



WELL INFORMATION					
MWD Run Number	100	200	300	400	
Date run completed	08-Feb-13	09-Feb-13	13-Feb-13	15-Feb-13	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	6.125	6.125	
Tool Nominal OD (in)	6.750	6.750	4.750	4.750	
Log Start Depth (MD, ft)	667.00	5,891.00	7,102.00	14,305.00	
Log End Depth (MD, ft)	5,891.00	7,102.00	14,305.00	16,319.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	08-Feb-13 00:45	09-Feb-13 01:30	11-Feb-13 03:30	14-Feb-13 11:00	
Drill/Wipe End Date and Time	08-Feb-13 16:00	09-Feb-13 17:15	13-Feb-13 13:00	15-Feb-13 11:45	
Min Inc (deg) @ Depth (MD, ft)	.22 @ 811.00	1.28 @ 5,928.00	86.88 @ 13,578.00	86.97 @ 14,813.00	
Max Inc (deg) @ Depth (MD, ft)	14.89 @ 2,986.00	87.81 @ 7,048.00	92.40 @ 10,563.00	92.75 @ 15,288.00	
Bit TFA(in2) / Bit Type	.86 / PDC	.98 / PDC	.86 / PDC	.86 / PDC	
Flow Rate (gpm)	594.93	558.18	268.77	270.00	
Max AV (fpm) / CV (fpm) @ MWD	395.3 / NA	401.0 / NA	401.2 / NA	401.4 / NA	
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	8.90 / 30.00	9.68 / 37.00	9.08 / 31.00	9.20 / 34.00	
Filtrate CL (ppm)	2,200.00	2,300.00	2,000.00	2,000.00	
pH / Fluid Loss (mptm)	9.00 / NA	8.30 / NA	8.60 / NA	8.80 / NA	
PV (cP) / YP (lbf2)	6 / 6.00	13 / 13.00	7 / 6.00	8 / 6.00	
% Solids / % Sand	3.9 / .6	10.5 / 0.30	5.2 / 0.15	4.5 / .1	
% Oil / Oil:Water Ratio	0.5 / 0.5:96.2	0 / 0:93.2	2 / 2:92.5	3.8 / 3.8:91.5	
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Max Tool Temp (deg F) @ Depth (MD, ft)	444.78 / PDM	424.22 / PDM	322.73 / PDM	312.22 / PDM	

Max Tool Temp (degF) / Source	141.70 / PCM	134.00 / PCM	238.70 / PCM	242.90 / PCM	
Rm @ Max Tool Temp (degF)	NA @ 141.70	NA @ 134.00	NA @ 238.70	NA @ 242.90	
Lead MWD Engineer	Ryan Brunkhorst	Ryan Brunkhorst	Ryan Brunkhorst	Ryan Brunkhorst	
Customer Representative	Matt Settles	Matt Settles	Johnny Sanchez	Johnny Sanchez	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.76	5.76	5.76	5.76	
Sub Serial Number	11567858	11567858	11730098	11730098	
Insert Serial Number	11680772	11680772	11680786	10809550	
Date and Time Initialized	07-Feb-13 11:56	07-Feb-13 11:56	09-Feb-13 20:12	13-Feb-13 14:14	
Date and Time Read	10-Feb-13 00:17	10-Feb-13 00:43	13-Feb-13 21:31	15-Feb-13 23:17	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	55.00	54.00	62.00	62.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11567858	11567858	11730098	11730098	
Sonde Serial Number	11833026	11833026	11180292	11833026	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	234.16	245.36	233.96	234.45	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	47.50	47.22	54.46	54.91	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11567858	11567858	11730098	11730098	
Insert/Sonde Serial Number	11293431	11293431	11680999	11293431	

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 7.4.01

WARRANTY

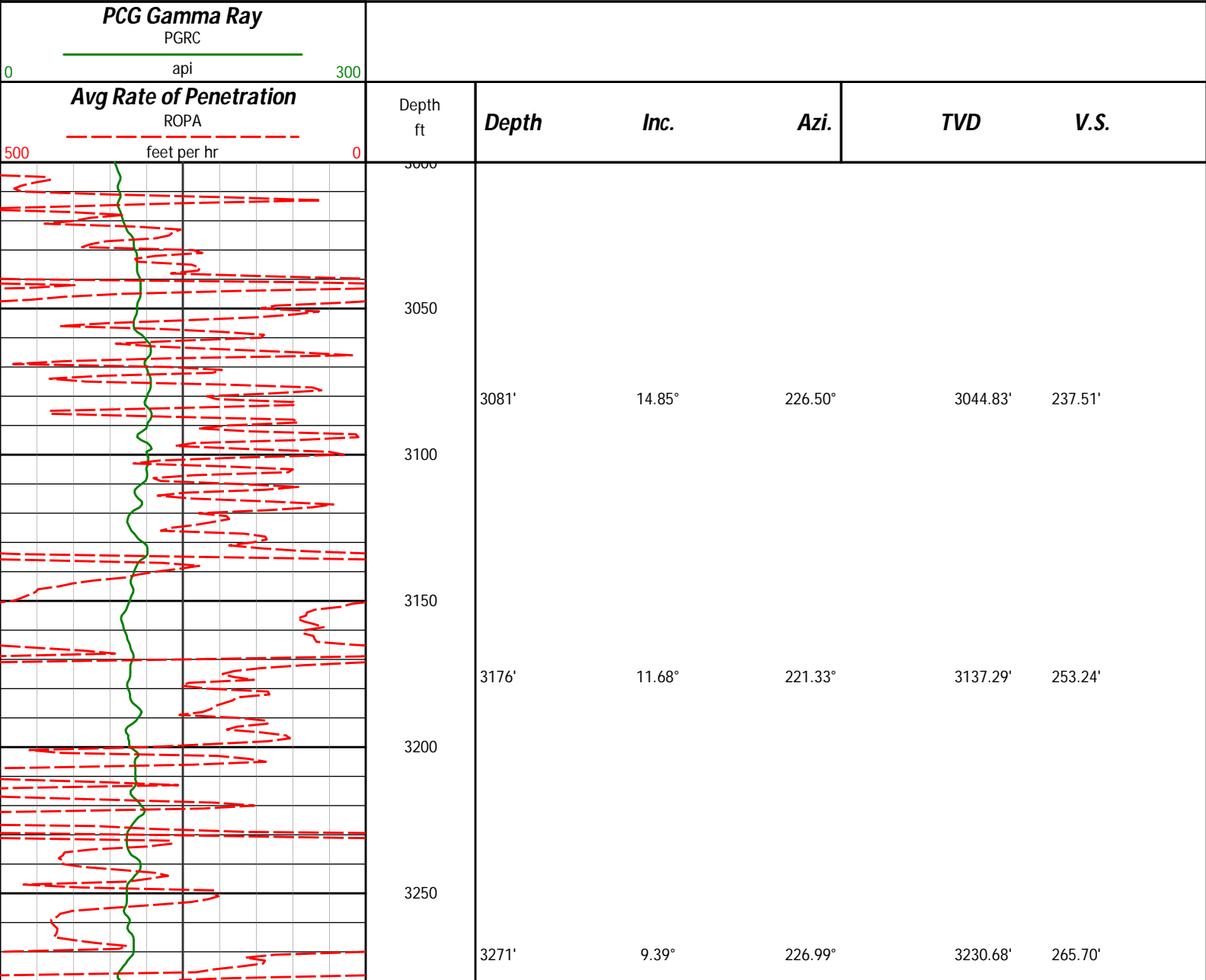
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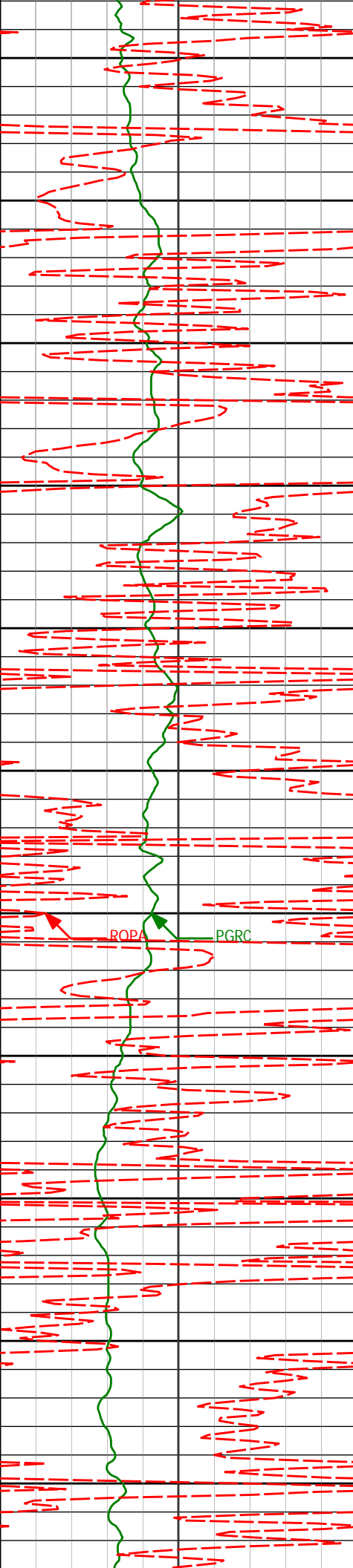
HALLIBURTON

Sperry Drilling Services

MD Main Log 1:600

Noble Energy
Wells Ranch State USX AA16-64-1HNL
H&P 343
T6N-R63W





3300

3350

3366'

4.79°

237.50°

3324.93'

274.98'

3400

3450

3461'

1.70°

239.20°

3419.77'

279.64'

3500

3550

3556'

1.74°

228.78°

3514.73'

281.99'

3600

3650

3651'

0.68°

90.38°

3609.72'

282.55'

3700

3750

3746'

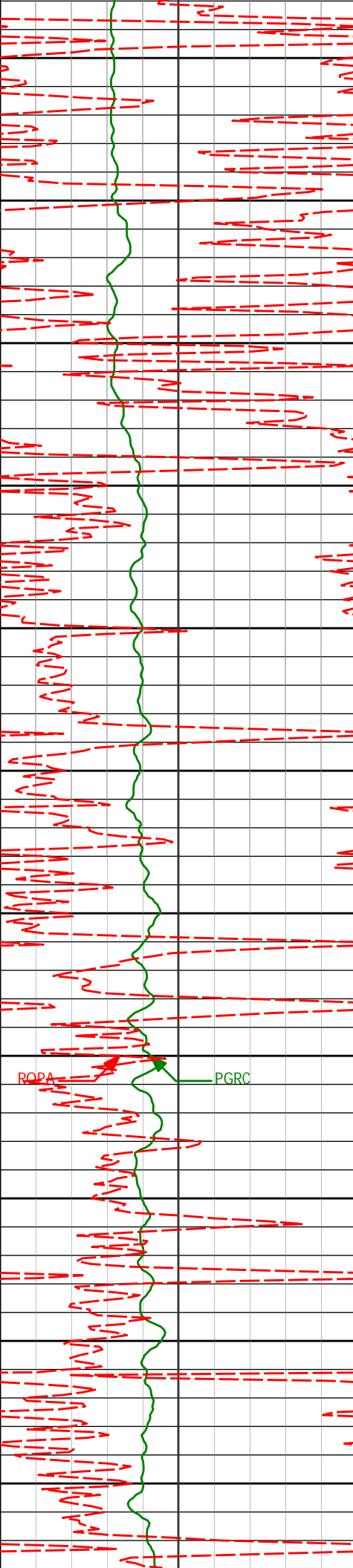
0.93°

109.87°

3704.71'

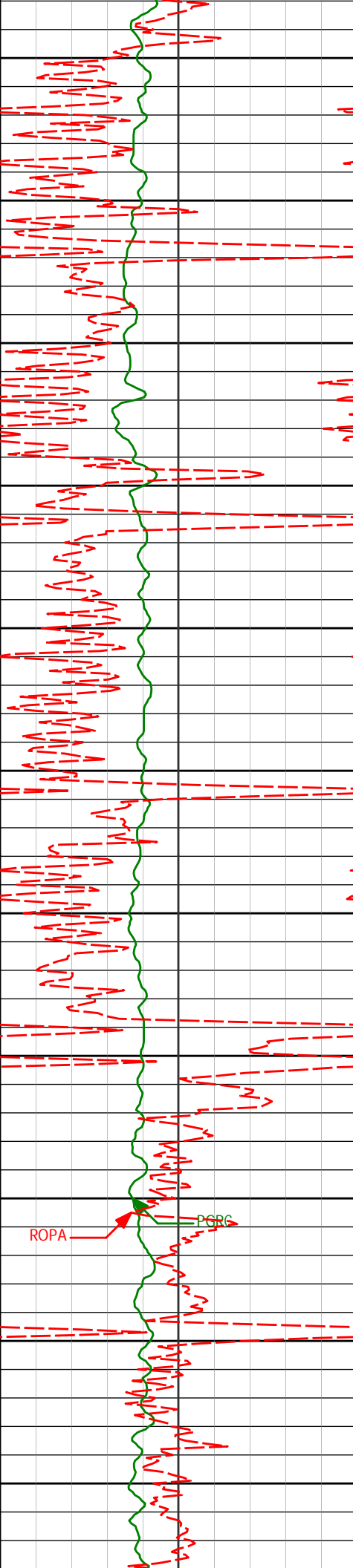
281.27'

3800



3850
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350

3841'	0.70°	80.99°	3799.70'	279.98'
3936'	1.23°	93.87°	3894.68'	278.39'
4031'	1.31°	92.72°	3989.66'	276.29'
4126'	0.53°	118.49°	4084.65'	274.83'
4221'	0.26°	98.90°	4179.64'	274.24'
4316'	0.60°	179.78°	4274.64'	274.05'



4400

4411'

0.48°

200.91°

4369.64'

274.22'

4450

4500

4506'

0.94°

189.70°

4464.63'

274.53'

4550

4600

4601'

0.96°

195.79°

4559.62'

274.93'

4650

4700

4696'

0.28°

206.56°

4654.61'

275.29'

4750

4800

4791'

0.38°

218.34°

4749.61'

275.60'

ROPA

PSRC

4850

4900

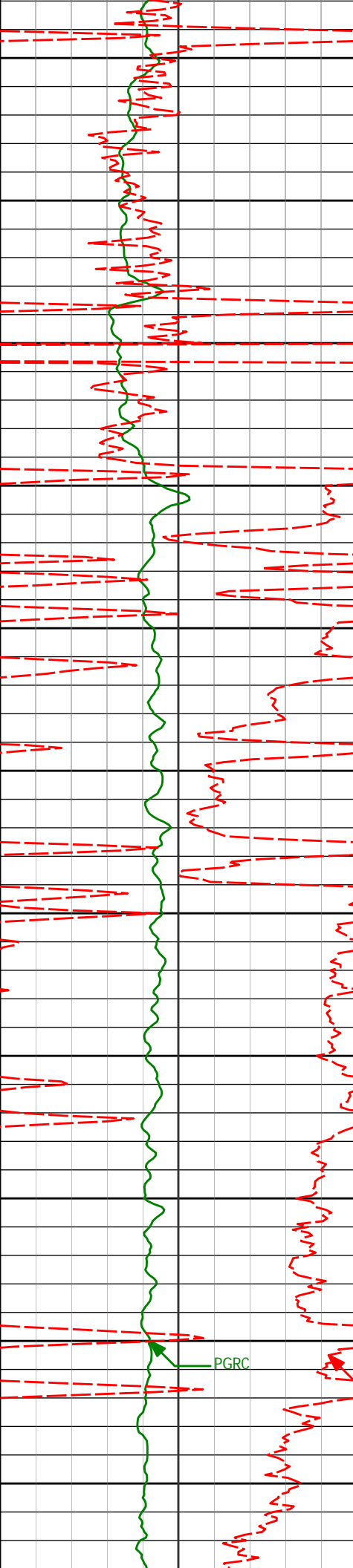
4886'

0.31°

128.80°

4844.61'

275.61'



4950

4981'

0.54°

196.65°

4939.61'

275.56'

5000

5050

5076'

1.24°

210.92°

5034.59'

276.27'

5100

5150

5171'

1.22°

212.49°

5129.57'

277.40'

5200

5250

5266'

0.84°

202.04°

5224.56'

278.26'

5300

5350

5361'

0.86°

203.65°

5319.55'

278.85'

5400

PGRC

5450

5456'

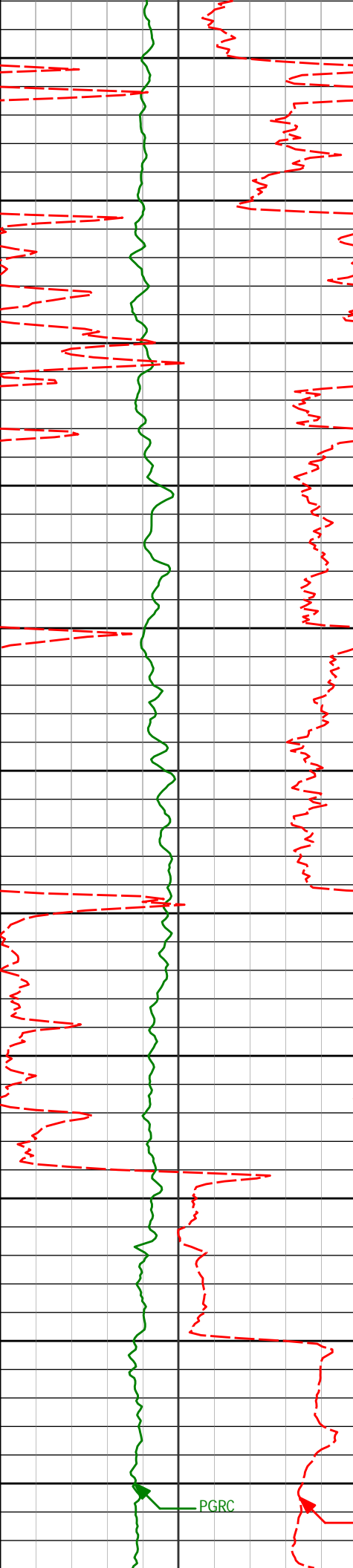
0.86°

238.35°

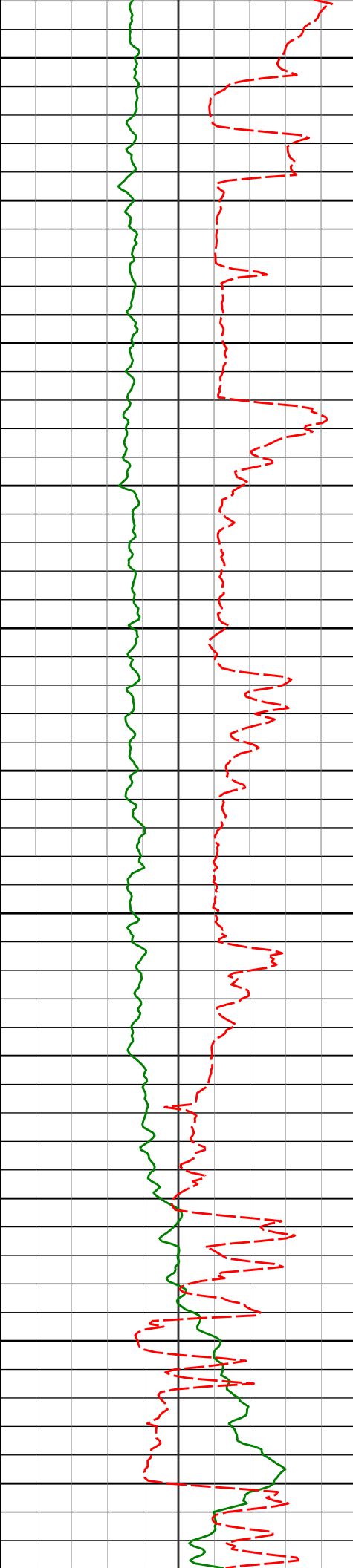
5414.54'

279.78'

ROPA



5500				
5550	5551'	1.20°	235.51°	5509.52' 281.24'
5600				
5650	5646'	0.96°	246.94°	5604.50' 282.82'
5700				
5750	5741'	0.71°	234.43°	5699.49' 284.06'
5800				
5850	5836'	0.88°	232.35°	5794.49' 285.14'
<Run 200> 5900				
5950	5928'	1.28°	249.30°	5886.47' 286.69'
6000	5976'	4.61°	257.83°	5934.40' 289.10'
6023'	6023'	9.63°	263.11°	5981.02' 294.88'



6050

6071'

13.42°

265.36°

6028.05'

304.45'

6100

6118'

14.06°

266.96°

6073.70'

315.60'

6150

6200

6213'

17.10°

267.09°

6165.20'

341.11'

6250

6300

6308'

26.42°

261.99°

6253.34'

376.18'

6350

6400

6403'

37.62°

267.44°

6333.78'

426.36'

6450

6451'

44.03°

270.83°

6370.08'

457.71'

6500

6498'

45.70°

269.38°

6403.40'

490.84'

6550

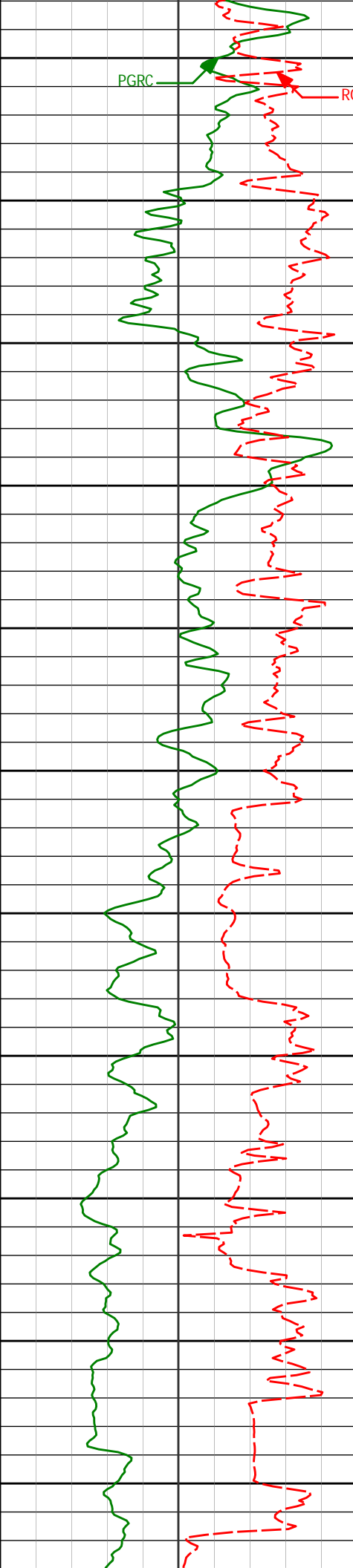
6546'

46.41°

268.81°

6436.71'

525.39'



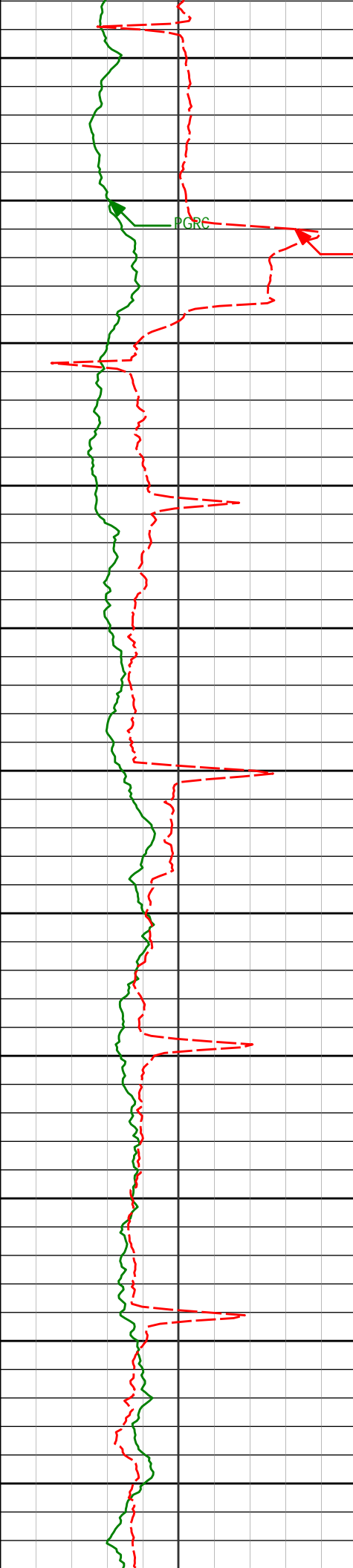
PGRC

ROPA

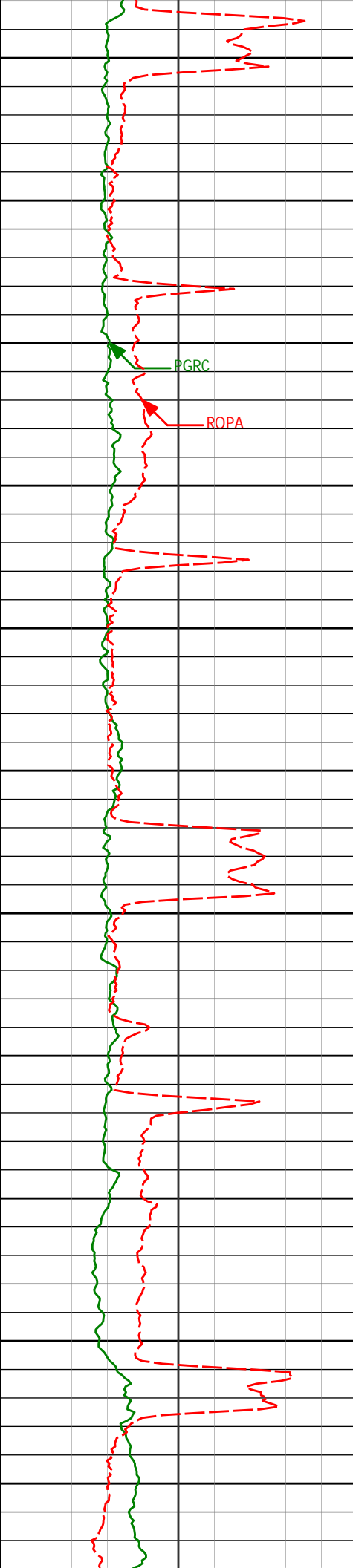
6600
6650
6700
6750
6800
6850
6900
6950
7000
7050
7100
<Run 300>

