



Gamma Ray

LWD MEMORY LOG

Scale:

1:240

Measured Depth

Depth Reference:

Driller's Depth

Status:

Final Print

API No: 05-123-51332-00

Job ID: 111055144

Permanent Datum (P.D.): Mean Sea Level

Log Measured From: Rig Floor

Company: Noble Energy

Well: Roth A32-790

Field: Wattenberg

County: Weld Country: United States

State: Colorado

Surface Location:

Latitude:

Longitude:

SEC: 30

TWN: 6N

RGE: 64W

Elevation: 0.00 ft

Above P.D.: 4728.00 ft

Magnetic Field Reference

Grid Dip Angle: (deg)

Total Magnetic Field Strength: (nT)

Mag to Reference North Correction: (deg)

From: 2021-10-14

To: 2021-10-18

Spud: 2021-10-02

Borehole Record

Casing Record

Hole Size (in)

13.500

8.500

From (ft)

30.00

1961.00

To (ft)

1961.00

17147.00

Size (in)

9.625

Weight (lb/ft)

36.00

From (ft)

30.00

1951.00

To (ft)

1951.00

1951.00

Mud Record

Deviation Record

Type

Oil Based Mud

From (ft)

1961.00

To (ft)

17153.00

Hole Size (in)

8.500

Interval (ft)

15192.00

Inc | Az (Start)

0.54 | 209.00

Inc | Az (End)

90.00 | 179.22

Acquisition System

Software Version

Other

Cadence

RT 6.1

6.1.9214.1

Rig:

H&P 517

Contractor: Helmerich & Payne Drilling Co

District: RMA

Unit: D&E

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Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours
						Top (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
1	1	8.500	PDC	3.00	AutoTrak Curve	1961.00	6558.00	1961.00	6571.00	2021-10-14 22:09	2021-10-15 16:14	17.55
2	2	8.500	PDC	3.00	AutoTrak Curve	6558.00	14185.00	6571.00	14198.00	2021-10-16 01:55	2021-10-17 05:33	27.24
3	3	8.500	PDC	3.00	AutoTrak Curve	14185.00	17142.00	14198.00	17153.00	2021-10-17 21:49	2021-10-18 09:11	12.22

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Carl Riehn	2021-10-14	2021-10-18	Jeremiah Samson	2021-10-14	2021-10-18	Michael Gurnsey	2021-10-14	2021-10-18
Sherman Pugh	2021-10-14	2021-10-18	Tien Bui	2021-10-14	2021-10-18			

Witness

Name	Run
Jim Turner	1,2,3

Mud Properties Record

Date / Time	Run No.	Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2021-10-14 12:37	1	1961.00	Oil Based Mud	9.3	10	N/A	16.0	79.5/20.5	Active Pit	25500	0.00
2021-10-15 22:01	2	6571.00	Oil Based Mud	9.6	14	N/A	15.8	79.8/20.2	Active Pit	31000	0.00
2021-10-17 13:17	2	13629.00	Oil Based Mud	10.1	16	N/A	18.6	80/20	Active Pit	28500	0.00
2021-10-17 15:38	3	14198.00	Oil Based Mud	10.1	16	N/A	18.6	80/20	Active Pit	28500	0.00

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
1	AutoTrak Curve Steering Unit	14868420	Near Bit VSS	5.93	6.77	7.000	4.330
1	AutoTrak Curve Steering Unit	14868420	Near Bit Inclination	5.93	6.77	7.000	4.330
1	AutoTrak Curve MWD	14219765	Gamma (single)	2.73	12.94	7.000	3.250
1	AutoTrak Curve MWD	14219765	Directional (mag)	12.27	22.48	7.000	3.250
2	AutoTrak Curve Steering Unit	14262246	Near Bit Inclination	5.93	6.77	7.000	4.330
2	AutoTrak Curve Steering Unit	14262246	Near Bit VSS	5.93	6.77	7.000	4.330
2	AutoTrak Curve MWD	12603327	Gamma (single)	2.09	12.94	7.000	3.250
2	AutoTrak Curve MWD	12603327	Directional (mag)	12.27	23.12	7.000	3.250
3	AutoTrak Curve Steering Unit	14986107	Near Bit Inclination	5.93	6.77	7.000	4.330
3	AutoTrak Curve Steering Unit	14986107	Near Bit VSS	5.93	6.77	7.000	4.330
3	AutoTrak Curve MWD	14256861	Gamma (single)	2.75	12.94	7.000	3.250
3	AutoTrak Curve MWD	14256861	Directional (mag)	12.27	22.46	7.000	3.250

Service and Tool Mnemonics

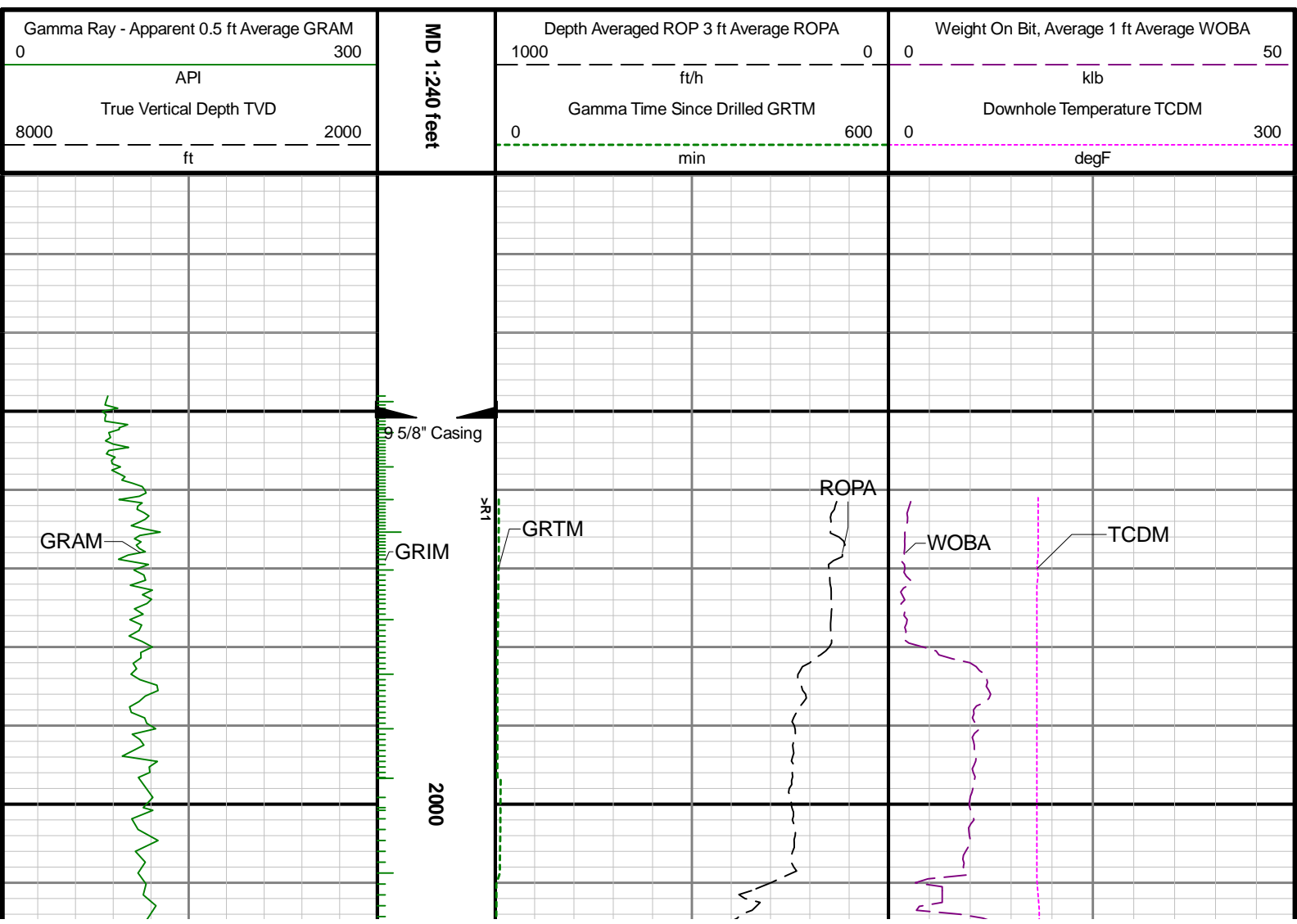
Mnemonic	Name	Description
ATC SU	AutoTrak Curve SU	Auto Trak Curve Steering Unit
ATC MWD	AutoTrak Curve MWD	Auto Trak Curve MWD
ATC LCPM	AutoTrak Curve LCPM	Auto Trak Curve LCPM

