

PCG Pressure Case Gamma

Country		: USA		Company		: Noble	
Field		: Wattenberg		Rig		: H&P 343	
Location		: Lat: 40° 27' 3.38" North Long: 104° 21' 22.61" West		Well		: Wells Ranch State AE30-62-1BHNA	
Well		: Wells Ranch State AE30-62-1BHNA		Company		: Noble	
Company		: Noble		Rig		: H&P 343	
Rig		: H&P 343		LOCATION <div>Company : Noble</div> <div>Rig : H&P 343</div> <div>Well : Wells Ranch State AE30-62-1BHNA</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 0512338687</div>			
LOCATION							
Permanent Datum		: Ground Level		Elevation		: 4745.00 ft	
Log Measured From		: Drill Floor		24.00 ft		Above Permanent Datum	
Drilling Measured From		: Drill Floor		MD LOG			
Depth Logged		: 630.00 ft To 16,238.00 ft		Unit No.		: 11610115	
Date Logged		: 11-Apr-14 To 22-Apr-14		Job No.:		CA-XX-0901134794	
Total Depth MD		: 16,238.00 ft TVD: 6,501.57 ft		Plot Type		: Final	
Spud Date		: 12-Apr-14		Plot Date		: 22-Apr-14	
Run No.	Borehole Record (MD)			Run No.	Borehole Record (MD)		
	Size	From	To		Size	From	To
	2	8,750 in	630.00 ft		5,729.00 ft		
	3	8,750 in	5,729.00 ft		6,738.00 ft		
4	6,125 in	6,738.00 ft	16,238.00 ft	Casing Record (MD)			
				Size	Weight	From	To
				9,625 in	36.60 lbpf	SURFACE	620.00 ft
				7,000 in	34.70 lbpf	SURFACE	6,728.00 ft

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	14-Apr-14	15-Apr-14	22-Apr-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)	630.00	5,729.00	6,738.00		
Log End Depth (MD, ft)	5,729.00	6,738.00	16,238.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	13-Apr-14 09:45	15-Apr-14 02:00	16-Apr-14 23:15		
Drill/Wipe End Date and Time	14-Apr-14 06:00	15-Apr-14 12:30	21-Apr-14 15:15		
Min Inc (deg) @ Depth (MD, ft)	0.14 @ 4,581.00	6.58 @ 5,816.00	86.70 @ 13,544.00		
Max Inc (deg) @ Depth (MD, ft)	7.60 @ 2,115.00	76.89 @ 6,669.00	92.41 @ 15,915.00		
Bit TFA(in2) / Bit Type	1.24 / PDC	1.24 / PDC	1.24 / PDC		
Flow Rate (gpm)	595.12	549.26	289.40		
Max AV (fpm) / CV (fpm) @ MWD	477.0 / NA	452.0 / NA	413.3 / NA		
Fluid Type	Native/Spud Mud	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.25 / 47.00	10.30 / 43.00	9.98 / 39.00		
Filtrate CL (ppm)	2,100.00	1,900.00	2,400.00		
pH / Fluid Loss (mptm)	9.00 / 5	9.20 / 5	9.40 / 6		
PV (cP) / YP (lbf2)	13 / 12.00	12 / 10.00	12 / 16.00		
% Solids / % Sand	6.70 / 0.30	9.2 / .4	9.2 / 0.50		
% Oil / Oil:Water Ratio	N/A / N/A	NA / NA	NA / NA		
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Max Tool Temp (in F) / S	454.00 / PGM	470.47 / PGM	390.51 / PGM		

Max Tool Temp (degF) / Source	154.30 / PCM	158.47 / PCM	239.54 / 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	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11341327	11341327	12361804		
Insert Serial Number	11227573	11227573	11227512		
Date and Time Initialized	12-Apr-14 16:51	01-Jan-70 00:00	16-Apr-14 02:28		
Date and Time Read	16-Apr-14 02:55	16-Apr-14 03:00	22-Apr-14 06:30		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	55.00	66.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341327	11341327	12361804		
Sonde Serial Number	11638605	11638605	11478007		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	101.52	180.27	189.47		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.69	47.92	58.59		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341327	11341327	12361804		
Insert/Sonde Serial Number	11579834	11579834	11120591		

REMARKS

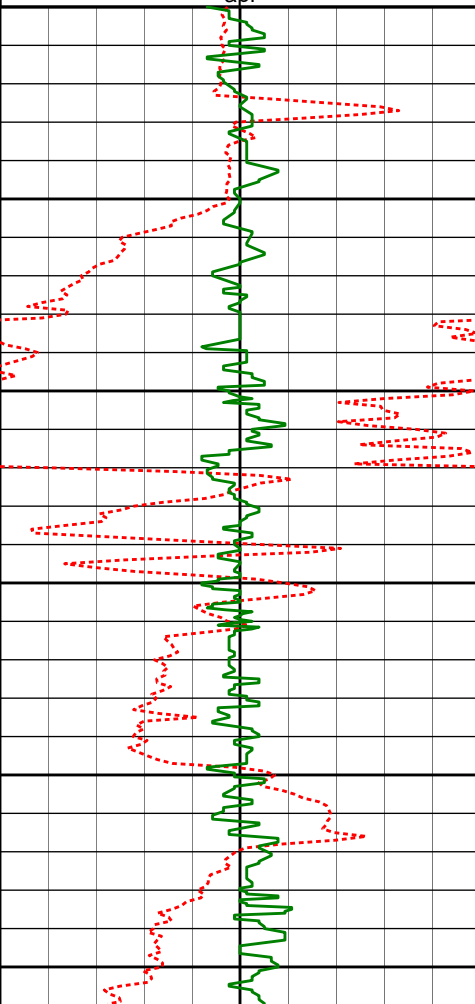
1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based 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

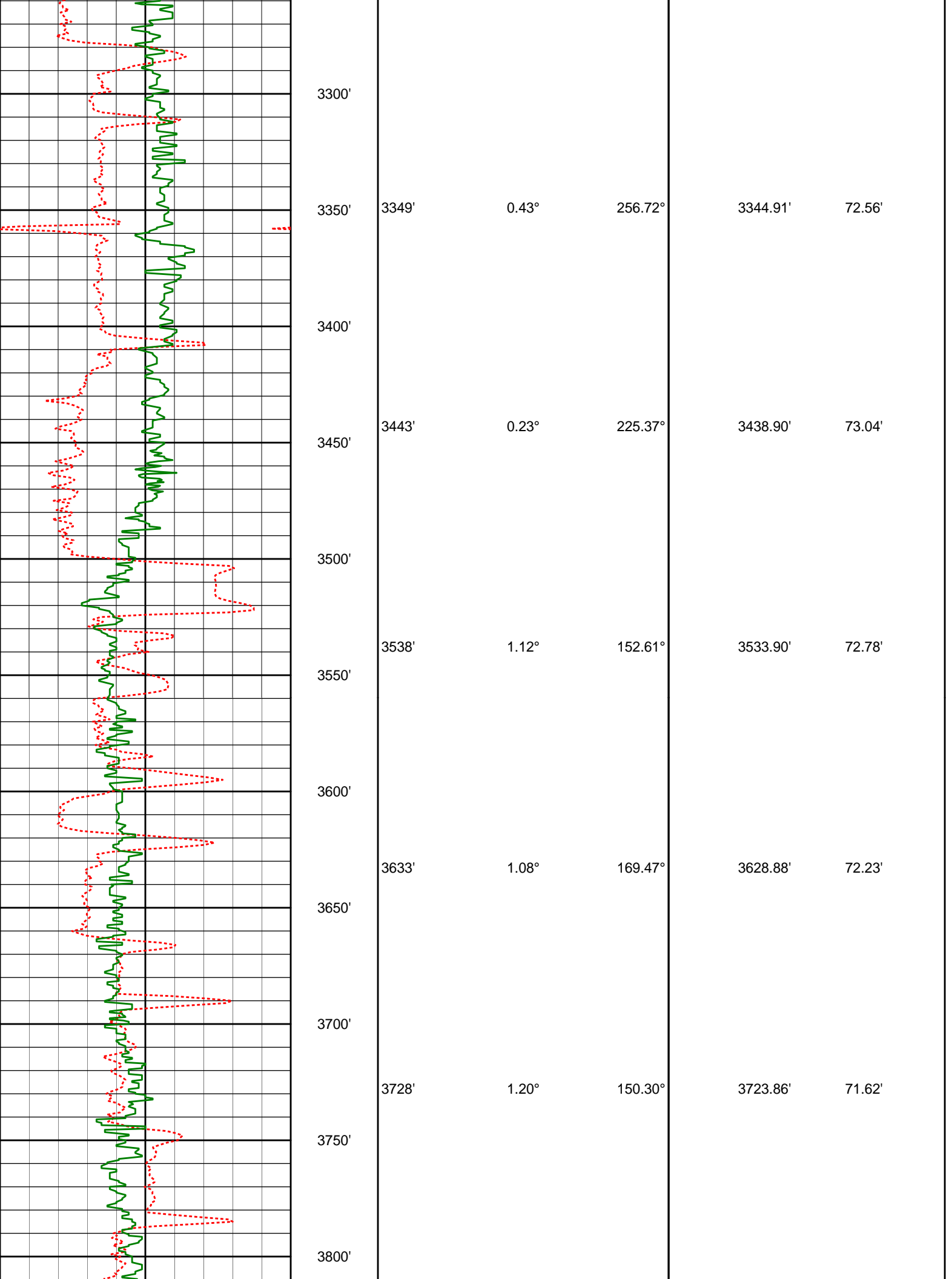
WARRANTY

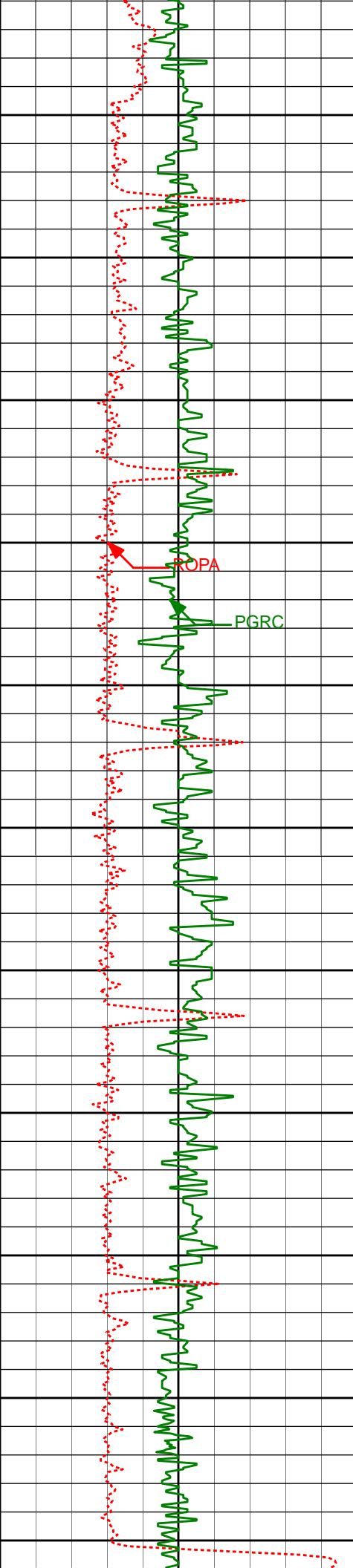
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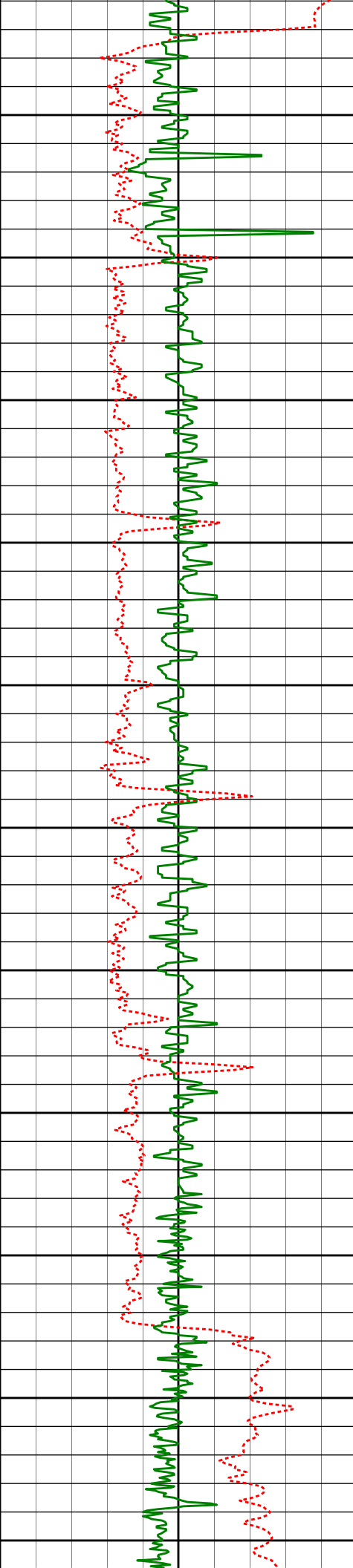
MD Main Log 1:600

Average Rate of Penetration ROPA 1K0 feet per hr						
PCG Gamma Ray BCorr PGRC 0200 api		Measured Depth (ft) 1:600	Depth	Inc	Azi.	TVDV.S.
		3000'				
		3050'				
		3064'	3064'	0.22°	32.73°	3059.91'73.28'
		3100'				
		3150'				
		3200'				
		3250'	3254'	0.46°	47.38°	3249.91'72.50'

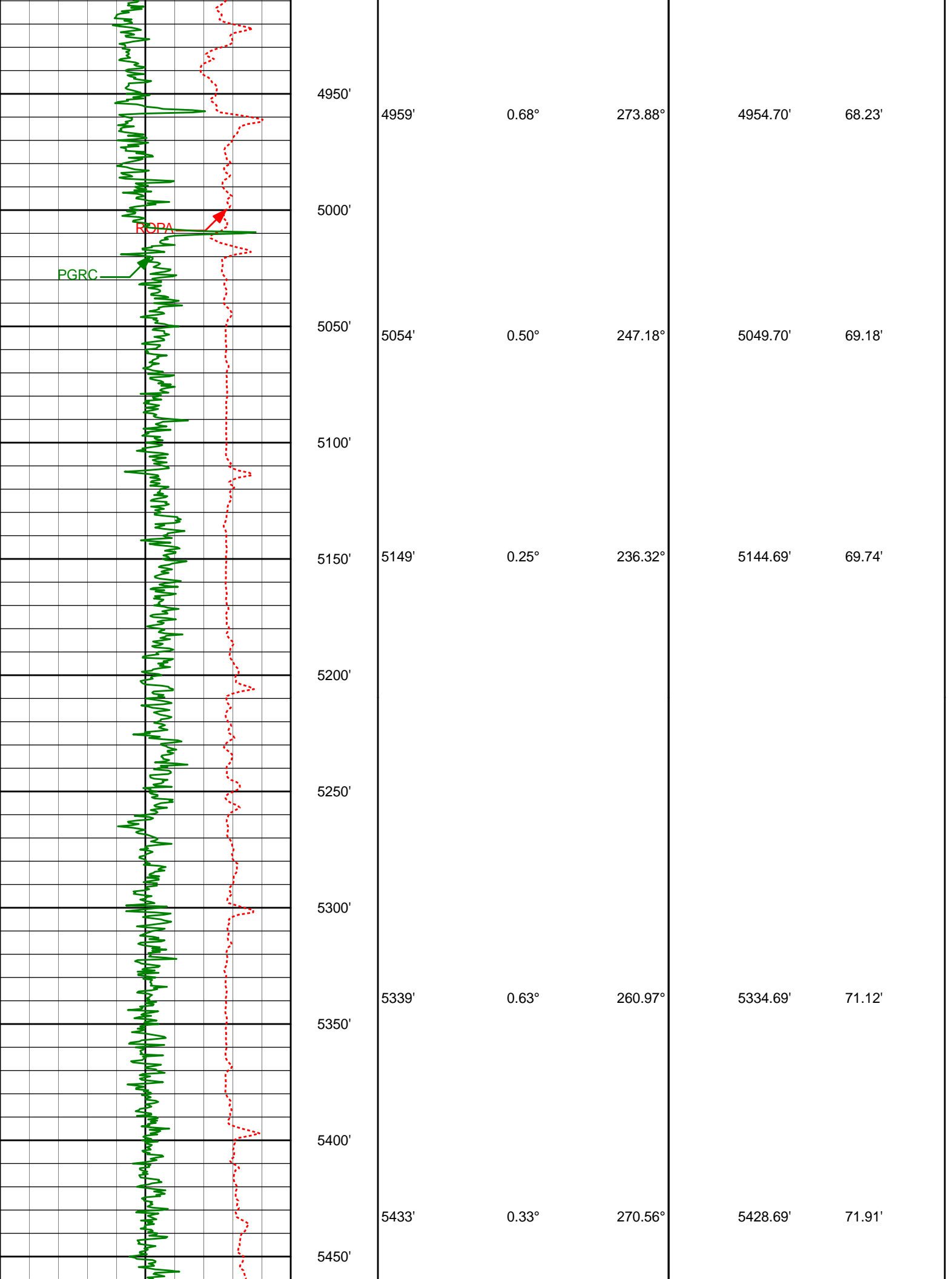


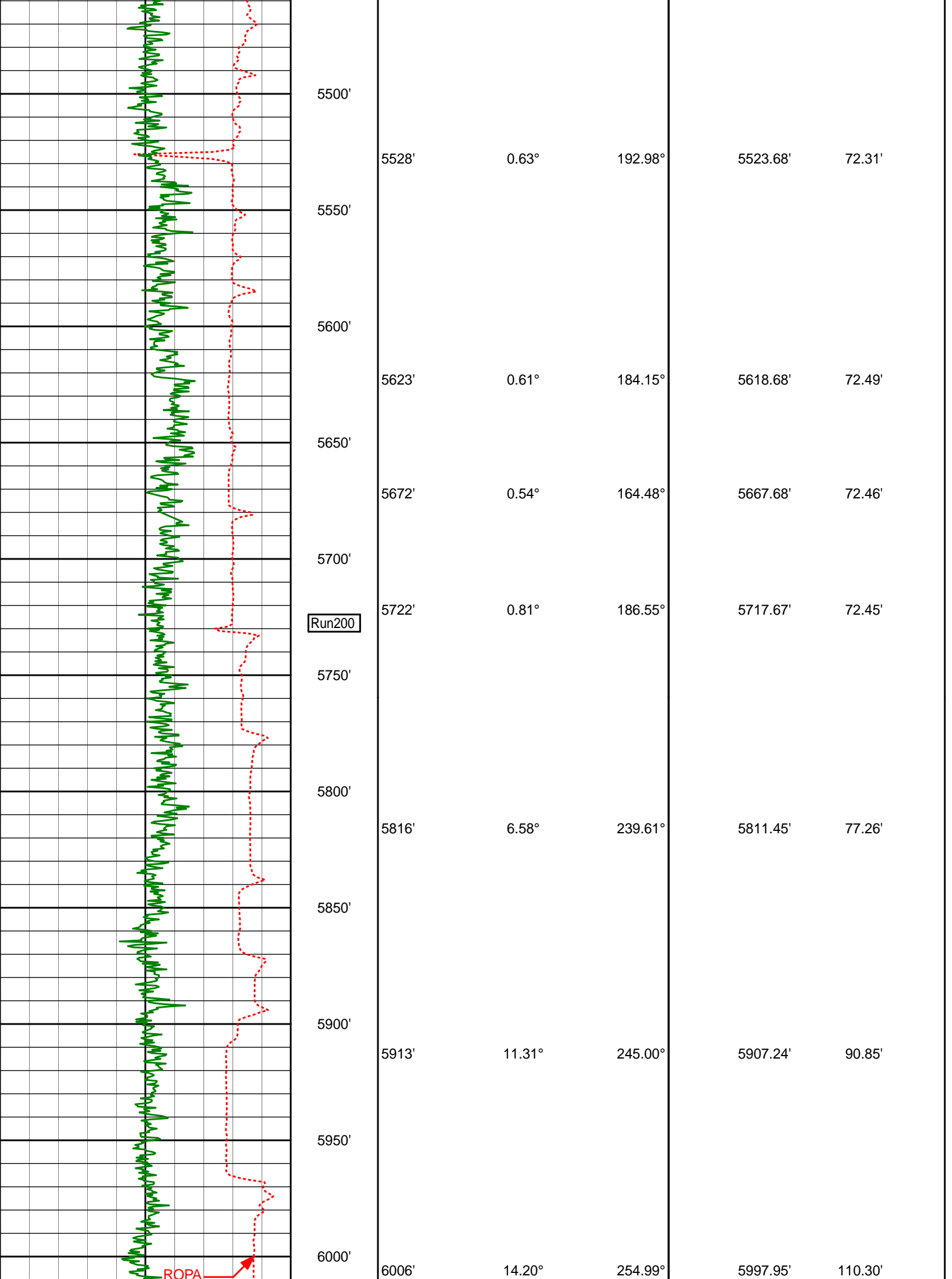


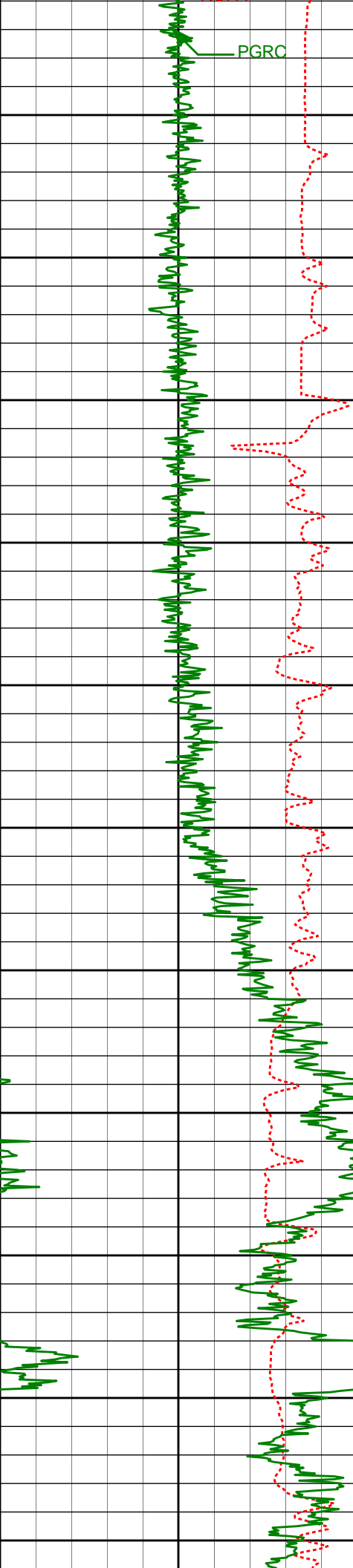
	3822'	1.42°	141.46°	3817.84'	70.45'
3850'					
3900'					
	3917'	1.35°	144.06°	3912.81'	69.10'
3950'					
4000'					
4050'					
4100'	4107'	1.14°	157.66°	4102.76'	67.16'
4150'					
4200'	4202'	1.21°	166.24°	4197.74'	66.61'
4250'					
4300'	4297'	1.05°	176.99°	4292.73'	66.37'
4350'					



4400'	4391'	0.61°	186.55°	4386.72'	66.42'
4450'					
4500'	4486'	0.50°	186.65°	4481.71'	66.54'
4550'					
4600'	4581'	0.14°	223.70°	4576.71'	66.68'
4650'					
4700'	4675'	0.46°	185.88°	4670.71'	66.81'
4750'					
4800'					
4850'					
4900'	4865'	0.31°	275.91°	4860.71'	67.42'

