



WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	29-Mar-15	30-Mar-15	31-Mar-15		
Rig Bit Number	0100	0200	0300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.750	4.750	4.750		
Log Start Depth (MD, ft)	937.00	7,087.00	9,162.00		
Log End Depth (MD, ft)	7,087.00	9,162.00	11,705.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	28-Mar-15 04:50	30-Mar-15 03:50	30-Mar-15 22:15		
Drill/Wipe End Date and Time	29-Mar-15 03:00	30-Mar-15 14:45	31-Mar-15 11:15		
Min Inc (deg) @ Depth (MD, ft)	1.11 @ 1,208.00	86.55 @ 7,156.00	89.69 @ 9,615.00		
Max Inc (deg) @ Depth (MD, ft)	83.11 @ 7,023.00	92.22 @ 8,094.00	93.67 @ 9,234.00		
Bit TFA(in2) / Bit Type	1.21 / PDC	0.98 / PDC	0.98 / PDC		
Flow Rate (gpm)	624.81	320.00	318.03		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Native/Spud Mud	Polymer	Polymer		
Density (ppg) / Viscosity (spqt)	9.00 / 41.00	9.40 / 30.00	9.65 / 33.00		
Filtrate CL (ppm)	2,800.00	3,000.00	3,000.00		
pH / Fluid Loss (mptm)	9.60 / 0	8.60 / 0	9.20 / 6		
PV (cP) / YP (lbf2)	14 / 13.00	5 / 5.00	8 / 9.00		
% Solids / % Sand	11.7 / .25	4.2 / .20	6.70 / 0.25		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	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		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Max Tool Temp (in F) / S	175.01 / PDM	200.00 / PDM	200.73 / PDM		

Max Tool Temp (degF) / Source	175.21 / PCM	202.60 / PCM	228.74 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 175.21	N/A @ 202.60	N/A @ 228.74		
Lead MWD Engineer	Cody Wurdeman	Cody Wurdeman	Cody Wurdeman		
Customer Representative	Clifford Kester	Clifford Kester	JW Irwing		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11404272	12310753	12310753		
Insert Serial Number	11680773	11680801	11680773		
Date and Time Initialized	27-Mar-15 17:56	29-Mar-15 14:44	30-Mar-15 16:38		
Date and Time Read	29-Mar-15 07:00	30-Mar-15 19:17	31-Mar-15 18:15		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	64.00	67.00	67.00		
Software Version	6.21	6.33	6.21		
Sub Serial Number	11404272	12310753	12310753		
Sonde Serial Number	10919505	11297623	10919505		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	309.20	296.05	7.19		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	57.48	60.40	60.40		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404272	12310753	12310753		
Insert/Sonde Serial Number	11293388	11579843	11293388		

## REMARKS

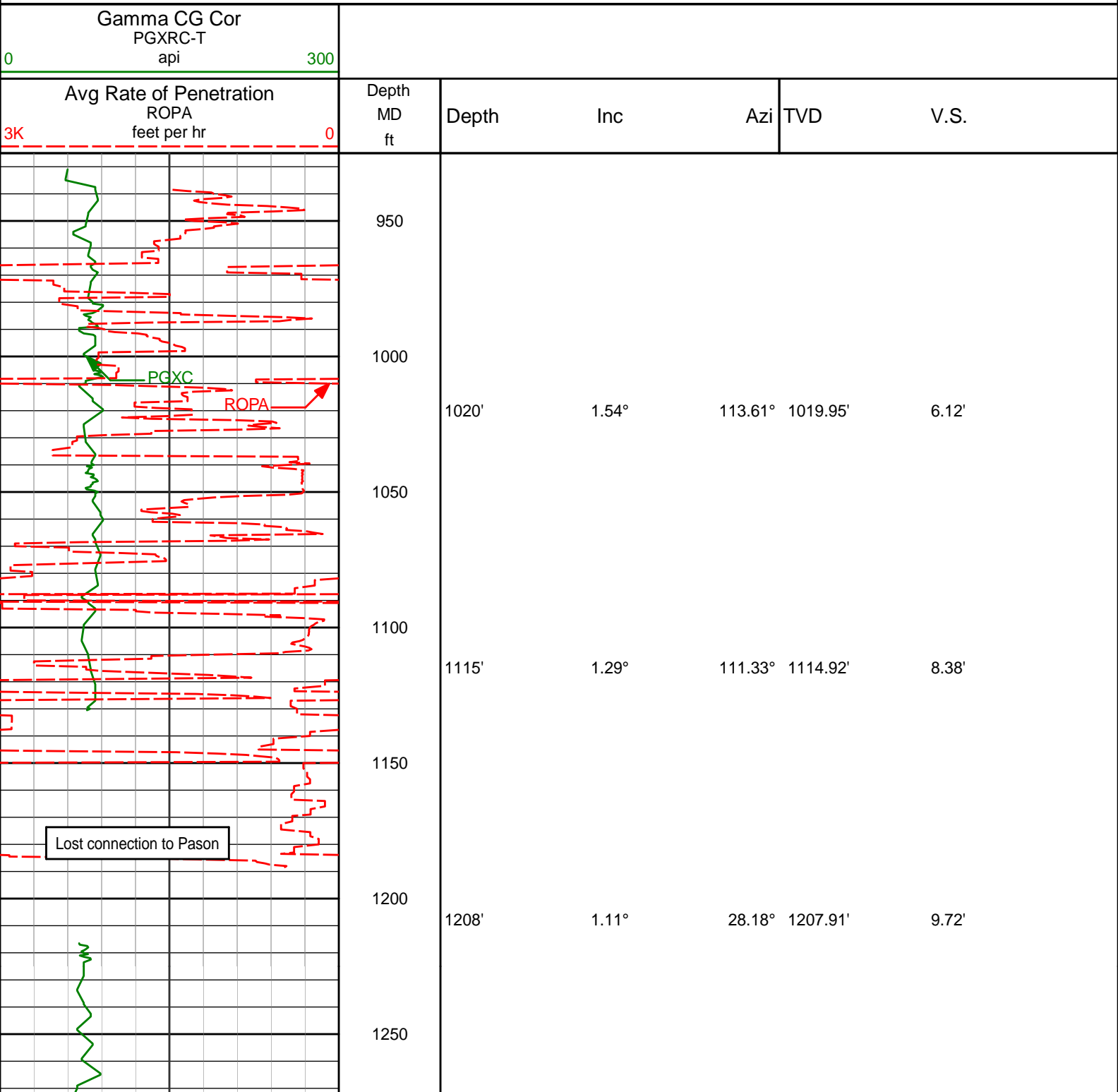
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:  
Hole Size: 8.75"  
Mud Density: 9.9-11.0
5. The following smoothing parameters have been applied to the data:  
Interval: 0.5 ft  
Coercion Distance: 1.2 ft (ROPA)  
Interval: 0.5 ft  
Coercion Distance: 0.6 ft (Gamma Ray)

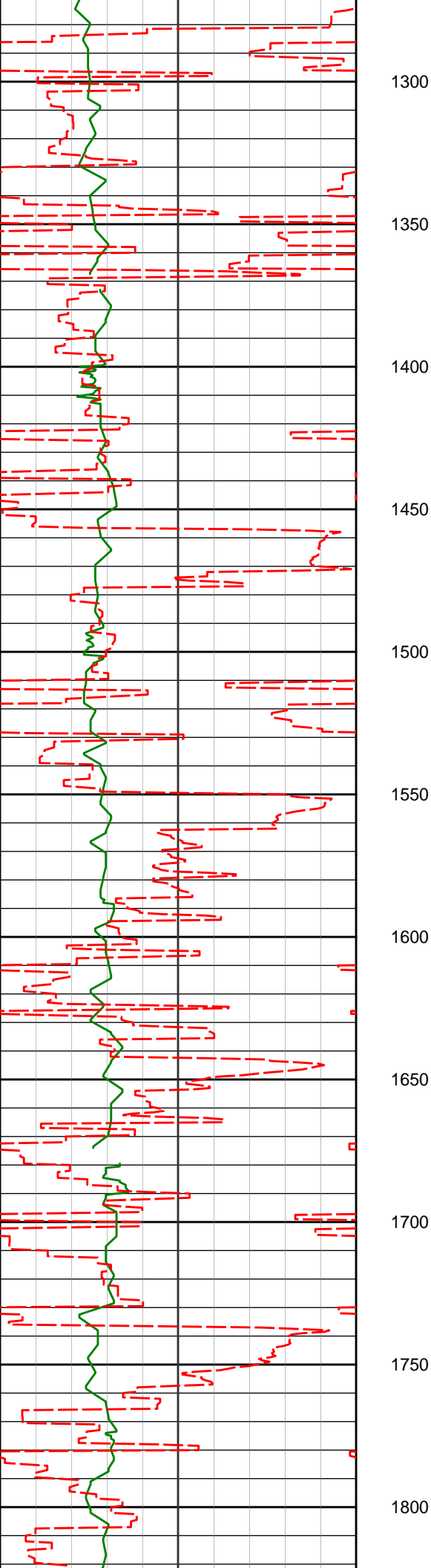
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# MD Detail 1:600 Scale



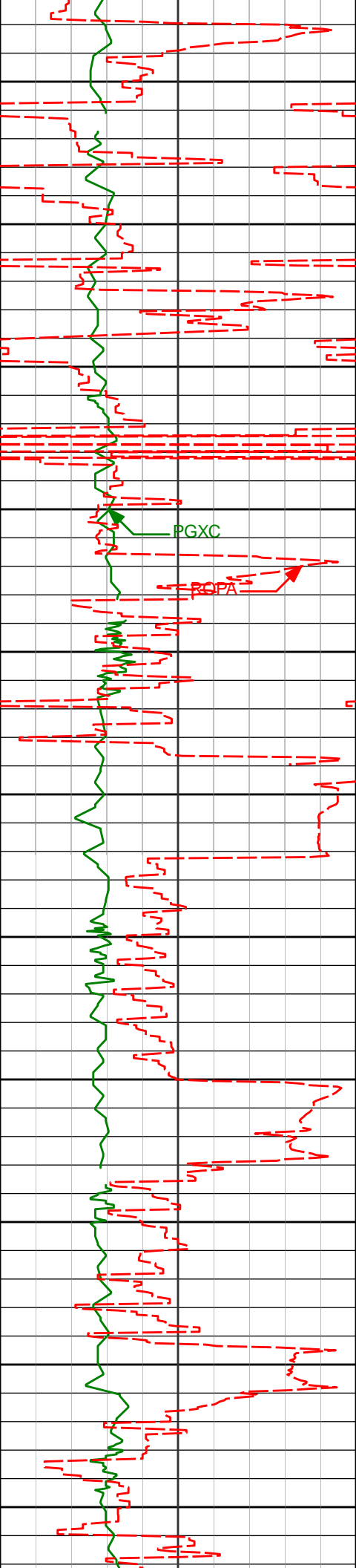


1393'	1.39°	48.43°	1392.86'	11.82'
-------	-------	--------	----------	--------

1486'	2.07°	356.01°	1485.82'	12.22'
-------	-------	---------	----------	--------

1579'	2.06°	351.51°	1578.76'	11.43'
-------	-------	---------	----------	--------

1764'	1.52°	335.22°	1763.67'	9.20'
-------	-------	---------	----------	-------



1850

1900

1950

2000

2050

2100

2150

2200

2250

2300

2350

1949'

1.60°

319.01° 1948.61'

5.95'

2136'

2.69°

227.13° 2135.51'

1.20'

2227'

5.98°

213.06° 2226.24'

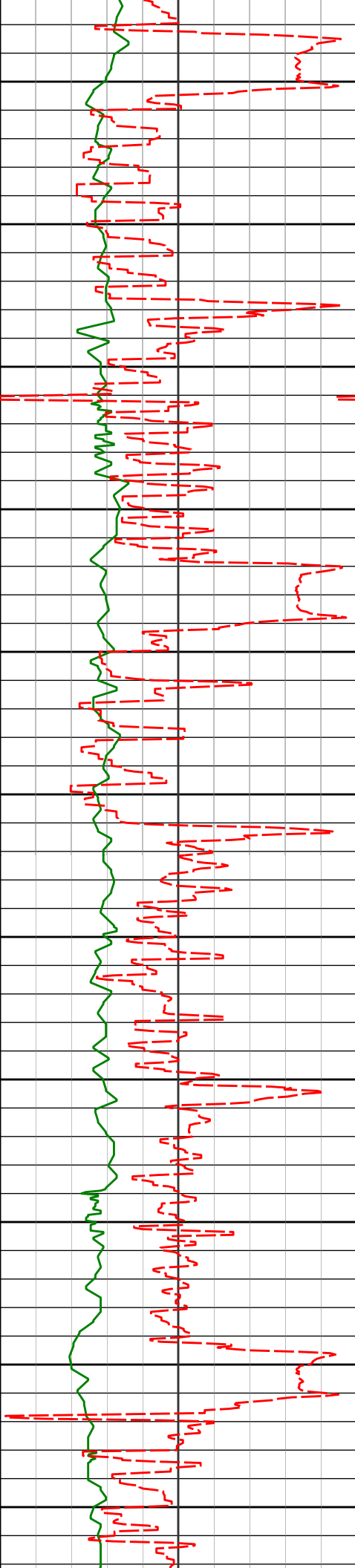
-2.21'

2320'

8.33°

201.11° 2318.52'

-5.88'



2400

2412'

10.37°

193.89° 2409.29'

-8.37'

2450

2500

2504'

10.39°

191.86° 2499.79'

-9.91'

2550

2600

2596'

11.61°

200.80° 2590.10'

-12.67'

2650

2700

2689'

11.06°

198.92° 2681.29'

-16.58'

2750

2800

2782'

10.72°

196.65° 2772.62'

-19.72'

2850

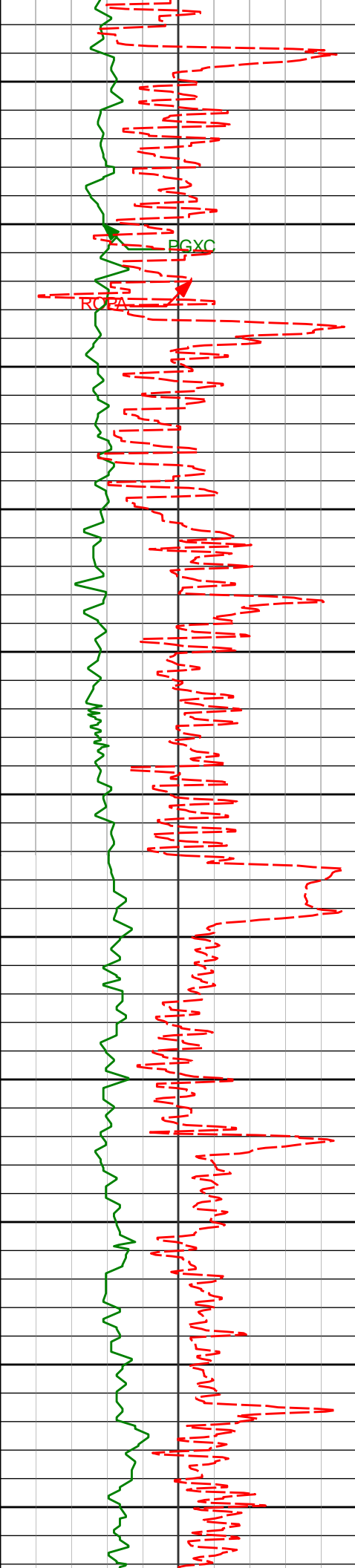
2875'

11.65°

206.87° 2863.86'

-24.20'

2900



2950

3000

3050

3100

3150

3200

3250

3300

3350

3400

3450

3065'

11.25°

204.30° 3050.08'

-35.91'

3160'

10.92°

199.10° 3143.31'

-40.39'

3255'

10.52°

210.02° 3236.66'

-45.51'

3350'

9.19°

207.59° 3330.25'

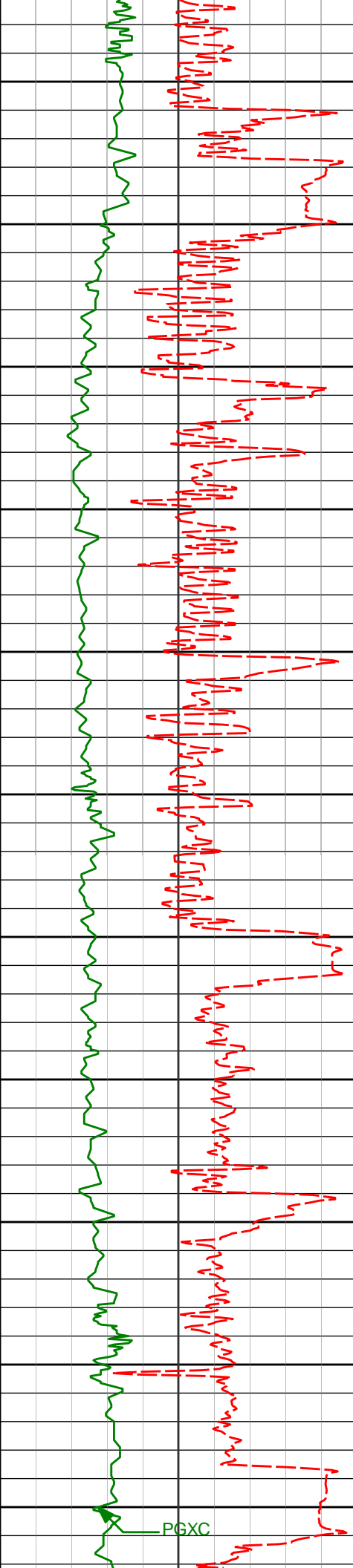
-51.44'

3446'

7.22°

205.80° 3425.27'

-55.96'



3500

3541'

8.49°

200.24°

3519.38'

-59.38'

3550

3600

3636'

10.40°

199.94°

3613.08'

-62.77'

3650

3700

3730'

11.16°

200.21°

3705.42'

-66.59'

3750

3800

3825'

12.40°

204.53°

3798.42'

-71.59'

3850

3900

3920'

12.97°

204.41°

3891.10'

-77.67'

3950

4000

PGXC

4015'

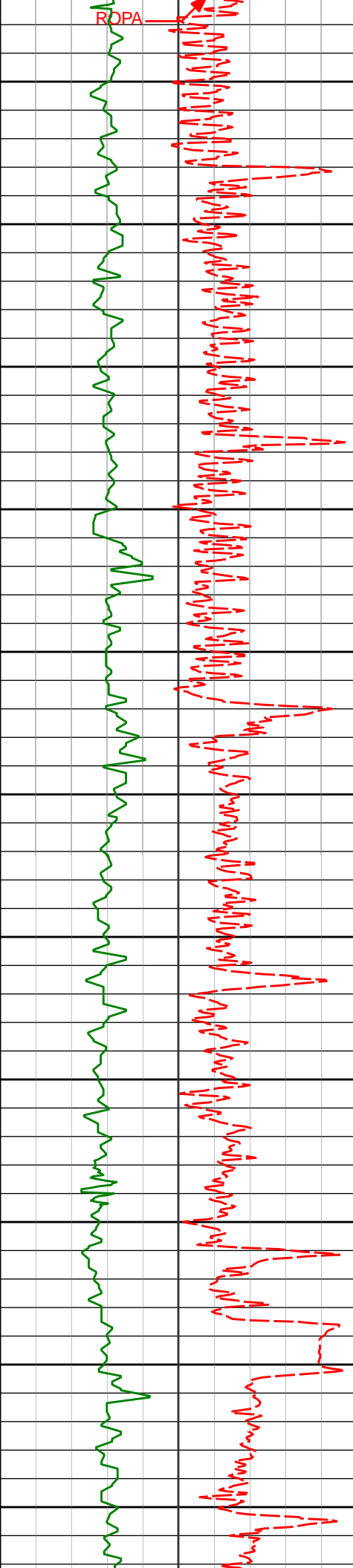
11.32°

214.28°

3983.98'

