



**1 : 600 / 1 : 240**

WELL INFORMATION					
MWD Run Number	100				
Date run completed	29-Mar-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (MD, ft)	937.00				
Log End Depth (MD, ft)	7,087.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	28-Mar-15 04:50				
Drill/Wipe End Date and Time	29-Mar-15 03:00				
Min Inc (deg) @ Depth (MD, ft)	1.11 @ 1,208.00				
Max Inc (deg) @ Depth (MD, ft)	83.11 @ 7,023.00				
Bit TFA(in2) / Bit Type	1.21 / PDC				
Flow Rate (gpm)	624.81				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	9.00 / 41.00				
Filtrate CL (ppm)	2,800.00				
pH / Fluid Loss (mptm)	9.60 / 0				
PV (cP) / YP (lhf2)	14 / 13.00				
% Solids / % Sand	11.7 / .25				
% 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) @ Depth (MD, ft)	175.01 / PDC				

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

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404272				
Insert Serial Number	11680773				
Date and Time Initialized	27-Mar-15 17:56				
Date and Time Read	29-Mar-15 07:00				
ECMB SW Version	N/A				

### Directional Sensor Information

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

### Gamma Ray Sensor Information

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

## REMARKS

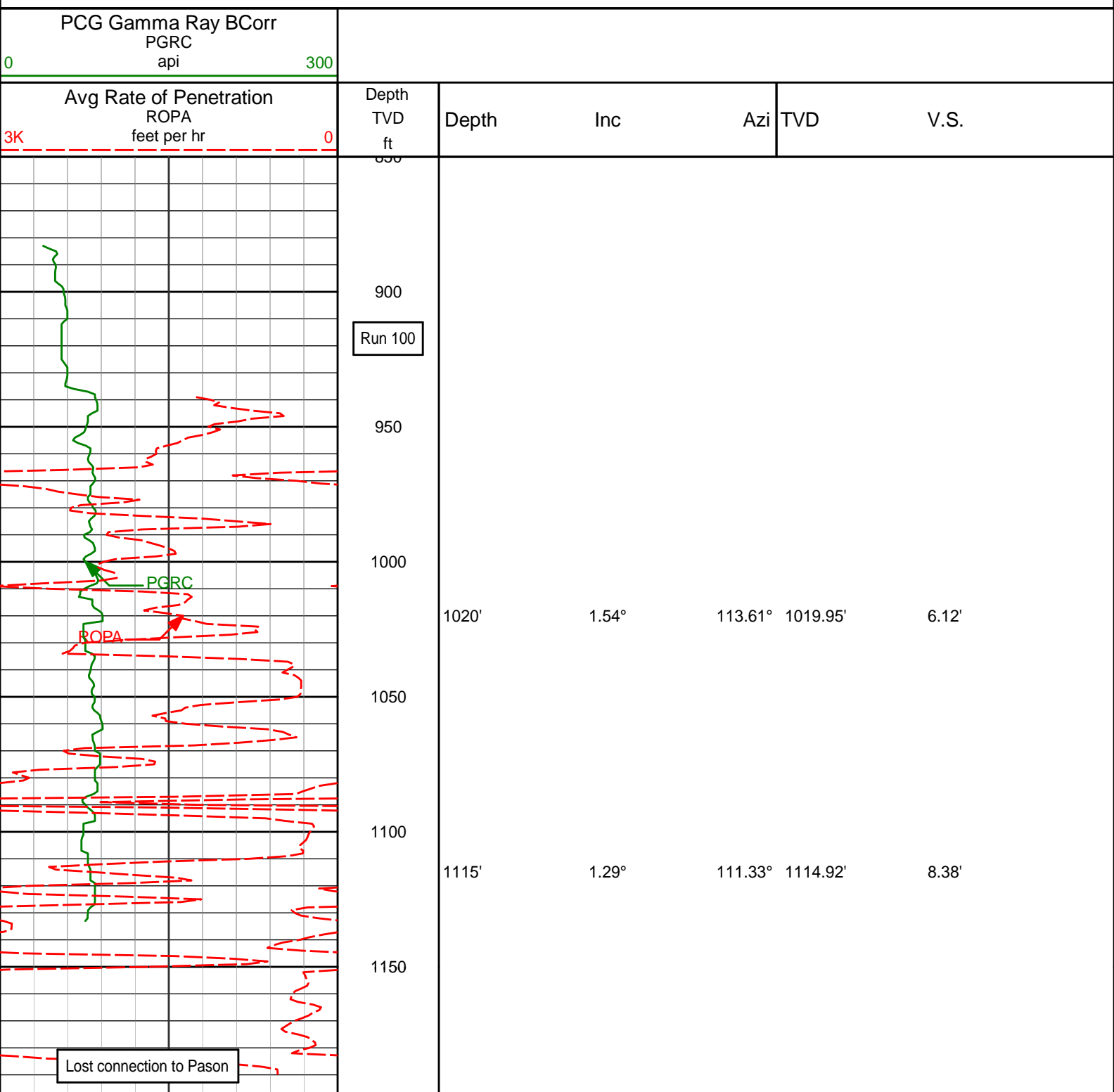
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance 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)

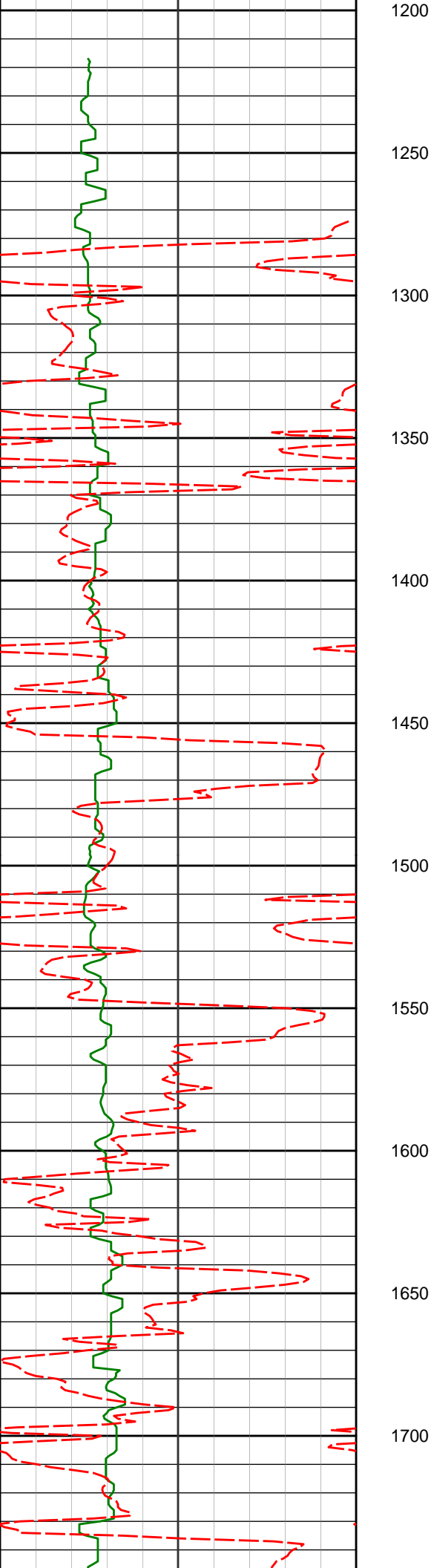
## WARRANTY

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# TVD Detail 1:600 Scale



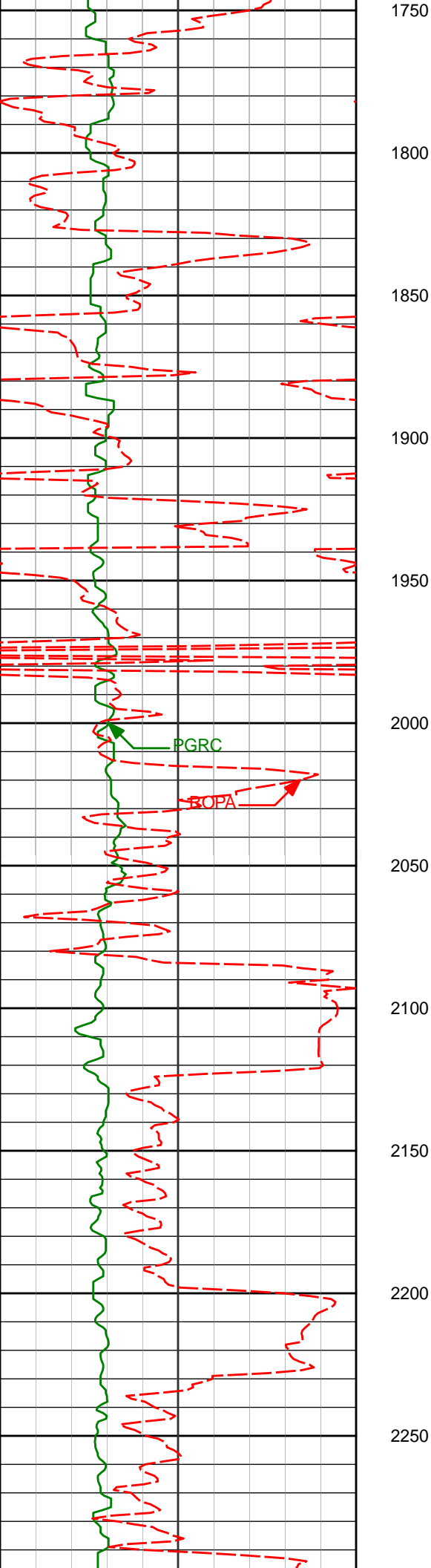


1208' 1.11° 28.18° 1207.91' 9.72'