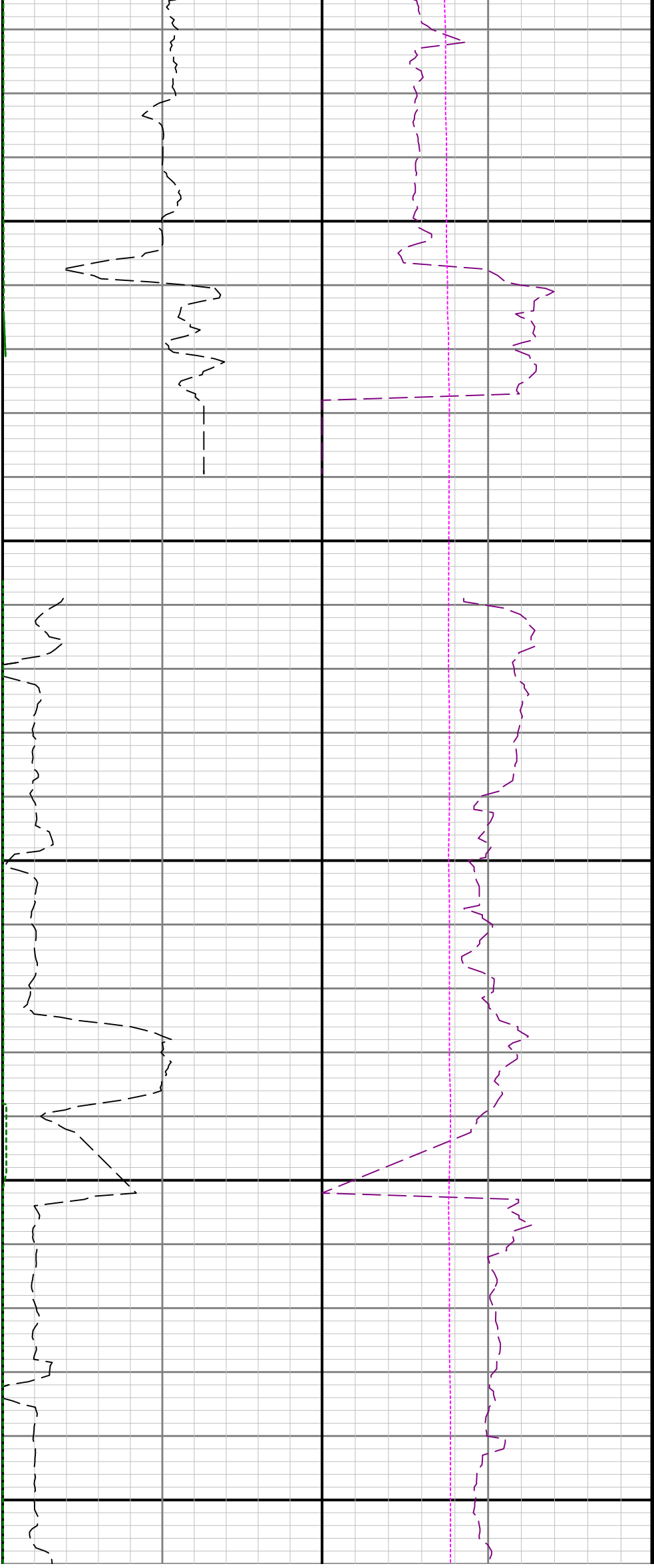
Comments

1	Baker Hughes Company runs 1, 2, and 3 utilized 6 ¾ inch NaviGamma services (Gamma Ray and Directional) behind an 8 ½ inch PDC bit and rotary steerable assembly from 1961 to 17153 feet MD (1961 to 6893 feet TVD).
2	Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes Company. Due to a lack of control by Baker Hughes Company logging engineers, depth calibrations and measurements could not be independently verified and the unverified depths as supplied to Baker Hughes Company are being used to present logging data.
3	The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	2064.00	8.500	1	Various intervals from 2064 to 8328 feet MD (2063 to 6863 feet TVD) were not logged due to issues with depth tracking.
2	6558.00	8.500	2	The interval from 6558 to 6571 feet MD (6336 to 6352 feet TVD) was logged up to 10 hours after being drilled due to a trip out of the hole for MWD tool failure.
3	9692.00	8.500	2	The interval from 9692 to 9754 feet MD (6863 to 6863 feet TVD) were not logged due to issues with depth tracking.
4	14185.00	8.500	3	The interval from 14185 to 14198 feet MD (6879 to 6879 feet TVD) was logged up to 16 hours after being drilled due to a trip out of the hole for MWD tool failure.
5	17140.00	8.500	3	The interval from17140 to 17153 feet MD (6893 to 6893 feet TVD) was not logged due to sensor to bit offset at well TD.

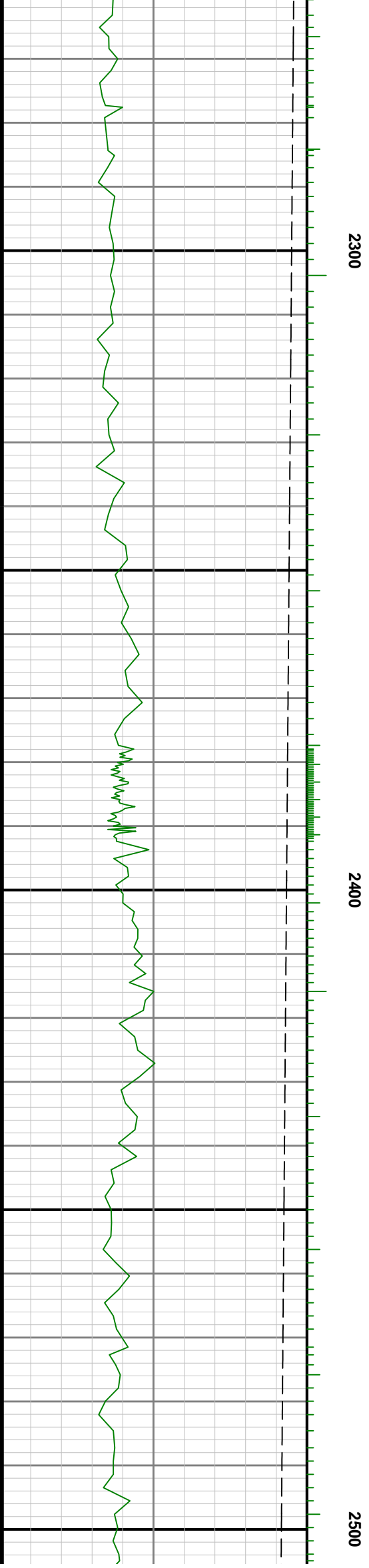
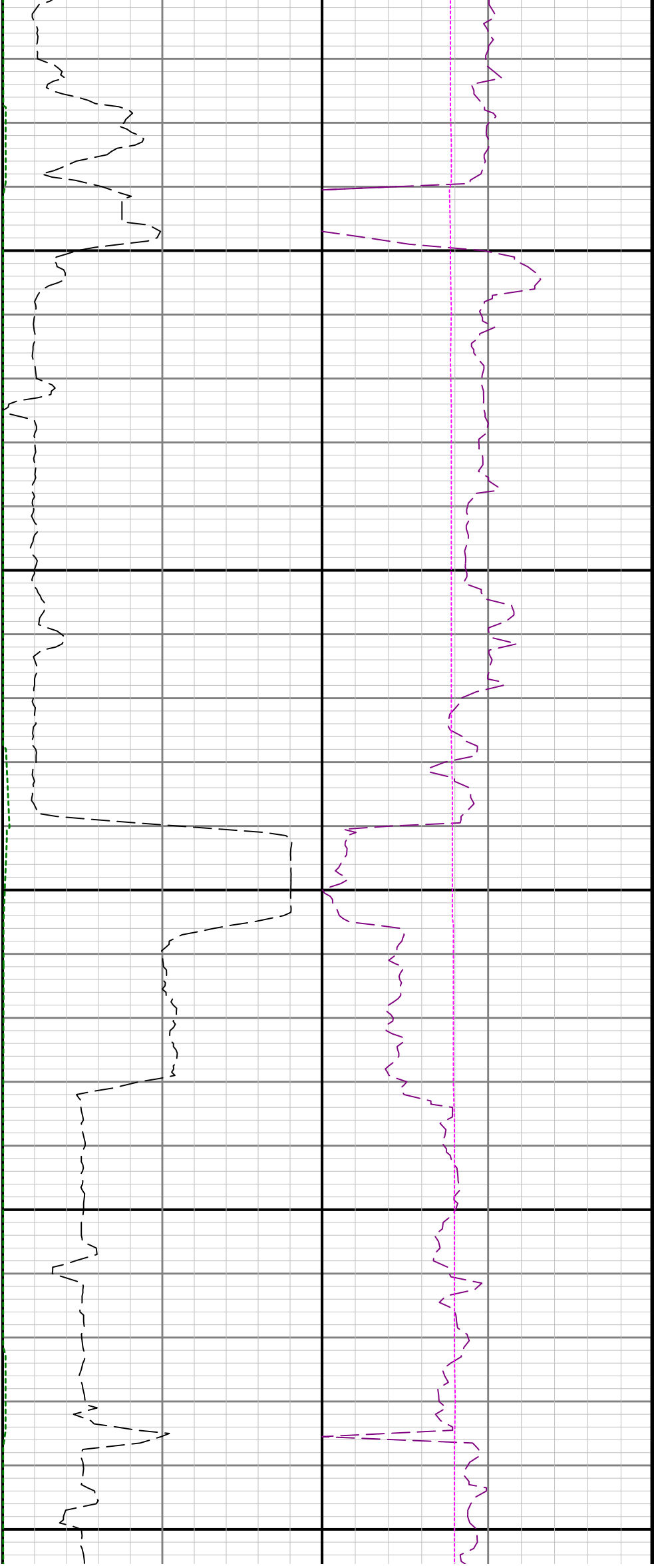




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2200

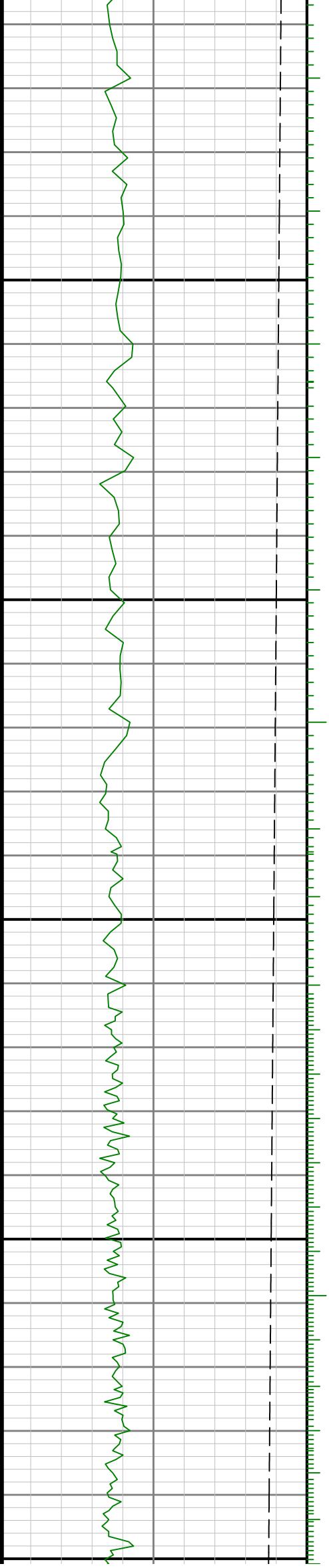
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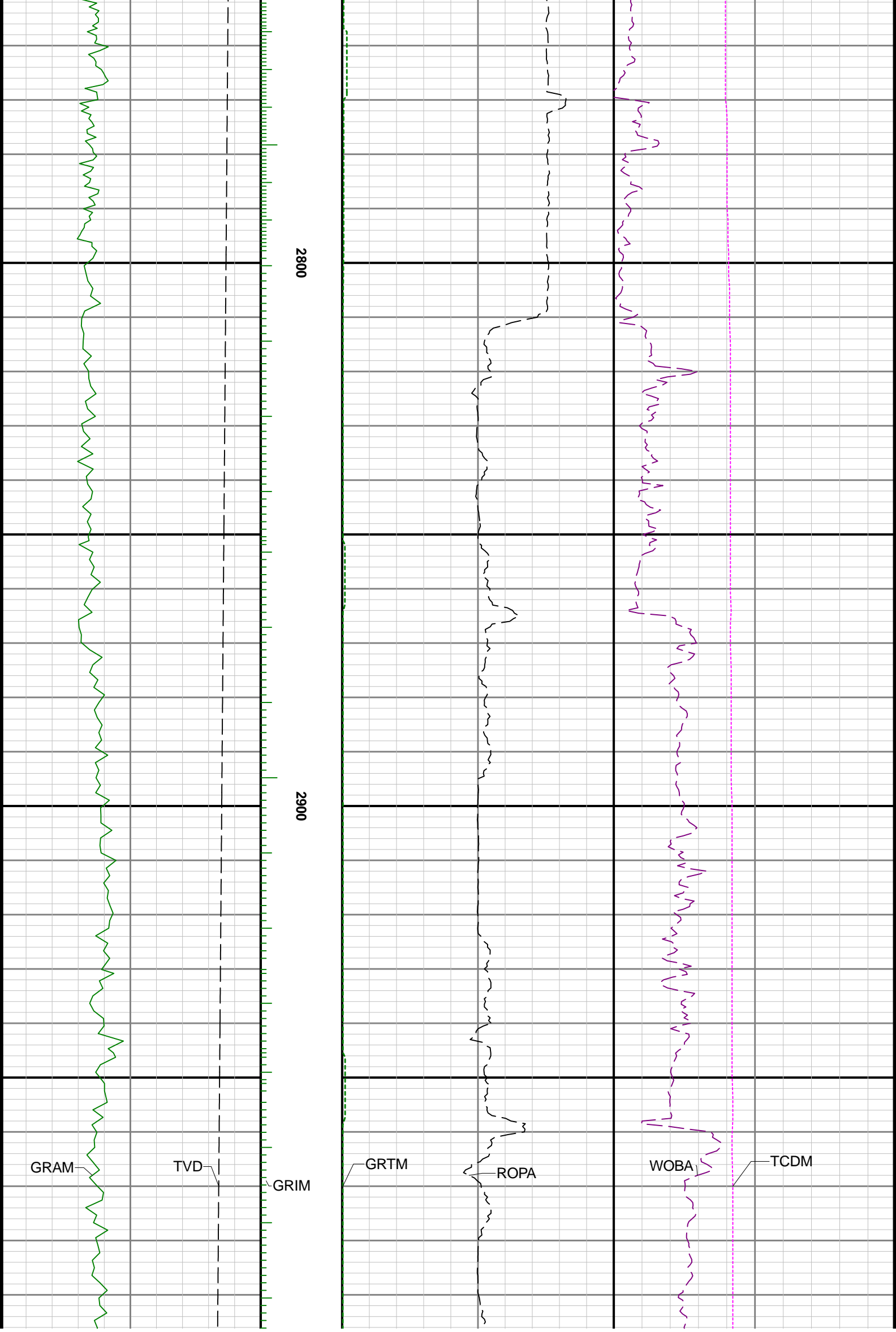


