

PCGC - Pressure Case Gamma
PCDC - Pressure Case Directional

1 : 240

Company : Anadarko Petroleum Corporation									
Rig : Ensign 132									
Well : Ferge 4C-14HZ									
Field : Wattenberg									
Country : USA									
API Number : 05-123-36343-00									
LOCATION					Other Services Directional Drilling				
Latitude : 40° 13' 6.93" North Longitude : 104° 45' 0.06" West UTM Easting = 3,209,434.557 ft UTM Northing = 1,323,360.771 ft									
Country : USA									
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WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	30-Mar-14	01-Apr-14	03-Apr-14	07-Apr-14	
Rig Bit Number	0100	0200	300	0400	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.750	6.750	4.750	
Log Start Depth (MD, ft)	1,258.00	1,267.00	6,972.00	7,750.00	
Log End Depth (MD, ft)	1,267.00	6,972.00	7,750.00	12,383.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	30-Mar-14 15:20	31-Mar-14 07:10	02-Apr-14 07:30	04-Apr-14 22:00	
Drill/Wipe End Date and Time	30-Mar-14 15:30	01-Apr-14 18:20	03-Apr-14 06:20	06-Apr-14 11:00	
Min Inc (deg) @ Depth (MD, ft)	0.37 @ 1,200.00	0.29 @ 5,830.00	6.91 @ 6,972.00	88.49 @ 10,631.00	
Max Inc (deg) @ Depth (MD, ft)	0.37 @ 1,250.00	12.56 @ 2,794.00	89.97 @ 7,750.00	92.07 @ 8,823.00	
Bit TFA(in2) / Bit Type	1.33 / PDC	1.33 / PDC	1.49 / PDC	1.24 / PDC	
Flow Rate (gpm)	600.00	578.68	529.26	293.95	
Max AV (fpm) / CV (fpm) @ MWD	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	
Density (ppg) / Viscosity (spqt)	8.40 / 28.00	8.80 / 39.00	10.30 / 47.00	9.65 / 50.00	
Filtrate CL (ppm)	1,200.00	1,200.00	1,200.00	1,000.00	
pH / Fluid Loss (mptm)	8.70 / 1	9.20 / 6	9.30 / 3	9.50 / 4	
PV (cP) / YP (lbf2)	1 / 3.00	8 / 9.00	15 / 19.00	16 / 16.00	
% Solids / % Sand	0.3 / 0.13	0.7 / 1.25	9.9 / 1.00	8.3 / 0.50	
% Oil / Oil:Water Ratio	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	
Rmf @ Measured Temp (degF)	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	
Max Tool Temp (in F) / S	21.00 / RPM	100.00 / RPM	107.10 / RPM	224.10 / RPM	

Max Tool Temp (degF) / Source	84.06 / PCM	163.20 / PCM	187.48 / PCM	234.12 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Matt Busche	Matt Busche	Matt Busche	Matt Busche	
Customer Representative	Terry Bradshaw	Terry Bradshaw	Terry Bradshaw	Terry Bradshaw	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	244108	244108	244108	12134682	
Insert Serial Number	11680779	11680779	12230081	11680779	
Date and Time Initialized	29-Mar-14 17:47	31-Mar-14 00:16	01-Apr-14 21:58	04-Apr-14 09:18	
Date and Time Read	30-Mar-14 17:33	02-Apr-14 06:23	03-Apr-14 14:34	07-Apr-14 01:59	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	45.02	45.02	40.32	42.58	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	244108	244108	244108	12134682	
Sonde Serial Number	11833026	11833026	11638587	11833026	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	104.68	94.84	49.38	347.06	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	49.97	49.97	45.27	47.53	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	244108	244108	244108	12134682	
Insert/Sonde Serial Number	11293433	11293433	11579846	11293433	

REMARKS

1. All depths are measured depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, 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 final survey is a straight line projection to the bit.
5. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

Insite version: 8.0.2

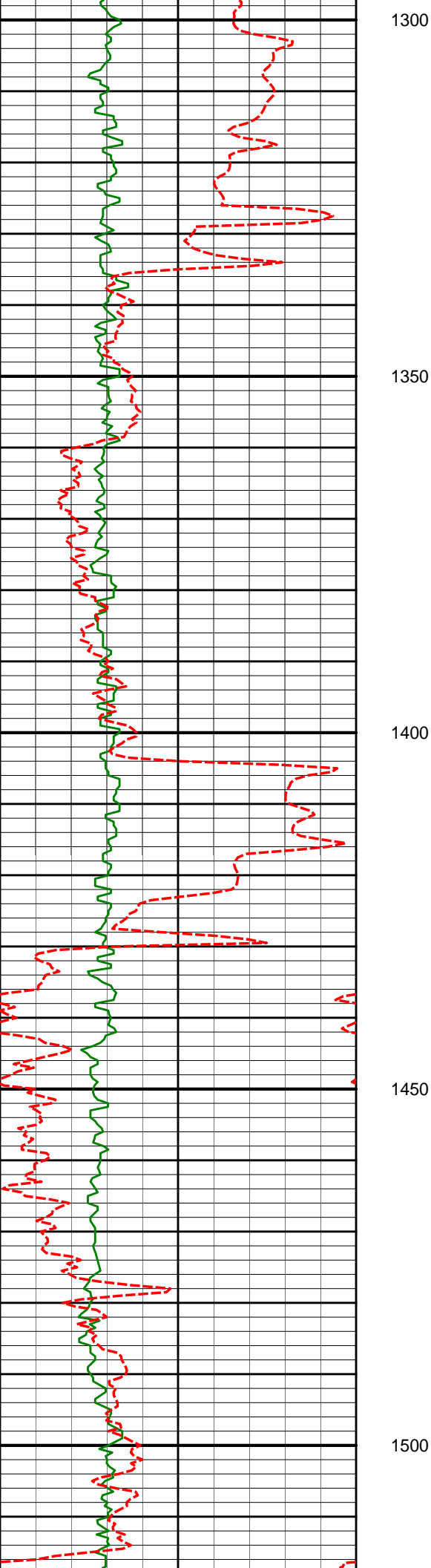
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HALLIBURTON

MD Main Log 1:240

[illegible]



1380'

0.65°

234.89°

1379.96'

-2.73'

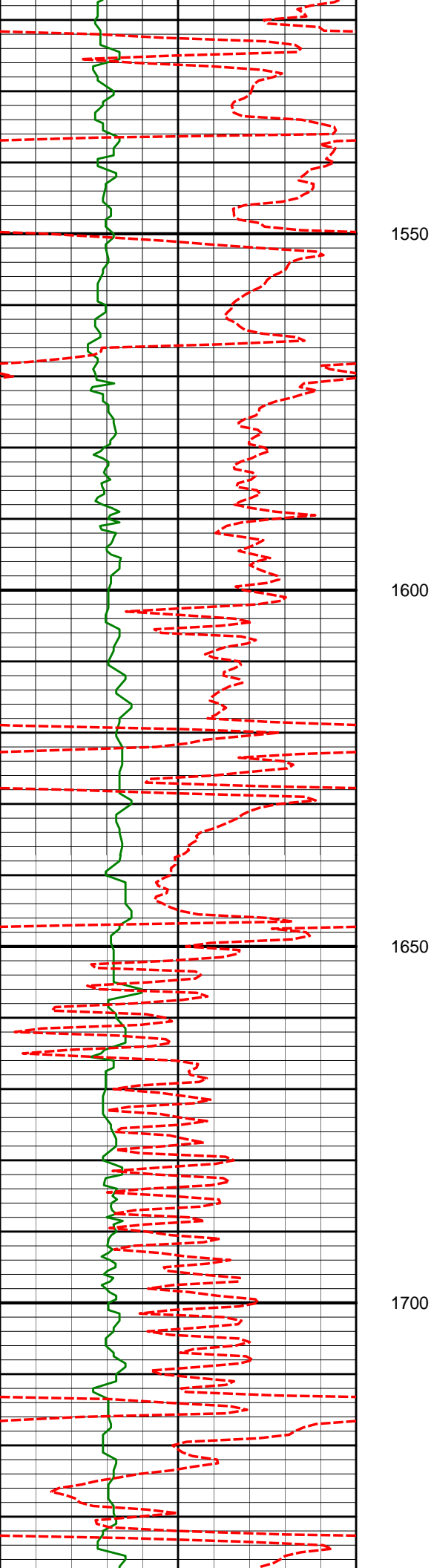
1485'

1.34°

265.23°

1484.94'

-3.17'



1570'

2.77°

254.70°

1569.88'

-3.80'

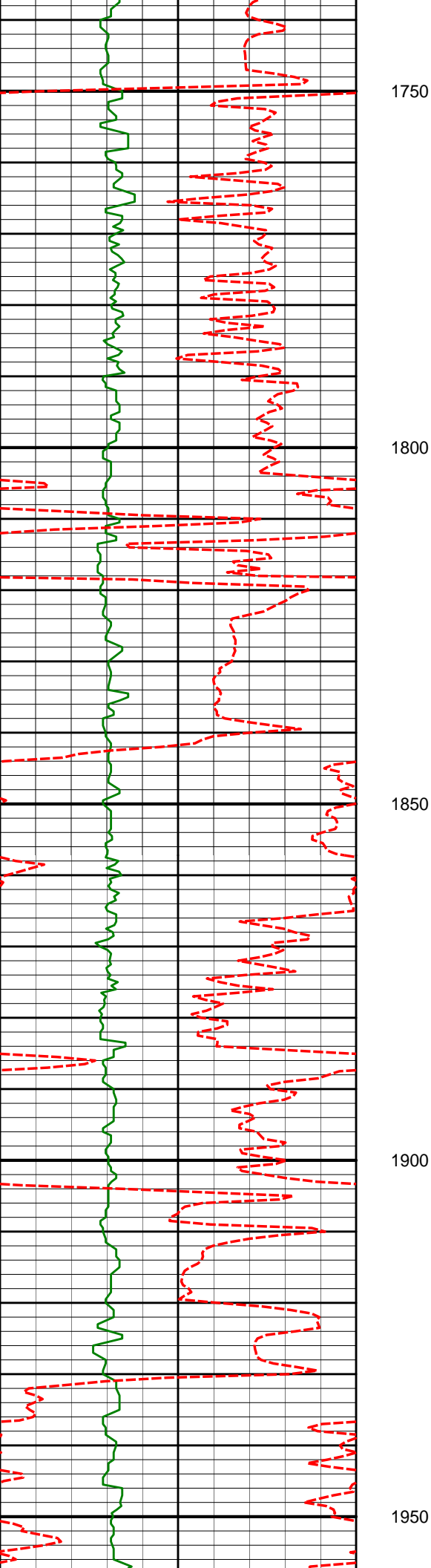
1664'

4.78°

258.91°

1663.67'

-5.15'



1759'

5.46°

267.19°

1758.30'

-6.13'

1853'

6.86°

251.30°

1851.76'

-8.15'

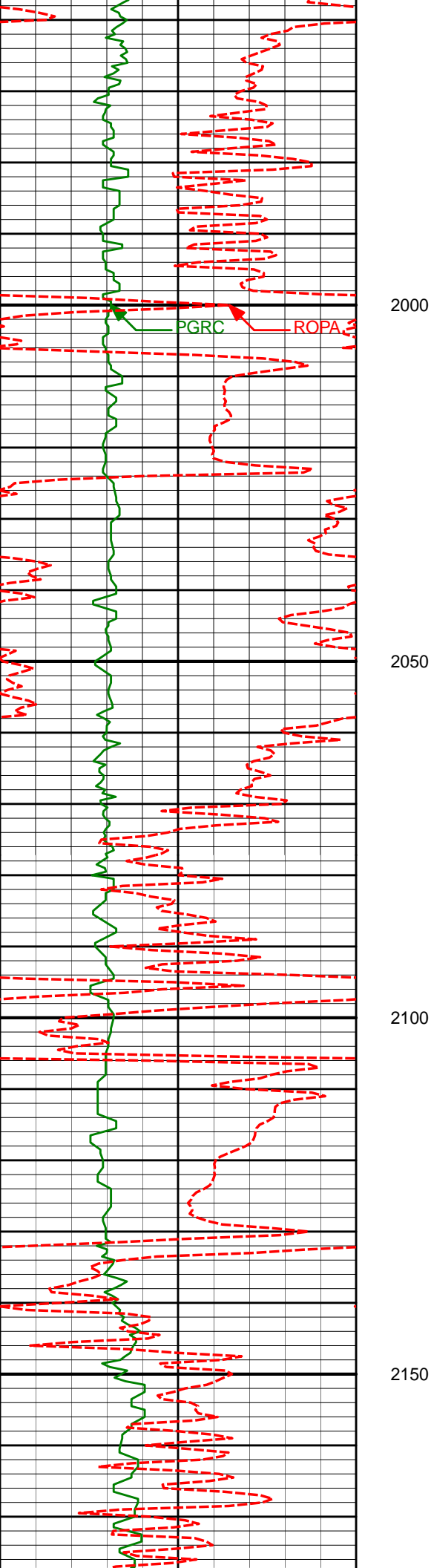
1947'

6.44°

233.23°

1945.14'

-13.11'



2041'

7.10°

237.86°

2038.48'

-19.36'

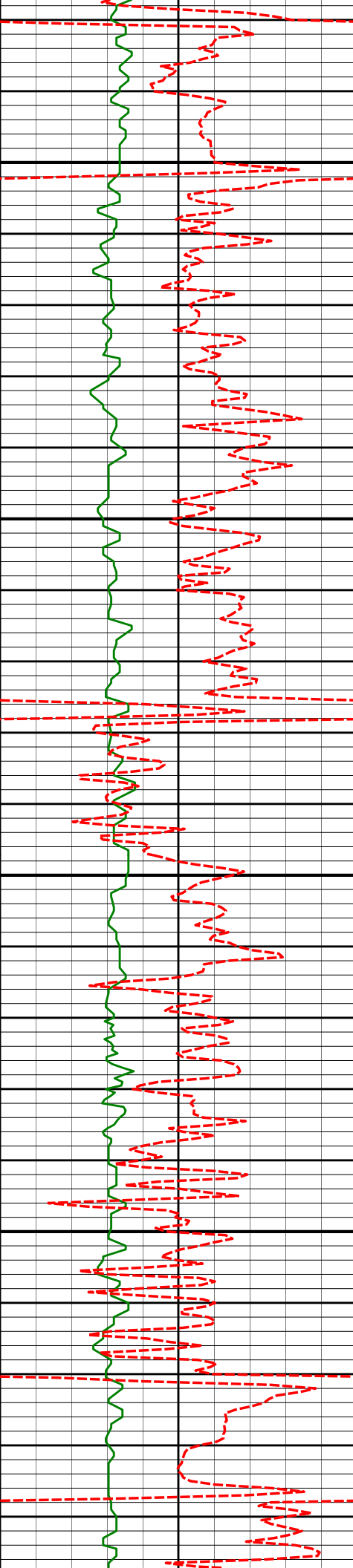
2135'

8.81°

243.20°

2131.57'

-25.69'



2200

2250

2300

2350

2229'

10.70°

241.39°

2224.21'

-33.12'

