

## PCGK - Pressure Case Gamma

[illegible]

## WELL INFORMATION

|                                  |                  |  |  |  |  |
|----------------------------------|------------------|--|--|--|--|
| MWD Run Number                   | 100              |  |  |  |  |
| Date run completed               | 23-Apr-15        |  |  |  |  |
| Rig Bit Number                   | 0200             |  |  |  |  |
| Bit Size (in)                    | 8.750            |  |  |  |  |
| Tool Nominal OD (in)             | 6.890            |  |  |  |  |
| Log Start Depth (MD, ft)         | 683.00           |  |  |  |  |
| Log End Depth (MD, ft)           | 6,428.00         |  |  |  |  |
| Drill or Wipe                    | Drill            |  |  |  |  |
| Drill/Wipe Start Date and Time   | 21-Apr-15 23:50  |  |  |  |  |
| Drill/Wipe End Date and Time     | 23-Apr-15 06:25  |  |  |  |  |
| Min Inc (deg) @ Depth (MD, ft)   | 0.18 @ 734.00    |  |  |  |  |
| Max Inc (deg) @ Depth (MD, ft)   | 88.97 @ 6,428.00 |  |  |  |  |
| Bit TFA(in2) / Bit Type          | 1.24 / PDC       |  |  |  |  |
| Flow Rate (gpm)                  | 600.00           |  |  |  |  |
| Max AV (fpm) / CV (fpm) @ MWD    | N/A / N/A        |  |  |  |  |
| Fluid Type                       | Native/Spud Mud  |  |  |  |  |
| Density (ppg) / Viscosity (spqt) | 8.65 / 28.00     |  |  |  |  |
| Filtrate CL (ppm)                | 1,700.00         |  |  |  |  |
| pH / Fluid Loss (mptm)           | 8.10 / 0         |  |  |  |  |
| PV (cP) / YP (lbf2)              | 1 / 4.00         |  |  |  |  |
| % Solids / % Sand                | 2.20 / 0.15      |  |  |  |  |
| % 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 (in) Temp (degF)   | 173.75 / 200.00  |  |  |  |  |

|                               |               |  |  |  |  |
|-------------------------------|---------------|--|--|--|--|
| Max Tool Temp (degF) / Source | 172.78 / PCM  |  |  |  |  |
| Rm @ Max Tool Temp (degF)     | N/A @ 172.78  |  |  |  |  |
| Lead MWD Engineer             | Robert Barnes |  |  |  |  |
| Customer Representative       | Jim Turner    |  |  |  |  |

## SENSOR INFORMATION

### Downhole Processor Information

|                           |                 |  |  |  |  |
|---------------------------|-----------------|--|--|--|--|
| Tool Type                 | PCM             |  |  |  |  |
| Software Version          | 5.93            |  |  |  |  |
| Sub Serial Number         | 11404298        |  |  |  |  |
| Insert Serial Number      | 10997267        |  |  |  |  |
| Date and Time Initialized | 21-Apr-15 13:14 |  |  |  |  |
| Date and Time Read        | 23-Apr-15 11:59 |  |  |  |  |
| ECMB SW Version           | N/A             |  |  |  |  |

### Directional Sensor Information

|                        |          |  |  |  |  |
|------------------------|----------|--|--|--|--|
| Tool Type              | PCDC     |  |  |  |  |
| Distance From Bit (ft) | 57.00    |  |  |  |  |
| Software Version       | 6.21     |  |  |  |  |
| Sub Serial Number      | 11404298 |  |  |  |  |
| Sonde Serial Number    | 11638501 |  |  |  |  |
| Sensor ID Number       | N/A      |  |  |  |  |
| Toolface Offset (deg)  | 183.50   |  |  |  |  |

### Gamma Ray Sensor Information

|                              |          |  |  |  |  |
|------------------------------|----------|--|--|--|--|
| Tool Type                    | PCG      |  |  |  |  |
| Distance From Bit (ft)       | 49.96    |  |  |  |  |
| Recorded Sample Period (sec) | 10       |  |  |  |  |
| Software Version             | 8.15     |  |  |  |  |
| Sub Serial Number            | 11404298 |  |  |  |  |
| Insert/Sonde Serial Number   | 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