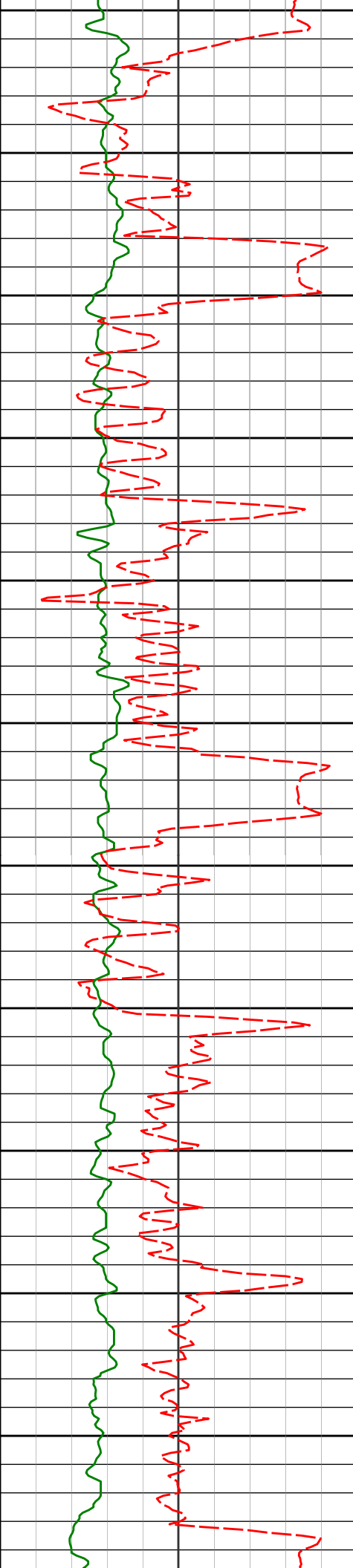
1393' 1.39° 48.43° 1392.86' 11.82'

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'
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'



2300

2320'

8.33°

201.11° 2318.52'

-5.88'

2350

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

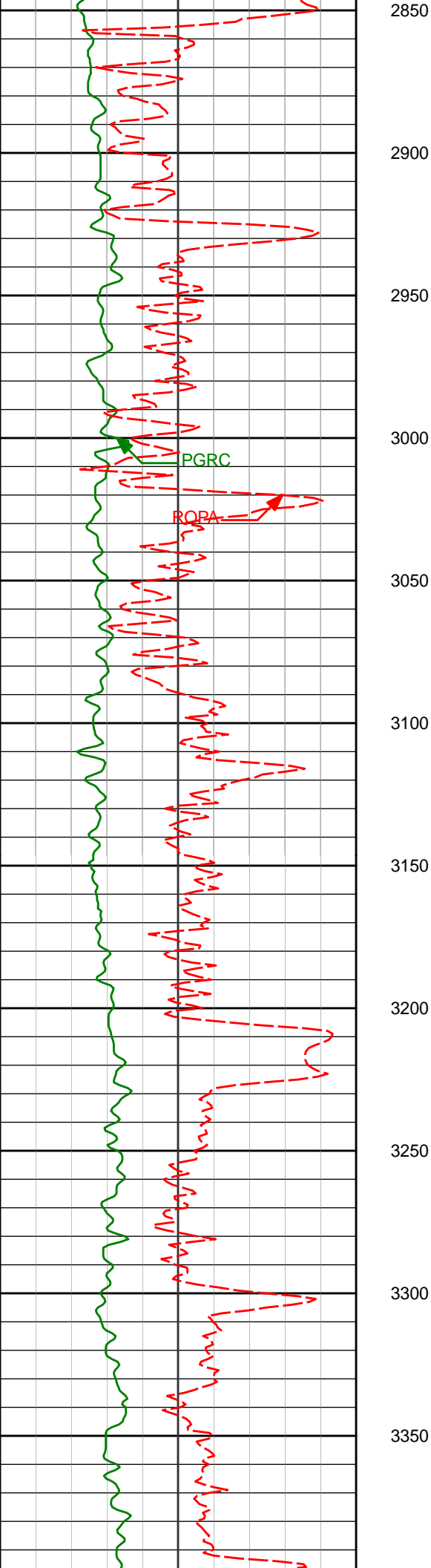
2782'

10.72°

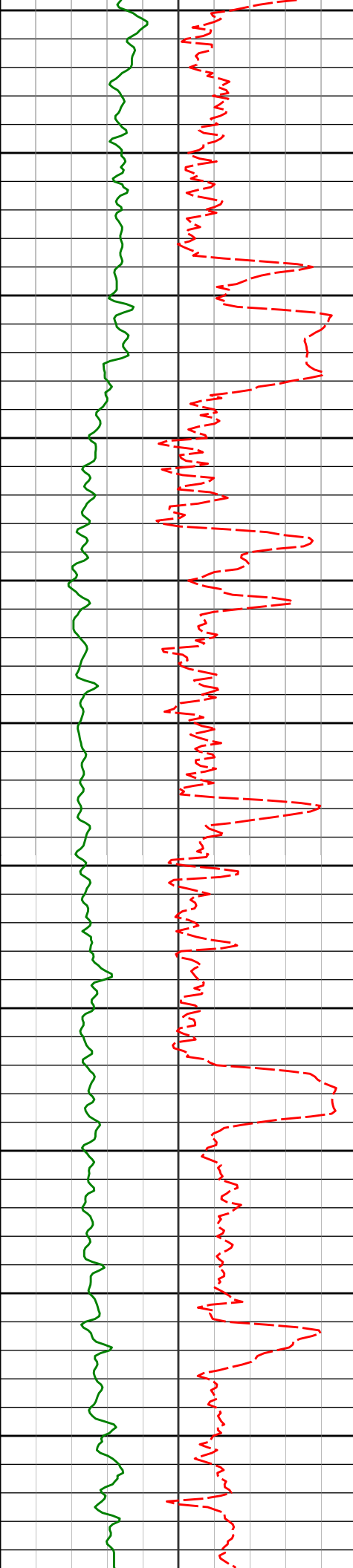
196.65° 2772.62'

-19.72'

2800



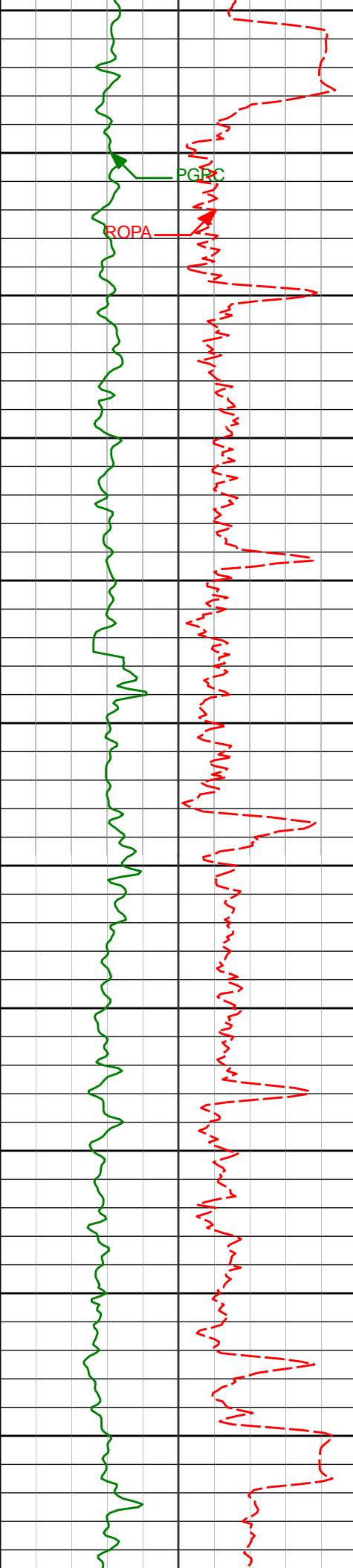
2875'	11.65°	206.87°	2863.86'	-24.20'
3065'	11.25°	204.30°	3050.08'	-35.91'
3160'	10.92°	199.10°	3143.31'	-40.39'
3255'	10.52°	210.02°	3236.66'	-45.51'
3350'	9.19°	207.59°	3330.25'	-51.44'



3400  
3446'  
3450  
3500  
3541'  
3550  
3600  
3636'  
3650  
3700  
3730'  
3750  
3800  
3825'  
3850  
3900  
3920'

3446'	7.22°	205.80°	3425.27'	-55.96'
3541'	8.49°	200.24°	3519.38'	-59.38'
3636'	10.40°	199.94°	3613.08'	-62.77'
3730'	11.16°	200.21°	3705.42'	-66.59'
3825'	12.40°	204.53°	3798.42'	-71.59'
3920'	12.97°	204.41°	3891.10'	-77.67'





3950

4015'

11.32°

214.28° 3983.98'

-84.97'

4000

PGRC

ROPA

4050

4110'

10.58°

215.10° 4077.25'

-93.21'

4100

4150

4205'

9.51°

212.86° 4170.80'

-100.60'

4200

4250

4300'

7.74°

211.76° 4264.72'

-106.59'

4300

4350

4394'

6.76°

208.66° 4357.97'

-111.18'

4400

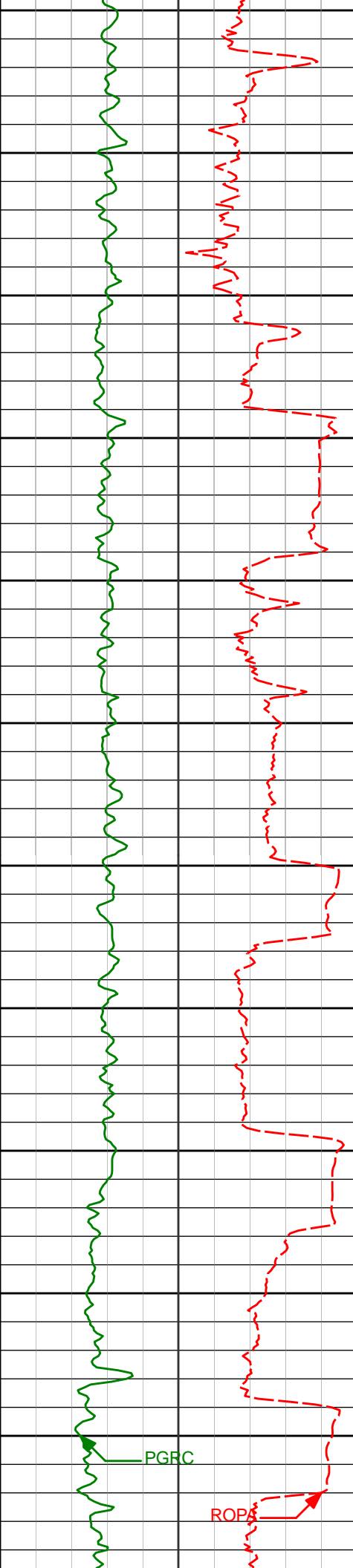
4450

4489'

7.36°

204.55° 4452.25'

-114.98'



4500

4550

4600

4650

4700

4750

4800

4850

4900

4950

5000

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'

