

D-C Pressure Case Directional
PCG-K Pressure Case Gamma



1 : 240

Country		: USA																																							
Field		: Wattenburg																																							
Location		: Lat: 40° 4' 16.19" North Long: 104° 54' 59.13" West																																							
Well		: NRC 3N-32HZ																																							
Company		: APC																																							
Rig		: H&P 308																																							
LOCATION		Company : APC Rig : H&P 308 Well : NRC 3N-32HZ Field : Wattenburg Country : USA API Number : 05-123-39291																																							
		Latitude : 40° 4' 16.19" North Longitude : 104° 54' 59.13" West					UTM Easting = 3,163,319.130 ft UTM Northing = 1,269,307.870 ft					Other Services Directional Drilling																													
Permanent Datum		: Ground Level					Elevation : 5034.00 ft					Elev.																													
Log Measured From		: Drill Floor					25.00 ft Above Permanent Datum					KB N/A DF 5059.00 ft GL 5034.00 ft WD N/A																													
Drilling Measured From		: Drill Floor					MD LOG																																		
Depth Logged		: 1,142.00 ft To 18,575.00 ft										Unit No. : 11610114					Job No. : CA-XX-0901325286																								
Date Logged		: 22-Jun-14 To 07-Jul-14										Plot Type : Final																													
Total Depth MD		: 18,575.00 ft TVD : 7,490.33 ft										Plot Date : 08-Jul-14																													
Spud Date		: 13-Jun-14																																							
Run No.		Borehole Record (MD)										Run No.										Borehole Record (MD)																			
		Size					From					To					Size					From					To														
0100		8.750 in					1,142.00 ft					7,229.00 ft																													
0200		8.750 in					7,229.00 ft					7,945.00 ft																													
0300		6.125 in					7,945.00 ft					11,392.00 ft																													
0400		6.125 in					11,392.00 ft					17,453.00 ft																													
0500		6.125 in					17,453.00 ft					18,575.00 ft																													
																						Size					Weight					Casing Record (MD)									

WELL INFORMATION

MWD Run Number	100	200	300	400	500
Date run completed	24-Jun-14	25-Jun-14	29-Jun-14	05-Jul-14	07-Jul-14
Rig Bit Number	0100	0200	0300	0	500
Bit Size (in)	8.750	8.750	6.125	6.125	6.125
Tool Nominal OD (in)	6.750	6.750	4.750	4.750	4.750
Log Start Depth (MD, ft)	1,242.00	7,235.00	7,944.00	11,392.00	17,453.00
Log End Depth (MD, ft)	7,235.00	7,944.00	11,392.00	17,453.00	18,575.00
Drill or Wipe	Drill	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	22-Jun-14 12:25	24-Jun-14 07:00	27-Jun-14 00:30	29-Jun-14 15:40	04-Jul-14 14:13
Drill/Wipe End Date and Time	24-Jun-14 04:15	25-Jun-14 18:00	29-Jun-14 13:45	05-Jul-14 05:10	07-Jul-14 14:45
Min Inc (deg) @ Depth (MD, ft)	0.16 @ 5,863.00	21.82 @ 7,229.00	87.35 @ 9,814.00	88.09 @ 12,877.00	89.11 @ 17,865.00
Max Inc (deg) @ Depth (MD, ft)	17.50 @ 7,184.00	89.94 @ 7,896.00	93.30 @ 8,396.00	91.45 @ 13,336.00	92.28 @ 18,148.00
Bit TFA(in2) / Bit Type	1.74 / N/A	1.84 / N/A	1.48 / N/A	1.48 / N/A	1.48 / N/A
Flow Rate (gpm)	514.76	488.89	315.00	310.20	276.00
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Fluid Type	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud
Density (ppg) / Viscosity (spqt)	8.60 / 44.00	10.20 / 66.00	9.70 / 45.00	9.56 / 50.00	9.50 / 56.00
Filtrate CL (ppm)	2,500.00	2,100.00	1,700.00	1,700.00	1,700.00
pH / Fluid Loss (mptm)	8.20 / 0	9.30 / 0	9.00 / 4	9.50 / 3	9.40 / 3
PV (cP) / YP (Ihf2)	10 / 9.00	24 / 29.00	14 / 19.00	20 / 19.00	20 / 19.00
% Solids / % Sand	3.2 / 0.10	11.2 / 0.40	7.2 / 0.6	6.70 / 0.60	6.70 / 0.60
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Max Tool Temp (in) / Tool C	127.07 / 120M	122.00 / 120M	210.01 / 120M	200.51 / 120M	200.51 / 120M

Max Tool Temp (degF) / Source	167.97 / PCM	180.09 / PCM	210.31 / PCM	239.54 / PCM	239.54 / PCM
Rm @ Max Tool Temp (degF)	N/A @ 167.97	N/A @ 180.09	N/A @ 210.31	N/A @ 239.54	N/A @ 239.54
Lead MWD Engineer	James Ramsay	James Ramsay	James Ramsay	James Ramsay	James Ramsay
Customer Representative	Keith Jordan	Keith Jordan	Keith Jordan	Keith Jordan	Keith Jordan

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	PCM
Software Version	5.76	5.76	5.84	5.93	5.93
Sub Serial Number	11404294	11404294	12396733	12396733	12396733
Insert Serial Number	11620312	11400901	11620312	11400901	11620295
Date and Time Initialized	20-Jun-14 20:14	24-Jun-14 00:52	25-Jun-14 23:53	29-Jun-14 06:40	04-Jul-14 15:01
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00
ECMB SW Version	N/A	N/A	N/A	N/A	N/A

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	PCDC
Distance From Bit (ft)	51.00	48.00	48.00	47.00	51.00
Software Version	6.21	6.21	6.21	6.21	6.21
Sub Serial Number	11404294	11404294	12396733	12396733	12396733
Sonde Serial Number	12177629	11833253	12177629	11833253	11297564
Sensor ID Number	N/A	N/A	N/A	N/A	N/A
Toolface Offset (deg)	213.21	171.23	65.76	139.96	326.65

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	PCG
Distance From Bit (ft)	55.11	50.78	51.06	50.16	54.24
Recorded Sample Period (sec)	10	10	10	10	10
Software Version	8.15	8.15	8.15	8.15	8.15
Sub Serial Number	11404294	11404294	12396733	12396733	12396733
Insert/Sonde Serial Number	12037422	12037424	12037422	12037424	11293345

REMARKS

1. All depths are measured vertical 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. All data presented is recorded data unless otherwise specified
4. 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
5. INSITE version 8.0.20
6. WITS locked up, had to restart the computers

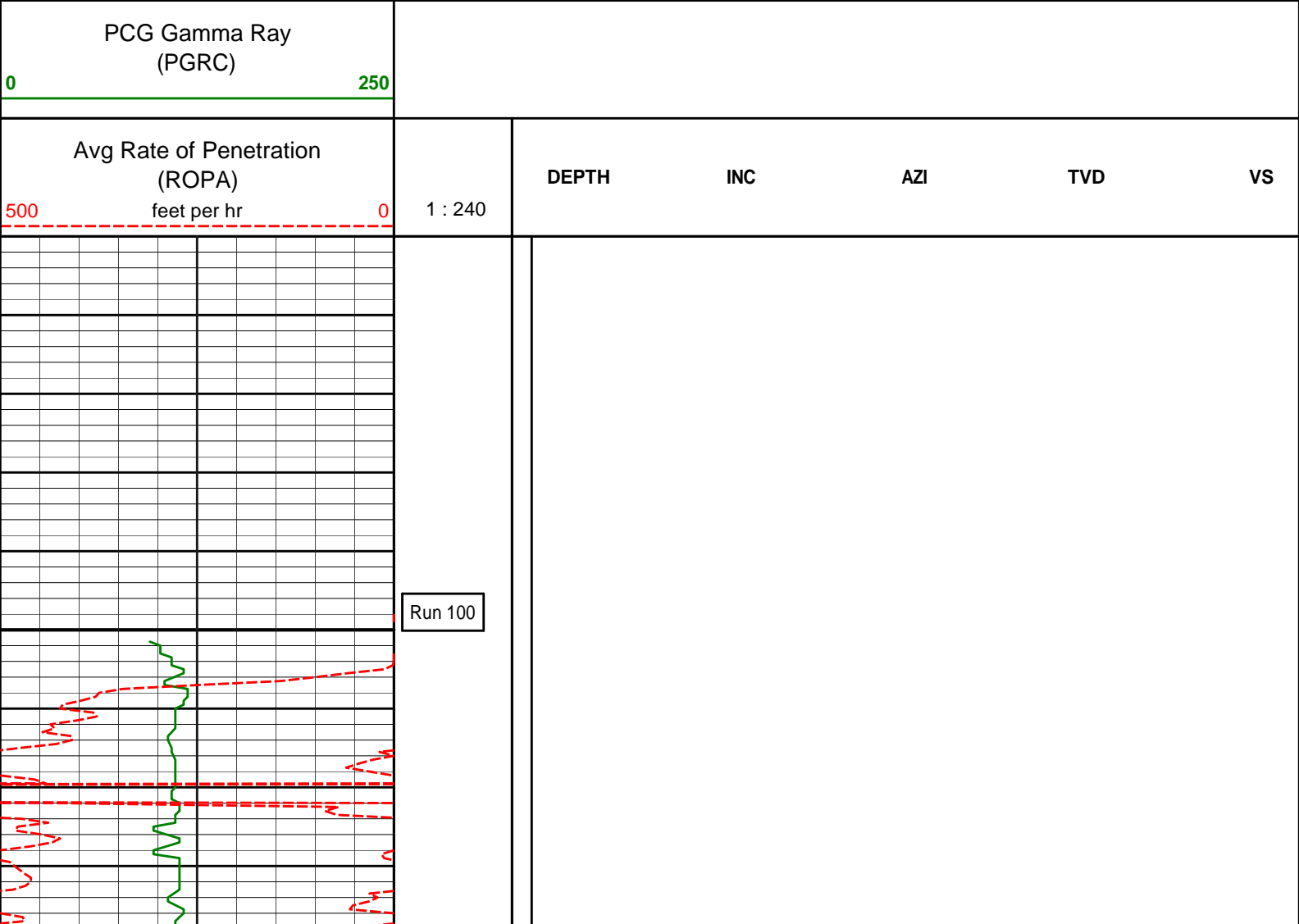
WARRANTY

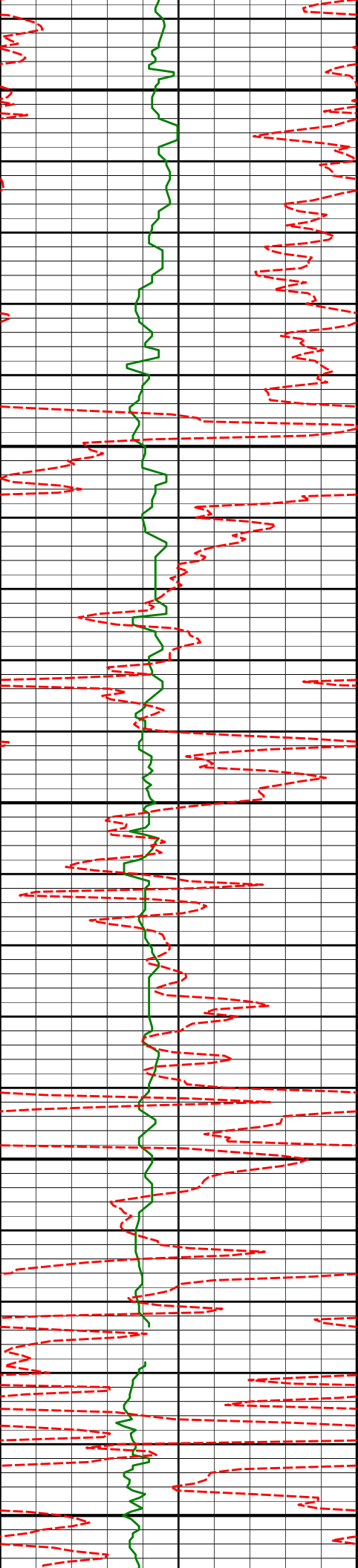
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HALLIBURTON

Sperry Drilling

MD 1:240 Detail Log





1297'

0.31°

69.41°

1296.97'

-6.16'

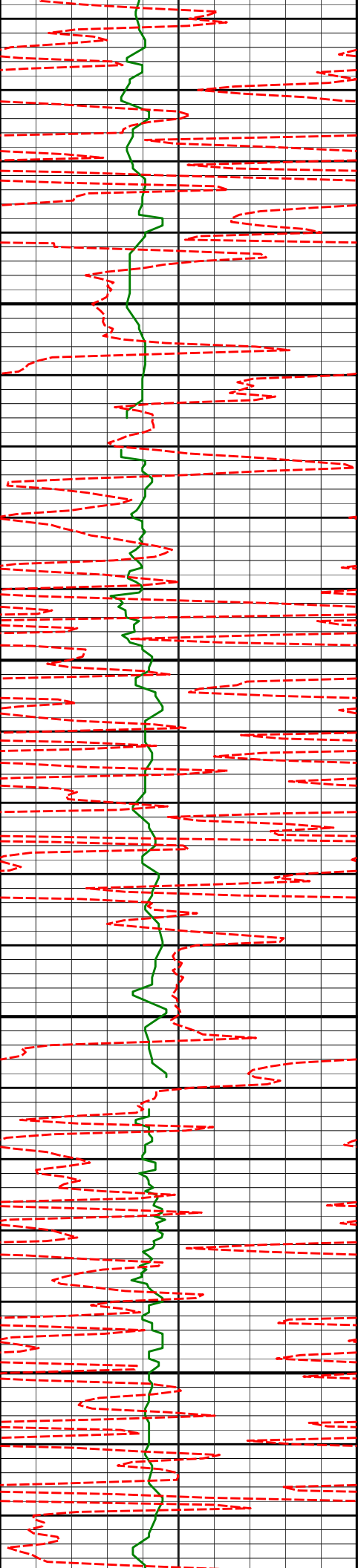
1482'

2.26°

75.89°

1481.91'

-5.10'



1574'

2.40°

131.38°

1573.85'

-5.93'

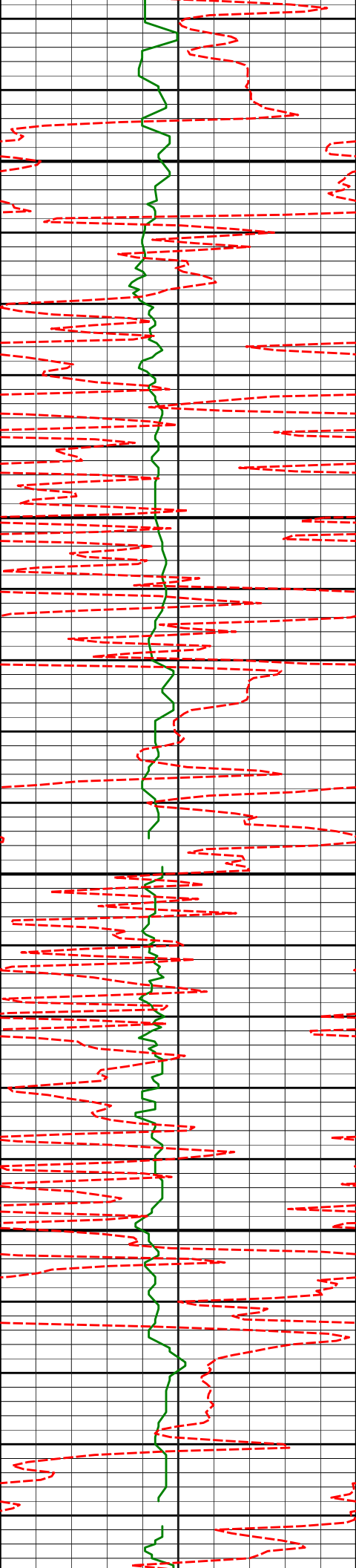
1668'

4.10°

114.38°

1667.70'

-8.62'



1761'

5.11°

110.14°

1760.39'

-11.41'

1852'

6.27°

105.76°

1850.95'

-14.16'

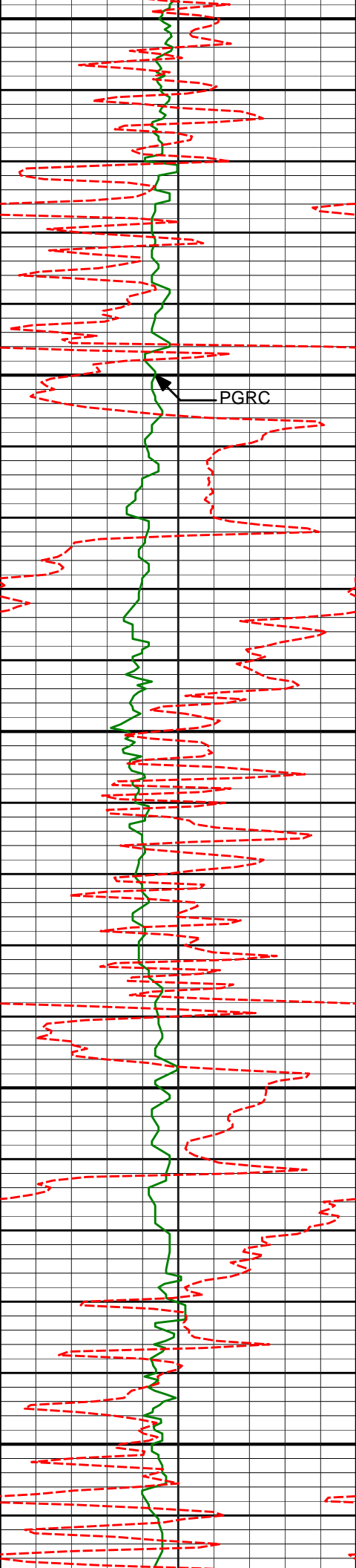
1943'

7.64°

97.18°

1941.28'

-16.27'



2036'

9.38°

96.44°

2033.25'

-17.89'

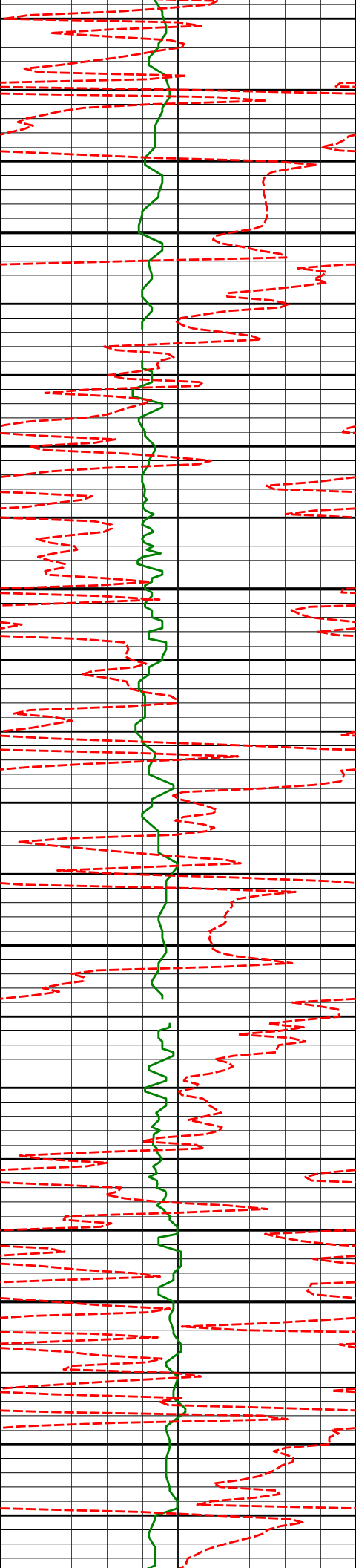
2129'

10.12°

95.34°

2124.90'

-19.50'



2221'

10.25°

89.79°

2215.46'

-20.22'

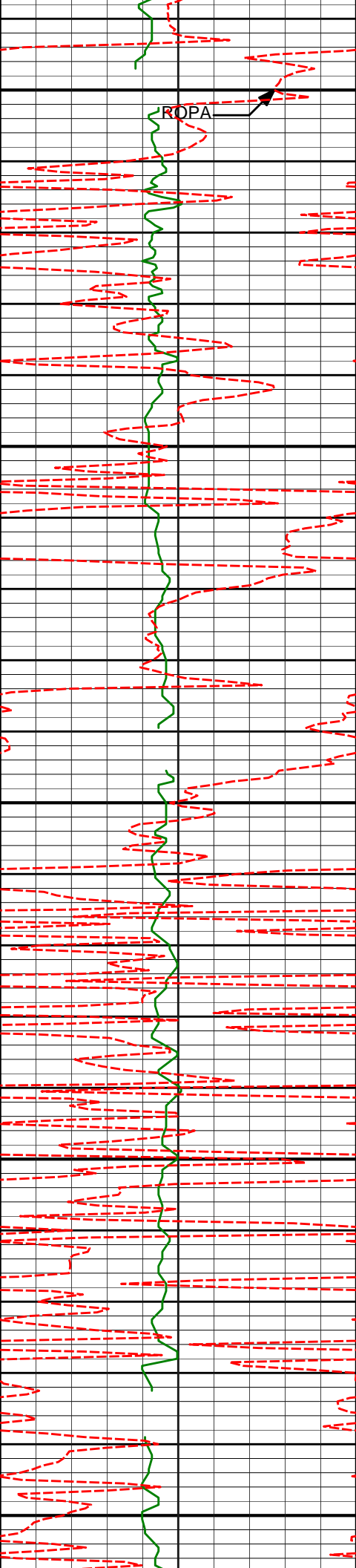
2312'

9.58°

91.02°

2305.10'

-20.33'



2405'

9.70°

92.36°

2396.78'

-20.79'

2497'

11.09°

90.38°

2487.27'

-21.16'

