

PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	16-Mar-14	17-Mar-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.850	6.850			
Log Start Depth (MD, ft)	633.00	6,040.00			
Log End Depth (MD, ft)	6,040.00	7,091.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	13-Mar-14 11:26	17-Mar-14 02:36			
Drill/Wipe End Date and Time	13-Mar-14 11:26	17-Mar-14 15:45			
Min Inc (deg) @ Depth (MD, ft)	0.07 @ 815.00	0.13 @ 6,046.00			
Max Inc (deg) @ Depth (MD, ft)	13.44 @ 3,826.00	83.85 @ 7,037.00			
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC			
Flow Rate (gpm)	566.01	560.49			
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA			
Fluid Type	Native/Spud Mud	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.80 / 31.00	10.80 / 39.00			
Filtrate CL (ppm)	1,900.00	2,000.00			
pH / Fluid Loss (mptm)	8.70 / 16	9.30 / 8			
PV (cP) / YP (lbf2)	4 / 4.00	12 / 11.00			
% Solids / % Sand	3.10 / 0.30	11.30 / 0.20			
% 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	145.00 / 63.00	150.00 / 65.00			

Max Tool Temp (degF) / Source	145.90 / PCM	158.60 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 145.90	NA @ 158.60			
Lead MWD Engineer	Kyle Wass	Kyle Wass			
Customer Representative	Jim Turner	Jim Turner			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404283	11404283			
Insert Serial Number	11400849	11400849			
Date and Time Initialized	15-Mar-14 10:56	15-Mar-14 10:56			
Date and Time Read	17-Mar-14 21:39	17-Mar-14 21:39			
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	11404283	11404283			
Sonde Serial Number	11638605	11638605			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	23.56	219.94			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.41	46.50			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404283	11404283			
Insert/Sonde Serial Number	11579852	11579852			

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

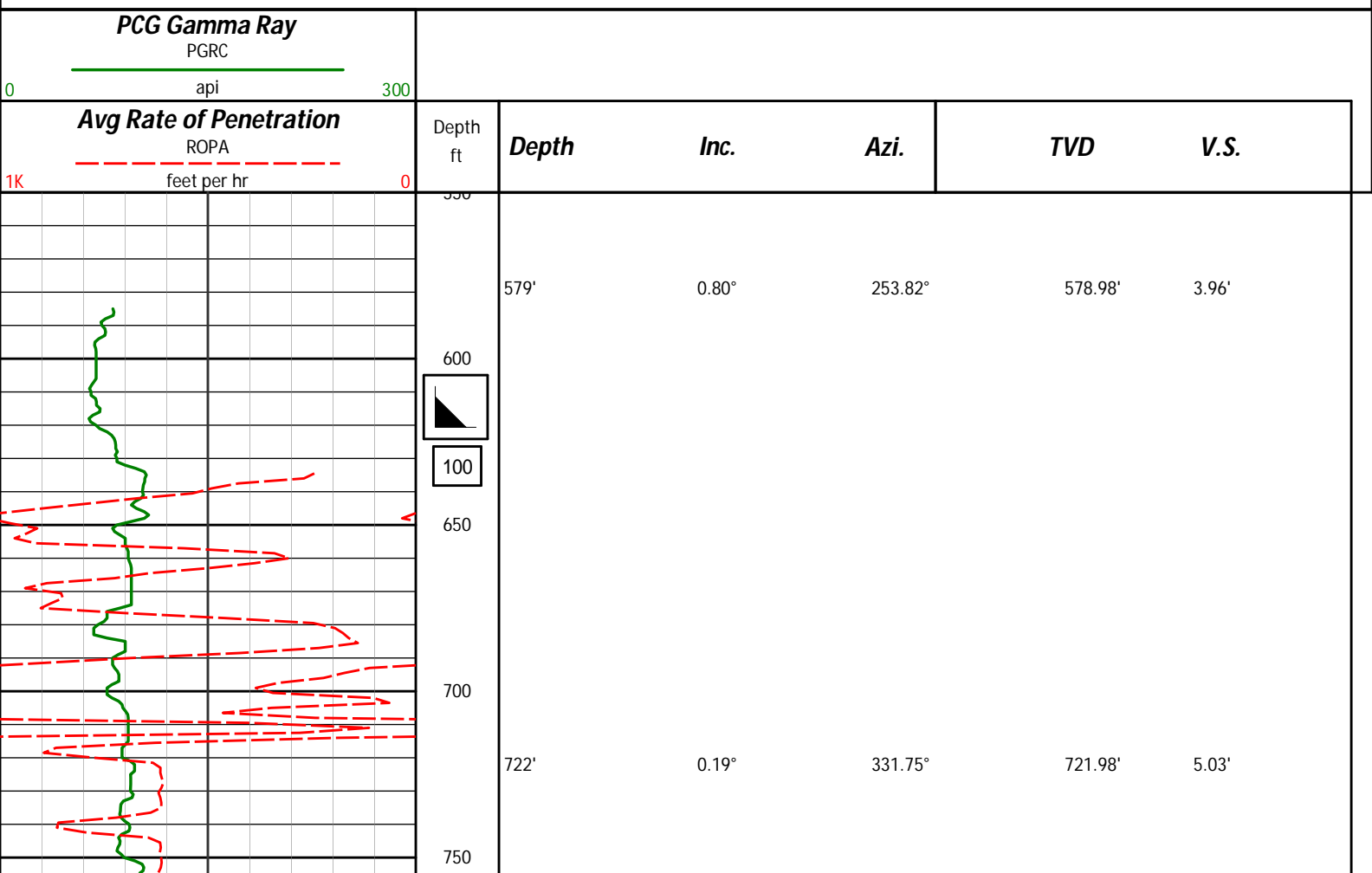
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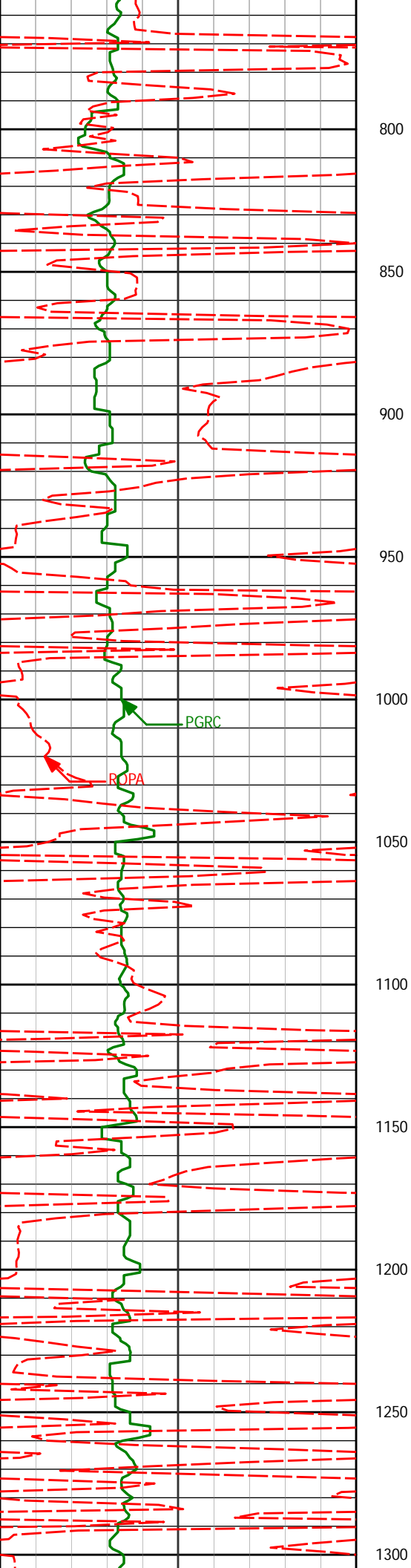
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Sperry Drilling Services

