

PCG Pressure Case Gamma

[illegible]

WELL INFORMATION

MWD Run Number	100				
Date run completed	16-Aug-13				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.790				
Log Start Depth (MD, ft)	894.00				
Log End Depth (MD, ft)	8,235.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	13-Aug-13 04:45				
Drill/Wipe End Date and Time	16-Aug-13 02:15				
Min Inc (deg) @ Depth (MD, ft)	.11 @ 1,113.00				
Max Inc (deg) @ Depth (MD, ft)	84.88 @ 8,188.00				
Bit TFA(in2) / Bit Type	2.23 / PDC				
Flow Rate (gpm)	570.77				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Fresh Water Gel				
Density (ppg) / Viscosity (spqt)	10.00 / 41.00				
Filtrate CL (ppm)	1,100.00				
pH / Fluid Loss (mptm)	8.50 / 4				
PV (cP) / YP (lhf2)	8 / 9.00				
% Solids / % Sand	4.50 / 0.00				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (degF) / Source	187.48 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 187.48				
Lead MWD Engineer	Clay Wass				
Customer Representative	Dave Cornett				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.84				
Sub Serial Number	11404277				
Insert Serial Number	11400825				
Date and Time Initialized	11-Aug-13 18:39				
Date and Time Read	16-Aug-13 16:18				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	45.43				
Software Version	6.21				
Sub Serial Number	11404277				
Sonde Serial Number	11833253				
Sensor ID Number	N/A				
Toolface Offset (deg)	57.32				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	55.74				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404277				
Insert/Sonde Serial Number	11292593				

REMARKS

<div>1. All depths are calibrated to the driller's pipe tally and are measured bit depths, measured from the drill floor.</div> <div>2. No depth corrections have been made for pipe stretch or compression.</div> <div>3. Critical annular velocities have been calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for syntheic and oil based fluids.</div> <div>4. All data presented is recorded (memory) data unless otherwise stated. ROPA is real time data</div> <div>5. The following smoothing parameters have been applied to the data: ROPA: 0.5 ft interval, 1.2 ft coercion distance, 3 ft gap fill PGRC: 0.5 ft interval, 0.6 ft coercion distance, 3 ft gap fill</div> <div>6. Insite Version 7.4.2</div>

WARRANTY

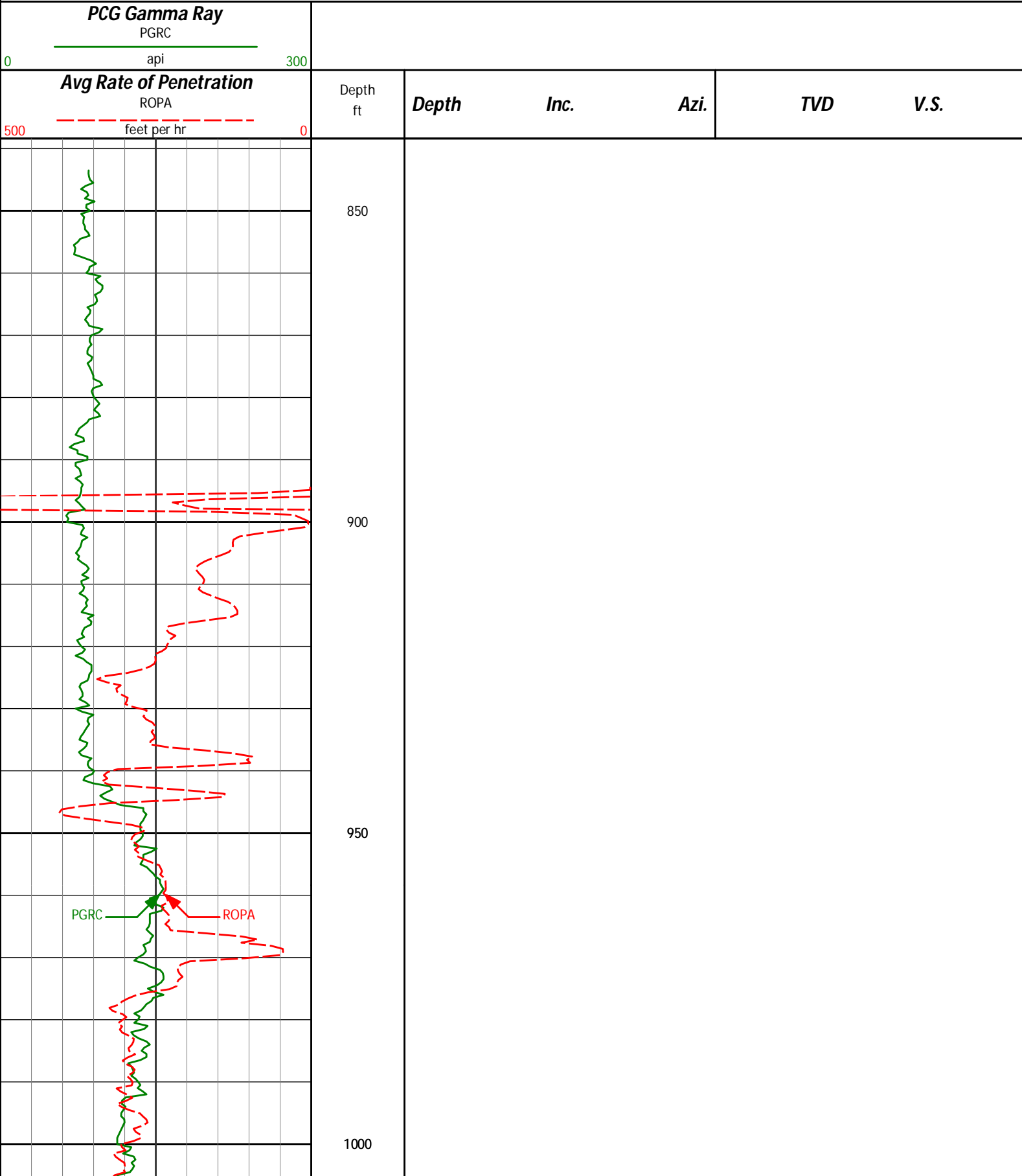
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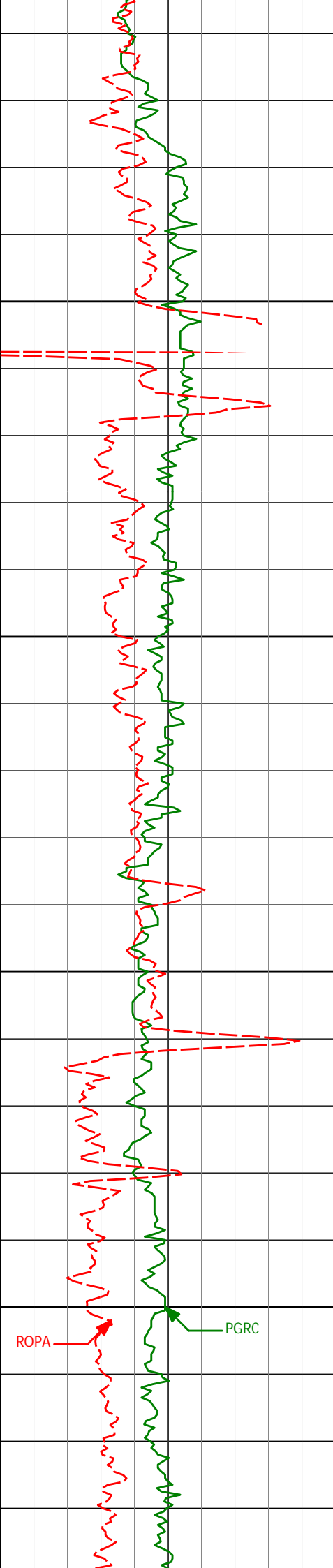
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Sperry Drilling Services

TVD Detail Log 1:240

Anadarko
Underhill 2C-17HZ
Xtreme 22
05123369170000





1018'

0.28°

299.36°

1017.98'

3.16'

1050

1100

1113'

0.11°

305.46°

1112.98'

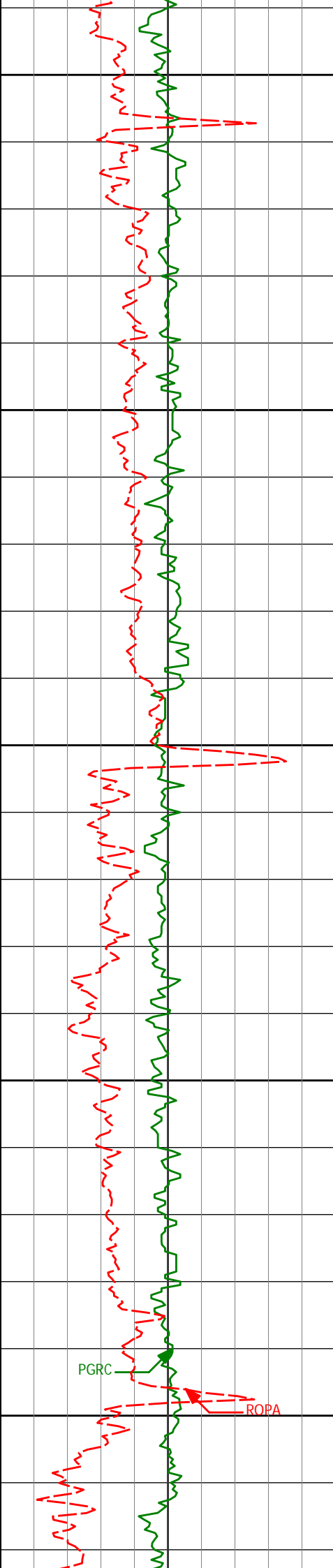
3.33'

