

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 31' 15.17" North Long: 104° 27' 3.10" West
Well	: NCLP AA06-68-1HNA
Company	: Noble
Rig	: H&P321
LOCATION	
Latitude : 40° 31' 15.17" North Longitude : 104° 27' 3.10" West	
UTM Easting = 3,291,668.540 ft UTM Northing = 1,434,322.630 ft	
Other Services Directional Drilling	

[illegible]

MWD Run Number	100	200			
Date run completed	09-Jun-14	10-Jun-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.840	6.750			
Log Start Depth (MD, ft)	877.00	5,943.00			
Log End Depth (MD, ft)	5,943.00	6,985.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	04-Jun-14 17:48	09-Jun-14 20:10			
Drill/Wipe End Date and Time	04-Jun-14 17:48	10-Jun-14 09:29			
Min Inc (deg) @ Depth (MD, ft)	0.10 @ 5,711.00	0.65 @ 5,949.00			
Max Inc (deg) @ Depth (MD, ft)	11.22 @ 3,720.00	83.76 @ 6,931.00			
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC			
Flow Rate (gpm)	595.70	529.65			
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA			
Fluid Type	Native/Spud Mud	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.60 / 34.00	11.00 / 39.00			
Filtrate CL (ppm)	1,500.00	1,600.00			
pH / Fluid Loss (mptm)	9.30 / 14	9.60 / 8			
PV (cP) / YP (lbf2)	5 / 6.00	11 / 11.00			
% Solids / % Sand	2.10 / 0.75	12.40 / 0.25			
% Oil / Oil:Water Ratio	NA / NA	NA / NA			
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 (in F) / C	159.40 / 70.8	127.22 / 53.0			

Max Tool Temp (degF) / Source	150.10 / PCM	167.00 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 150.10	NA @ 167.00			
Lead MWD Engineer	Robert Barnes	Robert Barnes			
Customer Representative	Jim Turner	Jim Turner			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11341336	11341336			
Insert Serial Number	11145581	11145581			
Date and Time Initialized	08-Jun-14 03:26	01-Jan-70 00:00			
Date and Time Read	10-Jun-14 15:43	10-Jun-14 15:47			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	54.00			
Software Version	6.21	6.21			
Sub Serial Number	11341336	11341336			
Sonde Serial Number	11638573	11638573			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	330.58	189.05			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.21	46.92			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341336	11341336			
Insert/Sonde Serial Number	11120591	11120591			

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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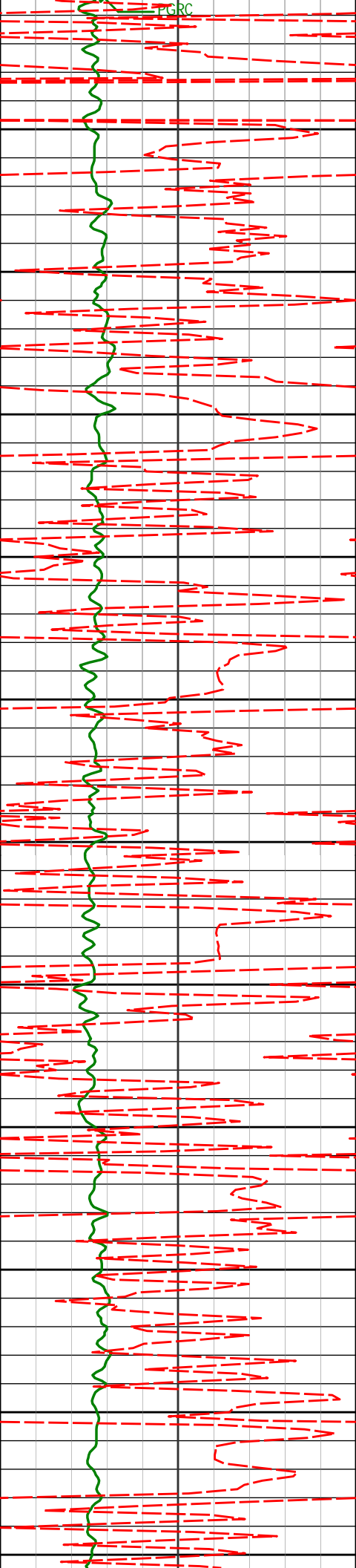
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Sperry Drilling Services

TVD Correlation Log 1:600

Noble Energy
NCLP AA06-68-1HNA
H&P 321
Sec. 4-T6N-R63W





1050

1089'

0.70°

217.69°

1088.95'

6.61'

1100

1150

1183'

0.99°

72.02°

1182.95'

6.20'

1200

1250

1274'

1.22°

50.03°

1273.93'

4.67'

1300

1350

1366'

1.39°

53.48°

1365.91'

2.98'

1400

1450

1457'

1.49°

50.58°

1456.88'

1.13'

1500

1550

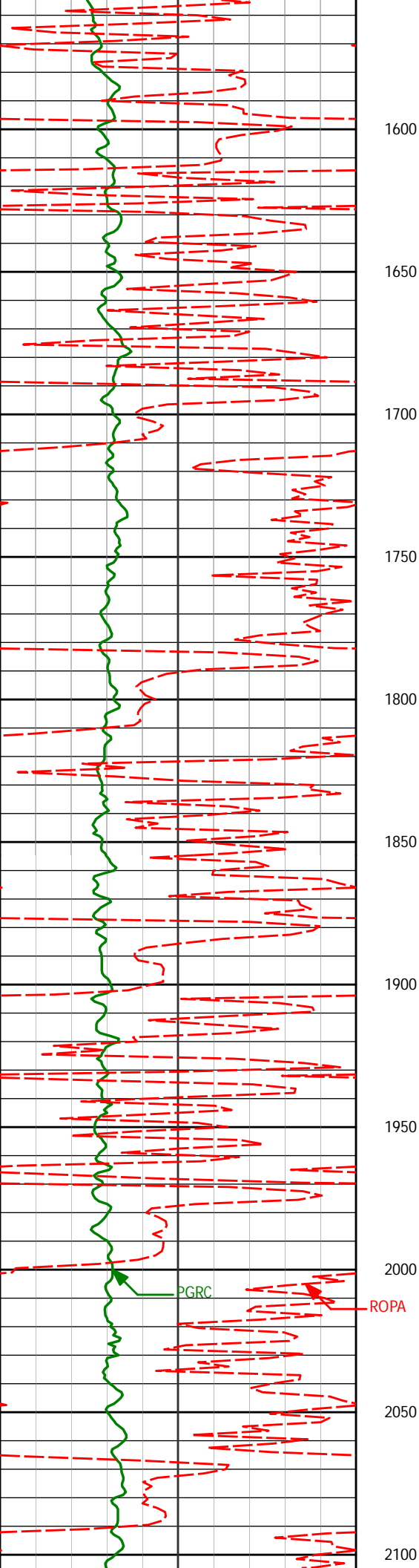
1549'

0.20°

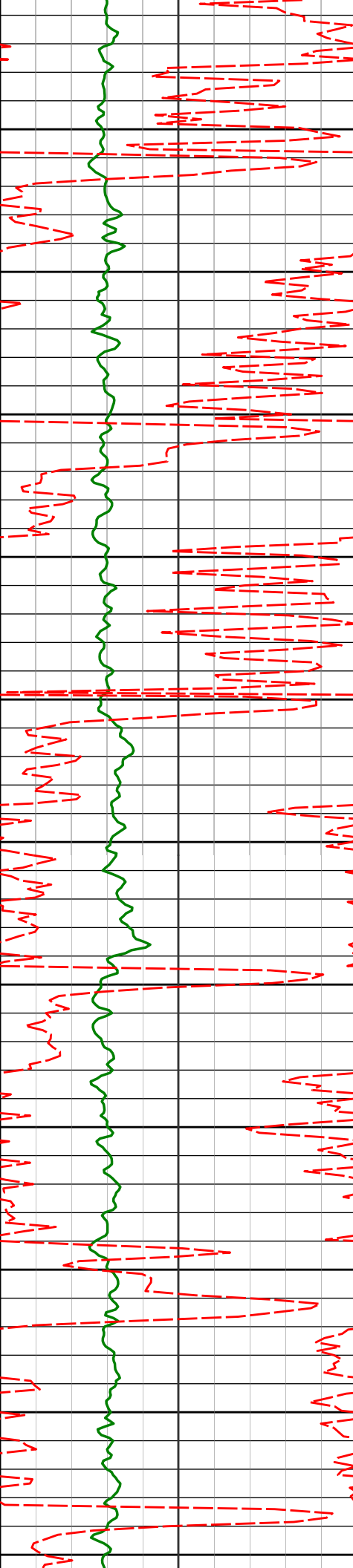
301.42°

1548.87'

0.31'



1642'	0.15°	246.15°	1641.87'	0.56'
1735'	0.15°	107.39°	1734.87'	0.55'
1828'	0.22°	15.69°	1827.87'	0.38'
1921'	0.25°	336.59°	1920.87'	0.40'
2015'	0.37°	41.73°	2014.86'	0.27'