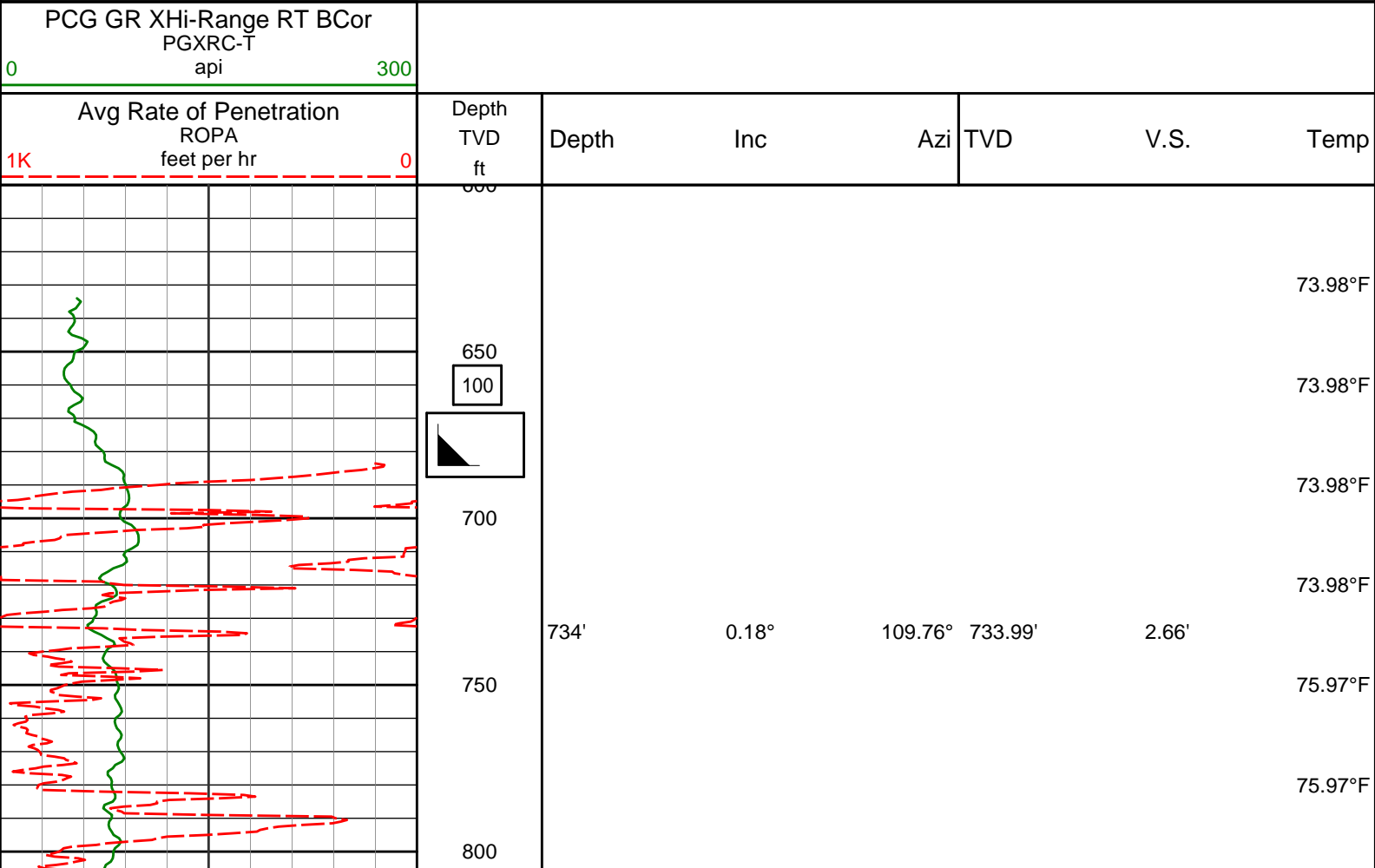
Interval Resolution: 1.2 ft

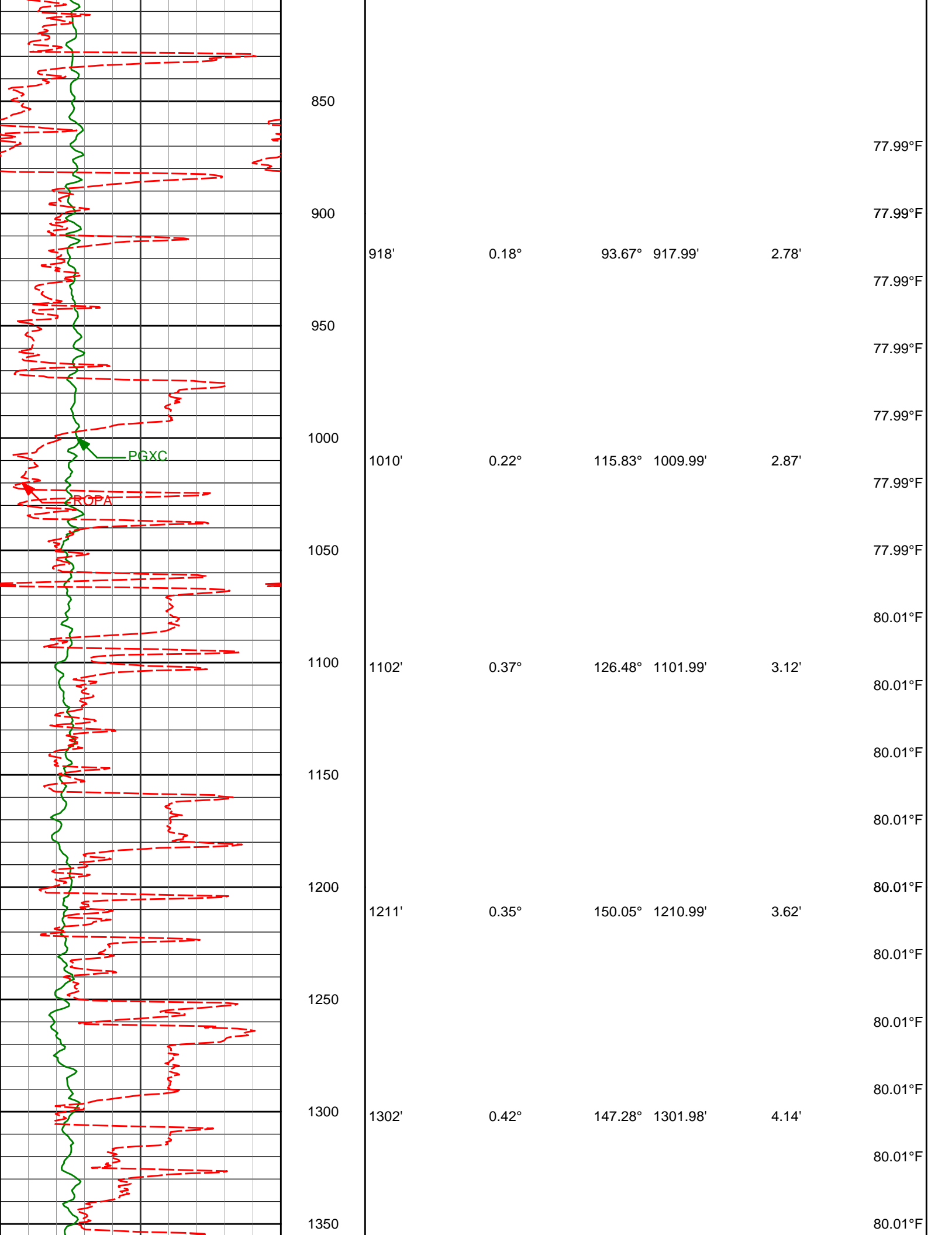
6. Insite Version v8.1.10

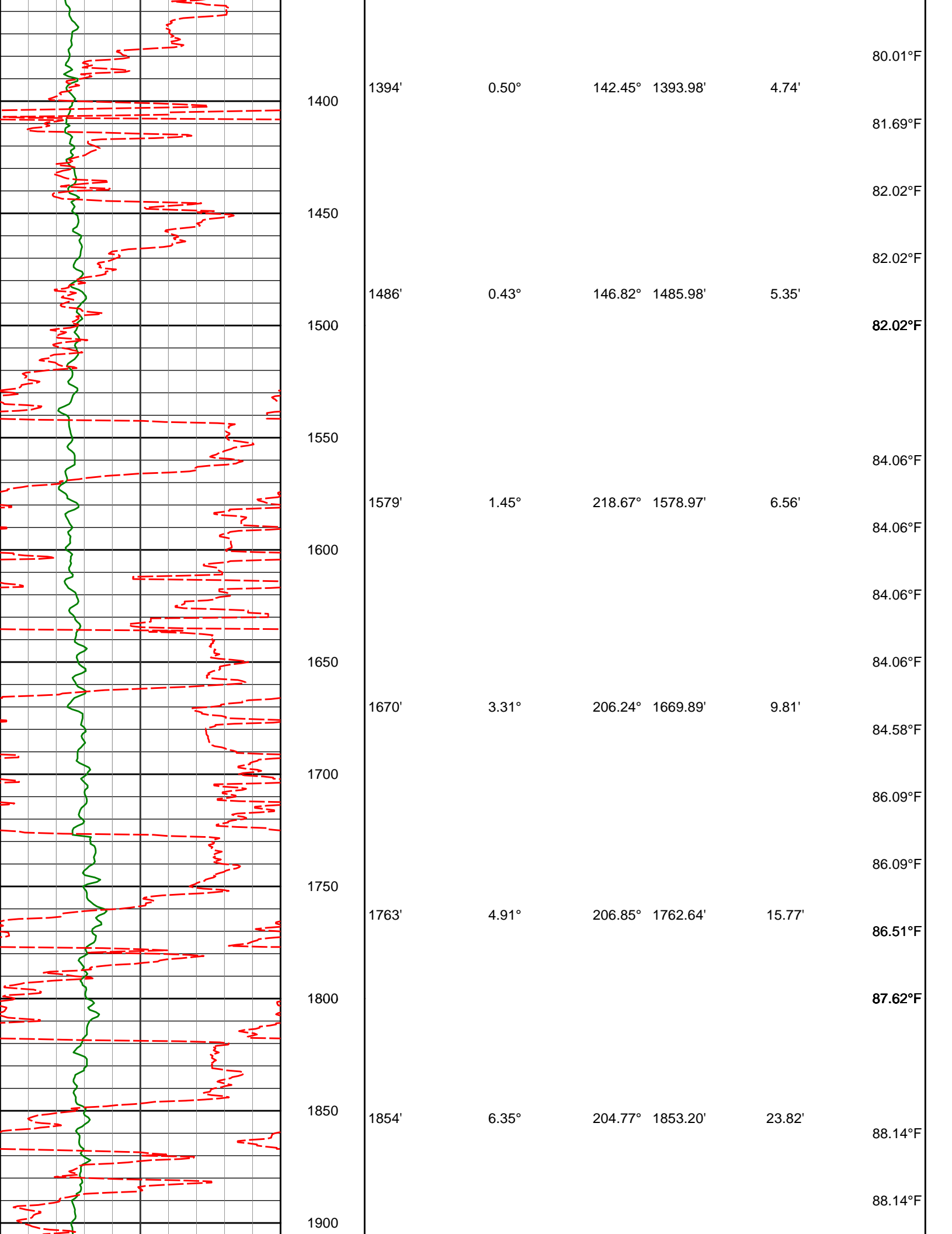
WARRANTY

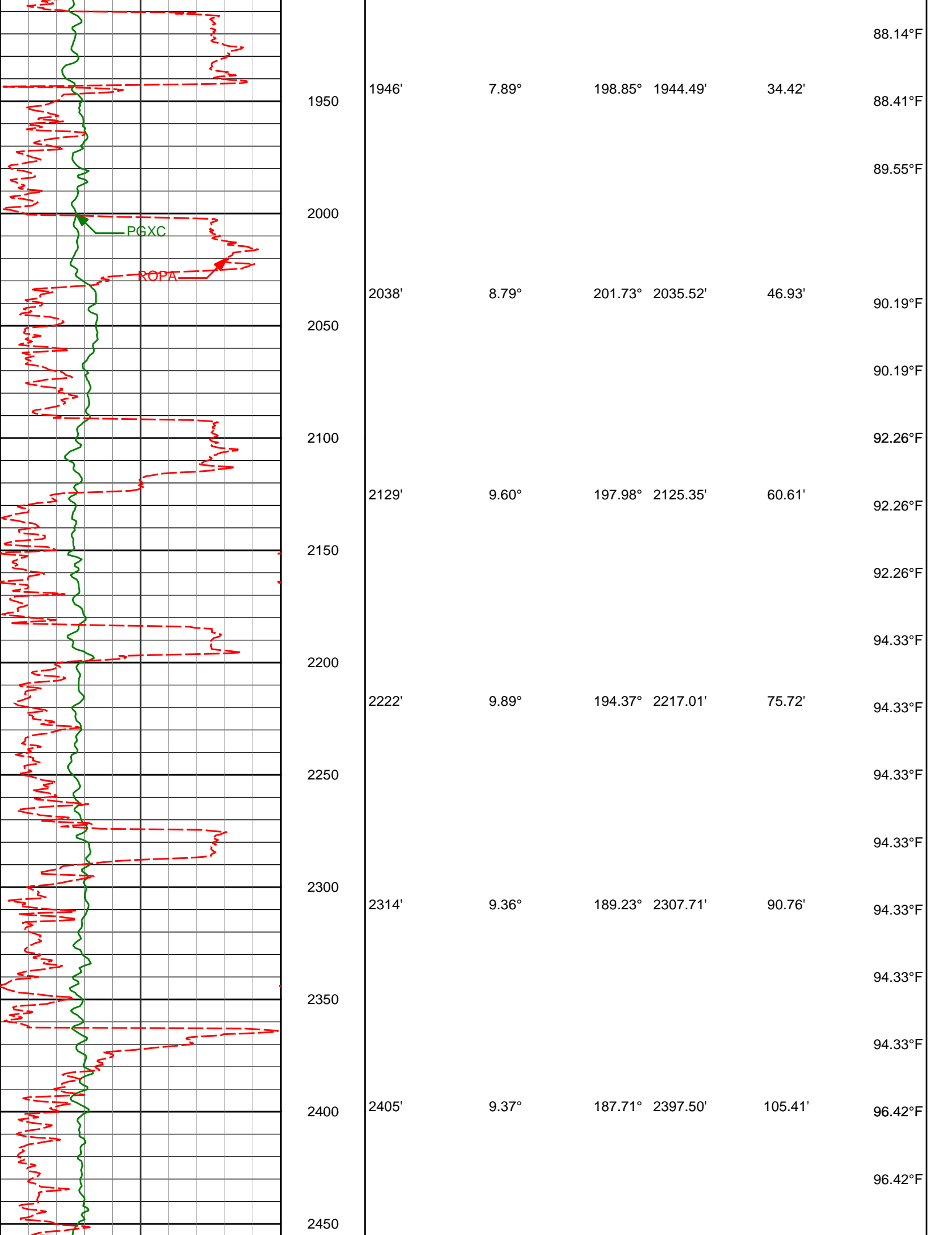
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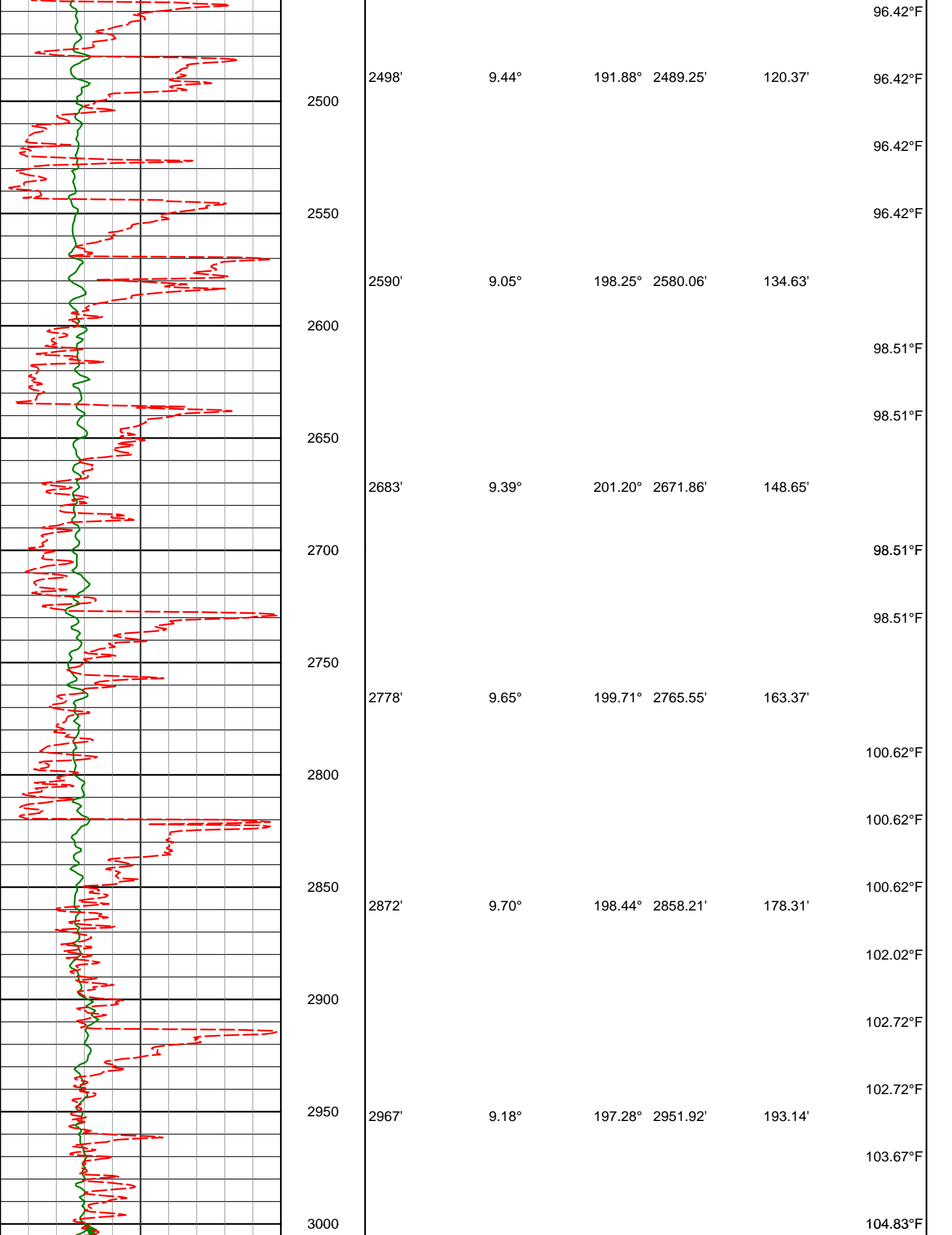
TVD Detail 1:600 Scale

