



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	20-Oct-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	644.00				
Log End Depth (TVD, ft)	6,587.87				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	19-Oct-15 01:17				
Drill/Wipe End Date and Time	20-Oct-15 02:29				
Min Inc (deg) @ Depth (TVD, ft)	0.16 @ 927.99				
Max Inc (deg) @ Depth (TVD, ft)	80.50 @ 6,580.56				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	587.24				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	9.83 / 36.00				
Filtrate CL (ppm)	1,800.00				
pH / Fluid Loss (mptm)	8.80 / 7				
PV (cP) / YP (lhf2)	12 / 12.00				
% Solids / % Sand	12.00 / 0.05				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (degF) / S	175.01 / PDC				

Max Tool Temp (degF) / Source	175.21 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Matt Busche				
Customer Representative	Johnny Sanchez				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11342302				
Insert Serial Number	11055866				
Date and Time Initialized	18-Oct-15 22:56				
Date and Time Read	20-Oct-15 07:56				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	67.00				
Software Version	6.33				
Sub Serial Number	11342302				
Sonde Serial Number	11062113				
Sensor ID Number	N/A				
Toolface Offset (deg)	257.80				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	59.92				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11342302				
Insert/Sonde Serial Number	11293345				

REMARKS

1. All depths are calibrated to driller's pipe tally and are total vertical depth from the 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.

4. Environmental parameters used in gamma and resistance processing:

Hole Size: 8.75"

Mud Density: 8.75-10.75ppg

5. The following smoothing parameters have been applied to the data:

1: 600 (2"):

Interval: 1.0 ft

Coercion Distance: 3.0 ft (ROPA)

Interval: 1.0 ft

Coercion Distance: 3.0 ft (Gamma Ray)

1: 240 (5")

Interval: 0.5 ft

Coercion Distance: 1.2 ft (ROPA)

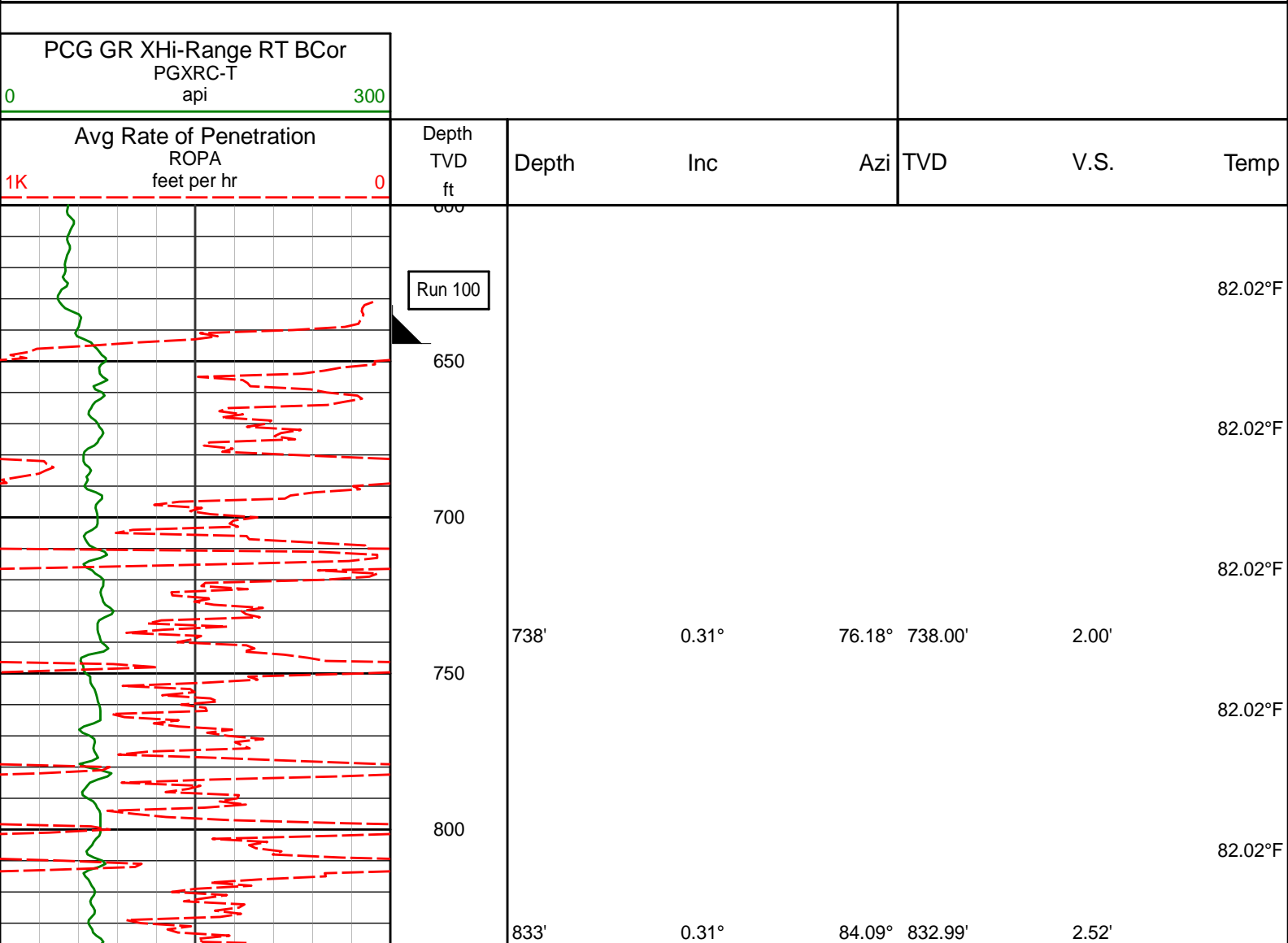
Interval: 0.5 ft

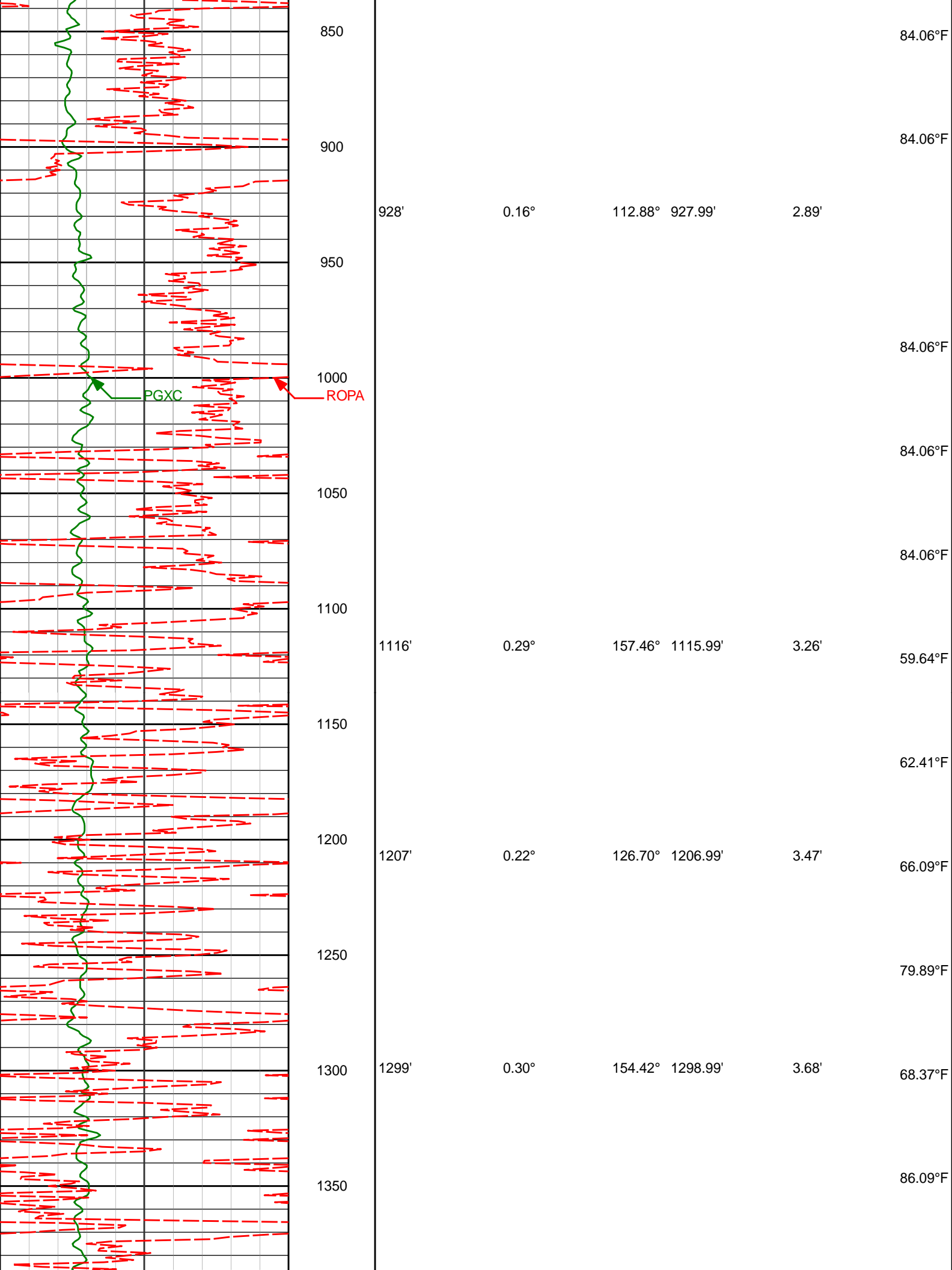
Coercion Distance: 0.6 ft (Gamma Ray)

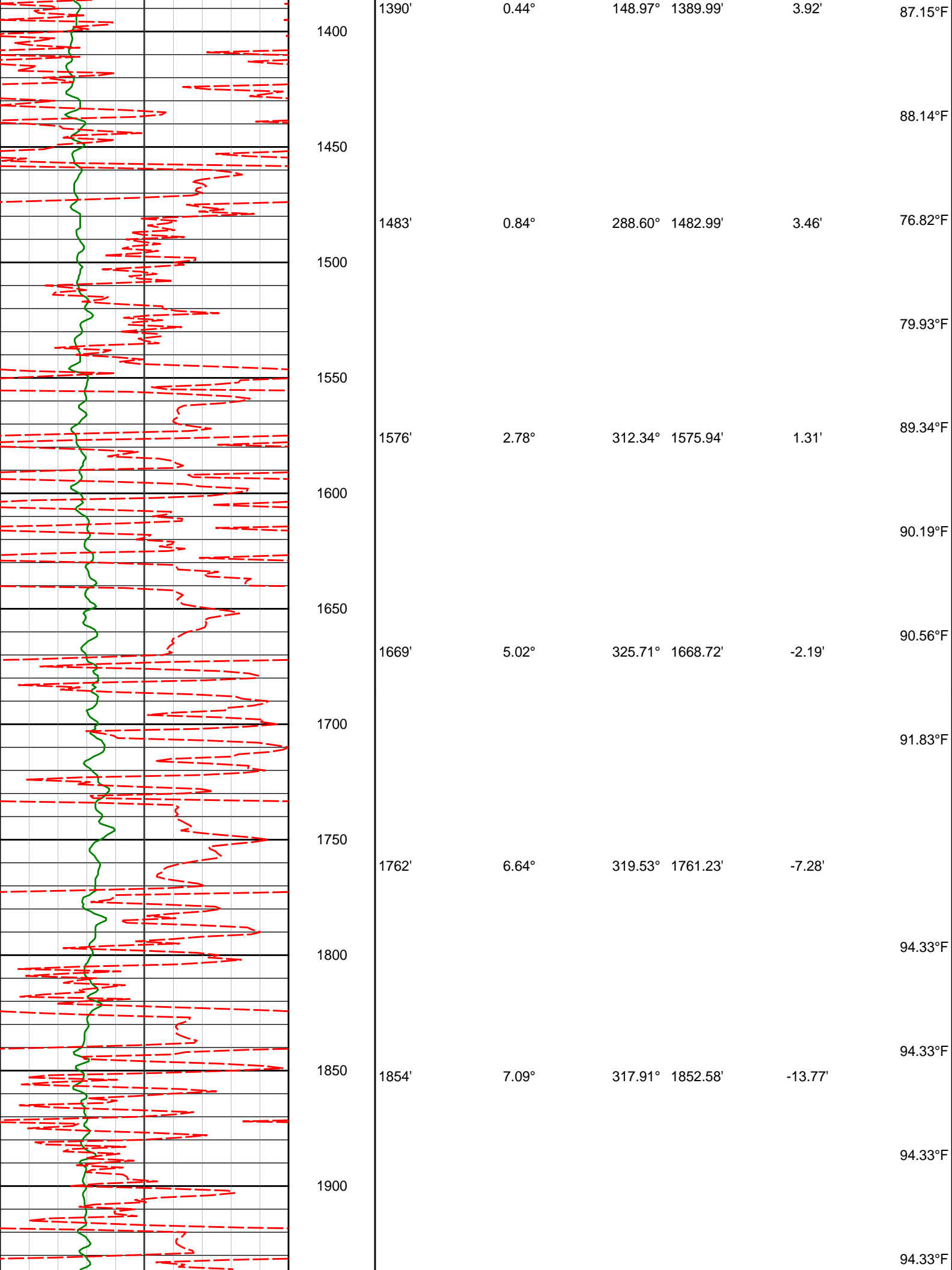
WARRANTY

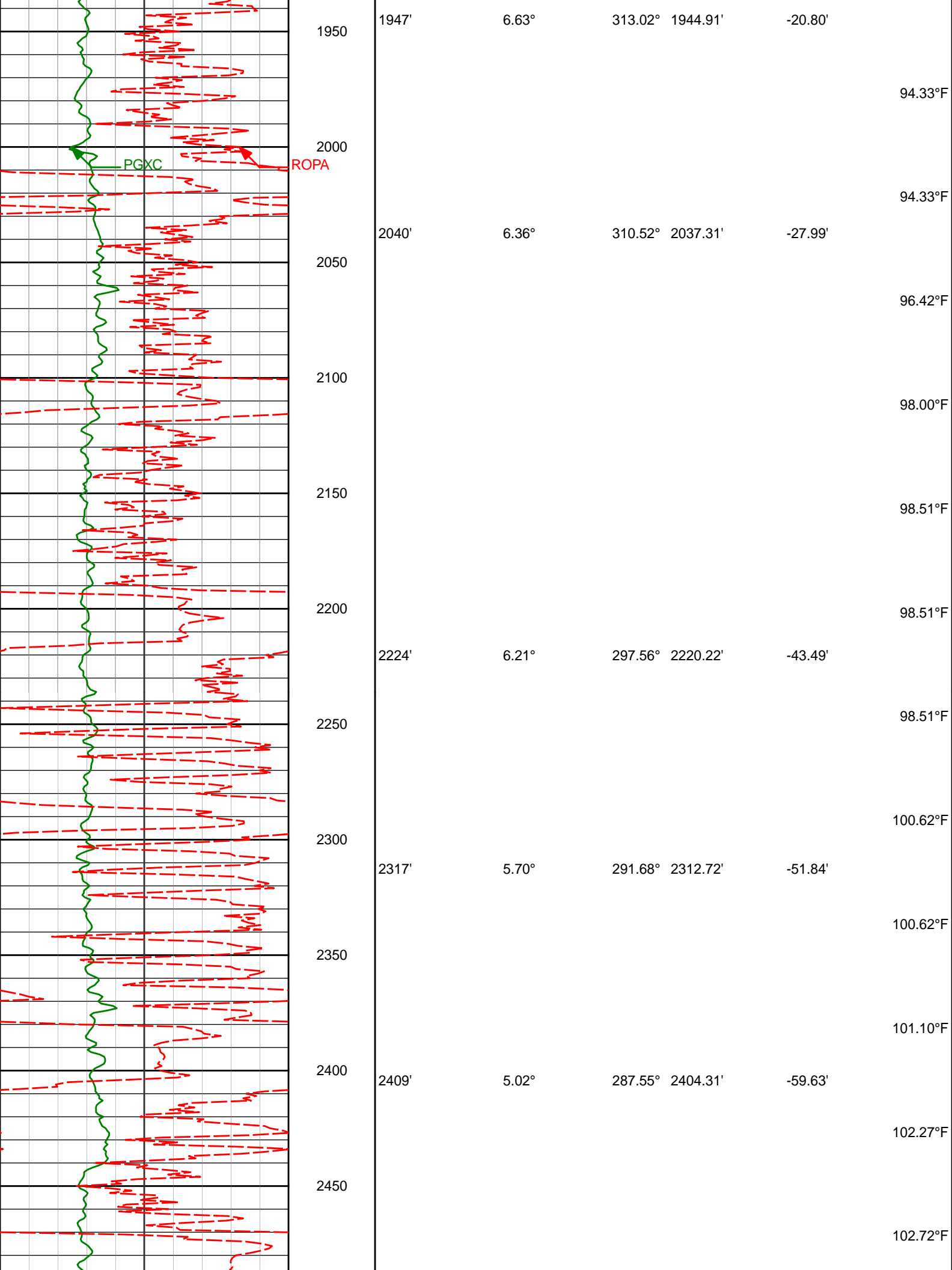
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES 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 FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

