



WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	10-Aug-13	11-Aug-13	14-Aug-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)	641.00	6,050.00	7,069.00		
Log End Depth (MD, ft)	6,050.00	7,069.00	11,560.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	09-Aug-13 09:45	10-Aug-13 12:00	12-Aug-13 11:45		
Drill/Wipe End Date and Time	10-Aug-13 03:30	11-Aug-13 04:30	14-Aug-13 00:30		
Min Inc (deg) @ Depth (MD, ft)	.13 @ 718.00	6.98 @ 6,090.00	85.43 @ 7,150.00		
Max Inc (deg) @ Depth (MD, ft)	12.36 @ 4,101.00	81.73 @ 7,015.00	93.15 @ 7,612.00		
Bit TFA(in2) / Bit Type	.86 / PDC	.86 / PDC	.55 / PDC		
Flow Rate (gpm)	574.71	561.59	285.43		
Max AV (fpm) / CV (fpm) @ MWD	386.2 / NA	373.8 / NA	408.1 / NA		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.90 / 27.00	10.00 / 34.00	9.57 / 33.00		
Filtrate CL (ppm)	1,700.00	2,400.00	2,800.00		
pH / Fluid Loss (mptm)	13.10 / NA	9.60 / NA	10.10 / NA		
PV (cP) / YP (Ihf2)	4 / 2.00	10 / 10.00	11 / 10.00		
% Solids / % Sand	3.70 / 0.15	12.2 / 0.25	7.2 / .25		
% Oil / Oil:Water Ratio	0 / 0:95	0 / 0:95	0 / 0:95		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Max Tool Temp (deg F) / S	145.00 / PCM	170.70 / PCM	200.00 / PCM		

Max Tool Temp (degF) / Source	145.90 / PCM	172.78 / PCM	230.30 / PCM		
Rm @ Max Tool Temp (degF)	NA @ NA	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	11404301	11404301	11698963		
Insert Serial Number	11399998	11399998	11400826		
Date and Time Initialized	08-Aug-13 19:56	01-Jan-70 00:00	11-Aug-13 07:29		
Date and Time Read	11-Aug-13 10:16	11-Aug-13 10:23	14-Aug-13 14:52		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	54.00	62.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404301	11404301	11698963		
Sonde Serial Number	11062116	11062116	11145627		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	14.29	43.73	317.56		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.76	46.87	55.23		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404301	11404301	11698963		
Insert/Sonde Serial Number	11579774	11579774	11293298		

## 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

WARRANTY

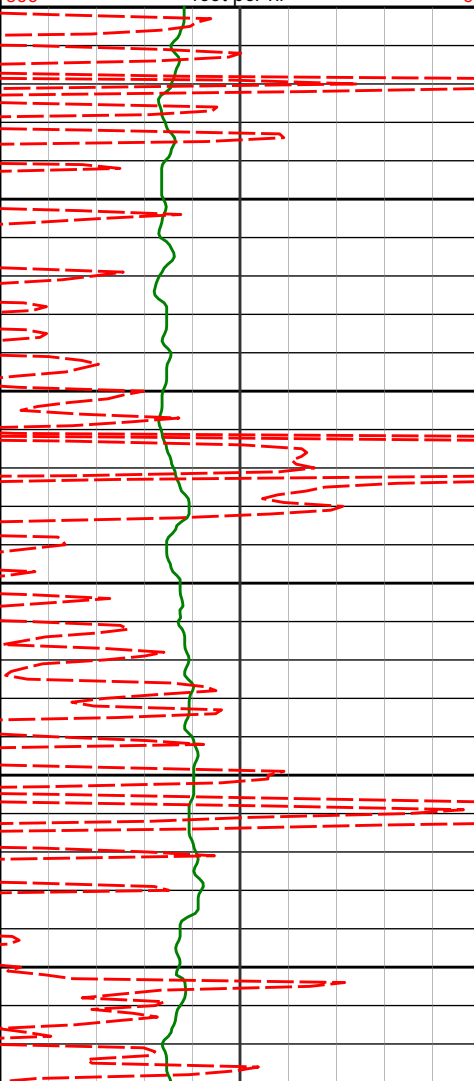
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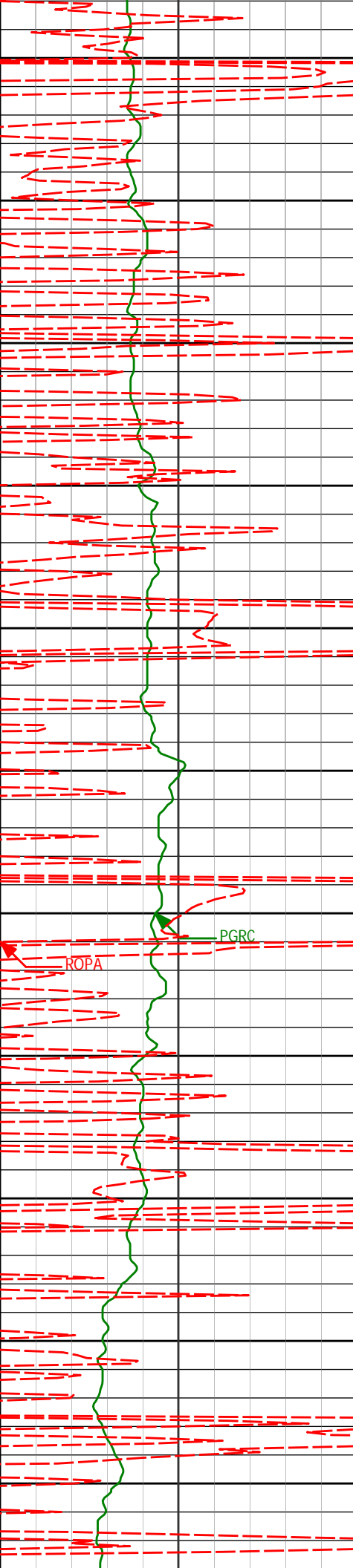
HALLIBURTON

Sperry Drilling Services

MD Main Log 1:600

Noble Energy  
Wells Ranch USX AA13-65-1HN  
H&P 343  
T6N-R62W

PCG Gamma Ray PGRC							
0	api	300					
Avg Rate of Penetration ROPA		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	feet per hr	0					
		3000					
		3050	3057'	9.97°	344.79°	3037.01'	103.09'
		3100					
		3150	3152'	8.86°	345.53°	3130.73'	109.28'
		3200					
		3250	3247'	8.83°	347.31°	3224.60'	114.79'



3300

3342'	8.65°	347.83°	3318.50'	119.97'
-------	-------	---------	----------	---------

3350

3400

3437'	7.62°	341.39°	3412.54'	125.39'
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3450

3500

3531'	7.44°	340.96°	3505.73'	131.07'
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3550

3600

3626'	8.09°	346.19°	3599.86'	136.47'
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3650

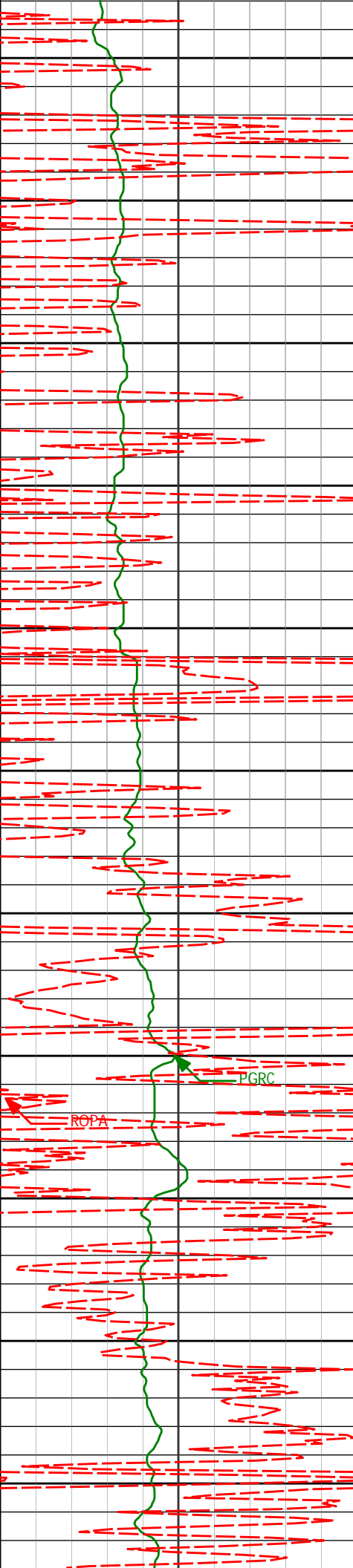
3700

3721'	9.59°	342.26°	3693.73'	142.54'
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3750

3800

3816'	10.71°	344.47°	3787.24'	149.66'
-------	--------	---------	----------	---------



3850

3900

3950

4000

4050

4100

4150

4200

4250

4300

4350

3911'

11.42°

345.80°

3880.47'

156.92'

4006'

11.93°

346.17°

3973.51'

164.31'

4101'

12.36°

347.19°

4066.38'

171.77'

4196'

11.57°

349.95°

4159.32'

178.54'

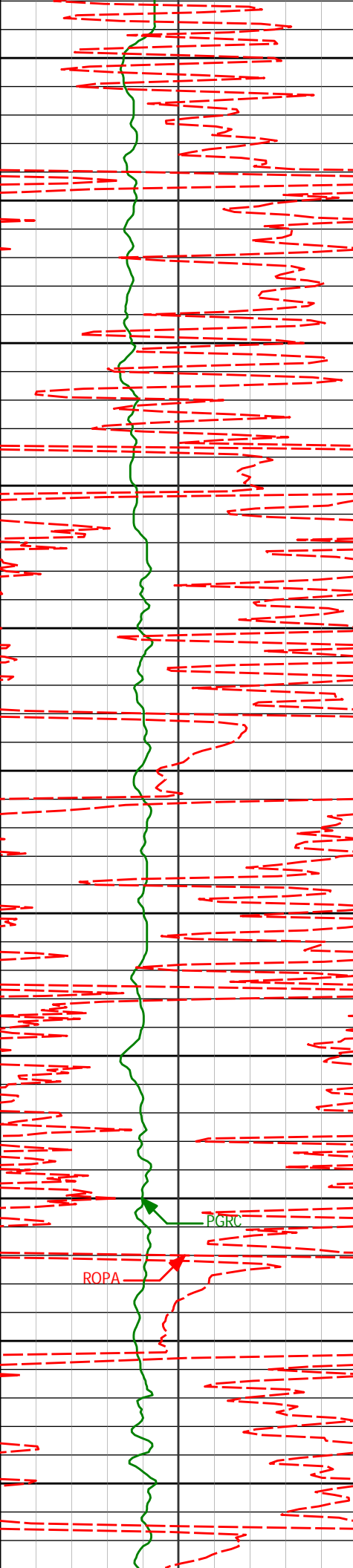
4291'

10.02°

348.86°

4252.63'

184.38'



4400

4450

4500

4550

4600

4650

4700

4750

4800

4850

4900

4386'      8.50°      350.74°      4346.39'      189.33'

4481'      7.55°      353.52°      4440.46'      193.11'

4576'      7.04°      349.39°      4534.69'      196.65'

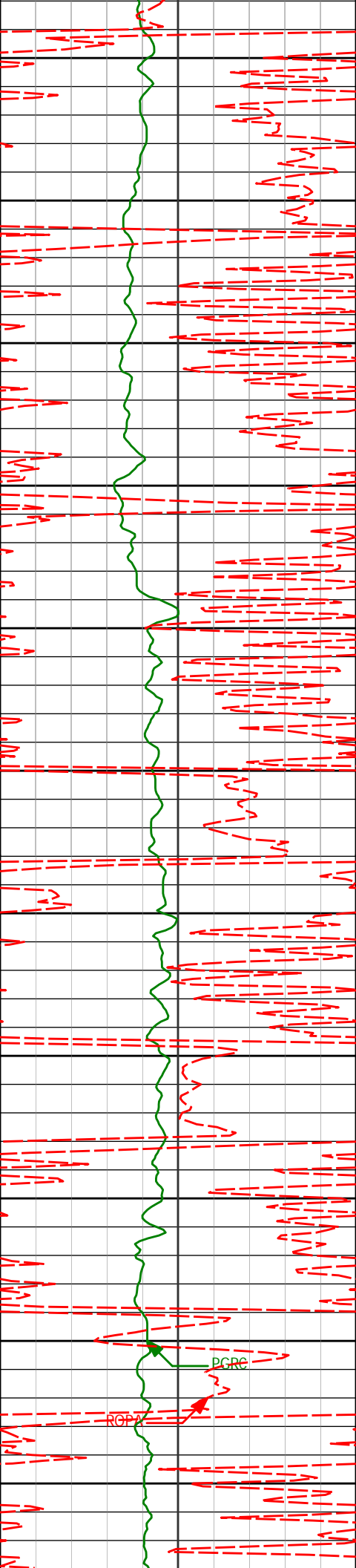
4671'      8.29°      341.13°      4628.85'      201.72'

4765'      6.91°      345.55°      4722.02'      207.07'

4860'      8.86°      343.89°      4816.11'      212.37'

PGRC

ROPA



4950

4955'

9.34°

350.24°

4909.92'

217.86'

5000

5050

5050'

8.58°

350.08°

5003.76'

222.54'

5100

5150

5145'

7.32°

354.21°

5097.85'

226.30'

5200

5250

5240'

6.87°

352.25°

5192.12'

229.41'

5300

5350

5335'

8.20°

349.37°

5286.30'

233.24'

5400

5450

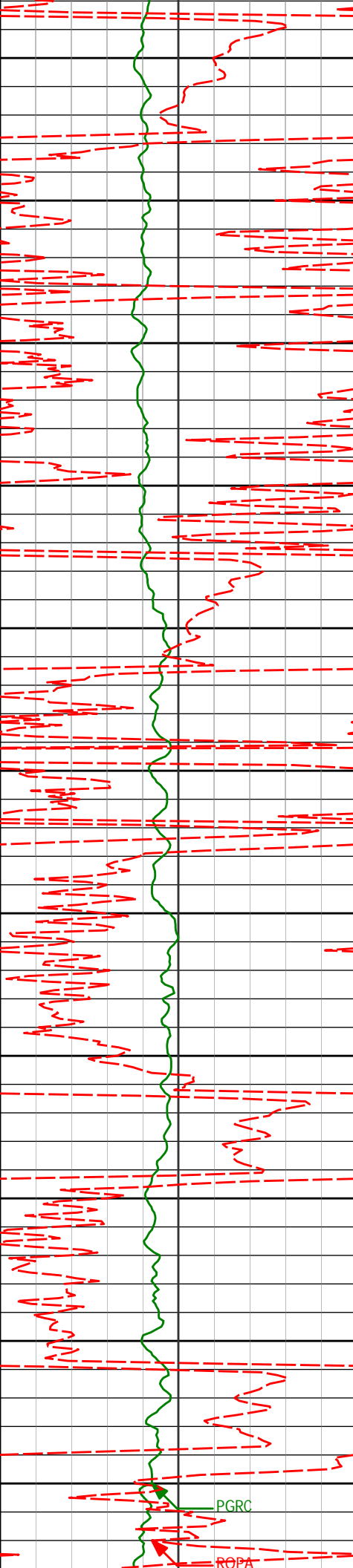
5430'

7.96°

349.74°

5380.35'

237.60'



5500

5524'

9.18°

343.12°

5473.30'

242.93'

5550

5600

5619'

7.53°

340.93°

5567.29'

249.08'

5650

5700

5714'

9.61°

336.36°

5661.23'

256.21'

5750

5800

5809'

7.86°

336.58°

5755.12'

263.89'

5850

5900

5904'

7.90°

336.06°

5849.22'

270.85'

5950

6000

5994'

7.83°

339.49°

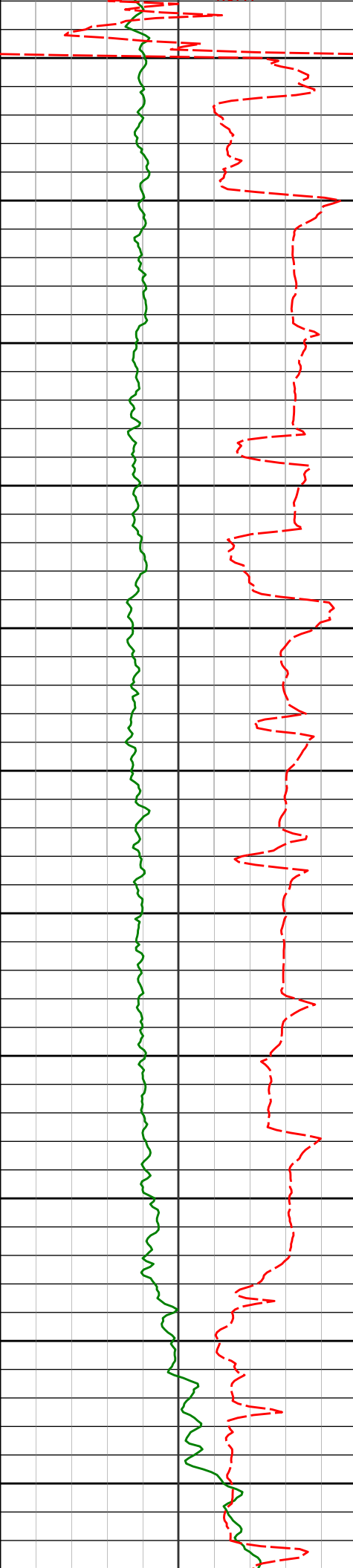
5938.38'

