

PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

Country : USA									
Field : Wattenburg									
Location : Lat: 40° 30' 37.01" North Long: 104° 27' 1.15" West									
Well : NCLP PC AA04-63-1HN									
Company : Noble Energy									
Rig : H&P 321									
LOCATION					Company : Noble Energy				
Latitude : 40° 30' 37.01" North Longitude : 104° 27' 1.15" West UTM Easting = 3,291,864.370 ft UTM Northing = 1,430,463.030 ft					Rig : H&P 321				
					API Number : 05-123-37173				
Permanent Datum : Ground Level					Elevation : 4710.00 ft				
Log Measured From : Drill Floor					30.00 ft Above Permanent Datum				
Drilling Measured From : Drill Floor					MD LOG				
Depth Logged : 645.00 ft To 16,232.00 ft					Unit No. : 11210424				
Date Logged : 15-Jan-14 To 26-Jan-14					Job No. : CA-XX-0900859730				
Total Depth MD : 16,232.00 ft TVD : 6,610.13 ft					Plot Type : Final				
Spud Date : 15-Jan-14					Plot Date : 26-Jan-14				
Run No.		Borehole Record (MD)			Run No.		Borehole Record (MD)		
Size		From		To		Size		From	
0100		8.750 in		645.00 ft		4.566.00 ft			
0200		8.750 in		4.566.00 ft		7.099.00 ft			
0300		6.125 in		7.099.00 ft		13.685.00 ft			
0400		6.125 in		13.686.00 ft		16.232.00 ft			
						Size		Casing Record (MD)	
						Weight		From	
						9.625 in		34.90 lbpf	
						7.000 in		25.70 lbpf	
								SURFACE	
								SURFACE	
								637.00 ft	
								7,089.00 ft	

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	17-Jan-14	18-Jan-14	23-Jan-14	26-Jan-14	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	6.125	6.125	
Tool Nominal OD (in)	6.880	6.880	5.000	5.000	
Log Start Depth (MD, ft)	645.00	4,566.00	7,099.00	13,686.00	
Log End Depth (MD, ft)	4,566.00	7,099.00	13,686.00	16,232.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	16-Jan-14 12:08	17-Jan-14 11:23	19-Jan-14 19:11	23-Jan-14 18:38	
Drill/Wipe End Date and Time	17-Jan-14 00:55	18-Jan-14 11:25	22-Jan-14 20:26	25-Jan-14 17:18	
Min Inc (deg) @ Depth (MD, ft)	0.09 @ 903.00	0.62 @ 4,570.00	88.15 @ 10,991.00	88.55 @ 15,993.00	
Max Inc (deg) @ Depth (MD, ft)	1.74 @ 1,458.00	85.08 @ 7,045.00	92.90 @ 11,637.00	92.35 @ 13,906.00	
Bit TFA(in2) / Bit Type	0.91 / PDC	1.37 / PDC	0.98 / PDC	0.98 / PDC	
Flow Rate (gpm)	600.00	578.62	303.79	281.82	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	NA / NA	NA / NA	
Fluid Type	Native/Spud Mud	Native/Spud Mud	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	8.60 / 33.00	8.70 / 34.00	9.25 / 36.00	9.32 / 35.00	
Filtrate CL (ppm)	1,400.00	1,900.00	2,400.00	1,900.00	
pH / Fluid Loss (mptm)	11.10 / 17	9.70 / 16	9.70 / 9	9.00 / 7	
PV (cP) / YP (lbf2)	4 / 4.00	6 / 4.00	9 / 9.00	8 / 10.00	
% Solids / % Sand	2.10 / 0.90	2.80 / 0.05	5.50 / 0.30	5.50 / 0.10	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	NA / NA	1.50 / NA	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	NA @ NA	NA @ NA	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	NA @ NA	NA @ NA	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	NA @ NA	NA @ NA	
Max Tool Temp (degF) / S	104.00 / PDM	100.00 / PDM	200.00 / PDM	204.50 / PDM	

Max Tool Temp (degF) / Source	124.80 / PCM	162.80 / PCM	230.30 / PCM	234.50 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ 124.80	N/A @ 162.80	NA @ 230.30	NA @ 234.50	
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass	Kyle Wass	
Customer Representative	Jim Turner	Jim Turner	Jim Turner	Jim Turner	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	246470	246470	12310746	12310746	
Insert Serial Number	11680744	11680744	11680744	11680745	
Date and Time Initialized	14-Jan-14 22:06	14-Jan-14 22:06	19-Jan-14 02:14	23-Jan-14 00:15	
Date and Time Read	18-Jan-14 19:02	18-Jan-14 19:12	23-Jan-14 09:05	26-Jan-14 05:29	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	58.00	54.00	64.00	65.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	246470	246470	12310746	12310746	
Sonde Serial Number	11297580	11297580	11297580	11638494	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	18.48	212.49	151.20	6.00	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	51.08	47.62	67.22	67.52	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	246470	246470	12310746	12310746	
Insert/Sonde Serial Number	11293386	11293386	11293386	11681007	

REMARKS

1. All depths are calibrated to driller's pipe tally and measured 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 V8.0.0

WARRANTY

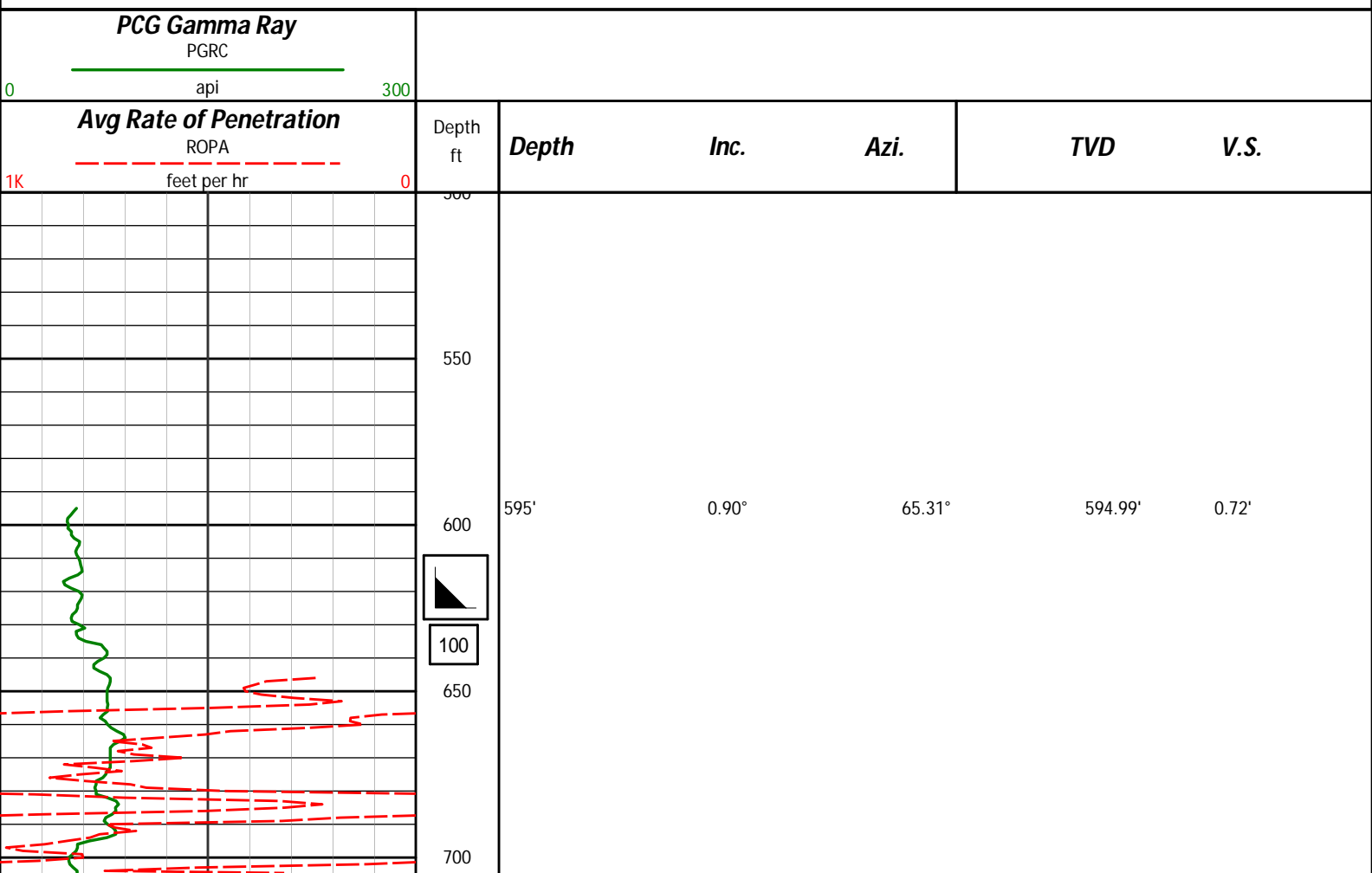
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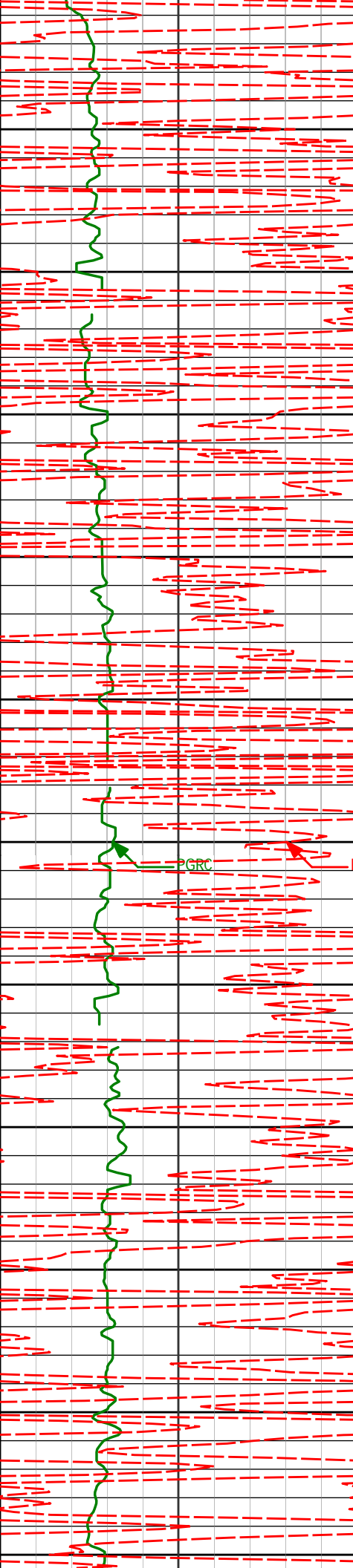
HALLIBURTON

Sperry Drilling Services

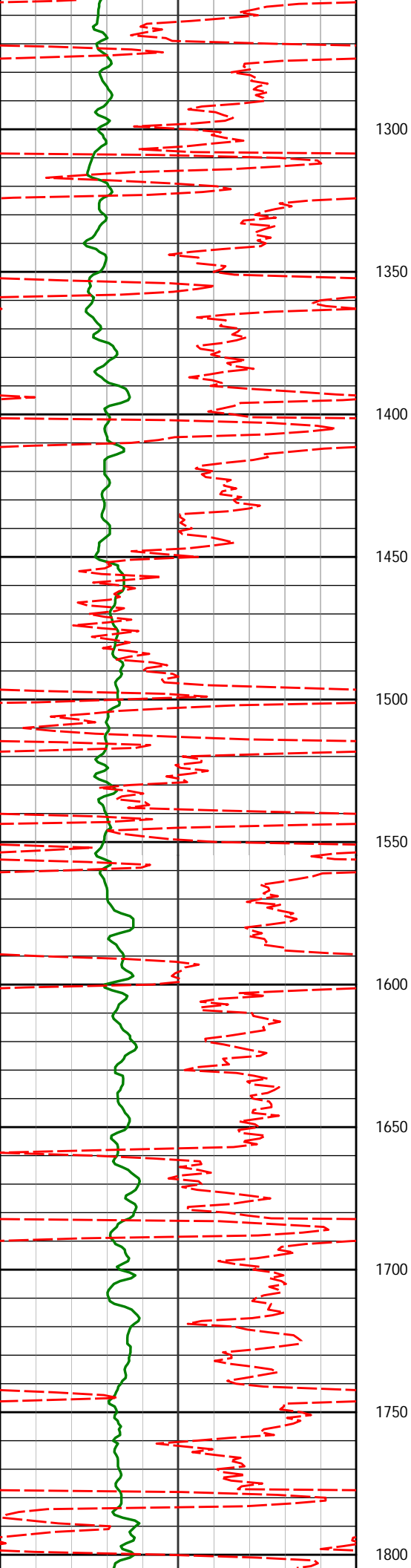
MD Correlation Log 1:600

Noble Energy
NCLP PC AA04-63-1HN
H&P 321
Sec. 4-T6N-R63W

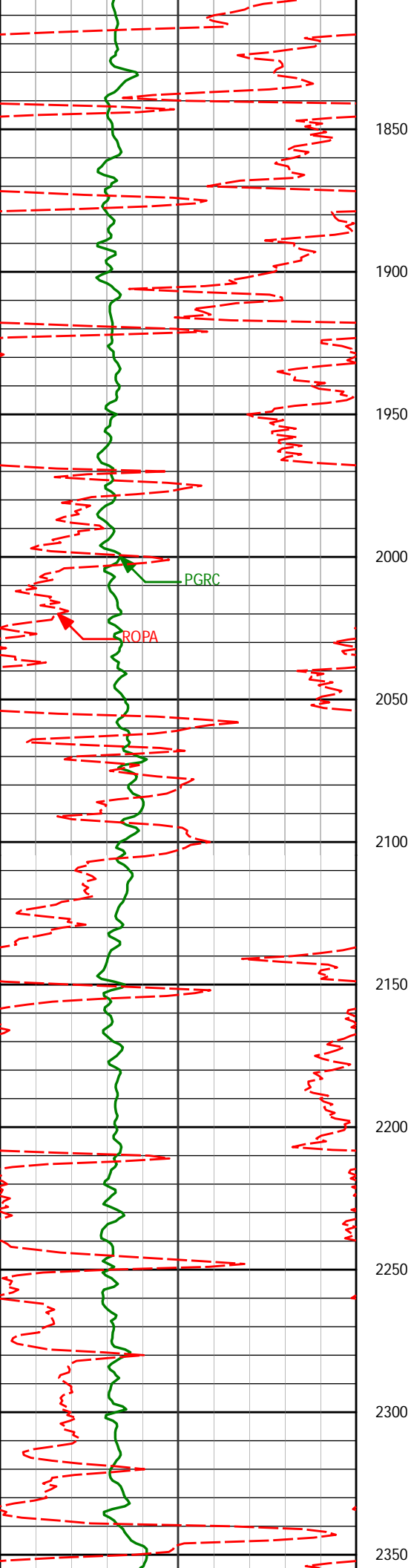




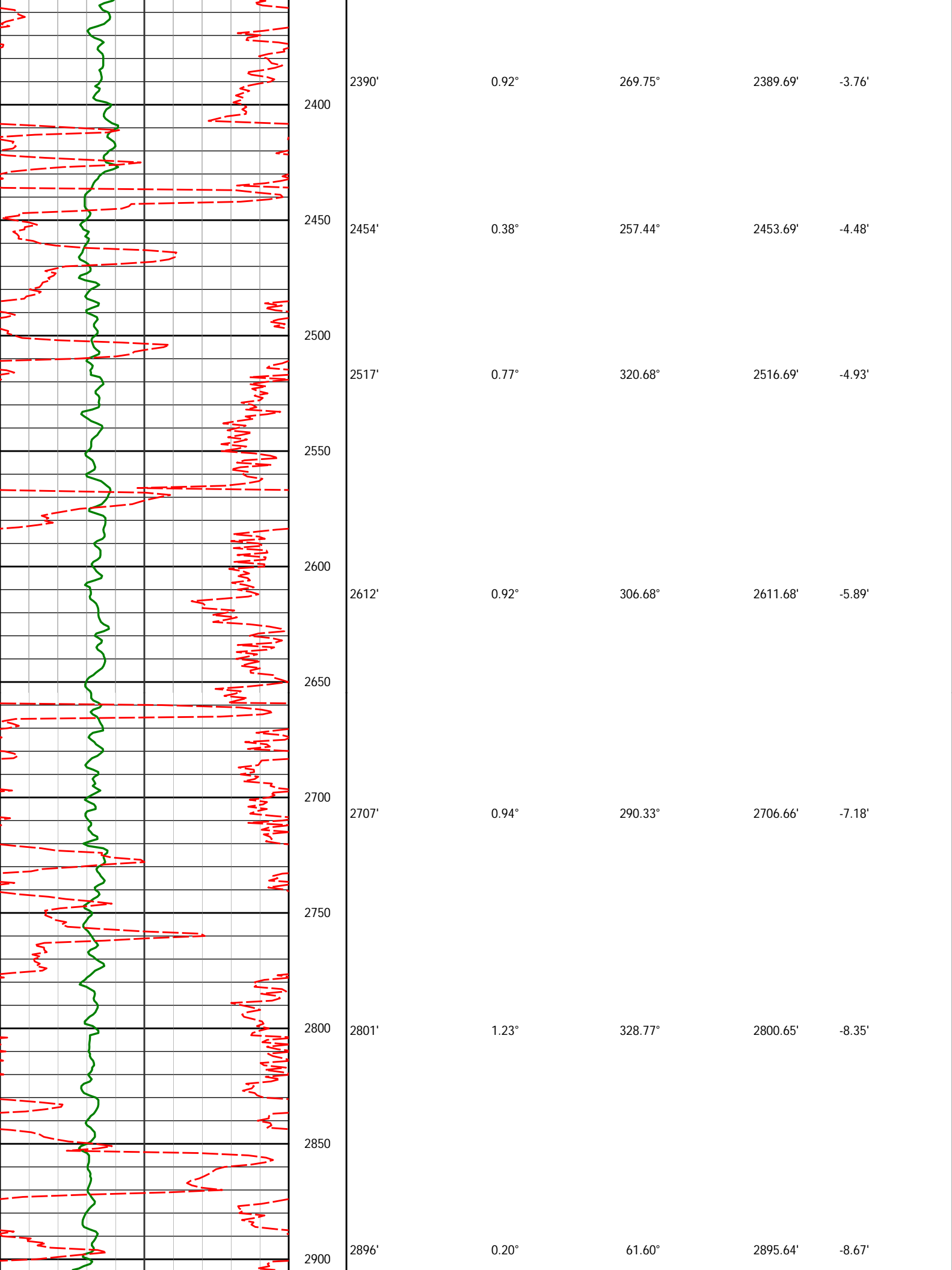
720'	0.44°	132.91°	719.98'	1.96'
750				
800				
811'	0.29°	310.20°	810.98'	2.04'
850				
900				
903'	0.09°	267.34°	902.98'	1.80'
950				
1000				
996'	0.17°	29.41°	995.98'	1.80'
1050				
1087'	1.08°	358.88°	1086.98'	1.91'
1100				
1150				
1181'	1.60°	1.99°	1180.95'	2.08'
1200				
1250				

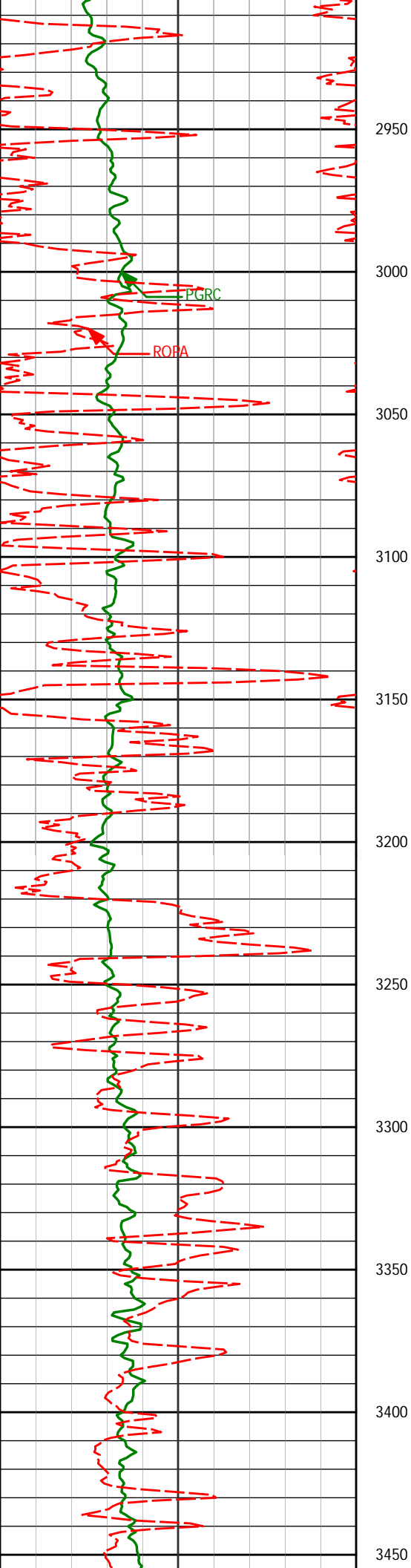


1365'	1.42°	4.51°	1364.89'	2.65'
1458'	1.74°	10.64°	1457.85'	3.16'
1550'	1.49°	8.51°	1549.82'	3.76'
1642'	1.10°	6.74°	1641.79'	4.17'
1733'	1.16°	10.87°	1732.77'	4.56'

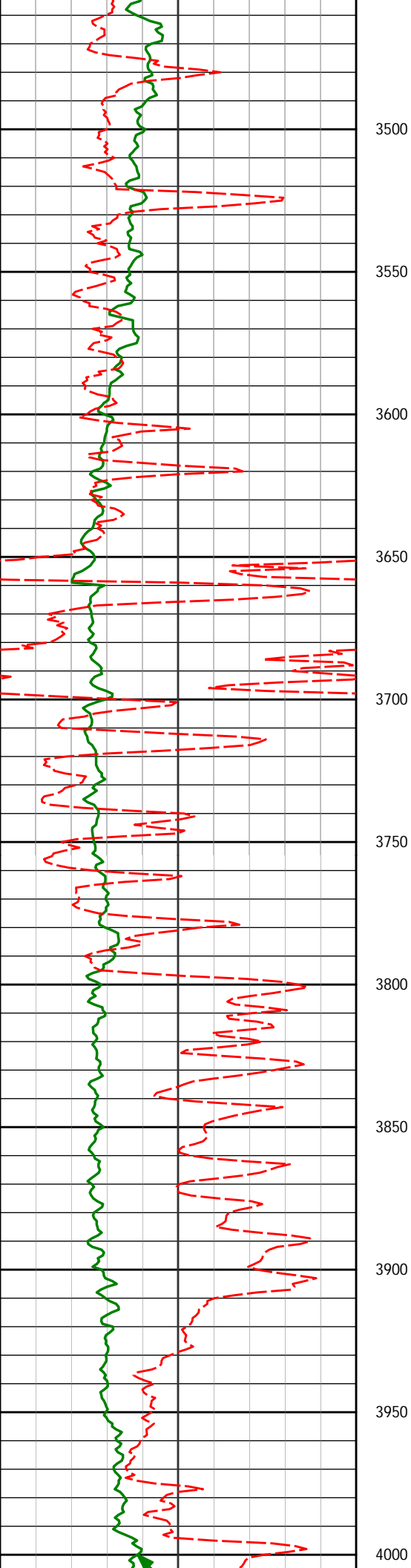


1826'	0.86°	244.26°	1825.77'	4.15'
1919'	1.02°	218.20°	1918.75'	2.95'
2014'	0.65°	241.65°	2013.74'	1.89'
2201'	1.10°	241.08°	2200.72'	-0.69'
2296'	1.00°	240.62°	2295.71'	-2.26'

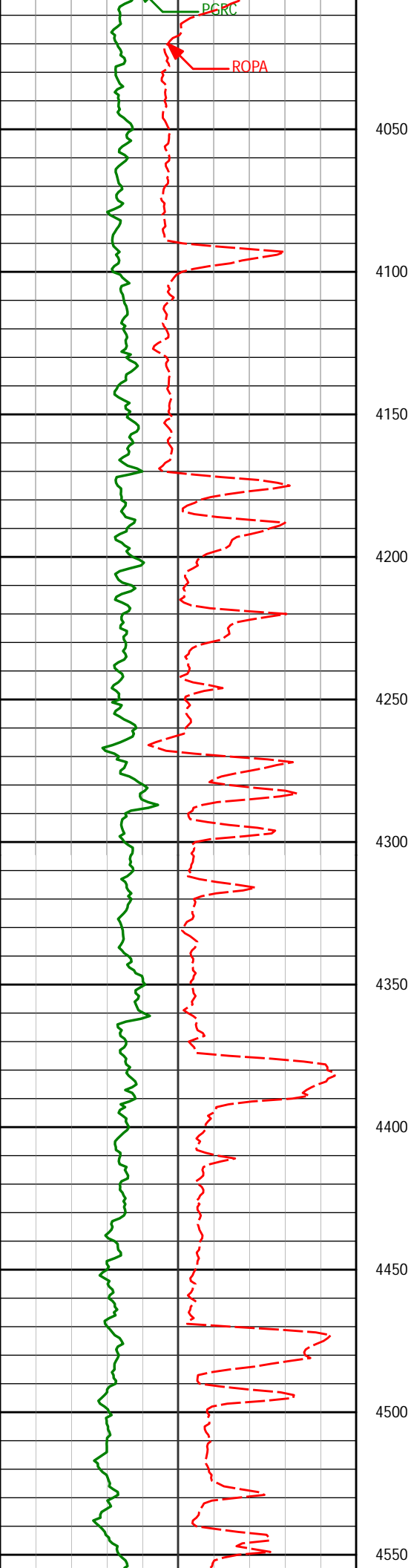




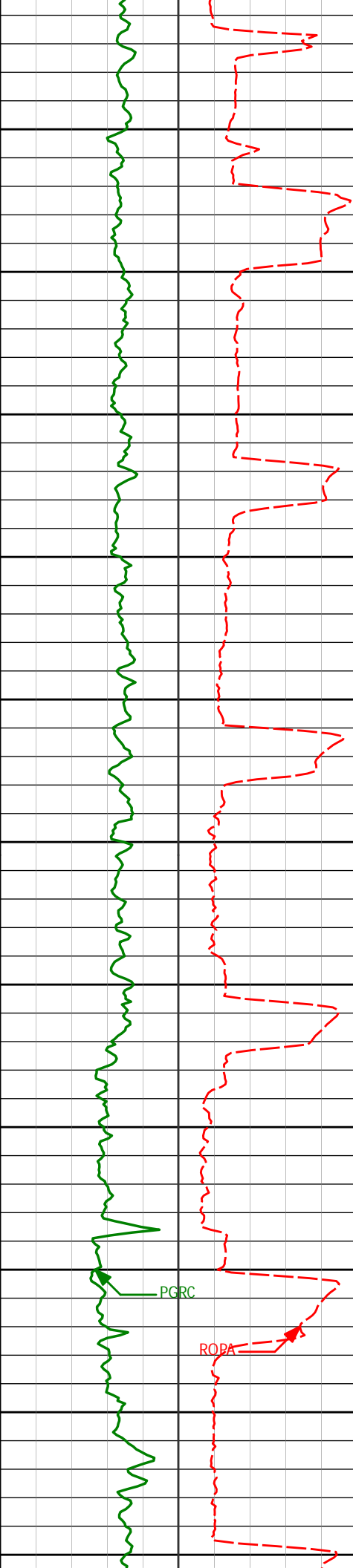
2991'	0.28°	66.67°	2990.64'	-8.31'
3086'	0.28°	167.13°	3085.64'	-8.05'
3181'	0.41°	188.67°	3180.64'	-8.08'
3275'	0.25°	117.30°	3274.64'	-7.98'
3370'	0.47°	116.39°	3369.63'	-7.47'



3465'	0.94°	83.05°	3464.63'	-6.35'
3500				
3550				
3559'	0.26°	98.40°	3558.62'	-5.37'
3600				
3650				
3654'	0.68°	149.18°	3653.62'	-4.90'
3700				
3750				
3749'	0.43°	148.40°	3748.61'	-4.48'
3800				
3850				
3843'	0.39°	143.95°	3842.61'	-4.14'
3900				
3938'	0.81°	154.38°	3937.61'	-3.72'
3950				
4000				



4033'	0.68°	160.63°	4032.60'	-3.31'
4050				
4100				
4128'	0.84°	151.61°	4127.59'	-2.87'
4150				
4200				
4223'	0.99°	148.30°	4222.58'	-2.19'
4250				
4300				
4318'	1.51°	143.74°	4317.55'	-1.13'
4350				
4400				
4413'	0.89°	166.22°	4412.53'	-0.32'
4450				
4500				
4550				



200

4600

4650

4700

4750

4800

4850

4900

4950

5000

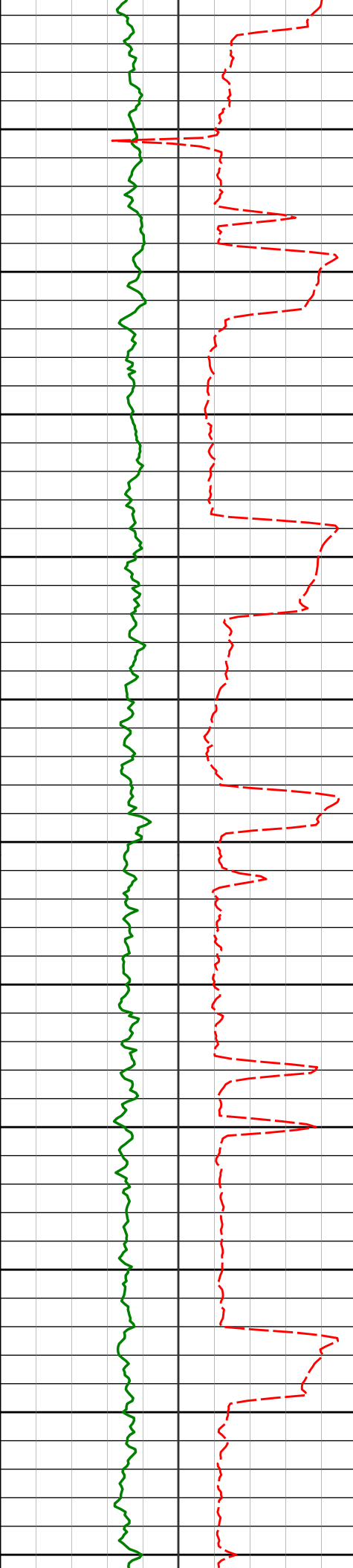
5050

5100

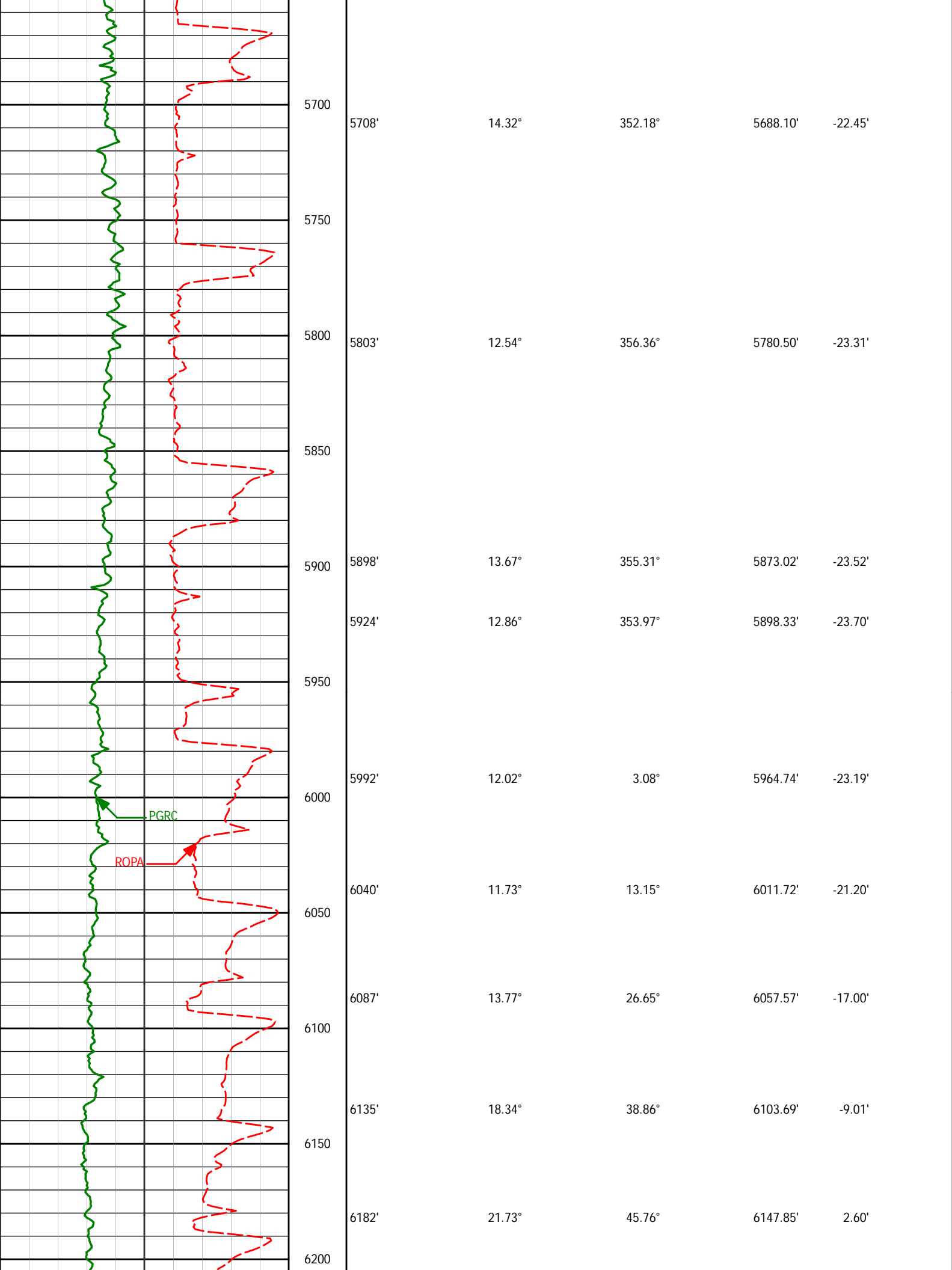
4570'	0.62°	211.32°	4569.52'	0.13'
4665'	3.26°	342.09°	4664.47'	-0.83'
4760'	4.90°	344.25°	4759.23'	-2.34'
4855'	6.30°	349.40°	4853.70'	-3.84'
4949'	7.23°	354.66°	4947.08'	-4.66'
5044'	9.93°	354.41°	5041.01'	-5.12'