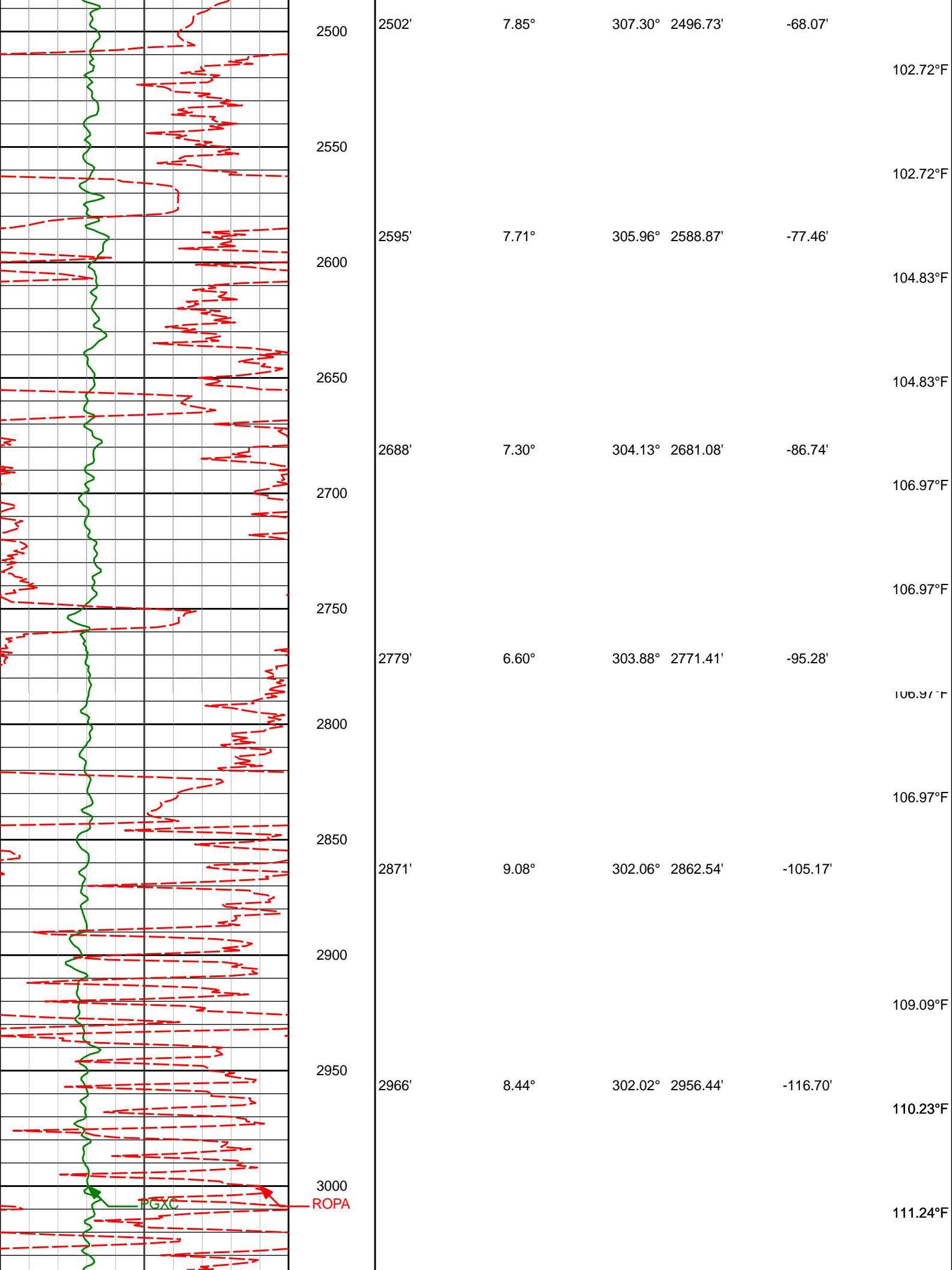
TVD Detail 1:600 Scale

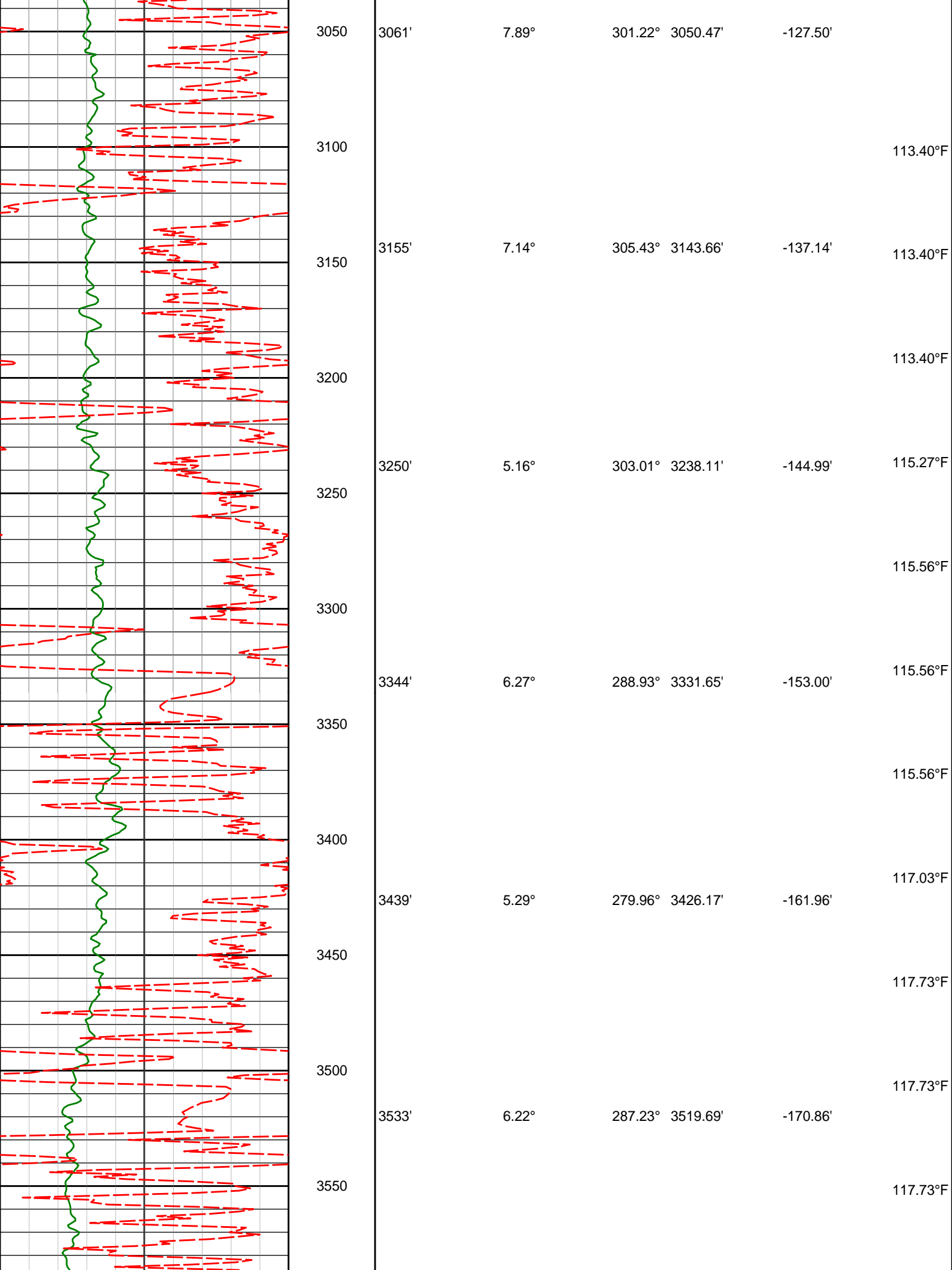


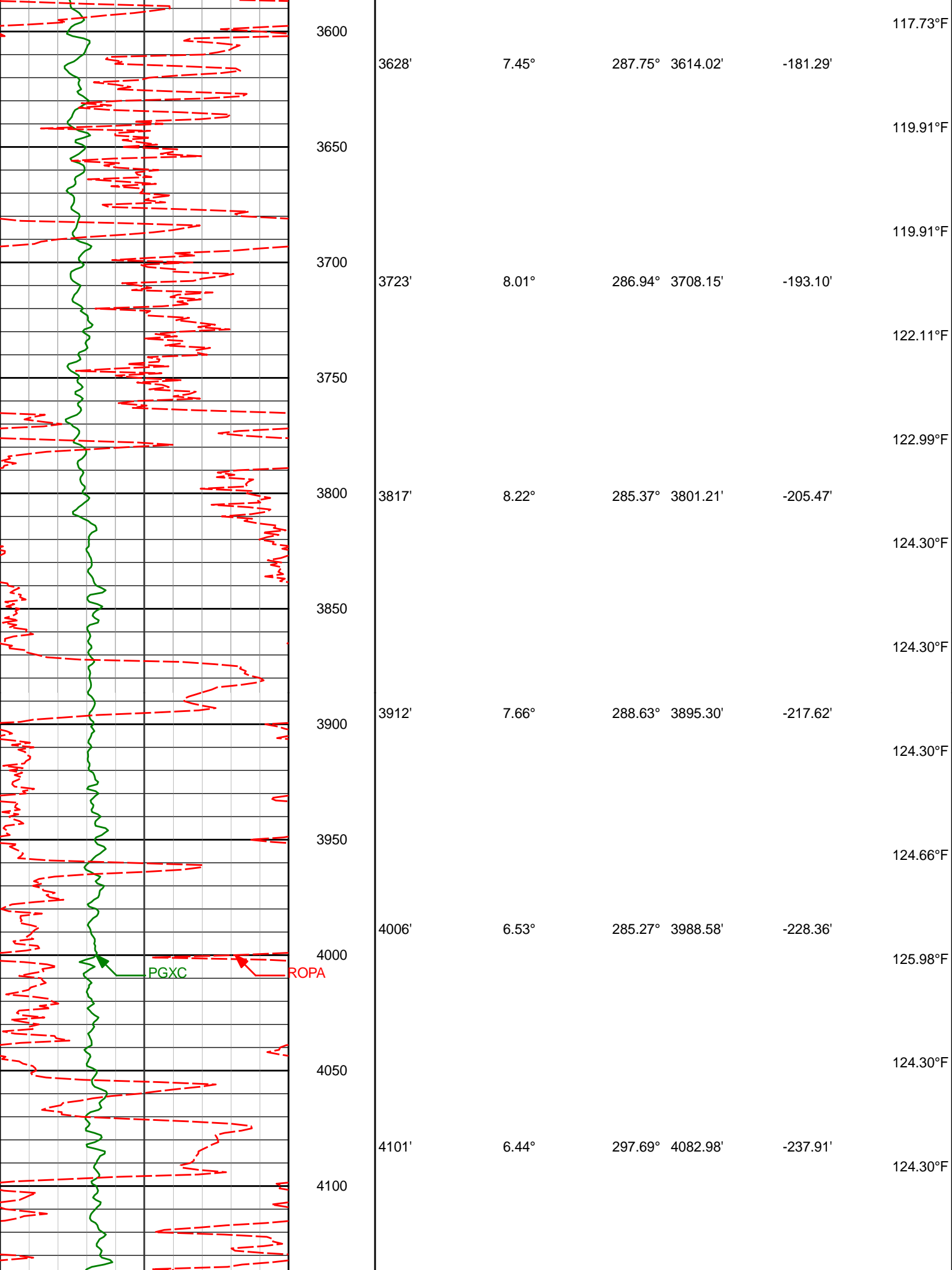


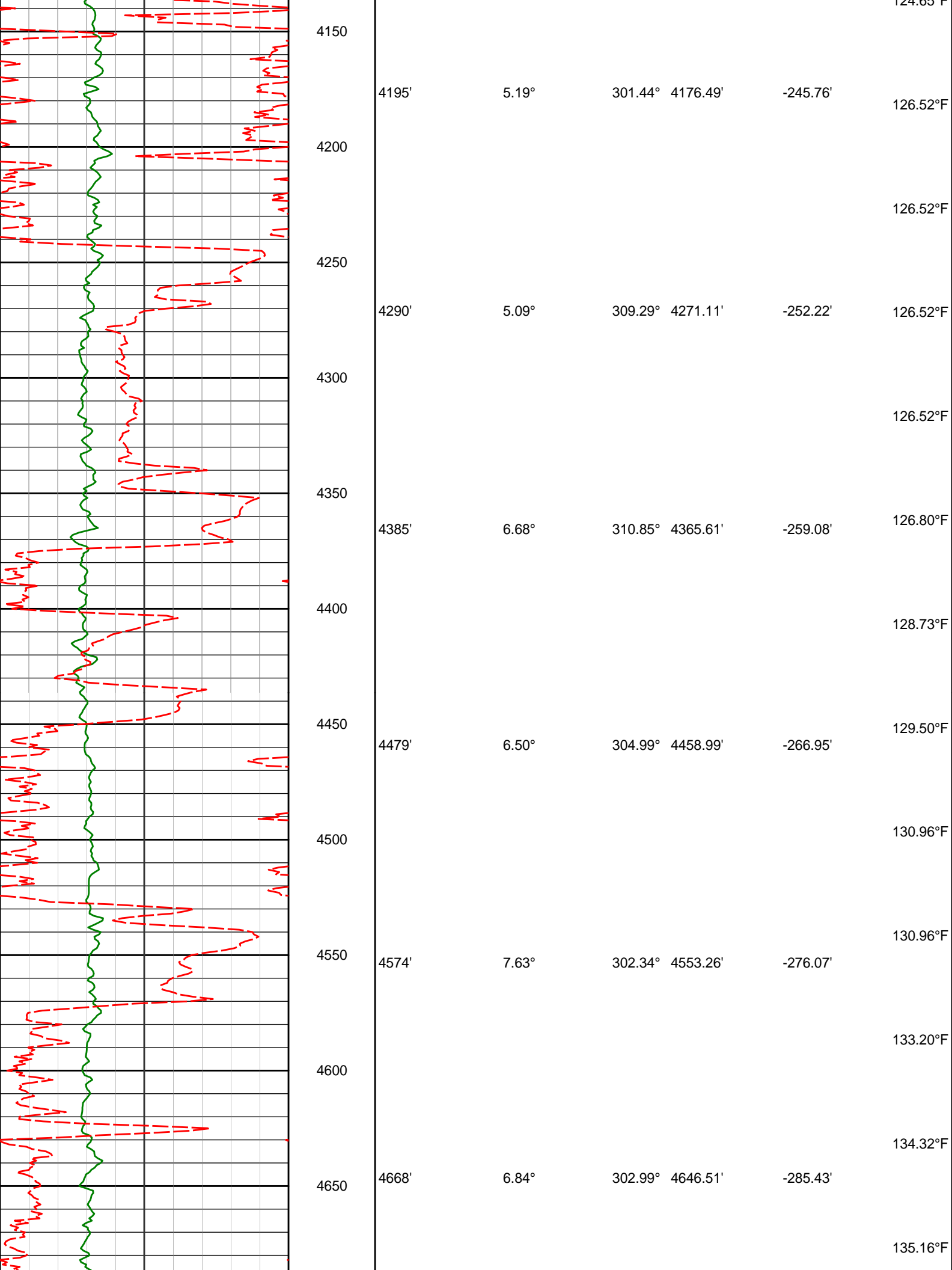


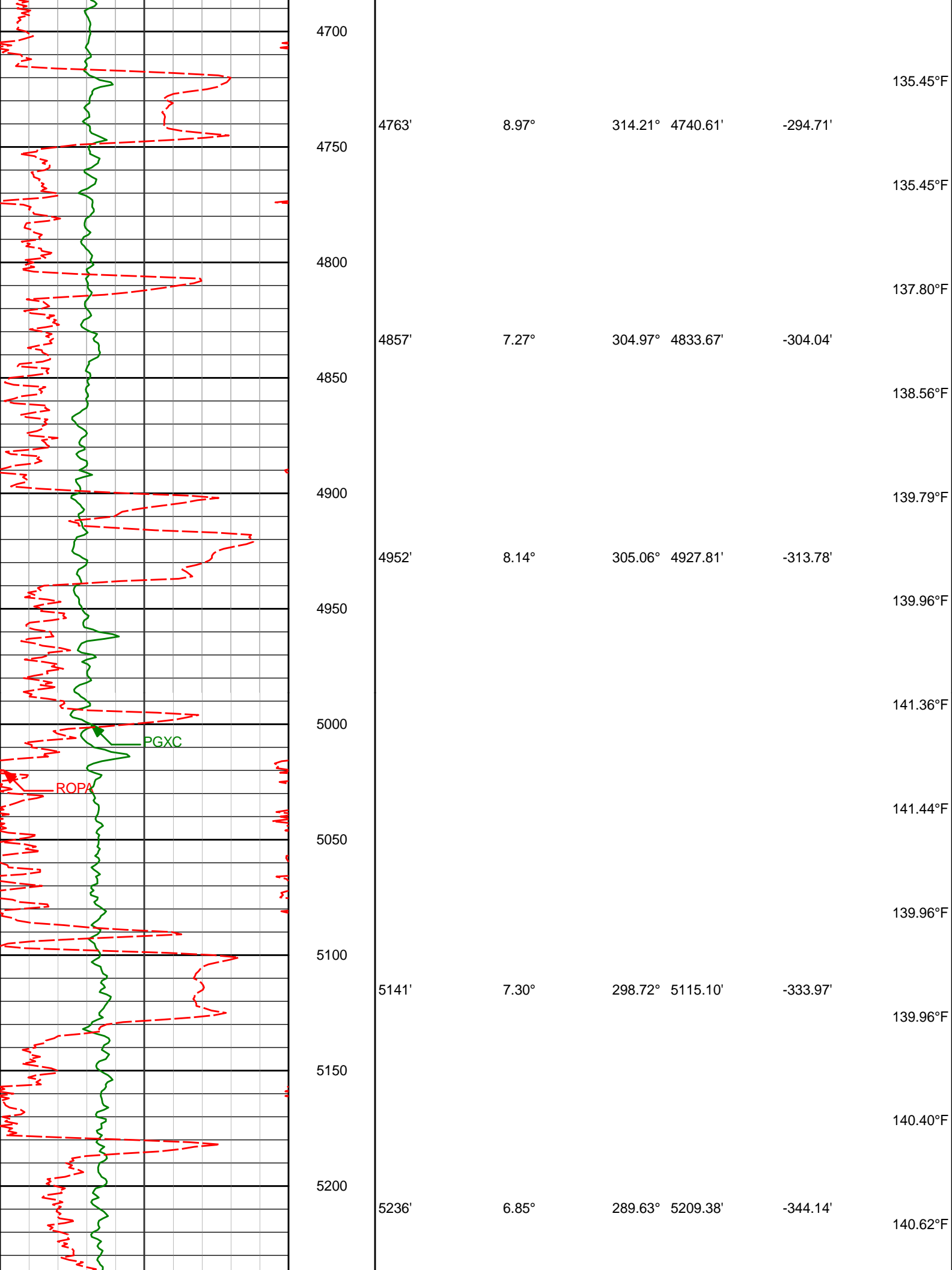


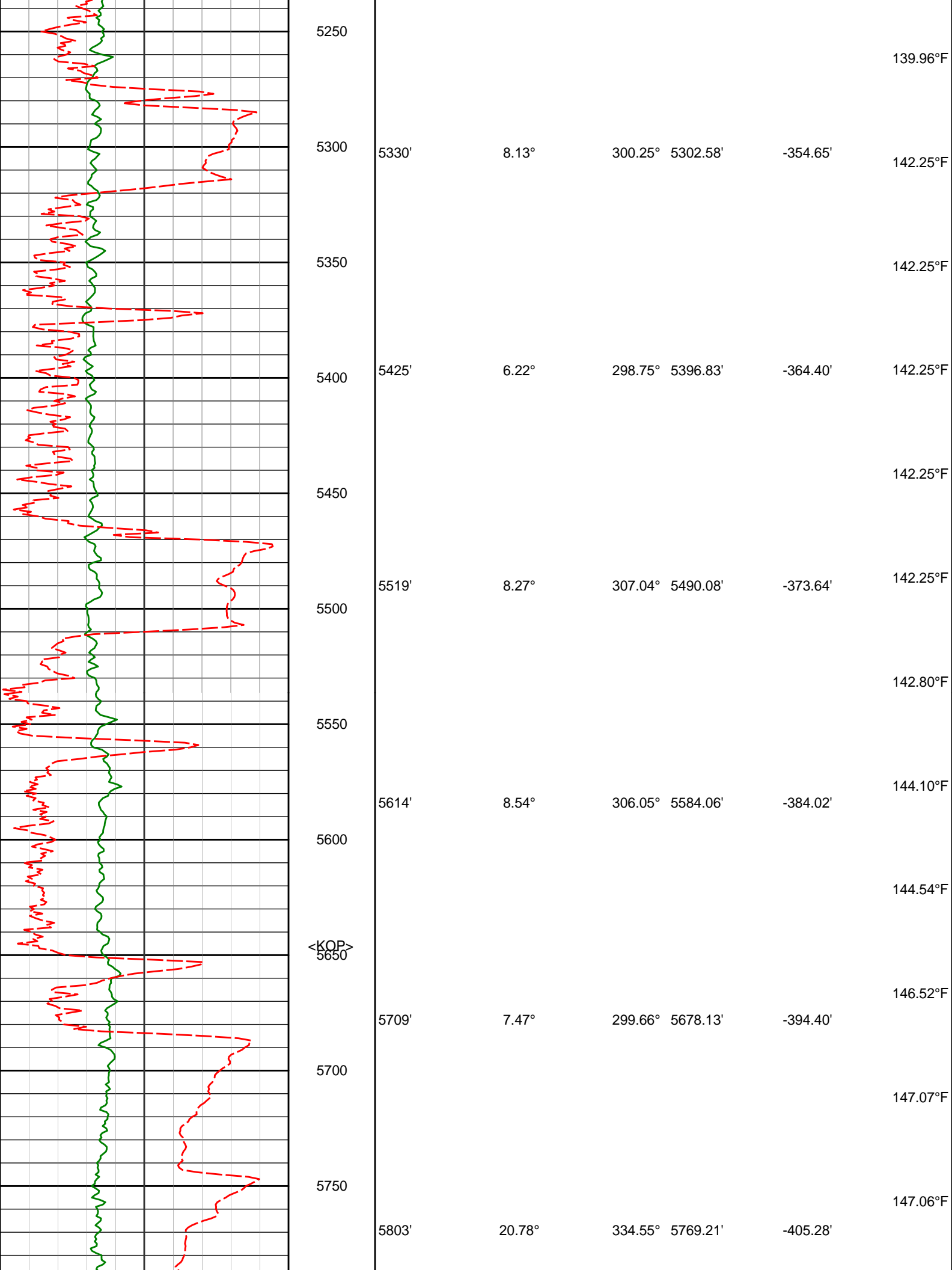


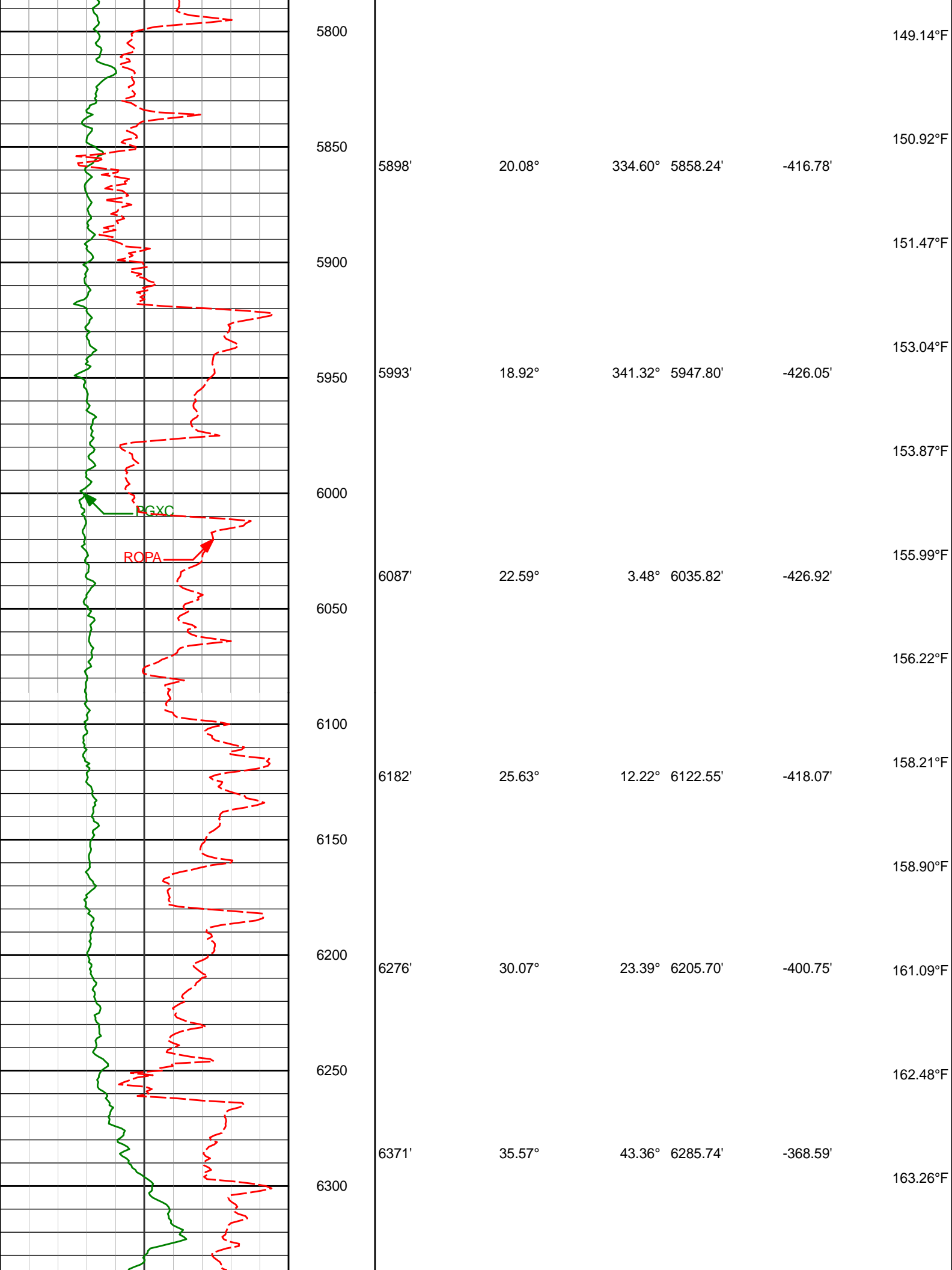


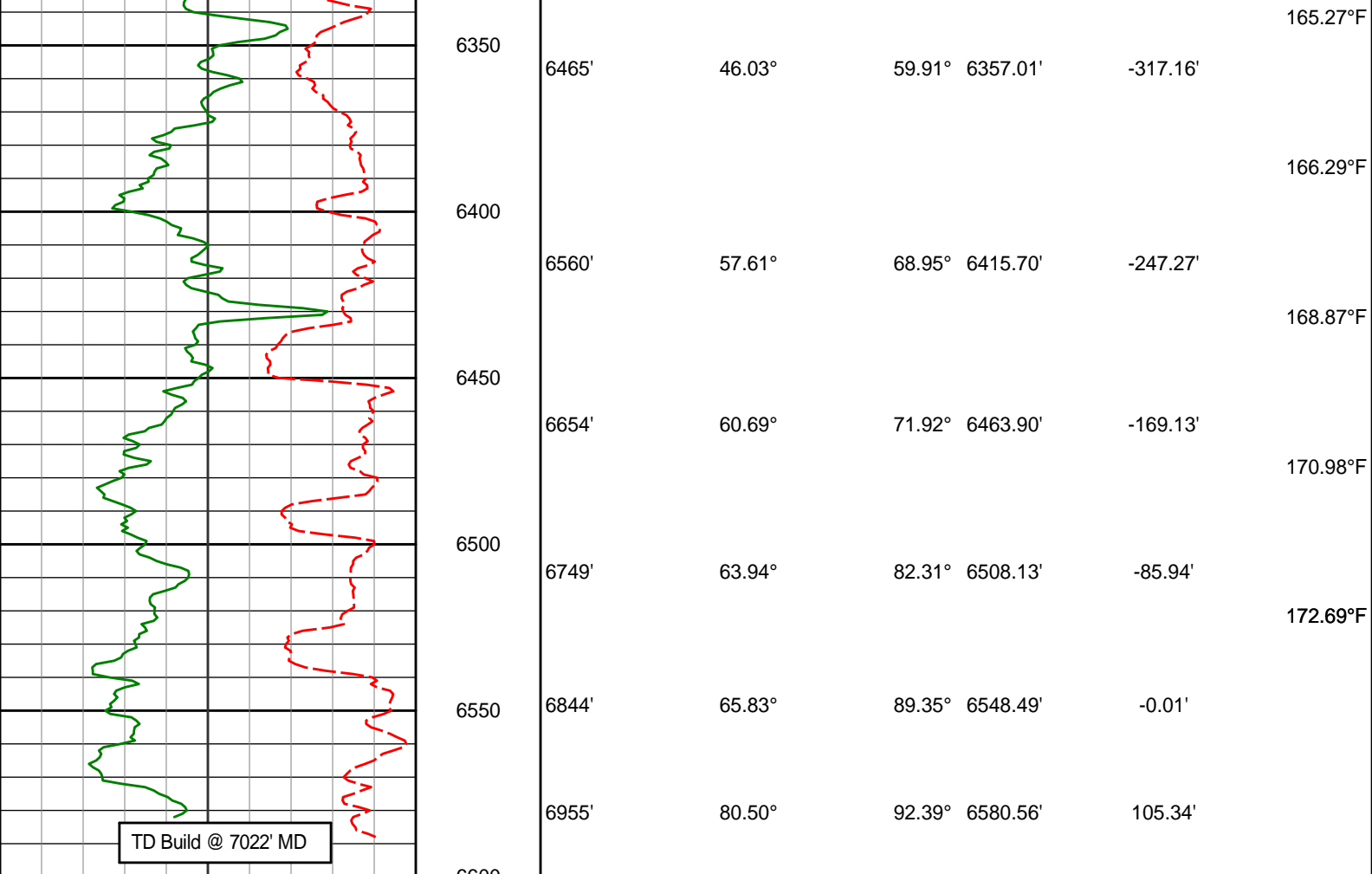








