

1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300	400	
Date run completed	02-Oct-13	23-Oct-13	23-Oct-13	27-Oct-13	
Rig Bit Number	0100	0200	0300	0400	
Bit Size (in)	13.500	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.450	6.450	4.750	
Log Start Depth (MD, ft)	13.00	895.00	7,121.00	7,669.00	
Log End Depth (MD, ft)	895.00	7,121.00	7,669.00	11,913.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	01-Oct-13 19:30	21-Oct-13 13:00	23-Oct-13 11:40	25-Oct-13 06:47	
Drill/Wipe End Date and Time	28-Oct-13 03:30	22-Oct-13 20:00	23-Oct-13 21:58	27-Oct-13 05:51	
Min Inc (deg) @ Depth (MD, ft)	.24 @ 721.00	.36 @ 1,065.00	31.22 @ 7,122.00	88.43 @ 10,101.00	
Max Inc (deg) @ Depth (MD, ft)	.44 @ 440.00	25.29 @ 7,075.00	89.63 @ 7,626.00	92.87 @ 7,818.00	
Bit TFA(in2) / Bit Type	1.49 / PDC	.97 / PDC	.97 / PDC	.98 / PDC	
Flow Rate (gpm)	469.67	578.89	525.00	279.94	
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	Fresh Water Gel	Fresh Water Gel	Native/Spud Mud	
Density (ppg) / Viscosity (spqt)	8.50 / 46.00	10.10 / 42.00	10.10 / 42.00	9.53 / 41.00	
Filtrate CL (ppm)	350.00	100.00	100.00	1,200.00	
pH / Fluid Loss (mptm)	9.00 / 9	9.00 / 5	9.00 / 5	9.00 / 7	
PV (cP) / YP (lbf2)	7 / 15.00	14 / 10.00	14 / 10.00	14 / 15.00	
% Solids / % Sand	1.2 / 0.25	8.30 / 0.50	8.30 / 0.50	6.2 / 1.50	
% 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 (deg F) @	224.12 / PDCM	122.22 / PDCM	177.31 / PDCM	224.12 / PDCM	

Max Tool Temp (degF) / Source	96.42 / PCM	162.80 / PCM	177.64 / PCM	231.42 / 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	Patrick Megee	Patrick Megee	Matt Busche	
Customer Representative	Mike Bradshaw	Sam Taylor	Sam Taylor	Jim Baker	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	11331933	11342274	11342274	12134683	
Insert Serial Number	11400938	11145513	11400995	11400995	
Date and Time Initialized	28-Sep-13 22:38	21-Oct-13 08:16	23-Oct-13 04:09	24-Oct-13 20:26	
Date and Time Read	04-Oct-13 18:09	23-Oct-13 05:24	24-Oct-13 03:49	27-Oct-13 21:13	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	53.08	46.00	43.00	44.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11331933	11342274	11342274	12134683	
Sonde Serial Number	11638568	11638521	11062040	11062040	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	291.32	352.83	120.00	307.71	

Gamma Ray Sensor Information

Tool Type		PCG	PCG	PCG	
Distance From Bit (ft)		49.13	45.91	46.99	
Recorded Sample Period (sec)		10	10	10	
Software Version		8.15	8.15	8.15	
Sub Serial Number		11342274	11342274	12134683	
Insert/Sonde Serial Number		11680918	12037426	12037426	

REMARKS

1. All depths are measured depth, 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 projection to the bit.
5. Due to tool stalling/resetting, there was a loss of detection here.
6. 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

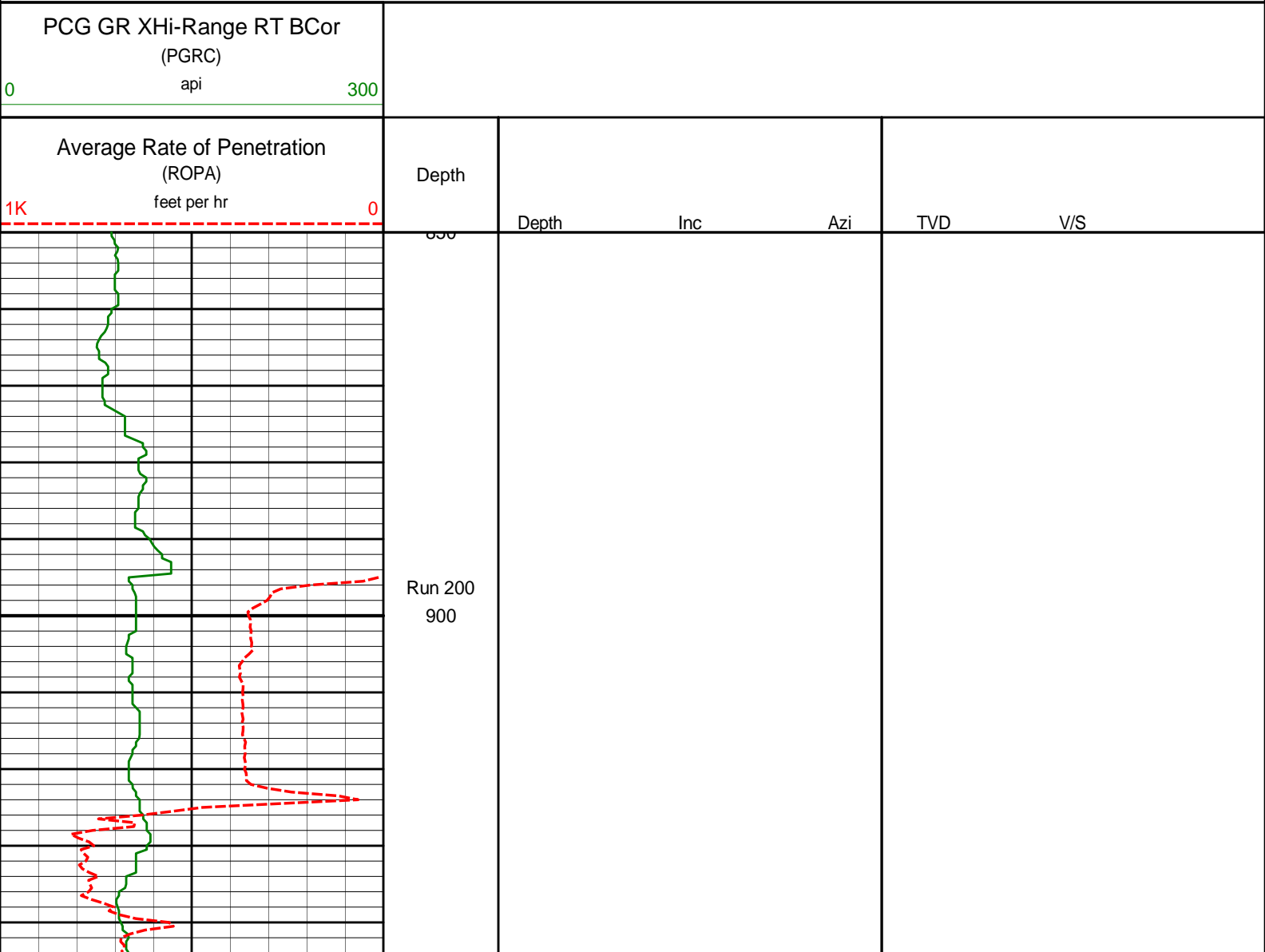
Insite version: 7.4.20

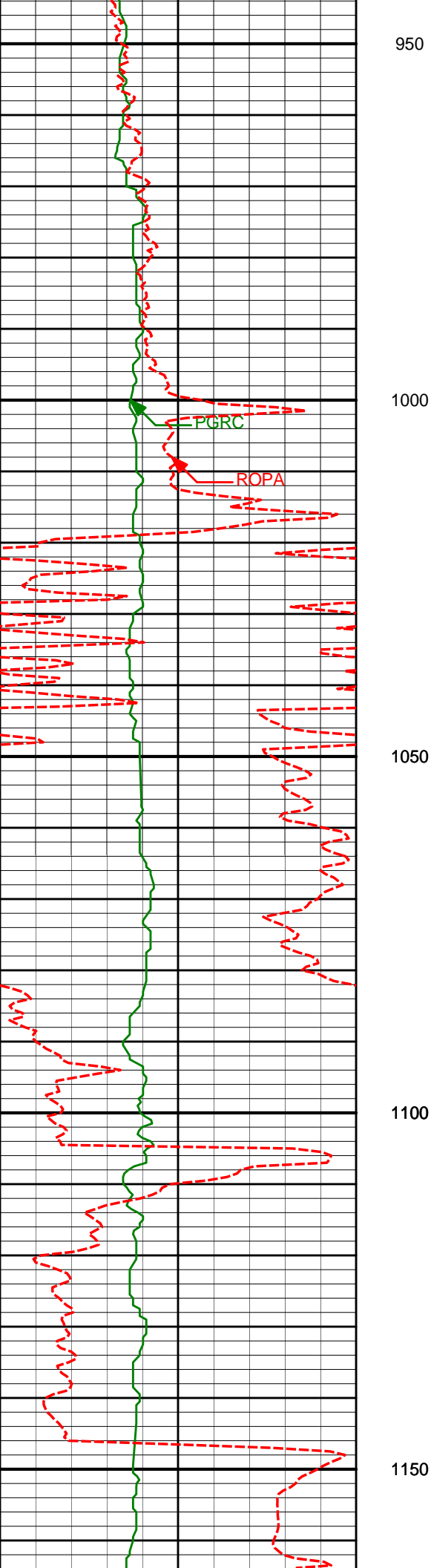
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MD Main Log 1:240





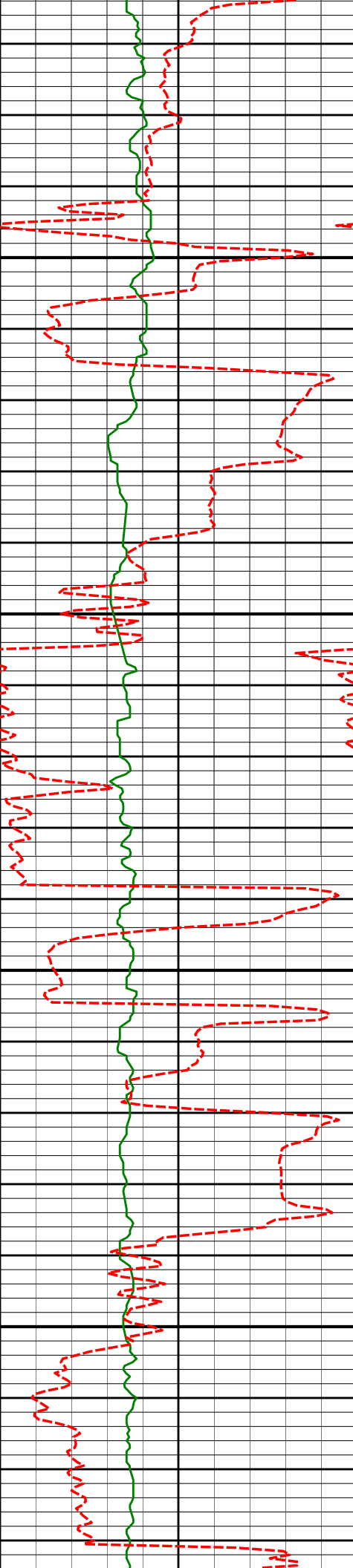
1065'

0.36°

210.63°

1064.98'

-0.83'



1200

1250

1300

1350

1249'

5.36°

270.53°

1248.70'

-1.10'

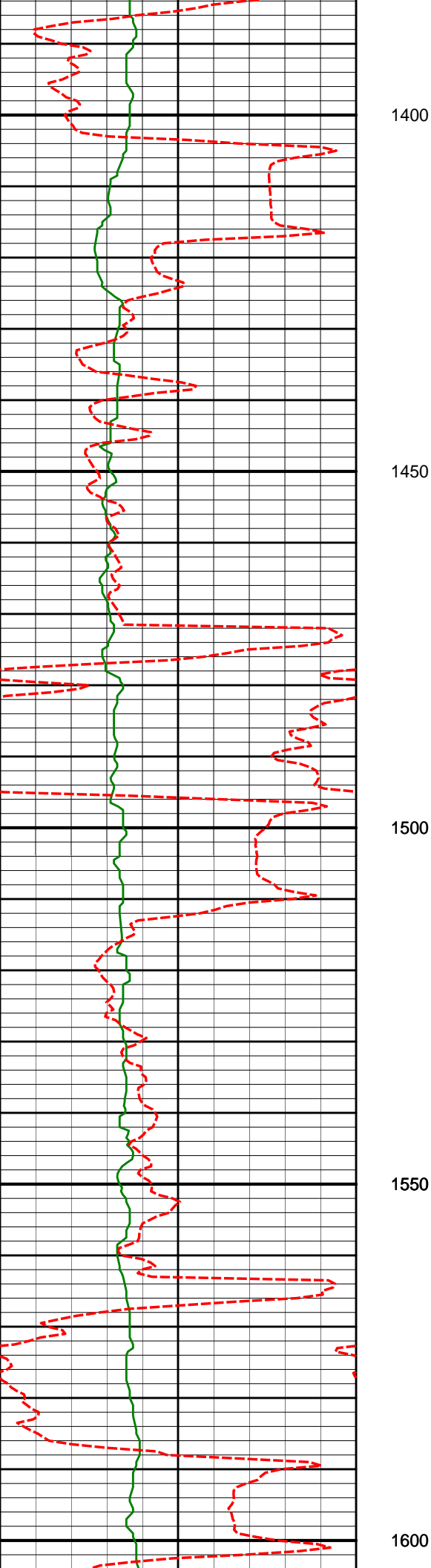
1340'

7.74°

270.42°

1339.10'

-0.84'



1432'

9.53°

266.82°

1430.06'

-0.98'

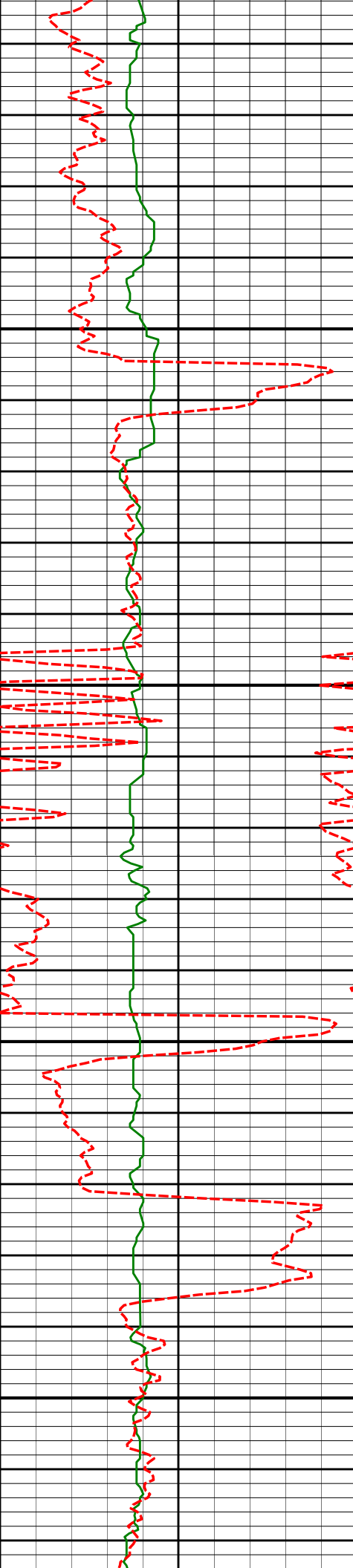
1524'

