

PCG Pressure Case Gamma

PCD Pressure Case Directional



Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 28' 10.13" North Long: 104° 21' 19.15" West
Well	: Wells Ranch AE20-63-1HN
Company	: Noble Energy
Rig	: HP 343
LOCATION	Company : Noble Energy
	Rig : HP 343
Latitude : 40° 28' 10.13" North Longitude : 104° 21' 19.15" West	Well : Wells Ranch AE20-63-1HN
	Field : Wattenberg
UTM Easting = 3,318,469.801 ft UTM Northing = 1,415,927.690 ft	Country : USA
	API Number : 0512337208
Permanent Datum : Ground Level	Elevation : 4785.00 ft
Log Measured From : Drill Floor	24.00 ft Above Permanent Datum
Drilling Measured From : Drill Floor	MD LOG
Depth Logged : 971.00 ft To 10,769.00 ft	Unit No. : 11610115
Date Logged : 21-Sep-13 To 25-Sep-13	Job No. : CA-XX-0900758836
Total Depth MD : 10,769.00 ft TVD : 6,569.71 ft	Plot Type : Final
Spud Date : 20-Sep-13	Plot Date : 26-Sep-13
Run No.	Borehole Record (MD)
Size	From To
2	8.750 in 971.00 ft 5,974.00 ft
3	8.750 in 5,974.00 ft 7,043.00 ft
4	6.125 in 7,043.00 ft 10,769.00 ft
	Casing Record (MD)
	Size Weight From To
	9.625 in 36.00 lbpf SURFACE 961.00 ft
	7.000 in 24.00 lbpf SURFACE 7043.00 ft

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	22-Sep-13	23-Sep-13	25-Sep-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.75		
Log Start Depth (MD, ft)	971.00	5,974.00	7,043.00		
Log End Depth (MD, ft)	5,974.00	7,043.00	10,769.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	21-Sep-13 17:00	22-Sep-13 17:30	24-Sep-13 12:30		
Drill/Wipe End Date and Time	22-Sep-13 11:00	23-Sep-13 10:00	25-Sep-13 13:00		
Min Inc (deg) @ Depth (MD, ft)	.10 @ 5,635.00	.63 @ 6,012.00	82.49 @ 7,160.00		
Max Inc (deg) @ Depth (MD, ft)	19.01 @ 3,832.00	75.20 @ 6,989.00	93.40 @ 9,693.00		
Bit TFA(in2) / Bit Type	.86 / PDC	1.24 / PDC	0.8629 / PDC		
Flow Rate (gpm)	598.73	572.58	300.00		
Max AV (fpm) / CV (fpm) @ MWD	350 / 400	350 / 350	500.0 / 350		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.40 / 26.00	10.20 / 40.00	9.30 / 31.00		
Filtrate CL (ppm)	1200	1200	1200		
pH / Fluid Loss (mptm)	8 / 32	8 / 32	8.4 / 120		
PV (cP) / YP (Ihf2)	2 / 1.00	11 / 12.00	6 / 7.00		
% Solids / % Sand	0.40 / 0.28	8.20 / 0.15	2.2 / 0.25		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		

Max Tool Temp (degF) / Source	163.20 / PCM	163.20 / PCM	223.41 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Adam Sampson	Adam Sampson	Adam Sampson		
Customer Representative	Matt Settles	Matt Settles	Matt Settles		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11341325	11341325	12134697		
Insert Serial Number	11400840	11400840	11227514		
Date and Time Initialized	21-Sep-13 07:55	01-Jan-70 00:00	23-Sep-13 17:26		
Date and Time Read	23-Sep-13 15:22	23-Sep-13 15:29	25-Sep-13 21:35		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	55.00	54.00	64.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341325	11341325	12134697		
Sonde Serial Number	11902117	11902117	12177530		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	101.35	241.95	193.61		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.71	48.71	56.83		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341325	11341325	12134697		
Insert/Sonde Serial Number	11579845	11579845	11579776		

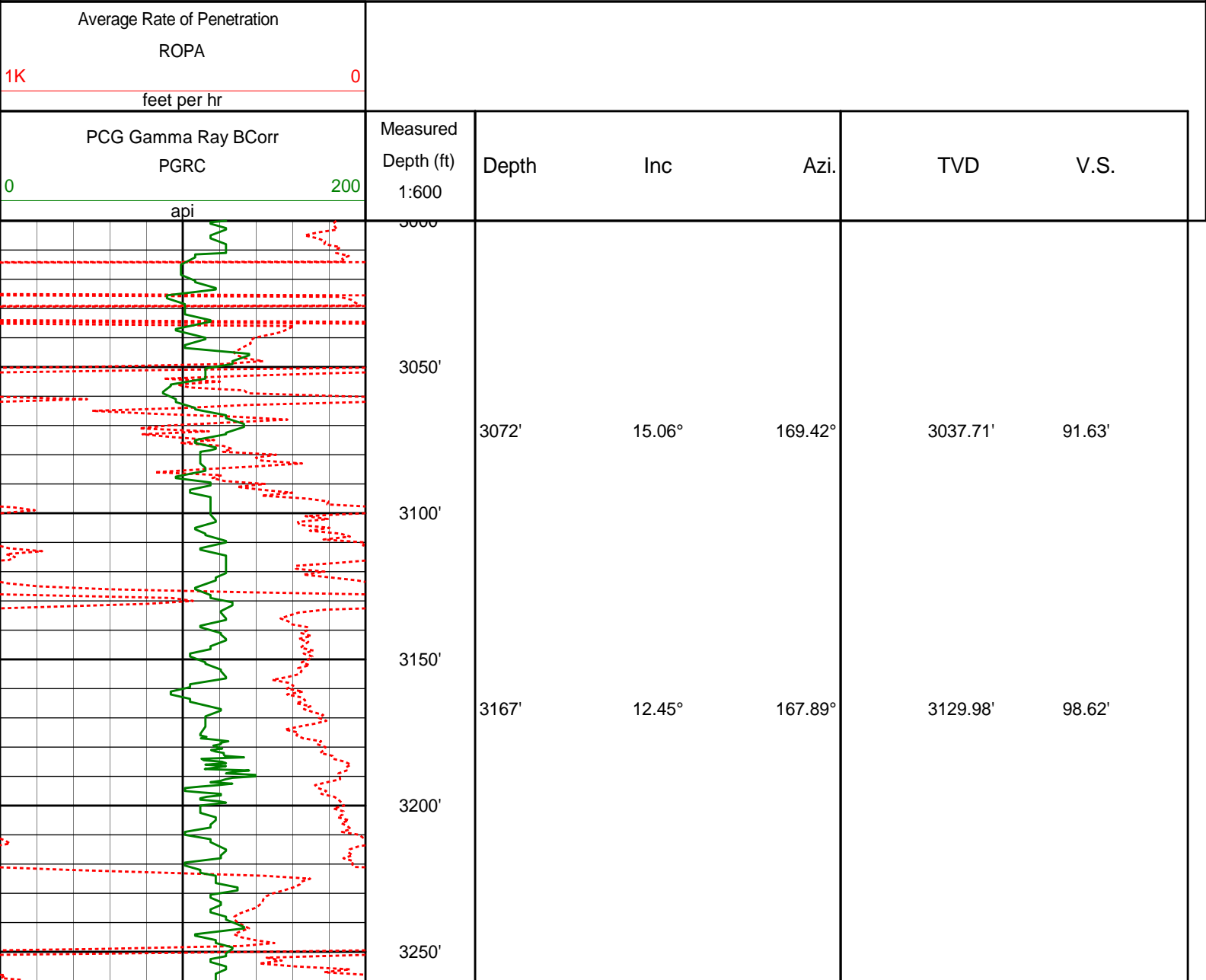
REMARKS

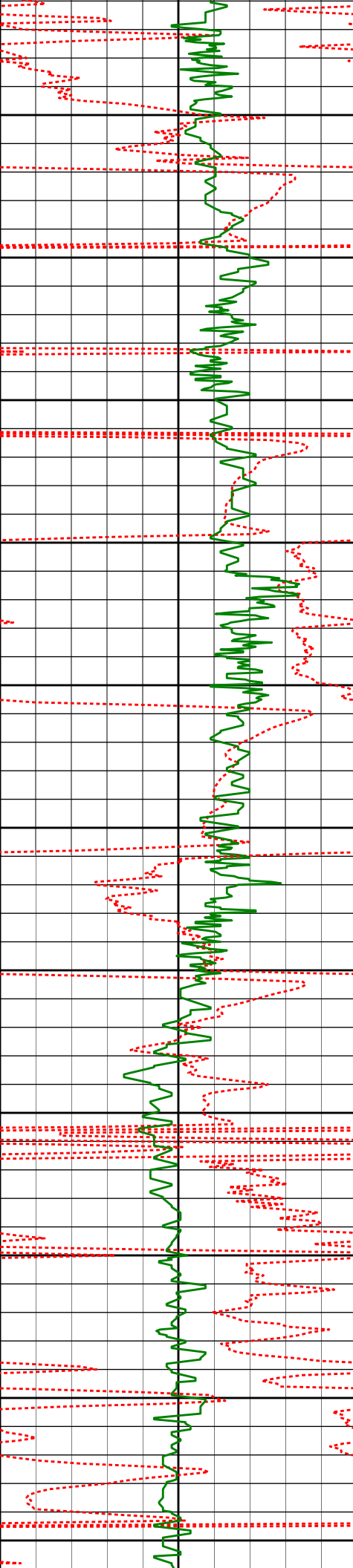
1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based 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 7.4.2

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HALLIBURTON

MD Main Log 1:600





3300'

3350'

3400'

3450'

3500'

3550'

3600'

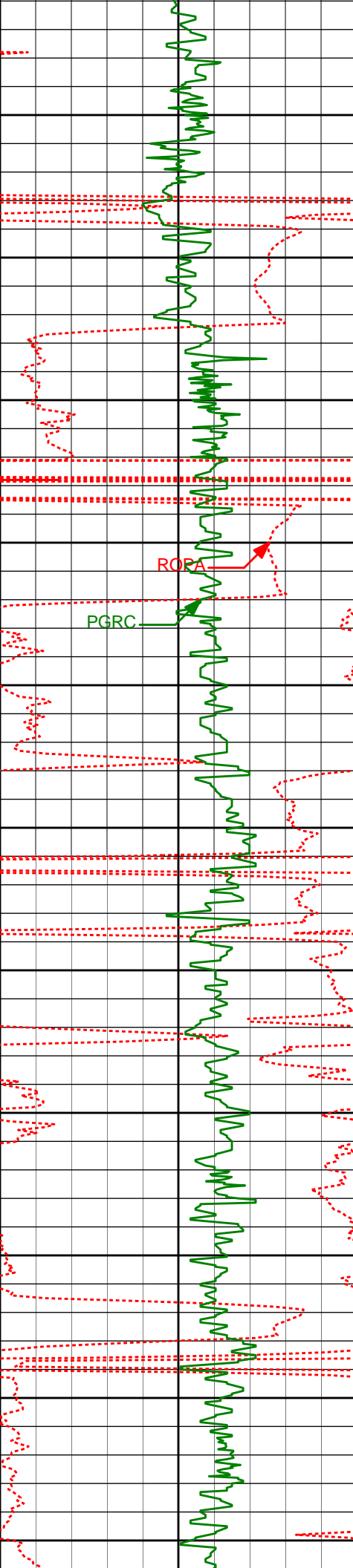
3650'

3700'

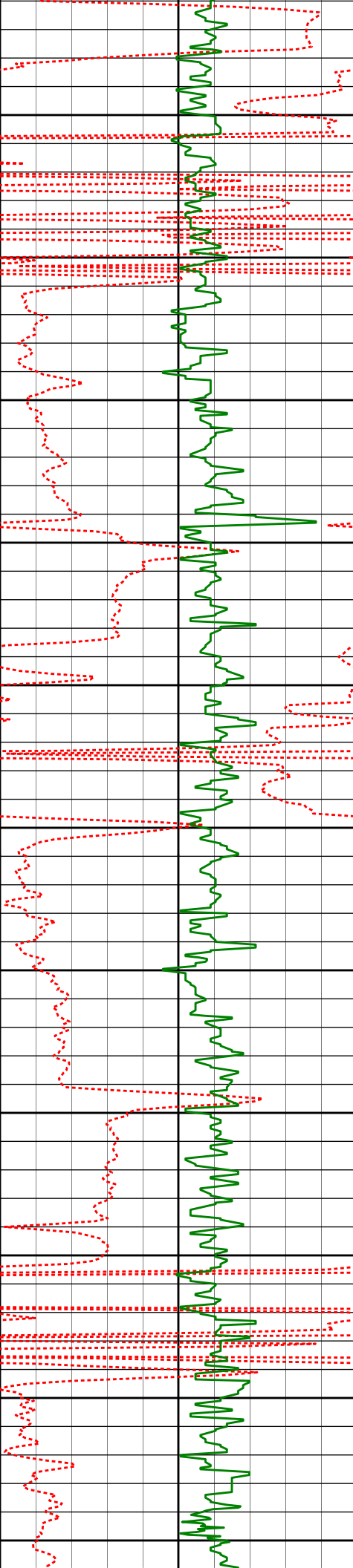
3750'

3800'

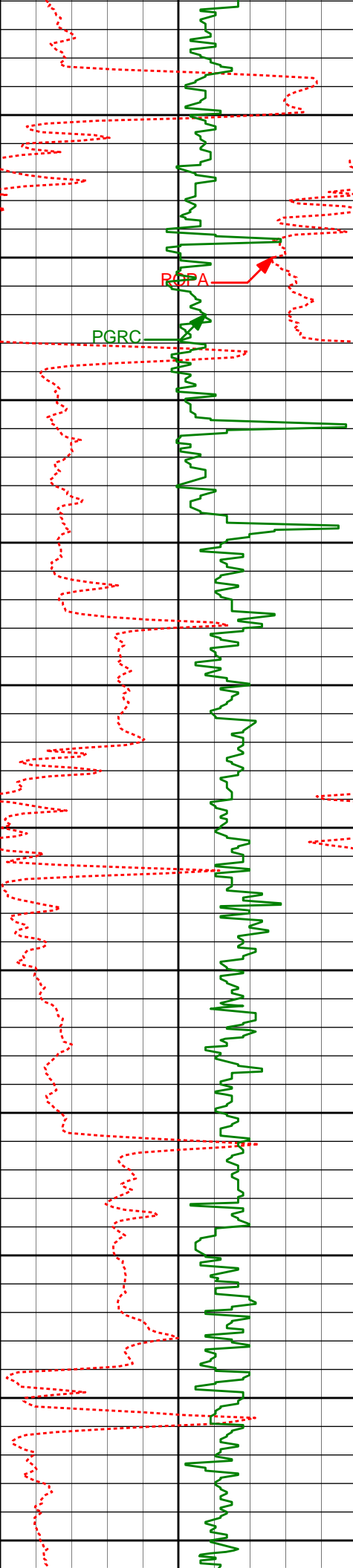
3262'	12.35°	174.01°	3222.77'	104.18'
3357'	11.61°	169.55°	3315.70'	109.25'
3452'	11.26°	164.15°	3408.82'	115.64'
3547'	12.86°	167.30°	3501.72'	122.73'
3642'	15.58°	172.03°	3593.80'	129.50'
3737'	17.17°	172.23°	3684.94'	136.26'



3832'	19.01°	171.15°	3775.24'	143.94'
3850'				
3900'				
3927'	17.23°	167.69°	3865.53'	152.70'
3950'				
4000'				
4021'	13.19°	169.89°	3956.22'	160.37'
4050'				
4100'				
4116'	11.41°	170.99°	4049.04'	166.07'
4150'				
4200'				
4211'	9.54°	173.19°	4142.45'	170.47'
4250'				
4300'				
4306'	8.28°	172.68°	4236.30'	173.98'
4350'				



4400'	4401'	8.38°	175.12°	4330.30'	177.04'
4450'					
4500'	4496'	7.06°	179.98°	4424.44'	179.13'
4550'					
4600'	4591'	5.31°	182.75°	4518.88'	180.12'
4650'					
4700'	4686'	3.82°	180.41°	4613.58'	180.78'
4750'					
4800'	4781'	3.08°	183.14°	4708.40'	181.29'
4850'					
4900'	4876'	2.00°	186.49°	4803.31'	181.46'



4950'

4971'

0.56°

217.47°

4898.28'

181.23'

5000'

5066'

0.50°

185.53°

4993.28'

181.00'

5100'

5150'

5160'

0.50°

236.25°

5087.28'

180.70'

5200'

5250'

5255'

0.34°

320.28°

5182.28'

180.18'

5300'

5350'

5350'

0.60°

261.70°

5277.27'

179.49'

5400'

5450'

