

PCDC - Pressure Case Directional

PCGK - Pressure Case Gamma



<div> <div>Country : USA</div> <div>Field : Wattenberg</div> <div>Location : Lat: 40° 29' 10.39" North Long: 104° 28' 7.72" West</div> <div>Well : Colt A13-652</div> <div>Company : Noble Energy</div> <div>Rig : H&P 321</div> <div> <div>LOCATION</div> <div> <div>Company : Noble Energy</div> <div>Rig : H&P 321</div> <div>Well : Colt A13-652</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 0512340928</div> </div> </div> </div>	<div> <div>Permanent Datum : Ground Level</div> <div>Elevation : 4664.00 ft</div> </div>		<div> <div>Other Services</div> <div>Directional Drilling</div> </div>	
	<div> <div>Log Measured From : Drill Floor</div> <div>Elevation : 30.00 ft Above Permanent Datum</div> </div>		<div> <div>Drilling Measured From : Drill Floor</div> <div>TVD LOG</div> </div>	
	<div> <div>Depth Logged : 939.99 ft To 6,727.06 ft</div> <div>Date Logged : 26-Mar-15 To 29-Mar-15</div> <div>Total Depth MD : 7,060.00 ft TVD : 6,727.06 ft</div> <div>Spud Date : 26-Mar-15</div> </div>		<div> <div>Unit No. : 11210424</div> <div>Job No. :CA-XX-0902175510</div> </div>	
	<div> <div>Plot Type : Final</div> <div>Plot Date : 30-Mar-15</div> </div>			
	<div> <div>Borehole Record (TVD)</div> <div> <div>Size</div> <div>From</div> <div>To</div> </div> </div>		<div> <div>Casing Record (TVD)</div> <div> <div>Size</div> <div>Weight</div> <div>From</div> <div>To</div> </div> </div>	
	<div> <div>100</div> <div>8,750 in</div> <div>939.99 ft</div> <div>6,365.80 ft</div> </div>		<div> <div>9,625 in</div> <div>34.90 lbpf</div> <div>SURFACE</div> <div>929.99 ft</div> </div>	
	<div> <div>200</div> <div>8,750 in</div> <div>6,365.80 ft</div> <div>6,551.42 ft</div> </div>		<div> <div>7,000 in</div> <div>25.70 lbpf</div> <div>SURFACE</div> <div>6,727.23 ft</div> </div>	
	<div> <div>300</div> <div>8,750 in</div> <div>6,551.42 ft</div> <div>6,723.40 ft</div> </div>			
	<div> <div>400</div> <div>8,750 in</div> <div>6,723.40 ft</div> <div>6,727.06 ft</div> </div>			

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	19-Mar-15	20-Mar-15	24-Mar-15	29-Mar-15	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	6.125	8.750	
Tool Nominal OD (in)	6.790	6.790	4.780	6.790	
Log Start Depth (TVD, ft)	933.99	6,098.29	6,727.70	6,723.40	
Log End Depth (TVD, ft)	6,098.29	6,727.70	6,322.43	6,727.06	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	18-Mar-15 17:58	20-Mar-15 01:06	21-Mar-15 17:24	29-Mar-15 13:06	
Drill/Wipe End Date and Time	19-Mar-15 17:14	20-Mar-15 13:11	24-Mar-15 09:46	29-Mar-15 15:23	
Min Inc (deg) @ Depth (TVD, ft)	0.17 @ 956.99	15.64 @ 6,138.15	87.84 @ 6,510.95	86.95 @ 6,727.35	
Max Inc (deg) @ Depth (TVD, ft)	10.35 @ 3,784.82	83.05 @ 6,728.13	91.85 @ 6,455.96	91.00 @ 6,727.06	
Bit TFA(in2) / Bit Type	1.37 / PDC	1.37 / PDC	0.98 / PDC	1.49 / PDC	
Flow Rate (gpm)	586.74	550.10	315.00	570.00	
Max AV (fpm) / CV (fpm) @ MWD	349.4 / N/A	358.8 / N/A	515.8 / N/A	N/A / N/A	
Fluid Type	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	9.10 / 37.00	10.50 / 42.00	9.20 / 35.00	10.65 / 38.00	
Filtrate CL (ppm)	1,600.00	1,800.00	1,600.00	1,700.00	
pH / Fluid Loss (mptm)	9.30 / 8	9.80 / 7	8.20 / 8	9.30 / 6	
PV (cP) / YP (lhf2)	10 / 8.00	14 / 14.00	6 / 12.00	11 / 12.00	
% Solids / % Sand	4.20 / 0.25	11.20 / 0.20	5.60 / 0.15	10.80 / 0.15	
% Oil / Oil:Water Ratio	N/A / 0:95	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	167.00 / PCM	242.90 / PCM	160.83 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ 145.90	N/A @ 167.00	N/A @ 242.90	N/A @ 160.83	
Lead MWD Engineer	Robert Barnes	Robert Barnes	Robert Barnes	Robert Barnes	
Customer Representative	Jeremy Stolz	Jim Turner	Jim Turner	Jim Turner	

SENSOR INFORMATION

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 Distance: 1.2 ft
6. Insite Version v8.0.20

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TVD Detail 1:600 Scale

PCG GR XHi-Range RT BCor		
PGXRC-T		
0	api	300

0	api	300
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Inst Rate of Penetration
ROPI
feet per hr

1K feet per hr 0

Depth
TVD
ft

Depth

Inc

Azi

TVD

V.S.

Temp

900

70.02°F



Run 100

950

70.02°F

70.02°F

1000

- PGXC

PROPI

1014'

 0.43°

156.23°

1013.99'

-1.54'

1050

72.00°F

72.00°F

1100

1106'

 0.37°

146.06°

1105.99'

-1.85'

140.71°F

1150

140.26°F

1200

1198'

0.44°

174.34°

1197.99'

-2.05'

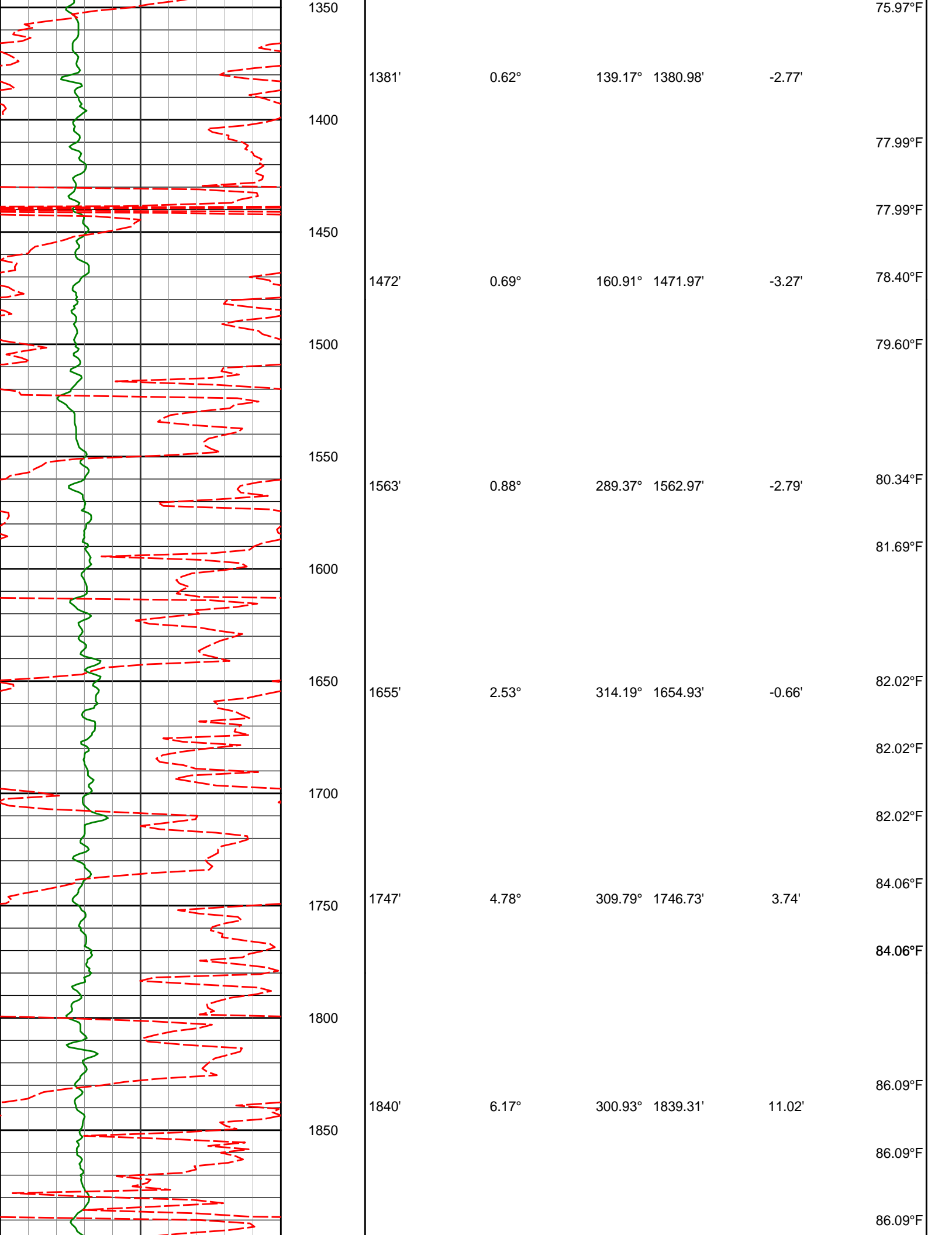
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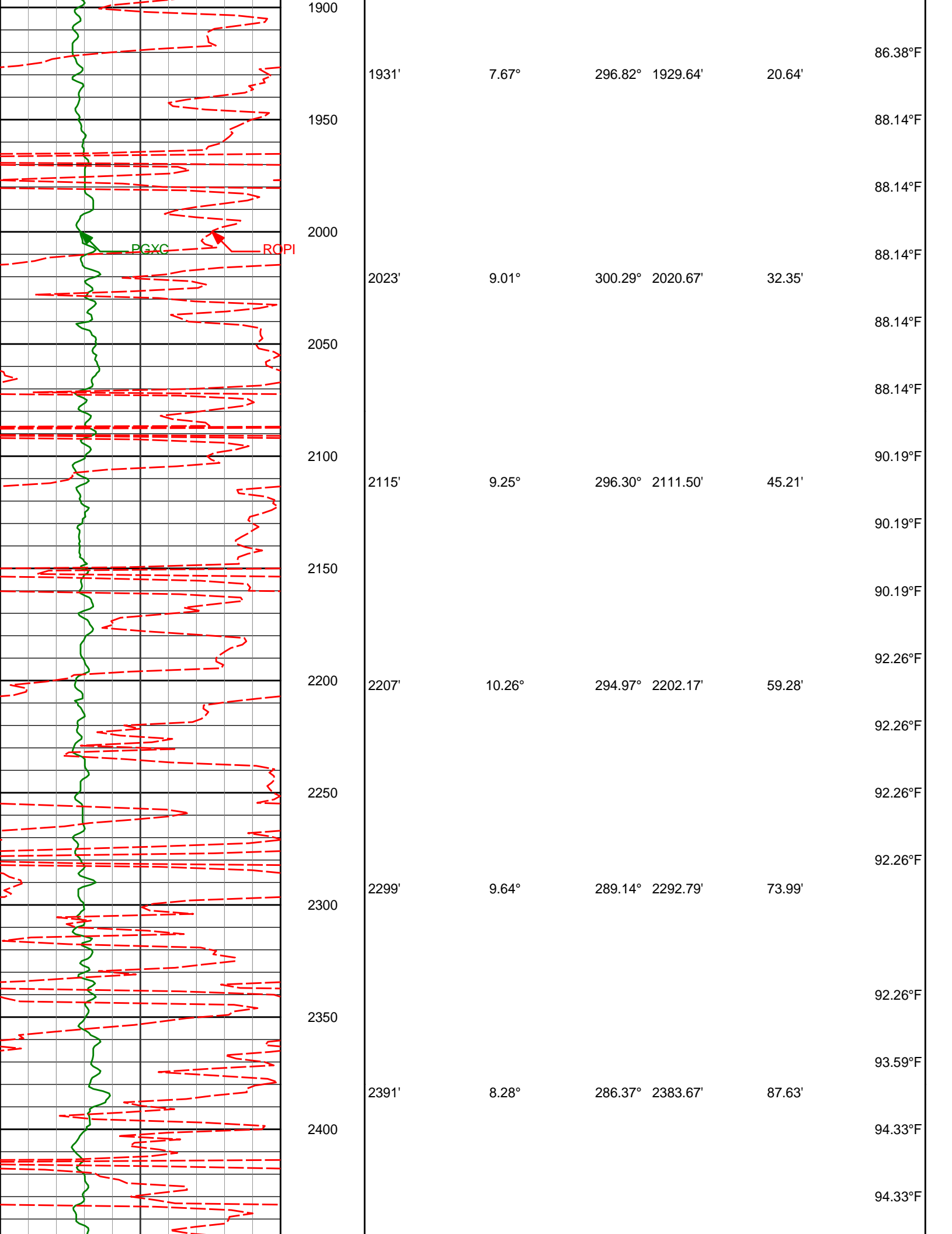
75.97°F

