

PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	11-Apr-14	12-Apr-14	12-Apr-14		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	8.750		
Tool Nominal OD (in)	6.800	6.800	4.750		
Log Start Depth (MD, ft)	668.00	5,914.00	6,100.00		
Log End Depth (MD, ft)	5,914.00	6,100.00	6,966.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	10-Apr-14 08:28	11-Apr-14 11:29	12-Apr-14 04:11		
Drill/Wipe End Date and Time	11-Apr-14 04:55	11-Apr-14 19:09	12-Apr-14 14:50		
Min Inc (deg) @ Depth (MD, ft)	0.17 @ 1,924.00	0.65 @ 5,919.00	11.75 @ 6,091.00		
Max Inc (deg) @ Depth (MD, ft)	14.06 @ 3,818.00	11.75 @ 6,091.00	86.86 @ 6,911.00		
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC	1.74 / PDC		
Flow Rate (gpm)	592.00	585.71	559.85		
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA	NA / NA		
Fluid Type	Native/Spud Mud	Fresh Water Gel	Native/Spud Mud		
Density (ppg) / Viscosity (spqt)	8.60 / 30.00	10.00 / 38.00	10.30 / 38.00		
Filtrate CL (ppm)	1,800.00	2,100.00	2,100.00		
pH / Fluid Loss (mptm)	9.90 / 23	NA / NA	NA / NA		
PV (cP) / YP (lbf2)	4 / 5.00	10 / 11.00	9 / 11.00		
% Solids / % Sand	2.10 / 0.40	8.50 / 0.15	8.1 / 0.10		
% Oil / Oil:Water Ratio	NA / NA	NA / NA	NA / NA		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Max Tool Temp (in F) / S	145.00 / PDM	151.50 / PDM	152.47 / PDM		

Max Tool Temp (degF) / Source	145.90 / PCM	151.50 / PCM	158.47 / PCM		
Rm @ Max Tool Temp (degF)	NA @ 145.90	NA @ 151.50	NA @ 158.47		
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass		
Customer Representative	Jim Turner	Jim Turner	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	245494	245494	245494		
Insert Serial Number	11400842	11400842	11400880		
Date and Time Initialized	10-Apr-14 01:56	10-Apr-14 01:56	11-Apr-14 23:56		
Date and Time Read	12-Apr-14 23:26	12-Apr-14 17:04	12-Apr-14 20:47		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	55.00	55.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	245494	245494	245494		
Sonde Serial Number	11478014	11478014	11477956		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	279.47	228.99	228.99		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.28	47.75	47.75		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	245494	245494	245494		
Insert/Sonde Serial Number	11681051	11681051	11680921		

REMARKS

1. All depths are calibrated to driller's pipe tally and are true vertical depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham 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:
 - 1: 600 Log
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
 - 1: 240 Log
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
 - ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft

Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft

6. Insite Version V8.0.10

WARRANTY

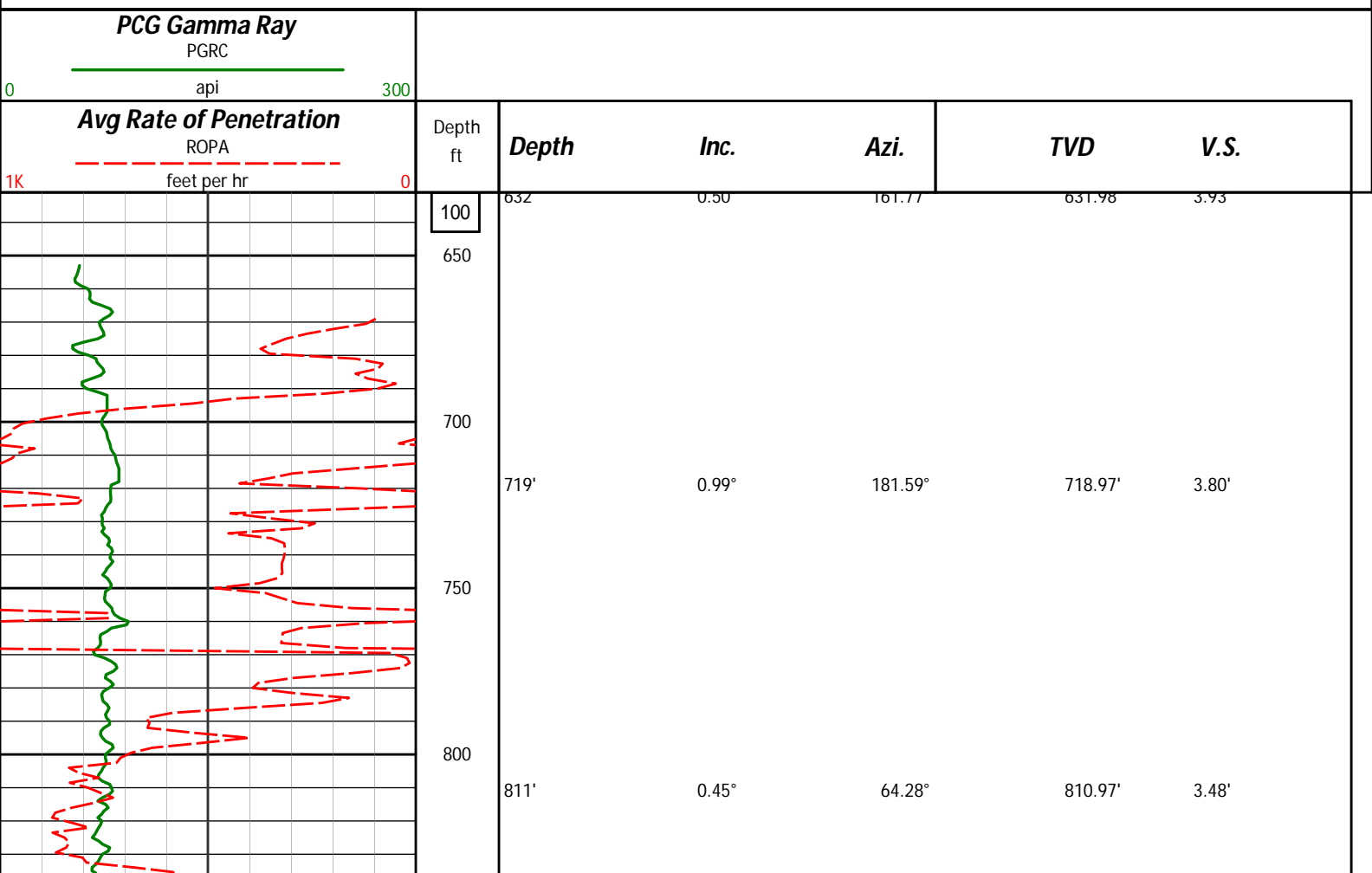
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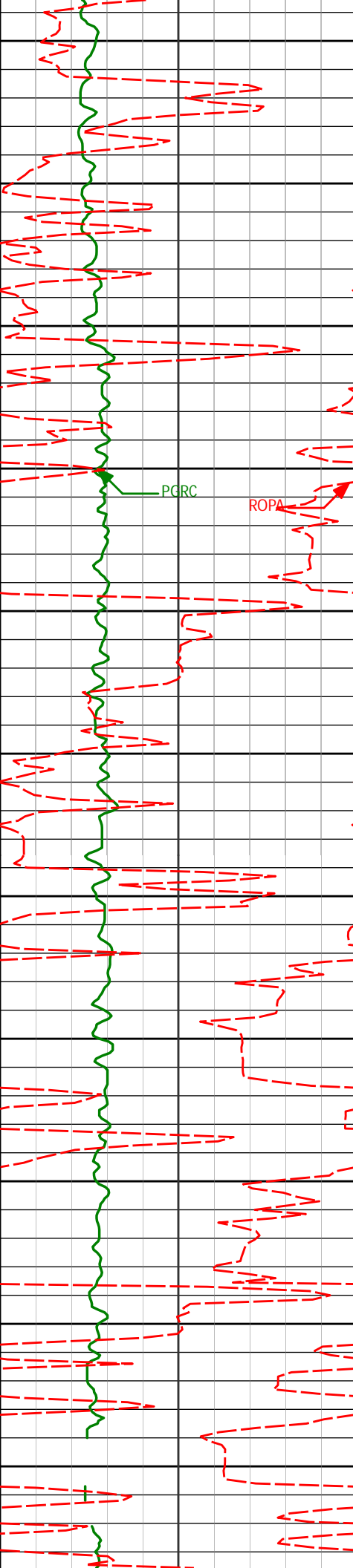
HALLIBURTON

Sperry Drilling Services

TVD Correlation Log 1:600

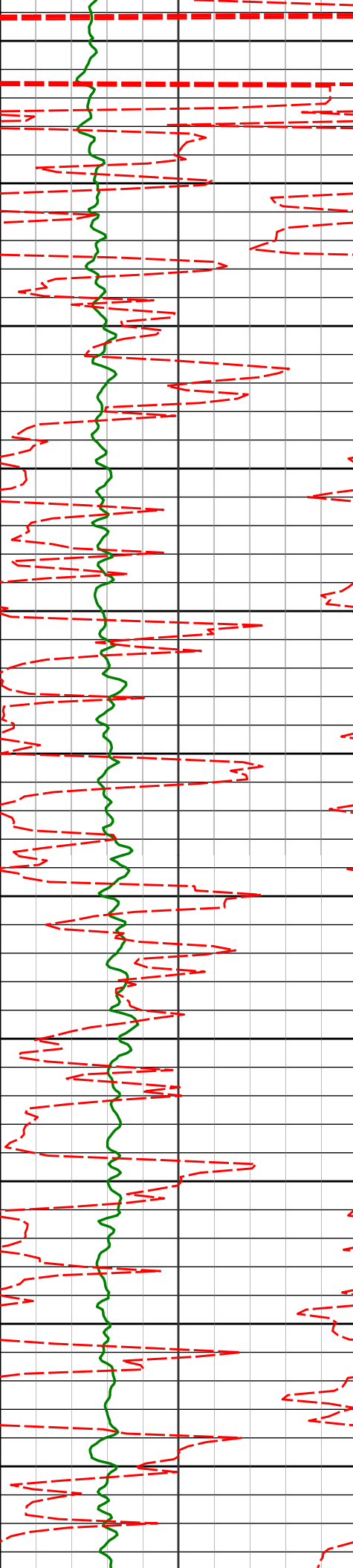
Noble Energy
Wells Ranch AE30-65-1HNC
H&P 321
Sec. 29-T6N-R62W





850
900
950
1000
1050
1100
1150
1200
1250
1300
1350

902'	0.57°	54.36°	901.96'	2.80'
994'	0.61°	46.27°	993.96'	2.09'
1086'	0.50°	35.90°	1085.95'	1.52'
1179'	0.62°	44.81°	1178.95'	0.95'
1272'	0.61°	46.31°	1271.94'	0.26'
1364'	0.64°	37.61°	1363.94'	-0.39'