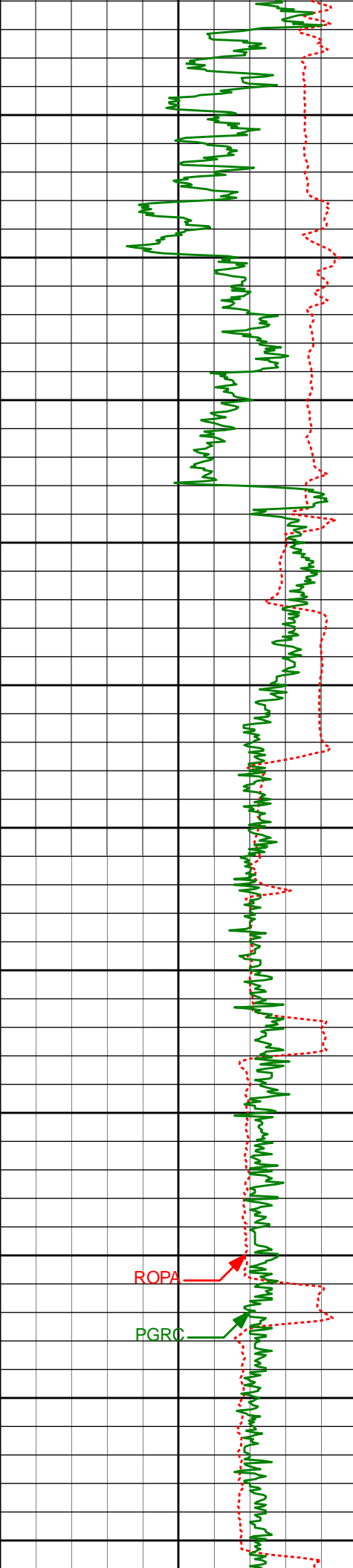




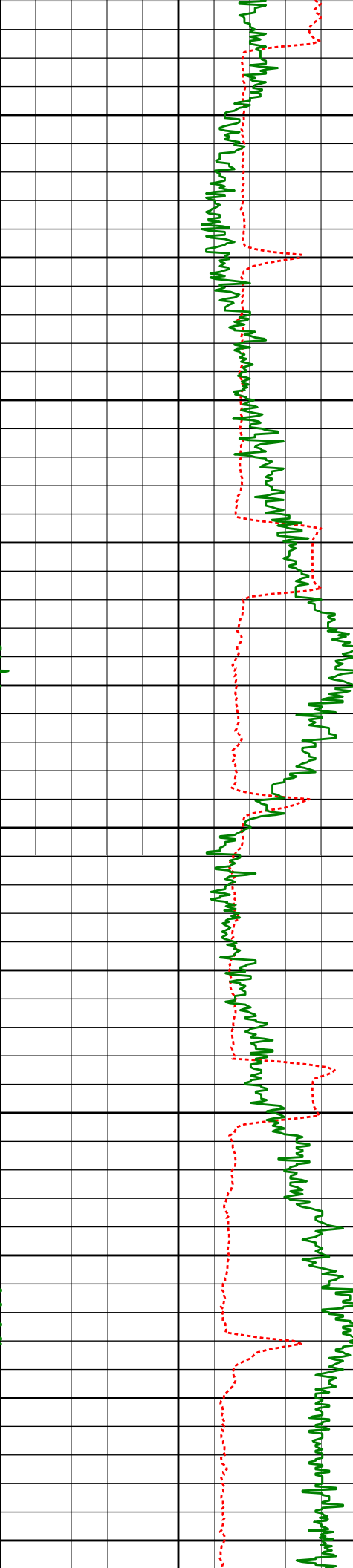


PGRC

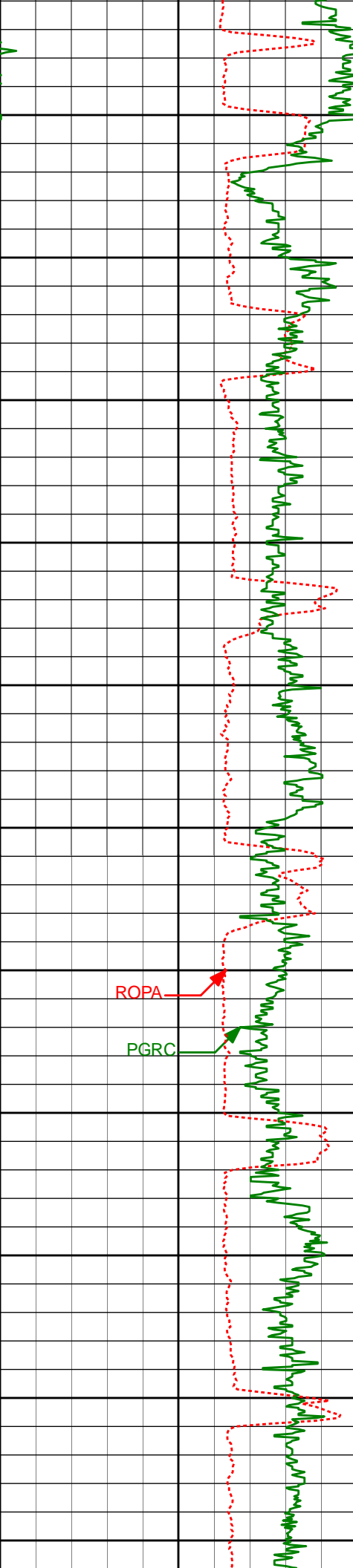
6050'	6054'	22.03°	260.89°	6043.54'	124.97'
6100'	6101'	28.88°	266.93°	6085.96'	145.08'
6150'	6149'	31.11°	272.22°	6127.53'	169.05'
6200'	6195'	34.47°	271.96°	6166.20'	193.91'
6250'	6243'	38.17°	268.65°	6204.87'	222.31'
6300'	6290'	43.66°	266.85°	6240.37'	253.08'
6350'					
6400'	6385'	57.06°	269.92°	6300.85'	326.05'
6450'					
6500'	6480'	66.19°	275.69°	6345.98'	409.25'
6550'					



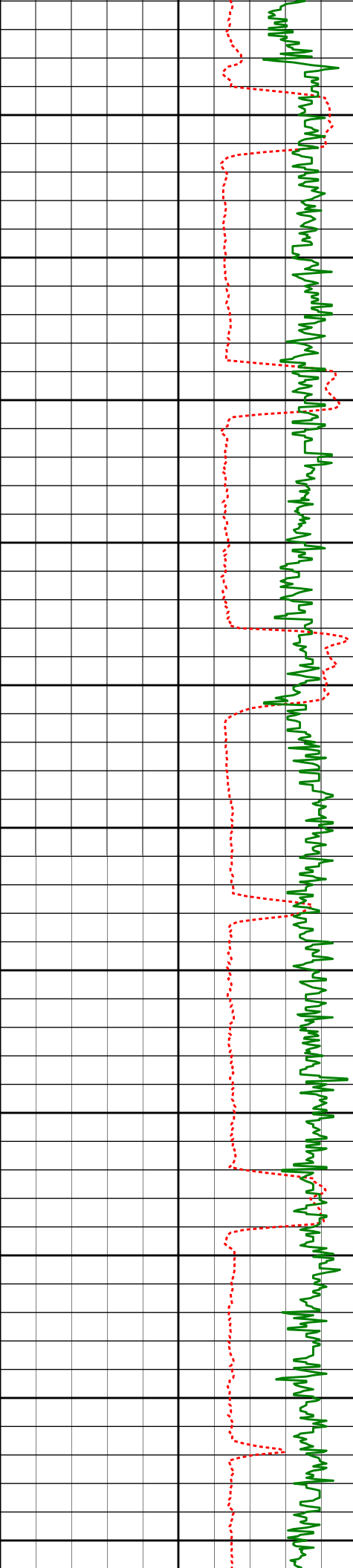
6575'	69.36°	272.18°	6381.92'	496.79'	
6600'					
6650'					
6669'	76.89°	269.14°	6409.19'	586.60'	
6700'					
<div><div></div><div>Casing Shoe @ 6728'</div></div>					
Run 300					
6750'					
6800'	6804'	88.61°	268.61°	6426.20'	720.29'
6850'	6850'	89.45°	268.35°	6426.98'	766.28'
6900'					
6944'	89.72°	268.37°	6427.66'	860.28'	
7000'					
7039'	89.44°	268.00°	6428.35'	955.27'	
7050'					
7100'					



	7134'	88.24°	268.07°	6430.28' 1050.25'
7150'				
7200'				
	7229'	89.20°	268.02°	6432.40' 1145.22'
7250'				
7300'				
	7323'	87.41°	268.97°	6435.18' 1239.17'
7350'				
7400'				
	7418'	87.81°	269.27°	6439.14' 1334.09'
7450'				
7500'				
	7513'	88.18°	270.52°	6442.47' 1429.00'
7550'				
7600'				
	7608'	88.98°	270.46°	6444.82' 1523.92'
7650'				



7700'	7703'	90.55°	271.61°	6445.21'	1618.82'
7750'					
7800'	7798'	90.22°	272.61°	6444.57'	1713.64'
7850'					
7900'	7893'	90.77°	272.31°	6443.75'	1808.42'
7950'					
8000'	7987'	89.66°	270.11°	6443.40'	1902.31'
8050'					
8100'	8082'	89.97°	267.98°	6443.70'	1997.30'
8150'					
8200'	8177'	90.43°	267.99°	6443.37'	2092.29'



8250'

8271'

90.15°

267.84°

6442.90'

2186.29'

8300'

8350'

8365'

89.78°

268.15°

6442.96'

2280.28'

8400'

8450'

8460'

89.08°

267.09°

6443.90'

2375.26'

8500'

8550'

8555'

89.88°

266.92°

6444.76'

2470.22'

8600'

8650'

8650'

89.20°

267.20°

6445.52'

2565.18'

8700'

8750'

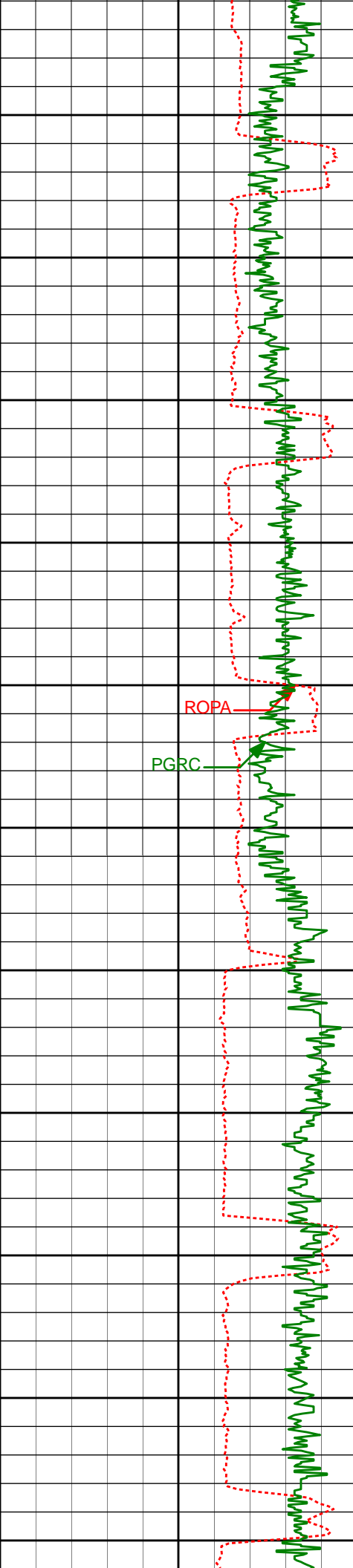
8745'

90.31°

266.89°

6445.93'

2660.15'



8800'

8839'

89.72°

266.55°

6445.91'

2754.10'

8850'

8900'

8934'

89.57°

267.36°

6446.50'

2849.06'

8950'

9000'

ROPA

PGRC

9029'

88.46°

266.66°

6448.13'

2944.01'

9050'

9100'

9124'

88.83°

266.61°

6450.38'

3038.93'

9150'

9200'

9219'

89.63°

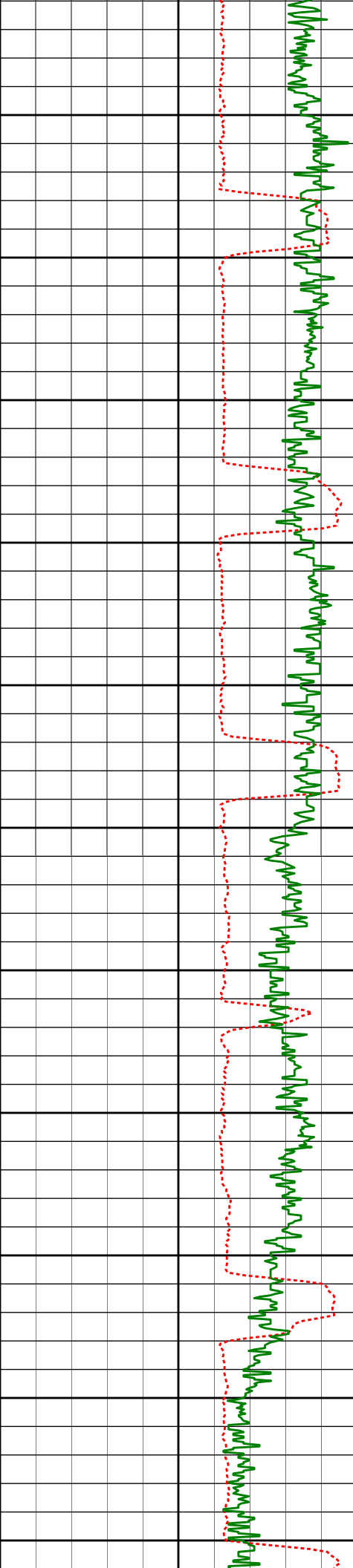
267.89°

6451.65'

3133.89'

9250'

9300'



9350'

9400'

9450'

9500'

9550'

9600'

9650'

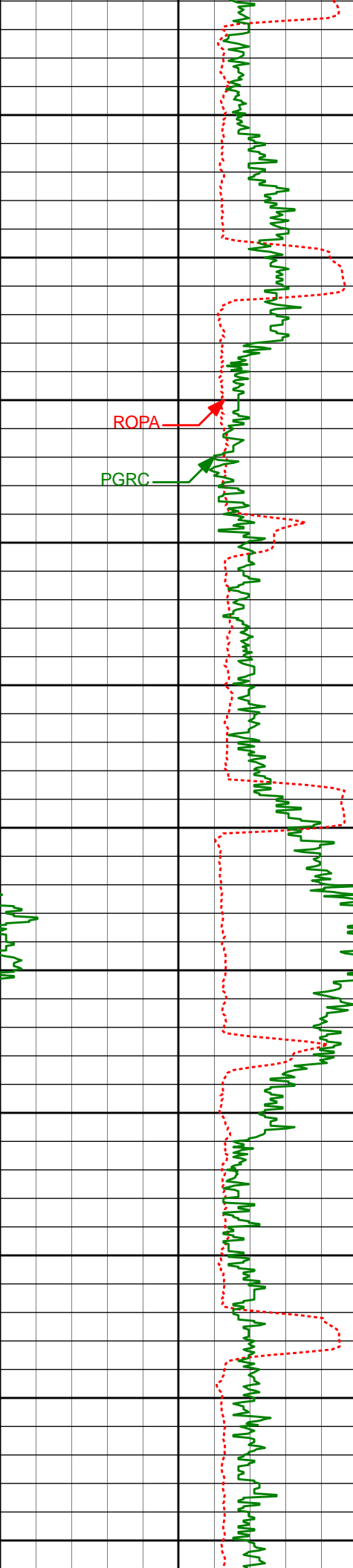
9700'

9750'

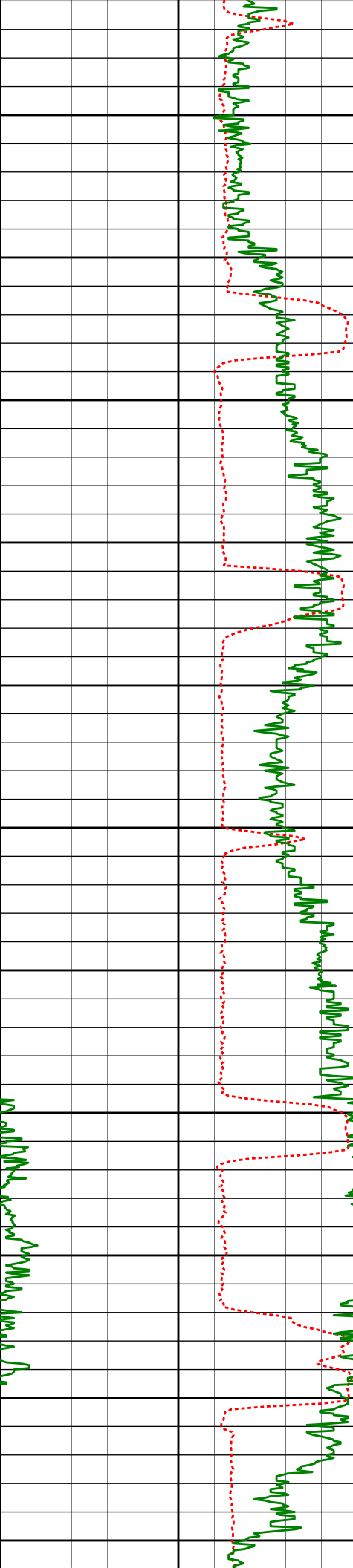
9800'

9850'

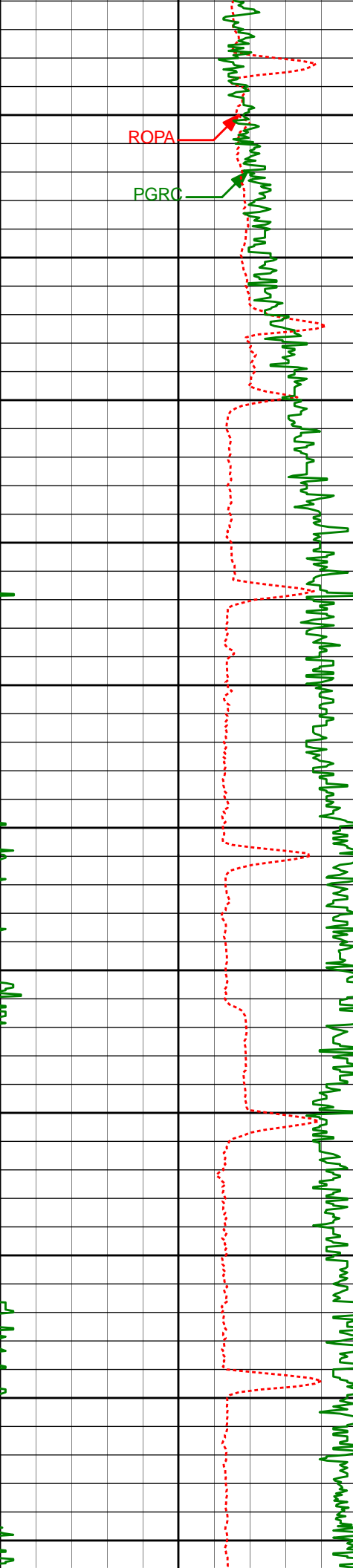
9314'	89.88°	268.66°	6452.06'	3228.89'
9408'	89.72°	269.26°	6452.39'	3322.88'
9503'	89.11°	269.17°	6453.36'	3417.87'
9597'	88.49°	269.35°	6455.32'	3511.84'
9692'	89.14°	269.47°	6457.29'	3606.81'
9786'	89.11°	268.89°	6458.72'	3700.80'



9880'	89.48°	269.58°	6459.88'	3794.78'
9900'				
9950'				
9975'	88.98°	269.58°	6461.16'	3889.76'
10000'				
10050'				
10069'	89.57°	269.61°	6462.35'	3983.73'
10100'				
10150'				
10164'	87.87°	268.50°	6464.47'	4078.70'
10200'				
10250'				
10258'	87.90°	268.96°	6467.94'	4172.64'
10300'				
10350'				
10353'	89.88°	268.94°	6469.78'	4267.61'
10400'				



10450'	10450'	90.49°	268.58°	6469.47'	4364.61'
10500'					
10550'	10545'	89.97°	270.00°	6469.08'	4459.60'
10600'					
10650'	10638'	88.86°	269.35°	6470.03'	4552.58'
10700'					
10750'	10730'	90.37°	271.01°	6470.65'	4644.53'
10800'					
10850'	10821'	90.52°	269.59°	6469.95'	4735.49'
10900'					
10950'	10914'	87.93°	267.47°	6471.20'	4828.46'



ROPA

PGRC

11000'

11050'

11100'

11150'

11200'

11250'

11300'

11350'

11400'

11450'

11500'

11007'

88.46°

267.50°

6474.13'

4921.40'

11099'

89.14°

267.06°

6476.06'

5013.36'

11192'

89.69°

267.11°

6477.01'

5106.32'

11284'

89.41°

266.35°

6477.73'

5198.27'

11377'

90.18°

267.33°

6478.06'

5291.22'

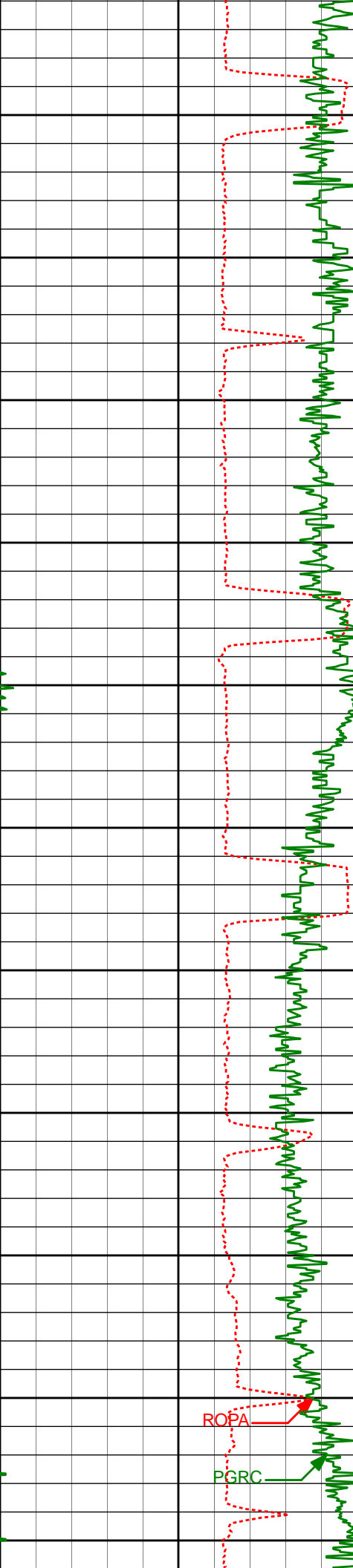
11469'

90.37°

266.86°

6477.62'

5383.19'



11550'

11561'

89.69°

267.31°

6477.57'

5475.16'

11600'

11650'

11654'

90.49°

269.67°

6477.43'

5568.15'

11700'

11750'

11747'

88.83°

265.12°

6477.98'

5661.10'

11800'

11850'

11840'

89.48°

267.77°

6479.35'

5754.02'

11900'

11950'

11933'

90.71°

269.46°

6479.20'

5847.02'

12000'

ROPA

PGRC

12050'

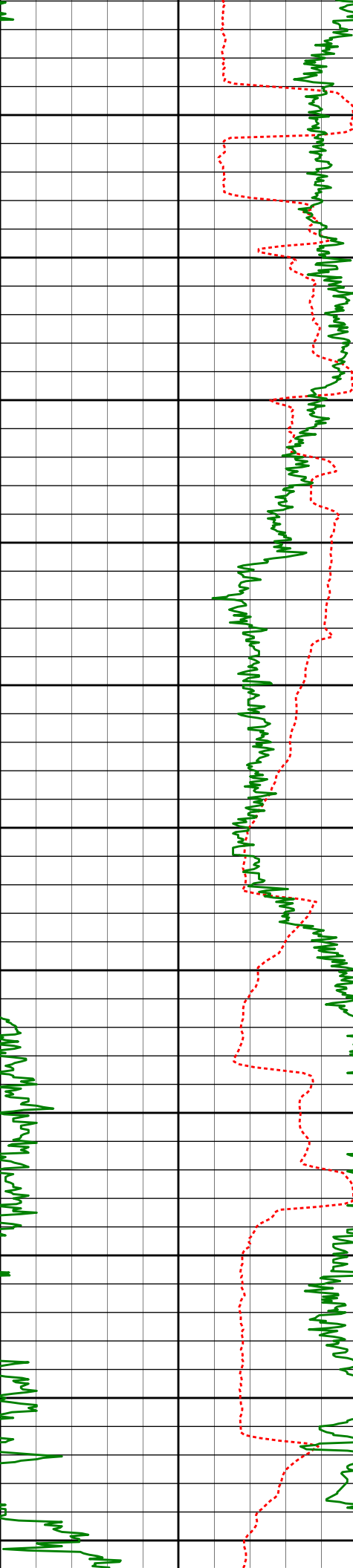
12027'

91.11°

269.86°

6477.71'

5940.99'



12100'

12150'

12200'

12250'

12300'

12350'

12400'

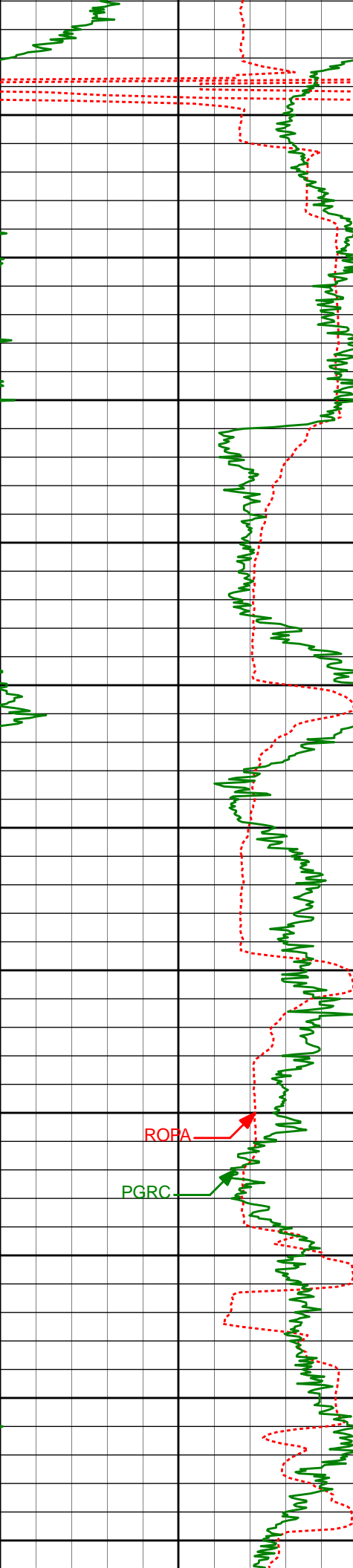
12450'

12500'

12550'

12600'

12120'	88.92°	267.52°	6477.68'	6033.97'
12215'	89.69°	270.36°	6478.83'	6128.96'
12310'	89.45°	269.51°	6479.55'	6223.92'
12405'	90.25°	268.48°	6479.80'	6318.92'
12500'	89.35°	270.62°	6480.13'	6413.90'
12595'	89.60°	270.51°	6481.00'	6508.84'



12650'

12700'

12750'

12800'

12850'

12900'

12950'

13000'

13050'

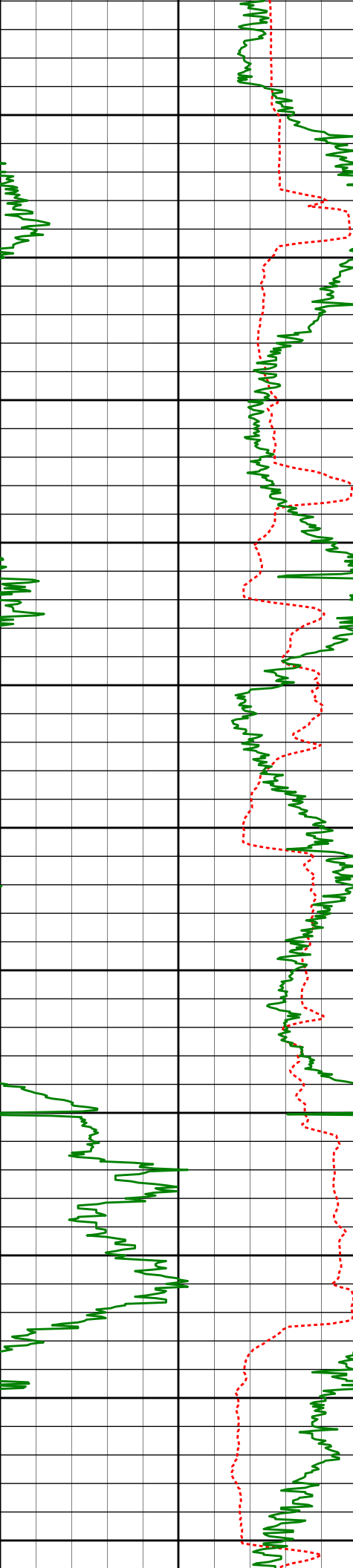
13100'