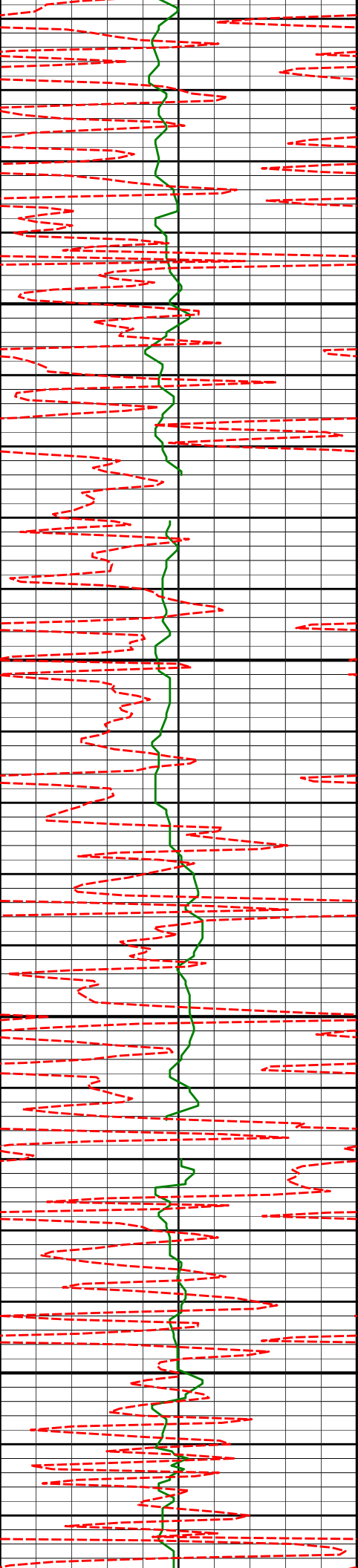
2589'

9.04°

86.23°

2577.85'

-20.75'



2682'

7.01°

81.66°

2669.94'

-19.44'

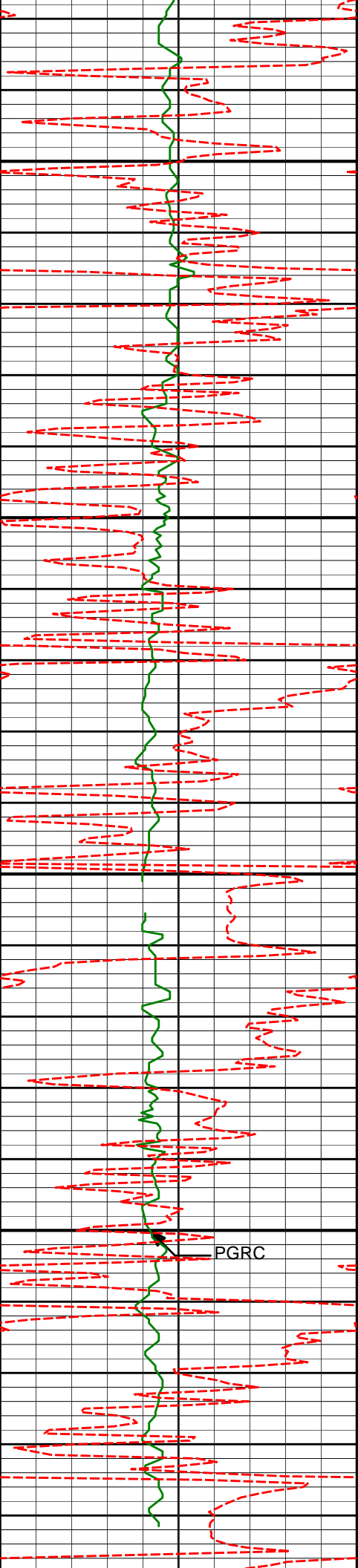
2775'

5.82°

77.77°

2762.35'

-17.62'



2868'

4.99°

75.62°

2854.94'

-15.62'

2961'

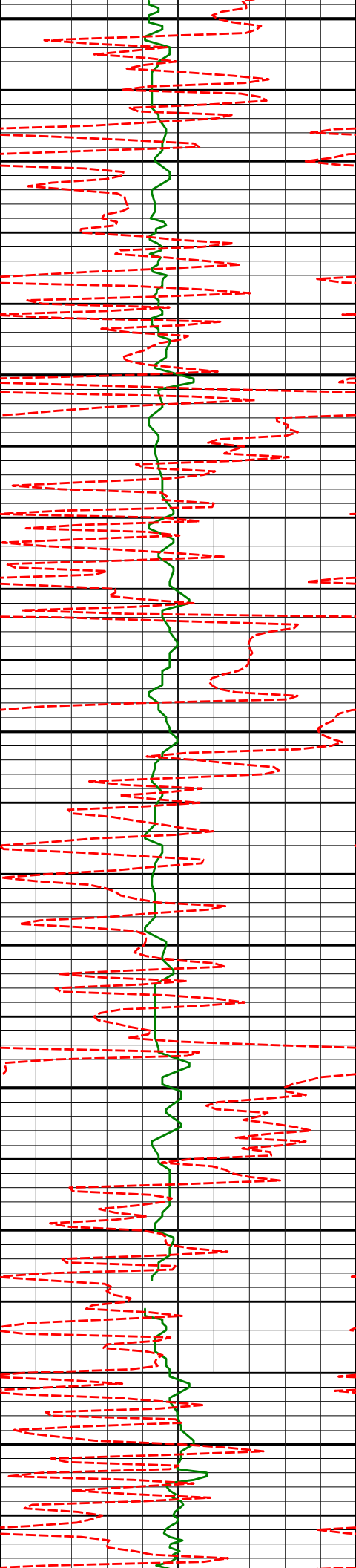
4.33°

88.01°

2947.64'

-14.49'

PGRC



3053'

2.16°

94.89°

3039.48'

-14.52'

3145'

1.29°

65.68°

3131.44'

-14.24'

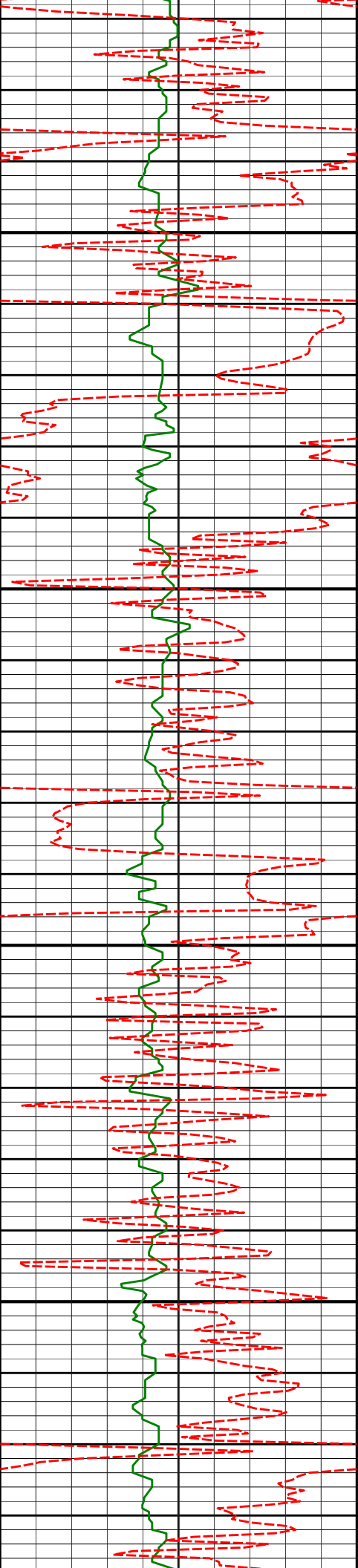
3237'

1.75°

20.96°

3223.41'

-12.50'



3328'

1.15°

310.48°

3314.39'

-10.61'

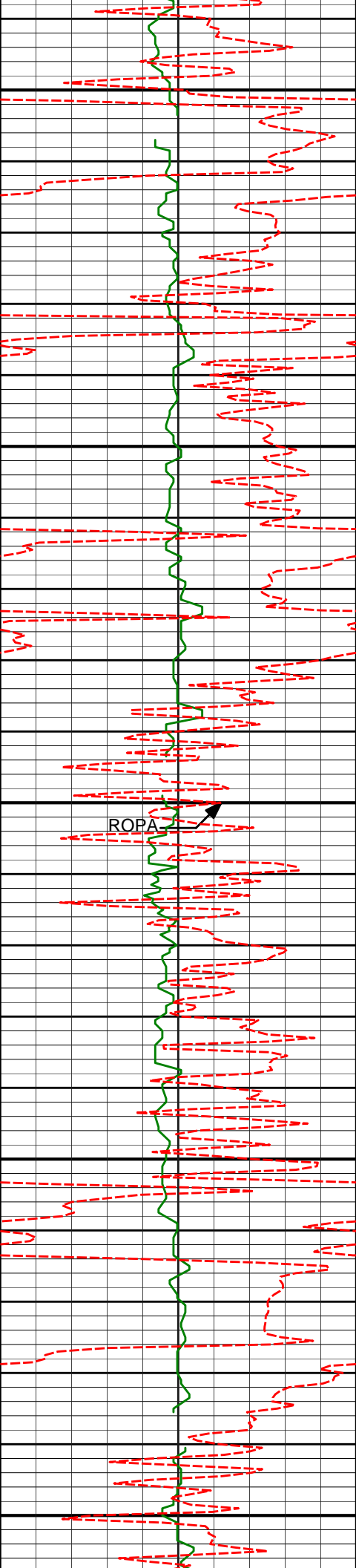
3420'

1.12°

277.67°

3406.37'

-9.89'



3512'

0.91°

261.47°

3498.36'

-9.88'

3603'

1.44°

269.81°

3589.34'

-9.99'

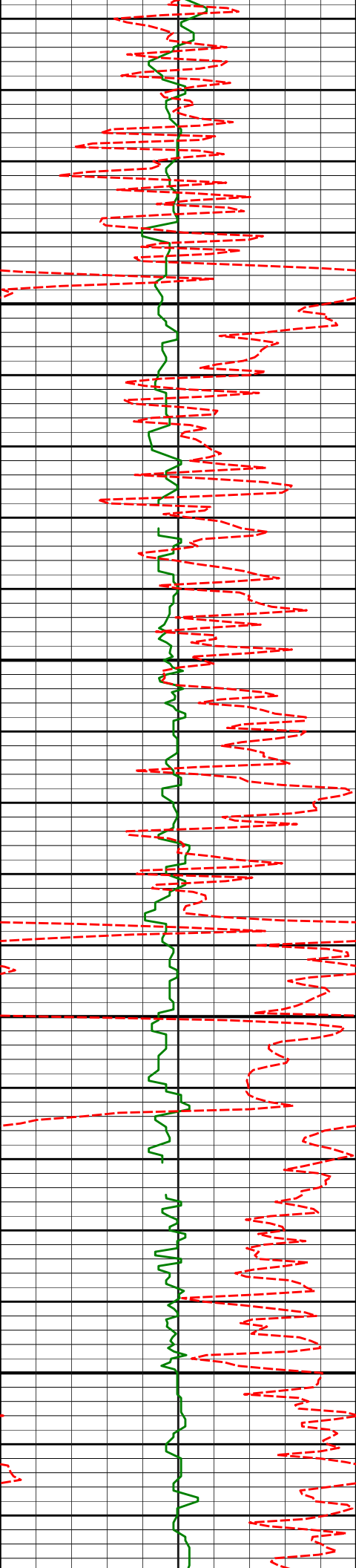
3695'

0.45°

194.46°

3681.33'

-10.35'



3787'

1.01°

260.12°

3773.32'

-10.83'

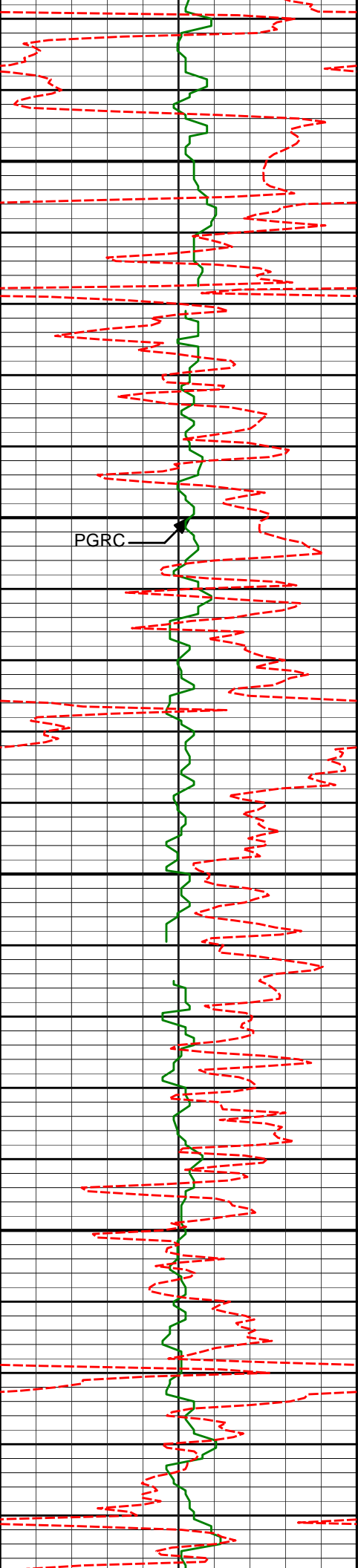
3879'

0.72°

305.72°

3865.31'

-10.64'



PGRC



3973'

0.43°

134.61°

3959.31'

-10.54'

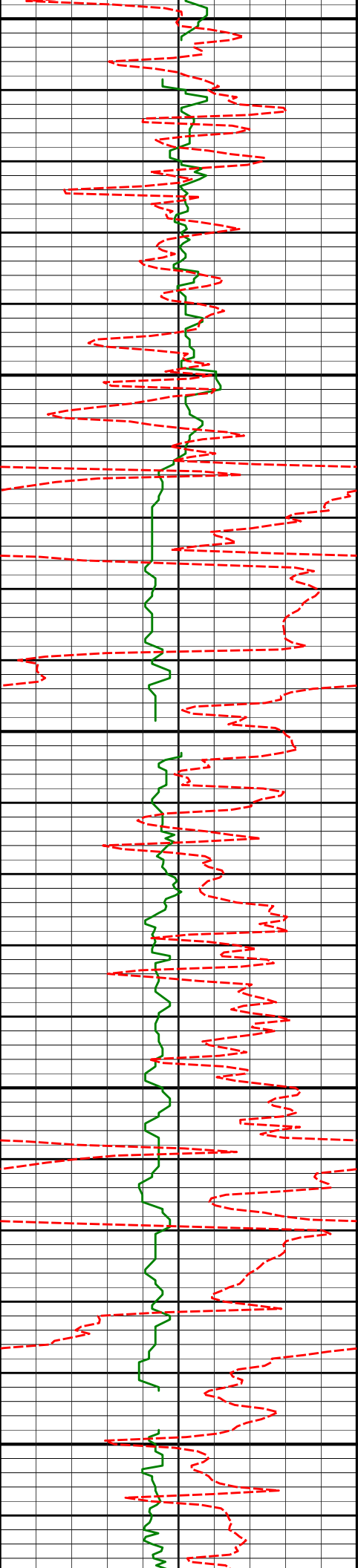
4068'

0.47°

247.81°

4054.31'

-10.94'



4162'

1.50°

284.27°

4148.29'

-10.78'

4257'

0.84°

234.55°

4243.27'

-10.88'

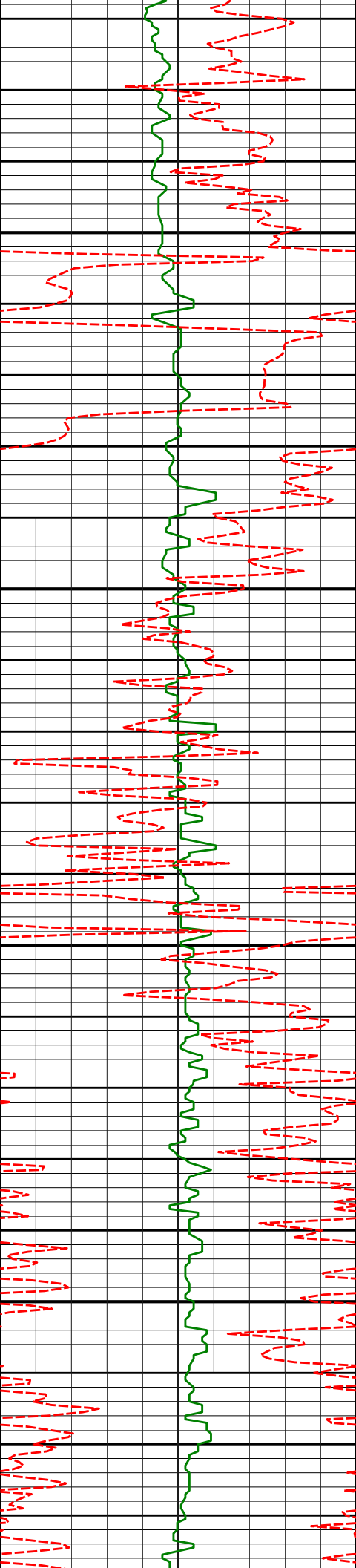
4351'

1.10°

302.50°

4337.26'

-10.79'



4445'

1.04°

4.86°

4431.25'

-9.46'

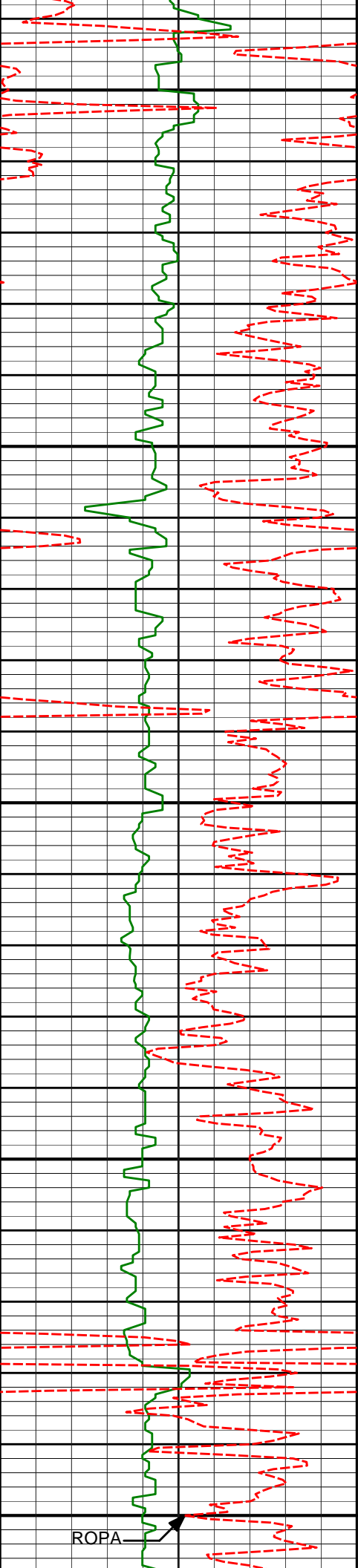
4540'

1.50°

1.94°

4526.23'

-7.35'



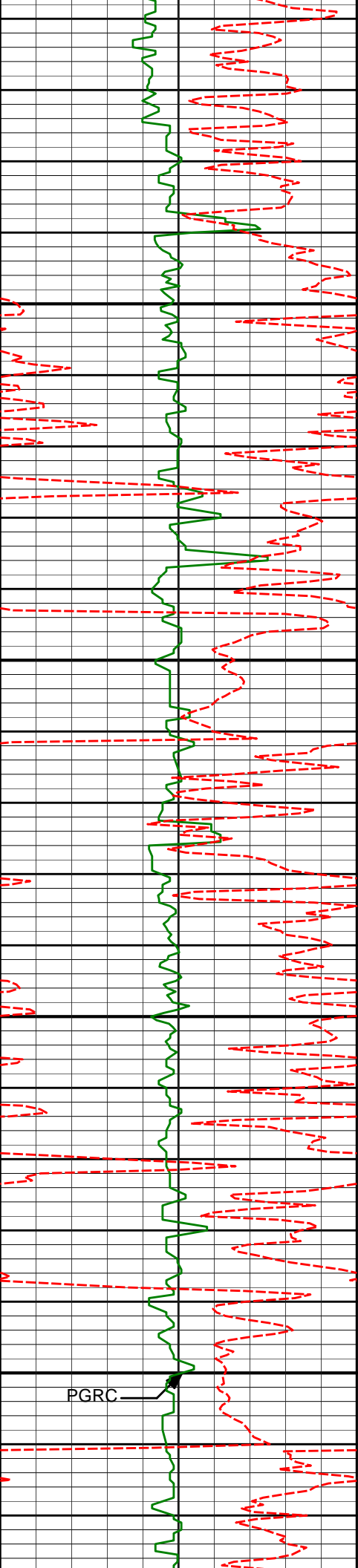
4729'

1.36°

5.40°

4715.17'

-2.65'



4823'

1.61°

2.98°

4809.14'

-0.22'

4918'

1.04°

89.20°

4904.12'

1.13'

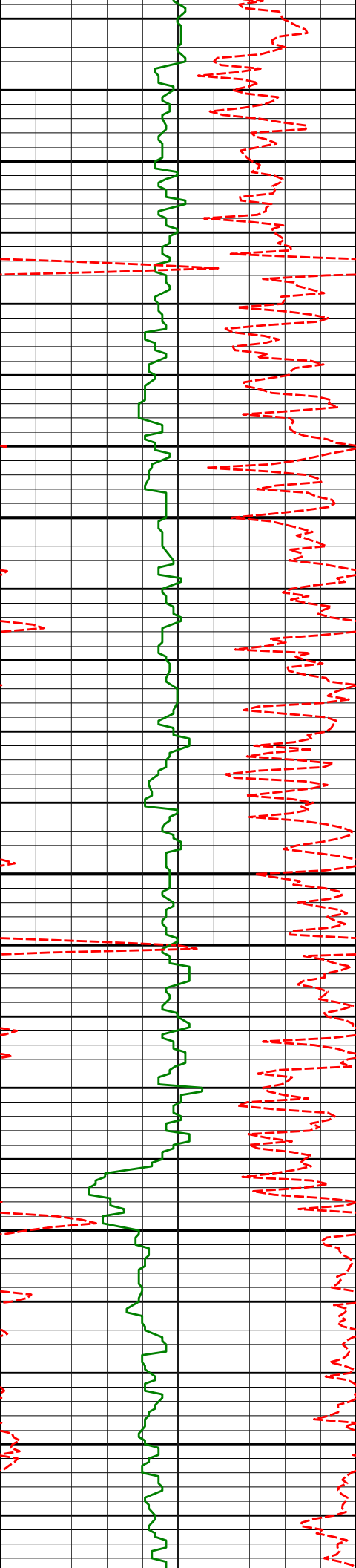
5012'