1400

1450

1500

1550

1600

1650

1700

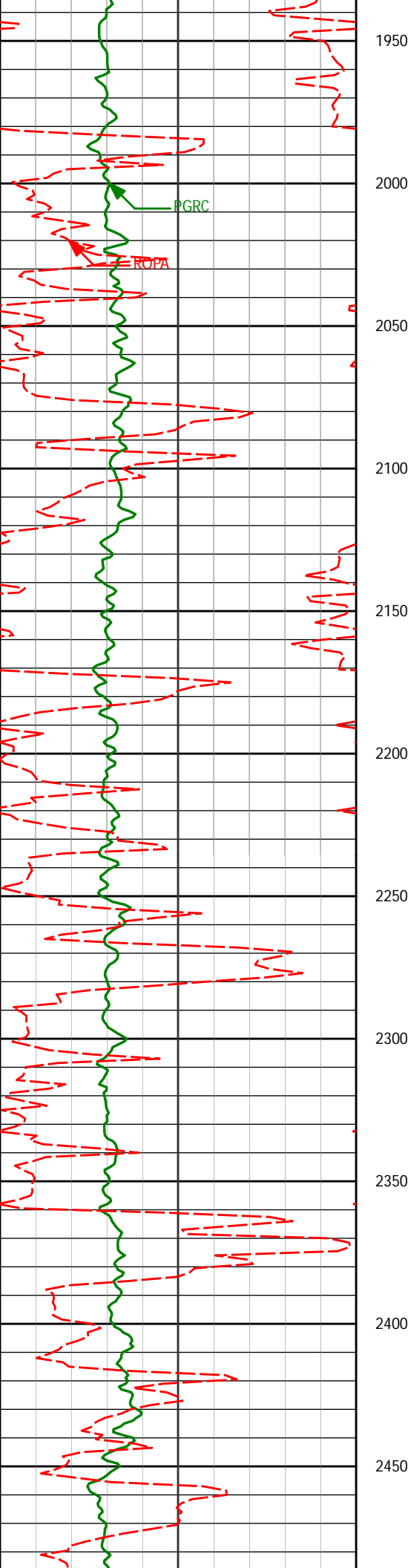
1750

1800

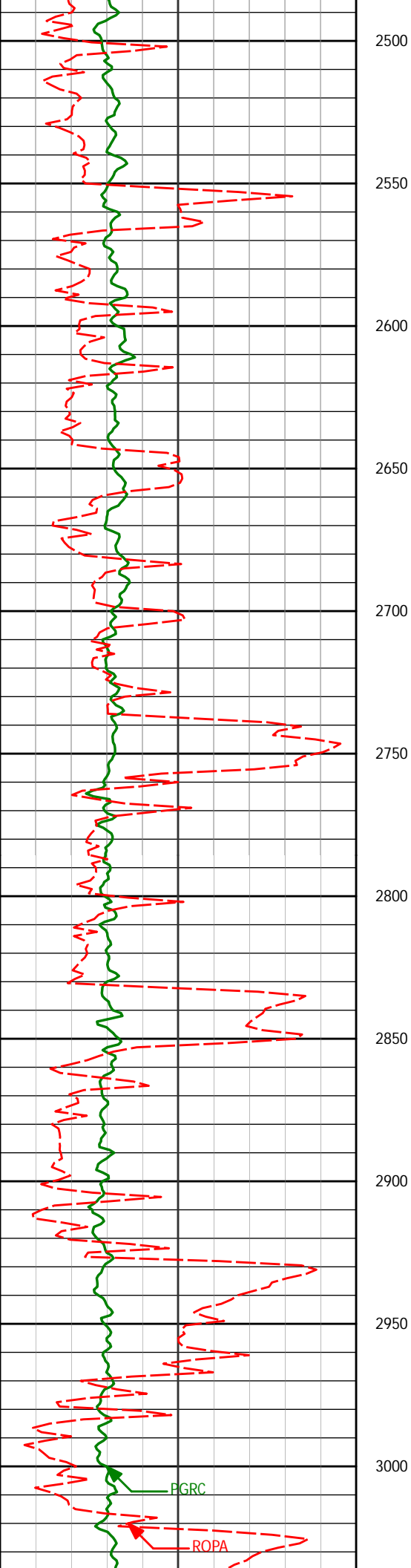
1850

1900

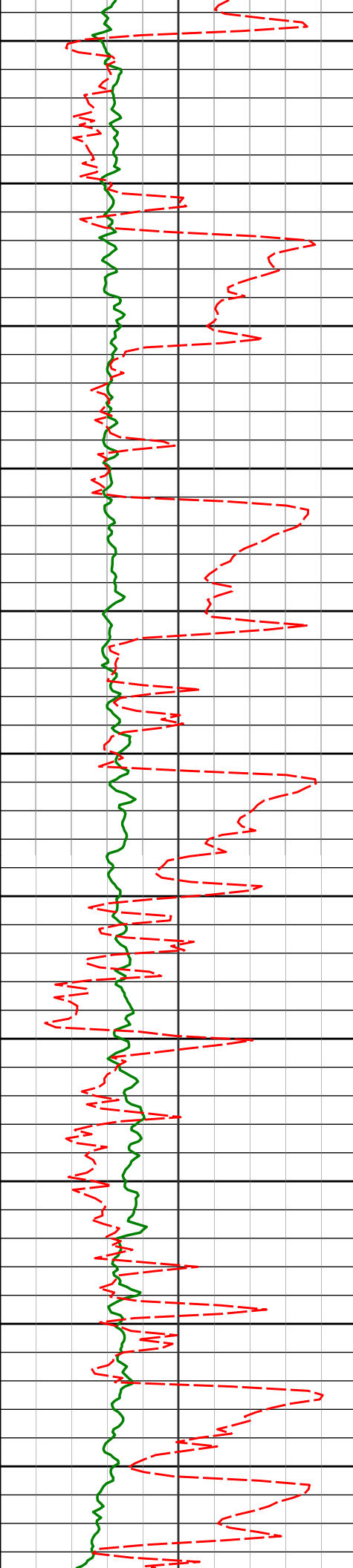
1456'	0.92°	46.30°	1455.93'	-1.21'
1548'	0.41°	187.23°	1547.93'	-1.70'
1640'	0.28°	163.01°	1639.93'	-1.74'
1735'	0.37°	154.48°	1734.92'	-1.95'
1830'	0.34°	165.54°	1829.92'	-2.17'
1924'	0.17°	191.15°	1923.92'	-2.22'



1950				
2000				
2019'	0.19°	100.65°	2018.92'	-2.35'
2050				
2100				
2114'	0.34°	100.57°	2113.92'	-2.79'
2150				
2200				
2209'	0.50°	130.71°	2208.92'	-3.39'
2250				
2300				
2303'	0.59°	249.19°	2302.92'	-3.26'
2350				
2400				
2398'	0.33°	220.81°	2397.91'	-2.63'
2450				

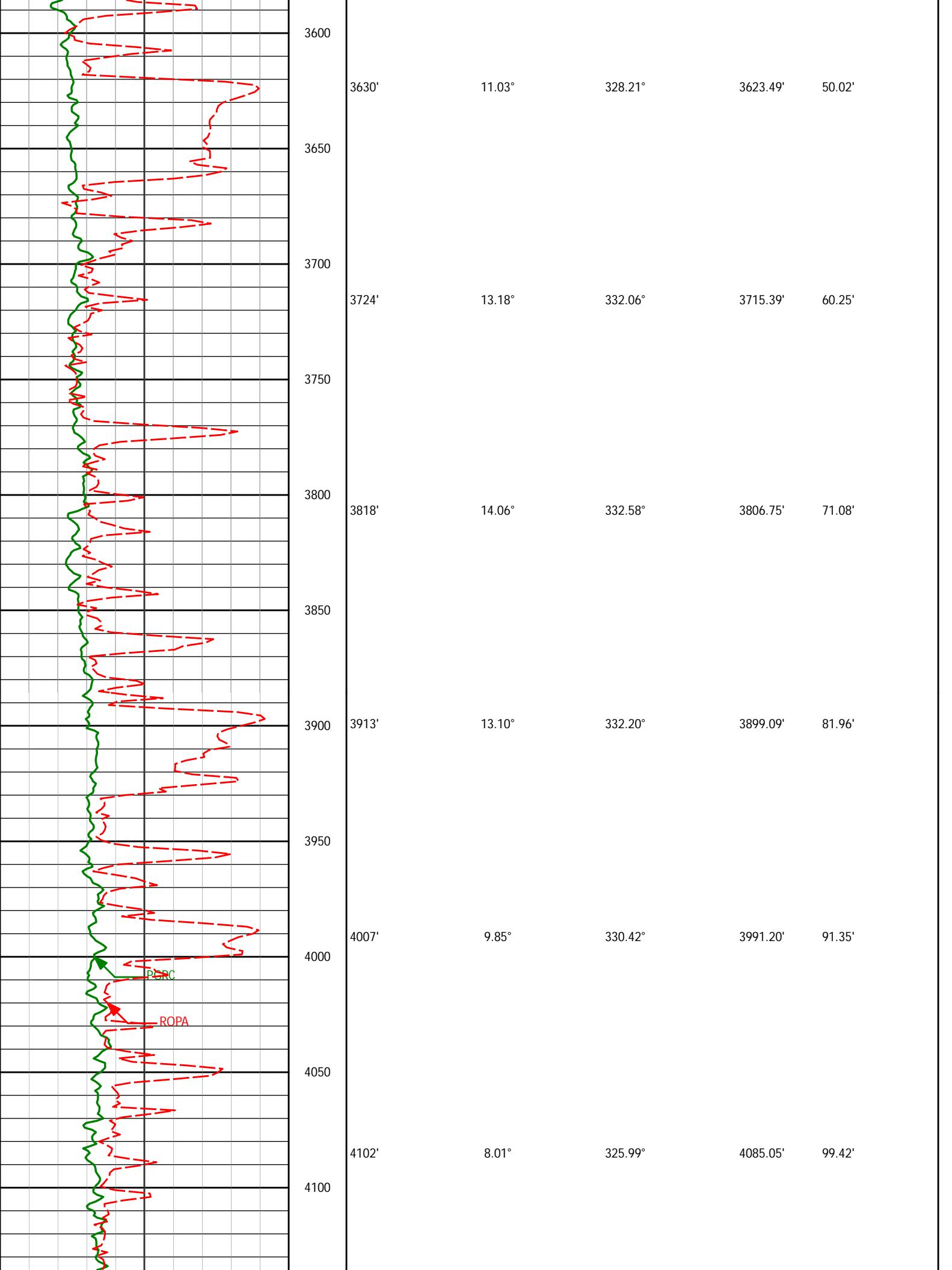


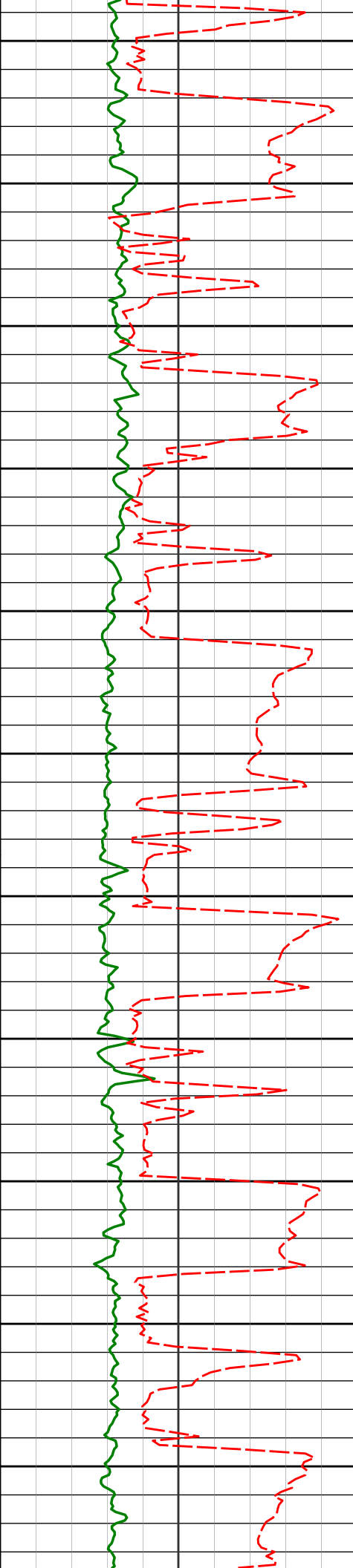
2492'	0.26°	234.46°	2491.91'	-2.29'
2587'	0.39°	216.14°	2586.91'	-1.94'
2682'	0.40°	230.61°	2681.91'	-1.50'
2777'	1.28°	291.00°	2776.90'	-0.25'
2871'	2.09°	335.39°	2870.86'	1.49'
2966'	4.42°	336.18°	2965.70'	3.83'



3050
3100
3150
3200
3250
3300
3350
3400
3450
3500
3550

3061'	5.08°	340.10°	3060.37'	6.94'
3156'	6.89°	332.70°	3154.85'	11.24'
3251'	8.73°	336.21°	3248.97'	17.09'
3346'	10.15°	325.42°	3342.69'	25.12'
3440'	7.58°	323.79°	3435.56'	33.81'
3535'	7.48°	325.06°	3529.74'	41.33'





4150

4197'

7.36°

324.22°

4179.19'

106.96'

4200

4250

4292'

7.35°

320.43°

4273.41'

114.66'

4300

4350

4387'

7.55°

319.69°

4367.61'

122.83'

4400

4450

4481'

8.68°

327.92°

4460.67'

130.89'

4500

4550

4576'

7.57°

330.34°

4554.71'

138.11'

