

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

**1 : 600 / 1 : 240**

Country : USA			
Field : Wattenberg			
Location : Lat: 40° 19' 56.93" North Long: 104° 48' 46.84" West			
Well : SHABLE K08-69HN			
Company : Noble			
Rig : H&P 321			
LOCATION			
Latitude : 40° 19' 56.93" North Longitude : 104° 48' 46.84" West		Other Services Directional Drilling	
UTM Easting = 3,191,522.480 ft UTM Northing = 1,364,705.120 ft			
Permanent Datum : Ground Level	Elevation : 4715.00 ft	Elev.	KB N/A
Log Measured From : Drill Floor	30.00 ft Above Permanent Datum	DF	4745.00 ft
Drilling Measured From : Drill Floor	MD LOG	GL	4715.00 ft
		WD	N/A
Depth Logged : 644.00 ft To 17,656.00 ft	Unit No. : 11210424	Job No. : CA-XX-0901584411	
Date Logged : 25-Aug-14 To 06-Sep-14	Plot Type : Final		
Total Depth MD : 17,656.00 ft TVD: 7,135.11 ft	Plot Date : 06-Sep-14		
Spud Date : 25-Aug-14			
Run No.	Borehole Record (MD)		Run No.
Size	From	To	Size
0100	8.750 in	644.00 ft	5,772.00 ft
0200	8.750 in	5,771.67 ft	7,536.00 ft
0300	6.125 in	7,536.10 ft	14,939.00 ft
0400	6.125 in	14,939.00 ft	16,615.00 ft
0500	6.125 in	16,615.00 ft	17,656.00 ft
			Casing Record (MD)
	Size	Weight	From
	9.625 in	34.90 lbpf	SURFACE
	7.000 in	26.00 lbpf	SURFACE
			634.00 ft
			7,526.00 ft

**WELL INFORMATION**

<b>MWD Run Number</b>	100	200	400	500	
<b>Date run completed</b>	27-Aug-14	28-Aug-14	04-Sep-14	04-Oct-14	
<b>Rig Bit Number</b>	2	3	5	6	
<b>Bit Size (in)</b>	8.750	8.750	6.125	6.125	
<b>Tool Nominal OD (in)</b>	6.880	6.880	4.990	4.990	
<b>Log Start Depth (TVD, ft)</b>	644.00	5,743.61	7,125.25	7,137.70	
<b>Log End Depth (TVD, ft)</b>	5,743.61	7,092.76	7,137.70	7,135.11	
<b>Drill or Wipe</b>	Drill	Drill	Drill	Drill	
<b>Drill/Wipe Start Date and Time</b>	26-Aug-14 02:09	27-Aug-14 13:17	02-Sep-14 10:50	05-Sep-14 06:30	
<b>Drill/Wipe End Date and Time</b>	27-Aug-14 02:21	28-Aug-14 03:55	03-Sep-14 22:17	05-Sep-14 23:23	
<b>Min Inc (deg) @ Depth (TVD, ft)</b>	0.13 @ 1,090.99	8.04 @ 5,776.29	88.43 @ 7,126.85	88.15 @ 7,140.37	
<b>Max Inc (deg) @ Depth (TVD, ft)</b>	11.42 @ 4,281.61	82.28 @ 7,086.83	90.89 @ 7,129.84	91.91 @ 7,137.31	
<b>Bit TFA(in2) / Bit Type</b>	0.74 / PDC	1.74 / PDC	0.65 / PDC	0.65 / PDC	
<b>Flow Rate (gpm)</b>	562.45	585.00	328.48	279.00	
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	NA / NA	NA / NA	NA / NA	NA / NA	
<b>Fluid Type</b>	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
<b>Density (ppg) / Viscosity (spqt)</b>	9.00 / 36.00	10.50 / 37.00	9.30 / 34.00	9.25 / 35.00	
<b>Filtrate CL (ppm)</b>	1,500.00	1,500.00	1,500.00	1,400.00	
<b>pH / Fluid Loss (mptm)</b>	9.40 / 9	9.20 / 8	9.10 / 6	9.50 / 7	
<b>PV (cP) / YP (lhf2)</b>	8 / 10.00	8 / 10.00	8 / 8.00	8 / 9.00	
<b>% Solids / % Sand</b>	4.20 / 0.40	10.00 / 0.60	5.70 / 0.15	5.30 / 0.30	
<b>% Oil / Oil:Water Ratio</b>	1.00 / NA	1.00 / NA	2.60 / NA	2.00 / NA	
<b>Rm @ Measured Temp (degF)</b>	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
<b>Rmf @ Measured Temp (degF)</b>	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
<b>Rmc @ Measured Temp (degF)</b>	NA @ NA	NA @ NA	NA @ NA	NA @ NA	

Max Tool Temp (degF) / Source	145.90 / PCM	179.90 / PCM	259.81 / PCM	264.60 / PCM	
Rm @ Max Tool Temp (degF)	NA @ 145.90	NA @ 179.90	NA @ 259.81	NA @ 264.60	
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	5.93	5.93	5.93	5.93	
Sub Serial Number	241717	241717	12365885	12365885	
Insert Serial Number	11680785	11680785	10997267	11680785	
Date and Time Initialized	25-Aug-14 15:31	25-Aug-14 15:31	01-Sep-14 05:58	04-Sep-14 02:48	
Date and Time Read	28-Aug-14 10:56	28-Aug-14 10:56	04-Sep-14 12:05	06-Sep-14 09:56	
ECMB SW Version	N/A	N/A	N/A	N/A	

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	57.00	54.00	66.00	66.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	241717	241717	12365885	12365885	
Sonde Serial Number	11297590	11297590	12174339	11297590	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	172.27	62.93	300.96	103.18	

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	49.42	49.66	69.22	69.20	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	241717	12365885	12365885	12365885	
Insert/Sonde Serial Number	11681002	11681002	11120592	11681002	

## REMARKS

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

## WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS

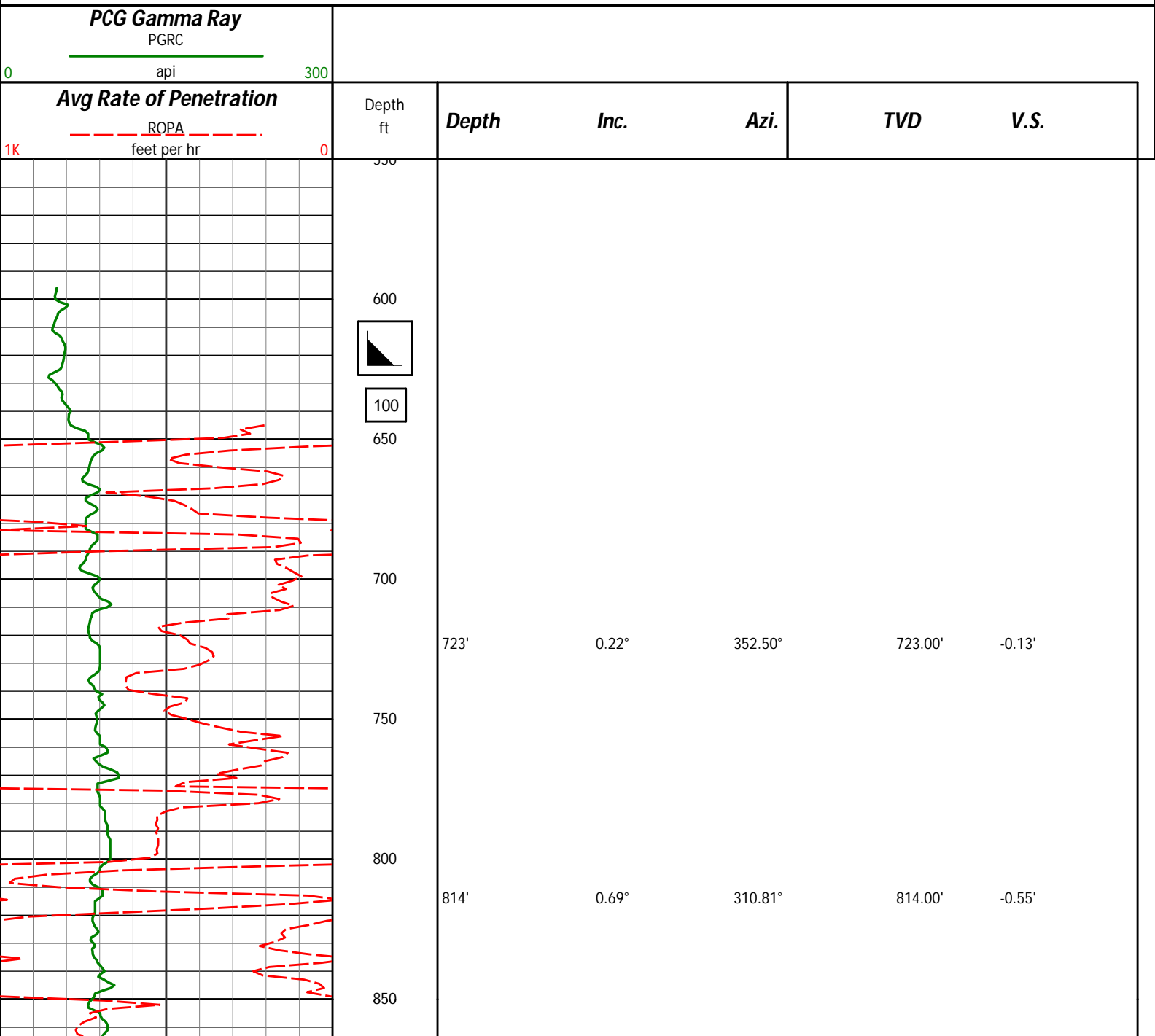
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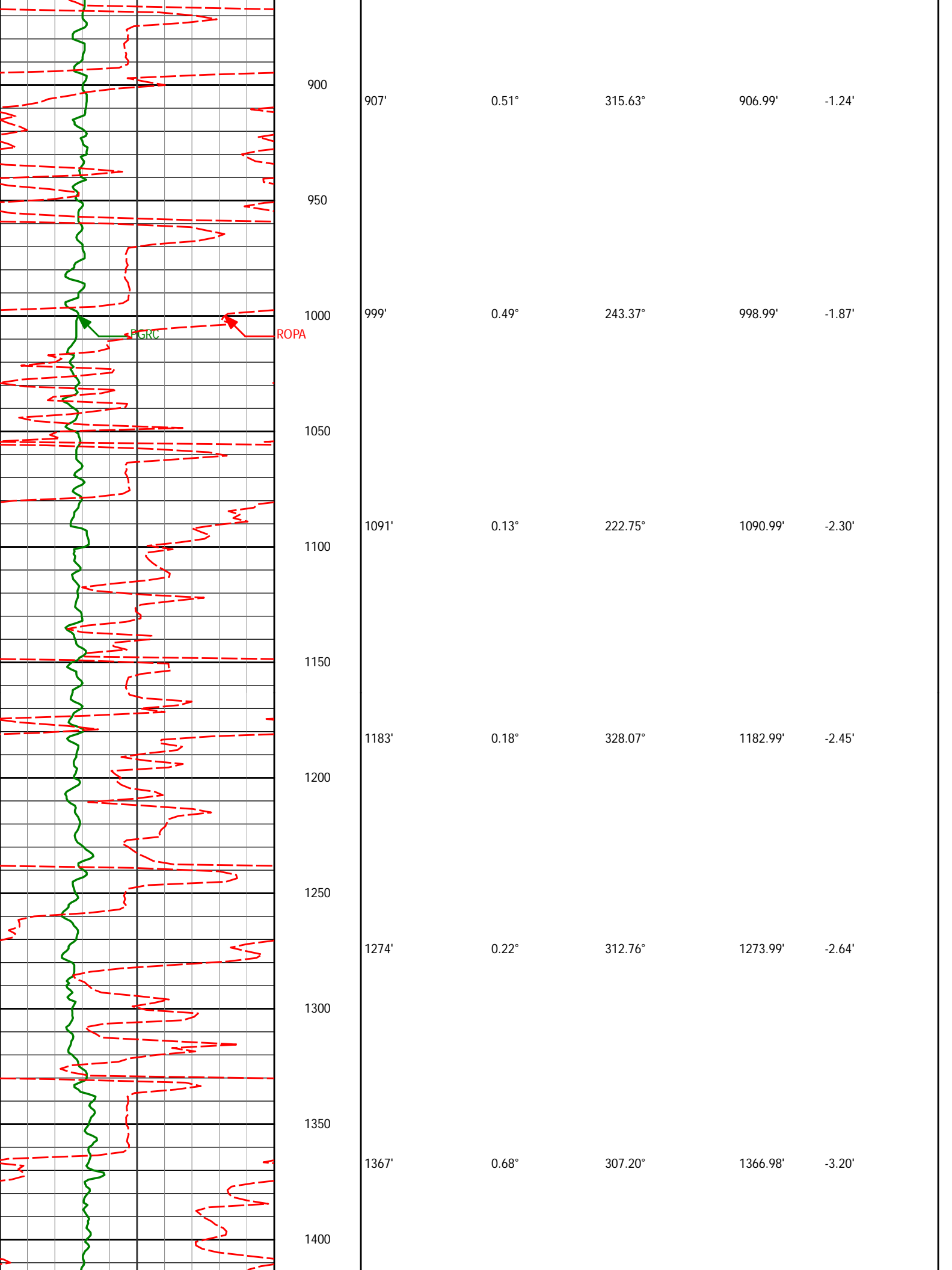
# HALLIBURTON

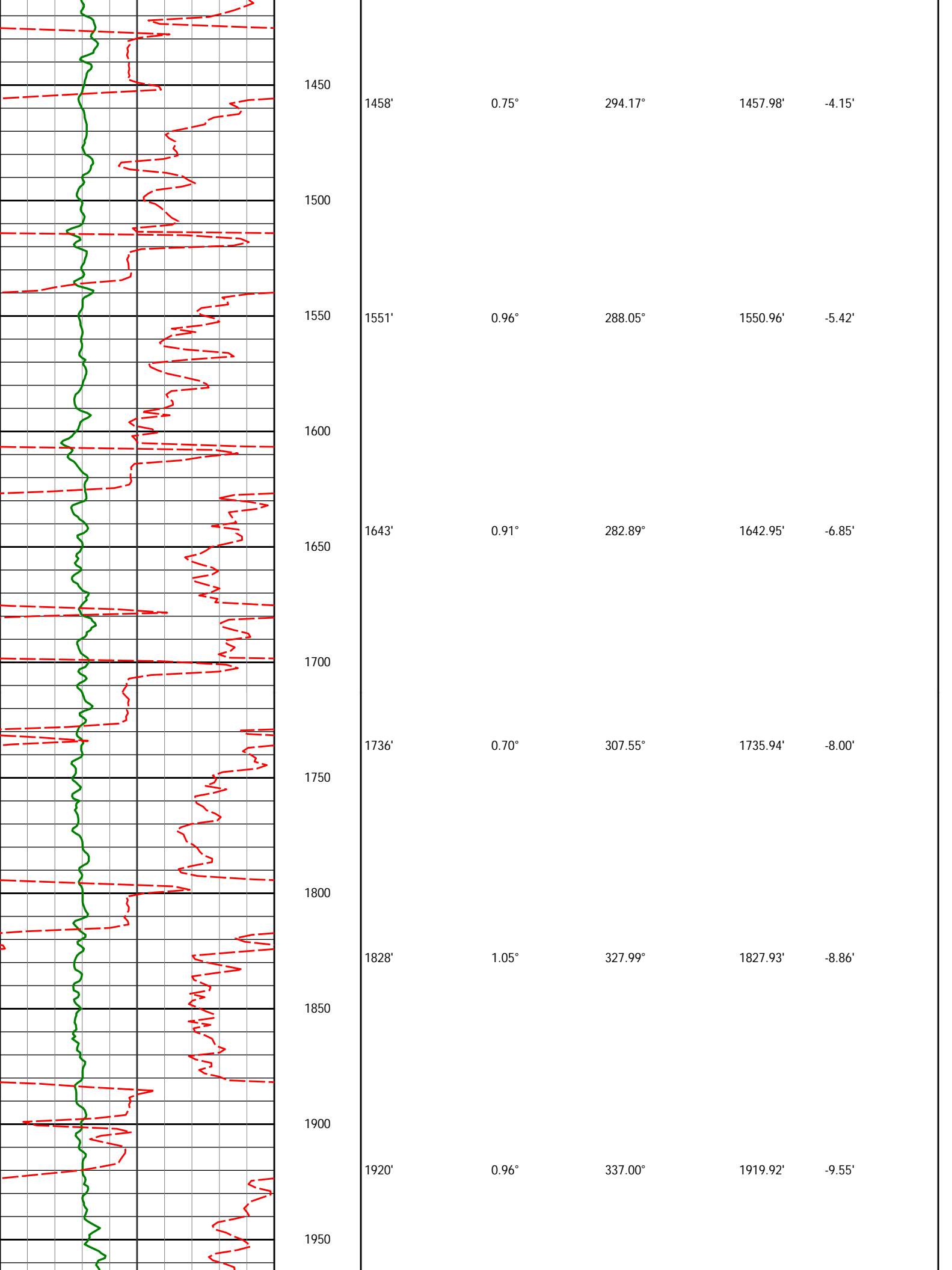
## Sperry Drilling Services

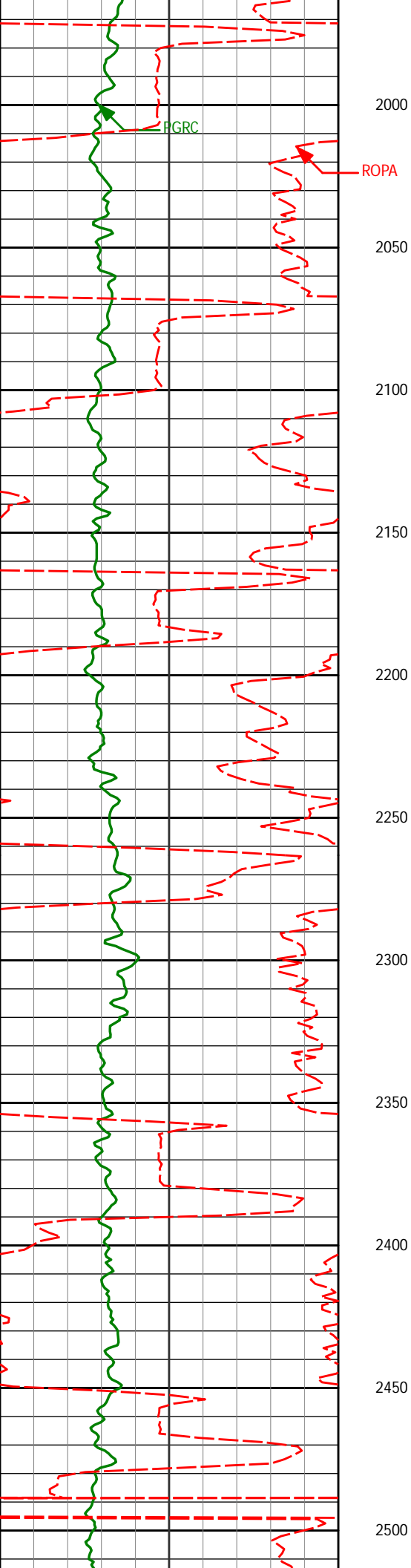
### TVD Correlation Log 1:600

Noble Energy  
Shable K08-69HN  
H&P 321  
Sec. 7-T4N-R66W

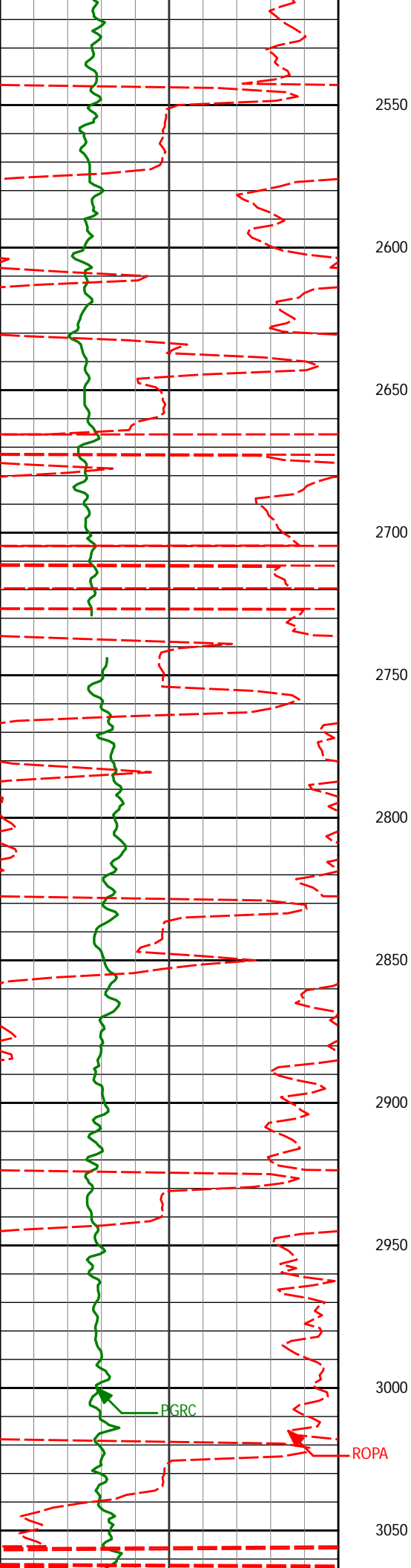




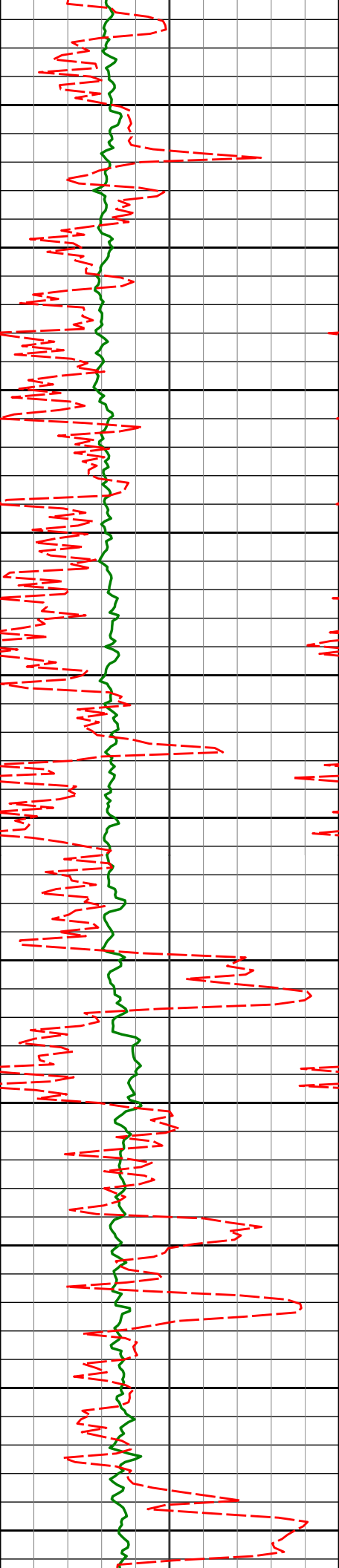




2015'	1.07°	358.10°	2014.90'	-9.83'
2110'	1.06°	348.78°	2109.89'	-9.97'
2204'	1.31°	347.76°	2203.87'	-10.29'
2299'	1.91°	168.55°	2298.85'	-10.23'
2394'	1.20°	157.27°	2393.82'	-9.62'
2489'	0.69°	64.22°	2488.81'	-8.75'



2584'	0.71°	45.38°	2583.80'	-7.79'
2679'	0.80°	49.11°	2678.79'	-6.84'
2773'	0.69°	144.32°	2772.79'	-6.01'
2868'	1.06°	152.32°	2867.78'	-5.32'
2963'	1.05°	158.81°	2962.76'	-4.65'
3058'	1.11°	154.54°	3057.74'	-4.01'



3100

3150

3200

3250

3300

3350

3400

3450

3500

3550

3600

3153'

1.28°

165.16°

3152.72'

-3.41'

3247'

0.93°

160.26°

3246.71'

-2.94'

3342'

1.09°

165.47°

3341.69'

-2.52'

3437'

0.84°

200.99°

3436.68'

-2.60'

3531'

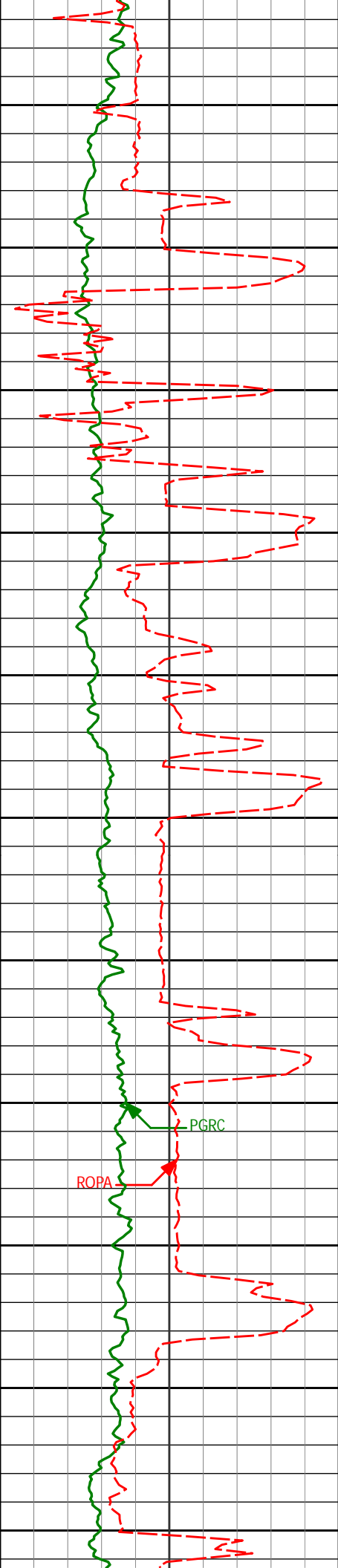
0.44°

266.05°

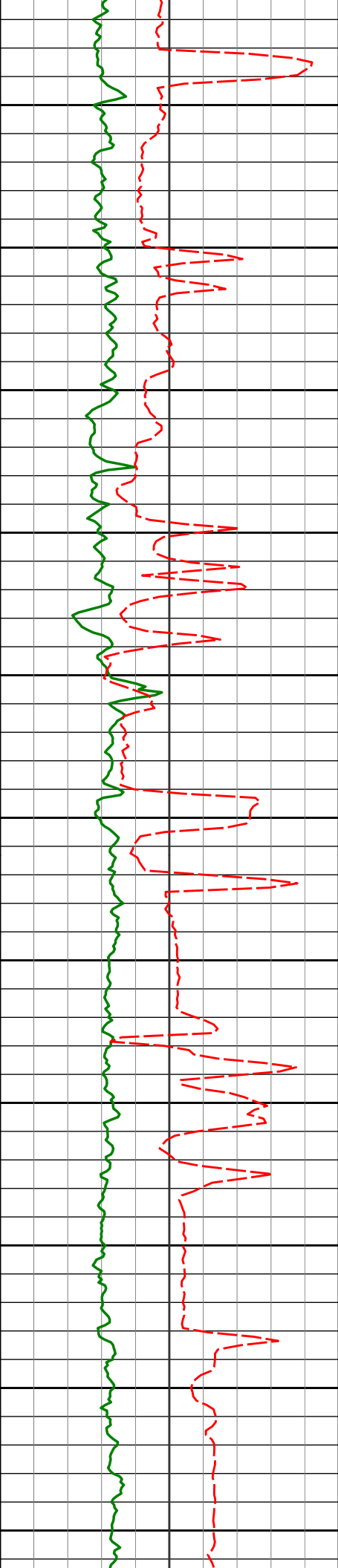
3530.67'

-3.23'