-84.97'





4050

4100

4150

4200

4250

4300

4350

4400

4450

4500

4550

4110'

10.58°

215.10° 4077.25'

-93.21'

4205'

9.51°

212.86° 4170.80'

-100.60'

4300'

7.74°

211.76° 4264.72'

-106.59'

4394'

6.76°

208.66° 4357.97'

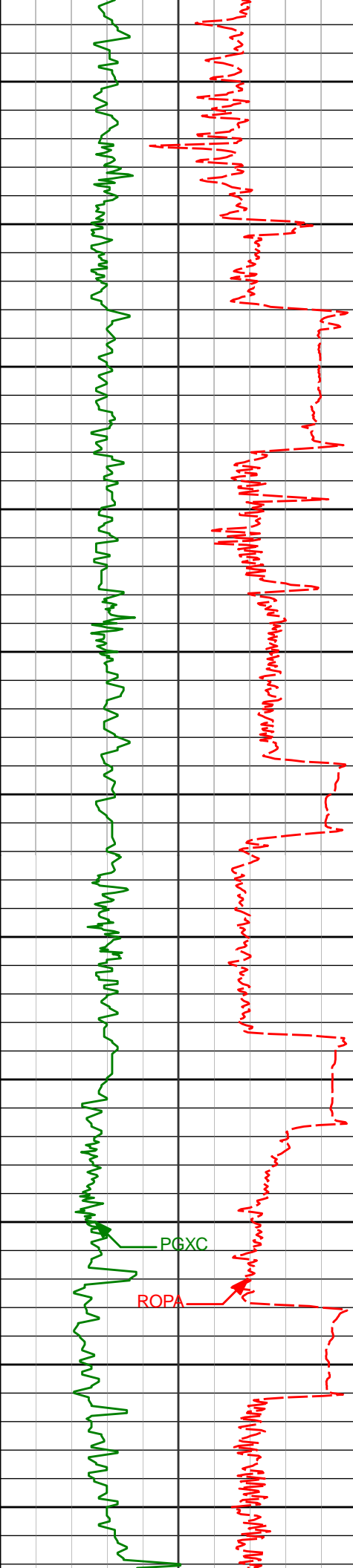
-111.18'

4489'

7.36°

204.55° 4452.25'

-114.98'



4600

4650

4700

4750

4800

4850

4900

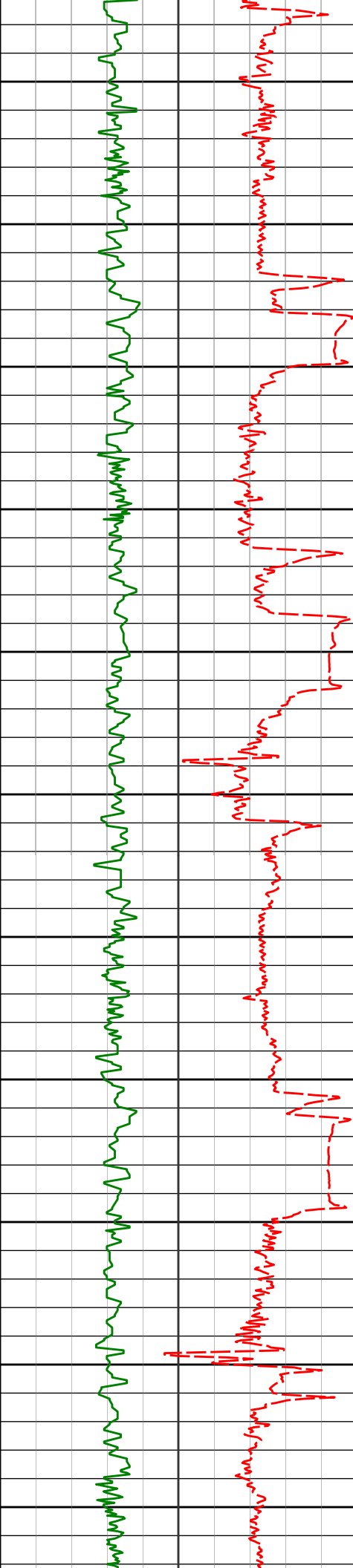
4950

5000

5050

5100

4584'	6.72°	200.32°	4546.53'	-118.00'
4679'	4.49°	192.71°	4641.07'	-119.56'
4774'	5.47°	188.81°	4735.71'	-120.00'
4869'	6.09°	195.29°	4830.23'	-120.79'
4964'	7.60°	208.00°	4924.55'	-123.67'
5059'	11.49°	210.24°	5018.22'	-129.52'



5150

5155'

10.05°

206.43° 5112.53'

-135.93'

5200

5250

5250'

9.93°

198.48° 5206.09'

-140.17'

5300

5350

5345'

10.48°

195.21° 5299.59'

-142.89'

5400

5450

5440'

9.54°

191.55° 5393.15'

-144.60'

5500

5550

5535'

11.84°

197.98° 5486.49'

-146.92'

5600

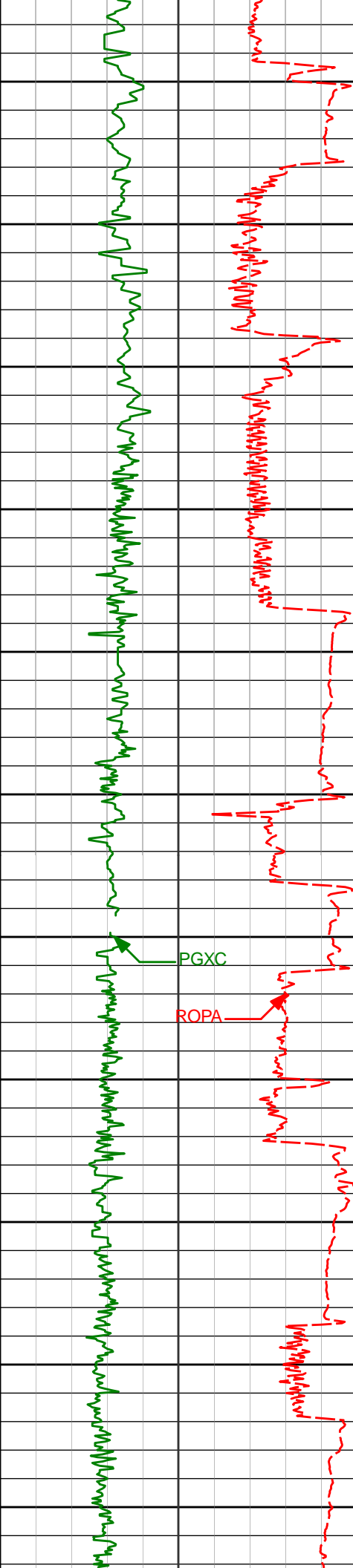
5650

5630'

10.77°

196.61° 5579.65'

-150.09'



5700

5725'

11.63°

203.16° 5672.84'

-154.07'

5750

5800

5820'

10.75°

199.77° 5766.04'

-158.54'

5850

5900

5915'

13.87°

194.57° 5858.84'

-161.81'

5950

6000

6010'

16.74°

186.68° 5950.48'

-163.01'

6050

6100

6104'

14.30°

177.61° 6041.05'

-160.81'

6150

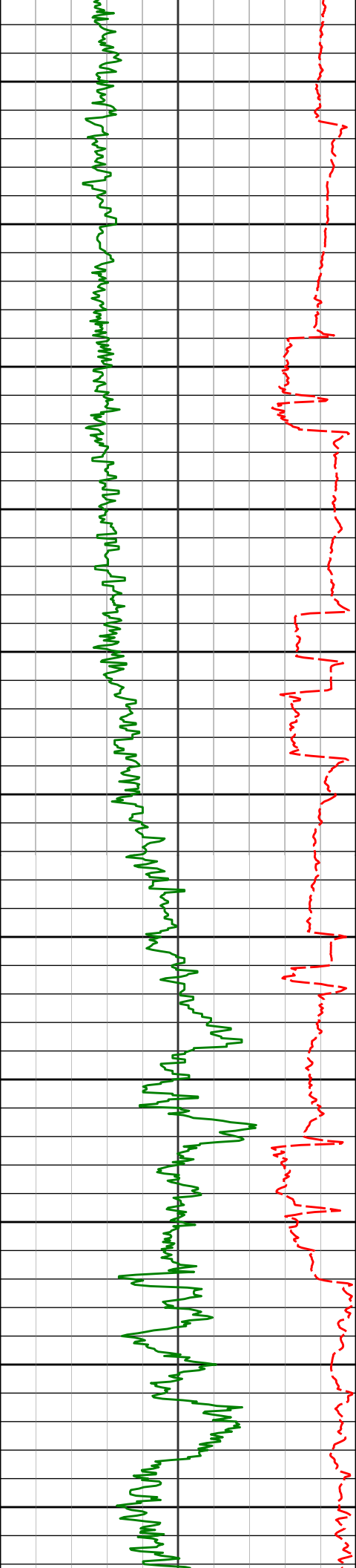
6200

6199'

18.41°

162.40° 6132.23'

-152.42'



6250

6300

6350

6400

6450

6500

6550

6600

6650

6700

6750

6294'

29.99°

144.59°

6218.85'

-129.77'

6389'

35.67°

131.55°

6298.74'

-90.57'

6484'

37.21°

120.74°

6375.24'

-41.16'

6579'

38.79°

103.62°

6450.31'

14.99'

6674'

40.52°

94.66°

6523.51'

75.46'

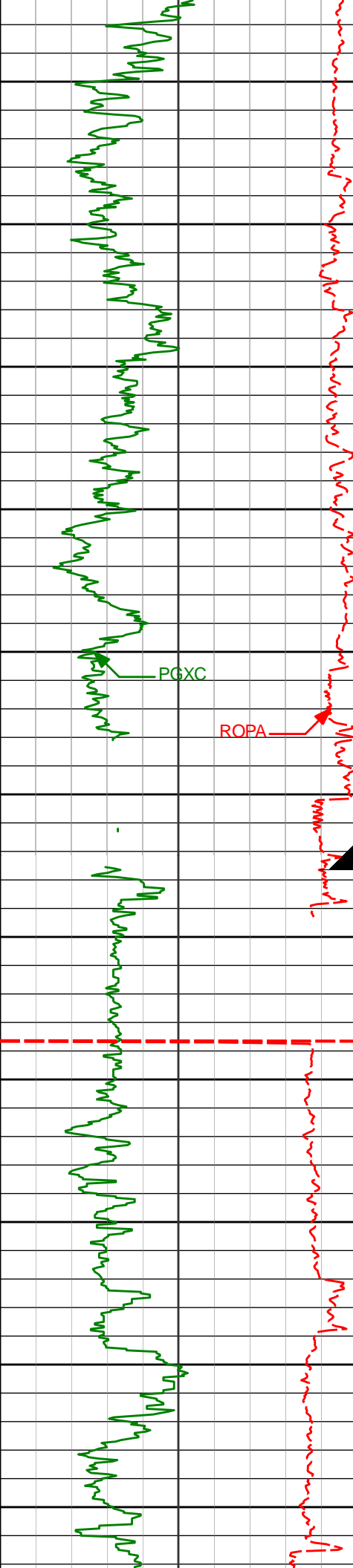
6769'

47.00°

83.31°

6592.20'

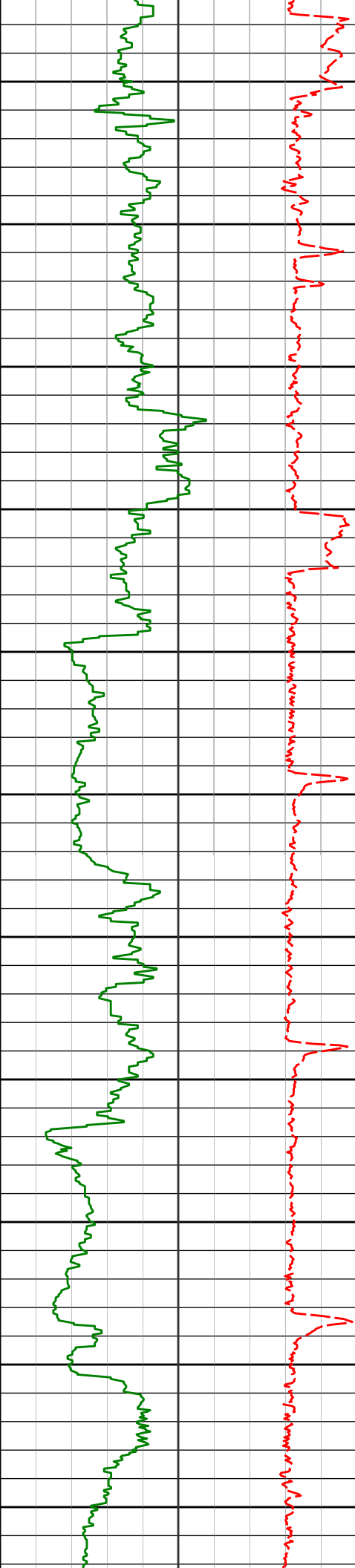
140.12'



6800				
6850				
6864'	61.05°	80.56°	6647.87'	213.94'
6900				
6950				
6959'	76.34°	82.58°	6682.29'	298.80'
7000				
7023'	83.11°	84.54°	6693.70'	359.88'
7050				
7100				
7150				
7156'	86.55°	86.01°	6705.68'	489.30'
7200				
7250				
7248'	88.58°	87.46°	6709.59'	579.59'
7300				

CSC  
Run 200

Casing Shoe @ 7105' MD



7350

7400

7450

7500

7550

7600

7650

7700

7750

7800

7850

7340'

88.49°

89.75° 6711.94'

670.44'

7433'

88.00°

90.20° 6714.79'

762.59'

7526'

91.20°

90.65° 6715.44'

854.87'

7619'

91.14°

90.48° 6713.54'

947.16'

7714'

90.22°

90.36° 6712.41'

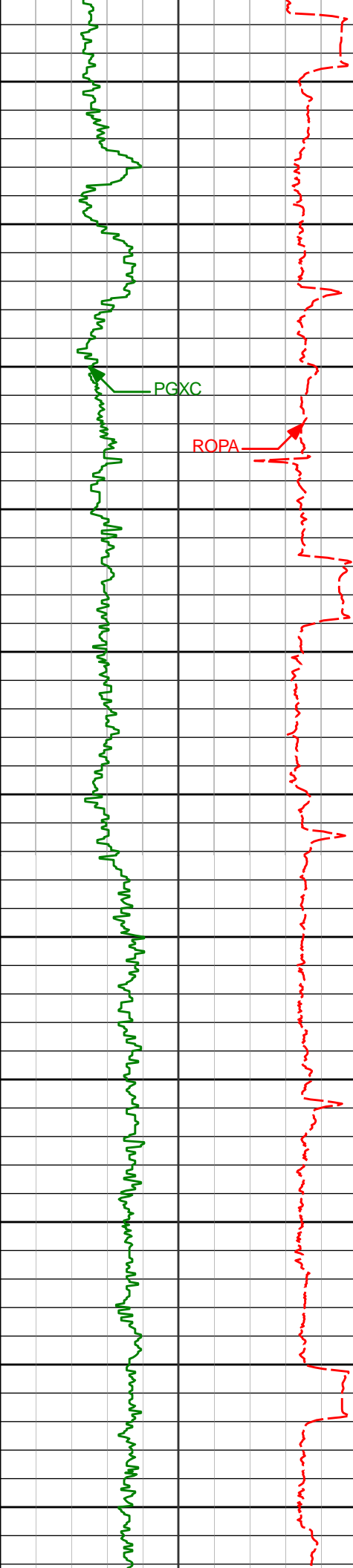
1041.43'

7809'

89.82°

89.78° 6712.38'

1135.62'



7900

7904'

90.43°

90.62° 6712.17'

1229.85'

7950

8000

7999'

90.03°

89.89° 6711.79'

1324.08'

8050

8100

8094'

92.22°

89.30° 6709.93'

1418.15'

8150

8200

8189'

91.94°

88.99° 6706.48'

1512.08'

8250

8300

8284'

91.42°

89.17° 6703.69'

1606.01'

8350

8400

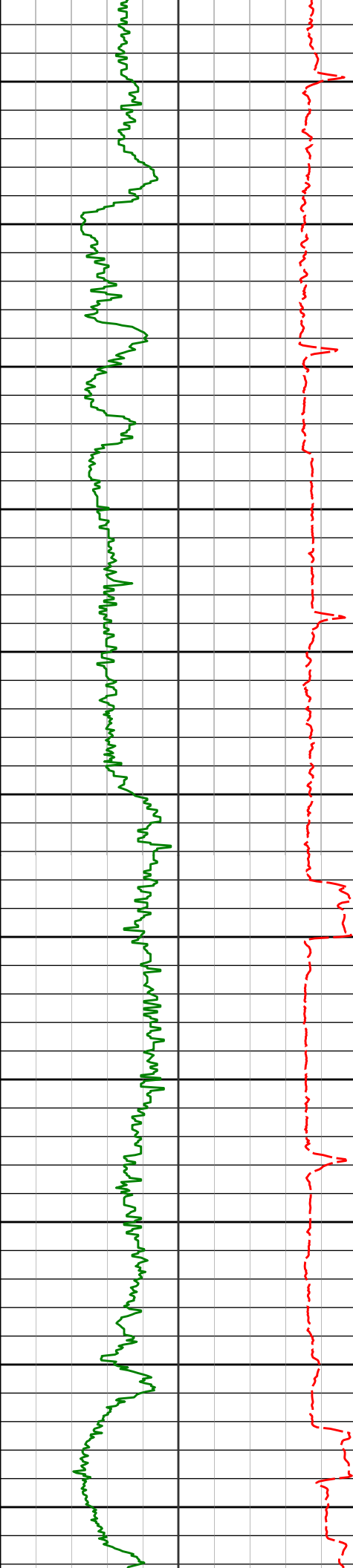
8379'

91.05°

91.40° 6701.65'

1700.22'





8450

8474'

90.62°

91.51° 6700.26'

1794.68'

8500

8550

8569'

90.22°

90.97° 6699.56'

1889.11'

8600

8650

8664'

90.09°

91.25° 6699.31'

1983.51'

8700

8750

8759'

91.11°

90.27° 6698.31'

2077.85'

8800

8850

8854'

90.59°

90.32° 6696.90'

2172.08'