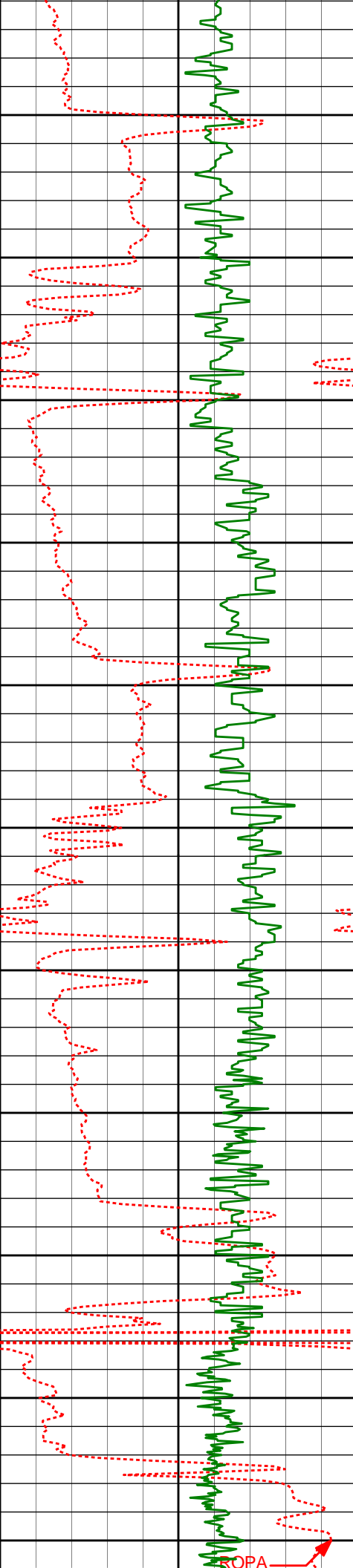
5445'

0.59°

253.46°

5372.27'

178.56'



5500'

5540'

0.15°

333.66°

5467.27'

178.05'

5550'

5600'

5635'

0.10°

83.71°

5562.27'

178.06'

5650'

5700'

5730'

0.35°

331.07°

5657.27'

177.97'

5750'

5800'

5825'

0.31°

16.21°

5752.26'

177.84'

5850'

5900'

5917'

0.33°

30.77°

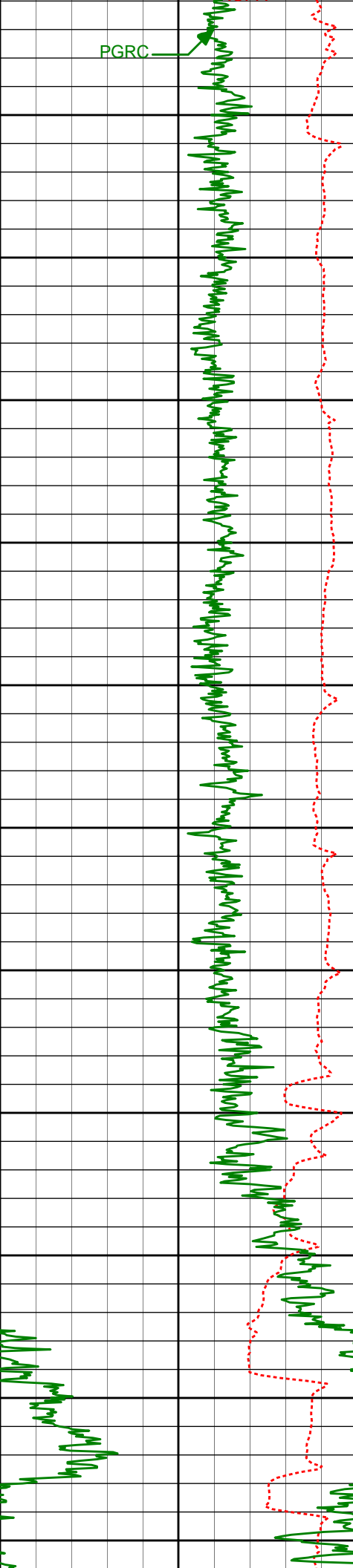
5844.26'

177.99'

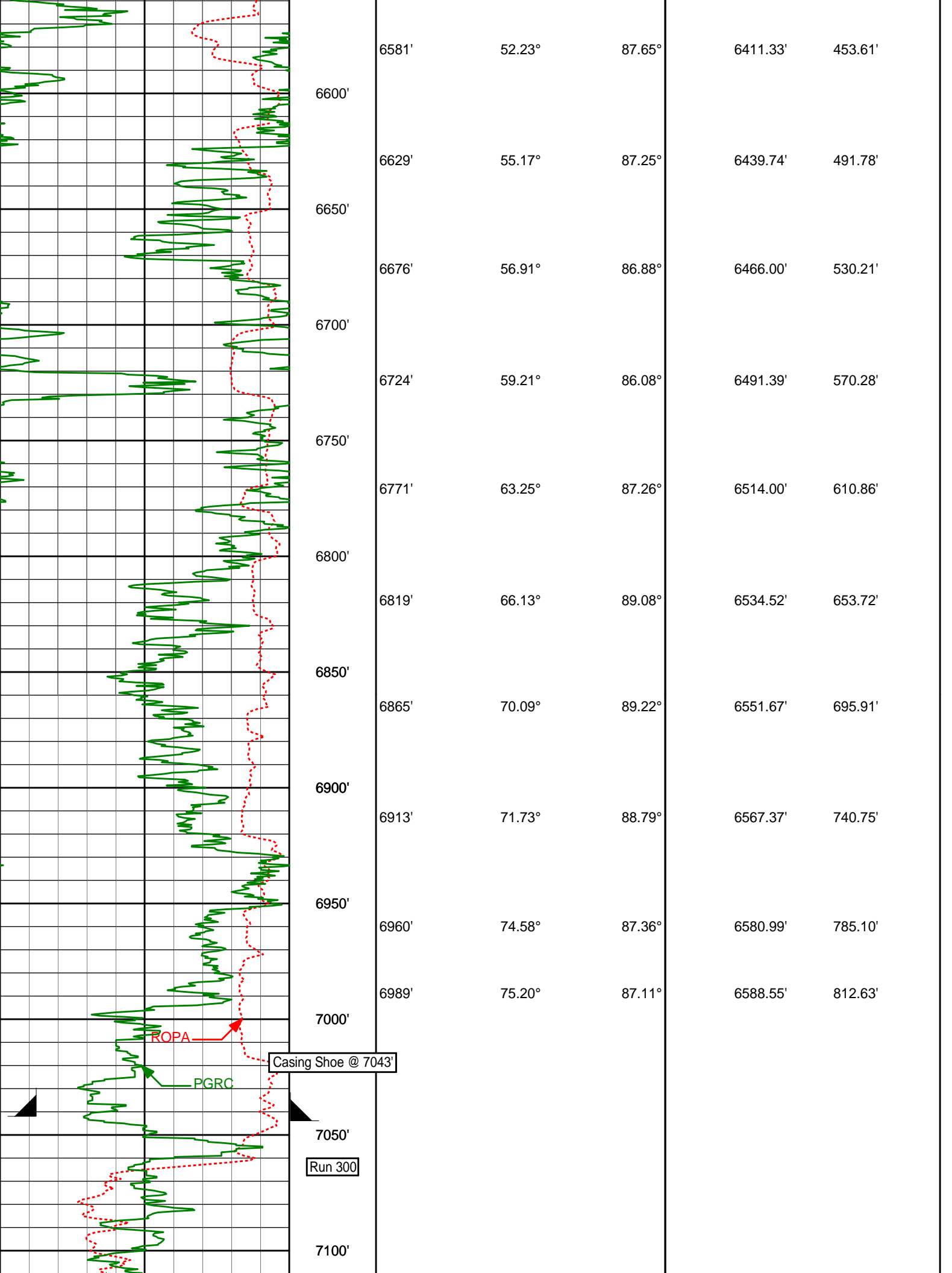
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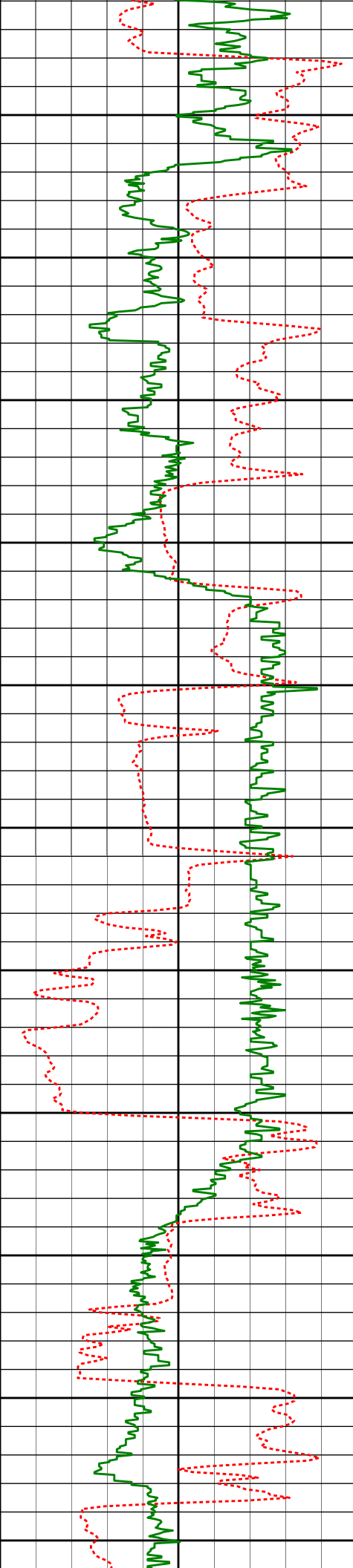
6000'

ROPA



	6012'	0.63°	101.20°	5939.26'	178.63'
6050'					
6100'	6107'	10.64°	98.82°	6033.68'	187.93'
6150'					
6200'	6201'	21.66°	98.25°	6123.83'	214.03'
6250'					
6300'	6296'	32.95°	96.82°	6208.11'	257.53'
6350'	6344'	39.43°	90.70°	6246.84'	285.78'
6400'	6391'	43.62°	86.69°	6282.03'	316.61'
6450'	6439'	45.03°	86.68°	6316.37'	349.63'
6500'	6486'	45.93°	87.02°	6349.32'	382.64'
6550'	6534'	49.41°	87.67°	6381.64'	417.64'





7150'

7160'

82.49°

86.89°

6621.61'

977.62'

7200'

7250'

7253'

86.15°

87.19°

6630.81'

1068.82'

7300'

7350'

7345'

90.83°

88.76°

6633.23'

1159.68'

7400'

7450'

7438'

90.34°

85.73°

6632.28'

1251.39'

7500'

7550'

7531'

91.33°

85.21°

6630.93'

1342.58'

7600'

7650'

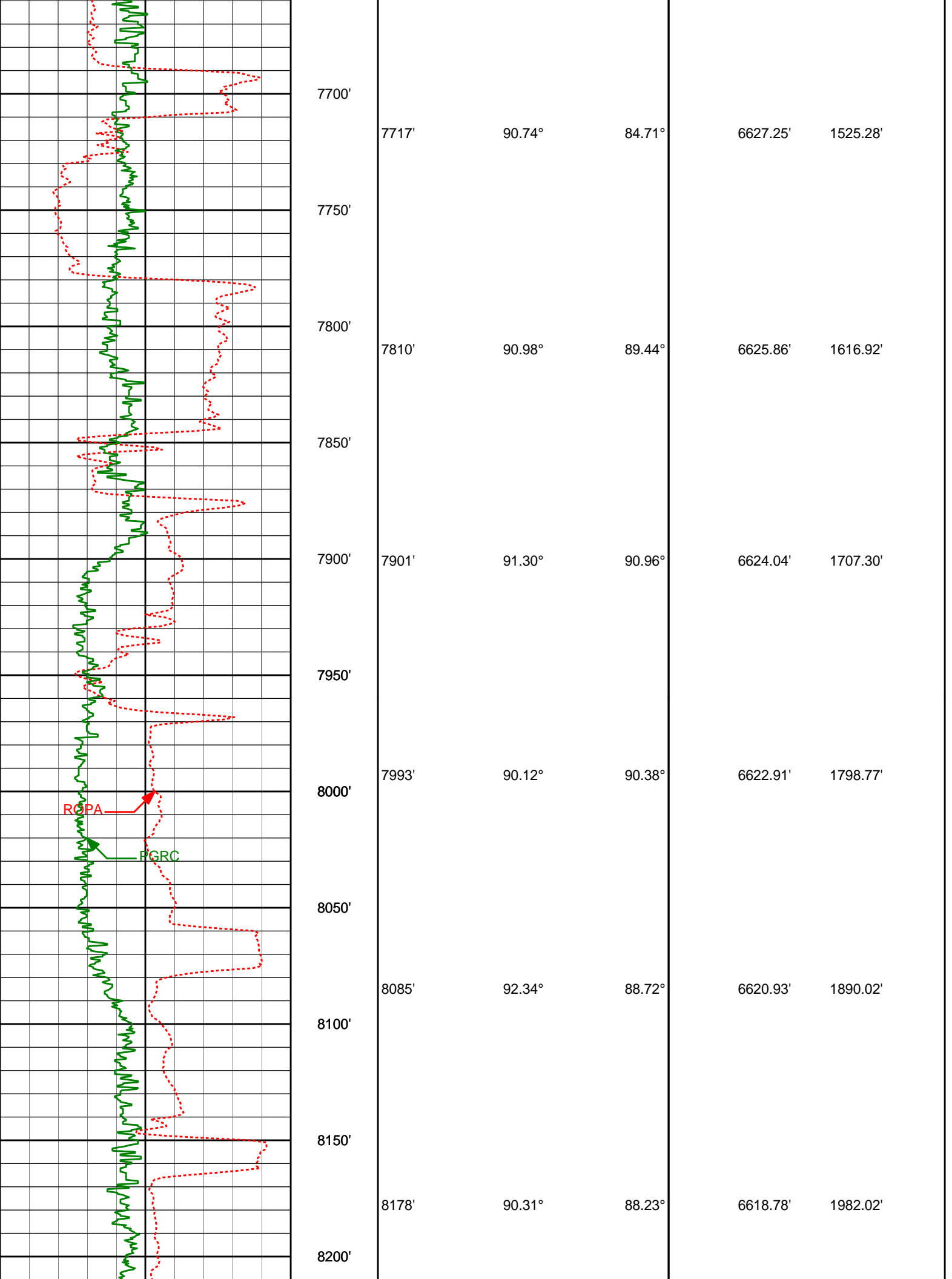
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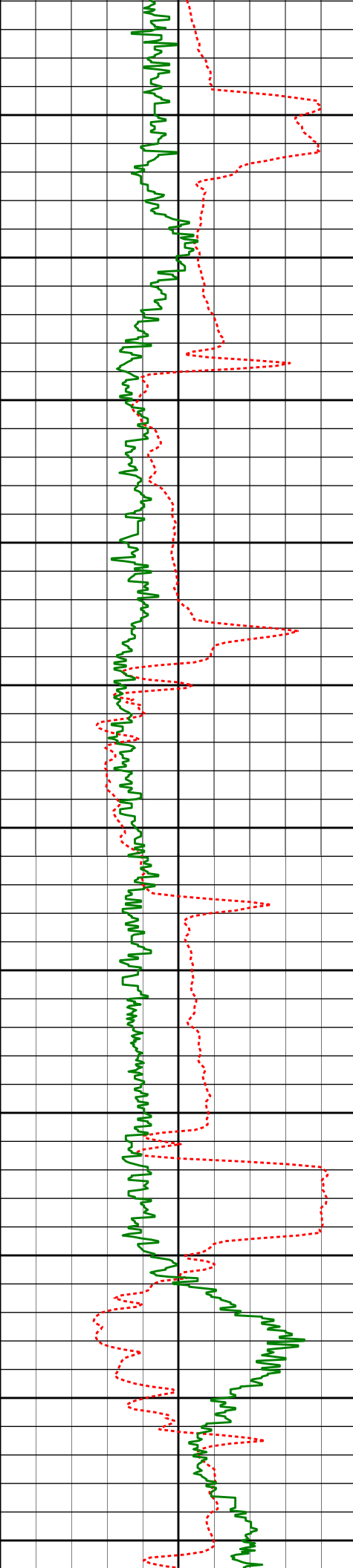
91.23°

87.11°

6628.85'

1433.96'





8250'

8271'

92.47°

90.68°

6616.52'

2074.22'

8300'

8350'

8365'

92.37°

89.35°

6612.55'

2167.49'

8400'

8450'

8460'

90.62°

89.91°

6610.08'

2261.71'

8500'

8550'

8555'

90.40°

87.08°

6609.23'

2355.71'

8600'

8650'

8649'

92.96°

91.48°

6606.47'

2448.84'

8700'

8750'