12.21°

266.92°

1520.40'

-1.63'



1650

1700

1750

1800

1616'

13.97°

262.99°

1610.01'

-3.15'

1708'

13.74°

260.07°

1699.33'

-6.02'

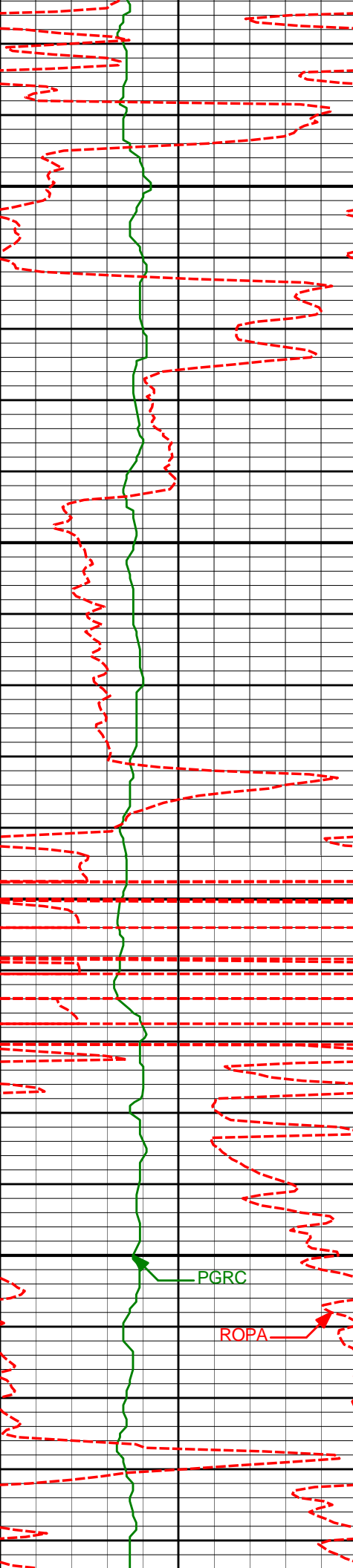
1799'

14.92°

260.95°

1787.50'

-9.34'



1850

1900

1950

2000

PGRC

ROPA

1890'

15.09°

267.08°

1875.40'

-11.39'

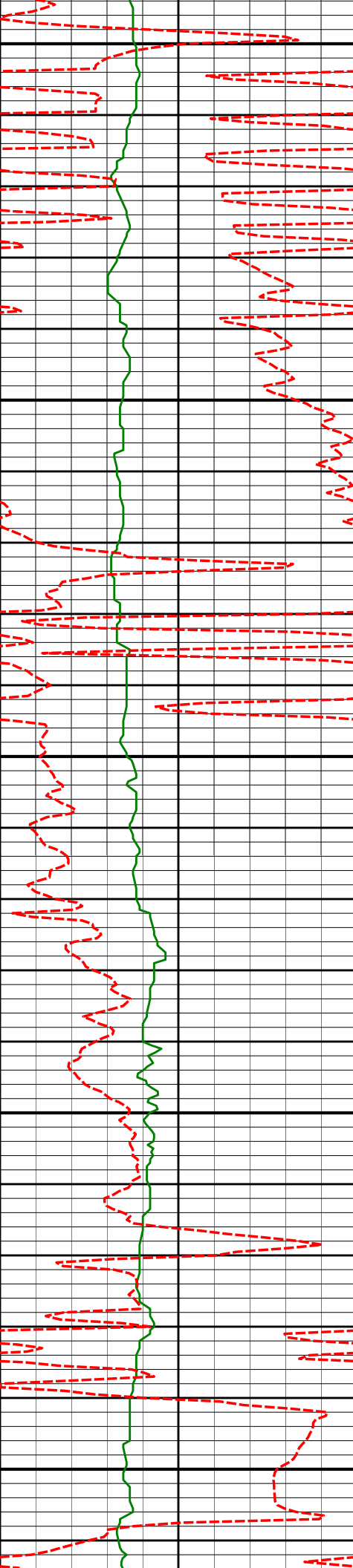
1985'

14.93°

266.71°

1967.16'

-12.30'



2050

2100

2150

2200

2250

2081'

14.29°

263.36°

2060.06'

-13.96'

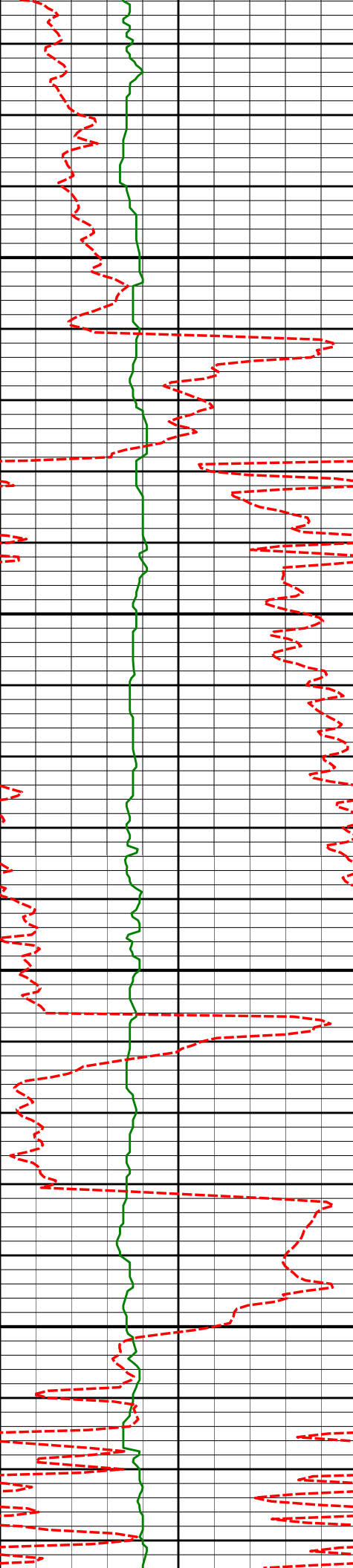
2176'

12.83°

261.80°

2152.41'

-16.45'



2300

2350

2400

2450

2271'

13.51°

271.35°

2244.92'

-17.32'

2366'

12.87°

271.87°

2337.42'

-16.34'

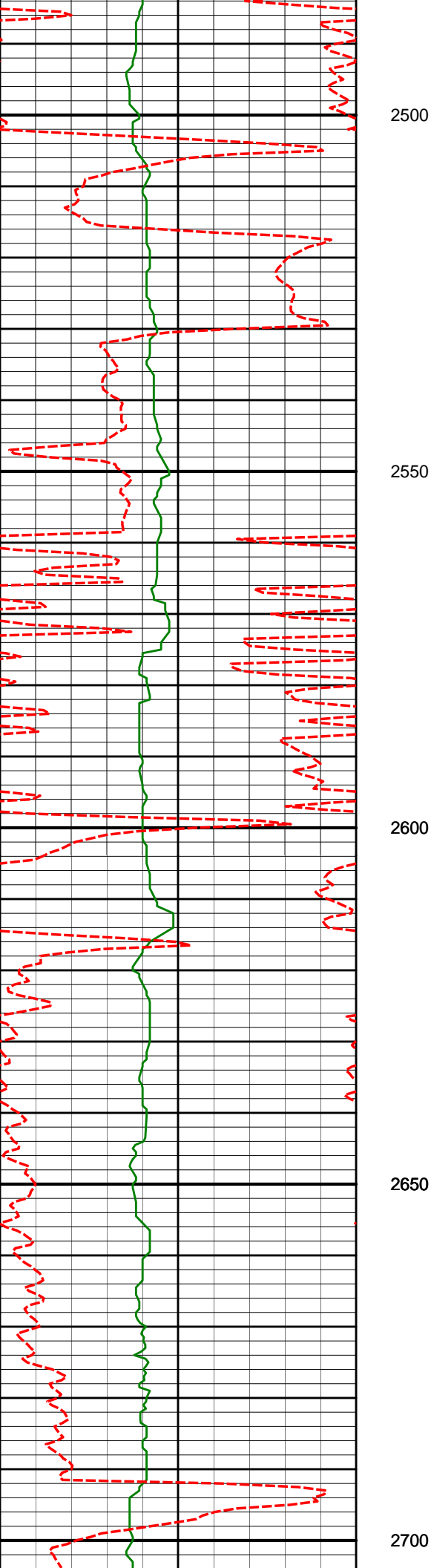
2461'

13.20°

273.00°

2429.97'

-15.06'



2500

2550

2600

2650

2700

2556'

14.23°

276.76°

2522.26'

-12.74'

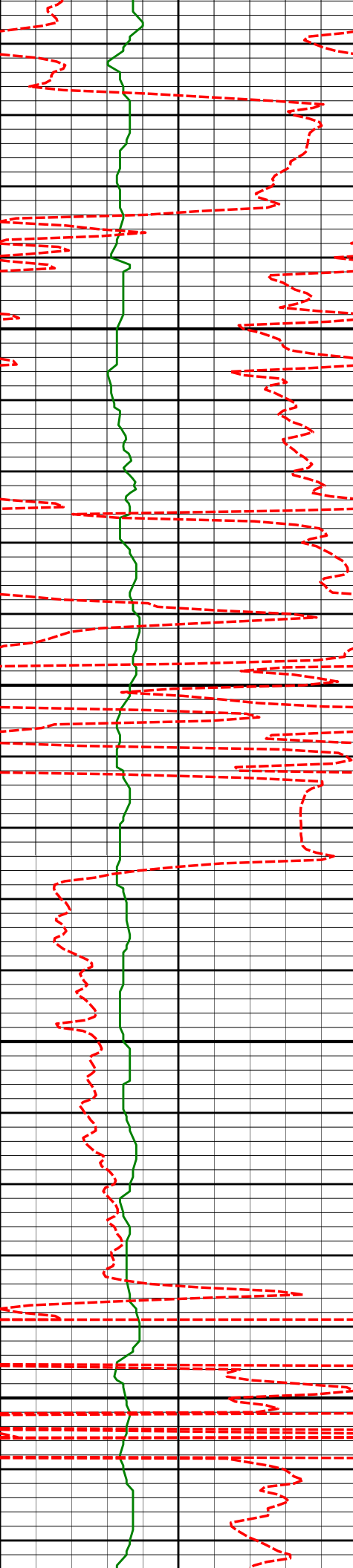
2651'

12.37°

274.67°

2614.71'

-10.16'



2750

2800

2850

2900

2746'

13.51°

271.48°

2707.30'

-8.68'

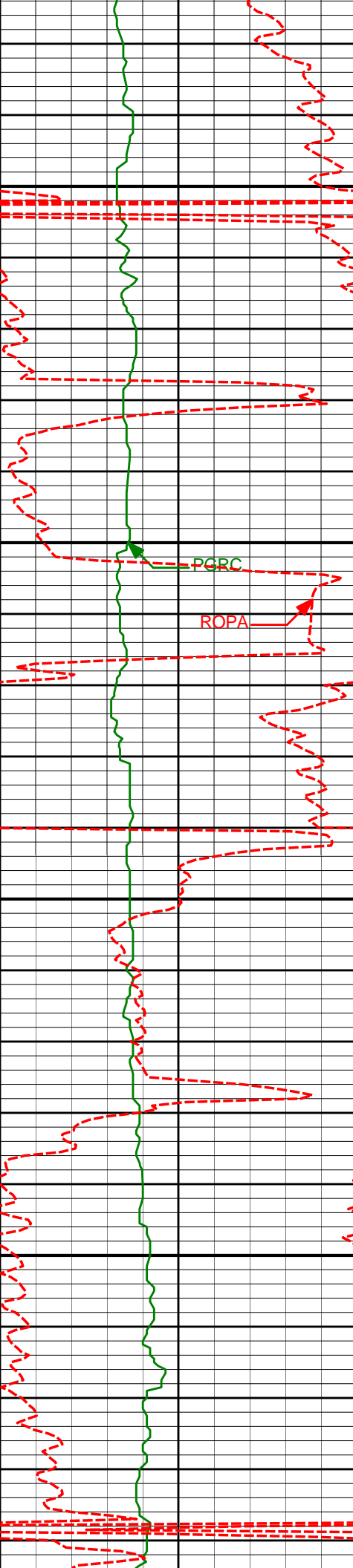
2842'

14.49°

271.25°

2800.44'

-7.73'



2937'

13.65°

270.09°

2892.59'

-7.06'

2950

3000

PCRC

ROPA

3032'

14.09°

267.56°

2984.82'

-7.15'

3050

3100

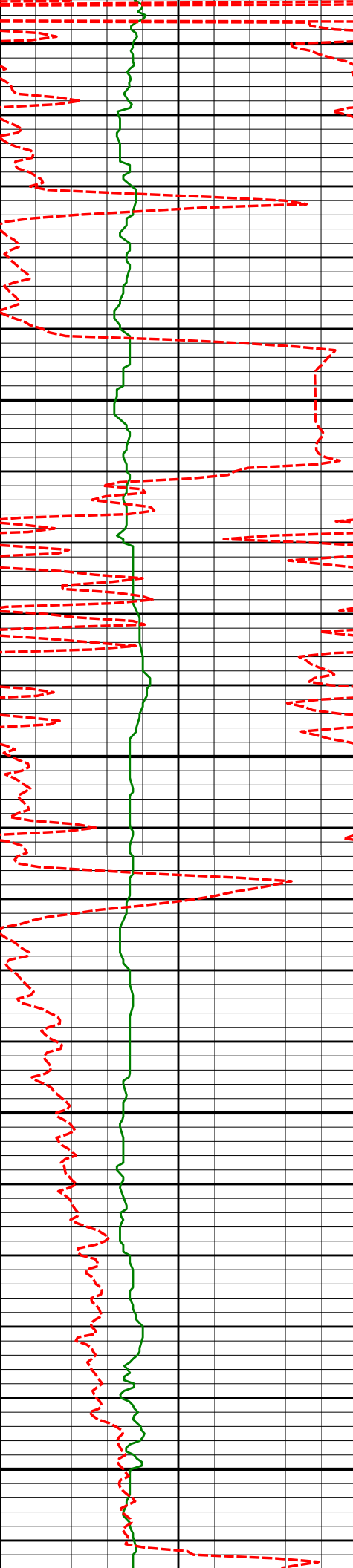
3127'

12.92°

266.13°

3077.20'

-7.98'



3150

3200

3250

3300

3350

3222'

14.53°

266.76°

3169.48'

-8.98'