4600

4650

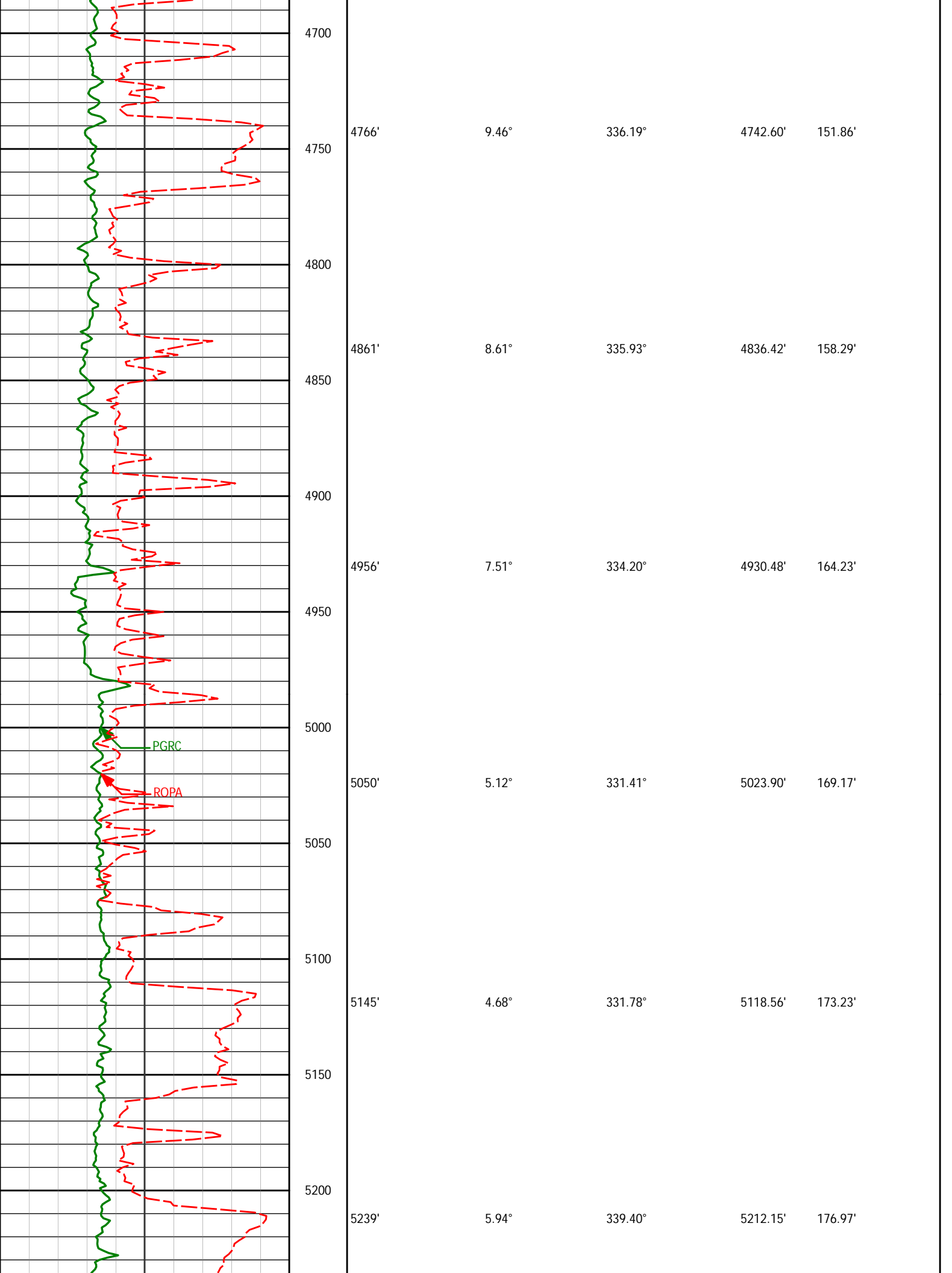
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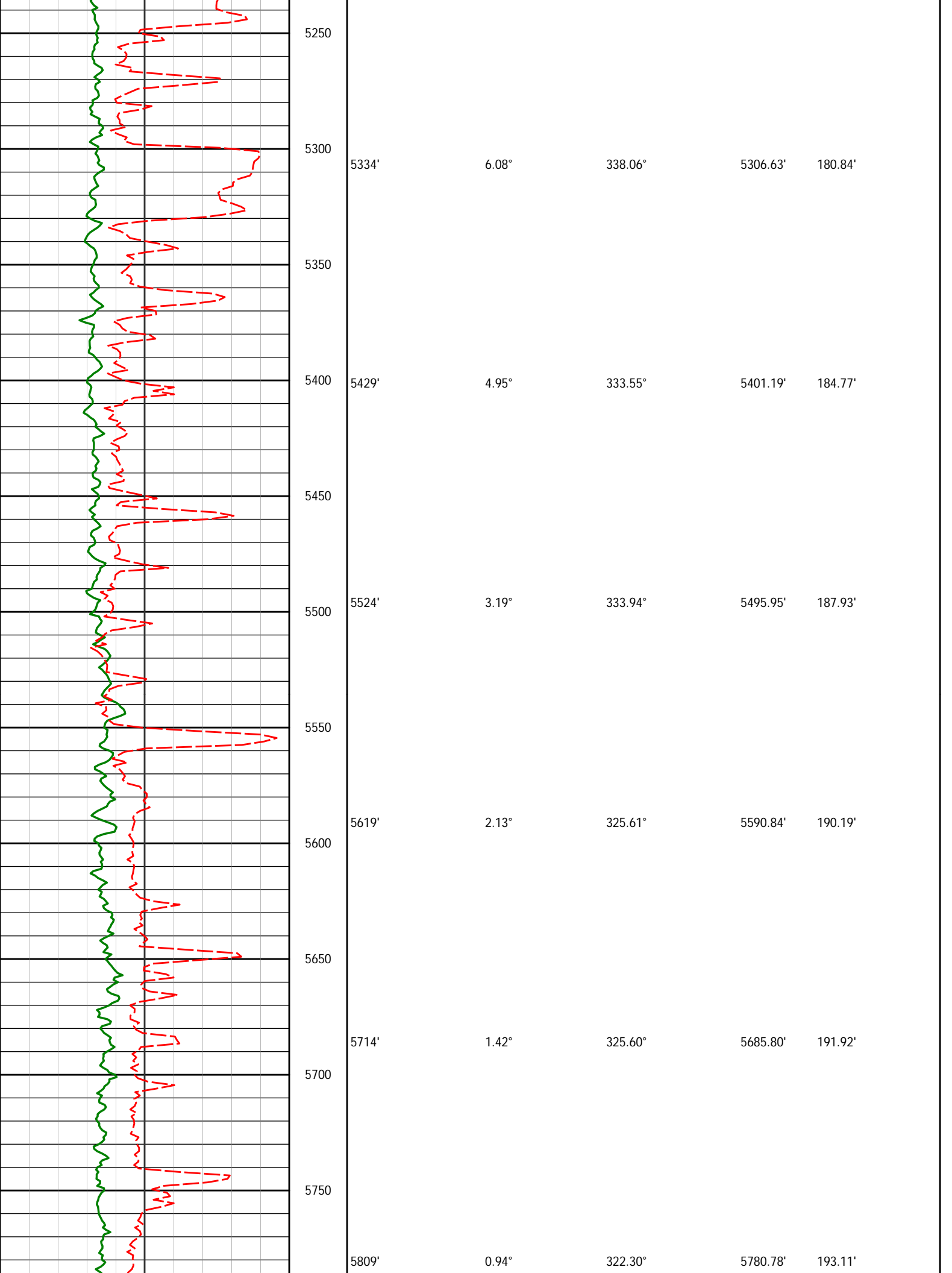
8.57°

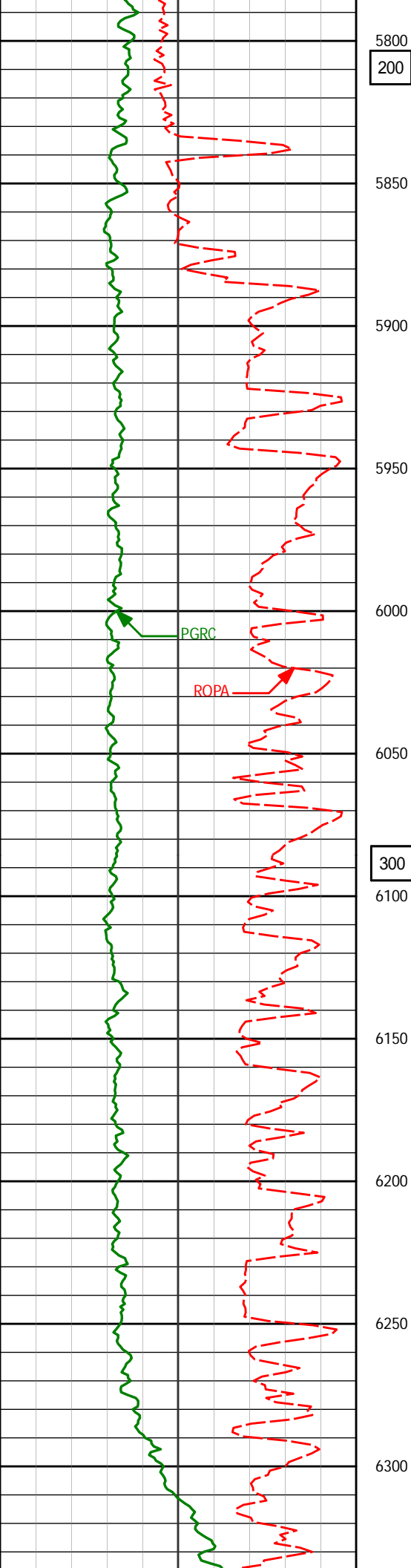
331.24°

4648.77'

144.93'







5800
200

5857' 0.81° 312.55° 5828.77' 193.61'

5850

5919' 0.65° 302.66° 5890.76' 194.25'

5900

5950

5997' 4.17° 277.03° 5968.68' 197.45'

6000

PGRC

6045' 8.85° 268.41° 6016.36' 202.88'

ROPA

6050

6091' 11.75° 268.39° 6061.62' 211.09'

300
6100

6139' 15.63° 268.44° 6108.24' 222.43'

6150

6186' 18.54° 265.93° 6153.17' 236.19'

6200

6234' 20.49° 266.24° 6198.41' 252.15'

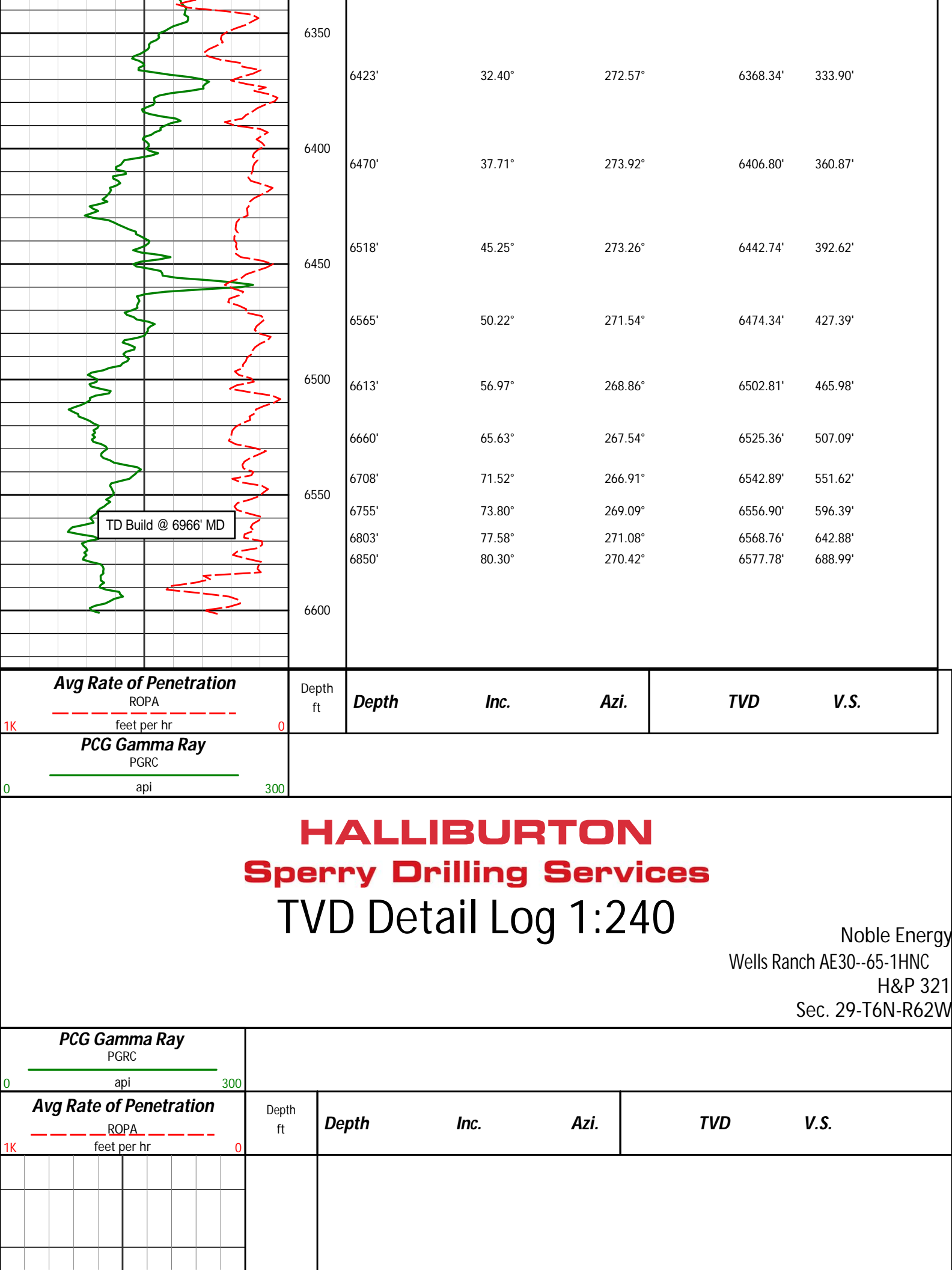
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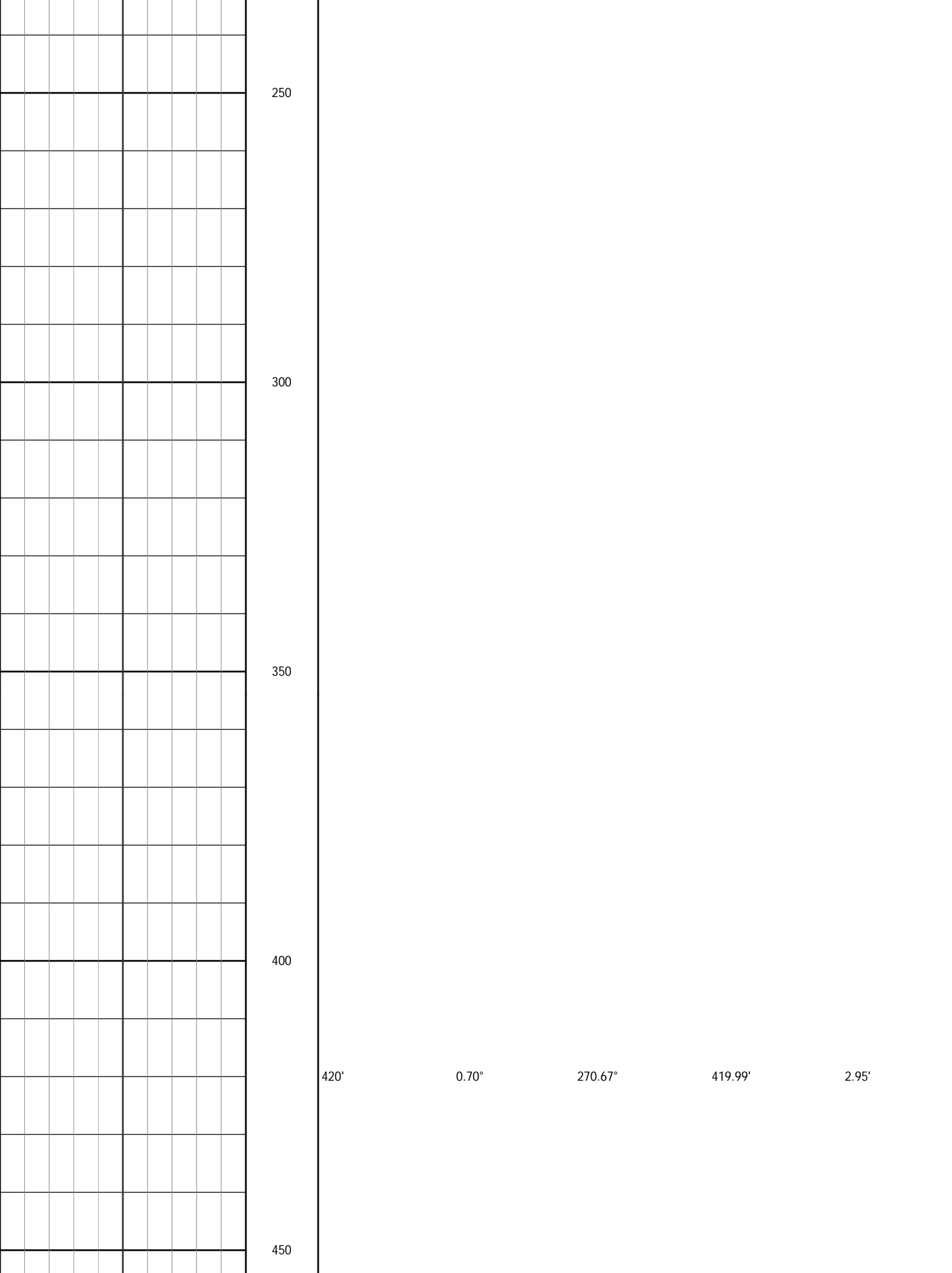
6281' 22.54° 266.89° 6242.13' 269.32'

