

## PCG Pressure Case Gamma PCD Pressure Case Directional

[illegible]

## WELL INFORMATION

MWD Run Number	100	200			
Date run completed	10-Aug-14	13-Aug-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	639.00	7,395.00			
Log End Depth (MD, ft)	7,395.00	12,454.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	08-Aug-14 07:00	11-Aug-14 05:15			
Drill/Wipe End Date and Time	09-Aug-14 18:00	12-Aug-14 19:15			
Min Inc (deg) @ Depth (MD, ft)	1.57 @ 6,181.00	86.58 @ 7,501.00			
Max Inc (deg) @ Depth (MD, ft)	81.28 @ 7,339.00	92.50 @ 11,572.00			
Bit TFA(in2) / Bit Type	1.24 / PDC	0.98 / PDC			
Flow Rate (gpm)	661.21	294.25			
Max AV (fpm) / CV (fpm) @ MWD	349.0 / NA	421.4 / NA			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	10.20 / 36.00	10.15 / 35.00			
Filtrate CL (ppm)	2,000.00	2,400.00			
pH / Fluid Loss (mptm)	9.40 / 8	9.20 / 8			
PV (cP) / YP (lbf2)	11 / 13.00	10 / 13.00			
% Solids / % Sand	6 / 0.25	9.20 / 0.10			
% Oil / Oil:Water Ratio	N/A / N/A	NA / NA			
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Max Tool Temp (in F) / C	175.01 / 80	210.00 / 90			

Max Tool Temp (degF) / Source	175.21 / PCM	242.90 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA			
Lead MWD Engineer	Gary Eifert	Gary Eifert			
Customer Representative	Johnny Sanchez	Johnny Sanchez			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11341339	12365887			
Insert Serial Number	11680736	11619996			
Date and Time Initialized	07-Aug-14 08:26	10-Aug-14 05:03			
Date and Time Read	10-Aug-14 04:30	13-Aug-14 10:33			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	61.00			
Software Version	6.21	6.21			
Sub Serial Number	11341339	12365887			
Sonde Serial Number	11638497	12174582			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	316.29	212.97			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.86	53.78			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341339	12365887			
Insert/Sonde Serial Number	11293301	11579761			

## REMARKS

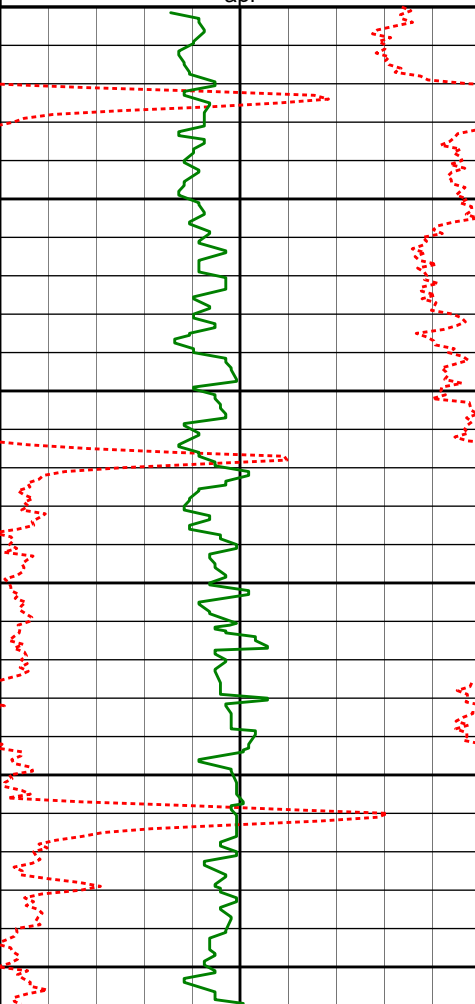
1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based 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 8.0.2

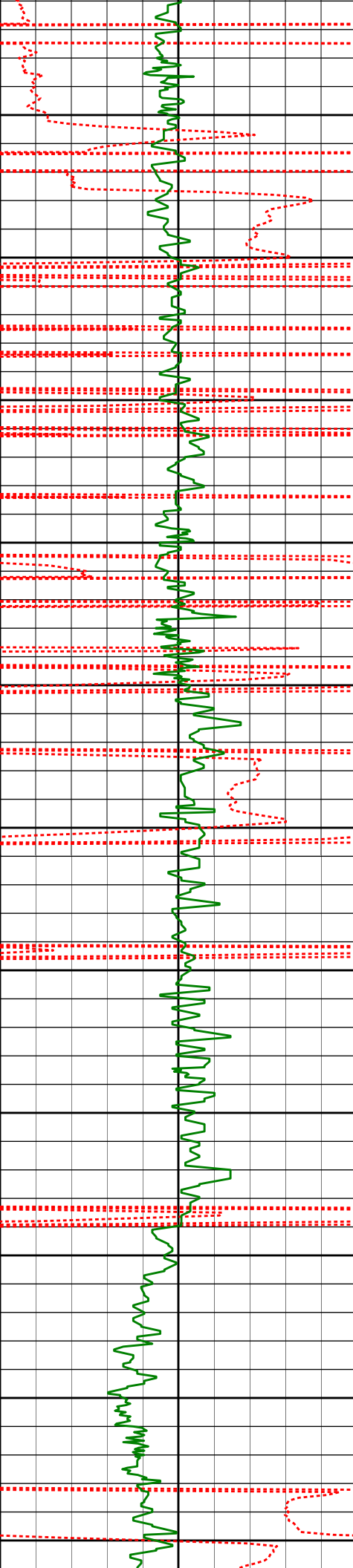
WARRANTY

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HALLIBURTON

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'	3059'	9.27°	150.66°	3025.71' 220.95'
		3100'				
		3150'	3154'	8.37°	151.24°	3119.59' 229.41'
		3200'				
		3250'	3248'	7.39°	147.81°	3212.70' 237.13'



3300'

3350'

3400'

3450'

3500'

3550'

3600'

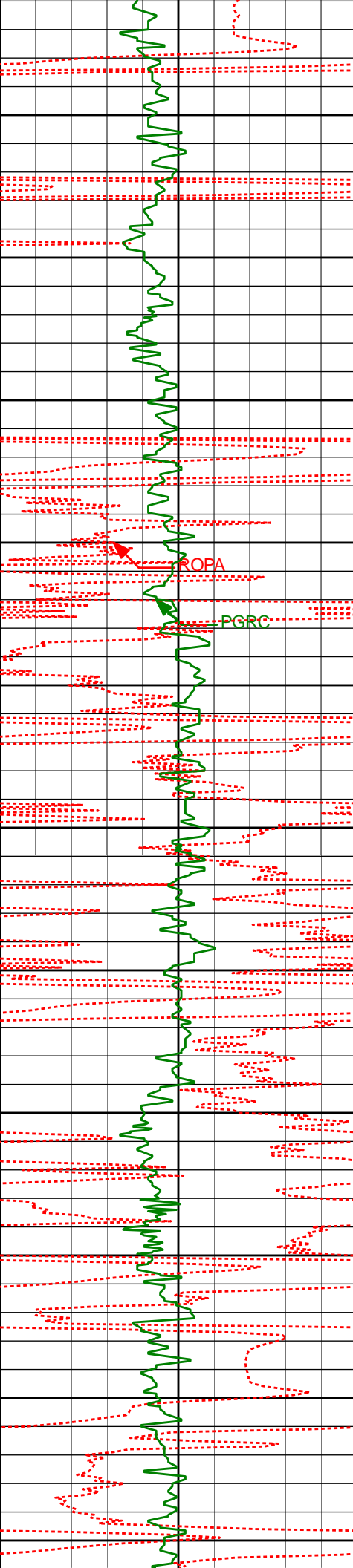
3650'

3700'

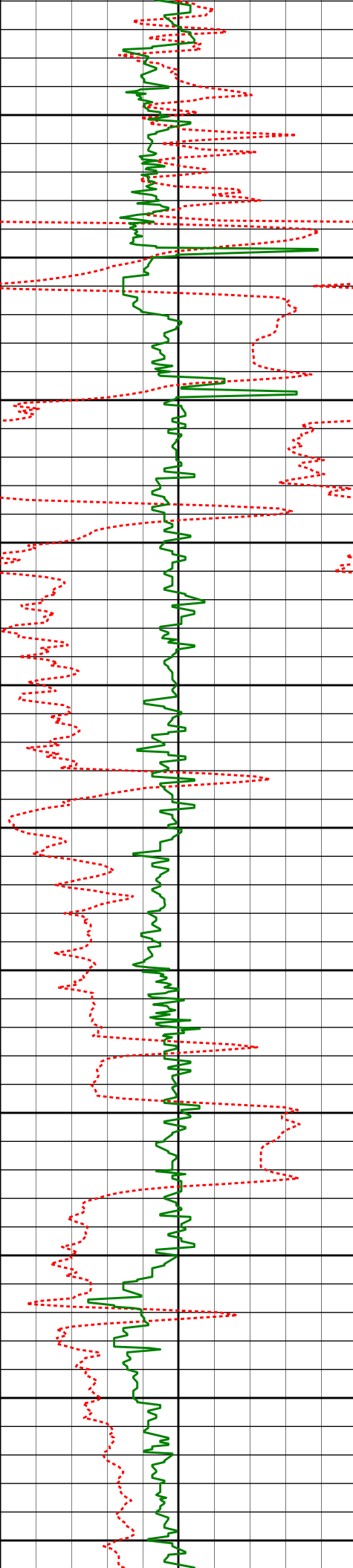
3750'

3800'

3343'	8.41°	146.66°	3306.80'	245.39'
3438'	7.93°	144.30°	3400.83'	254.23'
3532'	9.25°	149.77°	3493.78'	263.09'
3627'	8.77°	153.57°	3587.61'	271.58'
3721'	7.69°	152.54°	3680.64'	278.98'



3816'	10.52°	153.66°	3774.43'	287.22'
3850'				
3900'				
3910'	11.77°	155.94°	3866.66'	296.74'
3950'				
4000'	11.44°	156.71°	3958.73'	306.23'
4050'				
4100'	9.91°	155.90°	4052.09'	315.05'
4150'				
4200'	8.35°	154.42°	4145.88'	322.86'
4250'				
4288'	9.58°	148.13°	4238.73'	331.33'
4300'				
4350'				



4400'

4450'

4500'

4550'

4600'

4650'

4700'

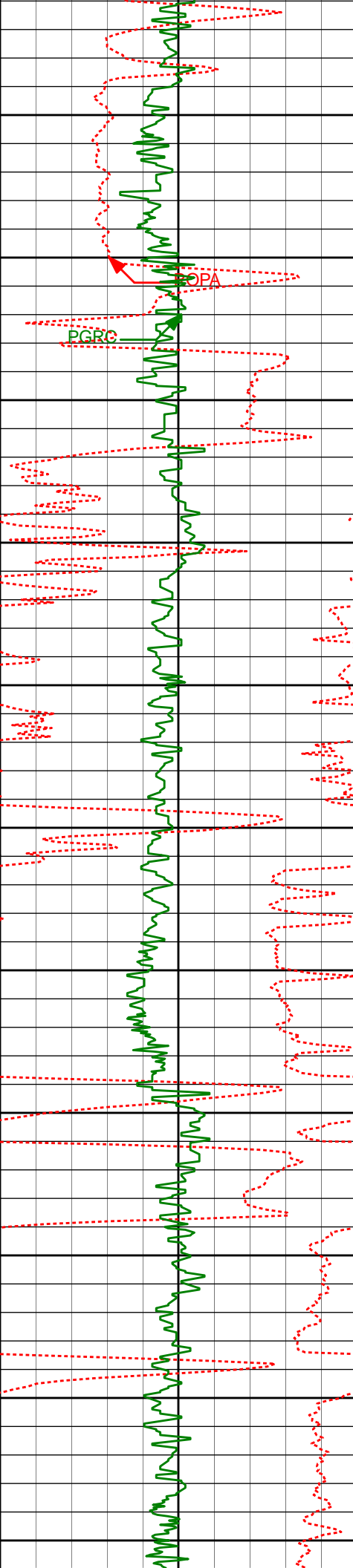
4750'

4800'

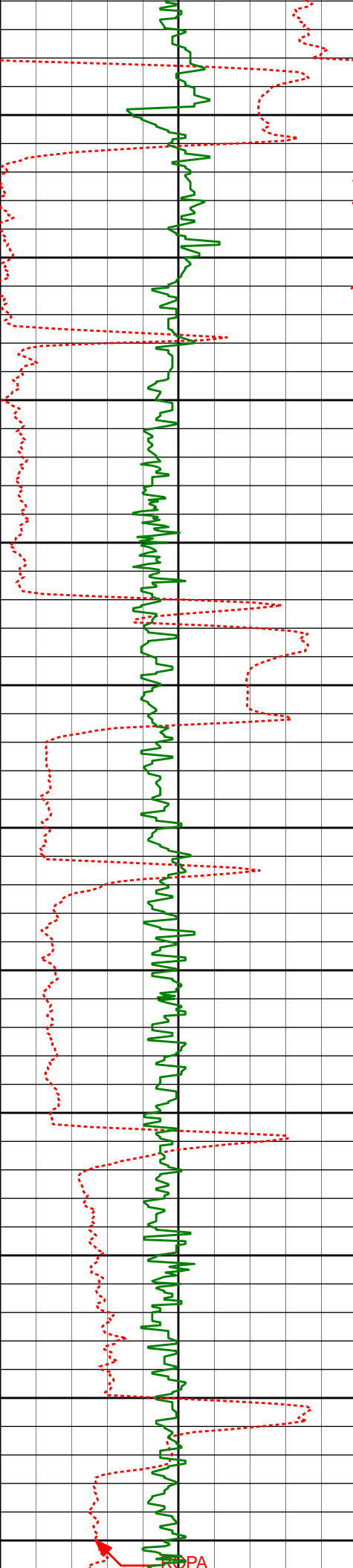
4850'

4900'

4383'	8.82°	144.12°	4332.51'	341.14'
4478'	9.59°	149.92°	4426.29'	350.75'
4573'	9.61°	154.92°	4519.96'	359.60'
4667'	8.45°	153.73°	4612.79'	367.44'
4761'	9.34°	149.68°	4705.66'	375.74'
4856'	9.39°	152.12°	4799.40'	384.72'



4950'	4950'	8.78°	150.89°	4892.22'	393.21'
5000'					
5045'	5045'	8.94°	146.77°	4986.09'	402.14'
5100'					
5139'	5139'	8.95°	140.99°	5078.94'	412.02'
5150'					
5200'					
5234'	5234'	7.74°	138.94°	5172.94'	422.00'
5250'					
5300'					
5329'	5329'	8.50°	135.31°	5266.99'	432.18'
5350'					
5400'					
5424'	5424'	8.08°	130.73°	5360.99'	443.16'
5450'					



5500'

5518'

5550'

5600'

5612'

5650'

5700'

5707'

5750'

5800'

5802'

5850'

5897'

5900'

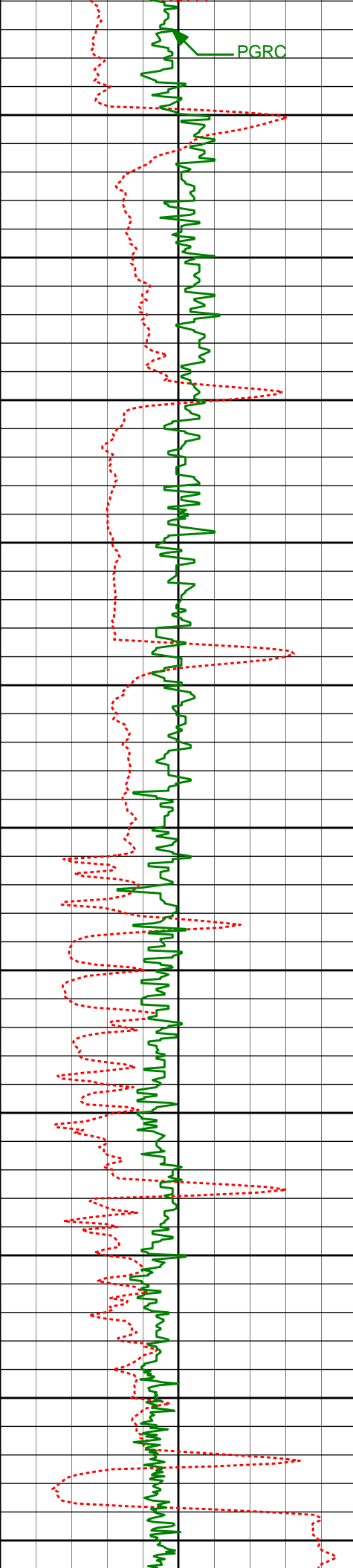
5950'

5991'

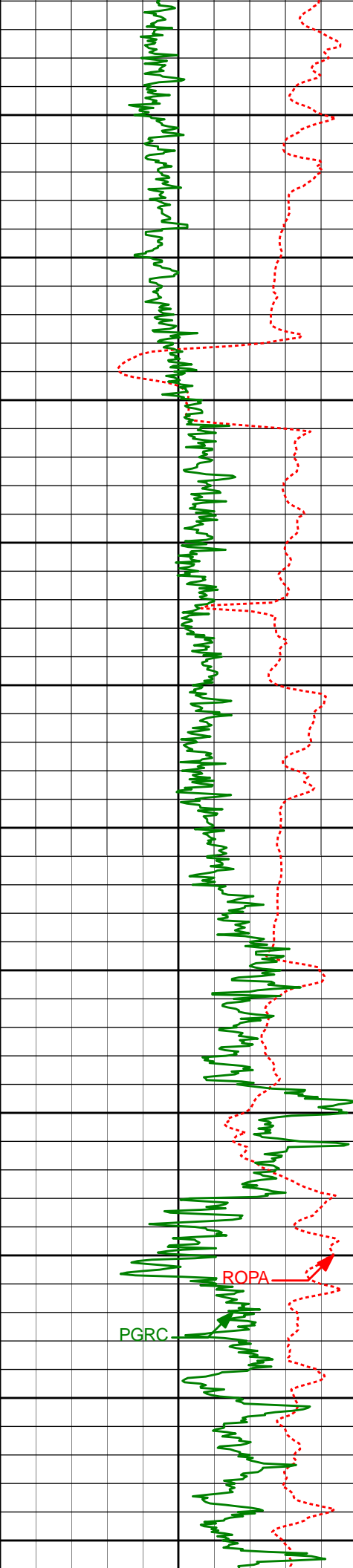
6000'

5518'	5.32°	136.64°	5454.34'	451.95'
5612'	4.32°	132.85°	5548.01'	458.13'
5707'	3.05°	153.05°	5642.82'	462.40'
5802'	2.59°	162.33°	5737.70'	464.67'
5897'	2.10°	165.10°	5832.62'	466.18'
5991'	1.85°	161.16°	5926.56'	467.45'