2150

2200

2250

2300

2350

2400

2450

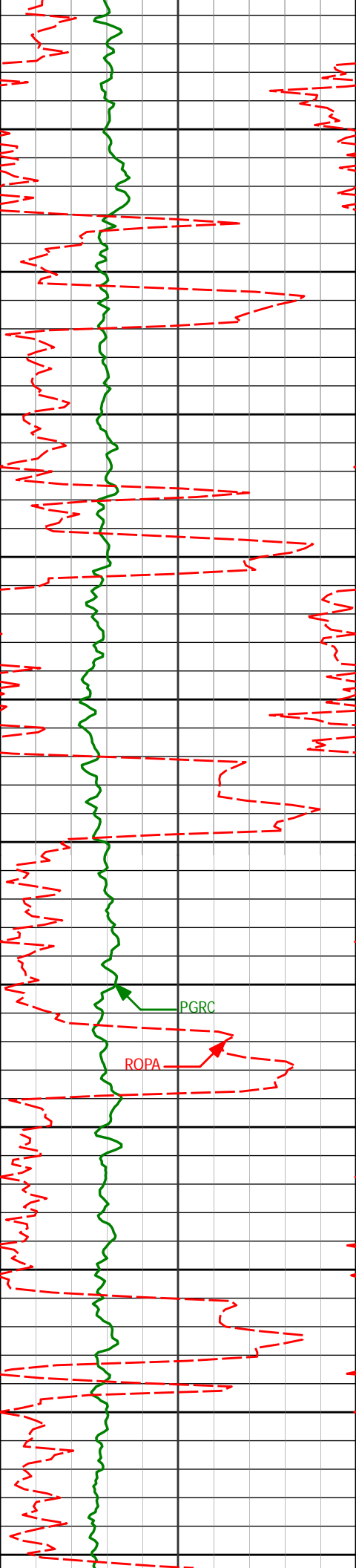
2500

2550

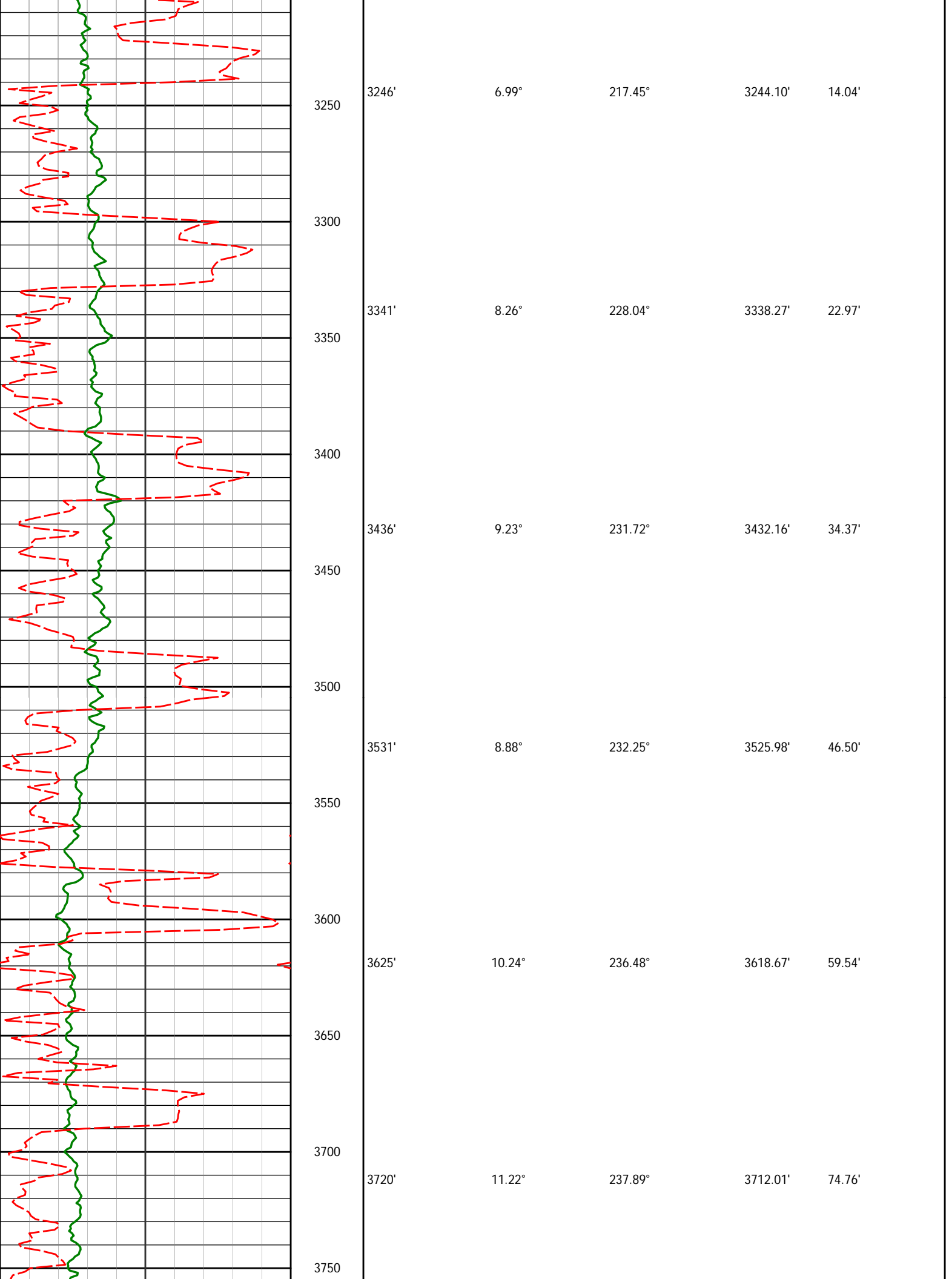
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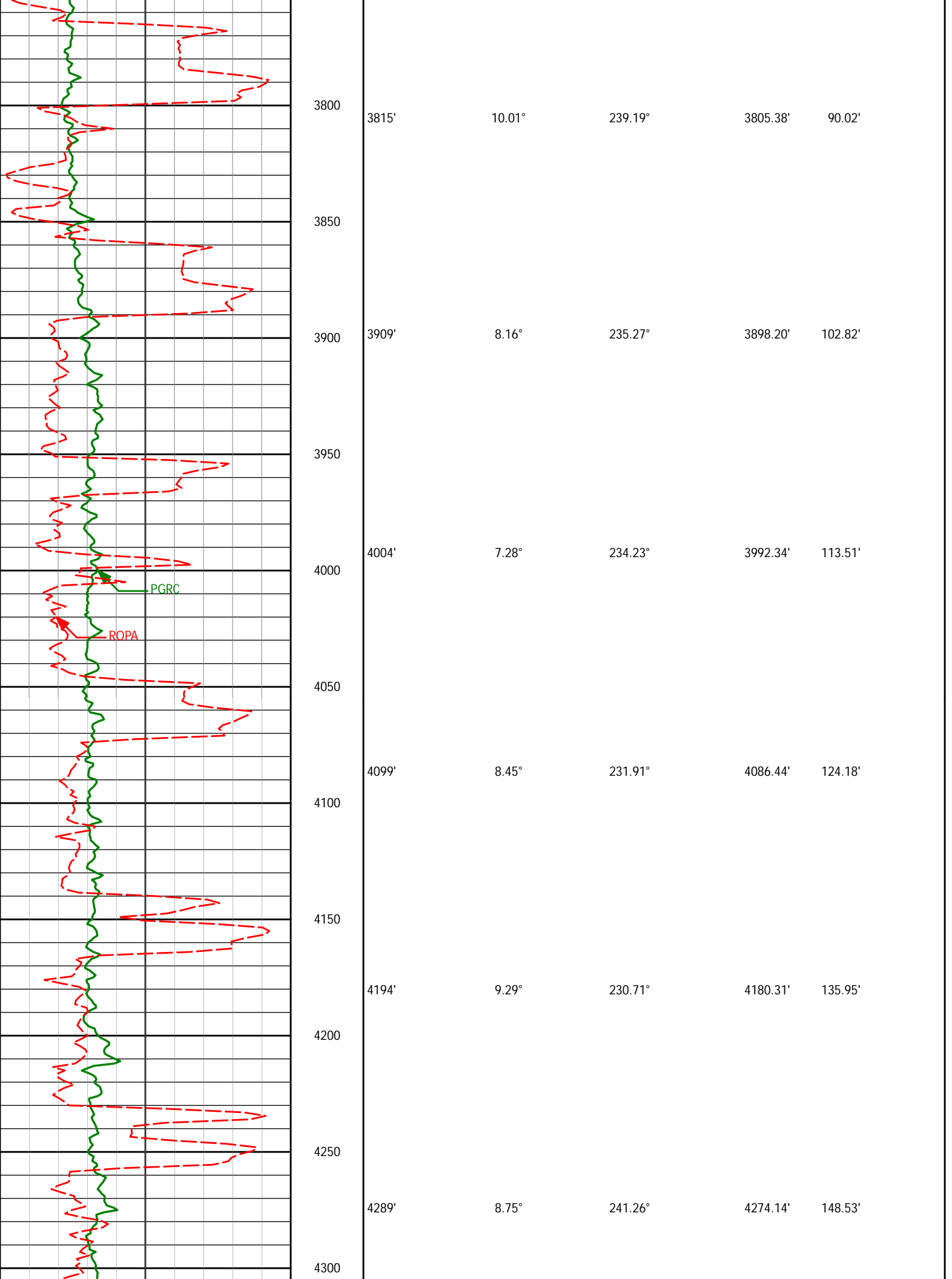
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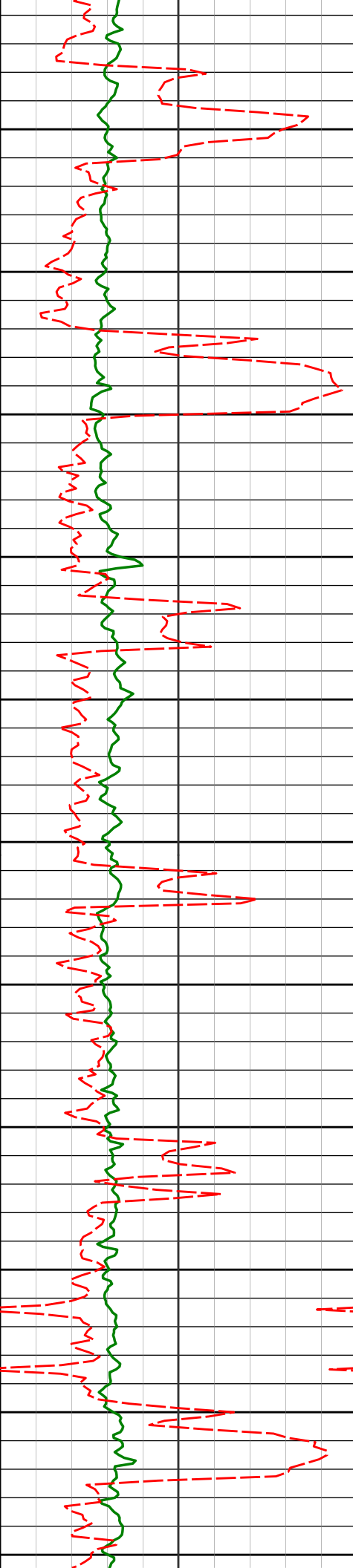
2110'	0.35°	24.11°	2109.86'	-0.07'
2204'	0.72°	55.44°	2203.86'	-0.70'
2299'	0.83°	75.89°	2298.85'	-1.88'
2394'	1.03°	60.08°	2393.84'	-3.31'
2488'	1.29°	67.25°	2487.82'	-5.05'
2583'	1.08°	90.51°	2582.80'	-6.94'