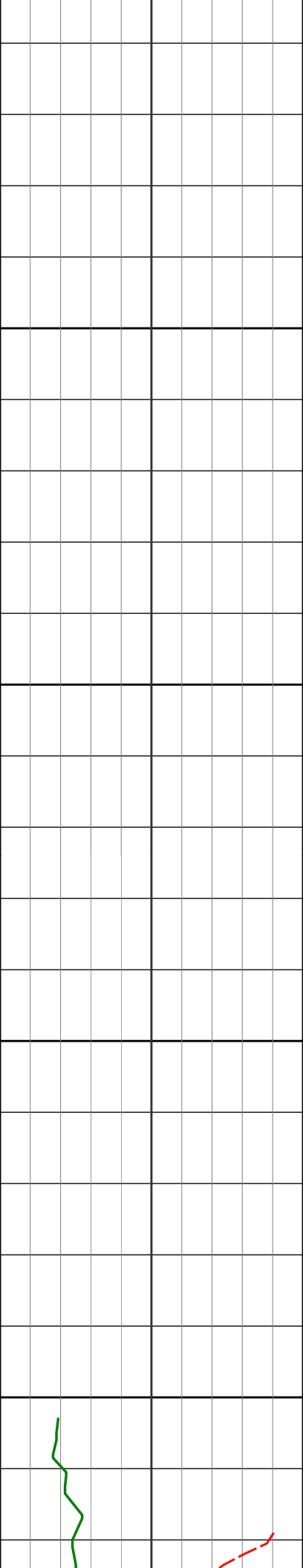
6300

6329' 25.96° 265.64° 6285.89' 288.94'

6375' 28.05° 268.40° 6326.87' 309.76'







500

550

600



Run 100

632'

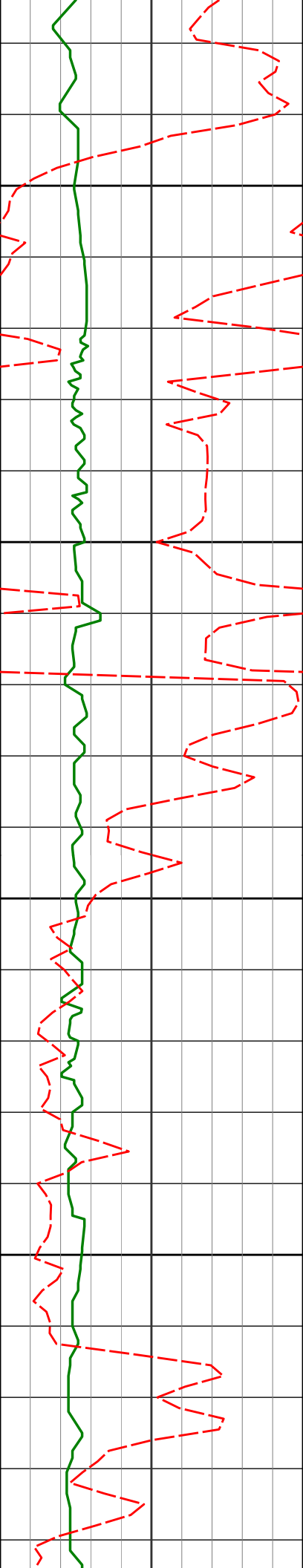
0.50°

161.77°

631.98'

3.93'

650



700

719'

0.99°

181.59°

718.97'

3.80'

750

800

811'

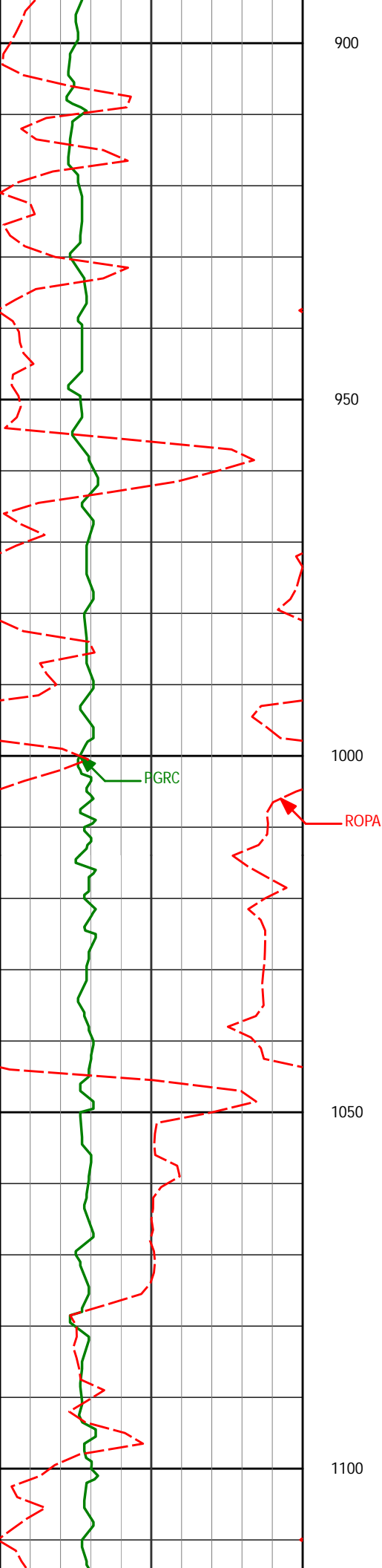
0.45°

64.28°

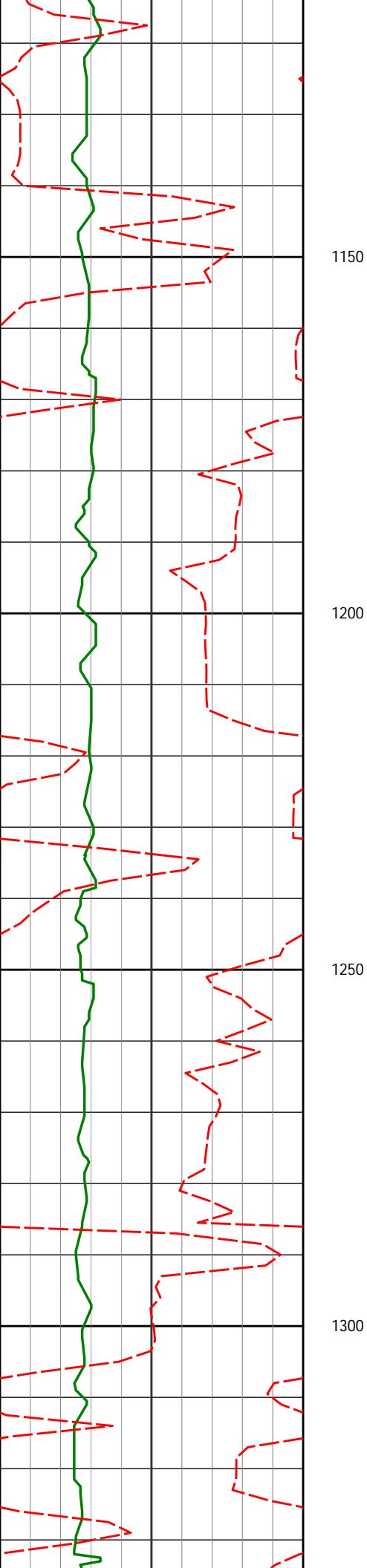
810.97'

3.48'

850



902'	0.57°	54.36°	901.96'	2.80'
994'	0.61°	46.27°	993.96'	2.09'
1086'	0.50°	35.90°	1085.95'	1.52'



1150

1179'

0.62°

44.81°

1178.95'

0.95'

1200

1250

1272'

0.61°

46.31°

1271.94'

0.26'

1300



1350

1364'

0.64°

37.61°

1363.94'

-0.39'

1400

1450

1456'

0.92°

46.30°

1455.93'

-1.21'

1500

1550

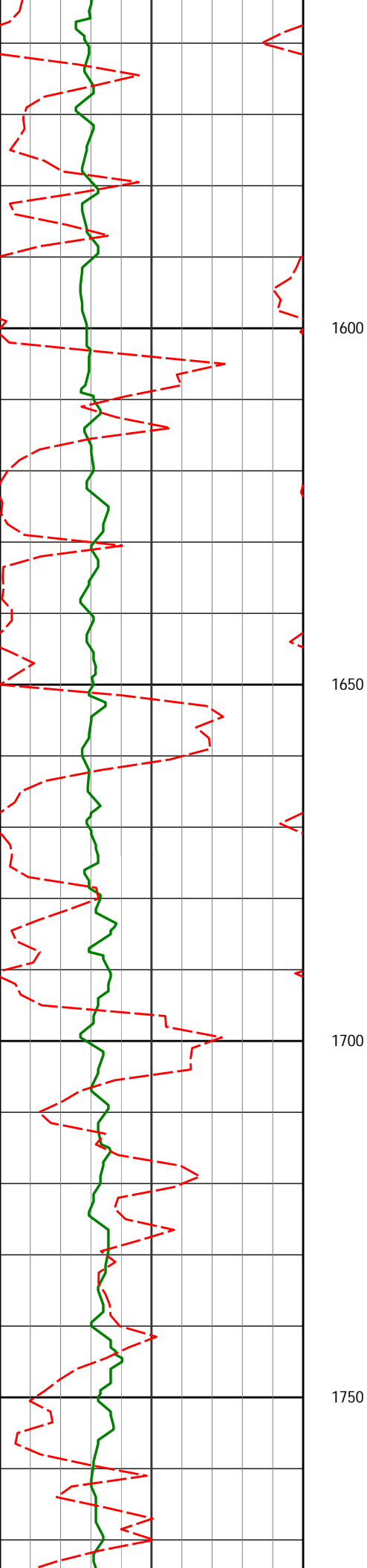
1548'

0.41°

187.23°

1547.93'

-1.70'



1640'

0.28°

163.01°

1639.93'

-1.74'

1650

1700

1735'

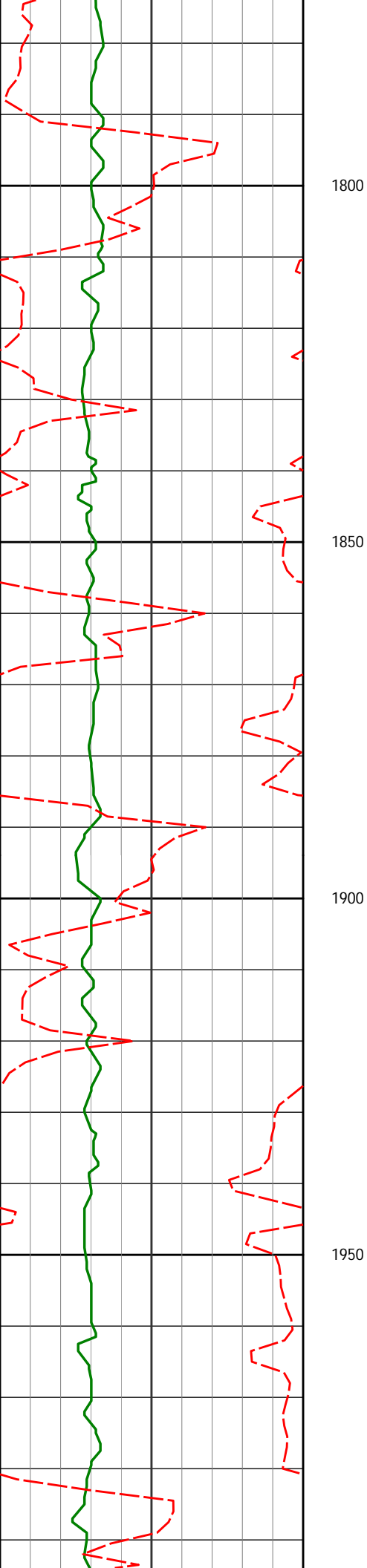
0.37°

154.48°

1734.92'

