



WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	07-Dec-12	09-Dec-12			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	643.00	5,862.72			
Log End Depth (TVD, ft)	5,862.72	6,639.58			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	06-Dec-12 21:30	08-Dec-12 01:00			
Drill/Wipe End Date and Time	07-Dec-12 17:00	09-Dec-12 03:00			
Min Inc (deg) @ Depth (TVD, ft)	0 @ 684.00	3.59 @ 5,942.66			
Max Inc (deg) @ Depth (TVD, ft)	13.81 @ 2,928.63	86.32 @ 6,636.94			
Bit TFA(in2) / Bit Type	.90 / PDC	.98 / PDC			
Flow Rate (gpm)	523.75	556.40			
Max AV (fpm) / CV (fpm) @ MWD	427.2 / NA	395.3 / NA			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.75 / 29.00	9.85 / 36.00			
Filtrate CL (ppm)	1,800.00	2,000.00			
pH / Fluid Loss (mptm)	9.80 / NA	12.50 / NA			
PV (cP) / YP (Ihf2)	4 / 4.00	12 / 11.00			
% Solids / % Sand	3.2 / .40	8.9 / .15			
% Oil / Oil:Water Ratio	0 / 0:96.5	0 / 0:94.5			
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA			
Max Tool Temp (deg F) / S	151.00 / PDM	120.00 / PDM			

Max Tool Temp (degF) / Source	154.30 / PCM	162.80 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 154.30	NA @ 162.80			
Lead MWD Engineer	Ryan Brunkhorst	Ryan Brunkhorst			
Customer Representative	Matt Settles	Matt Settles			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	11331929	11331929			
Insert Serial Number	11055839	11055839			
Date and Time Initialized	01-Dec-12 23:53	01-Dec-12 23:53			
Date and Time Read	09-Dec-12 08:40	09-Dec-12 08:46			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	57.00			
Software Version	6.21	6.21			
Sub Serial Number	11331929	11331929			
Sonde Serial Number	11638498	11638498			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	69.27	195.54			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.65	49.69			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11331929	11331929			
Insert/Sonde Serial Number	11681015	11681015			

REMARKS

1. All depths are true vertical bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
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
6. INSITE version 7.4.01

WARRANTY

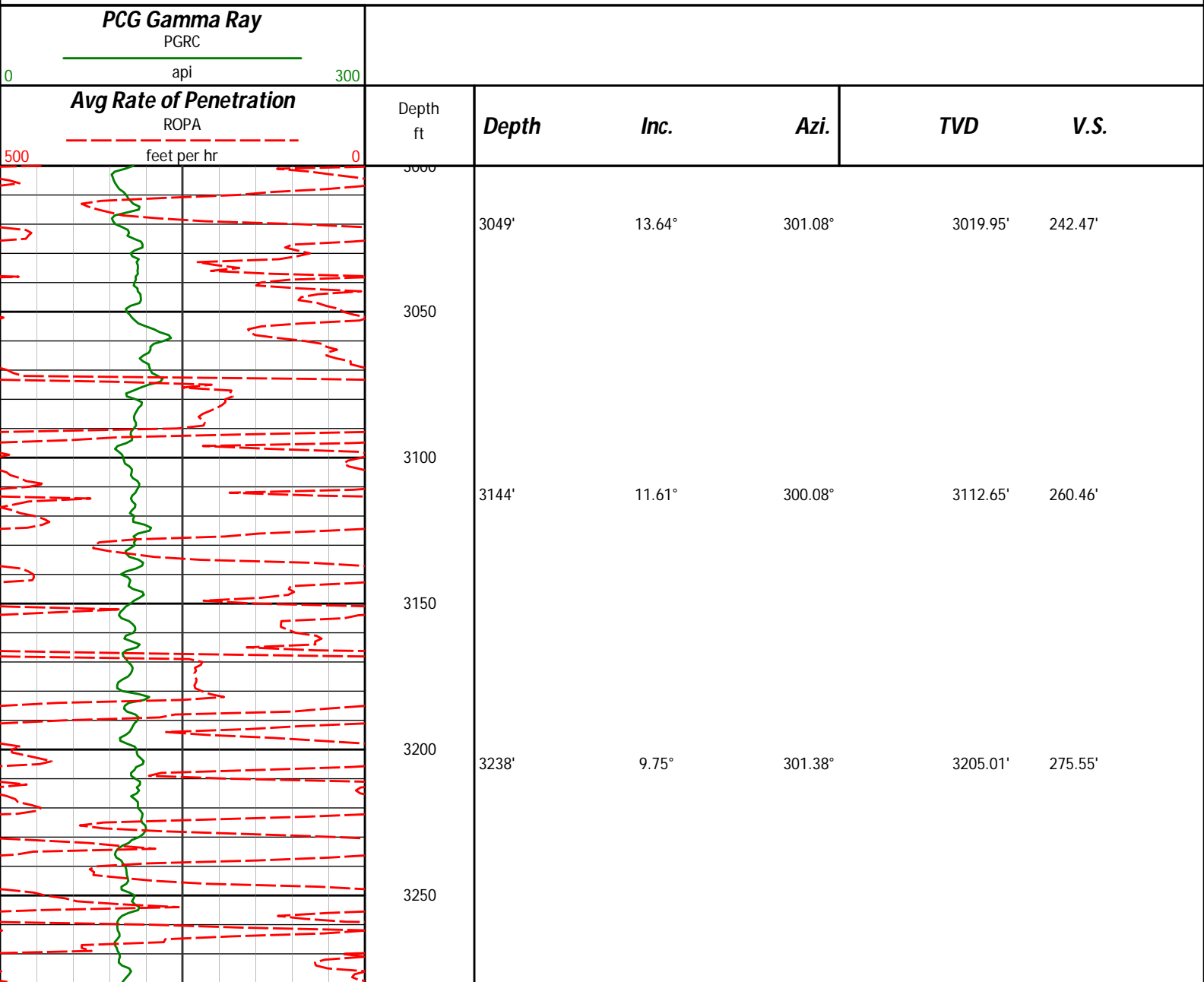
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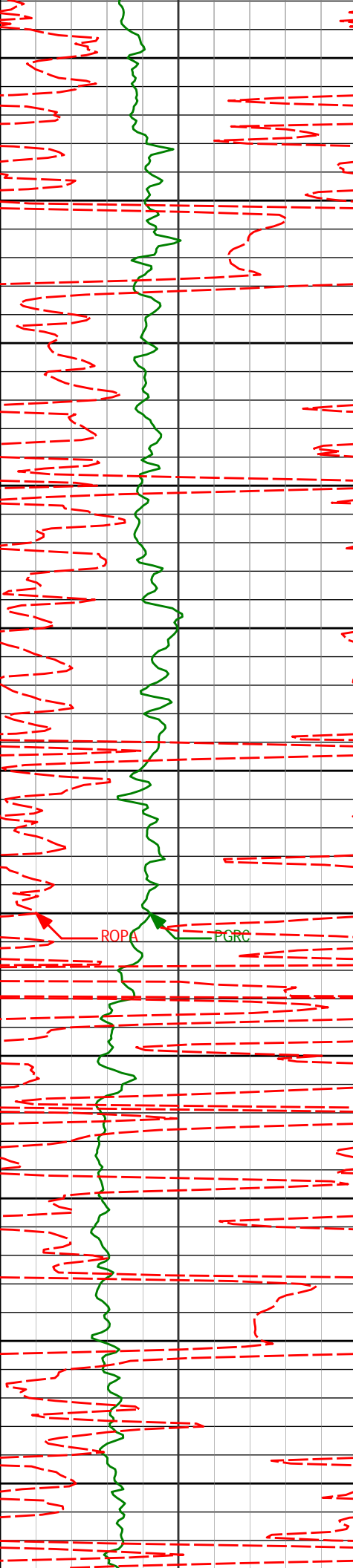
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Sperry Drilling Services

