



WELL INFORMATION					
MWD Run Number	100	200	300	400	
Date run completed	25-Dec-12	26-Dec-12	26-Dec-12	28-Dec-12	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	8.750	8.750	
Tool Nominal OD (in)	6.750	6.750	6.750	6.750	
Log Start Depth (TVD, ft)	677.00	5,949.74	6,628.64	6,710.47	
Log End Depth (TVD, ft)	5,949.74	6,628.64	6,710.47	6,745.44	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	23-Dec-12 23:00	25-Dec-12 07:15	26-Dec-12 11:00	27-Dec-12 07:00	
Drill/Wipe End Date and Time	24-Dec-12 21:45	26-Dec-12 01:00	26-Dec-12 13:30	27-Dec-12 18:30	
Min Inc (deg) @ Depth (TVD, ft)	0 @ 677.00	.34 @ 5,979.74	51.37 @ 6,654.59	69.80 @ 6,726.61	
Max Inc (deg) @ Depth (TVD, ft)	14.04 @ 2,966.74	47.00 @ 6,623.22	61.35 @ 6,707.18	85.96 @ 6,742.90	
Bit TFA(in2) / Bit Type	.90 / PDC	.86 / PDC	.86 / PDC	.92 / Tricone	
Flow Rate (gpm)	565.41	527.78	500.00	492.50	
Max AV (fpm) / CV (fpm) @ MWD	380.0 / 300.0	380.0 / 275.0	380.0 / 275.0	342.6 / 275.0	
Fluid Type	Native/Spud Mud	Native/Spud Mud	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	9.00 / 28.00	10.40 / 34.00	11.00 / 35.00	11.10 / 37.00	
Filtrate CL (ppm)	2,700.00	2,700.00	2,600.00	2,800.00	
pH / Fluid Loss (mptm)	9.90 / 99	8.50 / 8	8.40 / 0	8.20 / 22	
PV (cP) / YP (lbf2)	4 / 2.00	10 / 9.00	13 / 9.00	14 / 12.00	
% Solids / % Sand	4.2 / 1.50	4.7 / 0.50	12.2 / .3	12.4 / .25	
% Oil / Oil:Water Ratio	0 / 0:95	0 / 0:95	0 / 0:95	0 / 0:95	
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Max Tool Temp (deg F) / S	144.78 / PDM	159.76 / PDM	169.89 / PDM	154.89 / PDM	

Max Tool Temp (degF) / Source	141.70 / PCM	153.79 / PCM	163.20 / PCM	154.30 / PCM	
Rm @ Max Tool Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Lead MWD Engineer	Gary Eifert	Gary Eifert	Gary Eifert	Gary Eifert	
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.76	5.76	5.76	5.76	
Sub Serial Number	245494	245494	245494	245494	
Insert Serial Number	11400826	11400826	11680786	11680786	
Date and Time Initialized	22-Dec-12 22:11	22-Dec-12 22:11	26-Dec-12 02:39	26-Dec-12 02:39	
Date and Time Read	26-Dec-12 08:32	26-Dec-12 08:41	28-Dec-12 00:54	28-Dec-12 01:02	
ECMB SW Version	N/A	N/A	N/A	N/A	

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	57.00	55.00	54.00	54.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	245494	245494	245494	245494	
Sonde Serial Number	10859920	10859920	11638573	11638573	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	143.39	26.79	353.07	94.65	

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	49.40	48.16	47.14	46.98	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11909583	11909583	11909583	11909583	
Insert/Sonde Serial Number	11680972	11680972	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

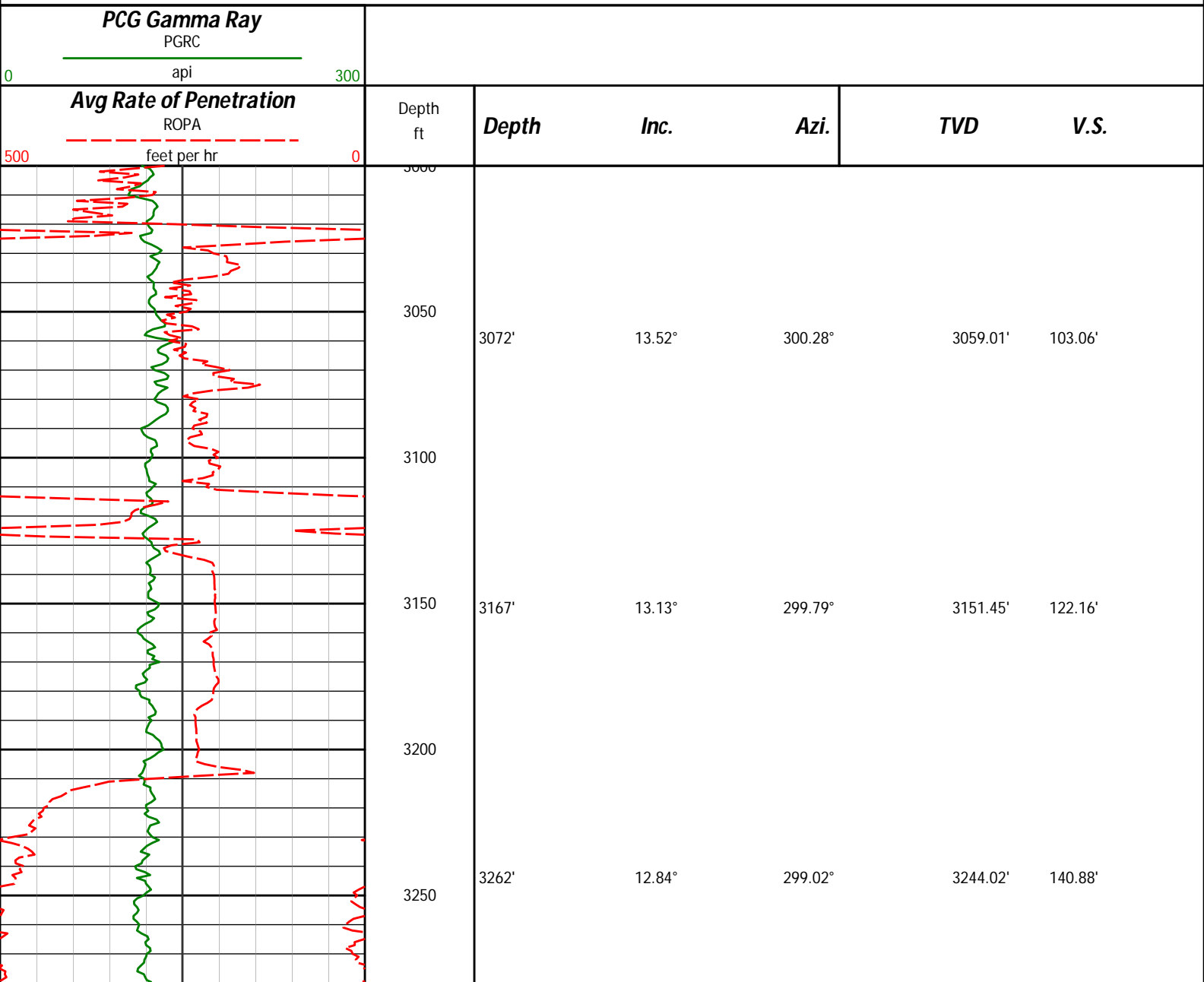
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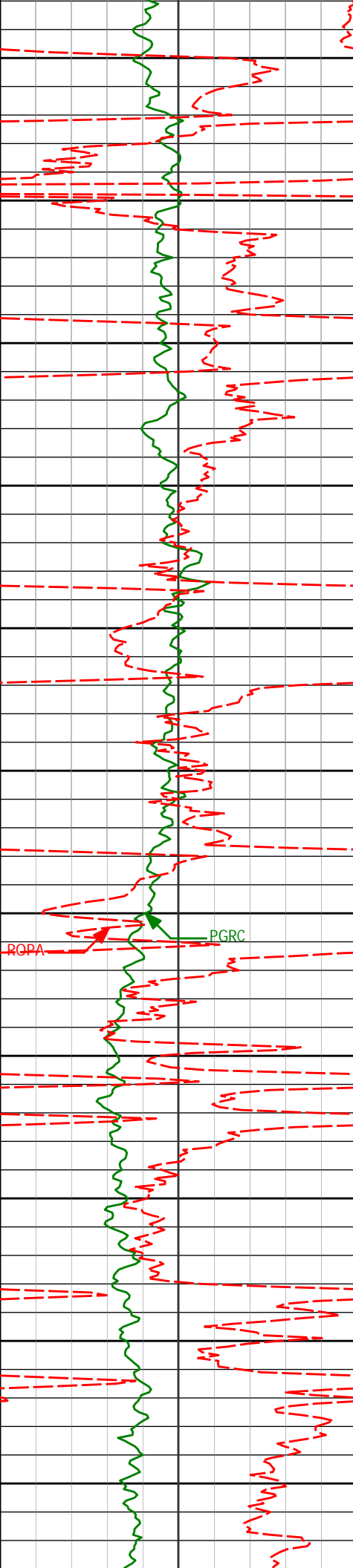
## HALLIBURTON