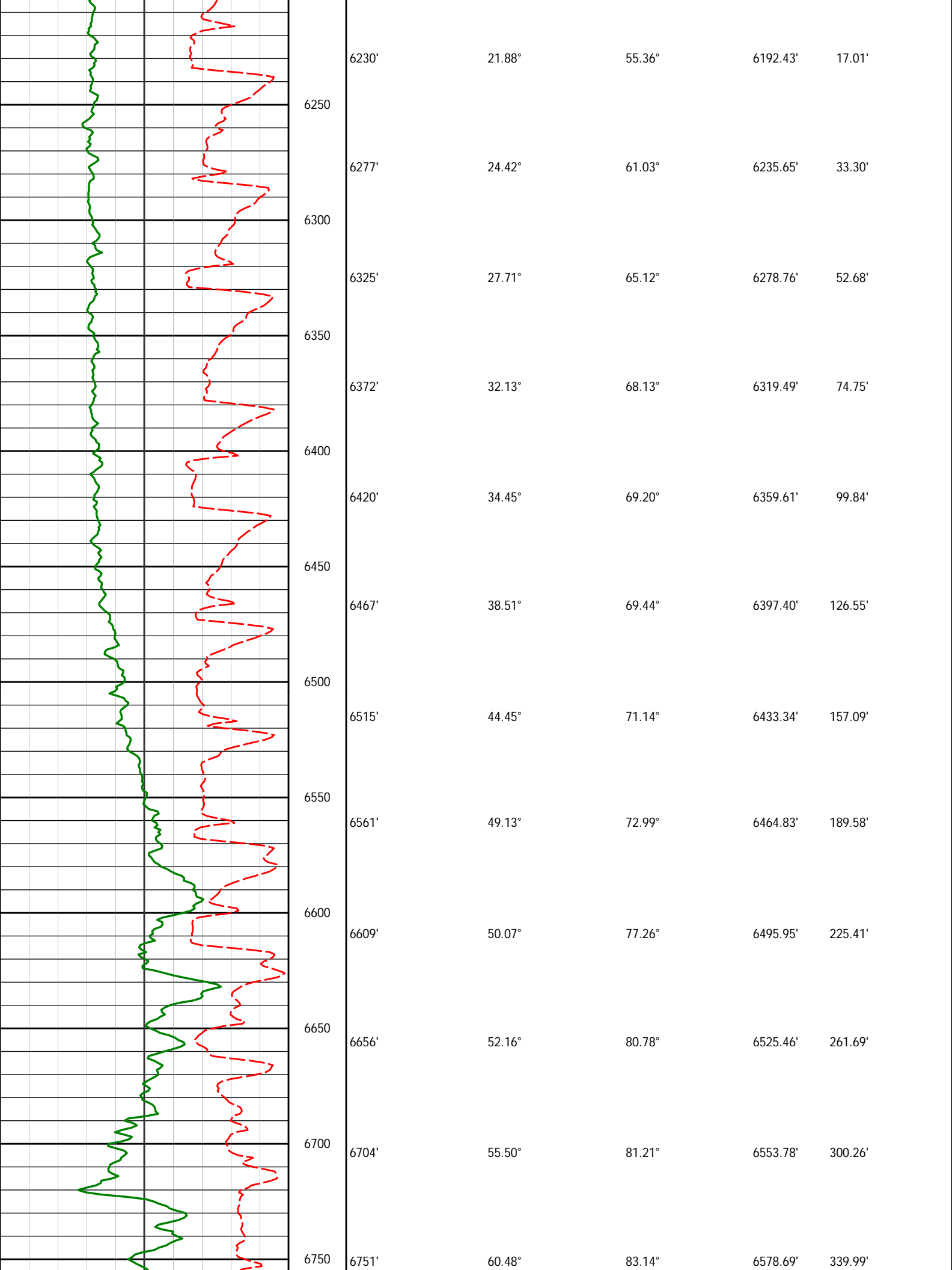
PGRC

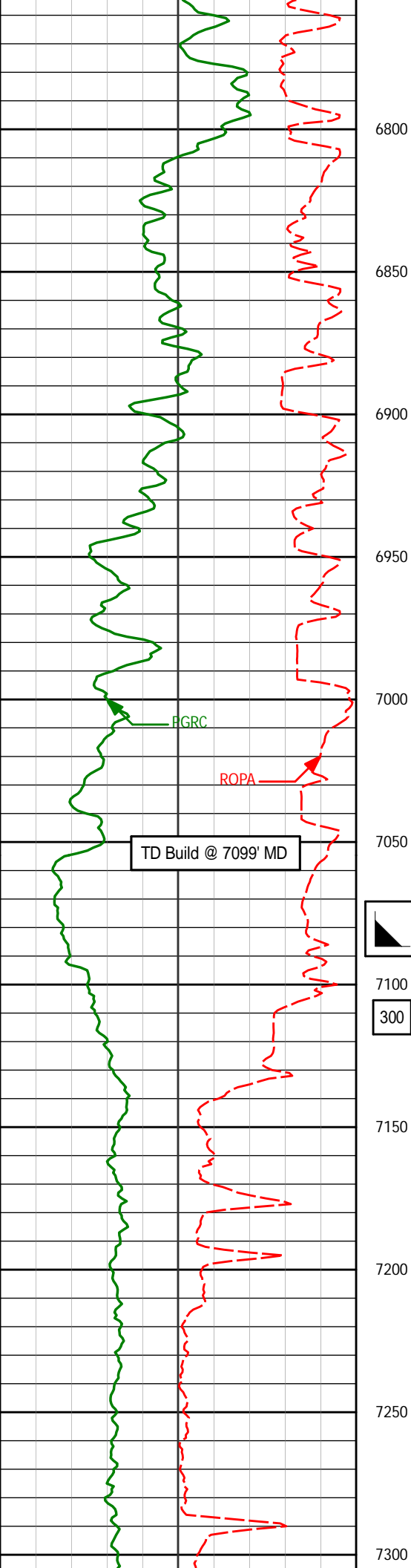
ROPA



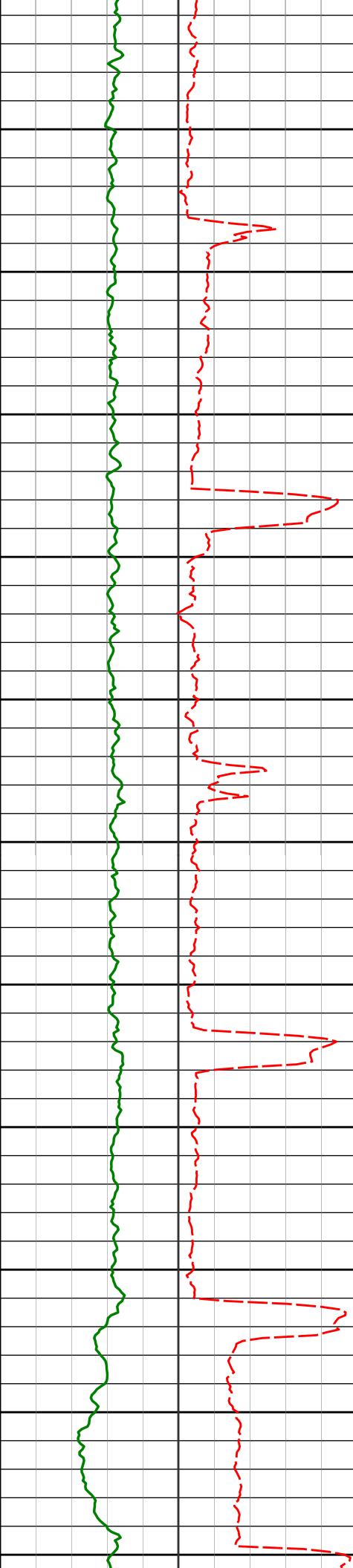
5139'	11.14°	350.75°	5134.41'	-6.30'
5150				
5200				
5234'	11.95°	349.96°	5227.49'	-8.29'
5250				
5300				
5329'	14.80°	353.70°	5319.90'	-9.96'
5350				
5400				
5424'	14.85°	348.17°	5411.74'	-12.26'
5450				
5500				
5519'	12.27°	344.17°	5504.09'	-16.13'
5550				
5600				
5614'	13.09°	347.39°	5596.77'	-19.94'
5650				



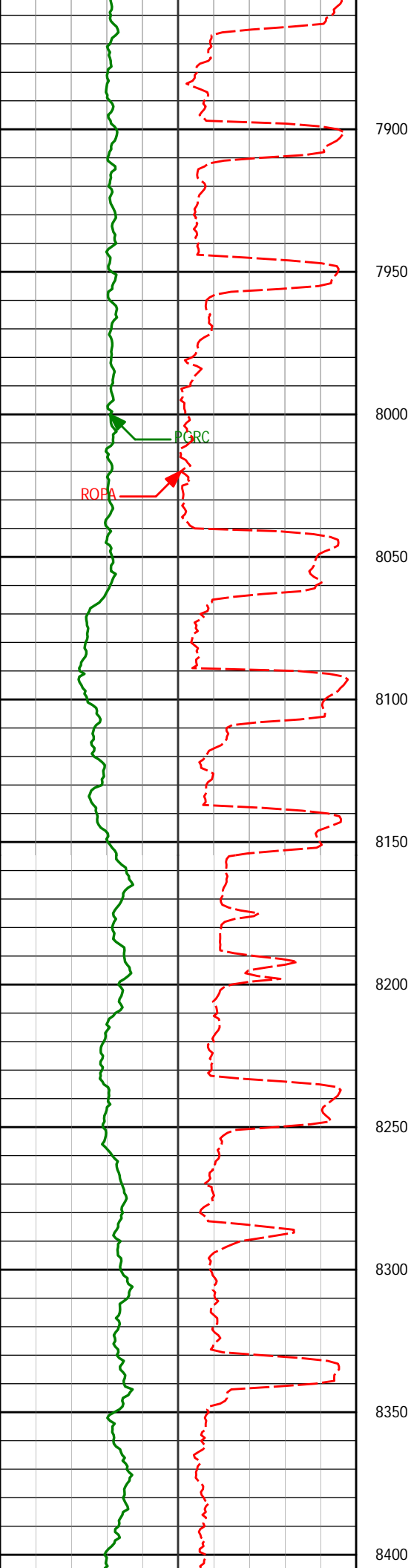




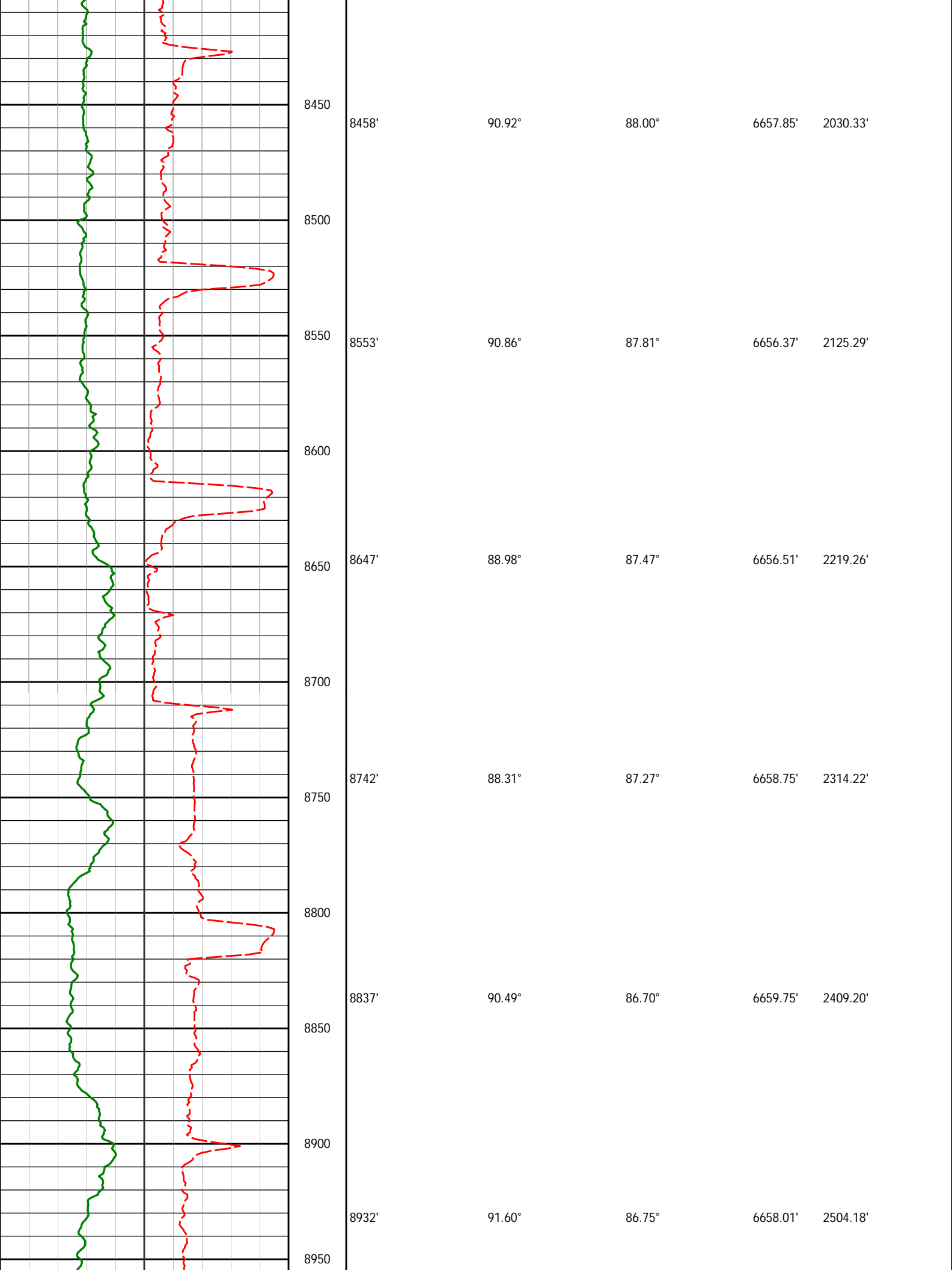
6800	6799'	65.75°	84.29°	6600.39'	382.74'
6850	6846'	70.21°	84.06°	6618.00'	426.27'
6900	6894'	74.23°	84.07°	6632.66'	471.93'
6950	6941'	77.64°	84.96°	6644.08'	517.49'
7000	6989'	80.30°	86.28°	6653.26'	564.60'
7050	7045'	85.08°	87.87°	6660.38'	620.12'
7100	7131'	89.72°	88.44°	6664.29'	705.97'
7150					
7200					
7250	7225'	90.49°	88.09°	6664.11'	799.91'
7300					

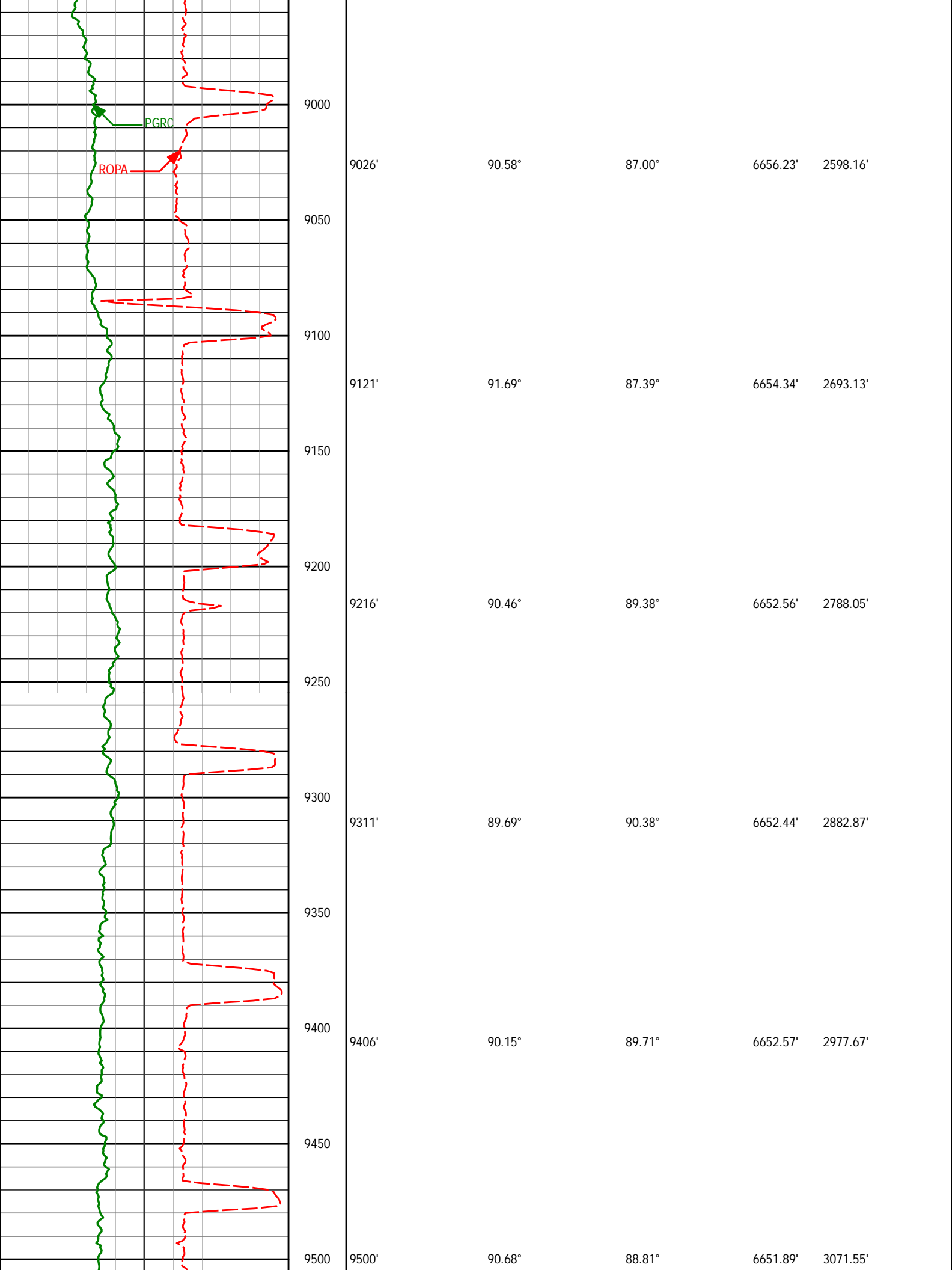


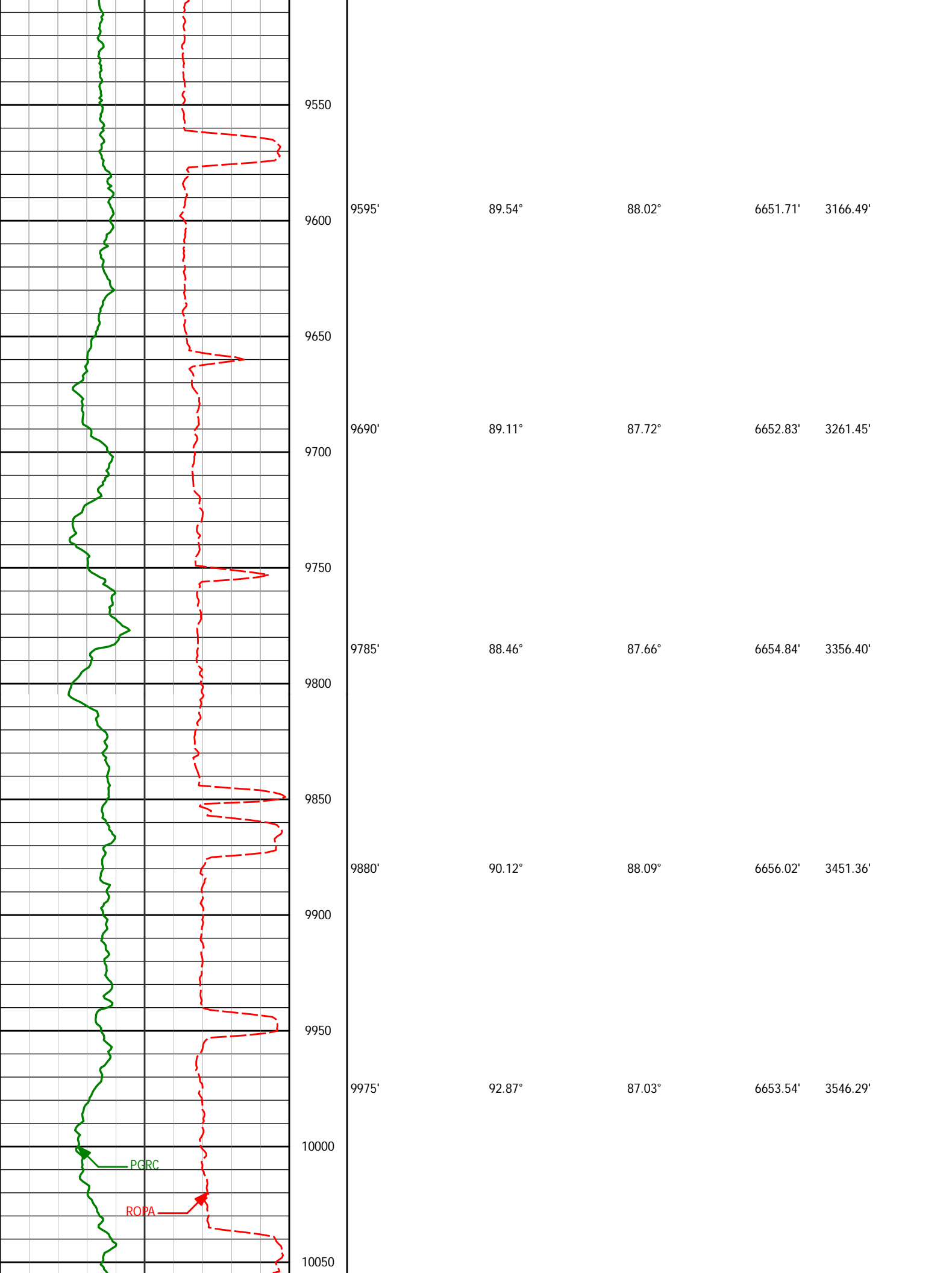
7320'	90.43°	87.94°	6663.35'	894.87'
7350				
7400				
7415'	90.31°	87.78°	6662.74'	989.84'
7450				
7500				
7510'	89.97°	89.28°	6662.50'	1084.77'
7550				
7600	90.03°	88.38°	6662.50'	1117.08'
7650				
7700	89.69°	89.06°	6662.74'	1274.60'
7750				
7794'	91.97°	90.62°	6661.38'	1368.41'
7800				
7850				

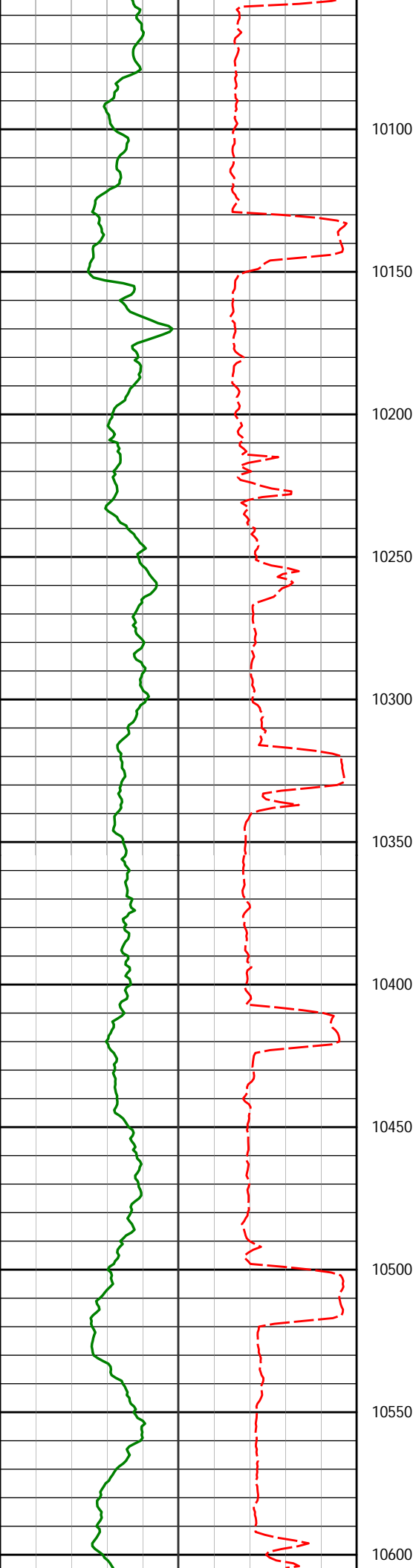


7889'	91.54°	91.31°	6658.47'	1463.06'
7900				
7950				
7984'	90.83°	93.33°	6656.50'	1557.52'
8000				
8050				
8079'	88.86°	92.56°	6656.76'	1651.89'
8100				
8150				
8173'	88.95°	89.43°	6658.55'	1745.55'
8200				
8250				
8268'	91.20°	88.53°	6658.43'	1840.45'
8300				
8350				
8363'	89.29°	88.25°	6658.02'	1935.38'
8400				









10070'	92.28°	88.96°	6649.27'	3641.15'
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10100

10150

10165'	90.62°	90.30°	6646.87'	3735.97'
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10200

10250

10256'	90.95°	90.85°	6645.62'	3826.71'
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10300

10350

10348'	89.26°	88.22°	6645.45'	3918.56'
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10400

10450

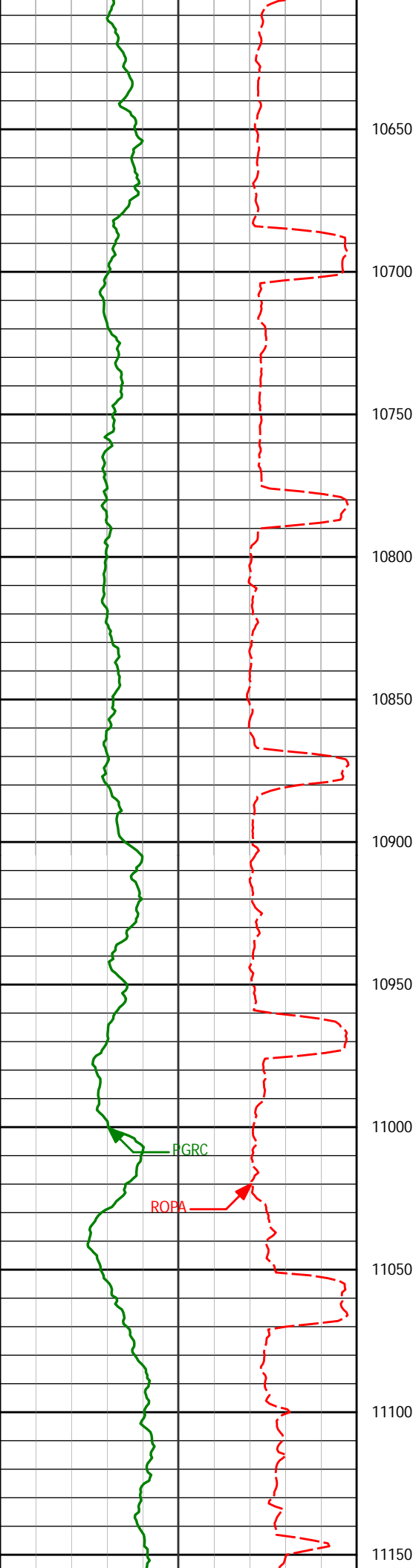
10440'	88.74°	88.62°	6647.06'	4010.49'
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10500

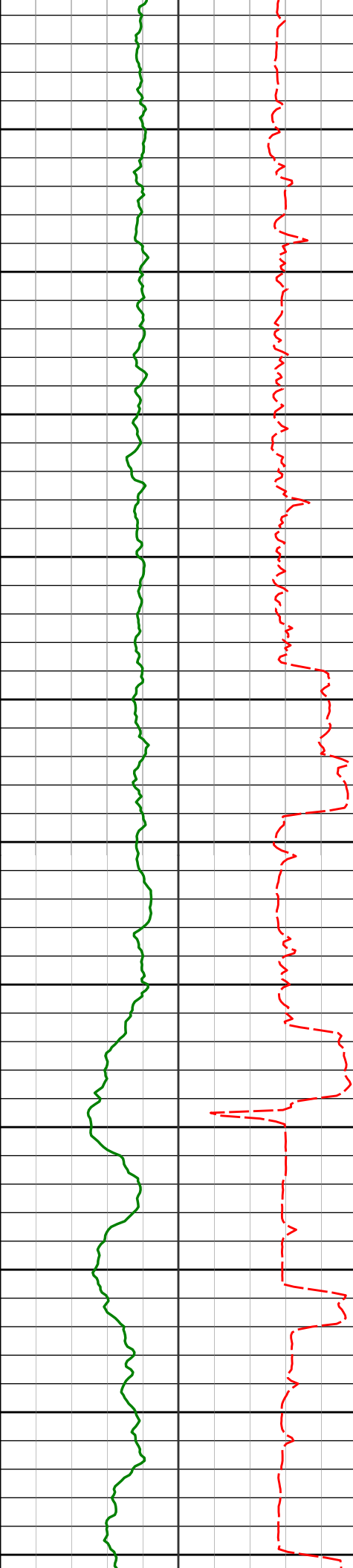
10531'	91.70°	88.92°	6646.71'	4101.40'
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10550

10600

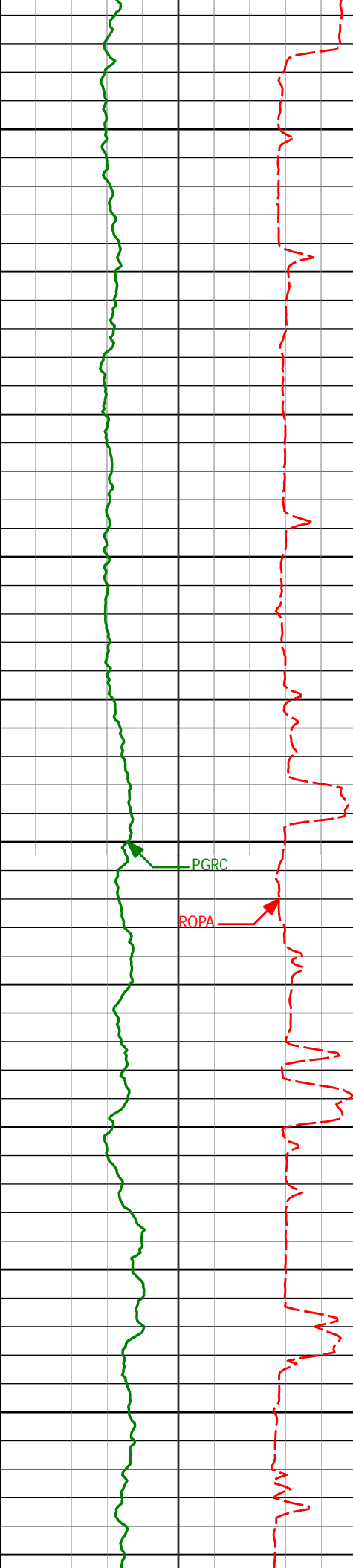


10624'	92.04°	88.54°	6643.67'	4194.27'
10650				
10700				
10715'	90.92°	89.95°	6641.32'	4285.12'
10750				
10800				
10807'	90.80°	90.59°	6639.94'	4376.89'
10850				
10900	10898'	88.83°	90.57°	6640.24'
10950				
10991'	88.15°	89.26°	6642.69'	4560.43'
11000				
11050				
11083'	89.54°	88.58°	6644.54'	4652.32'
11100				
11150				



11175'
11200
11250
11268'
11300
11350
11360'
11400
11450
11452'
11500
11550
11546'
11600
11637'
11650
11700

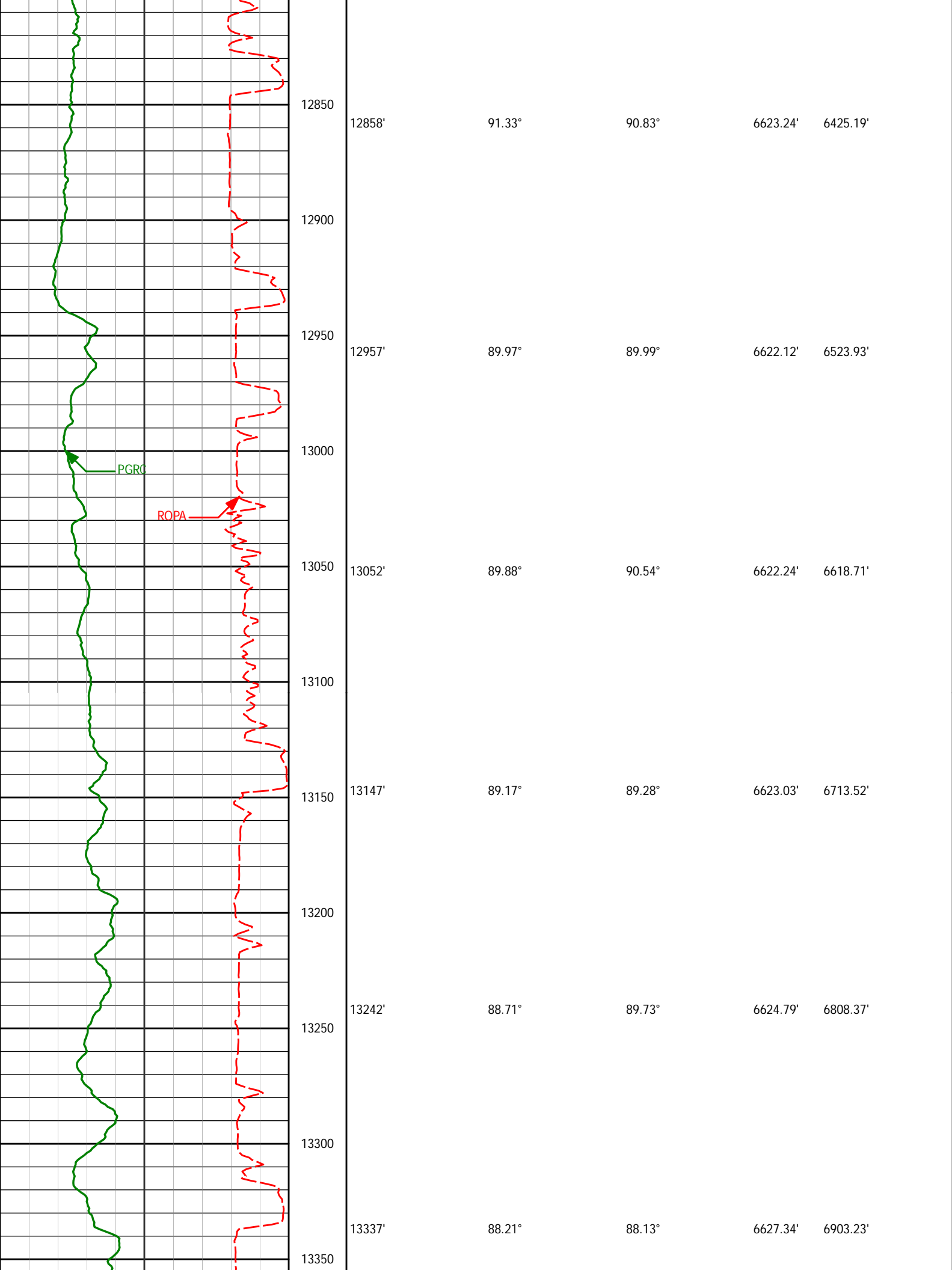
11175'	90.65°	88.43°	6644.39'	4744.25'
11268'	90.37°	87.50°	6643.56'	4837.21'
11360'	89.35°	86.98°	6643.79'	4929.20'
11452'	90.49°	86.58°	6643.91'	5021.20'
11546'	92.25°	88.82°	6641.67'	5115.13'
11637'	92.90°	89.66°	6637.58'	5205.93'