6593'	49.61°	267.11°	6468.15'	560.32'
6641'	55.13°	265.20°	6497.44'	598.30'
6688'	58.94°	264.97°	6523.01'	637.67'
6736'	63.06°	264.82°	6546.28'	679.59'
6783'	68.51°	265.72°	6565.55'	722.39'
6831'	74.65°	268.17°	6580.71'	767.90'
6878'	77.61°	268.58°	6591.98'	813.52'
6926'	79.27°	268.18°	6601.60'	860.54'
6973'	82.43°	268.18°	6609.07'	906.94'
7048'	87.81°	269.24°	6615.45'	981.63'

Casing Set @ 7,092'



7150	7148'	90.59°	270.12°	6616.84'	1081.56'
7200					
7250	7243'	88.27°	268.65°	6617.79'	1176.52'
7300					
7350	7338'	88.67°	268.59°	6620.32'	1271.48'
7400					
7450	7433'	88.86°	268.53°	6622.37'	1366.45'
7500					
7550	7528'	89.60°	268.75°	6623.65'	1461.44'
7600					
7650	7623'	90.55°	269.11°	6623.52'	1556.42'



7700

7718'

89.20°

268.43°

6623.73'

1651.41'

7750

7800

7813'

89.57°

268.09°

6624.75'

1746.40'

7850

7900

7908'

89.41°

267.58°

6625.60'

1841.40'

7950

8000

8003'

88.58°

270.41°

6627.26'

1936.35'

8050

8100

8098'

89.85°

270.64°

6628.56'

2031.25'

8150

8200

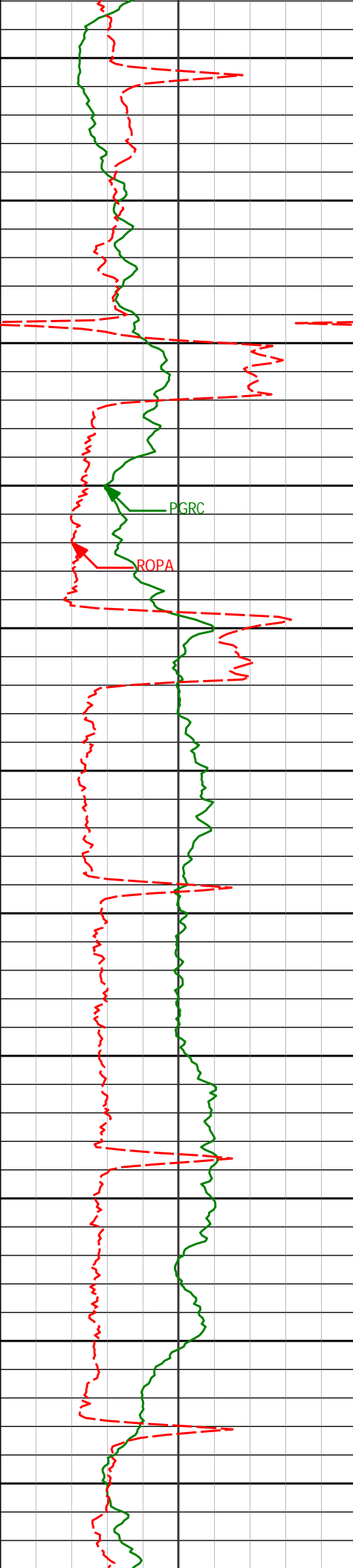
8193'

89.66°

270.08°

6628.97'

2126.16'



8250

8288'

90.62°

269.85°

6628.74'

2221.10'

8300

8350

8383'

90.06°

271.64°

6628.18'

2315.98'

8400

PGRC

ROPA

8450

8478'

88.37°

271.19°

6629.48'

2410.79'

8500

8550

8573'

88.00°

270.54°

6632.49'

2505.62'

8600

8650

8668'

88.67°

270.71°

6635.25'

2600.48'

8700

8750

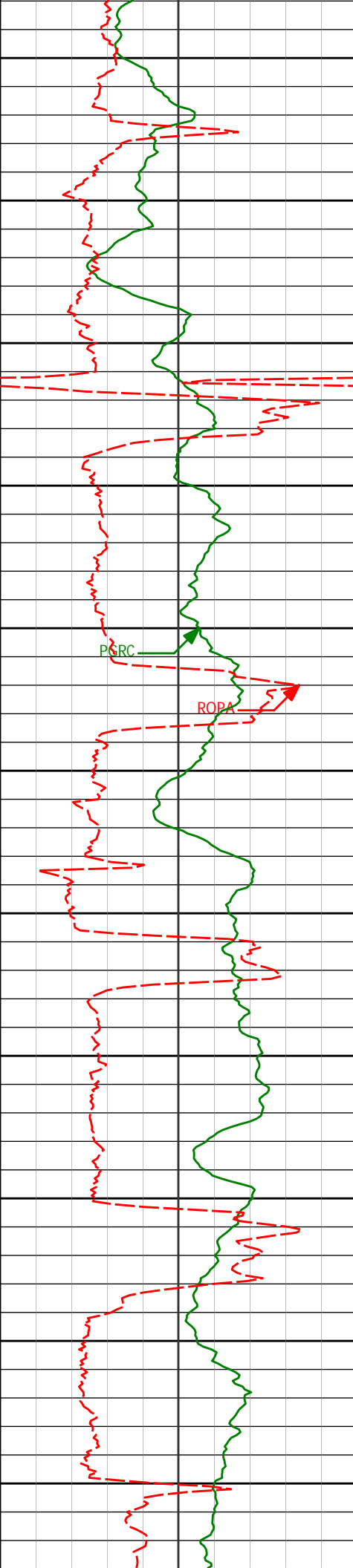
8763'

89.35°

270.95°

6636.89'

2695.34'



8800

8850

8900

8950

9000

9050

9100

9150

9200

9250

9300

8858'

90.31°

270.79°

6637.17'

2790.21'

8953'

90.83°

269.46°

6636.22'

2885.14'

9048'

90.12°

269.99°

6635.44'

2980.09'

9143'

90.22°

268.78°

6635.15'

3075.06'

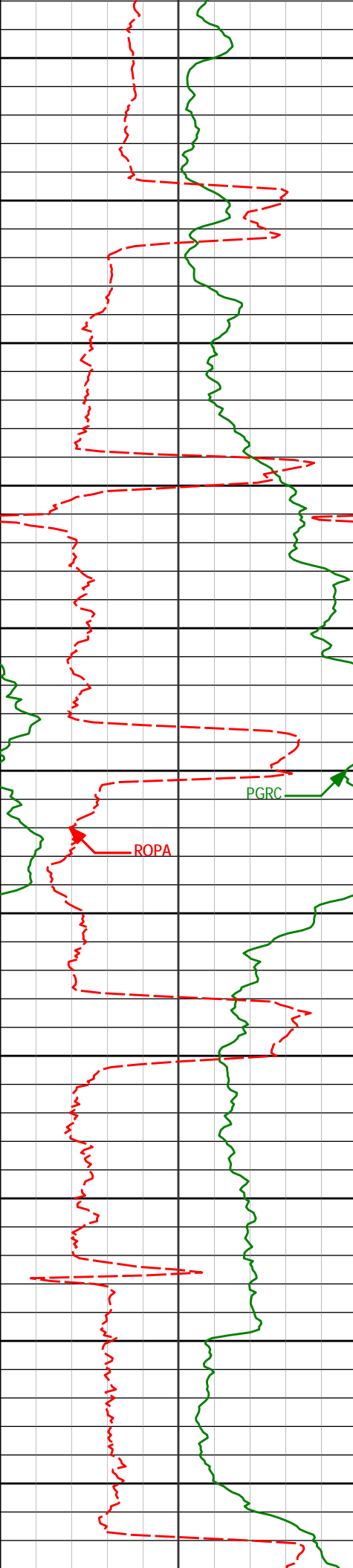
9238'

88.77°

269.84°

6635.99'

3170.02'



9350

9400

9450

9500

9550

9600

9650

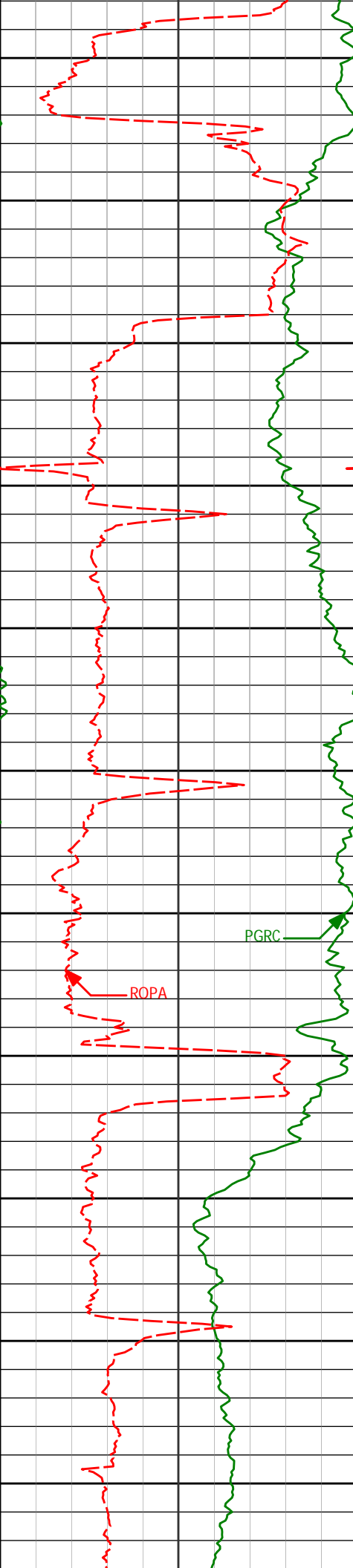
9700

9750

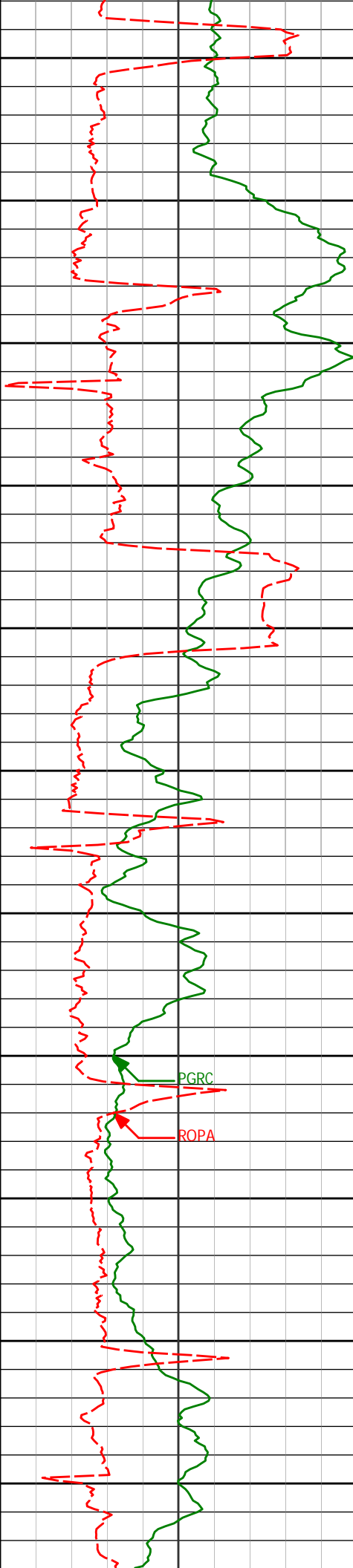
9800

9850

9333'	90.31°	269.96°	6636.75'	3264.96'
9428'	89.63°	269.55°	6636.80'	3359.91'
9523'	90.18°	269.47°	6636.96'	3454.87'
9618'	89.88°	268.85°	6636.91'	3549.85'
9713'	88.86°	269.71°	6637.96'	3644.82'
9807'	89.85°	269.58°	6639.02'	3738.77'



9900	9902'	90.40°	270.04°	6638.81'	3833.72'
9950					
10000	9997'	88.00°	269.08°	6640.13'	3928.66'
10050					
10100	10092'	88.43°	268.64°	6643.09'	4023.60'
10150					
10200	10187'	90.06°	271.02°	6644.35'	4118.53'
10250					
10300	10282'	87.81°	269.60°	6646.11'	4213.43'
10350					
10400	10377'	88.24°	270.14°	6649.39'	4308.32'



10450

10469'

90.83°

271.14°

6650.13'

4400.20'

10500

10550

10563'

92.40°

271.17°

6647.48'

4494.02'

10600

10650

10656'

89.41°

269.18°

6646.01'

4586.92'

10700

10750

10749'

88.98°

268.79°

6647.32'

4679.89'

10800

10850

10841'

89.82°

268.66°

6648.28'

4771.88'

10900

10950

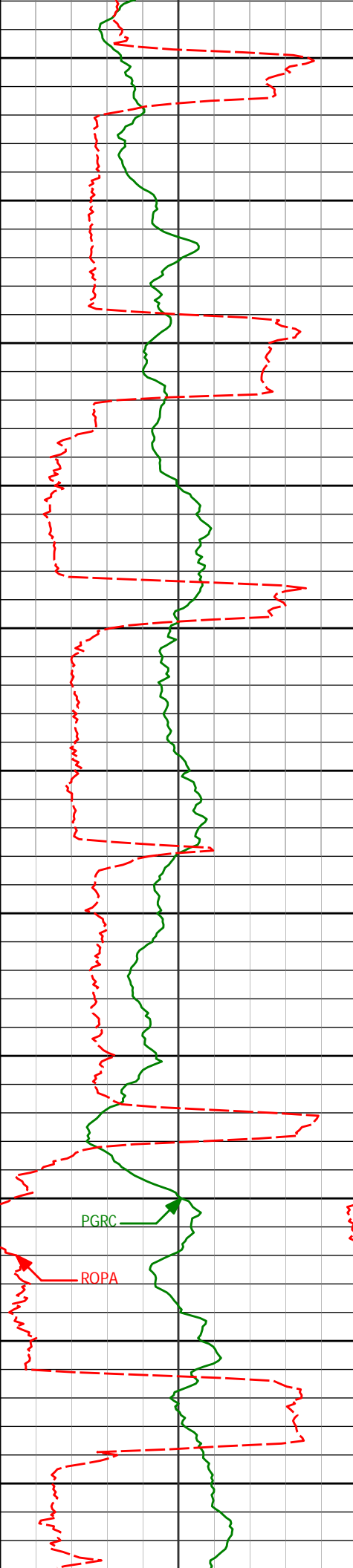
10935'

90.96°

268.49°

6647.64'

4865.87'



11000

11028'

90.52°

268.59°

6646.44'

4958.86'

11050

11100

11121'

88.83°

269.49°

6646.97'

5051.83'

11150

11200

11215'

88.80°

269.92°

6648.91'

5145.77'

11250

11300

11308'

89.88°

268.91°

6649.99'

5238.73'

11350

11400

11402'

91.23°

269.55°

6649.08'

5332.70'

11450

11500

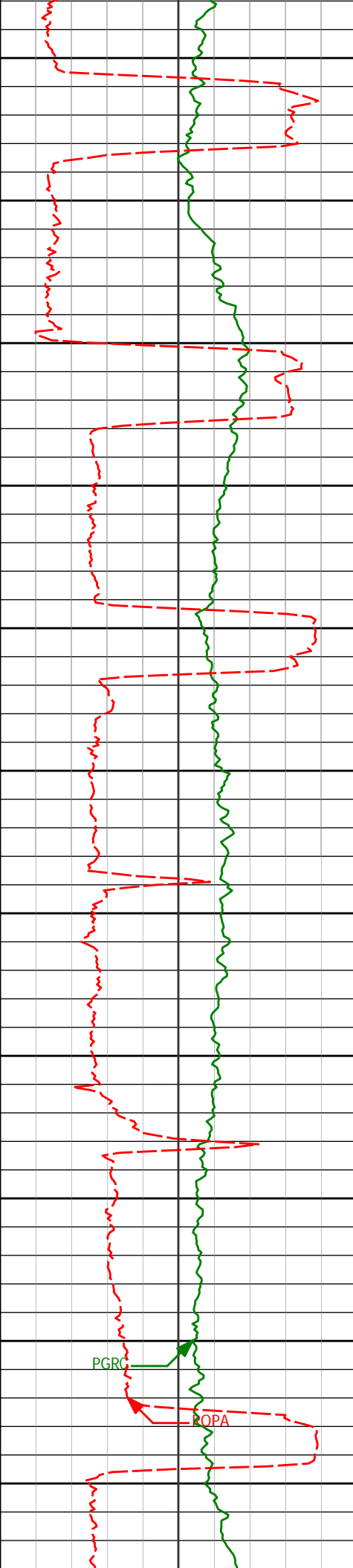
11496'

90.68°

270.03°

6647.51'

5426.63'



11550

11589'

90.52°

271.40°

6646.53'

5519.52'

11600

11650

11683'

89.51°

271.17°

6646.51'

5613.36'

11700

11750

11776'

88.58°

271.38°

6648.06'

5706.19'

11800

11850

11870'

89.41°

271.11°

6649.71'

5800.01'

11900

11950

11964'

90.62°

270.80°

6649.68'

5893.88'

12000

PGRC

ROPA

12050

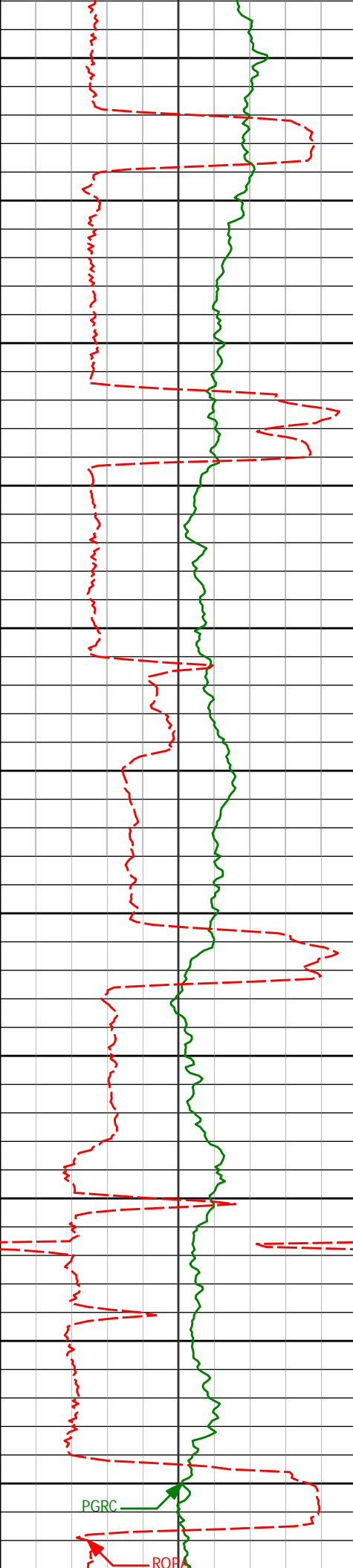
12059'

89.88°

270.45°

6649.27'

5988.78'



12100

12150

12200

12250

12300

12350

12400

12450

12500

12550

12600

12154'

89.72°

271.71°

6649.60'

6083.63'

12248'

88.77°

271.65°

6650.84'

6177.42'

12343'

89.32°

271.74°

6652.42'

6272.20'

12438'

88.77°

270.10°

6654.01'

6367.06'

12533'

89.57°

270.04°

6655.38'

6461.98'

12628'

89.60°

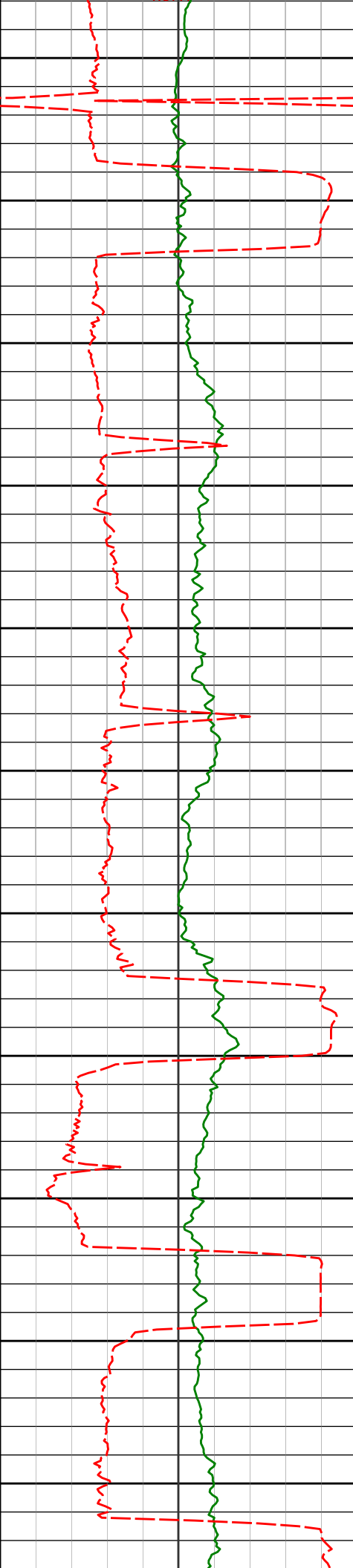
268.87°

6656.07'

6556.94'

PGRC

ROPA



12650

12700

12750

12800

12850

12900

12950

13000

13050

13100

13150

12723'

88.15°

270.52°

6657.94'

6651.88'

12818'

88.92°

270.30°

6660.37'

6746.76'

12913'

90.52°

270.14°

6660.83'

6841.68'

13008'

91.20°

269.01°

6659.40'

6936.62'

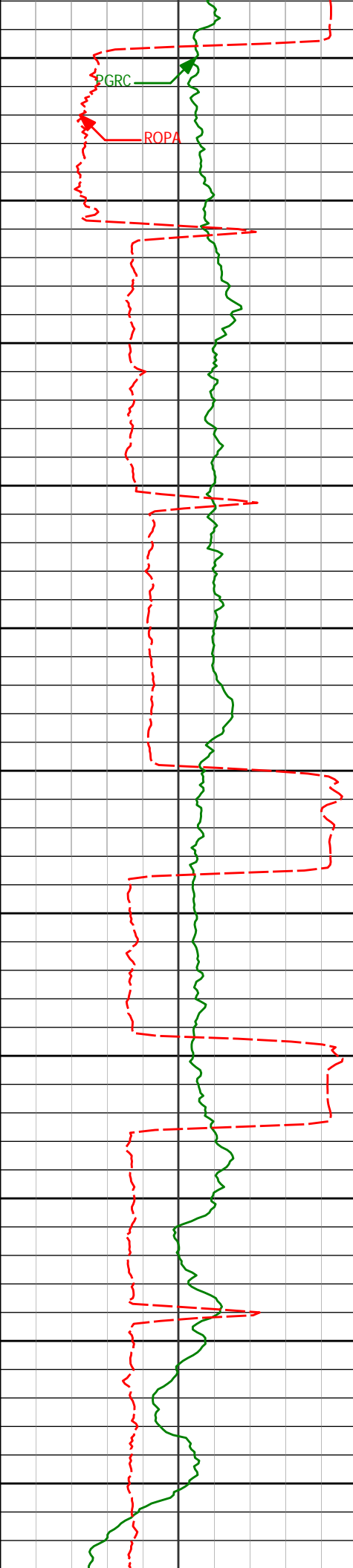
13103'

89.97°

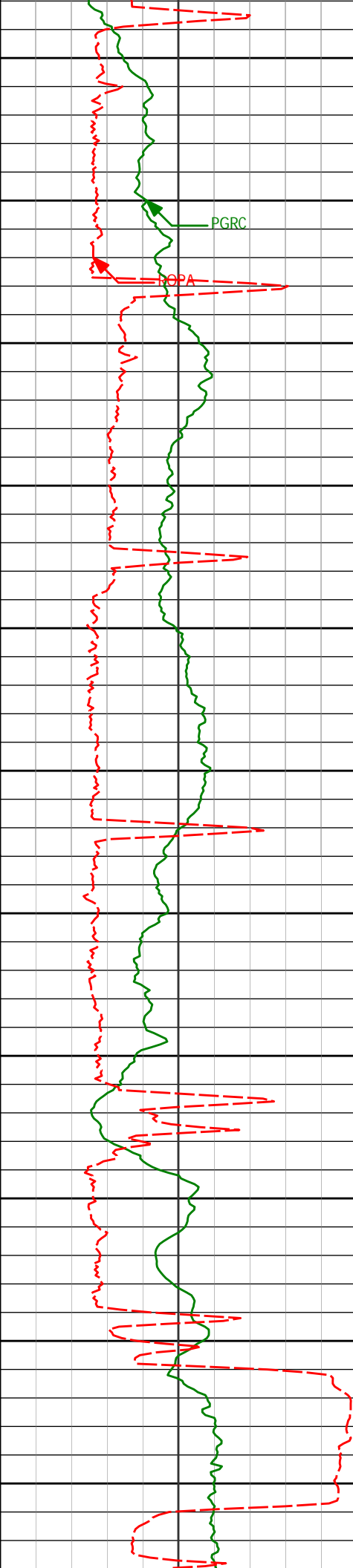
269.05°

6658.43'