2677'	1.55°	76.45°	2676.77'	-9.07'
2772'	0.21°	204.55°	2771.76'	-10.25'
2867'	2.64°	226.31°	2866.73'	-8.54'
2962'	4.12°	225.44°	2961.56'	-4.38'
3057'	6.18°	222.94°	3056.17'	1.77'
3151'	5.60°	210.61°	3149.68'	7.84'







4350

4383'

8.86°

240.21°

4367.03'

161.34'

4400

4450

4478'

10.29°

233.15°

4460.71'

174.81'

4500

4550

4573'

9.14°

230.50°

4554.34'

187.79'

4600

4650

4668'

7.04°

227.30°

4648.39'

198.22'

4700

4750

4763'

6.05°

223.28°

4742.77'

206.21'

4800

4850

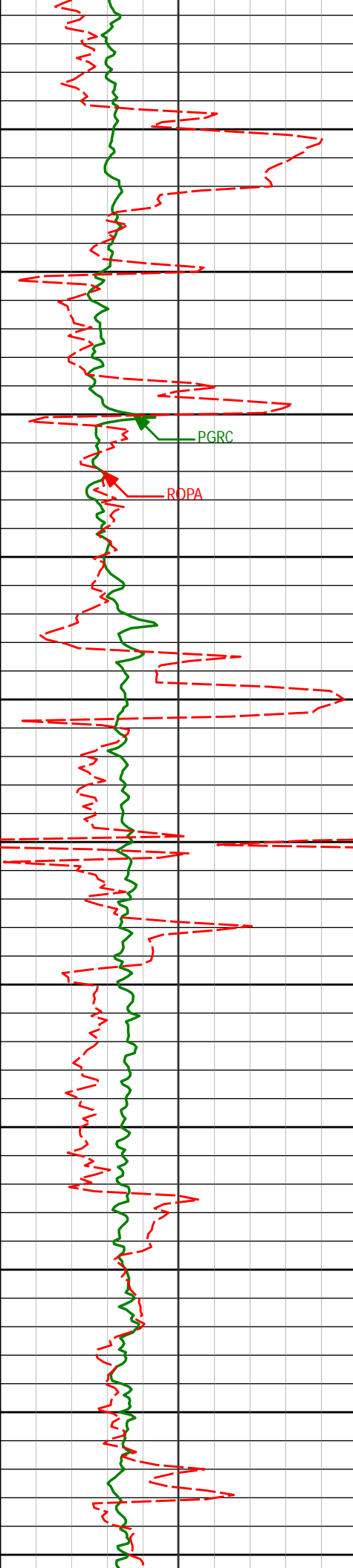
4857'

3.99°

230.14°

4836.41'

212.33'



4900

4952'

0.70°

251.38°

4931.32'

215.51'

4950

5000

5047'

1.41°

279.50°

5026.30'

217.21'

5050

5100

5142'

0.35°

37.67°

5121.29'

218.17'

5150

5200

5237'

0.62°

329.82°

5216.29'

218.22'

5250

5300

5332'

0.36°

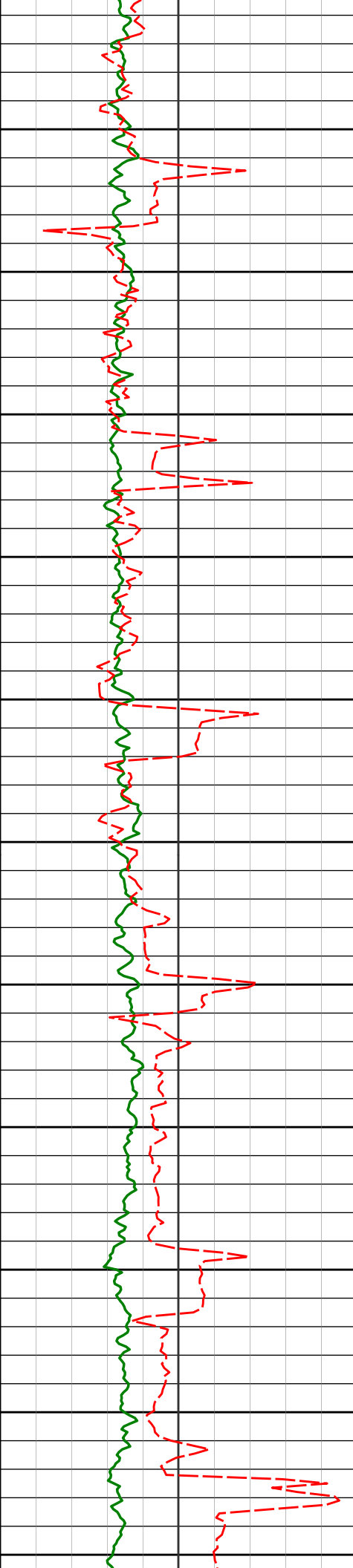
330.11°

5311.29'

218.60'

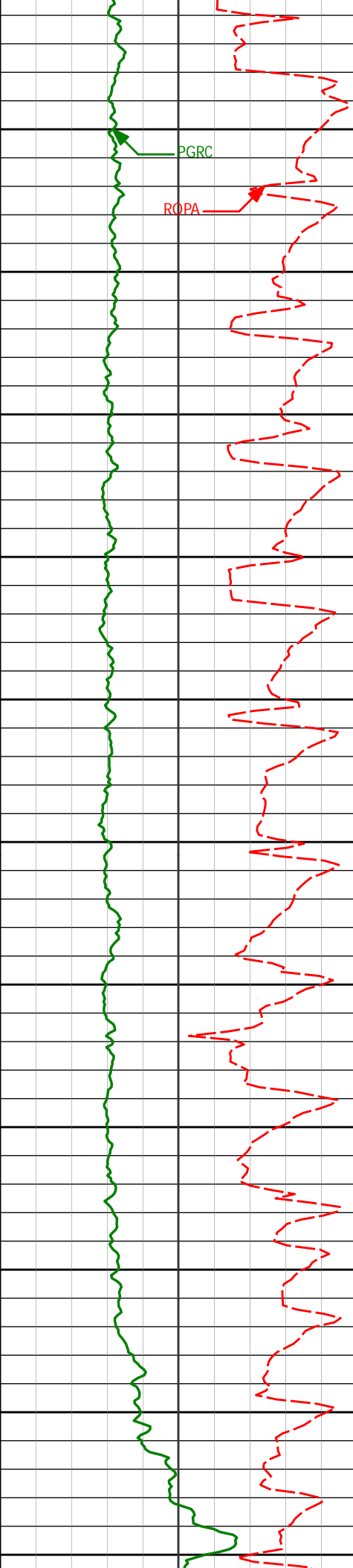
5350

5400

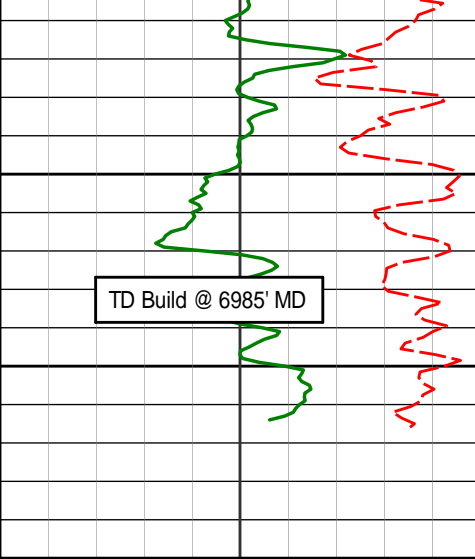


	5427'	0.51°	103.25°	5406.28'	218.33'
5450					
5500	5522'	0.51°	96.33°	5501.28'	217.51'
5550					
5600	5616'	0.52°	89.28°	5595.28'	216.67'
5650					
5700	5711'	0.10°	312.01°	5690.28'	216.30'
5750					
5800	5806'	0.59°	328.04°	5785.27'	216.60'
5850					
5900	5887'	0.50°	342.83°	5866.27'	216.90'
	5947'	0.65°	292.53°	5926.04'	217.26'
200					
5950					

200



5990'	1.01°	276.69°	5969.40'	217.84'
6000				
6036'	5.33°	265.45°	6015.58'	220.07'
6050				
6083'	9.46°	262.37°	6061.49'	225.55'
6100				
6129'	12.94°	264.47°	6106.95'	234.03'
6150				
6173'	15.47°	268.75°	6150.02'	244.47'
6200				
6219'	19.37°	268.46°	6194.35'	257.60'
6250				
6265'	23.57°	268.40°	6236.82'	273.30'
6300				
6311'	28.26°	270.34°	6278.91'	292.43'
6350				
6356'	31.40°	267.48°	6318.66'	314.10'
6400				
6403'	36.12°	264.23°	6357.86'	338.63'
6448'	40.90°	264.31°	6394.28'	365.48'
6494'	46.88°	267.20°	6429.04'	395.92'
6500				
6539'	52.49°	269.31°	6460.02'	428.92'
6586'	58.04°	270.37°	6488.30'	465.48'

	6630'	62.73°	269.72°	6512.11'	502.81'
	6676'	66.57°	270.18°	6533.71'	543.67'
	6721'	68.36°	270.21°	6552.21'	584.96'
	6768'	69.88°	269.51°	6569.52'	627.82'
	6813'	72.83°	269.85°	6585.31'	670.23'
	6859'	78.18°	271.21°	6599.48'	714.23'
	6893'	83.76°	271.91°	6607.66'	746.90'

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

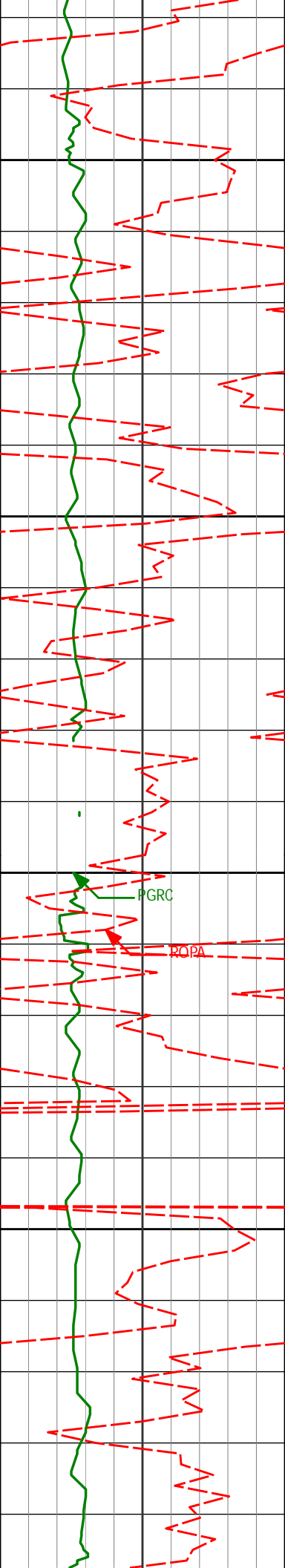
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Sperry Drilling Services

