

PCG Pressure Case Gamma Ray PCDC Pressure Case Directional

Country : USA						
Field : Retail						
Location : Lat: 40° 48' 31.99" North Long: 103° 50' 3.43" West						
Well : Razor 26K-3508B						
Company : Whiting Oil and Gas						
Rig : Frontier 26						
<div>LOCATION<div>Latitude : 40° 48' 31.99" NorthLongitude : 103° 50' 3.43" WestUTM Easting = 3,461,093.236 ftUTM Northing = 1,541,855.094 ft</div></div> <div>Other ServicesDirectional Drilling</div>						
Permanent Datum : Ground Level Elevation : 4737.50 ft						
Log Measured From : Drill Floor 22.00 ft Above Permanent DatumMD LOG						
Drilling Measured From : Drill Floor						
Depth Logged : 81.00 ft To 12,415.00 ft Unit No. : 11581668 Job No.: CA-XX-0901083164						
Date Logged : 07-Feb-14 To 16-Feb-14						
Total Depth MD : 12,415.00 ft TVD: 5,678.91 ft Plot Type : Final						
Spud Date : 07-Feb-14 Plot Date : 16-Feb-14						
Run No.	SizeFromTo		Run No.		SizeFromTo	
0100	13,500 in	81.00 ft	1,570.00 ft			
0200	8,750 in	1,570.00 ft	5,995.00 ft			
0300	6,000 in	5,995.00 ft	12,415.00 ft			
0400	6,000 in	12,415.57 ft	SURFACE	SizeWeightCasing Record (MD)FromTo		
				9,625 in36.00 lbpfSURFACE		1,558.00 ft
				7,000 in30.00 lbpfSURFACE		5,980.00 ft

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	07-Feb-14	10-Feb-14	16-Feb-14		
Rig Bit Number	0100	0200	0300		
Bit Size (in)	13.500	8.750	6.000		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	81.00	1,570.00	5,995.00		
Log End Depth (MD, ft)	1,570.00	5,995.00	12,415.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	07-Feb-14 12:30	09-Feb-14 05:57	11-Feb-14 21:45		
Drill/Wipe End Date and Time	07-Feb-14 19:15	10-Feb-14 10:19	15-Feb-14 14:45		
Min Inc (deg) @ Depth (MD, ft)	0.00 @ 0.00	2.45 @ 3,832.00	86.14 @ 10,439.00		
Max Inc (deg) @ Depth (MD, ft)	3.32 @ 1,450.00	86.36 @ 5,944.00	93.12 @ 8,183.00		
Bit TFA(in2) / Bit Type	0.75 / PDC	0.00 / PDC	0.65 / PDC		
Flow Rate (gpm)	775.00	400.00	250.00		
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA	NA / NA		
Fluid Type	Spud Mud	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.40 / 42.00	9.50 / 45.00	10.00 / 48.00		
Filtrate CL (ppm)	1,800.00	2,000.00	2,000.00		
pH / Fluid Loss (mptm)	9.00 / 0	9.30 / 0	9.30 / 3		
PV (cP) / YP (lbf2)	NA / NA	18 / 15.00	18 / 18.00		
% Solids / % Sand	4 / 0.25	9 / 0.25	9 / 0.25		
% Oil / Oil:Water Ratio	NA / NA	NA / NA	NA / NA		
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 (in F) / S	168.05 / (PCM)	170.47 / (PCM)	200.05 / (PCM)		

Max Tool Temp (degF) / Source	106.97 / PCM	158.47 / PCM	200.05 / PCM		
Rm @ Max Tool Temp (degF)	NA @ 106.97	NA @ 158.47	NA @ 200.05		
Lead MWD Engineer	Tyrell Foran	Scott Trowbridge	Scott Trowbridge		
Customer Representative	Kenneth Wilkerson	Kenneth Wilkerson	Kenneth Wilkerson		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404301	11404301	12334786		
Insert Serial Number	10997265	11619990	11619997		
Date and Time Initialized	05-Feb-14 08:14	08-Feb-14 06:38	11-Feb-14 06:53		
Date and Time Read	07-Feb-14 21:39	10-Feb-14 18:40	16-Feb-14 03:31		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.76	48.60	46.88		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404301	11404301	12334786		
Sonde Serial Number	11478070	11638497	11902169		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	354.69	255.54	257.14		

Gamma Ray Sensor Information

Tool Type		PCG	PCG		
Distance From Bit (ft)		53.55	41.18		
Recorded Sample Period (sec)		10	10		
Software Version		8.15	8.15		
Sub Serial Number		11404301	12334786		
Insert/Sonde Serial Number		11680942	11681015		

REMARKS

1. All depths are true vertical 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 annular velocities are calculated using the "Power Law" for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. All data is stored data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
 PCG Gamma Ray BCorr (PGRC)
 Interval Resolution: .5
 Interval Distance: .6
 Gap Fill: 3
 Average Rate of Penetration (ROPA)
 Interval Resolution: .5
 Interval Distance: 1.2
 Gap Fill: 3
6. INSITE Version 8.0.10

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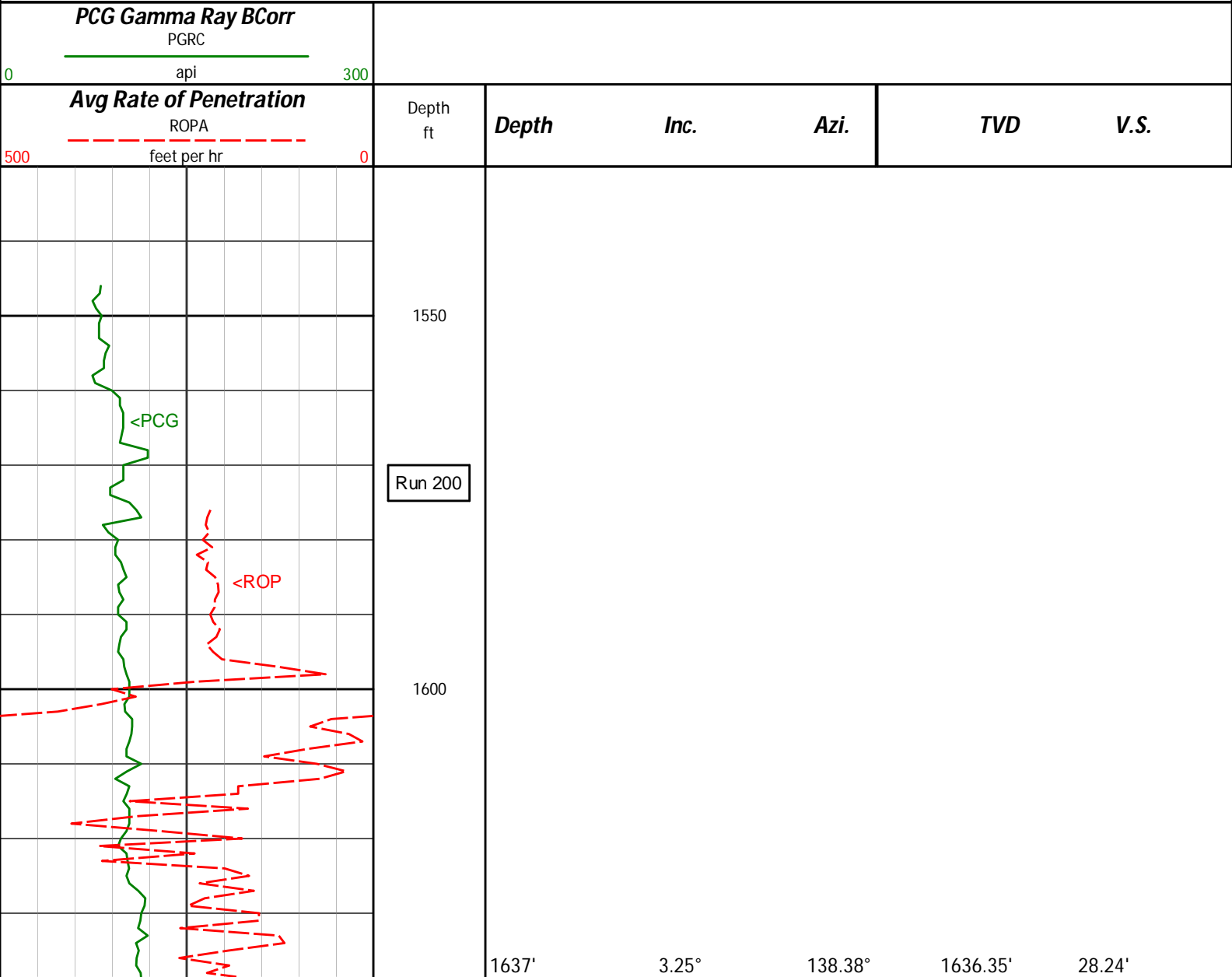
MD Main Log 1:240

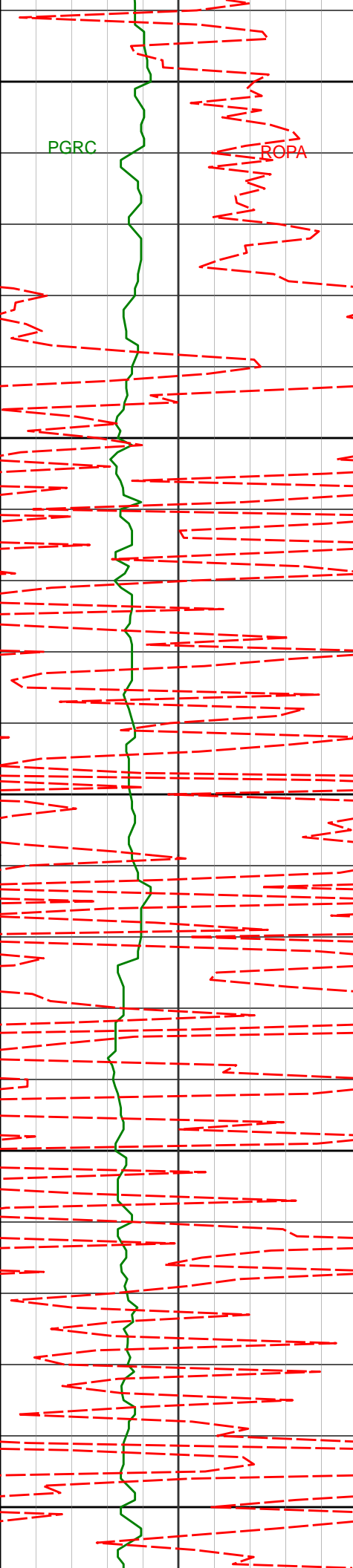
Whiting Oil and Gas

Razor 26K-3508B

Frontier 26

Sec. 26-T10N-R58W





1650

1700

1750

1800

1850

1728'

3.10°

137.52°

1727.21'

32.27'

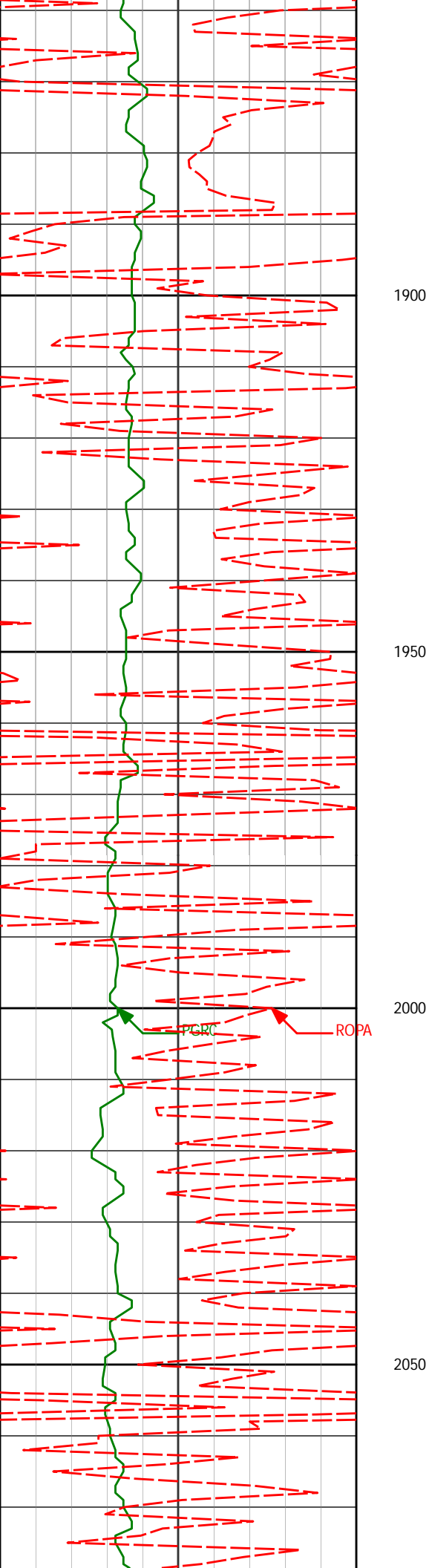
1819'

2.93°

130.52°

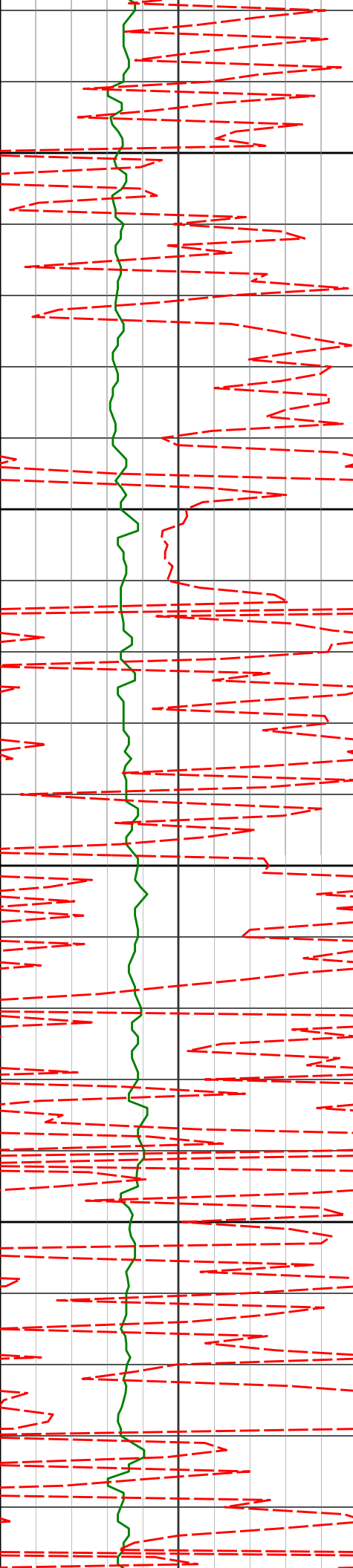
1818.08'

35.90'



1911'	5.54°	138.35°	1909.82'	41.16'
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2003'	4.95°	133.67°	2001.44'	47.72'
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2100

2150

2200

2250

2094'

4.80°

135.69°

2092.11'

53.64'

2185'

4.74°

163.34°

2182.81'

60.28'

