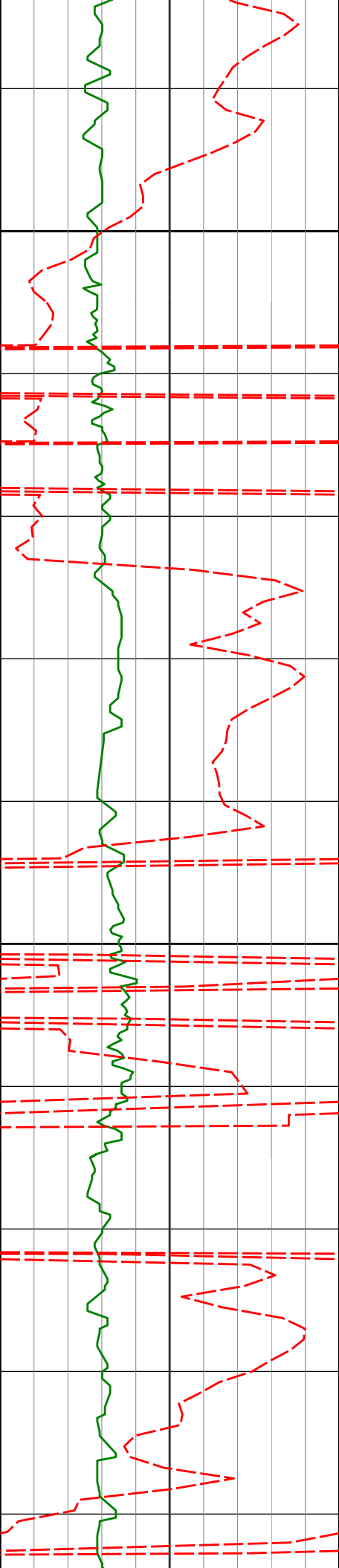
84.06°F

84.06°F

86.09°F

86.09°F

86.09°F



2300

2299'

8.52°

174.95°

2296.33'

-6.85'

88.14°F

88.14°F

88.14°F

89.87°F

2400

2394'

10.19°

175.72°

2390.06'

-5.05'

90.19°F

90.19°F

90.19°F

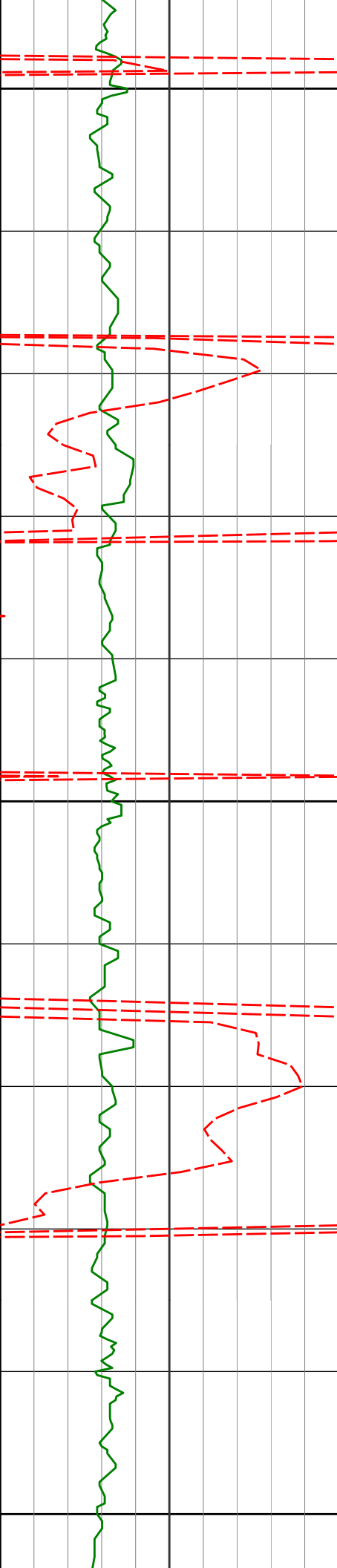
2489'

11.43°

169.52°

2483.38'

-3.88'



2500

2600

2700

2583'

10.61°

169.31°

2575.65'

-3.65'

2678'

11.14°

169.78°

2668.94'

-3.38'

92.26°F

92.26°F

92.26°F

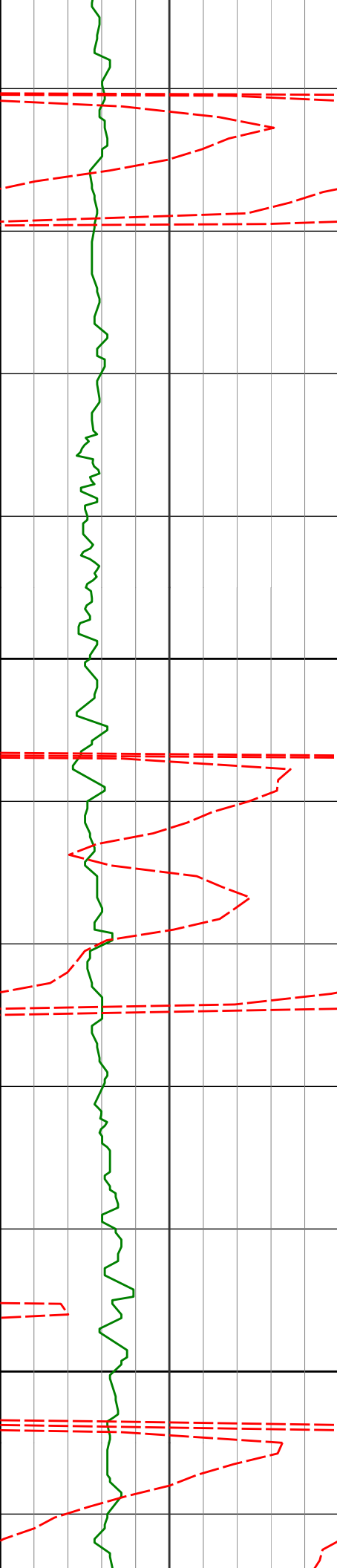
92.26°F

94.33°F

94.33°F

94.33°F

94.33°F



2773'

11.16°

170.36° 2762.15'

-2.93'

2800

2868'

11.46°

169.55° 2855.30'

-2.52'