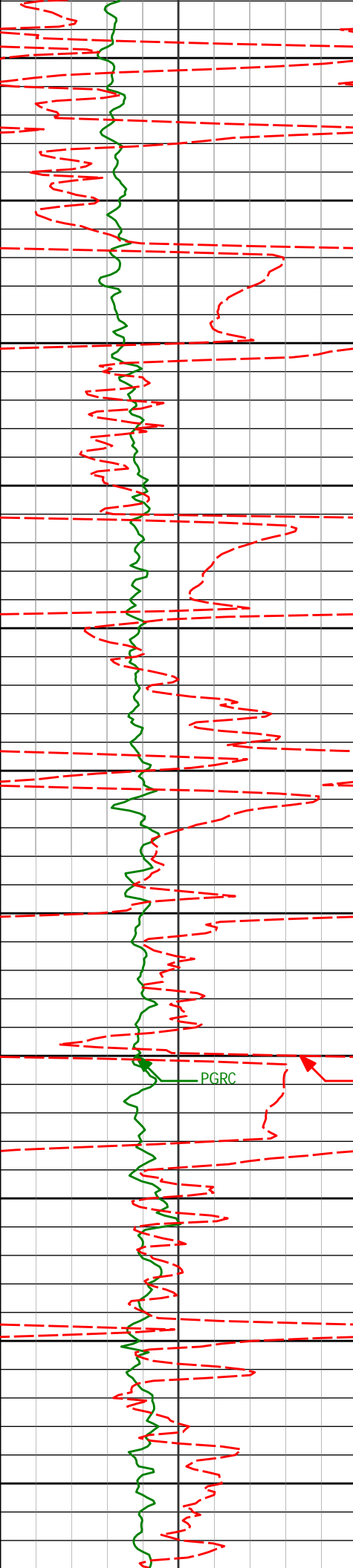
TVD Main Log 1:600

Noble Energy
Wells Ranch State USX AA16-67-1HNL
H&P 343
T6N-R63W





3300	3333'	8.26°	304.99°	3298.84'	288.11'
3350					
3400	3427'	6.39°	299.30°	3392.07'	298.28'
3450					
3500	3522'	5.13°	297.15°	3486.59'	306.72'
3550					
3600	3616'	4.78°	293.69°	3580.24'	314.10'
3650					
3700	3710'	5.09°	293.97°	3673.89'	321.53'
3750					
3800	3804'	3.60°	294.57°	3767.61'	328.06'



3850

3899'

3.85°

290.64°

3862.41'

333.78'

3900

3950

3993'

2.46°

264.91°

3956.27'

338.75'

4000

4050

4088'

1.63°

196.60°

4051.22'

341.15'

4100

4150

4182'

1.51°

65.81°

4145.21'

340.39'

4200

PGRC

ROPA

4250

4300

4350

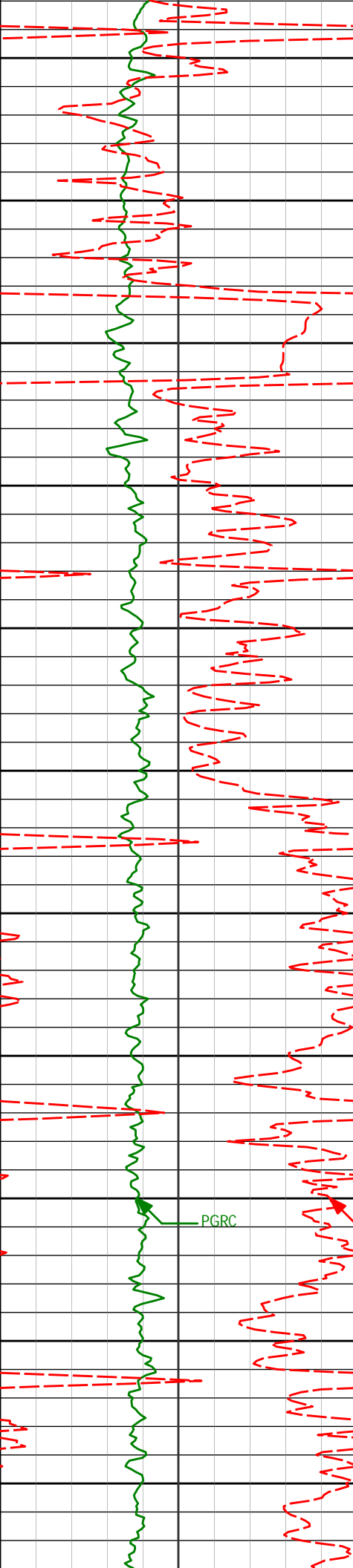
4371'

1.27°

112.71°

4334.18'

337.65'



4400

4466'

2.14°

113.99°

4429.14'

335.05'

4450

4500

4560'

0.86°

143.23°

4523.11'

333.01'

4550

4600

4655'

1.76°

142.49°

4618.08'

331.67'

4650

4700

4749'

1.64°

116.34°

4712.04'

329.57'

4750

4800

4843'

1.32°

99.18°

4806.01'

327.29'

4850

4900

4938'

1.69°

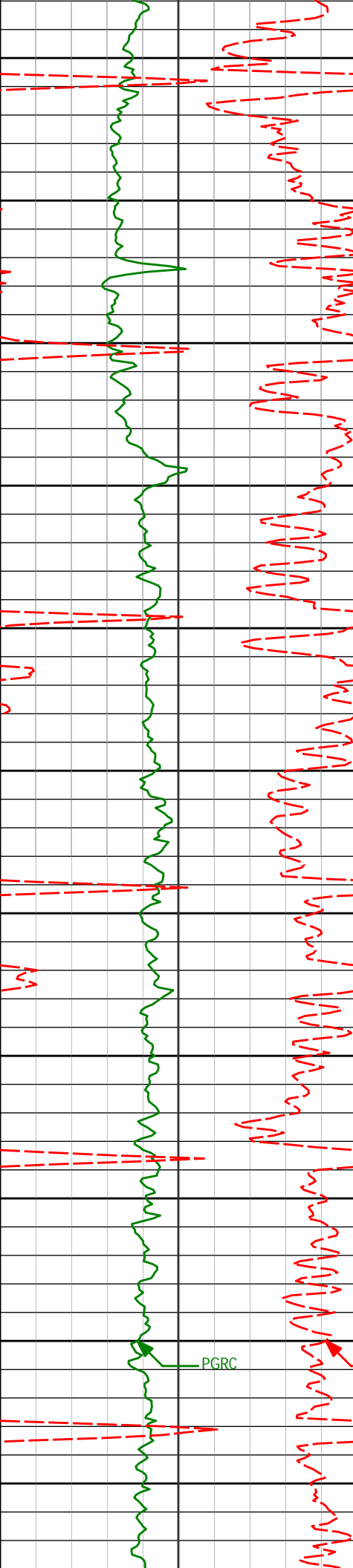
54.82°

4900.98'

325.08'

PGRC

ROPA



4950

5000

5050

5100

5150

5200

5250

5300

5350

5400

5450

5032'

1.55°

49.04°

4994.94'

323.00'

5127'

1.40°

40.93°

5089.91'

321.29'

5221'

1.25°

39.83°

5183.89'

319.90'

5316'

1.14°

52.12°

5278.87'

318.51'

5411'

1.09°

24.40°

5373.85'

317.40'

5504'

1.32°

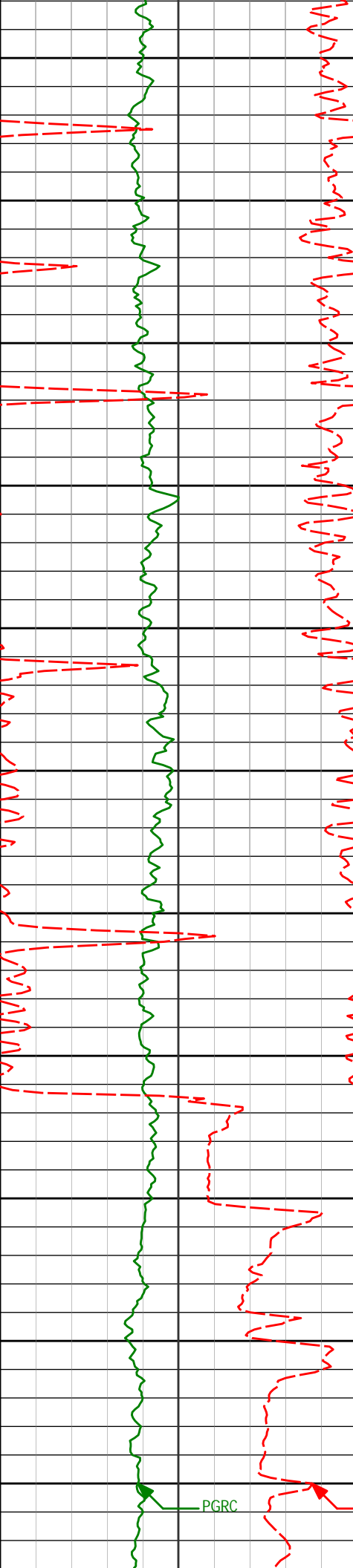
31.46°

5466.83'

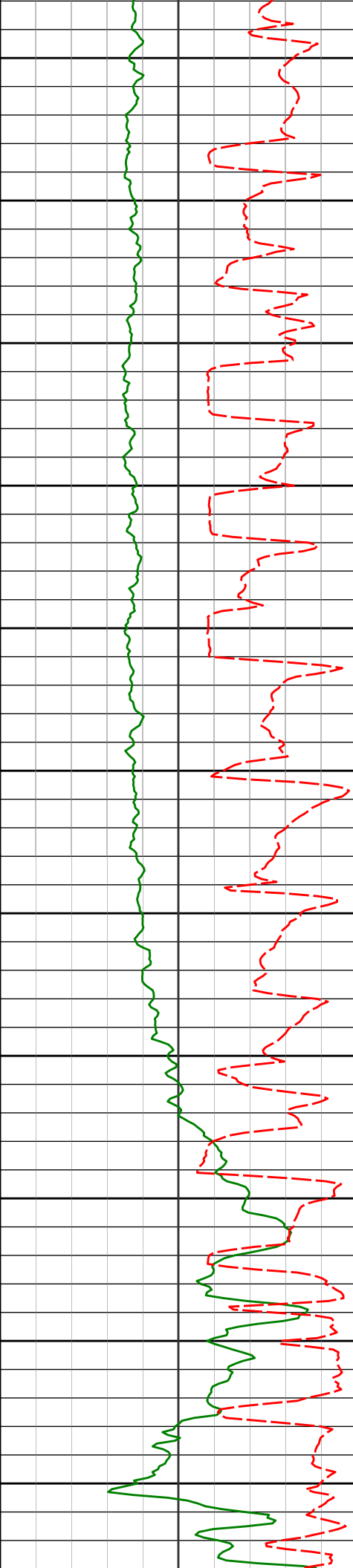
316.50'

