

PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

Country		: USA					
Field		: Wattenburg					
Location		: Lat: 40° 28' 24.20" North Long: 104° 23' 39.05" West					
Well		: Wells Ranch USX AA23-66-1HN					
Company		: Noble Energy					
Rig		: H&P 321					
LOCATION		Latitude : 40° 28' 24.20" North Longitude : 104° 23' 39.05" West UTM Easting = 3,307,640.788 ft UTM Northing = 1,417,214.198 ft		Other Services Directional Drilling			
Permanent Datum		: Ground Level		Elevation : 4808.00 ft		Elev. KB N/A	
Log Measured From		: Drill Floor		30.00 ft Above Permanent Datum		DF 4838.00 ft GL 4808.00 ft WD N/A	
Drilling Measured From		: Drill Floor		TVD LOG			
Depth Logged		: 638.91 ft To 6,638.45 ft		Unit No. : 11210424		Job No. :CA-XX-0900577115	
Date Logged		: 15-Jul-13 To 20-Jul-13		Plot Type : Final			
Total Depth MD		: 6,996.00 ft TVD: 6,638.45 ft		Plot Date : 22-Jul-13			
Spud Date		: 15-Jul-13					
Run No.		Borehole Record (TVD)		Run No.		Borehole Record (TVD)	
		Size From To				Size From To	
1		8.750 in 638.91 ft 5,938.78 ft					
2		8.750 in 5,938.78 ft 6,638.45 ft					
						Casing Record (TVD)	
				Size Weight From To			
				9.625 in 34.90 lbpf SURFACE 637.91 ft			

WELL INFORMATION

MWD Run Number	100	200		
Date run completed	18-Jul-13	19-Jul-13		
Rig Bit Number	2	3		
Bit Size (in)	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750		
Log Start Depth (MD, ft)	639.00	5,960.00		
Log End Depth (MD, ft)	5,960.00	6,996.00		
Drill or Wipe	Drill	Drill		
Drill/Wipe Start Date and Time	16-Jul-13 23:21	15-Jul-13 23:14		
Drill/Wipe End Date and Time	17-Jul-13 23:20	15-Jul-13 23:14		
Min Inc (deg) @ Depth (MD, ft)	.06 @ 4,110.00	1.33 @ 5,965.00		
Max Inc (deg) @ Depth (MD, ft)	11.44 @ 2,595.00	80.43 @ 6,941.00		
Bit TFA(in2) / Bit Type	.75 / PDC	.90 / PDC		
Flow Rate (gpm)	577.93	571.86		
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA		
Fluid Type	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.90 / 36.00	10.55 / 46.00		
Filtrate CL (ppm)	1,350.00	1,700.00		
pH / Fluid Loss (mptm)	9.10 / 17	9.70 / 9		
PV (cP) / YP (lbf2)	7 / 7.00	15 / 15.00		
% Solids / % Sand	4.00 / 0.25	10.20 / 0.20		
% Oil / Oil:Water Ratio	NA / NA	NA / NA		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA		

Max Tool Temp (degF) / Source	145.90 / PCM	162.80 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 145.90	NA @ 162.80			
Lead MWD Engineer	Christopher Befort	Christopher Befort			
Customer Representative	Jim Turner	Stetson Neilsen			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	233811	233811			
Insert Serial Number	11227560	11227560			
Date and Time Initialized	15-Jul-13 04:10	15-Jul-13 04:10			
Date and Time Read	19-Jul-13 10:07	19-Jul-13 10:13			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	57.00	55.00			
Software Version	6.21	6.21			
Sub Serial Number	233811	233811			
Sonde Serial Number	11297582	11297582			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	308.80	340.21			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.77	48.07			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	233811	233811			
Insert/Sonde Serial Number	11293348	11293348			

REMARKS

1. All depths are calibrated to driller's pipe tally and are true vertical depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham 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:
1:600 Log
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft

1:240 Log
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft

ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft

Interval Resolution: 1.2 ft

6. Insite Version 7.4.2

WARRANTY

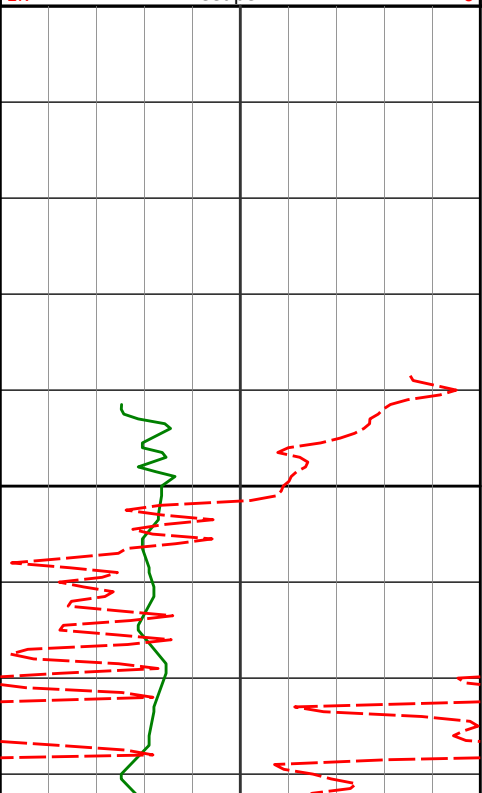
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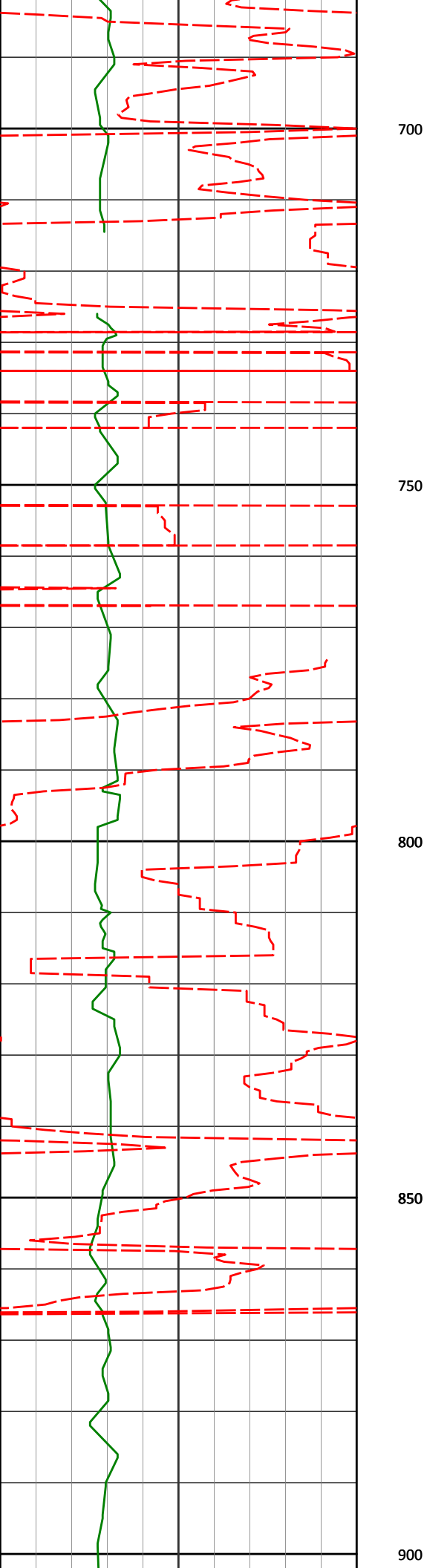
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Sperry Drilling Services

TVD Detail Log 1:240

Noble Energy
USX AA23-66-1HN
H&P 321
Sec. 24-T6N-R63W

PCG Gamma Ray PGRC 0 300 api						
Avg Rate of Penetration ROPA 1K 0 feet per hr		Depth ft	Depth	Inc.	Azi.	TVD V.S.
		600	603'	0.10°	348.70°	602.91' -4.52'
		650	669'	0.69°	26.66°	668.91' -4.70'



721'

0.56°

14.60°

720.91'

-4.93'

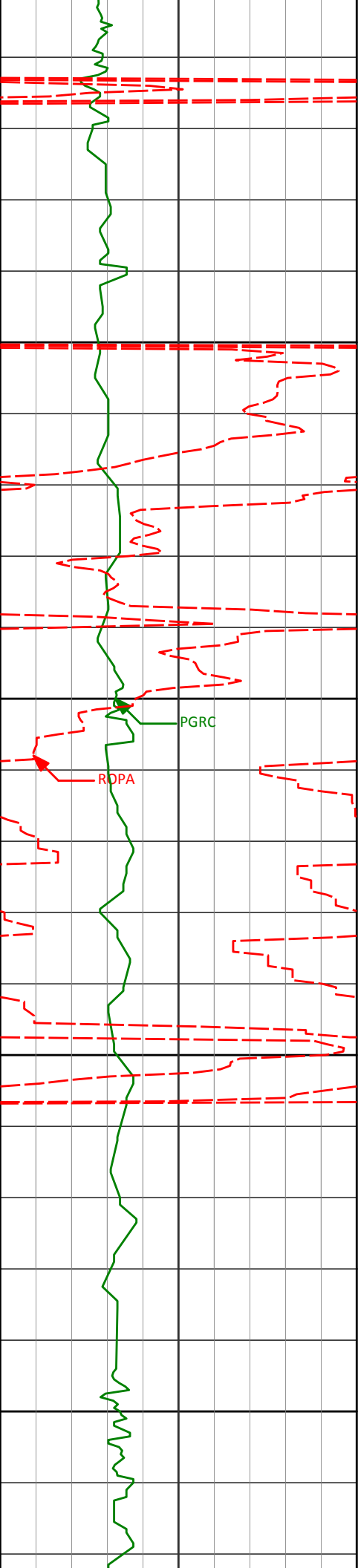
813'

0.68°

26.14°

812.90'

-5.32'



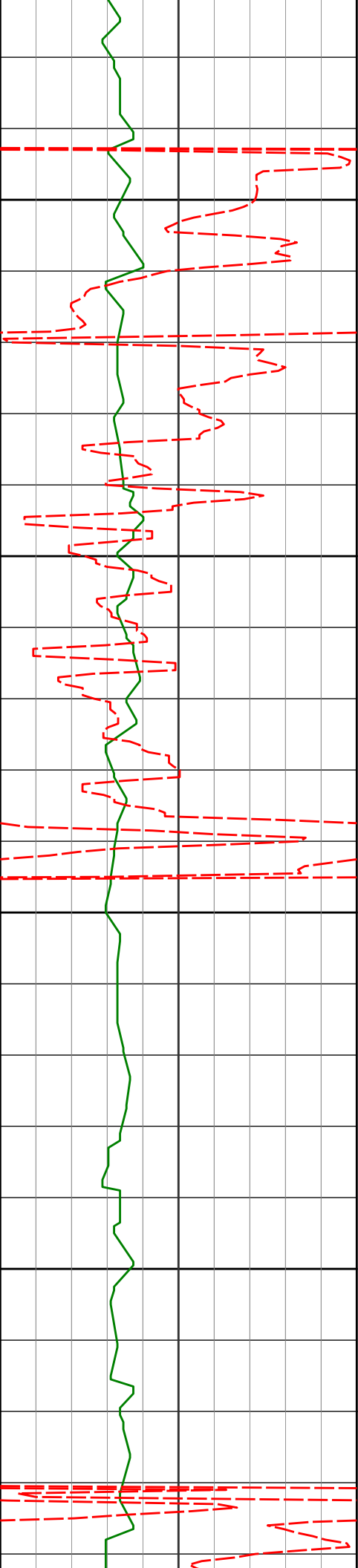
950

1000

1050

1100

904'	0.83°	22.89°	903.90'	-5.86'
997'	0.39°	68.87°	996.89'	-6.45'
1090'	0.76°	29.34°	1089.89'	-7.08'



1150

1181'

0.15°

307.74°

1180.88'

-7.30'

1200

1250

1274'

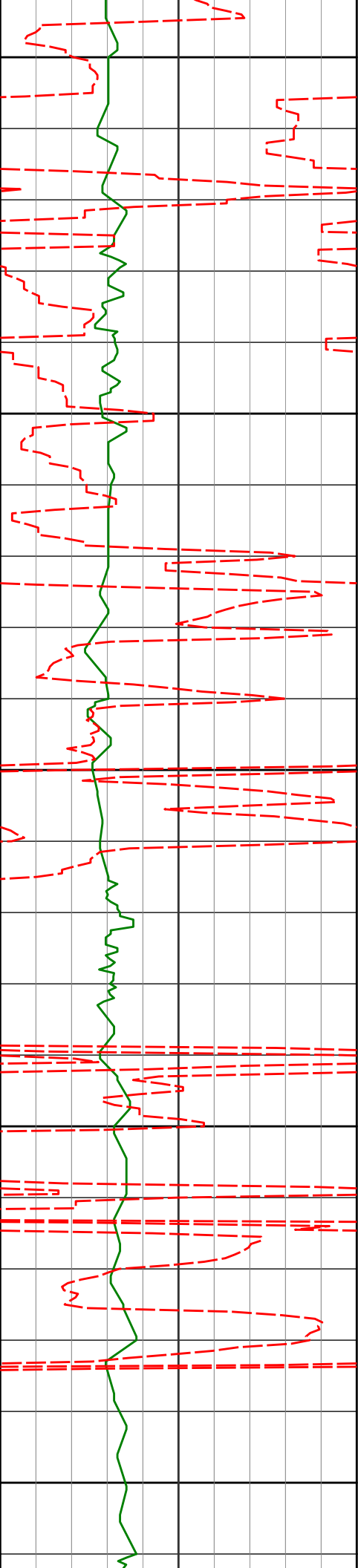
0.13°

125.36°

1273.88'