2.22°

191.44°

4998.09'

-0.65'



5106'

2.12°

174.94°

5092.02'

-4.16'

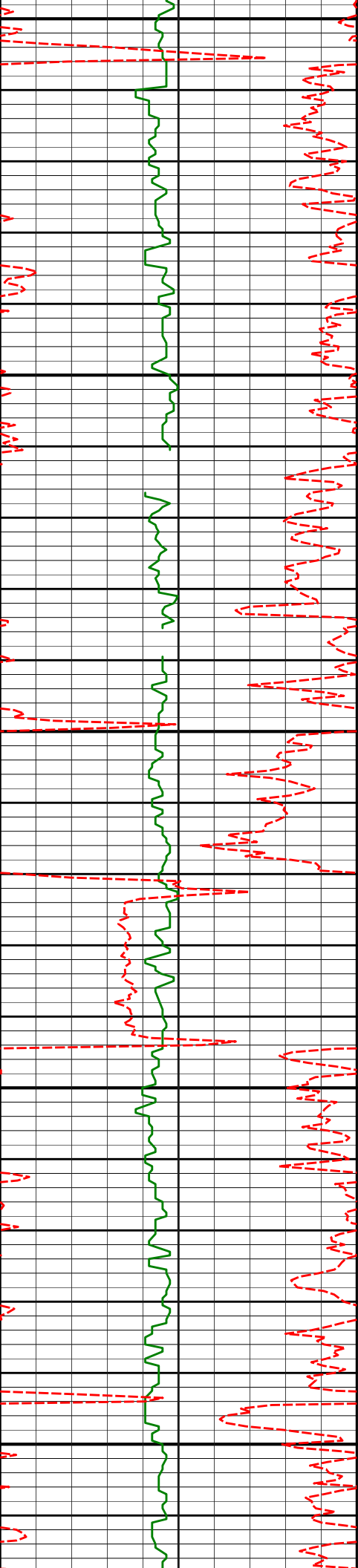
5201'

1.29°

172.27°

5186.98'

-6.97'



5296'

1.35°

186.49°

5281.96'

-9.15'

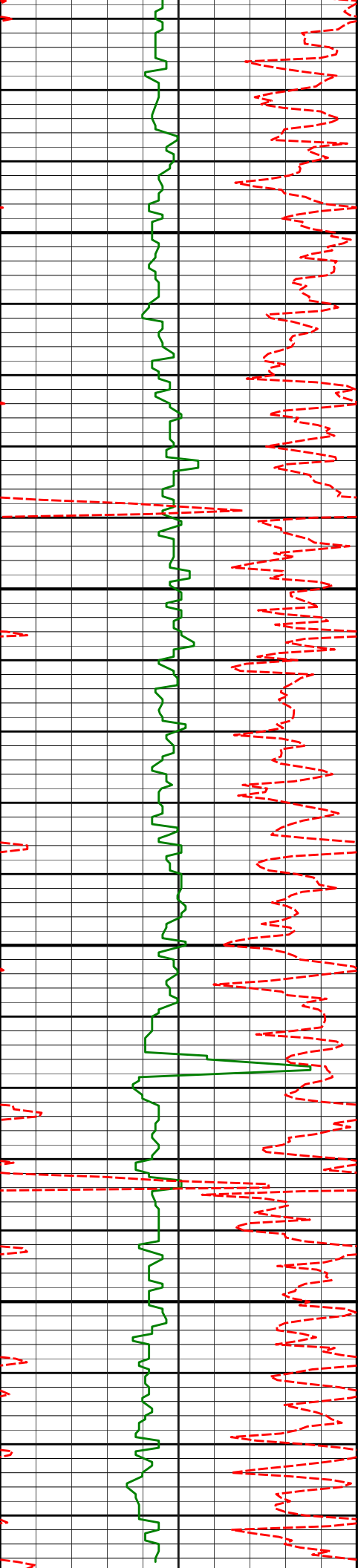
5390'

0.90°

185.79°

5375.94'

-10.98'



5485'

1.12°

181.72°

5470.92'

-12.65'

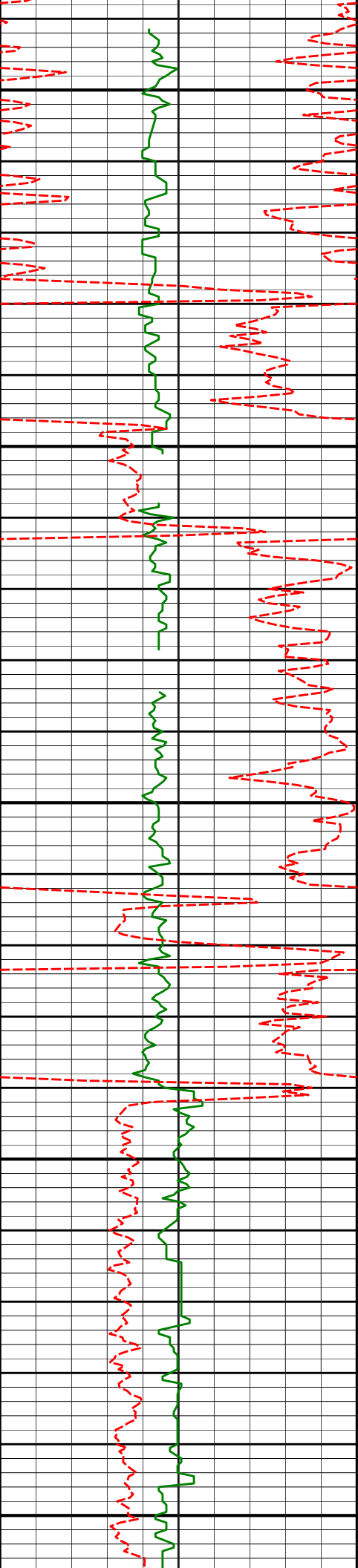
5674'

0.53°

208.69°

5659.90'

-15.26'



5768'

0.55°

213.10°

5753.90'

-16.02'

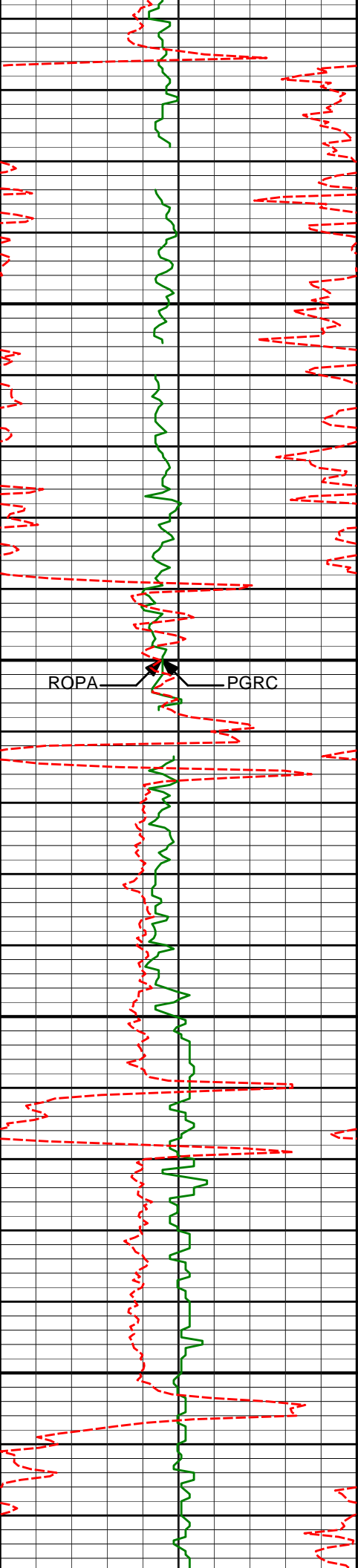
5863'

0.16°

330.88°

5848.90'

-16.29'



5957'

0.31°

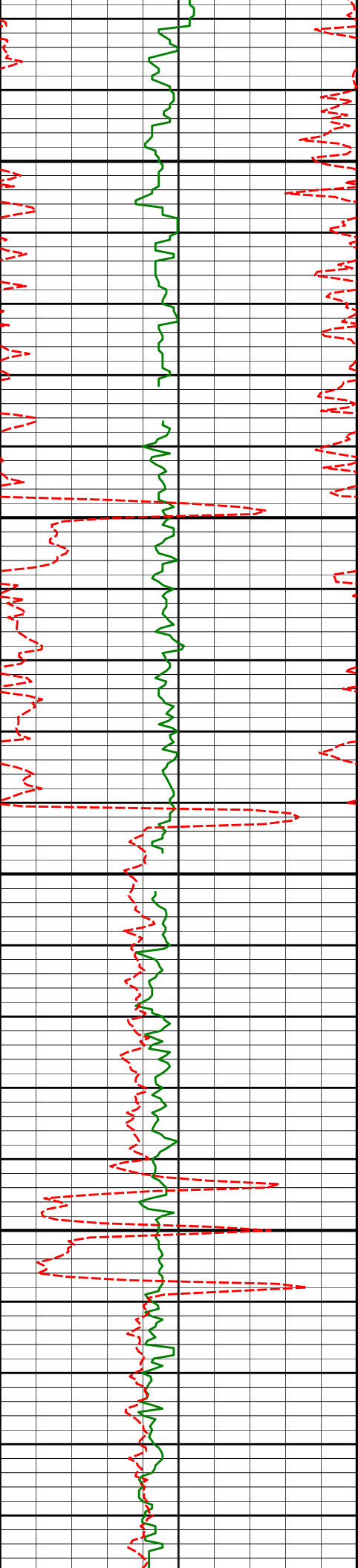
159.02°

5942.90'

-16.41'

ROPA

PGRC



6146'

0.20°

66.79°

6131.90'

-16.76'

6241'

0.49°

23.82°

6226.90'

-16.32'

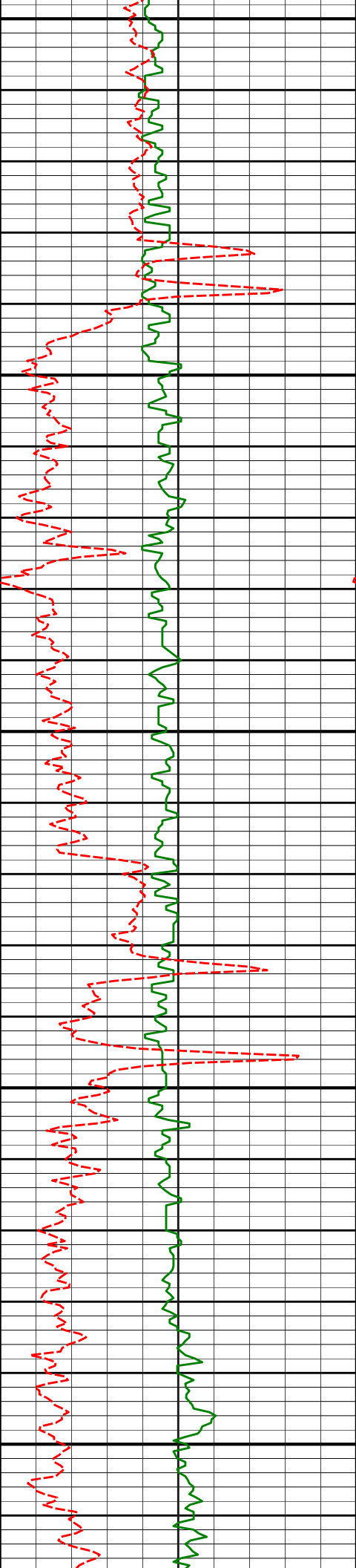
6335'

1.08°

24.74°

6320.89'

-15.15'



6430'

0.94°

40.83°

6415.87'

-13.75'

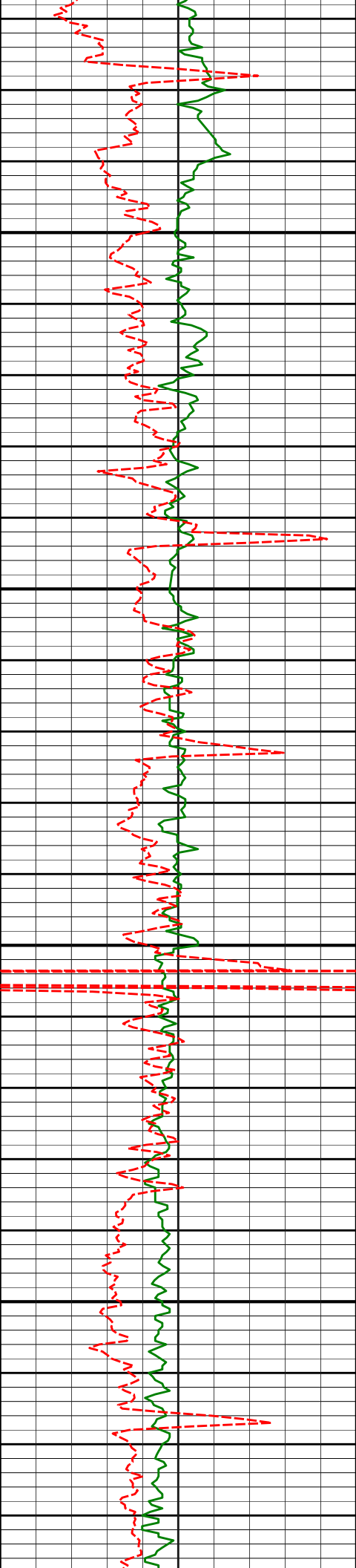
6524'

1.14°

35.77°

6509.86'

-12.41'



6618'

1.02°

66.86°

6603.84'

-11.32'

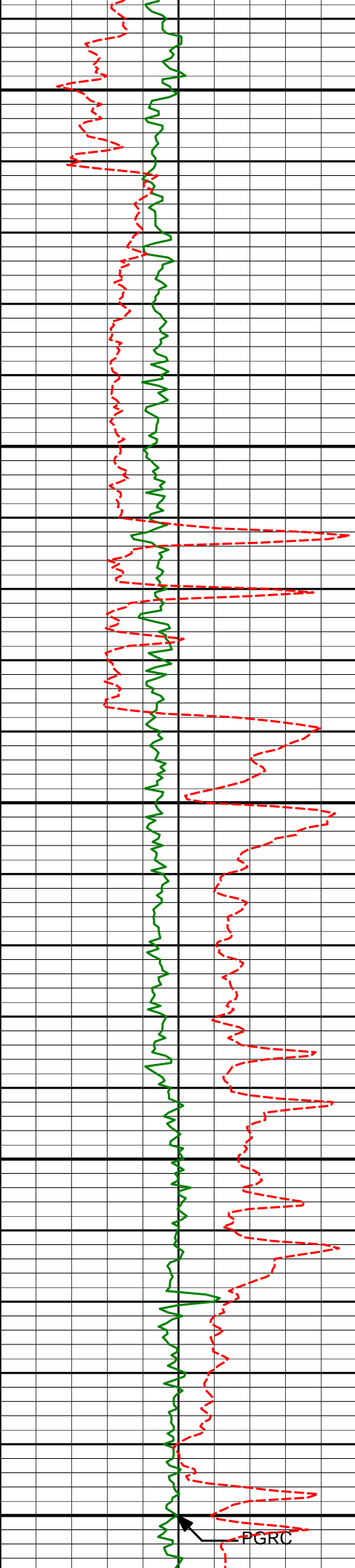
6712'

1.27°

77.70°

6697.82'

-10.77'



6807'

0.99°

59.99°

6792.80'

-10.13'

6901'

2.42°

26.94°

6886.76'

-7.96'

6948'

5.91°

19.03°

6933.63'

-4.78'

6995'

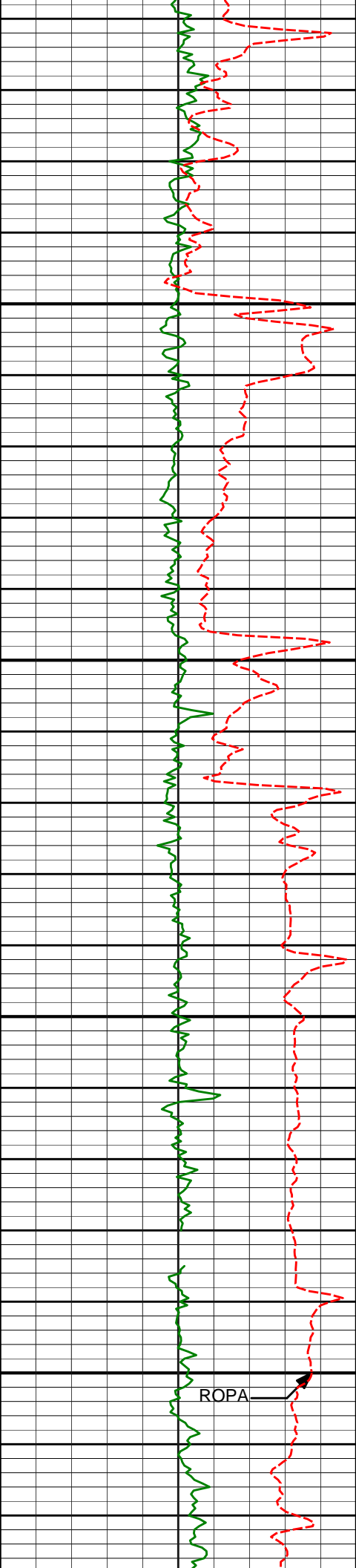
9.51°

25.12°

6980.20'

1.02'

PGRC

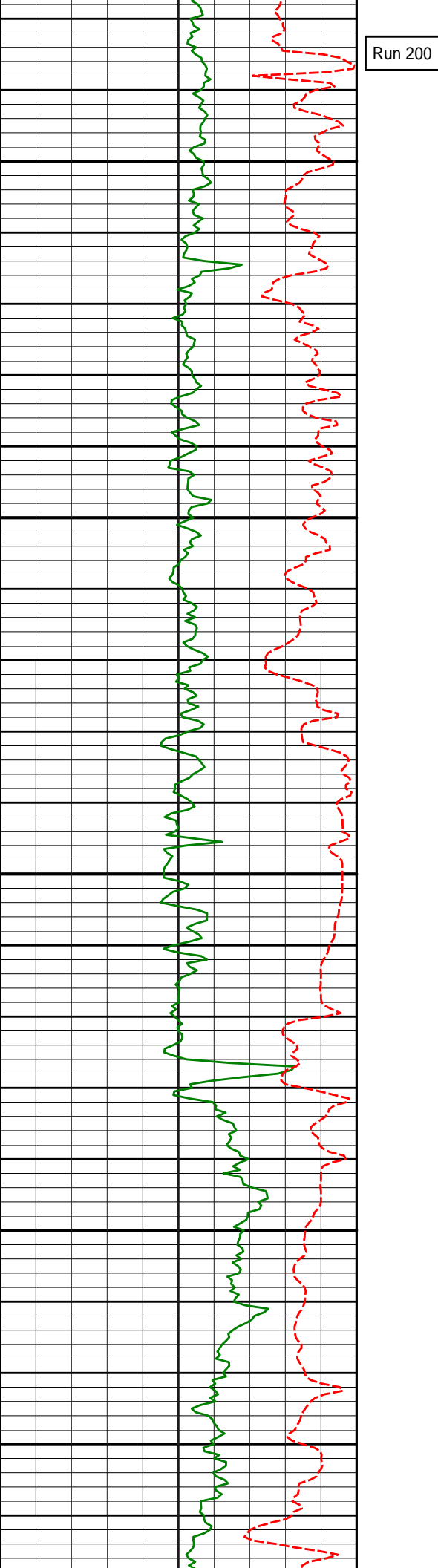


7042'	11.09°	27.58°	7026.44'	8.54'
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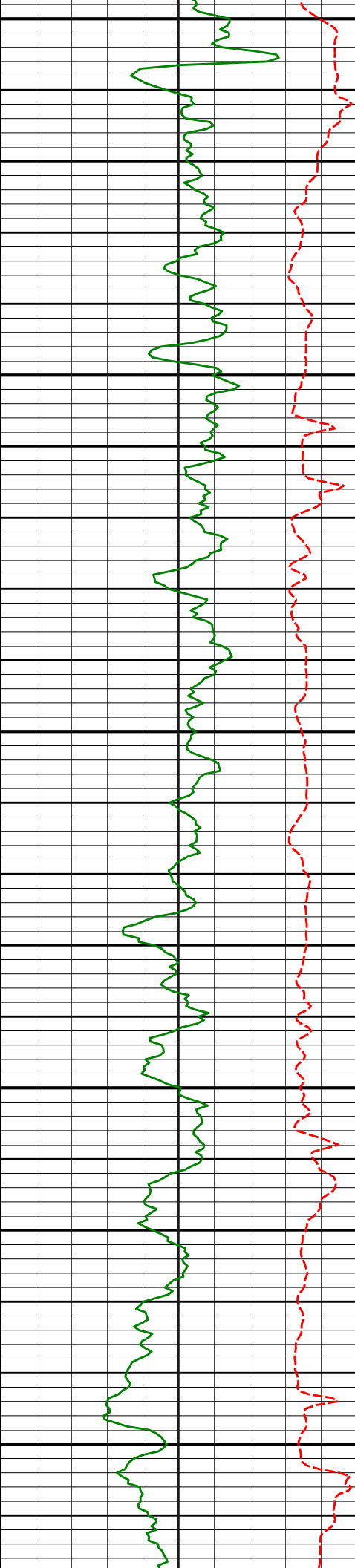
7090'	13.76°	27.53°	7073.31'	17.70'
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7137'	14.07°	28.86°	7118.93'	27.66'
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7184'	17.50°	24.84°	7164.15'	39.08'
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7242'	21.82°	23.20°	7218.50'	57.50'
7289'	26.89°	19.65°	7260.97'	76.66'
7335'	31.83°	6.95°	7300.77'	99.61'
7381'	33.11°	359.80°	7339.51'	124.66'
7428'	41.07°	3.22°	7375.48'	153.49'



7474'