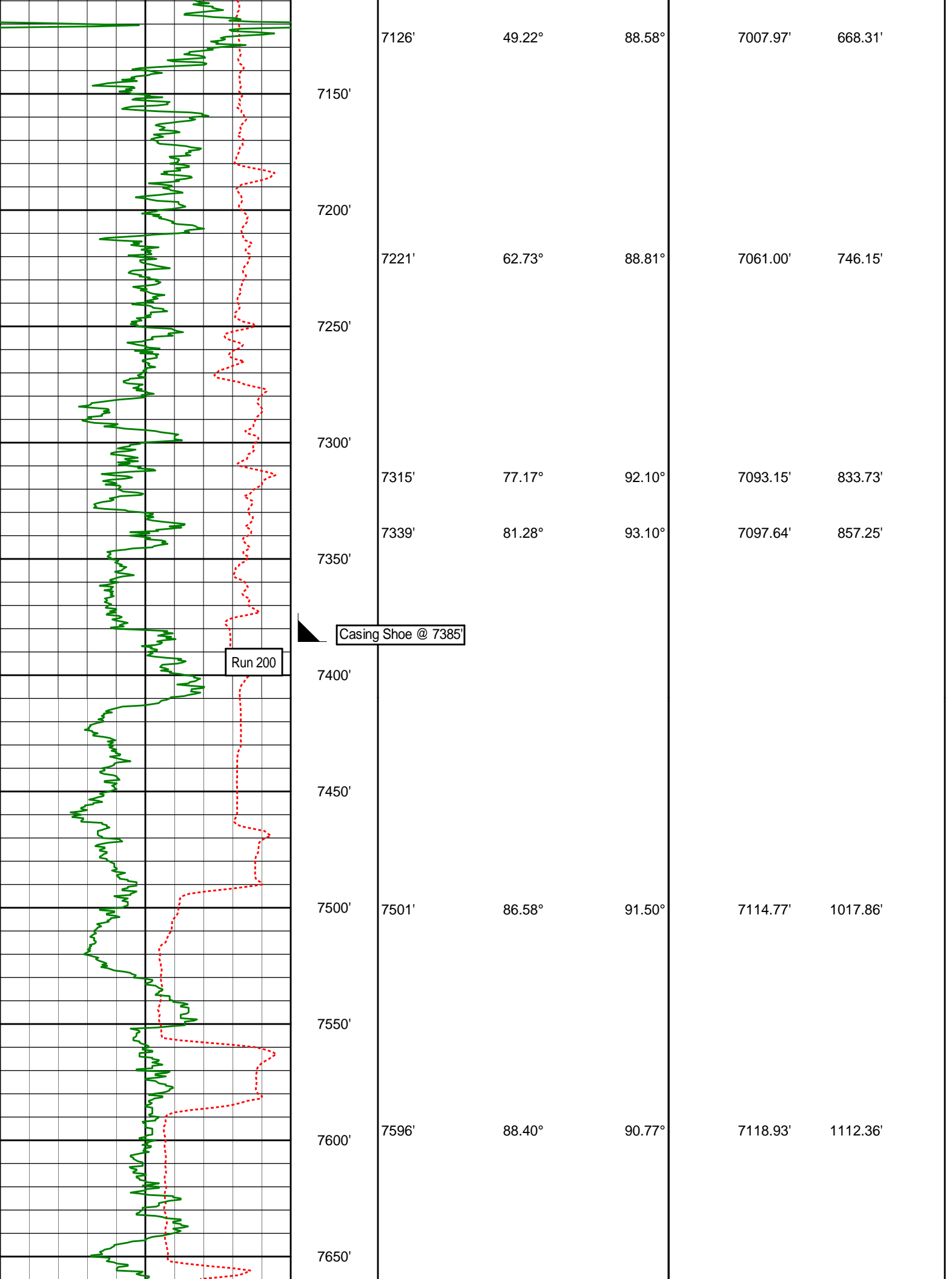


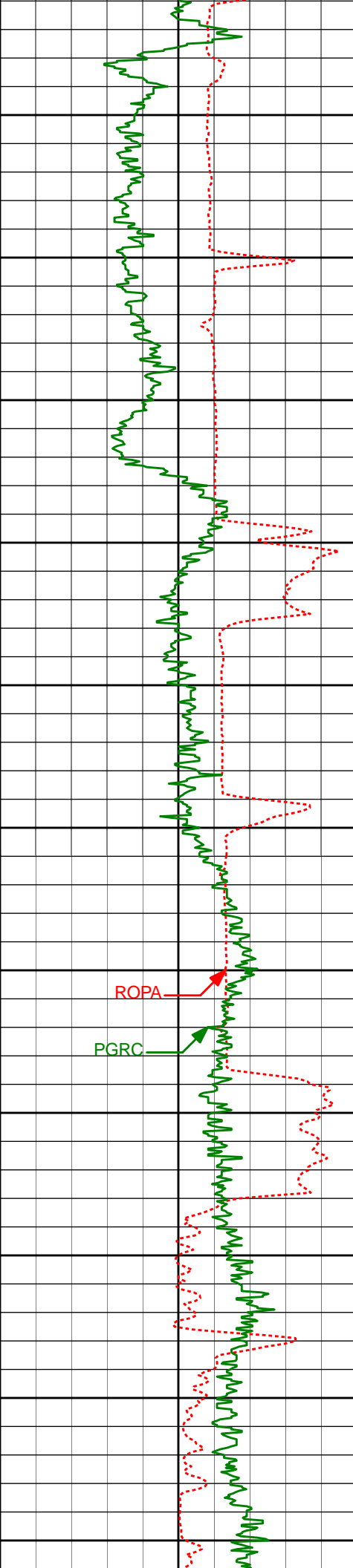


6050'				
6086'	1.73°	157.32°	6021.52'	468.81'
6100'				
6150'				
6181'	1.57°	143.57°	6116.48'	470.39'
6200'				
6250'				
6276'	1.73°	140.93°	6211.44'	472.30'
6300'				
6350'				
6370'	1.79°	147.45°	6305.40'	474.23'
6400'				
6450'				
6465'	1.86°	145.37°	6400.35'	476.18'
6500'				
6550'				
6559'	1.92°	160.39°	6494.30'	477.87'

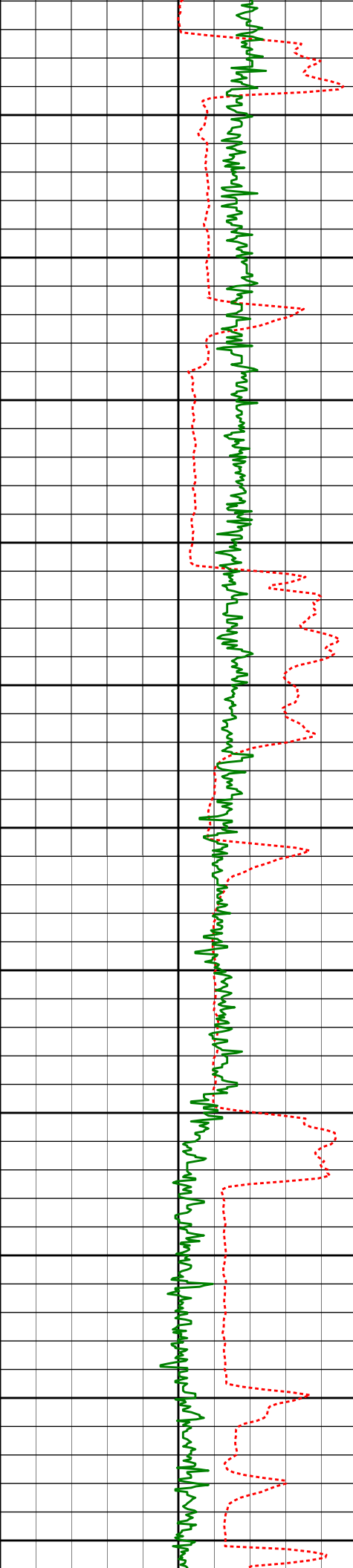


6600'					
6650'	6653'	4.80°	84.19°	6588.16'	482.41'
6700'					
6750'	6748'	10.78°	78.23°	6682.24'	494.75'
6800'					
6850'	6843'	19.33°	76.63°	6773.90'	518.02'
6900'					
6950'	6937'	27.75°	83.20°	6860.01'	554.03'
7000'					
7050'	7032'	37.69°	87.94°	6939.85'	604.42'
7100'					





7690'	88.43°	89.55°	7121.53'	1205.75'
7700'				
7750'				
7785'	87.47°	88.87°	7124.92'	1299.94'
7800'				
7850'				
7879'	90.22°	89.68°	7126.82'	1393.17'
7900'				
7950'				
7973'	89.66°	88.96°	7126.92'	1486.45'
8000'				
8067'	91.39°	90.35°	7126.06'	1579.78'
8100'				
8150'				
8161'	90.46°	90.24°	7124.54'	1673.23'
8200'				



8250'

8256'

90.31°

90.51°

7123.90'

1767.69'

8300'

8350'

8351'

89.97°

87.76°

7123.67'

1861.91'

8400'

8450'

8446'

90.03°

88.70°

7123.67'

1955.94'

8500'

8550'

8540'

89.91°

89.64°

7123.72'

2049.18'

8600'

8650'

8635'

90.34°

90.63°

7123.51'

2143.61'

8700'

8750'

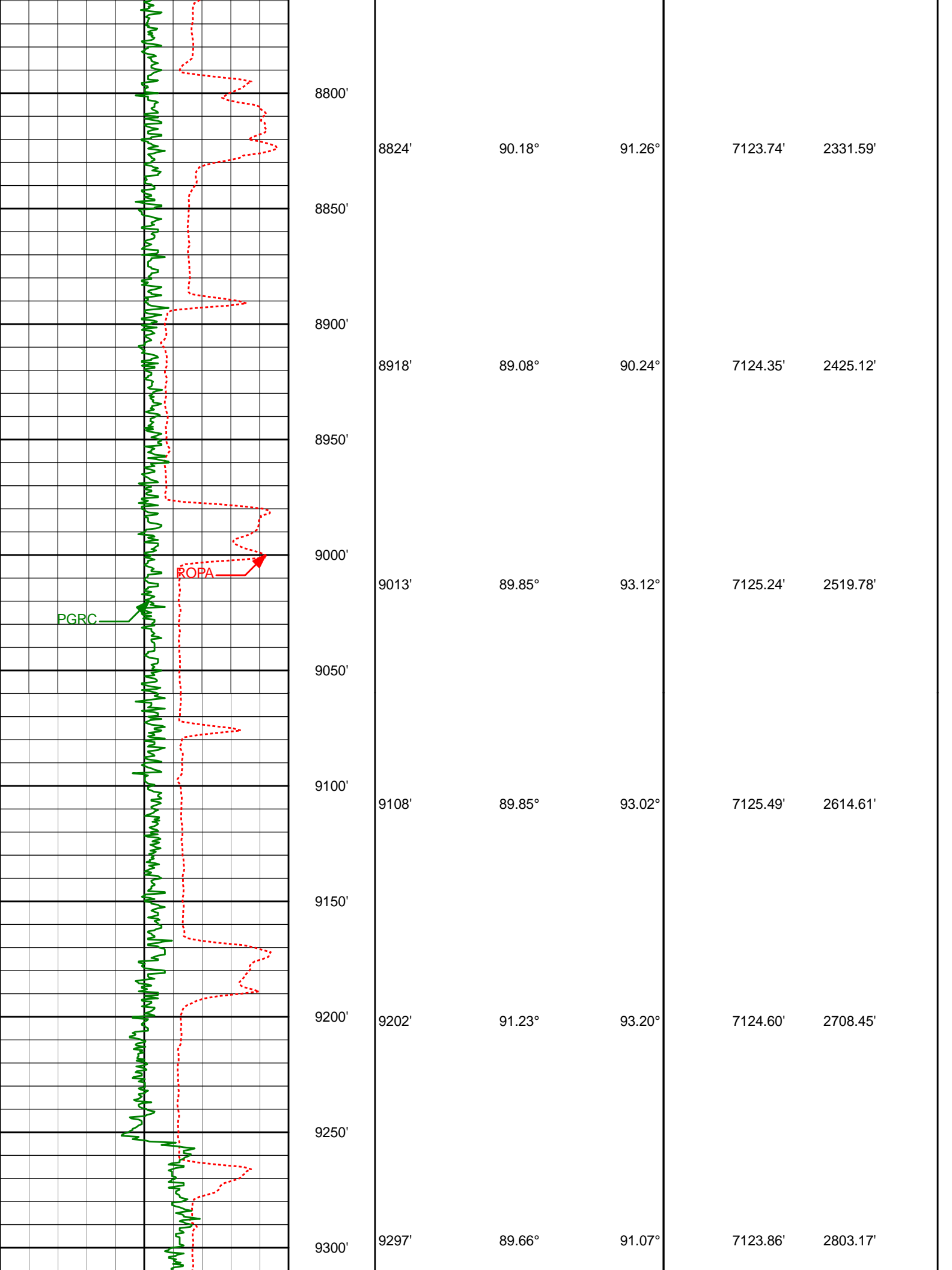
8729'

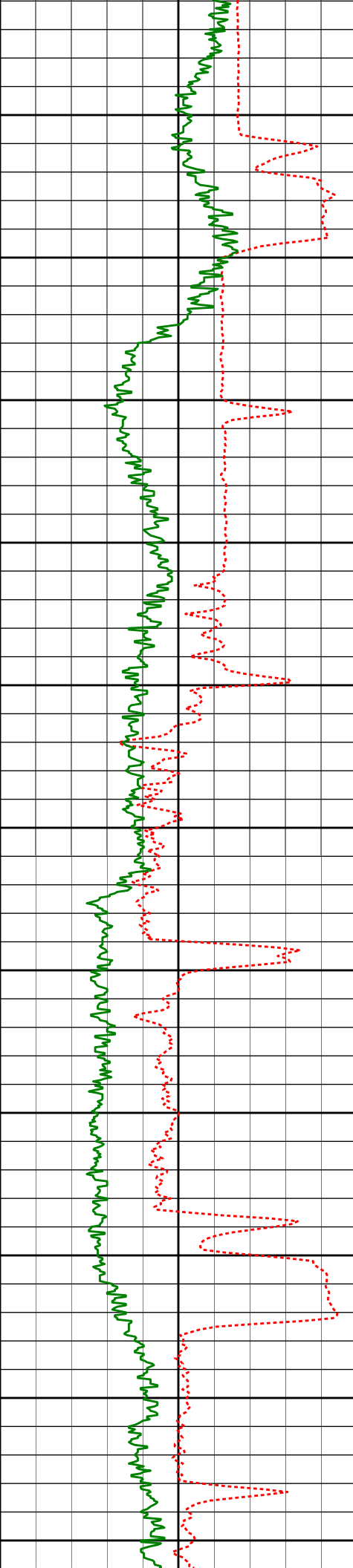
89.60°

90.06°

7123.56'

2237.07'





9350'

9391'

91.97°

90.59°

7122.52'

2896.70'

9400'

9450'

9486'

91.73°

89.66°

7119.46'

2991.08'

9500'

9550'

9581'

91.63°

89.16°

7116.67'

3085.32'

9600'

9650'

9675'

90.19°

88.33°

7115.18'

3178.46'

9700'

9750'

9770'

91.75°

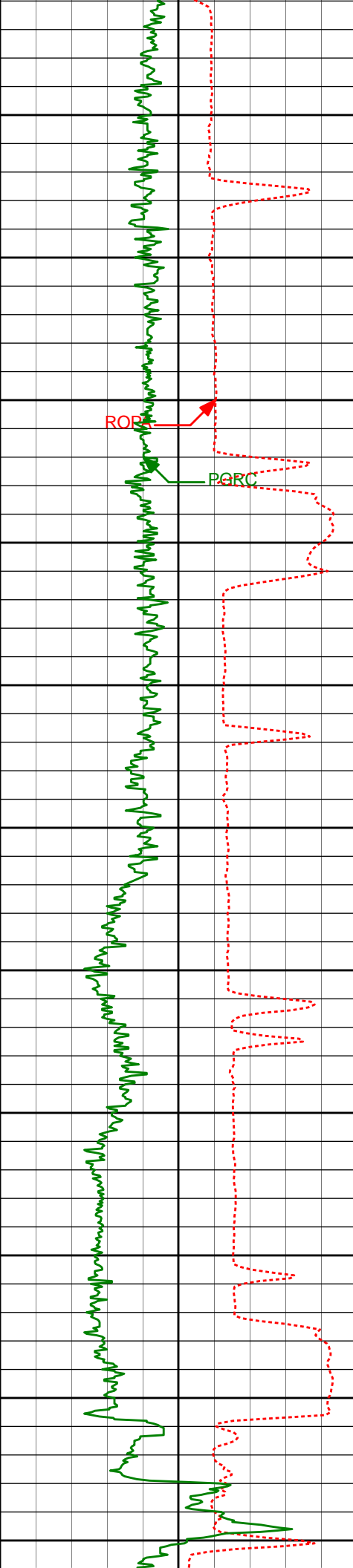
90.03°

7113.57'

3272.68'

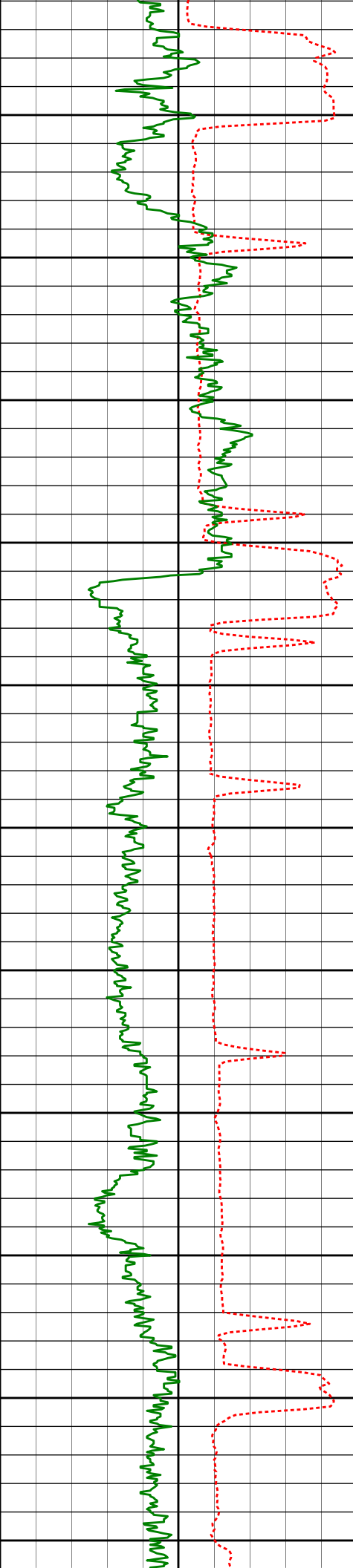
9800'

9850'

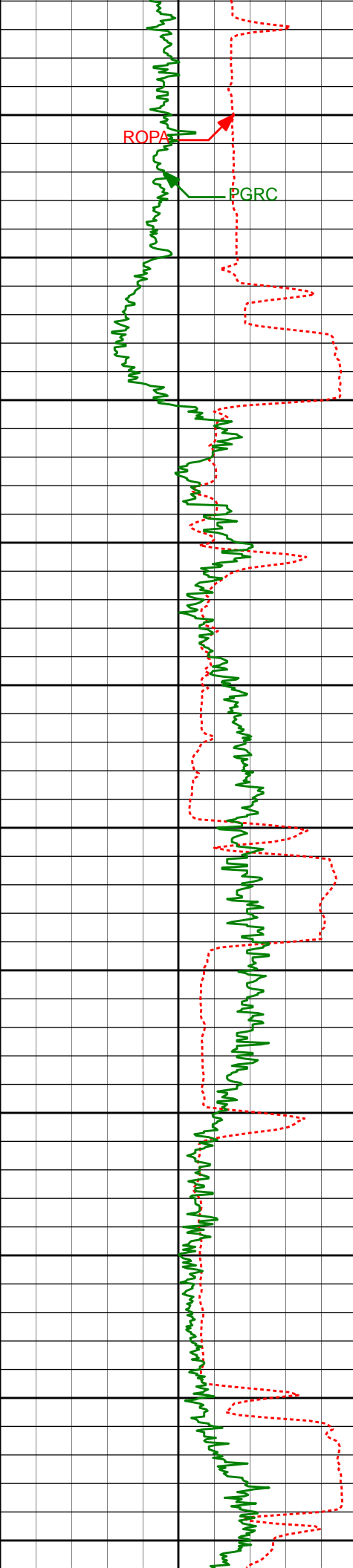


9900'	9865'	91.33°	89.27°	7111.02'	3366.98'
9950'	9960'	90.22°	88.36°	7109.73'	3461.12'
10000'	10054'	90.09°	90.70°	7109.48'	3554.44'
10100'	10149'	90.12°	89.89°	7109.30'	3648.89'
10200'	10244'	91.14°	89.72°	7108.26'	3743.25'
10300'	10338'	91.26°	91.64°	7106.29'	3836.75'
10400'					