8900

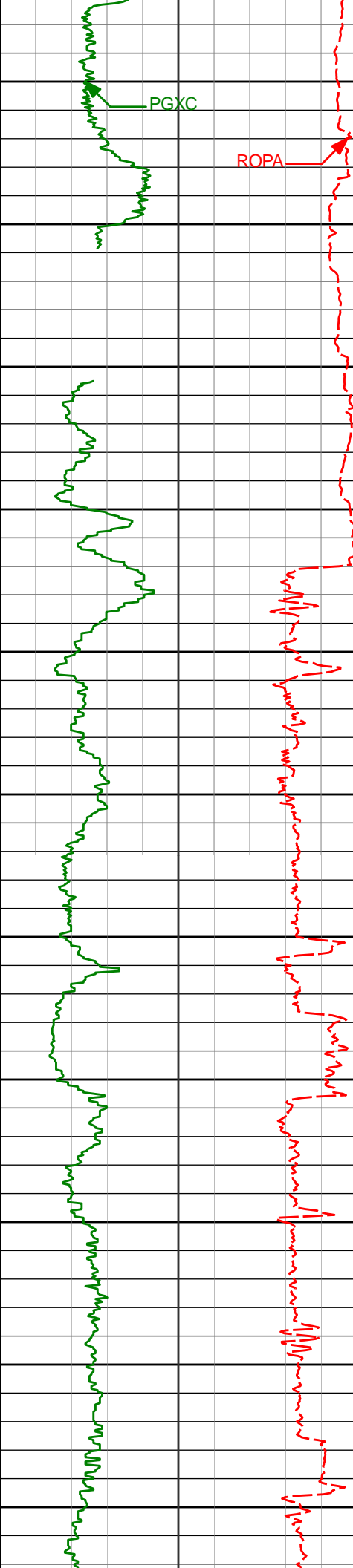
8950

8949'

91.02°

89.14° 6695.57'

2266.19'



9000

PGXC

ROPA

9044'

92.16°

88.62° 6692.93'

2360.08'

9050

9100

9150

9200

9234'

93.67°

89.09° 6682.98'

2547.70'

9250

9300

9329'

92.96°

88.30° 6677.49'

2641.41'

9350

9400

9424'

89.85°

87.48° 6675.16'

2735.03'

9450

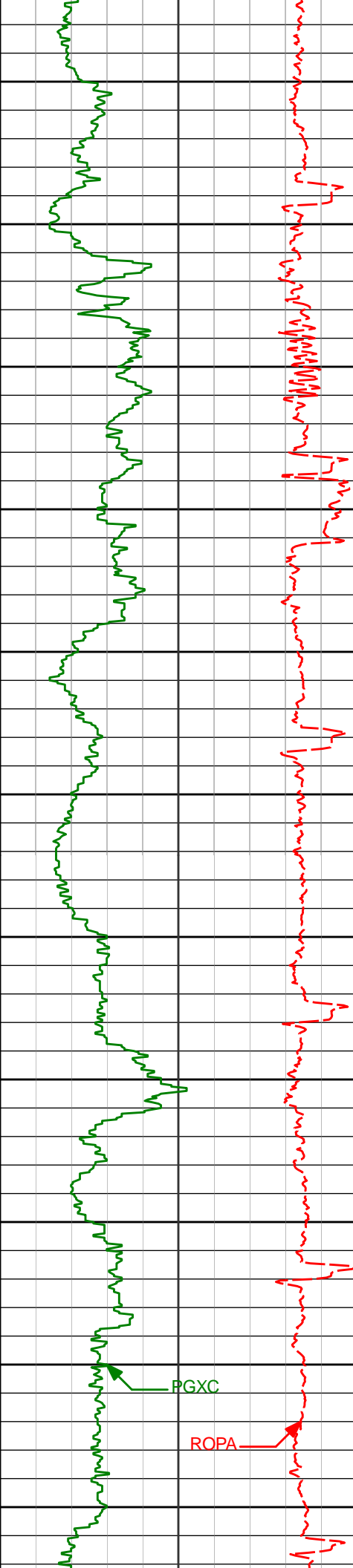
9500

9519'

90.03°

86.95° 6675.26'

2828.50'



9550

9600

9650

9700

9750

9800

9850

9900

9950

10000

10050

9615'

9709'

9804'

9899'

9994'

89.69°

92.07°

91.88°

91.54°

90.89°

86.11° 6675.49'

87.45° 6674.05'

87.72° 6670.77'

87.22° 6667.94'

86.99° 6665.93'

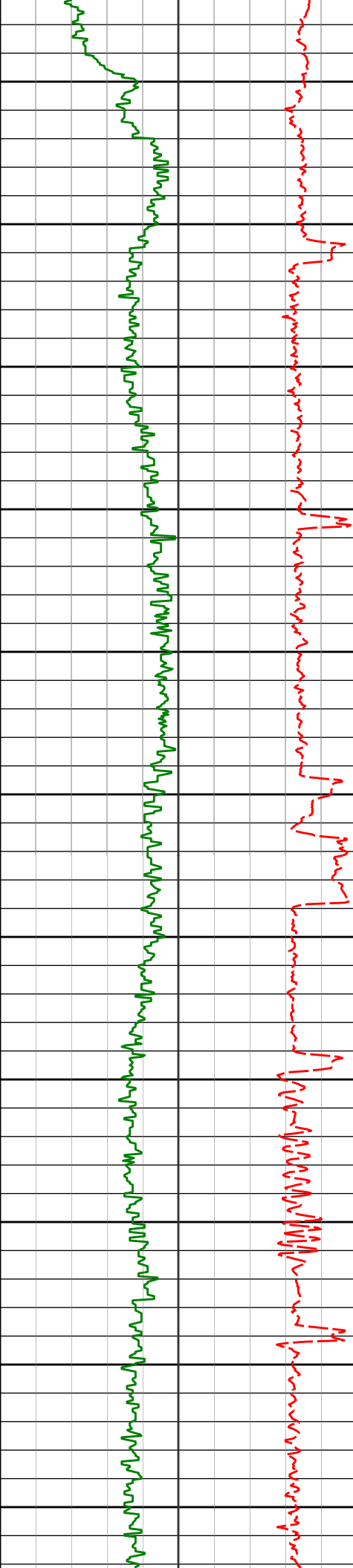
2922.74'

3015.07'

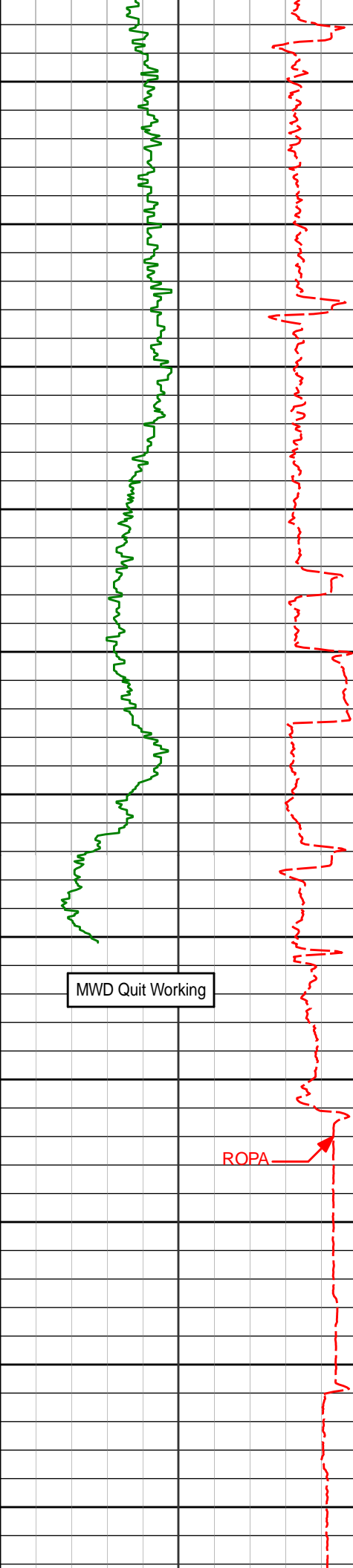
3108.59'

3202.09'

3295.51'



10089'	91.64°	87.23°	6663.83'	3388.92'
10100				
10150				
10184'	91.76°	86.74°	6661.01'	3482.27'
10200				
10250				
10279'	91.39°	85.95°	6658.40'	3575.44'
10300				
10350				
10373'	91.11°	87.20°	6656.35'	3667.70'
10400				
10450				
10468'	90.99°	88.13°	6654.61'	3761.29'
10500				
10550				
10563'	90.49°	87.26°	6653.38'	3854.88'
10600				



10650

10700

10750

10800

10850

10900

10950

11000

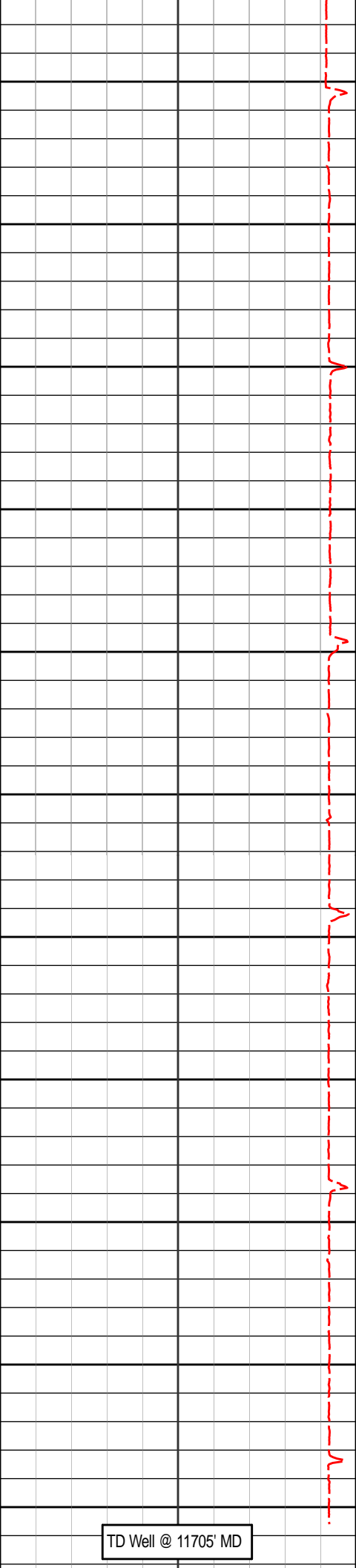
11050

11100

11150

10659'      90.68°      86.88°    6652.40'      3949.29'

10754'      90.31°      86.34°    6651.58'      4042.56'



11200

11250

11300

11350

11400

11450

11500

11550

11600

11650

11700

PTB

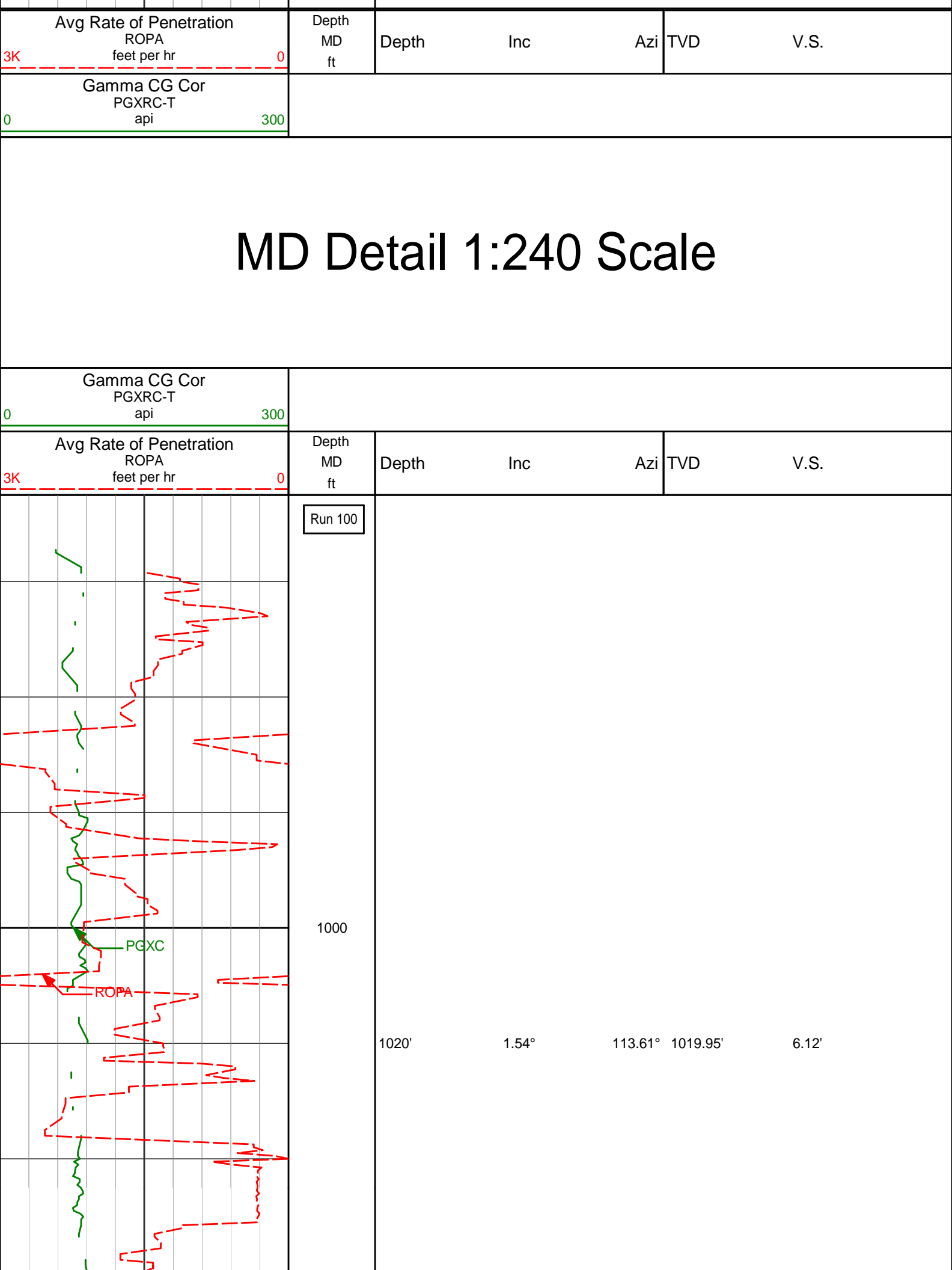
TD Well @ 11705' MD

11705'

90.31°

86.34° 6646.43'

4975.50'





1100

1115'

1.29°

111.33° 1114.92'

8.38'

Lost connection to Pason

1200

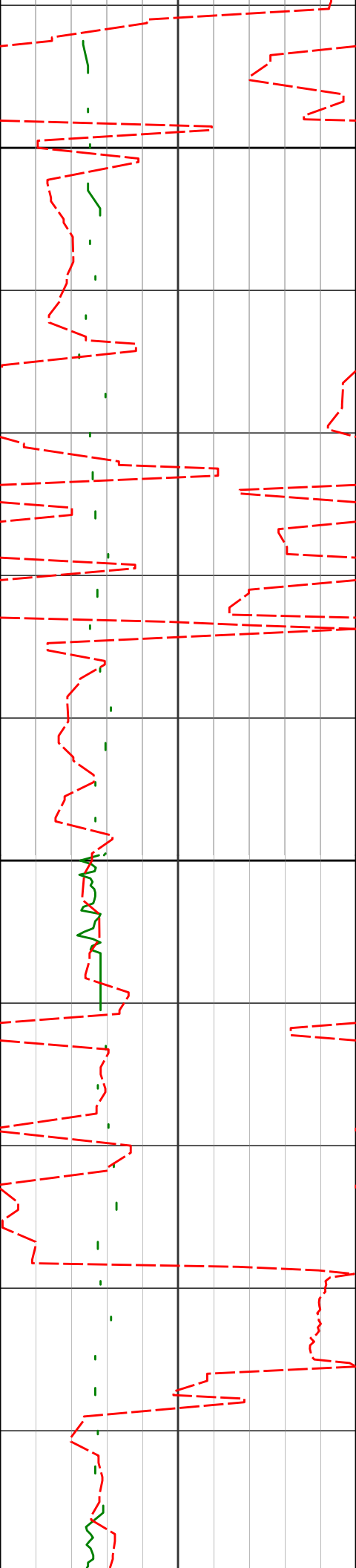
1208'

1.11°

28.18° 1207.91'

9.72'





1300

1393'

1.39°

48.43° 1392.86'

11.82'

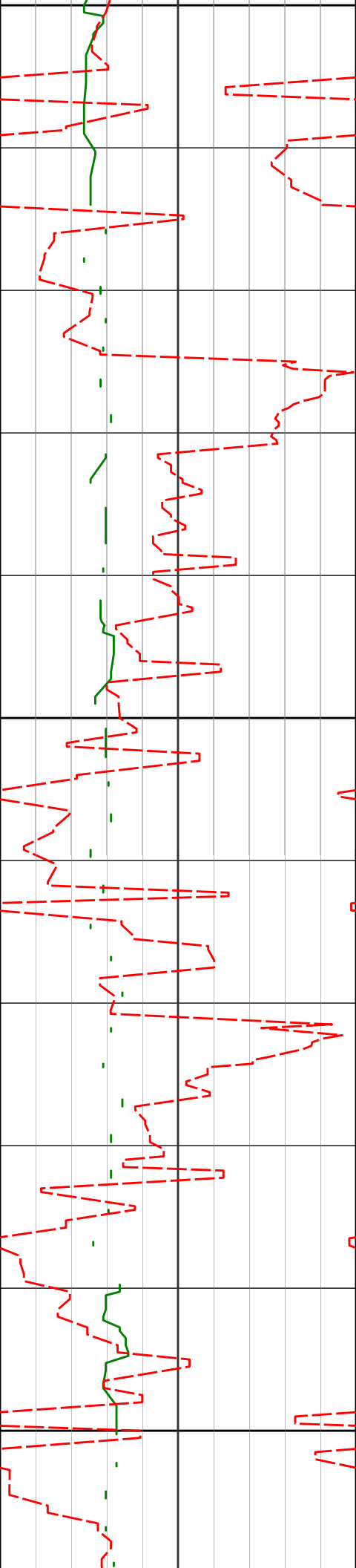
1400

1486'

2.07°

356.01° 1485.82'

12.22'



1500

1579'

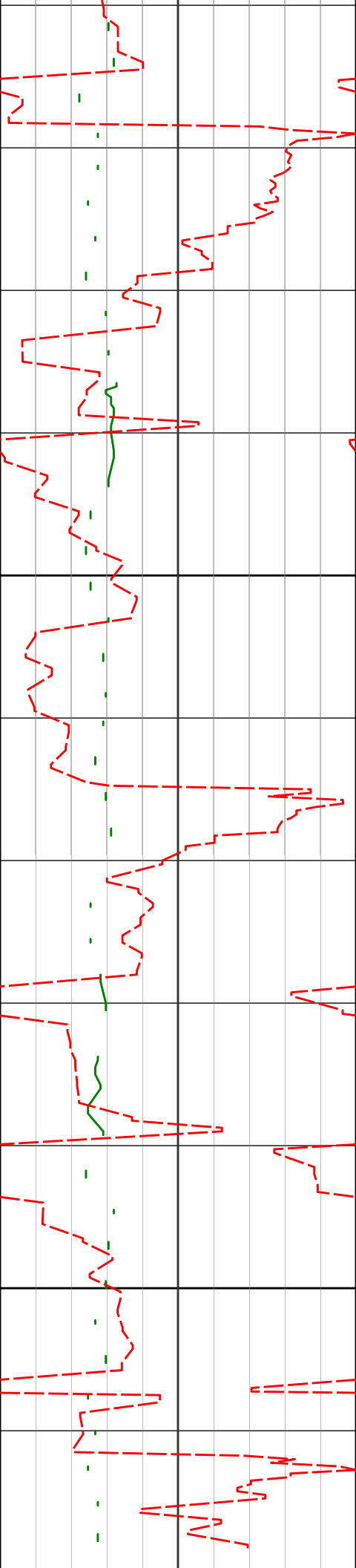
2.06°

351.51° 1578.76'