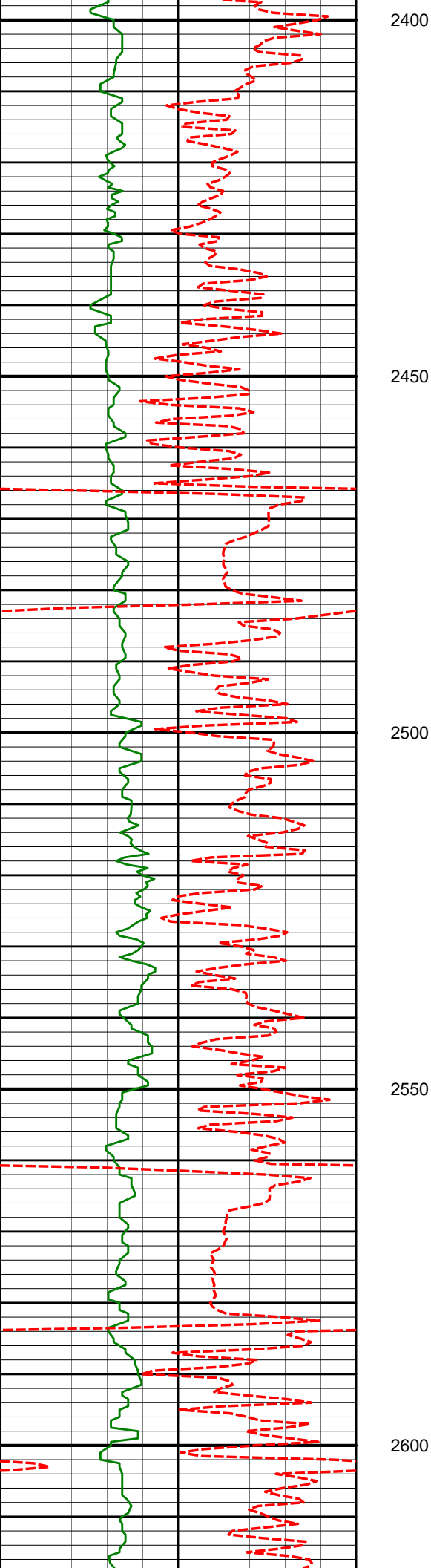
2323'

9.79°

239.29°

2316.71'

-41.38'



2417'

10.13°

243.71°

2409.30'

-49.12'

2512'

10.18°

236.77°

2502.81'

-57.42'

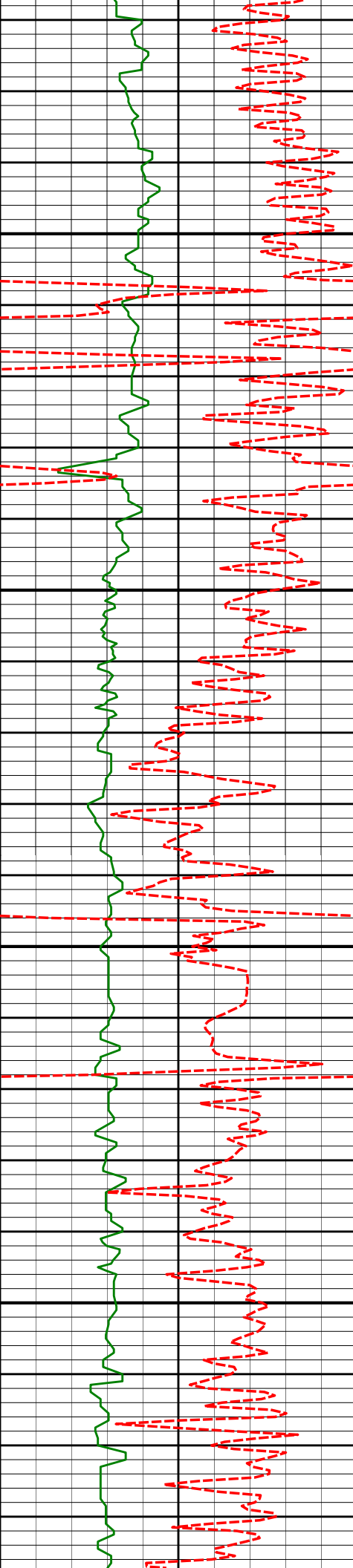
2606'

10.90°

242.47°

2595.23'

-66.08'



2650

2700

2750

2800

2700'

10.00°

239.95°

2687.67'

-74.28'

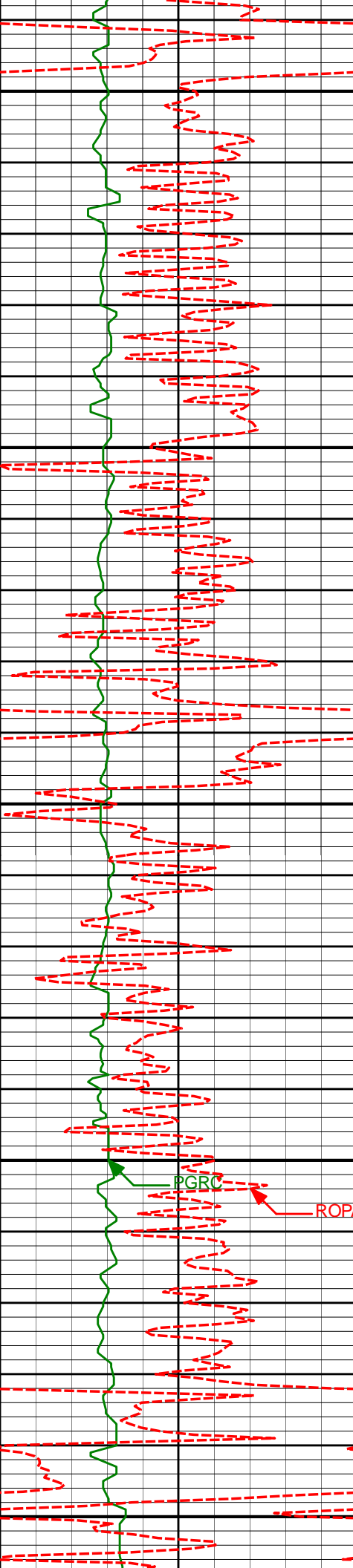
2794'

12.56°

241.40°

2779.84'

-83.26'



2850

2889'

12.28°

239.10°

2872.62'

-93.39'

2900

2950

2983'

12.38°

239.14°

2964.45'

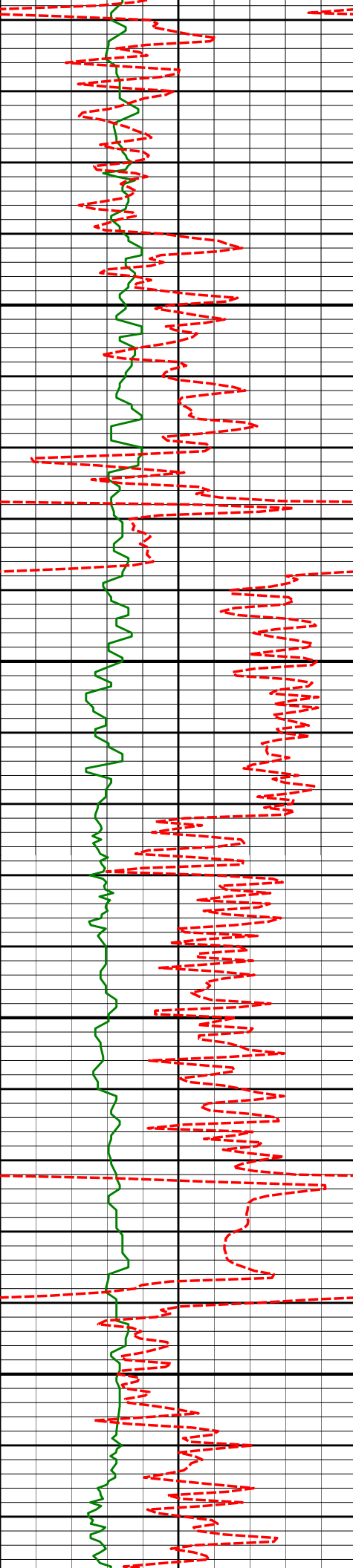
-103.69'

3000

3050

PGRC

ROPA



3077'

10.89°

237.22°

3056.52'

-113.67'

3100

3150

3171'

8.97°

232.24°

3149.11'

-122.97'

3200

3250

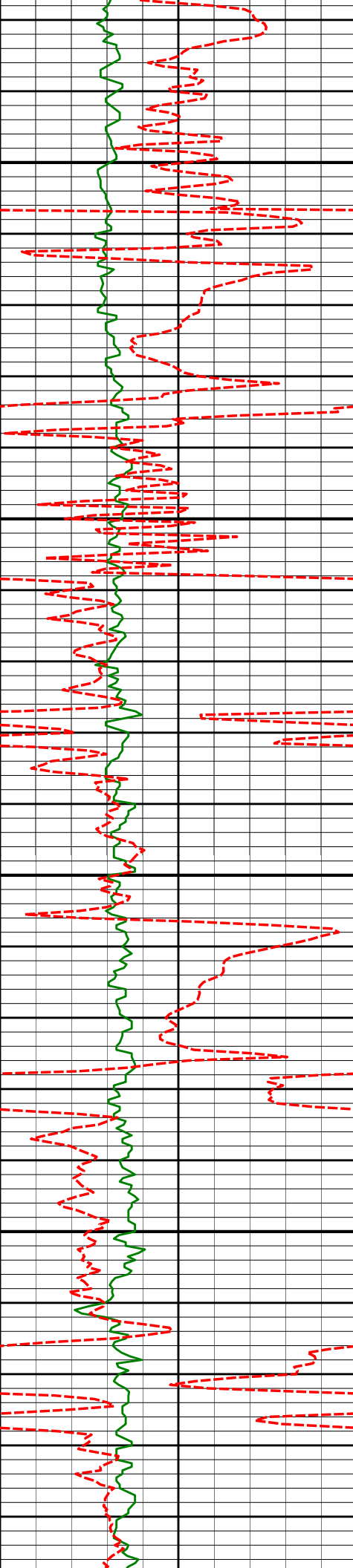
3265'

8.59°

243.75°

3242.01'

-130.56'



3300

3350

3400

3450

3360'

8.17°

244.88°

3336.00'

-136.56'

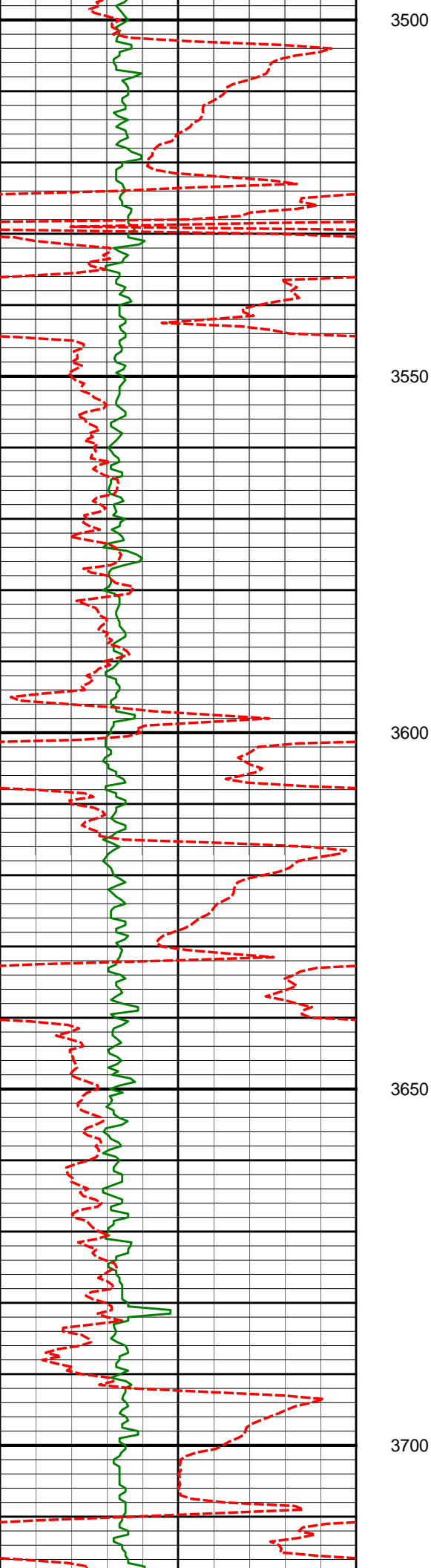
3455'

8.38°

238.57°

3430.01'

-143.04'



3500

3550

3600

3650

3700

3550'

9.51°

243.60°

3523.86'

-150.14'

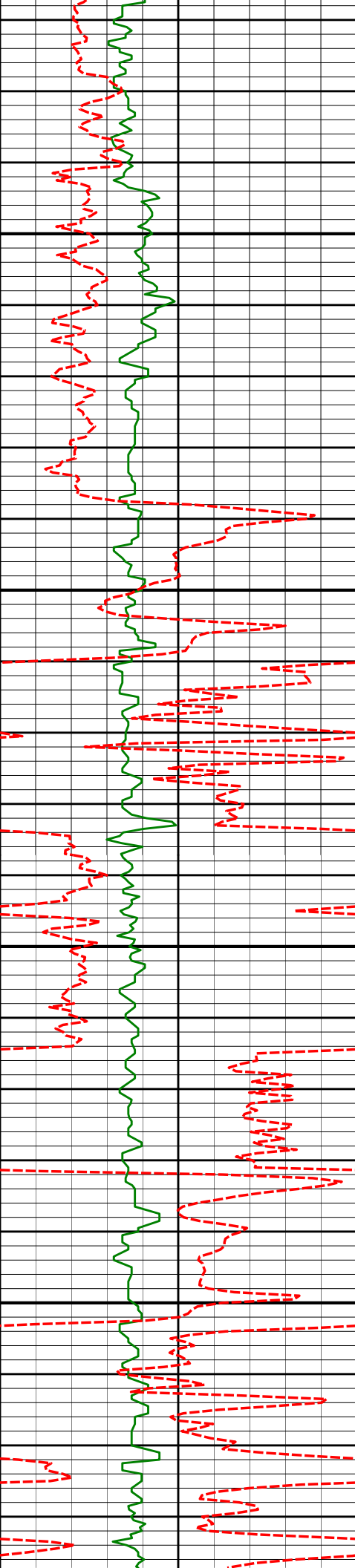
3645'

9.54°

243.05°

3617.55'

-157.19'



3740'

9.18°

243.48°

3711.28'

-164.15'

3750

3800

3835'

9.68°

243.90°

3805.00'

-171.04'

3850

3900

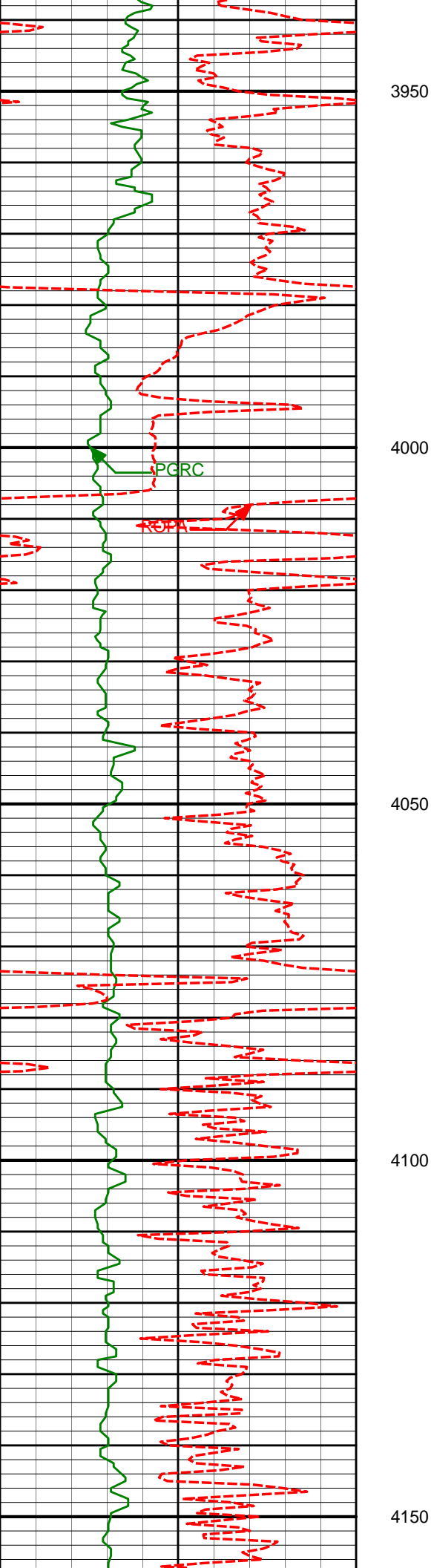
3930'