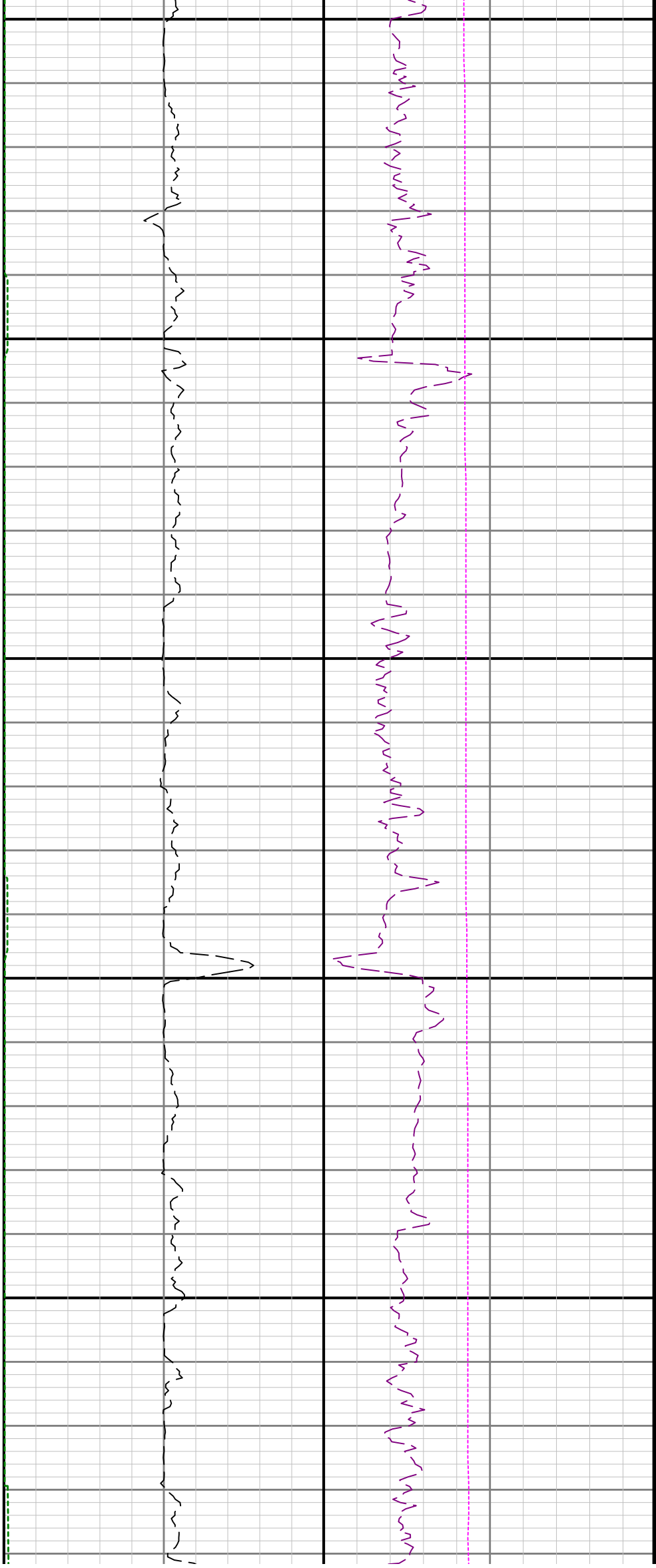


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2700



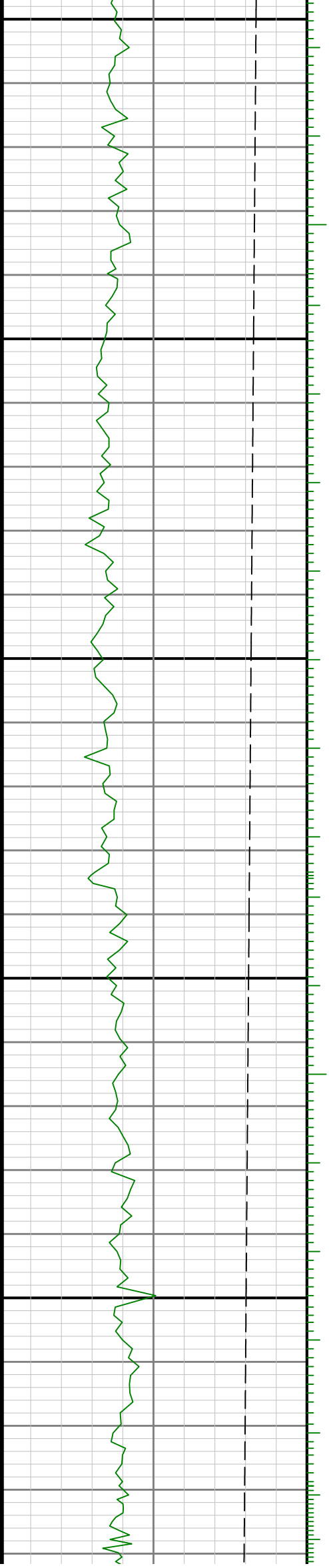


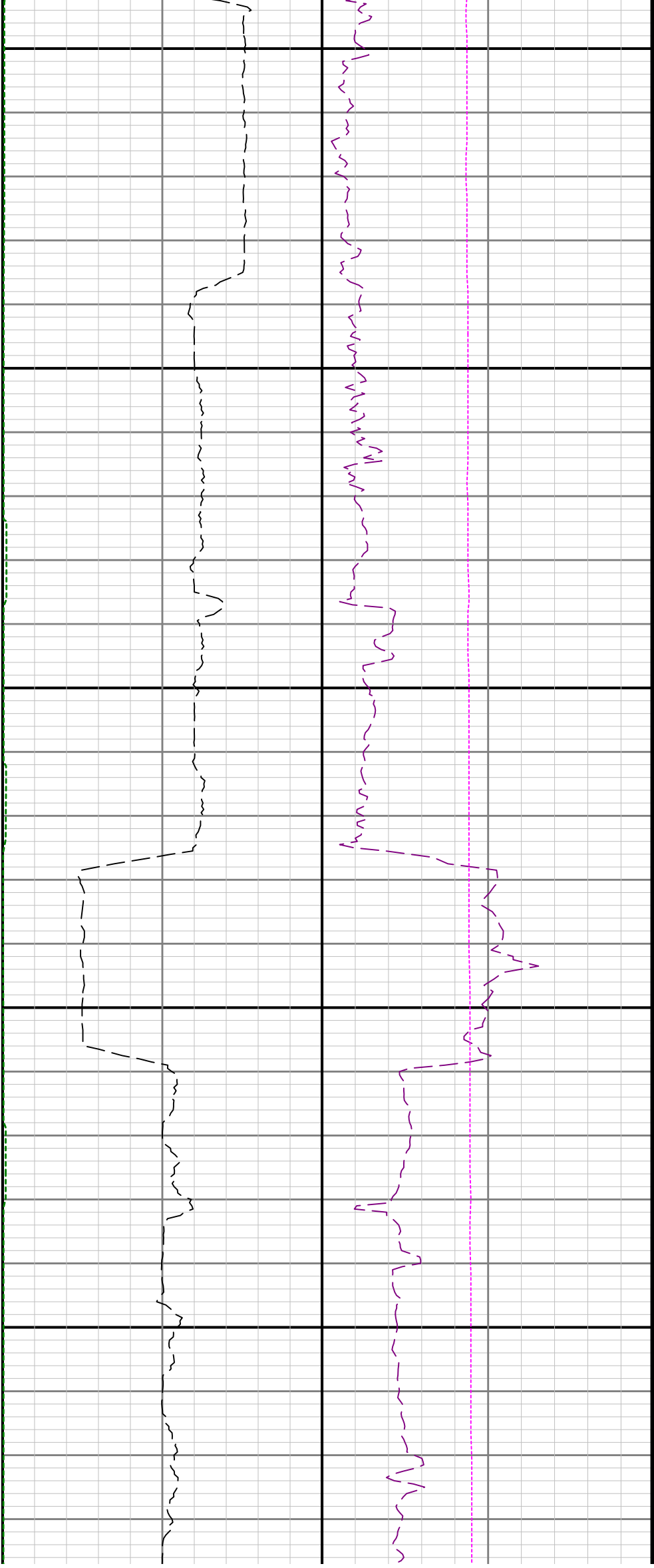


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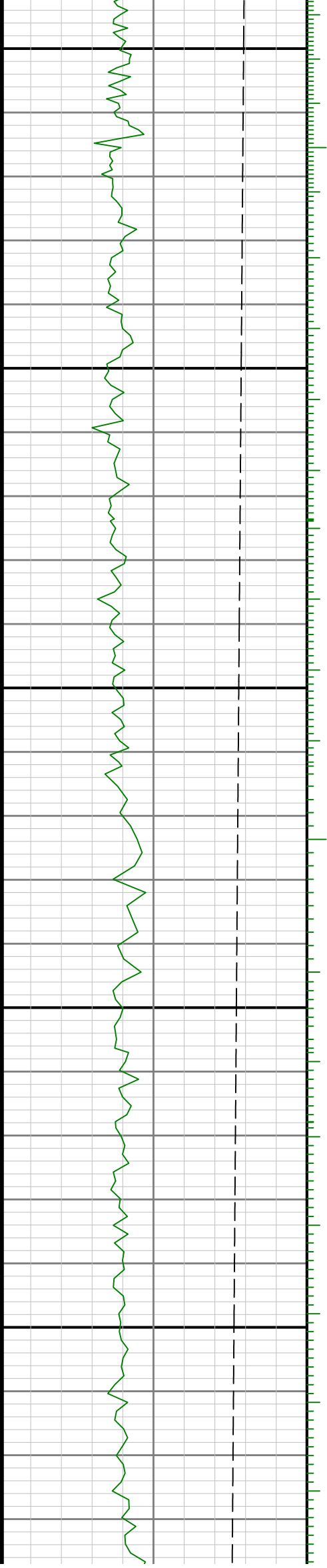
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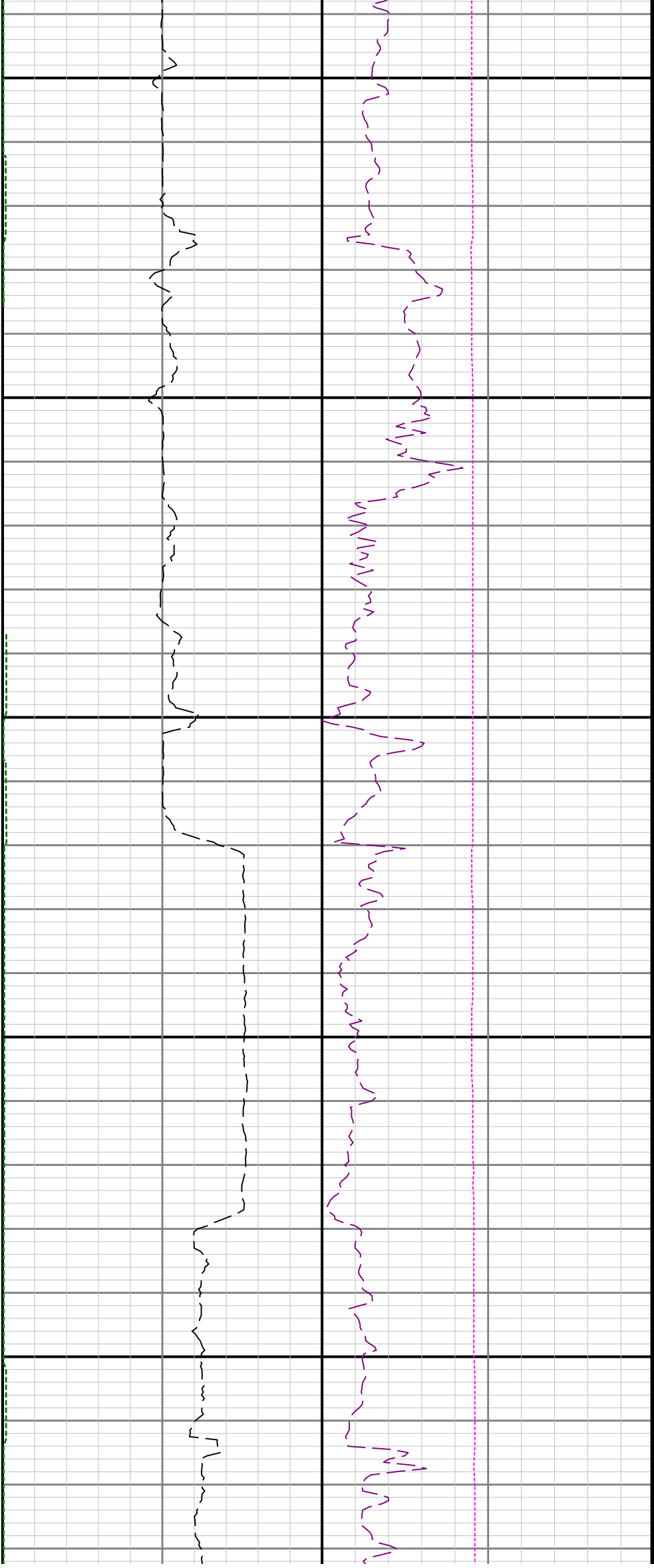




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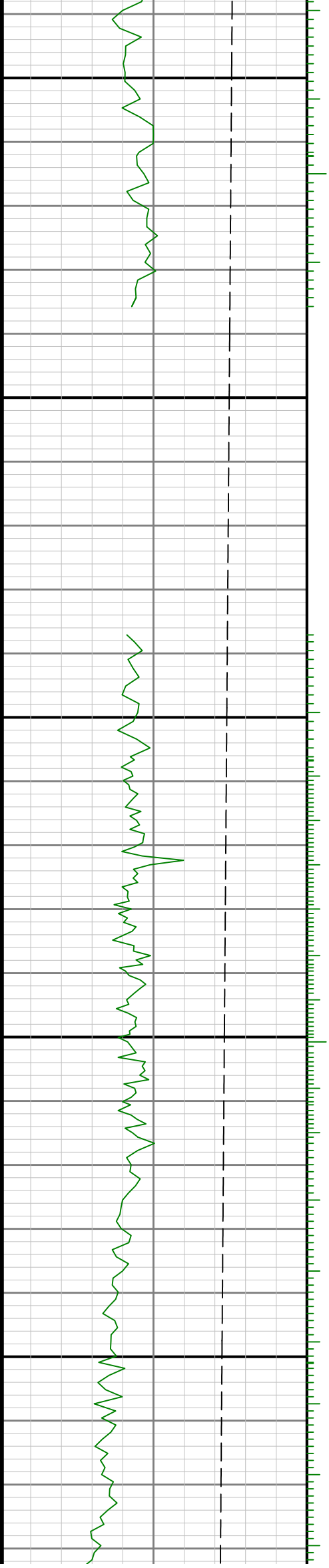