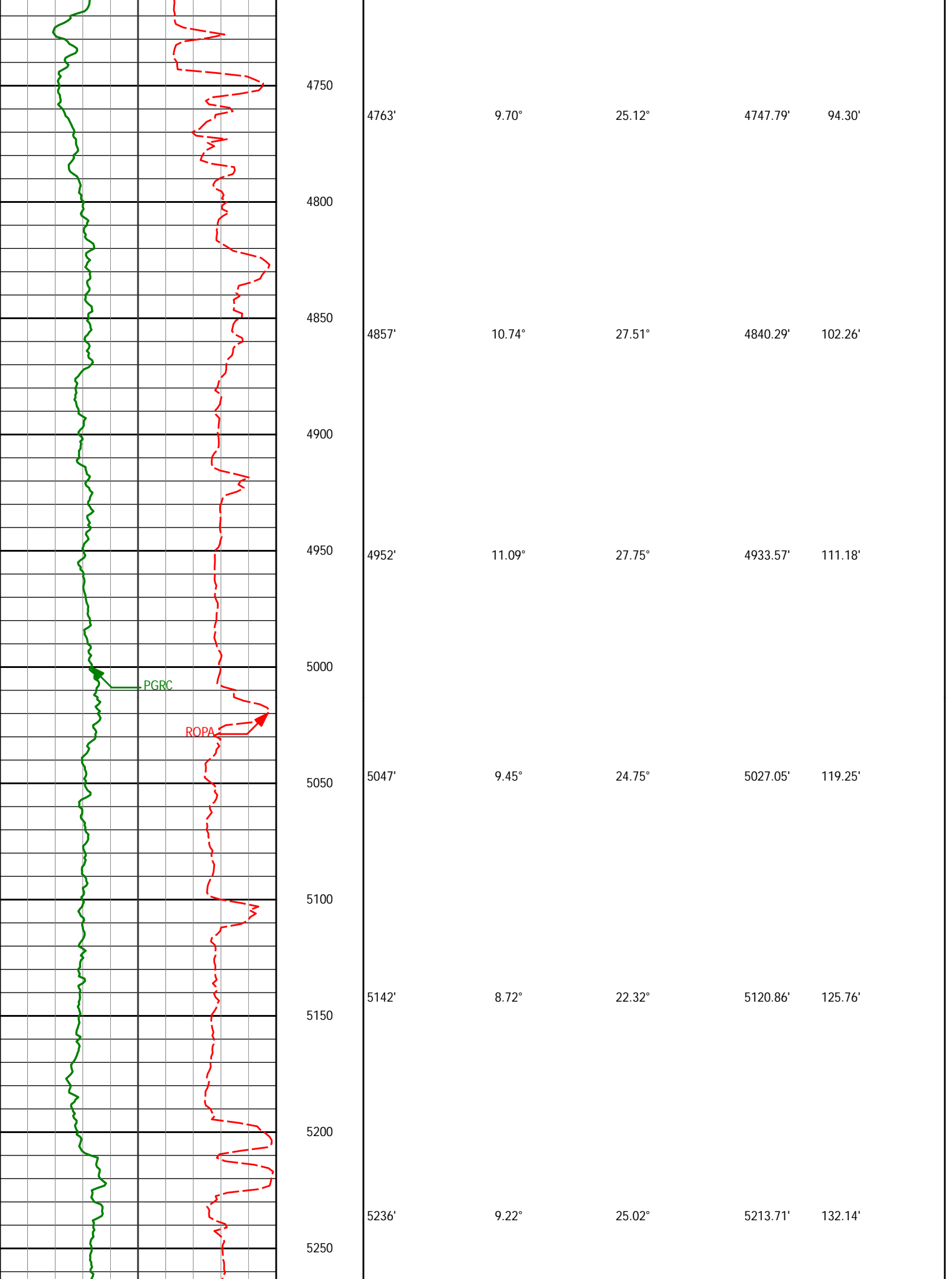


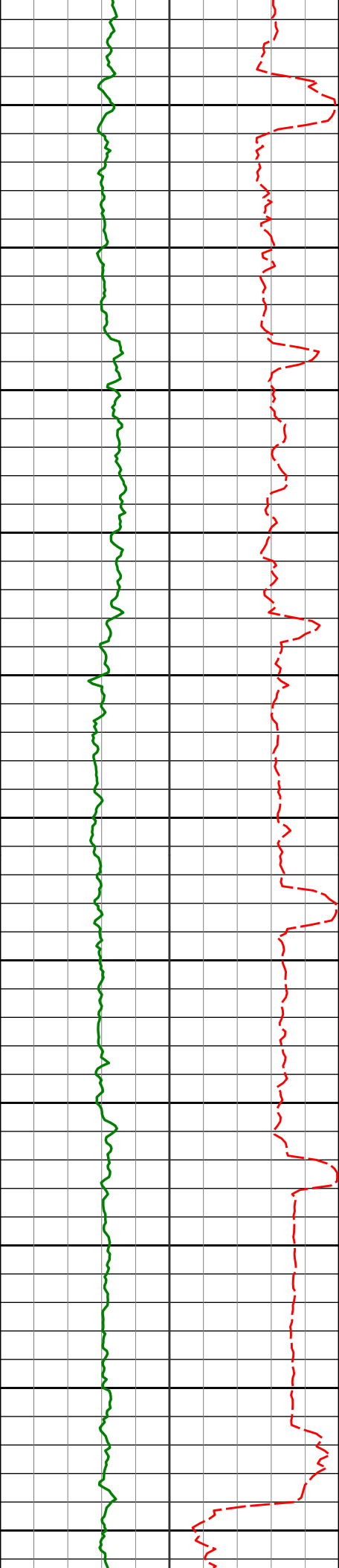


3626'	2.23°	18.90°	3625.65'	-2.93'
3650				
3700				
3721'	3.59°	28.45°	3720.53'	-0.75'
3750				
3800				
3815'	5.76°	33.93°	3814.21'	3.52'
3850				
3900				
3910'	7.75°	35.20°	3908.54'	10.21'
3950				
4000				
4005'	8.90°	34.84°	4002.54'	18.51'
4050				
4100	10.44°	34.14°	4096.19'	28.01'
4150				



4200	4194'	11.39°	33.81°	4188.49'	38.50'
4250					
4300	4289'	11.42°	32.29°	4281.61'	49.31'
4350					
4400	4384'	10.91°	31.37°	4374.81'	59.59'
4450					
4500	4479'	10.86°	30.69°	4468.10'	69.39'
4550					
4600	4573'	10.21°	29.80°	4560.52'	78.59'
4650					
4700	4668'	9.51°	26.84°	4654.12'	86.84'





5300

5331'

9.87°

30.14°

5307.39'

139.95'

5350

5400

5426'

8.94°

28.43°

5401.12'

148.05'

5450

5500

5521'

8.22°

28.83°

5495.05'

155.29'

5550

5600

5616'

8.22°

25.20°

5589.08'

161.90'

5650

5700

5710'

7.64°

25.72°

5682.18'

167.90'

5750

200

5800

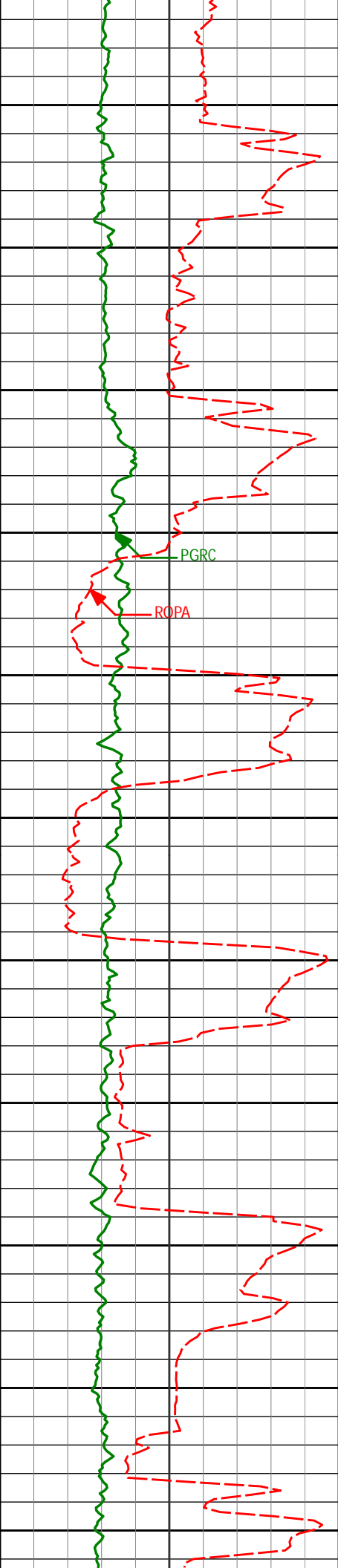
5805'

8.04°

25.32°

5776.29'

173.91'



5850

5900

5950

6000

6050

6100

6150

6200

6250

6300

6350

5900'

5995'

6089'

6184'

6279'

8.87°

9.54°

10.08°

10.53°

11.45°

34.05°

30.73°

33.71°

30.00°

27.22°

5870.26'

5964.04'

6056.66'

6150.13'

6243.39'

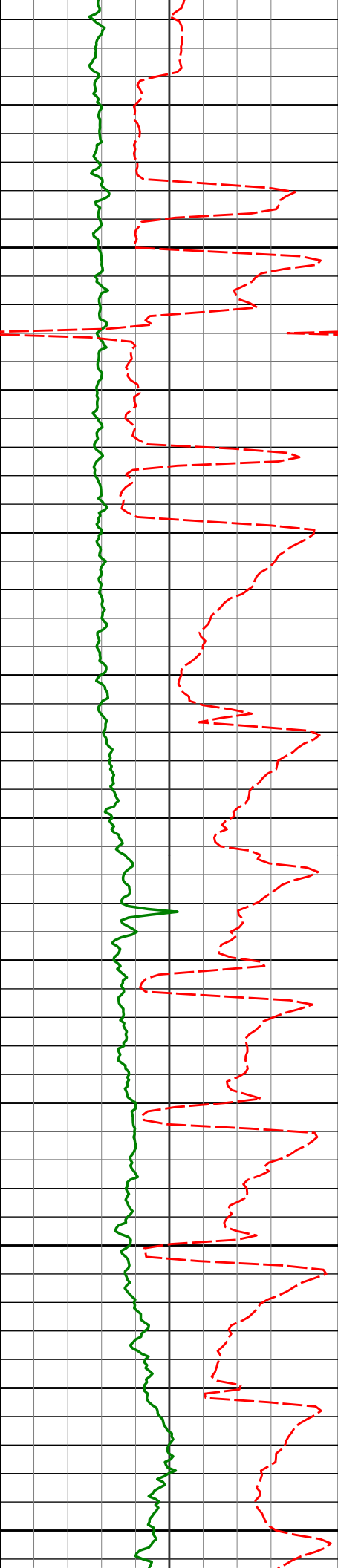
181.29'

189.88'

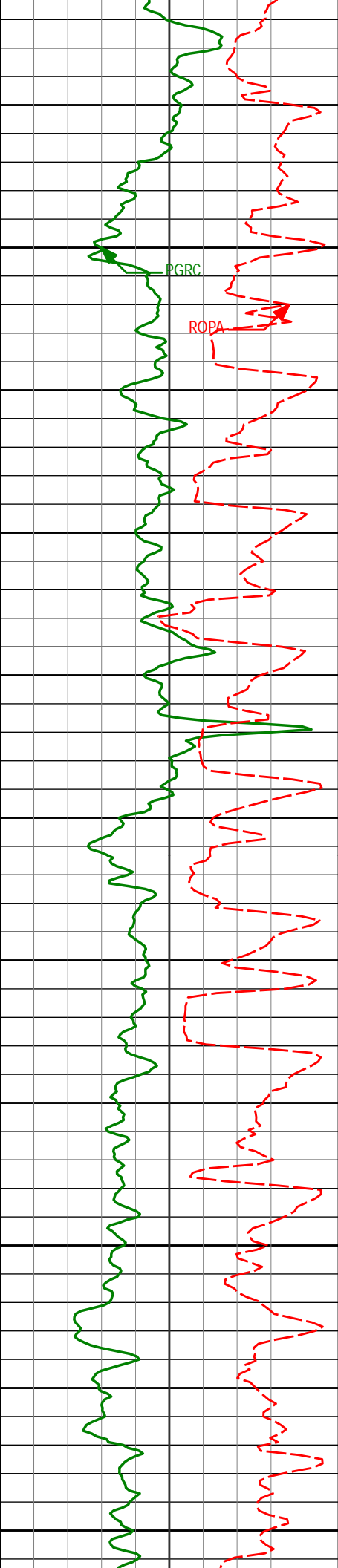
198.92'

208.40'

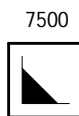
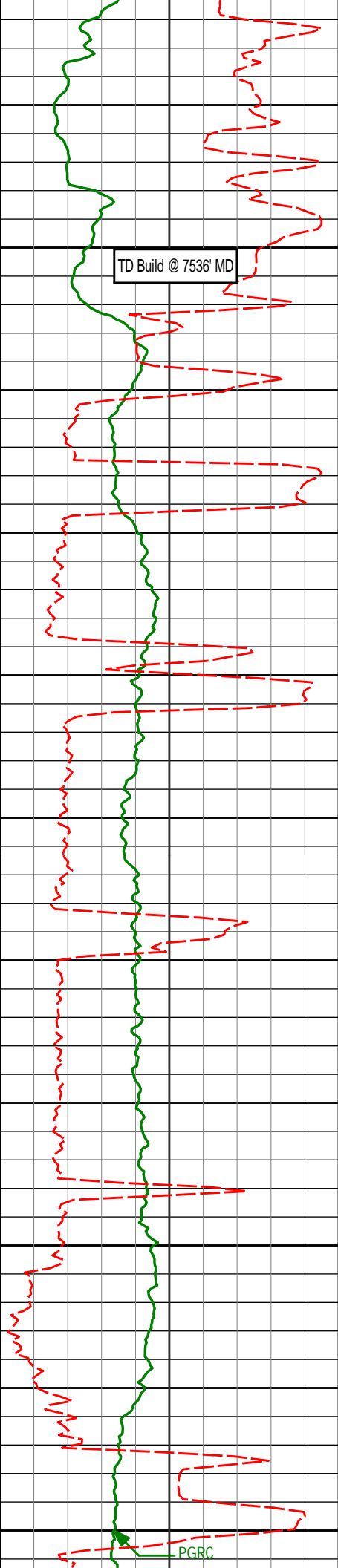
217.63'



6374'	10.60°	22.82°	6336.64'	225.93'
6400				
6450				
6493'	9.01°	23.86°	6453.89'	234.63'
6500				
6550				
6564'	10.15°	31.51°	6523.91'	240.53'
6600				
6612'	15.49°	42.27°	6570.70'	247.36'
6650				
6658'	19.82°	49.04°	6614.53'	257.73'
6700				
6706'	23.40°	52.69°	6659.15'	271.87'
6750				
6753'	26.16°	57.72°	6701.82'	288.45'
6800				
6801'	29.54°	61.29°	6744.26'	308.19'
6850				
6848'	34.24°	63.62°	6784.15'	330.62'
6900				
6896'	39.62°	65.67°	6822.51'	357.12'



6950	6942'	45.45°	66.58°	6856.39'	385.99'
7000	6990'	49.91°	64.39°	6888.70'	418.78'
7050	7037'	53.18°	62.70°	6917.93'	452.30'
7100	7085'	56.74°	63.55°	6945.49'	487.98'
7150	7132'	61.18°	64.50°	6969.71'	524.80'
7200	7180'	64.73°	64.92°	6991.54'	564.10'
7250	7227'	66.32°	66.19°	7011.01'	603.66'
7300	7275'	66.54°	70.06°	7030.21'	645.06'
7350	7322'	69.45°	75.49°	7047.83'	687.11'
7400	7370'	73.66°	80.96°	7063.02'	731.97'
7450	7417'	76.79°	87.35°	7075.02'	777.29'



300

7500

7550

7600

7650

7700

7750

7800

7850

7900

7950

8000

7482'

82.28°

92.70°

7086.83'

841.11'

7560'

86.36°

94.46°

7094.55'

918.33'

7623'

87.26°

94.59°

7098.05'

980.81'

7718'

89.78°

93.51°

7100.51'

1075.22'

7813'

90.12°

93.33°

7100.59'

1169.77'

7908'

90.92°

93.40°

7099.73'

1264.34'

8003'

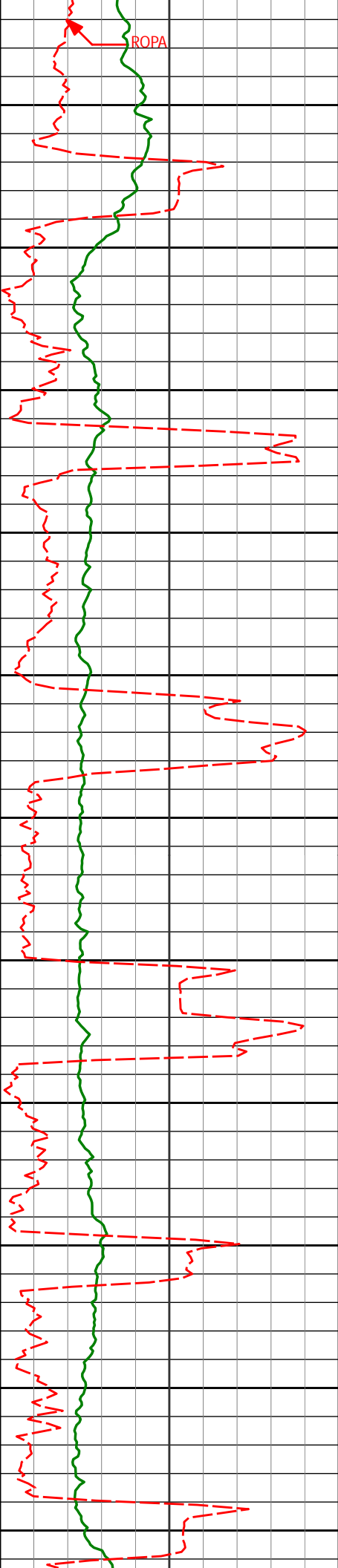
91.11°

92.08°

7098.04'

1358.98'





ROPA

8050

8100

8150

8200

8250

8300

8350

8400

8450

8500

8550

8097'

91.76°

91.71°

7095.69'

1452.72'

8192'

90.71°

90.98°

7093.64'

1547.52'

8287'

89.91°

91.81°

7093.13'

1642.34'

8381'

88.92°

92.44°

7094.09'

1736.08'

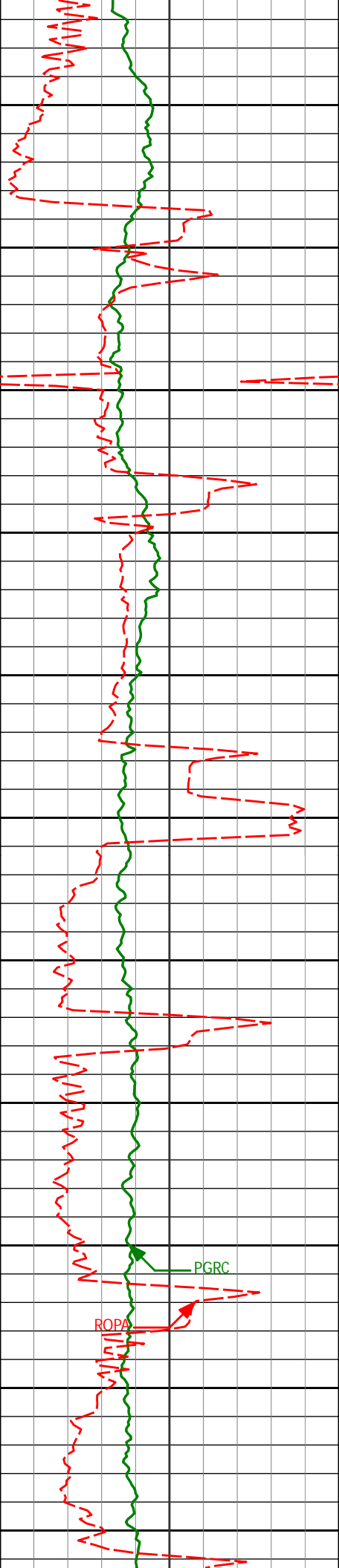
8476'

88.95°

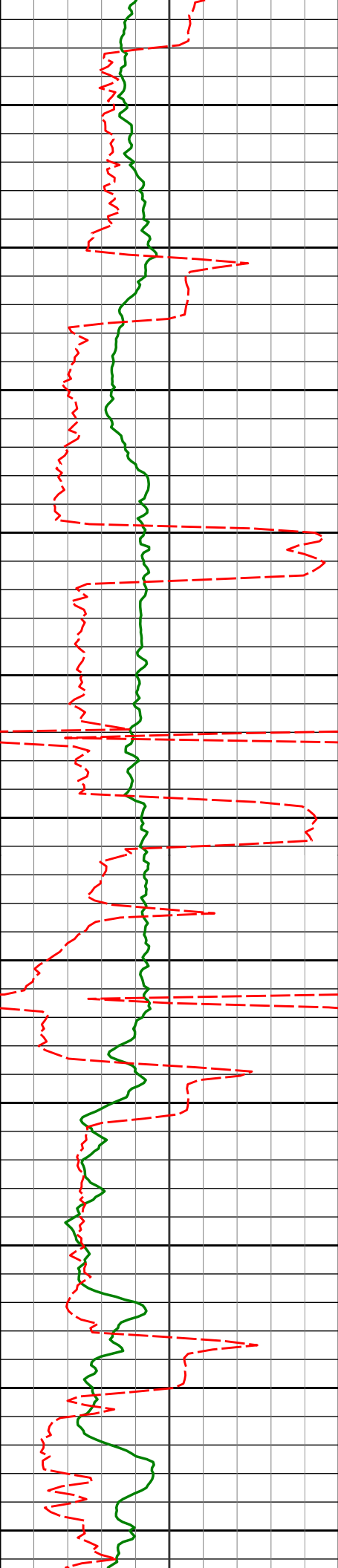
92.55°

7095.85'

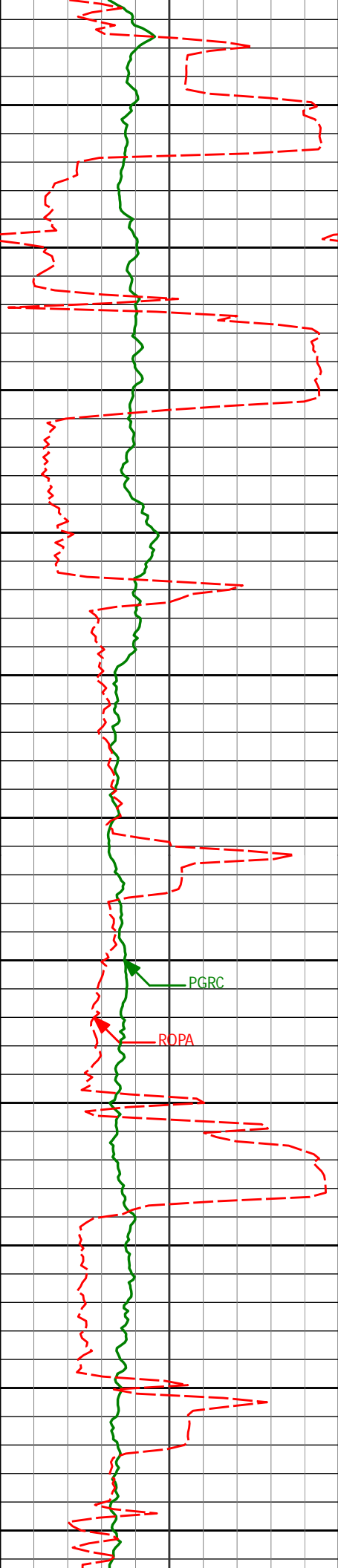
1830.76'



8571'	89.35°	93.02°	7097.26'	1925.40'
8665'	89.57°	92.78°	7098.15'	2019.04'
8760'	89.29°	92.46°	7099.09'	2113.71'
8854'	90.31°	91.13°	7099.42'	2207.48'
8949'	90.34°	90.71°	7098.88'	2302.35'
9044'	90.68°	91.43°	7098.04'	2397.20'



9150	9138'	91.23°	91.36°	7096.47'	2491.01'
9200					
9250	9233'	91.63°	90.48°	7094.10'	2585.85'
9300					
9350	9328'	90.49°	91.24°	7092.34'	2680.70'
9400					
9450	9423'	89.38°	90.20°	7092.45'	2775.58'
9500					
9550	9517'	89.51°	89.38°	7093.36'	2869.52'
9600					
9650	9612'	91.36°	88.36°	7092.64'	2964.50'



9700

9707'

90.96°

87.82°

7090.72'

3059.48'

9750

9800

9801'

88.34°

90.47°

7091.29'

3153.44'

9850

9900

9896'

89.17°

90.55°

7093.36'

3248.32'

9950

10000

9991'

89.63°

90.61°

7094.35'

3343.21'

10050

10100

10086'

88.58°

90.76°

7095.83'

3438.08'

10150

10200

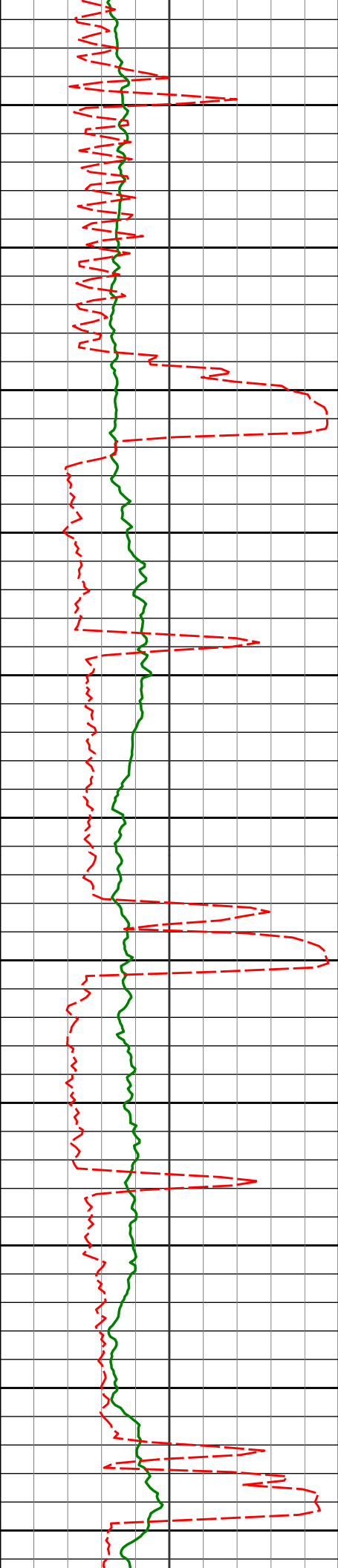
10180'

89.01°

90.01°

7097.81'

3531.97'



10250

10275'

89.82°

90.52°

7098.78'

3626.88'

10300

10350

10370'

88.18°

91.89°

7100.44'

3721.71'

10400

10450

10464'

89.48°

91.41°

7102.36'

3815.48'

10500

10550

10559'

88.80°

91.24°

7103.78'

3910.30'

10600

10650

10654'

89.85°

91.07°

7104.90'

4005.14'

10700

10750

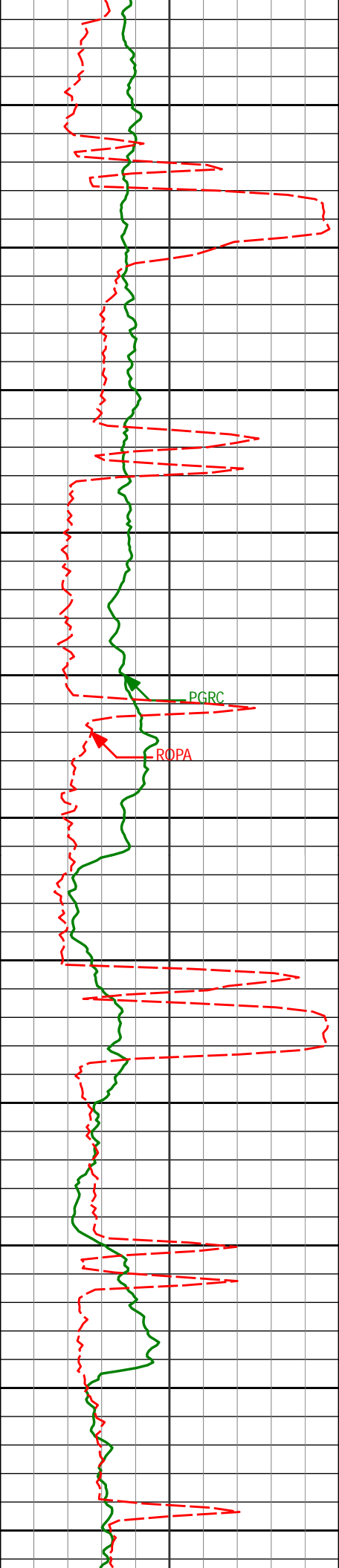
10754'

89.51°

92.49°

7105.46'

4104.90'



10800

10850

10900

10950

11000

11050

11100

11150

11200

11250

11300

10849'

88.09°

92.61°

7107.45'

4199.57'

10944'

89.26°

93.06°

7109.65'

4294.18'

11039'

90.22°

92.76°

7110.08'

4388.82'

11134'

88.77°

93.07°

7110.92'

4483.45'