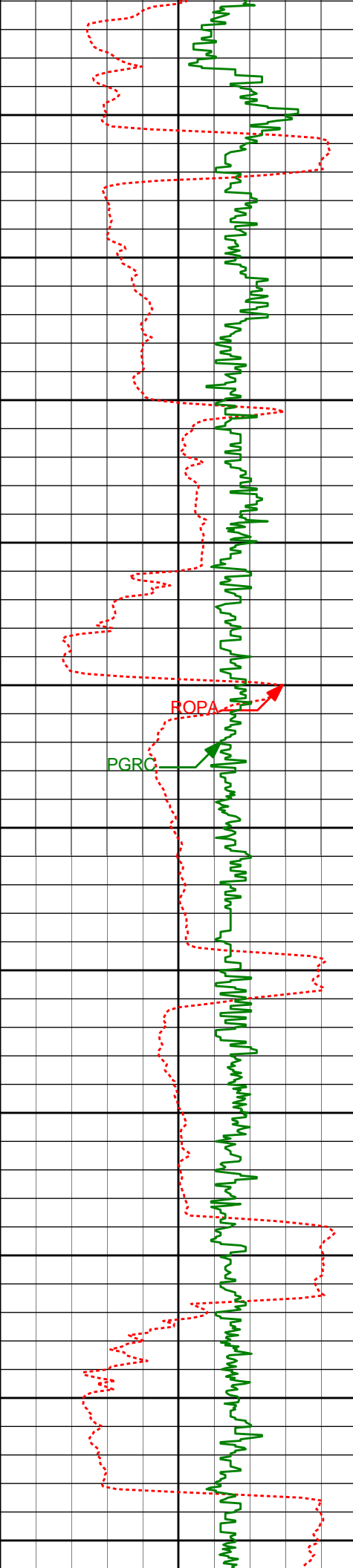
8744'

93.36°

90.70°

6601.24'

2543.23'



8800'

8839'

92.03°

90.12°

6596.77'

2637.54'

8850'

8900'

8934'

90.71°

88.68°

6594.50'

2731.73'

8950'

9000'

PGRC

ROPA

9029'

90.55°

92.31°

6593.45'

2826.14'

9050'

9100'

9124'

90.28°

92.89°

6592.77'

2920.89'

9150'

9200'

9219'

90.40°

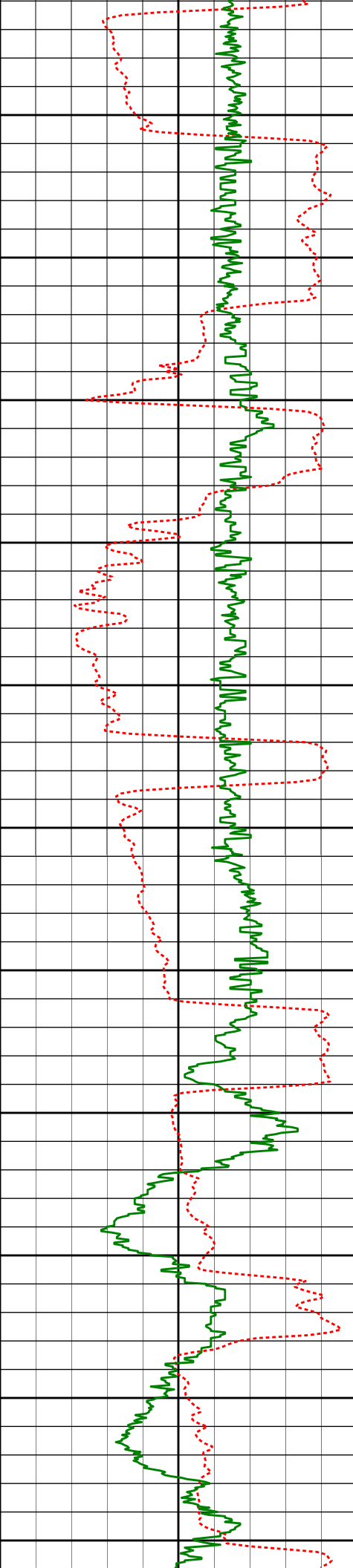
92.66°

6592.20'

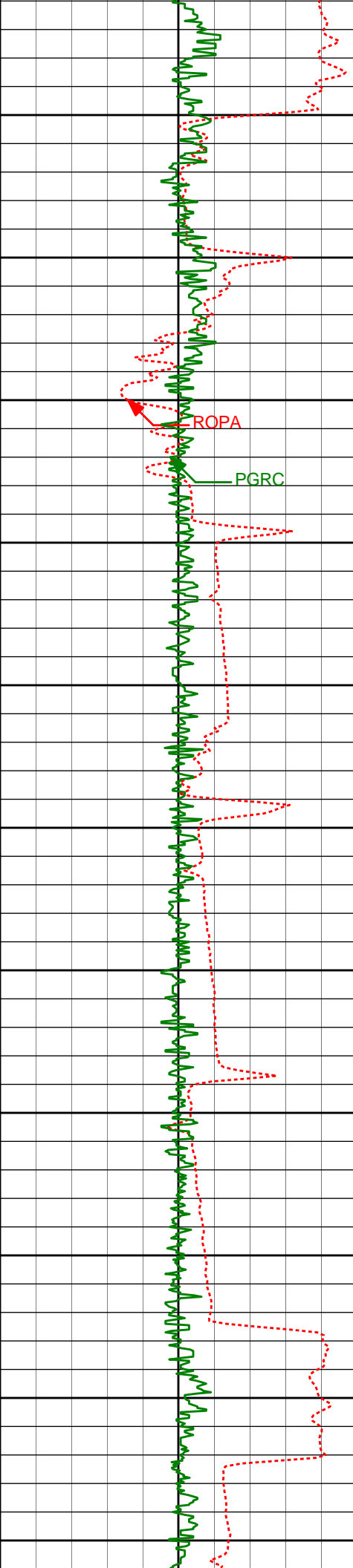
3015.66'

9250'

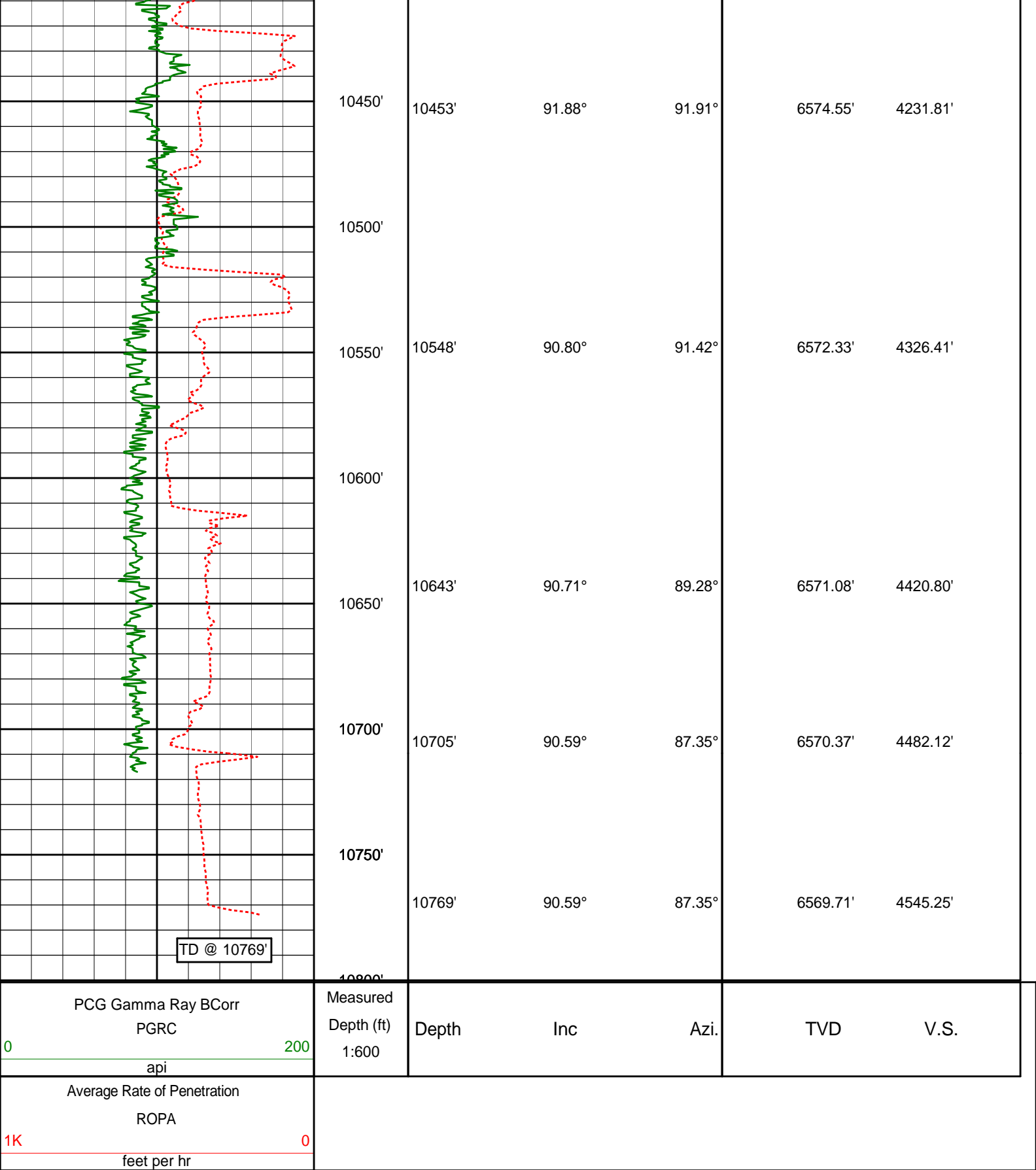
9300'



9350'	9313'	90.31°	92.00°	6591.62'	3109.37'
9400'	9408'	90.15°	87.15°	6591.24'	3203.60'
9450'					
9500'	9503'	89.85°	86.26°	6591.24'	3297.14'
9550'					
9600'	9598'	89.69°	85.66°	6591.62'	3390.45'
9650'					
9700'	9693'	93.40°	84.73°	6589.06'	3483.47'
9750'					
9800'	9788'	92.19°	84.54°	6584.43'	3576.24'
9850'					

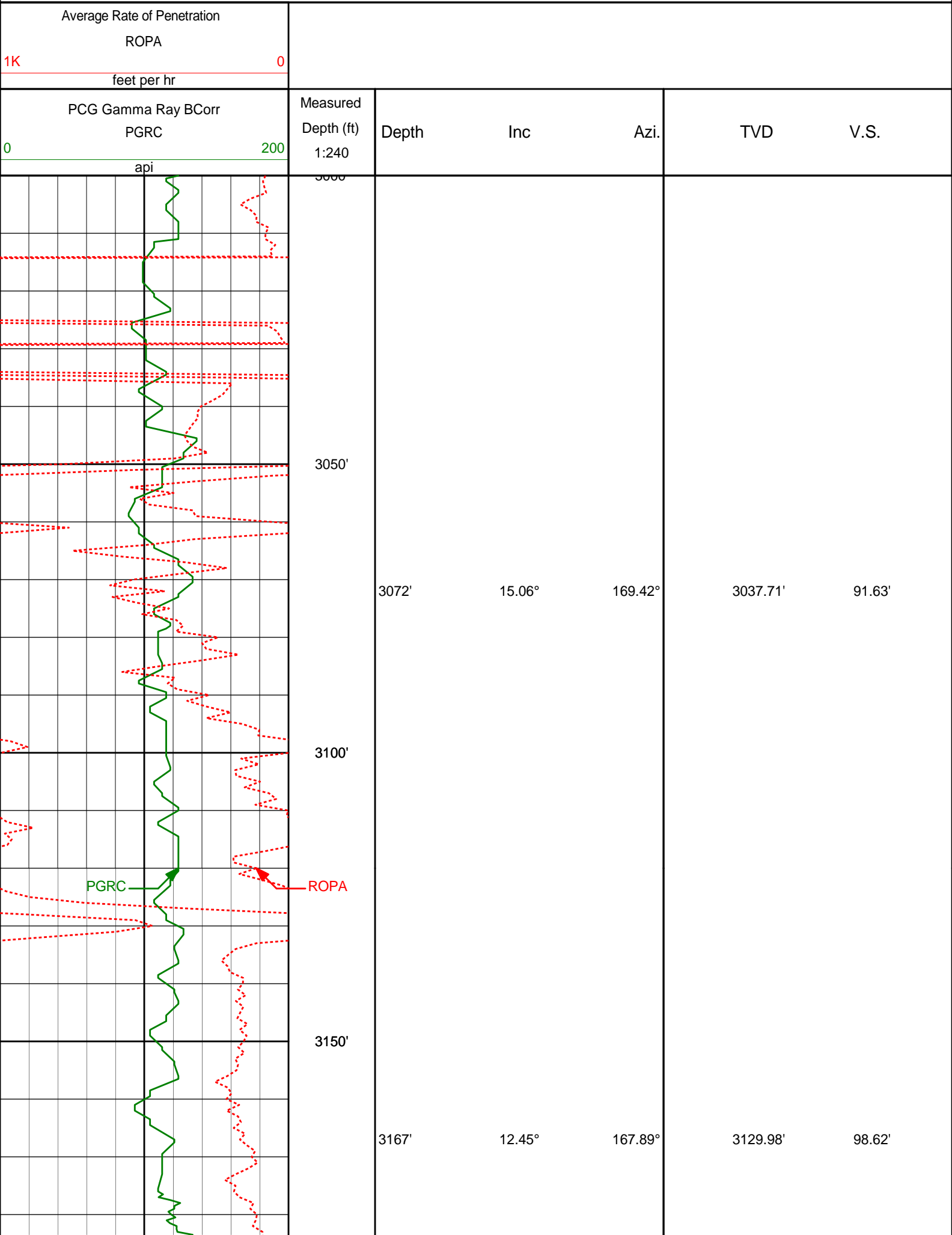


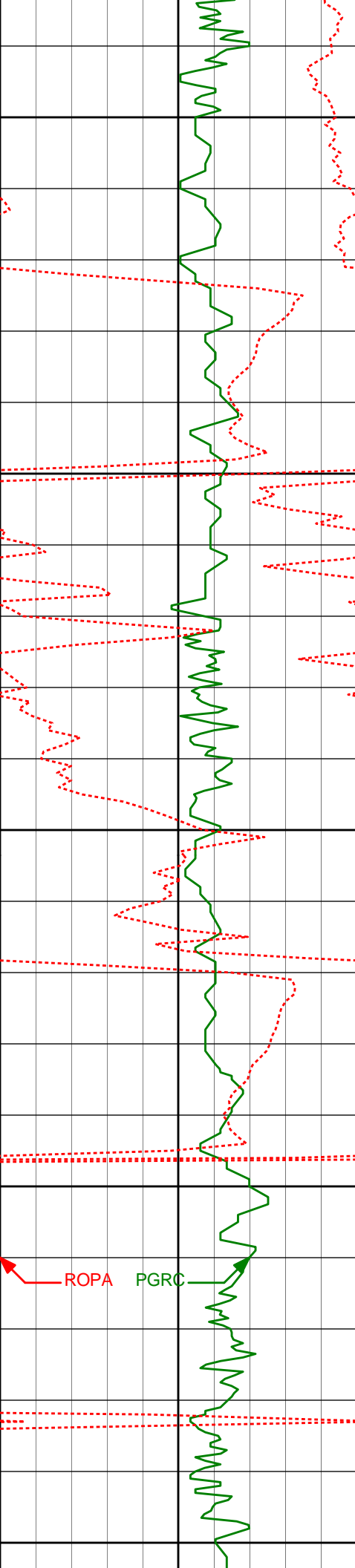
9883'	91.33°	89.00°	6581.51'	3669.73'
9900'				
9950'				
9978'	91.33°	87.64°	6579.30'	3763.68'
10000'				
10050'				
10073'	90.46°	87.69°	6577.82'	3857.47'
10100'				
10150'				
10168'	90.40°	86.33°	6577.10'	3951.09'
10200'				
10250'				
10263'	90.40°	84.74°	6576.44'	4044.27'
10300'				
10350'				
10358'	90.00°	87.27°	6576.11'	4137.59'
10400'				



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MD Main Log 1:240





3200'

3250'

3300'

3350'

3400'

3262'

12.35°

174.01°

3222.77'

104.18'

3357'