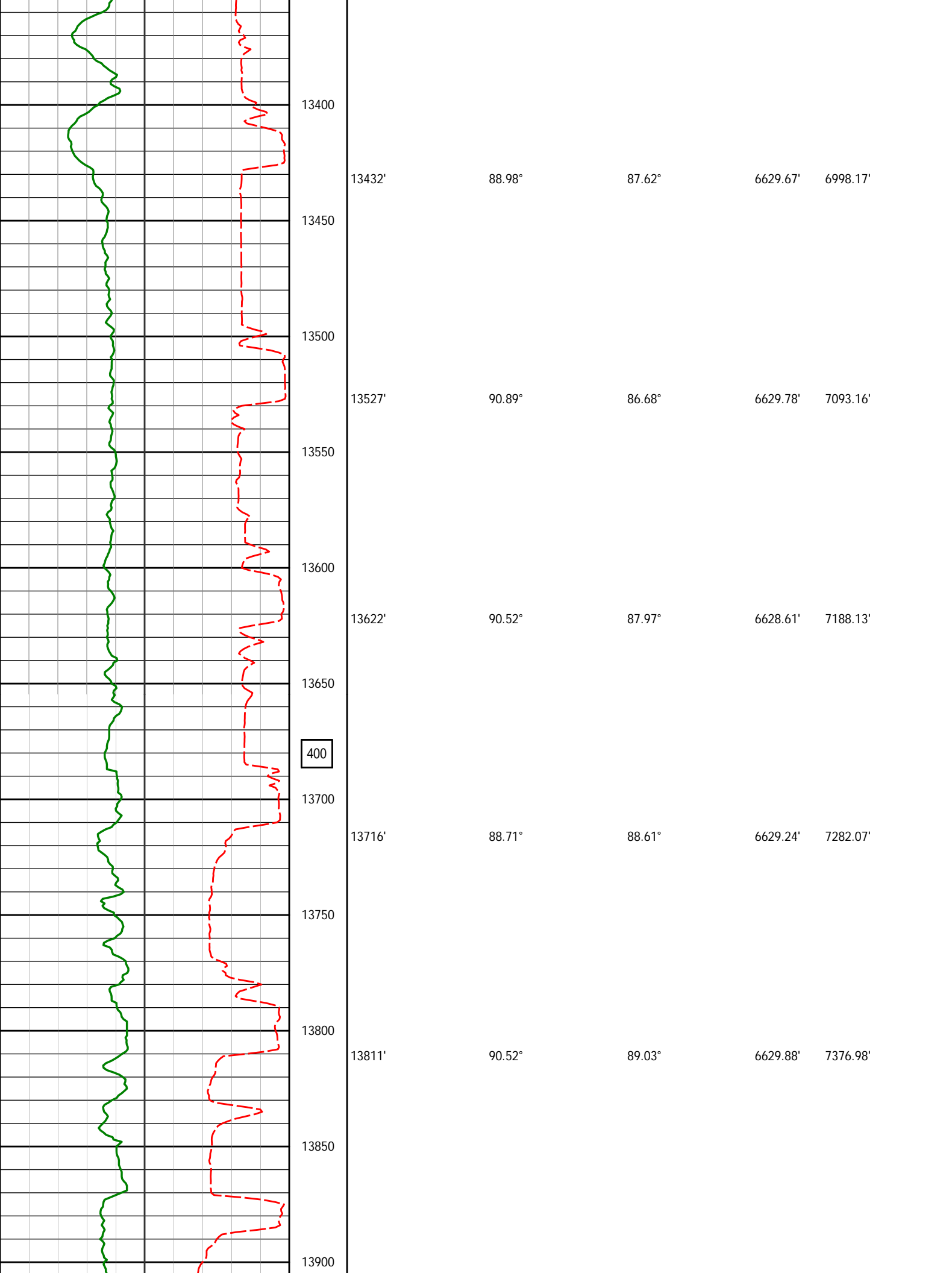


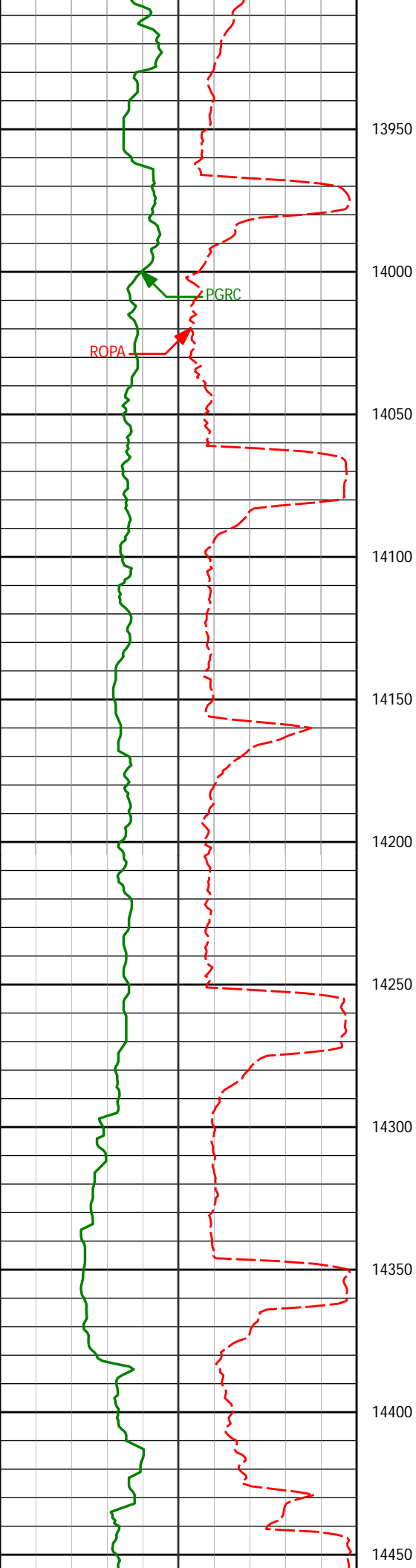
11729'	89.94°	90.43°	6635.30'	5297.70'
11750				
11800				
11820'	89.60°	90.09°	6635.66'	5388.49'
11850				
11900				
11913'	90.65°	90.39°	6635.46'	5481.27'
11950				
12000				
12007'	91.02°	89.47°	6634.09'	5575.08'
12050				
12100	12101'	88.40°	89.17°	6634.57'
12150				
12194'	89.17°	88.10°	6636.54'	5761.85'
12200				
12250				



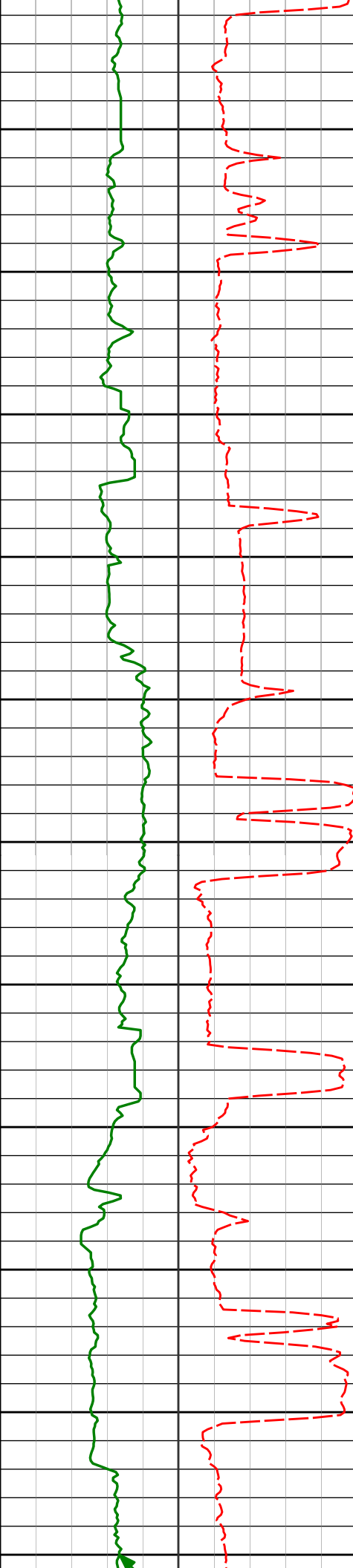
12289'	90.65°	87.50°	6636.69'	5856.82'
12300				
12350				
12384'	91.39°	87.77°	6635.00'	5951.78'
12400				
12450				
12479'	91.33°	87.32°	6632.74'	6046.73'
12500				
12550				
12573'	92.38°	87.58°	6629.70'	6140.67'
12600				
12650				
12668'	90.71°	88.25°	6627.14'	6235.59'
12700				
12750				
12763'	91.33°	90.13°	6625.45'	6330.46'
12800				





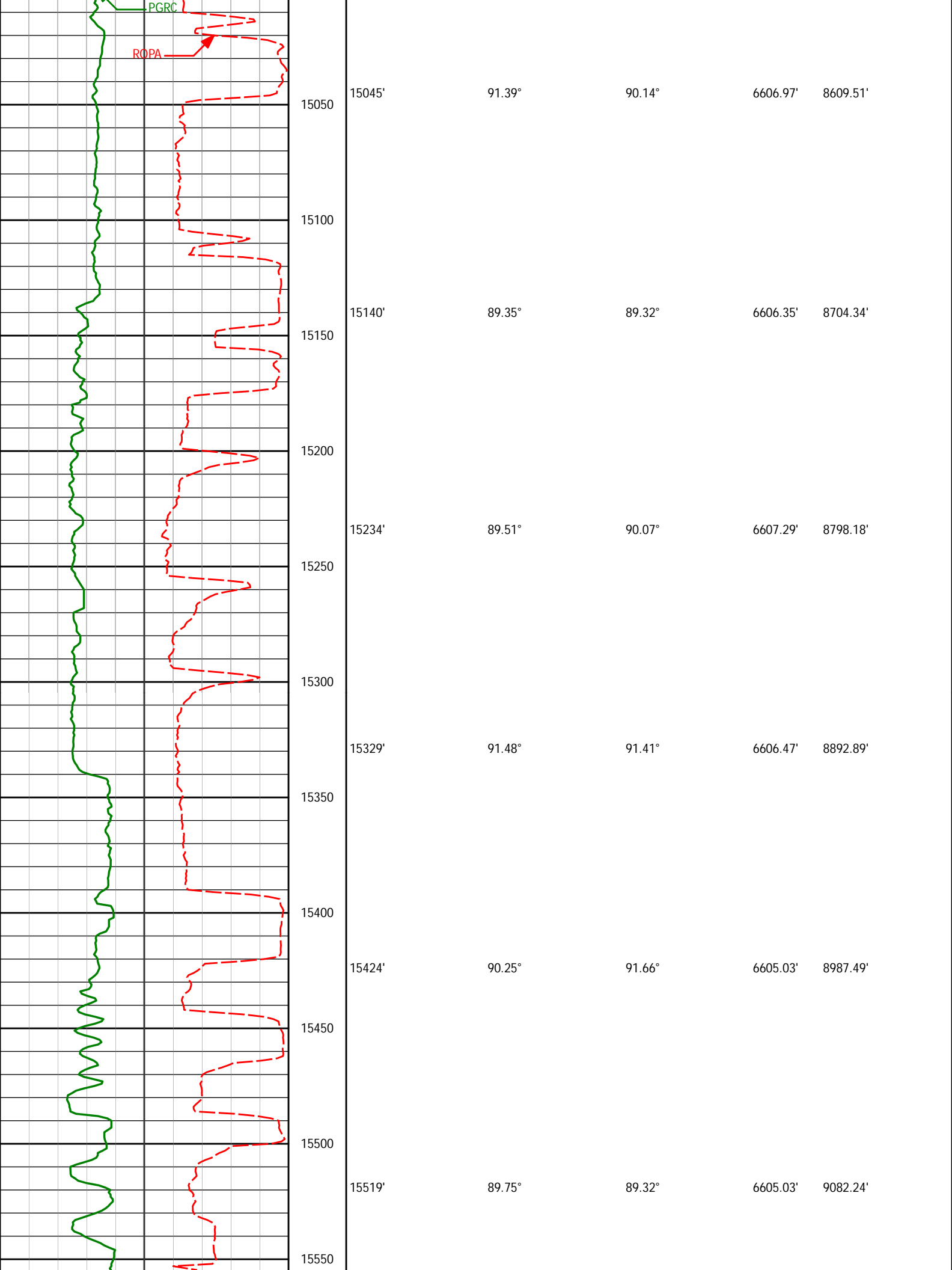


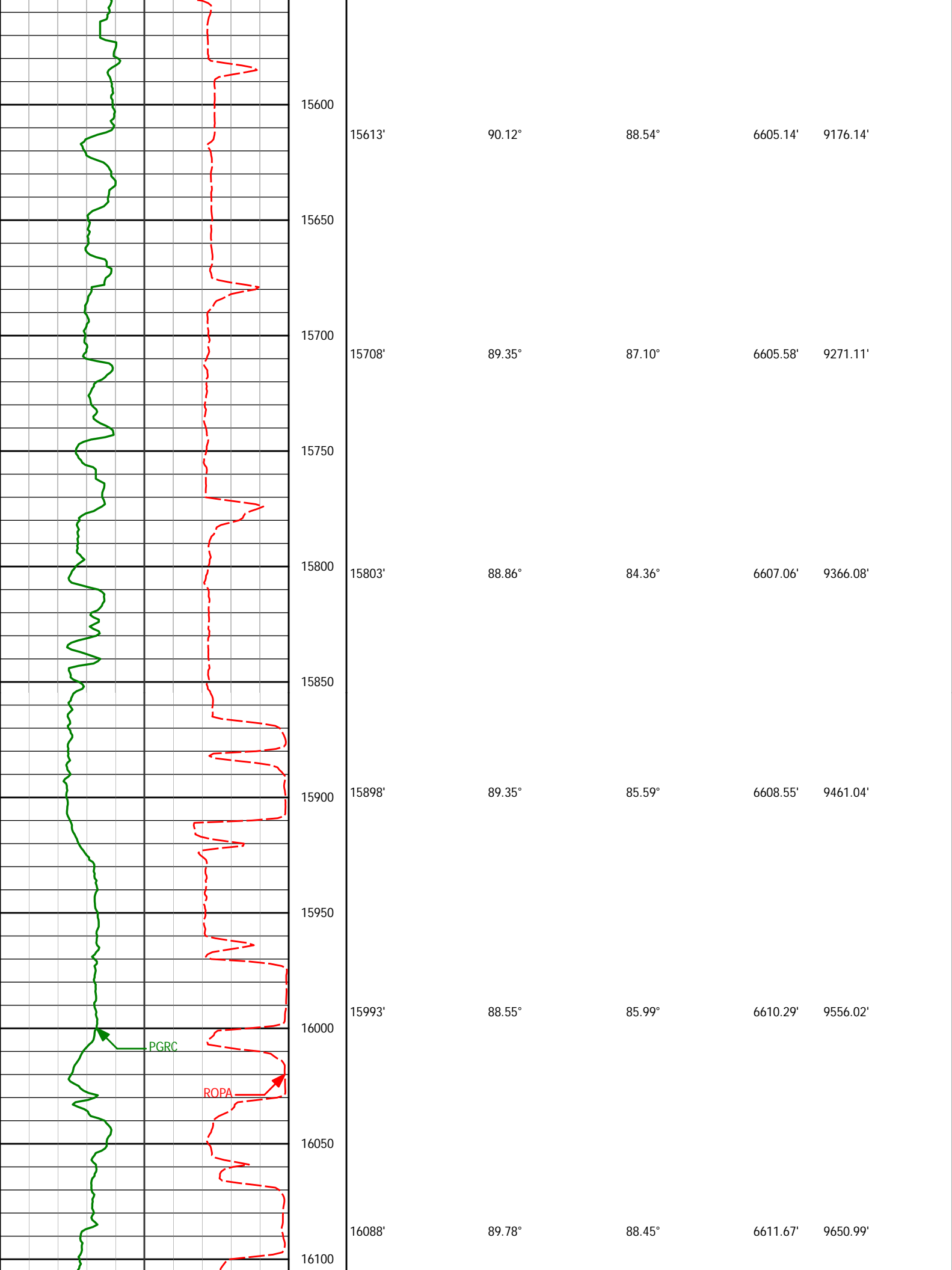
13906'	92.35°	89.43°	6627.50'	7471.83'
14001'	91.82°	88.93°	6624.04'	7566.65'
14096'	91.05°	89.67°	6621.67'	7661.50'
14191'	90.28°	87.72°	6620.56'	7756.41'
14286'	90.92°	88.65°	6619.57'	7851.35'
14381'	91.11°	89.55°	6617.89'	7946.23'

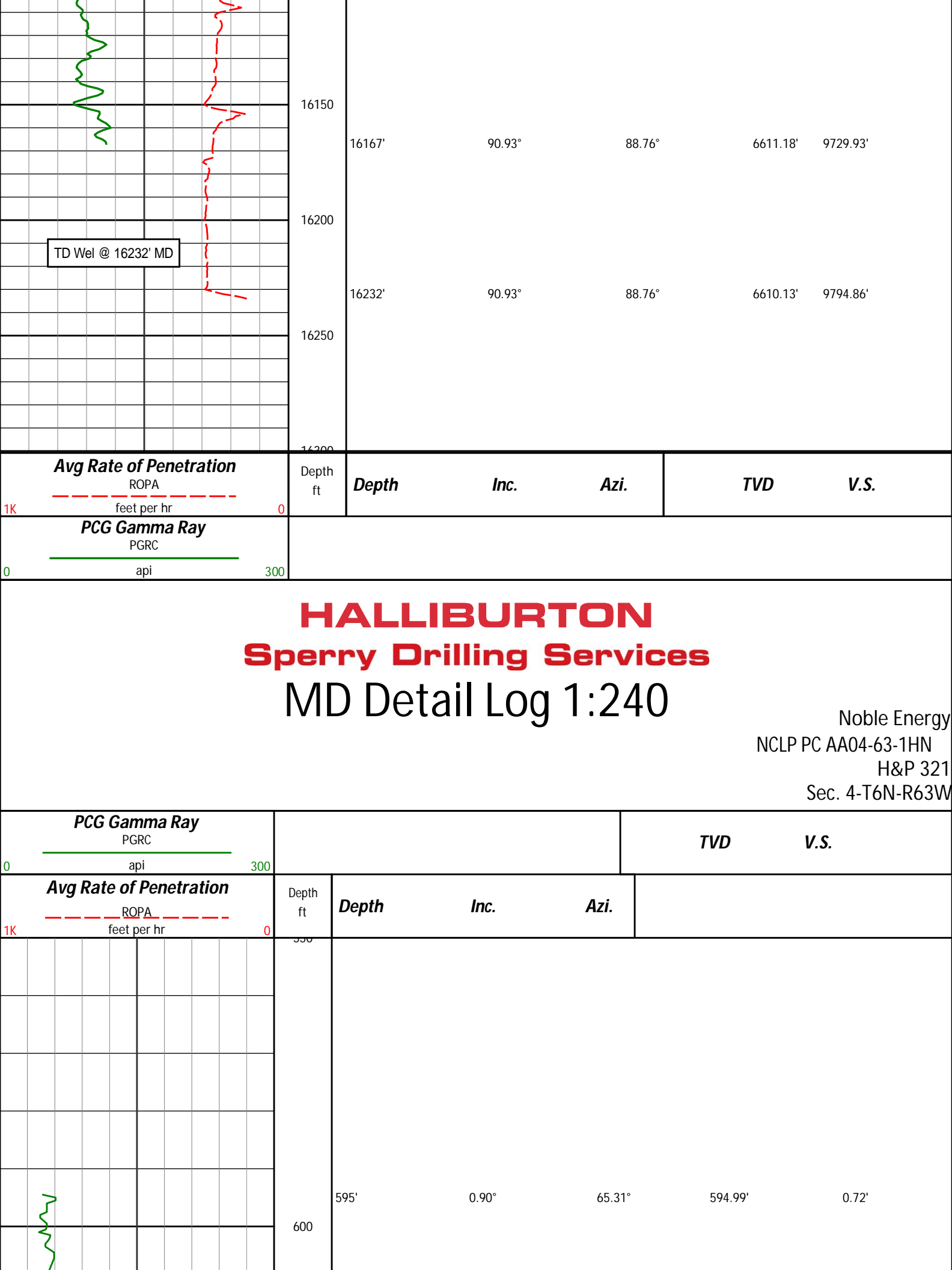


14450
14500
14550
14600
14650
14700
14750
14800
14850
14900
14950
15000

14476'	90.49°	88.06°	6616.56'	8041.13'
14571'	90.37°	87.99°	6615.85'	8136.09'
14666'	90.59°	87.79°	6615.05'	8231.05'
14760'	90.03°	88.25°	6614.54'	8325.01'
14855'	92.01°	88.96°	6612.85'	8419.92'
14950'	91.85°	89.74°	6609.65'	8514.73'







TD Wel @ 16232' MD

Avg Rate of Penetration

ROPA

feet per hr

PCG Gamma Ray

PGRC

api

Depth
ft

Depth

Inc.

Azi.

TVD

V.S.

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy
NCLP PC AA04-63-1HN
H&P 321
Sec. 4-T6N-R63W

PCG Gamma Ray

PGRC

api

Avg Rate of Penetration

ROPA

feet per hr

Depth
ft

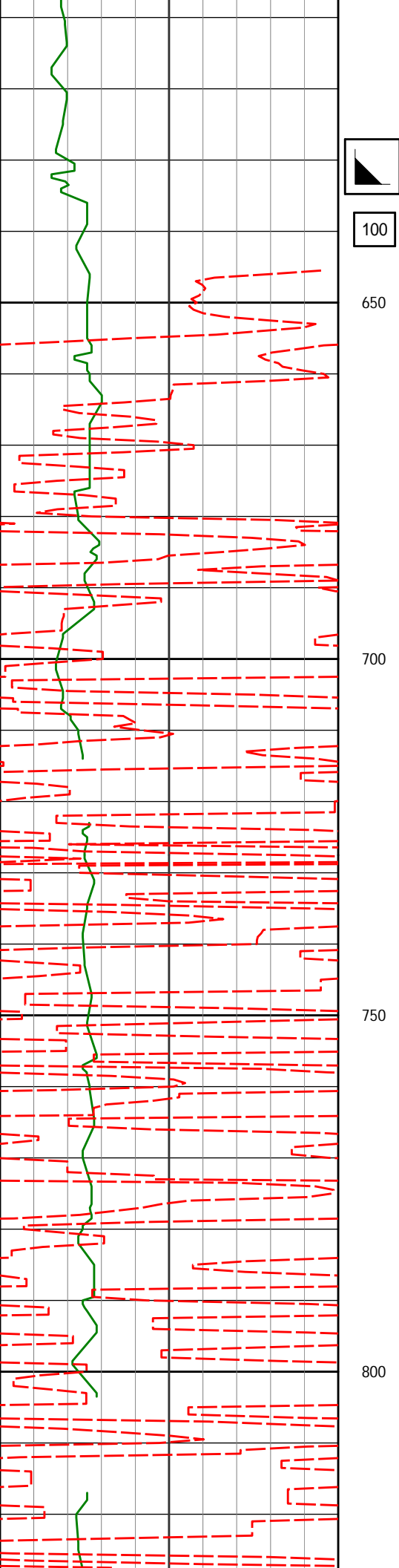
Depth

Inc.

Azi.

TVD

V.S.



100

650

700

750

800

720'

0.44°

132.91°

719.98'

1.96'

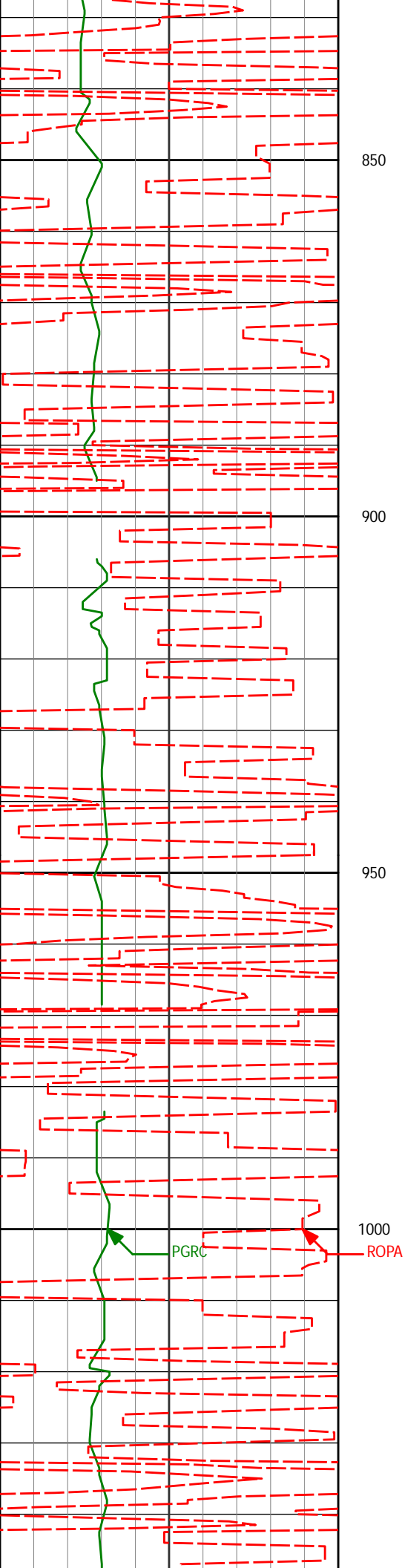
811'

0.29°

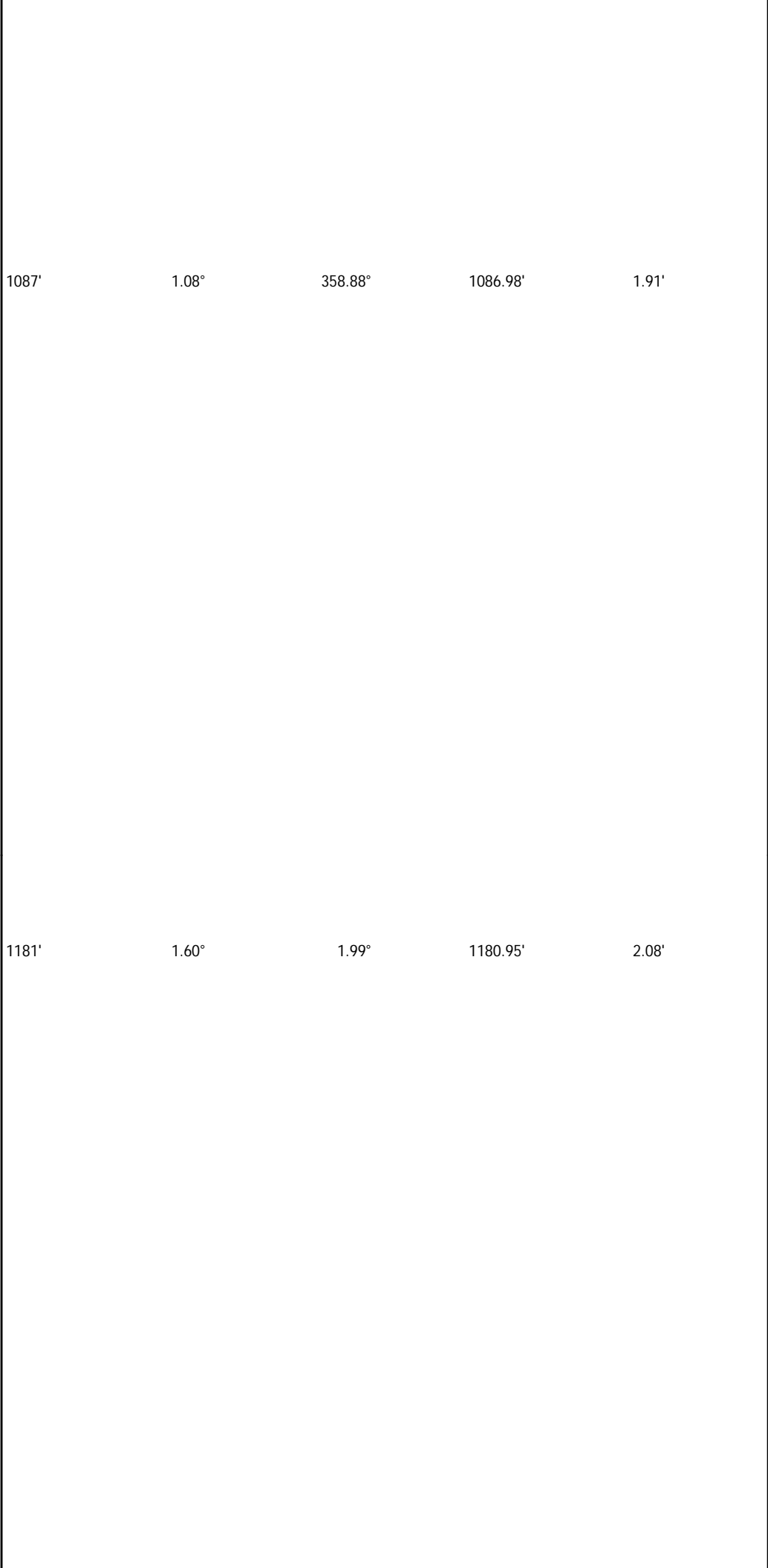
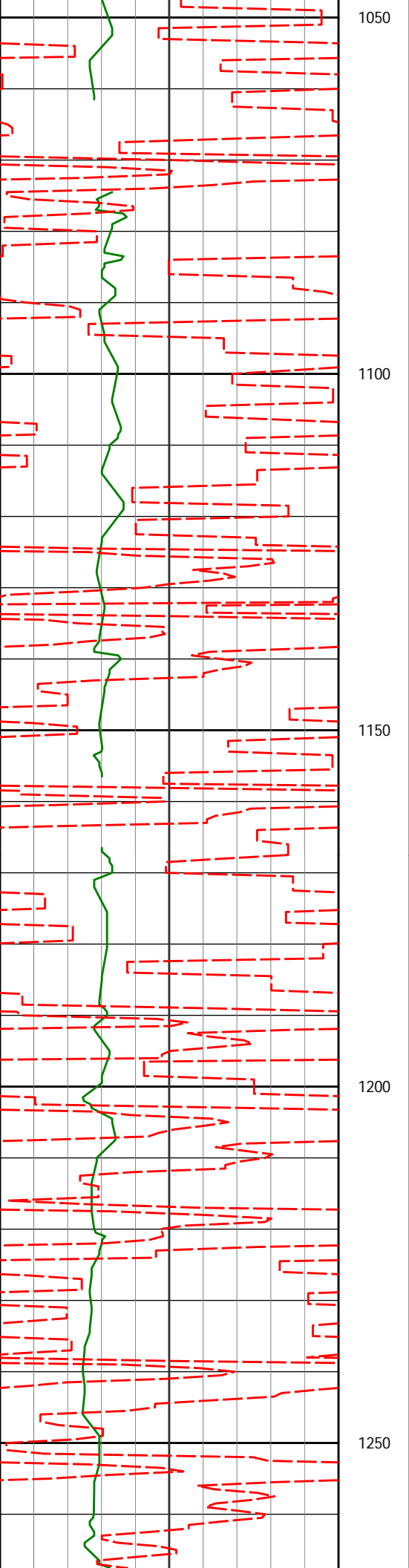
310.20°

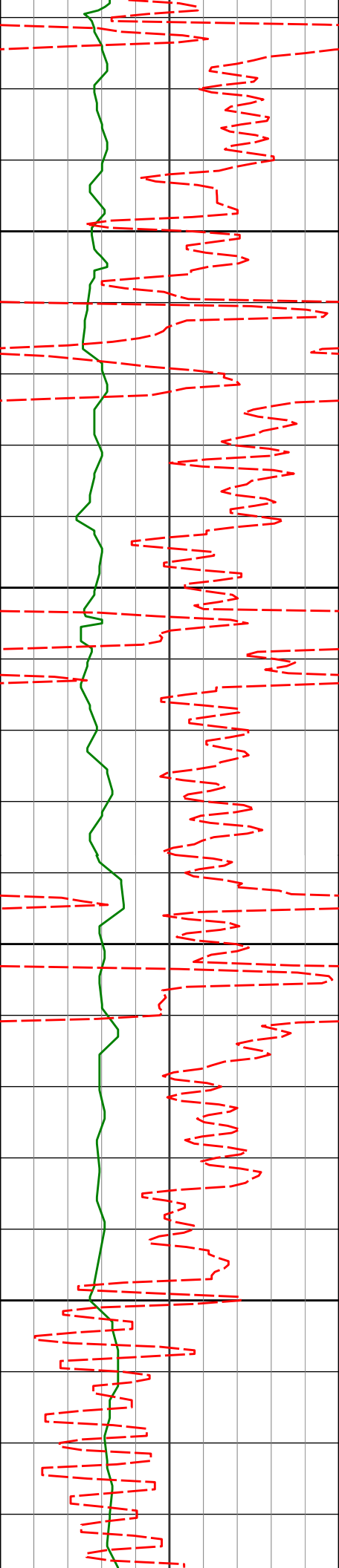
810.98'

2.04'



850					
900	903'	0.09°	267.34°	902.98'	1.80'
950					
996'		0.17°	29.41°	995.98'	1.80'
1000					





1300

1350

1365'

1400

1450

1458'

1.42°

4.51°

1364.89'

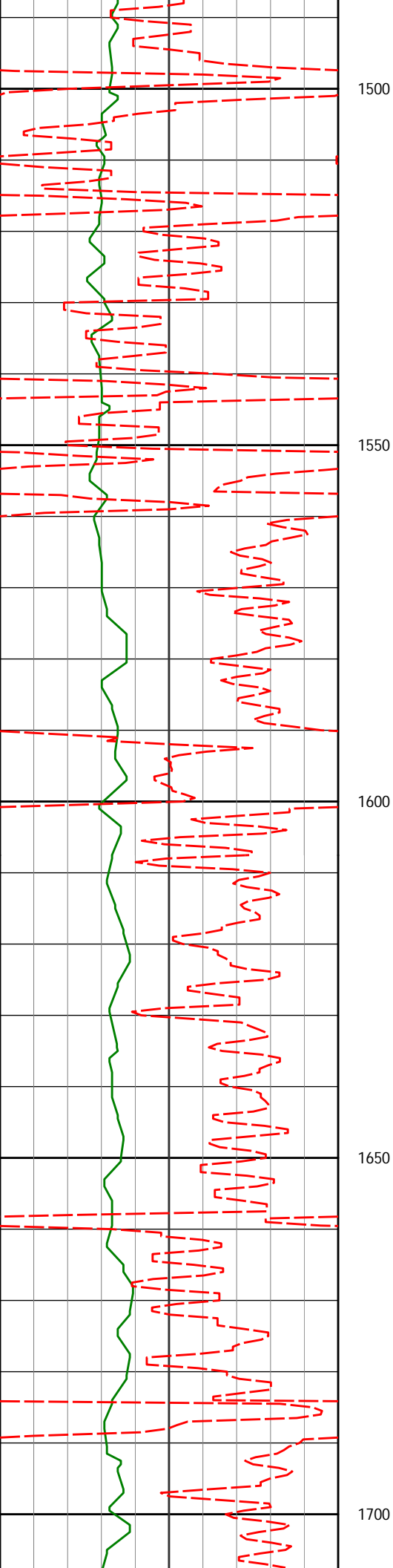
2.65'

1.74°

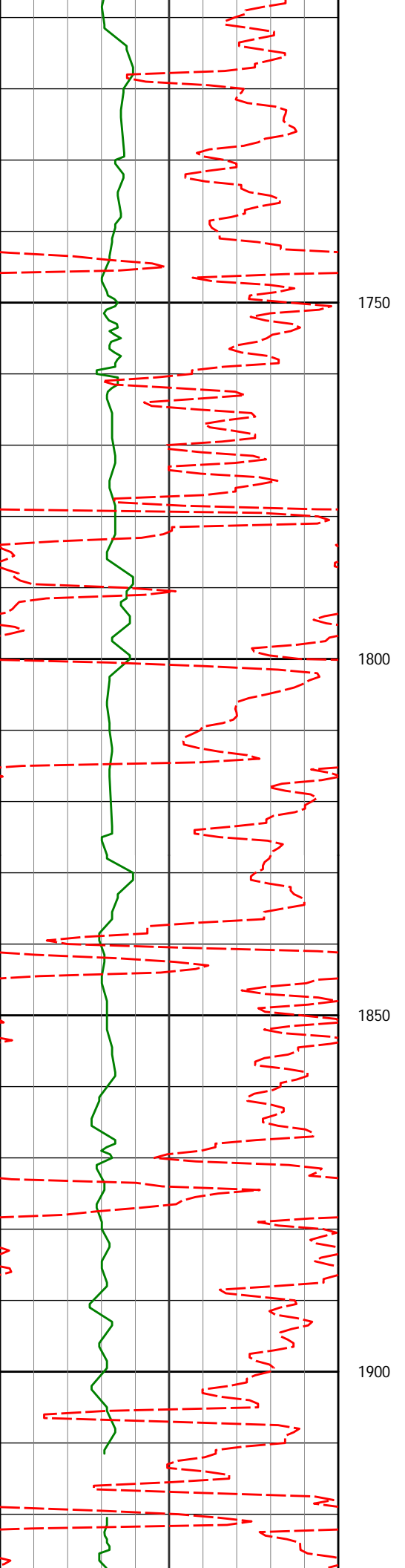
10.64°

1457.85'