1150

1200

ROPA

PGRC



1250

1300

1350

1400

1450

1305'

0.26°

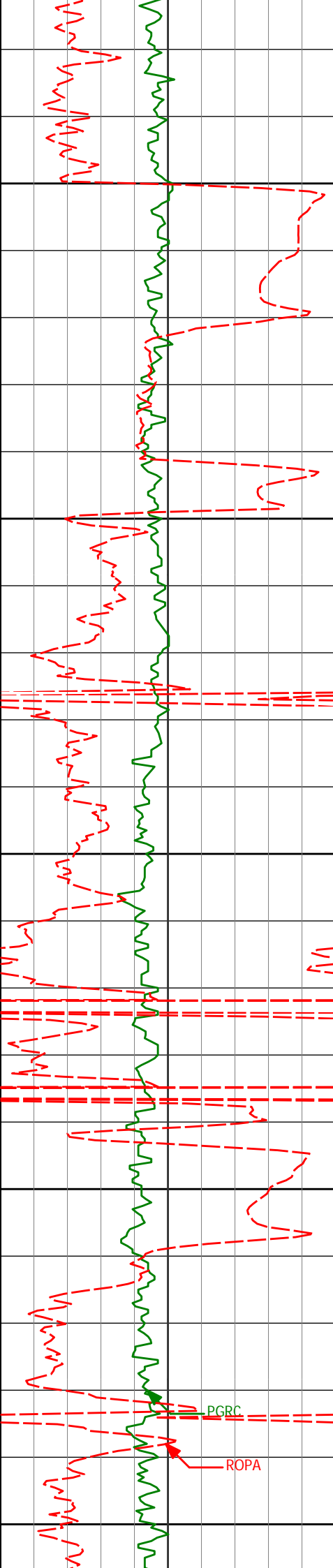
265.60°

1304.98'

3.39'

PGRC

ROPA



1500

1550

1600

1650

1700

1495'

0.48°

229.18°

1494.97'

2.82'

1591'

2.37°

231.31°

1590.94'

1.29'

1686'

3.77°

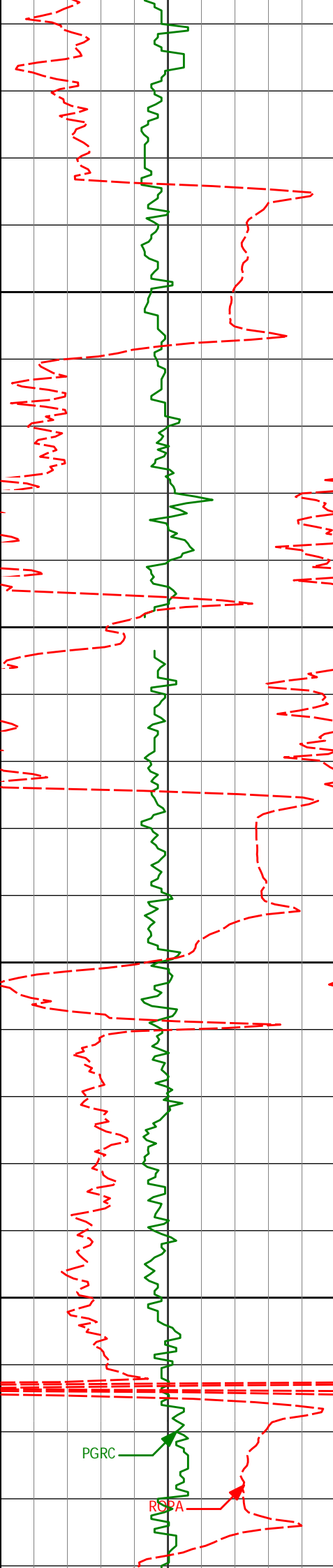
227.07°

1685.80'

-2.12'

PGRC

ROPA



1750

1800

1850

1900

1779'

6.39°

221.70°

1778.43'

-8.15'

1871'

7.66°

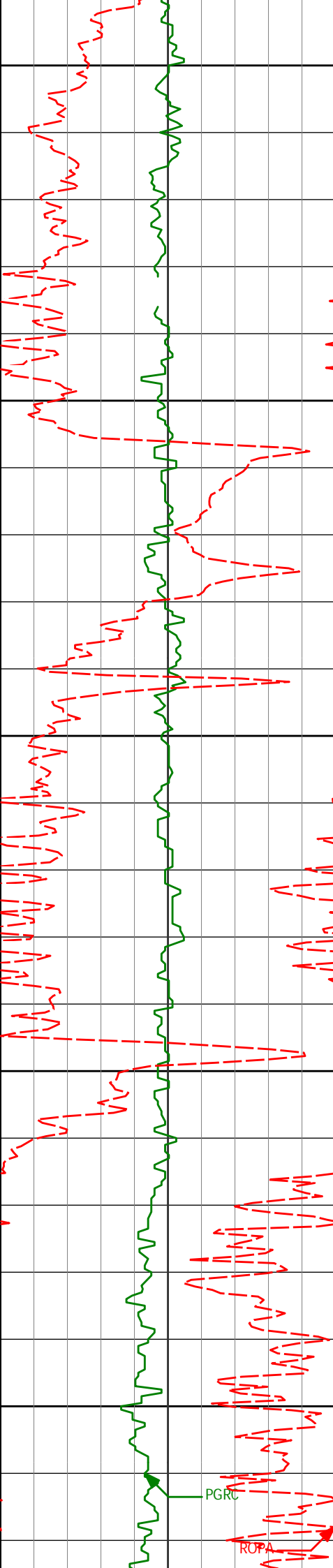
213.19°

1869.74'

-17.21'

PGRC

RCPA



1950

1962'

9.77°

207.47°

1959.68'

-29.23'

2000

2050

2054'

11.76°

206.09°

2050.06'

-44.68'

2100

2150

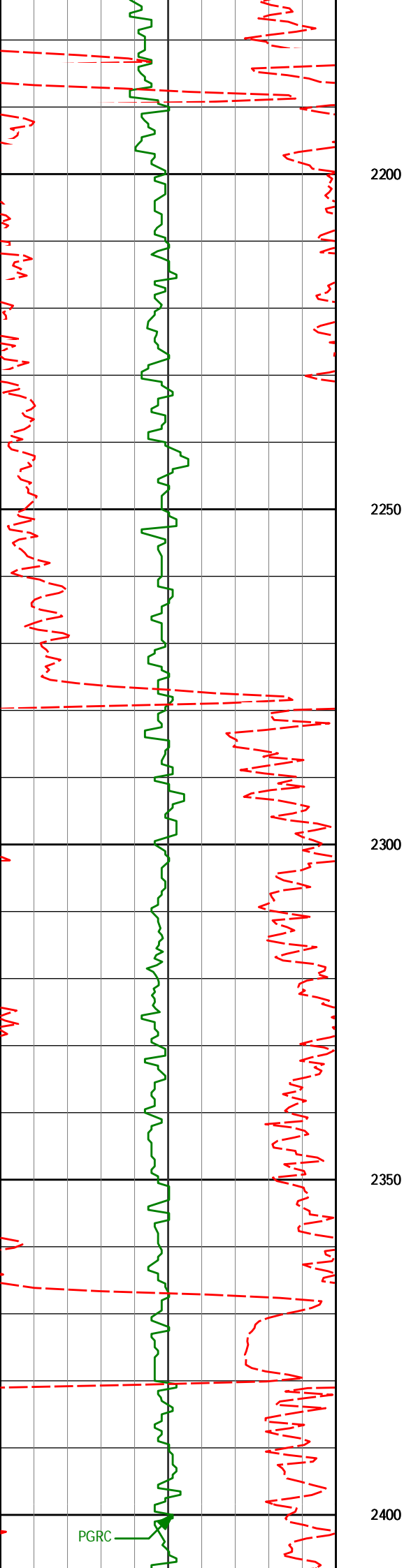
2146'

11.44°

205.57°

2140.18'

-61.45'



2239'

11.04°

204.95°

2231.40'

-77.95'

2250

2300

2330'