7031.60'



13200	13198'	88.15°	269.45°	6659.99'	7126.56'
13250					
13300	13293'	89.01°	269.55°	6662.35'	7221.49'
13350					
13400	13388'	90.59°	269.42°	6662.68'	7316.46'
13450					
13500	13483'	90.03°	269.69°	6662.16'	7411.42'
13550					
13600	13578'	86.88°	270.44°	6664.73'	7506.30'
13650					
13700	13673'	87.35°	270.32°	6669.51'	7601.10'



13750

13768'

88.15°

269.96°

6673.24'

7695.95'

13800

13863'

89.23°

269.75°

6675.41'

7790.87'

13900

13950

13958'

89.91°

268.37°

6676.12'

7885.85'

14000

14050

14053'

90.89°

267.91°

6675.46'

7980.85'

14100

14150

14148'

92.38°

267.91°

6672.75'

8075.80'

14200

14250

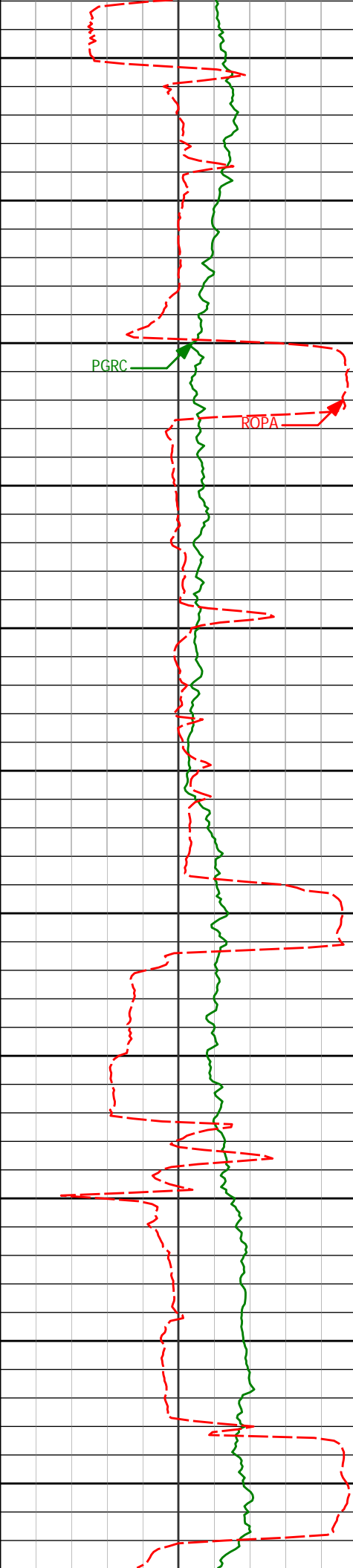
14243'

89.97°

268.64°

6670.80'

8170.77'



14300
<Run 400>

14338' 90.28° 268.96° 6670.59' 8265.76'

14350

14400

14433' 89.17° 268.54° 6671.05' 8360.75'

14450

14500

14528' 90.59° 268.89° 6671.25' 8455.74'

14550

14600

14623' 89.57° 269.12° 6671.12' 8550.72'

14650

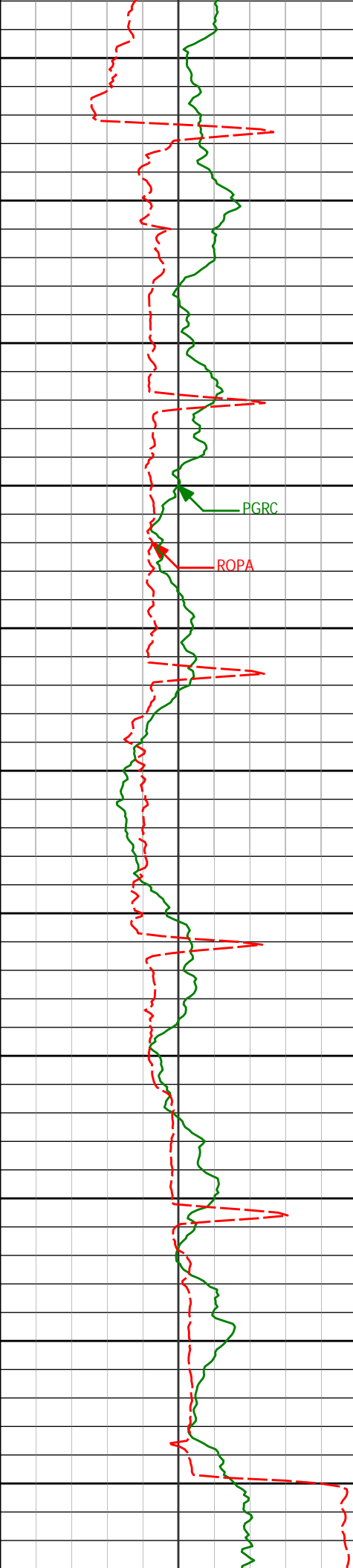
14700

14718' 90.22° 268.71° 6671.29' 8645.71'

14750

14800

14813' 86.97° 269.91° 6673.62' 8740.64'



14850

14900

14950

15000

15050

15100

15150

15200

15250

15300

15350

14908'

87.22°

270.22°

6678.43'

8835.45'

15003'

87.84°

270.18°

6682.53'

8930.29'

15098'

89.10°

270.33°

6685.06'

9025.17'

15193'

91.17°

270.56°

6684.84'

9120.08'

15288'

92.75°

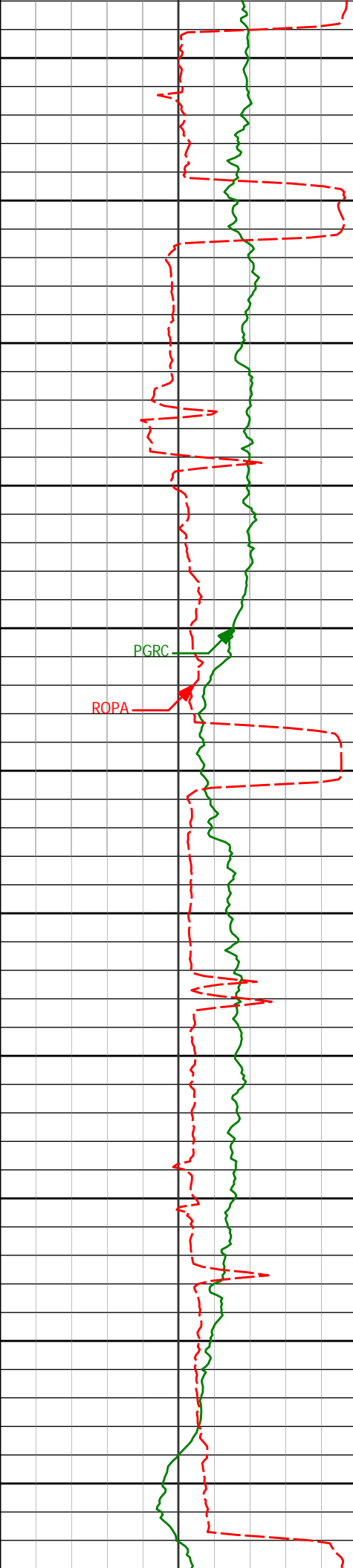
269.81°

6681.59'

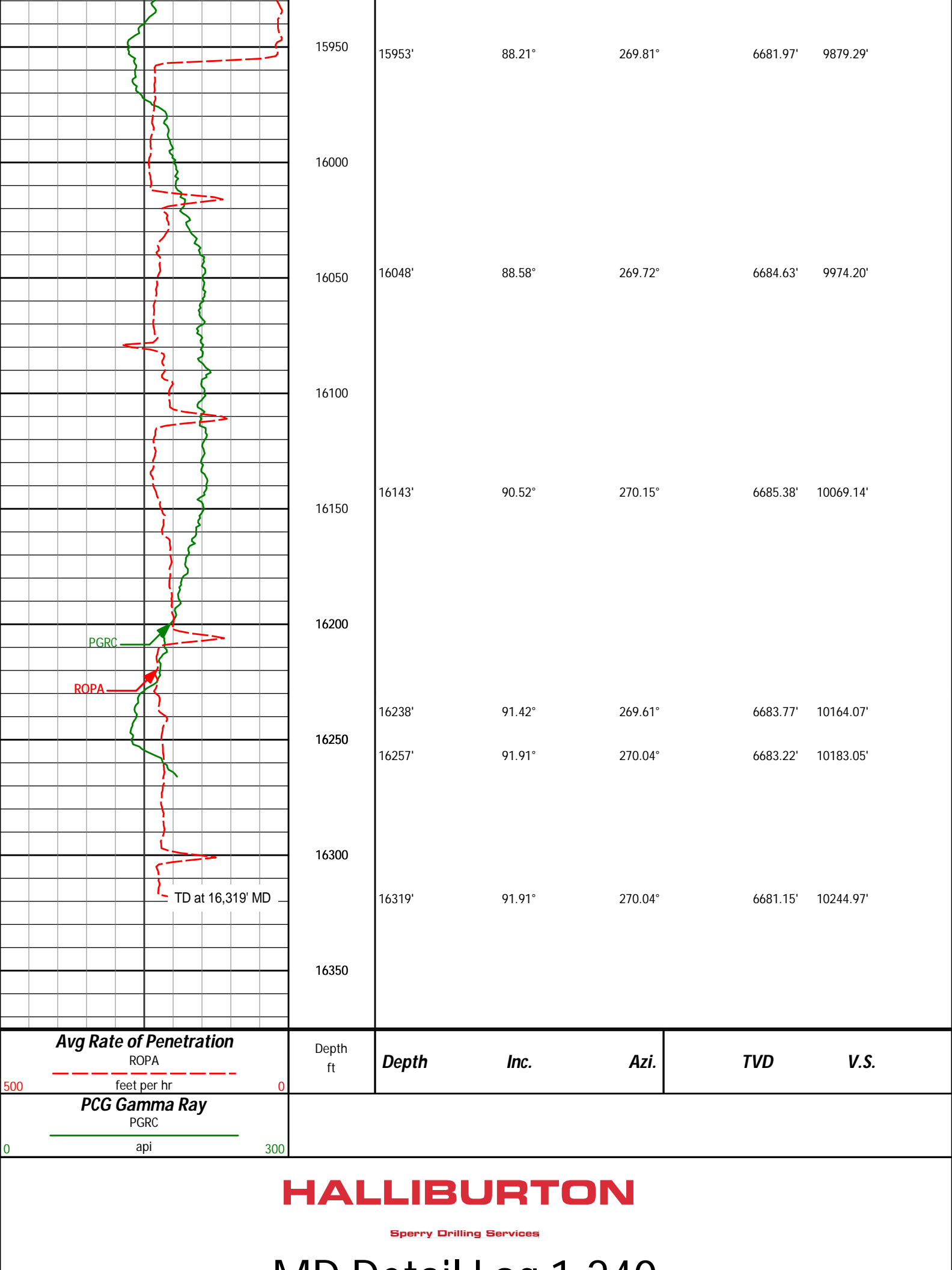
9214.95'

PGRC

ROPA



15383'	90.06°	269.41°	6679.26'	9309.87'
15400				
15450				
15478'	88.71°	270.16°	6680.28'	9404.81'
15500				
15550				
15573'	90.46°	270.91°	6680.97'	9499.71'
15600				
15650				
15668'	89.07°	270.70°	6681.36'	9594.58'
15700				
15750				
15763'	89.94°	270.46°	6682.18'	9689.48'
15800				
15850				
15858'	91.05°	270.62°	6681.36'	9784.38'
15900				



15950

15953'

88.21°

269.81°

6681.97'

9879.29'

16000

16050

16048'

88.58°

269.72°

6684.63'

9974.20'

16100

16150

16143'

90.52°

270.15°

6685.38'

10069.14'

16200

PGRC

ROPA

16250

16238'

91.42°

269.61°

6683.77'

10164.07'

16257'

91.91°

270.04°

6683.22'

10183.05'

16300

TD at 16,319' MD

16350

16319'

91.91°

270.04°

6681.15'

10244.97'

Avg Rate of Penetration

ROPA

feet per hr

PCG Gamma Ray

PGRC

api

Depth
ft

Depth

Inc.

Azi.

TVD

V.S.

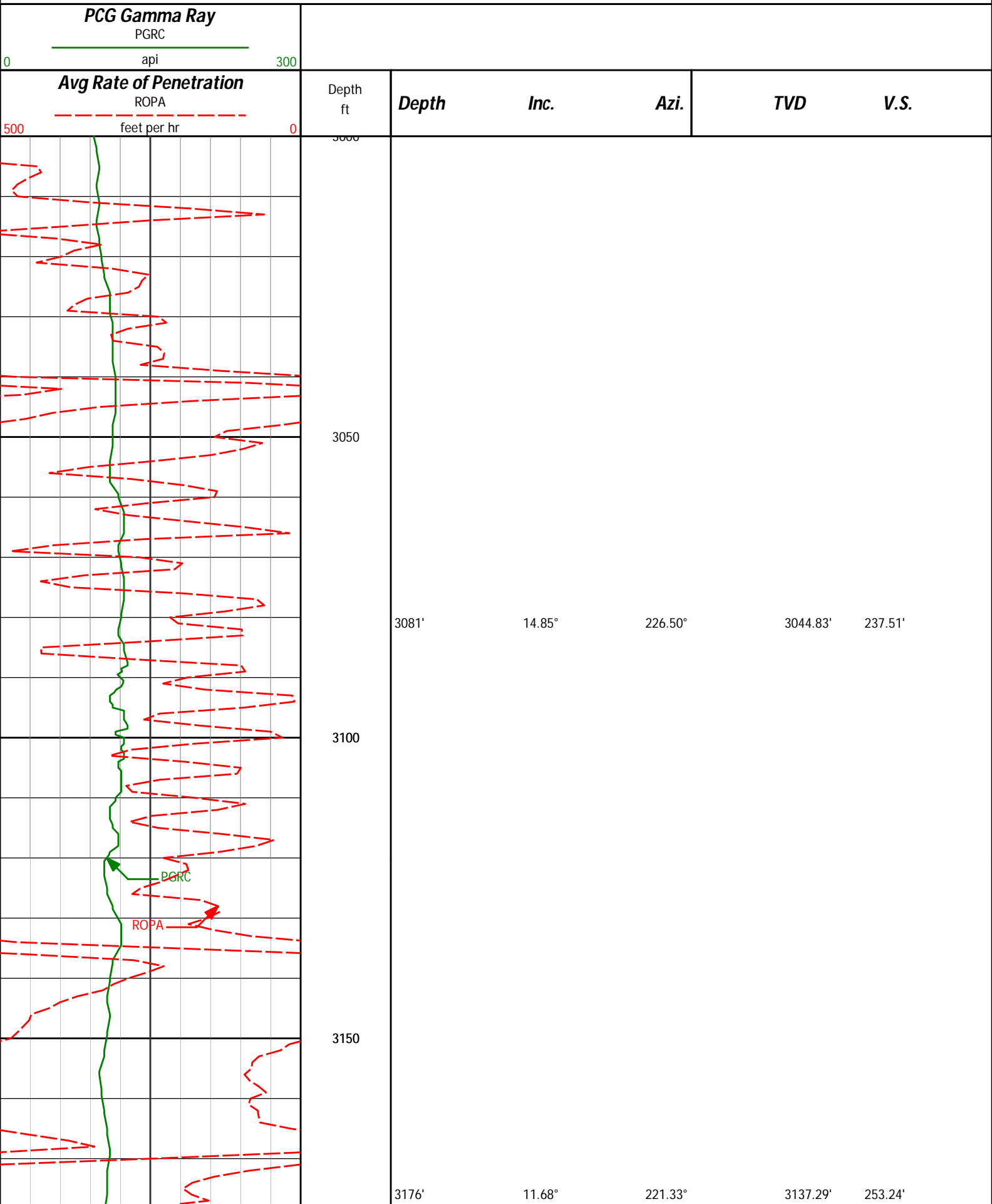
HALLIBURTON

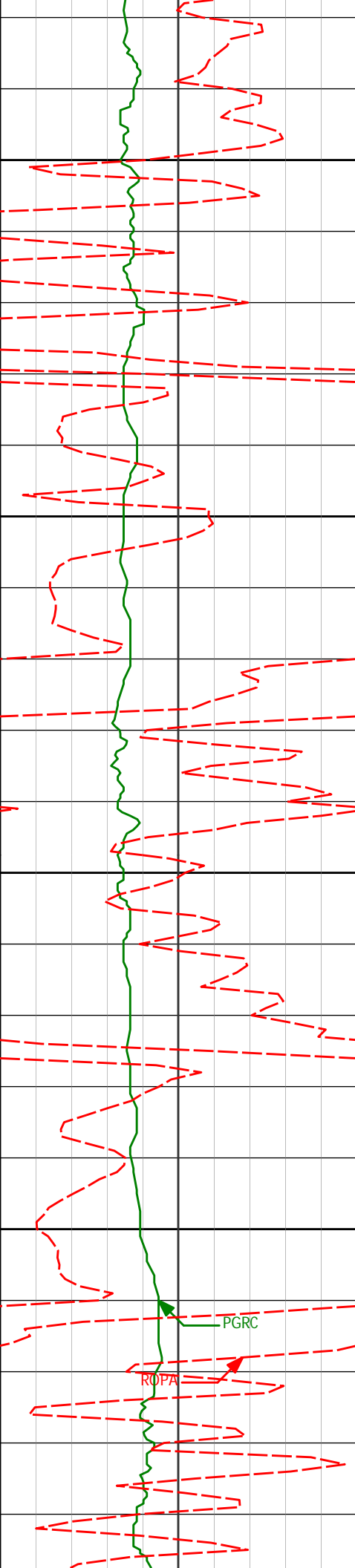
Sperry Drilling Services

MD Detail Log 1-240

MD Detail Log 1:240

Noble Energy
Wells Ranch State USX AA16-64-1HNL
H&P 343
T6N-R63W





3200

3250

3300

3350

3271'

9.39°

226.99°

3230.68'

265.70'

3366'

4.79°

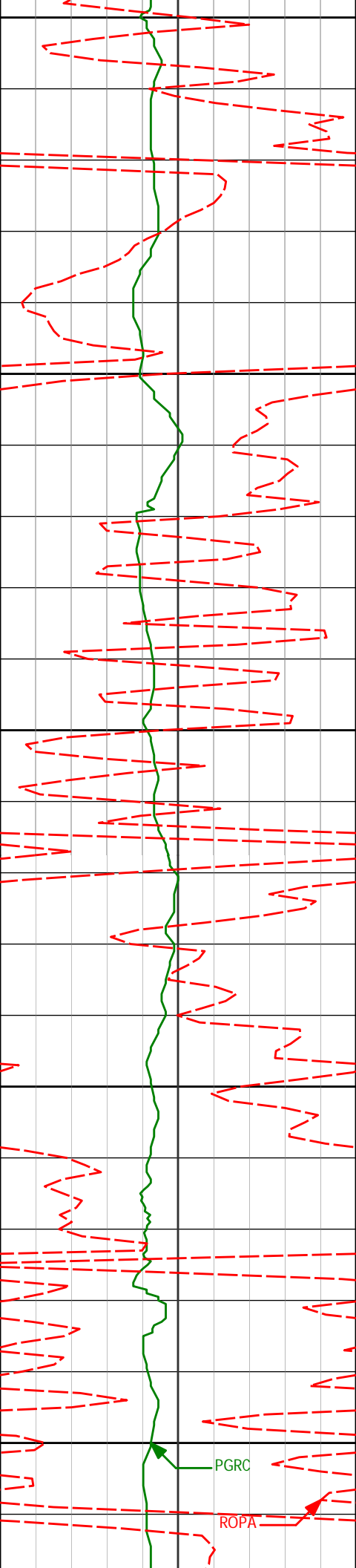
237.50°

3324.93'

274.98'

PGRC

ROPA



3400

3450

3500

3550

3600

3461'

1.70°

239.20°

3419.77'

279.64'

3556'

1.74°

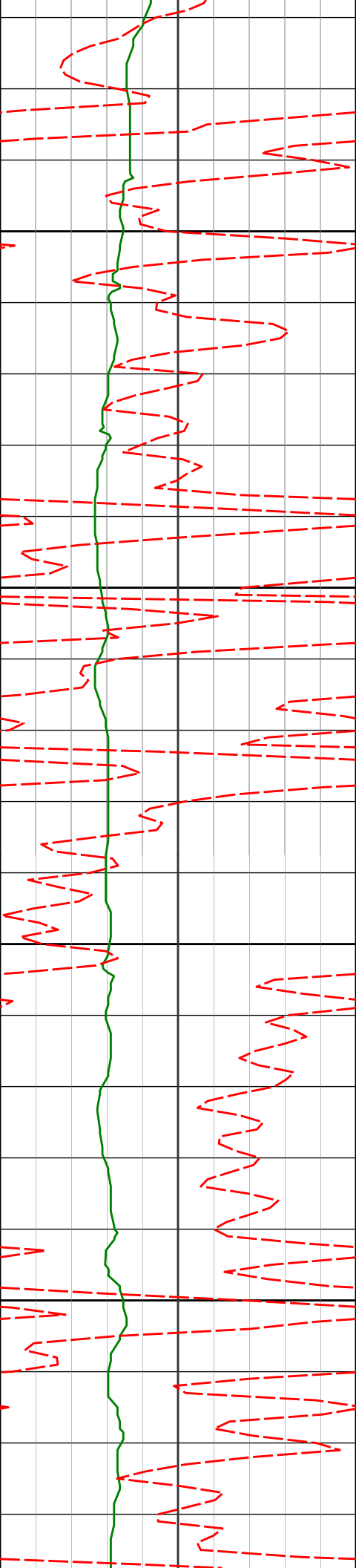
228.78°

3514.73'

281.99'

PGRC

ROPA



3650

3651'

0.68°

90.38°

3609.72'

282.55'

3700

3750

3746'

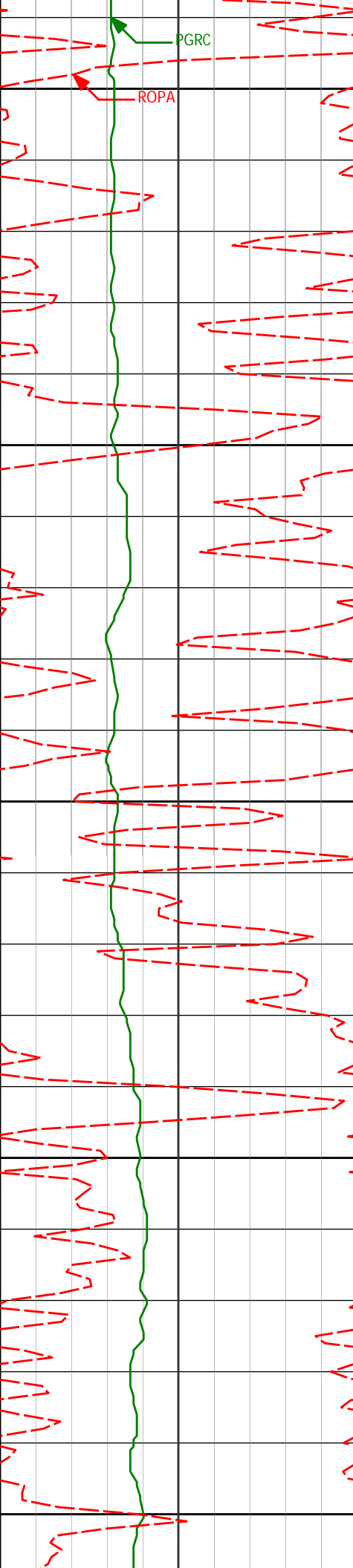
0.93°

109.87°

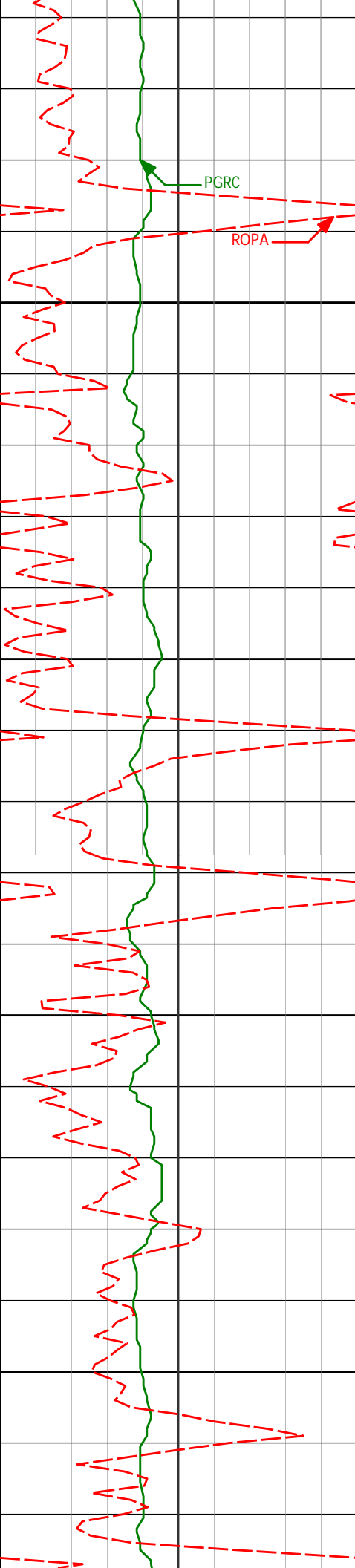
3704.71'