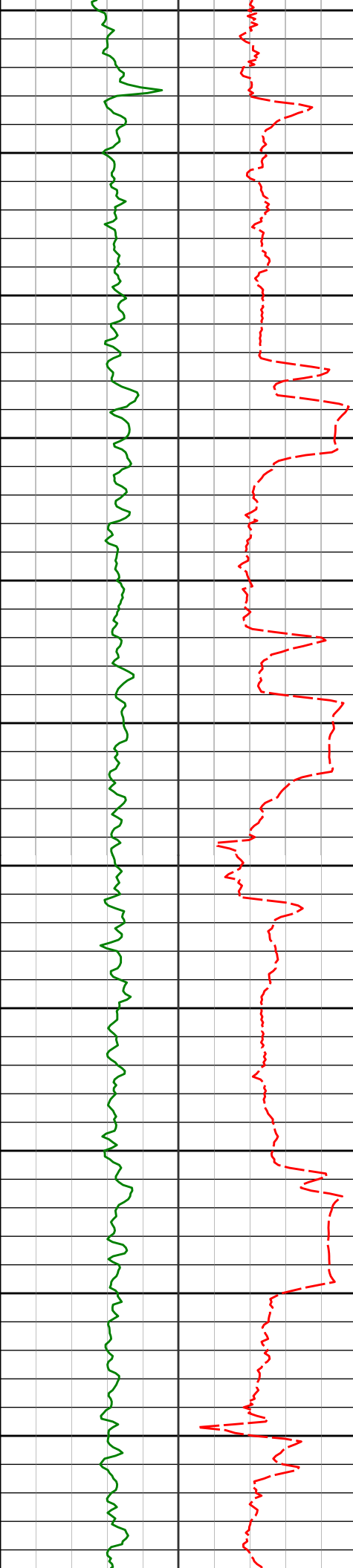
5059'

11.49°

210.24°

5018.22'

-129.52'



5050

5100

5150

5200

5250

5300

5350

5400

5450

5500

5550

5155'

10.05°

206.43°

5112.53'

-135.93'

5250'

9.93°

198.48°

5206.09'

-140.17'

5345'

10.48°

195.21°

5299.59'

-142.89'

5440'

9.54°

191.55°

5393.15'

-144.60'

5535'

11.84°

197.98°

5486.49'

-146.92'

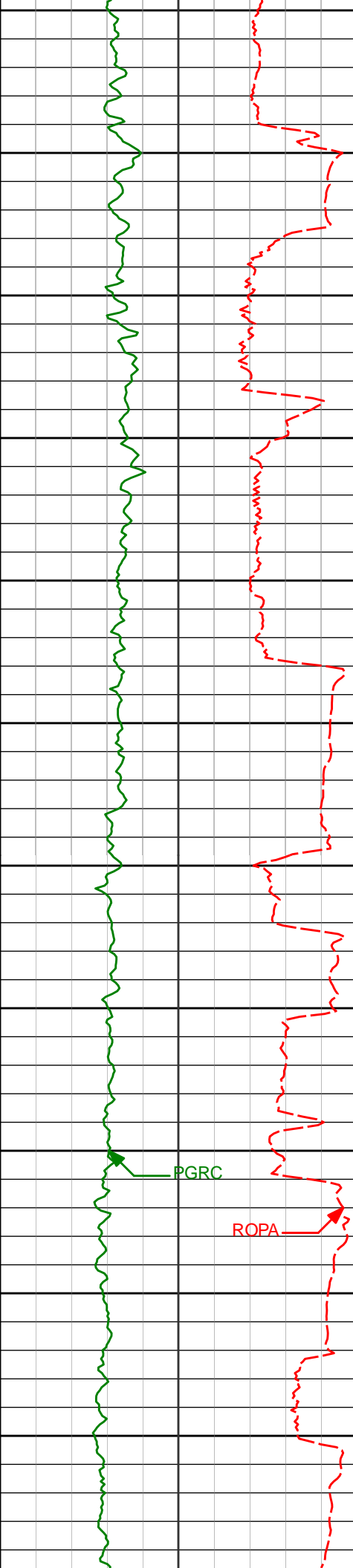
5630'

10.77°

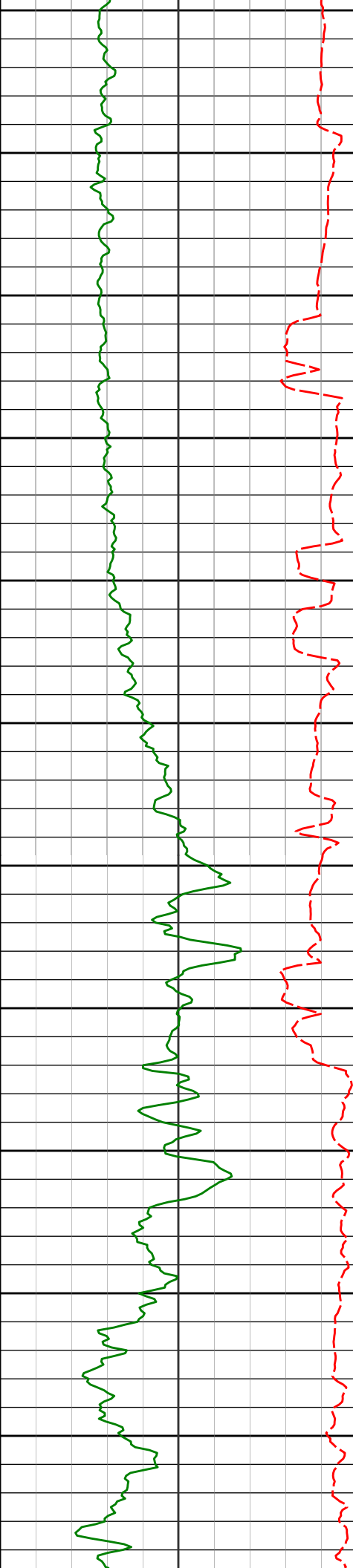
196.61°

5579.65'

-150.09'



5725'	11.63°	203.16°	5672.84'	-154.07'
5820'	10.75°	199.77°	5766.04'	-158.54'
5915'	13.87°	194.57°	5858.84'	-161.81'
5950'	16.74°	186.68°	5950.48'	-163.01'
6010'	14.30°	177.61°	6041.05'	-160.81'
6199'	18.41°	162.40°	6132.23'	-152.42'



6150

6200

6250

6300

6350

6400

6450

6500

6550

6600

6650

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'

6864'

61.05°

80.56°

6647.87'

213.94'

6959'

76.34°

82.58°

6682.29'

298.80'

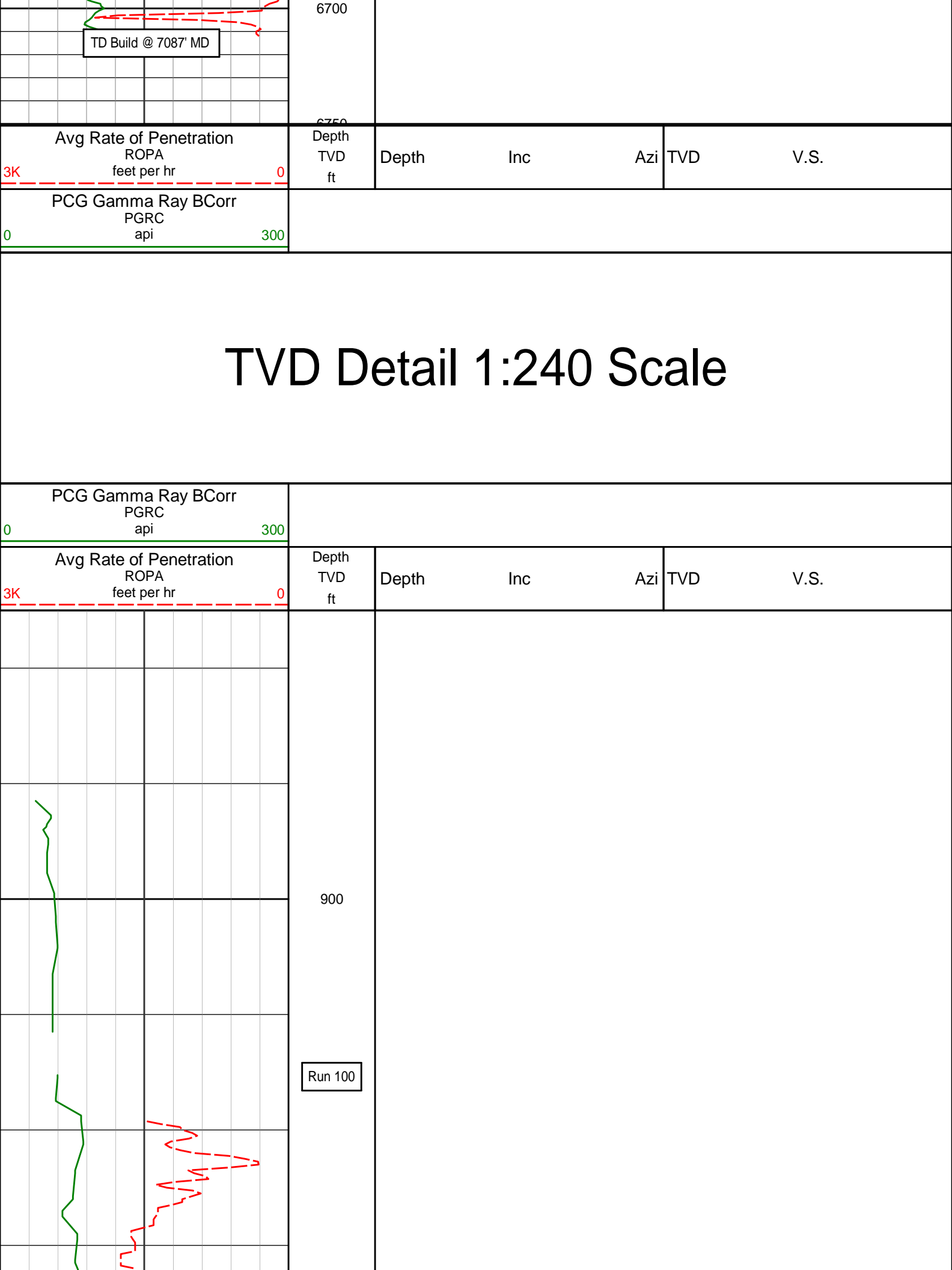
7023'