TVD Detail Log 1:240

Noble Energy
NCLP AA06-68-1HNA
H&P 321
Sec. 4-T6N-R63W

<div>PCG Gamma Ray</div> <div>PGRC</div> <div>0300</div> <div>api</div>							
<div>Avg Rate of Penetration</div> <div>ROPA</div> <div>1K0</div> <div>feet per hr</div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div></div></div>		850					
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<div><div></div></div>							
<div><div></div></div>							
<div><div></div></div>		850	852'	0.50°	206.97°	851.97'	5.22'
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100

900

905'

0.52°

219.42°

904.96'

5.49'

950

1000

PGRC

ROPA

1050

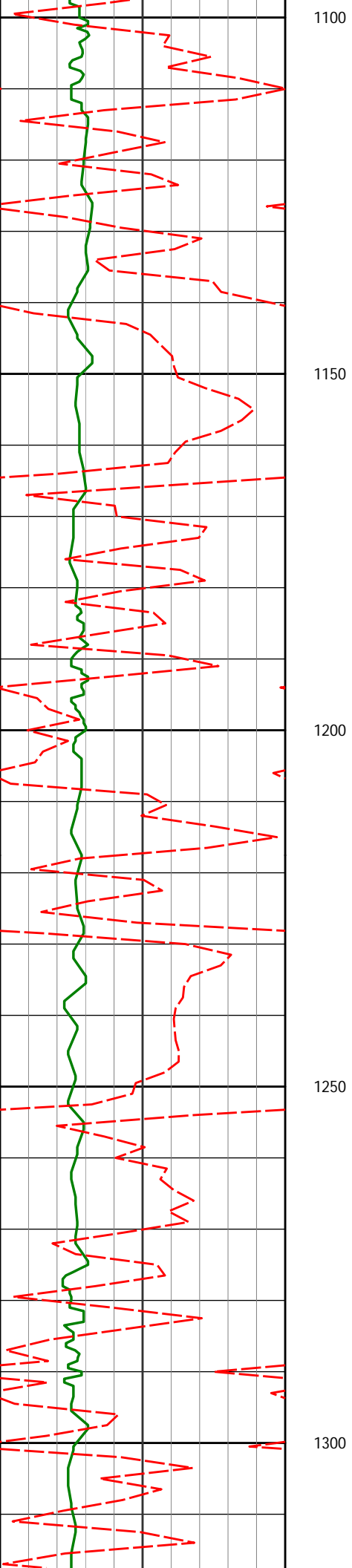
1089'

0.70°

217.69°

1088.95'

6.61'



1183'

0.99°

72.02°

1182.95'

6.20'

1150

1200

1250

1274'

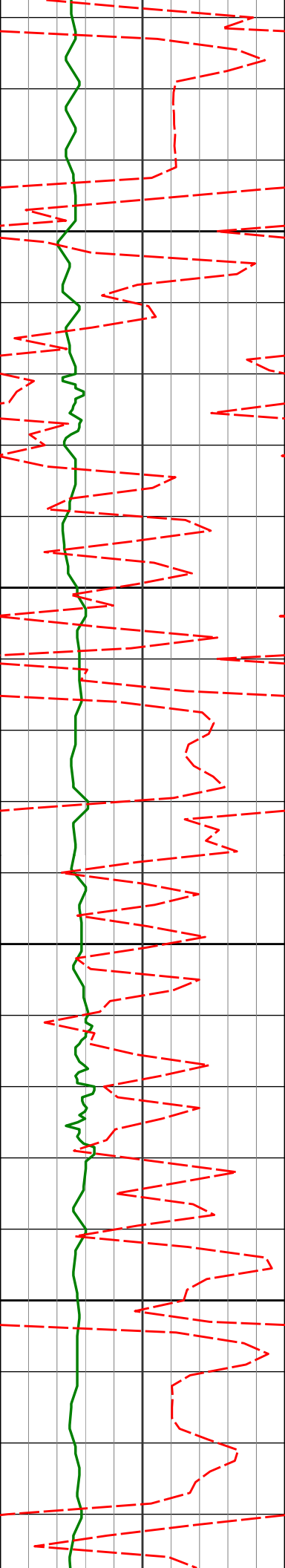
1.22°

50.03°

1273.93'

4.67'

1300



1350

1366'

1.39°

53.48°

1365.91'

2.98'

1400

1450

1457'

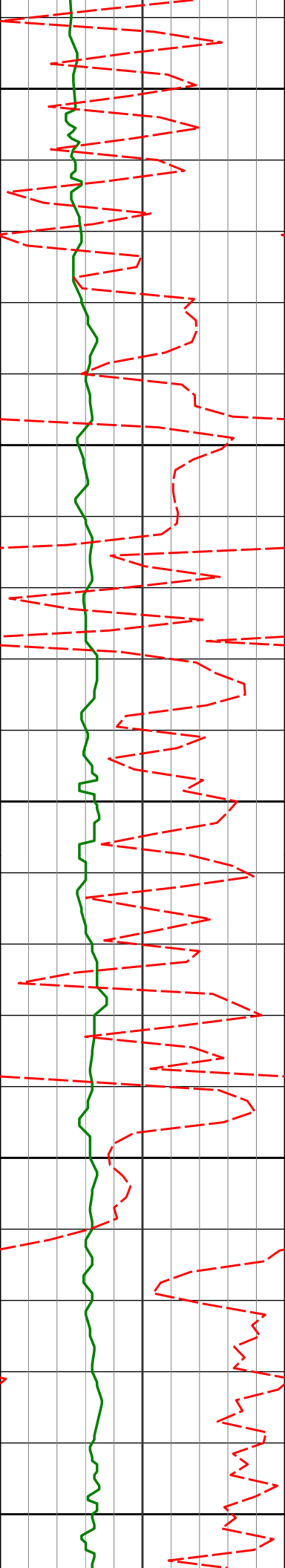
1.49°

50.58°

1456.88'

1.13'

1500



1550

1549'

0.20°

301.42°

1548.87'

0.31'

1600

1642'

0.15°

246.15°

1641.87'

0.56'

1650

1700

1735'

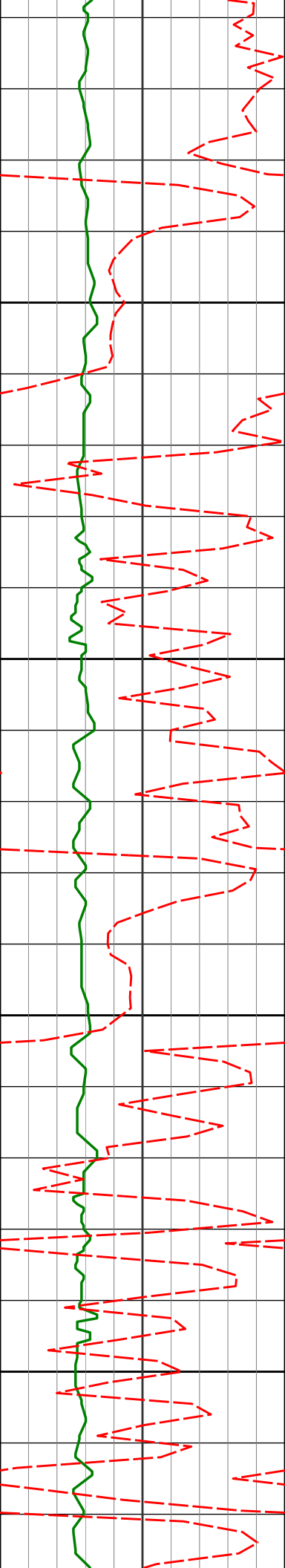
0.15°

107.39°

1734.87'

0.55'

1750



1800

1828'

0.22°

15.69°

1827.87'

0.38'

1850

1900

1921'

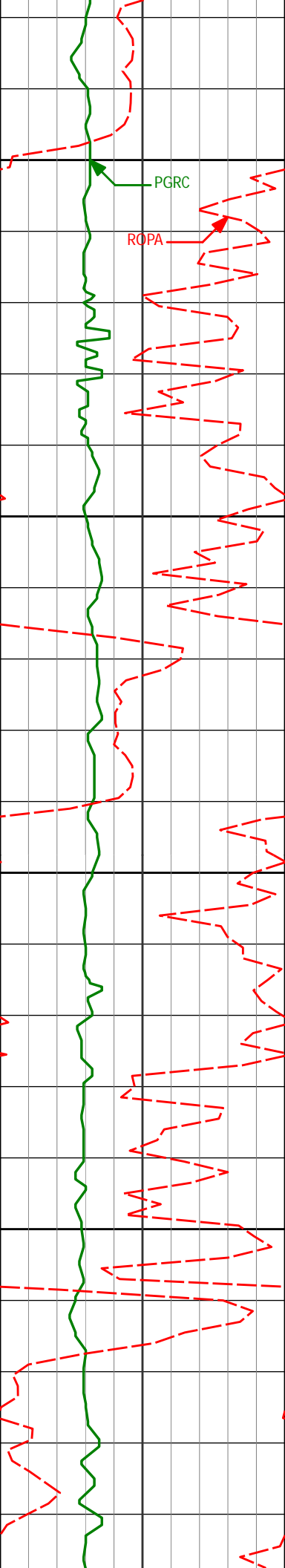
0.25°

336.59°

1920.87'

0.40'

1950



2000

2015'

0.37°

41.73°

2014.86'

0.27'

2050

2100

2110'

