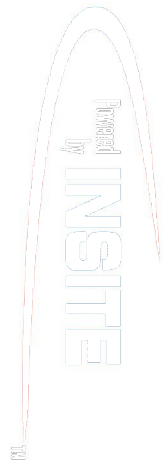


**PCDC - Pressure Case Directional  
PCGK - Pressure Case Gamma**

**1 : 600 / 1 : 240**

Country		: USA		<div>Company : Noble Energy</div> <div>Rig : H&amp;P 321</div> <div>Well : Wells Ranch AE20-68-1HN</div> <div>Field : Wattenburg</div> <div>Country : USA</div> <div>API Number : 05-123-37217</div>			
Field		: Wattenburg					
Location		: Lat: 40° 28' 34.68" North Long: 104° 21' 18.68" West					
Well		: Wells Ranch AE20-68-1HN					
Company		: Noble Energy					
Rig		: H&P 321		<div>Other Services</div> <div>Directional Drilling</div>			
LOCATION							
Latitude : 40° 28' 34.68" North		Longitude : 104° 21' 18.68" West		UTM Easting = 3,318,473.740 ft		UTM Northing = 1,418,412.290 ft	
Permanent Datum		: Ground Level		Elevation : 4841.00 ft		Elev. KB N/A	
Log Measured From		: Drill Floor		30.00 ft Above Permanent Datum		DF 4871.00 ft GL 4841.00 ft WD N/A	
Drilling Measured From		: Drill Floor		MD LOG			
Depth Logged : 983.00 ft To 10,911.00 ft		Unit No. : 11210424		Job No. :CA-XX-0900807598			
Date Logged : 15-Oct-13 To 21-Oct-13		Plot Type : Final					
Total Depth MD : 10,911.00 ft TVD : 6,630.08 ft		Plot Date : 21-Oct-13					
Spud Date : 15-Oct-13							
Borehole Record (MD)		Borehole Record (MD)					
Run No.	Size	From	To	Run No.	Size	From	To
100	8.750 in	983.00 ft	5,903.00 ft				
200	8.750 in	5,903.00 ft	7,041.00 ft				
300	6.125 in	7,041.00 ft	10,911.00 ft				
		Casing Record (MD)					
	Size	Weight	From	To			
		9.625	34.90	0.00	983.00		
		7.000	26.00	0.00	7031.00		

**WELL INFORMATION**

MWD Run Number	100	200	300		
Date run completed	17-Oct-13	19-Oct-13	21-Oct-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.870	6.870	4.790		
Log Start Depth (MD, ft)	983.00	5,903.00	7,041.00		
Log End Depth (MD, ft)	5,903.00	7,041.00	10,911.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	15-Oct-13 19:39	17-Oct-13 23:19	19-Oct-13 23:50		
Drill/Wipe End Date and Time	17-Oct-13 13:20	18-Oct-13 19:15	21-Oct-13 00:29		
Min Inc (deg) @ Depth (MD, ft)	0.20 @ 5,443.00	2.01 @ 5,916.00	85.13 @ 7,092.00		
Max Inc (deg) @ Depth (MD, ft)	13.79 @ 2,788.00	82.94 @ 6,987.00	92.68 @ 9,083.00		
Bit TFA(in2) / Bit Type	0.78 / PDC	1.24 / PDC	0.65 / PDC		
Flow Rate (gpm)	587.30	559.68	315.00		
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA	NA / NA		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.50 / 48.00	10.30 / 37.00	9.50 / 37.00		
Filtrate CL (ppm)	1,900.00	1,850.00	2,500.00		
pH / Fluid Loss (mptm)	9.60 / 10	9.70 / 9	9.80 / 9		
PV (cP) / YP (Ihf2)	13 / 11.00	12 / 8.00	10 / 8.00		
% Solids / % Sand	8.00 / 0.15	9.50 / 0.10	5.80 / 0.15		
% Oil / Oil:Water Ratio	NA / NA	NA / NA	NA / NA		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		

Max Tool Temp (degF) / Source	141.70 / PCM	154.30 / PCM	215.51 / PCM		
Rm @ Max Tool Temp (degF)	NA @ 141.70	NA @ 154.30	NA @ 215.51		
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass		
Customer Representative	Stetson Nielsen	Stetson Nielsen	Stetson Nielsen		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11341336	11341336	11768602		
Insert Serial Number	11620297	11620297	11680773		
Date and Time Initialized	15-Oct-13 21:16	15-Oct-13 21:16	19-Oct-13 06:40		
Date and Time Read	19-Oct-13 01:38	19-Oct-13 01:44	21-Oct-13 09:31		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	54.00	64.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341336	11341336	11768602		
Sonde Serial Number	10859920	10859920	11297617		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	189.59	356.27	307.54		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.53	47.74	66.69		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341336	11341336	11768602		
Insert/Sonde Serial Number	12037423	12037423	11293386		

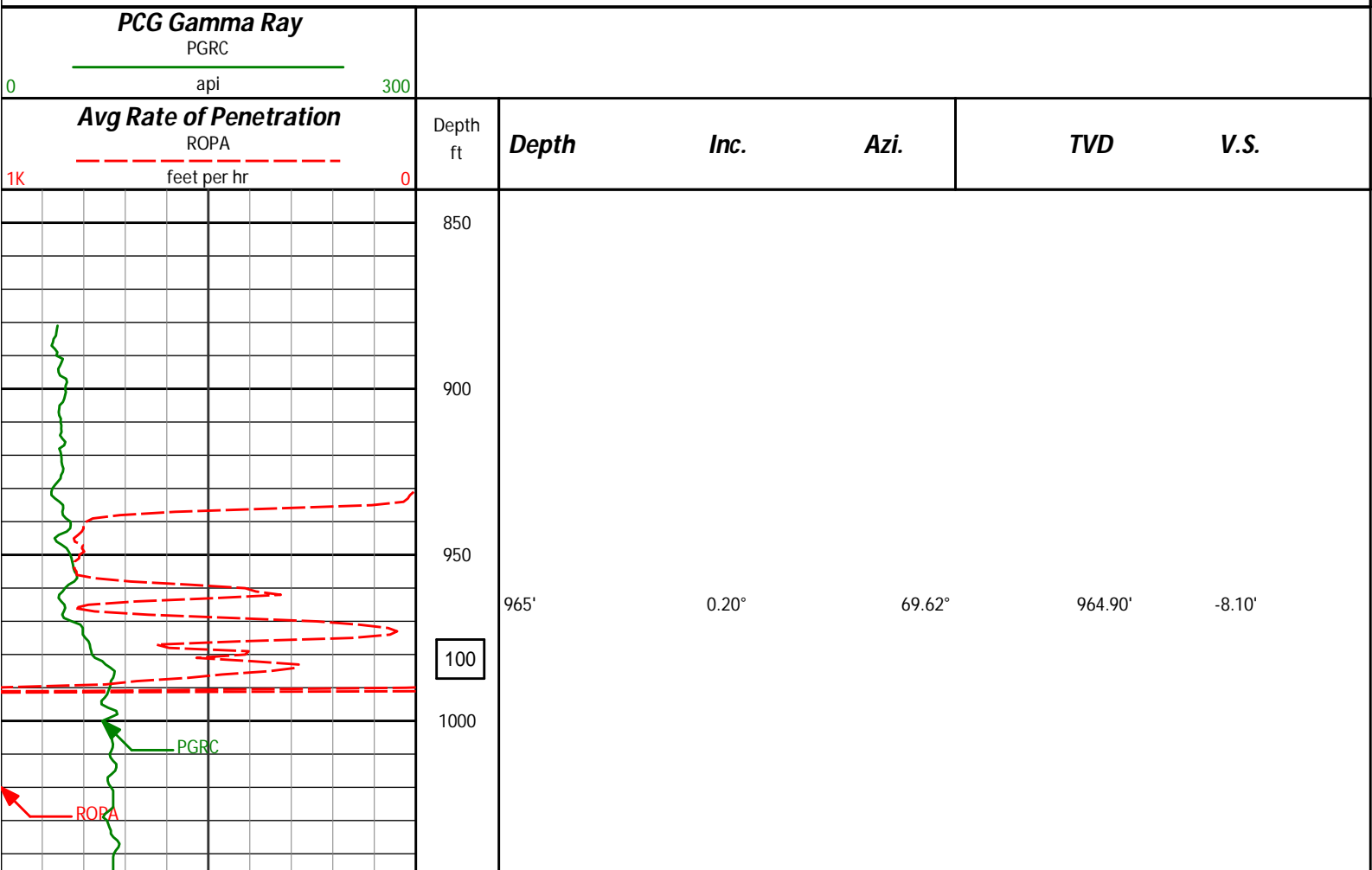
## REMARKS

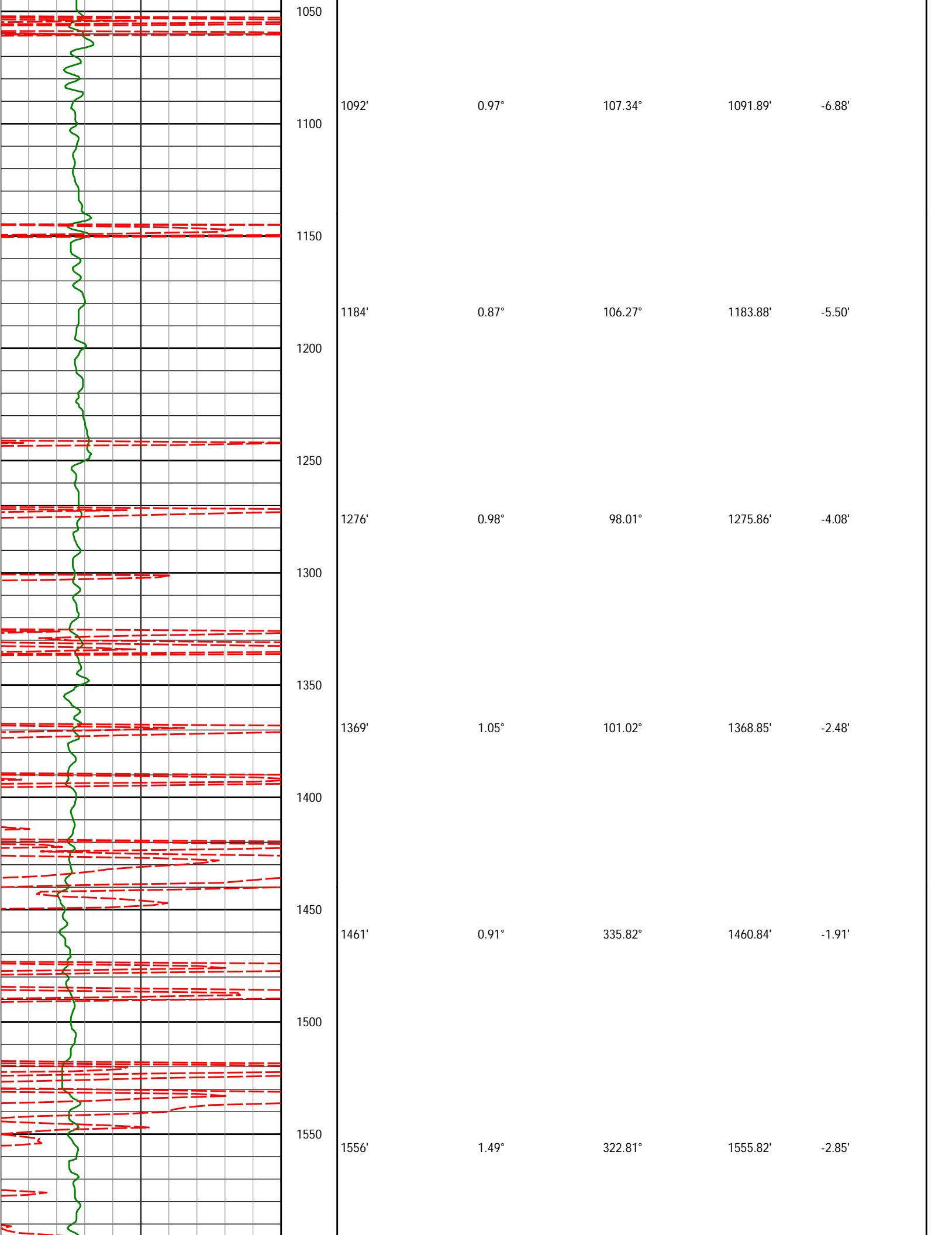
1. All depths are calibrated to driller's pipe tally and are measured depth's from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model 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

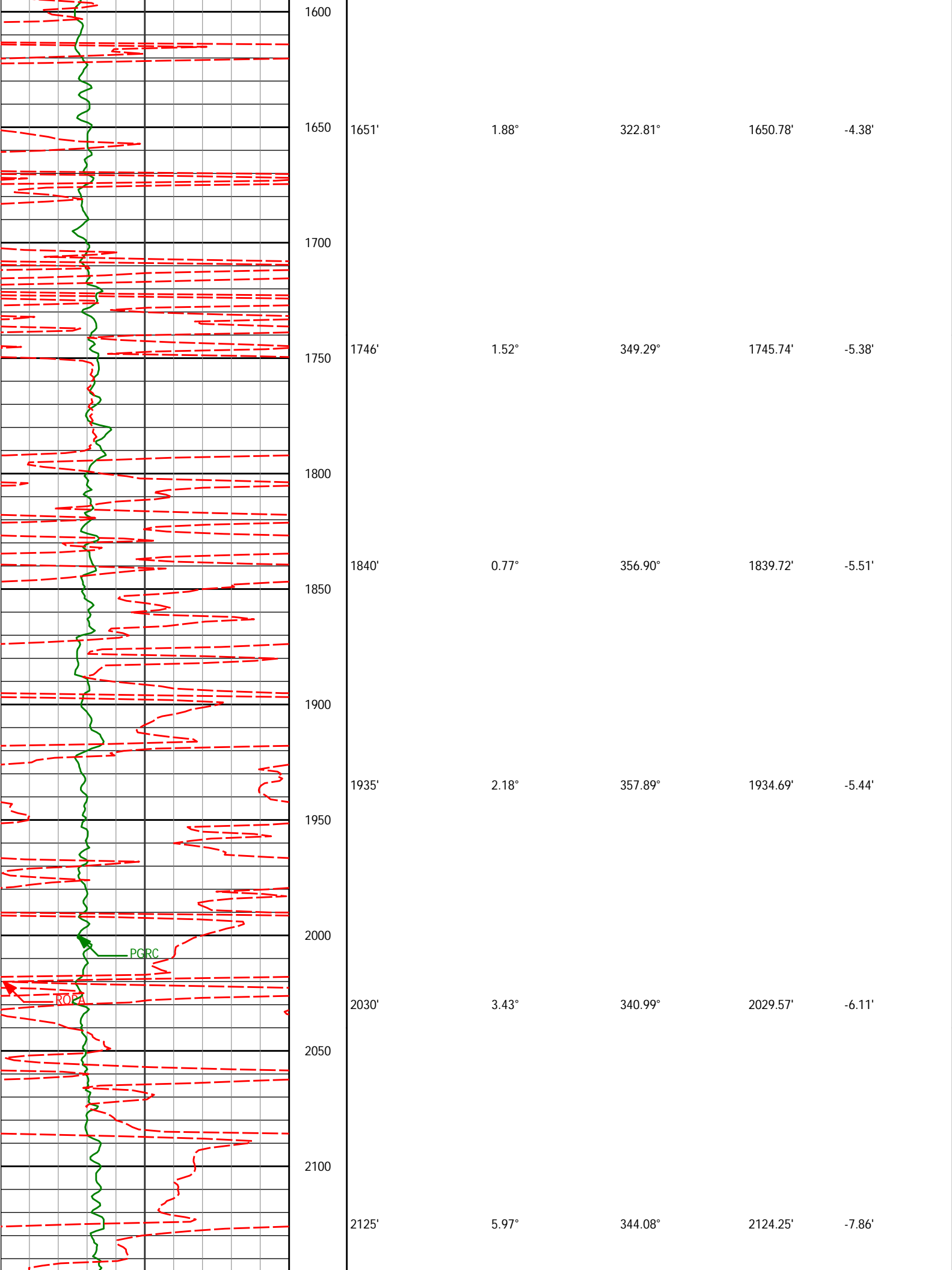
## 6. Inside Version V8.0.0

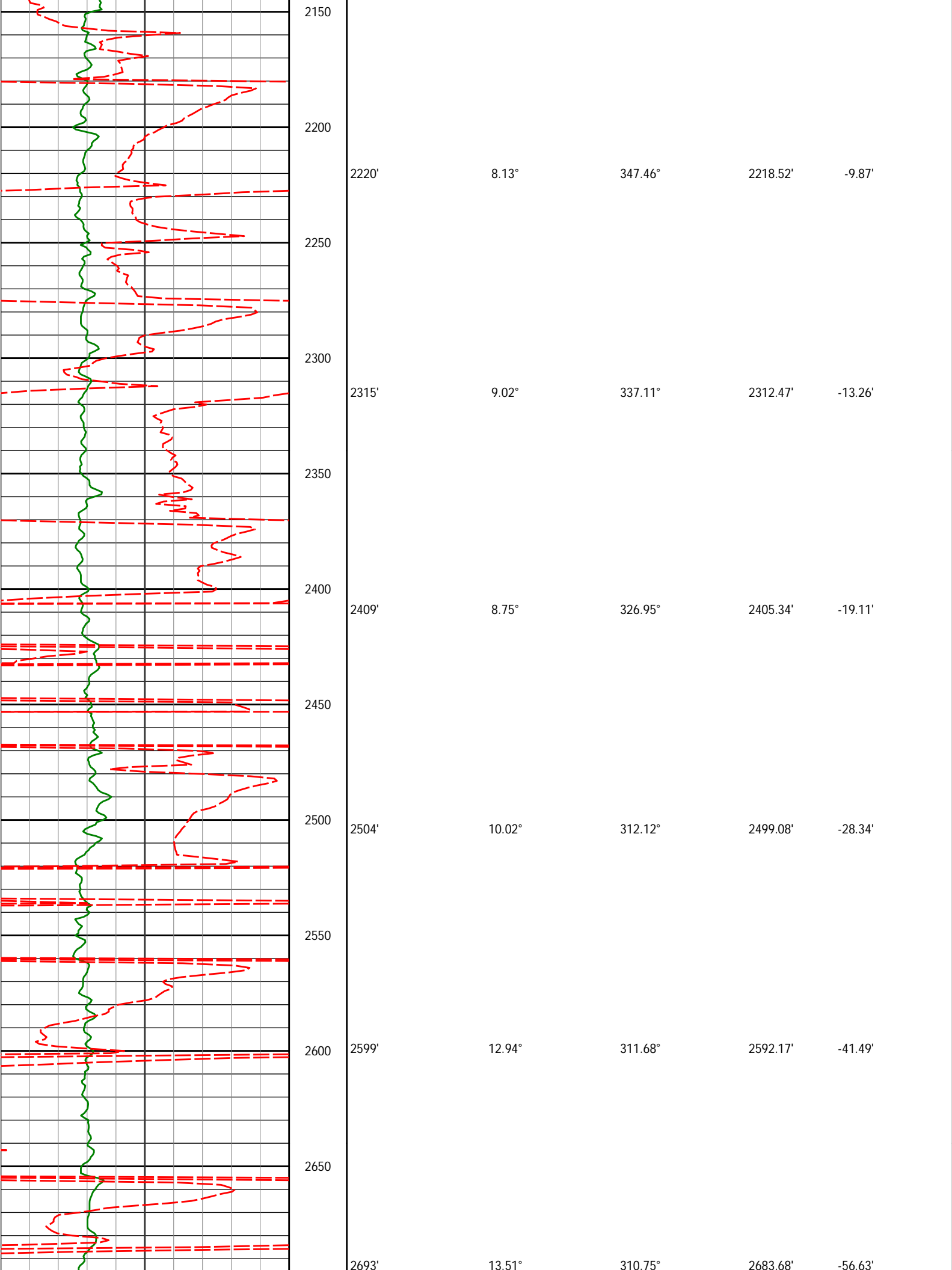
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

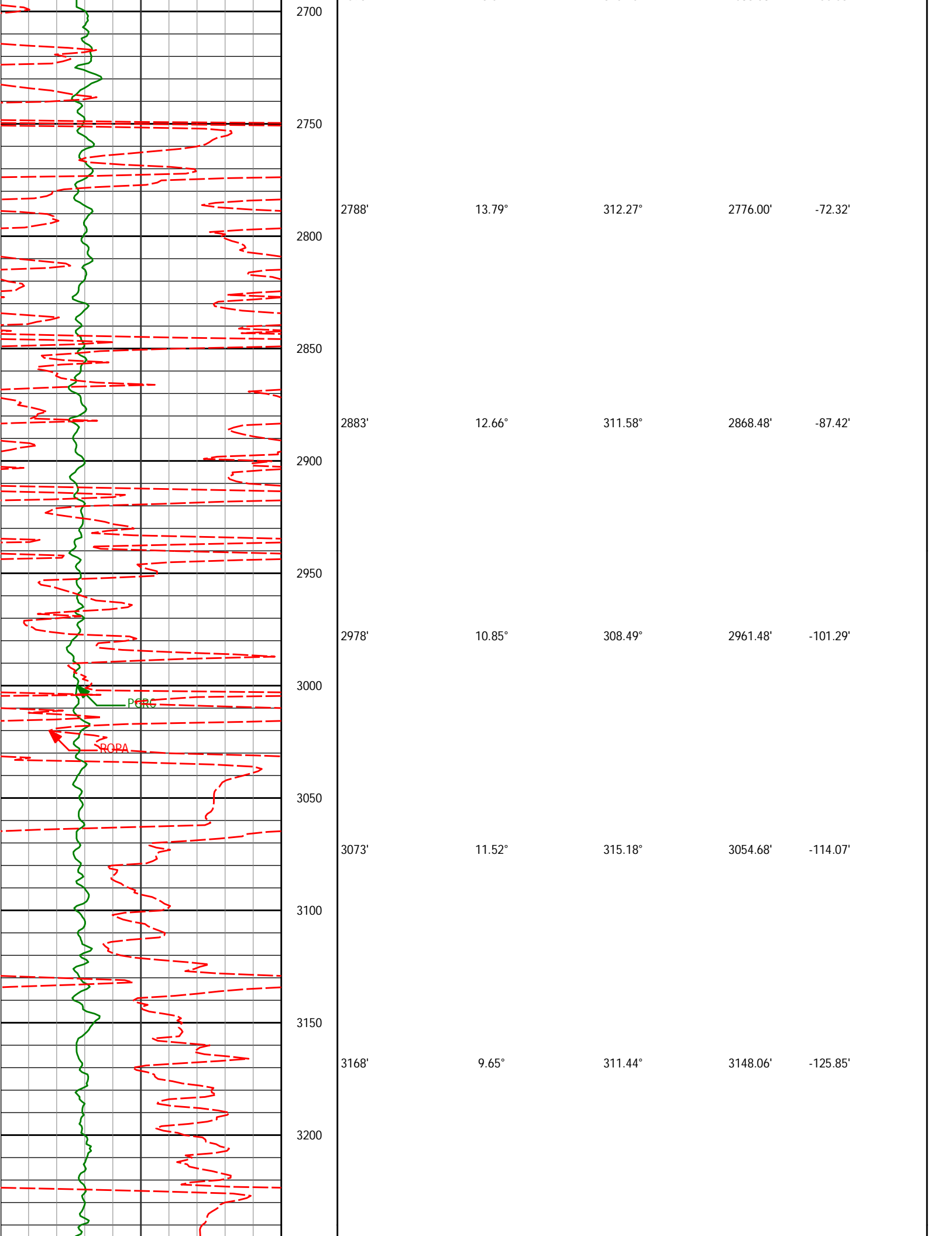
Noble Energy  
Wells Ranch AE20-68-1HN  
H&P 321  
Sec. 20-T6N-R62W