10.74°

203.42°

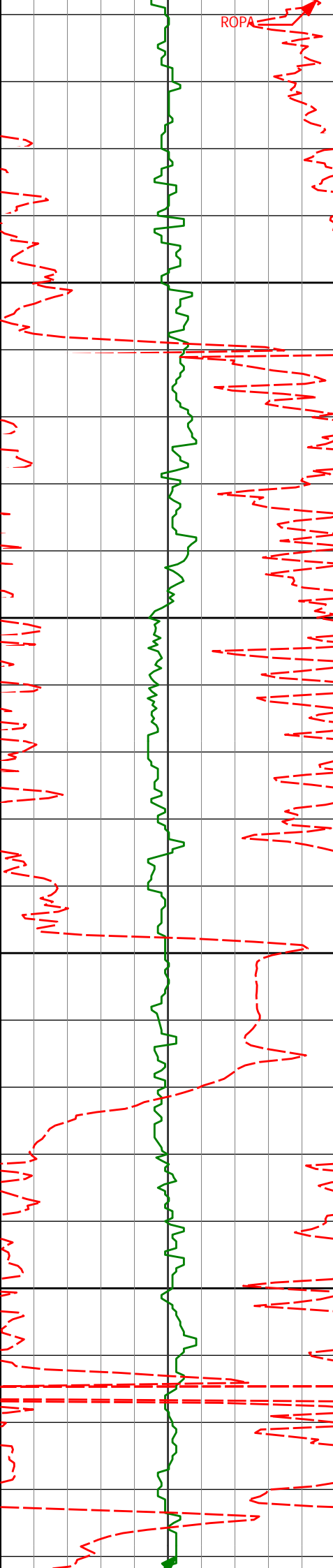
2320.76'

-93.73'

2350

2400

PGRC



2450

2500

2550

2600

2422'

2514'

2606'

11.33°

10.61°

11.98°

204.45°

204.08°

204.52°

2411.06'

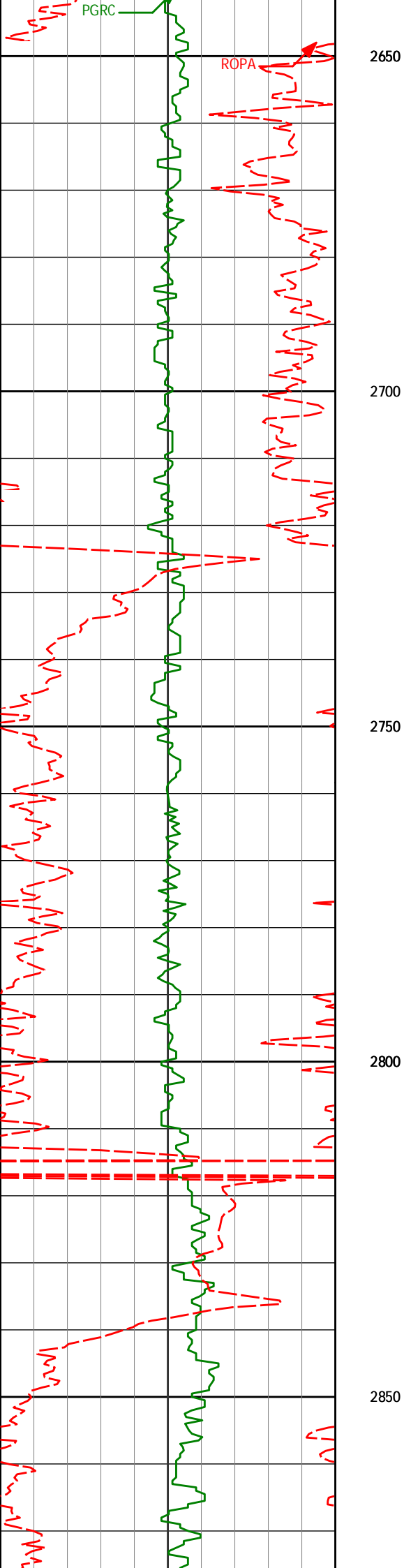
2501.38'

2591.59'

-109.93'

-125.99'

-142.51'



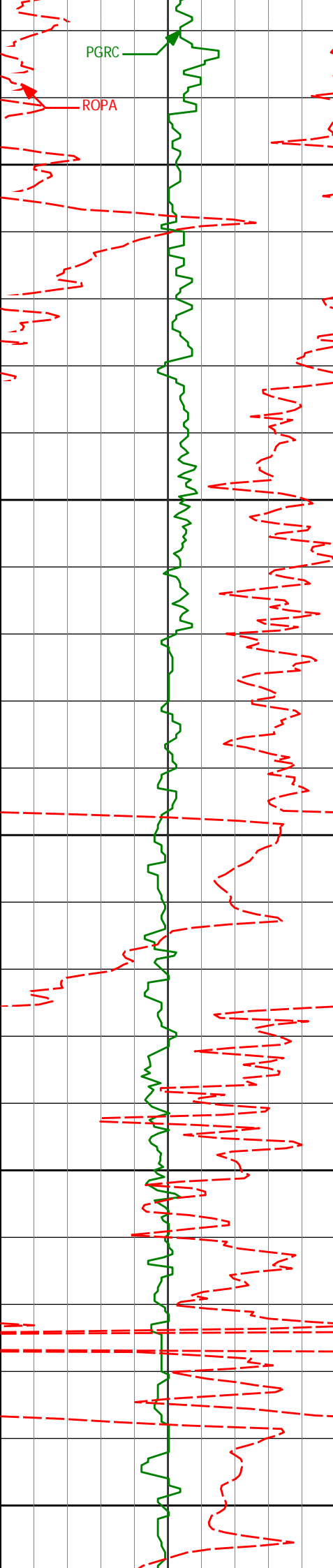
2791'

10.35°

201.55°

2773.09'

-175.63'



2900

2950

3000

3050

3100

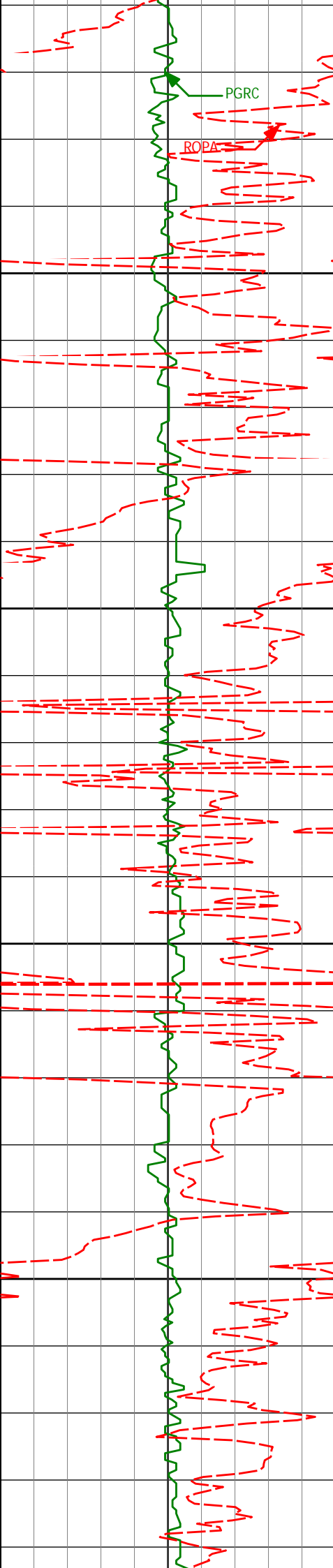
2974'

10.29°

205.48°

2953.13'

-205.86'



3150

3200

3250

3300

3158'

11.50°

211.59°

3133.82'

-236.55'

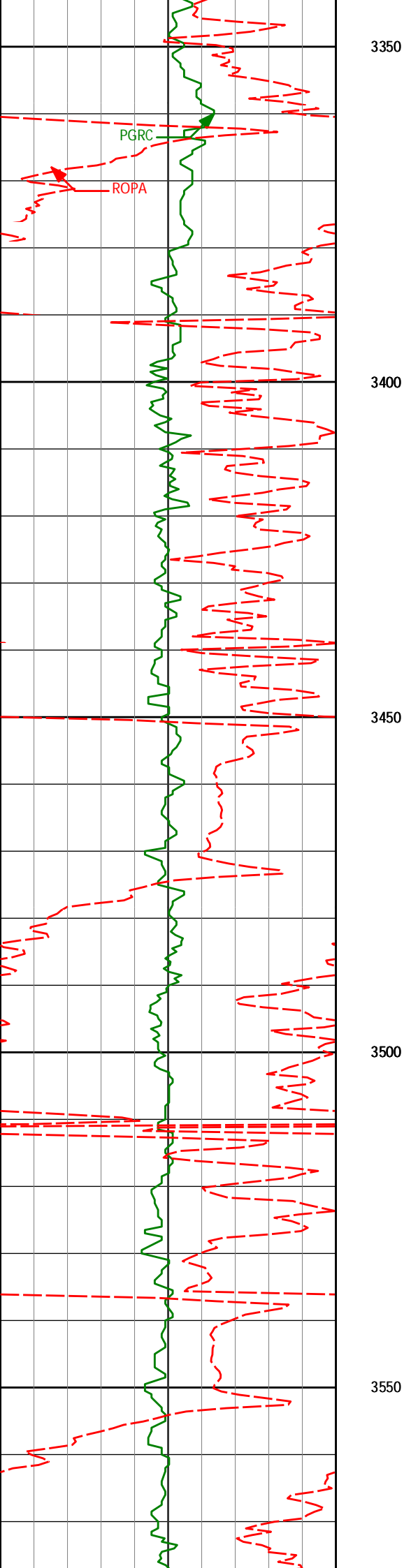
3342'

