

## PCG Pressure Case Gamma

[illegible]

## WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	22-Dec-14	23-Dec-14	26-Dec-14		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	1,227.00	5,547.00	5,958.00		
Log End Depth (MD, ft)	5,547.00	5,958.00	10,182.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	22-Dec-14 01:00	23-Dec-14 05:00	24-Dec-14 19:00		
Drill/Wipe End Date and Time	22-Dec-14 19:00	23-Dec-14 12:00	25-Dec-14 22:30		
Min Inc (deg) @ Depth (MD, ft)	0.40 @ 1,288.00	48.94 @ 5,631.00	88.27 @ 9,023.00		
Max Inc (deg) @ Depth (MD, ft)	38.74 @ 5,536.00	83.36 @ 5,904.00	93.08 @ 10,125.00		
Bit TFA(in2) / Bit Type	1.21 / PDC	1.24 / PDC	0.65 / PDC		
Flow Rate (gpm)	636.43	600.00	299.29		
Max AV (fpm) / CV (fpm) @ MWD	445.9 / NA	392.8 / NA	N/A / N/A		
Fluid Type	Native/Spud Mud	Fresh Water Gel	Native/Spud Mud		
Density (ppg) / Viscosity (spqt)	9.50 / 39.00	10.80 / 43.00	10.05 / 37.00		
Filtrate CL (ppm)	2,200.00	2,300.00	2,400.00		
pH / Fluid Loss (mptm)	9.80 / 6	9.00 / 5	8.90 / 7		
PV (cP) / YP (lbf2)	12 / 11.00	15 / 14.00	10 / 13.00		
% Solids / % Sand	5.7 / 0.20	10.70 / 0.15	7.6 / 0.20		
% Oil / Oil:Water Ratio	N/A / N/A	NA / NA	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA	N/A @ N/A		
Max Tool Temp (in F) / C	159.46 / 65.8	159.47 / 65.8	225.93 / 91.1		

Max Tool Temp (degF) / Source	150.10 / PCM	158.47 / PCM	205.20 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA	N/A @ N/A		
Lead MWD Engineer	Brett Vandergon	Brett Vandergon	Brett Vandergon		
Customer Representative	Seth Mulherin	Seth Mulherin	Seth Mulherin		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11341350	11341350	12314810		
Insert Serial Number	11619985	11619985	11227512		
Date and Time Initialized	21-Dec-14 09:52	01-Jan-70 00:00	23-Dec-14 18:36		
Date and Time Read	23-Dec-14 16:37	23-Dec-14 16:31	26-Dec-14 12:07		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58.00	54.00	57.00		
Software Version	6.21	6.21	6.33		
Sub Serial Number	11341350	11341350	12314810		
Sonde Serial Number	11478016	11478016	10993517		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	305.80	328.00	170.90		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	51.22	46.80	50.25		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341350	11341350	12314810		
Insert/Sonde Serial Number	12037419	12037419	11293261		

## REMARKS

1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based fluids and the "Bingham 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  
PGRC (Corrected Gamma Ray):  
Interval Resolution: 1.0 ft  
Interval Distance: 3.0 ft  
Gap Fill: 5.0 ft  
ROPA (Average Rate of Penetration)  
Interval Resolution: 1.0 ft  
Interval Distance: 3.0 ft  
Gap Fill: 5.0 ft  
1: 240  
PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

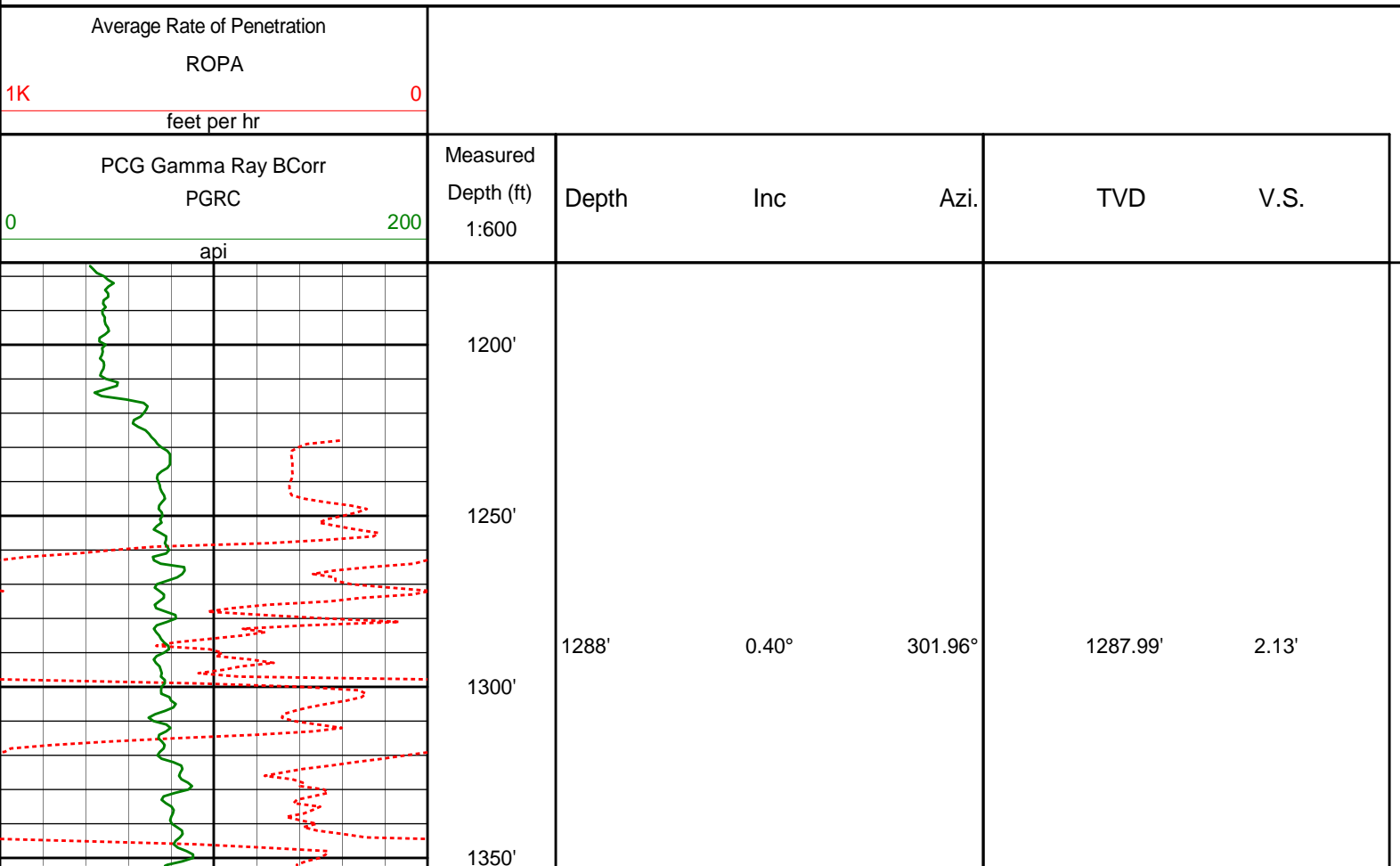
Gap Fill: 3.0 ft  
ROPA (Average Rate of Penetration)  
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill: 3.0 ft  
6. INSITE version 8.0.2

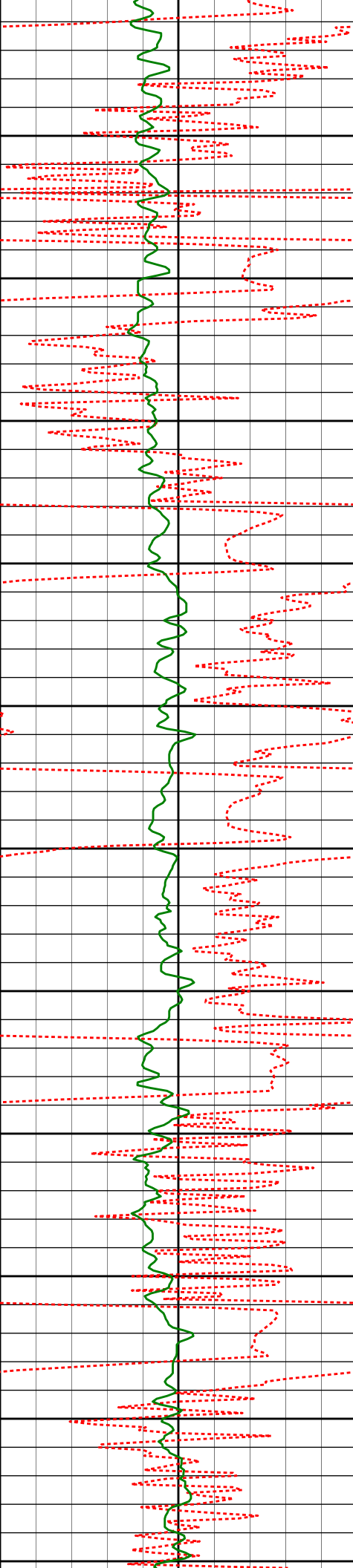
## WARRANTY

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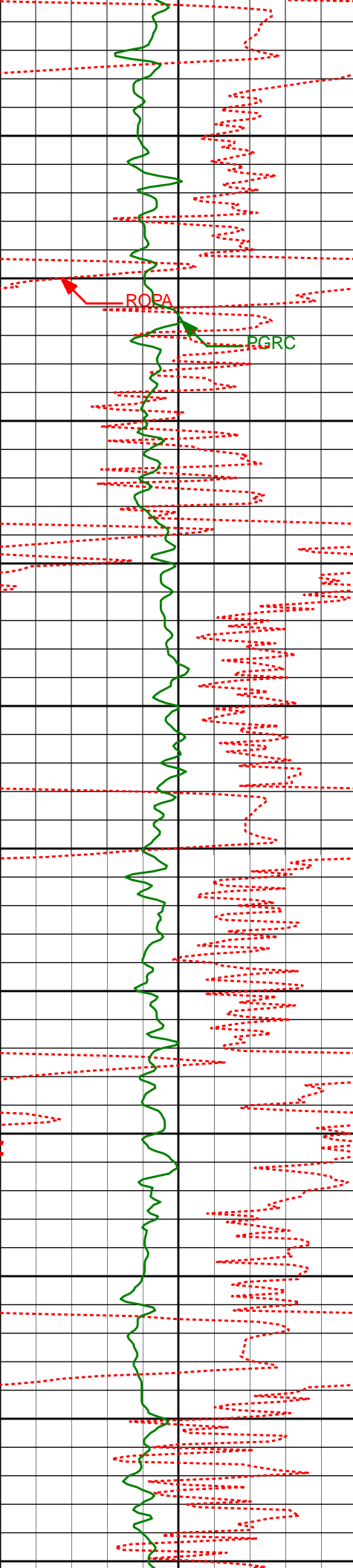
# HALLIBURTON

## MD Main Log 1:600

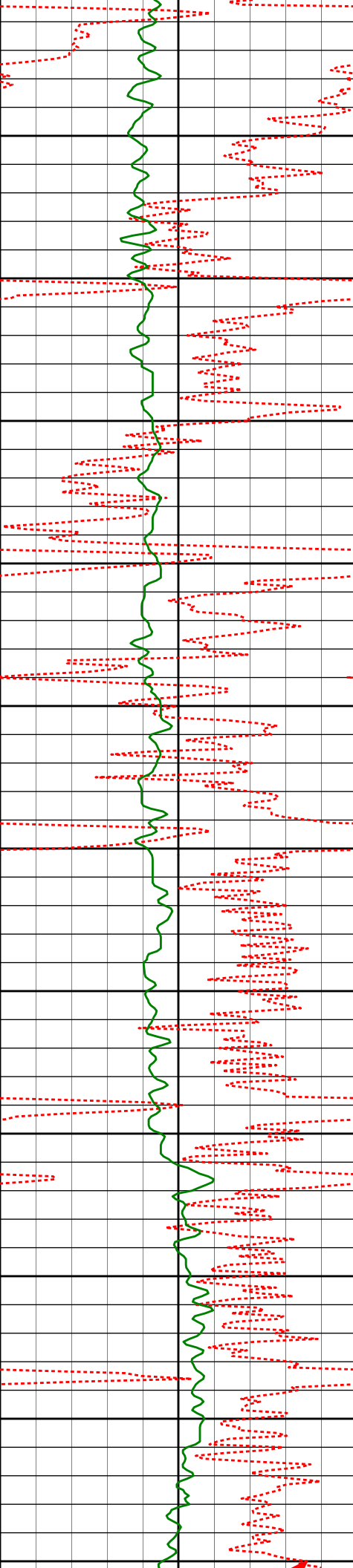




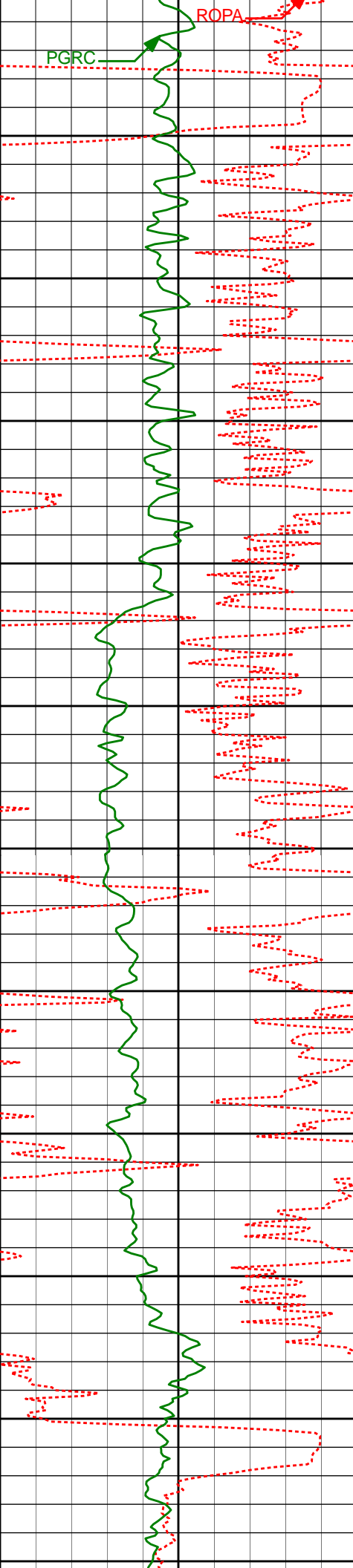
	1381'	2.28°	254.67°	1380.96'	2.30'
1400'					
1450'					
1473'	1473'	3.77°	248.66°	1472.83'	1.82'
1500'					
1550'					
1567'	1567'	5.86°	243.10°	1566.50'	0.26'
1600'					
1650'					
1660'	1660'	7.34°	251.56°	1658.88'	-1.37'
1700'					
1750'	1752'	8.93°	250.11°	1749.95'	-2.71'
1800'					
1844'	1844'	10.49°	250.21°	1840.63'	-4.46'
1850'					
1900'					



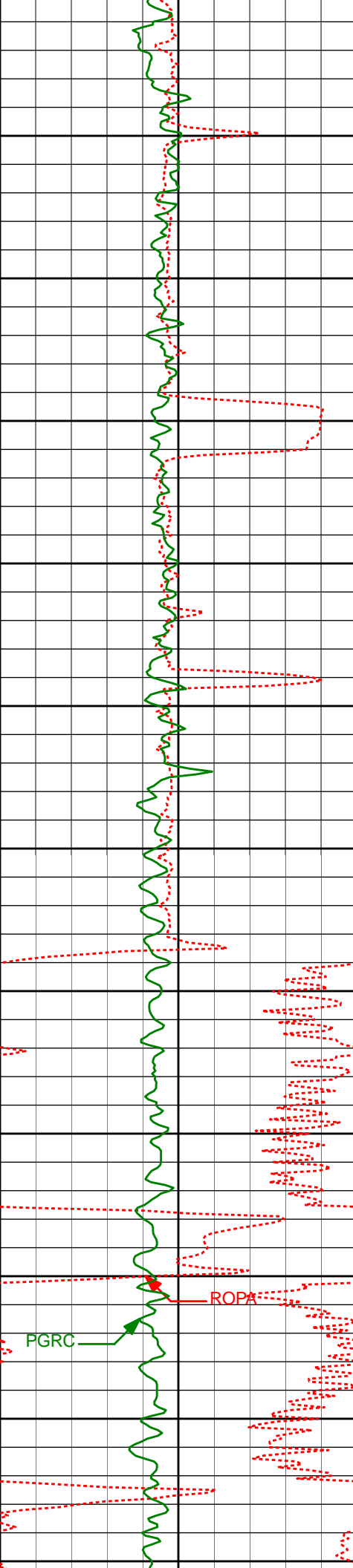
1937'	12.49°	251.25°	1931.77'	-6.35'
1950'				
2000'				
2029'	12.29°	249.13°	2021.62'	-8.56'
2050'				
2100'				
2122'	11.74°	247.43°	2112.59'	-11.37'
2150'				
2200'				
2214'	13.06°	250.82°	2202.44'	-13.93'
2250'				
2300'				
2306'	12.78°	249.72°	2292.11'	-16.20'
2350'				
2400'	13.66°	255.50°	2383.62'	-17.68'
2450'				



2500'	2494'	13.50°	255.00°	2474.99'	-18.21'
2550'					
2600'	2589'	13.49°	254.47°	2567.37'	-18.95'
2650'					
2700'	2684'	13.05°	254.15°	2659.83'	-19.84'
2750'					
2800'	2780'	12.41°	253.23°	2753.47'	-20.92'
2850'					
2900'	2875'	11.47°	253.31°	2846.42'	-22.08'
2950'					
3000'	2970'	10.45°	251.55°	2939.69'	-23.39'