-1.95'

1750



1830'

0.34°

165.54°

1829.92'

-2.17'

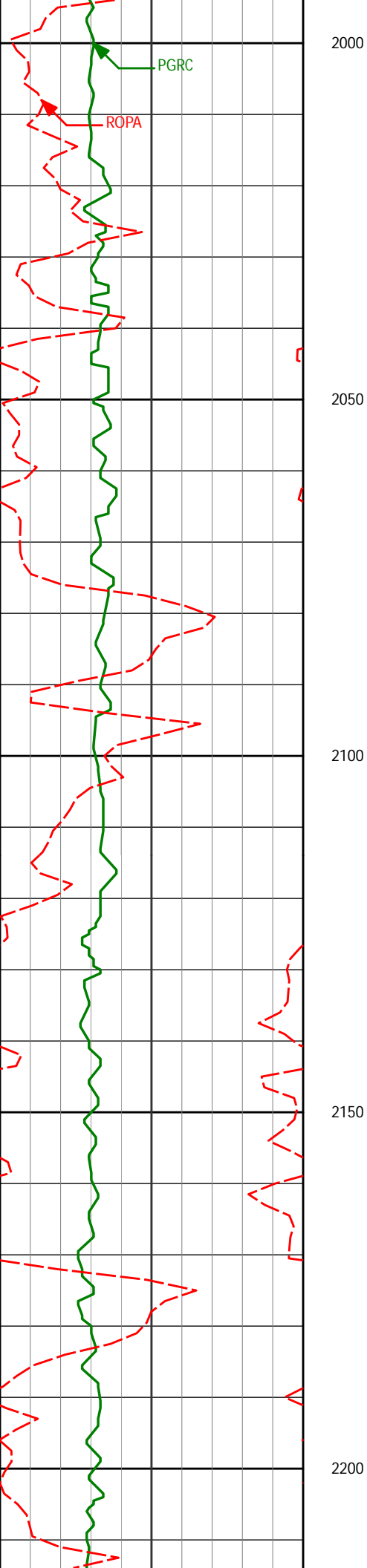
1924'

0.17°

191.15°

1923.92'

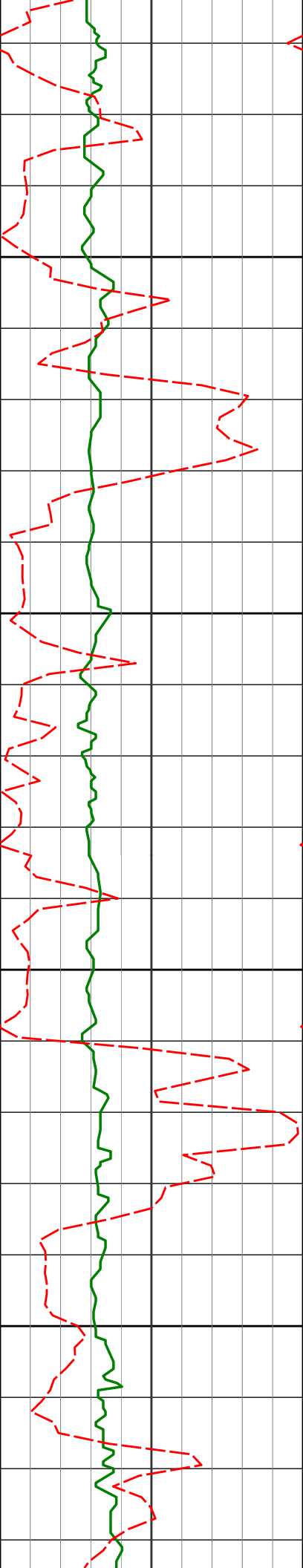
-2.22'



2019' 0.19° 100.65° 2018.92' -2.35'

2114' 0.34° 100.57° 2113.92' -2.79'

2209' 0.50° 130.71° 2208.92' -3.39'



2250

2300

2350

2400

2303'

0.59°

249.19°

2302.92'

-3.26'

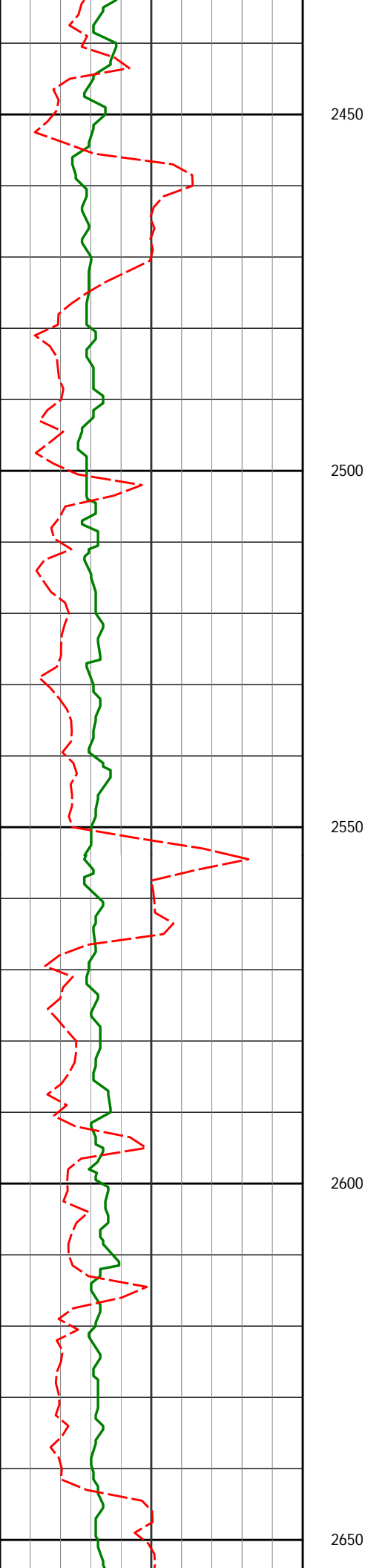
2398'

0.33°

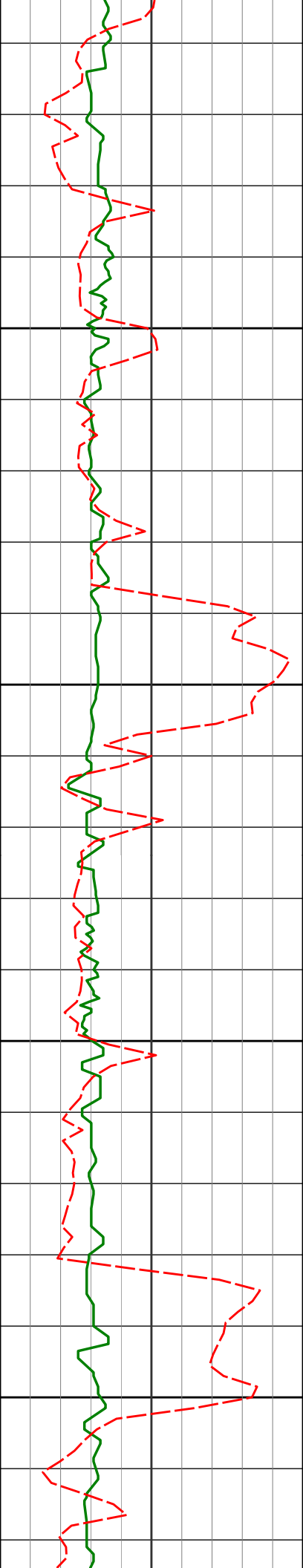
220.81°

2397.91'

-2.63'



2450				
2492'	0.26°	234.46°	2491.91'	-2.29'
2500				
2550				
2587'	0.39°	216.14°	2586.91'	-1.94'
2600				
2650				



2682'

0.40°

230.61°

2681.91'

-1.50'

2700

2750

2777'

1.28°

291.00°

2776.90'

-0.25'

2800

2850

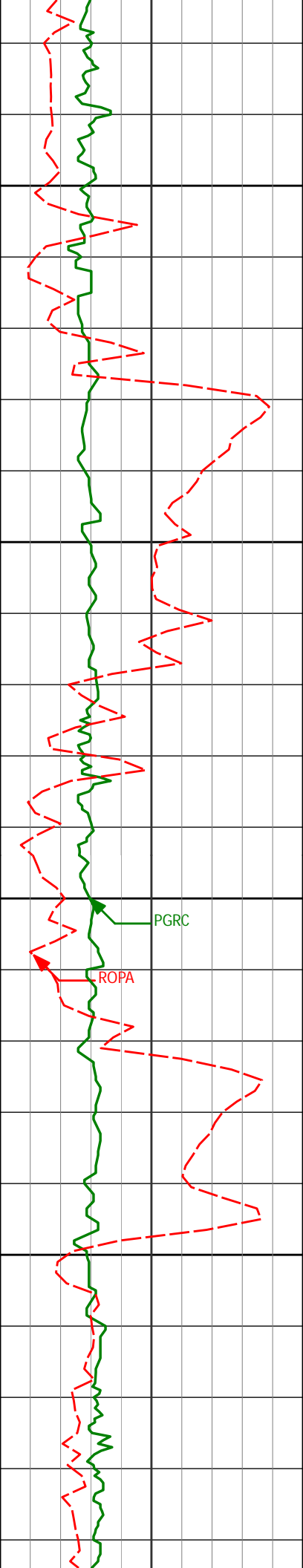
2871'

2.09°

335.39°

2870.86'

1.49'



2900

2950

3000

3050

2966'

4.42°

336.18°

2965.70'

3.83'

PGRC

ROPA

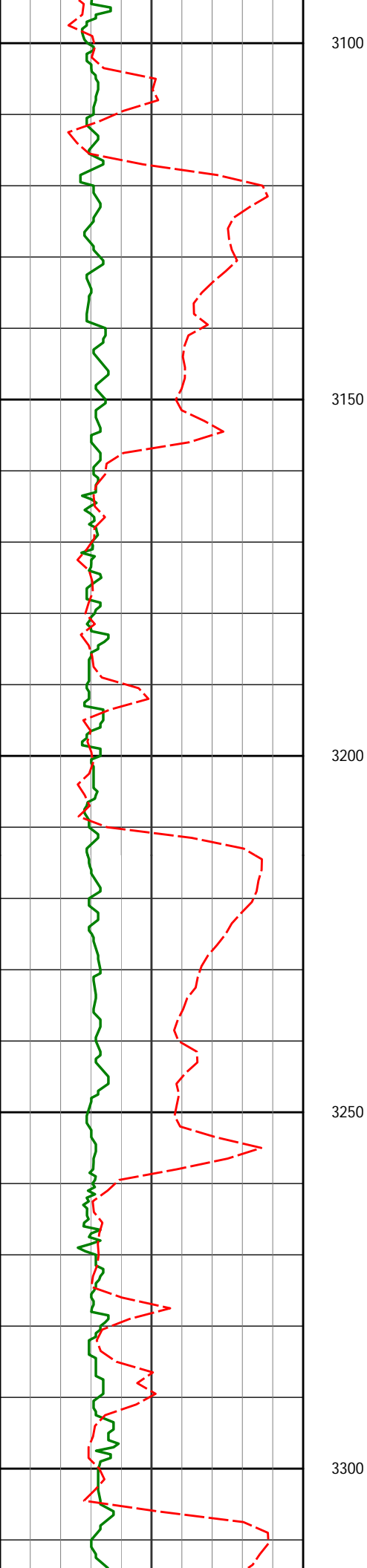
3061'

5.08°

340.10°

3060.37'

6.94'



3156'

6.89°

332.70°

3154.85'

11.24'

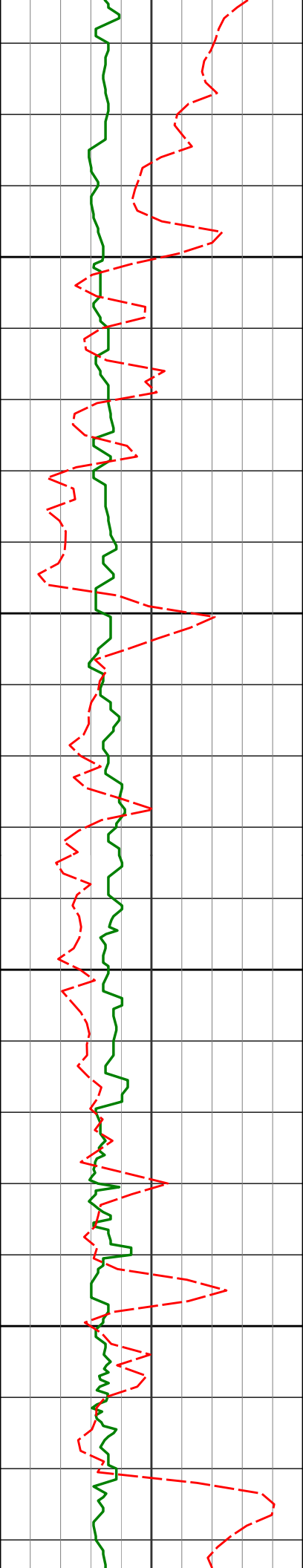
3251'