-7.29'

1300



1350

1365'	0.07°	214.43°	1364.88'	-7.34'
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1400

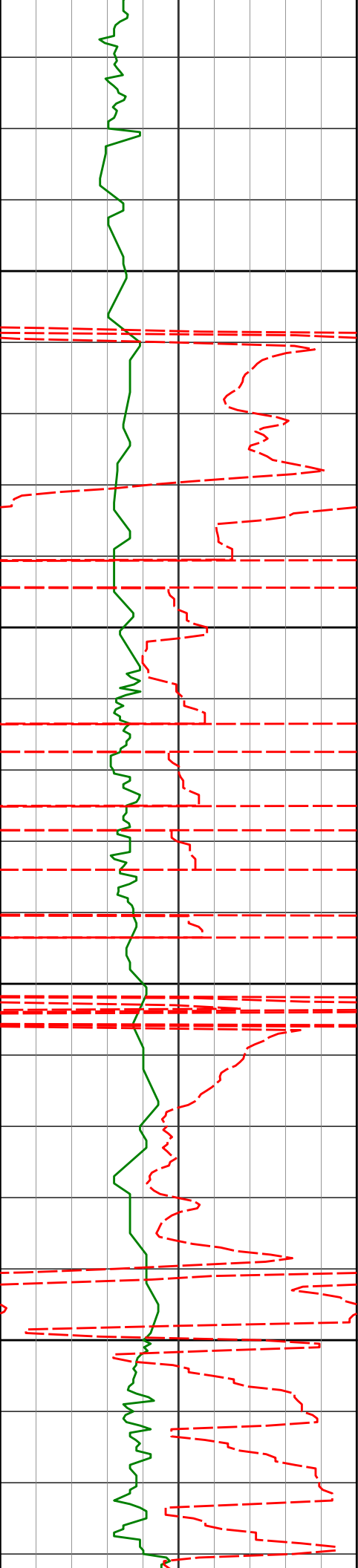
1450

1457'	0.77°	237.73°	1456.88'	-6.77'
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1500

1550

1552'	1.86°	241.23°	1551.85'	-4.83'
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1600

1650

1700

1750

1647'

2.68°

232.17°

1646.78'

-1.63'

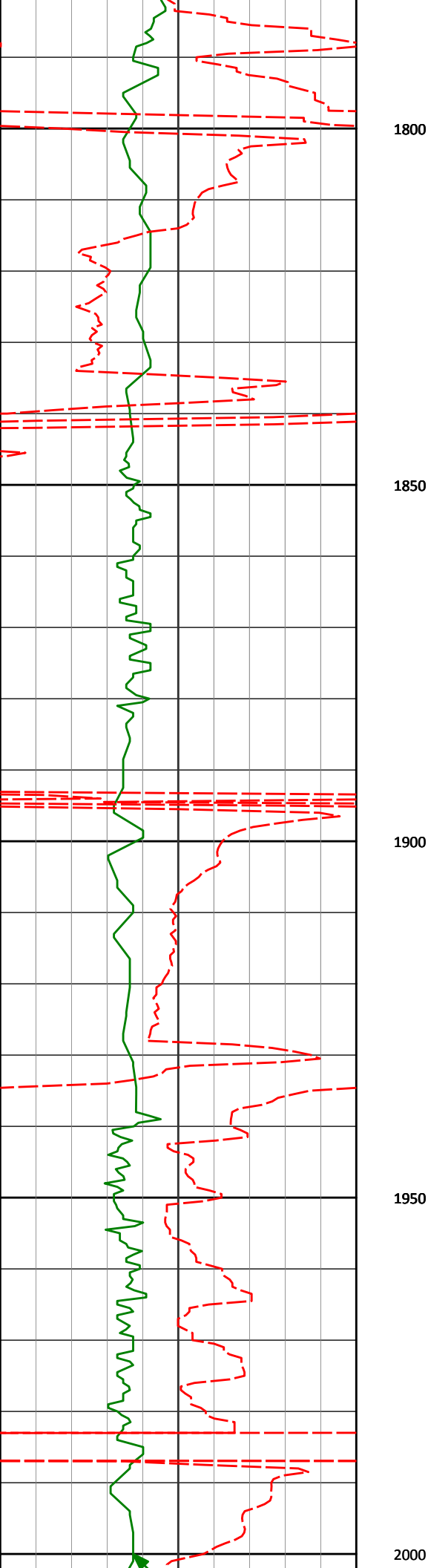
1742'

4.67°

238.75°

1741.58'

3.56'



1837'

6.94°

241.22°

1836.08'

12.10'

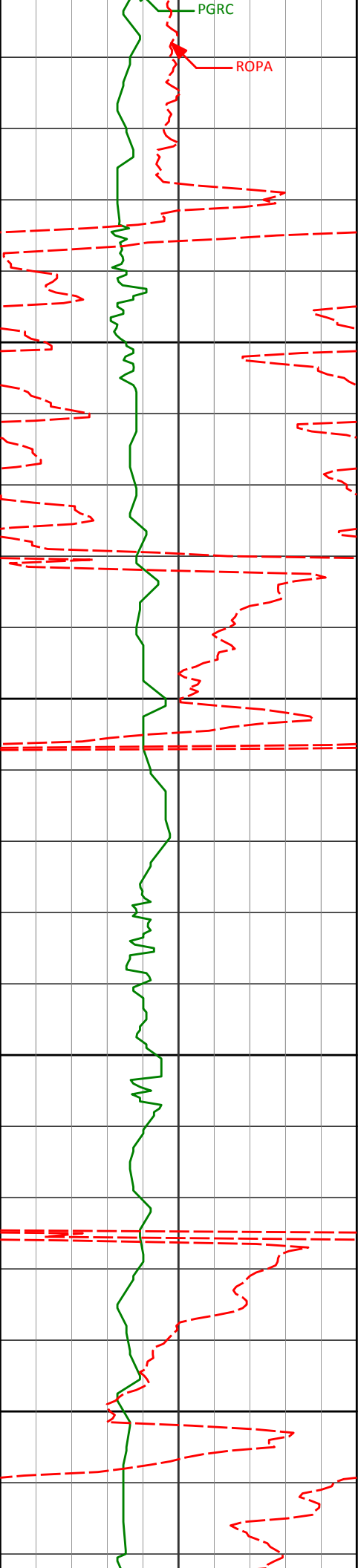
1932'

8.47°

240.17°

1930.22'

23.46'



2026'	10.53°	238.17°	2022.93'	37.10'
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2050

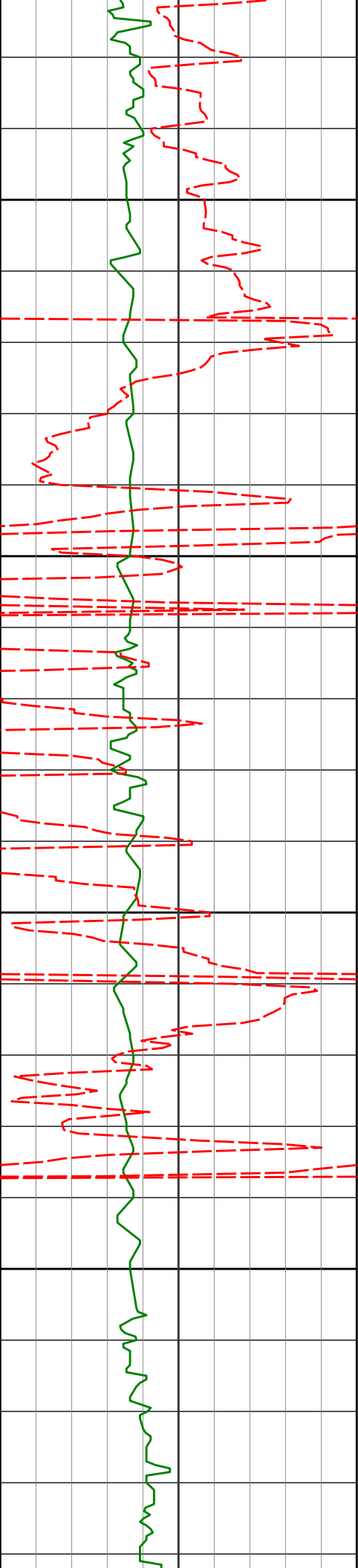
2100

2121'	9.72°	225.48°	2116.46'	50.62'
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2150

2200

2216'	10.07°	227.83°	2210.05'	62.96'
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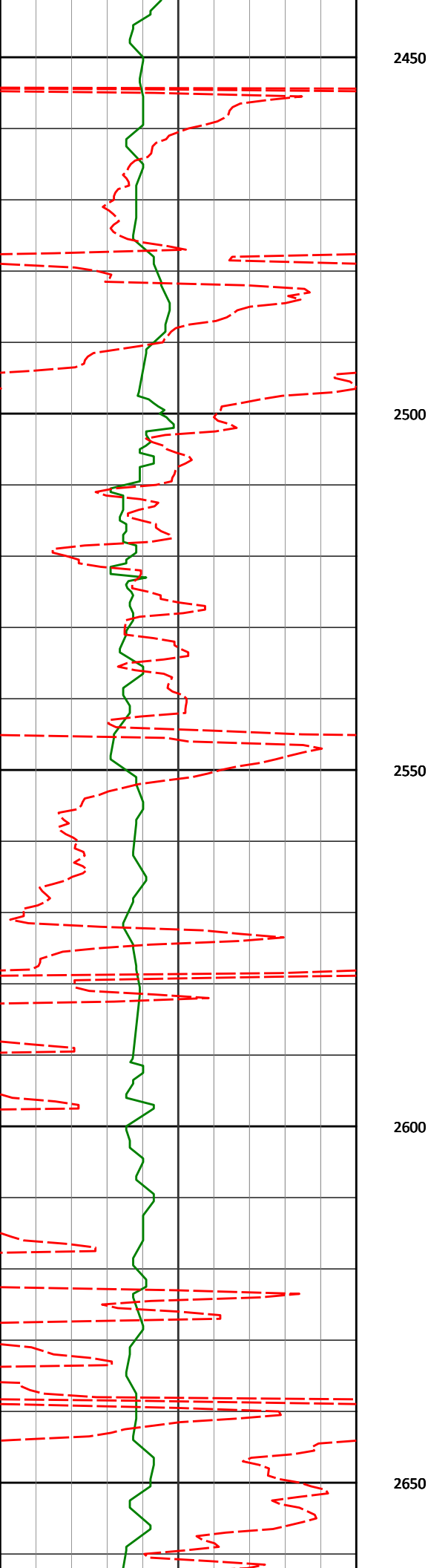
2250

2300

2350

2400

2311'	10.79°	226.50°	2303.48'	76.06'
2405'	9.92°	225.11°	2395.95'	88.67'



2500'

10.73°

226.01°

2489.41'

101.33'

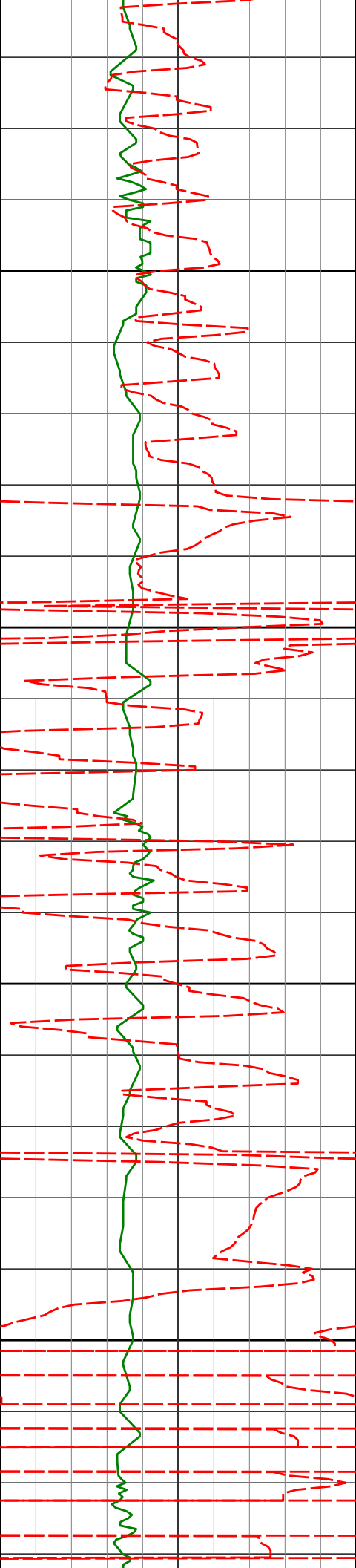
2595'