47.19°

0.39°

7407.91'

186.28'

7520'

54.09°

356.29°

7436.41'

222.50'

7566'

61.08°

354.72°

7460.37'

261.77'

7612'

68.77°

353.14°

7479.14'

303.65'

7658'

75.31°

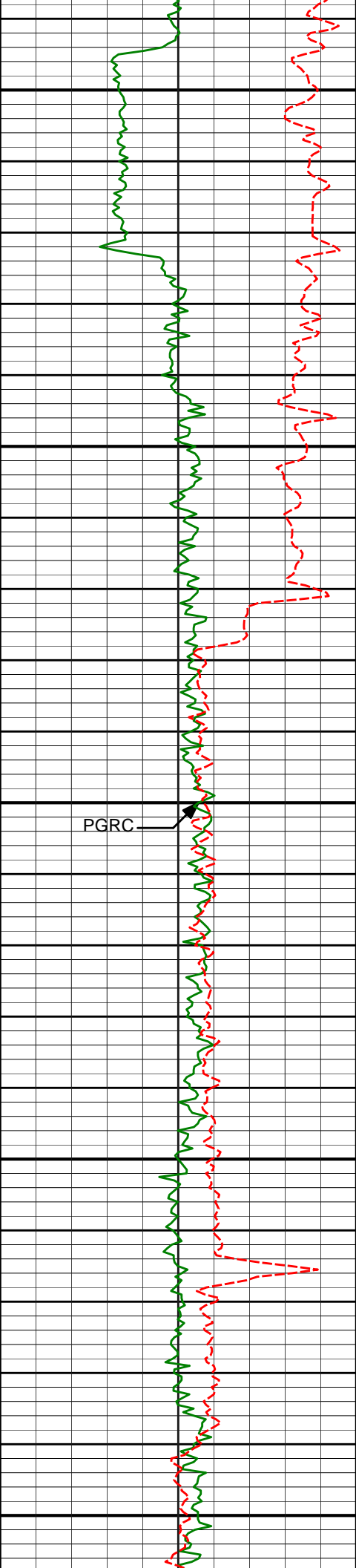
354.01°

7492.76'

347.45'



7704'	80.74°	354.93°	7501.89'	392.46'
7752'	86.14°	356.91°	7506.91'	439.20'
7798'	88.21°	357.74°	7509.08'	485.24'
7844'	86.95°	357.46°	7511.08'	531.31'



7897'

89.94°

357.79°

7512.45'

584.26'

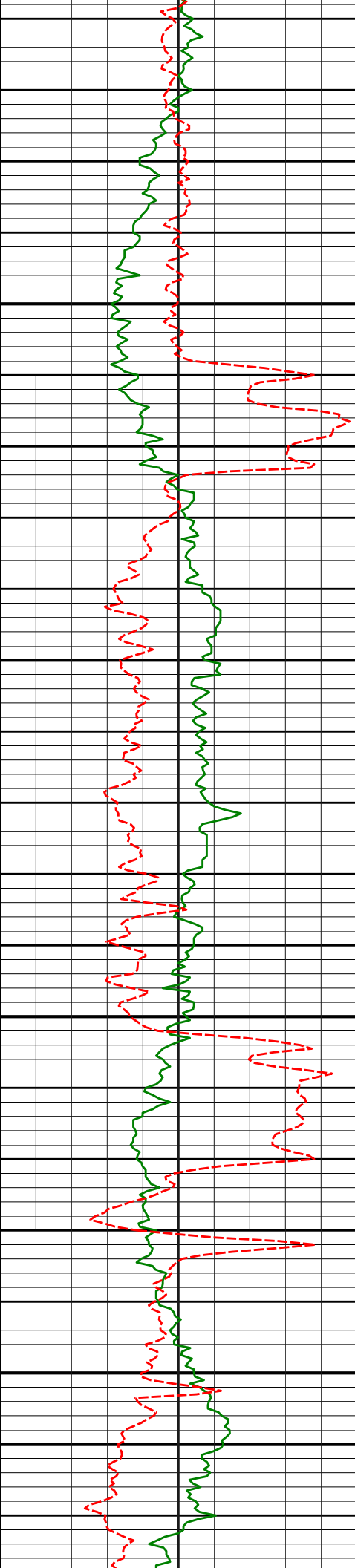
8018'

90.28°

0.32°

7512.21'

705.34'



8113'

91.42°

359.79°

7510.80'

800.33'

8207'

92.09°

359.45°

7507.92'

894.29'

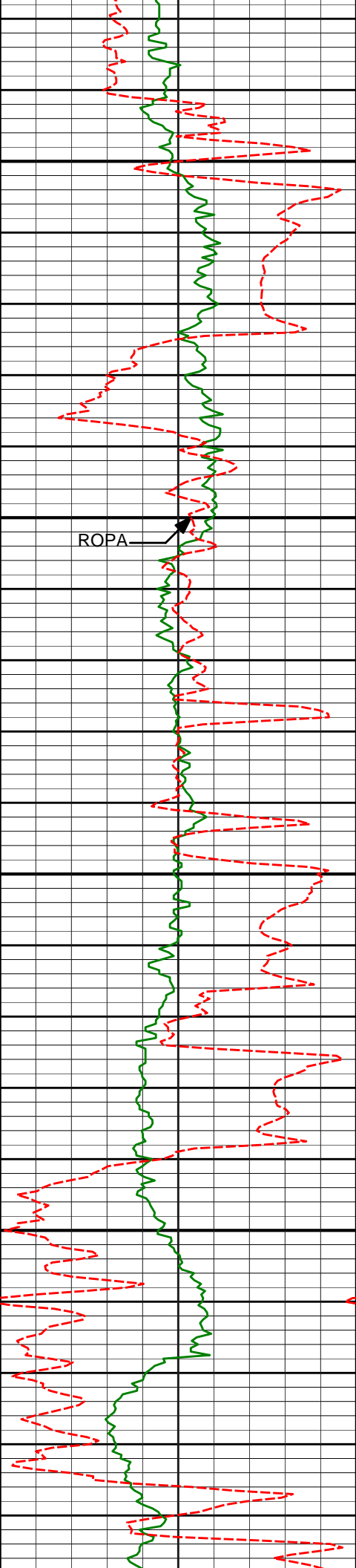
8301'

92.90°

359.58°

7503.83'

988.19'



8396'

93.30°

359.79°

7498.69'

1083.05'

ROPA

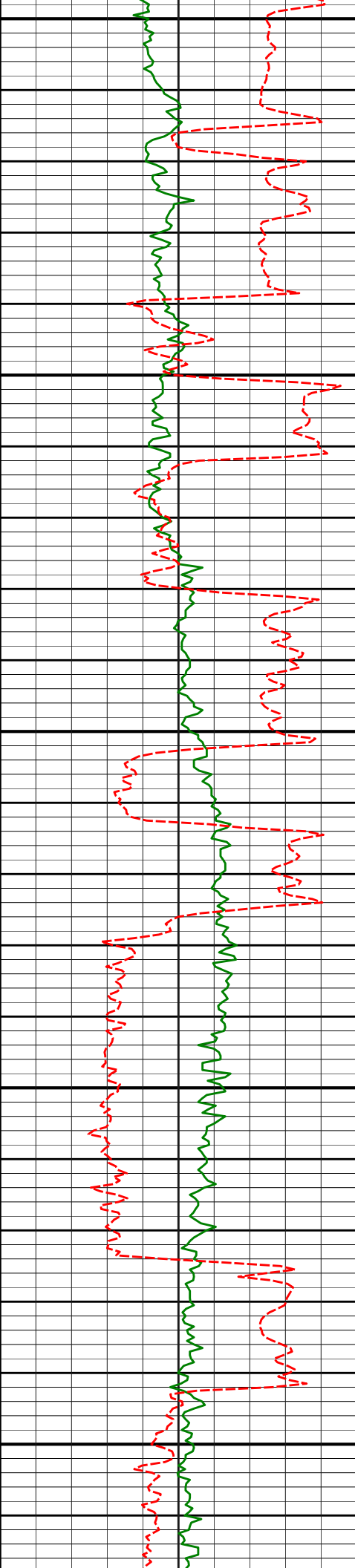
8491'

93.17°

0.28°

7493.33'

1177.90'



8585'

92.40°

0.73°

7488.76'

1271.78'

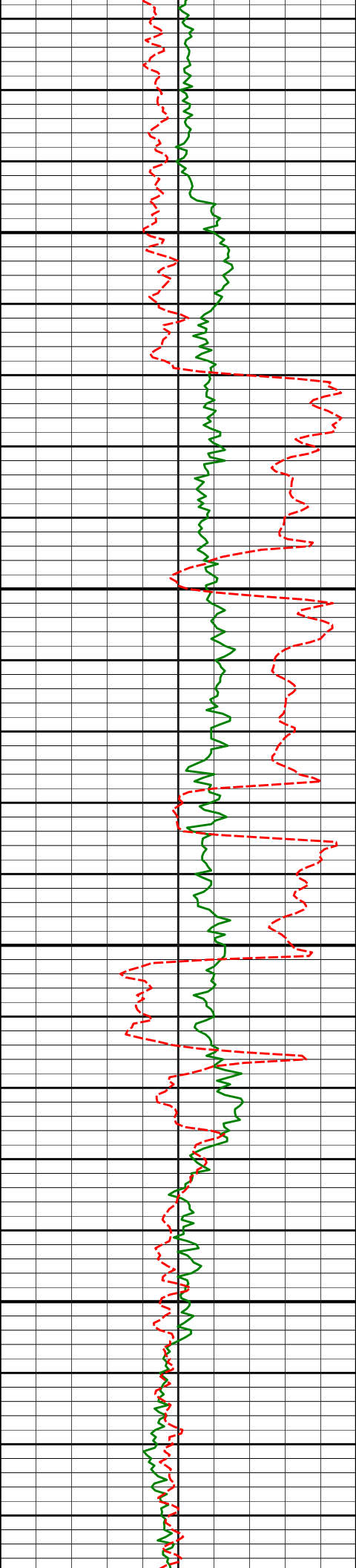
8680'

90.22°

1.02°

7486.59'

1366.74'



8774'

90.65°

0.24°

7485.88'

1460.73'

8868'

90.25°

0.65°

7485.14'

1554.73'

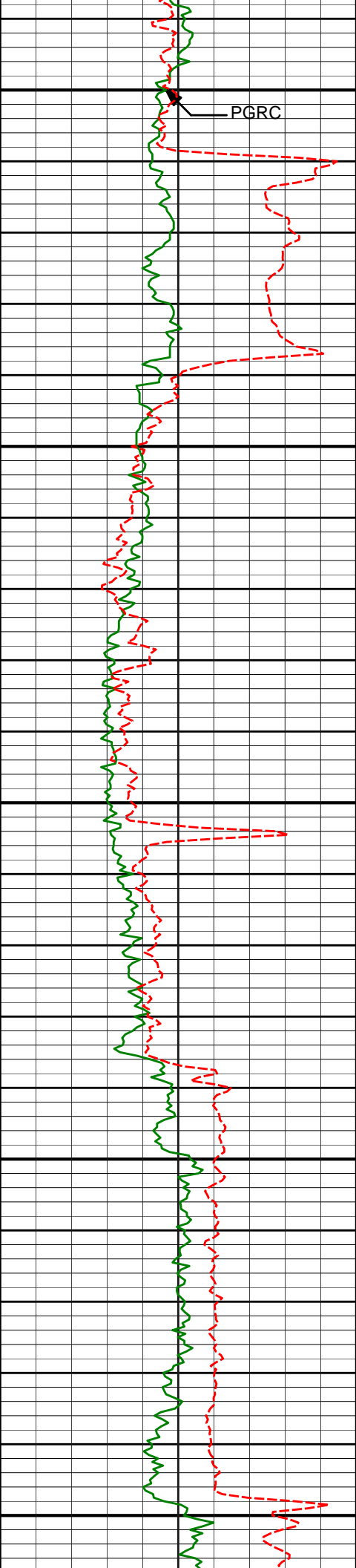
8963'

89.14°

1.05°

7485.65'

1649.71'



9057'

87.81°

1.38°

7488.15'

1743.66'

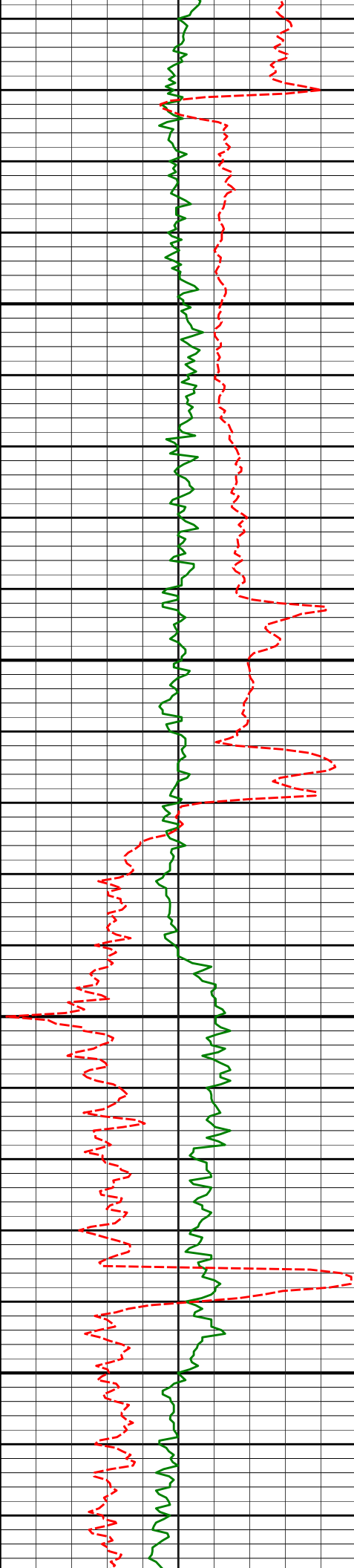
9152'

89.60°

1.21°

7490.29'

1838.60'



9247'

89.20°

1.54°

7491.29'

1933.57'

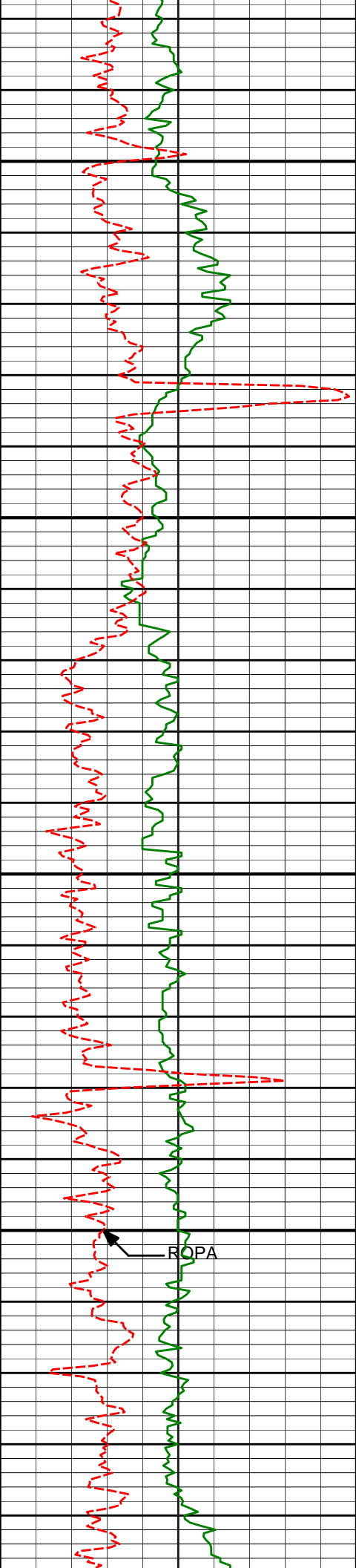
9341'

88.31°

0.97°

7493.33'

2027.53'



9436'

88.24°

0.58°

7496.19'

2122.47'

9530'

88.80°

0.47°

7498.62'

2216.44'

ROPA

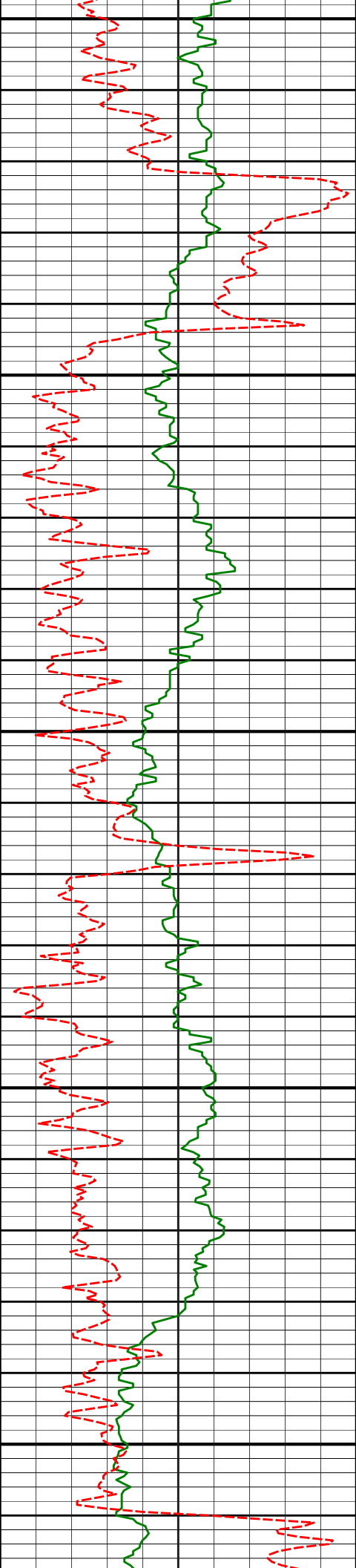
9625'

89.57°

0.10°

7499.97'

2311.43'



9719'

87.96°

359.97°

7502.00'

2405.40'

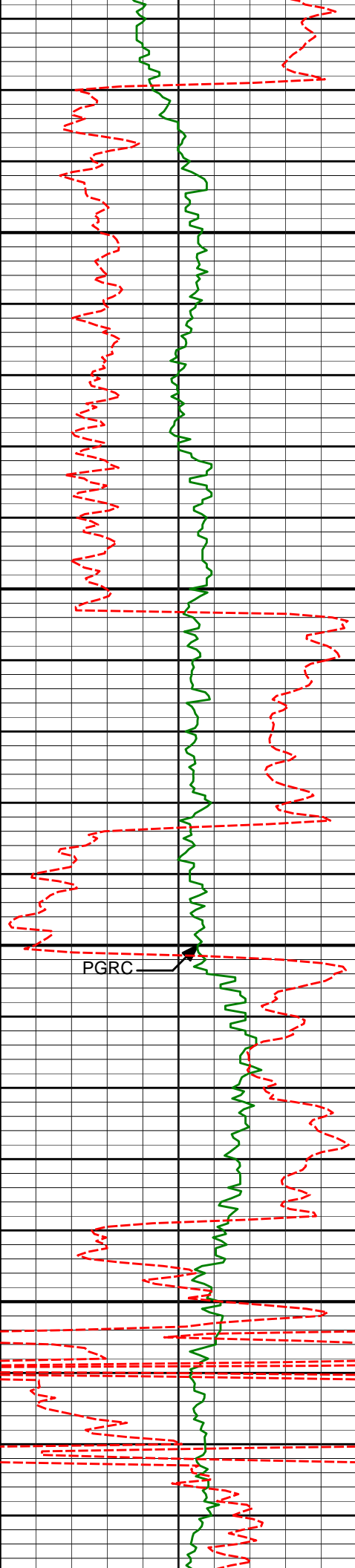
9814'

87.35°

359.87°

7505.88'

2500.32'



9909'

87.69°

359.46°

7510.00'

2595.23'

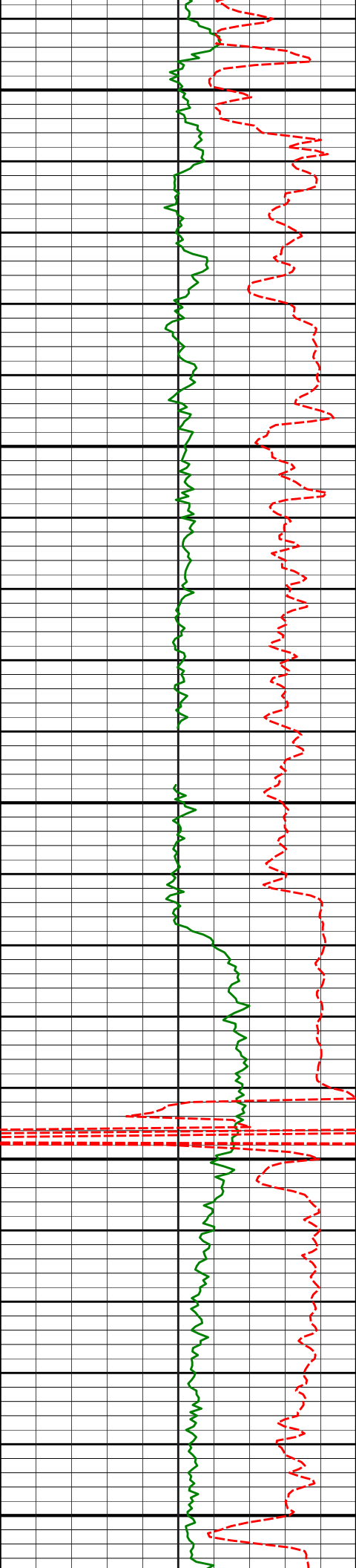
10003'

89.01°

358.00°

7512.70'

2689.16'



10097'

90.43°

356.72°

7513.16'

2783.06'

10192'

91.02°

356.28°

7511.96'

2877.87'