8.73°

336.21°

3248.97'

17.09'



3346'

10.15°

325.42°

3342.69'

25.12'

3350

3400

3440'

7.58°

323.79°

3435.56'

33.81'

3450

3500

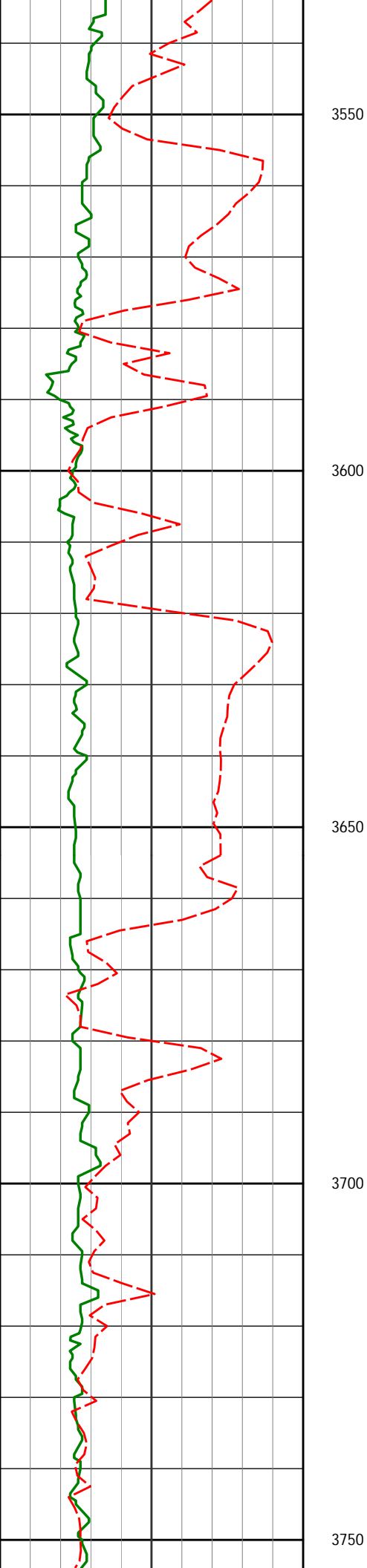
3535'

7.48°

325.06°

3529.74'

41.33'



3630'

11.03°

328.21°

3623.49'

50.02'

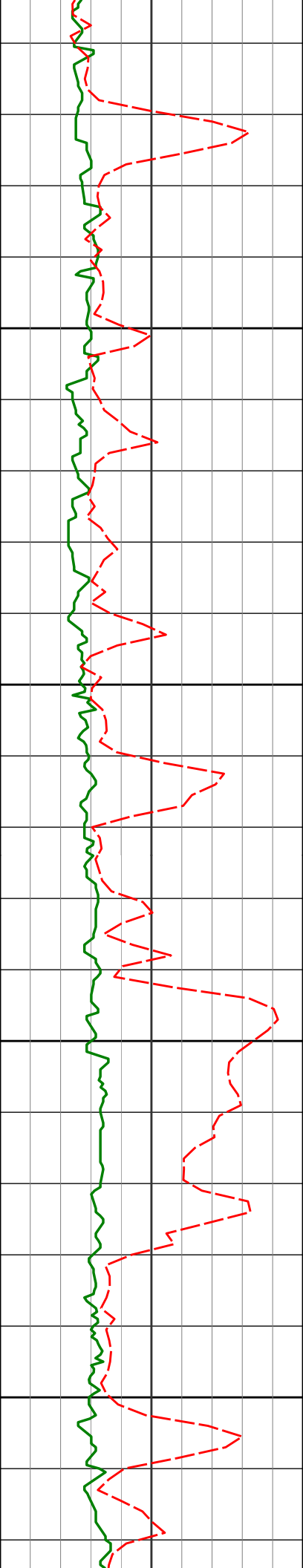
3724'

13.18°

332.06°

3715.39'

60.25'



3800

3818'

14.06°

332.58°

3806.75'

71.08'

3850

3900

3913'

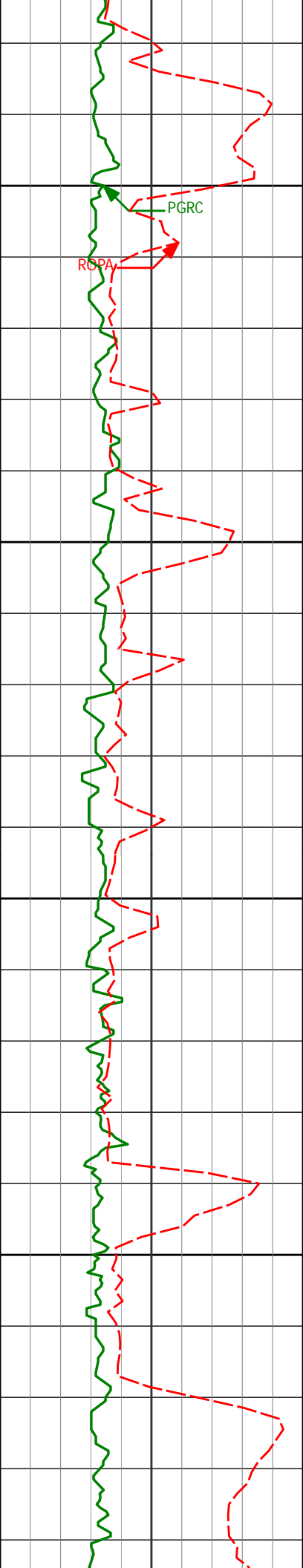
13.10°

332.20°

3899.09'

81.96'

3950



4007'

9.85°

330.42°

3991.20'

91.35'

4000

PGR

RCPA

4050

4102'

8.01°

325.99°

4085.05'

99.42'

4100

4150

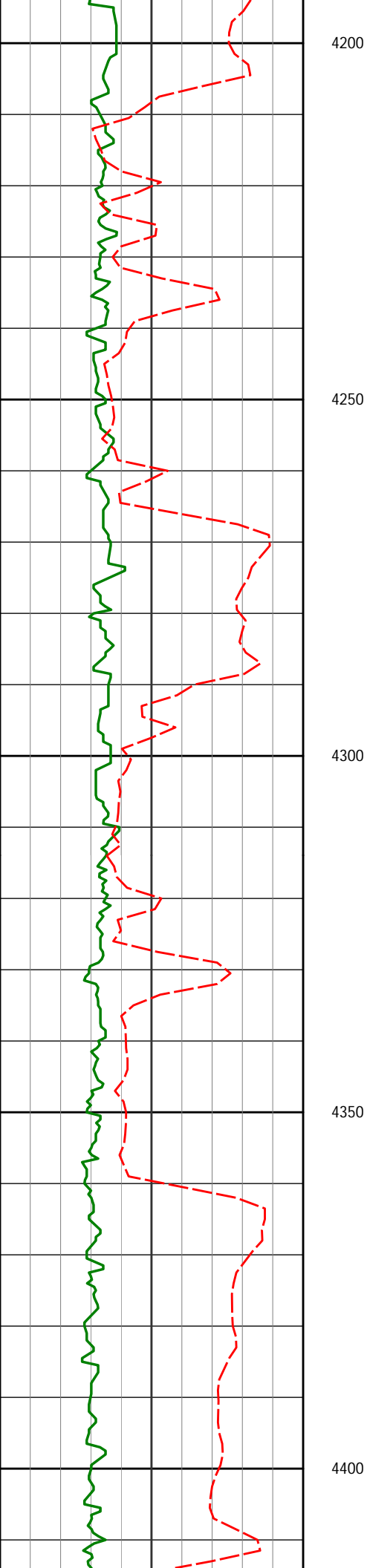
4197'

7.36°

324.22°

4179.19'

106.96'



4292'

7.35°

320.43°

4273.41'

114.66'

4387'

7.55°

319.69°

4367.61'

122.83'

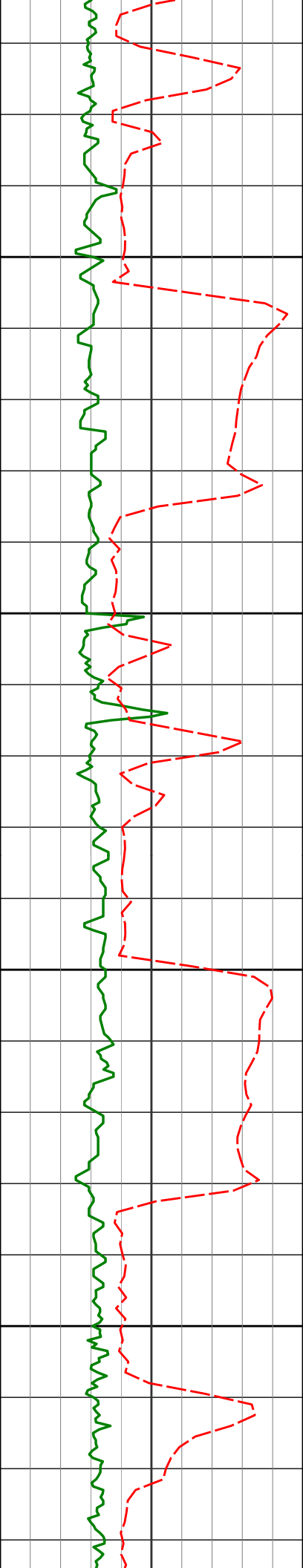
4200

4250

4300

4350

4400



4450

4481'

8.68°

327.92°

4460.67'

130.89'

4500

4550

4576'

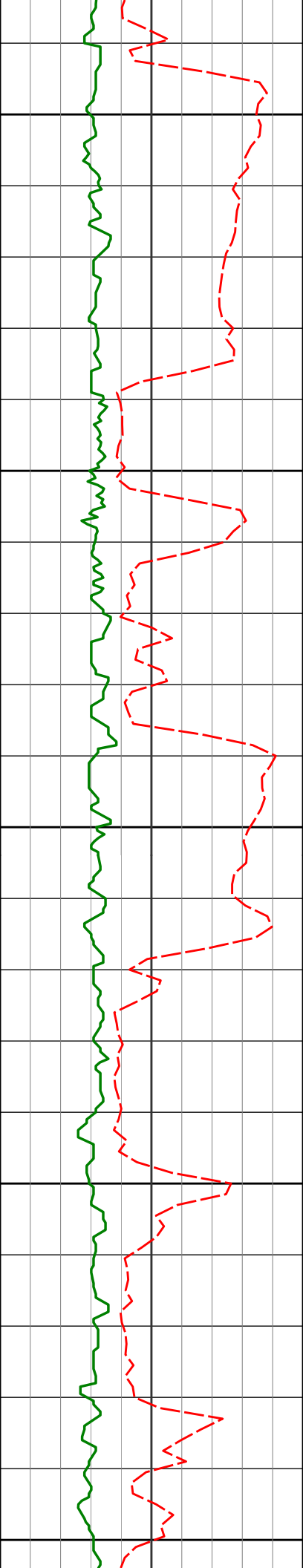
7.57°

330.34°

4554.71'

138.11'

4600



4650

4700

4750

4800

4850

4671'

4766'

4861'

8.57°

9.46°

8.61°

331.24°

336.19°

335.93°

4648.77'

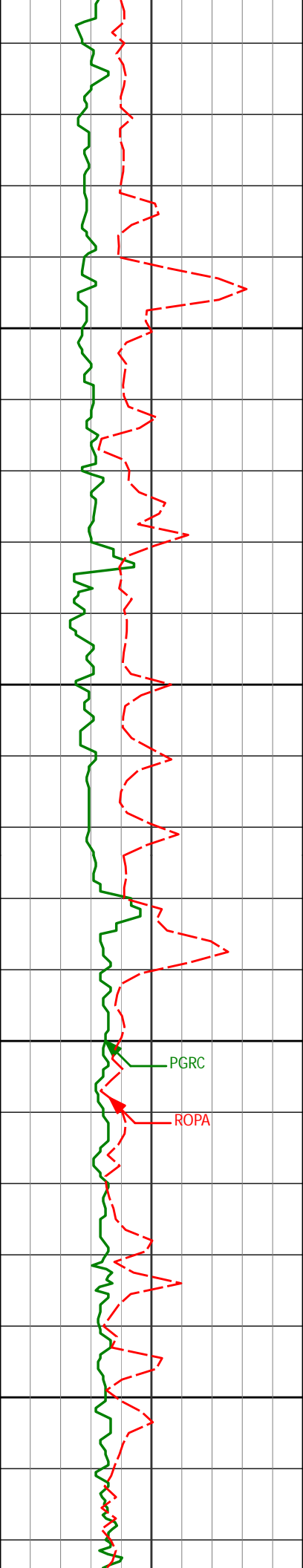
4742.60'

4836.42'

144.93'

151.86'

158.29'



4900

4956'

7.51°

334.20°

4930.48'