11.61°

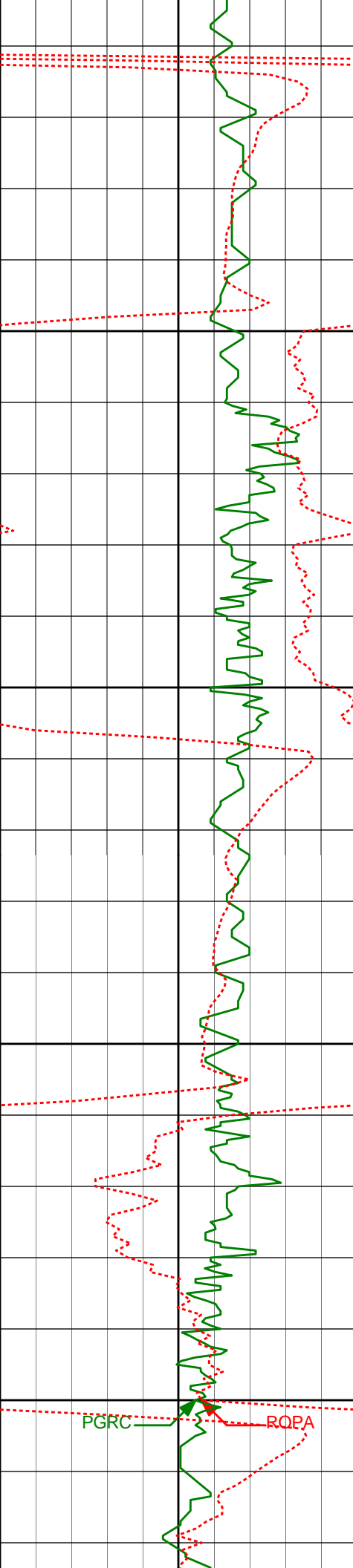
169.55°

3315.70'

109.25'

ROPA

PGRC



3450'

3500'

3550'

3600'

3452'

11.26°

164.15°

3408.82'

115.64'

3547'

12.86°

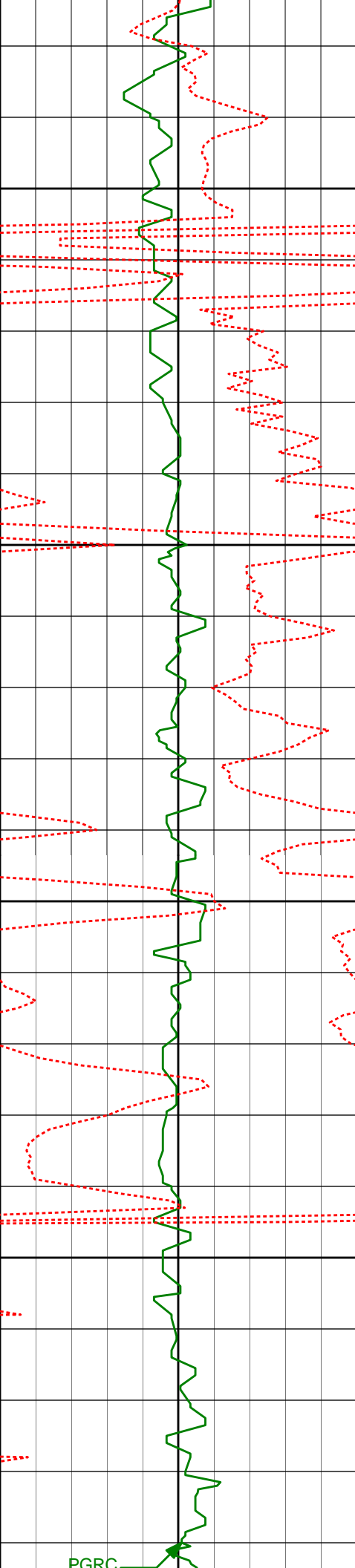
167.30°

3501.72'

122.73'

PGRC

ROPA



3650'

3700'

3750'

3800'

3642'

15.58°

172.03°

3593.80'

129.50'

3737'

17.17°

172.23°

3684.94'

136.26'

3832'

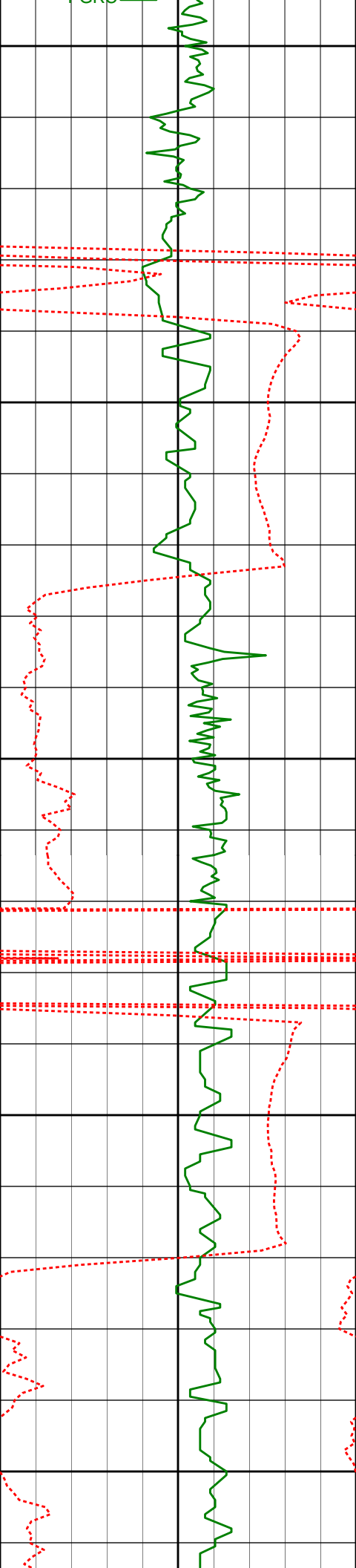
19.01°

171.15°

3775.24'

143.94'

PGRC



3850'

3900'

3950'

4000'

4050'

3927'

17.23°

167.69°

3865.53'

152.70'

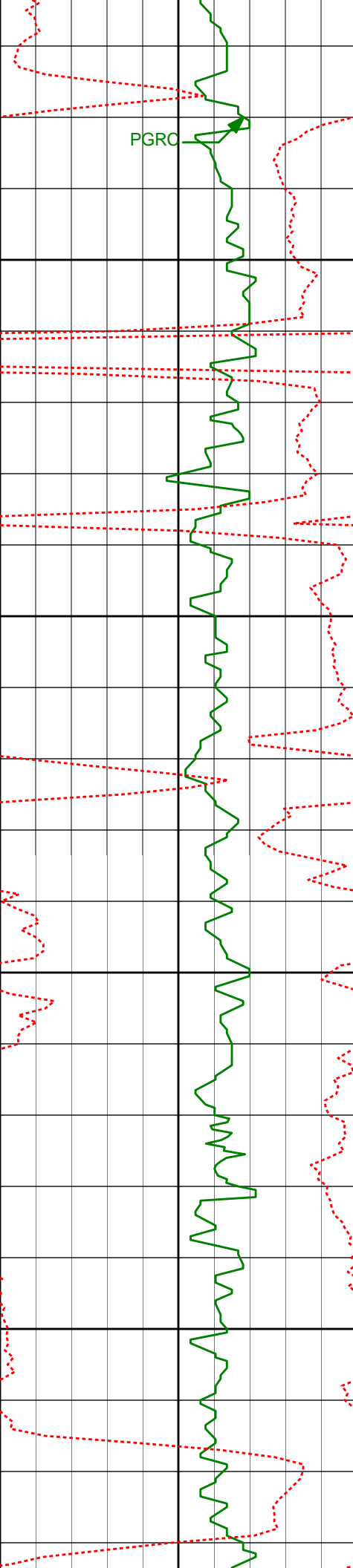
4021'

13.19°

169.89°

3956.22'

160.37'



PGRC

ROPA

4100'

4116'

11.41°

170.99°

4049.04'

166.07'

4150'

4200'

4211'

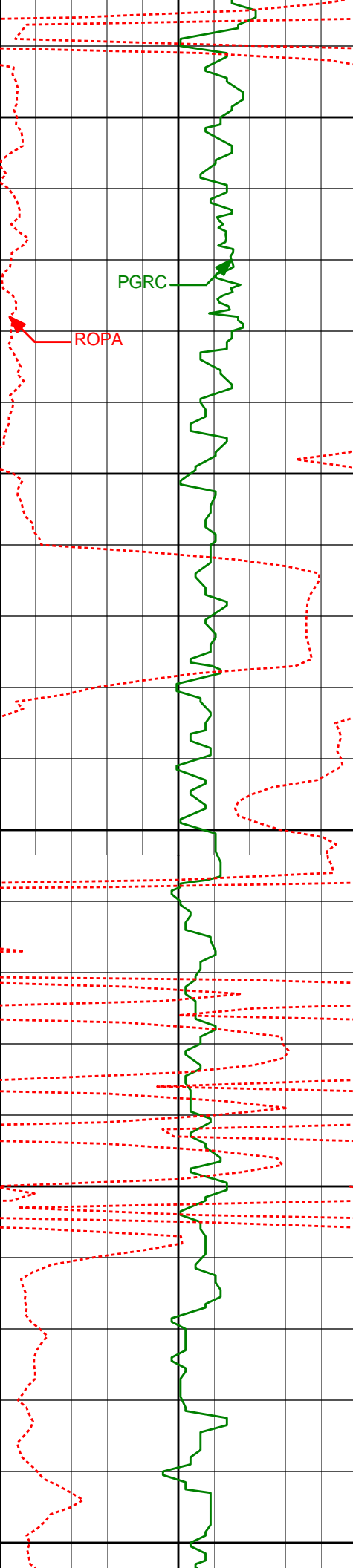
9.54°

173.19°

4142.45'

170.47'

4250'



4300'

4306'

8.28°

172.68°

4236.30'

173.98'

PGRC

ROPA

4350'

4400'

4401'

8.38°

175.12°

4330.30'

177.04'

4450'

4496'

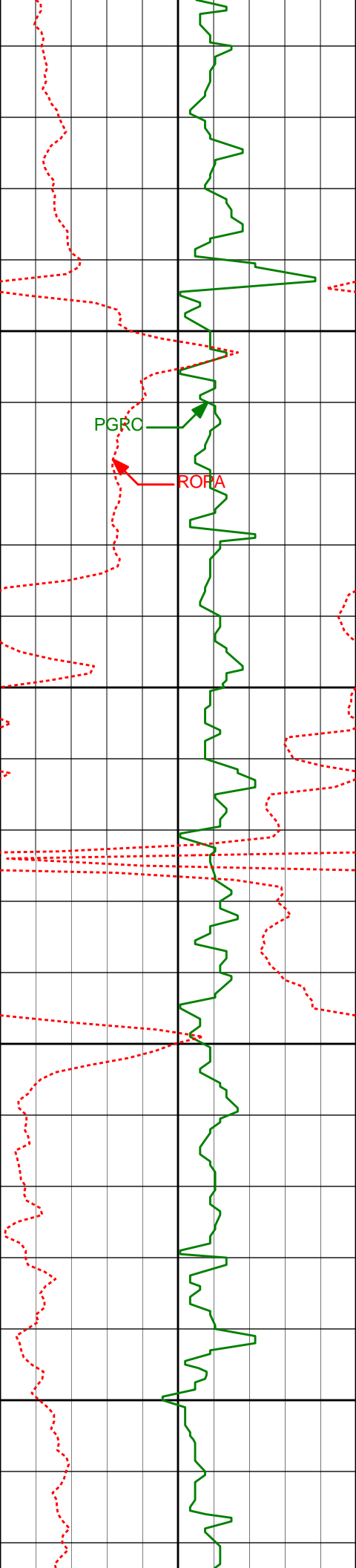
7.06°

179.98°

4424.44'

179.13'

4500'



4550'

PGRC

ROPA

4600'

4650'

4700'

4591'

5.31°

182.75°

4518.88'

180.12'

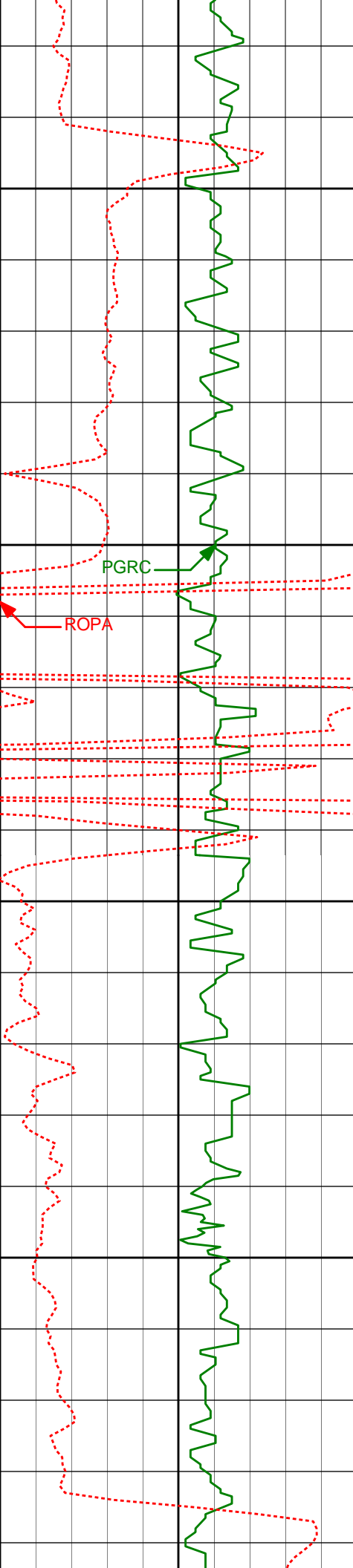
4686'

3.82°

180.41°

4613.58'

180.78'



4750'

4781'

3.08°

183.14°

4708.40'

181.29'

4800'

PGRC

ROPA

4850'

4876'

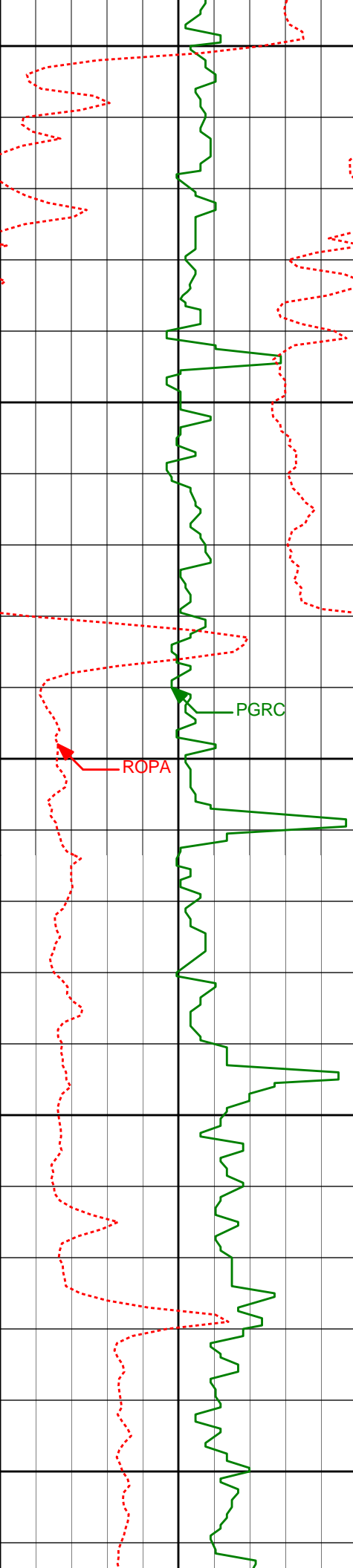
2.00°

186.49°

4803.31'

181.46'

4900'



4950'

4971'

0.56°

217.47°

4898.28'

181.23'

5000'

5050'

ROPA

PGRC

5066'

0.50°

185.53°

4993.28'

181.00'

5100'

5150'

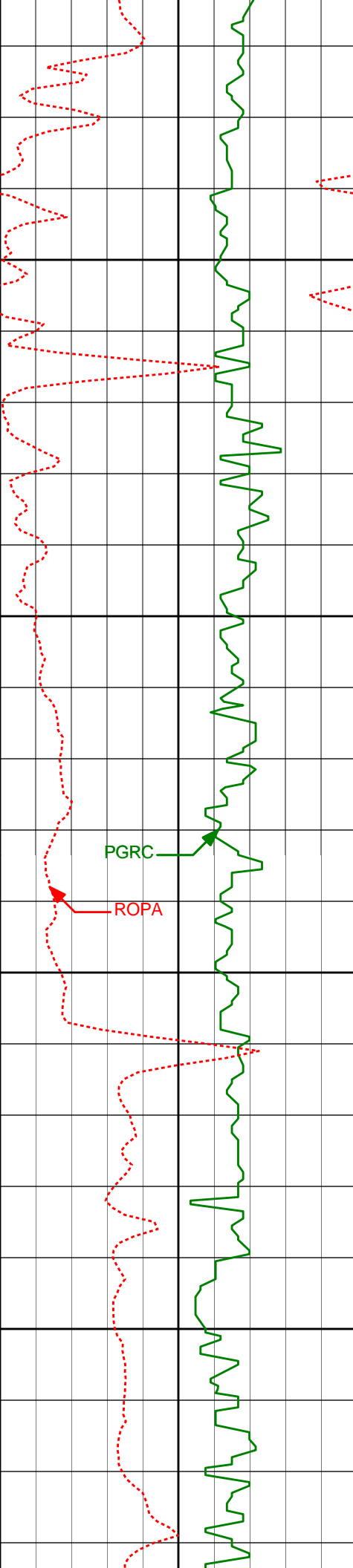
5160'