11.44°

227.66°

2582.64'

115.19'



2689'

10.23°

224.54°

2674.96'

128.45'

2700

2750

2784'

10.40°

223.50°

2768.42'

140.78'

2800

2850

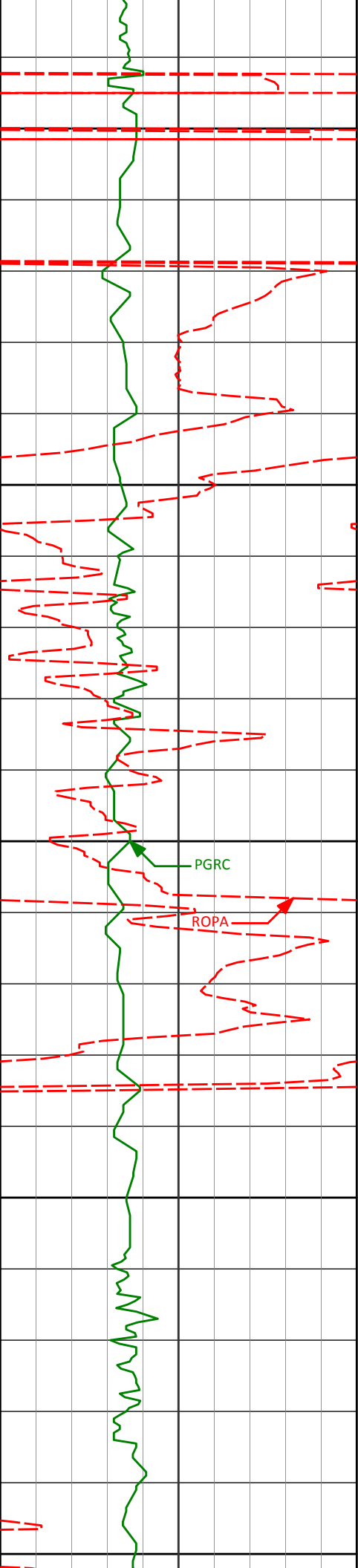
2879'

9.52°

218.00°

2861.99'

152.05'



2900

2950

3000

3050

3100

2973'

9.54°

223.79°

2954.70'

162.73'

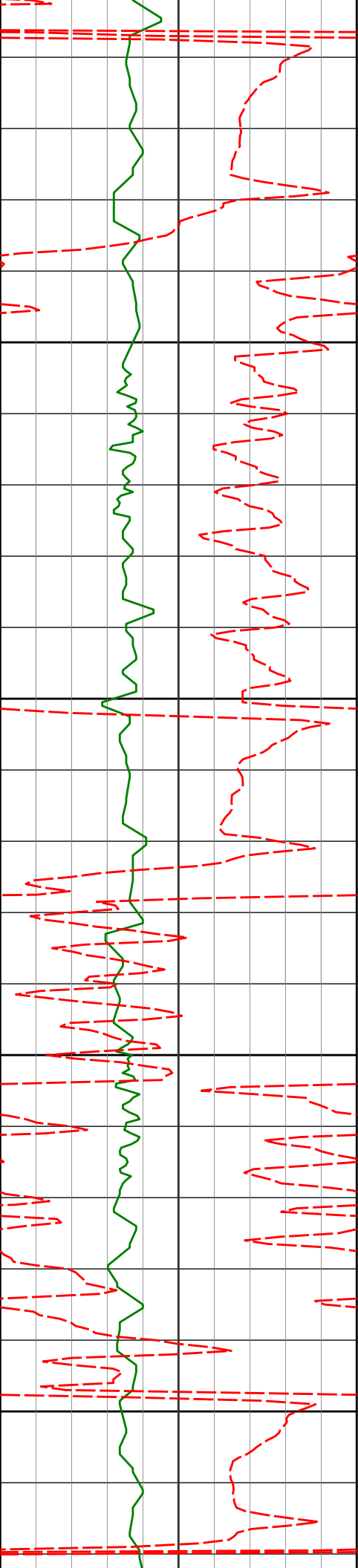
3068'

8.22°

222.69°

3048.56'

173.24'



3162'

5.83°

223.51°

3141.84'

181.44'

3150

3200

3257'

4.12°

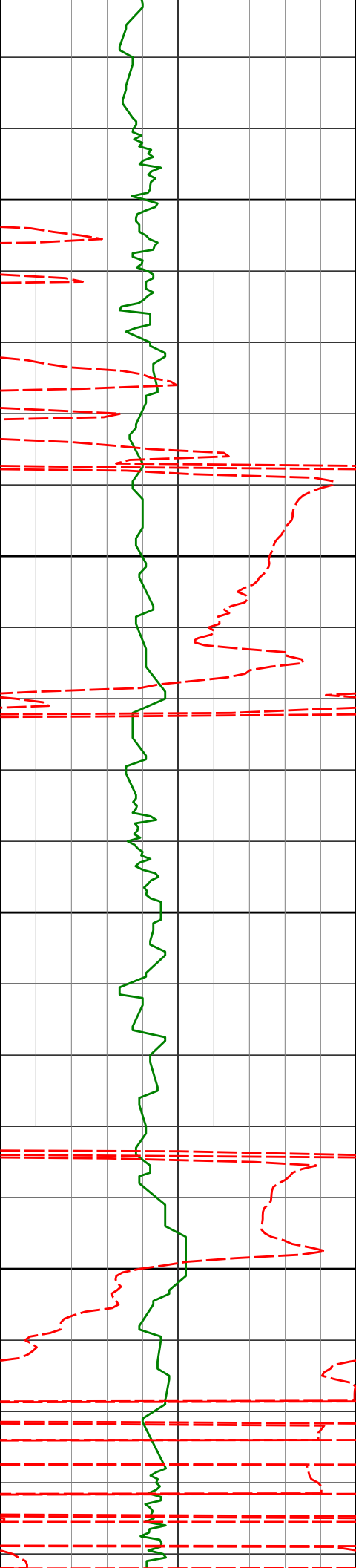
223.48°

3236.48'

187.36'

3250

3300



3351'

2.64°

245.50°

3330.32'

191.79'

3350

3400

3446'

1.58°

206.93°

3425.26'

194.46'

3450

3500

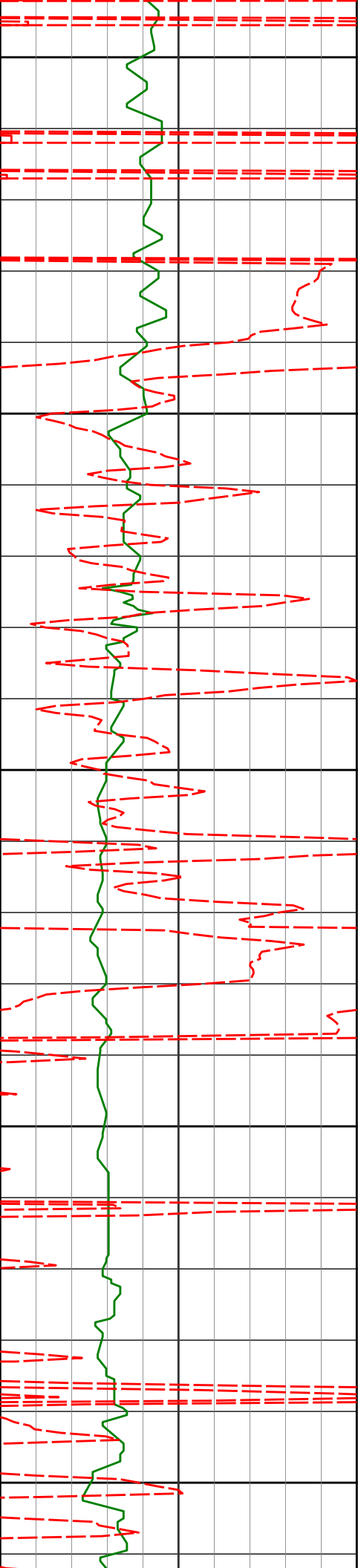
3541'

1.28°

151.33°

3520.23'

194.63'



3550

3600

3650

3700

3750

3636'

0.49°

148.23°

3615.22'

193.96'

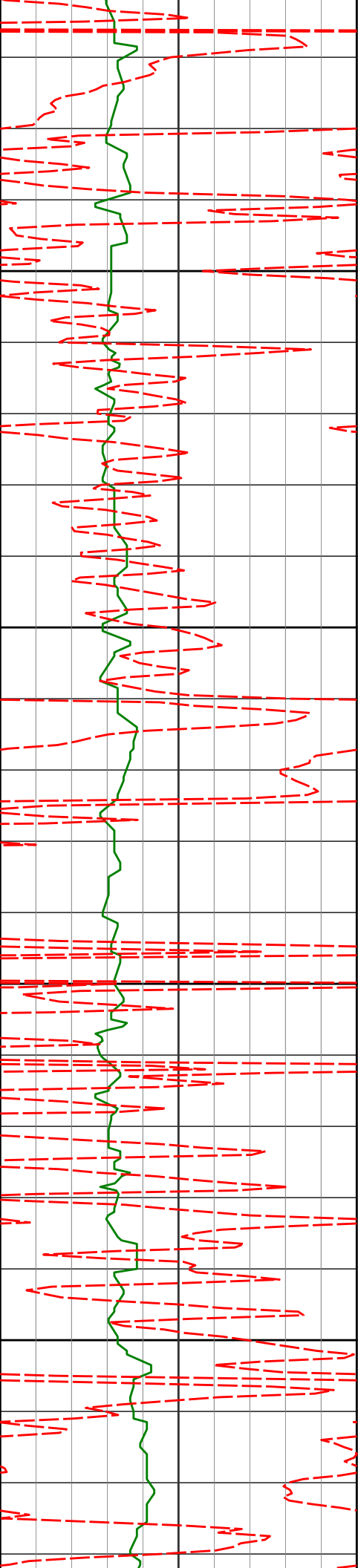
3731'

0.47°

155.38°

3710.22'

193.62'



3800

3826'

0.33°

119.66°

3805.22'

193.24'

3850

3900

3920'

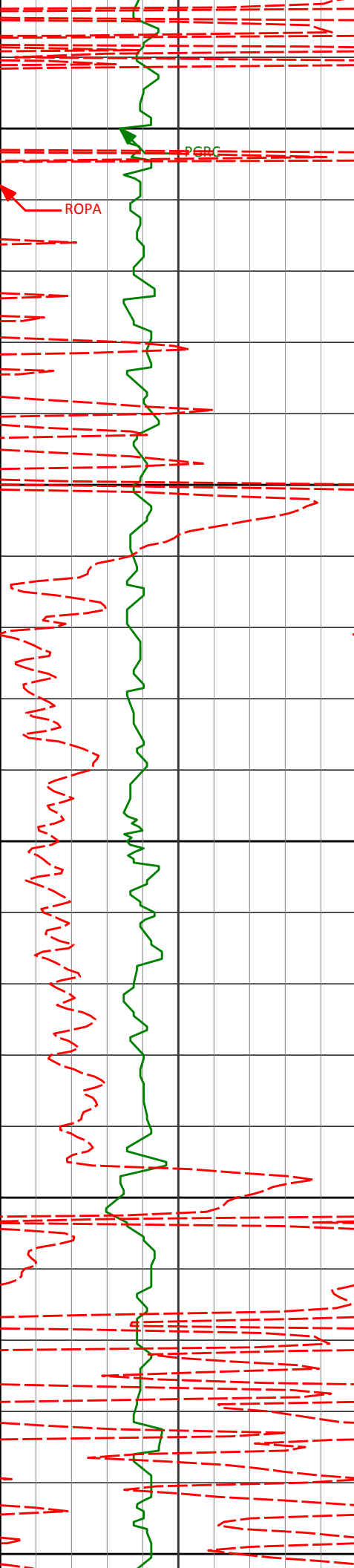
0.43°

10.96°

3899.21'

192.92'

3950



4015'	0.83°	16.91°	3994.21'	192.61'
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4000