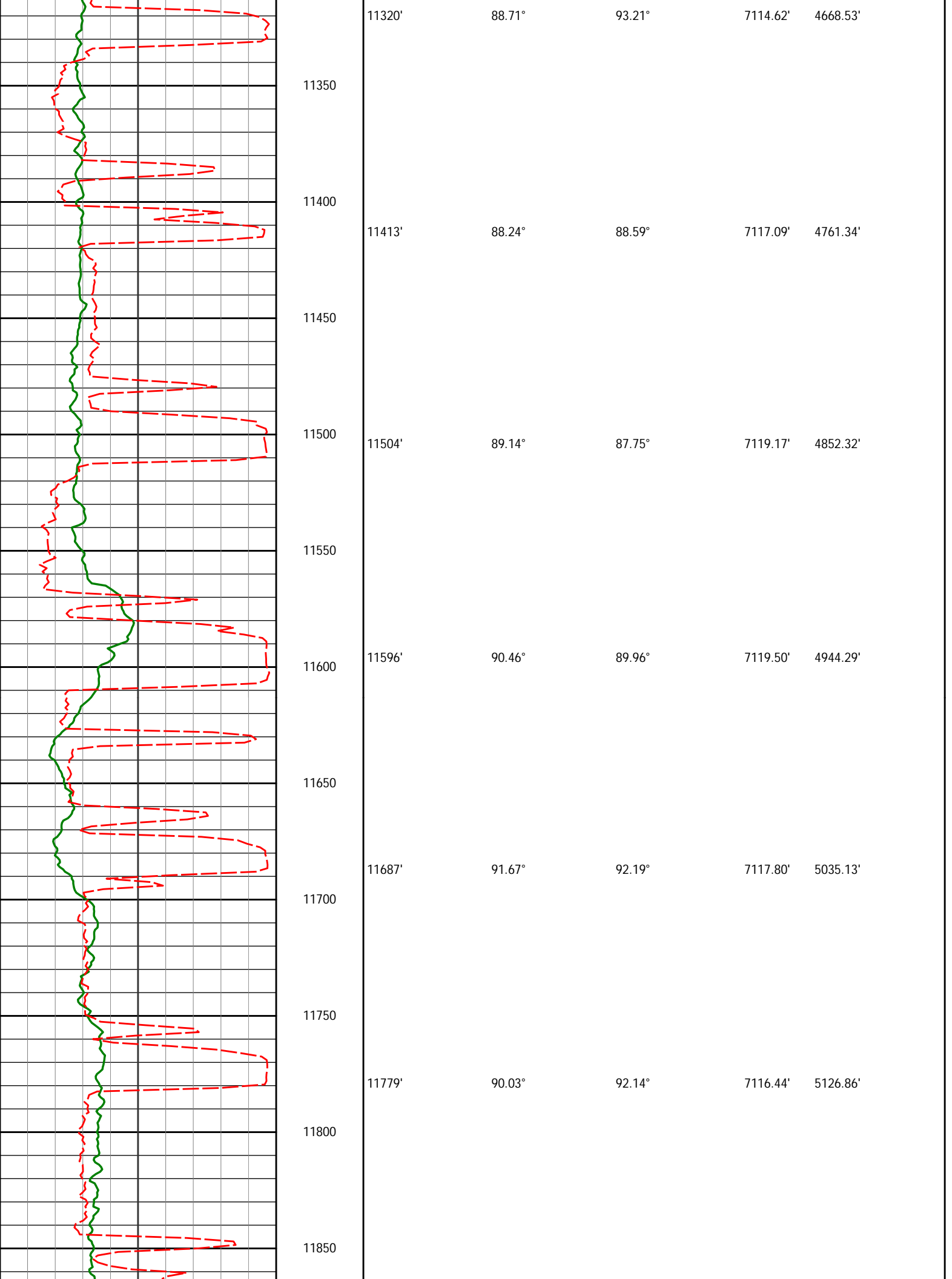
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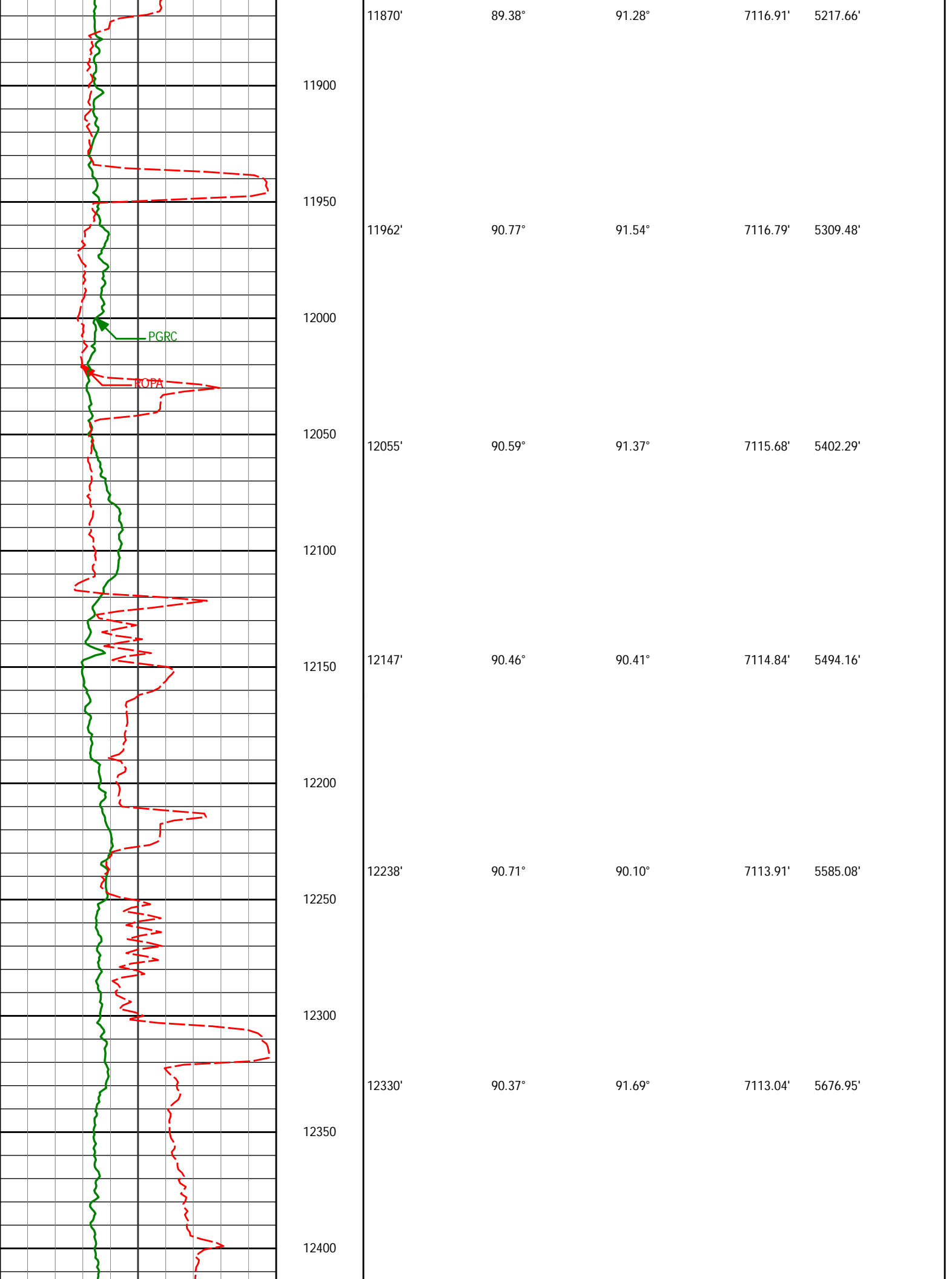
88.98°

93.79°

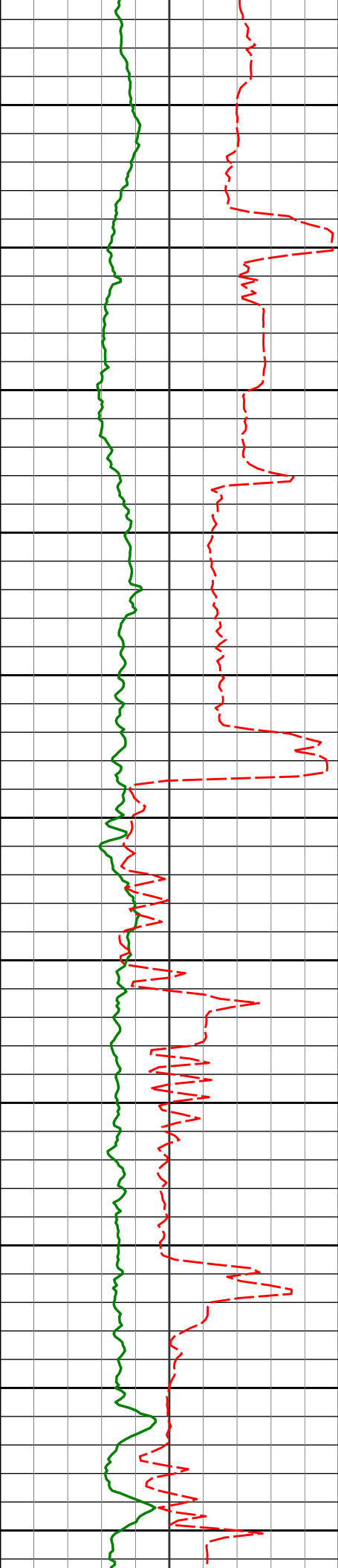
7112.76'

4576.99'









12450

12500

12550

12600

12650

12700

12750

12800

12850

12900

12950

12422'

90.31°

90.86°

7112.50'

5768.78'

12514'

89.78°

92.18°

7112.43'

5860.60'

12607'

90.25°

91.91°

7112.40'

5953.35'

12699'

88.71°

91.54°

7113.24'

6045.14'

12792'

88.71°

91.90°

7115.33'

6137.91'

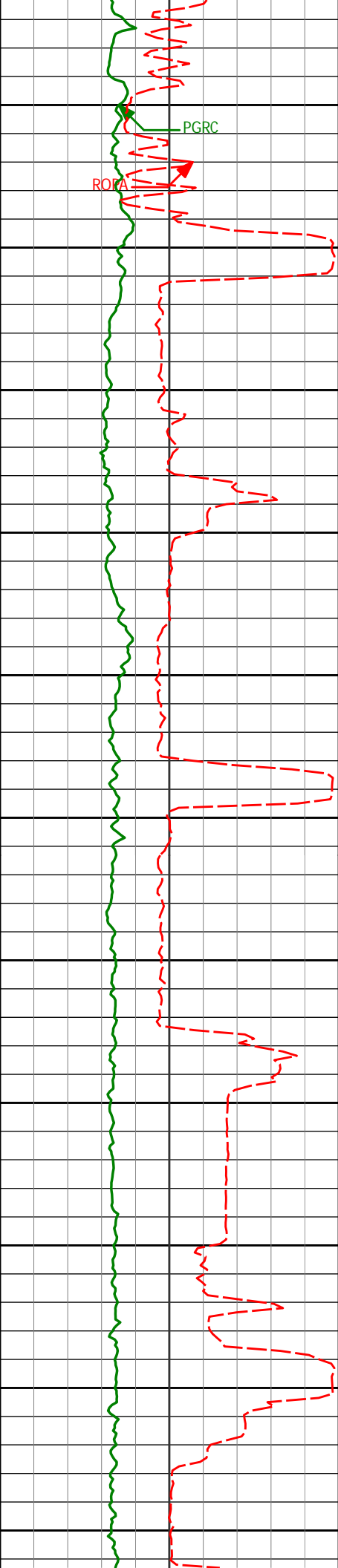
12884'

88.24°

90.31°

7117.78'

6229.73'



13000

13050

13100

13150

13200

13250

13300

13350

13400

13450

13500

12975'

87.81°

90.18°

7120.92'

6320.60'

13070'

90.00°

90.50°

7122.73'

6415.49'

13165'

92.10°

92.04°

7120.99'

6510.30'

13260'

89.66°

91.46°

7119.53'

6605.06'

13354'

88.89°

89.46°

7120.72'

6698.96'

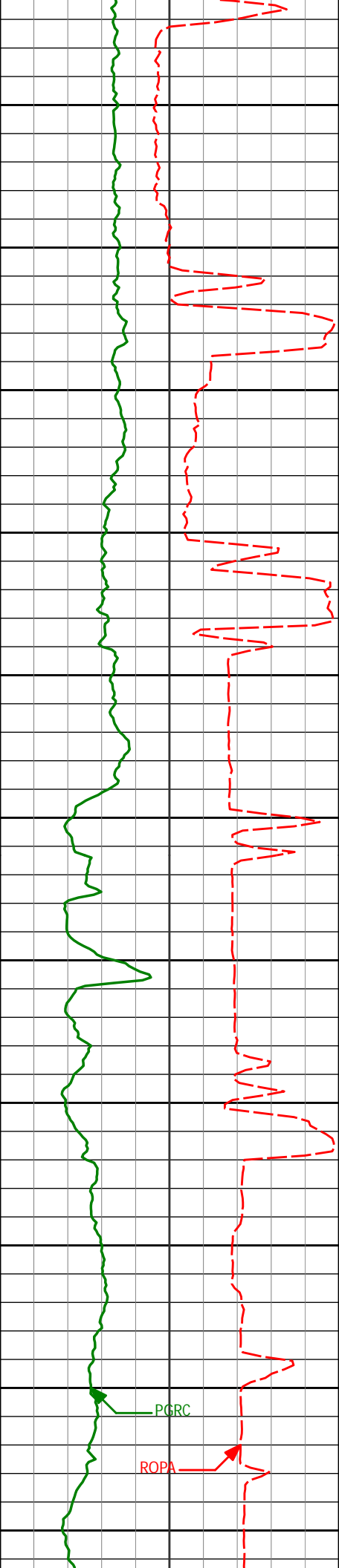
13449'

89.88°

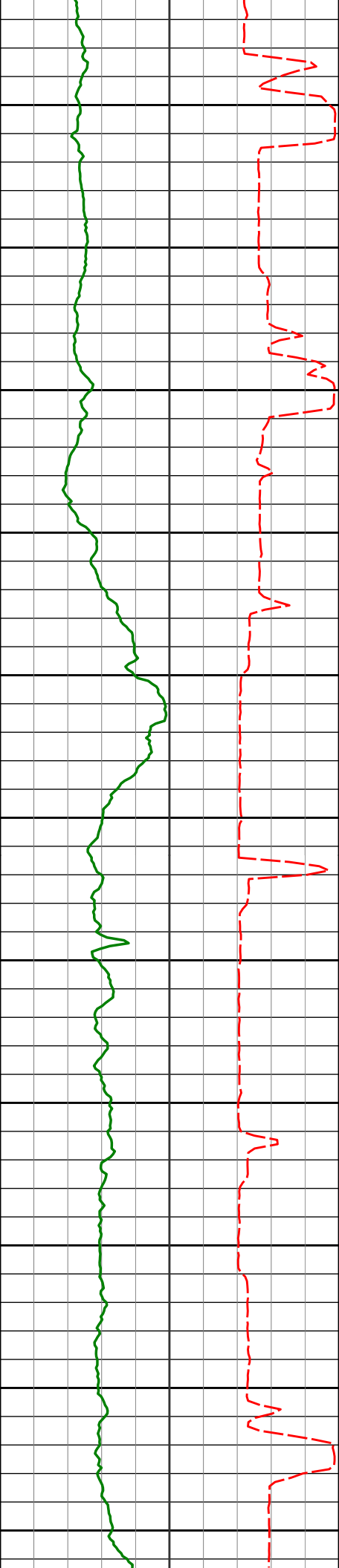
92.13°

7121.74'

6793.82'



13550	13544'	90.12°	92.34°	7121.74'	6888.54'
13600					
13650	13639'	88.92°	92.94°	7122.54'	6983.21'
13700					
13750	13733'	89.04°	91.39°	7124.21'	7076.93'
13800					
13850	13828'	88.80°	90.81°	7126.00'	7171.77'
13900					
13950	13923'	89.63°	90.90°	7127.30'	7266.63'
14000					
14050	14018'	91.23°	91.05°	7126.59'	7361.49'



14100

14113'

90.49°

90.82°

7125.16'

7456.34'

14150

14200

14207'

89.08°

92.39°

7125.52'

7550.14'

14250

14300

14303'

89.04°

92.57°

7127.09'

7645.82'

14350

14400

14397'

89.51°

92.00°

7128.28'

7739.53'

14450

14500

14492'

90.40°

91.39°

7128.35'

7834.32'

14550

14600

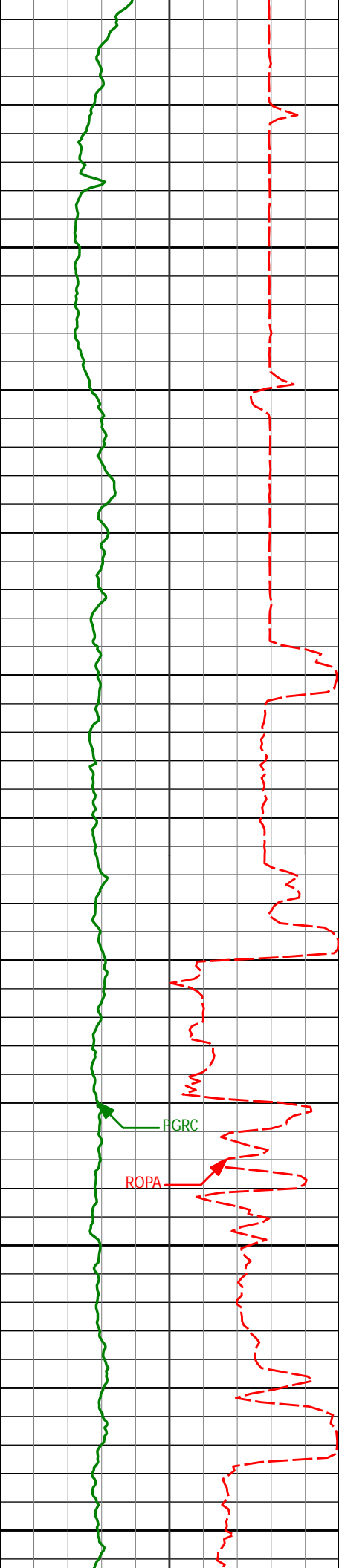
14587'

89.32°

91.75°

7128.59'

7929.12'



14650

14682'

90.09°

91.27°

7129.08'

8023.93'

14700

14750

14776'

91.63°

91.78°

7127.67'

8117.73'

14800

14850

14871'

90.68°

91.66°

7125.75'

8212.50'

14900

400

14936'

90.19°

91.51°

7125.26'

8277.36'

14950

15000

FGRC

ROPA

15031'

90.25°

91.78°

7124.89'

8372.16'

15050

15100

15126'

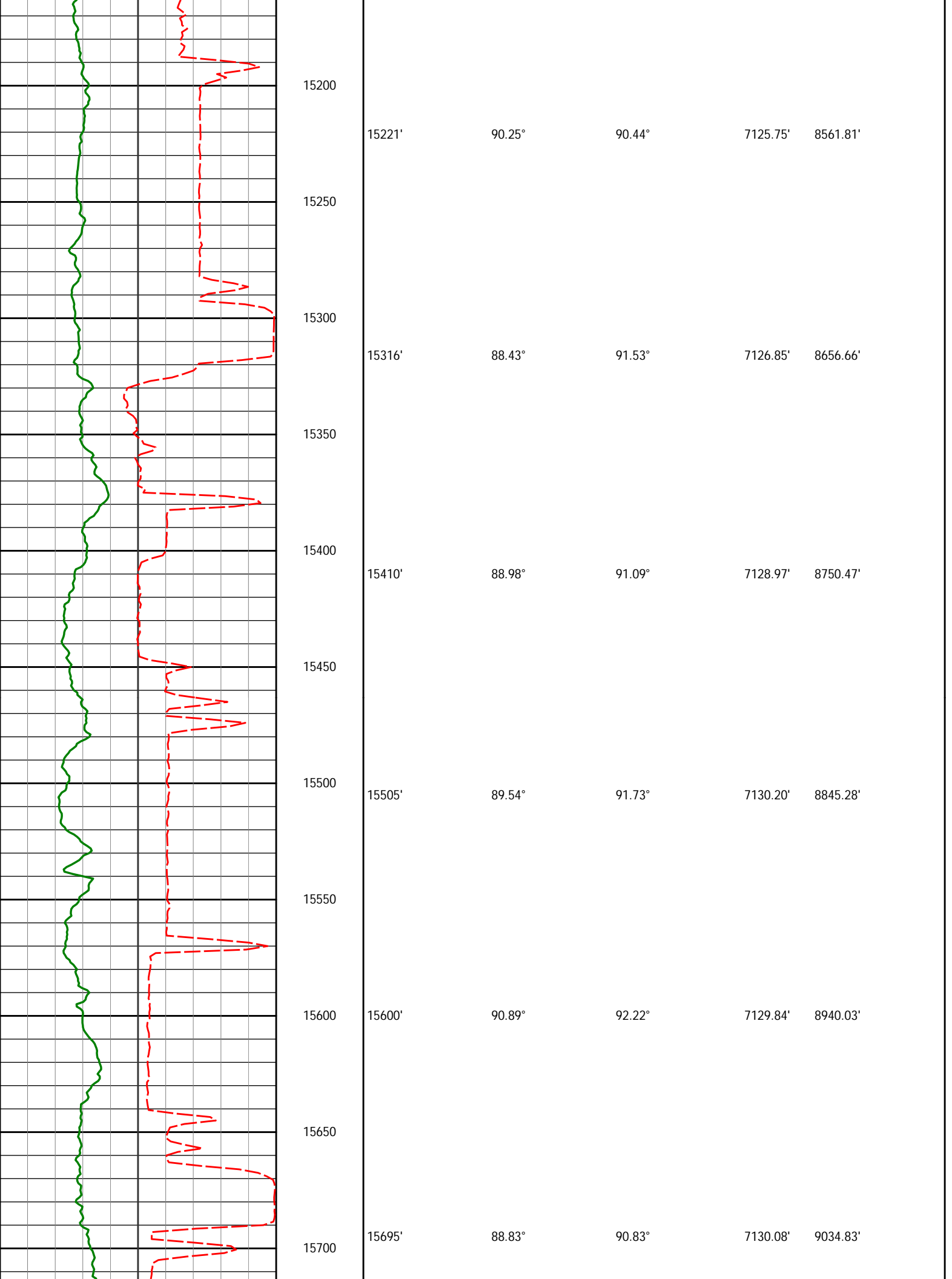
89.23°

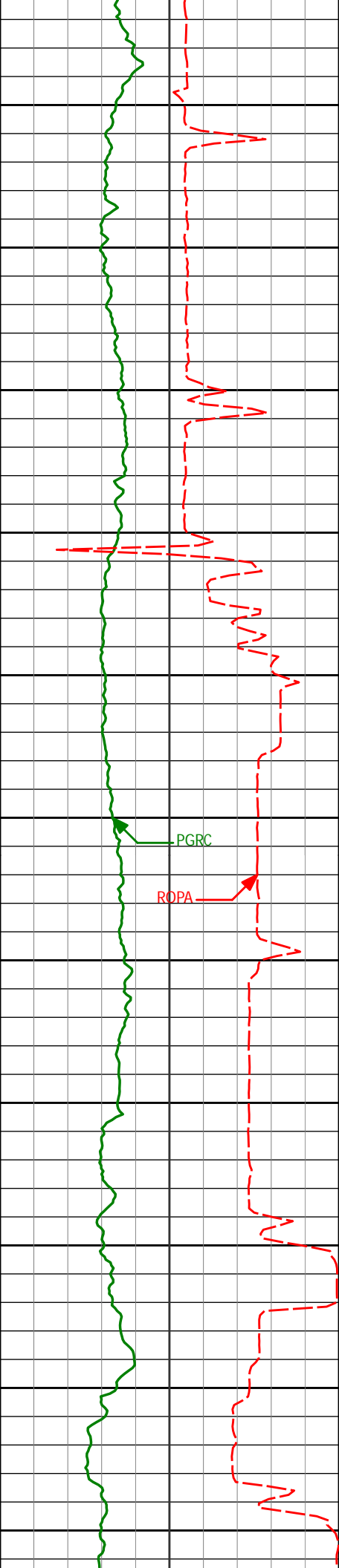
91.50°

7125.32'

8466.95'

15150





15750

15790'

89.57°

90.05°

7131.40'

9129.73'

15800

15850

15885'

89.32°

89.23°

7132.32'

9224.68'

15900

15950

15980'

89.60°

89.19°

7133.22'

9319.65'

16000

PGRC

ROPA

16050

16075'

88.89°

88.03°

7134.47'

9414.63'

16100

16150

16170'

89.41°

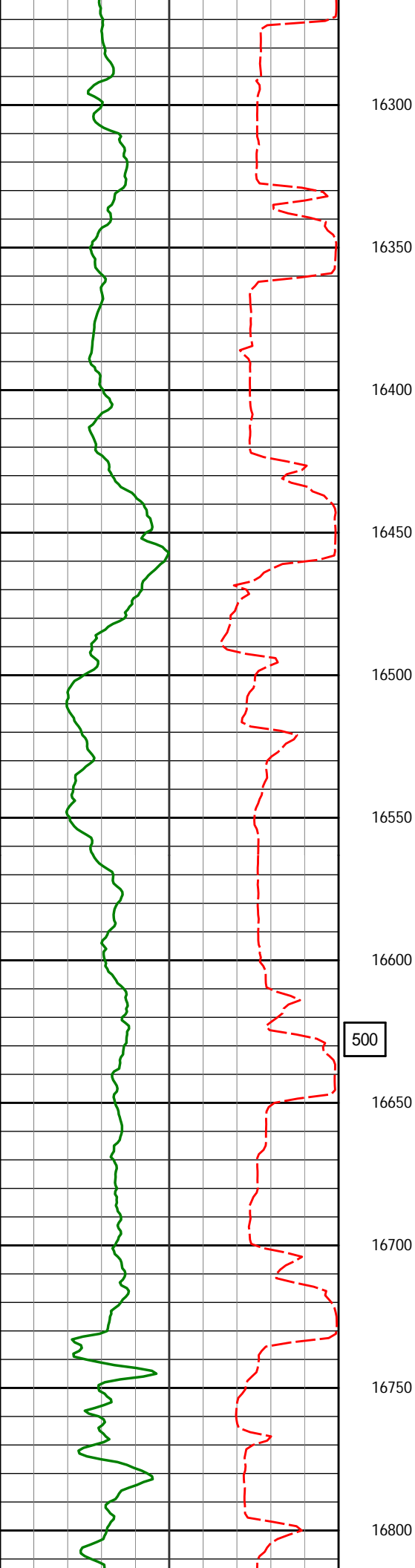
88.35°

7135.88'

9509.62'

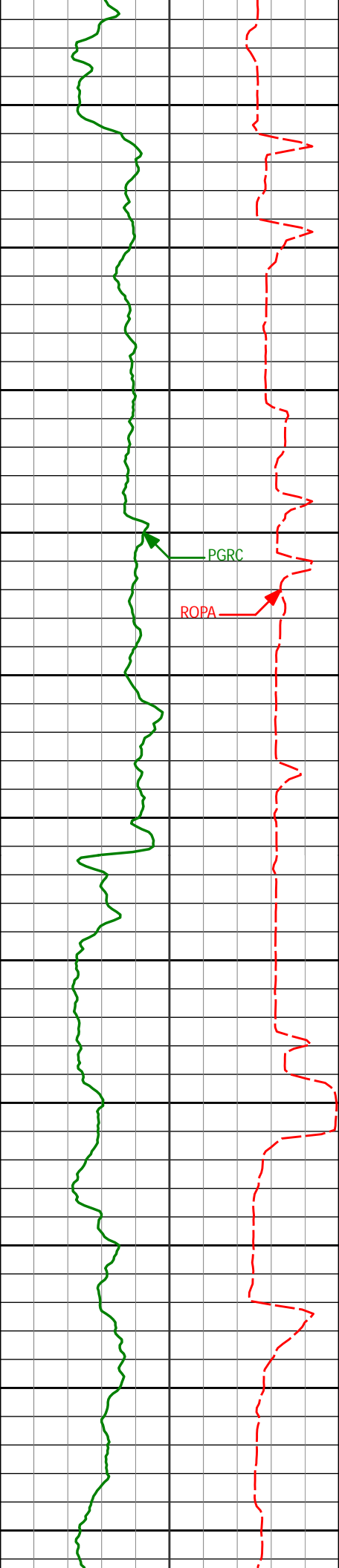
16200

16250



16264	89.14	89.58	7137.07	9603.59
16359'	89.72°	90.69°	7138.01'	9698.52'
16454'	89.63°	93.40°	7138.55'	9793.26'
16636'	90.18°	93.41°	7137.61'	9974.42'
16731'	89.17°	93.60°	7138.15'	10068.96'





16850

16900

16950

17000

17050

17100

17150

17200

17250

17300

17350

16826'

88.15°

93.41°

7140.37'

10163.48'

16921'

88.83°

93.33°

7142.87'

10258.01'

17016'

89.41°

92.75°

7144.33'

10352.62'

17110'

90.34°

92.80°

7144.54'

10446.27'

17205'

89.91°

92.13°

7144.33'

10540.97'

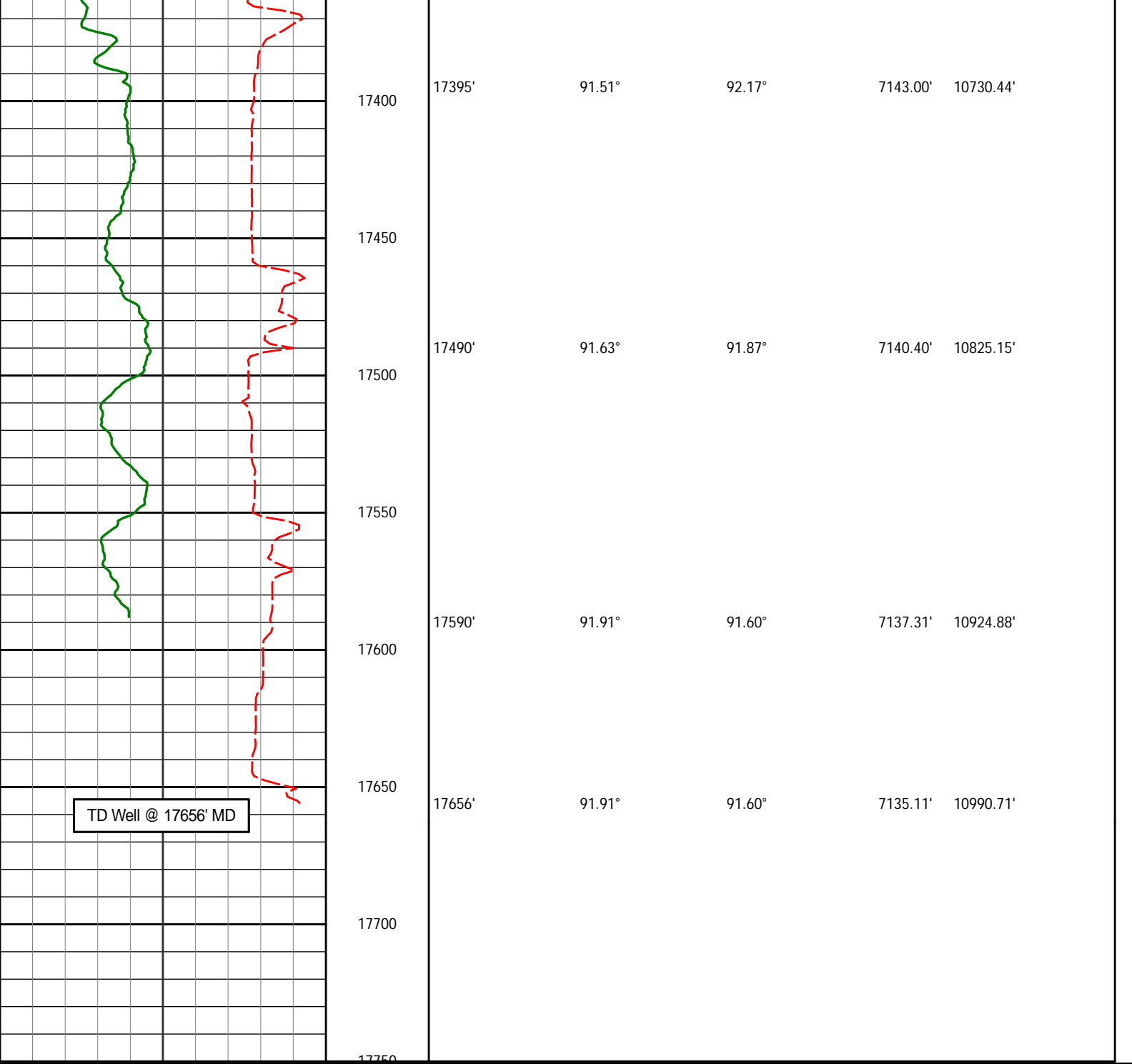
17300'