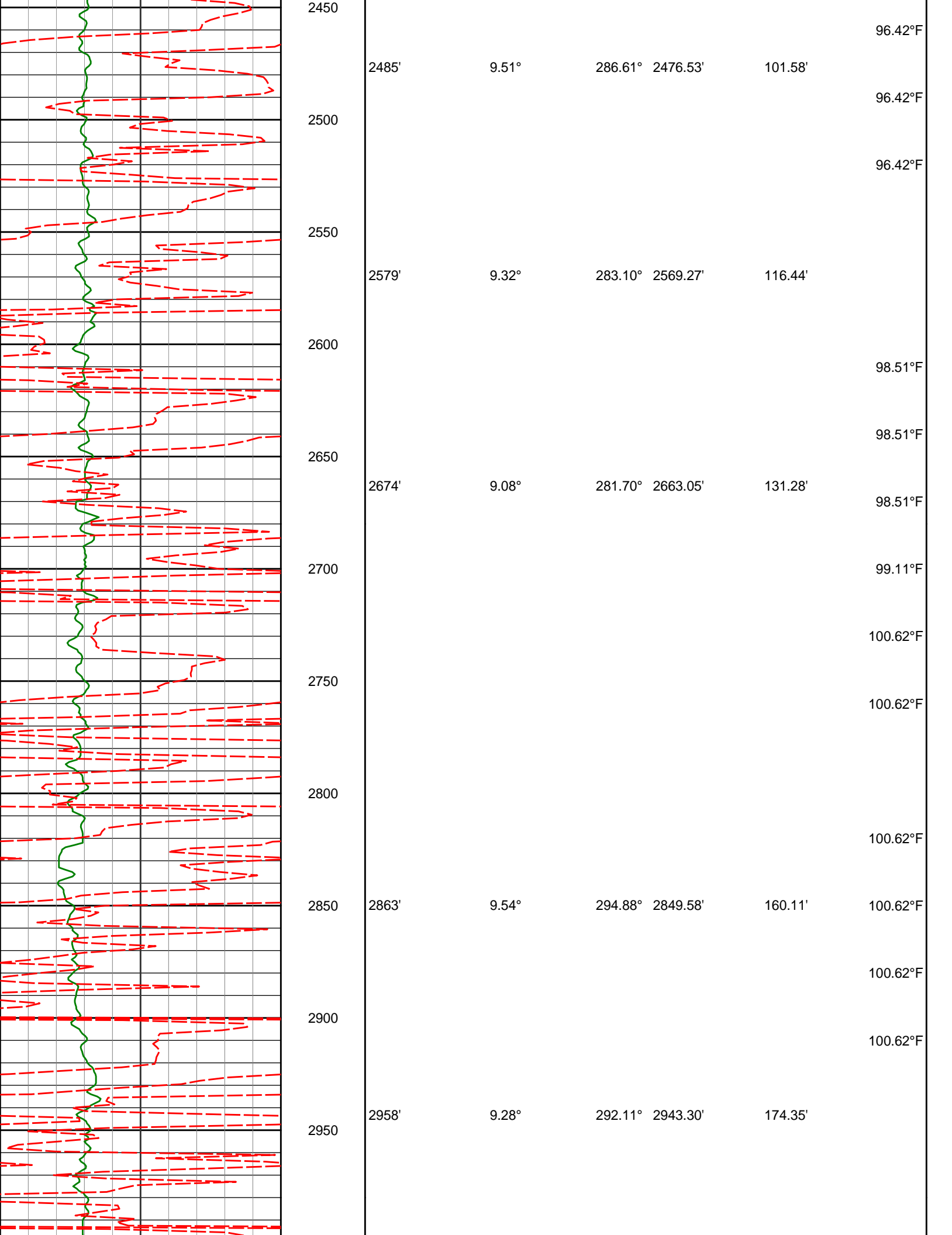
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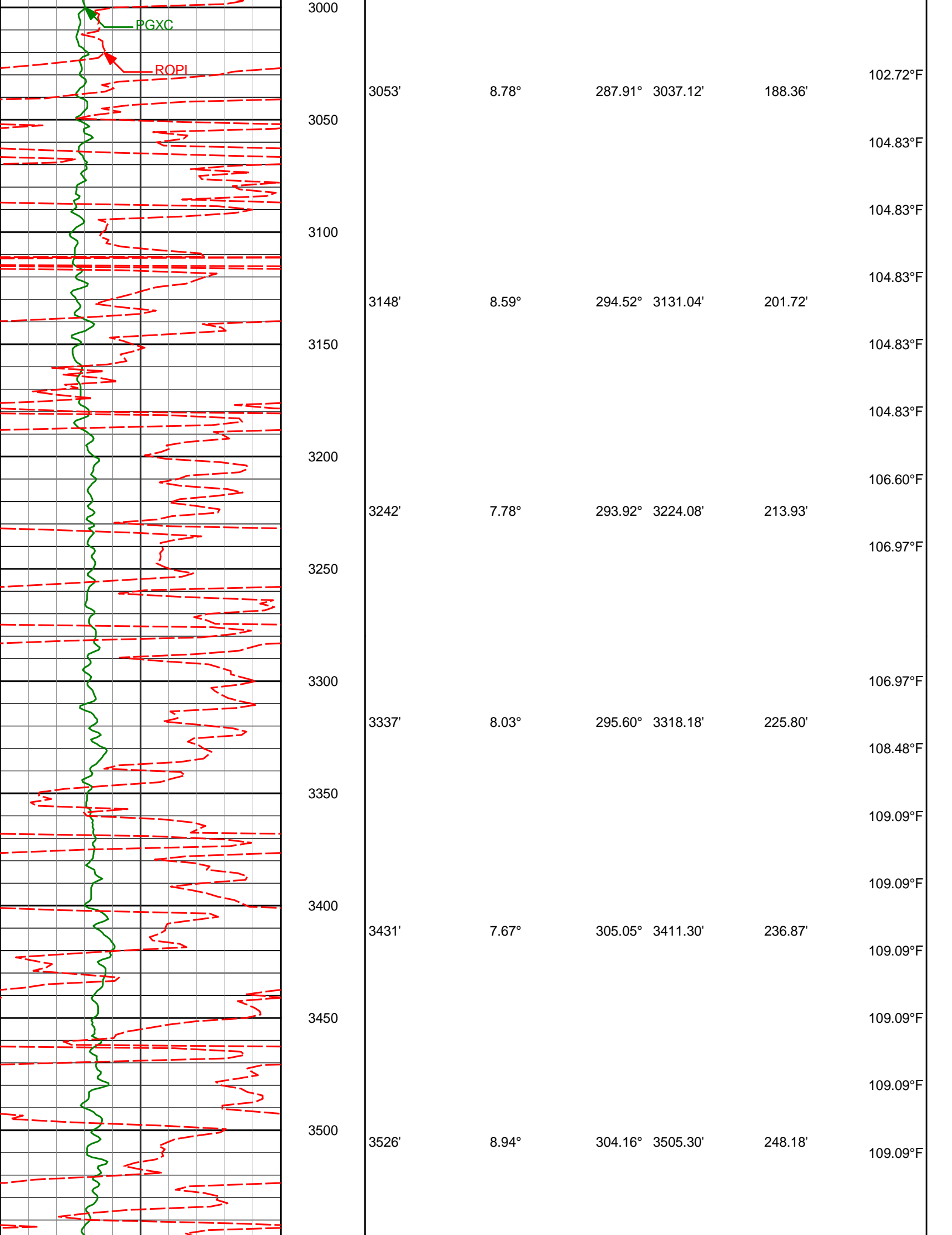
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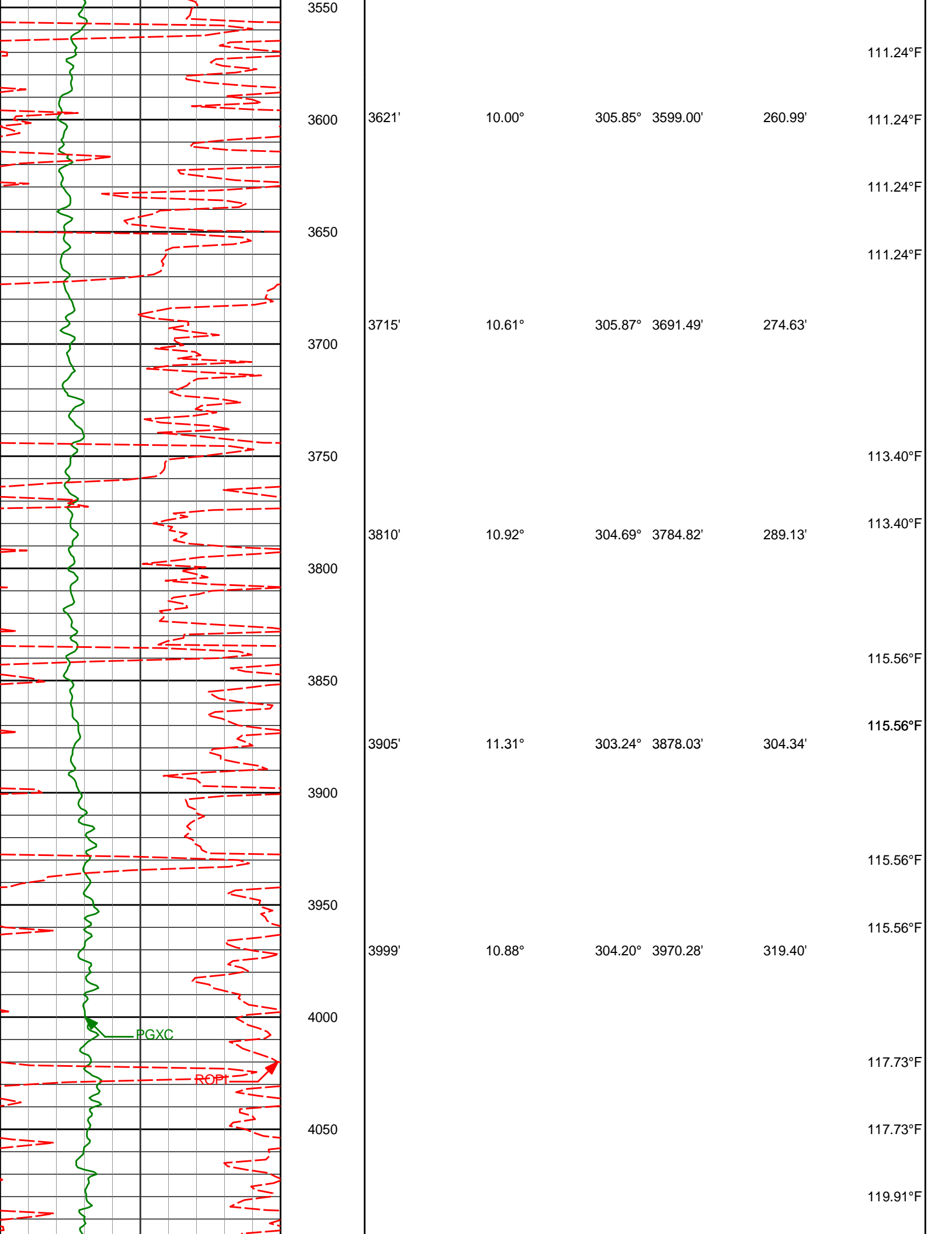
75.97°F