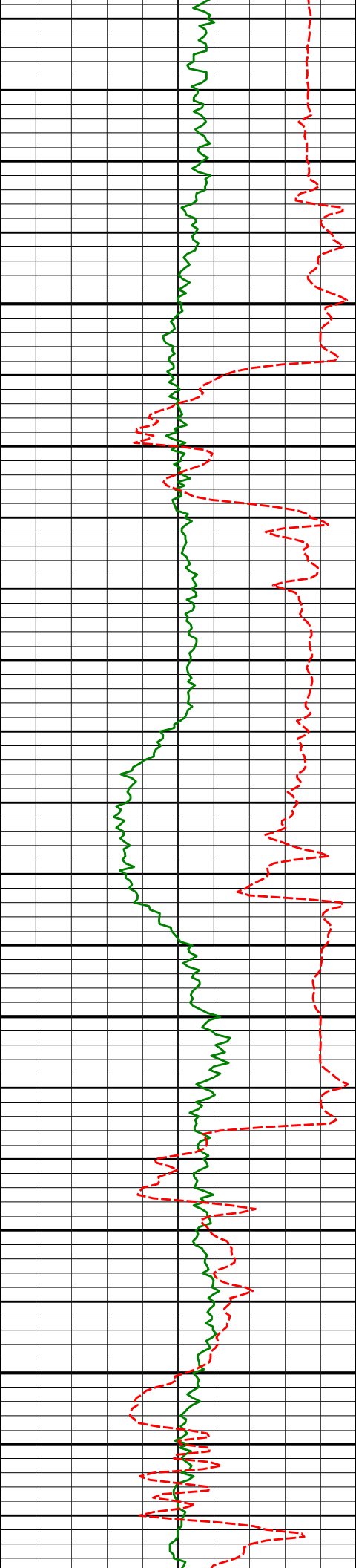
10285'

92.19°

356.34°

7509.35'

2970.64'



10380'

92.77°

357.64°

7505.24'

3065.42'

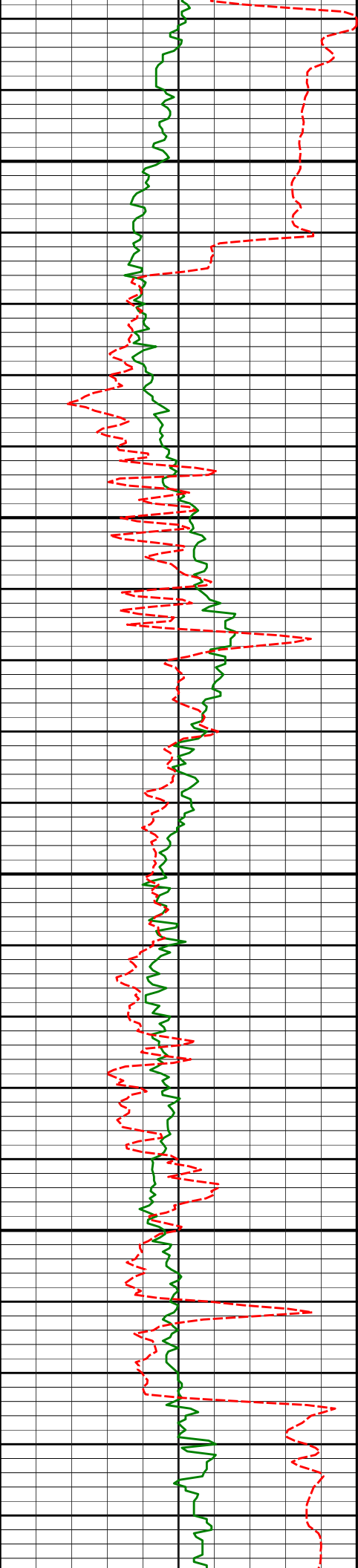
10474'

92.03°

358.87°

7501.31'

3159.29'



10568'

90.86°

359.76°

7498.94'

3253.25'

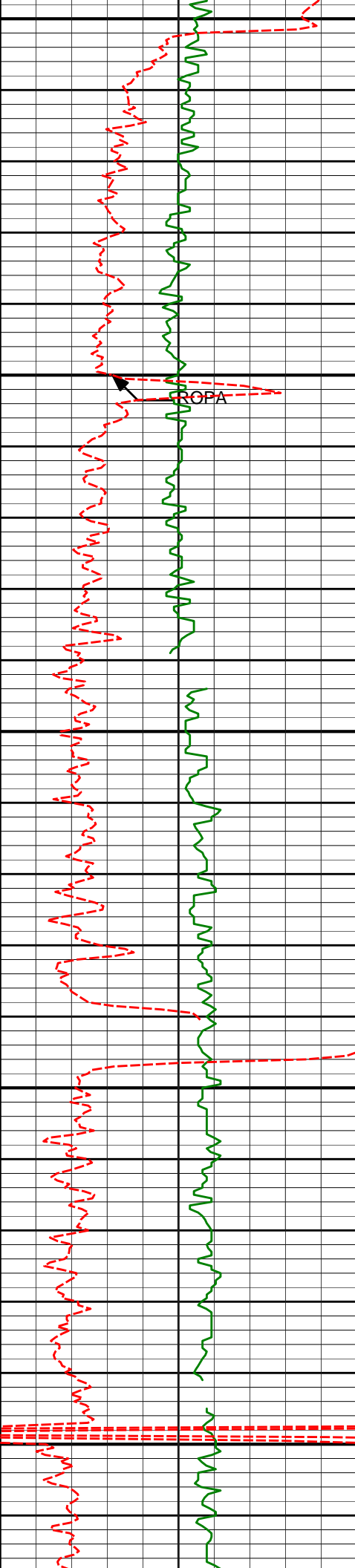
10662'

90.89°

359.47°

7497.50'

3347.24'



10754'

89.29°

0.31°

7497.36'

3439.23'

10847'

90.03°

359.89°

7497.91'

3532.23'

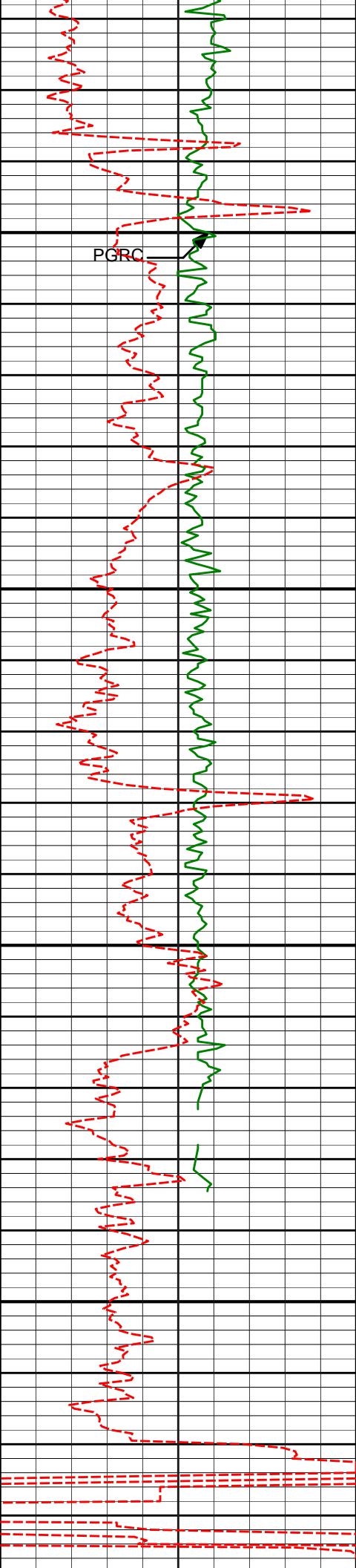
10939'

90.28°

0.18°

7497.66'

3624.23'



PGRC

11031'

90.18°

359.35°

7497.29'

3716.23'

11123'

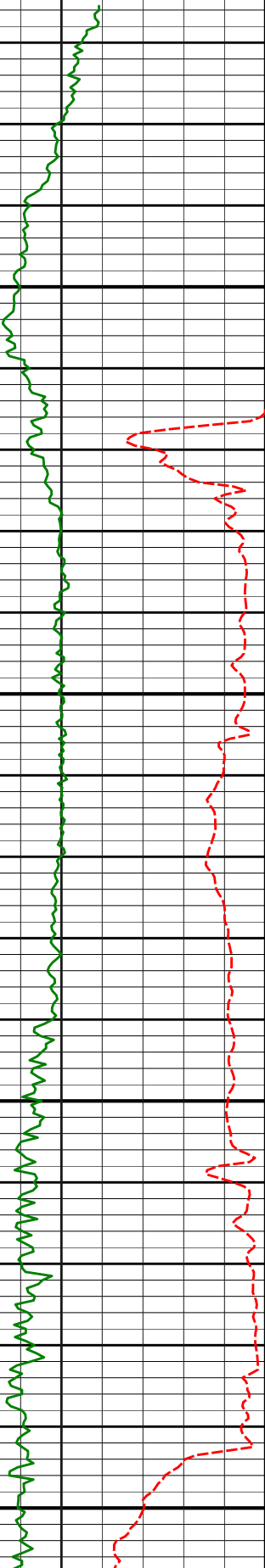
88.89°

358.63°

7498.04'

3808.21'

See Comment #6



Run 400

11217'

88.15°

358.16°

7500.46'

3902.14'

11310'

91.20°

356.39°

7500.99'

3995.02'

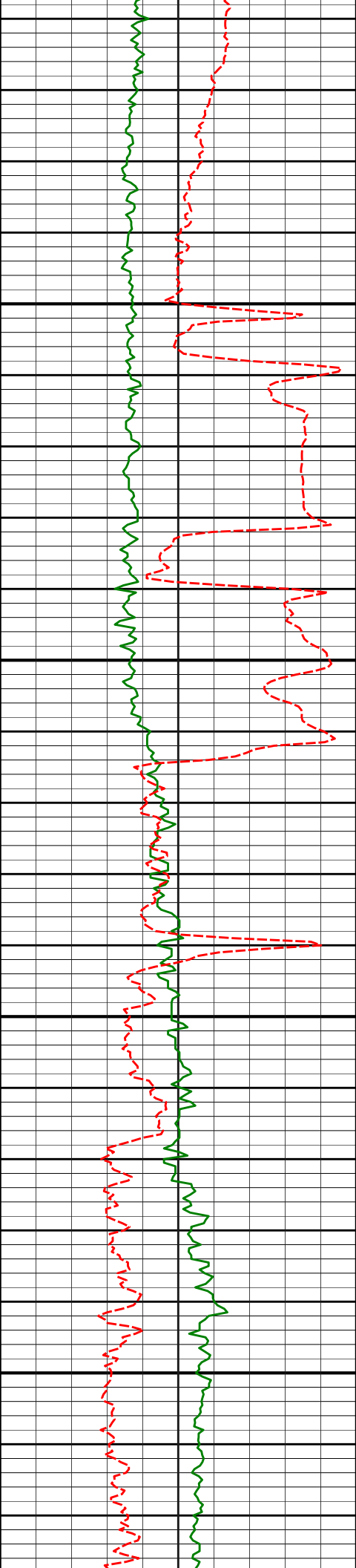
11402'

90.43°

357.88°

7499.68'

4086.89'



11492'

89.38°

359.64°

7499.83'

4176.87'

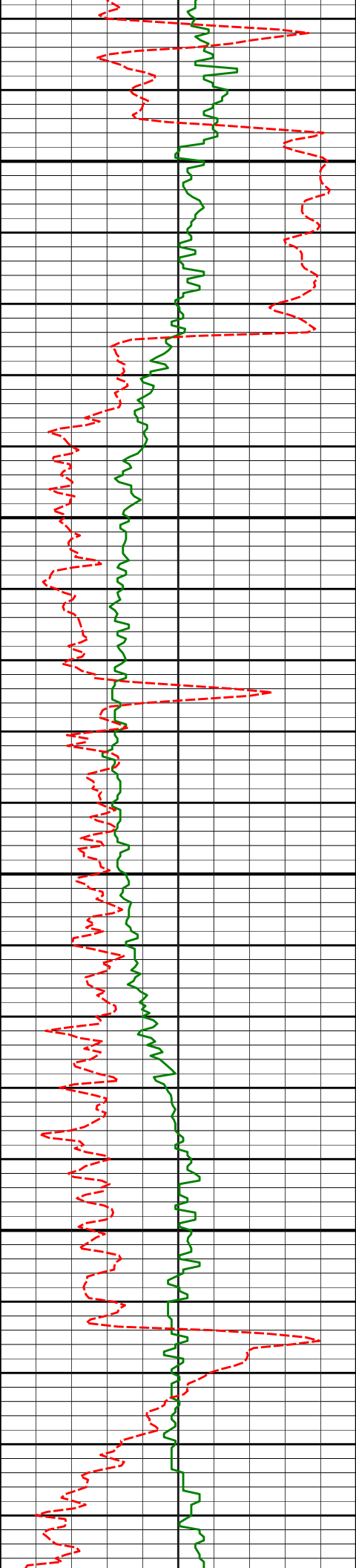
11585'

89.11°

0.39°

7501.06'

4269.86'



11678'

89.08°

2.30°

7502.53'

4362.81'

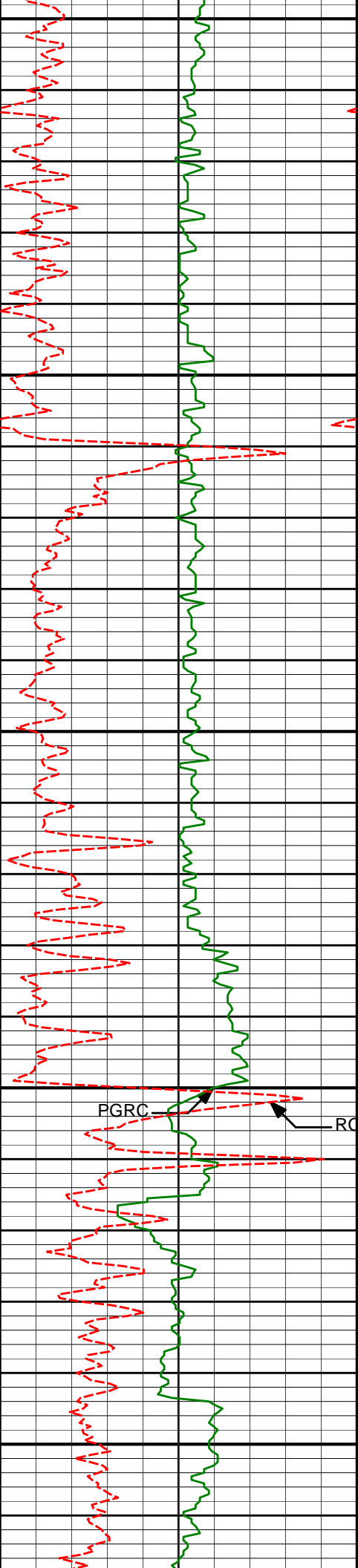
11770'

89.38°

1.81°

7503.76'

4454.75'



11862'

89.29°

1.92°

7504.83'

4546.69'

11954'

90.93°

3.30°

7504.66'

4638.59'

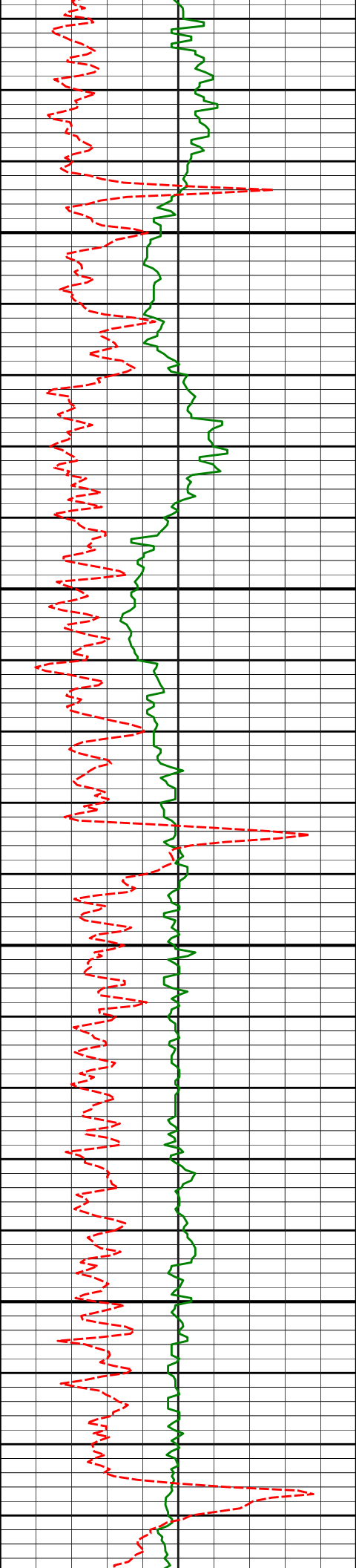
12046'

90.99°

3.34°

7503.11'

4730.42'



12139'

90.65°

3.12°

7501.78'

4823.27'

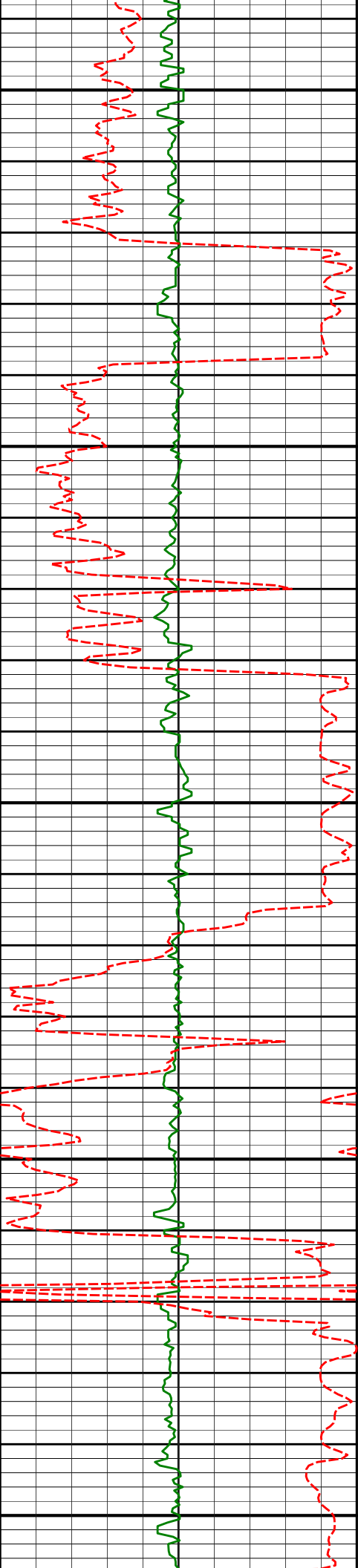
12231'

90.03°

2.96°

7501.24'

4915.13'



12324'

90.65°

4.93°

7500.69'

5007.91'

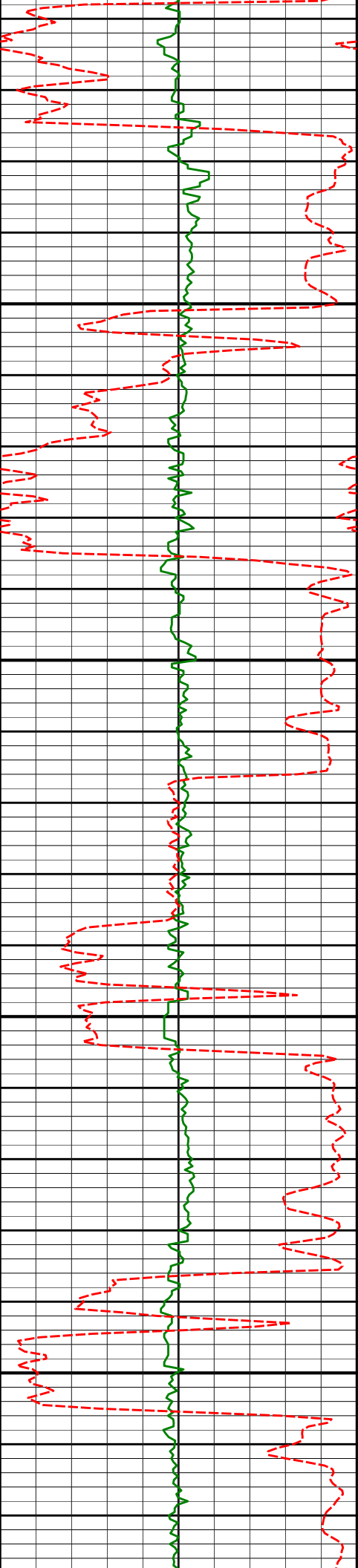
12417'

90.80°

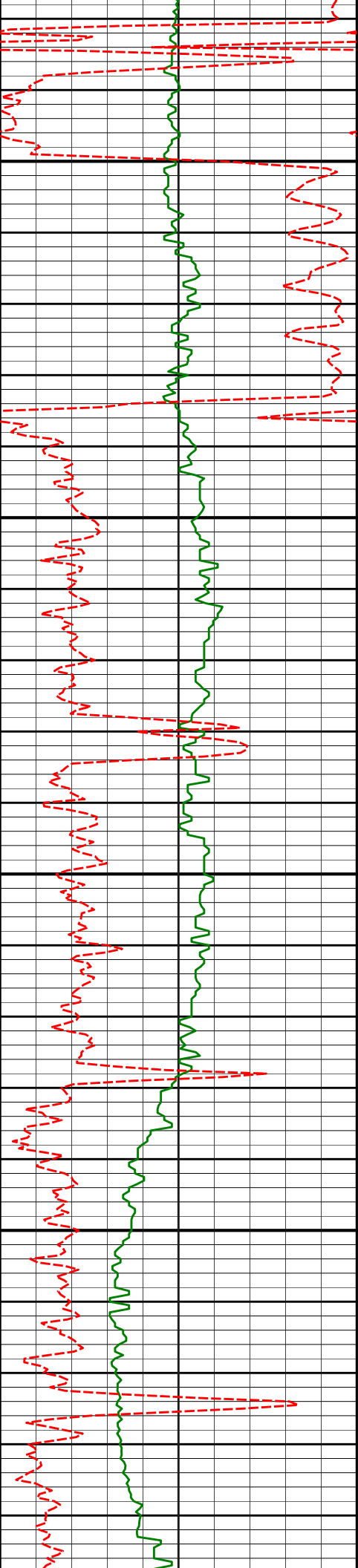
5.29°

7499.51'

5100.53'



12510'	90.37°	5.59°	7498.56'	5193.11'
12602'	90.00°	3.86°	7498.26'	5284.79'
12694'	90.55°	2.39°	7497.82'	5376.65'



12786'

88.30°

358.26°

7498.74'

5468.62'