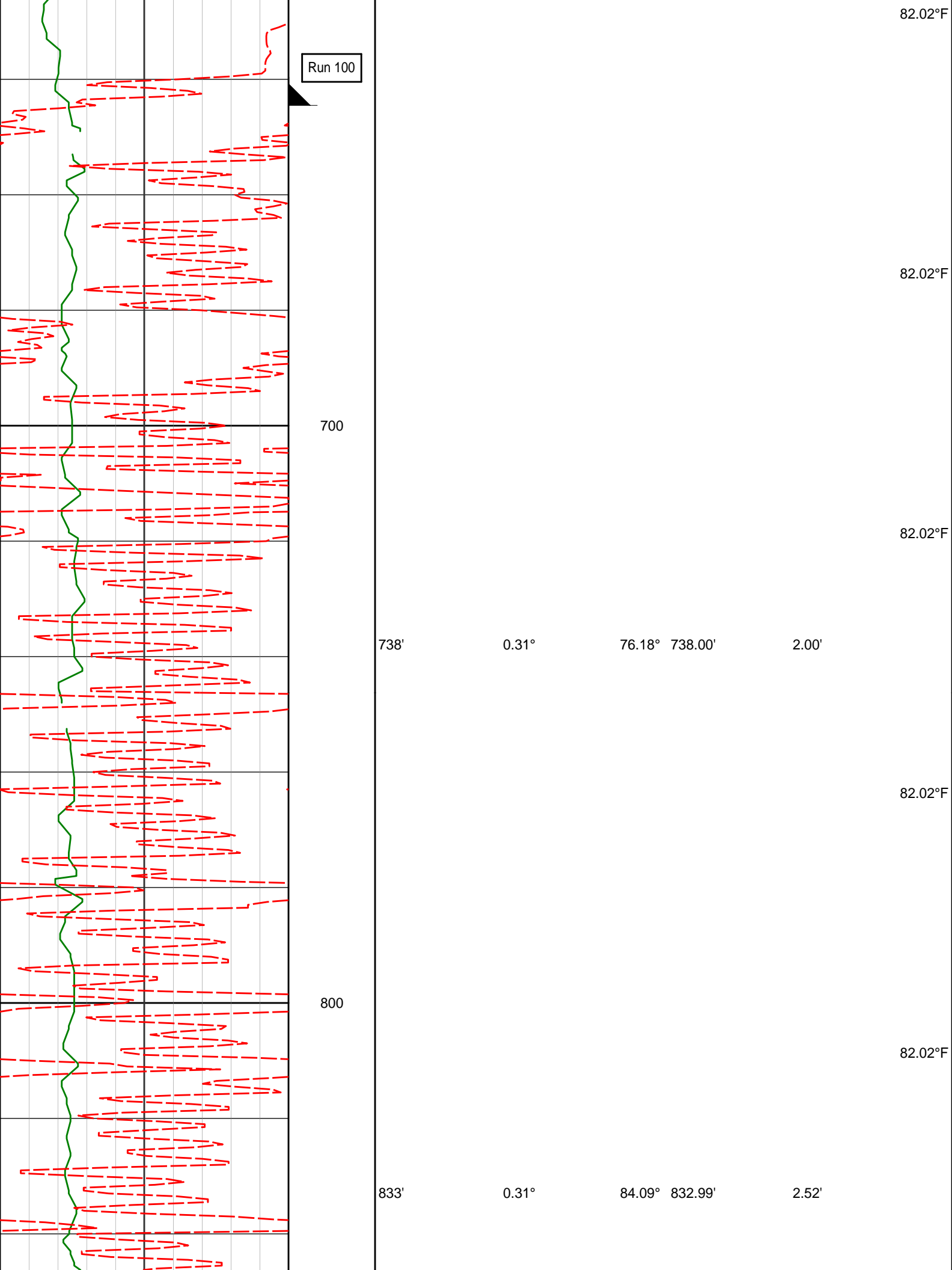


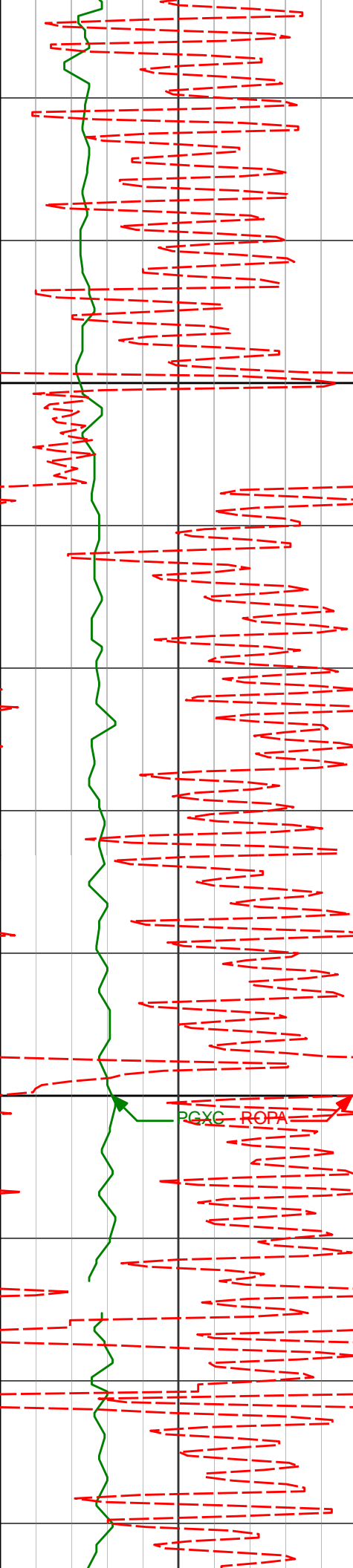


Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0								
PCG GR XHi-Range RT BCor PGXRC-T api								
0 300								

TVD Detail 1:240 Scale

PCG GR XHi-Range RT PGXRC-T api								
0 300								
Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0								





900

928'