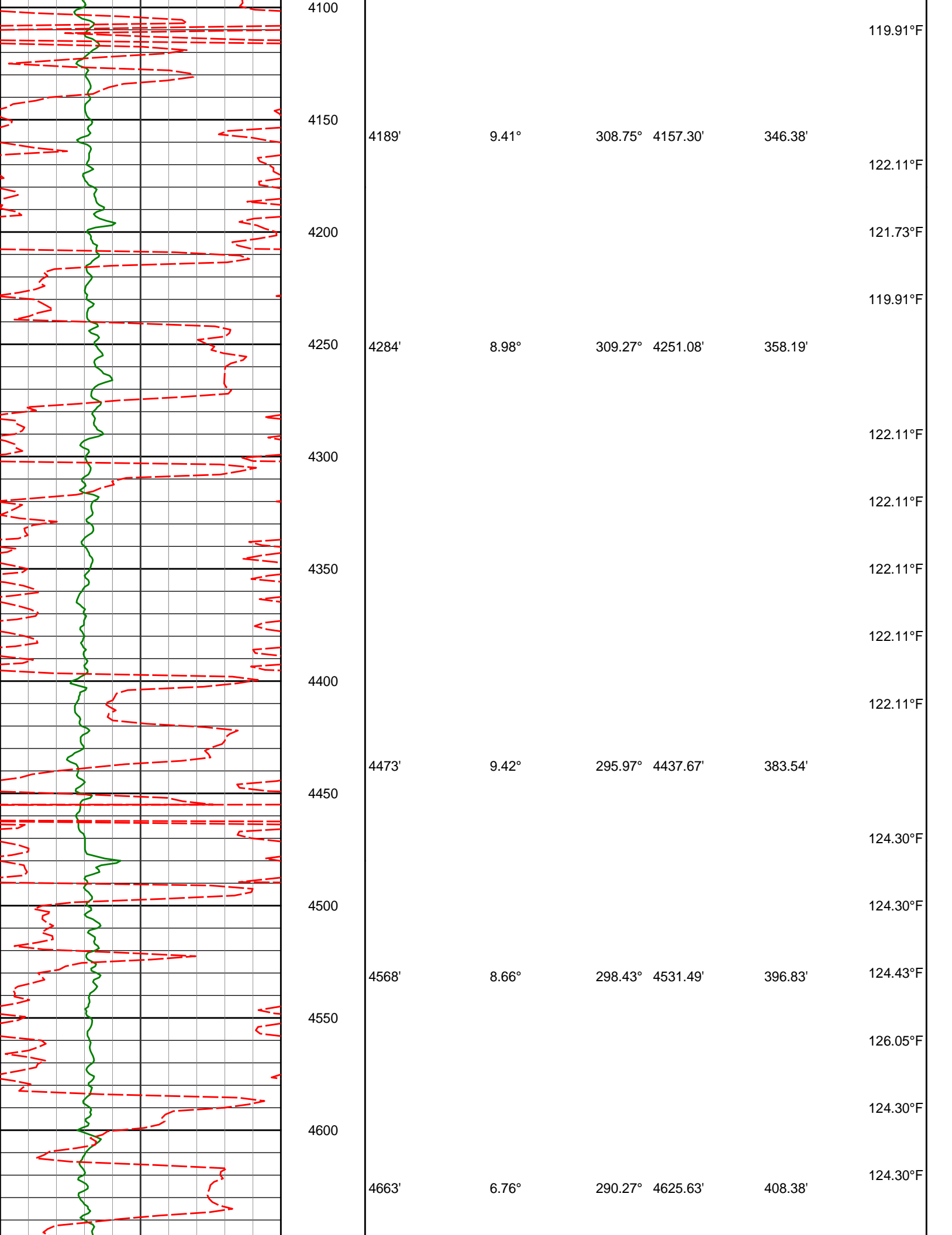


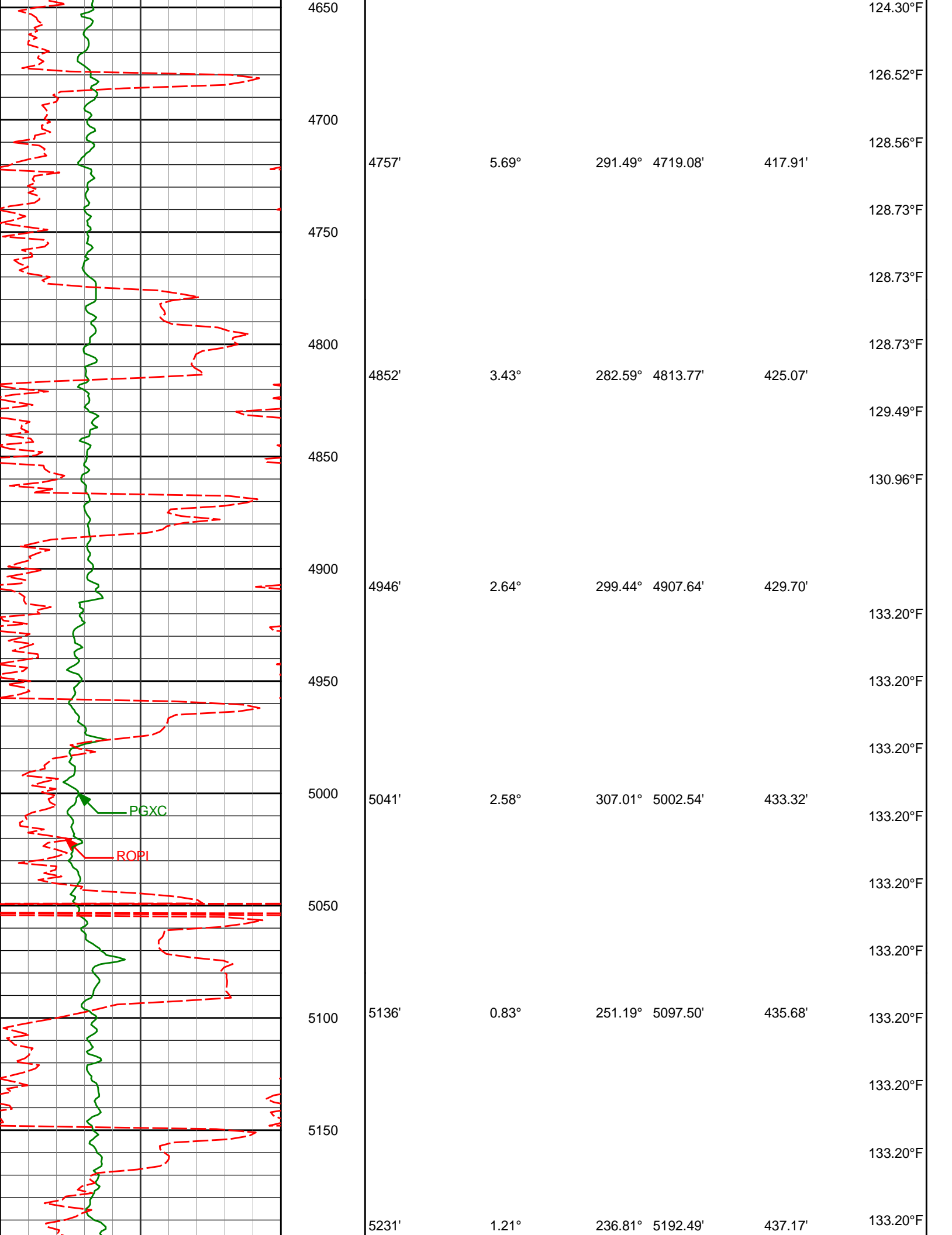


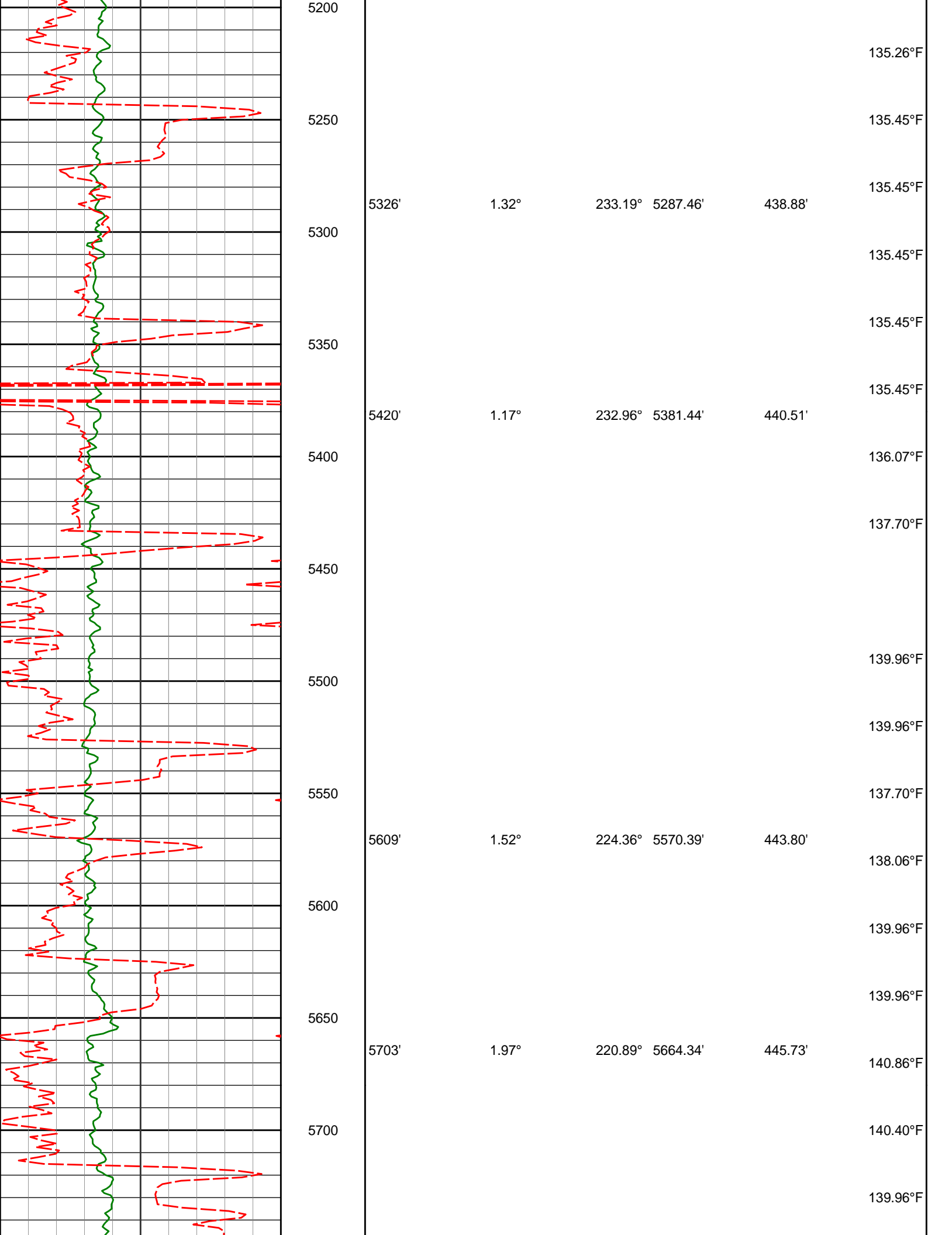


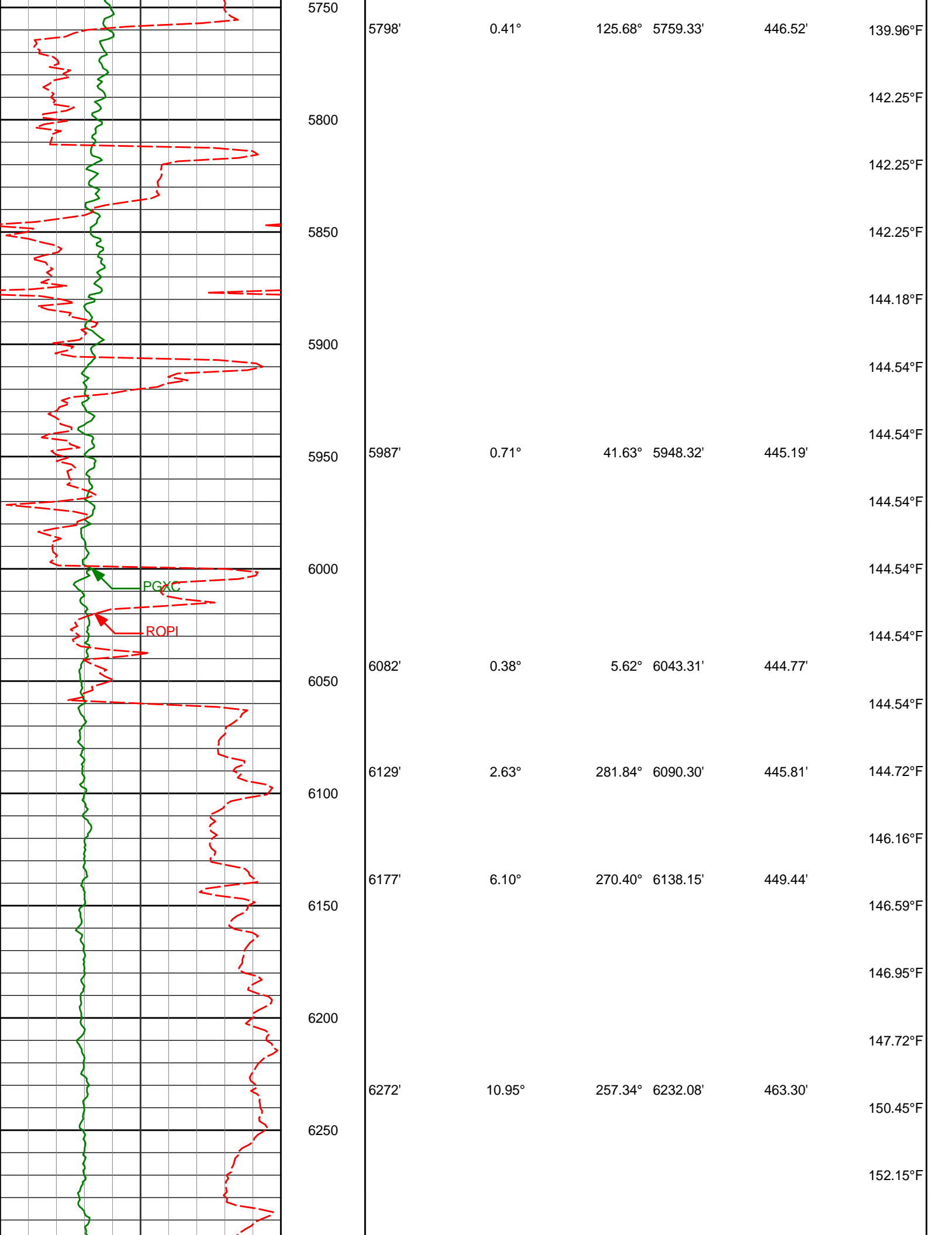


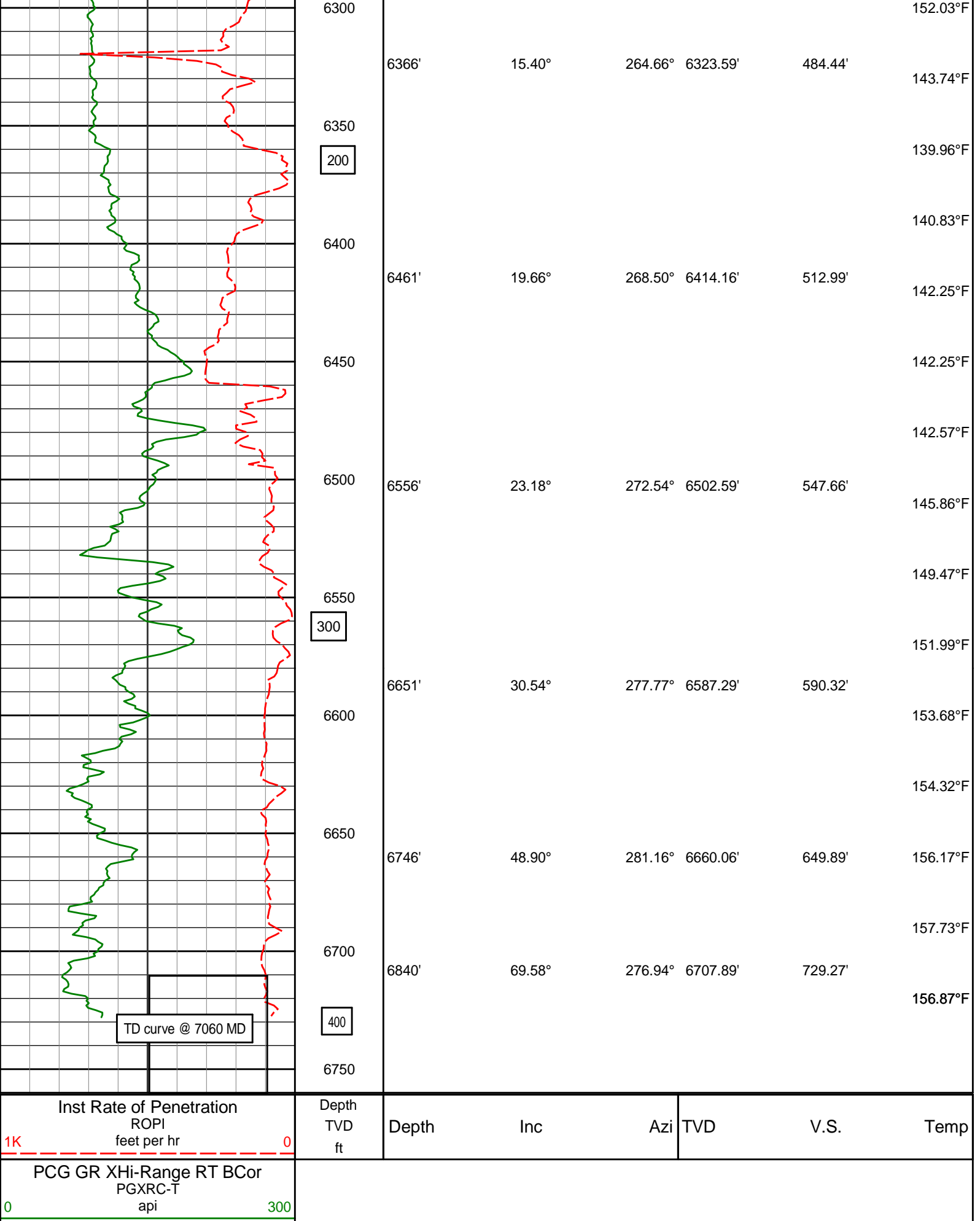












TVD Detail 1:240 Scale

PCG	GR	XHi-Range	RT	BCor
		PGXRC-T		
		api		3

0	api	300
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Inst Rate of Penetration
ROPI
feet per hr

1K feet per hr 0

Depth
TVD
ft

Depth

Inc

Az

TVD