3050'				
3065'	11.90°	252.35°	3032.88'	-24.89'
3100'				
3150'				
3160'	11.90°	251.07°	3125.84'	-26.57'
3200'				
3250'				
3255'	12.22°	249.99°	3218.75'	-28.69'
3300'				
3350'				
3350'	12.65°	250.04°	3311.52'	-31.04'
3400'				
3445'	13.08°	250.48°	3404.13'	-33.39'
3450'				
3500'				
3540'	12.96°	252.28°	3496.69'	-35.36'
3550'				



3600'

3635'

12.09°

252.07°

3589.43'

-36.96'

3650'

3700'

3730'

11.87°

256.91°

3682.36'

-37.70'

3750'

3800'

3825'

10.99°

256.62°

3775.48'

-37.66'

3850'

3900'

3921'

10.47°

256.05°

3869.80'

-37.75'

3950'

4000'

4015'

10.85°

256.98°

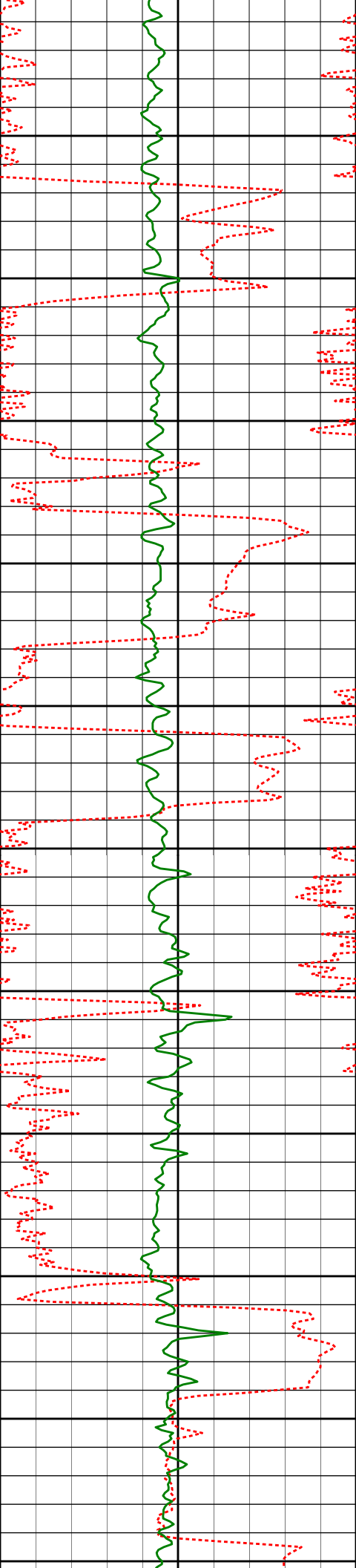
3962.18'

-37.79'

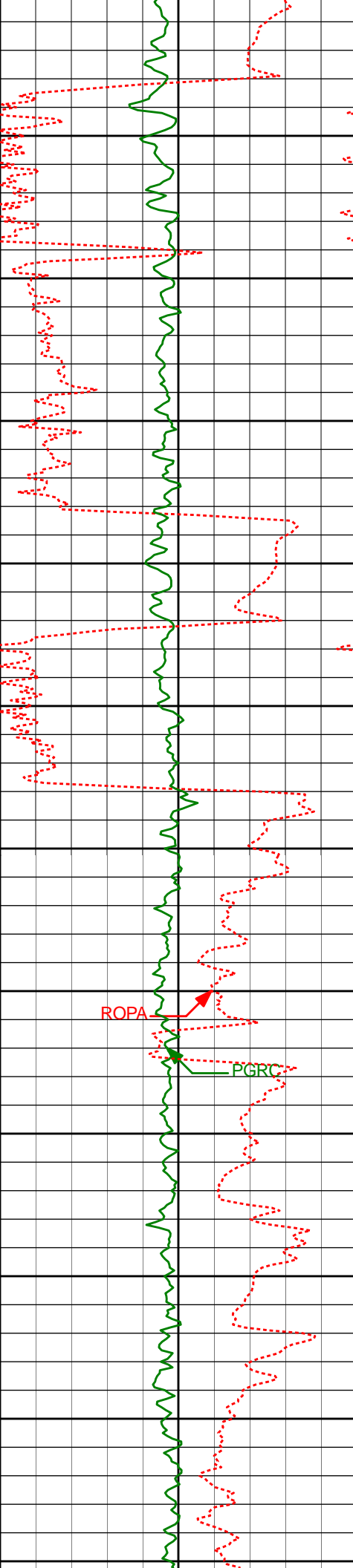
4050'

4100'

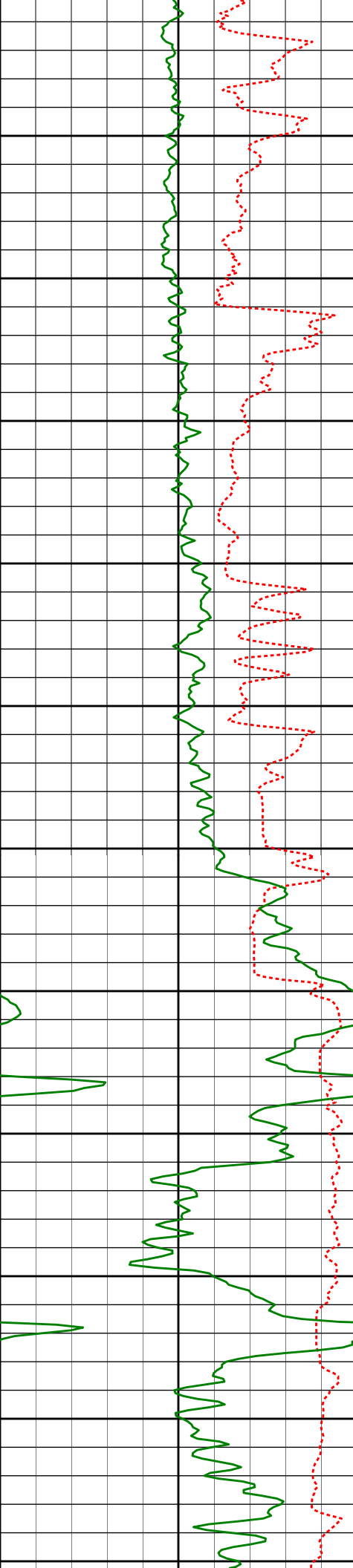




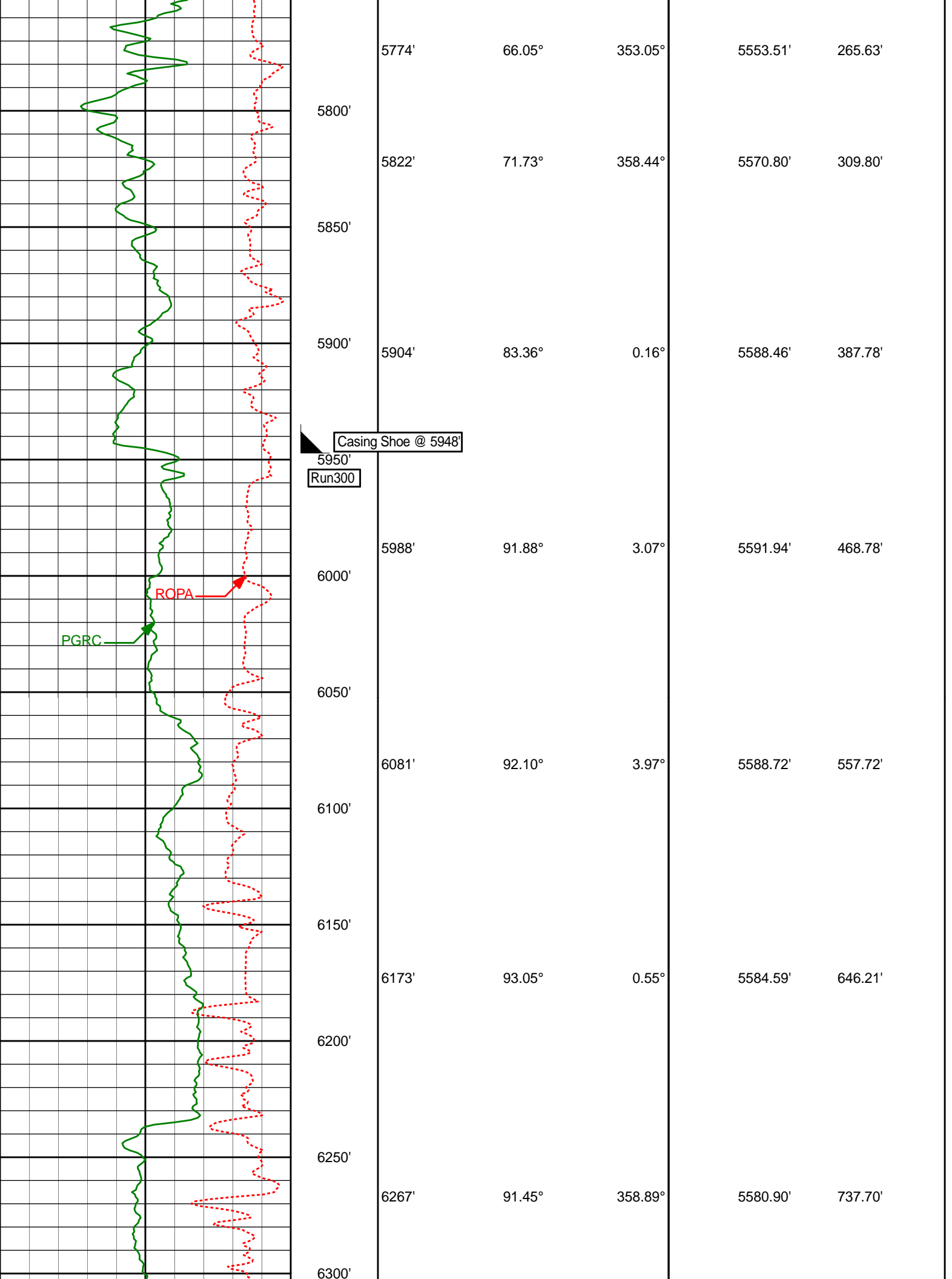
	4110'	9.45°	258.55°	4055.69'	-37.48'
4150'					
4200'	4206'	9.86°	250.95°	4150.33'	-38.03'
4250'					
4300'	4301'	11.01°	251.38°	4243.76'	-39.67'
4350'					
4400'	4396'	12.98°	256.66°	4336.68'	-40.50'
4450'					
4500'	4491'	10.77°	257.61°	4429.65'	-40.34'
4550'					
4600'	4586'	9.81°	253.35°	4523.12'	-40.66'
4650'					

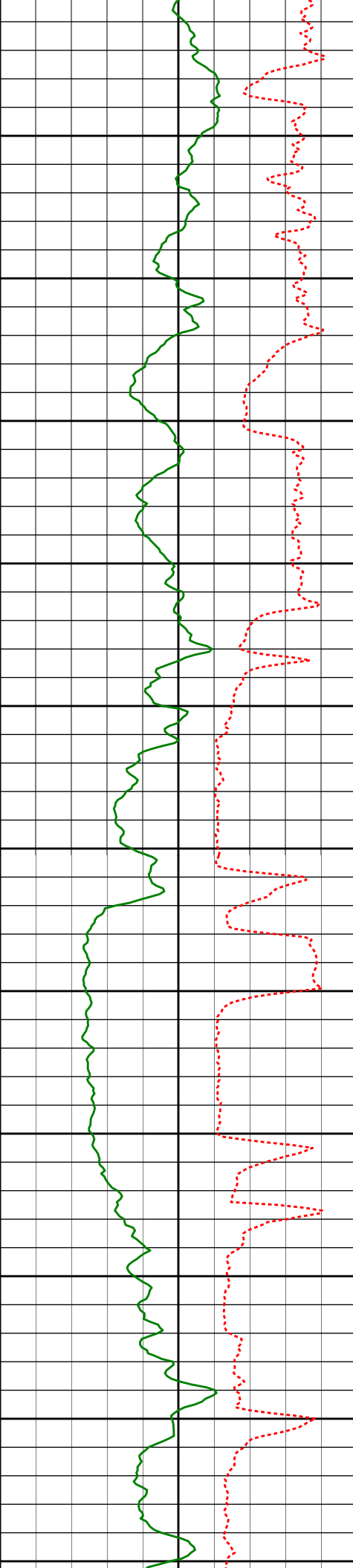


4681'	12.38°	256.46°	4616.33'	-41.16'
4700'				
4750'				
4776'	10.18°	252.39°	4709.50'	-41.81'
4800'				
4850'				
4872'	12.32°	250.93°	4803.65'	-43.46'
4900'				
4950'				
4966'	11.44°	255.96°	4895.63'	-44.57'
5000'				
5050'				
5061'	17.20°	265.05°	4987.65'	-42.62'
5100'				
5150'				
5157'	19.63°	277.04°	5078.76'	-34.93'
5200'				



5250'	5251'	24.55°	283.24°	5165.85'	-20.67'
5300'					
5350'	5347'	28.40°	294.20°	5251.81'	2.20'
5400'	5395'	32.22°	302.21°	5293.26'	18.31'
5450'	5441'	33.80°	308.77°	5331.85'	37.18'
5500'	5489'	36.27°	313.86°	5371.16'	59.66'
5550'	5536'	38.74°	319.15°	5408.45'	84.40'
Run200 5550'					
5600'					
5650'	5631'	48.94°	334.25°	5477.07'	146.09'
5700'	5679'	54.74°	340.38°	5506.73'	183.29'
5750'	5726'	60.50°	346.44°	5531.91'	222.88'





6350'

6362'

91.17°

358.93°

5578.73'

830.50'

6400'

6450'

6457'

91.33°

358.50°

5576.66'

923.38'

6500'

6550'

6552'

91.69°

358.39°

5574.15'

1016.34'

6600'

6650'

6647'

89.78°

358.43°

5572.93'

1109.33'

6700'

6750'

6742'

90.22°

358.22°

5572.93'

1202.36'

6800'

6837'

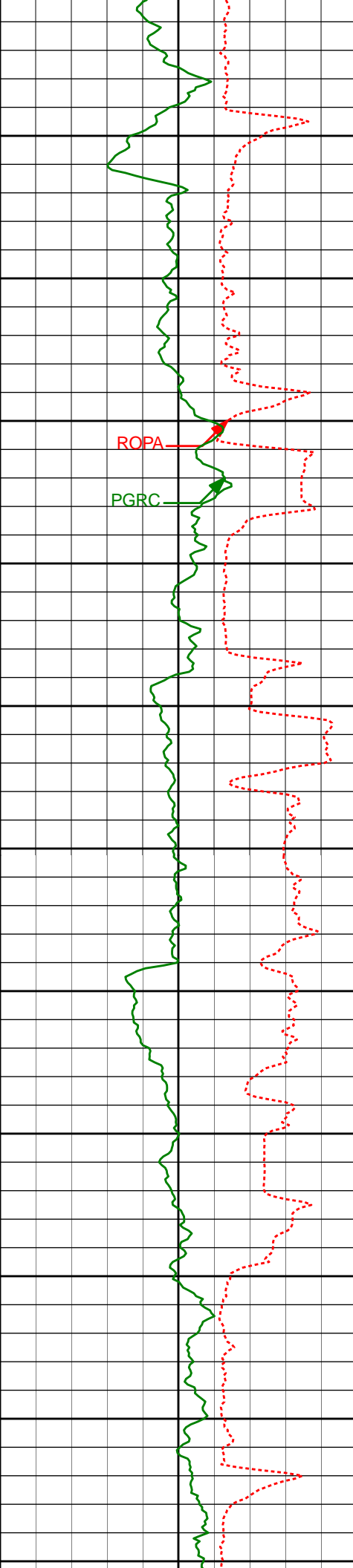
90.46°

358.01°

5572.36'

1295.46'

6850'



6900'

6932'

90.83°

357.41°

5571.29'

1388.69'

6950'

7000'

ROPA

PGRC

7027'

90.96°

359.39°

5569.81'

1481.68'

7050'

7100'

7122'

88.74°

359.15°

5570.07'

1574.37'

7150'

7200'

7217'

89.14°

358.65°

5571.83'

1667.19'

7250'

7300'

7312'

89.97°

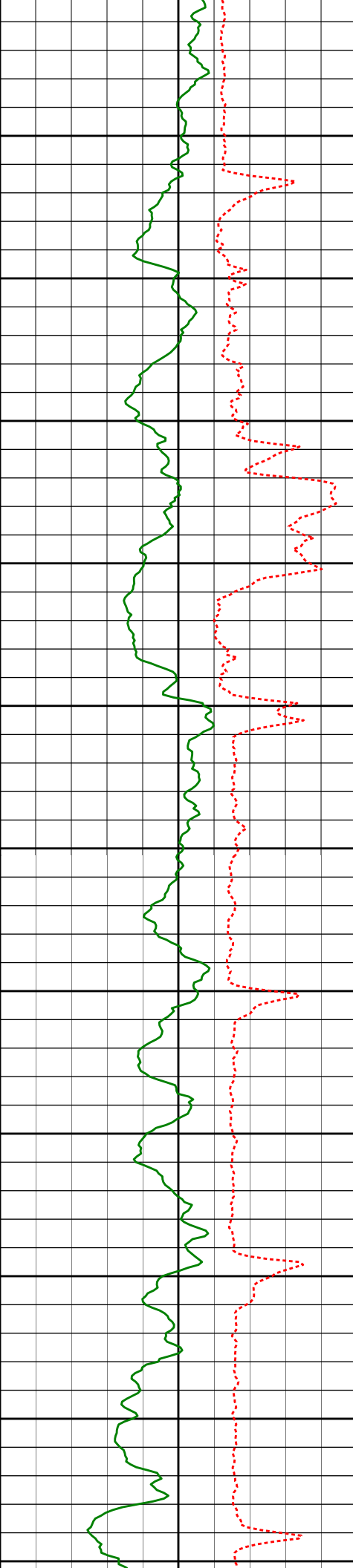
358.65°

5572.57'