9.69°

242.57°

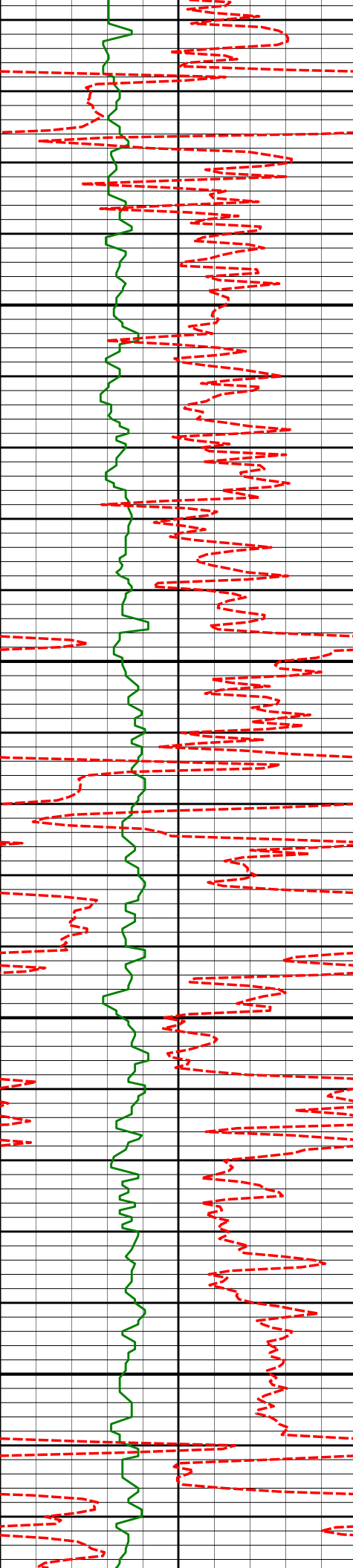
3898.64'

-178.24'



4025'	11.37°	243.73°	3992.04'	-186.07'
-------	--------	---------	----------	----------

4120'	11.17°	242.62°	4085.21'	-194.44'
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4200

4215'

11.29°

242.45°

4178.39'

-202.98'

4250

4300

4310'

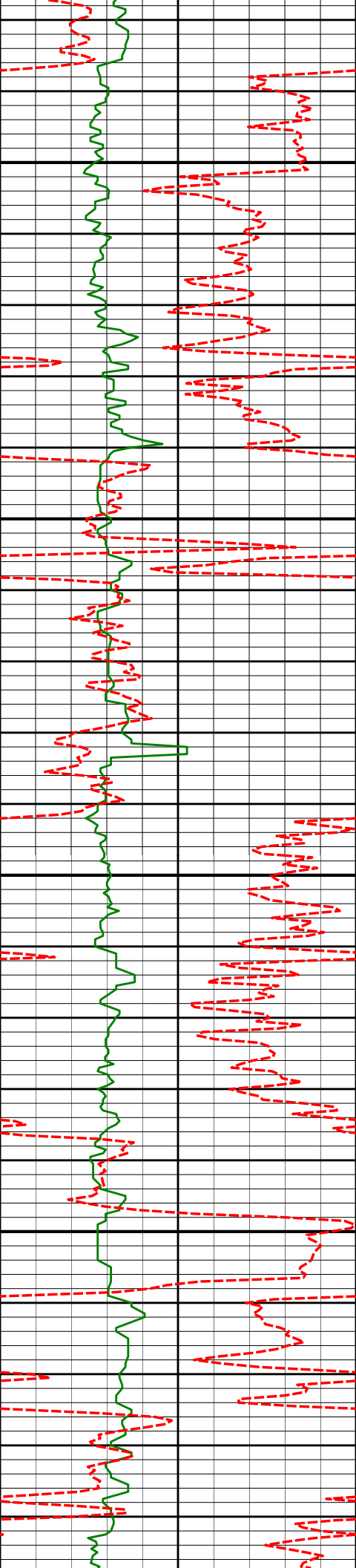
9.73°

240.54°

4271.79'

-211.23'

4350



4400

4405'

8.11°

242.41°

4365.64'

-218.28'

4450

4500

4500'

6.54°

240.37°

4459.86'

-224.06'

4550

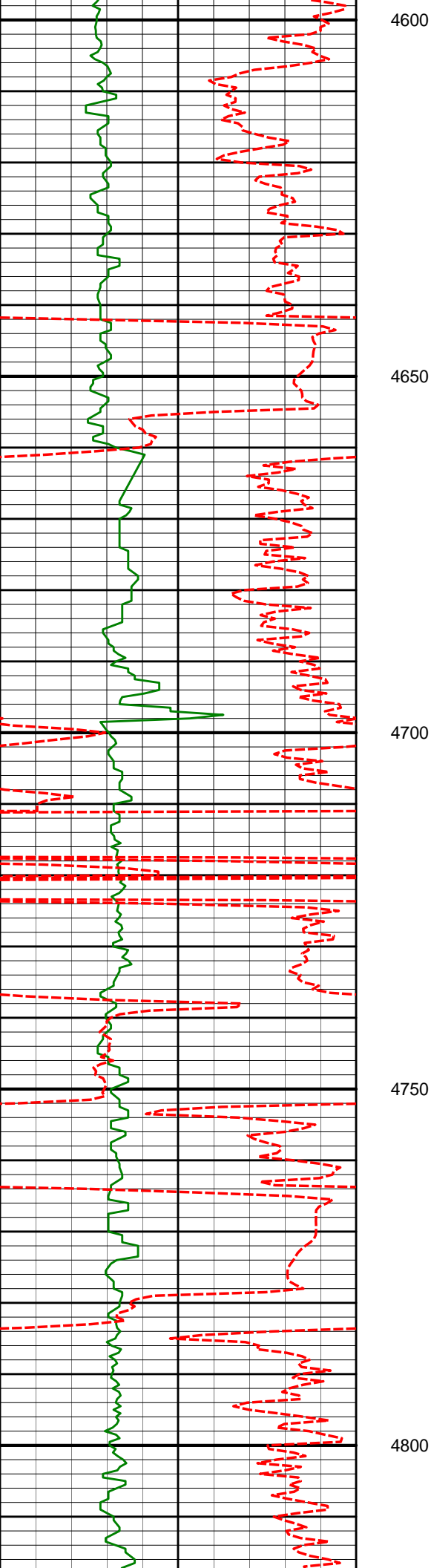
4595'

5.26°

241.50°

4554.36'

-228.81'



4690'

3.59°

241.39°

4649.07'

-232.31'

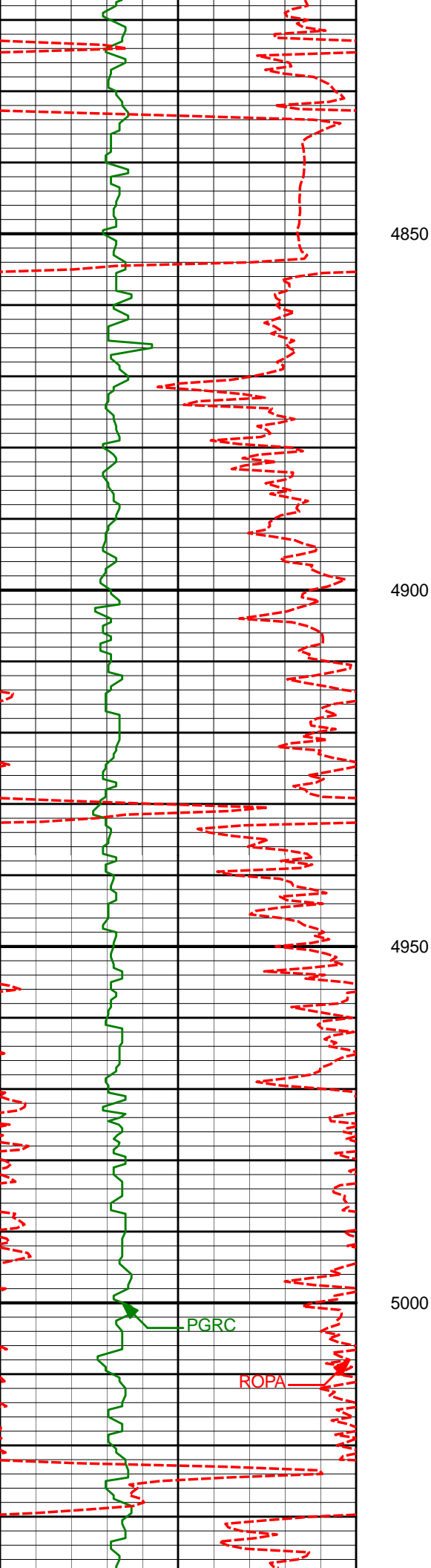
4786'

2.87°

223.98°

4744.92'

-235.48'



4850

4900

4950

5000

4881'

0.44°

205.46°

4839.88'

-237.52'

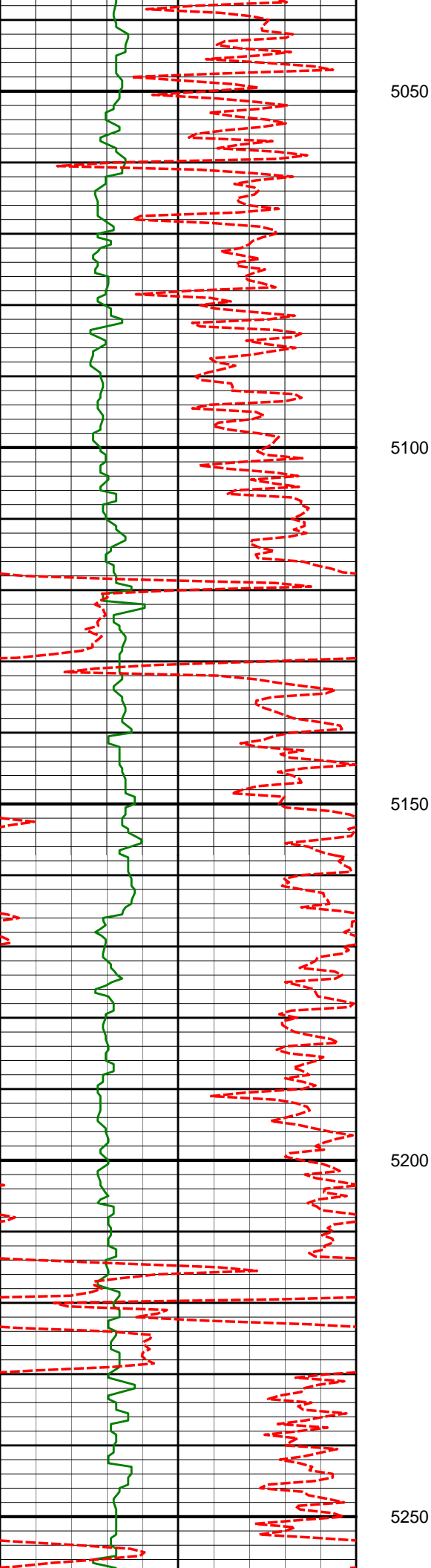
4976'

0.70°

128.51°

4934.87'

-238.21'



5071'

0.43°

350.13°

5029.87'

-238.22'

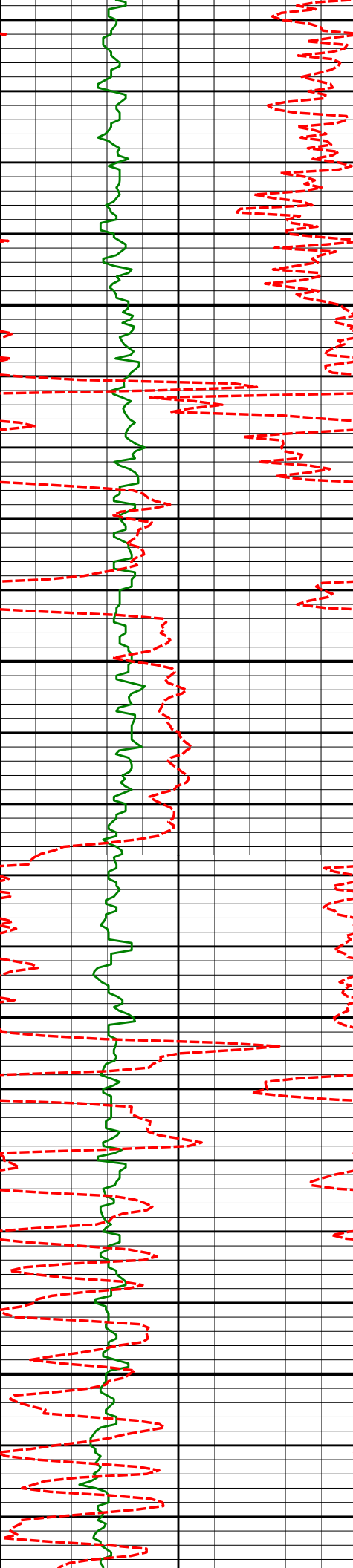
5166'

0.34°

330.78°

5124.87'

-237.63'



5300

5350

5400

5450

5261'

0.64°

334.55°

5219.86'

-236.90'

5356'

0.95°

313.16°

5314.85'

-235.88'

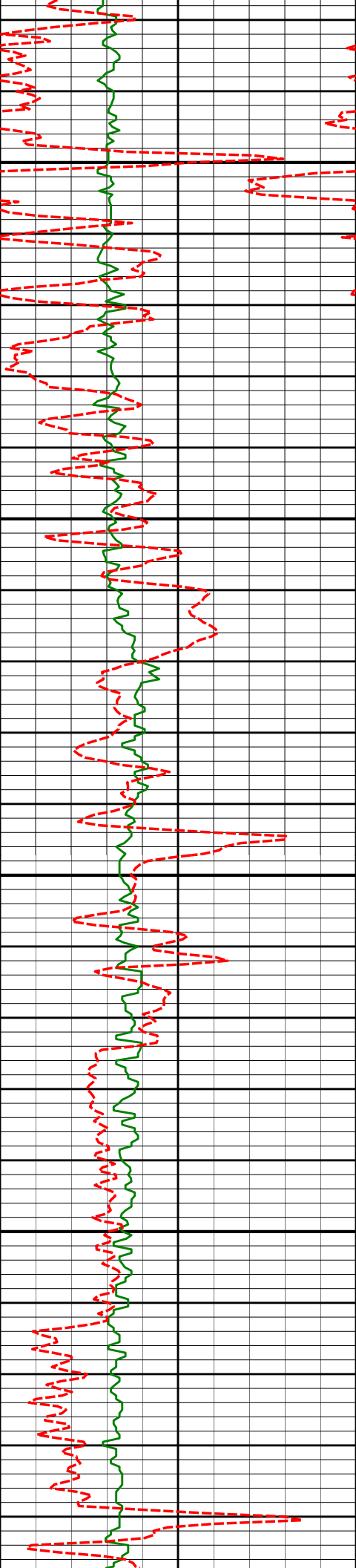
5451'