3.16'



1550'	1.49°	8.51°	1549.82'	3.76'
1642'	1.10°	6.74°	1641.79'	4.17'



1733'

1.16°

10.87°

1732.77'

4.56'

1750

1800

1826'

0.86°

244.26°

1825.77'

4.15'

1850

1900

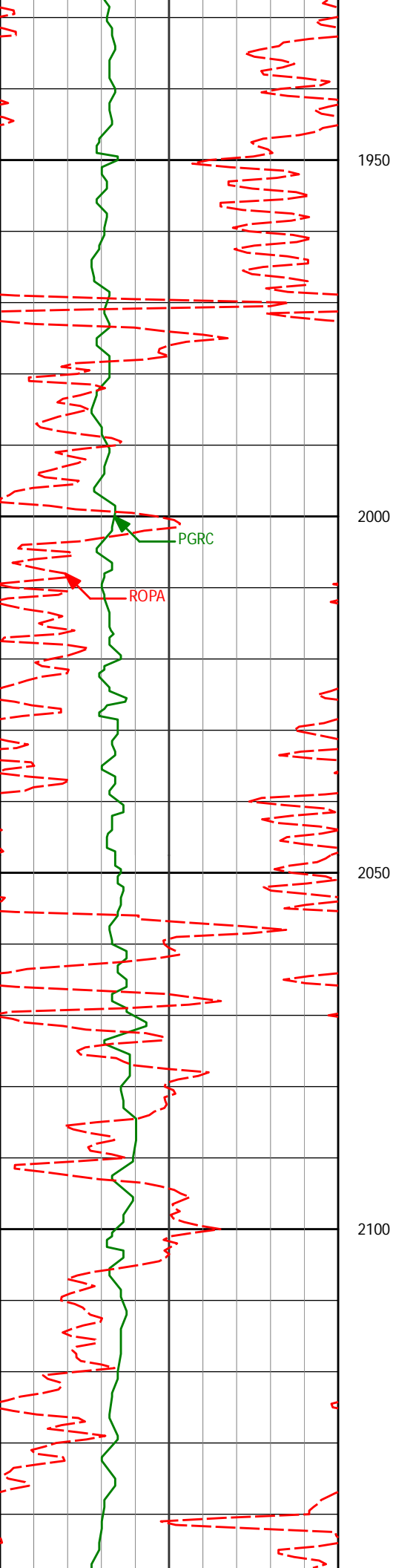
1919'

1.02°

218.20°

1918.75'

2.95'



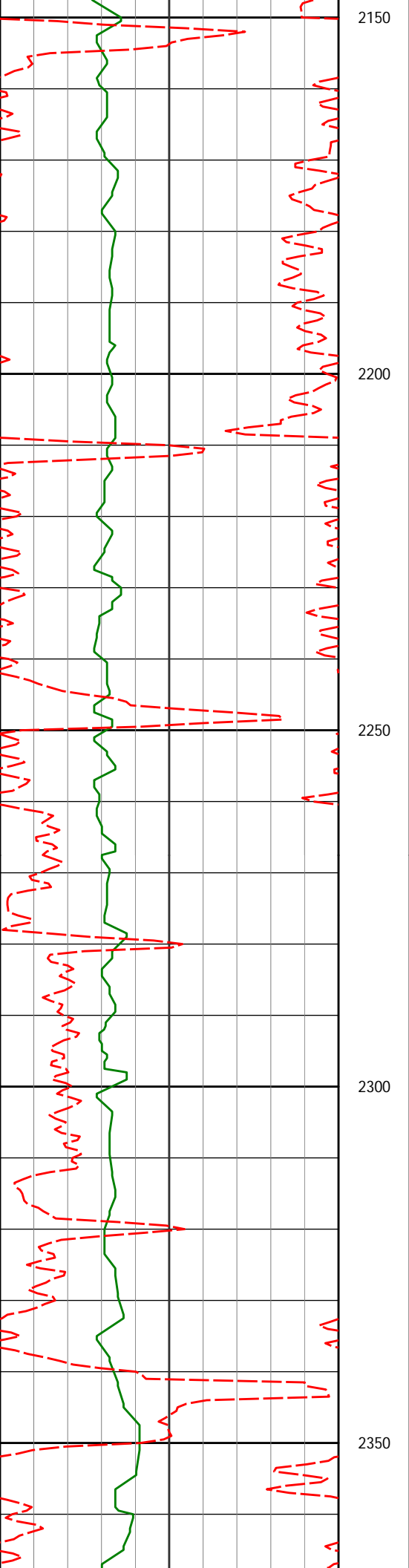
2014'

0.65°

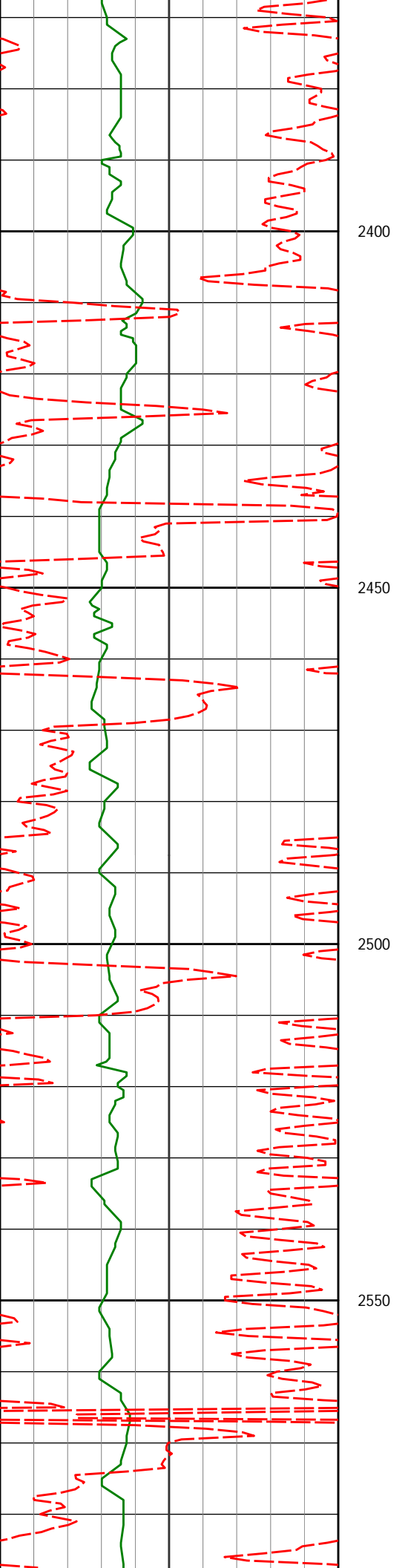
241.65°

2013.74'

1.89'



2150				
2200	2201'	1.10°	241.08°	2200.72'
2250				
2300	2296'	1.00°	240.62°	2295.71'
2350				



2390'

0.92°

269.75°

2389.69'

-3.76'

2400

2450

2454'

0.38°

257.44°

2453.69'

-4.48'

2500

2517'

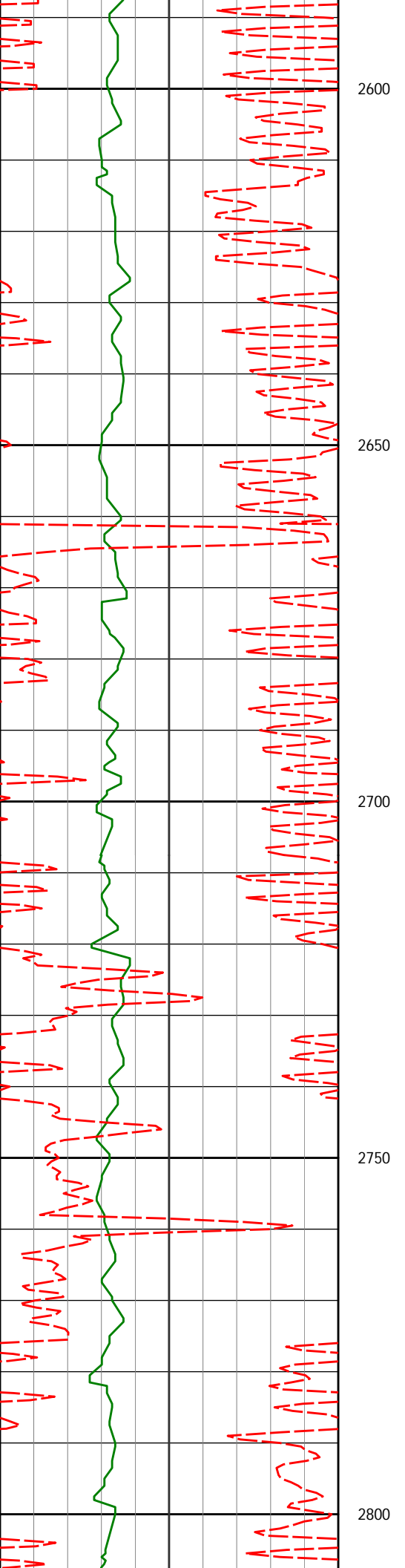
0.77°

320.68°

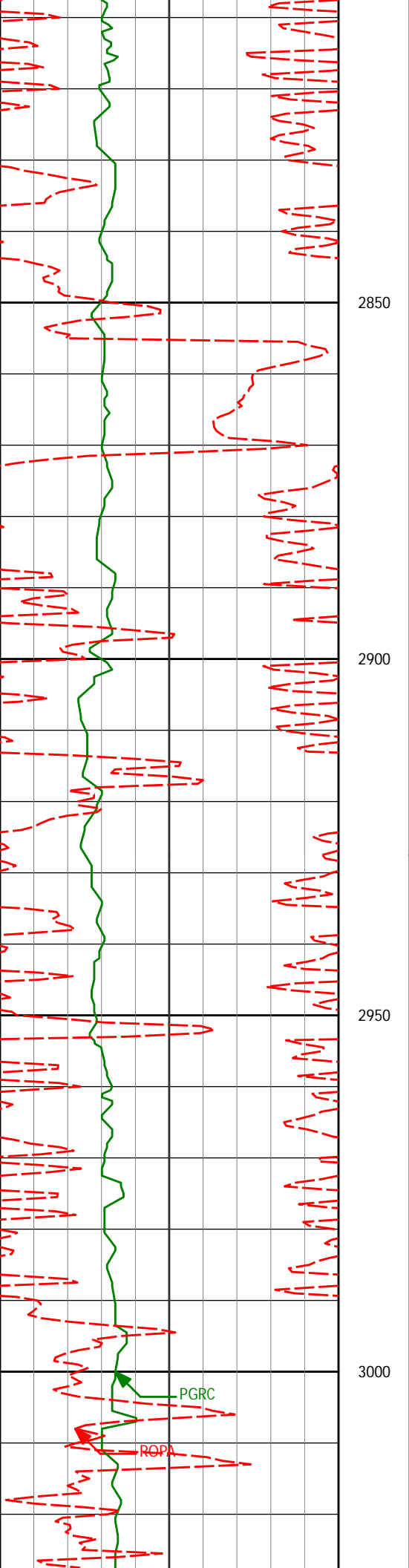
2516.69'

-4.93'

2550



2600				
2612'	0.92°	306.68°	2611.68'	-5.89'
2650				
2700				
2707'	0.94°	290.33°	2706.66'	-7.18'
2750				
2800				
2801'	1.23°	328.77°	2800.65'	-8.35'



2896'

0.20°

61.60°

2895.64'

-8.67'

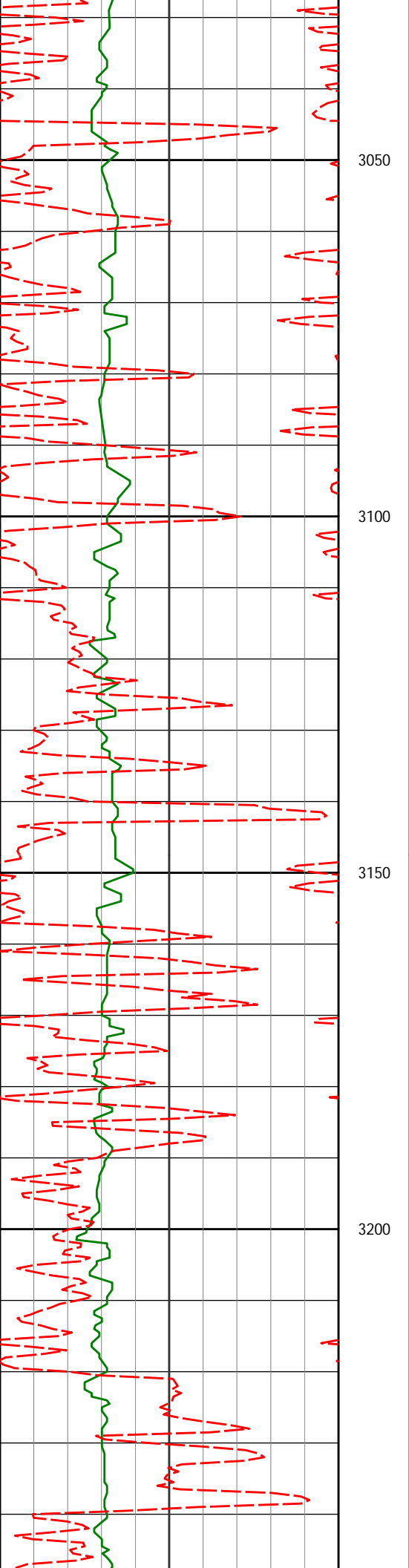
2991'

0.28°

66.67°

2990.64'

-8.31'



3050

3086'

0.28°

167.13°

3085.64'

-8.05'

3100

3150

3181'

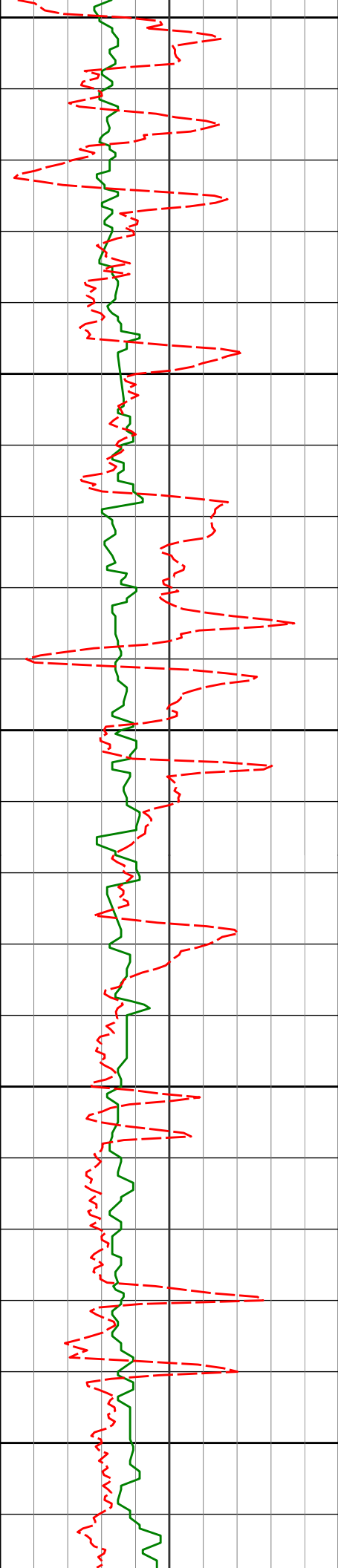
0.41°

188.67°

3180.64'

-8.08'

3200



3275'

0.25°

117.30°

3274.64'

-7.98'

3370'

0.47°

116.39°

3369.63'

-7.47'

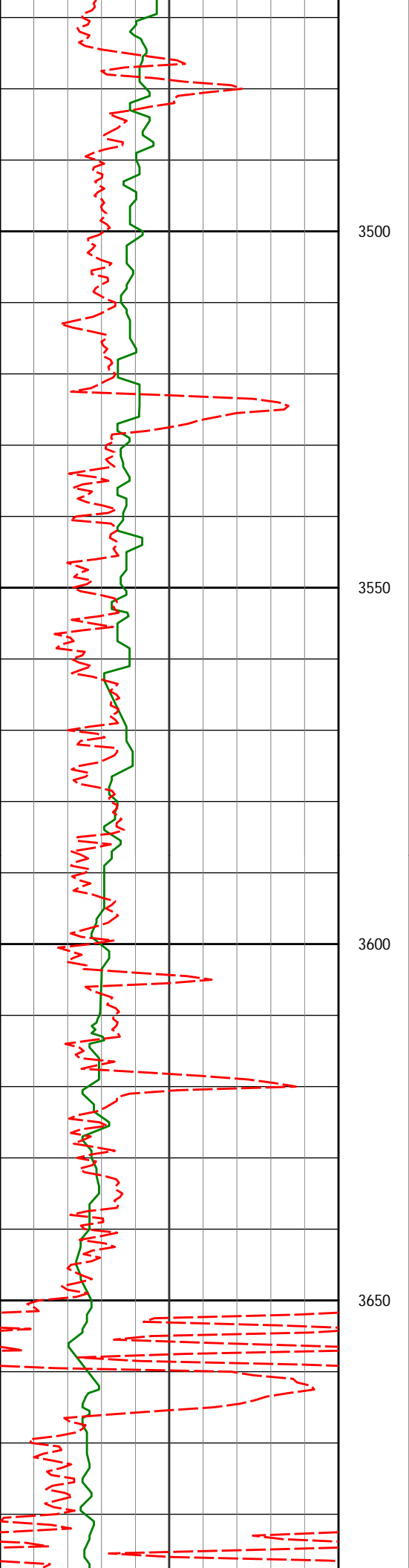
3465'

0.94°

83.05°

3464.63'

-6.35'



3559'

0.26°

98.40°

3558.62'

-5.37'

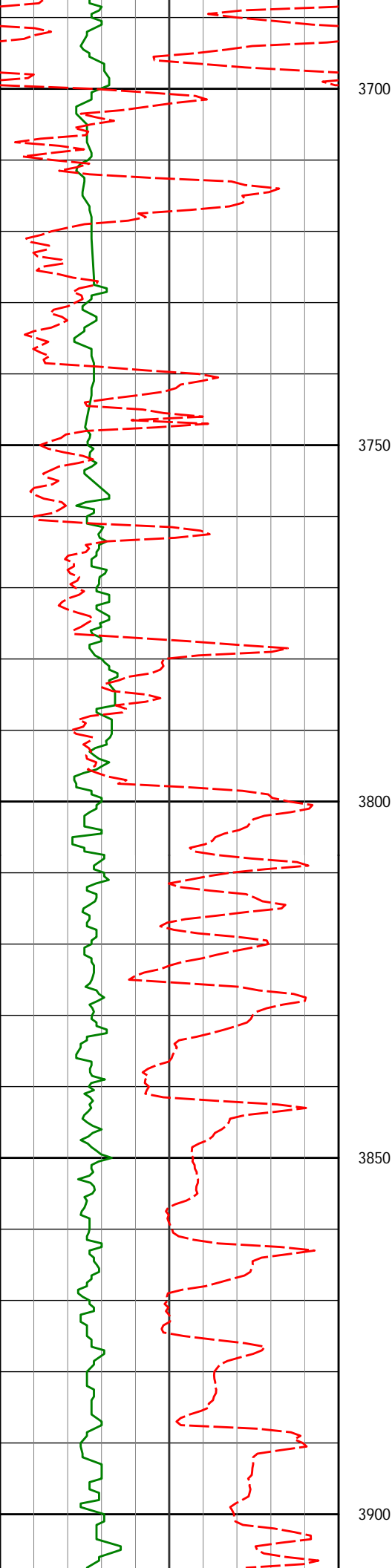
3654'

0.68°

149.18°

3653.62'

-4.90'



3749'

0.43°

148.40°

3748.61'

-4.48'

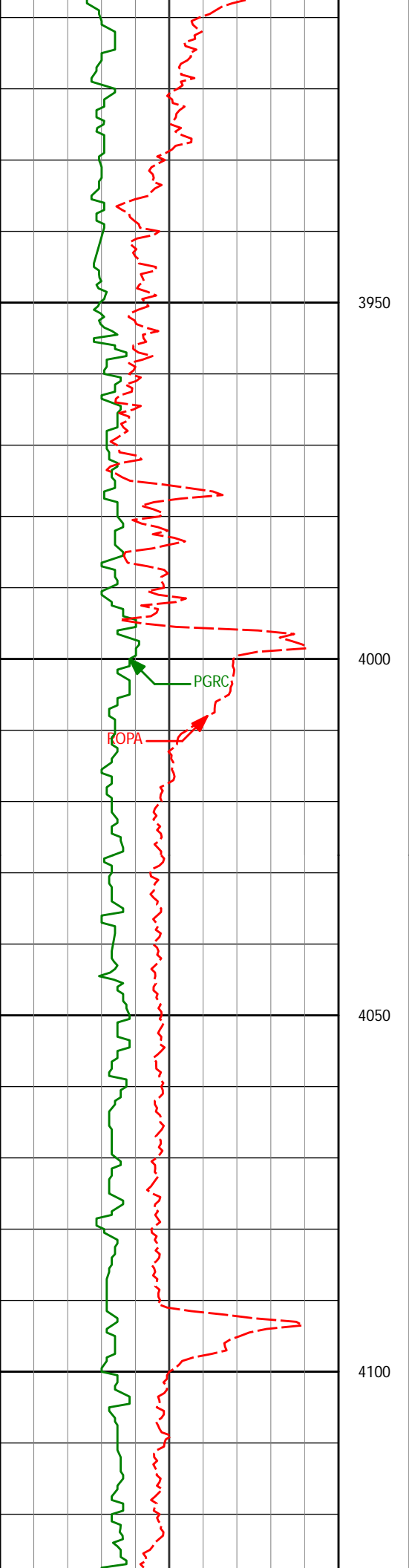
3843'

0.39°

143.95°

3842.61'

-4.14'



3938'

0.81°

154.38°

3937.61'

-3.72'

3950

4000

4033'

0.68°

160.63°

4032.60'

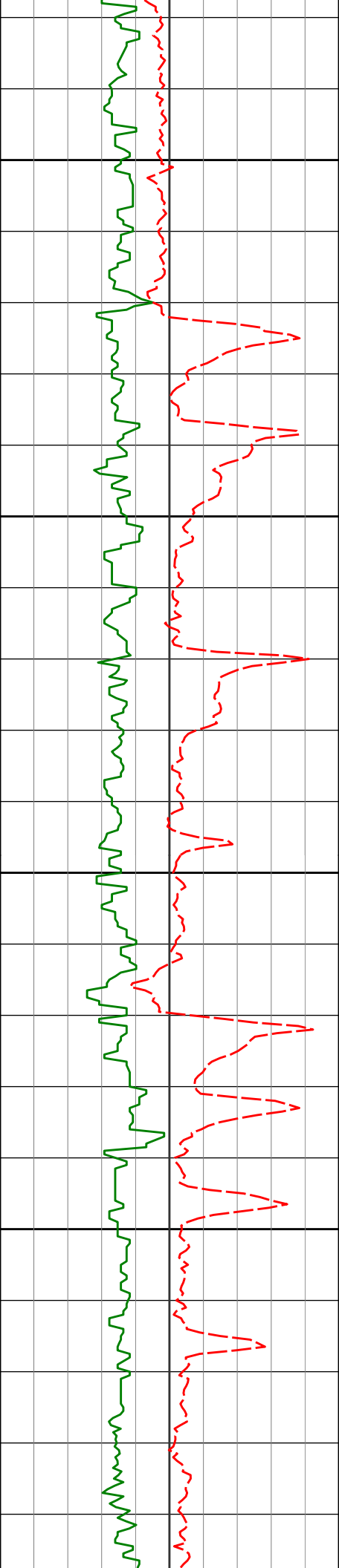
-3.31'

4050

4100

PGRC

ROPA



4150

4200

4250

4300

4223'

4318'

0.99°

1.51°

148.30°

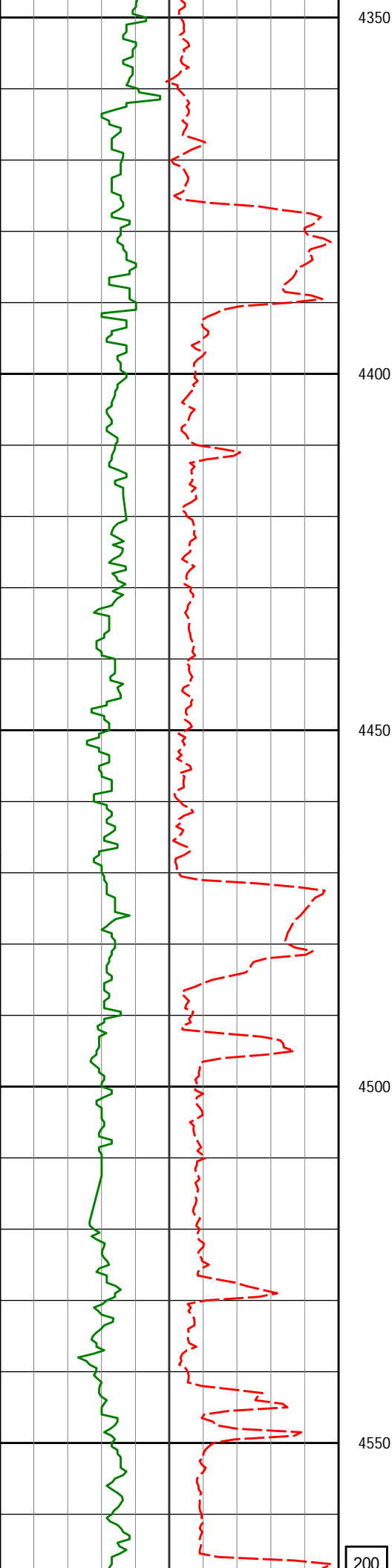
143.74°

4222.58'

4317.55'

-2.19'

-1.13'



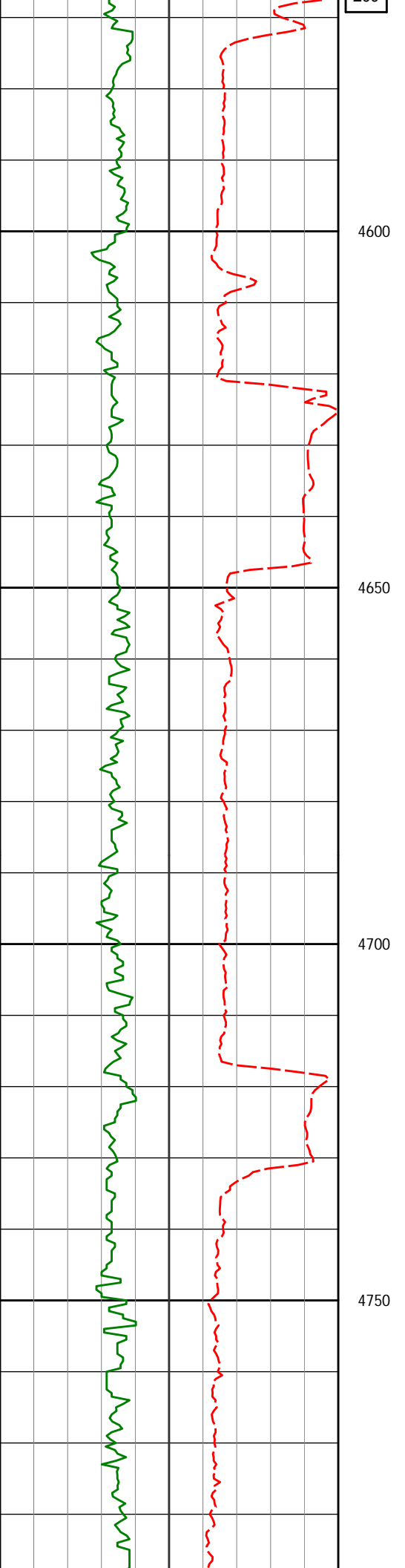
4413'

0.89°

166.22°

4412.53'

-0.32'



4570'

0.62°

211.32°

4569.52'

0.13'

4600

4650

4665'

3.26°

342.09°

4664.47'

-0.83'

4700

4750

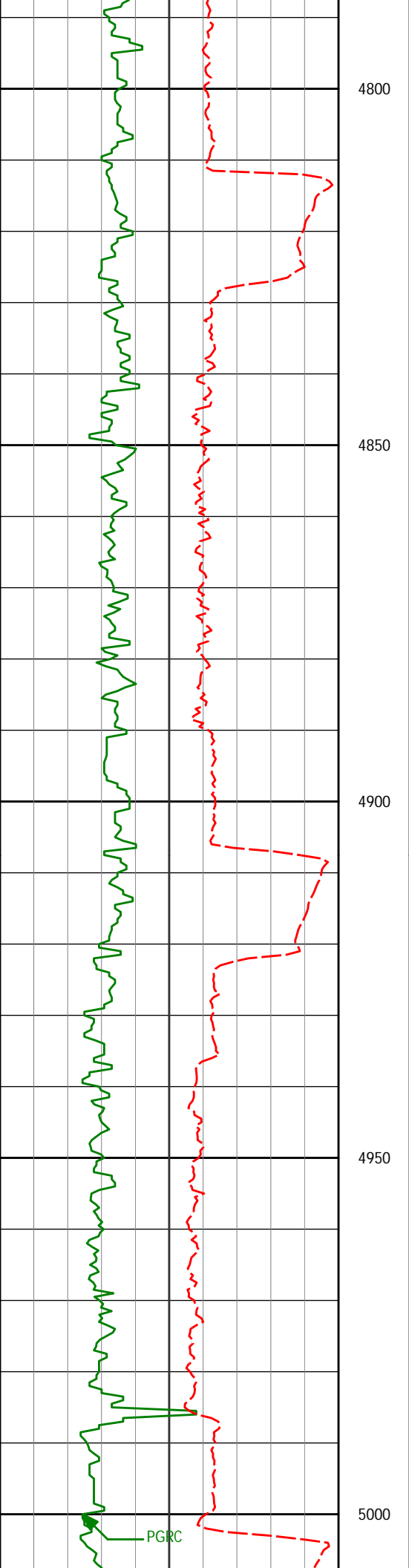
4760'

4.90°

344.25°

4759.23'

-2.34'



4855'

6.50°

349.46°

4853.76'

-3.84'

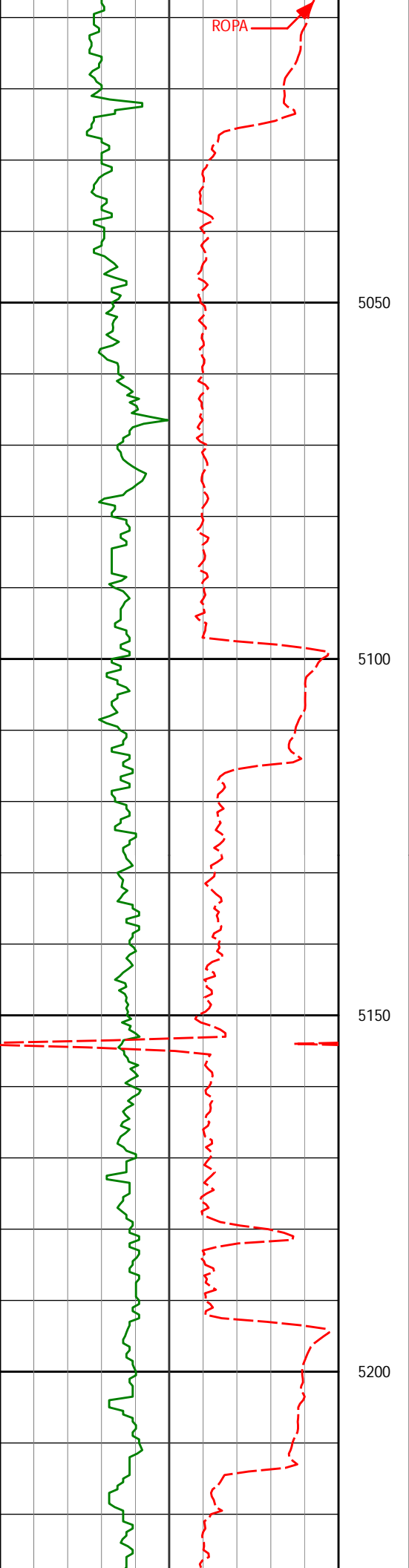
4949'

7.23°

354.66°

4947.08'

-4.66'



5044'

9.93°

354.41°

5041.01'

-5.12'

5050

5100

5139'

11.14°

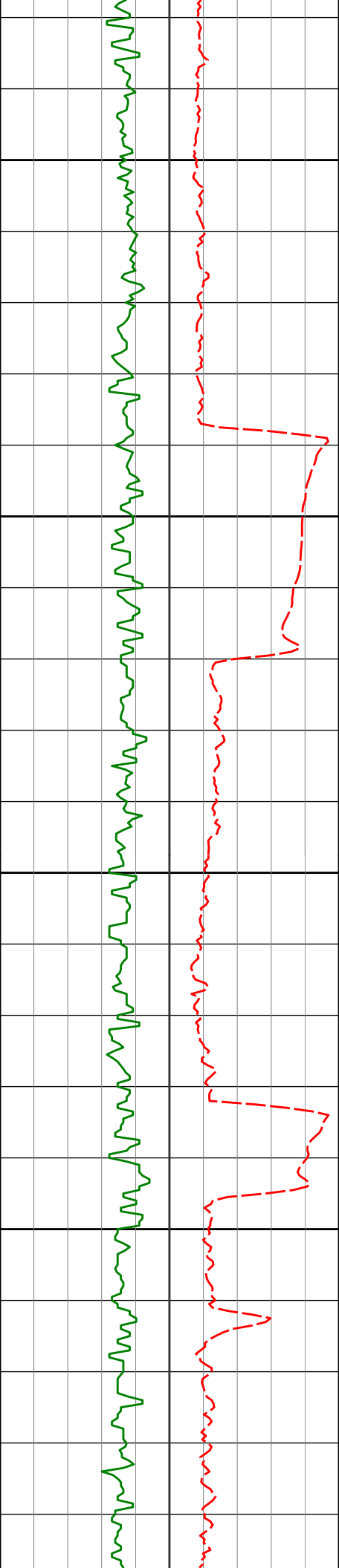
350.75°

5134.41'

-6.30'

5150

5200



5234'

11.95°

349.96°

5227.49'

-8.29'

5250

5300

5329'

14.80°

353.70°

5319.90'

-9.96'

5350

5400

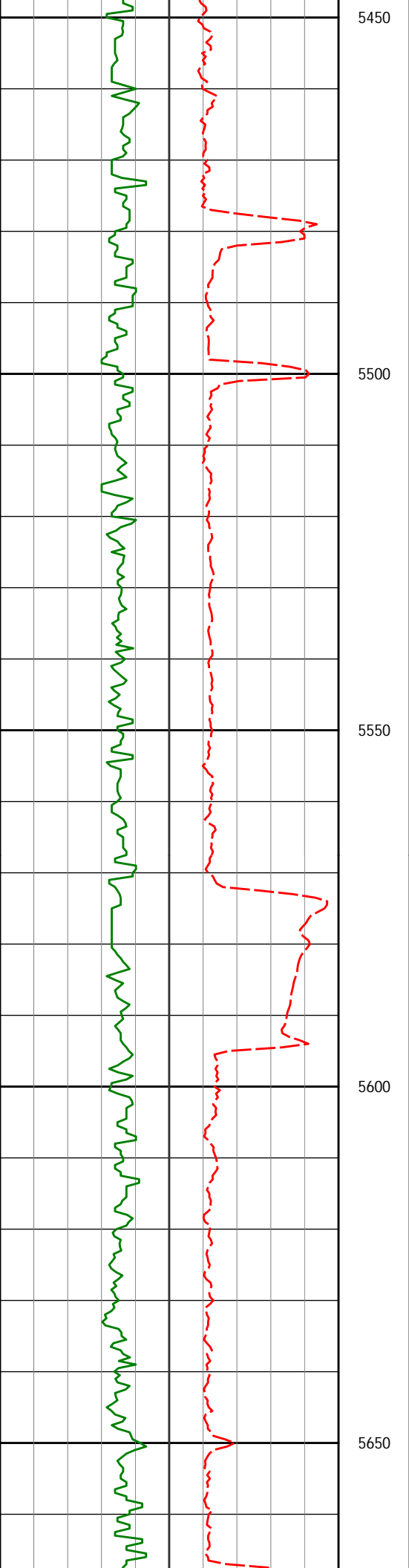
5424'