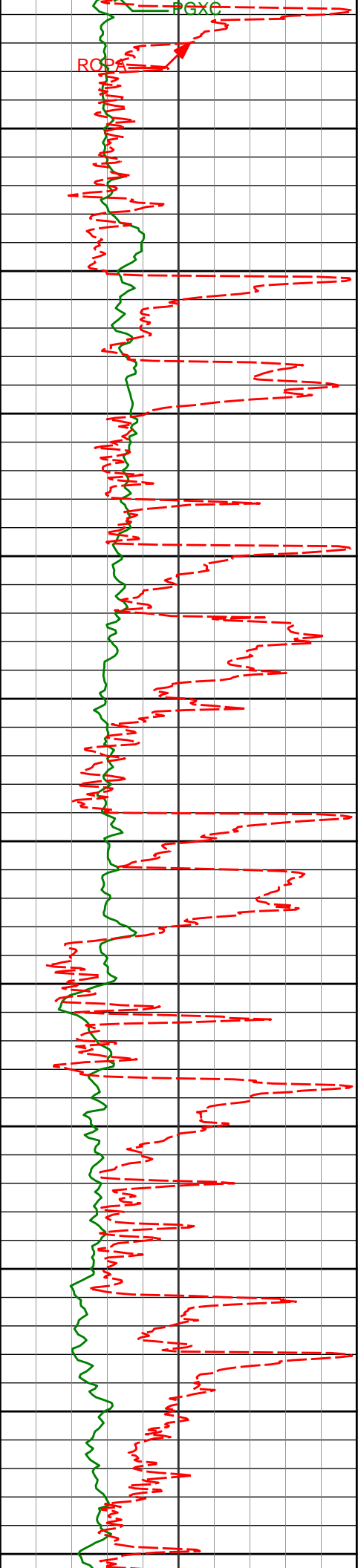






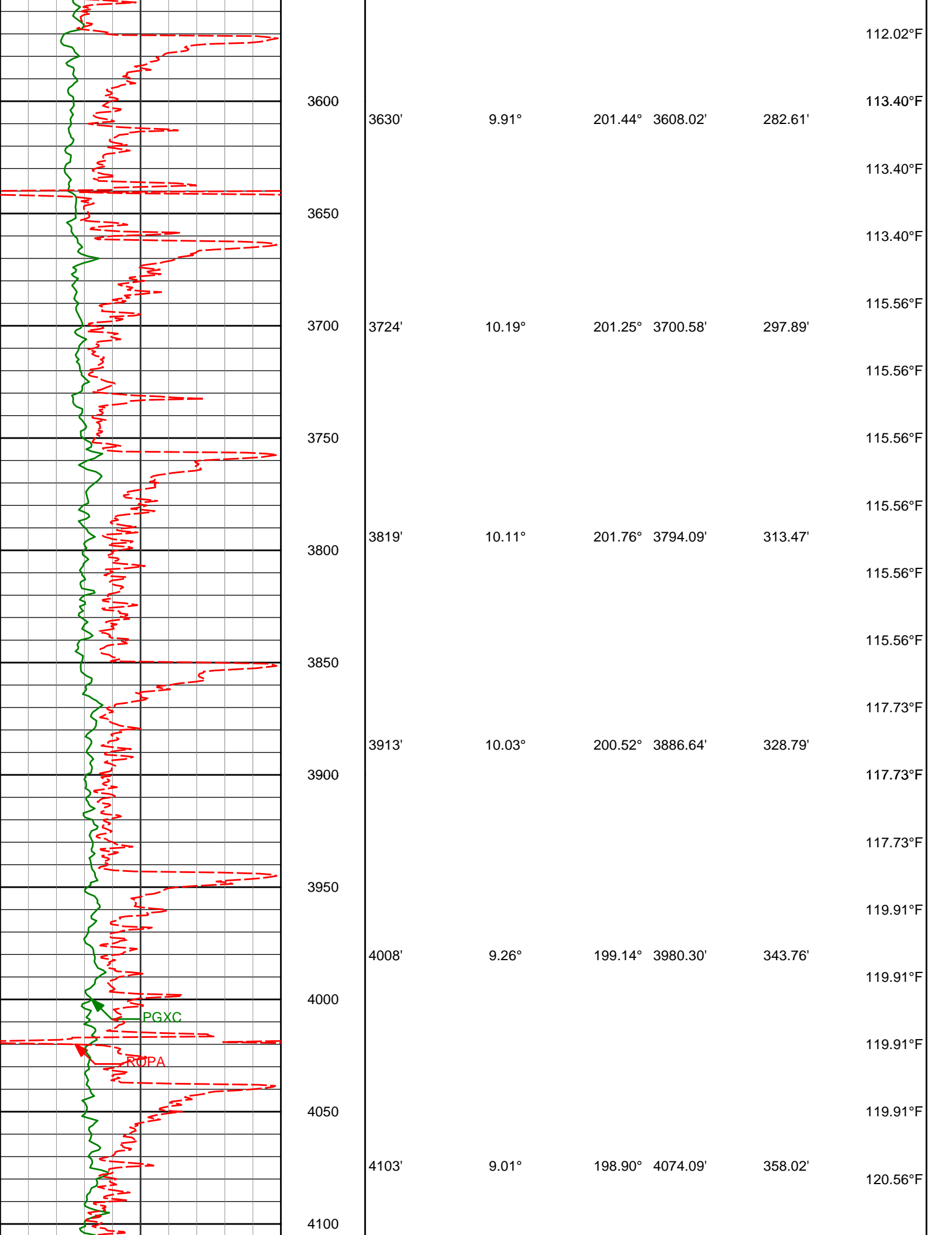


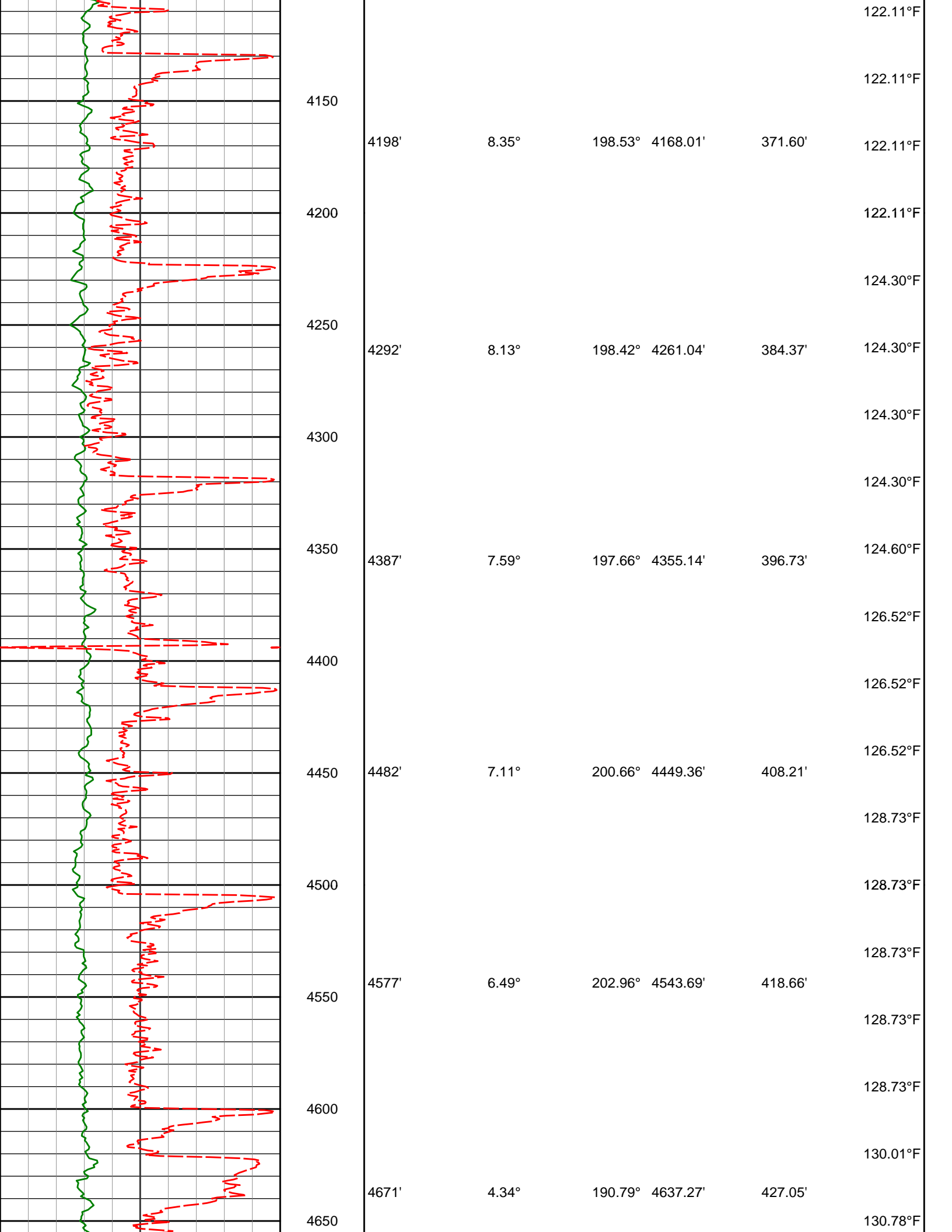


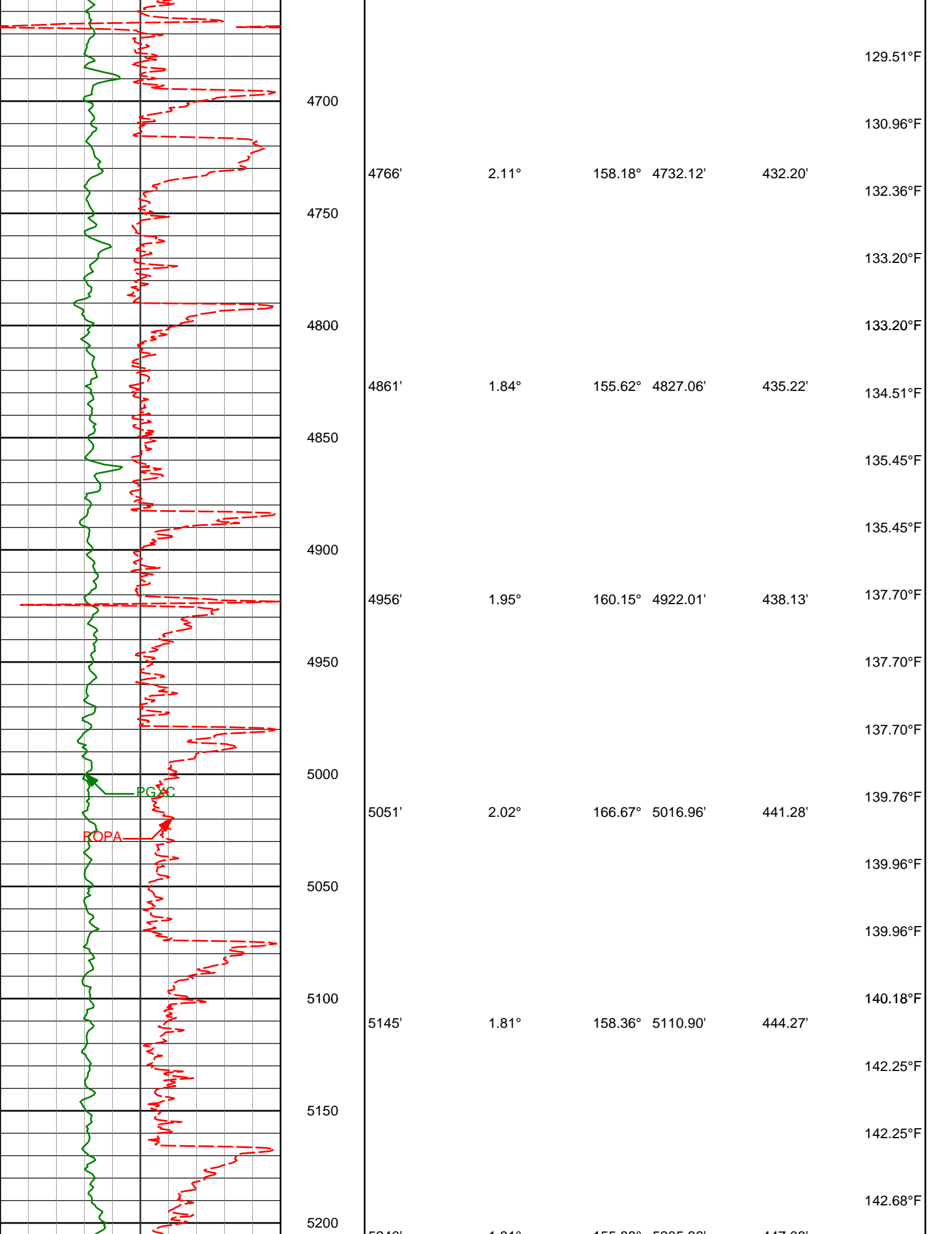


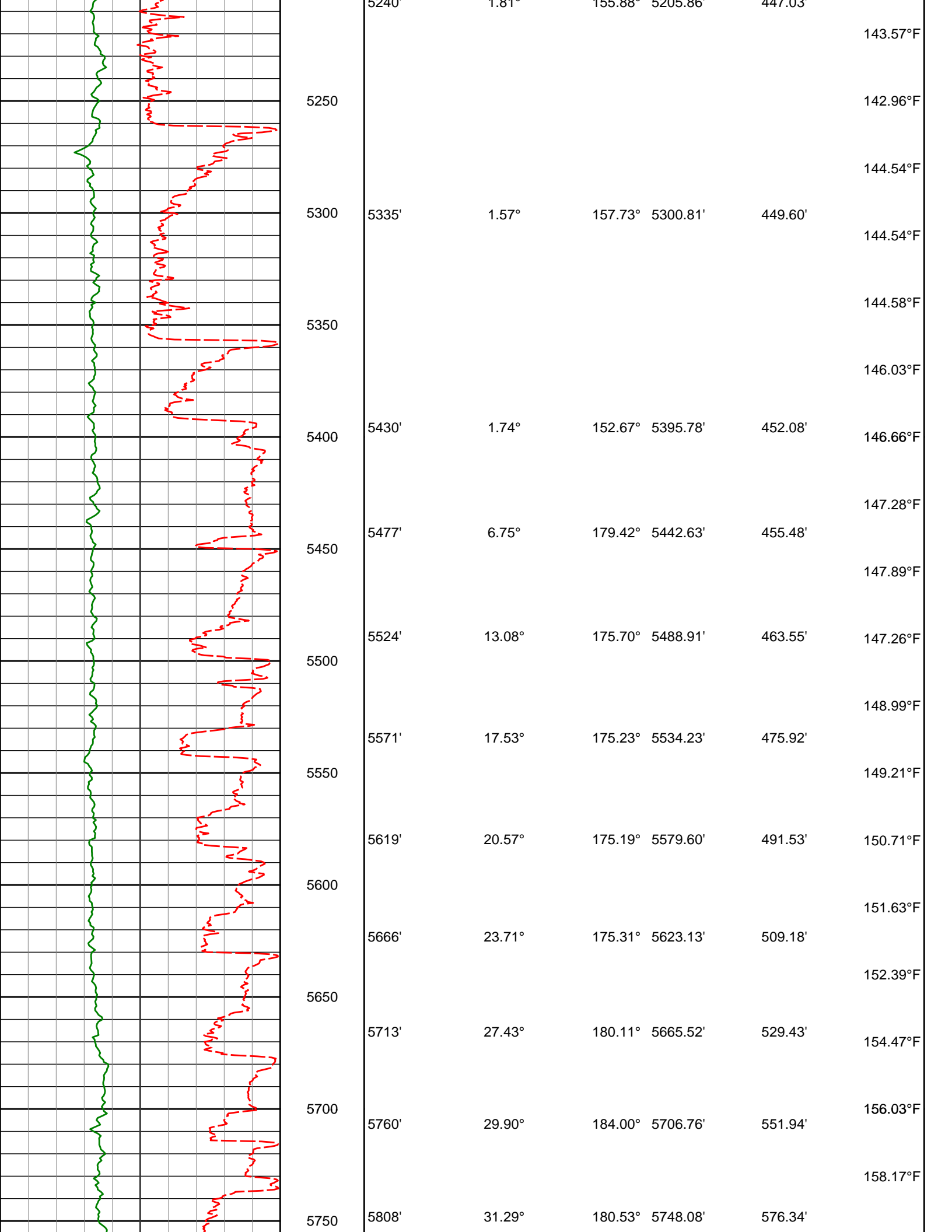
|      |       |       |         |          |         |          |
|------|-------|-------|---------|----------|---------|----------|
|      |       |       |         |          |         | 104.83°F |
| 3050 | 3062' | 8.41° | 194.11° | 3045.81' | 207.11' | 104.83°F |
|      |       |       |         |          |         | 104.83°F |
| 3100 |       |       |         |          |         | 104.83°F |
|      |       |       |         |          |         | 104.83°F |
| 3150 | 3157' | 6.09° | 183.42° | 3140.05' | 218.88' | 106.97°F |
|      |       |       |         |          |         | 106.97°F |
| 3200 |       |       |         |          |         | 106.97°F |
|      |       |       |         |          |         | 106.97°F |
| 3250 | 3251' | 5.93° | 185.99° | 3233.53' | 228.68' | 106.97°F |
|      |       |       |         |          |         | 106.97°F |
| 3300 |       |       |         |          |         | 106.97°F |
|      |       |       |         |          |         | 106.97°F |
| 3350 | 3346' | 8.45° | 203.58° | 3327.79' | 239.96' | 106.97°F |
|      |       |       |         |          |         | 109.09°F |
| 3400 |       |       |         |          |         | 109.09°F |
|      |       |       |         |          |         | 109.09°F |
| 3450 | 3441' | 9.18° | 202.52° | 3421.66' | 253.36' | 109.09°F |
|      |       |       |         |          |         | 111.24°F |
| 3500 |       |       |         |          |         | 111.24°F |
|      |       |       |         |          |         | 111.24°F |
| 3550 | 3535' | 9.65° | 201.78° | 3514.40' | 267.60' | 111.24°F |
|      |       |       |         |          |         | 111.24°F |