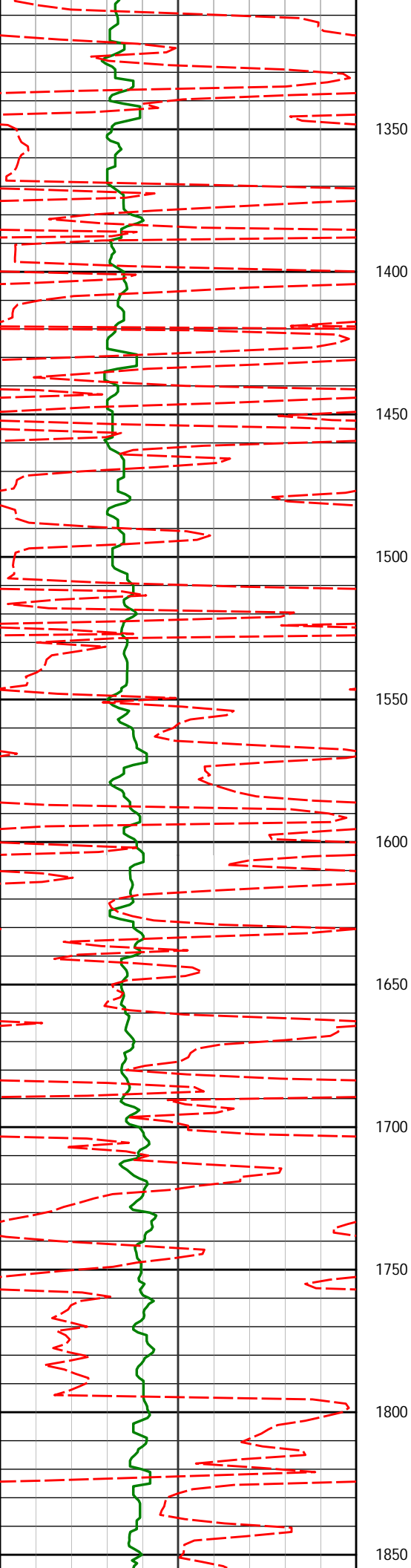
TVD Correlation Log 1:600

Noble Energy
Wells Ranch AA35-68-1BHNC
H&P 321
Sec. 36-T6N-R63W

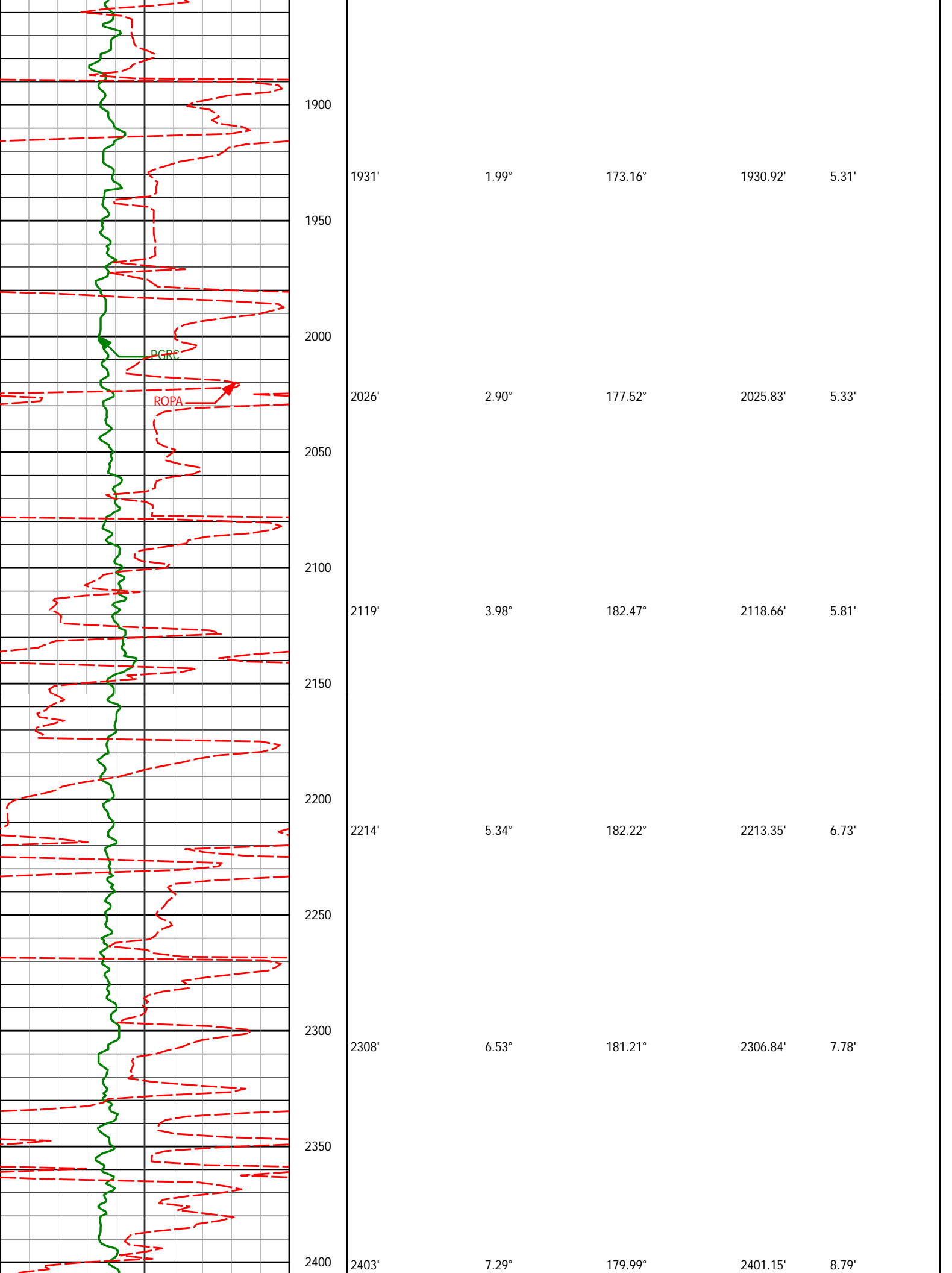


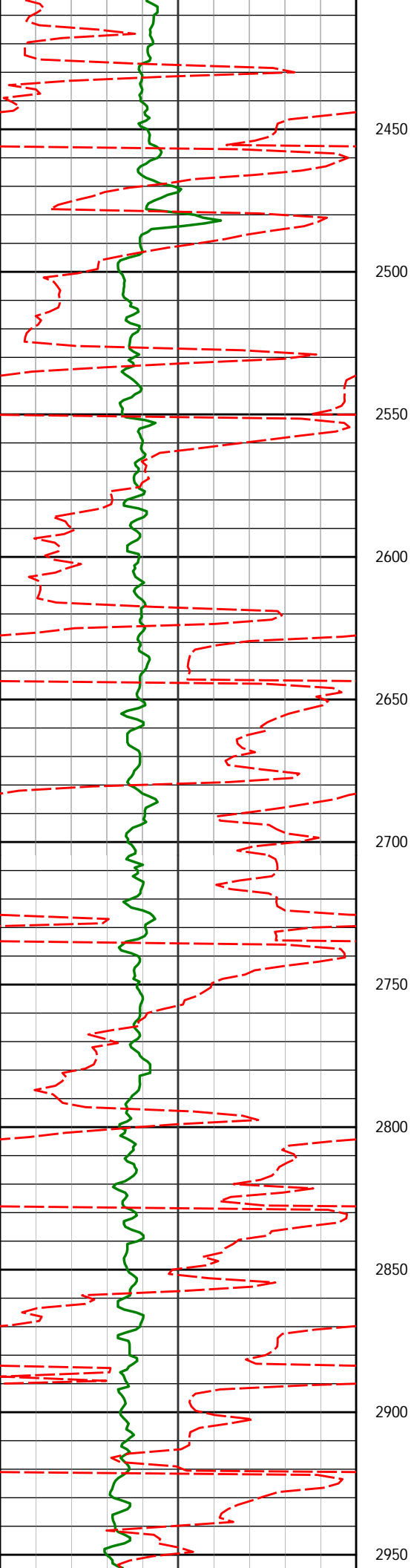


815'	0.07°	263.86°	814.98'	5.15'
907'	0.29°	179.50°	906.98'	5.22'
998'	0.09°	186.60°	997.97'	5.25'
1090'	0.19°	131.15°	1089.97'	5.16'
1182'	0.14°	139.48°	1181.97'	4.99'
1274'	0.09°	43.49°	1273.97'	4.87'

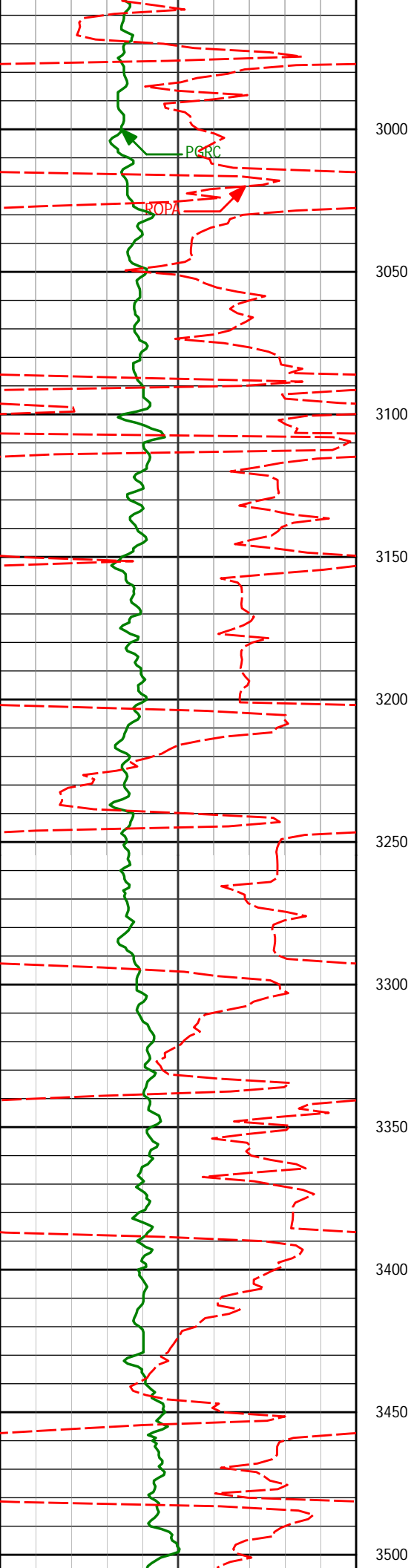


1350				
1365'	0.42°	116.50°	1364.97'	4.53'
1400				
1450				
1457'	0.16°	178.89°	1456.97'	4.25'
1500				
1550				
1552'	0.12°	191.15°	1551.97'	4.28'
1600				
1650				
1647'	0.28°	197.54°	1646.97'	4.40'
1700				
1750				
1742'	0.45°	217.37°	1741.97'	4.73'
1800				
1837'	1.33°	185.93°	1836.96'	5.18'
1850				

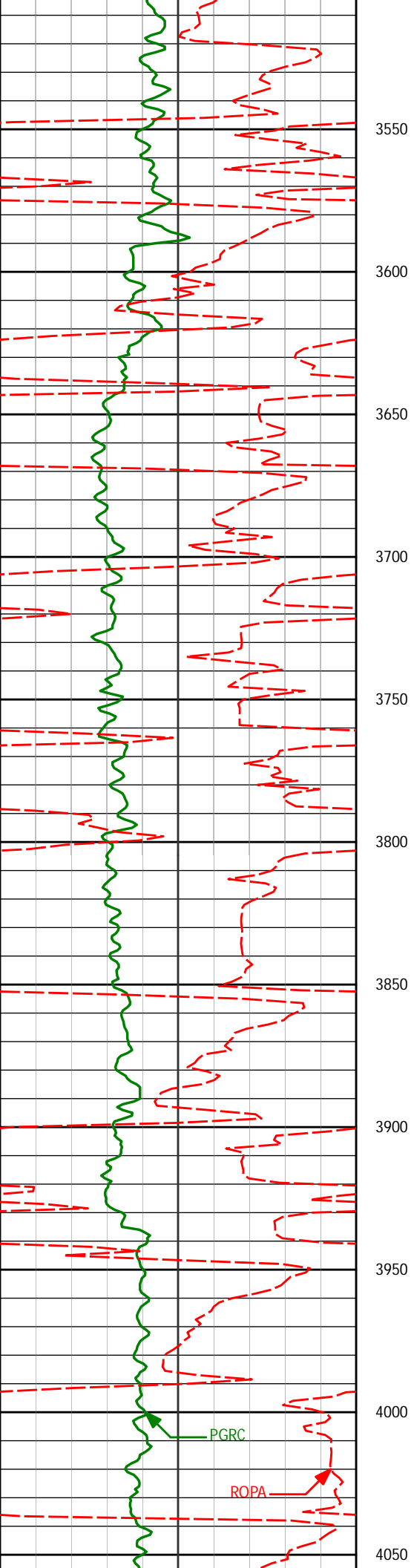




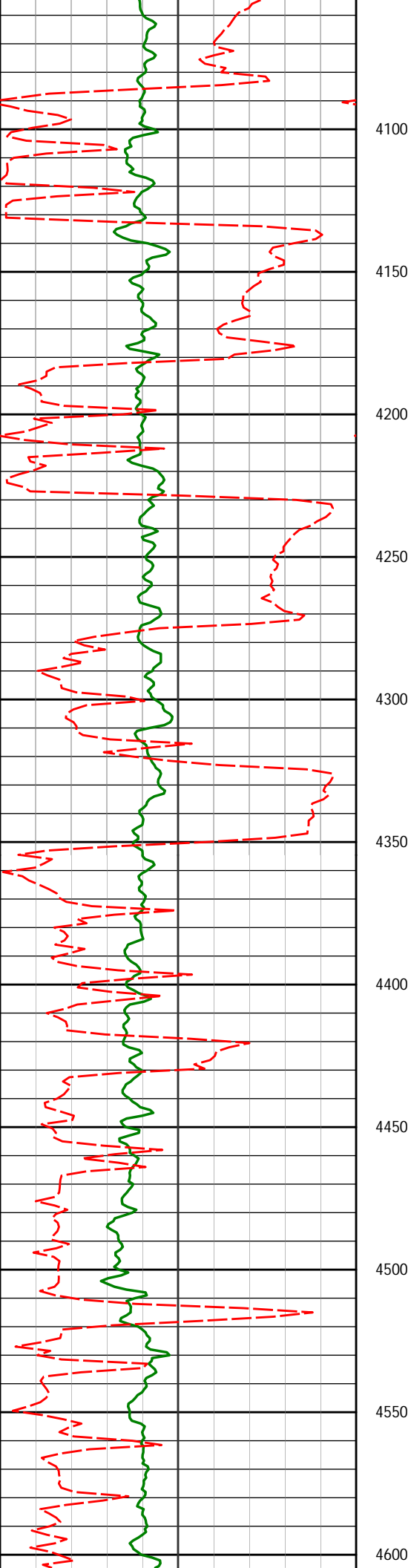
2498'	8.50°	188.39°	2495.25'	10.83'
2593'	10.55°	179.70°	2588.94'	13.04'
2688'	10.55°	183.30°	2682.34'	14.86'
2783'	11.70°	186.79°	2775.55'	17.94'
2877'	11.63°	188.88°	2867.61'	22.00'



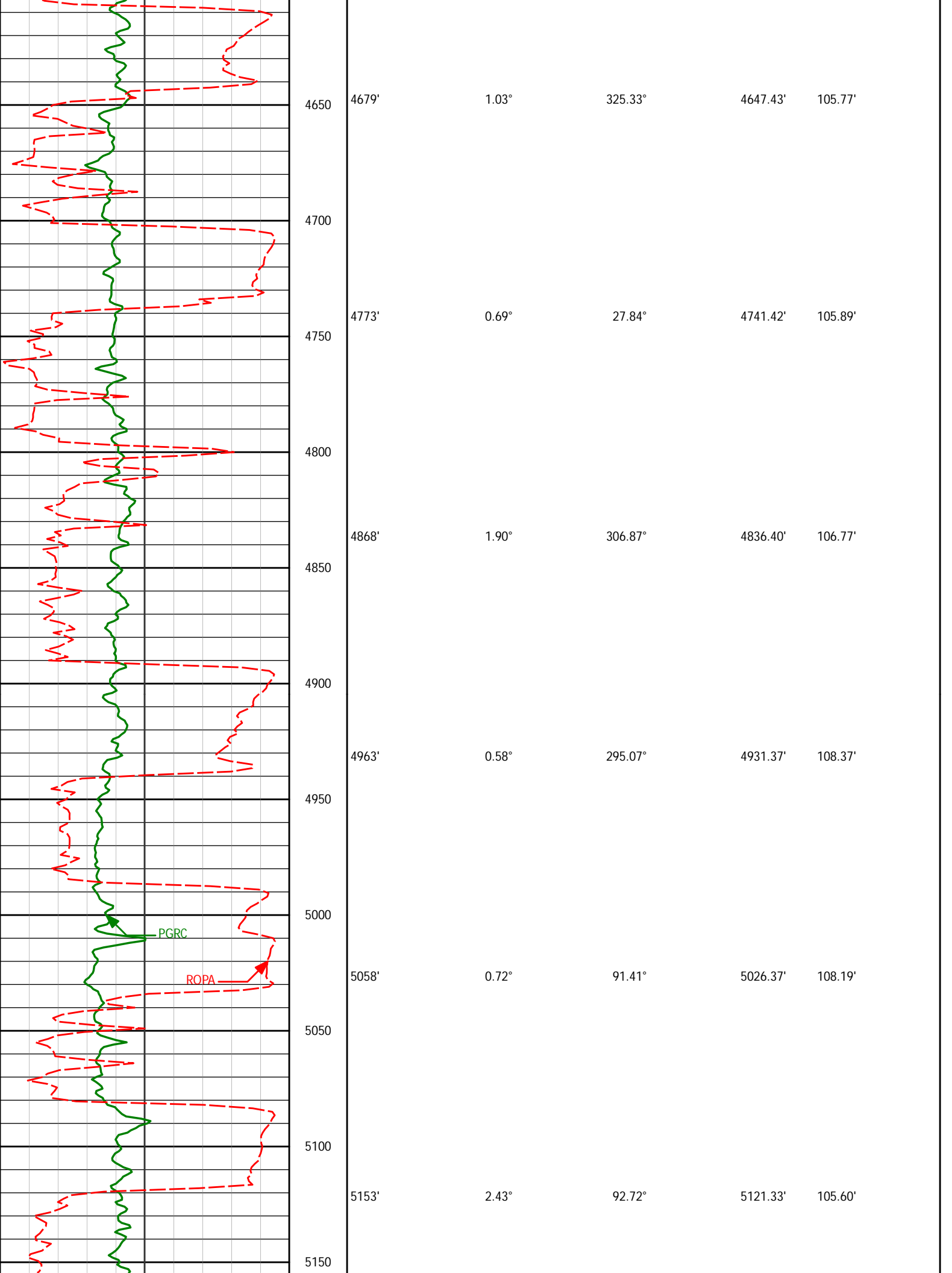
2972'	12.89°	194.35°	2960.44'	27.65'
3067'	11.88°	193.60°	3053.23'	34.12'
3162'	10.02°	191.97°	3146.50'	39.50'
3256'	9.66°	193.80°	3239.11'	44.30'
3351'	8.50°	192.34°	3332.92'	48.85'
3446'	8.44°	191.94°	3426.89'	52.86'