281.27'

3800



3841'	0.70°	80.99°	3799.70'	279.98'
3850				
3900				
3936'	1.23°	93.87°	3894.68'	278.39'
3950				
4000				
4031'	1.31°	92.72°	3989.66'	276.29'
4050				



4100

4126'

0.53°

118.49°

4084.65'

274.83'

4150

4200

4221'

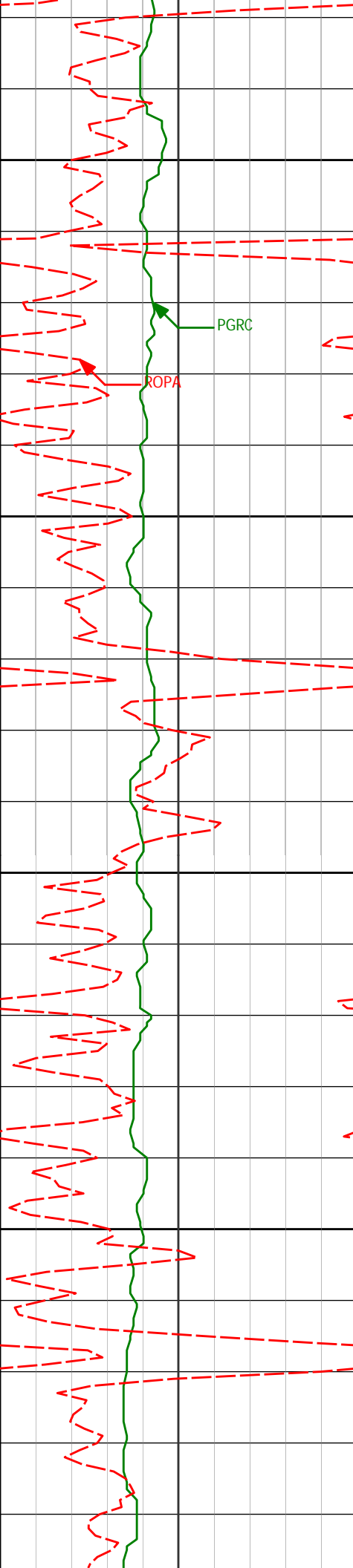
0.26°

98.90°

4179.64'

274.24'

4250



4300

4350

4400

4450

4316'

0.60°

179.78°

4274.64'

274.05'

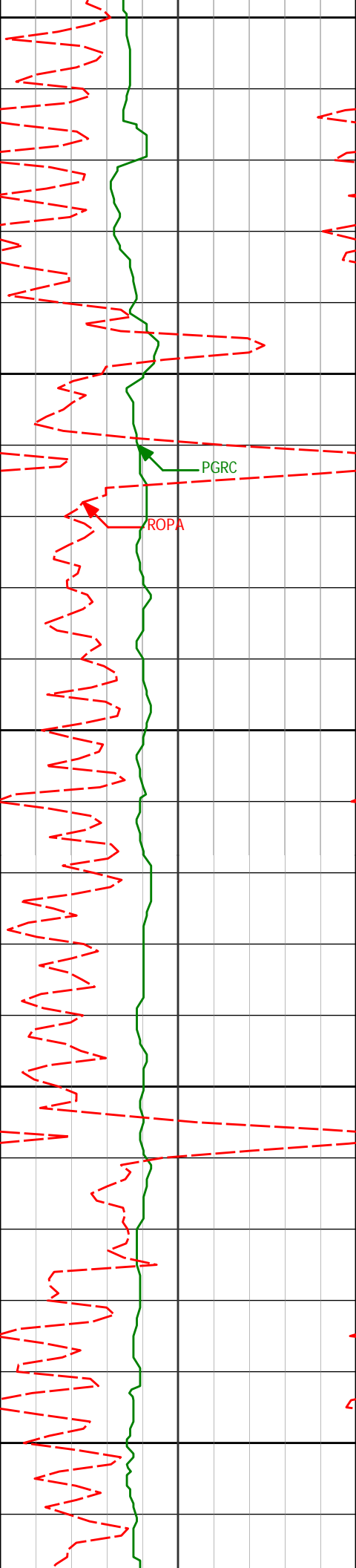
4411'

0.48°

200.91°

4369.64'

274.22'



4500

4506'

0.94°

189.70°

4464.63'

274.53'

4550

PGRC

ROPA

4600

4601'

0.96°

195.79°

4559.62'

274.93'

4650

4700

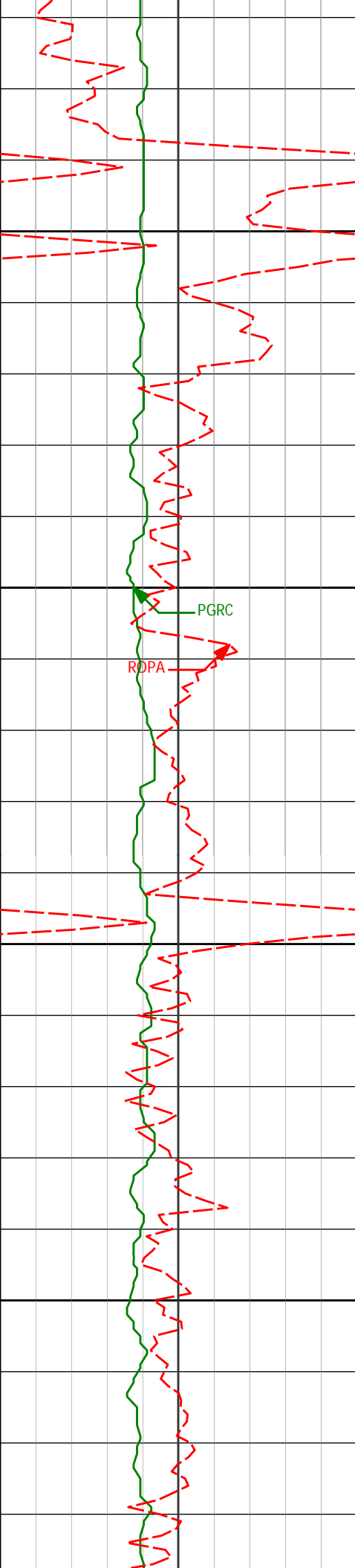
4696'

0.28°

206.56°

4654.61'

275.29'



4750

4800

4850

4900

4791'

0.38°

218.34°

4749.61'

275.60'

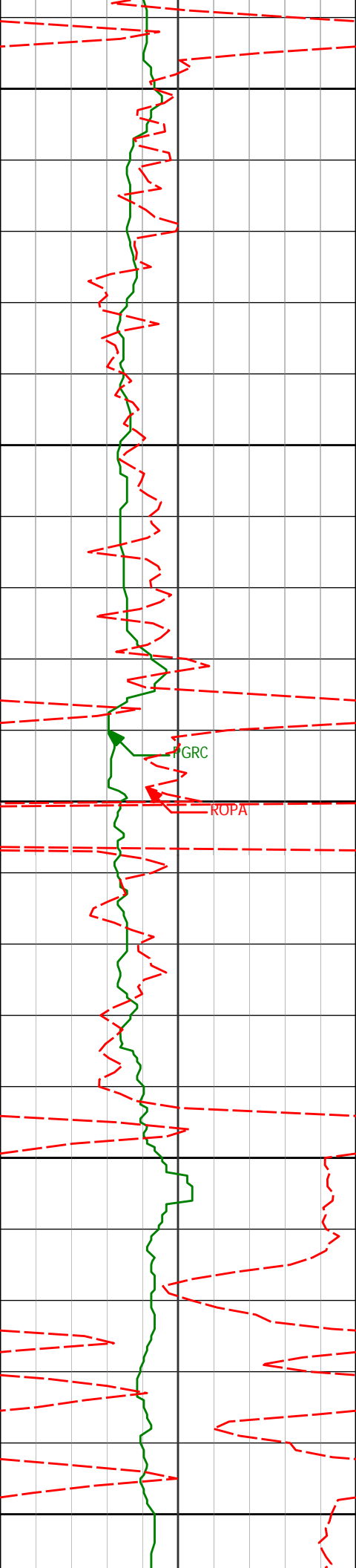
4886'

0.31°

128.80°

4844.61'

275.61'



4950

4981'

0.54°

196.65°

4939.61'

275.56'

5000

5050

GRC

ROPA

5076'

1.24°

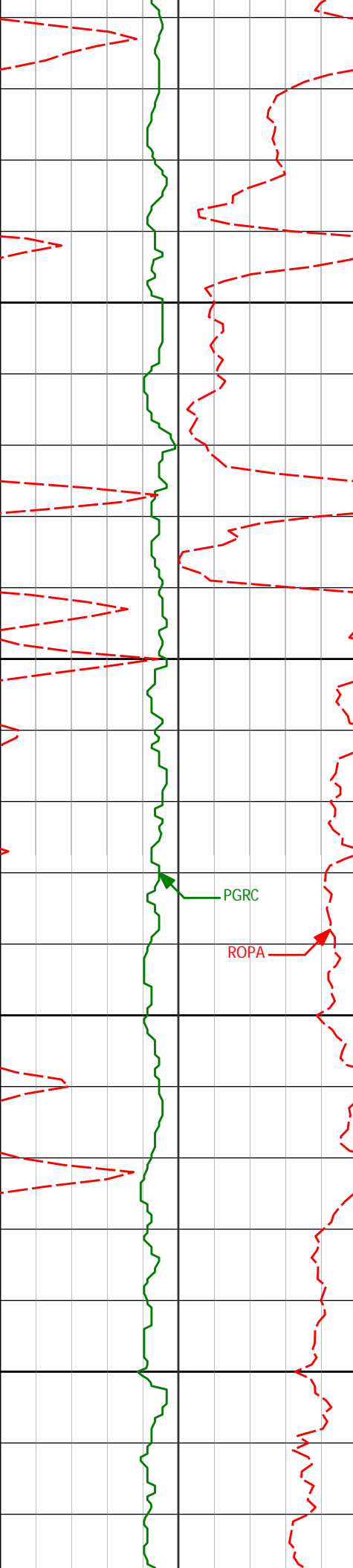
210.92°

5034.59'

276.27'

5100

5150



5200

5250

5300

5350

PGRC

ROPA

5171'

1.22°

212.49°

5129.57'

277.40'

5266'

0.84°

202.04°

5224.56'

278.26'

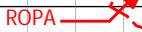
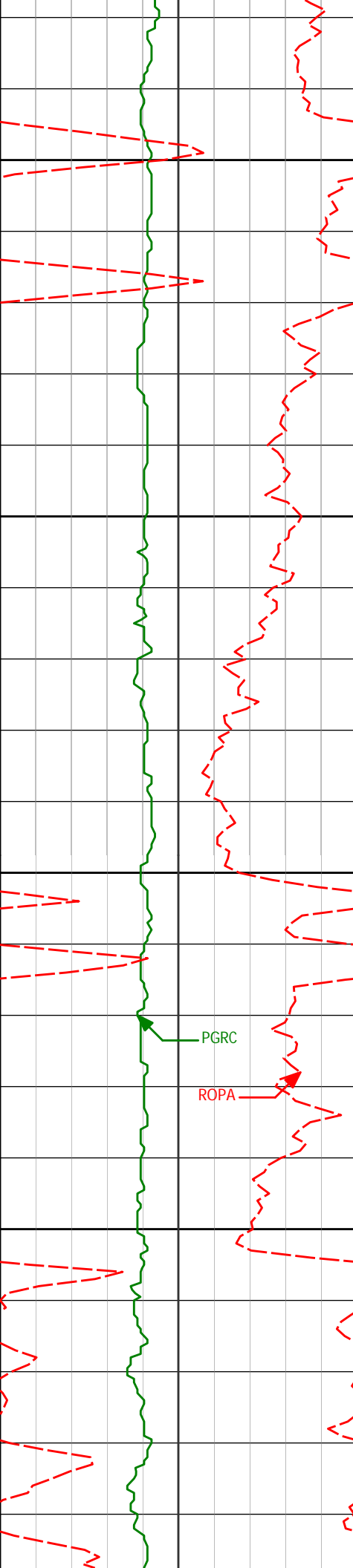
5361'

0.86°

203.65°

5319.55'

278.85'

54005450550055505456'

0.86°

238.35°

5414.54'

279.78'

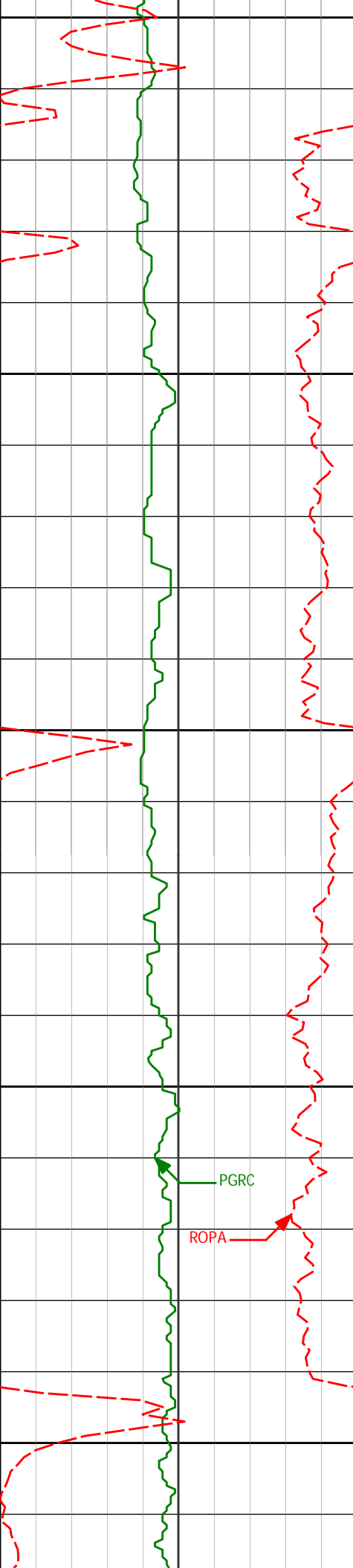
5551'

1.20°

235.51°

5509.52'

281.24'



5600

5650

5700

5750

5800

5646'

0.96°

246.94°

5604.50'

282.82'

5741'

0.71°

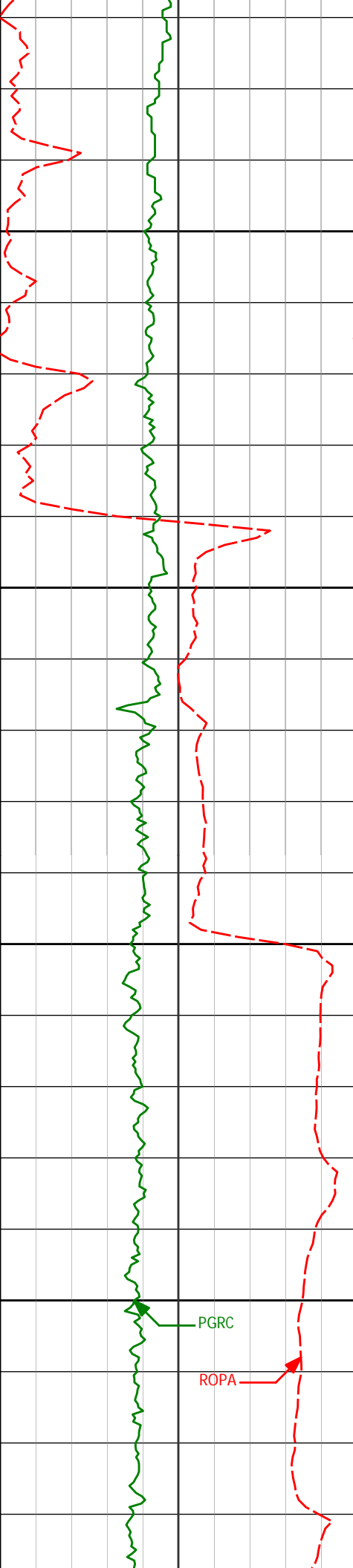
234.43°

5699.49'

284.06'

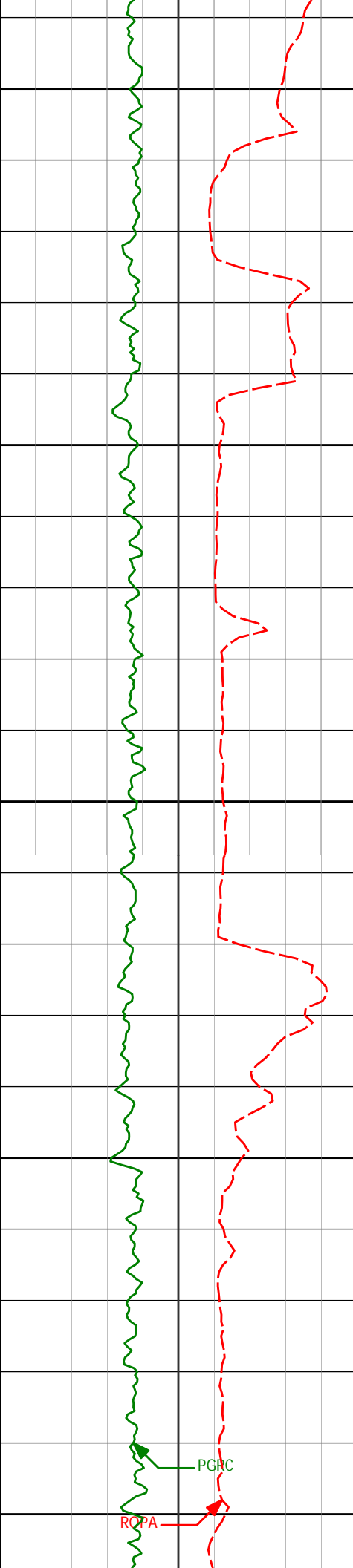
PGRC

ROPA



<Run 200>

5836'	0.88°	232.35°	5794.49'	285.14'
5850				
5900				
5928'	1.28°	249.30°	5886.47'	286.69'
5950				
5976'	4.61°	257.83°	5934.40'	289.10'
6000				
6023'	9.63°	263.11°	5981.02'	294.88'



6050

6071'

13.42°

265.36°

6028.05'

304.45'

6100

6118'

14.06°

266.96°

6073.70'

315.60'

6150

6200

6213'

17.10°

267.09°

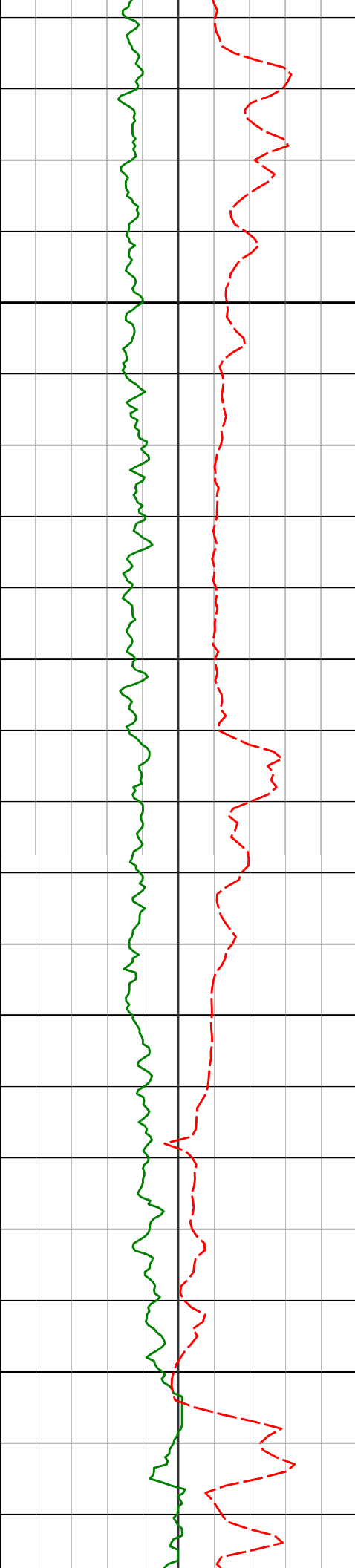
6165.20'

341.11'

6250

PGRC

ROPA



6300

6308'

26.42°

261.99°

6253.34'

376.18'

6350

6400

6403'

37.62°

267.44°

6333.78'

426.36'

6450

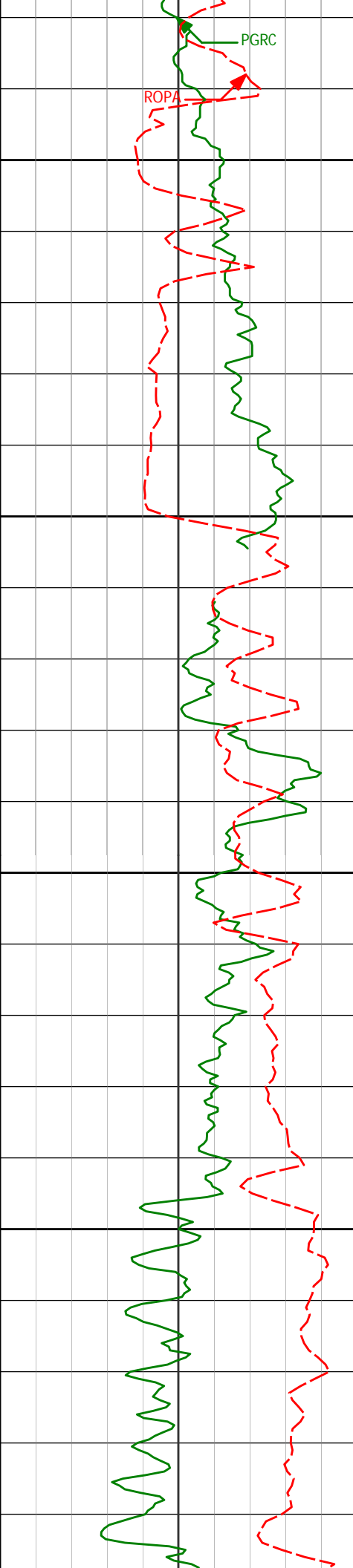
6451'

44.03°

270.83°

6370.08'

457.71'



6500

6550

6600

6650

6498'

45.70°

269.38°

6403.40'

490.84'

6546'

46.41°

268.81°

6436.71'

525.39'

6593'

49.61°

267.11°

6468.15'

560.32'

6641'

55.13°

265.20°

6497.44'

598.30'

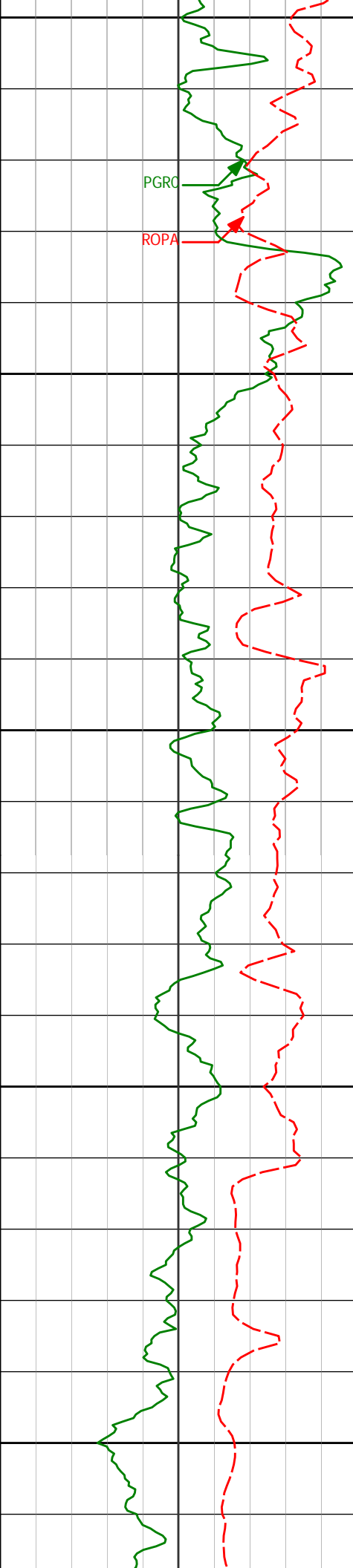
6688'

58.94°

264.97°

6523.01'

637.67'



6700

6736'

63.06°

264.82°

6546.28'

679.59'

6750

6783'

68.51°

265.72°

6565.55'

722.39'

6800

6831'

74.65°

268.17°

6580.71'

767.90'

6850

6878'