164.23'

4950

5000

PGRC

ROPA

5050'

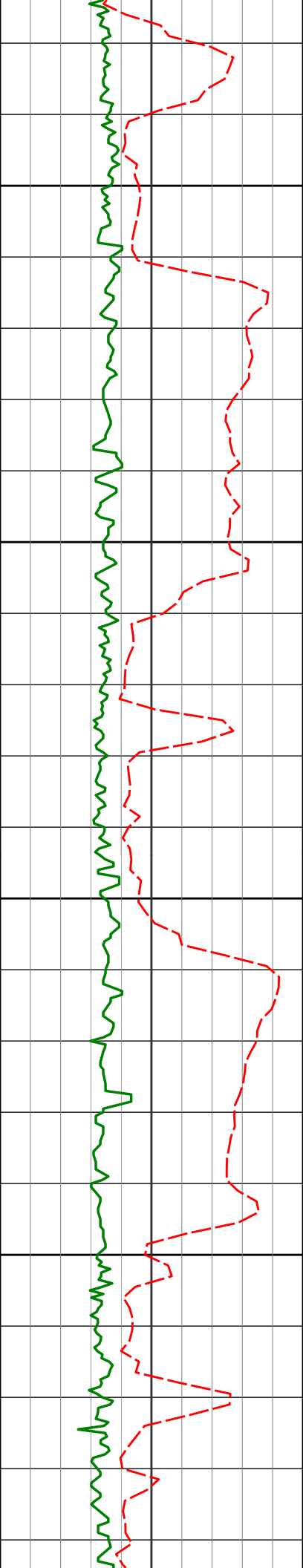
5.12°

331.41°

5023.90'

169.17'

5050



5100

5145'

4.68°

331.78°

5118.56'

173.23'

5150

5200

5239'

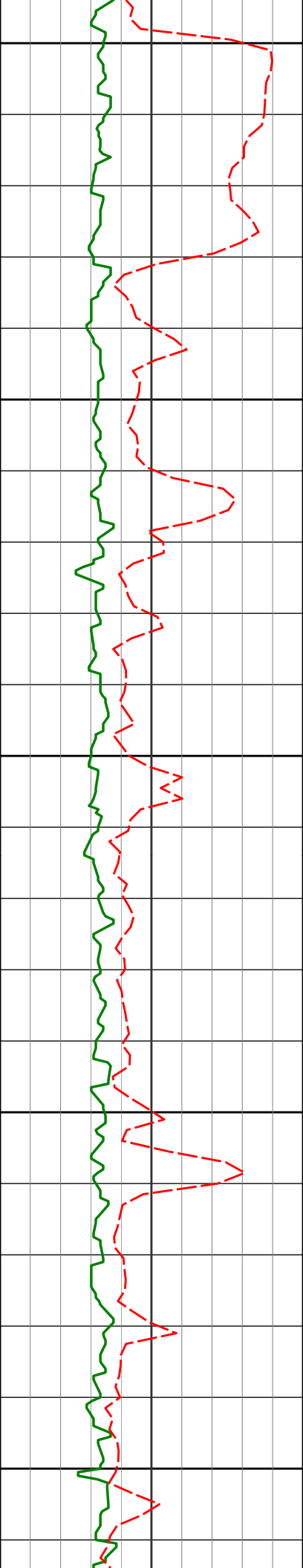
5.94°

339.40°

5212.15'

176.97'

5250



5300

5334'

6.08°

338.06°

5306.63'

180.84'

5350

5400

5429'

4.95°

333.55°

5401.19'

184.77'

5450

5500

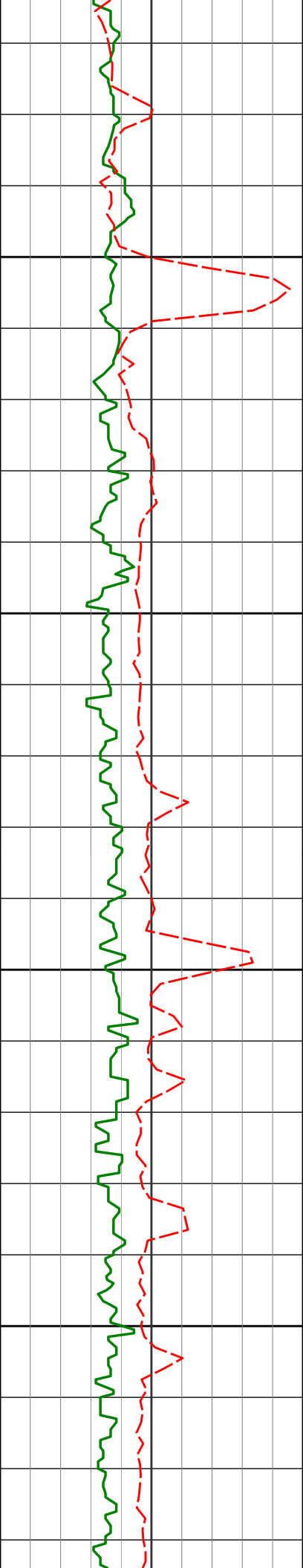
5524'

3.19°

333.94°

5495.95'

187.93'



5550

5619'

2.13°

325.61°

5590.84'

190.19'

5600

5650

5714'

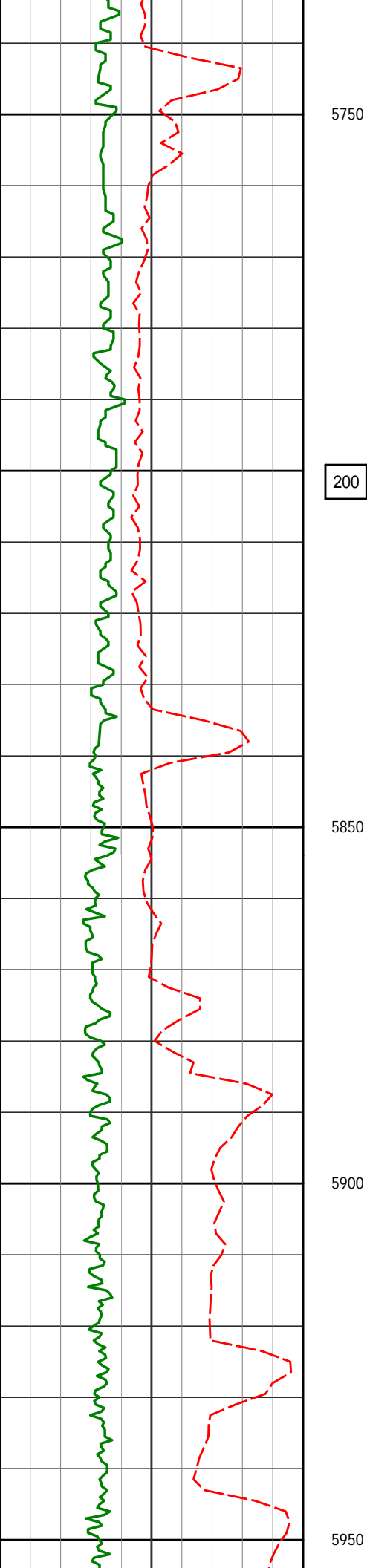
1.42°

325.60°

5685.80'

191.92'

5700



5809'

0.94°

322.30°

5780.78'

193.11'

200

5857'

0.81°

312.55°

5828.77'

193.61'

5850

5919'

0.65°

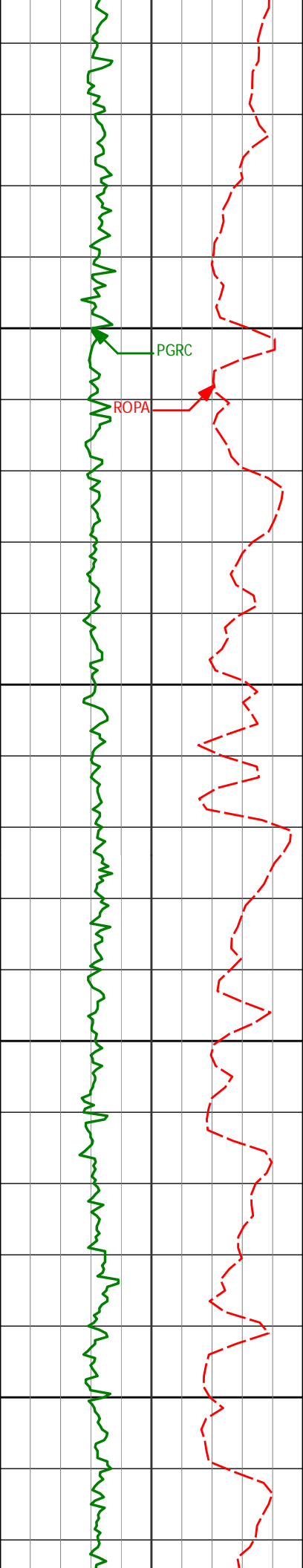
302.66°

5890.76'

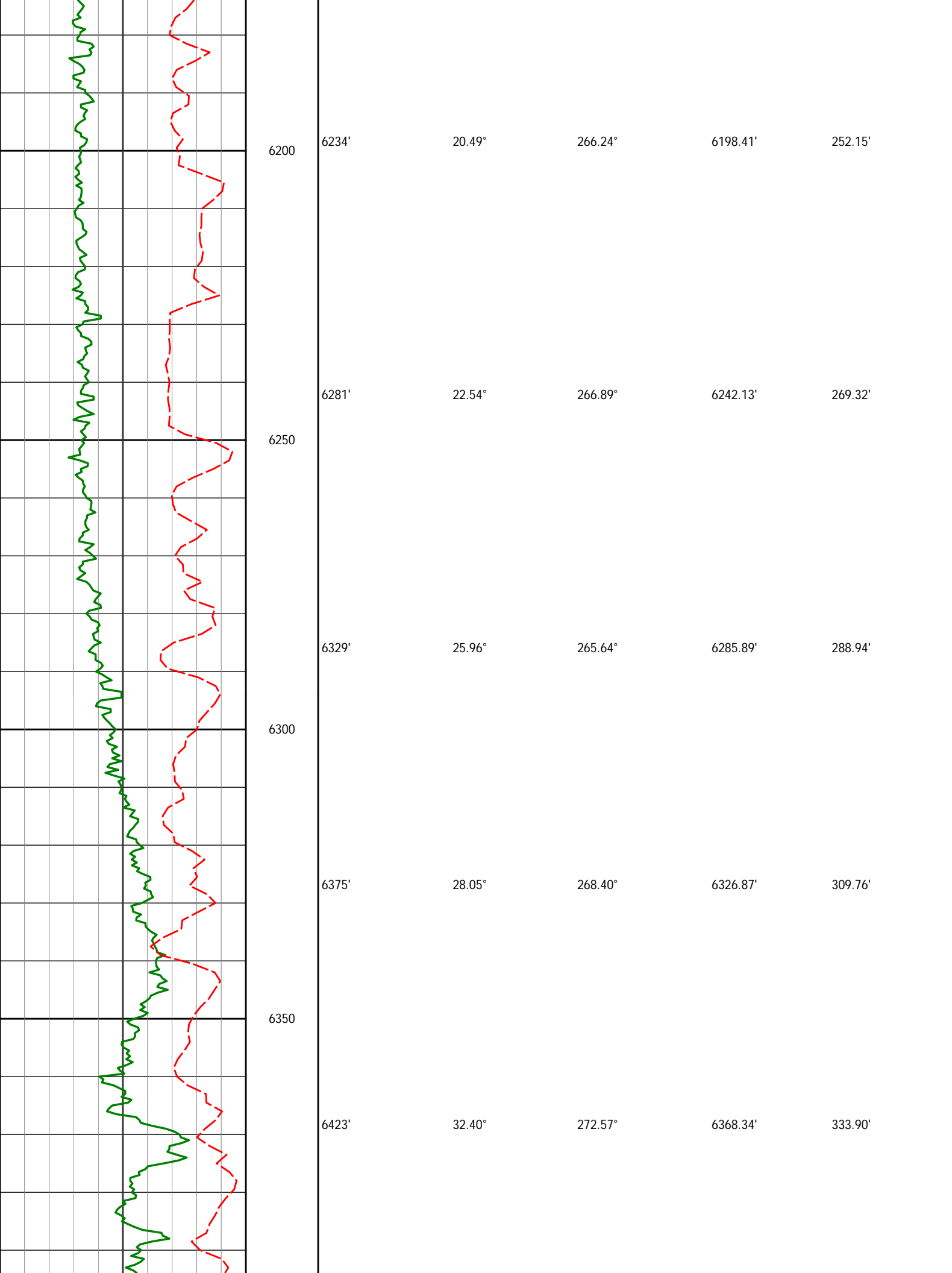
194.25'