10.96°

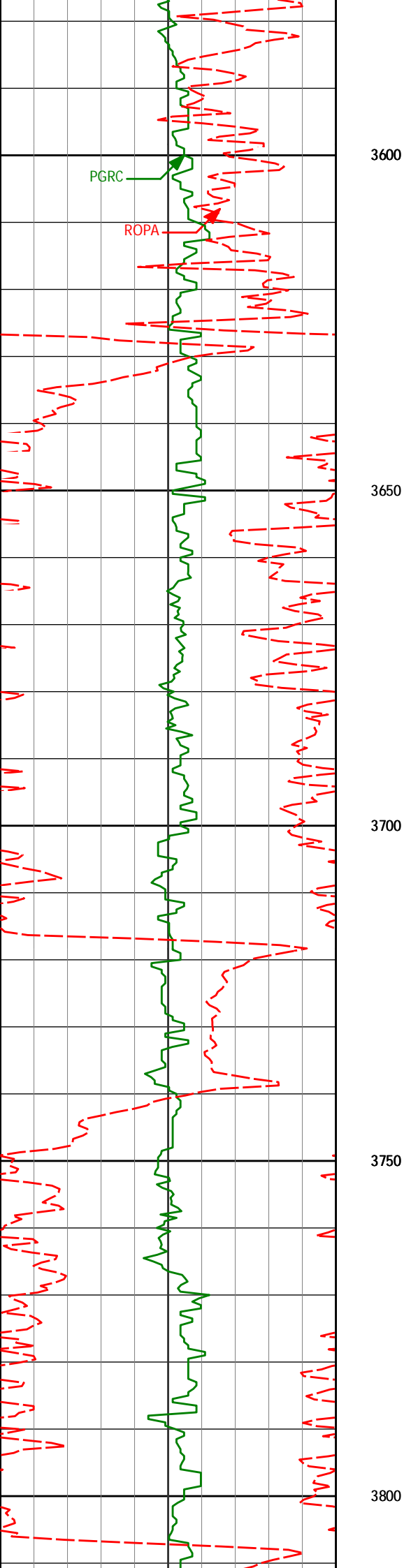
212.56°

3314.30'

-267.19'



3526' 11.35° 206.28° 3494.82' -298.43'



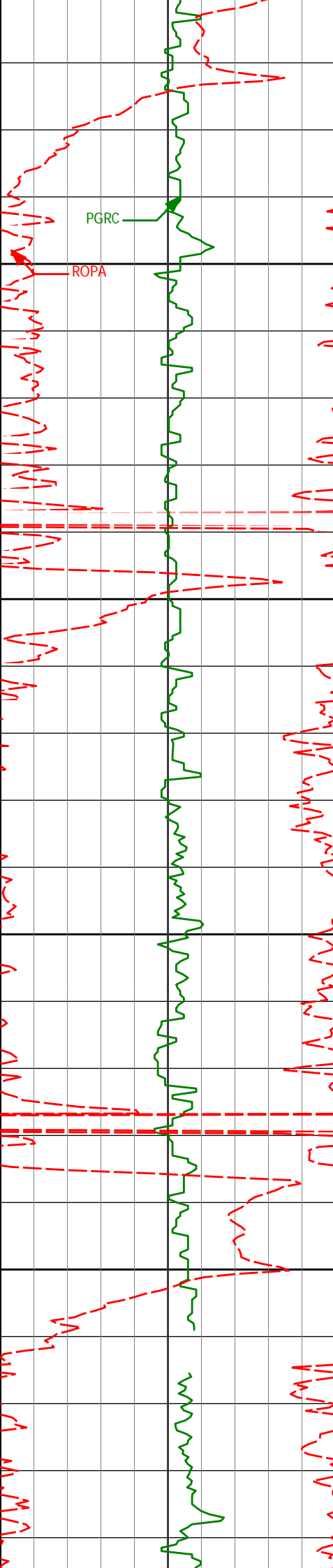
3708'

9.59°

205.15°

3673.78'

-328.43'



3850

3900

3950

4000

3891'

11.77°

206.22°

3853.60'

-359.19'

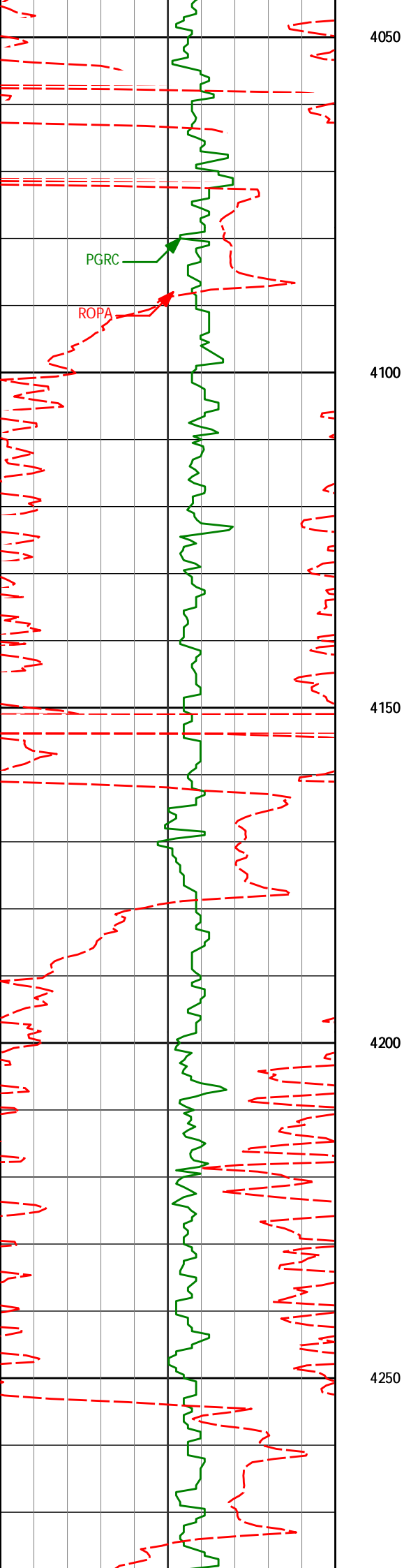
4075'

10.98°

204.16°

4033.99'

-392.24'



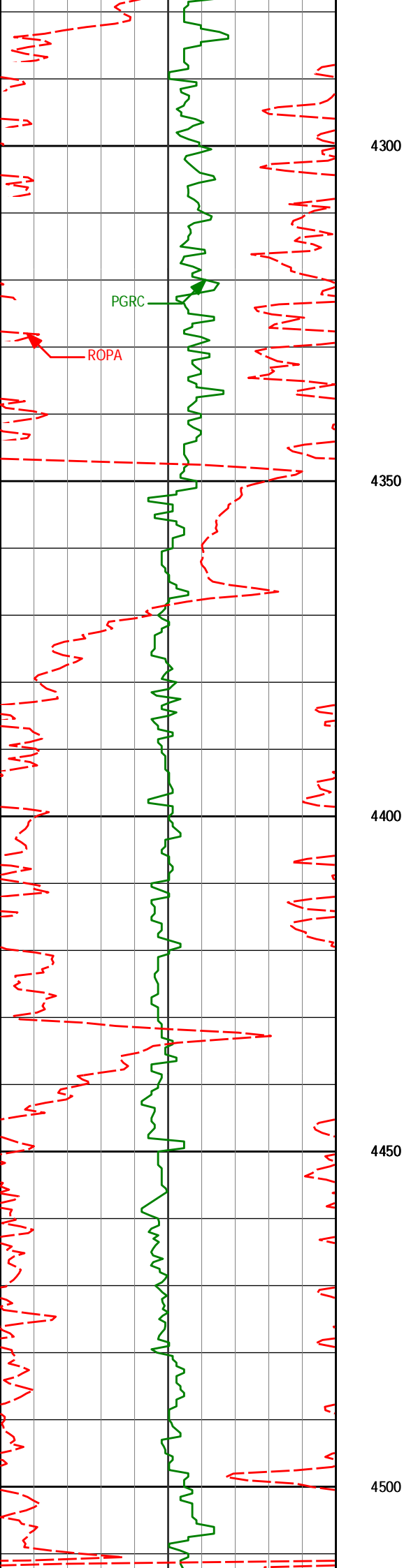
4257'

10.47°

201.67°

4212.81'

-423.62'



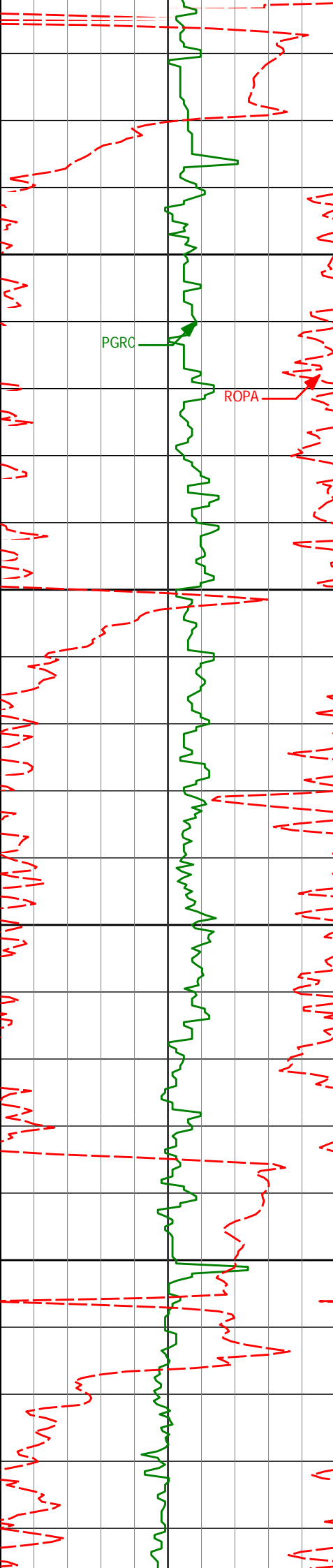
4434'