14.85°

348.17°

5411.74'

-12.26'



5519'

12.27°

344.17°

5504.09'

-16.13'

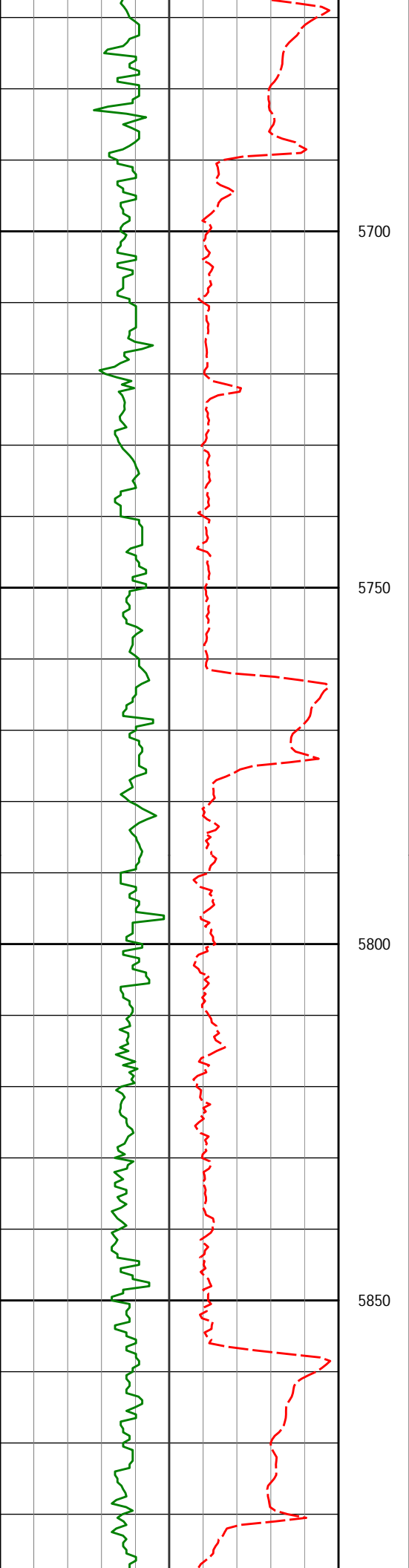
5614'

13.09°

347.39°

5596.77'

-19.94'



5700

5708'

14.32°

352.18°

5688.10'

-22.45'

5750

5800

5803'

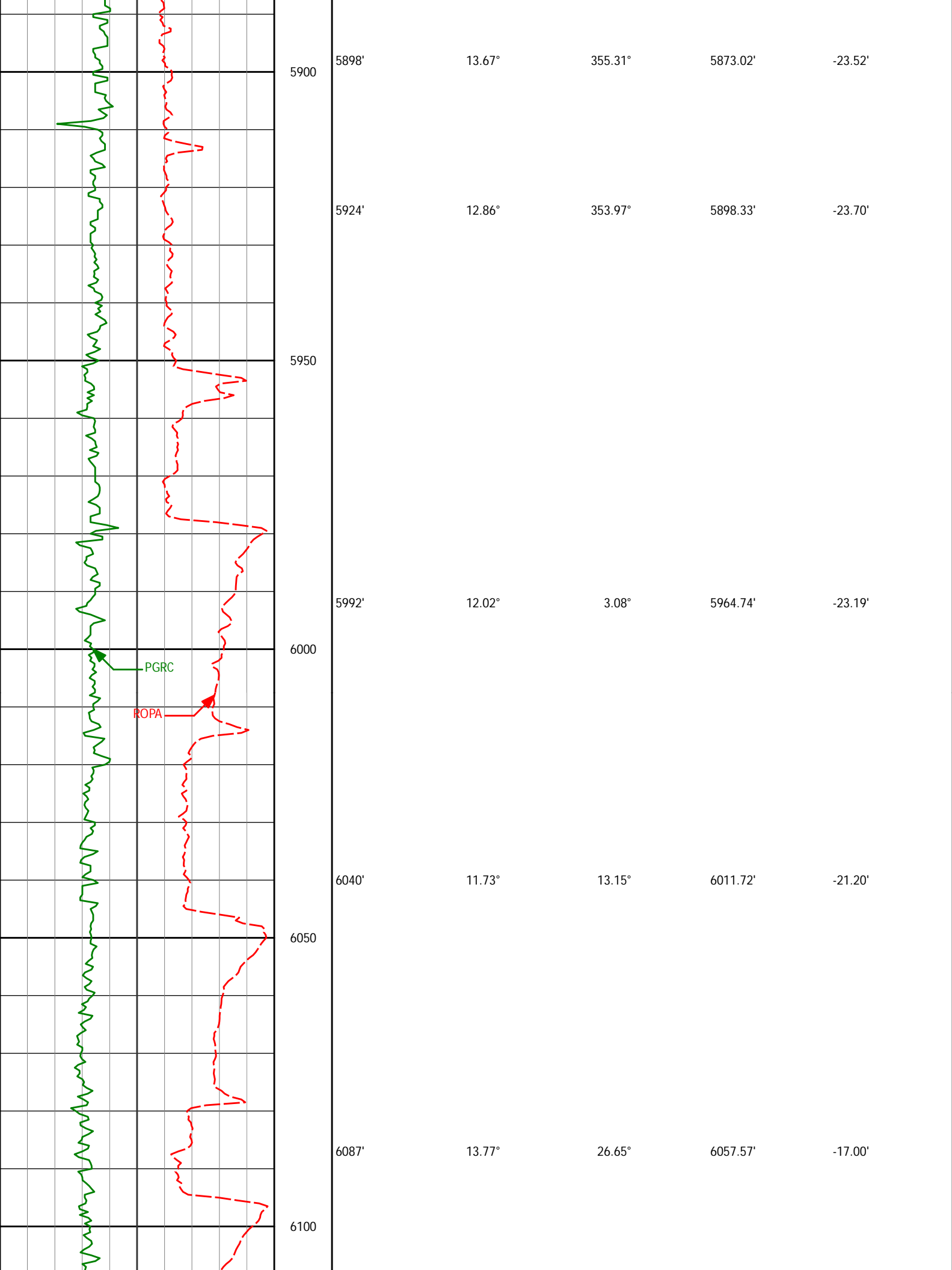
12.54°

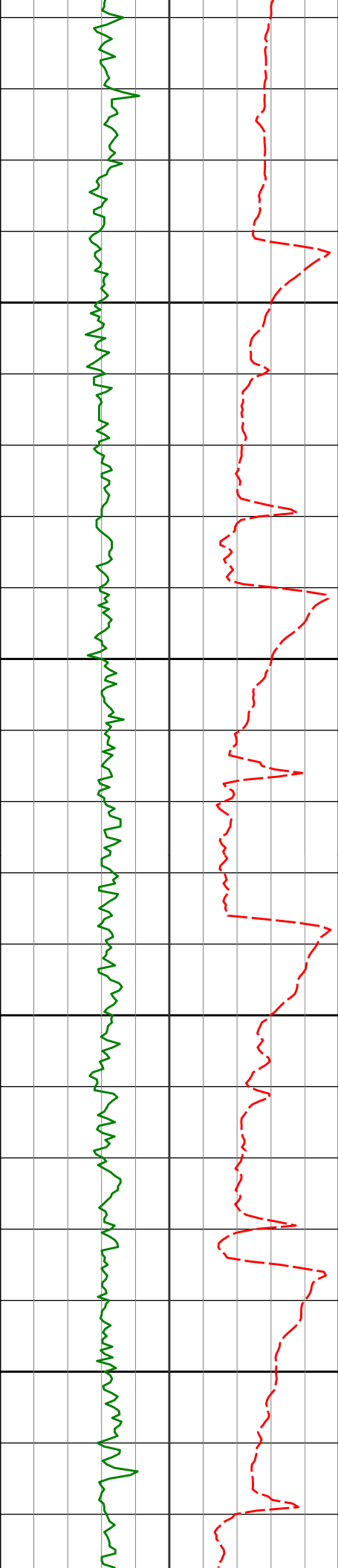
356.36°

5780.50'

-23.31'

5850





6135'	18.34°	38.86°	6103.69'	-9.01'
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6150

6182'	21.73°	45.76°	6147.85'	2.60'
-------	--------	--------	----------	-------

6200

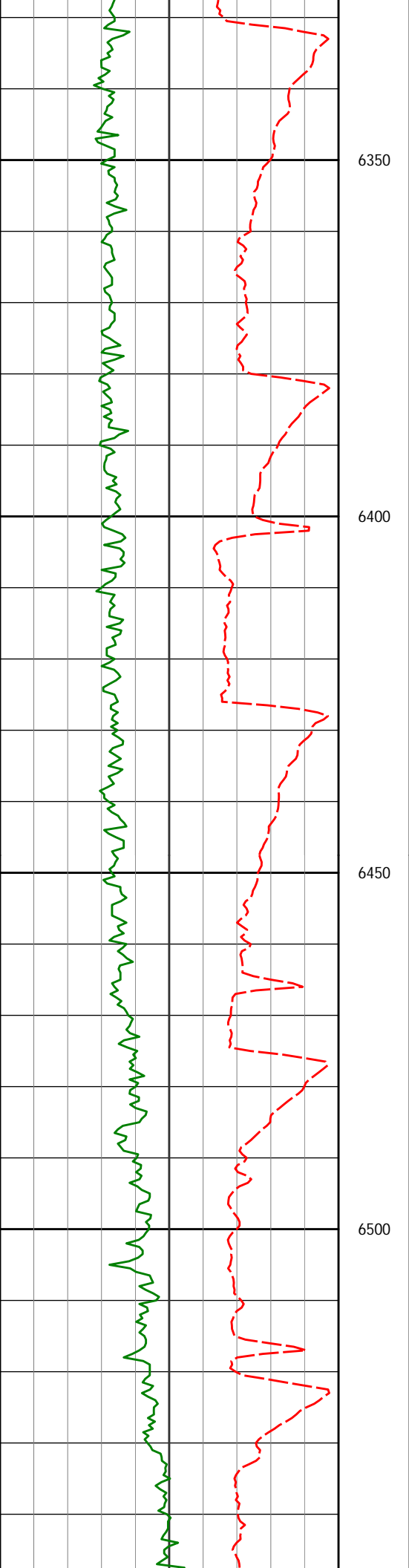
6230'	21.88°	55.36°	6192.43'	17.01'
-------	--------	--------	----------	--------

6250

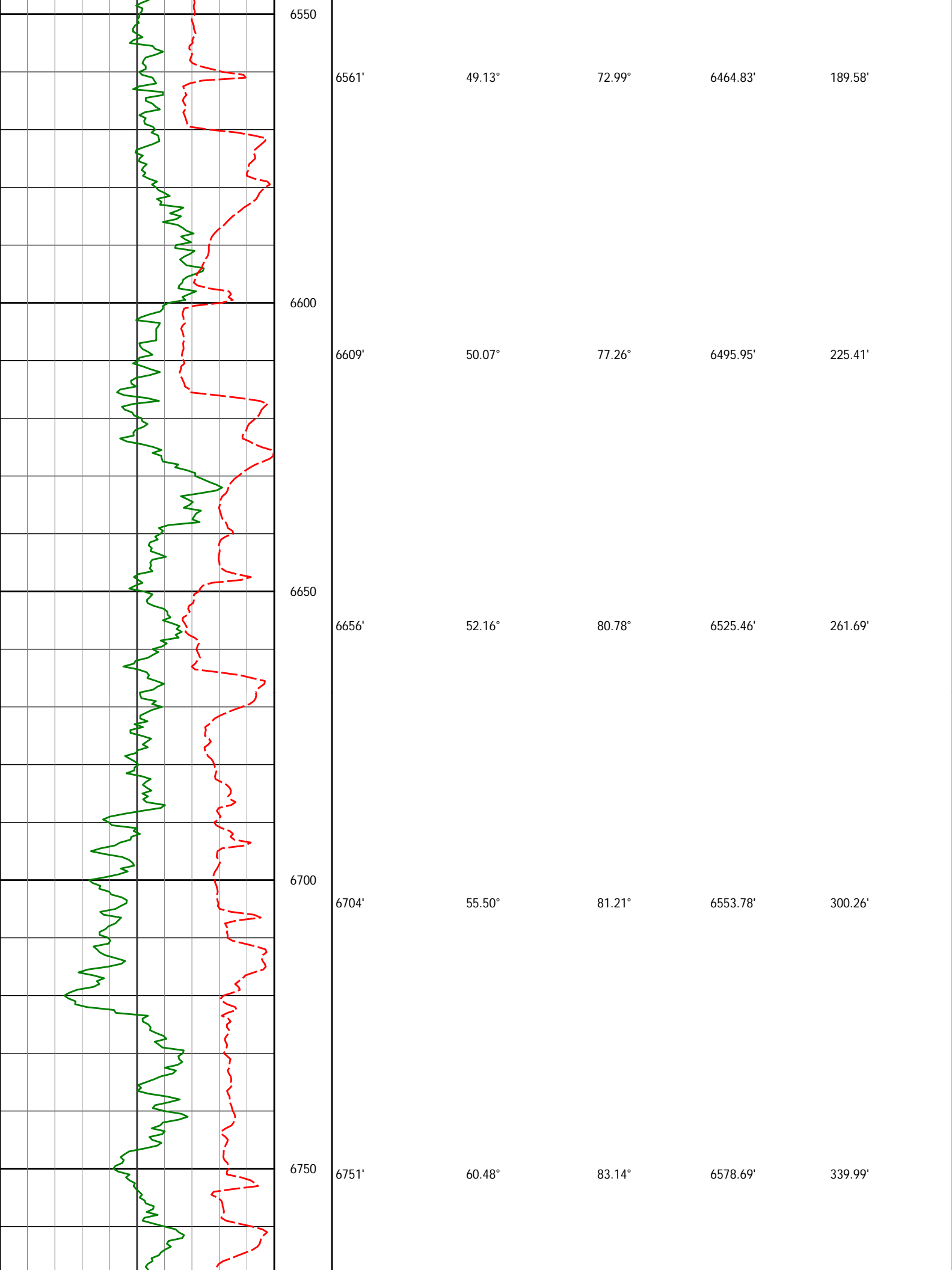
6277'	24.42°	61.03°	6235.65'	33.30'
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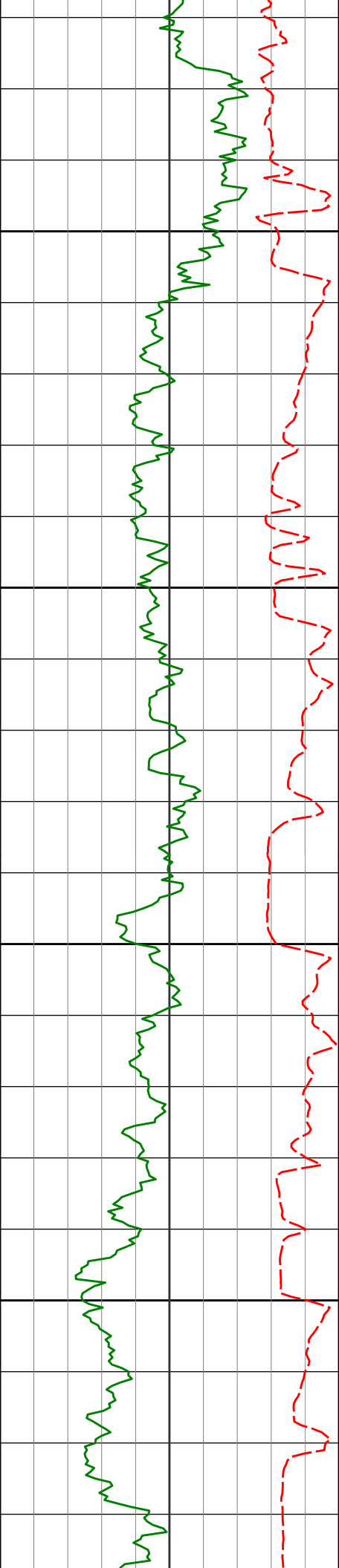
6300

6325'	27.71°	65.12°	6278.76'	52.68'
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6350				
6372'	32.13°	68.13°	6319.49'	74.75'
6400				
6420'	34.45°	69.20°	6359.61'	99.84'
6450				
6467'	38.51°	69.44°	6397.40'	126.55'
6500				
6515'	44.45°	71.14°	6433.34'	157.09'





6800

6799'

65.75°

84.29°

6600.39'

382.74'

6850

6846'

70.21°

84.06°

6618.00'

426.27'

6900

6894'

74.23°

84.07°

6632.66'

471.93'

6950

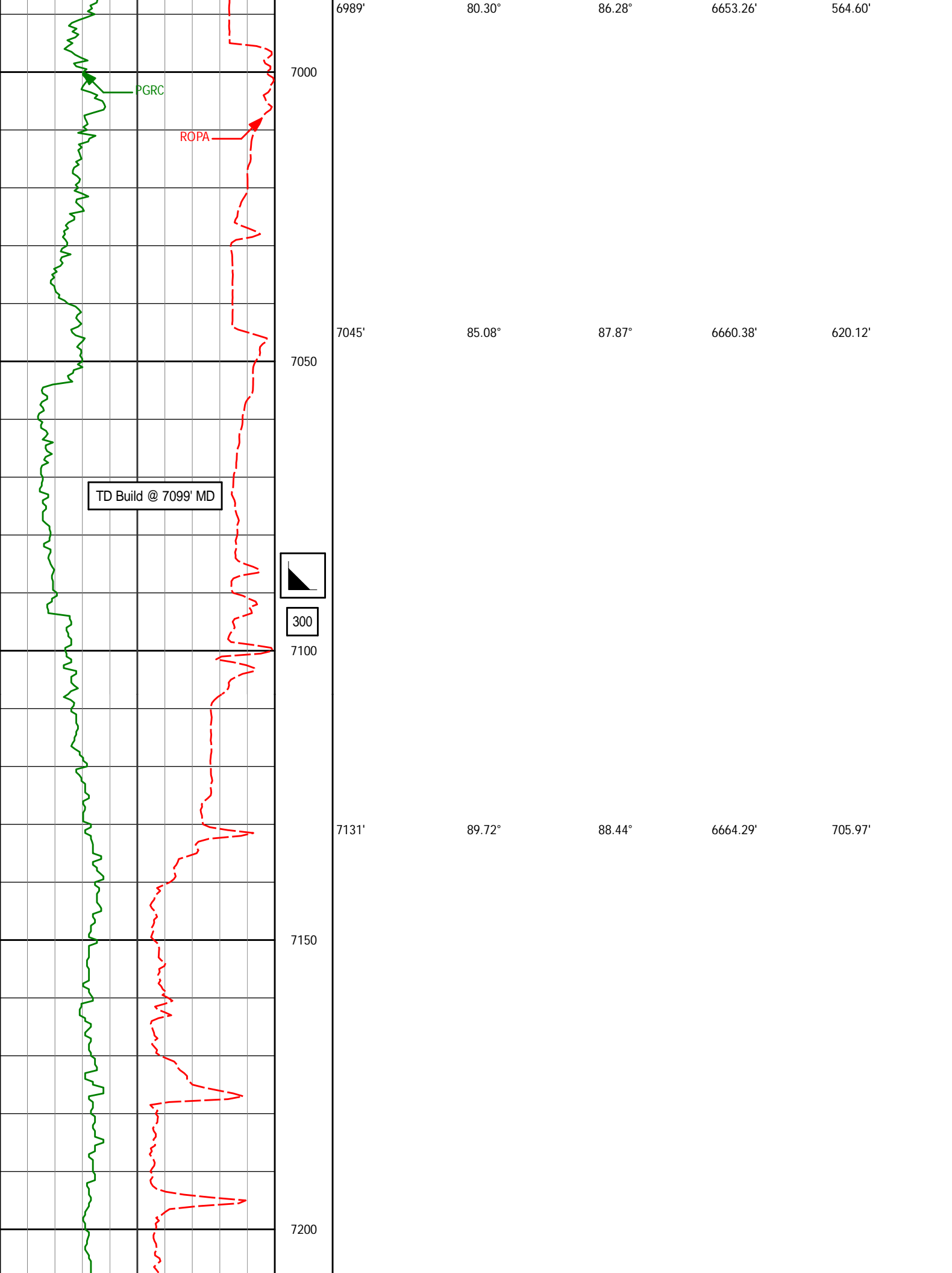
6941'

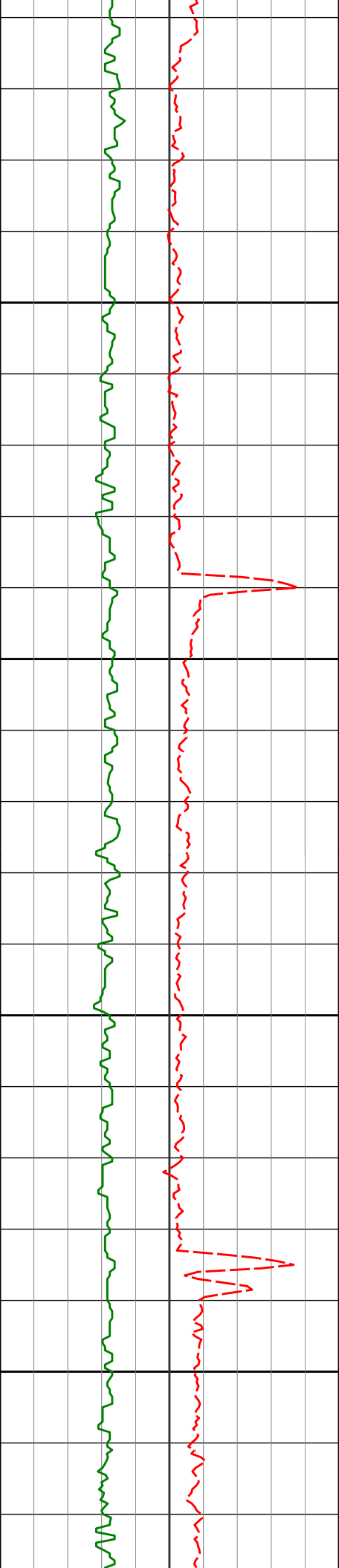
77.64°

84.96°

6644.08'

517.49'





7225'

90.49°

88.09°

6664.11'

799.91'

7250

7300

7320'

90.43°

87.94°

6663.35'

894.87'

7350

7400

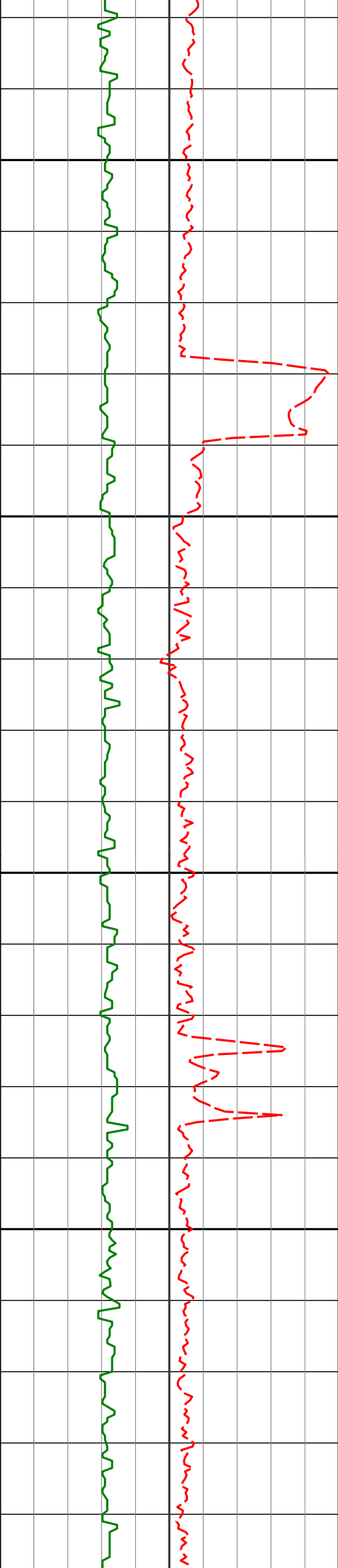
7415'

90.31°

87.78°

6662.74'

989.84'



7450

7500

7550

7600

7510'

89.97°

89.28°

6662.50'

1084.77'

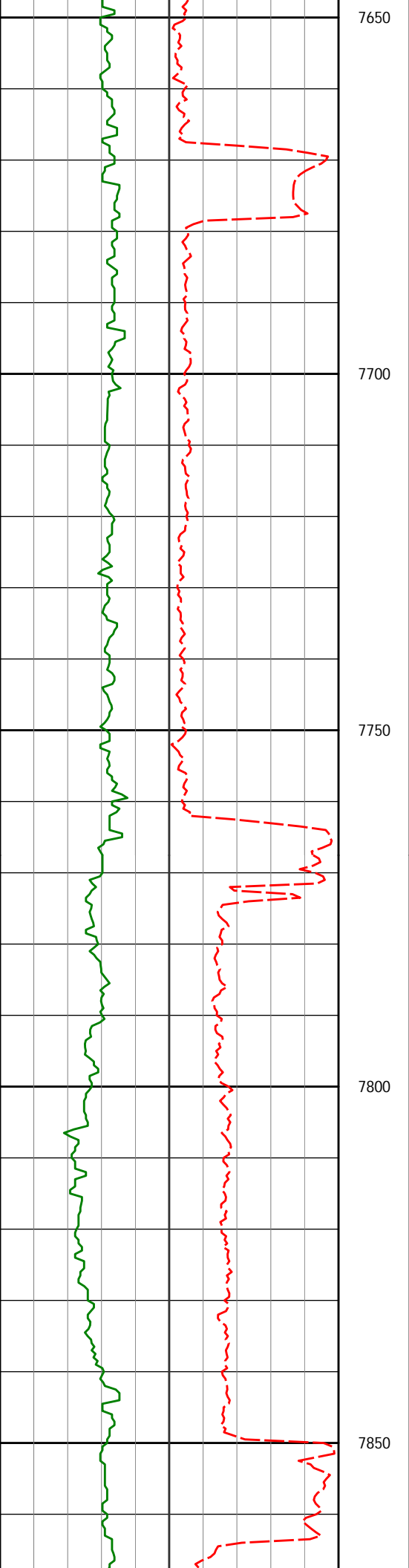
7605'

90.03°

88.38°

6662.50'

1179.68'



7700'

89.69°

89.06°

6662.74'

1274.60'

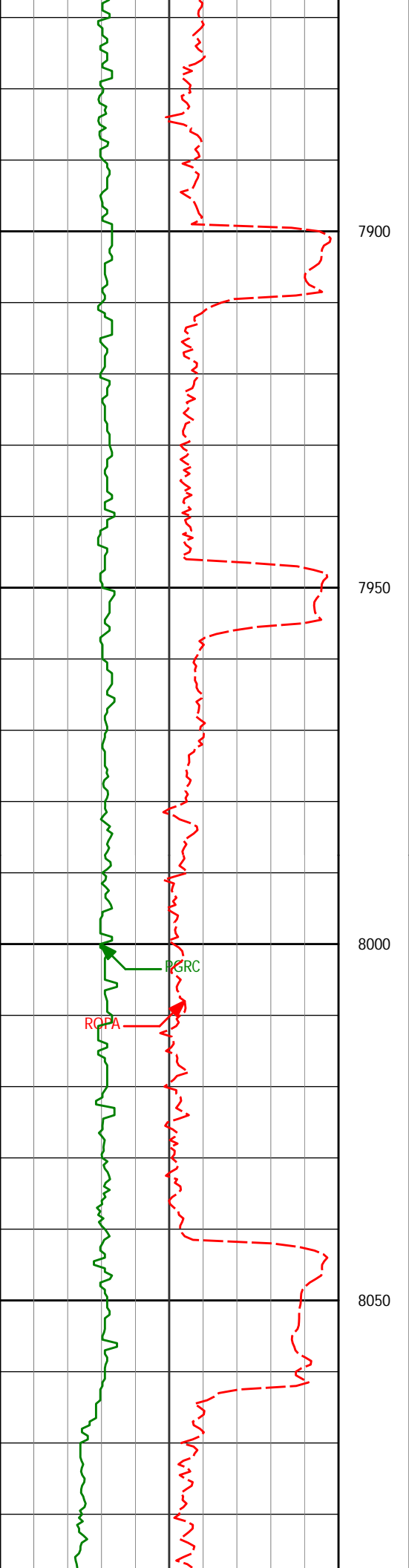
7794'

91.97°

90.62°

6661.38'

1368.41'



7889'

91.54°

91.31°

6658.47'

1463.06'

7900

7950

7984'

90.83°

93.33°

6656.50'

1557.52'

8000

8050

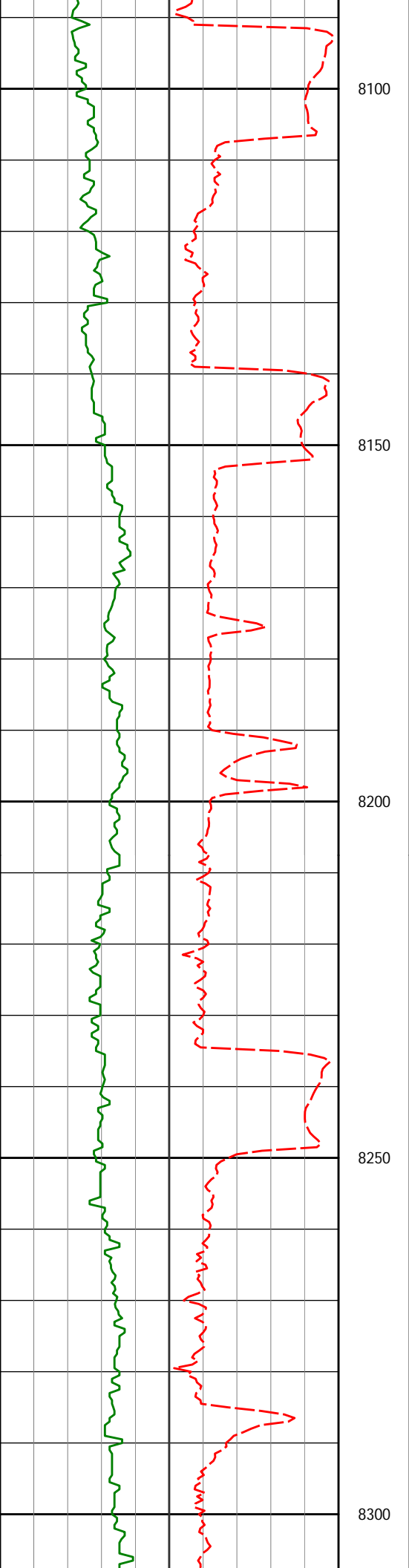
8079'

88.86°

92.56°

6656.76'

1651.89'



8173'

88.95°

89.43°

6658.55'

1745.55'

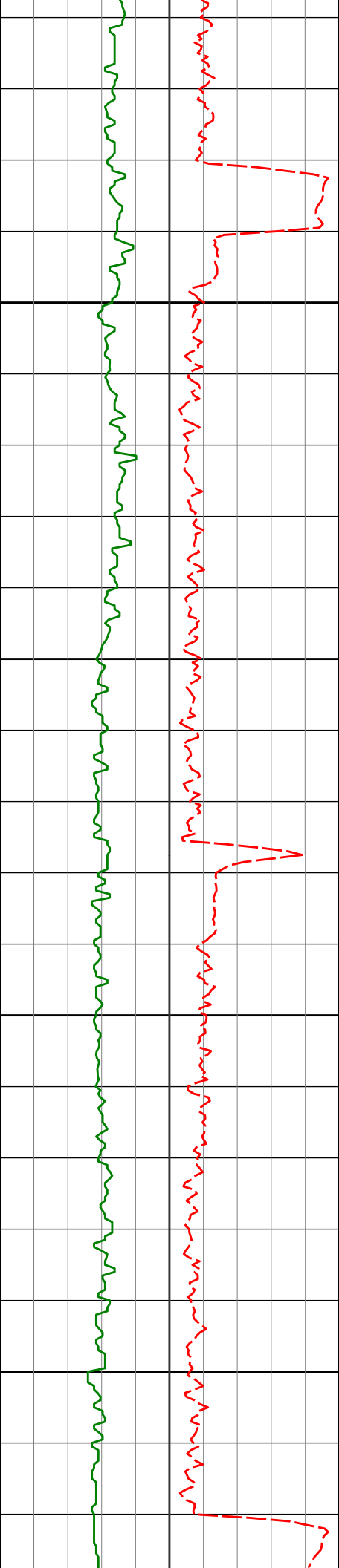
8268'

91.20°

88.53°

6658.43'

1840.45'



8350

8363'

89.29°

88.25°

6658.02'

1935.38'

8400

8450

8458'

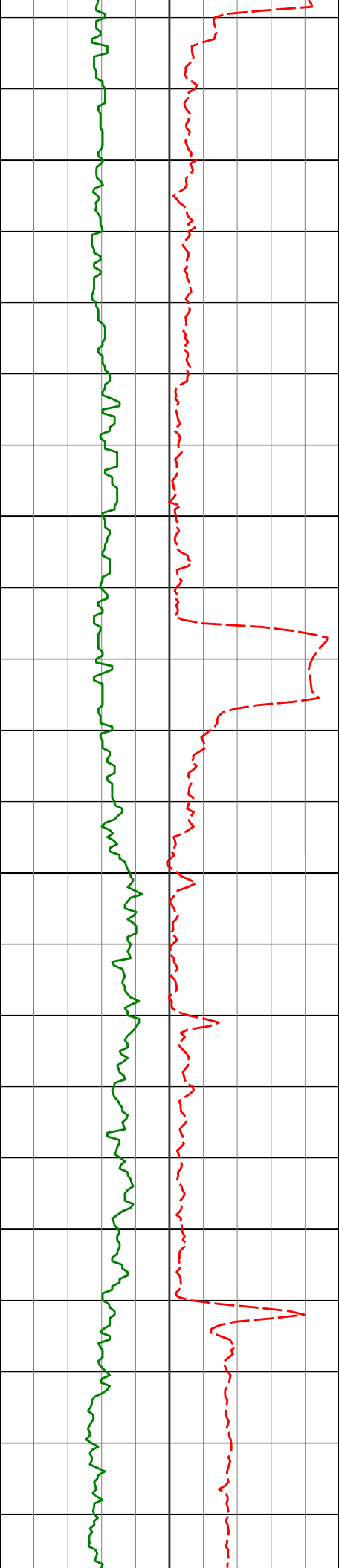
90.92°

88.00°

6657.85'

2030.33'

8500



8550

8553'

90.86°

87.81°

6656.37'

2125.29'

8600

8650

8647'

88.98°

87.47°

6656.51'

2219.26'