11.43'

1600

1700



1764'

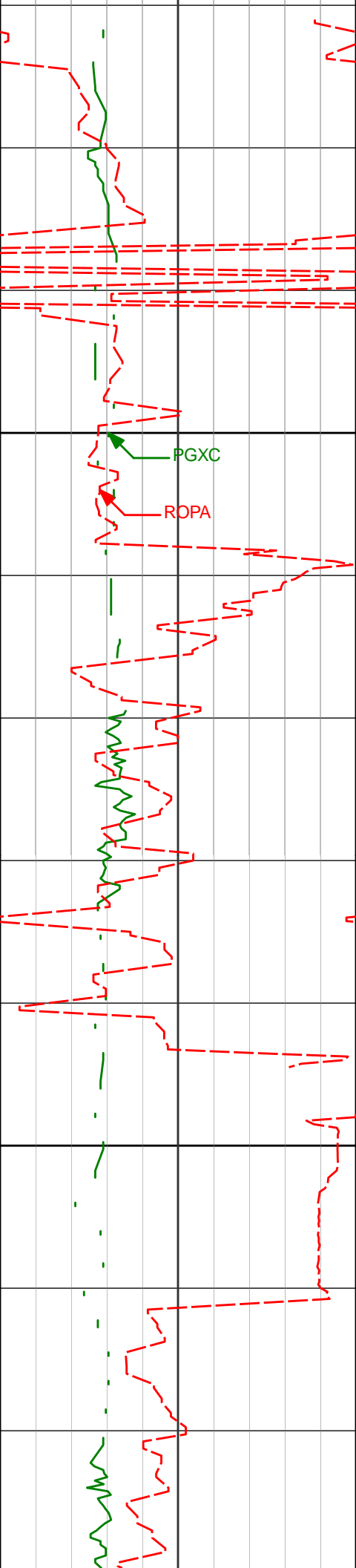
1.52°

335.22° 1763.67'

9.20'

1800

1900



2000

2100

1949'

1.60°

319.01° 1948.61'

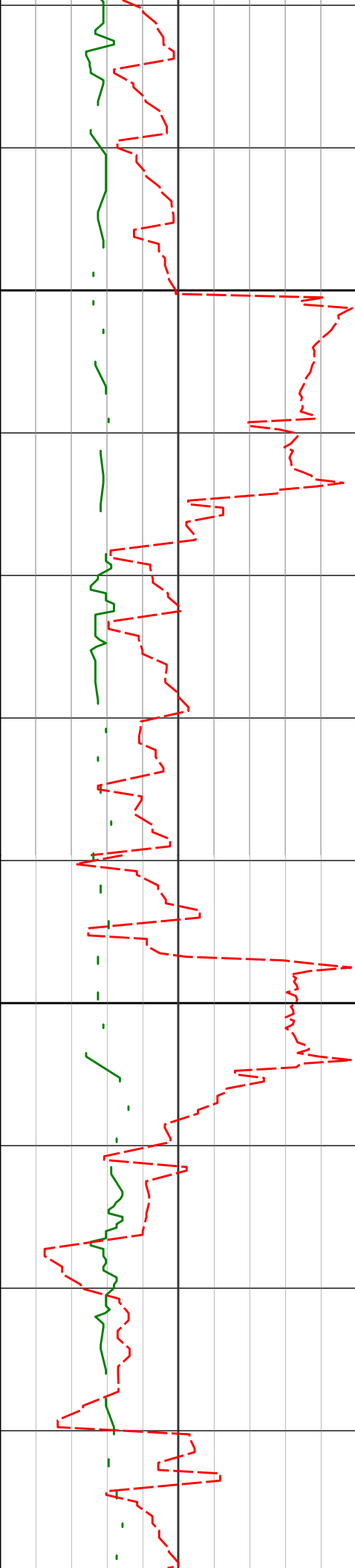
5.95'

2136'

2.69°

227.13° 2135.51'

1.20'



2200

2227'

5.98°

213.06° 2226.24'

-2.21'

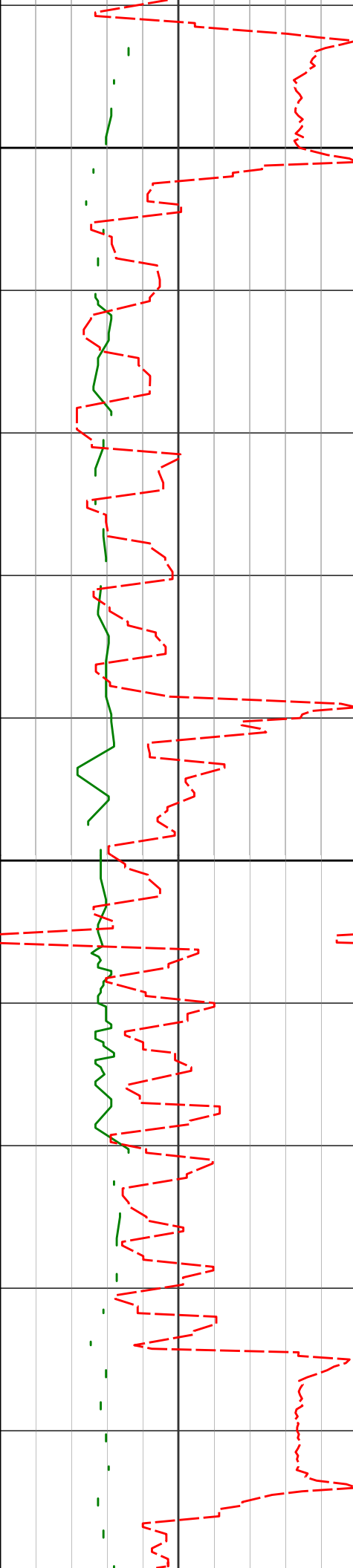
2300

2320'

8.33°

201.11° 2318.52'

-5.88'



2400

2412'

10.37°

193.89° 2409.29'

-8.37'

2500

2504'

10.39°

191.86° 2499.79'

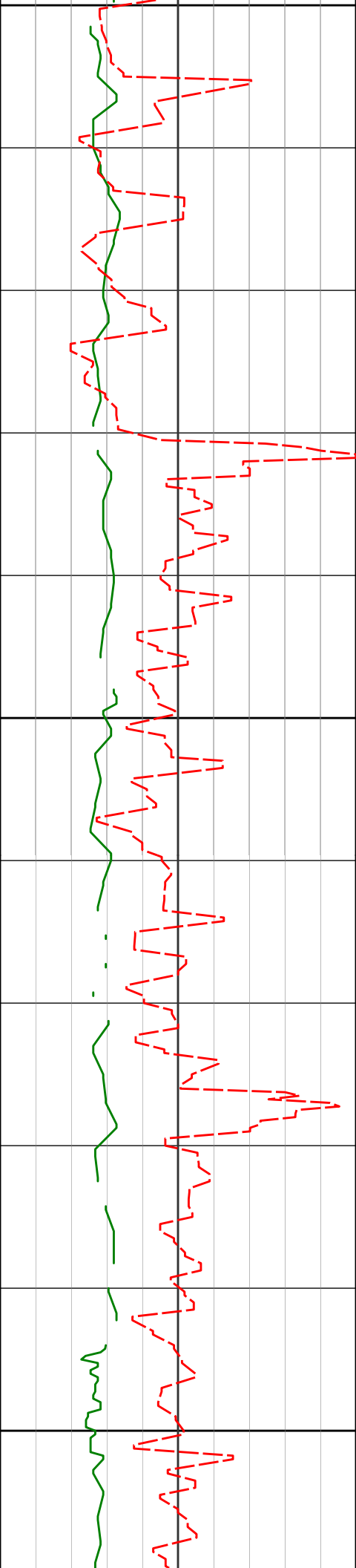
-9.91'

2596'

11.61°

200.80° 2590.10'

-12.67'



2600

2700

2800

2689'

11.06°

198.92° 2681.29'

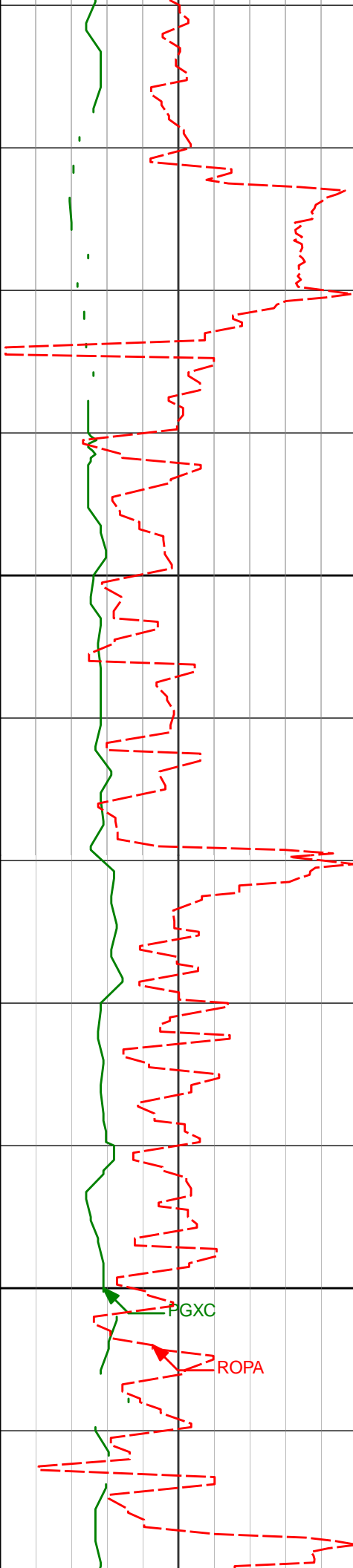
-16.58'

2782'

10.72°

196.65° 2772.62'

-19.72'



2900

3000

2875'

11.65°

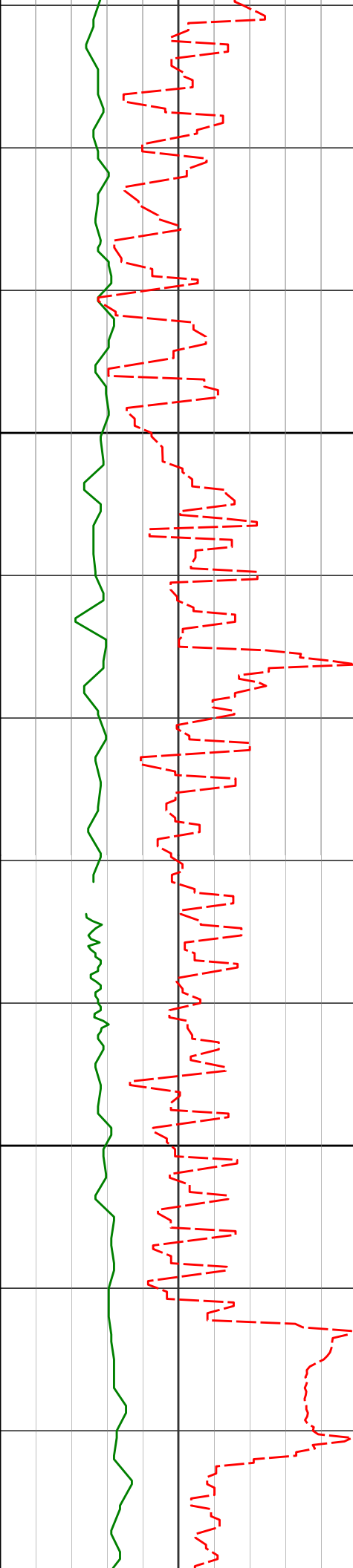
206.87° 2863.86'

-24.20'

PGXC

ROPA





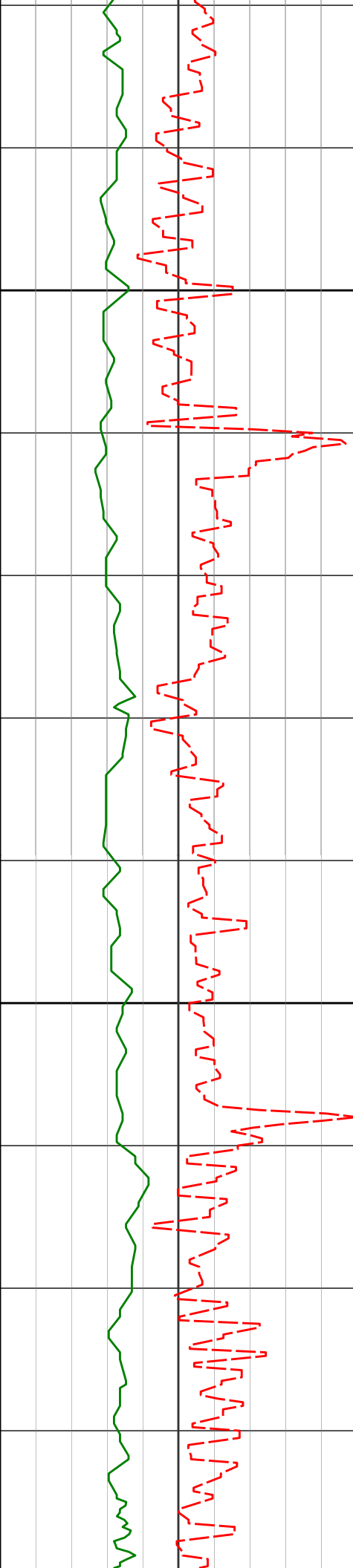
3065'	11.25°	204.30°	3050.08'	-35.91'
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3100

3160'	10.92°	199.10°	3143.31'	-40.39'
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3200

3255'	10.52°	210.02°	3236.66'	-45.51'
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3300

3350'

9.19°

207.59° 3330.25'

-51.44'

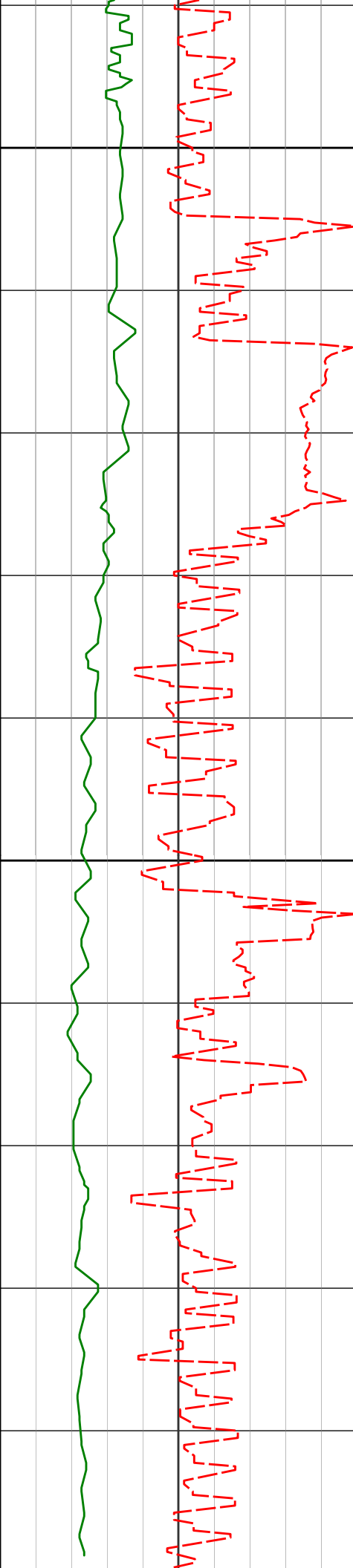
3400

3446'

7.22°

205.80° 3425.27'

-55.96'



3500

3541'

8.49°

200.24° 3519.38'

-59.38'

3600

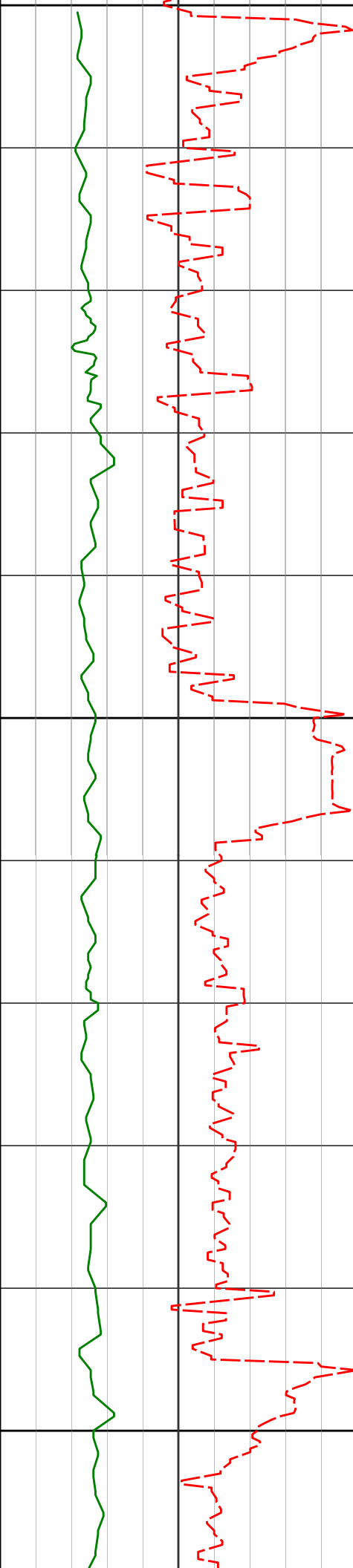
3636'

10.40°

199.94° 3613.08'

-62.77'

3700



3700

3730'

11.16°

200.21° 3705.42'

-66.59'

3800

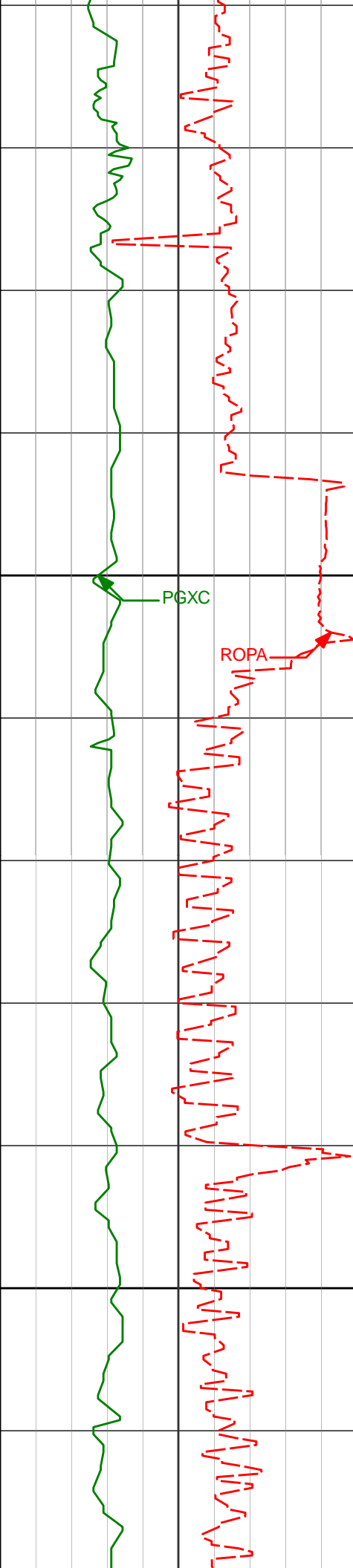
3825'