Sperry Drilling Services

### TVD Main Log 1:600

Noble Energy  
Wells Ranch State PC USX AA16-69-1HNL  
H&P 343  
T6N-R63W





3300

3357'

12.05°

301.76°

3336.79'

158.67'

3350

3400

3452'

11.43°

303.90°

3429.80'

175.04'

3450

3500

3547'

12.01°

310.13°

3522.82'

190.56'

3550

3600

3642'

12.99°

304.84°

3615.57'

207.03'

3650

3700

3737'

13.48°

303.34°

3708.05'

225.19'

3750

3800

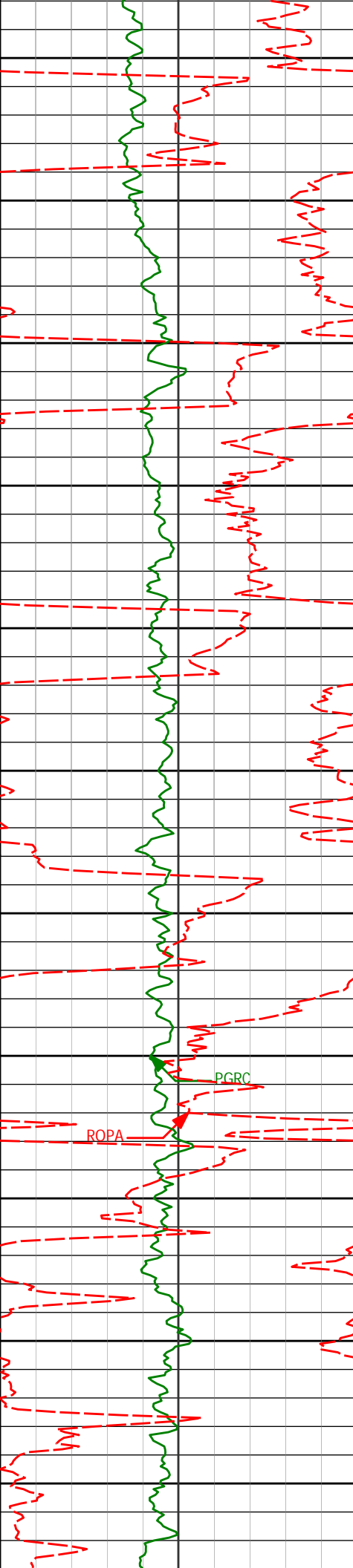
3832'

13.64°

302.54°

3800.40'

244.03'



3850

3900

3950

4000

4050

4100

4150

4200

4250

4300

4350

3927'

12.06°

300.07°

3893.02'

262.19'

4022'

10.16°

299.44°

3986.24'

278.19'

4117'

8.23°

297.74°

4080.01'

291.59'

4212'

5.05°

297.50°

4174.36'

301.38'

4307'

3.05°

310.26°

4269.12'

307.07'

4402'

3.00°

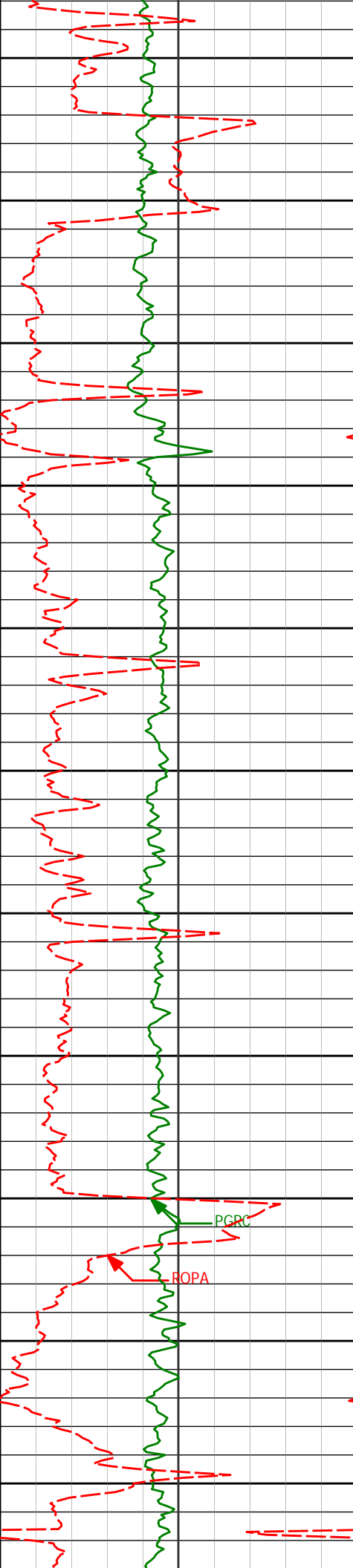
309.56°

4363.99'

310.95'

PGRC

ROPA



4400

4450

4500

4550

4600

4650

4700

4750

4800

4850

4900

4497'

1.27°

317.29°

4458.92'

313.61'

4592'

1.18°

311.45°

4553.90'

315.07'

4687'

1.14°

332.46°

4648.88'

316.26'

4782'

1.19°

345.91°

4743.86'

316.96'

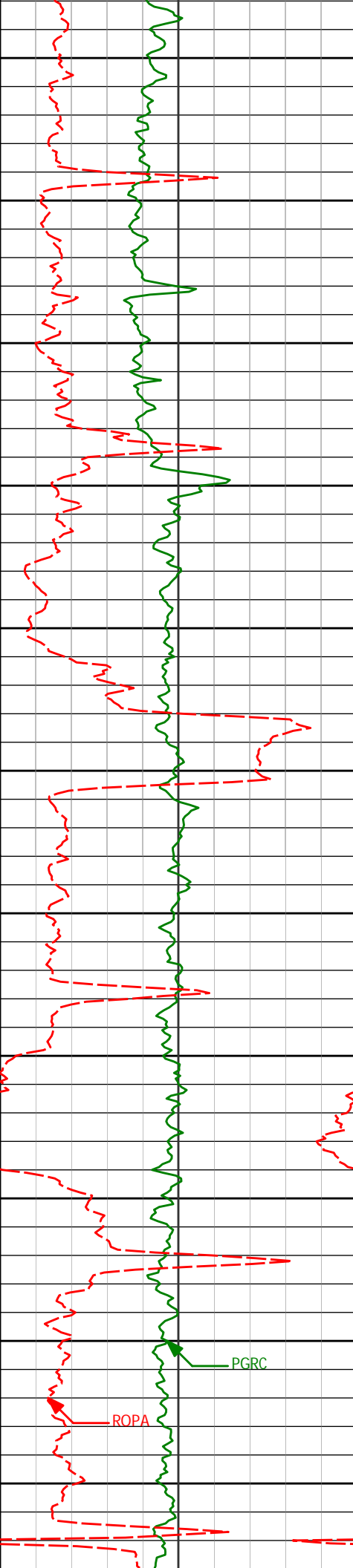
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0.76°

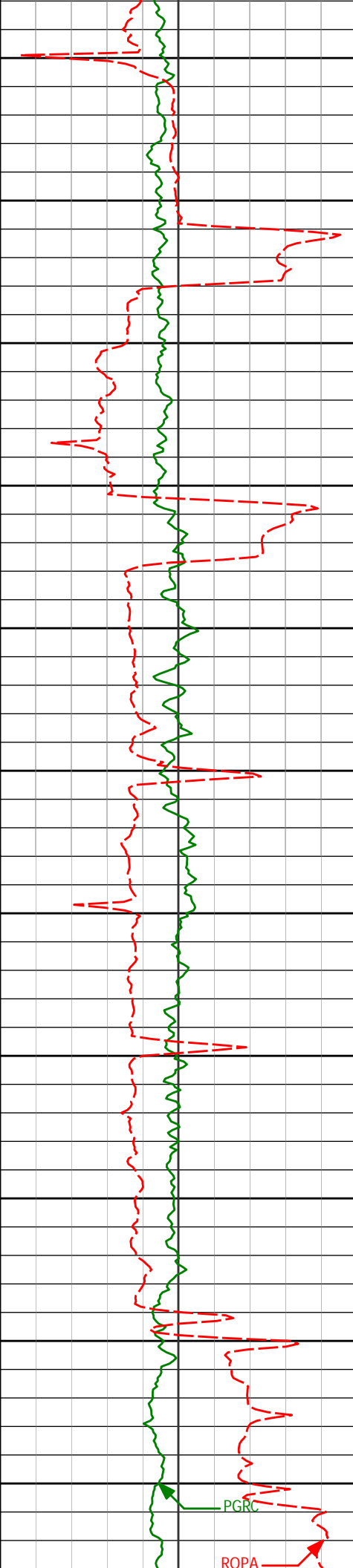
22.34°

4838.85'

316.98'