8700

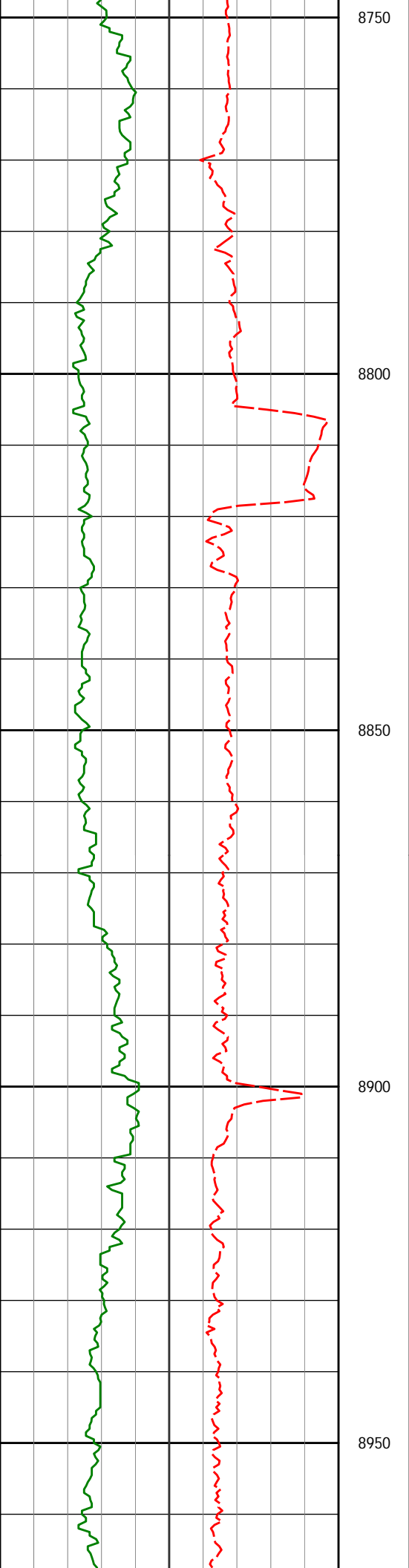
8742'

88.31°

87.27°

6658.75'

2314.22'



8837'

90.49°

86.70°

6659.75'

2409.20'

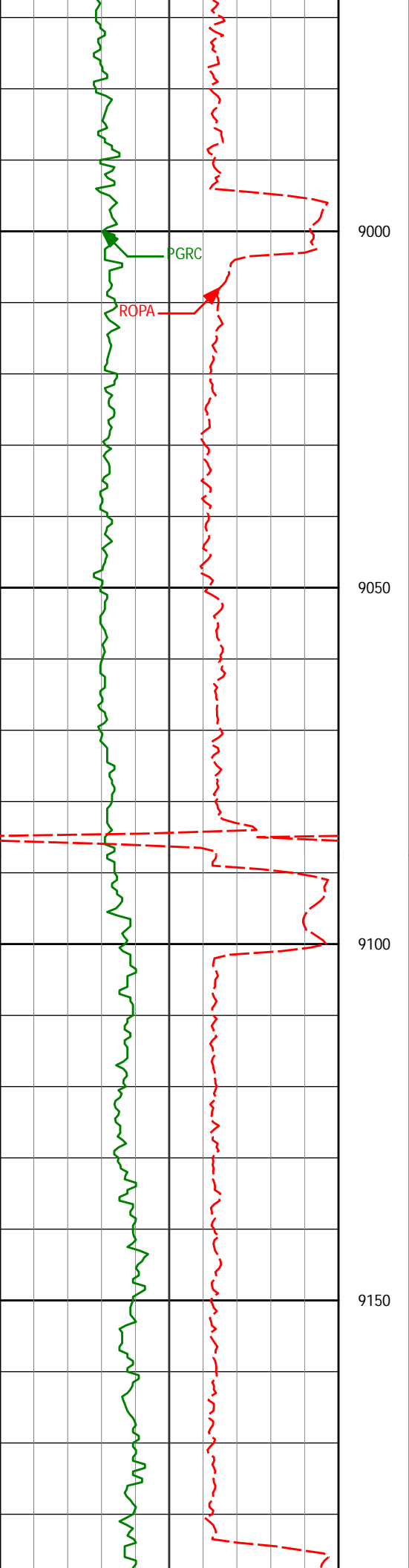
8932'

91.60°

86.75°

6658.01'

2504.18'



9026'

90.58°

87.00°

6656.23'

2598.16'

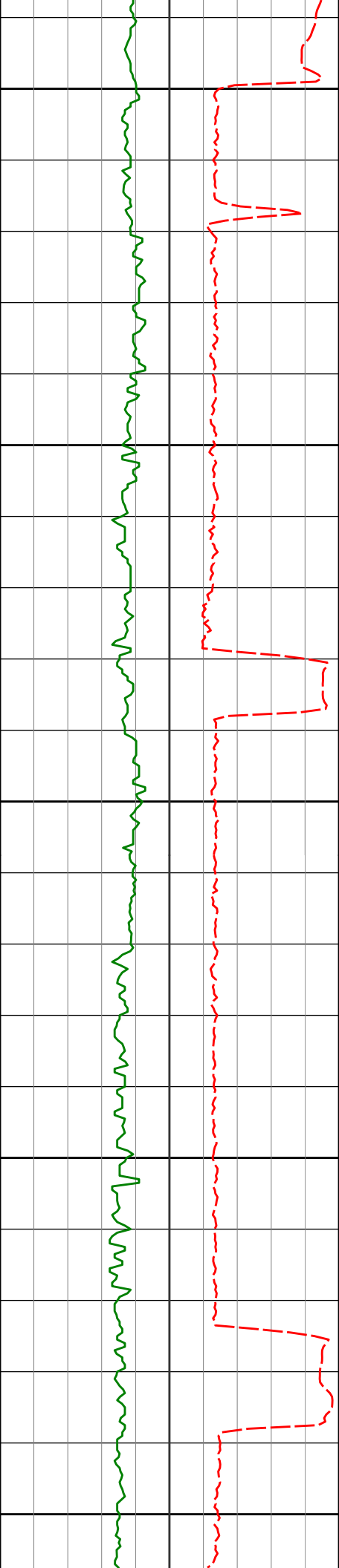
9121'

91.69°

87.39°

6654.34'

2693.13'



9200

9216'

90.46°

89.38°

6652.56'

2788.05'

9250

9300

9311'

89.69°

90.38°

6652.44'

2882.87'

9350

9400

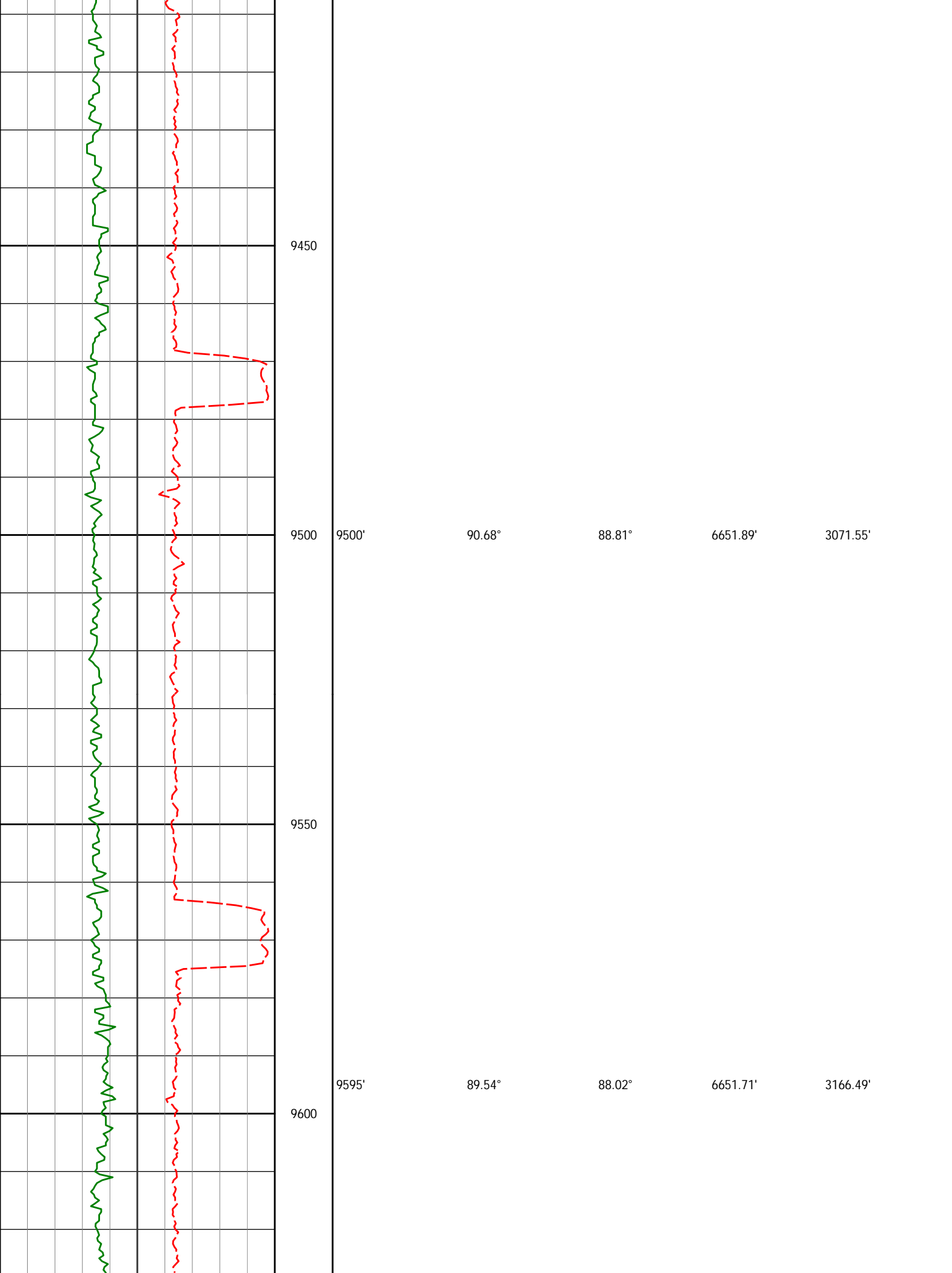
9406'

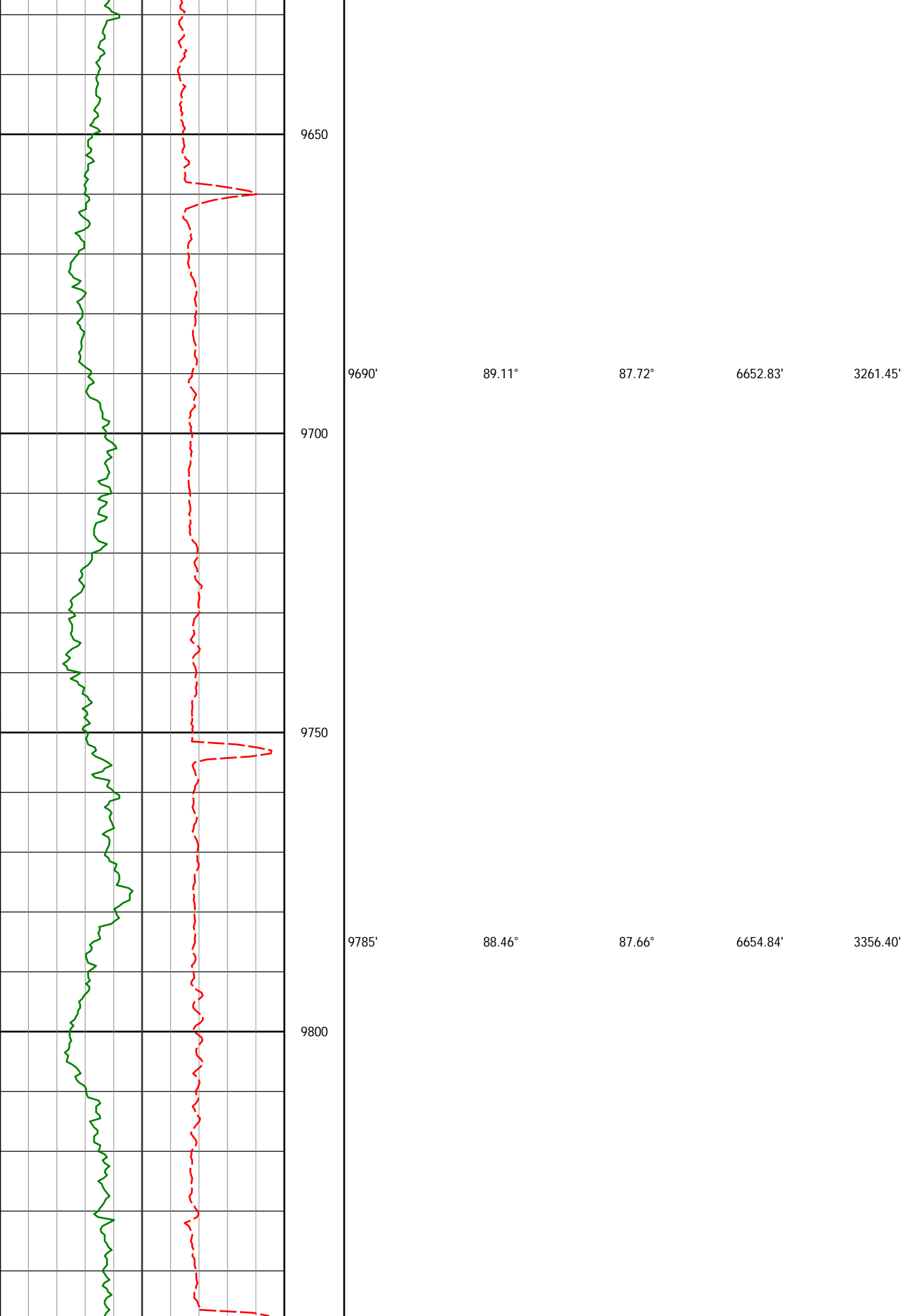
90.15°

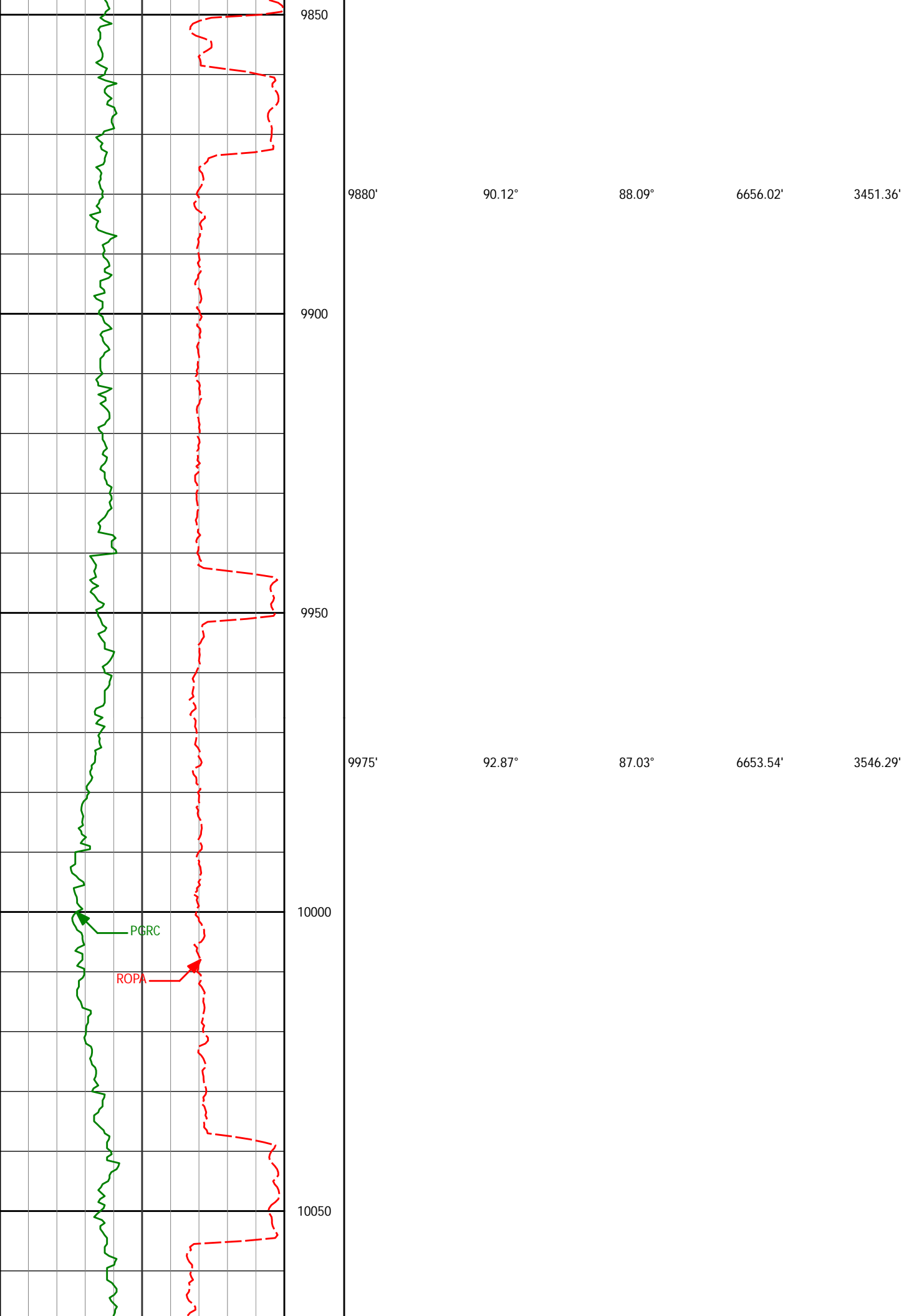
89.71°

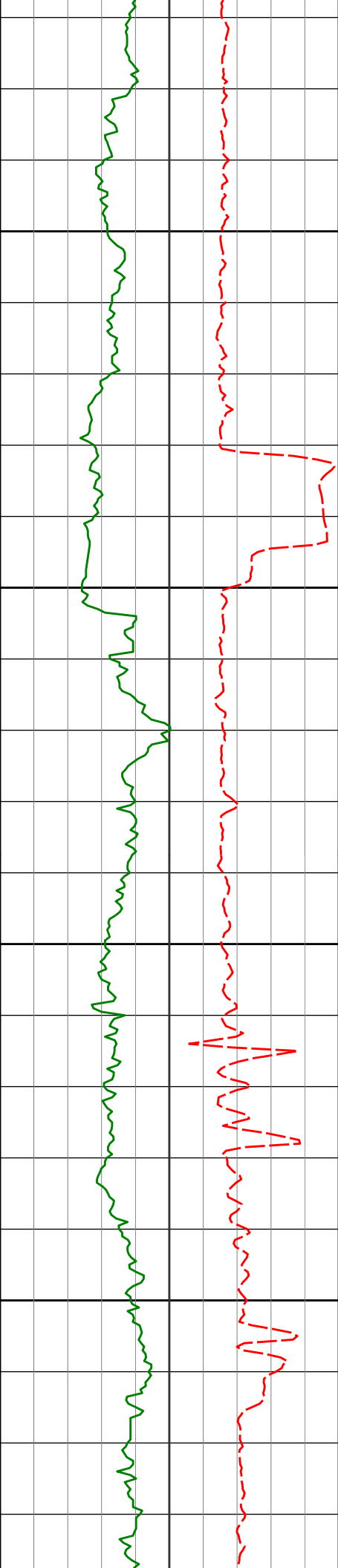
6652.57'

2977.67'

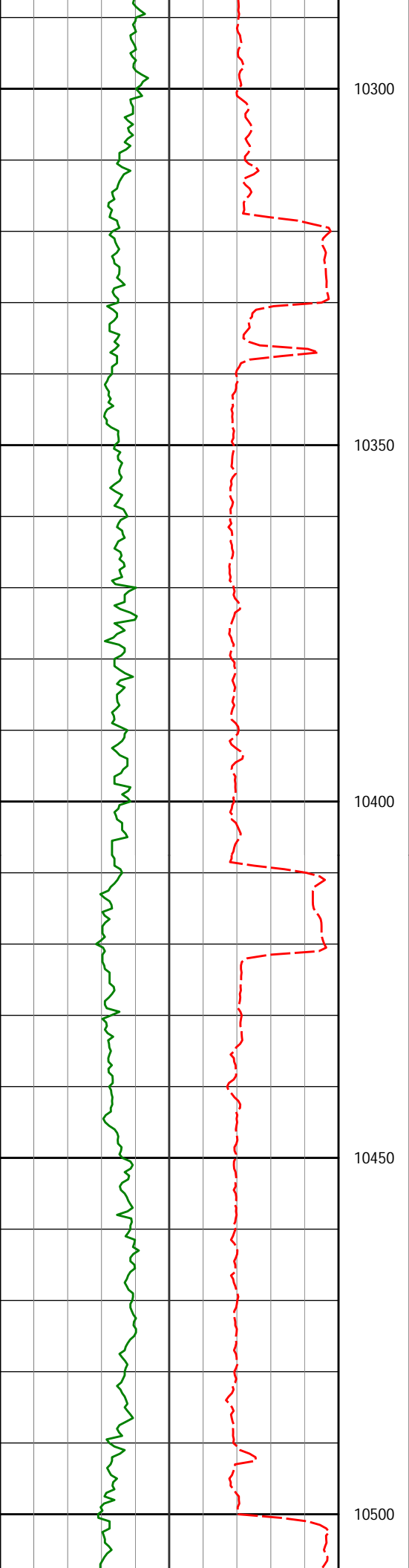








10070'	92.28°	88.96°	6649.27'	3641.15'
10100				
10150				
10165'	90.62°	90.30°	6646.87'	3735.97'
10200				
10250				
10256'	90.95°	90.85°	6645.62'	3826.71'



10348'

89.26°

88.22°

6645.45'

3918.56'

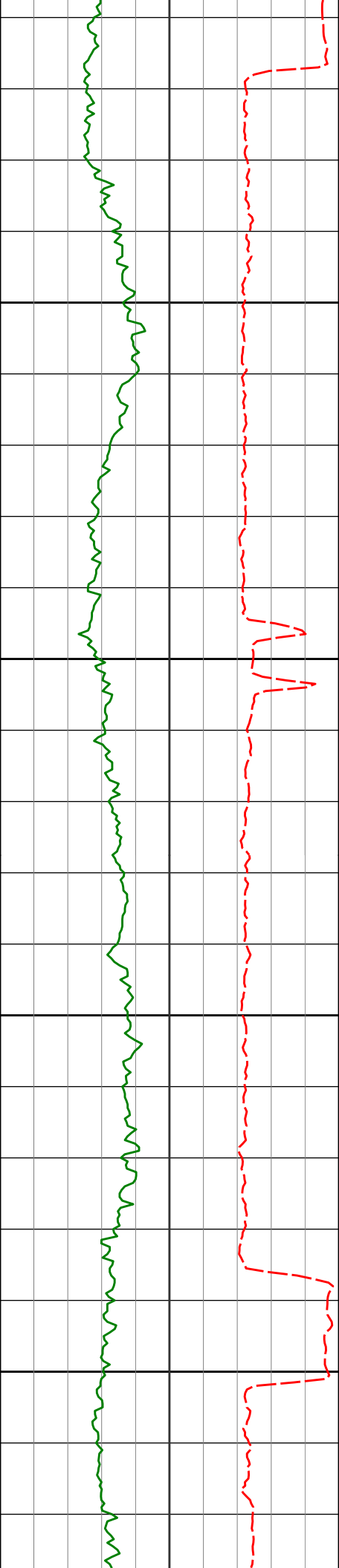
10440'

88.74°

88.62°

6647.06'

4010.49'



10531'

91.70°

88.92°

6646.71'

4101.40'

10550

10600

10624'

92.04°

88.54°

6643.67'

4194.27'

10650

10700

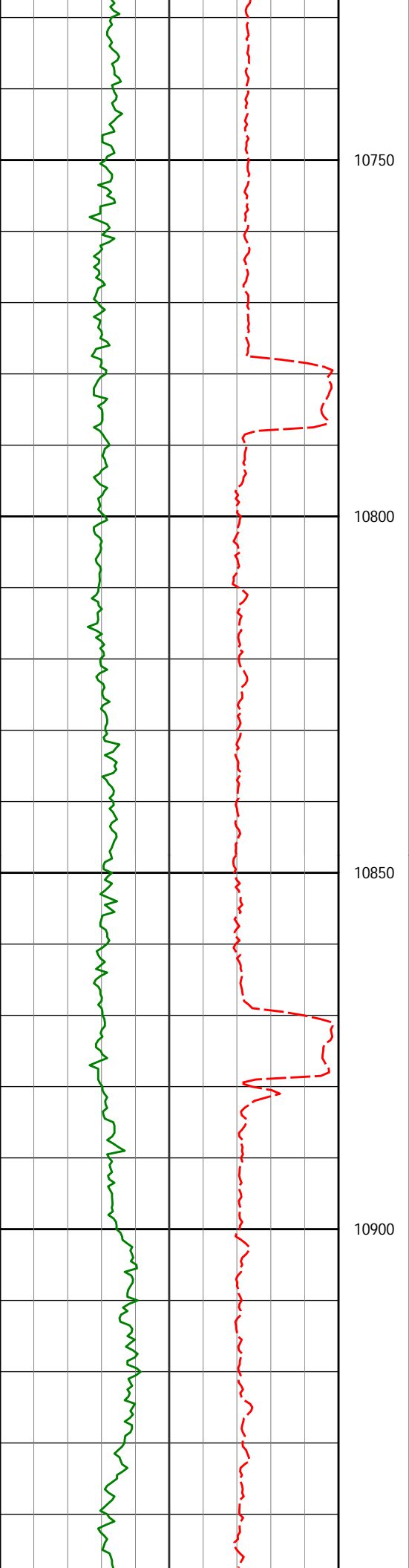
10715'

90.92°

89.95°

6641.32'

4285.12'



10807'

90.80°

90.59°

6639.94'

4376.89'

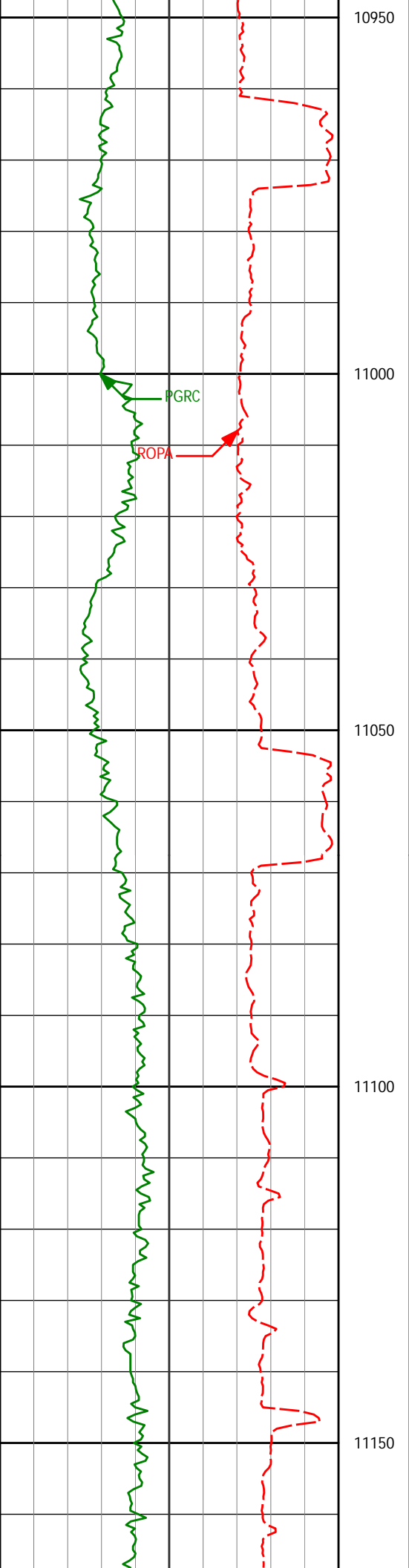
10898'

88.83°

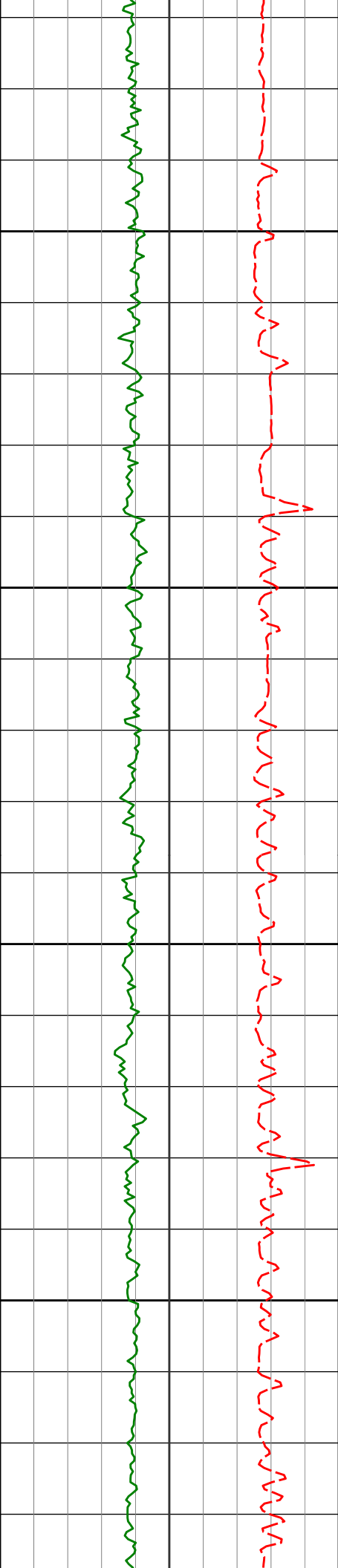
90.57°

6640.24'

4467.64'



10950				
10991'	88.15°	89.26°	6642.69'	4560.43'
11000				
11050				
11083'	89.54°	88.58°	6644.54'	4652.32'
11100				
11150				



11175'

90.65°

88.43°

6644.39'

4744.25'

11200

11250

11268'

90.37°

87.50°

6643.56'

4837.21'

11300

11350

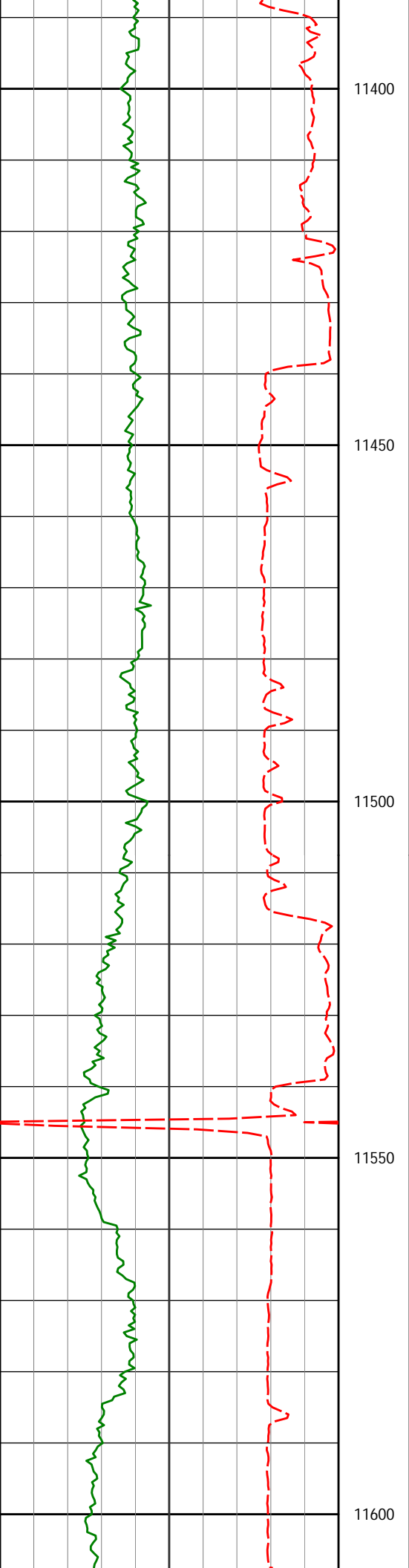
11360'

89.35°

86.98°

6643.79'

4929.20'



11452'

90.49°

86.58°

6643.91'

5021.20'

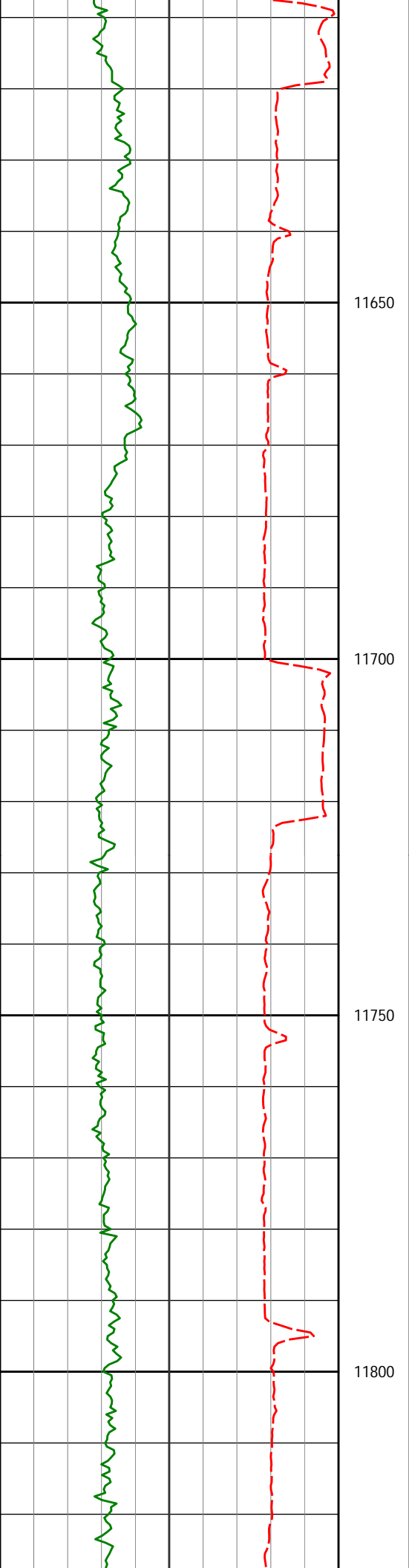
11546'

92.25°

88.82°

6641.67'

5115.13'



11637'

92.90°

89.66°

6637.58'

5205.93'

11650

11700

11729'

89.94°

90.43°

6635.30'

5297.70'

11750

11800

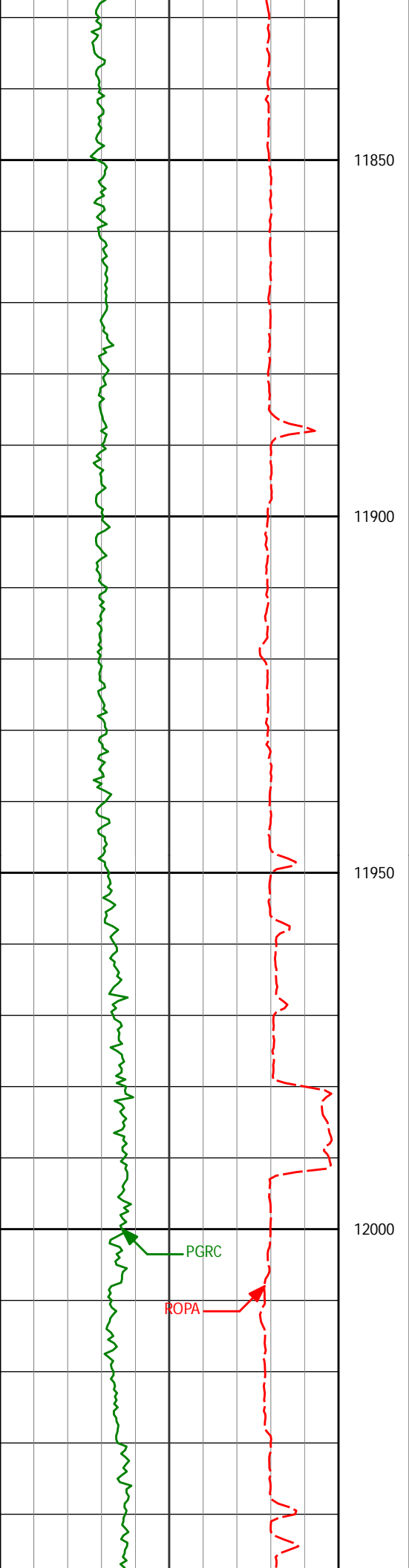
11820'