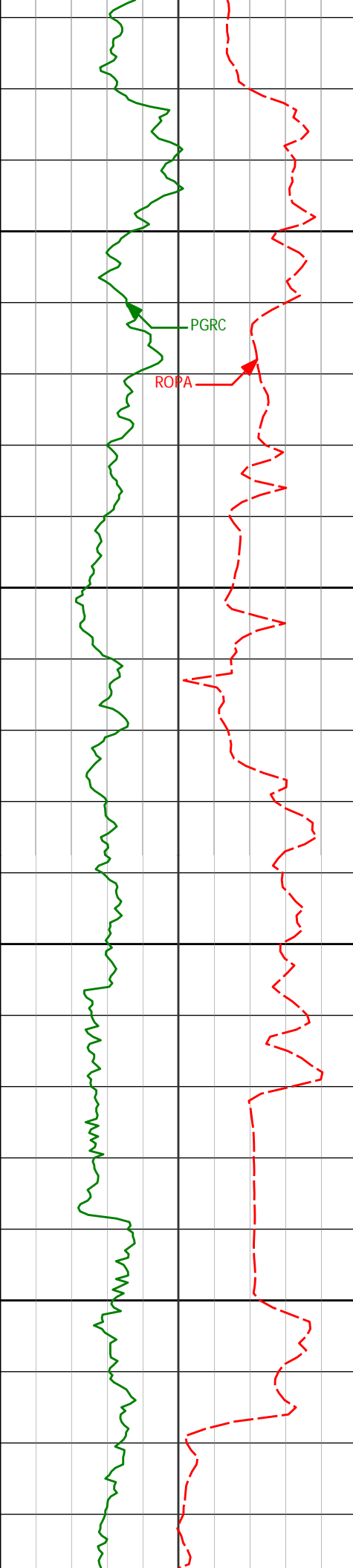
77.61°

268.58°

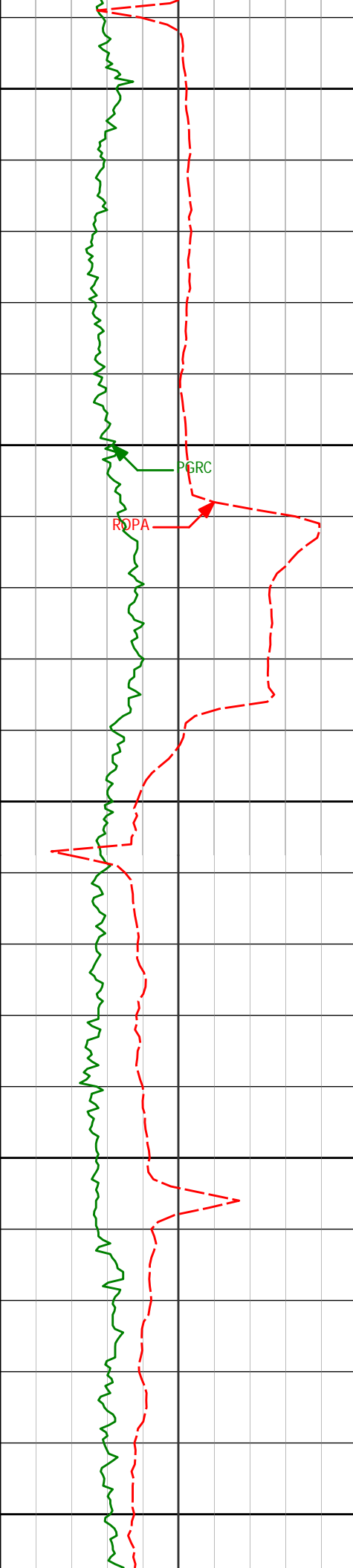
6591.98'

813.52'

6900



6926'	79.27°	268.18°	6601.60'	860.54'
6950				
6973'	82.43°	268.18°	6609.07'	906.94'
7000				
7048'	87.81°	269.24°	6615.45'	981.63'
7100				
Casing Set @ 7,092'				
<Run 300>				



7150

7200

7250

7300

7350

7148'

90.59°

270.12°

6616.84'

1081.56'

7243'

88.27°

268.65°

6617.79'

1176.52'

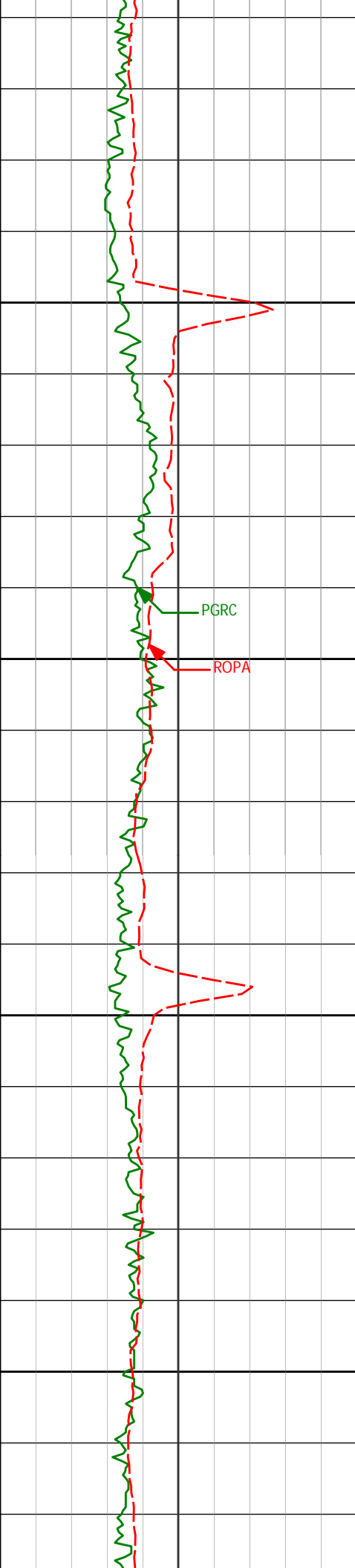
7338'

88.67°

268.59°

6620.32'

1271.48'



7400

7433'

88.86°

268.53°

6622.37'

1366.45'

PGRC

ROPA

7450

7500

7528'

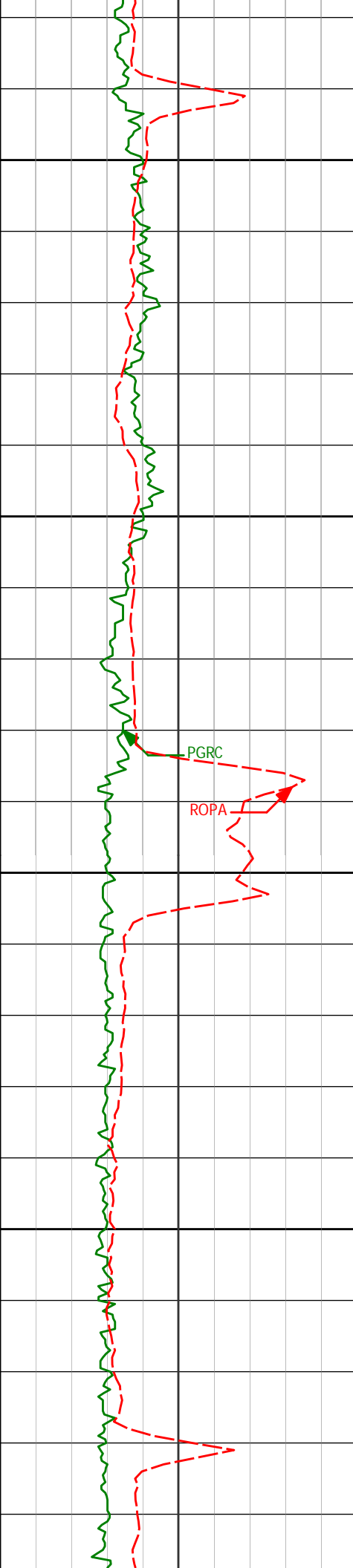
89.60°

268.75°

6623.65'

1461.44'

7550



7600

7623'

90.55°

269.11°

6623.52'

1556.42'

7650

7700

7718'

89.20°

268.43°

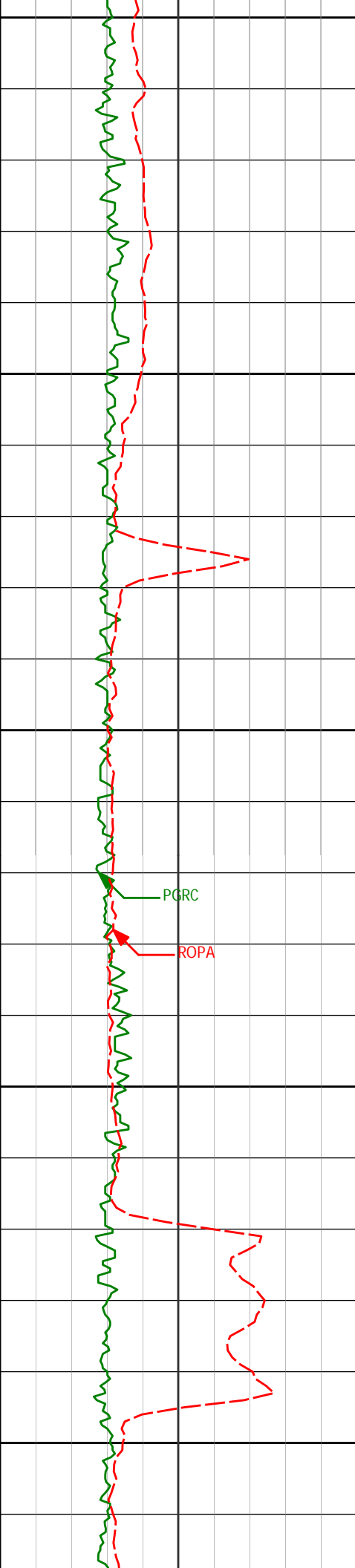
6623.73'

1651.41'

7750

PGRC

ROPA



7800

7813'

89.57°

268.09°

6624.75'

1746.40'

7850

7900

7908'

89.41°

267.58°

6625.60'

1841.40'

7950

8000

8003'

88.58°

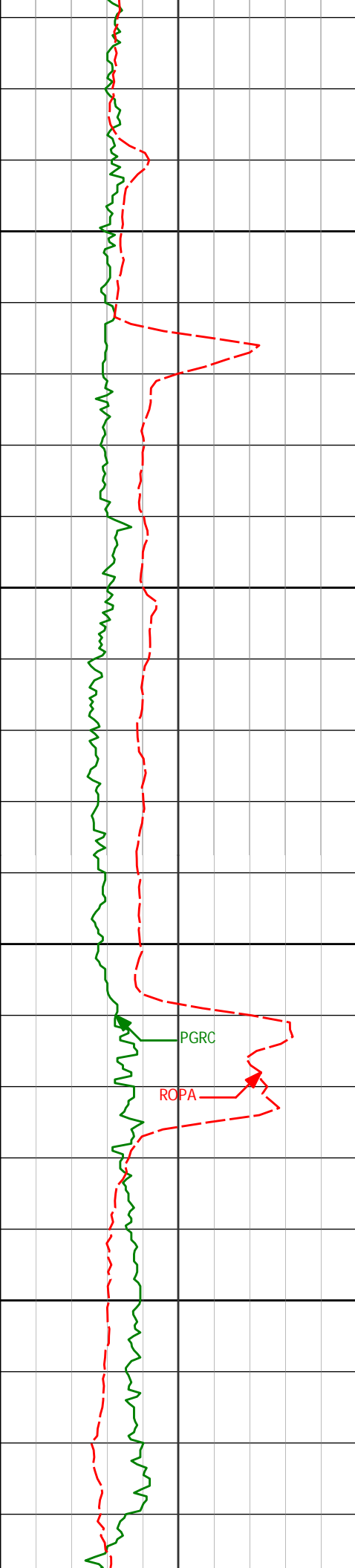
270.41°

6627.26'

1936.35'

PGRC

ROPA



8050

8100

8150

8200

8098'

89.85°

270.64°

6628.56'

2031.25'

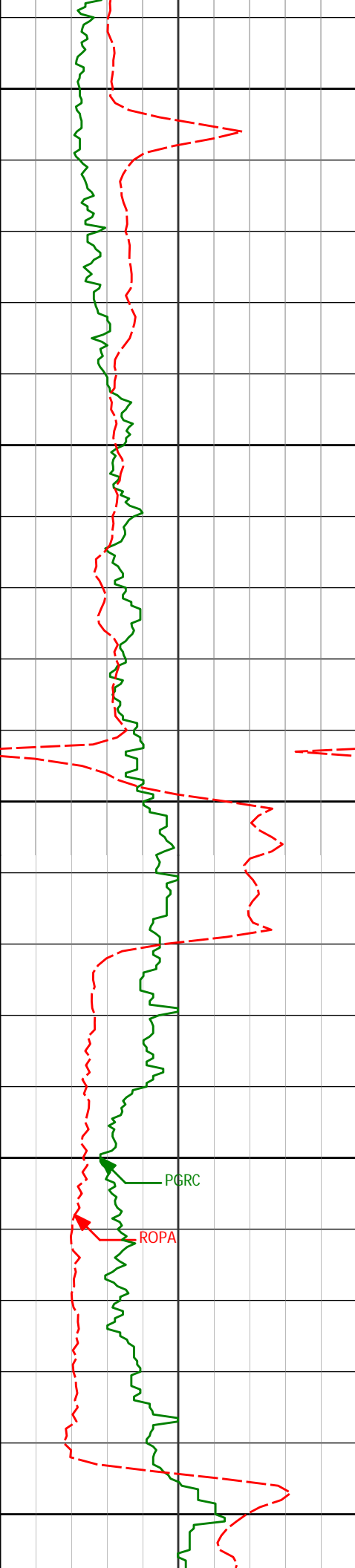
8193'

89.66°

270.08°

6628.97'

2126.16'



8250

8288'

90.62°

269.85°

6628.74'

2221.10'

8300

8350

8383'

90.06°

271.64°

6628.18'

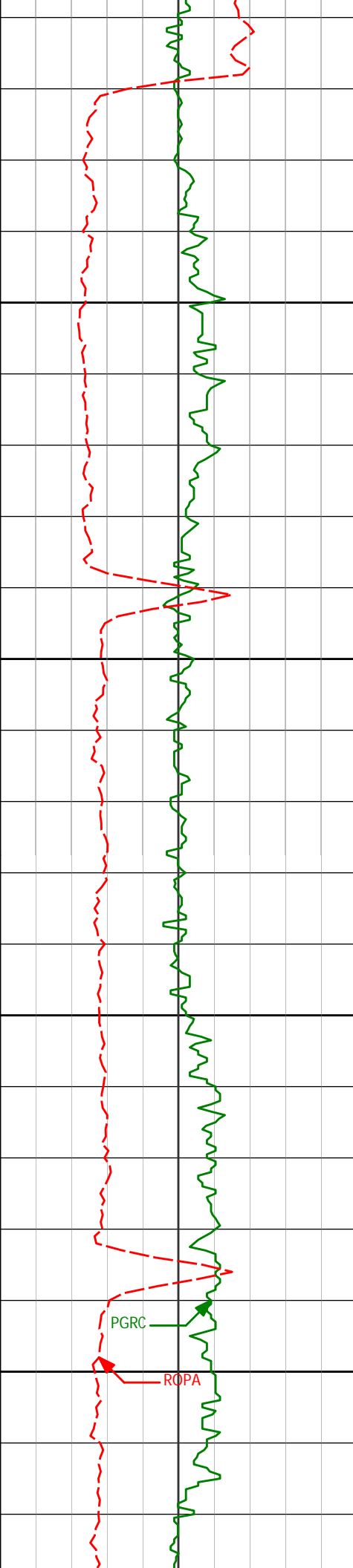
2315.98'

8400

PGRC

ROPA

8450



8478' 88.37° 271.19° 6629.48' 2410.79'

8500

8550

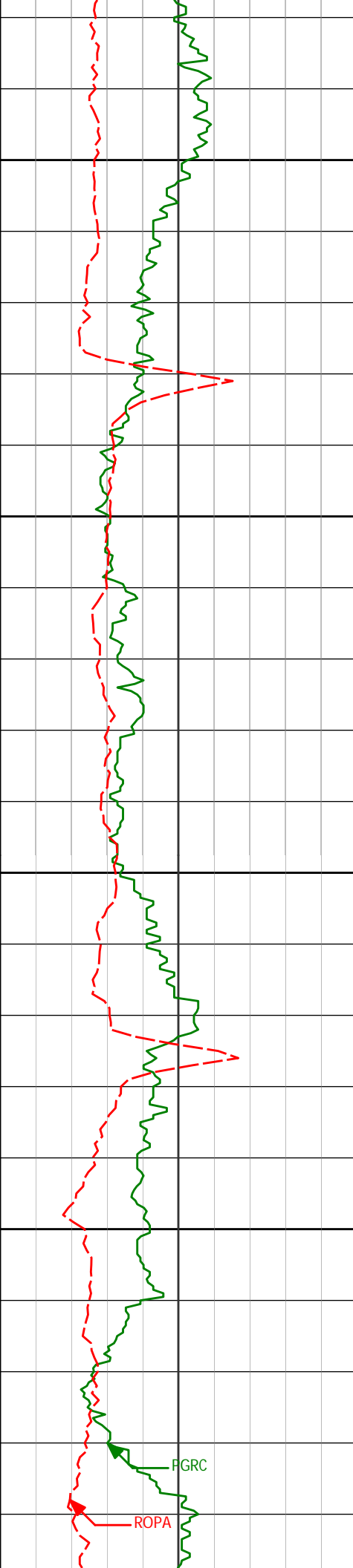
8573' 88.00° 270.54° 6632.49' 2505.62'

8600

PGRC
ROPA

8650

8668' 88.67° 270.71° 6635.25' 2600.48'



8700

8750

8800

8850

8763'

89.35°

270.95°

6636.89'

2695.34'

8858'

90.31°

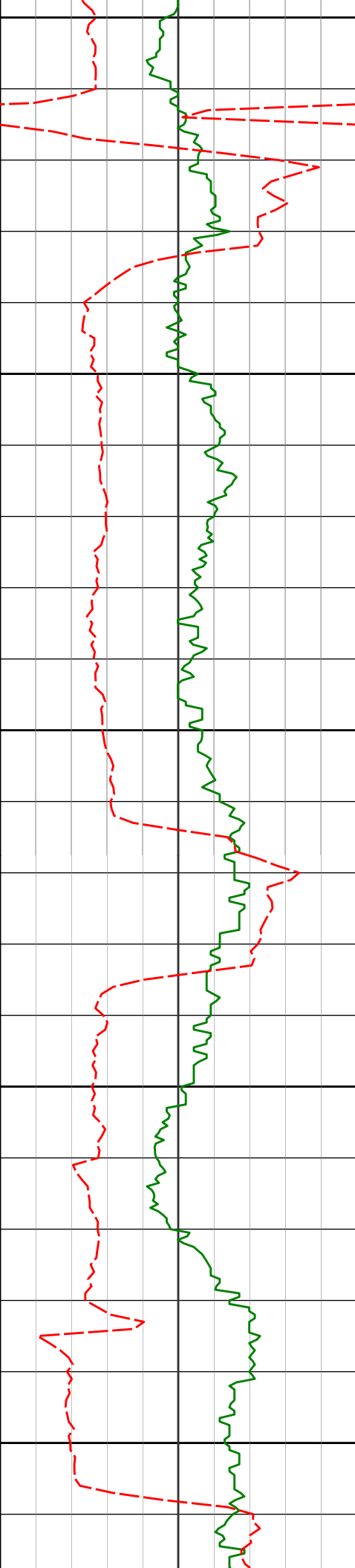
270.79°

6637.17'

2790.21'

FGRC

ROPA



8900

8950

9000

9050

9100

8953'

90.83°

269.46°

6636.22'

2885.14'

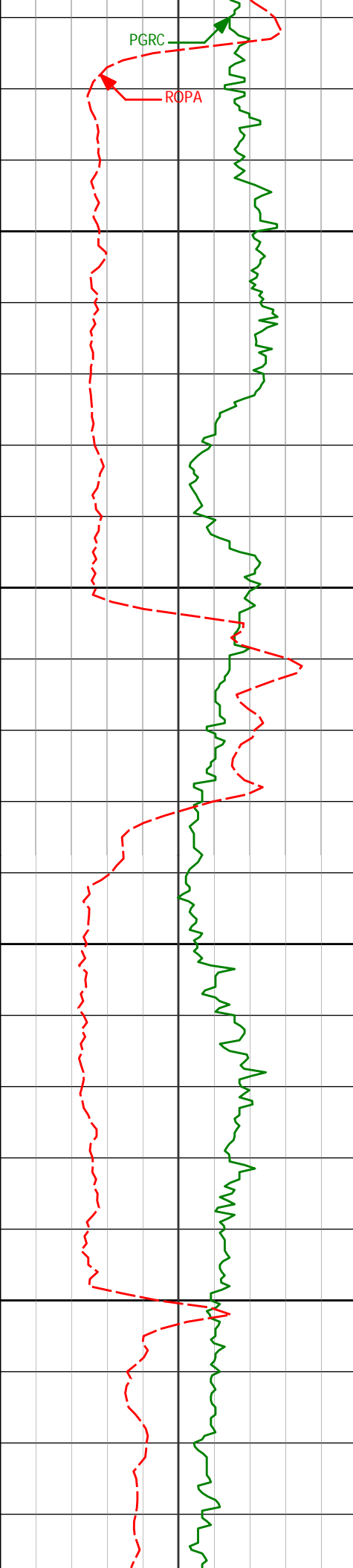
9048'

90.12°

269.99°

6635.44'

2980.09'



9143'	90.22°	268.78°	6635.15'	3075.06'
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9150

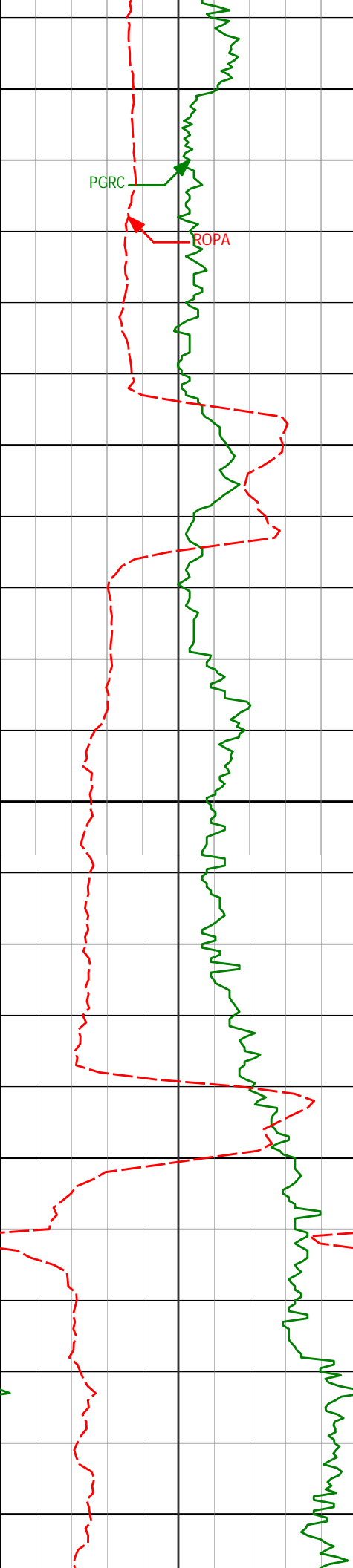
9200

9238'	88.77°	269.84°	6635.99'	3170.02'
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9250

9300

9333'	90.31°	269.96°	6636.75'	3264.96'
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9350

9400

9450

9500

9550

9428'

89.63°

269.55°

6636.80'

3359.91'

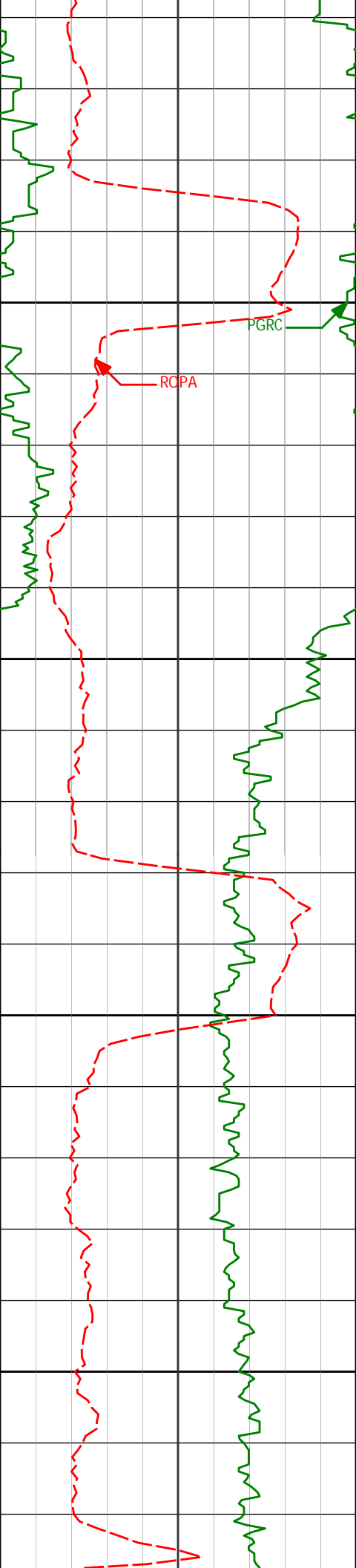
9523'

90.18°

269.47°

6636.96'

3454.87'



9600

9650

9700

9750

9618'

89.88°

268.85°

6636.91'

3549.85'