V.S.

Temp |

900

70.02°F |

70.02°F

70.02°F |

Run 100



1000

- PGXC

ROPI

1014'

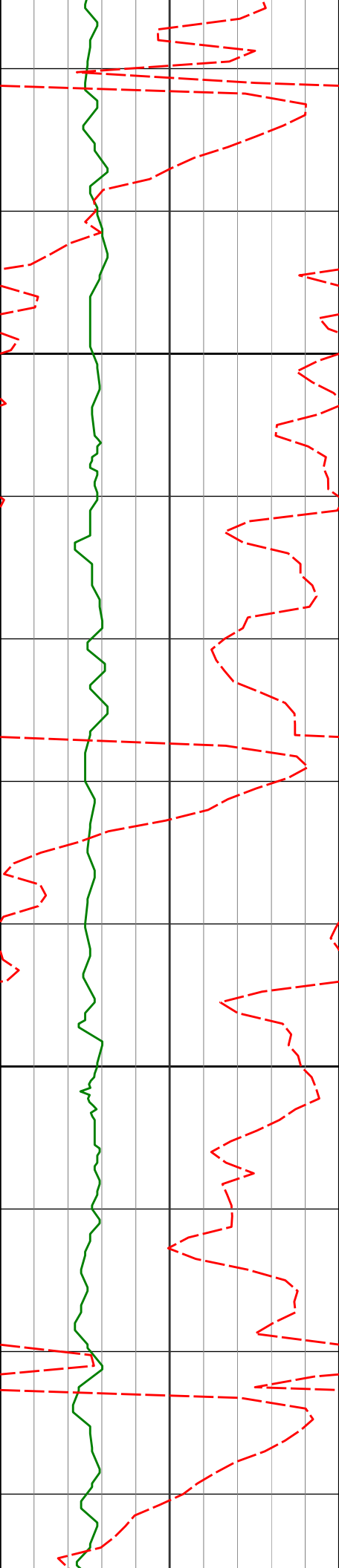
 0.43°

156.23°

1013.99'

-1.54'

72.00°F |



1100

1106'

0.37°

146.06°

1105.99'

-1.85'

72.00°F

140.71°F

140.26°F

1200

1198'

0.44°

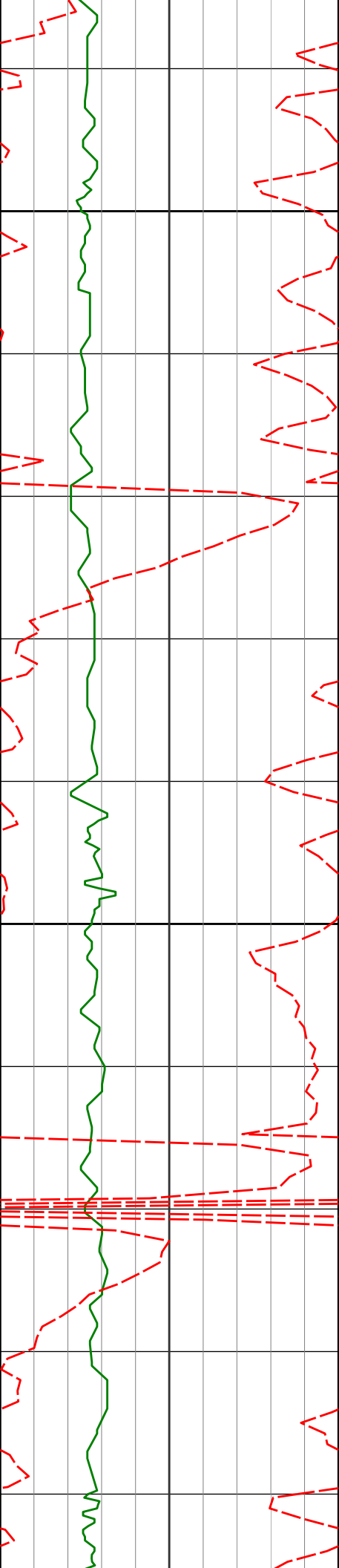
174.34°

1197.99'

-2.05'

75.97°F

75.97°F



1300

75.97°F

75.97°F

1381'

0.62°

139.17°

1380.98'

-2.77'

1400

77.99°F

77.99°F

1472'