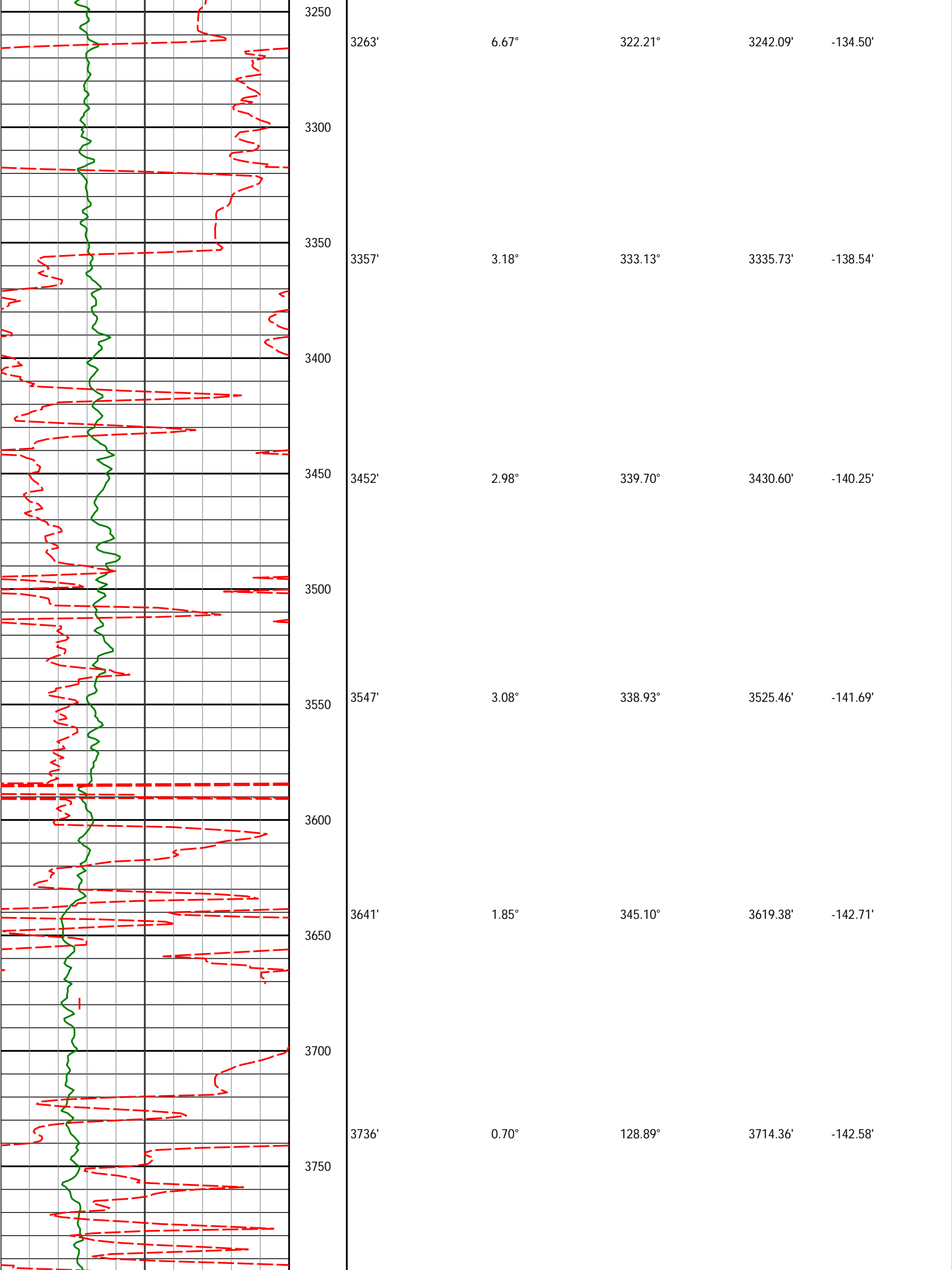




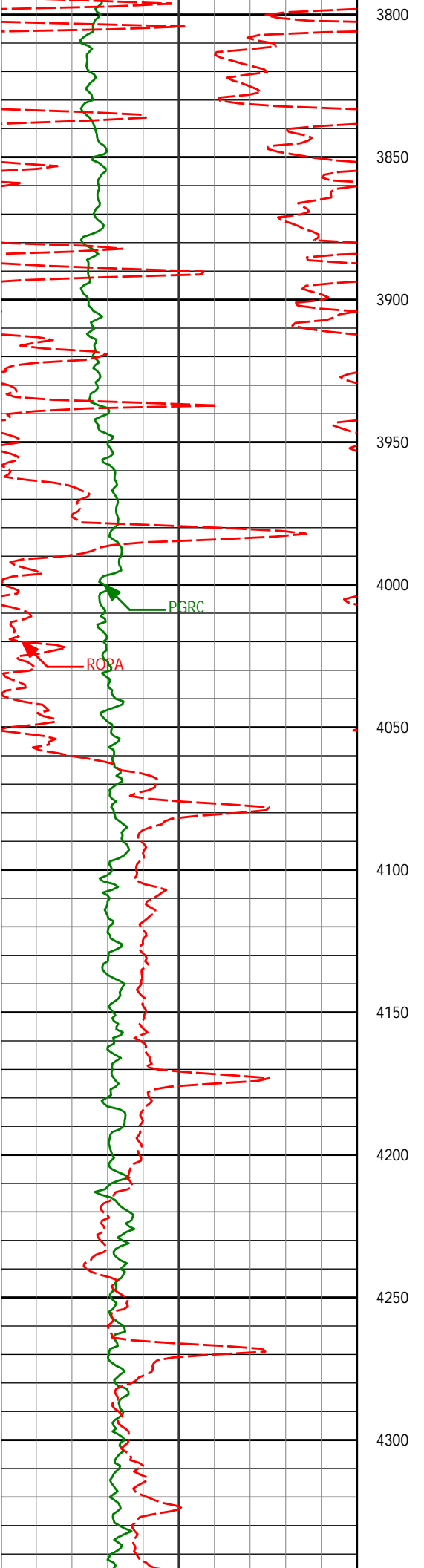




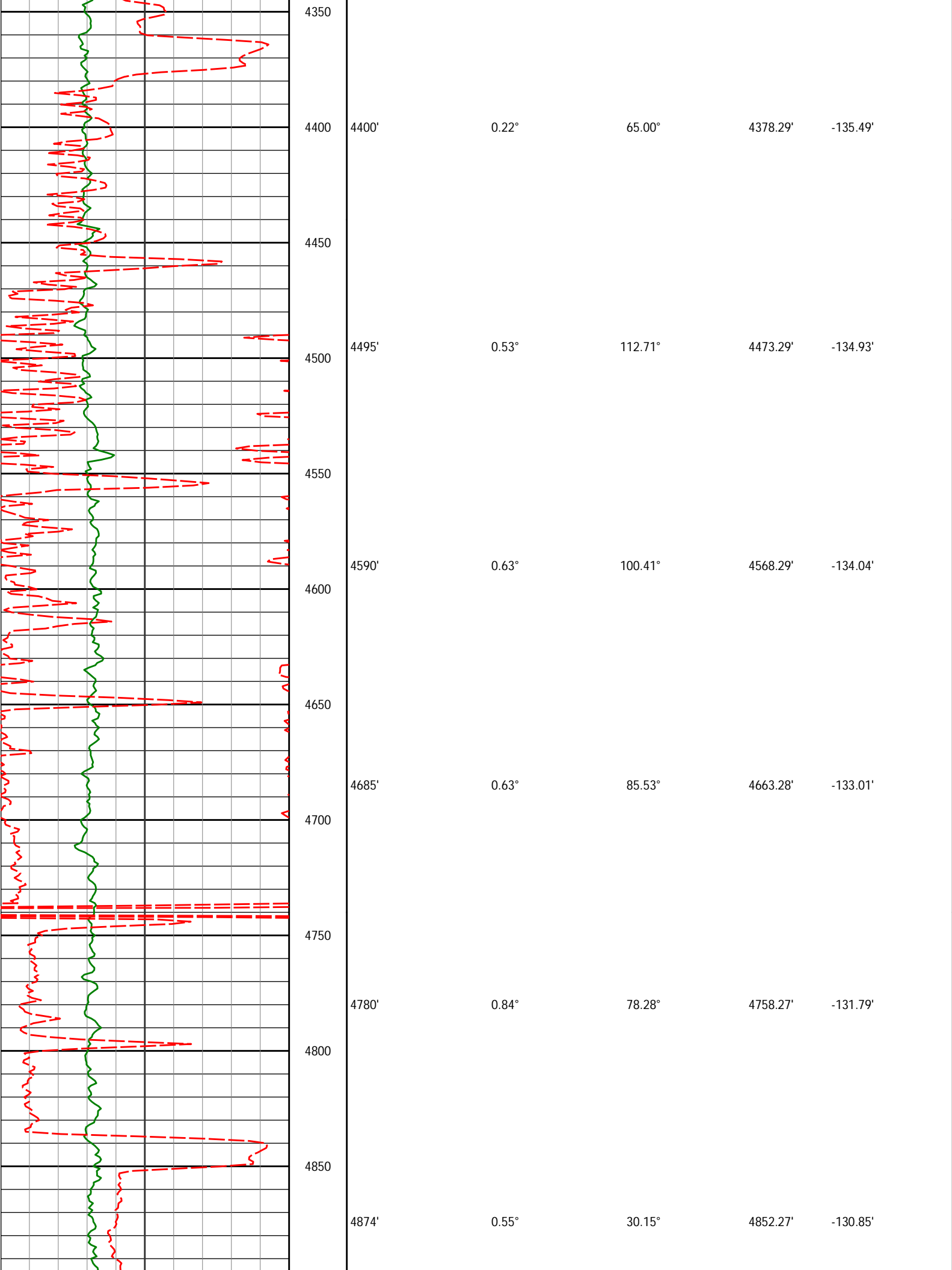


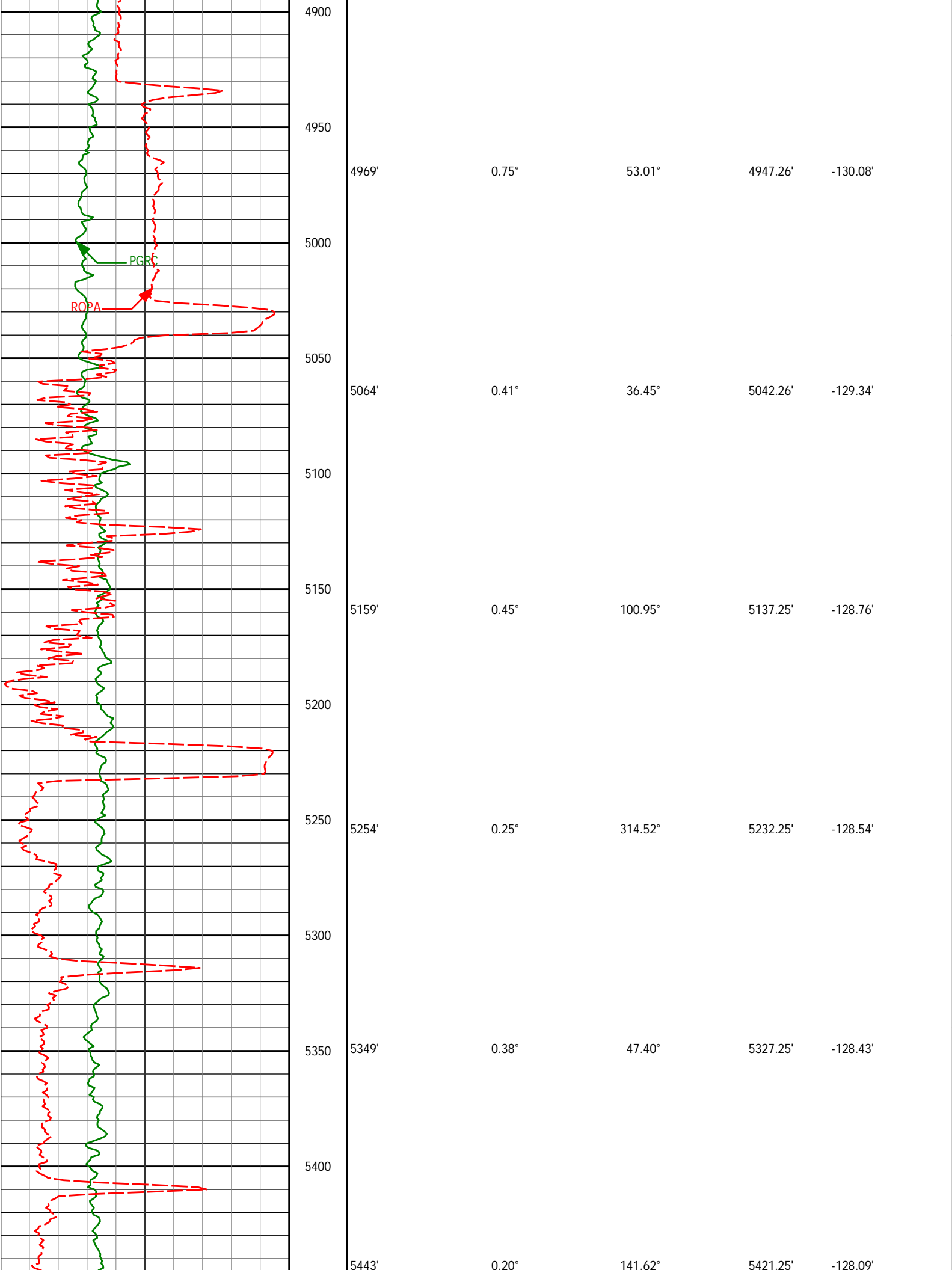


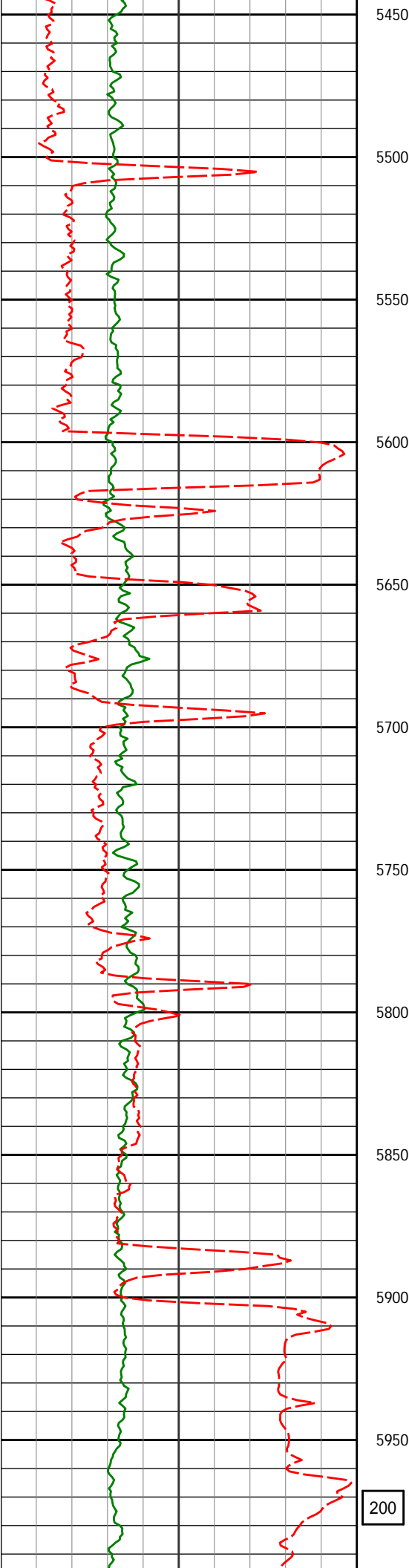




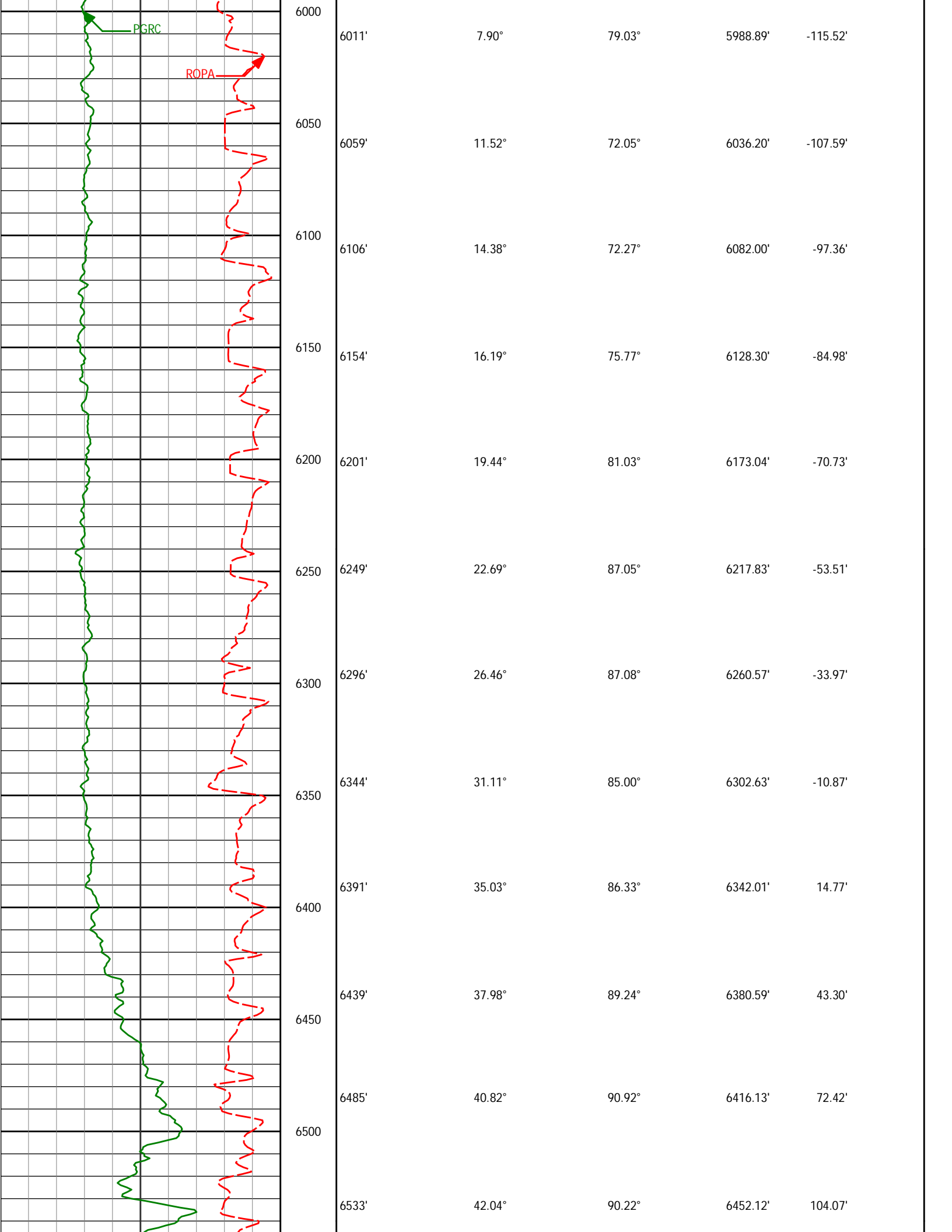
3831'	0.87°	149.80°	3809.35'	-141.83'
3926'	0.94°	148.22°	3904.34'	-141.15'
4021'	0.85°	118.72°	3999.33'	-140.20'
4116'	0.96°	109.88°	4094.32'	-138.88'
4211'	0.59°	105.02°	4189.31'	-137.69'
4305'	1.06°	60.01°	4283.30'	-136.45'