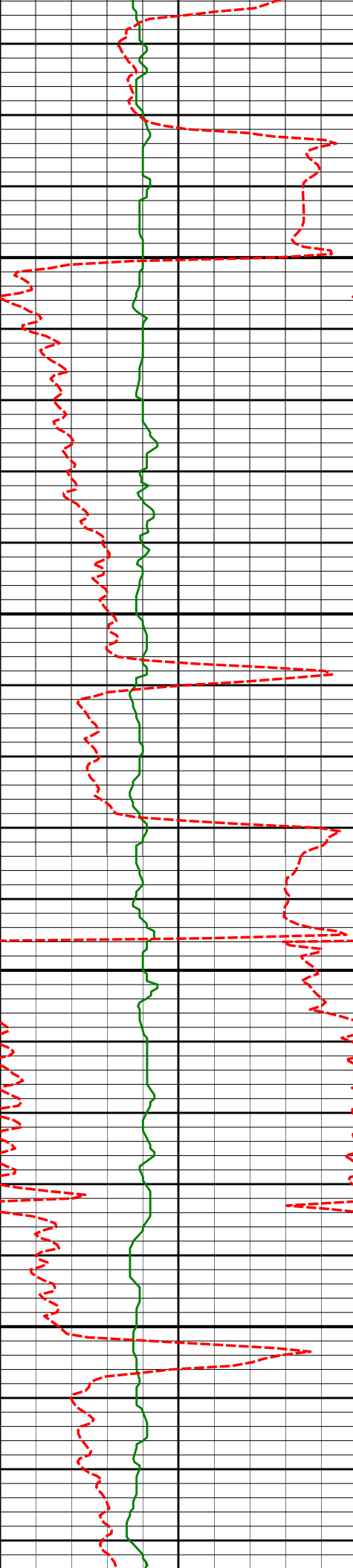
3317'

12.75°

268.10°

3261.80'

-9.62'



3400

3413'

13.13°

265.41°

3355.36'

-10.48'

3450

3500

3508'

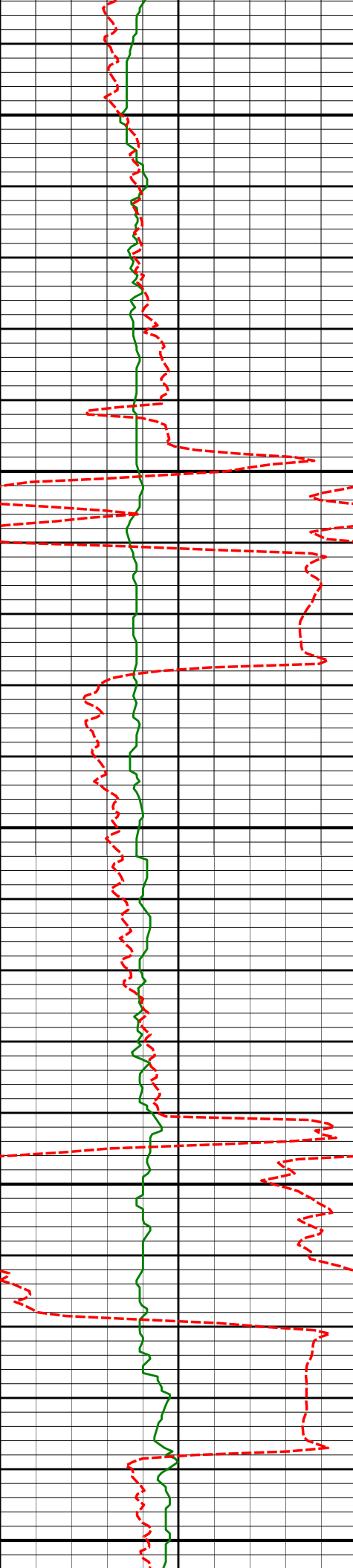
13.84°

263.94°

3447.74'

-12.17'

3550



3600

3603'

12.29°

265.14°

3540.28'

-13.86'

3650

3700

3698'

12.55°

268.38°

3633.06'

-14.66'

3750

3800

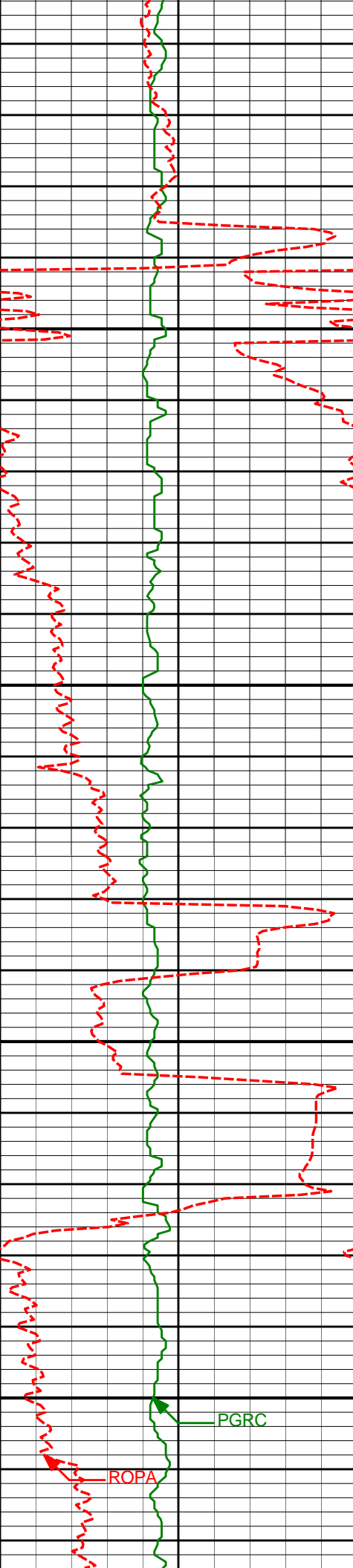
3793'

13.71°

264.77°

3725.58'

-15.61'



3850

3900

3950

4000

3888'

12.43°

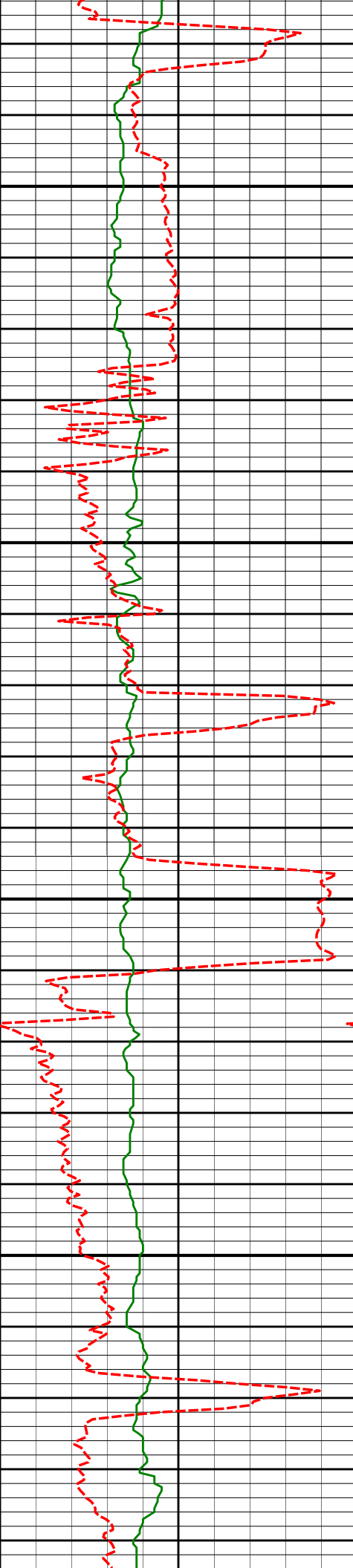
264.12°

3818.11'

-17.32'

PGRC

ROPA



4050

4100

4150

4200

4078'

12.99°

266.80°

4003.46'

-19.89'

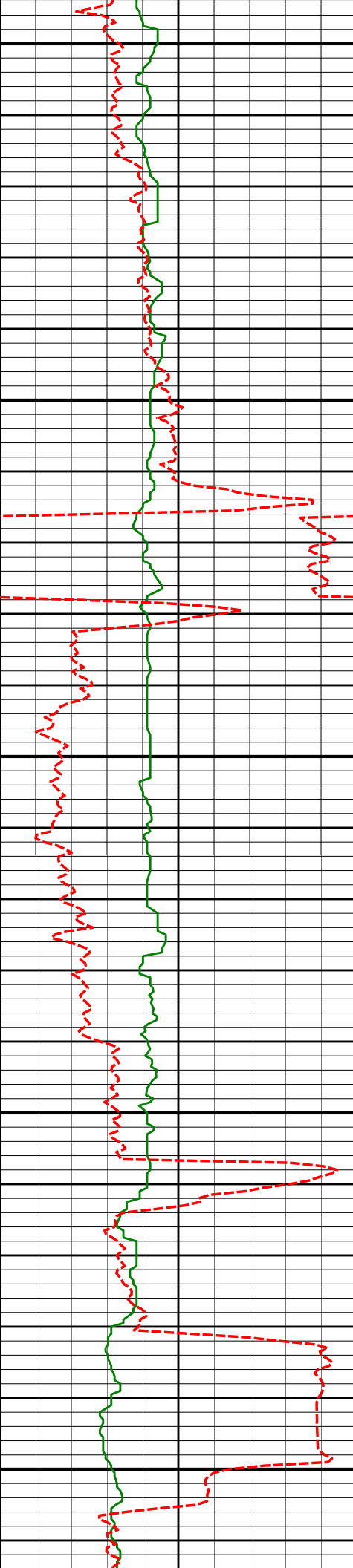
4174'

14.74°

264.01°

4096.66'

-21.37'



4250

4269'

13.73°

263.85°

4188.74'

-23.44'

4300

4350

4364'

11.61°

263.31°

4281.43'

-25.41'

4400

4450

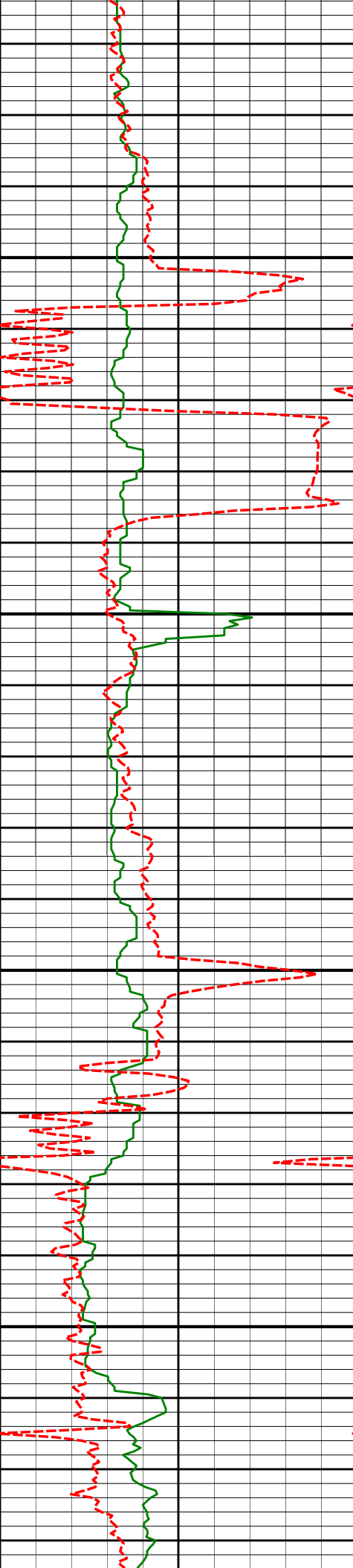
4459'

12.40°

261.63°

4374.35'

-27.68'



4500

4550

4600

4650

4554'

13.34°

261.07°

4466.96'

-30.50'

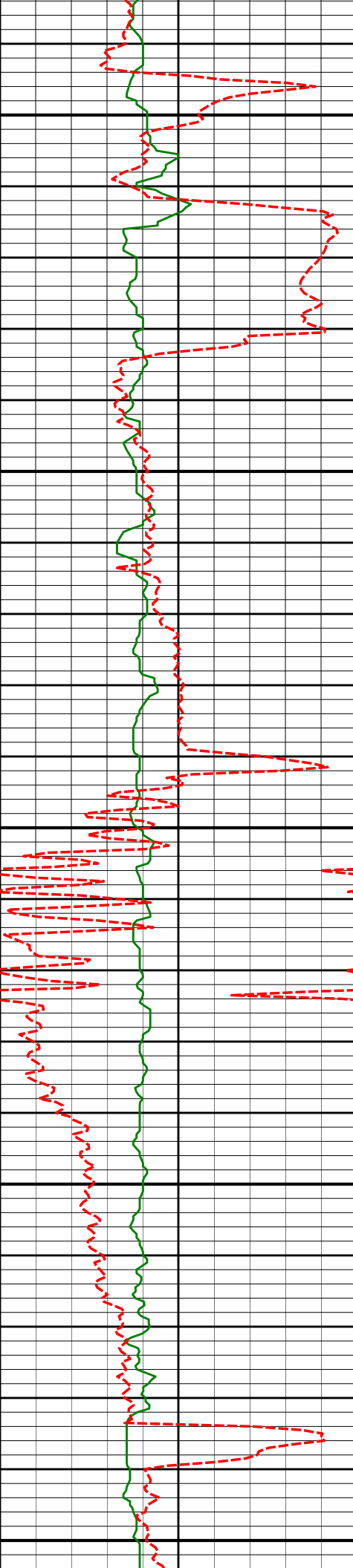
4649'

12.11°

261.22°

4559.62'

-33.37'



4700

4750

4800

4850

4900

4745'

14.07°

264.01°

4653.12'

-35.76'

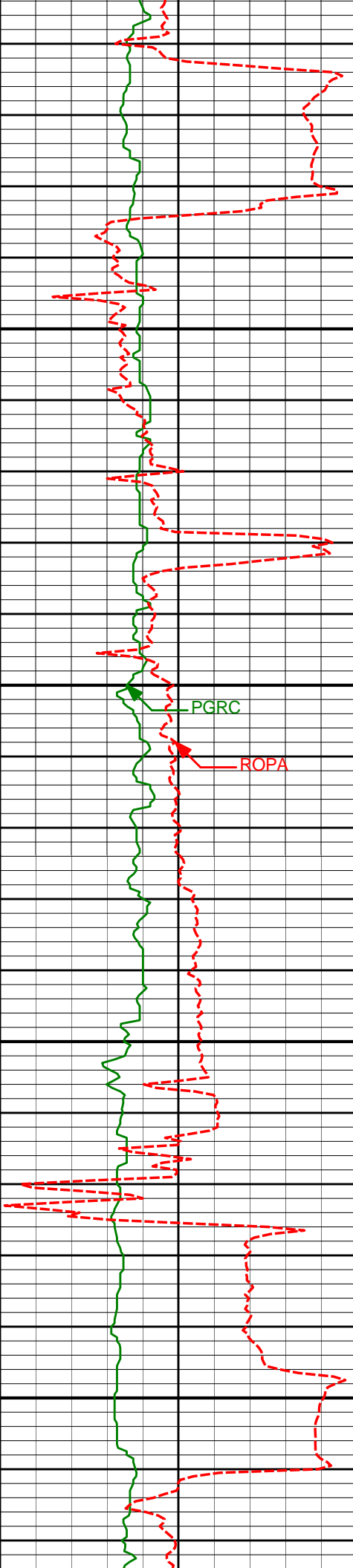
4840'

13.31°

263.20°

4745.42'

-37.88'