2900

94.33°F

95.96°F

96.42°F

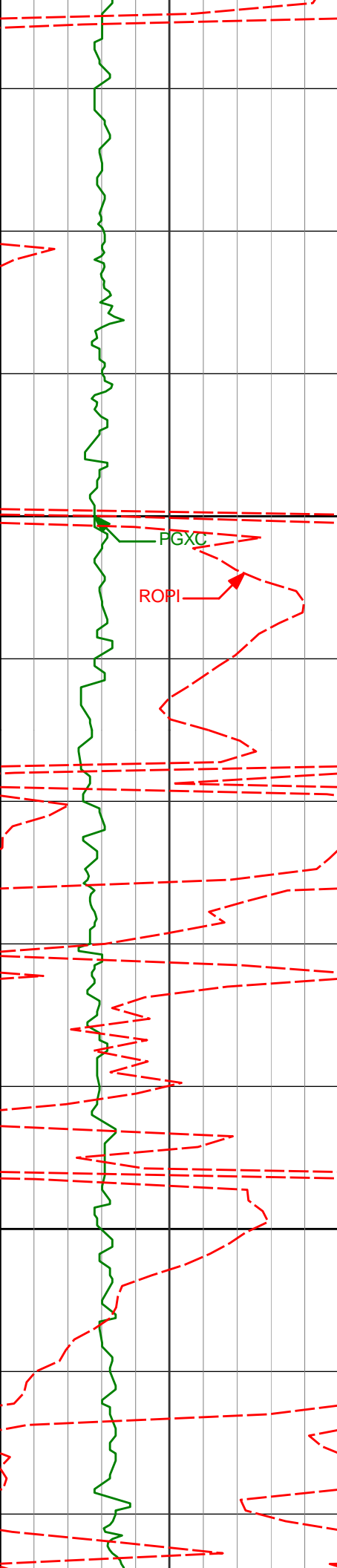
96.42°F

98.51°F

98.51°F

96.42°F





2963'

9.85°

171.90° 2948.66'

-1.92'

96.42°F

97.43°F

3000

98.51°F

PGXC

ROPI

100.62°F

3057'

11.66°

168.59° 3041.01'

-1.48'

100.62°F

100.62°F

3100

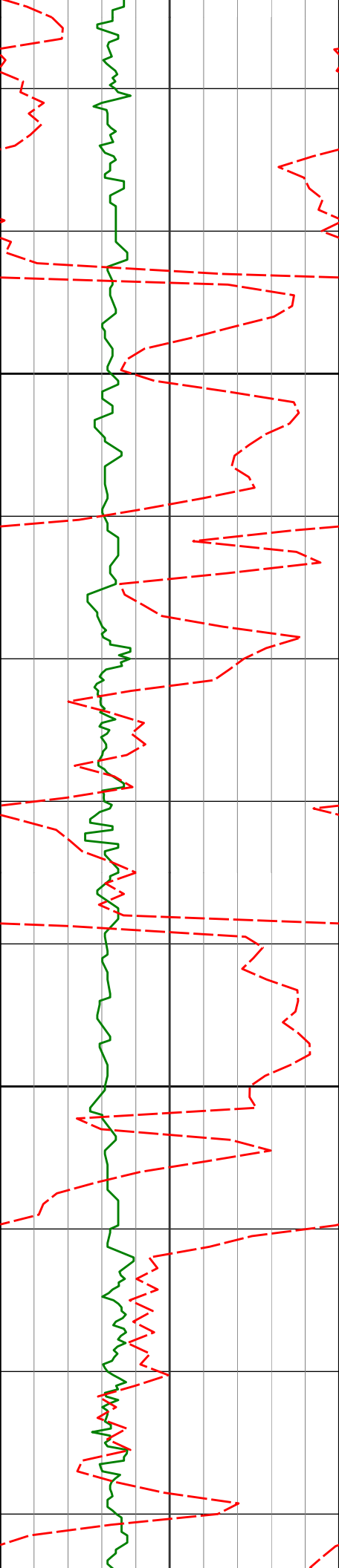
101.70°F

3152'

10.70°

170.44° 3134.20'

-1.23'



3200

3246'

3300

3341'

10.08°

167.41°

3226.66'

-1.14'

9.96°

163.97°

3320.21'

-2.00'

102.72°F

102.72°F

104.14°F

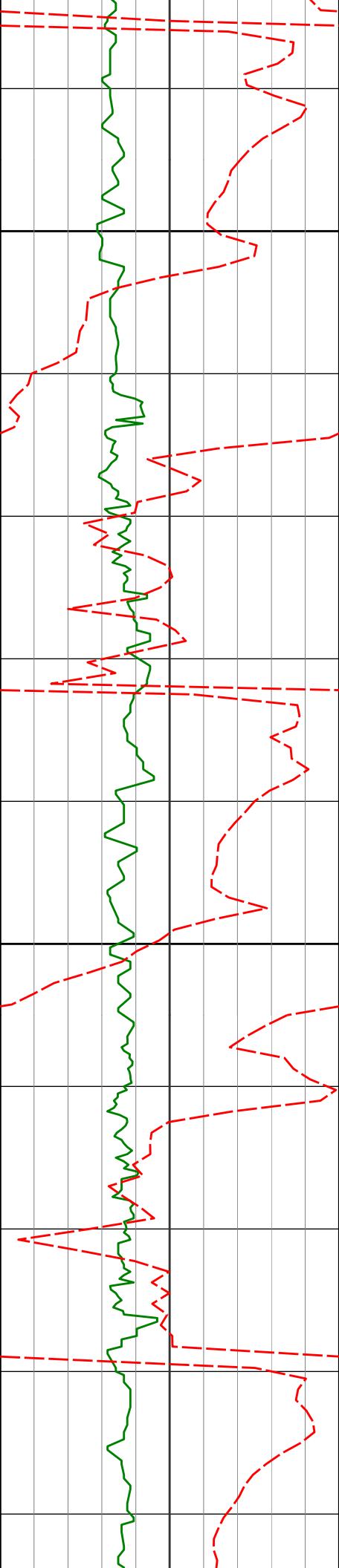
103.41°F

104.83°F

104.83°F

106.25°F

106.97°F



3400

3436'

10.22°

170.32°

3413.75'

-2.43'

107.17°F

108.94°F

109.09°F

110.05°F

3500

3531'