277.16'

PGRC

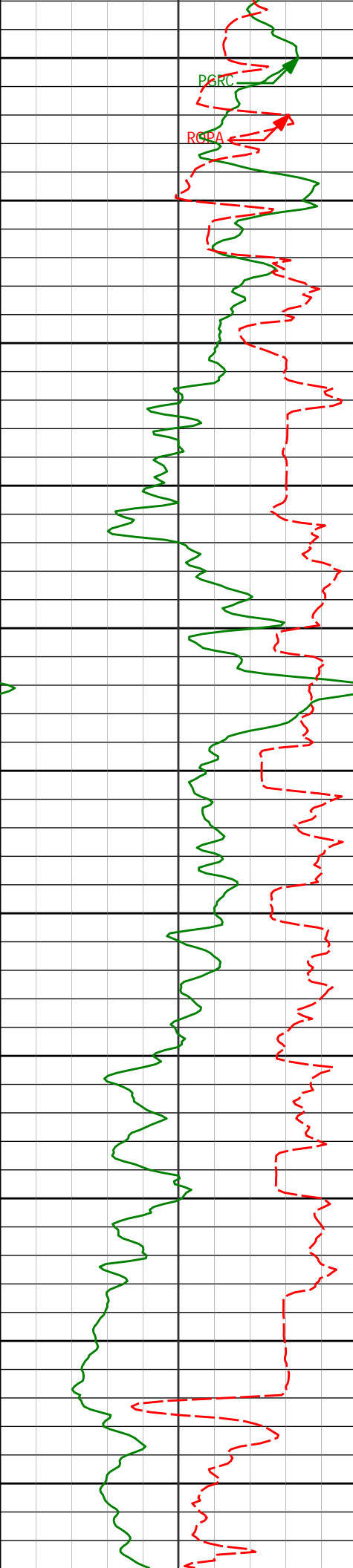
ROPA



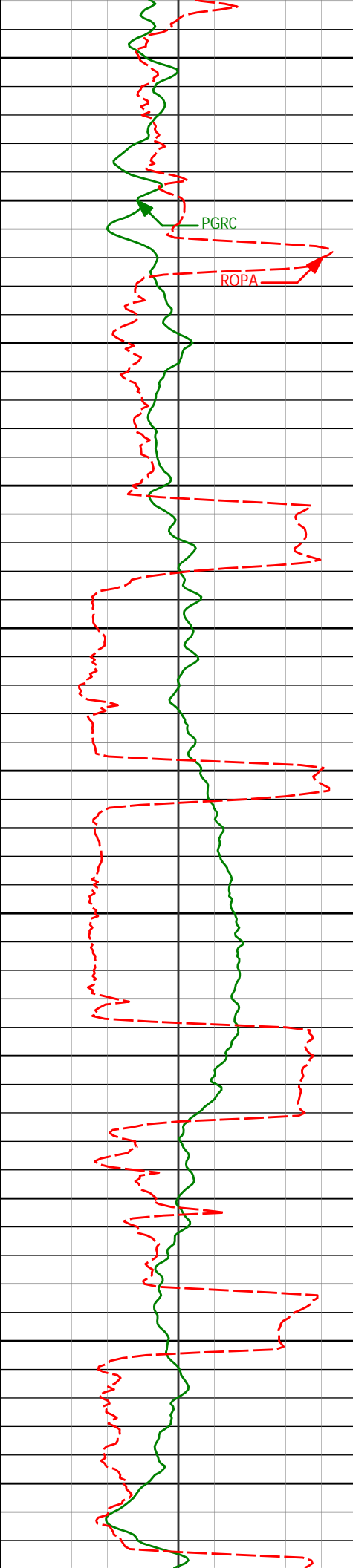


6050  
<Run 200>

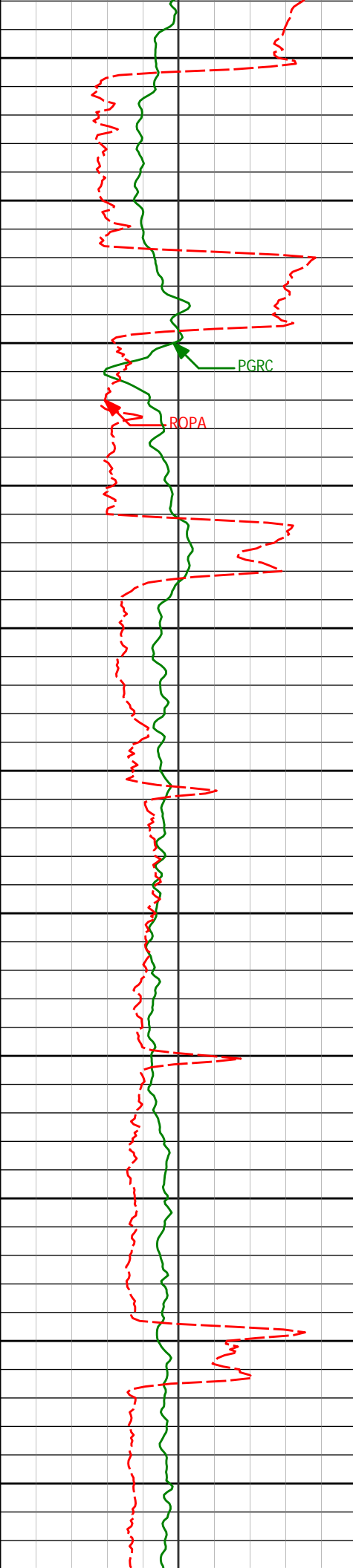
6090'	6.98°	330.57°	6033.58'	283.94'
6100				
6138'	11.45°	308.86°	6080.96'	289.86'
6150				
6185'	16.11°	302.01°	6126.60'	299.88'
6200				
6233'	18.83°	299.26°	6172.38'	313.24'
6250				
6280'	22.81°	297.36°	6216.30'	328.97'
6300				
6328'	27.62°	297.64°	6259.72'	348.31'
6350				
6375'	32.96°	296.92°	6300.29'	370.76'
6400				
6423'	40.39°	295.46°	6338.76'	398.08'
6450				
6470'	47.51°	297.92°	6372.58'	429.05'
6500				
6518'	49.04°	298.15°	6404.52'	462.84'
6550				
6565'	49.92°	297.29°	6435.06'	496.60'



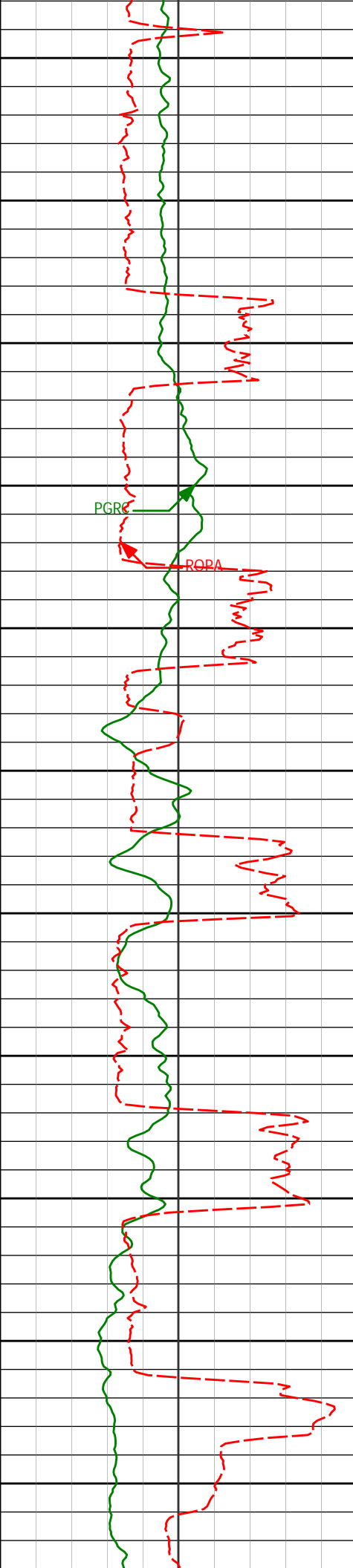
6600	6613'	54.16°	294.74°	6464.58'	532.70'
6650	6660'	58.22°	291.80°	6490.73'	570.48'
6700	6708'	59.78°	287.84°	6515.45'	610.83'
6750	6755'	60.78°	286.98°	6538.75'	651.16'
6800	6803'	64.20°	282.47°	6560.93'	693.47'
6850	6850'	67.44°	277.92°	6580.19'	736.31'
6900	6898'	71.99°	275.33°	6596.83'	781.29'
6950	6945'	76.44°	273.28°	6609.61'	826.38'
7000	7015'	81.73°	267.45°	6622.87'	894.34'
7050	Casing Set @ 7,059' MD				
	<Run 300>				
7100					



7150	7150'	85.43°	267.28°	6637.96'	1025.89'
7200					
7250	7243'	85.77°	267.49°	6645.09'	1116.84'
7300					
7350	7335'	88.33°	269.07°	6649.82'	1207.22'
7400					
7450	7428'	89.32°	268.74°	6651.73'	1298.87'
7500					
7550	7520'	93.02°	271.43°	6649.85'	1389.81'
7600					
7650	7612'	93.15°	271.34°	6644.90'	1480.95'



7700	7703'	91.60°	272.52°	6641.13'	1571.25'
7750					
7800	7798'	86.64°	271.59°	6642.59'	1665.59'
7850					
7900	7893'	88.28°	271.15°	6646.81'	1759.73'
7950					
8000	7988'	89.26°	270.69°	6648.85'	1853.85'
8050					
8100	8083'	90.89°	269.54°	6648.72'	1947.81'
8150					
8200	8177'	89.66°	268.73°	6648.27'	2040.52'



8250

8272'

89.85°

264.37°

6648.68'

2133.40'

8300

8350

8367'

90.80°

264.35°

6648.14'

2225.48'

8400

8450

8462'

92.31°

266.45°

6645.55'

2317.92'

8500

8550

8557'

92.10°

268.22°

6641.90'

2411.01'

8600

8650

8652'

91.20°

270.37°

6639.16'

2504.71'

8700

8750

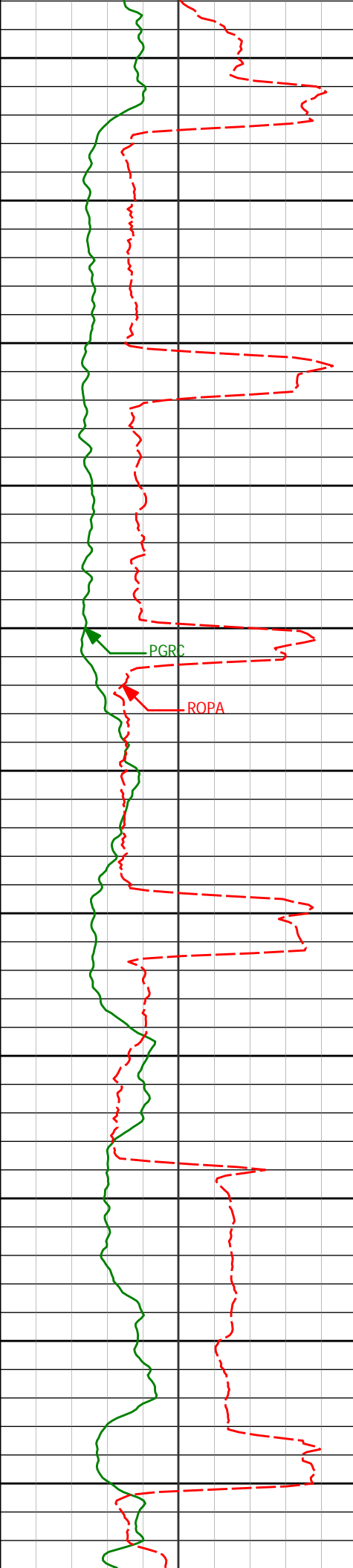
8747'

90.31°

271.10°

6637.91'

2598.81'



8800

8842'

89.81°

271.43°

6637.81'

2693.03'

8850

8900

8937'

89.48°

271.67°

6638.39'

2787.31'

8950

9000

9032'

89.57°

271.12°

6639.19'

2881.55'

9050

9100

9127'

88.61°

270.80°

6640.69'

2975.69'

9150

9200

9222'

89.57°

270.58°

6642.20'

3069.77'

9250

9300

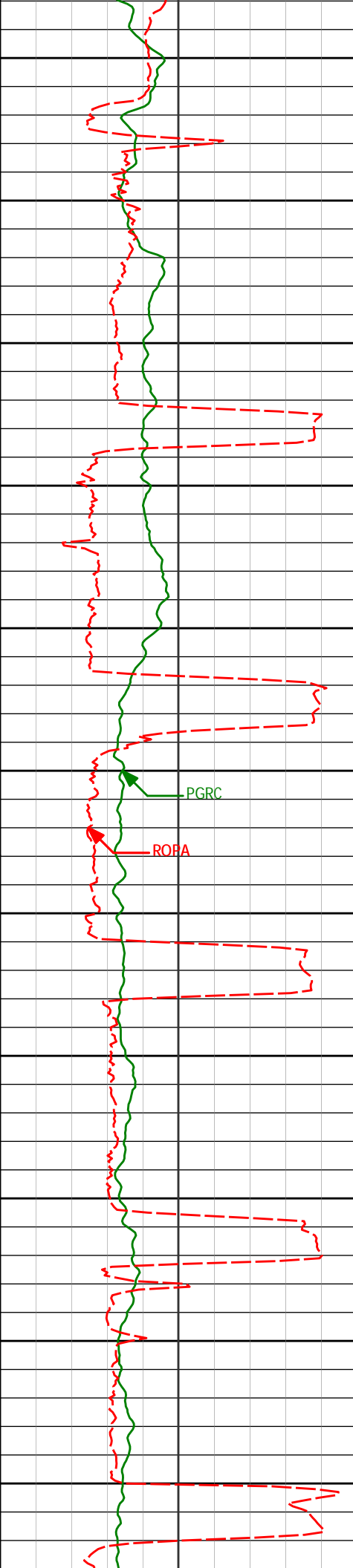
9317'

88.71°

270.82°

6643.63'

3163.86'



9350

9400

9450

9500

9550

9600

9650

9700

9750

9800

9850

9411'	89.23°	269.94°	6645.33'	3256.87'
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9506'	90.77°	271.87°	6645.33'	3351.01'
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9601'	89.72°	270.97°	6644.92'	3445.26'
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9696'	89.48°	270.31°	6645.58'	3539.34'
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9791'	89.35°	270.18°	6646.55'	3633.32'
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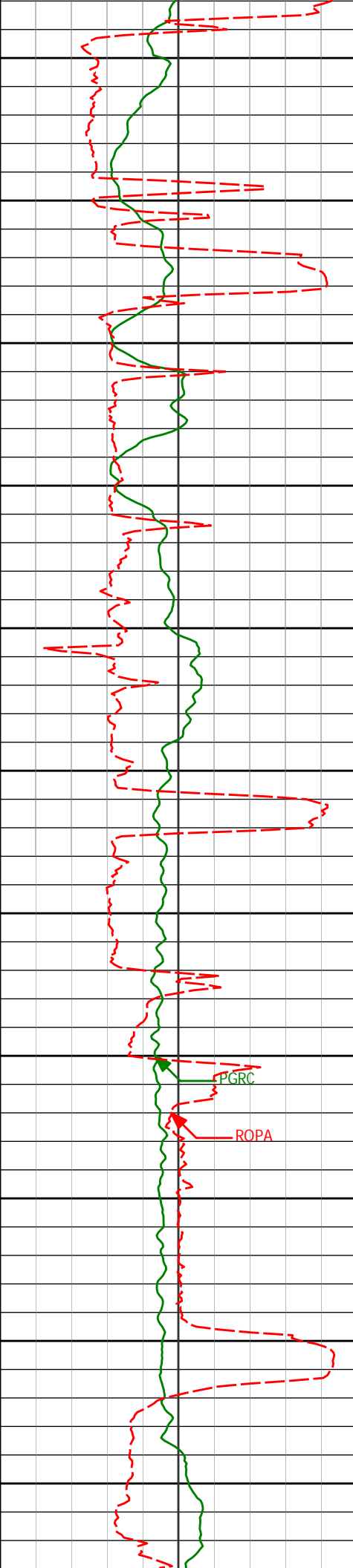
PGRC