4950

5000

5050

5100

4935'

14.31°

265.08°

4837.68'

-39.79'

5030'

13.46°

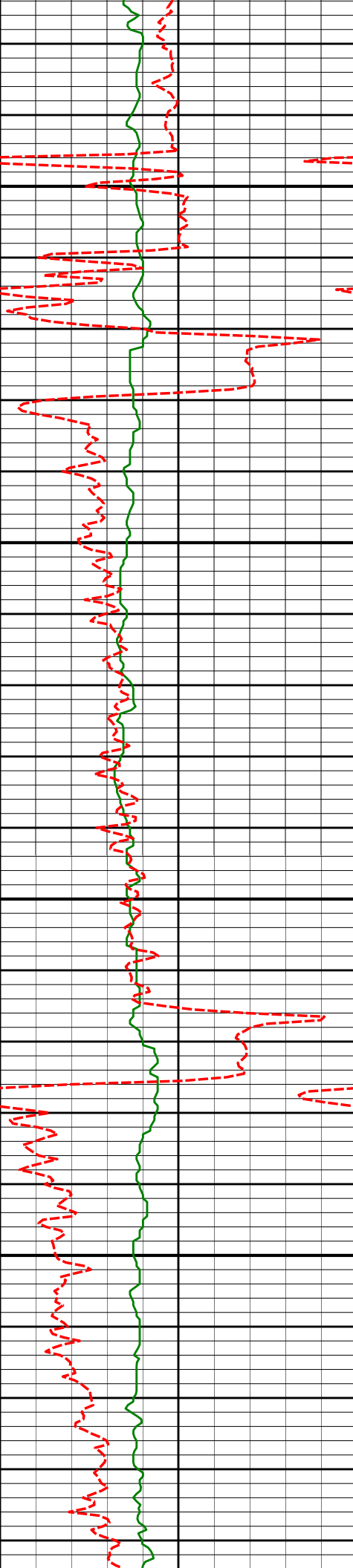
266.40°

4929.90'

-41.10'

PGRC

ROPA



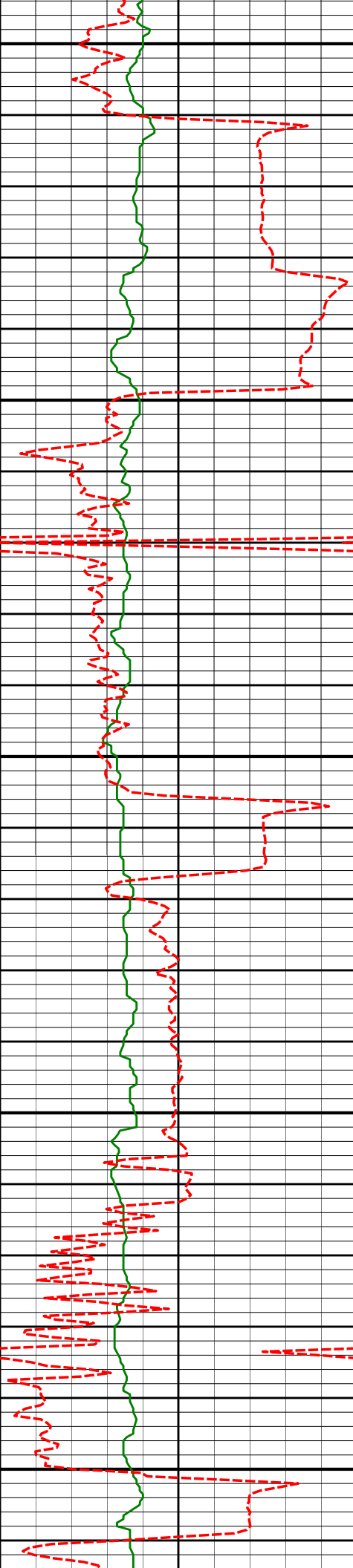
5150

5200

5250

5300

5125'	15.47°	264.04°	5021.88'	-42.71'
5220'	14.03°	264.30°	5113.75'	-44.76'
5315'	12.16°	262.93°	5206.27'	-46.77'



5350

5400

5450

5500

5550

5411'

13.66°

264.36°

5299.85'

-48.76'

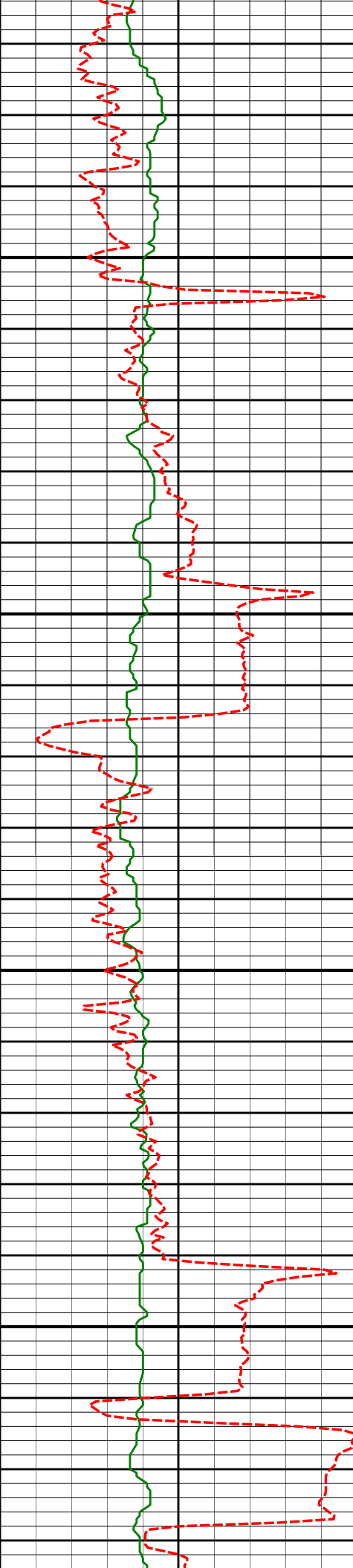
5506'

12.72°

263.80°

5392.34'

-50.62'



5600

5601'

10.72°

263.55°

5485.35'

-52.42'

5650

5700

5696'

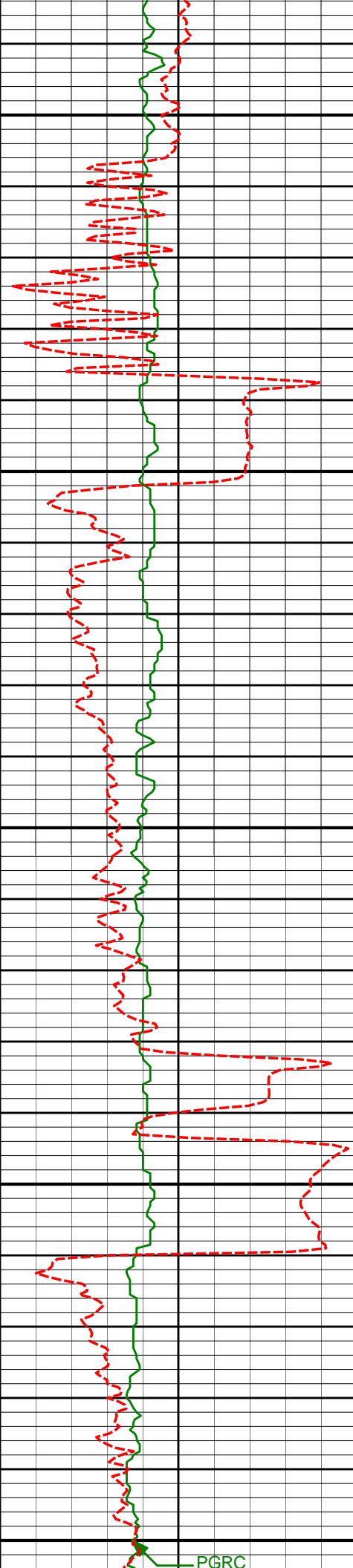
9.10°

263.09°

5578.93'

-54.04'

5750



5800

5850

5900

5950

6000

5791'

9.23°

266.72°

5672.72'

-55.12'

5886'

8.28°

258.81°

5766.61'

-56.63'

5982'

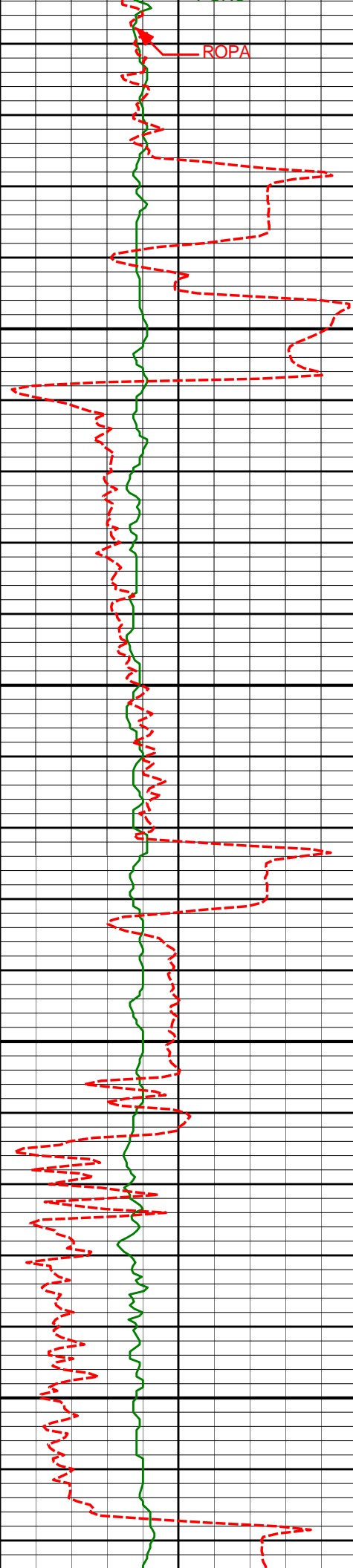
8.90°

266.68°

5861.54'

-58.16'

PGRC



6050

6100

6150

6200

6077'

8.47°

274.30°

5955.45'

-57.82'

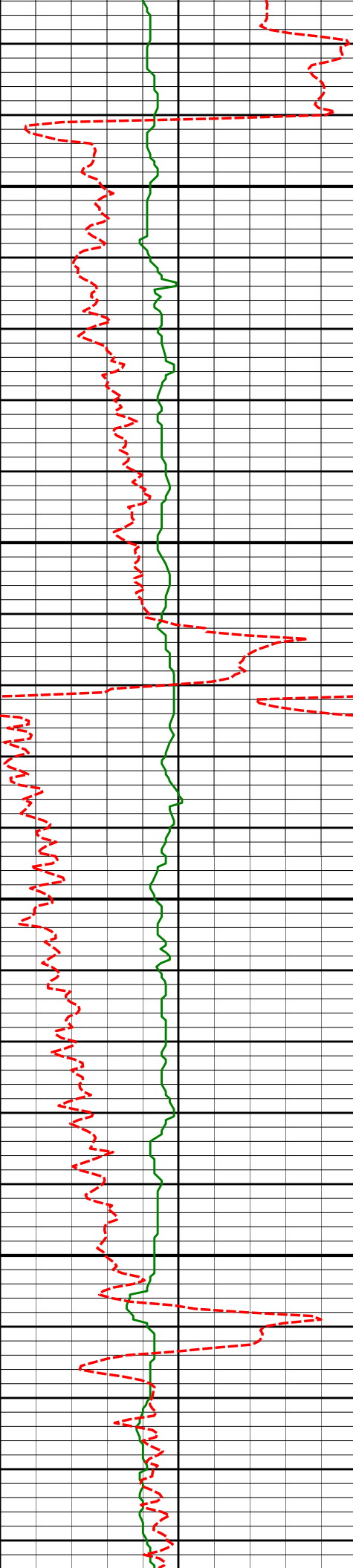
6172'

6.66°

270.63°

6049.62'

-57.02'



6250

6267'

4.40°

267.28°

6144.18'

-56.98'

6300

6350

6362'

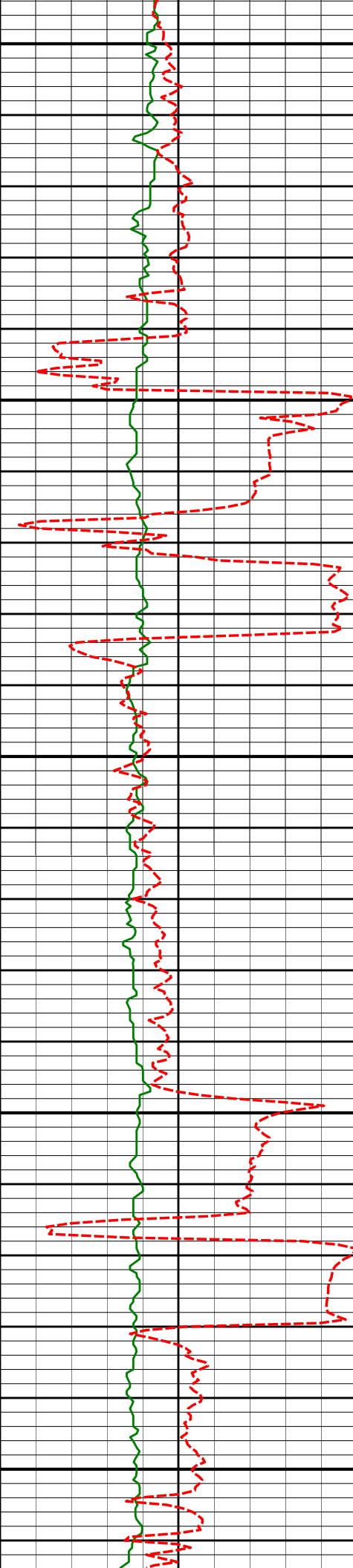
3.55°

262.04°

6238.95'

-57.44'

6400



6450

6457'

2.80°

262.54°

6333.80'

-58.06'

6500

6550

6552'

1.98°

249.27°

6428.72'

-58.88'

6600

6650

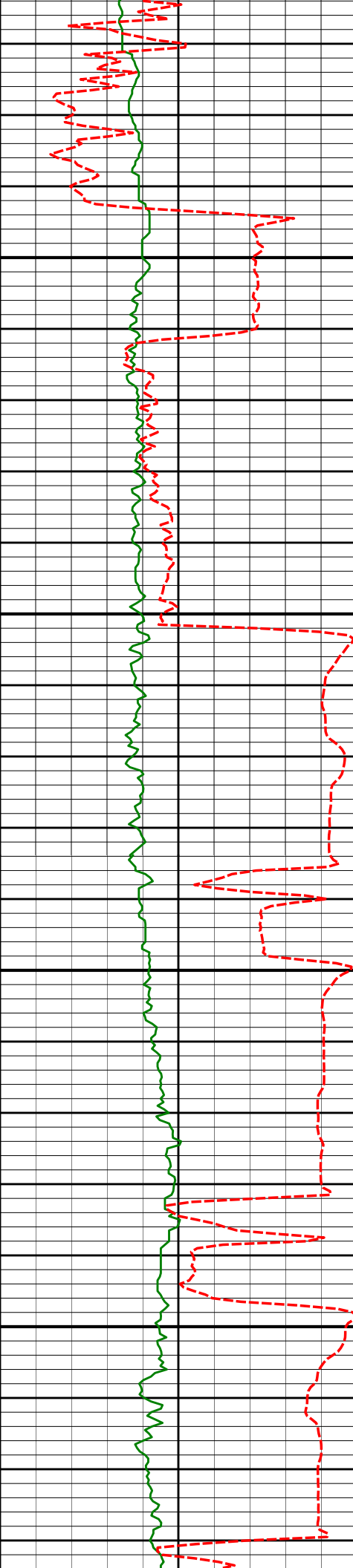
6647'