13150'

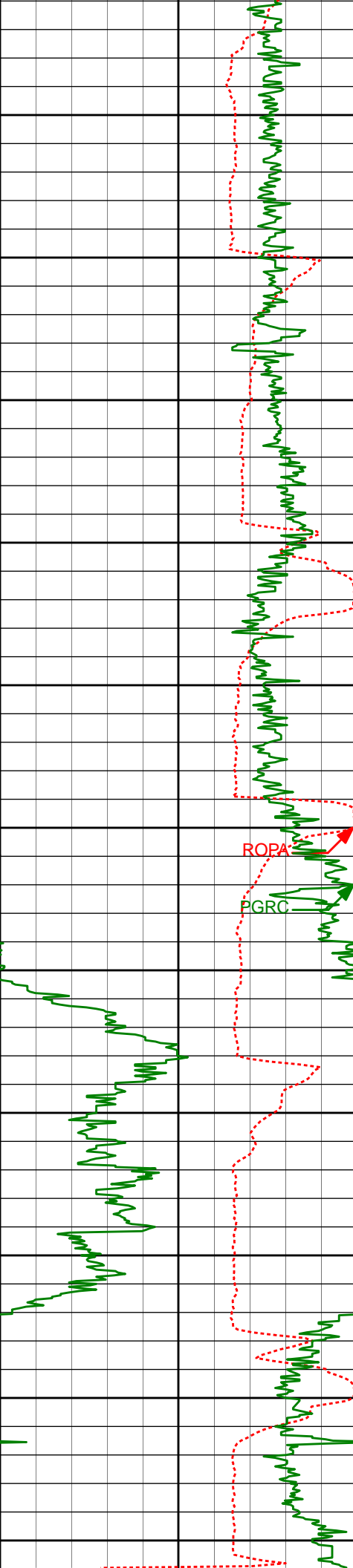
12690'	89.69°	269.38°	6481.59'	6603.81'
12785'	89.82°	270.16°	6481.99'	6698.78'
12880'	90.28°	269.25°	6481.91'	6793.76'
12974'	90.43°	268.54°	6481.33'	6887.76'
13069'	90.09°	267.83°	6480.90'	6982.76'

ROFA

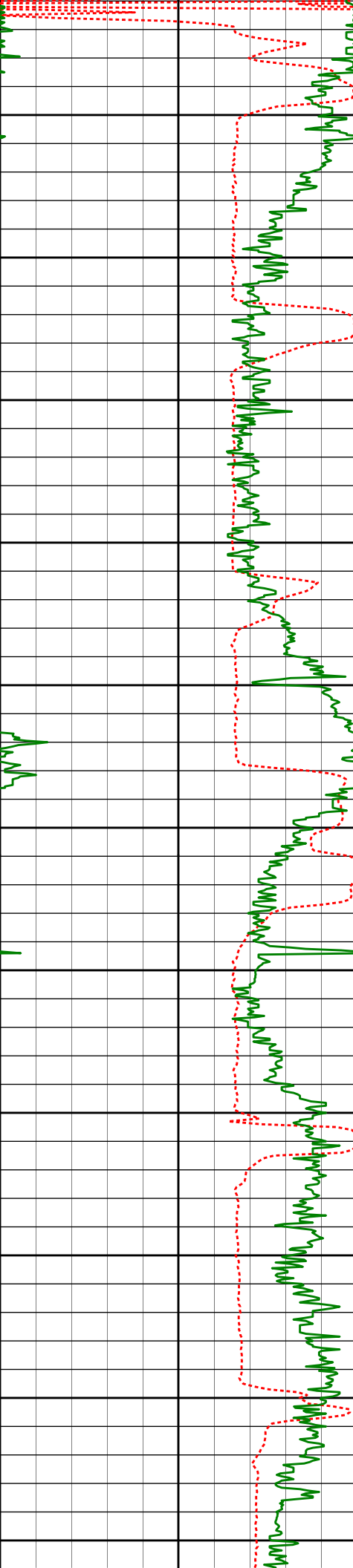
PGRC



	13164'	89.48°	267.18°	6481.25'	7077.74'
13200'					
13250'	13259'	89.20°	267.62°	6482.35'	7172.71'
13300'					
13350'	13354'	87.72°	266.23°	6484.90'	7267.63'
13400'					
13450'	13449'	87.66°	266.37°	6488.73'	7362.48'
13500'					
13550'	13544'	86.70°	266.74°	6493.40'	7457.31'
13600'					
13650'	13639'	87.68°	267.68°	6498.06'	7552.16'
13700'					



13734'	88.27°	267.21°	6501.42'	7647.08'
13750'				
13800'				
13828'	88.89°	267.31°	6503.75'	7741.03'
13850'				
13900'				
13923'	90.00°	267.90°	6504.67'	7836.01'
13950'				
14000'				
14018'	90.65°	269.34°	6504.13'	7931.01'
14050'				
14100'				
14113'	91.82°	269.43°	6502.08'	8025.97'
14150'				
14200'				
14207'	91.14°	269.61°	6499.65'	8119.93'
14250'				



14300'

14350'

14400'

14450'

14500'

14550'

14600'

14650'

14700'

14750'

14800'

14302'

14397'

14492'

14587'

14682'

14777'

90.68°

90.03°

90.96°

89.78°

89.45°

89.94°

269.06°

268.50°

268.36°

269.11°

268.62°

268.28°

6498.14'

6497.56'

6496.73'

6496.12'

6496.76'

6497.27'

8214.91'

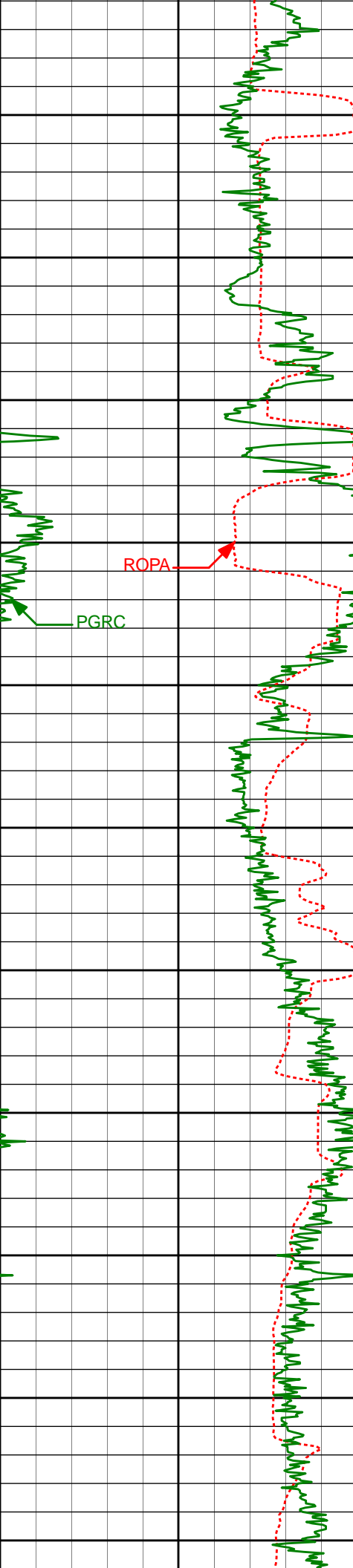
8309.90'

8404.90'

8499.89'

8594.89'

8689.89'



14850'

14900'

14950'

15000'

15050'

15100'

15150'

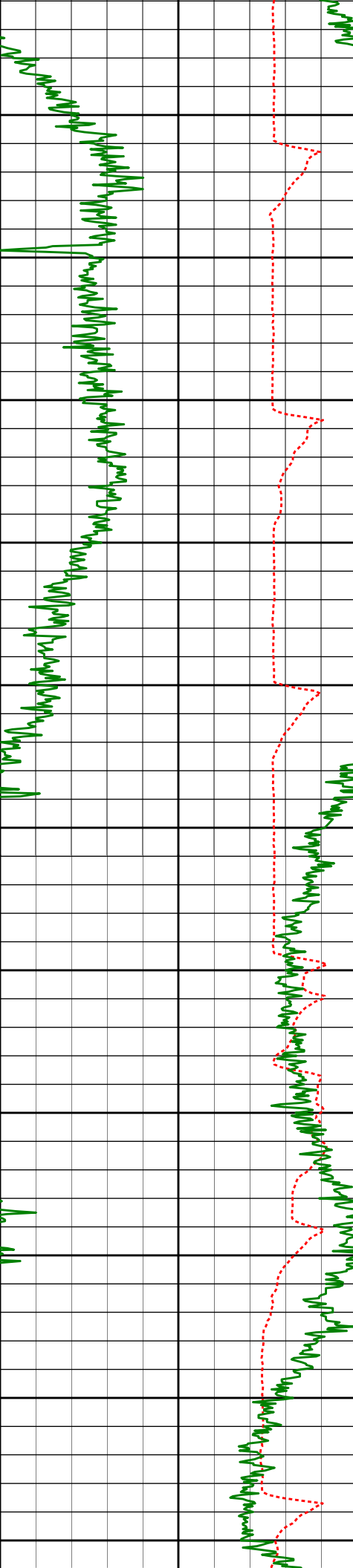
15200'

15250'

15300'

15350'

14872'	89.14°	268.64°	6498.03'	8784.88'
14966'	87.72°	268.69°	6500.60'	8878.85'
15061'	87.81°	268.00°	6504.31'	8973.77'
15156'	87.66°	270.14°	6508.06'	9068.69'
15251'	88.03°	269.53°	6511.64'	9163.60'
15346'	88.58°	269.59°	6514.45'	9258.54'



15400'

15450'

15500'

15550'

15600'

15650'

15700'

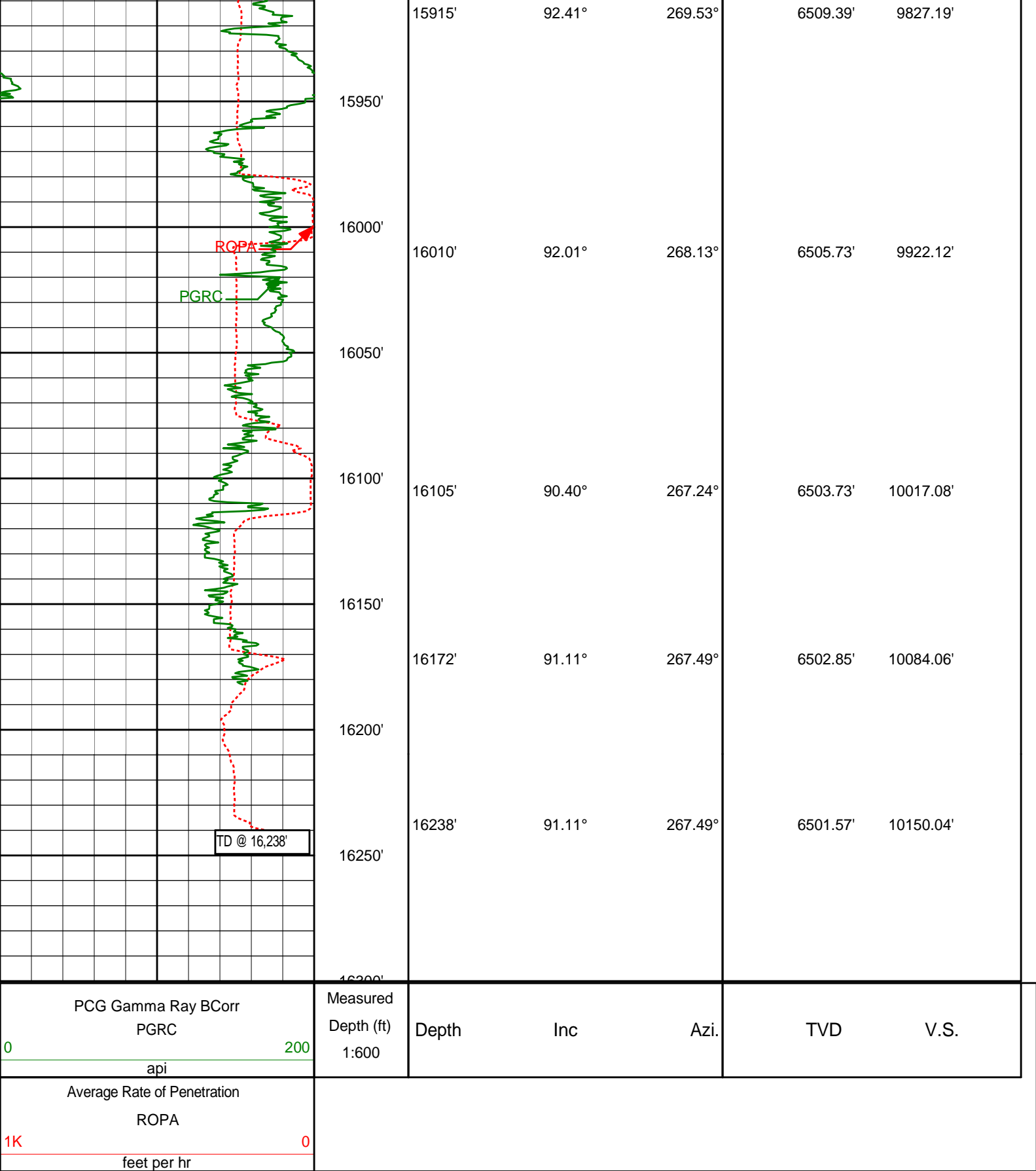
15750'

15800'

15850'

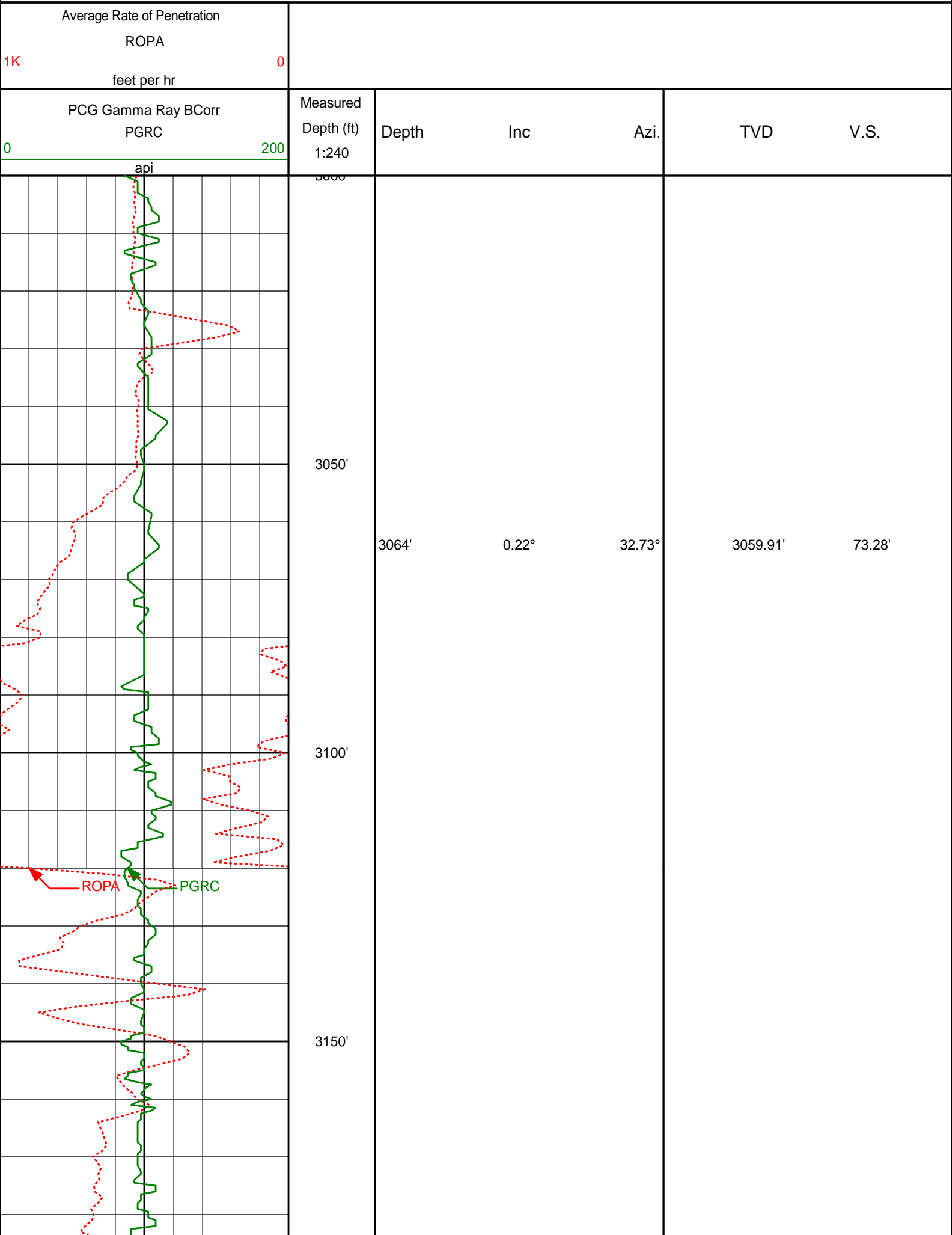
15900'

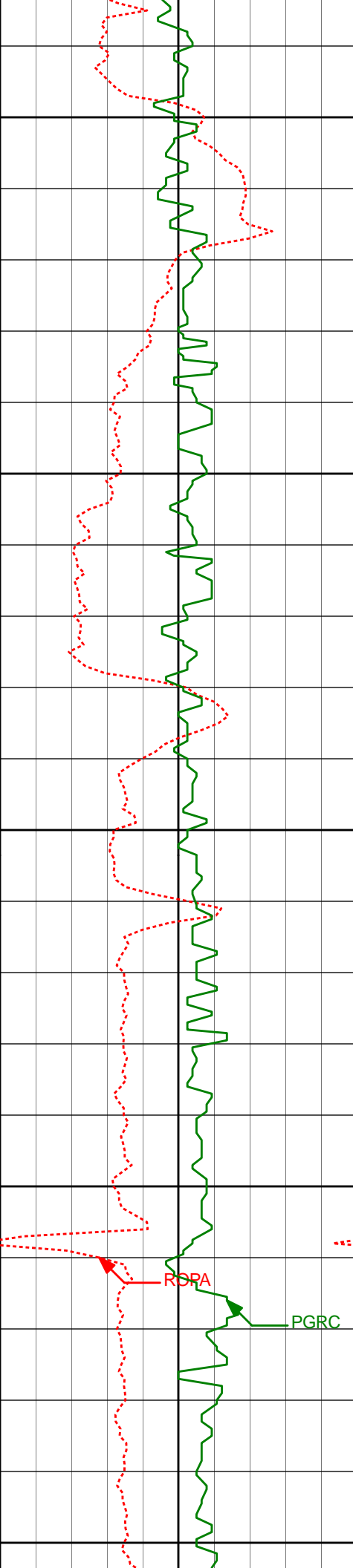
15441'	88.71°	269.29°	6516.69'	9353.50'
15536'	90.52°	271.84°	6517.33'	9448.43'
15630'	90.43°	269.72°	6516.55'	9542.35'
15725'	91.30°	270.01°	6515.12'	9637.32'
15820'	91.60°	269.57°	6512.71'	9732.27'



HALLIBURTON

MD Main Log 1:240





3200'

3250'

3300'

3350'

3400'

3254'

0.46°

47.38°

3249.91'

72.50'

3349'

0.43°

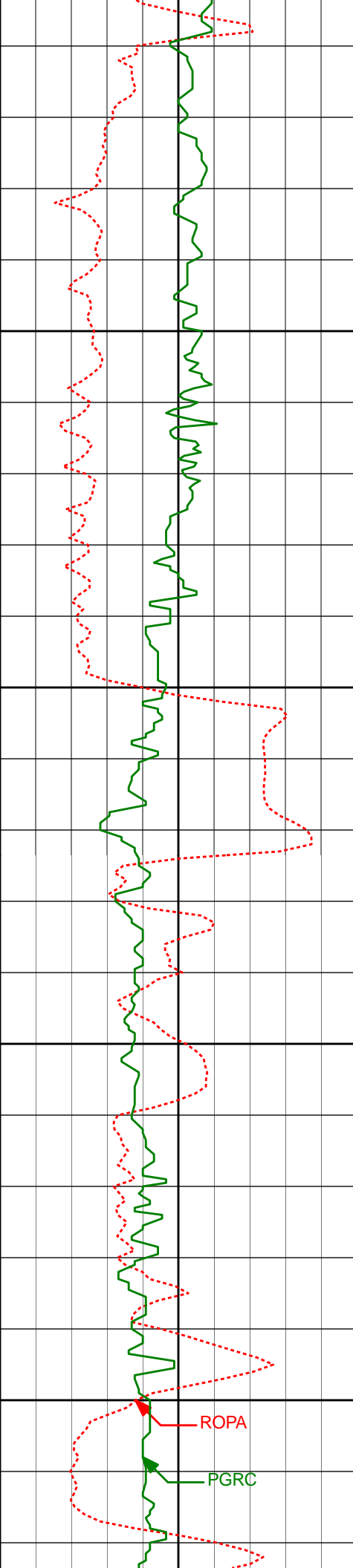
256.72°

3344.91'

72.56'

ROPA

PGRC



3443'	0.23°	225.37°	3438.90'	73.04'
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3500'				
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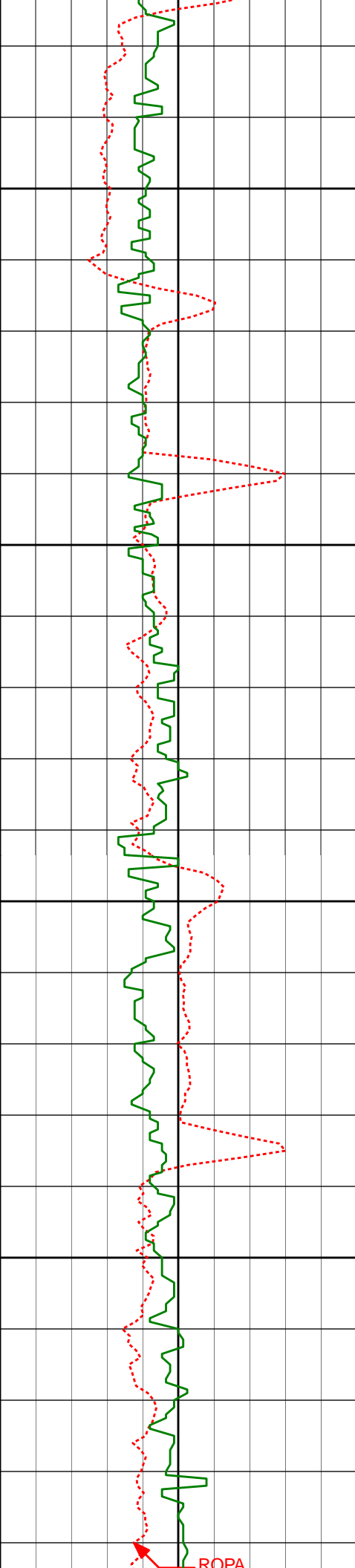
3538'	1.12°	152.61°	3533.90'	72.78'
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3550'				
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3600'				
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ROPA

PGRC



3633'

1.08°

169.47°

3628.88'

72.23'

3650'

3700'

3728'

1.20°

150.30°

3723.86'

71.62'

3750'

3800'

3822'

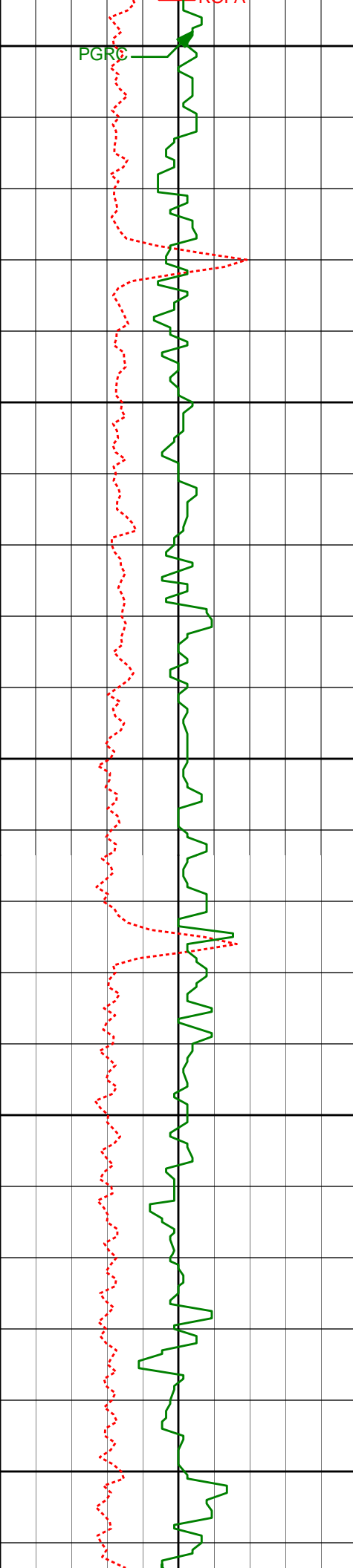
1.42°

141.46°

3817.84'

70.45'

ROPA



3850'

3900'

3950'

4000'

4050'