ROPA



9886'	90.09°	271.10°	6647.01'	3727.40'
9900				
9950				
9981'	88.86°	270.17°	6647.88'	3821.47'
10000				
10050				
10076'	89.60°	270.99°	6649.16'	3915.53'
10100				
10150				
10171'	89.44°	268.27°	6649.96'	4009.36'
10200				
10250				
10266'	90.28°	268.86°	6650.19'	4102.90'
10300				
10350				
10360'	89.48°	268.86°	6650.39'	4195.54'
10400				





10450

10456'

88.49°

269.01°

6652.09'

4290.16'

10500

10550

10550'

87.19°

269.43°

6655.63'

4382.83'

10600

10650

10645'

87.65°

268.85°

6659.91'

4476.44'

10700

10750

10740'

89.01°

267.60°

6662.67'

4569.84'

10800

10850

10835'

90.99°

267.88°

6662.67'

4663.13'

10900

10950

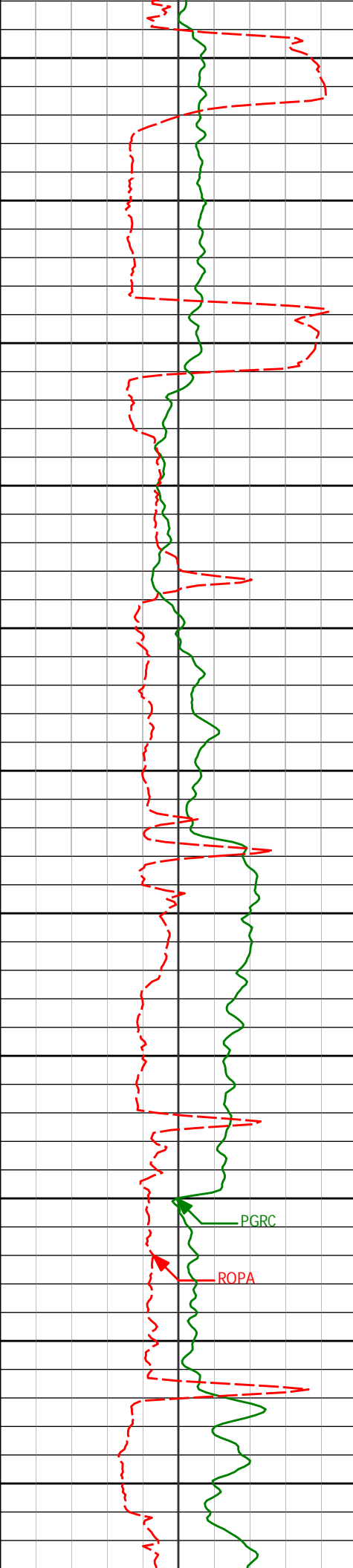
10930'

91.14°

269.29°

6660.90'

4756.66'



11000

11025'

90.09°

271.13°

6659.88'

4850.63'

11050

11100

11120'

87.84°

271.18°

6661.60'

4944.81'

11150

11200

11215'

88.70°

271.08°

6664.46'

5038.95'

11250

11300

11310'

89.32°

270.36°

6666.10'

5133.04'

11350

11400

11405'

90.22°

270.44°

6666.48'

5227.06'

11450

11500

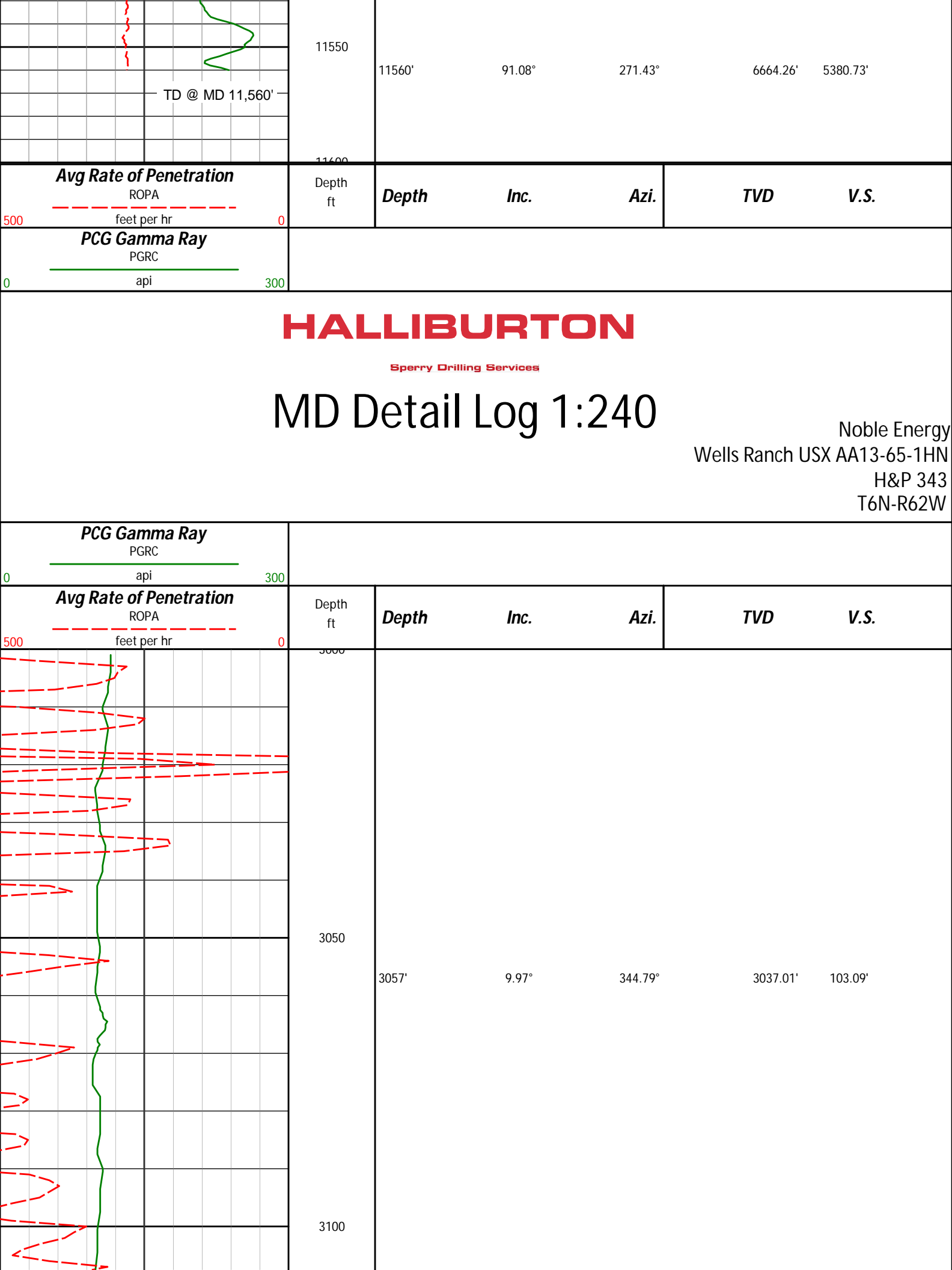
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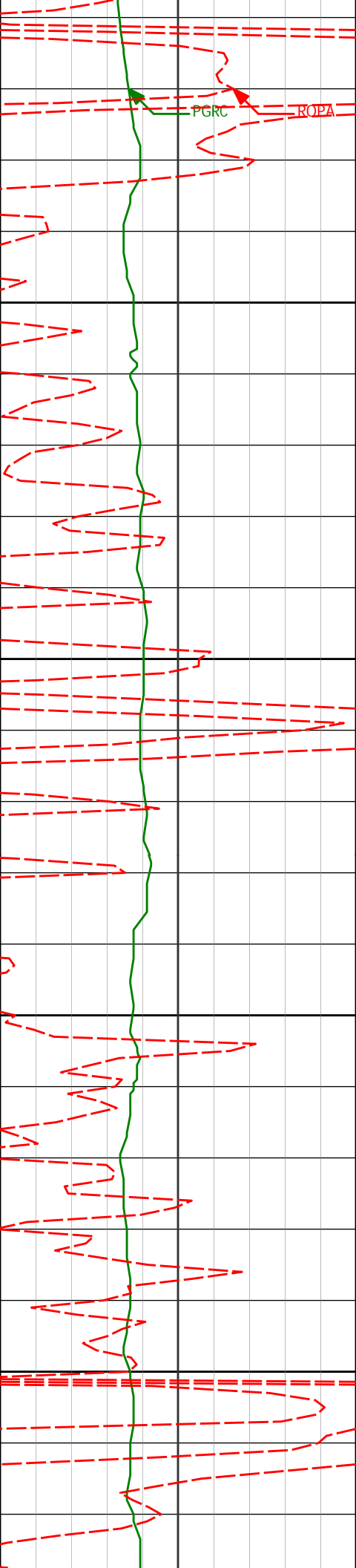
91.08°

271.43°

6665.41'

5320.21'





3150

3152'

8.86°

345.53°

3130.73'

109.28'

3200

3250

3247'

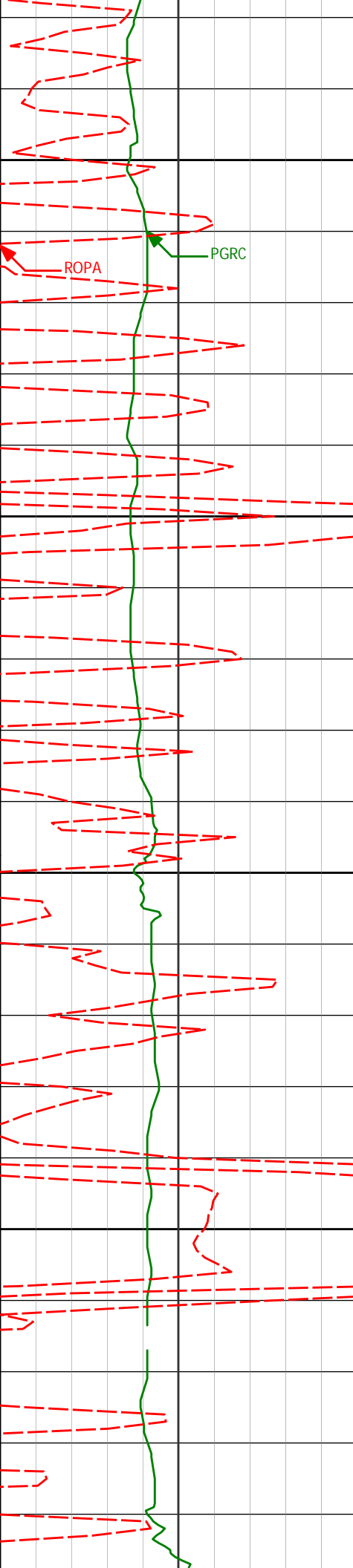
8.83°

347.31°

3224.60'

114.79'

3300



3342'

8.65°

347.83°

3318.50'

119.97'

3350

3400

3437'

7.62°

341.39°

3412.54'

125.39'

3450

3500

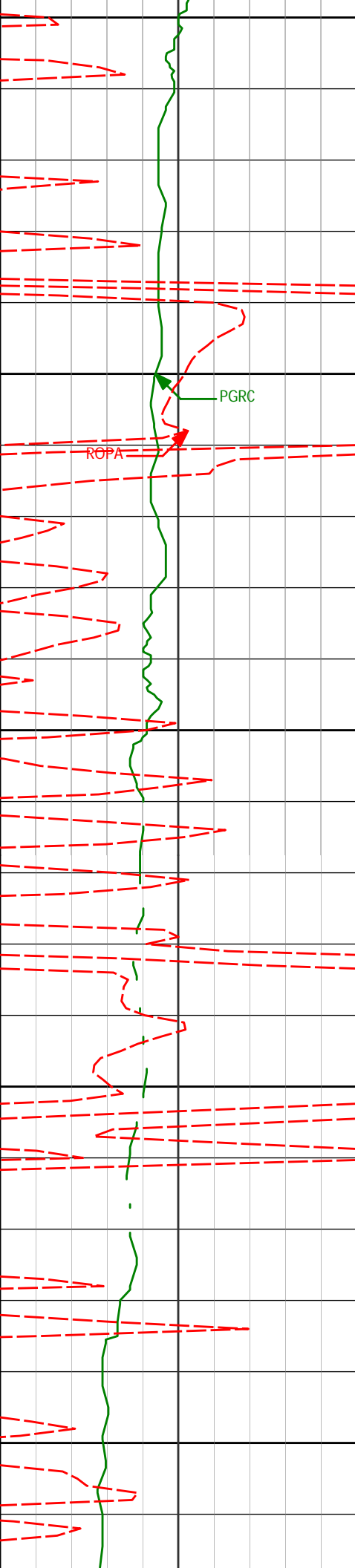
3531'

7.44°

340.96°

3505.73'

131.07'



3550

3600

3650

3700

3750

3626'

8.09°

346.19°

3599.86'

136.47'

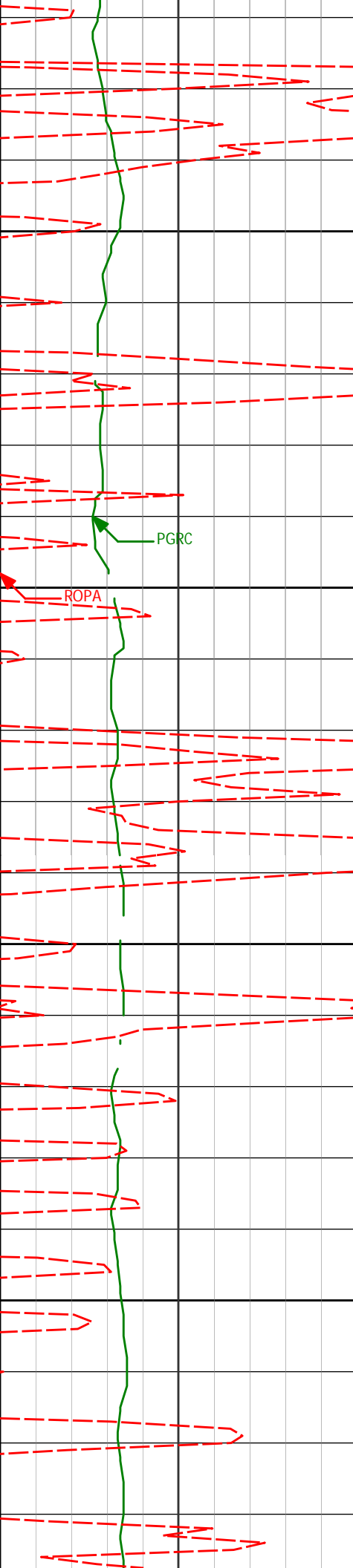
3721'

9.59°

342.26°

3693.73'

142.54'



3800

3816'

10.71°

344.47°

3787.24'

149.66'

3850

3900

3911'

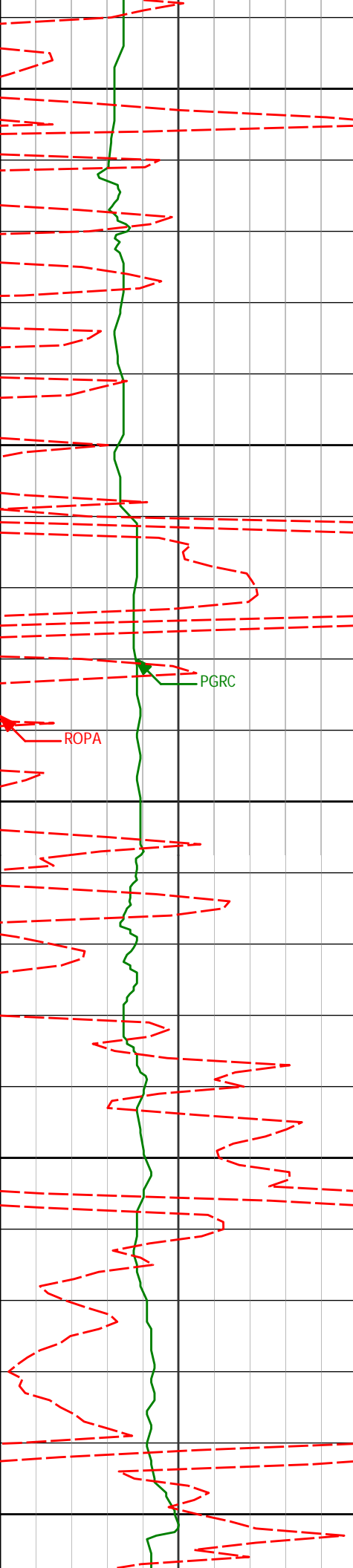
11.42°

345.80°

3880.47'

156.92'

3950



4000

4006'

11.93°

346.17°

3973.51'

164.31'

4050

4100

4101'

12.36°

347.19°

4066.38'

171.77'

4150

4200

4196'