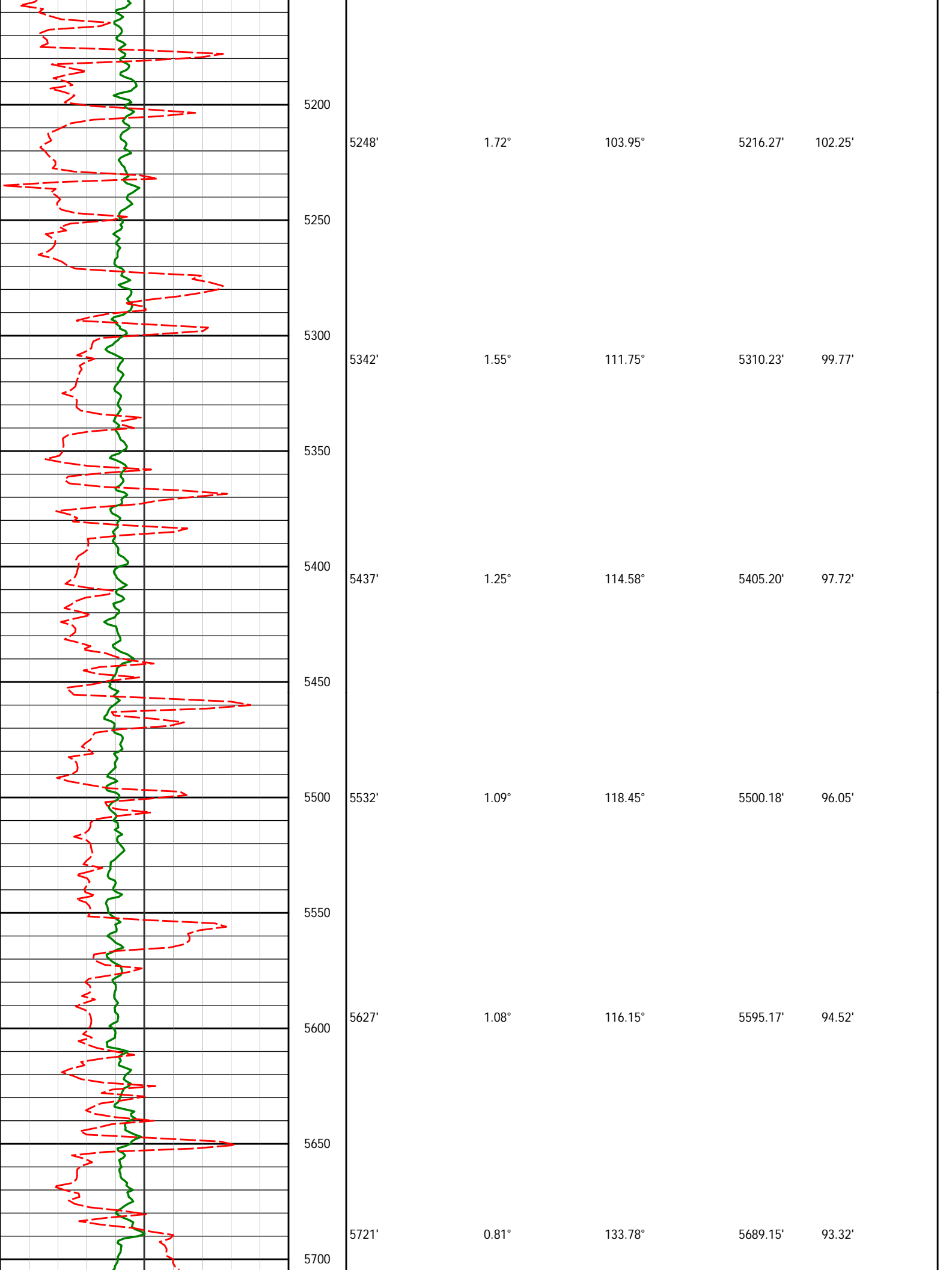


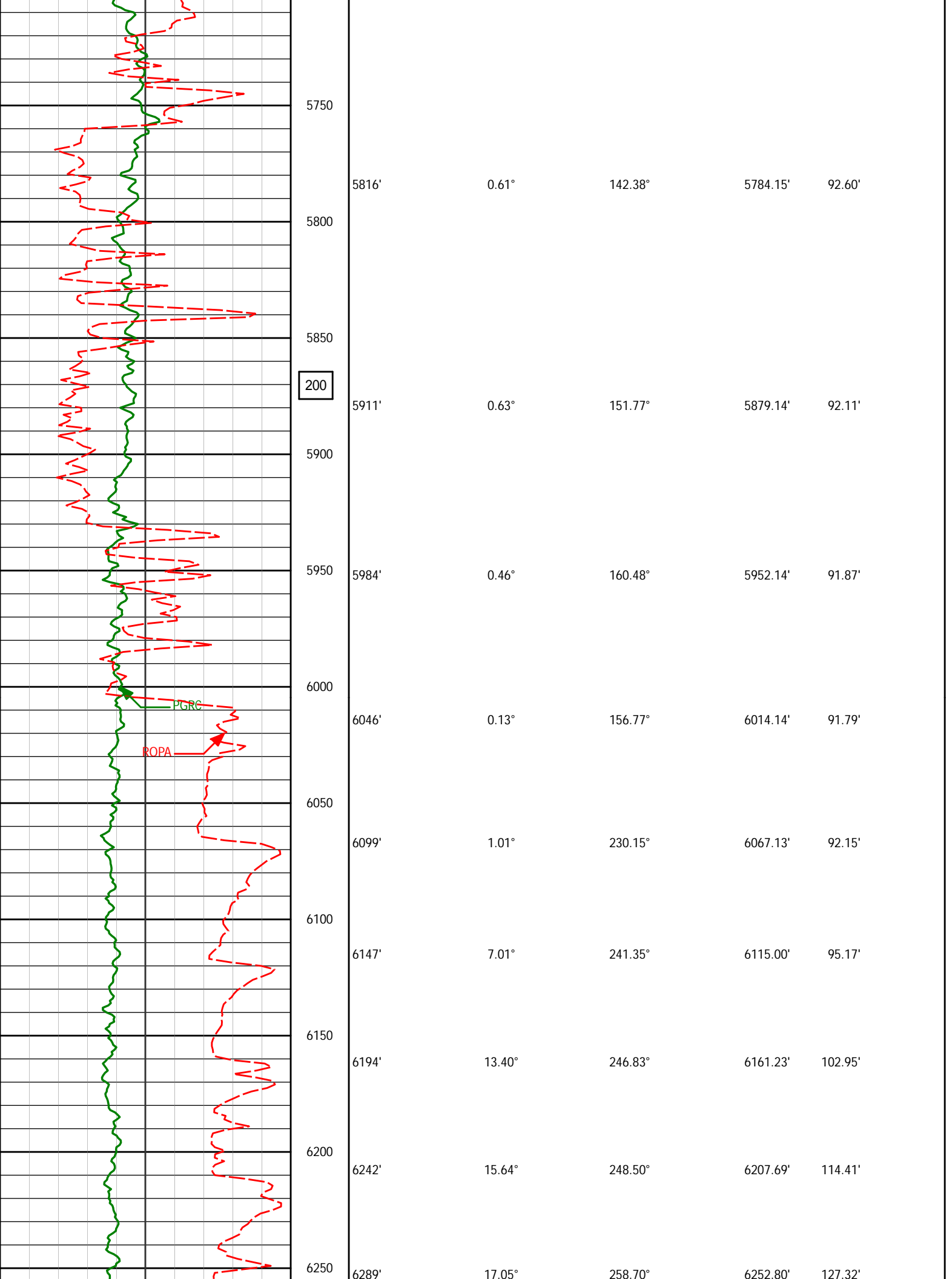
3541'	9.42°	196.89°	3520.74'	57.67'
3636'	11.38°	195.63°	3614.17'	63.74'
3731'	12.88°	192.41°	3707.05'	70.05'
3826'	13.44°	193.65°	3799.55'	76.58'
3921'	11.76°	197.39°	3892.26'	83.63'
4016'	8.99°	198.43°	3985.70'	90.14'

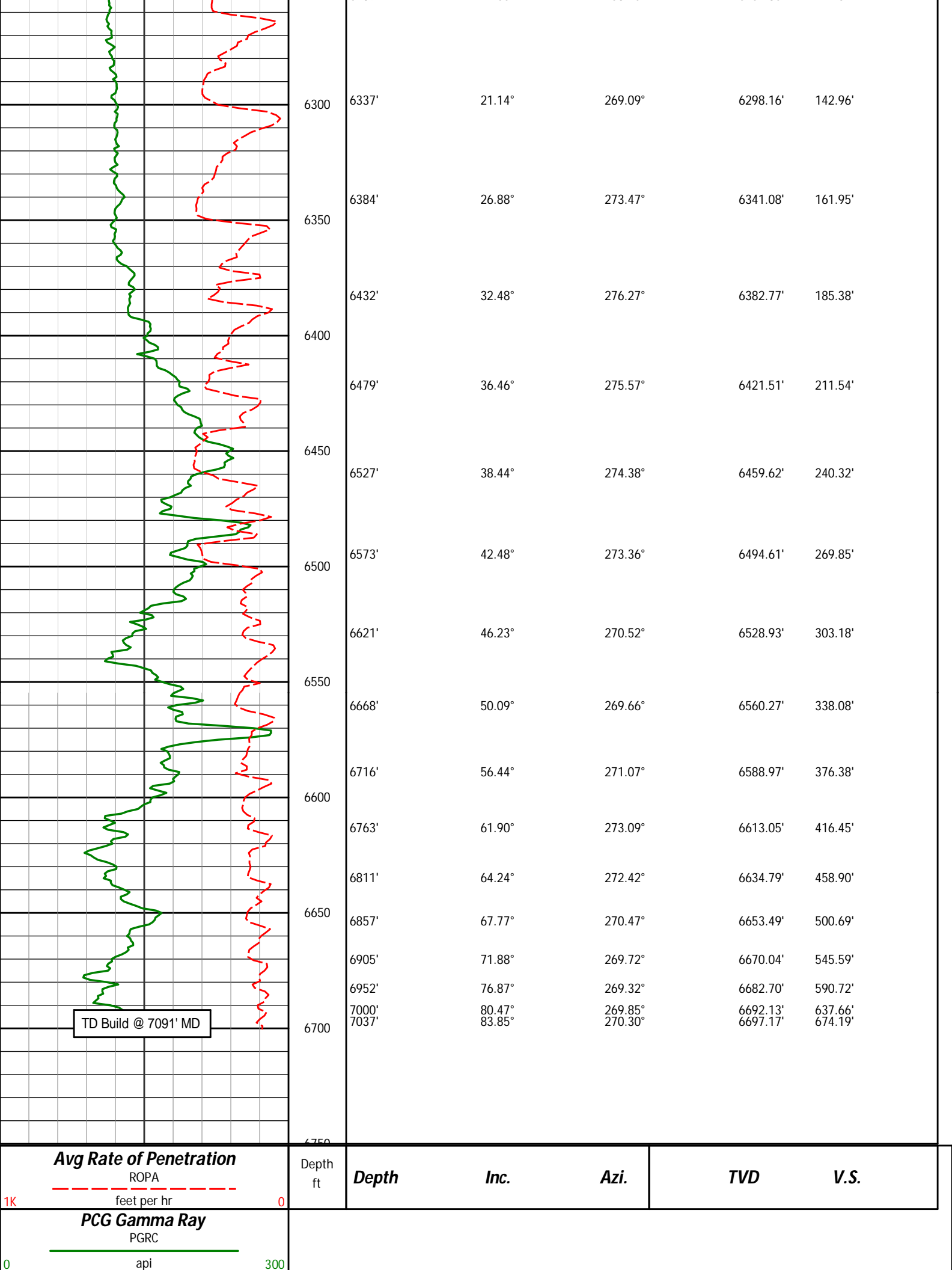


4110'	6.07°	201.00°	4078.88'	95.15'
4100				
4205'	2.97°	203.49°	4173.57'	98.47'
4200				
4300'	1.10°	207.36°	4268.51'	100.11'
4300				
4395'	0.77°	313.97°	4363.50'	101.01'
4400				
4489'	1.31°	302.50°	4457.49'	102.29'
4500				
4584'	1.66°	302.78°	4552.45'	104.25'
4600				