11.91°

207.70°

4386.44'

-454.96'



4550

4605'

11.10°

205.27°

4554.00'

-485.69'

PGRC

ROPA

4600

4650

4700

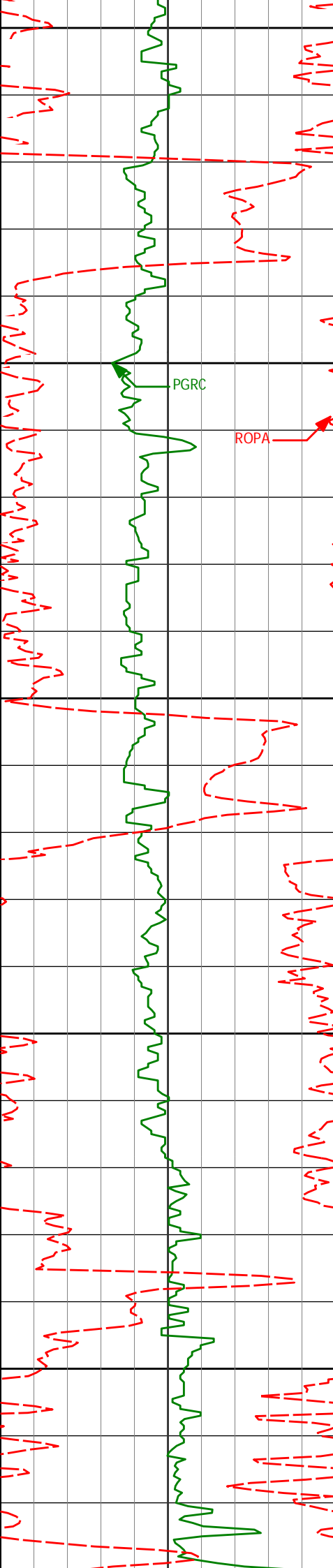
4776'

10.58°

198.59°

4721.96'

-515.63'



4750

4800

4850

4900

4950

PGRC

ROPA

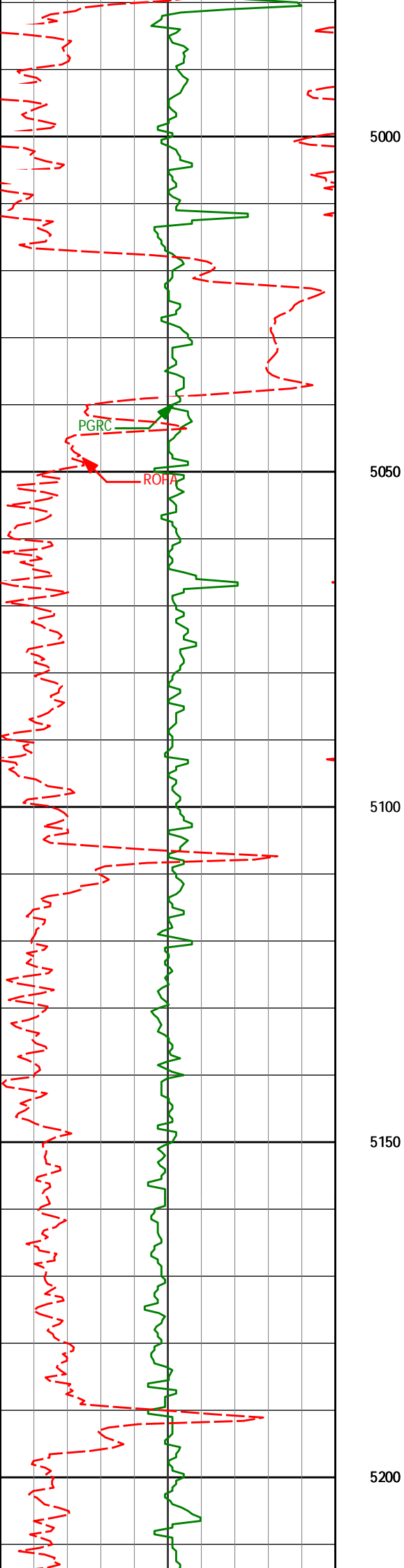
4947'

12.84°

202.96°

4889.39'

-548.19'



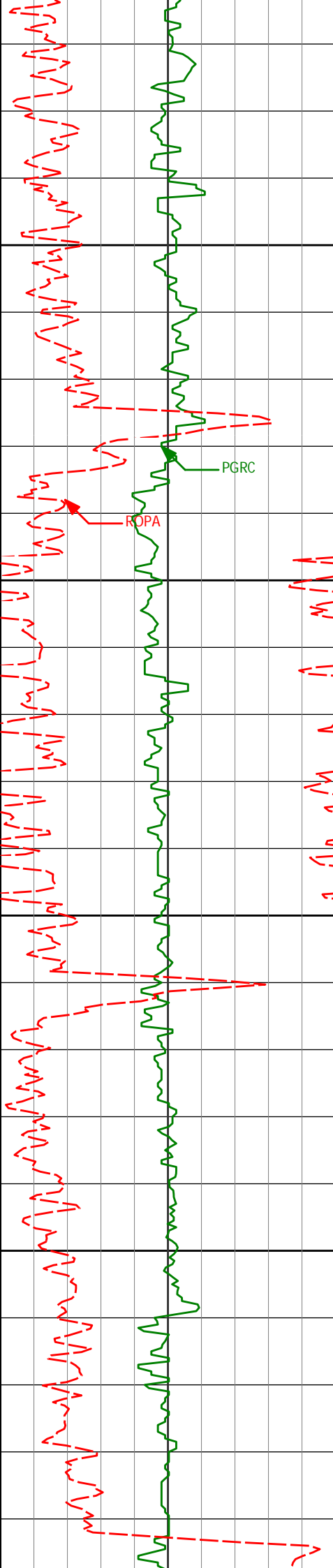
5118'

11.82°

211.04°

5056.46'

-580.93'



5250

5300

5350

5400

5289'

10.91°

209.15°

5224.10'

-610.32'

PGRC

ROPA

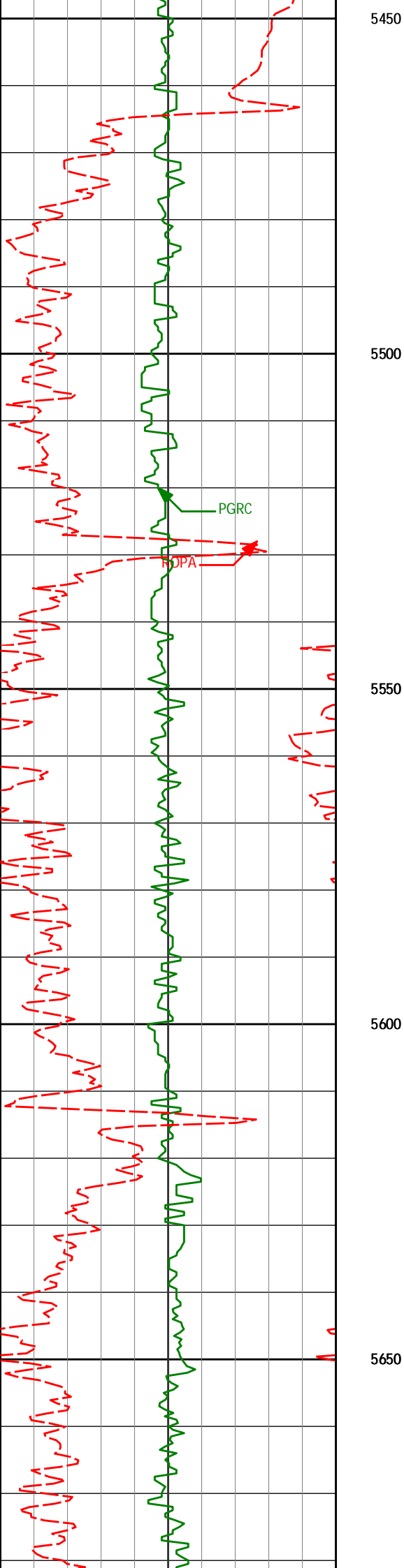
5461'

10.04°

207.58°

5393.23'

-638.04'