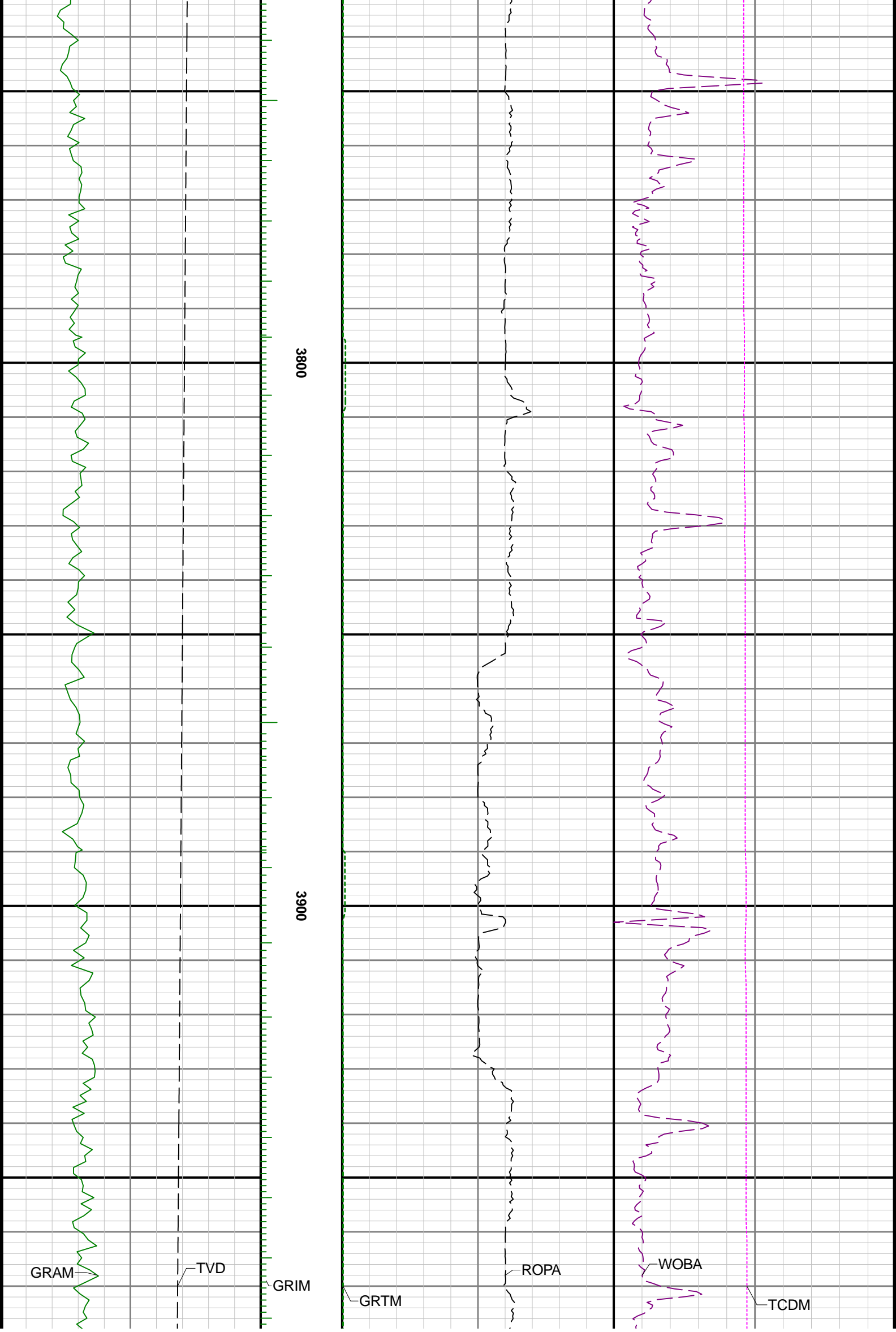


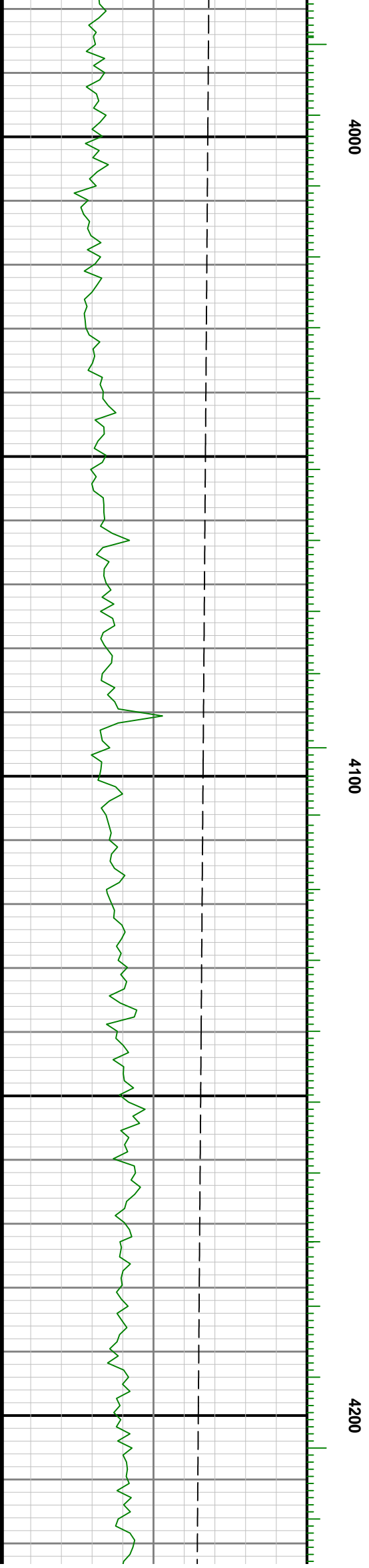
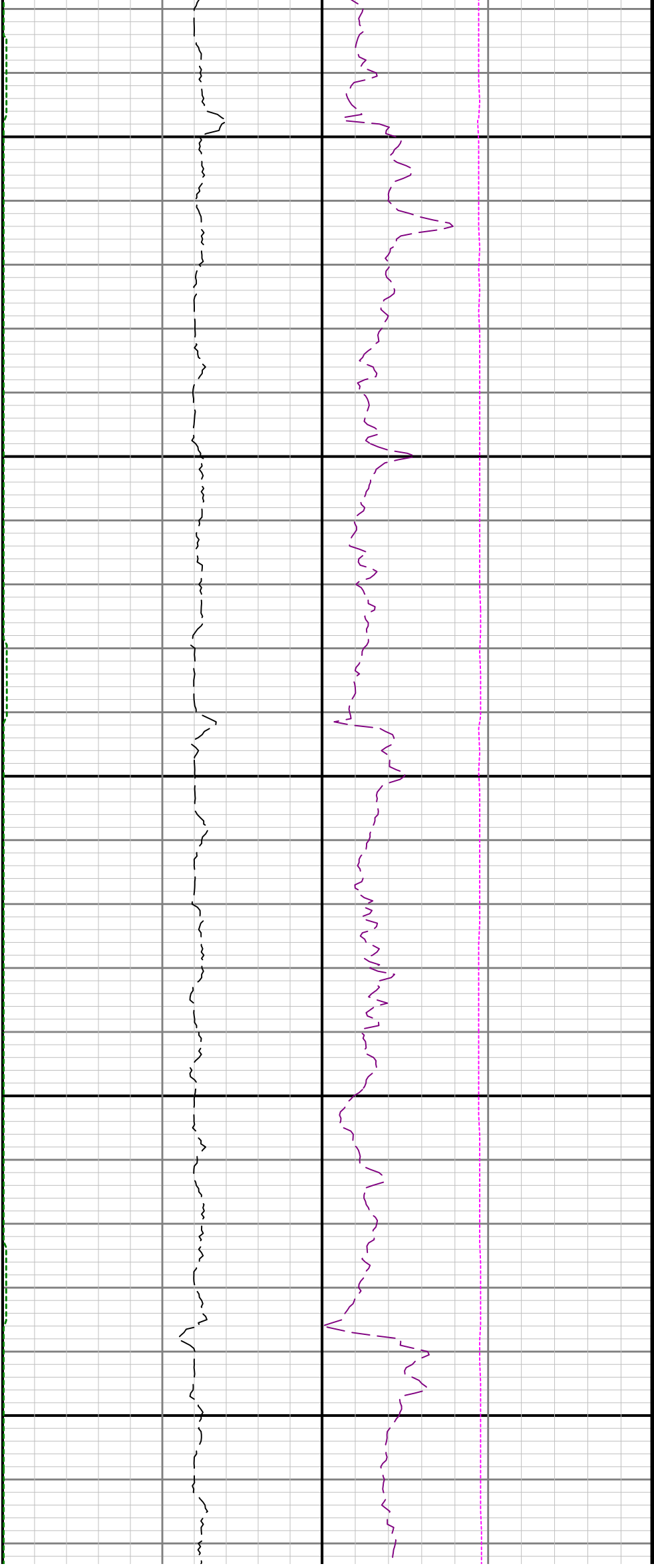
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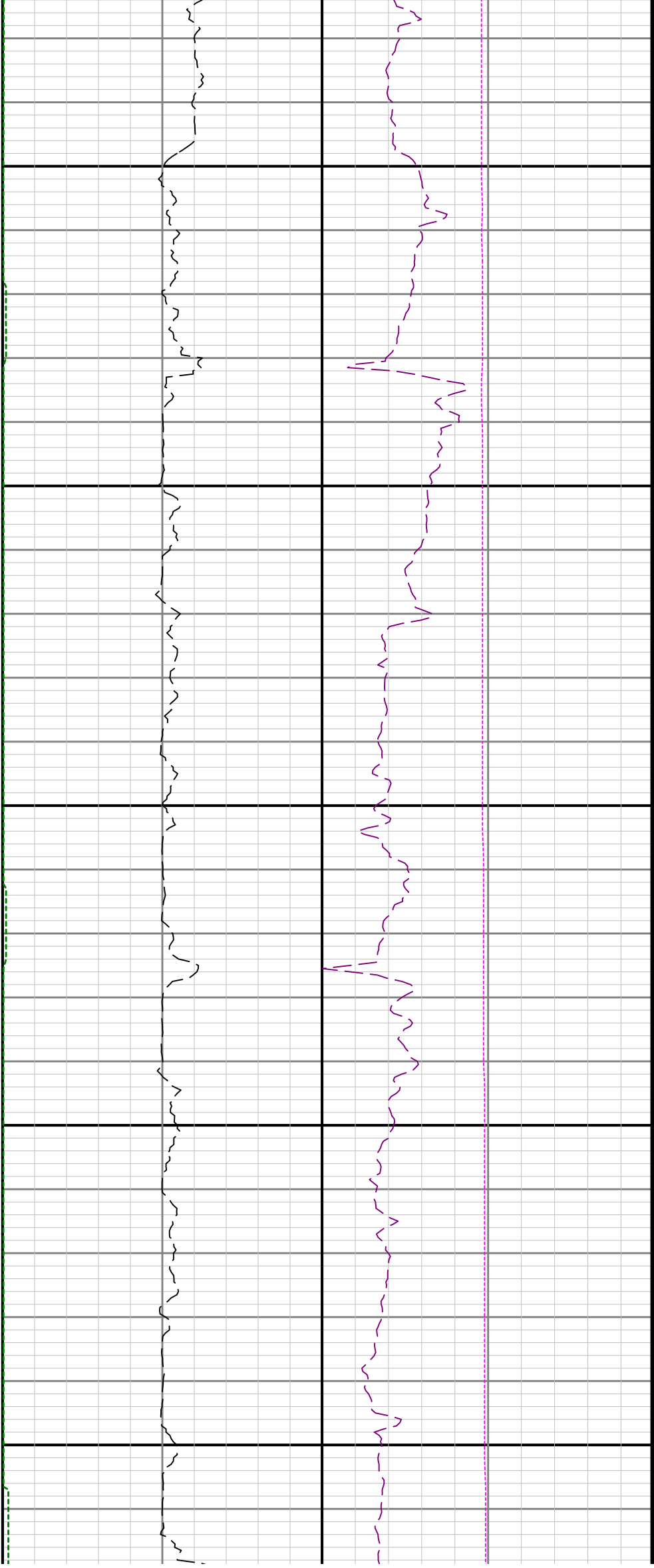
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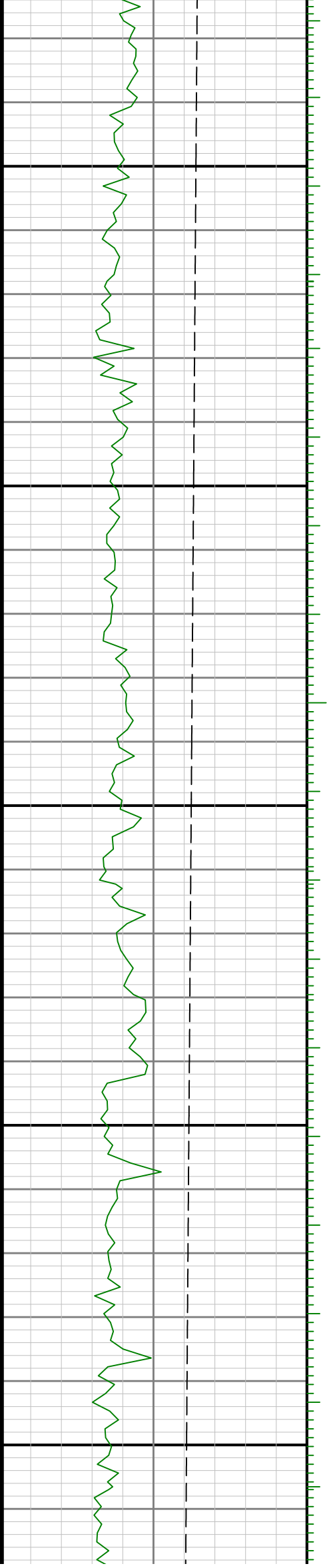