0.98°

294.53°

5409.84'

-235.01'



5500

5550

5600

5650

5546'

0.81°

271.16°

5504.83'

-234.66'

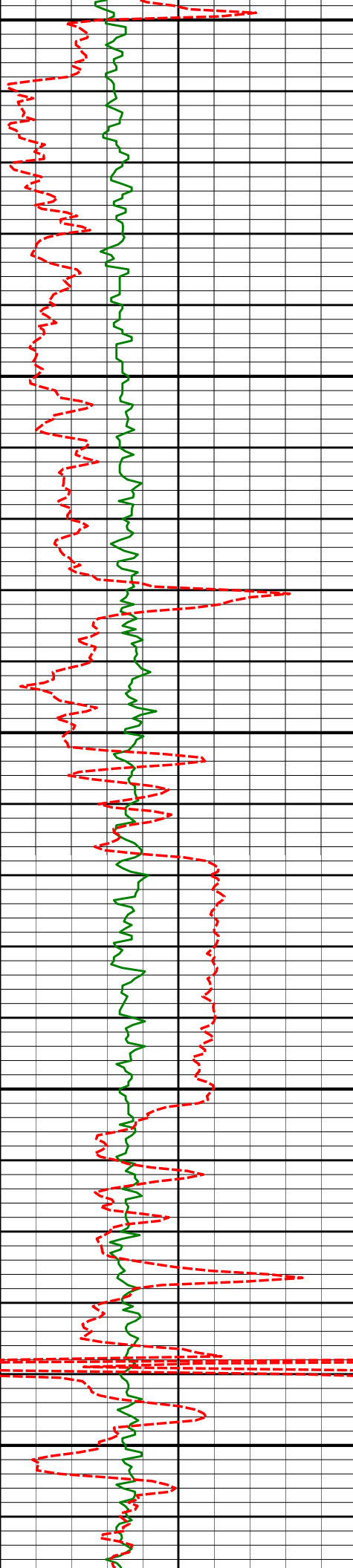
5640'

0.84°

268.02°

5598.82'

-234.67'



5700

5750

5800

5850

5900

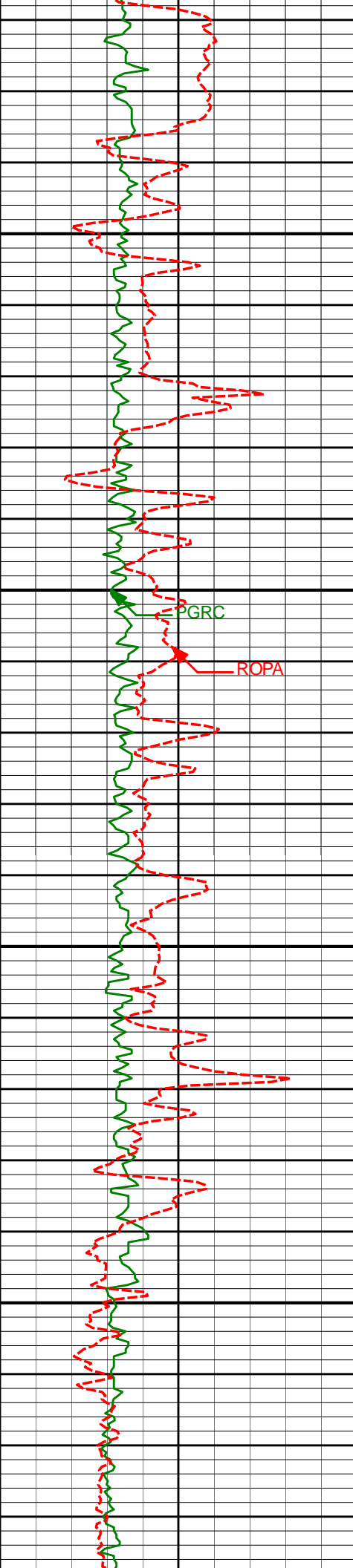
5830'

0.29°

288.91°

5788.81'

-234.56'



5950

6000

6050

6100

PGRC

ROPA

6021'

0.47°

258.02°

5979.81'

-234.57'

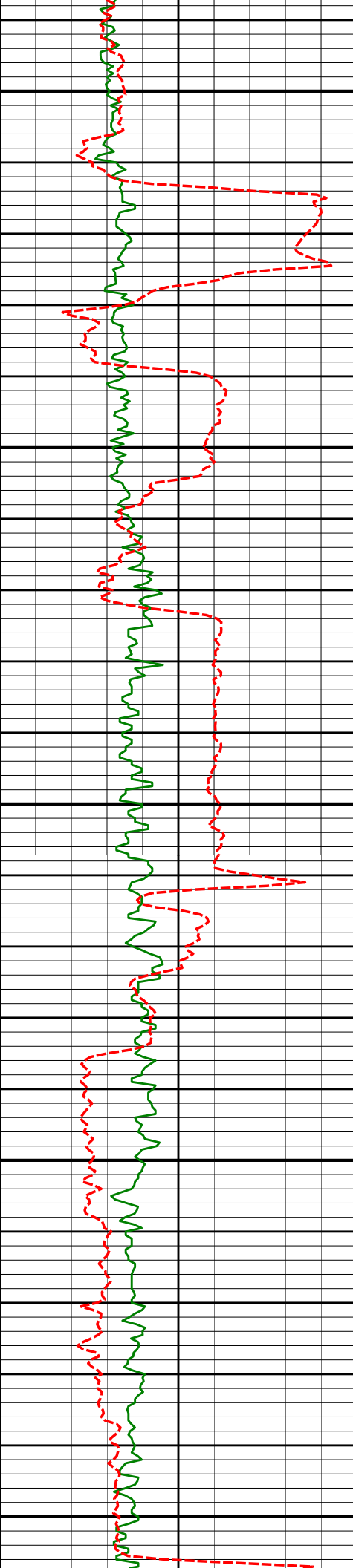
6116'

1.16°

252.25°

6074.80'

-234.94'



6150

6200

6250

6300

6350

6211'

1.05°

271.04°

6169.78'

-235.22'

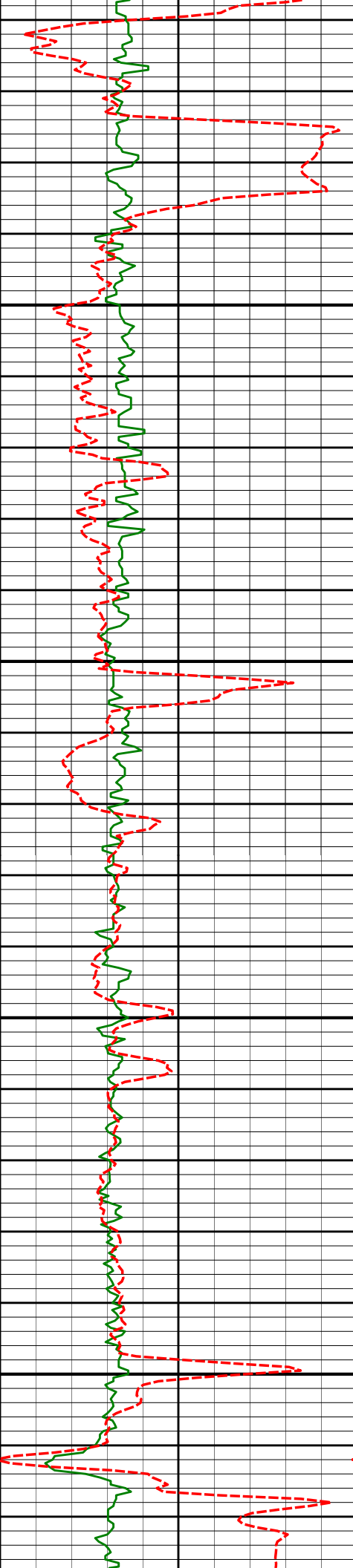
6306'

1.15°

258.88°

6264.76'

-235.39'



6400

6401'

0.83°

258.52°

6359.75'

-235.71'

6450

6500

6496'

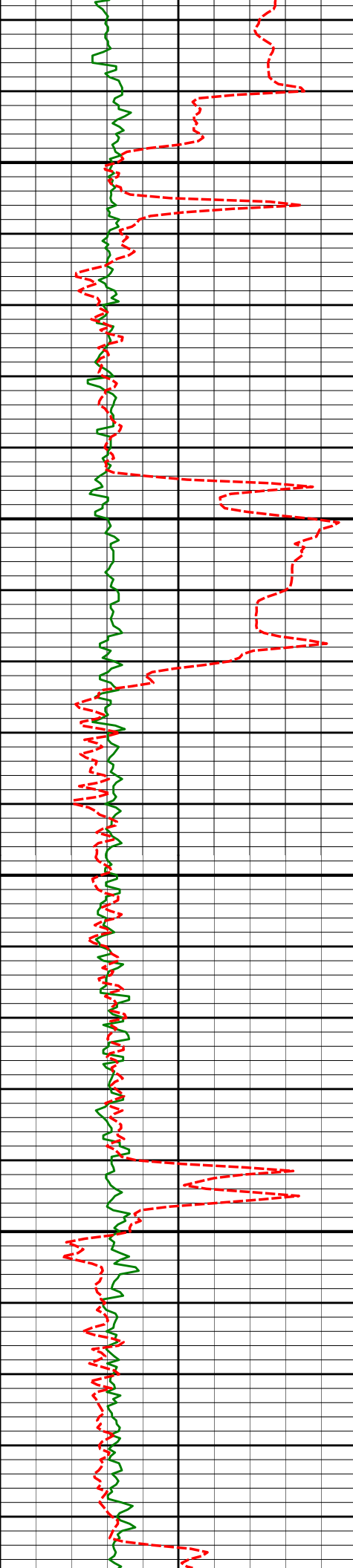
1.87°

239.36°

6454.72'

-236.63'

6550



6600

6650

6700

6750

6591'

1.37°

234.16°

6549.68'

-238.09'

6687'

1.38°

265.39°

6645.66'

-238.85'

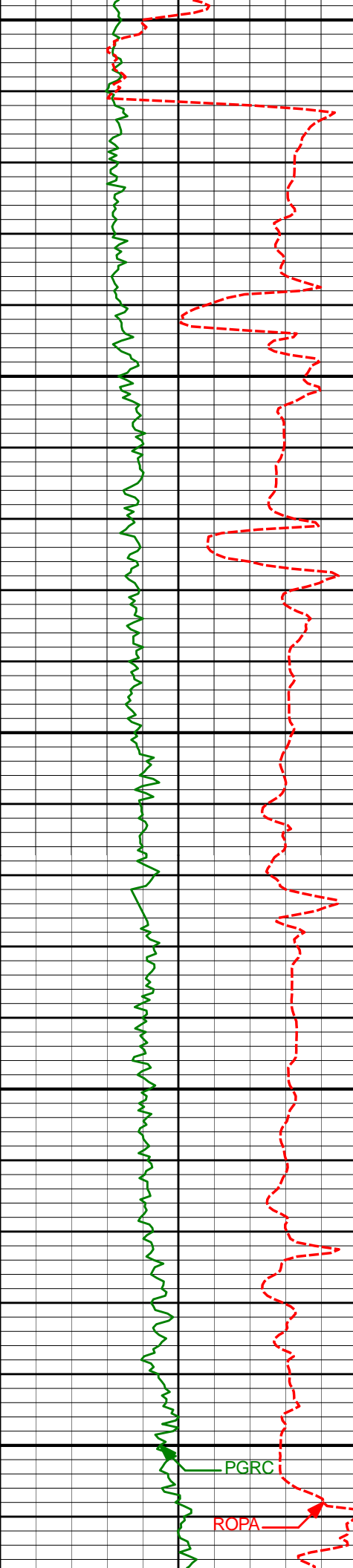
6782'

2.01°

263.21°

6740.61'

-239.14'



6800

6830'

2.01°

292.31°

6788.58'

-238.92'

6850

6877'

2.78°

326.59°

6835.55'

-237.66'

6900

6925'

4.37°

349.70°

6883.45'

-234.89'

6950

Run 300

6972'

6.91°

3.01°

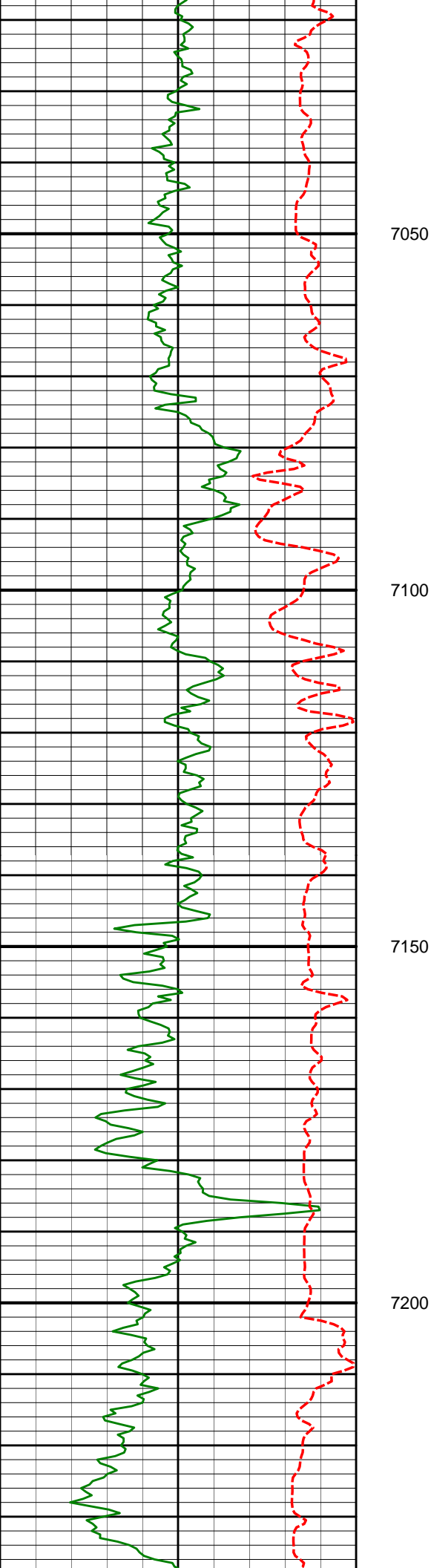
6930.22'

-230.30'

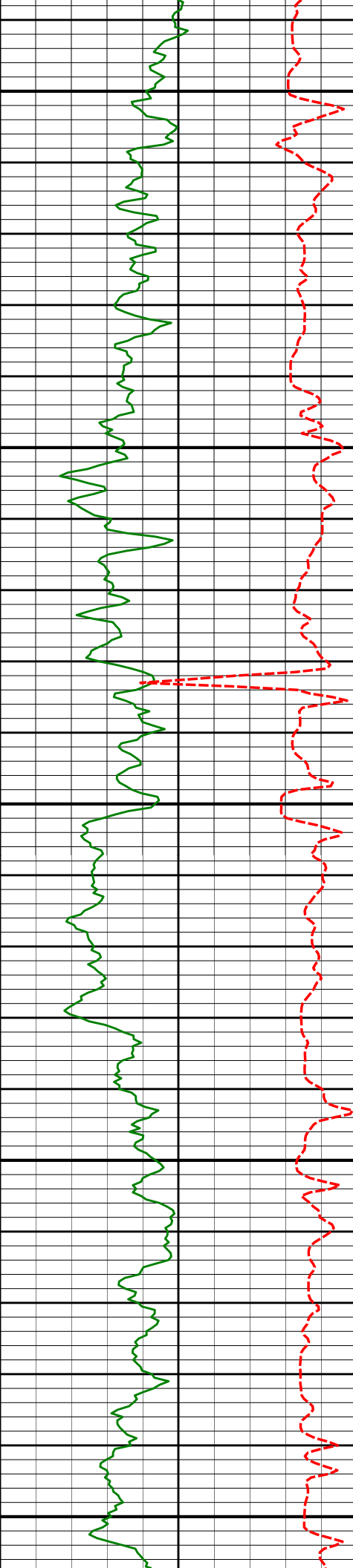
7000

PGRC

ROPA



7025'	12.58°	17.17°	6982.44'	-221.59'
7067'	18.56°	16.11°	7022.89'	-210.79'
7115'	24.49°	18.18°	7067.52'	-193.98'
7162'	30.09°	11.10°	7109.28'	-173.15'
7210'	35.62°	6.70°	7149.59'	-147.43'