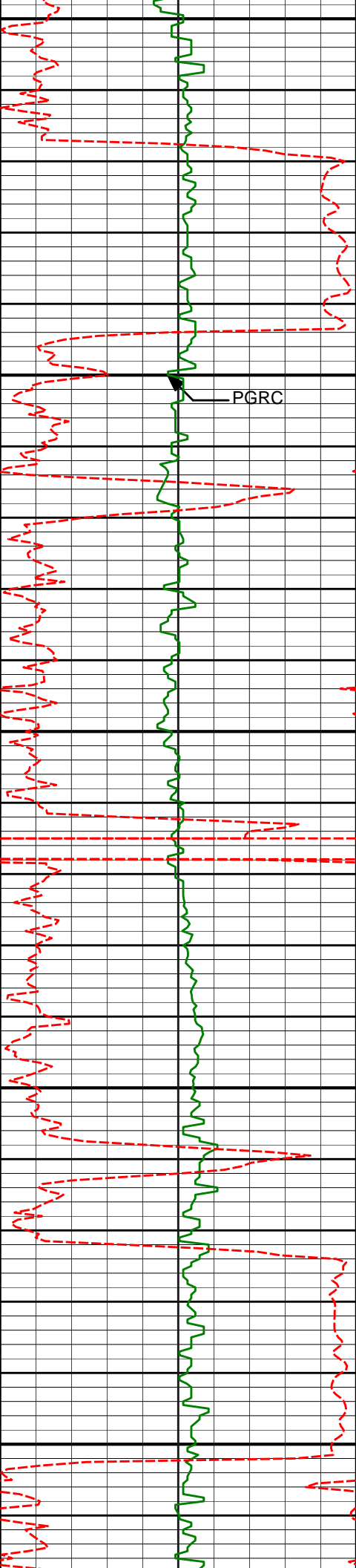
12877'

88.09°

358.11°

7501.61'

5559.53'



12969'

88.12°

358.08°

7504.65'

5651.43'

13061'

88.55°

358.17°

7507.33'

5743.34'

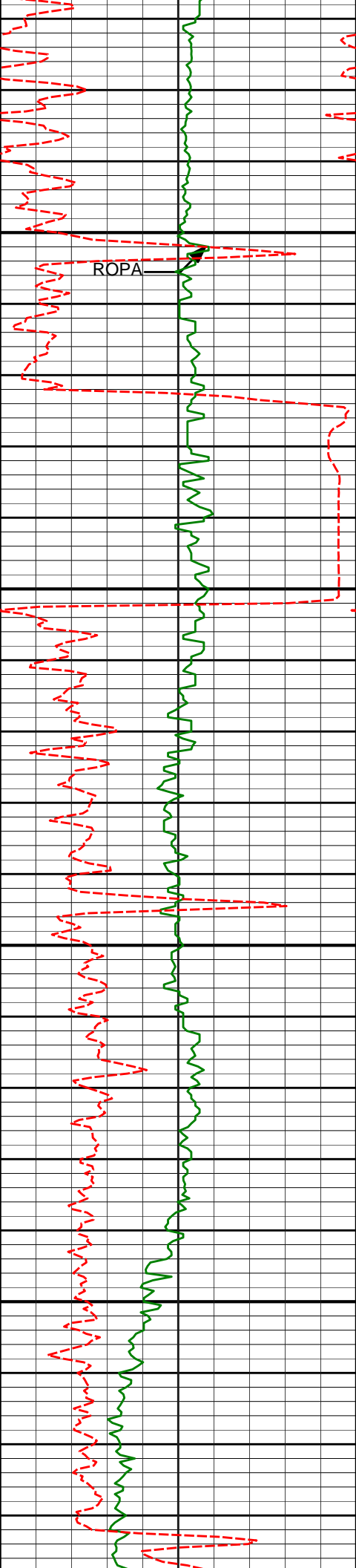
13153'

89.41°

357.51°

7508.96'

5835.26'



13245'

91.36°

357.36°

7508.35'

5927.16'

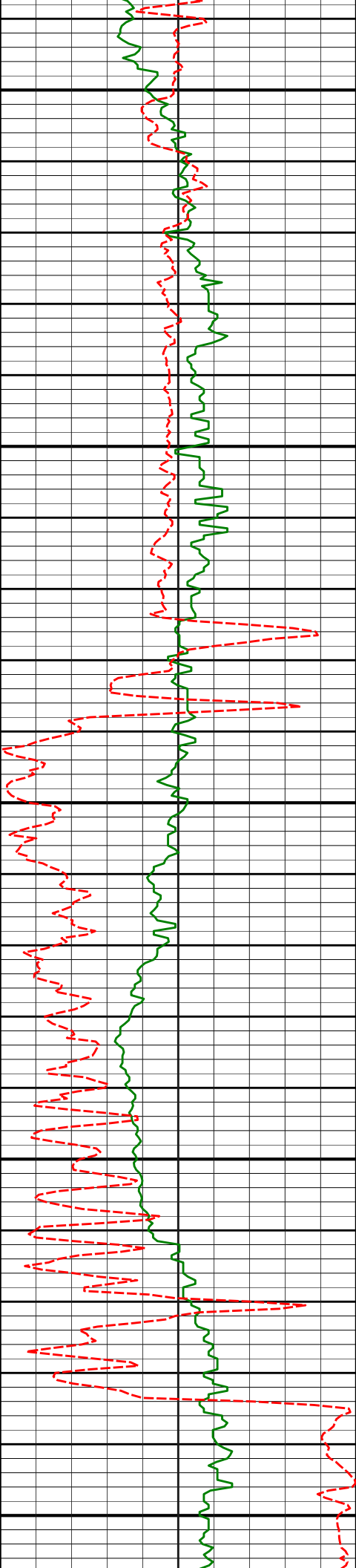
13336'

91.45°

357.52°

7506.11'

6018.04'



13428'

91.23°

357.29°

7503.96'

6109.92'

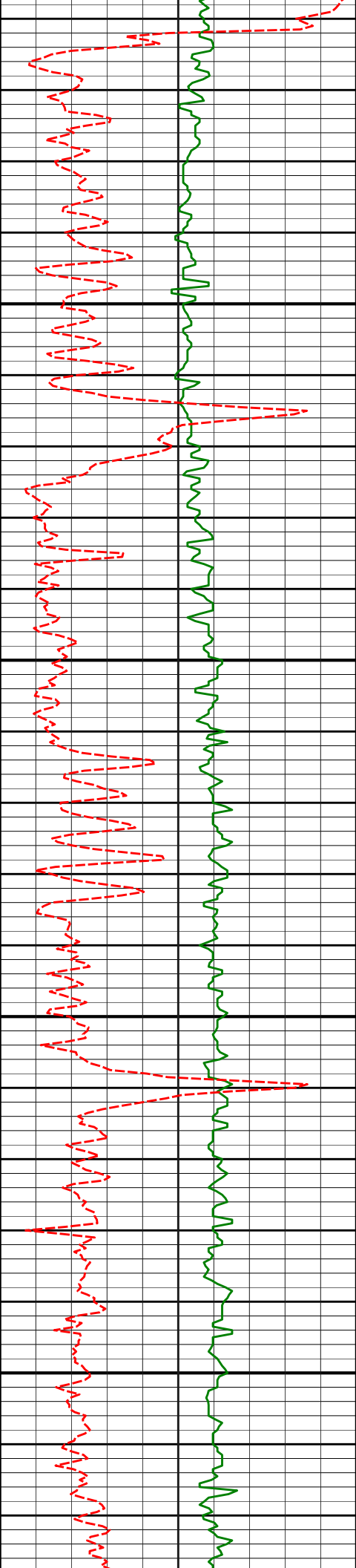
13522'

91.33°

357.03°

7501.86'

6203.78'



13617'

89.85°

358.24°

7500.88'

6298.69'

13711'

89.29°

358.39°

7501.59'

6392.65'

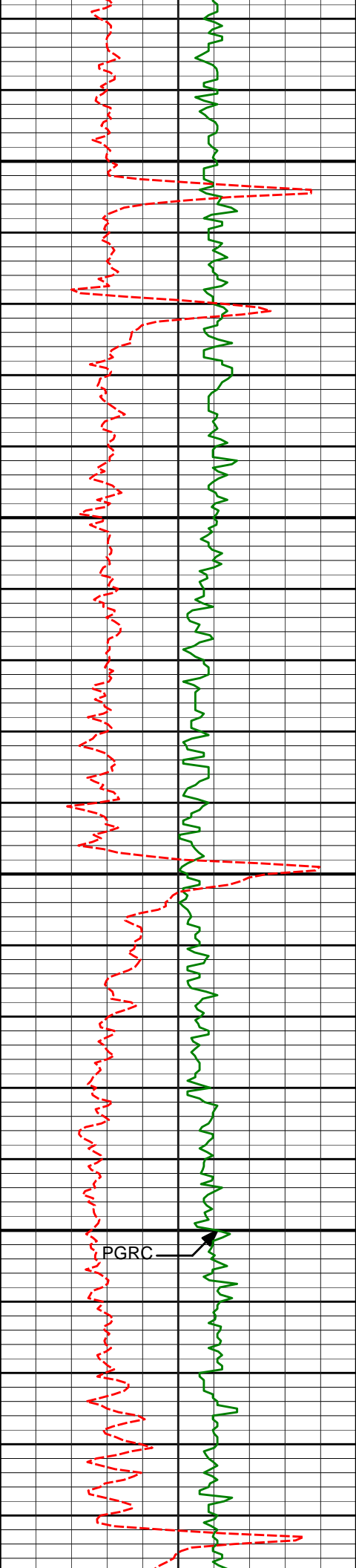
13806'

89.85°

359.04°

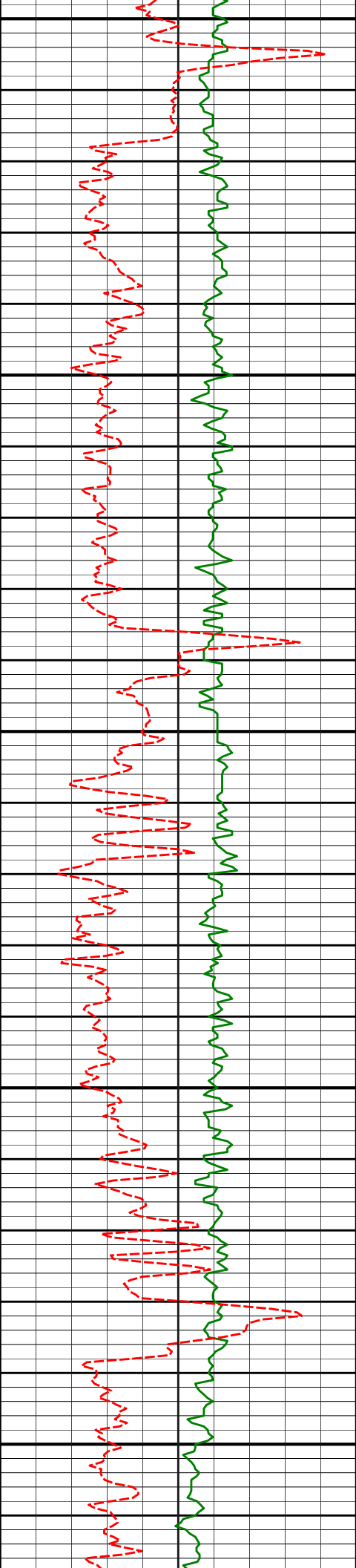
7502.30'

6487.62'



13900'	90.00°	358.97°	7502.43'	6581.60'
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13995'	89.54°	359.36°	7502.81'	6676.59'
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14089'

89.72°

358.84°

7503.41'

6770.58'

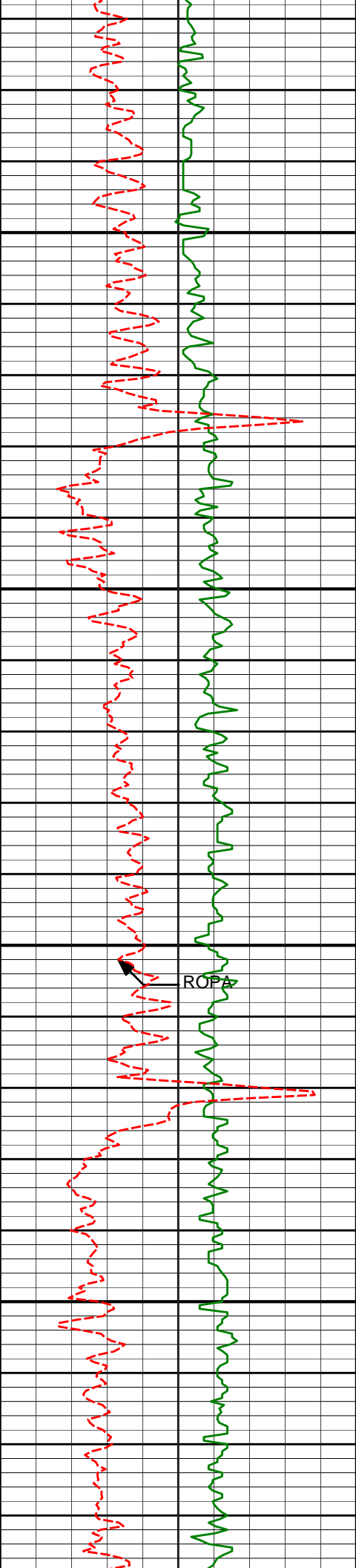
14183'

90.00°

359.86°

7503.64'

6864.57'



14278'

89.72°

0.06°

7503.88'

6959.57'

14372'

89.41°

359.65°

7504.59'

7053.57'

ROP

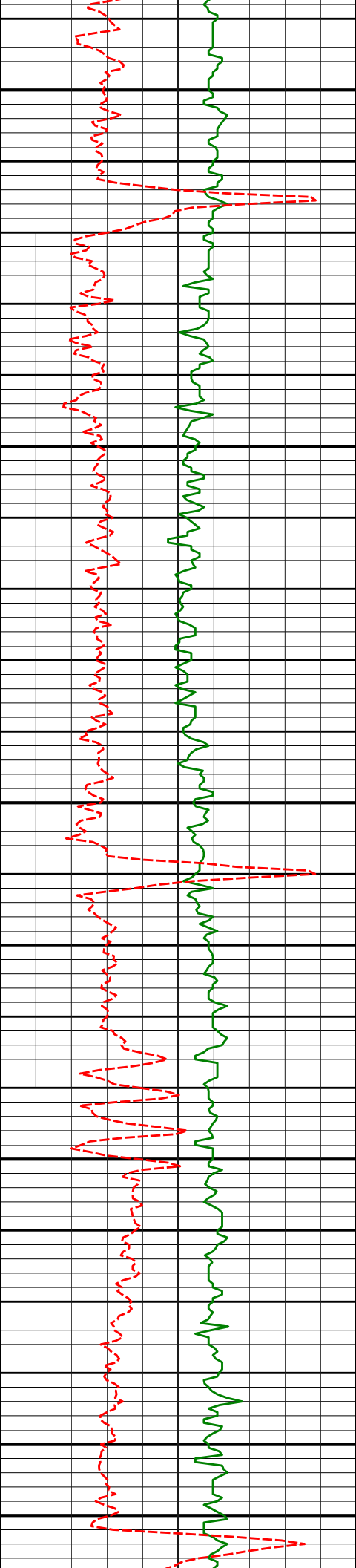
14466'

90.09°

0.72°

7505.00'

7147.56'



14561'

89.69°

0.18°

7505.18'

7242.56'

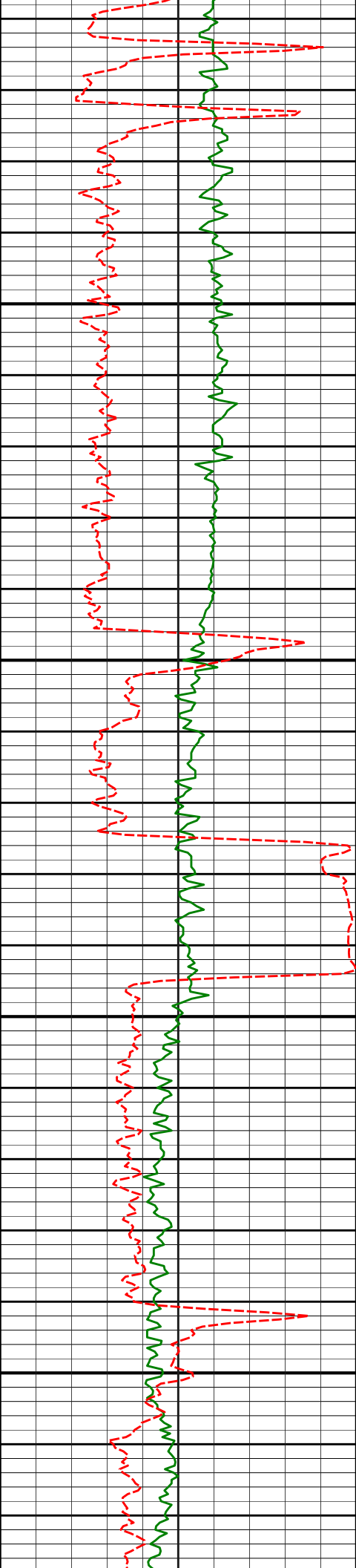
14655'

89.29°

0.28°

7506.02'

7336.56'



14750'

89.41°

359.32°

7507.10'

7431.55'

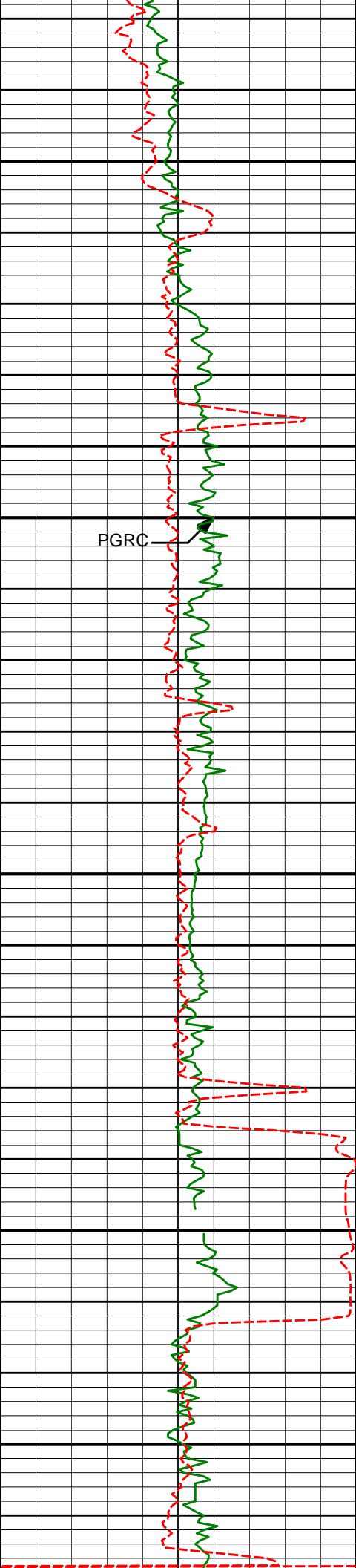
14844'

89.85°

359.40°

7507.70'

7525.54'



14939'

89.85°

359.52°

7507.95'

7620.54'

15033'

89.63°

359.05°

7508.38'

7714.53'

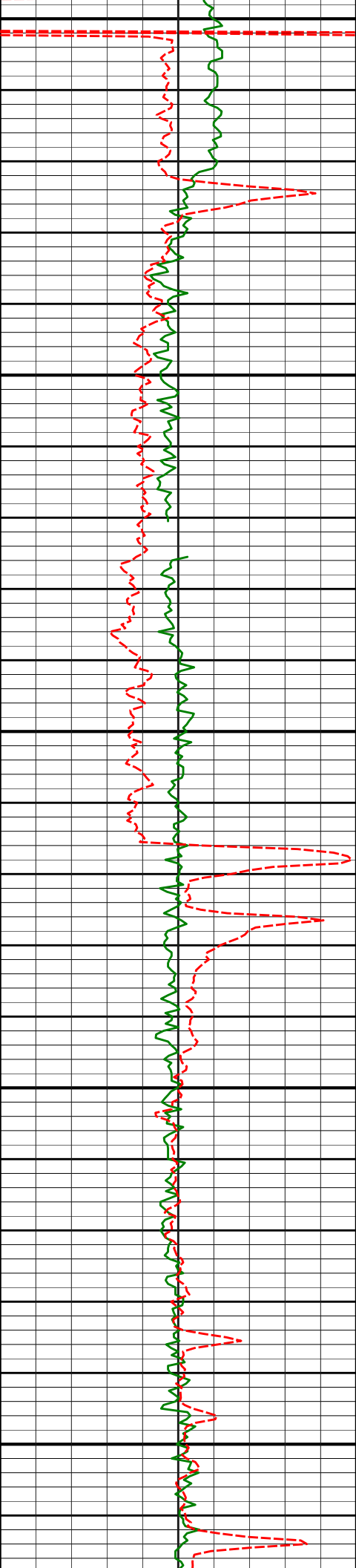
15128'

90.28°

359.80°

7508.45'

7809.52'



15222'

90.37°

359.20°

7507.92'

7903.52'

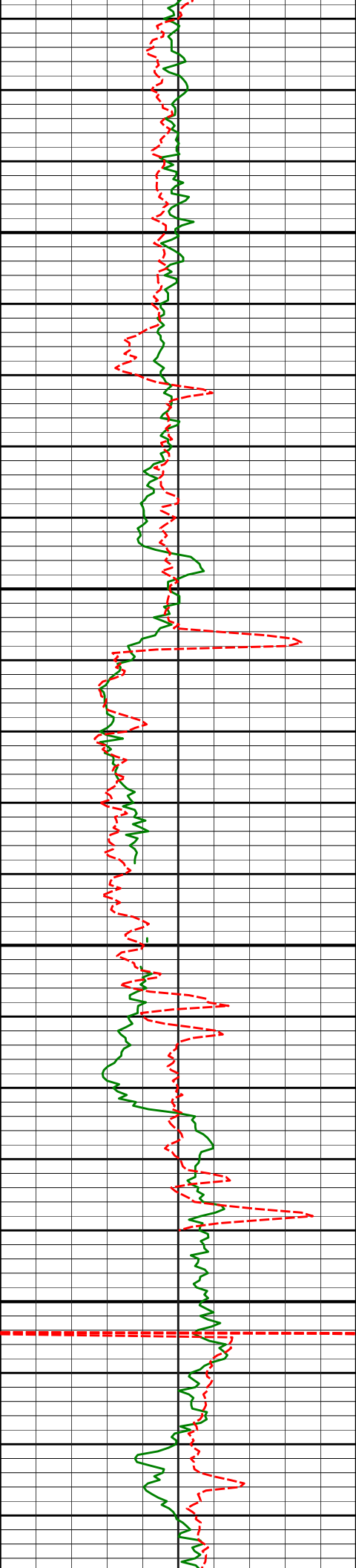
15317'

