

### PCG Pressure Case Gamma PCD Pressure Case Directional

Country		: USA					
Field		: Wattenberg					
Location		: Lat: 40° 27' 4.50" North Long: 104° 21' 22.57" West					
Well		: Wells Ranch AE30-62HNC					
Company		: Noble Energy					
Rig		: H&P 343					
LOCATION							
		Latitude : 40° 27' 4.50" North Longitude : 104° 21' 22.57" West					
		UTM Easting = 3,318,291.010 ft UTM Northing = 1,409,283.400 ft					

## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300		
<b>Date run completed</b>	26-May-14	27-May-14	30-May-14		
<b>Rig Bit Number</b>	2	3	4		
<b>Bit Size (in)</b>	8.750	8.750	6.125		
<b>Tool Nominal OD (in)</b>	6.750	6.750	4.750		
<b>Log Start Depth (MD, ft)</b>	641.00	5,790.00	6,912.00		
<b>Log End Depth (MD, ft)</b>	5,790.00	6,912.00	12,026.00		
<b>Drill or Wipe</b>	Drill	Drill	Drill		
<b>Drill/Wipe Start Date and Time</b>	25-May-14 21:00	26-May-14 23:15	28-May-14 12:45		
<b>Drill/Wipe End Date and Time</b>	26-May-14 14:00	27-May-14 09:15	29-May-14 16:45		
<b>Min Inc (deg) @ Depth (MD, ft)</b>	0.04 @ 4,957.00	0.44 @ 5,904.00	87.57 @ 7,132.00		
<b>Max Inc (deg) @ Depth (MD, ft)</b>	10.52 @ 2,208.00	77.26 @ 6,852.00	91.26 @ 8,451.00		
<b>Bit TFA(in2) / Bit Type</b>	1.20 / PDC	1.24 / PDC	1.24 / PDC		
<b>Flow Rate (gpm)</b>	593.71	586.25	300.00		
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	411.1 / NA	408.0 / NA	448.2 / NA		
<b>Fluid Type</b>	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
<b>Density (ppg) / Viscosity (spqt)</b>	8.90 / 29.00	10.10 / 39.00	9.50 / 34.00		
<b>Filtrate CL (ppm)</b>	2,200.00	2,500.00	2,700.00		
<b>pH / Fluid Loss (mptm)</b>	9.30 / 28	9.60 / 8	9.90 / 8		
<b>PV (cP) / YP (lbf2)</b>	4 / 2.00	12 / 13.00	8 / 9.00		
<b>% Solids / % Sand</b>	3.70 / 0.25	8.90 / 0.15	5.70 / 0.15		
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	NA / NA	NA / NA		
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	NA @ NA	NA @ NA		
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	NA @ NA	NA @ NA		
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	NA @ NA	NA @ NA		
<b>Max Tool Temp (in F) / S</b>	170.07 / PCM	170.07 / PCM	220.10 / PCM		

Max Tool Temp (degF) / Source	170.37 / PCM	170.37 / PCM	226.10 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Lead MWD Engineer	Brett Vandergon	Brett Vandergon	Brett Vandergon		
Customer Representative	Matt Settles	Matt Settles	Matt Settles		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11341327	11341327	12310807		
Insert Serial Number	11400994	11400994	11227556		
Date and Time Initialized	25-May-14 13:24	01-Jan-70 00:00	27-May-14 17:52		
Date and Time Read	27-May-14 16:25	27-May-14 16:19	30-May-14 02:00		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	54.00	65.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341327	11341327	12310807		
Sonde Serial Number	11062120	11062120	11297584		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	260.31	280.53	245.56		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.48	47.23	57.81		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341327	11341327	12310807		
Insert/Sonde Serial Number	11579775	11579775	11579843		

## 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:  
PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 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

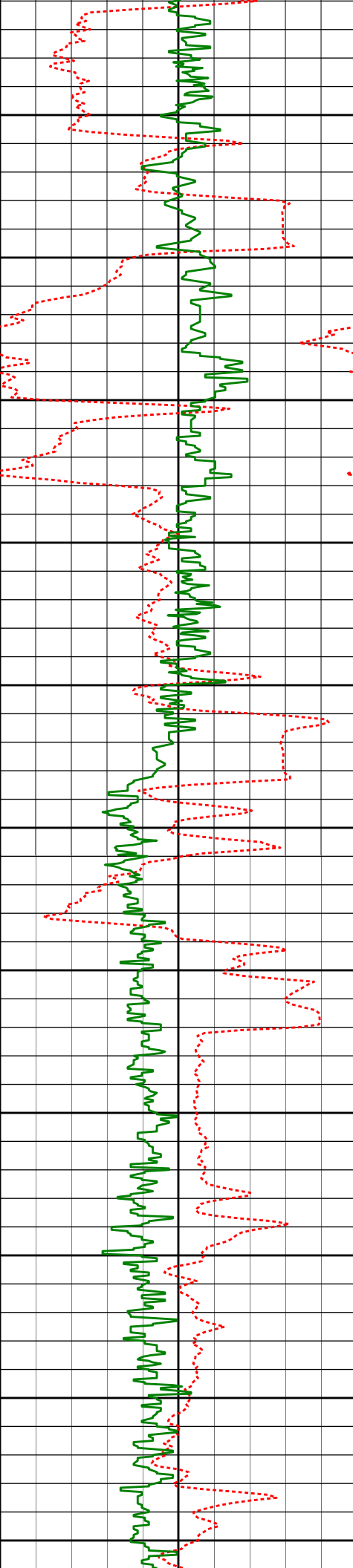
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MD Main Log 1:600

Average Rate of Penetration ROPA						
1K0						
feet per hr						
PCG Gamma Ray BCorr PGRC		Measured Depth (ft)	Inc	Azi.	TVD	V.S.
0200		1:600				
api						
		3000'				
		3050'				
		3062'	7.60°	347.40°	3048.13'	42.28'
		3100'				
		3150'				
		3157'	8.05°	349.13°	3142.24'	45.31'
		3200'				
		3250'				



3300'

3350'

3400'

3450'

3500'

3550'

3600'

3650'

3700'

3750'

3800'

3346'

8.84°

343.52°

3329.19'

52.78'

3441'

7.67°

344.38°

3423.21'

56.98'

3536'

8.56°

349.68°

3517.26'

60.37'

3630'

10.19°

351.18°

3610.00'

63.38'

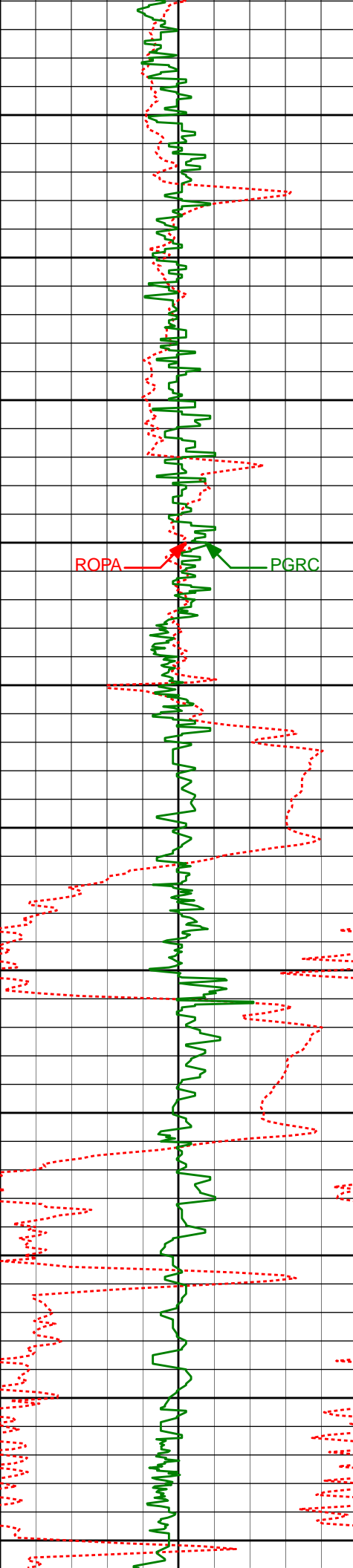
3725'

10.40°

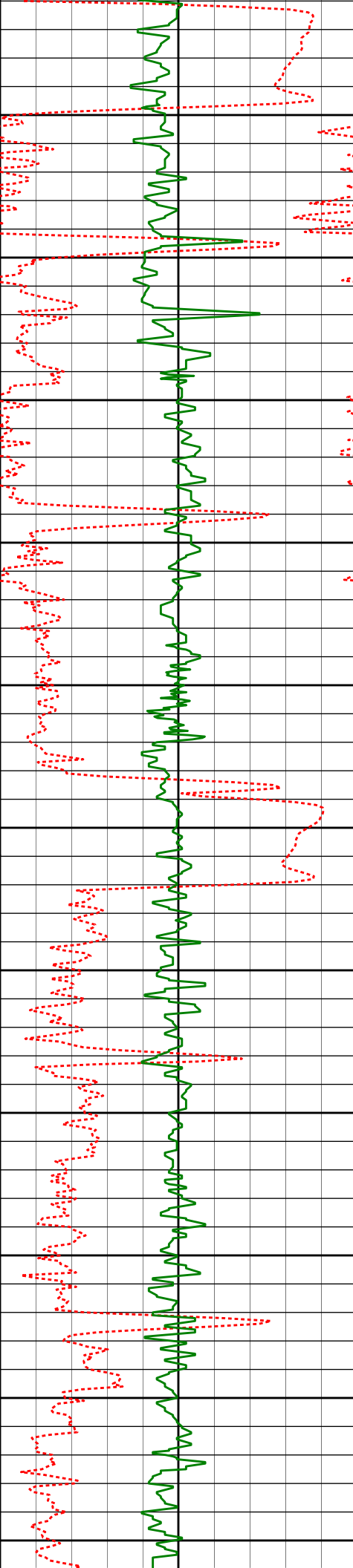
347.34°

3703.47'

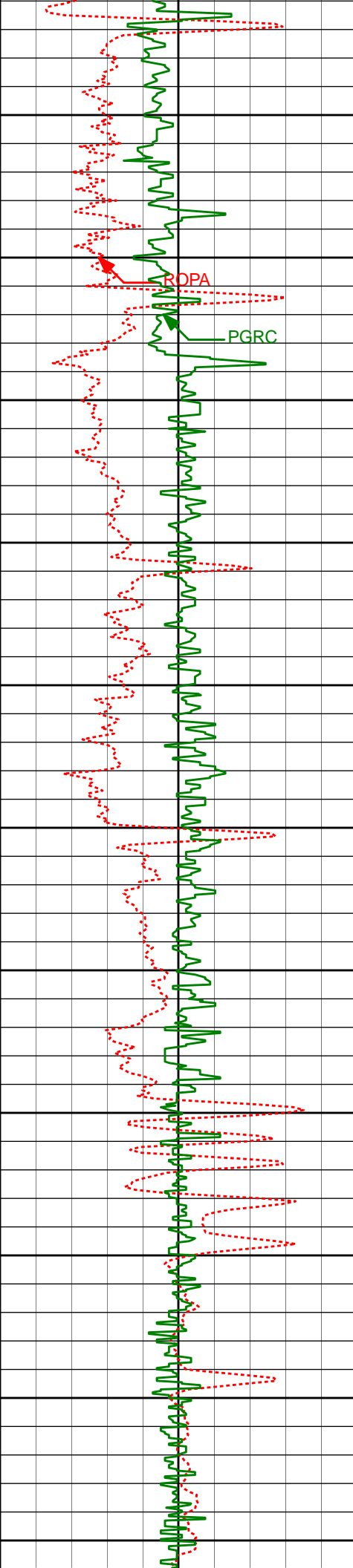
67.08'



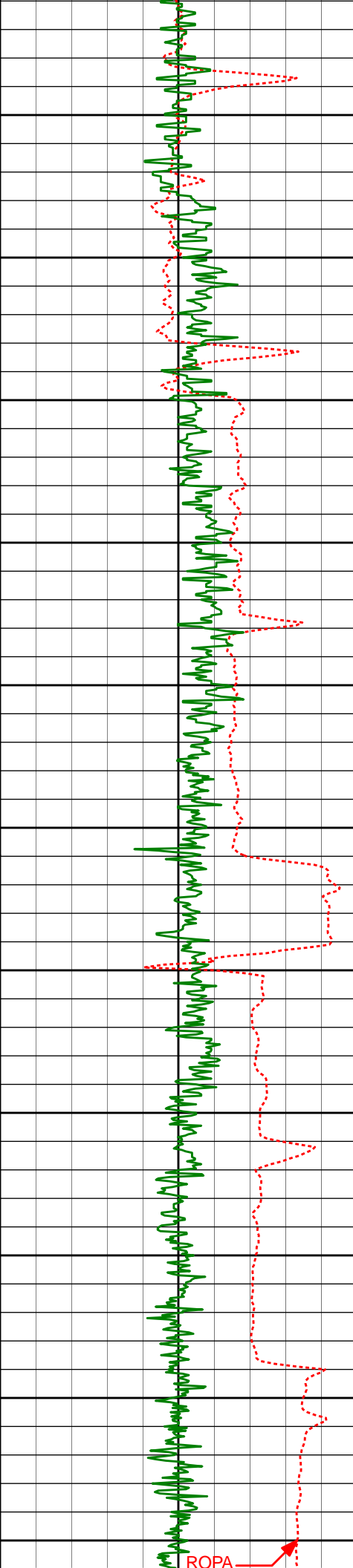
3820'	10.36°	344.95°	3796.91'	71.70'
3850'				
3900'				
3915'	9.53°	344.14°	3890.49'	76.57'
3950'				
4000'				
4010'	9.01°	343.51°	3984.25'	81.30'
4050'				
4100'				
4105'	6.96°	338.16°	4078.32'	85.95'
4150'				
4200'				
4200'	3.53°	343.93°	4172.91'	89.16'
4250'				
4294'	2.90°	347.20°	4266.76'	90.65'
4300'				
4350'				



4389'	2.09°	344.24°	4361.67'	91.78'
4400'				
4450'				
4484'	1.54°	324.87°	4456.62'	93.07'
4500'				
4550'				
4578'	1.66°	335.45°	4550.59'	94.44'
4600'				
4650'				
4673'	0.64°	43.38°	4645.57'	94.70'
4700'				
4750'				
4768'	0.50°	93.87°	4740.57'	93.93'
4800'				
4850'				
4862'	0.07°	80.80°	4834.56'	93.46'
4900'				

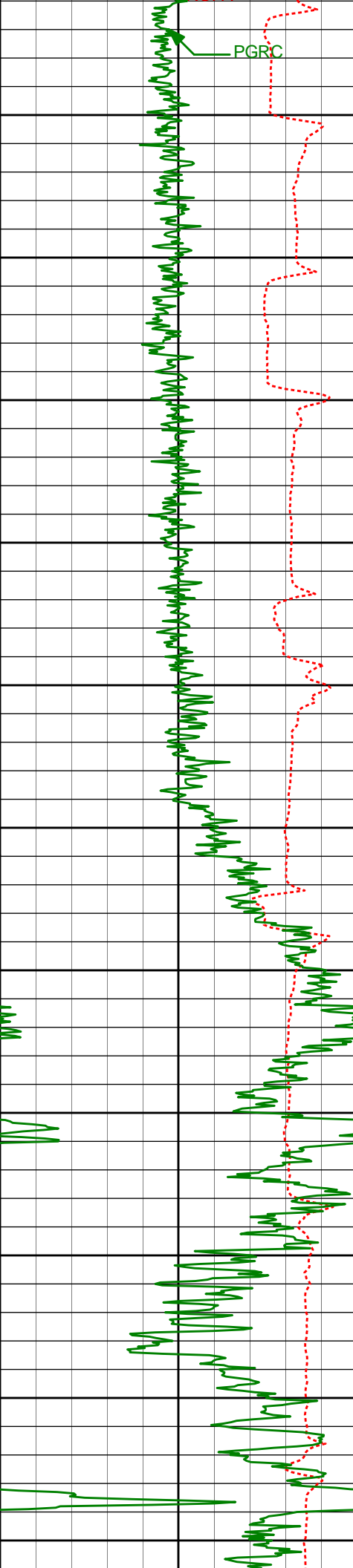


4950'	4957'	0.04°	167.97°	4929.56'	93.40'
5000'					
5050'	5051'	0.14°	207.42°	5023.56'	93.44'
5100'					
5150'	5146'	0.34°	172.76°	5118.56'	93.45'
5200'					
5250'	5242'	0.93°	191.04°	5214.56'	93.53'
5300'					
5350'	5336'	0.96°	227.25°	5308.54'	94.21'
5400'					
5450'	5431'	1.93°	227.50°	5403.51'	95.92'