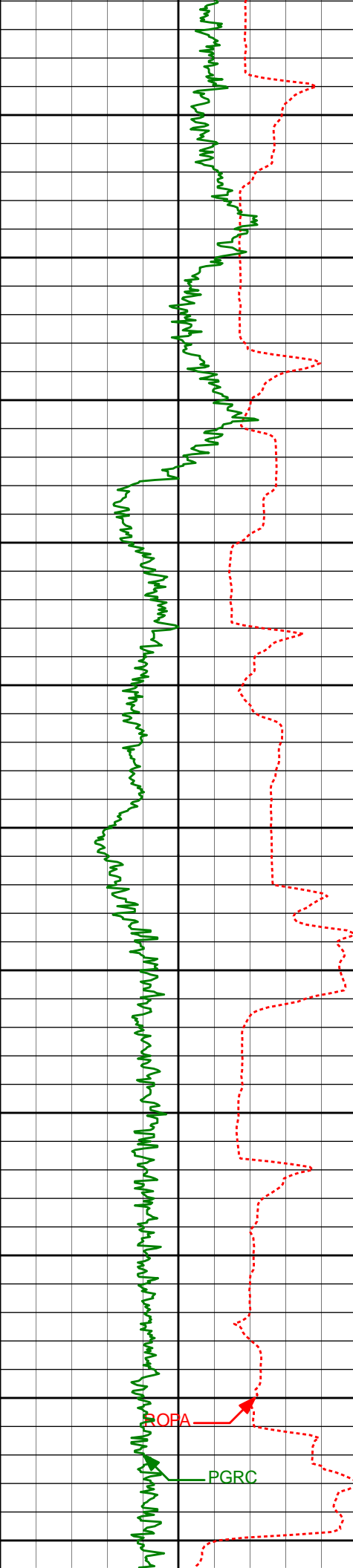




10433'	89.11°	93.35°	7105.98'	3931.51'
10450'				
10500'				
10528'	86.82°	93.40°	7109.36'	4026.31'
10550'				
10600'				
10622'	87.69°	91.01°	7113.86'	4119.94'
10650'				
10700'				
10716'	88.28°	89.90°	7117.17'	4213.36'
10750'				
10800'				
10811'	87.53°	90.06°	7120.64'	4307.70'
10850'				
10900'				
10905'	88.89°	89.26°	7123.57'	4400.99'
10950'				



11000'	10999'	89.05°	88.63°	7125.26'	4494.17'
11050'					
11100'	11094'	90.55°	90.13°	7125.60'	4588.45'
11150'					
11200'	11188'	89.72°	89.34°	7125.37'	4681.80'
11250'					
11300'	11288'	91.82°	87.74°	7124.03'	4780.84'
11350'					
11400'	11383'	91.33°	87.30°	7121.42'	4874.65'
11450'					
11500'	11478'	92.28°	89.40°	7118.43'	4968.65'



11550'

11600'

11650'

11700'

11750'

11800'

11850'

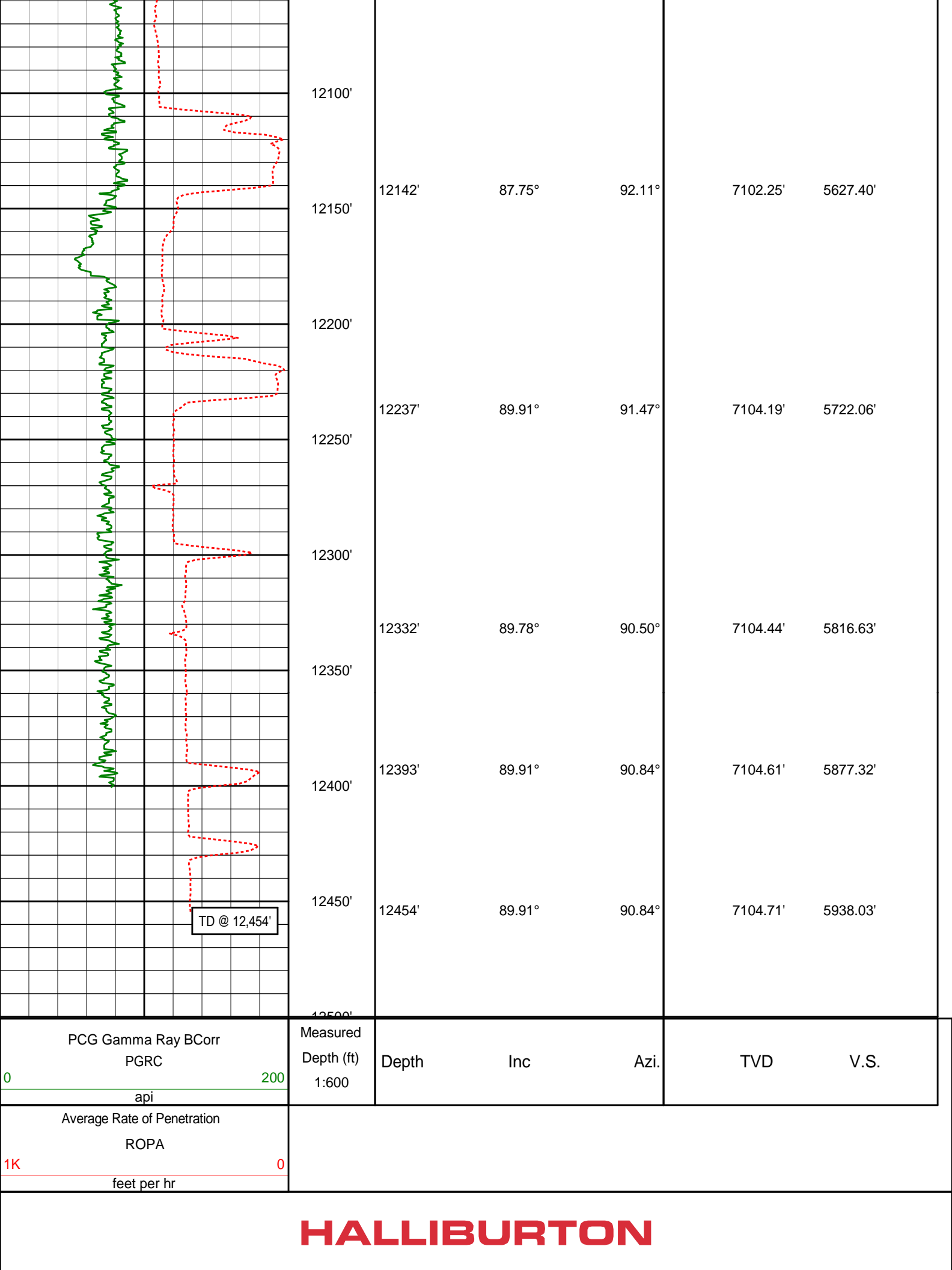
11900'

11950'

12000'

12050'

11572'	92.50°	88.82°	7114.51'	5061.80'
11667'	91.91°	88.67°	7110.85'	5155.88'
11762'	91.97°	87.81°	7107.64'	5249.85'
11857'	91.66°	89.65°	7104.63'	5343.94'
11952'	90.65°	89.63°	7102.71'	5438.25'
12047'	91.08°	91.45°	7101.28'	5532.73'



PCG Gamma Ray BCorr  
PGRC

0200

api

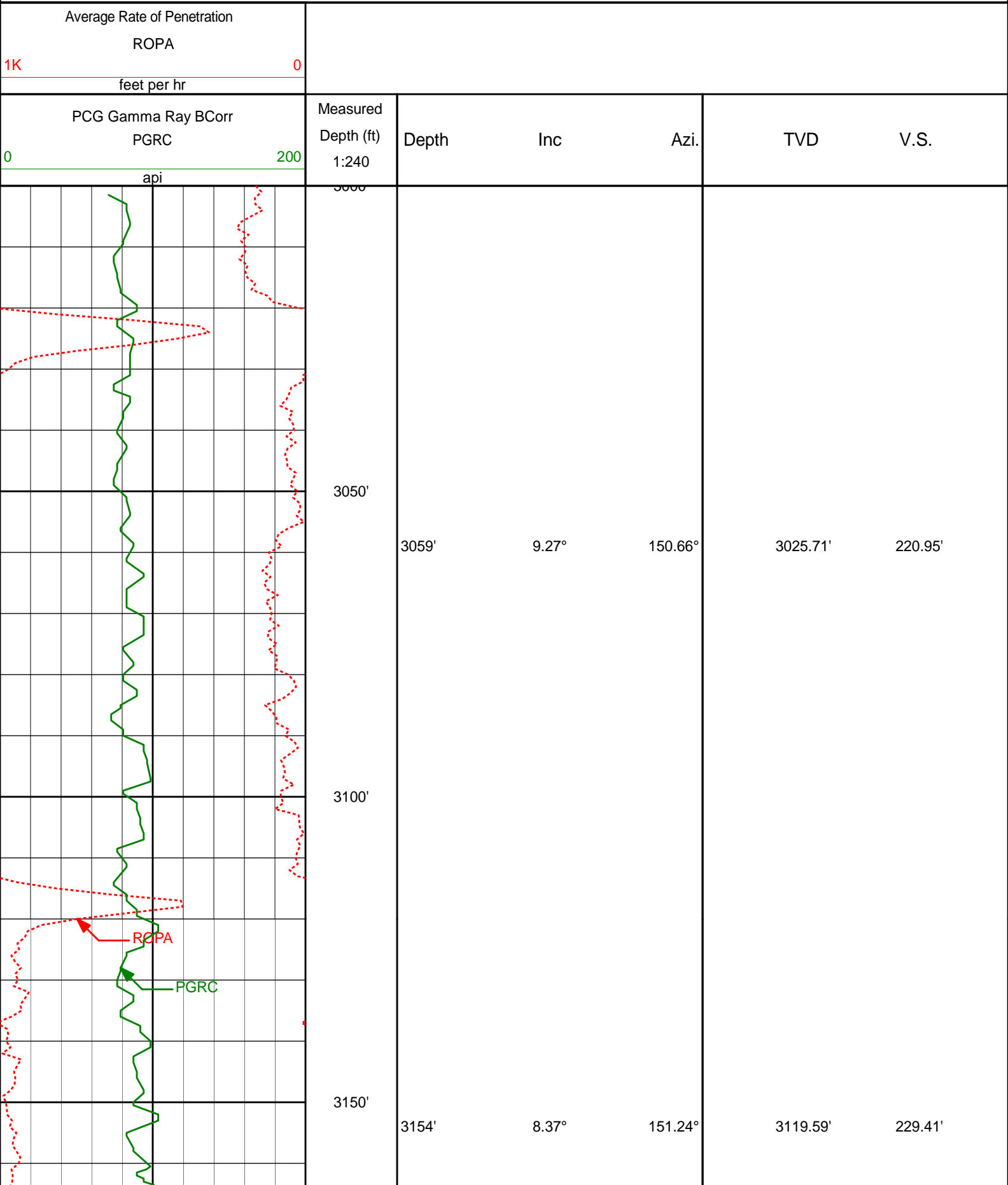
Average Rate of Penetration  
ROPA

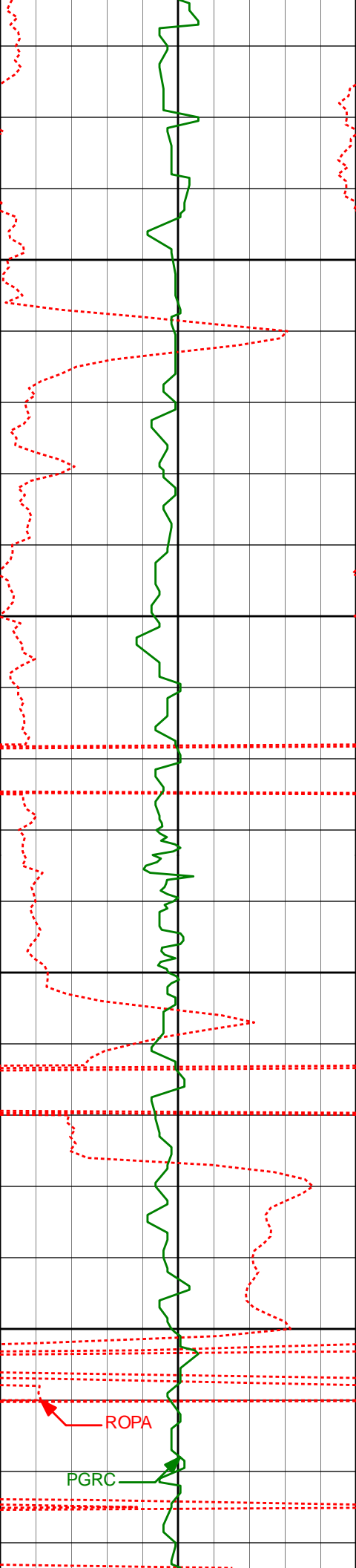
1K0

feet per hr

Measured Depth (ft) 1:600	Depth	Inc	Azi.	TVD	V.S.
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MD Main Log 1:240





3200'

3250'

3300'

3350'

3248'

3343'

3350'

7.39°

8.41°

147.81°

146.66°

3212.70'

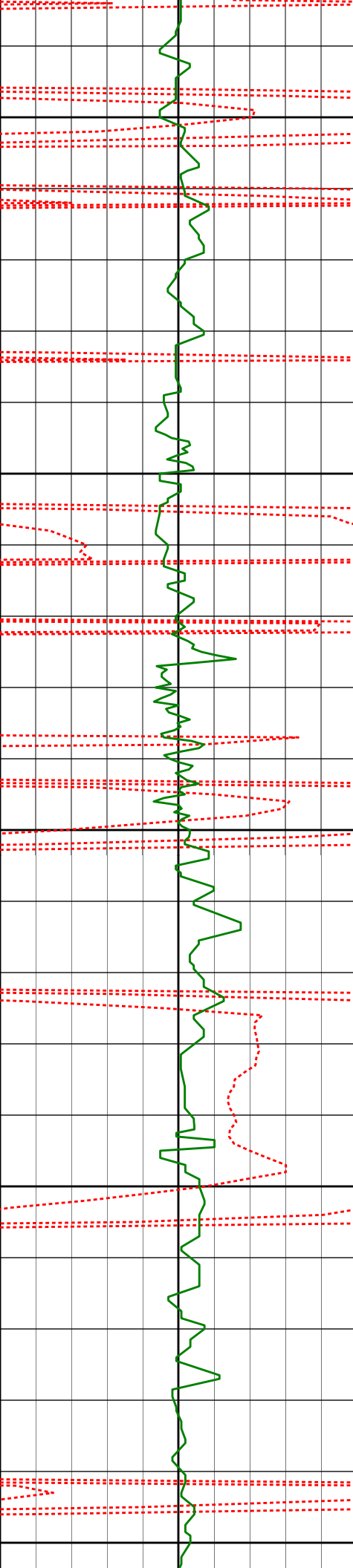
3306.80'

237.13'

245.39'

ROPA

PGRC



3400'

3450'

3500'

3550'

3600'

3438'

7.93°

144.30°

3400.83'

254.23'

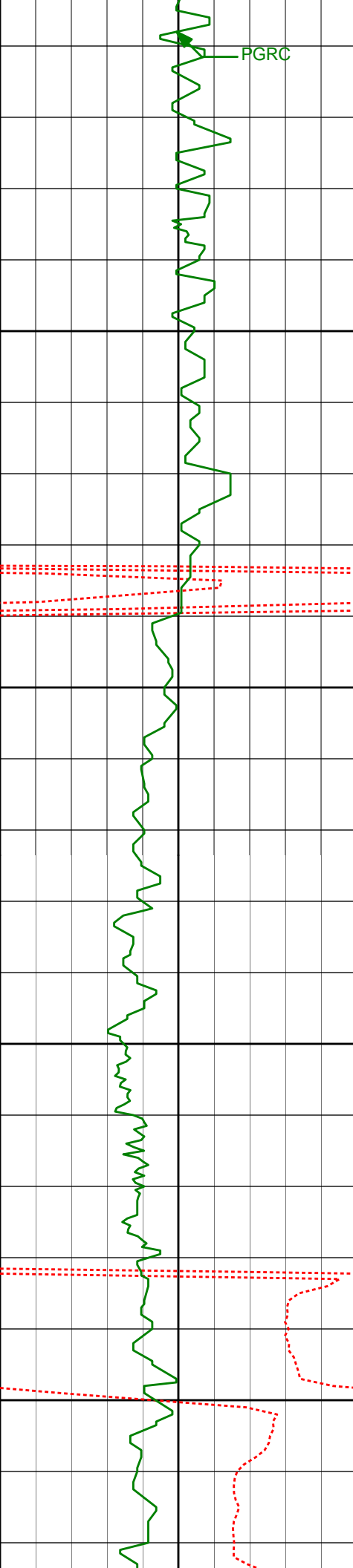
3532'

9.25°

149.77°

3493.78'

263.09'



3627'	8.77°	153.57°	3587.61'	271.58'
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3650'

3700'

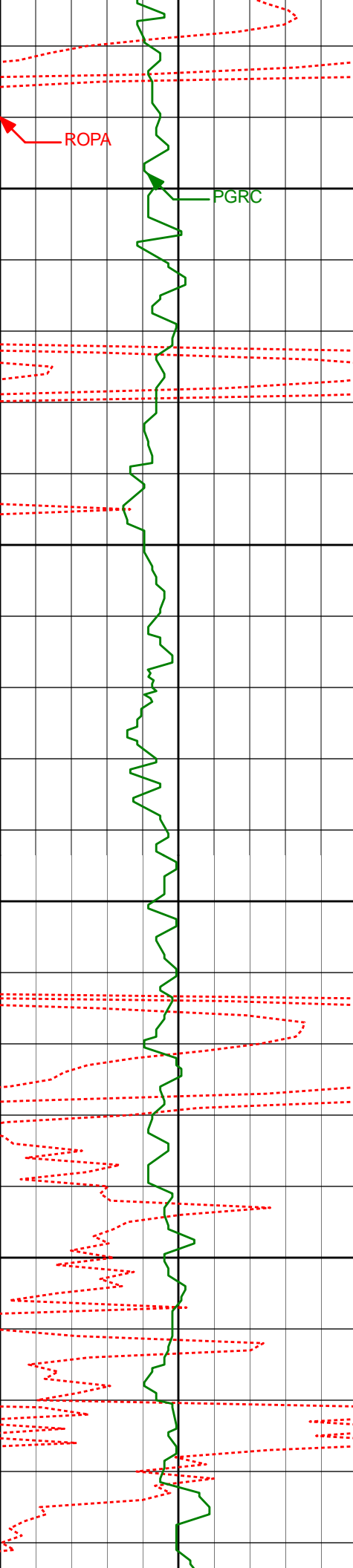
3721'	7.69°	152.54°	3680.64'	278.98'
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3750'

3800'

3816'	10.52°	153.66°	3774.43'	287.22'
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3850'

3900'

3950'

4000'

3910'

4004'