7250

7257'

41.03°

5.21°

7186.45'

-118.45'

7300

7305'

47.48°

2.35°

7220.82'

-85.05'

7350

7352'

53.23°

0.69°

7250.79'

-48.89'

7400

7400'

58.94°

0.31°

7277.56'

-9.08'

7450

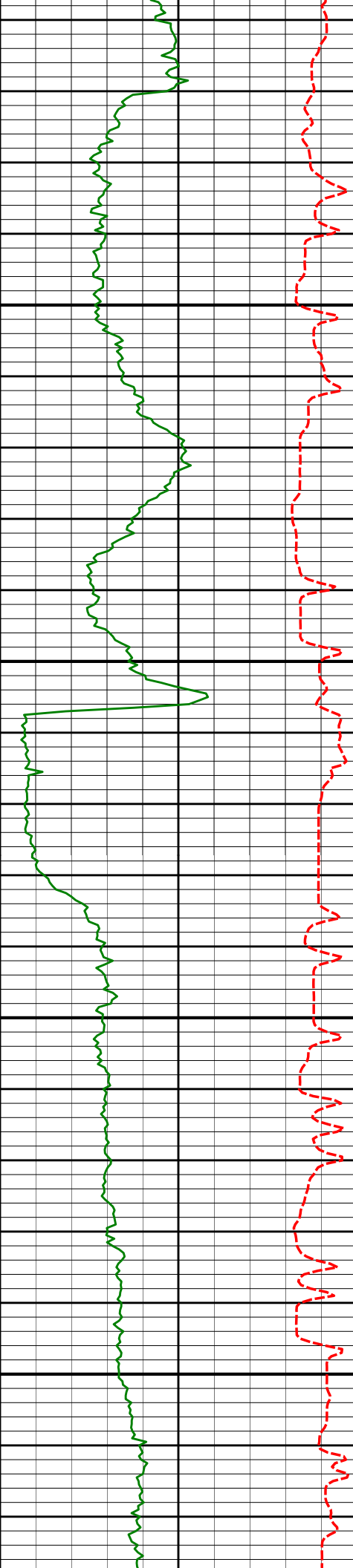
7448'

64.72°

359.21°

7300.22'

33.22'



7500

7550

7600

7650

7496'

69.91°

359.72°

7318.72'

77.49'

7543'

72.38°

359.73°

7333.91'

121.96'

7591'

75.64°

0.01°

7347.13'

168.10'

7" Casing Shoe @ 7638' MD / 7230.50' TVD

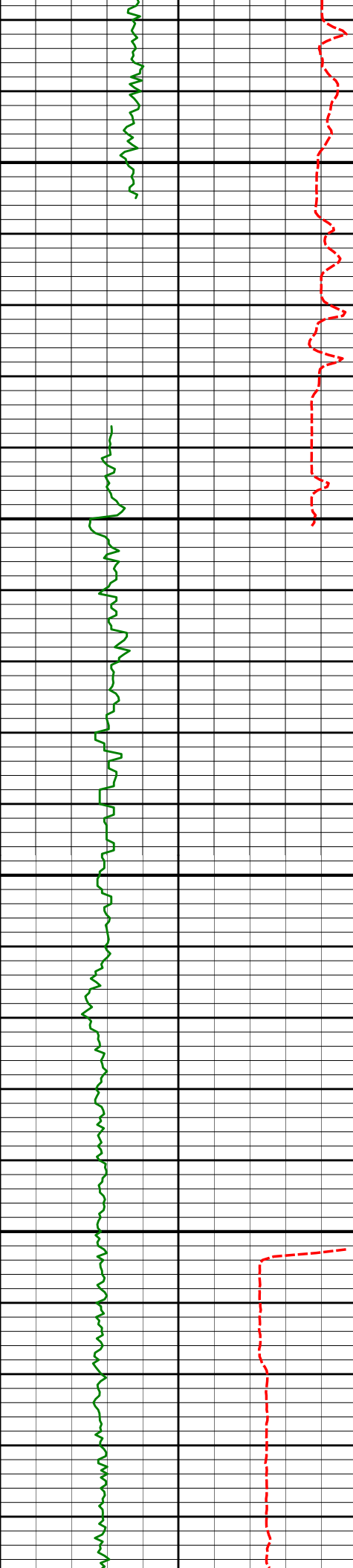
7638'

77.90°

1.17°

7357.89'

213.85'



7700

7686'

84.48°

1.39°

7365.23'

261.24'

7708'

88.00°

2.22°

7366.68'

283.18'

7" Casing Shoe @ 7738' MD / 7367.36' TVD

7750
Run 400

7777'

89.72°

1.95°

7368.05'

352.12'

7800

7850

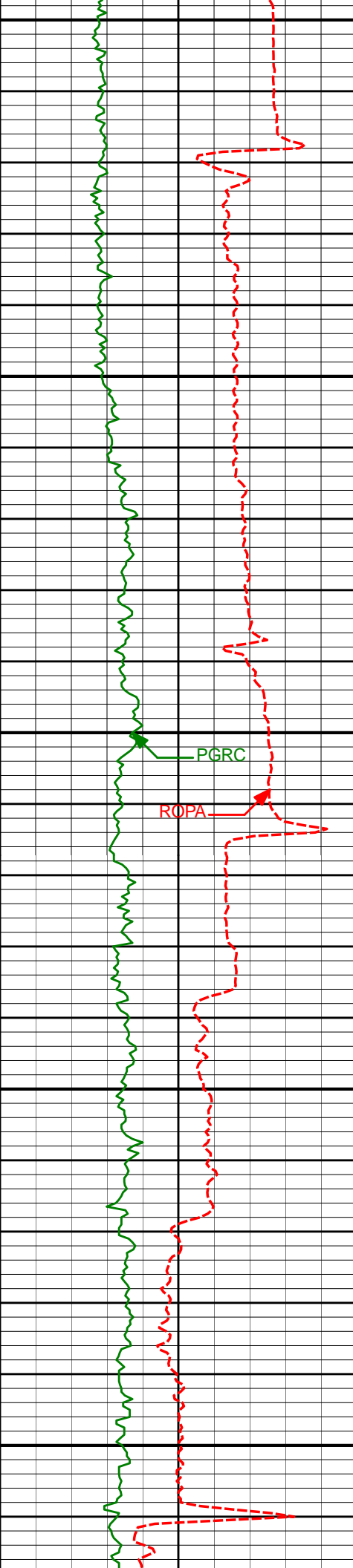
7872'

89.51°

0.95°

7368.69'

447.08'



7900

7950

8000

8050

8100

7967'

89.38°

0.25°

7369.61'

542.07'

PGRC

ROPA

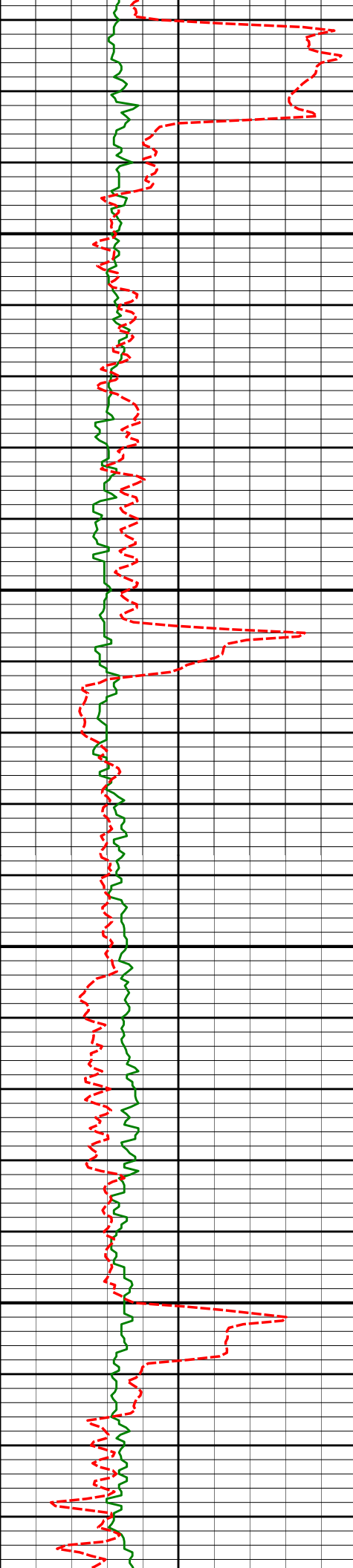
8062'

89.01°

359.78°

7370.94'

637.06'



8150

8157'

90.22°

359.09°

7371.58'

732.05'

8200

8250

8252'

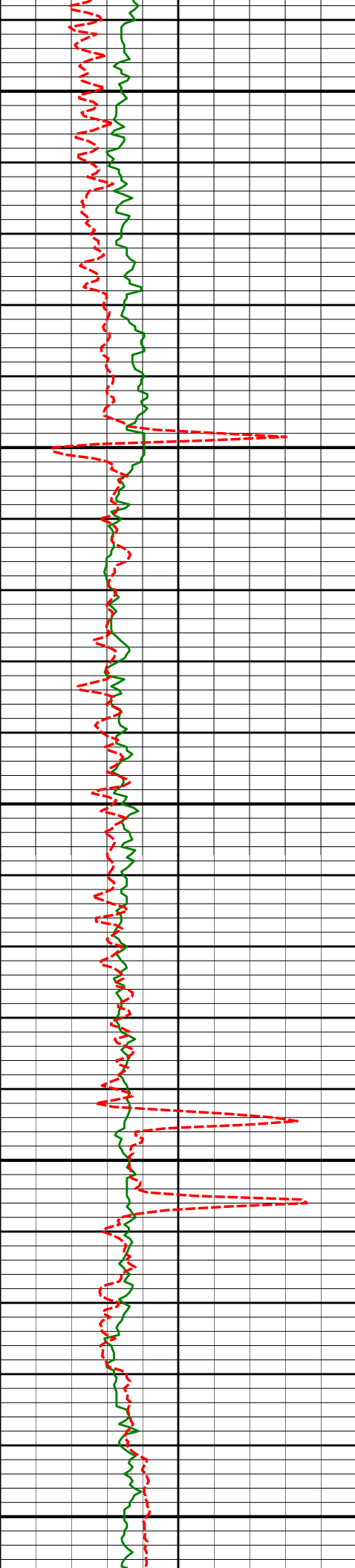
90.18°

359.00°

7371.25'

827.04'

8300



8350

8348'

90.18°

358.57°

7370.95'

923.02'

8400

8443'

89.97°

358.99°

7370.82'

1018.00'

8450

8500

8538'

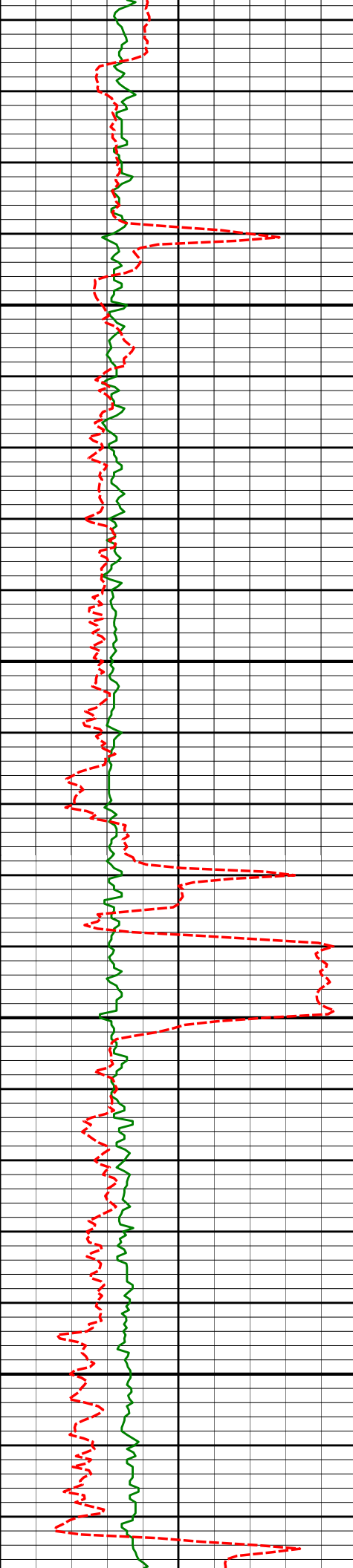
89.91°

359.22°

7370.92'

1112.99'

8550



8600

8633'

89.72°

358.83°

7371.23'

1207.97'

8650

8700

8750

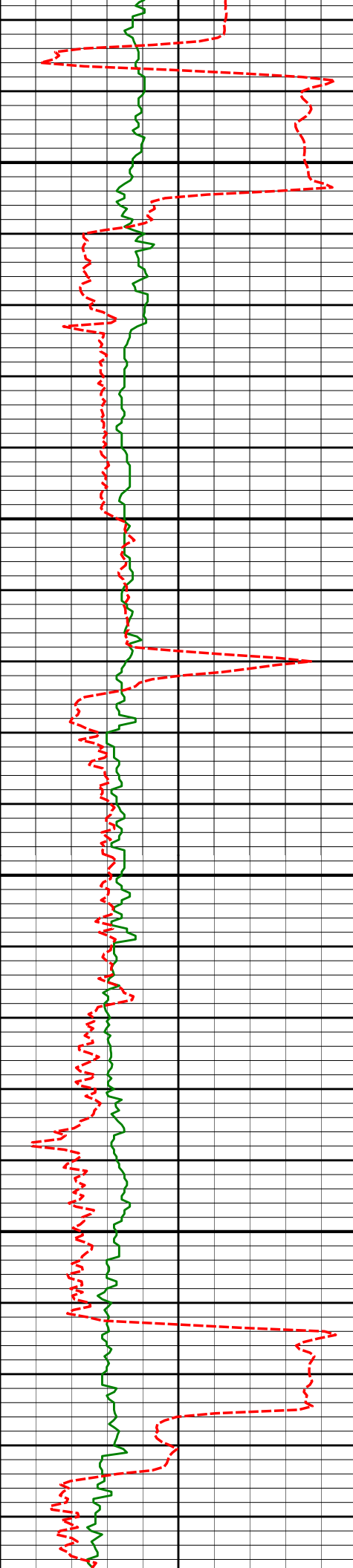
8728'

90.92°

358.37°

7370.70'

1302.94'



8800

8823'

92.07°

0.65°

7368.22'

1397.90'

8850

8900

8918'