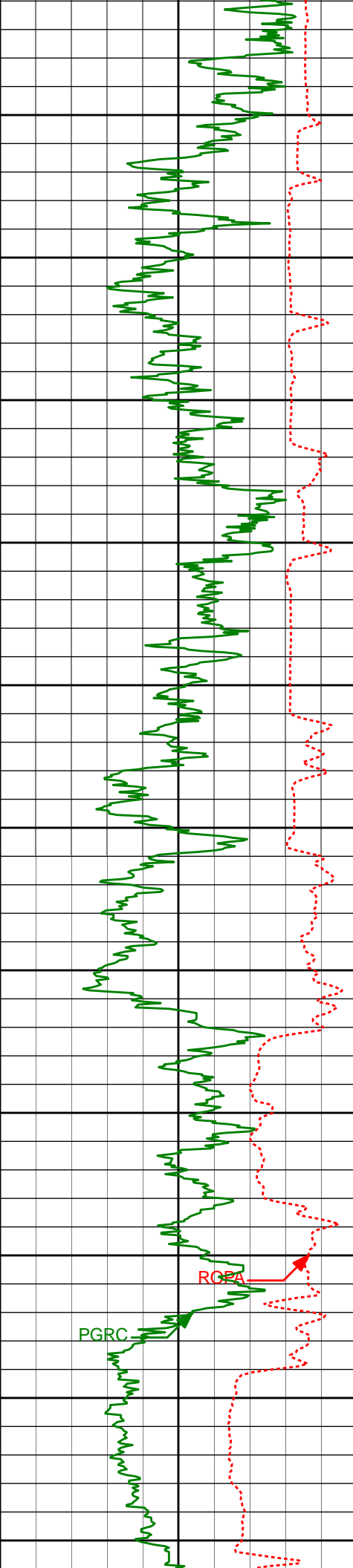


5500'				
5526'	2.12°	221.52°	5498.45'	98.19'
5550'				
5600'				
5621'	1.55°	224.83°	5593.41'	100.19'
5650'				
5700'				
5716'	1.14°	225.30°	5688.38'	101.71'
5750'				
Run200				
5800'				
5810'	0.61°	220.27°	5782.37'	102.67'
5850'				
5900'				
5904'	0.44°	251.49°	5876.36'	103.32'
5950'				
6000'				
5999'	7.91°	275.28°	5971.05'	110.19'

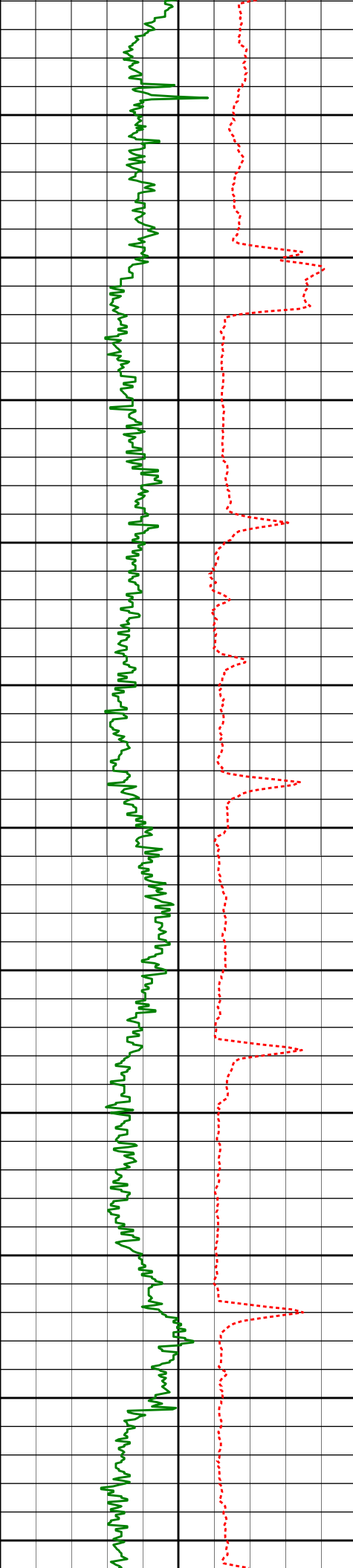




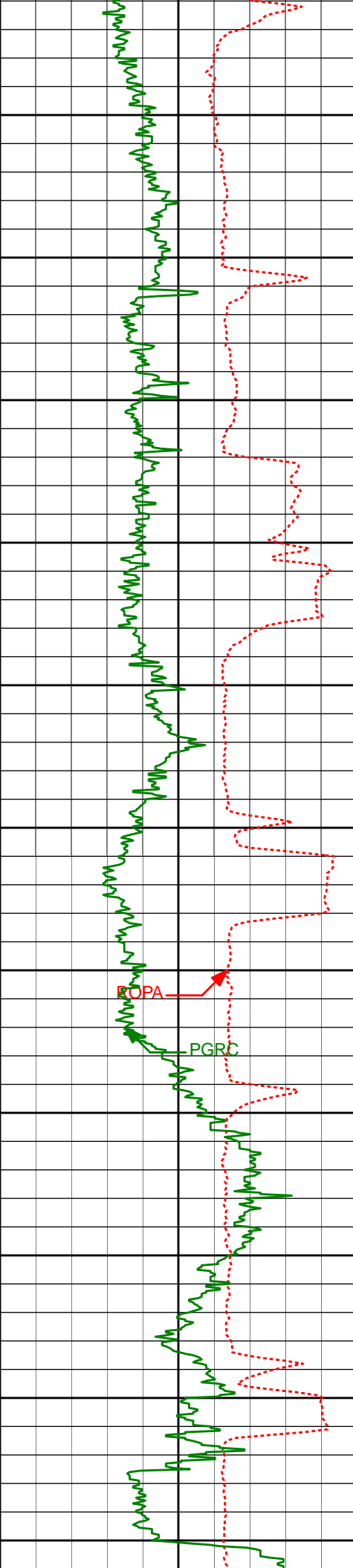
6050'				
6093'	13.55°	268.16°	6063.37'	127.65'
6100'				
6150'				
6188'	17.96°	267.01°	6154.78'	153.37'
6200'				
6250'				
6283'	23.61°	270.70°	6243.56'	187.01'
6300'				
6350'				
6378'	33.35°	275.97°	6326.98'	232.19'
6400'				
6450'				
6473'	47.78°	275.45°	6398.96'	293.67'
6500'				
6550'				



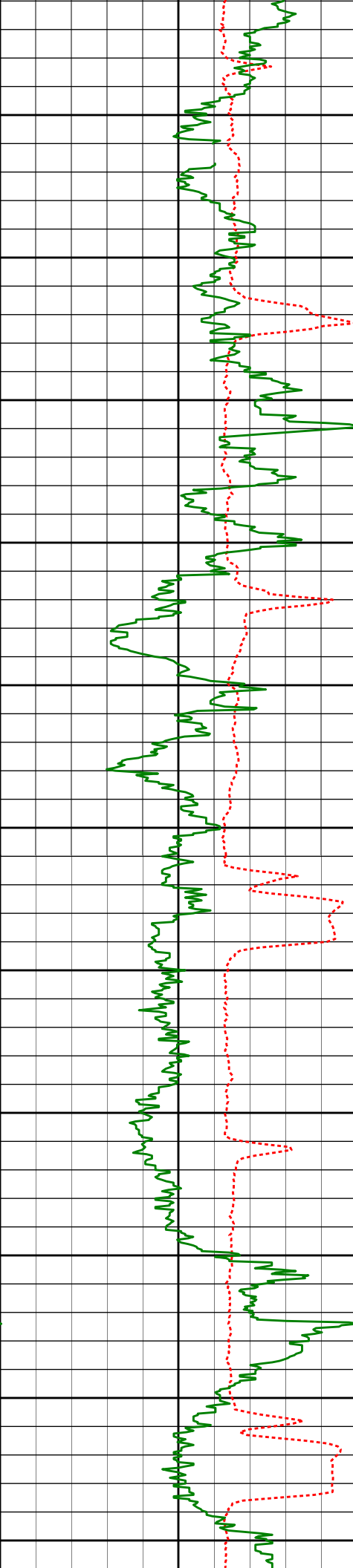
6568'	62.05°	270.86°	6453.44'	371.16'
6600'				
6650'				
6663'	67.90°	267.72°	6493.62'	457.10'
6700'				
6750'				
6758'	73.41°	266.58°	6525.08'	546.40'
6800'				
6806'	75.00°	266.50°	6538.14'	592.39'
6850'				
6852'	77.26°	265.62°	6549.17'	636.82'
6900'	Casing Shoe @ 6902'			
	Run 300			
6950'				
7000'				
7039'	87.69°	267.67°	6573.63'	821.19'
7050'				
7100'				



7132'	87.57°	267.84°	6577.47'	913.87'
7150'				
7200'				
7225'	89.82°	268.09°	6579.59'	1006.63'
7250'				
7300'				
7318'	89.26°	266.94°	6580.34'	1099.36'
7350'				
7400'				
7412'	90.06°	267.33°	6580.89'	1193.05'
7450'				
7500'				
7505'	89.60°	266.58°	6581.17'	1285.71'
7550'				
7600'	89.75°	266.31°	6581.70'	1378.30'
7650'				



7700'	7693'	90.52°	266.53°	6581.47'	1472.87'
7750'					
7800'	7788'	90.55°	266.15°	6580.59'	1567.43'
7850'					
7900'	7882'	90.28°	267.20°	6579.91'	1661.05'
7950'					
8000'	7977'	90.65°	269.29°	6579.13'	1755.85'
8050'					
8100'	8072'	91.02°	269.35°	6577.75'	1850.75'
8150'					
8200'	8167'	90.40°	269.42°	6576.57'	1945.66'



8250'

8262'

89.85°

268.52°

6576.37'

2040.54'

8300'

8350'

8356'

90.59°

268.40°

6576.00'

2134.37'

8400'

8450'

8451'

91.26°

268.50°

6574.47'

2229.20'

8500'

8550'

8546'

90.52°

268.99°

6573.00'

2324.05'

8600'

8650'

8641'

90.99°

268.93°

6571.74'

2418.92'

8700'

8750'

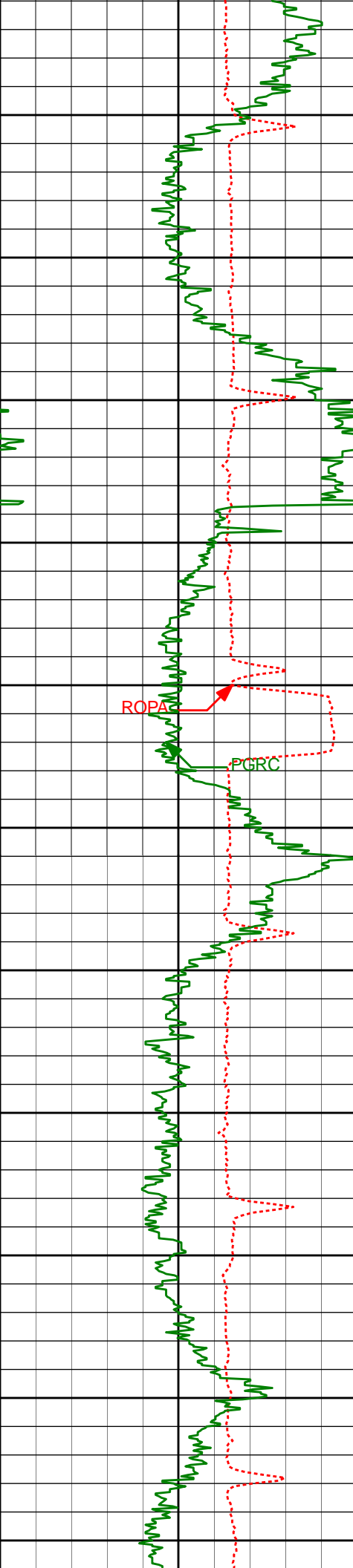
8736'

89.14°

269.46°

6571.64'

2513.81'



8800'

8831'

89.48°

269.28°

6572.78'

2608.72'

8850'

8900'

8925'

90.74°

269.40°

6572.60'

2702.63'

8950'

9000'

9020'

88.80°

269.46°

6572.98'

2797.54'

9050'

9100'

9115'

88.28°

269.16°

6575.40'

2892.42'

9150'

9200'

9210'

88.61°

269.09°

6577.98'

2987.28'

9250'

9300'

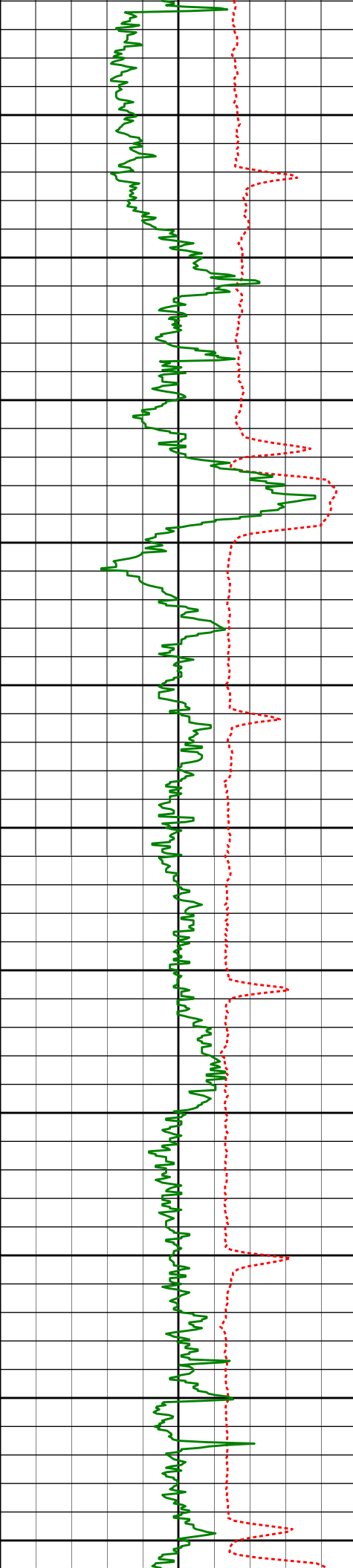
9305'

89.41°

269.22°

6579.62'

3082.16'



9350'

9400'

9450'

9500'

9550'

9600'

9650'

9700'

9750'

9800'

9850'

9399'

90.65°

268.93°

6579.57'

3176.05'

9494'

89.63°

268.38°

6579.34'

3270.90'

9589'

89.20°

267.42°

6580.31'

3365.67'

9684'

90.00°

268.10°

6580.97'

3460.43'

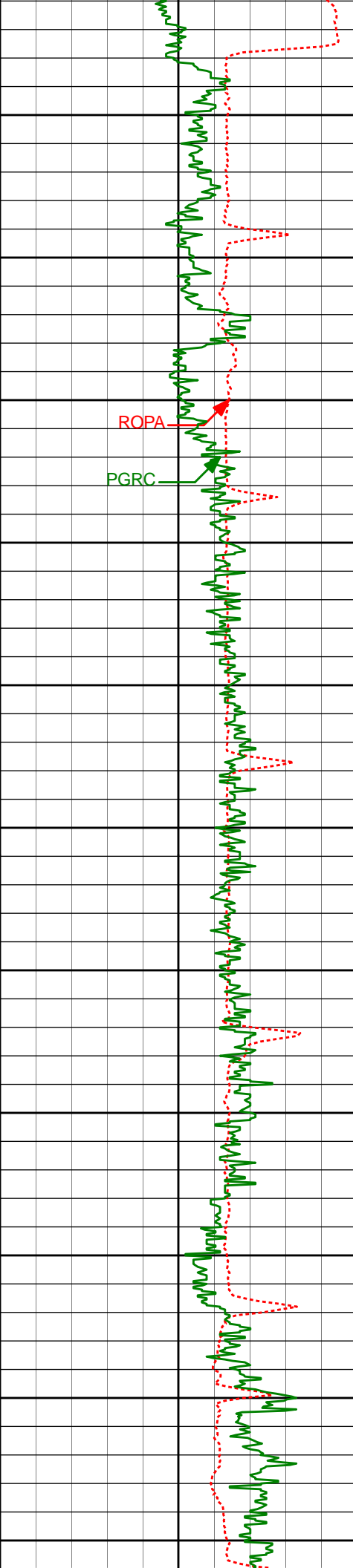
9778'

90.49°

268.90°

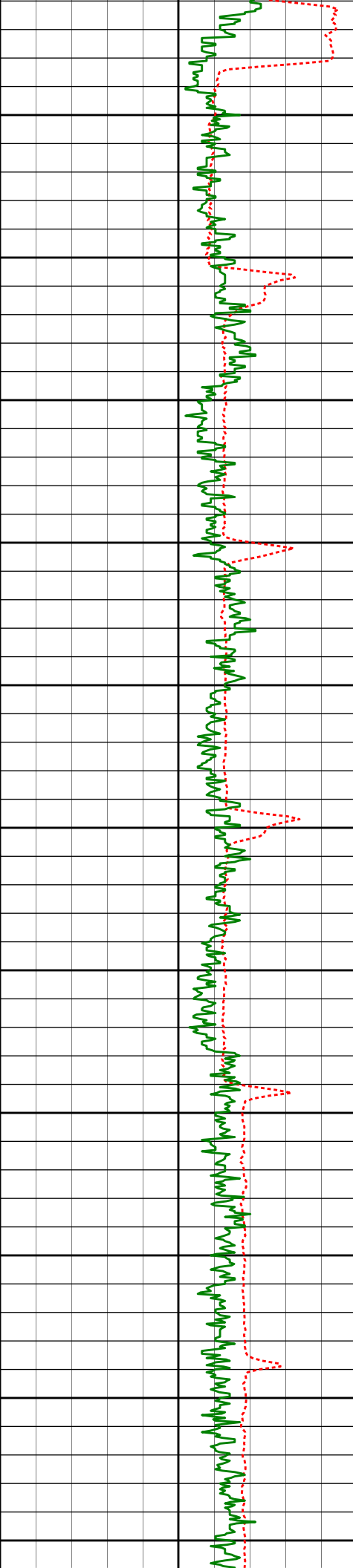
6580.57'

3554.26'