10.04°

172.89°

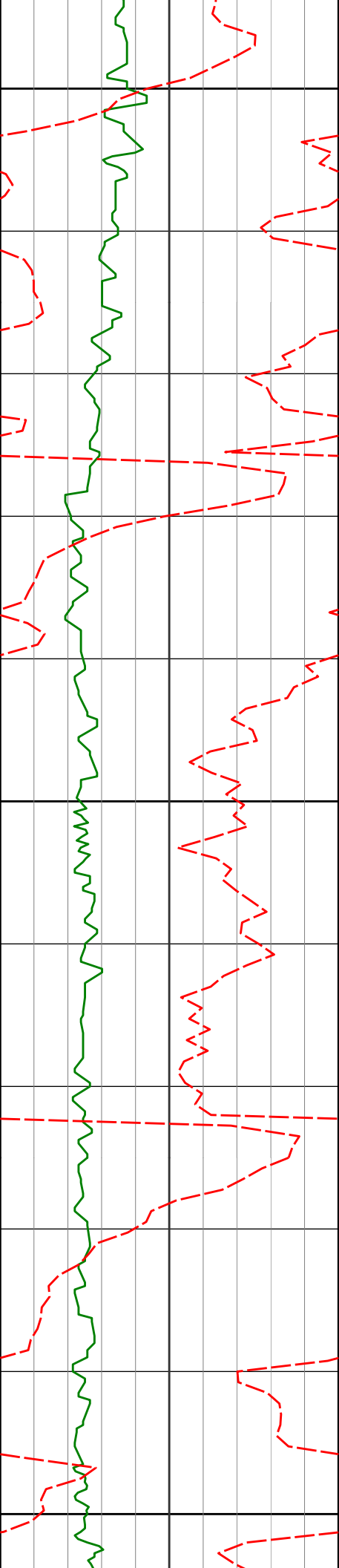
3507.27'

-1.58'

110.98°F

111.24°F

111.24°F



3600

3626'

11.41°

172.01° 3600.60'

-0.43'

112.45°F

113.40°F

113.40°F

114.46°F

3700

3721'

11.77°

172.63° 3693.67'

0.78'

115.56°F

115.56°F

115.56°F

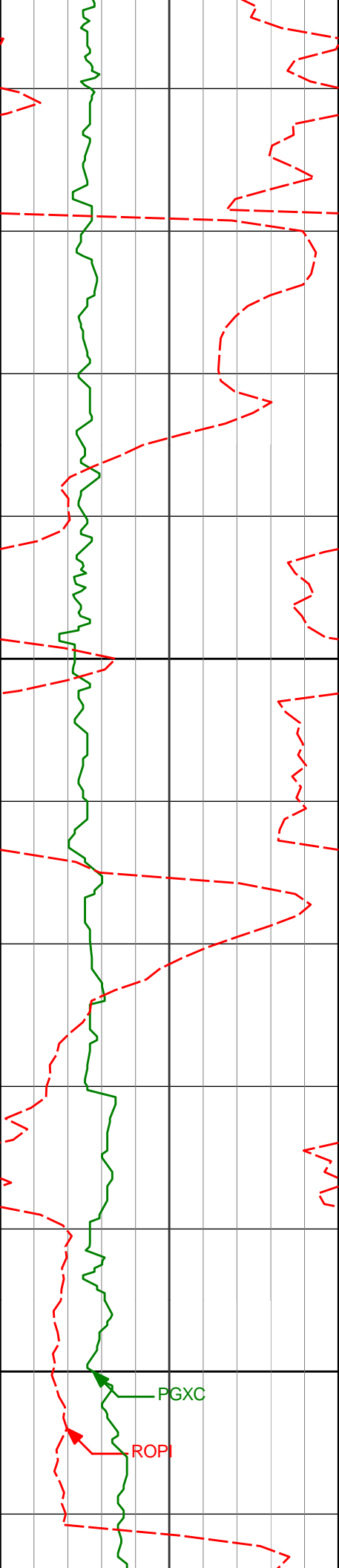
3800

3816'

12.98°

173.21° 3786.46'

2.29'



				115.56°F
				115.56°F
				116.13°F
3911'	11.21°	167.00°	3879.35'	2.86'
3900				117.73°F
				117.73°F
				118.09°F
4005'	11.43°	166.04°	3971.52'	2.17'
				119.91°F
4000				119.91°F



4100

4200

4100'

4195'

9.96°

9.32°

165.92° 4064.87'

164.78° 4158.53'

1.34'

0.42'

119.91°F

119.91°F

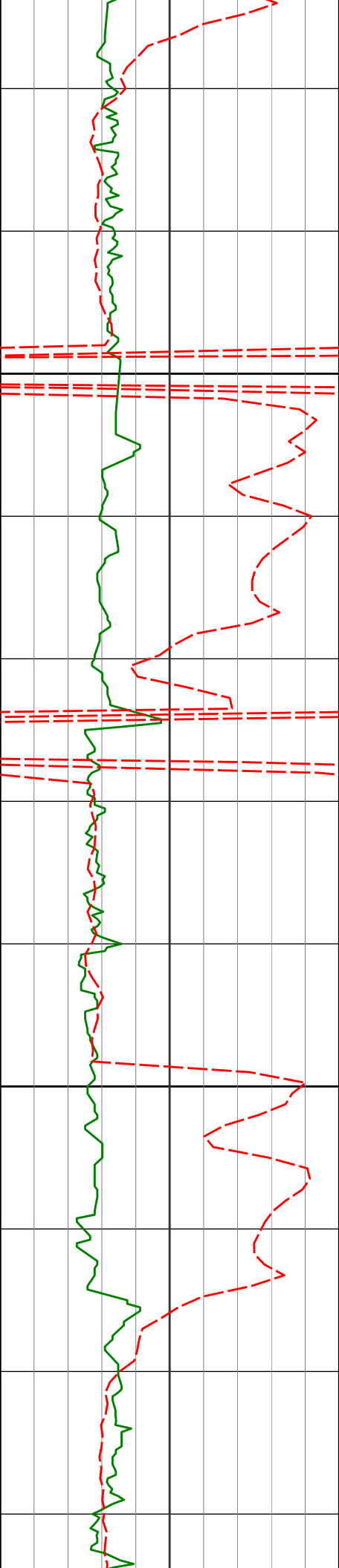
119.91°F

121.52°F

122.11°F

122.11°F

122.11°F



4300

4400

4290'

10.31°

177.12° 4252.15'

1.14'

122.11°F

124.30°F

124.30°F

4385'

10.00°

168.50° 4345.67'

2.37'