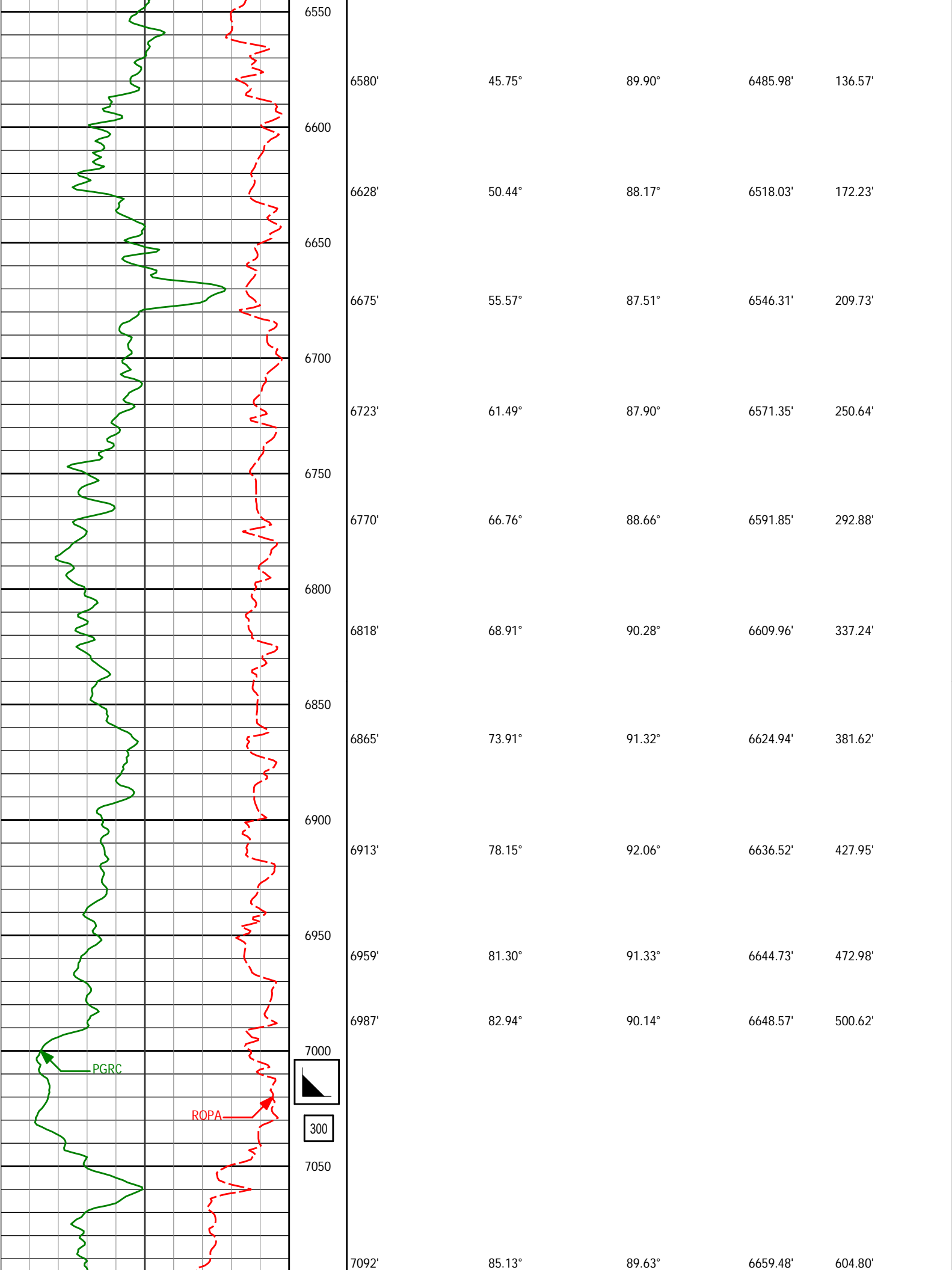


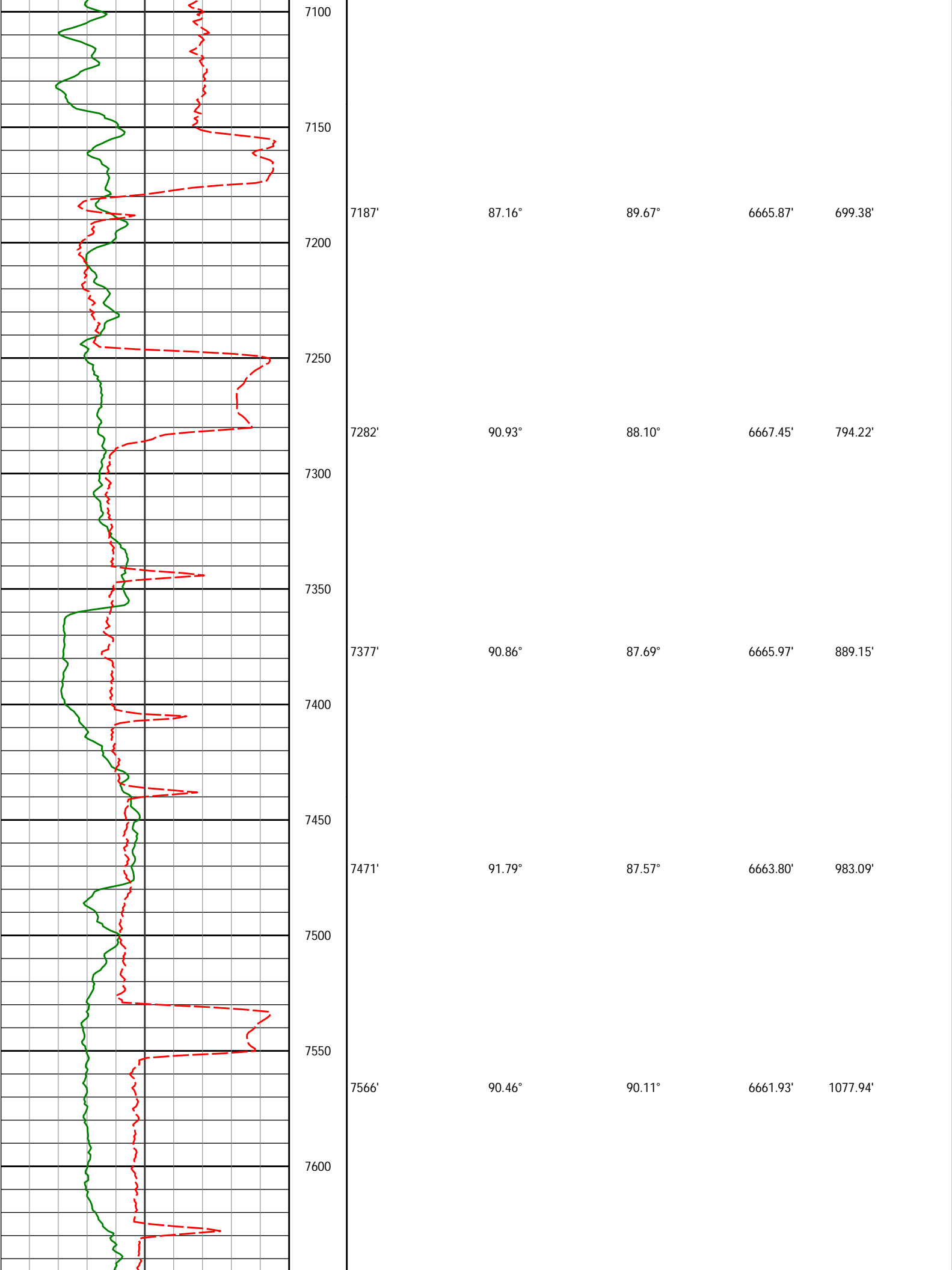


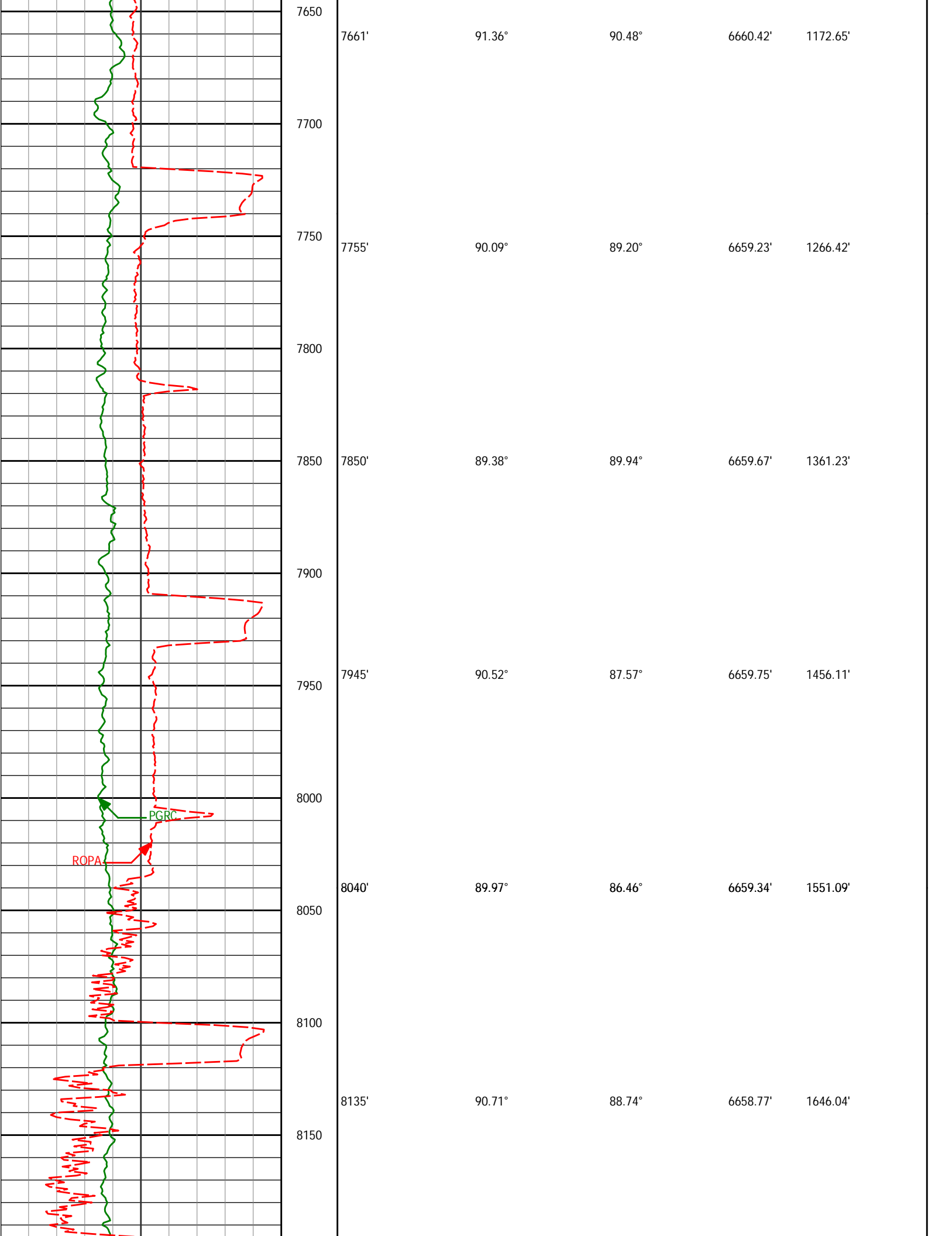


5538'	0.56°	108.60°	5516.25'	-127.57'
5633'	0.22°	238.84°	5611.25'	-127.31'
5728'	0.64°	51.82°	5706.25'	-127.04'
5846'	1.86°	77.11°	5824.22'	-124.61'
5916'	2.01°	87.11°	5894.18'	-122.26'
5964'	3.25°	82.85°	5942.13'	-120.06'