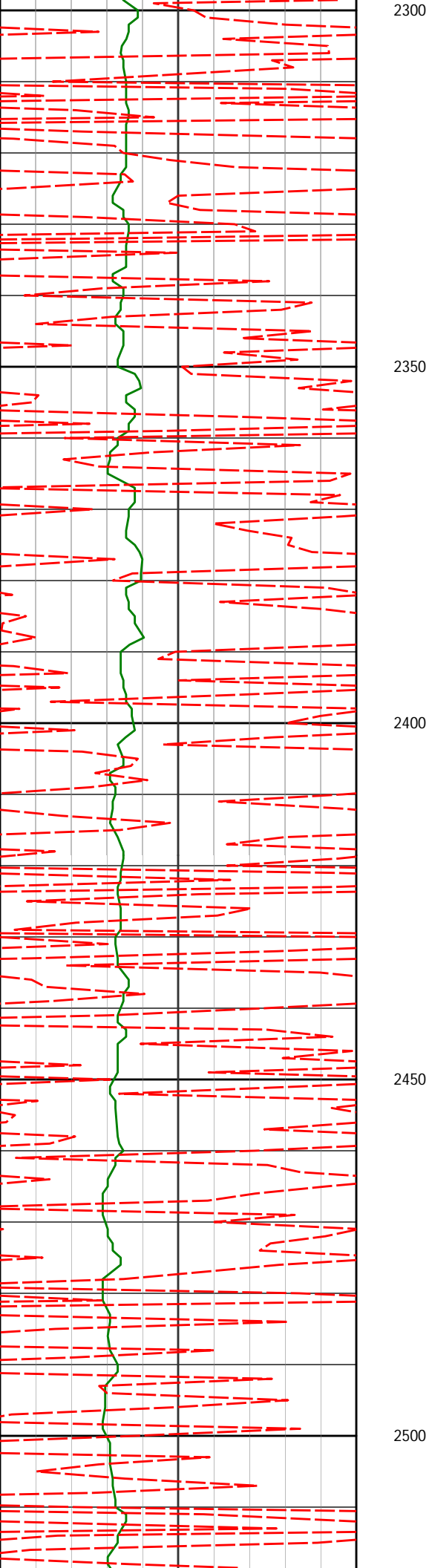
2276'

4.84°

161.31°

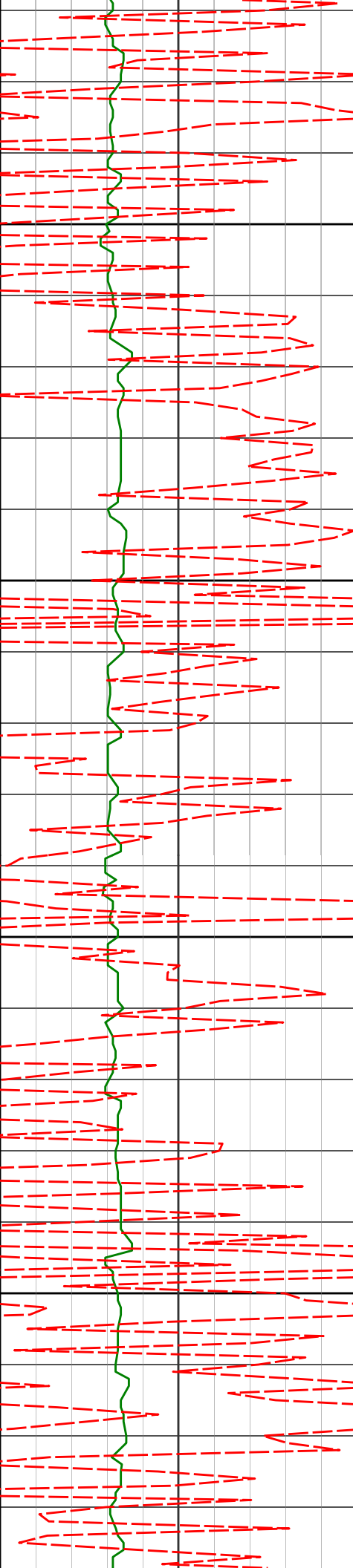
2273.49'

67.70'



2367'	3.82°	161.04°	2364.23'	74.38'
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2459'	4.35°	159.68°	2455.99'	80.72'
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2550

2551'

4.69°

158.36°

2547.71'

87.70'

2600

2650

2642'

4.80°

155.98°

2638.39'

94.87'

2700

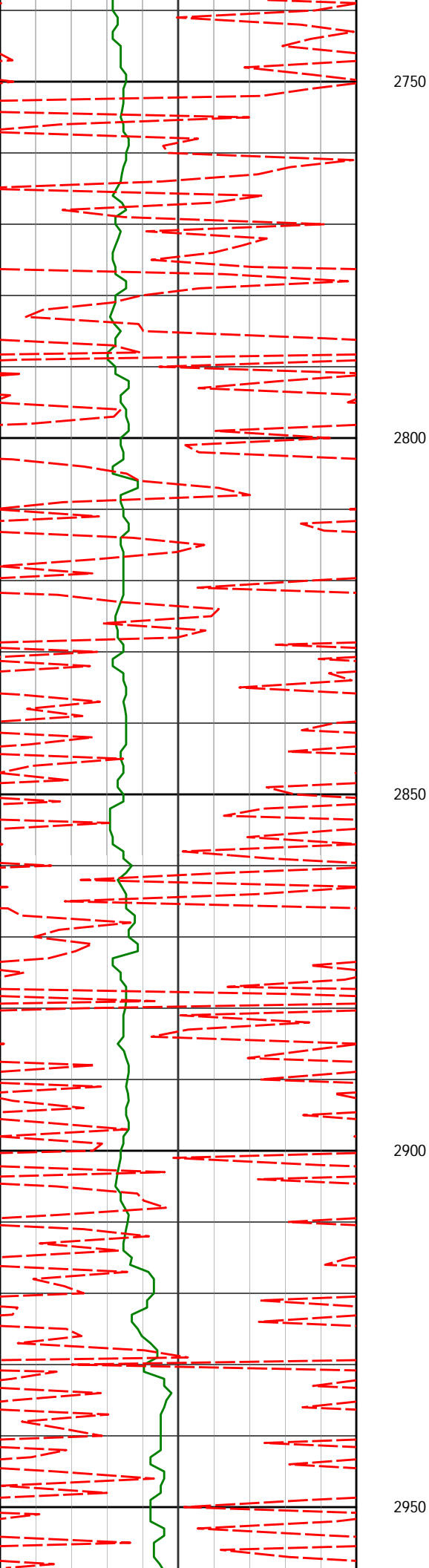
2734'

4.85°

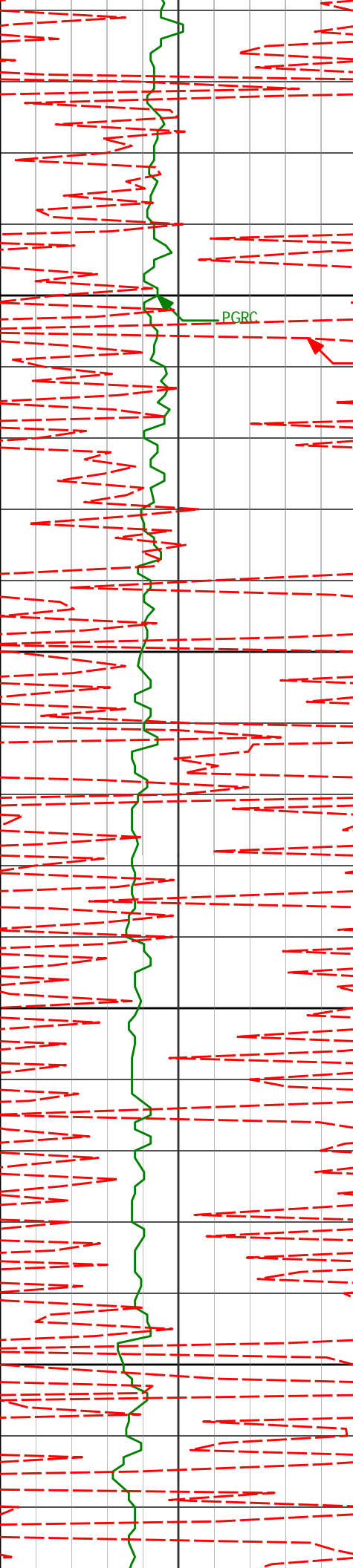
154.19°

2730.07'

102.16'



2825'	4.60°	146.31°	2820.76'	108.97'
2917'	3.81°	160.75°	2912.51'	115.18'



3000

PGRC

ROPA

3008'

3.07°

165.18°

3003.35'

120.51'

3050

3100

3100'

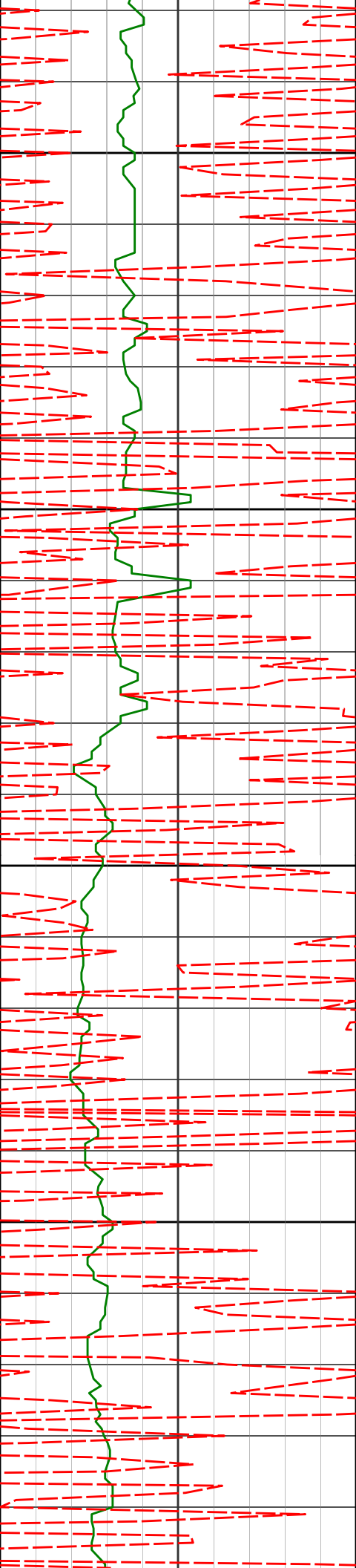
3.36°

173.63°

3095.21'

125.64'

3150



3190'

3.62°

167.81°

3185.04'

131.09'

3200

3250

3282'

3.52°

169.99°

3276.86'

136.79'

3300

3350

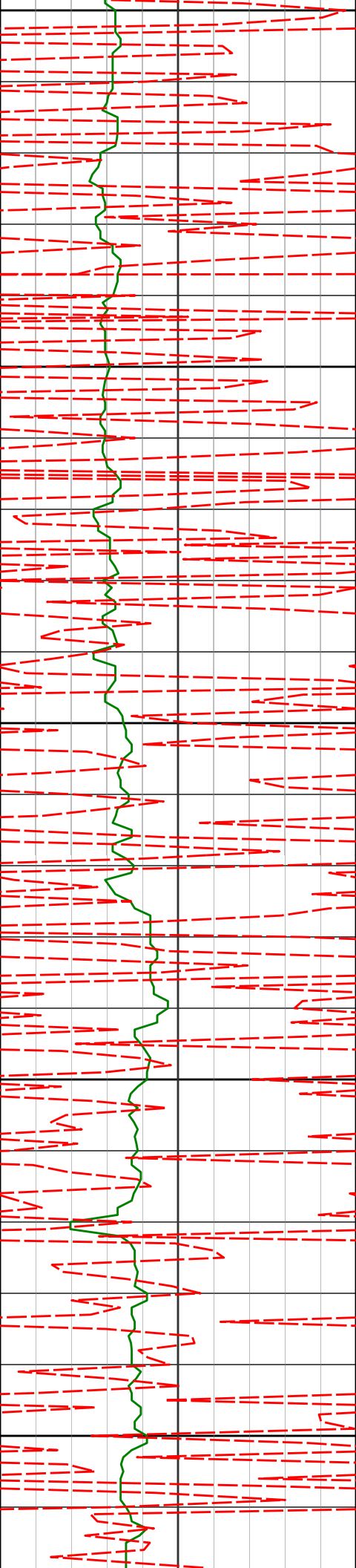
3374'

3.93°

167.01°

3368.67'

142.73'



3400

3450

3500

3550

3600

3465'

3.77°

168.68°

3459.46'

148.79'

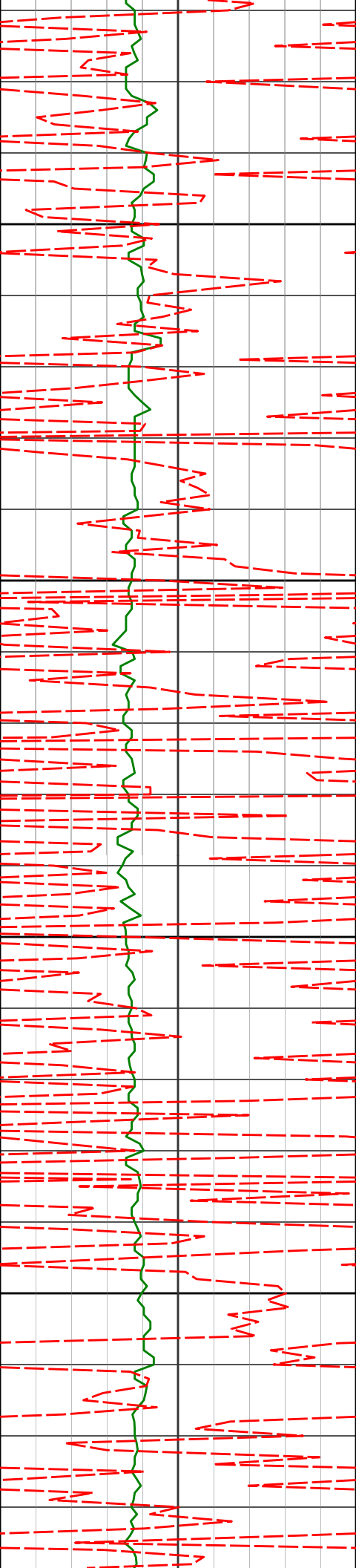
3557'

3.77°

164.46°

3551.26'

154.78'



3650

3649'

3.55°

165.98°

3643.07'

160.57'

3700

3740'

2.90°

168.02°

3733.93'

165.64'

3750

3800

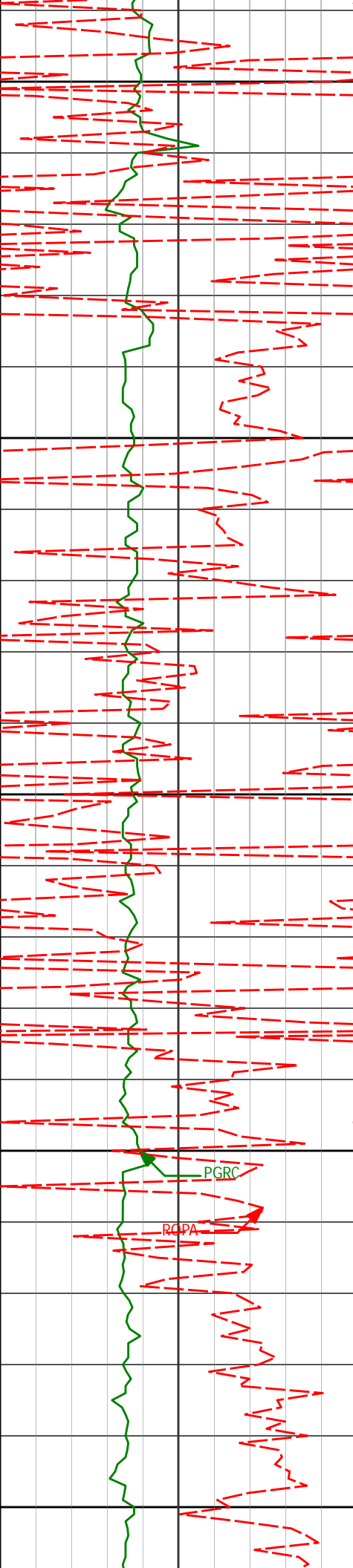
3832'