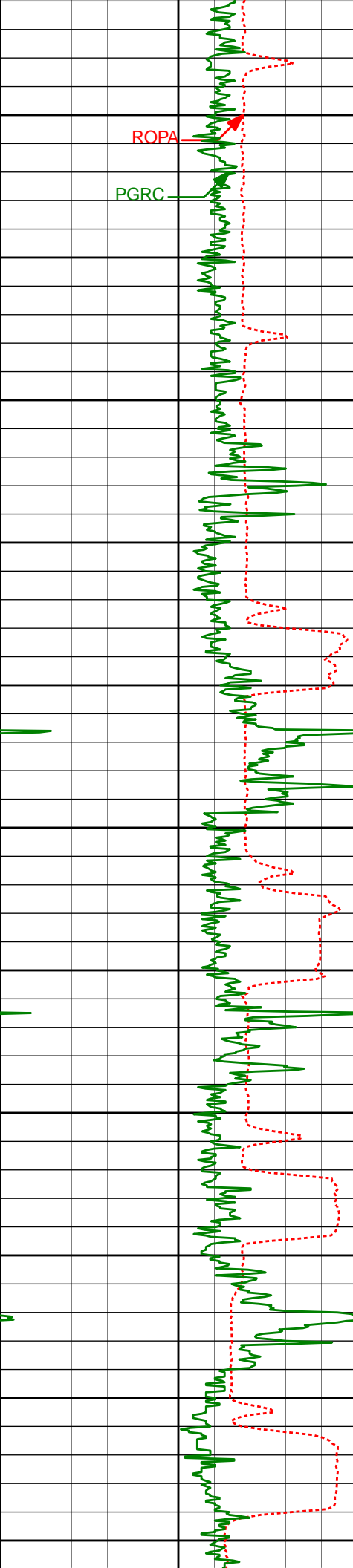


	9871'	88.03°	267.51°	6581.77'	3647.06'
9900'					
9950'					
	9967'	87.75°	266.79°	6585.31'	3742.68'
10000'					
10050'					
	10062'	89.41°	267.11°	6587.66'	3837.30'
10100'					
10150'					
	10157'	89.60°	266.50°	6588.48'	3931.93'
10200'					
10250'	10251'	89.45°	266.00°	6589.26'	4025.48'
10300'					
10350'	10346'	90.31°	266.08°	6589.46'	4120.00'
10400'					

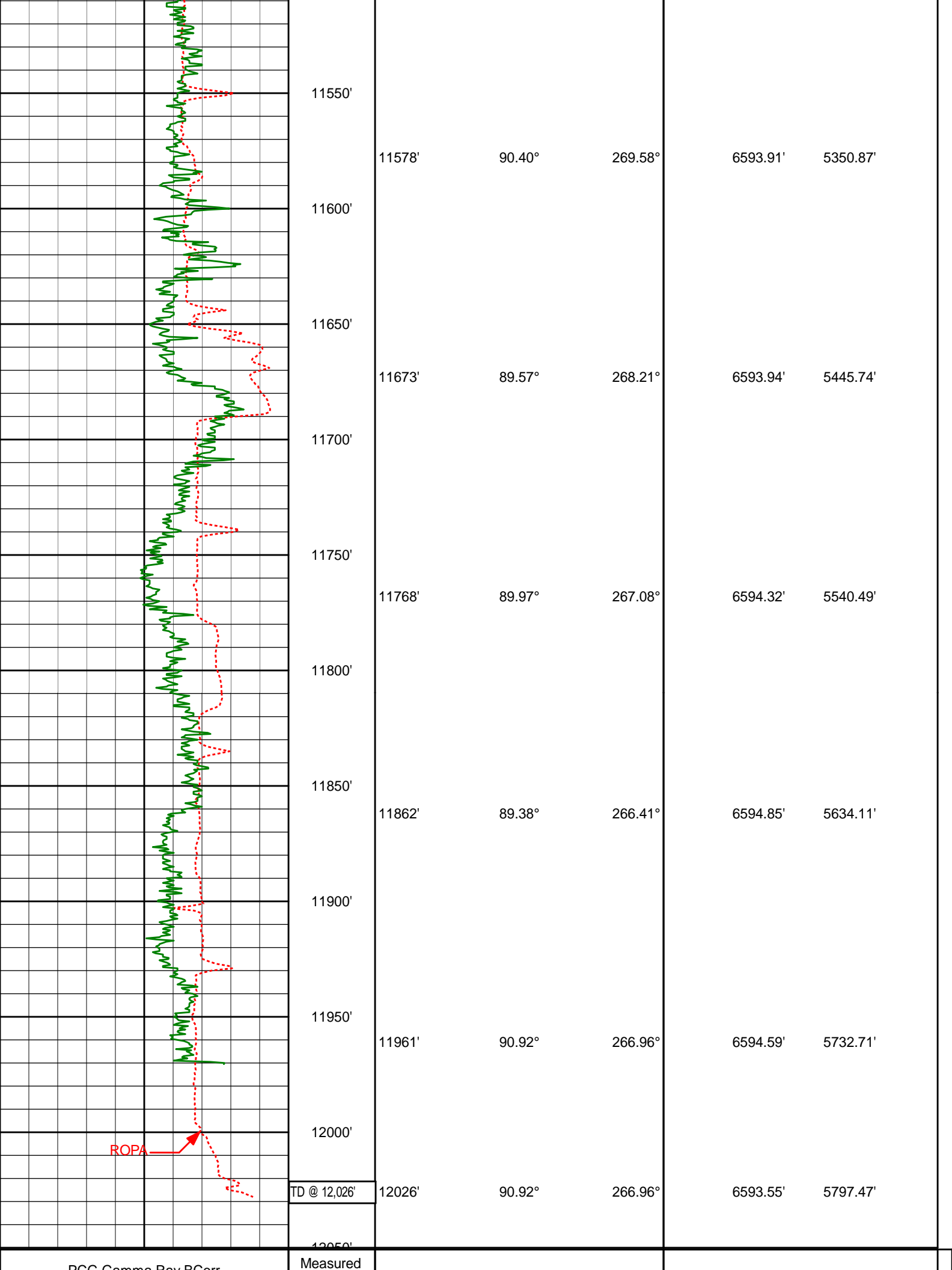




10450'	10441'	90.25°	268.22°	6589.00'	4214.67'
10500'					
10550'	10536'	89.97°	268.91°	6588.81'	4309.52'
10600'					
10650'	10631'	89.78°	268.99°	6589.02'	4404.40'
10700'					
10750'	10726'	89.54°	268.77°	6589.58'	4499.27'
10800'					
10850'	10821'	89.51°	269.23°	6590.37'	4594.15'
10900'					
10950'	10916'	89.75°	271.00°	6590.98'	4689.10'



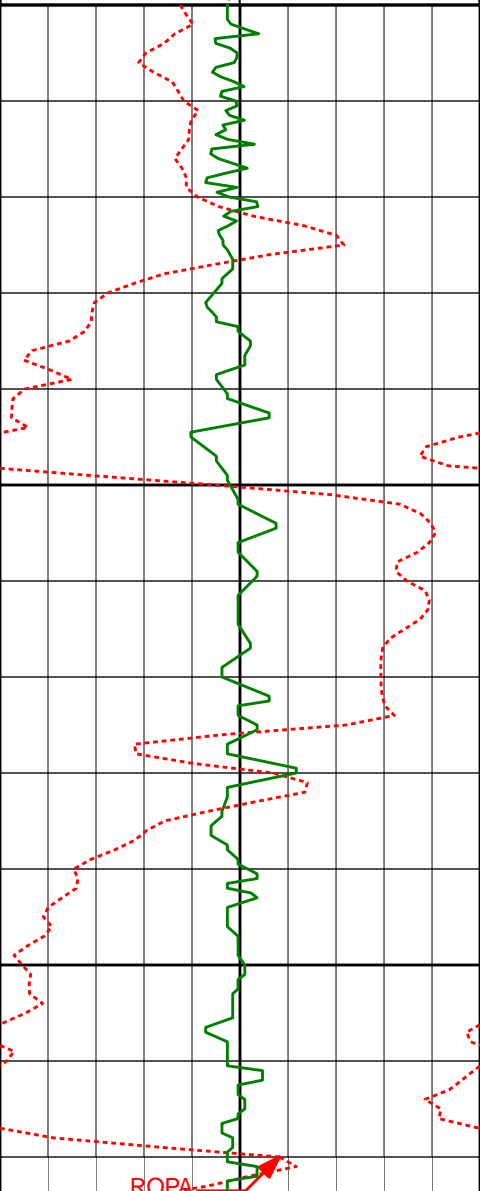
11000'	11010'	89.69°	271.76°	6591.44'	4783.10'
11050'					
11100'	11105'	89.91°	272.99°	6591.78'	4878.09'
11150'					
11200'	11199'	89.32°	273.21°	6592.41'	4972.06'
11250'					
11300'	11294'	89.51°	271.31°	6593.38'	5067.05'
11350'					
11400'	11389'	89.54°	270.94°	6594.17'	5162.04'
11450'					
11500'	11483'	90.18°	268.71°	6594.40'	5255.98'



<div> <div>PCG Gamma Ray BCON</div> <div>PGRC</div> <div>0200</div> <div>api</div> </div>	<div>Depth (ft)</div> <div>1:600</div>	<div>Depth</div>	<div>Inc</div>	<div>Azi.</div>	<div>TVD</div>	<div>V.S.</div>
<div> <div>Average Rate of Penetration</div> <div>ROPA</div> <div>1K0</div> <div>feet per hr</div> </div>						

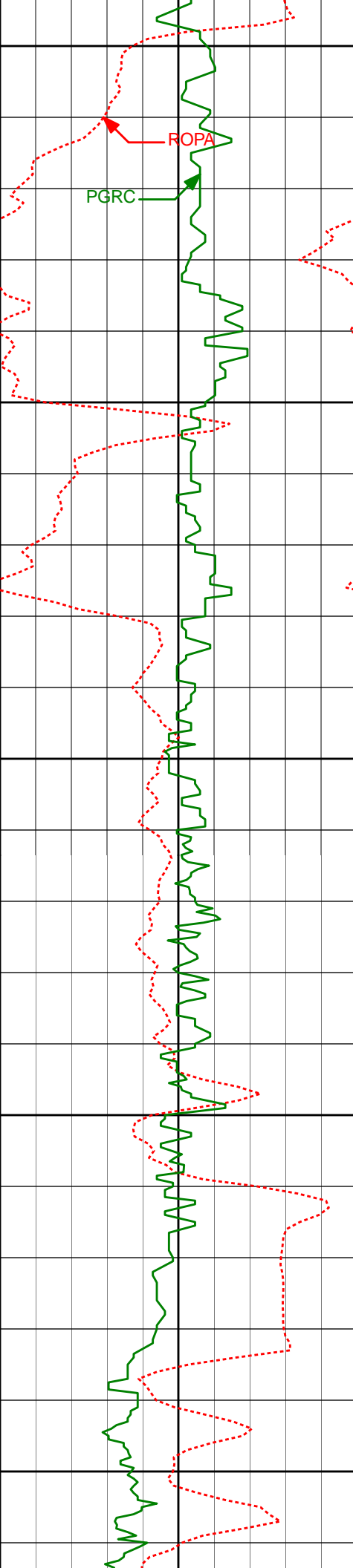
# HALLIBURTON

# MD Main Log 1:240

Average Rate of Penetration ROPA							
1K	0	Measured Depth (ft) 1:240	Depth	Inc	Azi.	TVD	V.S.
feet per hr							
0	200						
api							
		3050'					
		3062'	7.60°	347.40°	3048.13'	42.28'	
		3100'					
ROPA							



45.31'



3350'

3400'

3450'

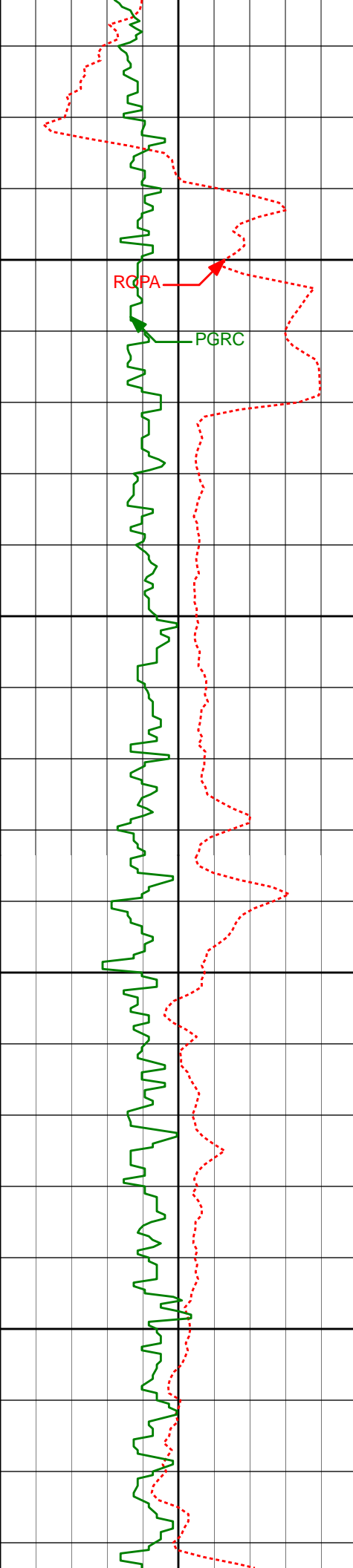
3500'

3550'

3346'      8.84°      343.52°      3329.19'      52.78'

3441'      7.67°      344.38°      3423.21'      56.98'

3536'      8.56°      349.68°      3517.26'      60.37'



3600'

RCPA

PGRC

3630'

10.19°

351.18°

3610.00'

63.38'

3650'

3700'

3725'

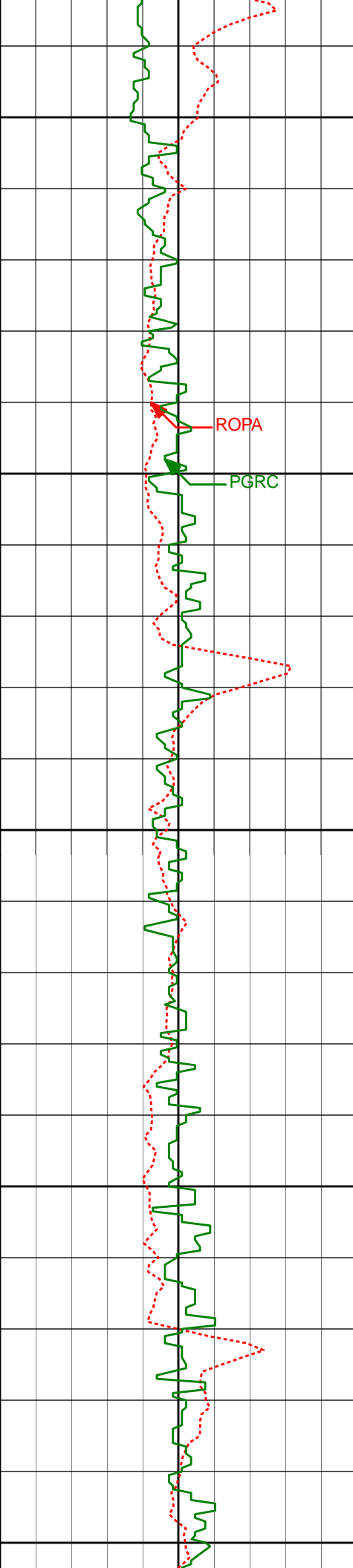
10.40°

347.34°

3703.47'

67.08'

3750'



3800'

3820'

10.36°

344.95°

3796.91'

71.70'

3850'

ROPA

PGRC

3900'

3915'

9.53°

344.14°

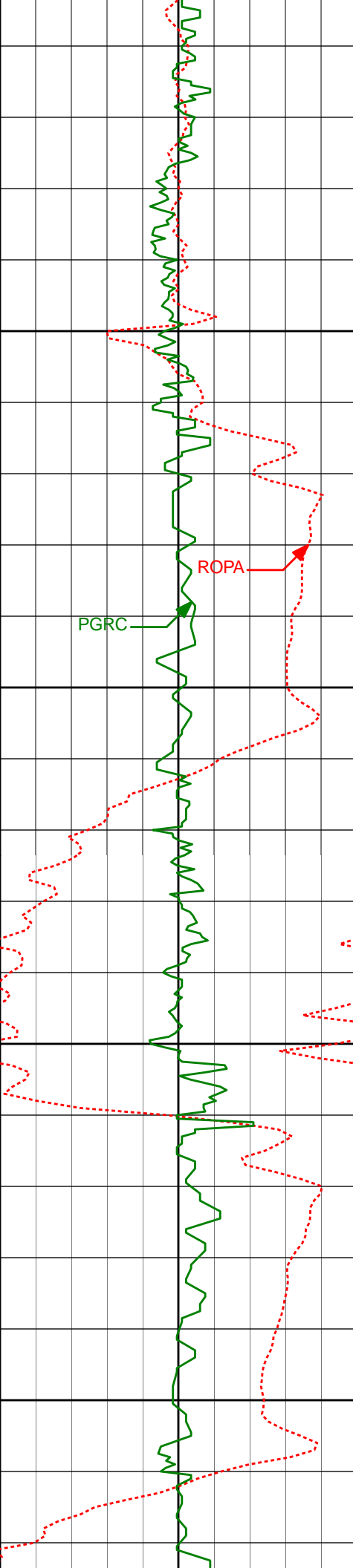
3890.49'

76.57'

3950'

4000'





4010'