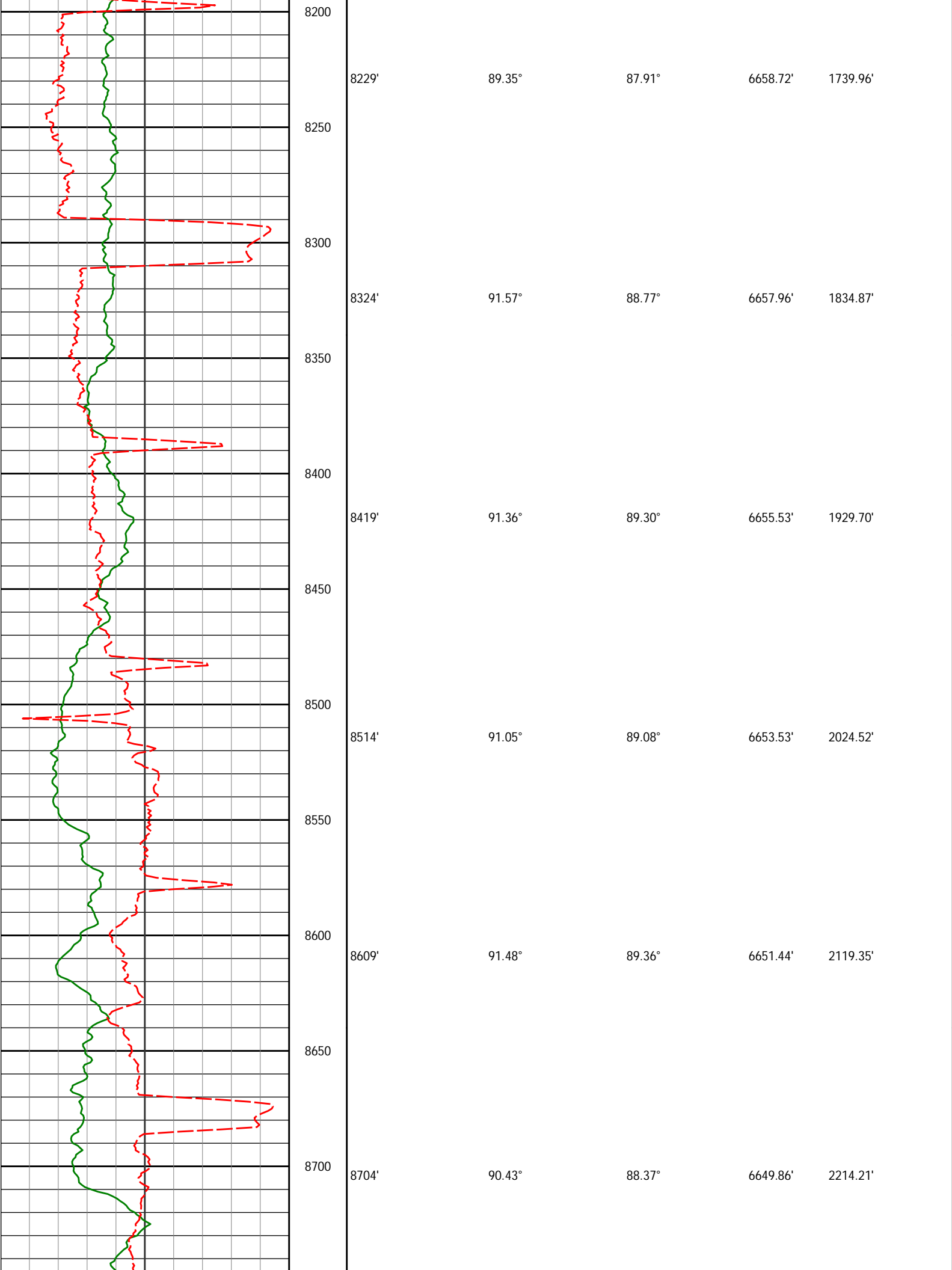


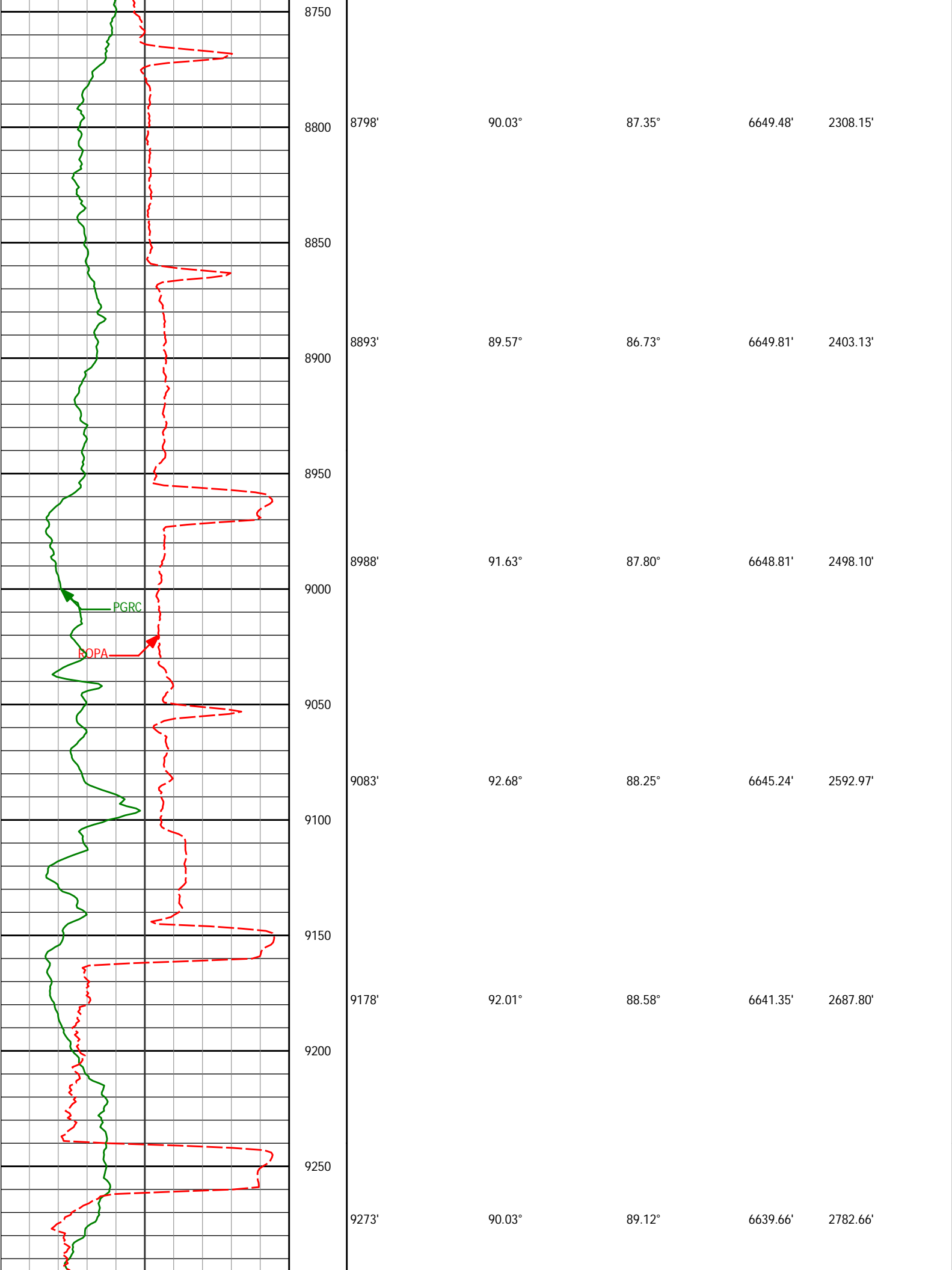


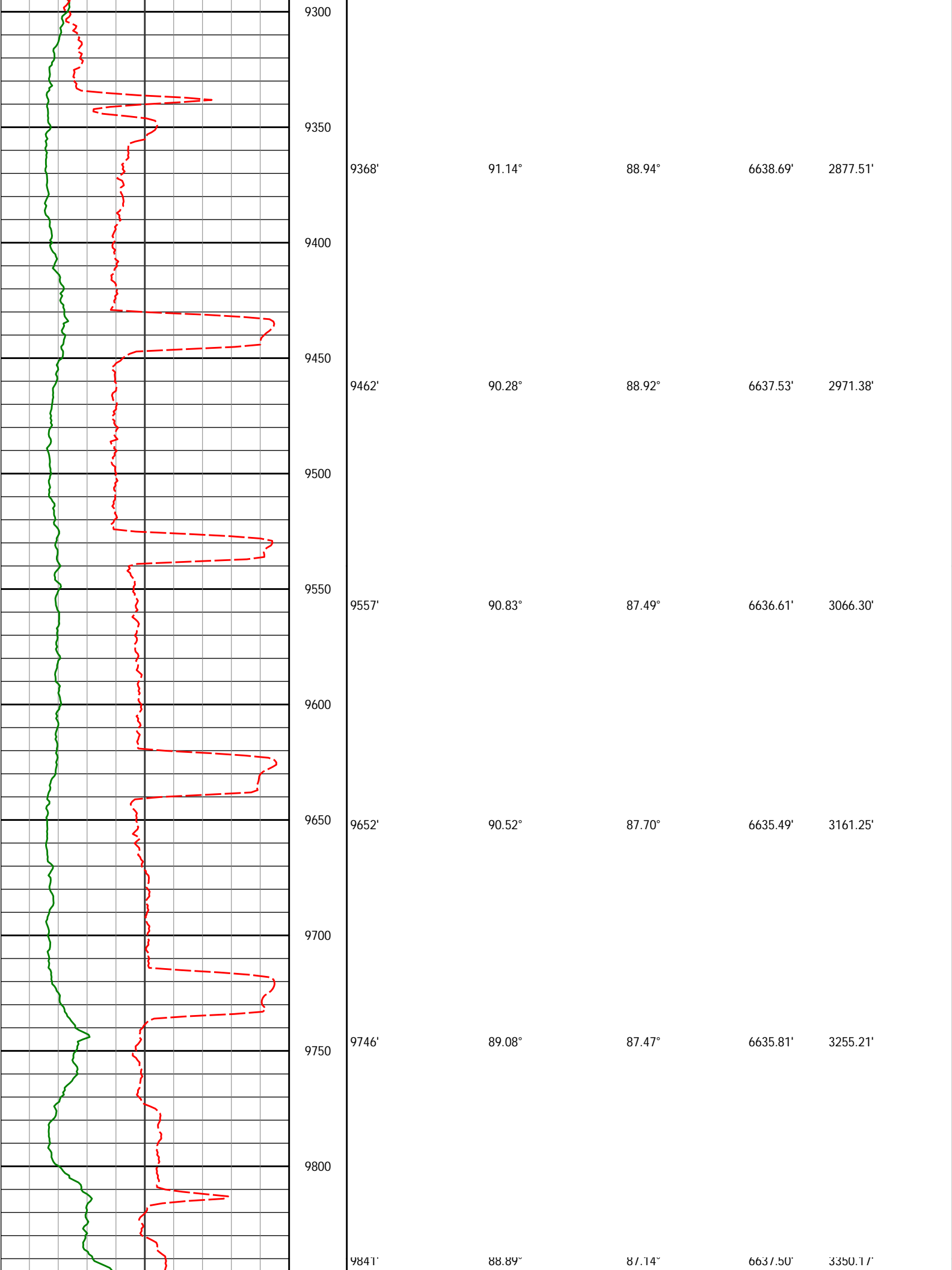


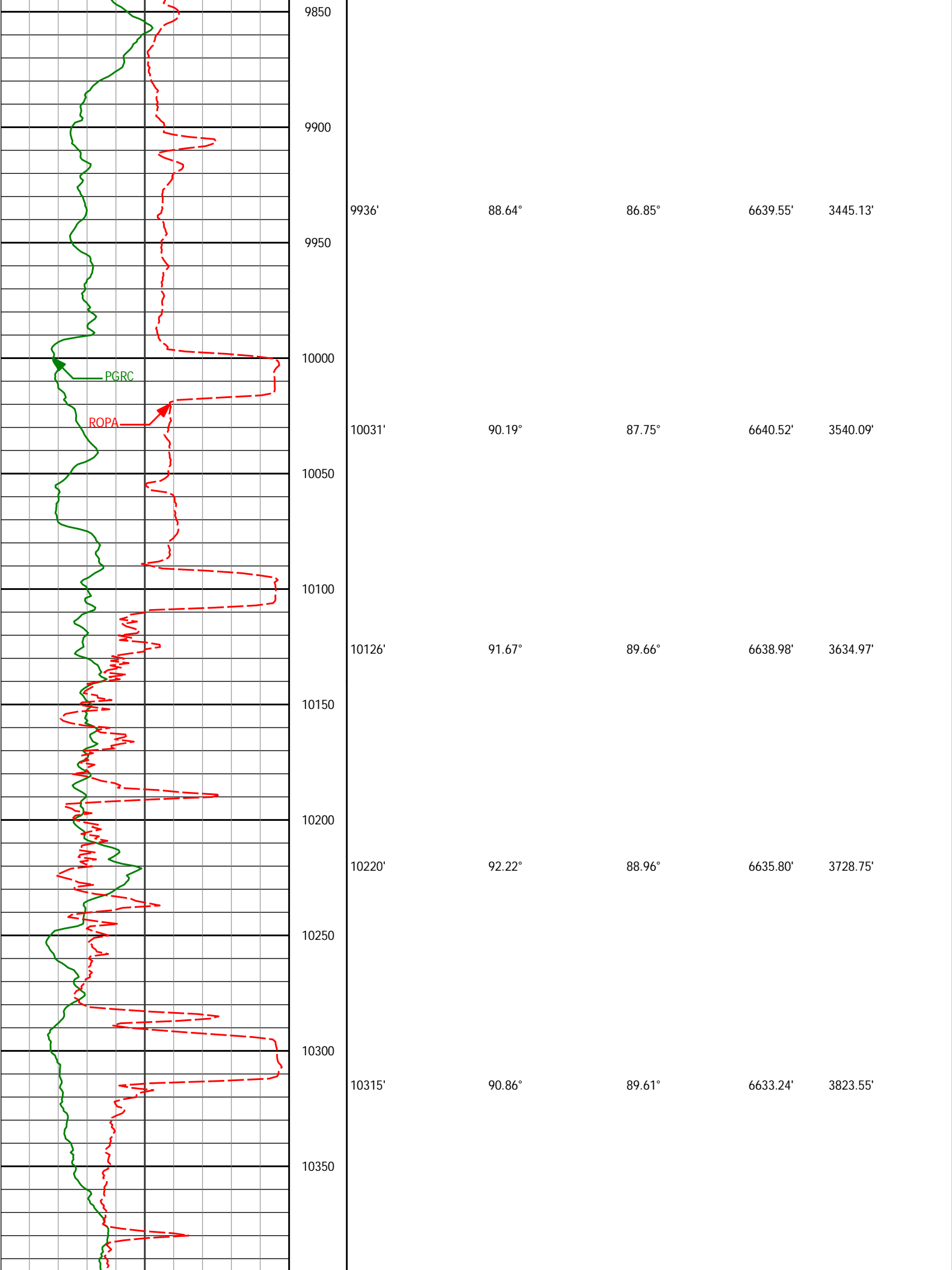


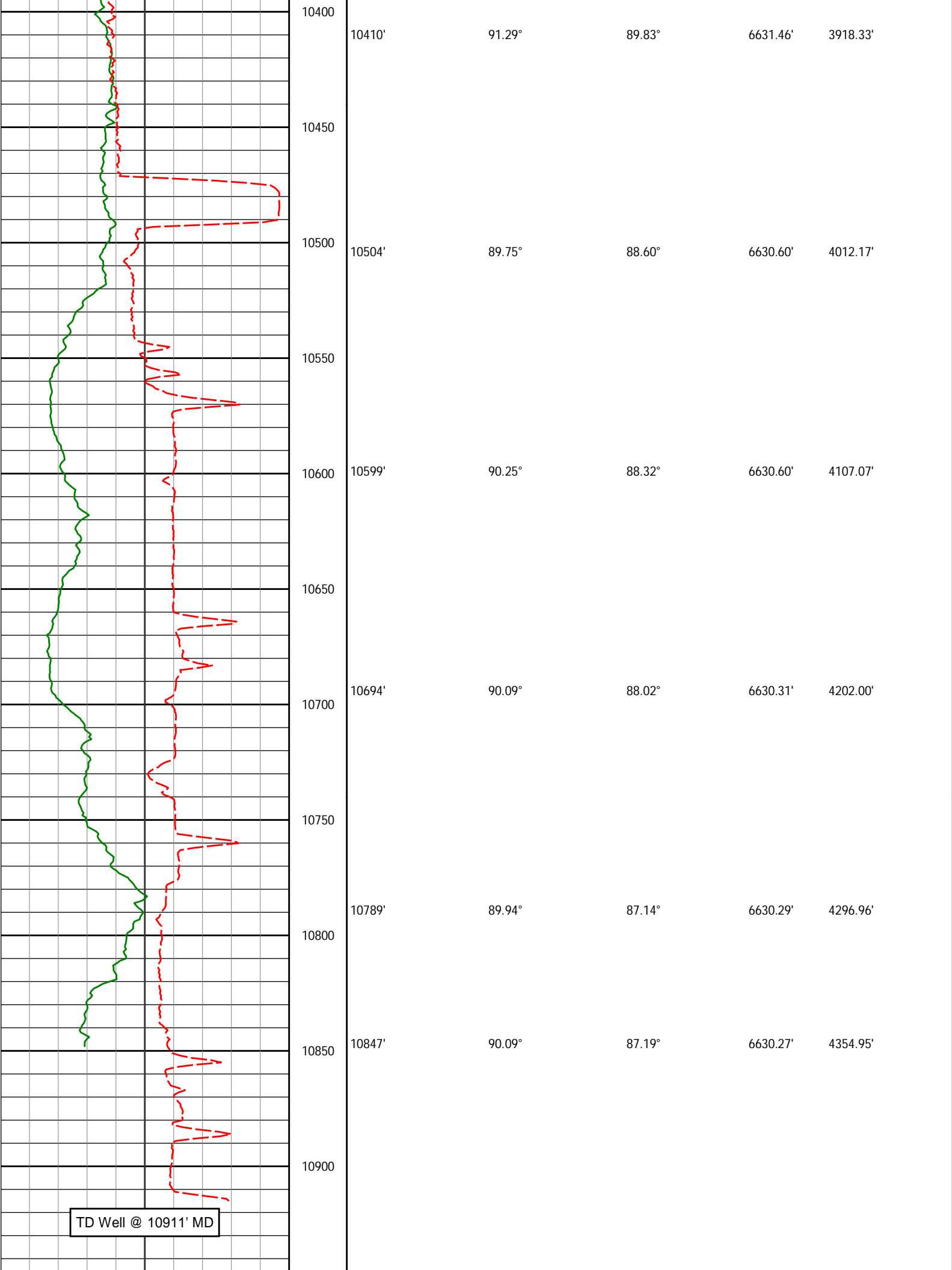




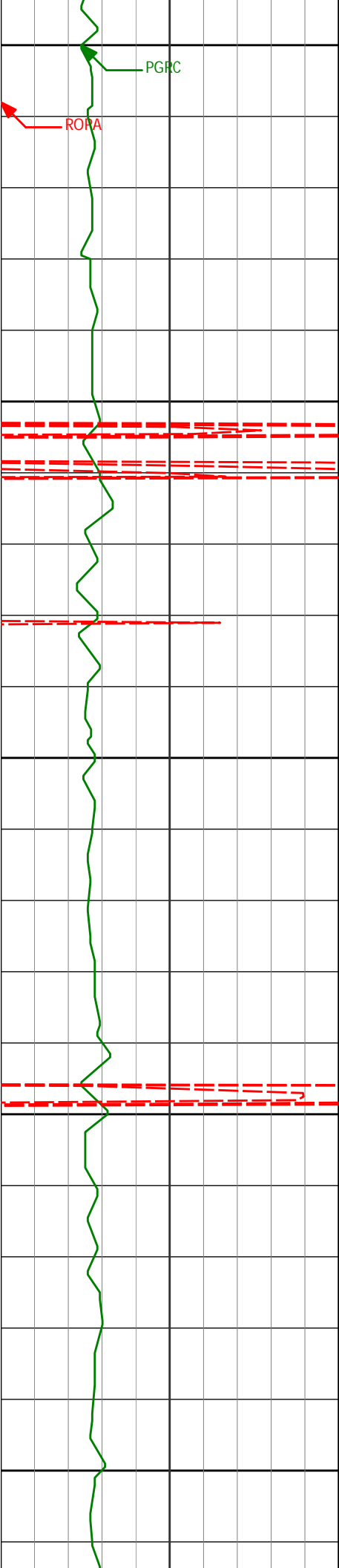








<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>							
<div><div>HALLIBURTON</div><div>Sperry Drilling Services</div><div>MD Detail Log 1:240</div><div><div>Noble Energy</div><div>Wells Ranch AE20-68-1HN</div><div>H&amp;P 321</div><div>Sec. 20-T6N-R62W</div></div></div>							
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>							
<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
		900					
		950					
		965'	0.20°	69.62°	964.90'	-8.10'	
		100					



1000

1050

1100

1150

1200

PGRC

ROPA

1092'

0.97°

107.34°

1091.89'

-6.88'

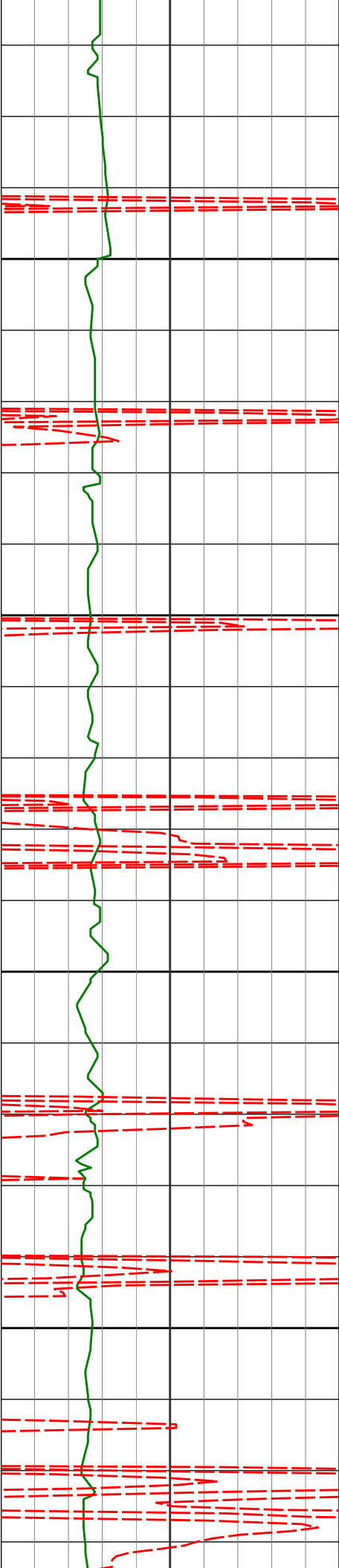
1184'

0.87°

106.27°

1183.88'

-5.50'



1250

1276'

0.98°

98.01°

1275.86'

-4.08'

1300

1350

1369'

1.05°

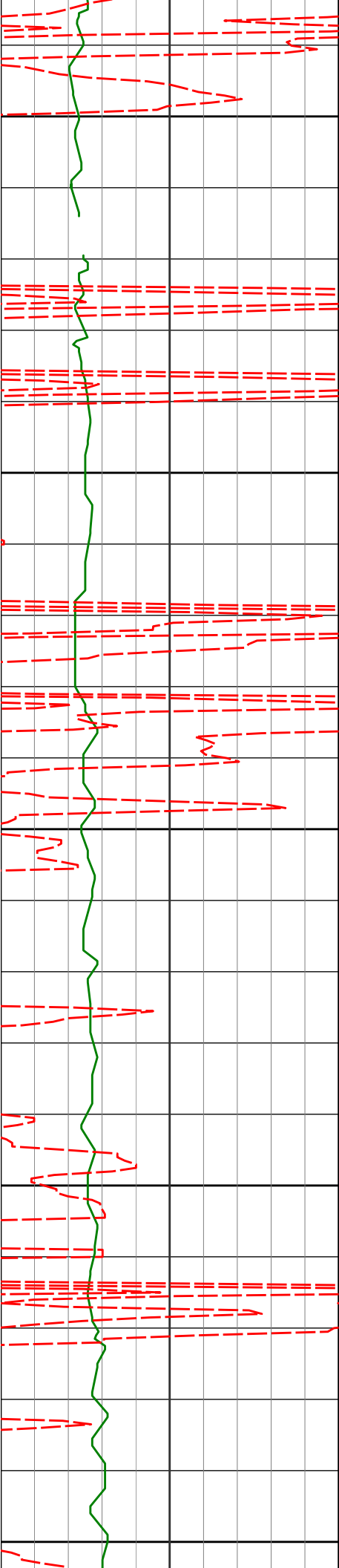
101.02°

1368.85'

-2.48'

1400





1450

1461'

0.91°

335.82°

1460.84'

-1.91'

1500

1550

1556'

1.49°

322.81°

1555.82'

-2.85'

1600

1650

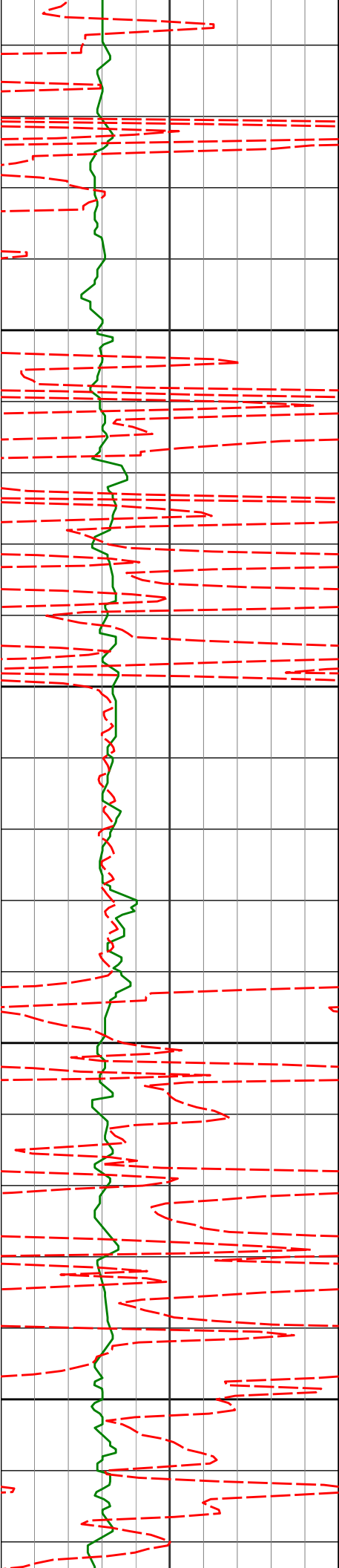
1651'

1.88°

322.81°

1650.78'

-4.38'



1700

1750

1800

1850

1746'

1.52°

349.29°

1745.74'

-5.38'

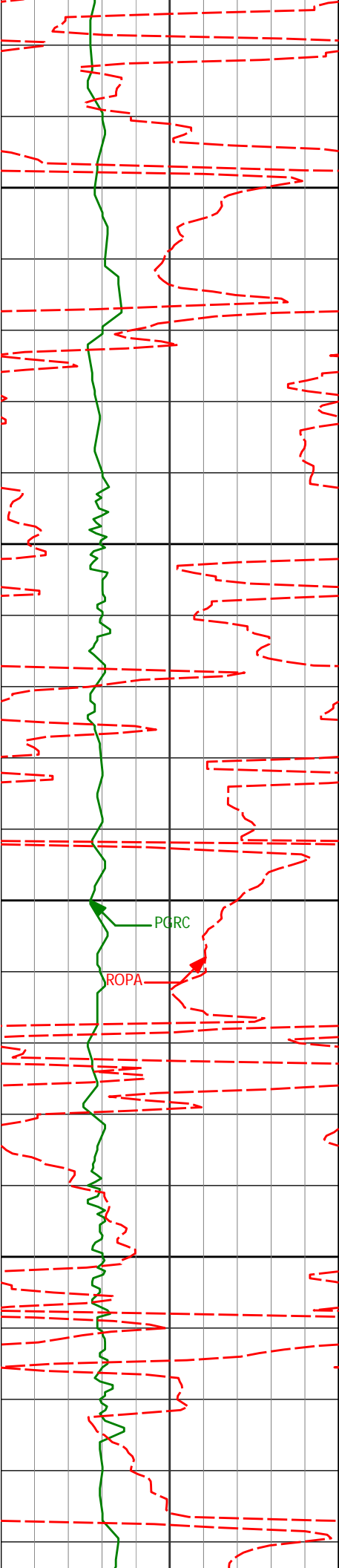
1840'

0.77°

356.90°

1839.72'

-5.51'



1900

1950

2000

2050

PGRC

ROPA

1935'

2.18°

357.89°

1934.69'

-5.44'

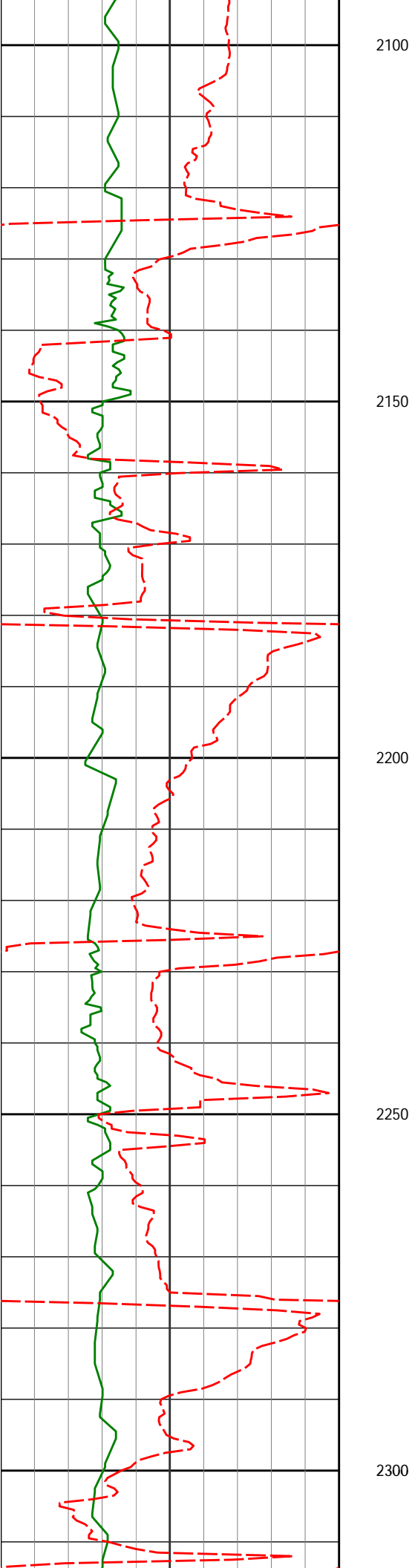
2030'

3.43°

340.99°

2029.57'

-6.11'



2125'

5.97°

344.08°

2124.25'

-7.86'

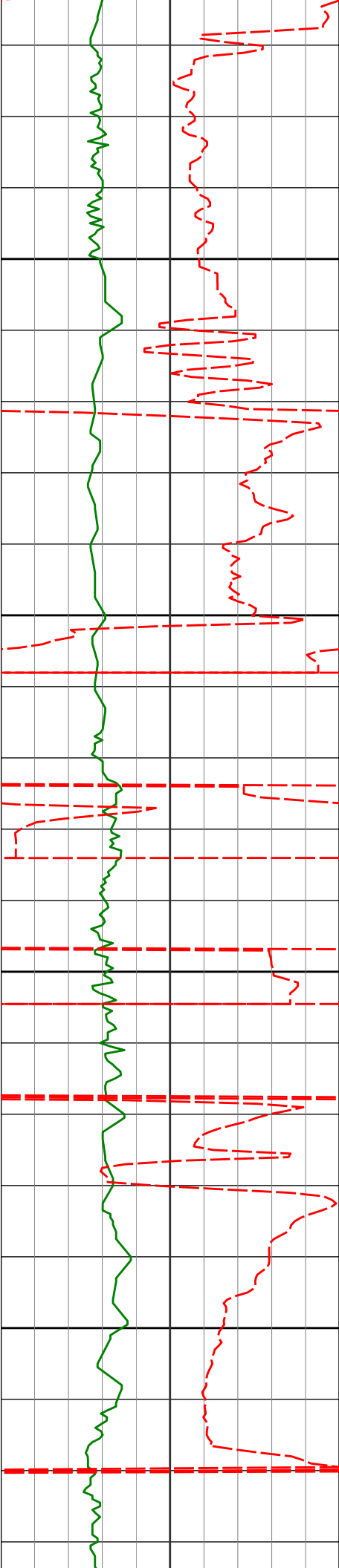
2220'

8.13°

347.46°

2218.52'

-9.87'



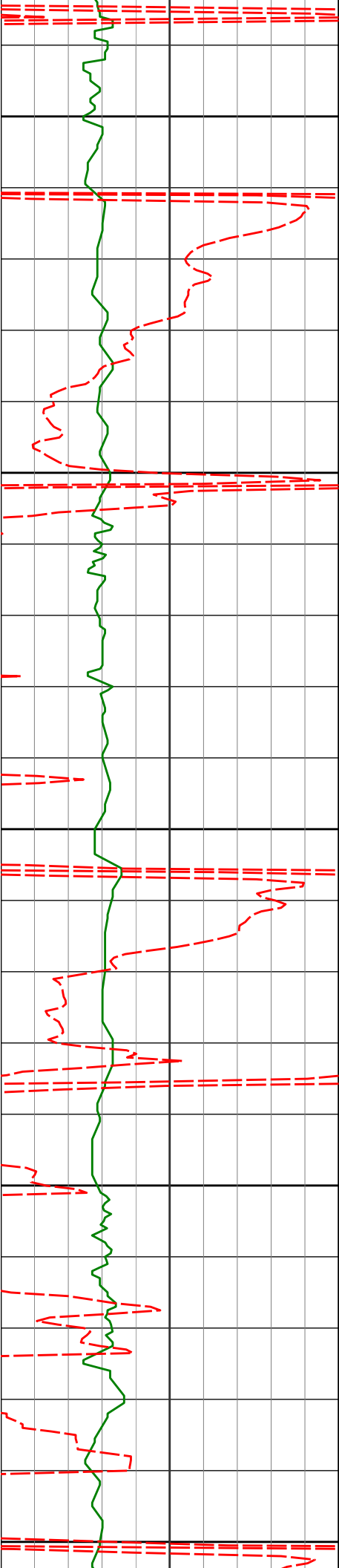
2350

2400

2450

2500

2315'	9.02°	337.11°	2312.47'	-13.26'
2409'	8.75°	326.95°	2405.34'	-19.11'
2504'	10.02°	312.12°	2499.08'	-28.34'