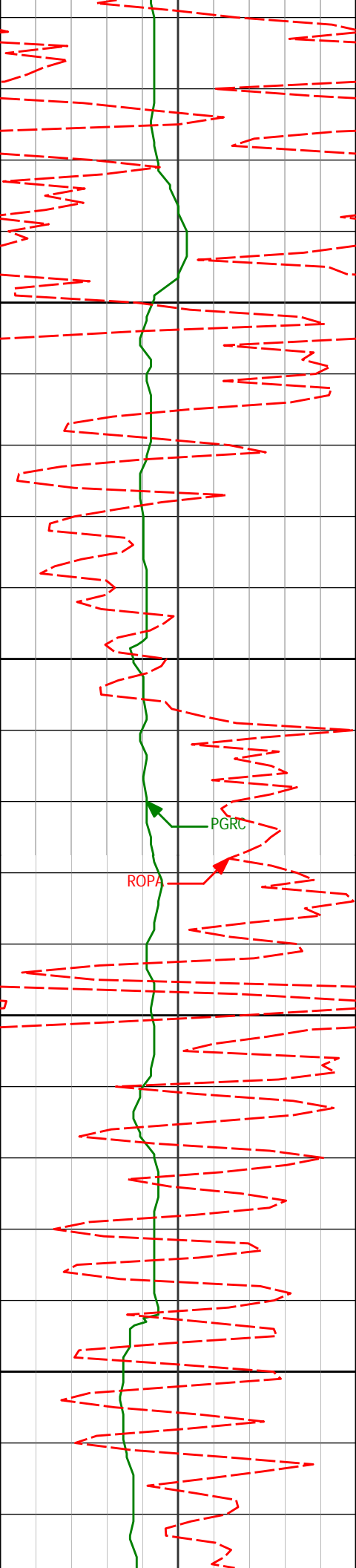
11.57°

349.95°

4159.32'

178.54'





4250

4291'

10.02°

348.86°

4252.63'

184.38'

4300

4350

4386'

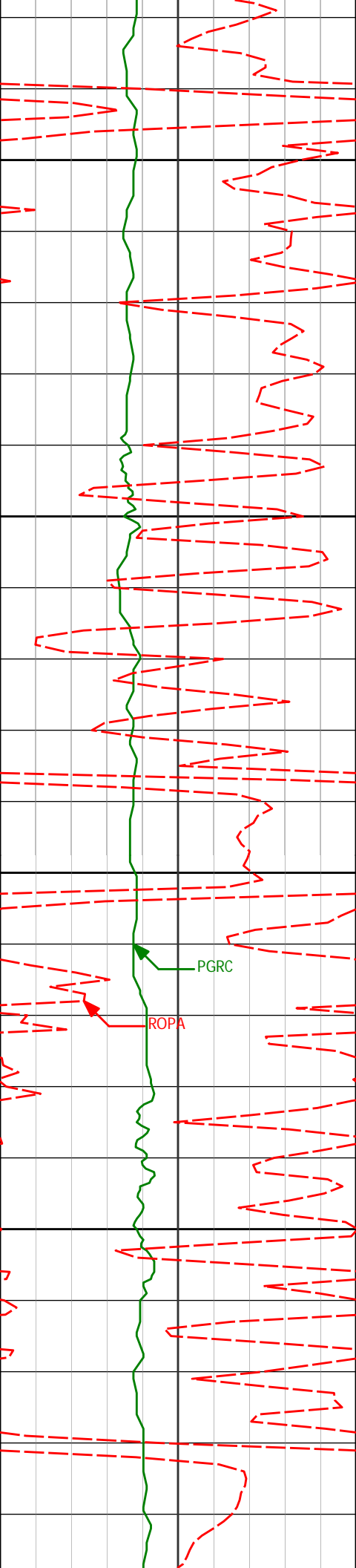
8.50°

350.74°

4346.39'

189.33'

4400



4450

4481'

7.55°

353.52°

4440.46'

193.11'

4500

4550

PGRC

ROPA

4576'

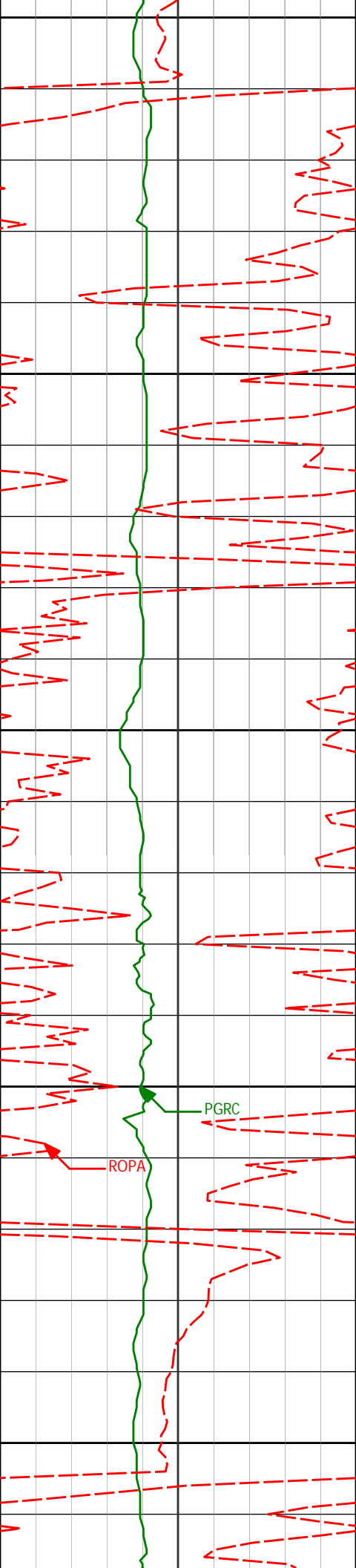
7.04°

349.39°

4534.69'

196.65'

4600



4650

4671'

8.29°

341.13°

4628.85'

201.72'

4700

4750

4765'

6.91°

345.55°

4722.02'

207.07'

4800

PGRC

ROPA

4850

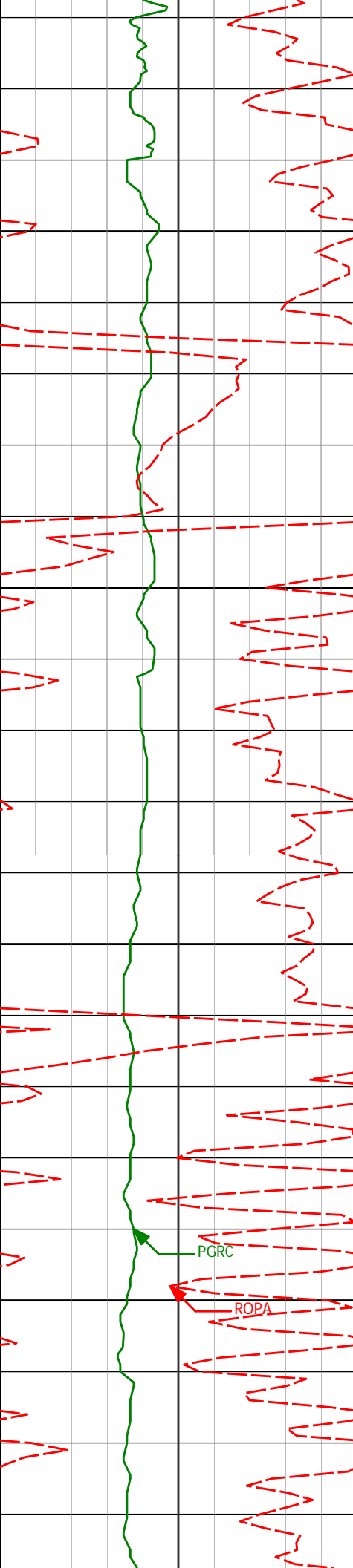
4860'

8.86°

343.89°

4816.11'

212.37'



4900

4950

5000

5050

4955'

9.34°

350.24°

4909.92'

217.86'

PGRC

ROPA

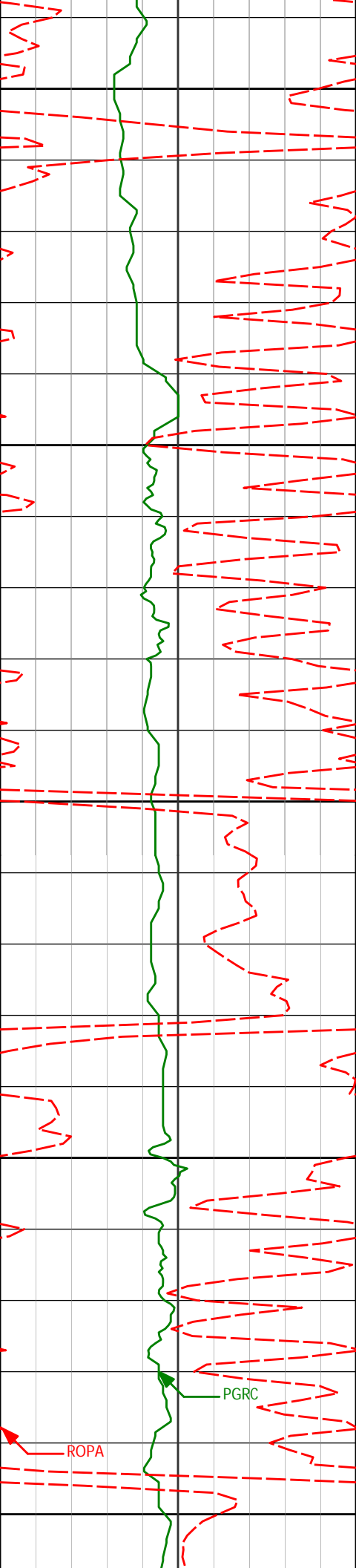
5050'

8.58°

350.08°

5003.76'

222.54'



5100

5145'

7.32°

354.21°

5097.85'

226.30'

5150

5200

5240'

6.87°

352.25°

5192.12'

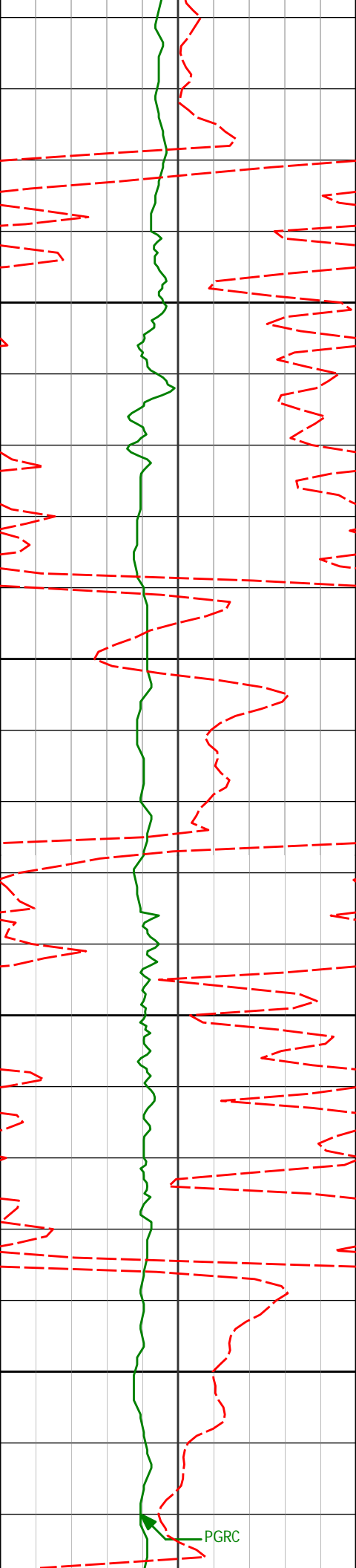
229.41'

5250

PGRC

ROPA

5300



5335' 8.20° 349.37° 5286.30' 233.24'

5350

5400

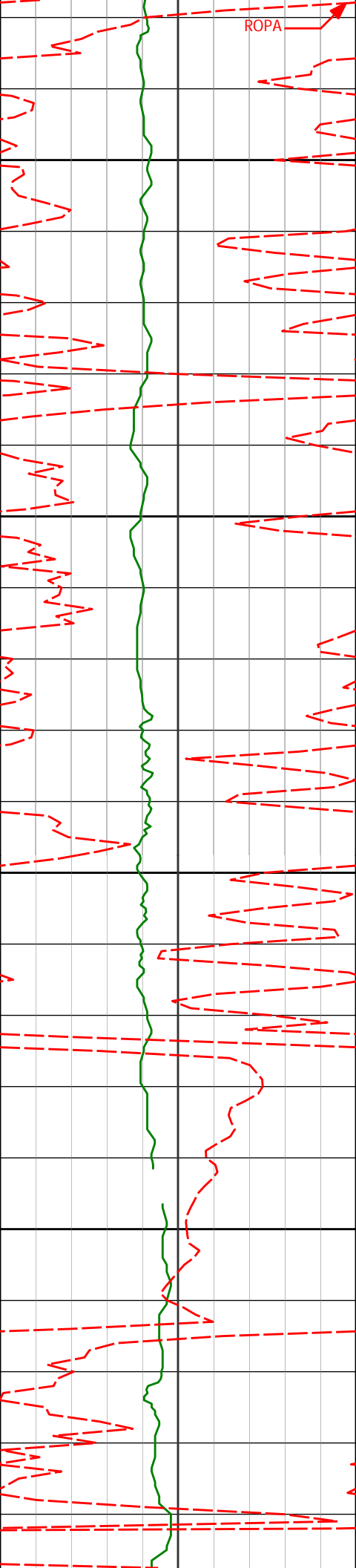
5430' 7.96° 349.74° 5380.35' 237.60'

5450

5500

5524' 9.18° 343.12° 5473.30' 242.93'

PGRC



5550

5600

5650

5700

5619'

7.53°

340.93°

5567.29'

249.08'

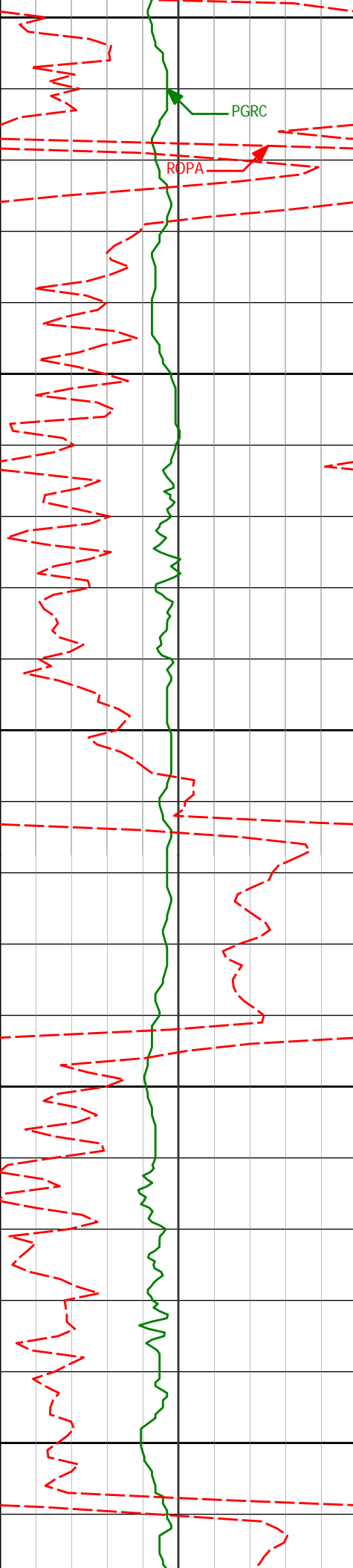
5714'

9.61°

336.36°

5661.23'

256.21'



5750

PGRC

ROPA

5800

5809'

7.86°

336.58°

5755.12'

263.89'

5850

5900

5904'