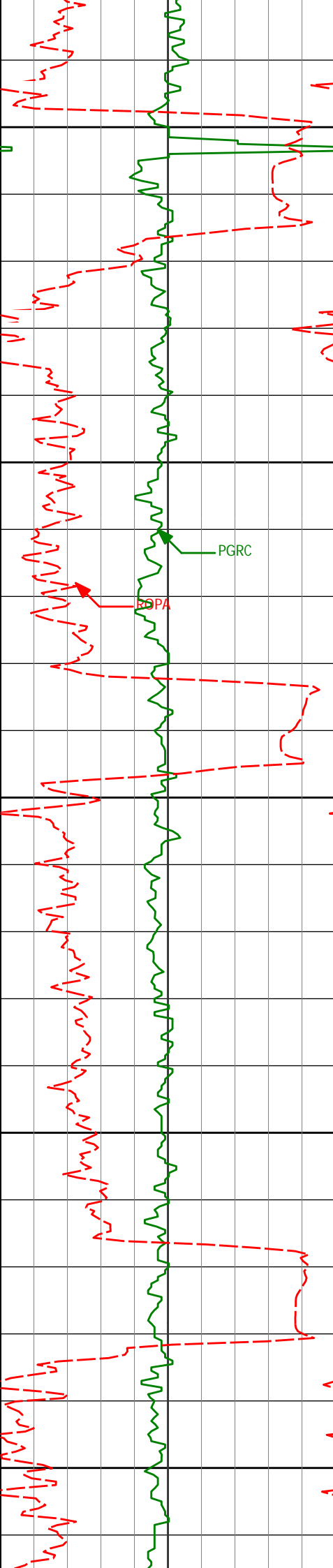
5632'

10.83°

205.10°

5561.40'

-666.00'



5700

5750

5800

5850

5900

5804'

10.17°

197.12°

5730.53'

-695.31'

PGRC

BOPA

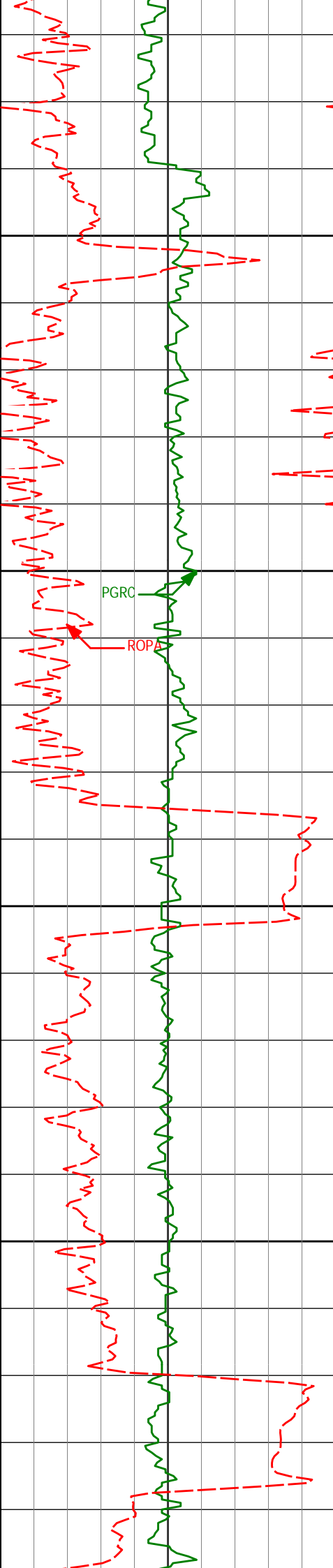
5975'

10.79°

204.37°

5898.68'

-724.48'



5950

6000

6050

6100

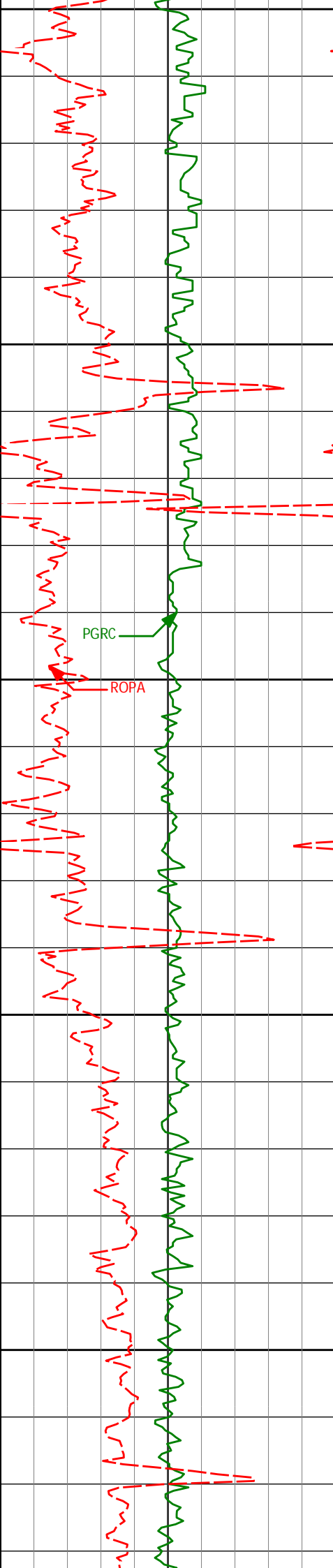
6147'

9.85°

211.84°

6067.90'

-751.86'



6150

6200

6250

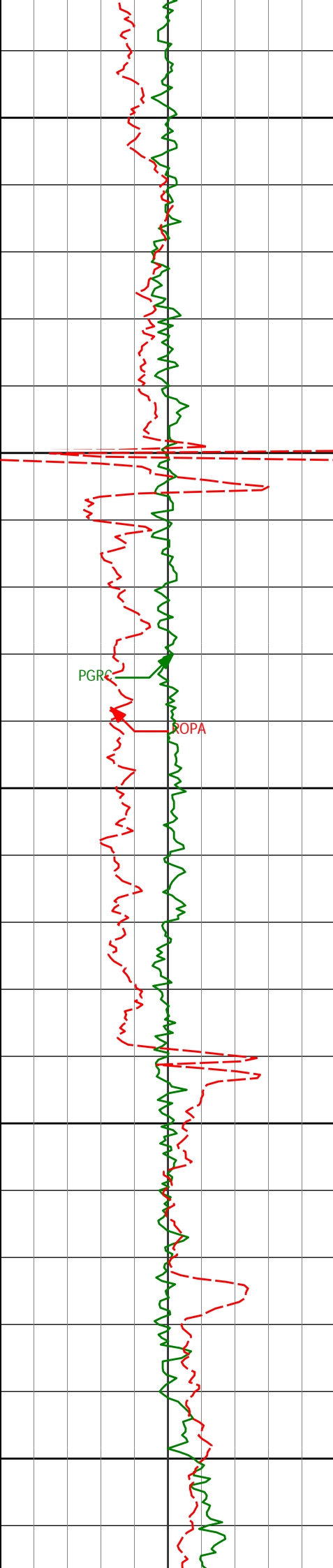
6300

6350

6232'	10.80°	212.86°	6151.53'	-764.84'
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6318'	9.35°	210.63°	6236.20'	-777.74'
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6404'	8.12°	210.04°	6321.20'	-789.10'
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6400

6450

6500

6550

6600

PGR

POPA

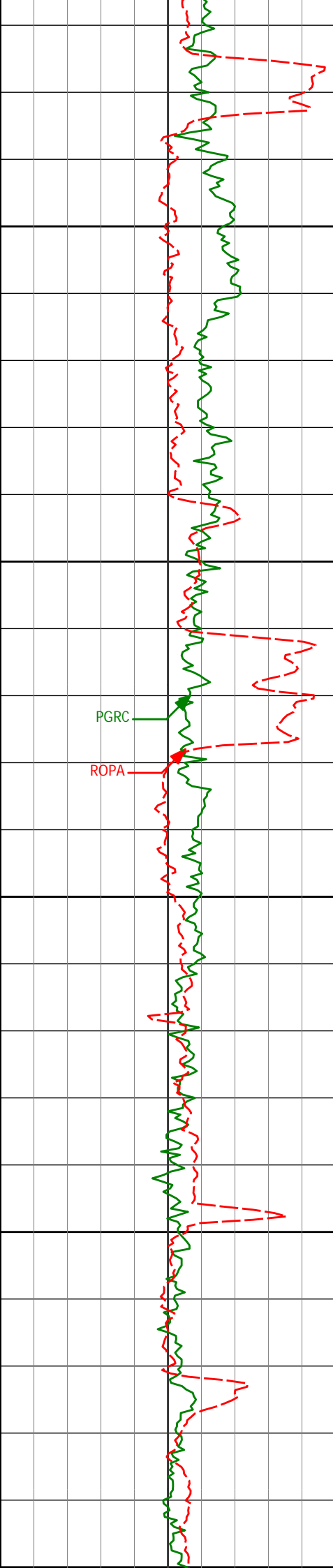
6575'

6.44°

210.26°

6490.81'

-807.99'



6650

6700

6750

6800

6850

6747'

4.81°

214.95°

6661.98'

-822.36'