2550

2600

2650

2700

2750

2599'

12.94°

311.68°

2592.17'

-41.49'

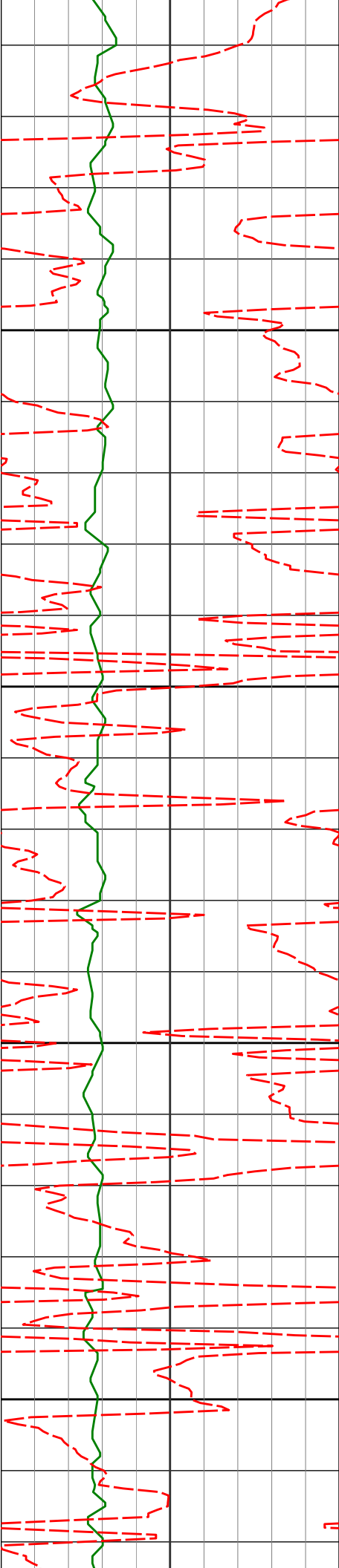
2693'

13.51°

310.75°

2683.68'

-56.63'



2788'

13.79°

312.27°

2776.00'

-72.32'

2800

2850

2883'

12.66°

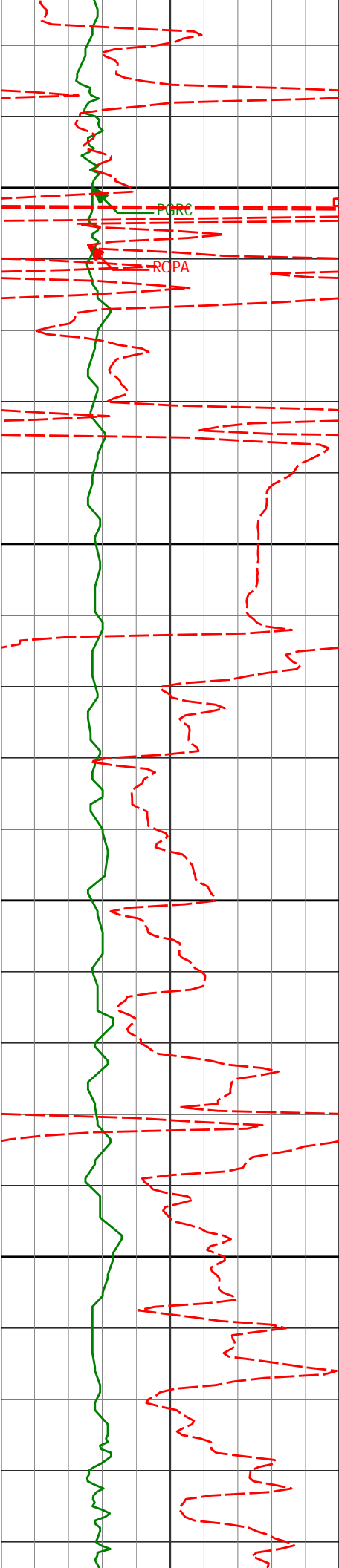
311.58°

2868.48'

-87.42'

2900

2950



2978'

10.85°

308.49°

2961.48'

-101.29'

3000

PORC

RCPA

3050

3073'

11.52°

315.18°

3054.68'

-114.07'

3100

3150

3168'

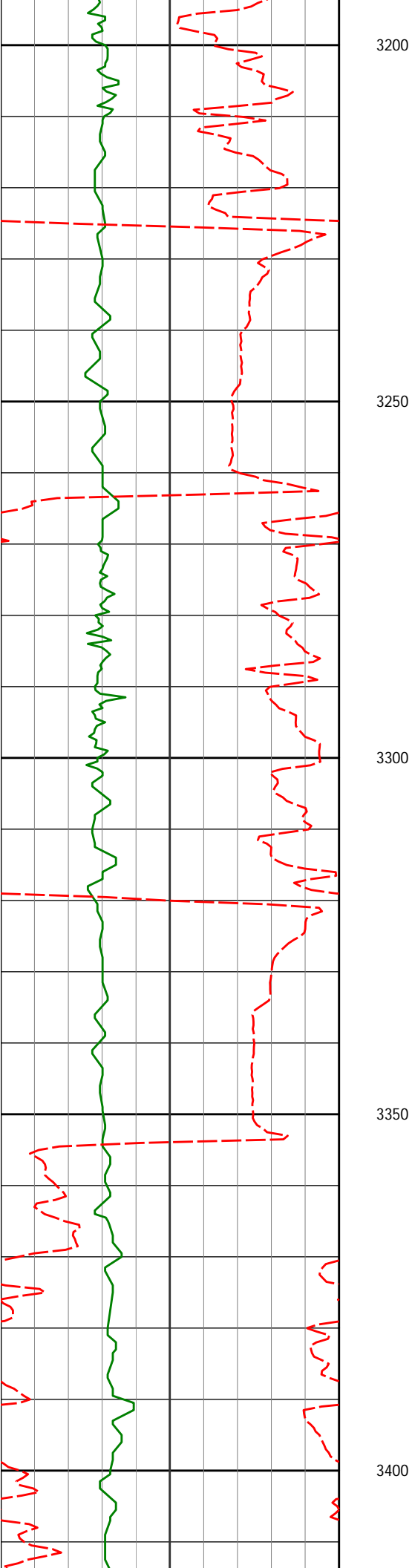
9.65°

311.44°

3148.06'

-125.85'





3263'

6.67°

322.21°

3242.09'

-134.50'

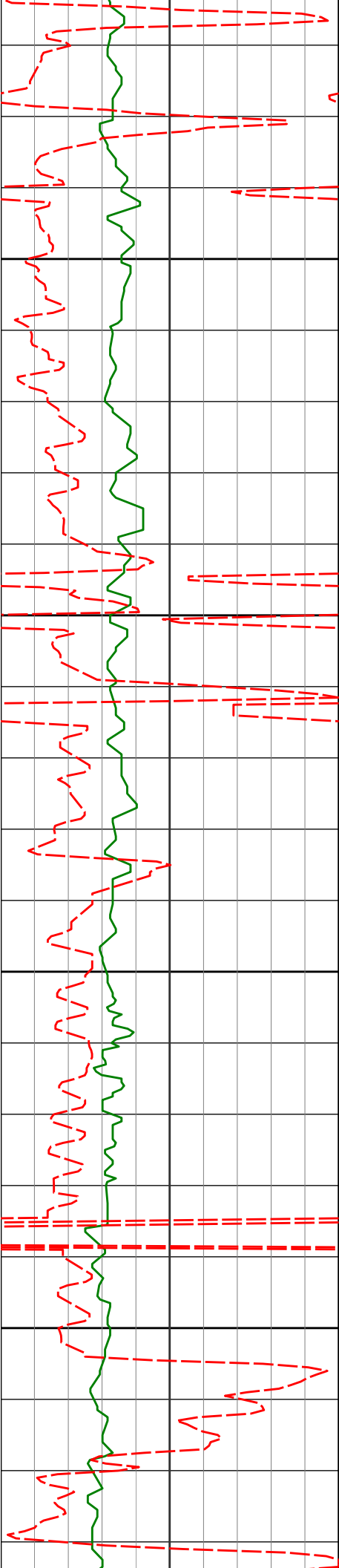
3357'

3.18°

333.13°

3335.73'

-138.54'



3450

3452'

2.98°

339.70°

3430.60'

-140.25'

3500

3550

3547'

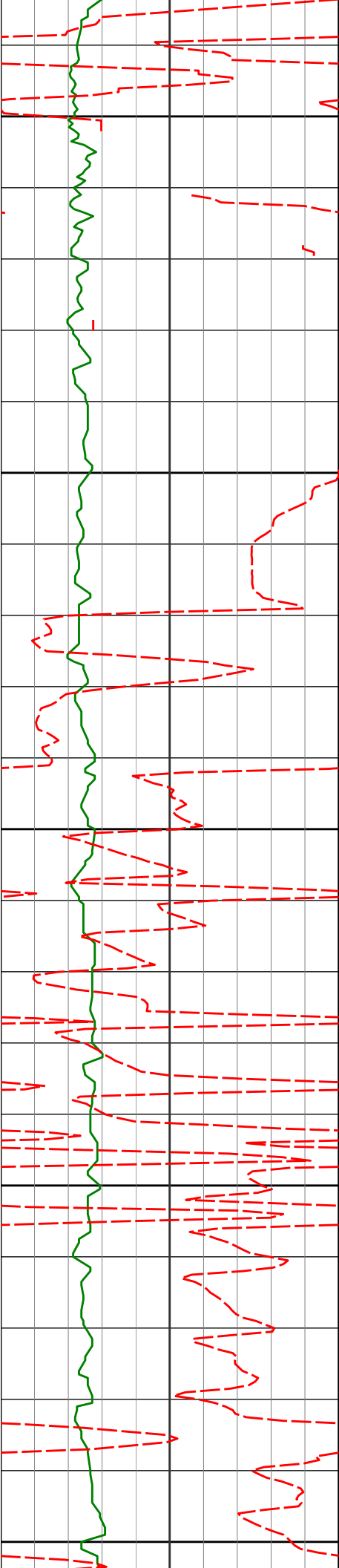
3.08°

338.93°

3525.46'

-141.69'

3600



3641'

1.85°

345.10°

3619.38'

-142.71'

3650

3700

3736'

0.70°

128.89°

3714.36'

-142.58'

3750

3800

3831'

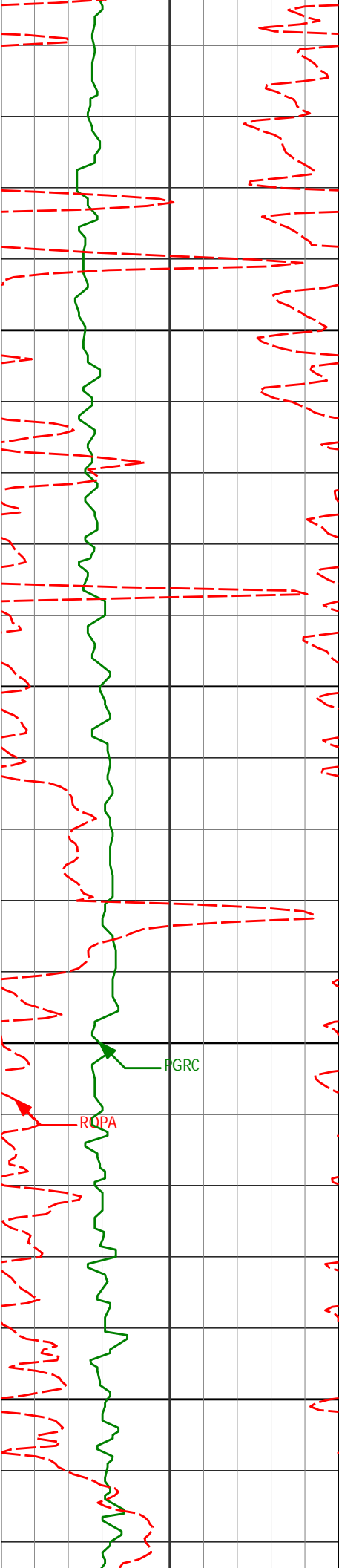
0.87°

149.80°

3809.35'

-141.83'

3850



3900

3926'

0.94°

148.22°

3904.34'

-141.15'

3950

4000

PGRC

RQPA

4021'

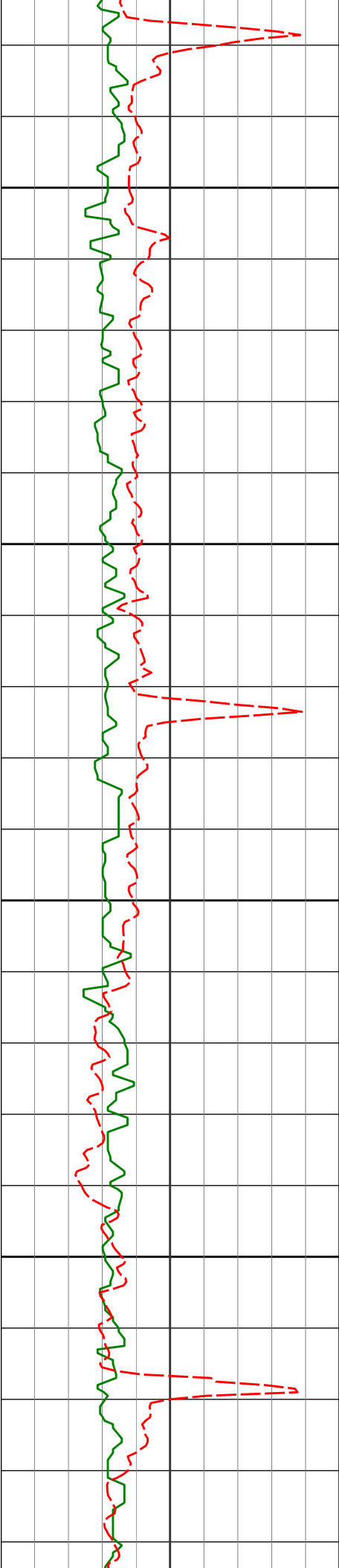
0.85°

118.72°

3999.33'

-140.20'

4050



4100

4116'

0.96°

109.88°

4094.32'

-138.88'

4150

4200

4211'

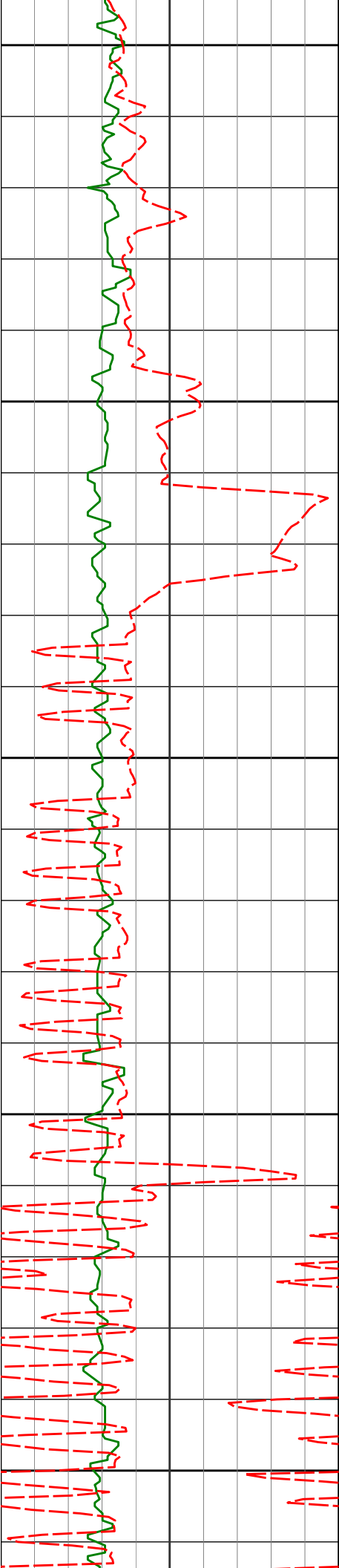
0.59°

105.02°

4189.31'

-137.69'

4250



4300

4305'

1.06°

60.01°

4283.30'

-136.45'

4350

4400

4400'

0.22°

65.00°

4378.29'

-135.49'

4450

4500

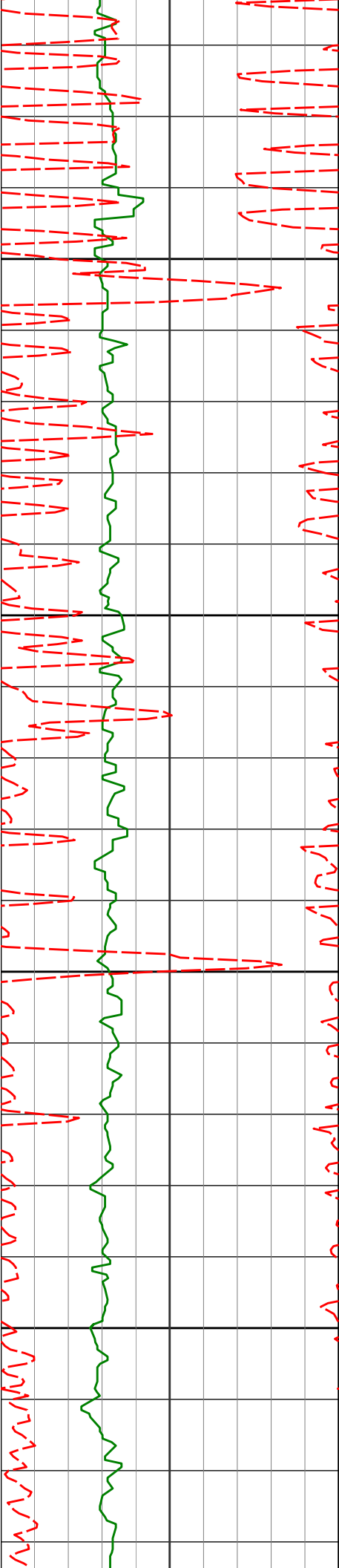
4495'

0.53°

112.71°

4473.29'

-134.93'



4550

4590'

0.63°

100.41°

4568.29'

-134.04'

4600

4650

4685'

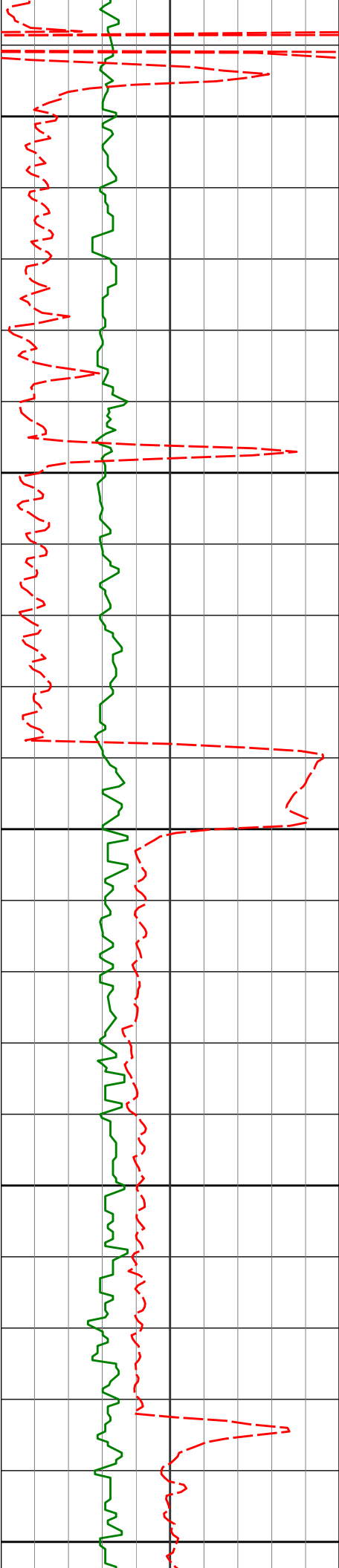
0.63°

85.53°

4663.28'

-133.01'

4700



4750

4780'

0.84°

78.28°

4758.27'

-131.79'

4800

4850

4874'

0.55°

30.15°

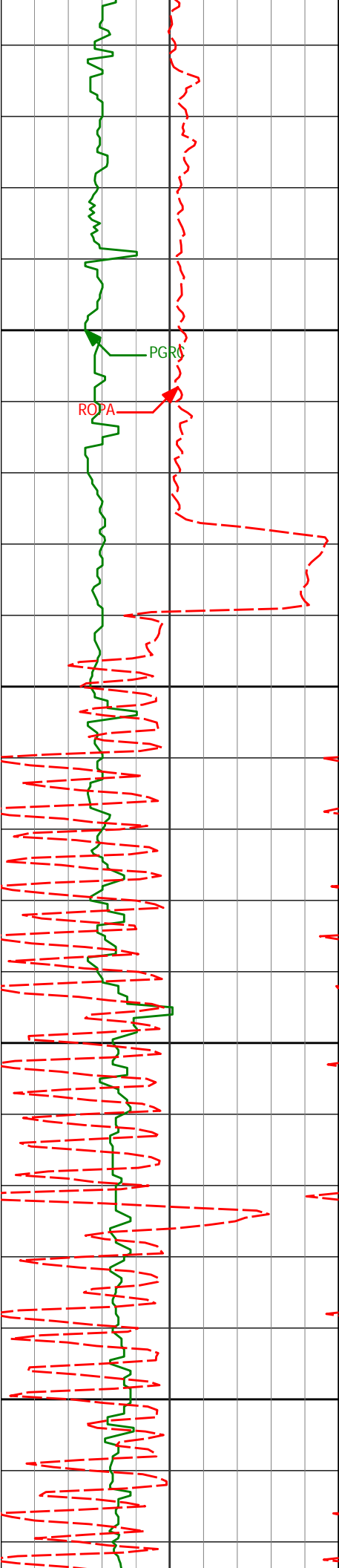
4852.27'