90.09°

92.13°

7144.33'

10635.71'



<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>	
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HALLIBURTON

Sperry Drilling Services

TVD Detail Log 1:240

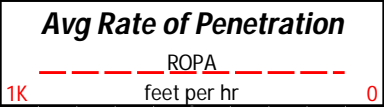
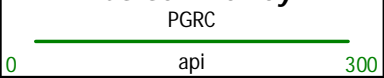
Noble Energy

Shable K08-69-H

H&P 321

Sec. 7-T4N-R66W

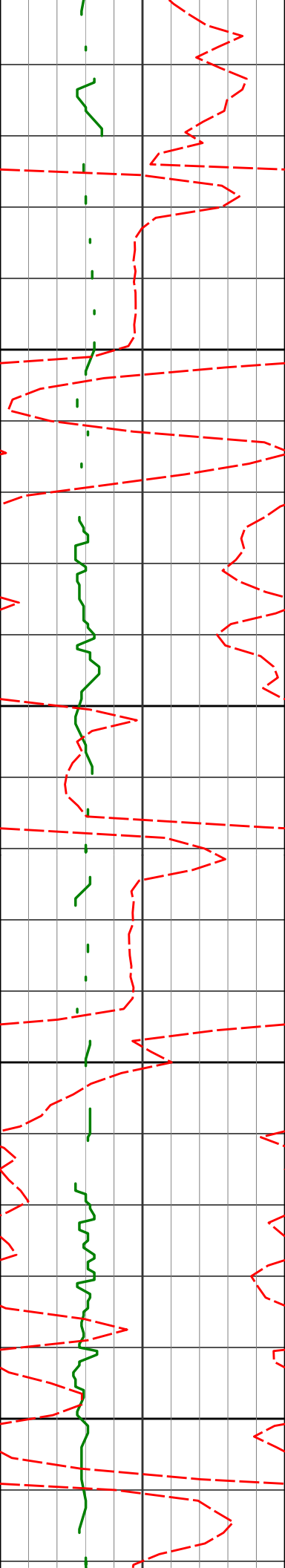
PCG Gamma Ray
---------------



Depth ft
550
600
650
700
750

<i>Depth</i>	<i>Inc.</i>	<i>Azi.</i>
723'	0.22°	352.50°

<i>TVD</i>	<i>V.S.</i>
723.00'	-0.13'



800

850

900

950

814'

0.69°

310.81°

814.00'

-0.55'

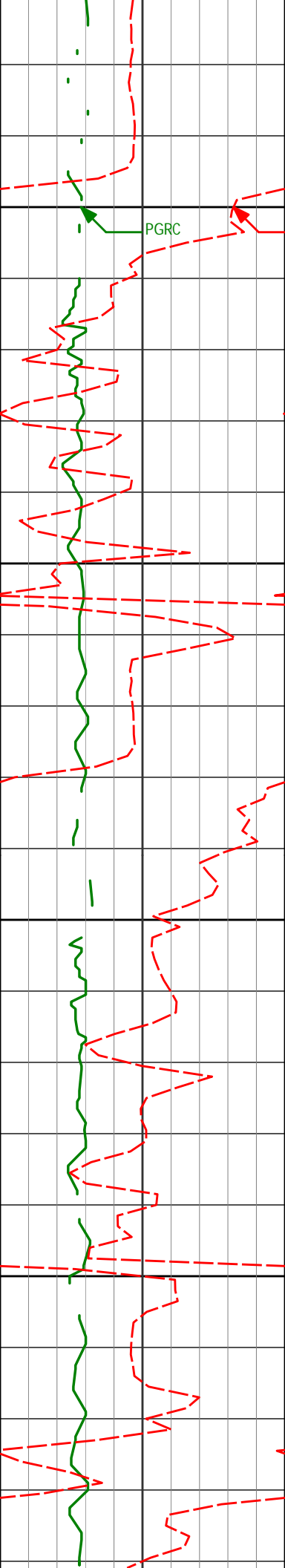
907'

0.51°

315.63°

906.99'

-1.24'



1000

1050

1100

1150

999'

0.49°

243.37°

998.99'

-1.87'

1091

0.13

222.15

1090.99'

-2.30'

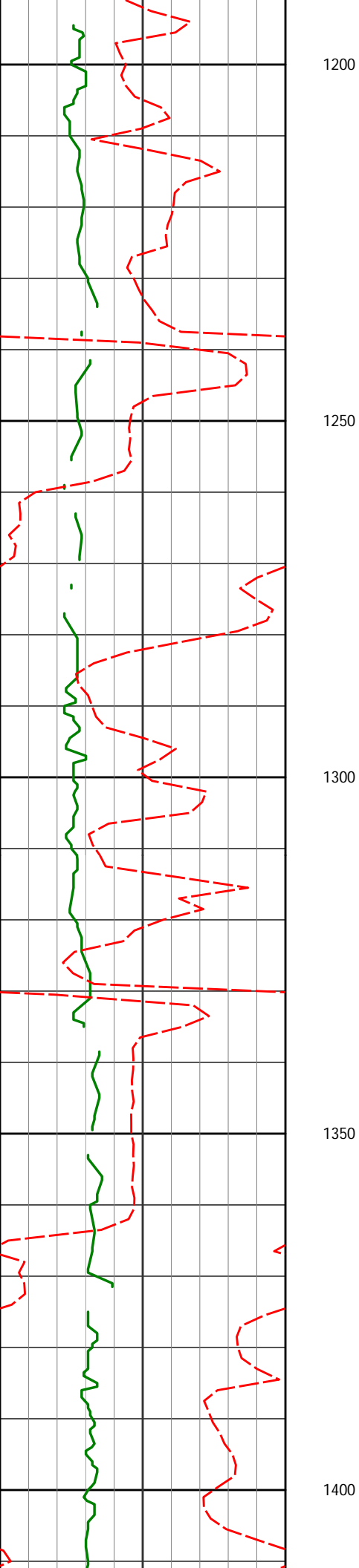
1183'

0.18°

328.07°

1182.99'

-2.45'



1274'

0.22°

312.76°

1273.99'

-2.64'

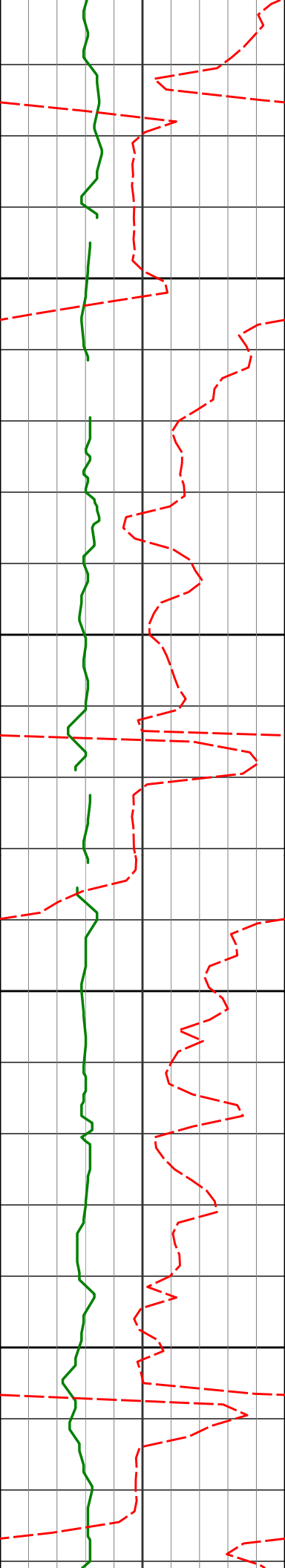
1367'

0.68°

307.20°

1366.98'

-3.20'



1450

1500

1550

1600

1458'

0.75°

294.17°

1457.98'

-4.15'

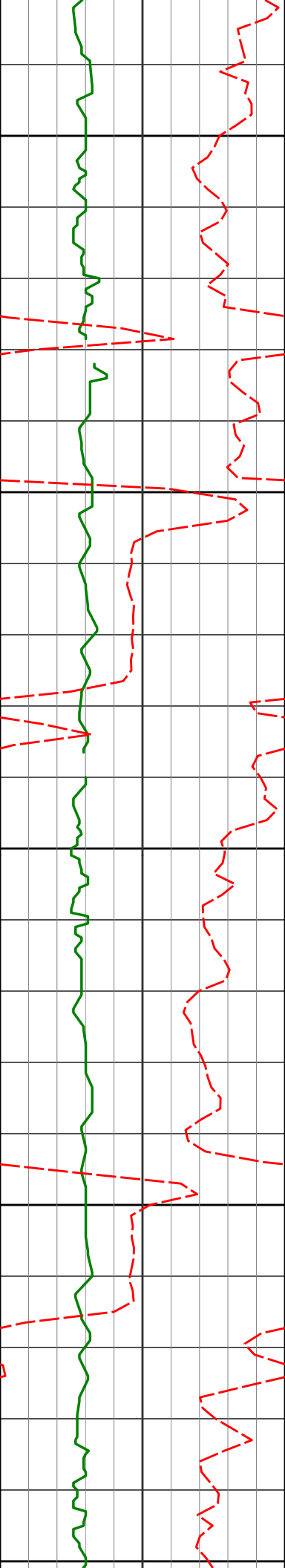
1551'

0.96°

288.05°

1550.96'

-5.42'



1650

1700

1750

1800

1850

1643'

0.91°

282.89°

1642.95'

-6.85'

1736'

0.70°

307.55°

1735.94'

-8.00'

1828'

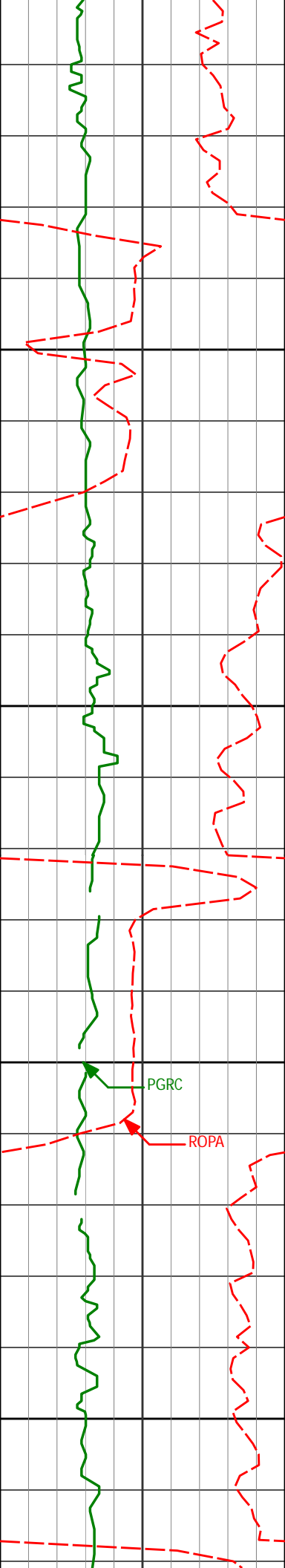
1.05°

327.99°

1827.93'

-8.86'





1900

1920'

0.96°

337.00°

1919.92'

-9.55'

1950

2000

2015'

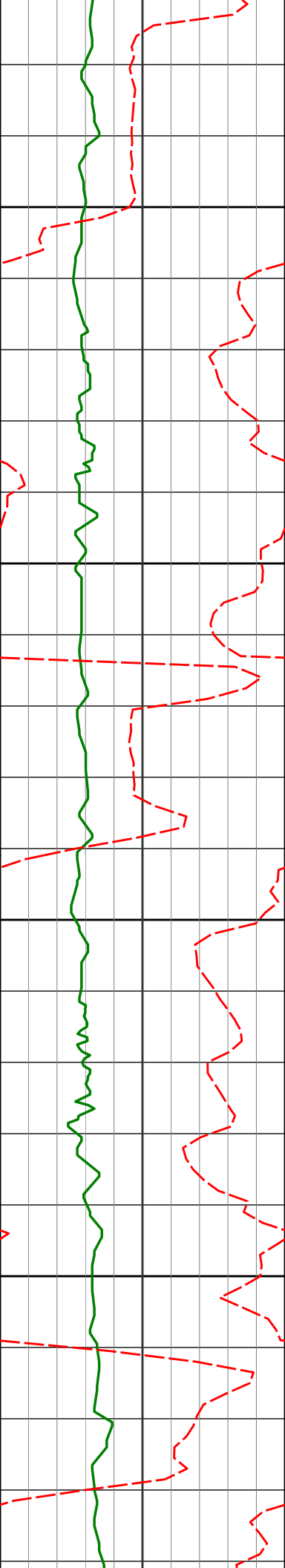
1.07°

358.10°

2014.90'

-9.83'

2050



2100

2110'

1.06°

348.78°

2109.89'

-9.97'

2150

2200

2204'

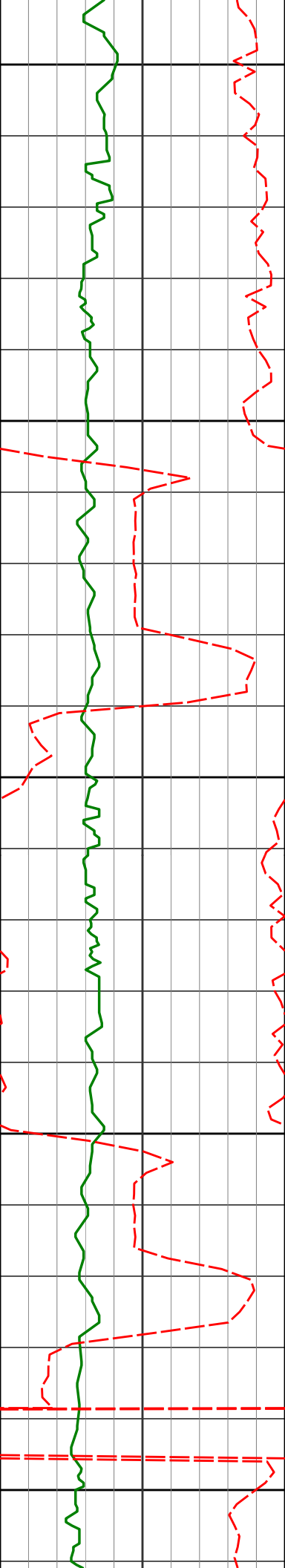
1.31°

347.76°

2203.87'

-10.29'

2250



2300

2350

2400

2450

2500

2299'

2394'

2489'

1.91°

1.20°

0.69°

168.55°

157.27°

64.22°

2298.85'

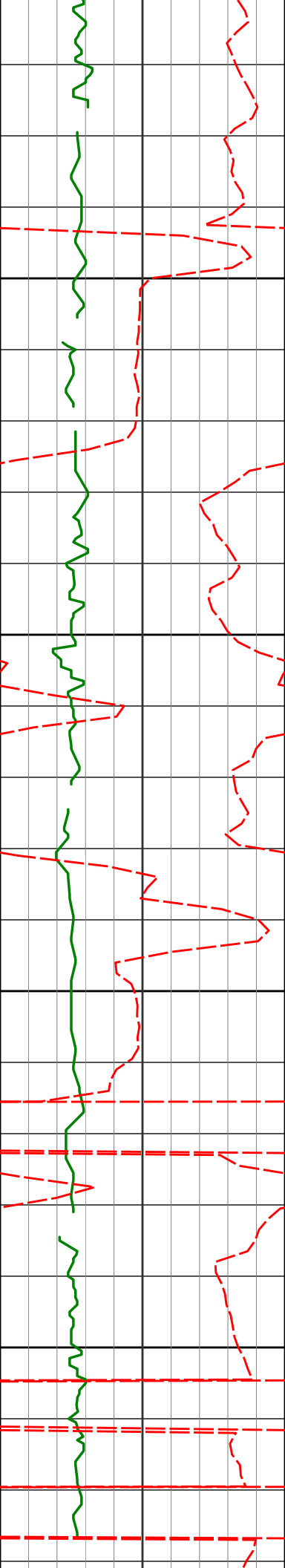
2393.82'

2488.81'

-10.23'

-9.62'

-8.75'



2550

2600

2650

2700

2584'

0.71°

45.38°

2583.80'

-7.79'

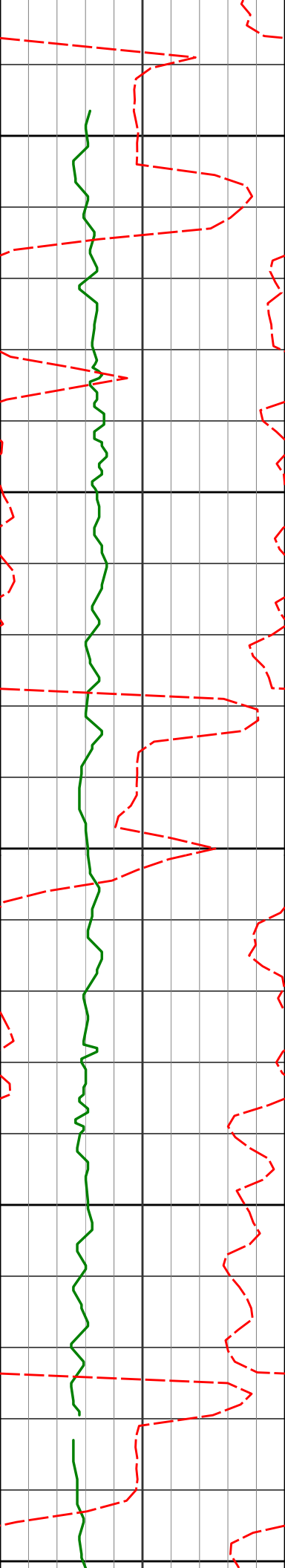
2679'

0.80°

49.11°

2678.79'

-6.84'



2750

2773'

0.69°

144.32°

2772.79'

-6.01'

2800

2850

2868'

1.06°

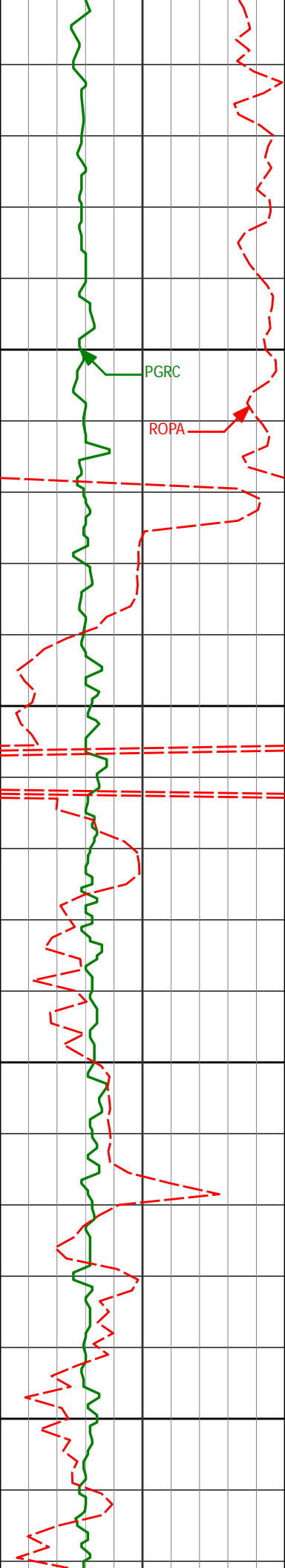
152.32°

2867.78'

-5.32'

2900

2950



3000

3050

3100

3150

2963'

1.05°

158.81°

2962.76'

-4.65'

PGRC

ROPA

3058'

1.11°

154.54°

3057.74'

-4.01'

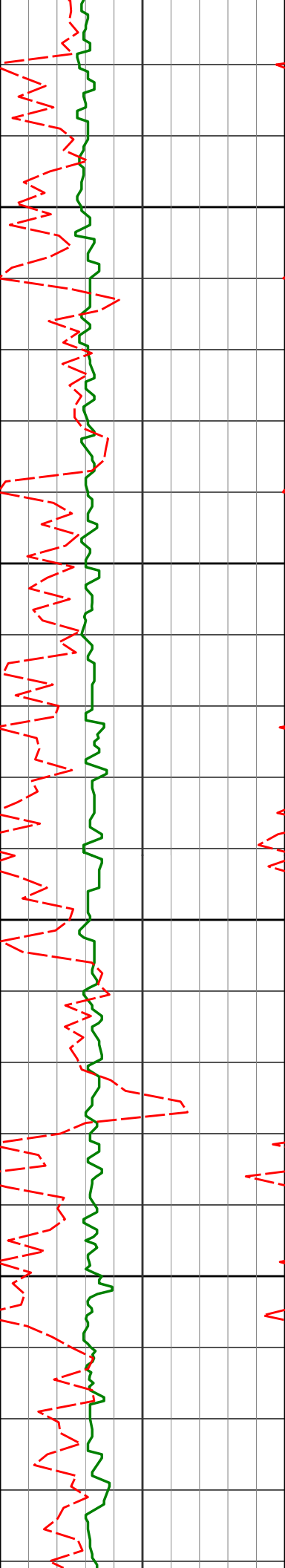
3153'

1.28°

165.16°

3152.72'

-3.41'



3200

3250

3300

3350

3247'

0.93°

160.26°

3246.71'

-2.94'

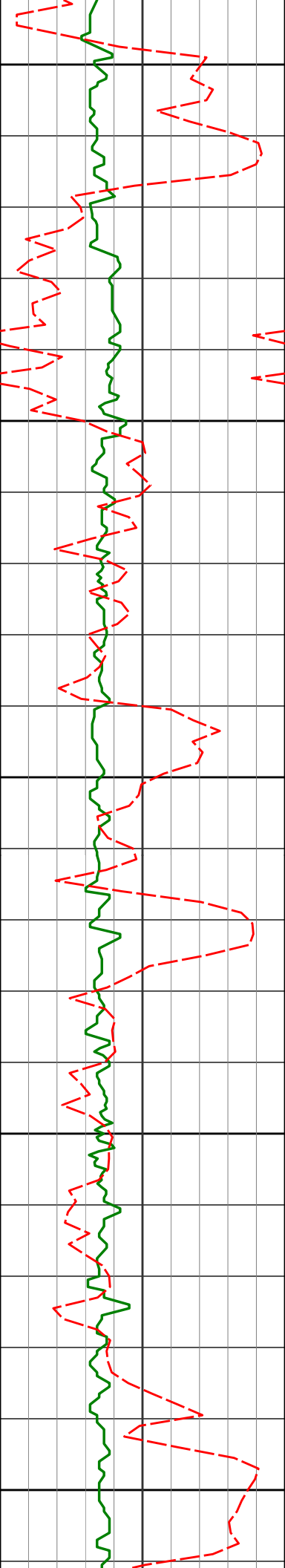
3342'

1.09°

165.47°

3341.69'

-2.52'



3400

3450

3500

3550

3600

3437'

0.84°

200.99°

3436.68'

-2.60'

3531'

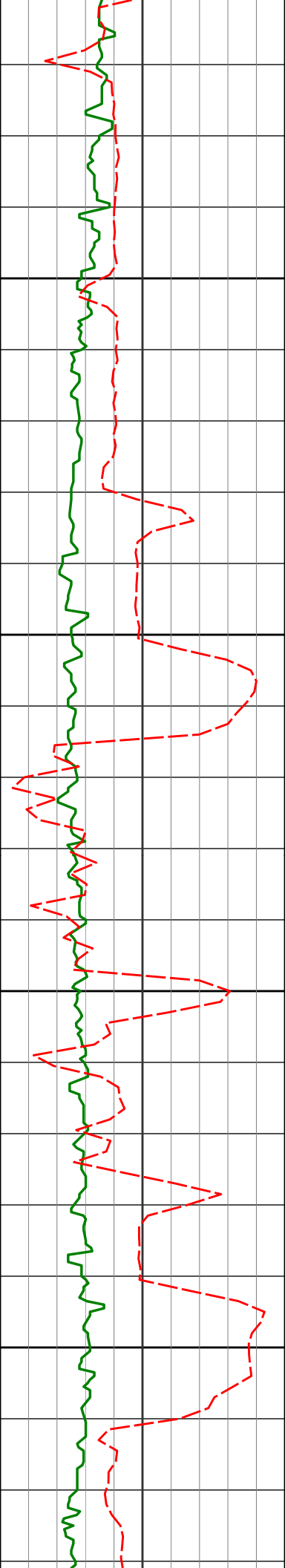
0.44°

266.05°

3530.67'

-3.23'





3626'

2.23°

18.90°

3625.65'

-2.93'

3650

3700

3721'

3.59°

28.45°

3720.53'

-0.75'

3750

3800

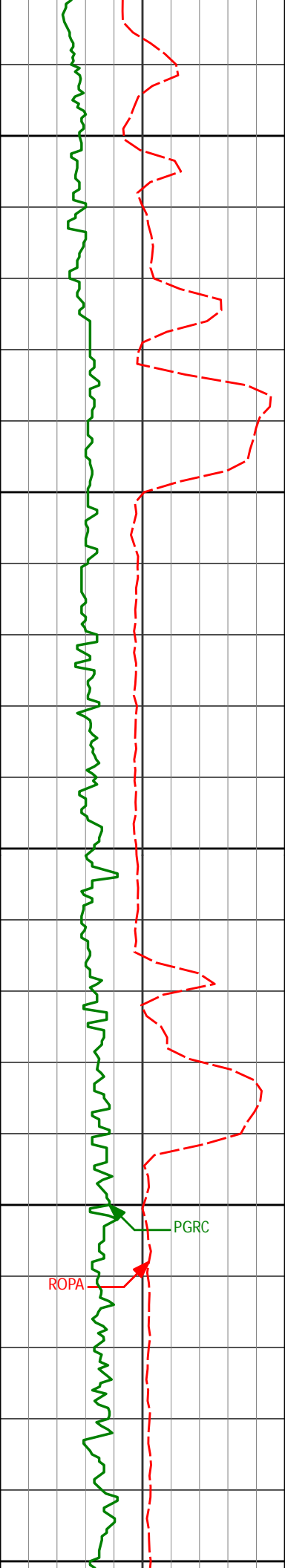
3815'

5.76°

33.93°

3814.21'

3.52'



3850

3900

3950

4000

4050

3910'

7.75°

35.20°

3908.54'

10.21'

4005'

8.90°

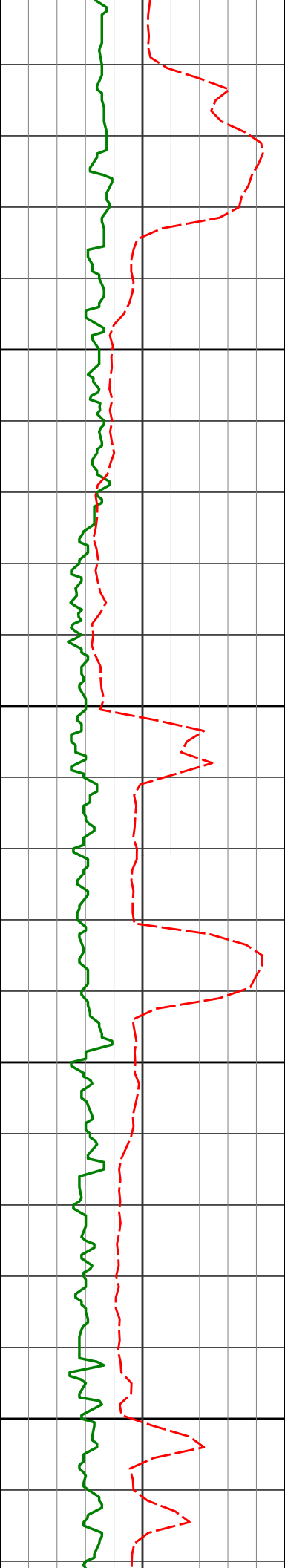
34.84°

4002.54'

18.51'

ROPA

PGRC



4100

4100'

10.44°

34.14°

4096.19'

28.01'

4150

4200

4250

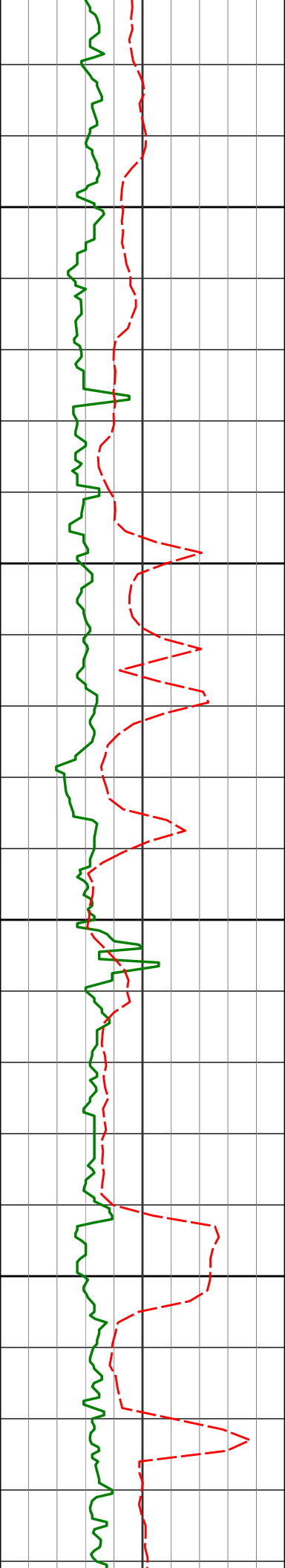
4194'

11.39°

33.81°

4188.49'

38.50'



4300

4350

4400

4450

4289'

11.42°

32.29°

4281.61'

49.31'

4384'