PGRC

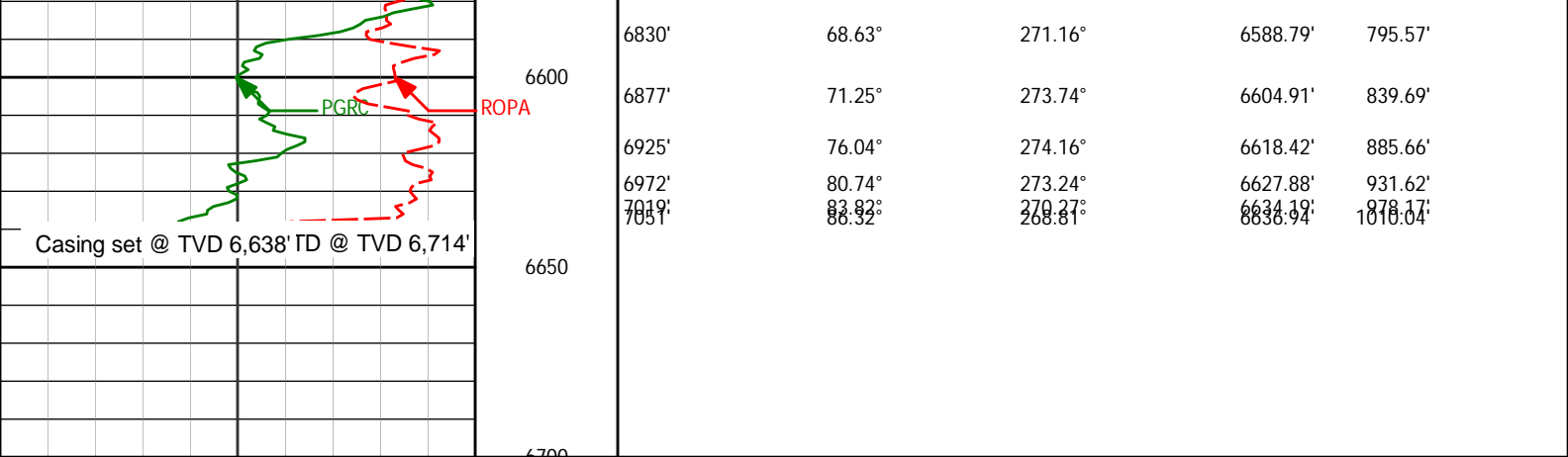
ROPA



5500				
5550				
5599'	1.28°	31.14°	5561.80'	315.40'
5600				
5650				
5693'	1.42°	43.19°	5655.78'	314.08'
5700				
5750				
5788'	1.46°	47.86°	5750.75'	312.39'
5800				
5844'	1.36°	52.62°	5806.73'	311.35'
5850				
5886'	1.39°	54.27°	5848.72'	310.55'
<Run 200>				
5900				
5980'	3.59°	280.73°	5942.66'	312.53'
5950				
6027'	8.98°	272.38°	5989.37'	317.65'
6000				



	6074'	14.46°	266.77°	6035.37'	327.18'
6050					
	6121'	18.13°	262.51°	6080.48'	340.27'
6100					
	6169'	20.95°	259.93°	6125.71'	356.10'
6150					
	6216'	22.91°	261.67°	6169.31'	373.39'
6200					
	6263'	24.97°	261.85°	6212.26'	392.23'
6250					
	6310'	27.73°	262.04°	6254.37'	412.85'
6300					
	6358'	30.33°	262.48°	6296.34'	435.89'
6350					
	6405'	35.80°	261.19°	6335.71'	461.22'
6400					
	6453'	42.47°	261.44°	6372.92'	491.09'
6450					
	6500'	46.21°	264.61°	6406.53'	523.64'
6500					
	6547'	47.90°	267.17°	6438.56'	557.92'
6550					
	6594'	50.79°	269.31°	6469.18'	593.53'
	6641'	53.68°	267.90°	6497.96'	630.66'
	6688'	57.45°	267.42°	6524.53'	669.36'
	6736'	60.94°	267.40°	6549.11'	710.51'
	6783'	65.25°	267.55°	6570.37'	752.35'



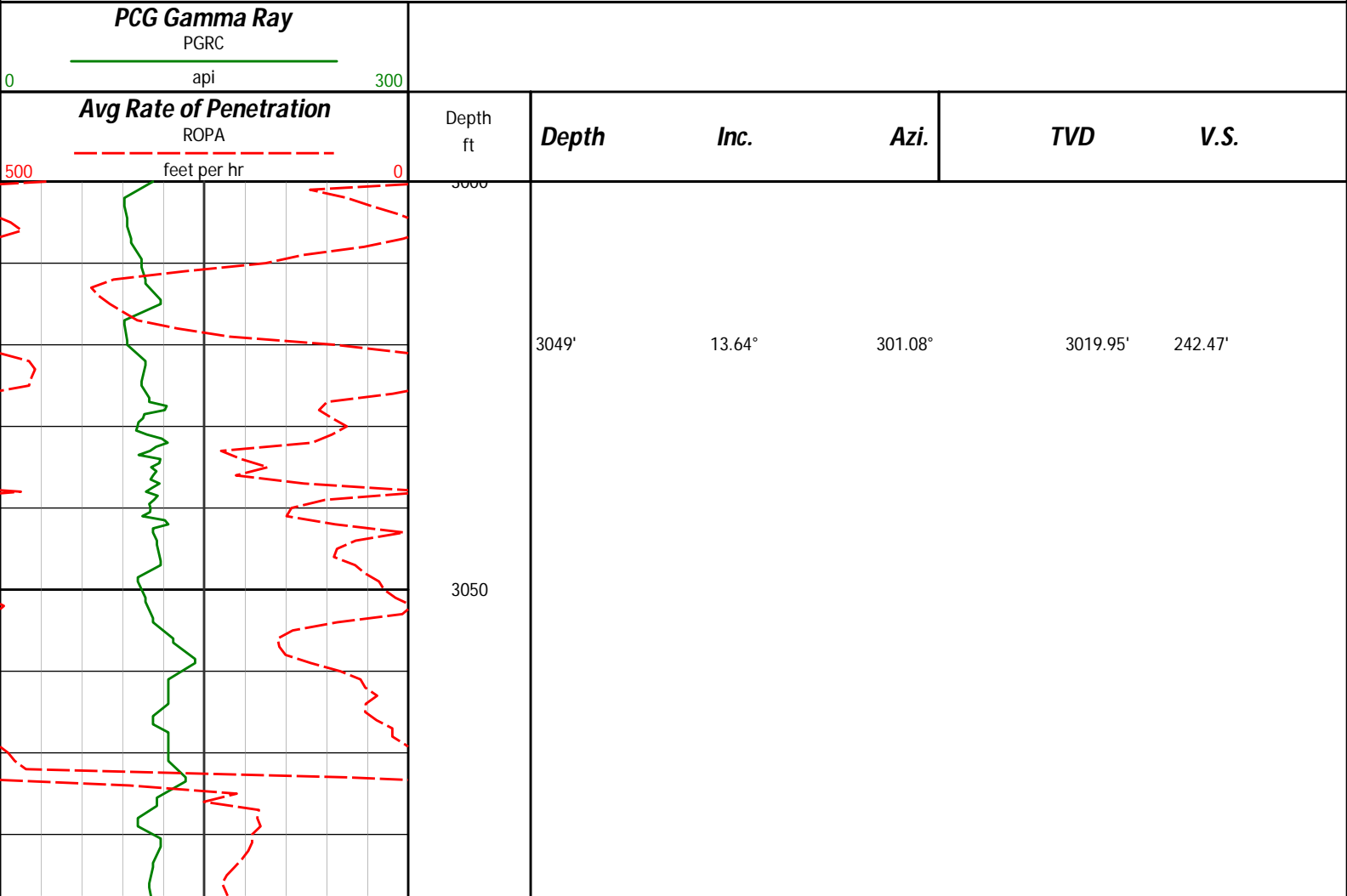
Avg Rate of Penetration ROPA feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	0					
PCG Gamma Ray PGRC api						
0	300					