90.15°

358.71°

7507.49'

7998.50'



15411'

90.34°

359.08°

7507.09'

8092.48'

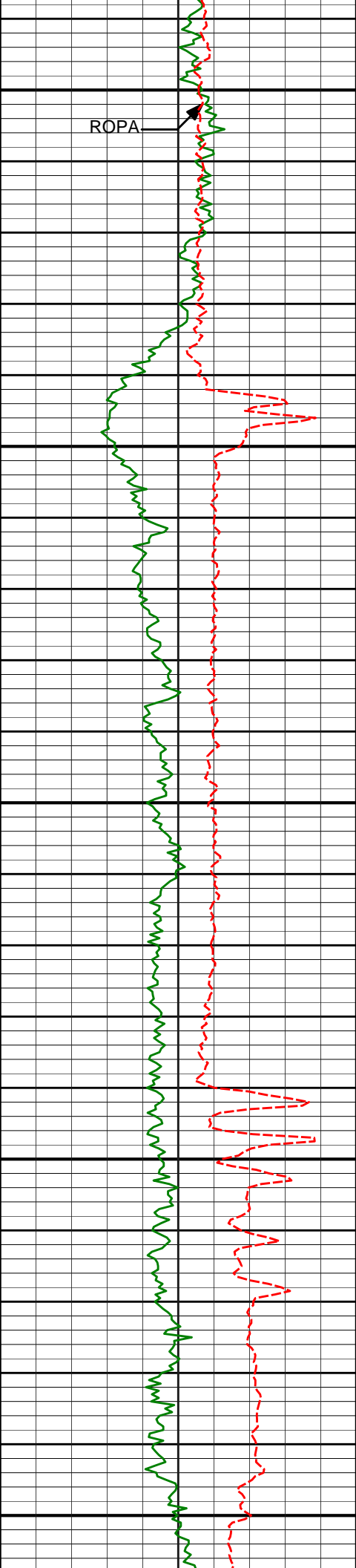
15506'

90.56°

358.81°

7506.34'

8187.46'



15600

91.02°

359.13°

7505.05

8281.44

15694'

90.99°

359.11°

7503.40'

8375.41'

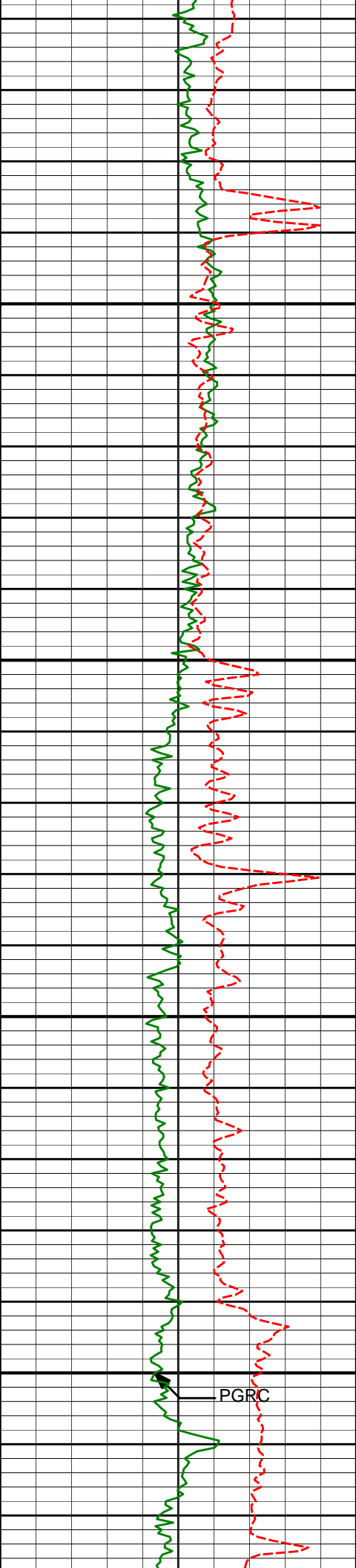
15789'

90.12°

358.59°

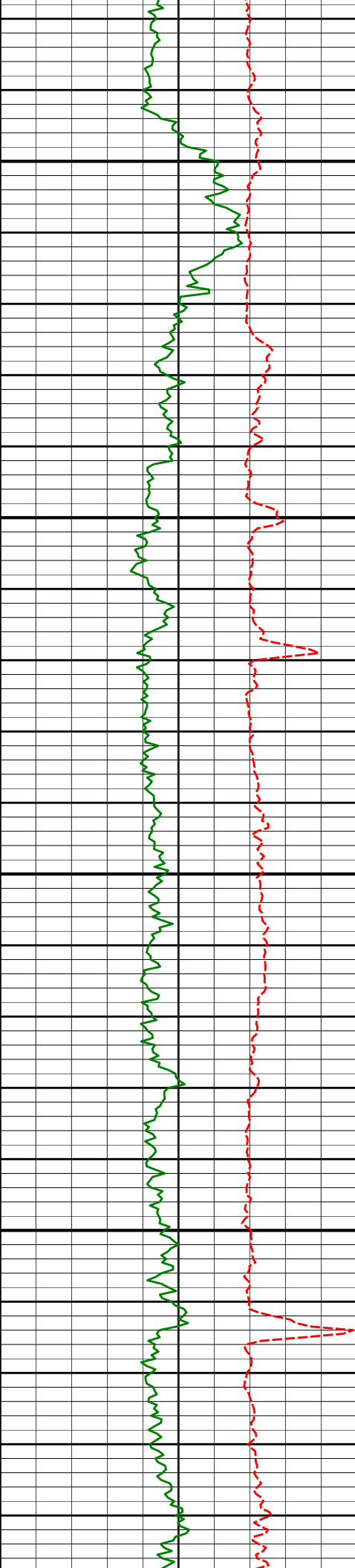
7502.48'

8470.39'



15884'	90.40°	357.81°	7502.05'	8565.34'
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15979'	90.74°	358.49°	7501.10'	8660.28'
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16073'

90.62°

358.80°

7499.98'

8754.25'

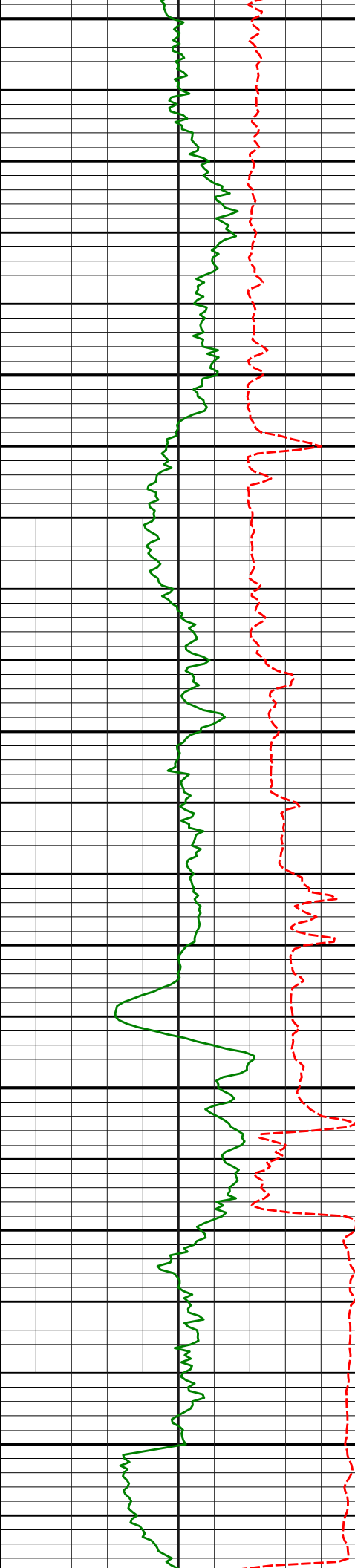
16168'

90.46°

358.40°

7499.09'

8849.22'



16263'

90.34°

358.50°

7498.43'

8944.18'

16358'

89.75°

358.34°

7498.35'

9039.14'

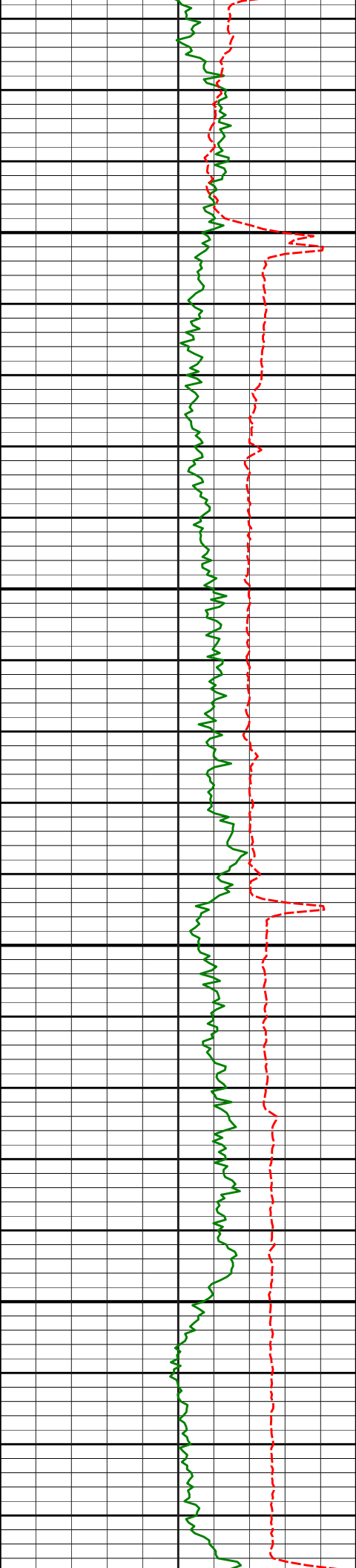
16453'

90.65°

359.49°

7498.02'

9134.12'



16548'

90.62°

359.57°

7496.97'

9229.11'

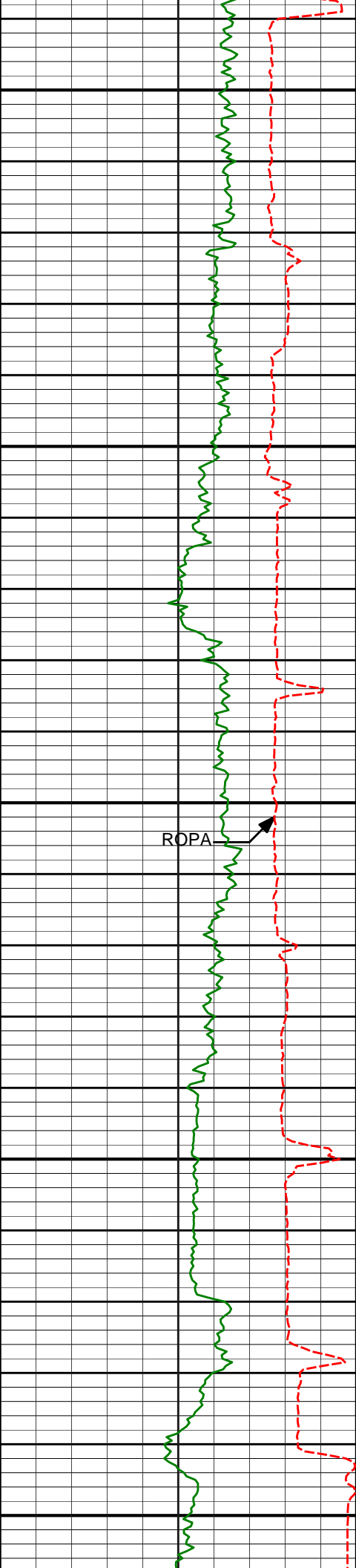
16643'

90.52°

359.81°

7496.02'

9324.11'



16737'

90.03°

359.47°

7495.57'

9418.10'

ROPA

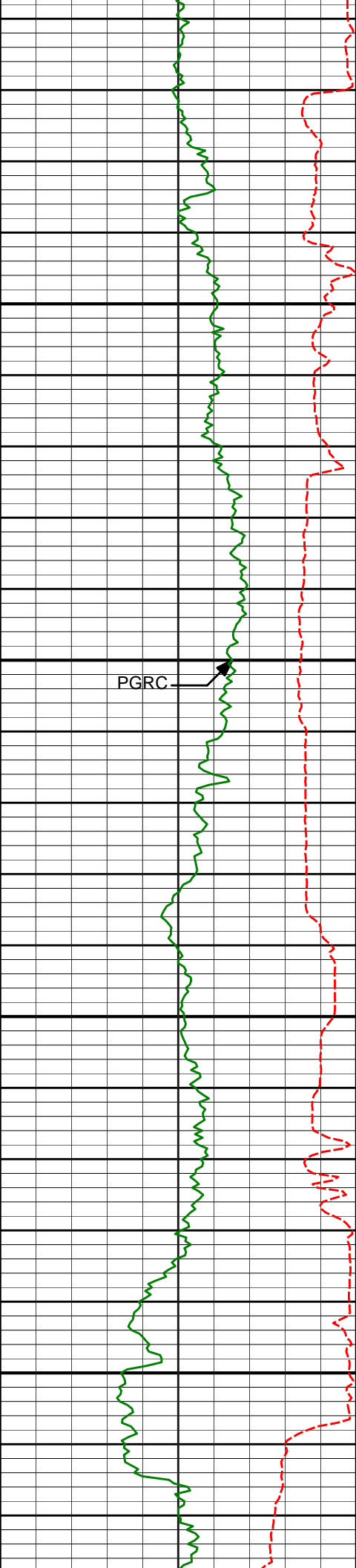
16832'

89.66°

359.77°

7495.83'

9513.10'



16927'

89.07°

0.98°

7496.88'

9608.09'

17021'

88.74°

0.60°

7498.68'

9702.06'

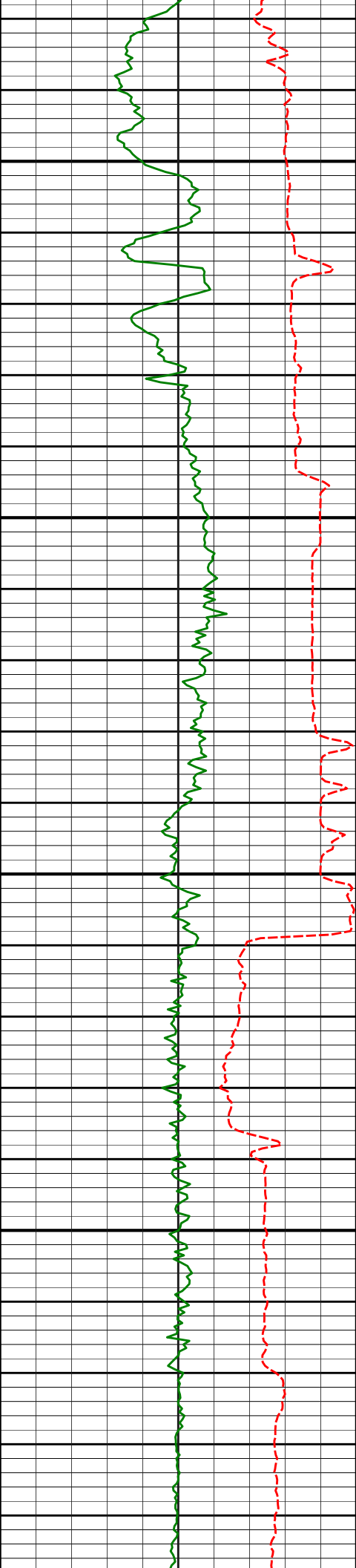
17116'

89.69°

1.78°

7499.98'

9797.03'



17211'

89.23°

1.56°

7500.87'

9891.99'

17305'

88.58°

0.50°

7502.67'

9985.95'



Run 500

17400

89.51°

0.40°

7504.25

10080.94

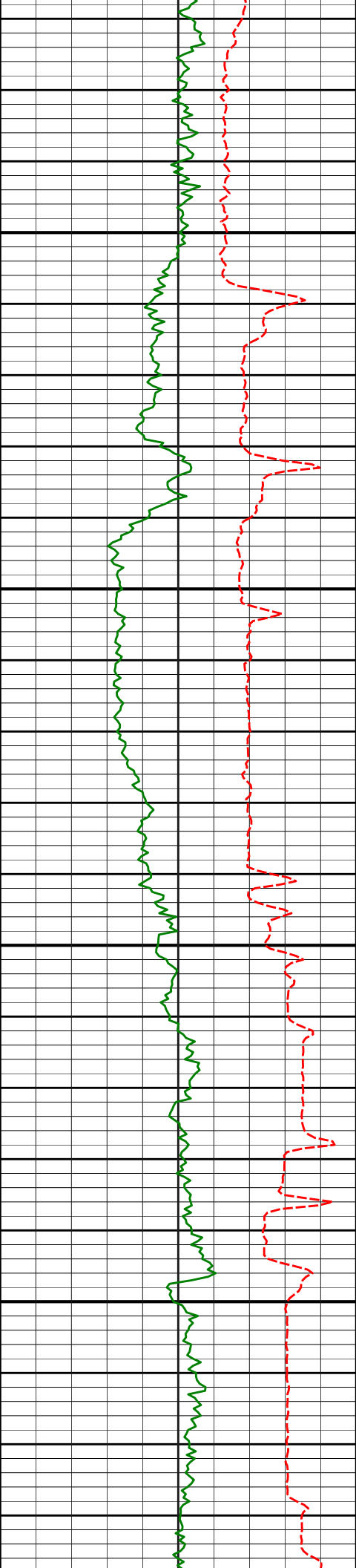
17487'

90.09°

0.36°

7504.56'

10167.93'



17582'

89.78°

359.33°

7504.67'

10262.93'

17676'

90.00°

358.99°

7504.85'

10356.92'

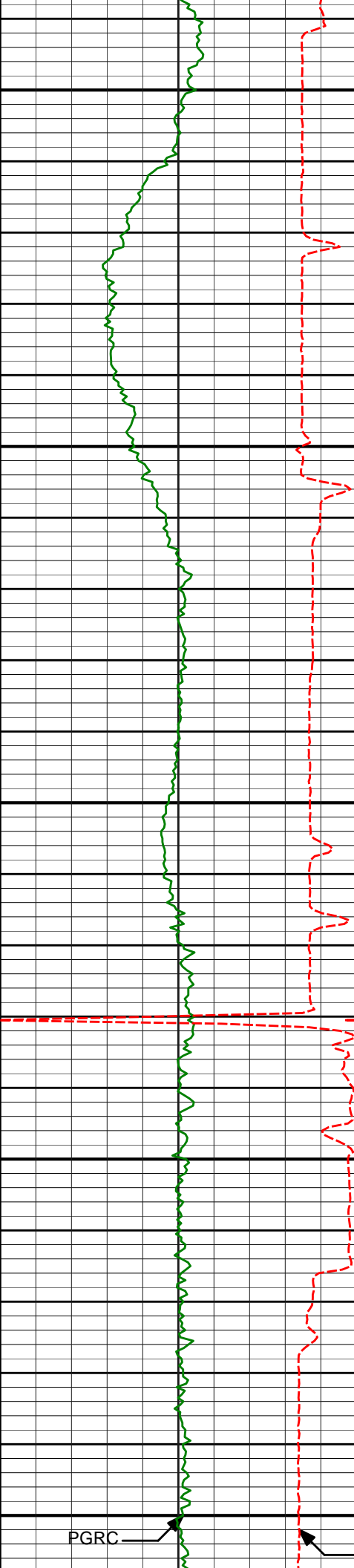
17771'

89.41°

358.42°

7505.34'

10451.89'



17865'

89.11°

357.79°

7506.55'

10545.83'

17959'

92.19°

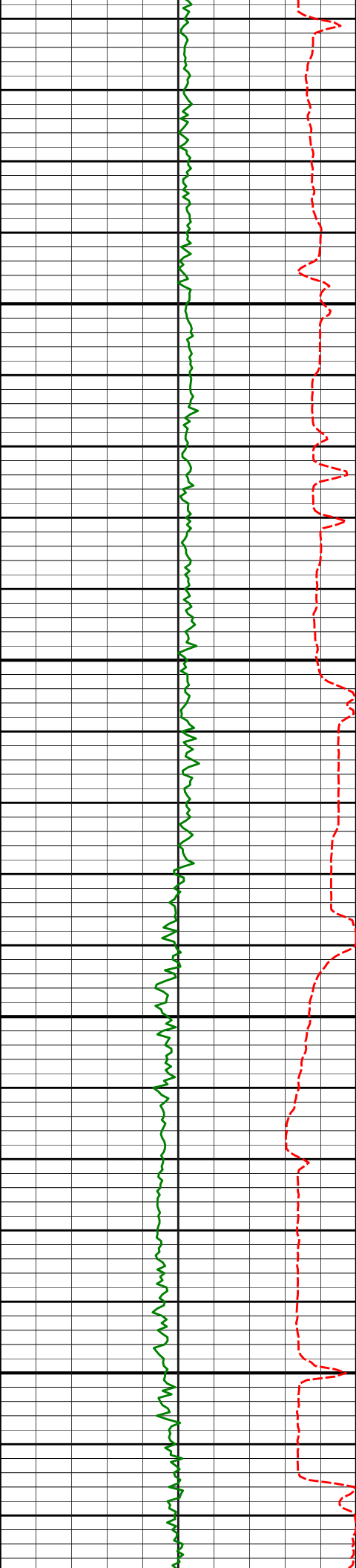
358.61°

7505.48'

10639.77'

PGRC

ROPA



18054'

92.16°

357.99°

7501.88'

10734.66'

18148'

92.28°

357.28°

7498.24'

10828.51'



18243'

90.43°

357.35°

7495.99'

10923.37'

18337'

90.40°

356.70°

7495.31'

11017.24'

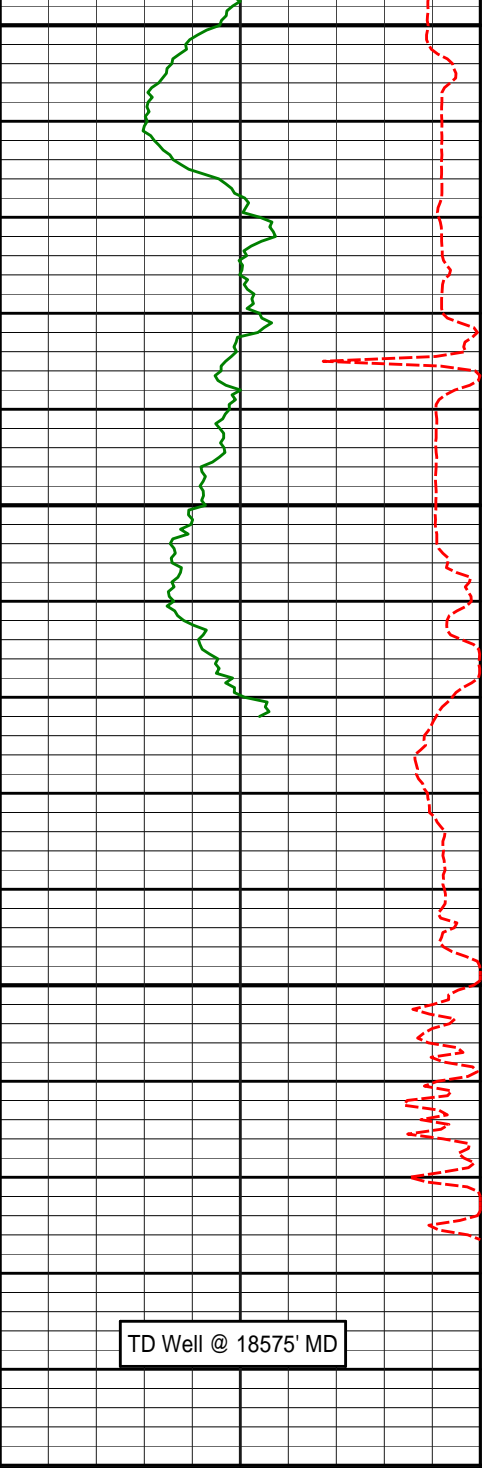
18432'

90.99°

356.14°

7494.16'

11112.05'



18524' 91.79° 355.77° 7491.93' 11203.79'

18575' 91.79° 355.77° 7490.33' 11254.63'

TD Well @ 18575' MD

Avg Rate of Penetration (ROPA) feet per hr		DEPTH	INC	AZI	TVD	VS
500-----0	1 : 240					
PCG Gamma Ray (PGRC)						
0-----250						

HALLIBURTON

Sperry Drilling

MD 1:240 Detail Log

HALLIBURTON

DIRECTIONAL SURVEY REPORT

APC
NRC 3N-32HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901325286
Survey's tied on to surface gyro's.