12.40°

204.53° 3798.42'

-71.59'

3900



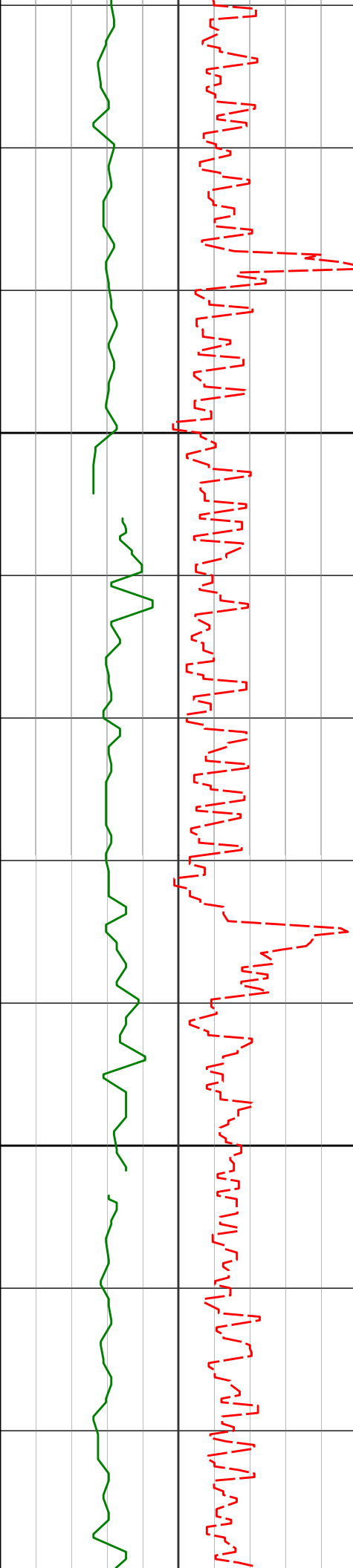
4000

PGXC

ROPA

4100

3920'	12.97°	204.41°	3891.10'	-77.67'
4015'	11.32°	214.28°	3983.98'	-84.97'
4110'	10.58°	215.10°	4077.25'	-93.21'



4200

4205'

9.51°

212.86° 4170.80'

-100.60'

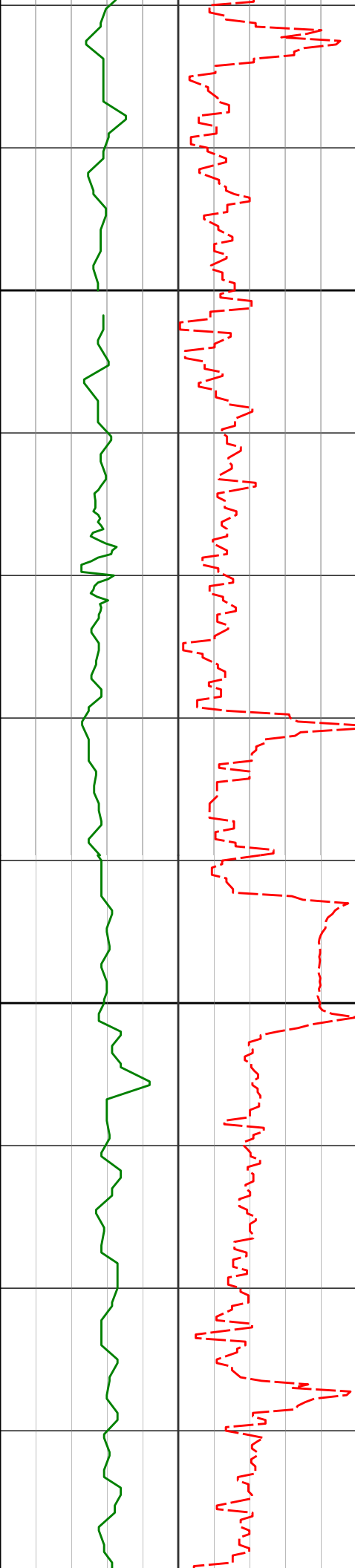
4300

4300'

7.74°

211.76° 4264.72'

-106.59'



4400

4394'

6.76°

208.66° 4357.97'

-111.18'

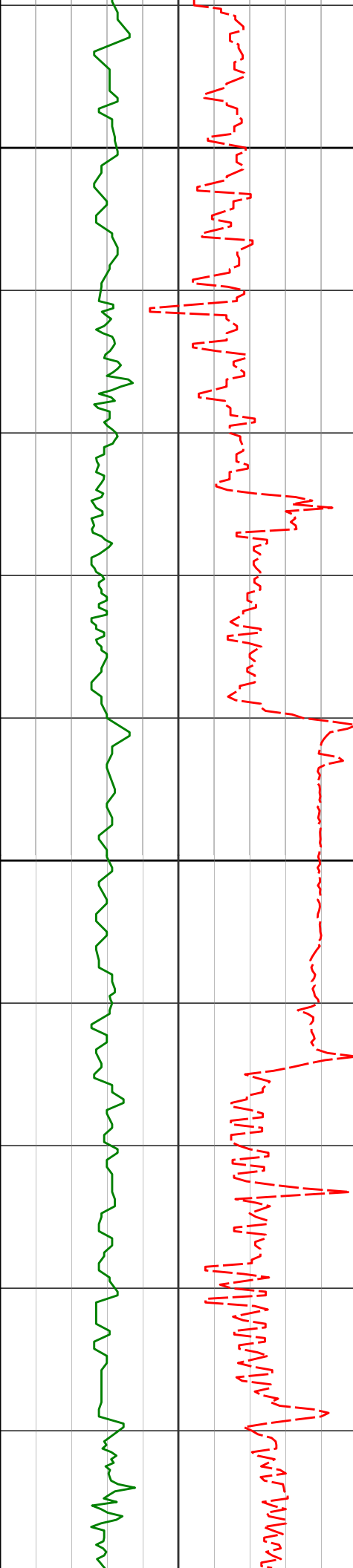
4500

4489'

7.36°

204.55° 4452.25'

-114.98'



4600

4700

4800

4584'

6.72°

200.32° 4546.53'

-118.00'

4679'

4.49°

192.71° 4641.07'

-119.56'

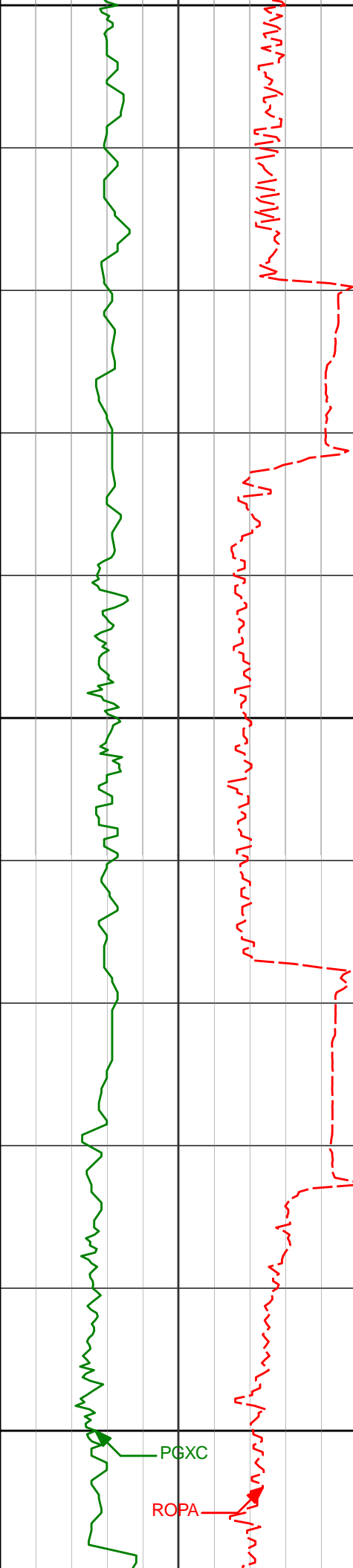
4774'

5.47°

188.81° 4735.71'

-120.00'





4800

4869'

6.09°

195.29° 4830.23'

-120.79'

4900

4964'

7.60°

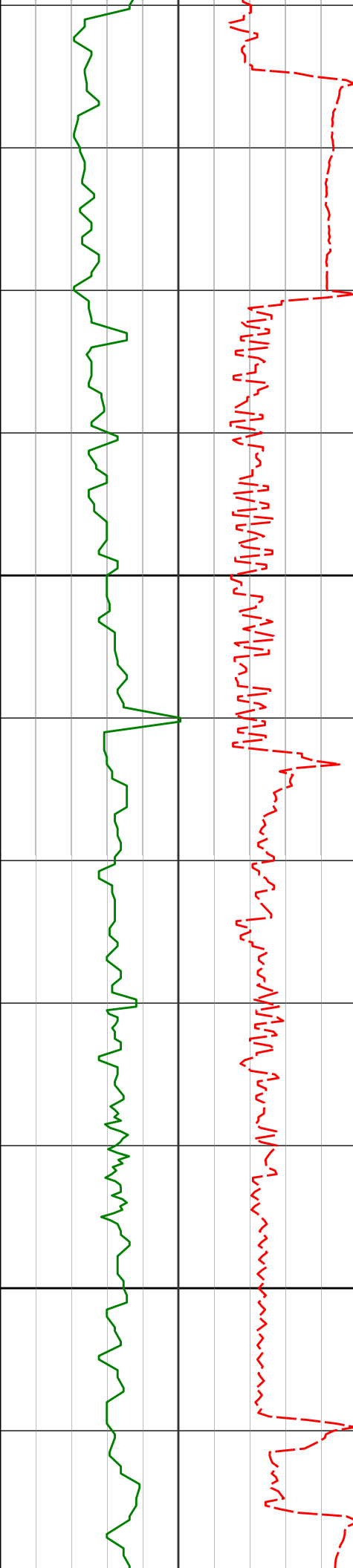
208.00° 4924.55'

-123.67'

5000

PGXC

ROPA



5100

5200

5059'

11.49°

210.24° 5018.22'

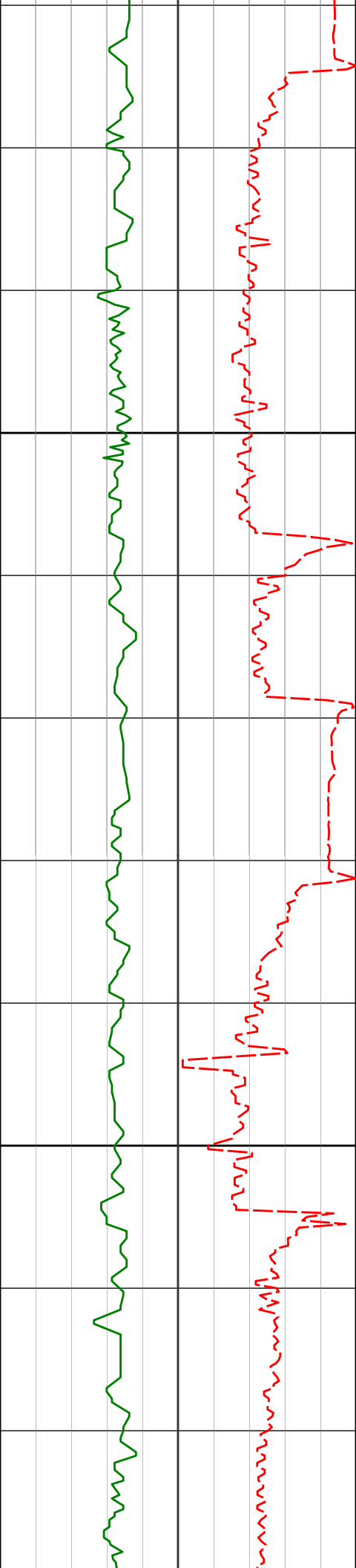
-129.52'

5155'

10.05°

206.43° 5112.53'

-135.93'



5250'

9.93°

198.48° 5206.09'

-140.17'

5300

5345'

10.48°

195.21° 5299.59'

-142.89'

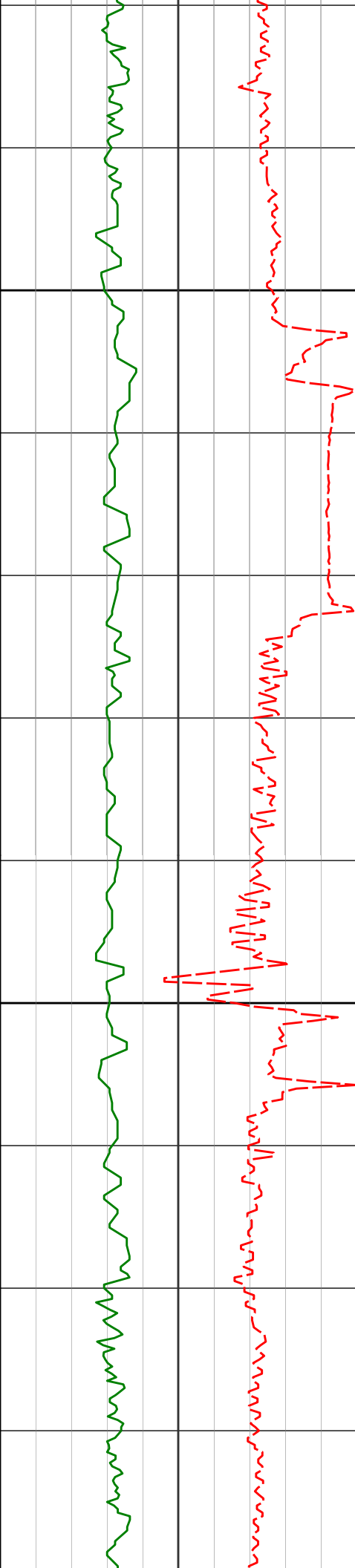
5400

5440'

9.54°

191.55° 5393.15'

-144.60'



5500

5535'

11.84°

197.98° 5486.49'

-146.92'

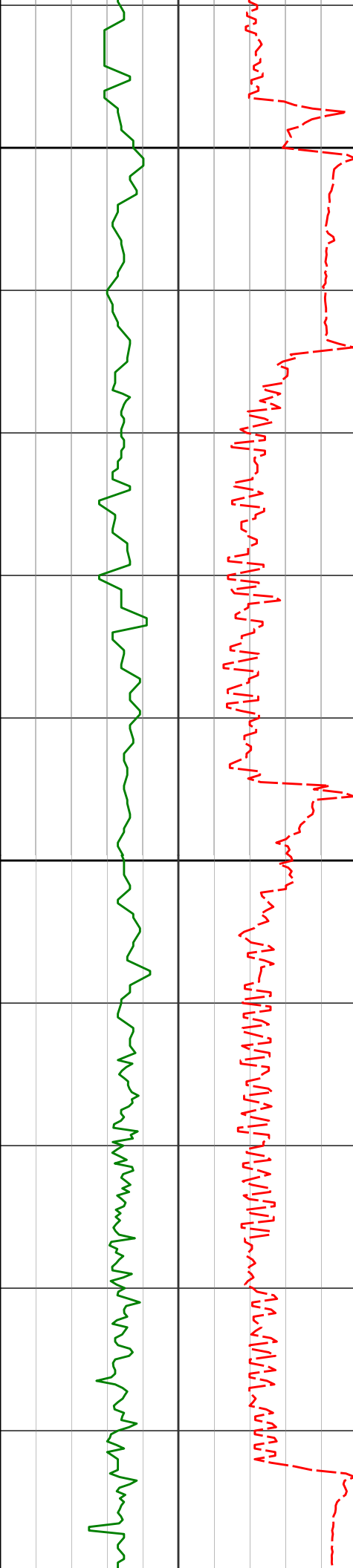
5600

5630'

10.77°

196.61° 5579.65'

-150.09'



5700

5725'

11.63°

203.16° 5672.84'

-154.07'

5800

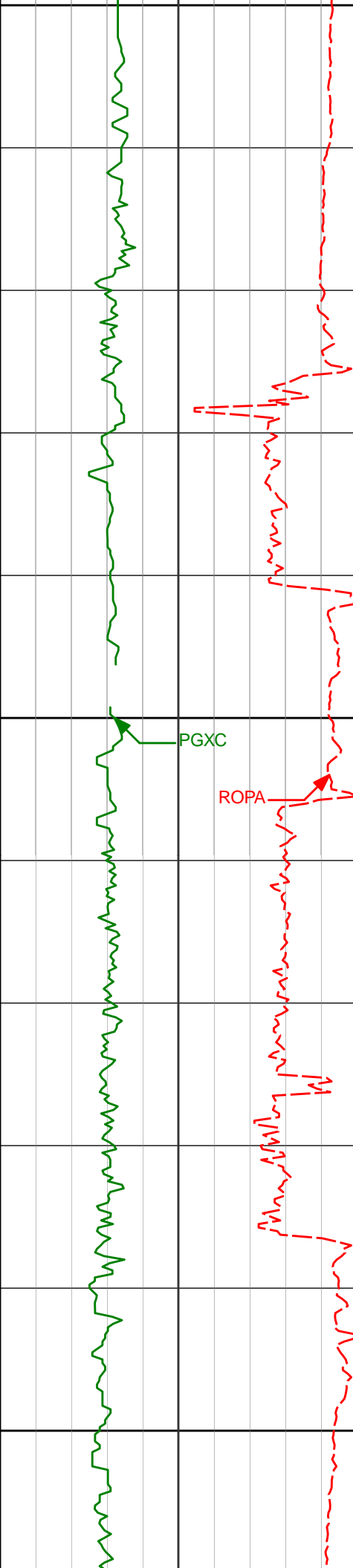
5820'

10.75°

199.77° 5766.04'

-158.54'

5900



5900

5915'

13.87°

194.57° 5858.84'

-161.81'

6000

6010'

16.74°

186.68° 5950.48'

-163.01'