10.91°

31.37°

4374.81'

59.59'

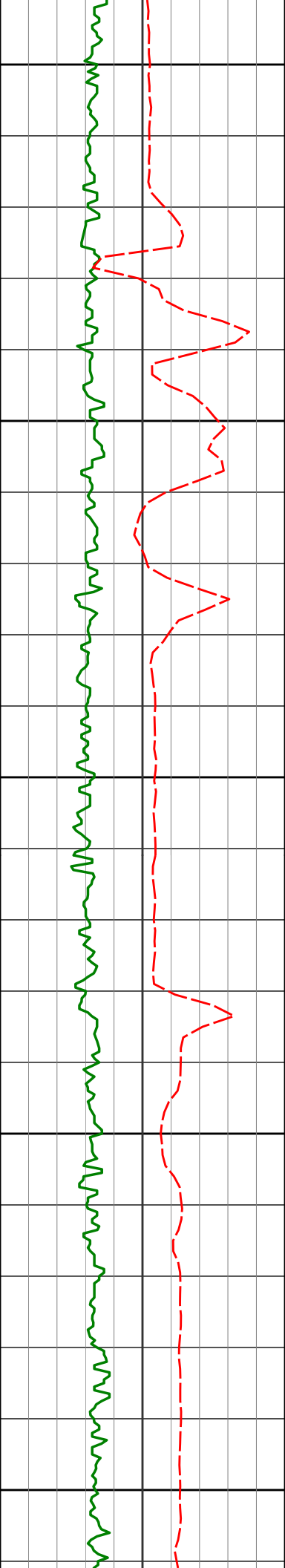
4479'

10.86°

30.69°

4468.10'

69.39'



4500

4550

4600

4650

4700

4573'

10.21°

29.80°

4560.52'

78.59'

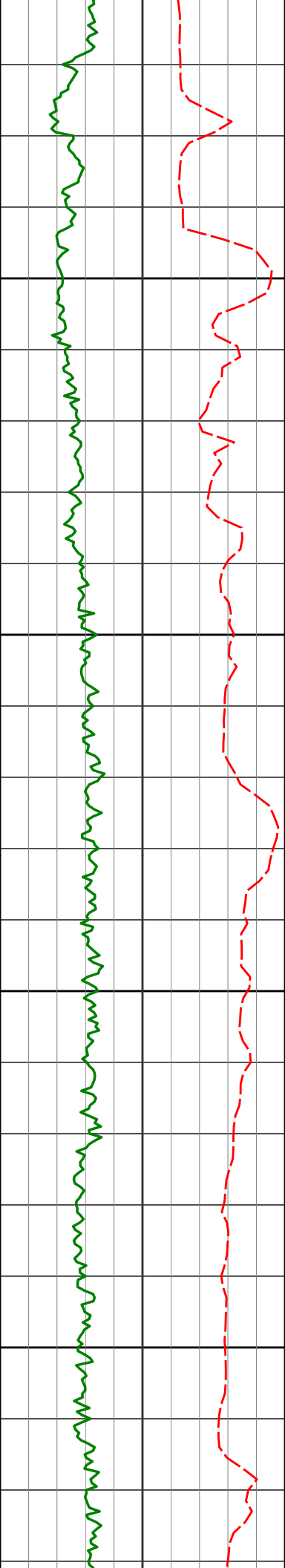
4668'

9.51°

26.84°

4654.12'

86.84'



4750

4763'

9.70°

25.12°

4747.79'

94.30'

4800

4850

4857'

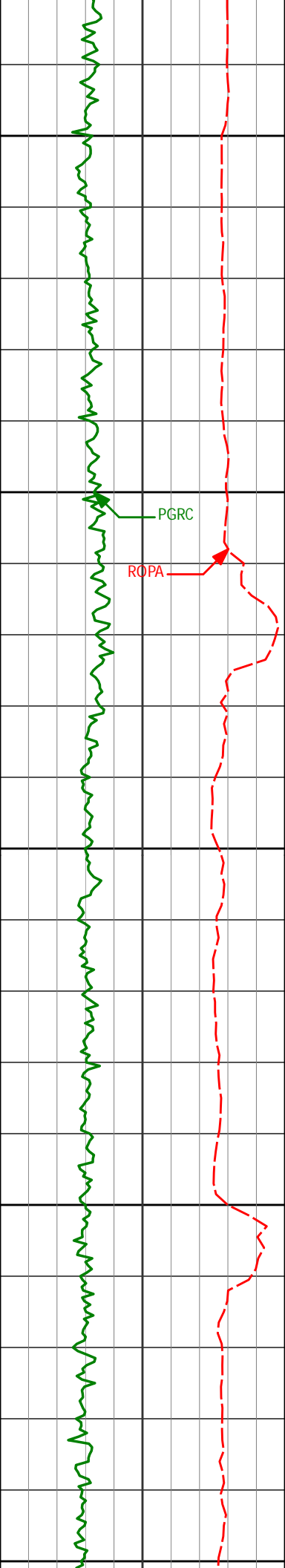
10.74°

27.51°

4840.29'

102.26'

4900



4950

4952'

11.09°

27.75°

4933.57'

111.18'

5000

PGRC

RØPA

5050

5047'

9.45°

24.75°

5027.05'

119.25'

5100

5142'

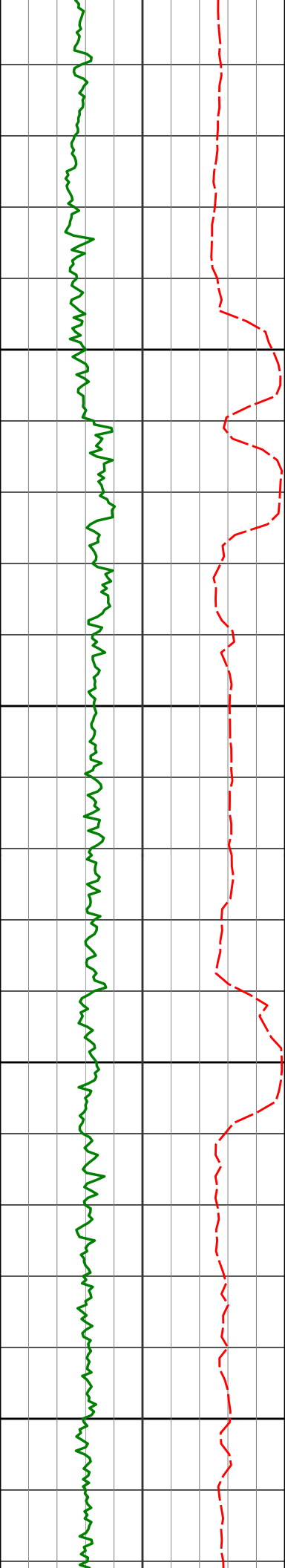
8.72°

22.32°

5120.86'

125.76'

5150



5200

5236'

9.22°

25.02°

5213.71'

132.14'

5250

5300

5331'

9.87°

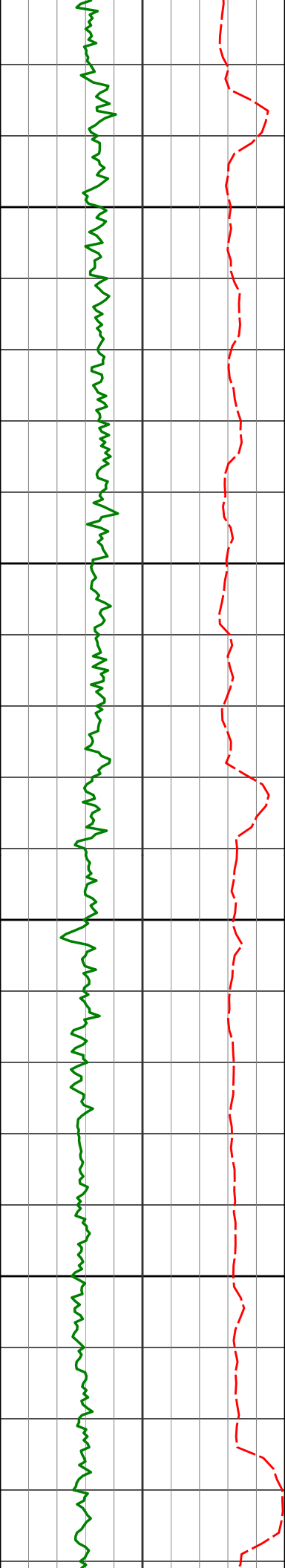
30.14°

5307.39'

139.95'

5350





5400

5426'

8.94°

28.43°

5401.12'

148.05'

5450

5500

5521'

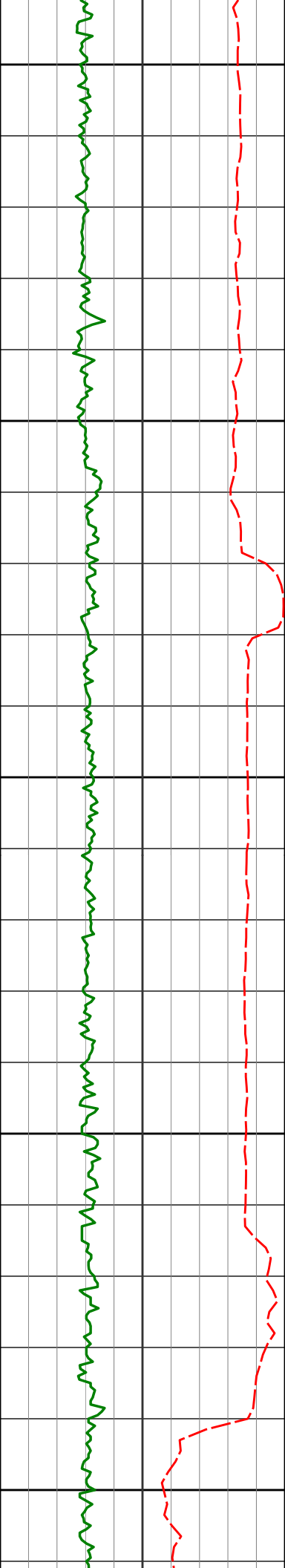
8.22°

28.83°

5495.05'

155.29'

5550



5600

5616'

8.22°

25.20°

5589.08'

161.90'

5650

5700

5710'

7.64°

25.72°

5682.18'

167.90'

5750

200

5800

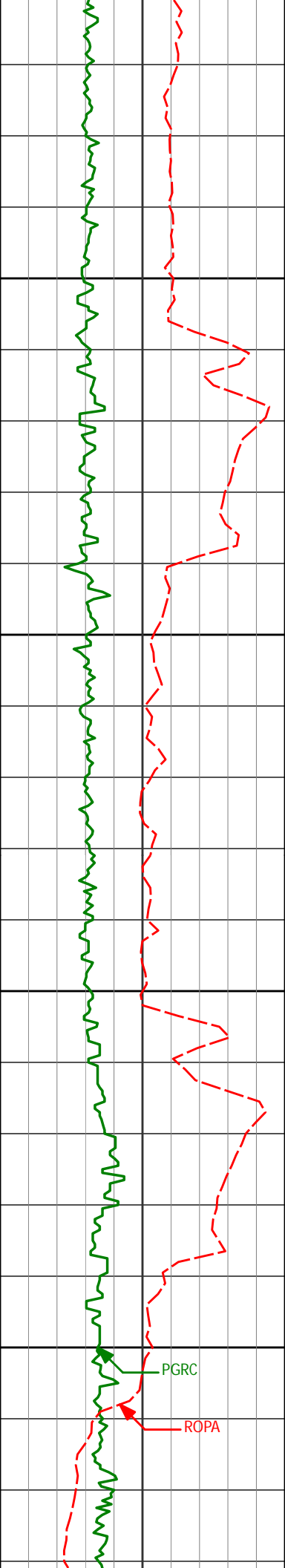
5805'

8.04°

25.32°

5776.29'

173.91'



5850

5900

5950

6000

PGRC

ROPA

5900'

8.87°

34.05°

5870.26'

181.29'

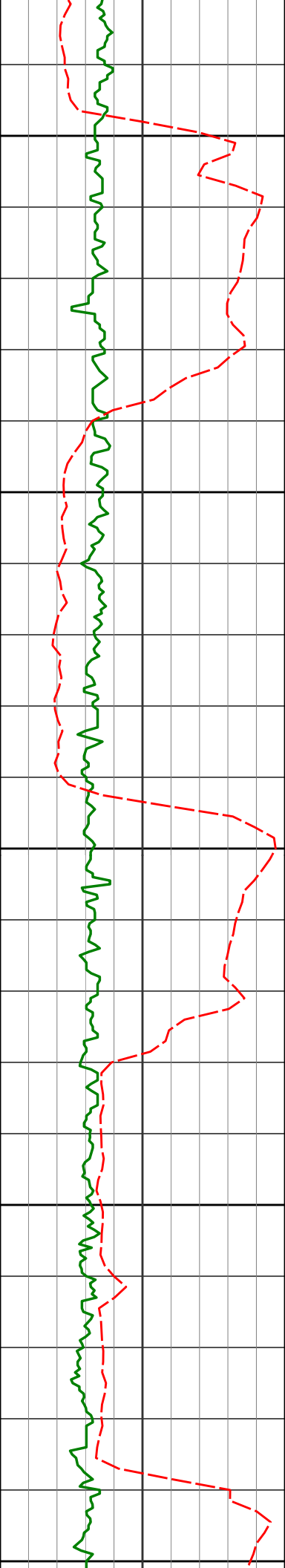
5995'

9.54°

30.73°

5964.04'

189.88'



6050

6089'

10.08°

33.71°

6056.66'

198.92'

6100

6150

6184'

10.53°

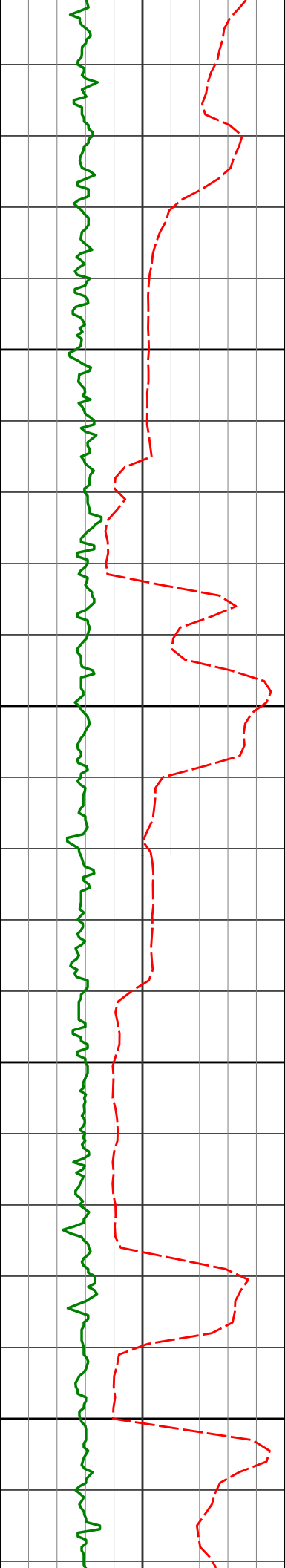
30.00°

6150.13'

208.40'

6200

6250



6300

6350

6400

6450

6279'

11.45°

27.22°

6243.39'

217.63'

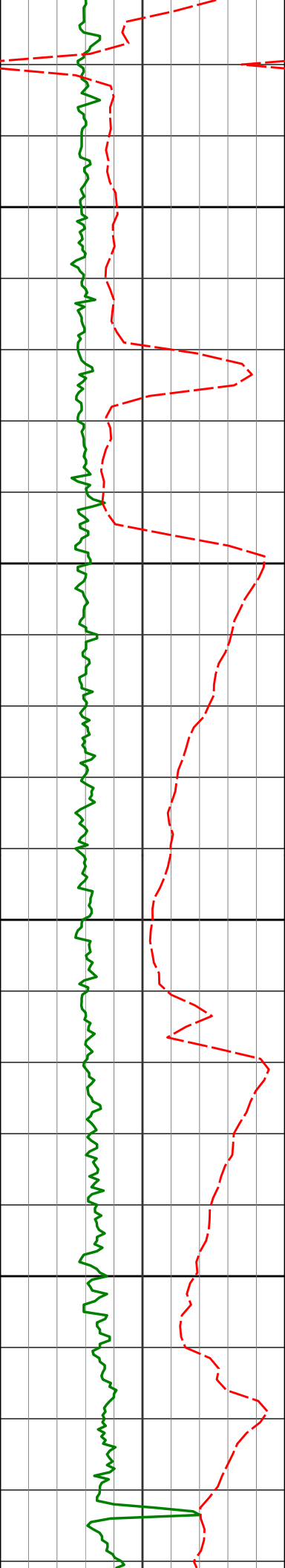
6374'

10.60°

22.82°

6336.64'

225.93'

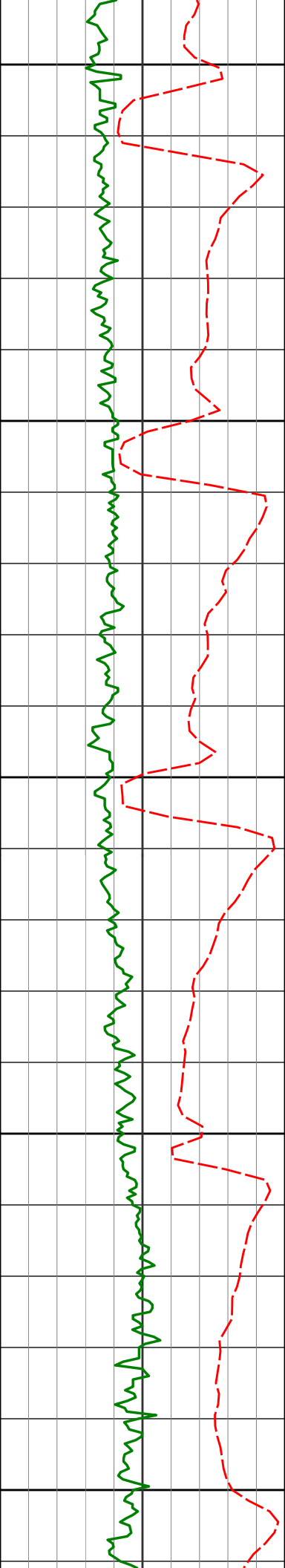


6500

6550

6600

6650



6700

6706'	23.40°	52.69°	6659.15'	271.87'
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6750

6753'	26.16°	57.72°	6701.82'	288.45'
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6800

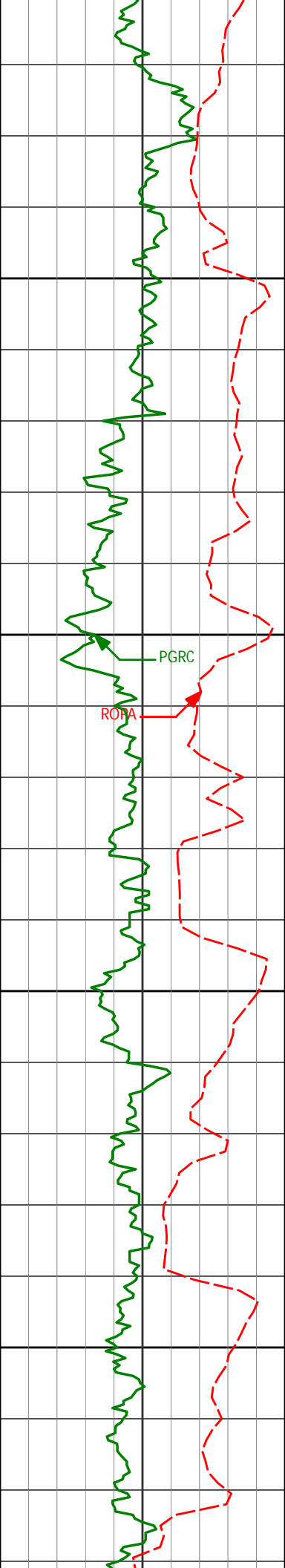
6801'	29.54°	61.29°	6744.26'	308.19'
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6850

6848'	34.24°	63.62°	6784.15'	330.62'
-------	--------	--------	----------	---------

6900

6896'	39.62°	65.67°	6822.51'	357.12'
-------	--------	--------	----------	---------



6942'

6950

6990'

7000

7037'

7050

7085'

7100

6942'

6990'

7037'

7085'

45.45°

49.91°

53.18°

56.74°

66.58°

64.39°

62.70°

63.55°

6856.39'

6888.70'

6917.93'

6945.49'

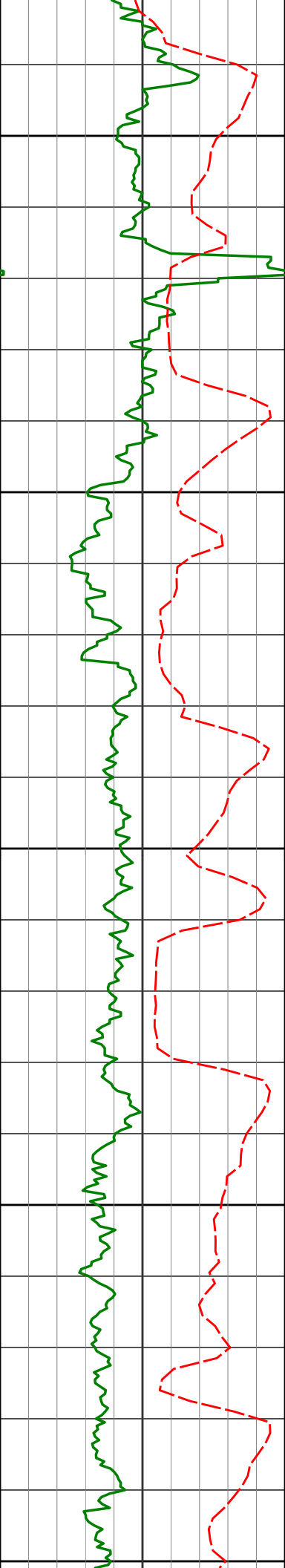
385.99'

418.78'

452.30'

487.98'





7150

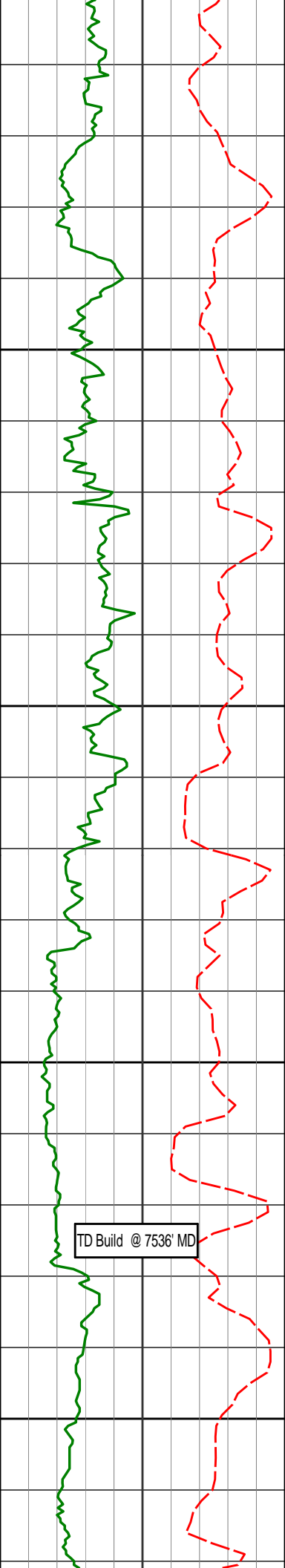
7200

7250

7300

7350

7132'	61.18°	64.50°	6969.71'	524.80'
7180'	64.73°	64.92°	6991.54'	564.10'
7227'	66.32°	66.19°	7011.01'	603.66'
7275'	66.54°	70.06°	7030.21'	645.06'
7322'	69.45°	75.49°	7047.83'	687.11'



300

7370'

73.66°

80.96°

7063.02'

731.97'

7400

7417'

76.79°

87.35°

7075.02'

777.29'

7450

7482'

82.28°

92.70°

7086.83'

841.11'

7500

7550

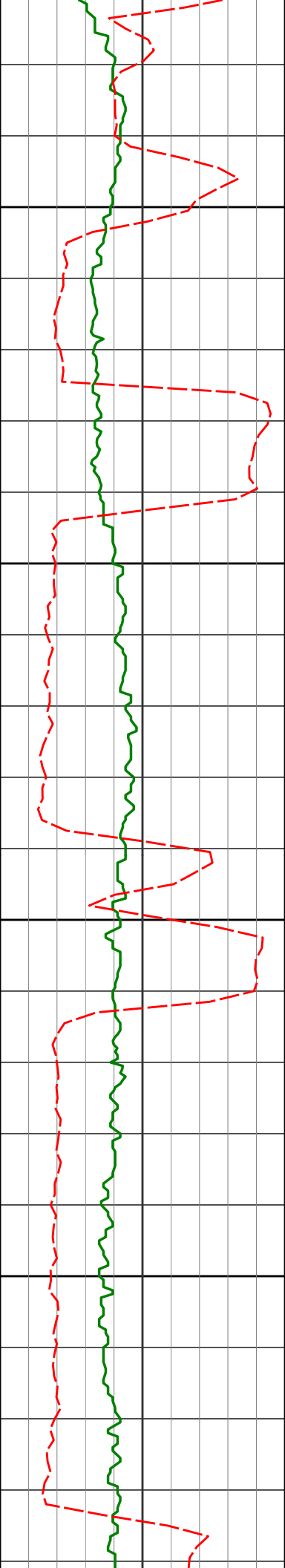
7560'

86.36°

94.46°

7094.55'

918.33'



7600

7623'

87.26°

94.59°

7098.05'

980.81'

7650

7700

7718'

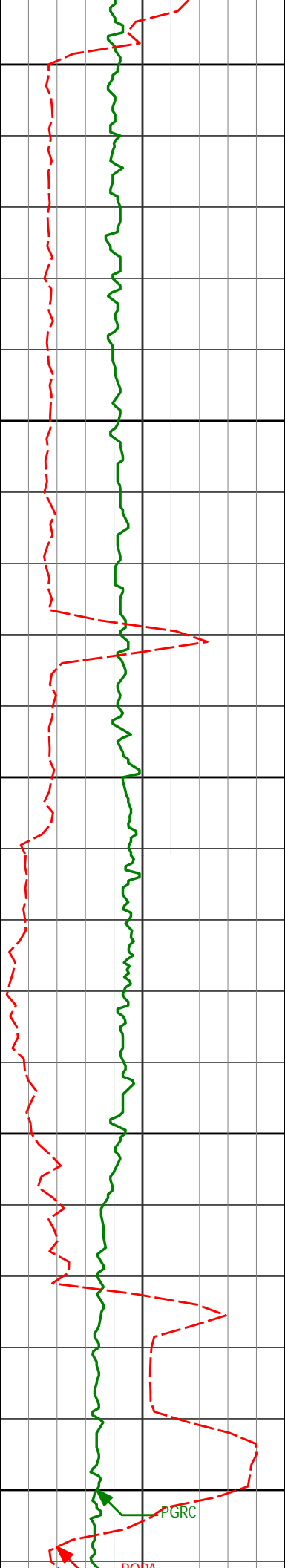
89.78°

93.51°

7100.51'

1075.22'

7750



7800

7813'

90.12°

93.33°

7100.59'

1169.77'

7850

7900

7908'

90.92°

93.40°

7099.73'

1264.34'

7950

8000

8003'

91.11°

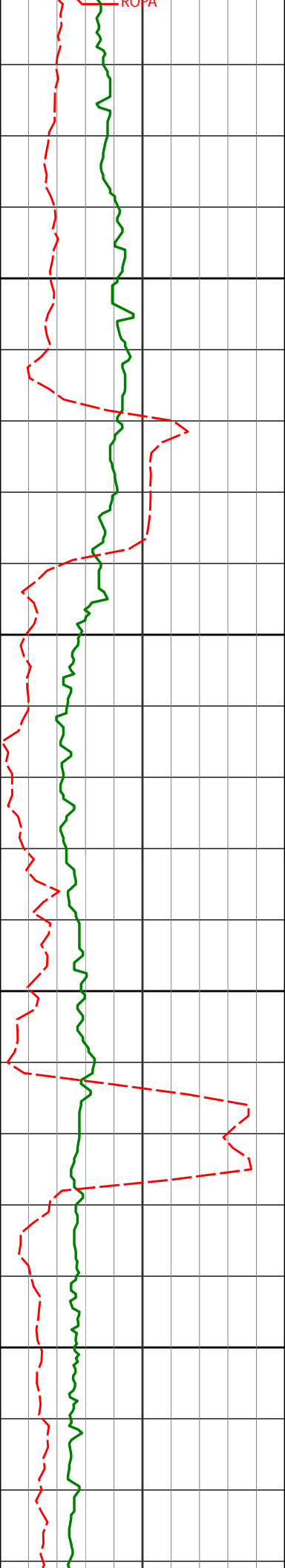
92.08°

7098.04'

1358.98'

PGRC

PODA



8050

8100

8150

8200

8097'

91.76°

91.71°

7095.69'

1452.72'

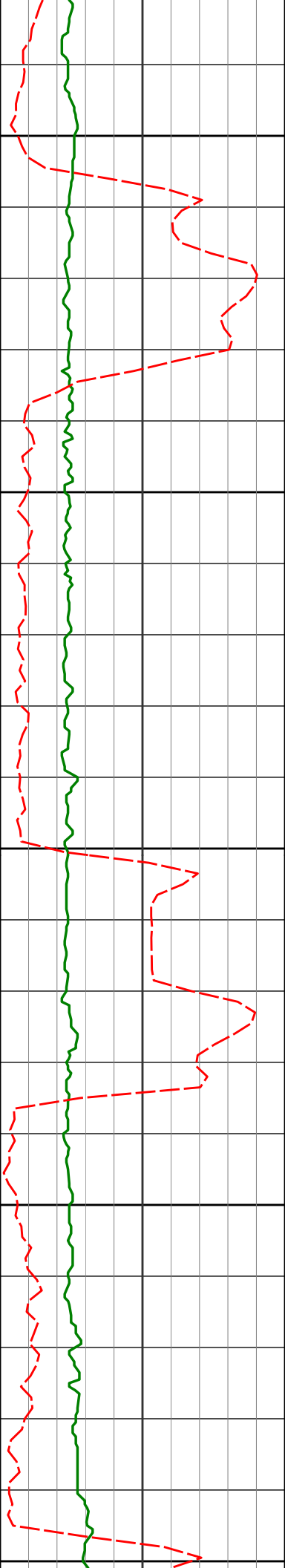
8192'