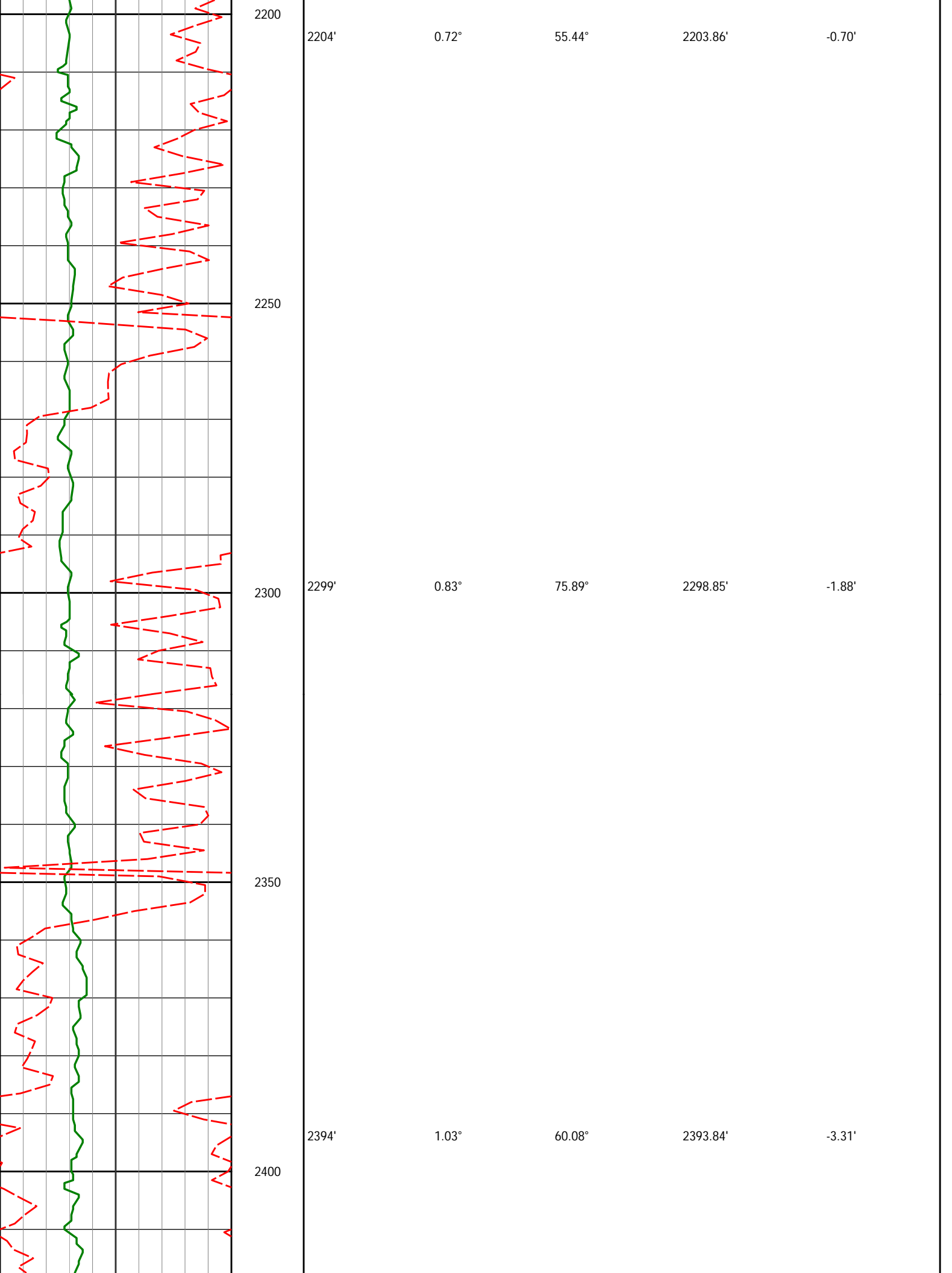
0.35°

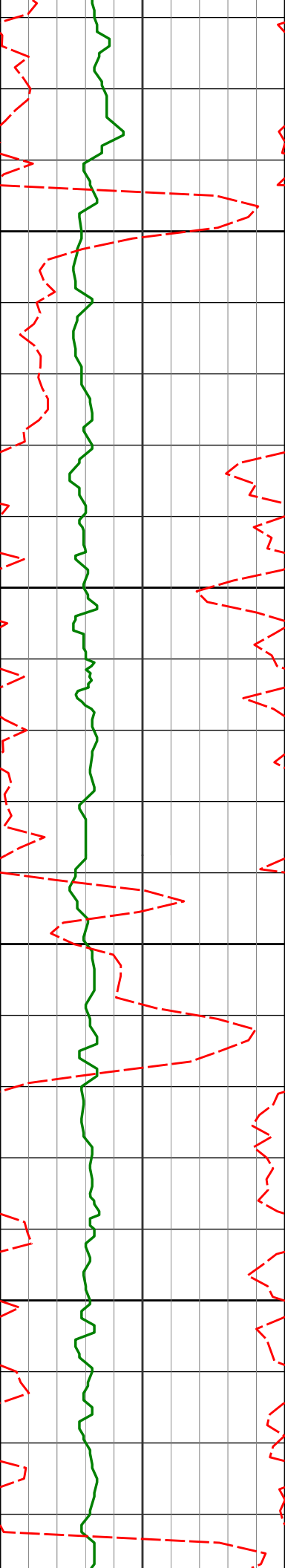
24.11°

2109.86'

-0.07'

2150





2450

2488'

1.29°

67.25°

2487.82'

-5.05'

2500

2550

2583'

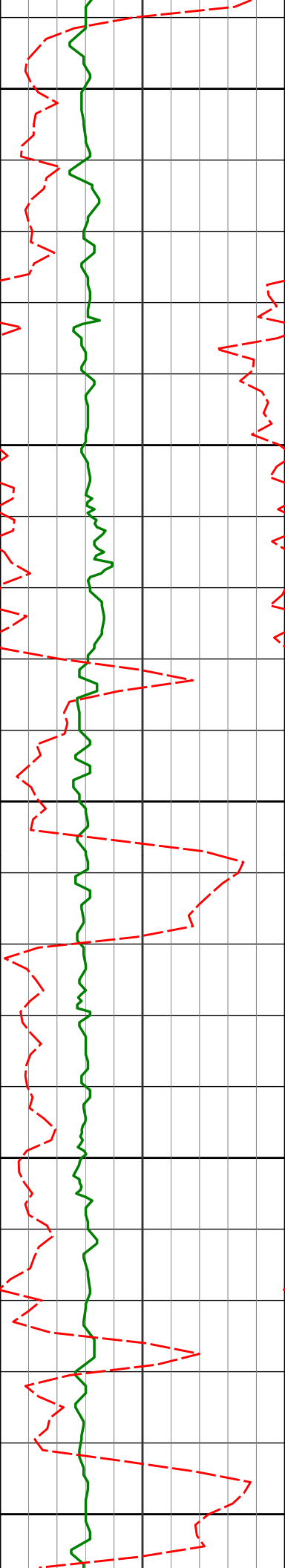
1.08°

90.51°

2582.80'

-6.94'

2600



2650

2677'

1.55°

76.45°

2676.77'

-9.07'

2700

2750

2772'

0.21°

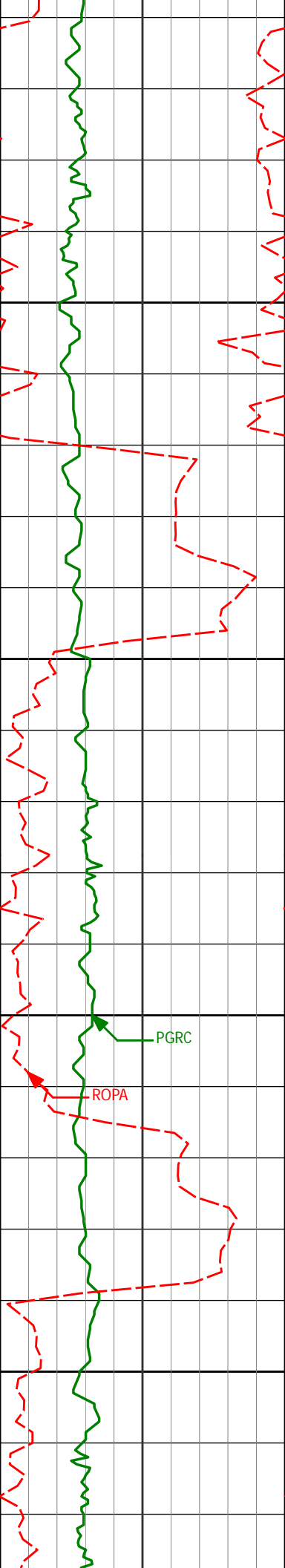
204.55°

2771.76'

-10.25'

2800

2850



2867'

2.64°

226.31°

2866.73'

-8.54'

2900

2950

2962'

4.12°

225.44°

2961.56'

-4.38'

3000

PGRC

ROPA

3050

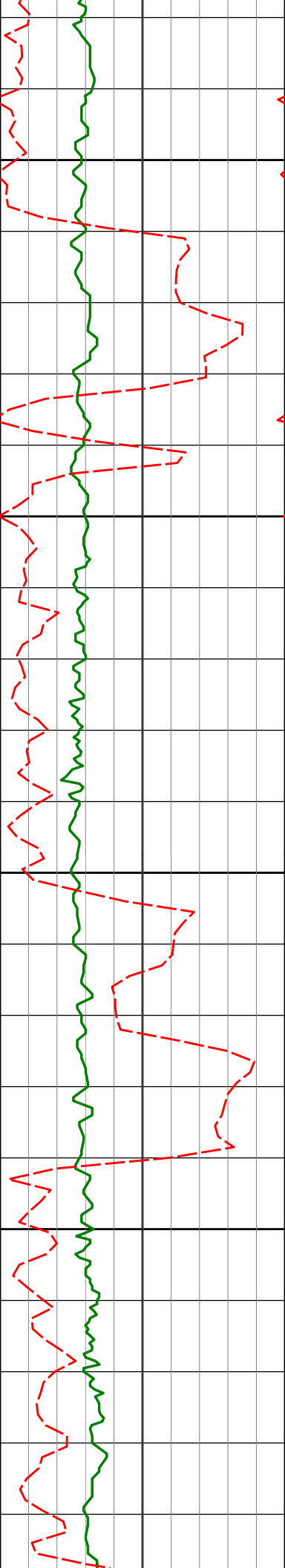
3057'

6.18°

222.94°

3056.17'

1.77'



3100

3150

3200

3250

3151'

5.60°

210.61°

3149.68'

7.84'