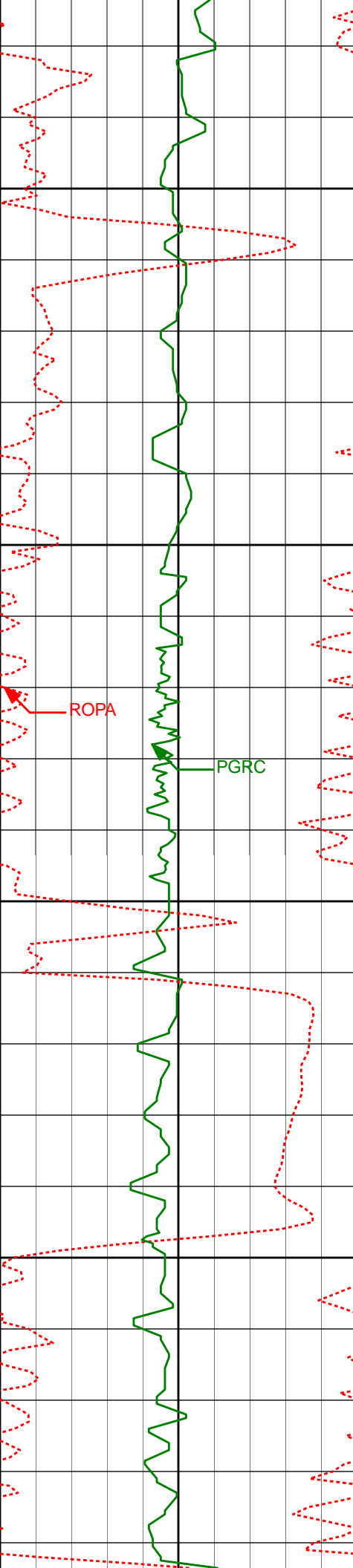
4050'

4100'

4150'

4200'

4010'	9.01°	343.51°	3984.25'	81.30'
4105'	6.96°	338.16°	4078.32'	85.95'
4200'	3.53°	343.93°	4172.91'	89.16'



4250'

4294'

2.90°

347.20°

4266.76'

90.65'

4300'

4350'

4389'

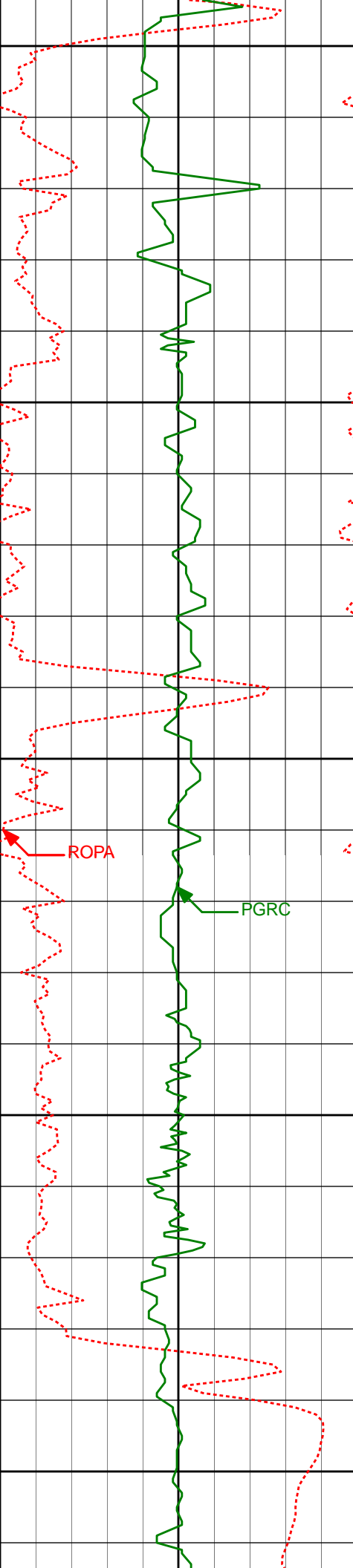
2.09°

344.24°

4361.67'

91.78'

4400'



4450'

4484'

1.54°

324.87°

4456.62'

93.07'

4500'

4550'

ROPA

PGRC

4578'

1.66°

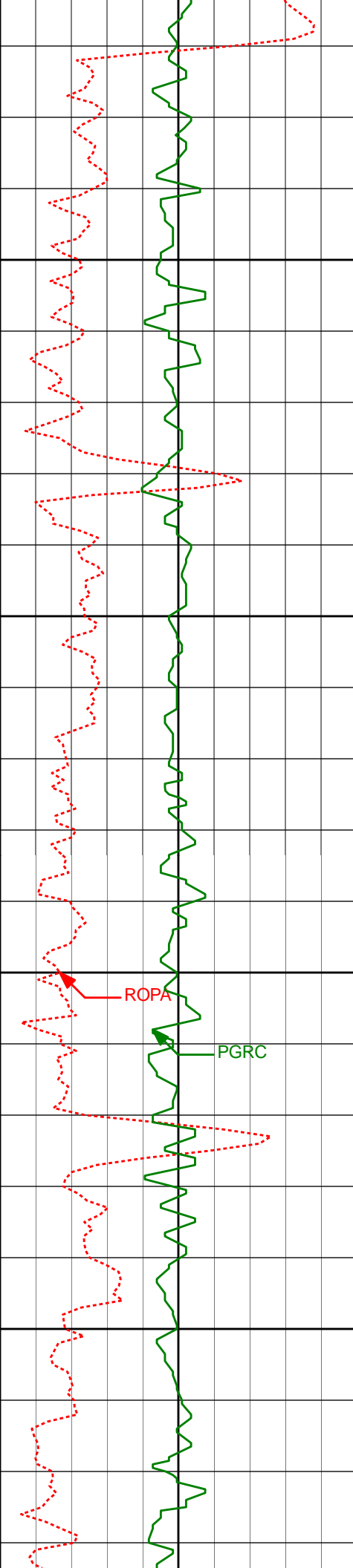
335.45°

4550.59'

94.44'

4600'

4650'



4700'

4750'

4800'

4850'

4673'

0.64°

43.38°

4645.57'

94.70'

4768'

0.50°

93.87°

4740.57'

93.93'

ROPA

PGRC

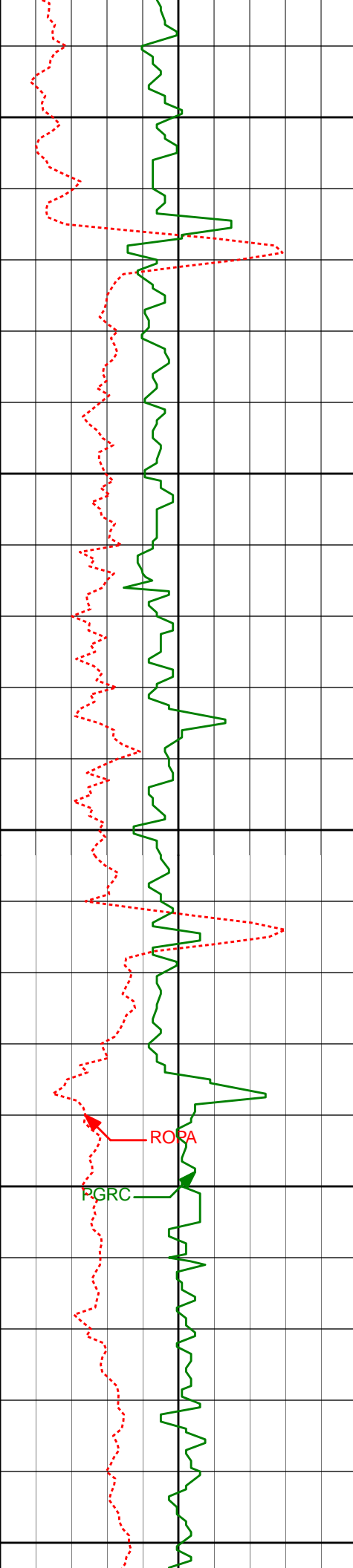
4862'

0.07°

80.80°

4834.56'

93.46'



4900'

4950'

5000'

5050'

5100'

4957'

0.04°

167.97°

4929.56'

93.40'

5051'

0.14°

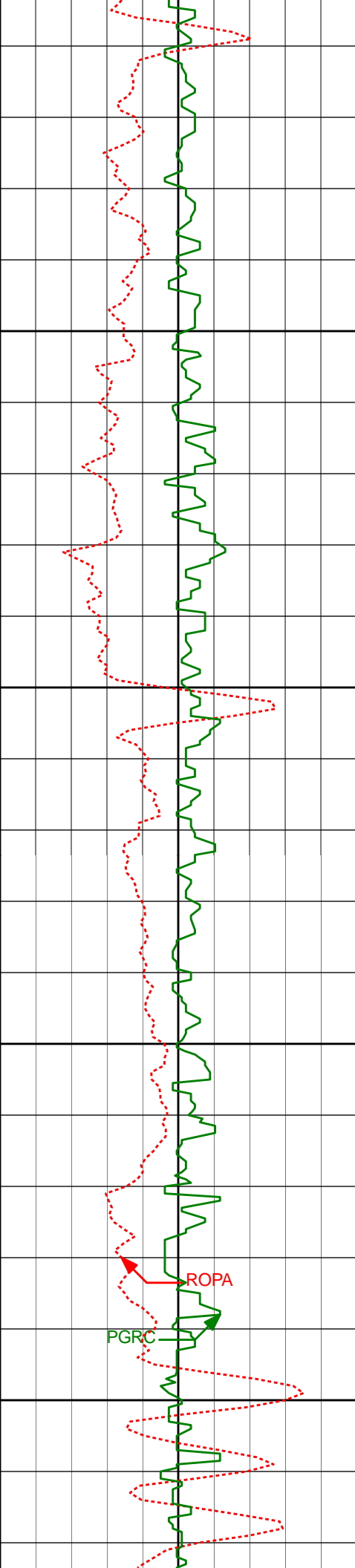
207.42°

5023.56'

93.44'

RORA

PGRC



5150'

5200'

5250'

5300'

5146'

0.34°

172.76°

5118.56'

93.45'

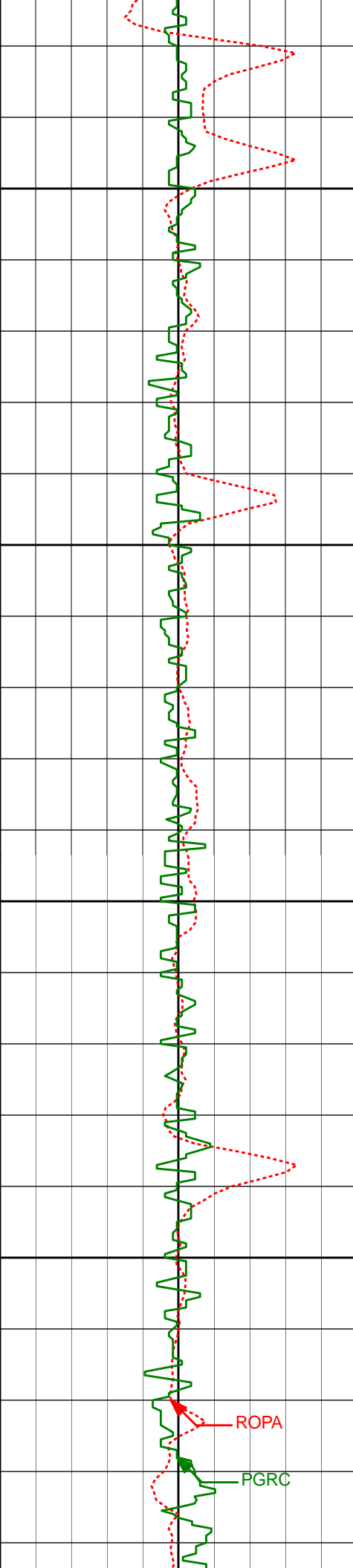
5242'

0.93°

191.04°

5214.56'

93.53'



5350'

5400'

5450'

5500'

5336'

0.96°

227.25°

5308.54'

94.21'

5431'

1.93°

227.50°

5403.51'

95.92'

5526'

2.12°

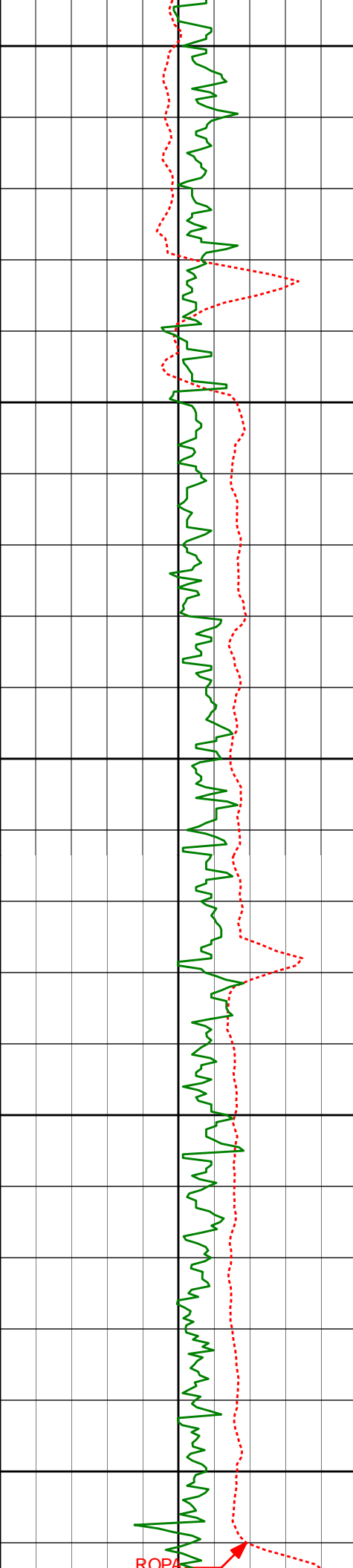
221.52°

5498.45'

98.19'

ROPA

PGRC



5550'

5600'

5650'

5700'

5750'

5621'

1.55°

224.83°

5593.41'

100.19'

5716'

1.14°

225.30°

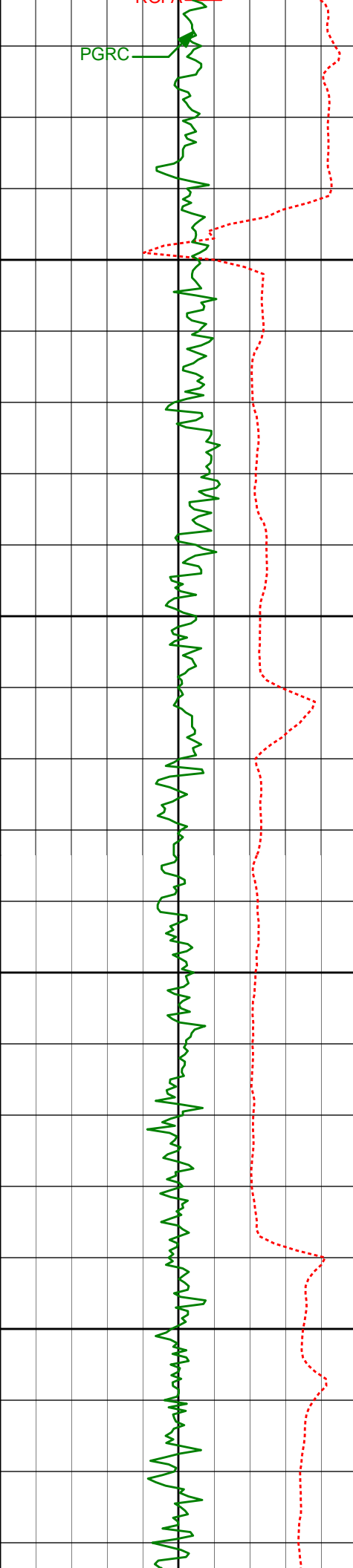
5688.38'

101.71'

ROP







Run200

5800'

5850'

5900'

5950'

5810'

0.61°

220.27°

5782.37'

102.67'