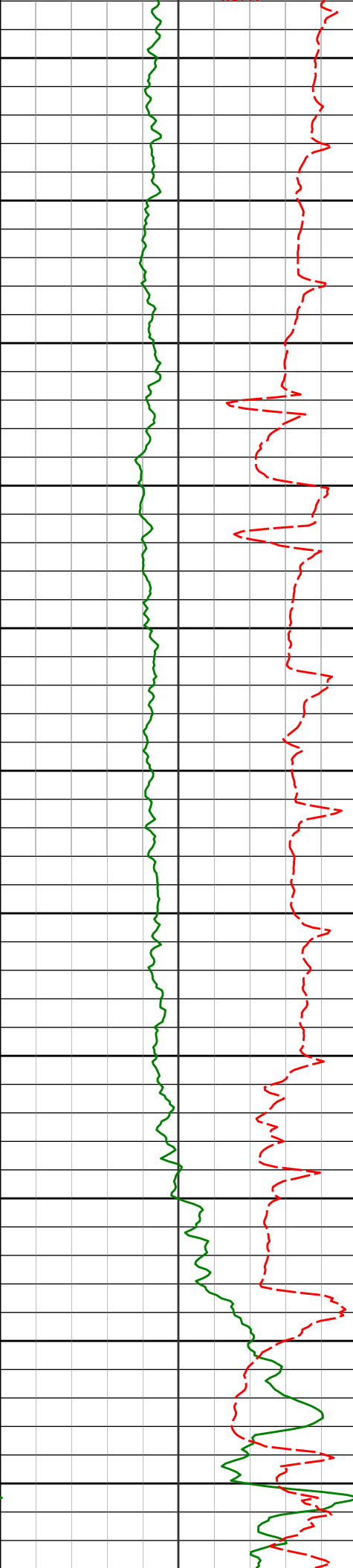


4972'	0.56°	9.34°	4933.84'	316.68'
4950				
5000				
5067'	0.49°	14.09°	5028.84'	316.52'
5050				
5100				
5162'	0.43°	347.94°	5123.84'	316.50'
5150				
5200				
5257'	0.40°	209.48°	5218.83'	316.74'
5250				
5300				
5352'	0.57°	236.39°	5313.83'	317.29'
5350				
5400				
5447'	1.30°	236.98°	5408.82'	318.57'
5450				



5500	5542'	1.46°	229.22°	5503.79'	320.38'
5550					
5600	5637'	1.06°	172.48°	5598.77'	321.16'
5650					
5700	5732'	1.02°	108.06°	5693.76'	320.23'
5750					
5800	5827'	0.81°	113.42°	5788.75'	318.80'
5850					
5900	5922'	0.07°	183.80°	5883.74'	318.18'
<Run 200> 5950					
6000	6018'	0.34°	0.54°	5979.74'	318.18'
6065'	6065'	1.09°	293.39°	6026.74'	318.60'





6050

6113'

5.20°

292.14°

6074.66'

321.04'

6100

6160'

9.04°

281.15°

6121.29'

326.66'

6150

6208'

12.54°

280.80°

6168.43'

335.50'

6200

6255'

12.82°

282.58°

6214.28'

345.63'

6250

6303'

15.35°

275.38°

6260.84'

357.17'

6300

6350'

18.50°

272.81°

6305.80'

370.83'

6350

6398'

22.25°

270.03°

6350.79'

387.53'

6400

6445'

26.18°

269.40°

6393.65'

406.81'

6450

6493'

29.09°

267.61°

6436.17'

429.05'

6500

6540'

31.80°

265.29°

6476.68'

452.79'

6588'

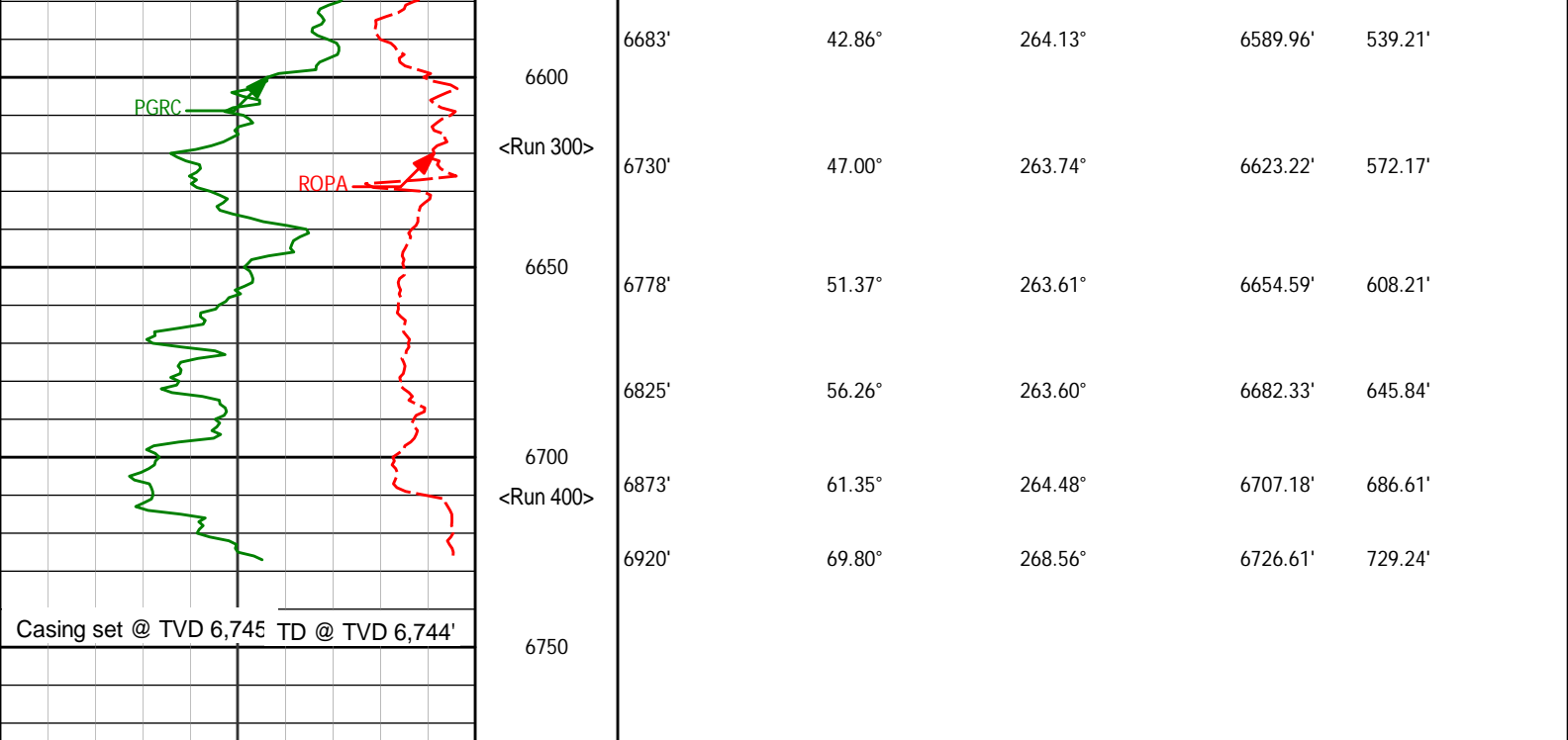
35.86°

264.66°

6516.55'

479.37'

6550



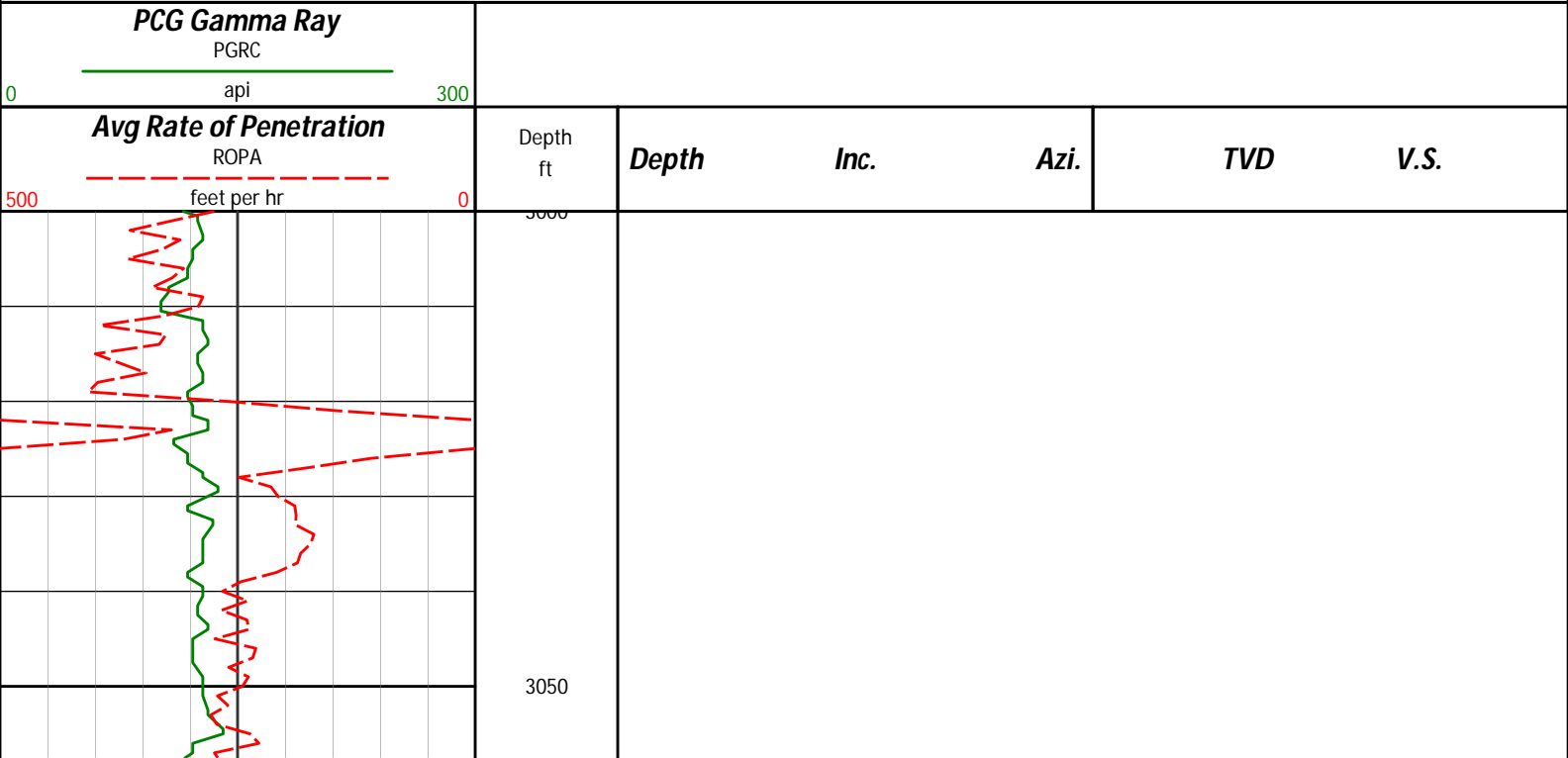
<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div><div>5000</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div><div>0300</div></div>							