124.30°F

124.30°F

125.12°F

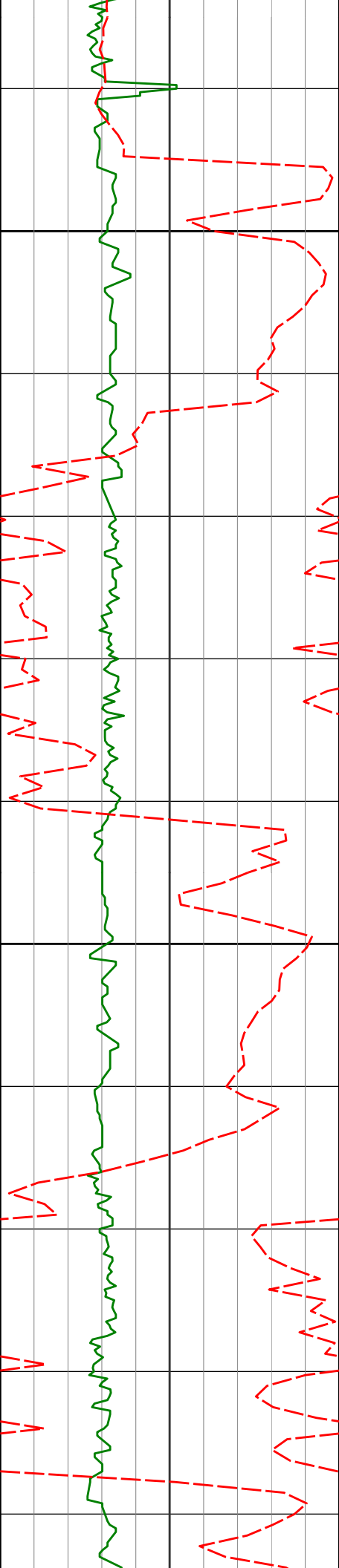
4479'

9.49°

161.85° 4438.31'

1.42'

124.60°F



4500

4600

4574'

4669'

10.02°

10.87°

163.27° 4531.94'

166.59° 4625.37'

-0.29'

-1.39'