0.16°

112.88° 927.99'

2.89'

1000

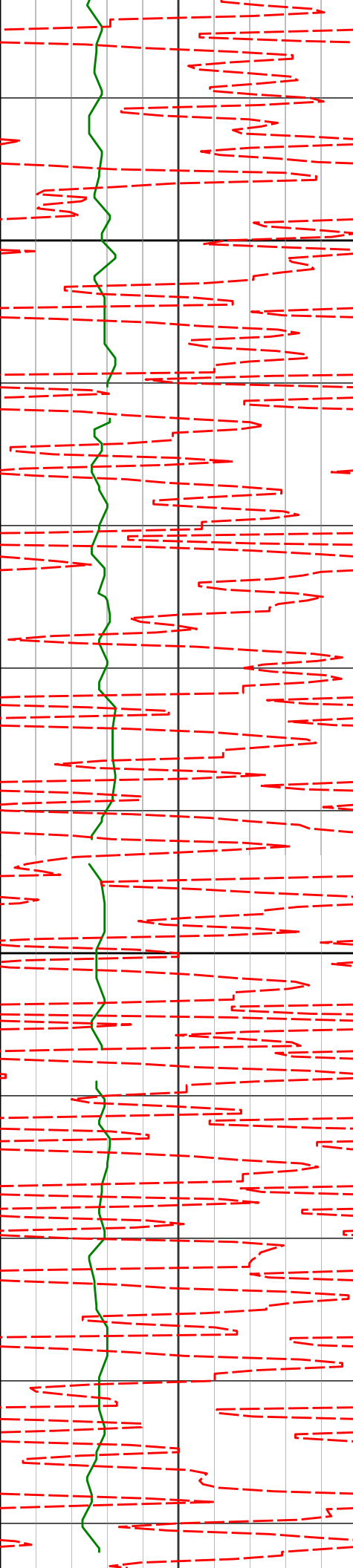
PGXC ROPA

84.06°F

84.06°F

84.06°F

84.06°F



1100

1116'

0.29°

157.46°

1115.99'

3.26'

1200

1207'

0.22°

126.70°

1206.99'

3.47'

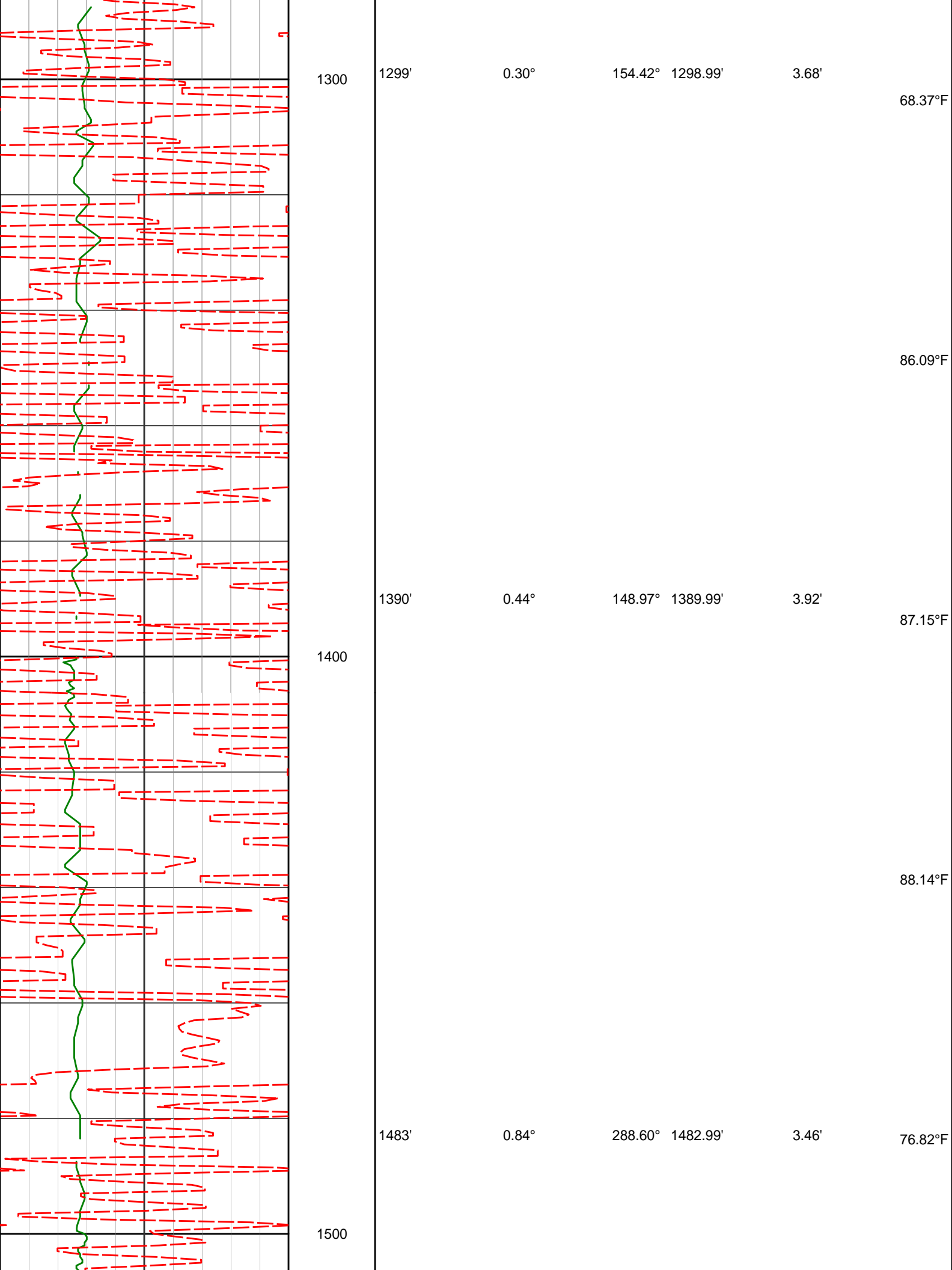
84.06°F

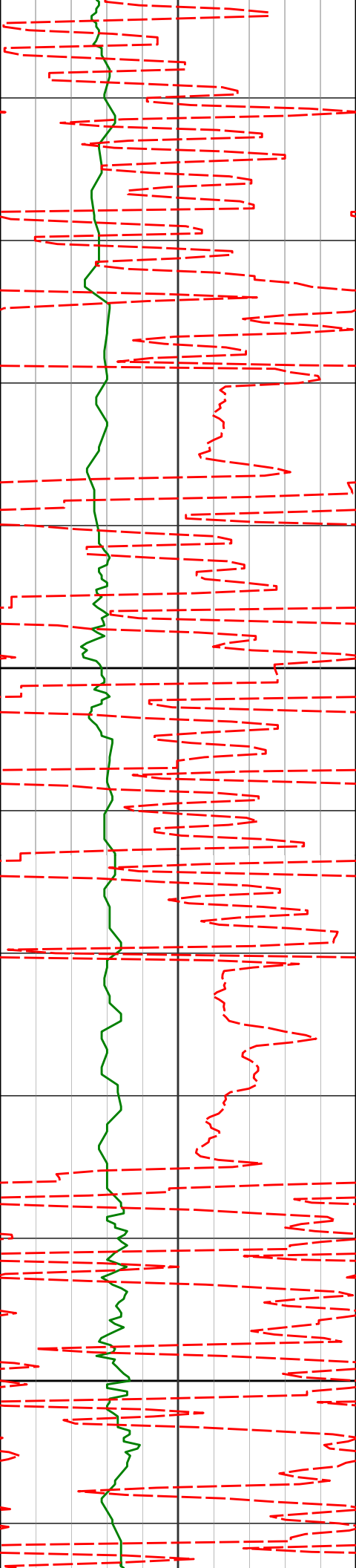
59.64°F

62.41°F

66.09°F

79.89°F





1600

1700

1576'