0.57°

185.79°

6523.69'

-59.91'



6700

6742'

0.54°

192.73°

6618.69'

-60.81'

6750

6790'

2.57°

14.41°

6666.68'

-59.99'

6800

6837'

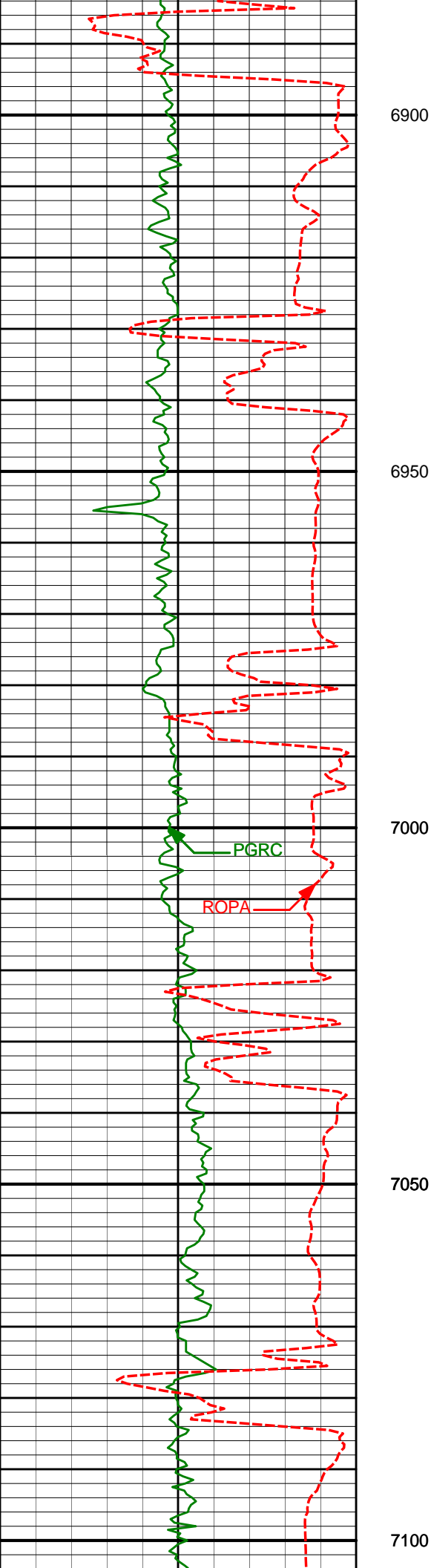
7.15°

10.43°

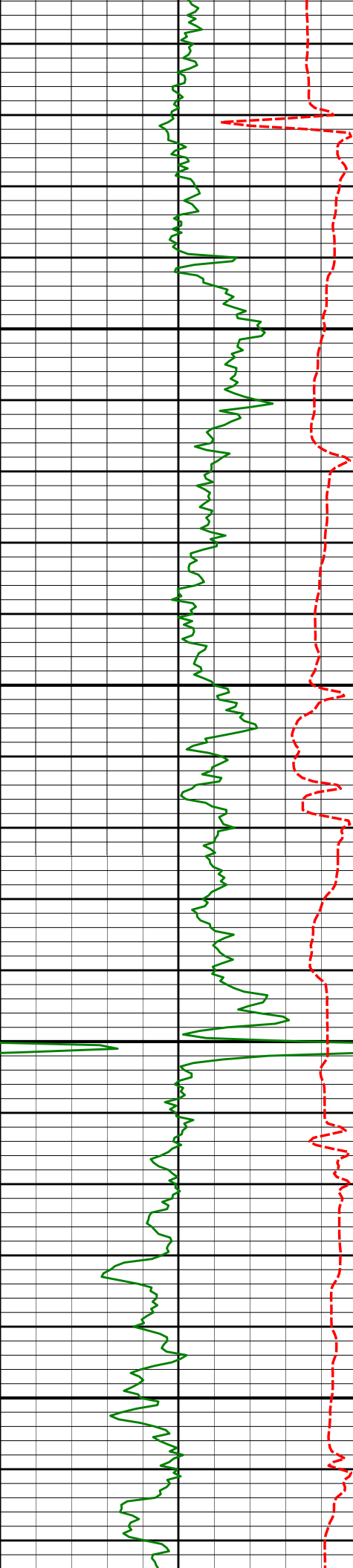
6713.49'

-56.11'

6850



6885'	10.87°	15.15°	6760.90'	-48.83'
6932'	14.28°	18.96°	6806.76'	-39.12'
6980'	19.09°	14.04°	6852.73'	-25.97'
7027'	21.85°	12.91°	6896.76'	-10.05'
7075'	25.29°	6.66°	6940.75'	8.79'



Run 300

7122'

31.22°

359.99°

6982.14'

30.95'

7150

7170'

37.85°

0.01°

7021.66'

58.14'

7200

7217'

42.12°

358.53°

7057.67'

88.33'

7250

7265'

47.53°

355.70°

7091.70'

122.13'

7300

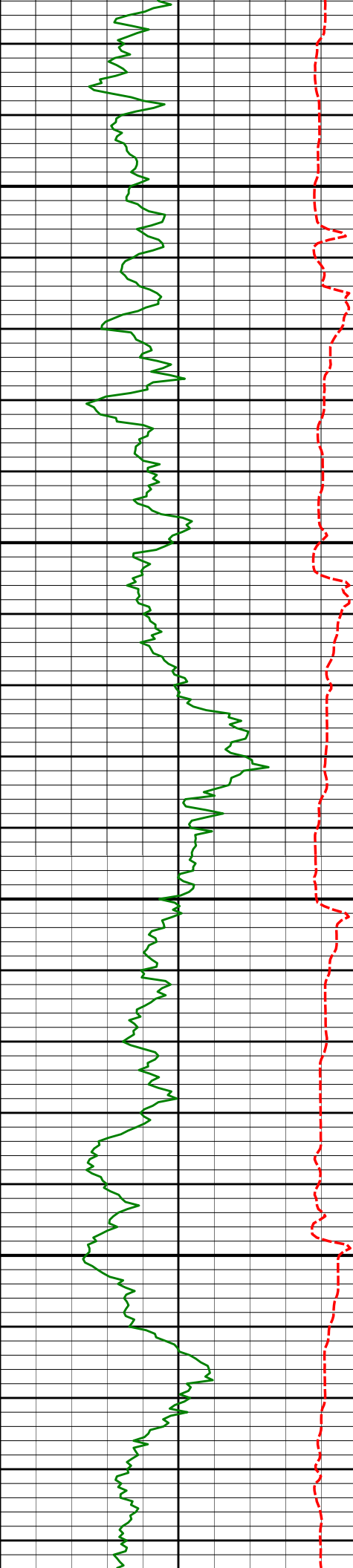
7312'

54.23°

354.00°

7121.34'

158.48'



7350

7360'

60.34°

353.05°

7147.27'

198.66'

7400

7407'

67.04°

354.85°

7168.09'

240.60'

7450

7455'

73.82°

357.04°

7184.16'

285.73'

7500

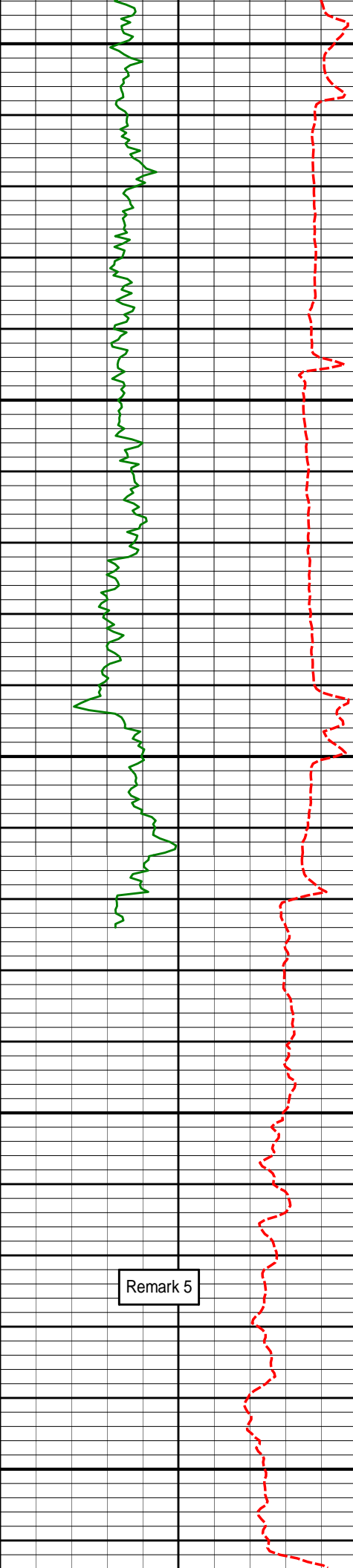
7503'

81.36°

358.49°

7194.47'

332.56'



7550

Run 300

7600

7650

Run 400

7700

Remark 5

7750

7551'

88.46°

359.99°

7198.72'

380.34'

7598'

88.92°

359.96°

7199.80'

427.32'

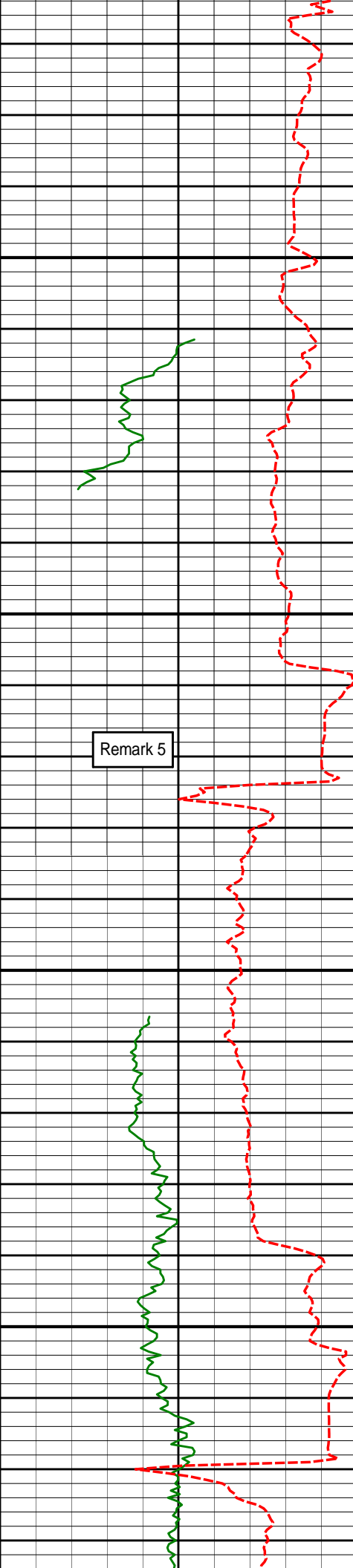
7626'

89.63°

359.82°

7200.15'

455.32'



7800

7818'

92.87°

358.36°

7195.96'

647.24'

7850

Remark 5

7900

7913'

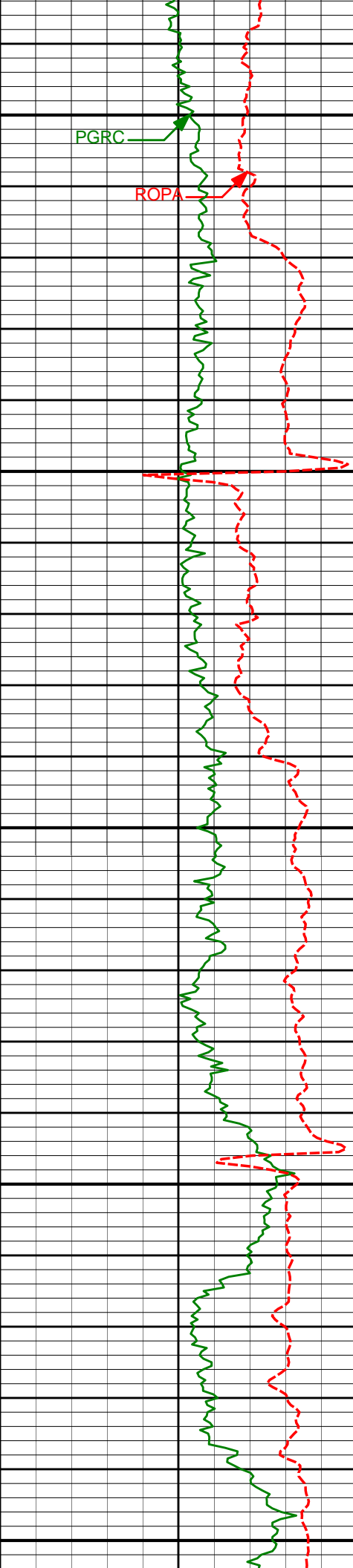
91.54°

357.96°

7192.31'

742.16'

7950



8000

PGRC

ROPA

8008'

90.09°

359.34°

7190.95'

837.14'

8050

8100

8103'

89.66°

359.07°

7191.16'

932.14'

8150

8200

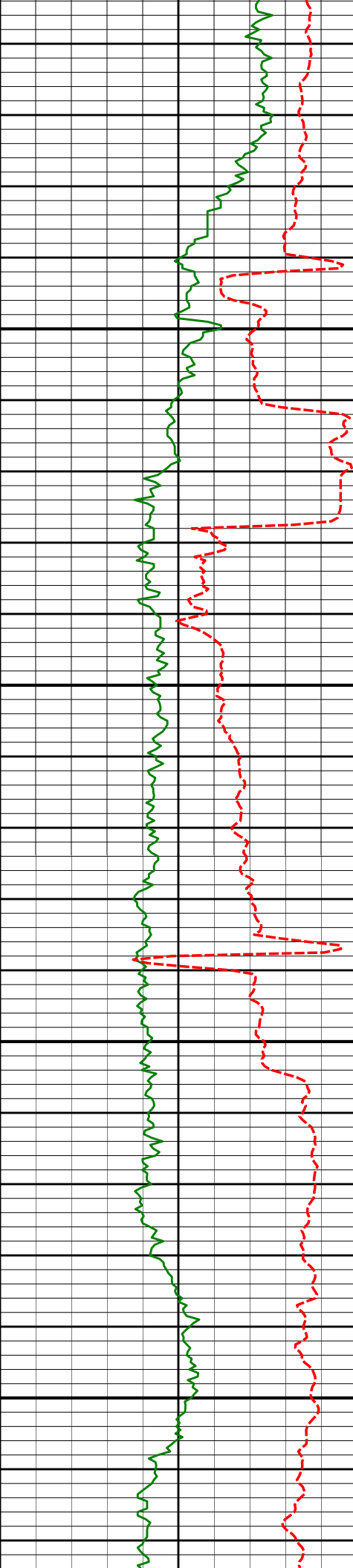
8198'