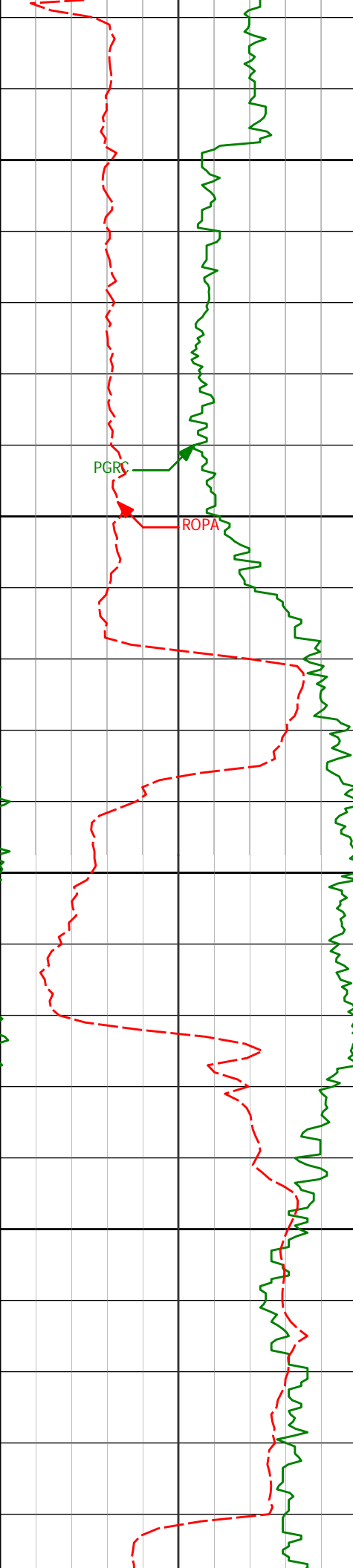
9713'

88.86°

269.71°

6637.96'

3644.82'



9800

9807'

89.85°

269.58°

6639.02'

3738.77'

9850

PGR

ROPA

9900

9902'

90.40°

270.04°

6638.81'

3833.72'

9950

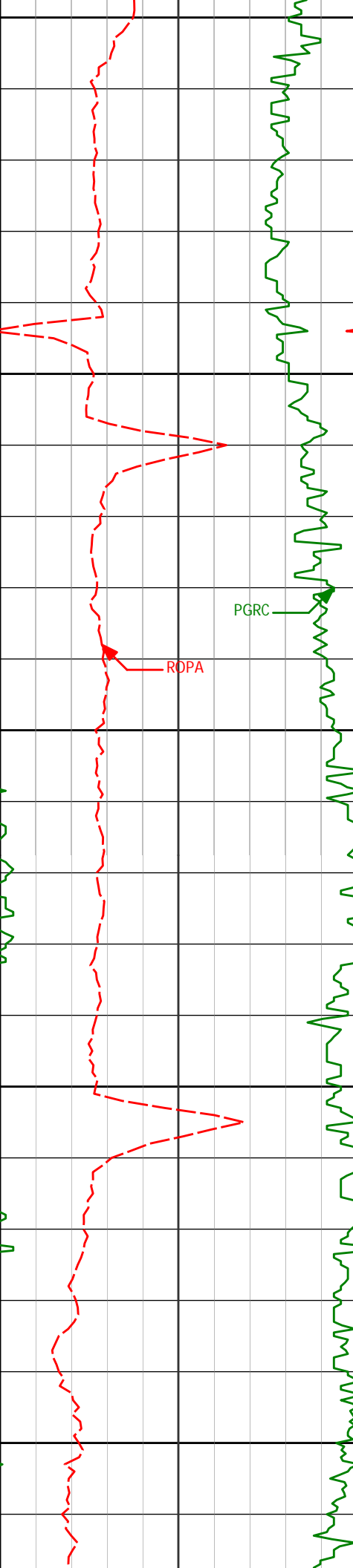
9997'

88.00°

269.08°

6640.13'

3928.66'



10000

10050

10100

10150

10200

PGRC

ROPA

10092'

88.43°

268.64°

6643.09'

4023.60'

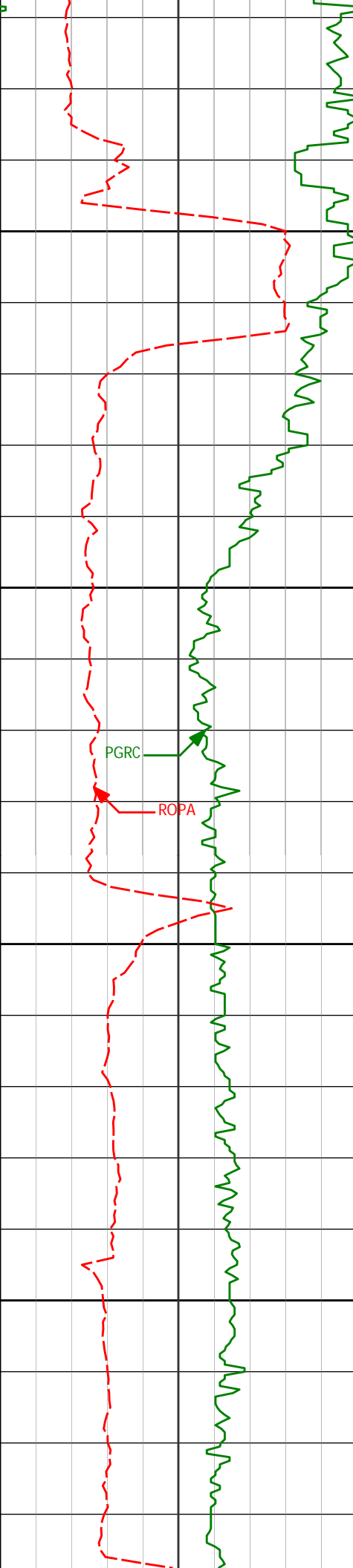
10187'

90.06°

271.02°

6644.35'

4118.53'



10250

10282'

87.81°

269.60°

6646.11'

4213.43'

10300

10350

10377'

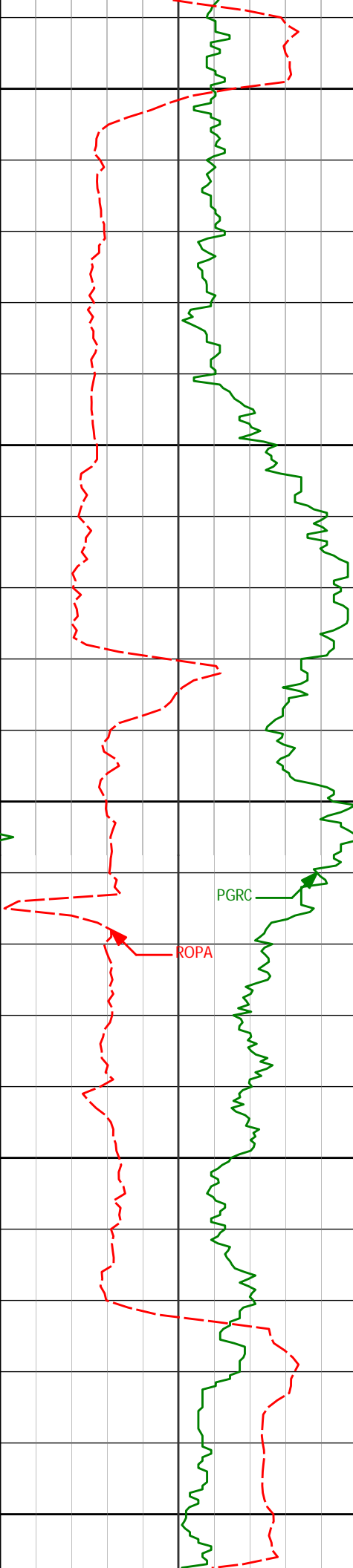
88.24°

270.14°

6649.39'

4308.32'

10400



10450

10469'

90.83°

271.14°

6650.13'

4400.20'

10500

10550

10563'

92.40°

271.17°

6647.48'

4494.02'

10600

10650

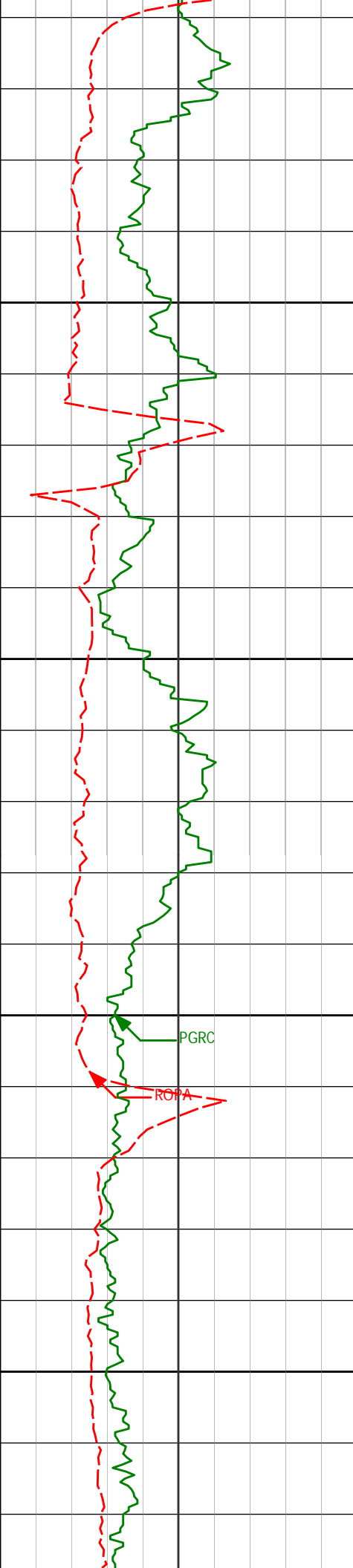
10656'

89.41°

269.18°

6646.01'

4586.92'



10700

10750

10800

10850

10749'

88.98°

268.79°

6647.32'

4679.89'

10841'

89.82°

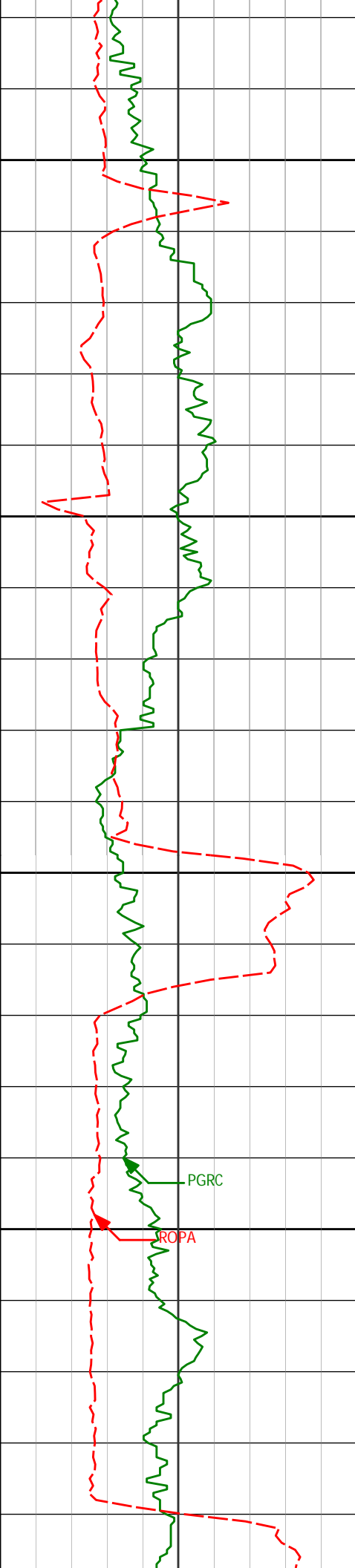
268.66°

6648.28'

4771.88'

PGRC

ROMA



10900

10935'

90.96°

268.49°

6647.64'

4865.87'

10950

11000

11028'

90.52°

268.59°

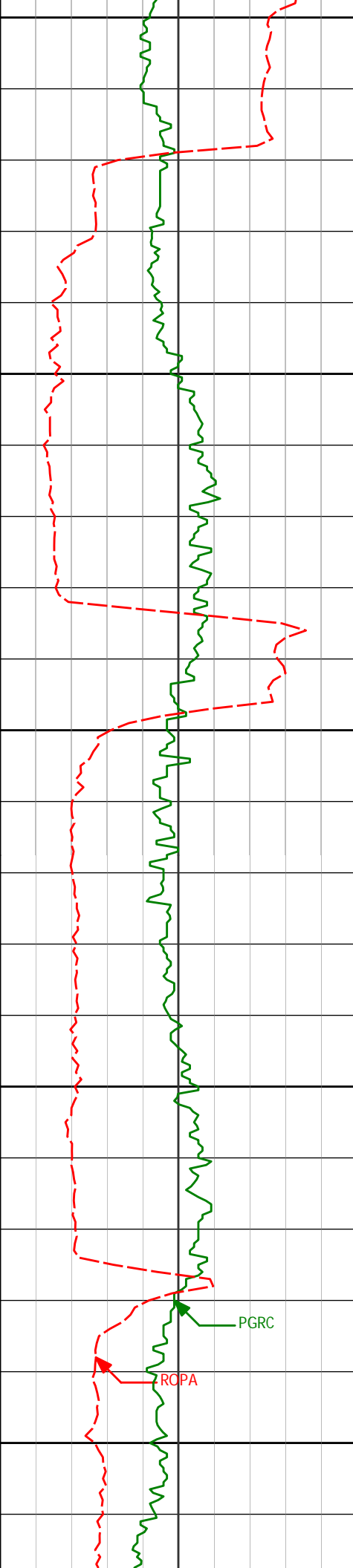
6646.44'

4958.86'

11050

PGRC

ROPA



11100

11121'

88.83°

269.49°

6646.97'

5051.83'

11150

11200

11215'

88.80°

269.92°

6648.91'

5145.77'

11250

PGRC

RCPA

11300

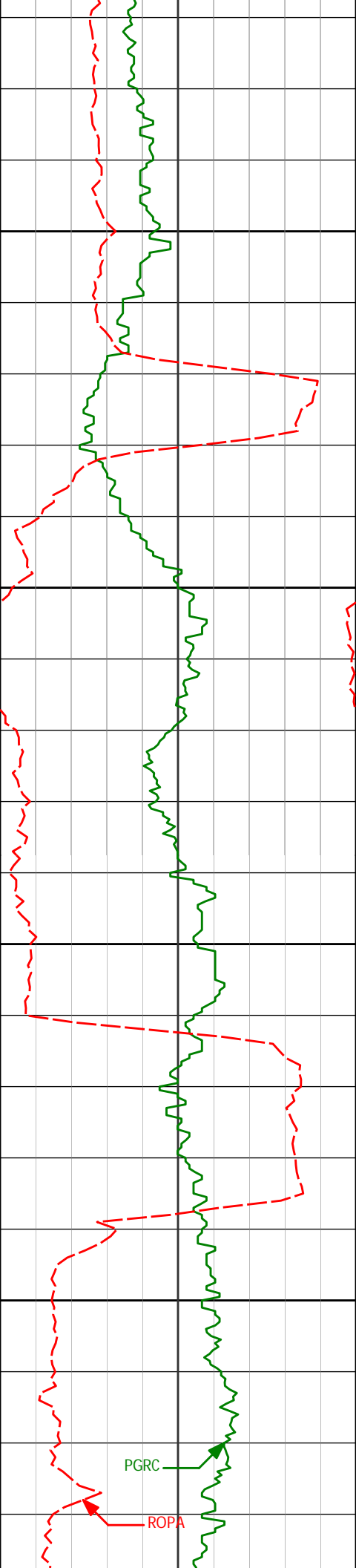
11308'

89.88°

268.91°

6649.99'

5238.73'



11350

11400

11450

11500

11402'

91.23°

269.55°

6649.08'

5332.70'

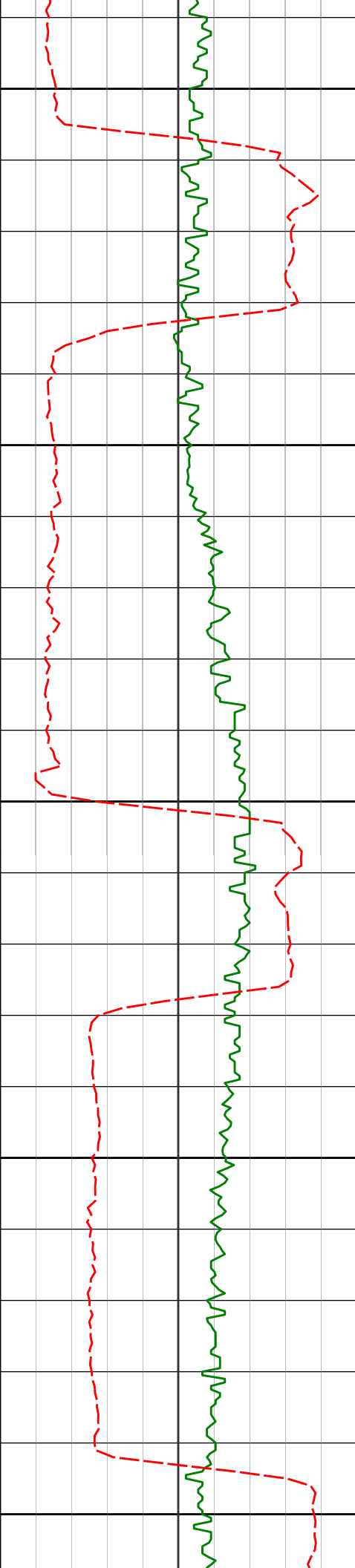
11496'

90.68°

270.03°

6647.51'

5426.63'



11550

11589'

90.52°

271.40°

6646.53'

5519.52'

11600

11650

11683'

89.51°

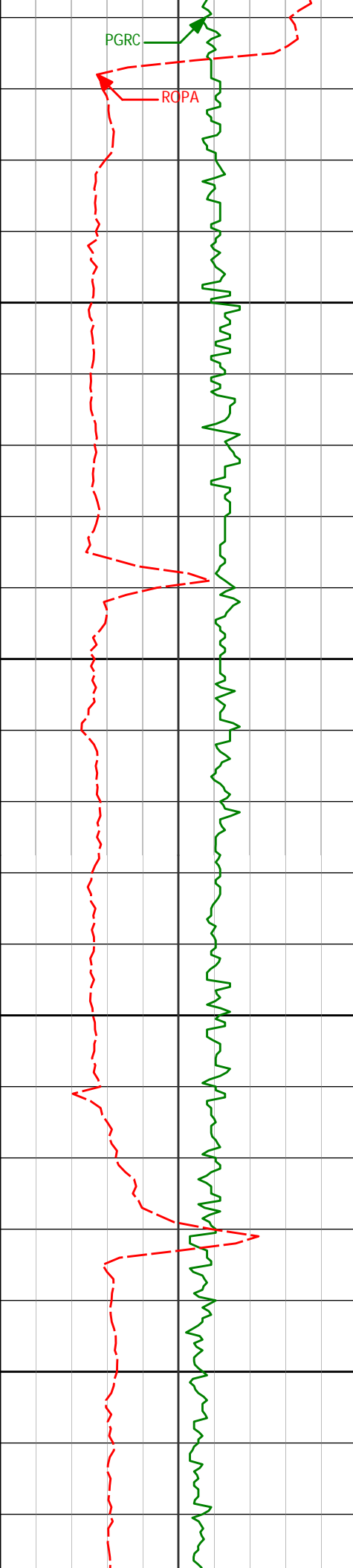
271.17°

6646.51'

5613.36'

11700

11750



11776'	88.58°	271.38°	6648.06'	5706.19'
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11800

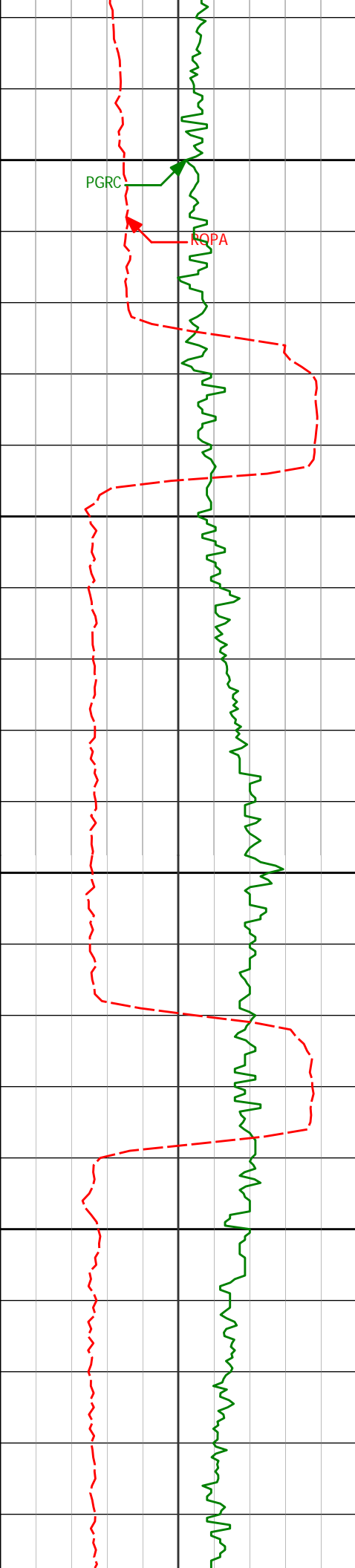
11850

11870'	89.41°	271.11°	6649.71'	5800.01'
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11900

11950

11964'	90.62°	270.80°	6649.68'	5893.88'
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12000

12050

12100

12150

12059'

89.88°

270.45°

6649.27'

5988.78'

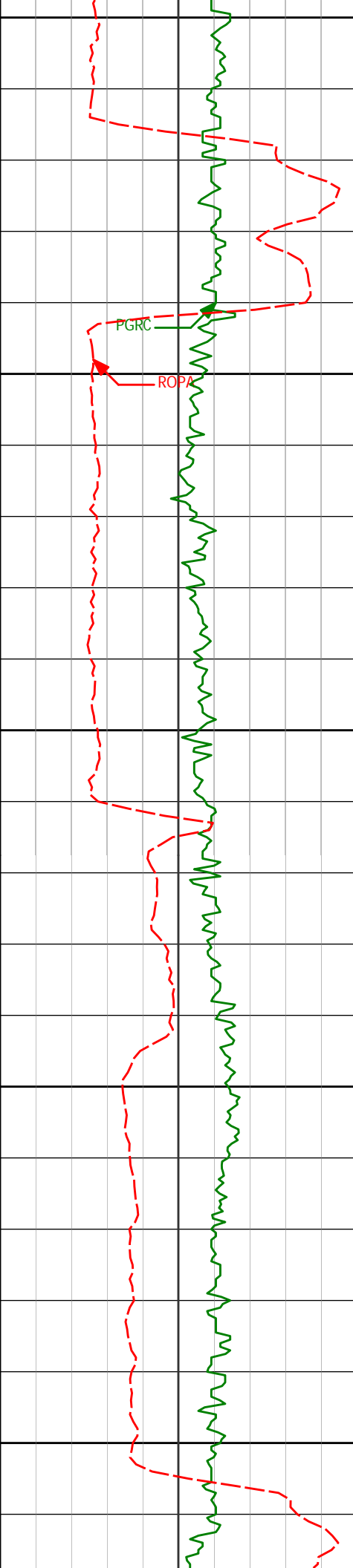
12154'

89.72°

271.71°

6649.60'

6083.63'



12200

12250

12300

12350

12400

12248'

88.77°

271.65°

6650.84'

6177.42'

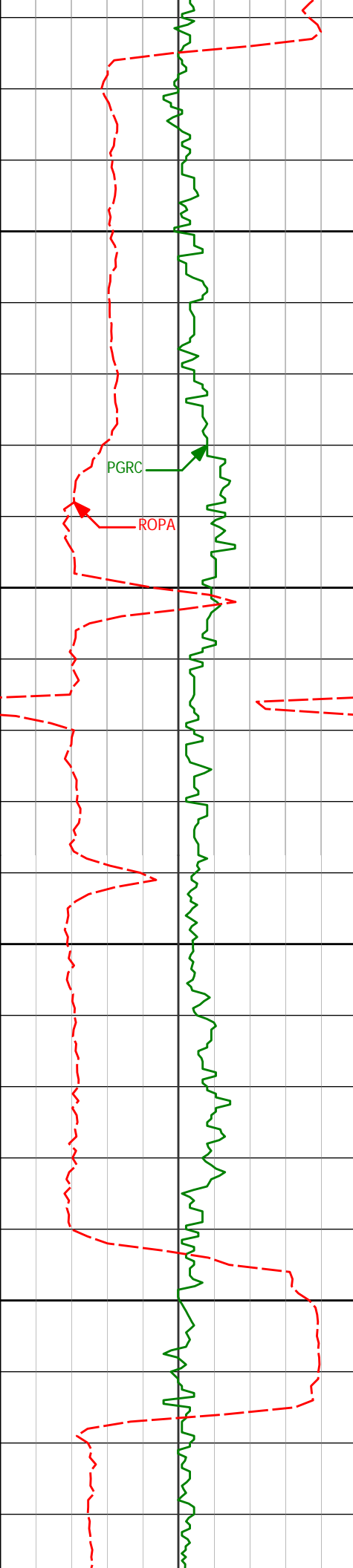
12343'

89.32°

271.74°

6652.42'

6272.20'



12438'	88.77°	270.10°	6654.01'	6367.06'
--------	--------	---------	----------	----------