2.78°

312.34° 1575.94'

1.31'

79.93°F

89.34°F

90.19°F

90.56°F

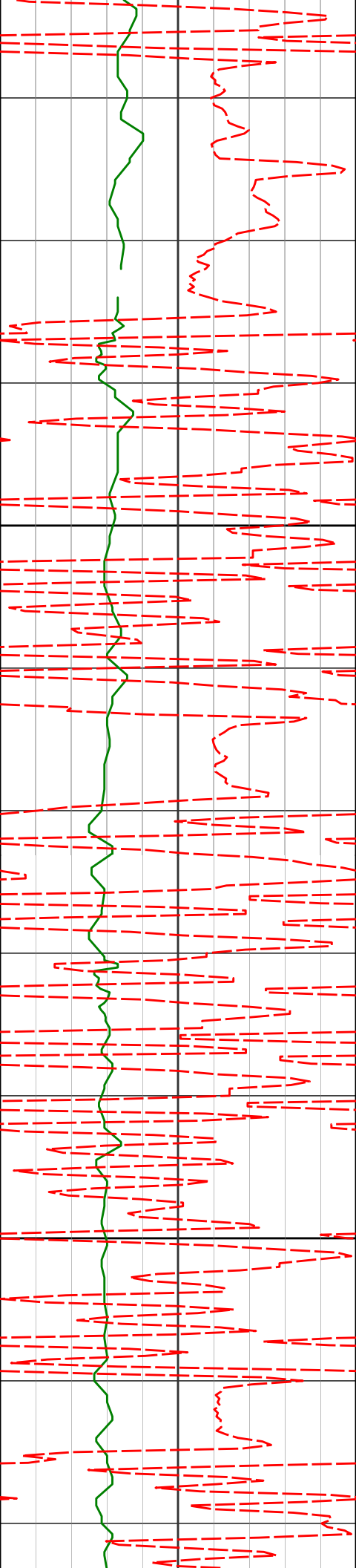
91.83°F

1669'

5.02°

325.71° 1668.72'

-2.19'



1762'

6.64°

319.53° 1761.23'

-7.28'

1800

94.33°F

1854'

7.09°

317.91° 1852.58'

-13.77'

94.33°F

1900

94.33°F

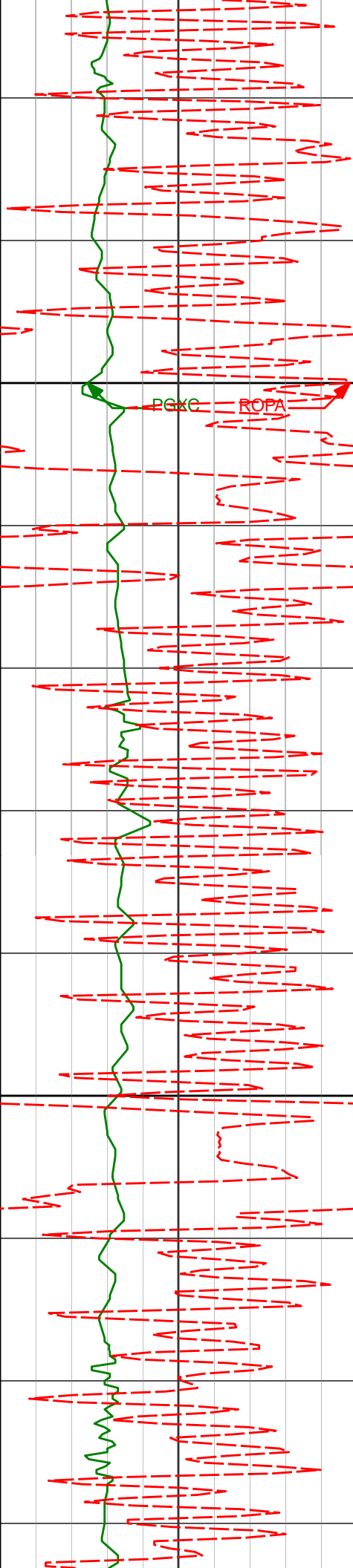
1947'

6.63°

313.02° 1944.91'

-20.80'

94.33°F



2000

PGXC

ROPA

2040'

6.36°

310.52° 2037.31'

-27.99'

2100

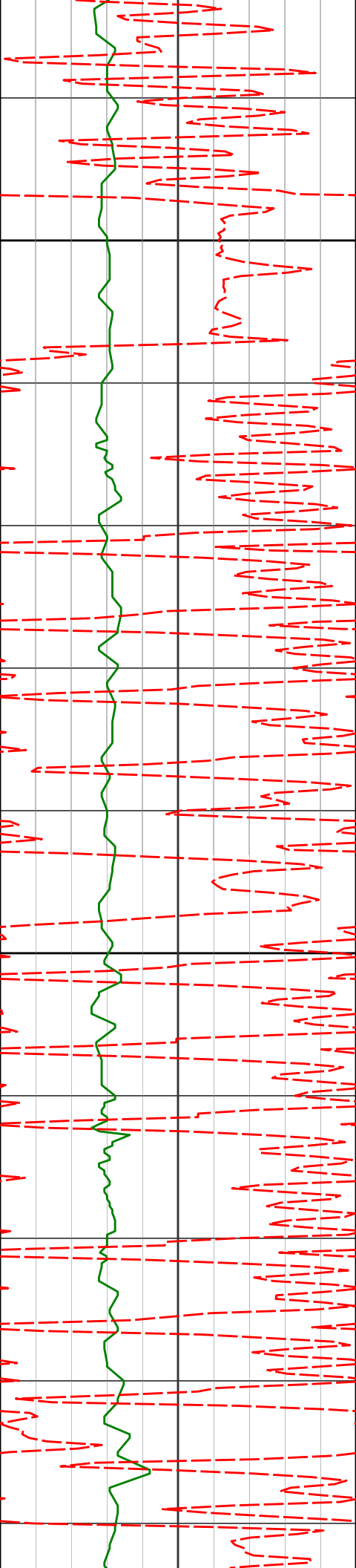
94.33°F

94.33°F

96.42°F

98.00°F

98.51°F



2200

98.51°F

2224'

6.21°

297.56° 2220.22'

-43.49'

98.51°F

2300

100.62°F

2317'

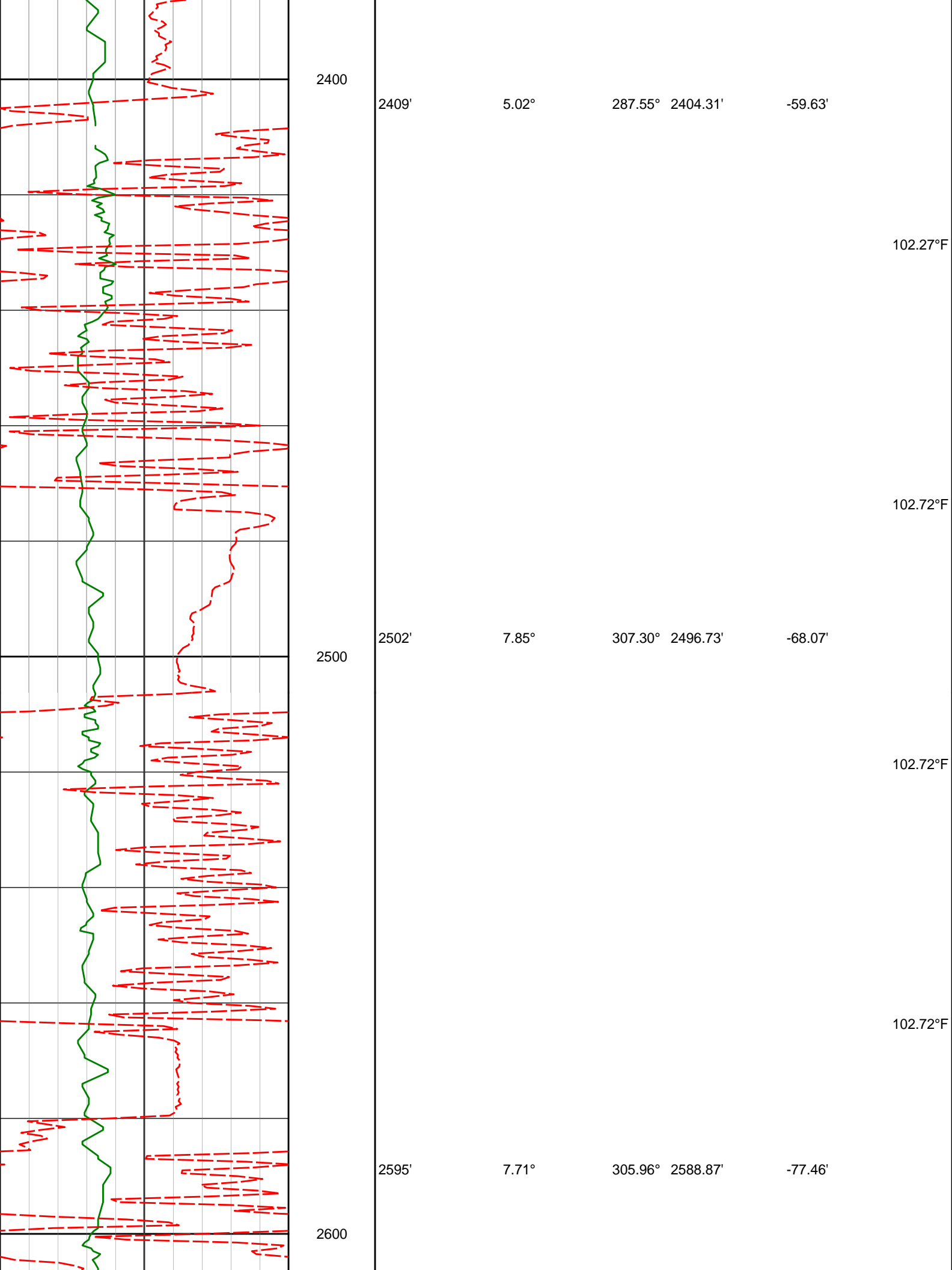
5.70°

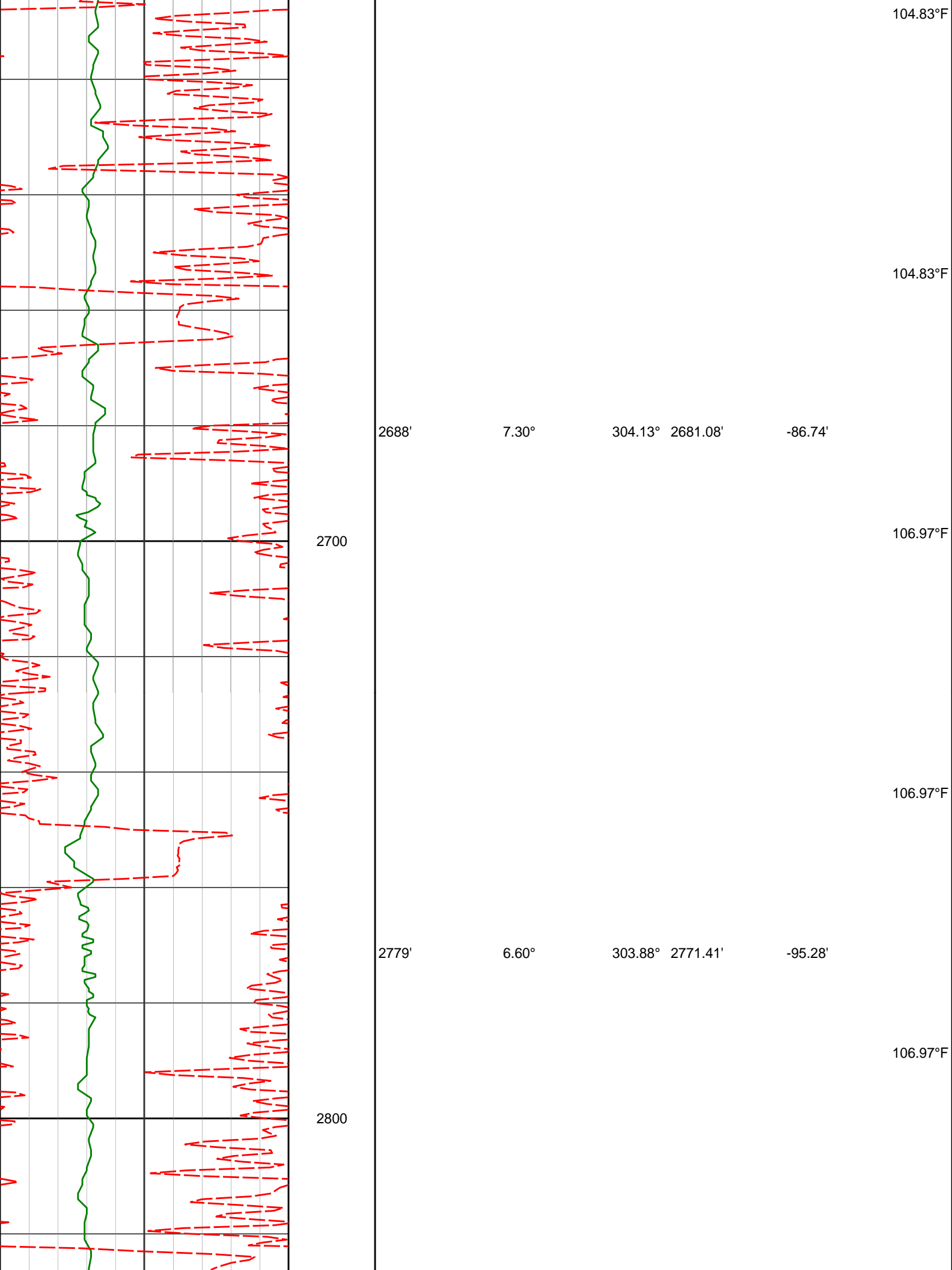
291.68° 2312.72'

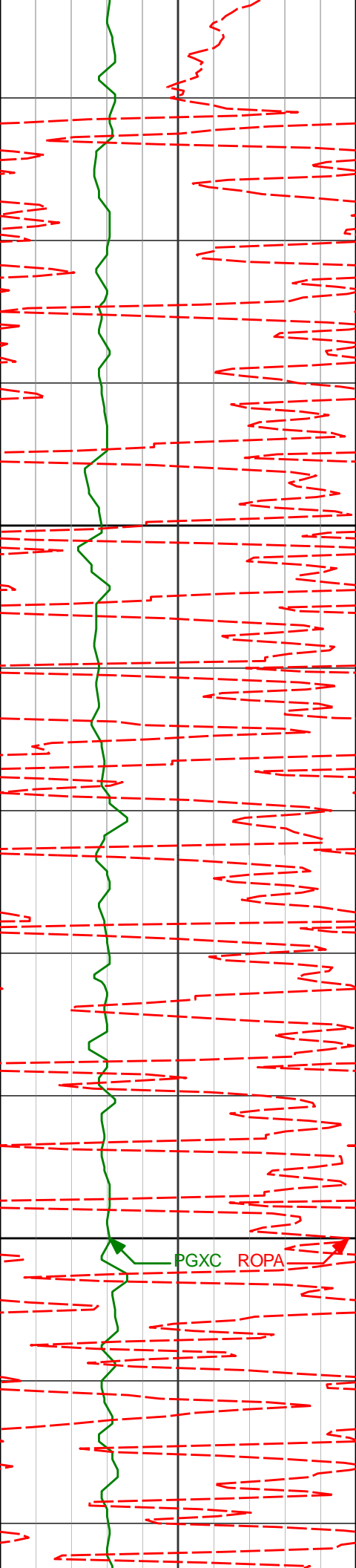
-51.84'