90.09°

358.63°

7191.36'

1027.14'



8250

8300

8350

8400

8294'

88.52°

358.55°

7192.52'

1123.13'

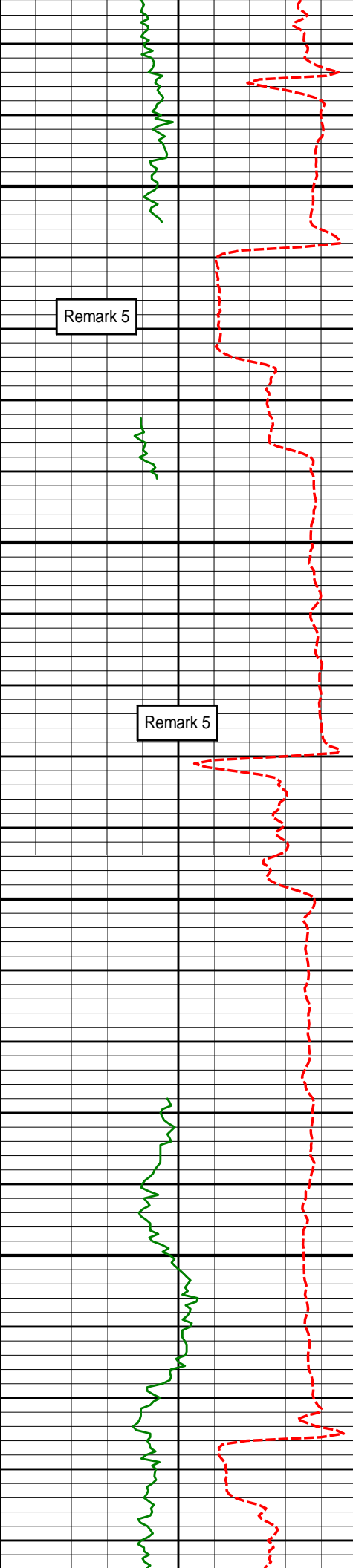
8389'

89.32°

358.35°

7194.31'

1218.11'



8450

Remark 5

8484'

89.29°

357.93°

7195.46'

1313.09'

8500

Remark 5

8550

8579'

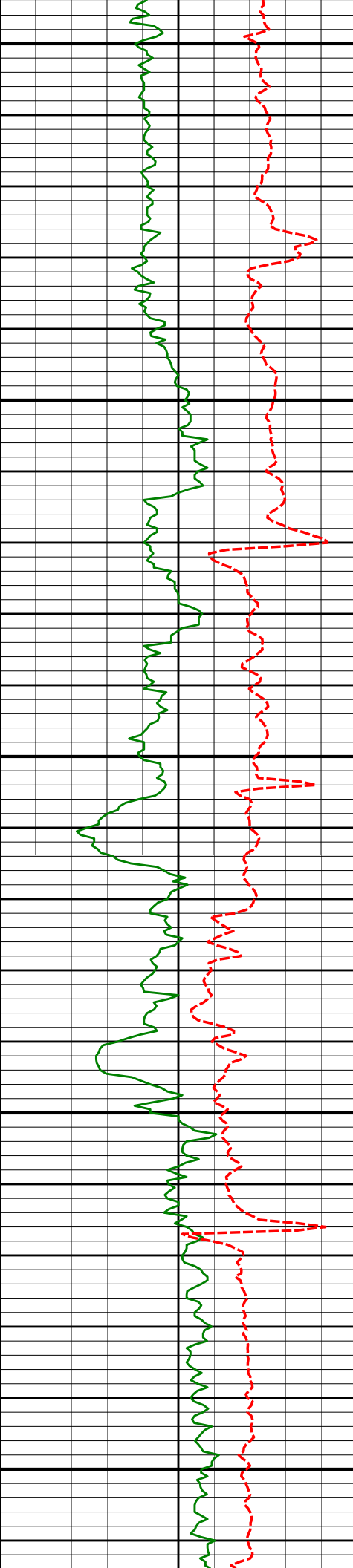
88.98°

357.29°

7196.90'

1408.05'

8600



8650

8674'

88.70°

357.47°

7198.81'

1502.99'

8700

8750

8769'

89.51°

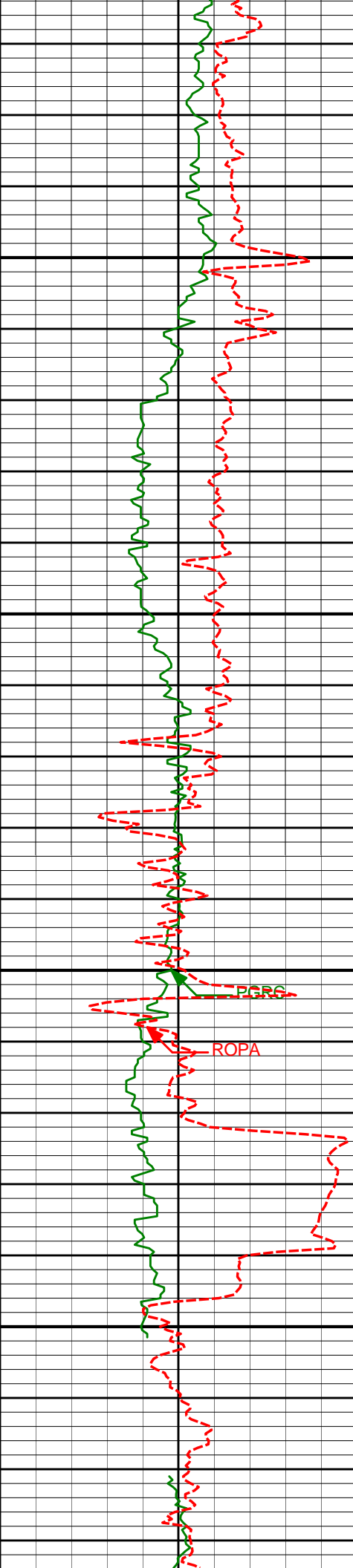
358.13°

7200.30'

1597.95'

8800

8850



8900

8950

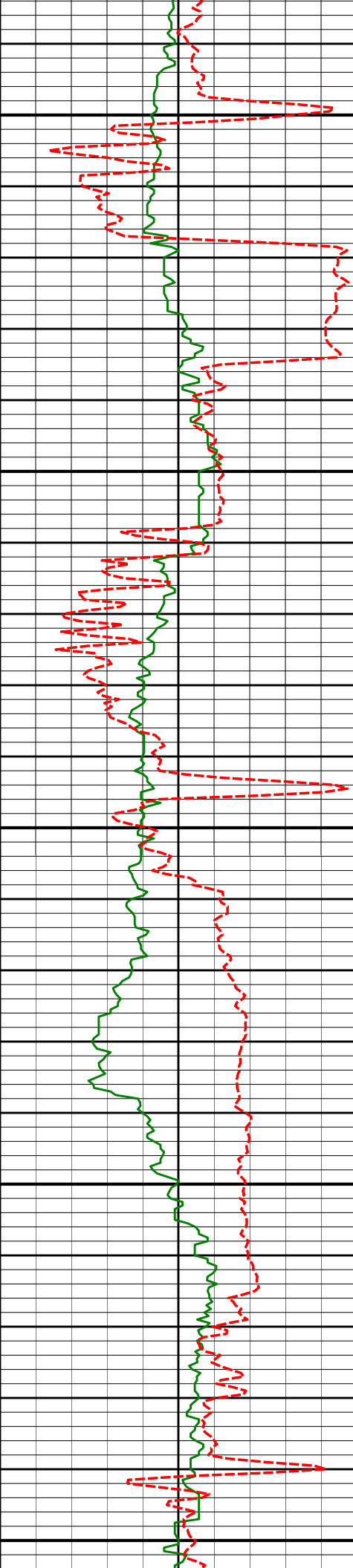
9000

9050

PGRG

ROPA

8804	89.41	356.71	7201.19	1692.91
8959'	90.03°	355.43°	7201.65'	1787.78'
9054'	90.31°	357.26°	7201.37'	1882.67'



9100

9150

9200

9250

9300

9149'

89.66°

359.36°

7201.40'

1977.66'

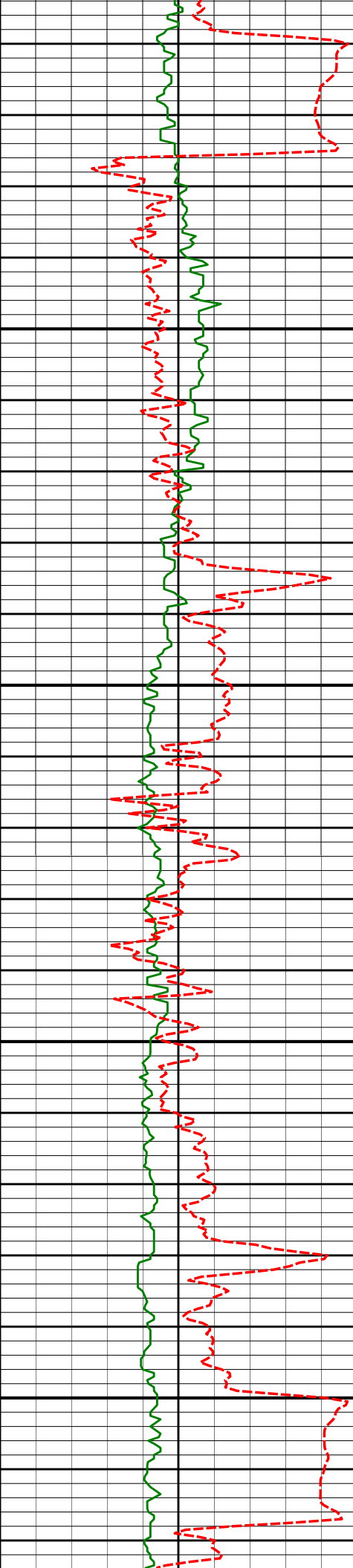
9244'

90.56°

358.95°

7201.22'

2072.66'



9350

9400

9450

9500

9339'

90.34°

1.22°

7200.47'

2167.63'

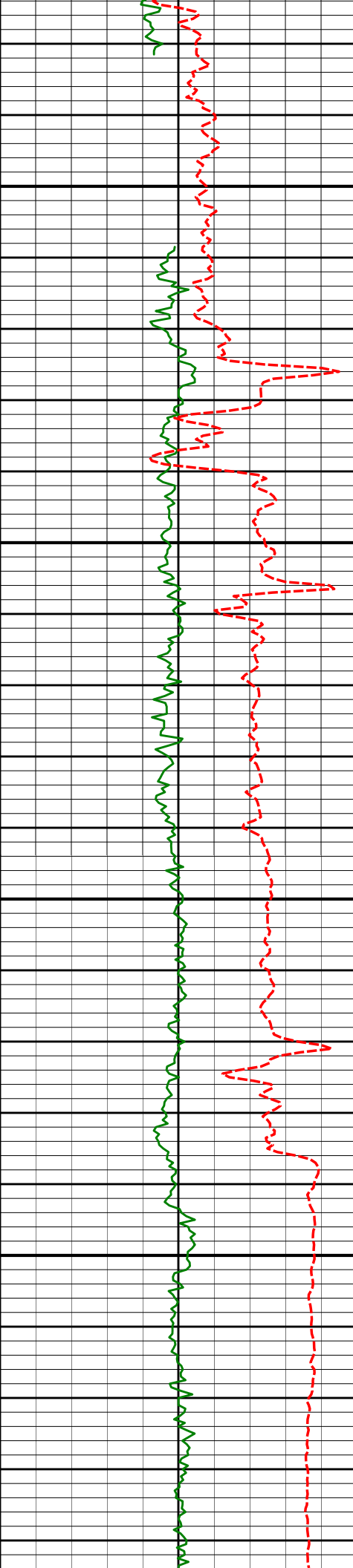
9435'

91.54°

0.87°

7198.90'

2263.56'



9550

9600

9650

9700

9530'

89.63°

1.56°

7197.92'

2358.48'

9625'

89.88°

0.48°

7198.33'

2453.42'

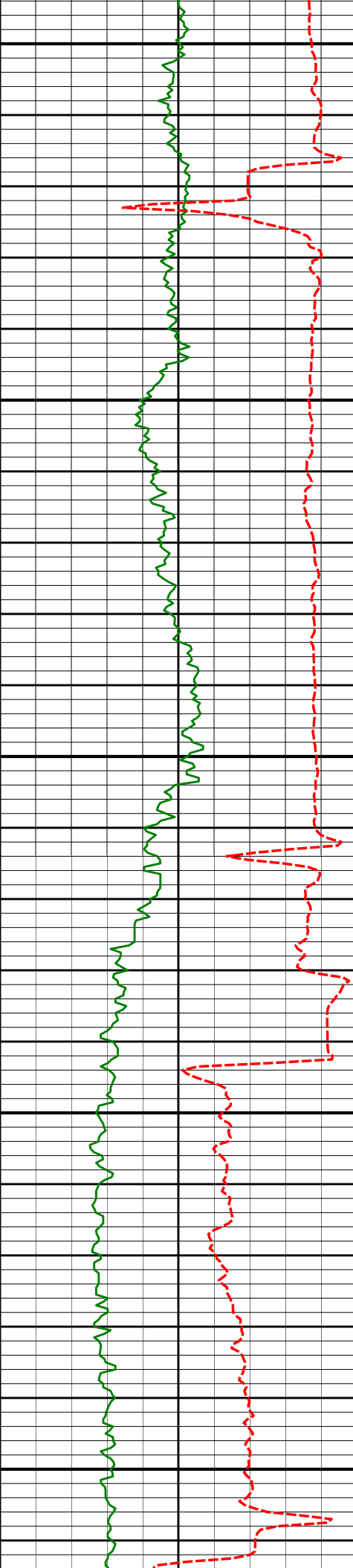
9720'

89.91°

0.14°

7198.51'

2548.39'



9750

9800

9850

9900

9950

9815'

90.93°

359.86°

7197.82'

2643.38'

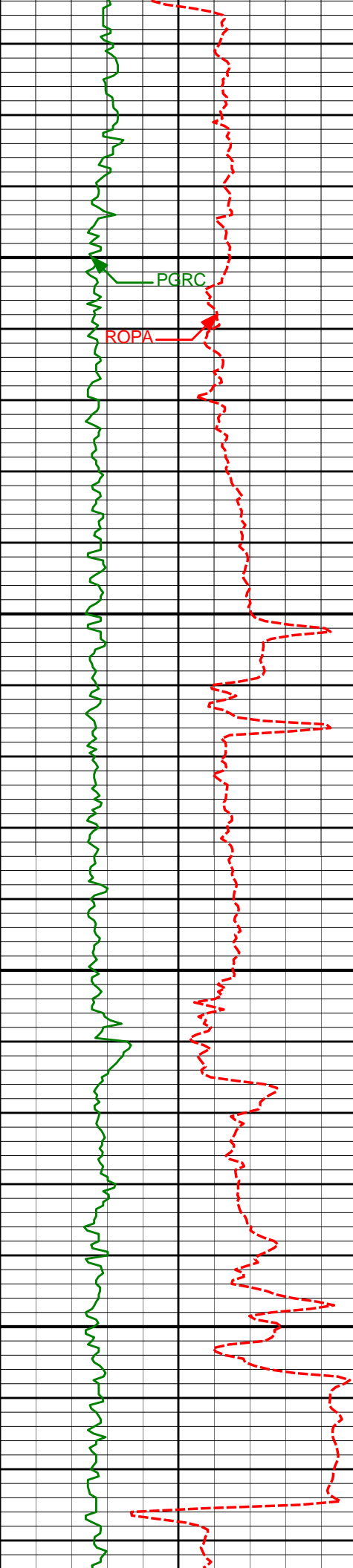
9910'