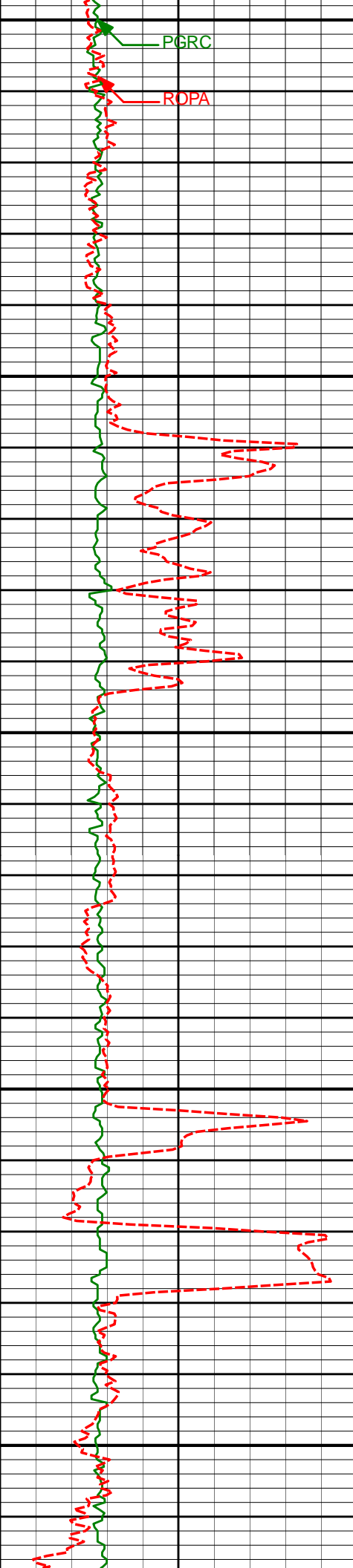
92.07°

0.16°

7364.79'

1492.83'

8950



9000

PGRC

ROPA

9013'

90.89°

0.71°

7362.34'

1587.79'

9050

9100

9109'

90.59°

0.11°

7361.10'

1683.78'

9150

9200

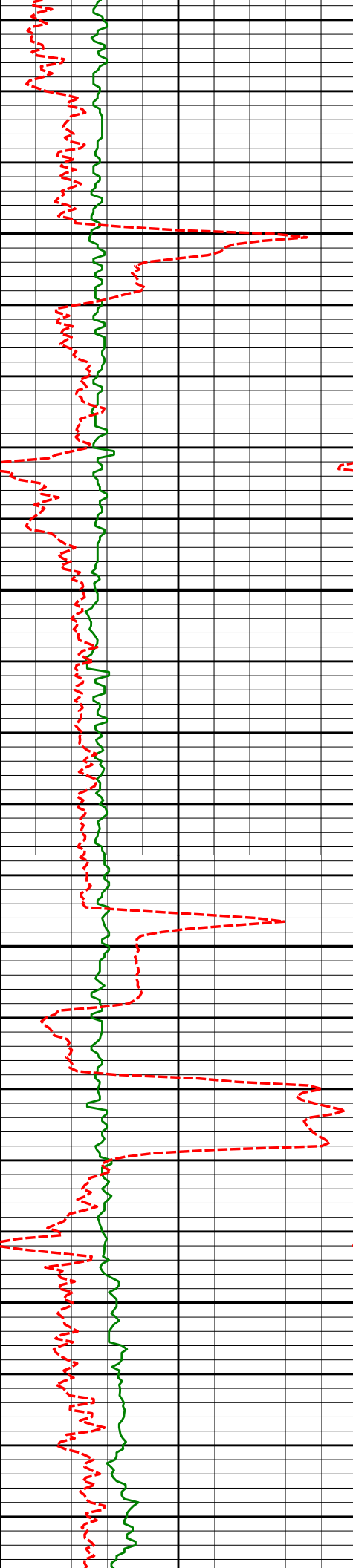
9204'

89.75°

0.14°

7360.82'

1778.78'



9250

9300

9350

9400

9299'

89.23°

359.31°

7361.66'

1873.77'

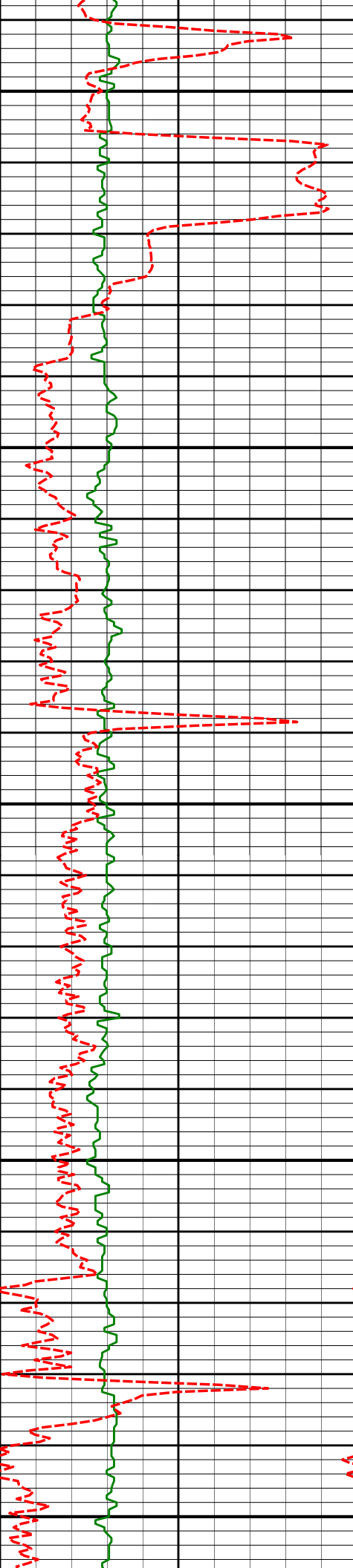
9394'

88.70°

0.03°

7363.37'

1968.76'



9450

9489'

89.72°

359.50°

7364.68'

2063.75'

9500

9550

9584'

89.60°

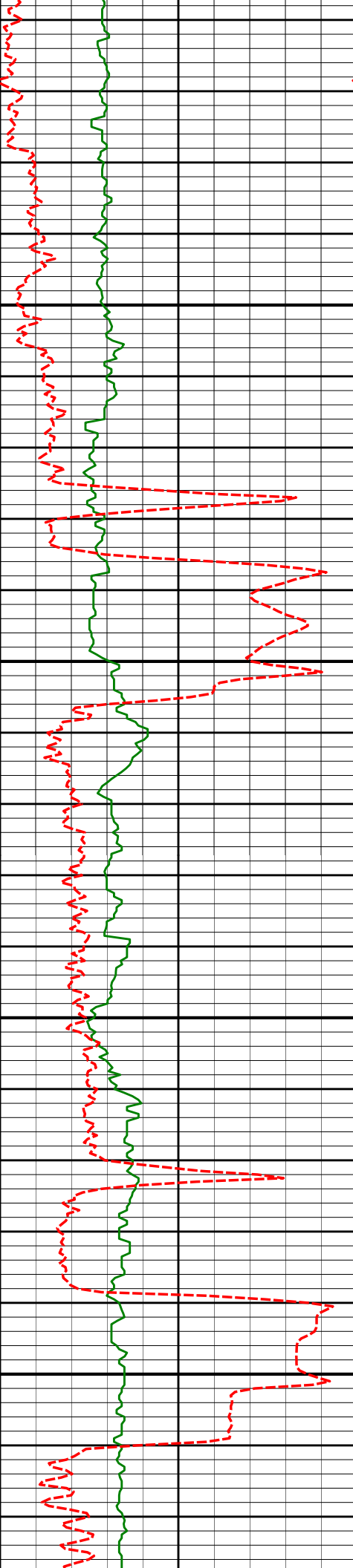
359.43°

7365.24'

2158.74'

9600

9650



9700

9750

9800

9850

9680'

88.95°

358.61°

7366.45'

2254.72'

9775'

89.41°

359.23°

7367.81'

2349.69'

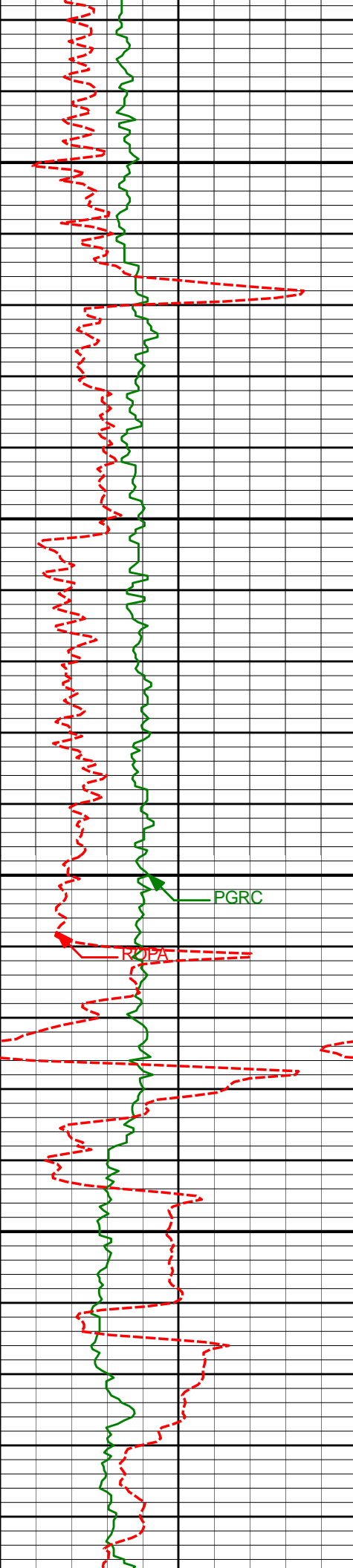
9870'

91.26°

0.29°

7367.25'

2444.68'



9900

9950

10000

10050

9965'

91.17°

359.68°

7365.23'

2539.66'

PGRC

ROPA

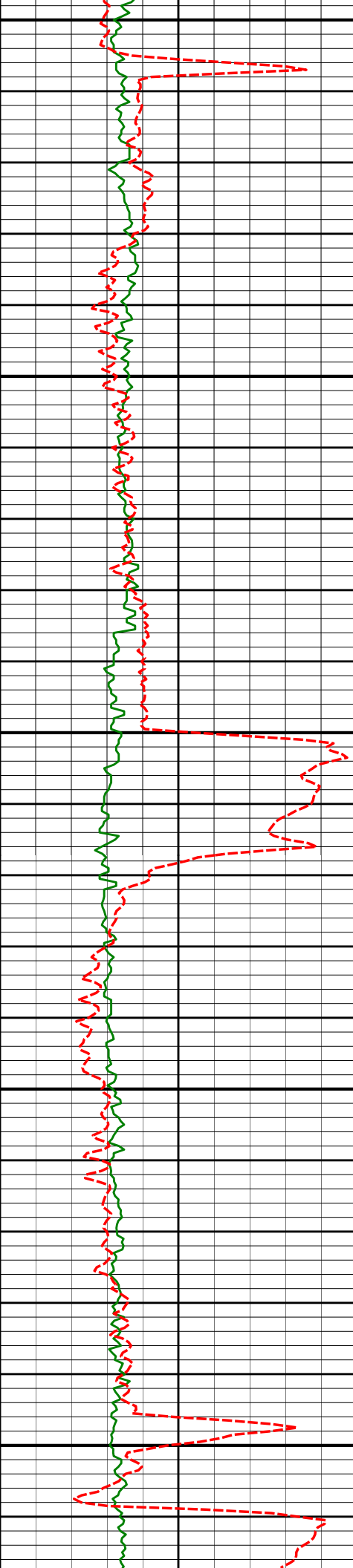
10060'

90.92°

359.47°

7363.49'

2634.64'



10100

10150

10200

10250

10300

10155'

90.68°

359.12°

7362.16'

2729.62'

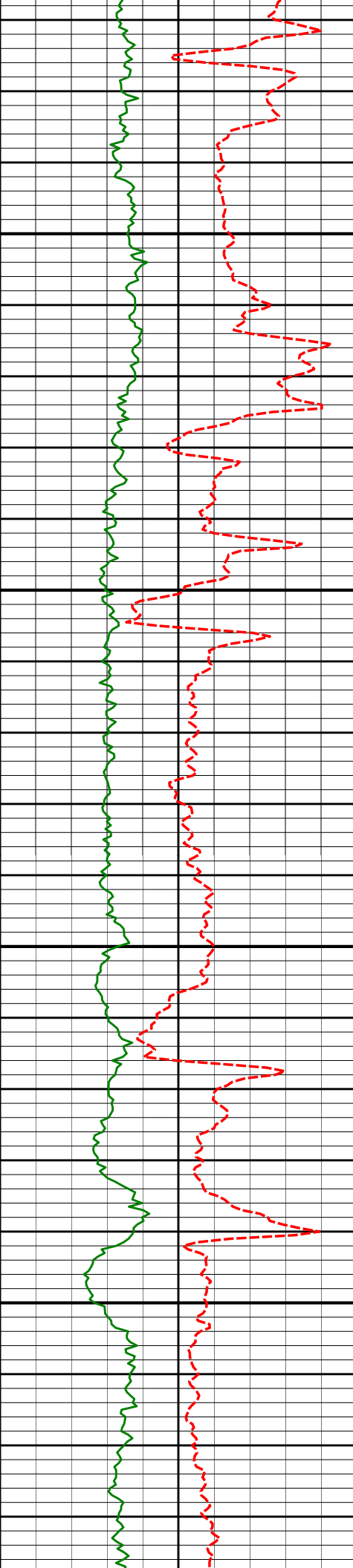
10250'

91.73°

0.01°

7360.17'

2824.60'



10350

10400

10450

10500

10346'

90.46°

1.04°

7358.33'

2920.57'

10441'

88.95°

1.37°

7358.82'

3015.55'

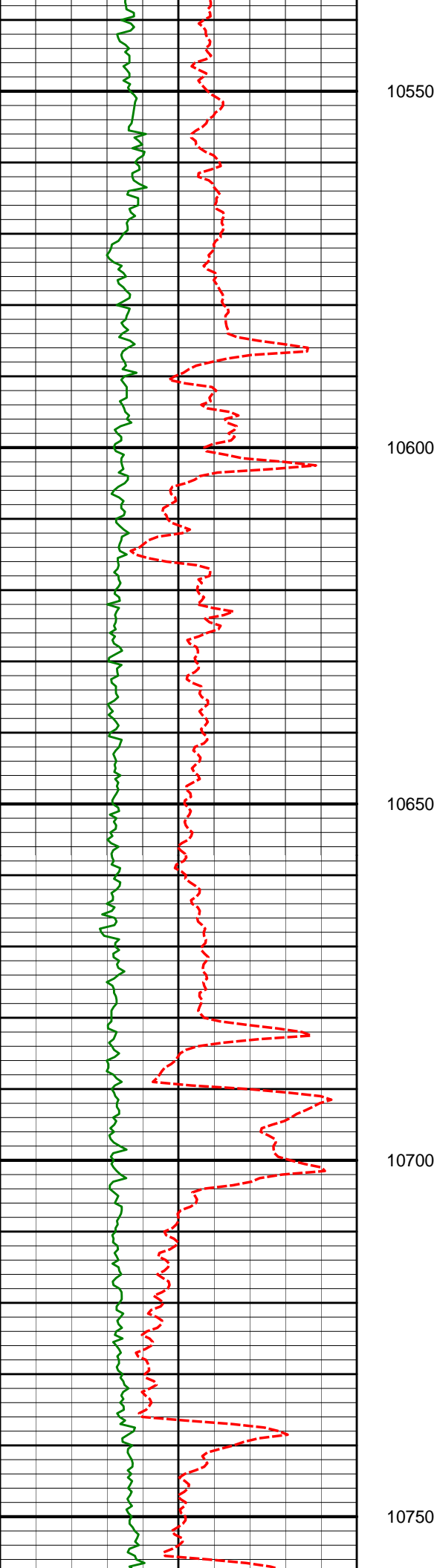
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88.77°