100.62°F

101.10°F







2900

3000

2871'

9.08°

302.06° 2862.54'

-105.17'

2966'

8.44°

302.02° 2956.44'

-116.70'

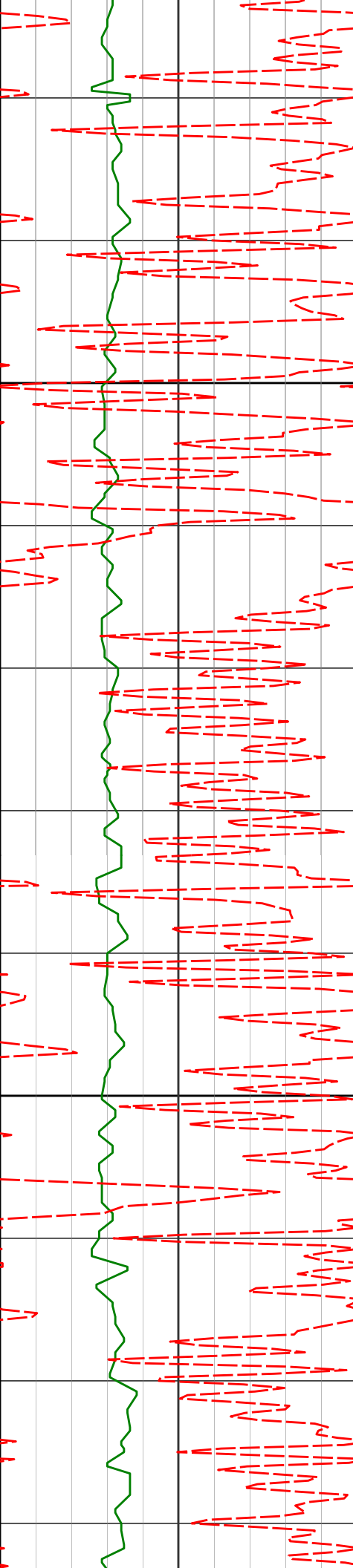
106.97°F

109.09°F

110.23°F

111.24°F

PGXC ROPA



3061'

7.89°

301.22° 3050.47'

-127.50'

3100

113.40°F

3155'

7.14°

305.43° 3143.66'

-137.14'

113.40°F

3200

113.40°F

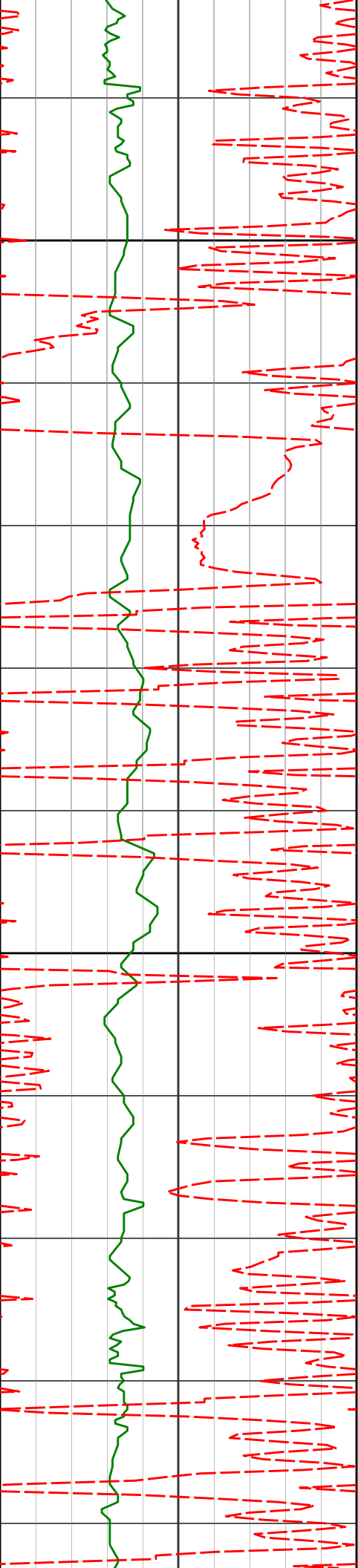
3250'

5.16°

303.01° 3238.11'

-144.99'

115.27°F



3300

3400

3344'

3439'

6.27°

5.29°

288.93°

279.96°

3331.65'

3426.17'

-153.00'

-161.96'

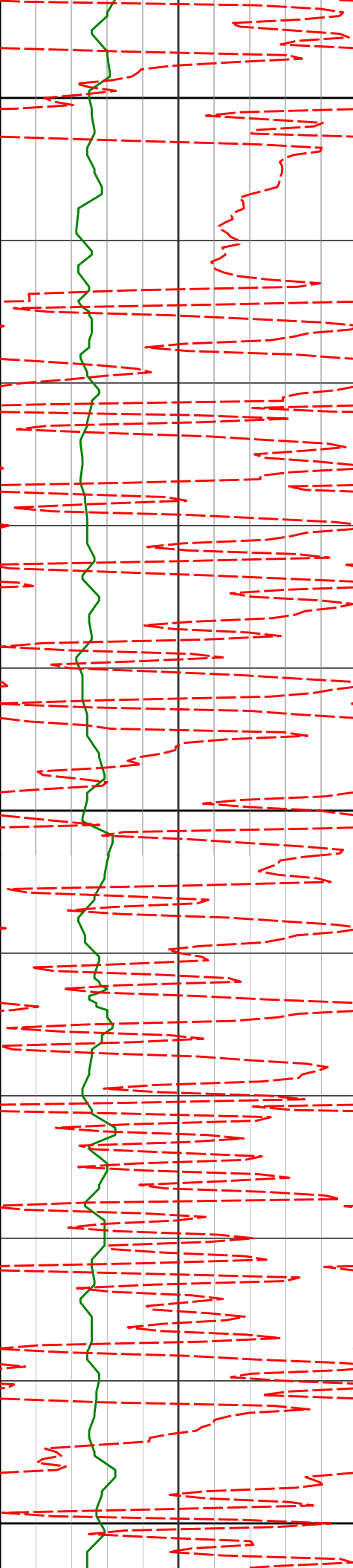
115.56°F

115.56°F

115.56°F

117.03°F

117.73°F



3500

117.73°F

3533'

6.22°

287.23°

3519.69'

-170.86'

117.73°F

3600

117.73°F

3628'

7.45°

287.75°

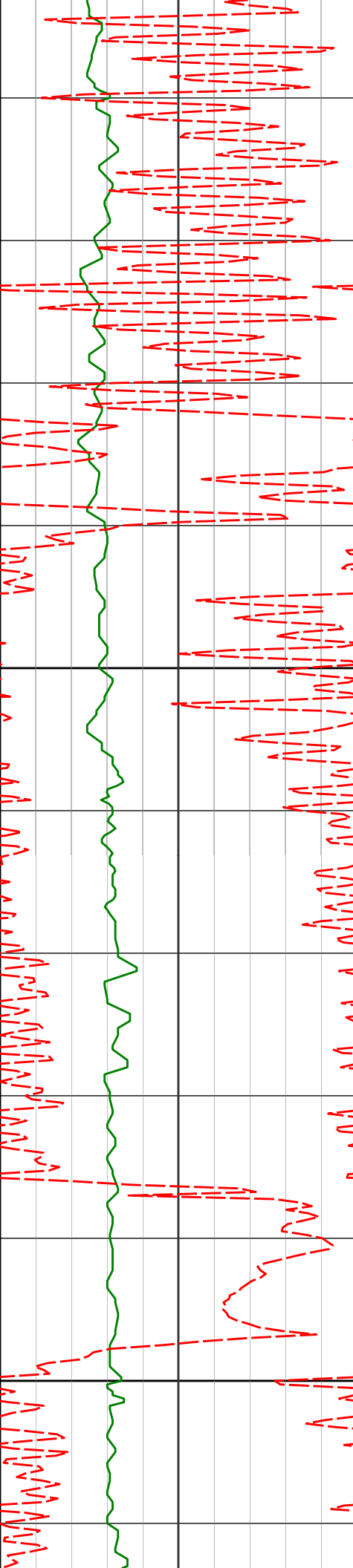
3614.02'

-181.29'

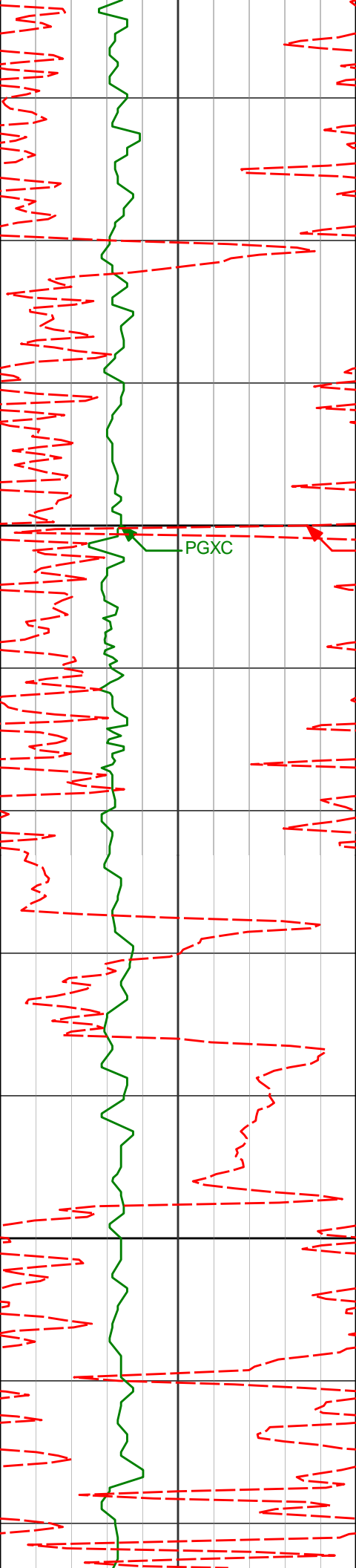
119.91°F

3700

119.91°F



	3723'	8.01°	286.94°	3708.15'	-193.10'	
						122.11°F
						122.99°F
3800	3817'	8.22°	285.37°	3801.21'	-205.47'	
						124.30°F
						124.30°F
3900	3912'	7.66°	288.63°	3895.30'	-217.62'	
						124.30°F



4006'

6.53°

285.27° 3988.58'

-228.36'

4000

PGXC

ROPA

124.66°F

125.98°F

124.30°F

4101'

6.44°

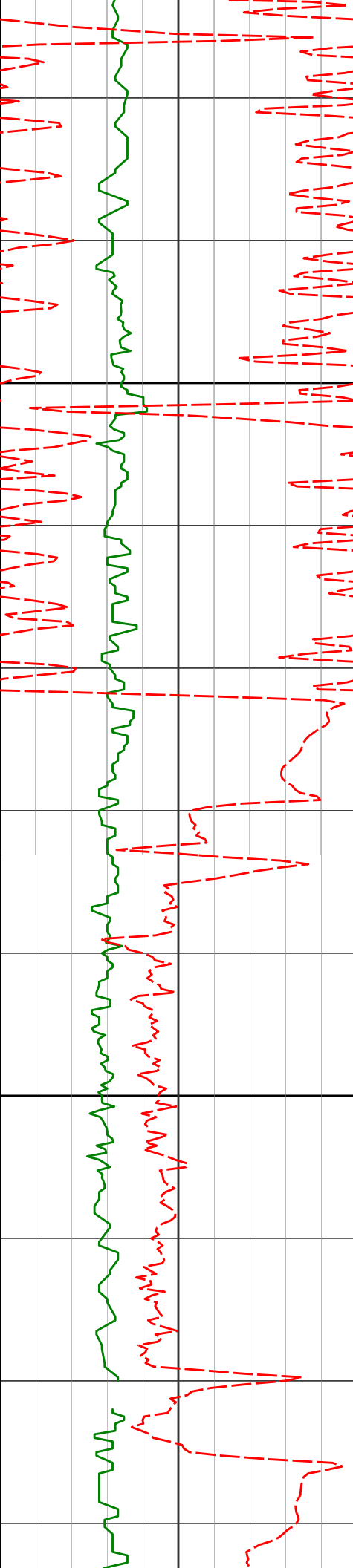
297.69° 4082.98'

-237.91'

4100

124.30°F

124.65°F



4195'

4200

4290'

4300

4385'

5.19°

5.09°

6.68°

301.44°

309.29°

310.85°

4176.49'

4271.11'

4365.61'

-245.76'

-252.22'

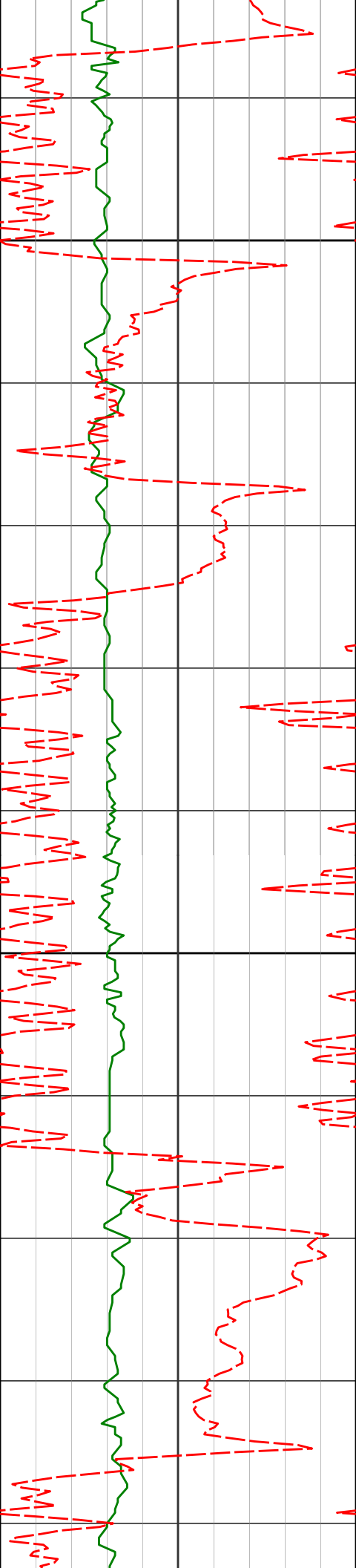
-259.08'

126.52°F

126.52°F

126.52°F

126.80°F



4400

128.73°F

4479'

6.50°

304.99°

4458.99'

-266.95'

129.50°F

4500

130.96°F

4574'