7.90°

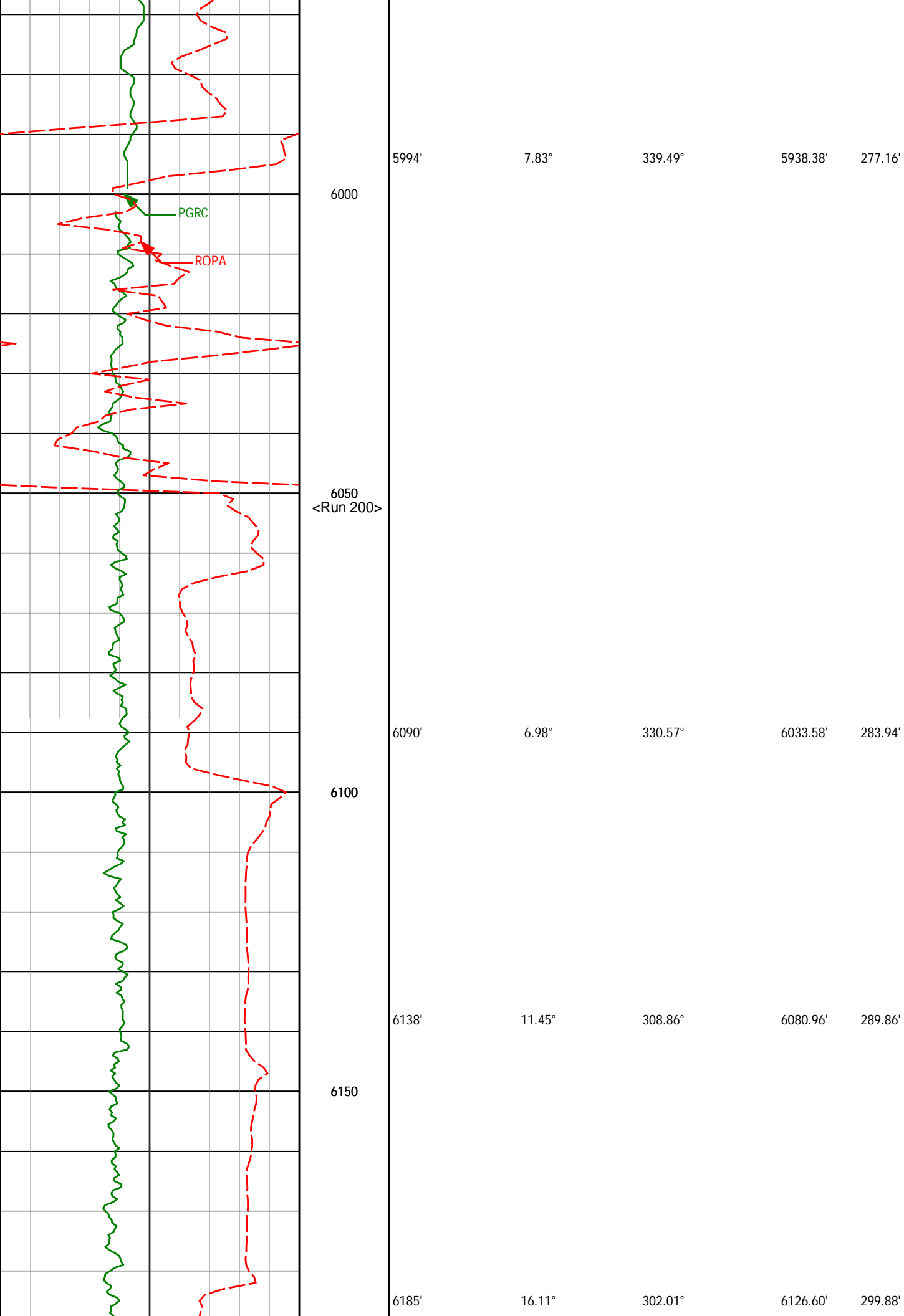
336.06°

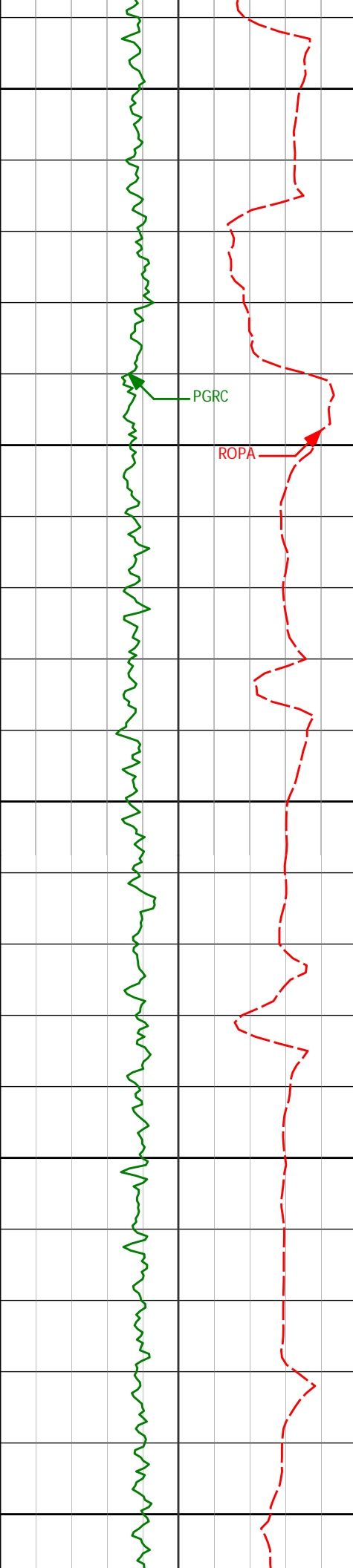
5849.22'

270.85'

5950







6200

6233'

18.83°

299.26°

6172.38'

313.24'

PGRC

6250

ROPA

6280'

22.81°

297.36°

6216.30'

328.97'

6300

6328'

27.62°

297.64°

6259.72'

348.31'

6350

6375'

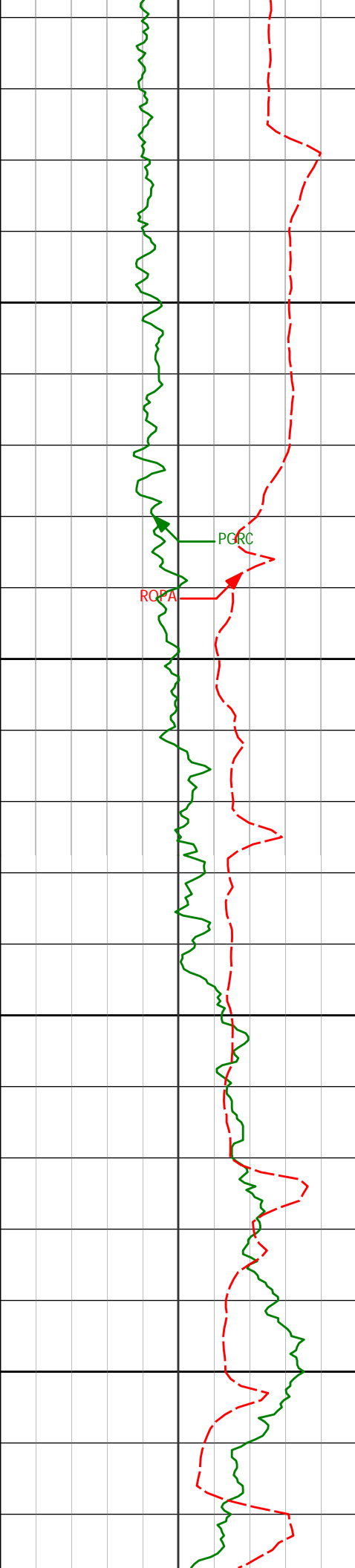
32.96°

296.92°

6300.29'

370.76'

6400

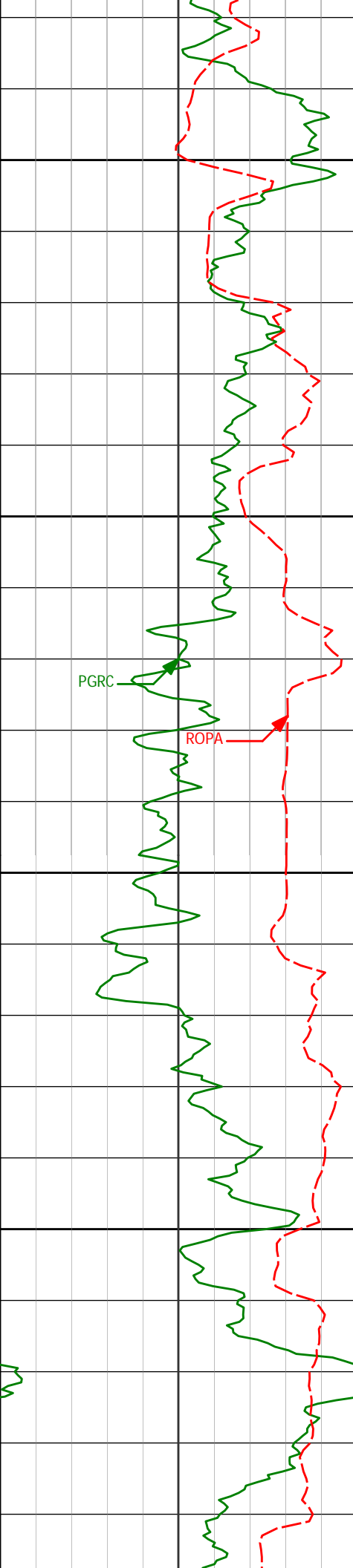


6450

6500

6550

6600



6650

6660'

58.22°

291.80°

6490.73'

570.48'

6700

6708'

59.78°

287.84°

6515.45'

610.83'

PGRC

ROPA

6750

6755'

60.78°

286.98°

6538.75'

651.16'

6800

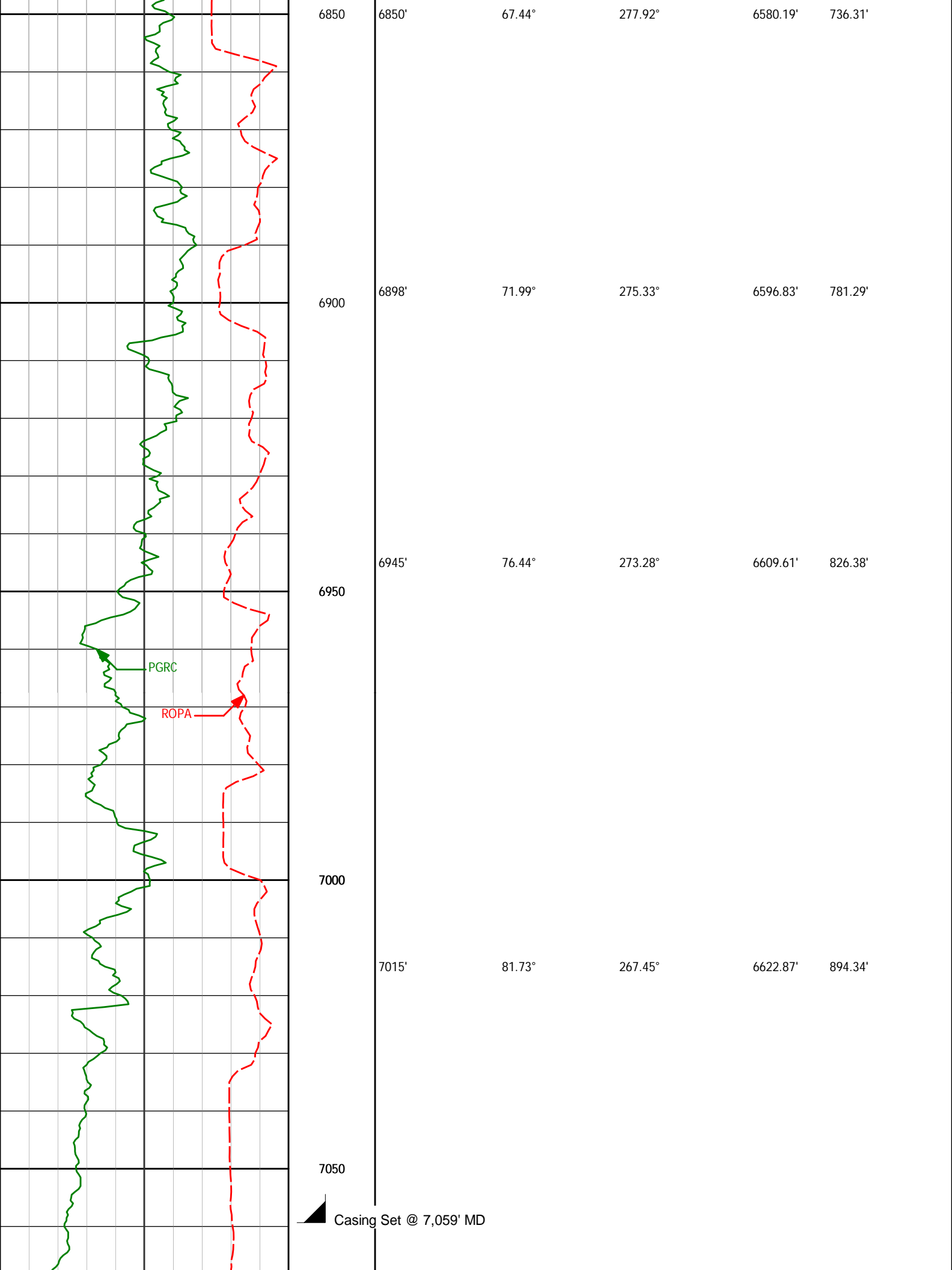
6803'

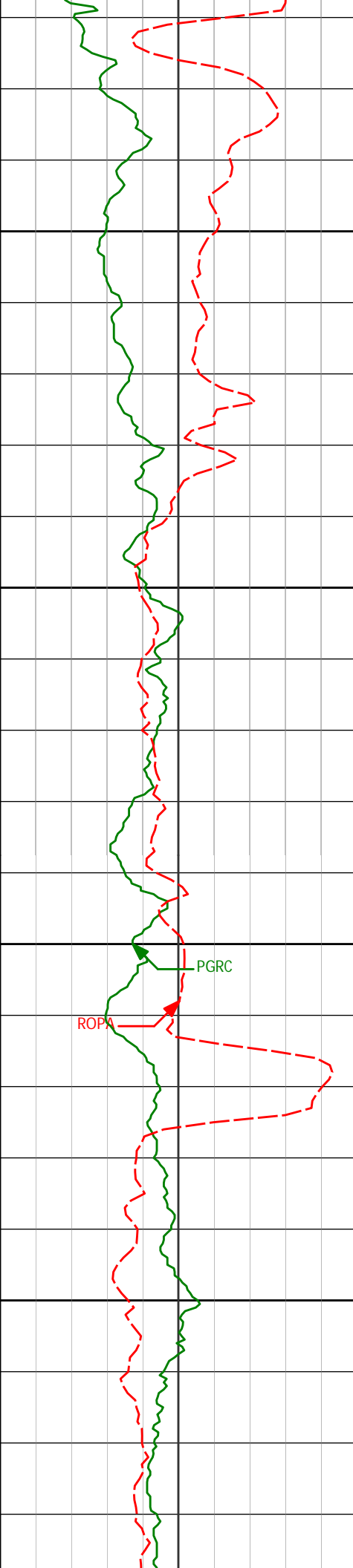
64.20°

282.47°

6560.93'

693.47'





<Run 300>

7100

7150

7200

7250

7150'

85.43°

267.28°

6637.96'

1025.89'

7243'

85.77°

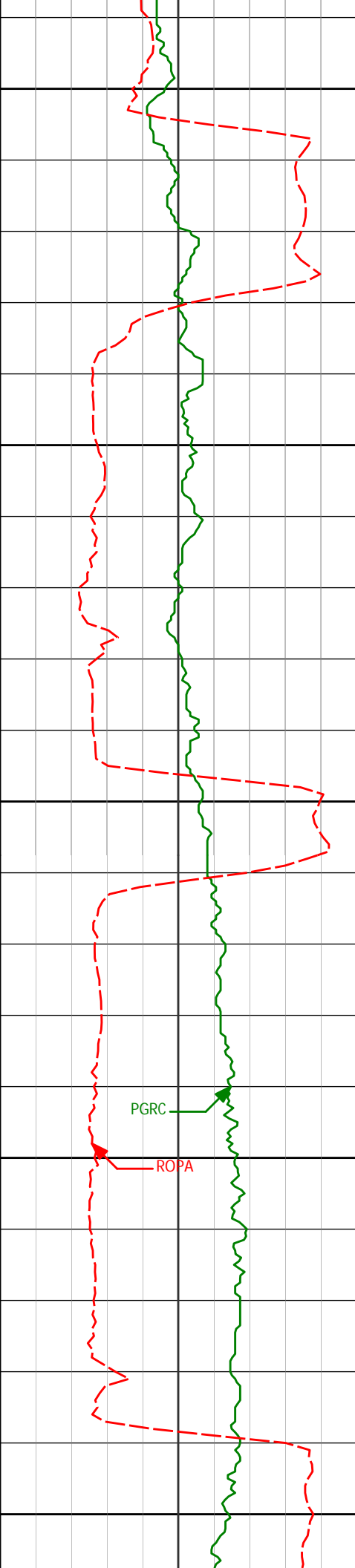
267.49°

6645.09'

1116.84'

PGRC

ROPA



7300

7335'

88.33°

269.07°

6649.82'

1207.22'

7350

7400

7428'

89.32°

268.74°

6651.73'

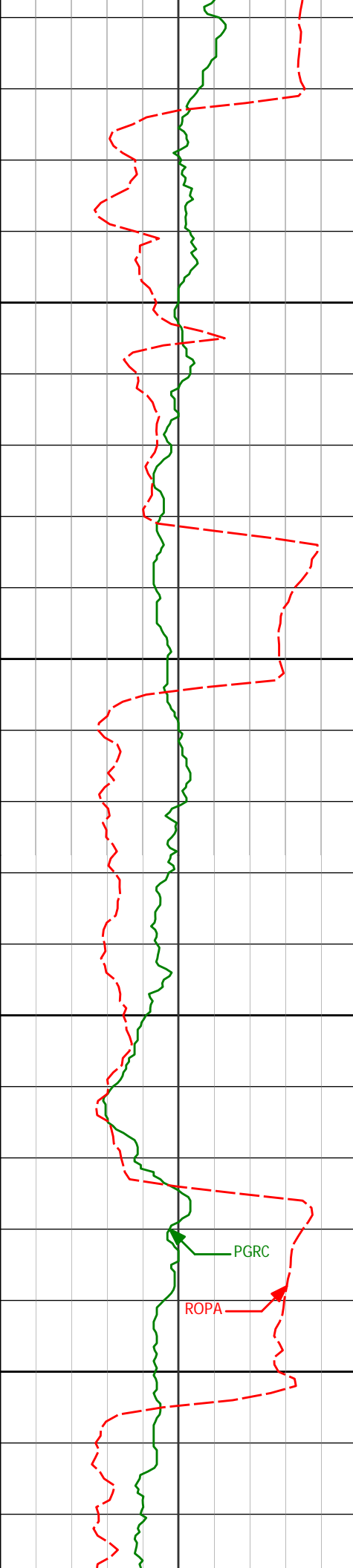
1298.87'