2.45°

150.34°

3825.83'

169.74'



3850

3900

3924'

3.64°

124.73°

3917.70'

173.41'

3950

4000

PGRC

ROPA

4015'

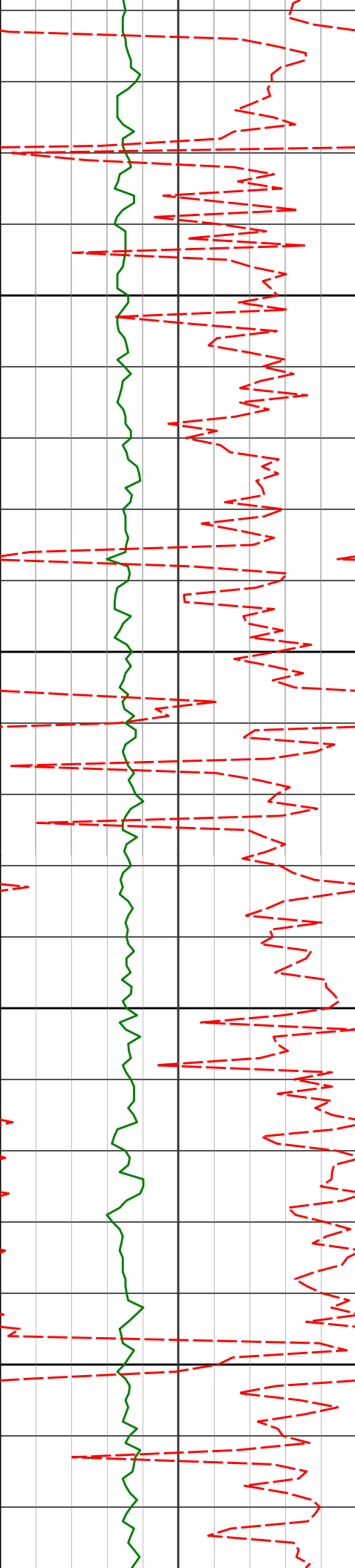
3.21°

129.37°

4008.54'

177.05'

4050



4100

4107'

4.34°

129.96°

4100.34'

181.33'

4150

4200

4199'

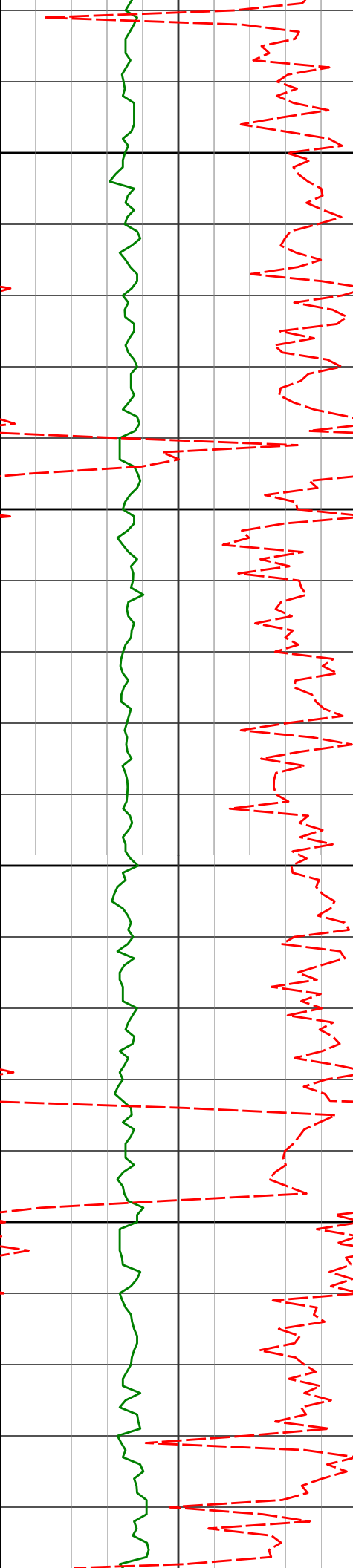
3.89°

127.38°

4192.10'

185.91'

4250



4291'

3.61°

131.31°

4283.90'

190.13'

4300

4350

4382'

3.13°

131.75°

4374.75'

194.02'

4400

4450

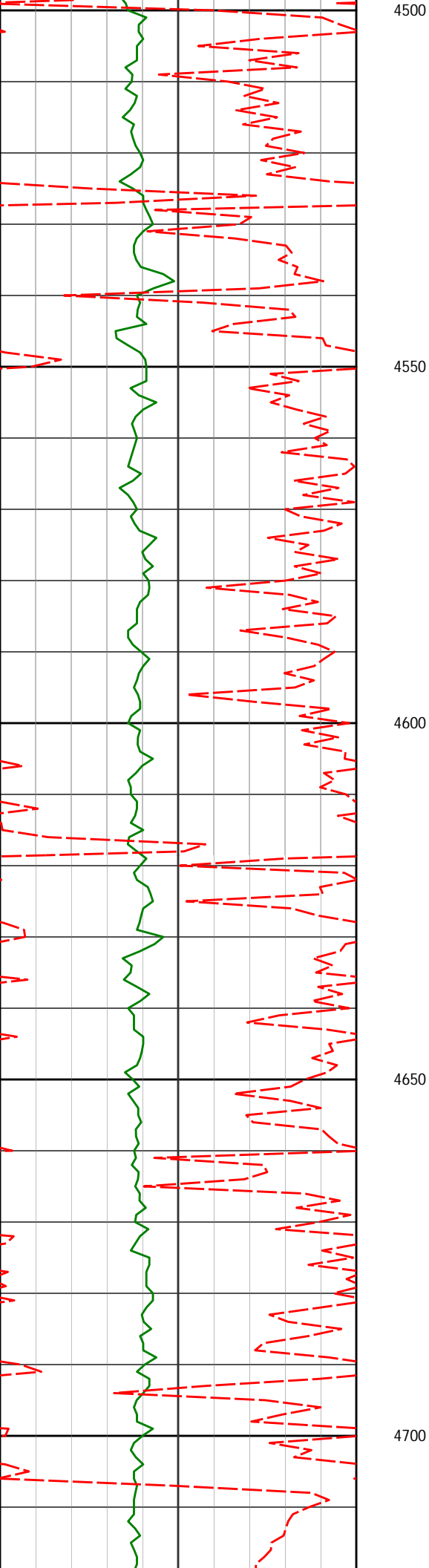
4473'

4.60°

142.65°

4465.54'

198.93'



4564'

3.50°

143.23°

4556.31'

204.39'

4550

4600

4650

4700

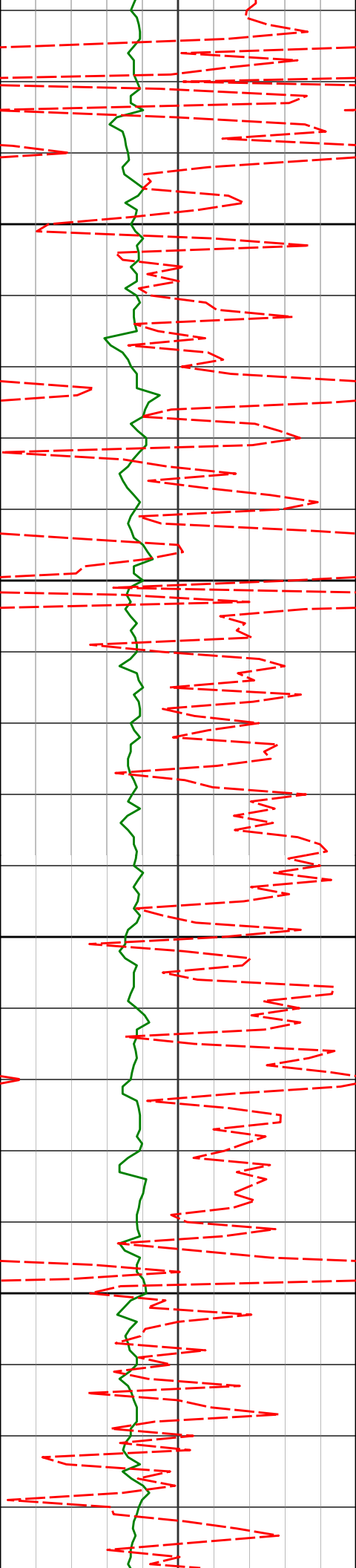
4656'

2.69°

141.02°

4648.18'

208.58'



4750

4800

4850

4900

4747'

4838'

4929'

4.44°

3.97°

3.78°

154.97°

153.06°

149.83°

4739.00'

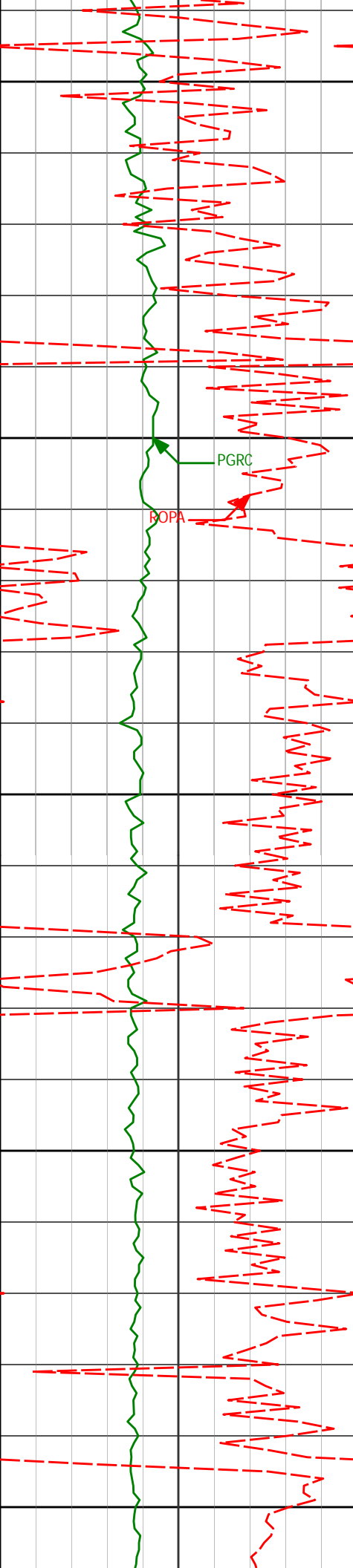
4829.75'

4920.54'

213.67'

219.91'

225.55'



4950

5000

5050

5100

5150

PGR

BOPA

5025'

3.15°

146.28°

5016.37'

230.74'

5120'

2.51°

139.74°

5111.25'

234.74'

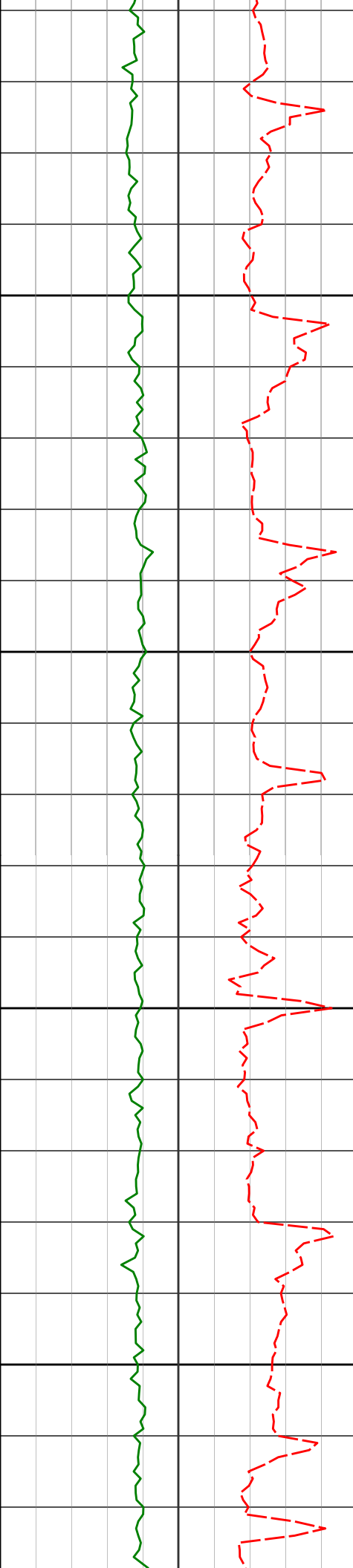
5151'

4.32°

143.97°

5142.20'

236.30'



5200

5250

5300

5350

5183'

7.73°

145.32°

5174.01'

239.21'

5214'

11.14°

140.84°

5204.59'

243.51'

5246'

14.95°

141.60°

5235.76'

249.53'

5278'

18.08°

141.28°

5266.44'

257.13'

5309'

21.34°

144.98°

5295.62'

266.04'

5341'

24.58°

147.99°

5325.08'

277.04'

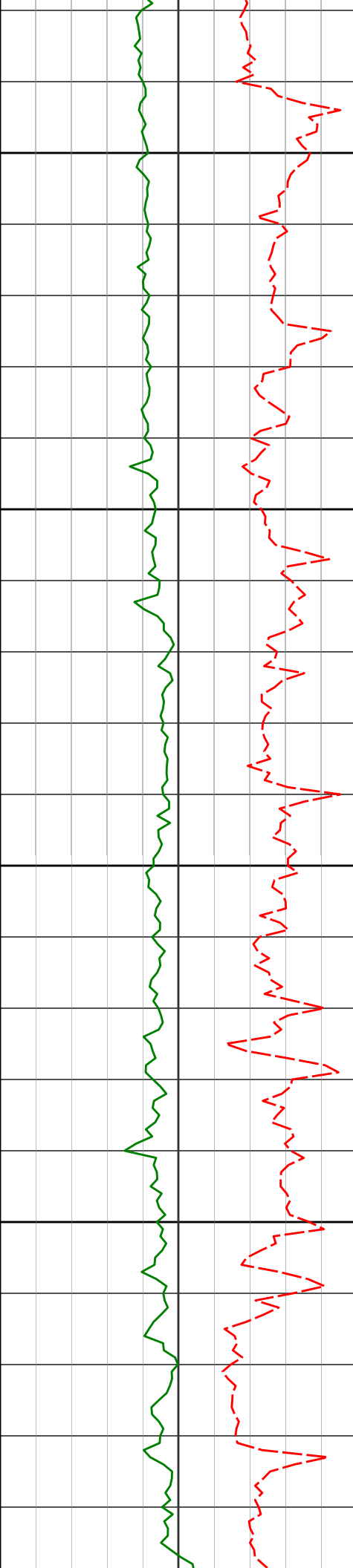
5373'

26.13°

155.23°

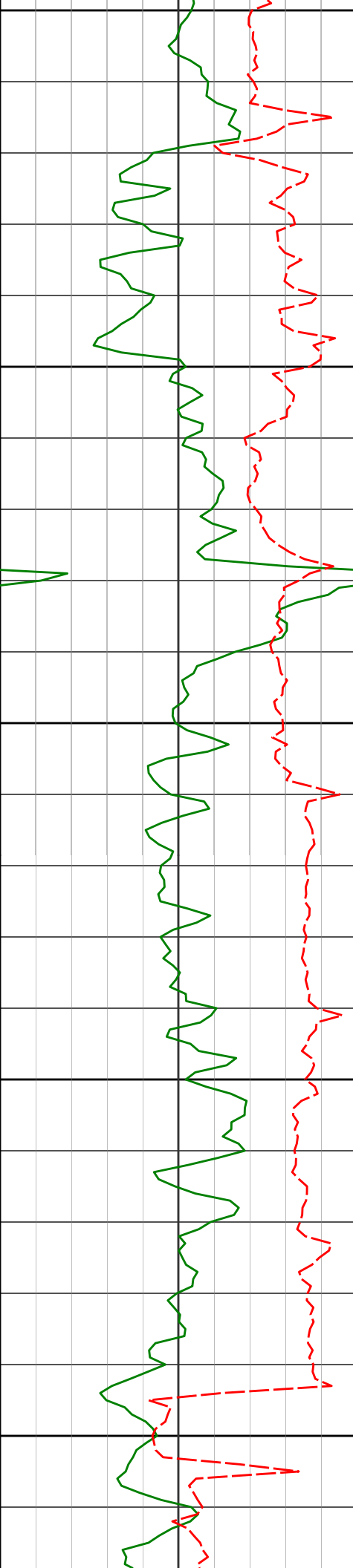
5354.00'