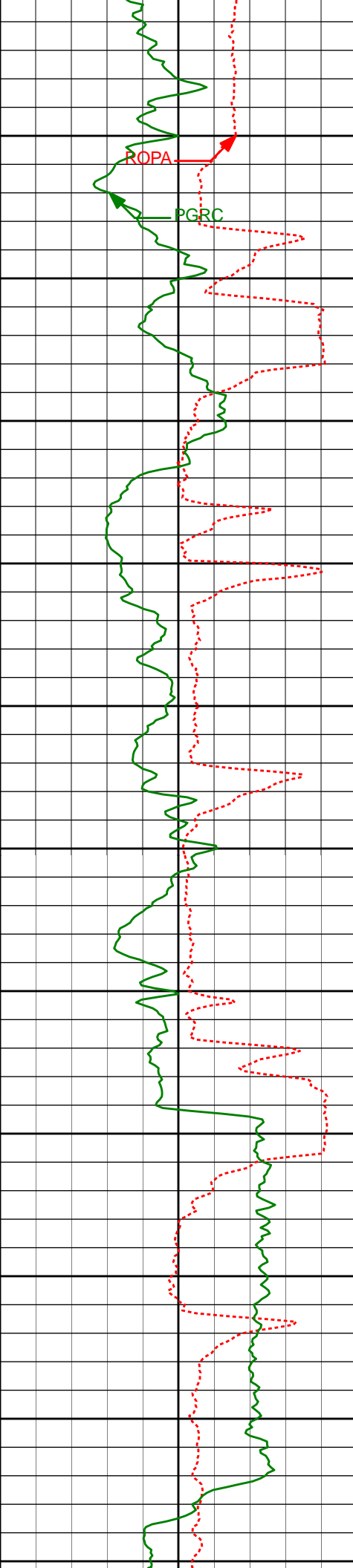
1760.11'

7350'

7400'

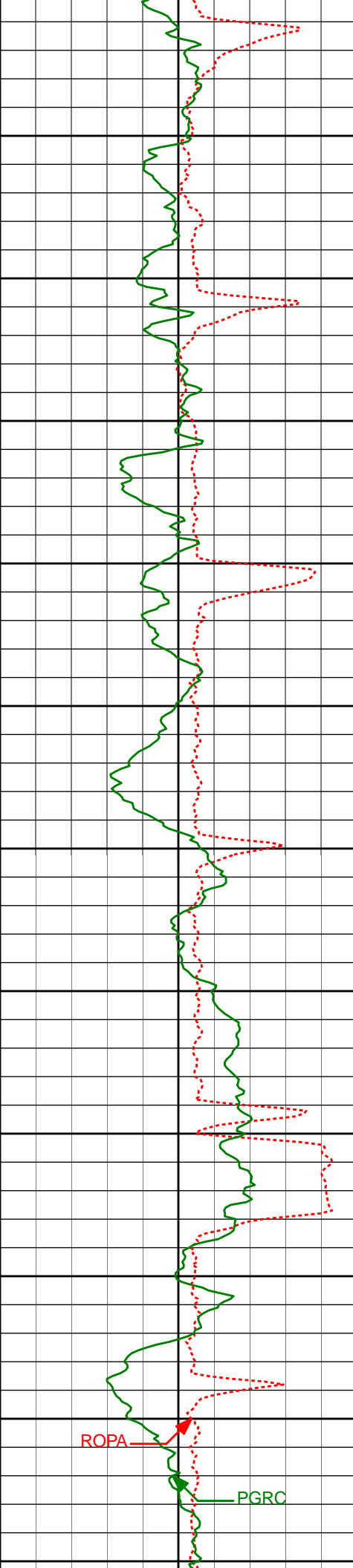


	7407'	88.86°	357.95°	5573.54'	1853.14'
7450'					
7500'	7502'	88.65°	357.47°	5575.61'	1946.35'
7550'					
7600'	7597'	89.57°	359.70°	5577.09'	2039.27'
7650'					
7700'	7692'	90.55°	0.47°	5576.99'	2131.67'
7750'					
7800'	7787'	90.52°	359.81°	5576.09'	2224.04'
7850'					
7900'	7882'	90.83°	359.52°	5574.97'	2316.59'
7950'					

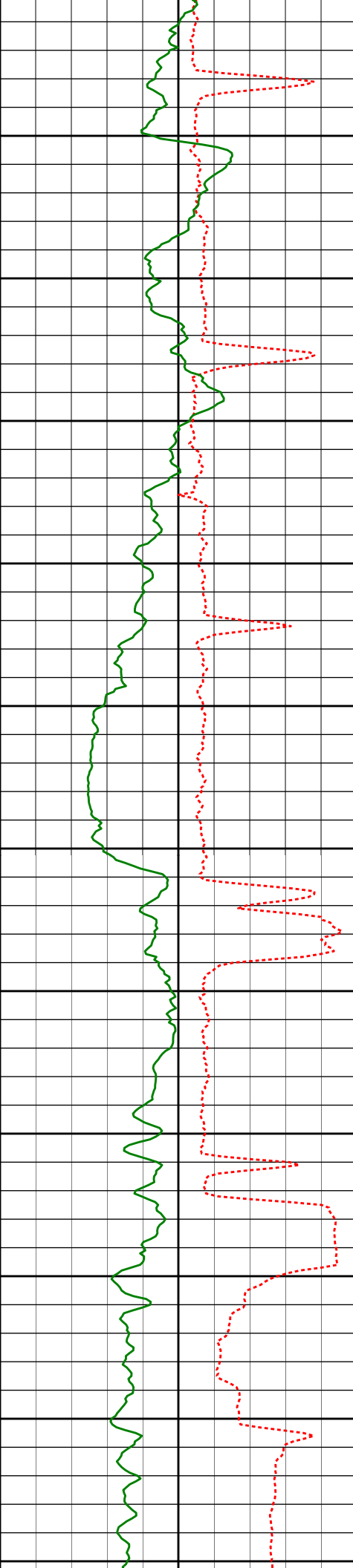


7977'	91.33°	359.31°	5573.18'	2409.22'
8000'				
8050'				
8072'	90.34°	358.46°	5571.80'	2502.05'
8100'				
8150'				
8168'	90.77°	358.30°	5570.87'	2596.03'
8200'				
8250'				
8263'	91.32°	358.17°	5569.13'	2689.08'
8300'				
8350'				
8358'	88.43°	357.67°	5569.34'	2782.23'
8400'				
8450'				
8453'	88.46°	356.92°	5571.92'	2875.56'
8500'				





8550'	8548'	89.17°	356.91°	5573.88'	2969.01'
8600'					
8650'	8643'	89.97°	357.05°	5574.60'	3062.47'
8700'					
8750'	8738'	90.80°	356.92°	5573.96'	3155.92'
8800'					
8850'	8833'	91.23°	356.19°	5572.28'	3249.49'
8900'					
8950'	8928'	88.98°	358.10°	5572.10'	3342.89'
9000'					
9050'	9023'	88.27°	357.57°	5574.37'	3436.05'



9100'

9118'

88.64°

357.56°

5576.93'

3529.29'

9150'

9200'

9213'

89.01°

358.46°

5578.87'

3622.41'

9250'

9300'

9308'

88.80°

357.53°

5580.68'

3715.53'

9350'

9400'

9403'

89.85°

356.19°

5581.81'

3809.01'

9450'

9500'

9498'

89.32°

357.85°

5582.50'

3902.45'

9550'

9600'

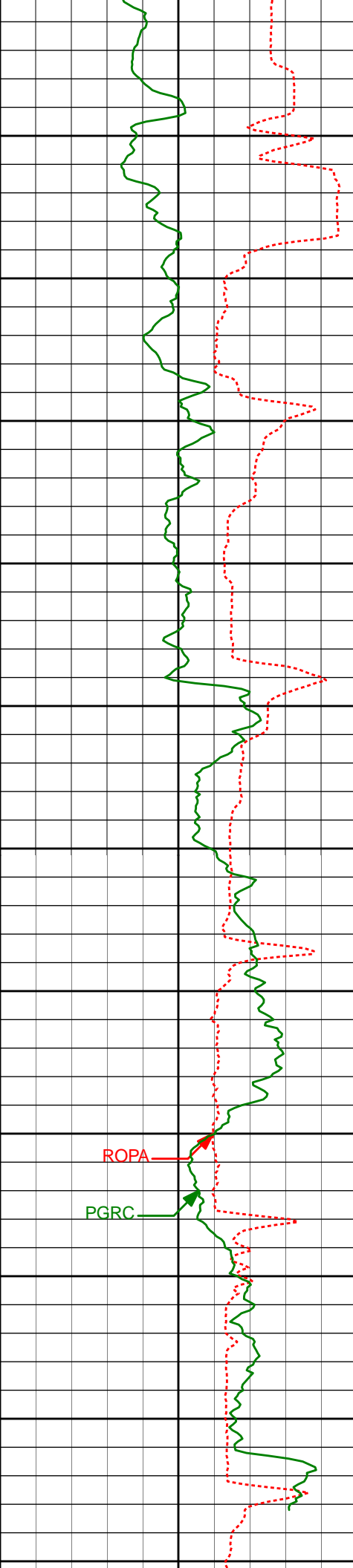
9593'

89.60°

357.74°

5583.39'

3995.65'



9650'

9688'

92.34°

358.83°

5581.78'

4088.68'

9700'

9750'

9783'

92.25°

358.63°

5577.98'

4181.50'

9800'

9850'

9878'

92.53°

358.06°

5574.02'

4274.44'

9900'

9950'

9973'

92.25°

358.38°

5570.06'

4367.43'

10000'

10050'

10068'

92.34°

358.96°

5566.25'

4460.26'

10100'

10125'

93.08°

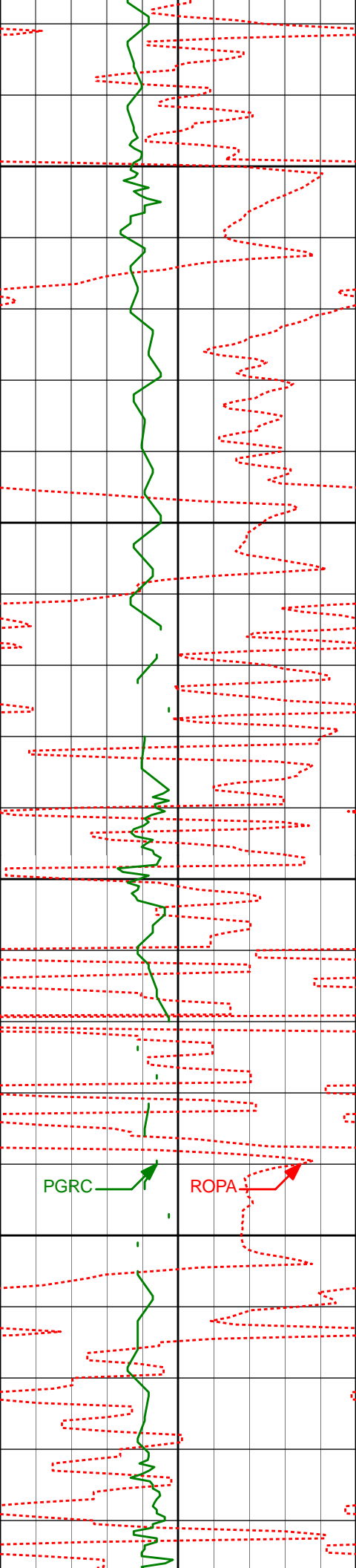
358.89°

5563.55'

4515.90'

10150'





1300'

1350'

1400'

1450'

PGRC

ROPA

1288'

0.40°

301.96°

1287.99'

2.13'

1381'

2.28°

254.67°

1380.96'

2.30'

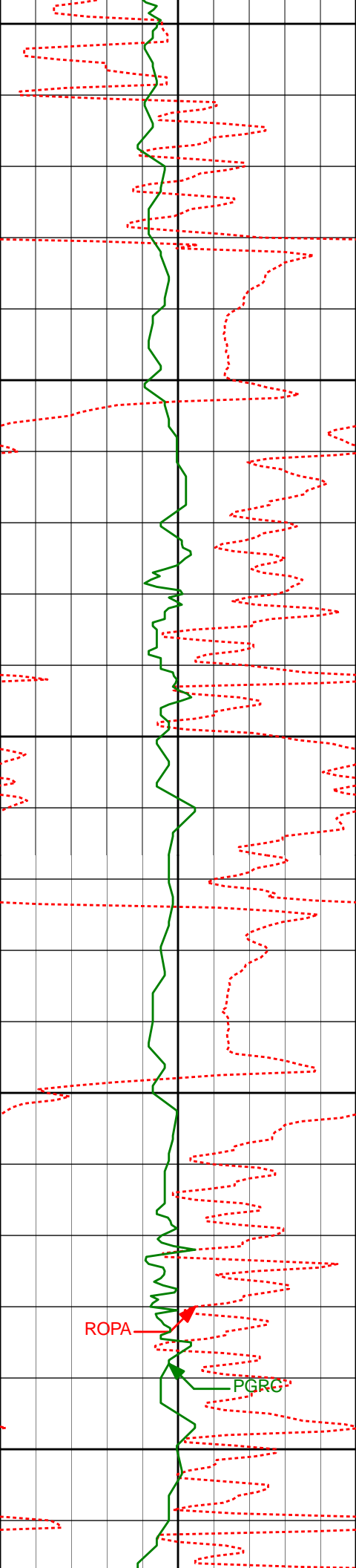
1473'

3.77°

248.66°

1472.83'

1.82'



1500'

1550'

1600'

1650'

1700'

1567'

5.86°

243.10°

1566.50'

0.26'

1660'

7.34°

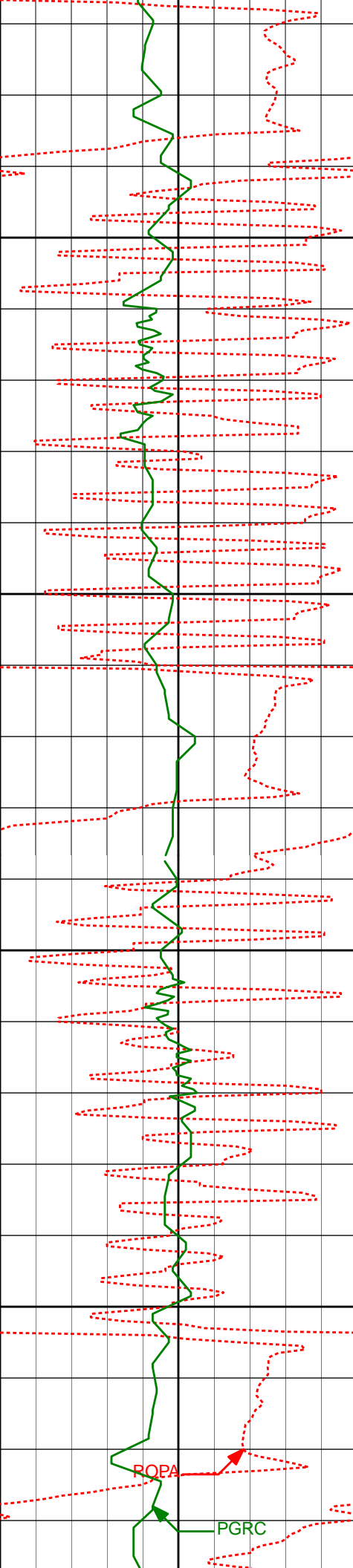
251.56°

1658.88'

-1.37'

ROPA

PGRC



1750'

1800'

1850'

1900'

1752'

8.93°

250.11°

1749.95'

-2.71'

1844'

10.49°

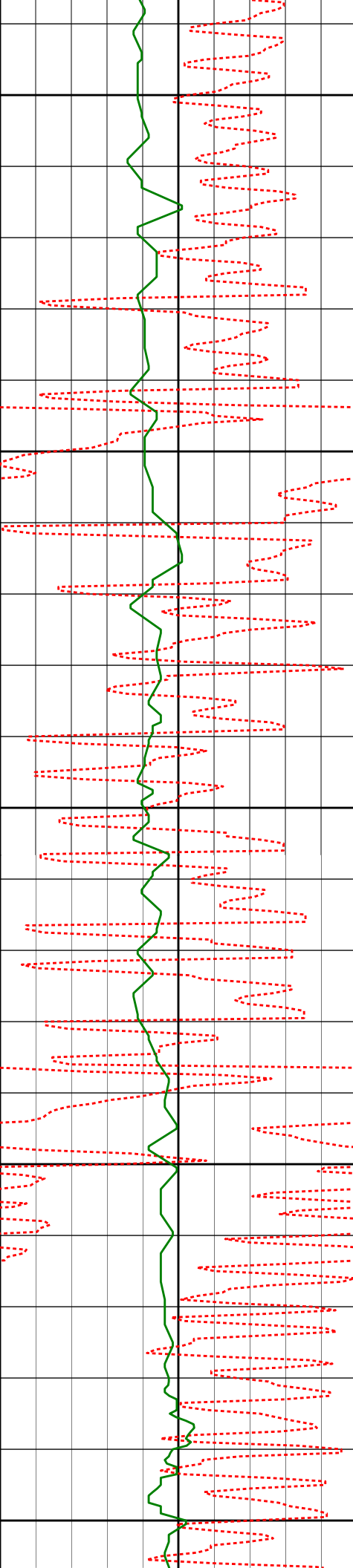
250.21°

1840.63'

-4.46'

RQPA

PGRC



1950'

2000'