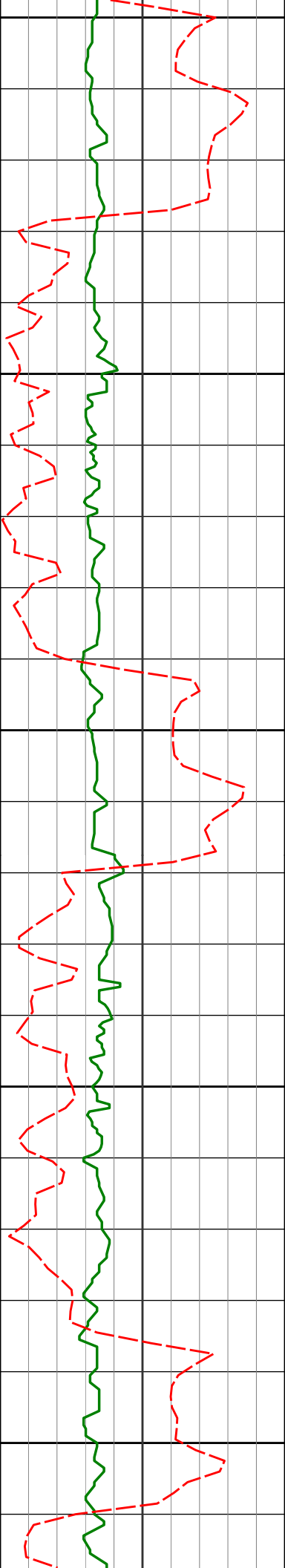
3246'

6.99°

217.45°

3244.10'

14.04'



3300

3341'

8.26°

228.04°

3338.27'

22.97'

3350

3400

3436'

9.23°

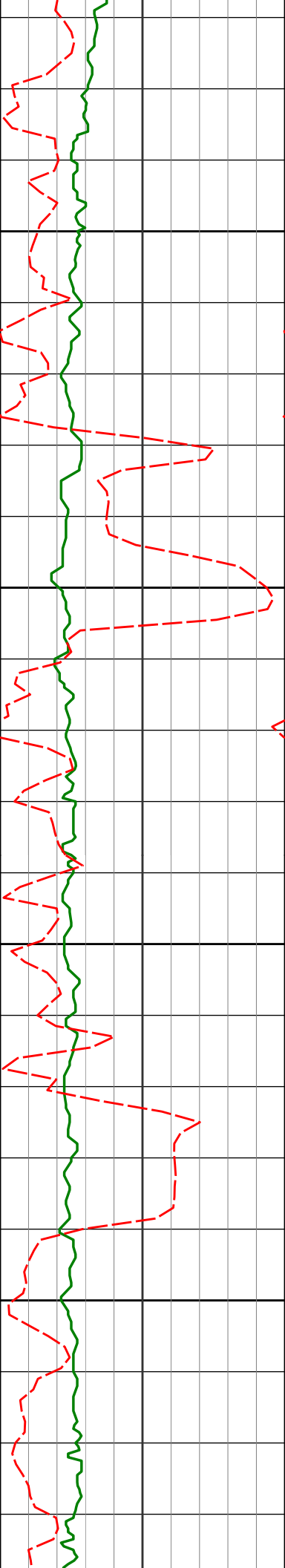
231.72°

3432.16'

34.37'

3450

3500



3531'	8.88°	232.25°	3525.98'	46.50'
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3550

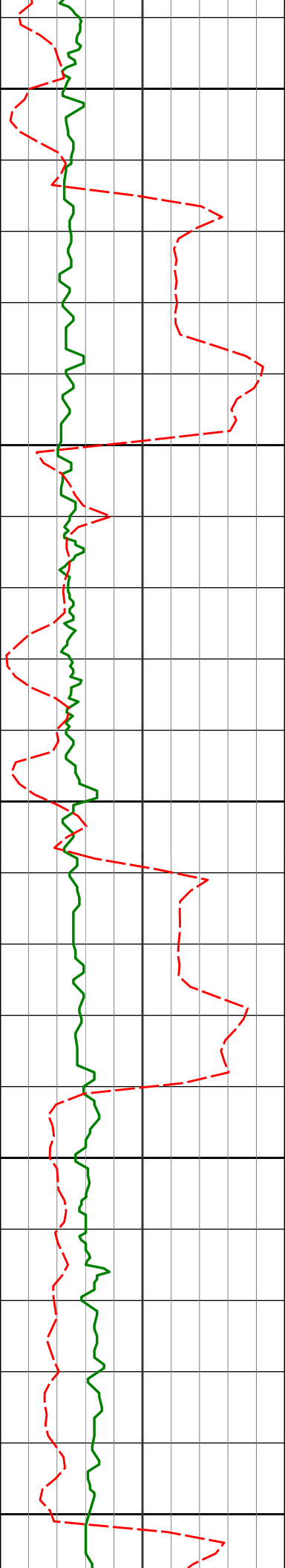
3600

3625'	10.24°	236.48°	3618.67'	59.54'
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3650

3700

3720'	11.22°	237.89°	3712.01'	74.76'
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3750

3800

3850

3900

3950

3815'

10.01°

239.19°

3805.38'

90.02'

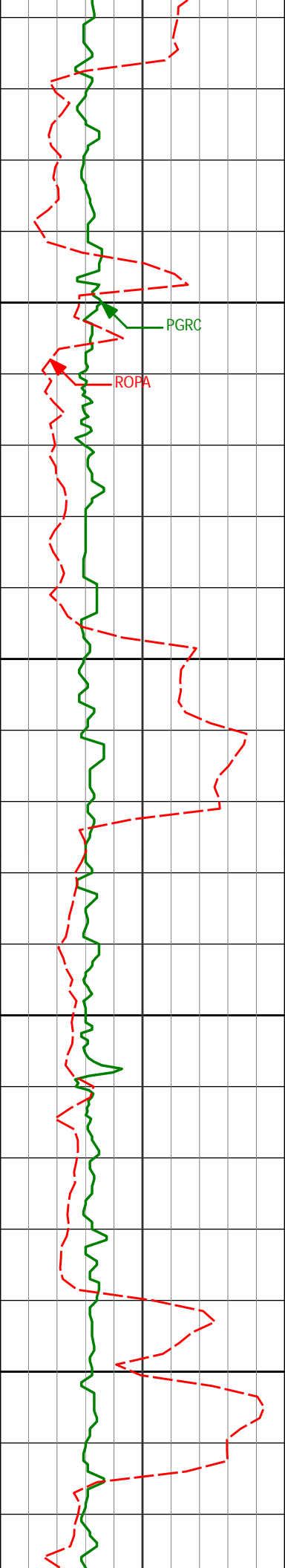
3909'

8.16°

235.27°

3898.20'

102.82'



4000

4050

4100

4150

4004'

7.28°

234.23°

3992.34'

113.51'

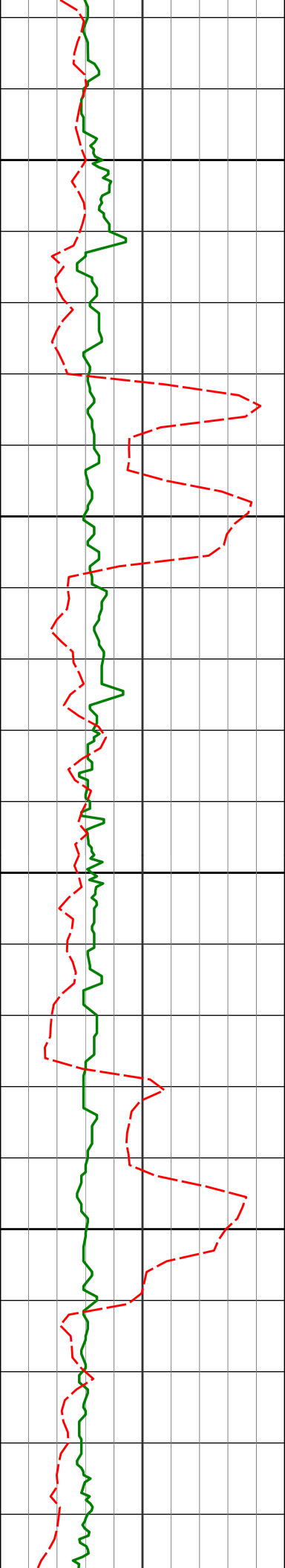
4099'

8.45°

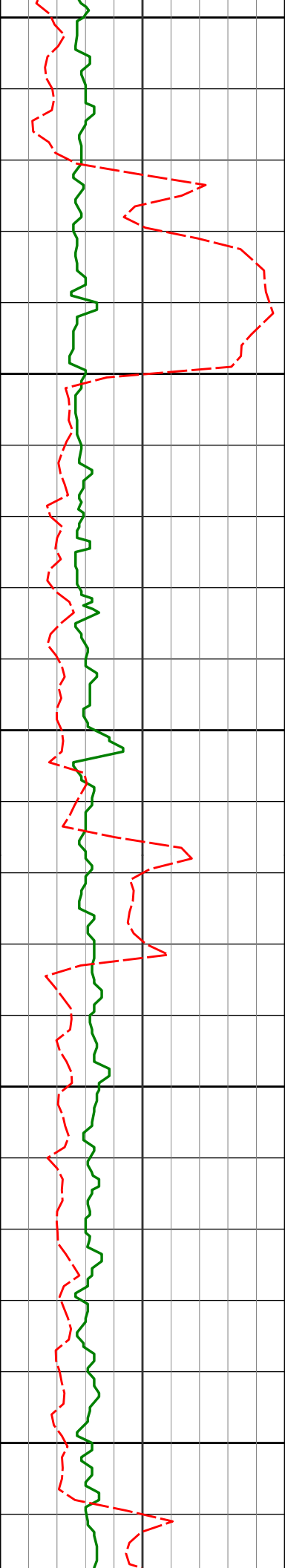
231.91°

4086.44'

124.18'



4194'	9.29°	230.71°	4180.31'	135.95'
4200				
4250				
4289'	8.75°	241.26°	4274.14'	148.53'
4300				
4350				
4383'	8.86°	240.21°	4367.03'	161.34'



4400

4450

4500

4550

4600

4478'

10.29°

233.15°

4460.71'

174.81'