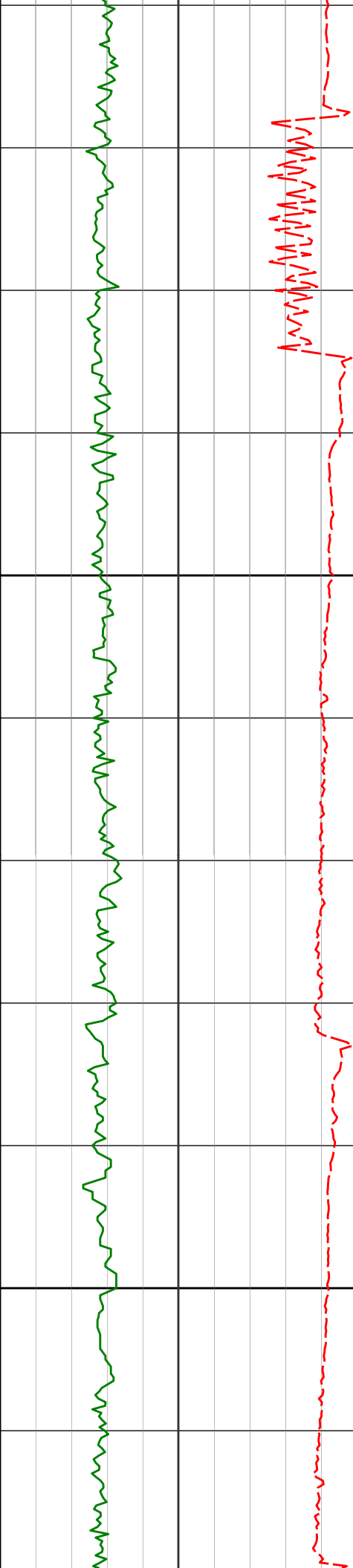
6100

6104'

14.30°

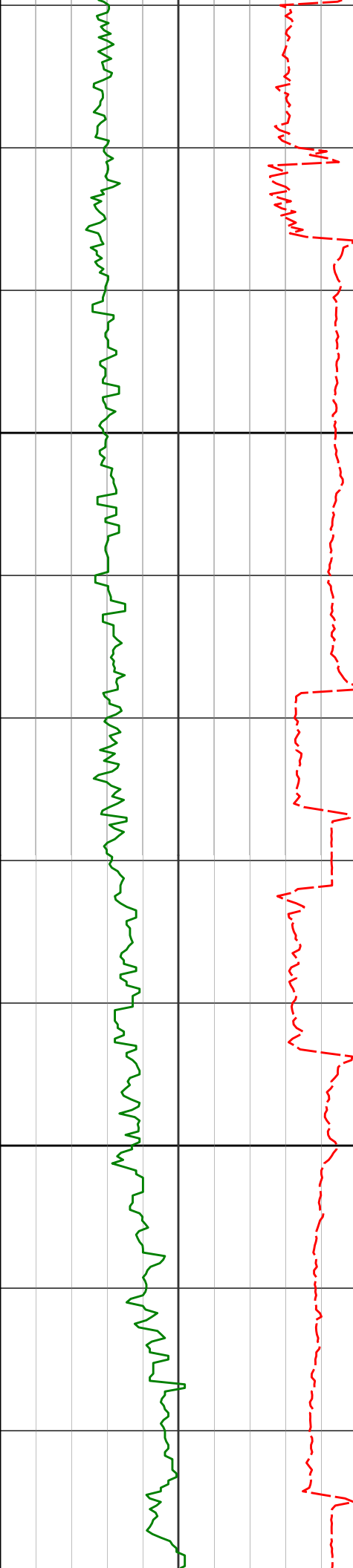
177.61° 6041.05'

-160.81'



6200	6199'	18.41°	162.40°	6132.23'	-152.42'
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6300	6294'	29.99°	144.59°	6218.85'	-129.77'
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6400

6500

6389'

35.67°

131.55° 6298.74'

-90.57'

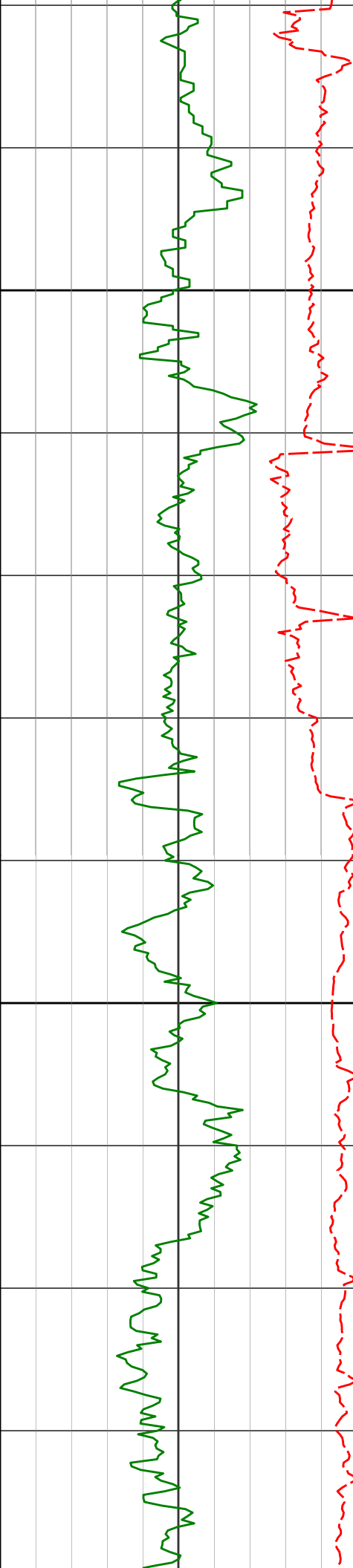
6484'

37.21°

120.74° 6375.24'

-41.16'





6579'

38.79°

103.62° 6450.31'

14.99'

6600

6674'

40.52°

94.66° 6523.51'

75.46'

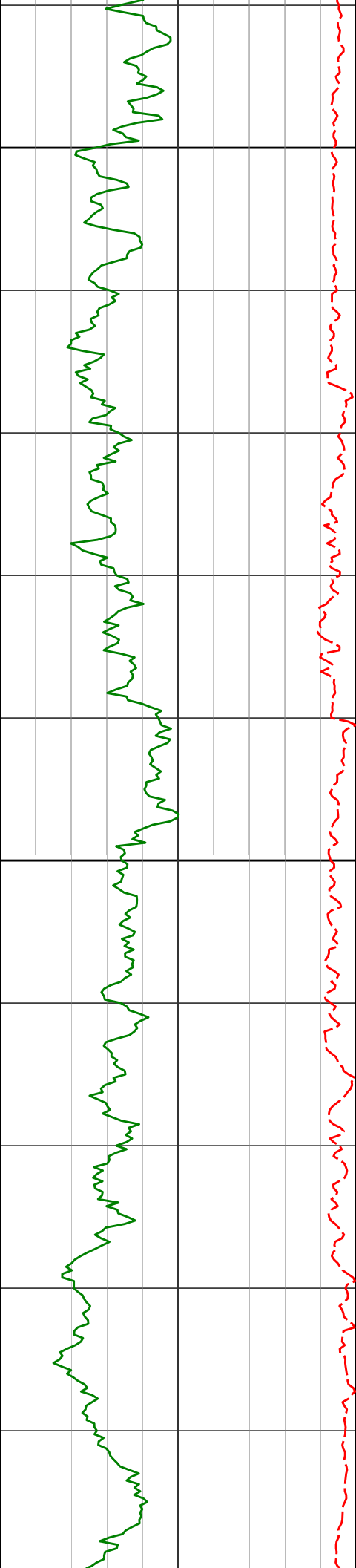
6700

6769'

47.00°

83.31° 6592.20'

140.12'



6800

6864'

61.05°

80.56° 6647.87'

213.94'

6900

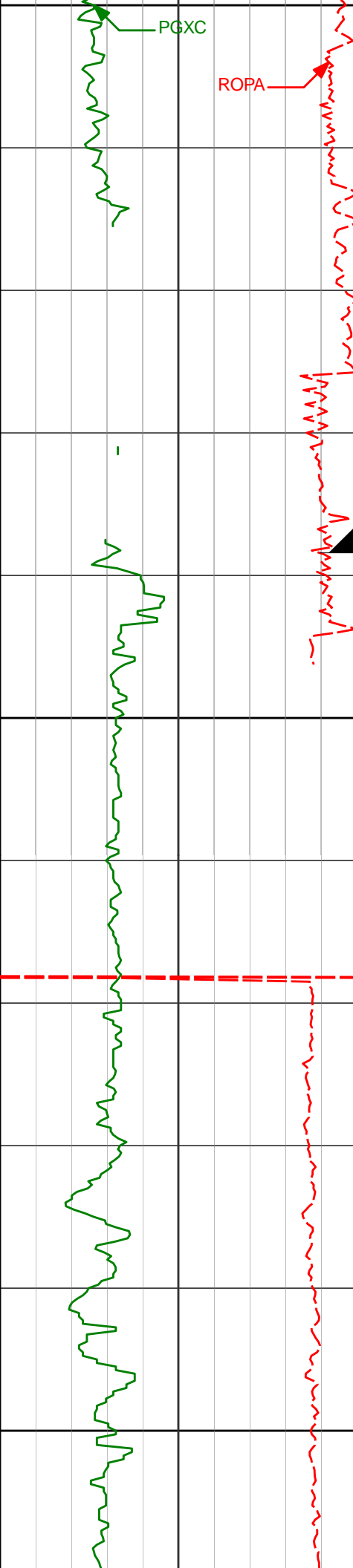
6959'

Run 200

76.34°

82.58° 6682.29'

298.80'



PGXC

ROPA

CSG

Casing Shoe @ 7077'

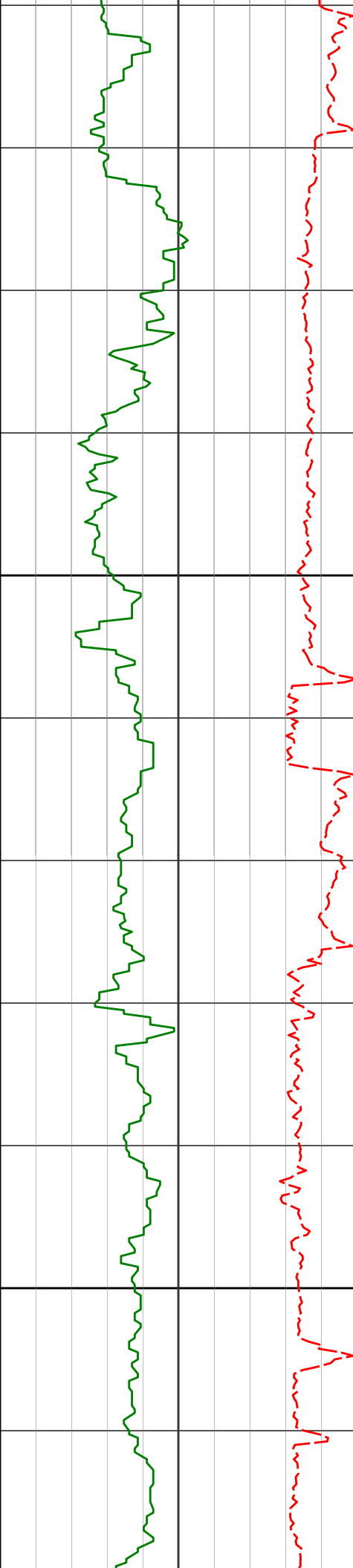
Run 300

7023'      83.11°      84.54°    6693.70'      359.88'

7100

7156'      86.55°      86.01°    6705.68'      489.30'

7200



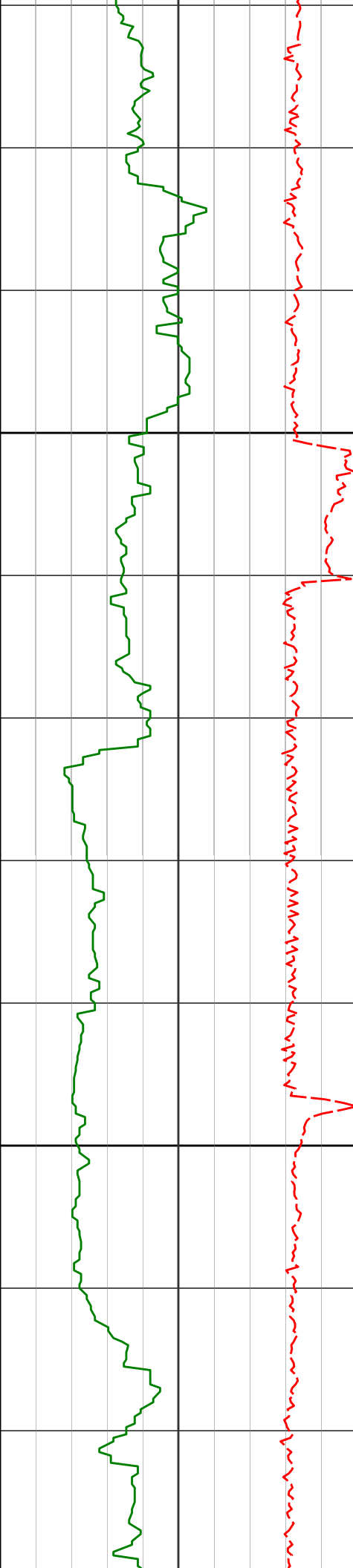
7248'	88.58°	87.46°	6709.59'	579.59'
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7300

7340'	88.49°	89.75°	6711.94'	670.44'
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7400

7433'	88.00°	90.20°	6714.79'	762.59'
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7500

7526'

91.20°

90.65° 6715.44'

854.87'

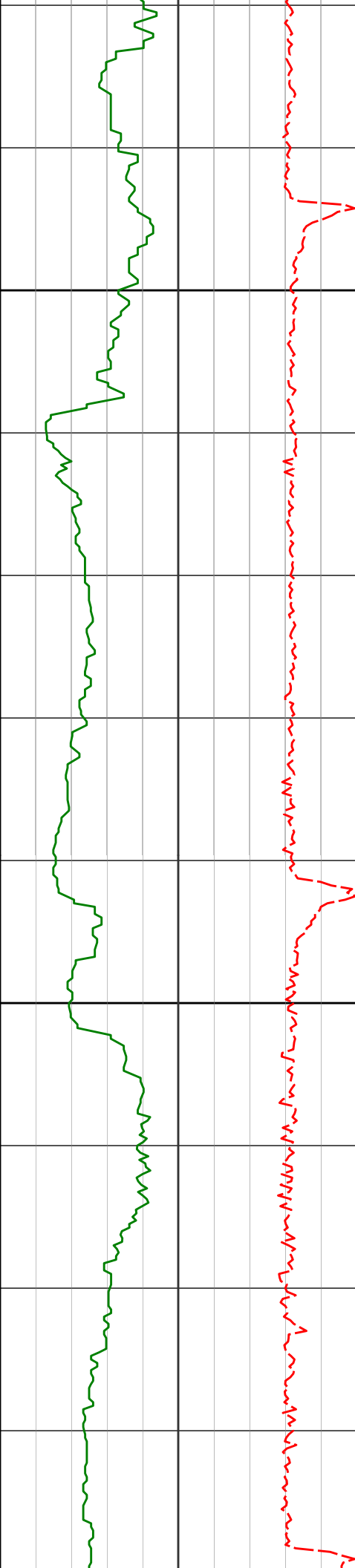
7600

7619'

91.14°

90.48° 6713.54'

947.16'



7700

7714'

90.22°

90.36° 6712.41'

1041.43'

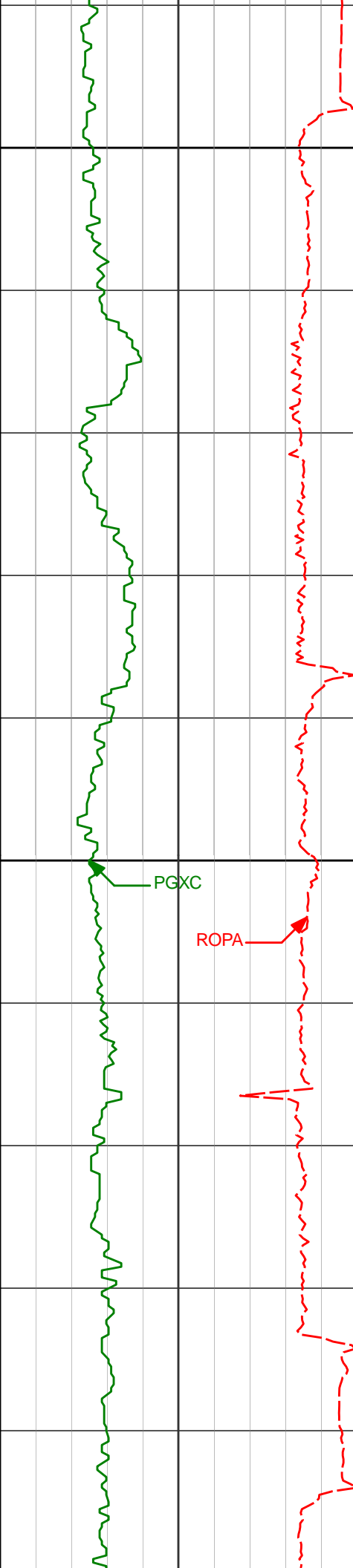
7800

7809'

89.82°

89.78° 6712.38'

1135.62'



7900

7904'

90.43°

90.62° 6712.17'

1229.85'

8000

7999'

90.03°

89.89° 6711.79'

1324.08'

PGXC

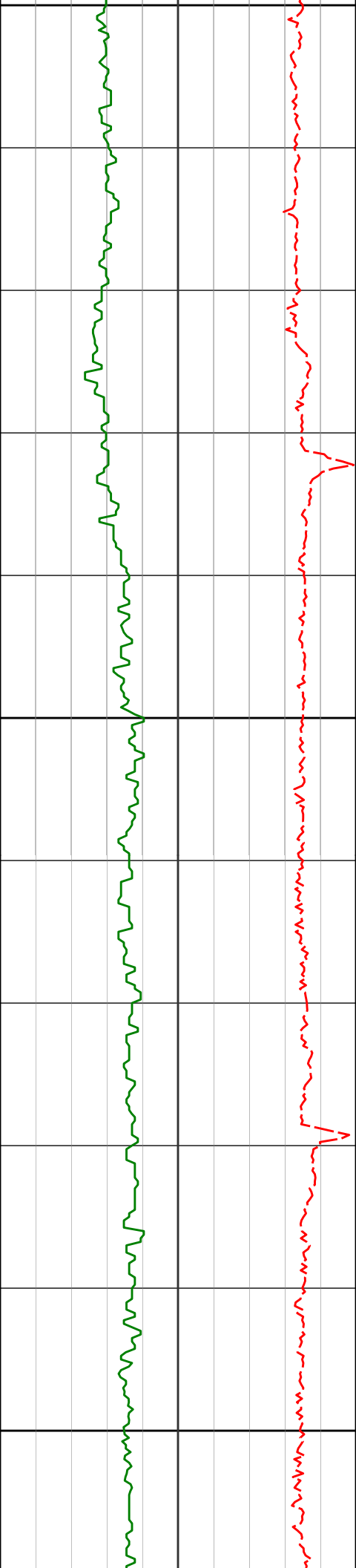
ROPA

8094'

92.22°

89.30° 6709.93'

1418.15'



8100

8189'

91.94°

88.99° 6706.48'

1512.08'

8200

8284'