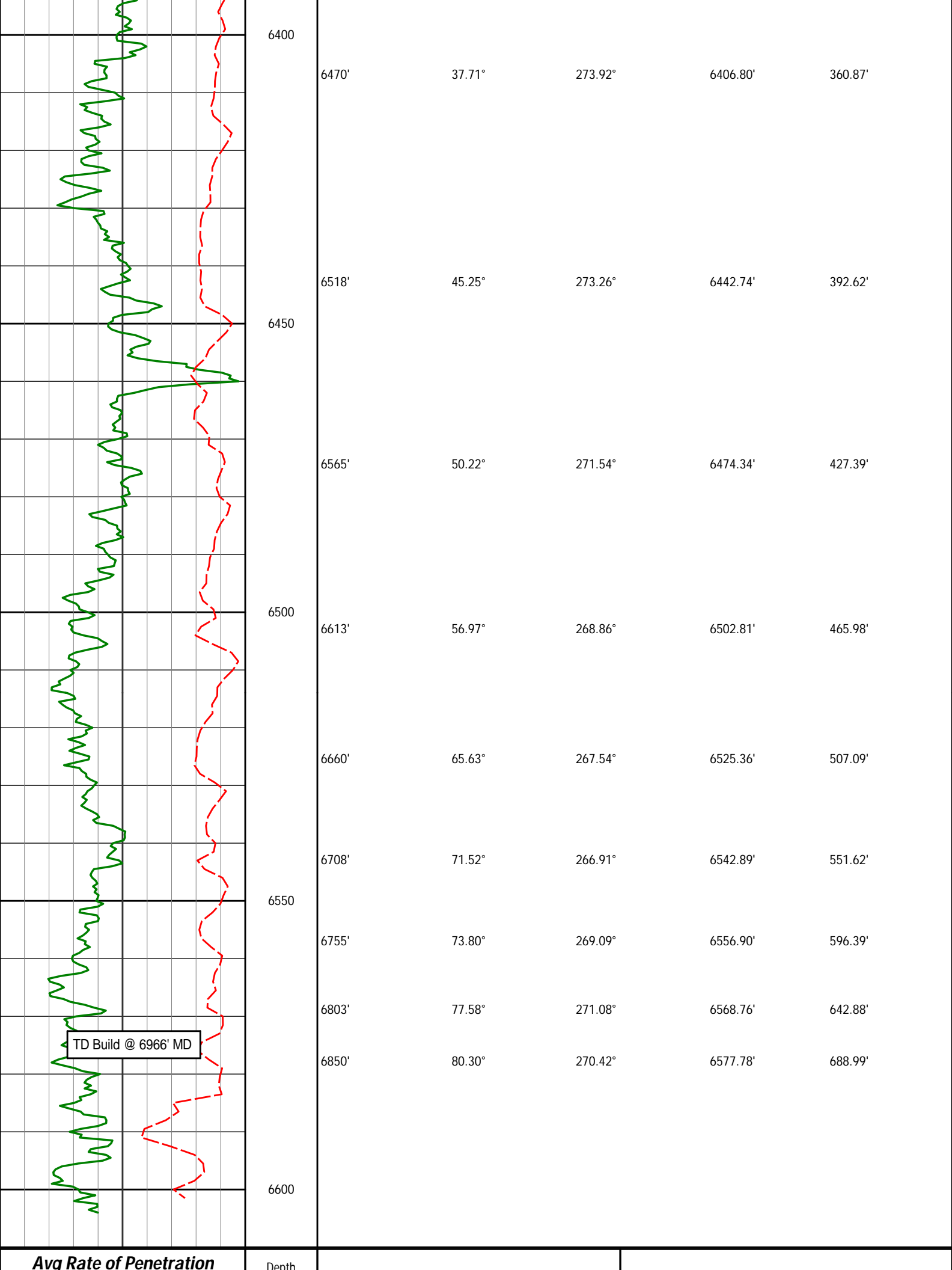
5900

5950



5997'	4.17°	277.03°	5968.68'	197.45'
6045'	8.85°	268.41°	6016.36'	202.88'
6091'	11.75°	268.39°	6061.62'	211.09'
6139'	15.63°	268.44°	6108.24'	222.43'
6186'	18.54°	265.93°	6153.17'	236.19'





6400

6470'

37.71°

273.92°

6406.80'

360.87'

6518'

45.25°

273.26°

6442.74'

392.62'

6450

6565'

50.22°

271.54°

6474.34'

427.39'

6500

6613'

56.97°

268.86°

6502.81'

465.98'

6660'

65.63°

267.54°

6525.36'

507.09'

6708'

71.52°

266.91°

6542.89'

551.62'

6550

6755'

73.80°

269.09°

6556.90'

596.39'

6803'

77.58°

271.08°

6568.76'

642.88'

6850'

80.30°

270.42°

6577.78'

688.99'

6600

TD Build @ 6966' MD

Avg Rate of Penetration

Depth

	ROP A	Depth	Inc.	Azi.	TVD	V.S.
1K	feet per hr					
	PCG Gamma Ray					
	PGRC					
0	api	300				

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE30-65-1HNC
Wattenburg
Weld Colorado
USA
CA-XX-0901176449

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
214.00	0.50	294.17	214.00	0.38 N	0.85 W	0.86	0.23
420.00	0.70	270.67	419.99	0.77 N	2.93 W	2.95	0.15
632.00	0.50	161.77	631.98	0.10 S	3.94 W	3.93	0.46
719.00	0.99	181.59	718.97	1.21 S	3.84 W	3.80	0.63
811.00	0.45	64.28	810.97	1.85 S	3.53 W	3.48	1.37
902.00	0.57	54.36	901.96	1.43 S	2.84 W	2.80	0.16
994.00	0.61	46.27	993.96	0.82 S	2.12 W	2.09	0.10
1086.00	0.50	35.90	1085.95	0.16 S	1.53 W	1.52	0.16
1179.00	0.62	44.81	1178.95	0.53 N	0.94 W	0.95	0.16
1272.00	0.61	46.31	1271.94	1.22 N	0.22 W	0.26	0.02
1364.00	0.64	37.61	1363.94	1.97 N	0.44 E	-0.39	0.11
1456.00	0.92	46.30	1455.93	2.89 N	1.29 E	-1.21	0.33
1548.00	0.41	187.23	1547.93	3.07 N	1.78 E	-1.70	1.37
1640.00	0.28	163.01	1639.93	2.53 N	1.81 E	-1.74	0.21
1735.00	0.37	154.48	1734.92	2.03 N	2.01 E	-1.95	0.11
1830.00	0.34	165.54	1829.92	1.48 N	2.21 E	-2.17	0.08
1924.00	0.17	191.15	1923.92	1.07 N	2.25 E	-2.22	0.21
2019.00	0.19	100.65	2018.92	0.91 N	2.38 E	-2.35	0.27
2114.00	0.34	100.57	2113.92	0.83 N	2.81 E	-2.79	0.16
2209.00	0.50	130.71	2208.92	0.50 N	3.40 E	-3.39	0.28
2303.00	0.59	249.19	2302.92	0.06 N	3.26 E	-3.26	1.00
2398.00	0.33	220.81	2397.91	0.32 S	2.63 E	-2.63	0.36
2492.00	0.26	234.46	2491.91	0.65 S	2.28 E	-2.29	0.11
2587.00	0.39	216.14	2586.91	1.03 S	1.91 E	-1.94	0.17
2682.00	0.40	230.61	2681.91	1.50 S	1.46 E	-1.50	0.11
2777.00	1.28	291.00	2776.90	1.33 S	0.22 E	-0.25	1.20
2871.00	2.09	335.39	2870.86	0.60 N	1.48 W	1.49	1.57
2966.00	4.42	336.18	2965.70	5.53 N	3.68 W	3.83	2.45
3061.00	5.08	340.10	3060.37	12.83 N	6.59 W	6.94	0.77
3156.00	6.89	332.70	3154.85	21.85 N	10.63 W	11.24	2.07
3251.00	8.73	336.21	3248.97	33.51 N	16.16 W	17.09	2.00
3346.00	10.15	325.42	3342.69	47.00 N	23.82 W	25.12	2.38
3440.00	7.58	323.79	3435.56	58.82 N	32.18 W	33.81	2.75
3535.00	7.48	325.06	3529.74	68.95 N	39.42 W	41.33	0.20
3630.00	11.03	328.21	3623.49	81.75 N	47.76 W	50.02	3.77
3724.00	13.18	332.06	3715.39	98.86 N	57.52 W	60.25	2.44
3818.00	14.06	332.58	3806.75	118.46 N	67.80 W	71.08	0.95
3913.00	13.10	332.20	3899.09	138.23 N	78.13 W	81.96	1.01
4007.00	9.85	330.42	3991.20	154.65 N	87.07 W	91.35	3.48
4102.00	8.01	325.99	4085.05	167.20 N	94.78 W	99.42	2.07
4197.00	7.36	324.22	4179.19	177.63 N	102.04 W	106.96	0.73
4292.00	7.35	320.43	4273.41	187.25 N	109.47 W	114.66	0.51
4387.00	7.55	319.69	4367.61	196.69 N	117.38 W	122.83	0.23
4481.00	8.68	327.92	4460.67	207.41 N	125.14 W	130.89	1.72
4576.00	7.57	330.34	4554.71	218.92 N	132.05 W	138.11	1.22
4671.00	8.57	331.24	4648.77	230.57 N	138.55 W	144.93	1.06
4766.00	9.46	336.19	4742.60	243.91 N	145.11 W	151.86	1.24
4861.00	8.61	335.93	4836.42	257.55 N	151.16 W	158.29	0.90
4956.00	7.51	334.20	4930.48	269.63 N	156.76 W	164.23	1.19

5050.00	5.12	331.41	5023.90	278.85 N	161.44 W	169.17	2.56
5145.00	4.68	331.78	5118.56	285.98 N	165.31 W	173.23	0.46
5239.00	5.94	339.40	5212.15	293.92 N	168.83 W	176.97	1.53
5334.00	6.08	338.06	5306.63	303.18 N	172.44 W	180.84	0.21
5429.00	4.95	333.55	5401.19	311.52 N	176.15 W	184.77	1.27
5524.00	3.19	333.94	5495.95	317.57 N	179.13 W	187.93	1.85
5619.00	2.13	325.61	5590.84	321.40 N	181.29 W	190.19	1.18
5714.00	1.42	325.60	5685.80	323.83 N	182.95 W	191.92	0.75
5809.00	0.94	322.30	5780.78	325.41 N	184.09 W	193.11	0.51
5857.00	0.81	312.55	5828.77	325.95 N	184.59 W	193.61	0.41
5919.00	0.65	302.66	5890.76	326.44 N	185.20 W	194.25	0.33
5997.00	4.17	277.03	5968.68	327.03 N	188.39 W	197.45	4.61
6045.00	8.85	268.41	6016.36	327.14 N	193.82 W	202.88	9.93
6091.00	11.75	268.39	6061.62	326.91 N	202.04 W	211.09	6.30
6139.00	15.63	268.44	6108.24	326.59 N	213.39 W	222.43	8.08
6186.00	18.54	265.93	6153.17	325.89 N	227.18 W	236.19	6.39
6234.00	20.49	266.24	6198.41	324.80 N	243.17 W	252.15	4.07
6281.00	22.54	266.89	6242.13	323.77 N	260.38 W	269.32	4.39
6329.00	25.96	265.64	6285.89	322.47 N	280.05 W	288.94	7.20
6375.00	28.05	268.40	6326.87	321.40 N	300.90 W	309.76	5.30
6423.00	32.40	272.57	6368.34	321.67 N	325.04 W	333.90	10.06
6470.00	37.71	273.92	6406.80	323.21 N	351.98 W	360.87	11.42
6518.00	45.25	273.26	6442.74	325.19 N	383.69 W	392.62	15.73
6565.00	50.22	271.54	6474.34	326.63 N	418.43 W	427.39	10.92
6613.00	56.97	268.86	6502.81	326.72 N	457.03 W	465.98	14.76
6660.00	65.63	267.54	6525.36	325.41 N	498.20 W	507.09	18.59
6708.00	71.52	266.91	6542.89	323.24 N	542.81 W	551.62	12.33
6755.00	73.80	269.09	6556.90	321.68 N	587.64 W	596.39	6.57
6803.00	77.58	271.08	6568.76	321.76 N	634.14 W	642.88	8.84
6850.00	80.30	270.42	6577.78	322.36 N	680.26 W	688.99	5.95
6911.00	86.86	267.18	6584.59	321.08 N	740.82 W	749.50	11.98
6992.00	90.31	267.10	6586.59	317.04 N	821.68 W	830.21	4.26
7085.00	90.40	266.41	6586.02	311.77 N	914.53 W	922.88	0.75
7177.00	90.28	266.84	6585.47	306.36 N	1006.37 W	1014.53	0.49
7269.00	89.97	267.01	6585.27	301.42 N	1098.24 W	1106.22	0.38
7361.00	90.31	266.83	6585.05	296.48 N	1190.10 W	1197.92	0.42
7453.00	90.89	266.89	6584.08	291.44 N	1281.96 W	1289.60	0.63
7548.00	90.28	269.02	6583.11	288.05 N	1376.89 W	1384.39	2.33
7643.00	90.65	270.54	6582.34	287.69 N	1471.88 W	1479.34	1.65
7737.00	89.48	270.79	6582.24	288.78 N	1565.87 W	1573.33	1.27
7832.00	87.41	268.35	6584.81	288.07 N	1660.82 W	1668.22	3.37
7926.00	88.30	267.76	6588.33	284.88 N	1754.70 W	1761.97	1.14

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 271.60 DEGREES (GRID)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7926.00 FEET
IS 1777.68 FEET ALONG 279.22 DEGREES (GRID)**

**First Three survey's from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.
Survey Depth 214 Inc 0.50 Azi 294.17
Survey Depth 421 Inc 0.70 Azi 270.67
Survey Depth 619 Inc 0.50 Azi 161.67
Tied in @ Surface
Magnetic direction of 7.568 has been added to AZI for grid direction correction.**