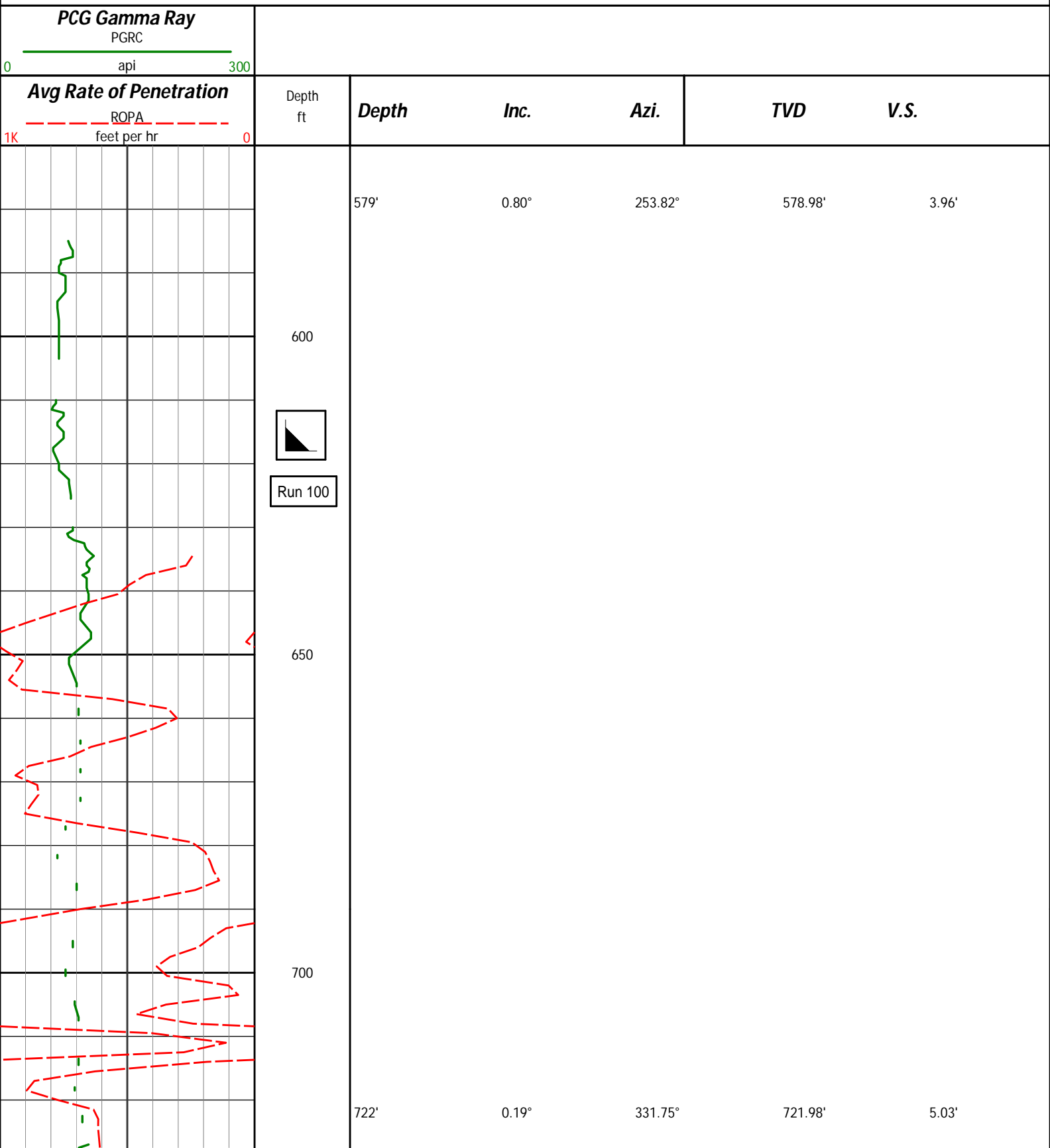


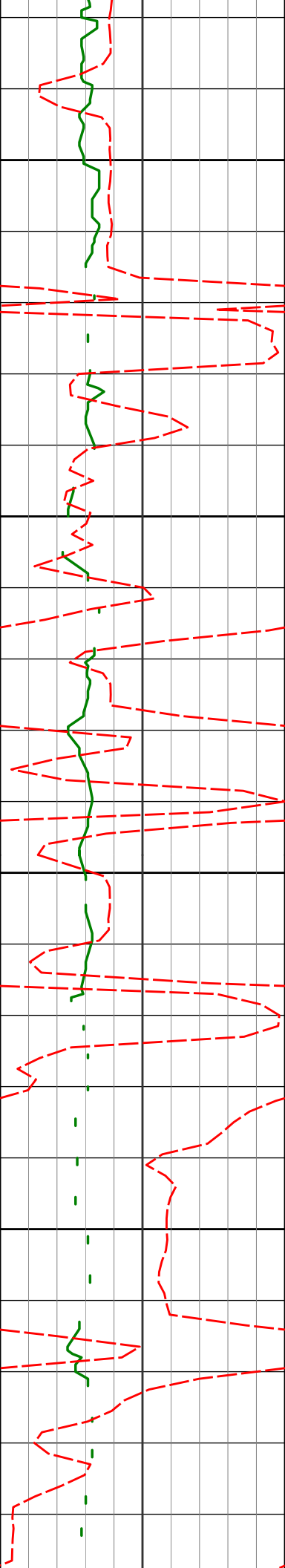




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Sperry Drilling Services
TVD Detail Log 1:240

Noble Energy
Wells Ranch AA35-68-1BHNC
H&P 321
Sec. 36-T6N-R63W





750

800

850

900

815'

0.07°

263.86°

814.98'

5.15'

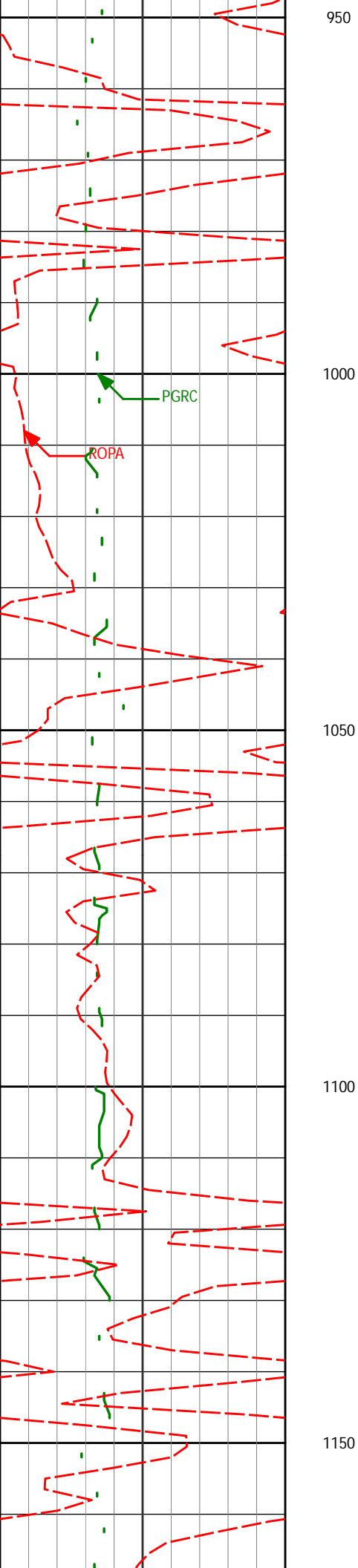
907'

0.29°

179.50°

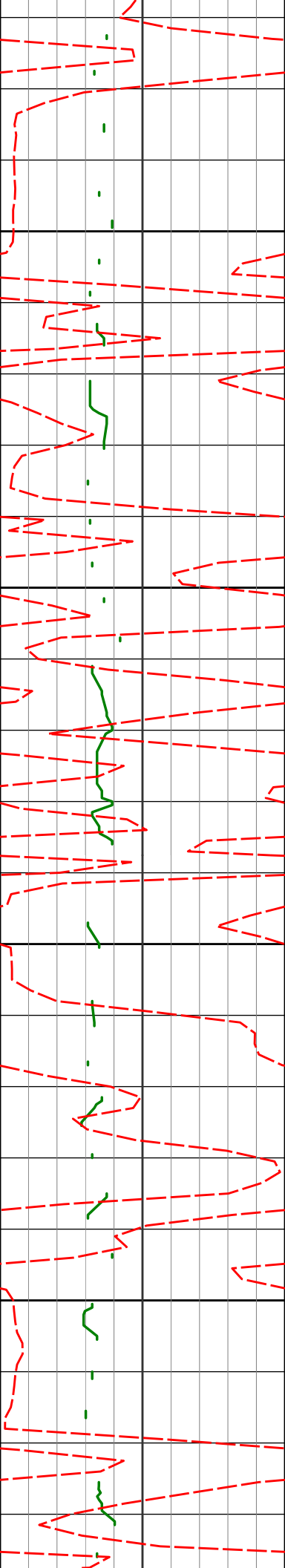
906.98'

5.22'



998' 0.09° 186.60° 997.97' 5.25'

1090' 0.19° 131.15° 1089.97' 5.16'



1182'

0.14°

139.48°

1181.97'

4.99'

1200

1250

1274'

0.09°

43.49°

1273.97'

4.87'

1300

1350

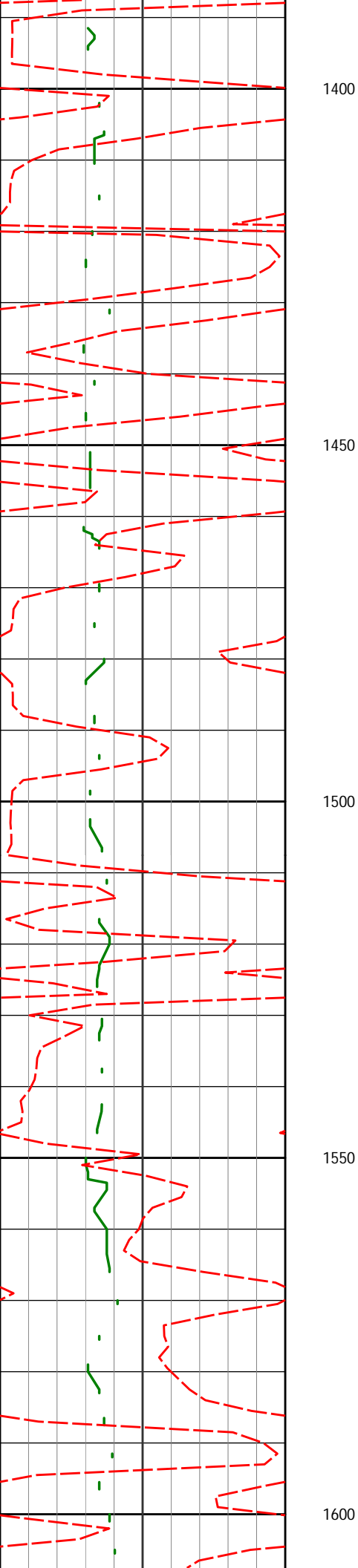
1365'

0.42°

116.50°

1364.97'

4.53'



1457'

0.16°

178.89°

1456.97'

4.25'