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3110.50'



10631'

88.49°

1.06°

7362.98'

3205.45'

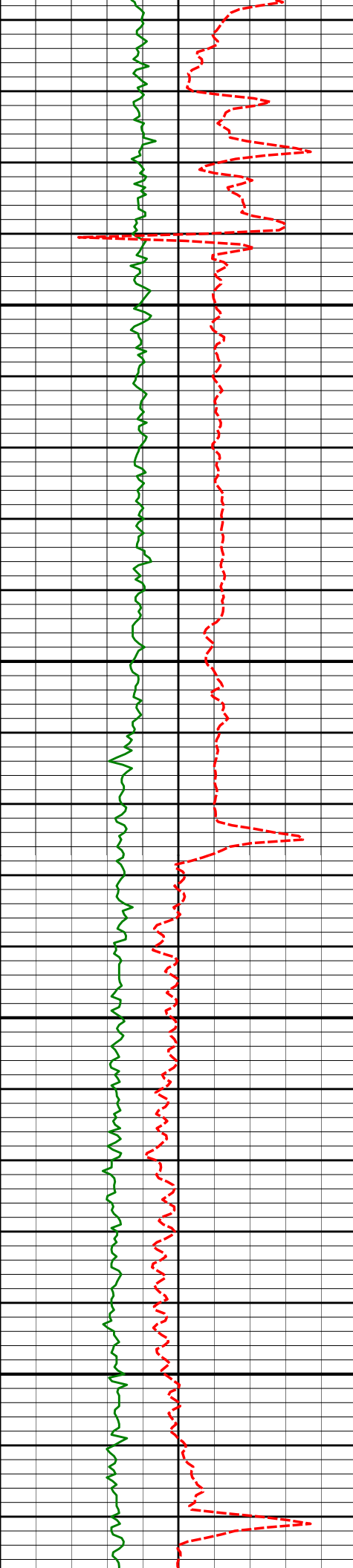
10726'

89.94°

0.41°

7364.28'

3300.43'



10800

10821'

90.46°

359.86°

7363.95'

3395.43'

10850

10900

10917'

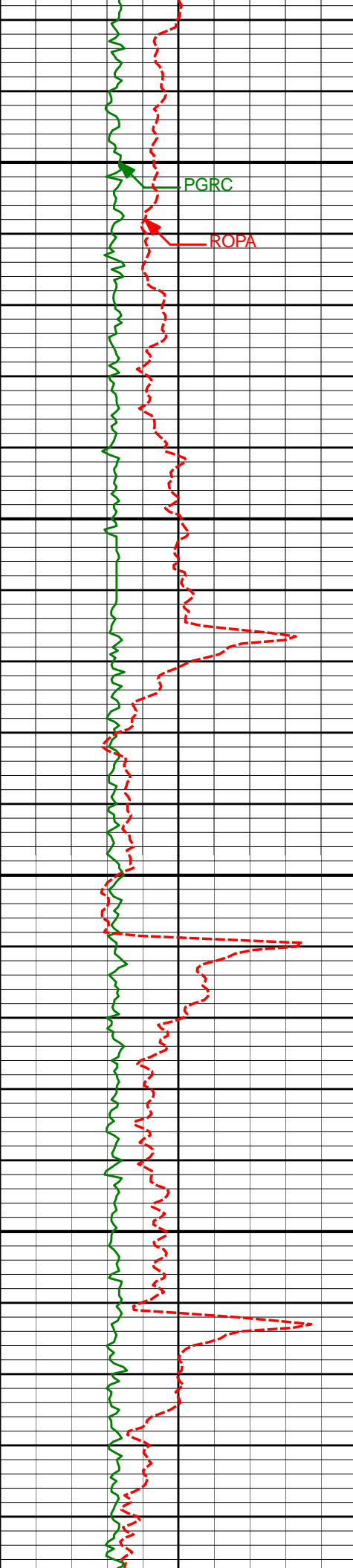
90.43°

359.89°

7363.20'

3491.42'

10950



11000

11050

11100

11150

PGRC

ROPA

11012'

90.25°

358.90°

7362.64'

3586.42'

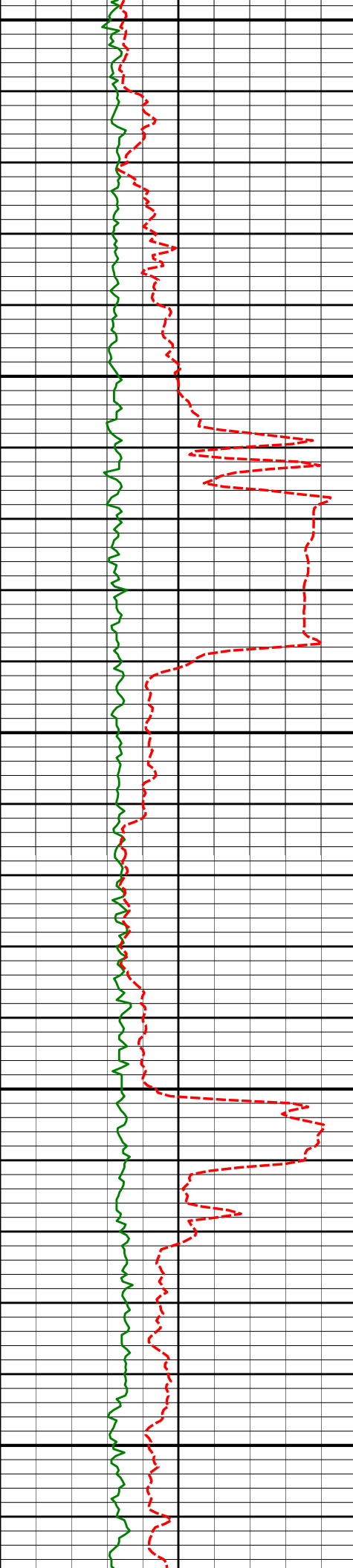
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89.94°

358.35°

7362.49'

3681.39'



11200

11250

11300

11350

11400

11202'

11297'

11392'

89.54°

90.65°

90.31°

357.68°

0.02°

0.46°

7362.92'

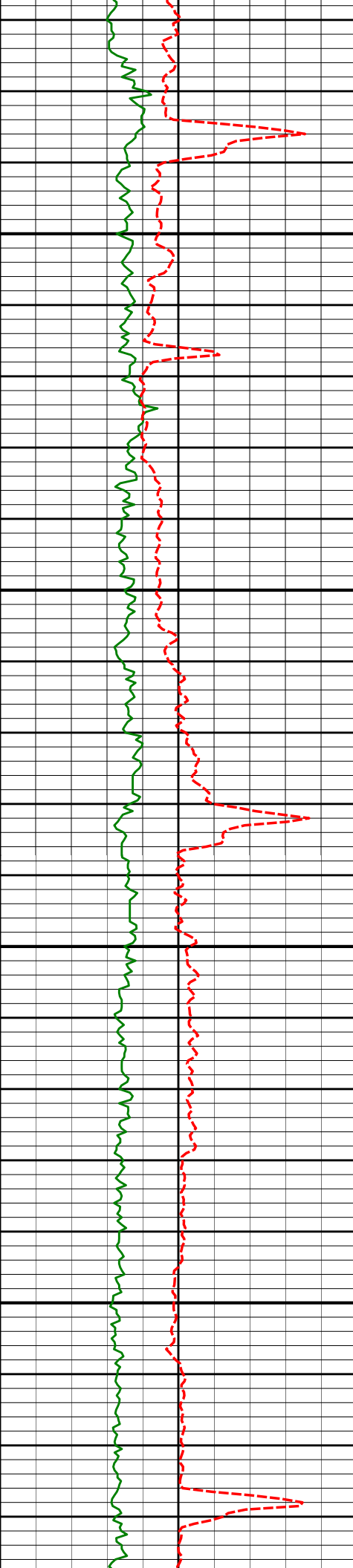
7362.77'

7361.97'

3776.33'

3871.30'

3966.30'



11450

11500

11550

11600

11487'

89.32°

358.74°

7362.28'

4061.29'

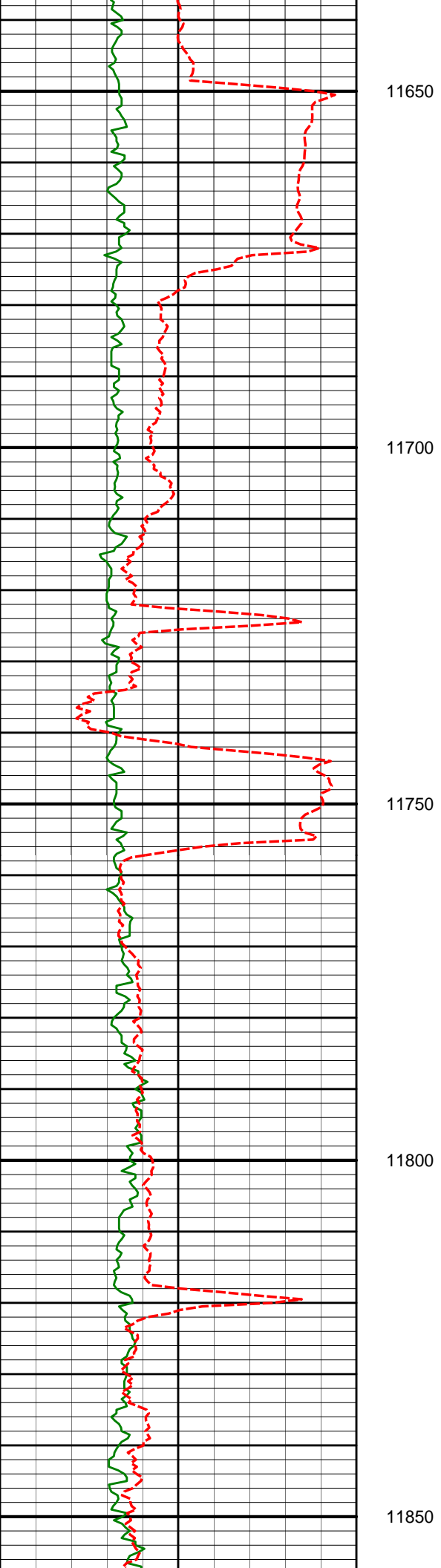
11582'

89.11°

358.20°

7363.58'

4156.25'



11677'

90.65°

0.55°

7363.79'

4251.23'

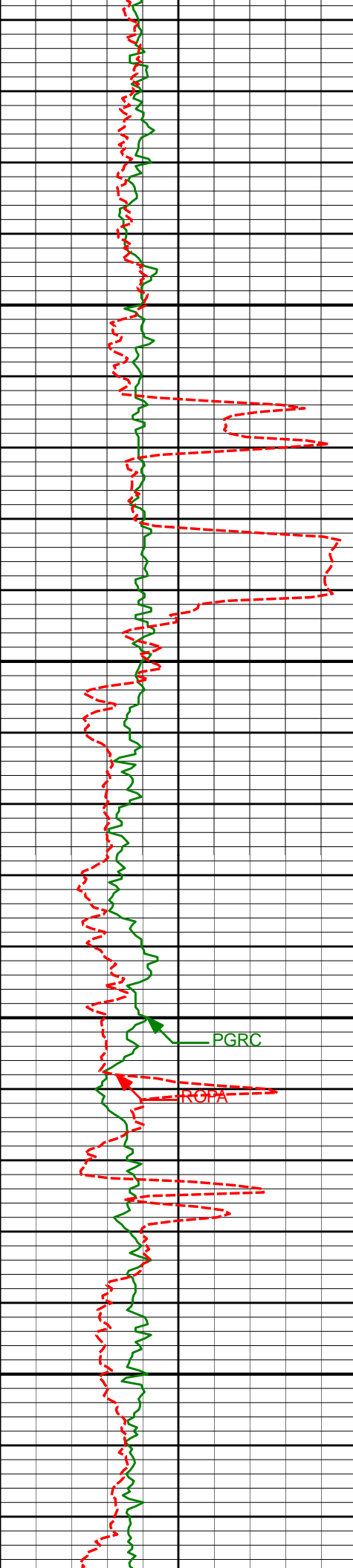
11772'

91.33°

1.51°

7362.15'

4346.20'



11867'

91.02°

1.31°

7360.21'

4441.15'

11900

11950

11962'

90.34°

2.43°

7359.09'

4536.09'

12000

PGRC

ROPA

12050

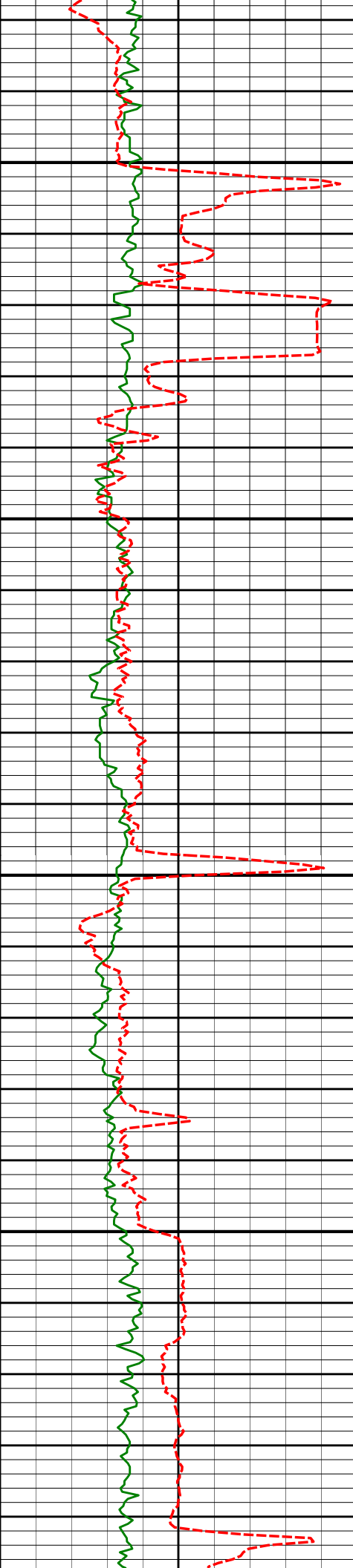
12057'

90.37°

2.86°

7358.50'

4630.99'



12100

12150

12200

12250

12152'

89.51°

2.55°

7358.60'

4725.88'