126.09°F

126.52°F

126.52°F

126.52°F

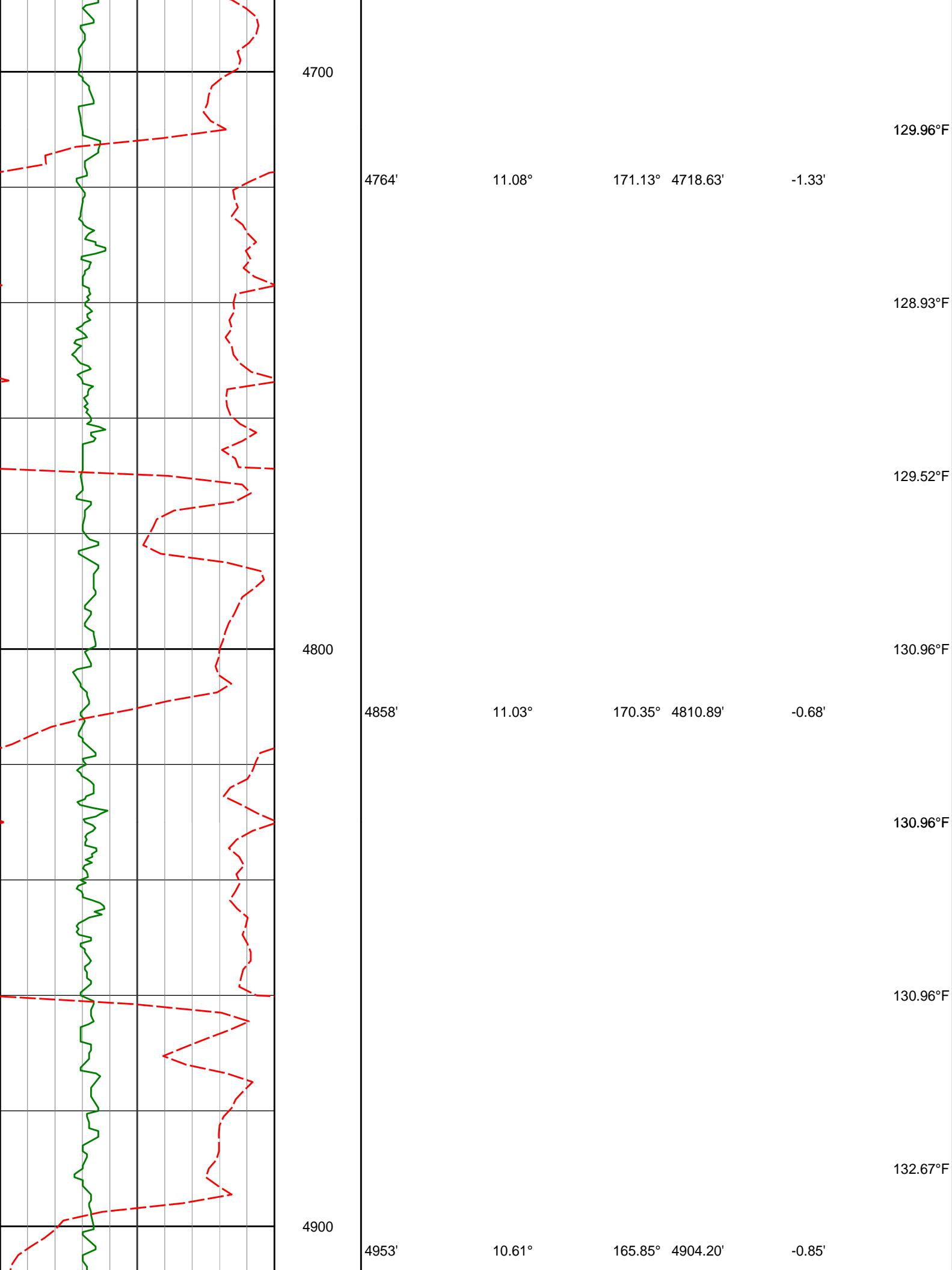
126.76°F

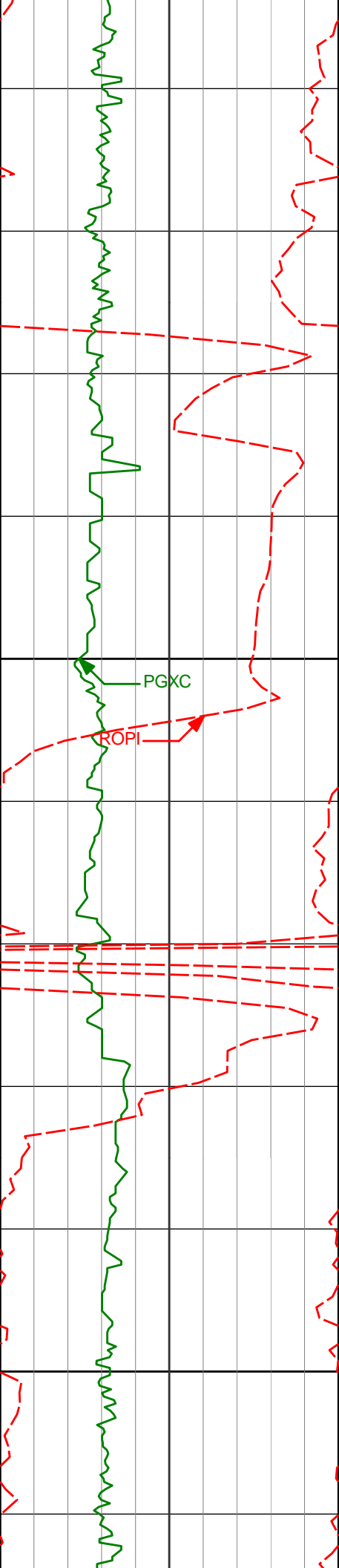
128.64°F

128.73°F

128.73°F







5000

5100

5047'

5143'

12.78°

11.38°

164.86°

166.68°

4996.24'

5090.12'

-1.97'

-3.00'

133.20°F

133.20°F

133.86°F

135.45°F

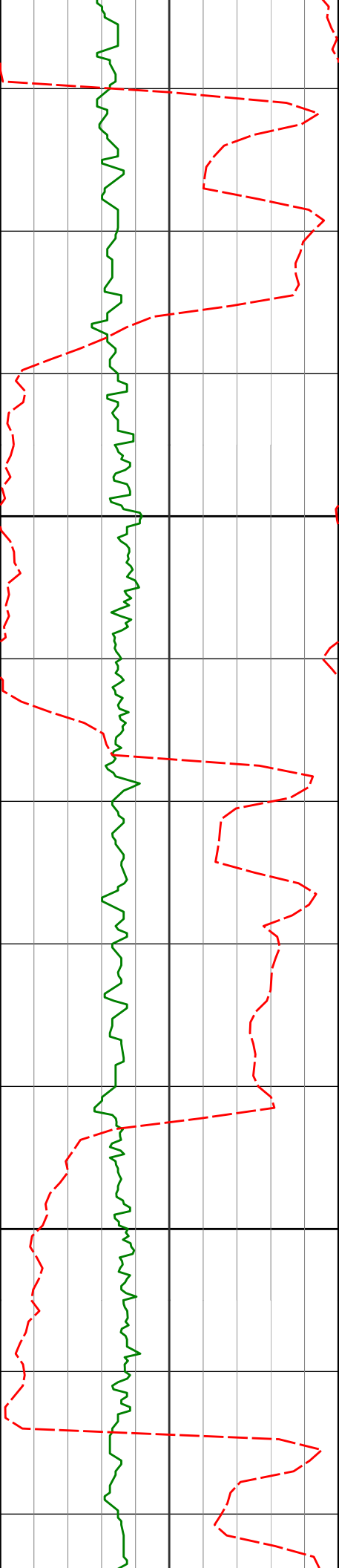
135.45°F

134.54°F

133.20°F

PGXC

ROPI



5200

5300

5238'

5333'

10.21°

11.09°

164.17°

165.07°

5183.44'

5276.80'

-3.99'

-5.23'

133.20°F

135.45°F

135.45°F

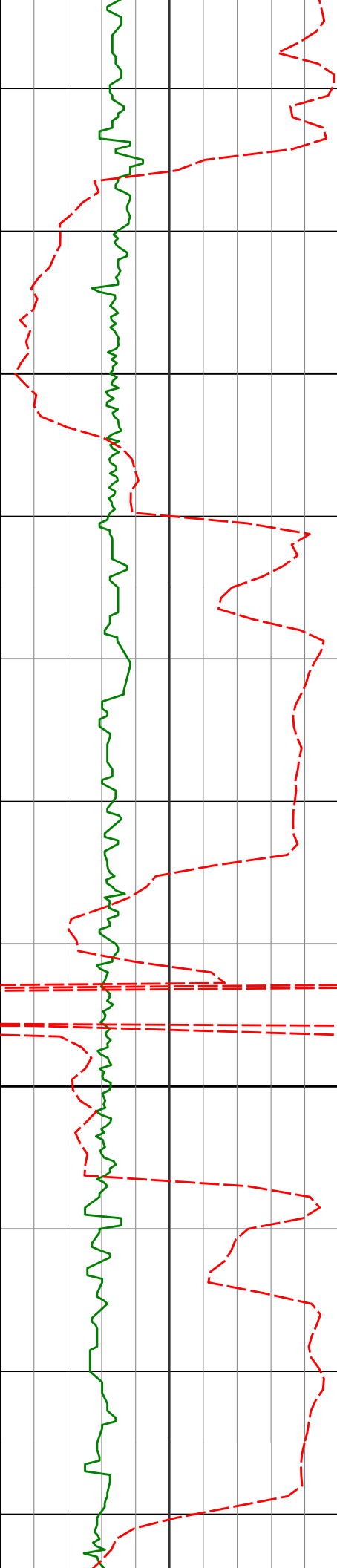
135.45°F

135.78°F

135.43°F

133.73°F

135.45°F



5427'

9.70°

165.35° 5369.25'

-6.26'

135.45°F

5400

135.45°F

135.45°F

5522'

10.97°

170.56° 5462.71'

-6.43'

135.09°F

133.91°F

5500

135.45°F

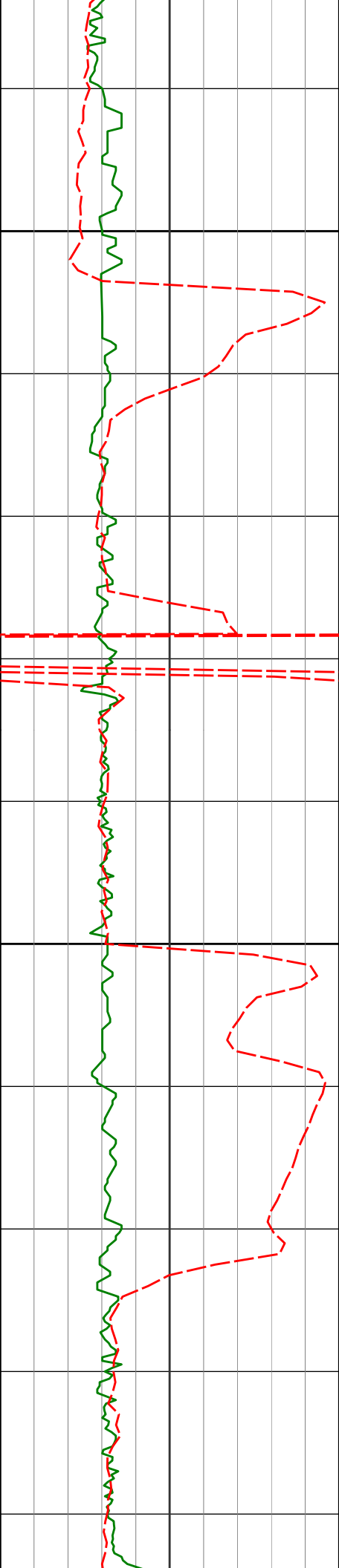
136.52°F

5617'