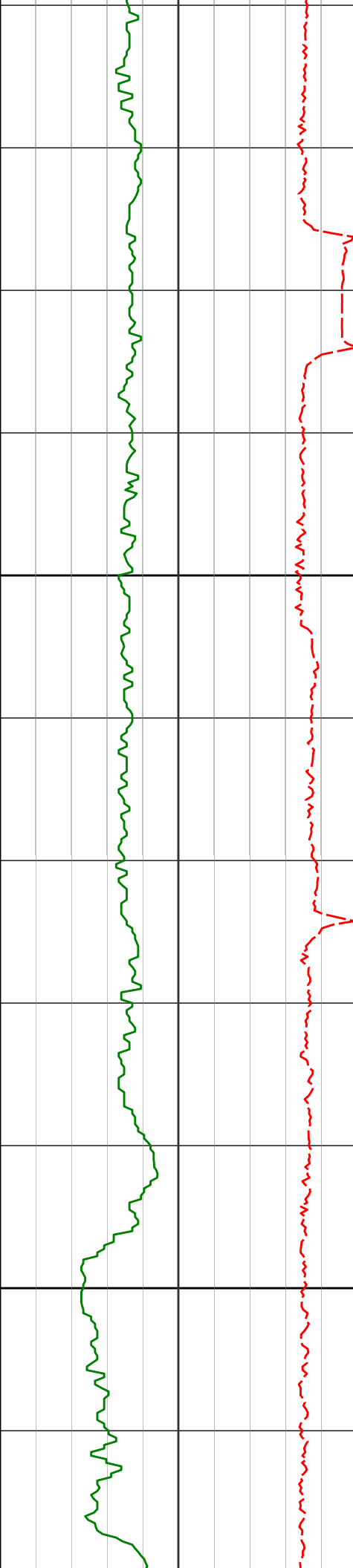
91.42°

89.17° 6703.69'

1606.01'

8300





8400

8500

8379'

91.05°

91.40° 6701.65'

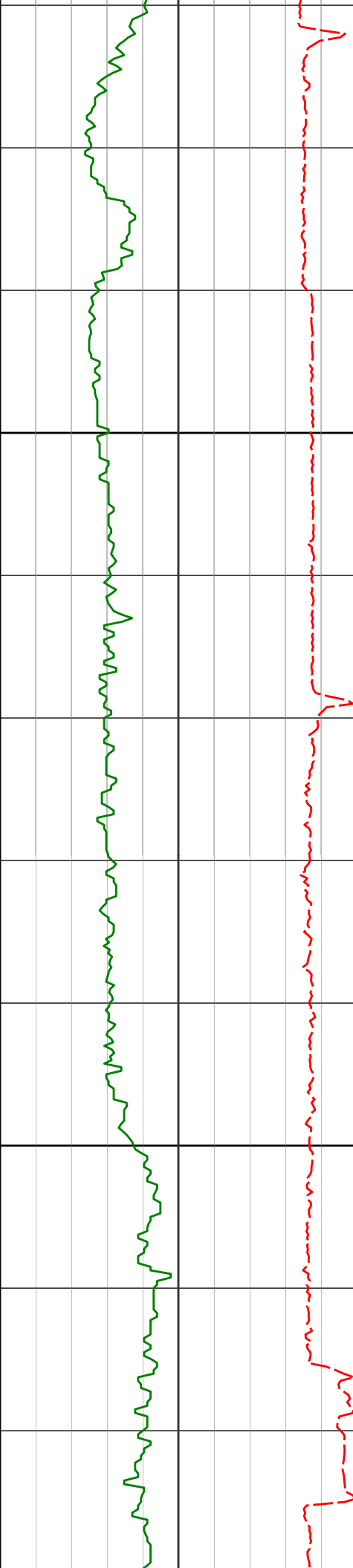
1700.22'

8474'

90.62°

91.51° 6700.26'

1794.68'



8600

8700

8569'

90.22°

90.97° 6699.56'

1889.11'

8664'

90.09°

91.25° 6699.31'

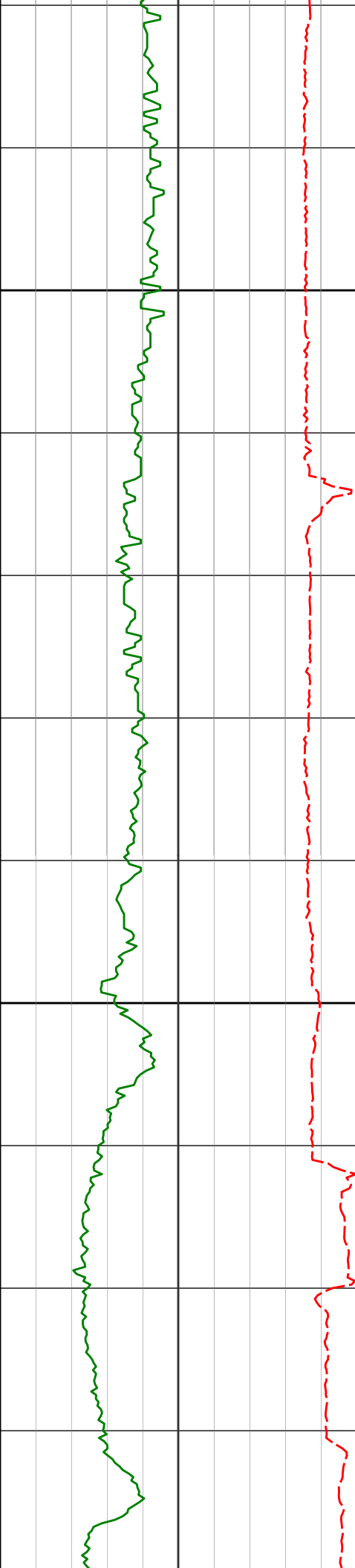
1983.51'

8759'

91.11°

90.27° 6698.31'

2077.85'



8800

8900

8854'

90.59°

90.32° 6696.90'

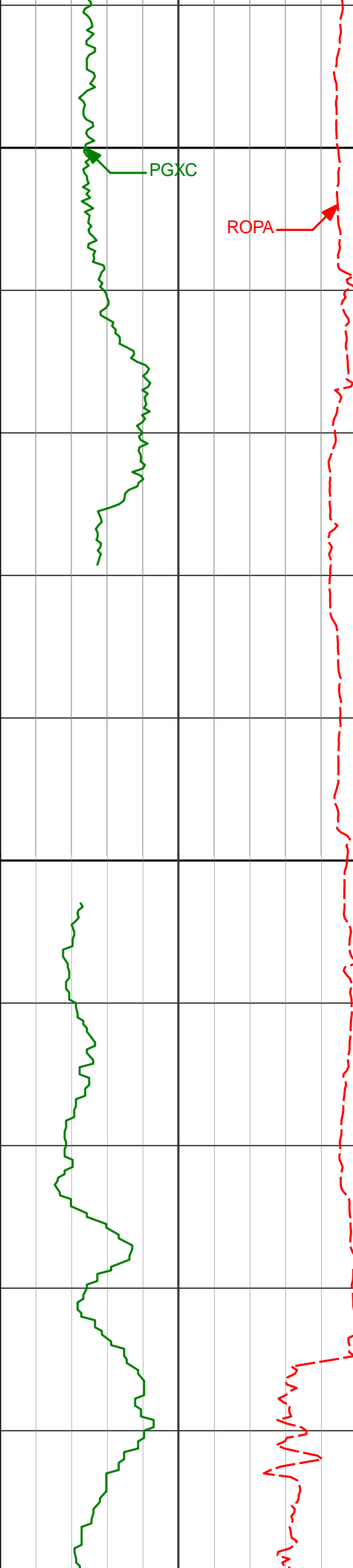
2172.08'

8949'

91.02°

89.14° 6695.57'

2266.19'



9000

PGXC

ROPA

9044'

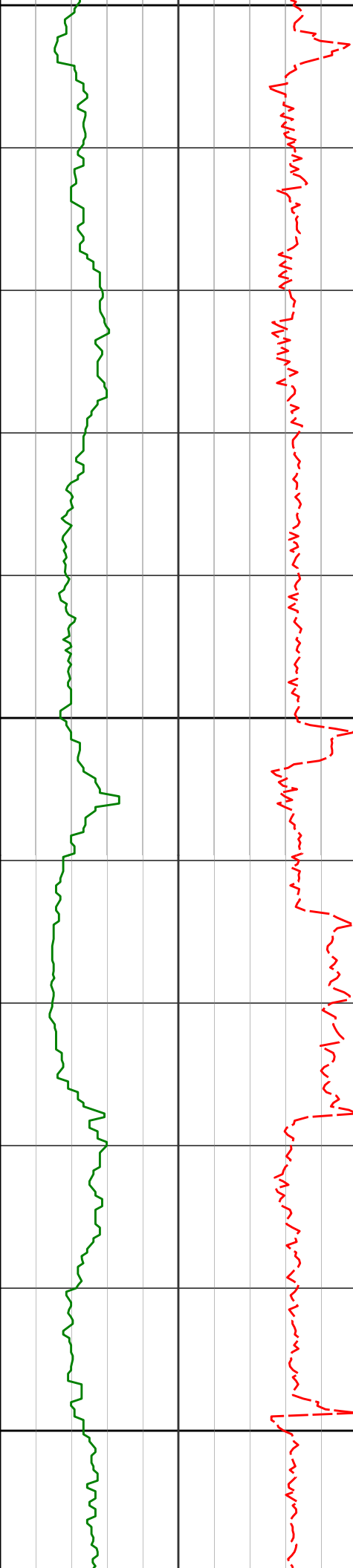
92.16°

88.62° 6692.93'

2360.08'

9100

9200



9200

9234'

93.67°

89.09° 6682.98'

2547.70'

9300

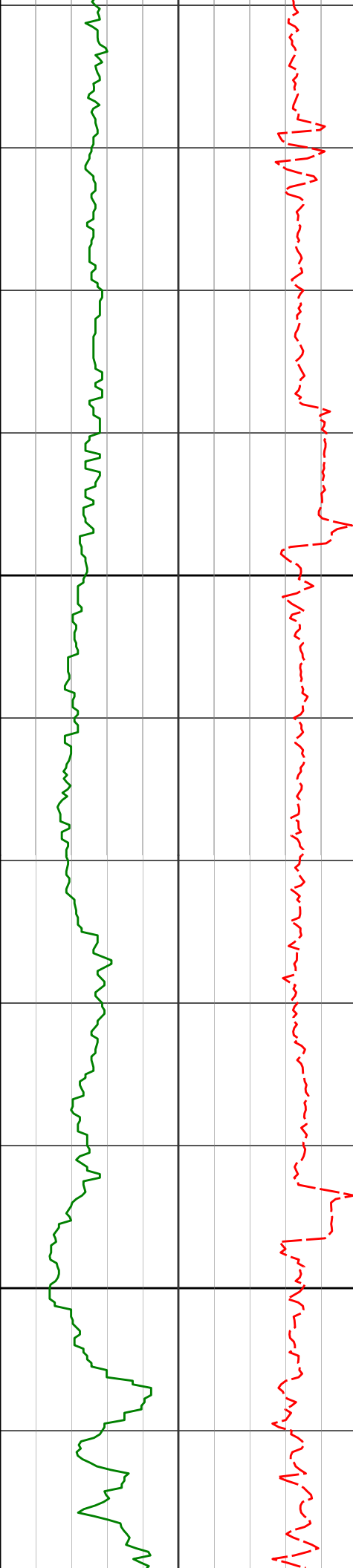
9329'

92.96°

88.30° 6677.49'

2641.41'

9400



9424'

89.85°

87.48° 6675.16'

2735.03'

9500

9519'

90.03°

86.95° 6675.26'

2828.50'

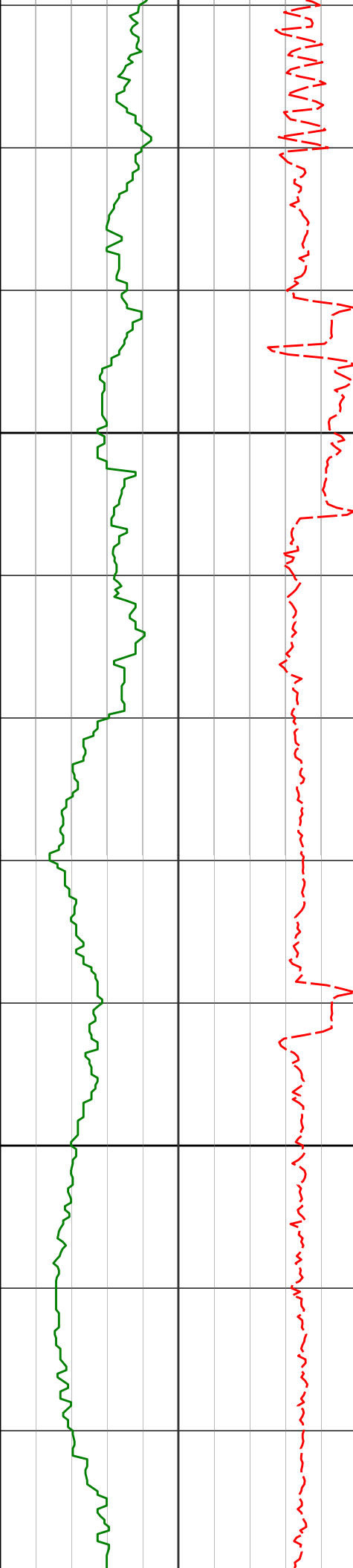
9600

9615'

89.69°

86.11° 6675.49'

2922.74'



9700

9709'

92.07°

87.45° 6674.05'

3015.07'

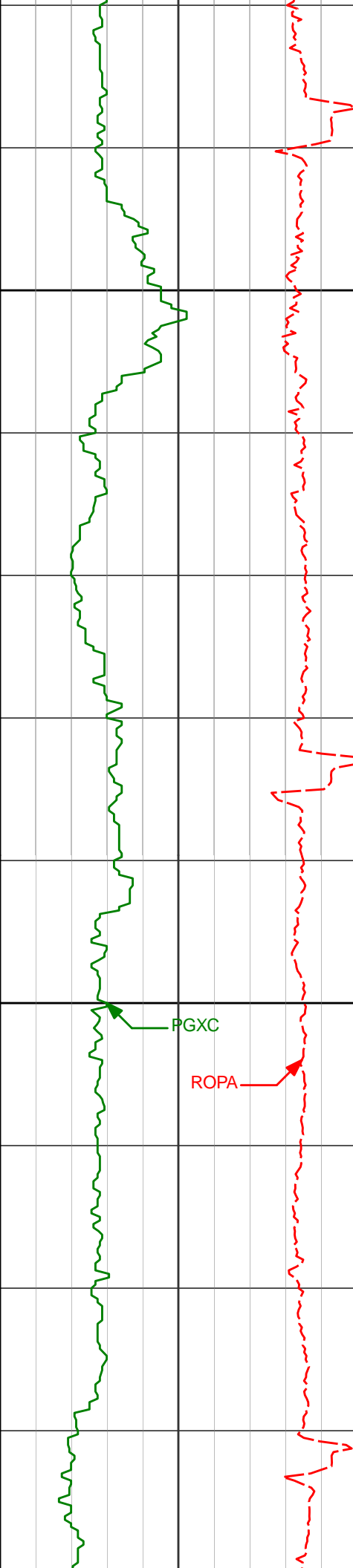
9800

9804'

91.88°

87.72° 6670.77'

3108.59'



9900

9899'

91.54°

87.22° 6667.94'

3202.09'

10000

9994'

90.89°

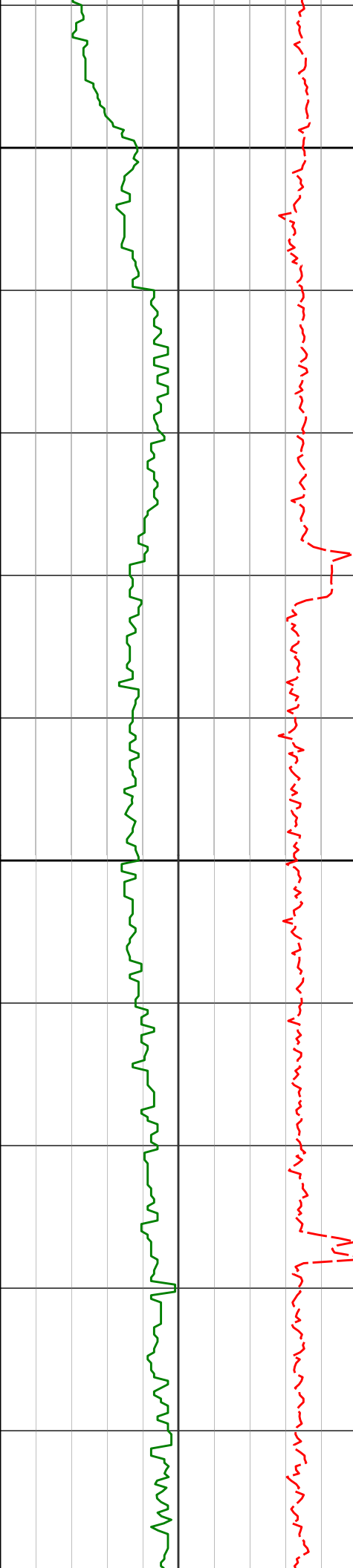
86.99° 6665.93'

3295.51'

PGXC

ROPA





10100

10200

10089'

91.64°

87.23° 6663.83'

3388.92'

10184'

91.76°

86.74° 6661.01'

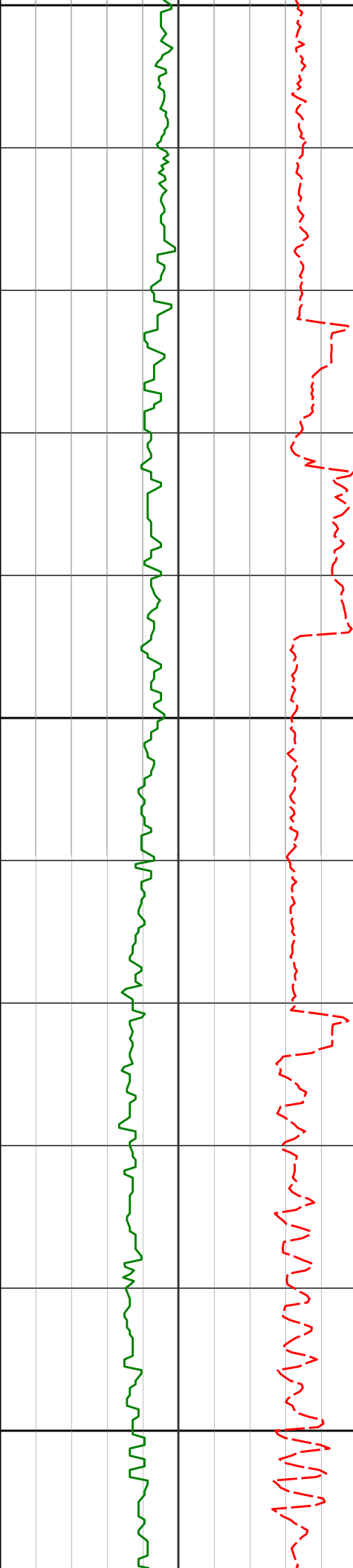
3482.27'

10279'

91.39°

85.95° 6658.40'

3575.44'



10300

10373'

91.11°

87.20° 6656.35'

3667.70'