289.62'



5400
Run 300

5404'	28.95°	154.47°	5381.49'	303.10'
5436'	32.55°	153.84°	5408.98'	318.40'
5468'	35.82°	152.11°	5435.45'	335.09'
5499'	39.60°	151.41°	5459.91'	352.54'
5531'	42.93°	152.37°	5484.02'	371.98'
5563'	44.98°	154.90°	5507.06'	392.70'
5594'	48.99°	154.88°	5528.20'	414.01'



5600

5626'

51.84°

155.60°

5548.59'

437.25'

5650

5658'

53.88°

153.27°

5567.91'

461.16'

5689'

57.77°

152.49°

5585.32'

484.96'

5700

5721'

62.11°

150.49°

5601.35'

510.38'

5750

5752'

65.52°

149.64°

5615.03'

535.65'

5784'

69.65°

149.14°

5627.23'

562.37'

5800

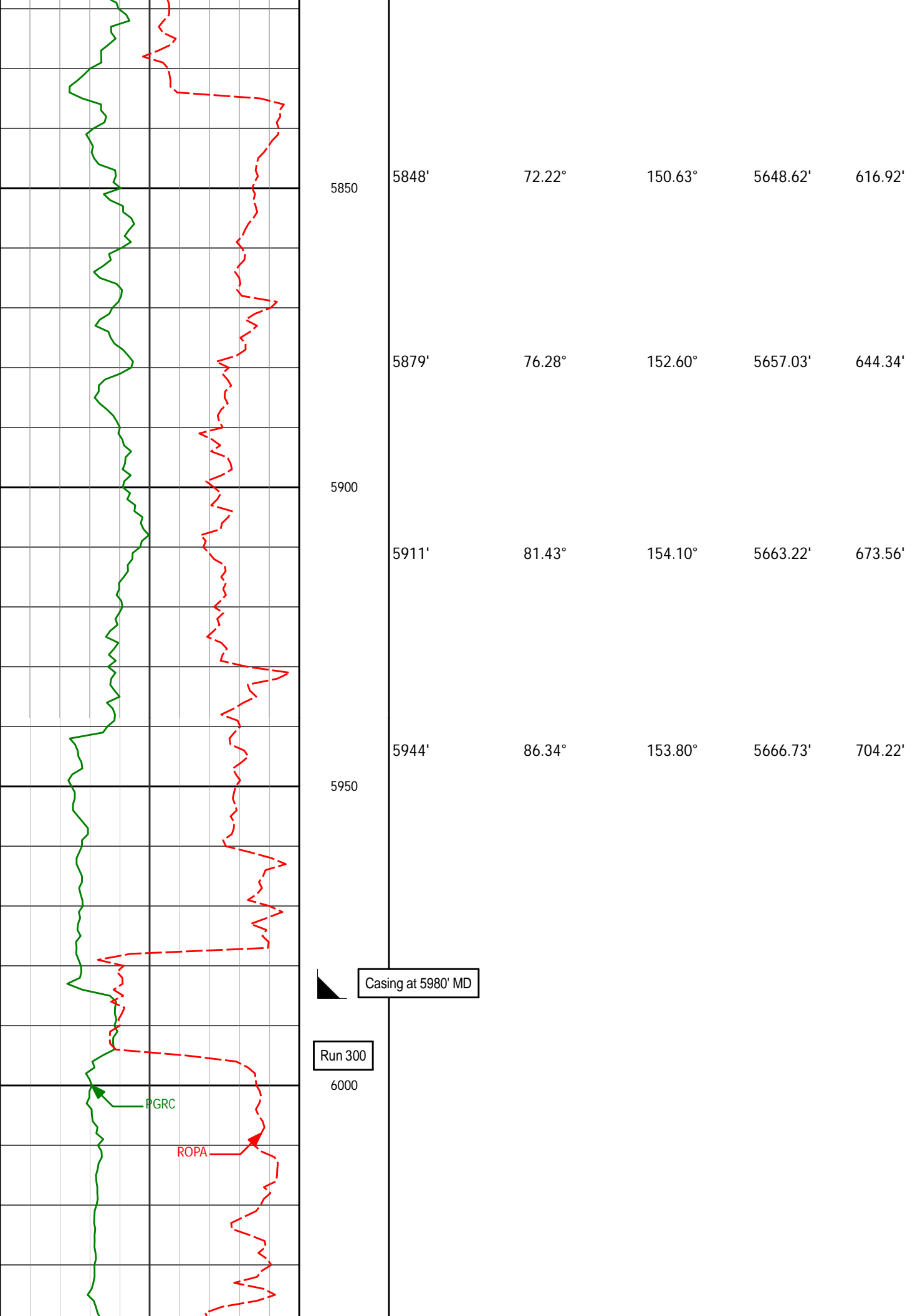
5816'

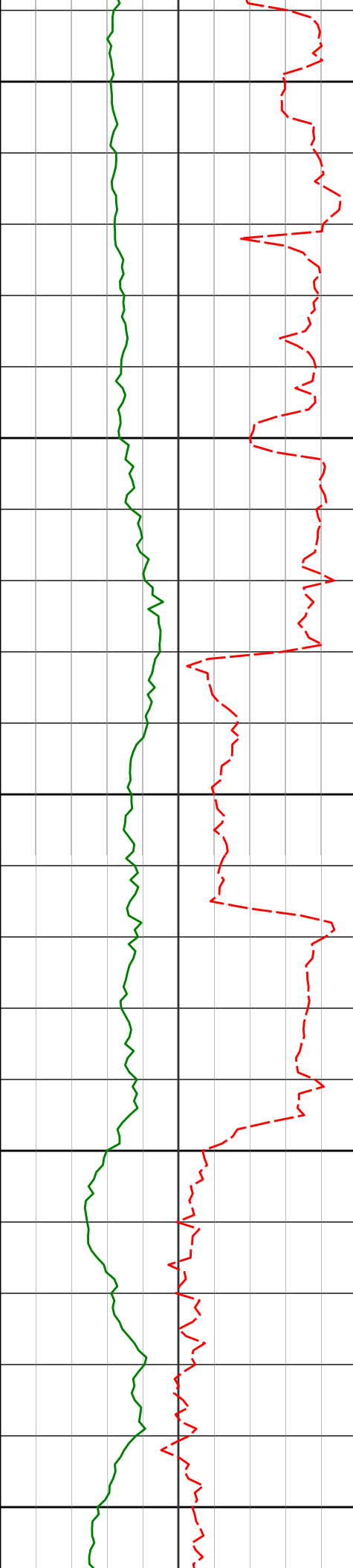
70.01°

149.13°

5638.26'

589.45'





6050

6054'

90.71°

153.40°

5669.56'

806.74'

6100

6117'

90.65°

154.29°

5668.81'

865.58'

6150

6200

6212'

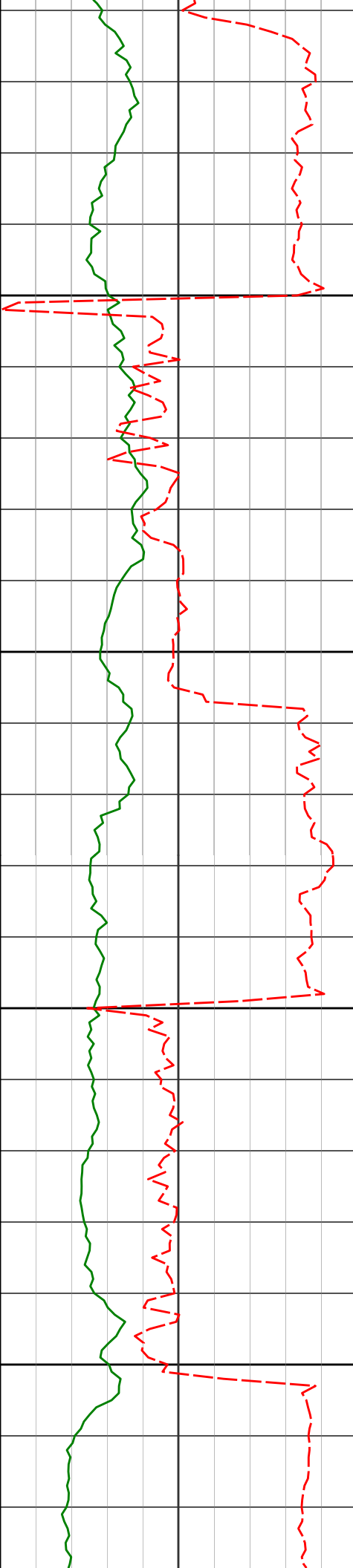
91.26°

156.29°

5667.23'

955.12'

6250



6300

6308'

91.54°

159.05°

5664.88'

1046.84'

6350

6400

6403'

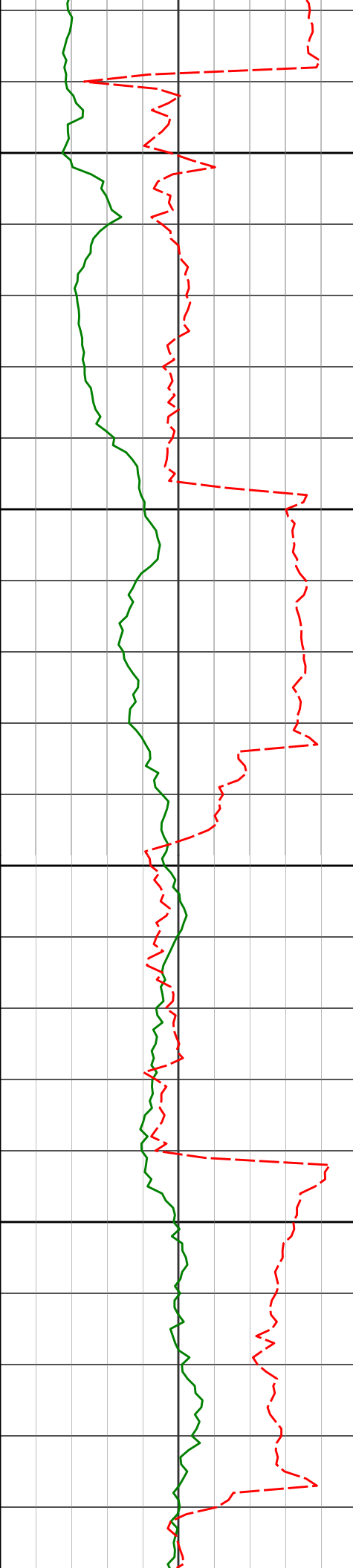
92.04°

161.37°

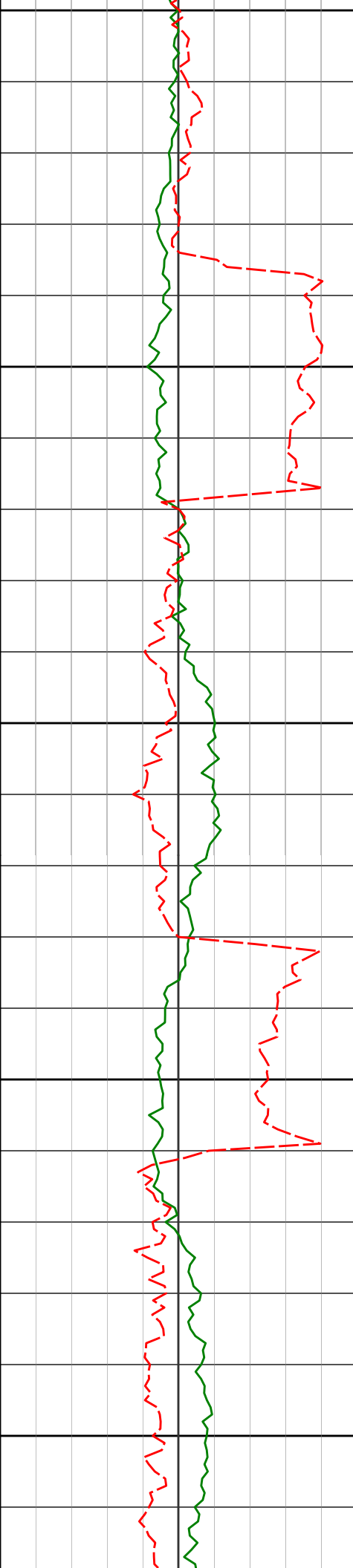
5661.92'

1138.74'

6450



6497'	90.96°	163.41°	5659.45'	1230.52'
6500				
6550				
6592'	90.31°	165.22°	5658.40'	1323.93'
6600				
6650				
6687'	90.62°	169.93°	5657.63'	1418.15'



6700

6750

6800

6850

6900

6781'

90.34°

172.81°

5656.84'

1511.97'

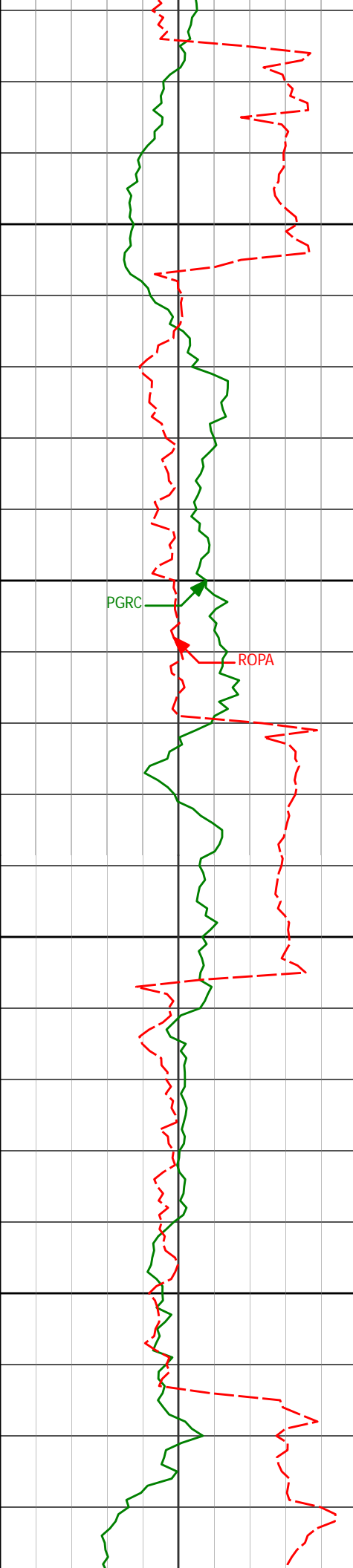
6876'

90.43°

175.48°

5656.20'

1606.96'



6950

6971'

90.65°

176.68°

5655.31'

1701.93'

7000

PGRC

ROPA

7050

7066'