PGRC

ROPA

7450

7500



7550

7600

7650

7700

7520'

93.02°

271.43°

6649.85'

1389.81'

7612'

93.15°

271.34°

6644.90'

1480.95'

7703'

91.60°

272.52°

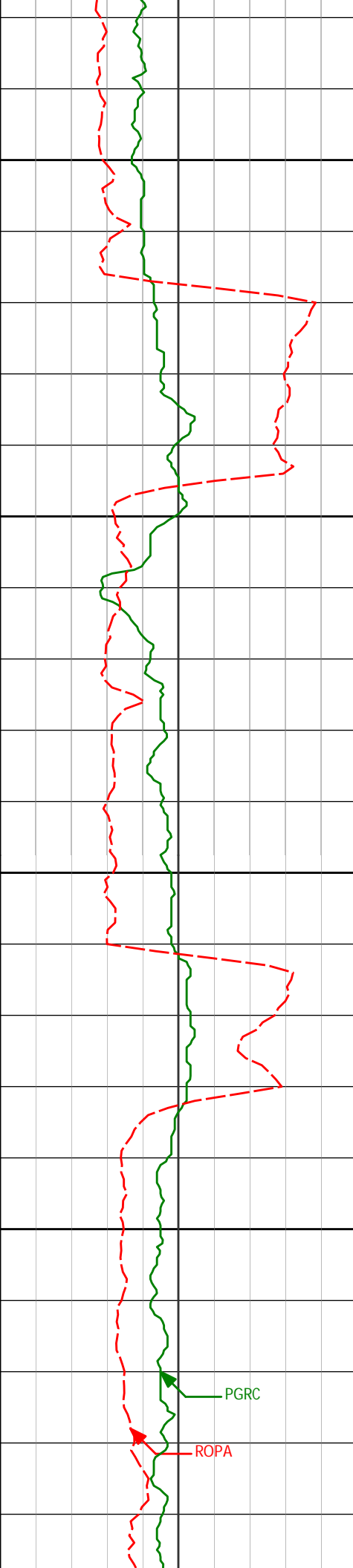
6641.13'

1571.25'

PGRC

ROPA





7750

7800

7850

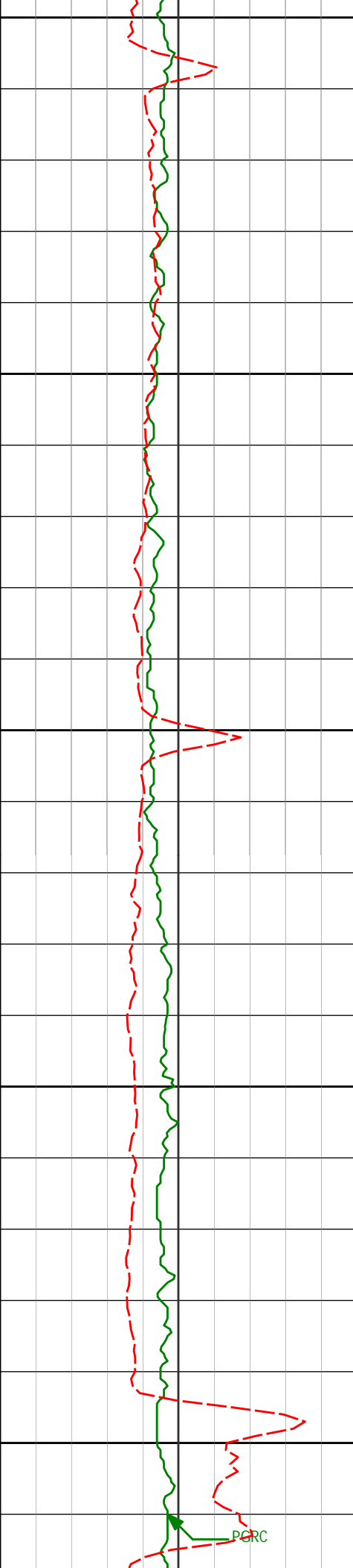
7900

7798'      86.64°      271.59°      6642.59'      1665.59'

7893'      88.28°      271.15°      6646.81'      1759.73'

PGRC

ROPA



7950

7988'

89.26°

270.69°

6648.85'

1853.85'

8000

8050

8083'

90.89°

269.54°

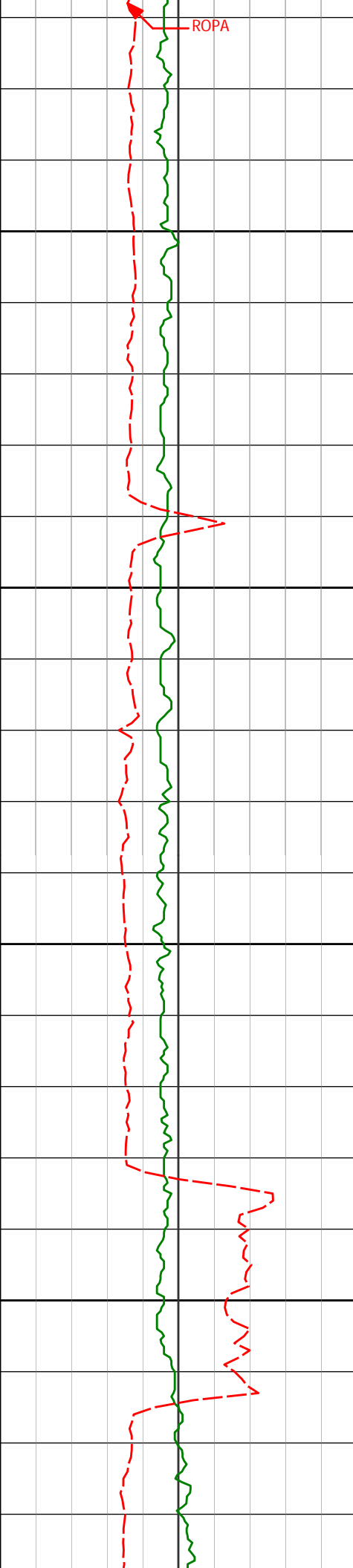
6648.72'

1947.81'

8100

8150

PORC



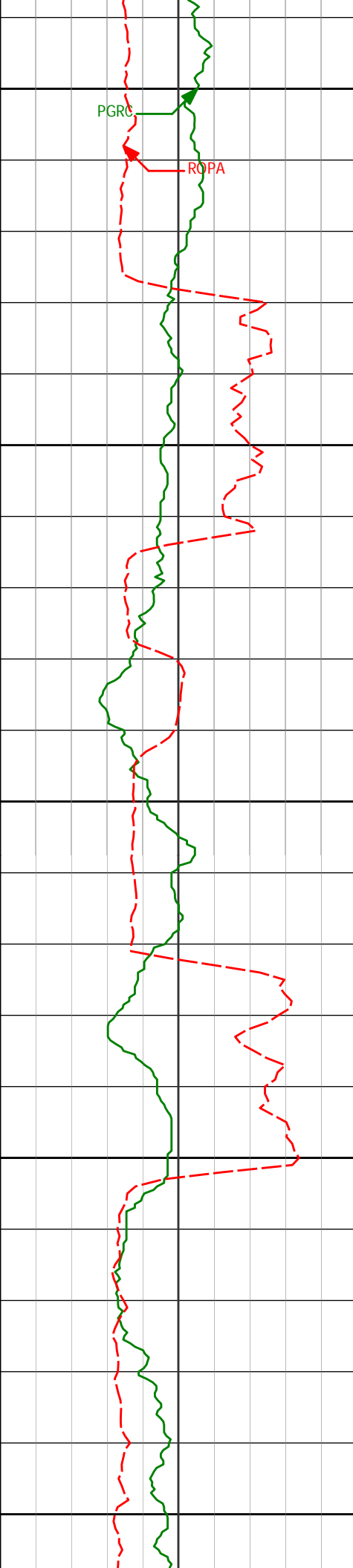
8200

8250

8300

8350

8177'	89.66°	268.73°	6648.27'	2040.52'
8272'	89.85°	264.37°	6648.68'	2133.40'
8367'	90.80°	264.35°	6648.14'	2225.48'



8400

8450

8500

8550

8600

PGRC

ROPA

8462'

92.31°

266.45°

6645.55'

2317.92'

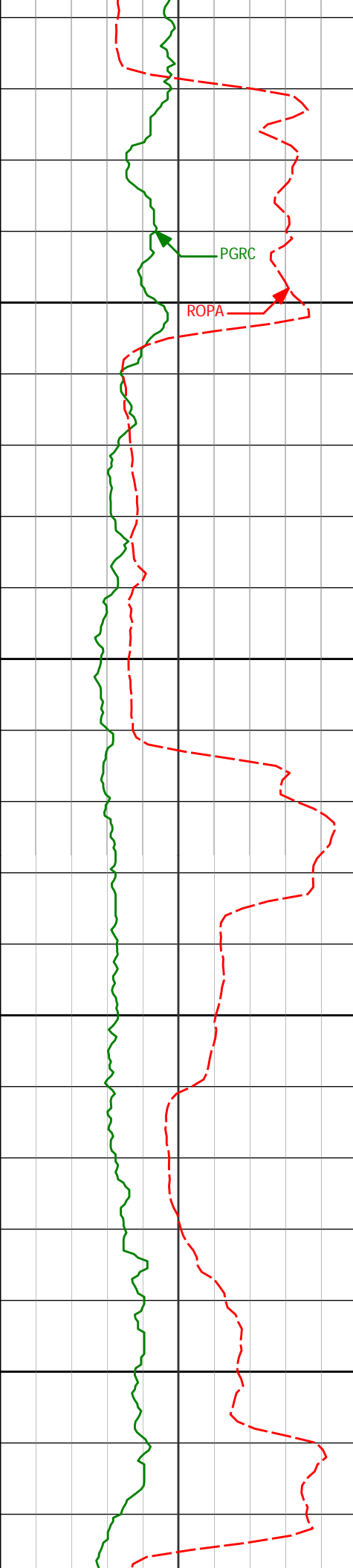
8557'

92.10°

268.22°

6641.90'

2411.01'



8650

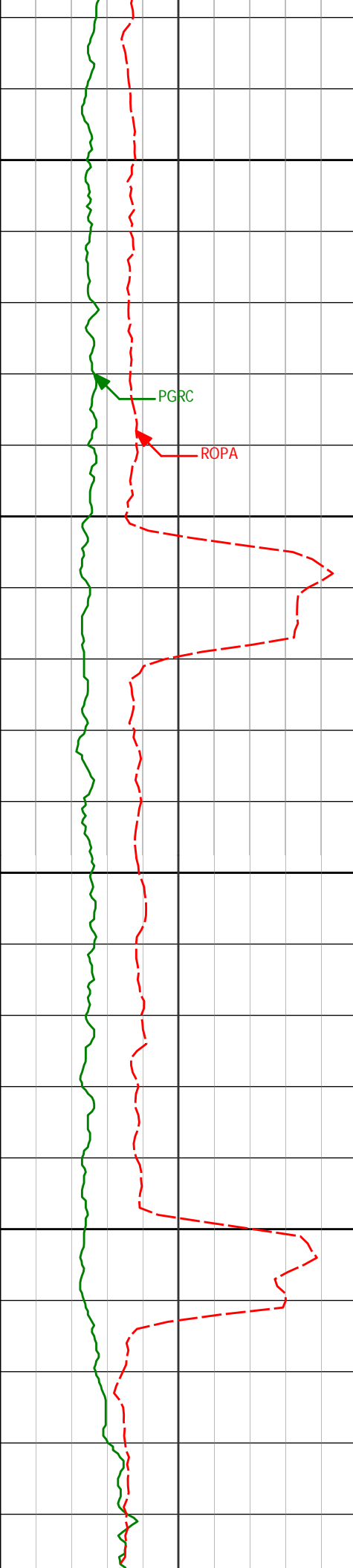
8652'      91.20°      270.37°      6639.16'      2504.71'

8700

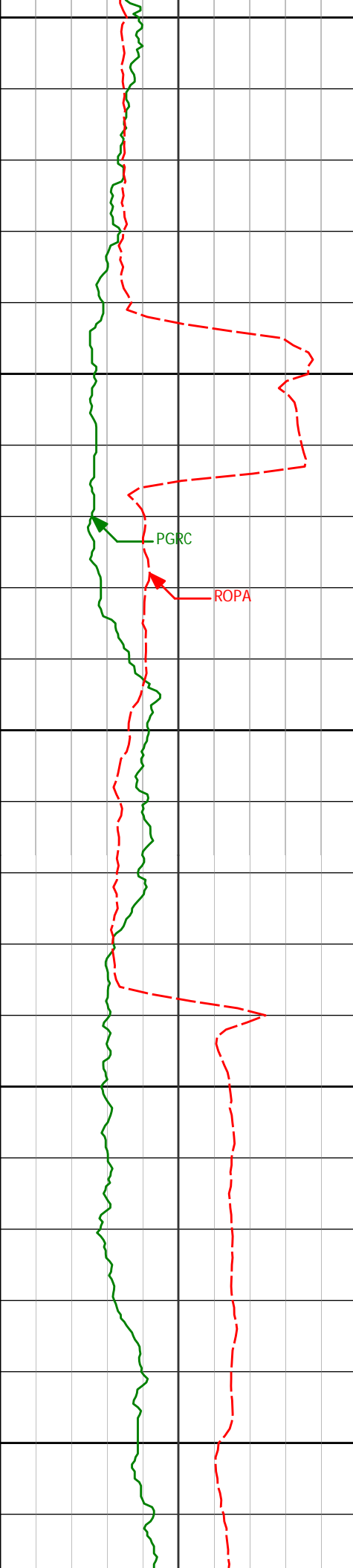
8750

8747'      90.31°      271.10°      6637.91'      2598.81'

8800



8842'	89.81°	271.43°	6637.81'	2693.03'
8850				
8900				
8937'	89.48°	271.67°	6638.39'	2787.31'
8950				
9000				
9032'	89.57°	271.12°	6639.19'	2881.55'



9050

9100

9150

9200

9250

9127'

88.61°

270.80°

6640.69'

2975.69'

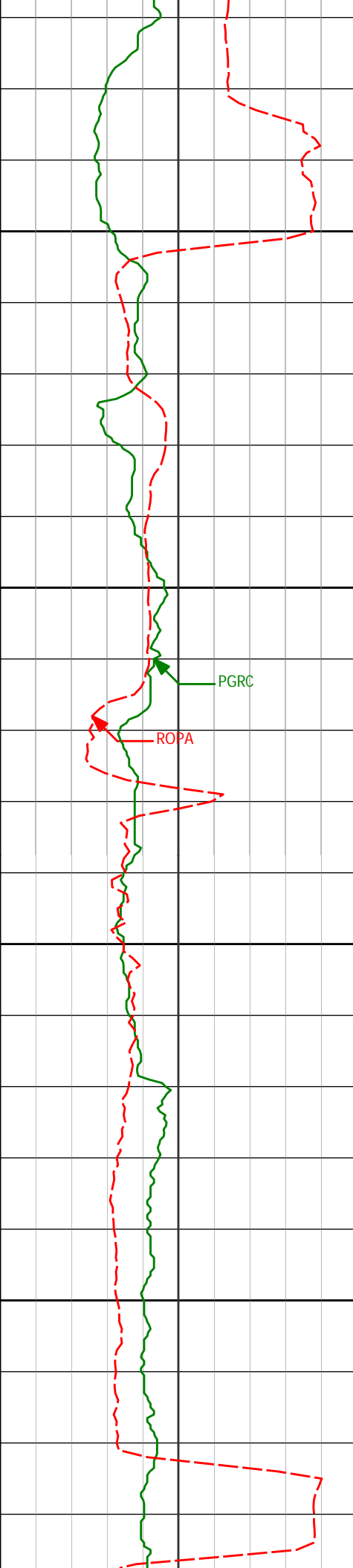
9222'

89.57°

270.58°

6642.20'

3069.77'



9300

9317'

88.71°

270.82°

6643.63'

3163.86'

9350

PGRC

ROPA

9400

9411'