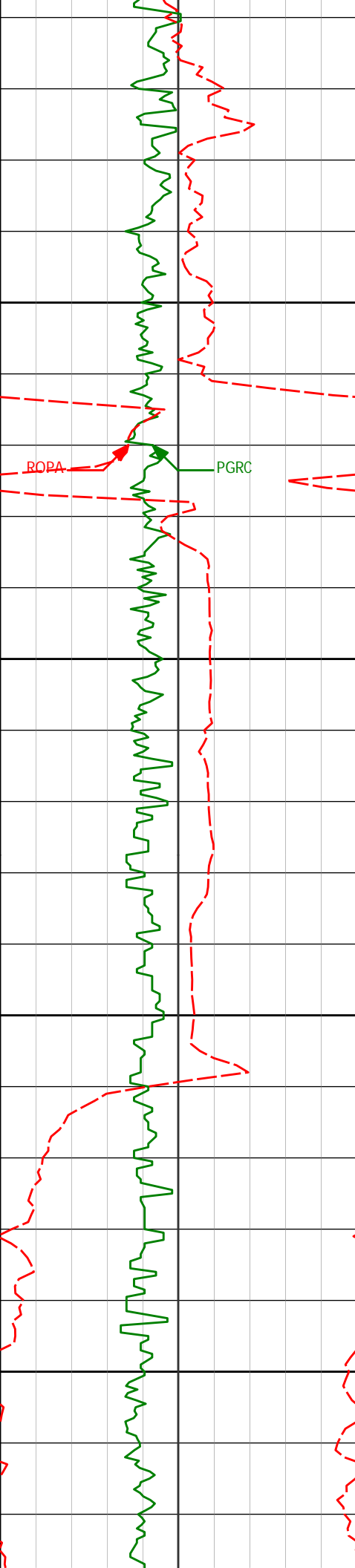
HALLIBURTON

Sperry Drilling Services

TVD Detail Log 1:240

Noble Energy  
Wells Ranch State PC USX AA16-69-1HNL  
H&P 343  
T6N-R63W





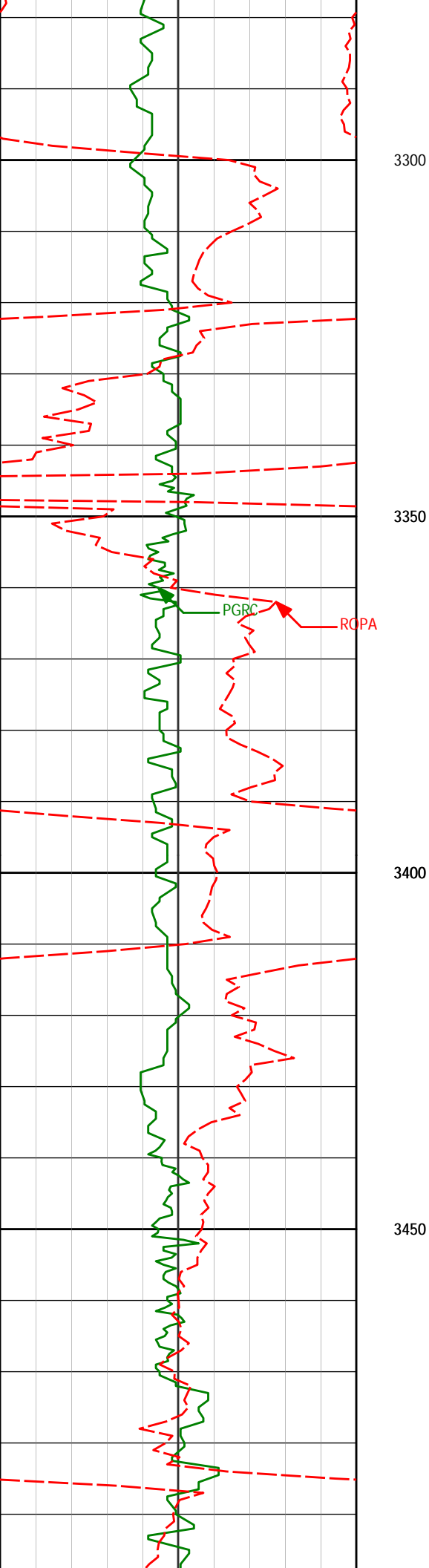
3100

3150

3200

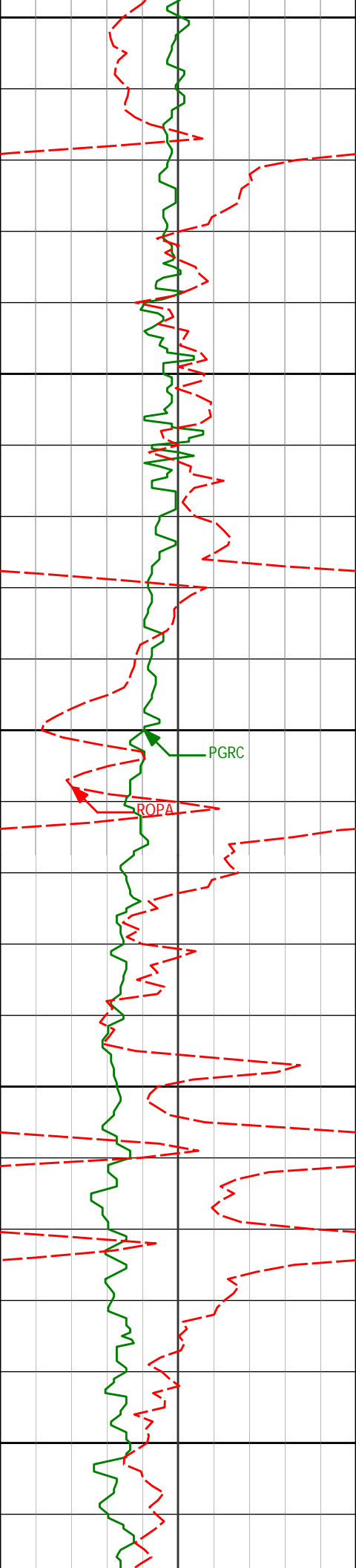
3250

3072'	13.52°	300.28°	3059.01'	103.06'
3167'	13.13°	299.79°	3151.45'	122.16'
3262'	12.84°	299.02°	3244.02'	140.88'



3357'	12.05°	301.76°	3336.79'	158.67'
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3452'	11.43°	303.90°	3429.80'	175.04'
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3500

3547'

12.01°

310.13°

3522.82'

190.56'

3550

3600

PGRC

ROPA

3642'

12.99°

304.84°

3615.57'

207.03'

3650

3700

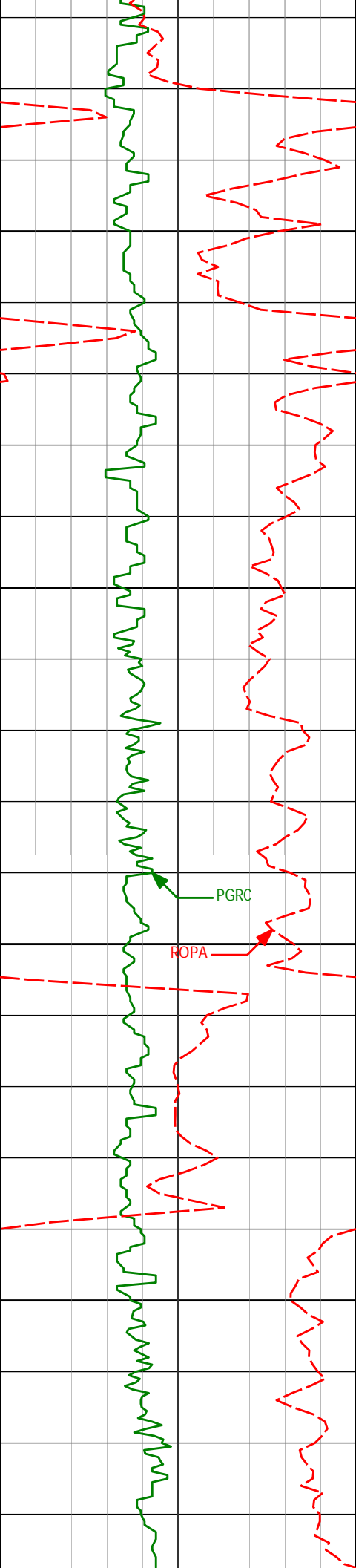
3737'