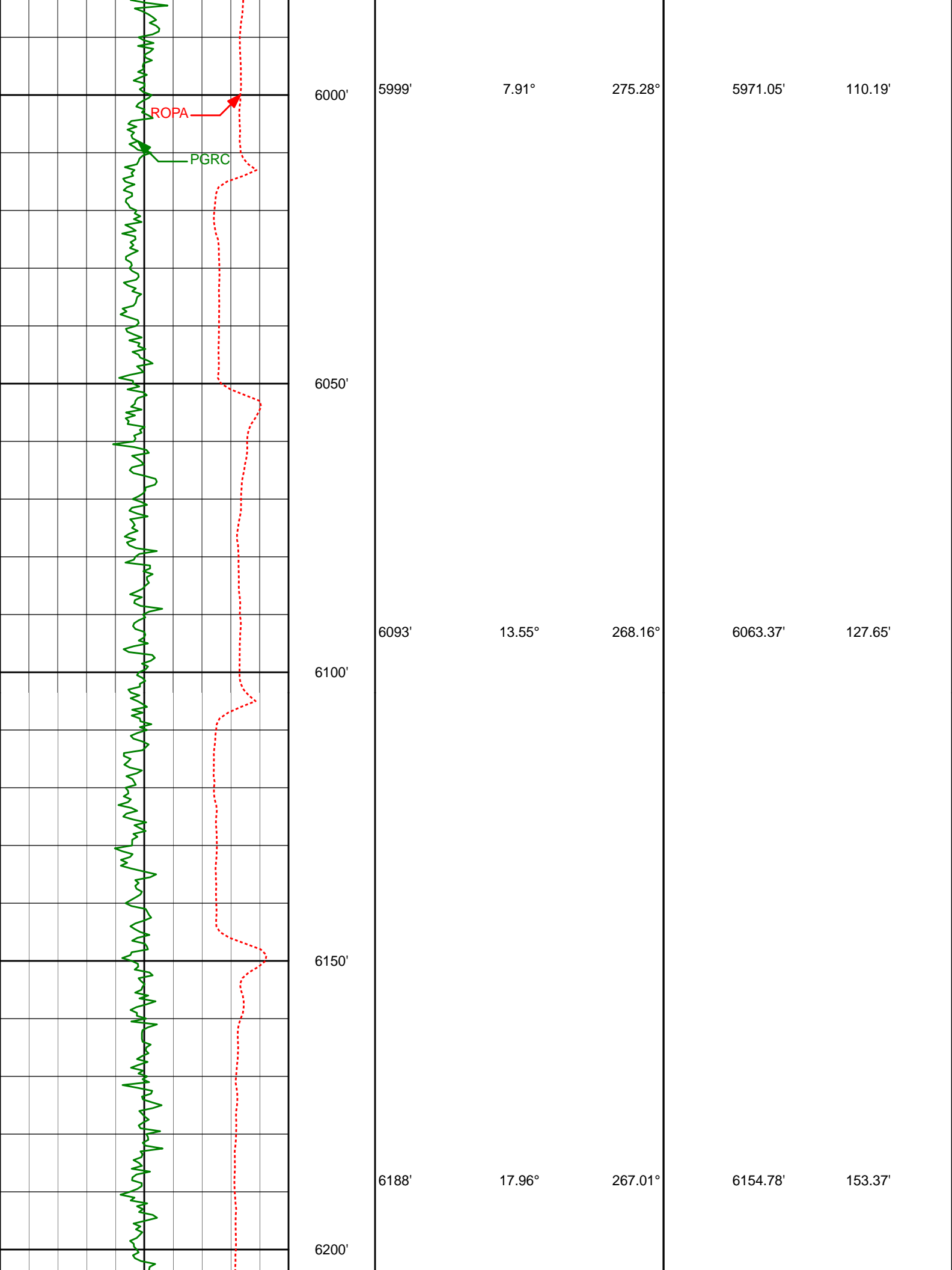
5904'

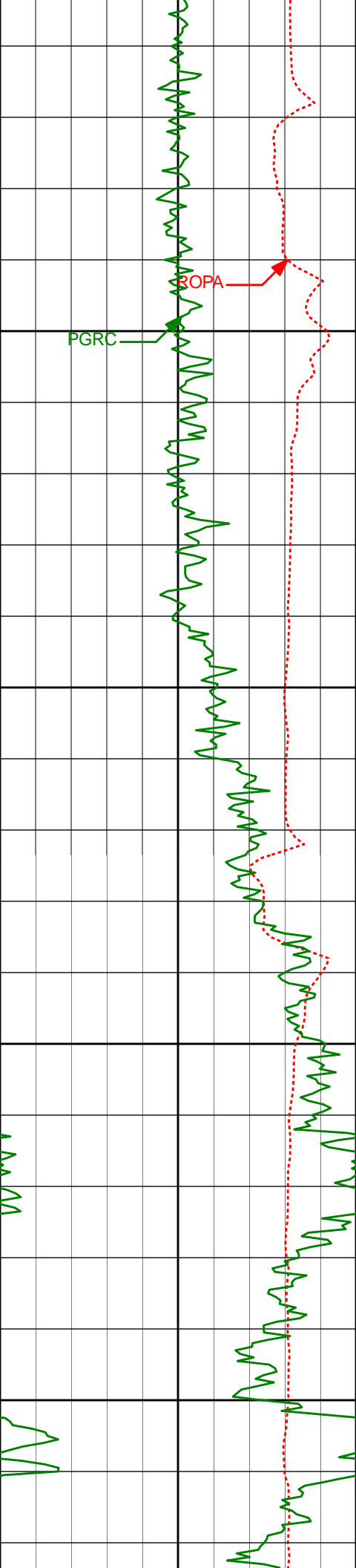
0.44°

251.49°

5876.36'

103.32'





6250'

6283'

23.61°

270.70°

6243.56'

187.01'

6300'

6350'

6378'

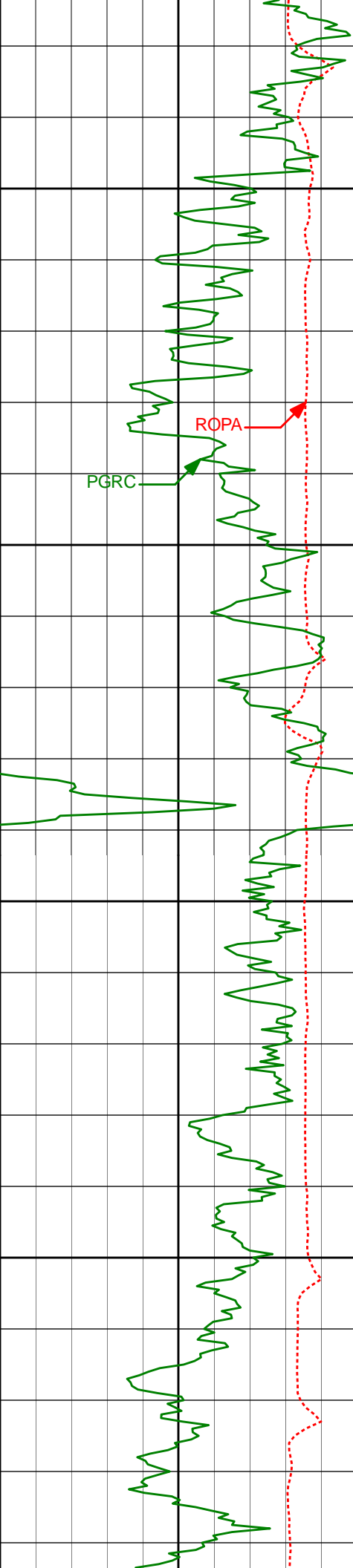
33.35°

275.97°

6326.98'

232.19'

6400'



6450'

6473'

47.78°

275.45°

6398.96'

293.67'

ROPA

PGRC

6500'

6550'

6568'

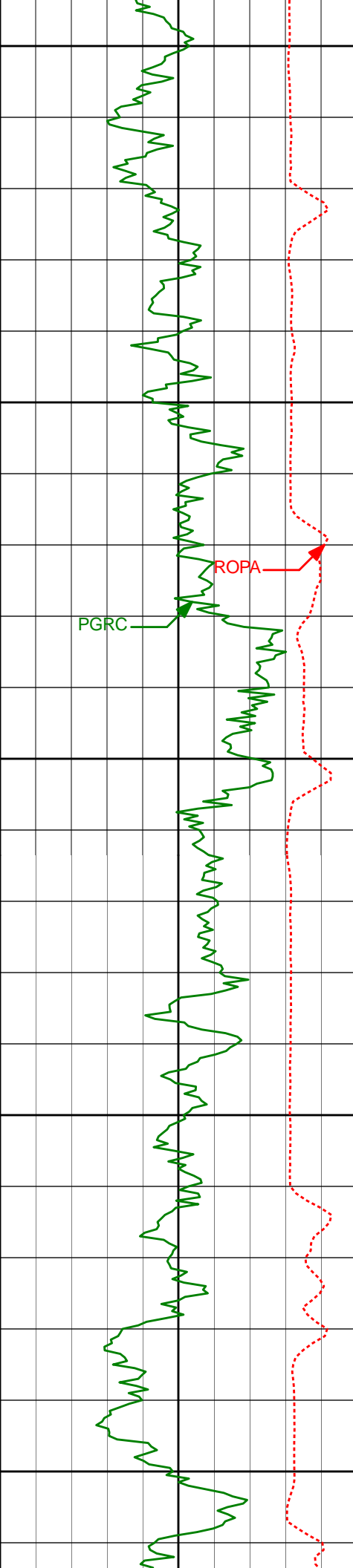
62.05°

270.86°

6453.44'

371.16'

6600'



6650'

6663'

67.90°

267.72°

6493.62'

457.10'

6700'

6750'

6758'

73.41°

266.58°

6525.08'

546.40'

6800'

6806'

75.00°

266.50°

6538.14'

592.39'

6850'

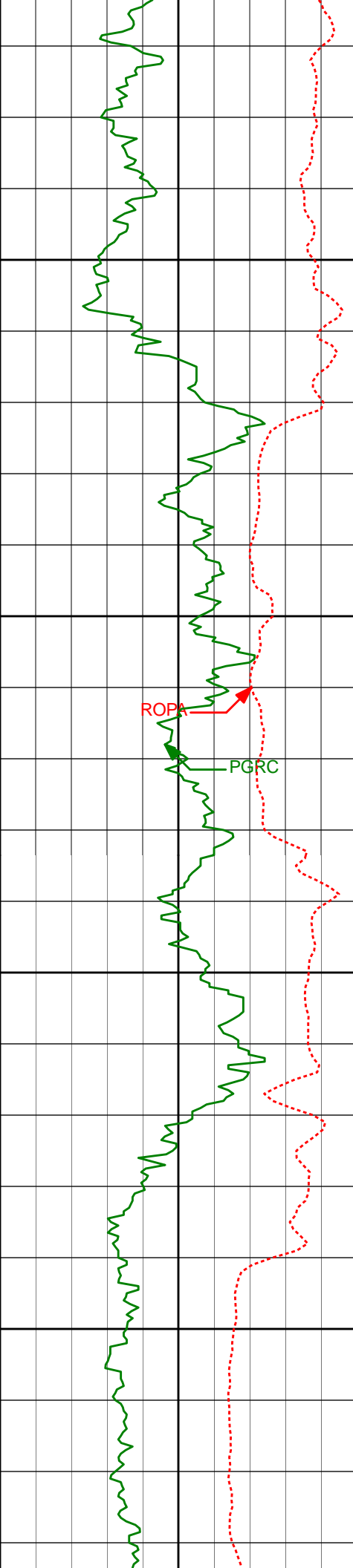
6852'

77.26°

265.62°

6549.17'

636.82'



6900'

Casing Shoe @ 6902'

Run 300

6950'

ROPA

PGRC

7000'

7039'

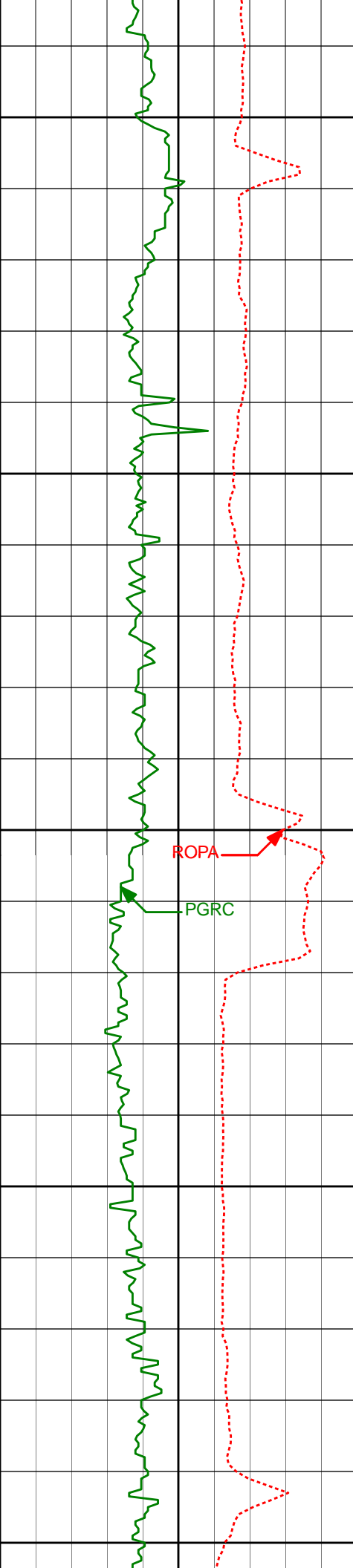
87.69°

267.67°

6573.63'

821.19'

7050'



7100'

7132'

87.57°

267.84°

6577.47'

913.87'

7150'

7200'

ROPA

PGRC

7225'

89.82°

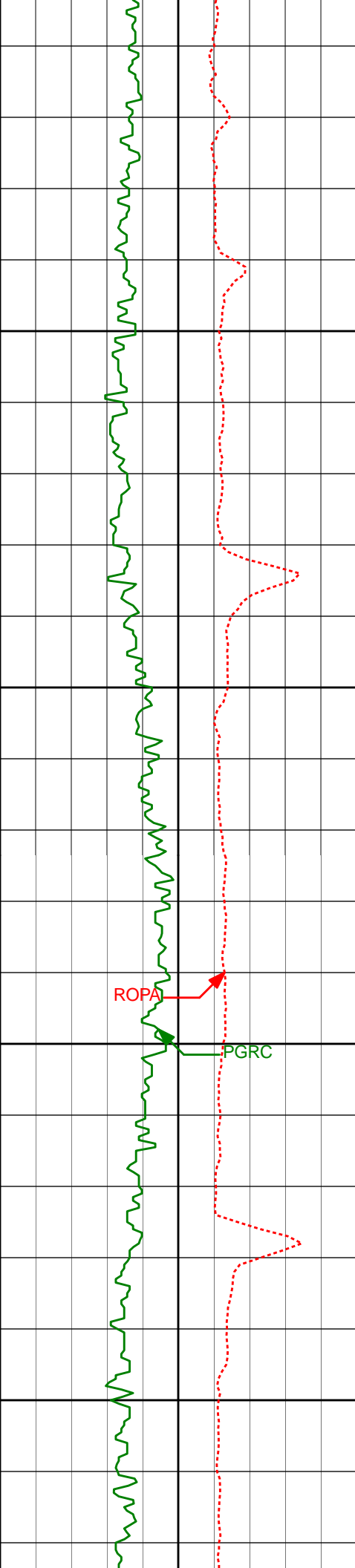
268.09°

6579.59'

1006.63'

7250'

7300'



7350'

7400'

7450'

7500'

7318'

89.26°

266.94°

6580.34'

1099.36'

7412'

90.06°

267.33°

6580.89'

1193.05'

7505'

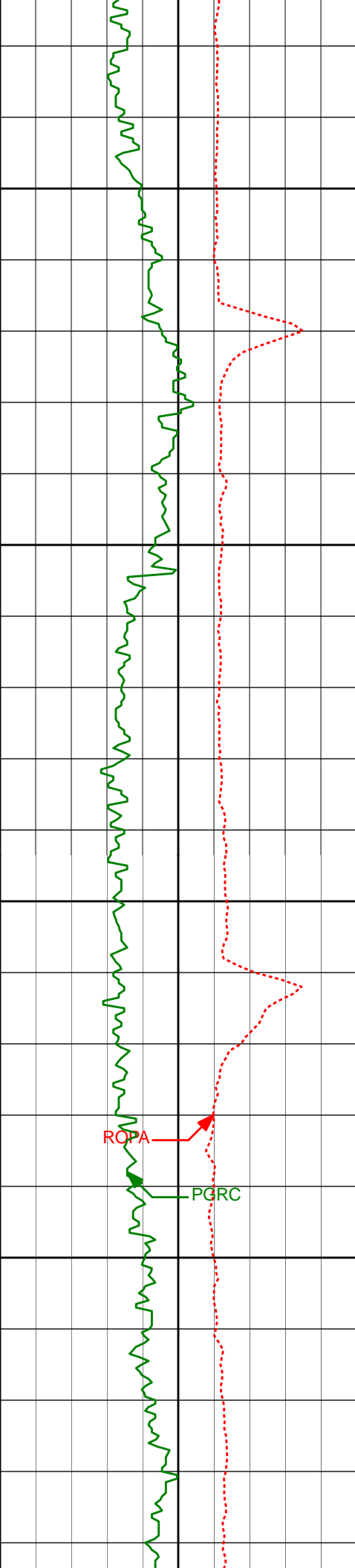
89.60°

266.58°

6581.17'

1285.71'





7550'

7600'

7650'

7700'

7598'

89.75°

266.31°

6581.70'

1378.30'

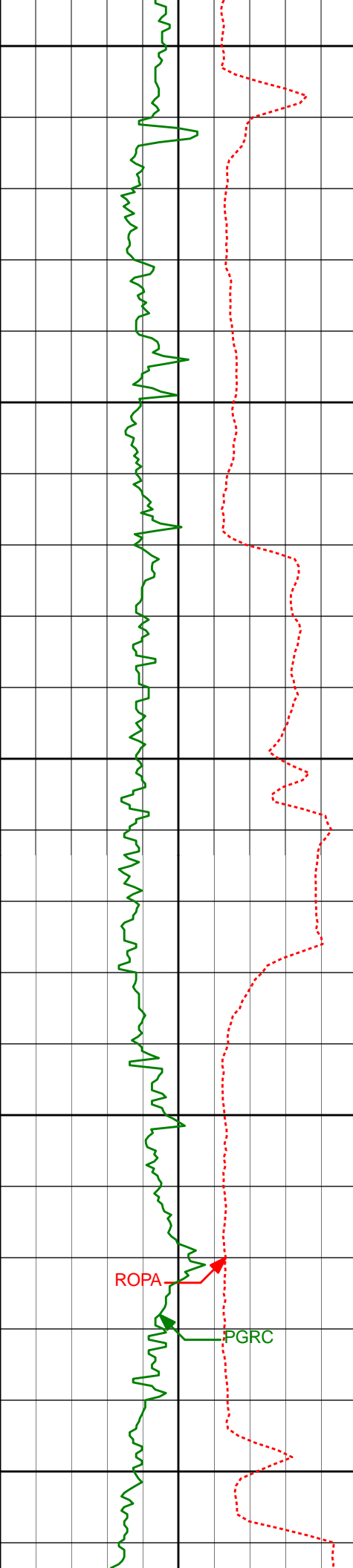
7693'