PGRC

ROPA

4050

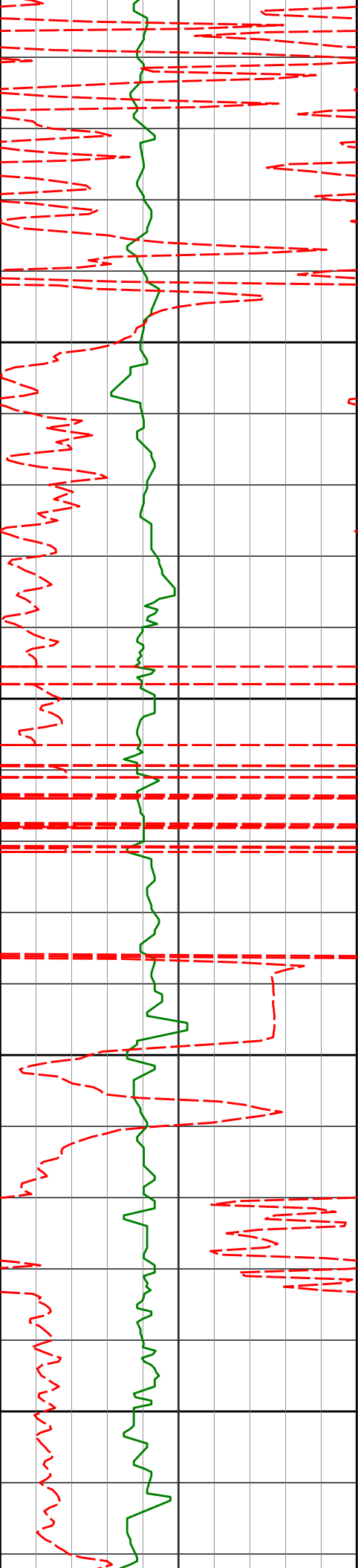
4110'	0.06°	53.10°	4089.20'	192.34'
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4100

4150

4205'	0.25°	143.79°	4184.20'	192.18'
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4200



4250

4300'

0.22°

189.55°

4279.20'

192.11'

4300

4350

4394'

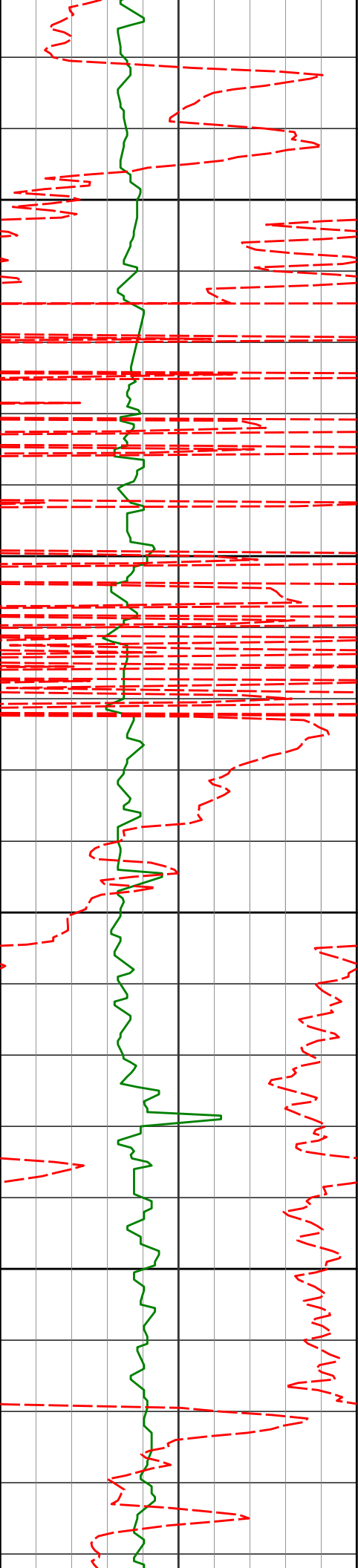
0.11°

225.38°

4373.20'

192.21'

4400



4450

4489'

0.56°

123.83°

4468.20'

191.91'

4500

4550

4584'

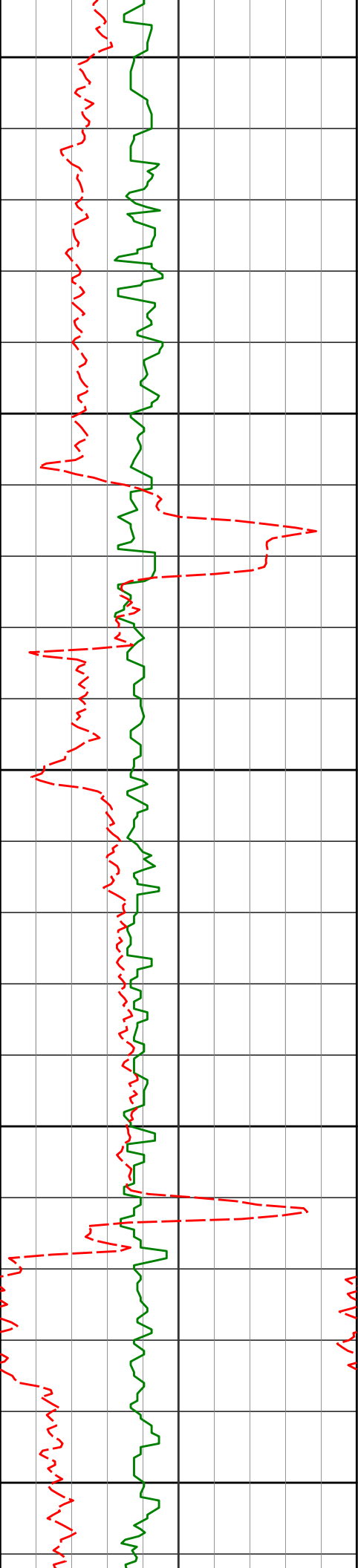
0.28°

162.61°

4563.20'

191.48'

4600



4650

4679'	0.67°	111.68°	4658.20'	190.92'
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4700

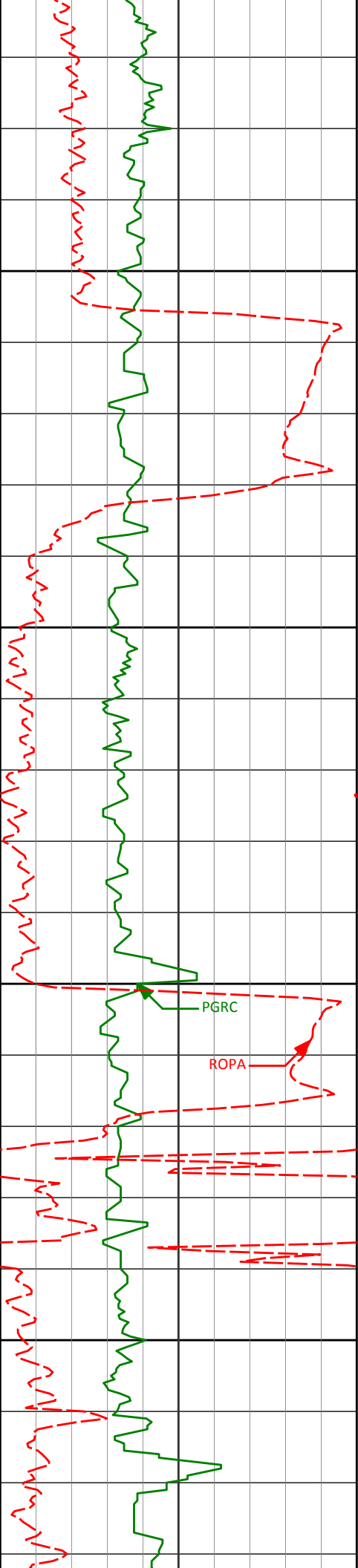
4750

4774'	1.08°	86.37°	4753.19'	189.52'
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4800

4850

4869'	2.54°	83.46°	4848.14'	186.53'
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4900

4964'

1.49°

48.85°

4943.08'

183.47'

4950

5000

5058'

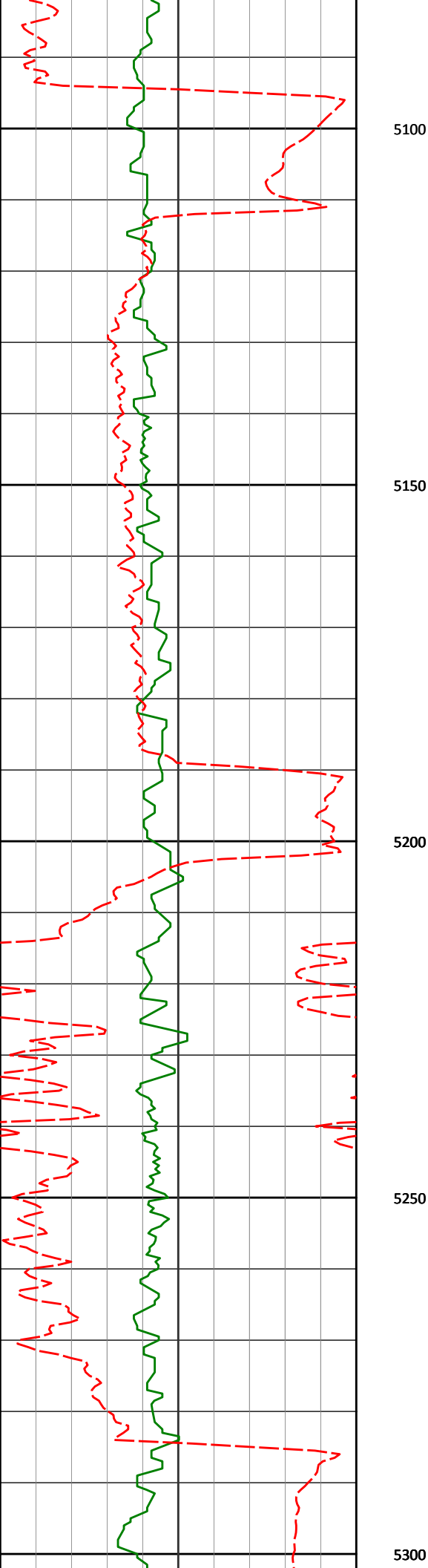
1.18°

62.60°

5037.05'

181.63'

5050



5153'

1.32°

115.41°

5132.03'

179.78'

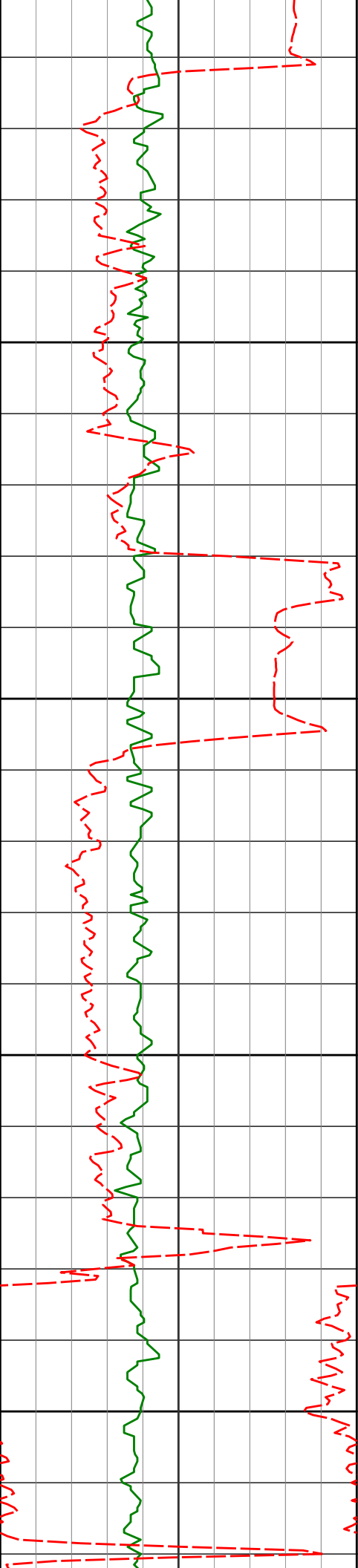
5247'

1.69°

132.51°

5226.00'

177.85'



5342'

1.23°

113.43°

5320.97'

175.94'

5350

5400

5437'

0.99°

83.39°

5415.95'

174.21'

5450

5500

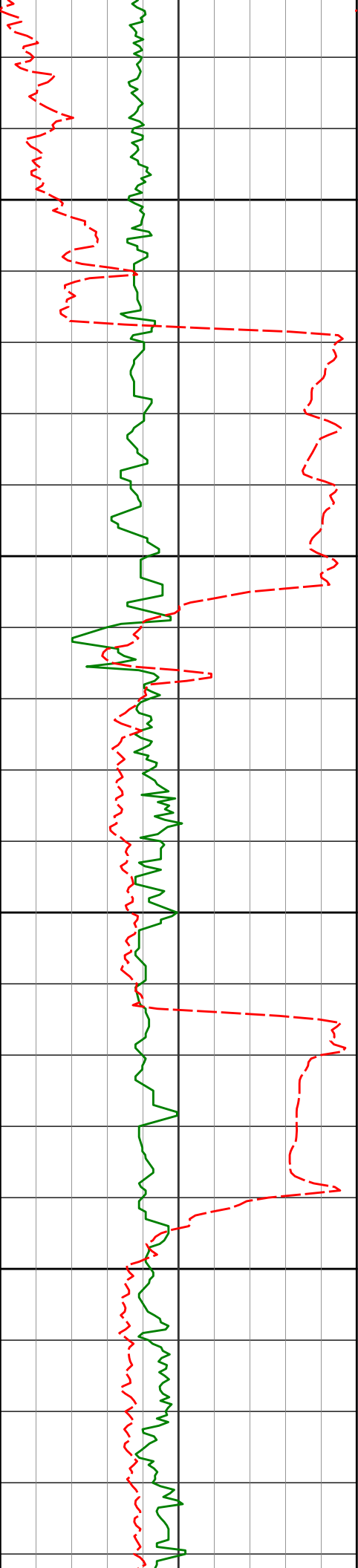
5532'