90.65°

1.12°

7196.52'

2738.33'



10000

10005'

89.26°

359.48°

7196.59'

2833.30'

10050

10100

10101'

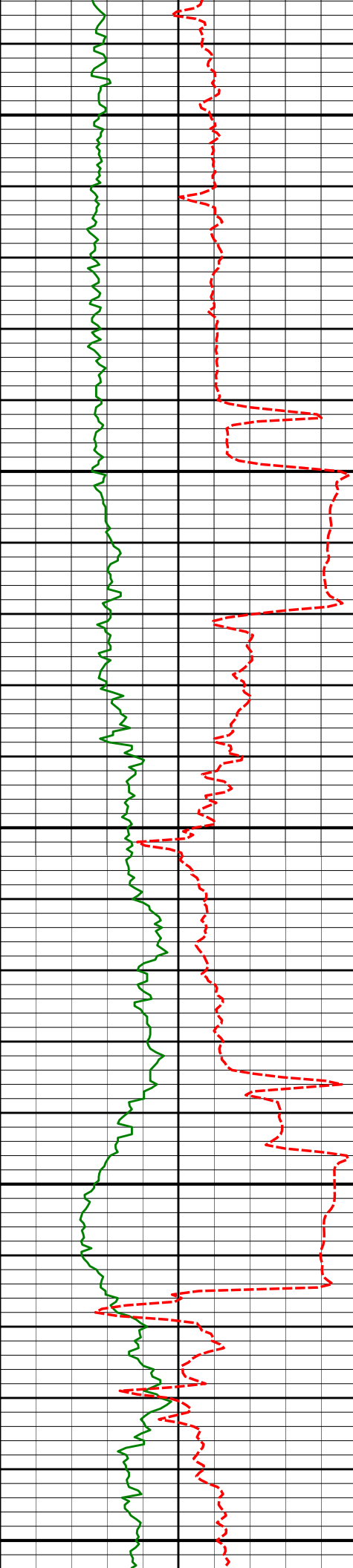
88.43°

357.19°

7198.53'

2929.27'

10150



10200

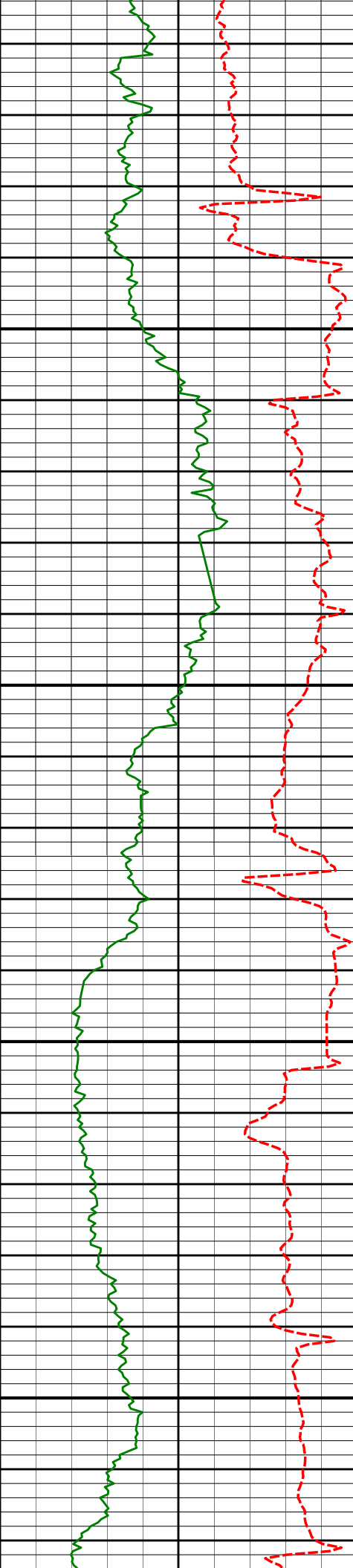
10250

10300

10350

10400

10196'	89.69°	355.75°	7200.09'	3024.16'
10291'	90.43°	356.52°	7199.99'	3119.04'
10386'	91.73°	358.54°	7198.20'	3213.98'



10450

10481'

90.74°

359.39°

7196.15'

3308.96'

10500

10550

10576'

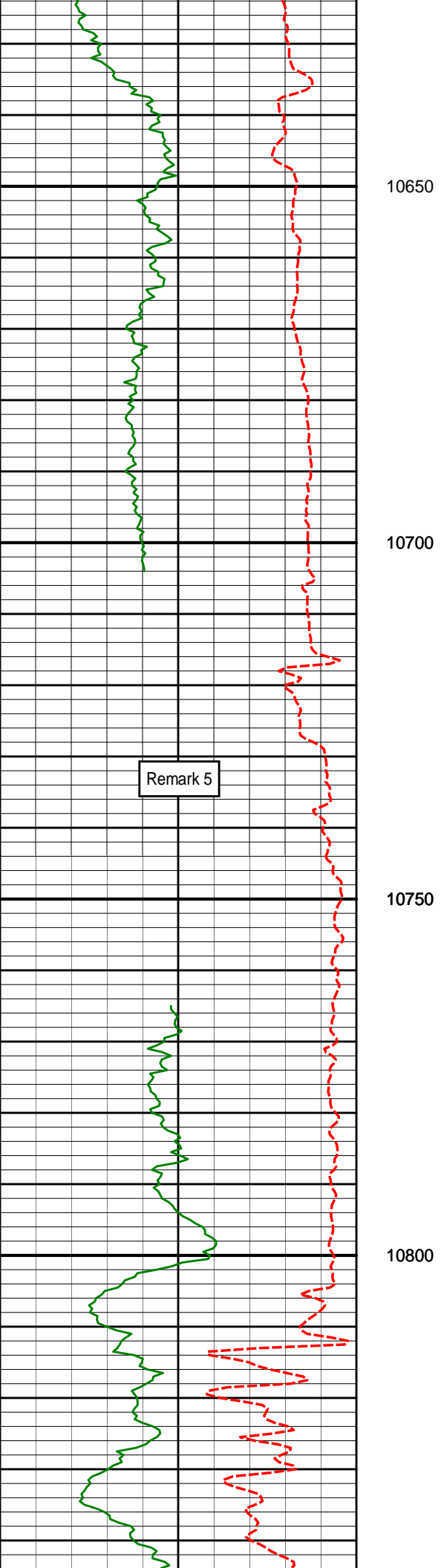
89.29°

0.28°

7196.13'

3403.94'

10600



10650

10671'

90.15°

359.57°

7196.59'

3498.93'

10700

Remark 5

10750

10766'

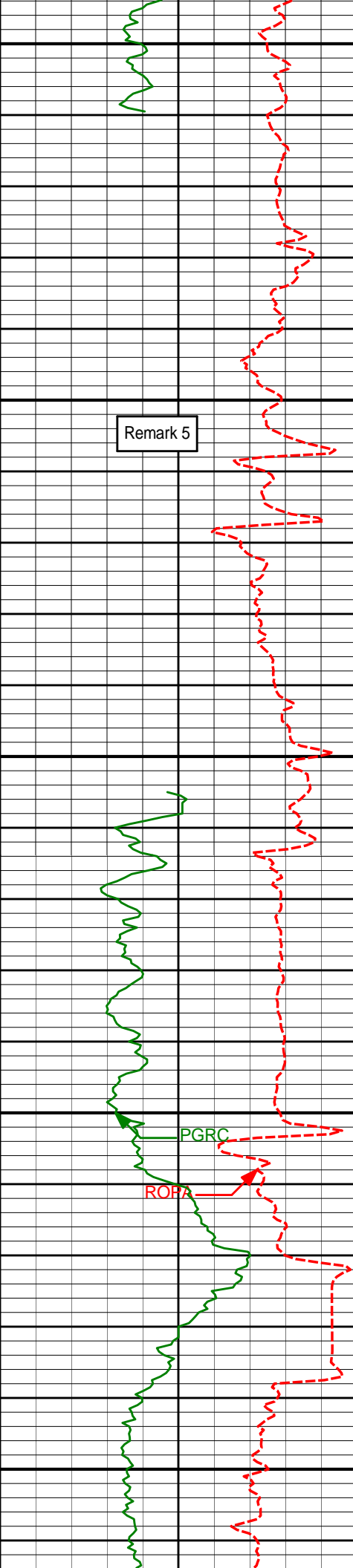
90.31°

359.86°

7196.20'

3593.92'

10800



10850

10861'

91.33°

359.36°

7194.85'

3688.91'

10900

Remark 5

10950

10956'

92.25°

358.48°

7191.88'

3783.86'

11000

PGRC

ROHA

11050

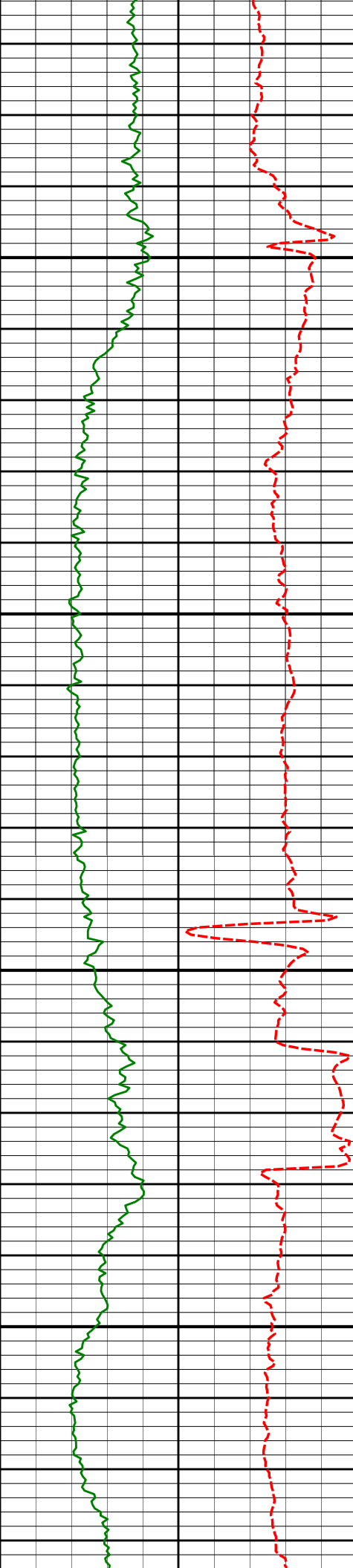
11052'

90.43°

358.85°

7189.64'

3879.82'



11100

11150

11200

11250

11147'

91.23°

359.16°

7188.26'

3974.81'

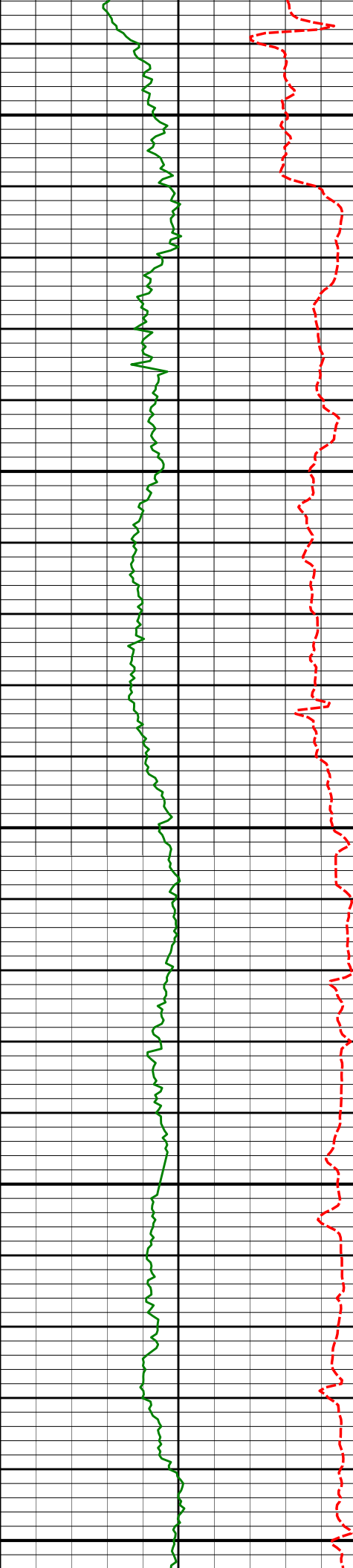
11242'

89.63°

359.42°

7187.54'

4069.81'



11300

11350

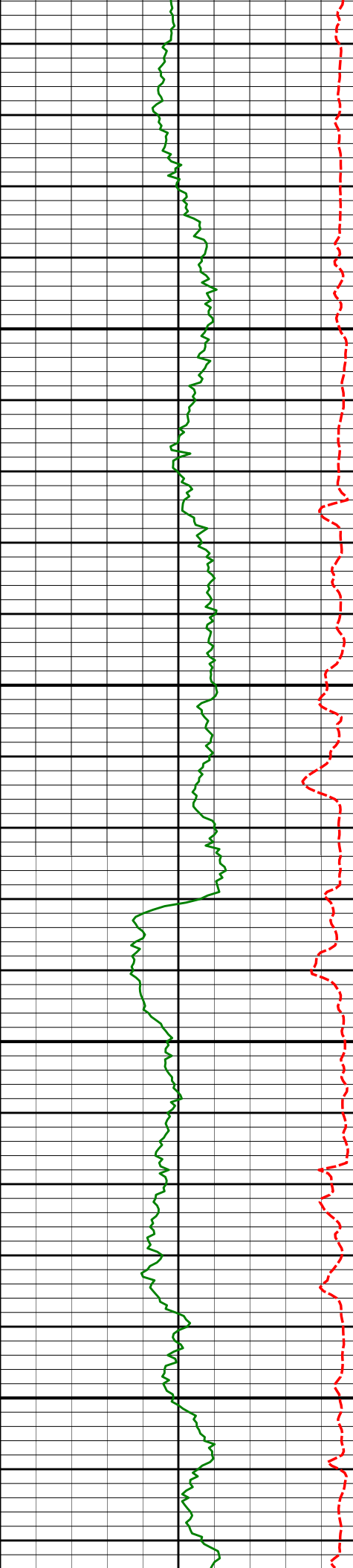
11400

11450

11500

11337'	90.68°	359.14°	7187.29'	4164.80'
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11432'	89.11°	359.61°	7187.46'	4259.80'
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11550

11600

11650

11700

11527'

89.04°

359.57°

7189.00'

4354.78'

11622'

89.29°

359.66°

7190.38'

4449.77'