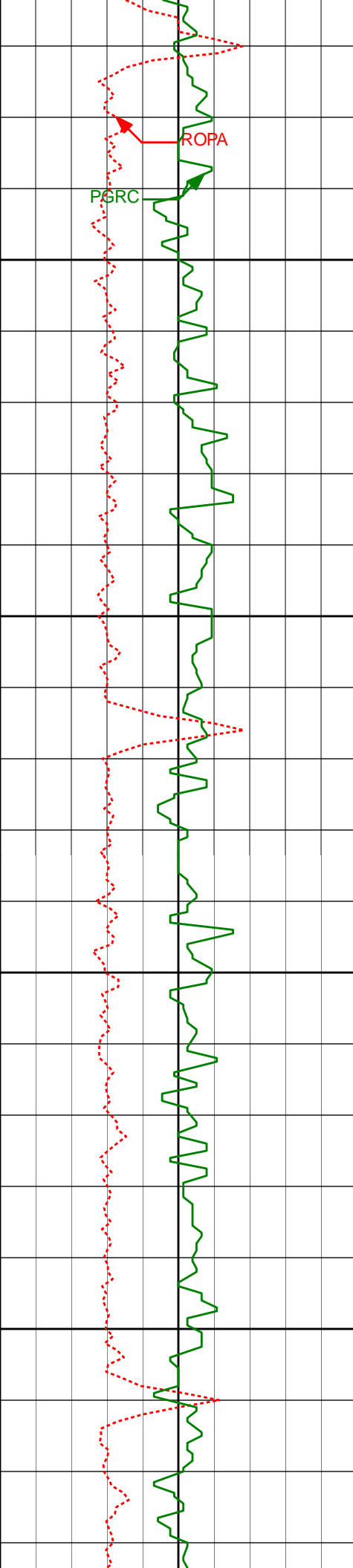
3917'

1.35°

144.06°

3912.81'

69.10'



4100'

4107'

1.14°

157.66°

4102.76'

67.16'

4150'

4200'

4202'

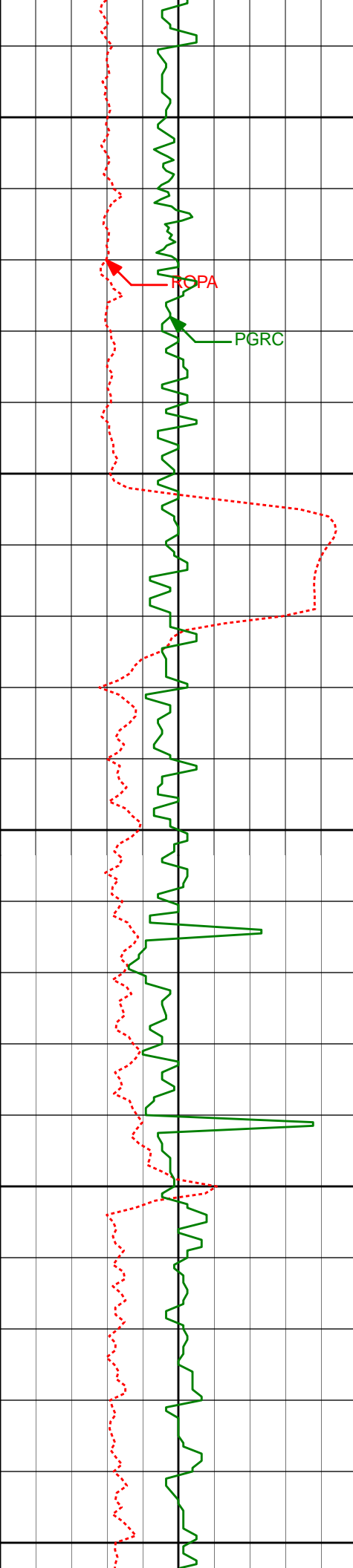
1.21°

166.24°

4197.74'

66.61'

4250'



4300'

4350'

4400'

4450'

4500'

4297'

4391'

4486'

1.05°

0.61°

0.50°

176.99°

186.55°

186.65°

4292.73'

4386.72'

4481.71'

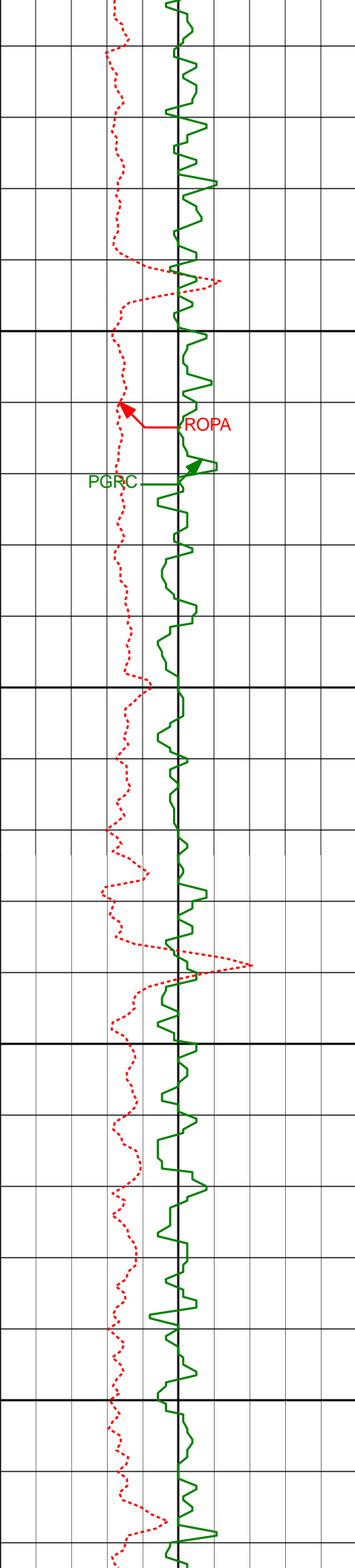
66.37'

66.42'

66.54'

ROPA

PGRC



4550'

4600'

4650'

4700'

4581'

0.14°

223.70°

4576.71'

66.68'

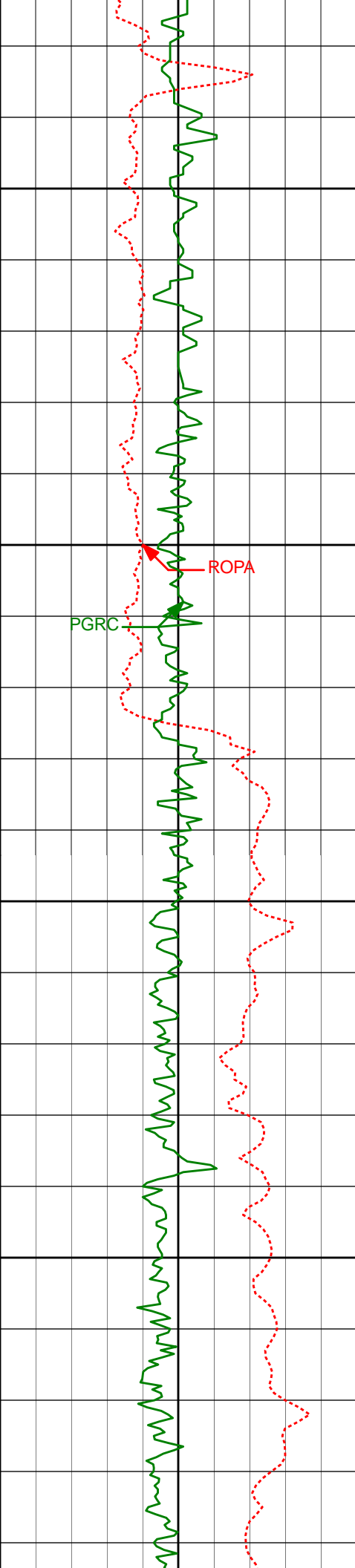
4675'

0.46°

185.88°

4670.71'

66.81'



4750'

4800'

4850'

4900'

PGRC

ROPA

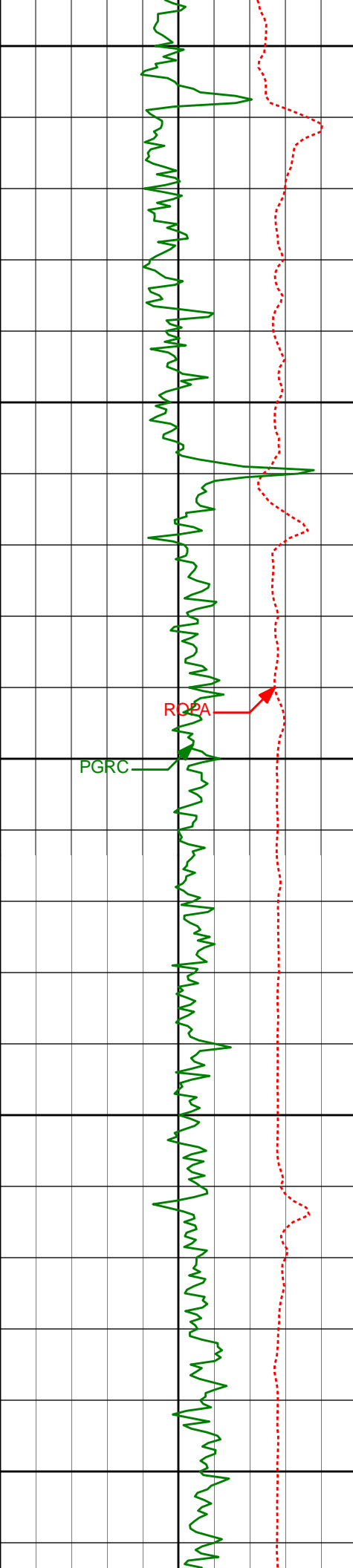
4865'

0.31°

275.91°

4860.71'

67.42'



4950'

4959'

0.68°

273.88°

4954.70'

68.23'

5000'

5050'

5054'

0.50°

247.18°

5049.70'

69.18'

5100'

5150'

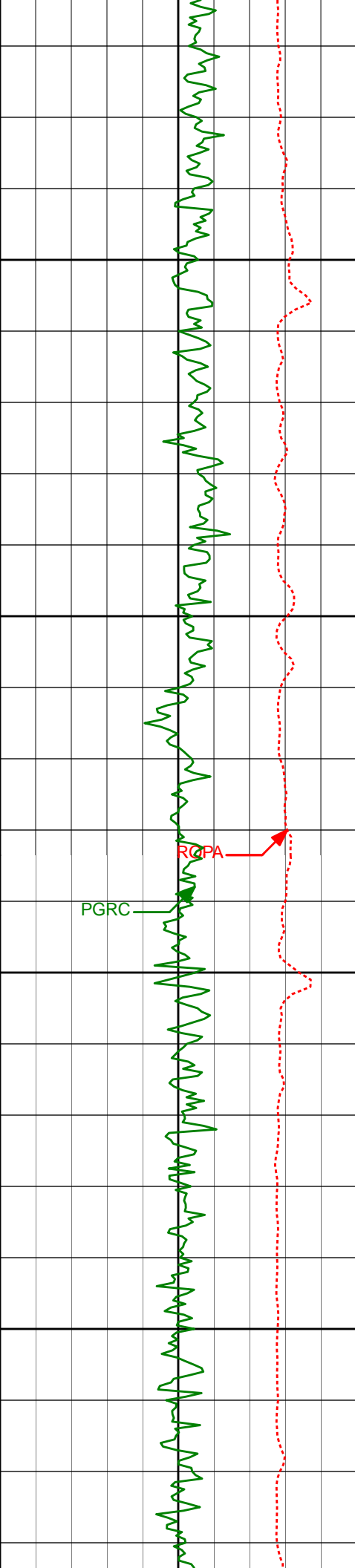
5149'

0.25°

236.32°

5144.69'

69.74'



5200'

5250'

5300'

5350'

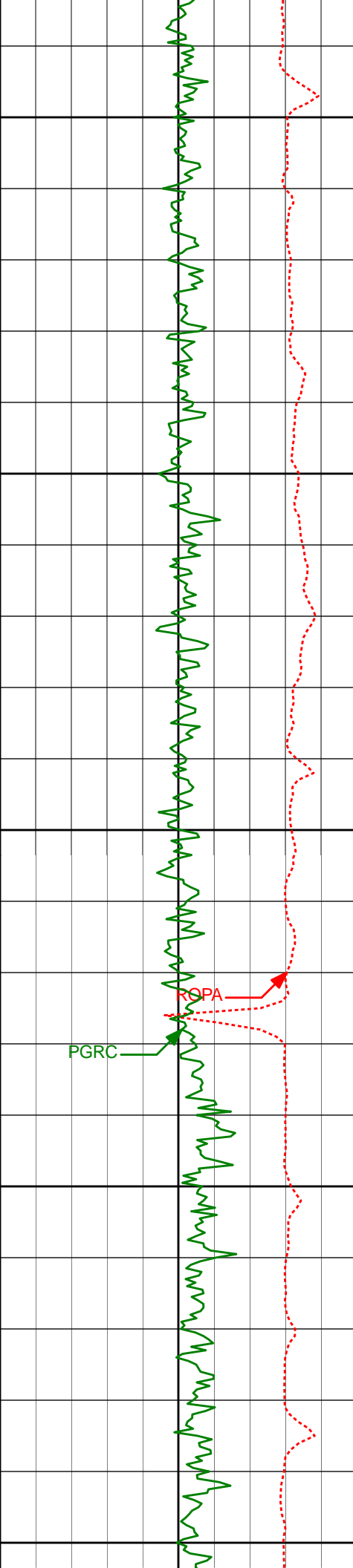
5339'

0.63°

260.97°

5334.69'

71.12'



5400'

5433'

0.33°

270.56°

5428.69'

71.91'

5450'

5500'

5550'

5600'

5528'

0.63°

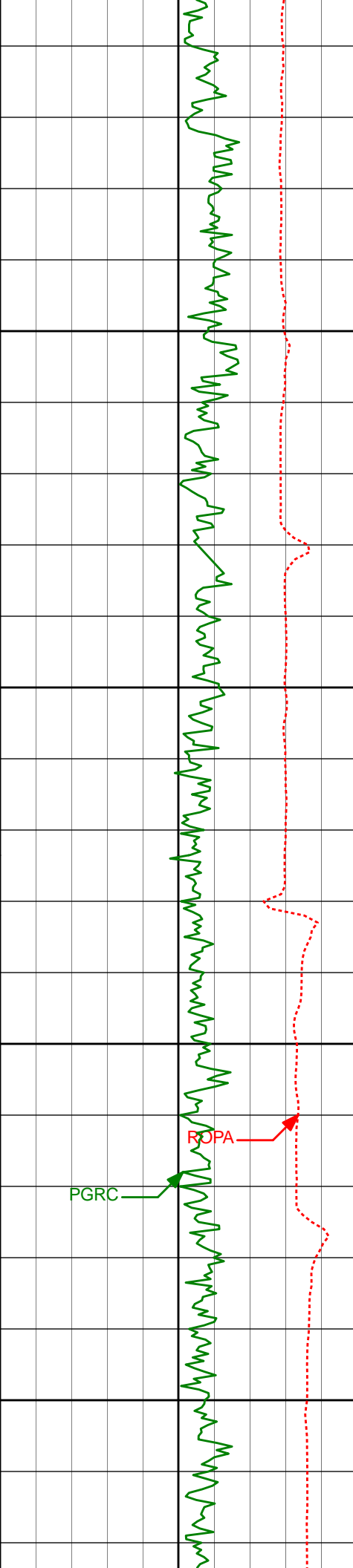
192.98°

5523.68'

72.31'

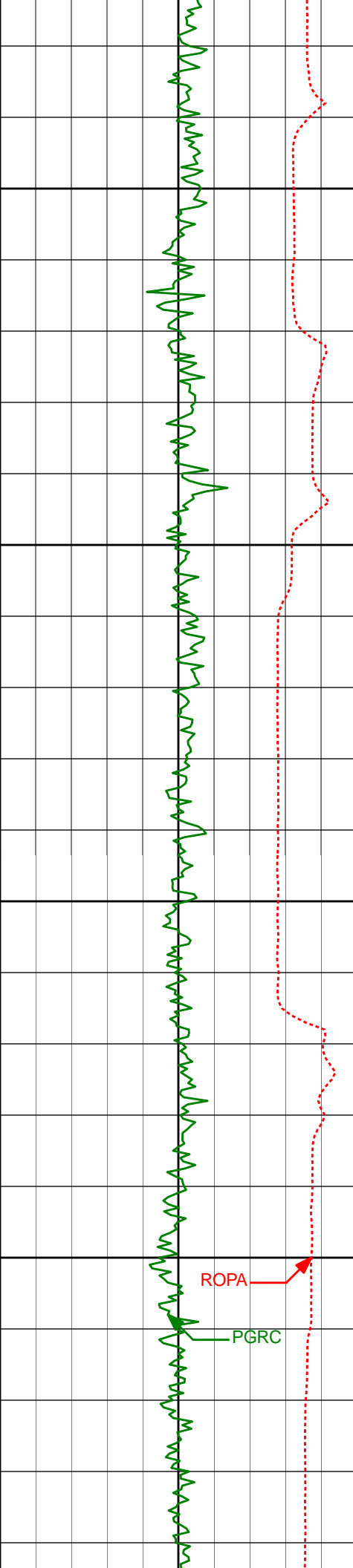
PGRC

XOPA



Run200

5623'	0.61°	184.15°	5618.68'	72.49'
5650'				
5672'	0.54°	164.48°	5667.68'	72.46'
5700'				
5722'	0.81°	186.55°	5717.67'	72.45'
5750'				
5800'				
5816'	6.58°	239.61°	5811.45'	77.26'



5850'

5900'

5950'

6000'

ROPA

PGRC

5913'

11.31°

245.00°

5907.24'

90.85'

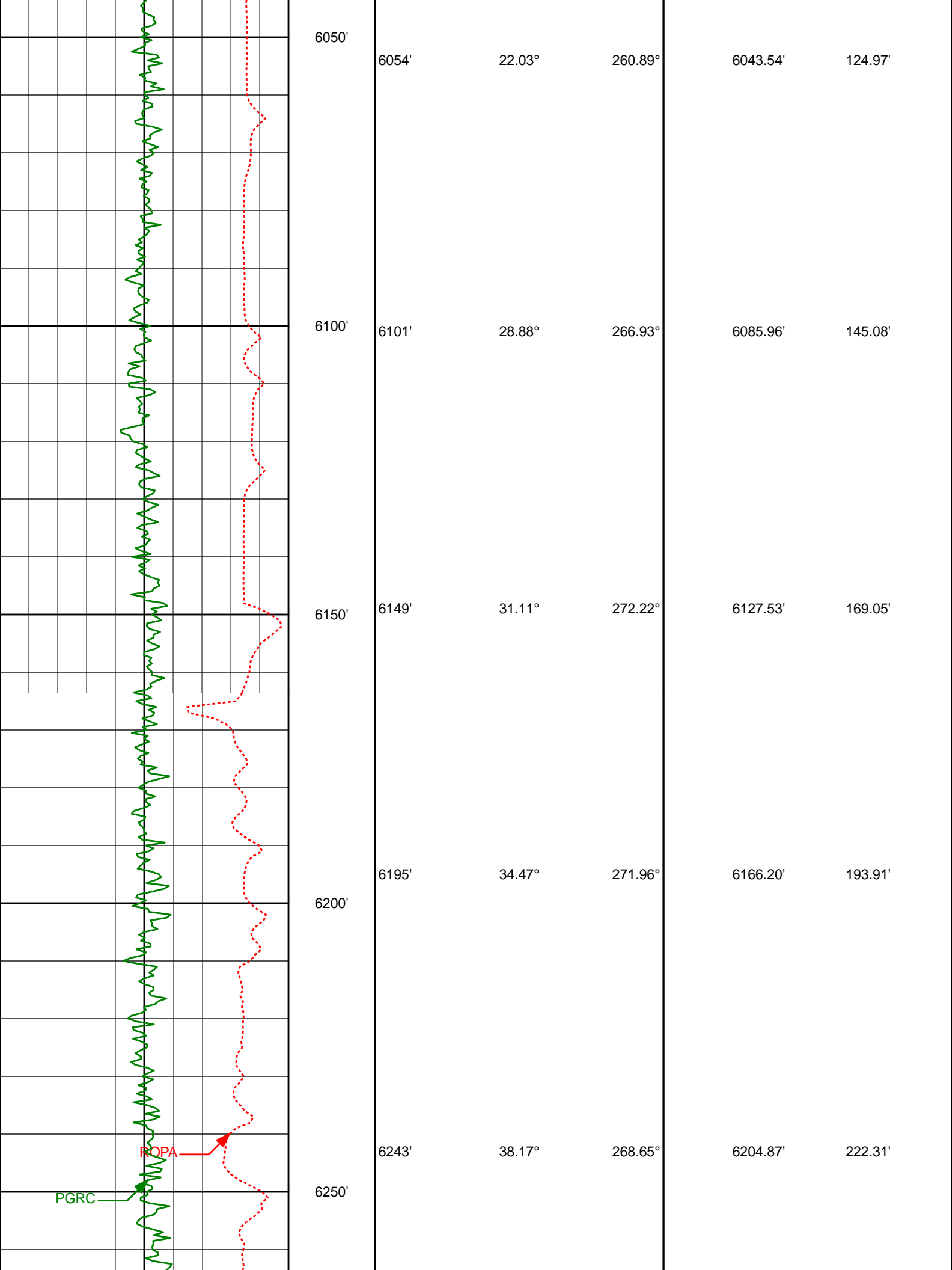
6006'

14.20°

254.99°

5997.95'

110.30'



6050'

6054'

22.03°

260.89°

6043.54'

124.97'

6100'

6101'

28.88°

266.93°

6085.96'

145.08'

6150'

6149'

31.11°

272.22°

6127.53'

169.05'

6200'

6195'

34.47°

271.96°

6166.20'

193.91'

6250'

6243'

38.17°

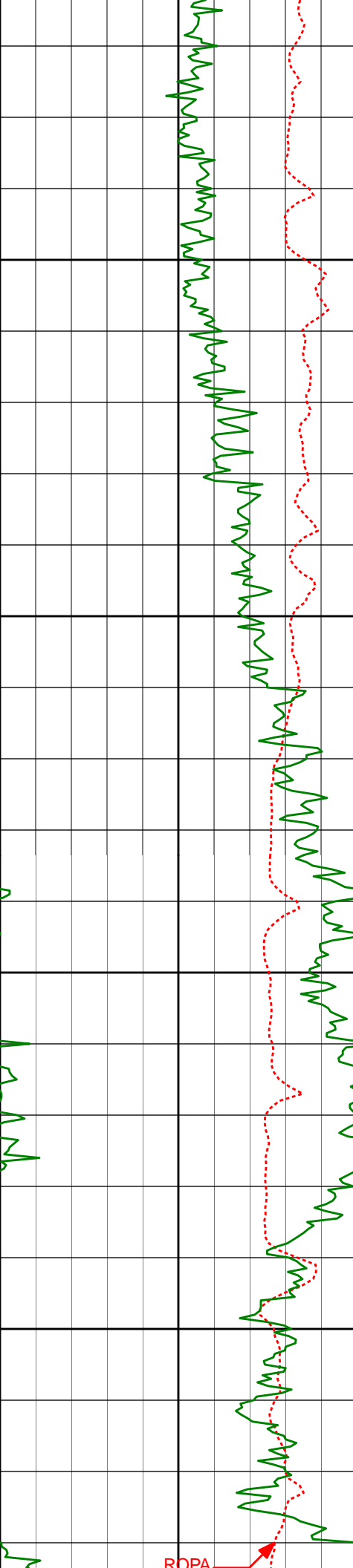
268.65°

6204.87'

222.31'

PGRC

ROPA



6300'

6350'

6400'

6450'

6290'

43.66°

266.85°

6240.37'

253.08'

6385'

57.06°

269.92°

6300.85'

326.05'

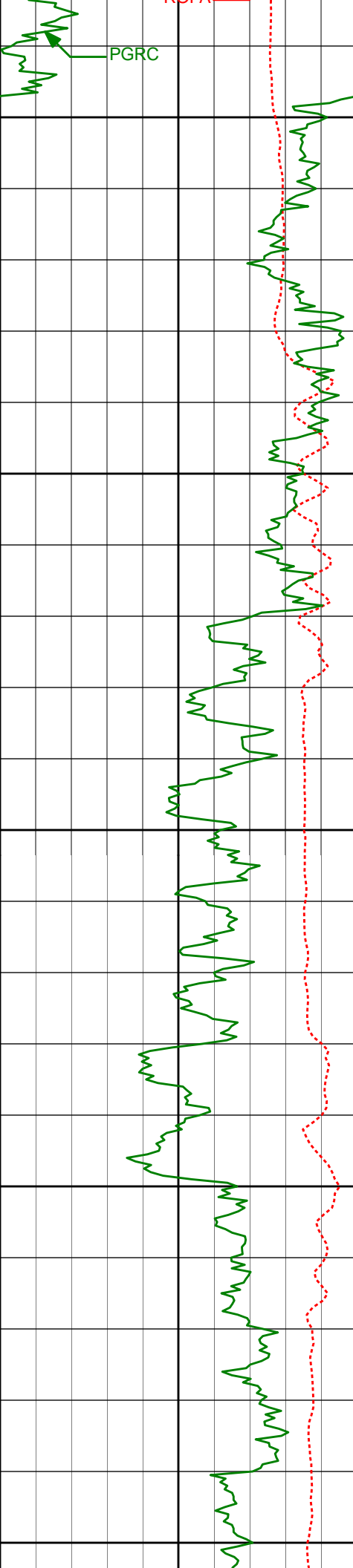
6480'

66.19°

275.69°

6345.98'

409.25'



6500'

6550'

6600'

6650'

6700'

6575'

69.36°

272.18°

6381.92'

496.79'

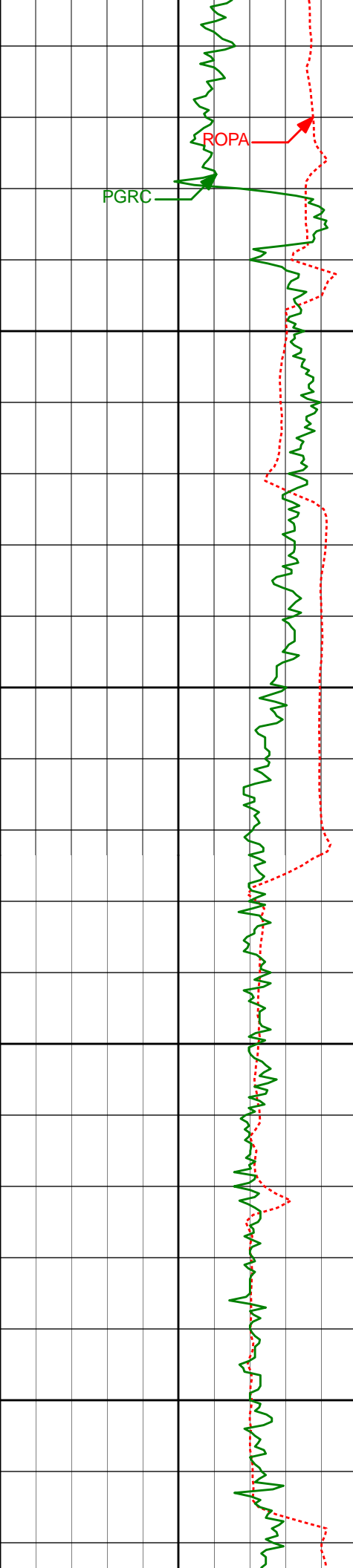
6669'