0.50°

236.25°

5087.28'

180.70'



5200'

5250'

5300'

5350'

5255'

0.34°

320.28°

5182.28'

180.18'

PGRC

ROPA

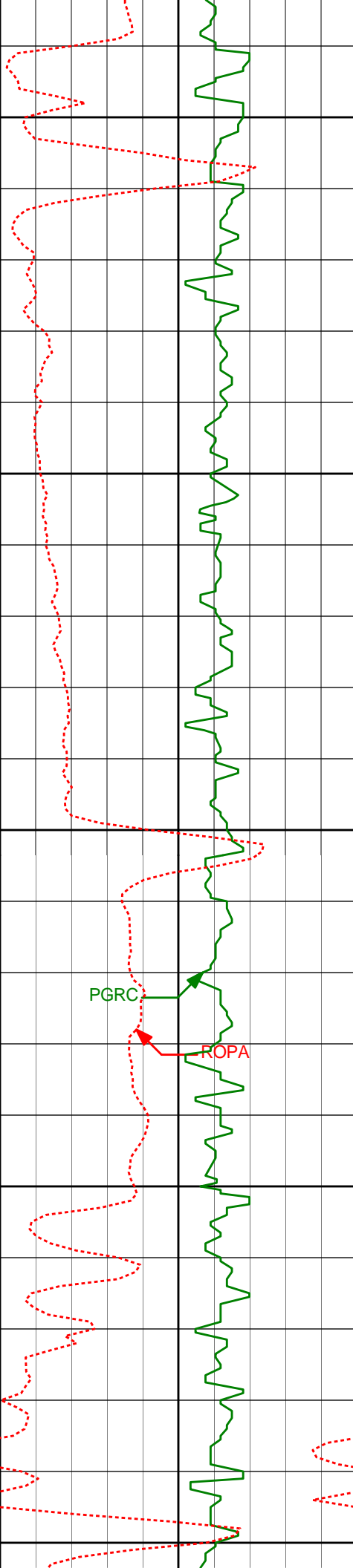
5350'

0.60°

261.70°

5277.27'

179.49'



5400'

5450'

5500'

5550'

5600'

5445'

0.59°

253.46°

5372.27'

178.56'

5540'

0.15°

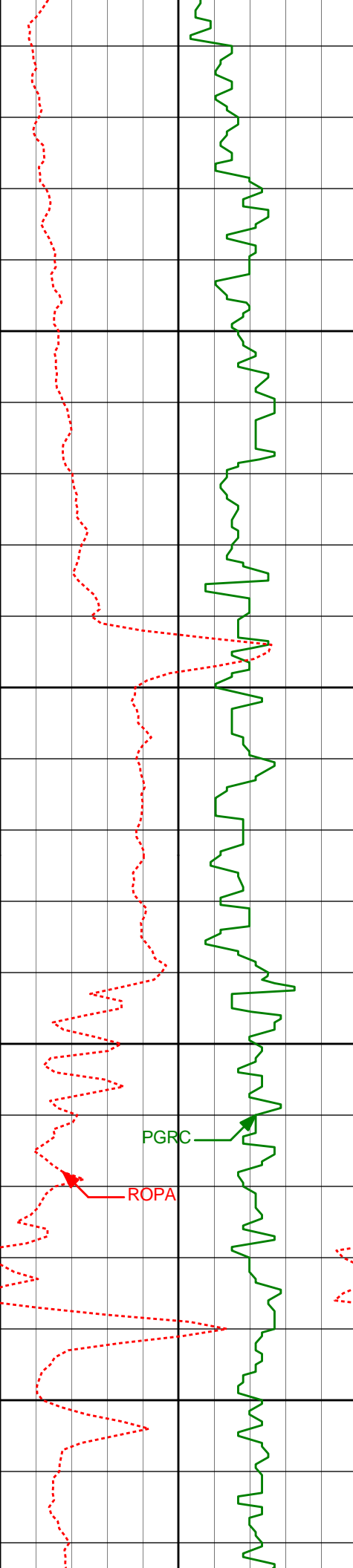
333.66°

5467.27'

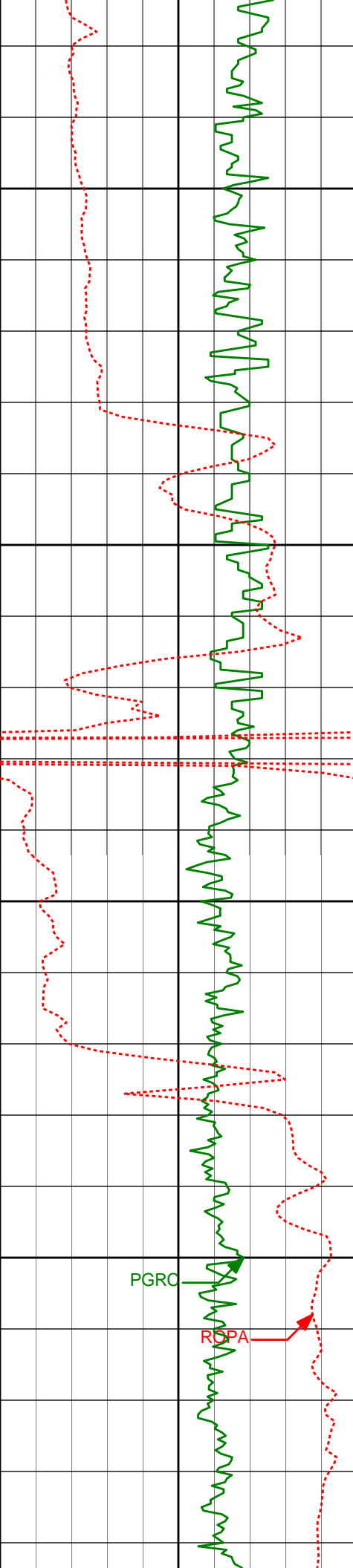
178.05'

PGRC

ROPA



5635'	0.10°	83.71°	5562.27'	178.06'
5650'				
5700'				
5730'	0.35°	331.07°	5657.27'	177.97'
5750'				
5800'				



5850'

5900'

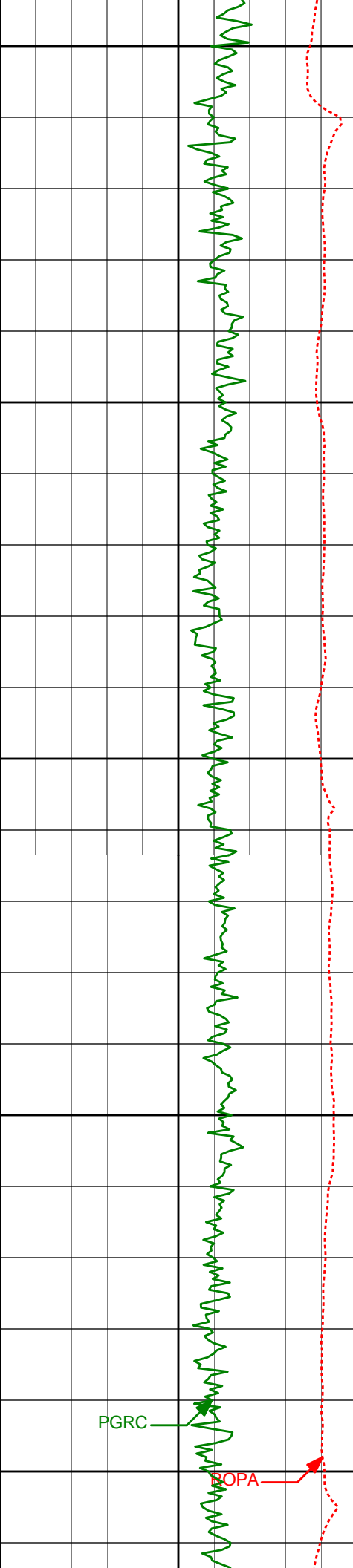
5950'

6000'

PGRC

ROPA

5825'	0.31°	16.21°	5752.26'	177.84'
5917'	0.33°	30.77°	5844.26'	177.99'
6012'	0.63°	101.20°	5939.26'	178.63'



6050'

6100'

6150'

6200'

6250'

6107'

10.64°

98.82°

6033.68'

187.93'

6201'

21.66°

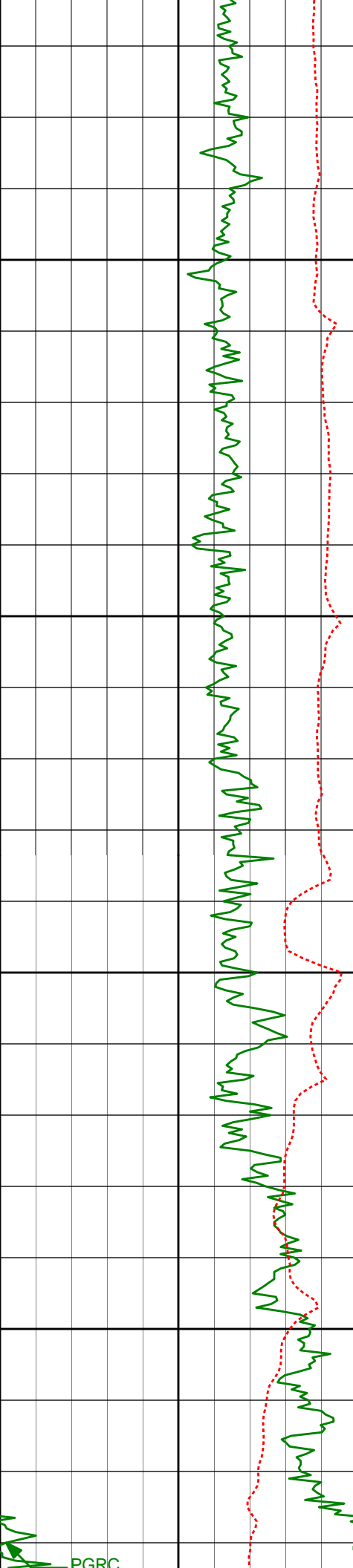
98.25°

6123.83'

214.03'

PGRC

POPA



6300'

6350'

6400'

6450'

6296'

32.95°

96.82°

6208.11'

257.53'

6344'

39.43°

90.70°

6246.84'

285.78'

6391'

43.62°

86.69°

6282.03'

316.61'

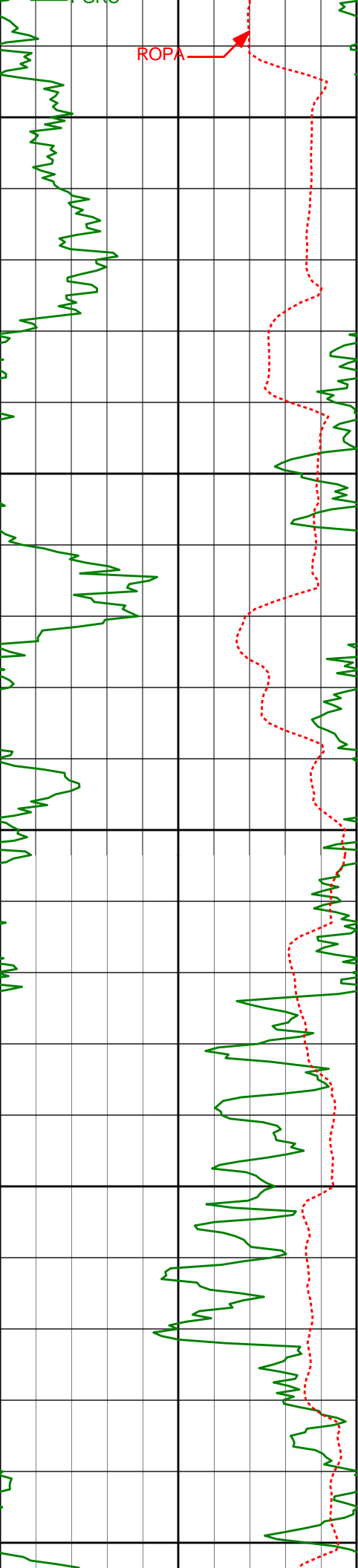
6439'

45.03°

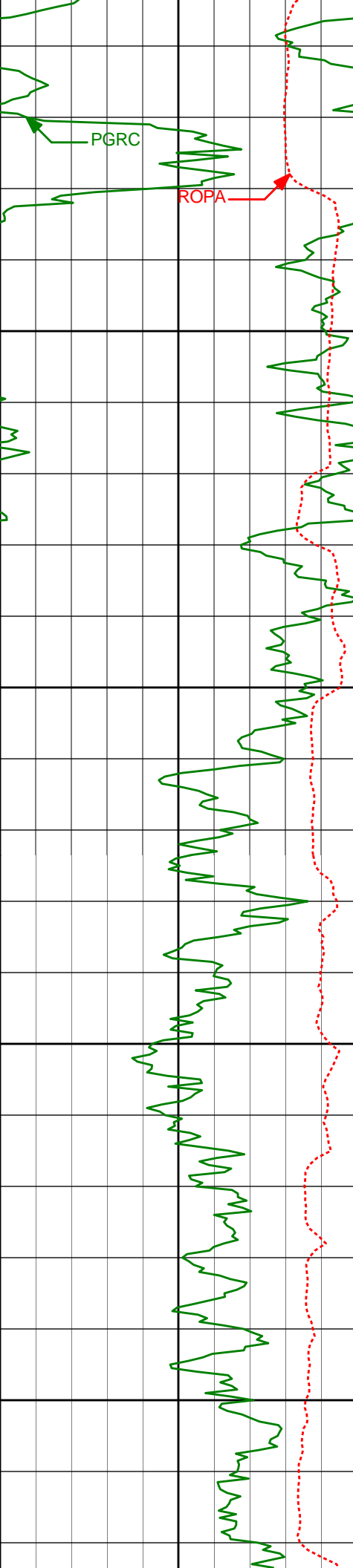
86.68°

6316.37'

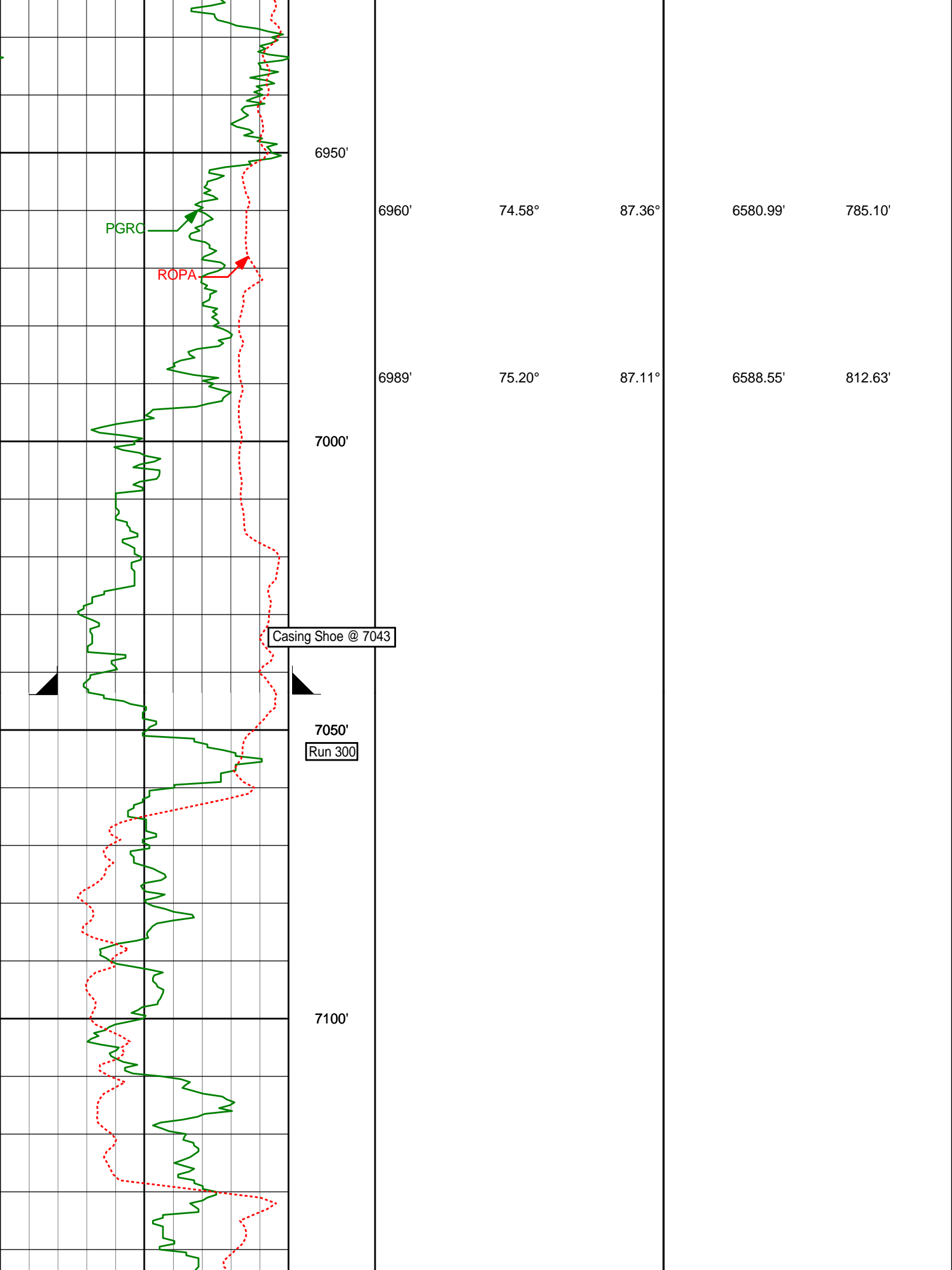
349.63'