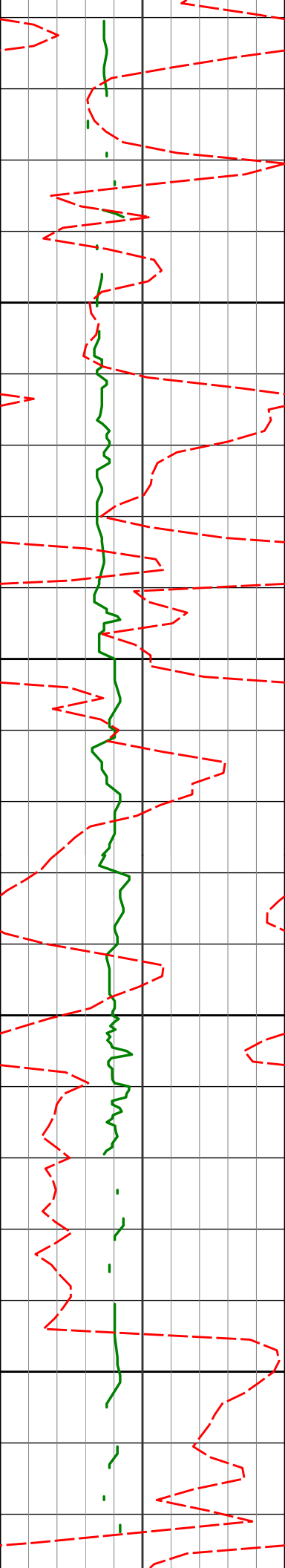
1552'

0.12°

191.15°

1551.97'

4.28'



1650

1700

1750

1800

1647'

0.28°

197.54°

1646.97'

4.40'

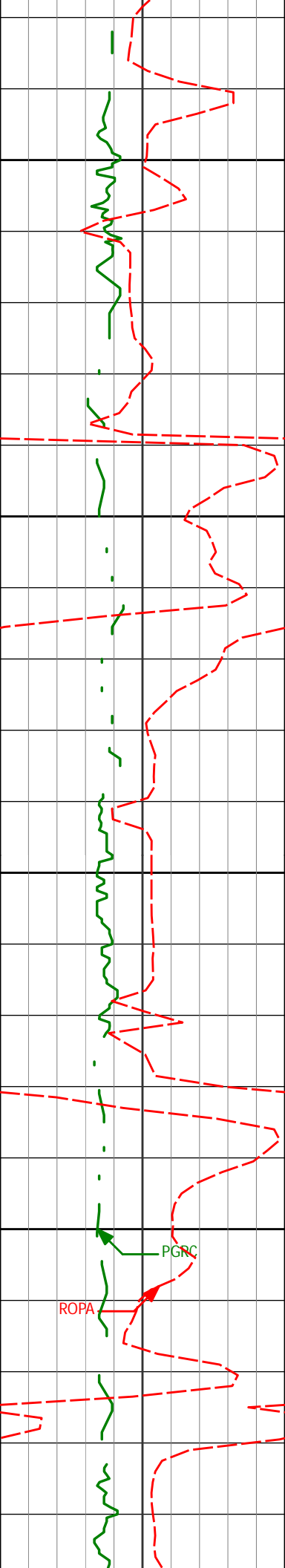
1742'

0.45°

217.37°

1741.97'

4.73'



1850

1900

1950

2000

1837'

1.33°

185.93°

1836.96'

5.18'

1931'

1.99°

173.16°

1930.92'

5.31'

2026'

2.90°

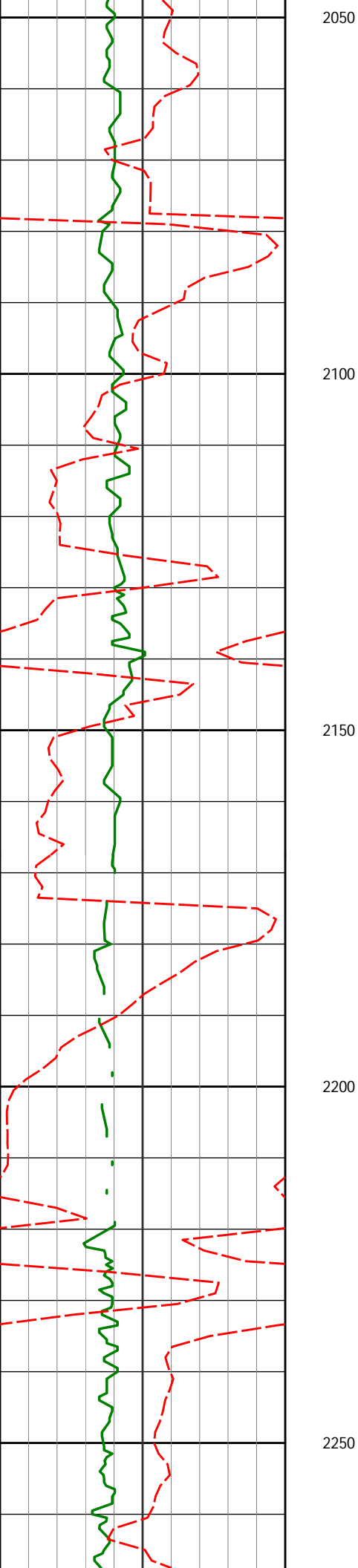
177.52°

2025.83'

5.33'

PGRC

ROPA



2119'

3.98°

182.47°

2118.66'

5.81'

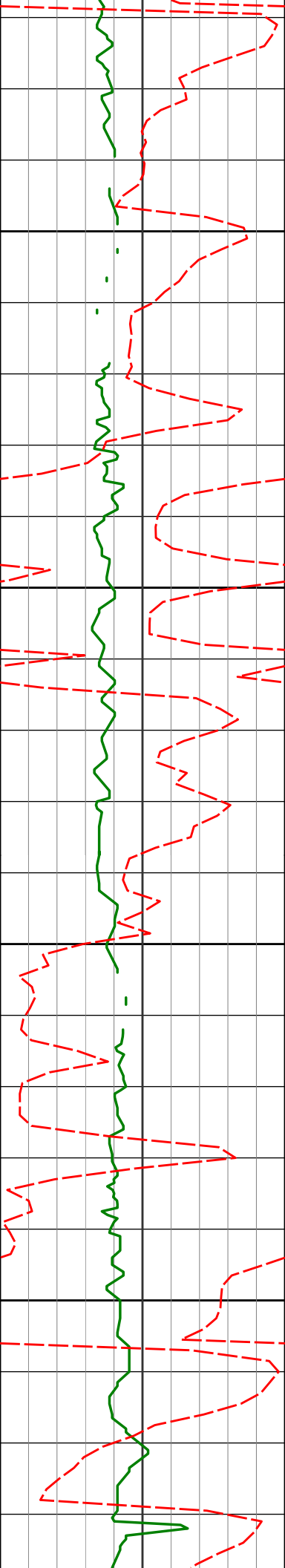
2214'

5.34°

182.22°

2213.35'

6.73'



2300

2308'

6.53°

181.21°

2306.84'

7.78'

2350

2400

2403'

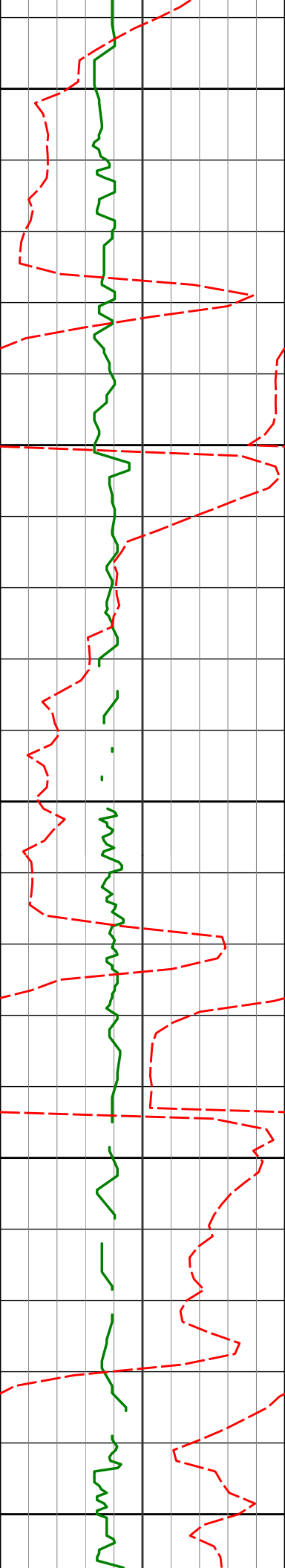
7.29°

179.99°

2401.15'

8.79'

2450



2500

2550

2600

2650

2700

2498'

8.50°

188.39°

2495.25'

10.83'

2593'

10.55°

179.70°

2588.94'

13.04'

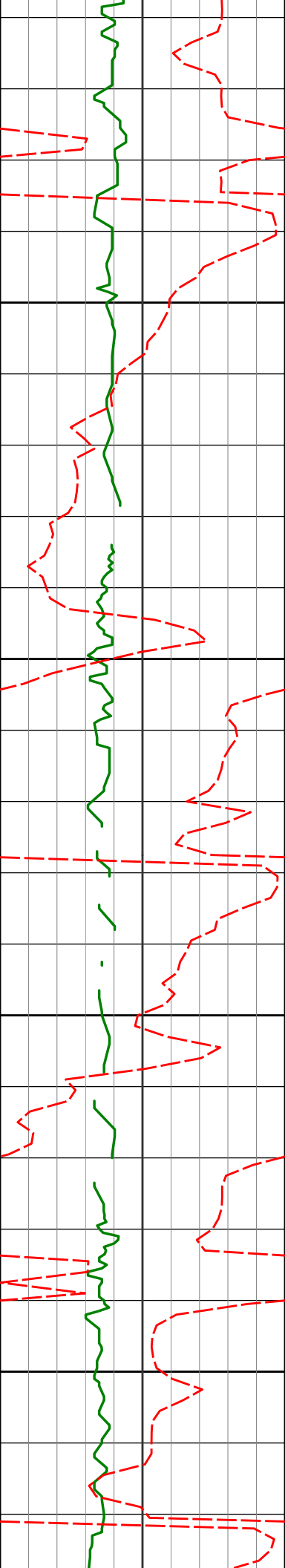
2688'

10.55°

183.30°

2682.34'

14.86'



2750

2783'

11.70°

186.79°

2775.55'

17.94'

2800

2850

2877'

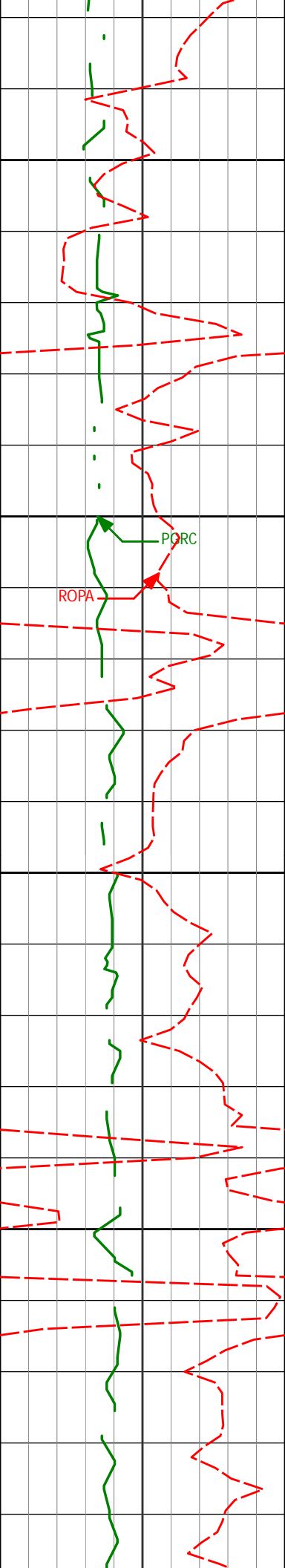
11.63°

188.88°

2867.61'

22.00'

2900



2950

2972'

12.89°

194.35°

2960.44'

27.65'

3000

ROPA

PORC

3050

3067'

11.88°

193.60°

3053.23'

34.12'

3100

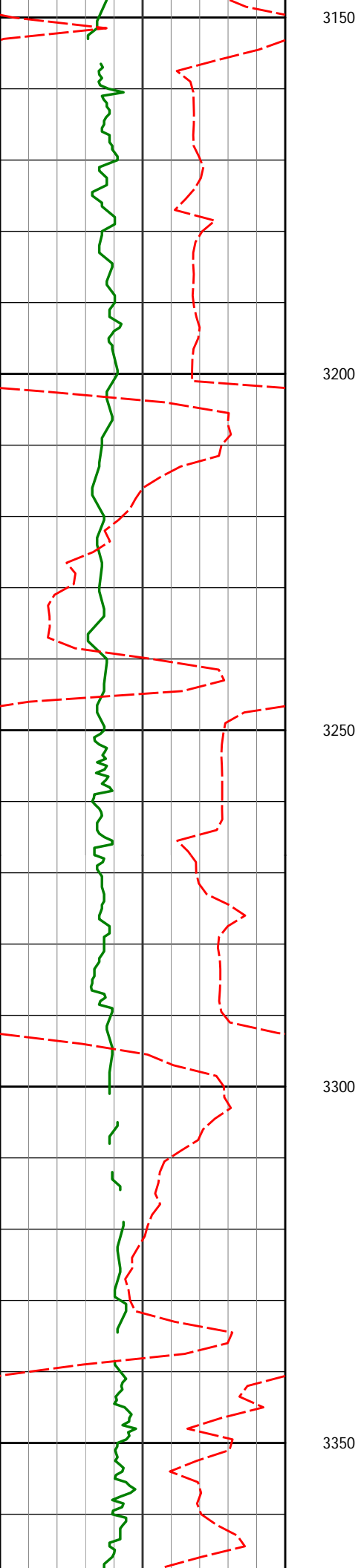
3162'