76.89°

269.14°

6409.19'

586.60'



Casing Shoe @ 6728'

Run 300

6750'

6800'

6850'

6900'

6804'

88.61°

268.61°

6426.20'

720.29'

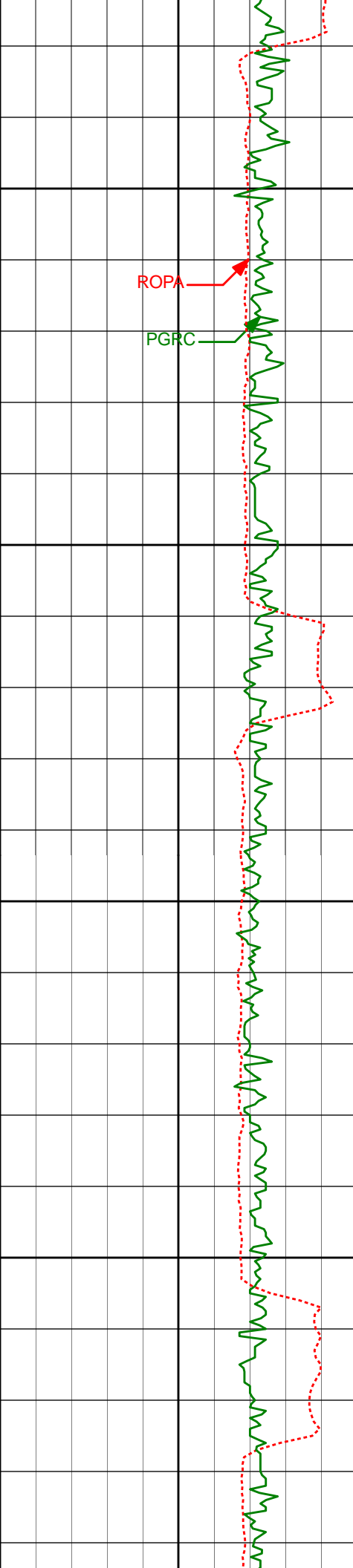
6850'

89.45°

268.35°

6426.98'

766.28'



6944'	89.72°	268.37°	6427.66'	860.28'
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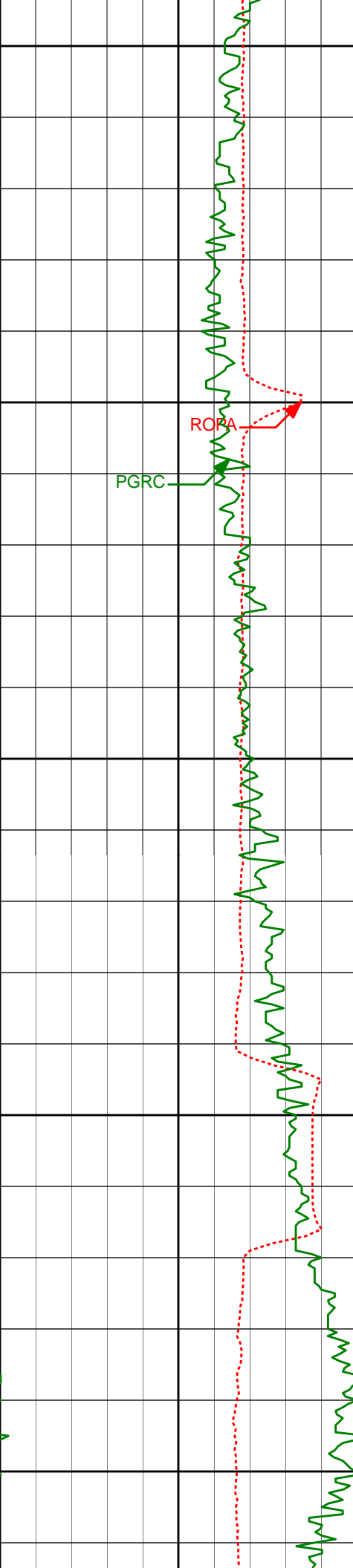
6950'

7039'	89.44°	268.00°	6428.35'	955.27'
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7050'

7100'

7134'	88.24°	268.07°	6430.28'	1050.25'
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7150'

7200'

7250'

7300'

7350'

ROPA

PGRC

7229'

89.20°

268.02°

6432.40'

1145.22'

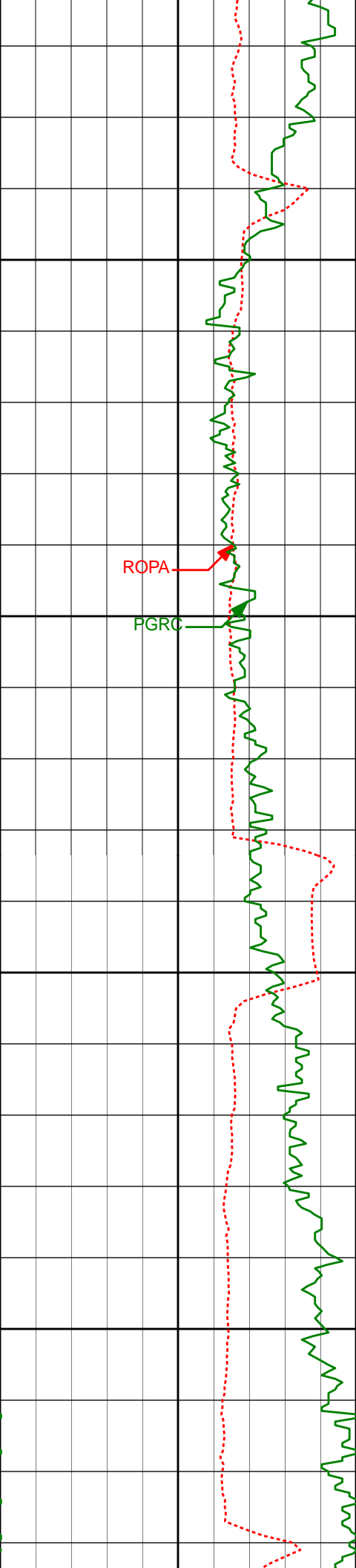
7323'

87.41°

268.97°

6435.18'

1239.17'



7400'

7418'

87.81°

269.27°

6439.14'

1334.09'

7450'

ROPA

PGRC

7500'

7513'

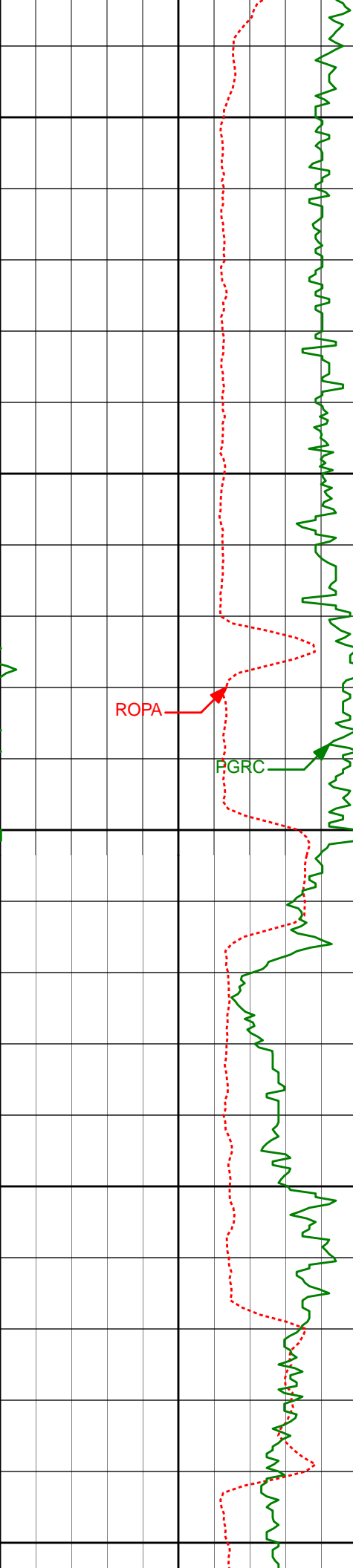
88.18°

270.52°

6442.47'

1429.00'

7550'



7600'

7608'

88.98°

270.46°

6444.82'

1523.92'

7650'

7700'

7703'

90.55°

271.61°

6445.21'

1618.82'

7750'

7800'

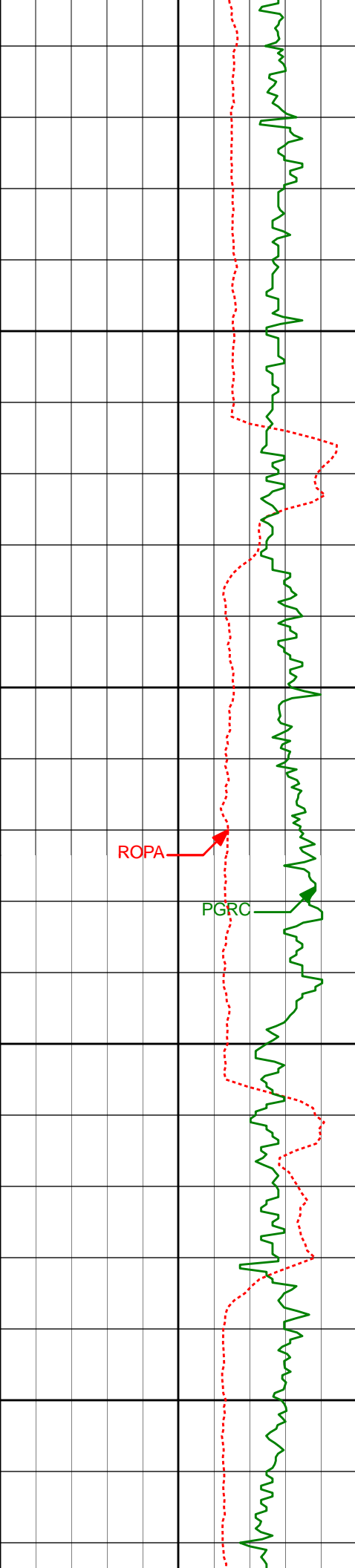
7798'

90.22°

272.61°

6444.57'

1713.64'



7850'

7893'

7900'

7950'

7987'

8000'

90.77°

272.31°

6443.75'

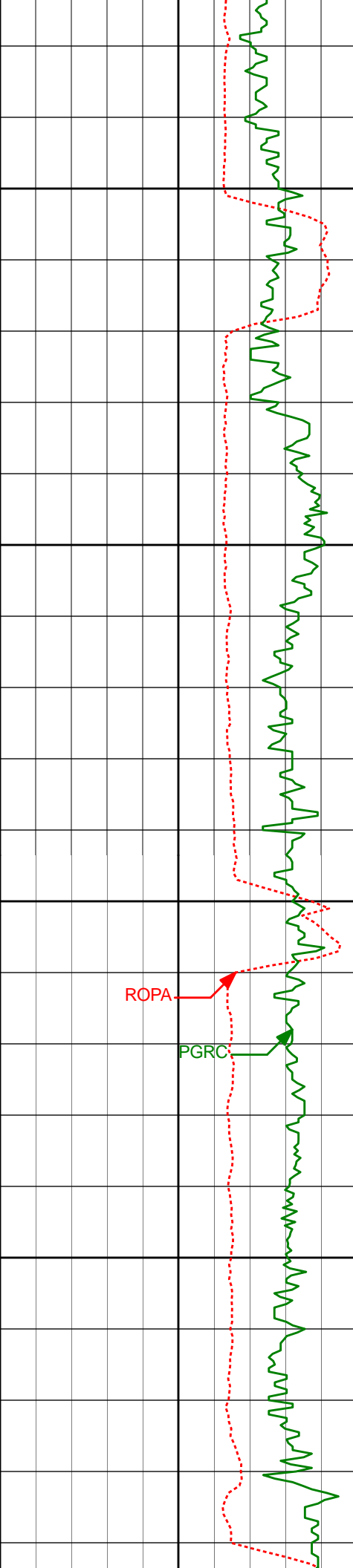
1808.42'

89.66°

270.11°

6443.40'

1902.31'



8050'

8100'

8150'

8200'

ROPA

PGRC

8082'

89.97°

267.98°

6443.70'

1997.30'

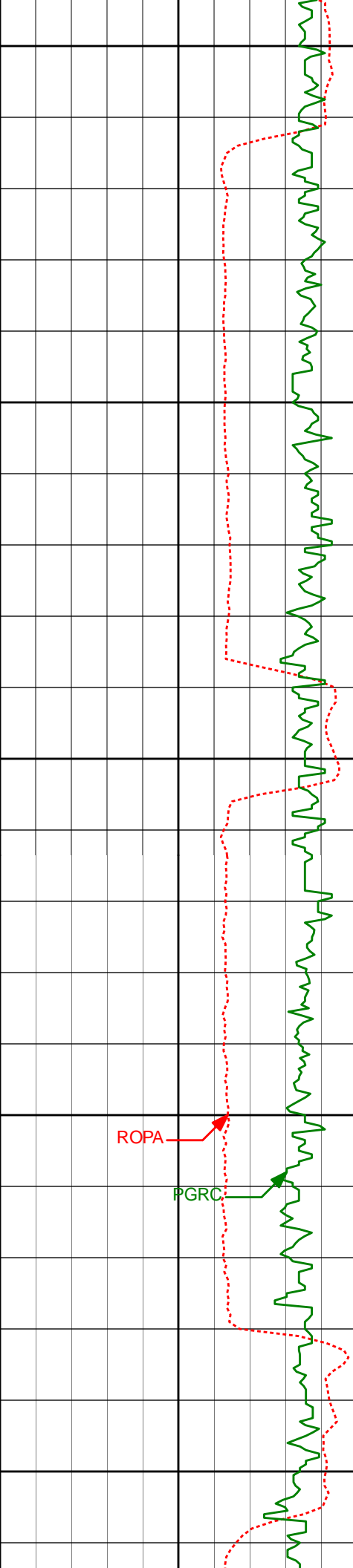
8177'

90.43°

267.99°

6443.37'

2092.29'



8250'

8271'

90.15°

267.84°

6442.90'

2186.29'

8300'

8350'

8365'

89.78°

268.15°

6442.96'

2280.28'

8400'

ROPA

PGRC

8450'

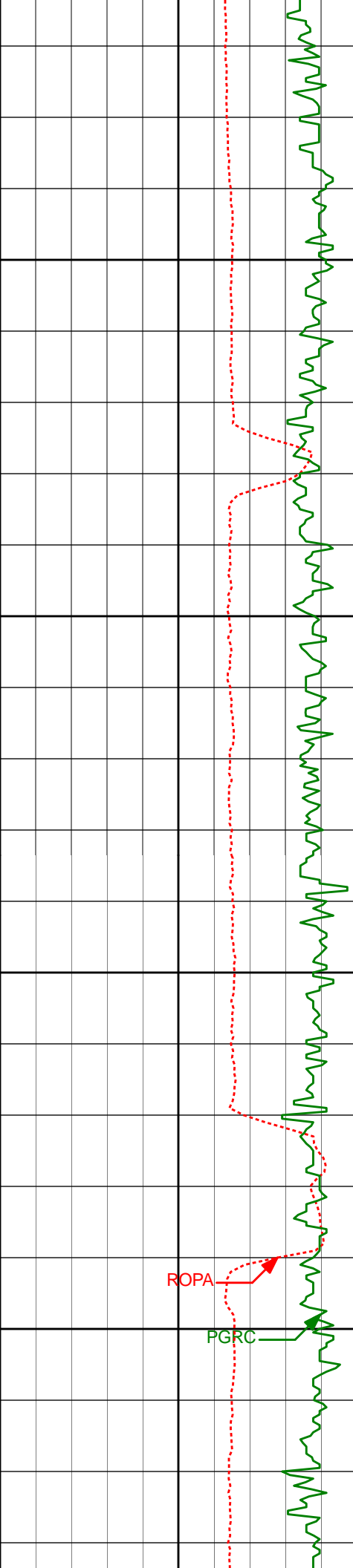
8460'

89.08°

267.09°

6443.90'

2375.26'



8500'

8550'

8600'

8650'

8555'

89.88°

266.92°

6444.76'

2470.22'

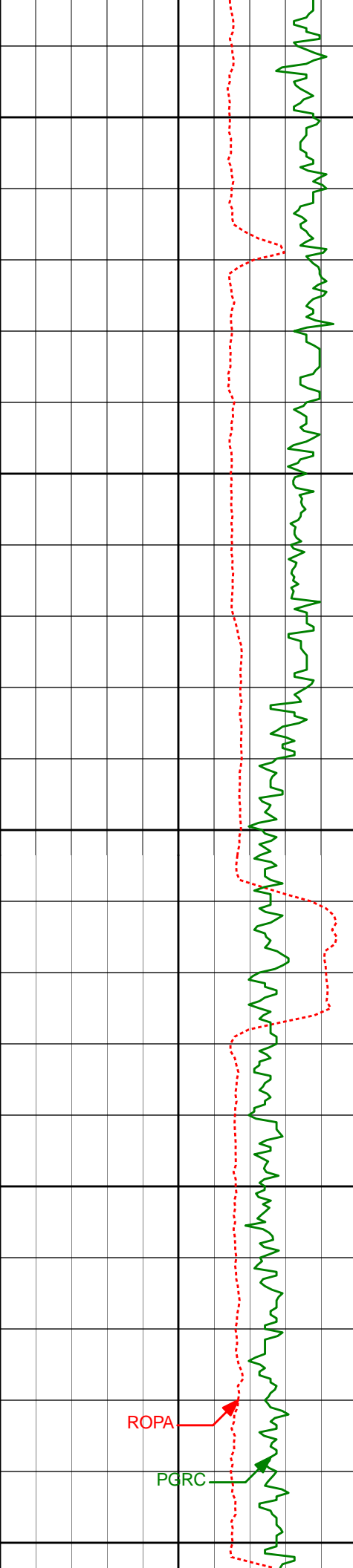
8650'

89.20°

267.20°

6445.52'

2565.18'



8700'

8750'

8800'

8850'

8900'

8745'

90.31°

266.89°

6445.93'

2660.15'

8839'

89.72°

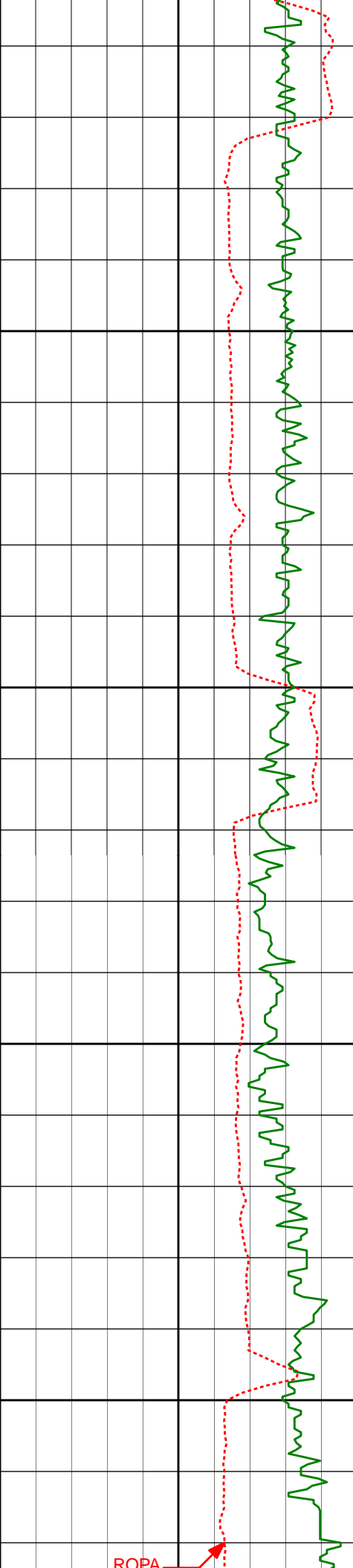
266.55°

6445.91'

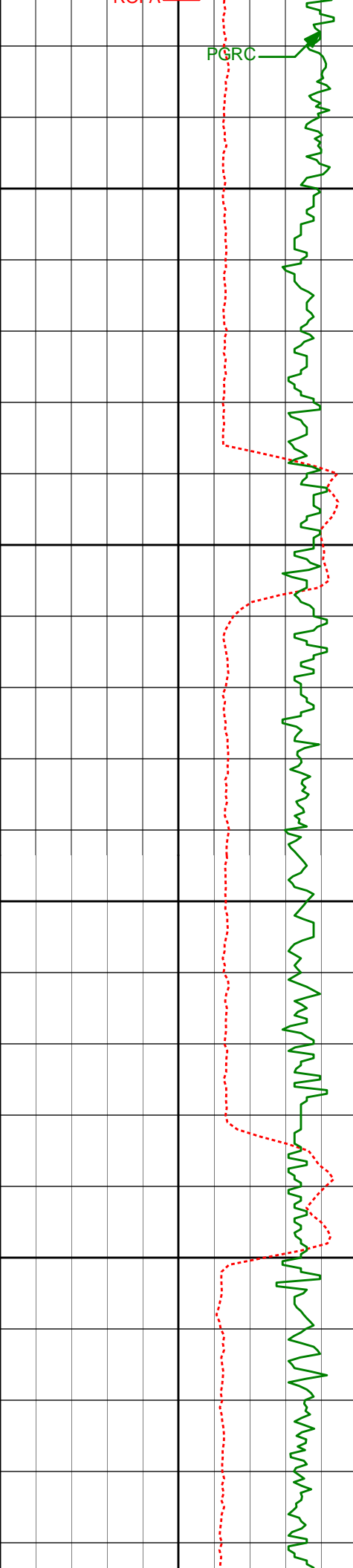
2754.10'

ROPA

PGRC



8934'	89.57°	267.36°	6446.50'	2849.06'
8950'				
9000'				
9029'	88.46°	266.66°	6448.13'	2944.01'
9050'				
9100'				



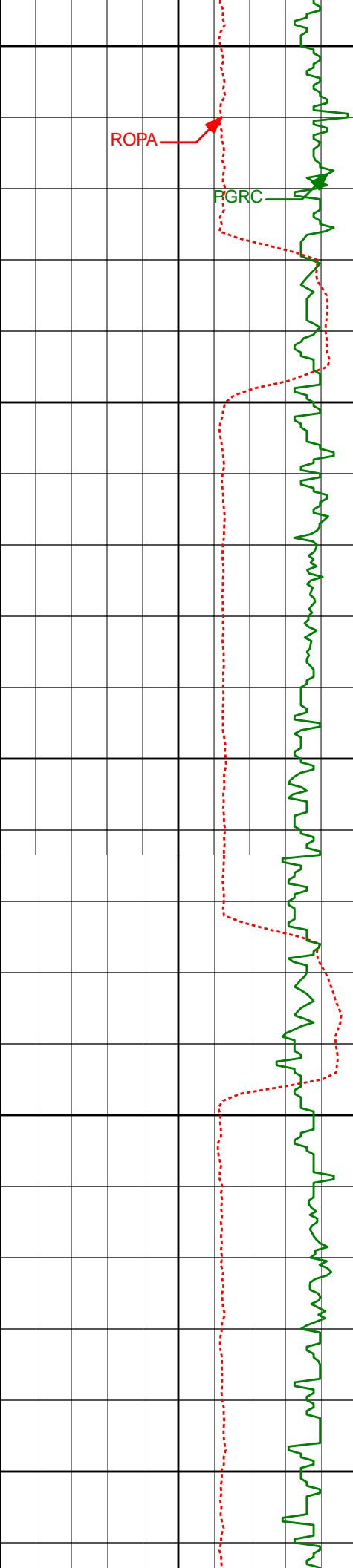
9150'

9200'

9250'

9300'

9124'	88.83°	266.61°	6450.38'	3038.93'
9219'	89.63°	267.89°	6451.65'	3133.89'
9314'	89.88°	268.66°	6452.06'	3228.89'



9350'

ROPA

PGRC

9400'

9408'

89.72°

269.26°

6452.39'

3322.88'

9450'

9500'

9503'

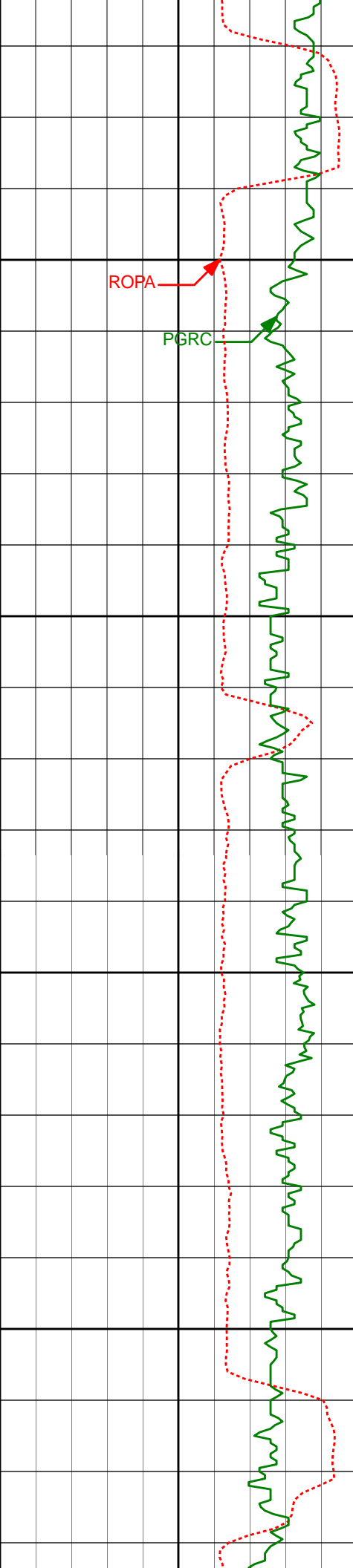
89.11°

269.17°

6453.36'