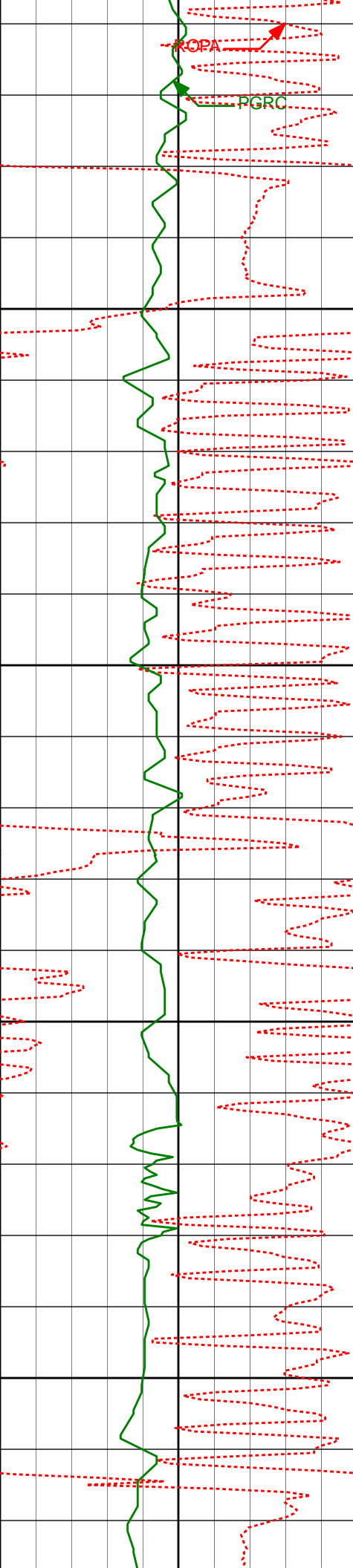
2050'

2100'

2150'

1937'	12.49°	251.25°	1931.77'	-6.35'
2029'	12.29°	249.13°	2021.62'	-8.56'
2122'	11.74°	247.43°	2112.59'	-11.37'





ROPA

PGRC

2200'

2250'

2300'

2350'

2214'

13.06°

250.82°

2202.44'

-13.93'

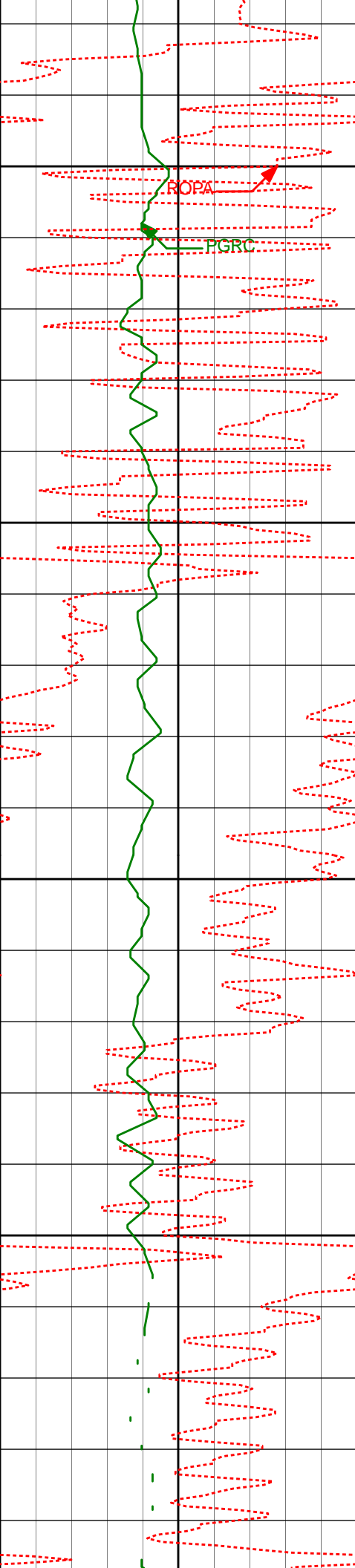
2306'

12.78°

249.72°

2292.11'

-16.20'



2400'

2400'

13.66°

255.50°

2383.62'

-17.68'

ROPA

PGRC

2450'

2500'

2550'

2494'

13.50°

255.00°

2474.99'

-18.21'

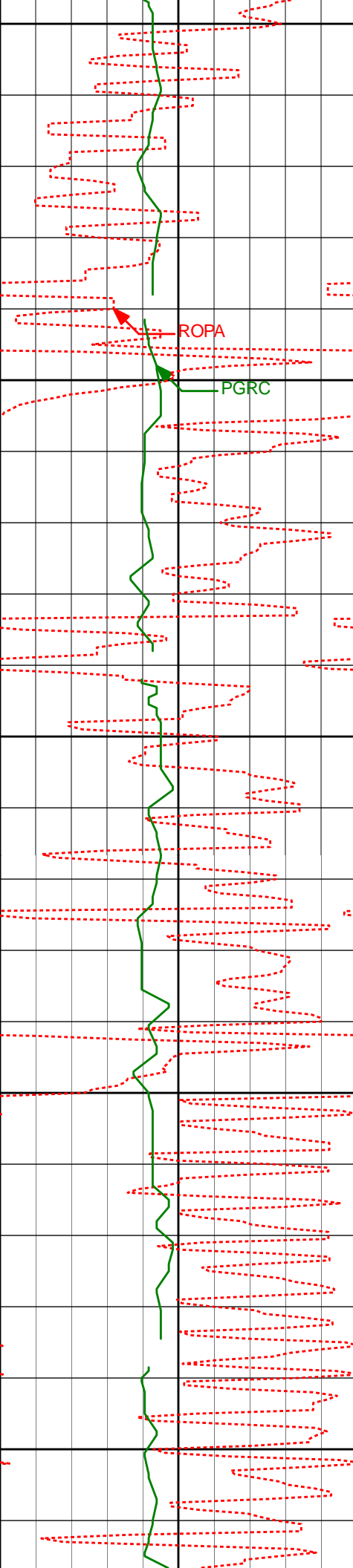
2589'

13.49°

254.47°

2567.37'

-18.95'



2600'

2650'

2700'

2750'

2800'

2684'

13.05°

254.15°

2659.83'

-19.84'

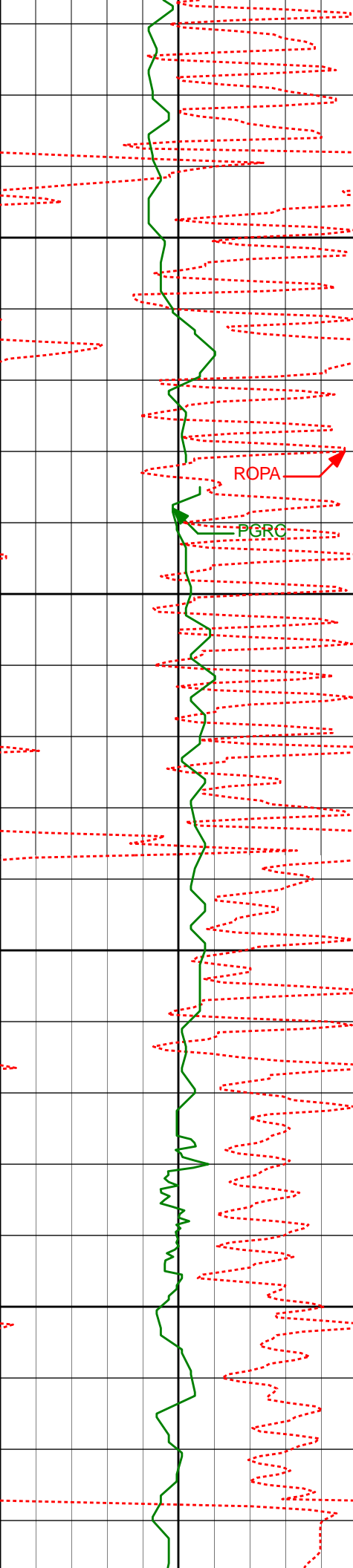
2780'

12.41°

253.23°

2753.47'

-20.92'



2850'

2875'

11.47°

253.31°

2846.42'

-22.08'

ROPA

PGRC

2900'

2950'

2970'

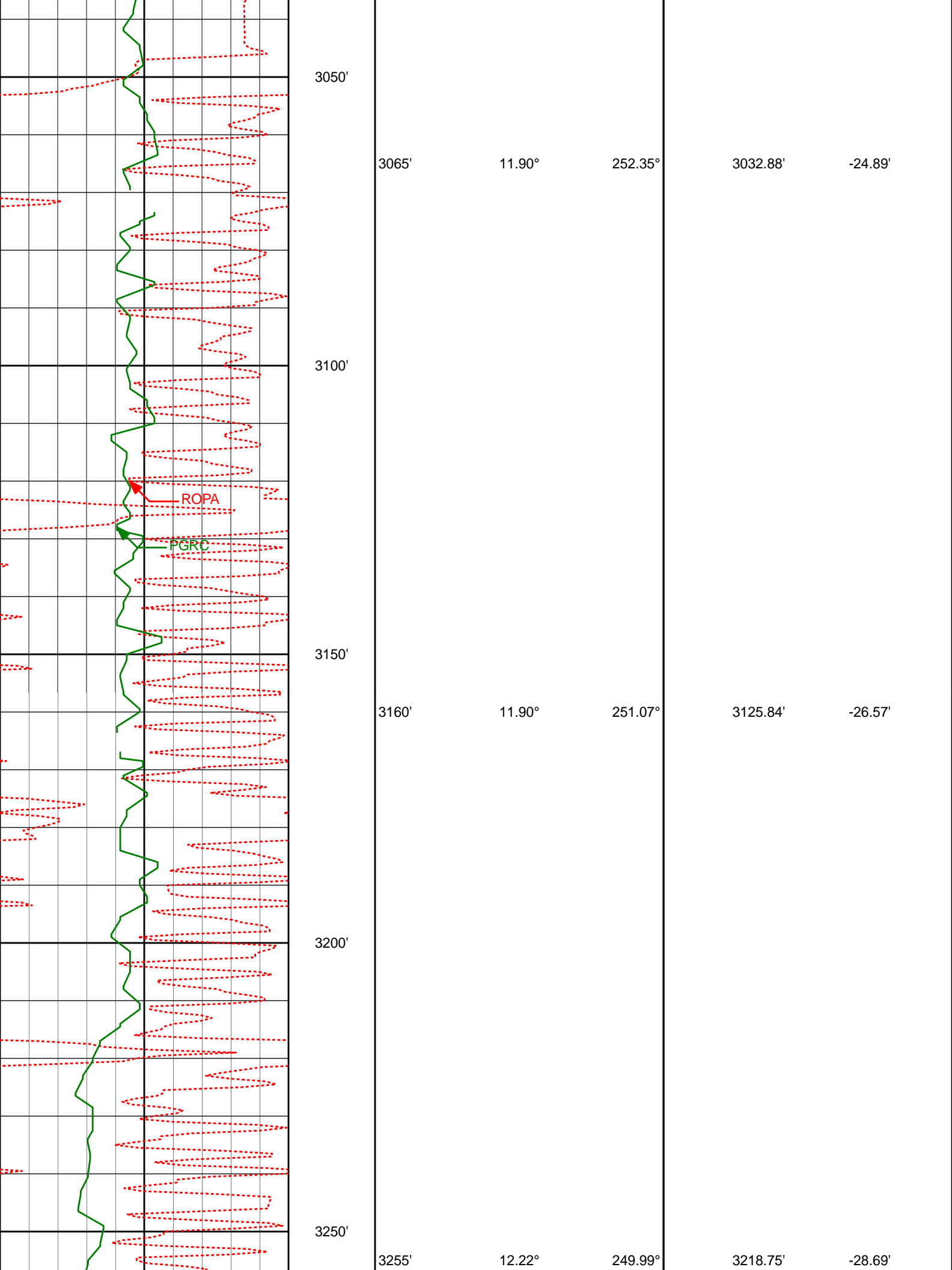
10.45°

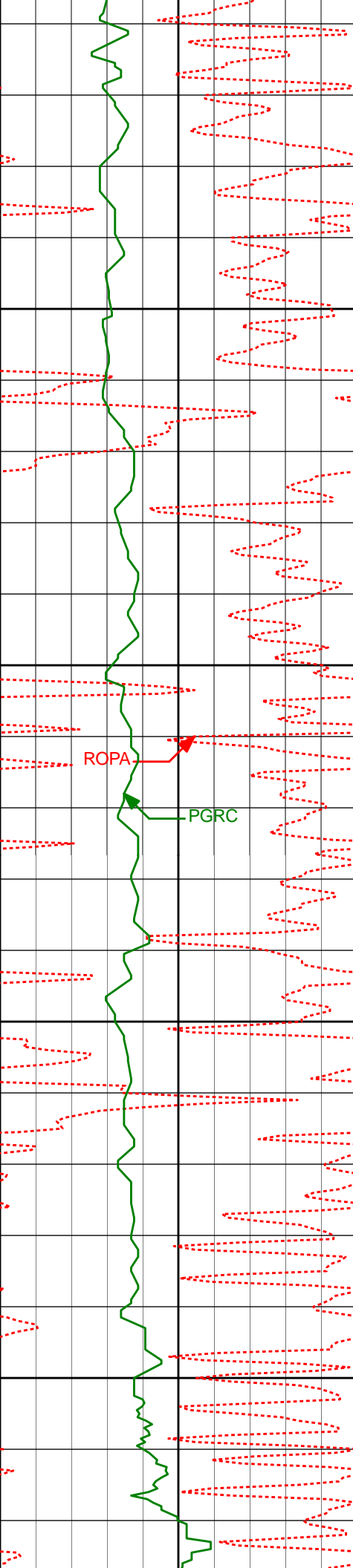
251.55°

2939.69'

-23.39'

3000'





3300'

3350'

3400'

3450'

3350'

3445'

12.65°

13.08°

250.04°

250.48°

3311.52'

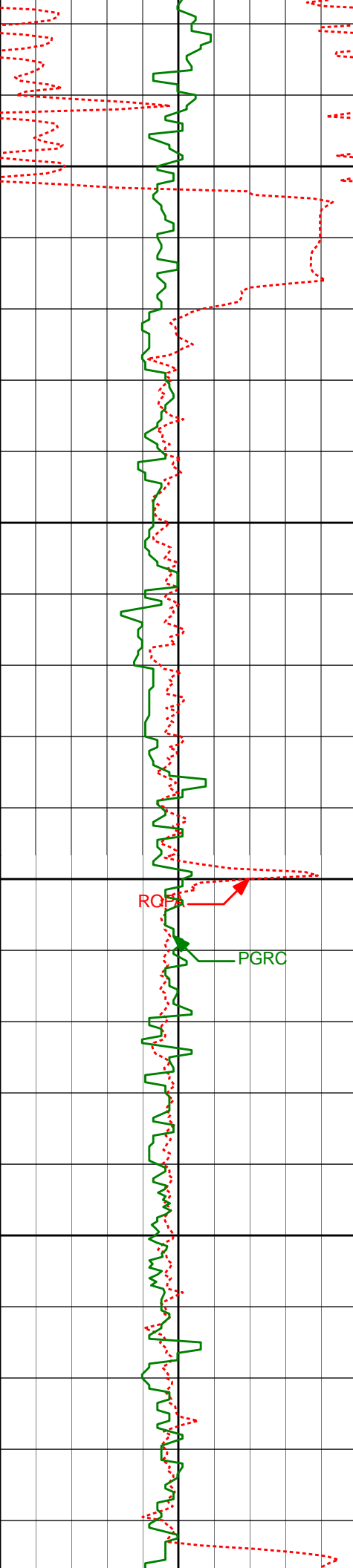
3404.13'

-31.04'

-33.39'

ROPA

PGRC



3500'

3540'

12.96°

252.28°

3496.69'

-35.36'

3550'

3600'

RQSS

PGRC

3635'

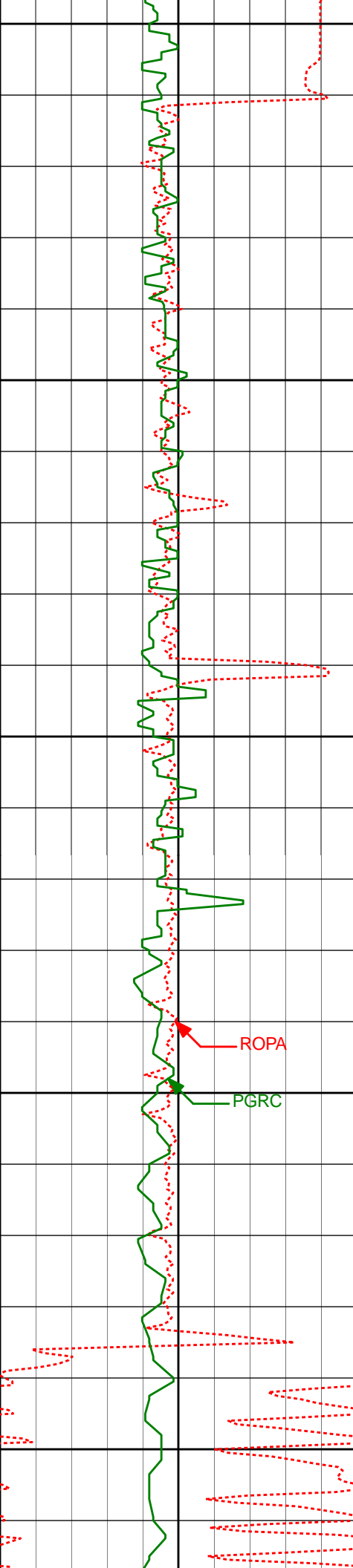
12.09°

252.07°

3589.43'

-36.96'

3650'



3700'

3730'

11.87°

256.91°

3682.36'

-37.70'

3750'

3800'

3825'

10.99°

256.62°

3775.48'

-37.66'