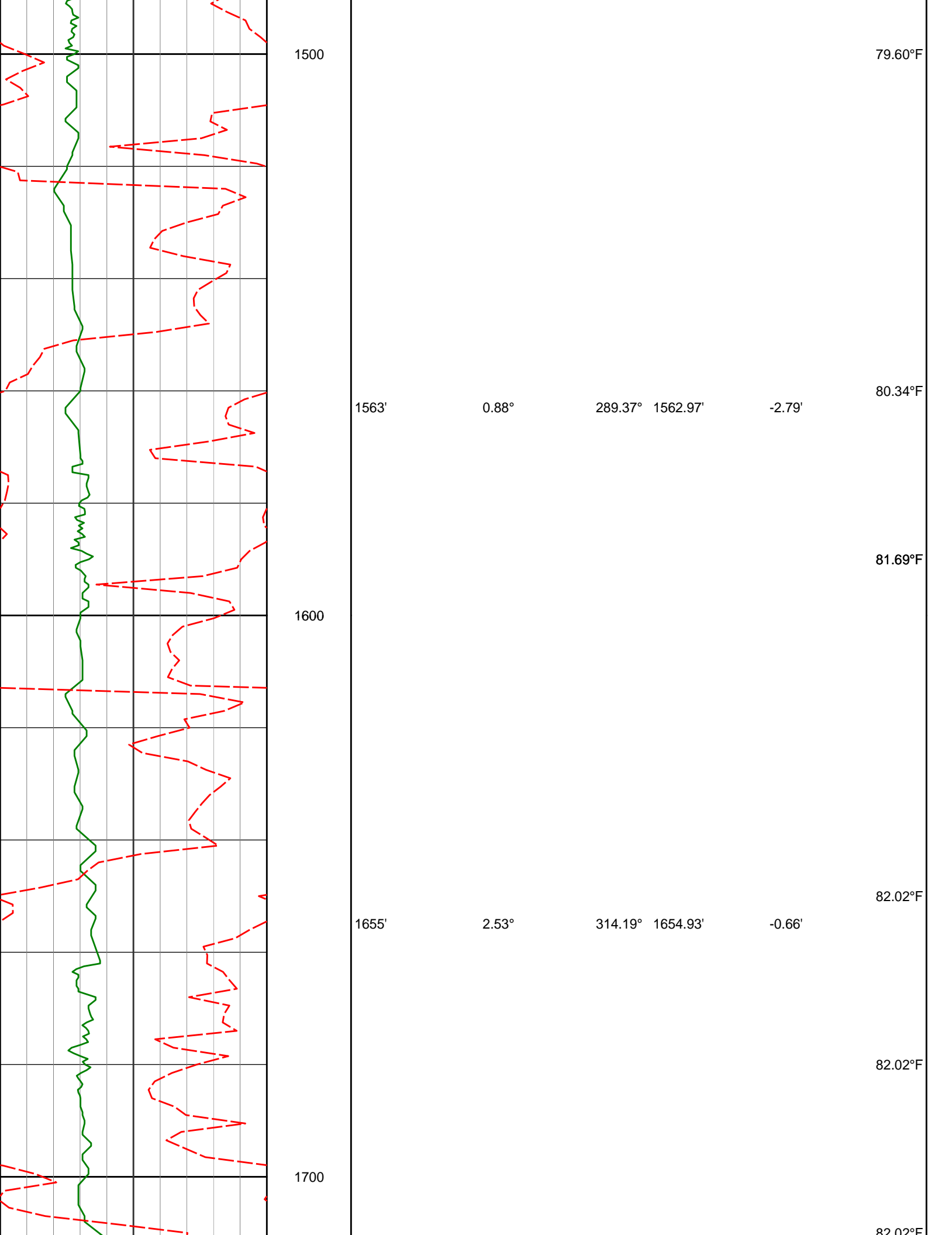
0.69°

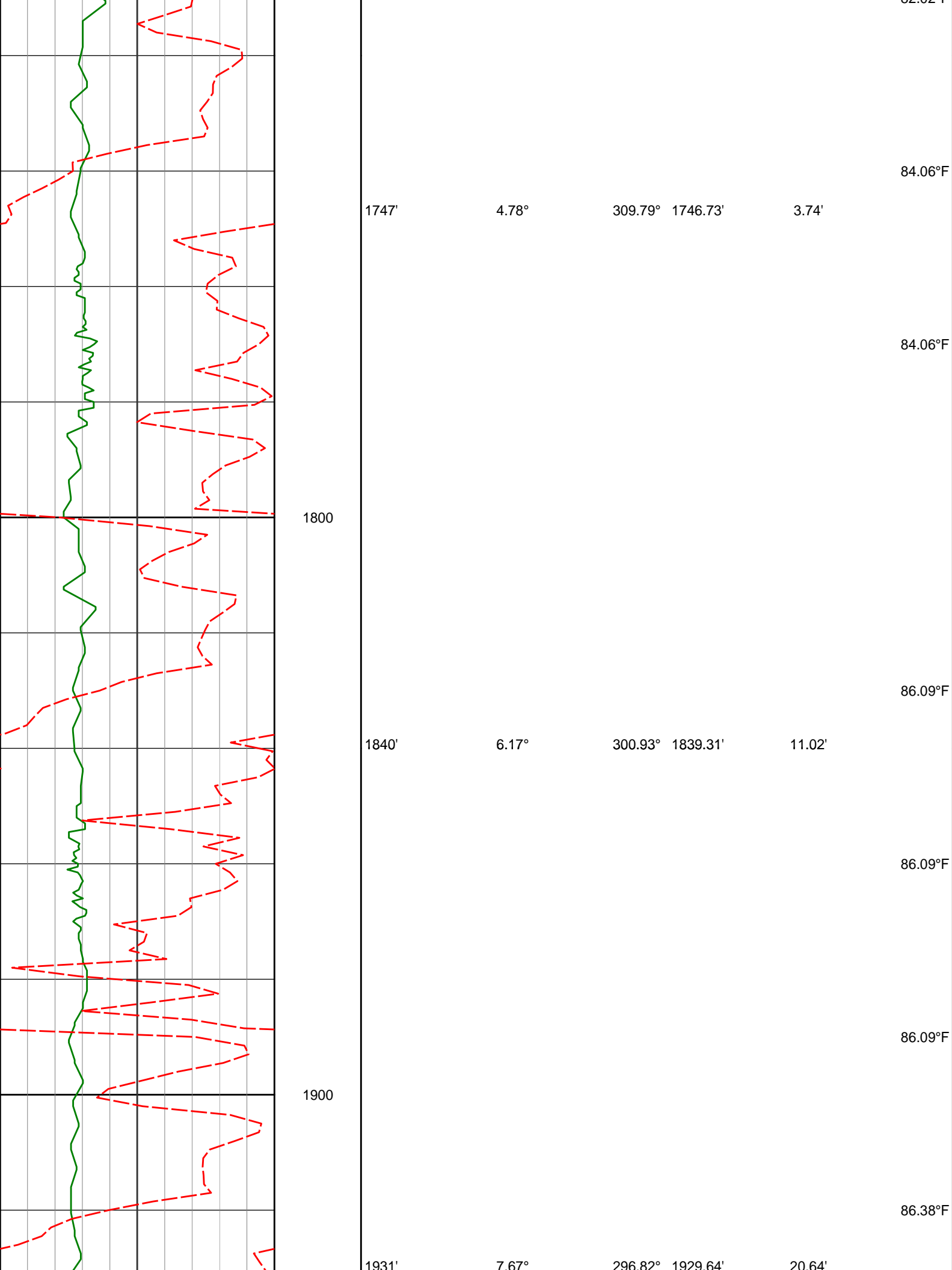
160.91°

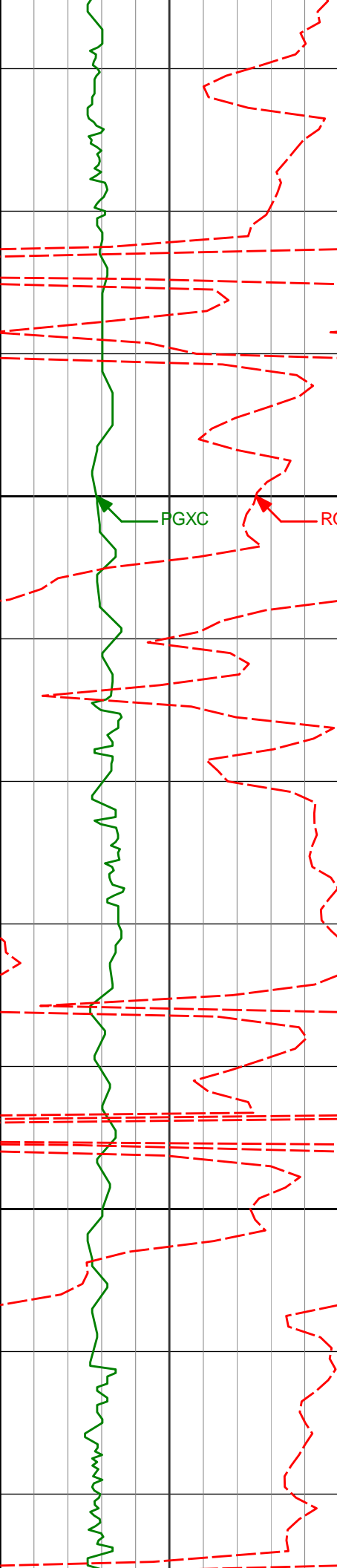
1471.97'

-3.27'

78.40°F







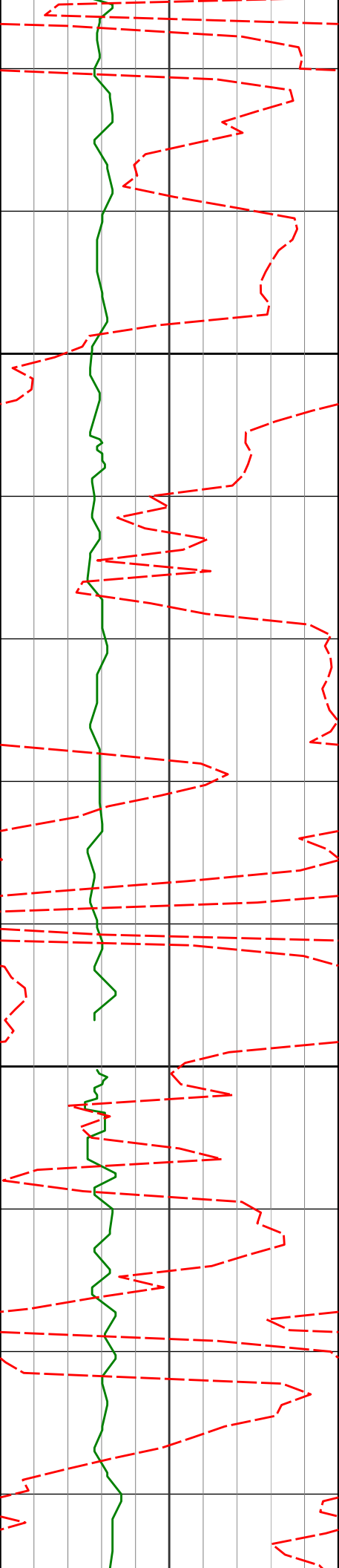
PGXC

ROPI

2000

2100

88.14°F				
88.14°F				
88.14°F				
2023'	9.01°	300.29°	2020.67'	32.35'
88.14°F				
88.14°F				
2115'	9.25°	296.30°	2111.50'	45.21'
90.19°F				
90.19°F				



2200

2207'

10.26°

294.97°

2202.17'

59.28'

90.19°F

92.26°F

92.26°F

92.26°F

92.26°F

2300

2299'

9.64°

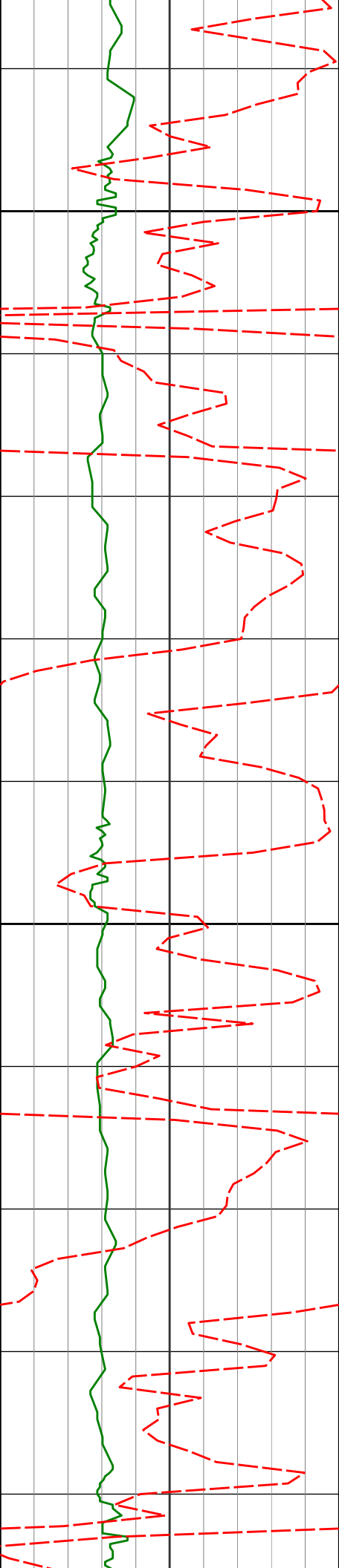
289.14°

2292.79'

73.99'

92.26°F

93.59°F



2391'

8.28°

286.37°

2383.67'

87.63'

2400

94.33°F

94.33°F

96.42°F

2485'

9.51°

286.61°

2476.53'

101.58'

96.42°F

2500

96.42°F

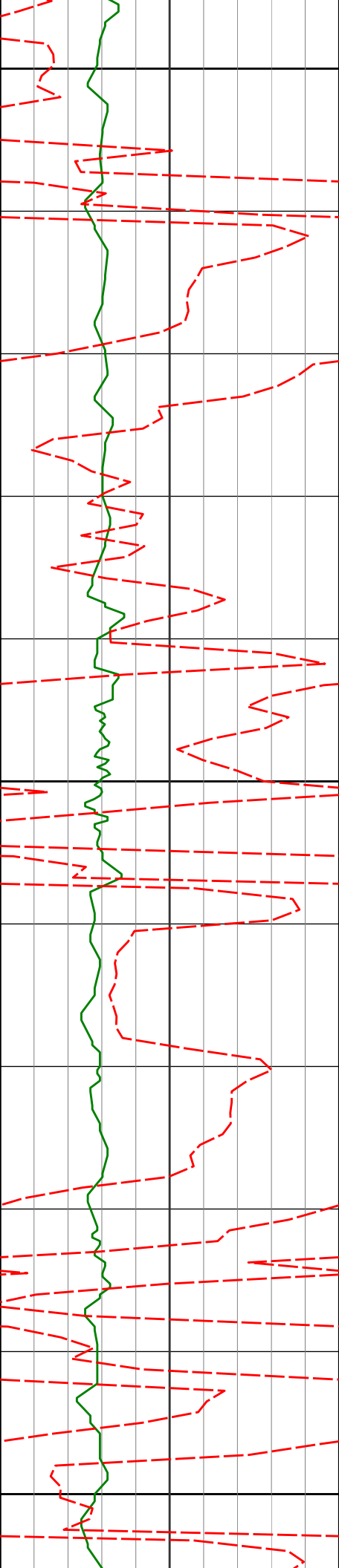
2579'

9.32°

283.10°

2569.27'

116.44'



2600

98.51°F

98.51°F

2674'

9.08°

281.70°

2663.05'

131.28'

98.51°F

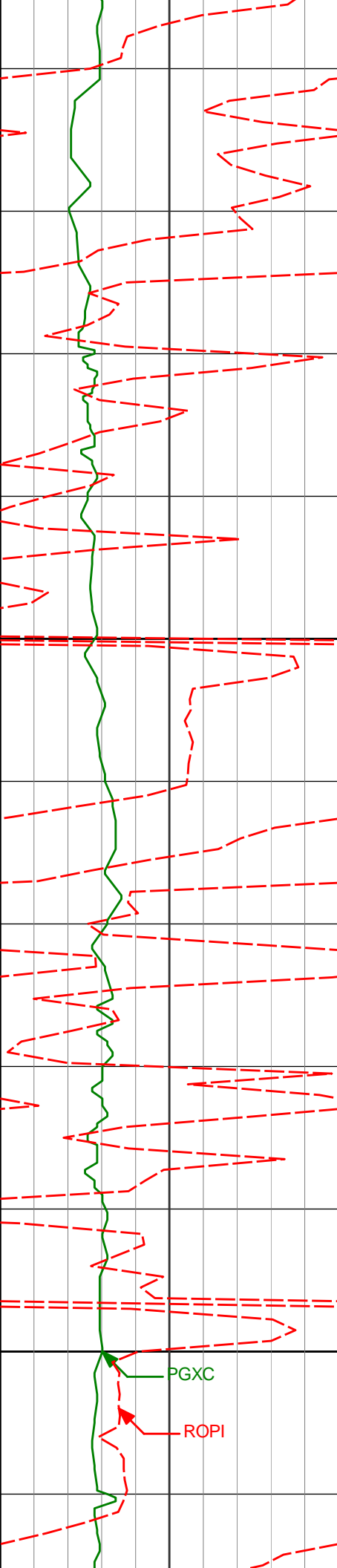
2700

99.11°F

100.62°F

100.62°F

2800



2900

3000

2863'

2958'

9.54°

9.28°

294.88°

292.11°

2849.58'

2943.30'

160.11'

174.35'

100.62°F

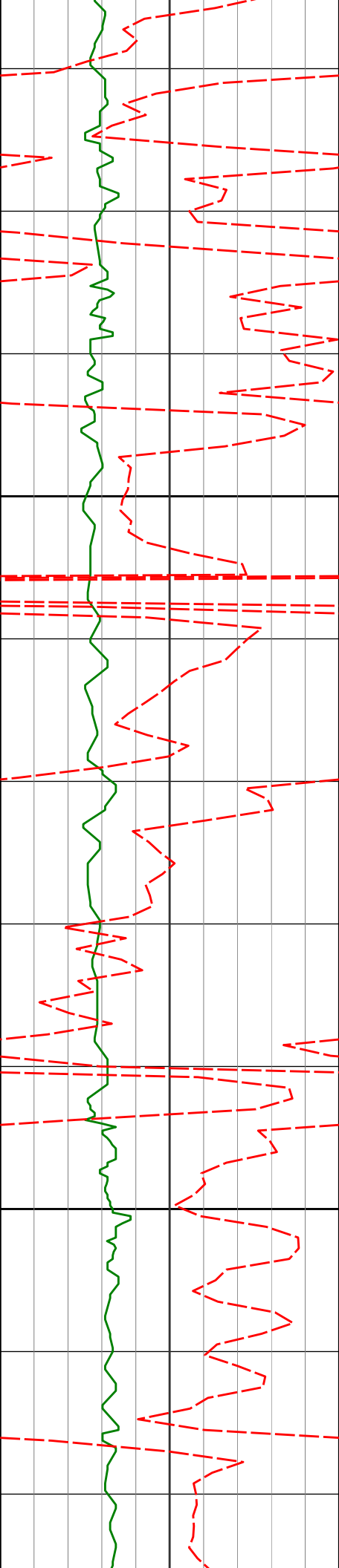
100.62°F

100.62°F

100.62°F

102.72°F

102.72°F



3053'

8.78°

287.91°

3037.12'

188.36'

104.83°F

104.83°F

3100

104.83°F

3148'

8.59°

294.52°

3131.04'

201.72'

104.83°F

104.83°F

3200

106.60°F

3242'

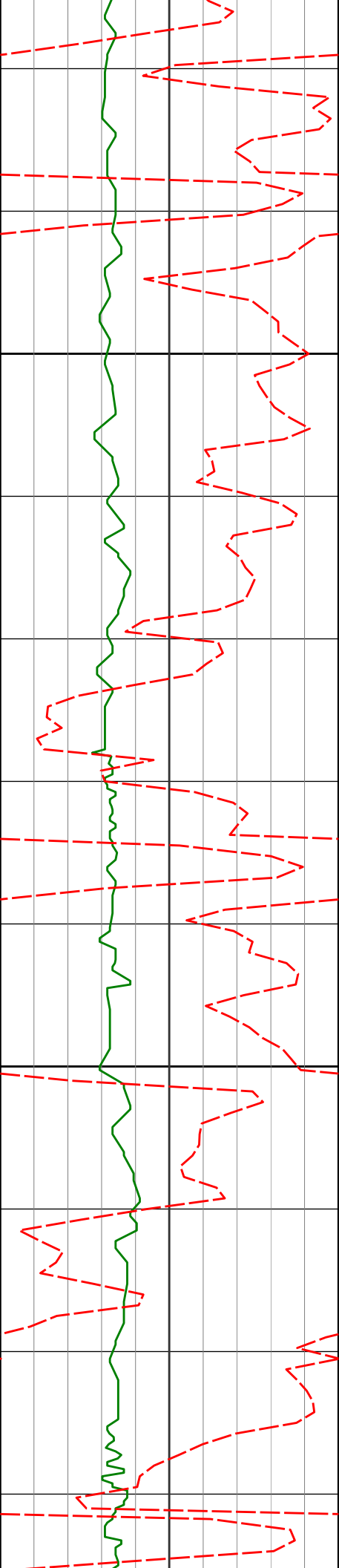
7.78°

293.92°

3224.08'