11.77°

11.44°

155.94°

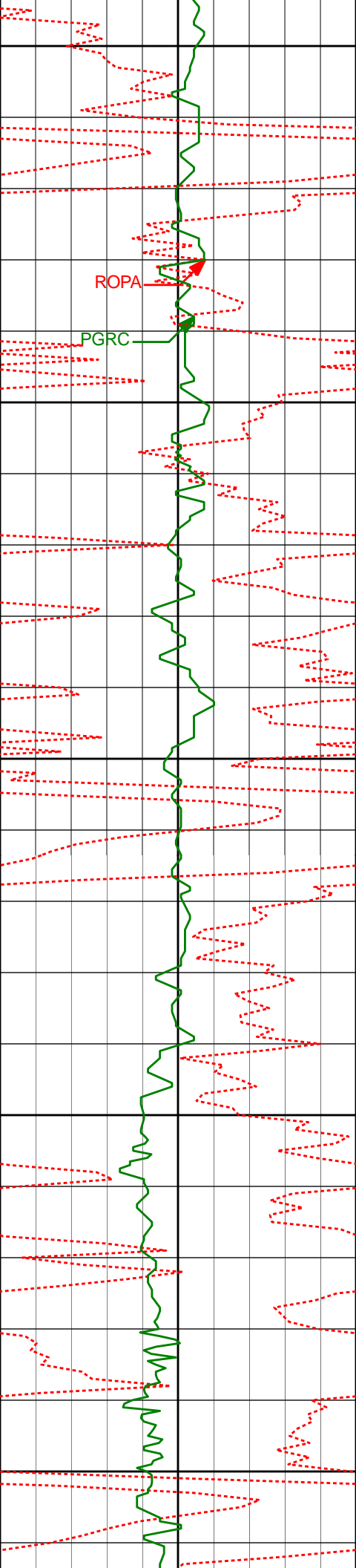
156.71°

3866.66'

3958.73'

296.74'

306.23'



4050'

4100'

4150'

4200'

4250'

4099'

9.91°

155.90°

4052.09'

315.05'

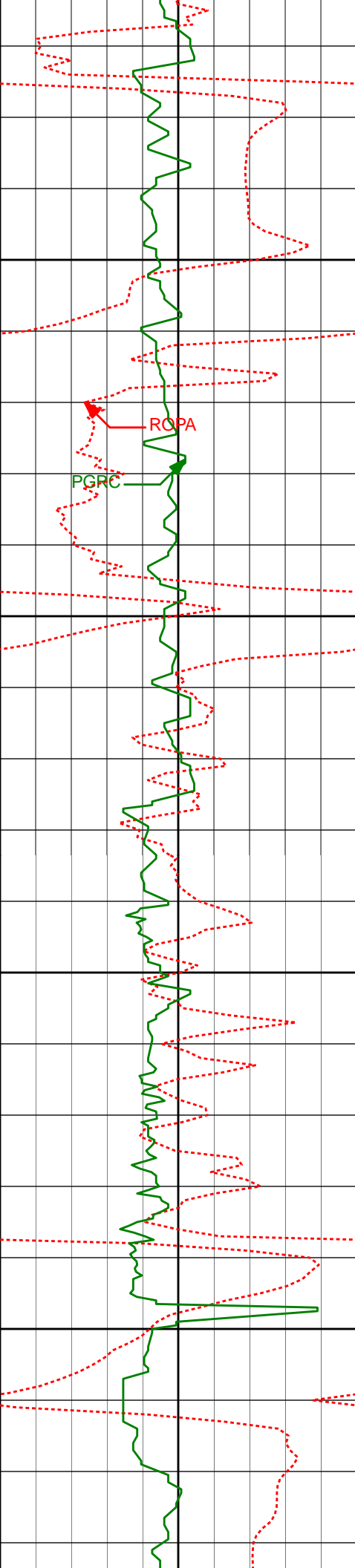
4194'

8.35°

154.42°

4145.88'

322.86'



4288'	9.58°	148.13°	4238.73'	331.33'
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4300'

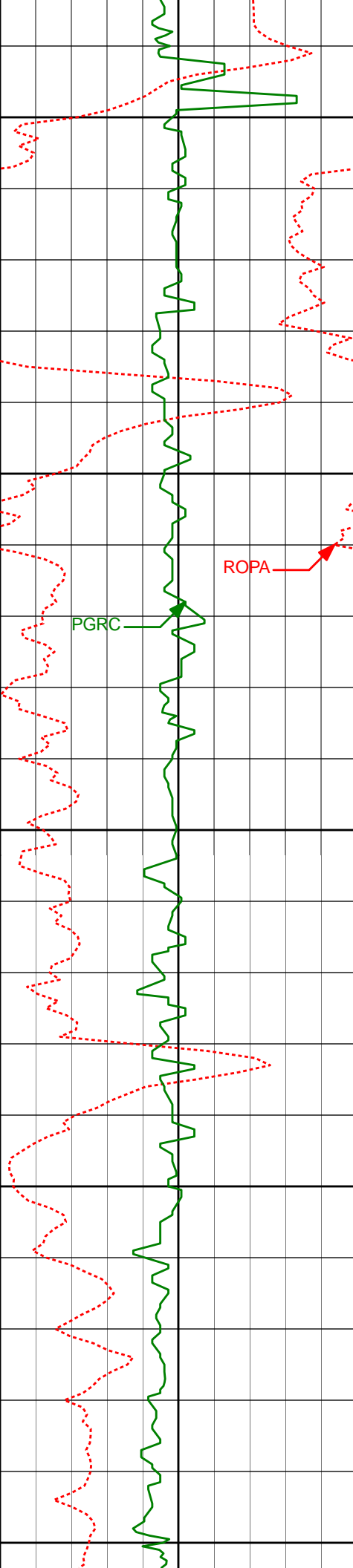
4350'

4383'	8.82°	144.12°	4332.51'	341.14'
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4400'

4450'

4478'	9.59°	149.92°	4426.29'	350.75'
-------	-------	---------	----------	---------



4500'

4550'

4600'

4650'

4700'

ROPA

PGRC

4573'

9.61°

154.92°

4519.96'

359.60'

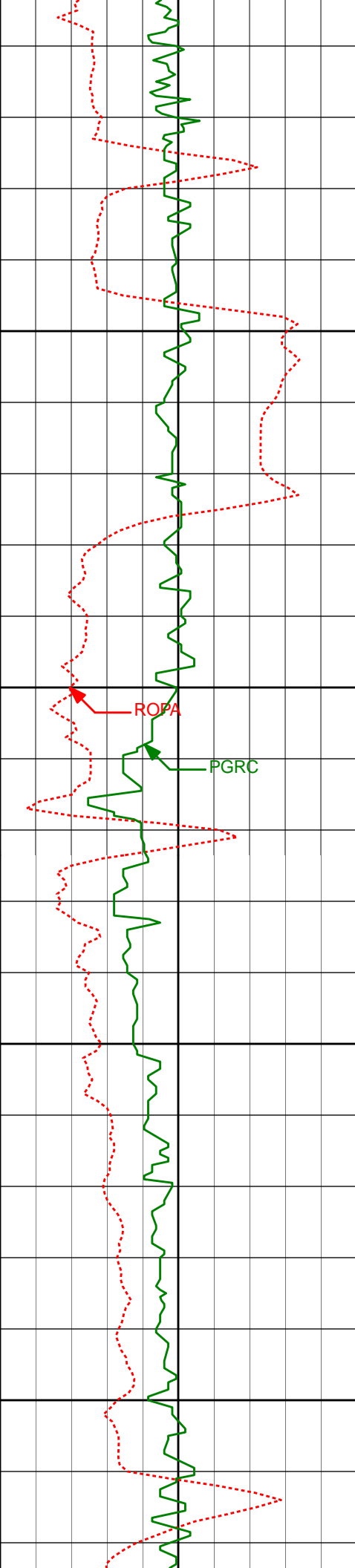
4667'

8.45°

153.73°

4612.79'

367.44'



4750'

4761'

9.34°

149.68°

4705.66'

375.74'

4800'

ROPA

PGRC

4850'

4856'

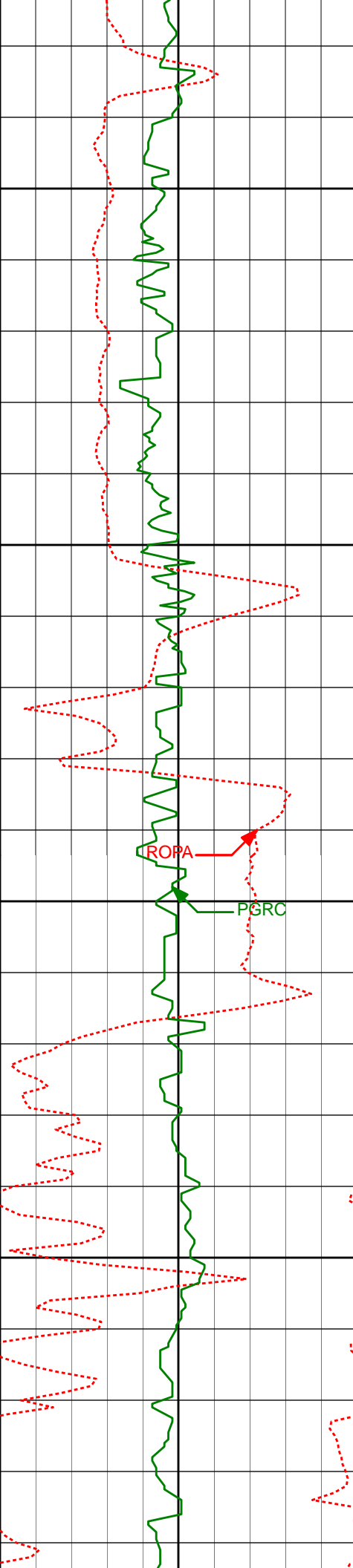
9.39°

152.12°

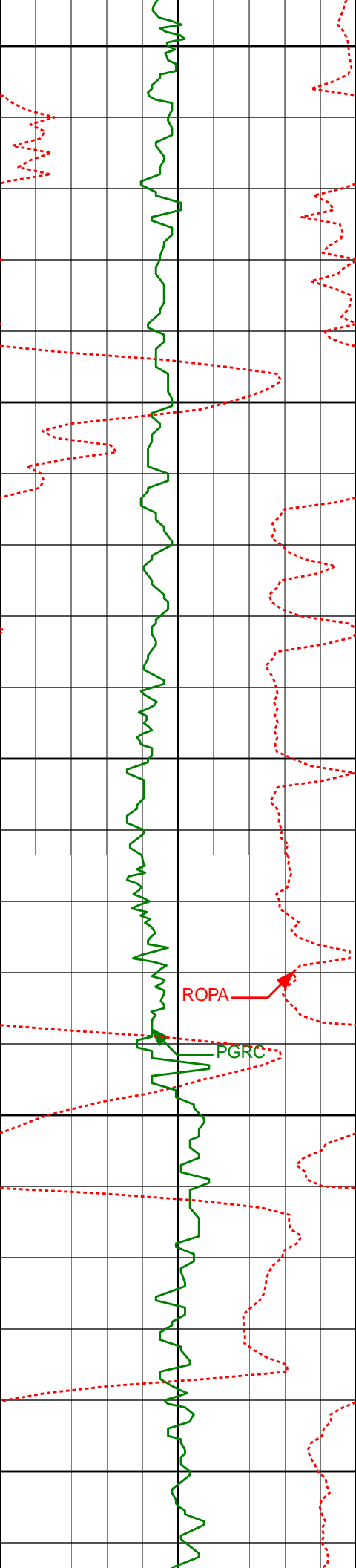
4799.40'

384.72'

4900'



4950'	4950'	8.78°	150.89°	4892.22'	393.21'
5000'					
5045'	5045'	8.94°	146.77°	4986.09'	402.14'
5050'					
5100'					
5139'	5139'	8.95°	140.99°	5078.94'	412.02'



5150'

5200'

5250'

5300'

5350'

5234'

7.74°

138.94°

5172.94'

422.00'

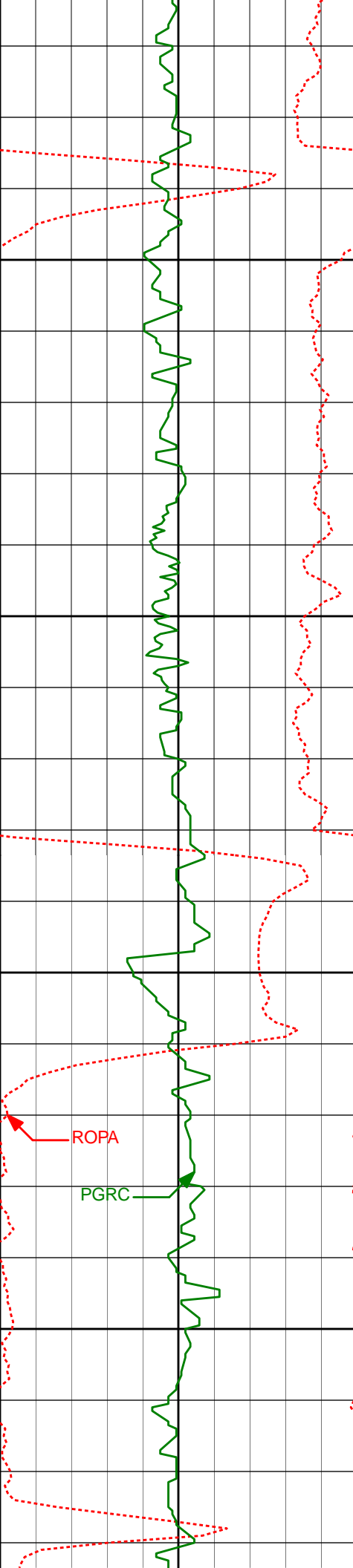
5329'

8.50°

135.31°

5266.99'

432.18'



5400'

5424'

8.08°

130.73°

5360.99'

443.16'

5450'

5500'

5518'

5.32°

136.64°

5454.34'

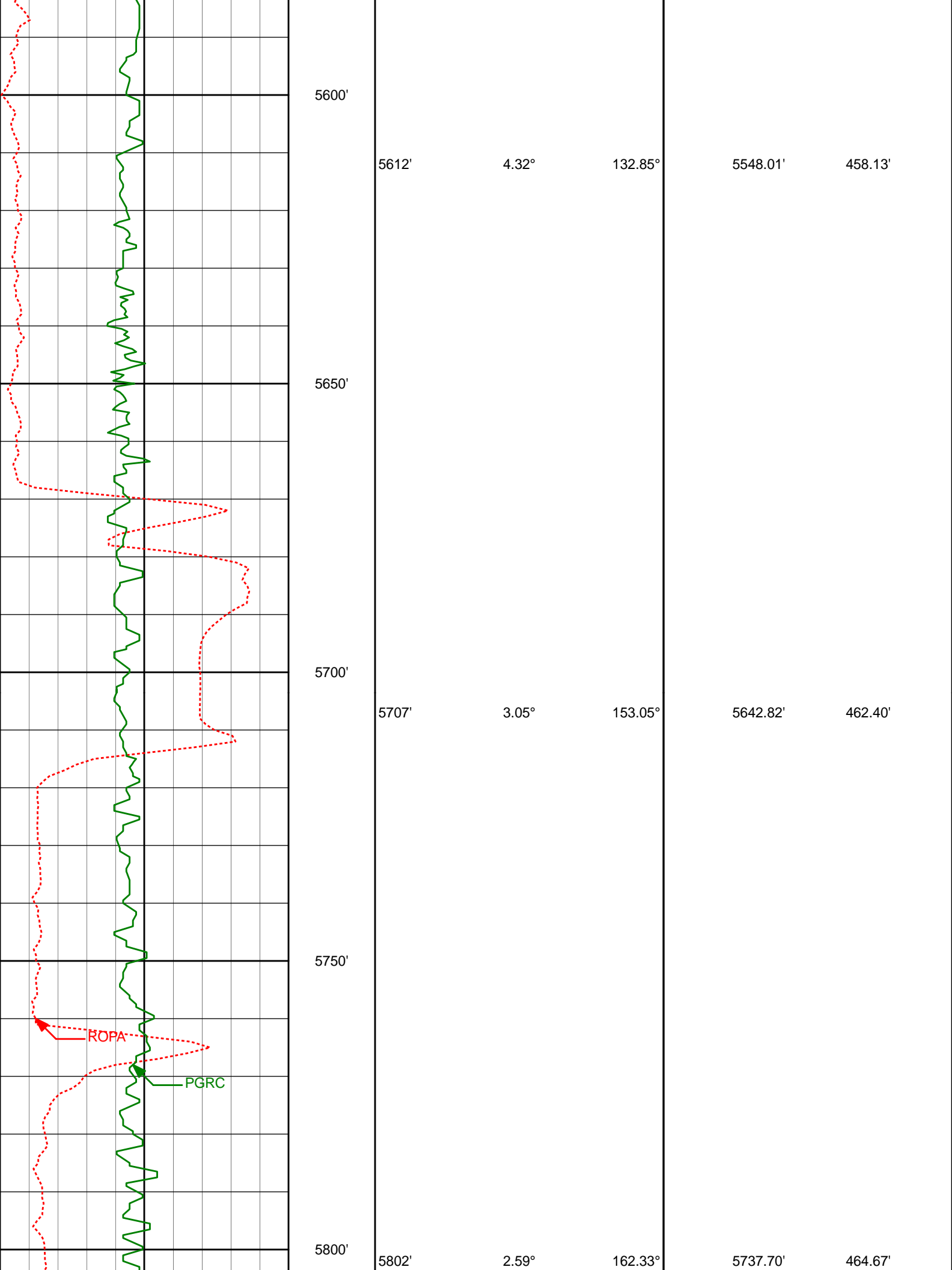
451.95'

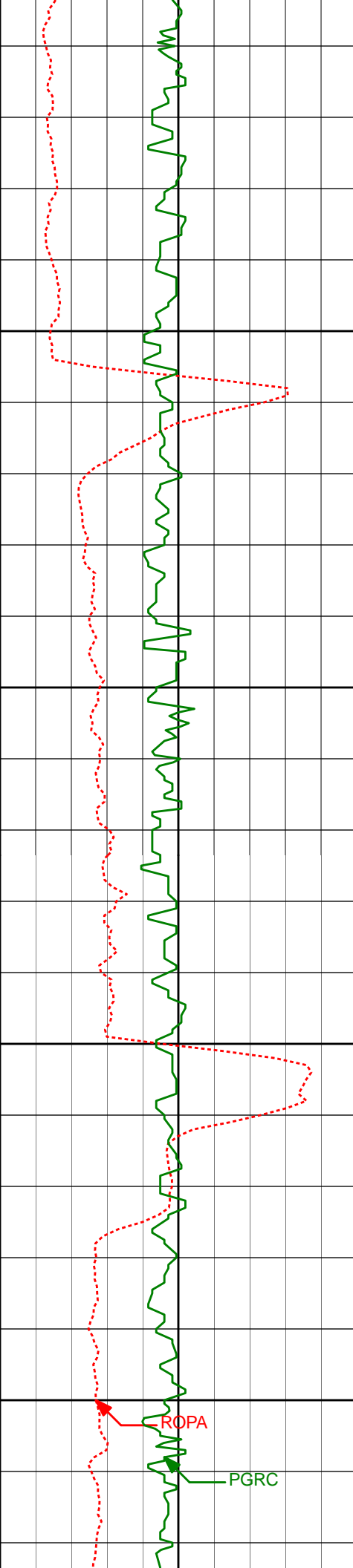
5550'

ROPA

PGRC







5850'

5900'

5950'

6000'

5897'

2.10°

165.10°

5832.62'

466.18'

5991'