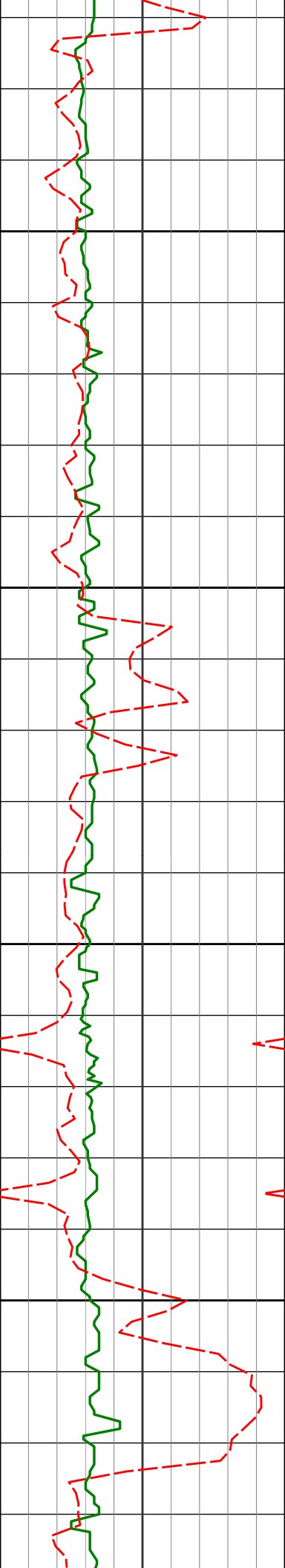
4573'

9.14°

230.50°

4554.34'

187.79'



4650	4668'	7.04°	227.30°	4648.39'	198.22'
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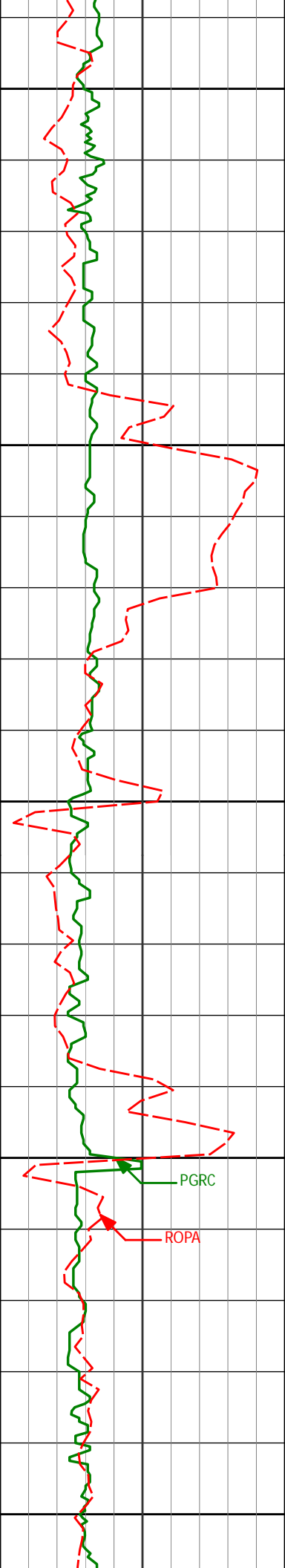
4700

4750	4763'	6.05°	223.28°	4742.77'	206.21'
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4750

4800

	4857'	3.99°	230.14°	4836.41'	212.33'
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4850

4900

4952'

0.70°

251.38°

4931.32'

215.51'

4950

5000

PGRC

ROPA

5047'

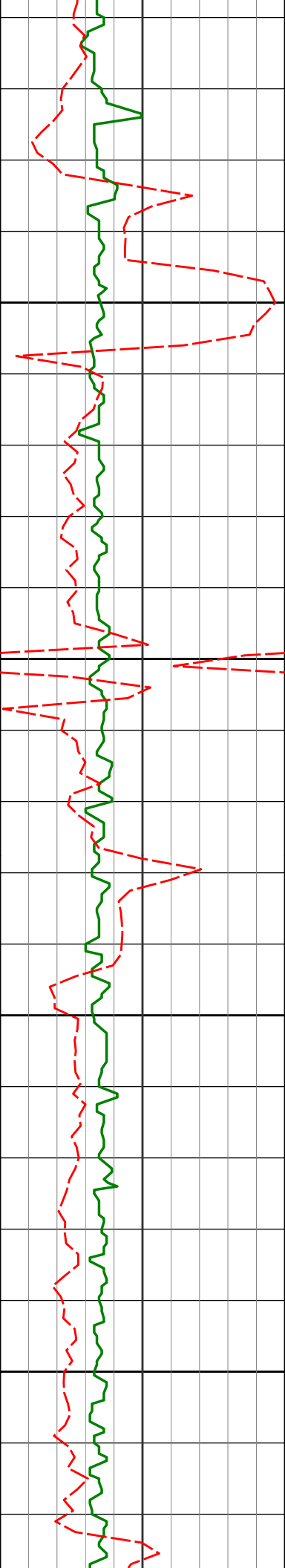
1.41°

279.50°

5026.30'

217.21'

5050



5100

5142'

0.35°

37.67°

5121.29'

218.17'

5150

5200

5237'

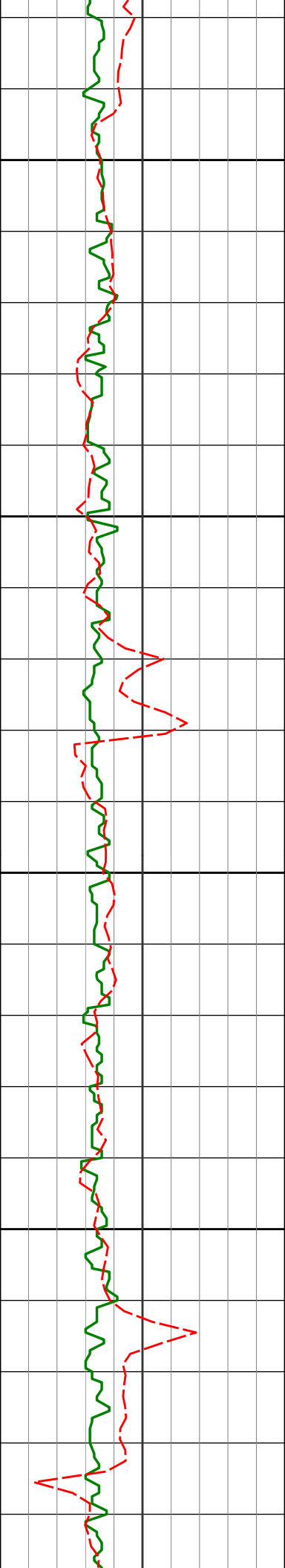
0.62°

329.82°

5216.29'

218.22'

5250



5300

5332'

0.36°

330.11°

5311.29'

218.60'

5350

5400

5427'

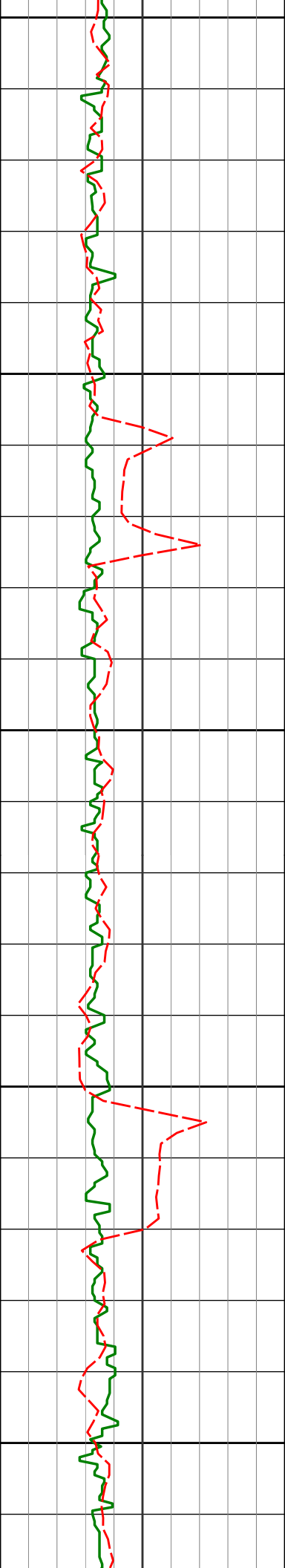
0.51°

103.25°

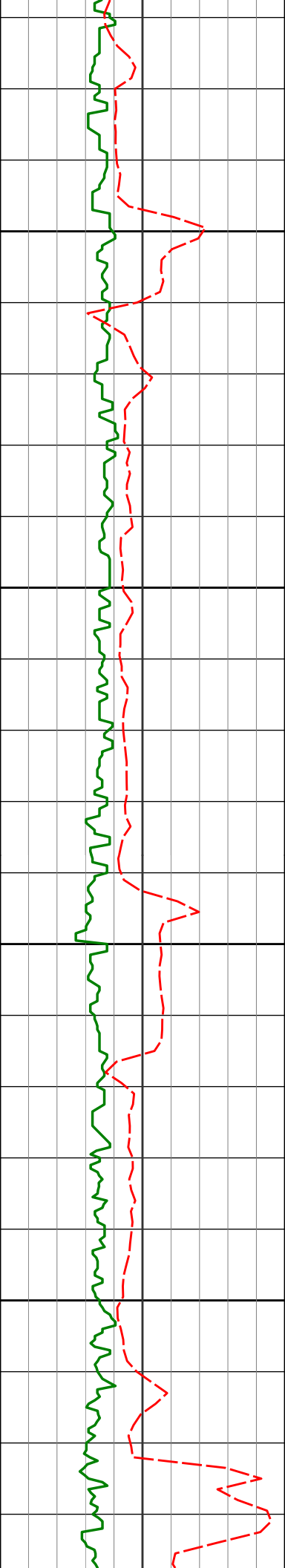
5406.28'

218.33'

5450



5500	5522'	0.51°	96.33°	5501.28'	217.51'
5550					
5600	5616'	0.52°	89.28°	5595.28'	216.67'
5650					
5700	5711'	0.10°	312.01°	5690.28'	216.30'



5750

5806'

0.59°

328.04°

5785.27'

216.60'

5800

5850

5887'

0.50°

342.83°

5866.27'

216.90'