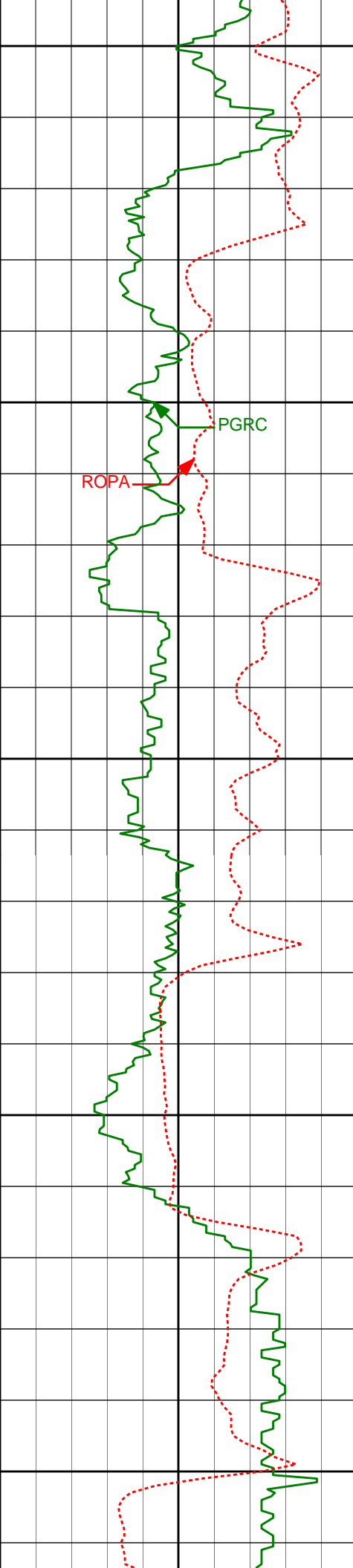


6486'	45.93°	87.02°	6349.32'	382.64'
6534'	49.41°	87.67°	6381.64'	417.64'
6581'	52.23°	87.65°	6411.33'	453.61'
6629'	55.17°	87.25°	6439.74'	491.78'
6676'	56.91°	86.88°	6466.00'	530.21'



6724'	59.21°	86.08°	6491.39'	570.28'
6750'				
6771'	63.25°	87.26°	6514.00'	610.86'
6800'				
6819'	66.13°	89.08°	6534.52'	653.72'
6850'				
6865'	70.09°	89.22°	6551.67'	695.91'
6900'				
6913'	71.73°	88.79°	6567.37'	740.75'





7150'

7160'

82.49°

86.89°

6621.61'

977.62'

7200'

PGRC

ROPA

7250'

7253'

86.15°

87.19°

6630.81'

1068.82'

7300'

7350'

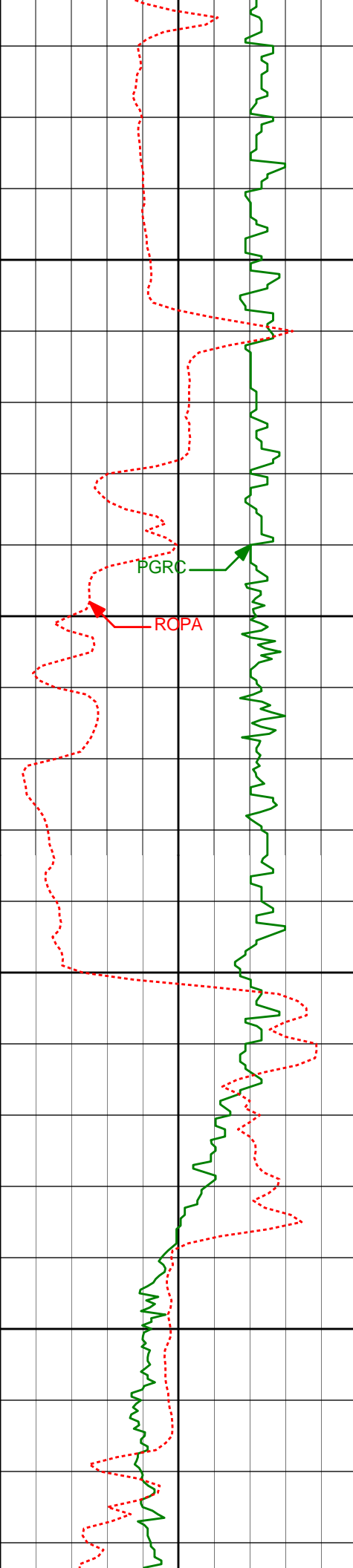
7345'

90.83°

88.76°

6633.23'

1159.68'



7400'

7438'

90.34°

85.73°

6632.28'

1251.39'

PGRC

ROPA

7450'

7500'

7531'

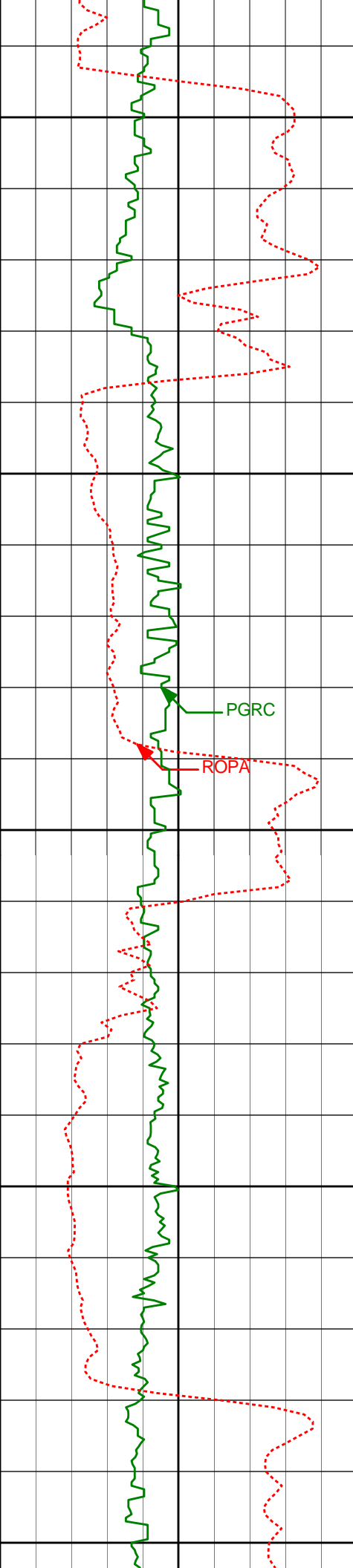
91.33°

85.21°

6630.93'

1342.58'

7550'



7600'

7624'

91.23°

87.11°

6628.85'

1433.96'

7650'

7700'

7717'

90.74°

84.71°

6627.25'

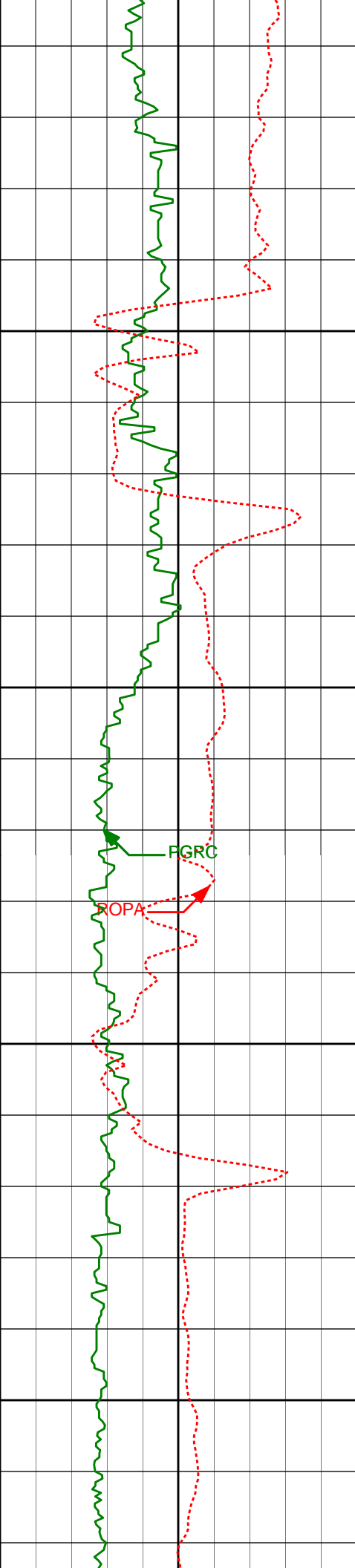
1525.28'

7750'

7800'

PGRC

ROPA



7850'

7900'

7950'

8000'

7810'

90.98°

89.44°

6625.86'

1616.92'

7901'

91.30°

90.96°

6624.04'

1707.30'

7993'

90.12°

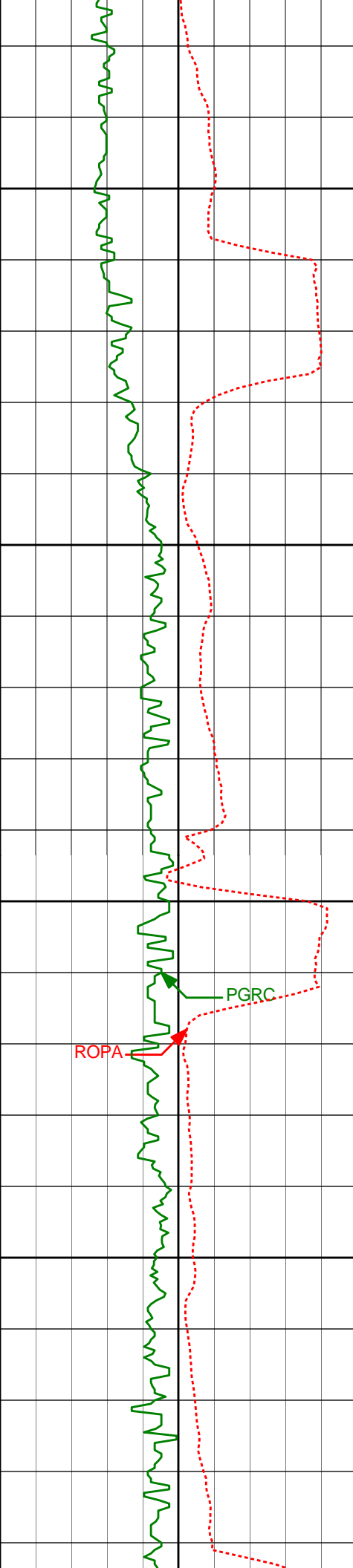
90.38°

6622.91'

1798.77'

FGRC

POPA



8050'

8085'

92.34°

88.72°

6620.93'

1890.02'

8100'

8150'

8178'

90.31°

88.23°

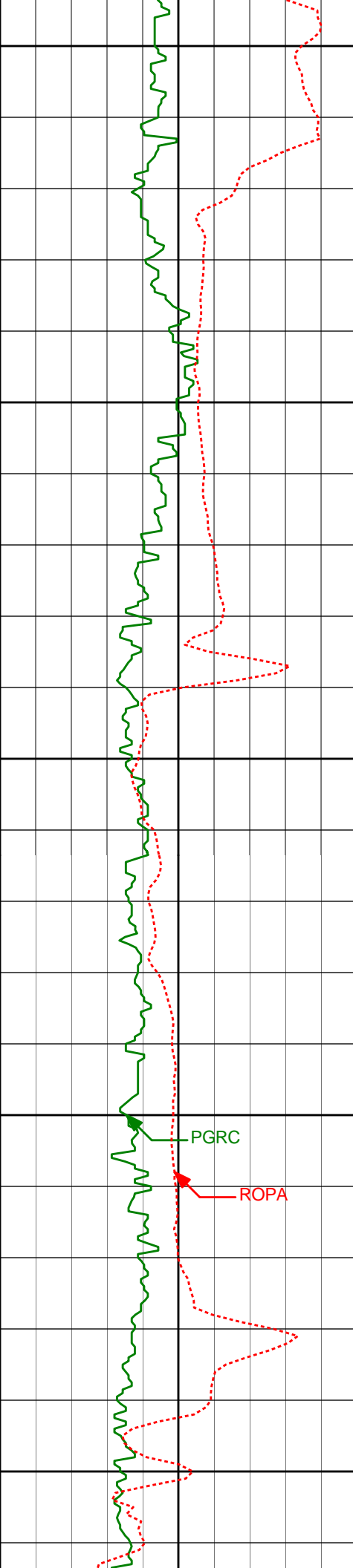
6618.78'

1982.02'

8200'

ROPA

PGRC



8250'

8271'

92.47°

90.68°

6616.52'

2074.22'

8300'

8350'

8365'

92.37°

89.35°

6612.55'

2167.49'

8400'

PGRC

ROPA

8450'

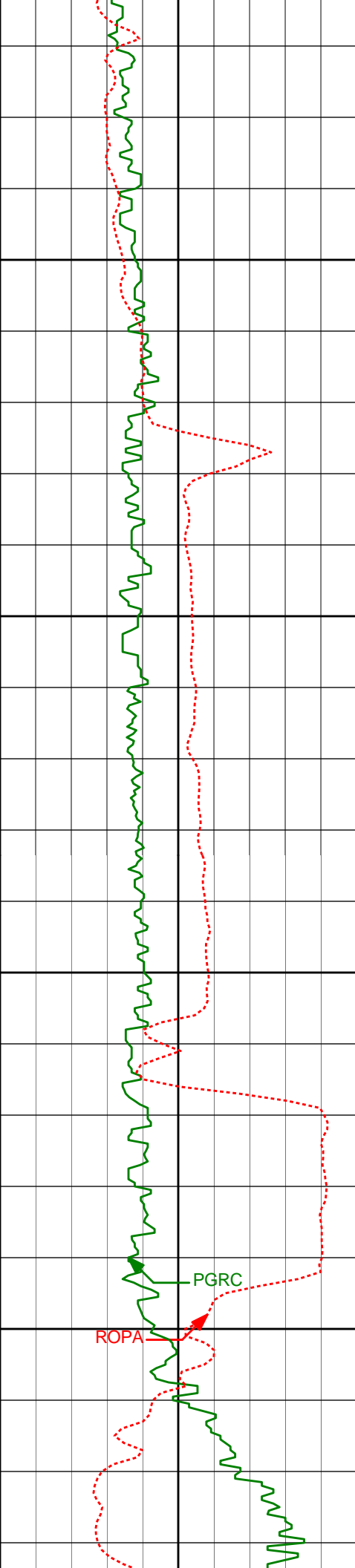
8460'

90.62°

89.91°

6610.08'

2261.71'



8500'

8550'

8600'

8650'

8555'

90.40°

87.08°

6609.23'

2355.71'

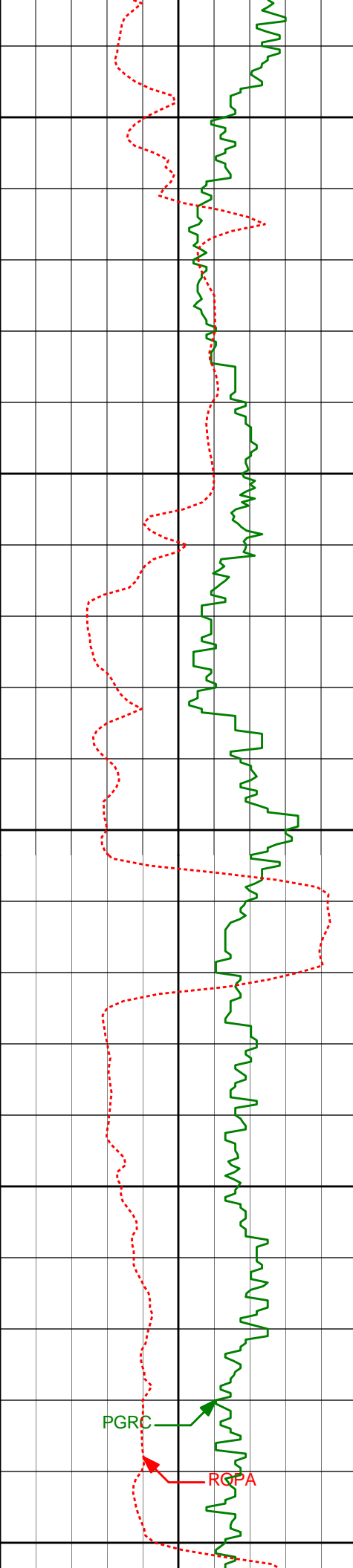
8649'