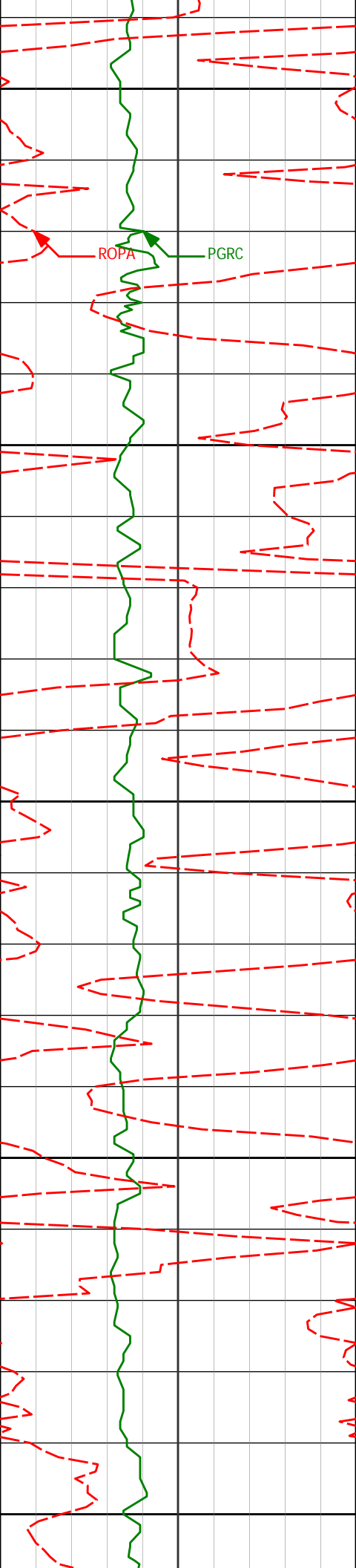
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Sperry Drilling Services

TVD Detail Log 1:240

Noble Energy
Wells Ranch State USX AA16-67-1HNL
H&P 343
T6N-R63W





3100

3144'

11.61°

300.08°

3112.65'

260.46'

ROPA

PGRC

3150

3200

3238'

9.75°

301.38°

3205.01'

275.55'

3250

3300

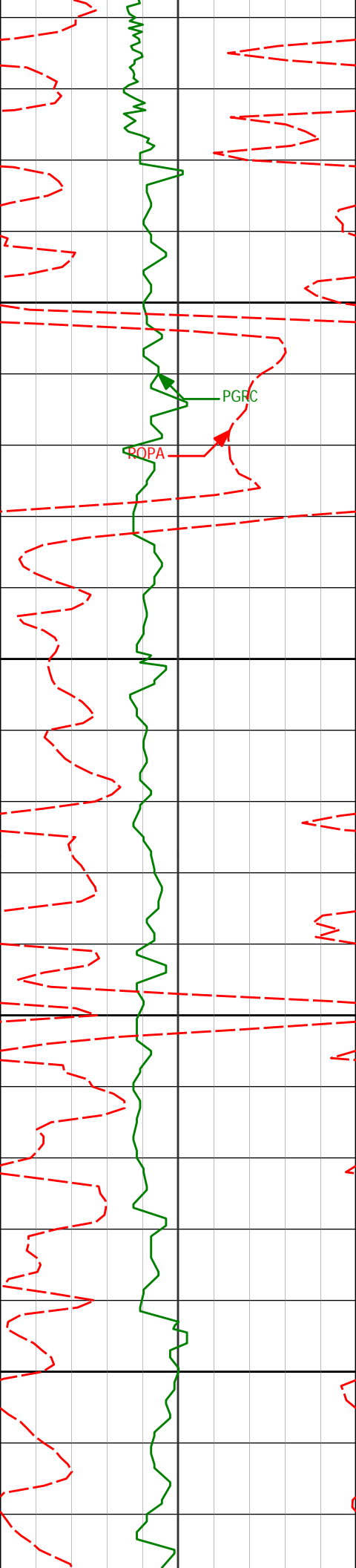
3333'

8.26°

304.99°

3298.84'

288.11'



3350

3400

3450

3500

3427'

6.39°

299.30°

3392.07'

298.28'

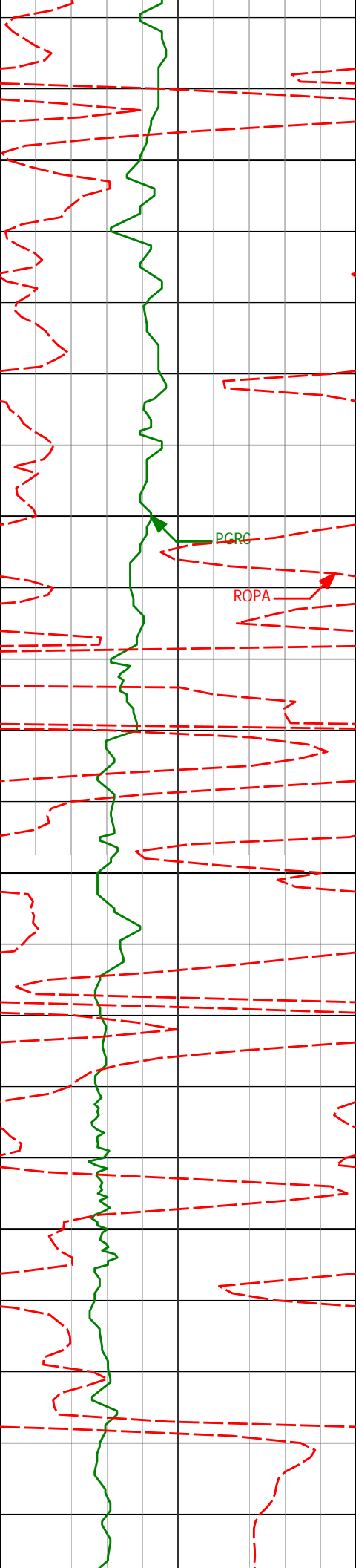
3522'

5.13°

297.15°

3486.59'

306.72'



3550

3616'

4.78°

293.69°

3580.24'

314.10'

3600

PGRC

ROPA

3650

3710'

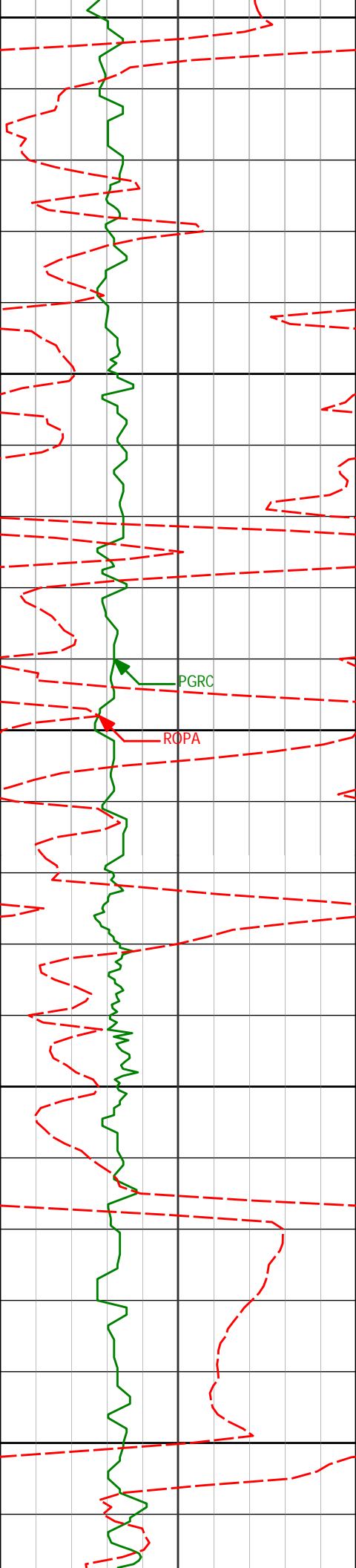
5.09°

293.97°

3673.89'

321.53'

3700



3750

3804'

3.60°

294.57°

3767.61'

328.06'

3800

3850

3899'

3.85°

290.64°

3862.41'

333.78'