90.71°

90.98°

7093.64'

1547.52'



8250

8287'

89.91°

91.81°

7093.13'

1642.34'

8300

8350

8381'

88.92°

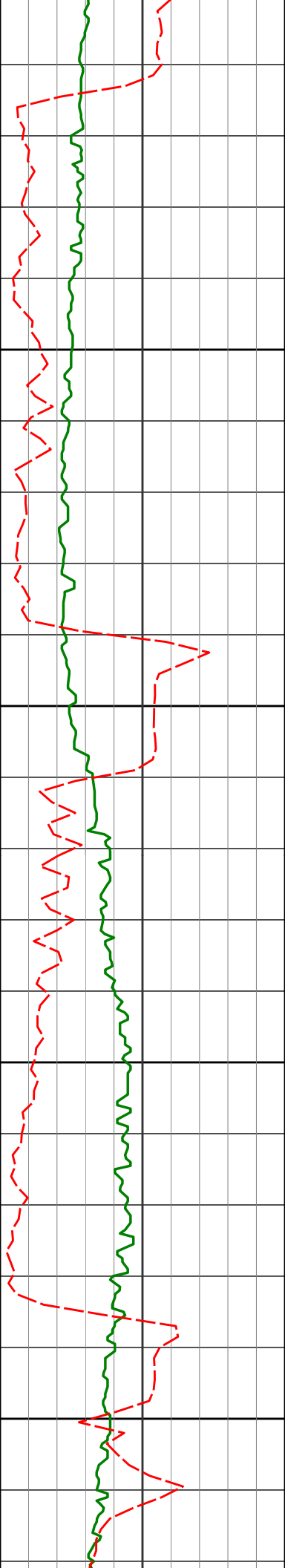
92.44°

7094.09'

1736.08'

8400

8450



8476'

88.95°

92.55°

7095.85'

1830.76'

8500

8550

8571'

89.35°

93.02°

7097.20'

1923.40'

8600

8650

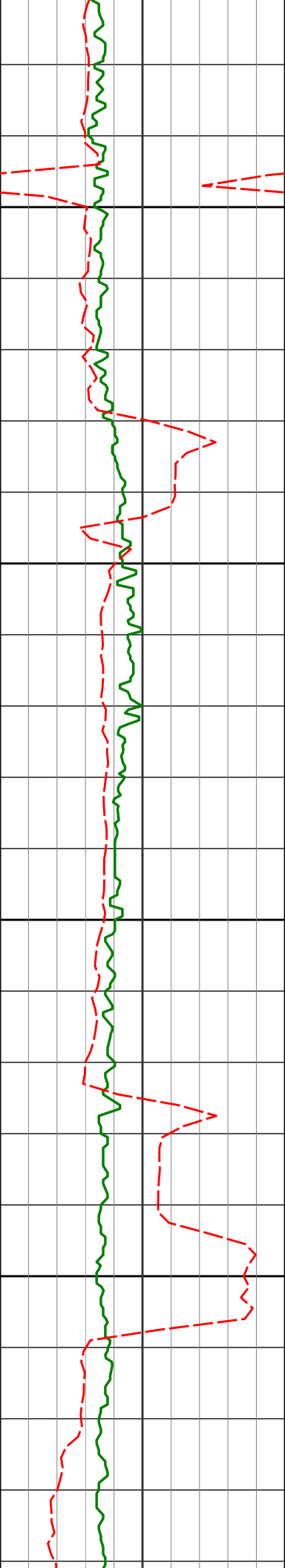
8665'

89.57°

92.78°

7098.15'

2019.04'



8700

8750

8800

8850

8760'

89.29°

92.46°

7099.09'

2113.71'

8854'

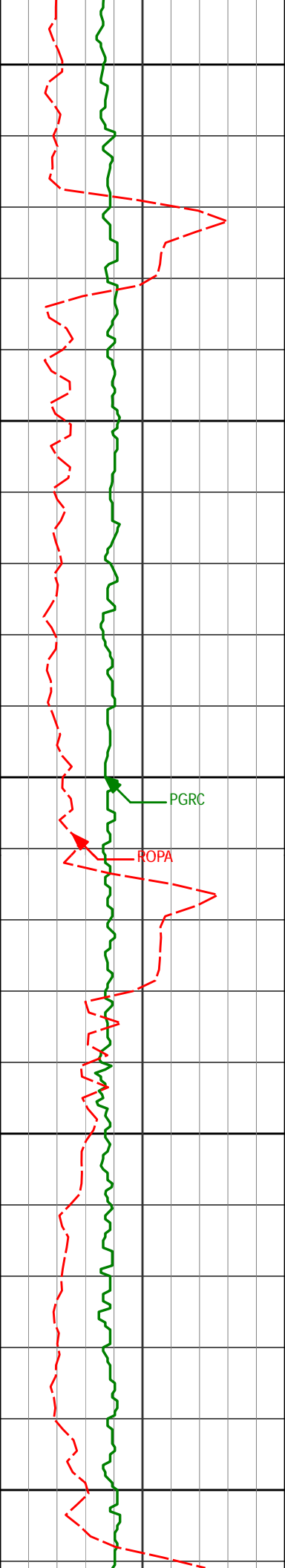
90.31°

91.13°

7099.42'

2207.48'





8900

8950

9000

9050

9100

8949'

90.34°

90.71°

7098.88'

2302.35'

PGRC

ROPA

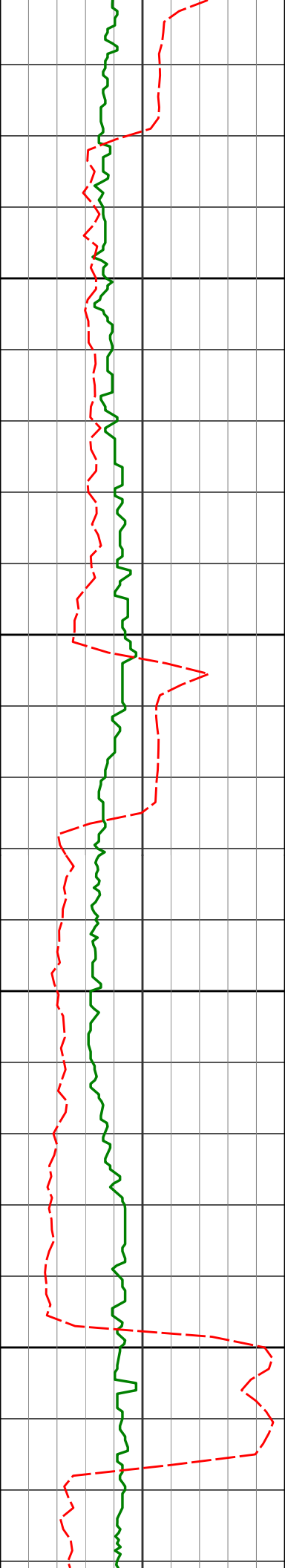
9044'

90.68°

91.43°

7098.04'

2397.20'



9138'	91.23°	91.36°	7096.47'	2491.01'
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9150

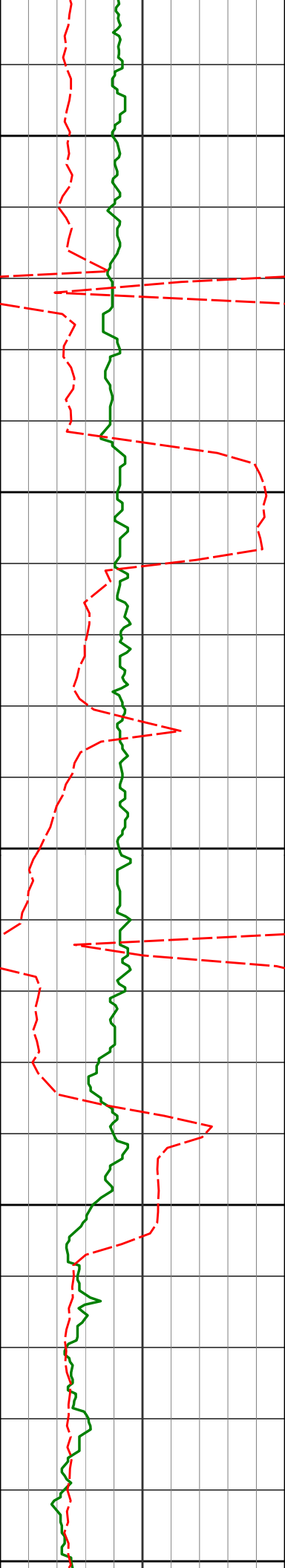
9200

9233'	91.63°	90.48°	7094.10'	2585.85'
-------	--------	--------	----------	----------

9250

9300

9328'	90.49°	91.24°	7092.34'	2680.70'
-------	--------	--------	----------	----------



9350

9400

9450

9500

9550

9423'

89.38°

90.20°

7092.45'

2775.58'

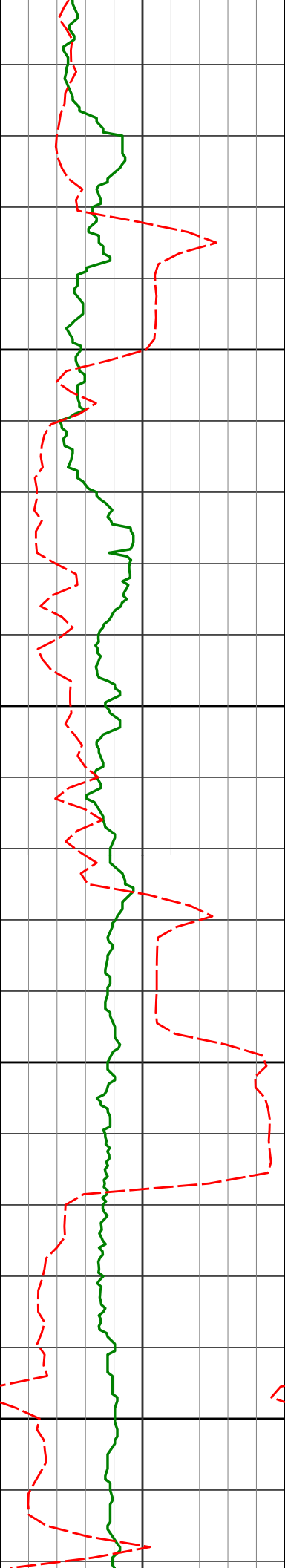
9517'

89.51°

89.38°

7093.36'

2869.52'



9600

9612'

91.36°

88.36°

7092.64'

2964.50'

9650

9700

9707'

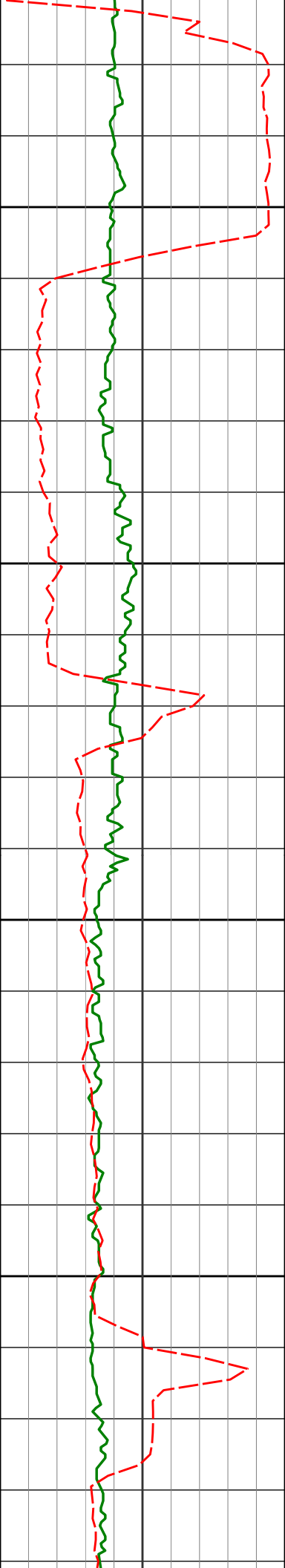
90.96°

87.82°

7090.72'

3059.48'

9750



9800

9801'

88.34°

90.47°

7091.29'

3153.44'

9850

9900

9896'

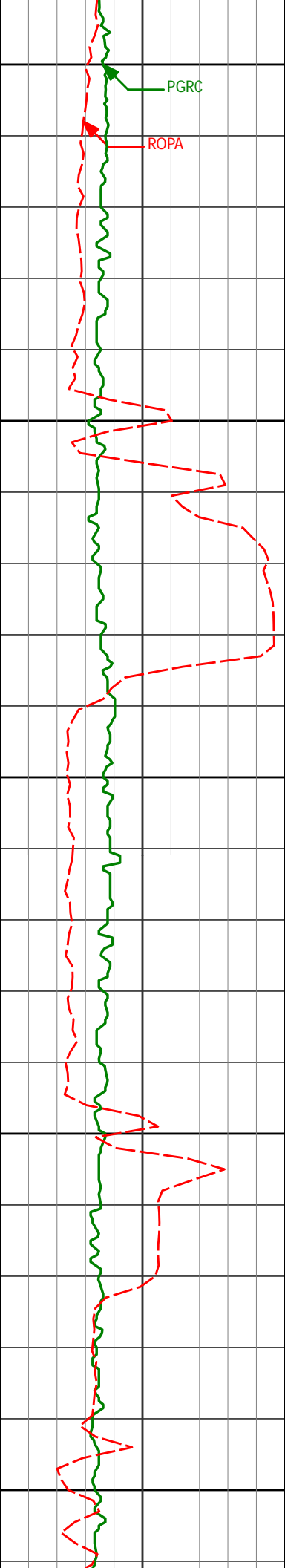
89.17°

90.55°

7093.36'

3248.32'

9950



10000

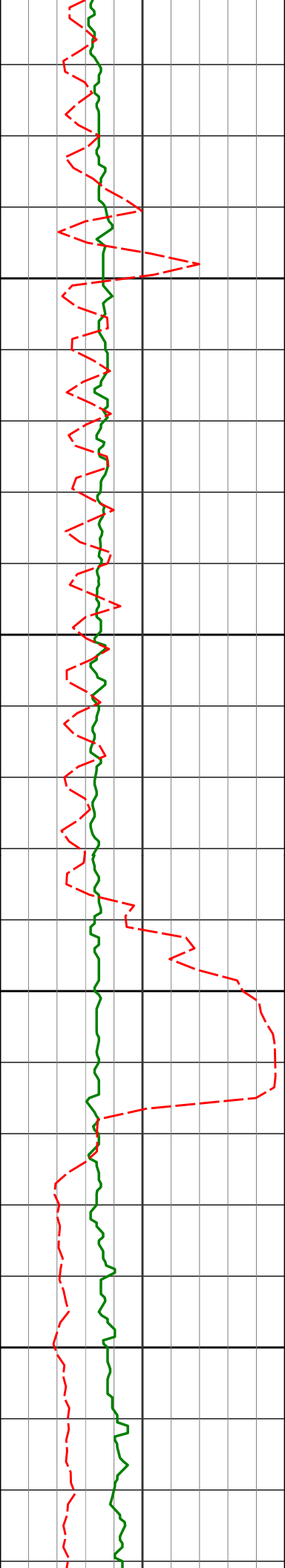
10050

10100

10150

10200

9991	89.63	90.61	7094.33	3343.21
10086'	88.58°	90.76°	7095.83'	3438.08'
10180'	89.01°	90.01°	7097.81'	3531.97'



10275'

89.82°

90.52°

7098.78'

3626.88'

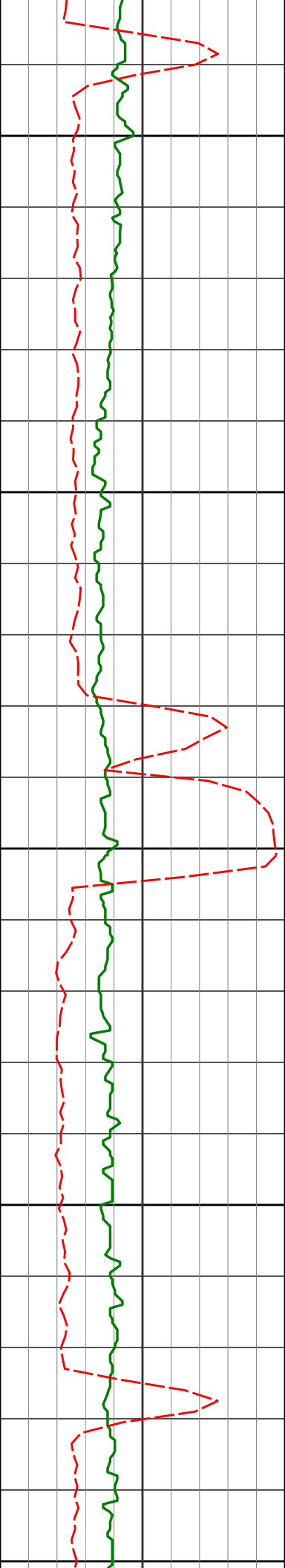
10370'

88.18°

91.89°

7100.44'

3721.71'



10450

10464'

89.48°

91.41°

7102.36'

3815.48'

10500

10550

10559'

88.80°

91.24°

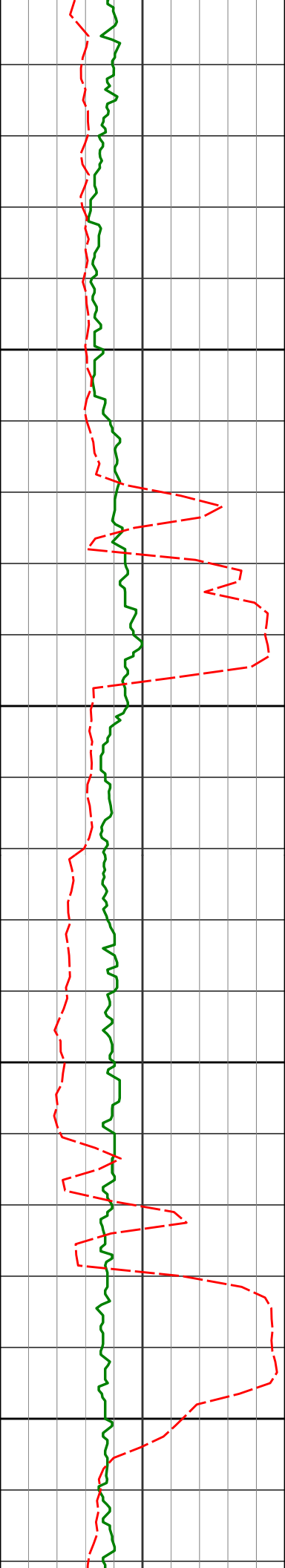
7103.78'

3910.30'

10600

10650





10700

10750

10800

10850

10654'

89.85°

91.07°

7104.90'

4005.14'

10754'

89.51°

92.49°

7105.46'

4104.90'

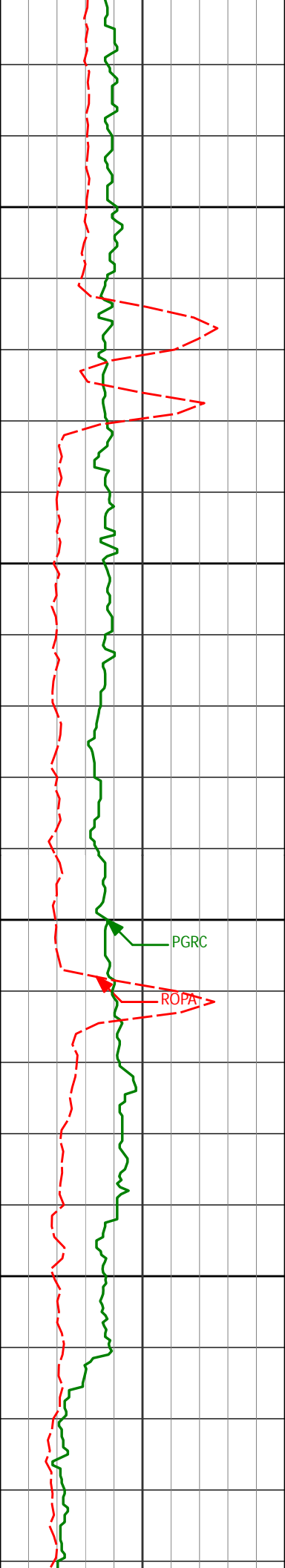
10849'

88.09°

92.61°

7107.45'

4199.57'



10900

10950

11000

11050

10944'

89.26°

93.06°

7109.65'

4294.18'

PGRC

ROPA

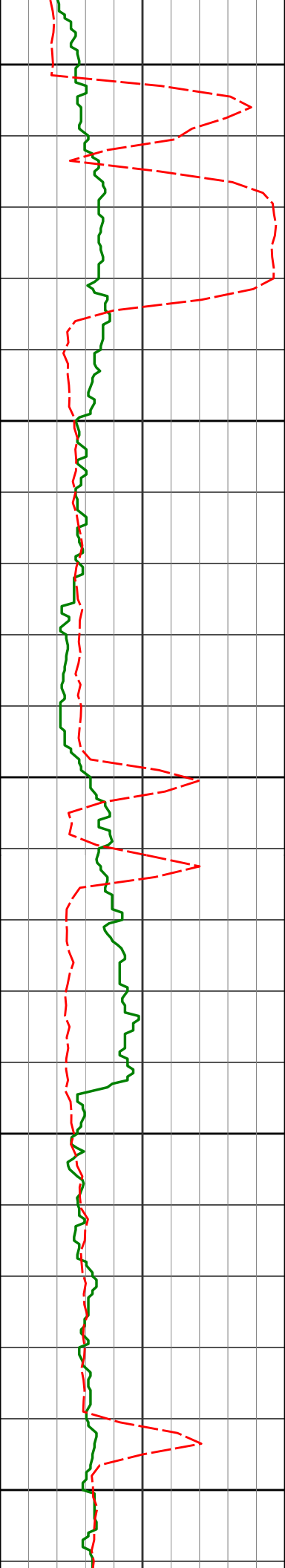
11039'

90.22°

92.76°

7110.08'

4388.82'



11100

11134'

88.77°

93.07°

7110.92'

4483.45'

11150

11200

11228'

88.98°

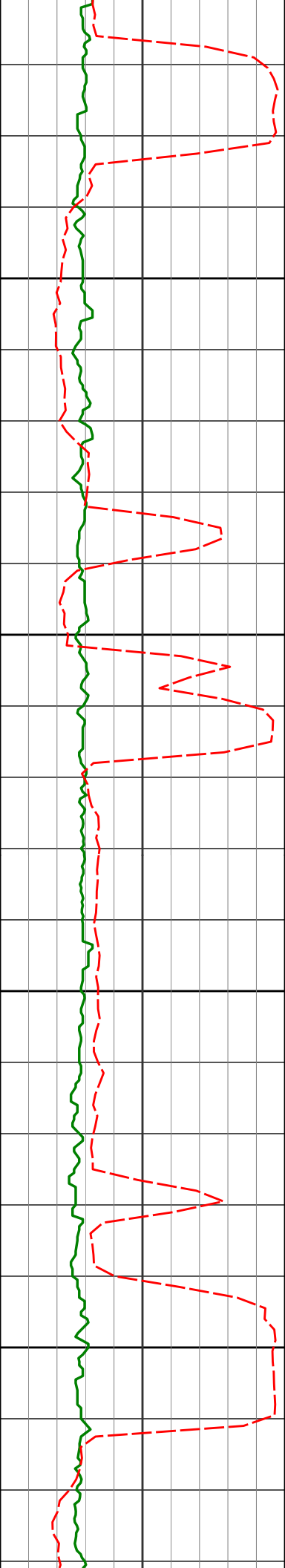
93.79°

7112.76'

4576.99'

11250

11300



11320'

88.71°

93.21°

7114.62'

4668.53'

11350

11400

11413'

88.24°

88.59°

7117.09'

4761.34'

11450

11500

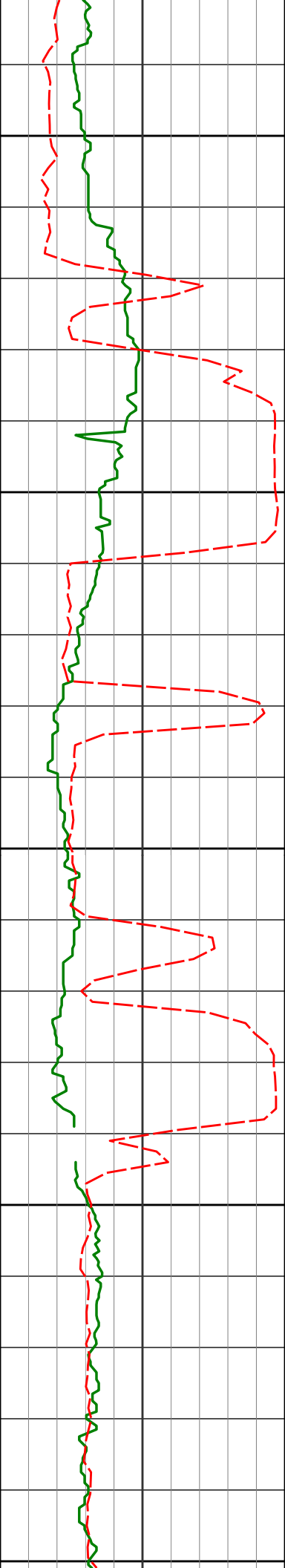
11504'

89.14°

87.75°

7119.17'

4852.32'



11550

11600

11650

11700

11750

11596'

90.46°

89.96°

7119.50'

4944.29'

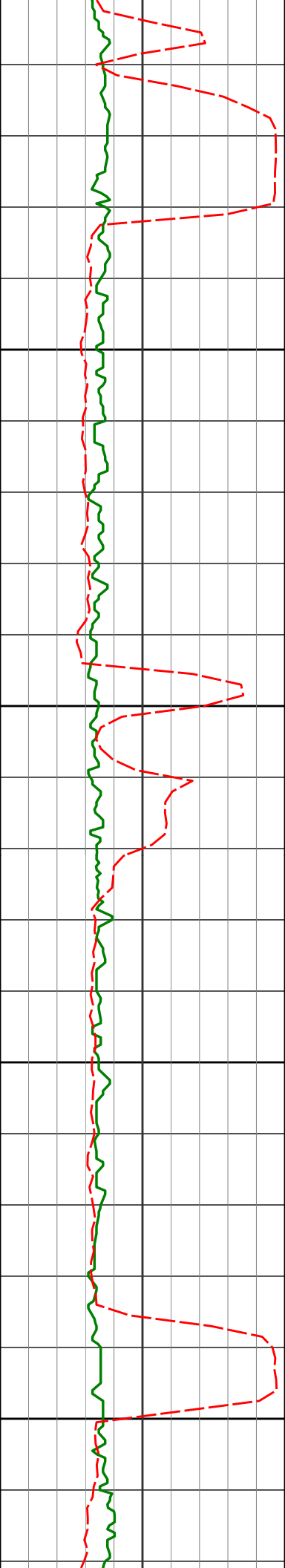
11687'

91.67°

92.19°

7117.80'

5035.13'



11779'

90.03°

92.14°

7116.44'

5126.86'

11800

11850

11870'

89.38°

91.28°

7116.91'

5217.66'

11900

11950

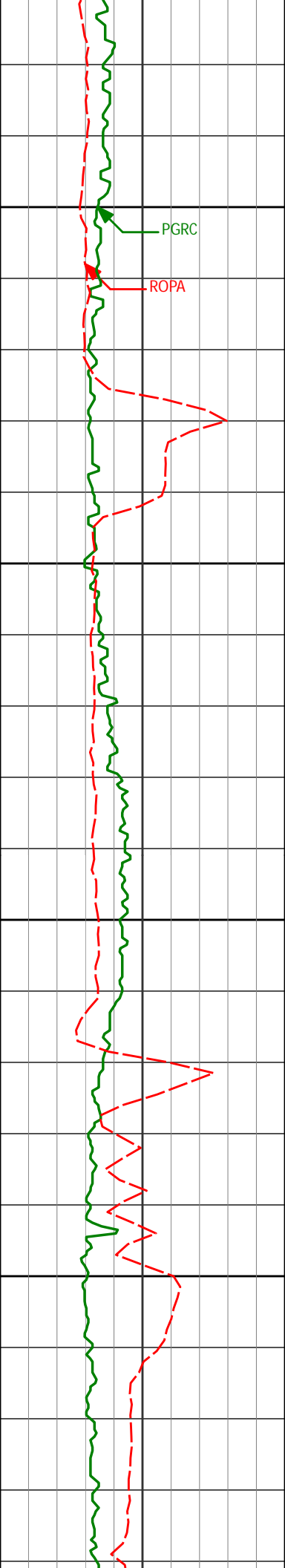
11962'

90.77°

91.54°

7116.79'

5309.48'



12000

PGRC

ROPA

12050

12055'

90.59°

91.37°

7115.68'

5402.29'