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
1125.00	0.16	316.73	1124.97	6.50 S	0.21 W	-6.50	TIE-IN
1297.00	0.31	69.41	1296.97	6.16 S	0.06 E	-6.16	0.23
1482.00	2.26	75.89	1481.91	5.10 S	4.07 E	-5.10	1.06
1574.00	2.40	131.38	1573.85	5.93 S	7.27 E	-5.93	2.36
1668.00	4.10	114.38	1667.70	8.62 S	11.81 E	-8.62	2.06
1761.00	5.11	110.14	1760.39	11.41 S	18.73 E	-11.41	1.15
1852.00	6.27	105.76	1850.95	14.16 S	27.31 E	-14.16	1.36
1943.00	7.64	97.18	1941.28	16.27 S	38.10 E	-16.27	1.89
2036.00	9.38	96.44	2033.25	17.89 S	51.77 E	-17.89	1.87
2129.00	10.12	95.34	2124.90	19.50 S	67.43 E	-19.50	0.82
2221.00	10.25	89.79	2215.46	20.22 S	83.66 E	-20.22	1.08
2312.00	9.58	91.02	2305.10	20.33 S	99.33 E	-20.33	0.77
2405.00	9.70	92.36	2396.78	20.79 S	114.90 E	-20.79	0.27
2497.00	11.09	90.38	2487.27	21.16 S	131.49 E	-21.16	1.56
2589.00	9.04	86.23	2577.85	20.75 S	147.55 E	-20.75	2.36
2682.00	7.01	81.66	2669.94	19.44 S	160.46 E	-19.44	2.29
2775.00	5.82	77.77	2762.35	17.62 S	170.68 E	-17.62	1.36
2868.00	4.99	75.62	2854.94	15.62 S	179.21 E	-15.62	0.92
2961.00	4.33	88.01	2947.64	14.49 S	186.64 E	-14.49	1.29
3053.00	2.16	94.89	3039.48	14.52 S	191.84 E	-14.52	2.39
3145.00	1.29	65.68	3131.44	14.24 S	194.51 E	-14.24	1.32
3237.00	1.75	20.96	3223.41	12.50 S	195.95 E	-12.50	1.34
3328.00	1.15	310.48	3314.39	10.61 S	195.76 E	-10.61	1.92
3420.00	1.12	277.67	3406.37	9.89 S	194.16 E	-9.89	0.70
3512.00	0.91	261.47	3498.36	9.88 S	192.55 E	-9.88	0.38
3603.00	1.44	269.81	3589.34	9.99 S	190.69 E	-9.99	0.61
3695.00	0.45	194.46	3681.33	10.35 S	189.44 E	-10.35	1.52
3787.00	1.01	260.12	3773.32	10.83 S	188.56 E	-10.83	1.00
3879.00	0.72	305.72	3865.31	10.64 S	187.29 E	-10.64	0.78
3973.00	0.43	134.61	3959.31	10.54 S	187.06 E	-10.54	1.22
4068.00	0.47	247.81	4054.31	10.94 S	186.95 E	-10.94	0.79
4162.00	1.50	284.27	4148.29	10.78 S	185.40 E	-10.78	1.23
4257.00	0.84	234.55	4243.27	10.88 S	183.63 E	-10.88	1.21
4351.00	1.10	302.50	4337.26	10.79 S	182.31 E	-10.79	1.18
4445.00	1.04	4.86	4431.25	9.46 S	181.62 E	-9.46	1.18
4540.00	1.50	1.94	4526.23	7.35 S	181.73 E	-7.35	0.49
4729.00	1.36	5.40	4715.17	2.65 S	182.03 E	-2.65	0.09
4823.00	1.61	2.98	4809.14	0.22 S	182.20 E	-0.22	0.27
4918.00	1.04	89.20	4904.12	1.13 N	183.13 E	1.13	1.96
5012.00	2.22	191.44	4998.09	0.65 S	183.63 E	-0.65	2.81
5106.00	2.12	174.94	5092.02	4.16 S	183.42 E	-4.16	0.67
5201.00	1.29	172.27	5186.98	6.97 S	183.72 E	-6.97	0.88
5296.00	1.35	186.49	5281.96	9.15 S	183.73 E	-9.15	0.35
5390.00	0.90	185.79	5375.94	10.98 S	183.53 E	-10.98	0.48
5485.00	1.12	181.72	5470.92	12.65 S	183.43 E	-12.65	0.24
5674.00	0.53	208.69	5659.90	15.26 S	182.96 E	-15.26	0.37
5768.00	0.55	213.10	5753.90	16.02 S	182.50 E	-16.02	0.05
5863.00	0.16	330.88	5848.90	16.29 S	182.19 E	-16.29	0.67
5957.00	0.31	159.02	5942.90	16.41 S	182.21 E	-16.41	0.50

6146.00	0.20	66.79	6131.90	16.76 S	182.70 E	-16.76	0.20
6241.00	0.49	23.82	6226.90	16.32 S	183.02 E	-16.32	0.39
6335.00	1.08	24.74	6320.89	15.15 S	183.55 E	-15.15	0.63
6430.00	0.94	40.83	6415.87	13.75 S	184.43 E	-13.75	0.33
6524.00	1.14	35.77	6509.86	12.41 S	185.49 E	-12.41	0.23
6618.00	1.02	66.86	6603.84	11.32 S	186.80 E	-11.32	0.63
6712.00	1.27	77.70	6697.82	10.77 S	188.59 E	-10.77	0.35
6807.00	0.99	59.99	6792.80	10.13 S	190.33 E	-10.13	0.47
6901.00	2.42	26.94	6886.76	7.96 S	191.93 E	-7.96	1.79
6948.00	5.91	19.03	6933.63	4.78 S	193.17 E	-4.78	7.51
6995.00	9.51	25.12	6980.20	1.02 N	195.61 E	1.02	7.84
7042.00	11.09	27.58	7026.44	8.54 N	199.35 E	8.54	3.49
7090.00	13.76	27.53	7073.31	17.70 N	204.13 E	17.70	5.56
7137.00	14.07	28.86	7118.93	27.66 N	209.47 E	27.66	0.95
7184.00	17.50	24.84	7164.15	39.08 N	215.19 E	39.08	7.66
7229.00	21.82	23.20	7206.52	52.91 N	221.33 E	52.91	9.68
7277.00	26.89	19.65	7250.24	71.35 N	228.50 E	71.35	10.99
7324.00	31.83	6.95	7291.23	93.70 N	233.59 E	93.70	16.86
7371.00	33.11	359.80	7330.89	118.85 N	235.04 E	118.85	8.60
7418.00	41.07	3.22	7368.36	147.15 N	235.86 E	147.15	17.49
7465.00	47.19	0.39	7402.08	179.83 N	236.85 E	179.83	13.68
7512.00	54.09	356.29	7431.88	216.12 N	235.73 E	216.12	16.15
7559.00	61.08	354.72	7457.06	255.65 N	232.61 E	255.65	15.14
7606.00	68.77	353.14	7476.96	297.94 N	228.09 E	297.94	16.64
7653.00	75.31	354.01	7491.45	342.35 N	223.10 E	342.35	14.03
7700.00	80.74	354.93	7501.20	388.09 N	218.67 E	388.09	11.71
7748.00	86.14	356.91	7506.68	435.64 N	215.28 E	435.64	11.97
7795.00	88.21	357.74	7508.99	482.53 N	213.09 E	482.53	4.74
7842.00	86.95	357.46	7510.98	529.44 N	211.13 E	529.44	2.75
7896.00	89.94	357.79	7512.44	583.37 N	208.89 E	583.37	5.57
8018.00	90.28	0.32	7512.21	705.34 N	206.88 E	705.34	2.09
8113.00	91.42	359.79	7510.80	800.33 N	206.97 E	800.33	1.32
8207.00	92.09	359.45	7507.92	894.29 N	206.35 E	894.29	0.80
8301.00	92.90	359.58	7503.83	988.19 N	205.55 E	988.19	0.87
8396.00	93.30	359.79	7498.69	1083.05 N	205.03 E	1083.05	0.48
8491.00	93.17	0.28	7493.33	1177.90 N	205.09 E	1177.90	0.53
8585.00	92.40	0.73	7488.76	1271.78 N	205.91 E	1271.78	0.95
8680.00	90.22	1.02	7486.59	1366.74 N	207.37 E	1366.74	2.31
8774.00	90.65	0.24	7485.88	1460.73 N	208.40 E	1460.73	0.95
8868.00	90.25	0.65	7485.14	1554.73 N	209.13 E	1554.73	0.61
8963.00	89.14	1.05	7485.65	1649.71 N	210.54 E	1649.71	1.24
9057.00	87.81	1.38	7488.15	1743.66 N	212.53 E	1743.66	1.46
9152.00	89.60	1.21	7490.29	1838.60 N	214.68 E	1838.60	1.89
9247.00	89.20	1.54	7491.29	1933.57 N	216.96 E	1933.57	0.55
9341.00	88.31	0.97	7493.33	2027.53 N	219.01 E	2027.53	1.12
9436.00	88.24	0.58	7496.19	2122.47 N	220.30 E	2122.47	0.42
9530.00	88.80	0.47	7498.62	2216.44 N	221.16 E	2216.44	0.61
9625.00	89.57	0.10	7499.97	2311.43 N	221.63 E	2311.43	0.90
9719.00	87.96	359.97	7502.00	2405.40 N	221.69 E	2405.40	1.72
9814.00	87.35	359.87	7505.88	2500.32 N	221.56 E	2500.32	0.65
9909.00	87.69	359.46	7510.00	2595.23 N	221.00 E	2595.23	0.56
10003.00	89.01	358.00	7512.70	2689.16 N	218.92 E	2689.16	2.09
10097.00	90.43	356.72	7513.16	2783.06 N	214.59 E	2783.06	2.03
10192.00	91.02	356.28	7511.96	2877.87 N	208.79 E	2877.87	0.77
10285.00	92.19	356.34	7509.35	2970.64 N	202.81 E	2970.64	1.26
10380.00	92.77	357.64	7505.24	3065.42 N	197.82 E	3065.42	1.50
10474.00	92.03	358.87	7501.31	3159.29 N	194.96 E	3159.29	1.53
10568.00	90.86	359.76	7498.94	3253.25 N	193.84 E	3253.25	1.56
10662.00	90.89	359.47	7497.50	3347.24 N	193.21 E	3347.24	0.31
10754.00	89.29	0.31	7497.36	3439.23 N	193.03 E	3439.23	1.96
10847.00	90.03	359.89	7497.91	3532.23 N	193.19 E	3532.23	0.91
10939.00	90.28	0.18	7497.66	3624.23 N	193.25 E	3624.23	0.42
11031.00	90.18	359.35	7497.29	3716.23 N	192.87 E	3716.23	0.91
11123.00	88.89	358.63	7498.04	3808.21 N	191.25 E	3808.21	1.61
11217.00	88.15	358.16	7500.46	3902.14 N	188.62 E	3902.14	0.93
11310.00	91.20	356.39	7500.99	3995.02 N	184.20 E	3995.02	3.79
11402.00	90.43	357.88	7499.68	4086.89 N	179.60 E	4086.89	1.82
11492.00	89.38	359.64	7499.83	4176.87 N	177.65 E	4176.87	2.28
11585.00	89.11	0.39	7501.06	4269.86 N	177.68 E	4269.86	0.86
11678.00	89.08	2.30	7502.53	4362.82 N	179.86 E	4362.81	2.05
11770.00	89.38	1.81	7503.76	4454.75 N	183.16 E	4454.75	0.62

	11862.00	89.29	1.92	7504.83	4546.69 N	186.15 E	4546.69	0.15
	11954.00	90.93	3.30	7504.66	4638.59 N	190.34 E	4638.59	2.33
	12046.00	90.99	3.34	7503.11	4730.42 N	195.67 E	4730.42	0.08
	12139.00	90.65	3.12	7501.78	4823.27 N	200.91 E	4823.27	0.44
	12231.00	90.03	2.96	7501.24	4915.13 N	205.79 E	4915.13	0.70
	12324.00	90.65	4.93	7500.69	5007.91 N	212.19 E	5007.91	2.22
	12417.00	90.80	5.29	7499.51	5100.53 N	220.47 E	5100.53	0.42
	12510.00	90.37	5.59	7498.56	5193.11 N	229.28 E	5193.11	0.56
	12602.00	90.00	3.86	7498.26	5284.79 N	236.86 E	5284.79	1.92
	12694.00	90.55	2.39	7497.82	5376.65 N	241.88 E	5376.65	1.71
	12786.00	88.30	358.26	7498.74	5468.62 N	242.40 E	5468.62	5.11
	12877.00	88.09	358.11	7501.61	5559.53 N	239.52 E	5559.53	0.28
	12969.00	88.12	358.08	7504.65	5651.43 N	236.46 E	5651.43	0.05
	13061.00	88.55	358.17	7507.33	5743.34 N	233.45 E	5743.34	0.48
	13153.00	89.41	357.51	7508.96	5835.26 N	229.99 E	5835.26	1.18
	13245.00	91.36	357.36	7508.35	5927.16 N	225.87 E	5927.16	2.13
	13336.00	91.45	357.52	7506.11	6018.04 N	221.81 E	6018.04	0.20
	13428.00	91.23	357.29	7503.96	6109.92 N	217.64 E	6109.92	0.35
	13522.00	91.33	357.03	7501.86	6203.78 N	212.99 E	6203.78	0.30
	13617.00	89.85	358.24	7500.88	6298.69 N	209.07 E	6298.69	2.01
	13711.00	89.29	358.39	7501.59	6392.65 N	206.30 E	6392.65	0.62
	13806.00	89.85	359.04	7502.30	6487.62 N	204.17 E	6487.62	0.90
	13900.00	90.00	358.97	7502.43	6581.60 N	202.54 E	6581.60	0.18
	13995.00	89.54	359.36	7502.81	6676.59 N	201.15 E	6676.59	0.63
	14089.00	89.72	358.84	7503.41	6770.58 N	199.68 E	6770.58	0.59
	14183.00	90.00	359.86	7503.64	6864.57 N	198.61 E	6864.57	1.13
	14278.00	89.72	0.06	7503.88	6959.57 N	198.54 E	6959.57	0.36
	14372.00	89.41	359.65	7504.59	7053.57 N	198.31 E	7053.57	0.55
	14466.00	90.09	0.72	7505.00	7147.56 N	198.61 E	7147.56	1.35
	14561.00	89.69	0.18	7505.18	7242.56 N	199.36 E	7242.56	0.71
	14655.00	89.29	0.28	7506.02	7336.56 N	199.73 E	7336.56	0.44
	14750.00	89.41	359.32	7507.10	7431.55 N	199.40 E	7431.55	1.02
	14844.00	89.85	359.40	7507.70	7525.54 N	198.35 E	7525.54	0.48
	14939.00	89.85	359.52	7507.95	7620.54 N	197.46 E	7620.54	0.13
	15033.00	89.63	359.05	7508.38	7714.53 N	196.28 E	7714.53	0.55
	15128.00	90.28	359.80	7508.45	7809.52 N	195.33 E	7809.52	1.04
	15222.00	90.37	359.20	7507.92	7903.52 N	194.51 E	7903.52	0.65
	15317.00	90.15	358.71	7507.49	7998.50 N	192.78 E	7998.50	0.57
	15411.00	90.34	359.08	7507.09	8092.48 N	190.96 E	8092.48	0.44
	15506.00	90.56	358.81	7506.34	8187.46 N	189.21 E	8187.46	0.37
	15600.00	91.02	359.13	7505.05	8281.44 N	187.53 E	8281.44	0.60
	15694.00	90.99	359.11	7503.40	8375.41 N	186.08 E	8375.41	0.04
	15789.00	90.12	358.59	7502.48	8470.39 N	184.18 E	8470.39	1.07
	15884.00	90.40	357.81	7502.05	8565.34 N	181.19 E	8565.34	0.87
	15979.00	90.74	358.49	7501.10	8660.28 N	178.12 E	8660.28	0.80
	16073.00	90.62	358.80	7499.98	8754.25 N	175.90 E	8754.25	0.35
	16168.00	90.46	358.40	7499.09	8849.22 N	173.58 E	8849.22	0.45
	16263.00	90.34	358.50	7498.43	8944.18 N	171.01 E	8944.18	0.16
	16358.00	89.75	358.34	7498.35	9039.14 N	168.39 E	9039.14	0.64
	16453.00	90.65	359.49	7498.02	9134.12 N	166.59 E	9134.12	1.54
	16548.00	90.62	359.57	7496.97	9229.11 N	165.81 E	9229.11	0.09
	16643.00	90.52	359.81	7496.02	9324.11 N	165.30 E	9324.11	0.27
	16737.00	90.03	359.47	7495.57	9418.10 N	164.71 E	9418.10	0.63
	16832.00	89.66	359.77	7495.83	9513.10 N	164.08 E	9513.10	0.50
	16927.00	89.07	0.98	7496.88	9608.09 N	164.70 E	9608.09	1.42
	17021.00	88.74	0.60	7498.68	9702.06 N	166.00 E	9702.06	0.54
	17116.00	89.69	1.78	7499.98	9797.03 N	167.97 E	9797.03	1.59
	17211.00	89.23	1.56	7500.87	9891.99 N	170.74 E	9891.99	0.54
	17305.00	88.58	0.50	7502.67	9985.95 N	172.43 E	9985.95	1.32
	17400.00	89.51	0.40	7504.25	10080.94 N	173.17 E	10080.94	0.98
	17487.00	90.09	0.36	7504.56	10167.93 N	173.75 E	10167.93	0.67
	17582.00	89.78	359.33	7504.67	10262.93 N	173.49 E	10262.93	1.13
	17676.00	90.00	358.99	7504.85	10356.92 N	172.11 E	10356.92	0.43
	17771.00	89.41	358.42	7505.34	10451.89 N	169.97 E	10451.89	0.86
	17865.00	89.11	357.79	7506.55	10545.83 N	166.86 E	10545.83	0.74
	17959.00	92.19	358.61	7505.48	10639.77 N	163.91 E	10639.77	3.39
	18054.00	92.16	357.99	7501.88	10734.66 N	161.09 E	10734.66	0.65
	18148.00	92.28	357.28	7498.24	10828.51 N	157.21 E	10828.51	0.77
	18243.00	90.43	357.35	7495.99	10923.37 N	152.77 E	10923.37	1.95
	18337.00	90.40	356.70	7495.31	11017.24 N	147.89 E	11017.24	0.69
	18432.00	88.58	357.66	7504.66	11112.15 N	144.38 E	11112.15	0.83

18432.00	90.99	356.14	7494.16	11112.05 N	141.96 E	11112.05	0.86
18524.00	91.79	355.77	7491.93	11203.79 N	135.47 E	11203.79	0.96
18575.00	91.79	355.77	7490.33	11254.63 N	131.71 E	11254.63	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 0.00 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 18575.00 FEET
IS 11255.40 FEET ALONG 0.67 DEGREES (TRUE)**

Final survey is a straight line projection to bit.

IFR Corrections have been applied to all surveys.

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