3900

3950

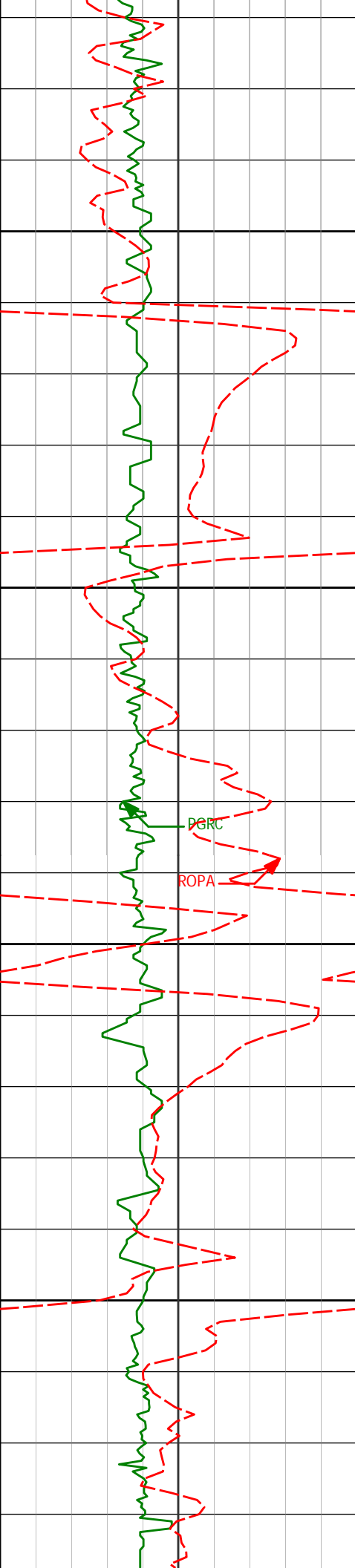
3993'

2.46°

264.91°

3956.27'

338.75'



4000

4050

4100

4150

4088'

1.63°

196.60°

4051.22'

341.15'

4182'

1.51°

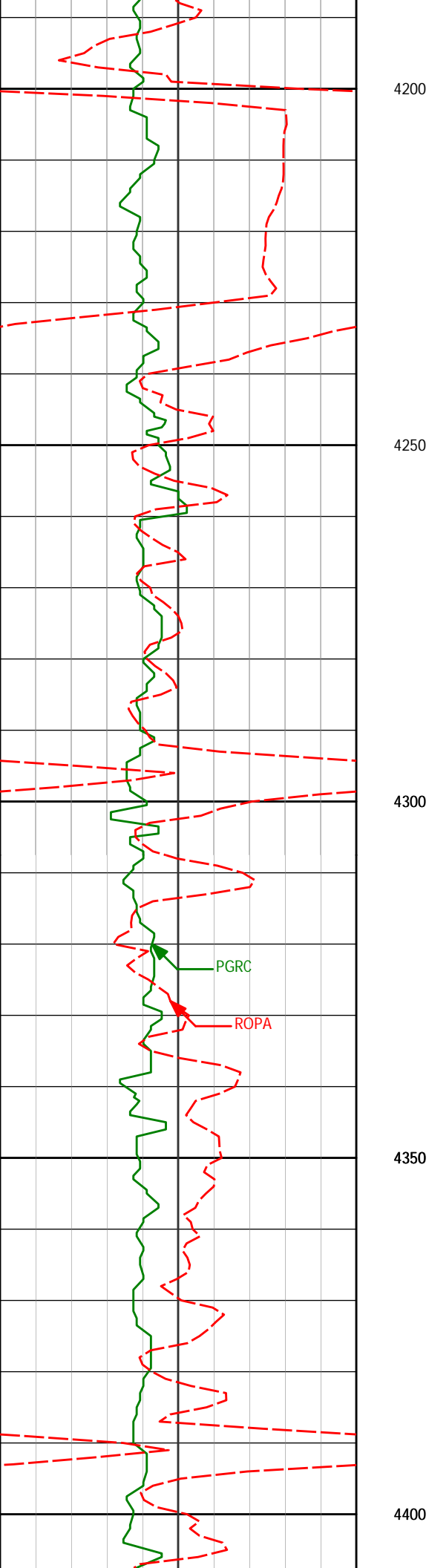
65.81°

4145.21'

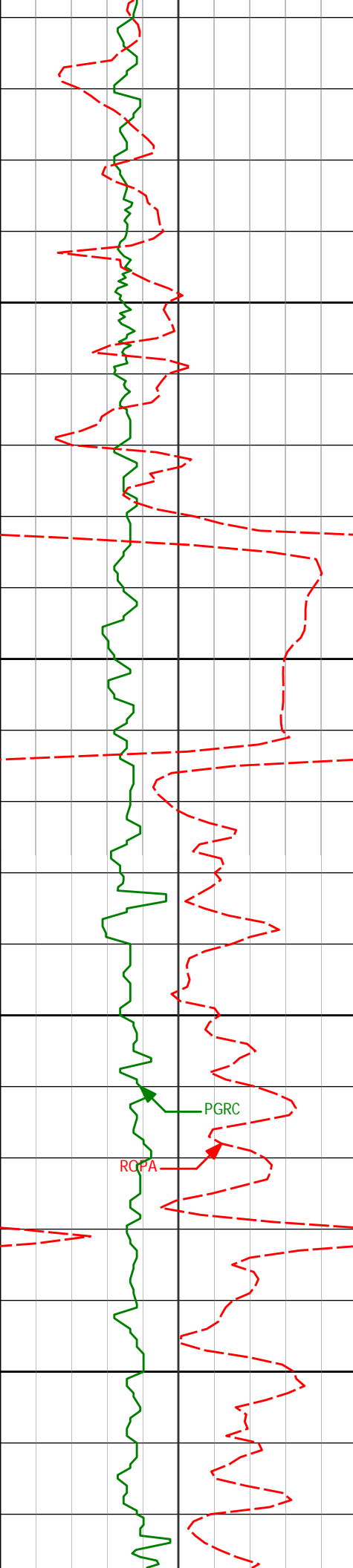
340.39'

DGRC

ROPA



4200				
4276'	0.46°	123.05°	4239.19'	338.95'
4250				
4300				
4371'	1.27°	112.71°	4334.18'	337.65'
4350				
4400				



4466'	2.14°	113.99°	4429.14'	335.05'
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4450

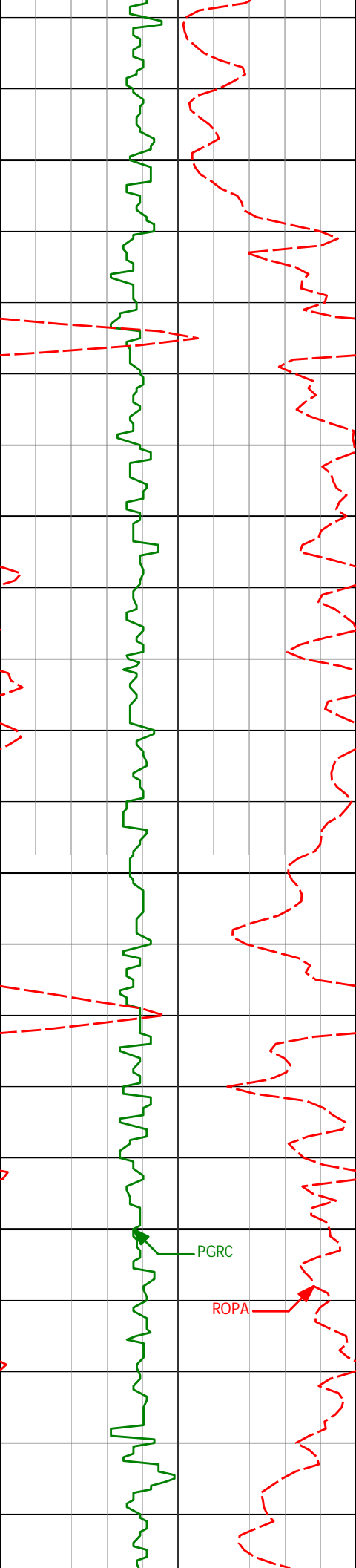
4500

4560'	0.86°	143.23°	4523.11'	333.01'
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4550

4600

4655'	1.76°	142.49°	4618.08'	331.67'
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4650

4700

4749'

1.64°

116.34°

4712.04'

329.57'

4750

4800

4843'

1.32°

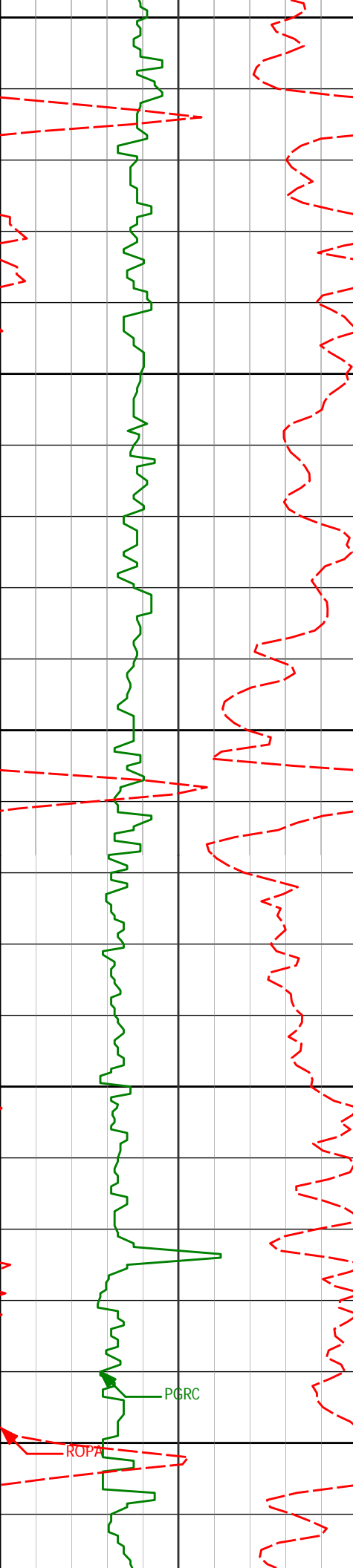
99.18°

4806.01'