2.22°

99.44°

5510.92'

171.59'



5550

5600

5650

5700

5627'

1.27°

41.50°

5605.88'

169.06'

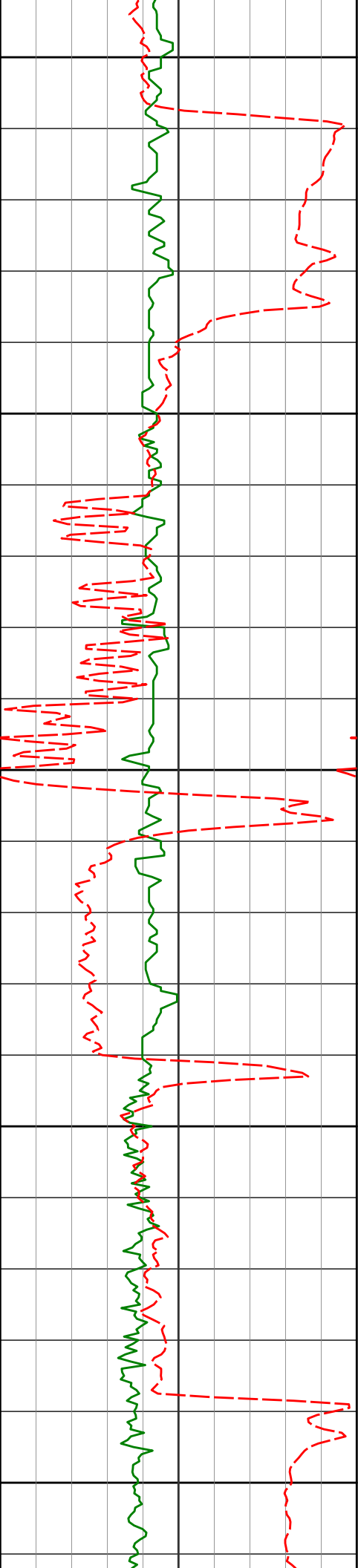
5722'

1.42°

4.19°

5700.85'

168.19'



5750

5816'

1.38°

346.57°

5794.82'

168.27'

5800

5850

5903'

1.48°

341.93°

5881.80'

168.77'

5900

5965'

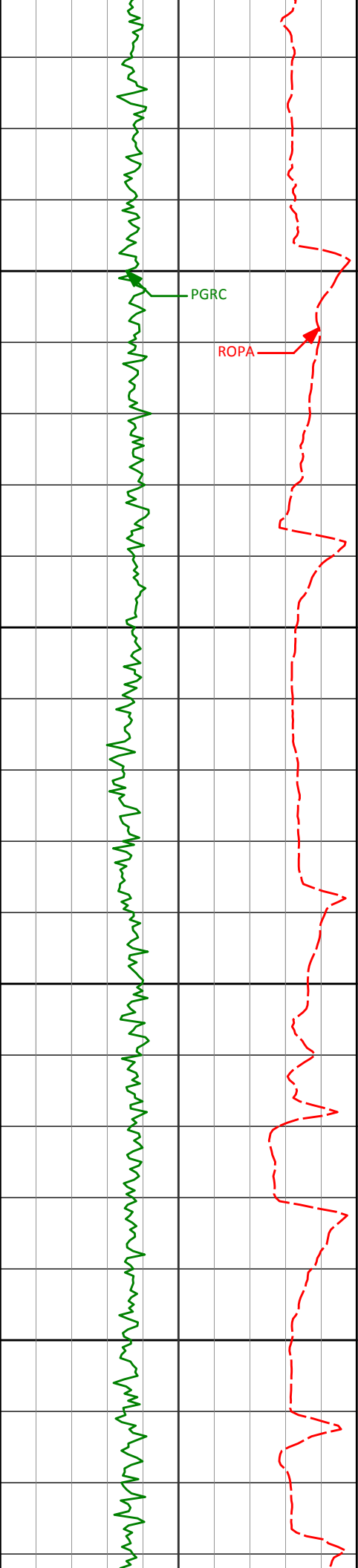
1.33°

345.43°

5943.78'

169.14'

5950



6006'

1.47°

339.19°

5984.77'

169.40'

6000

6054'

4.83°

288.60°

6032.69'

171.48'

6050

6100'

10.26°

287.30°

6078.28'

177.15'

6100

6148'

15.19°

281.44°

6125.09'

187.28'

6150

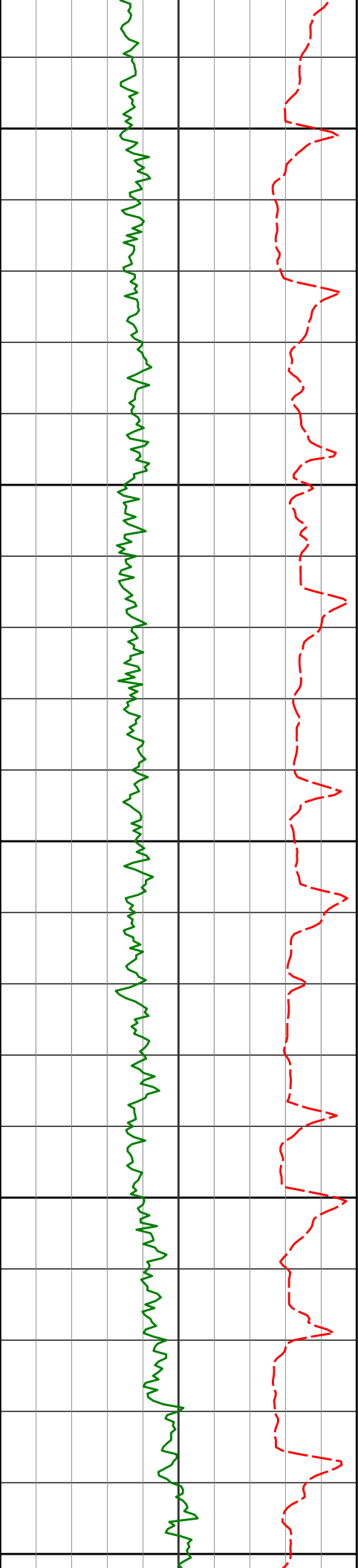
6195'

19.08°

275.40°

6170.00'

200.87'



6200

6243'	21.73°	271.28°	6214.98'	217.51'
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6250

6289'	24.36°	268.71°	6257.31'	235.50'
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6300

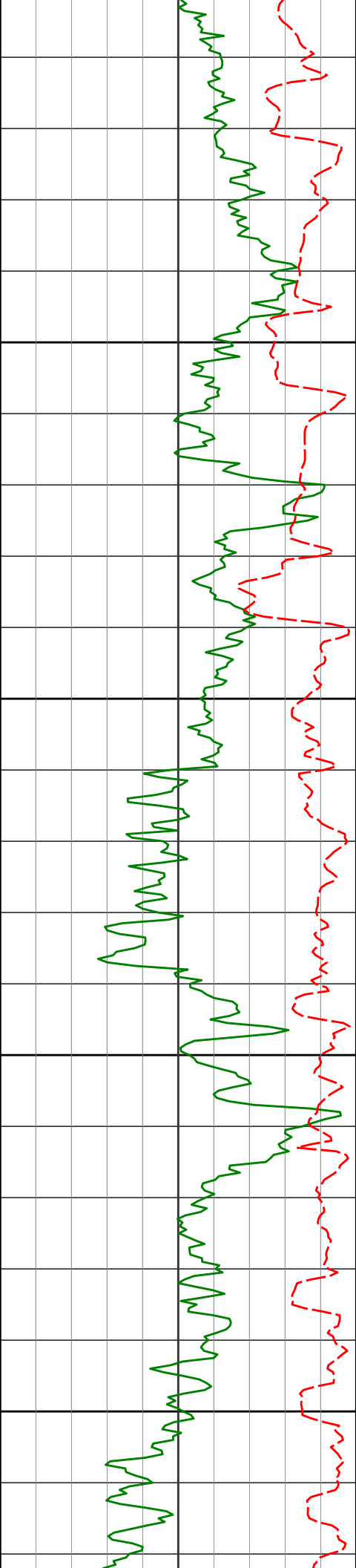
6337'	28.85°	266.67°	6300.21'	256.99'
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6350

6384'	33.25°	267.10°	6340.47'	281.23'
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6400

6432'	36.71°	268.55°	6379.79'	308.74'
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6450

6500

6550

6600

6479'

40.72°

270.52°

6416.46'

338.10'

6527'

44.45°

273.03°

6451.80'

370.48'

6574'

49.13°

273.49°

6483.97'

404.56'

6622'

53.37°

270.86°

6514.01'

441.85'

6669'

57.50°

266.82°

6540.68'

480.53'

6717'

62.96°

265.27°

6564.50'

522.16'

6764'

67.26°

266.90°

6584.28'

564.77'

6812'

72.06°

267.03°

6600.96'

609.76'

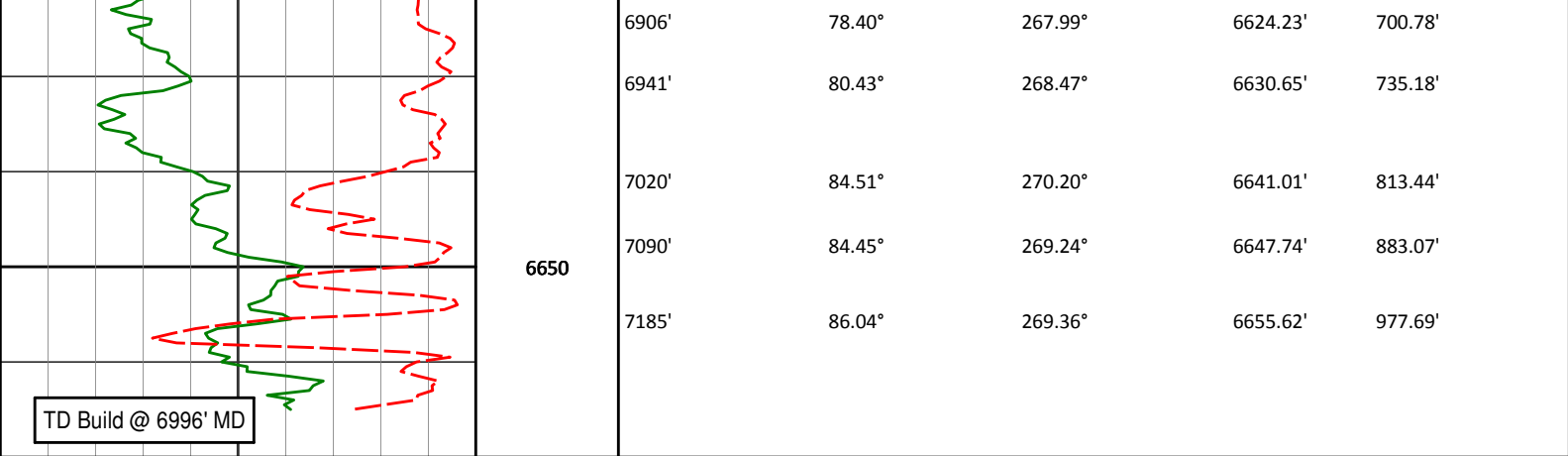
6858'

76.03°

266.77°

6613.60'

653.98'



Avg Rate of Penetration ROPA feet per hr 1K 0	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
PCG Gamma Ray PGRC api 0 300						