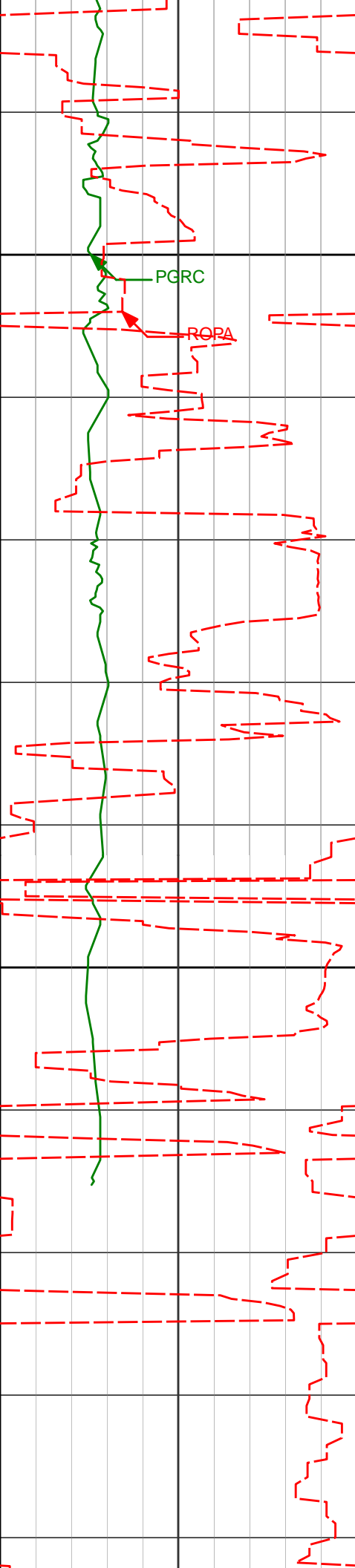
83.11°

84.54°

6693.70'

359.88'





1000

PGRC

ROPA

1020'

1.54°

113.61° 1019.95'

6.12'

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

1400

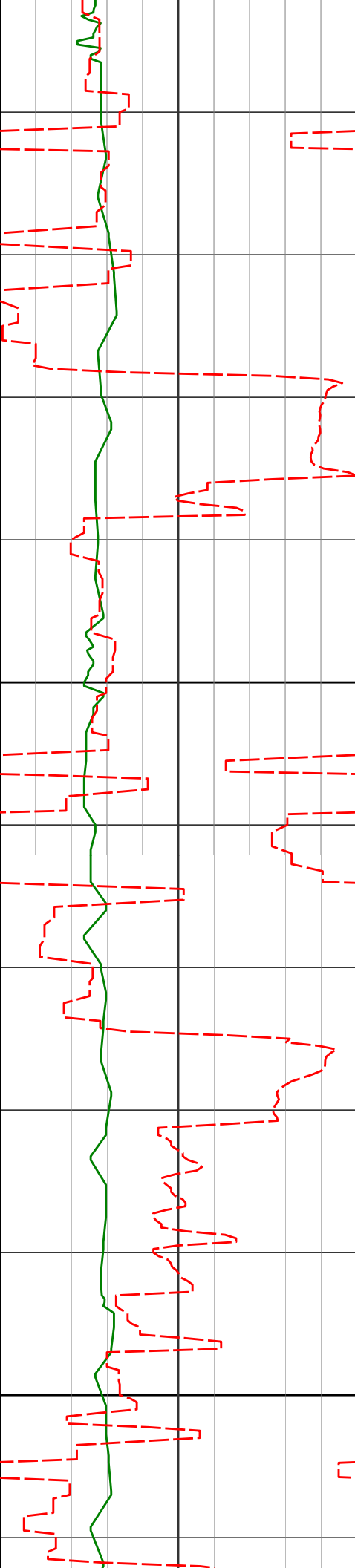
1393'

1.39°

48.43° 1392.86'

11.82'





1486'

2.07°

356.01° 1485.82'

12.22'

1500

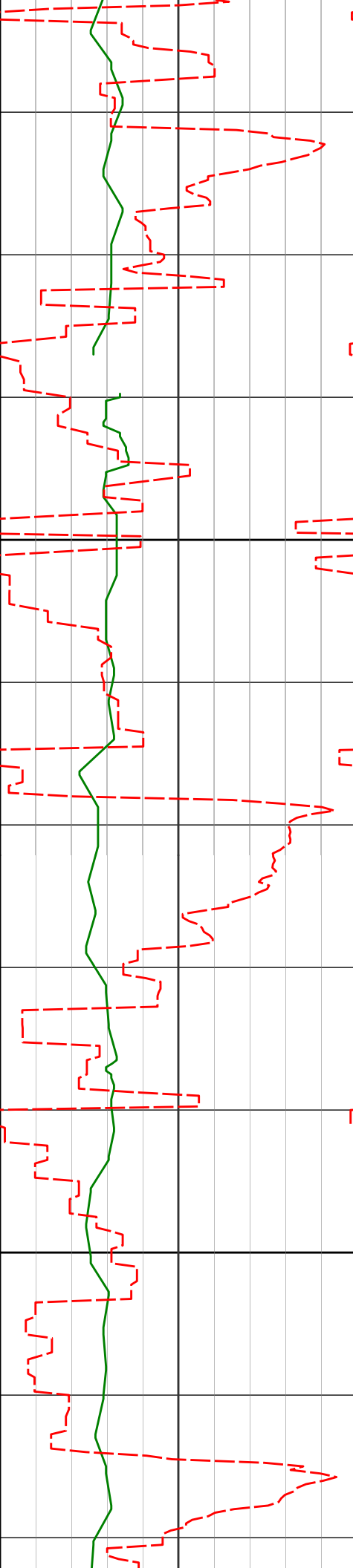
1579'

2.06°

351.51° 1578.76'

11.43'

1600



1700

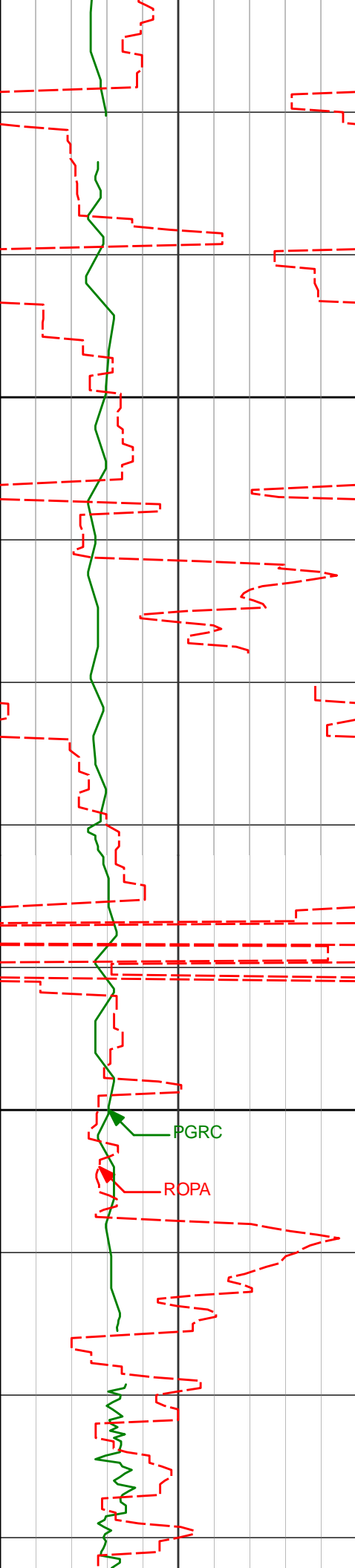
1764'

1.52°

335.22° 1763.67'

9.20'

1800



1900

1949'

1.60°

319.01° 1948.61'

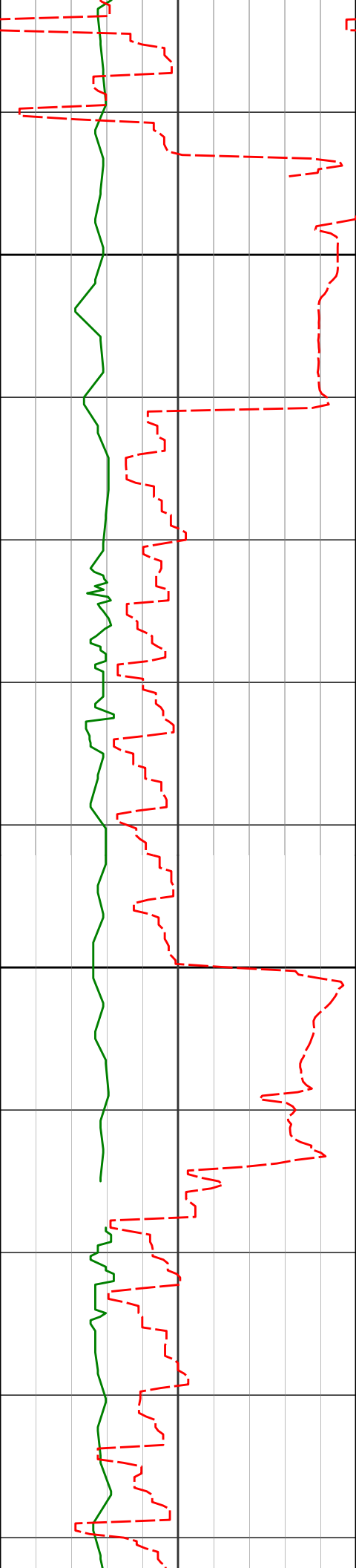
5.95'

2000

3000

PGRC

ROPA



2100

2136'

2.69°

227.13° 2135.51'

1.20'