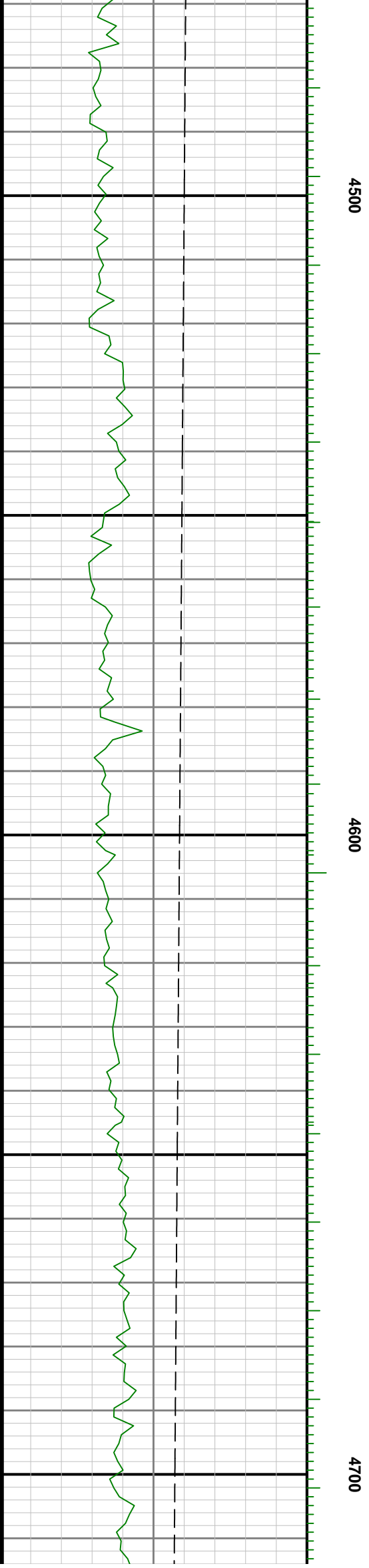
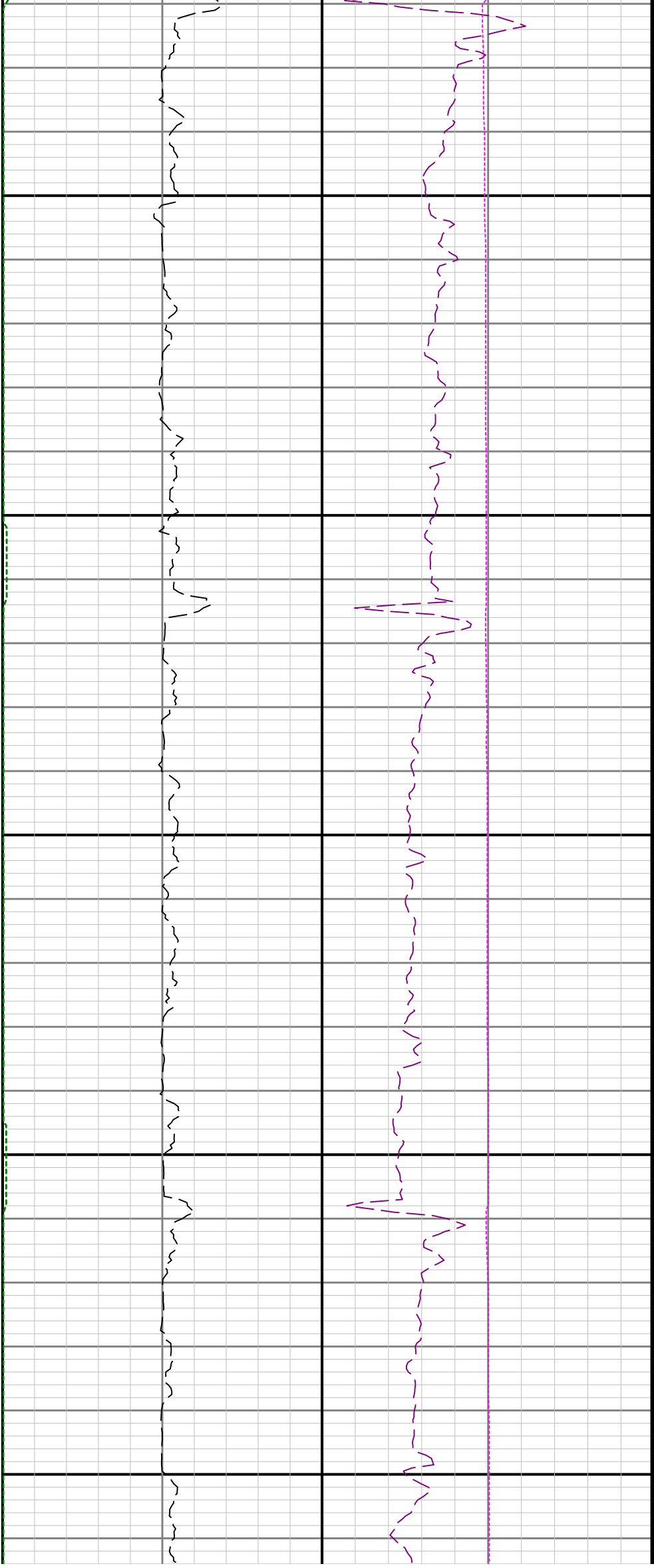


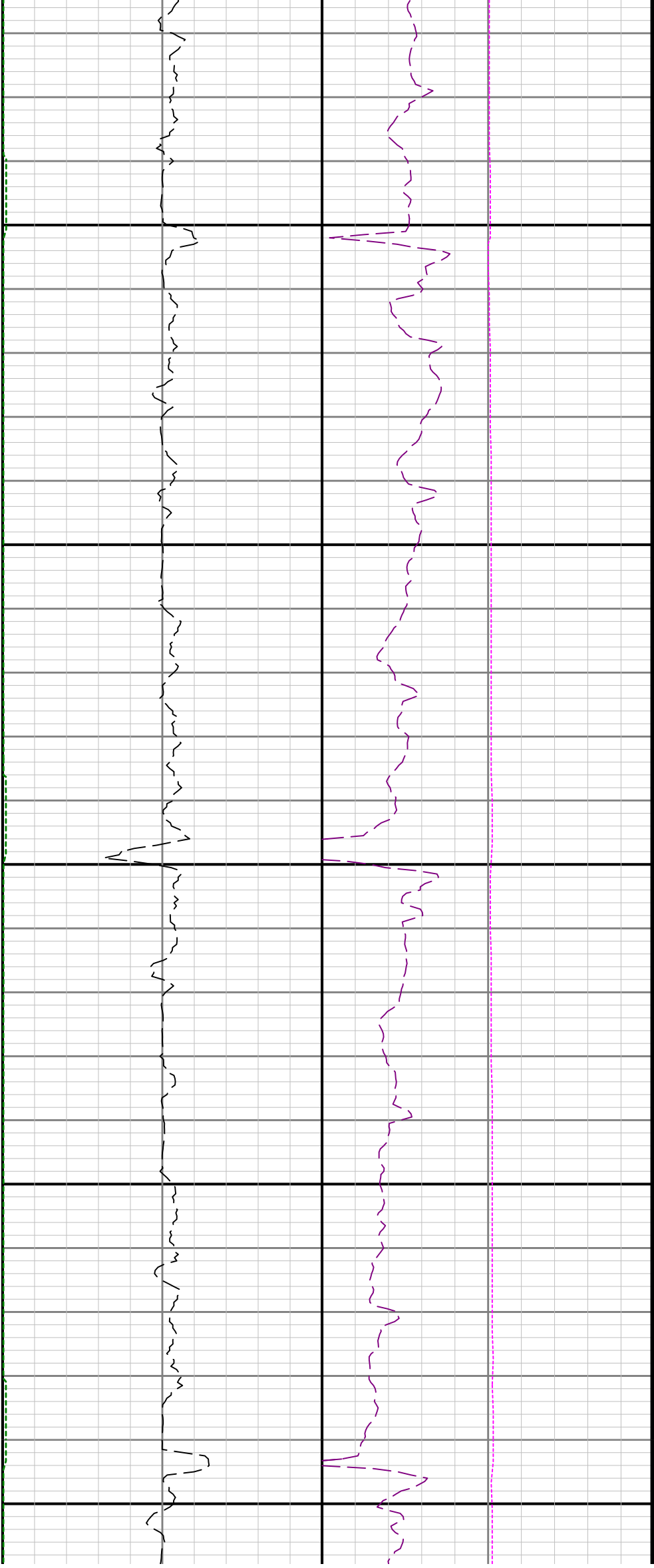


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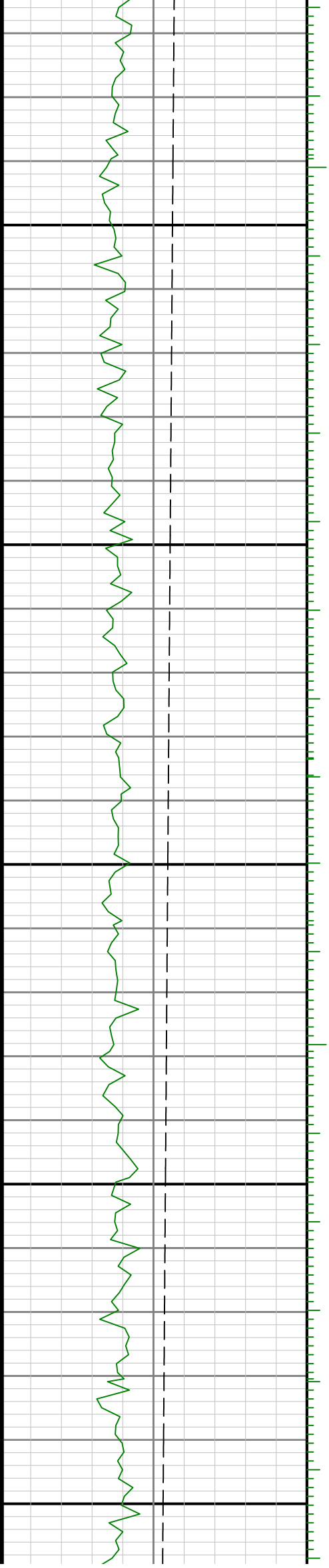