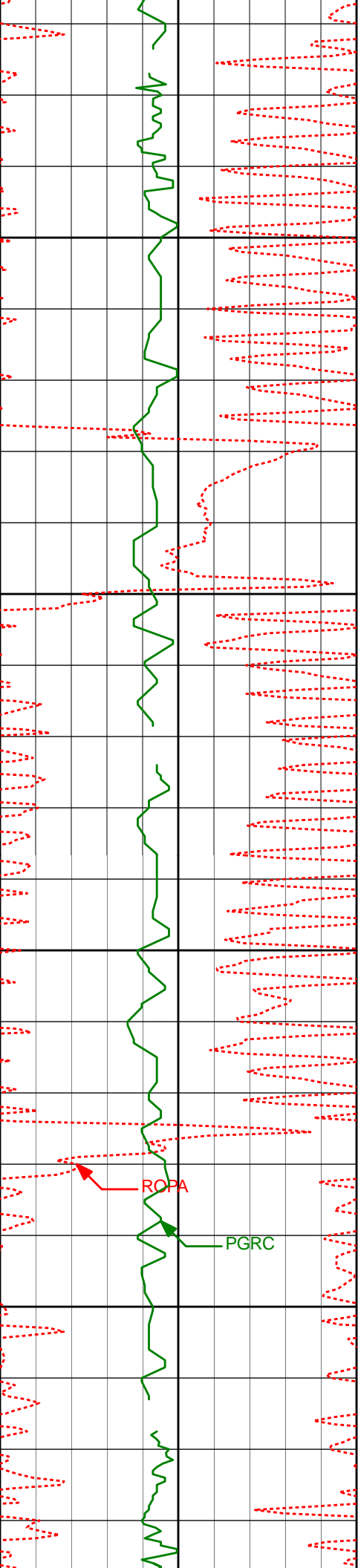
3850'

ROPA

PGRC

3900'





3921'

10.47°

256.05°

3869.80'

-37.75'

3950'

4000'

4015'

10.85°

256.98°

3962.18'

-37.79'

4050'

ROPA

PGRC

4100'

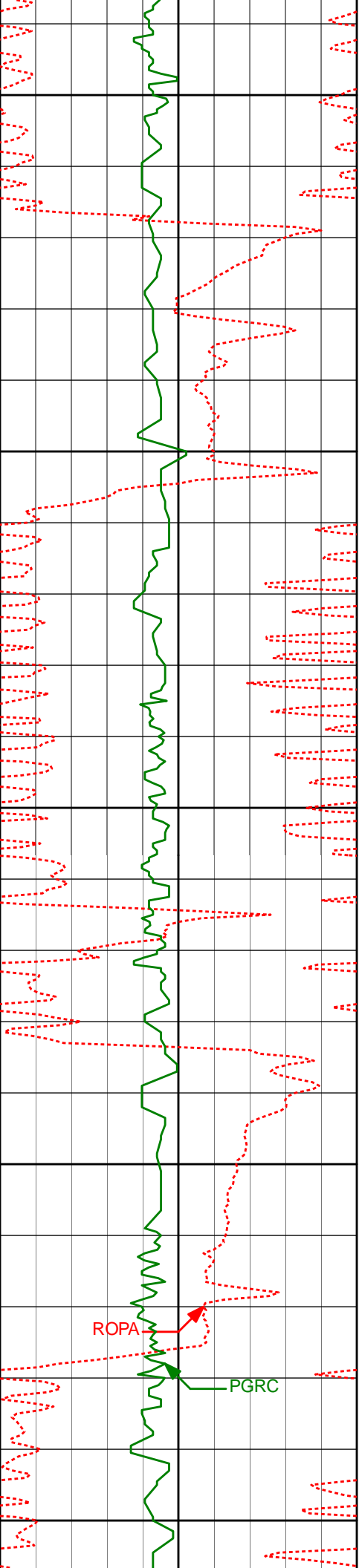
4110'

9.45°

258.55°

4055.69'

-37.48'



4150'

4200'

4250'

4300'

4350'

4206'

9.86°

250.95°

4150.33'

-38.03'

4301'

11.01°

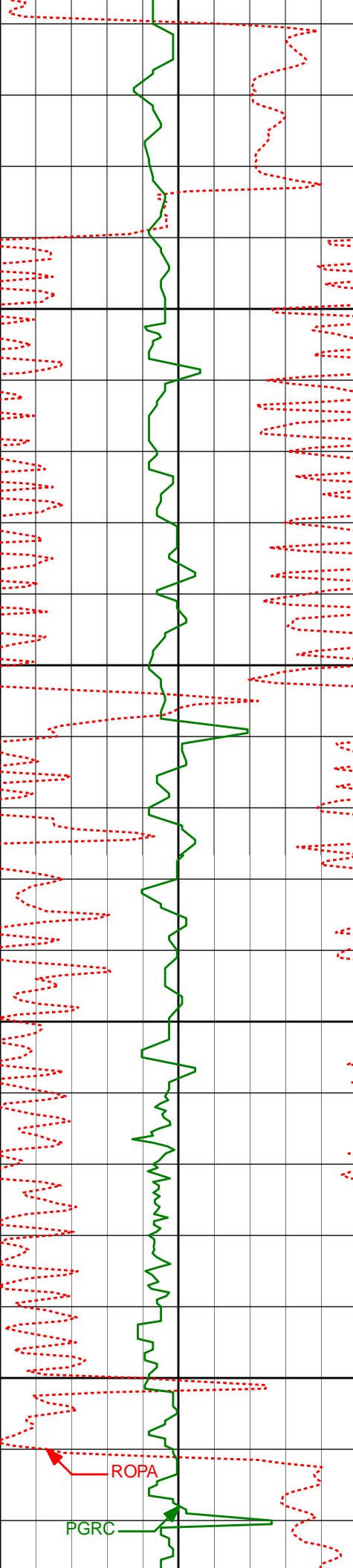
251.38°

4243.76'

-39.67'

ROPA

PGRC



4400'

4450'

4500'

4550'

4396'

12.98°

256.66°

4336.68'

-40.50'

4491'

10.77°

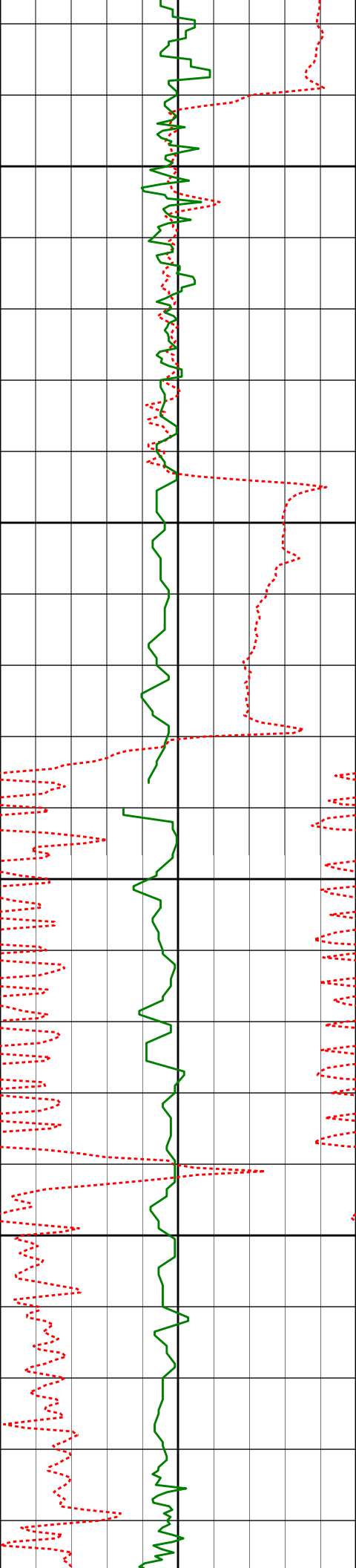
257.61°

4429.65'

-40.34'

ROPA

PGRC



4600'

4650'

4700'

4750'

4586'

9.81°

253.35°

4523.12'

-40.66'

4681'

12.38°

256.46°

4616.33'

-41.16'

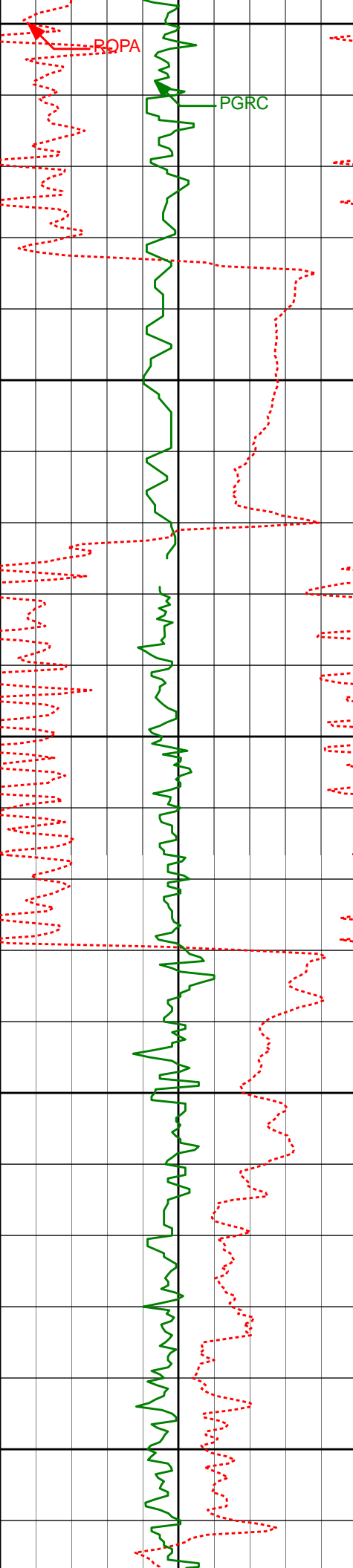
4776'

10.18°

252.39°

4709.50'

-41.81'



4800'

4850'

4900'

4950'

5000'

4872'

12.32°

250.93°

4803.65'

-43.46'

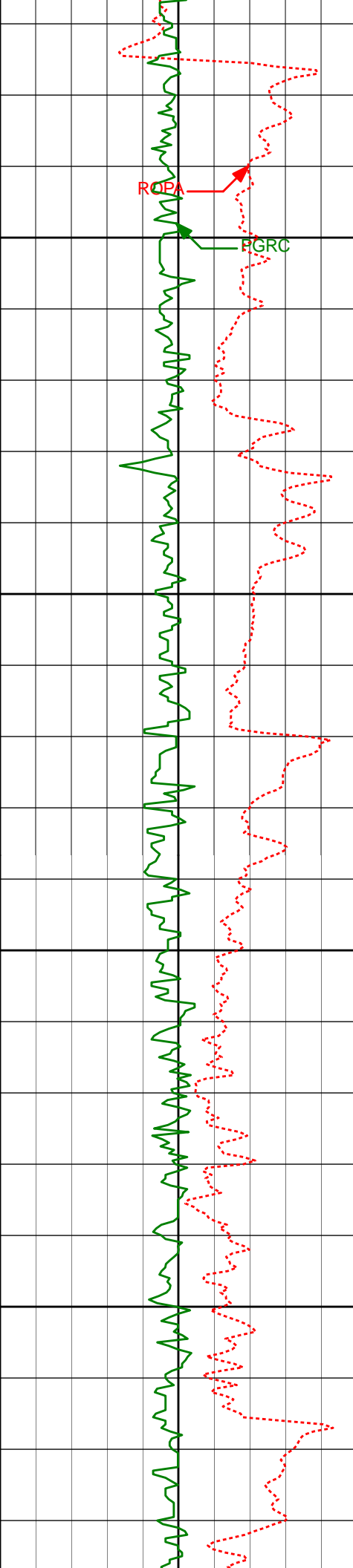
4966'

11.44°

255.96°

4895.63'

-44.57'



5050'

5061'

17.20°

265.05°

4987.65'

-42.62'

5100'

5150'

5157'

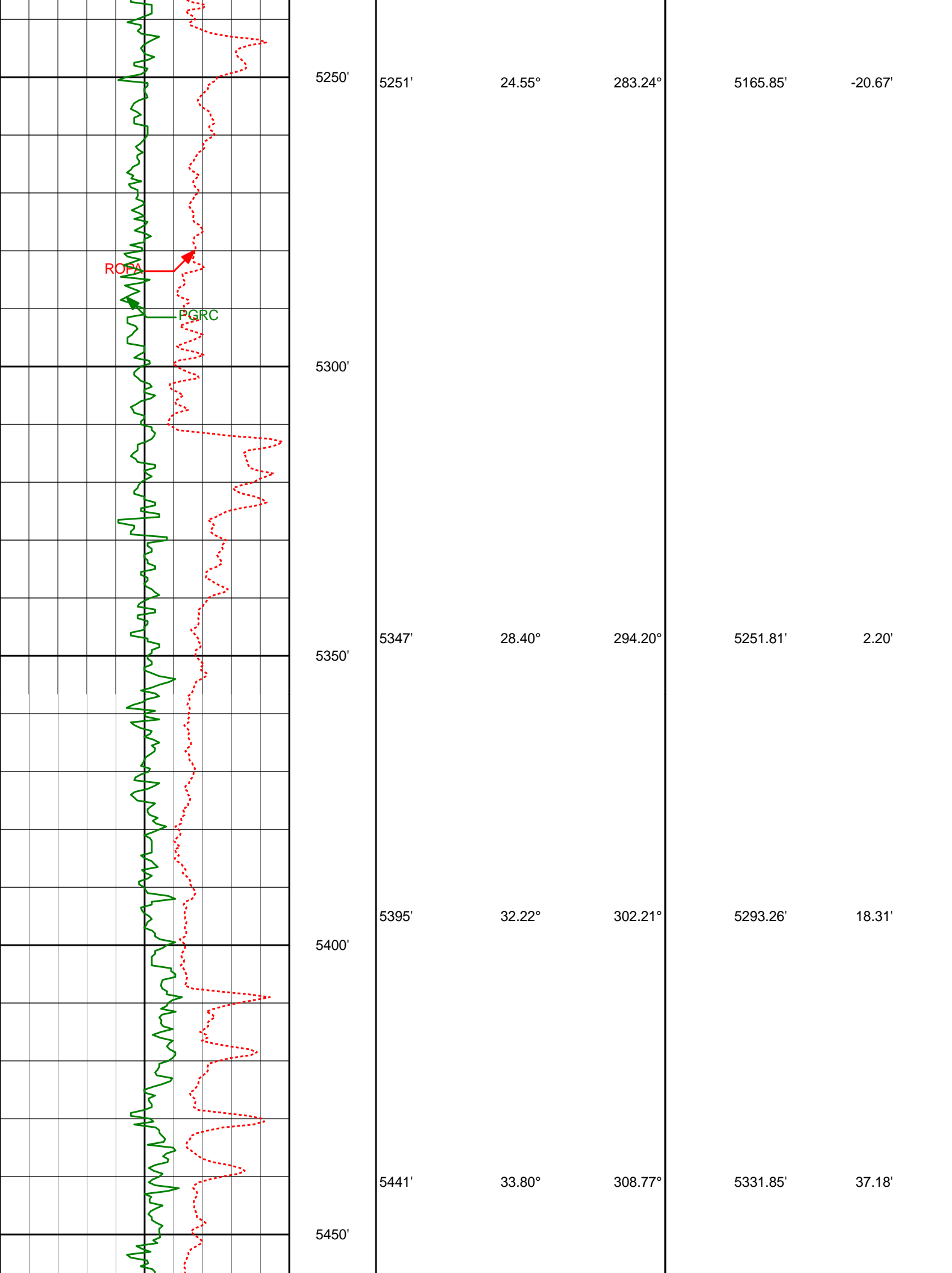
19.63°

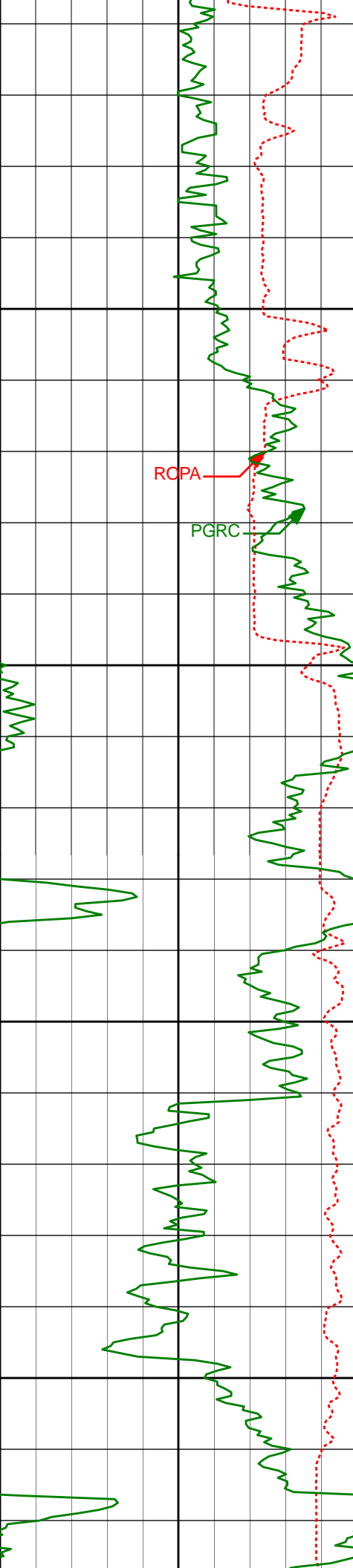
277.04°

5078.76'

-34.93'

5200'