-130.85'

4900

4950





5000

5050

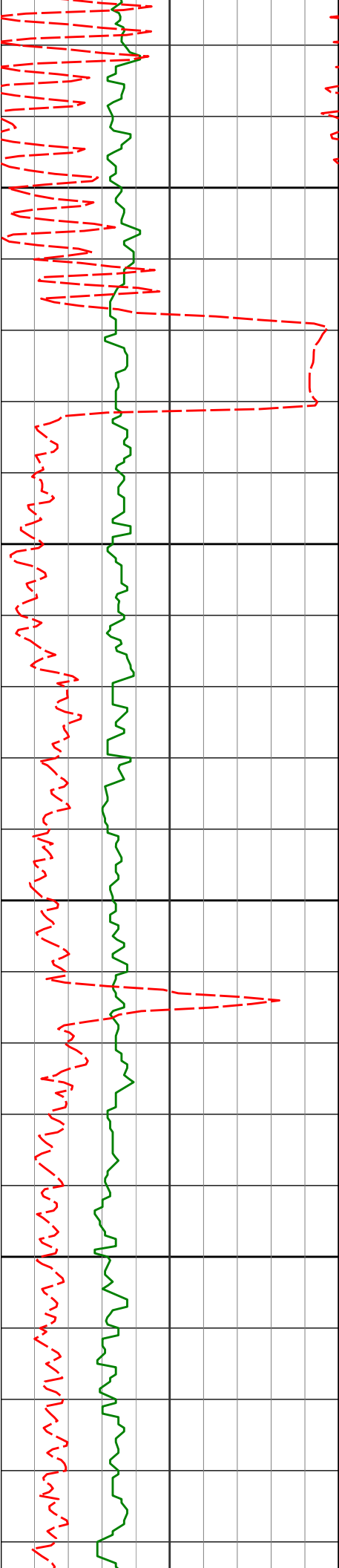
5100

5150

4969'	0.75°	53.01°	4947.26'	-130.08'
-------	-------	--------	----------	----------

5064'	0.41°	36.45°	5042.26'	-129.34'
-------	-------	--------	----------	----------

5159'	0.45°	100.95°	5137.25'	-128.76'
-------	-------	---------	----------	----------



5200

5250

5300

5350

5254'

0.25°

314.52°

5232.25'

-128.54'

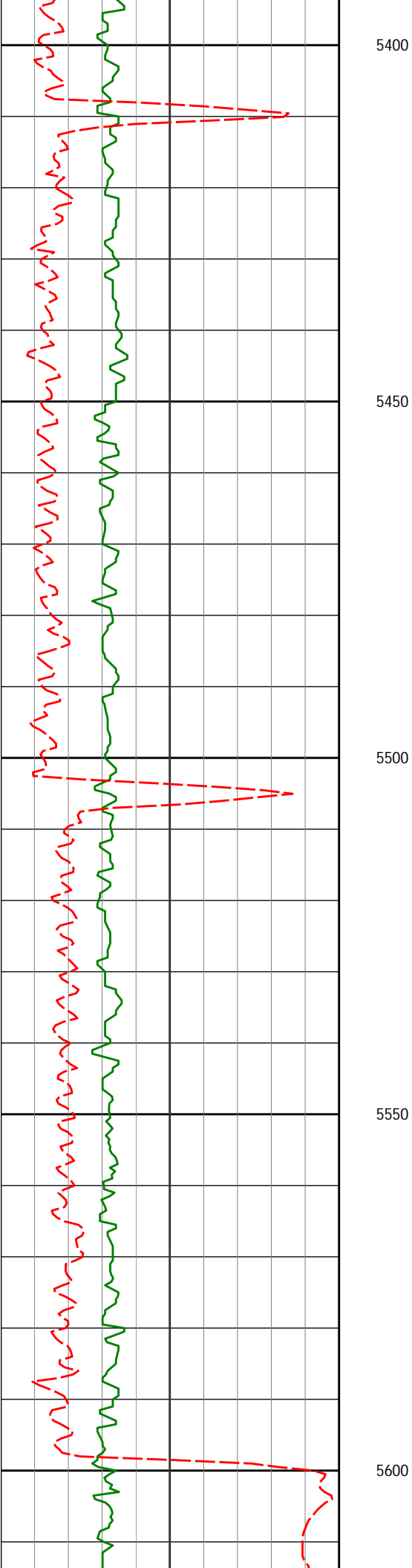
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47.40°

5327.25'

-128.43'



5443'

0.20°

141.62°

5421.25'

-128.09'

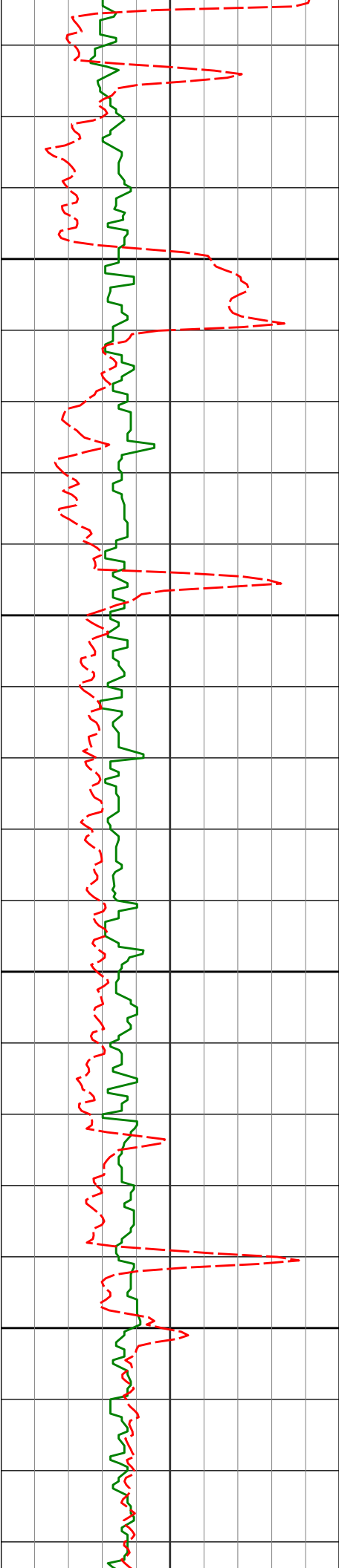
5538'

0.56°

108.60°

5516.25'

-127.57'



5633'

0.22°

238.84°

5611.25'

-127.31'

5650

5700

5728'

0.64°

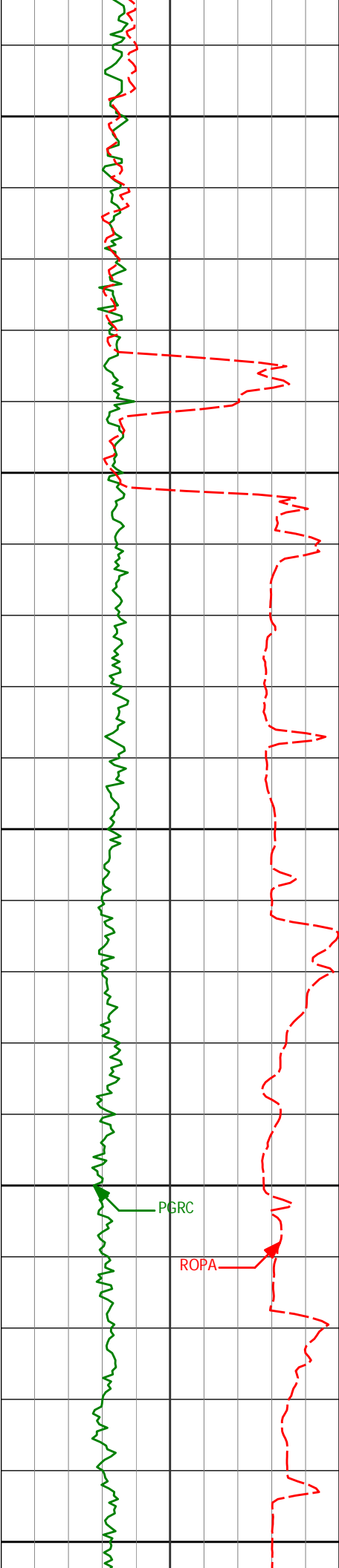
51.82°

5706.25'

-127.04'

5750

5800



200

5850

5900

5950

6000

6050

5846'

1.86°

77.11°

5824.22'

-124.61'

5916'

2.01°

87.11°

5894.18'

-122.26'

5964'

3.25°

82.85°

5942.13'

-120.06'

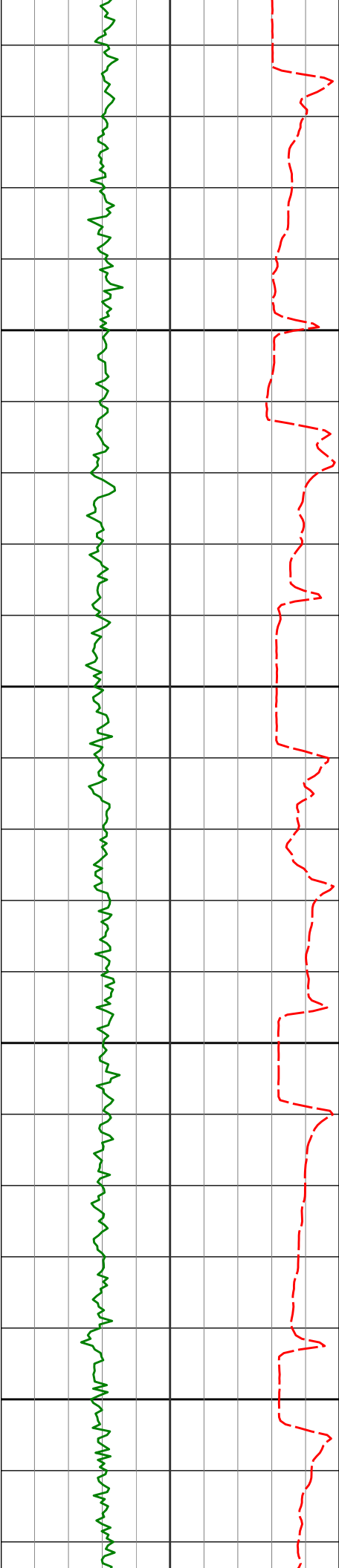
6011'

7.90°

79.03°

5988.89'

-115.52'



6100

6150

6200

6250

6059'

11.52°

72.05°

6036.20'

-107.59'

6106'

14.38°

72.27°

6082.00'

-97.36'

6154'

16.19°

75.77°

6128.30'

-84.98'

6201'

19.44°

81.03°

6173.04'

-70.73'

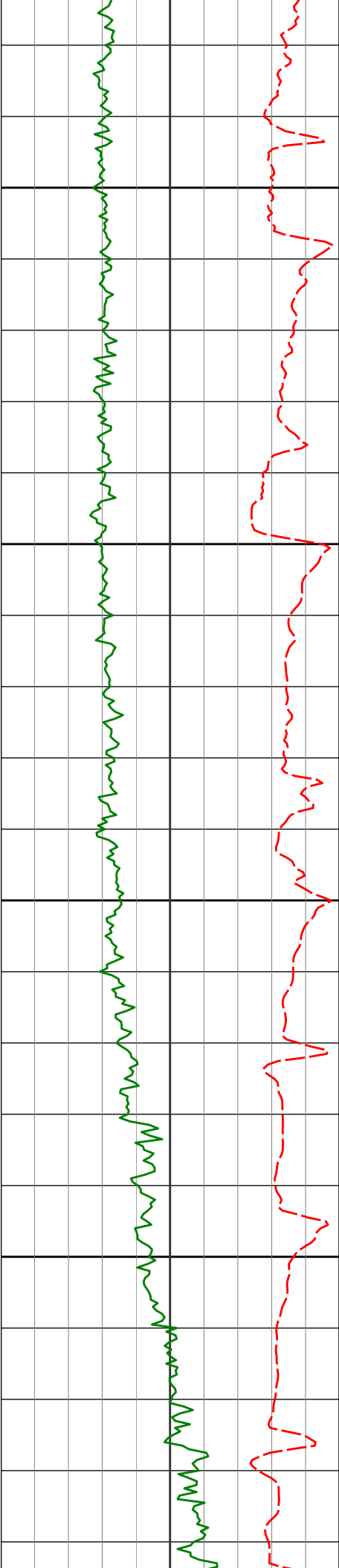
6249'

22.69°

87.05°

6217.83'

-53.51'



6300

6296'

26.46°

87.08°

6260.57'

-33.97'

6350

6344'

31.11°

85.00°

6302.63'

-10.87'

6400

6391'

35.03°

86.33°

6342.01'

14.77'

6450

6439'

37.98°

89.24°

6380.59'

43.30'

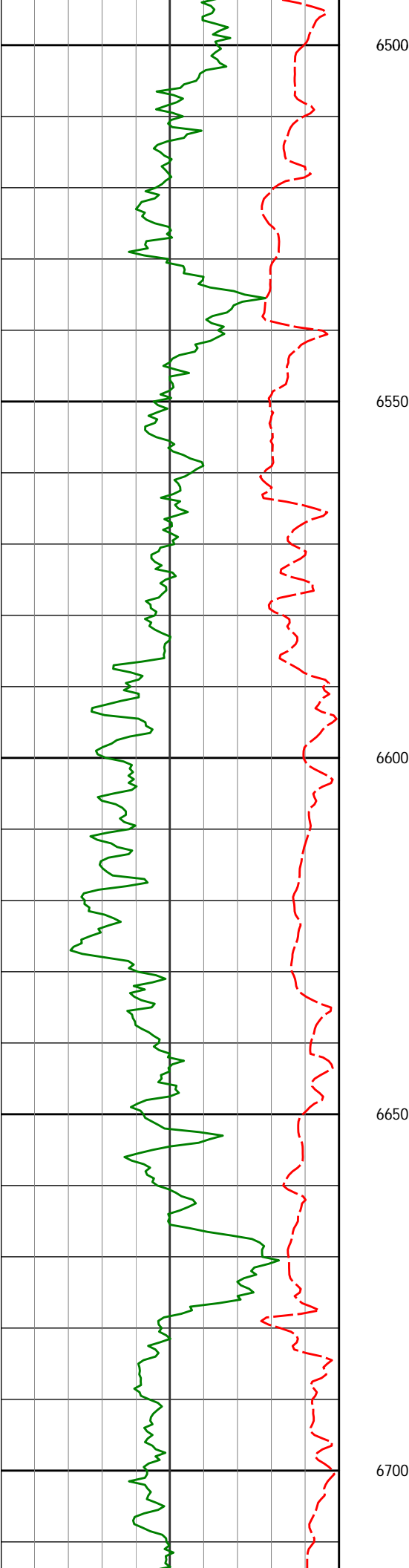
6485'

40.82°

90.92°

6416.13'

72.42'



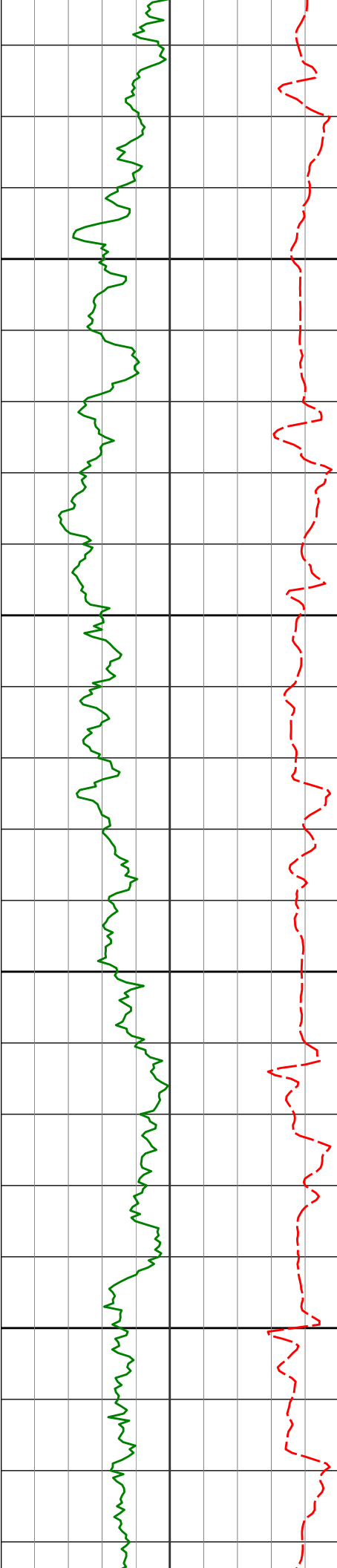
6533'	42.04°	90.22°	6452.12'	104.07'
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6580'	45.75°	89.90°	6485.98'	136.57'
-------	--------	--------	----------	---------

6628'	50.44°	88.17°	6518.03'	172.23'
-------	--------	--------	----------	---------

6675'	55.57°	87.51°	6546.31'	209.73'
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6750

6800

6850

6900

6723'

61.49°

87.90°

6571.35'

250.64'

6770'

66.76°

88.66°

6591.85'

292.88'

6818'

68.91°

90.28°

6609.96'

337.24'

6865'

73.91°

91.32°

6624.94'

381.62'

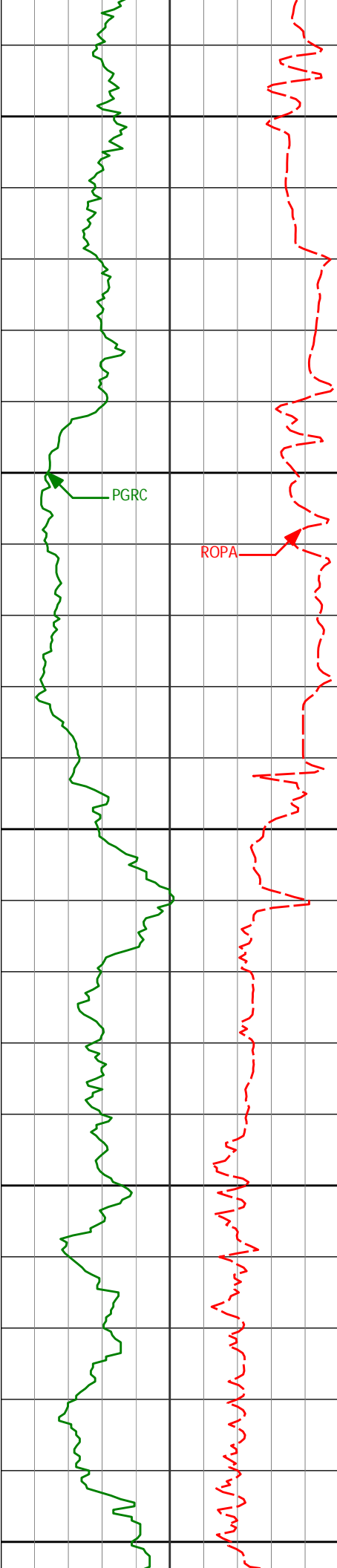
6913'

78.15°

92.06°

6636.52'

427.95'



6950

6959'

81.30°

91.33°

6644.73'

472.98'

6987'

82.94°

90.14°

6648.57'

500.62'

7000

PGRC

ROPA



300

7050

7092'

85.13°

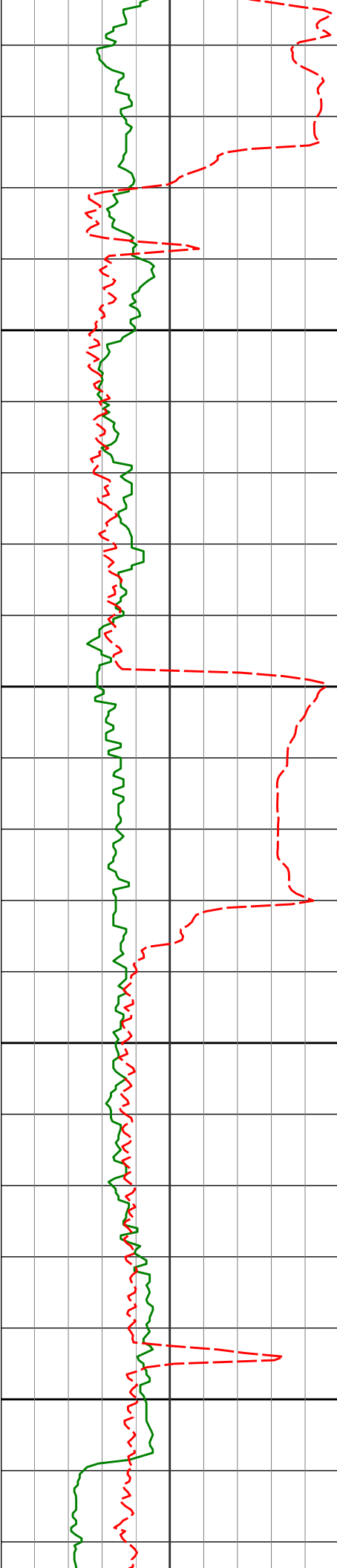
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604.80'

7100

7150



7200

7250

7300

7350

7187'

87.16°

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699.38'

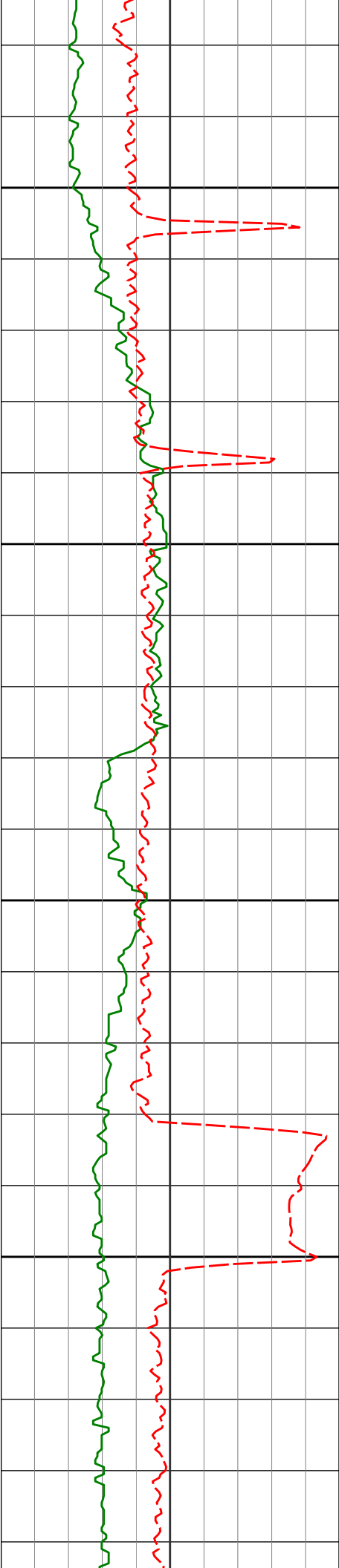
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794.22'