13.48°

303.34°

3708.05'

225.19'



3750

3800

3850

3900

3832'

13.64°

302.54°

3800.40'

244.03'

3927'

12.06°

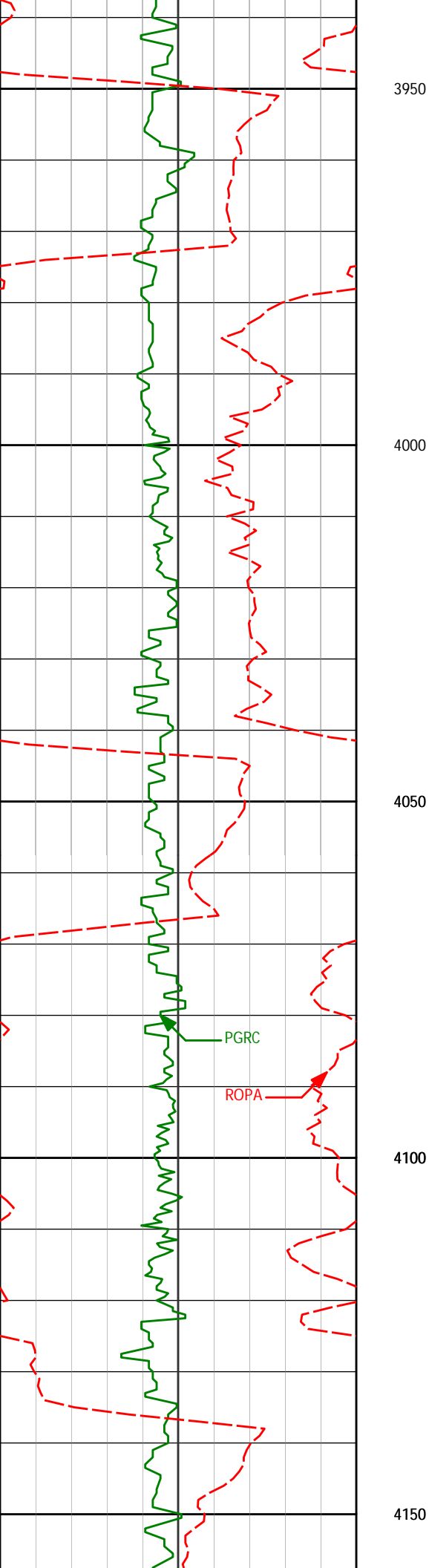
300.07°

3893.02'

262.19'

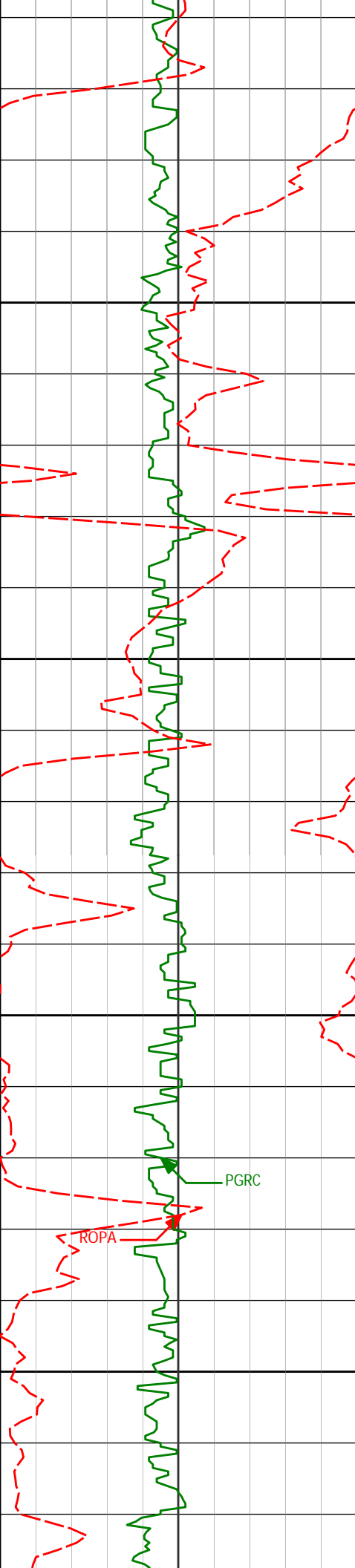
PGRC

ROPA



4022'	10.16°	299.44°	3986.24'	278.19'
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4117'	8.23°	297.74°	4080.01'	291.59'
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4212'

5.05°

297.50°

4174.36'

301.38'

4200

4250

4307'

3.05°

310.26°

4269.12'

307.07'

4300

PGRC

ROPA

4350

4402'

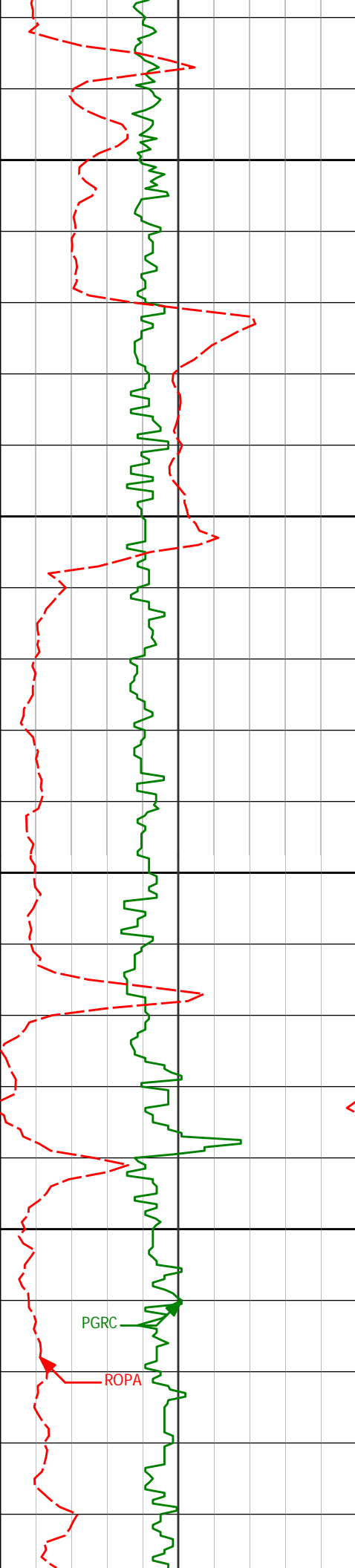
3.00°

309.56°

4363.99'

310.95'





4400

4450

4500

4550

4497'

1.27°

317.29°

4458.92'

313.61'

4592'

1.18°

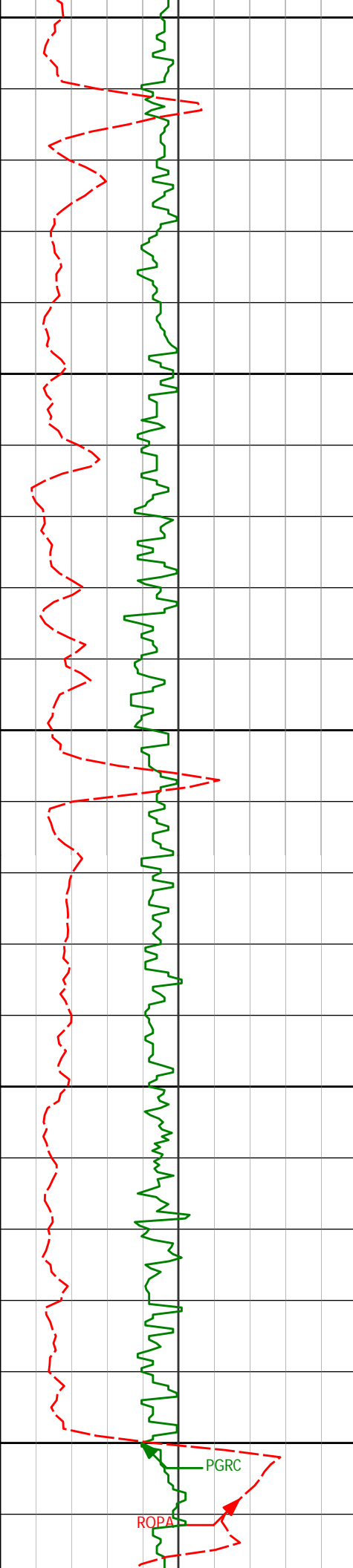
311.45°

4553.90'