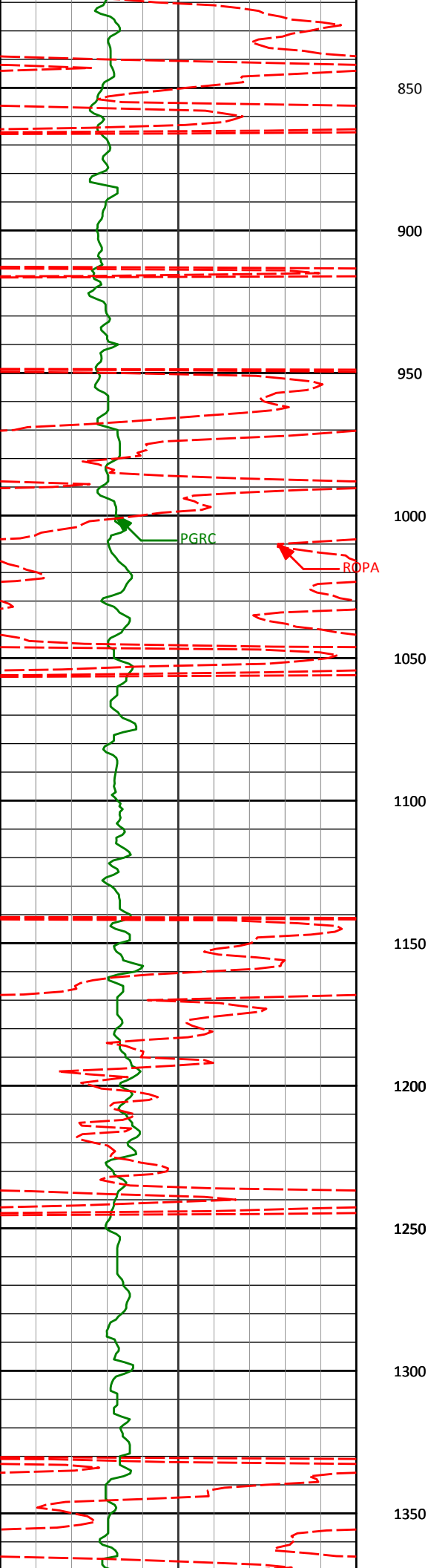
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Sperry Drilling Services

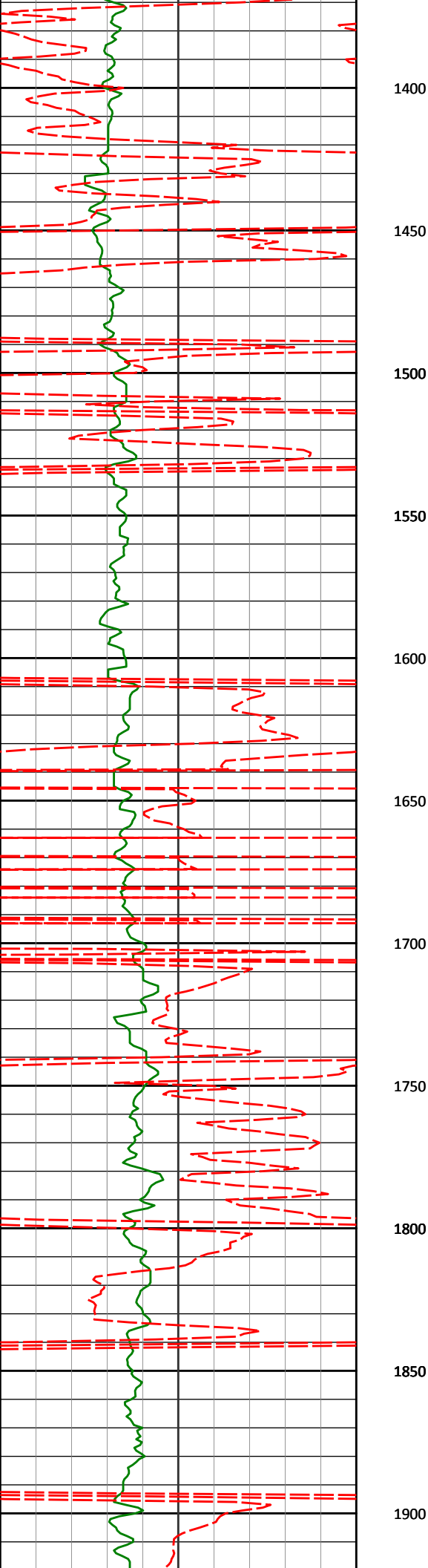
TVD Correlation Log 1:600

Noble Energy
Wells Ranch USX AA23-66-1HN
H&P 321
Sec. 24-T6N-R63W

PCG Gamma Ray PGRC api 0 300						
Avg Rate of Penetration ROPA feet per hr 1K 0	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
	600	603'	0.10°	348.70°	602.91'	-4.52'
	650	669'	0.69°	26.66°	668.91'	-4.70'
	700	721'	0.56°	14.60°	720.91'	-4.93'
	750					
	800					
		813'	0.68°	26.14°	812.90'	-5.32'



904'	0.83°	22.89°	903.90'	-5.86'
997'	0.39°	68.87°	996.89'	-6.45'
1090'	0.76°	29.34°	1089.89'	-7.08'
1181'	0.15°	307.74°	1180.88'	-7.30'
1274'	0.13°	125.36°	1273.88'	-7.29'
1365'	0.07°	214.43°	1364.88'	-7.34'



1457'

0.77°

237.73°

1456.88'

-6.77'

1552'

1.86°

241.23°

1551.85'

-4.83'

1647'

2.68°

232.17°

1646.78'

-1.63'

1742'

4.67°

238.75°

1741.58'

3.56'

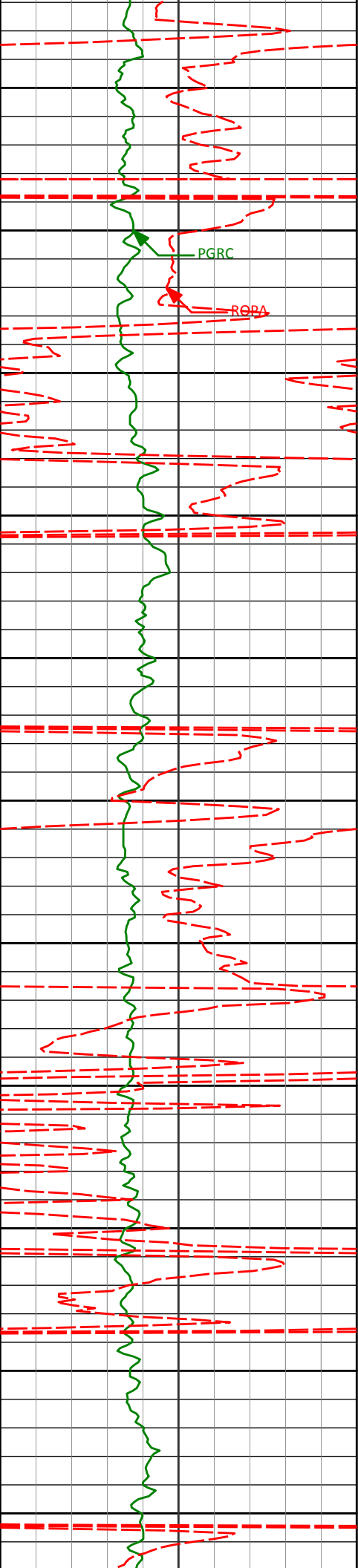
1837'

6.94°

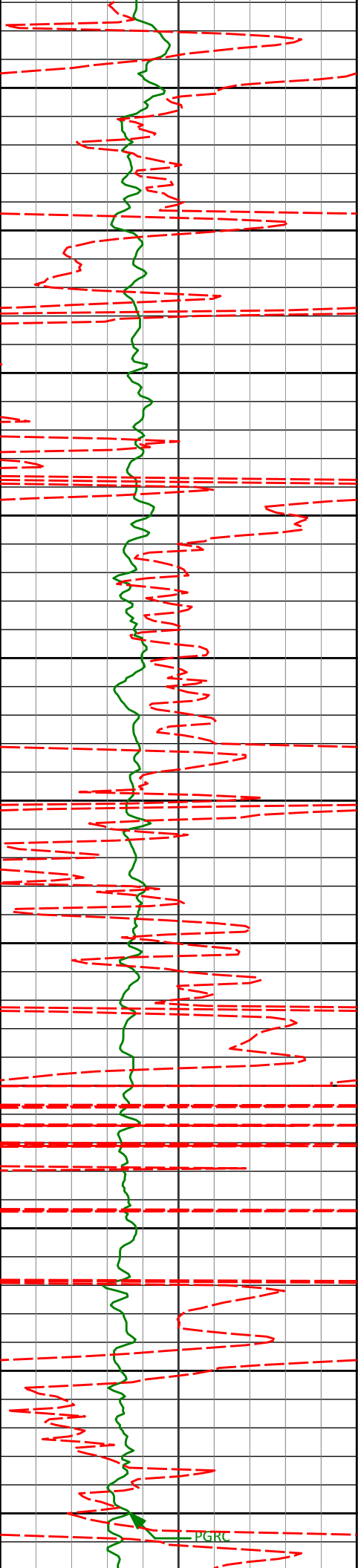
241.22°

1836.08'

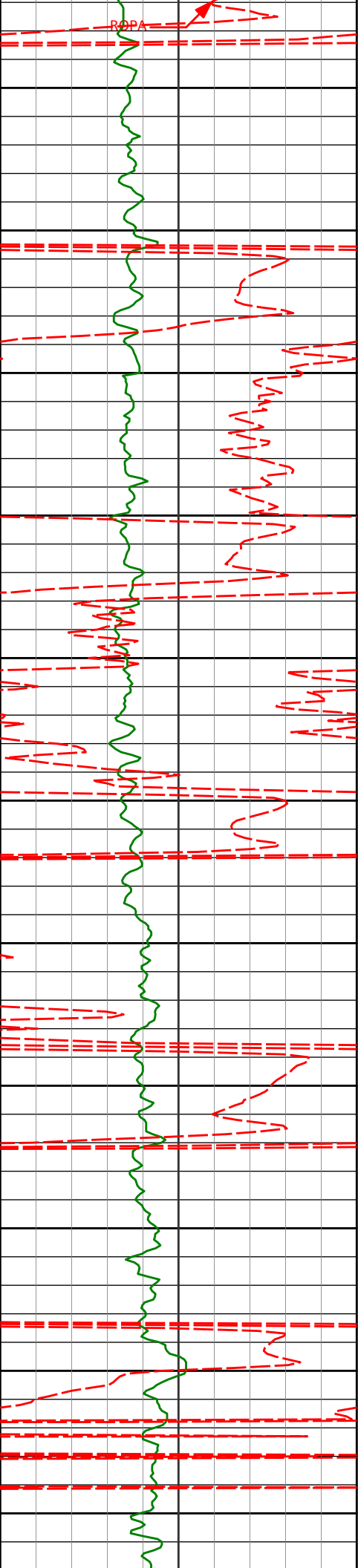
12.10'



1932'	8.47°	240.17°	1930.22'	23.46'
1950				
2000				
2026'	10.53°	238.17°	2022.93'	37.10'
2050				
2100				
2121'	9.72°	225.48°	2116.46'	50.62'
2150				
2200				
2216'	10.07°	227.83°	2210.05'	62.96'
2250				
2300				
2311'	10.79°	226.50°	2303.48'	76.06'
2350				
2400				
2405'	9.92°	225.11°	2395.95'	88.67'
2450				



2500'	10.73°	226.01°	2489.41'	101.33'
2500				
2550				
2595'	11.44°	227.66°	2582.64'	115.19'
2600				
2650				
2689'	10.23°	224.54°	2674.96'	128.45'
2700				
2750				
2784'	10.40°	223.50°	2768.42'	140.78'
2800				
2850				
2879'	9.52°	218.00°	2861.99'	152.05'
2900				
2950				
2973'	9.54°	223.79°	2954.70'	162.73'
3000				



3050

3100

3150

3200

3250

3300

3350

3400

3450

3500

3550

3068'

8.22°

222.69°

3048.56'

173.24'

3162'

5.83°

223.51°

3141.84'

181.44'

3257'

4.12°

223.48°

3236.48'

187.36'

3351'

2.64°

245.50°

3330.32'

191.79'

3446'

1.58°

206.93°

3425.26'

194.46'