10.02°

191.97°

3146.50'

39.50'



3256'

9.66°

193.80°

3239.11'

44.30'

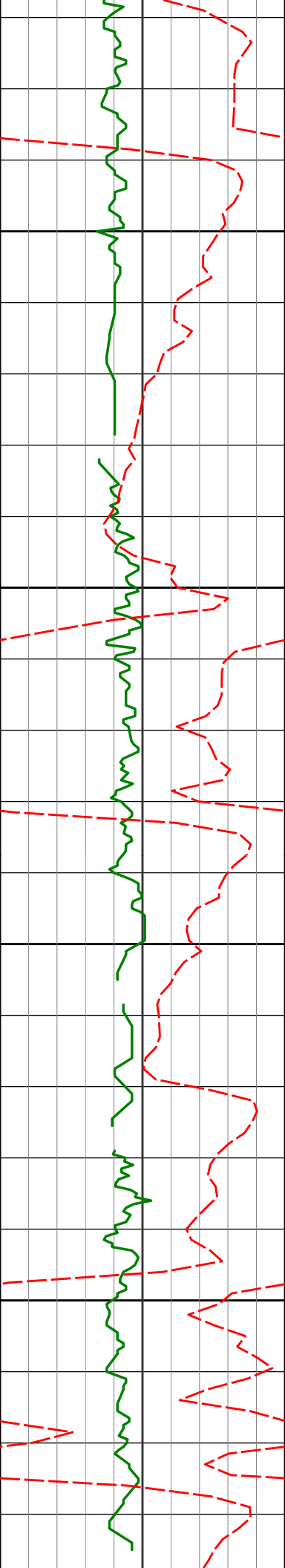
3351'

8.50°

192.34°

3332.92'

48.85'



3400

3446'

8.44°

191.94°

3426.89'

52.86'

3450

3500

3541'

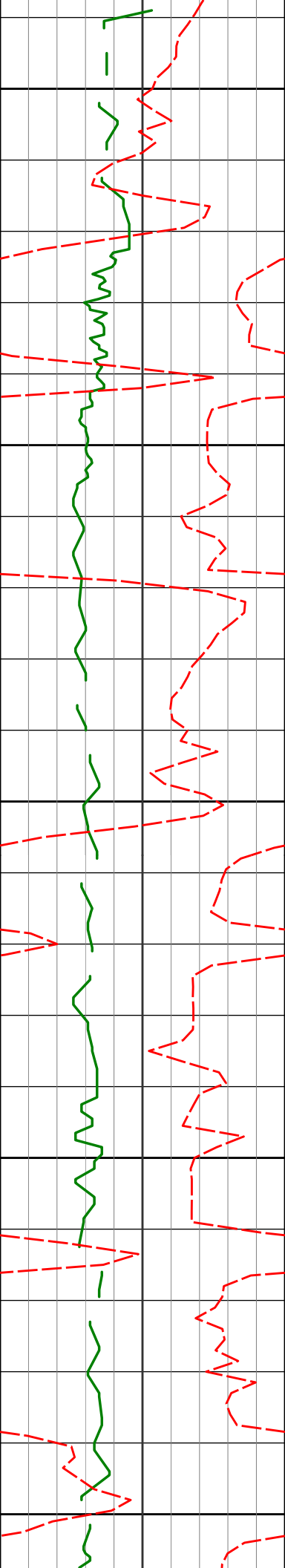
9.42°

196.89°

3520.74'

57.67'

3550



3600

3636'

11.38°

195.63°

3614.17'

63.74'

3650

3700

3731'

12.88°

192.41°

3707.05'

70.05'

3750

3800

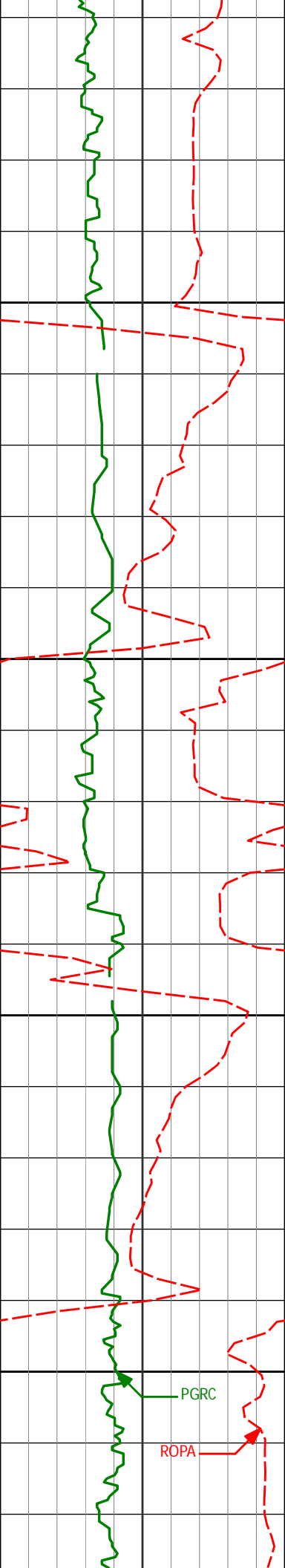
3826'

13.44°

193.65°

3799.55'

76.58'



3850

3900

3950

4000

PGRC

ROPA

3921'

11.76°

197.39°

3892.26'

83.63'

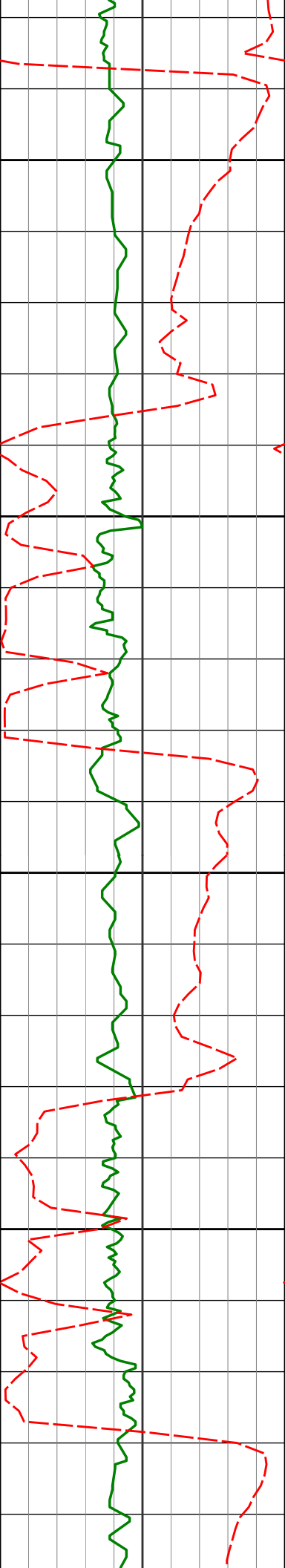
4016'

8.99°

198.43°

3985.70'

90.14'



4050

4110'

6.07°

201.00°

4078.88'

95.15'

4100

4150

4205'

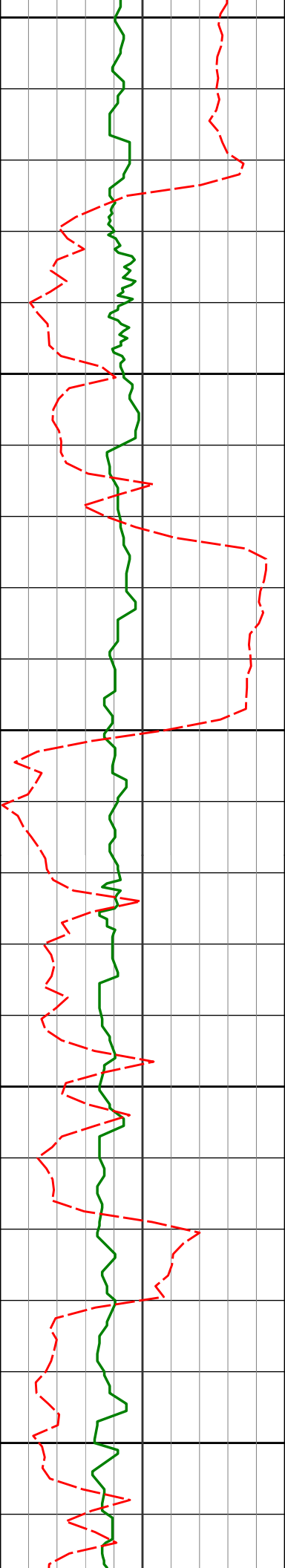
2.97°

203.49°

4173.57'

98.47'

4200



4250

4300'

1.10°

207.36°

4268.51'

100.11'

4300

4350

4395'

0.77°

313.97°

4363.50'

101.01'

4400

4450

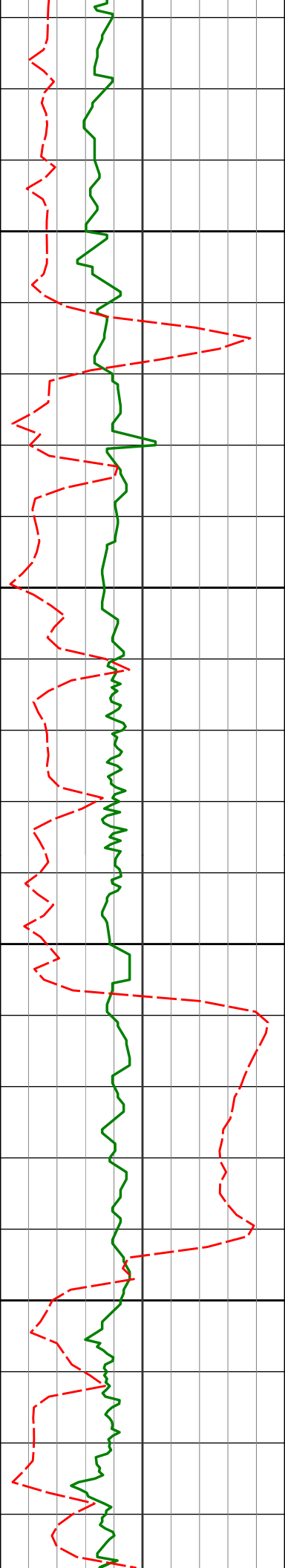
4489'

1.31°

302.50°

4457.49'

102.29'



4500

4550

4600

4650

4584'

1.66°

302.78°

4552.45'

104.25'

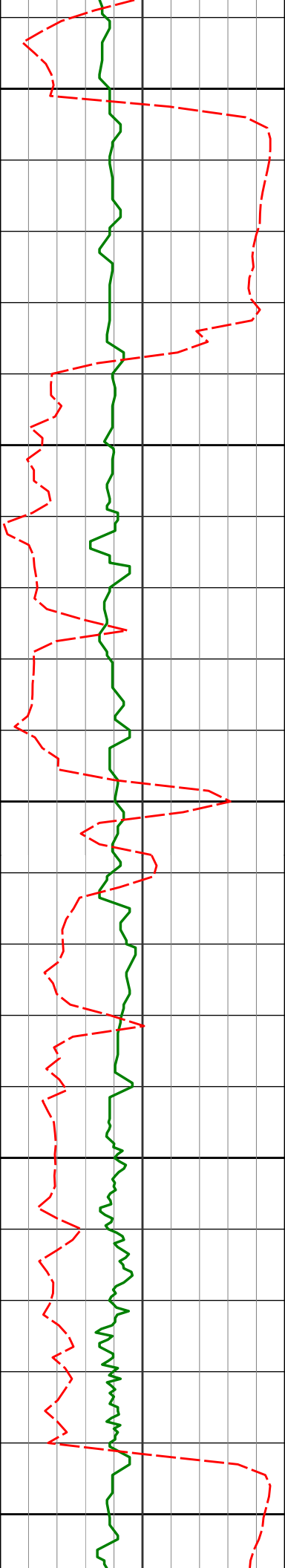
4679'

1.03°

325.33°

4647.43'

105.77'



4700

4773'

0.69°

27.84°

4741.42'

105.89'

4750

4800

4868'