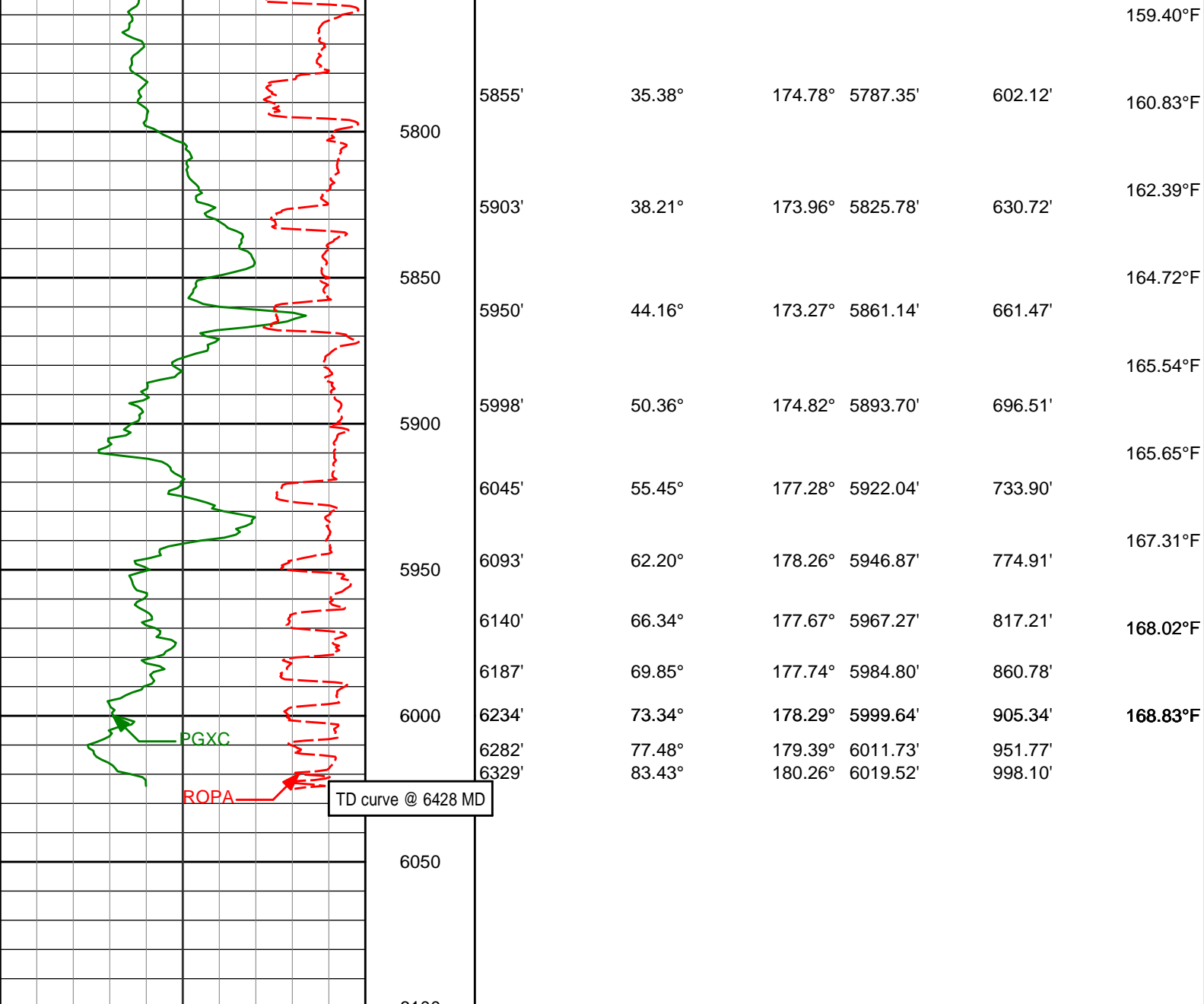








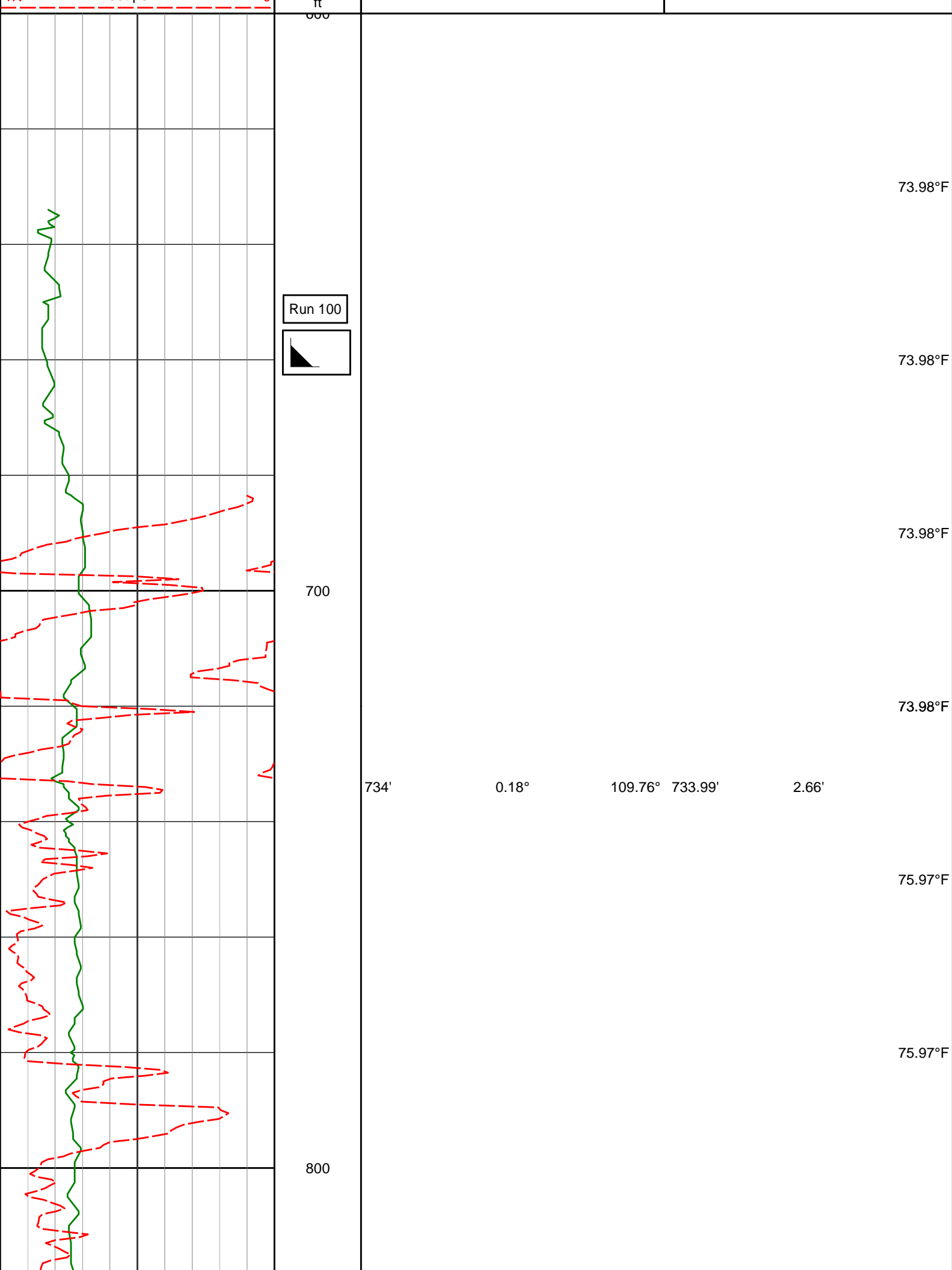


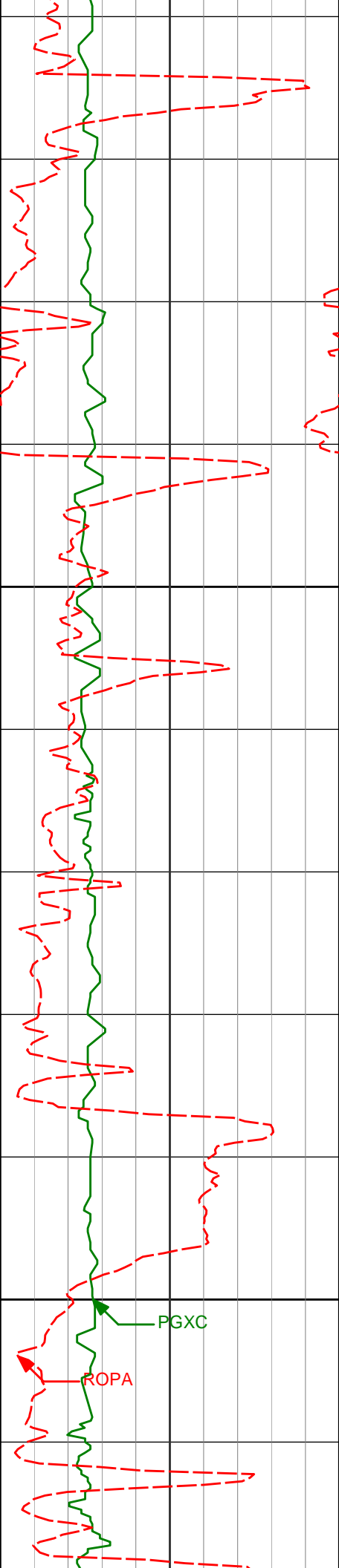


|  |  |                    |       |     |     |     |      |      |
|--|--|--------------------|-------|-----|-----|-----|------|------|
| Avg Rate of Penetration<br>ROPA<br>feet per hr |  | Depth<br>TVD<br>ft | Depth | Inc | Azi | TVD | V.S. | Temp |
| 1K 0   |  |                    |       |     |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

TVD Detail 1:240 Scale

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





900

918'

0.18°

93.67° 917.99'

2.78'

77.99°F

77.99°F

77.99°F

77.99°F

77.99°F

1000

1010'

0.22°

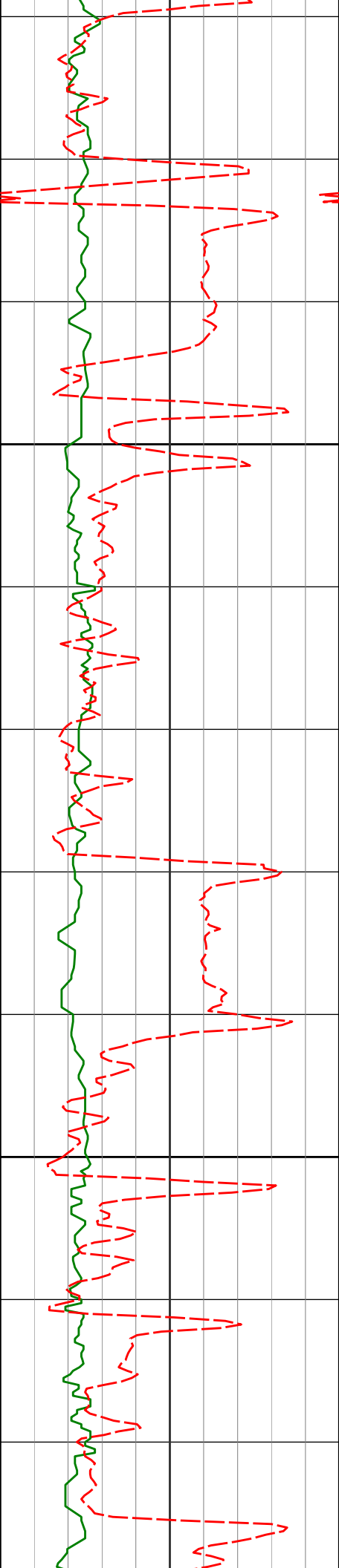
115.83° 1009.99'

2.87'

77.99°F

PGXC

ROPA



1100

1200

1102'

1211'

0.37°

0.35°

126.48°

150.05°

1101.99'

1210.99'

3.12'

3.62'

77.99°F

80.01°F

80.01°F

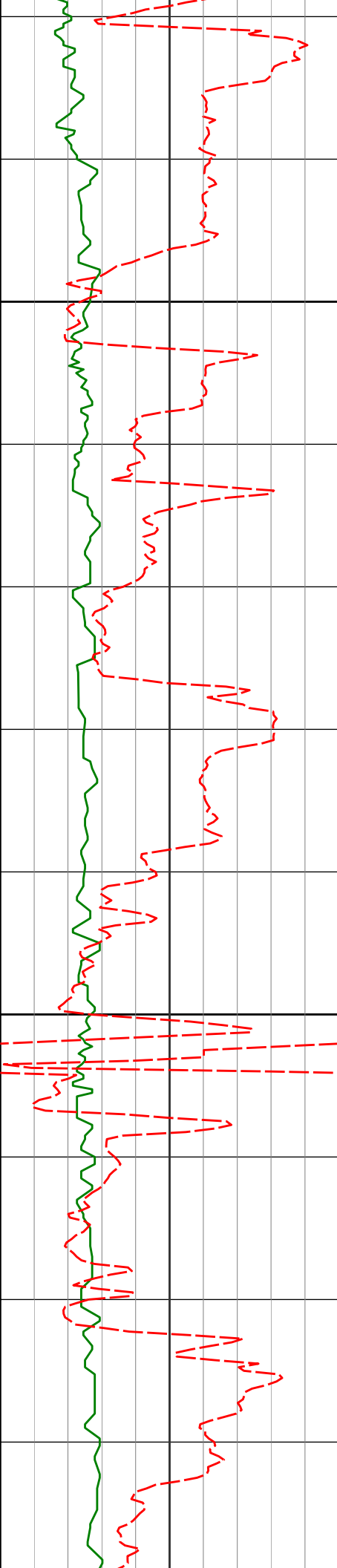
80.01°F

80.01°F

80.01°F

80.01°F





1300

1302'

0.42°

147.28°

1301.98'

4.14'

1400

1394'

0.50°

142.45°

1393.98'

4.74'