90.52°

266.53°

6581.47'

1472.87'



7750'

7788'

90.55°

266.15°

6580.59'

1567.43'

7800'

7850'

7882'

90.28°

267.20°

6579.91'

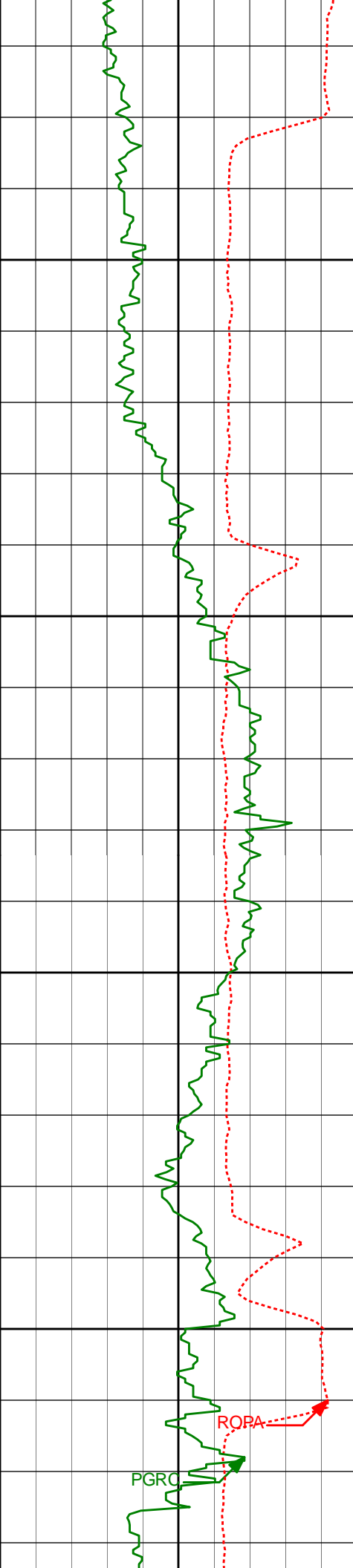
1661.05'

7900'

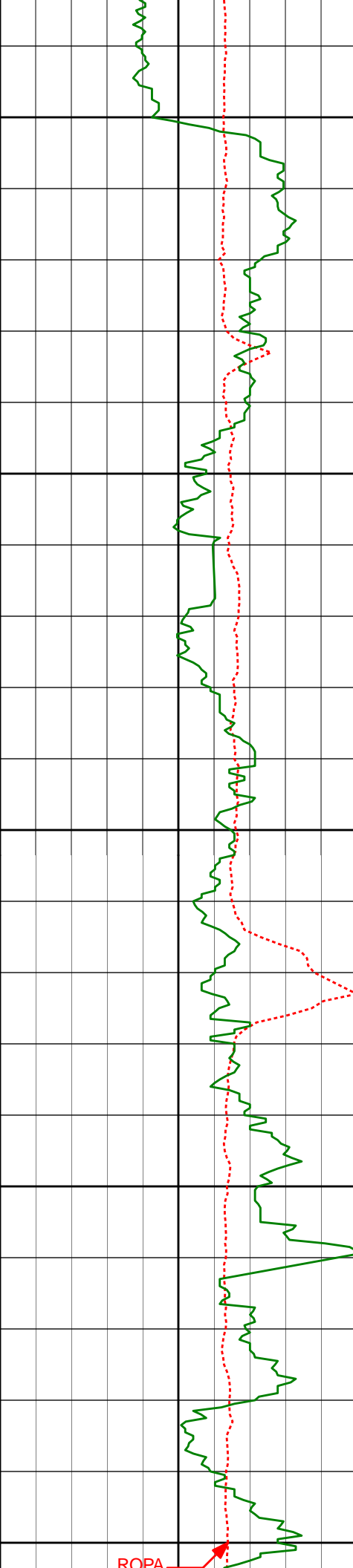
ROPA

PGRC

7950'



7977'	90.65°	269.29°	6579.13'	1755.85'
8072'	91.02°	269.35°	6577.75'	1850.75'
8167'	90.40°	269.42°	6576.57'	1945.66'



8200'

8250'

8300'

8350'

8400'

8262'

89.85°

268.52°

6576.37'

2040.54'

8356'

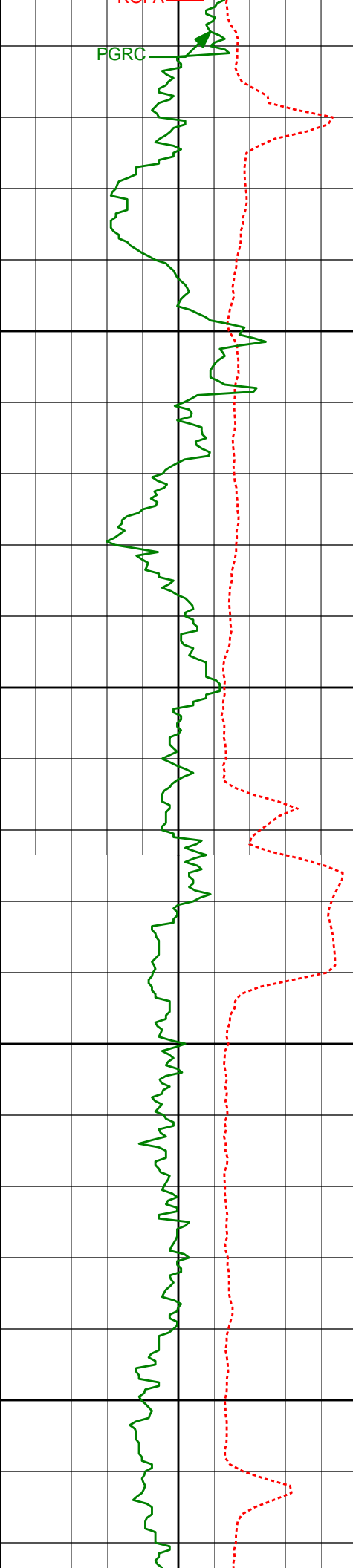
90.59°

268.40°

6576.00'

2134.37'

ROPA



8450'

8451'

91.26°

268.50°

6574.47'

2229.20'

8500'

8550'

8600'

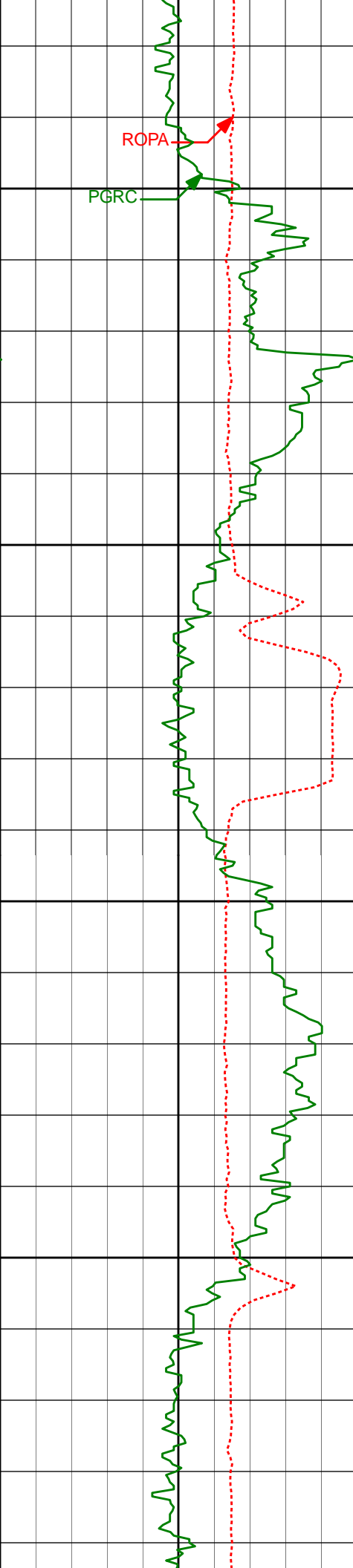
8546'

90.52°

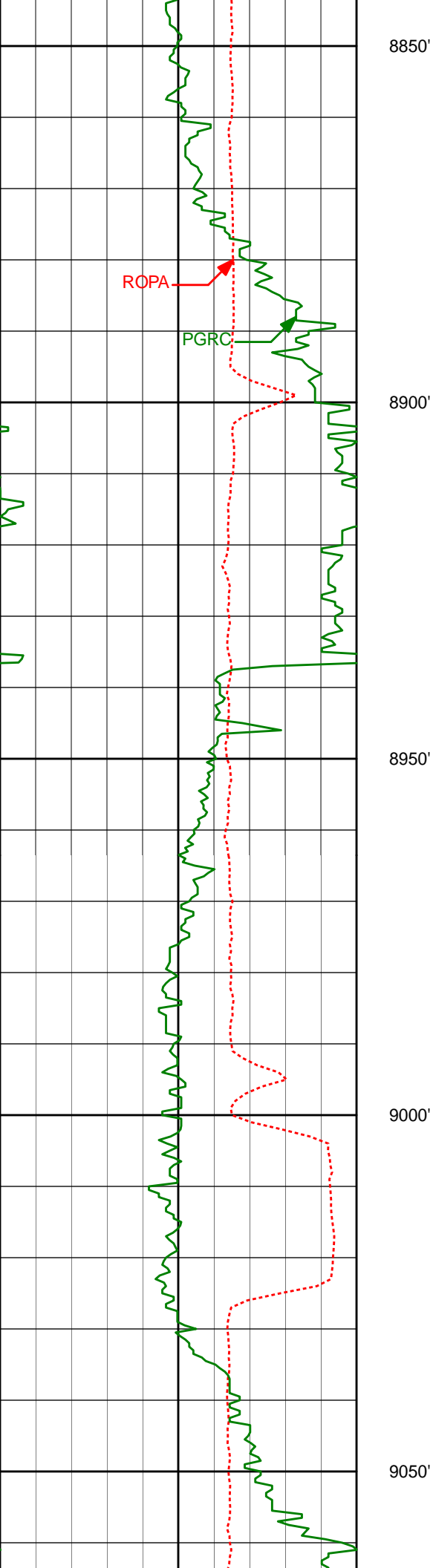
268.99°

6573.00'

2324.05'

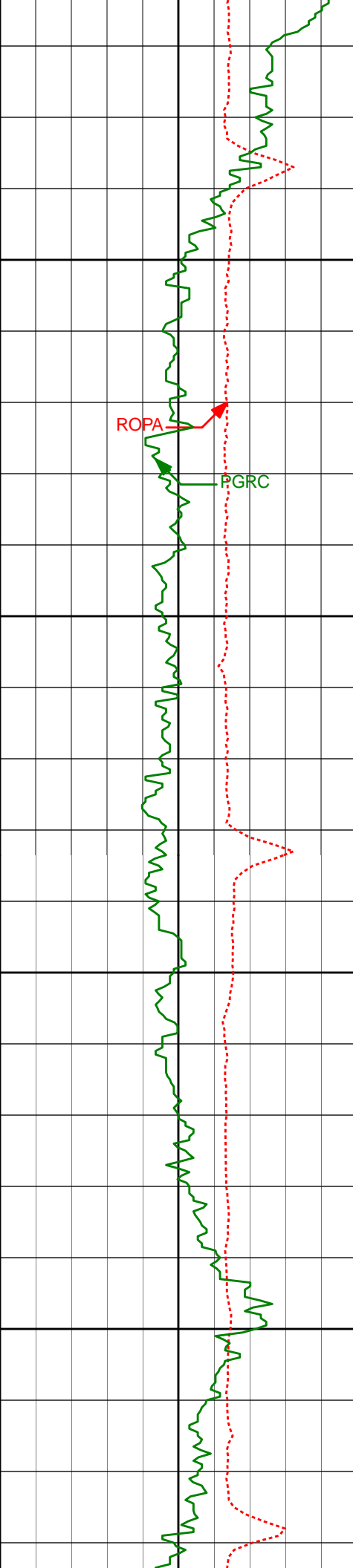


8641'	90.99°	268.93°	6571.74'	2418.92'
8736'	89.14°	269.46°	6571.64'	2513.81'
8831'	89.48°	269.28°	6572.78'	2608.72'



8925'	90.74°	269.40°	6572.60'	2702.63'
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9020'	88.80°	269.46°	6572.98'	2797.54'
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9100'

9115'

88.28°

269.16°

6575.40'

2892.42'

9150'

9200'

9210'

88.61°

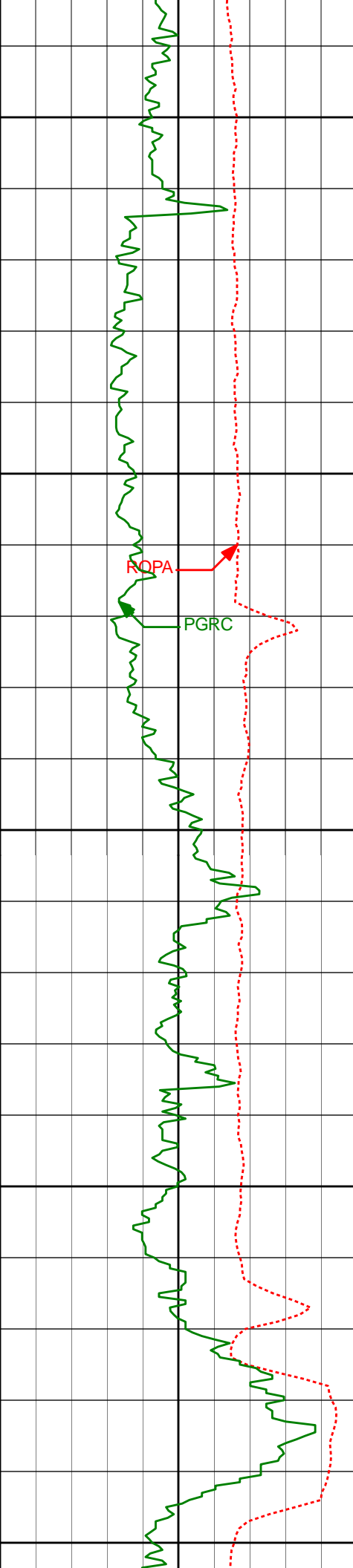
269.09°

6577.98'

2987.28'

9250'





9300'

9305'

89.41°

269.22°

6579.62'

3082.16'

9350'

ROPA

PGRC

9400'

9399'

90.65°

268.93°

6579.57'

3176.05'

9450'

9494'

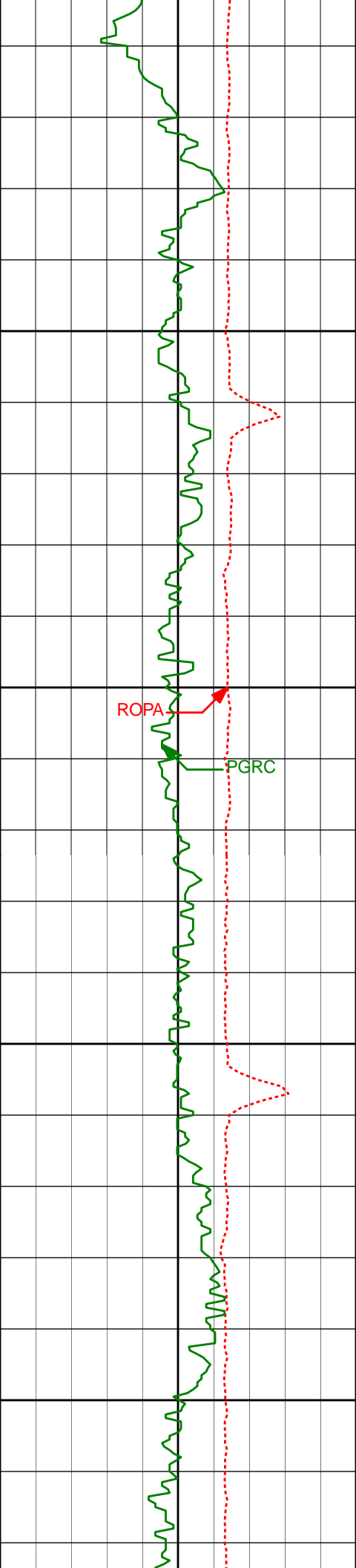
89.63°

268.38°

6579.34'

3270.90'

9500'



9550'

9589'

89.20°

267.42°

6580.31'

3365.67'

9600'

ROPA

PGRC

9650'

9684'