1.90°

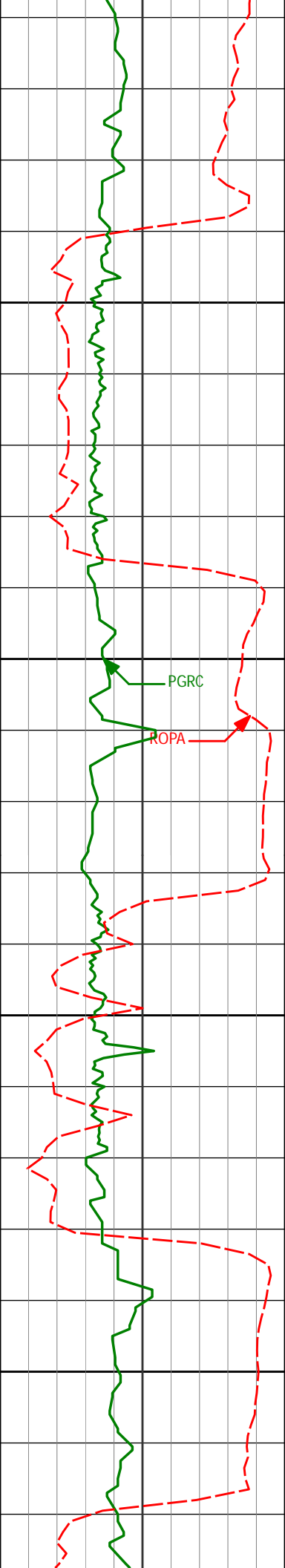
306.87°

4836.40'

106.77'

4850

4900



4963'

0.58°

295.07°

4931.37'

108.37'

4950

5000

PGRC

ROPA

5058'

0.72°

91.41°

5026.37'

108.19'

5050

5100

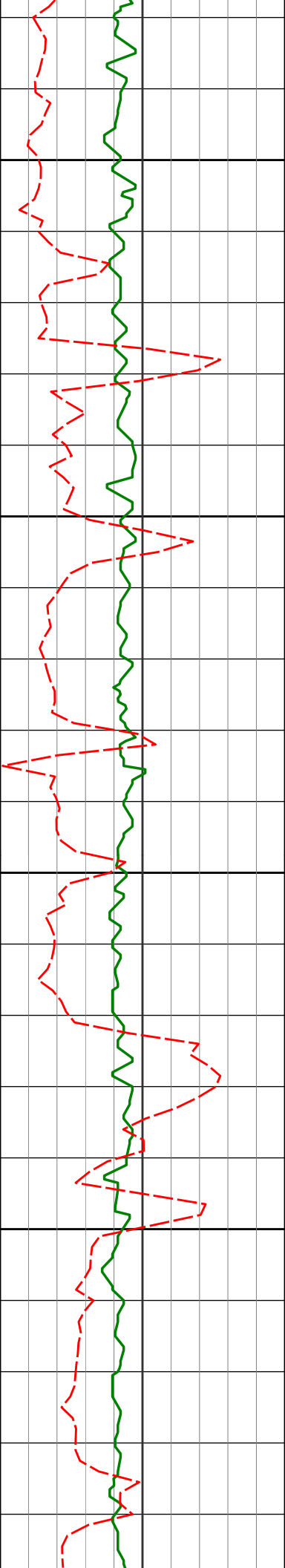
5153'

2.43°

92.72°

5121.33'

105.60'



5150

5200

5250

5300

5248'

1.72°

103.95°

5216.27'

102.25'

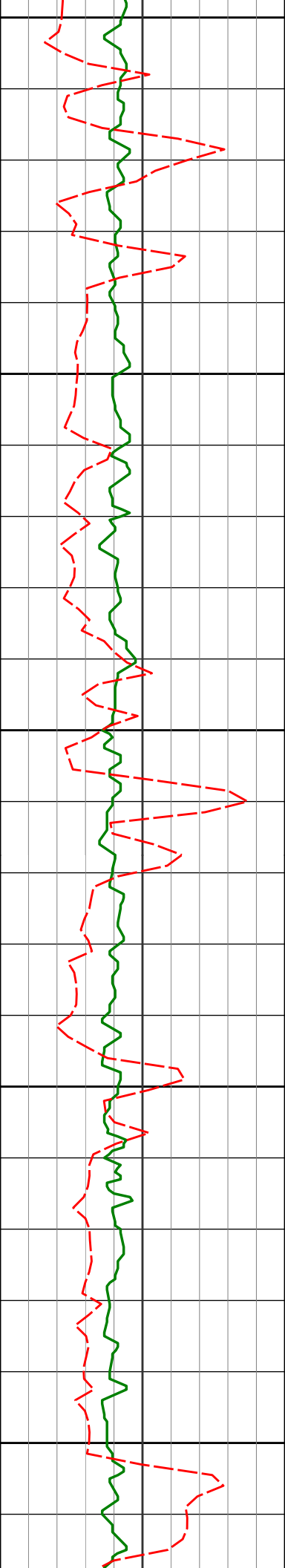
5342'

1.55°

111.75°

5310.23'

99.77'



5350

5400

5450

5500

5550

5437'

1.25°

114.58°

5405.20'

97.72'

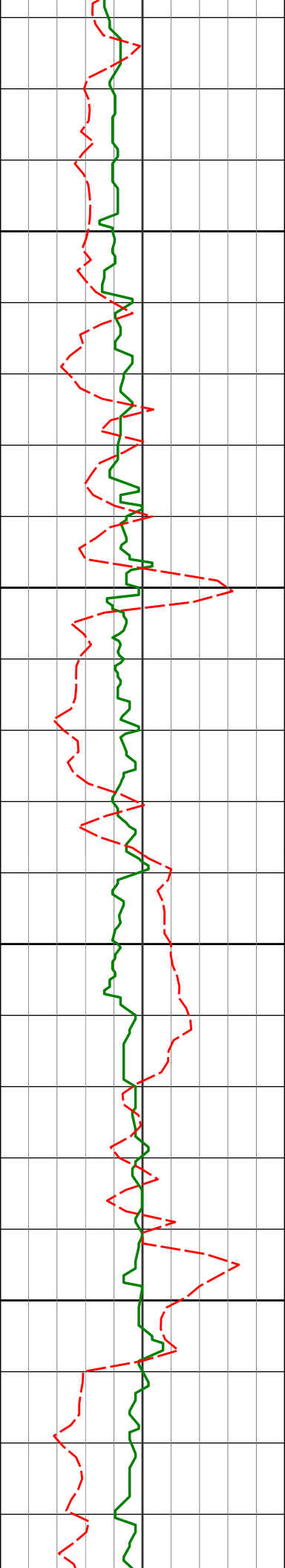
5532'

1.09°

118.45°

5500.18'

96.05'



5627'	1.08°	116.15°	5595.17'	94.52'
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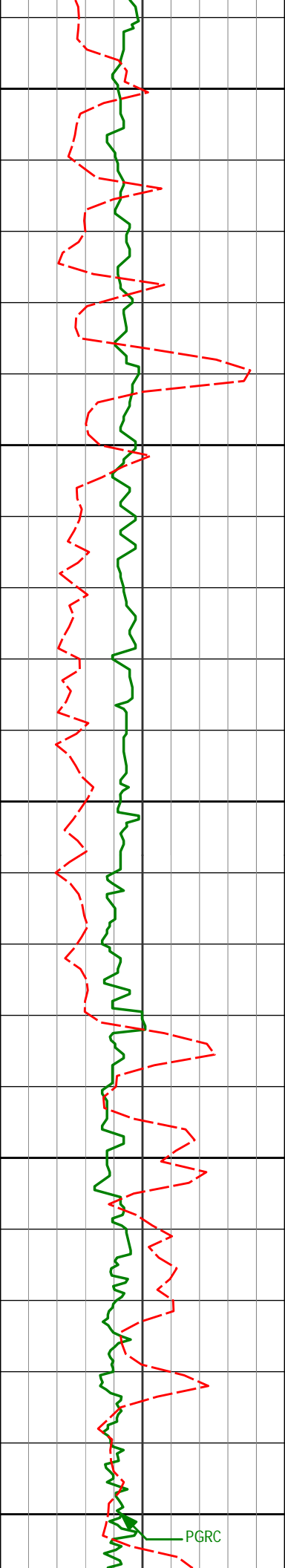
5600

5721'	0.81°	133.78°	5689.15'	93.32'
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5650

5700

5816'	0.61°	142.38°	5784.15'	92.60'
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5800

5850

5900

5950

6000

5911'

0.63°

151.77°

5879.14'

92.11'

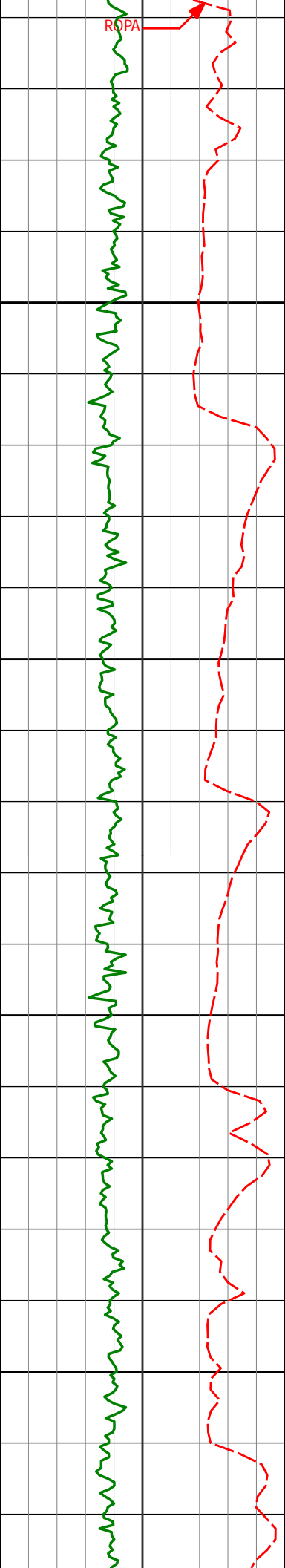
5984'

0.46°

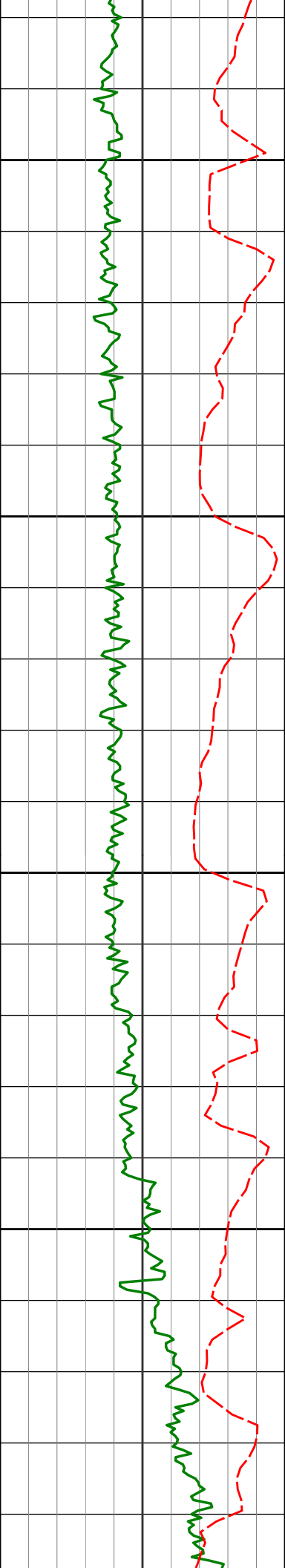
160.48°

5952.14'

91.87'



6046'	0.13°	156.77°	6014.14'	91.79'
6050				
6099'	1.01°	230.15°	6067.13'	92.15'
6100				
6147'	7.01°	241.35°	6115.00'	95.17'
6150				
6194'	13.40°	246.83°	6161.23'	102.95'
6200				
6242'	15.64°	248.50°	6207.69'	114.41'



6250

6289'

17.05°

258.70°

6252.80'

127.32'

6300

6337'

21.14°

269.09°

6298.16'

142.96'

6350

6384'

26.88°

273.47°

6341.08'

161.95'

6400

6432'

32.48°

276.27°

6382.77'

185.38'

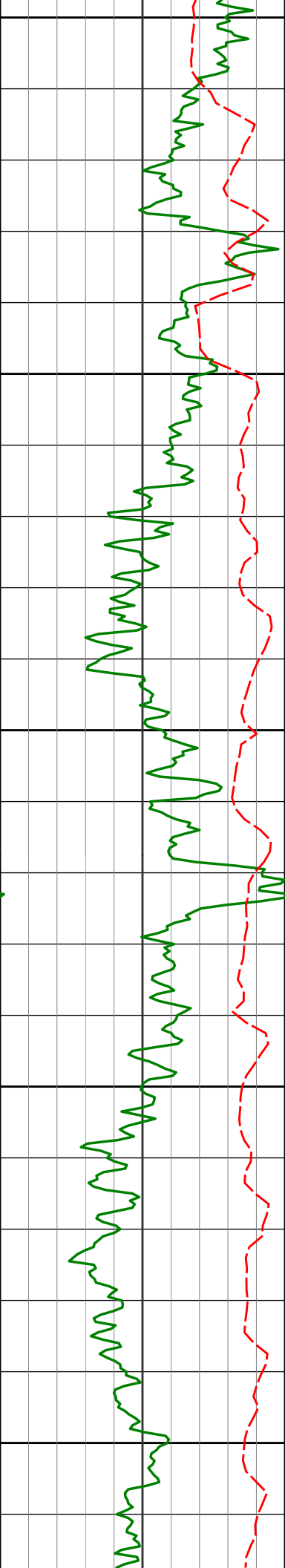
6479'