315.07'

PGRC

ROPA



4600

4650

4700

4750

4800

4687'

1.14°

332.46°

4648.88'

316.26'

4782'

1.19°

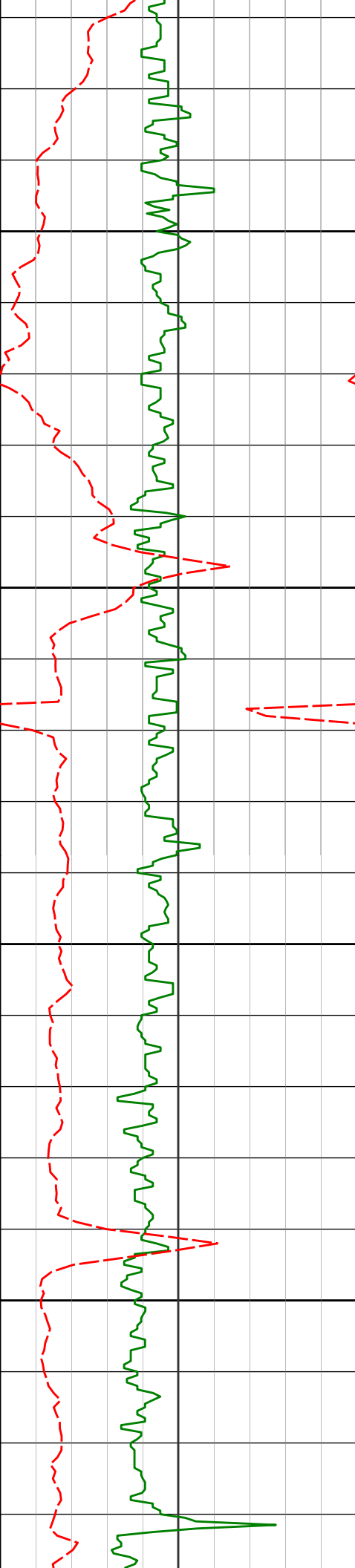
345.91°

4743.86'

316.96'

ROPA

PGRC



4877'

0.76°

22.34°

4838.85'

316.98'

4850

4900

4972'

0.56°

9.34°

4933.84'

316.68'

4950

5000

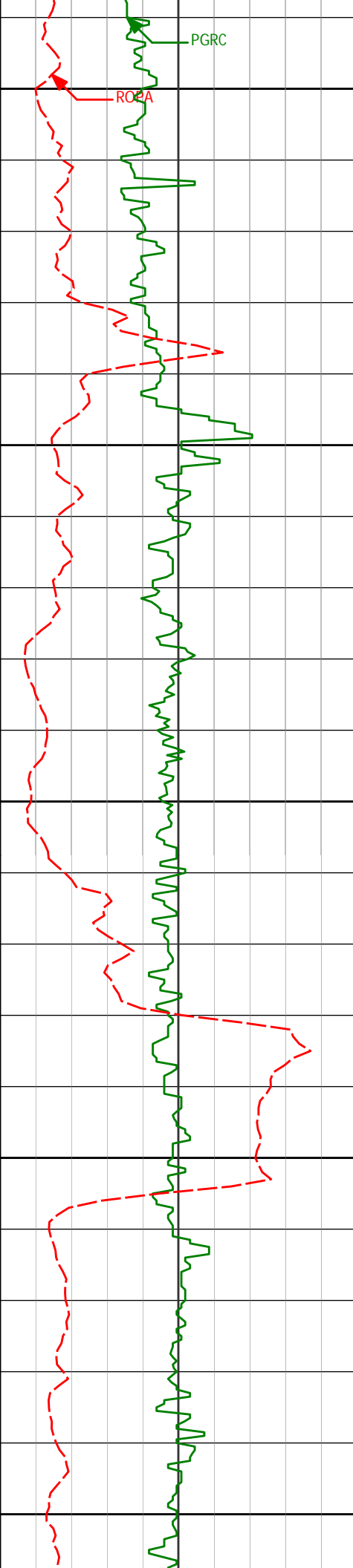
5067'

0.49°

14.09°

5028.84'

316.52'



5050

5100

5150

5200

5250

5162'

0.43°

347.94°

5123.84'

316.50'

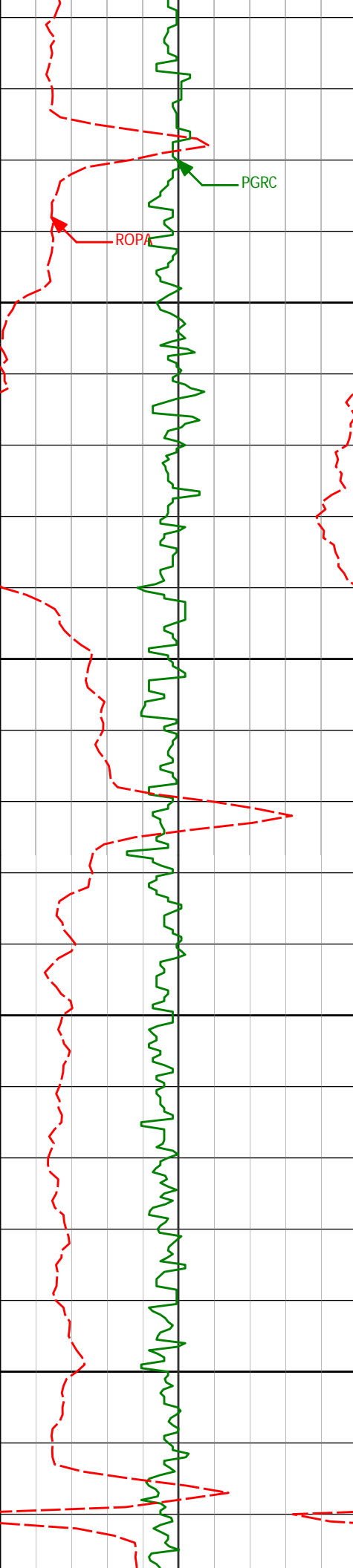
5257'

0.40°

209.48°

5218.83'

316.74'



5300

5352'

0.57°

236.39°

5313.83'

317.29'

5350

5400

5447'

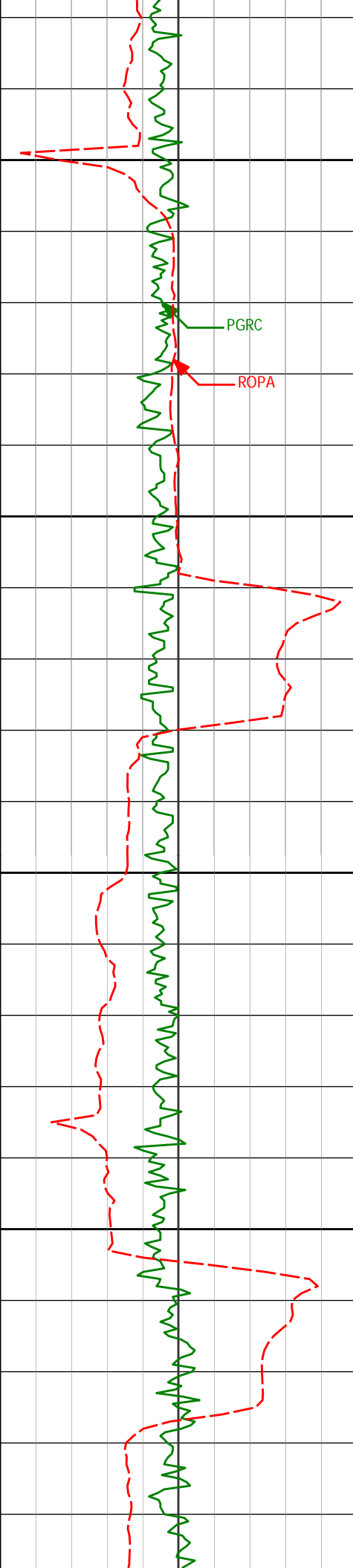
1.30°

236.98°

5408.82'

318.57'

5450



5500

5542'

1.46°

229.22°

5503.79'

320.38'

PGRC

ROPA

5550

5600

5637'

1.06°

172.48°

5598.77'

321.16'