11.97°

167.85° 5555.81'

-6.28'



5600

5700

5711'

5806'

9.98°

10.34°

166.14°

168.68°

5648.09'

5741.60'

-6.78'

-7.15'

137.70°F

137.70°F

138.79°F

138.02°F

139.96°F

139.96°F

139.96°F



5800

5901'

9.52°

170.52°

5835.17'

-6.89'

5900

5995'

10.76°

166.38°

5927.71'

-7.00'

6000

139.96°F

140.76°F

140.58°F

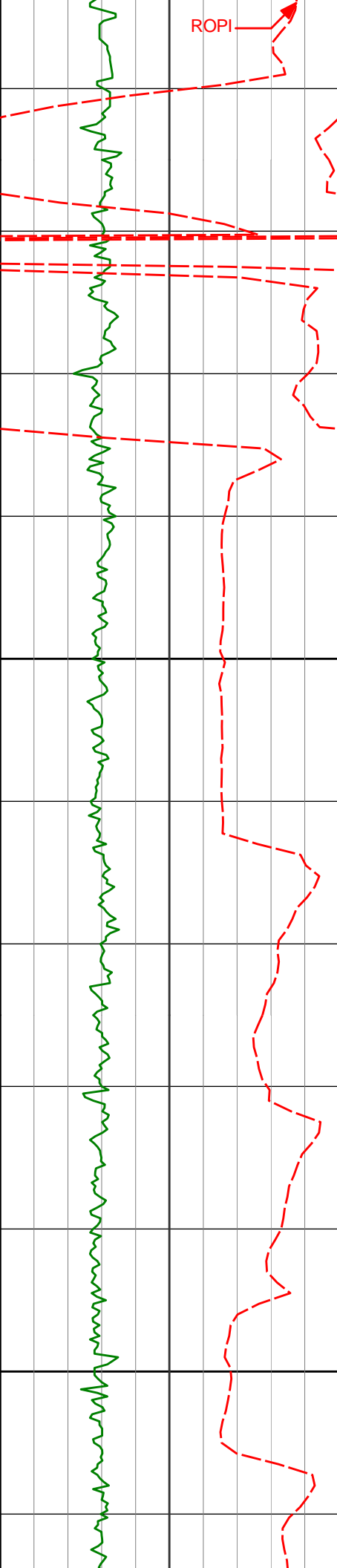
141.38°F

142.83°F

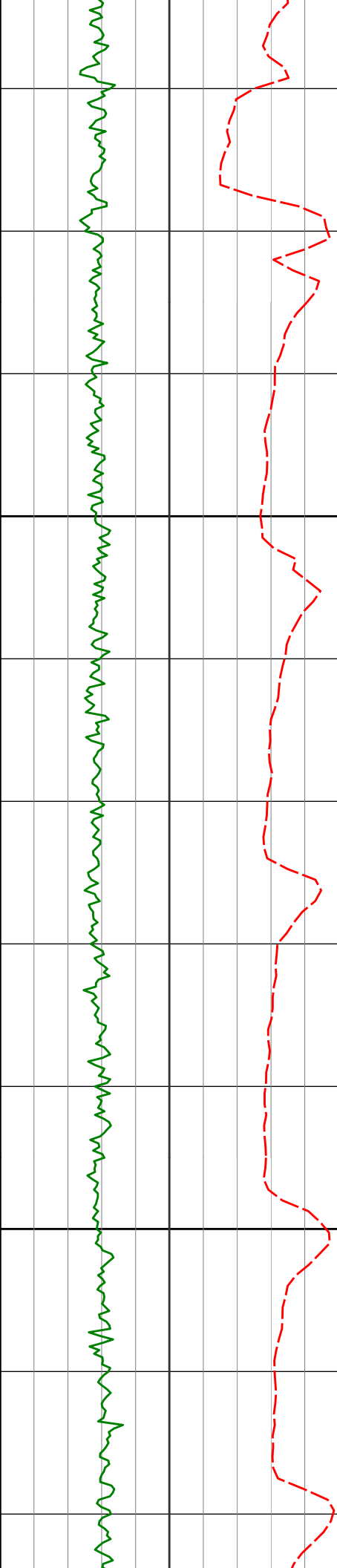
143.20°F

144.54°F

144.54°F

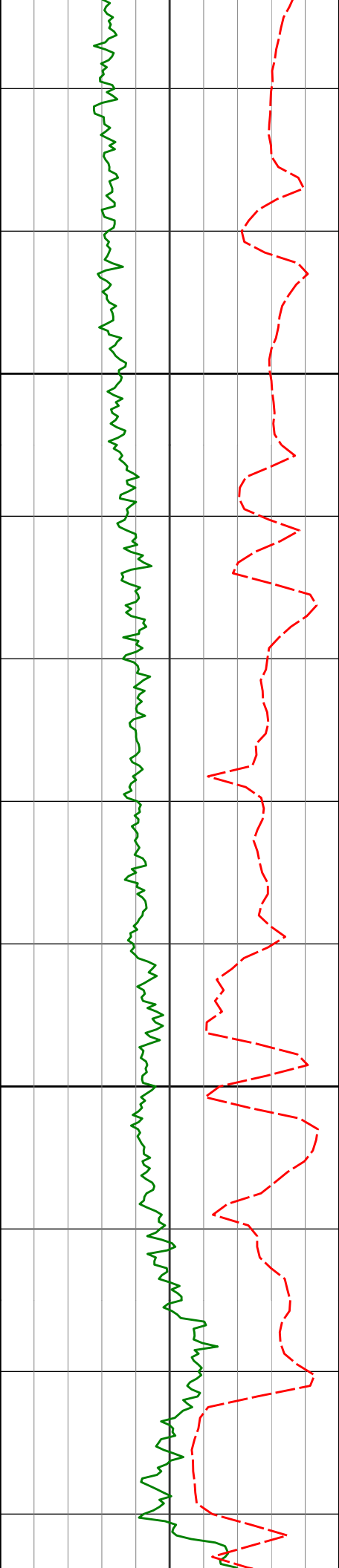


6085'	10.01°	160.57°	6016.23'	-8.44'	
					135.06°F
					133.45°F
6100					
6184'	8.29°	156.16°	6113.97'	-11.20'	
					133.31°F
200					
					134.95°F
6232'	10.81°	180.31°	6161.32'	-11.04'	
					136.49°F
6200					
6279'	13.12°	180.89°	6207.30'	-9.02'	
					138.22°F