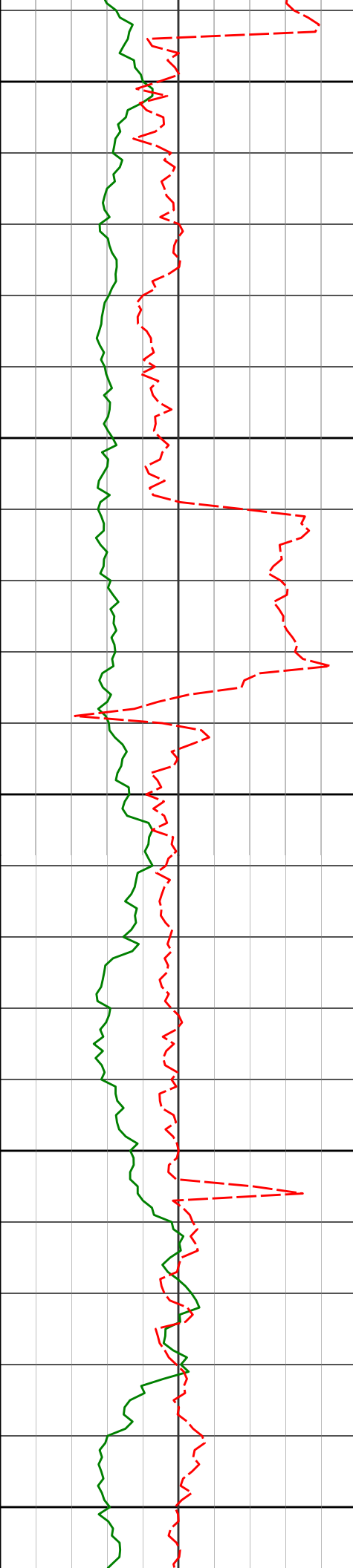
89.54°

179.10°

5655.15'

1796.78'

7100



7150

7200

7250

7300

7350

7161'

87.16°

179.86°

5657.89'

1891.41'

7256'

89.60°

183.46°

5660.57'

1985.66'

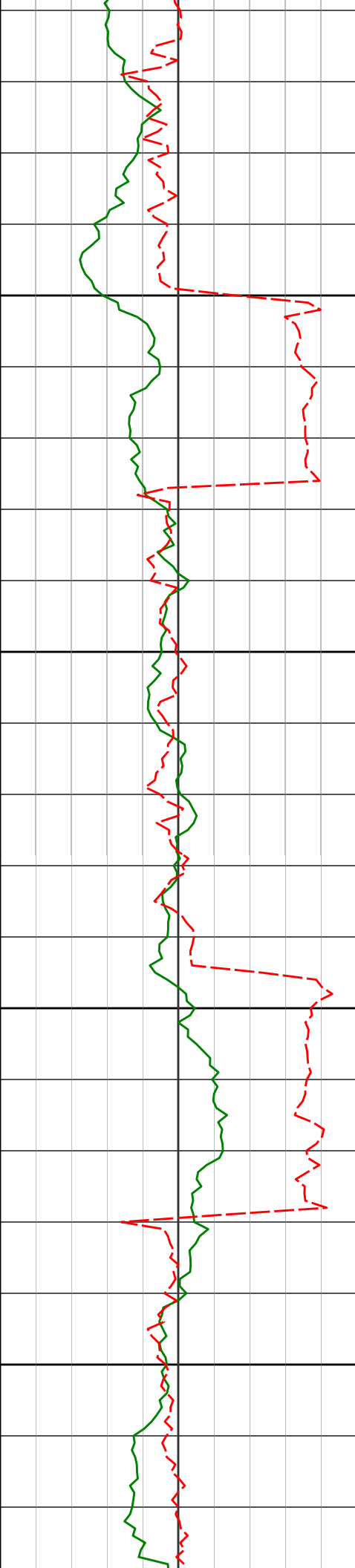
7351'

91.85°

183.01°

5659.37'

2079.61'



7400

7450

7500

7550

7446'

91.26°

182.35°

5656.79'

2173.68'

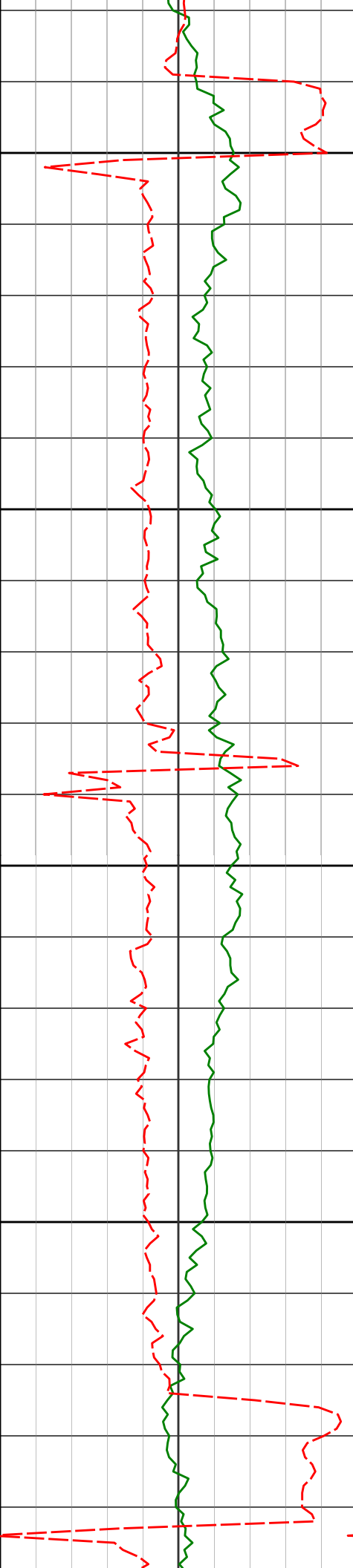
7541'

89.63°

181.67°

5656.06'

2267.91'



7600

7650

7700

7750

7635'

89.32°

181.24°

5656.92'

2361.27'

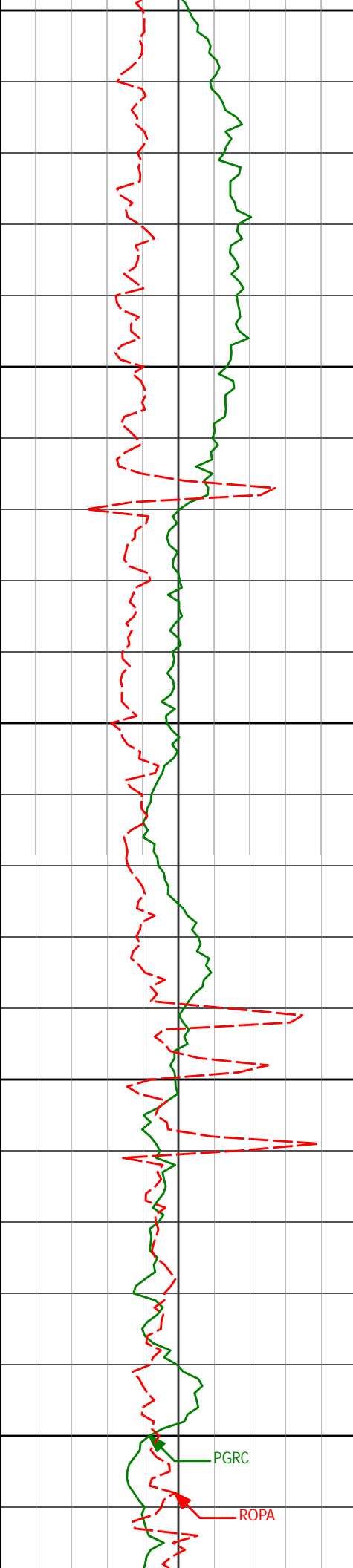
7727'

90.25°

181.41°

5657.26'

2452.66'



7800

7818'

87.87°

179.10°

5658.75'

2543.22'

7850

7900

7909'

89.04°

179.35°

5661.21'

2633.91'

7950

8000

8001'

90.99°

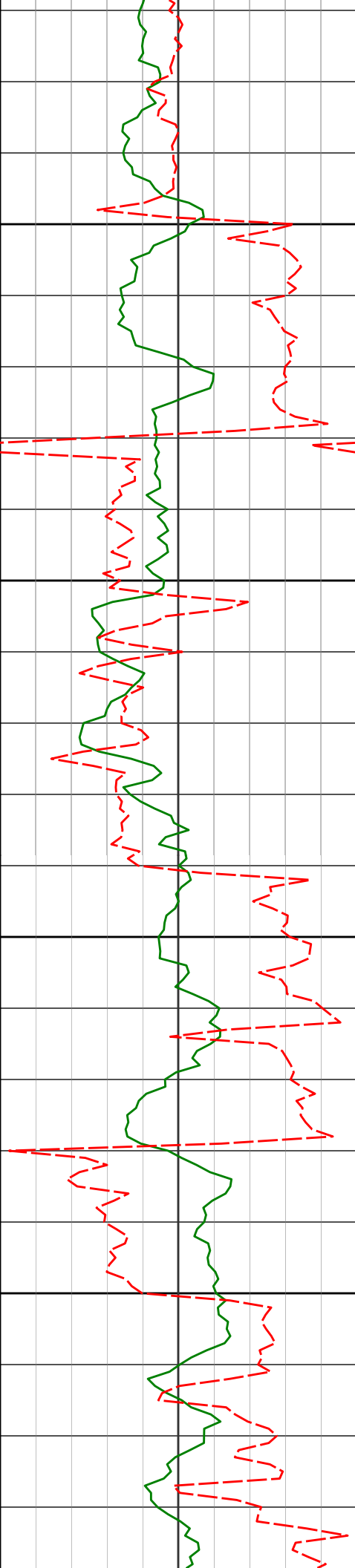
177.89°

5661.18'

2725.70'

PGRC

ROPA



8050

8092'

92.84°

179.23°

5658.14'

2816.44'

8100

8150

8183'

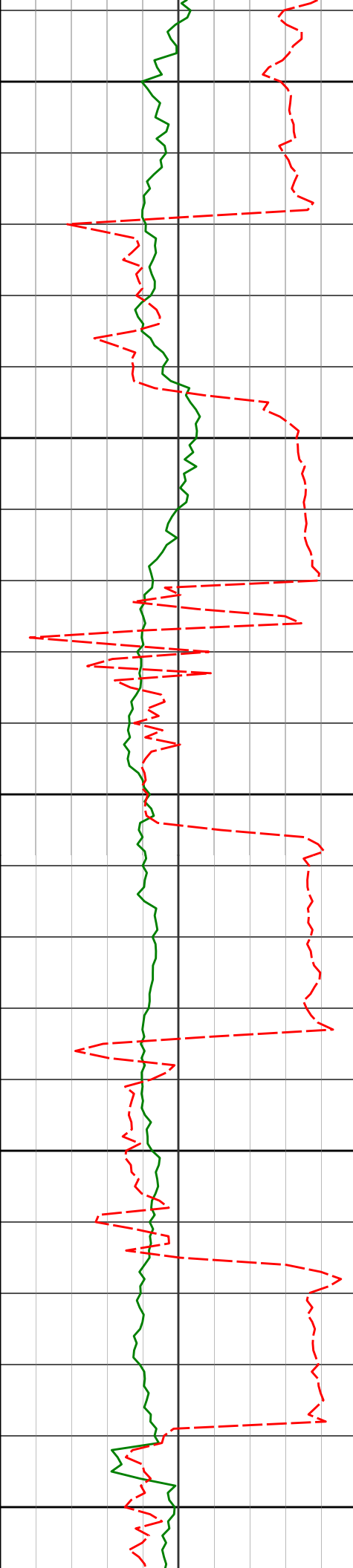
93.12°

179.13°

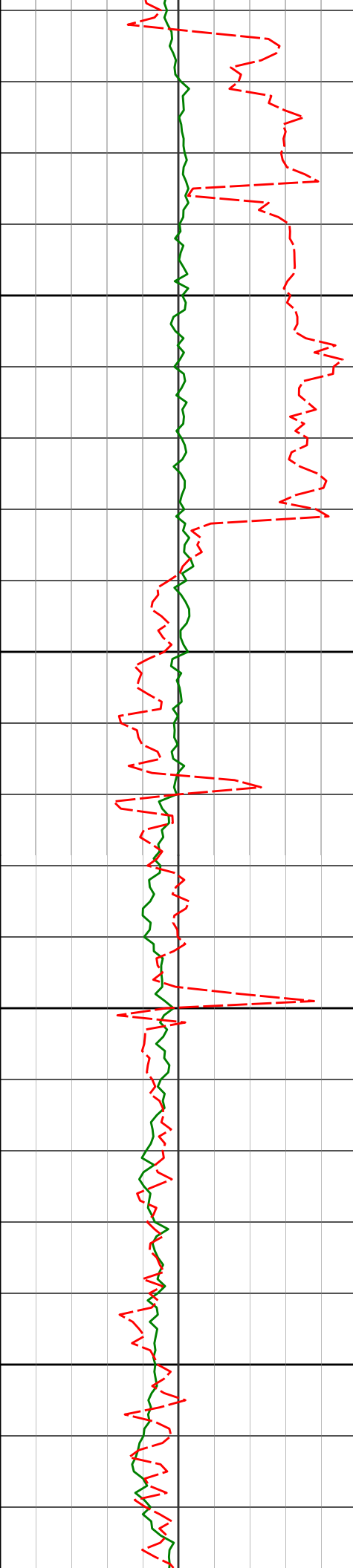
5653.41'

2907.05'

8200



8244'	92.19°	179.20°	5650.59'	2967.81'
8250				
8300				
8305'	90.22°	179.25°	5649.30'	3028.61'
8350				
8366'	89.69°	180.88°	5649.35'	3089.34'
8400				
8450				
8457'	87.16°	179.76°	5651.85'	3179.87'



8500

8550

8600

8650

8549'

88.80°

180.04°

5655.10'

3271.44'

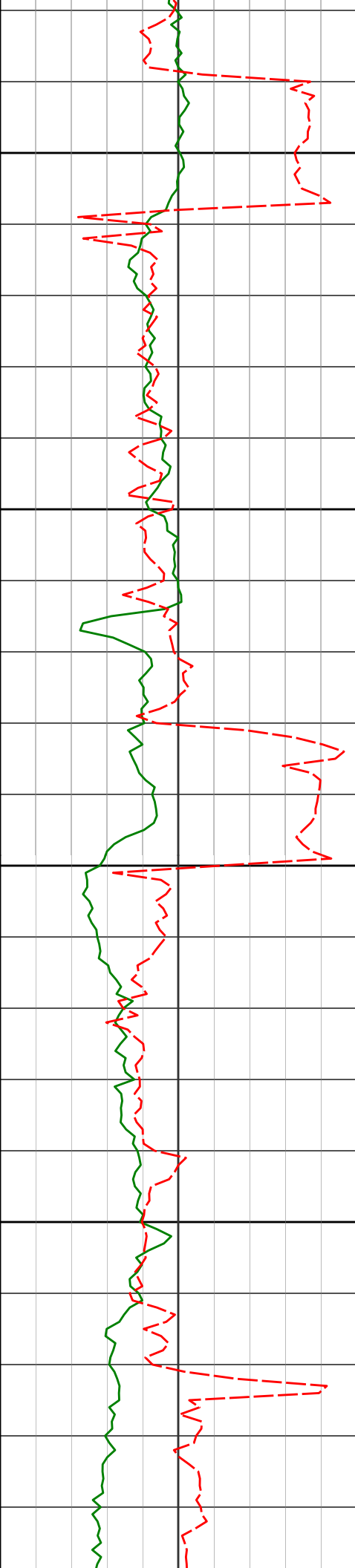
8641'

90.55°

179.97°

5655.62'

3363.06'



8700

8750

8800

8850

8732'

89.88°

181.34°

5655.28'

3453.57'