327.29'

PGRC

ROPA



4850

4900

4950

5000

5050

4938'

1.69°

54.82°

4900.98'

325.08'

5032'

1.55°

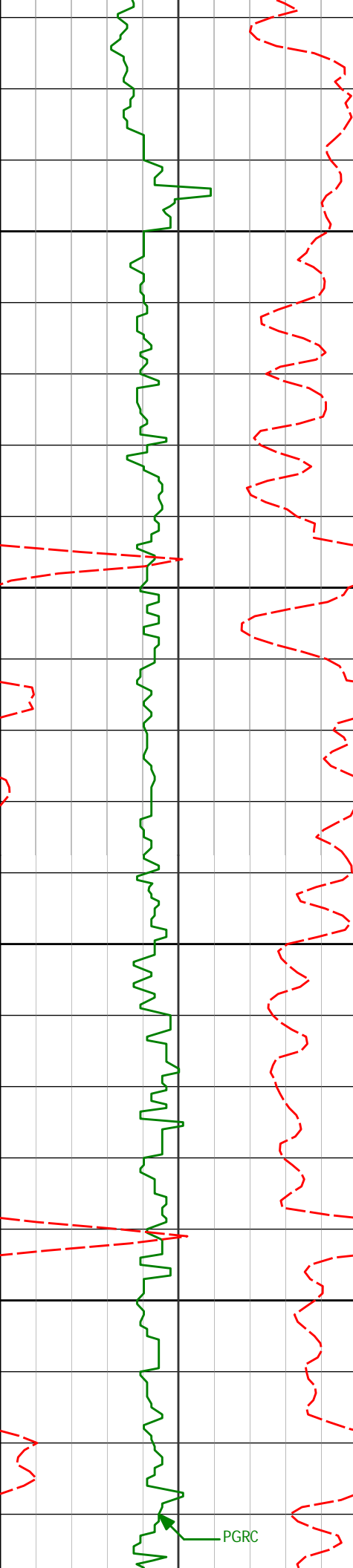
49.04°

4994.94'

323.00'

PGRC

ROPA



5100

5150

5200

5250

5127'

1.40°

40.93°

5089.91'

321.29'

5221'

1.25°

39.83°

5183.89'

319.90'

5316'

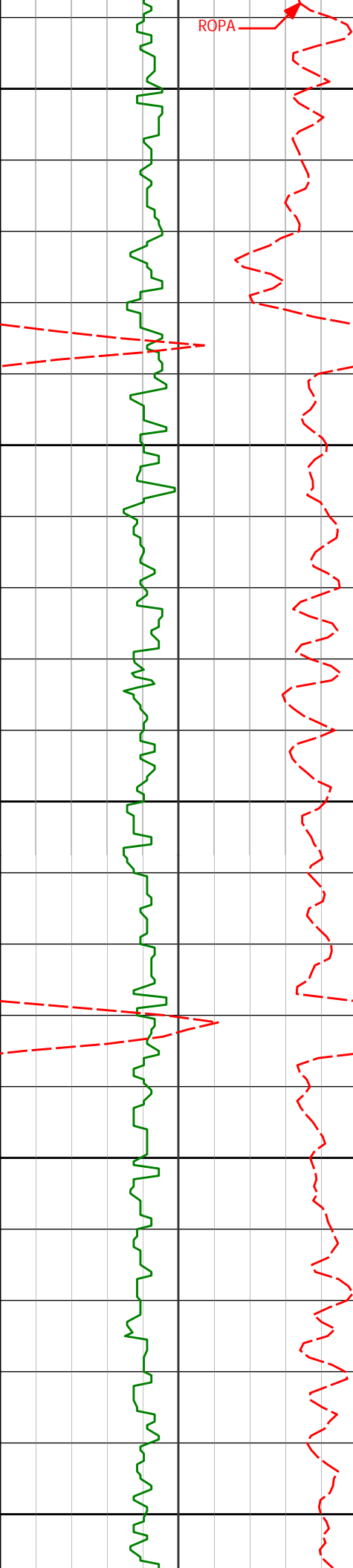
1.14°

52.12°

5278.87'

318.51'

PGRC



5300

5350

5400

5450

5500

5411'

1.09°

24.40°

5373.85'

317.40'

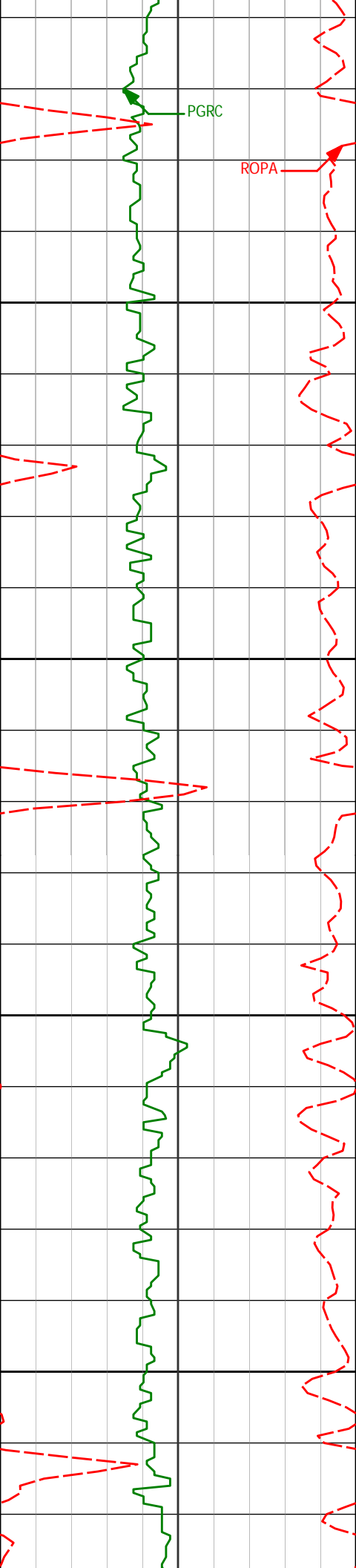
5504'

1.32°

31.46°

5466.83'

316.50'



PGRC

ROPA

5550

5599'

1.28°

31.14°

5561.80'

315.40'

5600

5650

5693'

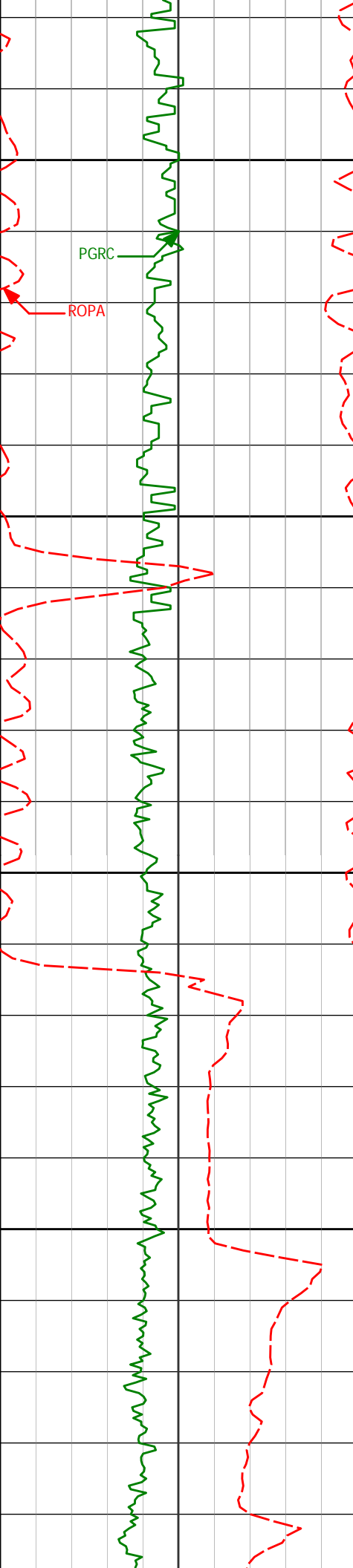
1.42°

43.19°

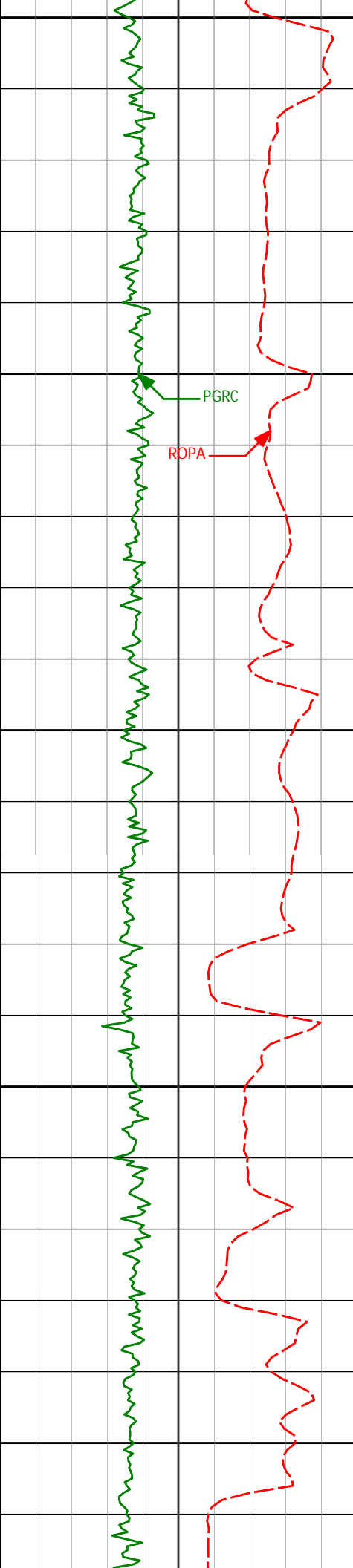
5655.78'