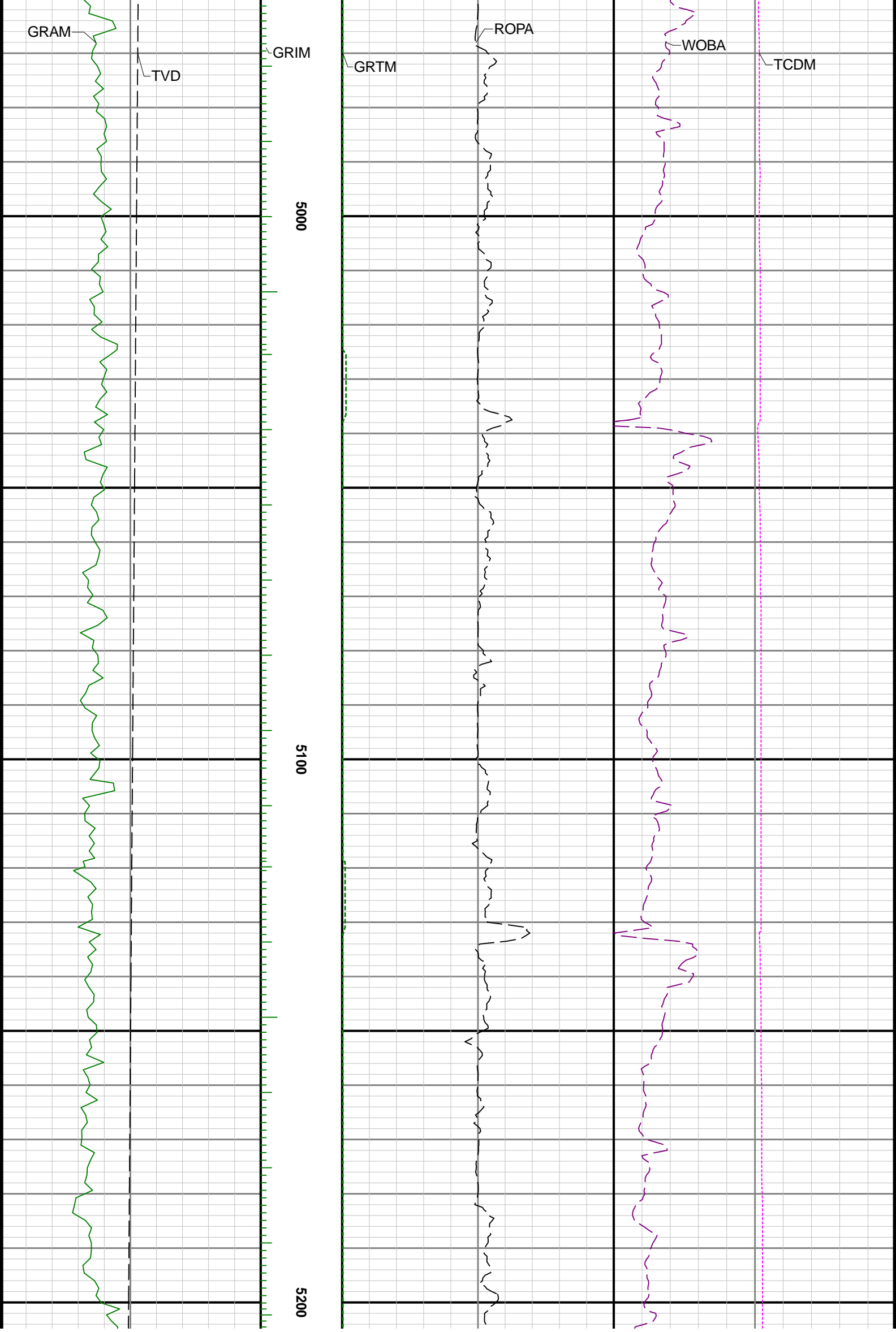


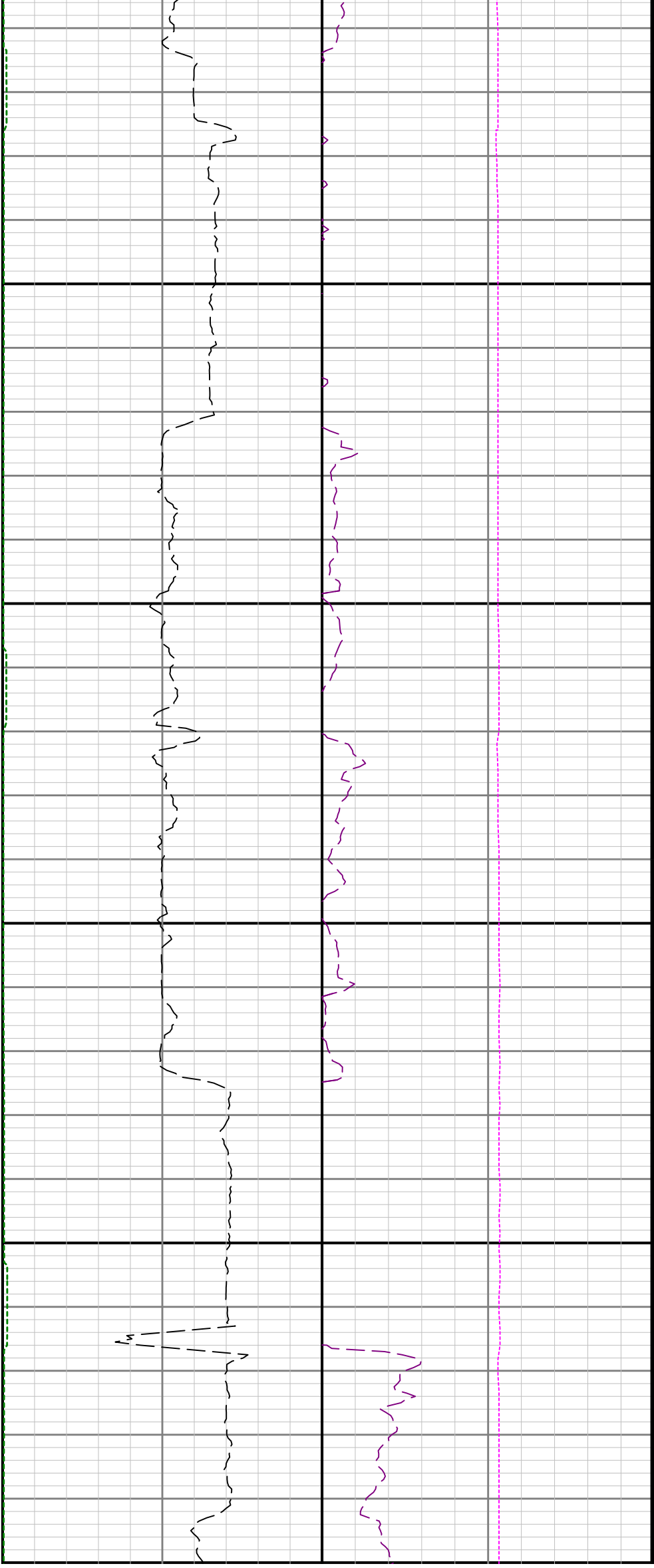


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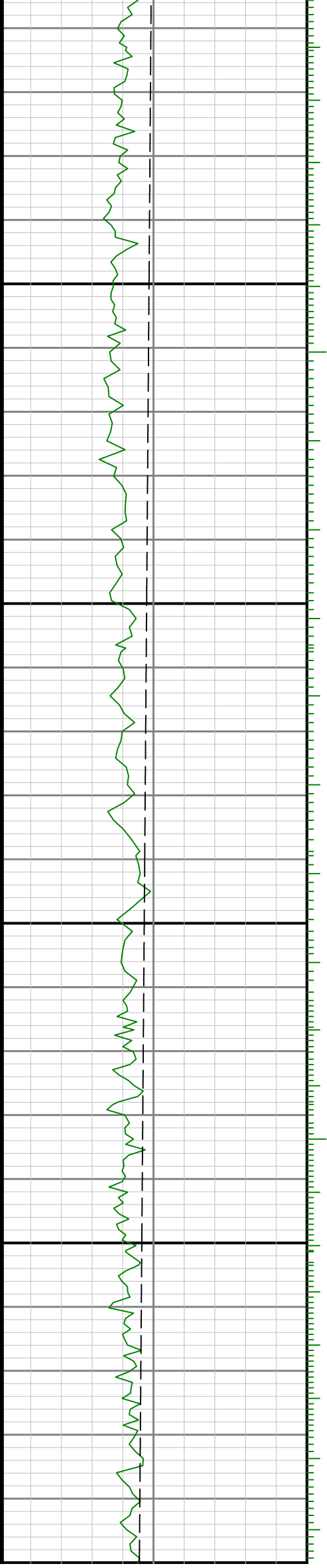