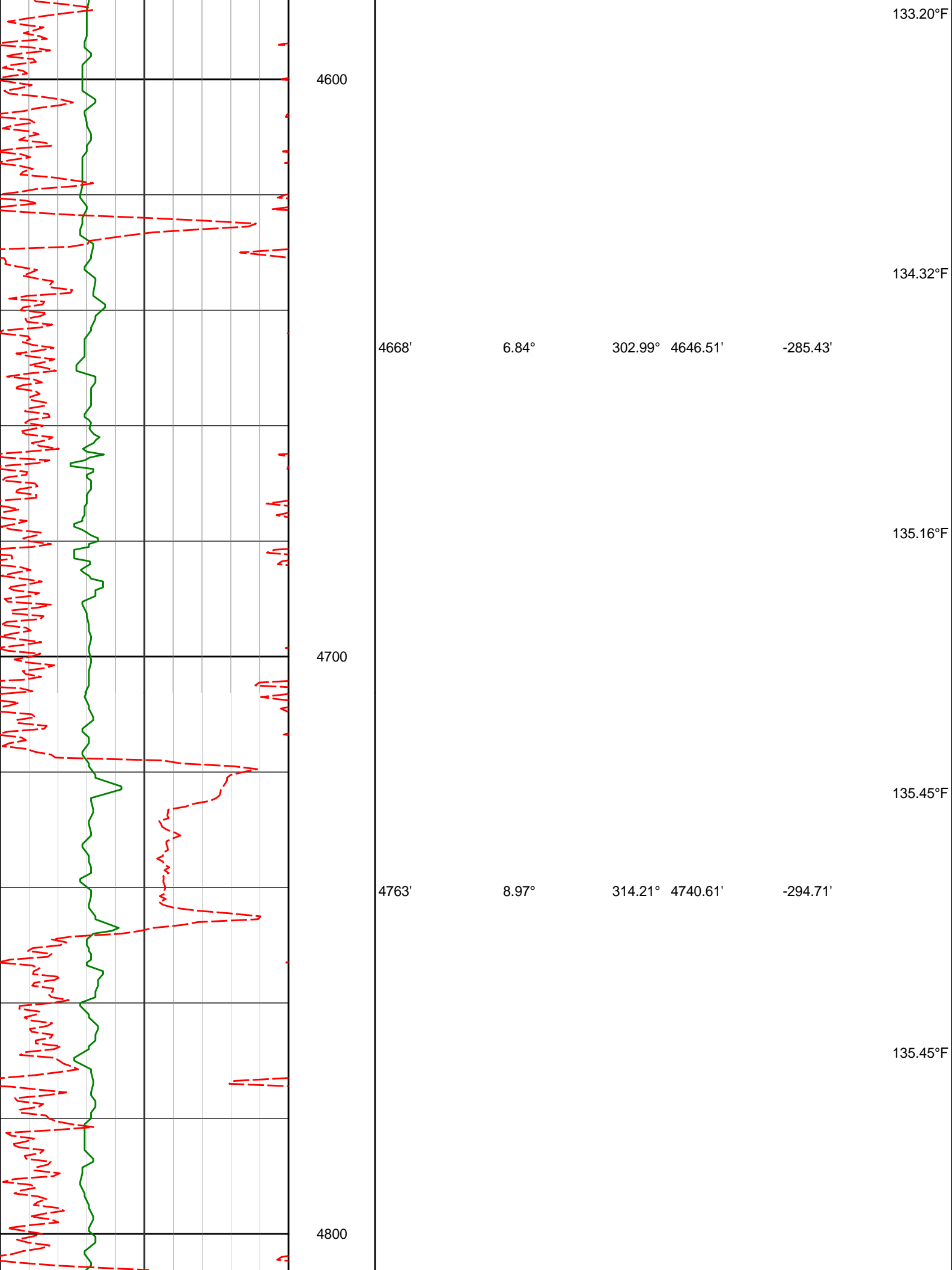
7.63°

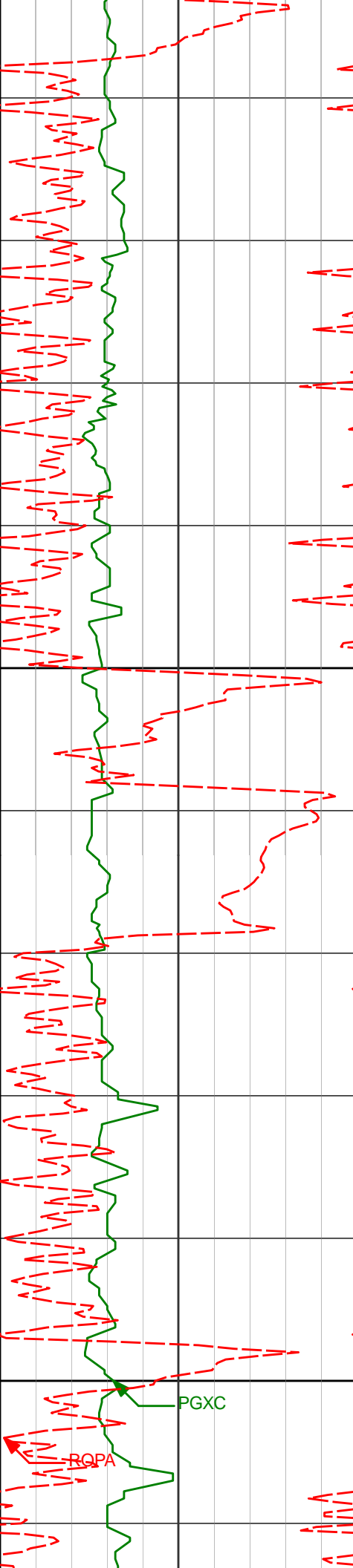
302.34°

4553.26'

-276.07'

130.96°F





4900

5000

4857'

4952'

7.27°

8.14°

304.97°

305.06°

4833.67'

4927.81'

-304.04'

-313.78'

137.80°F

138.56°F

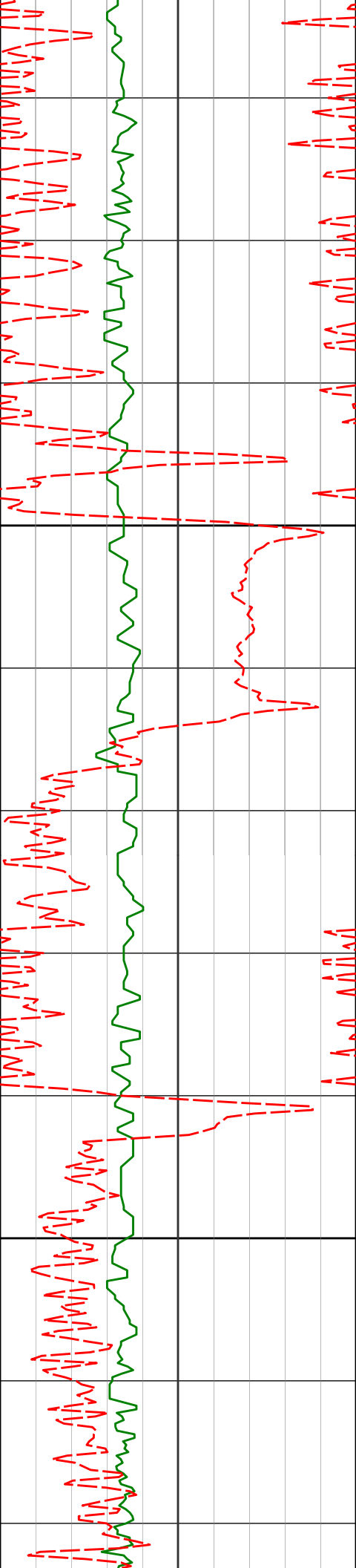
139.79°F

139.96°F

141.36°F

PGXC

RQPA



5100

5141'

7.30°

298.72°

5115.10'

-333.97'

141.44°F

139.96°F

139.96°F

140.40°F

5200

5236'

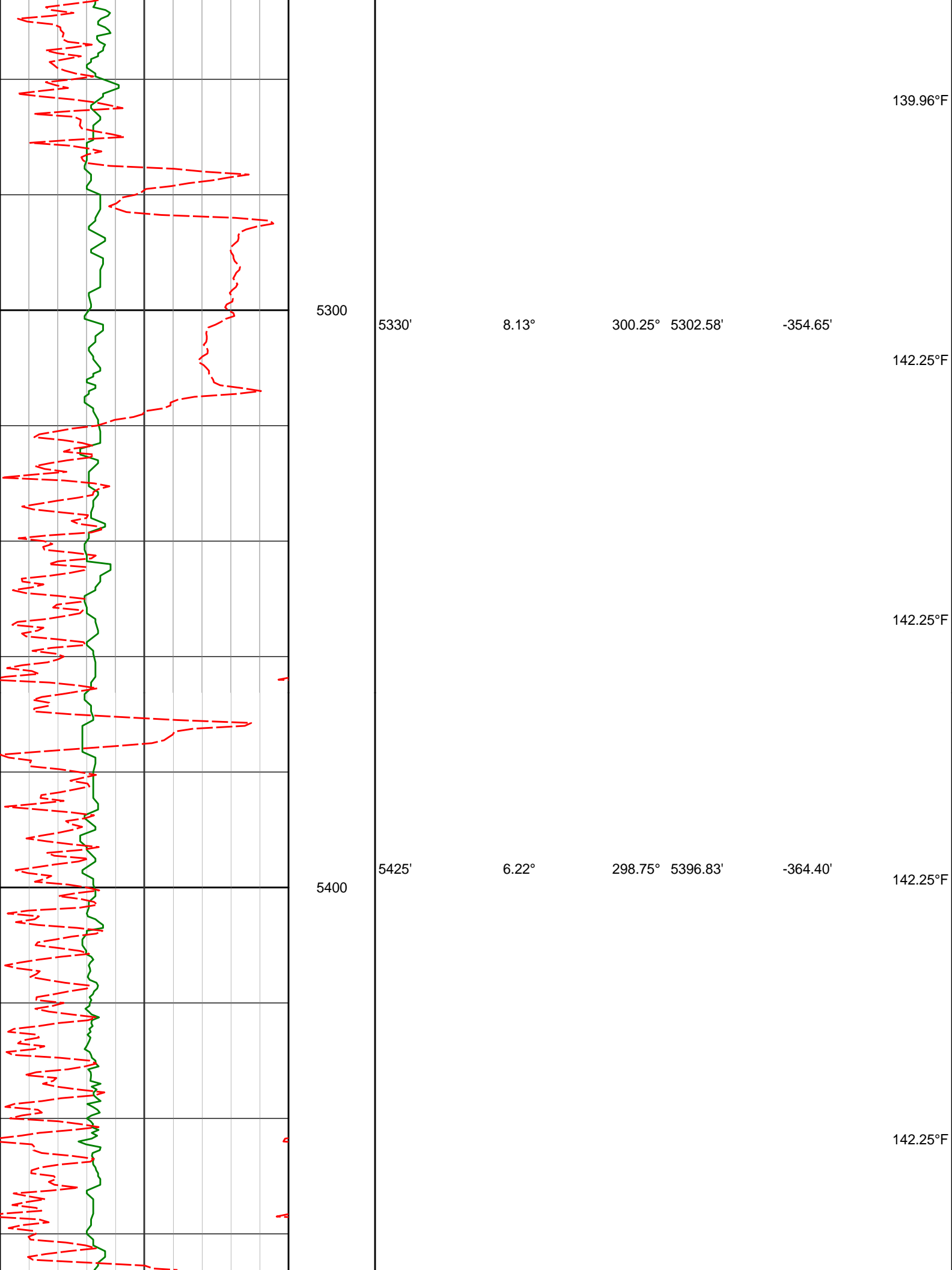
6.85°

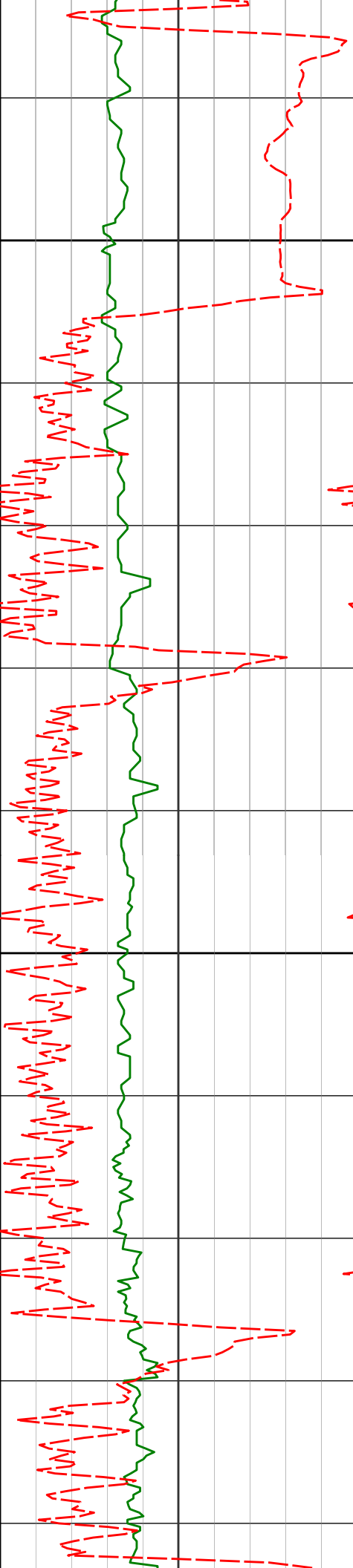
289.63°

5209.38'

-344.14'

140.62°F





<KOP>

5519'

8.27°

307.04° 5490.08'

-373.64'

142.25°F

5500

142.80°F

144.10°F

5614'

8.54°

306.05° 5584.06'

-384.02'

5600

144.54°F

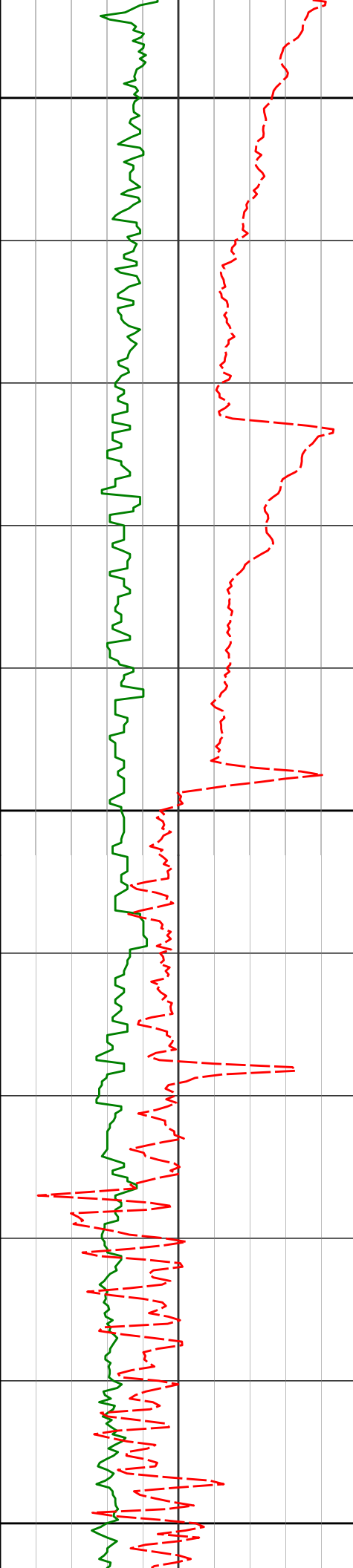
146.52°F

5709'

7.47°

299.66° 5678.13'