1.85°

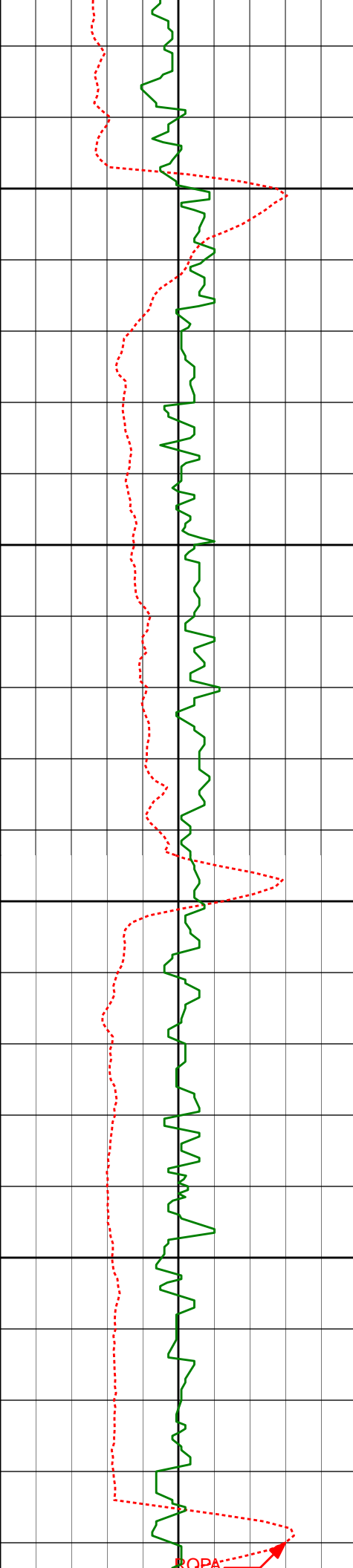
161.16°

5926.56'

467.45'

ROPA

PGRC



6050'

6086'

1.73°

157.32°

6021.52'

468.81'

6100'

6150'

6181'

1.57°

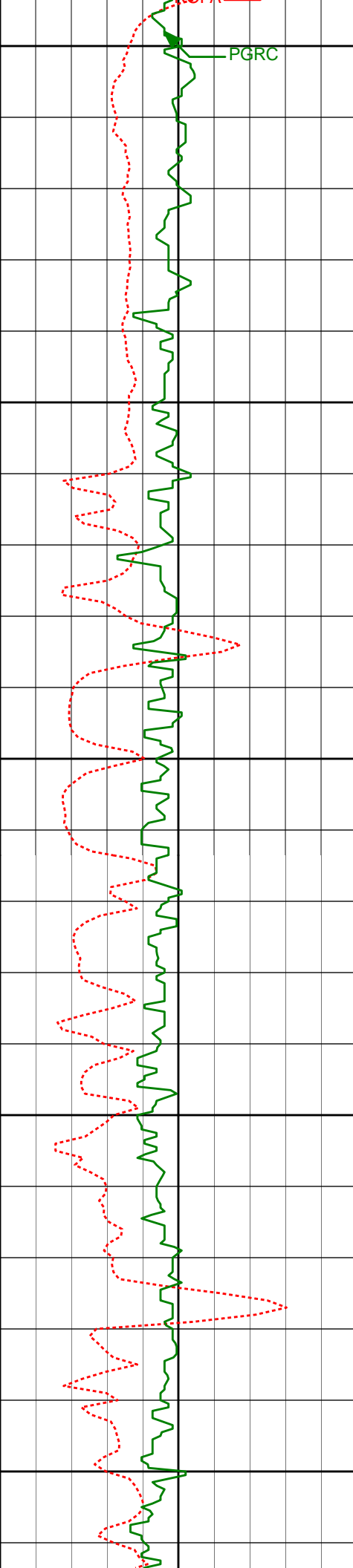
143.57°

6116.48'

470.39'

6200'

POPA



6250'

6276'

1.73°

140.93°

6211.44'

472.30'

6300'

6350'

6370'

1.79°

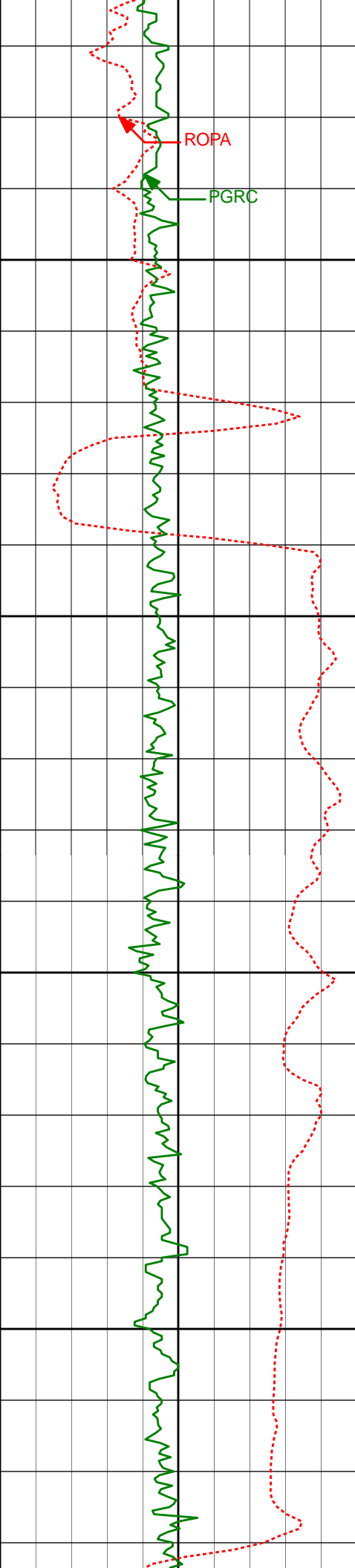
147.45°

6305.40'

474.23'

6400'

6450'



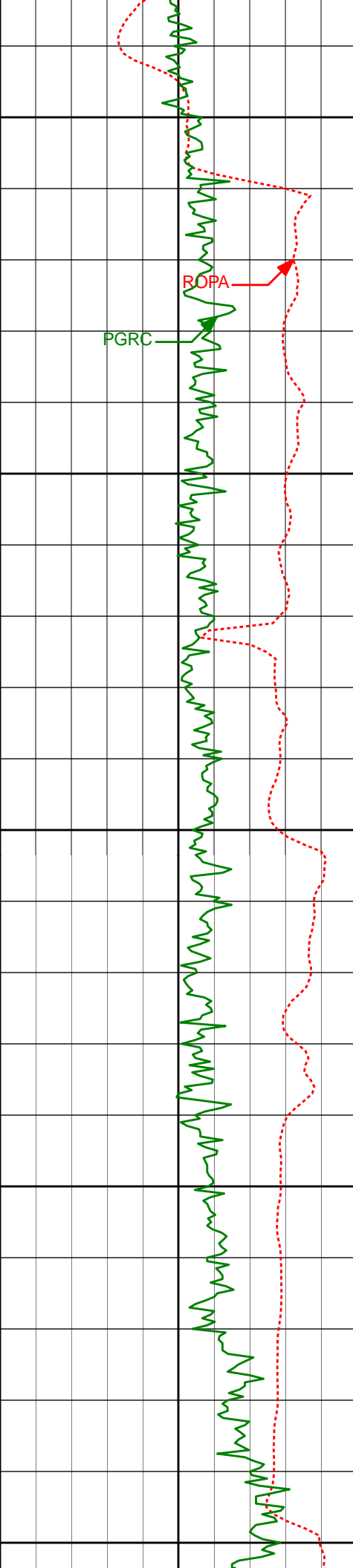
6500'

6550'

6600'

6650'

6465'	1.86°	145.37°	6400.35'	476.18'
6559'	1.92°	160.39°	6494.30'	477.87'
6653'	4.80°	84.19°	6588.16'	482.41'



6700'

6750'

6800'

6850'

6900'

6748'

10.78°

78.23°

6682.24'

494.75'

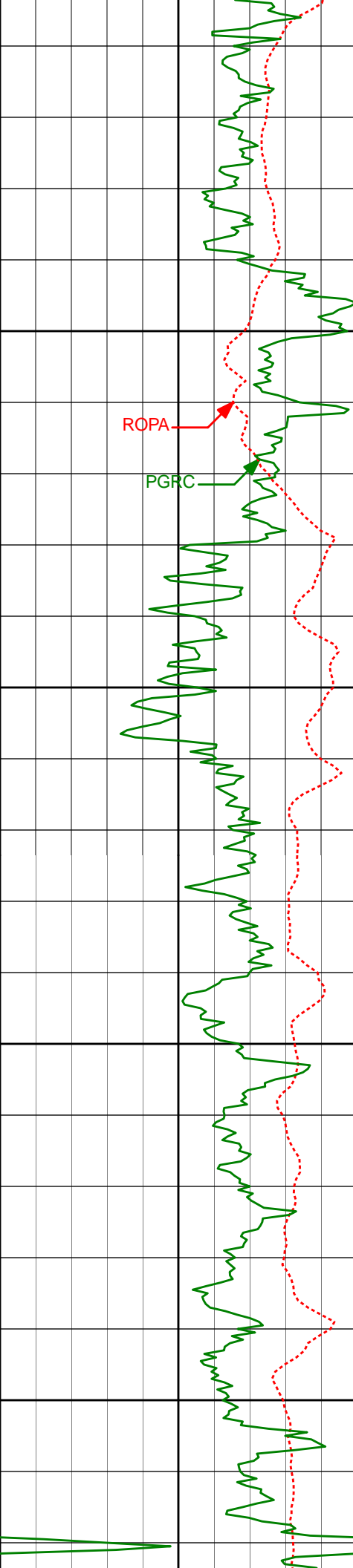
6843'

19.33°

76.63°

6773.90'

518.02'



6950'

7000'

7050'

7100'

6937'

27.75°

83.20°

6860.01'

554.03'

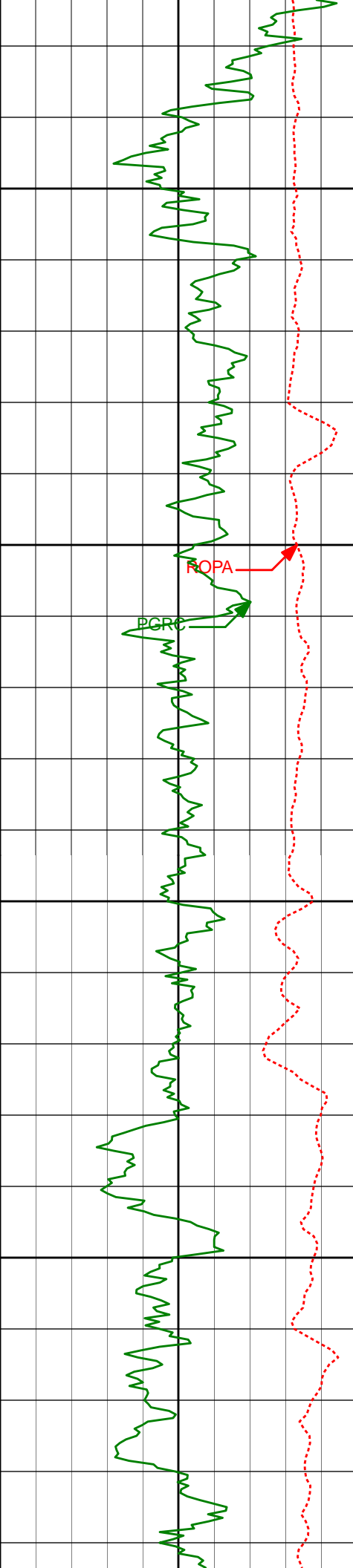
7032'

37.69°

87.94°

6939.85'

604.42'



7150'

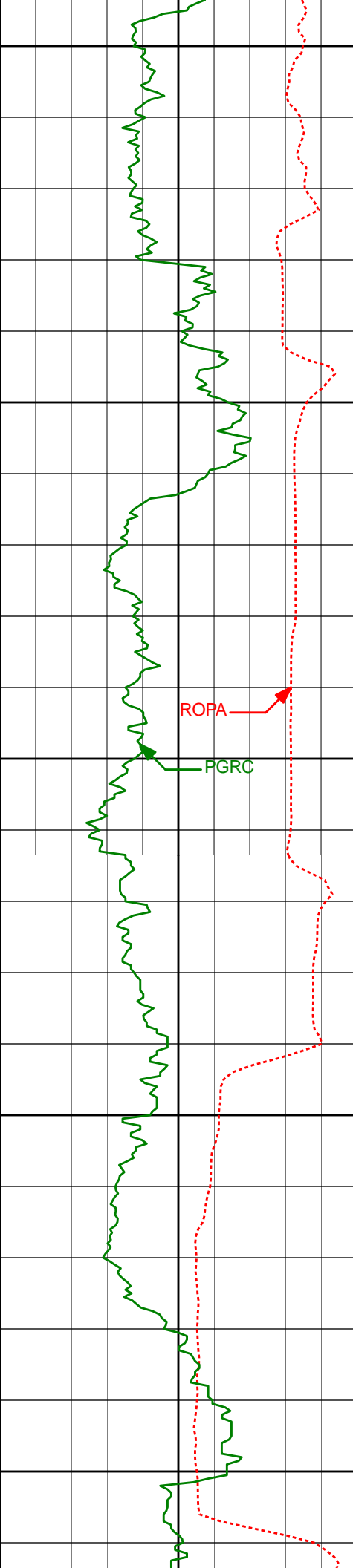
7200'

7250'

7300'

7126'	49.22°	88.58°	7007.97'	668.31'
7221'	62.73°	88.81°	7061.00'	746.15'
7315'	77.17°	92.10°	7093.15'	833.73'
7339'	81.28°	93.10°	7097.64'	857.25'





7350'



Casing Shoe @ 7385'

Run200

7400'

ROPA

PGRC

7450'

7500'

7501'

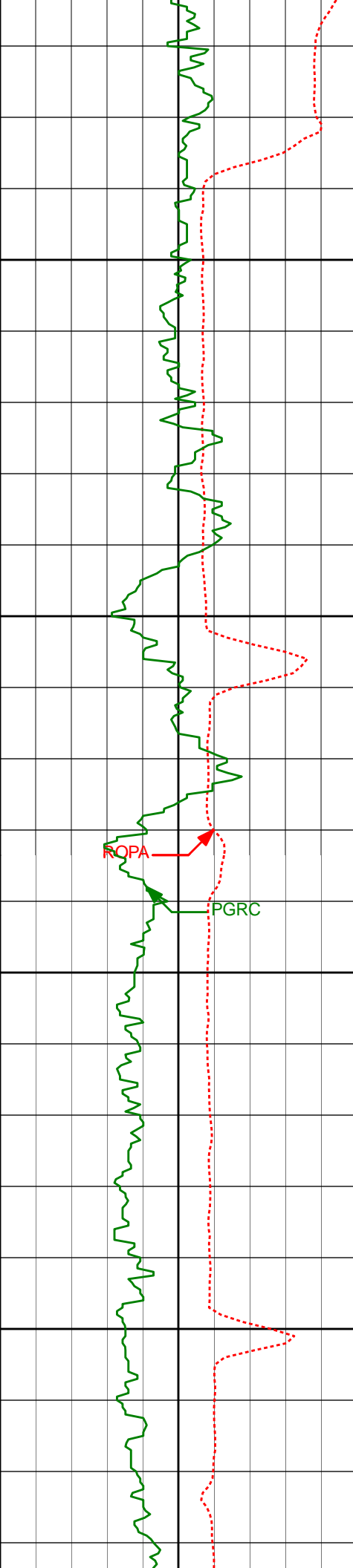
86.58°

91.50°

7114.77'

1017.86'

7550'



7600'

7650'

7700'

7750'

7596'

88.40°

90.77°

7118.93'

1112.36'

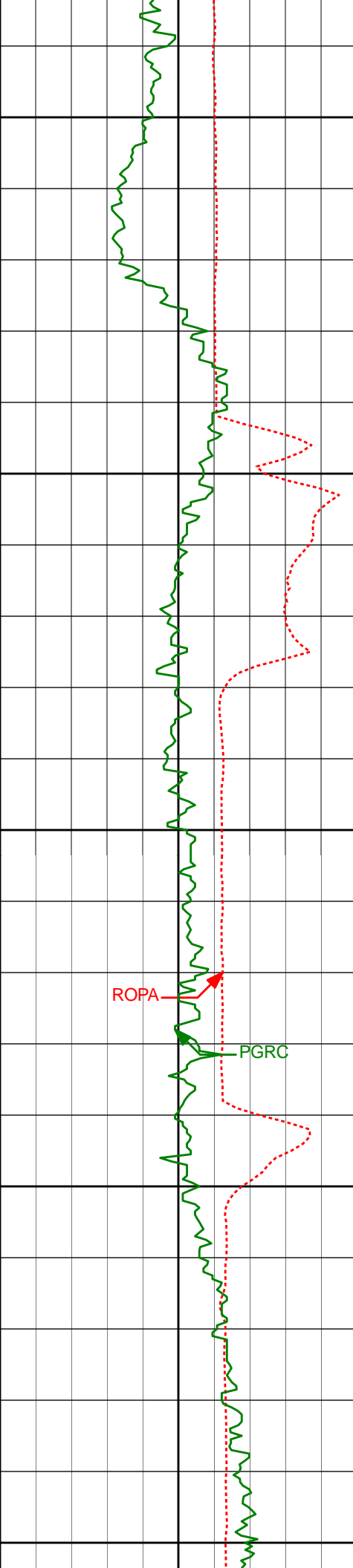
7690'

88.43°

89.55°

7121.53'

1205.75'



7800'

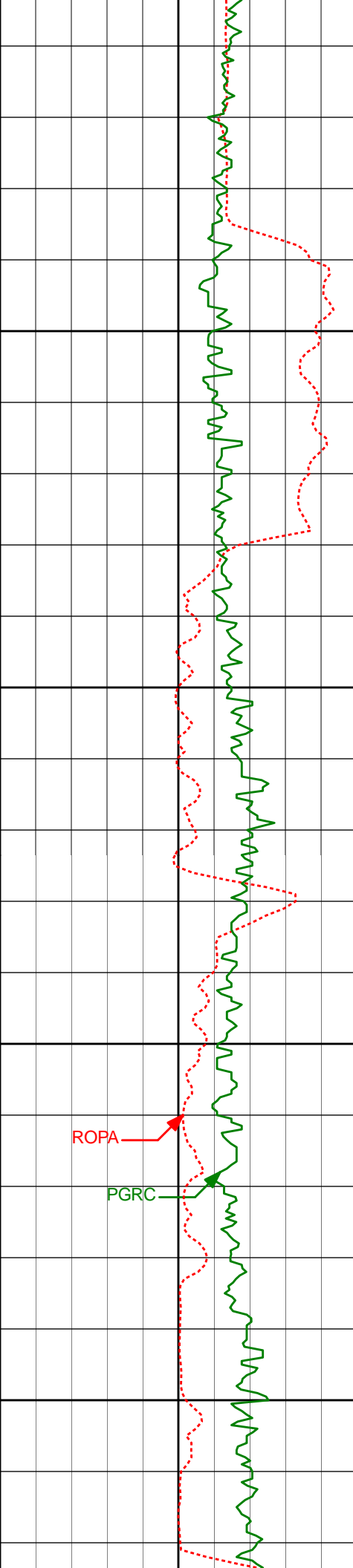
7850'

7900'

7950'

8000'

7785'	87.47°	88.87°	7124.92'	1299.94'
7879'	90.22°	89.68°	7126.82'	1393.17'
7973'	89.66°	88.96°	7126.92'	1486.45'



8050'

8067'

91.39°

90.35°

7126.06'

1579.78'

8100'

8150'

ROPA

PGRC

8161'