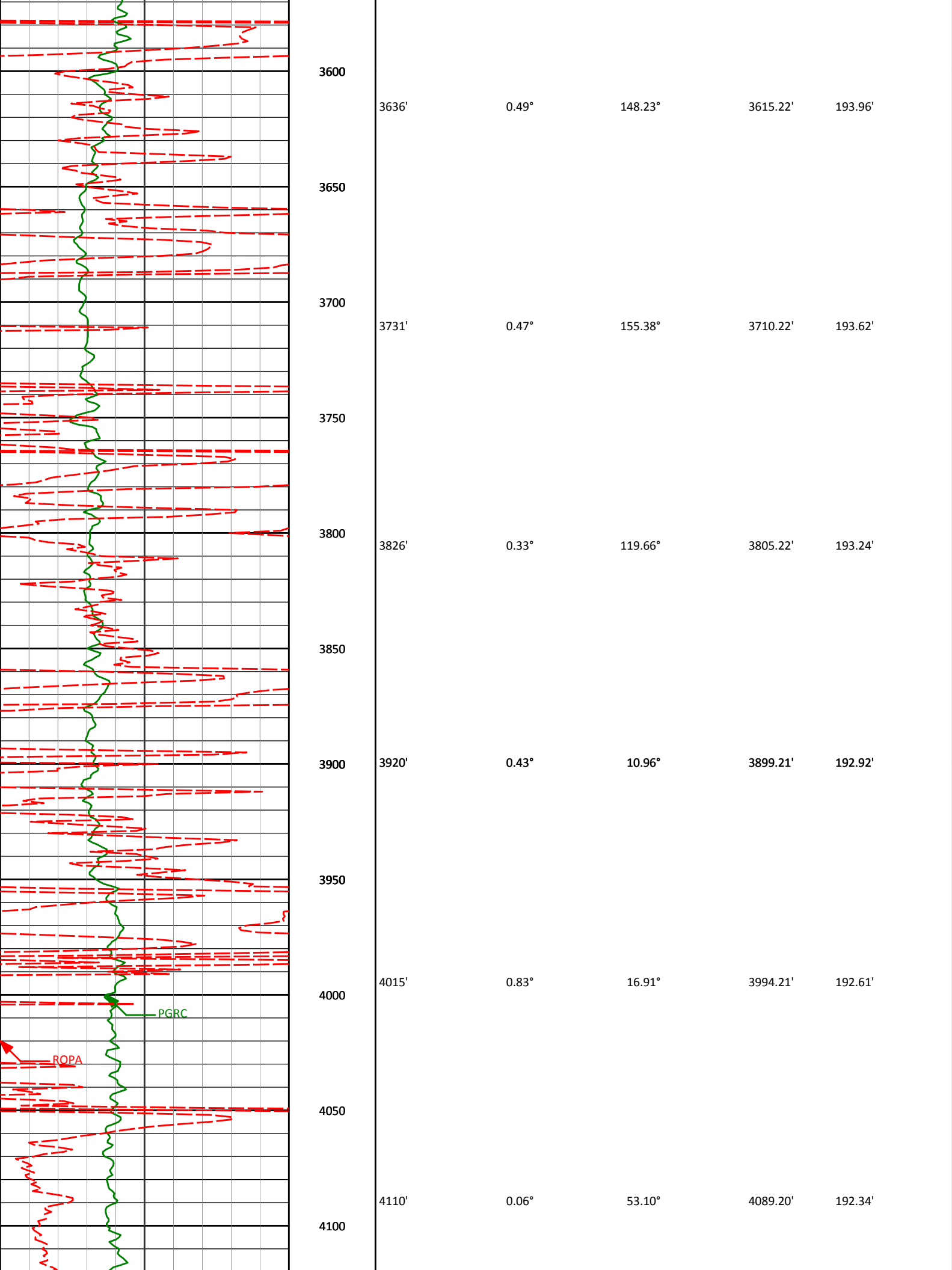
3541'

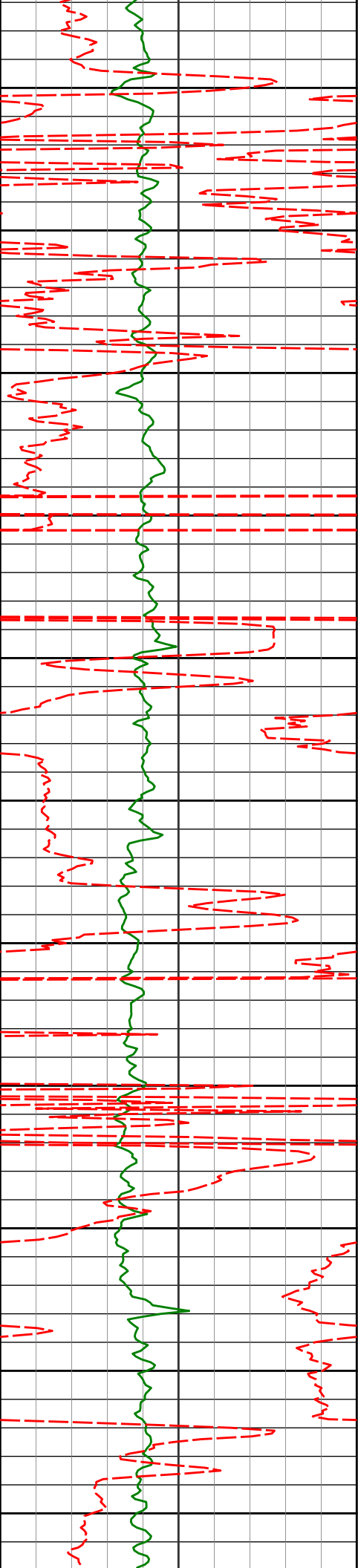
1.28°

151.33°

3520.23'

194.63'





4150

4205'

0.25°

143.79°

4184.20'

192.18'

4200

4250

4300'

0.22°

189.55°

4279.20'

192.11'

4300

4350

4394'

0.11°

225.38°

4373.20'

192.21'

4400

4450

4489'

0.56°

123.83°

4468.20'

191.91'

4500

4550

4584'

0.28°

162.61°

4563.20'

191.48'

4600

4650

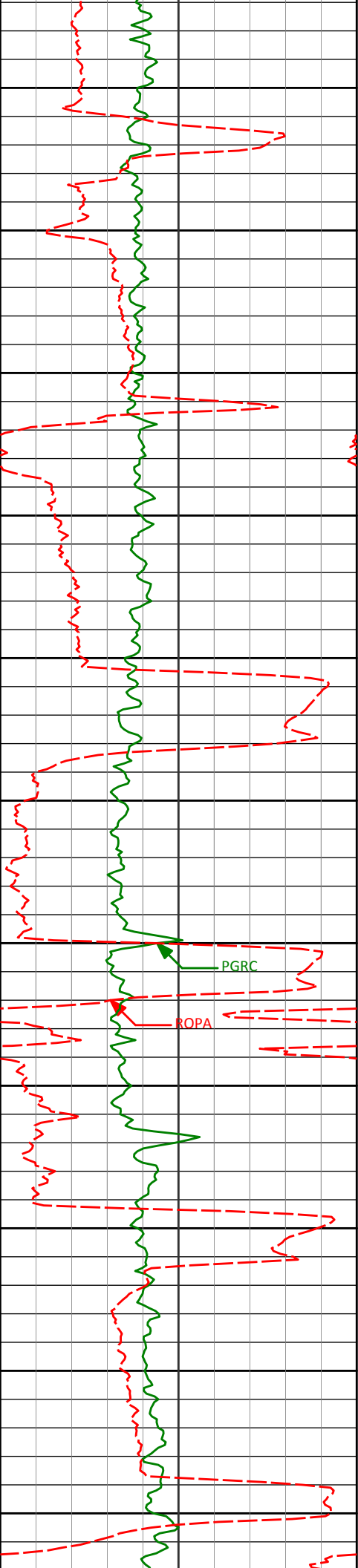
4679'

0.67°

111.68°

4658.20'

190.92'



4700

4750

4800

4850

4900

4950

5000

5050

5100

5150

5200

4774'

1.08°

86.37°

4753.19'

189.52'

4869'

2.54°

83.46°

4848.14'

186.53'

4964'

1.49°

48.85°

4943.08'

183.47'

5058'

1.18°

62.60°

5037.05'

181.63'

5153'

1.32°

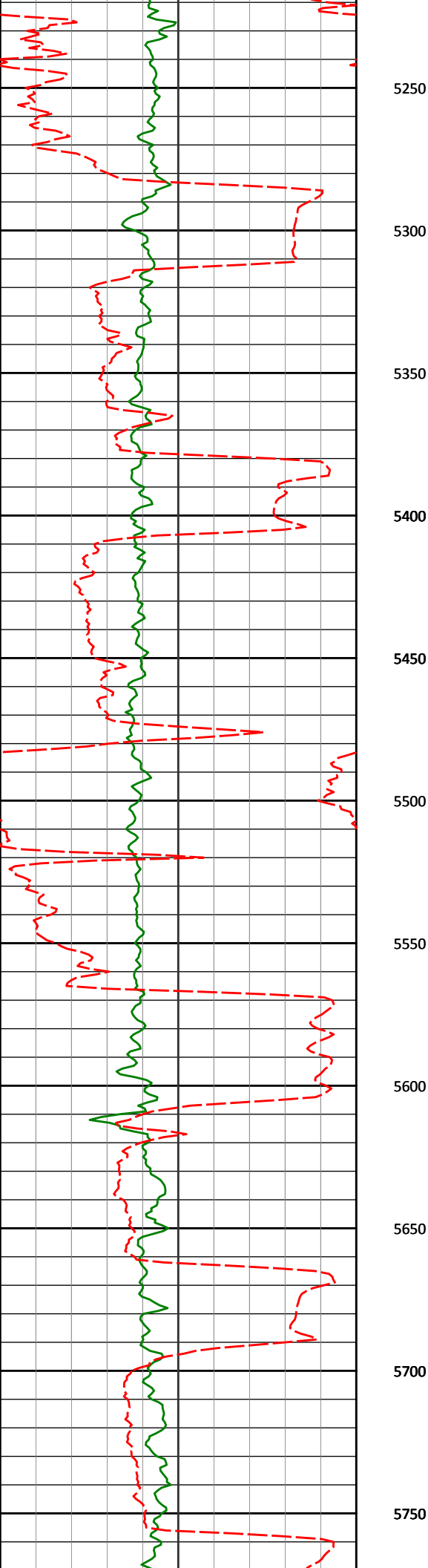
115.41°

5132.03'

179.78'

PGRC

ROPA



5247'

1.69°

132.51°

5226.00'

177.85'

5250

5300

5342'

1.23°

113.43°

5320.97'

175.94'

5350

5400

5437'

0.99°

83.39°

5415.95'

174.21'

5450

5500

5532'

2.22°

99.44°

5510.92'

171.59'

5550

5600

5627'

1.27°

41.50°

5605.88'

169.06'

5650

5700

5722'

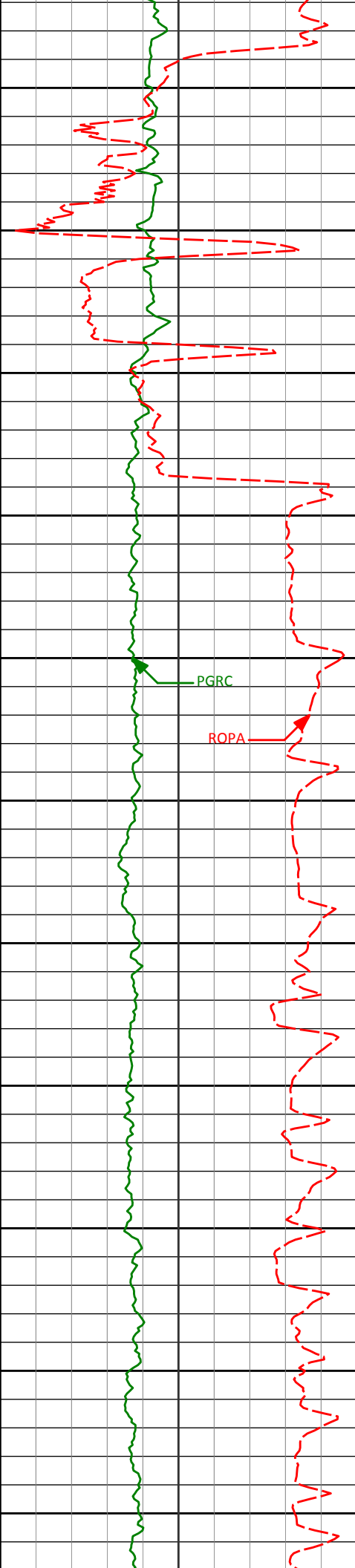
1.42°

4.19°

5700.85'