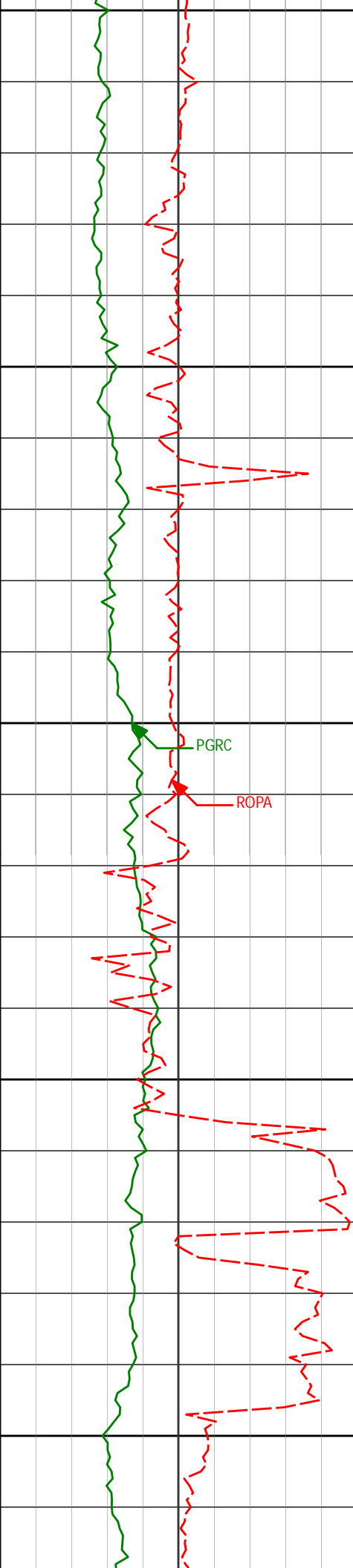
8824'

87.87°

181.48°

5657.08'

3544.93'



8900

8915'

88.40°

181.55°

5660.04'

3635.26'

8950

9000

PGRC

ROPA

9007'

89.97°

182.12°

5661.35'

3726.54'

9050

9100

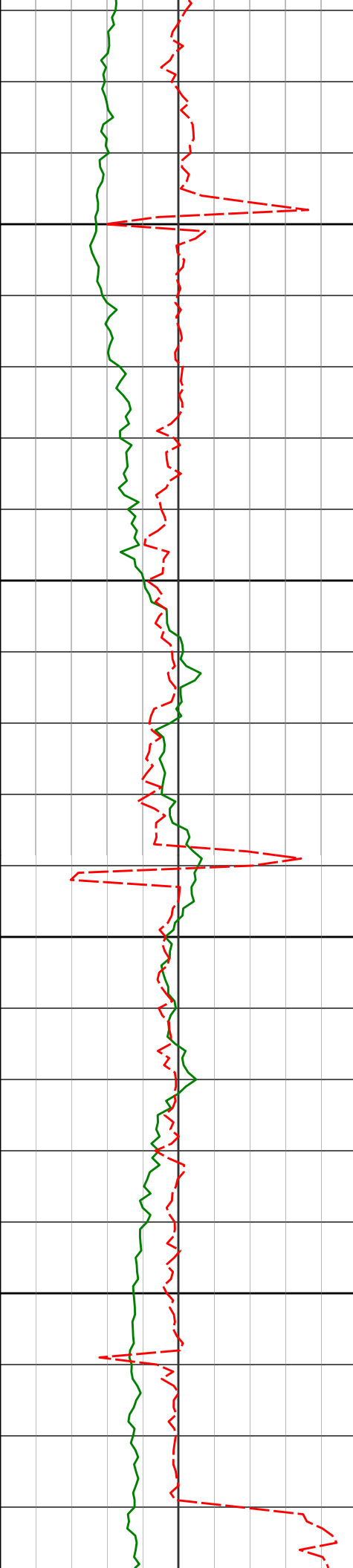
9098'

88.67°

179.93°

5662.43'

3816.99'



9150

9189'

89.04°

179.69°

5664.25'

3907.62'

9200

9250

9281'

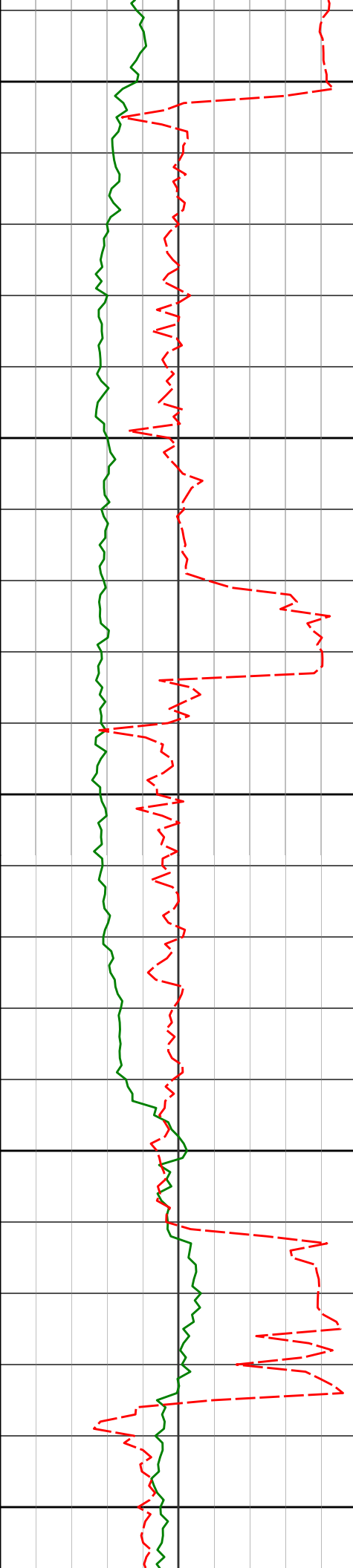
89.29°

179.68°

5665.59'

3999.27'

9300



9350

9372'

88.89°

182.16°

5667.04'

4089.73'

9400

9450

9464'

90.40°

182.97°

5667.61'

4180.87'

9500

9550

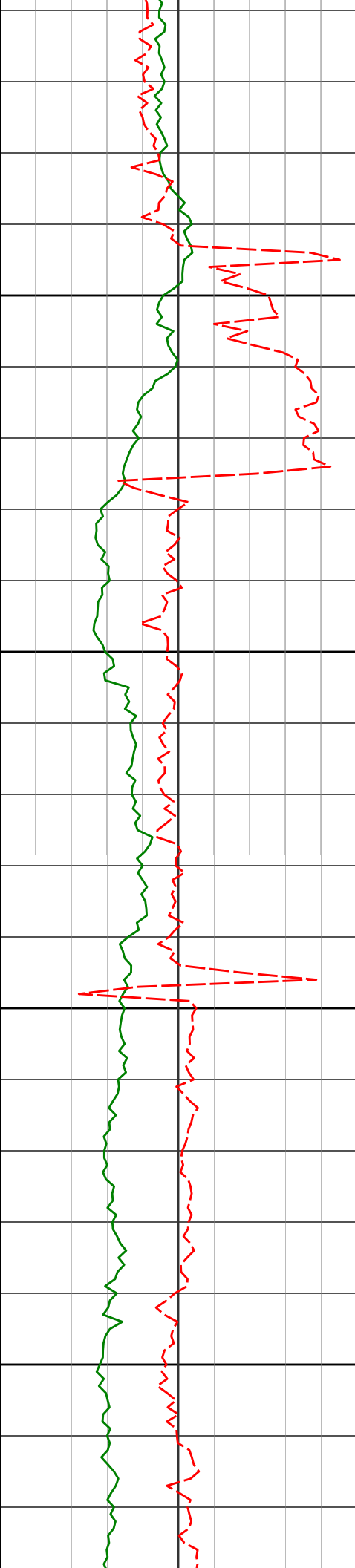
9555'

89.91°

181.78°

5667.36'

4271.07'



9600

9650

9700

9750

9646'

88.12°

180.71°

5668.93'

4361.47'

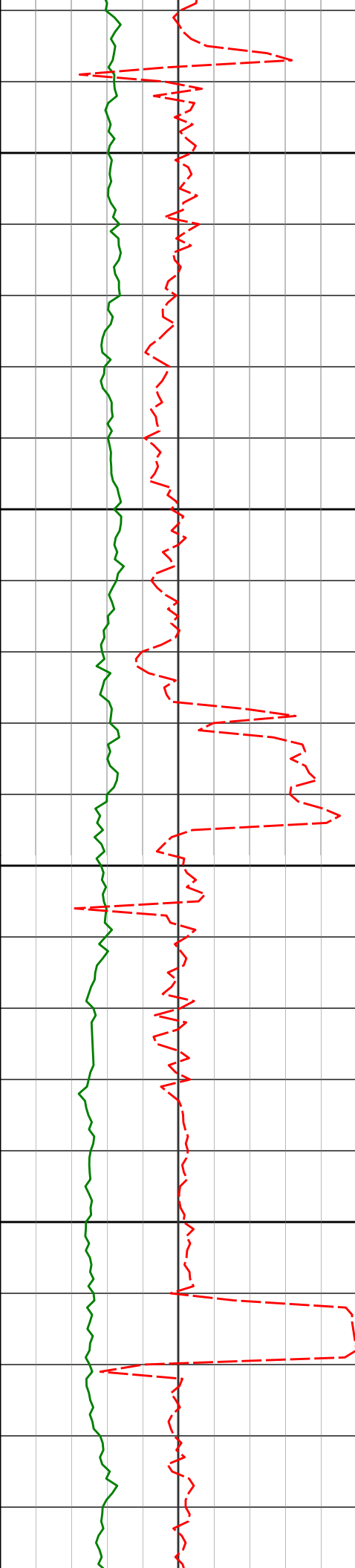
9738'

88.52°

180.28°

5671.62'

4452.97'



9800

9850

9900

9950

9828'

90.62°

182.99°

5672.30'

4542.31'

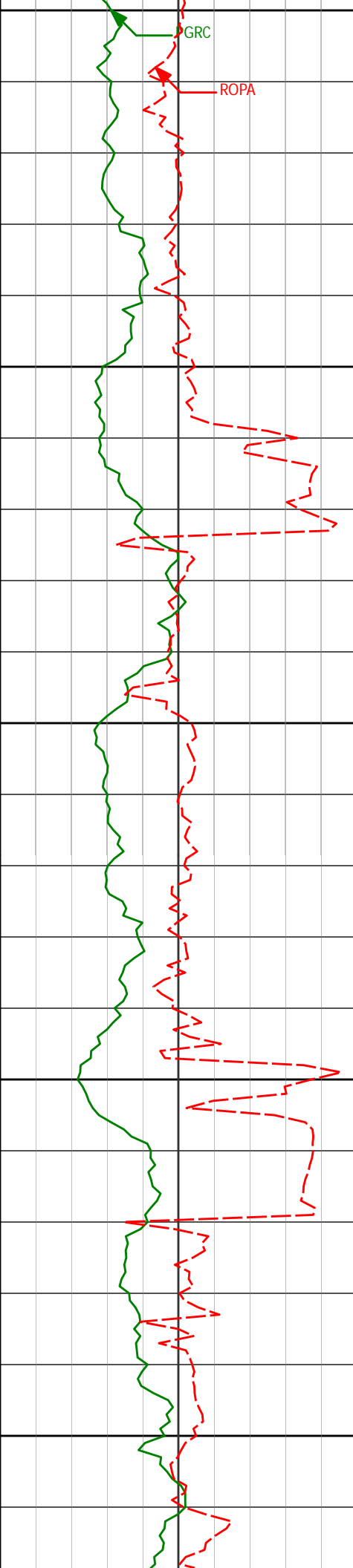
9920'

88.21°

177.85°

5673.24'

4633.82'



10000

10012'

90.52°

179.40°

5674.26'

4725.60'

10050

10100

10103'

91.14°

177.89°

5672.94'

4816.38'

10150

10200

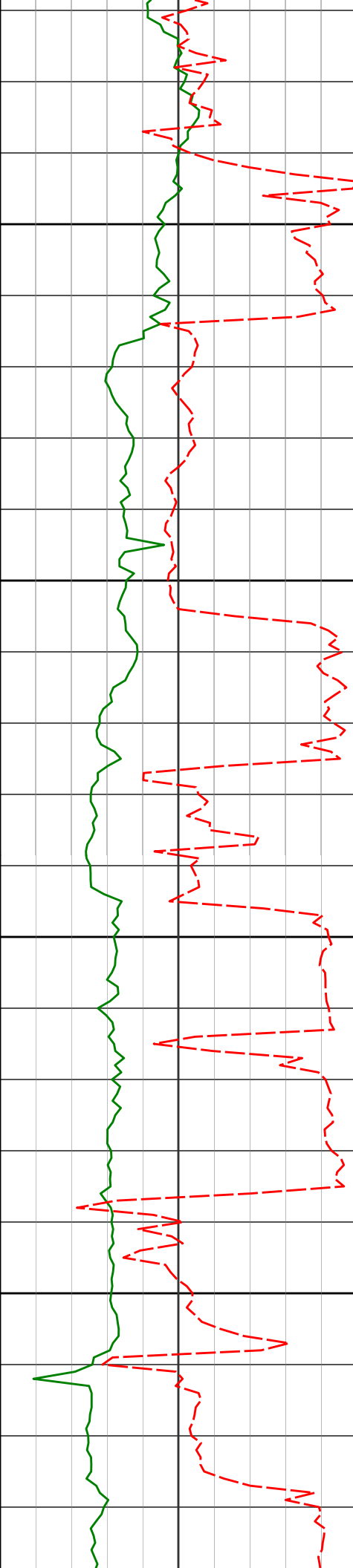
10195'

90.86°

177.30°

5671.33'

4908.25'



10250

10300

10350

10400

10256'

90.83°

177.04°

5670.43'

4969.19'

10317'

90.37°

175.70°

5669.80'

5030.16'

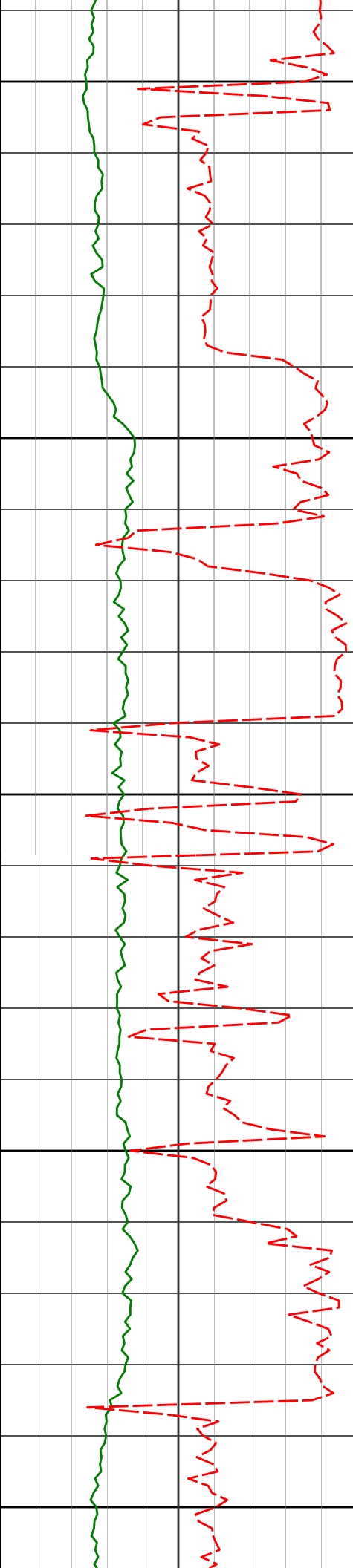
10378'