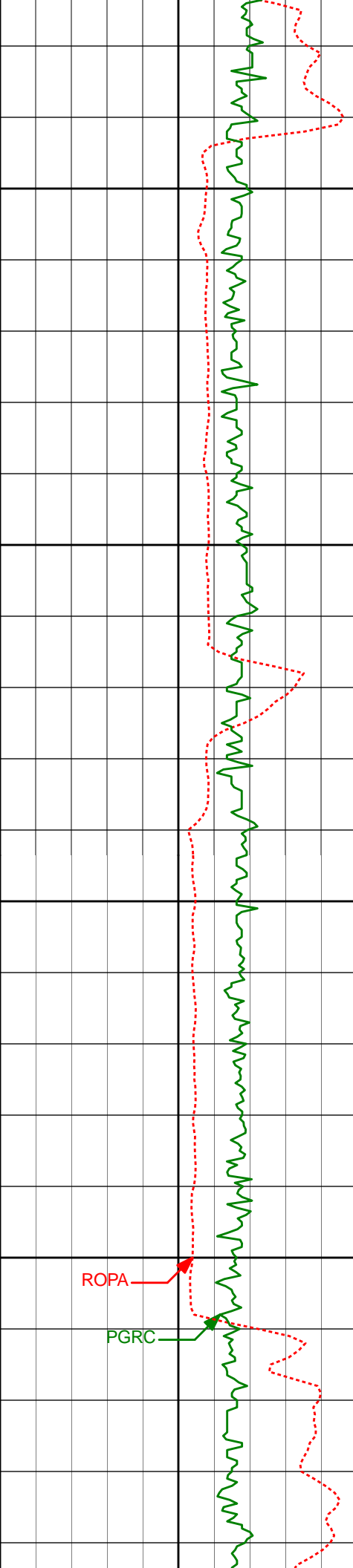
90.46°

90.24°

7124.54'

1673.23'

8200'



8250'

8256'

90.31°

90.51°

7123.90'

1767.69'

8300'

8350'

8351'

89.97°

87.76°

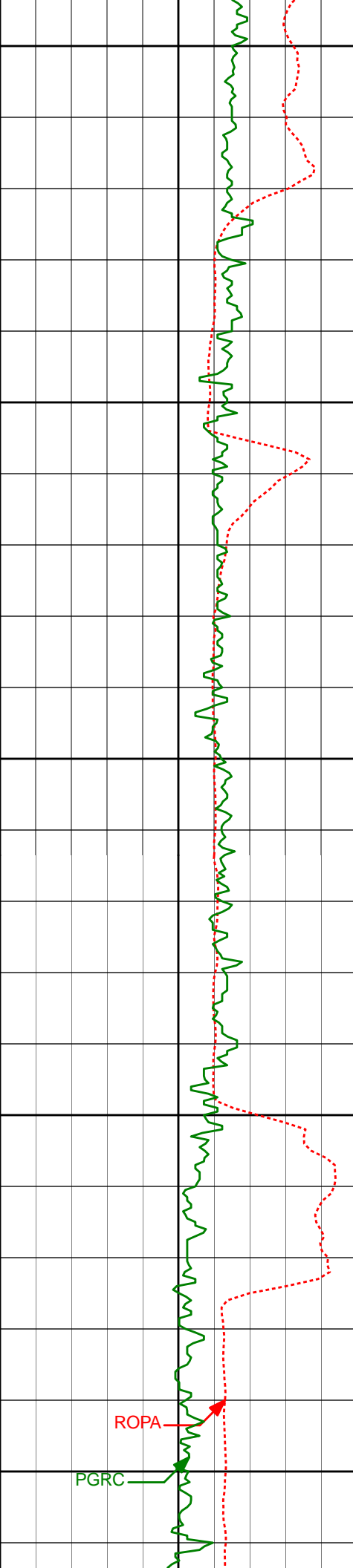
7123.67'

1861.91'

8400'

ROPA

PGRC



8450'

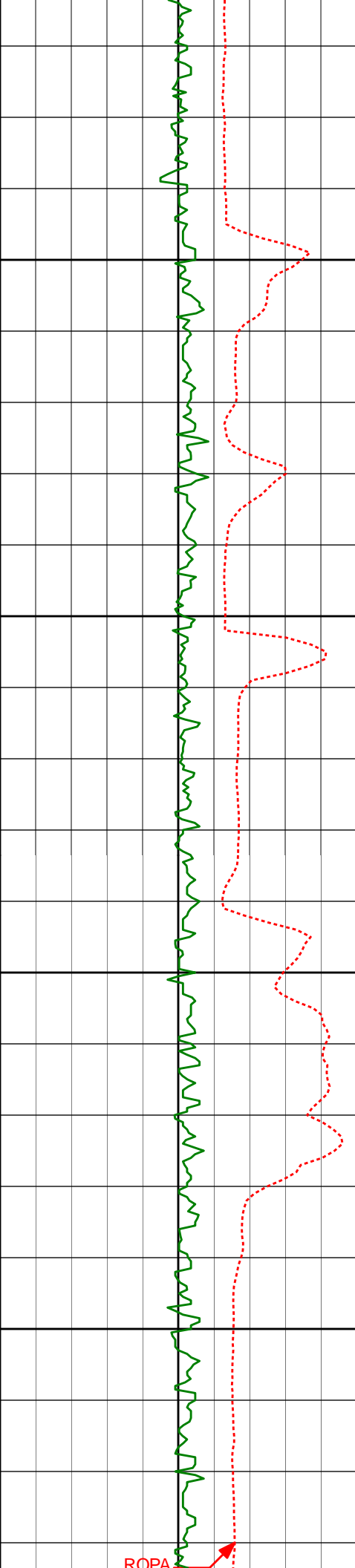
8500'

8550'

8600'

8650'

8446'	90.03°	88.70°	7123.67'	1955.94'
8540'	89.91°	89.64°	7123.72'	2049.18'
8635'	90.34°	90.63°	7123.51'	2143.61'



8700'

8729'

89.60°

90.06°

7123.56'

2237.07'

8750'

8800'

8824'

90.18°

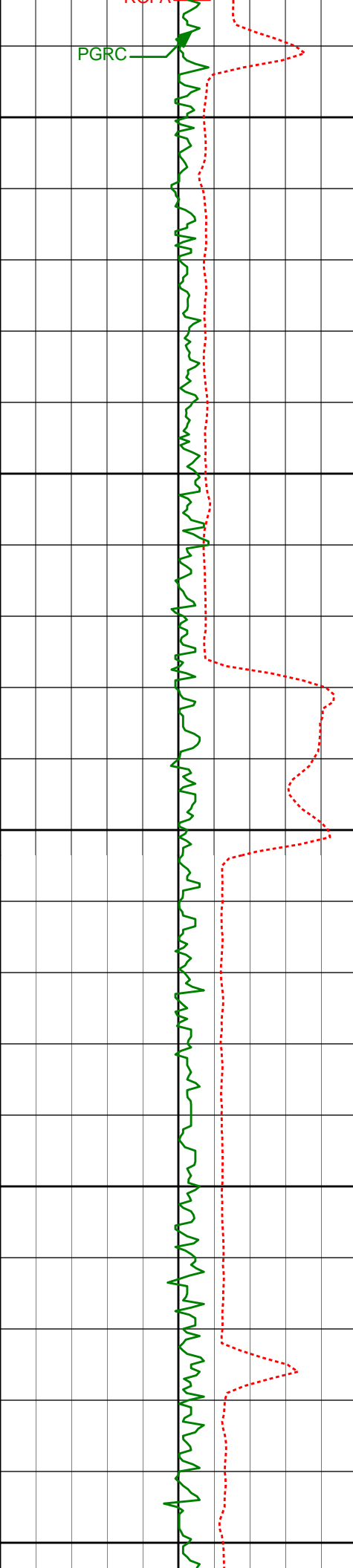
91.26°

7123.74'

2331.59'

8850'

ROPA



8900'

8918'

89.08°

90.24°

7124.35'

2425.12'

8950'

9000'

9013'

89.85°

93.12°

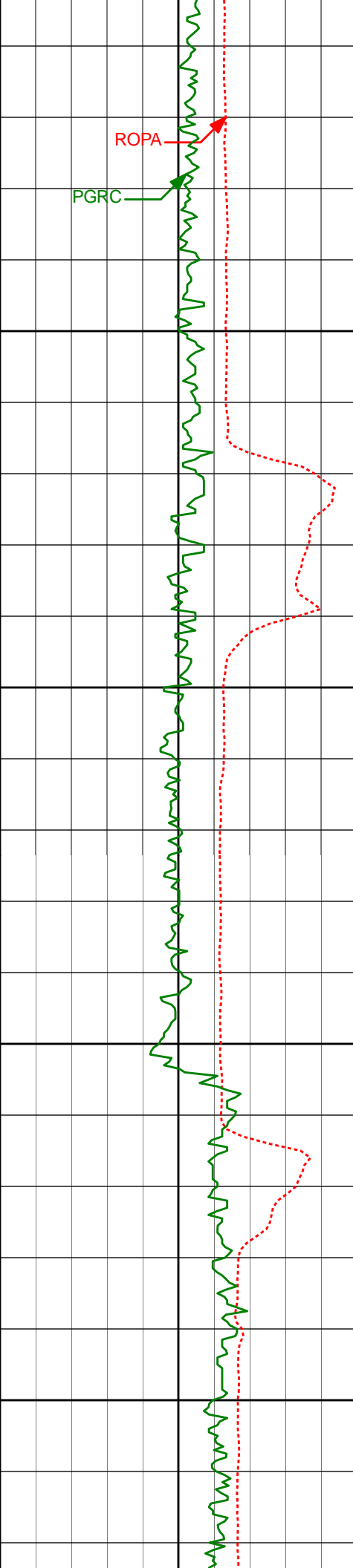
7125.24'

2519.78'

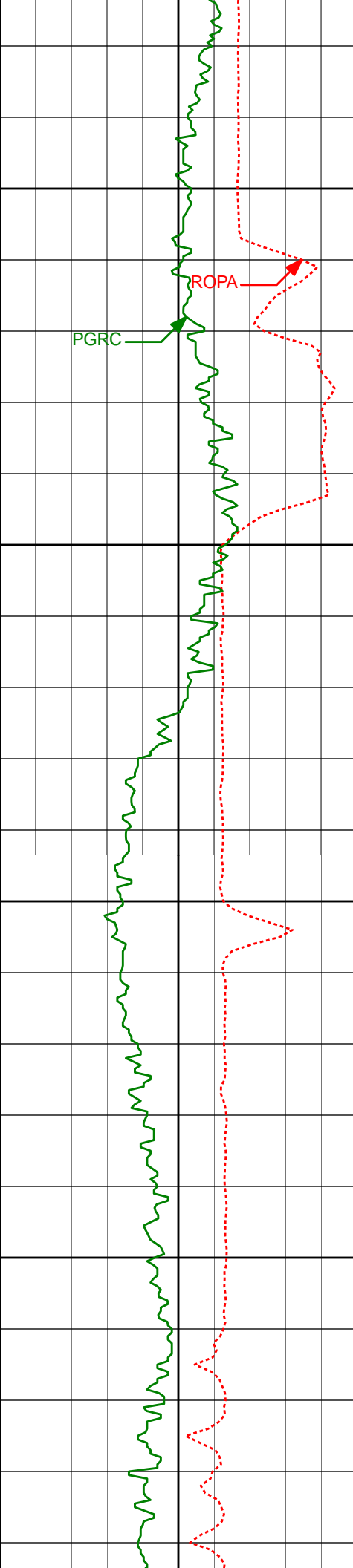
9050'

9100'





	9108'	89.85°	93.02°	7125.49'	2614.61'
9150'					
9200'	9202'	91.23°	93.20°	7124.60'	2708.45'
9250'					
9300'	9297'	89.66°	91.07°	7123.86'	2803.17'



9350'

9391'

91.97°

90.59°

7122.52'

2896.70'

9400'

9450'

9486'

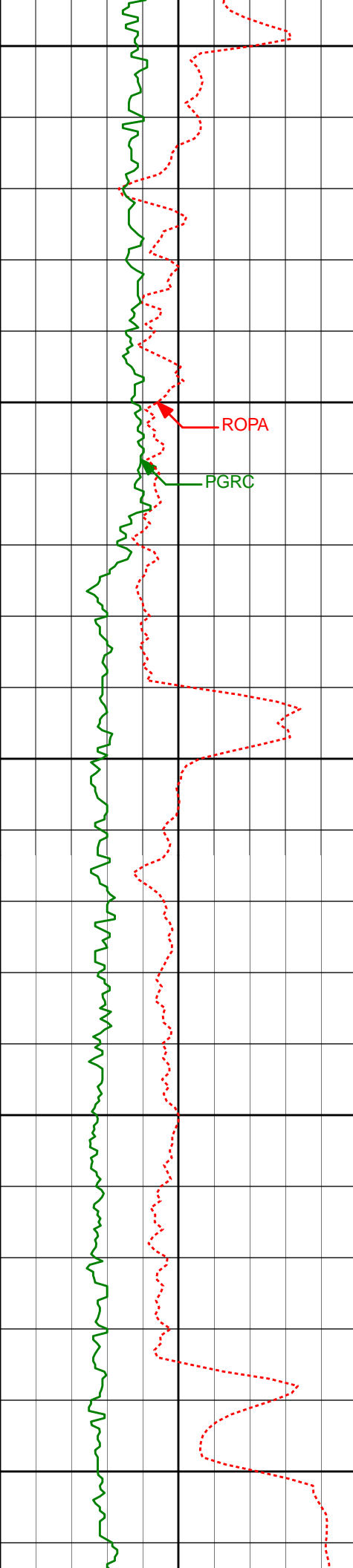
91.73°

89.66°

7119.46'

2991.08'

9500'



9550'

9581'

91.63°

89.16°

7116.67'

3085.32'

9600'

ROPA

PGRC

9650'

9675'

90.19°

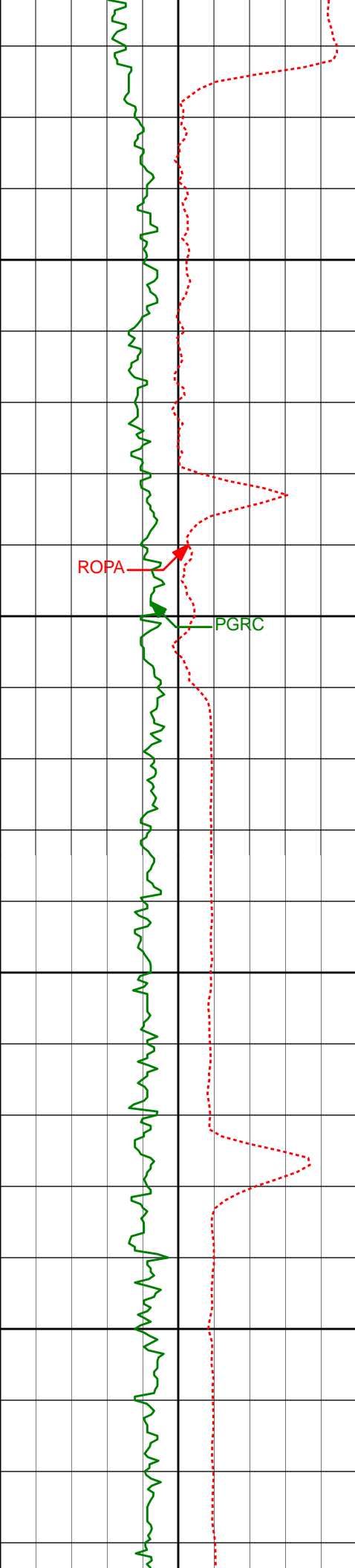
88.33°

7115.18'

3178.46'

9700'

9750'



9800'

9850'

9900'

9950'

9770'

91.75°

90.03°

7113.57'

3272.68'

9865'

91.33°

89.27°

7111.02'

3366.98'

9960'

90.22°

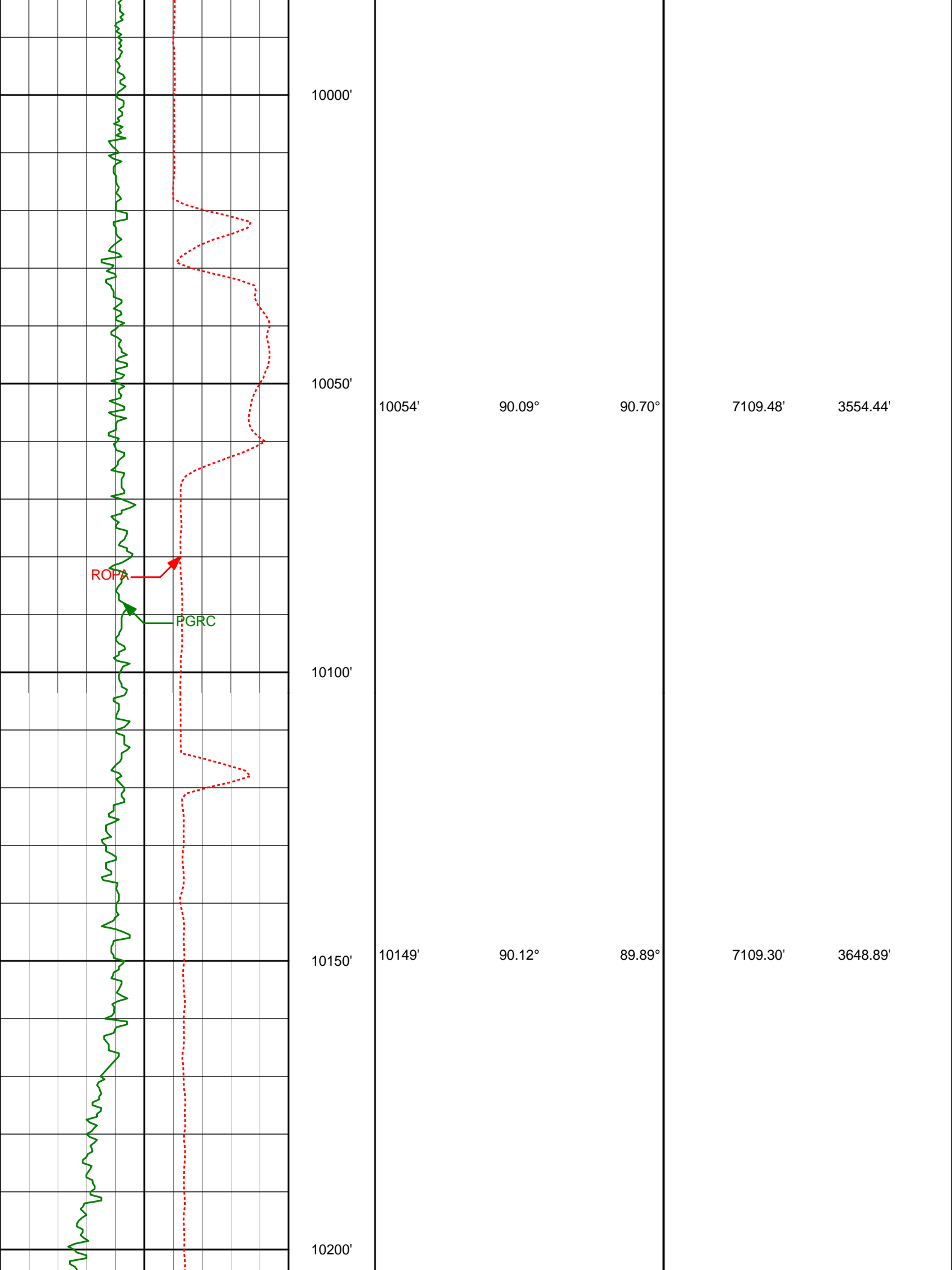
88.36°

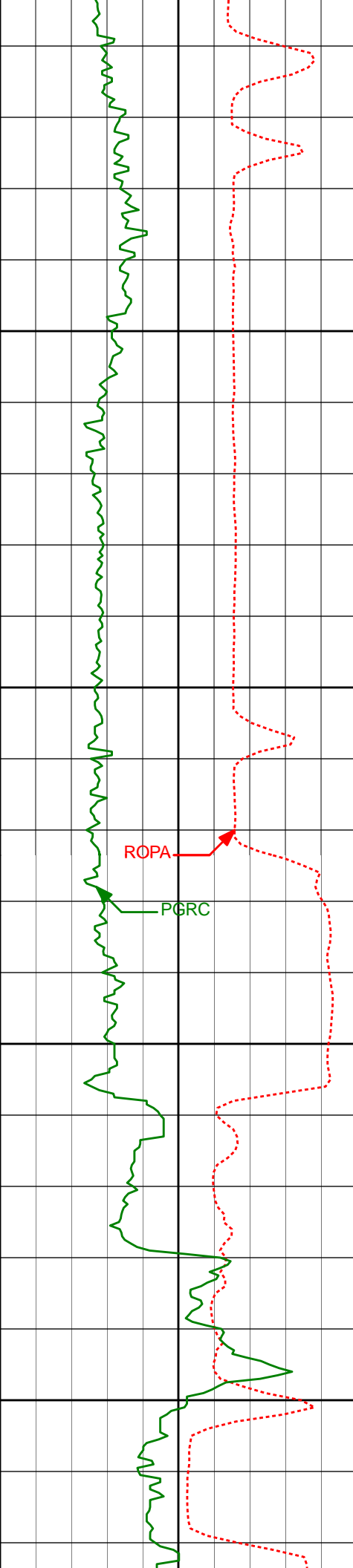
7109.73'