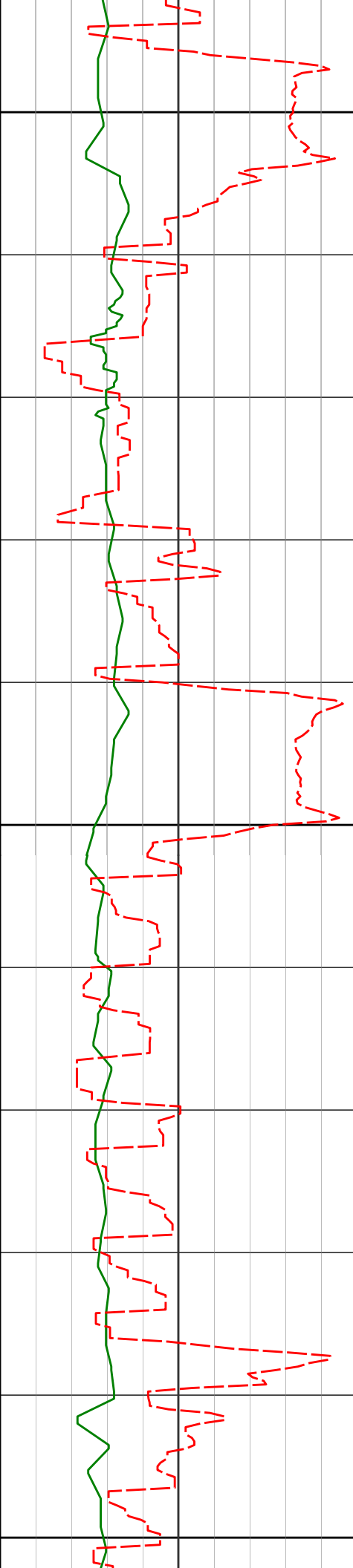
2200

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'

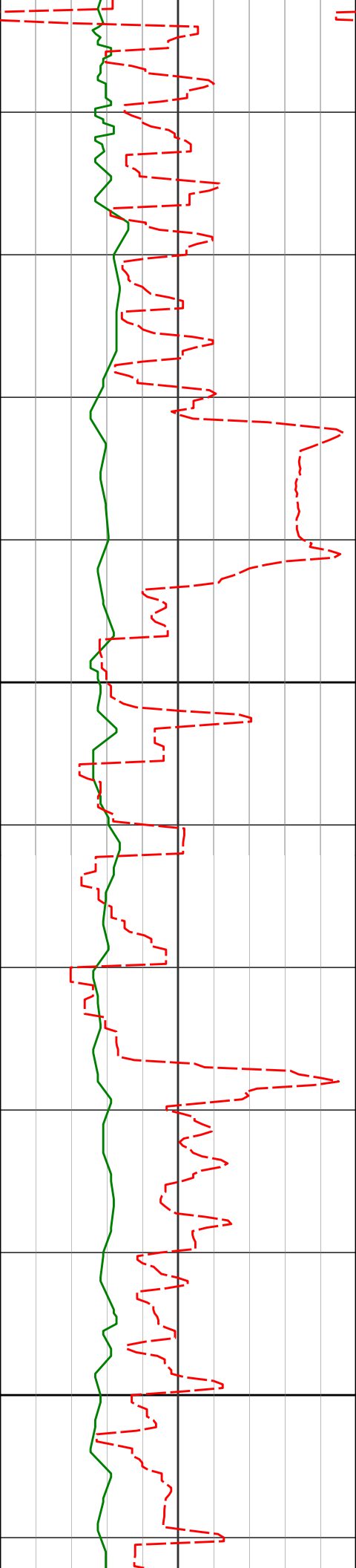
2500

2504'

10.39°

191.86° 2499.79'

-9.91'



2600

2700

2596'

11.61°

200.80° 2590.10'

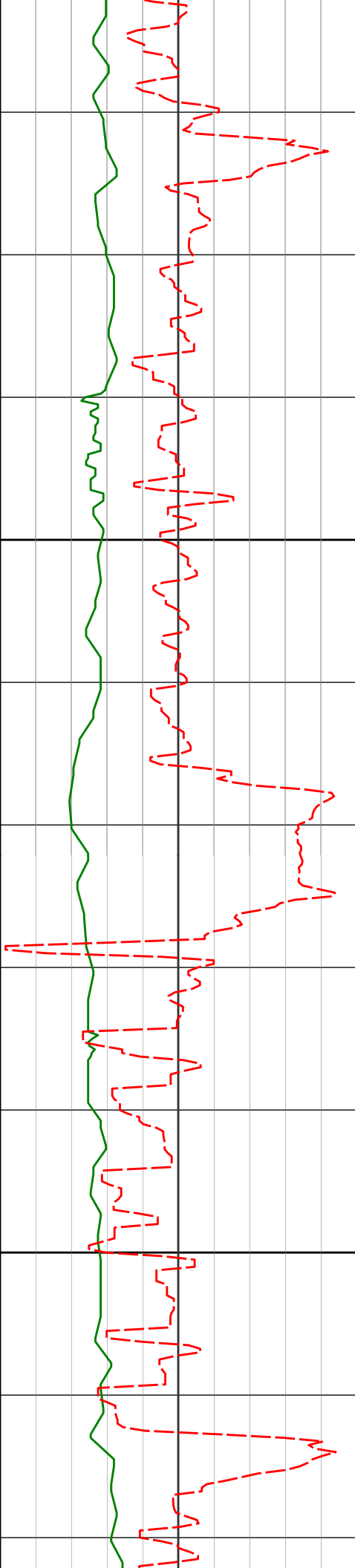
-12.67'

2689'

11.06°

198.92° 2681.29'

-16.58'



2800

2900

2782'

10.72°

196.65° 2772.62'

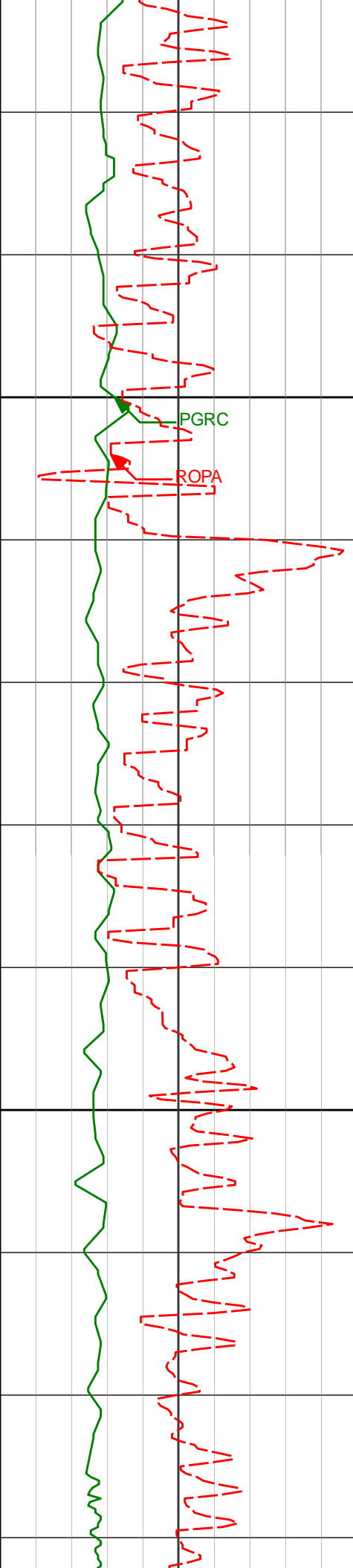
-19.72'

2875'

11.65°

206.87° 2863.86'

-24.20'



3000

PGRC

ROPA

3100

3065'

11.25°

204.30° 3050.08'

-35.91'

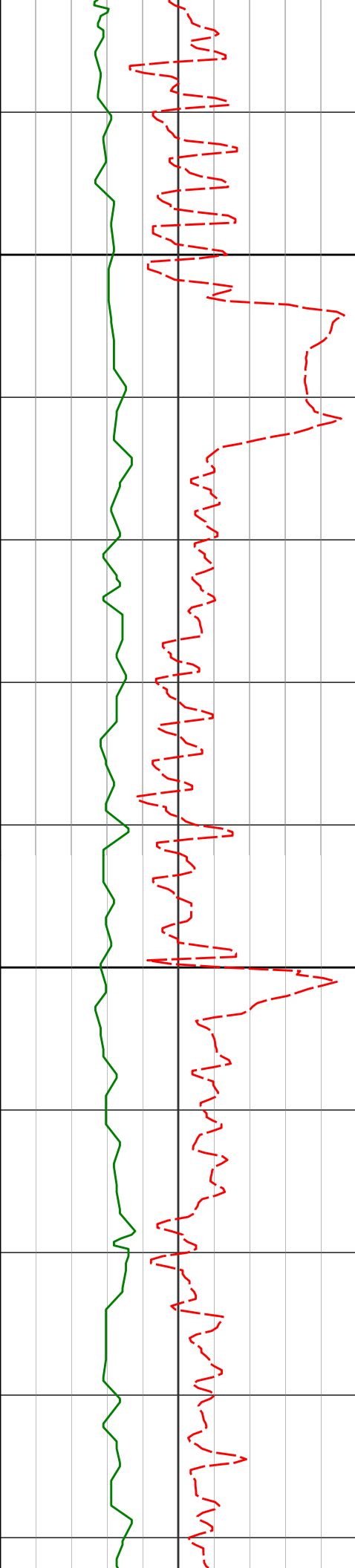
3160'

10.92°

199.10° 3143.31'

-40.39'





3200

3255'

10.52°

210.02° 3236.66'

-45.51'

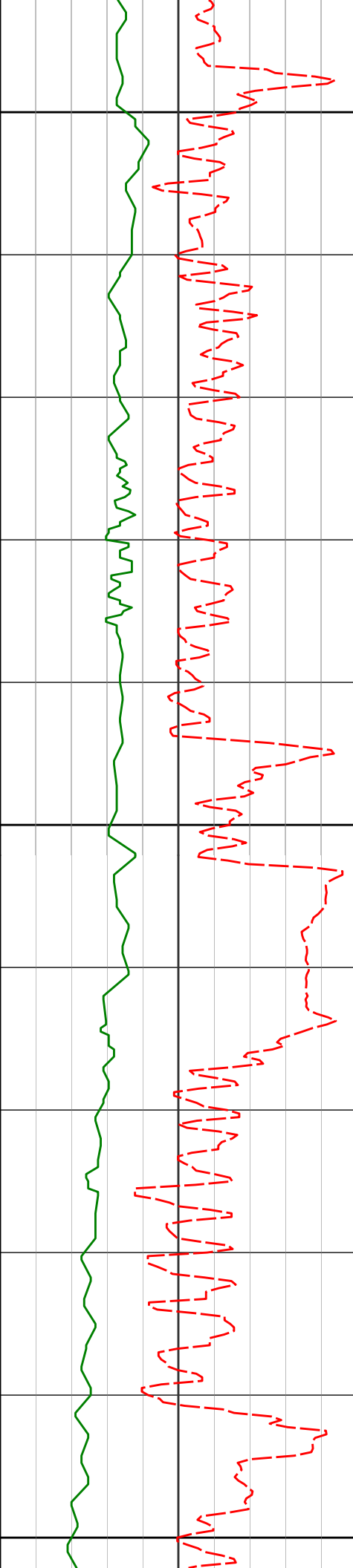
3300

3350'