PGRC

ROPA

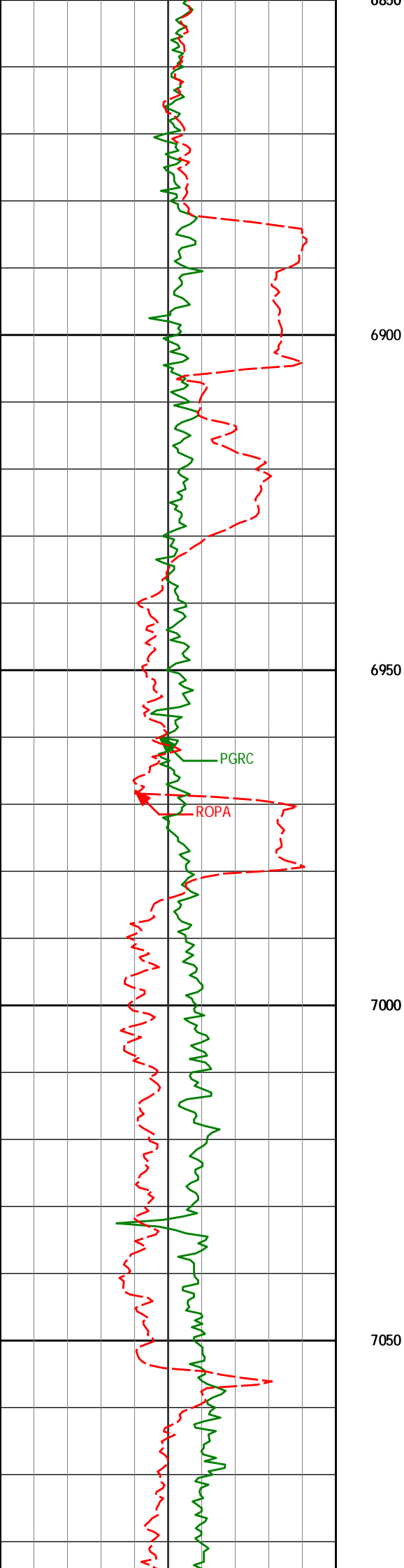
6918'

2.73°

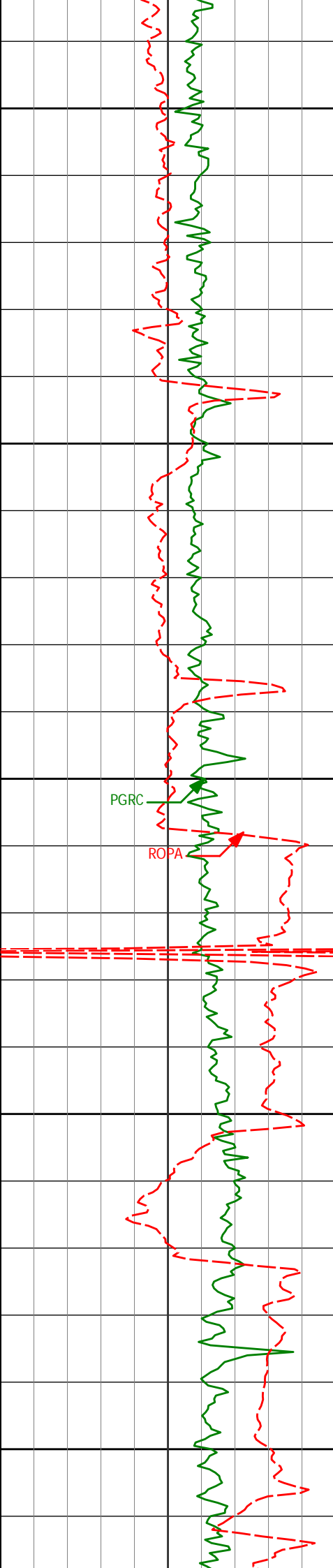
223.13°

6832.60'

-831.31'



7090' 0.48° 276.40° 7004.53' -834.28'



7100

7150

7200

7250

7300

7261'

0.60°

212.57°

7175.52'

-834.97'

7304'

1.93°

6.14°

7218.52'

-834.44'

7347'

4.07°

6.70°

7261.46'

-832.20'

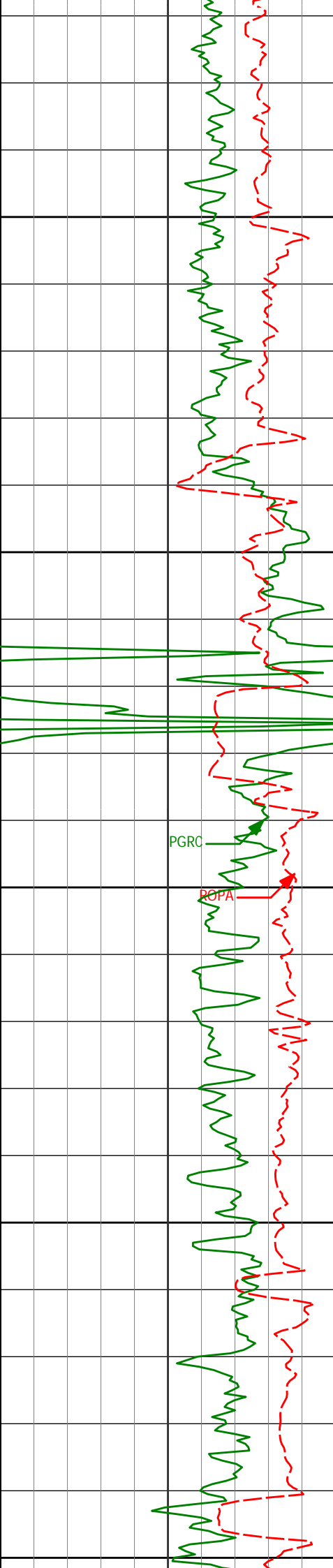
7390'

7.26°

355.41°

7304.24'

-827.97'



7350

7400

7450

7500

7550

7433'	12.74°	353.52°	7346.57'	-820.56'
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7476'	17.66°	357.81°	7388.06'	-809.33'
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7519'	20.36°	1.39°	7428.71'	-795.34'
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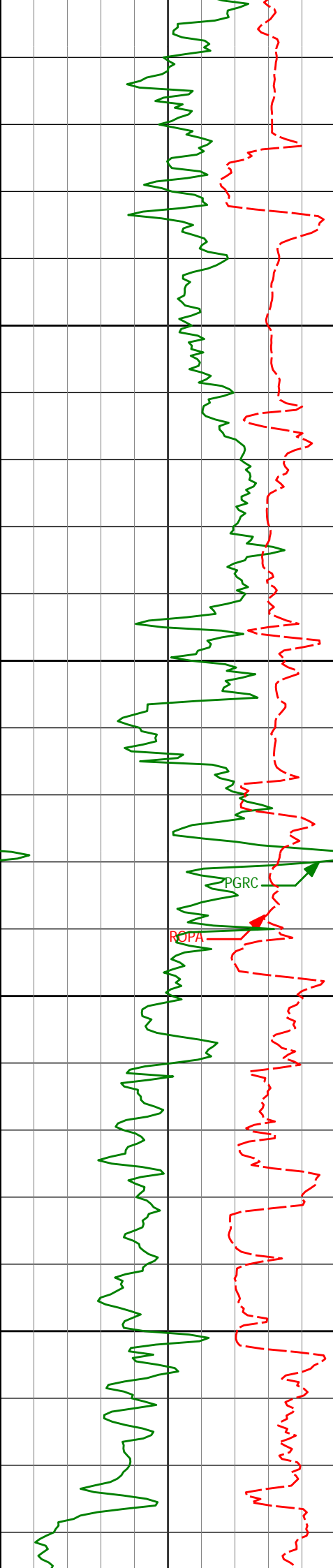
7561'	24.13°	0.91°	7467.57'	-779.44'
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7604'	28.92°	1.51°	7506.04'	-760.24'
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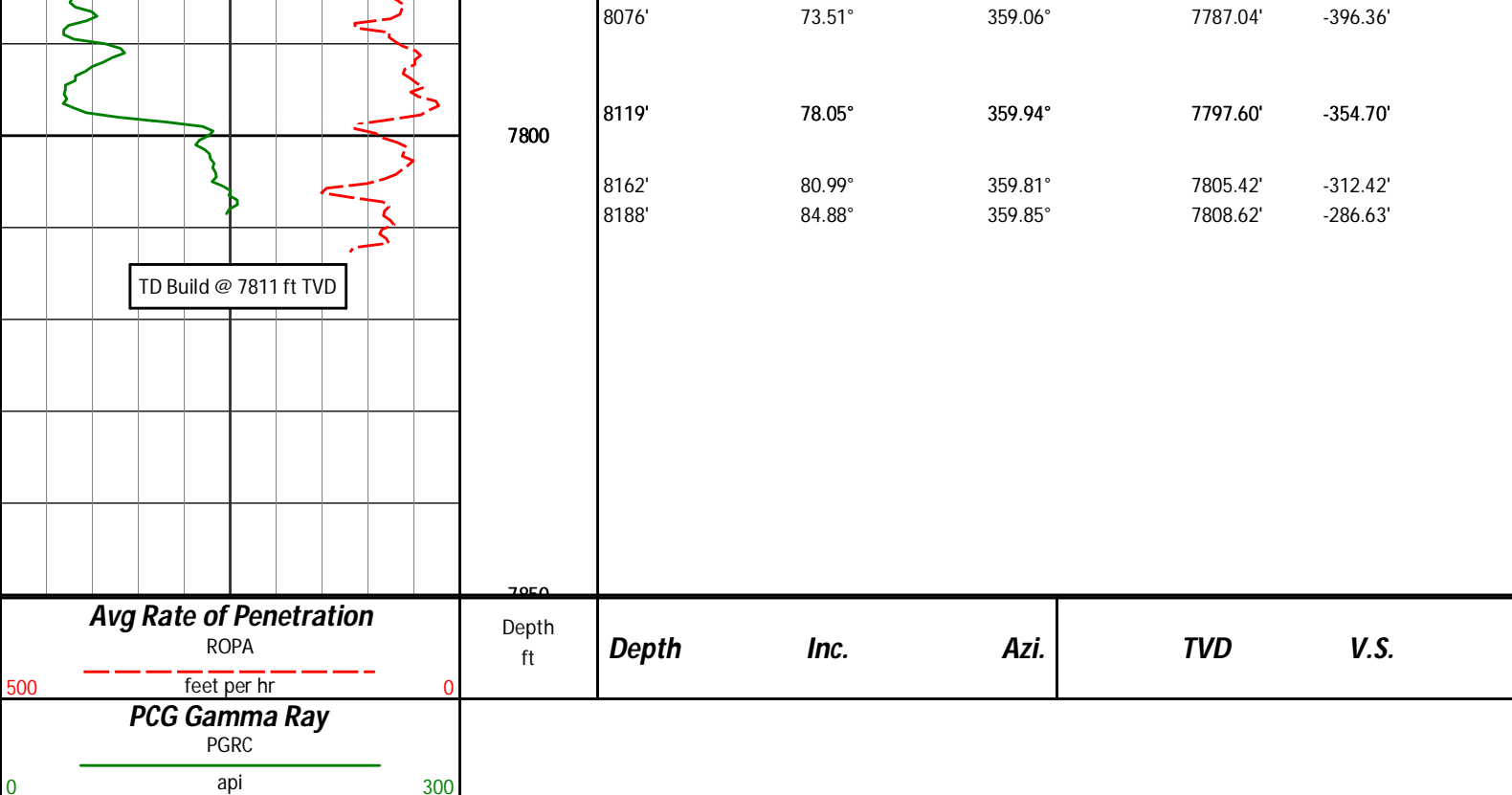
7647'	32.93°	2.51°	7542.92'	-738.15'
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PGRC