213.93'

106.97°F



3300

3337'

8.03°

295.60°

3318.18'

225.80'

106.97°F

108.48°F

109.09°F

109.09°F

3400

3431'

7.67°

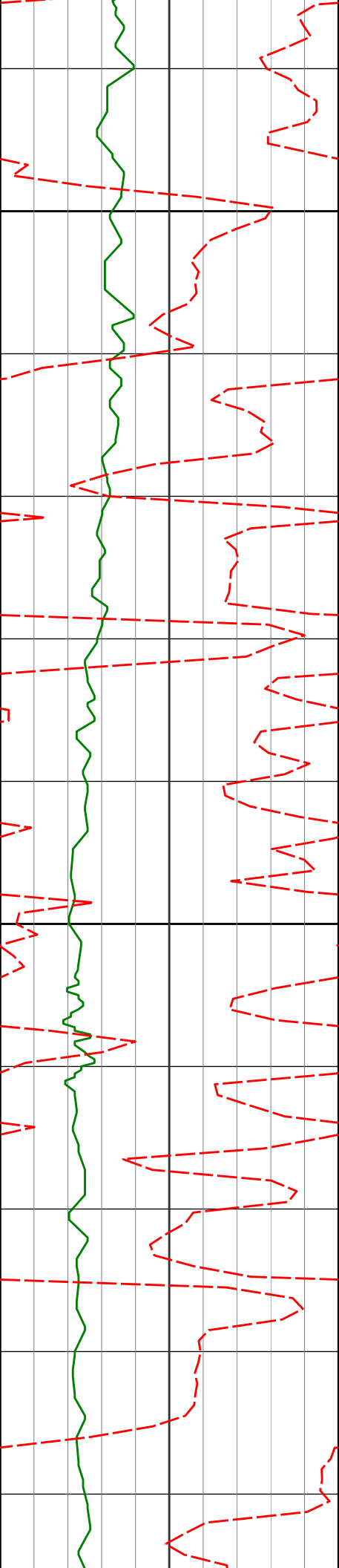
305.05°

3411.30'

236.87'

109.09°F

109.09°F



3500

3526'

8.94°

304.16°

3505.30'

248.18'

109.09°F

109.09°F

111.24°F

3600

3621'

10.00°

305.85°

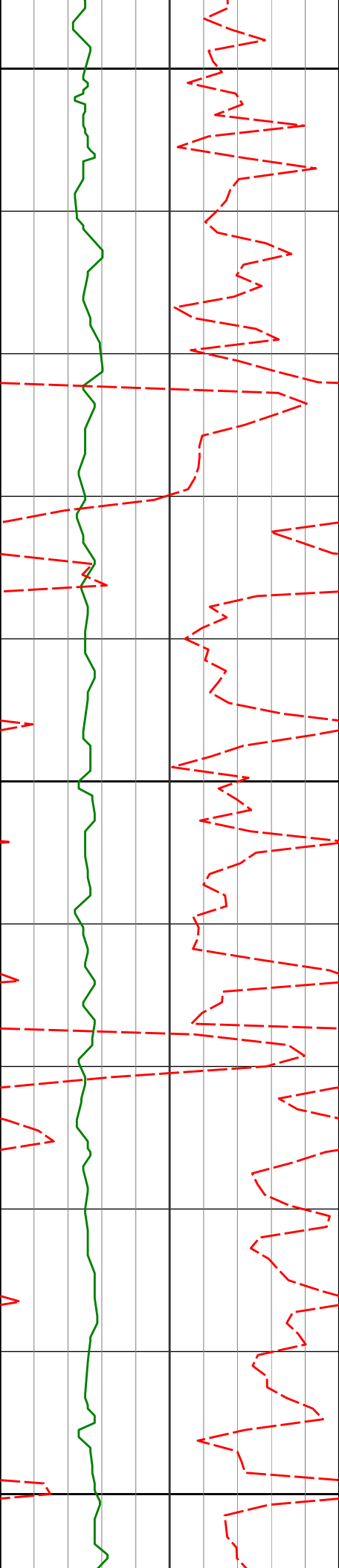
3599.00'

260.99'

111.24°F

111.24°F

111.24°F

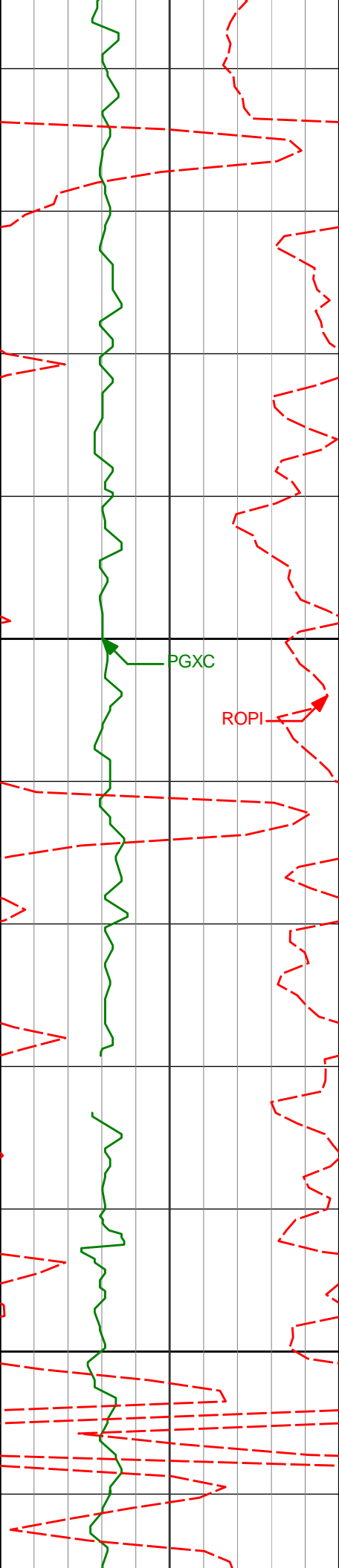


3700

3800

3900

3715'	10.61°	305.87°	3691.49'	274.63'	
					113.40°F
					113.40°F
3810'	10.92°	304.69°	3784.82'	289.13'	
					115.56°F
					115.56°F
3905'	11.31°	303.24°	3878.03'	304.34'	



4000

4100

3999'

10.88°

304.20°

3970.28'

319.40'

115.56°F

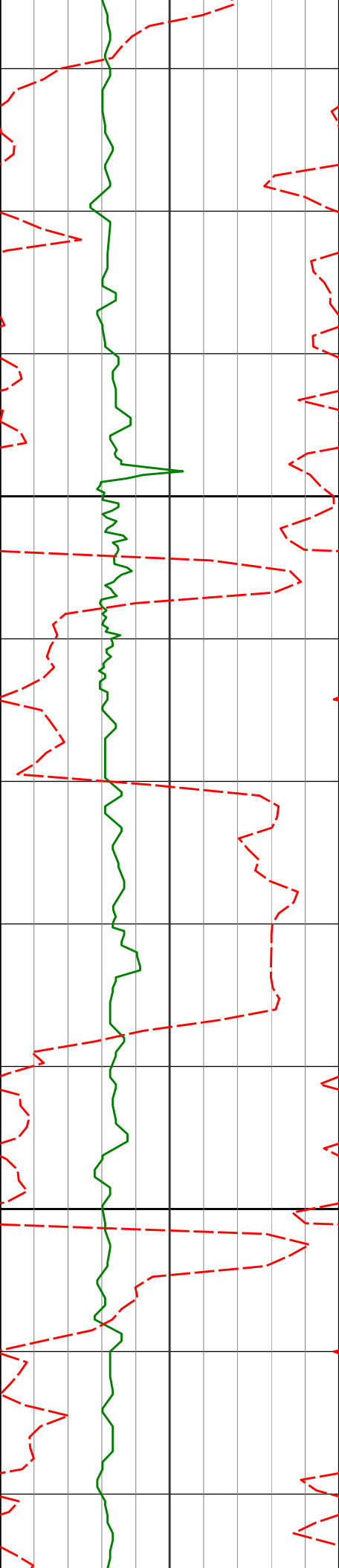
115.56°F

117.73°F

117.73°F

119.91°F

119.91°F



4189'

9.41°

308.75° 4157.30'

346.38'

122.11°F

4200

121.73°F

119.91°F

4284'

8.98°

309.27° 4251.08'

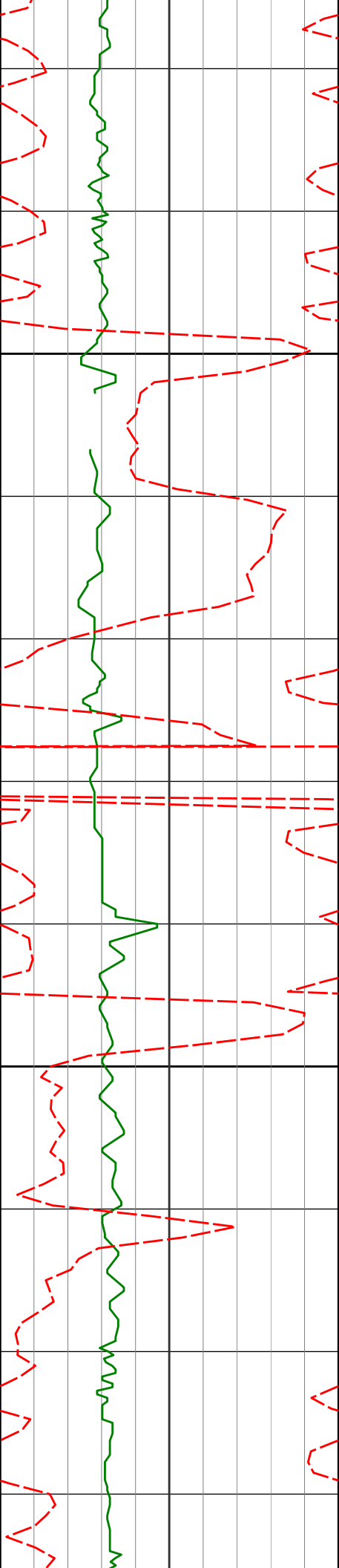
358.19'

122.11°F

4300

122.11°F

122.11°F



4400

4473'

9.42°

295.97°

4437.67'

383.54'

4500

4568'

8.66°

298.43°

4531.49'

396.83'

122.11°F

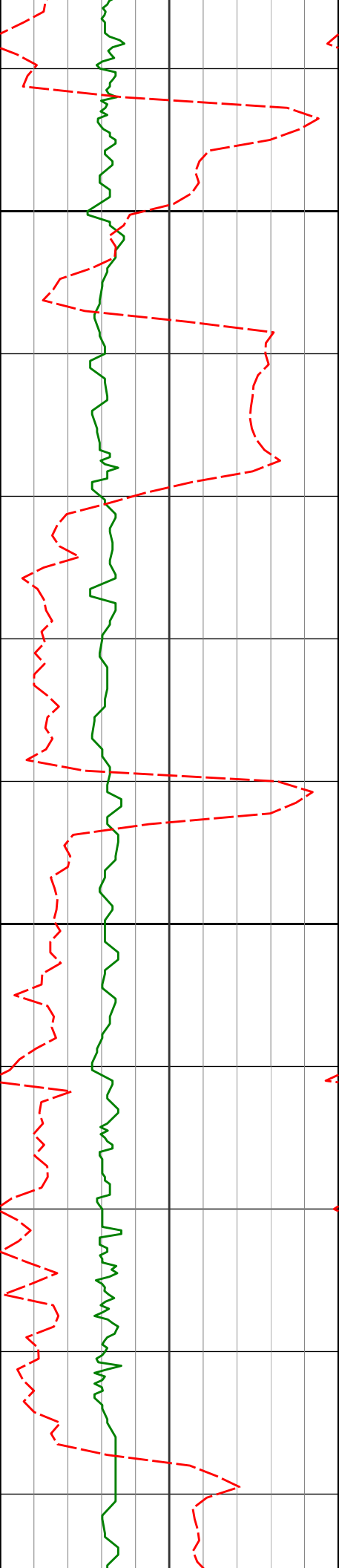
122.11°F

124.30°F

124.30°F

124.43°F

126.05°F



4600

4663'

6.76°

290.27°

4625.63'

408.38'

4700

4757'

5.69°

291.49°

4719.08'

417.91'