9.19°

207.59° 3330.25'

-51.44'



3400

3446'

7.22°

205.80° 3425.27'

-55.96'

3500

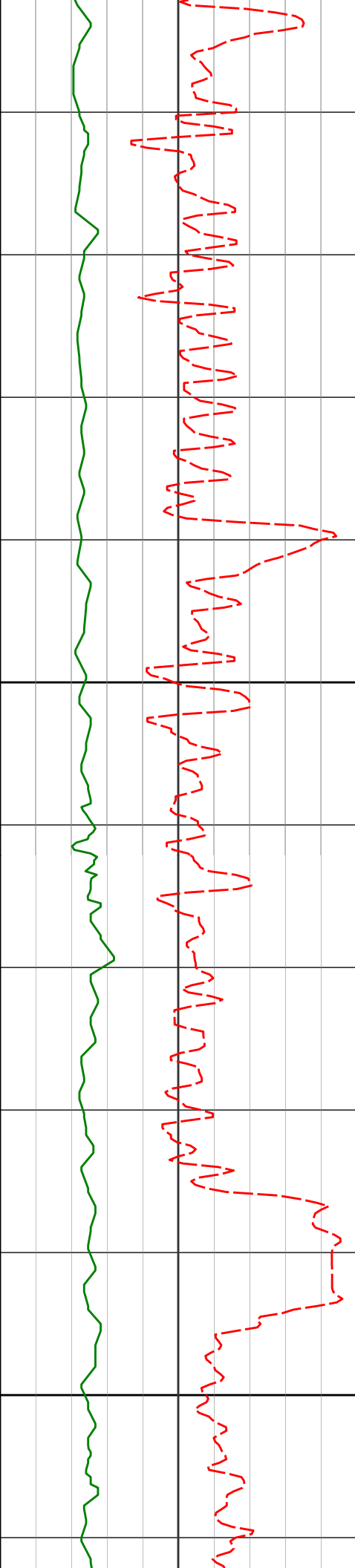
3541'

8.49°

200.24° 3519.38'

-59.38'

3600



3700

3800

3636'

10.40°

199.94° 3613.08'

-62.77'

3730'

11.16°

200.21° 3705.42'

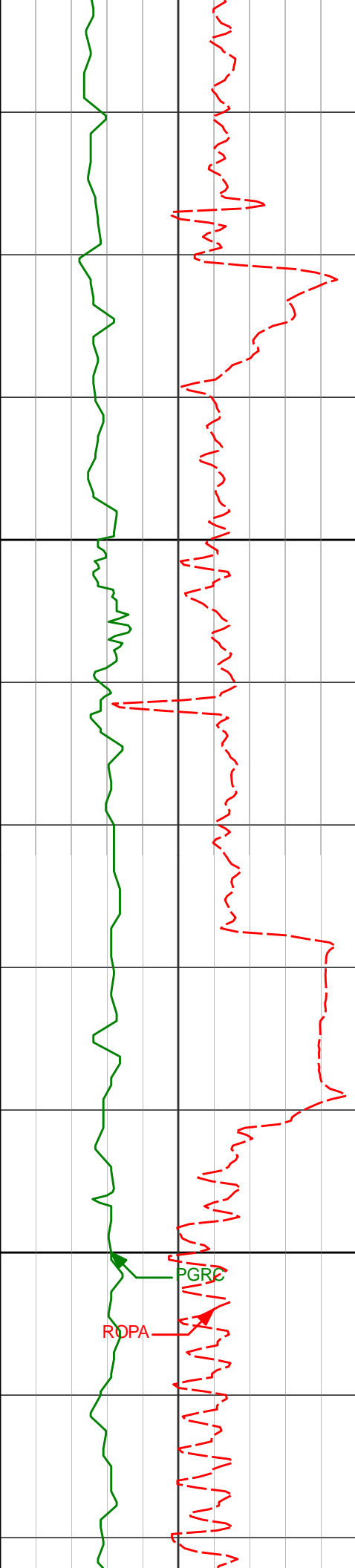
-66.59'

3825'

12.40°

204.53° 3798.42'

-71.59'



3900

4000

3920'

12.97°

204.41° 3891.10'

-77.67'

4015'

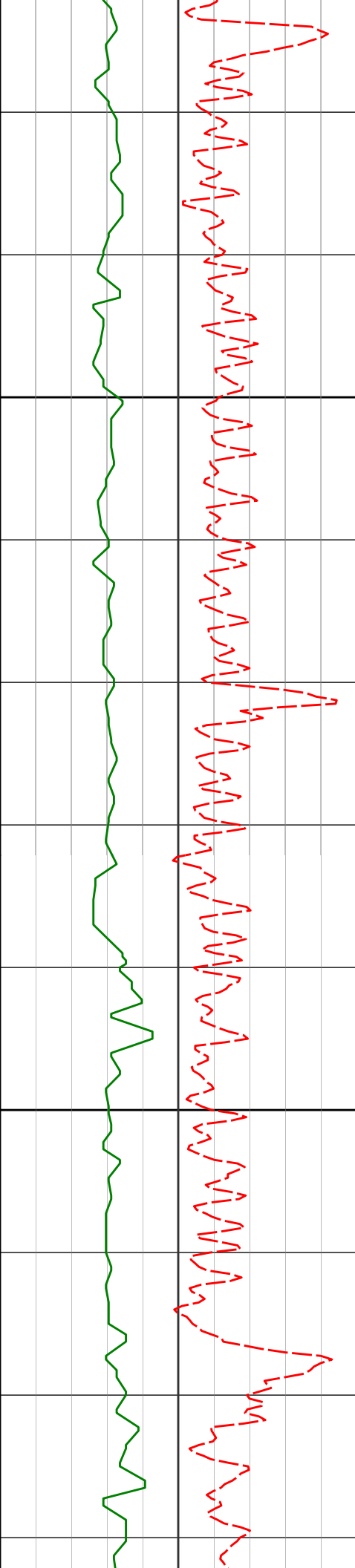
11.32°

214.28° 3983.98'

-84.97'

PGRC

ROPA



4100

4200

4110'

10.58°

215.10° 4077.25'

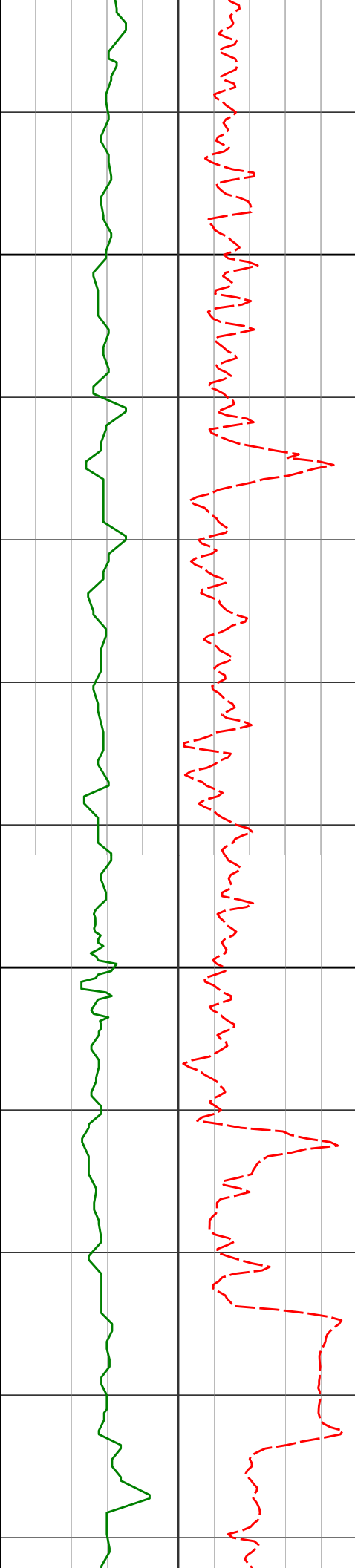
-93.21'

4205'

9.51°

212.86° 4170.80'

-100.60'



4300

4394'

4400

4489'

6.76°

7.36°

208.66° 4357.97'

204.55° 4452.25'

-111.18'

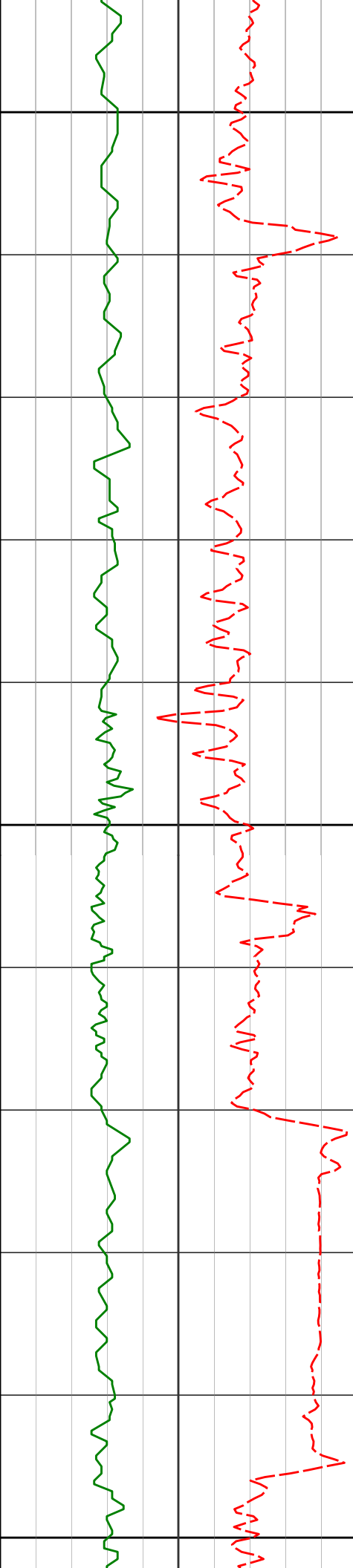
-114.98'

4300'

7.74°

211.76° 4264.72'

-106.59'



4500

4584'

6.72°

200.32° 4546.53'

-118.00'