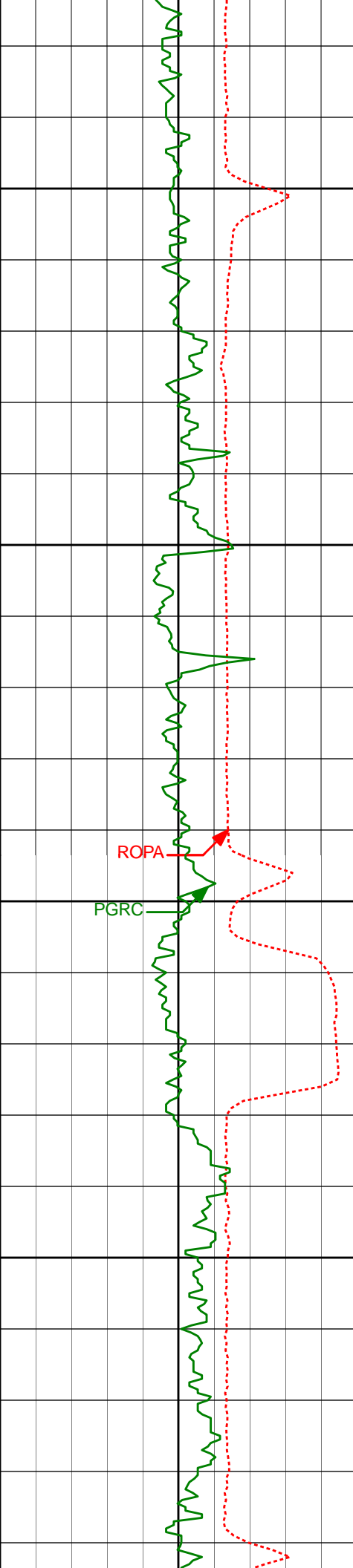
90.00°

268.10°

6580.97'

3460.43'

9700'



9750'

9778'

90.49°

268.90°

6580.57'

3554.26'

9800'

ROPA

PGRC

9850'

9871'

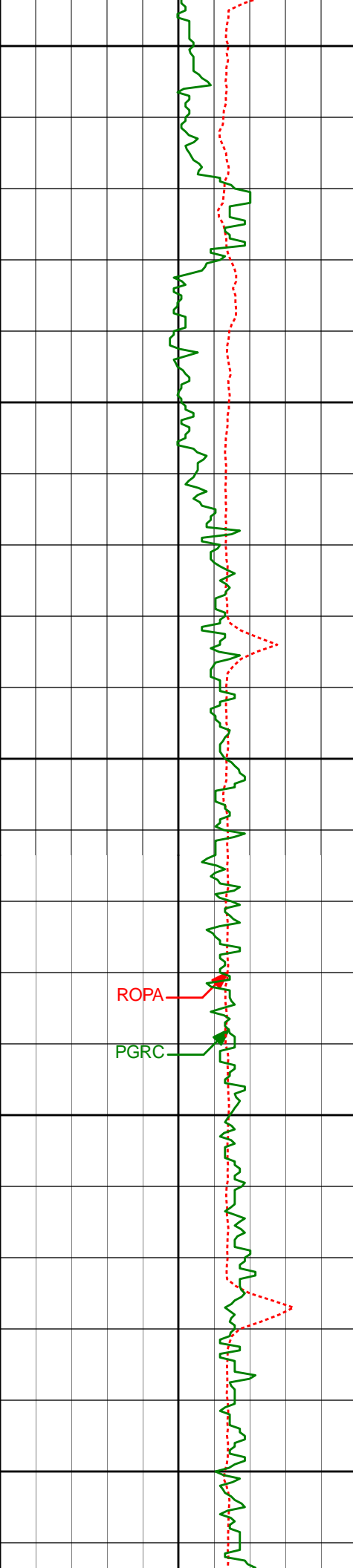
88.03°

267.51°

6581.77'

3647.06'

9900'



9950'

9967'

87.75°

266.79°

6585.31'

3742.68'

10000'

10050'

10062'

89.41°

267.11°

6587.66'

3837.30'

10100'

10150'

10157'

89.60°

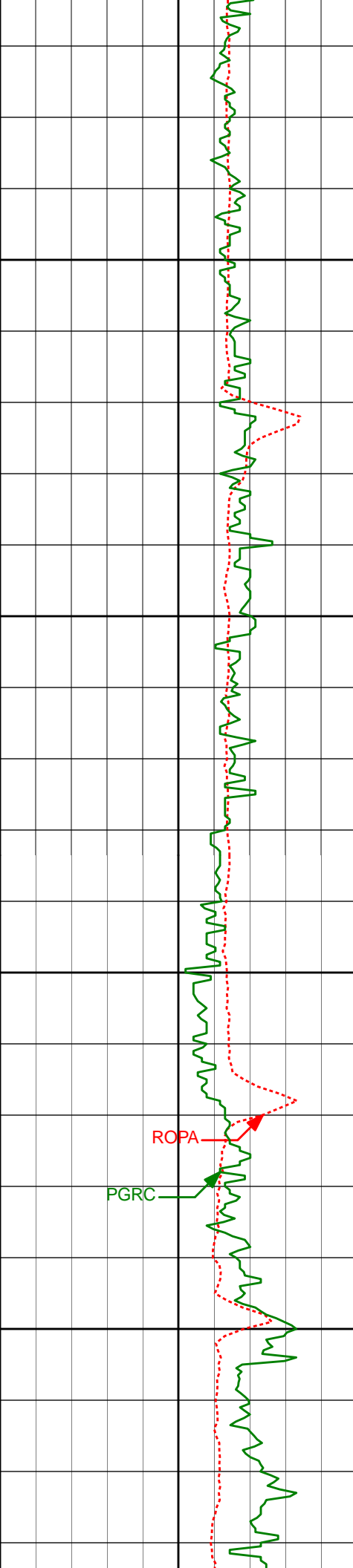
266.50°

6588.48'

3931.93'

ROPA

PGRC



10200'

10250'

10300'

10350'

10251'

89.45°

266.00°

6589.26'

4025.48'

ROPA

PGRC

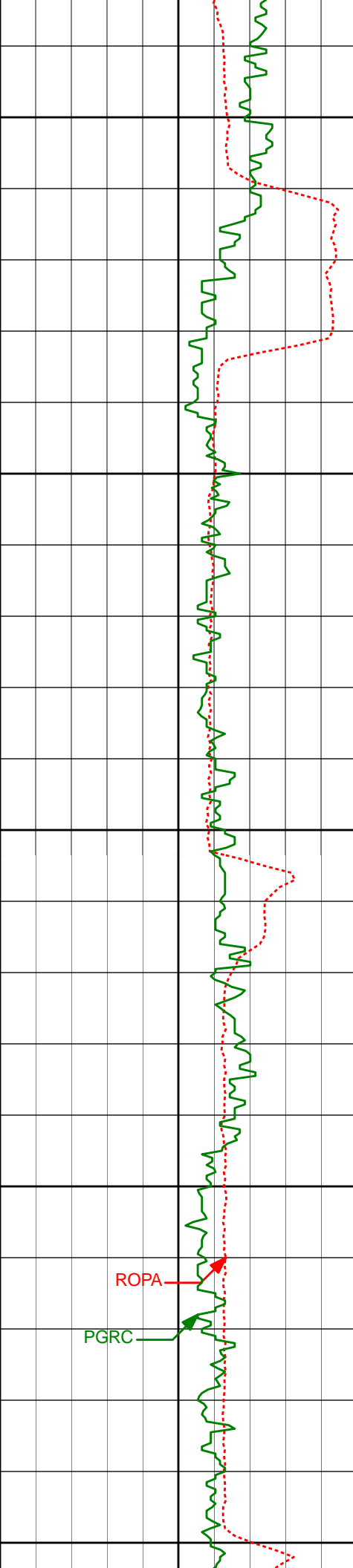
10346'

90.31°

266.08°

6589.46'

4120.00'



10400'

10441'

90.25°

268.22°

6589.00'

4214.67'

10450'

10500'

10536'

89.97°

268.91°

6588.81'

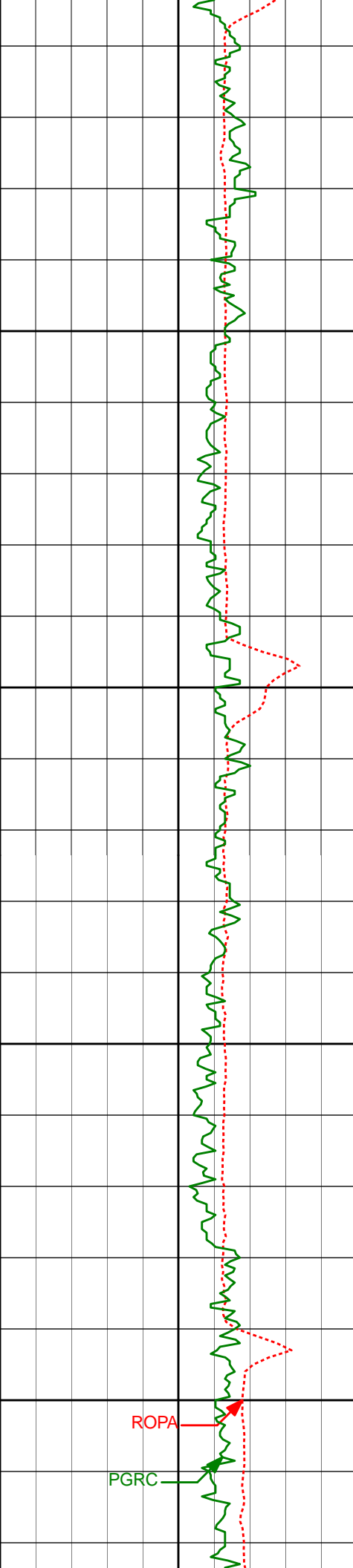
4309.52'

10550'

10600'

ROPA

PGRC



10650'

10700'

10750'

10800'

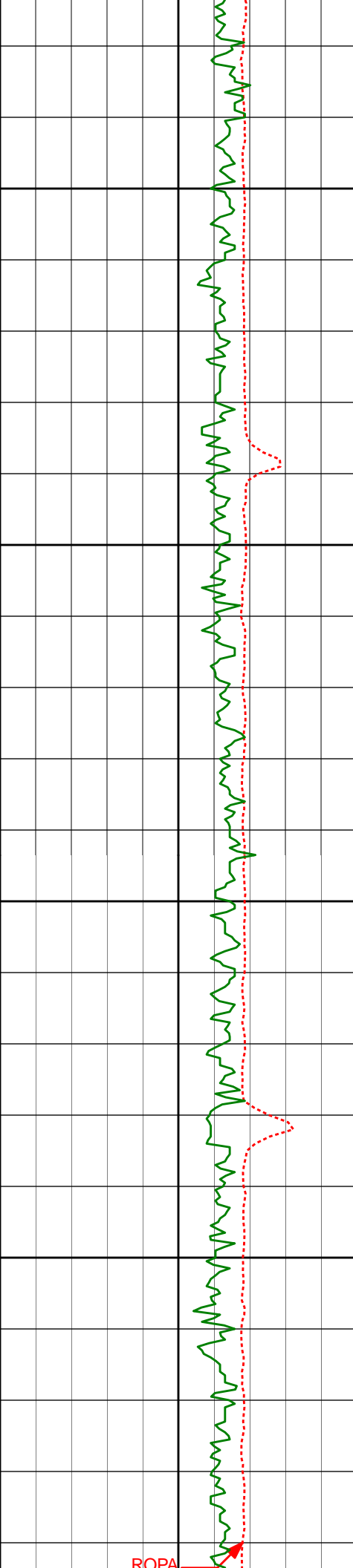
10631'	89.78°	268.99°	6589.02'	4404.40'
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10726'	89.54°	268.77°	6589.58'	4499.27'
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10821'	89.51°	269.23°	6590.37'	4594.15'
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ROPA

PGRC



10850'

10900'

10950'

11000'

10916'

89.75°

271.00°

6590.98'

4689.10'

11010'

89.69°

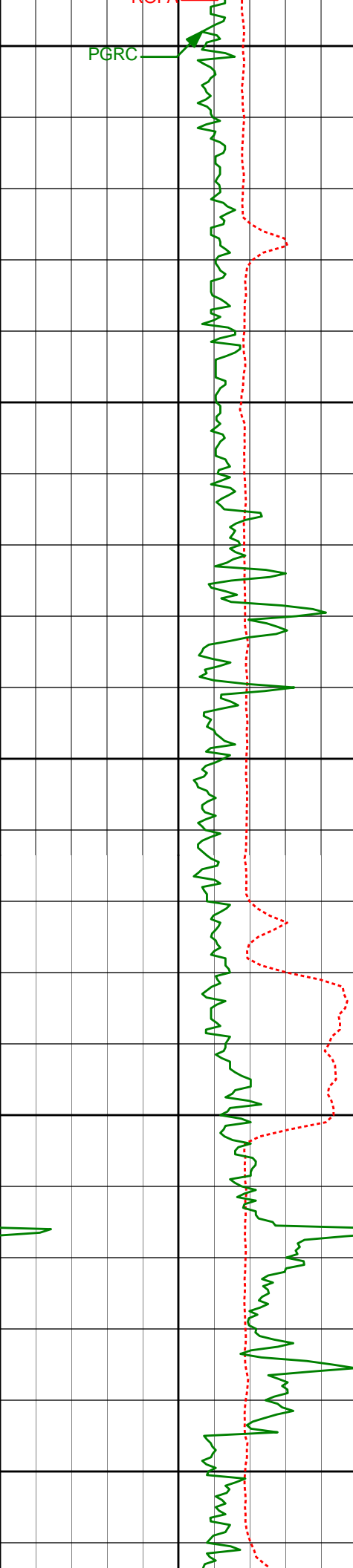
271.76°

6591.44'

4783.10'

ROPA





11050'

11100'

11150'

11200'

11250'

11105'

89.91°

272.99°

6591.78'

4878.09'

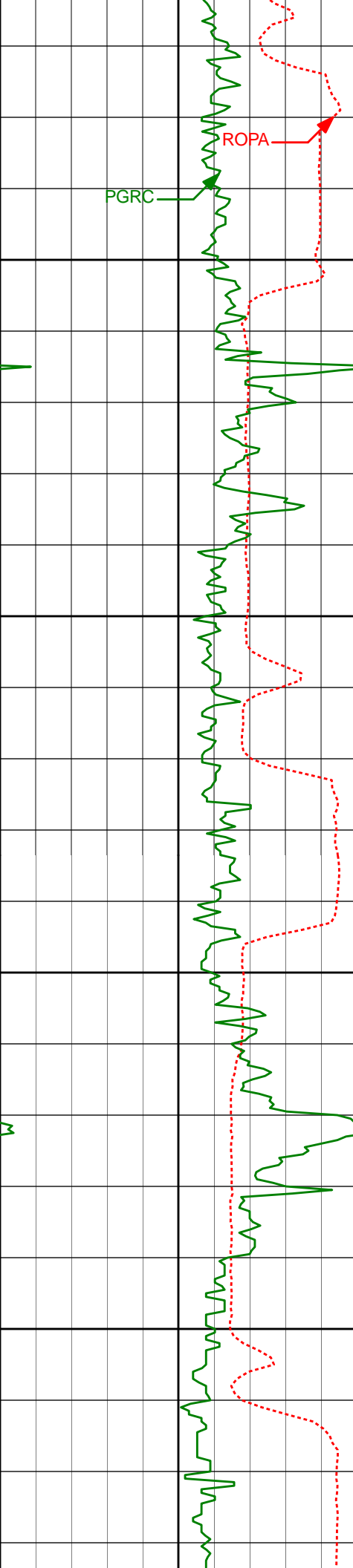
11199'

89.32°

273.21°

6592.41'

4972.06'



11300'

11350'

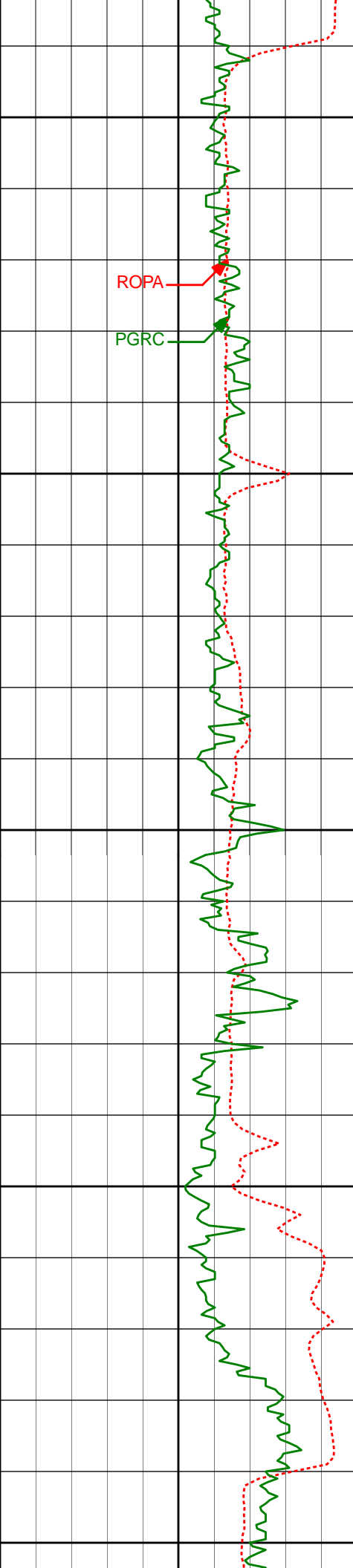
11400'

11450'

11294'	89.51°	271.31°	6593.38'	5067.05'
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11389'	89.54°	270.94°	6594.17'	5162.04'
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11483'	90.18°	268.71°	6594.40'	5255.98'
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ROPA

PGRC

11500'

11550'