3461.12'

ROPA

PGRC





10250'

10300'

10350'

10400'

10244'

91.14°

89.72°

7108.26'

3743.25'

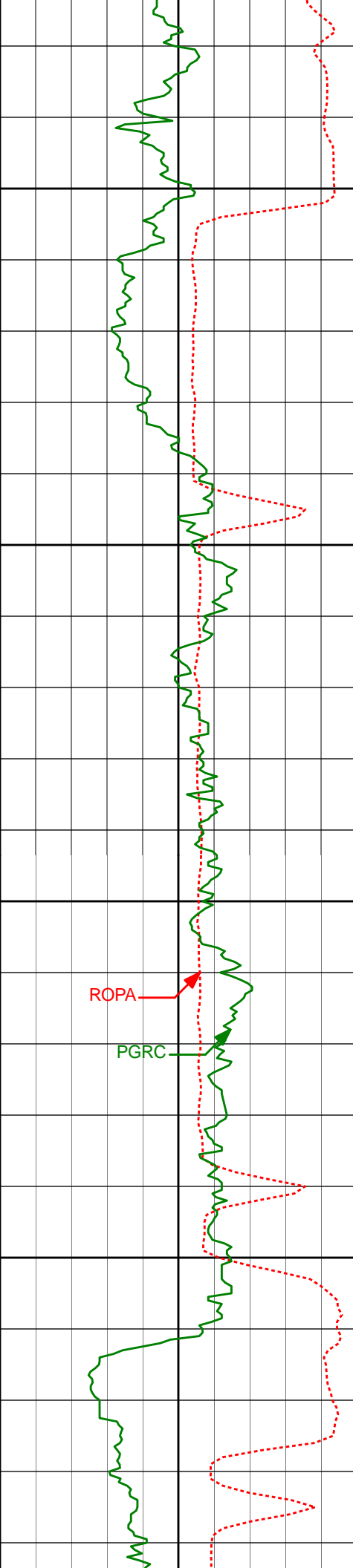
10338'

91.26°

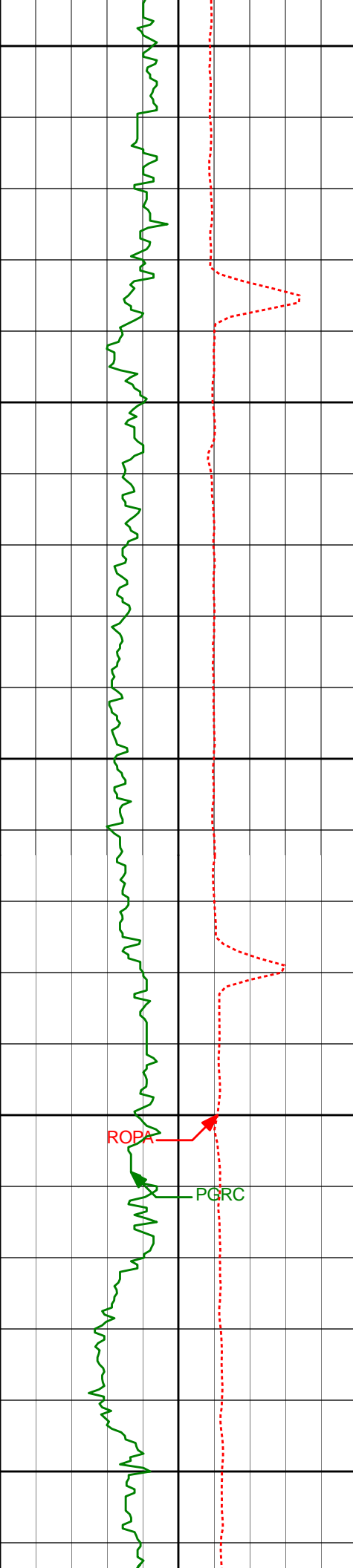
91.64°

7106.29'

3836.75'



10433'	89.11°	93.35°	7105.98'	3931.51'
10450'				
10500'				
10528'	86.82°	93.40°	7109.36'	4026.31'
10550'				
10600'				
10622'	87.69°	91.01°	7113.86'	4119.94'



10650'

10700'

10750'

10800'

10850'

10716'

88.28°

89.90°

7117.17'

4213.36'

10811'

87.53°

90.06°

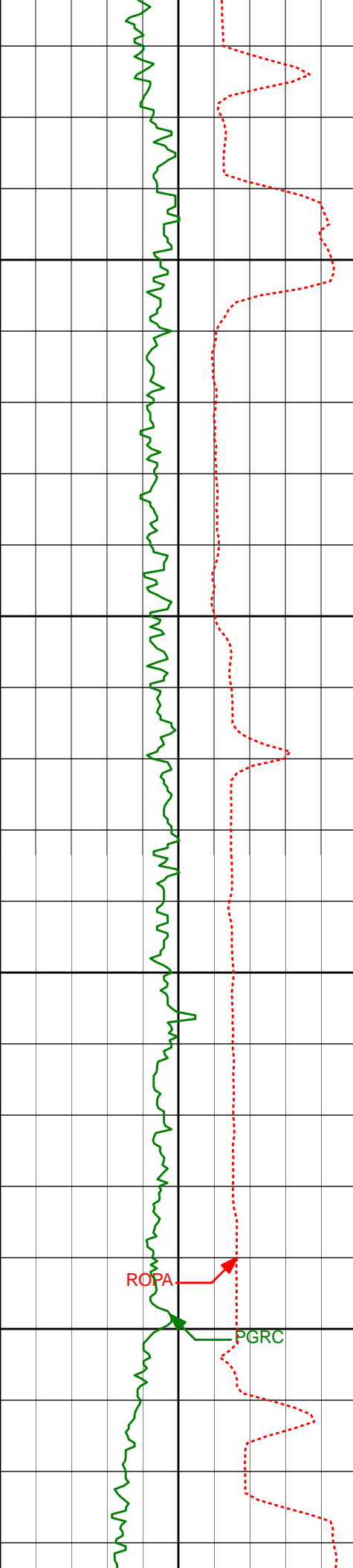
7120.64'

4307.70'

ROPA

PGRC





10900'

10950'

11000'

11050'

10905'

10999'

88.89°

89.05°

89.26°

88.63°

7123.57'

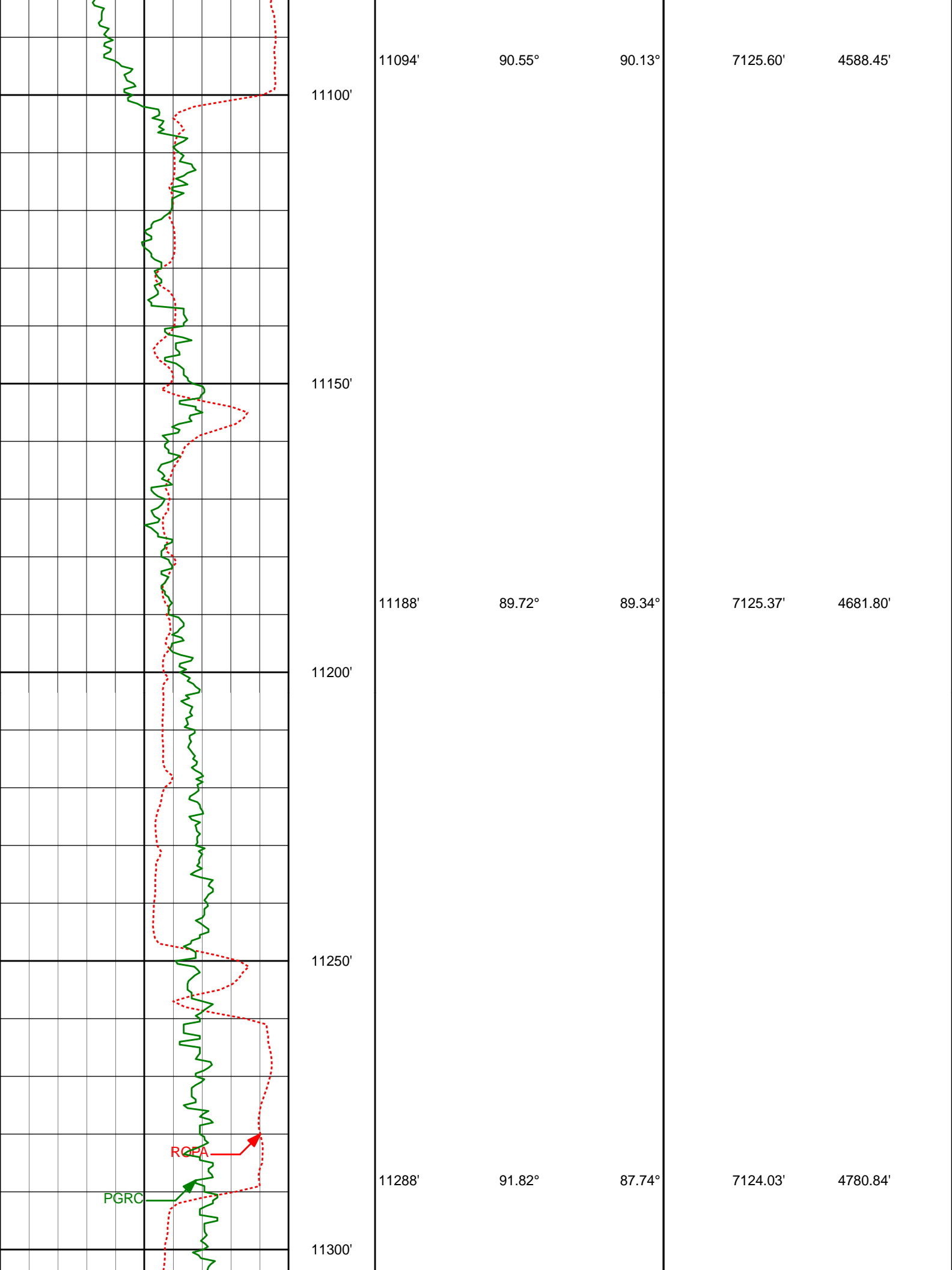
7125.26'

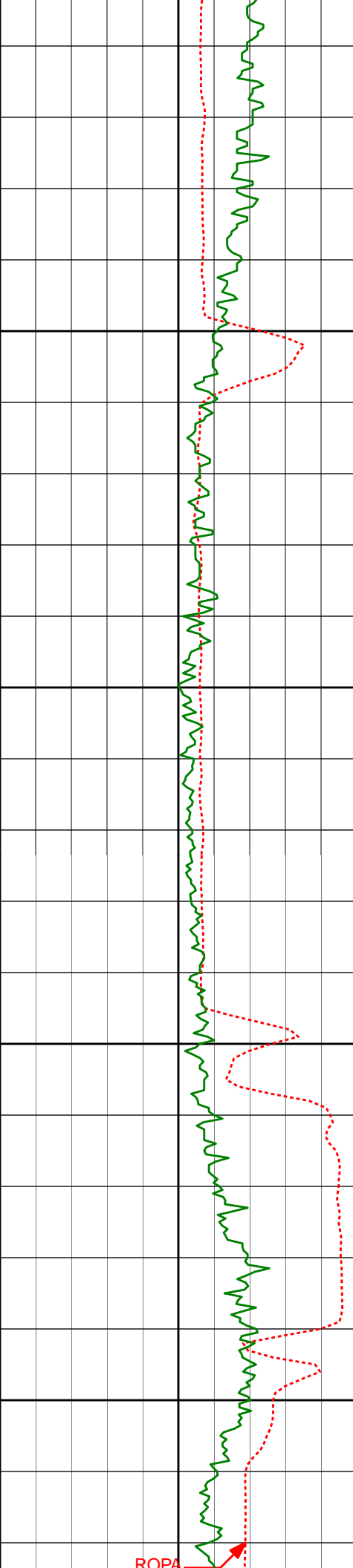
4400.99'

4494.17'

ROPA

PGRC





11350'

11383'

91.33°

87.30°

7121.42'

4874.65'

11400'

11450'

11478'

92.28°

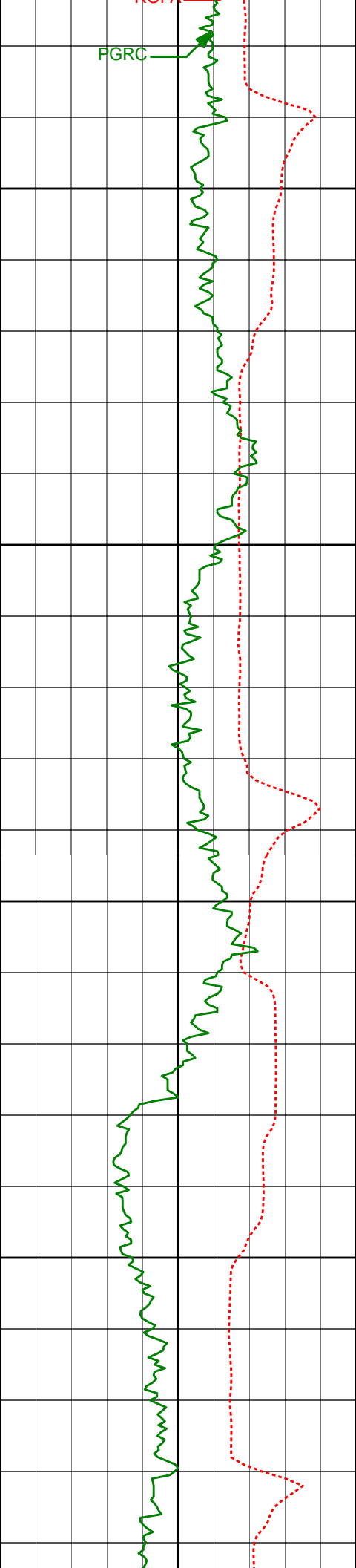
89.40°

7118.43'

4968.65'

11500'

ROPA



11550'

11572'

92.50°

88.82°

7114.51'

5061.80'

11600'

11650'

11667'

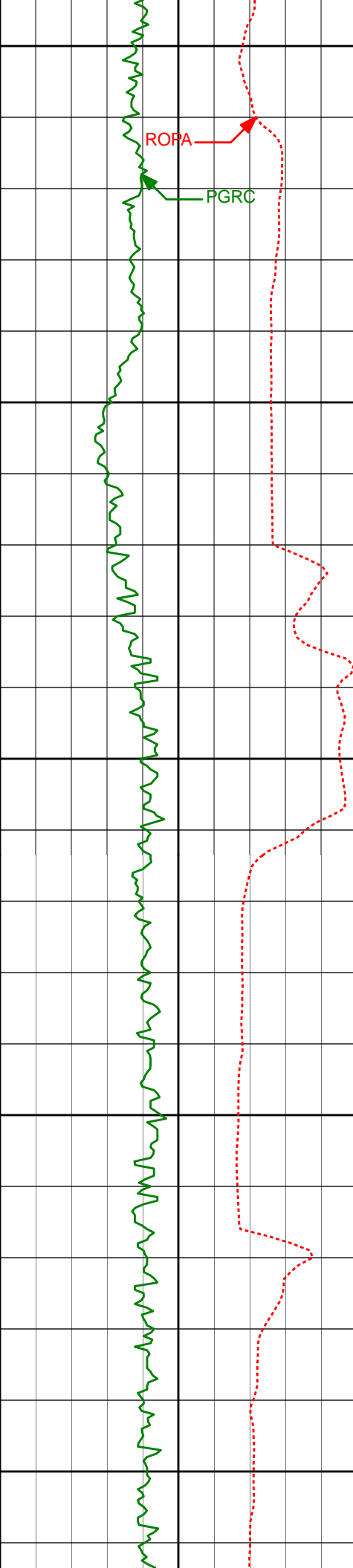
91.91°

88.67°

7110.85'

5155.88'

11700'



11750'

11762'

91.97°

87.81°

7107.64'

5249.85'

ROPA

PGRC

11800'

11850'

11857'

91.66°

89.65°

7104.63'

5343.94'

11900'

11950'

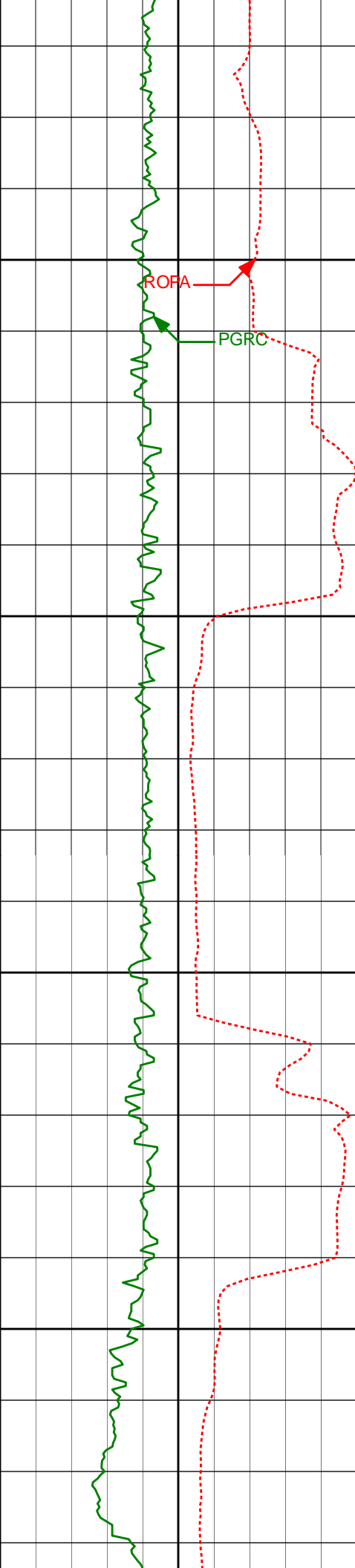
11952'

90.65°

89.63°

7102.71'

5438.25'



12000'

ROFA

PGRC

12050'

12100'

12150'

12047'

91.08°

91.45°

7101.28'

5532.73'