4600

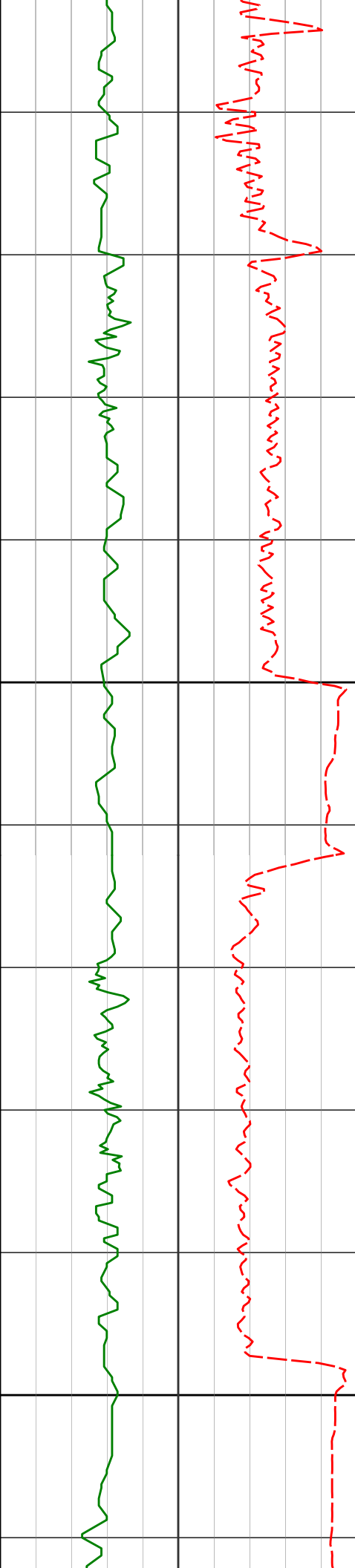
4679'

4.49°

192.71° 4641.07'

-119.56'

4700



4800

4900

4774'

5.47°

188.81° 4735.71'

-120.00'

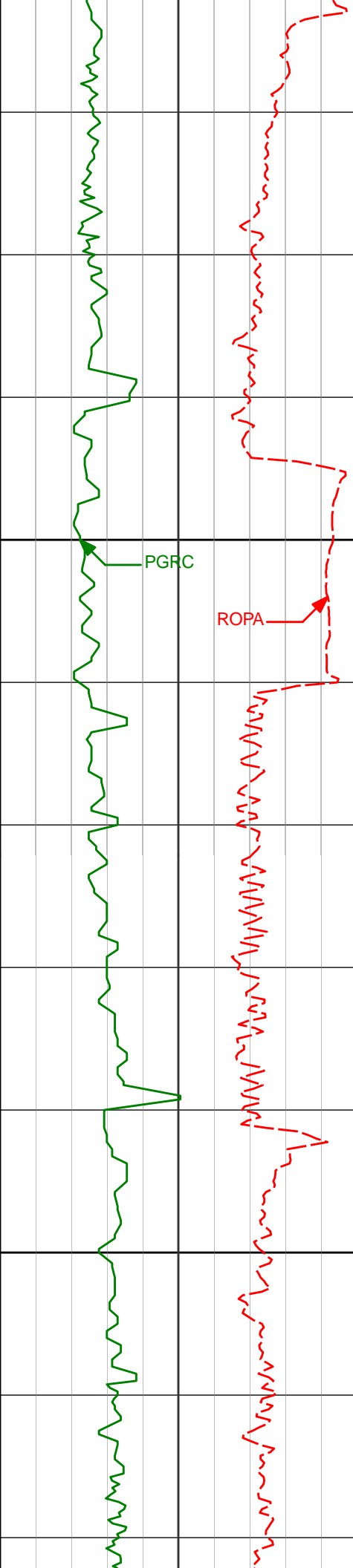
4869'

6.09°

195.29° 4830.23'

-120.79'

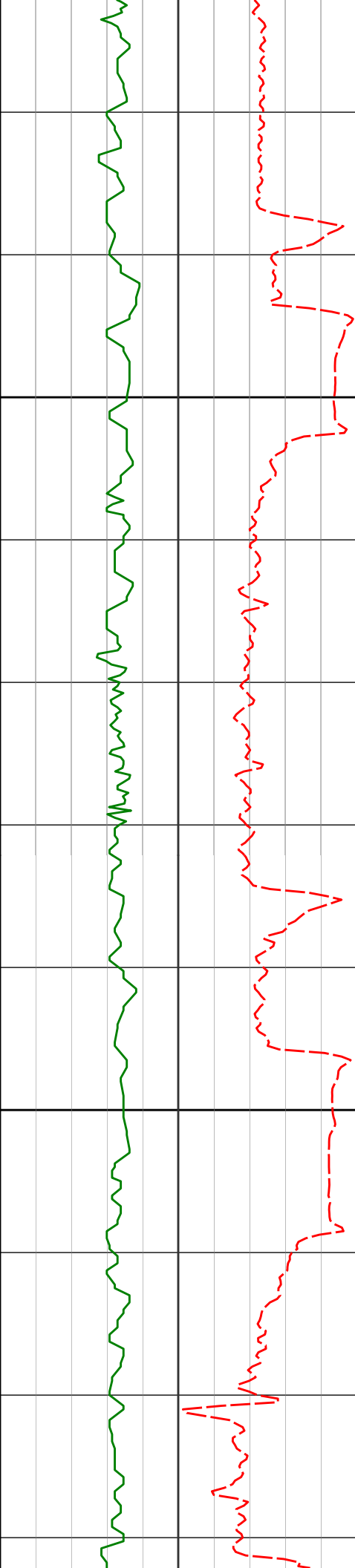




5000

5100

4964	7.60°	208.00°	4924.55	-123.67
5059'	11.49°	210.24°	5018.22'	-129.52'
5155'	10.05°	206.43°	5112.53'	-135.93'



5200

5250'

9.93°

198.48° 5206.09'

-140.17'

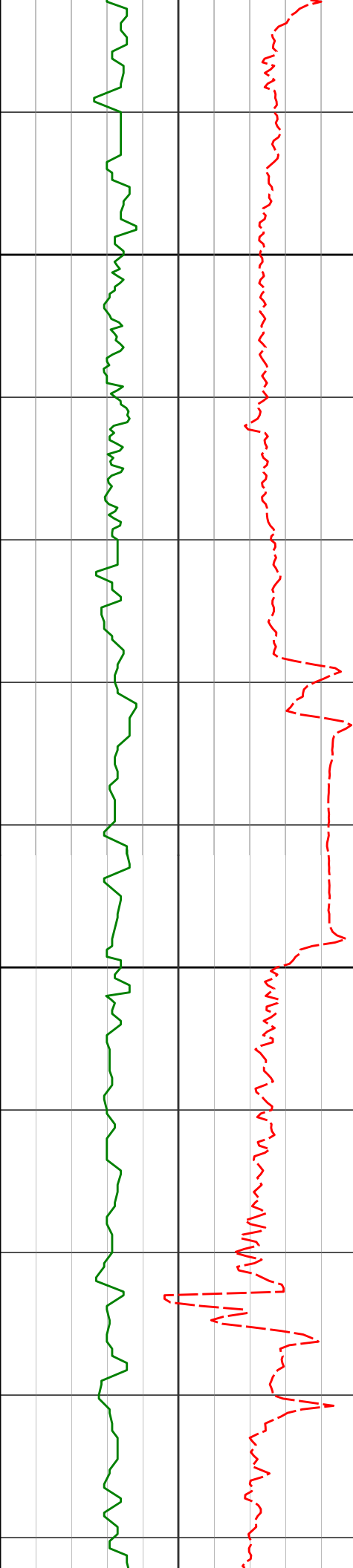
5300

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'

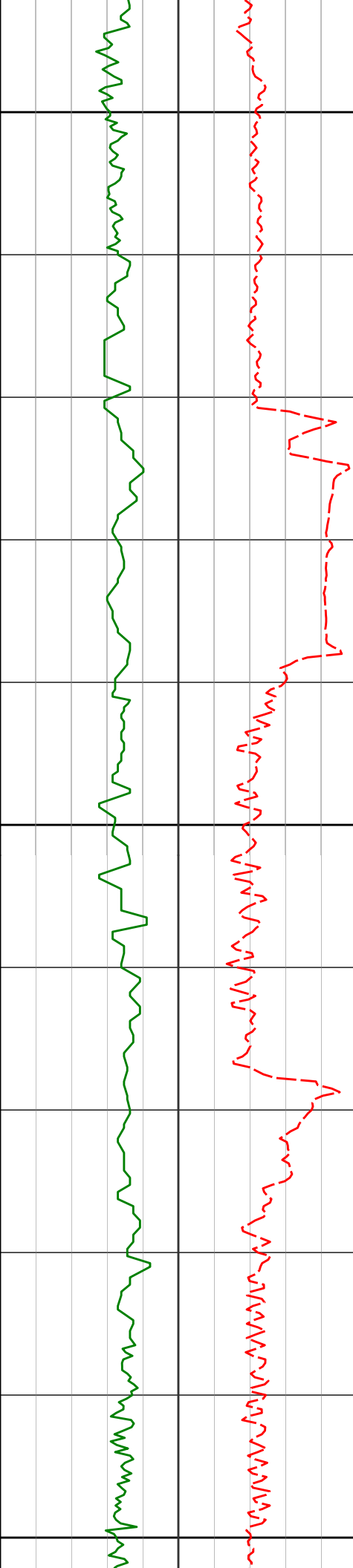
-146.92'

5630'

10.77°

196.61° 5579.65'

-150.09'



5600

5725'

11.63°

203.16° 5672.84'

-154.07'

5700

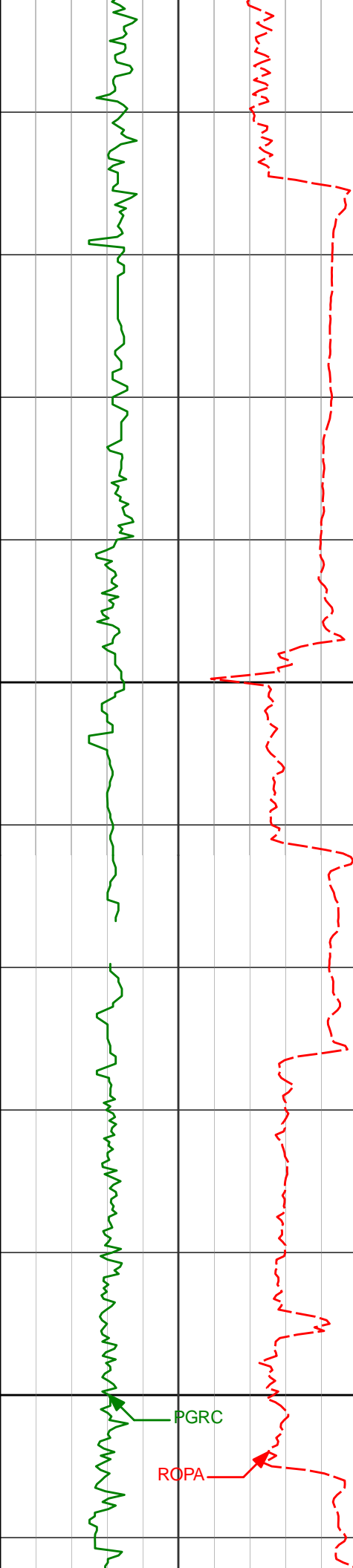
5820'