3417.87'

9550'



9600'

9650'

9700'

9750'

9597'

88.49°

269.35°

6455.32'

3511.84'

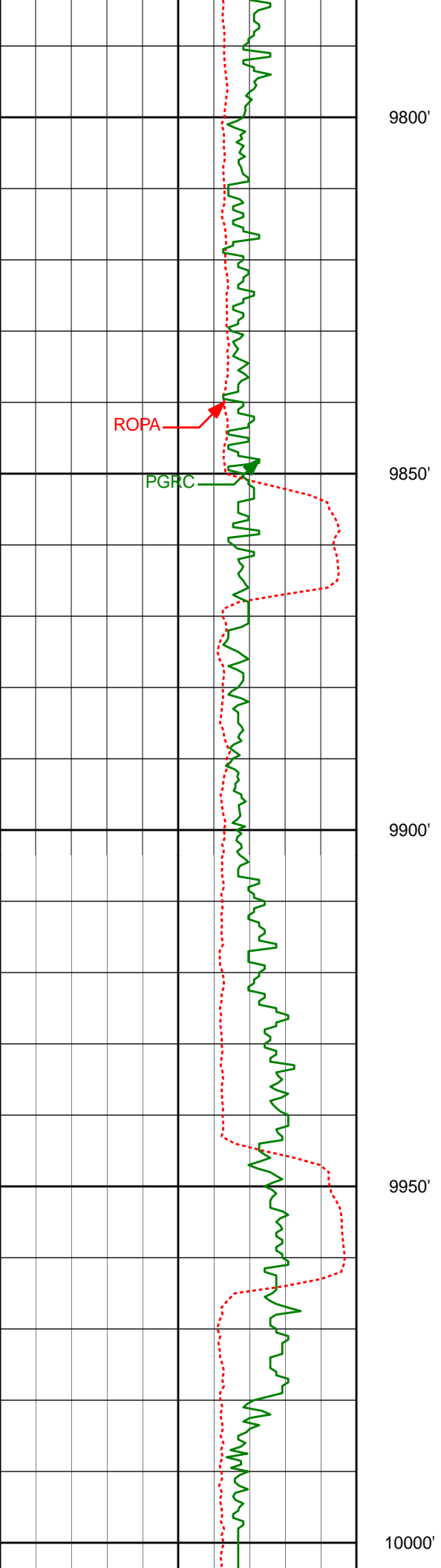
9692'

89.14°

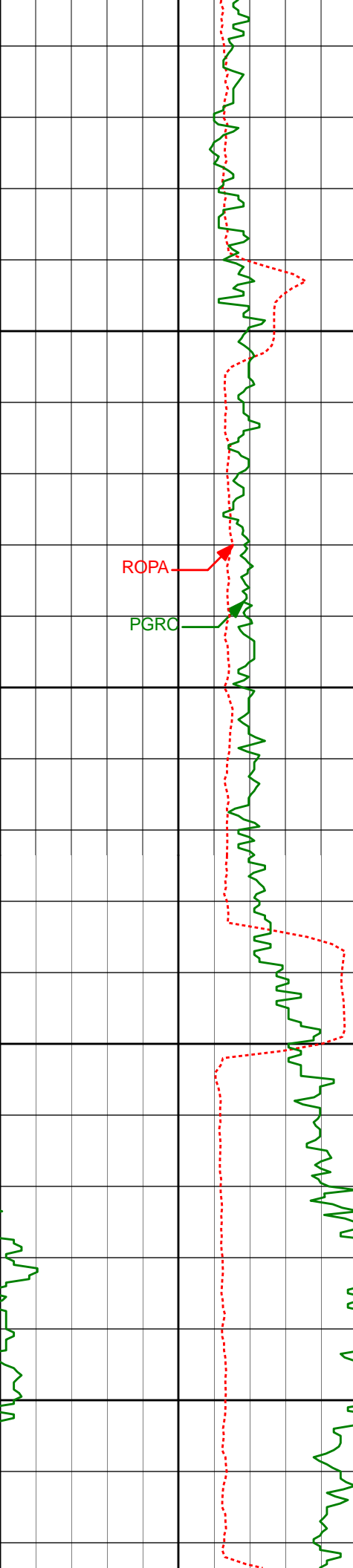
269.47°

6457.29'

3606.81'



9786'	89.11°	268.89°	6458.72'	3700.80'
9880'	89.48°	269.58°	6459.88'	3794.78'
9975'	88.98°	269.58°	6461.16'	3889.76'



10050'

10069'

89.57°

269.61°

6462.35'

3983.73'

10100'

10150'

10164'

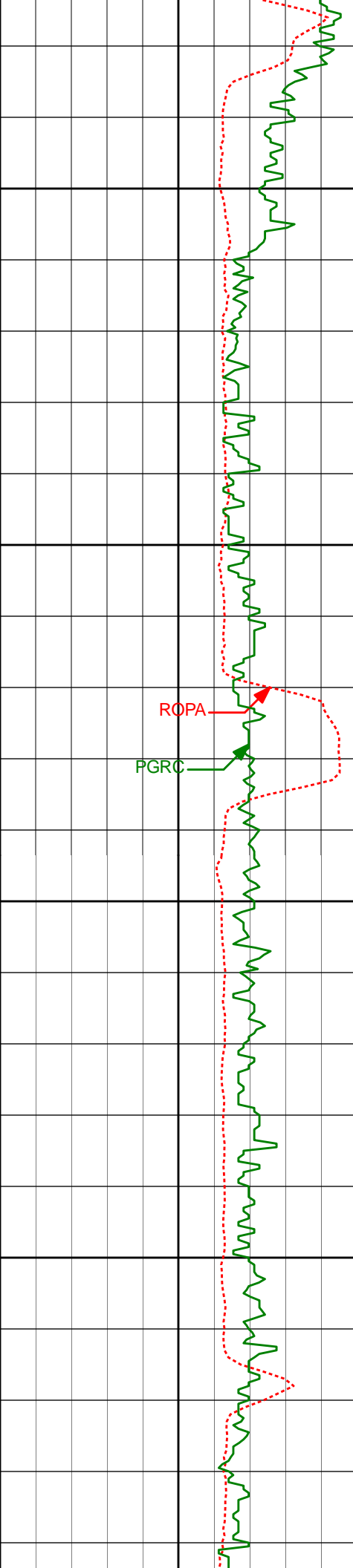
87.87°

268.50°

6464.47'

4078.70'

10200'



10250'

10258'

87.90°

268.96°

6467.94'

4172.64'

10300'

ROP A

PGRC

10350'

10353'

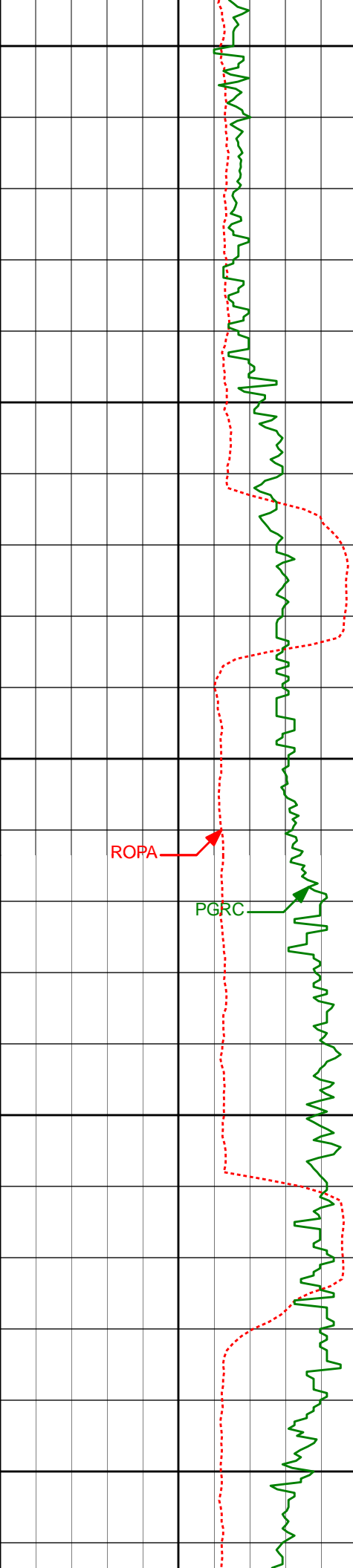
89.88°

268.94°

6469.78'

4267.61'

10400'



10450'

10500'

10550'

10600'

10650'

10450'

10545'

10638'

90.49°

89.97°

88.86°

268.58°

270.00°

269.35°

6469.47'

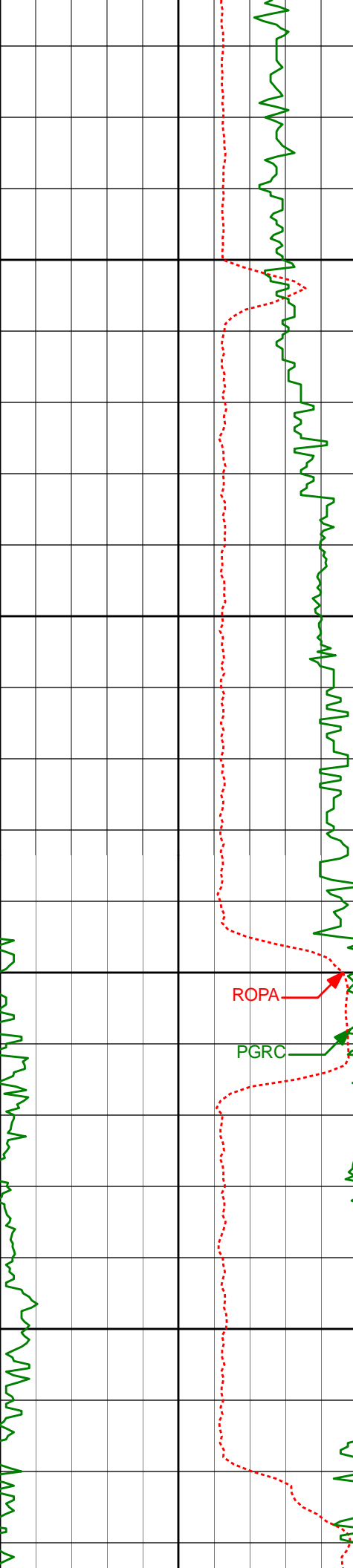
6469.08'

6470.03'

4364.61'

4459.60'

4552.58'



10700'

10730'

90.37°

271.01°

6470.65'

4644.53'

10750'

10800'

ROPA

PGRC

10821'

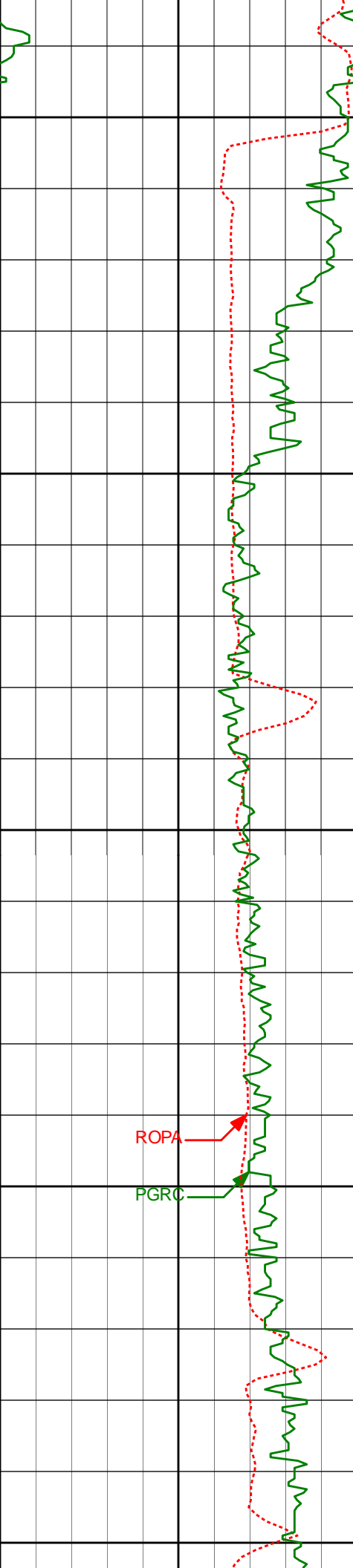
90.52°

269.59°

6469.95'

4735.49'

10850'



10900'

10914'

87.93°

267.47°

6471.20'

4828.46'

10950'

11000'

11007'

88.46°

267.50°

6474.13'

4921.40'

11050'

11100'

11099'

89.14°

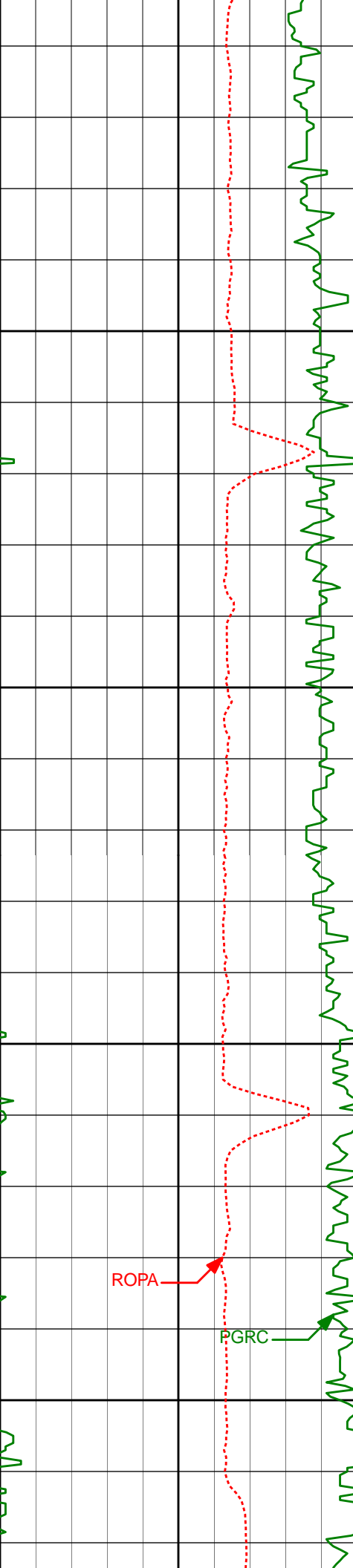
267.06°

6476.06'

5013.36'

ROPA

PGRC



11150'

11192'

11200'

11250'

11284'

11300'

89.69°

267.11°

6477.01'

5106.32'

89.41°

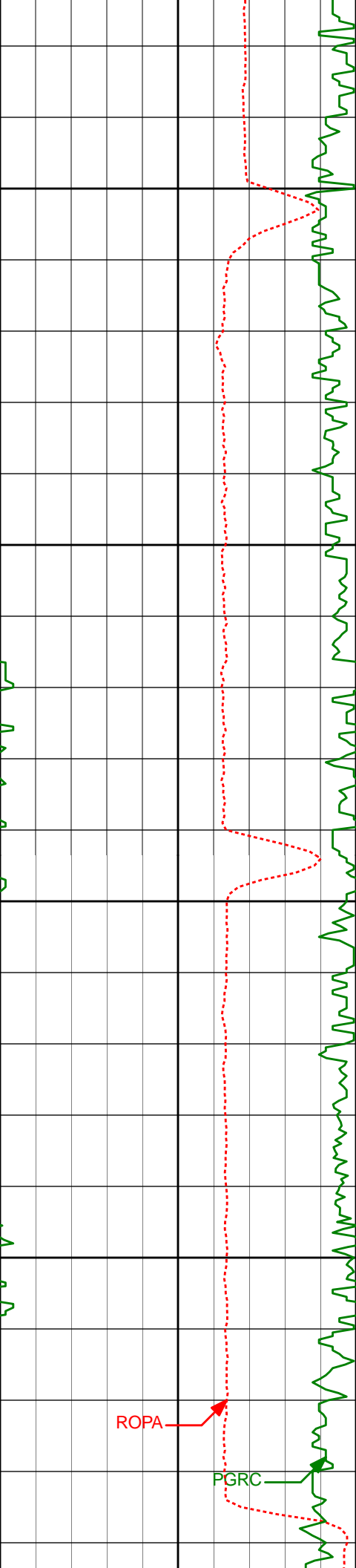
266.35°

6477.73'

5198.27'

ROPA

PGRC



11350'

11377'

90.18°

267.33°

6478.06'

5291.22'

11400'

11450'

11469'

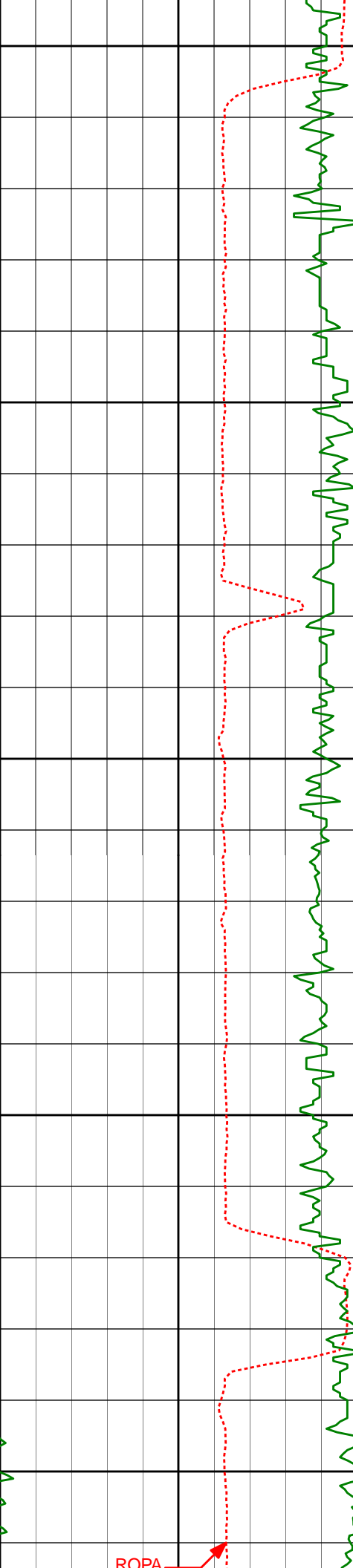
90.37°

266.86°

6477.62'

5383.19'

11500'



11550'

11561'

89.69°

267.31°

6477.57'

5475.16'

11600'

11650'

11654'

90.49°

269.67°

6477.43'

5568.15'

11700'

11750'

11747'

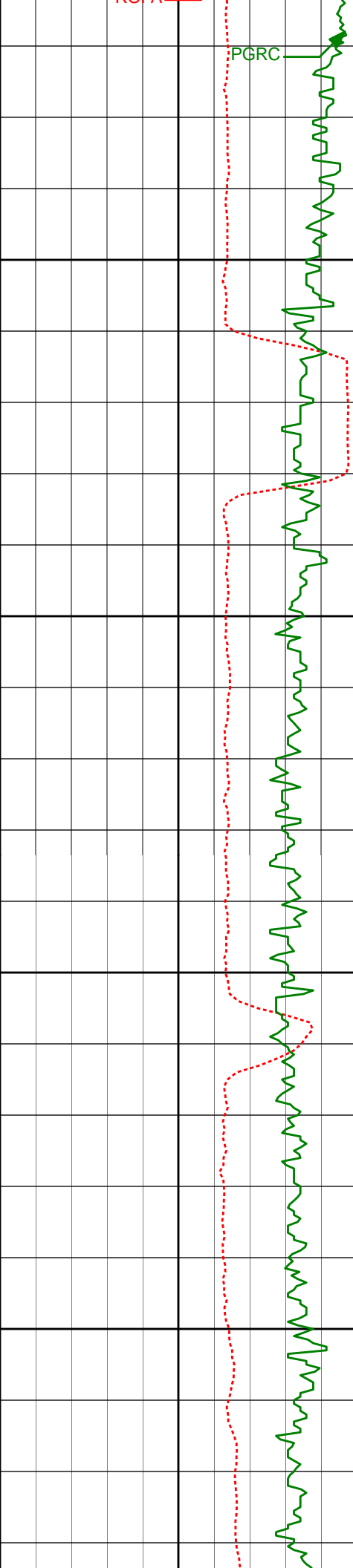
88.83°

265.12°

6477.98'

5661.10'

ROPA



11800'

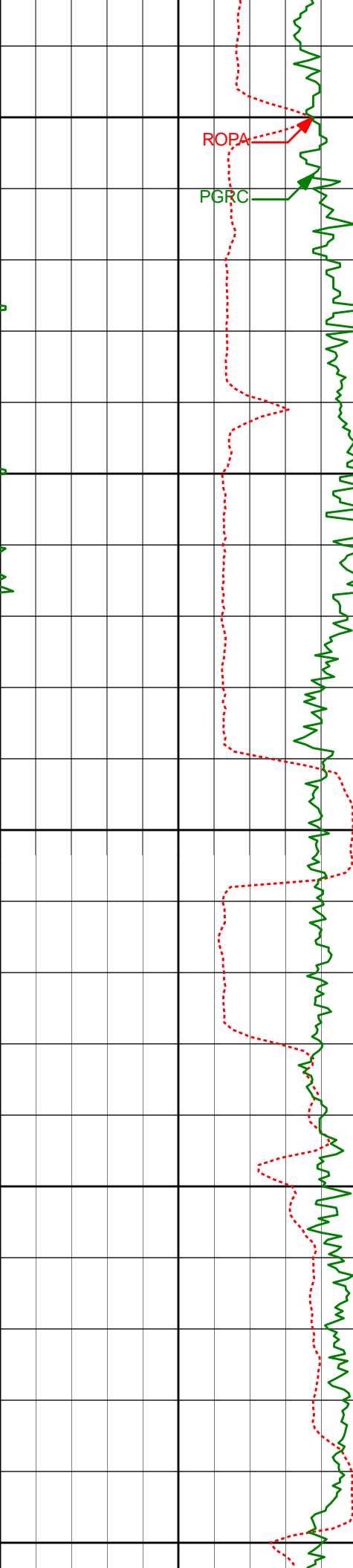
11850'

11900'

11950'

11840'	89.48°	267.77°	6479.35'	5754.02'
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11933'	90.71°	269.46°	6479.20'	5847.02'
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12000'

ROPA

PGRC

12050'

12100'

12150'

12200'

12027'

91.11°

269.86°

6477.71'

5940.99'

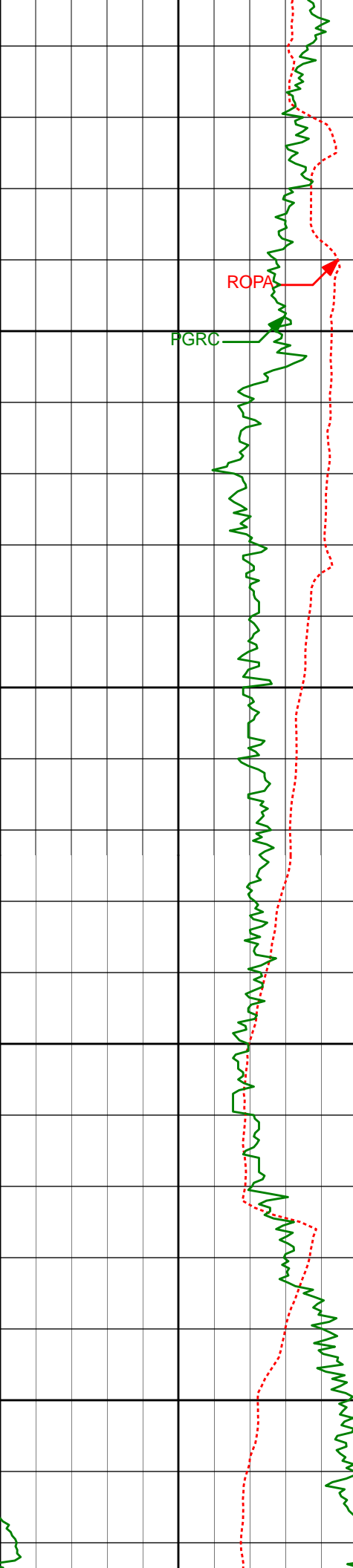
12120'

88.92°

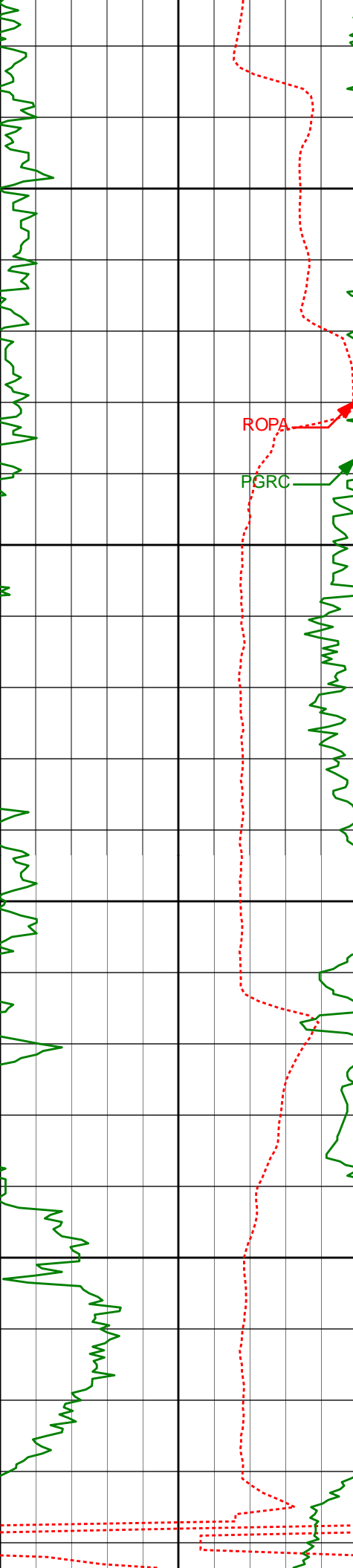
267.52°

6477.68'

6033.97'



Latitude	Longitude	Altitude	Distance	Angle
12250'	12215'	89.69°	270.36°	6478.83'
12300'	12310'	89.45°	269.51°	6479.55'
12350'				
12400'	12405'	90.25°	268.48°	6479.80'