5900

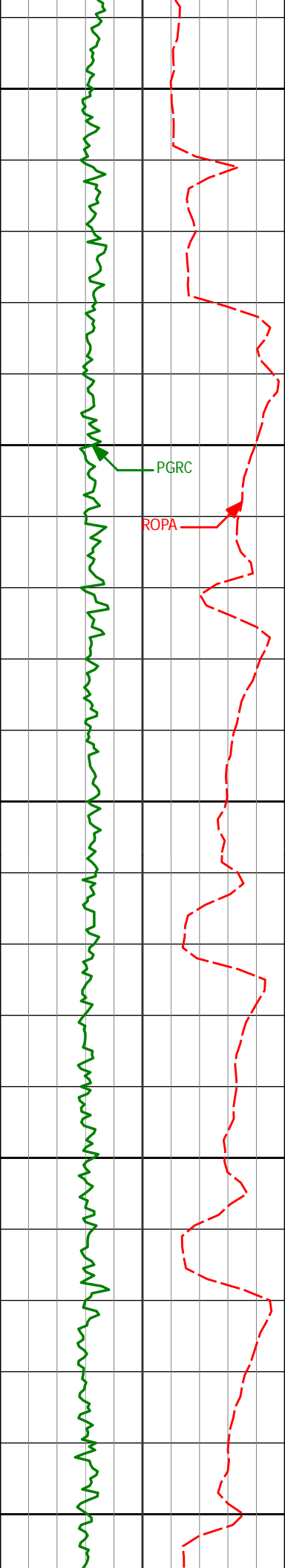
5947'

0.65°

292.53°

5926.04'

217.26'



200

5950

5990'

1.01°

276.69°

5969.40'

217.84'

6000

6036'

5.33°

265.45°

6015.58'

220.07'

6050

6083'

9.46°

262.37°

6061.49'

225.55'

6100

6129'

12.94°

264.47°

6106.95'

234.03'

6150

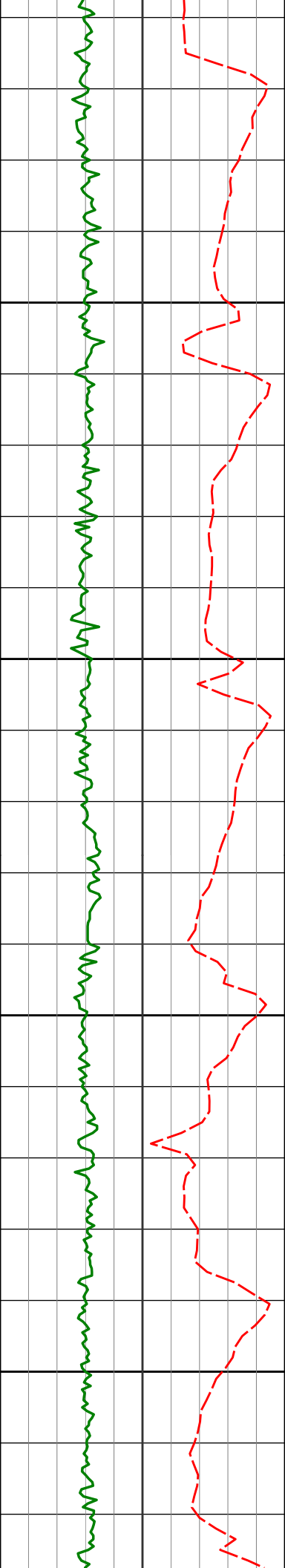
6173'

15.47°

268.75°

6150.02'

244.47'



6200

6250

6300

6350

6219'

19.37°

268.46°

6194.35'

257.60'

6265'

23.57°

268.40°

6236.82'

273.30'

6311'

28.26°

270.34°

6278.91'

292.43'

6356'

31.40°

267.48°

6318.66'

314.10'

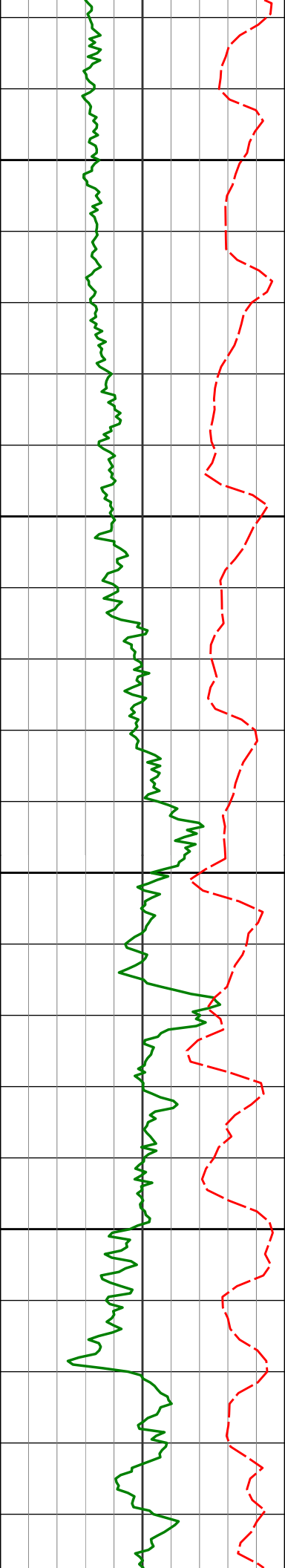
6403'

36.12°

264.23°

6357.86'

338.63'



6448'	40.90°	264.31°	6394.28'	365.48'
6494'	46.88°	267.20°	6429.04'	395.92'
6539'	52.49°	269.31°	6460.02'	428.92'
6586'	58.04°	270.37°	6488.30'	465.48'
6630'	62.73°	269.72°	6512.11'	502.81'
6676'	66.57°	270.18°	6533.71'	543.67'
6721'	68.36°	270.21°	6552.21'	584.96'
6768'	69.88°	269.51°	6569.52'	627.82'
6813'	72.83°	269.85°	6585.31'	670.23'

3341.00	8.26	228.04	3338.27	28.63 S	21.89 W	22.97	1.99
3436.00	9.23	231.72	3432.16	37.93 S	32.95 W	34.37	1.18
3531.00	8.88	232.25	3525.98	47.14 S	44.73 W	46.50	0.38
3625.00	10.24	236.48	3618.67	56.20 S	57.43 W	59.54	1.63
3720.00	11.22	237.89	3712.01	65.78 S	72.30 W	74.76	1.07
3815.00	10.01	239.19	3805.38	74.92 S	87.22 W	90.02	1.30
3909.00	8.16	235.27	3898.20	82.90 S	99.72 W	102.82	2.07
4004.00	7.28	234.23	3992.34	90.26 S	110.15 W	113.51	0.94
4099.00	8.45	231.91	4086.44	98.09 S	120.52 W	124.18	1.28
4194.00	9.29	230.71	4180.31	107.25 S	131.95 W	135.95	0.91
4289.00	8.75	241.26	4274.14	115.58 S	144.22 W	148.53	1.83
4383.00	8.86	240.21	4367.03	122.61 S	156.77 W	161.34	0.21
4478.00	10.29	233.15	4460.71	131.34 S	169.91 W	174.81	1.95
4573.00	9.14	230.50	4554.34	141.23 S	182.53 W	187.79	1.30
4668.00	7.04	227.30	4648.39	149.98 S	192.63 W	198.22	2.26
4763.00	6.05	223.28	4742.77	157.57 S	200.34 W	206.21	1.15
4857.00	3.99	230.14	4836.41	163.27 S	206.25 W	212.33	2.28
4952.00	0.70	251.38	4931.32	165.58 S	209.33 W	215.51	3.52
5047.00	1.41	279.50	5026.30	165.57 S	211.04 W	217.21	0.90
5142.00	0.35	37.67	5121.29	165.15 S	212.01 W	218.17	1.69
5237.00	0.62	329.82	5216.29	164.47 S	212.09 W	218.22	0.62
5332.00	0.36	330.11	5311.29	163.77 S	212.50 W	218.60	0.27
5427.00	0.51	103.25	5406.28	163.61 S	212.24 W	218.33	0.84
5522.00	0.51	96.33	5501.28	163.75 S	211.41 W	217.51	0.06
5616.00	0.52	89.28	5595.28	163.79 S	210.56 W	216.67	0.07
5711.00	0.10	312.01	5690.28	163.73 S	210.19 W	216.30	0.63
5806.00	0.59	328.04	5785.27	163.26 S	210.51 W	216.60	0.52
5887.00	0.50	342.83	5866.27	162.57 S	210.84 W	216.90	0.21
5949.00	0.65	292.53	5928.27	162.17 S	211.24 W	217.29	0.82
5994.00	1.01	276.69	5973.26	162.03 S	211.87 W	217.91	0.94
6042.00	5.33	265.45	6021.18	162.16 S	214.52 W	220.56	9.05
6090.00	9.46	262.37	6068.77	162.86 S	220.65 W	226.71	8.64
6138.00	12.94	264.47	6115.85	163.90 S	229.91 W	236.01	7.30
6184.00	15.47	268.75	6160.44	164.53 S	241.18 W	247.29	5.95
6232.00	19.37	268.46	6206.23	164.89 S	255.54 W	261.65	8.13
6279.00	23.57	268.40	6249.96	165.36 S	272.73 W	278.85	8.94
6327.00	28.26	270.34	6293.12	165.56 S	293.70 W	299.81	9.93
6374.00	31.40	267.48	6333.89	166.03 S	317.07 W	323.18	7.33
6422.00	36.12	264.23	6373.79	168.00 S	343.65 W	349.82	10.53
6469.00	40.90	264.31	6410.55	170.92 S	372.76 W	379.02	10.17
6517.00	46.88	267.20	6445.13	173.34 S	405.93 W	412.25	13.14
6564.00	52.49	269.31	6475.53	174.40 S	441.73 W	448.07	12.42
6612.00	58.04	270.37	6502.87	174.50 S	481.16 W	487.48	11.70
6658.00	62.73	269.72	6525.60	174.48 S	521.14 W	527.43	10.27
6706.00	66.57	270.18	6546.14	174.51 S	564.51 W	570.77	8.05
6753.00	68.36	270.21	6564.16	174.36 S	607.92 W	614.14	3.81
6801.00	69.88	269.51	6581.26	174.47 S	652.77 W	658.96	3.45
6848.00	72.83	269.85	6596.29	174.72 S	697.29 W	703.46	6.31
6896.00	78.18	271.21	6608.30	174.28 S	743.74 W	749.86	11.48
6931.00	83.76	271.91	6613.79	173.34 S	778.28 W	784.34	16.06

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 267.81 DEGREES (GRID)
A TOTAL CORRECTION OF 7.47 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6931.00 FEET
IS 797.35 FEET ALONG 257.44 DEGREES (GRID)**

First Surveys from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.

Survey Depth 269 Inc 0.1 Azi 327.47

Survey Depth 543 Inc 1.0 Azi 299.67

Survey Depth 852 Inc 0.5 Azi 219.44

Tied in @ Surface

Magnetic direction of 7.4721 has been added to AZI for grid direction correction.