12450

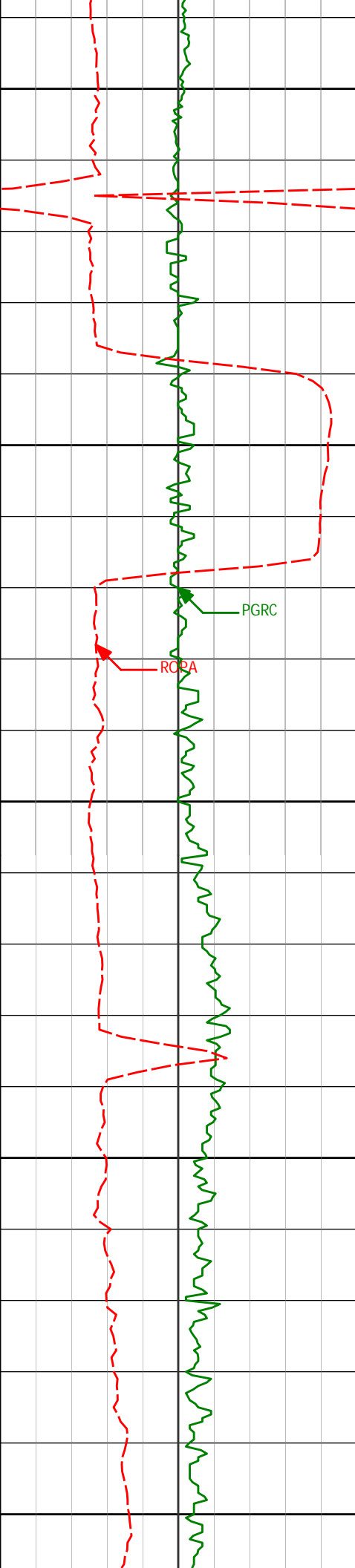
12500

12533'	89.57°	270.04°	6655.38'	6461.98'
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12550

12600

12628'	89.60°	268.87°	6656.07'	6556.94'
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12650

12700

12750

12800

12850

12723'

88.15°

270.52°

6657.94'

6651.88'

12818'

88.92°

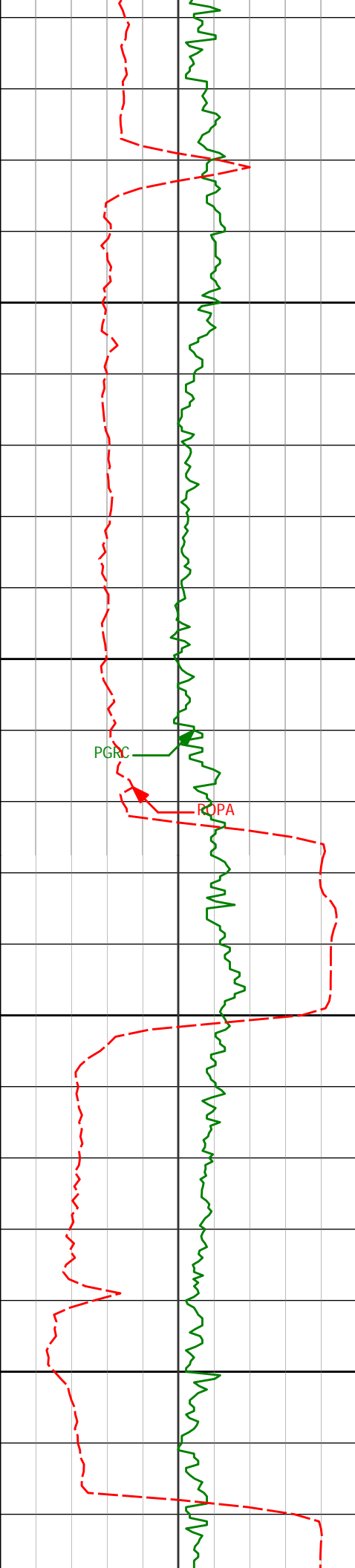
270.30°

6660.37'

6746.76'

RCPA

PGRC



12900

12913'

90.52°

270.14°

6660.83'

6841.68'

12950

PGR

PAPA

13000

13008'

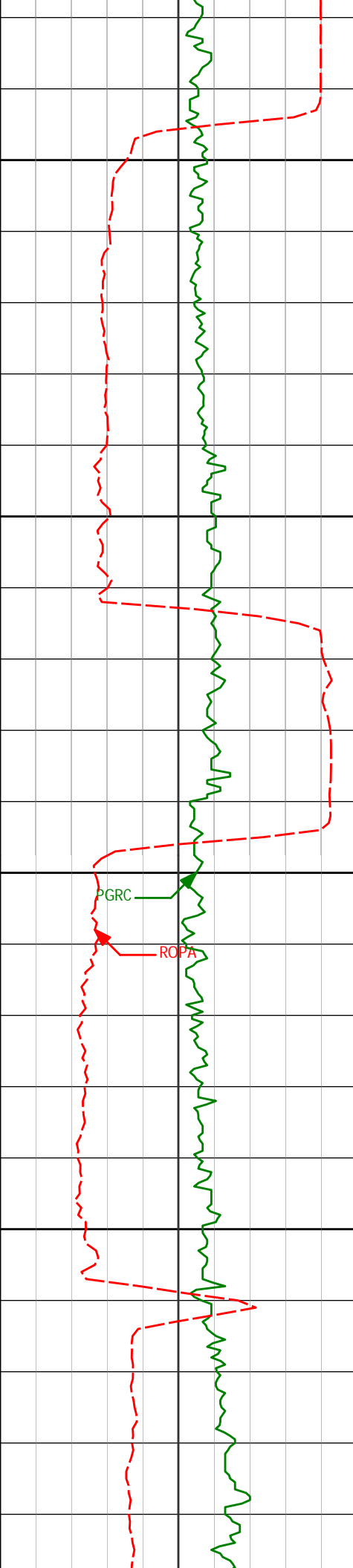
91.20°

269.01°

6659.40'

6936.62'

13050



13100

13150

13200

13250

13103'

89.97°

269.05°

6658.43'

7031.60'

13198'

88.15°

269.45°

6659.99'

7126.56'

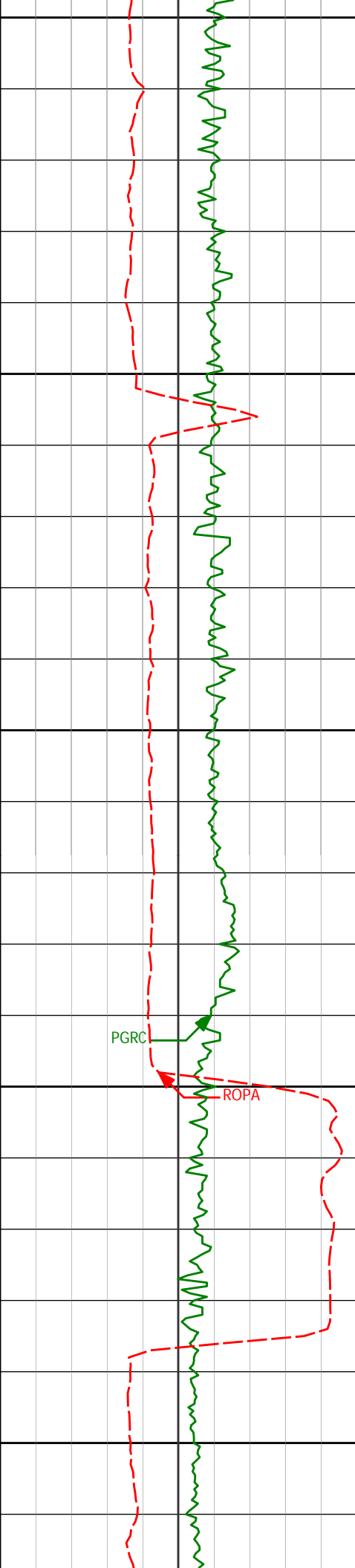
13293'

89.01°

269.55°

6662.35'

7221.49'



13300

13350

13388'

90.59°

269.42°

6662.68'

7316.46'

13400

PGRC

ROPA

13450

13483'

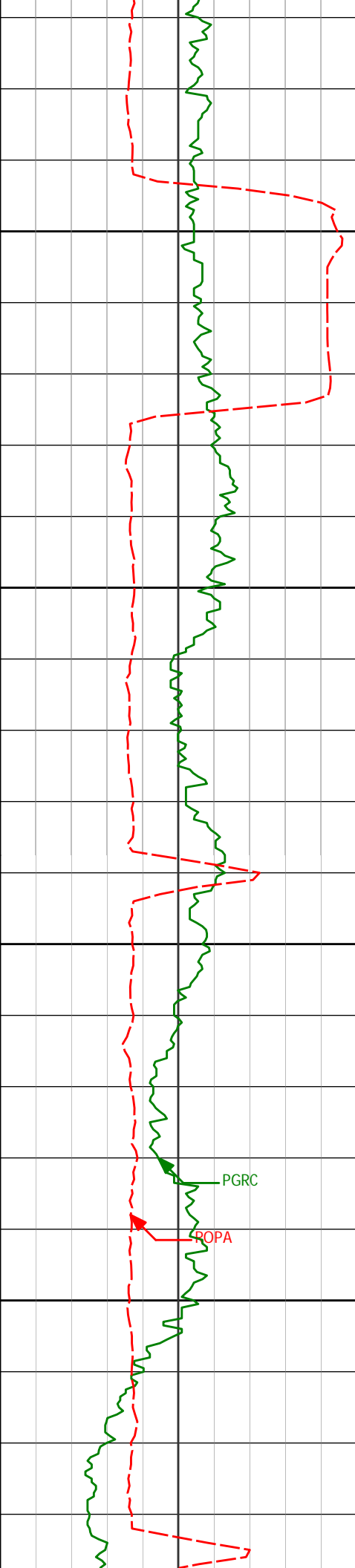
90.03°

269.69°

6662.16'

7411.42'

13500



13550

13600

13650

13700

13578'

86.88°

270.44°

6664.73'

7506.30'

13673'

87.35°

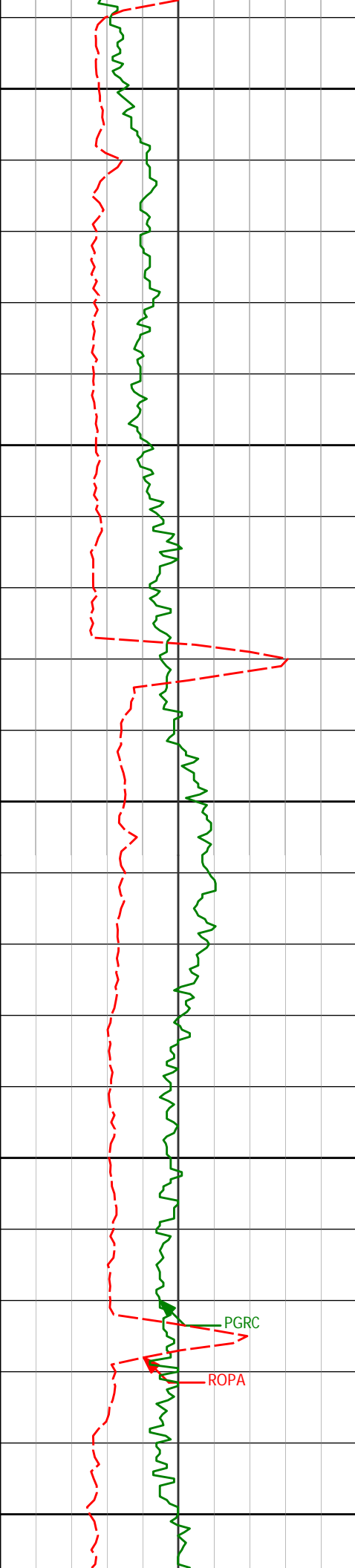
270.32°

6669.51'

7601.10'

PGRC

POPA



13750

13768'

88.15°

269.96°

6673.24'

7695.95'

13800

13850

13863'

89.23°

269.75°

6675.41'

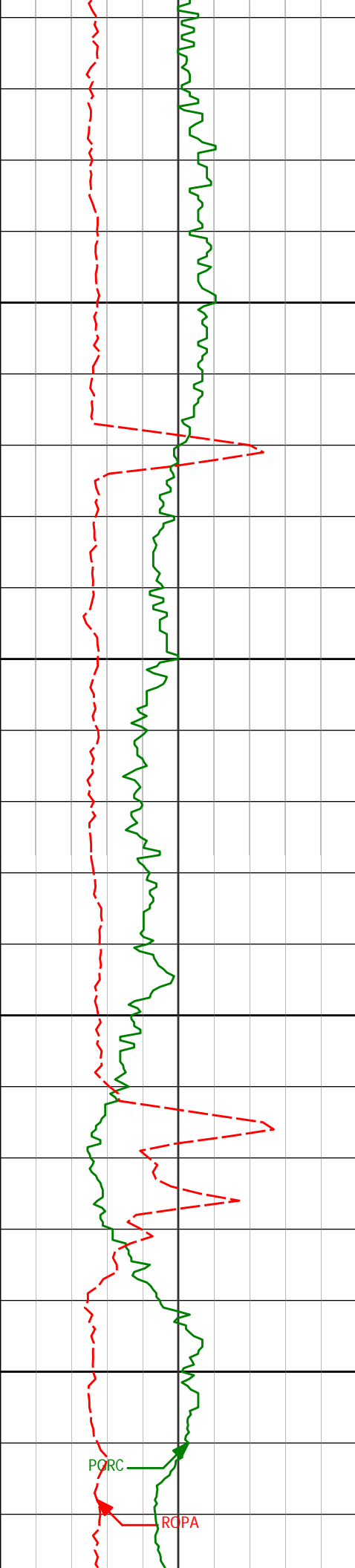
7790.87'

13900

13950

PGRC

ROPA



14000

14050

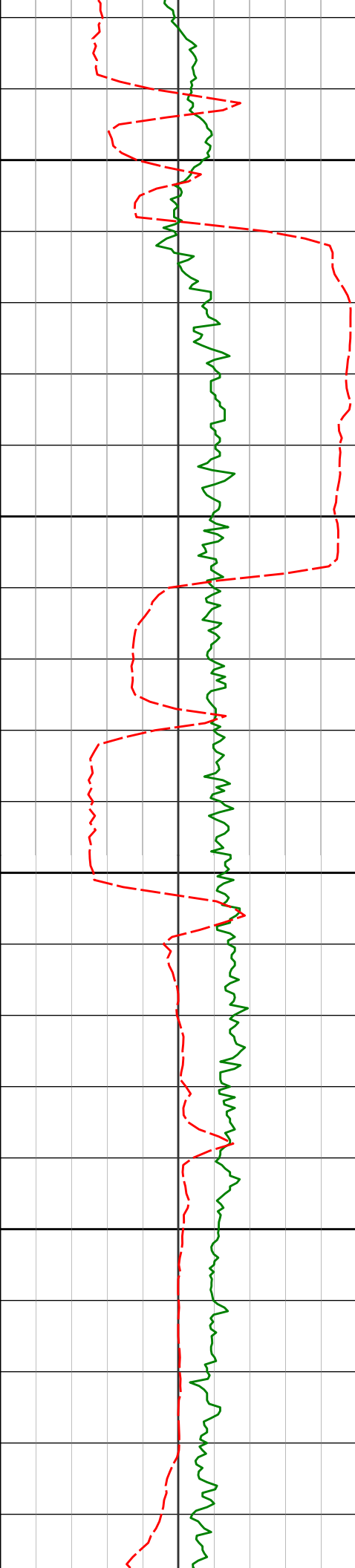
14100

14150

13958°	89.91°	268.37°	6676.12'	7885.85'
14053'	90.89°	267.91°	6675.46'	7980.85'
14148'	92.38°	267.91°	6672.75'	8075.80'

PQRC

RCPA



14200

14250

14300

<Run 400>

14350

14243'

89.97°

268.64°

6670.80'

8170.77'

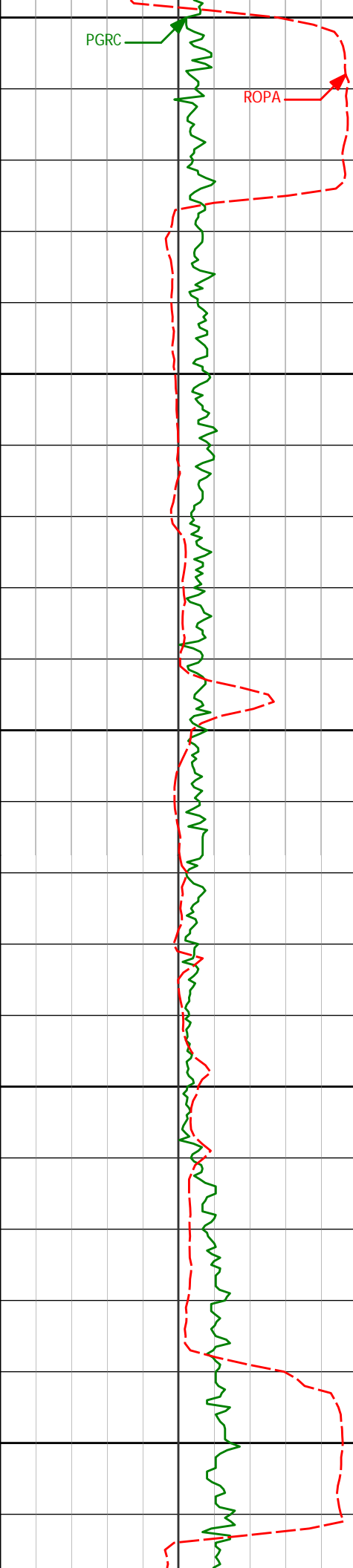
14338'

90.28°

268.96°

6670.59'

8265.76'



14400

14433'

89.17°

268.54°

6671.05'

8360.75'

14450

14500

14528'

90.59°

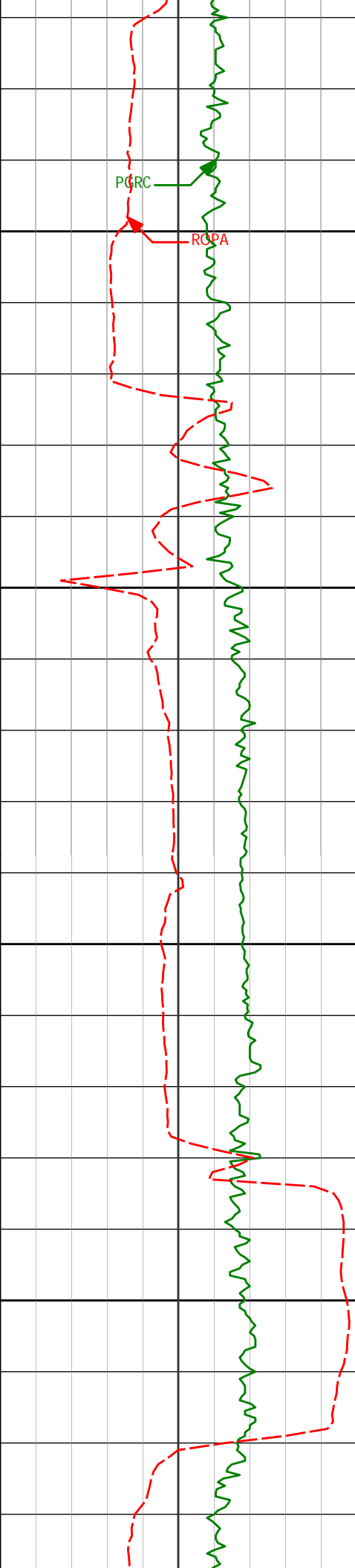
268.89°

6671.25'

8455.74'

14550

14600



14650

14700

14750

14800

14623'

89.57°

269.12°

6671.12'

8550.72'

14718'

90.22°

268.71°

6671.29'

8645.71'

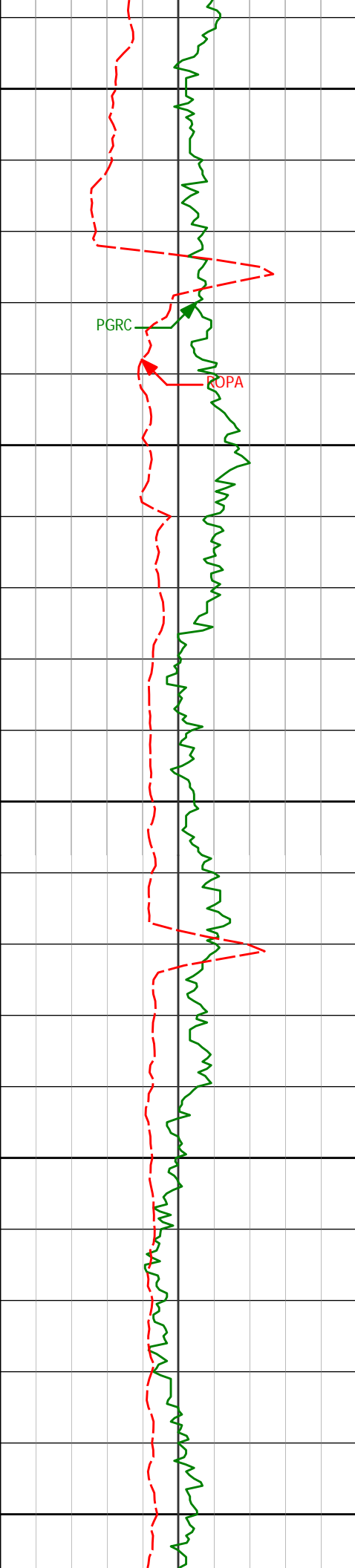
14813'

86.97°

269.91°

6673.62'

8740.64'



14850

PGRC

ROPA

14900

14950

15000

15050

14908'

87.22°

270.22°

6678.43'

8835.45'

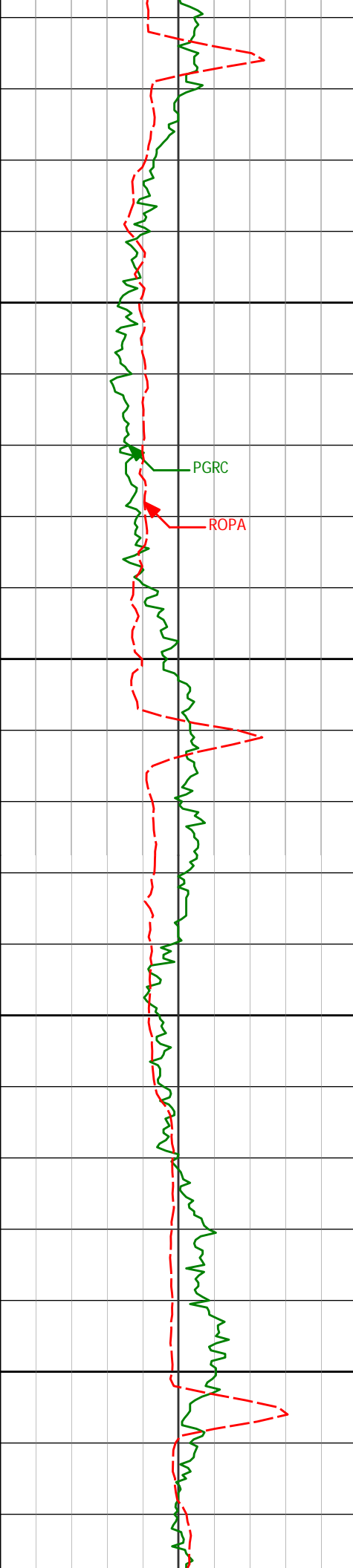
15003'

87.84°

270.18°

6682.53'

8930.29'



15100

15150

15200

15250

15098'

89.10°

270.33°

6685.06'

9025.17'

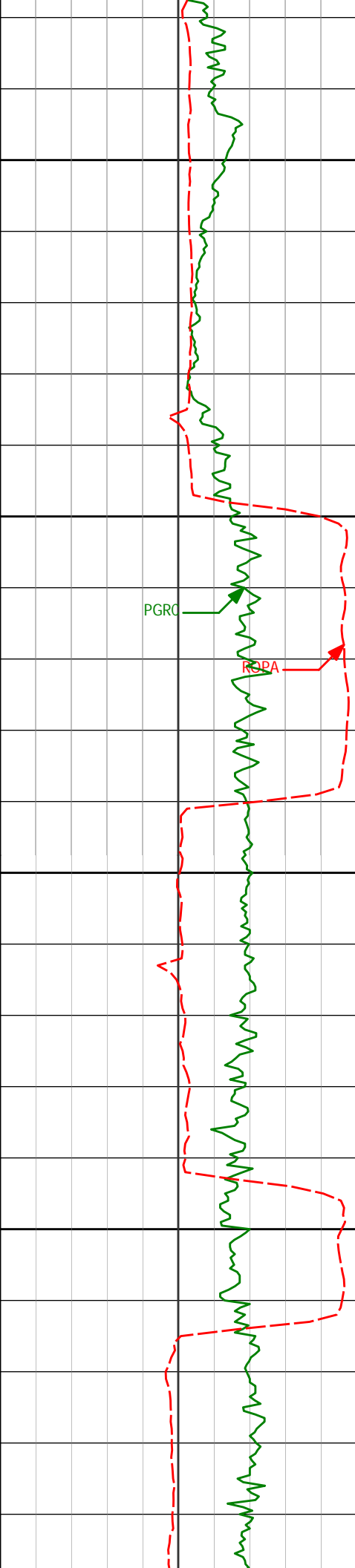
15193'

91.17°

270.56°

6684.84'

9120.08'



15300

15350

15400

15450

15288'

92.75°

269.81°

6681.59'

9214.95'

15383'

90.06°

269.41°

6679.26'

9309.87'

15478'