92.96°

91.48°

6606.47'

2448.84'



8700'

8744'

93.36°

90.70°

6601.24'

2543.23'

8750'

8800'

8839'

92.03°

90.12°

6596.77'

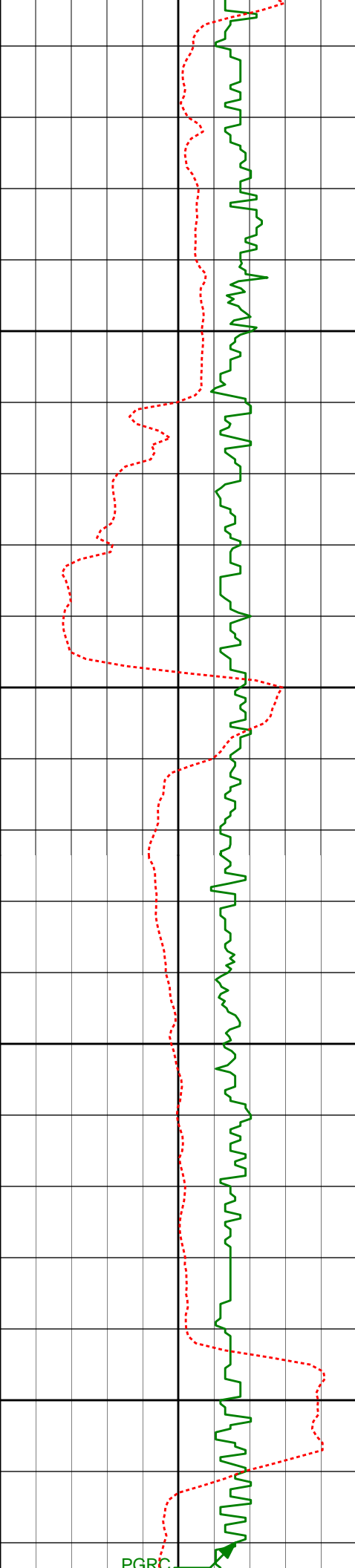
2637.54'

8850'

PGRC

RCPA

8900'



8950'

9000'

9050'

9100'

8934'

90.71°

88.68°

6594.50'

2731.73'

9029'

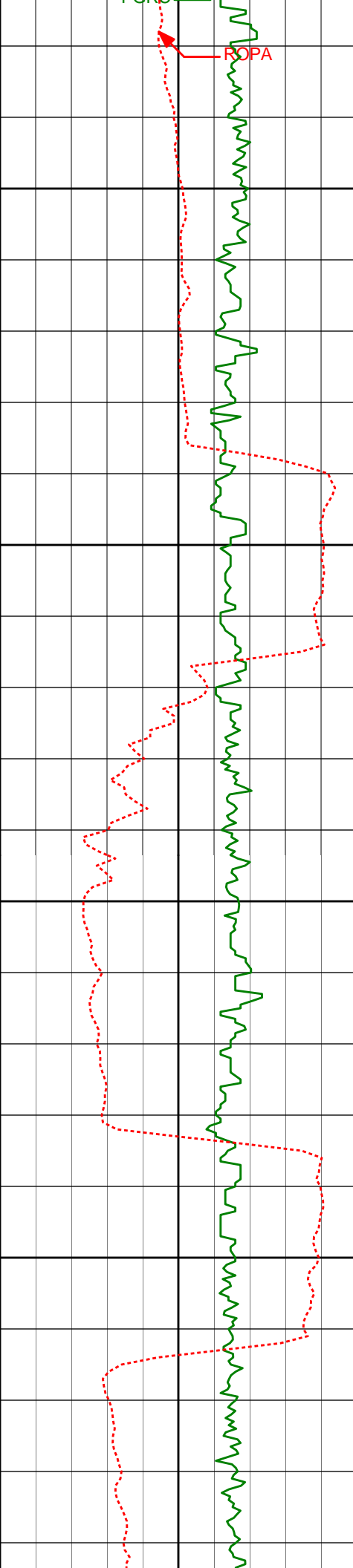
90.55°

92.31°

6593.45'

2826.14'

PGRC



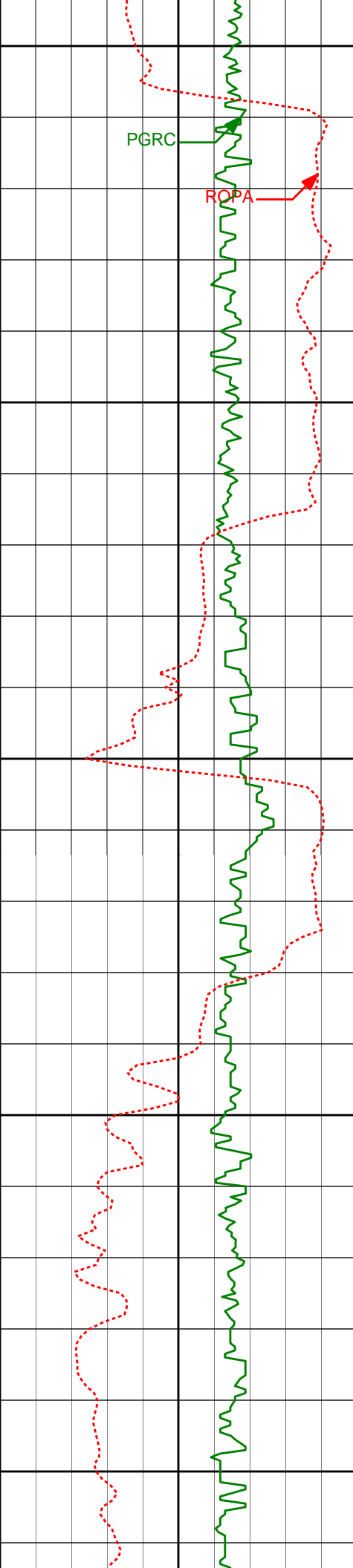
9150'

9200'

9250'

9300'

9124'	90.28°	92.89°	6592.77'	2920.89'
9219'	90.40°	92.66°	6592.20'	3015.66'
9313'	90.31°	92.00°	6591.62'	3109.37'



9350'

PGRC

ROPA

9400'

9408'

90.15°

87.15°

6591.24'

3203.60'

9450'

9500'

9503'

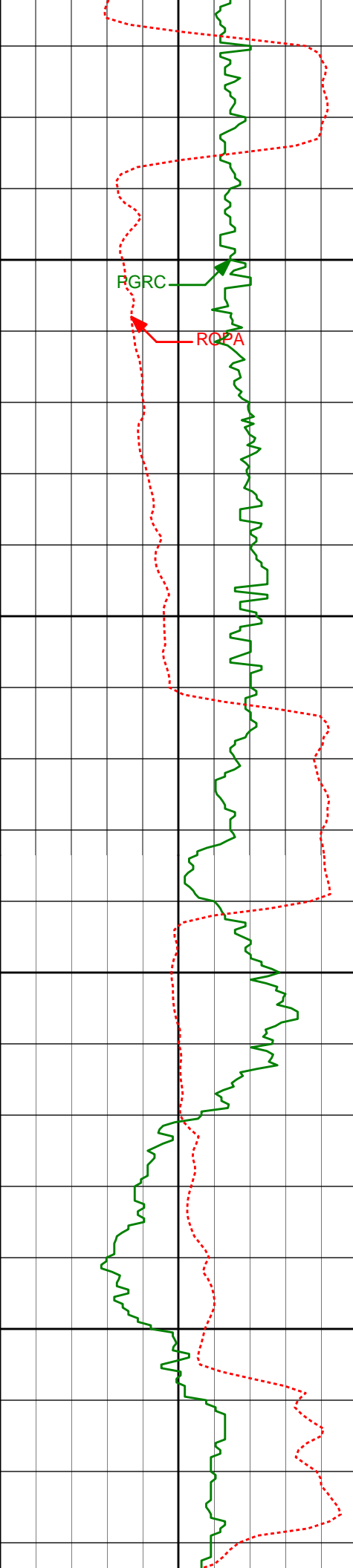
89.85°

86.26°

6591.24'

3297.14'

9550'



9600'

9650'

9700'

9750'

9598'

9693'

89.69°

93.40°

85.66°

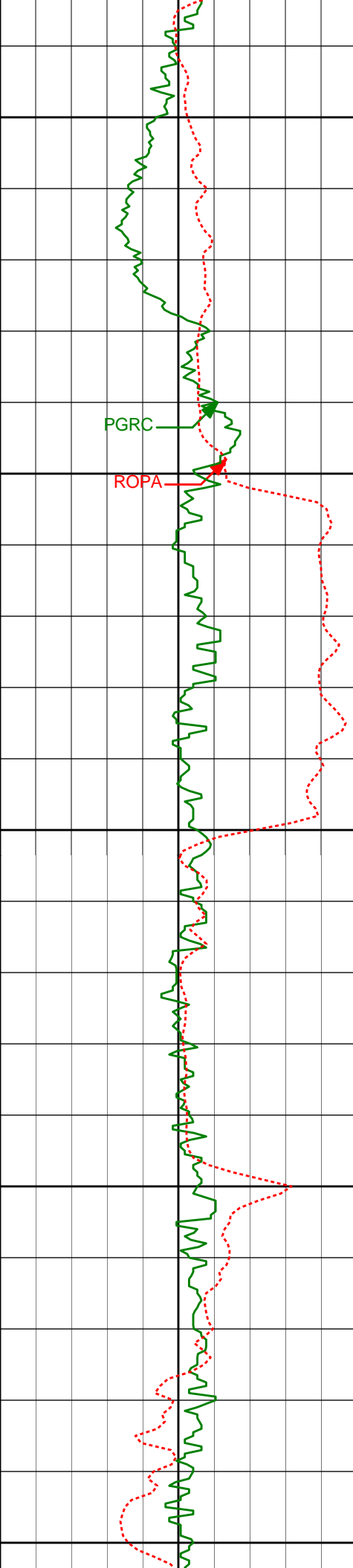
84.73°

6591.62'

6589.06'

3390.45'

3483.47'



9800'

9850'

9900'

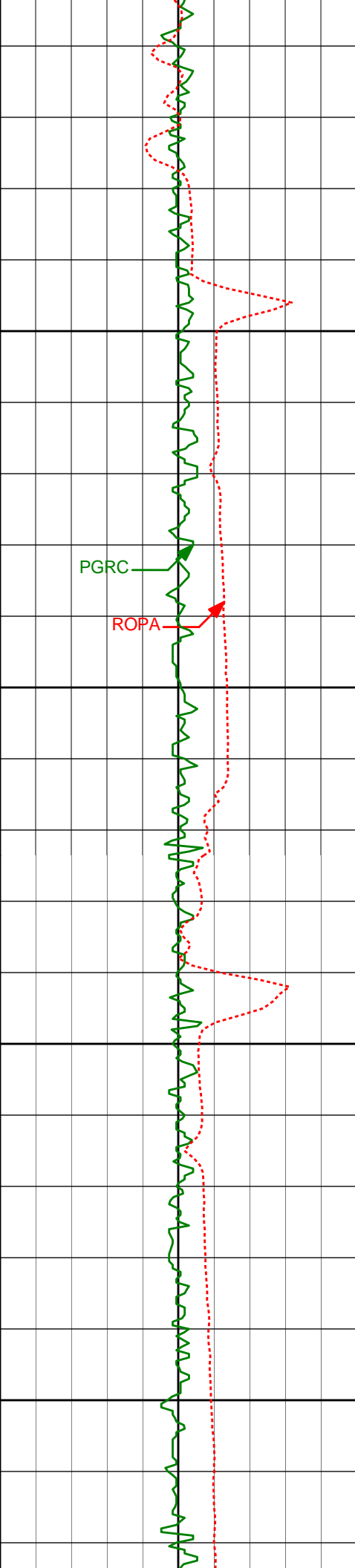
9950'

10000'

PGRC

ROPA

9788'	92.19°	84.54°	6584.43'	3576.24'
9883'	91.33°	89.00°	6581.51'	3669.73'
9978'	91.33°	87.64°	6579.30'	3763.68'



10050'

10073'

90.46°

87.69°

6577.82'

3857.47'

10100'

10150'

10168'

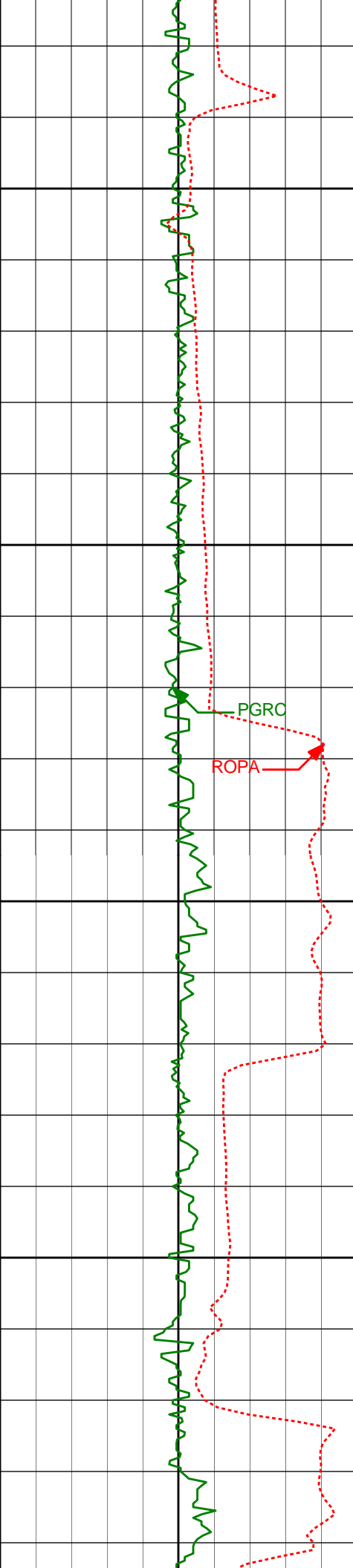
90.40°

86.33°

6577.10'

3951.09'

10200'



10250'

10263'

90.40°

84.74°

6576.44'

4044.27'

10300'

PGRC

ROPA

10350'

10358'