80.01°F

80.01°F

80.01°F

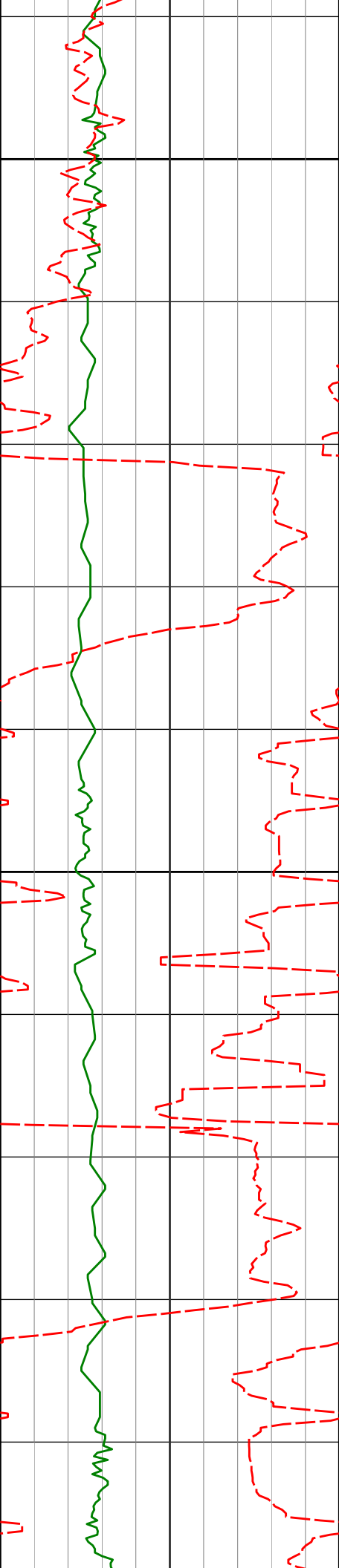
80.01°F

80.01°F

81.69°F

82.02°F

82.02°F



1500

1600

1486'

0.43°

146.82°

1485.98'

5.35'

82.02°F

1579'

1.45°

218.67°

1578.97'

6.56'

84.06°F

84.06°F

84.06°F

84.06°F

1670'

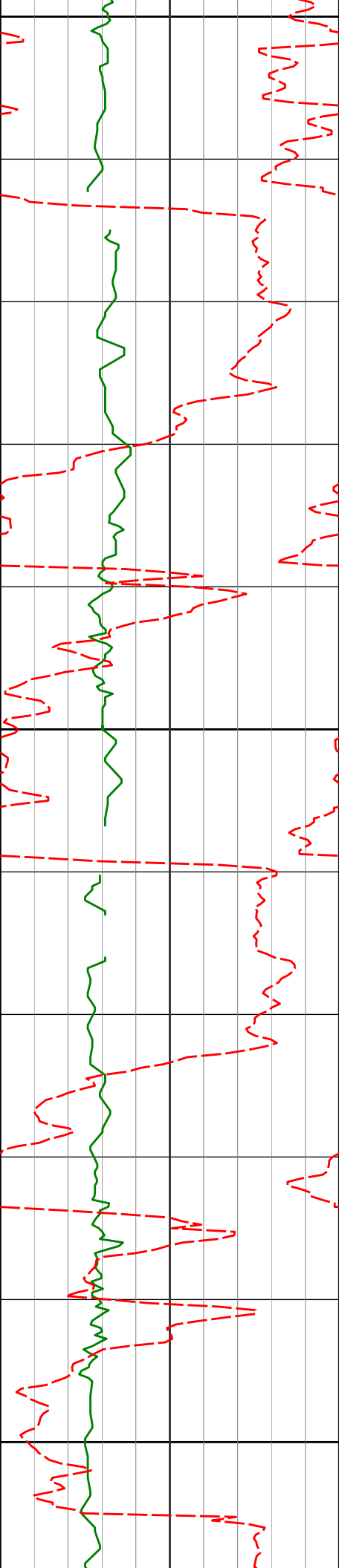
3.31°

206.24°

1669.89'

9.81'

84.58°F



1700

86.09°F

86.09°F

1763'

4.91°

206.85°

1762.64'

15.77'

86.51°F

1800

87.62°F

1854'

6.35°

204.77°

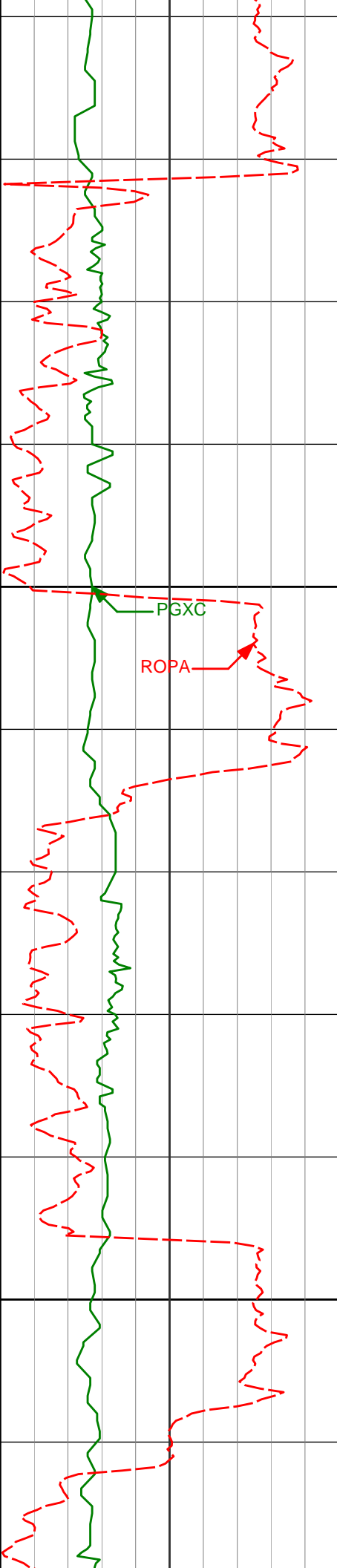
1853.20'

23.82'

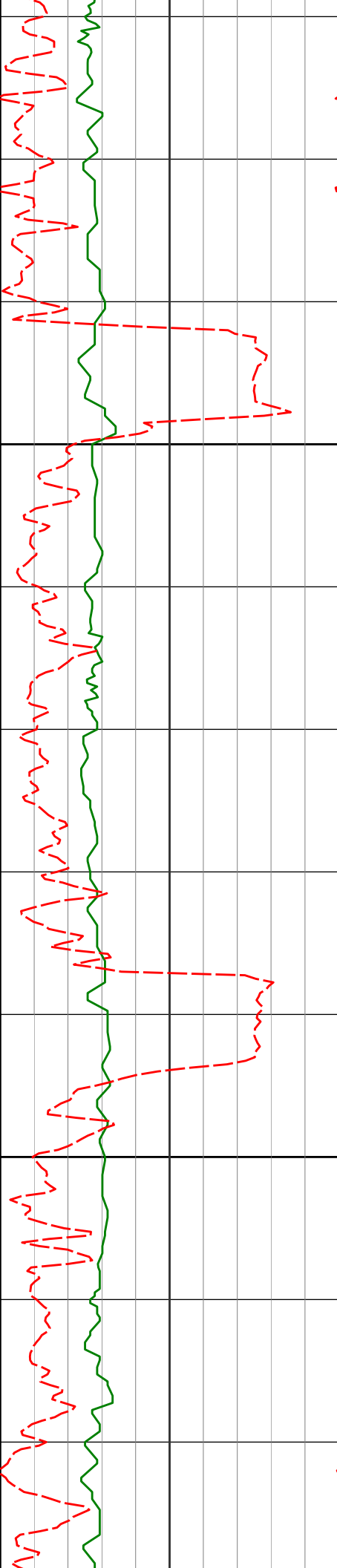
88.14°F

88.14°F

1900



|      |       |       |         |          |        |         |
|------|-------|-------|---------|----------|--------|---------|
| 2000 | 1946' | 7.89° | 198.85° | 1944.49' | 34.42' | 88.14°F |
|      |       |       |         |          |        | 88.41°F |
|      |       |       |         |          |        | 89.55°F |
|      |       |       |         |          |        |         |
| 2100 | 2038' | 8.79° | 201.73° | 2035.52' | 46.93' | 90.19°F |
|      |       |       |         |          |        | 90.19°F |
|      |       |       |         |          |        | 92.26°F |
|      |       |       |         |          |        |         |
|      | 2129' | 9.60° | 197.98° | 2125.35' | 60.61' | 92.26°F |



2200

2222'

9.89°

194.37°

2217.01'

75.72'

2300

2314'

9.36°

189.23°

2307.71'

90.76'

92.26°F

94.33°F

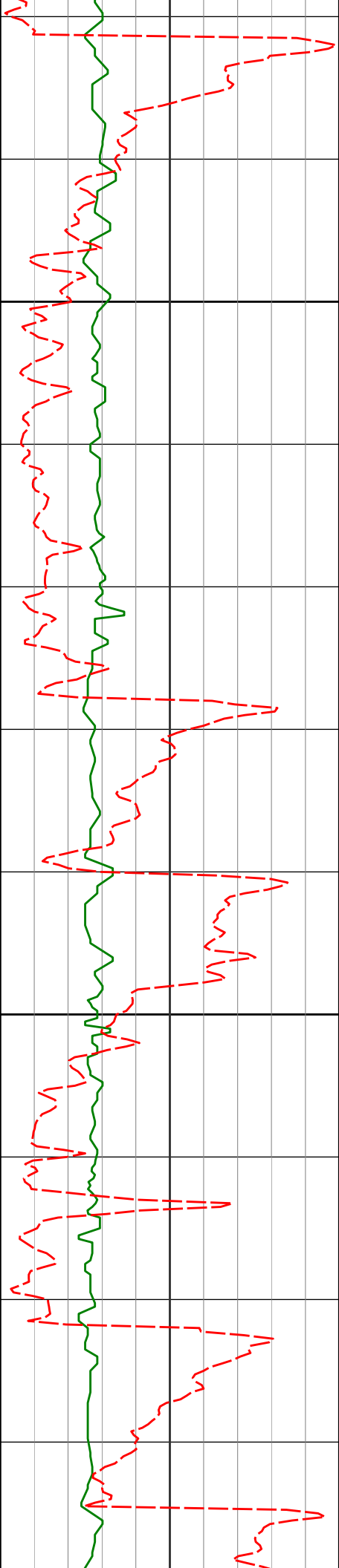
94.33°F

94.33°F

94.33°F

94.33°F

94.33°F



2400

2405'

9.37°

187.71° 2397.50'

105.41'

96.42°F

96.42°F

96.42°F

2498'

9.44°

191.88° 2489.25'

120.37'

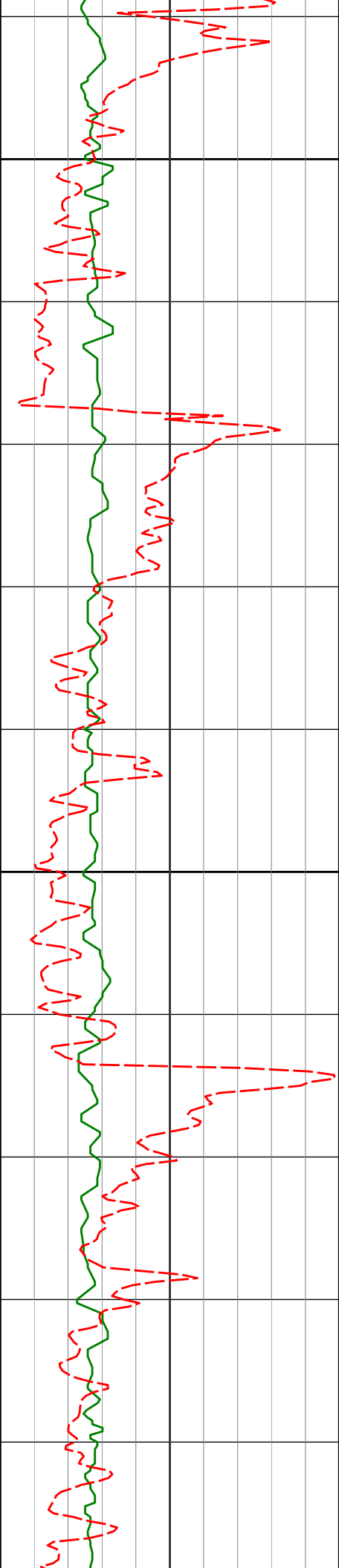
96.42°F

2500

96.42°F

96.42°F

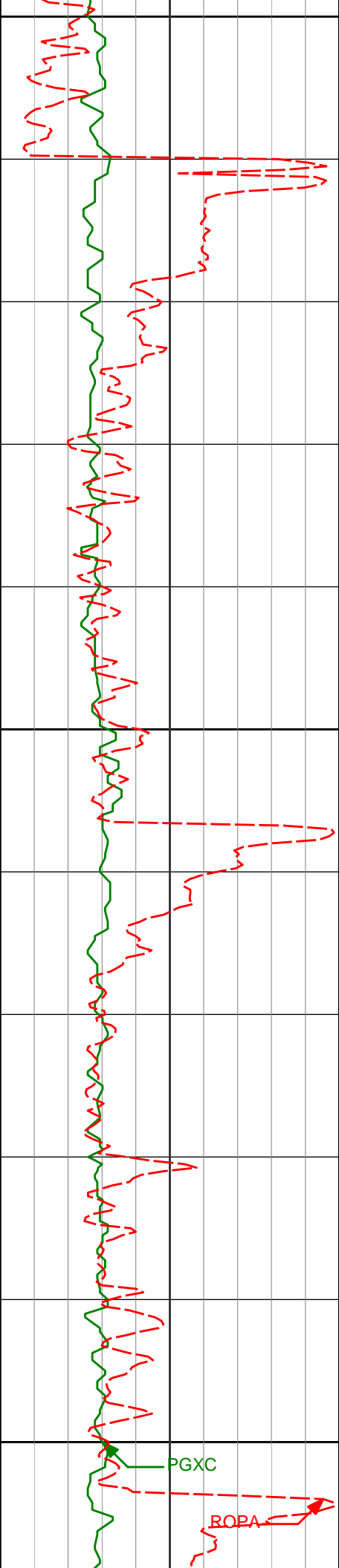
94.33°F



2600

2700

|       |       |         |          |         |          |
|-------|-------|---------|----------|---------|----------|
| 2590' | 9.05° | 198.25° | 2580.06' | 134.63' |          |
|       |       |         |          |         | 98.51°F  |
|       |       |         |          |         |          |
|       |       |         |          |         | 98.51°F  |
|       |       |         |          |         |          |
| 2683' | 9.39° | 201.20° | 2671.86' | 148.65' |          |
|       |       |         |          |         |          |
|       |       |         |          |         | 98.51°F  |
|       |       |         |          |         |          |
|       |       |         |          |         | 98.51°F  |
|       |       |         |          |         |          |
| 2778' | 9.65° | 199.71° | 2765.55' | 163.37' |          |
|       |       |         |          |         |          |
|       |       |         |          |         | 100.62°F |