88.71°

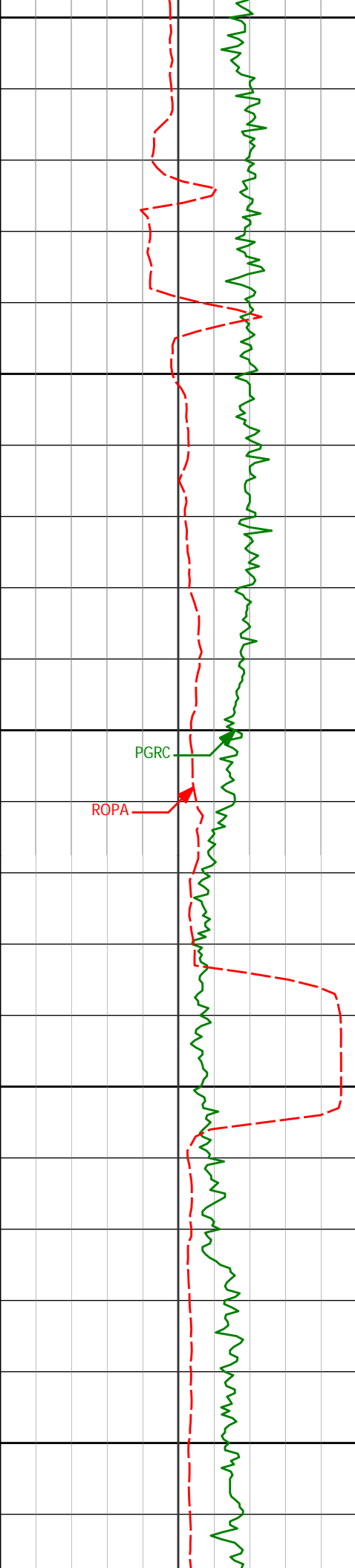
270.16°

6680.28'

9404.81'

PGRC

RAPA



15500

15550

15600

15650

15700

15573'

90.46°

270.91°

6680.97'

9499.71'

PGRC

ROPA

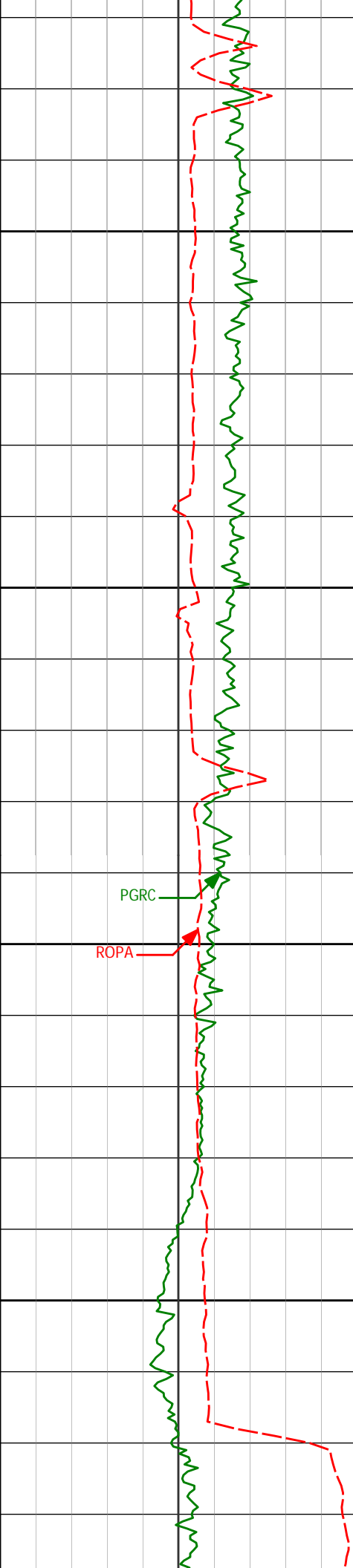
15668'

89.07°

270.70°

6681.36'

9594.58'



15750

15763'

89.94°

270.46°

6682.18'

9689.48'

15800

PGRC

ROPA

15850

15858'

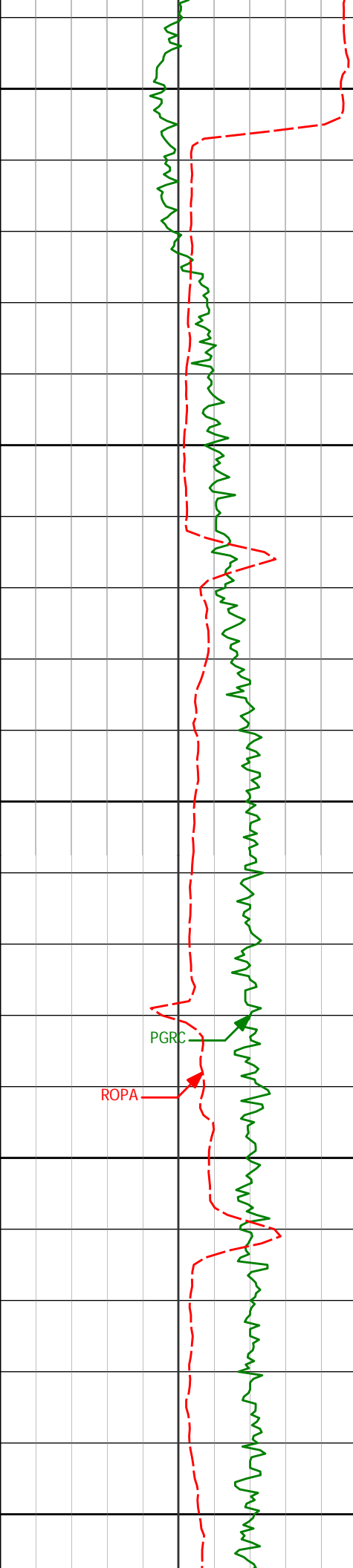
91.05°

270.62°

6681.36'

9784.38'

15900



15950

15953'

88.21°

269.81°

6681.97'

9879.29'

16000

16050

16048'

88.58°

269.72°

6684.63'

9974.20'

16100

16150

16143'

90.52°

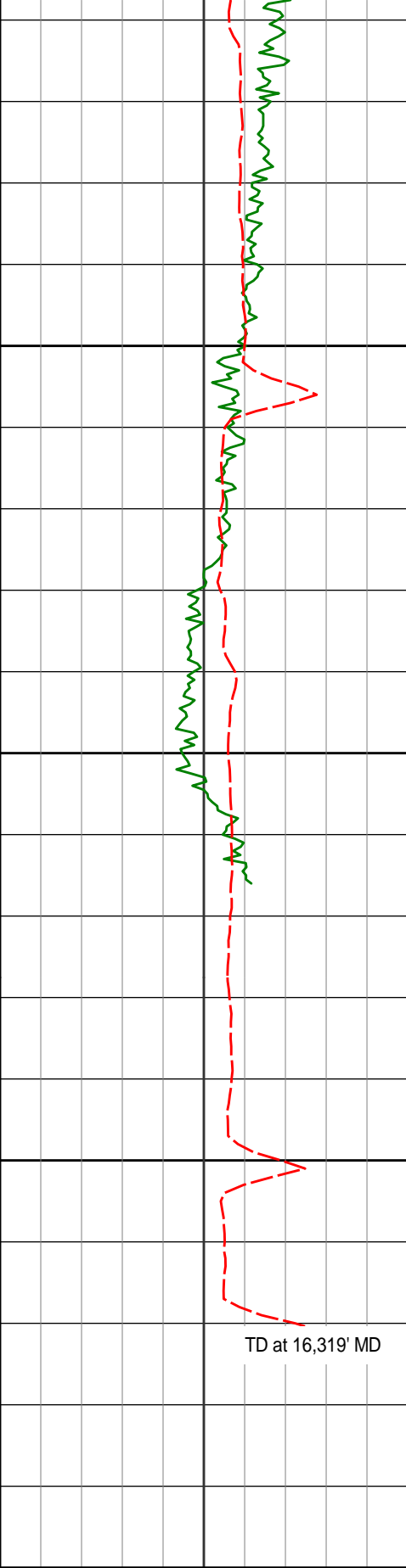
270.15°

6685.38'

10069.14'

PGRC

ROPA



16200

16238'

91.42°

269.61°

6683.77'

10164.07'

16250

16257'

91.91°

270.04°

6683.22'

10183.05'

16300

16319'

91.91°

270.04°

6681.15'

10244.97'

TD at 16,319' MD

16350

Avg Rate of Penetration

ROPA

feet per hr

500

0

PCG Gamma Ray

PGRC

api

0

300

Depth
ft

Depth

Inc.

Azi.

TVD

V.S.



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch State USX AA16-64-1
Wattenberg
Weld Colorado
USA
CA-XX-0900145813
Tie-on survey is tied on to surface casing.

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
656.00	0.00	0.00	656.00	0.00 N	0.00 E	0.00	0.00
718.00	0.37	265.72	718.00	0.01 S	0.20 W	0.20	0.60
811.00	0.22	248.25	811.00	0.10 S	0.66 W	0.67	0.19
904.00	0.80	205.47	903.99	0.76 S	1.11 W	1.14	0.71
998.00	0.73	247.68	997.99	1.58 S	1.95 W	2.00	0.59
1092.00	0.51	239.01	1091.98	2.02 S	2.86 W	2.93	0.25
1185.00	0.57	221.93	1184.98	2.58 S	3.52 W	3.61	0.18
1279.00	0.40	223.01	1278.97	3.16 S	4.06 W	4.17	0.18
1372.00	0.48	176.76	1371.97	3.79 S	4.26 W	4.39	0.38
1466.00	0.64	220.87	1465.97	4.58 S	4.58 W	4.74	0.47
1561.00	4.97	233.08	1560.83	7.45 S	8.22 W	8.48	4.58
1656.00	7.42	242.28	1655.27	12.78 S	16.94 W	17.39	2.77
1751.00	7.33	243.05	1749.49	18.38 S	27.77 W	28.42	0.14
1846.00	7.57	231.70	1843.69	25.01 S	38.09 W	38.96	1.57
1941.00	9.56	231.66	1937.62	33.78 S	49.19 W	50.37	2.09
2036.00	11.51	225.87	2031.02	45.27 S	62.18 W	63.76	2.33
2131.00	13.59	217.28	2123.75	60.76 S	75.74 W	77.88	2.94
2226.00	14.62	216.78	2215.89	79.24 S	89.68 W	92.47	1.09
2321.00	14.04	214.81	2307.93	98.31 S	103.44 W	106.91	0.80
2416.00	14.72	216.64	2399.96	117.45 S	117.22 W	121.37	0.86
2511.00	13.88	222.10	2492.02	135.59 S	132.06 W	136.85	1.67
2606.00	13.71	220.81	2584.28	152.57 S	147.06 W	152.45	0.37
2701.00	13.14	222.97	2676.68	168.99 S	161.78 W	167.75	0.80
2796.00	14.51	226.74	2768.93	185.05 S	177.81 W	184.34	1.73
2891.00	13.97	225.26	2861.01	201.28 S	194.62 W	201.73	0.69
2986.00	14.89	226.22	2953.01	217.79 S	211.58 W	219.27	1.00
3081.00	14.85	226.50	3044.83	234.62 S	229.22 W	237.51	0.09
3176.00	11.68	221.33	3137.29	250.22 S	244.41 W	253.24	3.56
3271.00	9.39	226.99	3230.68	262.73 S	256.43 W	265.70	2.64
3366.00	4.79	237.50	3324.93	270.15 S	265.44 W	274.98	5.01
3461.00	1.70	239.20	3419.77	273.01 S	270.00 W	279.64	3.25
3556.00	1.74	228.78	3514.73	274.68 S	272.30 W	281.99	0.33
3651.00	0.68	90.38	3609.72	275.63 S	272.82 W	282.55	2.41
3746.00	0.93	109.87	3704.71	275.90 S	271.53 W	281.27	0.39
3841.00	0.70	80.99	3799.70	276.07 S	270.23 W	279.98	0.49
3936.00	1.23	93.87	3894.68	276.05 S	268.64 W	278.39	0.60
4031.00	1.31	92.72	3989.66	276.17 S	266.54 W	276.29	0.09
4126.00	0.53	118.49	4084.65	276.43 S	265.07 W	274.83	0.91
4221.00	0.26	98.90	4179.64	276.67 S	264.47 W	274.24	0.31
4316.00	0.60	179.78	4274.64	277.20 S	264.25 W	274.05	0.65
4411.00	0.48	200.91	4369.64	278.07 S	264.39 W	274.22	0.24
4506.00	0.94	189.70	4464.63	279.21 S	264.67 W	274.53	0.50
4601.00	0.96	195.79	4559.62	280.75 S	265.01 W	274.93	0.11
4696.00	0.28	206.56	4654.61	281.72 S	265.33 W	275.29	0.72
4791.00	0.38	218.34	4749.61	282.17 S	265.63 W	275.60	0.13
4886.00	0.31	128.80	4844.61	282.58 S	265.63 W	275.61	0.51
4981.00	0.54	196.65	4939.61	283.17 S	265.56 W	275.56	0.54
5076.00	1.24	210.92	5034.59	284.48 S	266.21 W	276.27	0.77
5171.00	1.22	212.49	5129.57	286.22 S	267.28 W	277.40	0.04
5266.00	0.84	202.04	5224.56	287.72 S	268.09 W	278.26	0.44
5361.00	0.86	203.65	5319.55	289.02 S	268.64 W	278.85	0.03
5456.00	0.86	238.35	5414.54	290.04 S	269.53 W	279.78	0.54
5551.00	1.20	235.51	5509.52	290.98 S	270.96 W	281.24	0.36
5646.00	0.96	246.94	5604.50	291.86 S	272.51 W	282.82	0.34

5640.00	0.30	240.34	5004.30	291.00 S	272.31 W	202.02	0.34
5741.00	0.71	234.43	5699.49	292.51 S	273.72 W	284.06	0.32
5836.00	0.88	232.35	5794.49	293.30 S	274.78 W	285.14	0.18
5928.00	1.28	249.30	5886.47	294.09 S	276.30 W	286.69	0.55
5976.00	4.61	257.83	5934.40	294.69 S	278.68 W	289.10	6.98
6023.00	9.63	263.11	5981.02	295.56 S	284.44 W	294.88	10.76
6071.00	13.42	265.36	6028.05	296.49 S	293.98 W	304.45	7.95
6118.00	14.06	266.96	6073.70	297.24 S	305.12 W	315.60	1.58
6213.00	17.10	267.09	6165.20	298.56 S	330.59 W	341.11	3.20
6308.00	26.42	261.99	6253.34	302.22 S	365.55 W	376.18	10.00
6403.00	37.62	267.44	6333.78	306.47 S	415.62 W	426.36	12.16
6451.00	44.03	270.83	6370.08	306.89 S	446.97 W	457.71	14.13
6498.00	45.70	269.38	6403.40	306.83 S	480.12 W	490.84	4.17
6546.00	46.41	268.81	6436.71	307.38 S	514.68 W	525.39	1.71
6593.00	49.61	267.11	6468.15	308.64 S	549.58 W	560.32	7.32
6641.00	55.13	265.20	6497.44	311.21 S	587.49 W	598.30	11.92
6688.00	58.94	264.97	6523.01	314.59 S	626.77 W	637.67	8.12
6736.00	63.06	264.82	6546.28	318.32 S	668.58 W	679.59	8.59
6783.00	68.51	265.72	6565.55	321.85 S	711.28 W	722.39	11.73
6831.00	74.65	268.17	6580.71	324.26 S	756.73 W	767.90	13.68
6878.00	77.61	268.58	6591.98	325.55 S	802.34 W	813.52	6.35
6926.00	79.27	268.18	6601.60	326.88 S	849.34 W	860.54	3.55
6973.00	82.43	268.18	6609.07	328.35 S	895.71 W	906.94	6.72
7048.00	87.81	269.24	6615.45	330.03 S	970.39 W	981.63	7.31
7148.00	90.59	270.12	6616.84	330.59 S	1070.37 W	1081.56	2.92
7243.00	88.27	268.65	6617.79	331.61 S	1165.35 W	1176.52	2.89
7338.00	88.67	268.59	6620.32	333.90 S	1260.29 W	1271.48	0.43
7433.00	88.86	268.53	6622.37	336.28 S	1355.24 W	1366.45	0.21
7528.00	89.60	268.75	6623.65	338.54 S	1450.20 W	1461.44	0.81
7623.00	90.55	269.11	6623.52	340.31 S	1545.19 W	1556.42	1.07
7718.00	89.20	268.43	6623.73	342.35 S	1640.16 W	1651.41	1.59
7813.00	89.57	268.09	6624.75	345.24 S	1735.11 W	1746.40	0.53
7908.00	89.41	267.58	6625.60	348.83 S	1830.04 W	1841.40	0.56
8003.00	88.58	270.41	6627.26	350.49 S	1925.00 W	1936.35	3.10
8098.00	89.85	270.64	6628.56	349.62 S	2019.98 W	2031.25	1.36
8193.00	89.66	270.08	6628.97	349.02 S	2114.98 W	2126.16	0.62
8288.00	90.62	269.85	6628.74	349.08 S	2209.98 W	2221.10	1.04
8383.00	90.06	271.64	6628.18	347.85 S	2304.97 W	2315.98	1.97
8478.00	88.37	271.19	6629.48	345.50 S	2399.92 W	2410.79	1.84
8573.00	88.00	270.54	6632.49	344.07 S	2494.86 W	2505.62	0.79
8668.00	88.67	270.71	6635.25	343.03 S	2589.82 W	2600.48	0.73
8763.00	89.35	270.95	6636.89	341.66 S	2684.79 W	2695.34	0.76
8858.00	90.31	270.79	6637.17	340.21 S	2779.78 W	2790.21	1.02
8953.00	90.83	269.46	6636.22	340.01 S	2874.77 W	2885.14	1.50
9048.00	90.12	269.99	6635.44	340.46 S	2969.77 W	2980.09	0.93
9143.00	90.22	268.78	6635.15	341.48 S	3064.76 W	3075.06	1.28
9238.00	88.77	269.84	6635.99	342.63 S	3159.75 W	3170.02	1.89
9333.00	90.31	269.96	6636.75	342.79 S	3254.74 W	3264.96	1.63
9428.00	89.63	269.55	6636.80	343.20 S	3349.74 W	3359.91	0.84
9523.00	90.18	269.47	6636.96	344.01 S	3444.73 W	3454.87	0.59
9618.00	89.88	268.85	6636.91	345.40 S	3539.72 W	3549.85	0.73
9713.00	88.86	269.71	6637.96	346.60 S	3634.71 W	3644.82	1.40
9807.00	89.85	269.58	6639.02	347.18 S	3728.70 W	3738.77	1.06
9902.00	90.40	270.04	6638.81	347.50 S	3823.70 W	3833.72	0.75
9997.00	88.00	269.08	6640.13	348.22 S	3918.68 W	3928.66	2.72
10092.00	88.43	268.64	6643.09	350.11 S	4013.61 W	4023.60	0.65
10187.00	90.06	271.02	6644.35	350.40 S	4108.59 W	4118.53	3.04
10282.00	87.81	269.60	6646.11	349.88 S	4203.57 W	4213.43	2.80
10377.00	88.24	270.14	6649.39	350.10 S	4298.51 W	4308.32	0.73
10469.00	90.83	271.14	6650.13	349.07 S	4390.49 W	4400.20	3.02
10563.00	92.40	271.17	6647.48	347.18 S	4484.43 W	4494.02	1.67
10656.00	89.41	269.18	6646.01	346.89 S	4577.41 W	4586.92	3.86
10749.00	88.98	268.79	6647.32	348.54 S	4670.38 W	4679.89	0.62
10841.00	89.82	268.66	6648.28	350.59 S	4762.35 W	4771.88	0.92
10935.00	90.96	268.49	6647.64	352.92 S	4856.32 W	4865.87	1.23
11028.00	90.52	268.59	6646.44	355.29 S	4949.28 W	4958.86	0.49
11121.00	88.83	269.49	6646.97	356.85 S	5042.26 W	5051.83	2.06
11215.00	88.80	269.92	6648.91	357.34 S	5136.24 W	5145.77	0.46
11308.00	89.88	268.91	6649.99	358.28 S	5229.23 W	5238.73	1.59
11402.00	91.23	269.55	6649.08	359.55 S	5323.21 W	5332.70	1.59
11496.00	90.68	270.03	6647.51	359.89 S	5417.20 W	5426.63	0.78
11589.00	90.52	271.40	6646.53	358.73 S	5510.18 W	5519.52	1.48
11683.00	89.51	271.17	6646.51	356.62 S	5604.16 W	5613.36	1.10
11776.00	88.58	271.38	6648.06	354.56 S	5697.12 W	5706.19	1.03
11870.00	89.41	271.11	6649.71	352.51 S	5791.08 W	5800.01	0.93

11964.00	90.62	270.80	6649.68	350.95 S	5885.07 W	5893.88	1.33
12059.00	89.88	270.45	6649.27	349.91 S	5980.06 W	5988.78	0.86
12154.00	89.72	271.71	6649.60	348.12 S	6075.04 W	6083.63	1.34
12248.00	88.77	271.65	6650.84	345.36 S	6168.99 W	6177.42	1.01
12343.00	89.32	271.74	6652.42	342.56 S	6263.94 W	6272.20	0.59
12438.00	88.77	270.10	6654.01	341.03 S	6358.91 W	6367.06	1.82
12533.00	89.57	270.04	6655.38	340.91 S	6453.90 W	6461.98	0.84
12628.00	89.60	268.87	6656.07	341.82 S	6548.89 W	6556.94	1.23
12723.00	88.15	270.52	6657.94	342.32 S	6643.86 W	6651.88	2.31
12818.00	88.92	270.30	6660.37	341.64 S	6738.83 W	6746.76	0.84
12913.00	90.52	270.14	6660.83	341.28 S	6833.82 W	6841.68	1.69
13008.00	91.20	269.01	6659.40	341.98 S	6928.81 W	6936.62	1.39
13103.00	89.97	269.05	6658.43	343.59 S	7023.79 W	7031.60	1.30
13198.00	88.15	269.45	6659.99	344.84 S	7118.76 W	7126.56	1.96
13293.00	89.01	269.55	6662.35	345.66 S	7213.73 W	7221.49	0.91
13388.00	90.59	269.42	6662.68	346.52 S	7308.72 W	7316.46	1.67
13483.00	90.03	269.69	6662.16	347.26 S	7403.72 W	7411.42	0.65
13578.00	86.88	270.44	6664.73	347.15 S	7498.67 W	7506.30	3.41
13673.00	87.35	270.32	6669.51	346.52 S	7593.55 W	7601.10	0.51
13768.00	88.15	269.96	6673.24	346.29 S	7688.47 W	7695.95	0.92
13863.00	89.23	269.75	6675.41	346.53 S	7783.45 W	7790.87	1.16
13958.00	89.91	268.37	6676.12	348.09 S	7878.43 W	7885.85	1.62
14053.00	90.89	267.91	6675.46	351.17 S	7973.37 W	7980.85	1.14
14148.00	92.38	267.91	6672.75	354.63 S	8068.27 W	8075.80	1.57
14243.00	89.97	268.64	6670.80	357.49 S	8163.20 W	8170.77	2.65
14338.00	90.28	268.96	6670.59	359.48 S	8258.18 W	8265.76	0.47
14433.00	89.17	268.54	6671.05	361.55 S	8353.15 W	8360.75	1.25
14528.00	90.59	268.89	6671.25	363.68 S	8448.13 W	8455.74	1.54
14623.00	89.57	269.12	6671.12	365.33 S	8543.11 W	8550.72	1.10
14718.00	90.22	268.71	6671.29	367.13 S	8638.09 W	8645.71	0.81
14813.00	86.97	269.91	6673.62	368.28 S	8733.04 W	8740.64	3.65
14908.00	87.22	270.22	6678.43	368.17 S	8827.92 W	8835.45	0.42
15003.00	87.84	270.18	6682.53	367.84 S	8922.83 W	8930.29	0.65
15098.00	89.10	270.33	6685.06	367.42 S	9017.79 W	9025.17	1.34
15193.00	91.17	270.56	6684.84	366.68 S	9112.79 W	9120.08	2.19
15288.00	92.75	269.81	6681.59	366.37 S	9207.73 W	9214.95	1.84
15383.00	90.06	269.41	6679.26	367.02 S	9302.69 W	9309.87	2.86
15478.00	88.71	270.16	6680.28	367.38 S	9397.68 W	9404.81	1.63
15573.00	90.46	270.91	6680.97	366.49 S	9492.67 W	9499.71	2.00
15668.00	89.07	270.70	6681.36	365.15 S	9587.65 W	9594.58	1.48
15763.00	89.94	270.46	6682.18	364.19 S	9682.64 W	9689.48	0.95
15858.00	91.05	270.62	6681.36	363.30 S	9777.64 W	9784.38	1.18
15953.00	88.21	269.81	6681.97	362.94 S	9872.62 W	9879.29	3.11
16048.00	88.58	269.72	6684.63	363.33 S	9967.58 W	9974.20	0.40
16143.00	90.52	270.15	6685.38	363.44 S	10062.58 W	10069.14	2.09
16238.00	91.42	269.61	6683.77	363.64 S	10157.56 W	10164.07	1.10
16257.00	91.91	270.04	6683.22	363.69 S	10176.55 W	10183.05	3.43
16319.00	91.91	270.04	6681.15	363.65 S	10238.52 W	10244.97	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 CLOSURE OF 267.97 DEGREES (GRID)
A TOTAL CORRECTION OF 7.81 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16319.00 FEET
IS 10244.97 FEET ALONG 267.97 DEGREES (GRID)**