12100

12150

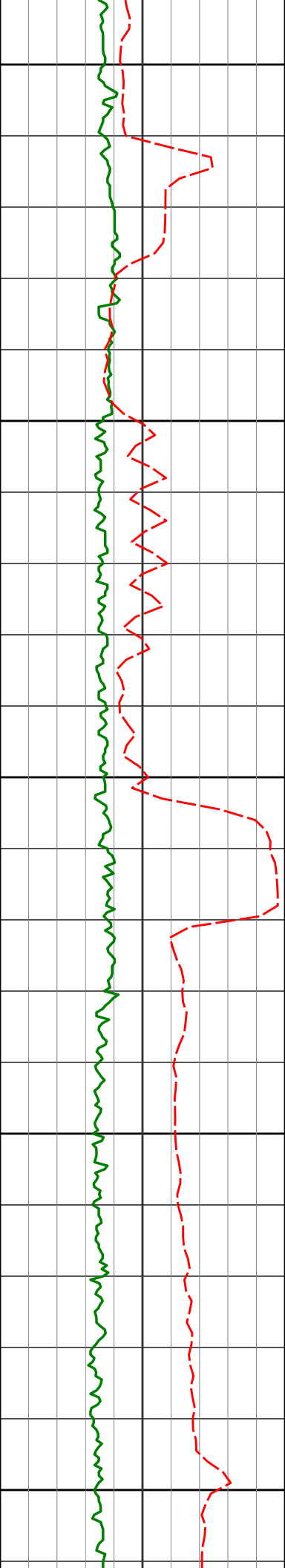
12147'

90.46°

90.41°

7114.84'

5494.16'



12200

12238'

90.71°

90.10°

7113.91'

5585.08'

12250

12300

12330'

90.37°

91.69°

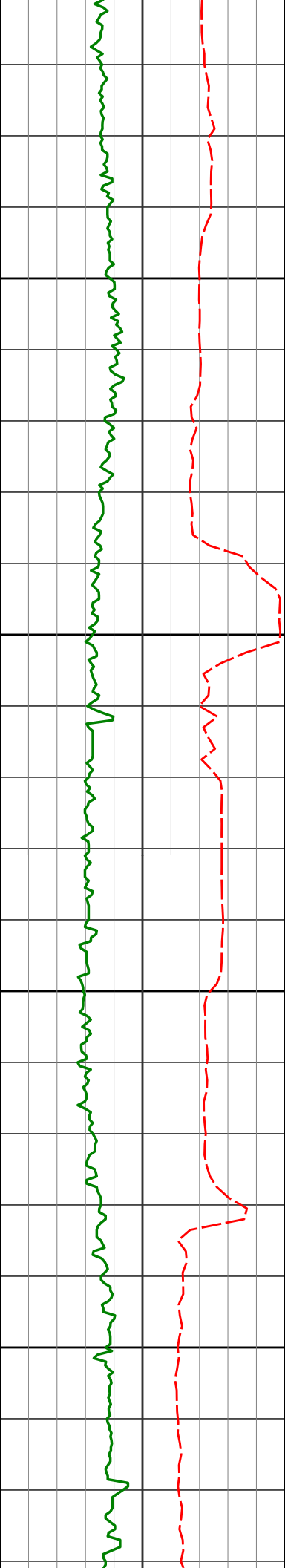
7113.04'

5676.95'

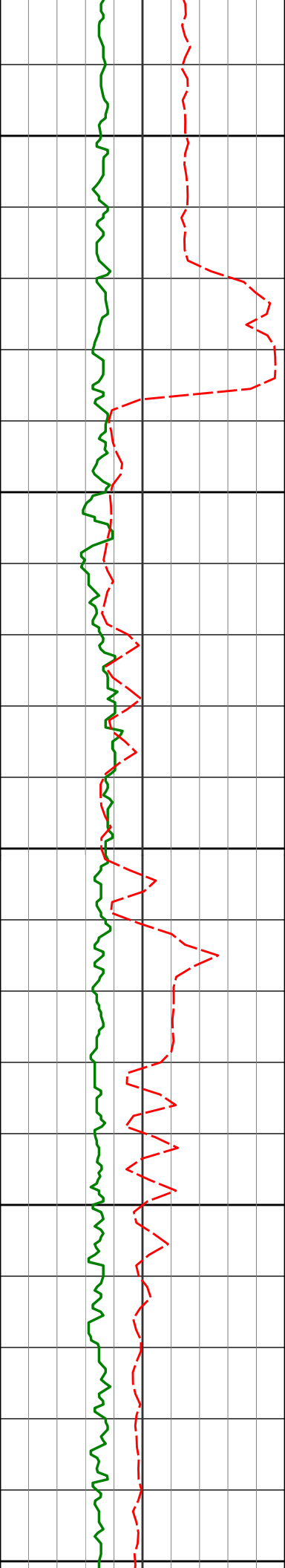
12350

12400





12422'	90.31°	90.86°	7112.50'	5768.78'
12450				
12500				
12514'	89.78°	92.18°	7112.43'	5860.60'
12550				
12600				
12607'	90.25°	91.91°	7112.40'	5953.35'



12650

12700

12750

12800

12850

12699'

88.71°

91.54°

7113.24'

6045.14'

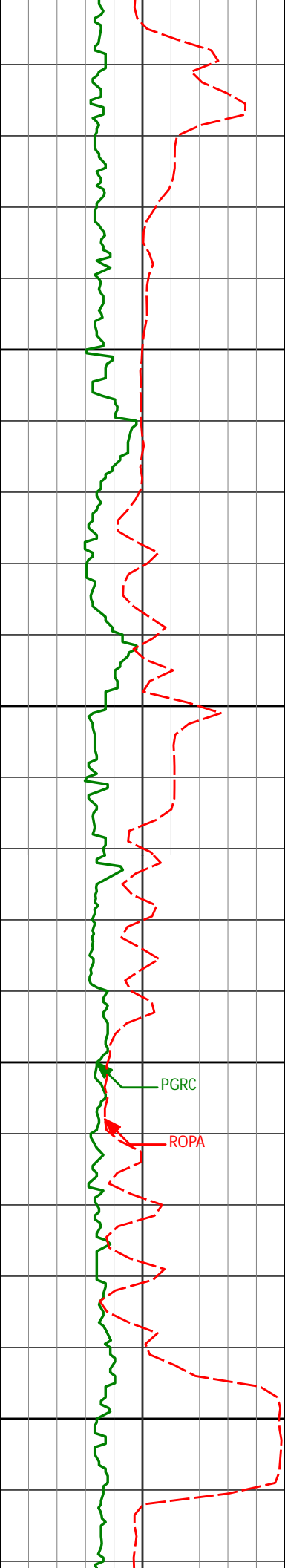
12792'

88.71°

91.90°

7115.33'

6137.91'



12884'

88.24°

90.31°

7117.78'

6229.73'

12900

12950

12975'

87.81°

90.18°

7120.92'

6320.60'

13000

PGRC

ROPA

13050

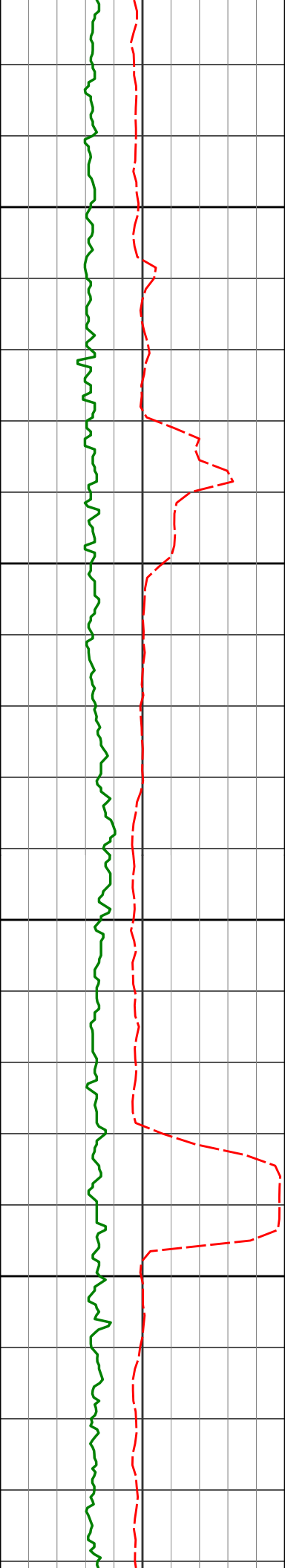
13070'

90.00°

90.50°

7122.73'

6415.49'



13100

13150

13200

13250

13165'

92.10°

92.04°

7120.99'

6510.30'

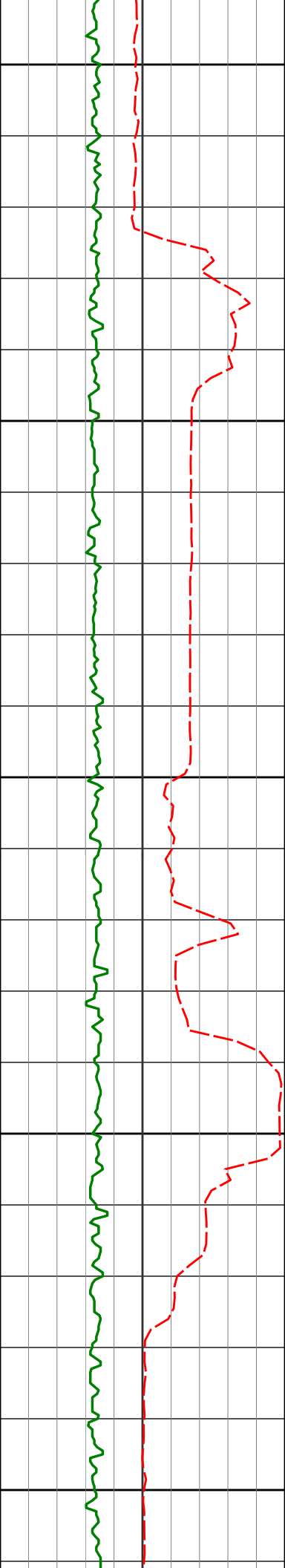
13260'

89.66°

91.46°

7119.53'

6605.06'



13300

13350

13400

13450

13500

13354'

88.89°

89.46°

7120.72'

6698.96'

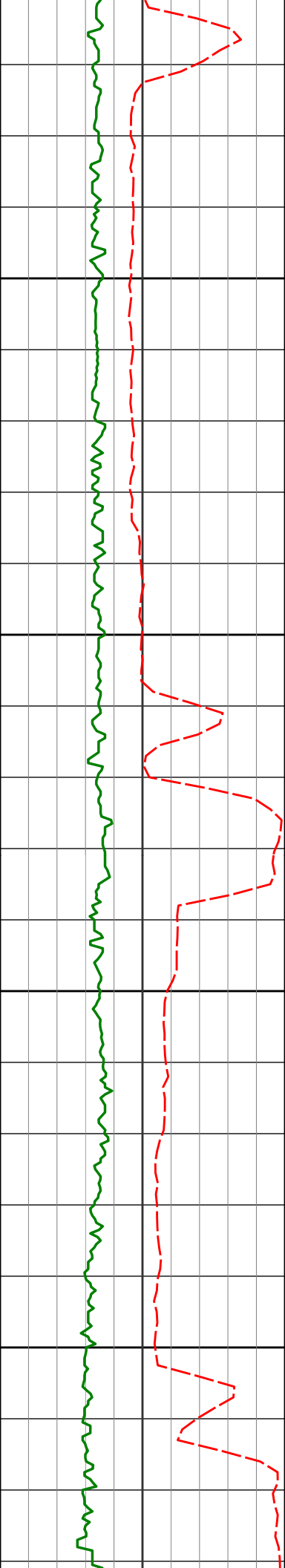
13449'

89.88°

92.13°

7121.74'

6793.82'



13544'

90.12°

92.34°

7121.74'

6888.54'

13550

13600

13639'

88.92°

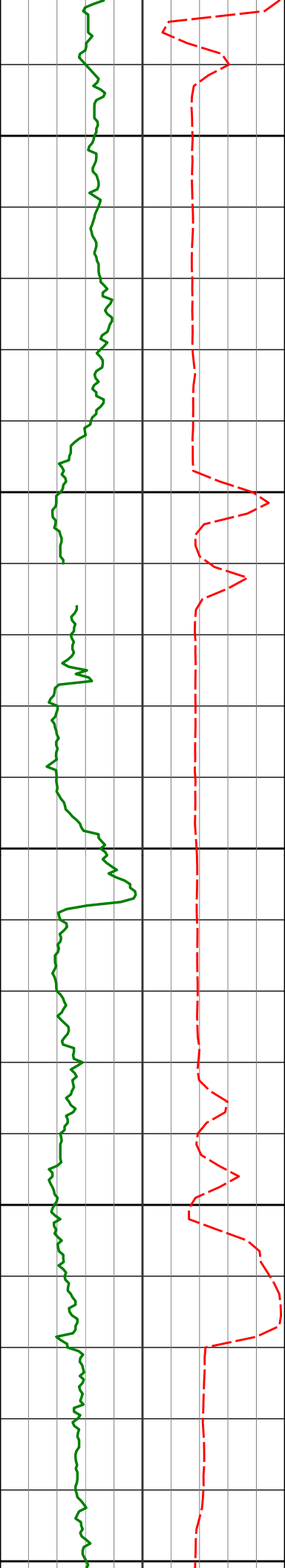
92.94°

7122.54'

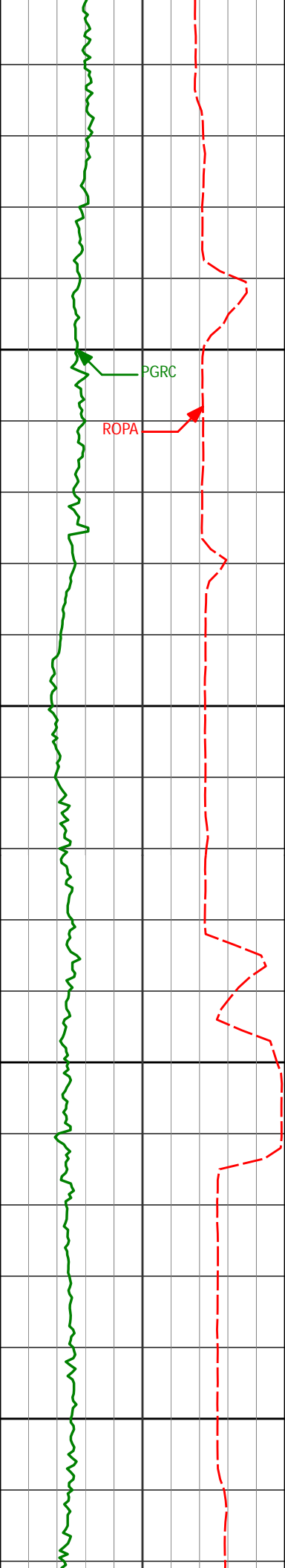
6983.21'

13650

13700



	13733'	89.04°	91.39°	7124.21'	7076.93'
13750					
13800					
13828'	13828'	88.80°	90.81°	7126.00'	7171.77'
13850					
13900					
13923'	13923'	89.63°	90.90°	7127.30'	7266.63'
13950					



14000

14050

14100

14150

14018'

91.23°

91.05°

7126.59'

7361.49'

14113'

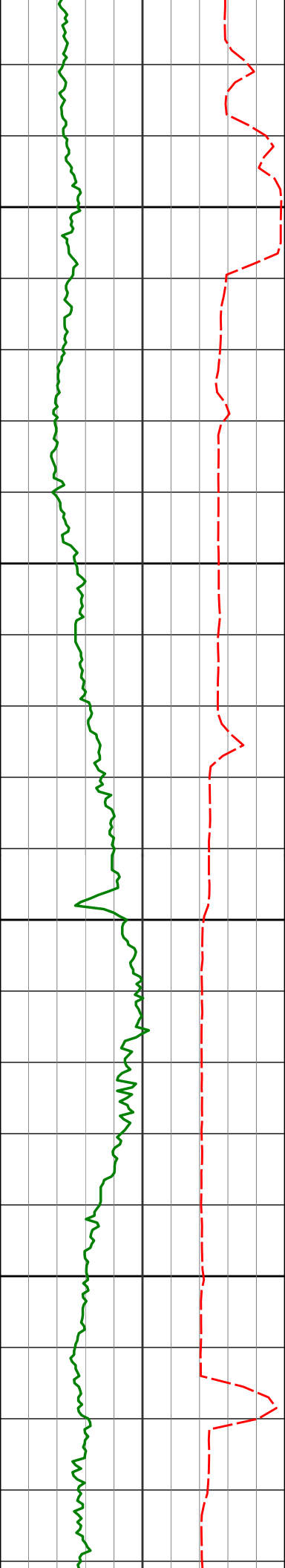
90.49°

90.82°

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7456.34'





14200

14207'

89.08°

92.39°

7125.52'

7550.14'

14250

14300

14303'

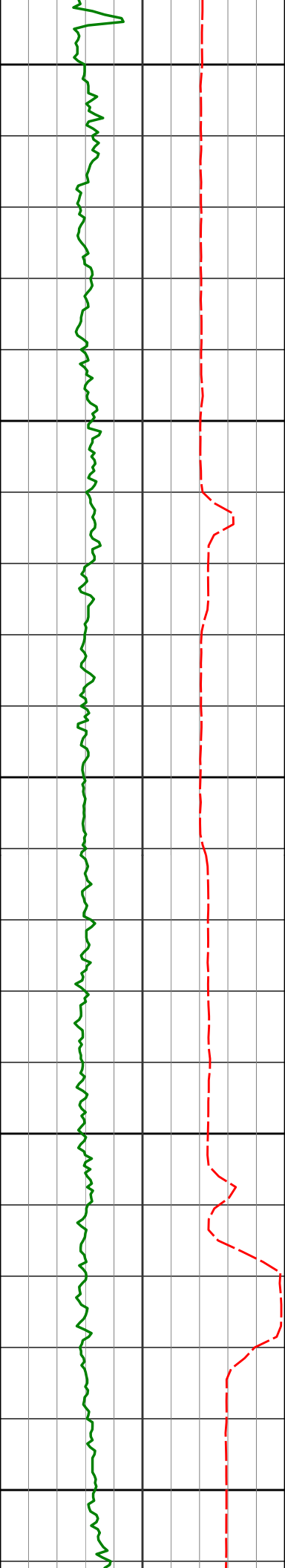
89.04°

92.57°

7127.09'

7645.82'

14350



14400

14450

14500

14550

14600

14397'

89.51°

92.00°

7128.28'

7739.53'

14492'

90.40°

91.39°

7128.35'

7834.32'

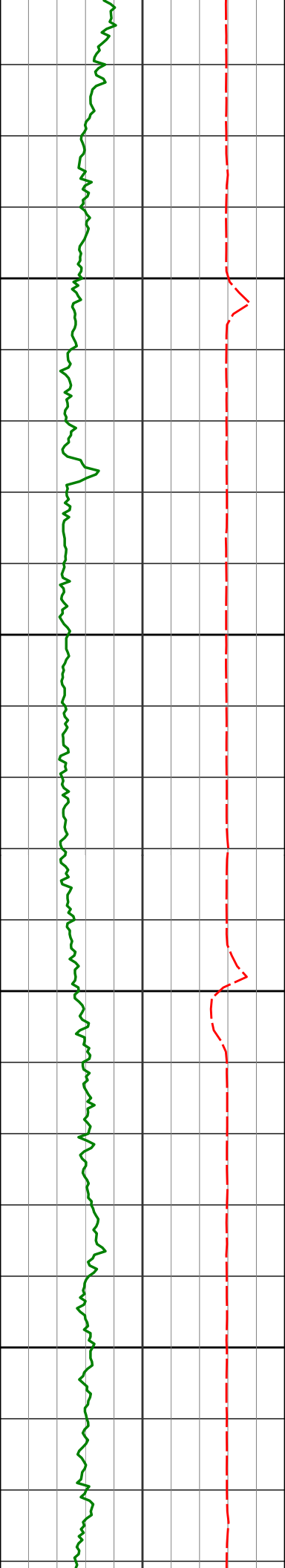
14587'

89.32°

91.75°

7128.59'

7929.12'



14650

14682'

90.09°

91.27°

7129.08'

8023.93'

14700

14750

14776'

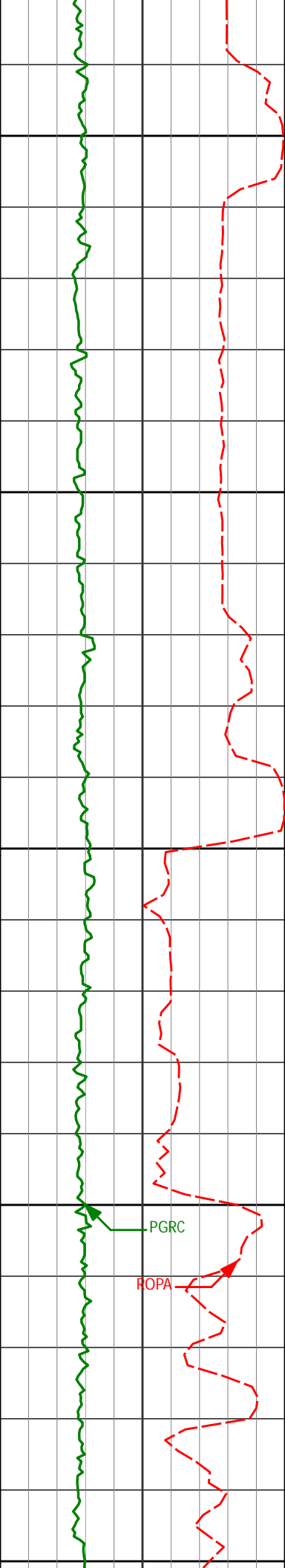
91.63°

91.78°

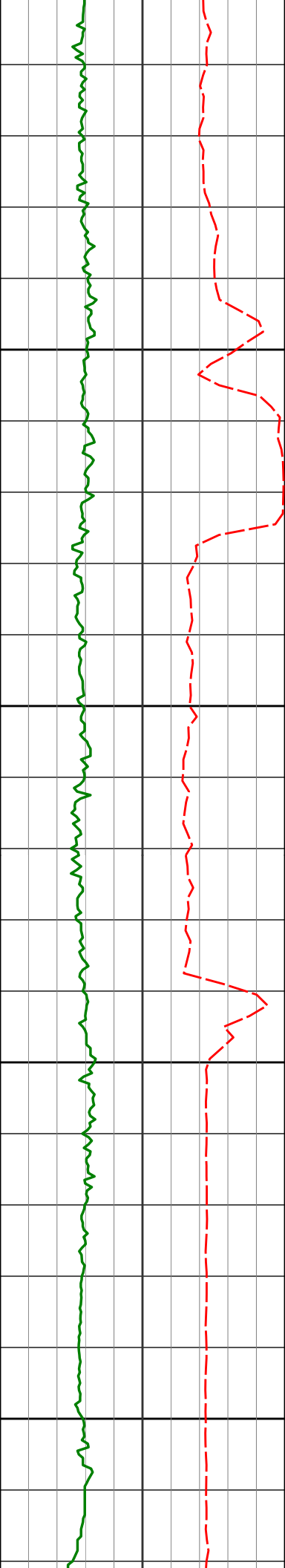
7127.67'

8117.73'

14800



14850					
14871'	90.68°	91.66°	7125.75'	8212.50'	
14900					
14936'	90.19°	91.51°	7125.26'	8277.36'	
Run 400					
14950					
15000					
15031'	90.25°	91.78°	7124.89'	8372.16'	
15050					



15100

15126'

89.23°

91.50°

7125.32'

8466.95'

15150

15200

15221'

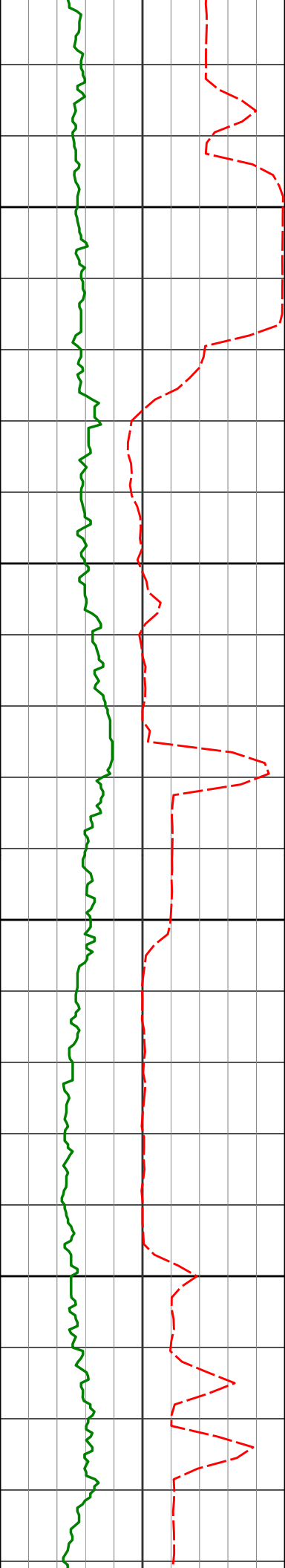
90.25°

90.44°

7125.75'

8561.81'

15250



15300

15350

15400

15450

15316'

88.43°

91.53°

7126.85'

8656.66'

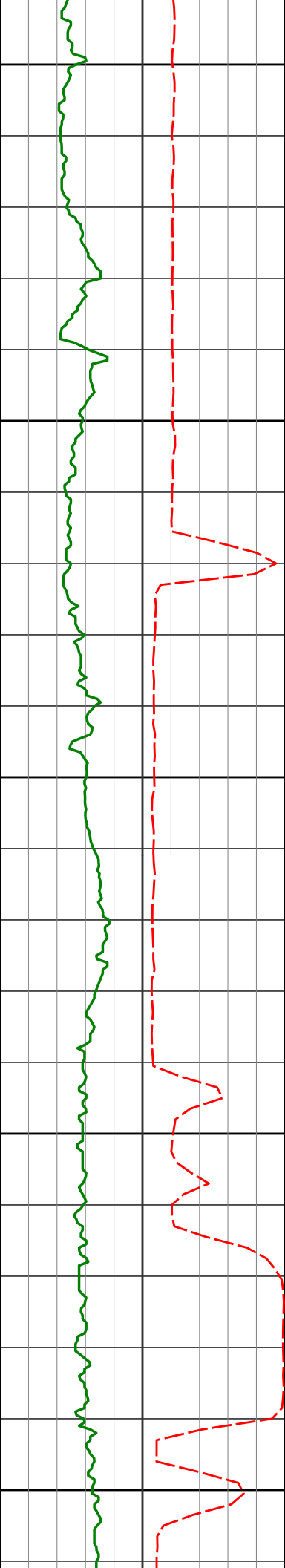
15410'

88.98°

91.09°

7128.97'

8750.47'



15500

15505'

89.54°

91.73°

7130.20'

8845.28'

15550

15600

15600'

90.89°

92.22°

7129.84'

8940.03'

15650

15695'

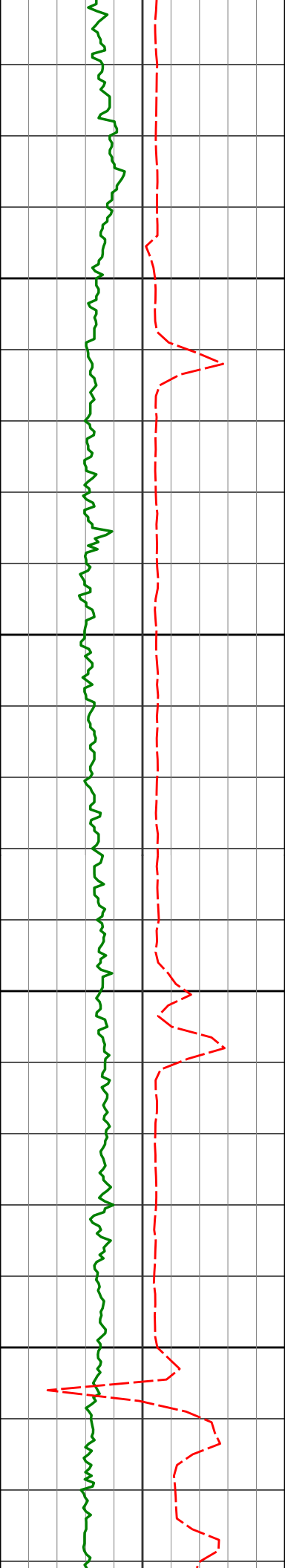
88.83°

90.83°

7130.08'

9034.83'

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15750

15790'

89.57°

90.05°

7131.40'

9129.73'

15800

15850

15885'

89.32°

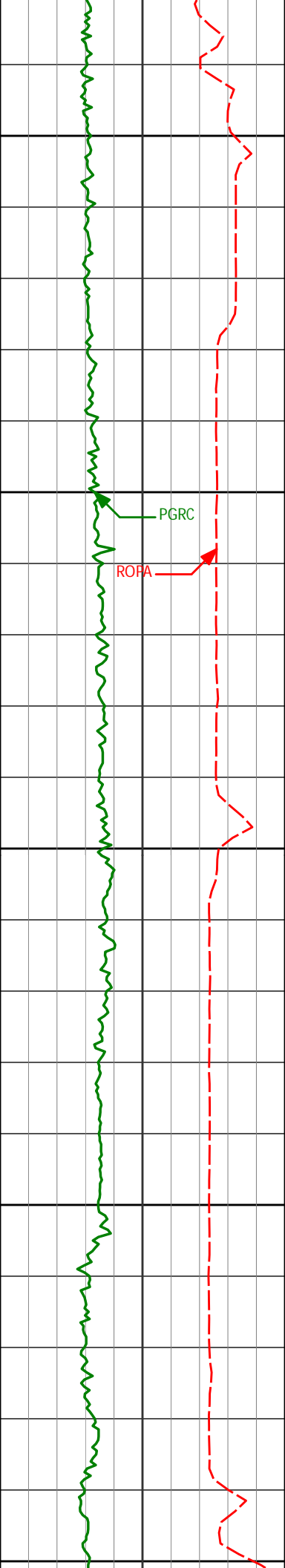
89.23°

7132.32'

9224.68'

15900





15950

15980'

89.60°

89.19°

7133.22'

9319.65'

16000

16050

16075'