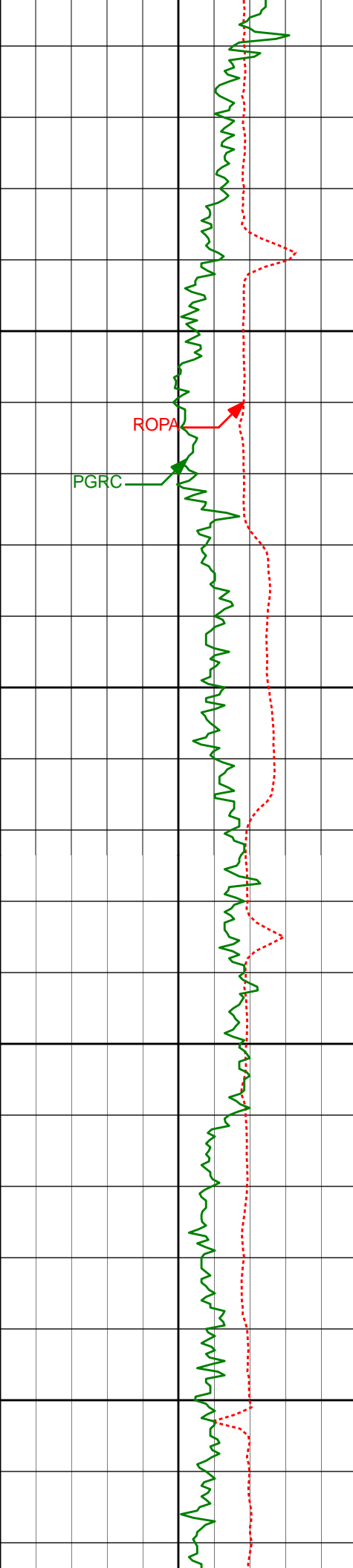
11600'

11650'

11700'

11578'	90.40°	269.58°	6593.91'	5350.87'
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11673'	89.57°	268.21°	6593.94'	5445.74'
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11750'

ROPA

PGRC

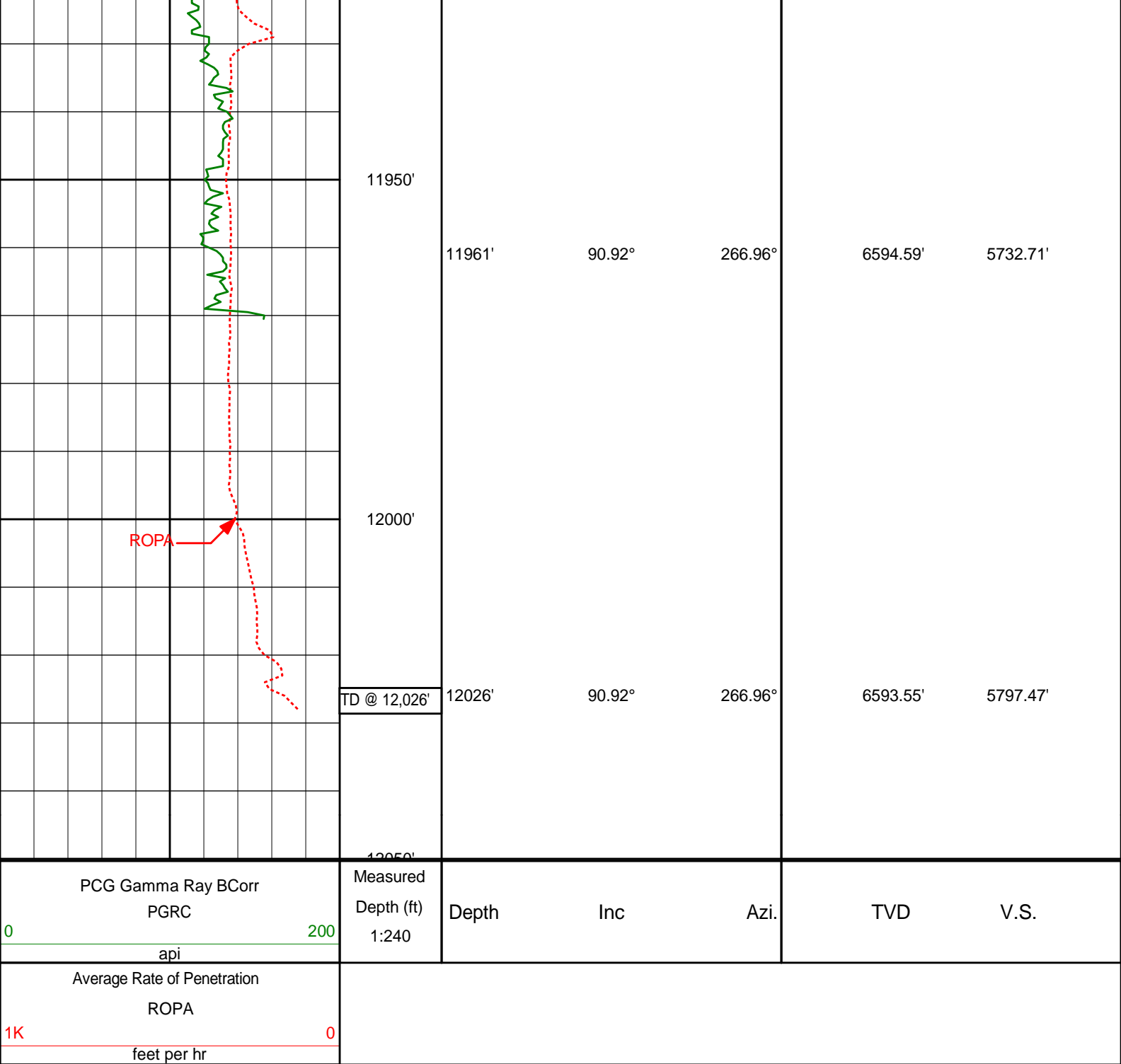
11800'

11850'

11900'

11768'	89.97°	267.08°	6594.32'	5540.49'
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11862'	89.38°	266.41°	6594.85'	5634.11'
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**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Noble Energy  
Wells Ranch AE30-62HNC  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901136504

The first two surveys at 370' and 613' 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
370.00	0.40	314.43	370.00	0.90 N	0.92 W	0.95	0.11

613.00	0.70	281.53	612.99	1.79 N	2.98 W	3.04	0.17
803.00	0.44	261.93	802.98	1.92 N	4.84 W	4.90	0.17
895.00	0.46	243.57	894.97	1.71 N	5.52 W	5.57	0.16
987.00	0.36	252.25	986.97	1.46 N	6.13 W	6.17	0.13
1080.00	0.32	176.82	1079.97	1.11 N	6.39 W	6.42	0.45
1172.00	0.09	337.42	1171.97	0.92 N	6.41 W	6.43	0.44
1265.00	0.32	45.15	1264.97	1.17 N	6.25 W	6.28	0.32
1358.00	0.57	66.87	1357.97	1.54 N	5.64 W	5.69	0.32
1452.00	0.80	88.72	1451.96	1.73 N	4.55 W	4.61	0.37
1545.00	0.70	120.59	1544.95	1.46 N	3.42 W	3.46	0.45
1638.00	0.73	127.75	1637.95	0.81 N	2.46 W	2.48	0.10
1733.00	0.77	1.16	1732.94	1.07 N	1.97 W	2.00	1.41
1828.00	2.07	346.94	1827.91	3.38 N	2.34 W	2.45	1.41
1923.00	3.97	356.46	1922.77	8.34 N	2.93 W	3.20	2.06
2018.00	6.26	353.35	2017.39	16.77 N	3.74 W	4.27	2.43
2113.00	9.35	353.37	2111.50	29.58 N	5.23 W	6.17	3.25
2208.00	10.52	351.66	2205.07	45.83 N	7.38 W	8.84	1.27
2302.00	10.00	349.57	2297.57	62.34 N	10.10 W	12.08	0.68
2397.00	8.93	347.42	2391.28	77.65 N	13.20 W	15.67	1.19
2492.00	10.03	345.78	2484.98	92.87 N	16.84 W	19.79	1.19
2587.00	9.94	347.37	2578.54	108.89 N	20.66 W	24.13	0.31
2682.00	9.25	347.18	2672.21	124.33 N	24.15 W	28.11	0.73
2777.00	8.80	346.15	2766.03	138.84 N	27.58 W	32.00	0.50
2872.00	8.37	347.62	2859.97	152.64 N	30.80 W	35.66	0.51
2967.00	7.98	347.07	2954.00	165.83 N	33.76 W	39.04	0.42
3062.00	7.60	347.40	3048.13	178.38 N	36.61 W	42.28	0.40
3157.00	8.05	349.13	3142.24	191.05 N	39.23 W	45.31	0.53
3346.00	8.84	343.52	3329.19	217.97 N	45.85 W	52.78	0.60
3441.00	7.67	344.38	3423.21	231.08 N	49.63 W	56.98	1.24
3536.00	8.56	349.68	3517.26	244.14 N	52.60 W	60.37	1.22
3630.00	10.19	351.18	3610.00	259.24 N	55.13 W	63.38	1.75
3725.00	10.40	347.34	3703.47	275.91 N	58.30 W	67.08	0.76
3820.00	10.36	344.95	3796.91	292.52 N	62.39 W	71.70	0.46
3915.00	9.53	344.14	3890.49	308.34 N	66.76 W	76.57	0.89
4010.00	9.01	343.51	3984.25	323.03 N	71.02 W	81.30	0.56
4105.00	6.96	338.16	4078.32	335.51 N	75.27 W	85.95	2.29
4200.00	3.53	343.93	4172.91	343.67 N	78.23 W	89.16	3.65
4294.00	2.90	347.20	4266.76	348.77 N	79.55 W	90.65	0.70
4389.00	2.09	344.24	4361.67	352.78 N	80.56 W	91.78	0.86
4484.00	1.54	324.87	4456.62	355.49 N	81.76 W	93.07	0.86
4578.00	1.66	335.45	4550.59	357.76 N	83.05 W	94.44	0.34
4673.00	0.64	43.38	4645.57	359.40 N	83.26 W	94.70	1.62
4768.00	0.50	93.87	4740.57	359.76 N	82.48 W	93.93	0.53
4862.00	0.07	80.80	4834.56	359.74 N	82.02 W	93.46	0.46
4957.00	0.04	167.97	4929.56	359.71 N	81.95 W	93.40	0.08
5051.00	0.14	207.42	5023.56	359.58 N	82.00 W	93.44	0.12
5146.00	0.34	172.76	5118.56	359.20 N	82.02 W	93.45	0.25
5242.00	0.93	191.04	5214.56	358.15 N	82.13 W	93.53	0.64
5336.00	0.96	227.25	5308.54	356.87 N	82.86 W	94.21	0.63
5431.00	1.93	227.50	5403.51	355.25 N	84.62 W	95.92	1.02
5526.00	2.12	221.52	5498.45	352.85 N	86.96 W	98.19	0.30
5621.00	1.55	224.83	5593.41	350.62 N	89.03 W	100.19	0.61
5716.00	1.14	225.30	5688.38	349.05 N	90.61 W	101.71	0.43
5810.00	0.61	220.27	5782.37	348.01 N	91.60 W	102.67	0.57
5904.00	0.44	251.49	5876.36	347.51 N	92.27 W	103.32	0.35
5999.00	7.91	275.28	5971.05	348.00 N	99.13 W	110.19	7.90
6093.00	13.55	268.16	6063.37	348.24 N	116.59 W	127.65	6.15
6188.00	17.96	267.01	6154.78	347.12 N	142.35 W	153.37	4.65
6283.00	23.61	270.70	6243.56	346.59 N	176.03 W	187.01	6.10
6378.00	33.35	275.97	6326.98	349.54 N	221.14 W	232.19	10.58
6473.00	47.78	275.45	6398.96	355.63 N	282.46 W	293.67	15.19
6568.00	62.05	270.86	6453.44	359.62 N	359.86 W	371.16	15.53
6663.00	67.90	267.72	6493.62	358.50 N	445.88 W	457.10	6.85
6758.00	73.41	266.58	6525.08	354.03 N	535.37 W	546.40	5.91
6806.00	75.00	266.50	6538.14	351.24 N	581.47 W	592.39	3.32
6852.00	77.26	265.62	6549.17	348.17 N	626.02 W	636.82	5.25
7039.00	87.69	267.67	6573.63	337.38 N	810.83 W	821.19	5.68
7132.00	87.57	267.84	6577.47	333.74 N	903.68 W	913.87	0.22
7225.00	89.82	268.09	6579.59	330.44 N	996.59 W	1006.63	2.43
7318.00	89.26	266.94	6580.34	326.41 N	1089.50 W	1099.36	1.38
7412.00	90.06	267.33	6580.89	321.71 N	1183.38 W	1193.05	0.95
7505.00	89.60	266.58	6581.17	316.77 N	1276.24 W	1285.71	0.95
7598.00	89.75	266.31	6581.70	311.00 N	1369.06 W	1378.30	0.33
7693.00	90.52	266.53	6581.47	305.07 N	1463.88 W	1472.87	0.84
7788.00	90.55	266.45	6582.50	302.82 N	1559.69 W	1567.42	0.42

7788.00	90.53	266.15	6580.59	299.00 N	1558.68 W	1567.43	0.40
7882.00	90.28	267.20	6579.91	293.55 N	1652.52 W	1661.05	1.15
7977.00	90.65	269.29	6579.13	290.64 N	1747.46 W	1755.85	2.23
8072.00	91.02	269.35	6577.75	289.52 N	1842.45 W	1850.75	0.39
8167.00	90.40	269.42	6576.57	288.50 N	1937.43 W	1945.66	0.66
8262.00	89.85	268.52	6576.37	286.79 N	2032.42 W	2040.54	1.11
8356.00	90.59	268.40	6576.00	284.26 N	2126.38 W	2134.37	0.80
8451.00	91.26	268.50	6574.47	281.69 N	2221.33 W	2229.20	0.71
8546.00	90.52	268.99	6573.00	279.61 N	2316.30 W	2324.05	0.93
8641.00	90.99	268.93	6571.74	277.89 N	2411.27 W	2418.92	0.50
8736.00	89.14	269.46	6571.64	276.55 N	2506.26 W	2513.81	2.03
8831.00	89.48	269.28	6572.78	275.51 N	2601.25 W	2608.72	0.40
8925.00	90.74	269.40	6572.60	274.43 N	2695.24 W	2702.63	1.35
9020.00	88.80	269.46	6572.98	273.48 N	2790.23 W	2797.54	2.04
9115.00	88.28	269.16	6575.40	272.34 N	2885.19 W	2892.42	0.63
9210.00	88.61	269.09	6577.98	270.89 N	2980.14 W	2987.28	0.36
9305.00	89.41	269.22	6579.62	269.49 N	3075.12 W	3082.16	0.85
9399.00	90.65	268.93	6579.57	267.97 N	3169.11 W	3176.05	1.35
9494.00	89.63	268.38	6579.34	265.74 N	3264.08 W	3270.90	1.22
9589.00	89.20	267.42	6580.31	262.26 N	3359.01 W	3365.67	1.11
9684.00	90.00	268.10	6580.97	258.54 N	3453.93 W	3460.43	1.11
9778.00	90.49	268.90	6580.57	256.08 N	3547.90 W	3554.26	1.00
9871.00	88.03	267.51	6581.77	253.17 N	3640.83 W	3647.06	3.04
9967.00	87.75	266.79	6585.31	248.40 N	3736.65 W	3742.68	0.80
10062.00	89.41	267.11	6587.66	243.35 N	3831.48 W	3837.30	1.78
10157.00	89.60	266.50	6588.48	238.05 N	3926.33 W	3931.93	0.67
10251.00	89.45	266.00	6589.26	231.91 N	4020.13 W	4025.48	0.56
10346.00	90.31	266.08	6589.46	225.35 N	4114.90 W	4120.00	0.91
10441.00	90.25	268.22	6589.00	220.62 N	4209.77 W	4214.67	2.25
10536.00	89.97	268.91	6588.81	218.24 N	4304.74 W	4309.52	0.78
10631.00	89.78	268.99	6589.02	216.50 N	4399.73 W	4404.40	0.22
10726.00	89.54	268.77	6589.58	214.65 N	4494.71 W	4499.27	0.34
10821.00	89.51	269.23	6590.37	212.99 N	4589.69 W	4594.15	0.49
10916.00	89.75	271.00	6590.98	213.18 N	4684.68 W	4689.10	1.88
11010.00	89.69	271.76	6591.44	215.44 N	4778.65 W	4783.10	0.81
11105.00	89.91	272.99	6591.78	219.38 N	4873.57 W	4878.09	1.32
11199.00	89.32	273.21	6592.41	224.46 N	4967.43 W	4972.06	0.67
11294.00	89.51	271.31	6593.38	228.21 N	5062.35 W	5067.05	2.01
11389.00	89.54	270.94	6594.17	230.07 N	5157.32 W	5162.04	0.39
11483.00	90.18	268.71	6594.40	229.79 N	5251.32 W	5255.98	2.47
11578.00	90.40	269.58	6593.91	228.37 N	5346.30 W	5350.87	0.94
11673.00	89.57	268.21	6593.94	226.54 N	5441.28 W	5445.74	1.69
11768.00	89.97	267.08	6594.32	222.63 N	5536.20 W	5540.49	1.26
11862.00	89.38	266.41	6594.85	217.29 N	5630.05 W	5634.11	0.95
11961.00	90.92	266.96	6594.59	211.57 N	5728.88 W	5732.71	1.65
12026.00	90.92	266.96	6593.55	208.12 N	5793.78 W	5797.47	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 271.83 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.43 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12026.00 FEET  
IS 5797.51 FEET ALONG 272.06 DEGREES (GRID)**

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