7377'

90.86°

87.69°

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7400

7450

7471'

91.79°

87.57°

6663.80'

983.09'

7500

7550

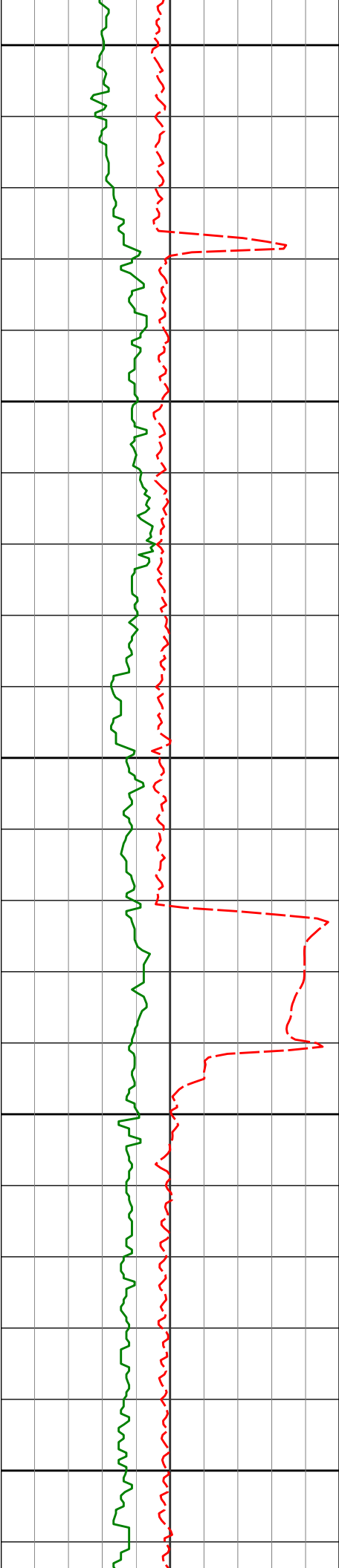
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90.11°

6661.93'

1077.94'



7600

7650

7700

7750

7800

7661'

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90.48°

6660.42'

1172.65'

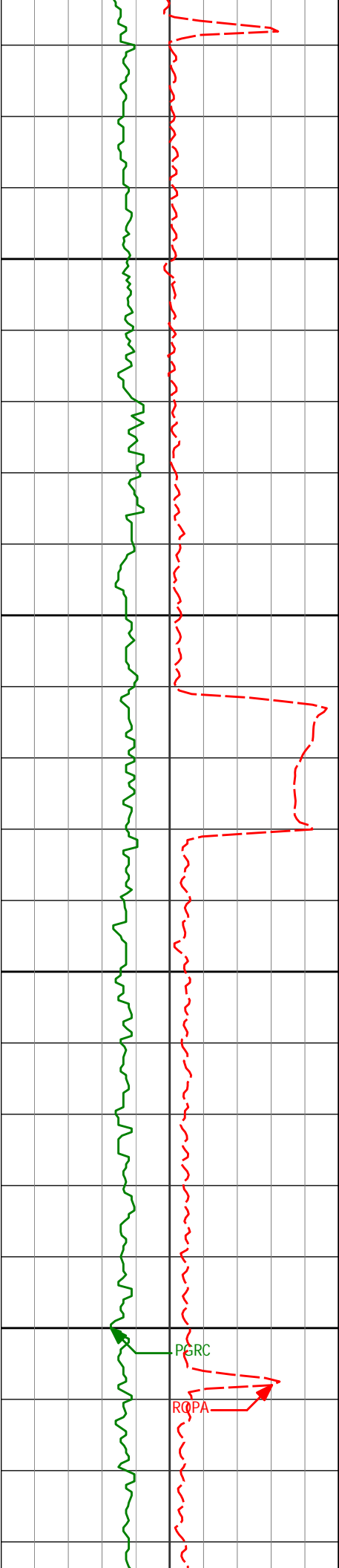
7755'

90.09°

89.20°

6659.23'

1266.42'



7850

7850'

89.38°

89.94°

6659.67'

1361.23'

7900

7950

7945'

90.52°

87.57°

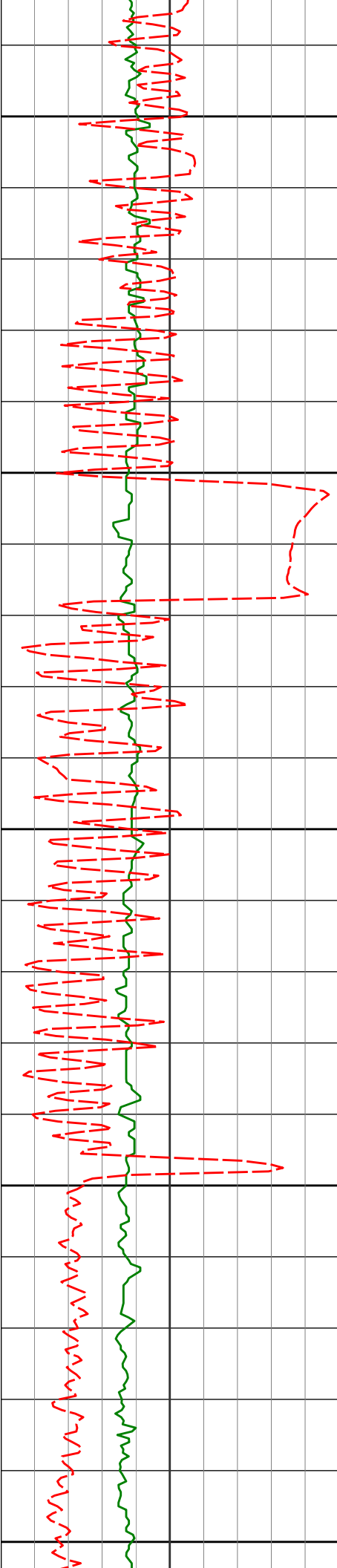
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1456.11'

8000

PSRC

RQPA



8040'

89.97°

86.46°

6659.34'

1551.09'

8050

8100

8135'

90.71°

88.74°

6658.77'

1646.04'

8150

8200

8229'

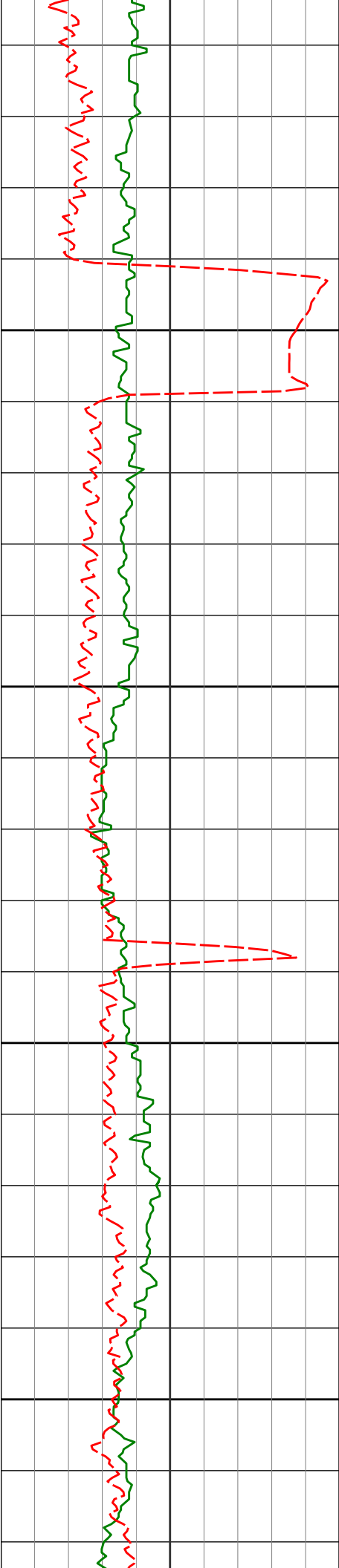
89.35°

87.91°

6658.72'

1739.96'

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8300

8324'

91.57°

88.77°

6657.96'

1834.87'

8350

8400

8419'

91.36°

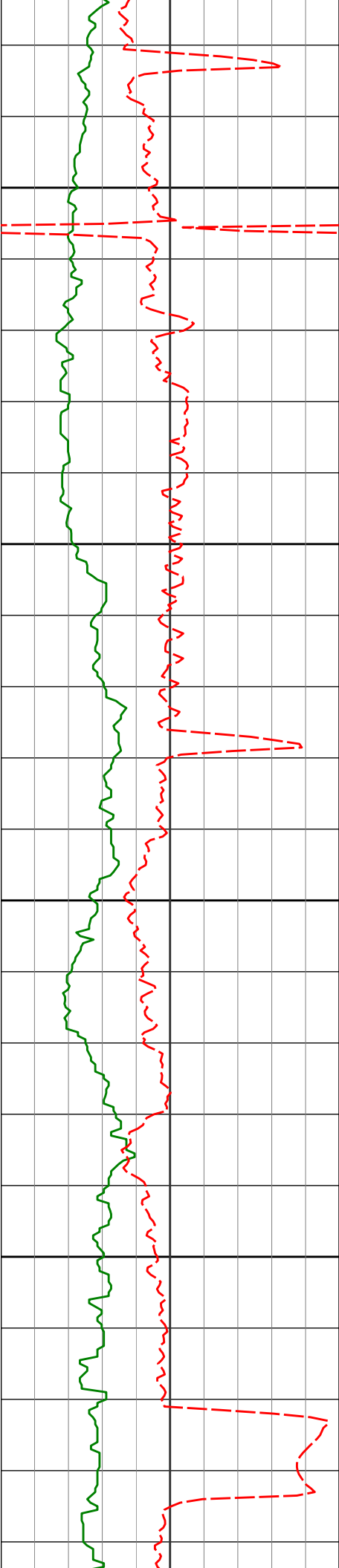
89.30°

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8500

8514'

91.05°

89.08°

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2024.52'

8550

8600

8609'

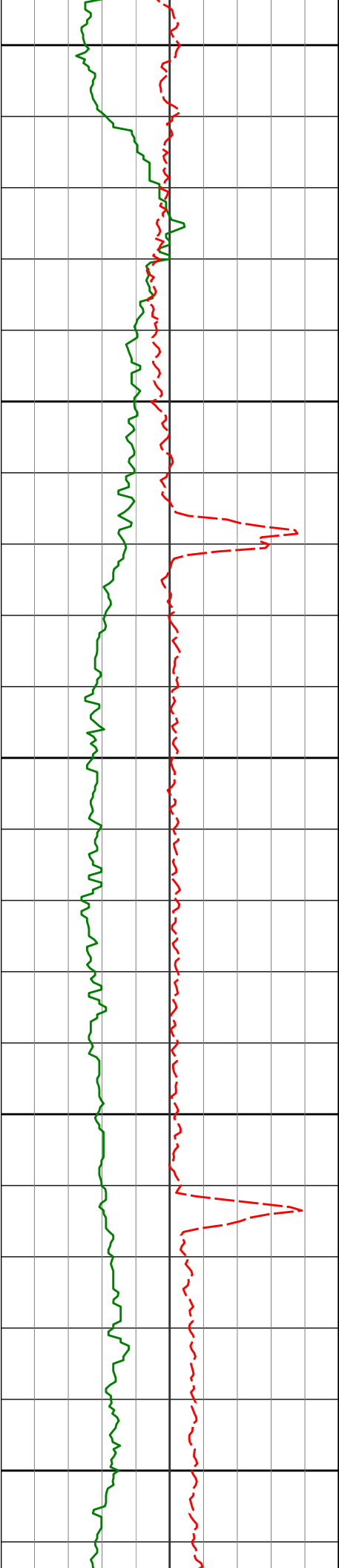
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8650



8700

8704'

90.43°

88.37°

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8750

8800

8798'

90.03°

87.35°

6649.48'

2308.15'

8850

8900

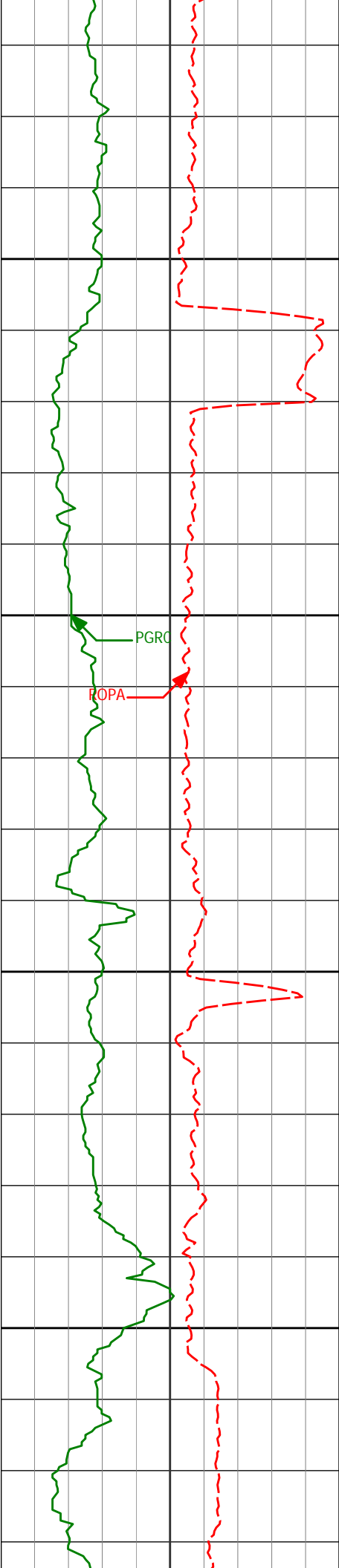
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86.73°

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91.63°

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2498.10'

9000

PGRC

ROPA

9050

9083'

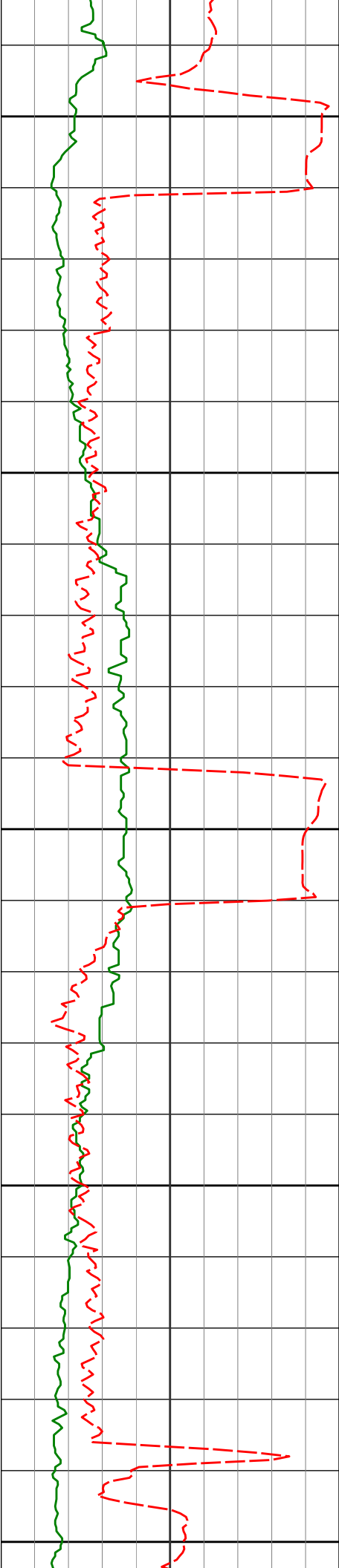
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2592.97'

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9150

9178'

92.01°

88.58°

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2687.80'

9200

9250

9273'

90.03°

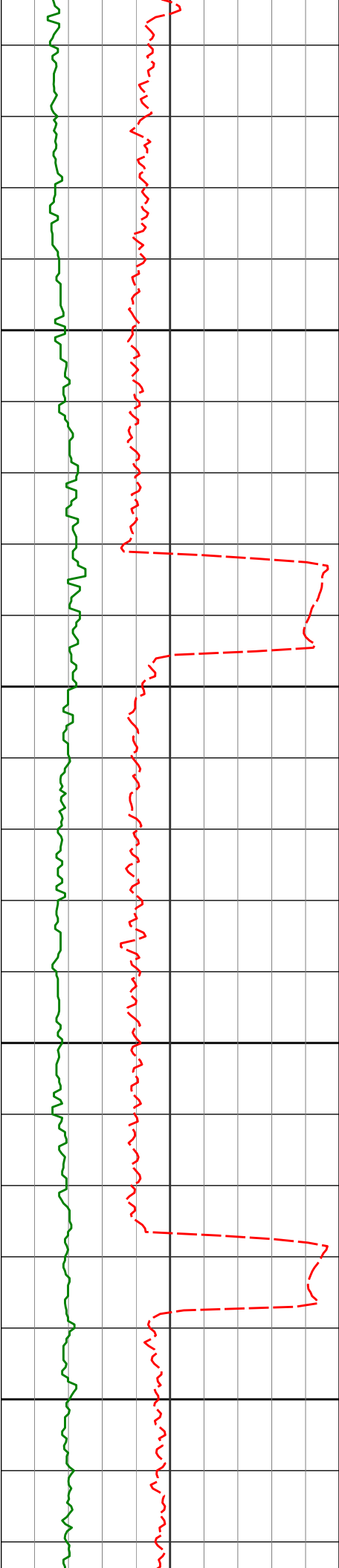
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2782.66'

9300

9350



9368'

91.14°

88.94°

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90.28°

88.92°

6637.53'

2971.38'

9500

9550

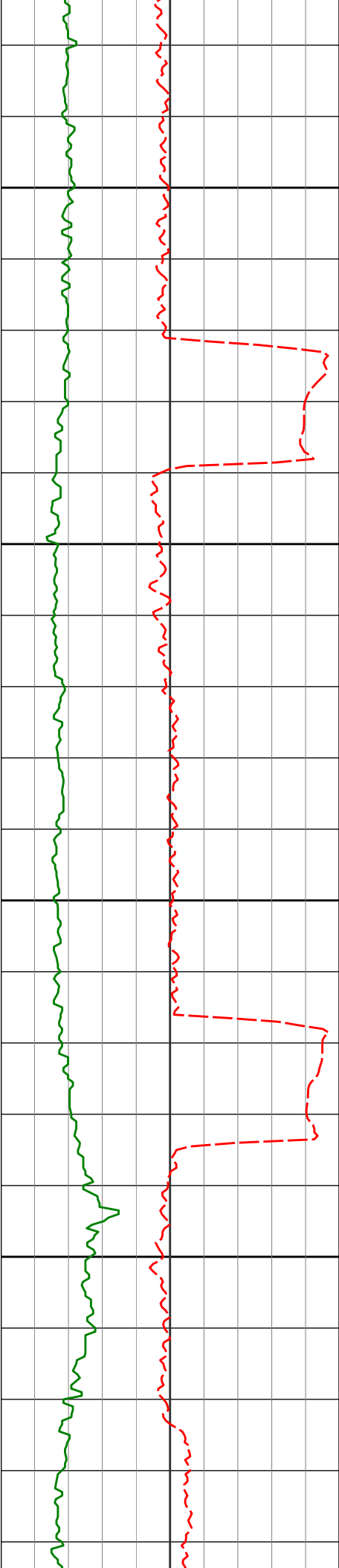
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3066.30'



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9700

9750

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90.52°

87.70°

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3161.25'

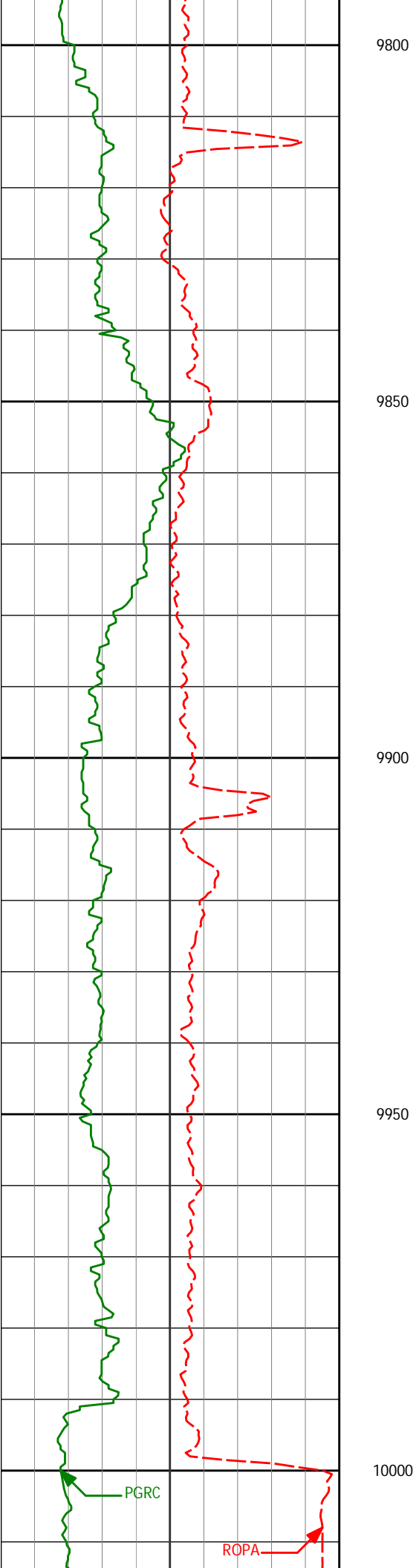
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3350.17'

9850

9900

9936'