POPA



7600	7690'	36.27°	2.81°	7578.31'	-713.75'
	7733'	41.33°	6.15°	7611.81'	-686.88'
7650	7776'	47.46°	6.28°	7642.52'	-656.95'
	7819'	52.86°	4.10°	7670.06'	-624.04'
7700	7862'	57.96°	2.57°	7694.46'	-588.68'
	7905'	61.19°	2.45°	7716.23'	-551.63'
7750	7947'	62.93°	2.70°	7735.91'	-514.54'
	7990'	63.81°	1.48°	7755.19'	-476.11'
	8033'	67.80°	359.78°	7772.81'	-436.90'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation
UNDERHILL 2C-17HZ
Wattenberg
Weld Colorado
USA
CA-XX-0900550721

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
894.00	0.24	146.01	893.98	3.22 N	0.80 E	3.23	TIE-IN
1018.00	0.28	299.36	1017.98	3.15 N	0.68 E	3.16	0.41
1113.00	0.11	305.46	1112.98	3.32 N	0.41 E	3.33	0.18
1305.00	0.26	265.60	1304.98	3.39 N	0.19 W	3.39	0.10
1495.00	0.48	229.18	1494.97	2.84 N	1.22 W	2.82	0.16
1591.00	2.37	231.31	1590.94	1.34 N	3.08 W	1.29	1.98
1686.00	3.77	227.07	1685.80	2.02 S	6.90 W	-2.12	1.49
1779.00	6.39	221.70	1778.43	7.97 S	12.58 W	-8.15	2.86
1871.00	7.66	213.19	1869.74	16.93 S	19.35 W	-17.21	1.78
1962.00	9.77	207.47	1959.68	28.85 S	26.23 W	-29.23	2.50
2054.00	11.76	206.09	2050.06	44.20 S	33.95 W	-44.68	2.18
2146.00	11.44	205.57	2140.18	60.85 S	42.01 W	-61.45	0.36
2239.00	11.04	204.95	2231.40	77.24 S	49.75 W	-77.95	0.46
2330.00	10.74	203.42	2320.76	92.92 S	56.80 W	-93.73	0.45
2422.00	11.33	204.45	2411.06	109.02 S	63.94 W	-109.93	0.67
2514.00	10.61	204.08	2501.38	124.97 S	71.14 W	-125.99	0.79
2606.00	11.98	204.52	2591.59	141.39 S	78.55 W	-142.51	1.49
2791.00	10.35	201.55	2773.09	174.31 S	92.62 W	-175.63	0.93
2974.00	10.29	205.48	2953.13	204.35 S	105.69 W	-205.86	0.39
3158.00	11.50	211.59	3133.82	234.80 S	122.37 W	-236.55	0.91
3342.00	10.96	212.56	3314.30	265.17 S	141.39 W	-267.19	0.31
3526.00	11.35	206.28	3494.82	296.16 S	158.83 W	-298.43	0.69
3708.00	9.59	205.15	3673.78	325.95 S	173.21 W	-328.43	0.97
3891.00	11.77	206.22	3853.60	356.50 S	187.94 W	-359.19	1.20
4075.00	10.98	204.16	4033.99	389.33 S	203.40 W	-392.24	0.48
4257.00	10.47	201.67	4212.81	420.53 S	216.61 W	-423.62	0.38
4434.00	11.91	207.70	4386.44	451.66 S	231.04 W	-454.96	1.05
4605.00	11.10	205.27	4554.00	482.17 S	246.27 W	-485.69	0.55
4776.00	10.58	198.59	4721.96	511.94 S	258.31 W	-515.63	0.79
4947.00	12.84	202.96	4889.39	544.32 S	270.72 W	-548.19	1.42

5118.00	11.82	211.04	5056.46	576.83 S	287.17 W	-580.93	1.17
5289.00	10.91	209.15	5224.10	605.98 S	304.09 W	-610.32	0.58
5461.00	10.04	207.58	5393.23	633.48 S	318.96 W	-638.04	0.53
5632.00	10.83	205.10	5561.40	661.25 S	332.68 W	-666.00	0.53
5804.00	10.17	197.12	5730.53	690.40 S	344.01 W	-695.31	0.93
5975.00	10.79	204.37	5898.68	719.42 S	355.06 W	-724.48	0.85
6147.00	9.85	211.84	6067.90	746.59 S	369.47 W	-751.86	0.95
6232.00	10.80	212.86	6151.53	759.45 S	377.62 W	-764.84	1.13
6318.00	9.35	210.63	6236.20	772.23 S	385.56 W	-777.74	1.74
6404.00	8.12	210.04	6321.20	783.50 S	392.16 W	-789.10	1.44
6575.00	6.44	210.26	6490.81	802.24 S	403.03 W	-807.99	0.98
6747.00	4.81	214.95	6661.98	816.48 S	412.02 W	-822.36	0.98
6918.00	2.73	223.13	6832.60	825.33 S	418.92 W	-831.31	1.25
7090.00	0.48	276.40	7004.53	828.24 S	422.44 W	-834.28	1.44
7261.00	0.60	212.57	7175.52	828.92 S	423.63 W	-834.97	0.34
7304.00	1.93	6.14	7218.52	828.39 S	423.68 W	-834.44	5.76
7347.00	4.07	6.70	7261.46	826.15 S	423.42 W	-832.20	4.98
7390.00	7.26	355.41	7304.24	821.92 S	423.46 W	-827.97	7.84
7433.00	12.74	353.52	7346.57	814.50 S	424.21 W	-820.56	12.75
7476.00	17.66	357.81	7388.06	803.26 S	425.00 W	-809.33	11.75
7519.00	20.36	1.39	7428.71	789.26 S	425.07 W	-795.34	6.83
7561.00	24.13	0.91	7467.57	773.36 S	424.75 W	-779.44	8.99
7604.00	28.92	1.51	7506.04	754.17 S	424.34 W	-760.24	11.14
7647.00	32.93	2.51	7542.92	732.09 S	423.55 W	-738.15	9.42
7690.00	36.27	2.81	7578.31	707.70 S	422.41 W	-713.75	7.76
7733.00	41.33	6.15	7611.81	680.87 S	420.27 W	-686.88	12.74
7776.00	47.46	6.28	7642.52	650.97 S	417.01 W	-656.95	14.27
7819.00	52.86	4.10	7670.06	618.10 S	414.05 W	-624.04	13.14
7862.00	57.96	2.57	7694.46	582.78 S	412.00 W	-588.68	12.22
7905.00	61.19	2.45	7716.23	545.74 S	410.38 W	-551.63	7.51
7947.00	62.93	2.70	7735.91	508.67 S	408.71 W	-514.54	4.18
7990.00	63.81	1.48	7755.19	470.26 S	407.31 W	-476.11	3.26
8033.00	67.80	359.78	7772.81	431.05 S	406.89 W	-436.90	9.96
8076.00	73.51	359.06	7787.04	390.50 S	407.30 W	-396.36	13.37
8119.00	78.05	359.94	7797.60	348.83 S	407.66 W	-354.70	10.75
8162.00	80.99	359.81	7805.42	306.55 S	407.75 W	-312.42	6.83
8188.00	84.88	359.85	7808.62	280.75 S	407.83 W	-286.63	14.97

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 0.83 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.65 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 8188.00 FEET
IS 495.12 FEET ALONG 235.46 DEGREES (TRUE)**