12450'

12500'

12550'

12600'

ROPA

PGRC

12500'

89.35°

270.62°

6480.13'

6413.90'

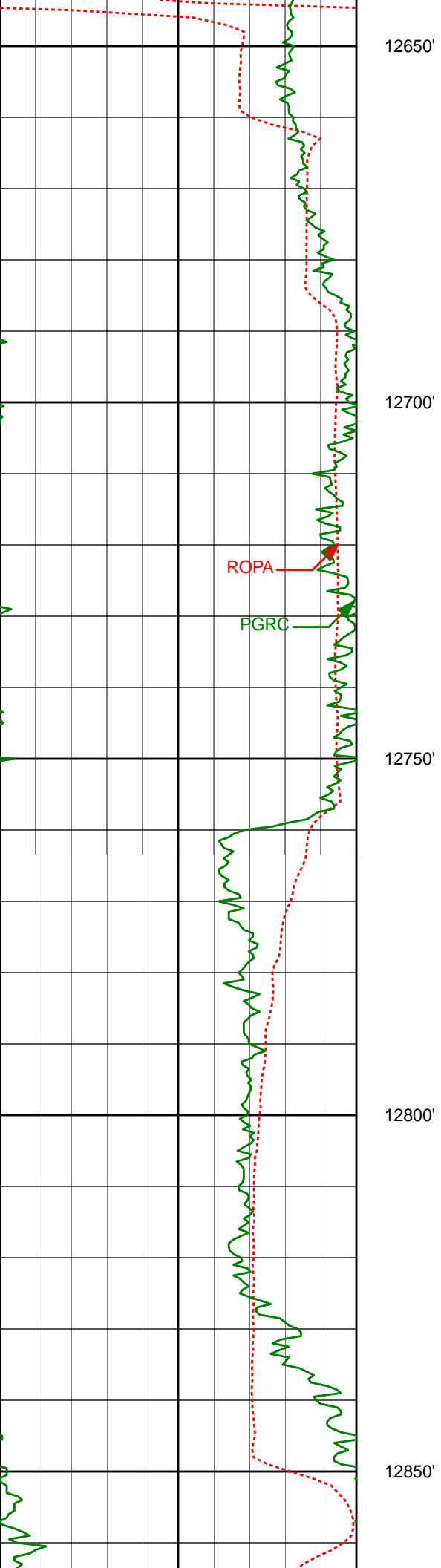
12595'

89.60°

270.51°

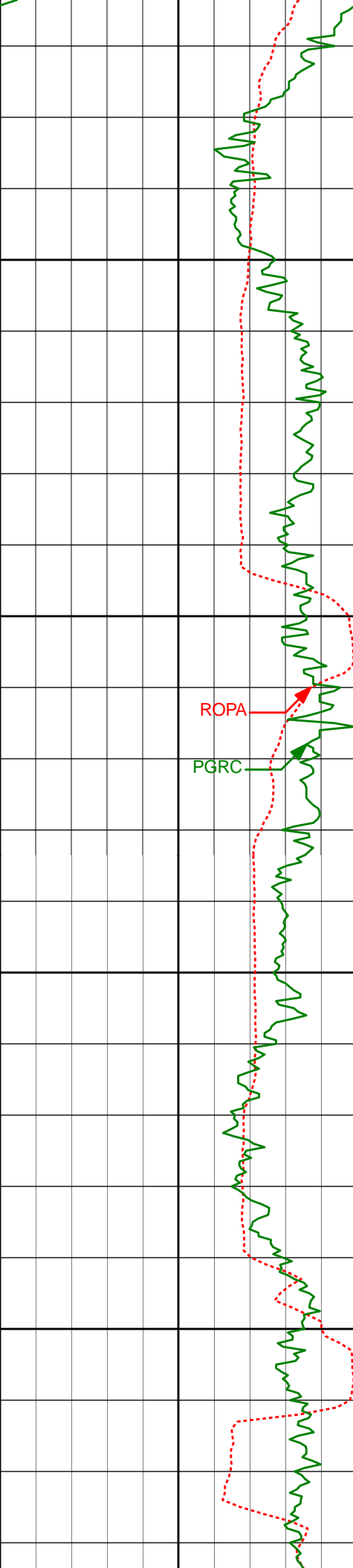
6481.00'

6508.84'

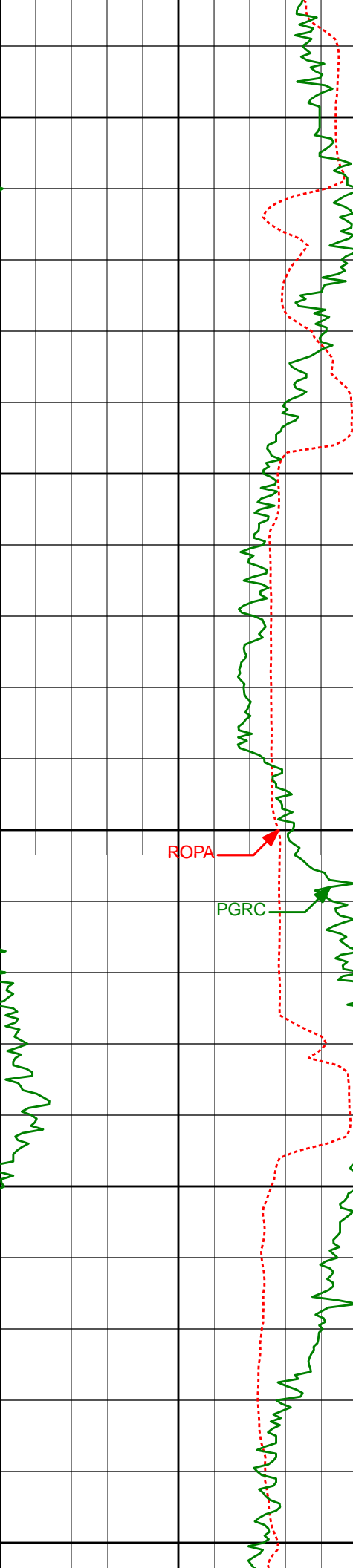


12690' 89.69° 269.38° 6481.59' 6603.81'

12785' 89.82° 270.16° 6481.99' 6698.78'



12880'	90.28°	269.25°	6481.91'	6793.76'
12900'				
12950'				
12974'	90.43°	268.54°	6481.33'	6887.76'
13000'				
13050'				
13069'	90.09°	267.83°	6480.90'	6982.76'



13100'

13150'

13200'

13250'

13300'

13164'

89.48°

267.18°

6481.25'

7077.74'

ROPA

PGRC

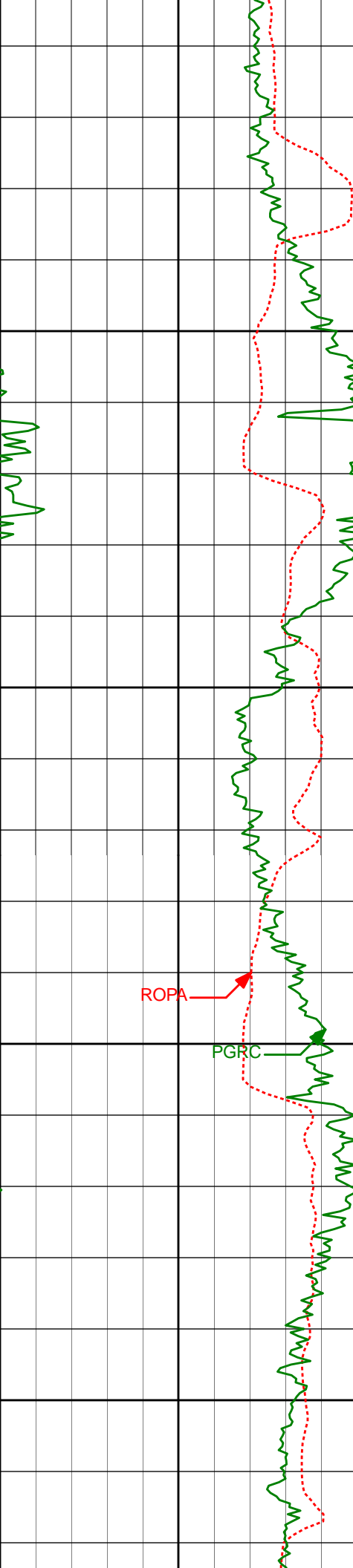
13259'

89.20°

267.62°

6482.35'

7172.71'



13350'

13354'

87.72°

266.23°

6484.90'

7267.63'

13400'

13450'

13449'

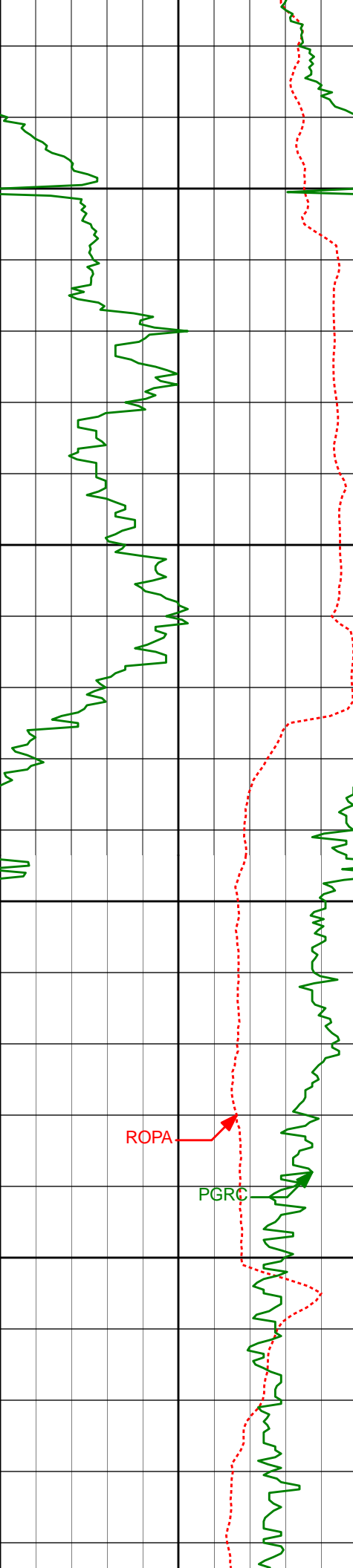
87.66°

266.37°

6488.73'

7362.48'

13500'



13544'	86.70°	266.74°	6493.40'	7457.31'
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13550'

13600'

13639'	87.68°	267.68°	6498.06'	7552.16'
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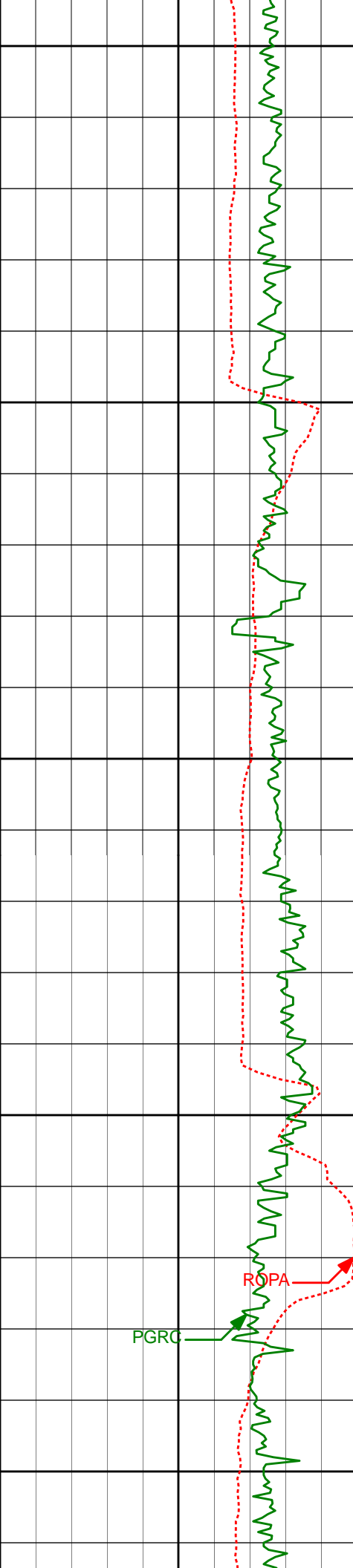
13650'

ROPA

PGRC

13700'

13734'	88.27°	267.21°	6501.42'	7647.08'
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13750'

13800'

13850'

13900'

13950'

13828'

88.89°

267.31°

6503.75'

7741.03'

13923'

90.00°

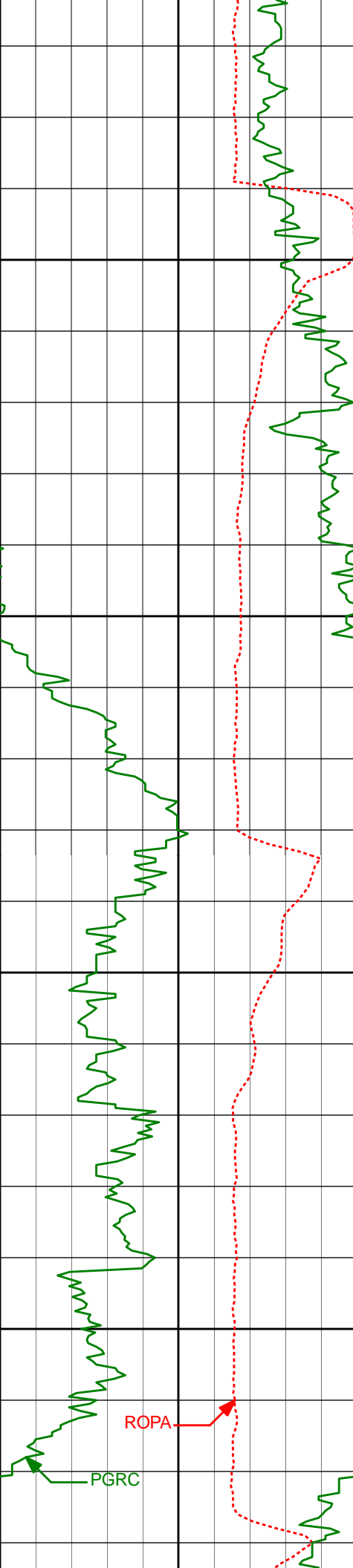
267.90°

6504.67'

7836.01'

PGRC

ROPA



14000'

14050'

14100'

14150'

14018'

90.65°

269.34°

6504.13'

7931.01'

14113'

91.82°

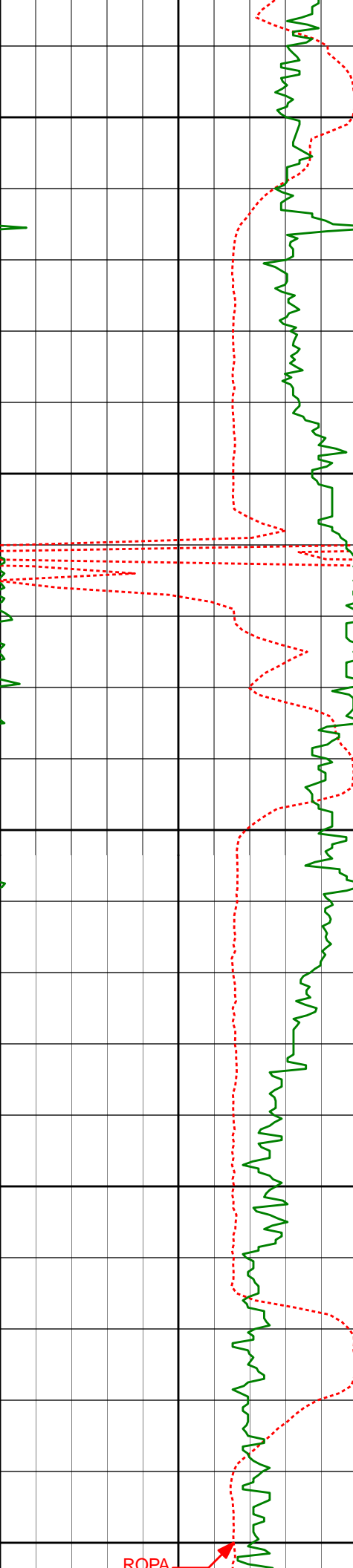
269.43°

6502.08'

8025.97'

ROPA

PGRC



14200'

14207'

91.14°

269.61°

6499.65'

8119.93'

14250'

14300'

14302'

90.68°

269.06°

6498.14'

8214.91'

14350'

14400'

14397'

90.03°

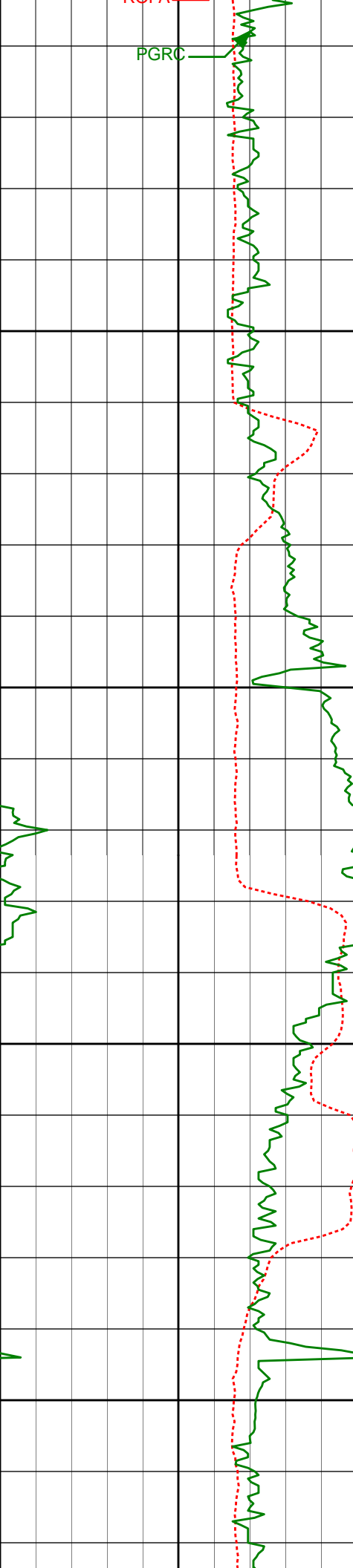
268.50°

6497.56'

8309.90'

ROPA





PGRC

ROTAX

14450'

14500'

14550'

14600'

14492'

90.96°

268.36°

6496.73'

8404.90'

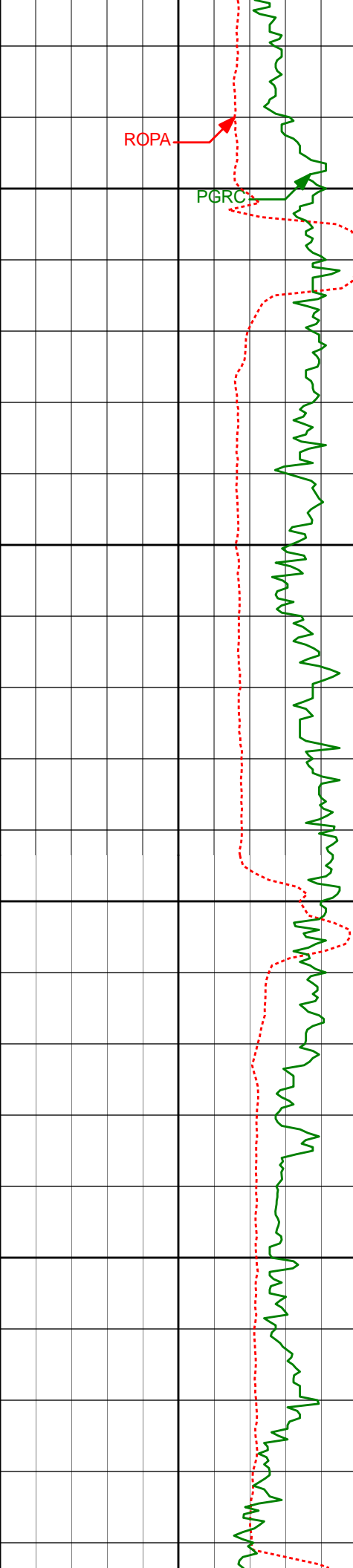
14587'

89.78°

269.11°

6496.12'

8499.89'



14650'

14682'

89.45°

268.62°

6496.76'

8594.89'

14700'

14750'

14777'

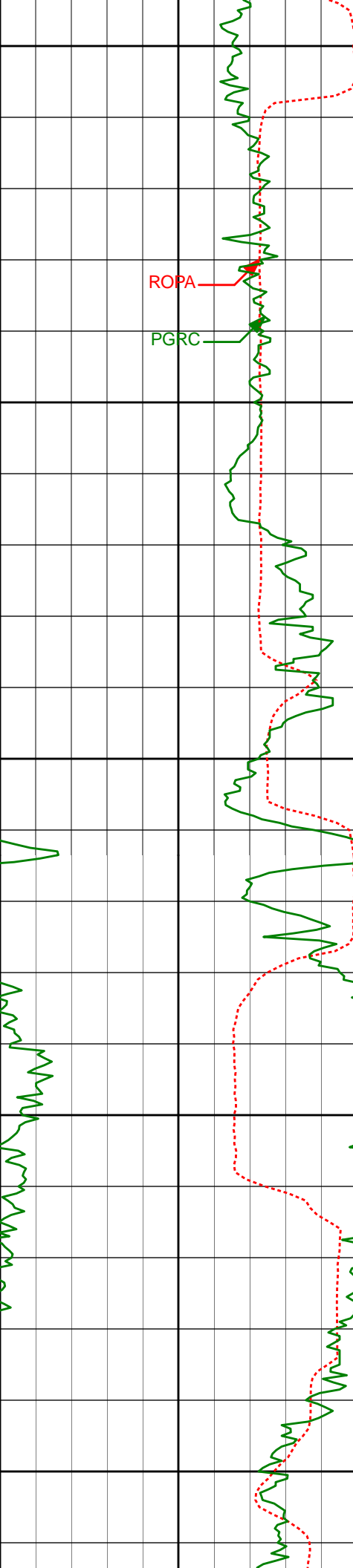
89.94°

268.28°

6497.27'

8689.89'

14800'



ROPA

PGRC

14850'

14872'

89.14°

268.64°

6498.03'

8784.88'

14900'

14950'

14966'

87.72°

268.69°

6500.60'

8878.85'

15000'

15050'

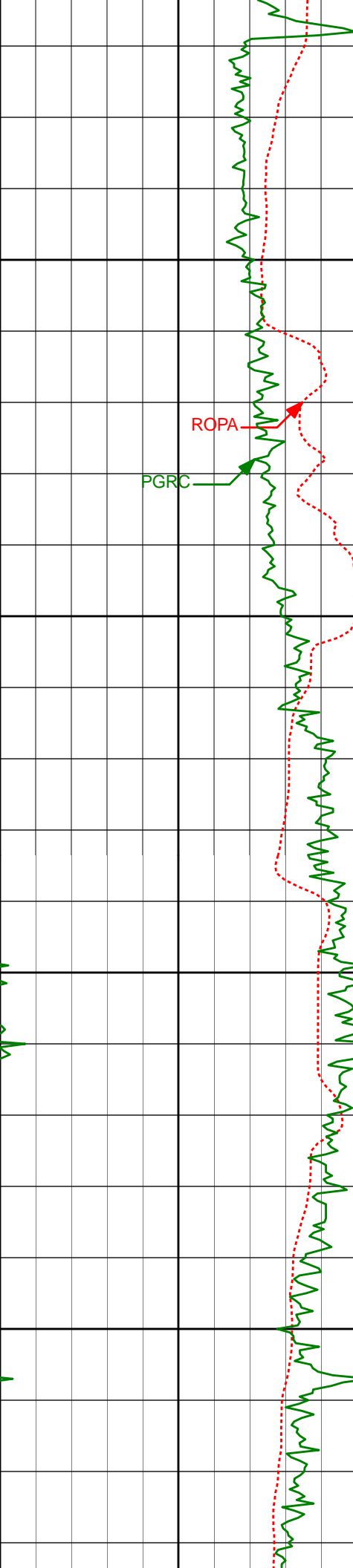
15061'

87.81°

268.00°

6504.31'

8973.77'



15100'

15150'

15200'

15250'

15156'

87.66°

270.14°

6508.06'

9068.69'

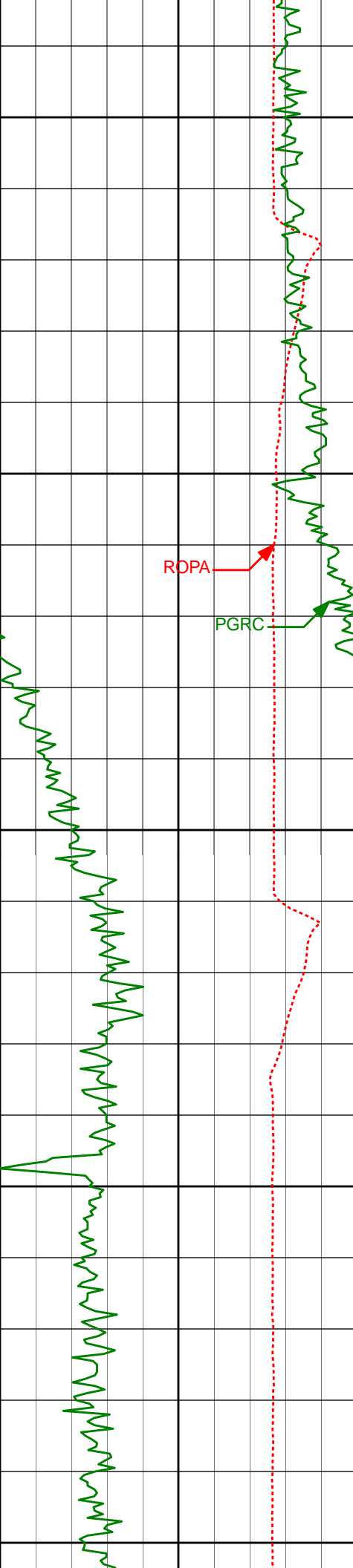
15251'

88.03°

269.53°

6511.64'

9163.60'



15300'

15350'

15400'

15450'

15500'

ROPA

PGRC

15346'

88.58°

269.59°

6514.45'

9258.54'