124.30°F

124.30°F

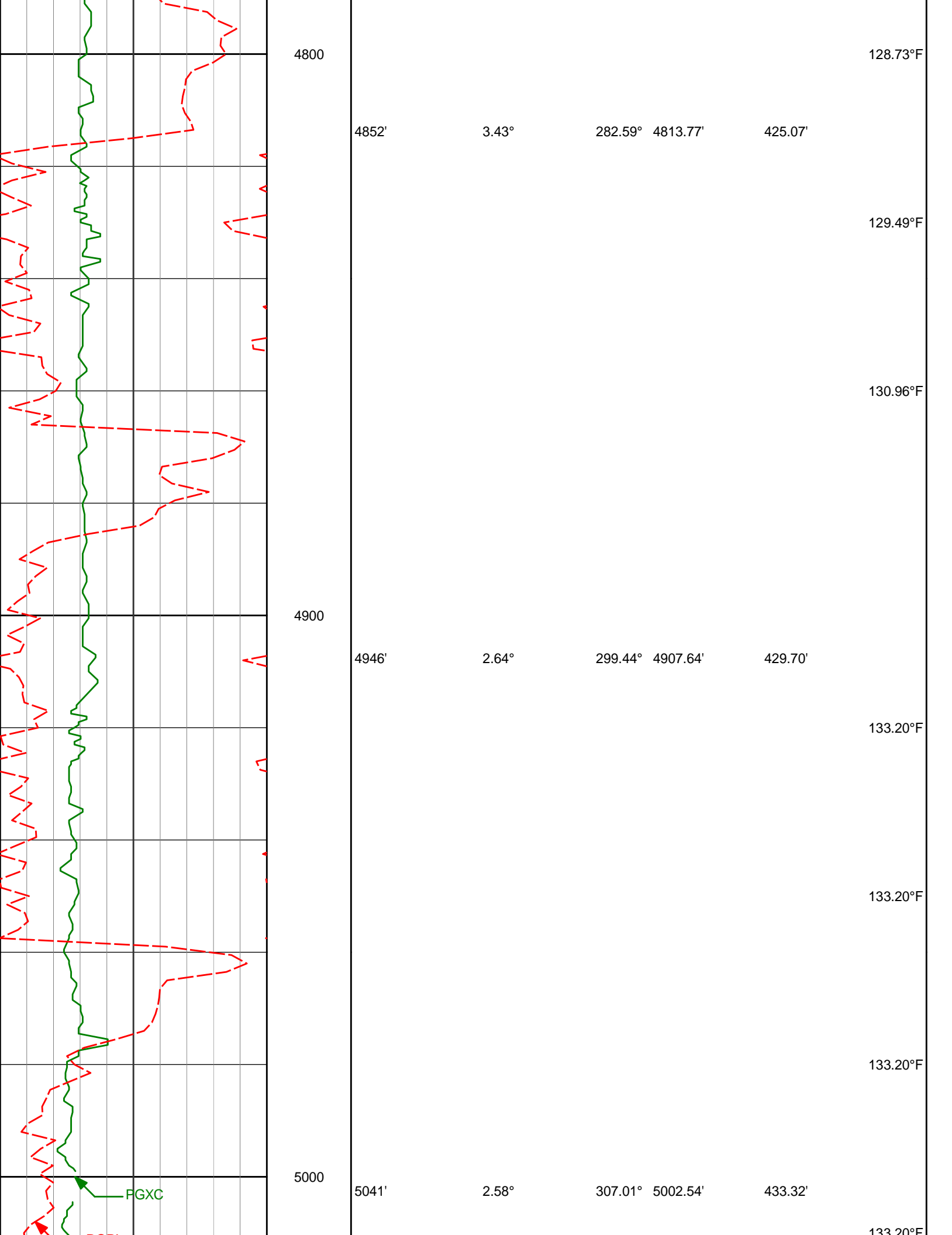
124.30°F

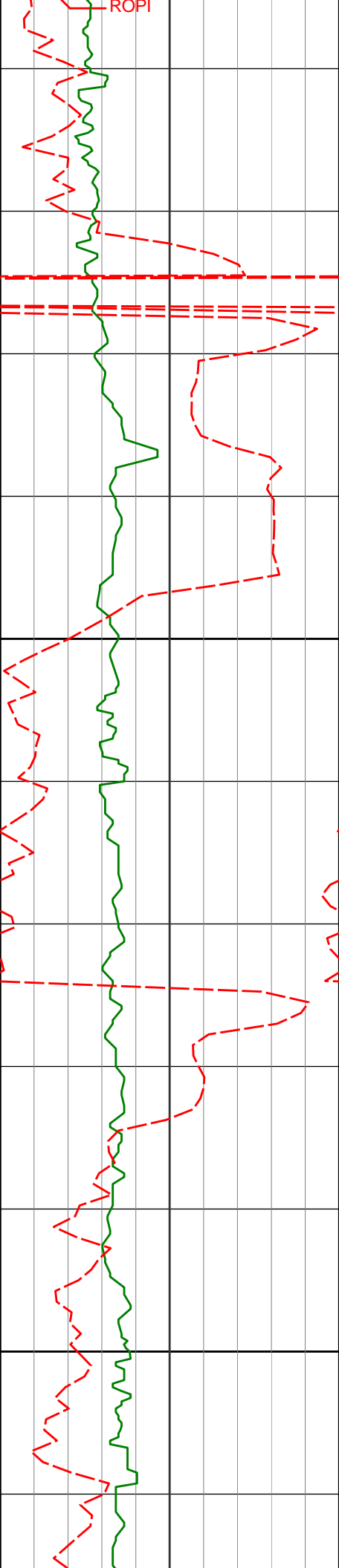
126.52°F

128.56°F

128.73°F

128.73°F





5100

5136'

0.83°

251.19°

5097.50'

435.68'

133.20°F

5200

5231'

1.21°

236.81°

5192.49'

437.17'

133.20°F

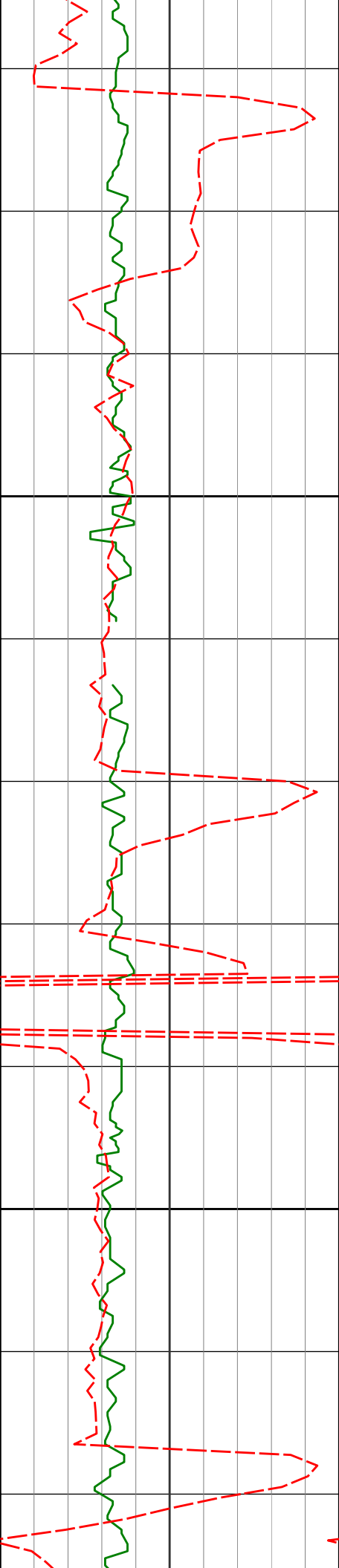
135.26°F

133.20°F

133.20°F

133.20°F

133.20°F



5300

5400

5326'

1.32°

233.19°

5287.46'

438.88'

5420'

1.17°

232.96°

5381.44'

440.51'

135.45°F

135.45°F

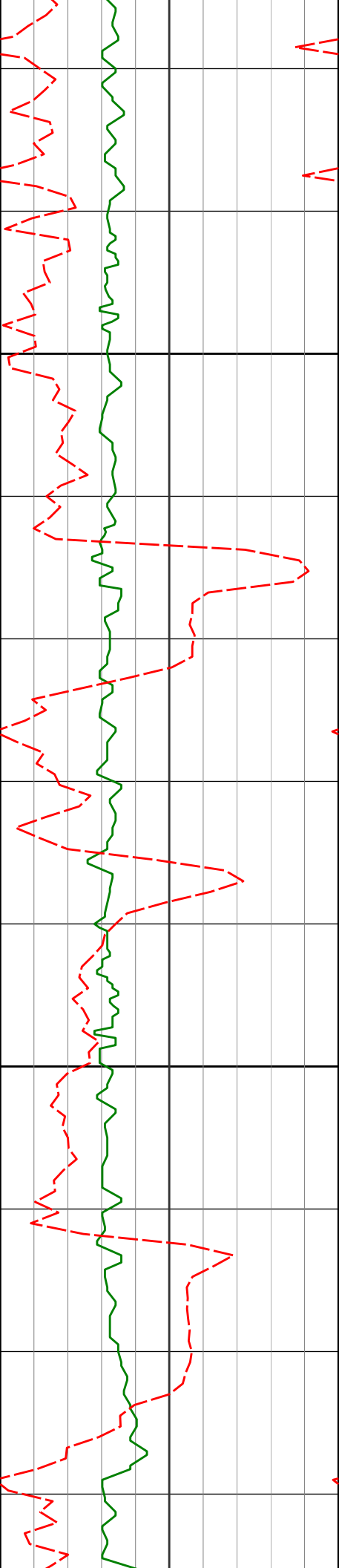
135.45°F

135.45°F

135.45°F

136.07°F

137.70°F



5500

5600

5609'

5703'

1.52°

1.97°

224.36°

220.89°

5570.39'

5664.34'

443.80'

445.73'

139.96°F

139.96°F

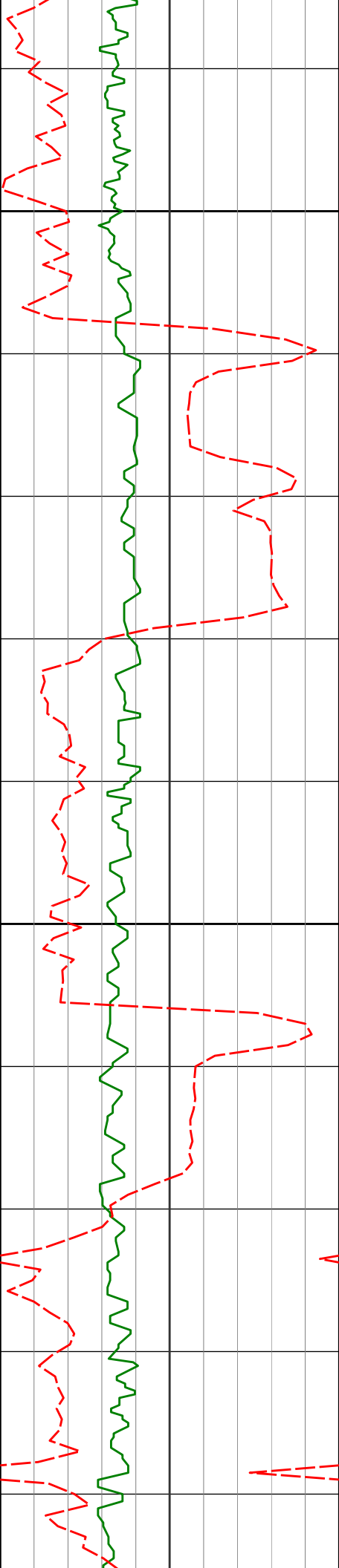
137.70°F

138.06°F

139.96°F

139.96°F

140.86°F



5700

5800

5798'

0.41°

125.68°

5759.33'

446.52'

140.00°F

140.40°F

139.96°F

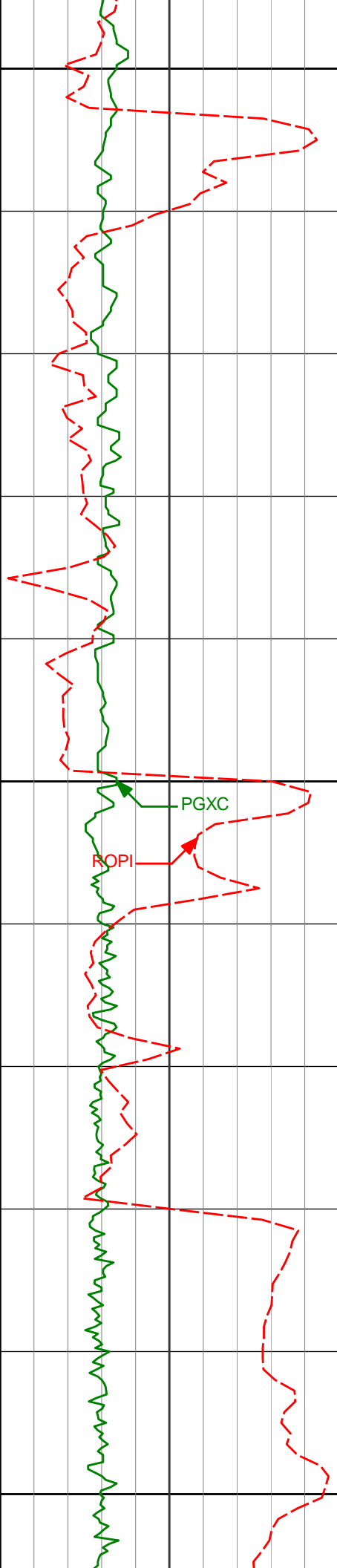
139.96°F

142.25°F

142.25°F

142.25°F

144.18°F



5900

144.54°F

144.54°F

5987'

0.71°

41.63°

5948.32'

445.19'

144.54°F

6000

144.54°F

PGXC

POPI

144.54°F

6082'

0.38°

5.62°

6043.31'

444.77'

144.54°F

6129'