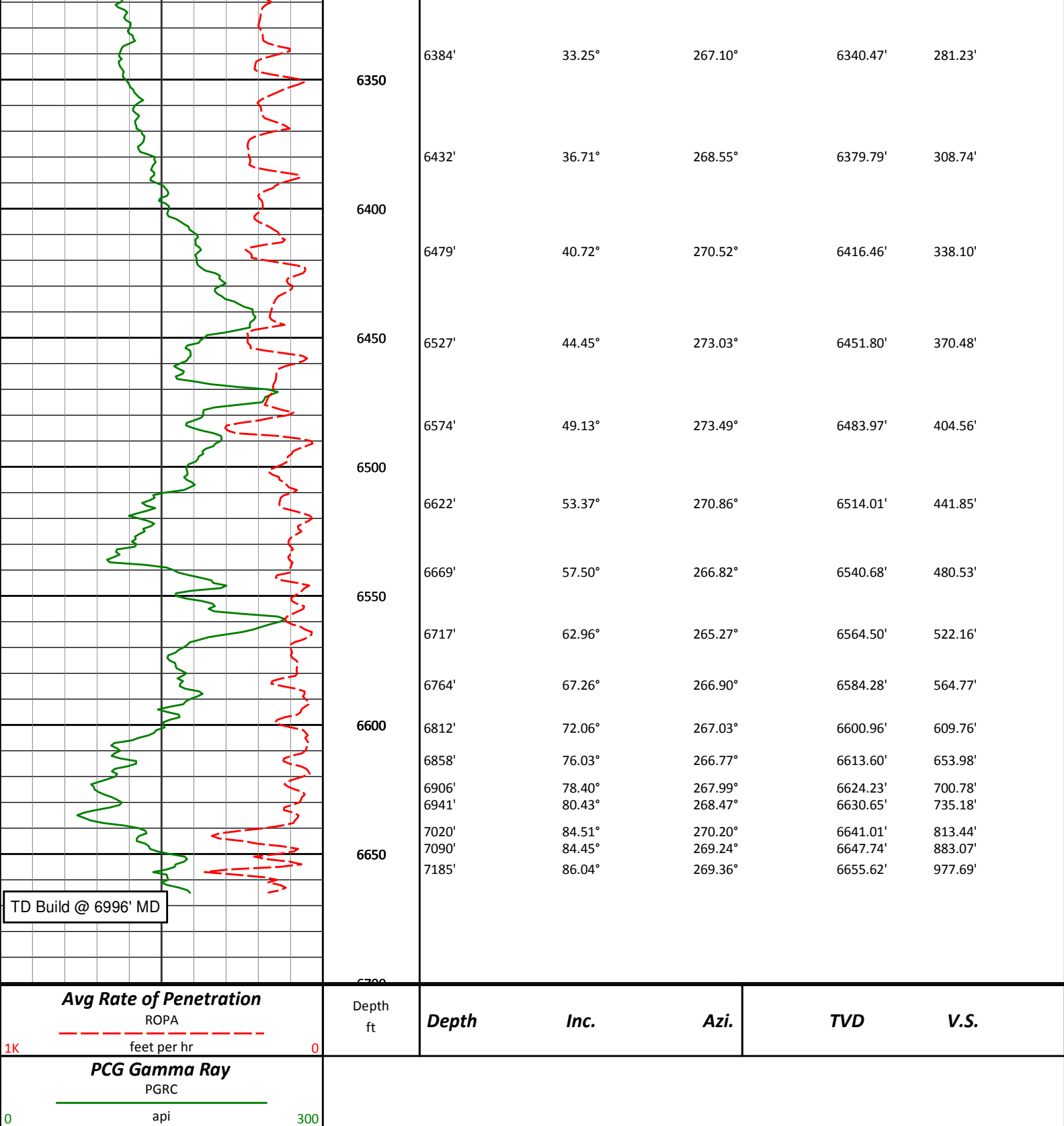
168.19'

5750



5800	5816'	1.38°	346.57°	5794.82'	168.27'
5850					
5900	5903'	1.48°	341.93°	5881.80'	168.77'
5950	5965'	1.33°	345.43°	5943.78'	169.14'
6000	6006'	1.47°	339.19°	5984.77'	169.40'
6050	6054'	4.83°	288.60°	6032.69'	171.48'
6100	6100'	10.26°	287.30°	6078.28'	177.15'
6150	6148'	15.19°	281.44°	6125.09'	187.28'
6200	6195'	19.08°	275.40°	6170.00'	200.87'
6250	6243'	21.73°	271.28°	6214.98'	217.51'
6300	6289'	24.36°	268.71°	6257.31'	235.50'
	6337'	28.85°	266.67°	6300.21'	256.99'

200



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch USX AA23-66-1HN
Wattenburg
Weld Colorado
USA
CA-XX-0900577115

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
310.00	0.60	89.10	309.99	0.03 N	1.62 E	-1.62	0.19
359.00	1.20	29.50	358.99	0.48 N	2.13 E	-2.15	2.11
448.00	2.00	31.30	447.95	2.61 N	3.40 E	-3.51	0.90
541.00	1.20	1.70	540.92	4.97 N	4.27 E	-4.48	1.21
603.00	0.10	348.70	602.91	5.68 N	4.28 E	-4.52	1.78
669.00	0.69	26.66	668.91	6.09 N	4.45 E	-4.70	0.93
721.00	0.56	14.60	720.91	6.61 N	4.65 E	-4.93	0.36
813.00	0.68	26.14	812.90	7.53 N	5.00 E	-5.32	0.19
904.00	0.83	22.89	903.90	8.62 N	5.49 E	-5.86	0.17
997.00	0.39	68.87	996.89	9.35 N	6.05 E	-6.45	0.67
1090.00	0.76	29.34	1089.89	10.01 N	6.65 E	-7.08	0.56
1181.00	0.15	307.74	1180.88	10.61 N	6.85 E	-7.30	0.83
1274.00	0.13	125.36	1273.88	10.63 N	6.84 E	-7.29	0.31
1365.00	0.07	214.43	1364.88	10.52 N	6.90 E	-7.34	0.16
1457.00	0.77	237.73	1456.88	10.15 N	6.34 E	-6.77	0.77
1552.00	1.86	241.23	1551.85	9.06 N	4.44 E	-4.83	1.15
1647.00	2.68	232.17	1646.78	6.96 N	1.34 E	-1.63	0.93
1742.00	4.67	238.75	1741.58	3.59 N	3.72 W	3.56	2.14
1837.00	6.94	241.22	1836.08	1.18 S	12.06 W	12.10	2.41
1932.00	8.47	240.17	1930.22	7.43 S	23.16 W	23.46	1.62
2026.00	10.53	238.17	2022.93	15.40 S	36.47 W	37.10	2.22
2121.00	9.72	225.48	2116.46	25.60 S	49.56 W	50.62	2.49
2216.00	10.07	227.83	2210.05	36.80 S	61.43 W	62.96	0.56
2311.00	10.79	226.50	2303.48	48.50 S	74.04 W	76.06	0.80
2405.00	9.92	225.11	2395.95	60.27 S	86.15 W	88.67	0.96
2500.00	10.73	226.01	2489.41	72.18 S	98.31 W	101.33	0.87
2595.00	11.44	227.66	2582.64	84.67 S	111.64 W	115.19	0.82
2689.00	10.23	224.54	2674.96	96.90 S	124.39 W	128.45	1.44
2784.00	10.40	223.50	2768.42	109.13 S	136.21 W	140.78	0.27
2879.00	9.52	218.00	2861.99	121.55 S	146.95 W	152.05	1.36
2973.00	9.54	223.79	2954.70	133.30 S	157.13 W	162.73	1.02
3068.00	8.22	222.69	3048.56	143.98 S	167.19 W	173.24	1.40
3162.00	5.83	223.51	3141.84	152.38 S	175.03 W	181.44	2.55
3257.00	4.12	223.48	3236.48	158.36 S	180.70 W	187.36	1.80
3351.00	2.64	245.50	3330.32	161.71 S	184.99 W	191.79	2.07
3446.00	1.58	206.93	3425.26	163.78 S	187.57 W	194.46	1.80
3541.00	1.28	151.33	3520.23	165.87 S	187.65 W	194.63	1.43
3636.00	0.49	148.23	3615.22	167.15 S	186.93 W	193.96	0.84
3731.00	0.47	155.38	3710.22	167.85 S	186.56 W	193.62	0.07
3826.00	0.33	119.66	3805.22	168.33 S	186.16 W	193.24	0.29
3920.00	0.43	10.96	3899.21	168.12 S	185.85 W	192.92	0.66
4015.00	0.83	16.91	3994.21	167.11 S	185.58 W	192.61	0.43
4110.00	0.06	53.10	4089.20	166.42 S	185.34 W	192.34	0.83
4205.00	0.25	143.79	4184.20	166.56 S	185.18 W	192.18	0.27
4300.00	0.22	189.55	4279.20	166.91 S	185.09 W	192.11	0.19
4394.00	0.11	225.38	4373.20	167.15 S	185.18 W	192.21	0.16
4489.00	0.56	123.83	4468.20	167.47 S	184.86 W	191.91	0.62
4584.00	0.28	162.61	4563.20	167.95 S	184.41 W	191.48	0.40
4679.00	0.67	111.68	4658.20	168.37 S	183.83 W	190.92	0.56
4774.00	1.08	86.37	4753.19	168.52 S	182.43 W	189.52	0.58
4869.00	2.54	83.46	4848.14	168.22 S	179.45 W	186.53	1.54
4964.00	1.49	48.85	4943.08	167.17 S	176.43 W	183.47	1.64
5058.00	1.18	62.60	5037.05	165.92 S	174.65 W	181.63	0.47
5153.00	1.32	115.41	5132.03	165.94 S	172.79 W	179.78	1.18
5247.00	1.69	132.51	5226.00	167.34 S	170.79 W	177.85	0.62
5342.00	1.23	113.43	5320.97	168.69 S	168.83 W	175.94	0.70
5437.00	0.99	83.39	5415.95	169.00 S	167.08 W	174.21	0.65
5532.00	2.22	99.44	5510.92	169.21 S	164.45 W	171.59	1.37
5627.00	1.27	41.50	5605.88	168.72 S	161.93 W	169.06	1.99
5722.00	1.42	4.19	5700.85	166.76 S	161.15 W	168.19	0.92
5816.00	1.38	346.57	5794.82	164.50 S	161.33 W	168.27	0.46
5903.00	1.48	341.93	5881.80	162.41 S	161.92 W	168.77	0.18
5965.00	1.33	345.43	5943.78	160.95 S	162.35 W	169.14	0.28
6006.00	1.47	339.19	5984.77	160.00 S	162.66 W	169.40	0.51
6054.00	4.83	288.60	6032.69	158.78 S	164.79 W	171.48	8.45
6100.00	10.26	287.30	6078.28	156.94 S	170.54 W	177.15	11.82
6148.00	15.19	281.44	6125.09	154.42 S	180.79 W	187.28	10.59
6195.00	19.88	275.42	6170.22	152.42 S	184.42 W	192.83	9.11

6195.00	19.08	275.40	6170.00	152.48 S	194.48 W	200.87	9.11
6243.00	21.73	271.28	6214.98	151.54 S	211.18 W	217.51	6.27
6289.00	24.36	268.71	6257.31	151.56 S	229.18 W	235.50	6.13
6337.00	28.85	266.67	6300.21	152.46 S	250.65 W	256.99	9.55
6384.00	33.25	267.10	6340.47	153.77 S	274.85 W	281.23	9.37
6432.00	36.71	268.55	6379.79	154.80 S	302.35 W	308.74	7.40
6479.00	40.72	270.52	6416.46	155.02 S	331.73 W	338.10	8.93
6527.00	44.45	273.03	6451.80	153.99 S	364.18 W	370.48	8.53
6574.00	49.13	273.49	6483.97	152.04 S	398.37 W	404.56	9.99
6622.00	53.37	270.86	6514.01	150.65 S	435.77 W	441.85	9.80
6669.00	57.50	266.82	6540.68	151.46 S	474.44 W	480.53	11.28
6717.00	62.96	265.27	6564.50	154.35 S	515.99 W	522.16	11.72
6764.00	67.26	266.90	6584.28	157.25 S	558.51 W	564.77	9.67
6812.00	72.06	267.03	6600.96	159.63 S	603.44 W	609.76	10.00
6858.00	76.03	266.77	6613.60	162.02 S	647.60 W	653.98	8.65
6906.00	78.40	267.99	6624.23	164.16 S	694.35 W	700.78	5.52
6941.00	80.43	268.47	6630.65	165.22 S	728.74 W	735.18	5.95
7020.00	84.51	270.20	6641.01	166.13 S	807.03 W	813.44	5.60
7090.00	84.45	269.24	6647.74	166.46 S	876.71 W	883.07	1.36
7185.00	86.04	269.36	6655.62	167.62 S	971.37 W	977.69	1.68
7279.00	88.30	269.46	6660.25	168.59 S	1065.24 W	1071.52	2.41
7374.00	91.54	270.38	6660.38	168.73 S	1160.23 W	1166.42	3.54
7469.00	91.51	271.28	6657.85	167.35 S	1255.19 W	1261.23	0.95
7563.00	92.28	281.00	6654.73	157.31 S	1348.48 W	1354.01	10.37
7658.00	90.96	287.47	6652.05	133.97 S	1440.48 W	1444.91	6.95
7753.00	88.03	282.01	6652.89	109.81 S	1532.30 W	1535.61	6.52
7847.00	86.27	277.90	6657.57	93.58 S	1624.75 W	1627.27	4.75
7942.00	87.69	275.21	6662.58	82.74 S	1718.98 W	1720.95	3.19

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 267.53 DEGREES (GRID)
A TOTAL CORRECTION OF 7.70 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7942.00 FEET
IS 1720.97 FEET ALONG 267.24 DEGREES (GRID)**

First Five survey's are from 3rd party source (Multi Shot EMS) and provided by CO-man on location before drilling.
Depth: 310.00 Inc. 0.60 Azi. 89.10
Depth: 359.00 Inc. 1.20 Azi. 359.00
Depth: 448.00 Inc. 2.00 Azi. 31.30
Depth: 541.00 Inc. 0.10 Azi. 1.70
Depth: 603.00 Inc. 0.10 Azi. 348.70
Tied in @ Surface