10.75°

199.77° 5766.04'

-158.54'

5800



5900

6000

5915'

13.87°

194.57° 5858.84'

-161.81'

6010'

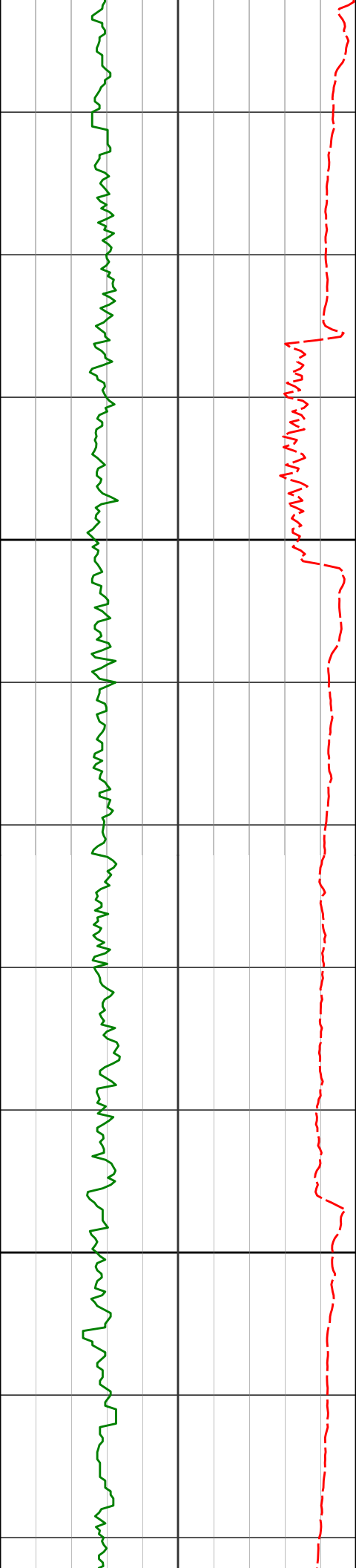
16.74°

186.68° 5950.48'

-163.01'

PGRC

ROPA



6104'

14.30°

177.61° 6041.05'

-160.81'

6100

6199'

18.41°

162.40° 6132.23'

-152.42'

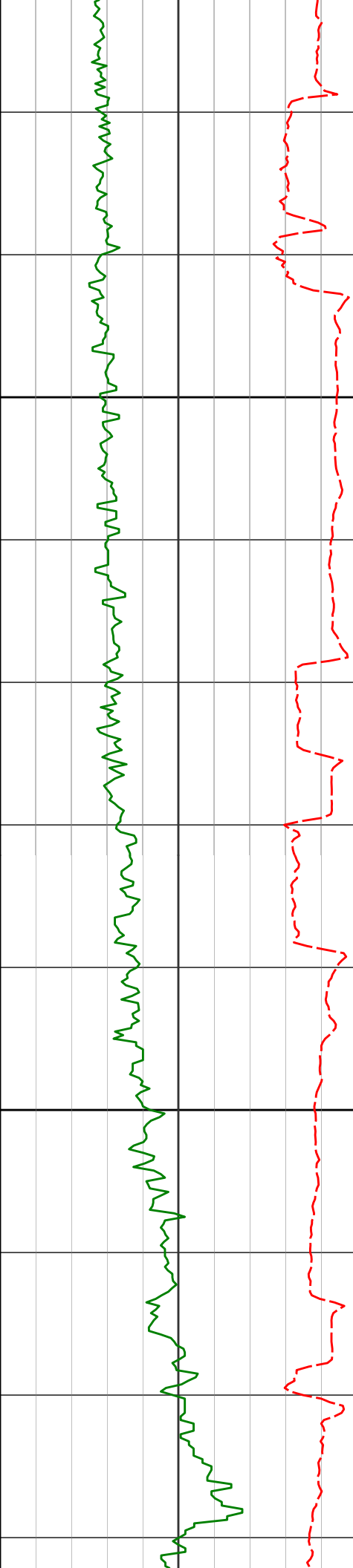
6200

6294'

29.99°

144.59° 6218.85'

-129.77'



6300

6389'

35.67°

131.55° 6298.74'

-90.57'

6400

6484'

37.21°

120.74° 6375.24'

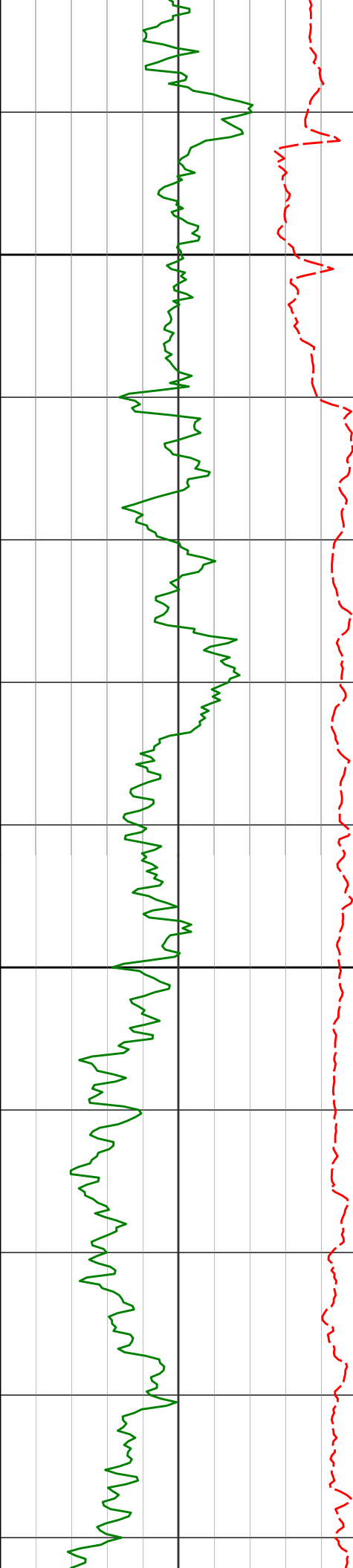
-41.16'

6579'

38.79°

103.62° 6450.31'

14.99'



6500

6674'

40.52°

94.66°

6523.51'

75.46'

6600

6769'

47.00°

83.31°

6592.20'

140.12'

6864'

61.05°

80.56°

6647.87'

213.94'

6959'

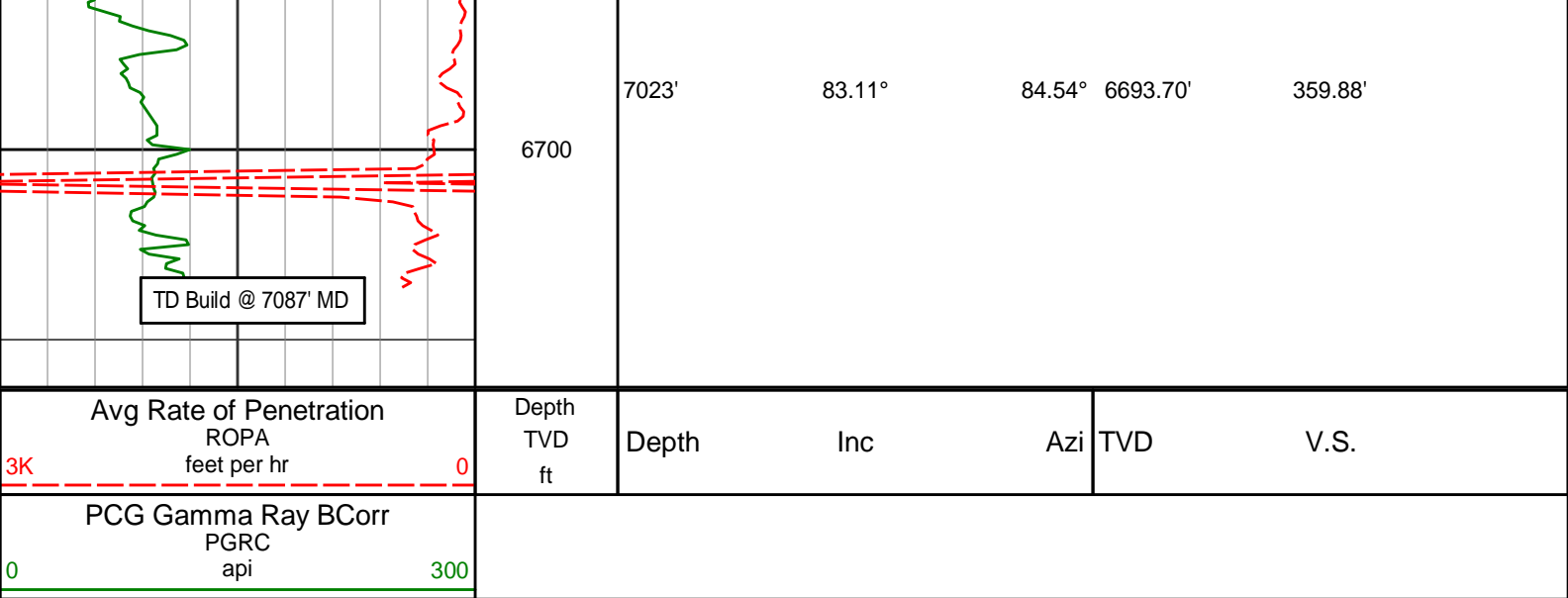
76.34°

82.58°

6682.29'

298.80'





## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Aggie State AA17-645  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0902180831

The first two surveys at 374' and 653' are 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
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

**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 7023.00 FEET  
IS 790.38 FEET ALONG 160.43 DEGREES (GRID)**

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