6300	6327'	14.11°	189.85°	6253.95'	-5.75'	140.03°F
	6374'	16.10°	205.97°	6299.35'	0.27'	142.64°F
6400	6422'	18.22°	226.88°	6345.25'	10.69'	145.62°F
	6468'	20.63°	242.93°	6388.66'	24.61'	146.84°F
	6516'	23.64°	255.78°	6433.15'	42.38'	148.49°F





6500

6600

6563'

6657'

6752'

28.16°

37.56°

45.88°

260.72°

265.53°

269.54°

6475.42'

6554.30'

6625.16'

62.88'

113.62'

175.98'

150.78°F

151.47°F

151.68°F

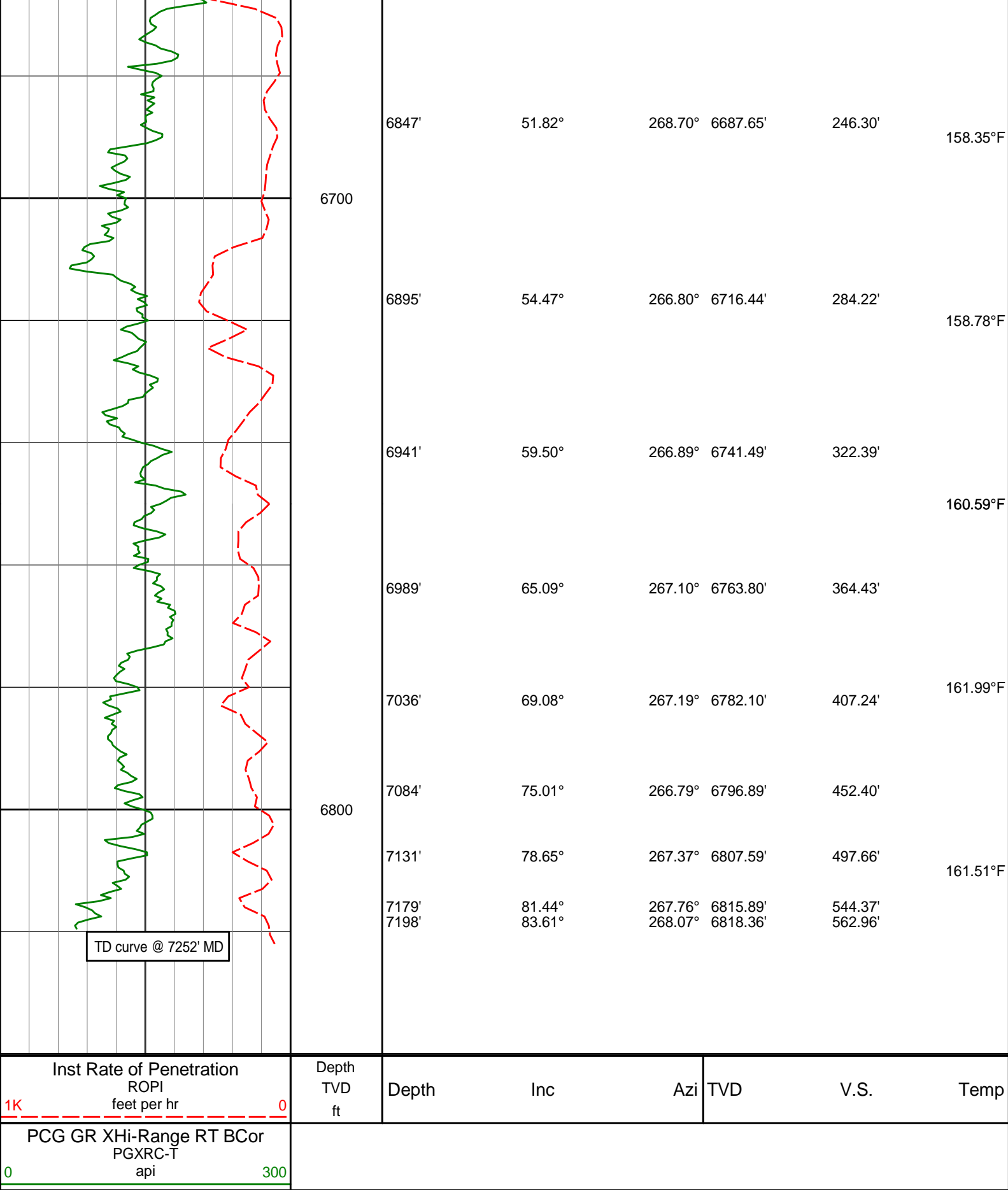
153.79°F

153.79°F

154.58°F

154.23°F

154.95°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy Inc  
Reliance E23-62-1HN  
Watteberg  
Weld Colorado  
USA  
CA-XX-0902136446  
Tied in @ Surface  
First two Survey's from 3rd party source (Multi Shot EMS)