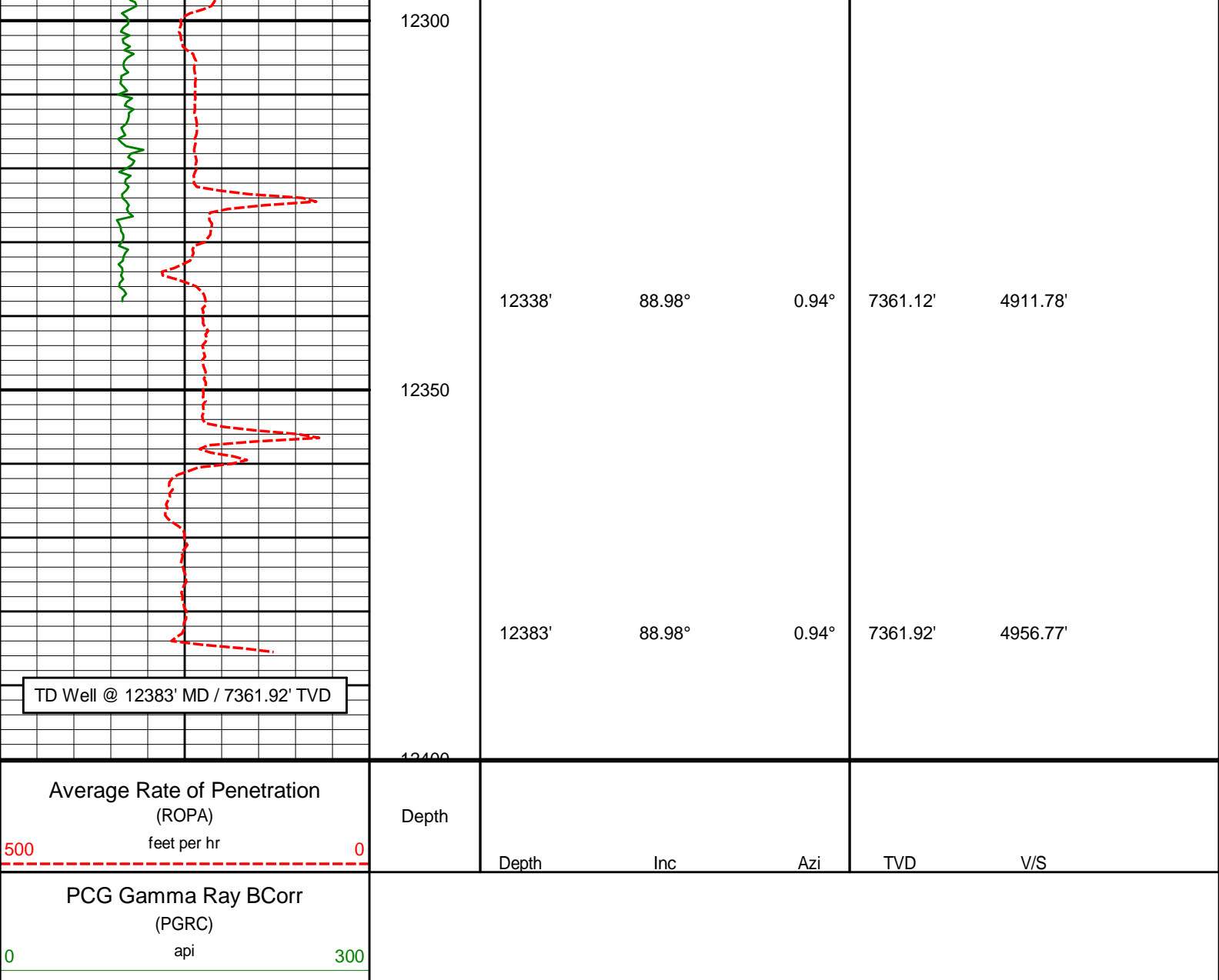
12247'

89.20°

1.57°

7359.68'

4820.81'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation
Ferge 4C-14HZ
Wattenberg
Weld Colorado
USA
CA-XX-0901100816

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1113.00	0.37	27.79	1112.96	2.62 S	4.86 W	-2.62	TIE-IN
1380.00	0.65	234.89	1379.96	2.73 S	5.70 W	-2.73	0.37
1485.00	1.34	265.23	1484.94	3.17 S	7.41 W	-3.17	0.81
1570.00	2.77	254.70	1569.88	3.80 S	10.38 W	-3.80	1.73
1664.00	4.78	258.91	1663.67	5.15 S	16.41 W	-5.15	2.16
1759.00	5.46	267.19	1758.30	6.13 S	24.81 W	-6.13	1.06
1853.00	6.86	251.30	1851.76	8.15 S	34.60 W	-8.15	2.33
1947.00	6.44	233.23	1945.14	13.11 S	44.14 W	-13.11	2.26
2041.00	7.10	237.86	2038.48	19.36 S	53.28 W	-19.36	0.91
2135.00	8.81	243.20	2131.57	25.69 S	64.63 W	-25.69	1.98
2229.00	10.70	241.39	2224.21	33.12 S	78.71 W	-33.12	2.04

2323.00	9.79	239.29	2316.71	41.38 S	93.25 W	-41.38	1.05
2417.00	10.13	243.71	2409.30	49.12 S	107.53 W	-49.12	0.89
2512.00	10.18	236.77	2502.81	57.42 S	122.04 W	-57.42	1.29
2606.00	10.90	242.47	2595.23	66.08 S	136.87 W	-66.08	1.35
2700.00	10.00	239.95	2687.67	74.28 S	151.82 W	-74.28	1.07
2794.00	12.56	241.40	2779.84	83.26 S	167.86 W	-83.26	2.74
2889.00	12.28	239.10	2872.62	93.39 S	185.60 W	-93.39	0.60
2983.00	12.38	239.14	2964.45	103.69 S	202.82 W	-103.69	0.11
3077.00	10.89	237.22	3056.52	113.67 S	218.94 W	-113.67	1.64
3171.00	8.97	232.24	3149.11	122.97 S	232.20 W	-122.97	2.24
3265.00	8.59	243.75	3242.01	130.56 S	244.29 W	-130.56	1.91
3360.00	8.17	244.88	3336.00	136.56 S	256.77 W	-136.56	0.47
3455.00	8.38	238.57	3430.01	143.04 S	268.79 W	-143.04	0.98
3550.00	9.51	243.60	3523.86	150.14 S	281.72 W	-150.14	1.45
3645.00	9.54	243.05	3617.55	157.19 S	295.77 W	-157.19	0.10
3740.00	9.18	243.48	3711.28	164.15 S	309.57 W	-164.15	0.39
3835.00	9.68	243.90	3805.00	171.04 S	323.52 W	-171.04	0.53
3930.00	9.69	242.57	3898.64	178.24 S	337.79 W	-178.24	0.24
4025.00	11.37	243.73	3992.04	186.07 S	353.28 W	-186.07	1.78
4120.00	11.17	242.62	4085.21	194.44 S	369.85 W	-194.44	0.31
4215.00	11.29	242.45	4178.39	202.98 S	386.27 W	-202.98	0.13
4310.00	9.73	240.54	4271.79	211.23 S	401.50 W	-211.23	1.68
4405.00	8.11	242.41	4365.64	218.28 S	414.43 W	-218.28	1.73
4500.00	6.54	240.37	4459.86	224.06 S	425.08 W	-224.06	1.67
4595.00	5.26	241.50	4554.36	228.81 S	433.61 W	-228.81	1.35
4690.00	3.59	241.39	4649.07	232.31 S	440.04 W	-232.31	1.76
4786.00	2.87	223.98	4744.92	235.48 S	444.35 W	-235.48	1.26
4881.00	0.44	205.46	4839.88	237.52 S	446.16 W	-237.52	2.59
4976.00	0.70	128.51	4934.87	238.21 S	445.86 W	-238.21	0.78
5071.00	0.43	350.13	5029.87	238.22 S	445.47 W	-238.22	1.12
5166.00	0.34	330.78	5124.87	237.63 S	445.67 W	-237.63	0.17
5261.00	0.64	334.55	5219.86	236.90 S	446.03 W	-236.90	0.32
5356.00	0.95	313.16	5314.85	235.88 S	446.84 W	-235.88	0.45
5451.00	0.98	294.53	5409.84	235.01 S	448.15 W	-235.01	0.33
5546.00	0.81	271.16	5504.83	234.66 S	449.56 W	-234.66	0.42
5640.00	0.84	268.02	5598.82	234.67 S	450.91 W	-234.67	0.06
5830.00	0.29	288.91	5788.81	234.56 S	452.76 W	-234.56	0.30
6021.00	0.47	258.02	5979.81	234.57 S	453.98 W	-234.57	0.14
6116.00	1.16	252.25	6074.80	234.94 S	455.28 W	-234.94	0.73
6211.00	1.05	271.04	6169.78	235.22 S	457.07 W	-235.22	0.40
6306.00	1.15	258.88	6264.76	235.39 S	458.87 W	-235.39	0.27
6401.00	0.83	258.52	6359.75	235.71 S	460.48 W	-235.71	0.34
6496.00	1.87	239.36	6454.72	236.63 S	462.49 W	-236.63	1.18
6591.00	1.37	234.16	6549.68	238.09 S	464.75 W	-238.09	0.55
6687.00	1.38	265.39	6645.66	238.85 S	466.83 W	-238.85	0.77
6782.00	2.01	263.21	6740.61	239.14 S	469.62 W	-239.14	0.67
6830.00	2.01	292.31	6788.58	238.92 S	471.24 W	-238.92	2.10
6877.00	2.78	326.59	6835.55	237.66 S	472.63 W	-237.66	3.39
6925.00	4.37	349.70	6883.45	234.89 S	473.60 W	-234.89	4.41
6972.00	6.91	3.01	6930.22	230.30 S	473.77 W	-230.30	6.04
7025.00	12.58	17.17	6982.44	221.59 S	471.89 W	-221.59	11.54
7067.00	18.56	16.11	7022.89	210.79 S	468.69 W	-210.79	14.25
7115.00	24.49	18.18	7067.52	193.98 S	463.46 W	-193.98	12.45
7162.00	30.09	11.10	7109.28	173.15 S	458.14 W	-173.15	13.75
7210.00	35.62	6.70	7149.59	147.43 S	454.19 W	-147.43	12.54
7257.00	41.03	5.21	7186.45	118.45 S	451.19 W	-118.45	11.68
7305.00	47.48	2.35	7220.82	85.05 S	449.04 W	-85.05	14.06
7352.00	53.23	0.69	7250.79	48.89 S	448.10 W	-48.89	12.53
7400.00	58.94	0.31	7277.56	9.08 S	447.75 W	-9.08	11.91
7448.00	64.72	359.21	7300.22	33.22 N	447.94 W	33.22	12.21
7496.00	69.91	359.72	7318.72	77.49 N	448.35 W	77.49	10.86
7543.00	72.38	359.73	7333.91	121.96 N	448.57 W	121.96	5.26
7591.00	75.64	0.01	7347.13	168.10 N	448.67 W	168.10	6.81
7638.00	77.90	1.17	7357.89	213.85 N	448.20 W	213.85	5.38
7686.00	84.48	1.39	7365.23	261.24 N	447.14 W	261.24	13.72
7708.00	88.00	2.22	7366.68	283.18 N	446.44 W	283.18	16.44
7777.00	89.72	1.95	7368.05	352.12 N	443.93 W	352.12	2.52
7872.00	89.51	0.95	7368.69	447.08 N	441.53 W	447.08	1.08
7967.00	89.38	0.25	7369.61	542.07 N	440.54 W	542.07	0.75
8062.00	89.01	359.78	7370.94	637.06 N	440.51 W	637.06	0.63
8157.00	90.22	359.09	7371.58	732.05 N	441.45 W	732.05	1.47
8252.00	90.18	359.00	7371.25	827.04 N	443.03 W	827.04	0.10
8348.00	90.18	358.57	7370.95	923.02 N	445.07 W	923.02	0.45
8443.00	89.97	358.99	7370.82	1018.00 N	447.09 W	1018.00	0.49

8538.00	89.91	359.22	7370.92	1112.99 N	448.57 W	1112.99	0.25
8633.00	89.72	358.83	7371.23	1207.97 N	450.19 W	1207.97	0.46
8728.00	90.92	358.37	7370.70	1302.94 N	452.51 W	1302.94	1.35
8823.00	92.07	0.68	7368.22	1397.90 N	453.30 W	1397.90	2.72
8918.00	92.07	0.19	7364.79	1492.83 N	452.58 W	1492.83	0.52
9013.00	90.89	0.73	7362.34	1587.79 N	451.82 W	1587.79	1.37
9109.00	90.59	0.11	7361.10	1683.78 N	451.11 W	1683.78	0.72
9204.00	89.75	0.14	7360.82	1778.78 N	450.90 W	1778.78	0.88
9299.00	89.23	359.31	7361.66	1873.77 N	451.36 W	1873.77	1.04
9394.00	88.70	0.03	7363.37	1968.76 N	451.90 W	1968.76	0.94
9489.00	89.72	359.50	7364.68	2063.75 N	452.29 W	2063.75	1.21
9584.00	89.60	359.43	7365.24	2158.74 N	453.18 W	2158.74	0.15
9680.00	88.95	358.61	7366.45	2254.72 N	454.82 W	2254.72	1.09
9775.00	89.41	359.23	7367.81	2349.69 N	456.61 W	2349.69	0.81
9870.00	91.26	0.29	7367.25	2444.68 N	457.01 W	2444.68	2.25
9965.00	91.17	359.68	7365.23	2539.66 N	457.03 W	2539.66	0.66
10060.00	90.92	359.47	7363.49	2634.64 N	457.74 W	2634.64	0.34
10155.00	90.68	359.12	7362.16	2729.62 N	458.91 W	2729.62	0.44
10250.00	91.73	0.01	7360.17	2824.60 N	459.63 W	2824.60	1.44
10346.00	90.46	1.04	7358.33	2920.57 N	458.75 W	2920.57	1.70
10441.00	88.95	1.37	7358.82	3015.55 N	456.74 W	3015.55	1.63
10536.00	88.77	1.47	7360.71	3110.50 N	454.39 W	3110.50	0.22
10631.00	88.49	1.06	7362.98	3205.45 N	452.29 W	3205.45	0.52
10726.00	89.94	0.41	7364.28	3300.43 N	451.07 W	3300.43	1.67
10821.00	90.46	359.86	7363.95	3395.43 N	450.85 W	3395.43	0.80
10917.00	90.43	359.89	7363.20	3491.42 N	451.06 W	3491.42	0.04
11012.00	90.25	358.90	7362.64	3586.42 N	452.07 W	3586.42	1.06
11107.00	89.94	358.35	7362.49	3681.39 N	454.35 W	3681.39	0.66
11202.00	89.54	357.68	7362.92	3776.33 N	457.64 W	3776.33	0.82
11297.00	90.65	0.02	7362.77	3871.30 N	459.55 W	3871.30	2.72
11392.00	90.31	0.46	7361.97	3966.30 N	459.15 W	3966.30	0.59
11487.00	89.32	358.74	7362.28	4061.29 N	459.81 W	4061.29	2.08
11582.00	89.11	358.20	7363.58	4156.25 N	462.35 W	4156.25	0.62
11677.00	90.65	0.55	7363.79	4251.23 N	463.39 W	4251.23	2.96
11772.00	91.33	1.51	7362.15	4346.20 N	461.68 W	4346.20	1.24
11867.00	91.02	1.31	7360.21	4441.15 N	459.35 W	4441.15	0.39
11962.00	90.34	2.43	7359.09	4536.09 N	456.25 W	4536.09	1.38
12057.00	90.37	2.86	7358.50	4630.99 N	451.86 W	4630.99	0.45
12152.00	89.51	2.55	7358.60	4725.88 N	447.37 W	4725.88	0.97
12247.00	89.20	1.57	7359.68	4820.81 N	443.96 W	4820.81	1.08
12338.00	88.98	0.94	7361.12	4911.78 N	441.96 W	4911.78	0.73
12383.00	88.98	0.94	7361.92	4956.77 N	441.22 W	4956.77	0.01

CALCULATION BASED ON MINIMUM CURVATURE METHOD

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

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 0.00 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.51 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12383.00 FEET
IS 4976.36 FEET ALONG 354.91 DEGREES (TRUE)**

All directional surveys tied on to the last gyro survey at 1113' MD. Final survey is a straight-line projection to the bit.