88.21°

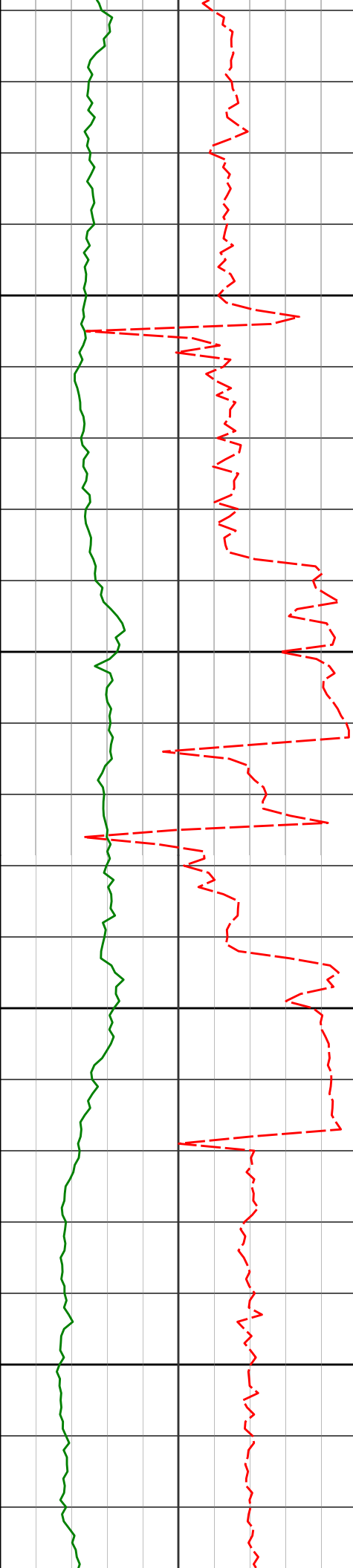
176.41°

5670.55'

5091.14'



	10439	86.14°	177.21°	5673.56	5152.02
10450					
10500	10500'	86.64°	177.63°	5677.40'	5212.84'
10550					
	10561'	87.87°	179.66°	5680.32'	5273.62'
10600					
10650	10652'	89.08°	178.87°	5682.74'	5364.31'



10700

10750

10800

10850

10743'

90.28°

179.06°

5683.25'

5455.06'

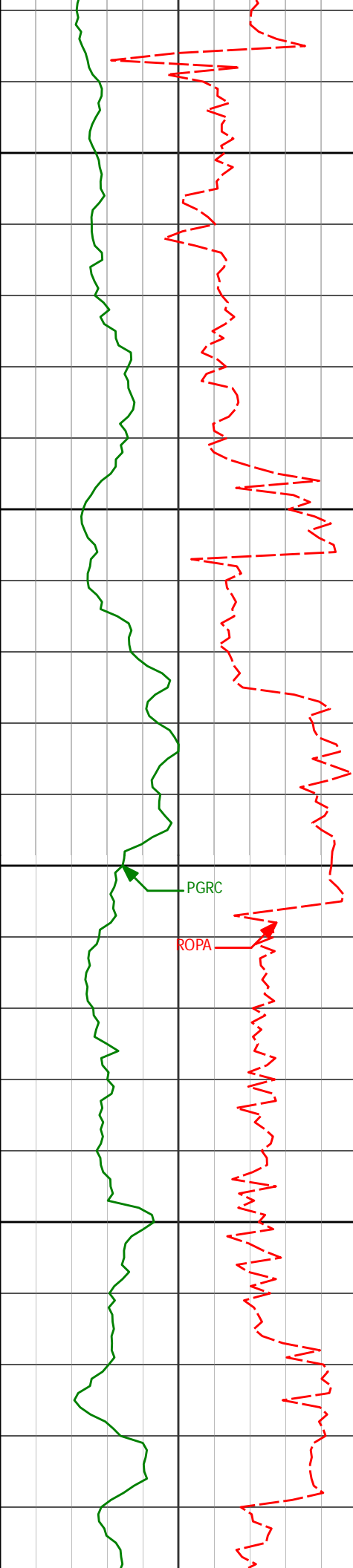
10835'

89.01°

181.39°

5683.82'

5546.63'



10900

10950

11000

11050

PGRC

ROPA

10926'

91.26°

182.11°

5683.61'

5636.95'

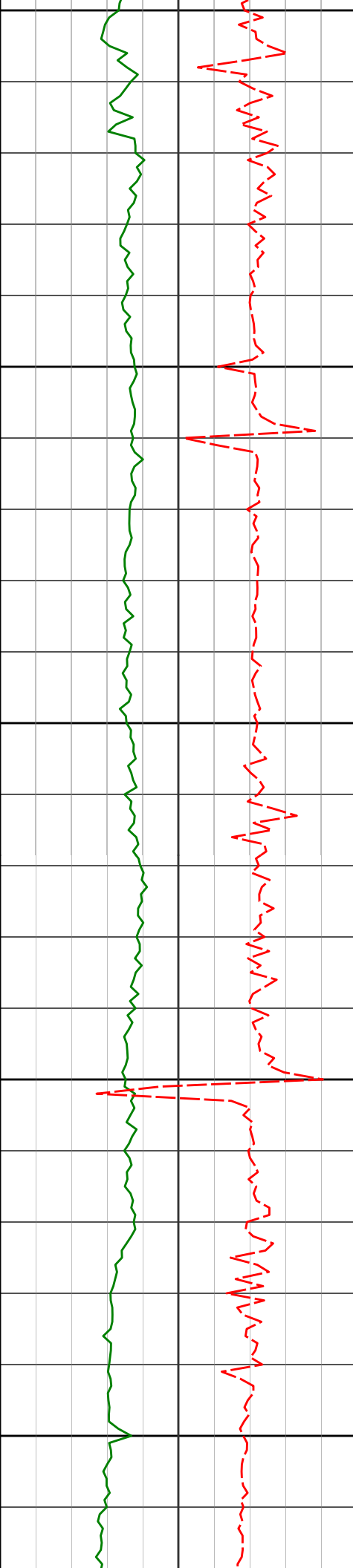
11018'

89.66°

181.24°

5682.87'

5728.28'



11100

11110'

88.89°

180.13°

5684.03'

5819.78'

11150

11200

11202'

88.18°

179.27°

5686.38'

5911.41'

11250

11293'

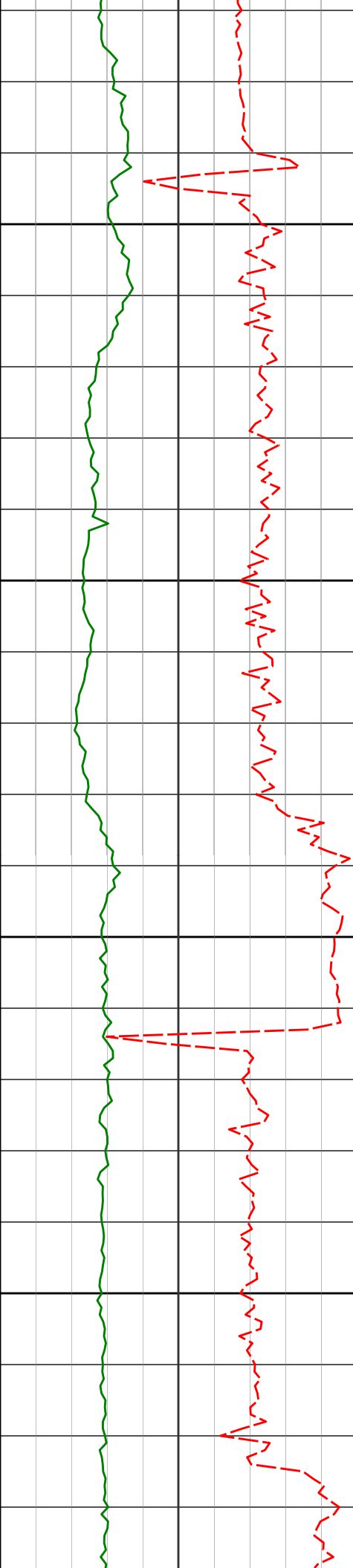
88.89°

179.95°

5688.71'

6002.05'

11300



11350

11400

11450

11500

11385'

91.36°

180.37°

5688.51'

6093.64'

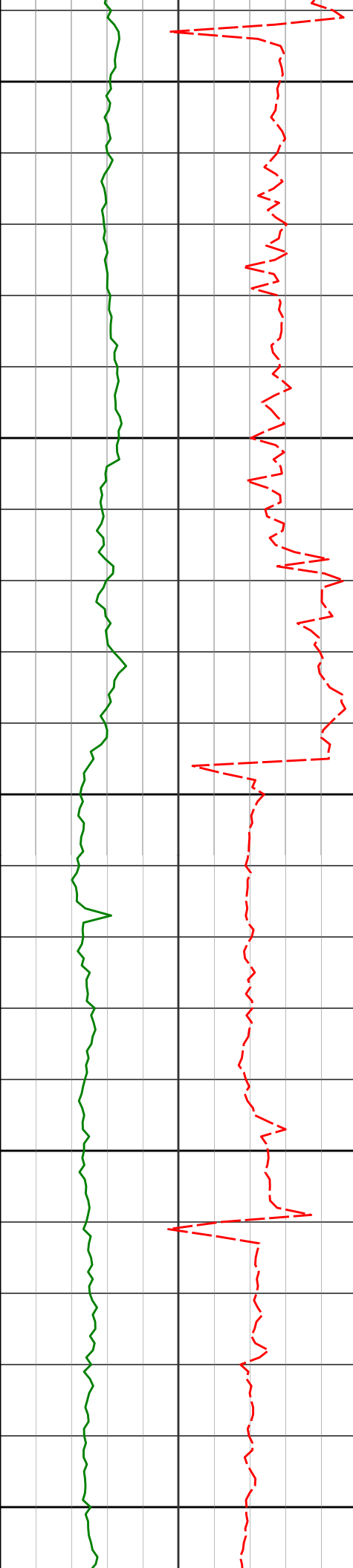
11476'

89.94°

180.24°

5687.48'

6184.21'



11550

11568'

91.14°

183.53°

5686.61'

6275.48'

11600

11650

11660'

88.74°

182.00°

5686.71'

6366.58'

11700

11750

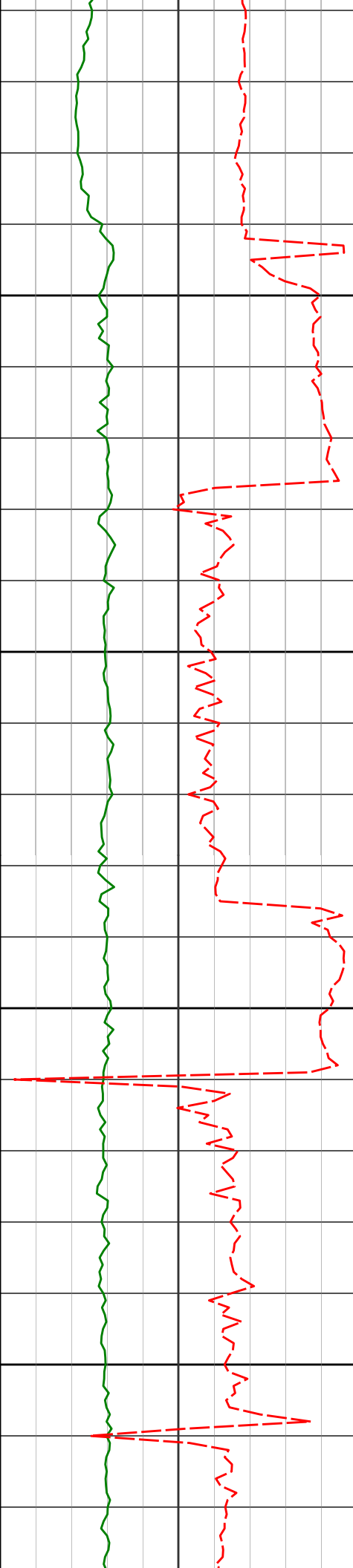
11752'

91.51°

182.96°

5686.51'

6457.73'



11800

11850

11900

11950

11843'

89.94°

180.29°

5685.35'

6548.07'

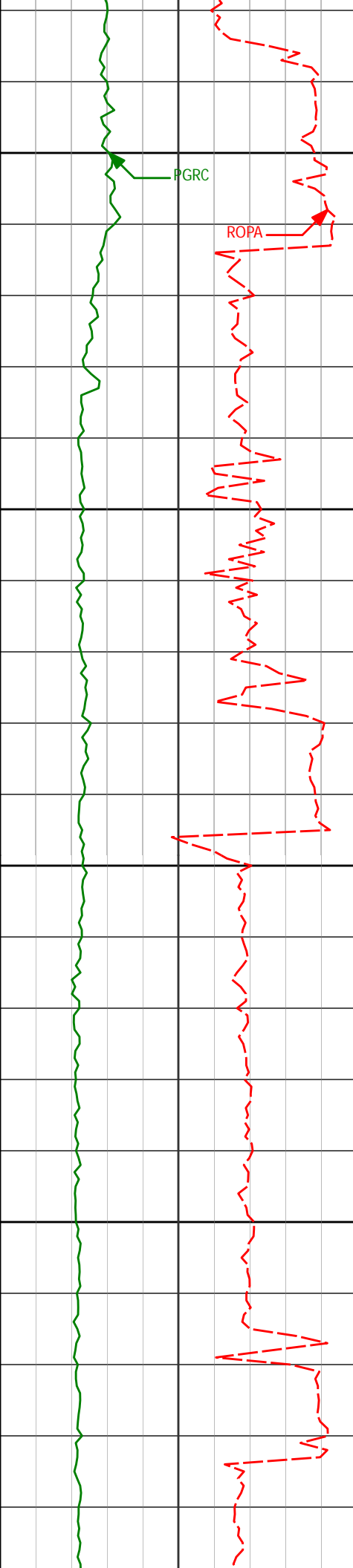
11934'

91.14°

182.07°

5684.50'

6638.49'



12000

ROPA

PGRC

12050

12100

12150

12026'

90.59°

177.93°

5683.11'

6730.07'

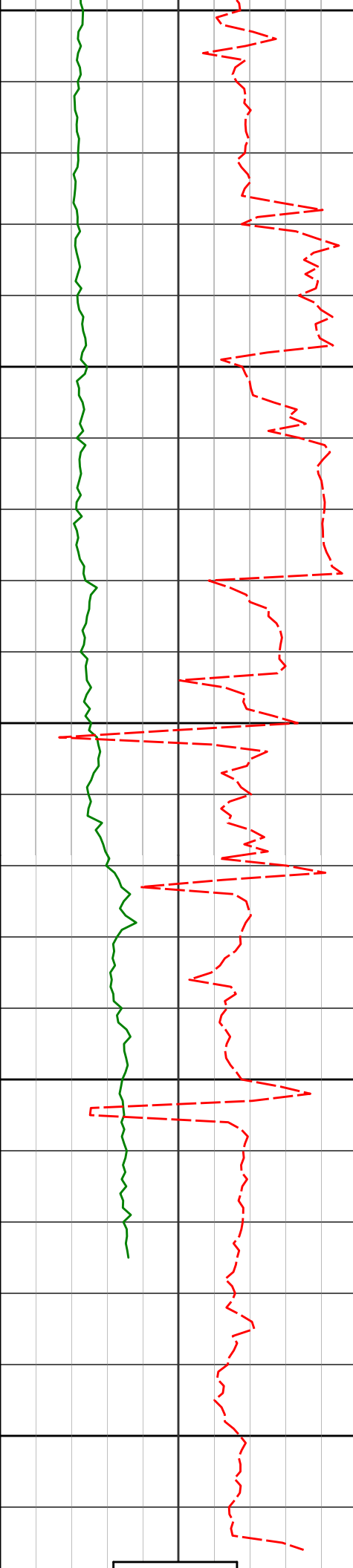
12117'

90.89°

178.58°

5681.93'

6820.90'



12200

12208'

91.76°

178.73°

5679.83'

6911.66'

12250

12300

12303'

89.23°

178.54°

5679.01'

7006.44'

12350

12366'

90.37°

178.08°

5679.23'

7069.31'

12400

12415'

90.37°

178.08°

5678.91'

7118.23'

TD at 12415' MD									
Avg Rate of Penetration ROPA ----- feet per hr					Depth ft	Depth	Inc.	Azi.	TVD V.S.
500				0					
PCG Gamma Ray BCorr PGRC ----- api									
0				300					

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Whiting Oil and Gas
Razor 26K-3508B
Redtail
Weld Colorado
USA
CA-XX-0901083164
Surveys are Sag, IFR and MS corrected.