314.08'

5700



5750	5788'	1.46°	47.86°	5750.75'	312.39'
5800	5844'	1.36°	52.62°	5806.73'	311.35'
5850	5886'	1.39°	54.27°	5848.72'	310.55'
<Run 200>					
5900					
	5980'	3.59°	280.73°	5942.66'	312.53'



5950

6027'

8.98°

272.38°

5989.37'

317.65'

6000

PGRC

ROPA

6074'

14.46°

266.77°

6035.37'

327.18'

6050

6121'

18.13°

262.51°

6080.48'

340.27'

6100

6169'

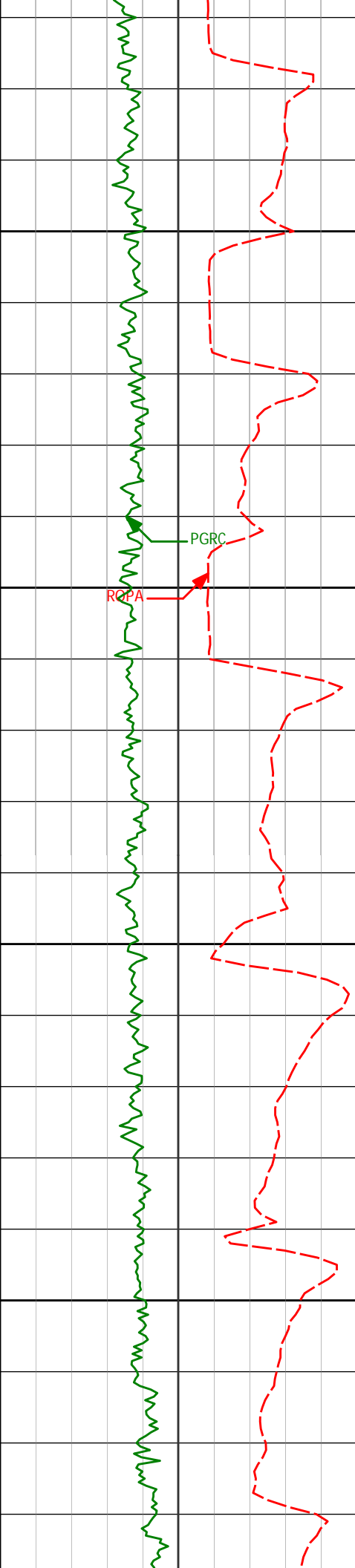
20.95°

259.93°

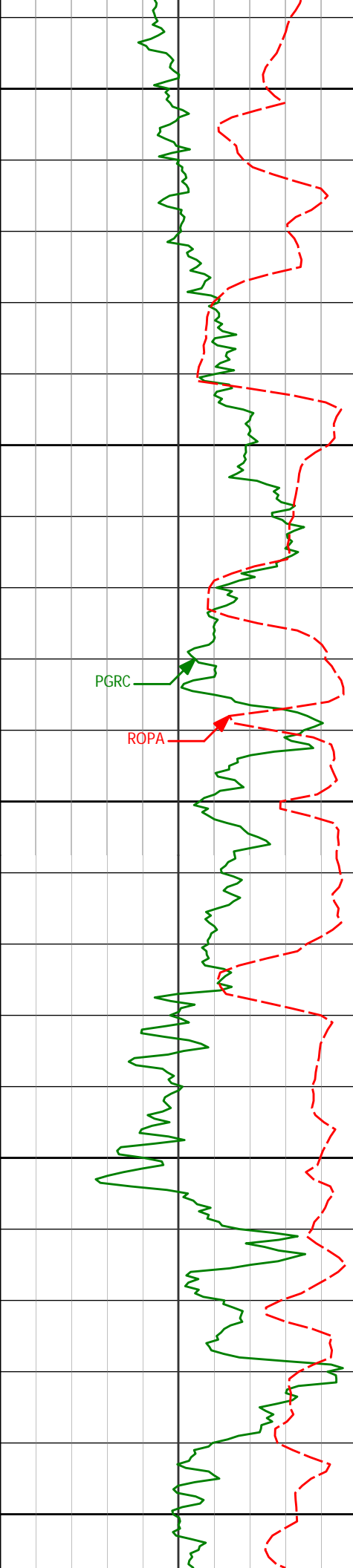
6125.71'

356.10'

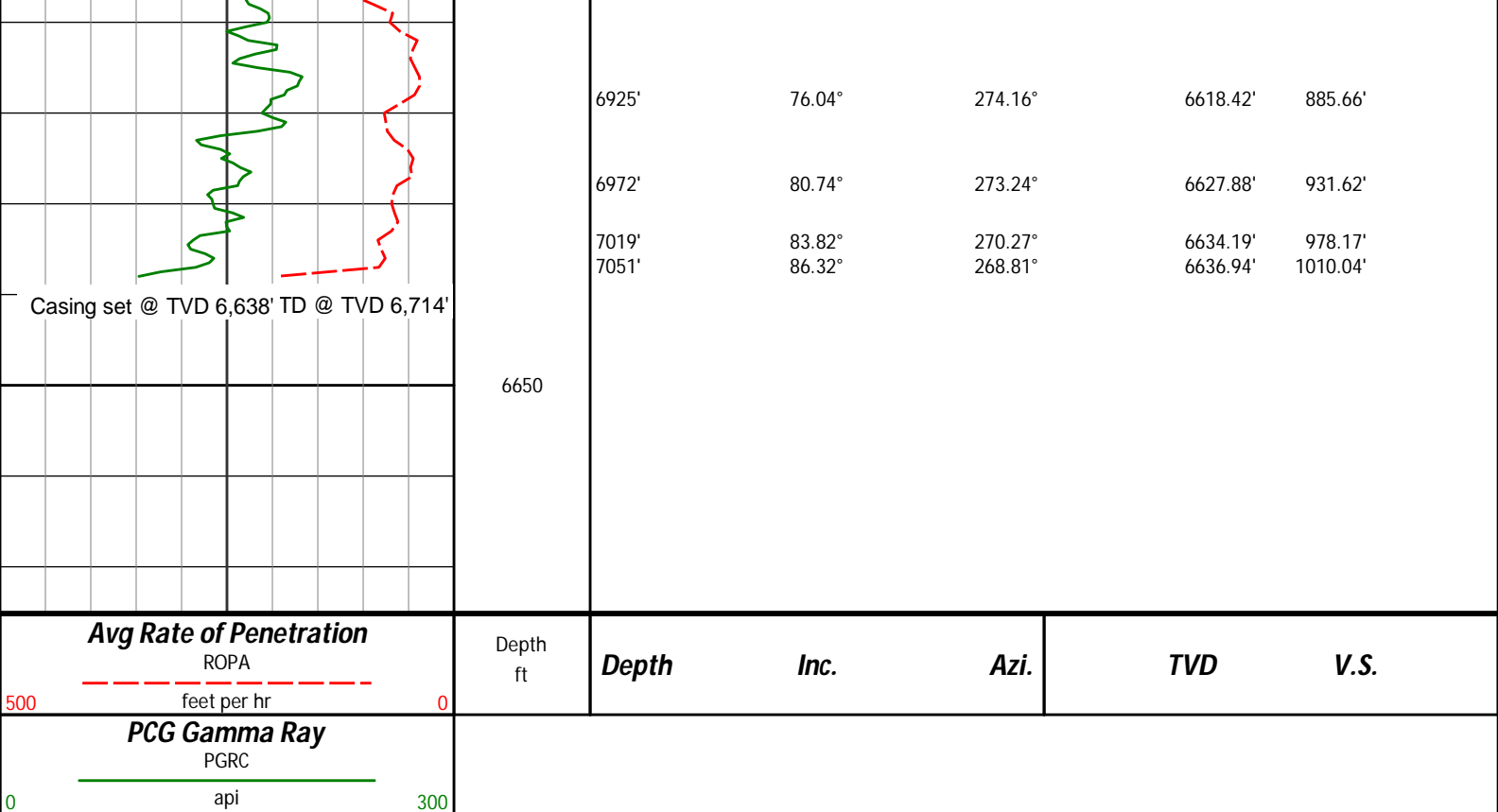
6150



6216'	22.91°	261.67°	6169.31'	373.39'
6200				
6263'	24.97°	261.85°	6212.26'	392.23'
6250				
6310'	27.73°	262.04°	6254.37'	412.85'
6300				
6358'	30.33°	262.48°	6296.34'	435.89'
6405'	35.80°	261.19°	6335.71'	461.22'
6350				
6453'	42.47°	261.44°	6372.92'	491.09'