<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
285.00	0.60	164.84	284.99	1.44 S	0.39 E	-0.10	0.21
600.00	0.80	173.64	599.97	5.22 S	1.07 E	-0.02	0.07
900.00	0.83	95.81	899.95	7.52 S	3.46 E	-1.91	0.34
992.00	0.73	94.79	991.94	7.63 S	4.70 E	-3.11	0.11
1086.00	0.91	111.11	1085.93	7.95 S	5.99 E	-4.31	0.31
1177.00	0.96	105.31	1176.92	8.42 S	7.40 E	-5.60	0.12
1269.00	0.80	123.55	1268.91	8.97 S	8.68 E	-6.75	0.35
1361.00	0.86	131.93	1360.90	9.79 S	9.72 E	-7.61	0.15
1453.00	0.80	136.86	1452.89	10.72 S	10.68 E	-8.36	0.10
1545.00	0.67	123.03	1544.88	11.48 S	11.56 E	-9.09	0.24
1731.00	0.76	92.07	1730.87	12.11 S	13.71 E	-11.06	0.21
1826.00	1.94	160.71	1825.84	13.66 S	14.87 E	-11.90	1.91
1920.00	3.43	180.00	1919.74	17.97 S	15.40 E	-11.57	1.83
2015.00	5.03	175.18	2014.48	24.96 S	15.75 E	-10.54	1.72
2110.00	6.50	175.88	2109.00	34.47 S	16.48 E	-9.40	1.55
2204.00	7.65	173.75	2202.28	46.00 S	17.55 E	-8.18	1.26
2299.00	8.52	174.95	2296.33	59.30 S	18.86 E	-6.85	0.93
2394.00	10.19	175.72	2390.06	74.70 S	20.11 E	-5.05	1.76
2489.00	11.43	169.52	2483.38	92.34 S	22.44 E	-3.88	1.78
2583.00	10.61	169.31	2575.65	109.99 S	25.74 E	-3.65	0.87
2678.00	11.14	169.78	2668.94	127.62 S	28.99 E	-3.38	0.56
2773.00	11.16	170.36	2762.15	145.71 S	32.16 E	-2.93	0.12
2868.00	11.46	169.55	2855.30	164.05 S	35.41 E	-2.52	0.36
2963.00	9.85	171.90	2948.66	181.38 S	38.27 E	-1.92	1.76
3057.00	11.66	168.59	3041.01	198.65 S	41.28 E	-1.48	2.04
3152.00	10.70	170.44	3134.20	216.76 S	44.64 E	-1.23	1.08
3246.00	10.08	167.41	3226.66	233.40 S	47.89 E	-1.14	0.88
3341.00	9.96	163.97	3320.21	249.42 S	51.97 E	-2.00	0.64
3436.00	10.22	170.32	3413.75	265.62 S	55.65 E	-2.43	1.20
3531.00	10.04	172.89	3507.27	282.15 S	58.10 E	-1.58	0.51
3626.00	11.41	172.01	3600.60	299.68 S	60.43 E	-0.43	1.45
3721.00	11.77	172.63	3693.67	318.60 S	62.98 E	0.78	0.39
3816.00	12.98	173.21	3786.46	338.79 S	65.48 E	2.29	1.28
3911.00	11.21	167.00	3879.35	358.38 S	68.82 E	2.86	2.31
4005.00	11.43	166.04	3971.52	376.32 S	73.12 E	2.17	0.31
4100.00	9.96	165.92	4064.87	393.42 S	77.39 E	1.34	1.55
4195.00	9.32	164.78	4158.53	408.81 S	81.41 E	0.42	0.70
4290.00	10.31	177.12	4252.15	424.72 S	83.86 E	1.14	2.44
4385.00	10.00	168.50	4345.67	441.29 S	85.93 E	2.37	1.63
4479.00	9.49	161.85	4438.31	456.65 S	89.96 E	1.42	1.31
4574.00	10.02	163.27	4531.94	472.01 S	94.78 E	-0.29	0.62
4669.00	10.87	166.59	4625.37	488.64 S	99.24 E	-1.39	1.09
4764.00	11.08	171.13	4718.63	506.37 S	102.72 E	-1.33	0.94
4858.00	11.03	170.35	4810.89	524.16 S	105.62 E	-0.68	0.17
4953.00	10.61	165.85	4904.20	541.60 S	109.28 E	-0.85	0.99
5047.00	12.78	164.86	4996.24	560.02 S	114.11 E	-1.97	2.32
5143.00	11.38	166.68	5090.12	579.48 S	119.07 E	-3.00	1.51
5238.00	10.21	164.17	5183.44	596.70 S	123.52 E	-3.99	1.32
5333.00	11.09	165.07	5276.80	613.63 S	128.17 E	-5.23	0.94
5427.00	9.70	165.35	5369.25	630.03 S	132.51 E	-6.26	1.48
5522.00	10.97	170.56	5462.71	646.70 S	136.02 E	-6.43	1.66
5617.00	11.97	167.85	5555.81	665.25 S	139.58 E	-6.28	1.19
5711.00	9.98	166.14	5648.09	682.69 S	143.58 E	-6.78	2.15
5806.00	10.34	168.68	5741.60	699.04 S	147.22 E	-7.15	0.61
5901.00	9.52	170.52	5835.17	715.15 S	150.19 E	-6.89	0.93
5995.00	10.76	166.38	5927.71	731.34 S	153.54 E	-7.00	1.53
6085.00	10.01	160.57	6016.23	746.88 S	158.12 E	-8.44	1.43
6184.00	8.29	156.16	6113.97	761.52 S	163.86 E	-11.20	1.88
6232.00	10.81	180.31	6161.32	769.19 S	165.24 E	-11.04	9.76

6279.00	13.12	180.89	6207.30	778.93 S	165.13 E	-9.02	4.90
6327.00	14.11	189.85	6253.95	790.15 S	164.04 E	-5.75	4.85
6374.00	16.10	205.97	6299.35	801.66 S	160.21 E	0.27	9.85
6422.00	18.22	226.88	6345.25	812.79 S	151.80 E	10.69	13.51
6468.00	20.63	242.93	6388.66	821.40 S	139.33 E	24.61	12.68
6516.00	23.64	255.78	6433.15	827.61 S	122.46 E	42.38	11.85
6563.00	28.16	260.72	6475.42	831.72 S	102.36 E	62.88	10.66
6657.00	37.56	265.53	6554.30	837.54 S	51.78 E	113.62	10.37
6752.00	45.88	269.54	6625.16	840.07 S	11.31 W	175.98	9.18
6847.00	51.82	268.70	6687.65	841.20 S	82.79 W	246.30	6.29
6895.00	54.47	266.80	6716.44	842.72 S	121.16 W	284.22	6.36
6941.00	59.50	266.89	6741.49	844.84 S	159.67 W	322.39	10.94
6989.00	65.09	267.10	6763.80	847.07 S	202.09 W	364.43	11.65
7036.00	69.08	267.19	6782.10	849.22 S	245.32 W	407.24	8.49
7084.00	75.01	266.79	6796.89	851.62 S	290.89 W	452.40	12.38
7131.00	78.65	267.37	6807.59	853.95 S	336.59 W	497.66	7.84
7179.00	81.44	267.76	6815.89	855.96 S	383.82 W	544.37	5.87
7198.00	83.61	268.07	6818.36	856.64 S	402.65 W	562.96	11.54

**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 258.68 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.83 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7198.00 FEET  
IS 946.55 FEET ALONG 205.17 DEGREES (GRID)**