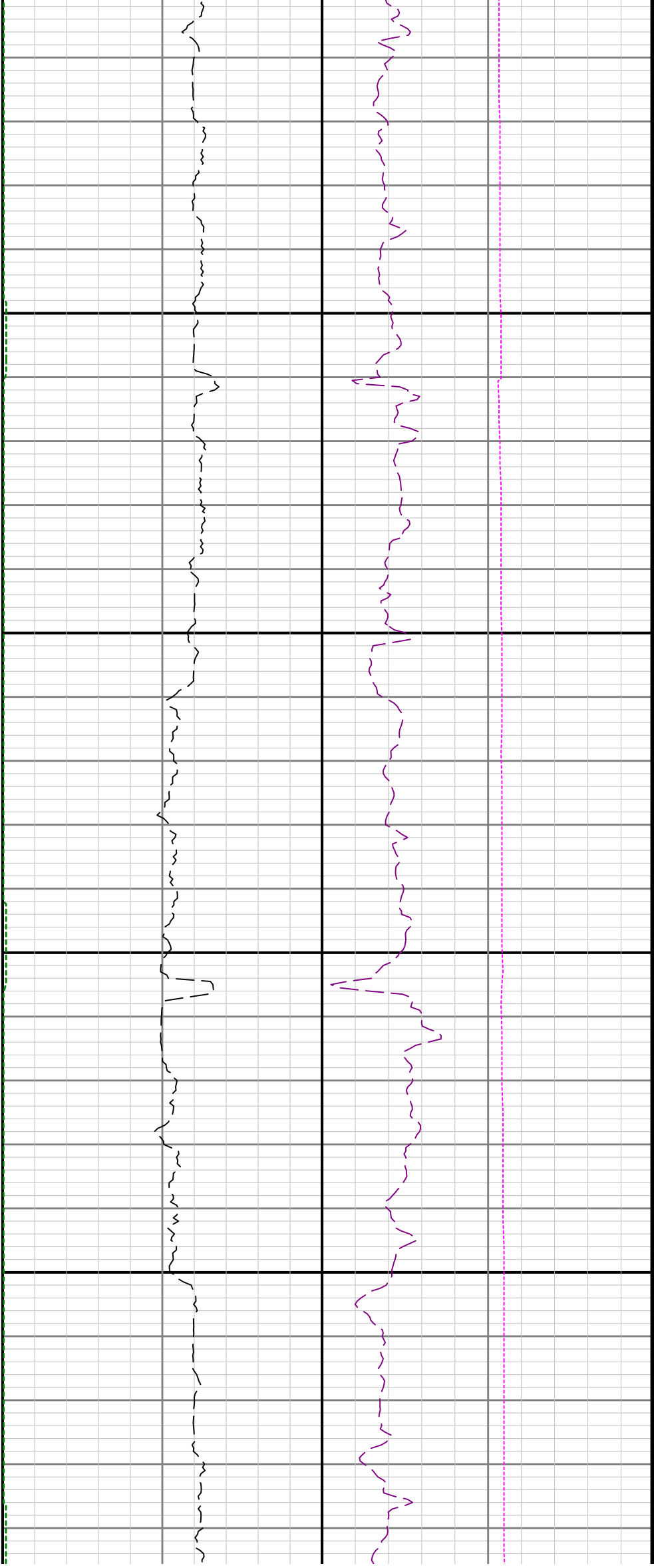




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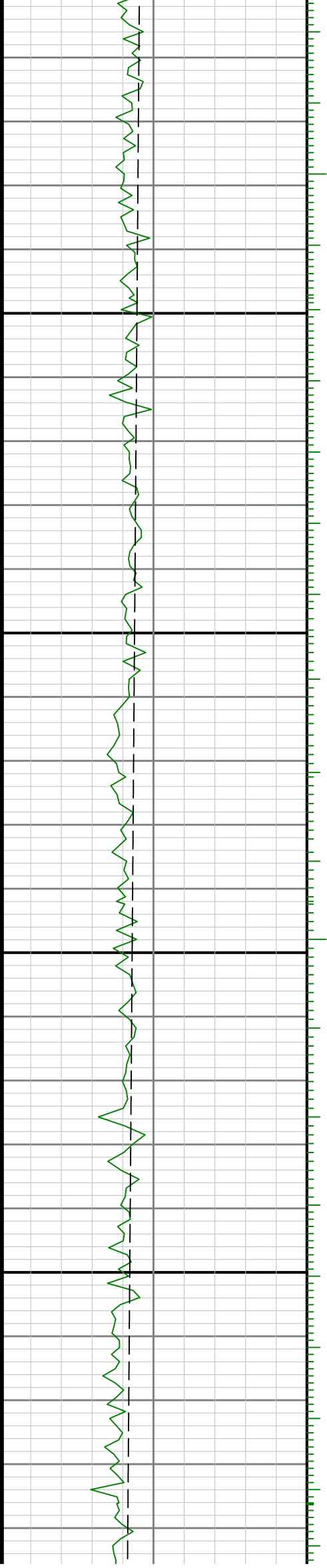
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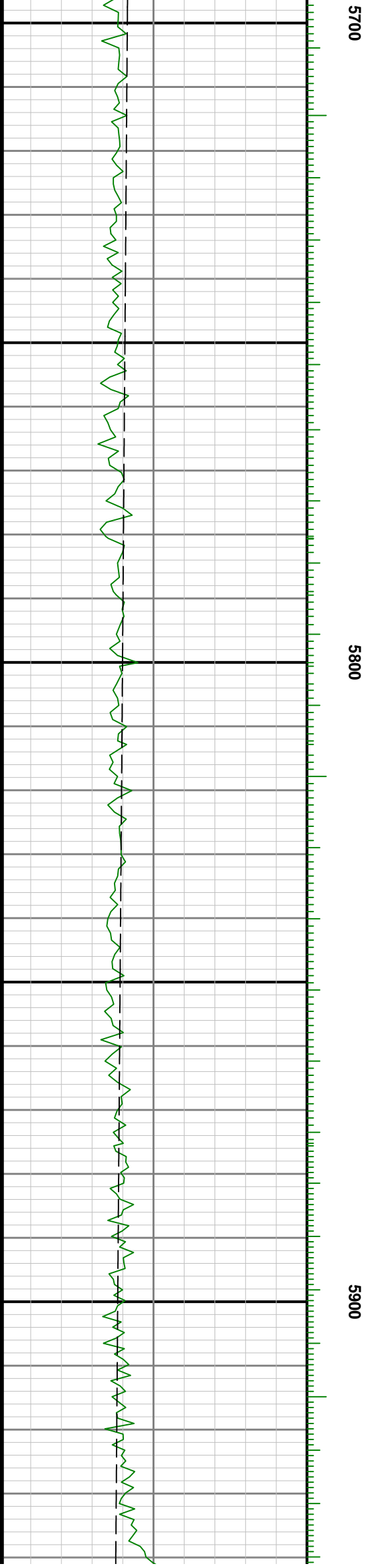