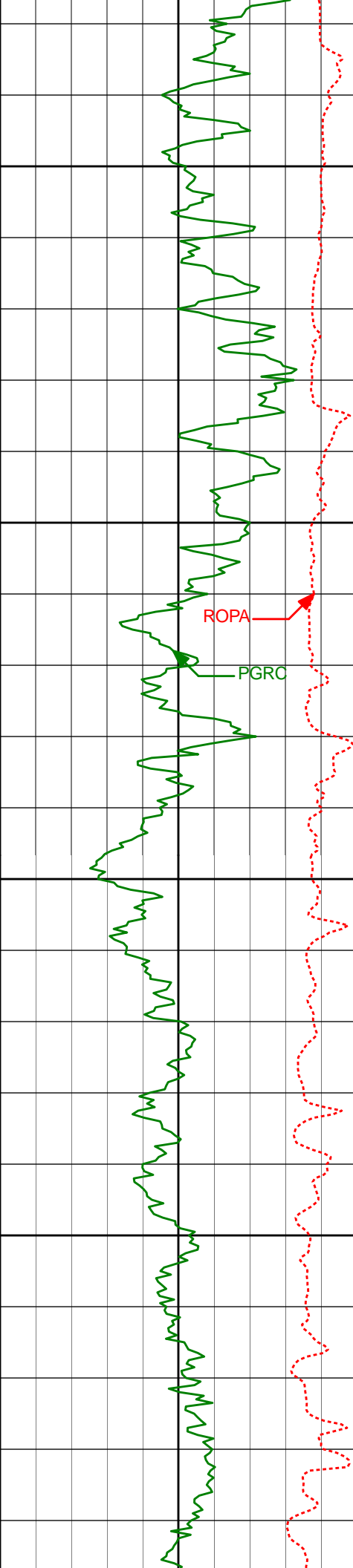
RCPA

PGRC

Run200

5489'	36.27°	313.86°	5371.16'	59.66'
5536'	38.74°	319.15°	5408.45'	84.40'
5631'	48.94°	334.25°	5477.07'	146.09'





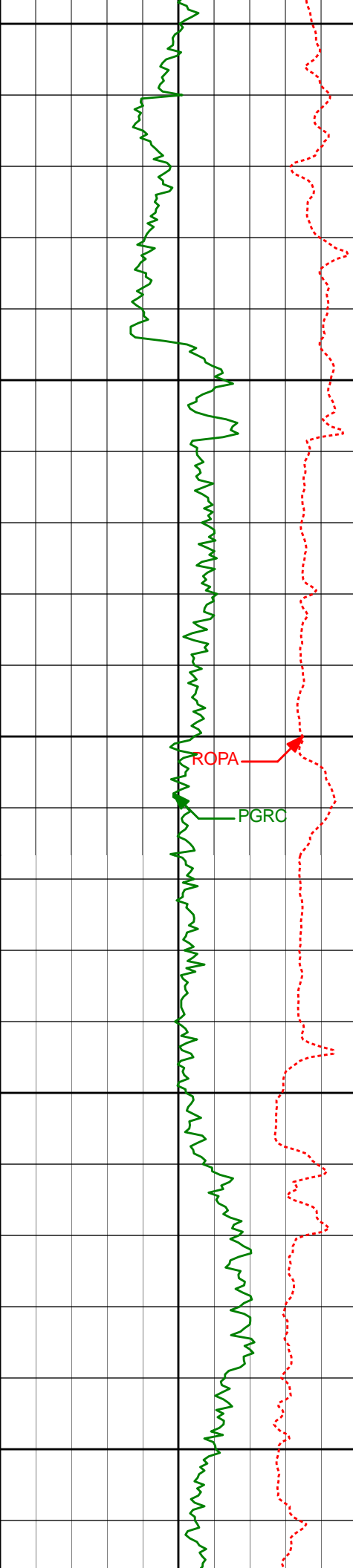
5700'

5750'

5800'

5850'

5679'	54.74°	340.38°	5506.73'	183.29'
5726'	60.50°	346.44°	5531.91'	222.88'
5774'	66.05°	353.05°	5553.51'	265.63'
5822'	71.73°	358.44°	5570.80'	309.80'



5900'

5904'

83.36°

0.16°

5588.46'

387.78'



Casing Shoe @ 5948'

5950'

Run300

5988'

91.88°

3.07°

5591.94'

468.78'

6000'

ROPA



PGRC



6050'

6081'

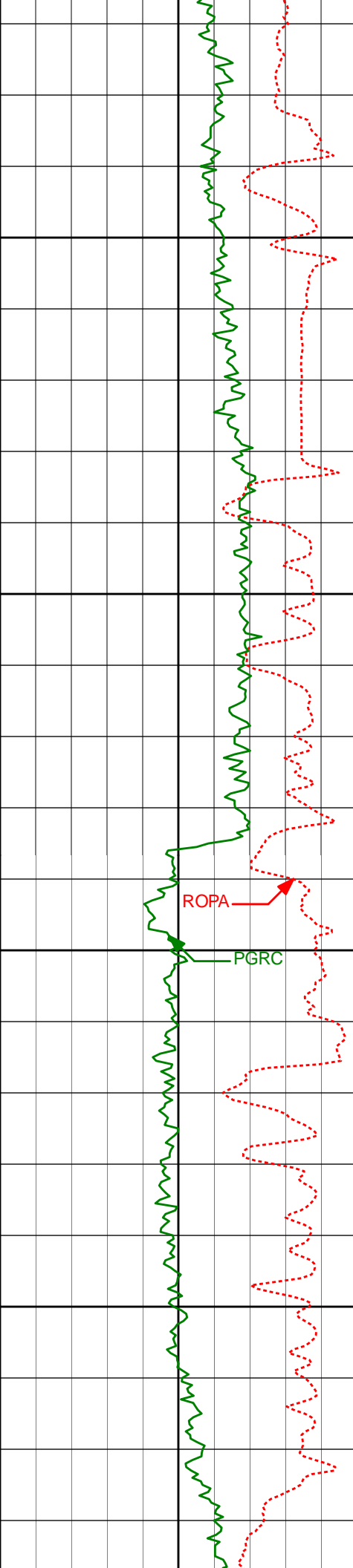
92.10°

3.97°

5588.72'

557.72'

6100'



6150'

6173'

93.05°

0.55°

5584.59'

646.21'

6200'

6250'

6267'

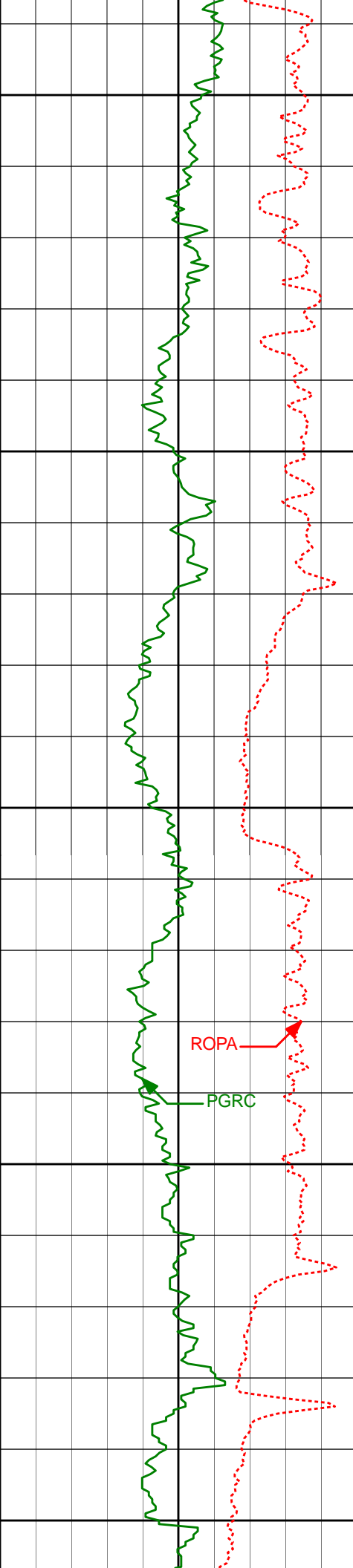
91.45°

358.89°

5580.90'

737.70'

6300'



6350'

6362'

91.17°

358.93°

5578.73'

830.50'

6400'

6450'

6457'

91.33°

358.50°

5576.66'

923.38'

6500'

6550'

6552'

91.69°

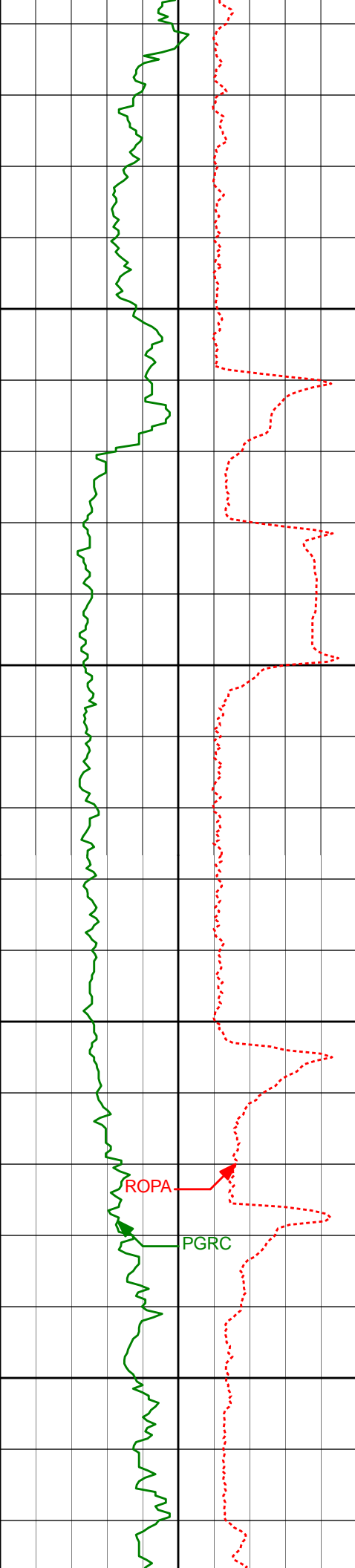
358.39°

5574.15'

1016.34'

ROPA

PGRC



6600'

6650'

6700'

6750'

6647'

89.78°

358.43°

5572.93'

1109.33'

ROPA

PGRC

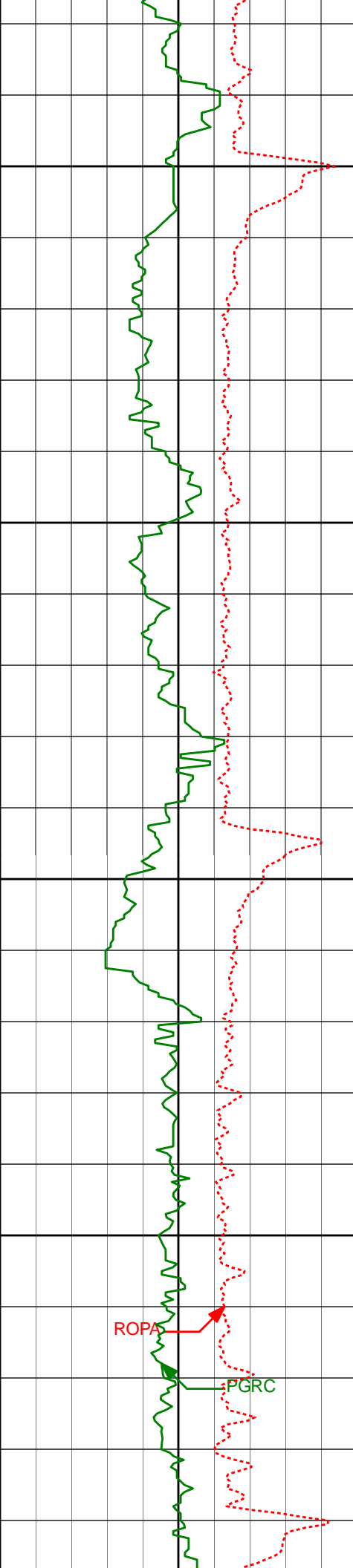
6742'

90.22°

358.22°

5572.93'

1202.36'



6800'

6850'

6900'

6950'

ROPA

PGRC

6837'

90.46°

358.01°

5572.36'

1295.46'

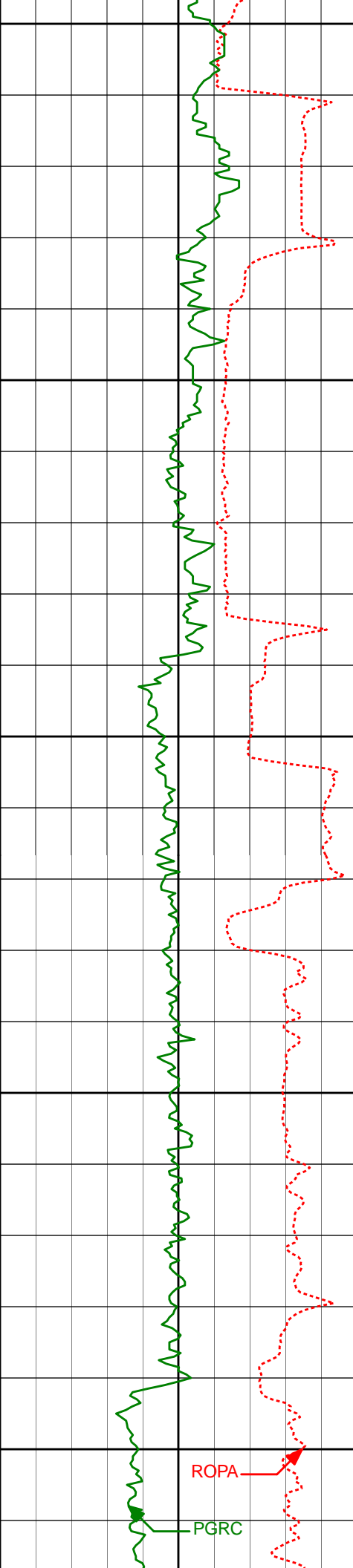
6932'

90.83°

357.41°

5571.29'

1388.69'



7000'

7027'

90.96°

359.39°

5569.81'

1481.68'

7050'

7100'

7122'

88.74°

359.15°

5570.07'

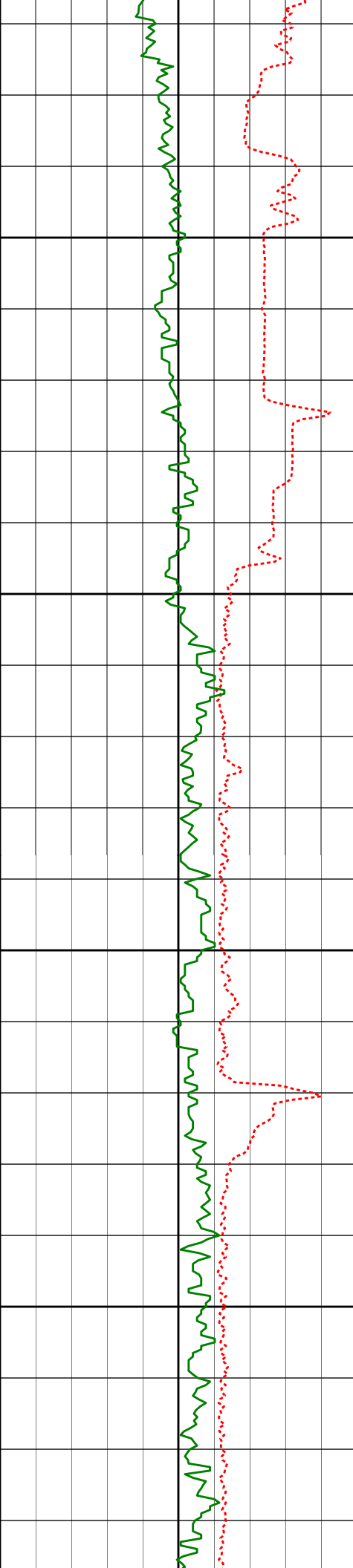
1574.37'

7150'

7200'

ROPA

PGRC



7250'

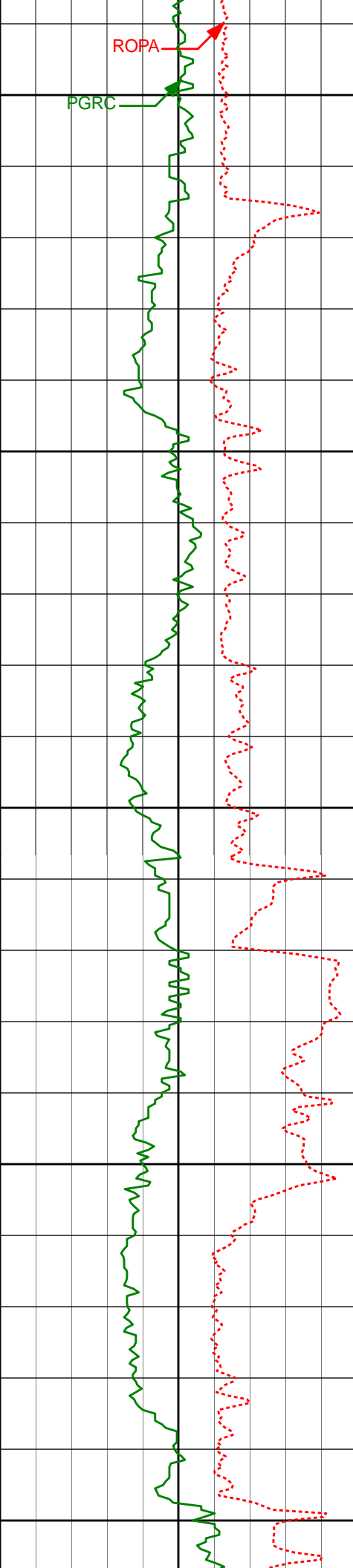
7300'

7350'

7400'

7217'	89.14°	358.65°	5571.83'	1667.19'
7312'	89.97°	358.65°	5572.57'	1760.11'
7407'	88.86°	357.95°	5573.54'	1853.14'





7450'

7500'

7550'

7600'

7650'

7502'

88.65°

357.47°

5575.61'

1946.35'