2800

100.62°F

100.62°F

2872'

9.70°

198.44°

2858.21'

178.31'

102.02°F

2900

102.72°F

102.72°F

2967'

9.18°

197.28°

2951.92'

193.14'

103.67°F

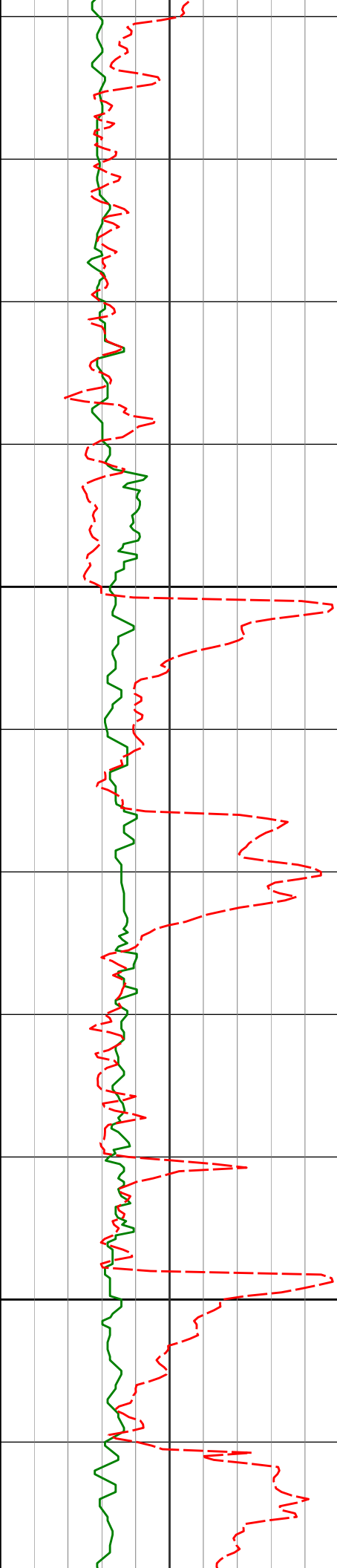
3000

104.83°F

PGXC

ROPA





3100

3200

3062'

3157'

3251'

8.41°

6.09°

5.93°

194.11°

183.42°

185.99°

3045.81'

3140.05'

3233.53'

207.11'

218.88'

228.68'

104.83°F

104.83°F

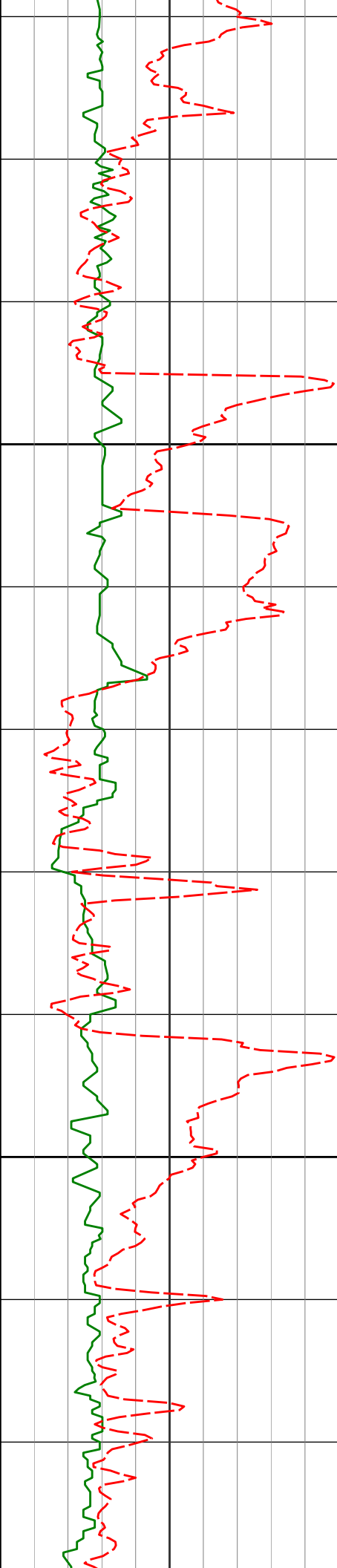
104.83°F

104.83°F

106.97°F

106.97°F

106.97°F



3300

3400

3346'

3441'

8.45°

9.18°

203.58°

202.52°

3327.79'

3421.66'

239.96'

253.36'

106.97°F

106.97°F

106.97°F

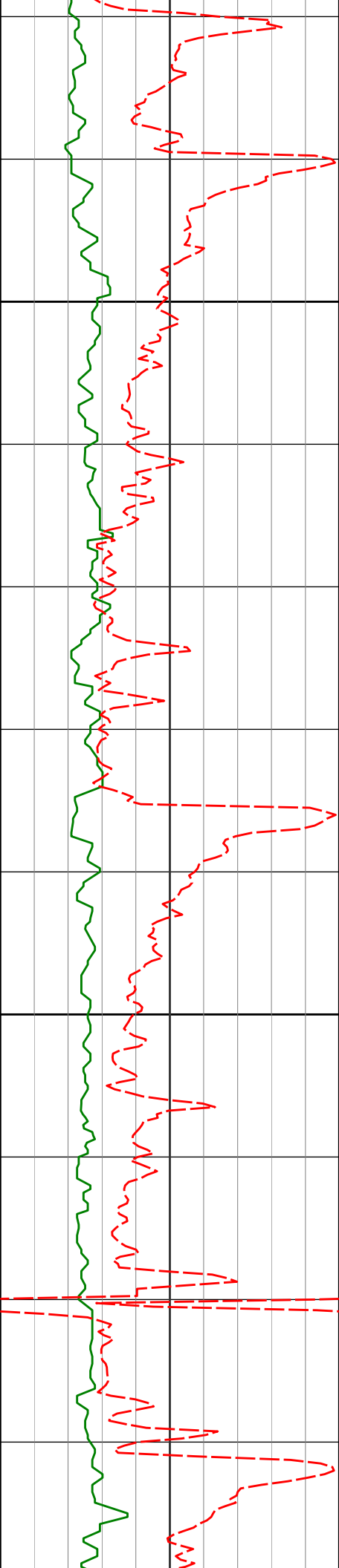
106.97°F

109.09°F

109.09°F

109.09°F

111.24°F



3500

3535'

9.65°

201.78°

3514.40'

267.60'

111.24°F

111.24°F

111.24°F

112.02°F

3600

3630'

9.91°

201.44°

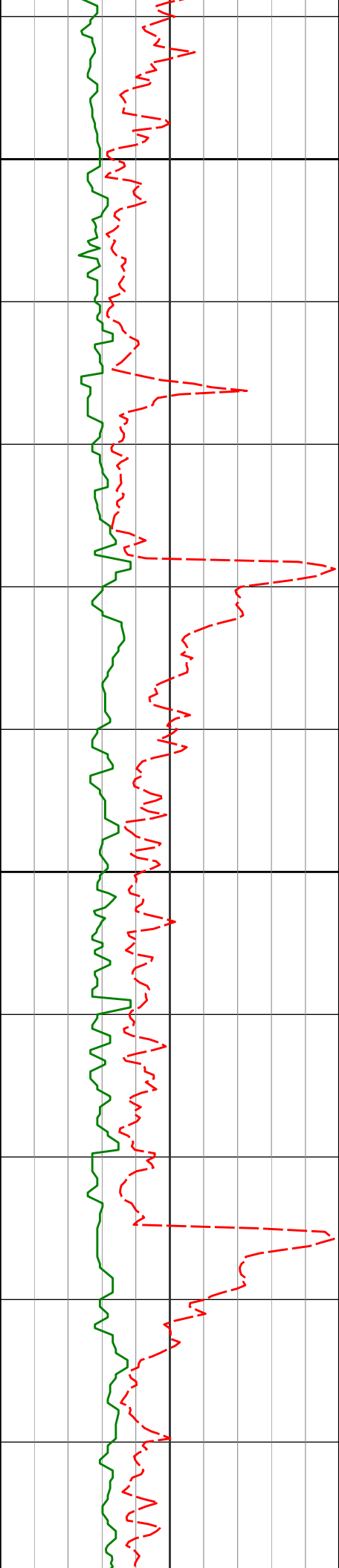
3608.02'

282.61'

113.40°F

113.40°F

113.40°F



3700

3724'

10.19°

201.25°

3700.58'

297.89'

115.56°F

115.56°F

115.56°F

115.56°F

3800

3819'

10.11°

201.76°

3794.09'

313.47'

115.56°F

115.56°F

117.73°F

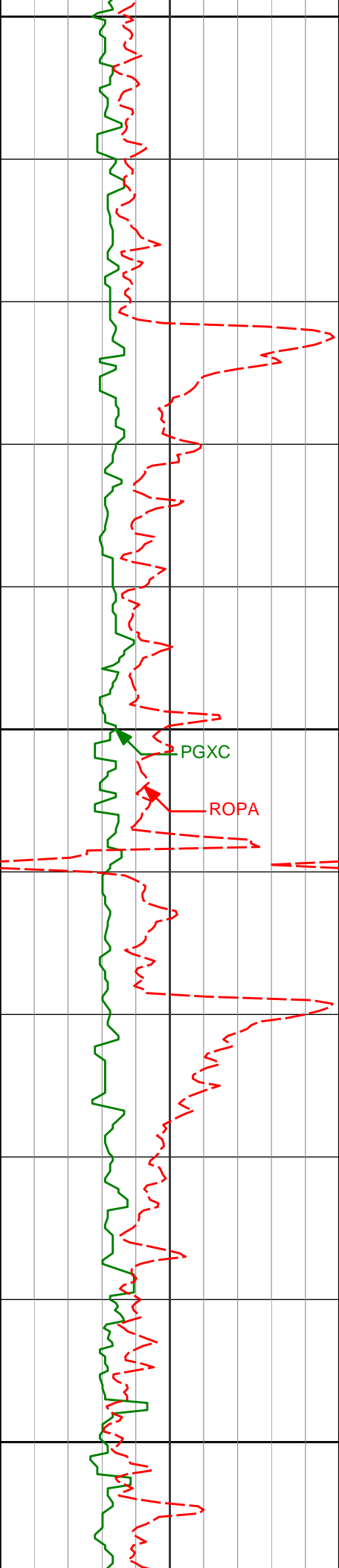
3913'

10.03°

200.52°

3886.64'

328.79'



3900

117.73°F

117.73°F

119.91°F

4008'

9.26°

199.14° 3980.30'

343.76'

119.91°F

4000

PGXC

ROPA

119.91°F

119.91°F

4103'

9.01°

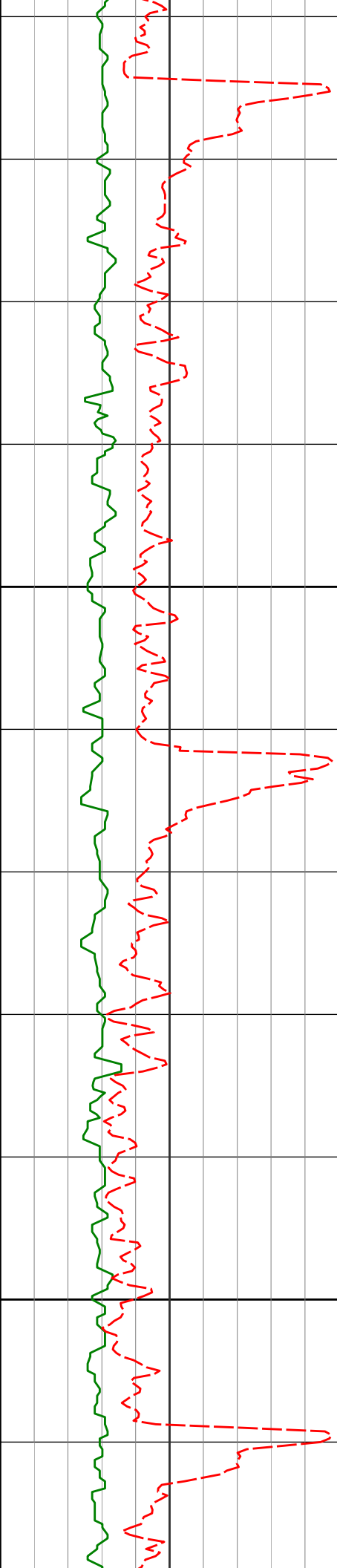
198.90° 4074.09'

358.02'

120.56°F

4100

122.11°F



4200

4300

4198'

8.35°

198.53°

4168.01'

371.60'

122.11°F

122.11°F

122.11°F

124.30°F

4292'

8.13°

198.42°

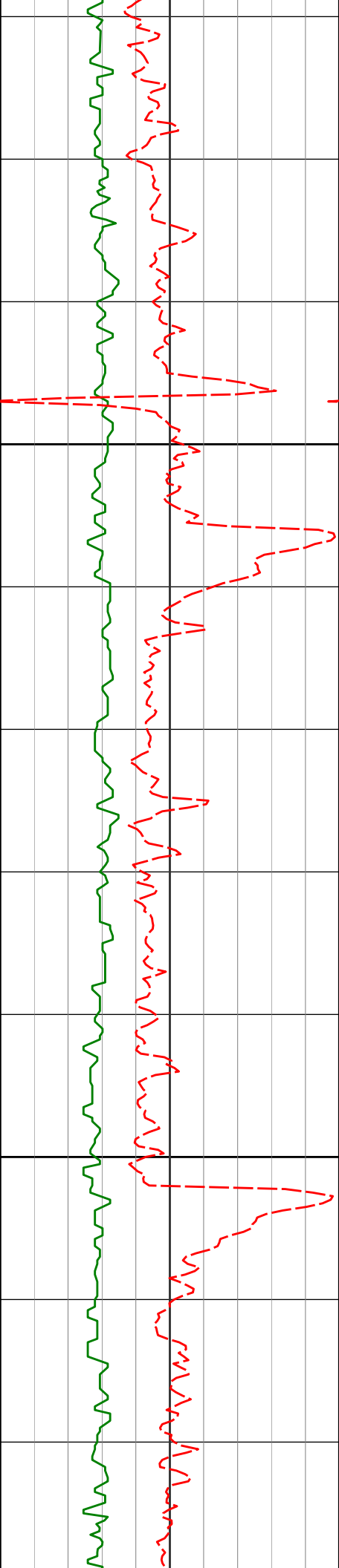
4261.04'