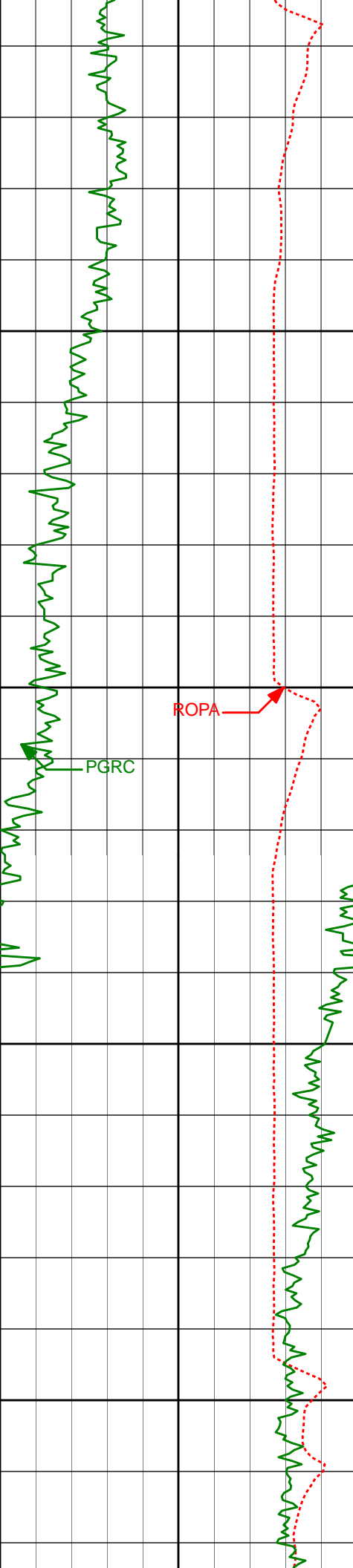
15441'

88.71°

269.29°

6516.69'

9353.50'



15550'

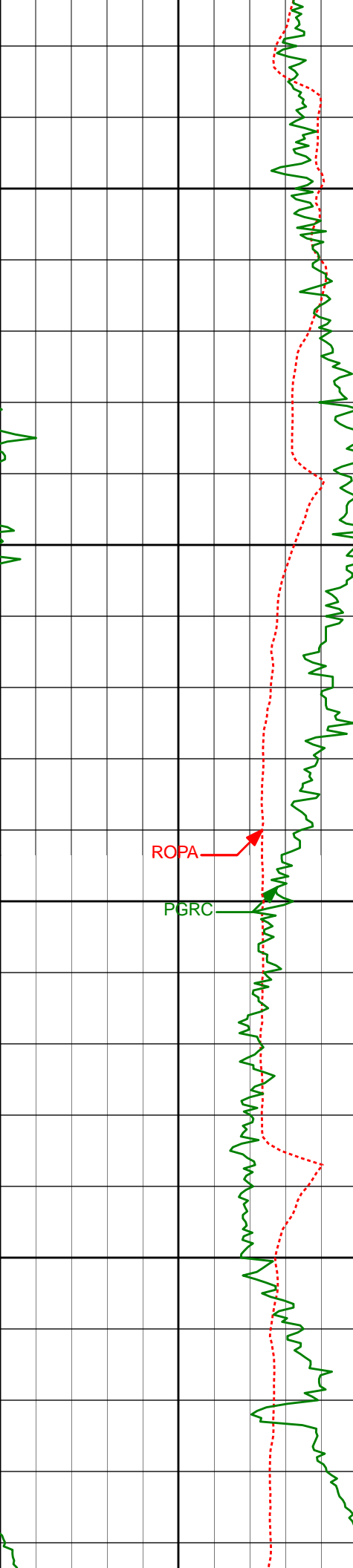
15600'

15650'

15700'

15536'	90.52°	271.84°	6517.33'	9448.43'
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15630'	90.43°	269.72°	6516.55'	9542.35'
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15750'

15800'

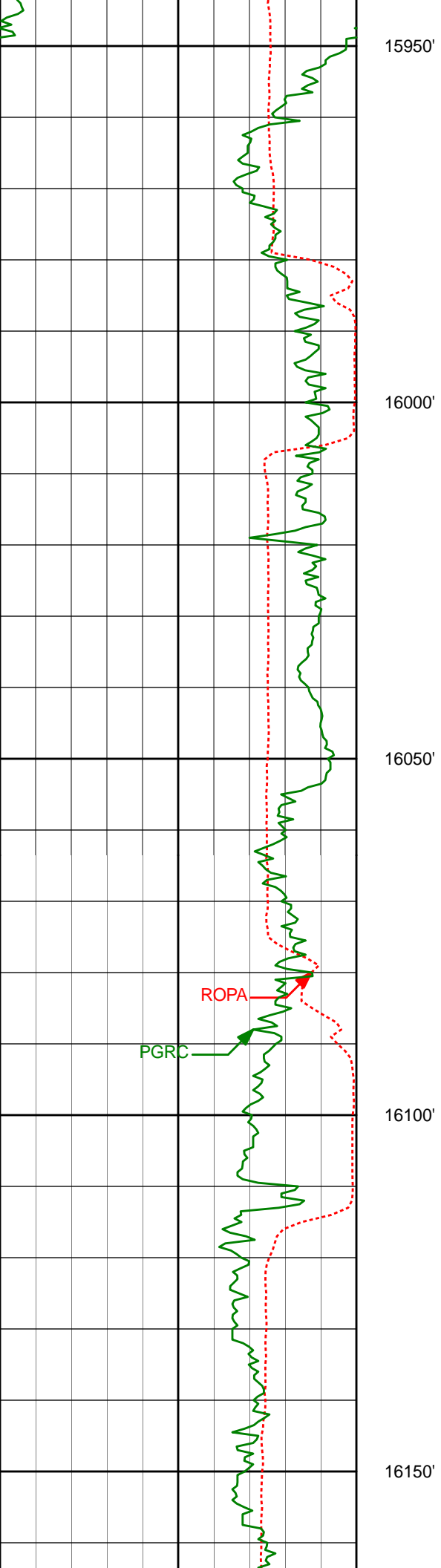
15850'

15900'

ROPA

PGRC

15725'	91.30°	270.01°	6515.12'	9637.32'
15820'	91.60°	269.57°	6512.71'	9732.27'
15915'	92.41°	269.53°	6509.39'	9827.19'



16010'

92.01°

268.13°

6505.73'

9922.12'

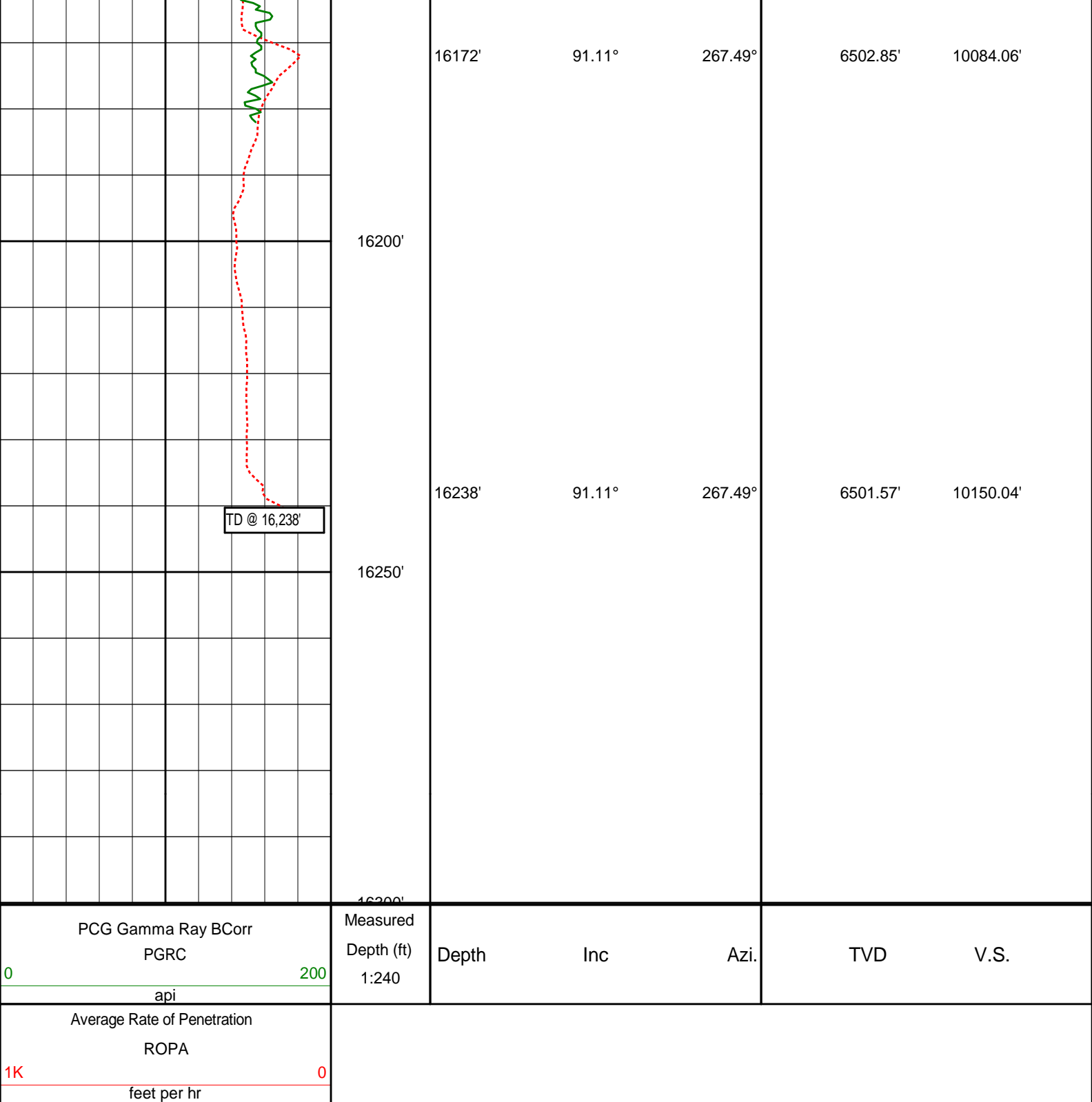
16105'

90.40°

267.24°

6503.73'

10017.08'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble
Wells Ranch State AE30-62-1BHNA
Wattenberg
Weld Colorado
USA
CA-XX-0901134794

The first two surveys at 345' and 587' are provided by HP.

Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
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0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
345.00	0.10	135.57	345.00	0.21 S	0.21 E	-0.21	0.03
587.00	0.20	183.57	587.00	0.79 S	0.33 E	-0.31	0.06
713.00	0.21	2.02	713.00	0.78 S	0.33 E	-0.31	0.33
898.00	0.68	20.53	897.99	0.59 N	0.72 E	-0.74	0.26
1083.00	0.55	41.14	1082.98	2.29 N	1.69 E	-1.75	0.14
1177.00	0.81	45.01	1176.98	3.10 N	2.46 E	-2.54	0.28
1270.00	0.87	37.02	1269.97	4.13 N	3.35 E	-3.45	0.14
1363.00	0.77	27.28	1362.96	5.24 N	4.06 E	-4.19	0.18
1457.00	0.83	46.68	1456.95	6.27 N	4.85 E	-5.00	0.29
1548.00	1.03	38.55	1547.94	7.36 N	5.84 E	-6.02	0.26
1641.00	0.79	39.97	1640.92	8.51 N	6.77 E	-6.98	0.26
1735.00	1.64	268.04	1734.91	8.96 N	5.84 E	-6.06	2.39
1830.00	3.99	274.11	1829.79	9.15 N	1.18 E	-1.41	2.49
1925.00	5.92	267.42	1924.43	9.17 N	7.01 W	6.78	2.12
2020.00	6.68	265.18	2018.86	8.48 N	17.41 W	17.19	0.84
2115.00	7.60	265.21	2113.12	7.49 N	29.17 W	28.98	0.97
2210.00	6.96	265.26	2207.35	6.49 N	41.17 W	41.00	0.67
2305.00	6.13	265.77	2301.73	5.64 N	51.97 W	51.81	0.88
2400.00	5.22	266.11	2396.27	4.98 N	61.34 W	61.19	0.96
2495.00	2.35	296.19	2491.06	5.54 N	67.40 W	67.24	3.58
2590.00	1.53	322.05	2586.00	7.40 N	69.92 W	69.72	1.24
2780.00	1.65	314.15	2775.93	11.31 N	73.45 W	73.14	0.13
2875.00	0.51	18.68	2870.92	12.66 N	74.29 W	73.95	1.58
2969.00	0.50	30.05	2964.91	13.41 N	73.95 W	73.60	0.11
3064.00	0.22	32.73	3059.91	13.93 N	73.65 W	73.28	0.30
3254.00	0.46	47.38	3249.91	14.75 N	72.89 W	72.50	0.13
3349.00	0.43	256.72	3344.91	14.92 N	72.96 W	72.56	0.91
3443.00	0.23	225.37	3438.90	14.71 N	73.43 W	73.04	0.28
3538.00	1.12	152.61	3533.90	13.75 N	73.14 W	72.78	1.13
3633.00	1.08	169.47	3628.88	12.05 N	72.55 W	72.23	0.34
3728.00	1.20	150.30	3723.86	10.30 N	71.89 W	71.62	0.42
3822.00	1.42	141.46	3817.84	8.54 N	70.68 W	70.45	0.32
3917.00	1.35	144.06	3912.81	6.71 N	69.29 W	69.10	0.10
4107.00	1.14	157.66	4102.76	3.15 N	67.26 W	67.16	0.19
4202.00	1.21	166.24	4197.74	1.30 N	66.66 W	66.61	0.20
4297.00	1.05	176.99	4292.73	0.54 S	66.38 W	66.37	0.28
4391.00	0.61	186.55	4386.72	1.90 S	66.39 W	66.42	0.49
4486.00	0.50	186.65	4481.71	2.81 S	66.49 W	66.54	0.12
4581.00	0.14	223.70	4576.71	3.31 S	66.62 W	66.68	0.42
4675.00	0.46	185.88	4670.71	3.77 S	66.74 W	66.81	0.38
4865.00	0.31	275.91	4860.71	4.47 S	67.33 W	67.42	0.29
4959.00	0.68	273.88	4954.70	4.41 S	68.14 W	68.23	0.39
5054.00	0.50	247.18	5049.70	4.53 S	69.08 W	69.18	0.34
5149.00	0.25	236.32	5144.69	4.81 S	69.64 W	69.74	0.27
5339.00	0.63	260.97	5334.69	5.20 S	71.02 W	71.12	0.22
5433.00	0.33	270.56	5428.69	5.28 S	71.80 W	71.91	0.33
5528.00	0.63	192.98	5523.68	5.79 S	72.19 W	72.31	0.68
5623.00	0.61	184.15	5618.68	6.80 S	72.34 W	72.49	0.10
5672.00	0.54	164.48	5667.68	7.28 S	72.30 W	72.46	0.42
5722.00	0.81	186.55	5717.67	7.86 S	72.28 W	72.45	0.74
5816.00	6.58	239.61	5811.45	11.25 S	77.00 W	77.26	6.52
5913.00	11.31	245.00	5907.24	18.08 S	90.42 W	90.85	4.95
6006.00	14.20	254.99	5997.95	24.89 S	109.71 W	110.30	3.90
6054.00	22.03	260.89	6043.54	27.85 S	124.31 W	124.97	16.73
6101.00	28.88	266.93	6085.96	29.85 S	144.38 W	145.08	15.57
6149.00	31.11	272.22	6127.53	29.99 S	168.35 W	169.05	7.20
6195.00	34.47	271.96	6166.20	29.09 S	193.24 W	193.91	7.31
6243.00	38.17	268.65	6204.87	28.97 S	221.66 W	222.31	8.72
6290.00	43.66	266.85	6240.37	30.21 S	252.40 W	253.08	11.95
6385.00	57.06	269.92	6300.85	32.07 S	325.35 W	326.05	14.32
6480.00	66.19	275.69	6345.98	27.81 S	408.69 W	409.25	10.99
6575.00	69.36	272.18	6381.92	21.81 S	496.40 W	496.79	4.78
6669.00	76.89	269.14	6409.19	20.82 S	586.27 W	586.60	8.59
6804.00	88.61	268.61	6426.20	23.45 S	719.93 W	720.29	8.69
6850.00	89.45	268.35	6426.98	24.67 S	765.90 W	766.28	1.91
6944.00	89.72	268.37	6427.66	27.36 S	859.86 W	860.28	0.29
7039.00	89.44	268.00	6428.35	30.37 S	954.81 W	955.27	0.49
7134.00	88.24	268.07	6430.28	33.63 S	1049.73 W	1050.25	1.27
7229.00	89.20	268.02	6432.40	36.87 S	1144.65 W	1145.22	1.01
7323.00	87.41	268.97	6435.18	39.34 S	1238.58 W	1239.17	2.16
7418.00	87.81	269.27	6439.14	40.79 S	1333.48 W	1334.09	0.53
7513.00	88.18	270.52	6442.47	40.97 S	1428.42 W	1429.00	1.37
7599.00	88.22	270.52	6444.22	40.97 S	1523.28 W	1523.88	1.24

7608.00	88.98	270.46	6444.82	40.16 S	1523.39 W	1523.92	0.84
7703.00	90.55	271.61	6445.21	38.44 S	1618.37 W	1618.82	2.05
7798.00	90.22	272.61	6444.57	34.94 S	1713.30 W	1713.64	1.11
7893.00	90.77	272.31	6443.75	30.87 S	1808.21 W	1808.42	0.66
7987.00	89.66	270.11	6443.40	28.88 S	1902.18 W	1902.31	2.62
8082.00	89.97	267.98	6443.70	30.46 S	1997.16 W	1997.30	2.27
8177.00	90.43	267.99	6443.37	33.80 S	2092.10 W	2092.29	0.48
8271.00	90.15	267.84	6442.90	37.22 S	2186.04 W	2186.29	0.34
8365.00	89.78	268.15	6442.96	40.51 S	2279.98 W	2280.28	0.51
8460.00	89.08	267.09	6443.90	44.46 S	2374.89 W	2375.26	1.34
8555.00	89.88	266.92	6444.76	49.42 S	2469.76 W	2470.22	0.86
8650.00	89.20	267.20	6445.52	54.29 S	2564.63 W	2565.18	0.77
8745.00	90.31	266.89	6445.93	59.19 S	2659.50 W	2660.15	1.21
8839.00	89.72	266.55	6445.91	64.57 S	2753.34 W	2754.10	0.72
8934.00	89.57	267.36	6446.50	69.62 S	2848.21 W	2849.06	0.87
9029.00	88.46	266.66	6448.13	74.57 S	2943.06 W	2944.01	1.38
9124.00	88.83	266.61	6450.38	80.15 S	3037.87 W	3038.93	0.39
9219.00	89.63	267.89	6451.65	84.70 S	3132.75 W	3133.89	1.59
9314.00	89.88	268.66	6452.06	87.56 S	3227.71 W	3228.89	0.85
9408.00	89.72	269.26	6452.39	89.27 S	3321.69 W	3322.88	0.66
9503.00	89.11	269.17	6453.36	90.57 S	3416.67 W	3417.87	0.65
9597.00	88.49	269.35	6455.32	91.78 S	3510.65 W	3511.84	0.69
9692.00	89.14	269.47	6457.29	92.76 S	3605.62 W	3606.81	0.70
9786.00	89.11	268.89	6458.72	94.11 S	3699.60 W	3700.80	0.62
9880.00	89.48	269.58	6459.88	95.36 S	3793.58 W	3794.78	0.83
9975.00	88.98	269.58	6461.16	96.06 S	3888.57 W	3889.76	0.53
10069.00	89.57	269.61	6462.35	96.72 S	3982.56 W	3983.73	0.63
10164.00	87.87	268.50	6464.47	98.29 S	4077.52 W	4078.70	2.14
10258.00	87.90	268.96	6467.94	100.37 S	4171.43 W	4172.64	0.49
10353.00	89.88	268.94	6469.78	102.11 S	4266.39 W	4267.61	2.08
10450.00	90.49	268.58	6469.47	104.21 S	4363.37 W	4364.61	0.73
10545.00	89.97	270.00	6469.08	105.39 S	4458.36 W	4459.60	1.59
10638.00	88.86	269.35	6470.03	105.92 S	4551.35 W	4552.58	1.38
10730.00	90.37	271.01	6470.65	105.63 S	4643.34 W	4644.53	2.44
10821.00	90.52	269.59	6469.95	105.15 S	4734.34 W	4735.49	1.57
10914.00	87.93	267.47	6471.20	107.53 S	4827.28 W	4828.46	3.60
11007.00	88.46	267.50	6474.13	111.61 S	4920.15 W	4921.40	0.57
11099.00	89.14	267.06	6476.06	115.98 S	5012.02 W	5013.36	0.88
11192.00	89.69	267.11	6477.01	120.71 S	5104.90 W	5106.32	0.59
11284.00	89.41	266.35	6477.73	125.96 S	5196.74 W	5198.27	0.88
11377.00	90.18	267.33	6478.06	131.08 S	5289.60 W	5291.22	1.34
11469.00	90.37	266.86	6477.62	135.74 S	5381.48 W	5383.19	0.55
11561.00	89.69	267.31	6477.57	140.42 S	5473.36 W	5475.16	0.89
11654.00	90.49	269.67	6477.43	142.87 S	5566.32 W	5568.15	2.68
11747.00	88.83	265.12	6477.98	147.10 S	5659.20 W	5661.10	5.21
11840.00	89.48	267.77	6479.35	152.86 S	5752.00 W	5754.02	2.93
11933.00	90.71	269.46	6479.20	155.11 S	5844.97 W	5847.02	2.25
12027.00	91.11	269.86	6477.71	155.67 S	5938.95 W	5940.99	0.60
12120.00	88.92	267.52	6477.68	157.80 S	6031.92 W	6033.97	3.45
12215.00	89.69	270.36	6478.83	159.55 S	6126.88 W	6128.96	3.10
12310.00	89.45	269.51	6479.55	159.66 S	6221.88 W	6223.92	0.93
12405.00	90.25	268.48	6479.80	161.33 S	6316.86 W	6318.92	1.37
12500.00	89.35	270.62	6480.13	162.07 S	6411.85 W	6413.90	2.44
12595.00	89.60	270.51	6481.00	161.14 S	6506.84 W	6508.84	0.29
12690.00	89.69	269.38	6481.59	161.23 S	6601.84 W	6603.81	1.19
12785.00	89.82	270.16	6481.99	161.61 S	6696.84 W	6698.78	0.83
12880.00	90.28	269.25	6481.91	162.10 S	6791.83 W	6793.76	1.07
12974.00	90.43	268.54	6481.33	163.91 S	6885.81 W	6887.76	0.77
13069.00	90.09	267.83	6480.90	166.92 S	6980.76 W	6982.76	0.83
13164.00	89.48	267.18	6481.25	171.06 S	7075.67 W	7077.74	0.94
13259.00	89.20	267.62	6482.35	175.37 S	7170.57 W	7172.71	0.55
13354.00	87.72	266.23	6484.90	180.46 S	7265.39 W	7267.63	2.14
13449.00	87.66	266.37	6488.73	186.58 S	7360.12 W	7362.48	0.16
13544.00	86.70	266.74	6493.40	192.29 S	7454.83 W	7457.31	1.08
13639.00	87.68	267.68	6498.06	196.90 S	7549.60 W	7552.16	1.43
13734.00	88.27	267.21	6501.42	201.14 S	7644.45 W	7647.08	0.79
13828.00	88.89	267.31	6503.75	205.63 S	7738.31 W	7741.03	0.67
13923.00	90.00	267.90	6504.67	209.60 S	7833.22 W	7836.01	1.32
14018.00	90.65	269.34	6504.13	211.89 S	7928.19 W	7931.01	1.66
14113.00	91.82	269.43	6502.08	212.91 S	8023.16 W	8025.97	1.24
14207.00	91.14	269.61	6499.65	213.69 S	8117.12 W	8119.93	0.75
14302.00	90.68	269.06	6498.14	214.80 S	8212.10 W	8214.91	0.75
14397.00	90.03	268.50	6497.56	216.82 S	8307.08 W	8309.90	0.90
14492.00	90.96	268.36	6496.73	219.42 S	8402.04 W	8404.90	0.99
14587.00	89.78	269.11	6496.12	221.52 S	8497.01 W	8499.89	1.47

14682.00	89.45	268.62	6496.76	223.40 S	8591.99 W	8594.89	0.62
14777.00	89.94	268.28	6497.27	225.97 S	8686.95 W	8689.89	0.63
14872.00	89.14	268.64	6498.03	228.52 S	8781.92 W	8784.88	0.92
14966.00	87.72	268.69	6500.60	230.71 S	8875.85 W	8878.85	1.51
15061.00	87.81	268.00	6504.31	233.45 S	8970.74 W	8973.77	0.73
15156.00	87.66	270.14	6508.06	234.99 S	9065.65 W	9068.69	2.26
15251.00	88.03	269.53	6511.64	235.27 S	9160.58 W	9163.60	0.75
15346.00	88.58	269.59	6514.45	236.00 S	9255.54 W	9258.54	0.58
15441.00	88.71	269.29	6516.69	236.93 S	9350.50 W	9353.50	0.34
15536.00	90.52	271.84	6517.33	235.99 S	9445.49 W	9448.43	3.29
15630.00	90.43	269.72	6516.55	234.71 S	9539.47 W	9542.35	2.26
15725.00	91.30	270.01	6515.12	234.93 S	9634.46 W	9637.32	0.97
15820.00	91.60	269.57	6512.71	235.28 S	9729.42 W	9732.27	0.56
15915.00	92.41	269.53	6509.39	236.03 S	9824.36 W	9827.19	0.85
16010.00	92.01	268.13	6505.73	237.97 S	9919.27 W	9922.12	1.53
16105.00	90.40	267.24	6503.73	241.80 S	10014.17 W	10017.08	1.94
16172.00	91.11	267.49	6502.85	244.88 S	10081.09 W	10084.06	1.12
16238.00	91.11	267.49	6501.57	247.77 S	10147.01 W	10150.04	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 268.57 DEGREES (GRID)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16238.00 FEET
IS 10150.04 FEET ALONG 268.60 DEGREES (GRID)**

Final survey is a straight line projection to TD.