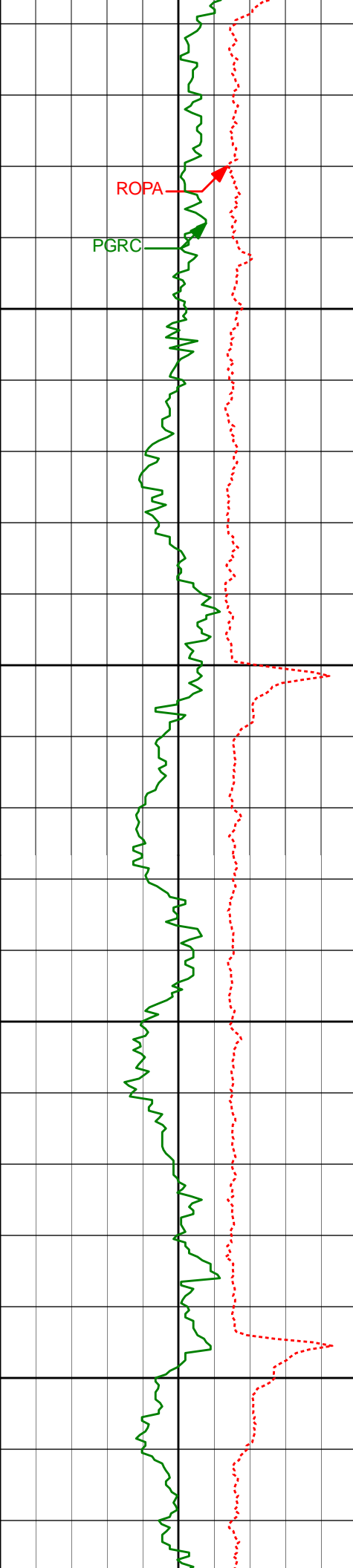
7597'

89.57°

359.70°

5577.09'

2039.27'



ROPA

PGRC

7700'

7750'

7800'

7850'

7692'

90.55°

0.47°

5576.99'

2131.67'

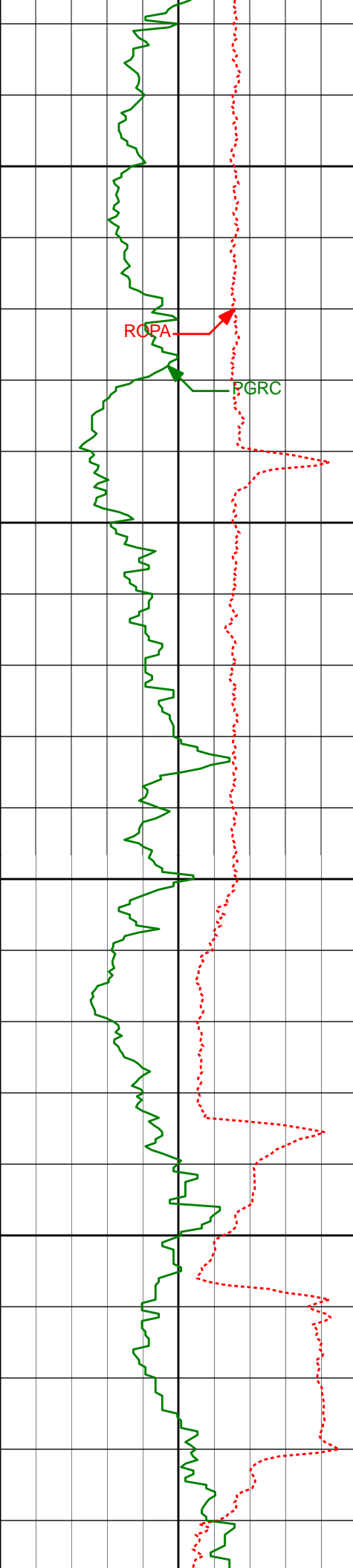
7787'

90.52°

359.81°

5576.09'

2224.04'



7900'

7950'

8000'

8050'

7882'

90.83°

359.52°

5574.97'

2316.59'

7977'

91.33°

359.31°

5573.18'

2409.22'

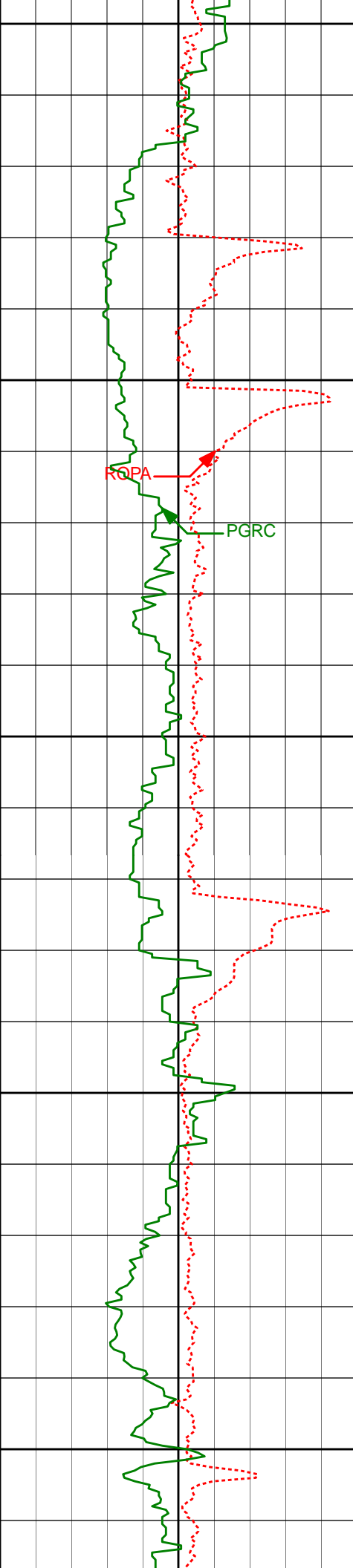
8072'

90.34°

358.46°

5571.80'

2502.05'



8100'

8150'

8200'

8250'

8300'

ROPA

PGRC

8168'

90.77°

358.30°

5570.87'

2596.03'

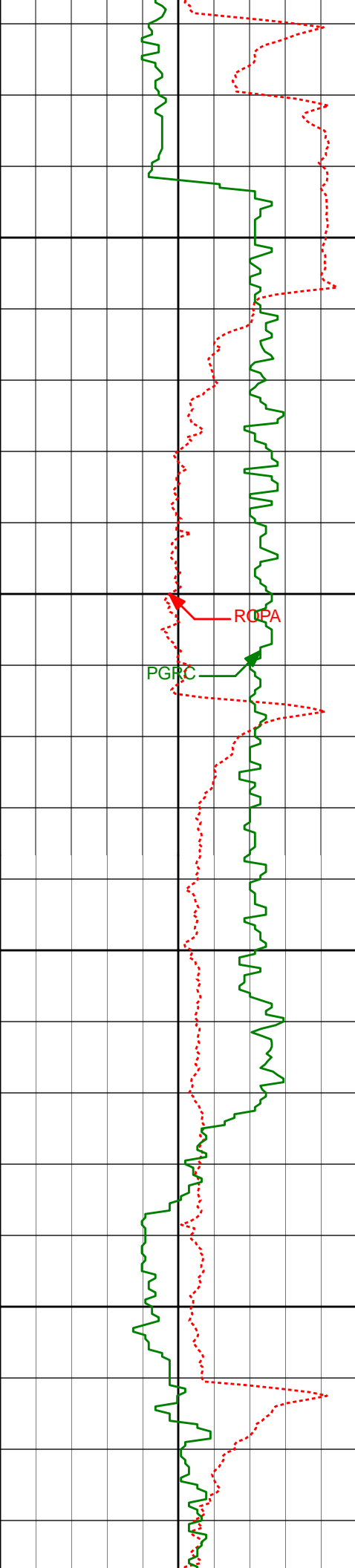
8263'

91.32°

358.17°

5569.13'

2689.08'



8350'

8400'

8450'

8500'

8358'

88.43°

357.67°

5569.34'

2782.23'

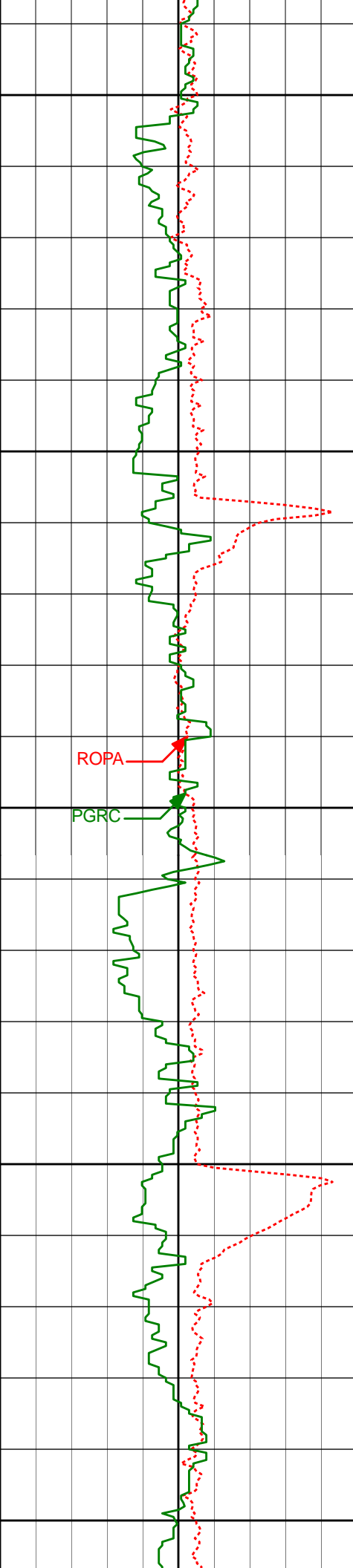
8453'

88.46°

356.92°

5571.92'

2875.56'



8550'

8600'

8650'

8700'

8750'

8548'

8643'

8738'

89.17°

89.97°

90.80°

356.91°

357.05°

356.92°

5573.88'

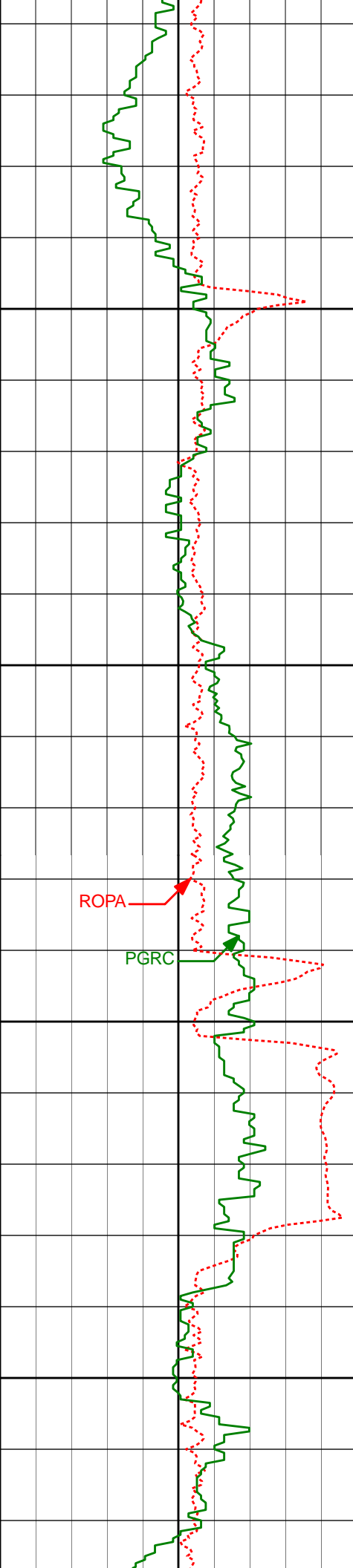
5574.60'

5573.96'

2969.01'

3062.47'

3155.92'



8800'

8833'

91.23°

356.19°

5572.28'

3249.49'

8850'

ROPA

PGRC

8900'

8928'

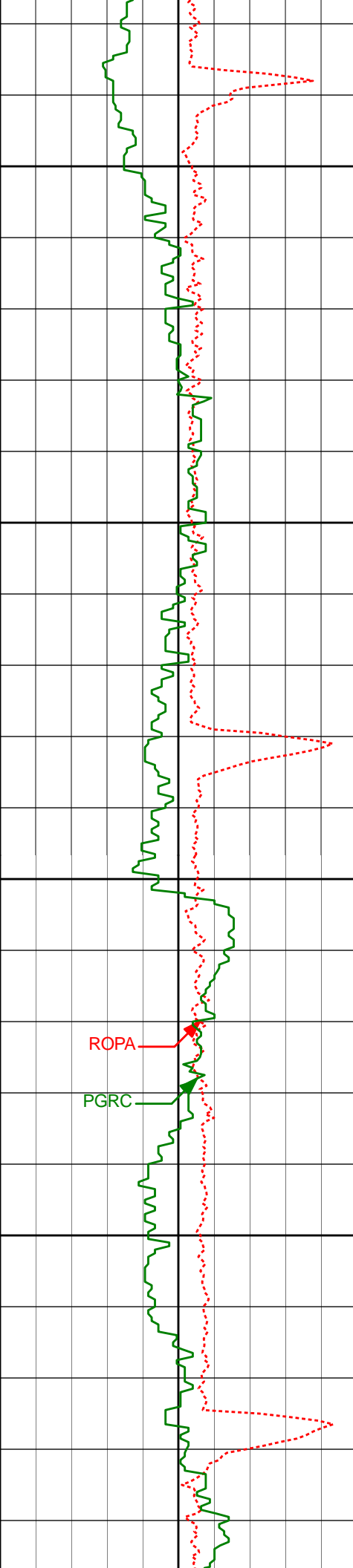
88.98°

358.10°

5572.10'

3342.89'

8950'



9000'

9023'

88.27°

357.57°

5574.37'

3436.05'

9050'

9100'

9118'

88.64°

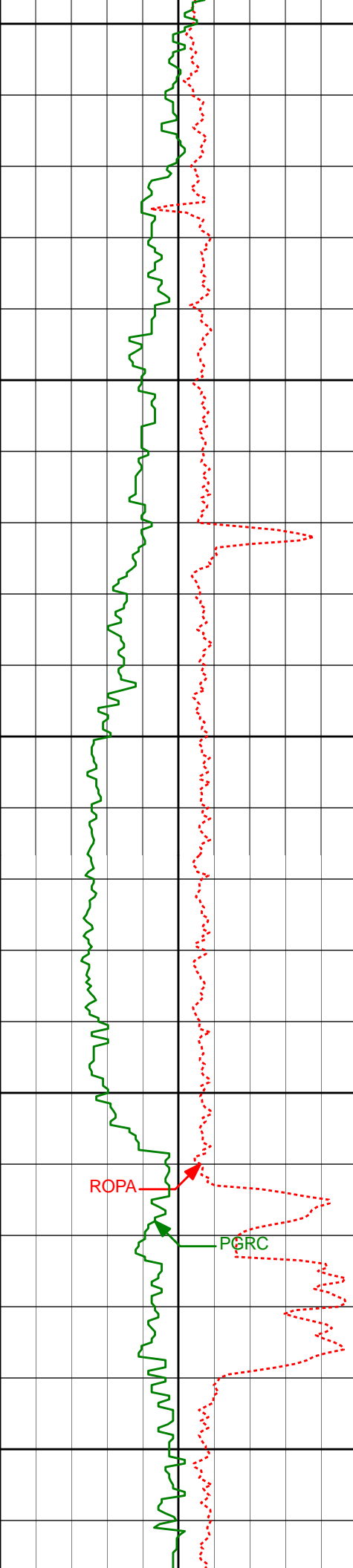
357.56°

5576.93'

3529.29'

9150'





9200'

9213'

89.01°

358.46°

5578.87'

3622.41'

9250'

9300'

9308'

88.80°

357.53°

5580.68'

3715.53'

9350'

ROPA

PGRC

9400'

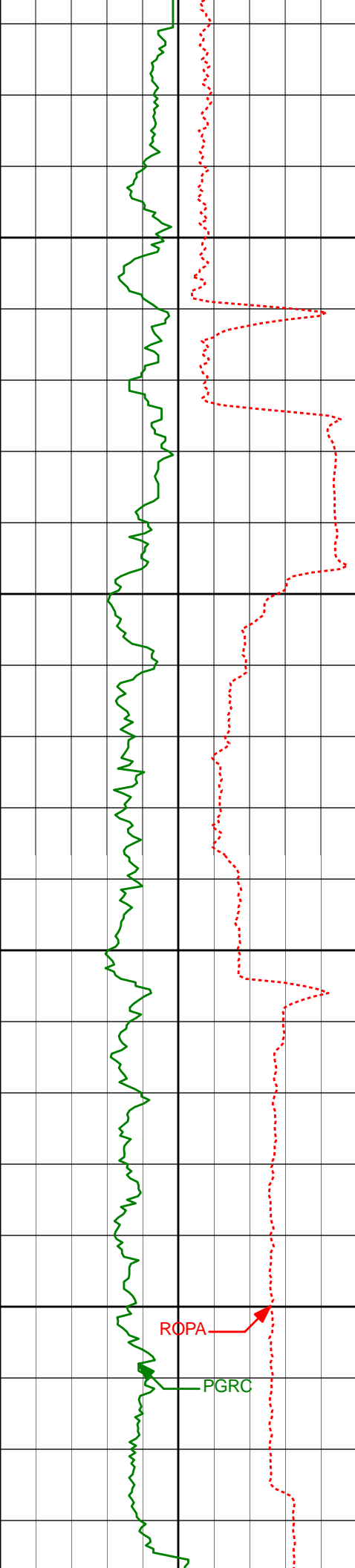
9403'

89.85°

356.19°

5581.81'

3809.01'



9450'

9500'

9550'

9600'

9498'

89.32°

357.85°

5582.50'

3902.45'