5650

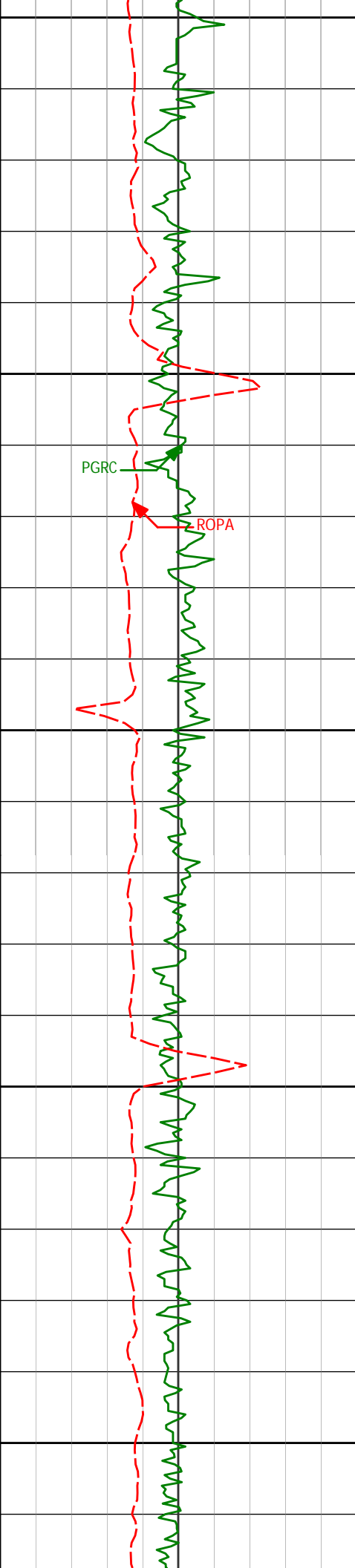
5732'

1.02°

108.06°

5693.76'

320.23'



5700

5750

PGRC

ROPA

5800

5850

5900

5827'

0.81°

113.42°

5788.75'

318.80'

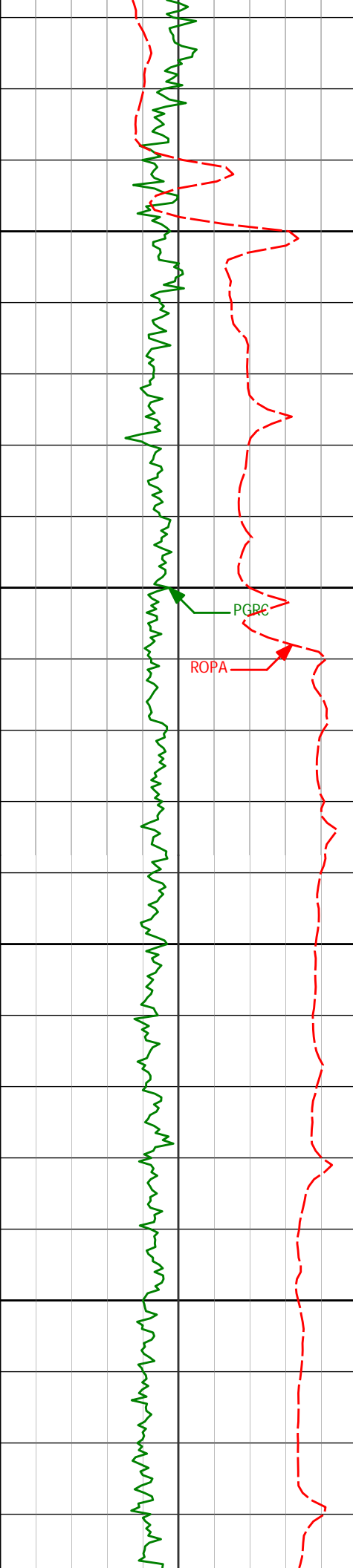
5922'

0.07°

183.80°

5883.74'

318.18'



<Run 200>  
5950

6000

PGRC

ROPA

6050

6100

6018'

0.34°

0.54°

5979.74'

318.18'

6065'

1.09°

293.39°

6026.74'

318.60'

6113'

5.20°

292.14°

6074.66'

321.04'

6160'

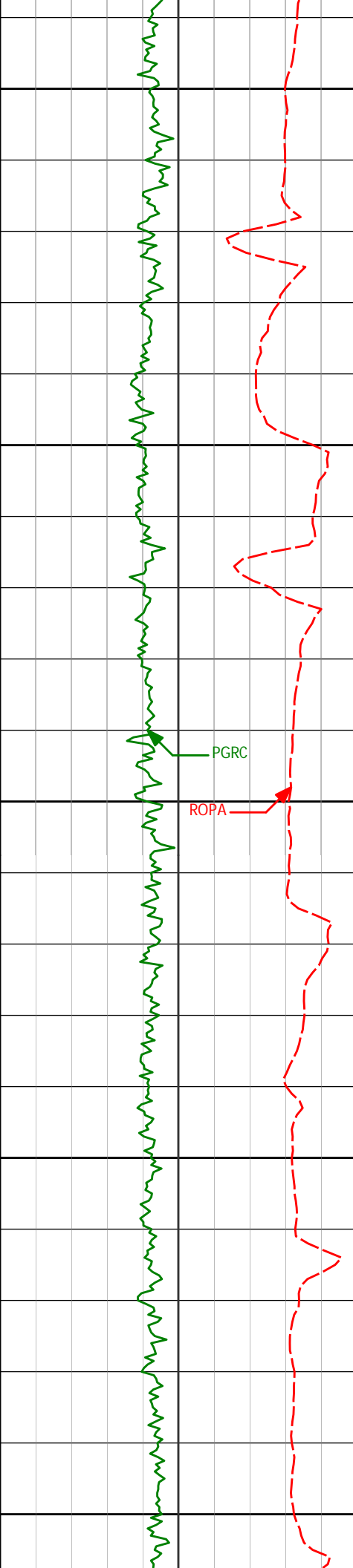
9.04°

281.15°

6121.29'

326.66'





6150

6208'

12.54°

280.80°

6168.43'

335.50'

6200

6255'

12.82°

282.58°

6214.28'

345.63'

6250

6303'

15.35°

275.38°

6260.84'

357.17'

6300

6350'

18.50°

272.81°

6305.80'

370.83'

6350

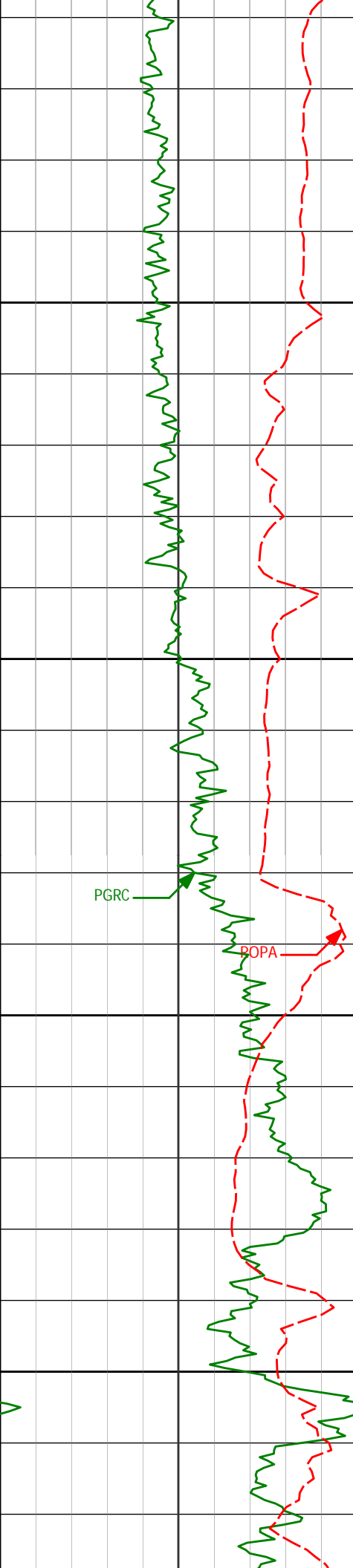
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22.25°