6400					
	6500'	46.21°	264.61°	6406.53'	523.64'
	6547'	47.90°	267.17°	6438.56'	557.92'
6450					
	6594'	50.79°	269.31°	6469.18'	593.53'
	6641'	53.68°	267.90°	6497.96'	630.66'
6500					
	6688'	57.45°	267.42°	6524.53'	669.36'
6550	6736'	60.94°	267.40°	6549.11'	710.51'
	6783'	65.25°	267.55°	6570.37'	752.35'
	6830'	68.63°	271.16°	6588.79'	795.57'
6600					
	6877'	71.25°	273.74°	6604.91'	839.69'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch State USX AA16-67-1
Wattenberg
Weld Colorado
USA
CA-XX-0009957676

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
684.00	0.00	0.00	684.00	0.00 N	0.00 E	0.00	0.00
800.00	0.25	20.59	800.00	0.24 N	0.09 E	-0.09	0.22
891.00	0.43	310.44	891.00	0.65 N	0.10 W	0.11	0.46
981.00	0.40	298.05	981.00	1.02 N	0.63 W	0.65	0.10
1254.00	0.25	305.52	1253.99	1.81 N	1.96 W	1.98	0.06
1440.00	0.49	350.94	1439.99	2.83 N	2.41 W	2.44	0.20
1535.00	1.66	321.92	1534.97	4.32 N	3.32 W	3.37	1.32
1630.00	3.30	301.85	1629.88	6.85 N	6.50 W	6.58	1.93
1725.00	5.54	293.66	1724.59	10.14 N	13.03 W	13.15	2.44
1819.00	6.72	296.63	1818.05	14.42 N	22.10 W	22.27	1.29
1913.00	8.57	298.11	1911.21	20.19 N	33.20 W	33.43	1.98
2008.00	9.70	299.22	2005.01	27.43 N	46.43 W	46.75	1.21
2103.00	11.23	304.82	2098.42	36.63 N	61.01 W	61.44	1.93
2197.00	13.14	306.25	2190.30	48.17 N	77.15 W	77.71	2.05
2292.00	13.54	304.27	2282.74	60.82 N	95.04 W	95.76	0.64
2387.00	13.15	302.58	2375.18	72.90 N	113.34 W	114.20	0.57
2482.00	13.49	303.07	2467.62	84.76 N	131.73 W	132.73	0.37
2577.00	12.65	303.74	2560.16	96.59 N	149.67 W	150.81	0.90
2671.00	13.09	303.06	2651.79	108.11 N	167.15 W	168.42	0.50
2765.00	12.55	301.50	2743.45	119.26 N	184.78 W	186.19	0.68
2860.00	12.67	299.44	2836.16	129.77 N	202.66 W	204.19	0.49
2955.00	13.81	300.42	2928.63	140.64 N	221.52 W	223.17	1.22
3049.00	13.64	301.08	3019.95	152.04 N	240.68 W	242.47	0.25
3144.00	11.61	300.08	3112.65	162.61 N	258.55 W	260.46	2.14

3238.00	9.75	301.38	3205.01	171.50 N	273.53 W	275.55	1.99
3333.00	8.26	304.99	3298.84	179.61 N	286.00 W	288.11	1.68
3427.00	6.39	299.30	3392.07	186.04 N	296.09 W	298.28	2.14
3522.00	5.13	297.15	3486.59	190.57 N	304.48 W	306.72	1.34
3616.00	4.78	293.69	3580.24	194.06 N	311.82 W	314.10	0.49
3710.00	5.09	293.97	3673.89	197.33 N	319.22 W	321.53	0.33
3804.00	3.60	294.57	3767.61	200.25 N	325.71 W	328.06	1.59
3899.00	3.85	290.64	3862.41	202.61 N	331.40 W	333.78	0.38
3993.00	2.46	264.91	3956.27	203.54 N	336.36 W	338.75	2.08
4088.00	1.63	196.60	4051.22	202.07 N	338.77 W	341.15	2.52
4182.00	1.51	65.81	4145.21	201.29 N	338.03 W	340.39	3.04
4276.00	0.46	123.05	4239.19	201.59 N	336.58 W	338.95	1.40
4371.00	1.27	112.71	4334.18	200.98 N	335.29 W	337.65	0.86
4466.00	2.14	113.99	4429.14	199.85 N	332.70 W	335.05	0.92
4560.00	0.86	143.23	4523.11	198.57 N	330.67 W	333.01	1.54
4655.00	1.76	142.49	4618.08	196.84 N	329.36 W	331.67	0.94
4749.00	1.64	116.34	4712.04	195.10 N	327.28 W	329.57	0.83
4843.00	1.32	99.18	4806.01	194.34 N	325.01 W	327.29	0.58
4938.00	1.69	54.82	4900.98	194.97 N	322.78 W	325.08	1.25
5032.00	1.55	49.04	4994.94	196.60 N	320.69 W	323.00	0.23
5127.00	1.40	40.93	5089.91	198.32 N	318.96 W	321.29	0.27
5221.00	1.25	39.83	5183.89	199.98 N	317.55 W	319.90	0.17
5316.00	1.14	52.12	5278.87	201.36 N	316.14 W	318.51	0.29
5411.00	1.09	24.40	5373.85	202.76 N	315.02 W	317.40	0.57
5504.00	1.32	31.46	5466.83	204.49 N	314.09 W	316.50	0.29
5599.00	1.28	31.14	5561.80	206.33 N	312.97 W	315.40	0.05
5693.00	1.42	43.19	5655.78	208.07 N	311.63 W	314.08	0.34
5788.00	1.46	47.86	5750.75	209.75 N	309.93 W	312.39	0.13
5844.00	1.36	52.62	5806.73	210.63 N	308.87 W	311.35	0.28
5886.00	1.39	54.27	5848.72	211.23 N	308.06 W	310.55	0.12
5980.00	3.59	280.73	5942.66	212.44 N	310.03 W	312.53	4.96
6027.00	8.98	272.38	5989.37	212.87 N	315.15 W	317.65	11.60
6074.00	14.46	266.77	6035.37	212.69 N	324.68 W	327.18	11.89
6121.00	18.13	262.51	6080.48	211.40 N	337.79 W	340.27	8.22
6169.00	20.95	259.93	6125.71	208.93 N	353.65 W	356.10	6.14
6216.00	22.91	261.67	6169.31	206.14 N	370.97 W	373.39	4.39
6263.00	24.97	261.85	6212.26	203.40 N	389.85 W	392.23	4.38
6310.00	27.73	262.04	6254.37	200.48 N	410.50 W	412.85	5.88
6358.00	30.33	262.48	6296.34	197.35 N	433.58 W	435.89	5.44
6405.00	35.80	261.19	6335.71	193.69 N	458.95 W	461.22	11.73
6453.00	42.47	261.44	6372.92	189.12 N	488.88 W	491.09	13.91
6500.00	46.21	264.61	6406.53	185.16 N	521.48 W	523.64	9.24
6547.00	47.90	267.17	6438.56	182.71 N	555.79 W	557.92	5.38
6594.00	50.79	269.31	6469.18	181.63 N	591.42 W	593.53	7.04
6641.00	53.68	267.90	6497.96	180.72 N	628.56 W	630.66	6.60
6688.00	57.45	267.42	6524.53	179.13 N	667.28 W	669.36	8.07
6736.00	60.94	267.40	6549.11	177.27 N	708.46 W	710.51	7.27
6783.00	65.25	267.55	6570.37	175.42 N	750.32 W	752.35	9.17
6830.00	68.63	271.16	6588.79	174.95 N	793.55 W	795.57	10.08
6877.00	71.25	273.74	6604.91	176.85 N	837.65 W	839.69	7.59
6925.00	76.04	274.16	6618.42	180.02 N	883.58 W	885.66	10.01
6972.00	80.74	273.24	6627.88	182.99 N	929.51 W	931.62	10.18
7019.00	83.82	270.27	6634.19	184.41 N	976.05 W	978.17	9.06
7051.00	86.32	268.81	6636.94	184.16 N	1007.93 W	1010.04	9.04

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 CLOSURE OF 280.35 DEGREES (GRID)
A TOTAL CORRECTION OF 7.83 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7051.00 FEET
IS 1024.62 FEET ALONG 280.35 DEGREES (GRID)