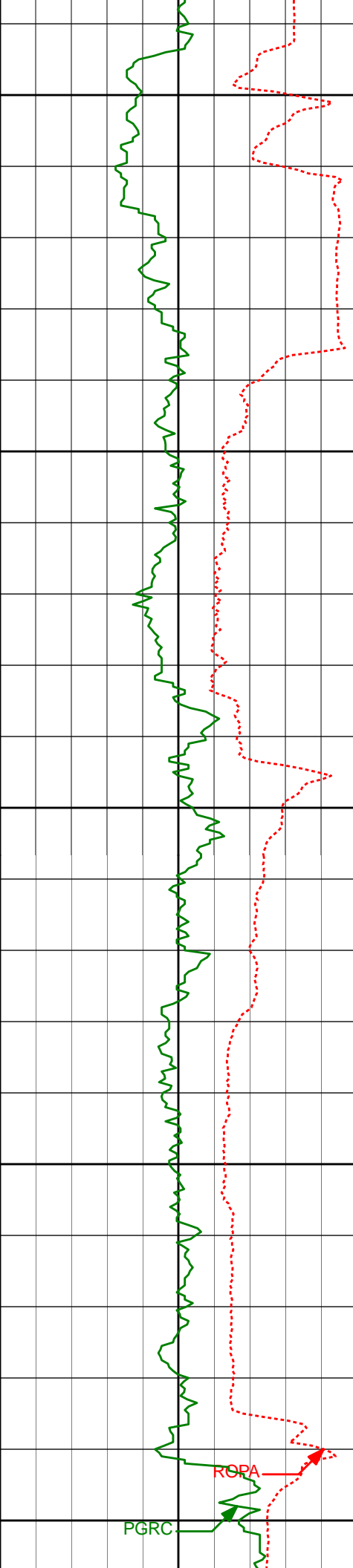
9593'

89.60°

357.74°

5583.39'

3995.65'



9650'

9688'

92.34°

358.83°

5581.78'

4088.68'

9700'

9750'

9783'

92.25°

358.63°

5577.98'

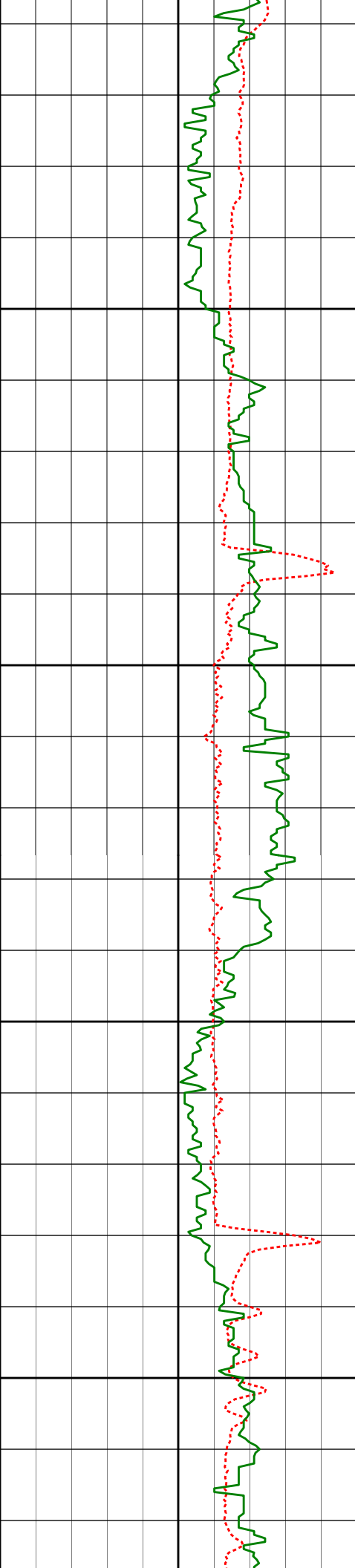
4181.50'

9800'

9850'

PGRC

ROPA



9878'

92.53°

358.06°

5574.02'

4274.44'

9900'

9950'

10000'

10050'

9973'

92.25°

358.38°

5570.06'

4367.43'

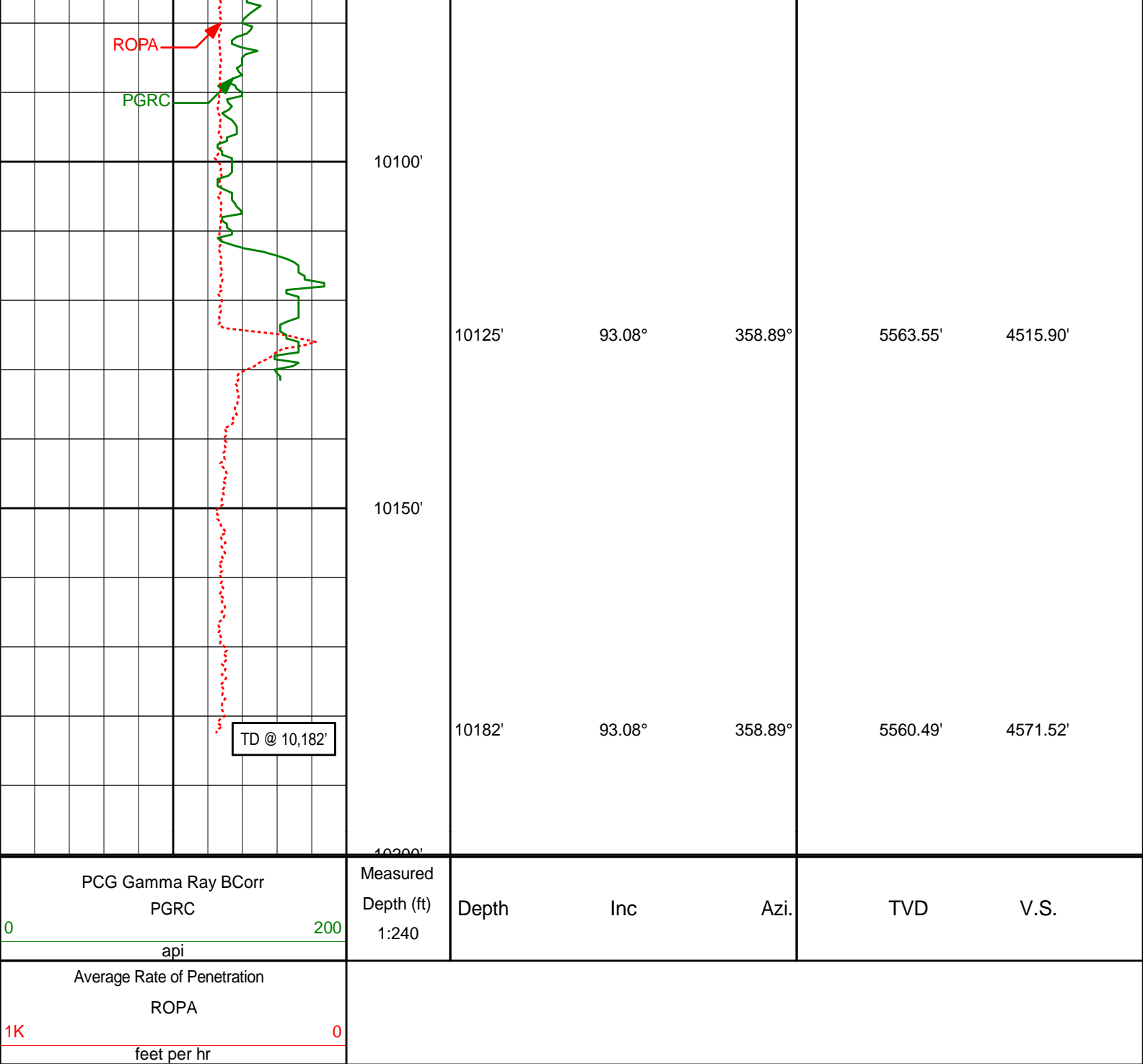
10068'

92.34°

358.96°

5566.25'

4460.26'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Noble Energy  
Davis State LD02-73HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901831239  
The first three surveys at 364', 640' and 920' 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
364.00	0.10	257.91	364.00	0.07 S	0.31 W	0.01	0.03
640.00	0.40	38.41	640.00	0.64 N	0.05 E	0.61	0.17

920.00	0.00	209.11	920.00	1.40 N	0.66 E	1.21	0.14
1288.00	0.40	301.96	1287.99	2.09 N	0.43 W	2.13	0.11
1381.00	2.28	254.67	1380.96	1.77 N	2.50 W	2.30	2.18
1473.00	3.77	248.66	1472.83	0.19 N	7.08 W	1.82	1.65
1567.00	5.86	243.10	1566.50	3.11 S	14.23 W	0.26	2.28
1660.00	7.34	251.56	1658.88	7.14 S	24.10 W	-1.37	1.90
1752.00	8.93	250.11	1749.95	11.42 S	36.39 W	-2.71	1.74
1844.00	10.49	250.21	1840.63	16.69 S	50.98 W	-4.46	1.70
1937.00	12.49	251.25	1931.77	22.79 S	68.47 W	-6.35	2.16
2029.00	12.29	249.13	2021.62	29.47 S	87.04 W	-8.56	0.54
2122.00	11.74	247.43	2112.59	36.63 S	105.02 W	-11.37	0.70
2214.00	13.06	250.82	2202.44	43.64 S	123.49 W	-13.93	1.63
2306.00	12.78	249.72	2292.11	50.58 S	142.85 W	-16.20	0.40
2400.00	13.66	255.50	2383.62	56.96 S	163.34 W	-17.68	1.69
2494.00	13.50	255.00	2474.99	62.58 S	184.69 W	-18.21	0.21
2589.00	13.49	254.47	2567.37	68.42 S	206.08 W	-18.95	0.13
2684.00	13.05	254.15	2659.83	74.32 S	227.07 W	-19.84	0.47
2780.00	12.41	253.23	2753.47	80.25 S	247.37 W	-20.92	0.70
2875.00	11.47	253.31	2846.42	85.91 S	266.19 W	-22.08	0.99
2970.00	10.45	251.55	2939.69	91.35 S	283.41 W	-23.39	1.13
3065.00	11.90	252.35	3032.88	97.05 S	300.91 W	-24.89	1.53
3160.00	11.90	251.07	3125.84	103.19 S	319.51 W	-26.57	0.28
3255.00	12.22	249.99	3218.75	109.81 S	338.21 W	-28.69	0.41
3350.00	12.65	250.04	3311.52	116.80 S	357.44 W	-31.04	0.46
3445.00	13.08	250.48	3404.13	123.94 S	377.35 W	-33.39	0.46
3540.00	12.96	252.28	3496.69	130.78 S	397.63 W	-35.36	0.45
3635.00	12.09	252.07	3589.43	137.08 S	417.24 W	-36.96	0.91
3730.00	11.87	256.91	3682.36	142.35 S	436.22 W	-37.70	1.08
3825.00	10.99	256.62	3775.48	146.66 S	454.54 W	-37.66	0.93
3921.00	10.47	256.05	3869.80	150.88 S	471.91 W	-37.75	0.55
4015.00	10.85	256.98	3962.18	154.93 S	488.81 W	-37.79	0.45
4110.00	9.45	258.55	4055.69	158.50 S	505.17 W	-37.48	1.50
4206.00	9.86	250.95	4150.33	162.74 S	520.66 W	-38.03	1.39
4301.00	11.01	251.38	4243.76	168.30 S	536.95 W	-39.67	1.22
4396.00	12.98	256.66	4336.68	173.66 S	555.94 W	-40.50	2.37
4491.00	10.77	257.61	4429.65	178.02 S	574.99 W	-40.34	2.34
4586.00	9.81	253.35	4523.12	182.25 S	591.42 W	-40.66	1.28
4681.00	12.38	256.46	4616.33	186.95 S	609.08 W	-41.16	2.77
4776.00	10.18	252.39	4709.50	191.88 S	626.98 W	-41.81	2.46
4872.00	12.32	250.93	4803.65	197.79 S	644.74 W	-43.46	2.25
4966.00	11.44	255.96	4895.63	203.33 S	663.27 W	-44.57	1.44
5061.00	17.20	265.05	4987.65	206.83 S	686.43 W	-42.62	6.49
5157.00	19.63	277.04	5078.76	206.08 S	716.59 W	-34.93	4.67
5251.00	24.55	283.24	5165.85	199.67 S	751.30 W	-20.67	5.79
5347.00	28.40	294.20	5251.81	185.73 S	791.57 W	2.20	6.47
5395.00	32.22	302.21	5293.26	174.22 S	812.83 W	18.31	11.57
5441.00	33.80	308.77	5331.85	159.67 S	833.19 W	37.18	8.48
5489.00	36.27	313.86	5371.16	141.46 S	853.84 W	59.66	7.97
5536.00	38.74	319.15	5408.45	120.70 S	873.50 W	84.40	8.62
5631.00	48.94	334.25	5477.07	65.66 S	908.69 W	146.09	15.33
5679.00	54.74	340.38	5506.73	30.85 S	923.15 W	183.29	15.69
5726.00	60.50	346.44	5531.91	7.16 N	934.40 W	222.88	16.39
5774.00	66.05	353.05	5553.51	49.31 N	941.96 W	265.63	16.88
5822.00	71.73	358.44	5570.80	93.93 N	945.24 W	309.80	15.80
5904.00	83.36	0.16	5588.46	173.85 N	946.19 W	387.78	14.33
5988.00	91.88	3.07	5591.94	257.66 N	943.82 W	468.78	10.71
6081.00	92.10	3.97	5588.72	350.43 N	938.11 W	557.72	1.00
6173.00	93.05	0.55	5584.59	442.25 N	934.49 W	646.21	3.86
6267.00	91.45	358.89	5580.90	536.17 N	934.95 W	737.70	2.45
6362.00	91.17	358.93	5578.73	631.13 N	936.76 W	830.50	0.30
6457.00	91.33	358.50	5576.66	726.08 N	938.89 W	923.38	0.49
6552.00	91.69	358.39	5574.15	821.01 N	941.47 W	1016.34	0.41
6647.00	89.78	358.43	5572.93	915.96 N	944.11 W	1109.33	2.01
6742.00	90.22	358.22	5572.93	1010.92 N	946.89 W	1202.36	0.50
6837.00	90.46	358.01	5572.36	1105.87 N	950.02 W	1295.46	0.34
6932.00	90.83	357.41	5571.29	1200.79 N	953.81 W	1388.69	0.74
7027.00	90.96	359.39	5569.81	1295.73 N	956.46 W	1481.68	2.09
7122.00	88.74	359.15	5570.07	1390.72 N	957.67 W	1574.37	2.35
7217.00	89.14	358.65	5571.83	1485.69 N	959.49 W	1667.19	0.67
7312.00	89.97	358.65	5572.57	1580.66 N	961.73 W	1760.11	0.88
7407.00	88.86	357.95	5573.54	1675.61 N	964.55 W	1853.14	1.38
7502.00	88.65	357.47	5575.61	1770.51 N	968.35 W	1946.35	0.55
7597.00	89.57	359.70	5577.09	1865.46 N	970.69 W	2039.27	2.54
7692.00	90.55	0.47	5576.99	1960.46 N	970.55 W	2131.67	1.32
7787.00	90.52	359.81	5576.09	2055.45 N	970.31 W	2224.04	0.70

7882.00	90.83	359.52	5574.97	2150.45 N	970.87 W	2316.59	0.44
7977.00	91.33	359.31	5573.18	2245.42 N	971.84 W	2409.22	0.57
8072.00	90.34	358.46	5571.80	2340.39 N	973.69 W	2502.05	1.36
8168.00	90.77	358.30	5570.87	2436.35 N	976.39 W	2596.03	0.48
8263.00	91.32	358.17	5569.13	2531.29 N	979.32 W	2689.08	0.60
8358.00	88.43	357.67	5569.34	2626.22 N	982.77 W	2782.23	3.09
8453.00	88.46	356.92	5571.92	2721.07 N	987.25 W	2875.56	0.79
8548.00	89.17	356.91	5573.88	2815.92 N	992.36 W	2969.01	0.75
8643.00	89.97	357.05	5574.60	2910.78 N	997.37 W	3062.47	0.86
8738.00	90.80	356.92	5573.96	3005.65 N	1002.38 W	3155.92	0.89
8833.00	91.23	356.19	5572.28	3100.46 N	1008.09 W	3249.49	0.89
8928.00	88.98	358.10	5572.10	3195.33 N	1012.81 W	3342.89	3.11
9023.00	88.27	357.57	5574.37	3290.23 N	1016.40 W	3436.05	0.94
9118.00	88.64	357.56	5576.93	3385.11 N	1020.44 W	3529.29	0.39
9213.00	89.01	358.46	5578.87	3480.03 N	1023.73 W	3622.41	1.02
9308.00	88.80	357.53	5580.68	3574.96 N	1027.05 W	3715.53	1.00
9403.00	89.85	356.19	5581.81	3669.81 N	1032.25 W	3809.01	1.80
9498.00	89.32	357.85	5582.50	3764.67 N	1037.20 W	3902.45	1.83
9593.00	89.60	357.74	5583.39	3859.60 N	1040.86 W	3995.65	0.31
9688.00	92.34	358.83	5581.78	3954.53 N	1043.70 W	4088.68	3.11
9783.00	92.25	358.63	5577.98	4049.43 N	1045.81 W	4181.50	0.23
9878.00	92.53	358.06	5574.02	4144.31 N	1048.56 W	4274.44	0.66
9973.00	92.25	358.38	5570.06	4239.18 N	1051.51 W	4367.43	0.44
10068.00	92.34	358.96	5566.25	4334.08 N	1053.71 W	4460.26	0.62
10125.00	93.08	358.89	5563.55	4391.00 N	1054.78 W	4515.90	1.31
10182.00	93.08	358.89	5560.49	4447.91 N	1055.88 W	4571.52	0.01

**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 346.64 DEGREES (GRID)  
A TOTAL CORRECTION OF 6.91 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10182.00 FEET  
IS 4571.52 FEET ALONG 346.65 DEGREES (GRID)**

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