384.37'

124.30°F

124.30°F

124.30°F



4400

4500

4387'

7.59°

197.66°

4355.14'

396.73'

124.60°F

126.52°F

126.52°F

126.52°F

4482'

7.11°

200.66°

4449.36'

408.21'

128.73°F

128.73°F

128.73°F

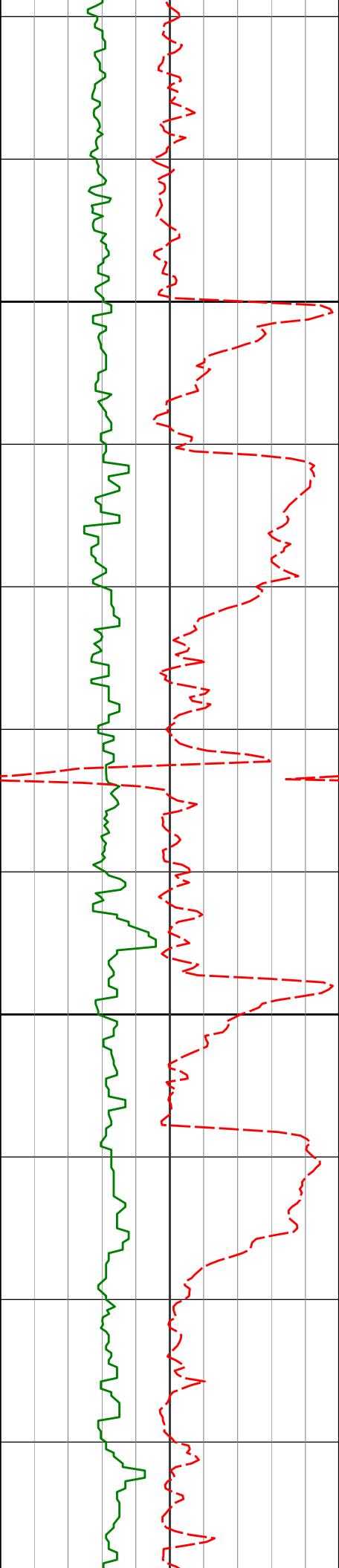
4577'

6.49°

202.96°

4543.69'

418.66'



4600

4671'

4.34°

190.79°

4637.27'

427.05'

4700

4766'

2.11°

158.18°

4732.12'

432.20'

128.73°F

128.73°F

130.01°F

130.78°F

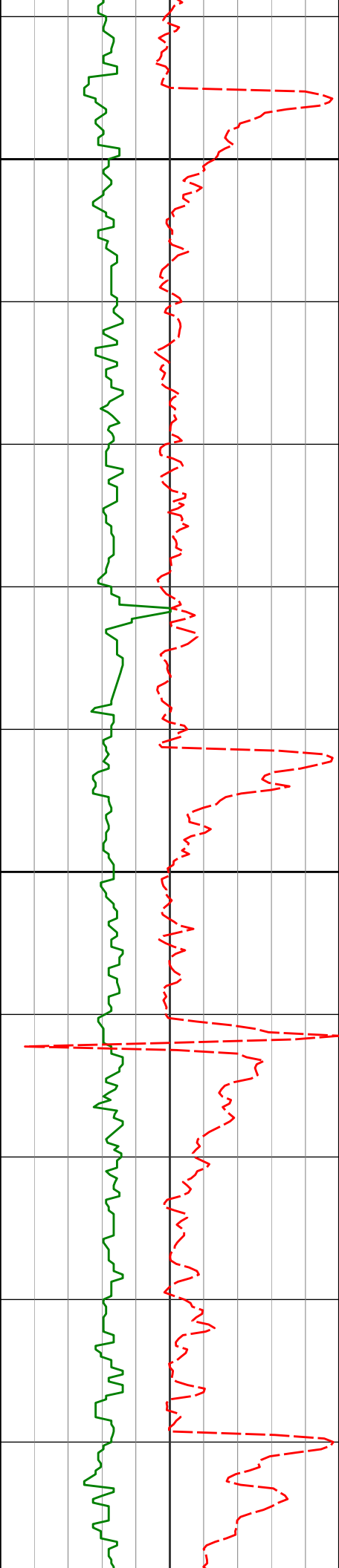
129.51°F

130.96°F

132.36°F

133.20°F





4800

133.20°F

4861'

1.84°

155.62°

4827.06'

435.22'

134.51°F

135.45°F

4900

135.45°F

4956'

1.95°

160.15°

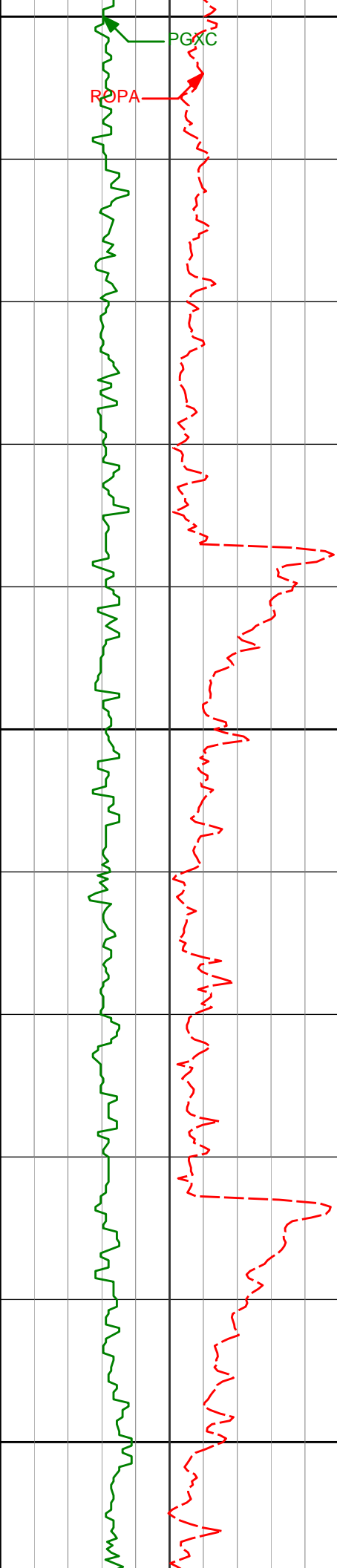
4922.01'

438.13'

137.70°F

137.70°F

137.70°F



5000

5051'

2.02°

166.67°

5016.96'

441.28'

139.76°F

139.96°F

139.96°F

5100

5145'

1.81°

158.36°

5110.90'

444.27'

140.18°F

142.25°F

142.25°F

142.68°F

5200

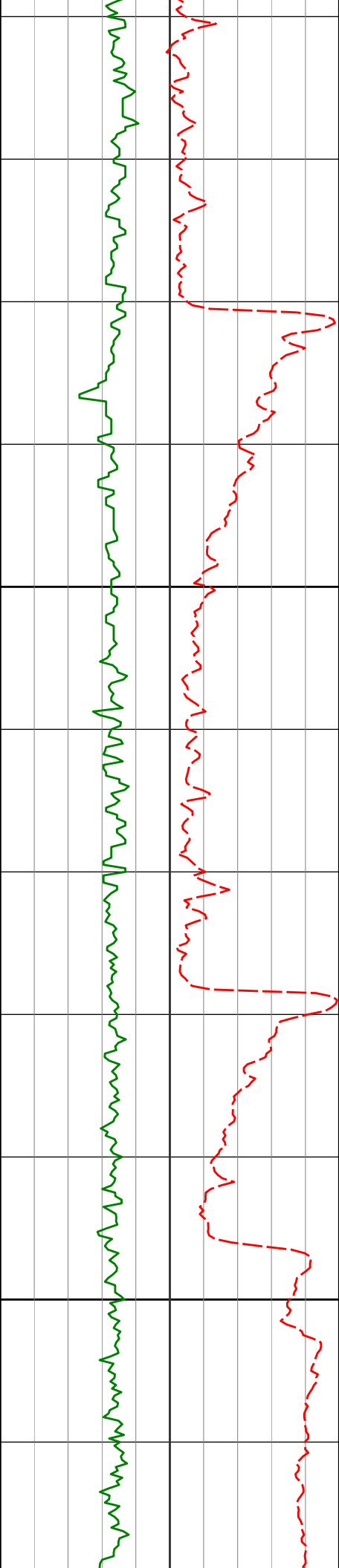
5240'

1.81°

155.88°

5205.86'

447.03'



5300

5335'

1.57°

157.73°

5300.81'

449.60'

143.57°F

142.96°F

144.54°F

144.54°F

144.58°F

146.03°F

5400

5430'

1.74°

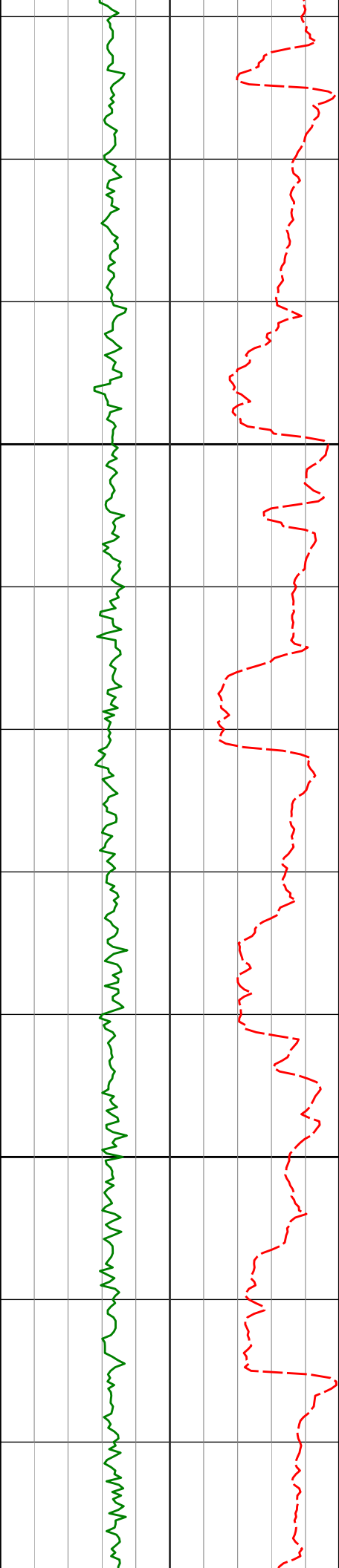
152.67°

5395.78'

452.08'

146.66°F

147.28°F



5477'

6.75°

179.42°

5442.63'

455.48'

147.89°F

5524'

13.08°

175.70°

5488.91'

463.55'

147.26°F

5500

5571'

17.53°

175.23°

5534.23'

475.92'

149.21°F

5619'

20.57°

175.19°

5579.60'

491.53'

150.71°F

5600

5666'

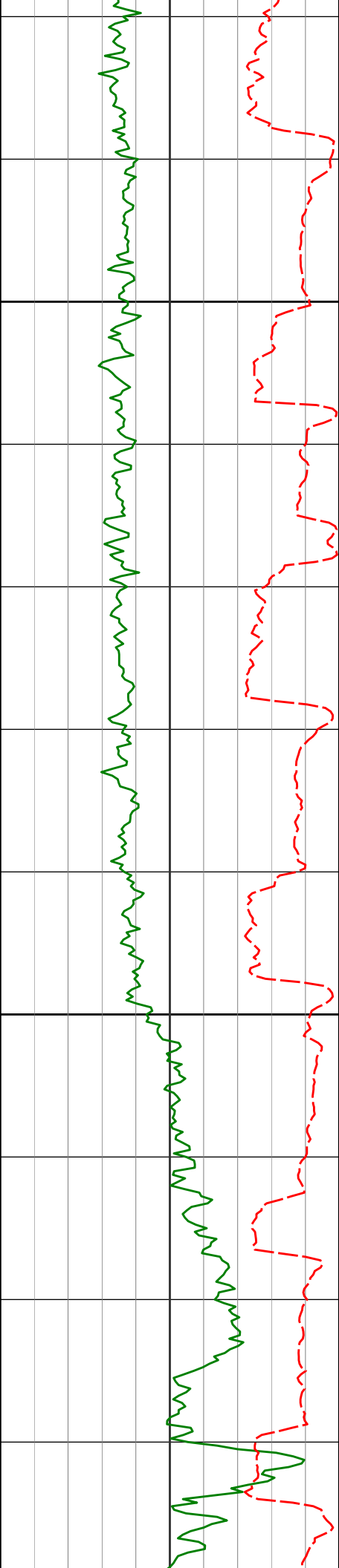
23.71°

175.31°

5623.13'

509.18'

152.39°F



5713'

27.43°

180.11°

5665.52'

529.43'

154.47°F

5700

5760'

29.90°

184.00°

5706.76'

551.94'

156.03°F

158.17°F

5808'

31.29°

180.53°

5748.08'

576.34'

159.40°F

5855'

35.38°

174.78°

5787.35'

602.12'

160.83°F

5800

162.39°F

5903'

38.21°

173.96°

5825.78'

630.72'