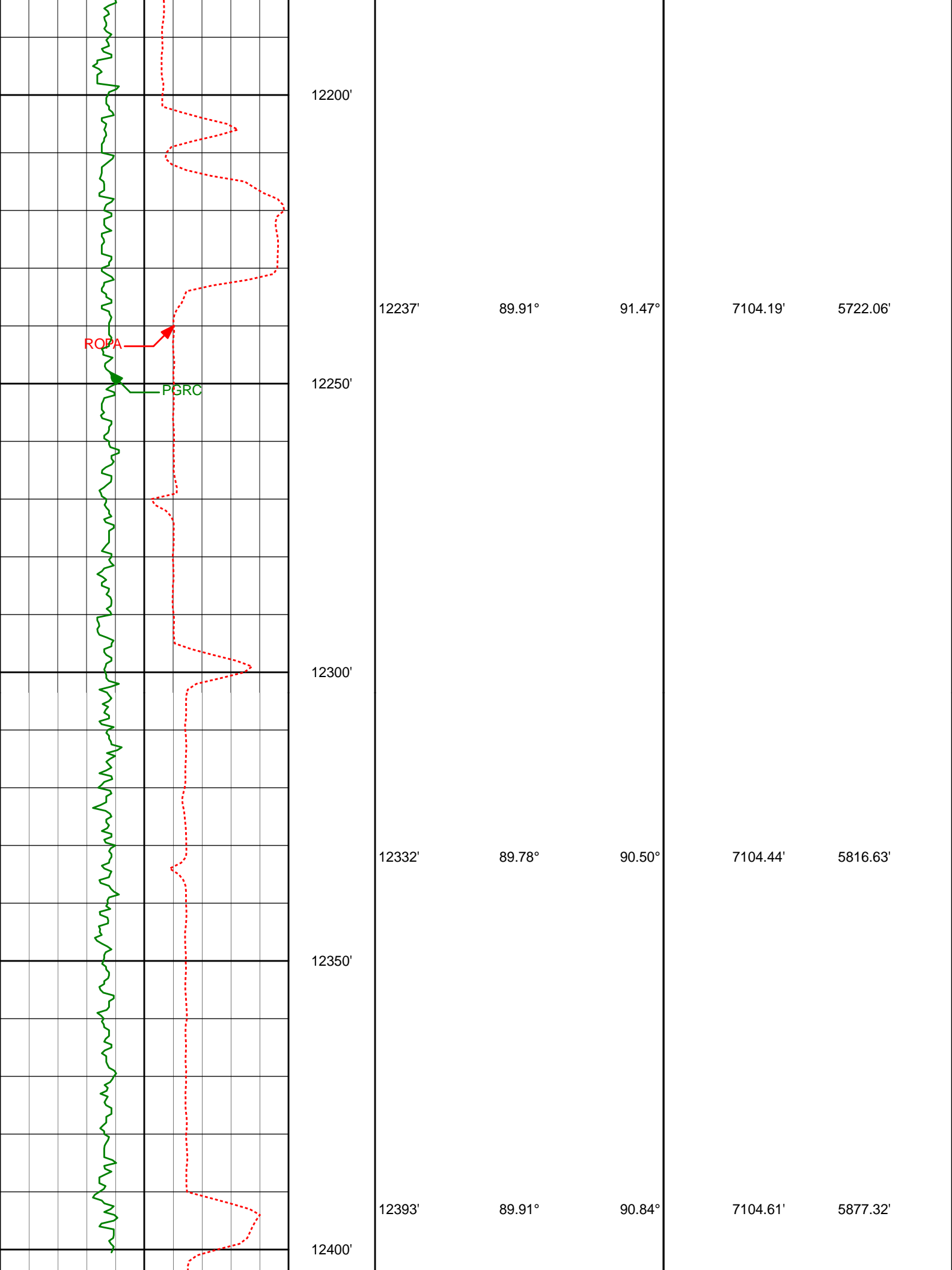
12142'

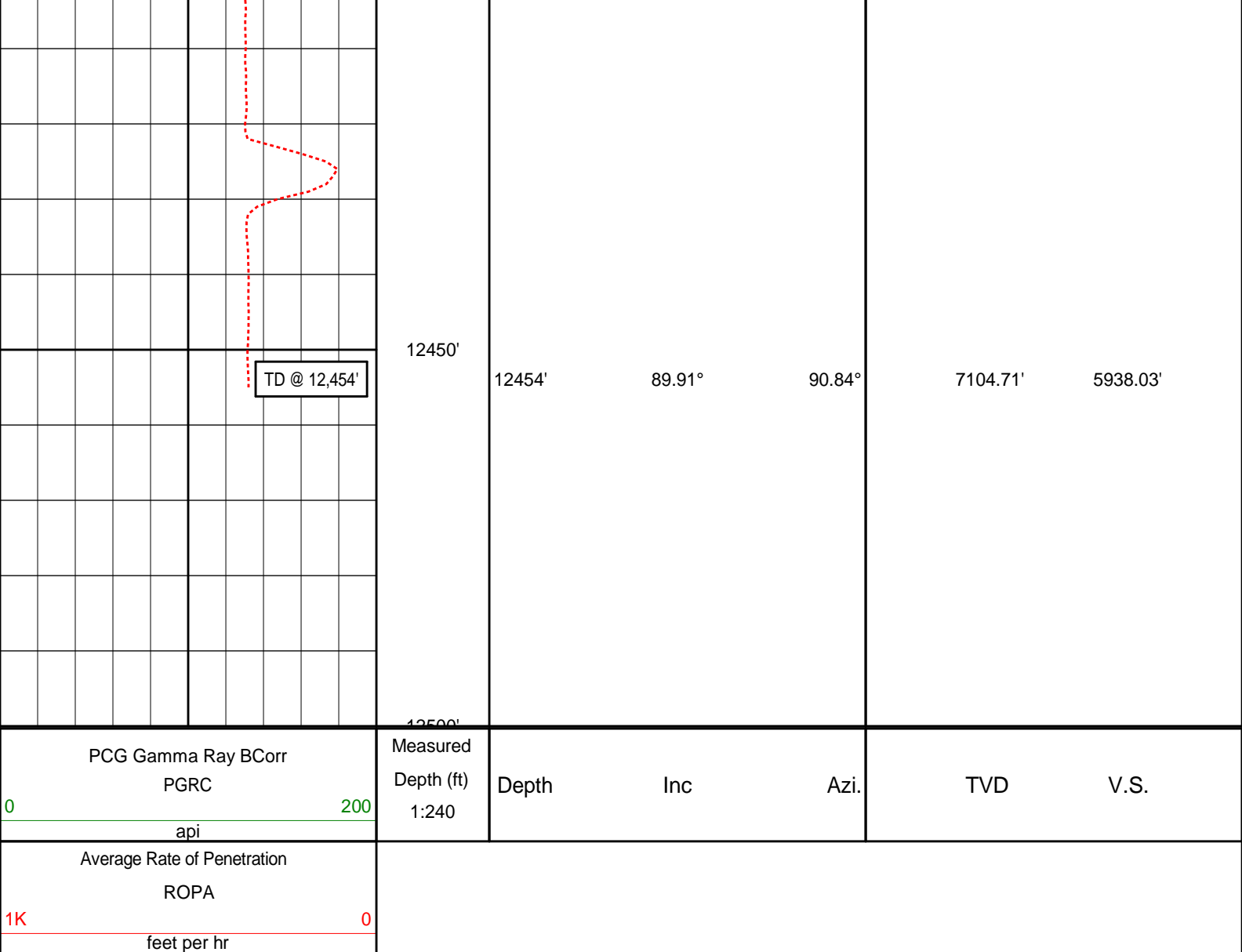
87.75°

92.11°

7102.25'

5627.40'





HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy  
Five Rivers K09-62-1HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901434934

The first two surveys at 362' 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
362.00	0.60	321.75	361.99	1.49 N	1.17 W	-1.33	0.17
613.00	0.70	353.35	612.98	4.04 N	2.16 W	-2.60	0.15
823.00	1.96	179.29	822.95	1.73 N	2.27 W	-2.45	1.27
917.00	2.06	178.70	916.89	1.57 S	2.21 W	-2.02	0.11
1012.00	1.97	185.47	1011.83	4.90 S	2.33 W	-1.76	0.27
1106.00	4.32	165.71	1105.68	9.94 S	1.61 W	-0.48	2.72
1201.00	7.22	152.52	1200.20	18.71 S	2.03 E	4.12	3.34
1292.00	11.02	143.61	1290.03	30.79 S	9.83 E	13.22	4.44
1384.00	10.89	139.86	1380.36	44.51 S	20.65 E	25.51	0.79
1477.00	10.17	135.56	1471.79	57.09 S	32.06 E	38.27	1.15
1568.00	10.95	139.11	1561.25	69.36 S	43.35 E	50.85	1.12



1659.00	10.98	145.51	1650.59	83.04 S	53.91 E	62.89	1.34
1753.00	10.20	144.41	1742.99	97.18 S	63.83 E	74.32	0.86
1846.00	9.65	153.71	1834.61	110.87 S	72.07 E	84.05	1.82
1940.00	9.06	154.56	1927.36	124.62 S	78.74 E	92.22	0.64
2033.00	10.60	155.10	2018.99	138.99 S	85.49 E	100.54	1.66
2126.00	10.35	153.64	2110.44	154.23 S	92.80 E	109.51	0.39
2218.00	9.40	146.62	2201.08	167.91 S	100.60 E	118.80	1.67
2311.00	11.22	141.46	2292.57	181.33 S	110.42 E	130.06	2.19
2403.00	11.41	136.37	2382.79	194.92 S	122.28 E	143.37	1.10
2495.00	11.44	145.56	2472.97	209.03 S	133.71 E	156.32	1.98
2588.00	11.97	151.88	2564.04	225.14 S	143.48 E	167.82	1.49
2680.00	12.46	151.91	2653.96	242.31 S	152.65 E	178.86	0.53
2775.00	12.92	151.71	2746.64	260.71 S	162.51 E	190.72	0.49
2869.00	10.80	151.11	2838.63	277.67 S	171.74 E	201.80	2.26
2964.00	10.04	151.32	2932.06	292.73 S	180.02 E	211.71	0.80
3059.00	9.27	150.66	3025.71	306.67 S	187.74 E	220.95	0.82
3154.00	8.37	151.24	3119.59	319.40 S	194.82 E	229.41	0.95
3248.00	7.39	147.81	3212.70	330.51 S	201.33 E	237.13	1.16
3343.00	8.41	146.66	3306.80	341.49 S	208.40 E	245.39	1.09
3438.00	7.93	144.30	3400.83	352.61 S	216.04 E	254.23	0.62
3532.00	9.25	149.77	3493.78	364.41 S	223.63 E	263.09	1.65
3627.00	8.77	153.57	3587.61	377.49 S	230.70 E	271.58	0.80
3721.00	7.69	152.54	3680.64	389.49 S	236.79 E	278.98	1.16
3816.00	10.52	153.66	3774.43	402.90 S	243.57 E	287.22	2.98
3910.00	11.77	155.94	3866.66	419.35 S	251.29 E	296.74	1.41
4004.00	11.44	156.71	3958.73	436.67 S	258.88 E	306.23	0.39
4099.00	9.91	155.90	4052.09	452.78 S	265.94 E	315.05	1.62
4194.00	8.35	154.42	4145.88	466.47 S	272.26 E	322.86	1.66
4288.00	9.58	148.13	4238.73	479.27 S	279.34 E	331.33	1.67
4383.00	8.82	144.12	4332.51	491.88 S	287.78 E	341.14	1.05
4478.00	9.59	149.92	4426.29	504.63 S	296.02 E	350.75	1.27
4573.00	9.61	154.92	4519.96	518.66 S	303.34 E	359.60	0.88
4667.00	8.45	153.73	4612.79	531.96 S	309.73 E	367.44	1.25
4761.00	9.34	149.68	4705.66	544.74 S	316.63 E	375.74	1.16
4856.00	9.39	152.12	4799.40	558.24 S	324.15 E	384.72	0.42
4950.00	8.78	150.89	4892.22	571.29 S	331.23 E	393.21	0.68
5045.00	8.94	146.77	4986.09	583.80 S	338.80 E	402.14	0.69
5139.00	8.95	140.99	5078.94	595.59 S	347.40 E	412.02	0.96
5234.00	7.74	138.94	5172.94	606.16 S	356.26 E	422.00	1.31
5329.00	8.50	135.31	5266.99	615.97 S	365.40 E	432.18	0.96
5424.00	8.08	130.73	5360.99	625.32 S	375.40 E	443.16	0.82
5518.00	5.32	136.64	5454.34	632.80 S	383.39 E	451.95	3.02
5612.00	4.32	132.85	5548.01	638.38 S	388.98 E	458.13	1.12
5707.00	3.05	153.05	5642.82	643.06 S	392.75 E	462.40	1.89
5802.00	2.59	162.33	5737.70	647.36 S	394.55 E	464.67	0.68
5897.00	2.10	165.10	5832.62	651.09 S	395.65 E	466.18	0.53
5991.00	1.85	161.16	5926.56	654.19 S	396.58 E	467.45	0.30
6086.00	1.73	157.32	6021.52	656.96 S	397.63 E	468.81	0.18
6181.00	1.57	143.57	6116.48	659.33 S	398.95 E	470.39	0.45
6276.00	1.73	140.93	6211.44	661.49 S	400.63 E	472.30	0.19
6370.00	1.79	147.45	6305.40	663.83 S	402.31 E	474.23	0.22
6465.00	1.86	145.37	6400.35	666.35 S	403.99 E	476.18	0.10
6559.00	1.92	160.39	6494.30	669.09 S	405.38 E	477.87	0.53
6653.00	4.80	84.19	6588.16	670.18 S	409.83 E	482.41	5.03
6748.00	10.78	78.23	6682.24	667.96 S	422.49 E	494.75	6.34
6843.00	19.33	76.63	6773.90	662.50 S	446.53 E	518.02	9.01
6937.00	27.75	83.20	6860.01	656.30 S	483.47 E	554.03	9.37
7032.00	37.69	87.94	6939.85	652.63 S	534.59 E	604.42	10.80
7126.00	49.22	88.58	7007.97	650.71 S	599.10 E	668.31	12.27
7221.00	62.73	88.81	7061.00	648.93 S	677.64 E	746.15	14.22
7315.00	77.17	92.10	7093.15	649.75 S	765.69 E	833.73	15.71
7339.00	81.28	93.10	7097.64	650.82 S	789.23 E	857.25	17.61
7501.00	86.58	91.50	7114.77	657.27 S	950.13 E	1017.86	3.42
7596.00	88.40	90.77	7118.93	659.15 S	1045.02 E	1112.36	2.06
7690.00	88.43	89.55	7121.53	659.41 S	1138.98 E	1205.75	1.30
7785.00	87.47	88.87	7124.92	658.10 S	1233.91 E	1299.94	1.24
7879.00	90.22	89.68	7126.82	656.91 S	1327.87 E	1393.17	3.05
7973.00	89.66	88.96	7126.92	655.80 S	1421.87 E	1486.45	0.97
8067.00	91.39	90.35	7126.06	655.23 S	1515.85 E	1579.78	2.36
8161.00	90.46	90.24	7124.54	655.71 S	1609.84 E	1673.23	1.00
8256.00	90.31	90.51	7123.90	656.34 S	1704.83 E	1767.69	0.33
8351.00	89.97	87.76	7123.67	654.90 S	1799.81 E	1861.91	2.92
8446.00	90.03	88.70	7123.67	651.97 S	1894.77 E	1955.94	0.99
8540.00	89.91	89.64	7123.72	650.61 S	1988.76 E	2049.18	1.01
8635.00	90.34	90.63	7123.51	650.83 S	2083.76 E	2143.61	1.14

8835.00	89.54	90.03	7123.51	650.03 S	2003.70 E	2143.01	1.14
8729.00	89.60	90.06	7123.56	651.40 S	2177.75 E	2237.07	0.99
8824.00	90.18	91.26	7123.74	652.49 S	2272.74 E	2331.59	1.40
8918.00	89.08	90.24	7124.35	653.72 S	2366.73 E	2425.12	1.60
9013.00	89.85	93.12	7125.24	656.51 S	2461.68 E	2519.78	3.14
9108.00	89.85	93.02	7125.49	661.59 S	2556.54 E	2614.61	0.11
9202.00	91.23	93.20	7124.60	666.69 S	2650.39 E	2708.45	1.48
9297.00	89.66	91.07	7123.86	670.23 S	2745.32 E	2803.17	2.79
9391.00	91.97	90.59	7122.52	671.59 S	2839.29 E	2896.70	2.51
9486.00	91.73	89.66	7119.46	671.80 S	2934.24 E	2991.08	1.01
9581.00	91.63	89.16	7116.67	670.82 S	3029.19 E	3085.32	0.54
9675.00	90.19	88.33	7115.18	668.76 S	3123.16 E	3178.46	1.77
9770.00	91.75	90.03	7113.57	667.40 S	3218.13 E	3272.68	2.43
9865.00	91.33	89.27	7111.02	666.82 S	3313.09 E	3366.98	0.91
9960.00	90.22	88.36	7109.73	664.86 S	3408.06 E	3461.12	1.51
10054.00	90.09	90.70	7109.48	664.09 S	3502.05 E	3554.44	2.49
10149.00	90.12	89.89	7109.30	664.58 S	3597.05 E	3648.89	0.85
10244.00	91.14	89.72	7108.26	664.25 S	3692.04 E	3743.25	1.09
10338.00	91.26	91.64	7106.29	665.37 S	3786.01 E	3836.75	2.05
10433.00	89.11	93.35	7105.98	669.50 S	3880.91 E	3931.51	2.89
10528.00	86.82	93.40	7109.36	675.09 S	3975.68 E	4026.31	2.41
10622.00	87.69	91.01	7113.86	678.70 S	4069.49 E	4119.94	2.70
10716.00	88.28	89.90	7117.17	679.45 S	4163.43 E	4213.36	1.34
10811.00	87.53	90.06	7120.64	679.42 S	4258.36 E	4307.70	0.81
10905.00	88.89	89.26	7123.57	678.86 S	4352.31 E	4400.99	1.68
10999.00	89.05	88.63	7125.26	677.13 S	4446.28 E	4494.17	0.69
11094.00	90.55	90.13	7125.60	676.10 S	4541.27 E	4588.45	2.23
11188.00	89.72	89.34	7125.37	675.67 S	4635.27 E	4681.80	1.22
11288.00	91.82	87.74	7124.03	673.12 S	4735.22 E	4780.84	2.64
11383.00	91.33	87.30	7121.42	669.01 S	4830.09 E	4874.65	0.69
11478.00	92.28	89.40	7118.43	666.28 S	4925.00 E	4968.65	2.43
11572.00	92.50	88.82	7114.51	664.82 S	5018.90 E	5061.80	0.66
11667.00	91.91	88.67	7110.85	662.74 S	5113.81 E	5155.88	0.64
11762.00	91.97	87.81	7107.64	659.82 S	5208.71 E	5249.85	0.91
11857.00	91.66	89.65	7104.63	657.72 S	5303.64 E	5343.94	1.96
11952.00	90.65	89.63	7102.71	657.12 S	5398.61 E	5438.25	1.06
12047.00	91.08	91.45	7101.28	658.02 S	5493.59 E	5532.73	1.97
12142.00	87.75	92.11	7102.25	660.97 S	5588.53 E	5627.40	3.57
12237.00	89.91	91.47	7104.19	663.93 S	5683.46 E	5722.06	2.37
12332.00	89.78	90.50	7104.44	665.57 S	5778.44 E	5816.63	1.03
12393.00	89.91	90.84	7104.61	666.28 S	5839.44 E	5877.32	0.60
12454.00	89.91	90.84	7104.71	667.17 S	5900.43 E	5938.03	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 96.44 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.95 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12454.00 FEET  
IS 5938.03 FEET ALONG 96.45 DEGREES (GRID)

Final survey is a straight line projection to TD.