89.23°

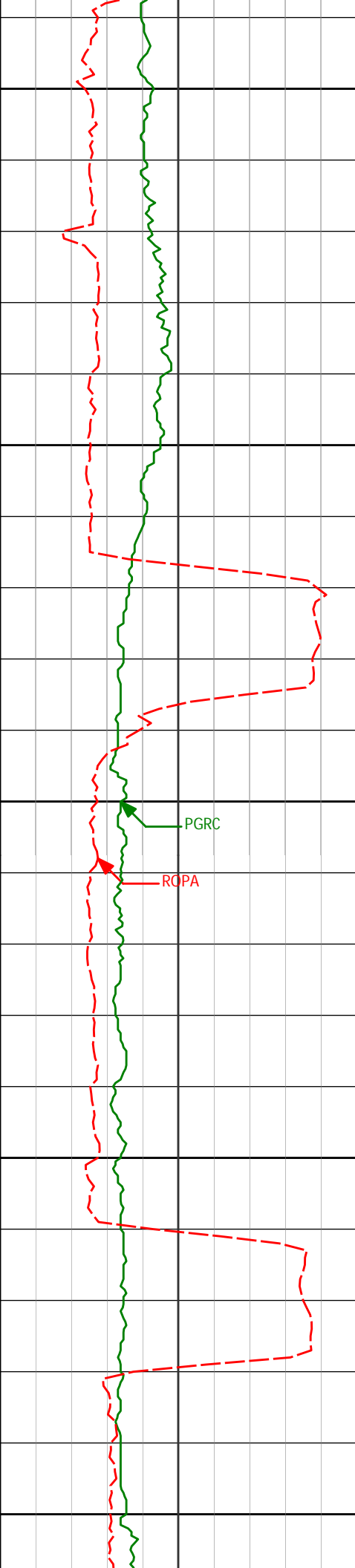
269.94°

6645.33'

3256.87'

9450





9500

9506'

90.77°

271.87°

6645.33'

3351.01'

9550

9600

9601'

89.72°

270.97°

6644.92'

3445.26'

9650

9700

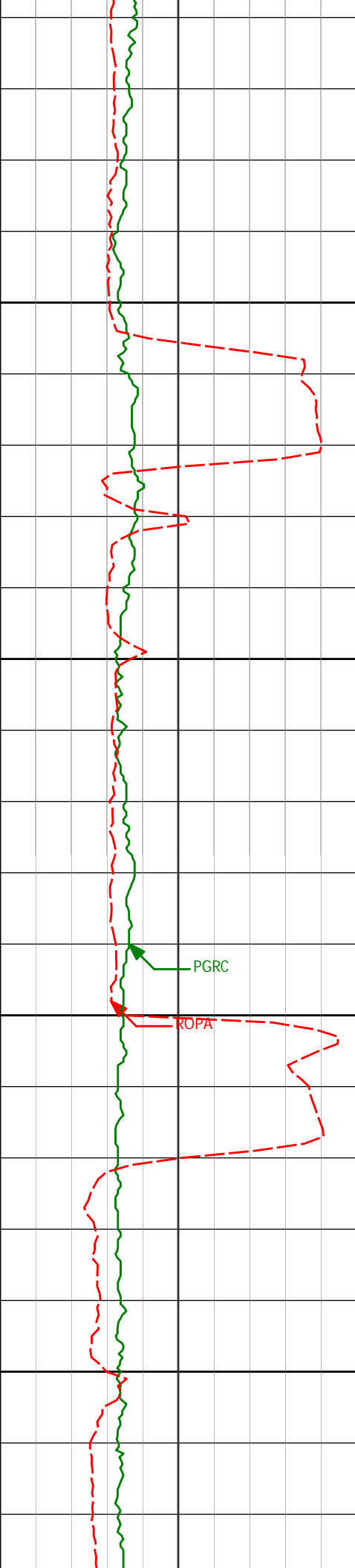
9696'

89.48°

270.31°

6645.58'

3539.34'



9750

9791'

89.35°

270.18°

6646.55'

3633.32'

9800

9850

9886'

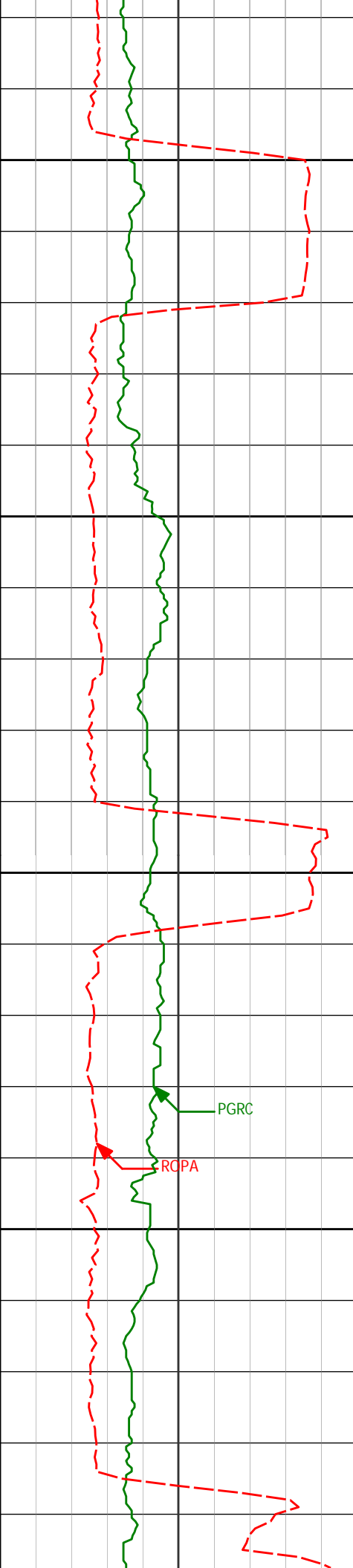
90.09°

271.10°

6647.01'

3727.40'

9900



9950

9981'

88.86°

270.17°

6647.88'

3821.47'

10000

10050

10076'

89.60°

270.99°

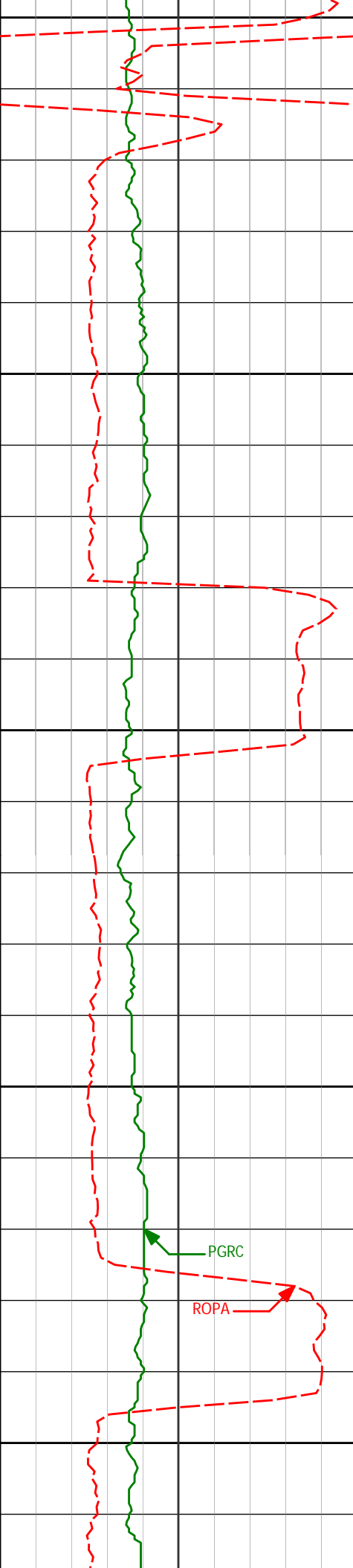
6649.16'

3915.53'

10100

PGRC

RCPA



10150

10171'

89.44°

268.27°

6649.96'

4009.36'

10200

10250

10266'

90.28°

268.86°

6650.19'

4102.90'

10300

10350

10360'

89.48°

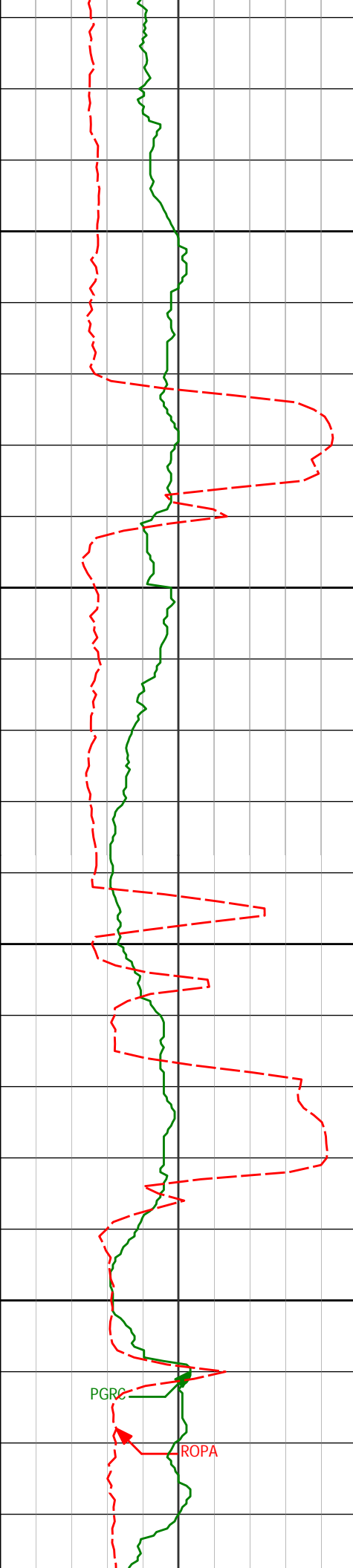
268.86°

6650.39'

4195.54'

PGRC

ROPA



10400

10450

10500

10550

10456'

88.49°

269.01°

6652.09'

4290.16'

10550'

87.19°

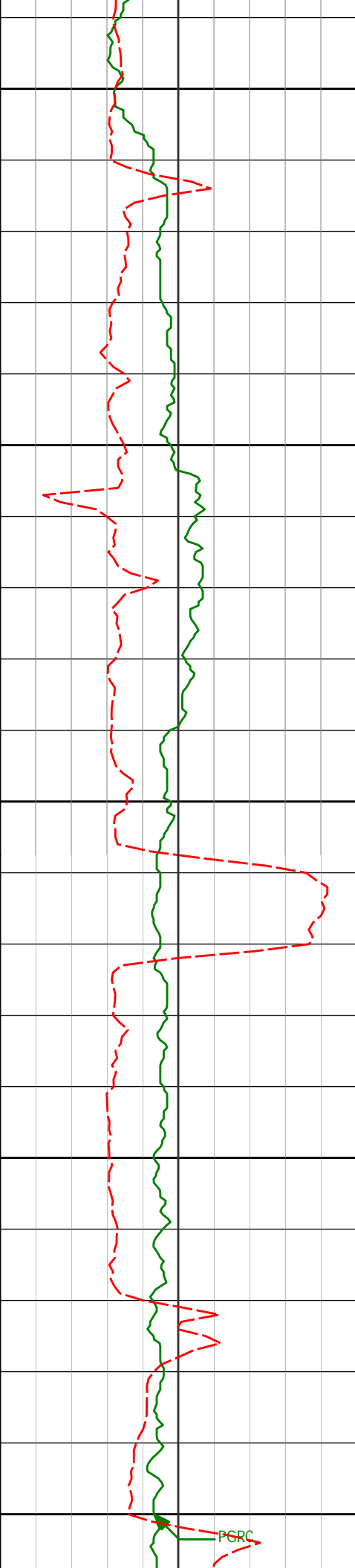
269.43°

6655.63'

4382.83'

PGRC

ROPA



10600

10650

10700

10750

10800

10645'

87.65°

268.85°

6659.91'

4476.44'

10740'

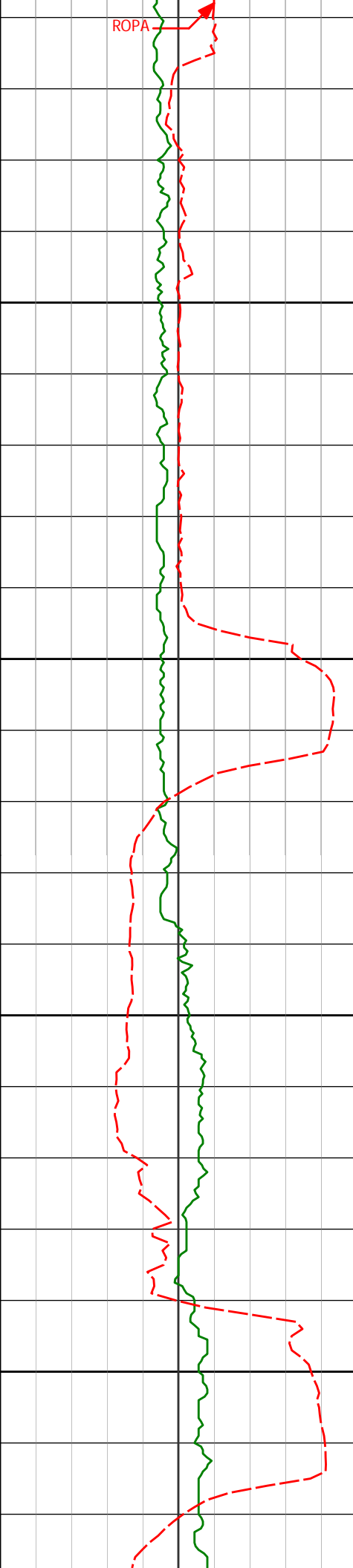
89.01°

267.60°

6662.67'

4569.84'

PGRC



10835'	90.99°	267.88°	6662.67'	4663.13'
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10850

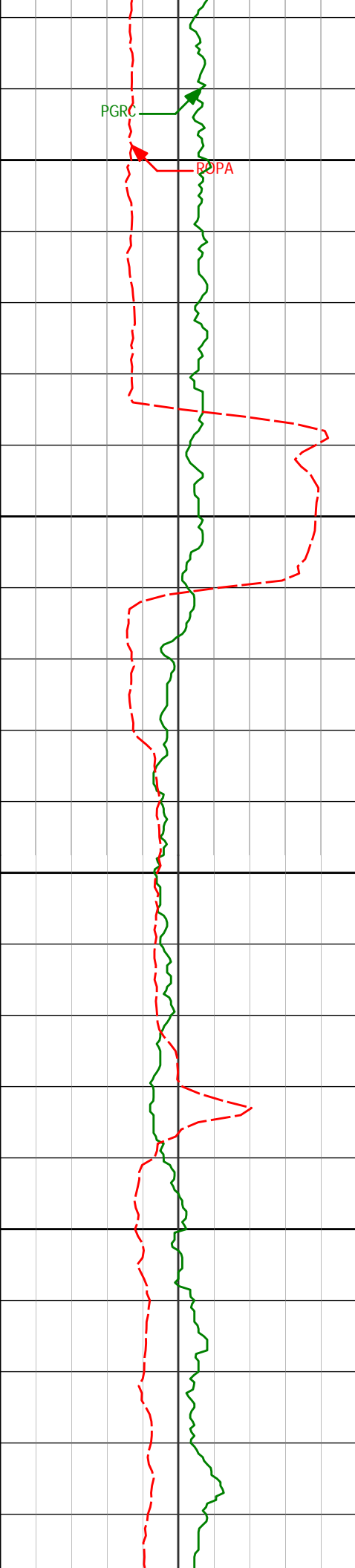
10900

10930'	91.14°	269.29°	6660.90'	4756.66'
--------	--------	---------	----------	----------

10950

11000

11025'	90.09°	271.13°	6659.88'	4850.63'
--------	--------	---------	----------	----------



11050

11100

11150

11200

11120'

87.84°

271.18°

6661.60'

4944.81'

11215'

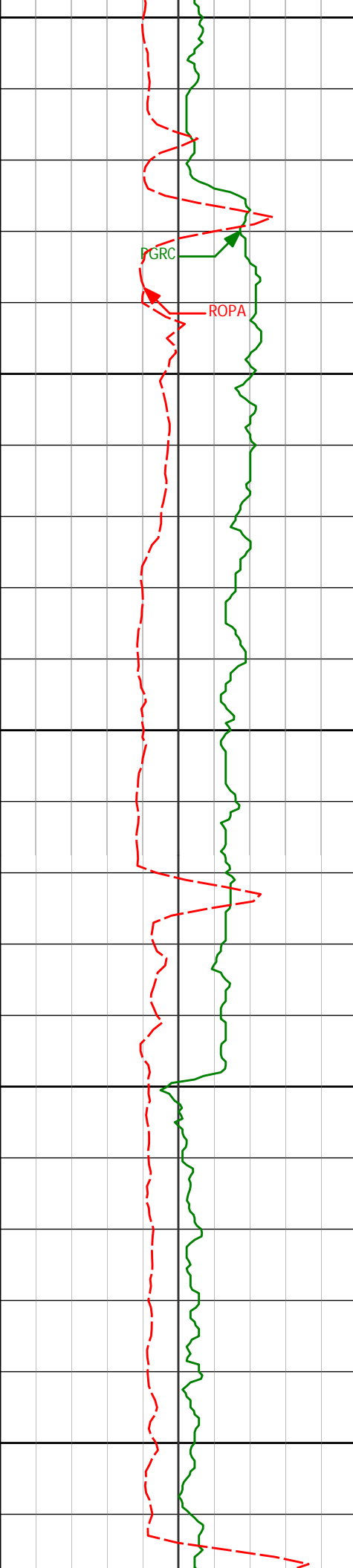
88.70°

271.08°

6664.46'