88.64°

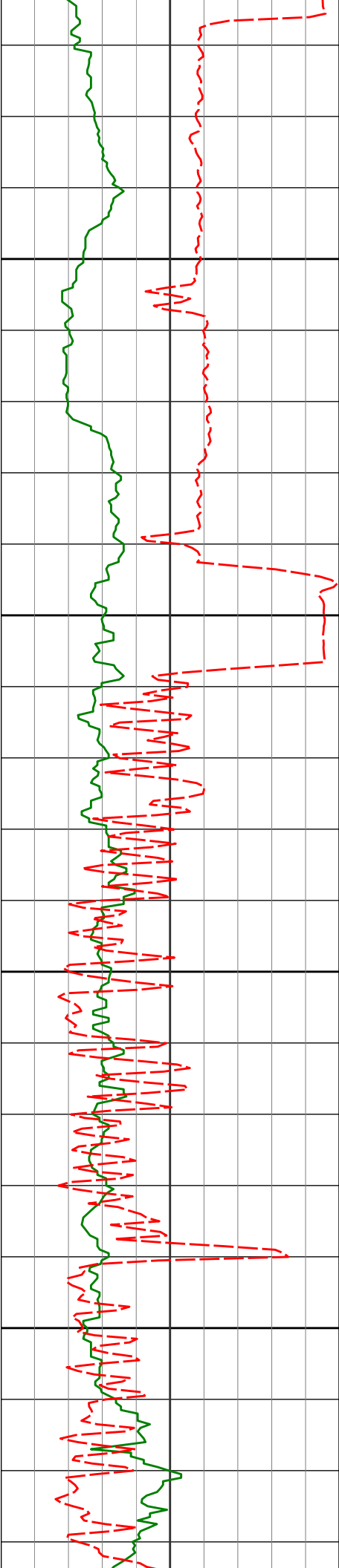
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10000



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10126'

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89.66°

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3634.97'

10150

10200

10220'

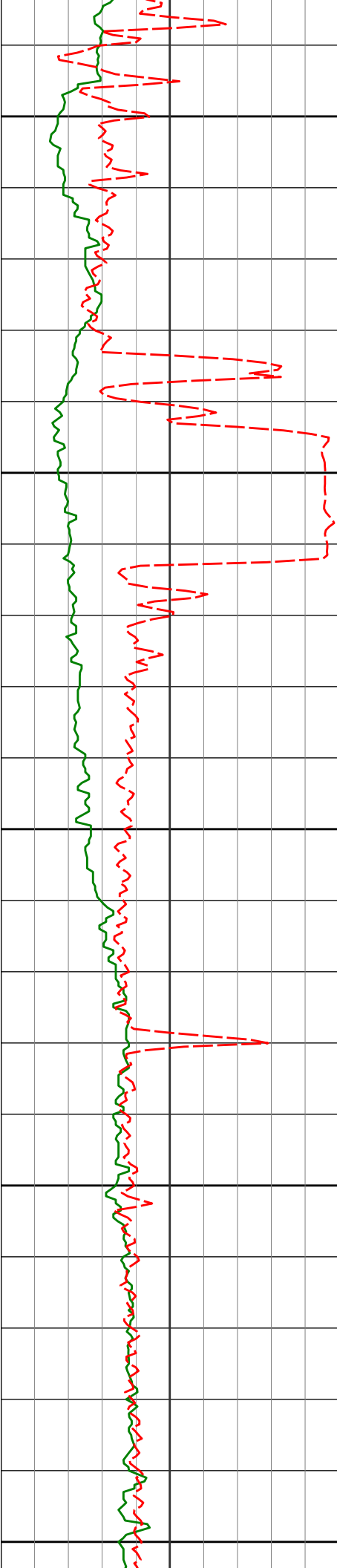
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10350

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10450

10315'

90.86°

89.61°

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3823.55'

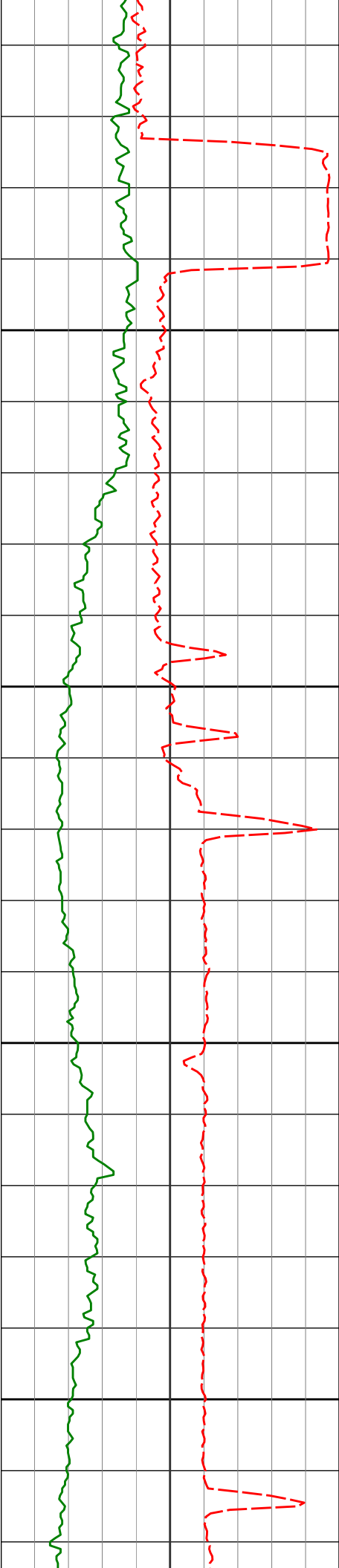
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3918.33'



10500

10504'

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88.60°

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4012.17'

10550

10600

10599'

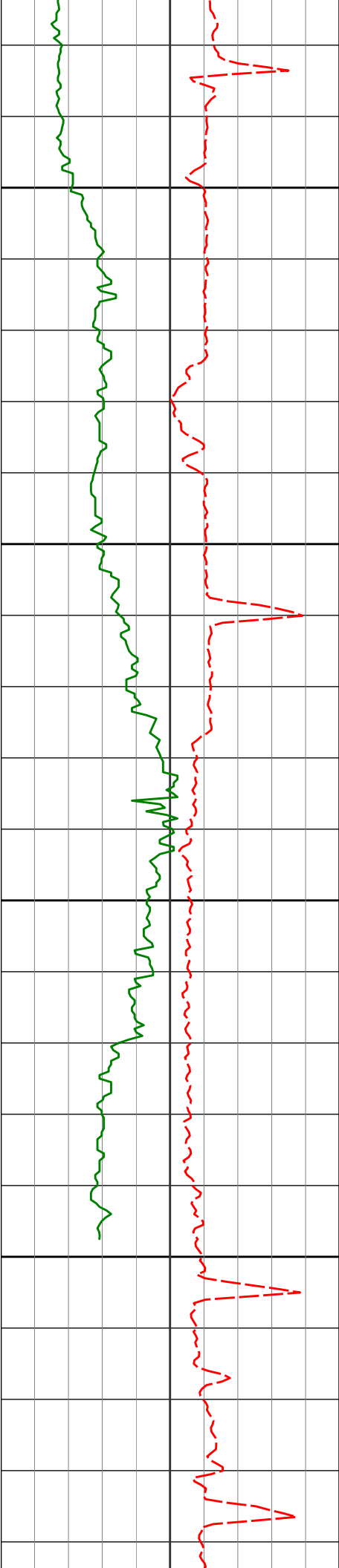
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10700

10750

10800

10850

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10789'

89.94°

87.14°

6630.29'

4296.96'

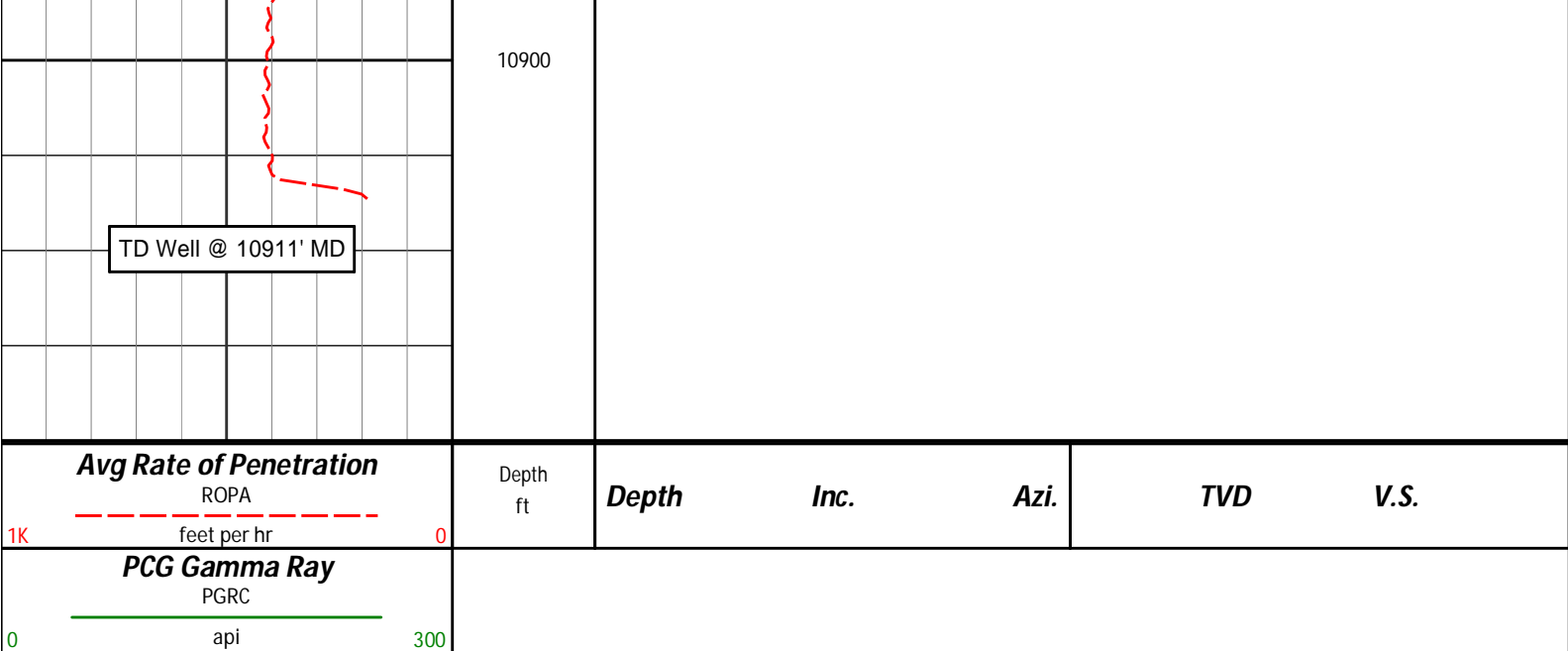
10847'

90.09°

87.19°

6630.27'

4354.95'



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Wells Ranch AE20-68-1HN  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0900807598

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
350.00	1.20	217.02	349.97	2.93 S	2.21 W	-2.41	0.34
720.00	1.00	217.42	719.91	8.58 S	6.50 W	-7.09	0.05
965.00	0.20	69.62	964.90	10.13 S	7.40 W	-8.10	0.48
1092.00	0.97	107.34	1091.89	10.38 S	6.17 W	-6.88	0.65
1184.00	0.87	106.27	1183.88	10.80 S	4.75 W	-5.50	0.11
1276.00	0.98	98.01	1275.86	11.11 S	3.30 W	-4.08	0.19
1369.00	1.05	101.02	1368.85	11.38 S	1.68 W	-2.48	0.09
1461.00	0.91	335.82	1460.84	10.88 S	1.15 W	-1.91	1.89
1556.00	1.49	322.81	1555.82	9.21 S	2.20 W	-2.85	0.67
1651.00	1.88	322.81	1650.78	6.98 S	3.89 W	-4.38	0.42
1746.00	1.52	349.29	1745.74	4.50 S	5.07 W	-5.38	0.90
1840.00	0.77	356.90	1839.72	2.64 S	5.34 W	-5.51	0.81
1935.00	2.18	357.89	1934.69	0.20 S	5.44 W	-5.44	1.48
2030.00	3.43	340.99	2029.57	4.30 N	6.43 W	-6.11	1.56
2125.00	5.97	344.08	2124.25	11.74 N	8.71 W	-7.86	2.69
2220.00	8.13	347.46	2218.52	23.05 N	11.52 W	-9.87	2.31
2315.00	9.02	337.11	2312.47	36.46 N	15.88 W	-13.26	1.87
2409.00	8.75	326.95	2405.34	49.24 N	22.65 W	-19.11	1.69
2504.00	10.02	312.12	2499.08	60.84 N	32.72 W	-28.34	2.86
2599.00	12.94	311.68	2592.17	73.46 N	46.79 W	-41.49	3.08
2693.00	13.51	310.75	2683.68	87.63 N	62.97 W	-56.63	0.65
2788.00	13.79	312.27	2776.00	102.49 N	79.75 W	-72.32	0.48
2883.00	12.66	311.58	2868.48	117.01 N	95.92 W	-87.42	1.19
2978.00	10.85	308.49	2961.48	129.49 N	110.71 W	-101.29	2.01
3073.00	11.52	315.18	3054.68	141.79 N	124.40 W	-114.07	1.54
3168.00	9.65	311.44	3148.06	153.79 N	137.06 W	-125.85	2.10
3263.00	6.67	322.21	3242.09	163.42 N	146.40 W	-134.50	3.51
3357.00	3.18	333.13	3335.73	170.06 N	150.93 W	-138.54	3.83
3452.00	2.98	339.70	3430.60	174.72 N	152.97 W	-140.25	0.43
3547.00	3.08	338.93	3525.46	179.41 N	154.74 W	-141.69	0.12

3641.00	1.85	345.10	3619.38	183.24 N	156.04 W	-142.71	1.33
3736.00	0.70	128.89	3714.36	184.36 N	155.99 W	-142.58	2.59
3831.00	0.87	149.80	3809.35	183.37 N	155.17 W	-141.83	0.35
3926.00	0.94	148.22	3904.34	182.08 N	154.40 W	-141.15	0.08
4021.00	0.85	118.72	3999.33	181.08 N	153.37 W	-140.20	0.49
4116.00	0.96	109.88	4094.32	180.48 N	152.01 W	-138.88	0.19
4211.00	0.59	105.02	4189.31	180.08 N	150.79 W	-137.69	0.40
4305.00	1.06	60.01	4283.30	180.39 N	149.57 W	-136.45	0.82
4400.00	0.22	65.00	4378.29	180.91 N	148.64 W	-135.49	0.89
4495.00	0.53	112.71	4473.29	180.82 N	148.07 W	-134.93	0.43
4590.00	0.63	100.41	4568.29	180.56 N	147.16 W	-134.04	0.17
4685.00	0.63	85.53	4663.28	180.50 N	146.12 W	-133.01	0.17
4780.00	0.84	78.28	4758.27	180.69 N	144.91 W	-131.79	0.24
4874.00	0.55	30.15	4852.27	181.21 N	144.01 W	-130.85	0.67
4969.00	0.75	53.01	4947.26	181.98 N	143.29 W	-130.08	0.34
5064.00	0.41	36.45	5042.26	182.62 N	142.59 W	-129.34	0.40
5159.00	0.45	100.95	5137.25	182.82 N	142.03 W	-128.76	0.48
5254.00	0.25	314.52	5232.25	182.89 N	141.81 W	-128.54	0.71
5349.00	0.38	47.40	5327.25	183.25 N	141.72 W	-128.43	0.49
5443.00	0.20	141.62	5421.25	183.34 N	141.39 W	-128.09	0.47
5538.00	0.56	108.60	5516.25	183.06 N	140.86 W	-127.57	0.43
5633.00	0.22	238.84	5611.25	182.82 N	140.58 W	-127.31	0.76
5728.00	0.64	51.82	5706.25	183.05 N	140.32 W	-127.04	0.90
5846.00	1.86	77.11	5824.22	183.88 N	137.94 W	-124.61	1.11
5916.00	2.01	87.11	5894.18	184.20 N	135.61 W	-122.26	0.53
5964.00	3.25	82.85	5942.13	184.41 N	133.42 W	-120.06	2.62
6011.00	7.90	79.03	5988.89	185.19 N	128.92 W	-115.52	9.92
6059.00	11.52	72.05	6036.20	187.30 N	121.12 W	-107.59	7.91
6106.00	14.38	72.27	6082.00	190.52 N	111.09 W	-97.36	6.10
6154.00	16.19	75.77	6128.30	193.98 N	98.93 W	-84.98	4.23
6201.00	19.44	81.03	6173.04	196.81 N	84.84 W	-70.73	7.72
6249.00	22.69	87.05	6217.83	198.53 N	67.70 W	-53.51	8.12
6296.00	26.46	87.08	6260.57	199.53 N	48.18 W	-33.97	8.01
6344.00	31.11	85.00	6302.63	201.16 N	25.14 W	-10.87	9.91
6391.00	35.03	86.33	6342.01	203.08 N	0.43 E	14.77	8.49
6439.00	37.98	89.24	6380.59	204.16 N	28.95 E	43.30	7.12
6485.00	40.82	90.92	6416.13	204.11 N	58.14 E	72.42	6.60
6533.00	42.04	90.22	6452.12	203.79 N	89.90 E	104.07	2.73
6580.00	45.75	89.90	6485.98	203.76 N	122.48 E	136.57	7.90
6628.00	50.44	88.17	6518.03	204.38 N	158.19 E	172.23	10.13
6675.00	55.57	87.51	6546.31	205.81 N	195.69 E	209.73	10.99
6723.00	61.49	87.90	6571.35	207.44 N	236.58 E	250.64	12.35
6770.00	66.76	88.66	6591.85	208.70 N	278.83 E	292.88	11.31
6818.00	68.91	90.28	6609.96	209.11 N	323.28 E	337.24	5.45
6865.00	73.91	91.32	6624.94	208.48 N	367.81 E	381.62	10.84
6913.00	78.15	92.06	6636.52	207.10 N	414.36 E	427.95	8.96
6959.00	81.30	91.33	6644.73	205.76 N	459.59 E	472.98	7.02
6987.00	82.94	90.14	6648.57	205.41 N	487.33 E	500.62	7.21
7092.00	85.13	89.63	6659.48	205.62 N	591.75 E	604.80	2.14
7187.00	87.16	89.67	6665.87	206.19 N	686.53 E	699.38	2.14
7282.00	90.93	88.10	6667.45	208.05 N	781.48 E	794.22	4.29
7377.00	90.86	87.69	6665.97	211.54 N	876.40 E	889.15	0.44
7471.00	91.79	87.57	6663.80	215.42 N	970.30 E	983.09	0.99
7566.00	90.46	90.11	6661.93	217.34 N	1065.25 E	1077.94	3.01
7661.00	91.36	90.48	6660.42	216.85 N	1160.23 E	1172.65	1.02
7755.00	90.09	89.20	6659.23	217.11 N	1254.22 E	1266.42	1.91
7850.00	89.38	89.94	6659.67	217.82 N	1349.22 E	1361.23	1.07
7945.00	90.52	87.57	6659.75	219.89 N	1444.19 E	1456.11	2.77
8040.00	89.97	86.46	6659.34	224.84 N	1539.05 E	1551.09	1.31
8135.00	90.71	88.74	6658.77	228.82 N	1633.96 E	1646.04	2.53
8229.00	89.35	87.91	6658.72	231.56 N	1727.92 E	1739.96	1.69
8324.00	91.57	88.77	6657.96	234.31 N	1822.87 E	1834.87	2.50
8419.00	91.36	89.30	6655.53	235.91 N	1917.82 E	1929.70	0.60
8514.00	91.05	89.08	6653.53	237.25 N	2012.79 E	2024.52	0.40
8609.00	91.48	89.36	6651.44	238.55 N	2107.76 E	2119.35	0.54
8704.00	90.43	88.37	6649.86	240.43 N	2202.73 E	2214.21	1.51
8798.00	90.03	87.35	6649.48	243.94 N	2296.66 E	2308.15	1.17
8893.00	89.57	86.73	6649.81	248.85 N	2391.53 E	2403.13	0.82
8988.00	91.63	87.80	6648.81	253.38 N	2486.41 E	2498.10	2.45
9083.00	92.68	88.25	6645.24	256.65 N	2581.29 E	2592.97	1.20
9178.00	92.01	88.58	6641.35	259.28 N	2676.17 E	2687.80	0.80
9273.00	90.03	89.12	6639.66	261.18 N	2771.13 E	2782.66	2.15

9273.00	90.03	89.12	6639.60	261.18 N	2771.13 E	2782.00	2.13
9368.00	91.14	88.94	6638.69	262.79 N	2866.11 E	2877.51	1.18
9462.00	90.28	88.92	6637.53	264.55 N	2960.09 E	2971.38	0.92
9557.00	90.83	87.49	6636.61	267.52 N	3055.03 E	3066.30	1.61
9652.00	90.52	87.70	6635.49	271.50 N	3149.94 E	3161.25	0.39
9746.00	89.08	87.47	6635.81	275.46 N	3243.86 E	3255.21	1.56
9841.00	88.89	87.14	6637.50	279.93 N	3338.74 E	3350.17	0.40
9936.00	88.64	86.85	6639.55	284.91 N	3433.58 E	3445.13	0.40
10031.00	90.19	87.75	6640.52	289.38 N	3528.47 E	3540.09	1.88
10126.00	91.67	89.66	6638.98	291.52 N	3623.42 E	3634.97	2.54
10220.00	92.22	88.96	6635.80	292.64 N	3717.36 E	3728.75	0.95
10315.00	90.86	89.61	6633.24	293.82 N	3812.32 E	3823.55	1.58
10410.00	91.29	89.83	6631.46	294.28 N	3907.30 E	3918.33	0.51
10504.00	89.75	88.60	6630.60	295.57 N	4001.28 E	4012.17	2.10
10599.00	90.25	88.32	6630.60	298.13 N	4096.25 E	4107.07	0.60
10694.00	90.09	88.02	6630.31	301.16 N	4191.20 E	4202.00	0.35
10789.00	89.94	87.14	6630.29	305.17 N	4286.11 E	4296.96	0.95
10847.00	90.09	87.19	6630.27	308.04 N	4344.04 E	4354.95	0.28

# **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 85.95 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 10847.00 FEET  
IS 4354.95 FEET ALONG 85.94 DEGREES (GRID)**

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

**Depth 350 Inc 1.20 Azi 217.02**

**Depth 720 Inc 1.00 Azi 217.42**

**Depth 965 Inc 0.20 Azi 69.62**

**Tied in @ Surface**

**Magnettic direction of 7.623 has been added to AZI for grid direction correction.**