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
170.00	0.33	177.82	170.00	0.49 S	0.02 E	0.49	0.19
261.00	0.18	202.76	261.00	0.88 S	0.03 W	0.88	0.20
352.00	0.12	231.43	352.00	1.07 S	0.16 W	1.06	0.10
443.00	0.38	208.23	443.00	1.40 S	0.37 W	1.36	0.30
535.00	0.08	174.20	535.00	1.73 S	0.51 W	1.68	0.34
626.00	0.91	164.17	625.99	2.49 S	0.31 W	2.45	0.91
718.00	0.76	136.50	717.98	3.64 S	0.31 E	3.65	0.46
808.00	0.61	119.59	807.98	4.31 S	1.14 E	4.39	0.28
900.00	0.29	156.58	899.97	4.76 S	1.66 E	4.89	0.45
992.00	0.30	186.56	991.97	5.21 S	1.72 E	5.35	0.17
1083.00	1.21	140.84	1082.96	6.20 S	2.30 E	6.38	1.12
1175.00	1.73	145.88	1174.93	8.10 S	3.69 E	8.40	0.58
1266.00	2.80	150.95	1265.86	11.18 S	5.54 E	11.64	1.20
1358.00	2.74	144.14	1357.75	14.93 S	7.92 E	15.59	0.36
1450.00	3.07	142.81	1449.64	18.67 S	10.70 E	19.57	0.37
1511.00	3.18	143.03	1510.54	21.32 S	12.71 E	22.39	0.18
1637.00	3.25	138.38	1636.35	26.79 S	17.18 E	28.24	0.21
1728.00	3.10	137.52	1727.21	30.53 S	20.55 E	32.27	0.17
1819.00	2.93	130.52	1818.08	33.85 S	23.98 E	35.90	0.45
1911.00	5.54	138.35	1909.82	38.70 S	28.72 E	41.16	2.90
2003.00	4.95	133.67	2001.44	44.76 S	34.55 E	47.72	0.79
2094.00	4.80	135.69	2092.11	50.20 S	40.05 E	53.64	0.25
2185.00	4.74	163.34	2182.81	56.52 S	43.78 E	60.28	2.50
2276.00	4.84	161.31	2273.49	63.76 S	46.09 E	67.70	0.22
2367.00	3.82	161.04	2364.23	70.27 S	48.31 E	74.38	1.12
2459.00	4.35	159.68	2455.99	76.44 S	50.51 E	80.72	0.59
2551.00	4.69	158.36	2547.71	83.20 S	53.11 E	87.70	0.39
2642.00	4.80	155.98	2638.39	90.14 S	56.03 E	94.87	0.25
2734.00	4.85	154.19	2730.07	97.16 S	59.29 E	102.16	0.17
2825.00	4.60	146.31	2820.76	103.66 S	62.99 E	108.97	0.76
2917.00	3.81	160.75	2912.51	109.61 S	66.05 E	115.18	1.43
3008.00	3.07	165.18	3003.35	114.82 S	67.67 E	120.51	0.86
3100.00	3.36	173.63	3095.21	119.88 S	68.60 E	125.64	0.60
3190.00	3.62	167.81	3185.04	125.28 S	69.49 E	131.09	0.49
3282.00	3.52	169.99	3276.86	130.90 S	70.59 E	136.79	0.18
3374.00	3.93	167.01	3368.67	136.75 S	71.79 E	142.73	0.49
3465.00	3.77	168.68	3459.46	142.73 S	73.08 E	148.79	0.21
3557.00	3.77	164.46	3551.26	148.61 S	74.49 E	154.78	0.30
3649.00	3.55	165.98	3643.07	154.28 S	75.99 E	160.57	0.26
3740.00	2.90	168.02	3733.93	159.27 S	77.15 E	165.64	0.73
3832.00	2.45	150.34	3825.83	163.25 S	78.60 E	169.74	1.02

3924.00	3.64	124.73	3917.70	166.63 S	81.98 E	173.41	1.93
4015.00	3.21	129.37	4008.54	169.89 S	86.32 E	177.05	0.56
4107.00	4.34	129.96	4100.34	173.76 S	90.98 E	181.33	1.23
4199.00	3.89	127.38	4192.10	177.89 S	96.13 E	185.91	0.53
4291.00	3.61	131.31	4283.90	181.70 S	100.78 E	190.13	0.41
4382.00	3.13	131.75	4374.75	185.24 S	104.79 E	194.02	0.53
4473.00	4.60	142.65	4465.54	189.80 S	108.86 E	198.93	1.80
4564.00	3.50	143.23	4556.31	194.92 S	112.73 E	204.39	1.21
4656.00	2.69	141.02	4648.18	198.85 S	115.77 E	208.58	0.89
4747.00	4.44	154.97	4739.00	203.70 S	118.61 E	213.67	2.13
4838.00	3.97	153.06	4829.75	209.70 S	121.52 E	219.91	0.54
4929.00	3.78	149.83	4920.54	215.10 S	124.46 E	225.55	0.32
5025.00	3.15	146.28	5016.37	220.03 S	127.51 E	230.74	0.69
5120.00	2.51	139.74	5111.25	223.79 S	130.31 E	234.74	0.75
5151.00	4.32	143.97	5142.20	225.25 S	131.43 E	236.30	5.89
5183.00	7.73	145.32	5174.01	228.00 S	133.37 E	239.21	10.66
5214.00	11.14	140.84	5204.59	232.04 S	136.44 E	243.51	11.24
5246.00	14.95	141.60	5235.76	237.67 S	140.96 E	249.53	11.92
5278.00	18.08	141.28	5266.44	244.78 S	146.63 E	257.13	9.79
5309.00	21.34	144.98	5295.62	253.16 S	152.88 E	266.04	11.26
5341.00	24.58	147.99	5325.08	263.57 S	159.75 E	277.04	10.77
5373.00	26.13	155.23	5354.00	275.62 S	166.23 E	289.62	10.82
5404.00	28.95	154.47	5381.49	288.59 S	172.33 E	303.10	9.17
5436.00	32.55	153.84	5408.98	303.31 S	179.46 E	318.40	11.29
5468.00	35.82	152.11	5435.45	319.32 S	187.64 E	335.09	10.66
5499.00	39.60	151.41	5459.97	336.02 S	196.62 E	352.54	12.27
5531.00	42.93	152.37	5484.02	354.63 S	206.55 E	371.98	10.59
5563.00	44.98	154.90	5507.06	374.53 S	216.41 E	392.70	8.43
5594.00	48.99	154.88	5528.20	395.05 S	226.02 E	414.01	12.94
5626.00	51.84	155.60	5548.59	417.44 S	236.35 E	437.25	9.07
5658.00	53.88	153.27	5567.91	440.45 S	247.36 E	461.16	8.62
5689.00	57.77	152.49	5585.32	463.27 S	259.05 E	484.96	12.72
5721.00	62.11	150.49	5601.35	487.59 S	272.28 E	510.38	14.60
5752.00	65.52	149.64	5615.03	511.70 S	286.16 E	535.65	11.27
5784.00	69.65	149.14	5627.23	537.15 S	301.22 E	562.37	12.99
5816.00	70.01	149.13	5638.26	562.93 S	316.63 E	589.45	1.13
5848.00	72.22	150.63	5648.62	589.12 S	331.82 E	616.92	8.21
5879.00	76.28	152.60	5657.03	615.37 S	346.00 E	644.34	14.45
5911.00	81.43	154.10	5663.22	643.42 S	360.07 E	673.56	16.74
5944.00	86.34	153.80	5666.73	672.89 S	374.48 E	704.22	14.91
6054.00	90.71	153.40	5669.56	771.36 S	423.36 E	806.74	3.99
6117.00	90.65	154.29	5668.81	827.90 S	451.13 E	865.58	1.42
6212.00	91.26	156.29	5667.23	914.19 S	490.83 E	955.12	2.20
6308.00	91.54	159.05	5664.88	1002.95 S	527.29 E	1046.84	2.89
6403.00	92.04	161.37	5661.92	1092.29 S	559.44 E	1138.74	2.50
6497.00	90.96	163.41	5659.45	1181.85 S	587.87 E	1230.52	2.45
6592.00	90.31	165.22	5658.40	1273.30 S	613.55 E	1323.93	2.02
6687.00	90.62	169.93	5657.63	1366.05 S	633.98 E	1418.15	4.97
6781.00	90.34	172.81	5656.84	1458.97 S	648.08 E	1511.97	3.08
6876.00	90.43	175.48	5656.20	1553.47 S	657.77 E	1606.96	2.81
6971.00	90.65	176.68	5655.31	1648.24 S	664.27 E	1701.93	1.28
7066.00	89.54	179.10	5655.15	1743.17 S	667.77 E	1796.78	2.80
7161.00	87.16	179.86	5657.89	1838.11 S	668.63 E	1891.41	2.63
7256.00	89.60	183.46	5660.57	1933.01 S	665.88 E	1985.66	4.58
7351.00	91.85	183.01	5659.37	2027.85 S	660.51 E	2079.61	2.42
7446.00	91.26	182.35	5656.79	2122.71 S	656.07 E	2173.68	0.93
7541.00	89.63	181.67	5656.06	2217.64 S	652.74 E	2267.91	1.86
7635.00	89.32	181.24	5656.92	2311.61 S	650.36 E	2361.27	0.56
7727.00	90.25	181.41	5657.26	2403.58 S	648.23 E	2452.66	1.03
7818.00	87.87	179.10	5658.75	2494.56 S	647.82 E	2543.22	3.64
7909.00	89.04	179.35	5661.21	2585.51 S	649.05 E	2633.91	1.31
8001.00	90.99	177.89	5661.18	2677.48 S	651.27 E	2725.70	2.65
8092.00	92.84	179.23	5658.14	2768.39 S	653.56 E	2816.44	2.51
8183.00	93.12	179.13	5653.41	2859.26 S	654.86 E	2907.05	0.33
8244.00	92.19	179.20	5650.59	2920.19 S	655.74 E	2967.81	1.53
8305.00	90.22	179.25	5649.30	2981.17 S	656.57 E	3028.61	3.23
8366.00	89.69	180.88	5649.35	3042.17 S	656.50 E	3089.34	2.81
8457.00	87.16	179.76	5651.85	3133.12 S	655.99 E	3179.87	3.04
8549.00	88.80	180.04	5655.10	3225.06 S	656.15 E	3271.44	1.81
8641.00	90.55	179.97	5655.62	3317.05 S	656.14 E	3363.06	1.90
8732.00	89.88	181.34	5655.28	3408.05 S	655.10 E	3453.57	1.68
8824.00	87.87	181.48	5657.08	3500.00 S	652.84 E	3544.93	2.19
8915.00	88.40	181.55	5660.04	3590.91 S	650.44 E	3635.26	0.59
9007.00	89.97	182.12	5661.35	3682.86 S	647.49 E	3726.54	1.82
9098.00	89.37	182.22	5662.32	3773.82 S	647.33 E	3817.83	1.86

9098.00	88.67	179.93	5662.43	3773.83 S	645.86 E	3816.99	2.80
9189.00	89.04	179.69	5664.25	3864.81 S	646.16 E	3907.62	0.48
9281.00	89.29	179.68	5665.59	3956.80 S	646.67 E	3999.27	0.27
9372.00	88.89	182.16	5667.04	4047.77 S	645.21 E	4089.73	2.76
9464.00	90.40	182.97	5667.61	4139.67 S	641.09 E	4180.87	1.86
9555.00	89.91	181.78	5667.36	4230.59 S	637.32 E	4271.07	1.41
9646.00	88.12	180.71	5668.93	4321.55 S	635.34 E	4361.47	2.29
9738.00	88.52	180.28	5671.62	4413.50 S	634.55 E	4452.97	0.64
9828.00	90.62	182.99	5672.30	4503.45 S	631.98 E	4542.31	3.81
9920.00	88.21	177.85	5673.24	4595.41 S	631.31 E	4633.82	6.17
10012.00	90.52	179.40	5674.26	4687.37 S	633.51 E	4725.60	3.02
10103.00	91.14	177.89	5672.94	4778.33 S	635.67 E	4816.38	1.79
10195.00	90.86	177.30	5671.33	4870.23 S	639.53 E	4908.25	0.71
10256.00	90.83	177.04	5670.43	4931.15 S	642.54 E	4969.19	0.43
10317.00	90.37	175.70	5669.80	4992.02 S	646.40 E	5030.16	2.32
10378.00	88.21	176.41	5670.55	5052.87 S	650.60 E	5091.14	3.73
10439.00	86.14	177.21	5673.56	5113.70 S	653.99 E	5152.02	3.64
10500.00	86.64	177.63	5677.40	5174.52 S	656.73 E	5212.84	1.07
10561.00	87.87	179.66	5680.32	5235.42 S	658.17 E	5273.62	3.89
10652.00	89.08	178.87	5682.74	5326.38 S	659.33 E	5364.31	1.59
10743.00	90.28	179.06	5683.25	5417.36 S	660.98 E	5455.06	1.34
10835.00	89.01	181.39	5683.82	5509.35 S	660.62 E	5546.63	2.88
10926.00	91.26	182.11	5683.61	5600.30 S	657.84 E	5636.95	2.60
11018.00	89.66	181.24	5682.87	5692.26 S	655.15 E	5728.28	1.98
11110.00	88.89	180.13	5684.03	5784.24 S	654.05 E	5819.78	1.47
11202.00	88.18	179.27	5686.38	5876.21 S	654.53 E	5911.41	1.21
11293.00	88.89	179.95	5688.71	5967.18 S	655.15 E	6002.05	1.08
11385.00	91.36	180.37	5688.51	6059.17 S	654.89 E	6093.64	2.72
11476.00	89.94	180.24	5687.48	6150.16 S	654.41 E	6184.21	1.57
11568.00	91.14	183.53	5686.61	6242.09 S	651.38 E	6275.48	3.81
11660.00	88.74	182.00	5686.71	6333.97 S	646.95 E	6366.58	3.09
11752.00	91.51	182.96	5686.51	6425.88 S	642.97 E	6457.73	3.19
11843.00	89.94	180.29	5685.35	6516.82 S	640.39 E	6548.07	3.40
11934.00	91.14	182.07	5684.50	6607.79 S	638.51 E	6638.49	2.36
12026.00	90.59	177.93	5683.11	6699.76 S	638.51 E	6730.07	4.54
12117.00	90.89	178.58	5681.93	6790.71 S	641.28 E	6820.90	0.79
12208.00	91.76	178.73	5679.83	6881.66 S	643.42 E	6911.66	0.97
12303.00	89.23	178.54	5679.01	6976.62 S	645.68 E	7006.44	2.67
12366.00	90.37	178.08	5679.23	7039.60 S	647.54 E	7069.31	1.95
12415.00	90.37	178.08	5678.91	7088.57 S	649.18 E	7118.23	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

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

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 174.77 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.06 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12415.00 FEET
IS 7118.23 FEET ALONG 174.77 DEGREES (TRUE)**

**Tie onto surface at 0' MD
Final Survey is a projection to bit at TD**