88.89°

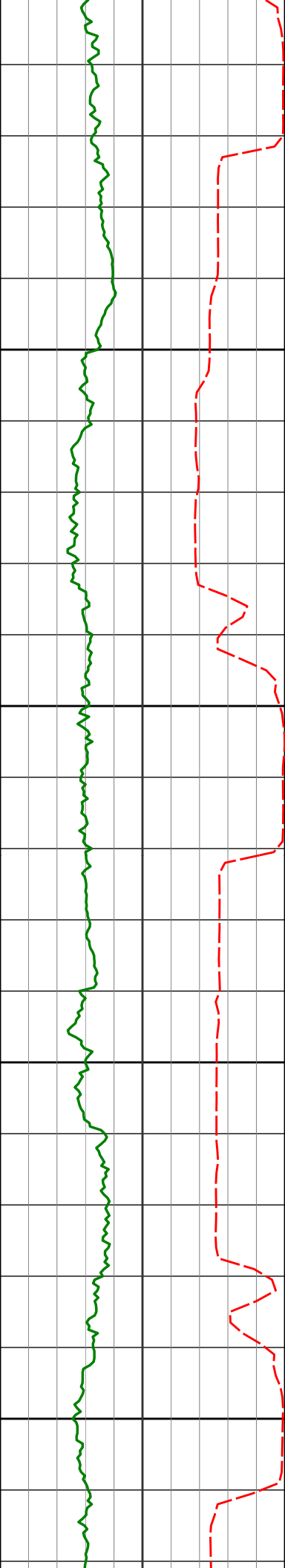
88.03°

7134.47'

9414.63'

16100

16150



16170'

89.41°

88.35°

7135.88'

9509.62'

16200

16250

16264'

89.14°

89.58°

7137.07'

9603.59'

16300

16350

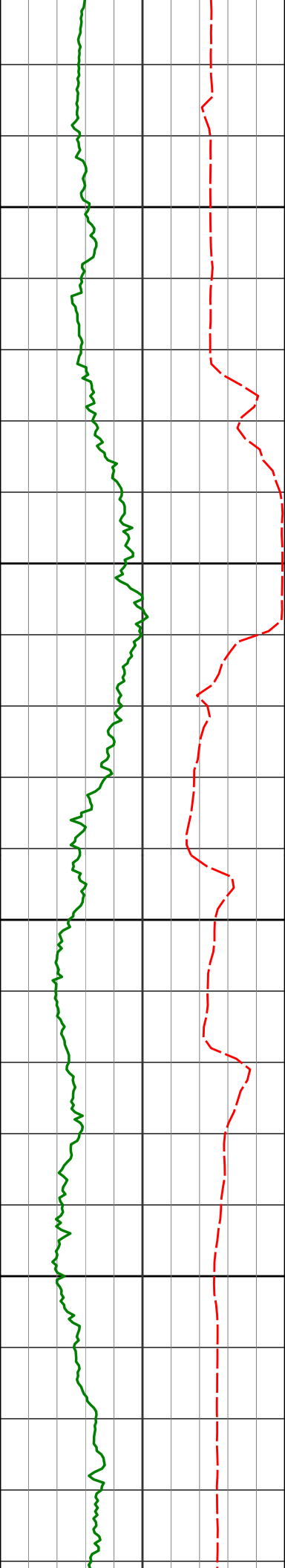
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89.72°

90.69°

7138.01'

9698.52'



16400

16450

16500

16550

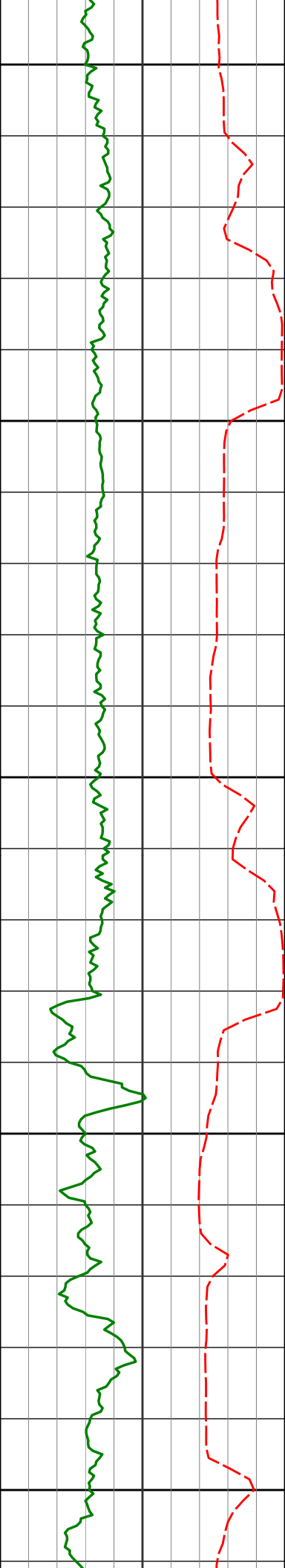
16454'

89.63°

93.40°

7138.55'

9793.26'



16600

500

16636'

90.18°

93.41°

7137.61'

9974.42'

16650

16700

16731'

89.17°

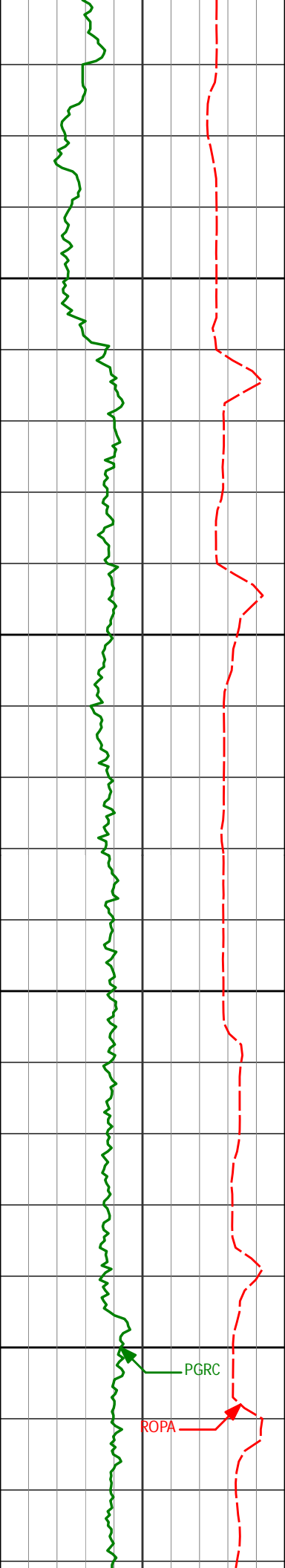
93.60°

7138.15'

10068.96'

16750

16800



16850

16900

16950

17000

16826'

88.15°

93.41°

7140.37'

10163.48'

16921'

88.83°

93.33°

7142.87'

10258.01'

17016'

89.41°

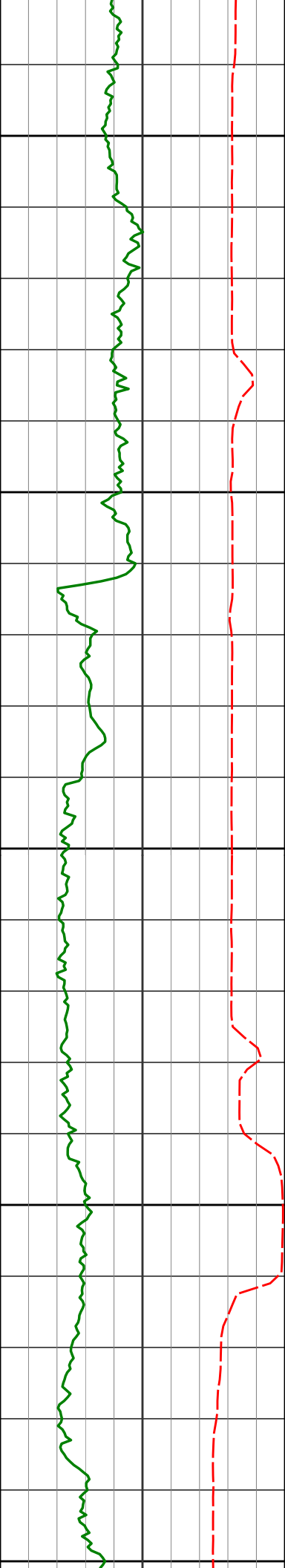
92.75°

7144.33'

10352.62'

PGRC

ROPA



17050

17100

17110'

90.34°

92.80°

7144.54'

10446.27'

17150

17200

17205'

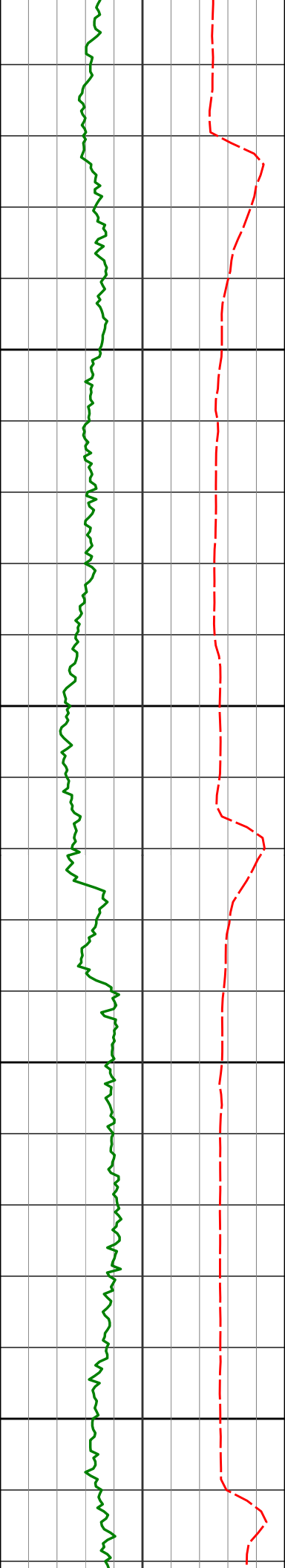
89.91°

92.13°

7144.33'

10540.97'

17250



17300

17300'

90.09°

92.13°

7144.33'

10635.71'

17350

17395'

91.51°

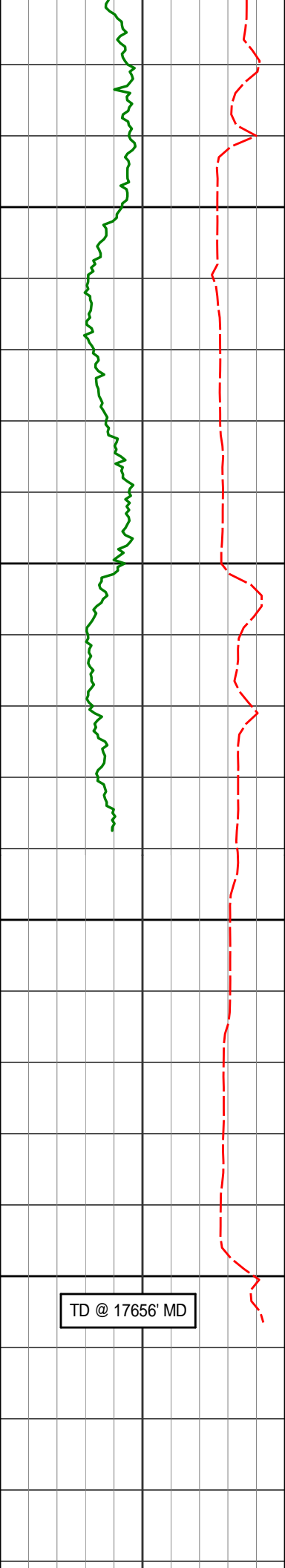
92.17°

7143.00'

10730.44'

17400

17450



17500

17550

17600

17650

17490'

91.63°

91.87°

7140.40'

10825.15'

17590'

91.91°

91.60°

7137.31'

10924.88'

17656'

91.91°

91.60°

7135.11'

10990.71'



[illegible]

# HALLIBURTON

# DIRECTIONAL SURVEY REPORT

**Noble  
SHABLE K08-69HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901584411**

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
723.00	0.22	352.50	723.00	1.38 N	0.18 W	-0.13	0.03
814.00	0.69	310.81	814.00	1.91 N	0.62 W	-0.55	0.60
907.00	0.51	315.63	906.99	2.57 N	1.33 W	-1.24	0.20
999.00	0.49	243.37	998.99	2.69 N	1.97 W	-1.87	0.64
1091.00	0.13	222.75	1090.99	2.43 N	2.39 W	-2.30	0.40
1183.00	0.18	328.07	1182.99	2.48 N	2.54 W	-2.45	0.27
1274.00	0.22	312.76	1273.99	2.72 N	2.74 W	-2.64	0.07
1367.00	0.68	307.20	1366.98	3.17 N	3.31 W	-3.20	0.50
1458.00	0.75	294.17	1457.98	3.74 N	4.29 W	-4.15	0.19
1551.00	0.96	288.05	1550.96	4.23 N	5.58 W	-5.42	0.25
1643.00	0.91	282.89	1642.95	4.64 N	7.03 W	-6.85	0.11
1736.00	0.70	307.55	1735.94	5.15 N	8.20 W	-8.00	0.43
1828.00	1.05	327.99	1827.93	6.20 N	9.09 W	-8.86	0.50
1920.00	0.96	337.00	1919.92	7.63 N	9.84 W	-9.55	0.20
2015.00	1.07	358.10	2014.90	9.25 N	10.18 W	-9.83	0.41
2110.00	1.06	348.78	2109.89	11.00 N	10.38 W	-9.97	0.18
2204.00	1.31	347.76	2203.87	12.90 N	10.78 W	-10.29	0.27
2299.00	1.91	168.55	2298.85	12.41 N	10.69 W	-10.23	3.39
2394.00	1.20	157.27	2393.82	9.94 N	9.99 W	-9.62	0.81
2489.00	0.69	64.22	2488.81	9.27 N	9.09 W	-8.75	1.49
2584.00	0.71	45.38	2583.80	9.93 N	8.16 W	-7.79	0.24
2679.00	0.80	49.11	2678.79	10.78 N	7.24 W	-6.84	0.11
2773.00	0.69	144.32	2772.79	10.75 N	6.41 W	-6.01	1.17
2868.00	1.06	152.32	2867.78	9.51 N	5.67 W	-5.32	0.41
2963.00	1.05	158.81	2962.76	7.92 N	4.95 W	-4.65	0.13
3058.00	1.11	154.54	3057.74	6.28 N	4.24 W	-4.01	0.11
3153.00	1.28	165.16	3152.72	4.42 N	3.57 W	-3.41	0.29
3247.00	0.93	160.26	3246.71	2.69 N	3.05 W	-2.94	0.39
3342.00	1.09	165.47	3341.69	1.09 N	2.56 W	-2.52	0.19
3437.00	0.84	200.99	3436.68	0.44 S	2.58 W	-2.60	0.67
3531.00	0.44	266.05	3530.67	1.11 S	3.19 W	-3.23	0.82
3626.00	2.23	18.90	3625.65	0.62 N	2.95 W	-2.93	2.56
3721.00	3.59	28.45	3720.53	4.98 N	0.94 W	-0.75	1.51
3815.00	5.76	33.93	3814.21	11.48 N	3.10 E	3.52	2.35
3910.00	7.75	35.20	3908.54	20.67 N	9.45 E	10.21	2.10
4005.00	8.90	34.84	4002.54	31.94 N	17.34 E	18.51	1.21
4100.00	10.44	34.14	4096.19	45.10 N	26.37 E	28.01	1.63
4194.00	11.39	33.81	4188.49	59.86 N	36.32 E	38.50	1.01
4289.00	11.42	32.29	4281.61	75.60 N	46.56 E	49.31	0.32
4384.00	10.91	31.37	4374.81	91.23 N	56.26 E	59.59	0.57
4479.00	10.86	30.69	4468.10	106.60 N	65.51 E	69.39	0.15
4573.00	10.21	29.80	4560.52	121.44 N	74.17 E	78.59	0.71
4668.00	9.51	26.84	4654.12	135.75 N	81.90 E	86.84	0.91

4763.00	9.70	25.12	4747.79	150.00 N	88.84 E	94.30	0.36
4857.00	10.74	27.51	4840.29	164.94 N	96.25 E	102.26	1.19
4952.00	11.09	27.75	4933.57	180.88 N	104.59 E	111.18	0.37
5047.00	9.45	24.75	5027.05	196.05 N	112.11 E	119.25	1.82
5142.00	8.72	22.32	5120.86	209.79 N	118.11 E	125.76	0.87
5236.00	9.22	25.02	5213.71	223.21 N	124.00 E	132.14	0.70
5331.00	9.87	30.14	5307.39	237.15 N	131.31 E	139.95	1.12
5426.00	8.94	28.43	5401.12	250.68 N	138.91 E	148.05	1.02
5521.00	8.22	28.83	5495.05	263.12 N	145.70 E	155.29	0.76
5616.00	8.22	25.20	5589.08	275.21 N	151.87 E	161.90	0.55
5710.00	7.64	25.72	5682.18	286.92 N	157.44 E	167.90	0.62
5805.00	8.04	25.32	5776.29	298.62 N	163.02 E	173.91	0.42
5900.00	8.87	34.05	5870.26	310.69 N	169.97 E	181.29	1.61
5995.00	9.54	30.73	5964.04	323.53 N	178.09 E	189.88	0.90
6089.00	10.08	33.71	6056.66	337.07 N	186.64 E	198.92	0.79
6184.00	10.53	30.00	6150.13	351.50 N	195.59 E	208.40	0.84
6279.00	11.45	27.22	6243.39	367.41 N	204.24 E	217.63	1.12
6374.00	10.60	22.82	6336.64	383.84 N	211.95 E	225.93	1.26
6493.00	9.01	23.86	6453.89	402.46 N	219.96 E	234.63	1.34
6564.00	10.15	31.51	6523.91	412.87 N	225.48 E	240.53	2.40
6612.00	15.49	42.27	6570.70	421.23 N	232.01 E	247.36	12.14
6658.00	19.82	49.04	6614.53	430.89 N	242.03 E	257.73	10.40
6706.00	23.40	52.69	6659.15	442.01 N	255.76 E	271.87	7.96
6753.00	26.16	57.72	6701.82	453.20 N	271.95 E	288.45	7.38
6801.00	29.54	61.29	6744.26	464.54 N	291.28 E	308.19	7.85
6848.00	34.24	63.62	6784.15	475.99 N	313.30 E	330.62	10.34
6896.00	39.62	65.67	6822.51	488.31 N	339.37 E	357.12	11.50
6942.00	45.45	66.58	6856.39	500.87 N	367.80 E	385.99	12.74
6990.00	49.91	64.39	6888.70	515.62 N	400.07 E	418.78	9.88
7037.00	53.18	62.70	6917.93	532.02 N	433.01 E	452.30	7.51
7085.00	56.74	63.55	6945.49	549.78 N	468.06 E	487.98	7.56
7132.00	61.18	64.50	6969.71	567.40 N	504.25 E	524.80	9.60
7180.00	64.73	64.92	6991.54	585.66 N	542.90 E	564.10	7.44
7227.00	66.32	66.19	7011.01	603.36 N	581.84 E	603.66	4.18
7275.00	66.54	70.06	7030.21	619.75 N	622.66 E	645.06	7.40
7322.00	69.45	75.49	7047.83	632.62 N	664.26 E	687.11	12.37
7370.00	73.66	80.96	7063.02	641.88 N	708.82 E	731.97	13.92
7417.00	76.79	87.35	7075.02	646.49 N	753.99 E	777.29	14.73
7482.00	82.28	92.70	7086.83	646.43 N	817.86 E	841.11	11.70
7560.00	86.36	94.46	7094.55	641.58 N	895.31 E	918.33	5.69
7623.00	87.26	94.59	7098.05	636.62 N	958.02 E	980.81	1.44
7718.00	89.78	93.51	7100.51	629.92 N	1052.74 E	1075.22	2.89
7813.00	90.12	93.33	7100.59	624.25 N	1147.57 E	1169.77	0.40
7908.00	90.92	93.40	7099.73	618.67 N	1242.40 E	1264.34	0.85
8003.00	91.11	92.08	7098.04	614.13 N	1337.27 E	1358.98	1.40
8097.00	91.76	91.71	7095.69	611.03 N	1431.19 E	1452.72	0.80
8192.00	90.71	90.98	7093.64	608.80 N	1526.14 E	1547.52	1.35
8287.00	89.91	91.81	7093.13	606.48 N	1621.11 E	1642.34	1.21
8381.00	88.92	92.44	7094.09	603.00 N	1715.04 E	1736.08	1.25
8476.00	88.95	92.55	7095.85	598.86 N	1809.93 E	1830.76	0.12
8571.00	89.35	93.02	7097.26	594.25 N	1904.81 E	1925.40	0.65
8665.00	89.57	92.78	7098.15	589.49 N	1998.69 E	2019.04	0.35
8760.00	89.29	92.46	7099.09	585.15 N	2093.58 E	2113.71	0.45
8854.00	90.31	91.13	7099.42	582.21 N	2187.53 E	2207.48	1.78
8949.00	90.34	90.71	7098.88	580.68 N	2282.52 E	2302.35	0.44
9044.00	90.68	91.43	7098.04	578.91 N	2377.50 E	2397.20	0.84
9138.00	91.23	91.36	7096.47	576.62 N	2471.46 E	2491.01	0.59
9233.00	91.63	90.48	7094.10	575.09 N	2566.41 E	2585.85	1.02
9328.00	90.49	91.24	7092.34	573.67 N	2661.38 E	2680.70	1.44
9423.00	89.38	90.20	7092.45	572.47 N	2756.37 E	2775.58	1.60
9517.00	89.51	89.38	7093.36	572.82 N	2850.37 E	2869.52	0.88
9612.00	91.36	88.36	7092.64	574.69 N	2945.34 E	2964.50	2.22
9707.00	90.96	87.82	7090.72	577.86 N	3040.27 E	3059.48	0.71
9801.00	88.34	90.47	7091.29	579.26 N	3134.24 E	3153.44	3.96
9896.00	89.17	90.55	7093.36	578.41 N	3229.21 E	3248.32	0.88
9991.00	89.63	90.61	7094.35	577.45 N	3324.20 E	3343.21	0.49
10086.00	88.58	90.76	7095.83	576.32 N	3419.18 E	3438.08	1.12
10180.00	89.01	90.01	7097.81	575.69 N	3513.16 E	3531.97	0.92
10275.00	89.82	90.52	7098.78	575.25 N	3608.15 E	3626.88	1.01
10370.00	88.18	91.89	7100.44	573.25 N	3703.11 E	3721.71	2.25
10464.00	89.48	91.41	7102.36	570.54 N	3797.05 E	3815.48	1.47
10559.00	88.80	91.24	7103.78	568.35 N	3892.01 E	3910.30	0.74
10654.00	89.85	91.07	7104.90	566.43 N	3986.99 E	4005.14	1.12
10754.00	89.51	92.49	7105.46	563.33 N	4086.93 E	4104.90	1.46

10849.00	88.09	92.61	7107.45	559.10 N	4181.82 E	4199.57	1.50
10944.00	89.26	93.06	7109.65	554.40 N	4276.67 E	4294.18	1.32
11039.00	90.22	92.76	7110.08	549.58 N	4371.55 E	4388.82	1.06
11134.00	88.77	93.07	7110.92	544.75 N	4466.42 E	4483.45	1.56
11228.00	88.98	93.79	7112.76	539.13 N	4560.23 E	4576.99	0.80
11320.00	88.71	93.21	7114.62	533.51 N	4652.04 E	4668.53	0.70
11413.00	88.24	88.59	7117.09	532.05 N	4744.97 E	4761.34	4.99
11504.00	89.14	87.75	7119.17	534.96 N	4835.90 E	4852.32	1.35
11596.00	90.46	89.96	7119.50	536.80 N	4927.87 E	4944.29	2.80
11687.00	91.67	92.19	7117.80	535.09 N	5018.83 E	5035.13	2.79
11779.00	90.03	92.14	7116.44	531.61 N	5110.75 E	5126.86	1.78
11870.00	89.38	91.28	7116.91	528.90 N	5201.71 E	5217.66	1.18
11962.00	90.77	91.54	7116.79	526.63 N	5293.68 E	5309.48	1.54
12055.00	90.59	91.37	7115.68	524.27 N	5386.64 E	5402.29	0.27
12147.00	90.46	90.41	7114.84	522.84 N	5478.63 E	5494.16	1.05
12238.00	90.71	90.10	7113.91	522.44 N	5569.62 E	5585.08	0.44
12330.00	90.37	91.69	7113.04	521.00 N	5661.60 E	5676.95	1.77
12422.00	90.31	90.86	7112.50	518.96 N	5753.58 E	5768.78	0.90
12514.00	89.78	92.18	7112.43	516.52 N	5845.54 E	5860.60	1.55
12607.00	90.25	91.91	7112.40	513.20 N	5938.48 E	5953.35	0.58
12699.00	88.71	91.54	7113.24	510.43 N	6030.44 E	6045.14	1.72
12792.00	88.71	91.90	7115.33	507.64 N	6123.37 E	6137.91	0.39
12884.00	88.24	90.31	7117.78	505.86 N	6215.32 E	6229.73	1.80
12975.00	87.81	90.18	7120.92	505.47 N	6306.26 E	6320.60	0.49
13070.00	90.00	90.50	7122.73	504.91 N	6401.24 E	6415.49	2.33
13165.00	92.10	92.04	7120.99	502.81 N	6496.19 E	6510.30	2.74
13260.00	89.66	91.46	7119.53	499.91 N	6591.13 E	6605.06	2.64
13354.00	88.89	89.46	7120.72	499.15 N	6685.11 E	6698.96	2.28
13449.00	89.88	92.13	7121.74	497.83 N	6780.09 E	6793.82	3.00
13544.00	90.12	92.34	7121.74	494.13 N	6875.01 E	6888.54	0.34
13639.00	88.92	92.94	7122.54	489.75 N	6969.91 E	6983.21	1.41
13733.00	89.04	91.39	7124.21	486.20 N	7063.82 E	7076.93	1.65
13828.00	88.80	90.81	7126.00	484.38 N	7158.79 E	7171.77	0.66
13923.00	89.63	90.90	7127.30	482.96 N	7253.77 E	7266.63	0.88
14018.00	91.23	91.05	7126.59	481.35 N	7348.75 E	7361.49	1.69
14113.00	90.49	90.82	7125.16	479.80 N	7443.72 E	7456.34	0.82
14207.00	89.08	92.39	7125.52	477.16 N	7537.68 E	7550.14	2.24
14303.00	89.04	92.57	7127.09	473.01 N	7633.58 E	7645.82	0.19
14397.00	89.51	92.00	7128.28	469.26 N	7727.49 E	7739.53	0.79
14492.00	90.40	91.39	7128.35	466.45 N	7822.45 E	7834.32	1.14
14587.00	89.32	91.75	7128.59	463.85 N	7917.41 E	7929.12	1.20
14682.00	90.09	91.27	7129.08	461.35 N	8012.38 E	8023.93	0.96
14776.00	91.63	91.78	7127.67	458.84 N	8106.33 E	8117.73	1.73
14871.00	90.68	91.66	7125.75	455.99 N	8201.27 E	8212.50	1.01
14936.00	90.19	91.51	7125.26	454.20 N	8266.24 E	8277.36	0.79
15031.00	90.25	91.78	7124.89	451.47 N	8361.20 E	8372.16	0.29
15126.00	89.23	91.50	7125.32	448.75 N	8456.16 E	8466.95	1.11
15221.00	90.25	90.44	7125.75	447.14 N	8551.14 E	8561.81	1.55
15316.00	88.43	91.53	7126.85	445.51 N	8646.12 E	8656.66	2.23
15410.00	88.98	91.09	7128.97	443.36 N	8740.07 E	8750.47	0.75
15505.00	89.54	91.73	7130.20	441.02 N	8835.03 E	8845.28	0.90
15600.00	90.89	92.22	7129.84	437.75 N	8929.97 E	8940.03	1.51
15695.00	88.83	90.83	7130.08	435.22 N	9024.93 E	9034.83	2.62
15790.00	89.57	90.05	7131.40	434.49 N	9119.92 E	9129.73	1.13
15885.00	89.32	89.23	7132.32	435.09 N	9214.91 E	9224.68	0.90
15980.00	89.60	89.19	7133.22	436.40 N	9309.90 E	9319.65	0.30
16075.00	88.89	88.03	7134.47	438.70 N	9404.86 E	9414.63	1.43
16170.00	89.41	88.35	7135.88	441.70 N	9499.80 E	9509.62	0.64
16264.00	89.14	89.58	7137.07	443.40 N	9593.77 E	9603.59	1.34
16359.00	89.72	90.69	7138.01	443.18 N	9688.77 E	9698.52	1.32
16454.00	89.63	93.40	7138.55	439.79 N	9783.70 E	9793.26	2.85
16542.00	90.68	93.32	7138.31	434.63 N	9871.54 E	9880.85	1.20
16636.00	90.18	93.41	7137.61	429.11 N	9965.38 E	9974.42	0.54
16731.00	89.17	93.60	7138.15	423.31 N	10060.20 E	10068.96	1.08
16826.00	88.15	93.41	7140.37	417.50 N	10154.99 E	10163.48	1.09
16921.00	88.83	93.33	7142.87	411.92 N	10249.80 E	10258.01	0.72
17016.00	89.41	92.75	7144.33	406.88 N	10344.65 E	10352.62	0.86
17110.00	90.34	92.80	7144.54	402.33 N	10438.54 E	10446.27	0.99
17205.00	89.91	92.13	7144.33	398.24 N	10533.45 E	10540.97	0.84
17300.00	90.09	92.13	7144.33	394.71 N	10628.38 E	10635.71	0.19
17395.00	91.51	92.17	7143.00	391.15 N	10723.31 E	10730.44	1.50
17490.00	91.63	91.87	7140.40	387.80 N	10818.21 E	10825.15	0.34
17590.00	91.91	91.60	7137.31	384.77 N	10918.12 E	10924.88	0.39
17656.00	91.91	91.60	7135.11	382.93 N	10984.05 E	10990.71	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 87.89 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.91 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17656.00 FEET  
IS 10990.73 FEET ALONG 88.00 DEGREES (GRID)**

**Tied in @ Surface**

**Date Printed:06 September 2014**