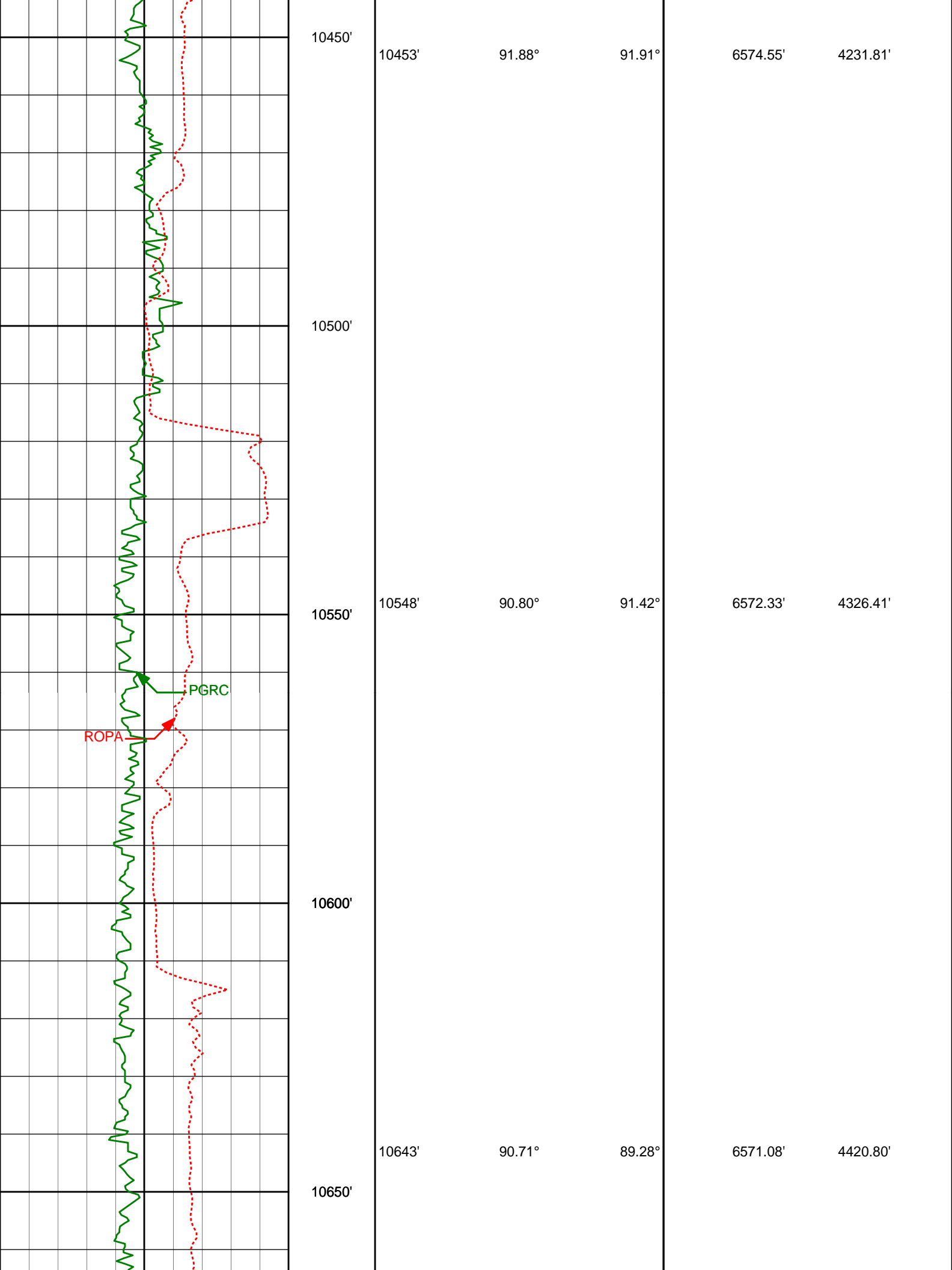
90.00°

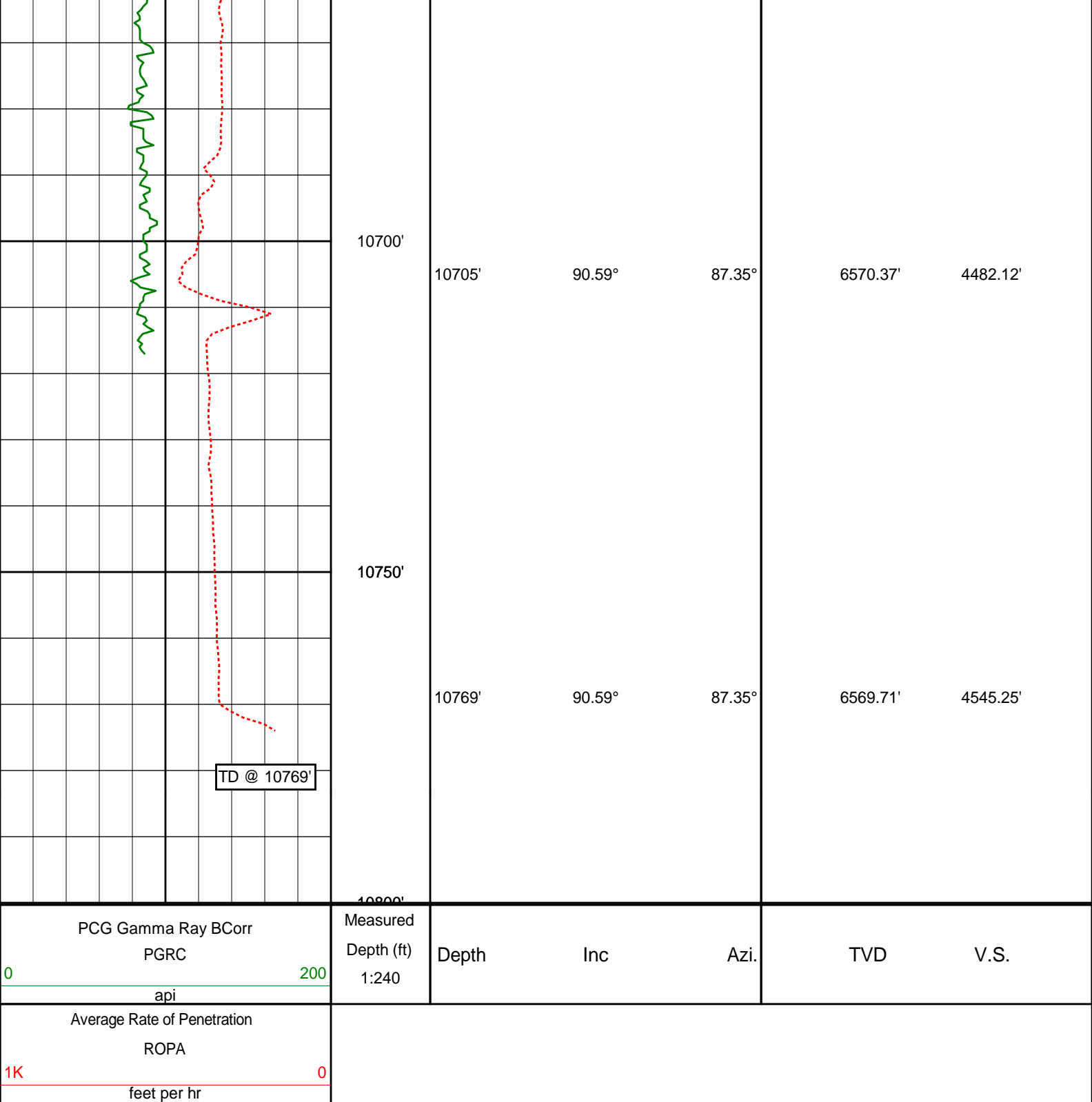
87.27°

6576.11'

4137.59'

10400'





HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE20-63-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900758836

Tie into existing surveys at 355', 645', and 935' 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
355.00	0.10	51.60	355.00	0.19 N	0.24 E	0.22	0.03
645.00	0.10	51.60	645.00	0.51 N	0.64 E	0.58	0.00
935.00	0.60	262.40	934.99	0.46 N	0.67 W	-0.72	0.24
994.00	0.28	228.14	993.99	0.33 N	1.08 W	-1.11	0.68
1086.00	0.22	11.36	1085.99	0.35 N	1.21 W	-1.25	0.52
1272.00	0.12	179.04	1271.99	0.50 N	1.14 W	-1.19	0.18
1458.00	1.74	206.03	1457.96	2.23 S	2.38 W	-2.10	0.88
1553.00	4.47	191.19	1552.81	7.16 S	3.73 W	-2.86	2.97
1648.00	6.46	181.98	1647.38	16.13 S	4.63 W	-2.70	2.28
1743.00	8.01	181.61	1741.62	28.09 S	5.00 W	-1.66	1.63
1838.00	8.67	176.38	1835.62	41.85 S	4.74 W	0.22	1.06
2028.00	11.80	166.43	2022.58	75.04 S	0.73 E	9.56	1.89
2122.00	12.66	170.40	2114.45	94.54 S	4.70 E	15.80	1.28
2217.00	14.38	159.44	2206.83	115.85 S	10.58 E	24.15	3.24
2313.00	12.79	158.91	2300.14	136.93 S	18.59 E	34.58	1.66
2407.00	13.30	165.23	2391.72	157.10 S	25.09 E	43.41	1.61
2502.00	14.27	163.97	2483.98	178.92 S	31.11 E	51.96	1.07
2597.00	13.31	164.95	2576.24	200.73 S	37.19 E	60.56	1.04
2692.00	13.49	168.60	2668.66	222.15 S	42.22 E	68.07	0.91
2787.00	12.26	167.65	2761.27	242.87 S	46.56 E	74.83	1.31
2882.00	13.33	173.61	2853.91	263.61 S	49.94 E	80.62	1.79
2977.00	15.16	175.53	2945.99	286.88 S	52.13 E	85.53	1.99
3072.00	15.06	169.42	3037.71	311.39 S	55.36 E	91.63	1.68
3167.00	12.45	167.89	3129.98	333.54 S	59.78 E	98.62	2.77
3262.00	12.35	174.01	3222.77	353.66 S	62.99 E	104.18	1.39
3357.00	11.61	169.55	3315.70	373.16 S	65.78 E	109.25	1.25
3452.00	11.26	164.15	3408.82	391.49 S	70.05 E	115.64	1.19
3547.00	12.86	167.30	3501.72	410.73 S	74.90 E	122.73	1.82
3642.00	15.58	172.03	3593.80	433.68 S	79.00 E	129.50	3.11
3737.00	17.17	172.23	3684.94	460.21 S	82.66 E	136.26	1.67
3832.00	19.01	171.15	3775.24	489.39 S	86.94 E	143.94	1.97
3927.00	17.23	167.69	3865.53	518.43 S	92.32 E	152.70	2.19
4021.00	13.19	169.89	3956.22	542.60 S	97.17 E	160.37	4.34
4116.00	11.41	170.99	4049.04	562.55 S	100.55 E	166.07	1.89
4211.00	9.54	173.19	4142.45	579.65 S	102.95 E	170.47	2.01
4306.00	8.28	172.68	4236.30	594.25 S	104.76 E	173.98	1.33
4401.00	8.38	175.12	4330.30	607.94 S	106.22 E	177.04	0.39
4496.00	7.06	179.98	4424.44	620.67 S	106.81 E	179.13	1.55
4591.00	5.31	182.75	4518.88	630.90 S	106.60 E	180.12	1.87
4686.00	3.82	180.41	4613.58	638.46 S	106.37 E	180.78	1.58
4781.00	3.08	183.14	4708.40	644.17 S	106.21 E	181.29	0.80
4876.00	2.00	186.49	4803.31	648.37 S	105.88 E	181.46	1.15
4971.00	0.56	217.47	4898.28	650.38 S	105.41 E	181.23	1.63
5066.00	0.50	185.53	4993.28	651.16 S	105.09 E	181.00	0.31
5160.00	0.50	236.52	5087.28	651.80 S	104.70 E	180.70	0.46
5255.00	0.34	320.28	5182.28	651.81 S	104.18 E	180.18	0.60
5350.00	0.60	261.70	5277.27	651.67 S	103.51 E	179.49	0.54
5445.00	0.59	253.46	5372.27	651.88 S	102.54 E	178.56	0.09
5540.00	0.15	333.66	5467.27	651.90 S	102.02 E	178.05	0.61
5635.00	0.10	83.71	5562.27	651.78 S	102.05 E	178.06	0.22
5730.00	0.35	331.07	5657.27	651.52 S	101.99 E	177.97	0.42
5825.00	0.31	16.21	5752.26	651.02 S	101.92 E	177.84	0.27
5917.00	0.33	30.77	5844.26	650.55 S	102.13 E	177.99	0.09
6012.00	0.63	101.20	5939.26	650.42 S	102.78 E	178.63	0.64
6107.00	10.64	98.82	6033.68	651.87 S	111.98 E	187.93	10.54
6201.00	21.66	98.25	6123.83	655.70 S	137.80 E	214.03	11.72
6296.00	32.95	96.82	6208.11	661.30 S	180.95 E	257.53	11.90
6344.00	39.43	90.70	6246.84	663.04 S	209.19 E	285.78	15.44
6391.00	43.62	86.69	6282.03	662.29 S	240.32 E	316.61	10.55
6439.00	45.03	86.68	6316.37	660.35 S	273.80 E	349.63	2.94
6486.00	45.93	87.02	6349.32	658.51 S	307.26 E	382.64	1.98
6534.00	49.41	87.67	6381.64	656.87 S	342.70 E	417.64	7.32
6581.00	52.23	87.65	6411.33	655.38 S	379.10 E	453.61	6.00
6629.00	55.17	87.25	6439.74	653.66 S	417.74 E	491.78	6.16
6676.00	56.91	86.88	6466.00	651.66 S	456.67 E	530.21	3.76
6724.00	59.21	86.08	6491.39	649.16 S	497.33 E	570.28	5.00
6771.00	63.25	87.59	6514.00	646.89 S	538.45 E	610.86	9.04
6819.00	66.13	88.04	6534.52	645.24 S	581.81 E	653.72	6.06
6865.00	70.09	88.31	6551.67	643.88 S	624.46 E	695.91	8.63
6913.00	71.73	87.87	6567.37	642.37 S	669.80 E	740.75	3.52
6960.00	74.58	86.43	6580.99	640.13 S	714.72 E	785.10	6.74
6989.00	75.20	86.17	6588.55	638.32 S	742.66 E	812.63	2.31
7022.00	76.42	86.12	6591.24	636.45 S	772.22 E	837.88	4.82

7160.00	82.49	86.89	6621.61	628.19 S	910.00 E	977.62	4.28
7253.00	86.15	87.19	6630.81	623.41 S	1002.41 E	1068.82	3.95
7345.00	90.83	88.76	6633.23	620.16 S	1094.29 E	1159.68	5.37
7438.00	90.34	85.73	6632.28	615.70 S	1187.17 E	1251.39	3.30
7531.00	91.33	85.21	6630.93	608.35 S	1279.87 E	1342.58	1.20
7624.00	91.23	87.11	6628.85	602.12 S	1372.63 E	1433.96	2.05
7717.00	90.74	84.71	6627.25	595.49 S	1465.37 E	1525.28	2.63
7810.00	90.98	89.44	6625.86	590.75 S	1558.21 E	1616.92	5.09
7901.00	91.30	90.96	6624.04	591.07 S	1649.19 E	1707.30	1.71
7993.00	90.12	90.38	6622.91	592.14 S	1741.18 E	1798.77	1.43
8085.00	92.34	88.72	6620.93	591.42 S	1833.14 E	1890.02	3.01
8178.00	90.31	88.23	6618.78	588.95 S	1926.08 E	1982.02	2.25
8271.00	92.47	90.68	6616.52	588.06 S	2019.04 E	2074.22	3.51
8365.00	92.37	89.35	6612.55	588.09 S	2112.95 E	2167.49	1.42
8460.00	90.62	89.91	6610.08	587.47 S	2207.91 E	2261.71	1.93
8555.00	90.40	87.08	6609.23	584.98 S	2302.87 E	2355.71	2.99
8649.00	92.96	91.48	6606.47	583.79 S	2396.79 E	2448.84	5.41
8744.00	93.36	90.70	6601.24	585.60 S	2491.62 E	2543.23	0.92
8839.00	92.03	90.12	6596.77	586.28 S	2586.51 E	2637.54	1.53
8934.00	90.71	88.68	6594.50	585.28 S	2681.48 E	2731.73	2.06
9029.00	90.55	92.31	6593.45	586.10 S	2776.45 E	2826.14	3.82
9124.00	90.28	92.89	6592.77	590.41 S	2871.35 E	2920.89	0.67
9219.00	90.40	92.66	6592.20	595.01 S	2966.24 E	3015.66	0.27
9313.00	90.31	92.00	6591.62	598.83 S	3060.16 E	3109.37	0.71
9408.00	90.15	87.15	6591.24	598.13 S	3155.13 E	3203.60	5.11
9503.00	89.85	86.26	6591.24	592.67 S	3249.97 E	3297.14	0.99
9598.00	89.69	85.66	6591.62	585.98 S	3344.73 E	3390.45	0.65
9693.00	93.40	84.73	6589.06	578.02 S	3439.35 E	3483.47	4.03
9788.00	92.19	84.54	6584.43	569.15 S	3533.81 E	3576.24	1.29
9883.00	91.33	89.00	6581.51	563.80 S	3628.59 E	3669.73	4.78
9978.00	91.33	87.64	6579.30	561.02 S	3723.53 E	3763.68	1.43
10073.00	90.46	87.69	6577.82	557.15 S	3818.43 E	3857.47	0.92
10168.00	90.40	86.33	6577.10	552.19 S	3913.30 E	3951.09	1.43
10263.00	90.40	84.74	6576.44	544.80 S	4008.01 E	4044.27	1.67
10358.00	90.00	87.27	6576.11	538.18 S	4102.77 E	4137.59	2.70
10453.00	91.88	91.91	6574.55	537.50 S	4197.72 E	4231.81	5.27
10548.00	90.80	91.42	6572.33	540.26 S	4292.65 E	4326.41	1.25
10643.00	90.71	89.28	6571.08	540.84 S	4387.64 E	4420.80	2.25
10705.00	90.59	87.35	6570.37	539.02 S	4449.60 E	4482.12	3.12
10769.00	90.59	87.35	6569.71	536.06 S	4513.53 E	4545.25	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 96.76 DEGREES (GRID)
A TOTAL CORRECTION OF 7.63 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10769.00 FEET
IS 4545.25 FEET ALONG 96.77 DEGREES (GRID)**

Final Survey Projected to TD