2.63°

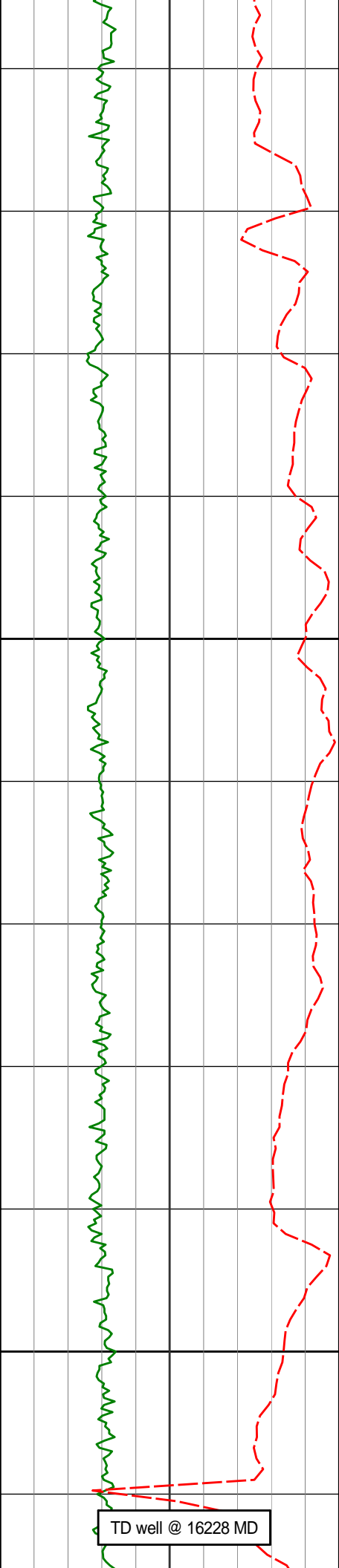
281.84°

6090.30'

445.81'

144.72°F

6100



6200

6300

6177'

6272'

6366'

6.10°

10.95°

15.40°

270.40°

257.34°

264.66°

6138.15'

6232.08'

6323.59'

449.44'

463.30'

484.44'

146.16°F

146.59°F

146.95°F

147.72°F

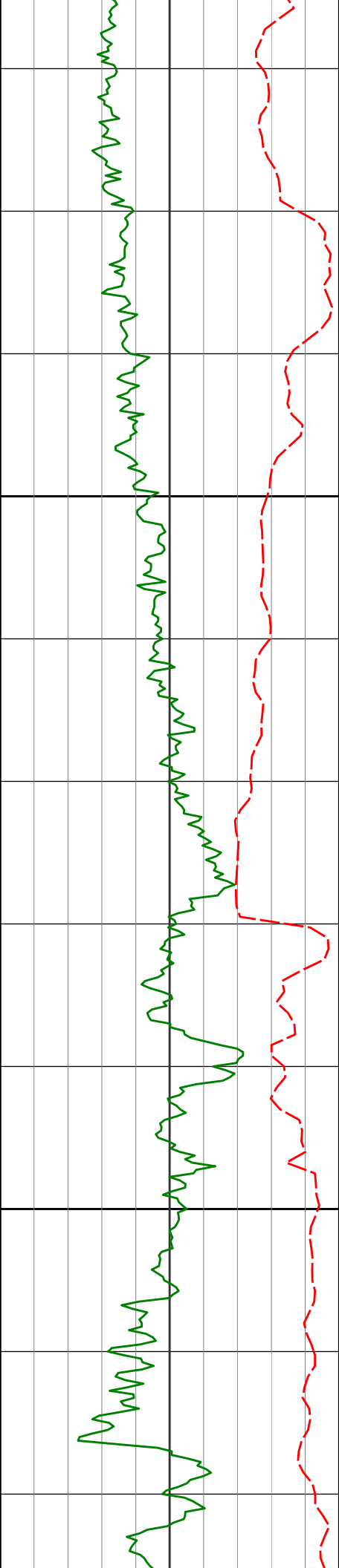
150.45°F

152.15°F

152.03°F

143.74°F

TD well @ 16228 MD



200

6400

6500

6461'

19.66°

268.50°

6414.16'

512.99'

6556'

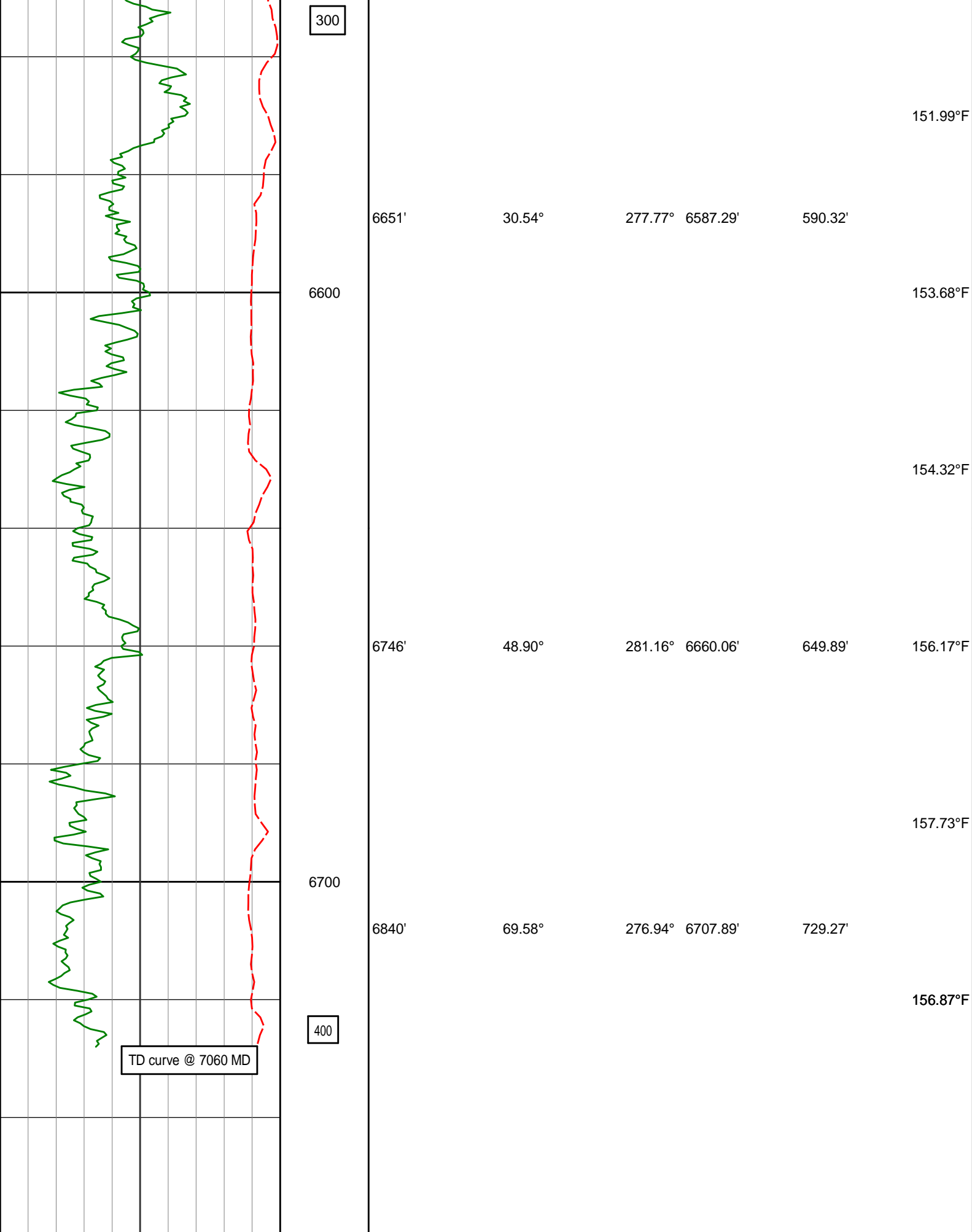
23.18°

272.54°

6502.59'

547.66'

145.74°F
139.96°F
140.83°F
142.25°F
142.25°F
142.57°F
145.86°F
149.47°F



Inst Rate of Penetration ROPI feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K	0							

PCG GR XHi-Range RT BCor PGXRC-T api	0	300
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HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Colt A13-652
Wattenberg
Weld Colorado
USA
CA-XX-0902175510
Tied in @ Surface

Final survey projected to bit.

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
1014.00	0.43	156.23	1013.99	3.48 S	1.53 E	-1.54	0.04
1106.00	0.37	146.06	1105.99	4.04 S	1.84 E	-1.85	0.10
1198.00	0.44	174.34	1197.99	4.64 S	2.04 E	-2.05	0.23
1381.00	0.62	139.17	1380.98	6.09 S	2.76 E	-2.77	0.20
1472.00	0.69	160.91	1471.97	6.98 S	3.26 E	-3.27	0.28
1563.00	0.88	289.37	1562.97	7.27 S	2.78 E	-2.79	1.56
1655.00	2.53	314.19	1654.93	5.62 S	0.65 E	-0.66	1.92
1747.00	4.78	309.79	1746.73	1.75 S	3.75 W	3.74	2.46
1840.00	6.17	300.93	1839.31	3.30 N	11.01 W	11.02	1.75
1931.00	7.67	296.82	1929.64	8.55 N	20.63 W	20.64	1.73
2023.00	9.01	300.29	2020.67	14.96 N	32.33 W	32.35	1.56
2115.00	9.25	296.30	2111.50	21.87 N	45.18 W	45.21	0.74
2207.00	10.26	294.97	2202.17	28.60 N	59.23 W	59.28	1.12
2299.00	9.64	289.14	2292.79	34.59 N	73.94 W	73.99	1.28
2391.00	8.28	286.37	2383.67	38.98 N	87.57 W	87.63	1.55
2485.00	9.51	286.61	2476.53	43.11 N	101.51 W	101.58	1.31
2579.00	9.32	283.10	2569.27	47.05 N	116.36 W	116.44	0.64
2674.00	9.08	281.70	2663.05	50.32 N	131.20 W	131.28	0.35
2863.00	9.54	294.88	2849.58	59.93 N	160.01 W	160.11	1.15
2958.00	9.28	292.11	2943.30	66.13 N	174.25 W	174.35	0.55
3053.00	8.78	287.91	3037.12	71.24 N	188.25 W	188.36	0.87
3148.00	8.59	294.52	3131.04	76.41 N	201.60 W	201.72	1.07
3242.00	7.78	293.92	3224.08	81.91 N	213.80 W	213.93	0.87
3337.00	8.03	295.60	3318.18	87.38 N	225.67 W	225.80	0.36
3431.00	7.67	305.05	3411.30	93.82 N	236.72 W	236.87	1.42
3526.00	8.94	304.16	3505.30	101.61 N	248.02 W	248.18	1.34
3621.00	10.00	305.85	3599.00	110.58 N	260.81 W	260.99	1.15
3715.00	10.61	305.87	3691.49	120.43 N	274.44 W	274.63	0.65
3810.00	10.92	304.69	3784.82	130.68 N	288.93 W	289.13	0.40
3905.00	11.31	303.24	3878.03	140.91 N	304.12 W	304.34	0.51
3999.00	10.88	304.20	3970.28	150.95 N	319.17 W	319.40	0.50
4189.00	9.41	308.75	4157.30	170.75 N	346.11 W	346.38	0.88
4284.00	8.98	309.27	4251.08	180.30 N	357.91 W	358.19	0.46
4473.00	9.42	295.97	4437.67	196.41 N	383.24 W	383.54	1.15
4568.00	8.66	298.43	4531.49	203.22 N	396.52 W	396.83	0.90
4663.00	6.76	290.27	4625.63	208.57 N	408.05 W	408.38	2.30
4757.00	5.69	291.49	4719.08	212.19 N	417.58 W	417.91	1.15
4852.00	3.43	282.59	4813.77	214.53 N	424.73 W	425.07	2.49
4946.00	2.64	299.44	4907.64	216.21 N	429.36 W	429.70	1.26
5041.00	2.58	307.01	5002.54	218.57 N	432.98 W	433.32	0.37
5136.00	0.83	251.19	5097.50	219.64 N	435.34 W	435.68	2.34
5231.00	1.21	236.81	5192.49	218.87 N	436.83 W	437.17	0.48
5326.00	1.32	233.19	5287.46	217.66 N	438.54 W	438.88	0.14
5420.00	1.17	232.96	5381.44	216.44 N	440.17 W	440.51	0.16
5609.00	1.52	224.36	5570.39	213.48 N	443.47 W	443.80	0.21
5703.00	1.97	220.89	5664.34	211.37 N	445.40 W	445.73	0.49

5798.00	0.41	125.68	5759.33	209.94 N	446.19 W	446.52	2.16
5987.00	0.71	41.63	5948.32	210.42 N	444.86 W	445.19	0.41
6082.00	0.38	5.62	6043.31	211.17 N	444.44 W	444.77	0.48
6129.00	2.63	281.84	6090.30	211.55 N	445.48 W	445.81	5.57
6177.00	6.10	270.40	6138.15	211.79 N	449.11 W	449.44	7.42
6272.00	10.95	257.34	6232.08	209.85 N	462.97 W	463.30	5.47
6366.00	15.40	264.66	6323.59	206.73 N	484.12 W	484.44	5.05
6461.00	19.66	268.50	6414.16	205.13 N	512.67 W	512.99	4.64
6556.00	23.18	272.54	6502.59	205.55 N	547.34 W	547.66	4.02
6651.00	30.54	277.77	6587.29	209.64 N	589.99 W	590.32	8.13
6746.00	48.90	281.16	6660.06	219.92 N	649.54 W	649.89	19.45
6840.00	69.58	276.94	6707.89	232.24 N	728.90 W	729.27	22.33
6936.00	86.95	272.86	6727.35	240.13 N	822.18 W	822.56	18.56
6966.00	90.06	272.40	6728.13	241.51 N	852.14 W	852.52	10.48
7006.00	90.71	271.97	6727.87	243.03 N	892.11 W	892.49	1.95
7060.00	91.00	270.00	6727.06	243.96 N	946.09 W	946.47	3.69

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 270.09 DEGREES (GRID)
A TOTAL CORRECTION OF 7.42 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7060.00 FEET
IS 977.04 FEET ALONG 284.46 DEGREES (GRID)**

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