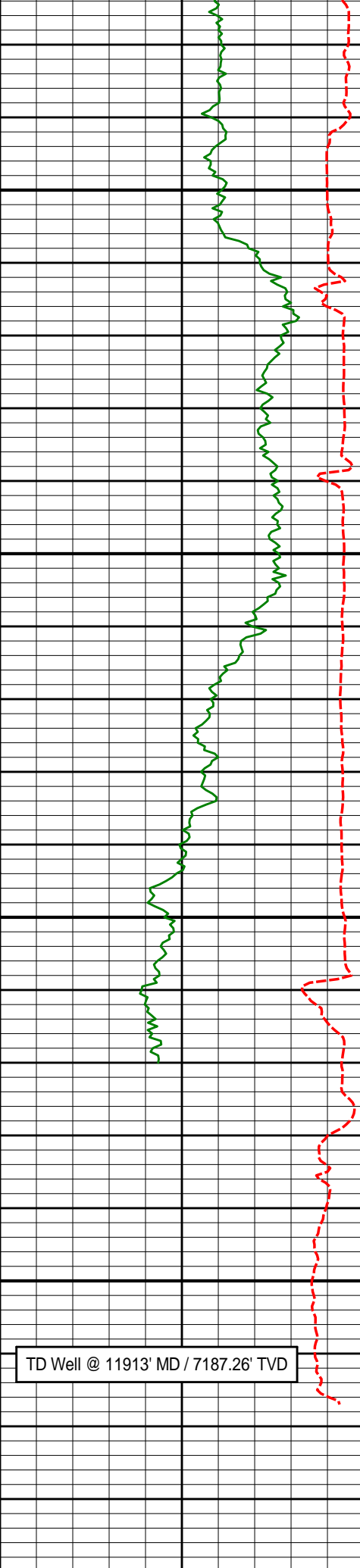
11717'

90.25°

0.05°

7190.76'

4544.75'



11750

11800

11850

11900

TD Well @ 11913' MD / 7187.26' TVD

Remark 4

11812'

91.02°

359.93°

7189.71'

4639.73'

11869'

91.54°

359.80°

7188.44'

4696.71'

11913'

91.54°

359.80°

7187.26'

4740.69'

Average Rate of Penetration

Average Rate of Penetration (ROPA) feet per hr	Depth	Depth	Inc	Azi	TVD	V/S
1K 0						
PCG GR XHi-Range RT BCor (PGRC) api						
0 300						



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.
Kunzman 4N-5HZ
Wattenberg
Weld Colorado
USA
CA-XX-0900610612

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
255.00	0.40	54.69	255.00	0.52 N	0.73 E	0.50	0.16
440.00	0.44	55.71	439.99	1.29 N	1.84 E	1.26	0.02
534.00	0.41	100.78	533.99	1.42 N	2.47 E	1.38	0.35
627.00	0.38	106.78	626.99	1.27 N	3.09 E	1.22	0.06
721.00	0.24	146.13	720.99	1.02 N	3.49 E	0.96	0.26
840.00	0.33	178.70	839.99	0.47 N	3.64 E	0.41	0.15
1065.00	0.36	210.63	1064.98	0.78 S	3.30 E	-0.83	0.09
1249.00	5.36	270.53	1248.70	1.19 S	5.59 W	-1.10	2.82
1340.00	7.74	270.42	1339.10	1.11 S	15.97 W	-0.84	2.62
1432.00	9.53	266.82	1430.06	1.49 S	29.77 W	-0.98	2.03
1524.00	12.21	266.92	1520.40	2.43 S	47.09 W	-1.63	2.91
1616.00	13.97	262.99	1610.01	4.31 S	67.83 W	-3.15	2.15
1708.00	13.74	260.07	1699.33	7.55 S	89.61 W	-6.02	0.80
1799.00	14.92	260.95	1787.50	11.26 S	111.82 W	-9.34	1.32
1890.00	15.09	267.08	1875.40	13.70 S	135.22 W	-11.39	1.75
1985.00	14.93	266.71	1967.16	15.03 S	159.78 W	-12.30	0.19
2081.00	14.29	263.36	2060.06	17.11 S	183.90 W	-13.96	1.11
2176.00	12.83	261.80	2152.41	19.97 S	205.98 W	-16.45	1.58
2271.00	13.51	271.35	2244.92	21.22 S	227.52 W	-17.32	2.40
2366.00	12.87	271.87	2337.42	20.61 S	249.19 W	-16.34	0.68
2461.00	13.20	273.00	2429.97	19.70 S	270.59 W	-15.06	0.44
2556.00	14.23	276.76	2522.26	17.75 S	293.02 W	-12.74	1.44
2651.00	12.37	274.67	2614.71	15.55 S	314.76 W	-10.16	2.02
2746.00	13.51	271.48	2707.30	14.43 S	335.99 W	-8.68	1.41
2842.00	14.49	271.25	2800.44	13.88 S	359.21 W	-7.73	1.02
2937.00	13.65	270.09	2892.59	13.60 S	382.31 W	-7.06	0.93
3032.00	14.09	267.56	2984.82	14.08 S	405.07 W	-7.15	0.78
3127.00	12.92	266.13	3077.20	15.29 S	427.21 W	-7.98	1.28
3222.00	14.53	266.76	3169.48	16.68 S	449.71 W	-8.98	1.70
3317.00	12.75	268.10	3261.80	17.70 S	472.08 W	-9.62	1.90
3413.00	13.13	265.41	3355.36	18.93 S	493.54 W	-10.48	0.74
3508.00	13.84	263.94	3447.74	20.99 S	515.59 W	-12.17	0.83
3603.00	12.29	265.14	3540.28	23.05 S	536.96 W	-13.86	1.65
3698.00	12.55	268.38	3633.06	24.20 S	557.36 W	-14.66	0.78
3793.00	13.71	264.77	3725.58	25.51 S	578.88 W	-15.61	1.49
3888.00	12.43	264.12	3818.11	27.59 S	600.26 W	-17.32	1.36
4078.00	12.99	266.80	4003.46	30.87 S	641.91 W	-19.89	0.43
4174.00	14.74	264.01	4096.66	32.75 S	664.83 W	-21.37	1.95
4269.00	13.73	263.85	4188.74	35.22 S	688.06 W	-23.44	1.06
4364.00	11.61	263.31	4281.43	37.54 S	708.77 W	-25.41	2.24
4459.00	12.40	261.63	4374.35	40.14 S	728.35 W	-27.68	0.91
4554.00	13.34	261.07	4466.96	43.32 S	749.27 W	-30.50	1.00
4649.00	12.11	261.22	4559.62	46.55 S	769.95 W	-33.37	1.30
4745.00	14.07	264.01	4653.12	49.30 S	791.52 W	-35.76	2.15
4840.00	13.31	263.20	4745.42	51.80 S	813.87 W	-37.88	0.83
4935.00	14.31	265.08	4837.68	54.10 S	836.43 W	-39.79	1.15

5030.00	13.46	266.40	4929.90	55.81 S	859.16 W	-41.10	0.96
5125.00	15.47	264.04	5021.88	57.82 S	882.81 W	-42.71	2.21
5220.00	14.03	264.30	5113.75	60.28 S	906.87 W	-44.76	1.52
5315.00	12.16	262.93	5206.27	62.65 S	928.25 W	-46.77	1.99
5411.00	13.66	264.36	5299.85	65.01 S	949.57 W	-48.76	1.60
5506.00	12.72	263.80	5392.34	67.24 S	971.14 W	-50.62	1.00
5601.00	10.72	263.55	5485.35	69.37 S	990.32 W	-52.42	2.11
5696.00	9.10	263.09	5578.93	71.26 S	1006.56 W	-54.04	1.71
5791.00	9.23	266.72	5672.72	72.60 S	1021.62 W	-55.12	0.62
5886.00	8.28	258.81	5766.61	74.36 S	1035.94 W	-56.63	1.61
5982.00	8.90	266.68	5861.54	76.14 S	1050.13 W	-58.16	1.38
6077.00	8.47	274.30	5955.45	76.04 S	1064.45 W	-57.82	1.29
6172.00	6.66	270.63	6049.62	75.45 S	1076.94 W	-57.02	1.98
6267.00	4.40	267.28	6144.18	75.56 S	1086.08 W	-56.98	2.40
6362.00	3.55	262.04	6238.95	76.14 S	1092.64 W	-57.44	0.97
6457.00	2.80	262.54	6333.80	76.85 S	1097.85 W	-58.06	0.79
6552.00	1.98	249.27	6428.72	77.74 S	1101.70 W	-58.88	1.03
6647.00	0.57	185.79	6523.69	78.79 S	1103.28 W	-59.91	1.90
6742.00	0.54	192.73	6618.69	79.69 S	1103.43 W	-60.81	0.08
6790.00	2.57	14.41	6666.68	78.87 S	1103.21 W	-59.99	6.47
6837.00	7.15	10.43	6713.49	74.97 S	1102.42 W	-56.11	9.76
6885.00	10.87	15.15	6760.90	67.67 S	1100.70 W	-48.83	7.90
6932.00	14.28	18.96	6806.76	57.91 S	1097.65 W	-39.12	7.46
6980.00	19.09	14.04	6852.73	44.69 S	1093.82 W	-25.97	10.44
7027.00	21.85	12.91	6896.76	28.70 S	1090.00 W	-10.05	5.94
7075.00	25.29	6.66	6940.75	9.80 S	1086.82 W	8.79	8.85
7122.00	31.22	359.99	6982.14	12.38 N	1085.66 W	30.95	14.27
7170.00	37.85	0.01	7021.66	39.58 N	1085.66 W	58.14	13.82
7217.00	42.12	358.53	7057.67	69.77 N	1086.06 W	88.33	9.31
7265.00	47.53	355.70	7091.70	103.54 N	1087.80 W	122.13	12.01
7312.00	54.23	354.00	7121.34	139.84 N	1091.10 W	158.48	14.53
7360.00	60.34	353.05	7147.27	179.94 N	1095.66 W	198.66	12.83
7407.00	67.04	354.85	7168.09	221.82 N	1100.08 W	240.60	14.66
7455.00	73.82	357.04	7184.16	266.90 N	1103.26 W	285.73	14.76
7503.00	81.36	358.49	7194.47	313.71 N	1105.08 W	332.56	16.00
7551.00	88.46	359.99	7198.72	361.48 N	1105.71 W	380.34	15.10
7598.00	88.92	359.96	7199.80	408.47 N	1105.73 W	427.32	0.99
7626.00	89.63	359.82	7200.15	436.47 N	1105.79 W	455.32	2.58
7818.00	92.87	358.36	7195.96	628.37 N	1108.83 W	647.24	1.85
7913.00	91.54	357.96	7192.31	723.25 N	1111.87 W	742.16	1.46
8008.00	90.09	359.34	7190.95	818.21 N	1114.11 W	837.14	2.11
8103.00	89.66	359.07	7191.16	913.20 N	1115.42 W	932.14	0.54
8198.00	90.09	358.63	7191.36	1008.18 N	1117.32 W	1027.14	0.65
8294.00	88.52	358.55	7192.52	1104.14 N	1119.68 W	1123.13	1.64
8389.00	89.32	358.35	7194.31	1199.08 N	1122.26 W	1218.11	0.87
8484.00	89.29	357.93	7195.46	1294.03 N	1125.34 W	1313.09	0.44
8579.00	88.98	357.29	7196.90	1388.93 N	1129.31 W	1408.05	0.75
8674.00	88.70	357.47	7198.81	1483.81 N	1133.65 W	1502.99	0.35
8769.00	89.51	358.13	7200.30	1578.73 N	1137.30 W	1597.95	1.09
8864.00	89.41	356.71	7201.19	1673.63 N	1141.58 W	1692.91	1.49
8959.00	90.03	355.43	7201.65	1768.40 N	1148.09 W	1787.78	1.49
9054.00	90.31	357.26	7201.37	1863.20 N	1154.15 W	1882.67	1.94
9149.00	89.66	359.36	7201.40	1958.16 N	1156.95 W	1977.66	2.32
9244.00	90.56	358.95	7201.22	2053.14 N	1158.36 W	2072.66	1.04
9339.00	90.34	1.22	7200.47	2148.14 N	1158.22 W	2167.63	2.40
9435.00	91.54	0.87	7198.90	2244.10 N	1156.47 W	2263.56	1.31
9530.00	89.63	1.56	7197.92	2339.07 N	1154.46 W	2358.48	2.14
9625.00	89.88	0.48	7198.33	2434.06 N	1152.78 W	2453.42	1.17
9720.00	89.91	0.14	7198.51	2529.05 N	1152.27 W	2548.39	0.35
9815.00	90.93	359.86	7197.82	2624.05 N	1152.27 W	2643.38	1.11
9910.00	90.65	1.12	7196.52	2719.04 N	1151.46 W	2738.33	1.36
10005.00	89.26	359.48	7196.59	2814.03 N	1150.96 W	2833.30	2.26
10101.00	88.43	357.19	7198.53	2909.96 N	1153.75 W	2929.27	2.54
10196.00	89.69	355.75	7200.09	3004.76 N	1159.59 W	3024.16	2.02
10291.00	90.43	356.52	7199.99	3099.55 N	1166.00 W	3119.04	1.12
10386.00	91.73	358.54	7198.20	3194.43 N	1170.09 W	3213.98	2.53
10481.00	90.74	359.39	7196.15	3289.40 N	1171.81 W	3308.96	1.37
10576.00	89.29	0.28	7196.13	3384.39 N	1172.08 W	3403.94	1.79
10671.00	90.15	359.57	7196.59	3479.39 N	1172.21 W	3498.93	1.18
10766.00	90.31	359.86	7196.20	3574.39 N	1172.68 W	3593.92	0.35
10861.00	91.33	359.36	7194.85	3669.37 N	1173.32 W	3688.91	1.20
10956.00	92.25	358.48	7191.88	3764.31 N	1175.11 W	3783.86	1.34
11052.00	90.43	358.85	7189.64	3860.25 N	1177.35 W	3879.82	1.93
11147.00	91.23	359.16	7188.26	3955.23 N	1178.99 W	3974.81	0.90
11242.00	89.63	359.42	7187.54	4050.24 N	1180.18 W	4069.81	1.71

11242.00	89.63	359.42	7187.34	4030.21 N	1180.18 W	4009.81	1.71
11337.00	90.68	359.14	7187.29	4145.20 N	1181.38 W	4164.80	1.14
11432.00	89.11	359.61	7187.46	4240.19 N	1182.41 W	4259.80	1.73
11527.00	89.04	359.57	7189.00	4335.18 N	1183.09 W	4354.78	0.08
11622.00	89.29	359.66	7190.38	4430.17 N	1183.73 W	4449.77	0.27
11717.00	90.25	0.05	7190.76	4525.17 N	1183.97 W	4544.75	1.09
11812.00	91.02	359.93	7189.71	4620.16 N	1183.98 W	4639.73	0.82
11869.00	91.54	359.80	7188.44	4677.14 N	1184.12 W	4696.71	0.95
11913.00	91.54	359.80	7187.26	4721.13 N	1184.28 W	4740.69	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 359.02 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.59 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11913.00 FEET
IS 4867.40 FEET ALONG 345.92 DEGREES (TRUE)**

All directional surveys tied to surface. Final survey is a straight-line projection to the bit.