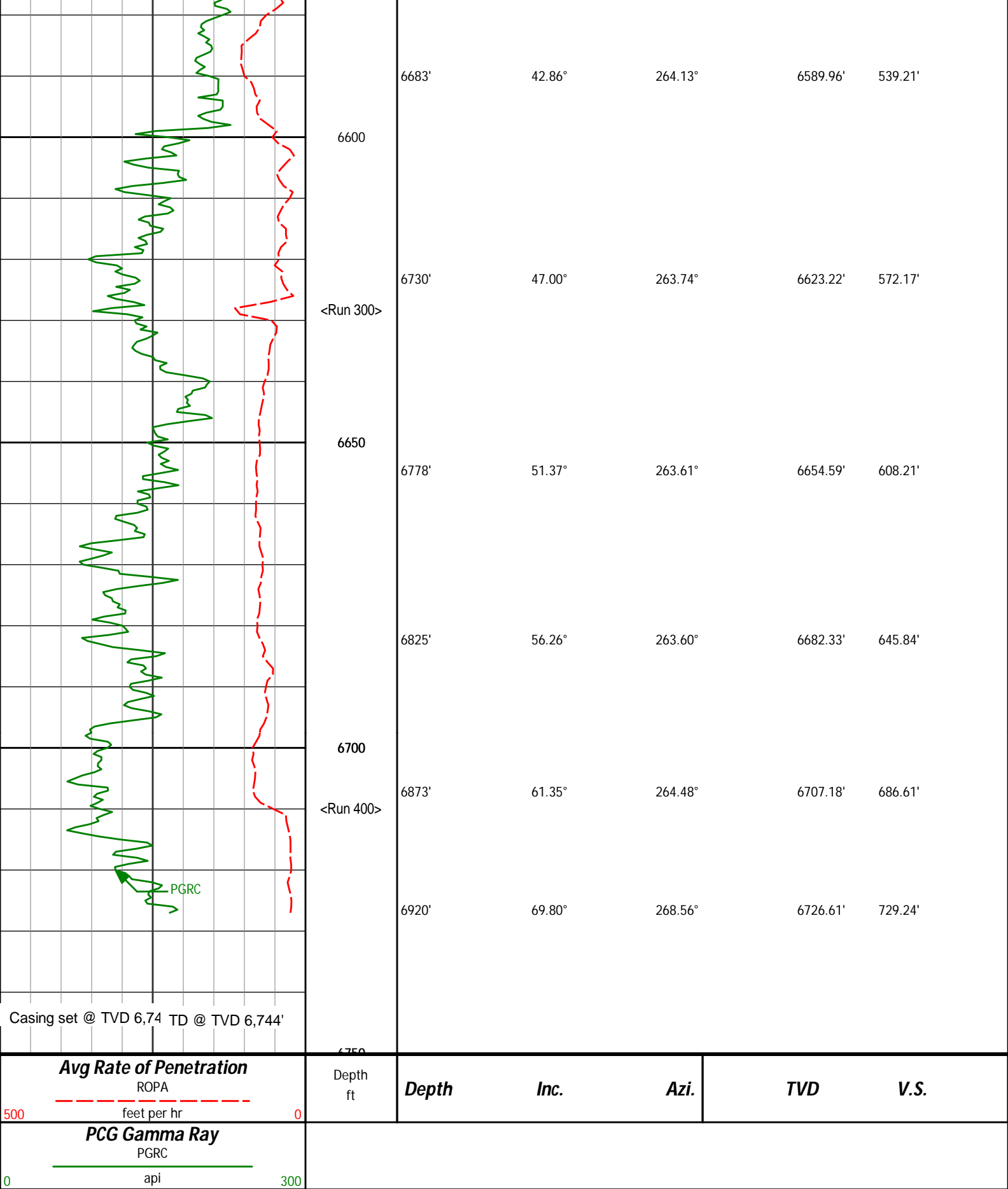
270.03°

6350.79'

387.53'



6445'	26.18°	269.40°	6393.65'	406.81'
6493'	29.09°	267.61°	6436.17'	429.05'
6540'	31.80°	265.29°	6476.68'	452.79'
6588'	35.86°	264.66°	6516.55'	479.37'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
677.00	0.00	0.00	677.00	0.00 N	0.00 E	0.00	0.00
809.00	0.62	74.88	809.00	0.19 N	0.69 E	-0.69	0.47
903.00	0.47	84.13	902.99	0.36 N	1.56 E	-1.56	0.19
996.00	0.49	89.66	995.99	0.40 N	2.33 E	-2.33	0.05
1088.00	0.62	104.46	1087.99	0.28 N	3.20 E	-3.20	0.21
1273.00	0.58	111.85	1272.98	0.32 S	5.03 E	-5.03	0.05
1365.00	0.47	101.69	1364.97	0.56 S	5.83 E	-5.84	0.15
1457.00	0.55	113.44	1456.97	0.82 S	6.60 E	-6.61	0.14
1647.00	0.22	348.74	1646.97	0.81 S	7.37 E	-7.38	0.37
1742.00	0.19	28.88	1741.96	0.50 S	7.40 E	-7.41	0.15
1837.00	0.35	84.07	1836.96	0.33 S	7.77 E	-7.77	0.30
1932.00	0.33	47.43	1931.96	0.11 S	8.26 E	-8.26	0.23
2027.00	0.36	102.72	2026.96	0.01 N	8.76 E	-8.76	0.34
2122.00	0.40	79.37	2121.96	0.00 N	9.37 E	-9.37	0.17
2217.00	1.98	330.99	2216.94	1.50 N	8.91 E	-8.89	2.25
2312.00	3.16	323.77	2311.84	5.04 N	6.57 E	-6.50	1.29
2407.00	5.31	315.14	2406.58	10.27 N	1.92 E	-1.79	2.35
2502.00	6.95	307.49	2501.04	16.89 N	5.74 W	5.95	1.93
2597.00	9.19	300.93	2595.09	24.28 N	16.81 W	17.11	2.54
2692.00	10.92	304.21	2688.63	33.24 N	30.76 W	31.17	1.92
2787.00	12.47	302.68	2781.65	43.84 N	46.84 W	47.38	1.66
2882.00	12.84	304.22	2874.34	55.32 N	64.20 W	64.88	0.53
2977.00	14.04	301.91	2966.74	67.35 N	82.72 W	83.55	1.38
3072.00	13.52	300.28	3059.01	79.04 N	102.09 W	103.06	0.68
3167.00	13.13	299.79	3151.45	90.00 N	121.05 W	122.16	0.43
3262.00	12.84	299.02	3244.02	100.48 N	139.65 W	140.88	0.36
3357.00	12.05	301.76	3336.79	110.82 N	157.31 W	158.67	1.03
3452.00	11.43	303.90	3429.80	121.30 N	173.56 W	175.04	0.80
3547.00	12.01	310.13	3522.82	132.92 N	188.93 W	190.56	1.47
3642.00	12.99	304.84	3615.57	145.39 N	205.25 W	207.03	1.58
3737.00	13.48	303.34	3708.05	157.57 N	223.26 W	225.19	0.63
3832.00	13.64	302.54	3800.40	169.68 N	241.95 W	244.03	0.26
3927.00	12.06	300.07	3893.02	180.67 N	259.98 W	262.19	1.76
4022.00	10.16	299.44	3986.24	189.77 N	275.86 W	278.19	2.00
4117.00	8.23	297.74	4080.01	197.05 N	289.17 W	291.59	2.05
4212.00	5.05	297.50	4174.36	202.14 N	298.90 W	301.38	3.35
4307.00	3.05	310.26	4269.12	205.71 N	304.54 W	307.07	2.29
4402.00	3.00	309.56	4363.99	208.93 N	308.39 W	310.95	0.07
4497.00	1.27	317.29	4458.92	211.28 N	311.01 W	313.61	1.84
4592.00	1.18	311.45	4553.90	212.70 N	312.46 W	315.07	0.16
4687.00	1.14	332.46	4648.88	214.19 N	313.63 W	316.26	0.45
4782.00	1.19	345.91	4743.86	215.98 N	314.31 W	316.96	0.29
4877.00	0.76	22.34	4838.85	217.52 N	314.31 W	316.98	0.77
4972.00	0.56	9.34	4933.84	218.56 N	314.00 W	316.68	0.26
5067.00	0.49	14.09	5028.84	219.41 N	313.82 W	316.52	0.08
5162.00	0.43	347.94	5123.84	220.16 N	313.80 W	316.50	0.23
5257.00	0.40	209.48	5218.83	220.22 N	314.04 W	316.74	0.82
5352.00	0.57	236.39	5313.83	219.66 N	314.59 W	317.29	0.29
5447.00	1.30	236.98	5408.82	218.82 N	315.89 W	318.57	0.77
5542.00	1.46	229.22	5503.79	217.44 N	317.71 W	320.38	0.26
5637.00	1.06	172.48	5598.77	215.78 N	318.51 W	321.16	1.31
5732.00	1.02	108.06	5693.76	214.65 N	317.59 W	320.23	1.16
5827.00	0.81	113.42	5788.75	214.12 N	316.17 W	318.80	0.23
5922.00	0.07	183.80	5883.74	213.80 N	315.55 W	318.18	0.84
6018.00	0.34	0.54	5979.74	214.02 N	315.55 W	318.18	0.43
6065.00	1.09	293.39	6026.74	214.34 N	315.96 W	318.60	2.15
6113.00	5.20	292.14	6074.66	215.34 N	318.40 W	321.04	8.55
6160.00	9.04	281.15	6121.29	216.86 N	324.00 W	326.66	8.64
6208.00	12.54	280.80	6168.43	218.57 N	332.82 W	335.50	7.28
6255.00	12.82	282.58	6214.28	220.66 N	342.92 W	345.63	1.03
6303.00	15.35	275.38	6260.84	222.41 N	354.44 W	357.17	6.39
6350.00	18.50	272.81	6305.80	223.36 N	368.09 W	370.83	6.90
6398.00	22.25	270.03	6350.79	223.74 N	384.79 W	387.53	8.06
6445.00	26.18	269.40	6393.65	223.64 N	404.07 W	406.81	8.39

6493.00	29.09	267.61	6436.17	223.04 N	426.32 W	429.05	6.29
6540.00	31.80	265.29	6476.68	221.54 N	450.08 W	452.79	6.28
6588.00	35.86	264.66	6516.55	219.20 N	476.69 W	479.37	8.50
6683.00	42.86	264.13	6589.96	213.30 N	536.61 W	539.21	7.38
6730.00	47.00	263.74	6623.22	209.79 N	569.61 W	572.17	8.83
6778.00	51.37	263.61	6654.59	205.78 N	605.71 W	608.21	9.11
6825.00	56.26	263.60	6682.33	201.56 N	643.40 W	645.84	10.41
6873.00	61.35	264.48	6707.18	197.30 N	684.22 W	686.61	10.72
6920.00	69.80	268.56	6726.61	194.76 N	726.89 W	729.24	19.63

**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 285.00 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 6920.00 FEET  
IS 752.53 FEET ALONG 285.00 DEGREES (GRID)**