36.46°

275.57°

6421.51'

211.54'



6450

6527'

38.44°

274.38°

6459.62'

240.32'

6573'

42.48°

273.36°

6494.61'

269.85'

6500

6621'

46.23°

270.52°

6528.93'

303.18'

6550

6668'

50.09°

269.66°

6560.27'

338.08'

6716'

56.44°

271.07°

6588.97'

376.38'

6600

6763'

61.90°

273.09°

6613.05'

416.45'

6811'

64.24°

272.42°

6634.79'

458.90'

6650

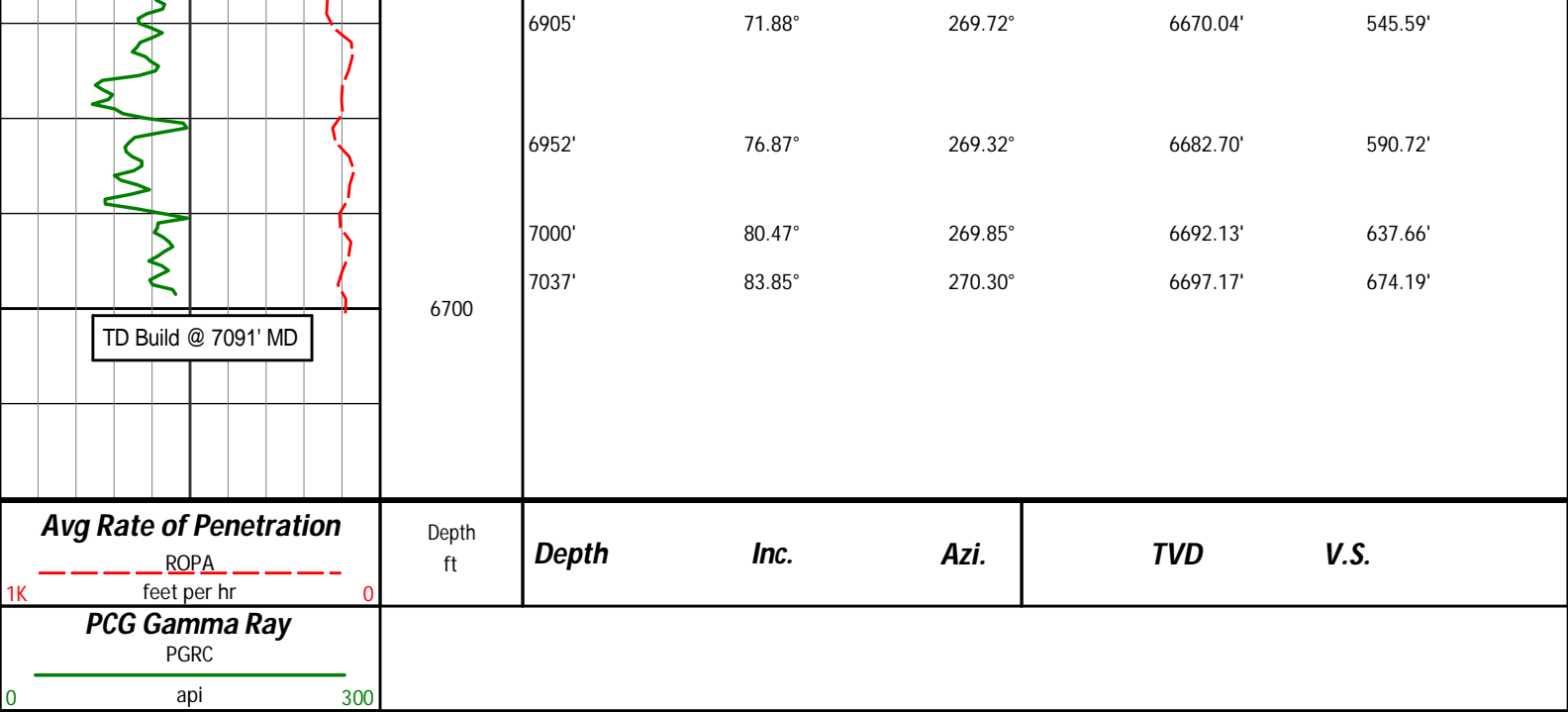
6857'

67.77°

270.47°

6653.49'

500.69'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA35-68-1BHNC
Wattenburg
Weld Colorado
USA
CA-XX-0901058465

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
579.00	0.80	253.82	578.98	1.13 S	3.88 W	3.96	0.14
722.00	0.19	331.75	721.98	1.20 S	4.95 W	5.03	0.55
815.00	0.07	263.86	814.98	1.07 S	5.08 W	5.15	0.19
907.00	0.29	179.50	906.98	1.30 S	5.14 W	5.22	0.32
998.00	0.09	186.60	997.97	1.61 S	5.14 W	5.25	0.22
1090.00	0.19	131.15	1089.97	1.78 S	5.04 W	5.16	0.17
1182.00	0.14	139.48	1181.97	1.96 S	4.85 W	4.99	0.06
1274.00	0.09	43.49	1273.97	2.00 S	4.73 W	4.87	0.19
1365.00	0.42	116.50	1364.97	2.09 S	4.38 W	4.53	0.44
1457.00	0.16	178.89	1456.97	2.37 S	4.07 W	4.25	0.41
1552.00	0.12	191.15	1551.97	2.60 S	4.09 W	4.28	0.05
1647.00	0.28	197.54	1646.97	2.92 S	4.18 W	4.40	0.17
1742.00	0.45	217.37	1741.97	3.44 S	4.48 W	4.73	0.22
1837.00	1.33	185.93	1836.96	4.83 S	4.82 W	5.18	1.03
1931.00	1.99	173.16	1930.92	7.54 S	4.73 W	5.31	0.80
2026.00	2.90	177.52	2025.83	11.58 S	4.43 W	5.33	0.98
2119.00	3.98	182.47	2118.66	17.15 S	4.47 W	5.81	1.20
2214.00	5.34	182.22	2213.35	24.86 S	4.78 W	6.73	1.43
2308.00	6.53	181.21	2306.84	34.58 S	5.07 W	7.78	1.27
2403.00	7.29	179.99	2401.15	46.01 S	5.18 W	8.79	0.81
2498.00	8.50	188.39	2495.25	58.98 S	6.20 W	10.83	1.76
2593.00	10.55	179.70	2588.94	74.63 S	7.18 W	13.04	2.63
2688.00	10.55	183.30	2682.34	92.01 S	7.64 W	14.86	0.69
2783.00	11.70	186.79	2775.55	110.25 S	9.28 W	17.94	1.40
2877.00	11.63	188.88	2867.61	129.08 S	11.87 W	22.00	0.46
2972.00	12.89	194.35	2960.44	148.81 S	15.97 W	27.65	1.80
3067.00	11.88	193.60	3053.23	168.58 S	20.90 W	34.12	1.08
3162.00	10.02	191.97	3146.50	186.17 S	24.91 W	39.50	1.98
3256.00	9.66	193.80	3239.11	201.83 S	28.49 W	44.30	0.51
3351.00	8.59	193.34	3332.92	216.43 S	31.89 W	48.85	1.34

3331.00	8.30	192.34	3332.92	216.43 S	31.89 W	48.83	1.24
3446.00	8.44	191.94	3426.89	230.11 S	34.83 W	52.86	0.09
3541.00	9.42	196.89	3520.74	244.37 S	38.53 W	57.67	1.31
3636.00	11.38	195.63	3614.17	260.83 S	43.32 W	63.74	2.08
3731.00	12.88	192.41	3707.05	280.20 S	48.12 W	70.05	1.73
3826.00	13.44	193.65	3799.55	301.27 S	53.00 W	76.58	0.66
3921.00	11.76	197.39	3892.26	321.24 S	58.50 W	83.63	1.97
4016.00	8.99	198.43	3985.70	337.52 S	63.74 W	90.14	2.92
4110.00	6.07	201.00	4078.88	349.13 S	67.84 W	95.15	3.13
4205.00	2.97	203.49	4173.57	356.08 S	70.63 W	98.47	3.27
4300.00	1.10	207.36	4268.51	359.15 S	72.03 W	100.11	1.97
4395.00	0.77	313.97	4363.50	359.52 S	72.90 W	101.01	1.59
4489.00	1.31	302.50	4457.49	358.50 S	74.27 W	102.29	0.61
4584.00	1.66	302.78	4552.45	357.17 S	76.34 W	104.25	0.37
4679.00	1.03	325.33	4647.43	355.72 S	77.98 W	105.77	0.85
4773.00	0.69	27.84	4741.42	354.53 S	78.20 W	105.89	1.00
4868.00	1.90	306.87	4836.40	353.08 S	79.19 W	106.77	2.02
4963.00	0.58	295.07	4931.37	351.93 S	80.89 W	108.37	1.41
5058.00	0.72	91.41	5026.37	351.74 S	80.72 W	108.19	1.34
5153.00	2.43	92.72	5121.33	351.85 S	78.12 W	105.60	1.80
5248.00	1.72	103.95	5216.27	352.29 S	74.72 W	102.25	0.86
5342.00	1.55	111.75	5310.23	353.10 S	72.17 W	99.77	0.30
5437.00	1.25	114.58	5405.20	354.01 S	70.03 W	97.72	0.32
5532.00	1.09	118.45	5500.18	354.87 S	68.30 W	96.05	0.19
5627.00	1.08	116.15	5595.17	355.69 S	66.70 W	94.52	0.05
5721.00	0.81	133.78	5689.15	356.54 S	65.42 W	93.32	0.42
5816.00	0.61	142.38	5784.15	357.41 S	64.63 W	92.60	0.24
5911.00	0.63	151.77	5879.14	358.27 S	64.08 W	92.11	0.11
5984.00	0.46	160.48	5952.14	358.90 S	63.79 W	91.87	0.26
6046.00	0.13	156.77	6014.14	359.20 S	63.68 W	91.79	0.53
6099.00	1.01	230.15	6067.13	359.55 S	64.01 W	92.15	1.85
6147.00	7.01	241.35	6115.00	361.23 S	66.91 W	95.17	12.55
6194.00	13.40	246.83	6161.23	364.75 S	74.44 W	102.95	13.74
6242.00	15.64	248.50	6207.69	369.31 S	85.58 W	114.41	4.75
6289.00	17.05	258.70	6252.80	372.99 S	98.23 W	127.32	6.79
6337.00	21.14	269.09	6298.16	374.50 S	113.80 W	142.96	11.05
6384.00	26.88	273.47	6341.08	373.99 S	132.89 W	161.95	12.78
6432.00	32.48	276.27	6382.77	371.93 S	156.56 W	185.38	12.02
6479.00	36.46	275.57	6421.51	369.19 S	183.01 W	211.54	8.51
6527.00	38.44	274.38	6459.62	366.67 S	212.09 W	240.32	4.39
6573.00	42.48	273.36	6494.61	364.67 S	241.86 W	269.85	8.90
6621.00	46.23	270.52	6528.93	363.56 S	275.39 W	303.18	8.84
6668.00	50.09	269.66	6560.27	363.51 S	310.39 W	338.08	8.32
6716.00	56.44	271.07	6588.97	363.25 S	348.84 W	376.38	13.44
6763.00	61.90	273.09	6613.05	361.76 S	389.15 W	416.45	12.19
6811.00	64.24	272.42	6634.79	359.71 S	431.90 W	458.90	5.03
6857.00	67.77	270.47	6653.49	358.66 S	473.90 W	500.69	8.60
6905.00	71.88	269.72	6670.04	358.59 S	518.94 W	545.59	8.69
6952.00	76.87	269.32	6682.70	358.97 S	564.19 W	590.72	10.65
7000.00	80.47	269.85	6692.13	359.31 S	611.24 W	637.66	7.58
7037.00	83.85	270.30	6697.17	359.26 S	647.89 W	674.19	9.21

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 265.48 DEGREES (GRID)
A TOTAL CORRECTION OF 7.62 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

**HORIZONTAL DISPLACEMENT(CLOSURE) AT 7037.00 FEET
IS 740.83 FEET ALONG 240.99 DEGREES (GRID)**

**First survey from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.
Survey Depth 579' Inc 0.08° Azi 253.82°
Tied in @ Surface
Magnetic direction of 7.621 has been added to AZI for grid direction correction.**