164.72°F

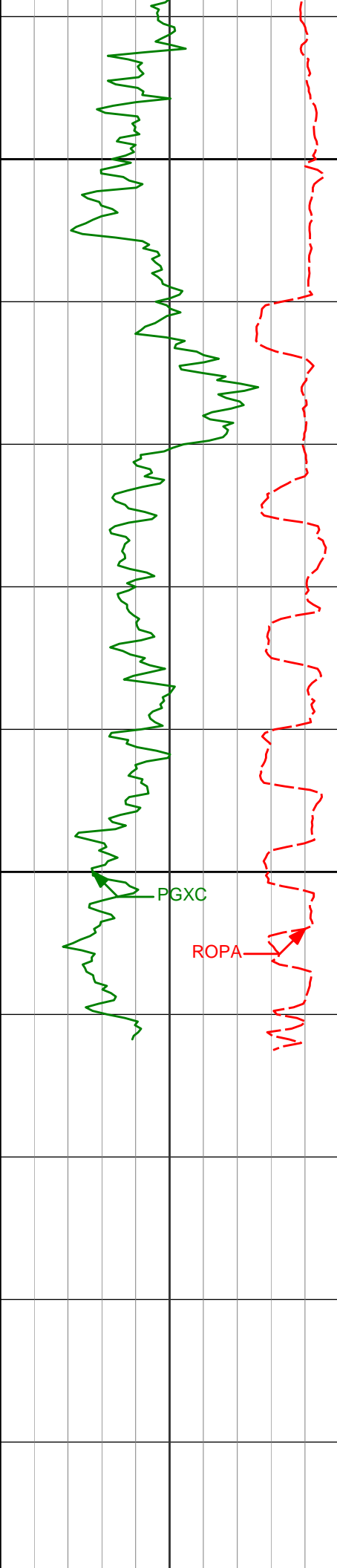
5950'

44.16°

173.27°

5861.14'

661.47'



TD curve @ 6428 MD

|      |       |        |         |          |          |
|------|-------|--------|---------|----------|----------|
|      |       |        |         |          | 165.54°F |
| 5900 | 5998' | 50.36° | 174.82° | 5893.70' | 696.51'  |
|      |       |        |         |          | 165.65°F |
|      | 6045' | 55.45° | 177.28° | 5922.04' | 733.90'  |
|      |       |        |         |          | 167.31°F |
|      | 6093' | 62.20° | 178.26° | 5946.87' | 774.91'  |
|      |       |        |         |          |          |
|      | 6140' | 66.34° | 177.67° | 5967.27' | 817.21'  |
|      |       |        |         |          | 168.02°F |
|      | 6187' | 69.85° | 177.74° | 5984.80' | 860.78'  |
| 6000 | 6234' | 73.34° | 178.29° | 5999.64' | 905.34'  |
|      |       |        |         |          | 168.83°F |
|      | 6282' | 77.48° | 179.39° | 6011.73' | 951.77'  |
|      | 6329' | 83.43° | 180.26° | 6019.52' | 998.10'  |

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

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble  
Neal LC35-738  
Wildcat  
Weld Colorado  
USA  
CA-XX-0902239555  
Tied in @ Surface  
First two surveys from 3rd party.  
  
Final survey projected to bit.

| Measured<br>Depth<br>(feet) | Inclination<br>(degrees) | Direction<br>(degrees) | Vertical<br>Depth<br>(feet) | Latitude<br>(feet) | Departure<br>(feet) | Vertical<br>Section<br>(feet) | Dogleg<br>(deg/100ft) |
|-----------------------------|--------------------------|------------------------|-----------------------------|--------------------|---------------------|-------------------------------|-----------------------|
| 0.00                        | 0.00                     | 0.00                   | 0.00                        | 0.00 N             | 0.00 E              | 0.00                          | TIE-IN                |
| 281.00                      | 0.40                     | 163.22                 | 281.00                      | 0.94 S             | 0.28 E              | 0.94                          | 0.14                  |
| 528.00                      | 0.40                     | 240.12                 | 527.99                      | 2.19 S             | 0.22 W              | 2.19                          | 0.20                  |
| 734.00                      | 0.18                     | 109.76                 | 733.99                      | 2.66 S             | 0.54 W              | 2.66                          | 0.26                  |
| 918.00                      | 0.18                     | 93.67                  | 917.99                      | 2.78 S             | 0.02 E              | 2.78                          | 0.03                  |
| 1010.00                     | 0.22                     | 115.83                 | 1009.99                     | 2.87 S             | 0.33 E              | 2.87                          | 0.10                  |
| 1102.00                     | 0.37                     | 126.48                 | 1101.99                     | 3.12 S             | 0.73 E              | 3.12                          | 0.17                  |
| 1211.00                     | 0.35                     | 150.05                 | 1210.99                     | 3.62 S             | 1.18 E              | 3.62                          | 0.14                  |
| 1302.00                     | 0.42                     | 147.28                 | 1301.98                     | 4.14 S             | 1.50 E              | 4.14                          | 0.08                  |
| 1394.00                     | 0.50                     | 142.45                 | 1393.98                     | 4.74 S             | 1.93 E              | 4.74                          | 0.09                  |
| 1486.00                     | 0.43                     | 146.82                 | 1485.98                     | 5.35 S             | 2.36 E              | 5.35                          | 0.08                  |
| 1579.00                     | 1.45                     | 218.67                 | 1578.97                     | 6.56 S             | 1.82 E              | 6.56                          | 1.48                  |
| 1670.00                     | 3.31                     | 206.24                 | 1669.89                     | 9.81 S             | 0.06 W              | 9.81                          | 2.11                  |
| 1763.00                     | 4.91                     | 206.85                 | 1762.64                     | 15.77 S            | 3.05 W              | 15.77                         | 1.73                  |
| 1854.00                     | 6.35                     | 204.77                 | 1853.20                     | 23.82 S            | 6.92 W              | 23.82                         | 1.60                  |
| 1946.00                     | 7.89                     | 198.85                 | 1944.49                     | 34.42 S            | 11.09 W             | 34.42                         | 1.85                  |
| 2038.00                     | 8.79                     | 201.73                 | 2035.52                     | 46.93 S            | 15.74 W             | 46.93                         | 1.08                  |
| 2129.00                     | 9.60                     | 197.98                 | 2125.35                     | 60.60 S            | 20.65 W             | 60.61                         | 1.10                  |
| 2222.00                     | 9.89                     | 194.37                 | 2217.01                     | 75.71 S            | 25.03 W             | 75.72                         | 0.73                  |
| 2314.00                     | 9.36                     | 189.23                 | 2307.71                     | 90.75 S            | 28.19 W             | 90.76                         | 1.10                  |
| 2405.00                     | 9.37                     | 187.71                 | 2397.50                     | 105.39 S           | 30.37 W             | 105.41                        | 0.27                  |
| 2498.00                     | 9.44                     | 191.88                 | 2489.25                     | 120.36 S           | 32.95 W             | 120.37                        | 0.74                  |
| 2590.00                     | 9.05                     | 198.25                 | 2580.06                     | 134.61 S           | 36.77 W             | 134.63                        | 1.19                  |
| 2683.00                     | 9.39                     | 201.20                 | 2671.86                     | 148.63 S           | 41.81 W             | 148.65                        | 0.62                  |
| 2778.00                     | 9.65                     | 199.71                 | 2765.55                     | 163.36 S           | 47.30 W             | 163.37                        | 0.38                  |
| 2872.00                     | 9.70                     | 198.44                 | 2858.21                     | 178.29 S           | 52.46 W             | 178.31                        | 0.23                  |
| 2967.00                     | 9.18                     | 197.28                 | 2951.92                     | 193.12 S           | 57.24 W             | 193.14                        | 0.58                  |
| 3062.00                     | 8.41                     | 194.11                 | 3045.81                     | 207.09 S           | 61.19 W             | 207.11                        | 0.96                  |
| 3157.00                     | 6.09                     | 183.42                 | 3140.05                     | 218.86 S           | 63.18 W             | 218.88                        | 2.81                  |
| 3251.00                     | 5.93                     | 185.99                 | 3233.53                     | 228.66 S           | 63.99 W             | 228.68                        | 0.33                  |
| 3346.00                     | 8.45                     | 203.58                 | 3327.79                     | 239.94 S           | 67.29 W             | 239.96                        | 3.50                  |
| 3441.00                     | 9.18                     | 202.52                 | 3421.66                     | 253.33 S           | 72.99 W             | 253.36                        | 0.78                  |
| 3535.00                     | 9.65                     | 201.78                 | 3514.40                     | 267.57 S           | 78.78 W             | 267.60                        | 0.51                  |
| 3630.00                     | 9.91                     | 201.44                 | 3608.02                     | 282.58 S           | 84.72 W             | 282.61                        | 0.29                  |
| 3724.00                     | 10.19                    | 201.25                 | 3700.58                     | 297.86 S           | 90.69 W             | 297.89                        | 0.30                  |
| 3819.00                     | 10.11                    | 201.76                 | 3794.09                     | 313.43 S           | 96.83 W             | 313.47                        | 0.13                  |
| 3913.00                     | 10.03                    | 200.52                 | 3886.64                     | 328.76 S           | 102.76 W            | 328.79                        | 0.25                  |
| 4008.00                     | 9.26                     | 199.14                 | 3980.30                     | 343.72 S           | 108.16 W            | 343.76                        | 0.84                  |
| 4103.00                     | 9.01                     | 198.90                 | 4074.09                     | 357.98 S           | 113.08 W            | 358.02                        | 0.28                  |
| 4198.00                     | 8.35                     | 198.53                 | 4168.01                     | 371.55 S           | 117.68 W            | 371.60                        | 0.70                  |
| 4292.00                     | 8.13                     | 198.42                 | 4261.04                     | 384.33 S           | 121.95 W            | 384.37                        | 0.23                  |

|         |       |        |         |           |          |         |       |
|---------|-------|--------|---------|-----------|----------|---------|-------|
| 4387.00 | 7.59  | 197.66 | 4355.14 | 396.69 S  | 125.97 W | 396.73  | 0.58  |
| 4482.00 | 7.11  | 200.66 | 4449.36 | 408.17 S  | 129.95 W | 408.21  | 0.65  |
| 4577.00 | 6.49  | 202.96 | 4543.69 | 418.62 S  | 134.12 W | 418.66  | 0.72  |
| 4671.00 | 4.34  | 190.79 | 4637.27 | 427.00 S  | 136.86 W | 427.05  | 2.58  |
| 4766.00 | 2.11  | 158.18 | 4732.12 | 432.15 S  | 136.88 W | 432.20  | 2.95  |
| 4861.00 | 1.84  | 155.62 | 4827.06 | 435.17 S  | 135.60 W | 435.22  | 0.30  |
| 4956.00 | 1.95  | 160.15 | 4922.01 | 438.08 S  | 134.42 W | 438.13  | 0.20  |
| 5051.00 | 2.02  | 166.67 | 5016.96 | 441.23 S  | 133.49 W | 441.28  | 0.25  |
| 5145.00 | 1.81  | 158.36 | 5110.90 | 444.22 S  | 132.56 W | 444.27  | 0.37  |
| 5240.00 | 1.81  | 155.88 | 5205.86 | 446.98 S  | 131.39 W | 447.03  | 0.08  |
| 5335.00 | 1.57  | 157.73 | 5300.81 | 449.55 S  | 130.29 W | 449.60  | 0.26  |
| 5430.00 | 1.74  | 152.67 | 5395.78 | 452.04 S  | 129.13 W | 452.08  | 0.23  |
| 5477.00 | 6.75  | 179.42 | 5442.63 | 455.43 S  | 128.78 W | 455.48  | 11.19 |
| 5524.00 | 13.08 | 175.70 | 5488.91 | 463.51 S  | 128.35 W | 463.55  | 13.53 |
| 5571.00 | 17.53 | 175.23 | 5534.23 | 475.87 S  | 127.36 W | 475.92  | 9.48  |
| 5619.00 | 20.57 | 175.19 | 5579.60 | 491.48 S  | 126.06 W | 491.53  | 6.34  |
| 5666.00 | 23.71 | 175.31 | 5623.13 | 509.13 S  | 124.59 W | 509.18  | 6.67  |
| 5713.00 | 27.43 | 180.11 | 5665.52 | 529.39 S  | 123.84 W | 529.43  | 9.06  |
| 5760.00 | 29.90 | 184.00 | 5706.76 | 551.90 S  | 124.68 W | 551.94  | 6.58  |
| 5808.00 | 31.29 | 180.53 | 5748.08 | 576.30 S  | 125.63 W | 576.34  | 4.68  |
| 5855.00 | 35.38 | 174.78 | 5787.35 | 602.07 S  | 124.50 W | 602.12  | 11.00 |
| 5903.00 | 38.21 | 173.96 | 5825.78 | 630.68 S  | 121.67 W | 630.72  | 5.98  |
| 5950.00 | 44.16 | 173.27 | 5861.14 | 661.43 S  | 118.22 W | 661.47  | 12.70 |
| 5998.00 | 50.36 | 174.82 | 5893.70 | 696.47 S  | 114.59 W | 696.51  | 13.13 |
| 6045.00 | 55.45 | 177.28 | 5922.04 | 733.86 S  | 112.04 W | 733.90  | 11.59 |
| 6093.00 | 62.20 | 178.26 | 5946.87 | 774.87 S  | 110.45 W | 774.91  | 14.18 |
| 6140.00 | 66.34 | 177.67 | 5967.27 | 817.18 S  | 108.95 W | 817.21  | 8.88  |
| 6187.00 | 69.85 | 177.74 | 5984.80 | 860.74 S  | 107.20 W | 860.78  | 7.46  |
| 6234.00 | 73.34 | 178.29 | 5999.64 | 905.30 S  | 105.65 W | 905.34  | 7.51  |
| 6282.00 | 77.48 | 179.39 | 6011.73 | 951.73 S  | 104.72 W | 951.77  | 8.92  |
| 6329.00 | 83.43 | 180.26 | 6019.52 | 998.06 S  | 104.58 W | 998.10  | 12.79 |
| 6371.00 | 87.17 | 180.44 | 6022.96 | 1039.91 S | 104.84 W | 1039.95 | 8.90  |
| 6428.00 | 88.97 | 180.44 | 6024.89 | 1096.88 S | 105.28 W | 1096.91 | 3.17  |

**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 180.02 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.02 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6428.00 FEET  
IS 1101.92 FEET ALONG 185.48 DEGREES (GRID)**