89.60°

90.09°

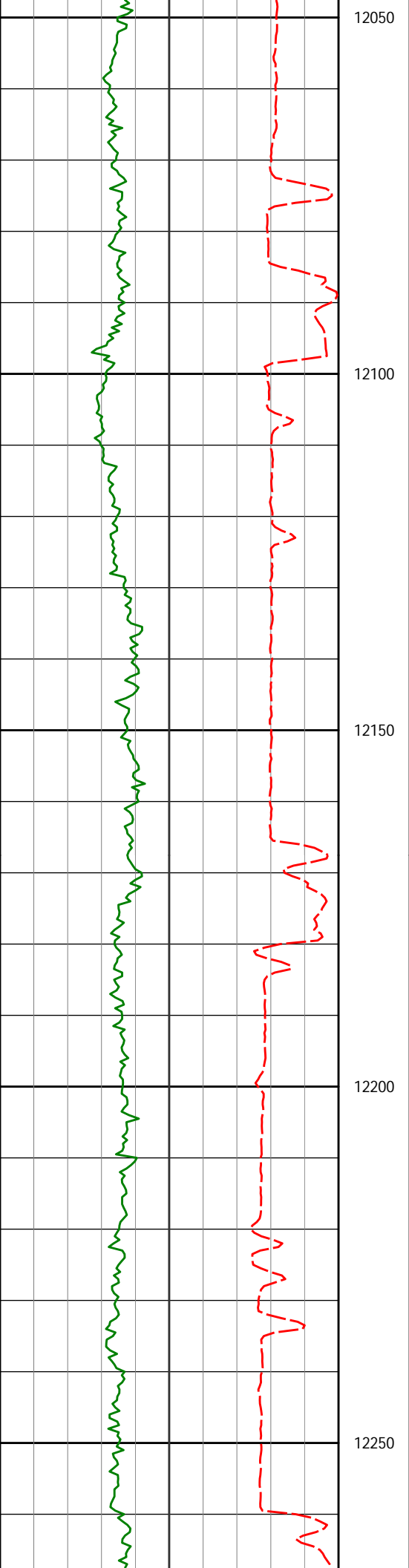
6635.66'

5388.49'



90.65° 90.39° 6635.46' 5481.27'

91.02° 89.47° 6634.09' 5575.08'



12101'

88.40°

89.17°

6634.57'

5668.95'

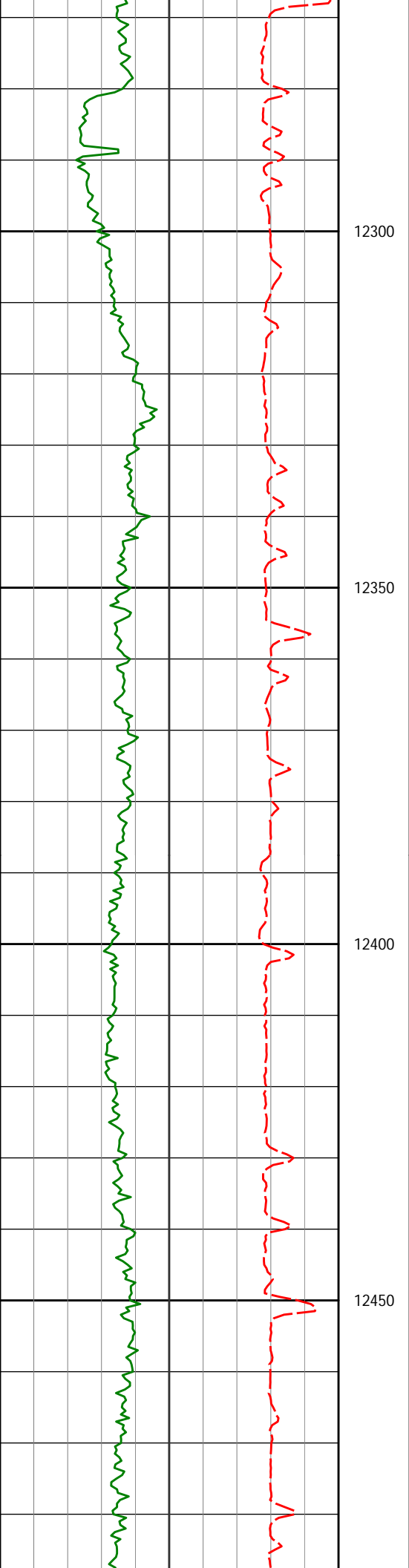
12194'

89.17°

88.10°

6636.54'

5761.85'



12289'

90.65°

87.50°

6636.69'

5856.82'

12300

12350

12384'

91.39°

87.77°

6635.00'

5951.78'

12400

12450

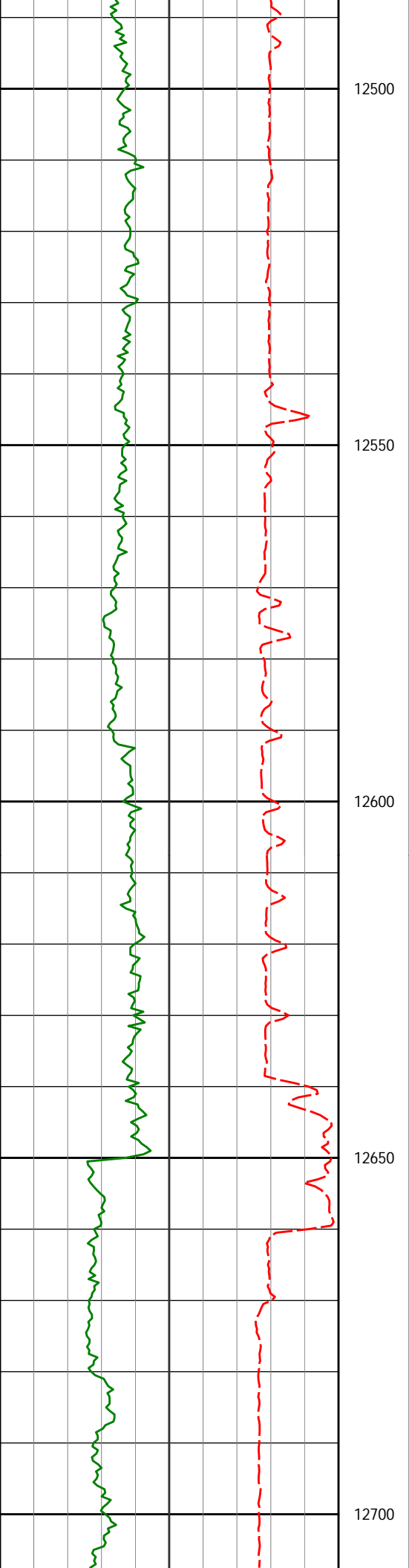
12479'

91.33°

87.32°

6632.74'

6046.73'



12573'

92.38°

87.58°

6629.70'

6140.67'

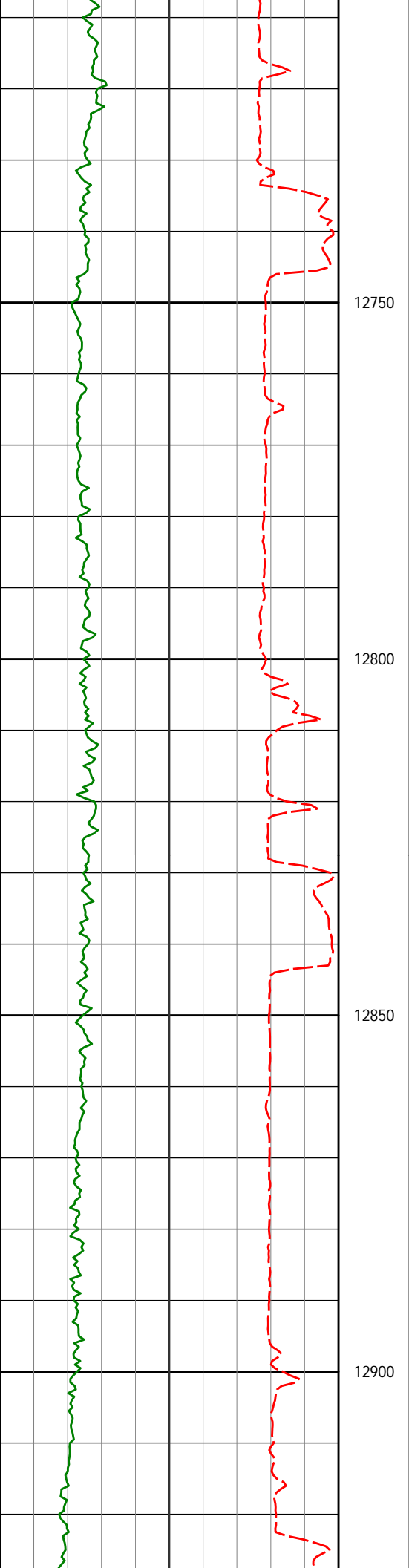
12668'

90.71°

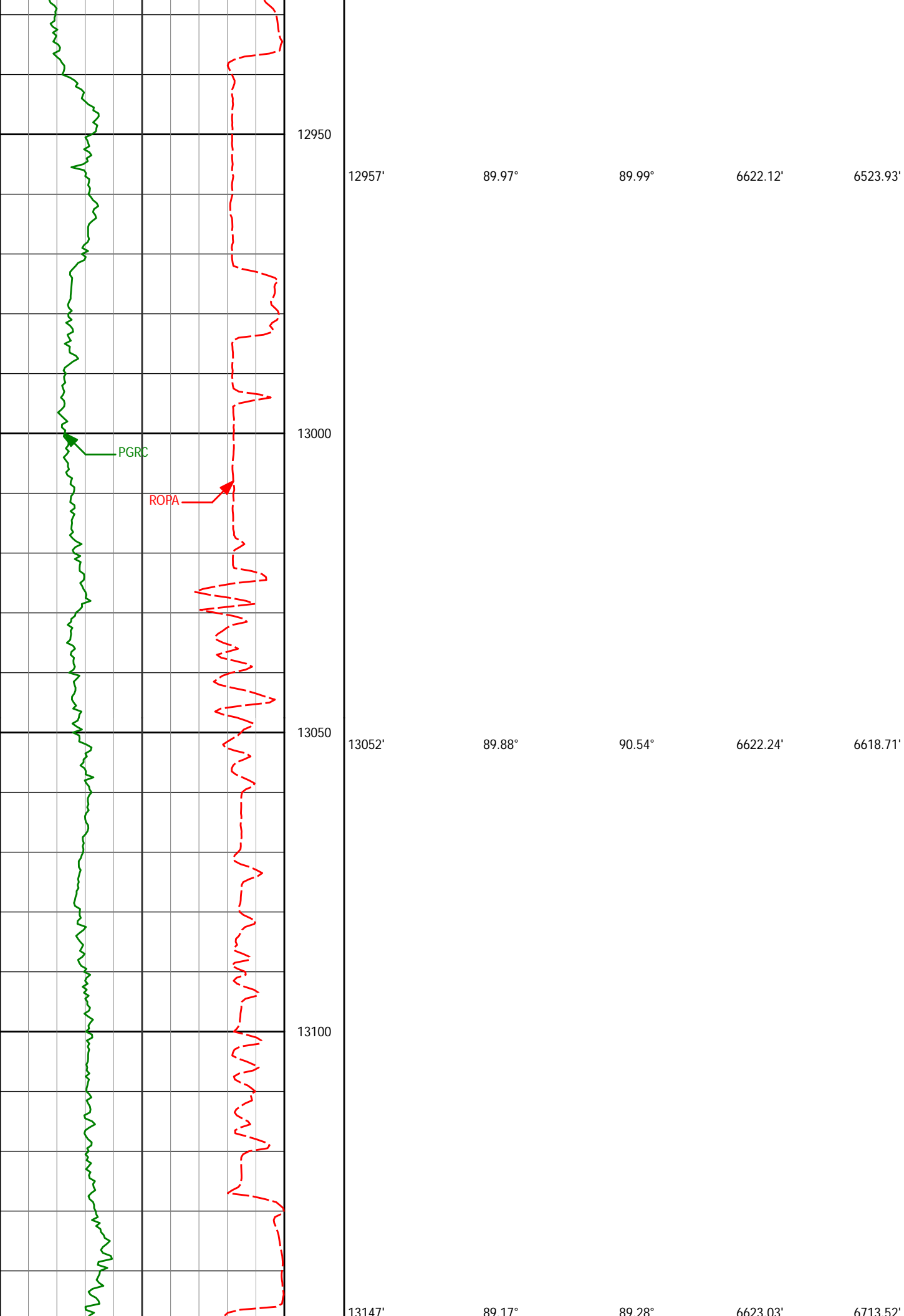
88.25°

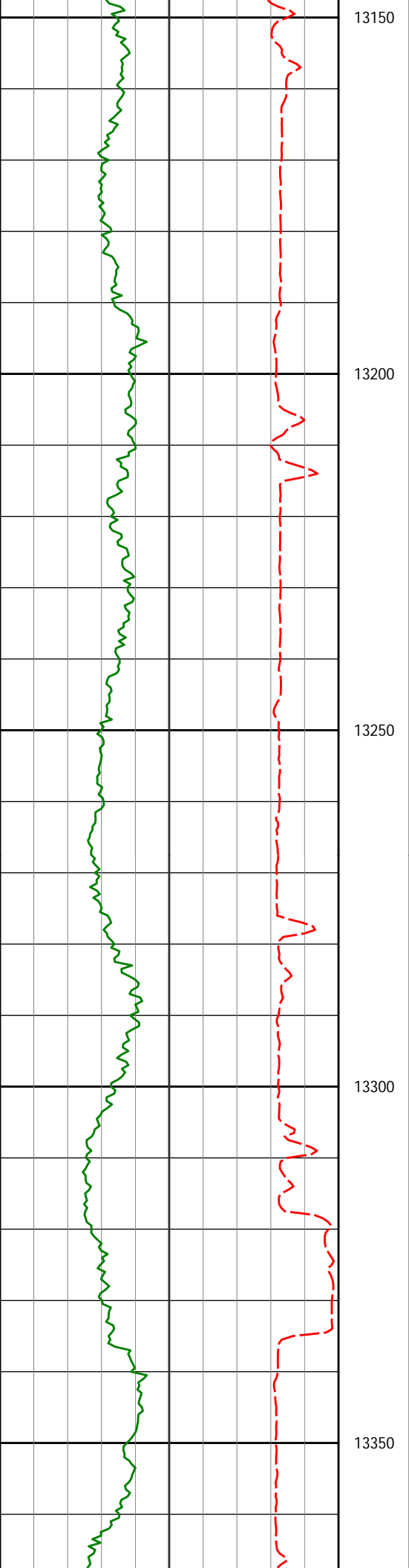
6627.14'

6235.59'

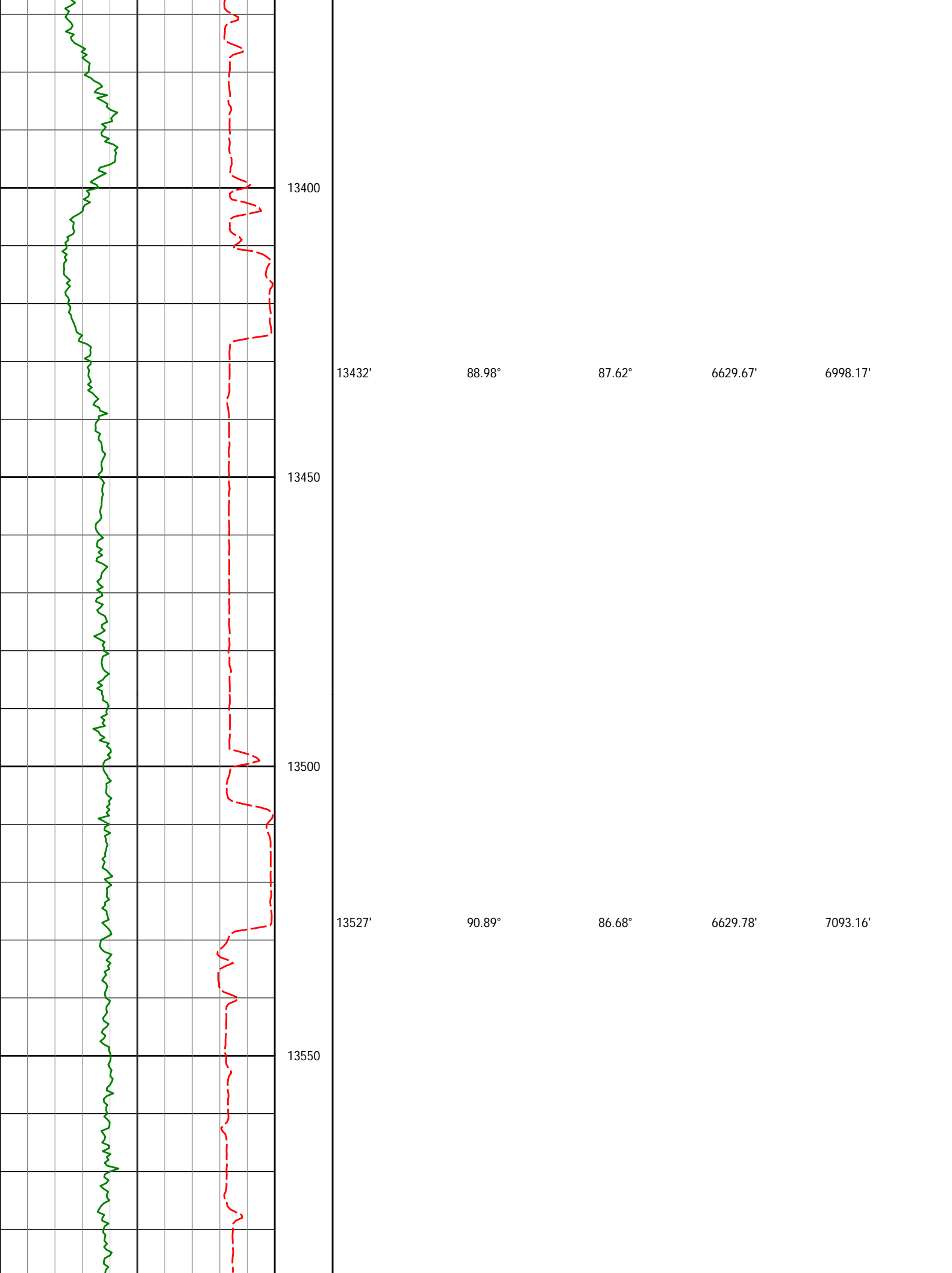


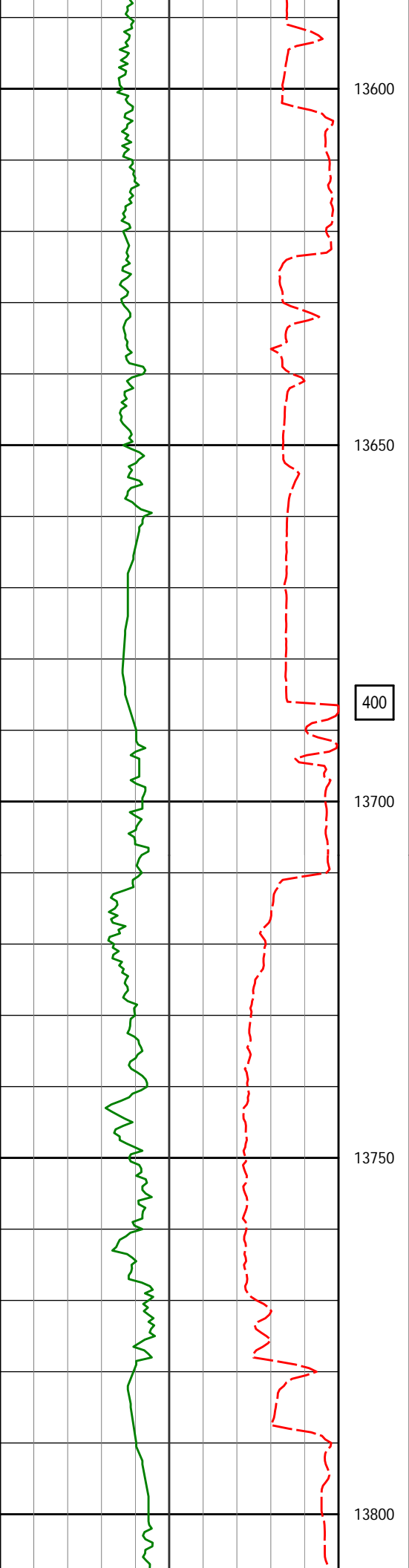
12750					
12763'	91.33°	90.13°	6625.45'	6330.46'	
12800					
12850					
12858'	91.33°	90.83°	6623.24'	6425.19'	
12900					





13150	13147'	89.71°	89.73°	6626.66'	6716.62'
13200					
13242'	88.71°	89.73°	6624.79'	6808.37'	
13250					
13300					
13337'	88.21°	88.13°	6627.34'	6903.23'	
13350					





13622'

90.52°

87.97°

6628.61'

7188.13'

400

13700

13716'

88.71°

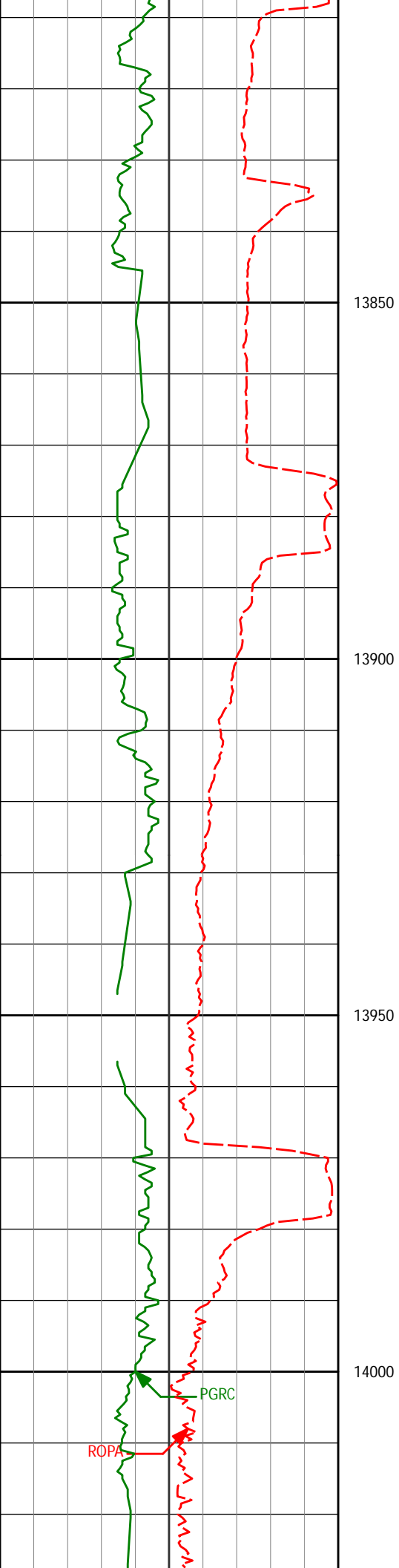
88.61°

6629.24'

7282.07'

13750

13800



13811'

90.52°

89.03°

6629.88'

7376.98'

13850

13900

13906'

92.35°

89.43°

6627.50'

7471.83'

13950

14000

14001'

91.82°

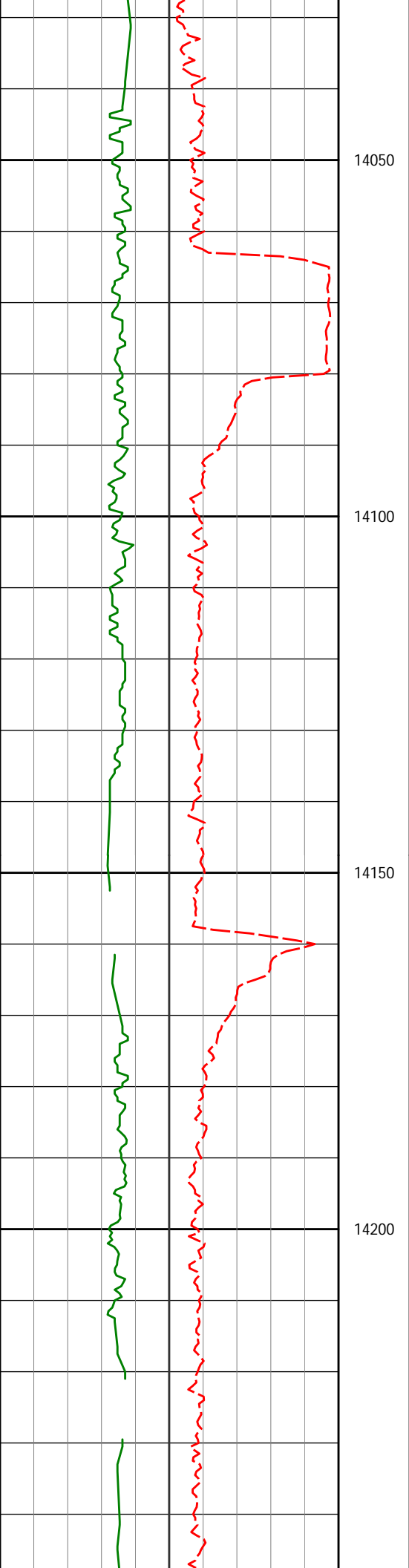
88.93°

6624.04'

7566.65'

PGRC

ROPA



14096'

91.05°

89.67°

6621.67'

7661.50'

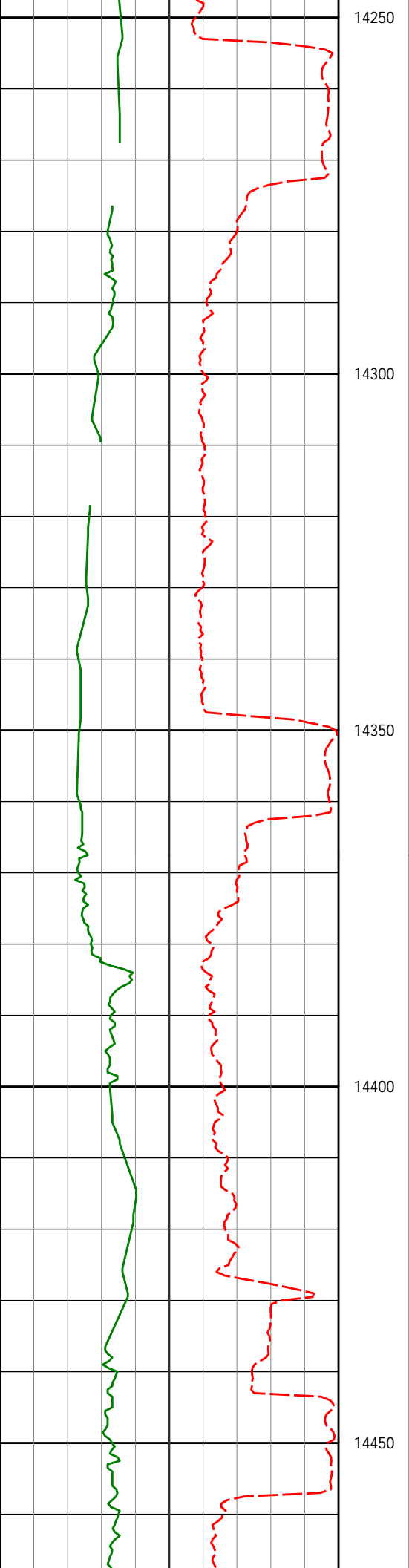
14191'

90.28°

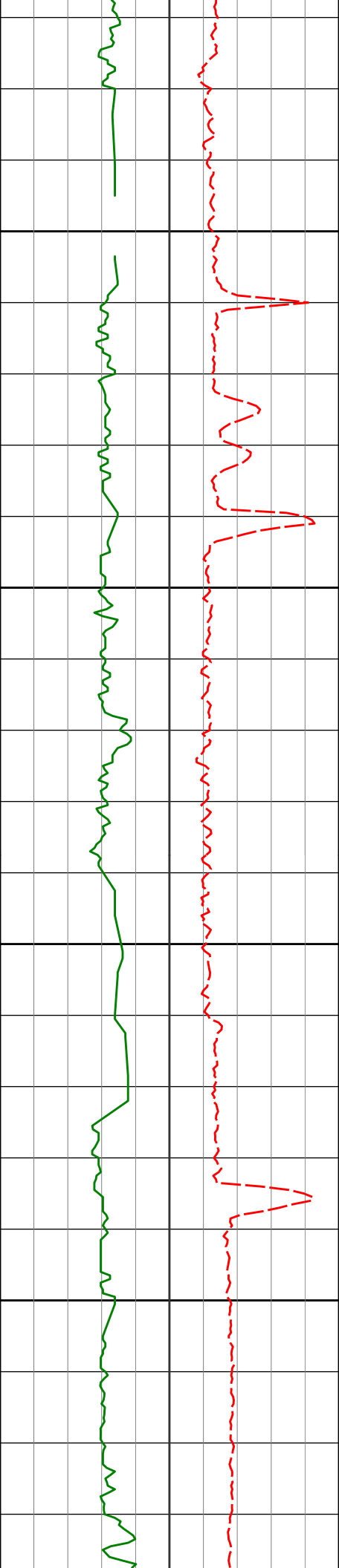
87.72°

6620.56'

7756.41'



14250				
14286'	90.92°	88.65°	6619.57'	7851.35'
14300				
14350				
14381'	91.11°	89.55°	6617.89'	7946.23'
14400				
14450				



14476'

90.49°

88.06°

6616.56'

8041.13'

14500

14550

14571'

90.37°

87.99°

6615.85'

8136.09'

14600

14650

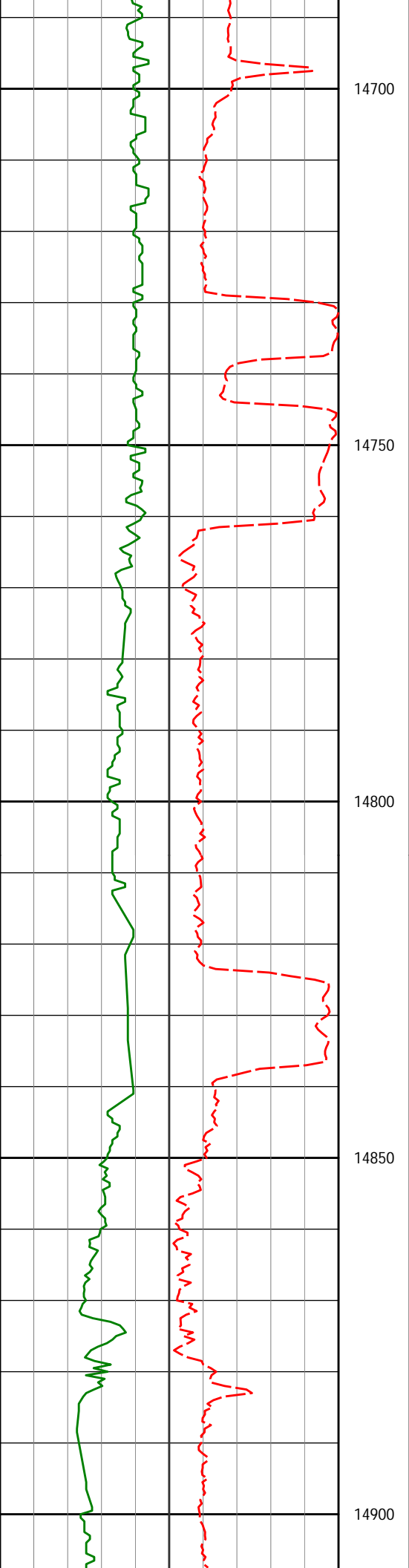
14666'

90.59°

87.79°

6615.05'

8231.05'



14760'

90.03°

88.25°

6614.54'

8325.01'

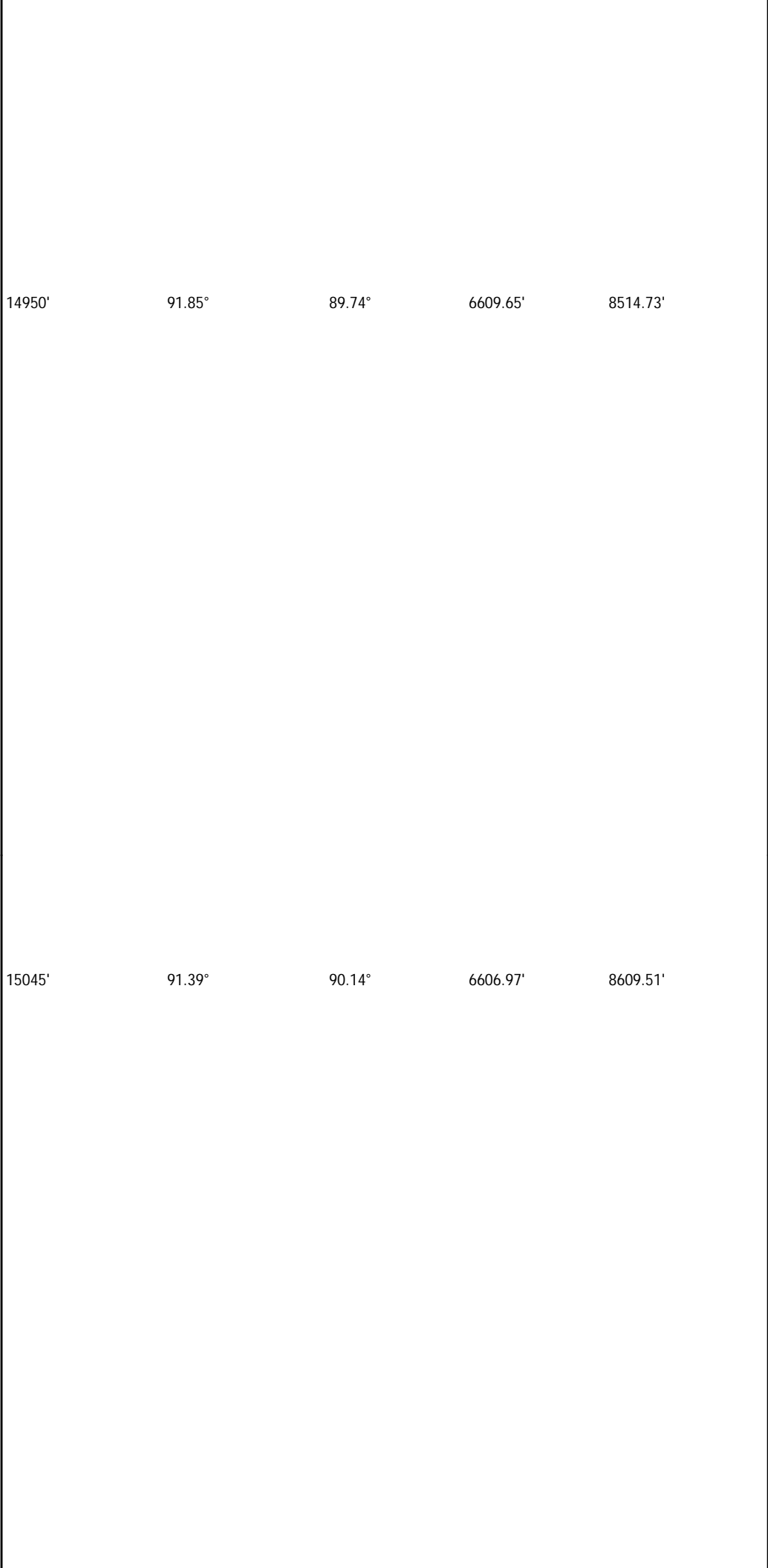
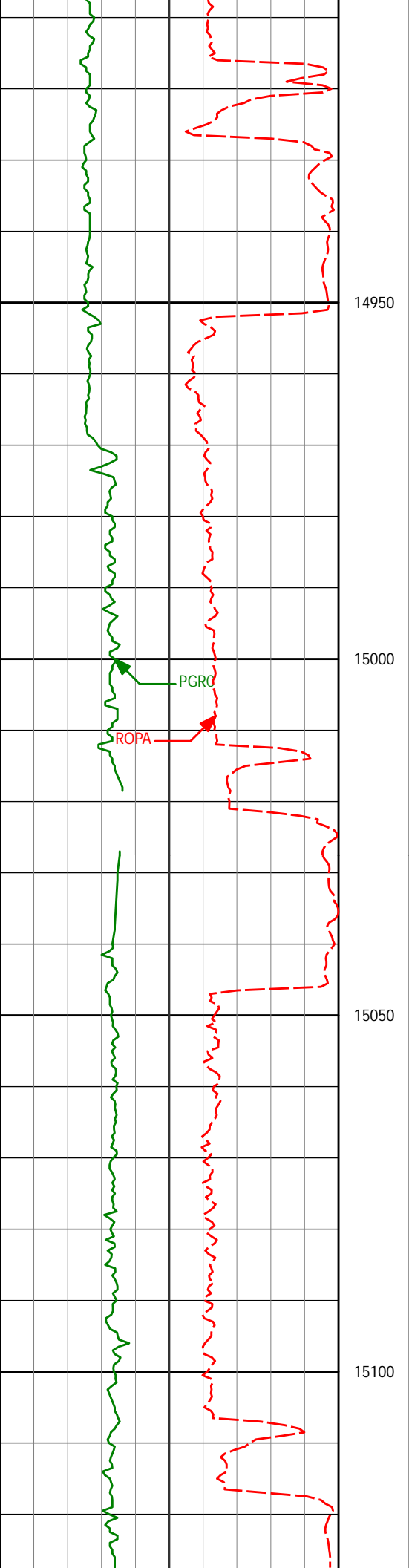
14855'