-394.40'



5700

147.07°F

147.06°F

5803'

20.78°

334.55° 5769.21'

-405.28'

5800

149.14°F

5898'

20.08°

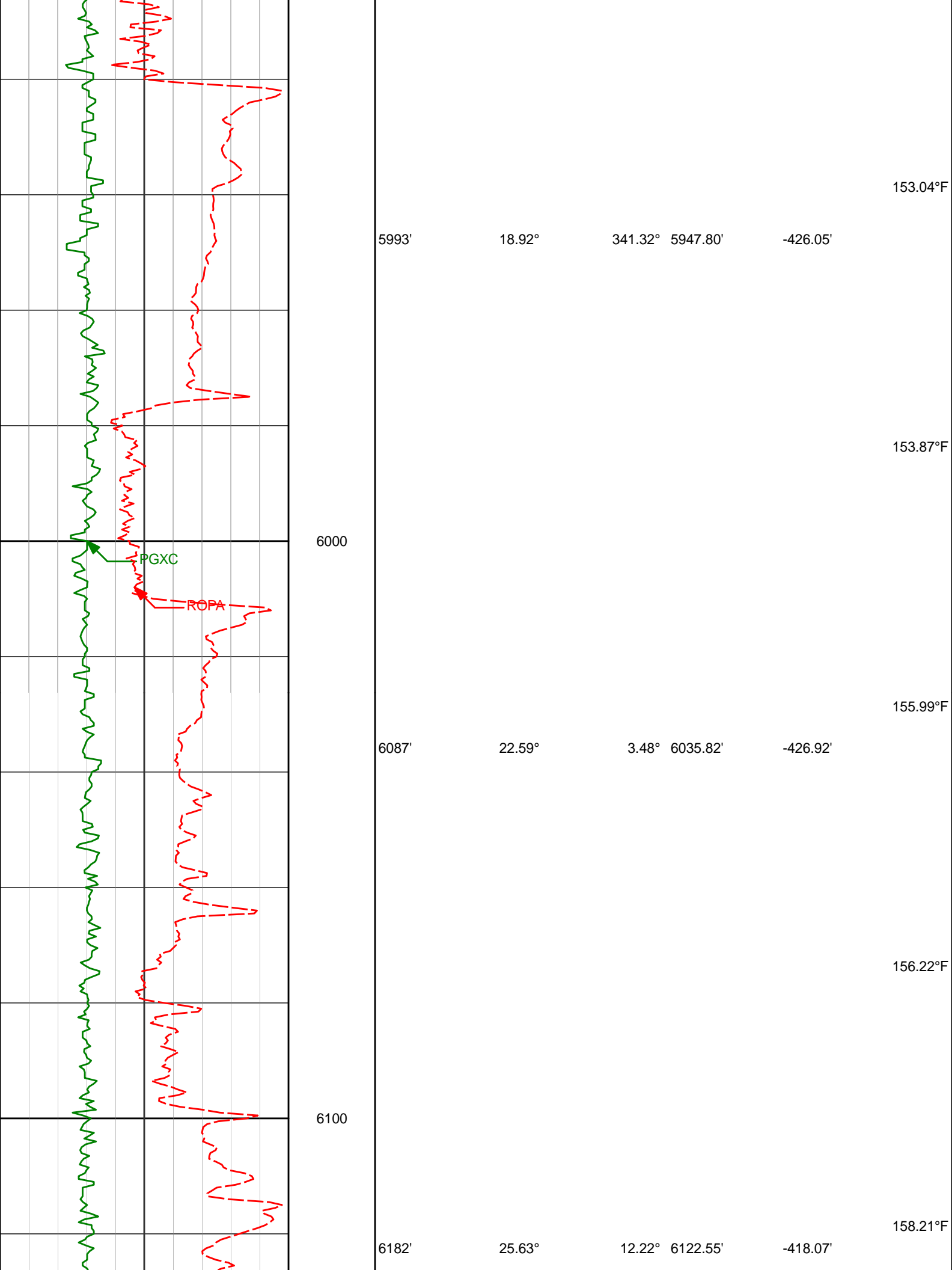
334.60° 5858.24'

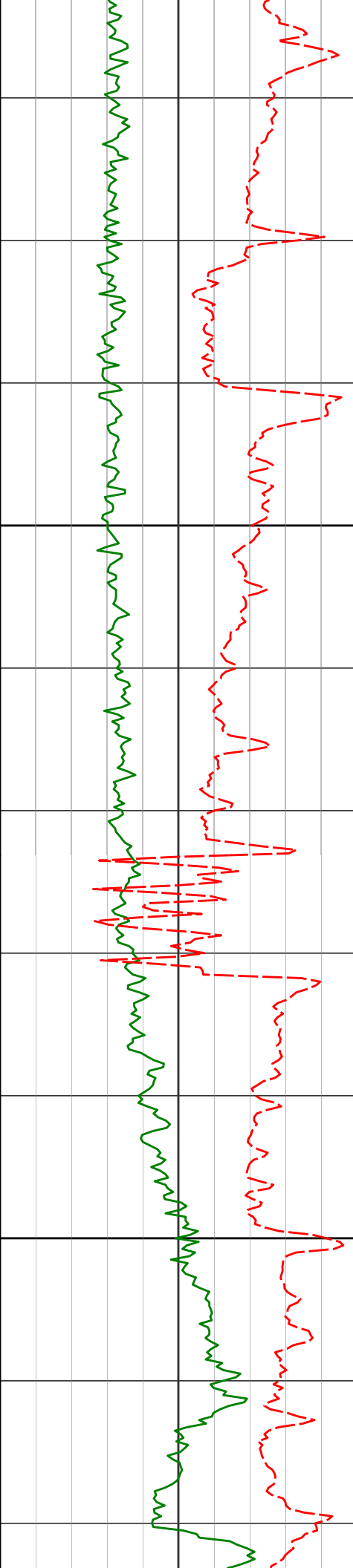
-416.78'

150.92°F

5900

151.47°F





6200

6276'

30.07°

23.39°

6205.70'

-400.75'

158.90°F

161.09°F

162.48°F

6371'

35.57°

43.36°

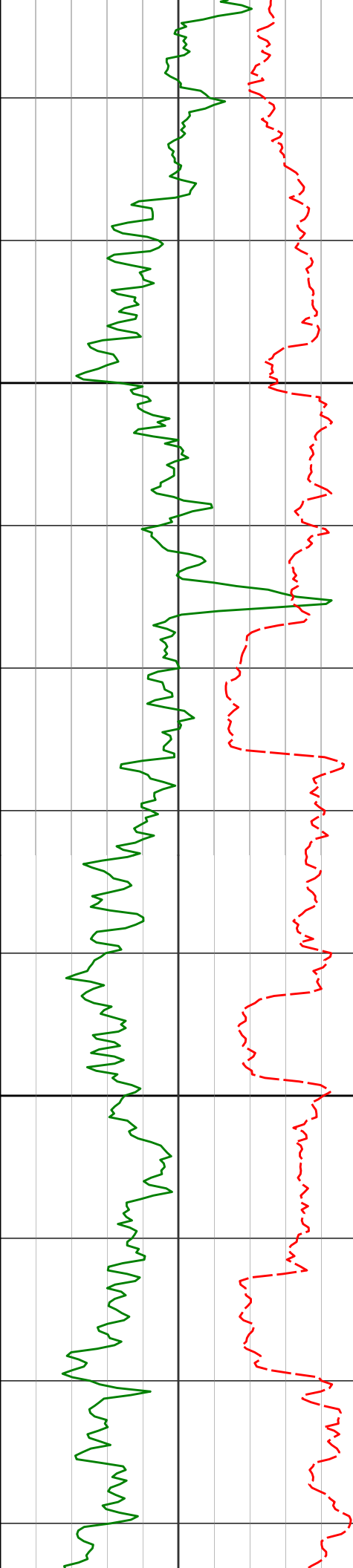
6285.74'

-368.59'

6300

163.26°F

165.27°F



6400

6500

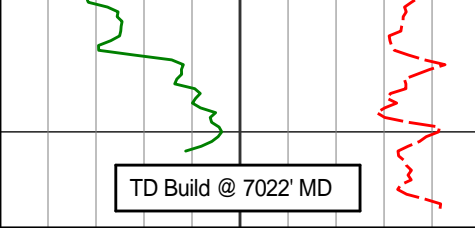
6465'	46.03°	59.91°	6357.01'	-317.16'
6560'	57.61°	68.95°	6415.70'	-247.27'
6654'	60.69°	71.92°	6463.90'	-169.13'
6749'	63.94°	82.31°	6508.13'	-85.94'
6844'	65.83°	89.35°	6548.49'	-0.01'

166.29°F

168.87°F

170.98°F

172.69°F

		6955'		80.50°		92.39°		6580.56'		105.34'					
Avg Rate of Penetration ROPA feet per hr		Depth TVD ft		Depth		Inc		Azi		TVD		V.S.		Temp	
PCG GR XHi-Range RT PGXRC-T api															

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
 Wells Ranch AE32-690
 Wattenberg
 Weld Colorado
 USA
 CA-XX-0902771586

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
738.00	0.31	76.18	738.00	0.48 N	1.96 E	2.00	0.04
833.00	0.31	84.09	832.99	0.57 N	2.48 E	2.52	0.05
928.00	0.16	112.88	927.99	0.55 N	2.86 E	2.89	0.20
1116.00	0.29	157.46	1115.99	0.01 N	3.28 E	3.26	0.11
1207.00	0.22	126.70	1206.99	0.31 S	3.51 E	3.47	0.17
1299.00	0.30	154.42	1298.99	0.64 S	3.76 E	3.68	0.16
1390.00	0.44	148.97	1389.99	1.16 S	4.04 E	3.92	0.16
1483.00	0.84	288.60	1482.99	1.25 S	3.58 E	3.46	1.30
1576.00	2.78	312.34	1575.94	0.48 N	1.28 E	1.31	2.19
1669.00	5.02	325.71	1668.72	5.35 N	2.68 W	-2.19	2.58
1762.00	6.64	319.53	1761.23	12.80 N	8.46 W	-7.28	1.87
1854.00	7.09	317.91	1852.58	21.06 N	15.71 W	-13.77	0.53
1947.00	6.63	313.02	1944.91	28.98 N	23.48 W	-20.80	0.80
2040.00	6.36	310.52	2037.31	35.99 N	31.32 W	-27.99	0.42
2224.00	6.21	297.56	2220.22	47.21 N	47.89 W	-43.49	0.77
2317.00	5.70	291.68	2312.72	51.25 N	56.64 W	-51.84	0.85
2409.00	5.02	287.55	2404.31	54.15 N	64.72 W	-59.63	0.85
2502.00	7.85	307.30	2496.73	59.22 N	73.65 W	-68.07	3.82
2595.00	7.71	305.96	2588.87	66.73 N	83.75 W	-77.46	0.25
2688.00	7.30	304.13	2681.08	73.71 N	93.69 W	-86.74	0.51
2779.00	6.60	303.88	2771.41	79.87 N	102.81 W	-95.28	0.77
2871.00	9.08	302.06	2862.54	86.67 N	113.35 W	-105.17	2.71
2966.00	8.44	302.02	2956.44	94.34 N	125.62 W	-116.70	0.67
3061.00	7.89	301.22	3050.47	101.42 N	137.10 W	-127.50	0.59
3155.00	7.14	305.43	3143.66	108.15 N	147.38 W	-137.14	0.99
3250.00	5.16	303.01	3238.11	113.90 N	155.77 W	-144.99	2.10
3344.00	6.27	288.93	3331.65	117.87 N	164.17 W	-153.00	1.89
3439.00	5.29	279.96	3426.17	120.31 N	173.39 W	-161.96	1.40
3533.00	6.22	287.23	3519.69	122.56 N	182.52 W	-170.86	1.26
3628.00	7.45	287.75	3614.02	125.97 N	193.31 W	-181.29	1.30
3723.00	8.01	286.94	3708.15	129.77 N	205.50 W	-193.10	0.59
3817.00	8.22	285.37	3801.21	133.46 N	218.25 W	-205.47	0.33
3912.00	7.66	288.63	3895.30	137.28 N	230.80 W	-217.62	0.76
4006.00	6.53	285.27	3988.58	140.69 N	241.88 W	-228.36	1.28
4101.00	6.44	297.69	4082.98	144.59 N	251.82 W	-237.91	1.48
4195.00	5.19	301.44	4176.49	149.26 N	260.12 W	-245.76	1.39
4290.00	5.09	309.29	4271.11	154.17 N	267.05 W	-252.22	0.75
4385.00	6.68	310.85	4365.61	160.46 N	274.49 W	-259.08	1.69
4479.00	6.50	304.99	4458.99	167.09 N	282.99 W	-266.95	0.74

4574.00	7.63	302.34	4553.26	173.55 N	292.73 W	-276.07	1.24
4668.00	6.84	302.99	4646.51	179.93 N	302.70 W	-285.43	0.85
4763.00	8.97	314.21	4740.61	188.18 N	312.75 W	-294.71	2.75
4857.00	7.27	304.97	4833.67	196.70 N	322.88 W	-304.04	2.27
4952.00	8.14	305.06	4927.81	204.01 N	333.31 W	-313.78	0.91
5141.00	7.30	298.72	5115.10	217.46 N	354.80 W	-333.97	0.63
5236.00	6.85	289.63	5209.38	222.27 N	365.43 W	-344.14	1.27
5330.00	8.13	300.25	5302.58	227.50 N	376.46 W	-354.65	2.00
5425.00	6.22	298.75	5396.83	233.36 N	386.77 W	-364.40	2.02
5519.00	8.27	307.04	5490.08	239.88 N	396.63 W	-373.64	2.45
5614.00	8.54	306.05	5584.06	248.15 N	407.79 W	-384.02	0.32
5709.00	7.47	299.66	5678.13	255.36 N	418.86 W	-394.40	1.47
5803.00	20.78	334.55	5769.21	273.55 N	431.41 W	-405.28	16.21
5898.00	20.08	334.60	5858.24	303.50 N	445.65 W	-416.78	0.74
5993.00	18.92	341.32	5947.80	332.83 N	457.58 W	-426.05	2.66
6087.00	22.59	3.48	6035.82	365.34 N	461.37 W	-426.92	9.15
6182.00	25.63	12.22	6122.55	403.66 N	455.91 W	-418.07	4.93
6276.00	30.07	23.39	6205.70	445.19 N	442.25 W	-400.75	7.27
6371.00	35.57	43.36	6285.74	487.28 N	413.72 W	-368.59	12.72
6465.00	46.03	59.91	6357.01	524.32 N	365.41 W	-317.16	15.93
6560.00	57.61	68.95	6415.70	556.02 N	298.08 W	-247.27	14.28
6654.00	60.69	71.92	6463.90	583.01 N	222.05 W	-169.13	4.25
6749.00	63.94	82.31	6508.13	601.62 N	140.19 W	-85.94	10.26
6844.00	65.83	89.35	6548.49	607.83 N	54.47 W	-0.01	7.00
6955.00	80.50	92.39	6580.56	606.12 N	51.45 E	105.34	13.47

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 84.88 DEGREES (GRID)
A TOTAL CORRECTION OF 7.31 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6955.00 FEET
IS 608.30 FEET ALONG 4.85 DEGREES (GRID)**

Final survey is a projection to the bit at TD.