5038.95'





11250

11300

11350

11400

11450

11310'

89.32°

270.36°

6666.10'

5133.04'

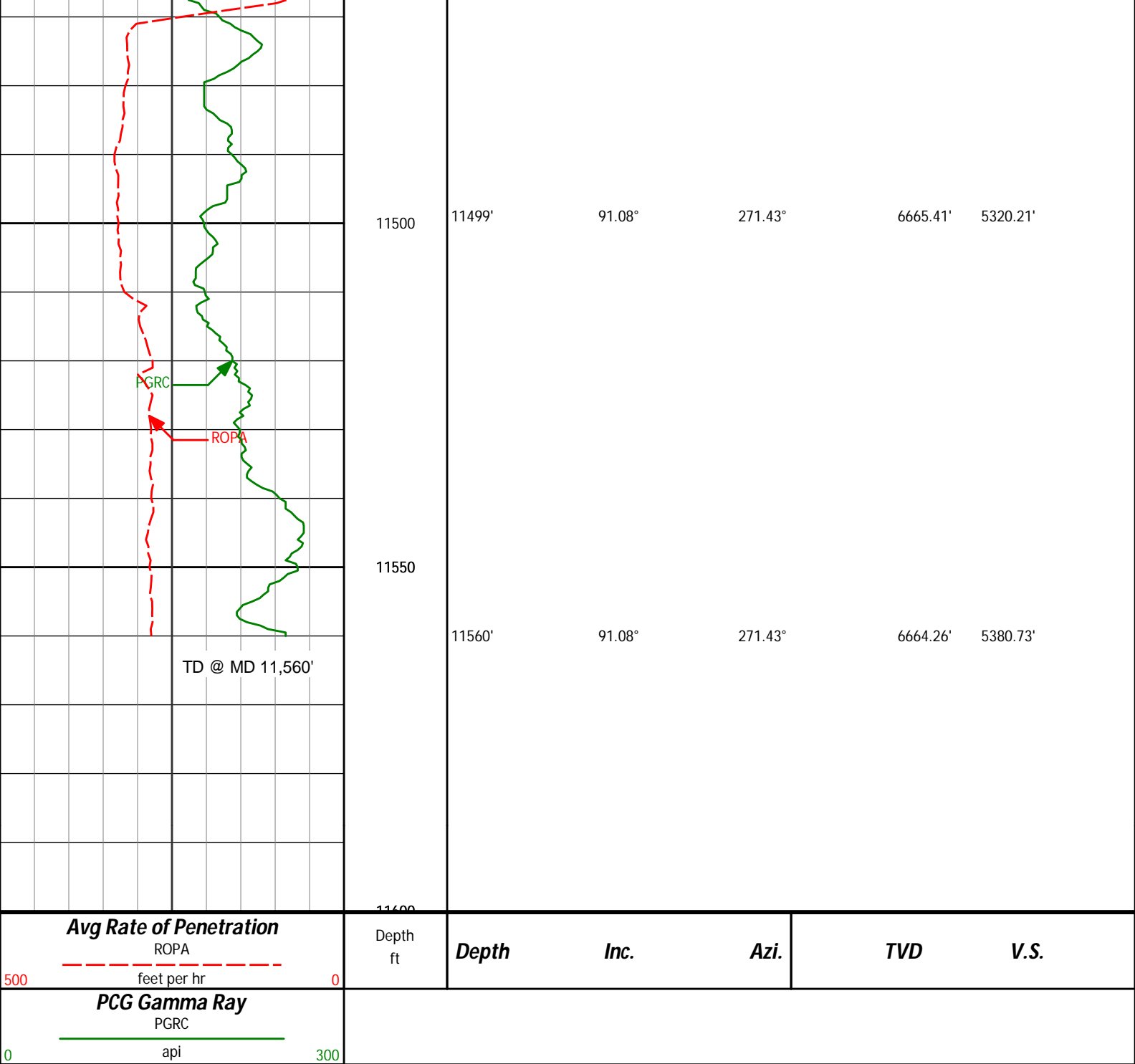
11405'

90.22°

270.44°

6666.48'

5227.06'



**HALLIBURTON**

## DIRECTIONAL SURVEY REPORT

Noble  
Wells Ranch USX AA13-65-1HN  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0900630174

Surveys are tied into two non-Haliburton surveys at MD 375' and 620' taken with a gyro while drilling the surface hole. Final survey is a straight-line projection to bit.

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
375.00	0.20	94.07	375.00	0.05 S	0.65 E	-0.65	0.05

810.00	0.20	253.47	810.00	0.20 S	0.67 E	-0.69	0.00
620.00	0.13	146.85	718.00	0.34 S	0.57 E	-0.61	0.27
718.00	0.28	155.70	810.00	0.63 S	0.72 E	-0.80	0.16
903.00	0.37	112.12	903.00	0.95 S	1.09 E	-1.22	0.28
997.00	0.82	167.88	996.99	1.72 S	1.51 E	-1.75	0.73
1089.00	0.86	168.22	1088.98	3.04 S	1.79 E	-2.22	0.04
1181.00	0.69	174.90	1180.97	4.26 S	1.98 E	-2.60	0.20
1273.00	0.89	201.53	1272.97	5.48 S	1.77 E	-2.57	0.45
1365.00	2.76	325.65	1364.93	4.32 S	0.26 E	-0.90	3.63
1457.00	5.09	334.07	1456.71	1.18 N	2.78 W	2.92	2.60
1550.00	6.78	338.90	1549.21	10.01 N	6.56 W	7.98	1.90
1642.00	8.95	342.51	1640.34	21.91 N	10.66 W	13.82	2.42
1735.00	8.97	342.65	1732.20	35.73 N	15.00 W	20.18	0.03
1827.00	9.14	343.39	1823.06	49.57 N	19.22 W	26.43	0.22
1918.00	9.29	341.59	1912.89	63.46 N	23.61 W	32.84	0.36
2013.00	9.47	351.19	2006.62	78.46 N	27.23 W	38.67	1.66
2108.00	8.87	351.11	2100.41	93.43 N	29.56 W	43.21	0.63
2203.00	8.65	351.85	2194.30	107.74 N	31.70 W	47.48	0.26
2298.00	9.15	347.59	2288.15	122.19 N	34.34 W	52.24	0.87
2393.00	9.04	344.46	2381.96	136.75 N	37.96 W	58.01	0.53
2487.00	8.88	344.21	2474.81	150.85 N	41.92 W	64.03	0.17
2582.00	8.73	344.36	2568.69	164.85 N	45.85 W	70.02	0.16
2677.00	9.69	342.34	2662.47	179.40 N	50.22 W	76.51	1.06
2772.00	9.83	344.61	2756.09	194.84 N	54.80 W	83.35	0.43
2867.00	9.53	344.38	2849.74	210.24 N	59.07 W	89.88	0.32
2962.00	9.69	344.00	2943.41	225.50 N	63.39 W	96.44	0.19
3057.00	9.97	344.79	3037.01	241.12 N	67.75 W	103.09	0.32
3152.00	8.86	345.53	3130.73	256.15 N	71.74 W	109.28	1.18
3247.00	8.83	347.31	3224.60	270.34 N	75.17 W	114.79	0.29
3342.00	8.65	347.83	3318.50	284.43 N	78.28 W	119.97	0.20
3437.00	7.62	341.39	3412.54	297.39 N	81.79 W	125.39	1.45
3531.00	7.44	340.96	3505.73	309.05 N	85.77 W	131.07	0.20
3626.00	8.09	346.19	3599.86	321.36 N	89.37 W	136.47	1.01
3721.00	9.59	342.26	3693.73	335.39 N	93.38 W	142.54	1.70
3816.00	10.71	344.47	3787.24	351.44 N	98.15 W	149.66	1.24
3911.00	11.42	345.80	3880.47	369.06 N	102.83 W	156.92	0.80
4006.00	11.93	346.17	3973.51	387.72 N	107.48 W	164.31	0.53
4101.00	12.36	347.19	4066.38	407.16 N	112.08 W	171.77	0.51
4196.00	11.57	349.95	4159.32	426.46 N	116.00 W	178.54	1.03
4291.00	10.02	348.86	4252.63	443.95 N	119.26 W	184.38	1.65
4386.00	8.50	350.74	4346.39	458.99 N	121.99 W	189.33	1.63
4481.00	7.55	353.52	4440.46	472.12 N	123.82 W	193.11	1.08
4576.00	7.04	349.39	4534.69	484.05 N	125.60 W	196.65	0.77
4671.00	8.29	341.13	4628.85	496.25 N	128.88 W	201.72	1.75
4765.00	6.91	345.55	4722.02	508.15 N	132.49 W	207.07	1.59
4860.00	8.86	343.89	4816.11	520.72 N	135.95 W	212.37	2.06
4955.00	9.34	350.24	4909.92	535.35 N	139.29 W	217.86	1.17
5050.00	8.58	350.08	5003.76	549.93 N	141.81 W	222.54	0.80
5145.00	7.32	354.21	5097.85	562.93 N	143.65 W	226.30	1.46
5240.00	6.87	352.25	5192.12	574.58 N	145.02 W	229.41	0.54
5335.00	8.20	349.37	5286.30	586.87 N	147.04 W	233.24	1.45
5430.00	7.96	349.74	5380.35	600.00 N	149.46 W	237.60	0.25
5524.00	9.18	343.12	5473.30	613.58 N	152.80 W	242.93	1.66
5619.00	7.53	340.93	5567.29	626.72 N	157.03 W	249.08	1.76
5714.00	9.61	336.36	5661.23	639.87 N	162.24 W	256.21	2.30
5809.00	7.86	336.58	5755.12	653.10 N	168.01 W	263.89	1.84
5904.00	7.90	336.06	5849.22	665.03 N	173.24 W	270.85	0.09
5994.00	7.83	339.49	5938.38	676.43 N	177.90 W	277.16	0.53
6090.00	6.98	330.57	6033.58	687.63 N	183.06 W	283.94	1.48
6138.00	11.45	308.86	6080.96	693.17 N	188.21 W	289.86	11.64
6185.00	16.11	302.01	6126.60	699.55 N	197.37 W	299.88	10.48
6233.00	18.83	299.26	6172.38	706.87 N	209.78 W	313.24	5.93
6280.00	22.81	297.36	6216.30	714.77 N	224.49 W	328.97	8.59
6328.00	27.62	297.64	6259.72	724.21 N	242.63 W	348.31	10.03
6375.00	32.96	296.92	6300.29	735.06 N	263.69 W	370.76	11.37
6423.00	40.39	295.46	6338.76	747.68 N	289.41 W	398.08	15.59
6470.00	47.51	297.92	6372.58	762.36 N	318.51 W	429.05	15.59
6518.00	49.04	298.15	6404.52	779.20 N	350.13 W	462.84	3.20
6565.00	49.92	297.29	6435.06	795.82 N	381.76 W	496.60	2.34
6613.00	54.16	294.74	6464.58	812.39 N	415.77 W	532.70	9.78
6660.00	58.22	291.80	6490.73	827.79 N	451.64 W	570.48	10.07
6708.00	59.78	287.84	6515.45	841.72 N	490.34 W	610.83	7.79
6755.00	60.78	286.98	6538.75	853.93 N	529.29 W	651.16	2.64
6803.00	64.20	282.47	6560.93	864.72 N	570.45 W	693.47	10.96

6850.00	67.44	277.92	6580.19	872.29 N	612.63 W	736.31	11.20
6898.00	71.99	275.33	6596.83	877.47 N	657.34 W	781.29	10.74
6945.00	76.44	273.28	6609.61	880.85 N	702.42 W	826.38	10.36
7015.00	81.73	267.45	6622.87	881.25 N	771.10 W	894.34	11.14
7150.00	85.43	267.28	6637.96	875.08 N	905.09 W	1025.89	2.74
7243.00	85.77	267.49	6645.09	870.84 N	997.72 W	1116.84	0.43
7335.00	88.33	269.07	6649.82	868.09 N	1089.54 W	1207.22	3.27
7428.00	89.32	268.74	6651.73	866.31 N	1182.51 W	1298.87	1.12
7520.00	93.02	271.43	6649.85	866.45 N	1274.46 W	1389.81	4.97
7612.00	93.15	271.34	6644.90	868.66 N	1366.30 W	1480.95	0.17
7703.00	91.60	272.52	6641.13	871.72 N	1457.17 W	1571.25	2.13
7798.00	86.64	271.59	6642.59	875.12 N	1552.07 W	1665.59	5.32
7893.00	88.28	271.15	6646.81	877.39 N	1646.94 W	1759.73	1.79
7988.00	89.26	270.69	6648.85	878.91 N	1741.91 W	1853.85	1.14
8083.00	90.89	269.54	6648.72	879.10 N	1836.90 W	1947.81	2.10
8177.00	89.66	268.73	6648.27	877.68 N	1930.89 W	2040.52	1.57
8272.00	89.85	264.37	6648.68	871.96 N	2025.69 W	2133.40	4.58
8367.00	90.80	264.35	6648.14	862.63 N	2120.23 W	2225.48	1.01
8462.00	92.31	266.45	6645.55	855.01 N	2214.88 W	2317.92	2.72
8557.00	92.10	268.22	6641.90	850.59 N	2309.70 W	2411.01	1.88
8652.00	91.20	270.37	6639.16	849.43 N	2404.65 W	2504.71	2.46
8747.00	90.31	271.10	6637.91	850.65 N	2499.63 W	2598.81	1.21
8842.00	89.81	271.43	6637.81	852.75 N	2594.61 W	2693.03	0.62
8937.00	89.48	271.67	6638.39	855.32 N	2689.57 W	2787.31	0.44
9032.00	89.57	271.12	6639.19	857.63 N	2784.54 W	2881.55	0.59
9127.00	88.61	270.80	6640.69	859.22 N	2879.51 W	2975.69	1.06
9222.00	89.57	270.58	6642.20	860.36 N	2974.49 W	3069.77	1.03
9317.00	88.71	270.82	6643.63	861.53 N	3069.47 W	3163.86	0.94
9411.00	89.23	269.94	6645.33	862.15 N	3163.45 W	3256.87	1.10
9506.00	90.77	271.87	6645.33	863.65 N	3258.43 W	3351.01	2.60
9601.00	89.72	270.97	6644.92	866.00 N	3353.40 W	3445.26	1.46
9696.00	89.48	270.31	6645.58	867.05 N	3448.39 W	3539.34	0.74
9791.00	89.35	270.18	6646.55	867.45 N	3543.39 W	3633.32	0.19
9886.00	90.09	271.10	6647.01	868.51 N	3638.38 W	3727.40	1.25
9981.00	88.86	270.17	6647.88	869.57 N	3733.37 W	3821.47	1.63
10076.00	89.60	270.99	6649.16	870.53 N	3828.35 W	3915.53	1.16
10171.00	89.44	268.27	6649.96	869.92 N	3923.34 W	4009.36	2.87
10266.00	90.28	268.86	6650.19	867.54 N	4018.31 W	4102.90	1.07
10360.00	89.48	268.86	6650.39	865.67 N	4112.29 W	4195.54	0.85
10456.00	88.49	269.01	6652.09	863.89 N	4208.25 W	4290.16	1.04
10550.00	87.19	269.43	6655.63	862.61 N	4302.18 W	4382.83	1.45
10645.00	87.65	268.85	6659.91	861.18 N	4397.07 W	4476.44	0.78
10740.00	89.01	267.60	6662.67	858.24 N	4491.98 W	4569.84	1.94
10835.00	90.99	267.88	6662.67	854.49 N	4586.90 W	4663.13	2.10
10930.00	91.14	269.29	6660.90	852.15 N	4681.85 W	4756.66	1.50
11025.00	90.09	271.13	6659.88	852.50 N	4776.84 W	4850.63	2.23
11120.00	87.84	271.18	6661.60	854.41 N	4871.80 W	4944.81	2.37
11215.00	88.70	271.08	6664.46	856.28 N	4966.74 W	5038.95	0.91
11310.00	89.32	270.36	6666.10	857.47 N	5061.71 W	5133.04	1.00
11405.00	90.22	270.44	6666.48	858.13 N	5156.71 W	5227.06	0.95
11499.00	91.08	271.43	6665.41	859.66 N	5250.69 W	5320.21	1.39
11560.00	91.08	271.43	6664.26	861.18 N	5311.66 W	5380.73	0.01

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT  
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD  
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 278.61 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11560.00 FEET  
IS 5381.02 FEET ALONG 279.21 DEGREES (GRID)**