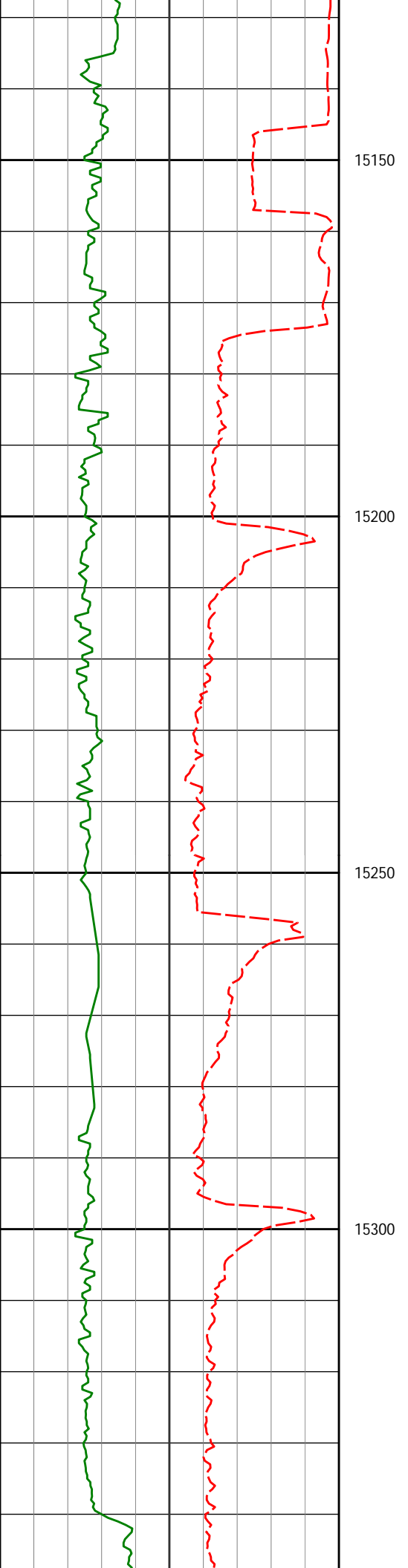
92.01°

88.96°

6612.85'

8419.92'





15140'

89.35°

89.32°

6606.35'

8704.34'

15150

15200

15234'

89.51°

90.07°

6607.29'

8798.18'

15250

15300

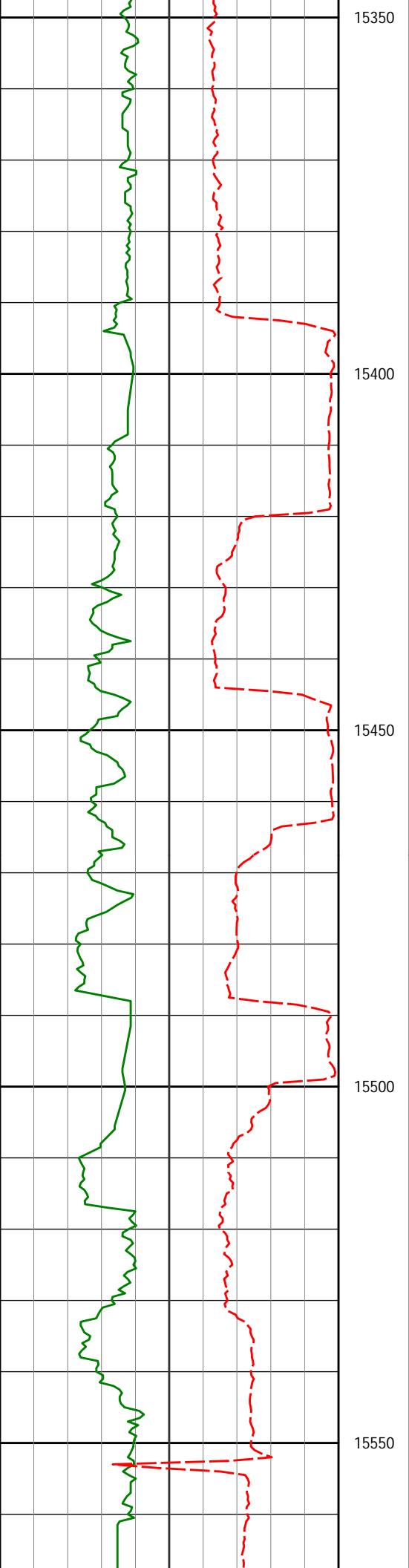
15329'

91.48°

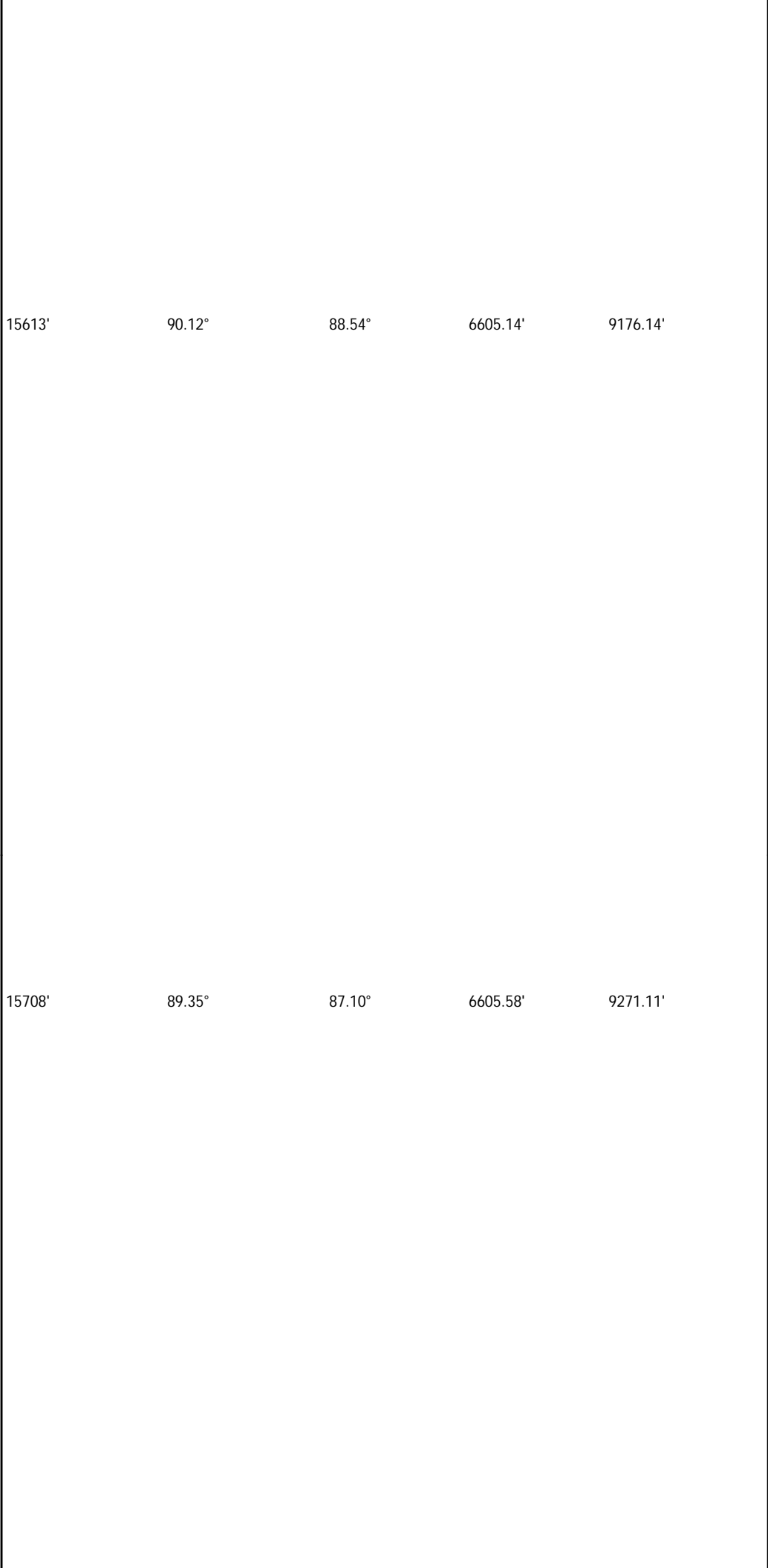
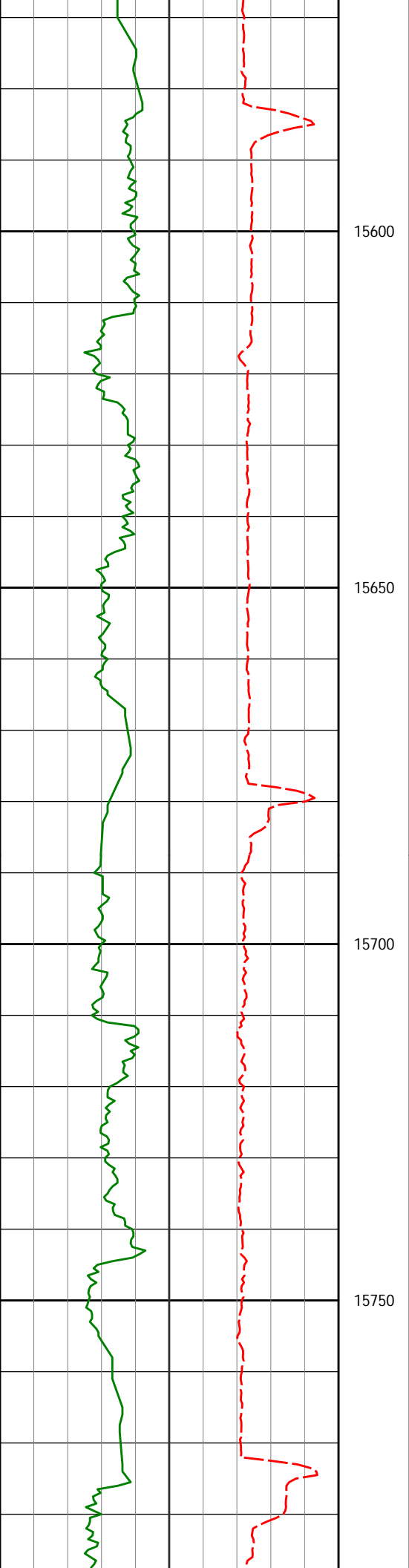
91.41°

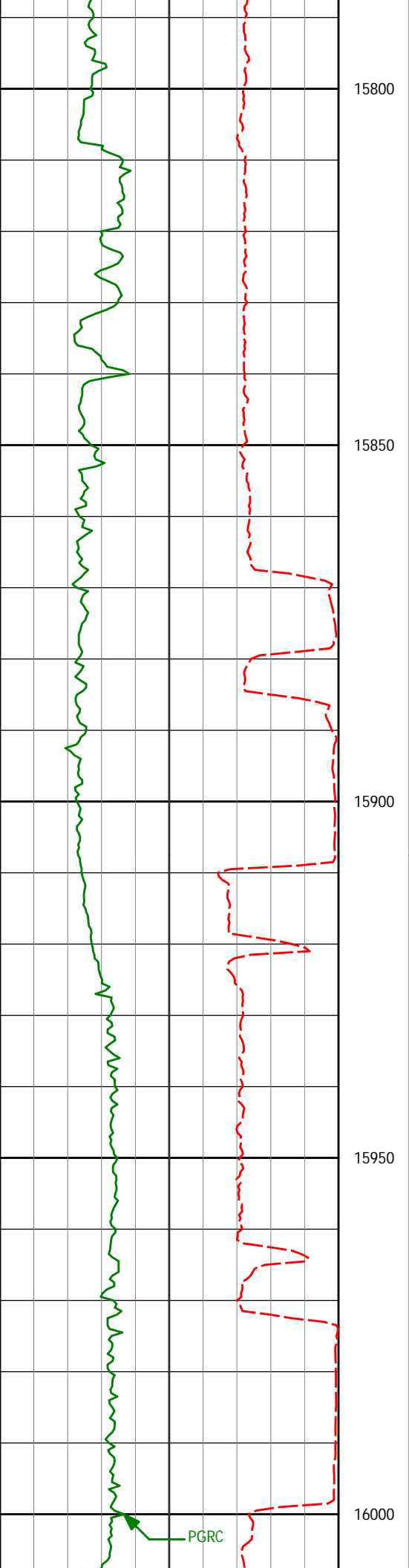
6606.47'

8892.89'

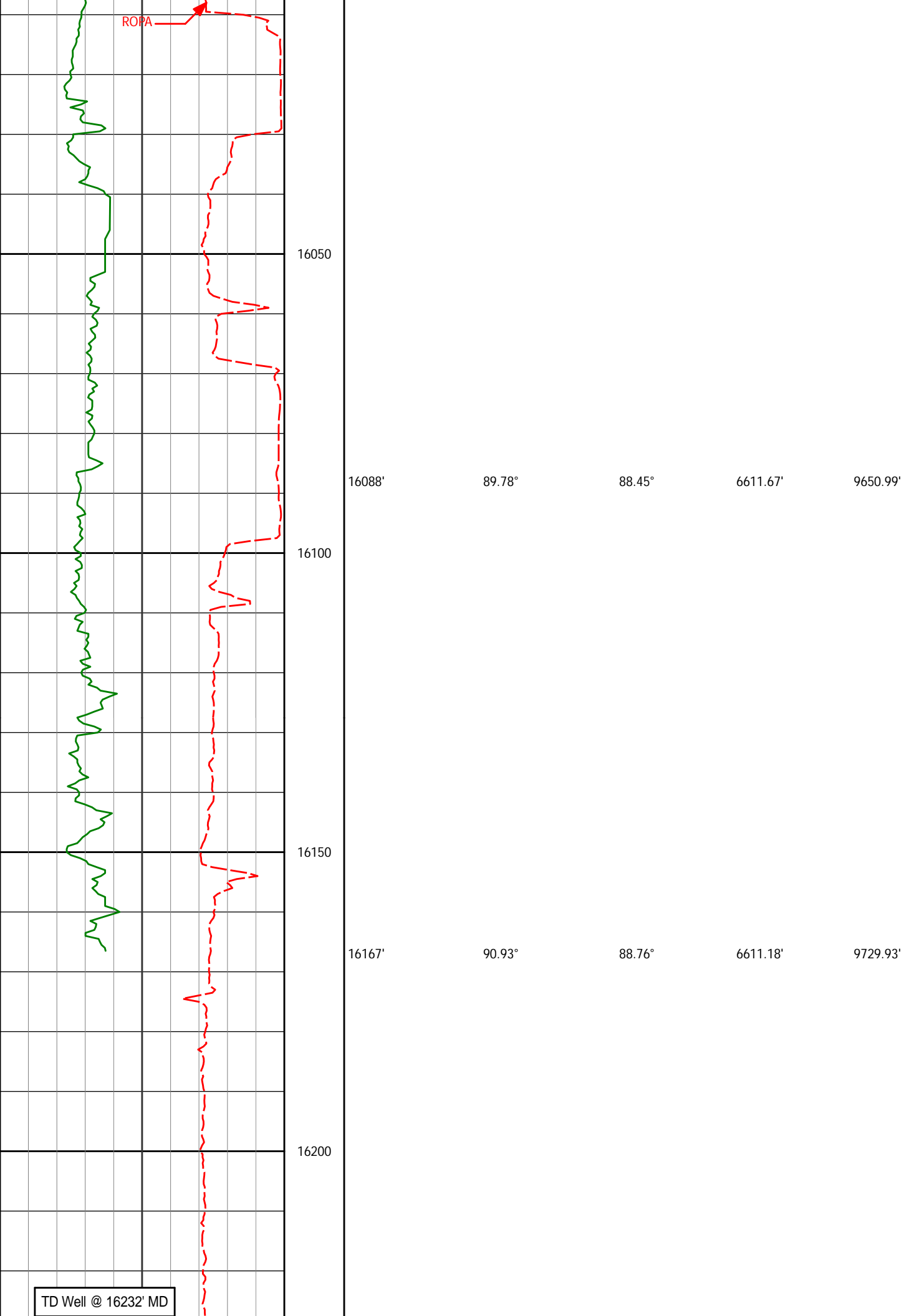


15350					
15400					
15424'	90.25°	91.66°	6605.03'	8987.49'	
15450					
15500					
15519'	89.75°	89.32°	6605.03'	9082.24'	
15550					





15800	15803'	88.86°	84.36°	6607.06'	9366.08'
15850					
15900	15898'	89.35°	85.59°	6608.55'	9461.04'
15950					
16000	15993'	88.55°	85.99°	6610.29'	9556.02'



[illegible]

HALLIBURTON

DIRECTIONAL SURVEY REPORT

**Noble Energy
NCLP PC AA04-63-1HN
Wattensburg
Weld Colorado
USA
CA-XX-0900859730**

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
250.00	0.40	140.31	250.00	0.67 S	0.56 E	0.51	0.16
500.00	0.40	299.51	500.00	0.91 S	0.36 E	0.30	0.31
595.00	0.90	65.31	594.99	0.44 S	0.74 E	0.72	1.24
720.00	0.44	132.91	719.98	0.35 S	1.99 E	1.96	0.67
811.00	0.29	310.20	810.98	0.44 S	2.07 E	2.04	0.80
903.00	0.09	267.34	902.98	0.30 S	1.82 E	1.80	0.25
996.00	0.17	29.41	995.98	0.18 S	1.81 E	1.80	0.25
1087.00	1.08	358.88	1086.98	0.79 N	1.86 E	1.91	1.03
1181.00	1.60	1.99	1180.95	2.99 N	1.89 E	2.08	0.56
1365.00	1.42	4.51	1364.89	7.83 N	2.16 E	2.65	0.10
1458.00	1.74	10.64	1457.85	10.37 N	2.51 E	3.16	0.39
1550.00	1.49	8.51	1549.82	12.92 N	2.95 E	3.76	0.28
1642.00	1.10	6.74	1641.79	14.98 N	3.23 E	4.17	0.43
1733.00	1.16	10.87	1732.77	16.76 N	3.50 E	4.56	0.11
1826.00	0.86	244.26	1825.77	17.38 N	3.05 E	4.15	1.95
1919.00	1.02	218.20	1918.75	16.42 N	1.91 E	2.95	0.49
2014.00	0.65	241.65	2013.74	15.50 N	0.91 E	1.89	0.52
2201.00	1.10	241.08	2200.72	14.13 N	1.59 W	-0.69	0.24
2296.00	1.00	240.62	2295.71	13.28 N	3.11 W	-2.26	0.11
2390.00	0.92	269.75	2389.69	12.88 N	4.58 W	-3.76	0.52
2454.00	0.38	257.44	2453.69	12.83 N	5.30 W	-4.48	0.87
2517.00	0.77	320.68	2516.69	13.11 N	5.77 W	-4.93	1.09
2612.00	0.92	306.68	2611.68	14.06 N	6.79 W	-5.89	0.27
2707.00	0.94	290.33	2706.66	14.79 N	8.13 W	-7.18	0.28
2801.00	1.23	328.77	2800.65	15.92 N	9.38 W	-8.35	0.81
2896.00	0.20	61.60	2895.64	16.87 N	9.76 W	-8.67	1.32
2991.00	0.28	66.67	2990.64	17.04 N	9.40 W	-8.31	0.09
3086.00	0.28	167.13	3085.64	16.91 N	9.14 W	-8.05	0.45
3181.00	0.41	188.67	3180.64	16.34 N	9.14 W	-8.08	0.19
3275.00	0.25	117.30	3274.64	15.92 N	9.01 W	-7.98	0.43
3370.00	0.47	116.39	3369.63	15.65 N	8.47 W	-7.47	0.23
3465.00	0.94	83.05	3464.63	15.57 N	7.35 W	-6.35	0.64
3559.00	0.26	98.40	3558.62	15.63 N	6.37 W	-5.37	0.74
3654.00	0.68	149.18	3653.62	15.12 N	5.87 W	-4.90	0.58

3834.00	0.88	149.18	3833.82	15.12 N	5.87 W	-4.36	0.38
3749.00	0.43	148.40	3748.61	14.33 N	5.40 W	-4.48	0.26
3843.00	0.39	143.95	3842.61	13.77 N	5.02 W	-4.14	0.05
3938.00	0.81	154.38	3937.61	12.90 N	4.54 W	-3.72	0.45
4033.00	0.68	160.63	4032.60	11.77 N	4.07 W	-3.31	0.16
4128.00	0.84	151.61	4127.59	10.62 N	3.55 W	-2.87	0.21
4223.00	0.99	148.30	4222.58	9.31 N	2.78 W	-2.19	0.17
4318.00	1.51	143.74	4317.55	7.60 N	1.61 W	-1.13	0.56
4413.00	0.89	166.22	4412.53	5.88 N	0.70 W	-0.32	0.81
4512.00	0.84	150.46	4511.52	4.50 N	0.16 W	0.13	0.24
4570.00	0.62	211.32	4569.52	3.86 N	0.11 W	0.13	1.32
4665.00	3.26	342.09	4664.47	5.99 N	1.21 W	-0.83	3.89
4760.00	4.90	344.25	4759.23	12.47 N	3.14 W	-2.34	1.73
4855.00	6.50	349.46	4853.76	21.66 N	5.23 W	-3.84	1.77
4949.00	7.23	354.66	4947.08	32.78 N	6.75 W	-4.66	1.02
5044.00	9.93	354.41	5041.01	46.89 N	8.10 W	-5.12	2.84
5139.00	11.14	350.75	5134.41	64.10 N	10.38 W	-6.30	1.45
5234.00	11.95	349.96	5227.49	82.84 N	13.57 W	-8.29	0.87
5329.00	14.80	353.70	5319.90	104.59 N	16.61 W	-9.96	3.13
5424.00	14.85	348.17	5411.74	128.57 N	20.44 W	-12.26	1.49
5519.00	12.27	344.17	5504.09	150.20 N	25.69 W	-16.13	2.89
5614.00	13.09	347.39	5596.77	170.41 N	30.79 W	-19.94	1.14
5708.00	14.32	352.18	5688.10	192.32 N	34.70 W	-22.45	1.78
5803.00	12.54	356.36	5780.50	214.25 N	36.95 W	-23.31	2.13
5898.00	13.67	355.31	5873.02	235.73 N	38.53 W	-23.52	1.22
5924.00	12.86	353.97	5898.33	241.67 N	39.08 W	-23.70	3.33
5992.00	12.02	3.08	5964.74	256.27 N	39.50 W	-23.19	3.14
6040.00	11.73	13.15	6011.72	266.01 N	38.12 W	-21.20	4.35
6087.00	13.77	26.65	6057.57	275.67 N	34.52 W	-17.00	7.65
6135.00	18.34	38.86	6103.69	286.66 N	27.21 W	-9.01	11.79
6182.00	21.73	45.76	6147.85	298.49 N	16.34 W	2.60	8.78
6230.00	21.88	55.36	6192.43	309.78 N	2.61 W	17.01	7.43
6277.00	24.42	61.03	6235.65	319.47 N	13.10 E	33.30	7.18
6325.00	27.71	65.12	6278.76	328.97 N	31.91 E	52.68	7.81
6372.00	32.13	68.13	6319.49	338.23 N	53.44 E	74.75	9.93
6420.00	34.45	69.20	6359.61	347.81 N	77.98 E	99.84	4.99
6467.00	38.51	69.44	6397.40	357.67 N	104.12 E	126.55	8.64
6515.00	44.45	71.14	6433.34	368.36 N	134.04 E	157.09	12.59
6561.00	49.13	72.99	6464.83	378.66 N	165.93 E	189.58	10.59
6609.00	50.07	77.26	6495.95	388.03 N	201.25 E	225.41	7.05
6656.00	52.16	80.78	6525.46	394.98 N	237.16 E	261.69	7.33
6704.00	55.50	81.21	6553.78	401.04 N	275.42 E	300.26	7.00
6751.00	60.48	83.14	6578.69	406.45 N	314.89 E	339.99	11.15
6799.00	65.75	84.29	6600.39	411.12 N	357.43 E	382.74	11.18
6846.00	70.21	84.06	6618.00	415.55 N	400.77 E	426.27	9.50
6894.00	74.23	84.07	6632.66	420.27 N	446.22 E	471.93	8.38
6941.00	77.64	84.96	6644.08	424.63 N	491.60 E	517.49	7.48
6989.00	80.30	86.28	6653.26	428.22 N	538.57 E	564.60	6.16
7045.00	85.08	87.87	6660.38	431.05 N	594.02 E	620.12	8.99
7131.00	89.72	88.44	6664.29	433.82 N	679.86 E	705.97	5.44
7225.00	90.49	88.09	6664.11	436.66 N	773.82 E	799.91	0.90
7320.00	90.43	87.94	6663.35	439.95 N	868.76 E	894.87	0.17
7415.00	90.31	87.78	6662.74	443.50 N	963.69 E	989.84	0.21
7510.00	89.97	89.28	6662.50	445.94 N	1058.66 E	1084.77	1.62
7605.00	90.03	88.38	6662.50	447.88 N	1153.64 E	1179.68	0.95
7700.00	89.69	89.06	6662.74	450.00 N	1248.61 E	1274.60	0.80
7794.00	91.97	90.62	6661.38	450.26 N	1342.59 E	1368.41	2.94
7889.00	91.54	91.31	6658.47	448.66 N	1437.53 E	1463.06	0.86
7984.00	90.83	93.33	6656.50	444.82 N	1532.43 E	1557.52	2.25
8079.00	88.86	92.56	6656.76	439.94 N	1627.30 E	1651.89	2.23
8173.00	88.95	89.43	6658.55	438.30 N	1721.26 E	1745.55	3.33
8268.00	91.20	88.53	6658.43	440.00 N	1816.23 E	1840.45	2.55
8363.00	89.29	88.25	6658.02	442.66 N	1911.19 E	1935.38	2.03
8458.00	90.92	88.00	6657.85	445.77 N	2006.14 E	2030.33	1.74
8553.00	90.86	87.81	6656.37	449.25 N	2101.06 E	2125.29	0.21
8647.00	88.98	87.47	6656.51	453.12 N	2194.98 E	2219.26	2.03
8742.00	88.31	87.27	6658.75	457.47 N	2289.85 E	2314.22	0.74
8837.00	90.49	86.70	6659.75	462.47 N	2384.71 E	2409.20	2.37
8932.00	91.60	86.75	6658.01	467.90 N	2479.53 E	2504.18	1.17
9026.00	90.58	87.00	6656.23	473.02 N	2573.38 E	2598.16	1.12
9121.00	91.69	87.39	6654.34	477.67 N	2668.24 E	2693.13	1.24
9216.00	90.46	89.38	6652.56	480.34 N	2763.18 E	2788.05	2.46
9311.00	89.69	90.38	6652.44	480.54 N	2858.18 E	2882.87	1.33
9406.00	90.15	89.71	6652.57	480.47 N	2953.18 E	2977.67	0.86
9500.00	90.68	88.81	6651.89	481.68 N	3047.17 E	3071.55	1.11

9595.00	89.54	88.02	6651.71	484.31 N	3142.13 E	3166.49	1.46
9690.00	89.11	87.72	6652.83	487.84 N	3237.06 E	3261.45	0.55
9785.00	88.46	87.66	6654.84	491.67 N	3331.96 E	3356.40	0.69
9880.00	90.12	88.09	6656.02	495.19 N	3426.88 E	3451.36	1.81
9975.00	92.87	87.03	6653.54	499.23 N	3521.75 E	3546.29	3.10
10070.00	92.28	88.96	6649.27	502.55 N	3616.59 E	3641.15	2.12
10165.00	90.62	90.30	6646.87	503.17 N	3711.55 E	3735.97	2.25
10256.00	90.95	90.85	6645.62	502.25 N	3802.54 E	3826.71	0.70
10348.00	89.26	88.22	6645.45	503.00 N	3894.53 E	3918.56	3.40
10440.00	88.74	88.62	6647.06	505.54 N	3986.48 E	4010.49	0.71
10531.00	91.70	88.92	6646.71	507.49 N	4077.45 E	4101.40	3.27
10624.00	92.04	88.54	6643.67	509.55 N	4170.37 E	4194.27	0.55
10715.00	90.92	89.95	6641.32	510.75 N	4261.33 E	4285.12	1.98
10807.00	90.80	90.59	6639.94	510.31 N	4353.32 E	4376.89	0.71
10898.00	88.83	90.57	6640.24	509.39 N	4444.31 E	4467.64	2.16
10991.00	88.15	89.26	6642.69	509.53 N	4537.27 E	4560.43	1.59
11083.00	89.54	88.58	6644.54	511.26 N	4629.24 E	4652.32	1.68
11175.00	90.65	88.43	6644.39	513.67 N	4721.20 E	4744.25	1.22
11268.00	90.37	87.50	6643.56	516.97 N	4814.14 E	4837.21	1.04
11360.00	89.35	86.98	6643.79	521.40 N	4906.03 E	4929.20	1.24
11452.00	90.49	86.58	6643.91	526.56 N	4997.88 E	5021.20	1.31
11546.00	92.25	88.82	6641.67	530.34 N	5091.77 E	5115.13	3.03
11637.00	92.90	89.66	6637.58	531.54 N	5182.67 E	5205.93	1.17
11729.00	89.94	90.43	6635.30	531.47 N	5274.63 E	5297.70	3.32
11820.00	89.60	90.09	6635.66	531.06 N	5365.63 E	5388.49	0.53
11913.00	90.65	90.39	6635.46	530.67 N	5458.63 E	5481.27	1.17
12007.00	91.02	89.47	6634.09	530.78 N	5552.62 E	5575.08	1.05
12101.00	88.40	89.17	6634.57	531.90 N	5646.60 E	5668.95	2.81
12194.00	89.17	88.10	6636.54	534.11 N	5739.55 E	5761.85	1.42
12289.00	90.65	87.50	6636.69	537.76 N	5834.48 E	5856.82	1.68
12384.00	91.39	87.77	6635.00	541.68 N	5929.38 E	5951.78	0.83
12479.00	91.33	87.32	6632.74	545.75 N	6024.27 E	6046.73	0.48
12573.00	92.38	87.58	6629.70	549.93 N	6118.12 E	6140.67	1.15
12668.00	90.71	88.25	6627.14	553.38 N	6213.02 E	6235.59	1.89
12763.00	91.33	90.13	6625.45	554.72 N	6307.99 E	6330.46	2.08
12858.00	91.33	90.83	6623.24	553.93 N	6402.96 E	6425.19	0.74
12957.00	89.97	89.99	6622.12	553.22 N	6501.95 E	6523.93	1.61
13052.00	89.88	90.54	6622.24	552.78 N	6596.95 E	6618.71	0.59
13147.00	89.17	89.28	6623.03	552.93 N	6691.94 E	6713.52	1.52
13242.00	88.71	89.73	6624.79	553.75 N	6786.92 E	6808.37	0.68
13337.00	88.21	88.13	6627.34	555.52 N	6881.87 E	6903.23	1.76
13432.00	88.98	87.62	6629.67	559.05 N	6976.77 E	6998.17	0.97
13527.00	90.89	86.68	6629.78	563.77 N	7071.65 E	7093.16	2.24
13622.00	90.52	87.97	6628.61	568.20 N	7166.54 E	7188.13	1.41
13716.00	88.71	88.61	6629.24	571.01 N	7260.49 E	7282.07	2.04
13811.00	90.52	89.03	6629.88	572.96 N	7355.46 E	7376.98	1.96
13906.00	92.35	89.43	6627.50	574.24 N	7450.42 E	7471.83	1.97
14001.00	91.82	88.93	6624.04	575.60 N	7545.35 E	7566.65	0.77
14096.00	91.05	89.67	6621.67	576.76 N	7640.31 E	7661.50	1.12
14191.00	90.28	87.72	6620.56	578.92 N	7735.27 E	7756.41	2.21
14286.00	90.92	88.65	6619.57	581.93 N	7830.22 E	7851.35	1.19
14381.00	91.11	89.55	6617.89	583.42 N	7925.19 E	7946.23	0.97
14476.00	90.49	88.06	6616.56	585.40 N	8020.16 E	8041.13	1.70
14571.00	90.37	87.99	6615.85	588.68 N	8115.10 E	8136.09	0.15
14666.00	90.59	87.79	6615.05	592.18 N	8210.03 E	8231.05	0.31
14760.00	90.03	88.25	6614.54	595.42 N	8303.97 E	8325.01	0.77
14855.00	92.01	88.96	6612.85	597.74 N	8398.92 E	8419.92	2.21
14950.00	91.85	89.74	6609.65	598.81 N	8493.86 E	8514.73	0.84
15045.00	91.39	90.14	6606.97	598.91 N	8588.82 E	8609.51	0.64
15140.00	89.35	89.32	6606.35	599.36 N	8683.82 E	8704.34	2.31
15234.00	89.51	90.07	6607.29	599.86 N	8777.81 E	8798.18	0.82
15329.00	91.48	91.41	6606.47	598.63 N	8872.79 E	8892.89	2.51
15424.00	90.25	91.66	6605.03	596.09 N	8967.74 E	8987.49	1.32
15519.00	89.75	89.32	6605.03	595.28 N	9062.73 E	9082.24	2.52
15613.00	90.12	88.54	6605.14	597.03 N	9156.72 E	9176.14	0.92
15708.00	89.35	87.10	6605.58	600.65 N	9251.64 E	9271.11	1.72
15803.00	88.86	84.36	6607.06	607.72 N	9346.36 E	9366.08	2.93
15898.00	89.35	85.59	6608.55	616.04 N	9440.98 E	9461.04	1.39
15993.00	88.55	85.99	6610.29	623.01 N	9535.71 E	9556.02	0.94
16088.00	89.78	88.45	6611.67	627.62 N	9630.58 E	9650.99	2.89
16167.00	90.93	88.76	6611.18	629.54 N	9709.55 E	9729.93	1.51
16232.00	90.93	88.76	6610.13	630.95 N	9774.53 E	9794.86	0.00

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 86.37 DEGREES (GRID)
A TOTAL CORRECTION OF 7.71 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16232.00 FEET
IS 9794.87 FEET ALONG 86.31 DEGREES (GRID)**

First three survey's are from 3rd party source (Multi Shot EMS) and provided by CO-man on location before drilling.

Depth 250 Inc 0.4 Azi 140.31

Depth 500 Inc 0.4 Azi 299.51

Depth 595 Inc 0.9 Azi 65.31

Tied in @ Surface

Magnetic direction of 7.712 has been added to AZI for grid direction correction.

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