10400

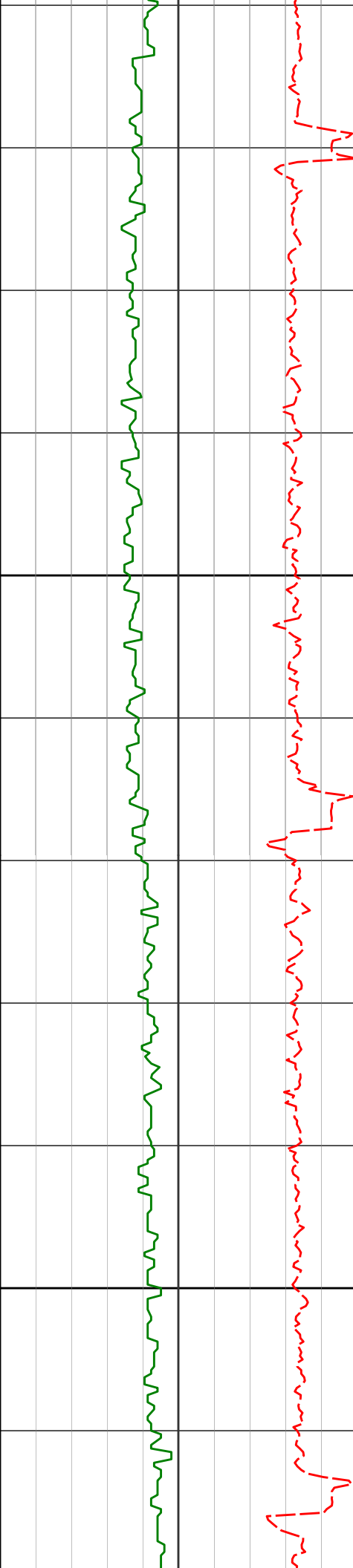
10468'

90.99°

88.13° 6654.61'

3761.29'

10500

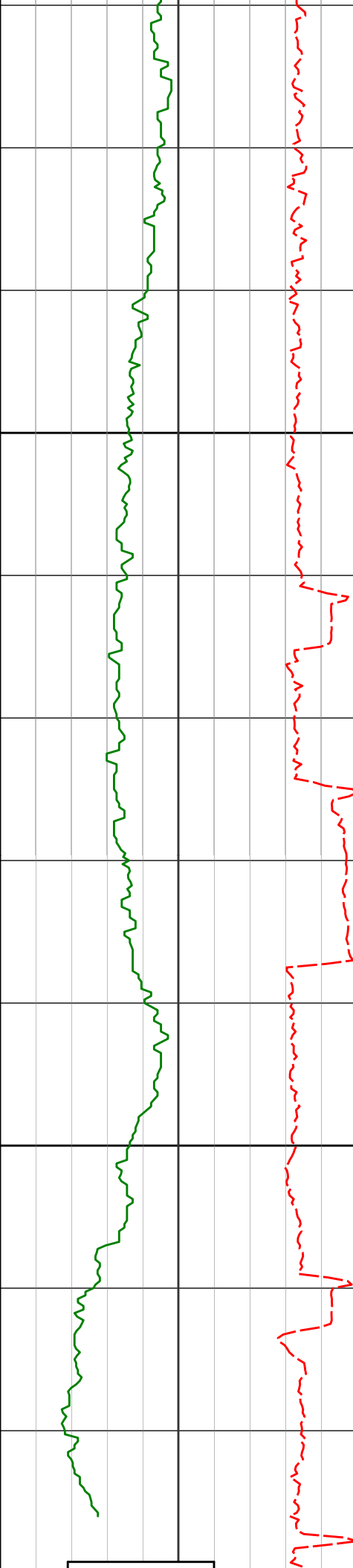


10600

10700

10563' 90.49° 87.26° 6653.38' 3854.88'

10659' 90.68° 86.88° 6652.40' 3949.29'



10800

10900

10754'

90.31°

86.34° 6651.58'

4042.56'

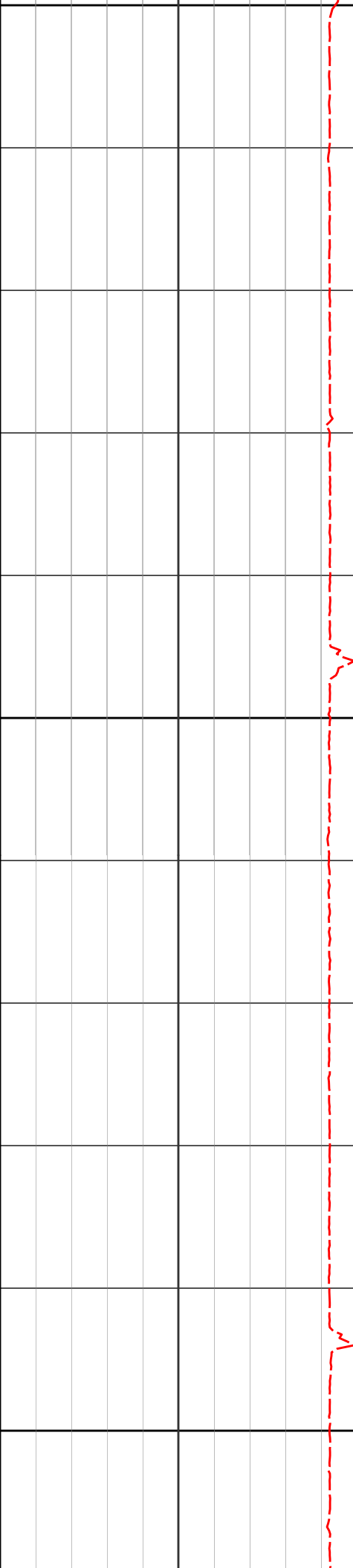
MWD Quit Working

ROPA

11000

11100

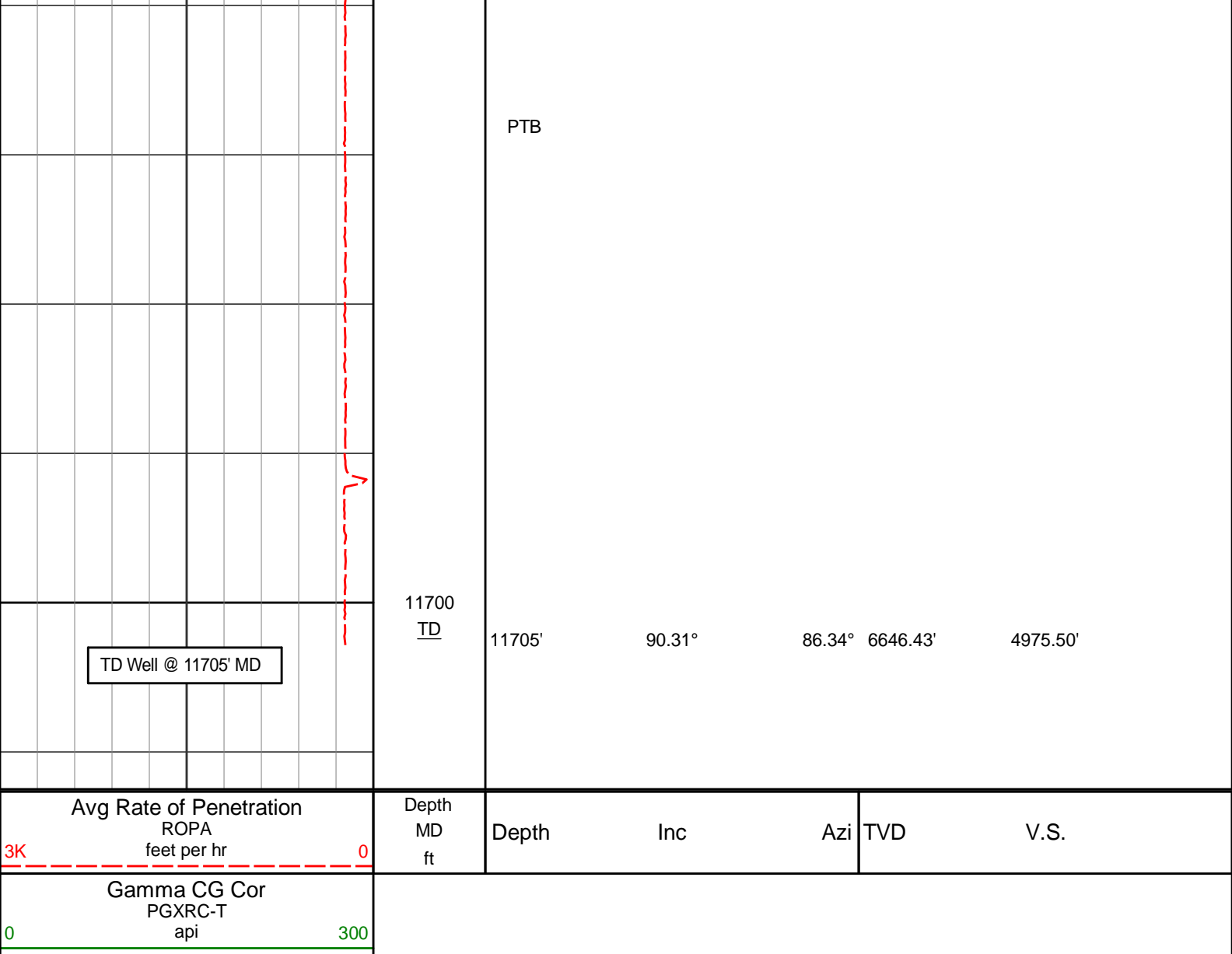




11400

11500

11600



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Aggie State AA17-645  
Wattenburg  
Weld Colorado  
USA

CA-XX-0902180831

First two surveys were provided by HP.

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
374.00	0.20	141.87	374.00	0.51 S	0.40 E	0.47	0.05
653.00	0.20	157.57	653.00	1.35 S	0.89 E	1.06	0.02
1020.00	1.54	113.61	1019.95	3.91 S	5.65 E	6.12	0.38
1115.00	1.29	111.33	1114.92	4.81 S	7.82 E	8.38	0.27
1208.00	1.11	28.18	1207.91	4.40 S	9.22 E	9.72	1.72
1393.00	1.39	48.43	1392.86	1.33 S	11.74 E	11.82	0.28
1486.00	2.07	356.01	1485.82	1.09 N	12.47 E	12.22	1.77
1579.00	2.06	351.51	1578.76	4.42 N	12.11 E	11.43	0.17
1764.00	1.52	335.22	1763.67	9.94 N	10.59 E	9.20	0.40
1949.00	1.60	319.01	1948.61	14.11 N	7.87 E	5.95	0.24
2136.00	2.69	227.13	2135.51	13.10 N	2.94 E	1.20	1.70



2155.00	2.83	227.13	2155.97	15.16 N	2.94 E	1.28	1.78
2227.00	5.98	213.06	2226.24	7.67 N	1.22 W	-2.21	3.77
2320.00	8.33	201.11	2318.52	2.67 S	6.29 W	-5.88	2.98
2412.00	10.37	193.89	2409.29	16.93 S	10.67 W	-8.37	2.55
2504.00	10.39	191.86	2499.79	33.09 S	14.37 W	-9.91	0.40
2596.00	11.61	200.80	2590.10	49.86 S	19.36 W	-12.67	2.28
2689.00	11.06	198.92	2681.29	67.05 S	25.58 W	-16.58	0.71
2782.00	10.72	196.65	2772.62	83.78 S	30.95 W	-19.72	0.59
2875.00	11.65	206.87	2863.86	100.44 S	37.67 W	-24.20	2.35
3065.00	11.25	204.30	3050.08	134.45 S	53.97 W	-35.91	0.34
3160.00	10.92	199.10	3143.31	151.39 S	60.72 W	-40.39	1.11
3255.00	10.52	210.02	3236.66	167.41 S	68.01 W	-45.51	2.18
3350.00	9.19	207.59	3330.25	181.64 S	75.86 W	-51.44	1.47
3446.00	7.22	205.80	3425.27	193.87 S	82.04 W	-55.96	2.07
3541.00	8.49	200.24	3519.38	205.82 S	87.06 W	-59.38	1.56
3636.00	10.40	199.94	3613.08	220.47 S	92.41 W	-62.77	2.01
3730.00	11.16	200.21	3705.42	236.98 S	98.45 W	-66.59	0.81
3825.00	12.40	204.53	3798.42	254.89 S	105.86 W	-71.59	1.60
3920.00	12.97	204.41	3891.10	273.87 S	114.50 W	-77.67	0.60
4015.00	11.32	214.28	3983.98	291.29 S	124.16 W	-84.97	2.79
4110.00	10.58	215.10	4077.25	306.13 S	134.43 W	-93.21	0.80
4205.00	9.51	212.86	4170.80	319.86 S	143.70 W	-100.60	1.20
4300.00	7.74	211.76	4264.72	331.89 S	151.33 W	-106.59	1.87
4394.00	6.76	208.66	4357.97	342.13 S	157.31 W	-111.18	1.12
4489.00	7.36	204.55	4452.25	352.57 S	162.52 W	-114.98	0.83
4584.00	6.72	200.32	4546.53	363.31 S	166.98 W	-118.00	0.87
4679.00	4.49	192.71	4641.07	372.16 S	169.73 W	-119.56	2.47
4774.00	5.47	188.81	4735.71	380.26 S	171.24 W	-120.00	1.09
4869.00	6.09	195.29	4830.23	389.59 S	173.26 W	-120.79	0.95
4964.00	7.60	208.00	4924.55	400.00 S	177.54 W	-123.67	2.24
5059.00	11.49	210.24	5018.22	413.73 S	185.26 W	-129.52	4.11
5155.00	10.05	206.43	5112.53	429.49 S	193.80 W	-135.93	1.67
5250.00	9.93	198.48	5206.09	444.68 S	200.09 W	-140.17	1.46
5345.00	10.48	195.21	5299.59	460.79 S	204.95 W	-142.89	0.84
5440.00	9.54	191.55	5393.15	476.84 S	208.80 W	-144.60	1.19
5535.00	11.84	197.98	5486.49	493.83 S	213.38 W	-146.92	2.72
5630.00	10.77	196.61	5579.65	511.60 S	218.93 W	-150.09	1.16
5725.00	11.63	203.16	5672.84	528.91 S	225.23 W	-154.07	1.62
5820.00	10.75	199.77	5766.04	546.06 S	231.99 W	-158.54	1.16
5915.00	13.87	194.57	5858.84	565.42 S	237.86 W	-161.81	3.48
6010.00	16.74	186.68	5950.48	590.04 S	242.31 W	-163.01	3.73
6104.00	14.30	177.61	6041.05	615.09 S	243.41 W	-160.81	3.65
6199.00	18.41	162.40	6132.23	641.13 S	238.38 W	-152.42	6.21
6294.00	29.99	144.59	6218.85	674.94 S	220.00 W	-129.77	14.29
6389.00	35.67	131.55	6298.74	712.74 S	185.44 W	-90.57	9.52
6484.00	37.21	120.74	6375.24	745.83 S	139.97 W	-41.16	6.94
6579.00	38.79	103.62	6450.31	767.58 S	86.21 W	14.99	11.19
6674.00	40.52	94.66	6523.51	777.11 S	26.47 W	75.46	6.28
6769.00	47.00	83.31	6592.20	775.56 S	38.96 E	140.12	10.69
6864.00	61.05	80.56	6647.87	764.64 S	114.85 E	213.94	14.97
6959.00	76.34	82.58	6682.29	751.79 S	202.15 E	298.80	16.22
7023.00	83.11	84.54	6693.70	744.74 S	264.69 E	359.88	11.00
7156.00	86.55	86.01	6705.68	733.84 S	396.68 E	489.30	2.81
7248.00	88.58	87.46	6709.59	728.60 S	488.44 E	579.59	2.71
7340.00	88.49	89.75	6711.94	726.36 S	580.37 E	670.44	2.49
7433.00	88.00	90.20	6714.79	726.32 S	673.33 E	762.59	0.72
7526.00	91.20	90.65	6715.44	727.01 S	766.31 E	854.87	3.47
7619.00	91.14	90.48	6713.54	727.93 S	859.29 E	947.16	0.19
7714.00	90.22	90.36	6712.41	728.63 S	954.28 E	1041.43	0.98
7809.00	89.82	89.78	6712.38	728.74 S	1049.28 E	1135.62	0.74
7904.00	90.43	90.62	6712.17	729.07 S	1144.27 E	1229.85	1.09
7999.00	90.03	89.89	6711.79	729.50 S	1239.27 E	1324.08	0.88
8094.00	92.22	89.30	6709.93	728.82 S	1334.25 E	1418.15	2.39
8189.00	91.94	88.99	6706.48	727.41 S	1429.17 E	1512.08	0.44
8284.00	91.42	89.17	6703.69	725.88 S	1524.12 E	1606.01	0.58
8379.00	91.05	91.40	6701.65	726.36 S	1619.09 E	1700.22	2.38
8474.00	90.62	91.51	6700.26	728.77 S	1714.05 E	1794.68	0.47
8569.00	90.22	90.97	6699.56	730.82 S	1809.02 E	1889.11	0.71
8664.00	90.09	91.25	6699.31	732.66 S	1904.00 E	1983.51	0.32
8759.00	91.11	90.27	6698.31	733.92 S	1998.99 E	2077.85	1.49
8854.00	90.59	90.32	6696.90	734.41 S	2093.98 E	2172.08	0.55
8949.00	91.02	89.14	6695.57	733.96 S	2188.96 E	2266.19	1.32
9044.00	92.16	88.62	6692.93	732.11 S	2283.91 E	2360.08	1.32
9139.00	93.09	89.06	6688.58	730.19 S	2378.79 E	2453.89	1.08
9234.00	93.67	89.09	6682.98	728.66 S	2473.61 E	2547.70	0.61

9329.00	92.96	88.30	6677.49	726.50 S	2568.42 E	2641.41	1.12
9424.00	89.85	87.48	6675.16	723.00 S	2663.32 E	2735.03	3.39
9519.00	90.03	86.95	6675.26	718.38 S	2758.21 E	2828.50	0.59
9615.00	89.69	86.11	6675.49	712.57 S	2854.03 E	2922.74	0.94
9709.00	92.07	87.45	6674.05	707.29 S	2947.86 E	3015.07	2.91
9804.00	91.88	87.72	6670.77	703.29 S	3042.72 E	3108.59	0.35
9899.00	91.54	87.22	6667.94	699.10 S	3137.58 E	3202.09	0.64
9994.00	90.89	86.99	6665.93	694.30 S	3232.44 E	3295.51	0.73
10089.00	91.64	87.23	6663.83	689.52 S	3327.30 E	3388.92	0.83
10184.00	91.76	86.74	6661.01	684.52 S	3422.12 E	3482.27	0.53
10279.00	91.39	85.95	6658.40	678.47 S	3516.89 E	3575.44	0.92
10373.00	91.11	87.20	6656.35	672.85 S	3610.70 E	3667.70	1.36
10468.00	90.99	88.13	6654.61	668.98 S	3705.61 E	3761.29	0.99
10563.00	90.49	87.26	6653.38	665.16 S	3800.52 E	3854.88	1.06
10659.00	90.68	86.88	6652.40	660.26 S	3896.39 E	3949.29	0.44
10754.00	90.31	86.34	6651.58	654.64 S	3991.22 E	4042.56	0.69
11705.00	90.31	86.34	6646.43	593.93 S	4940.26 E	4975.50	0.00

**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 97.52 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 11705.00 FEET  
IS 4975.84 FEET ALONG 96.86 DEGREES (GRID)**

**Final survey is a straight line projection to TD.**