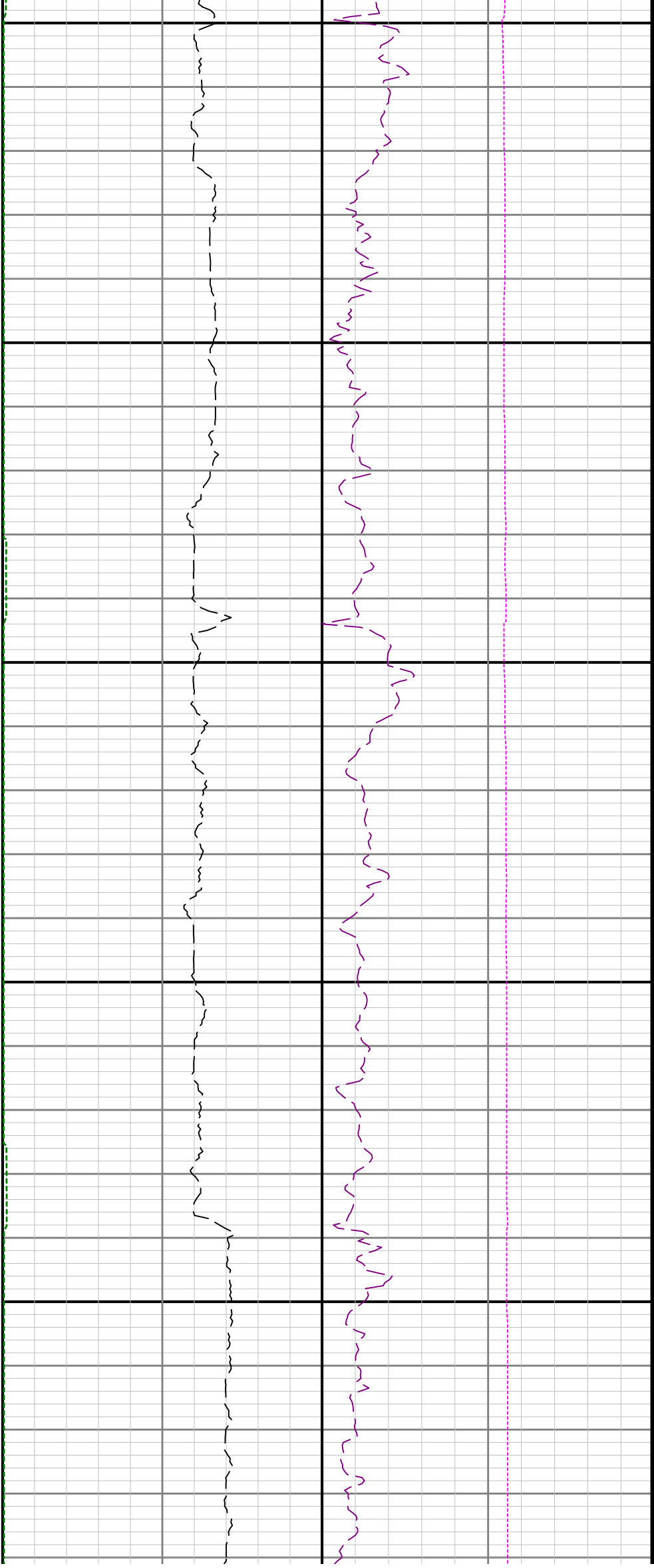


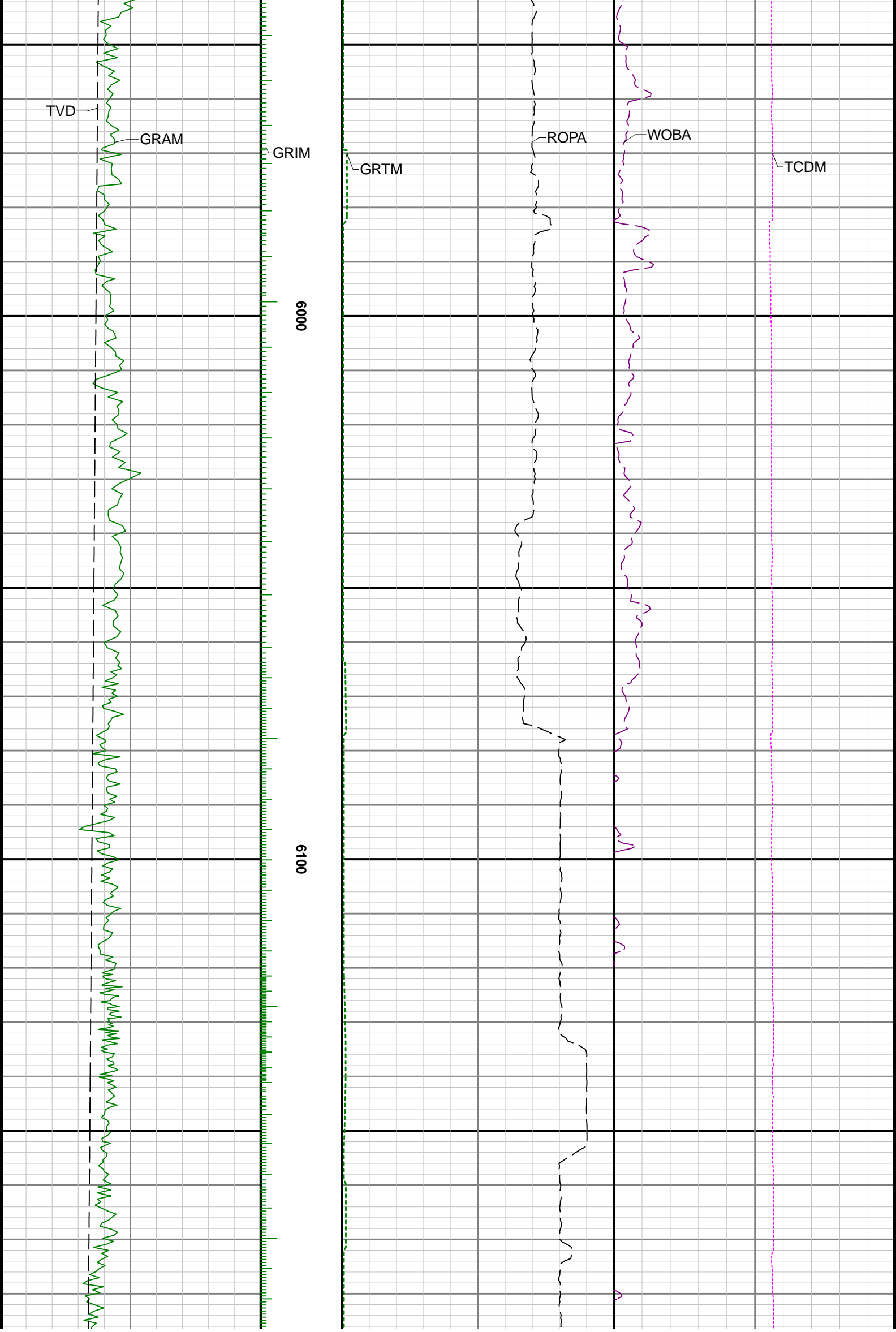


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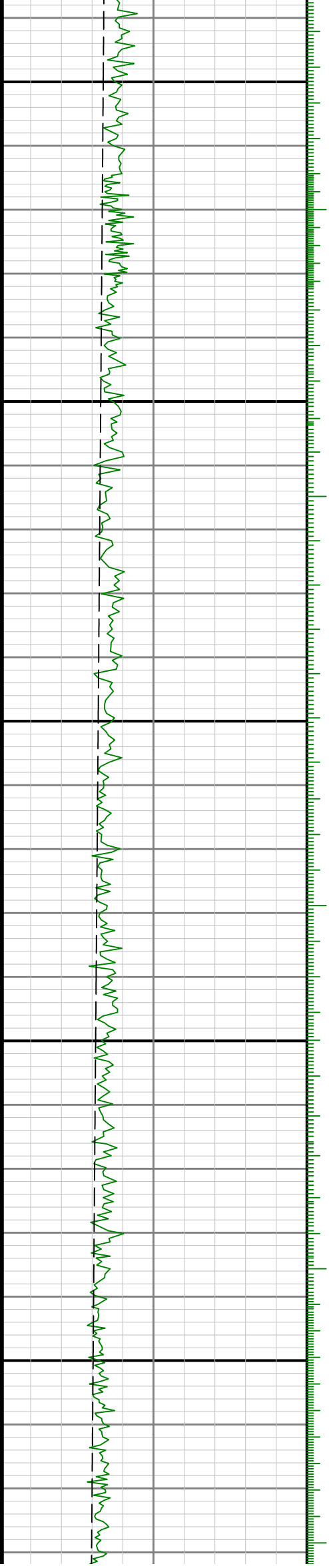


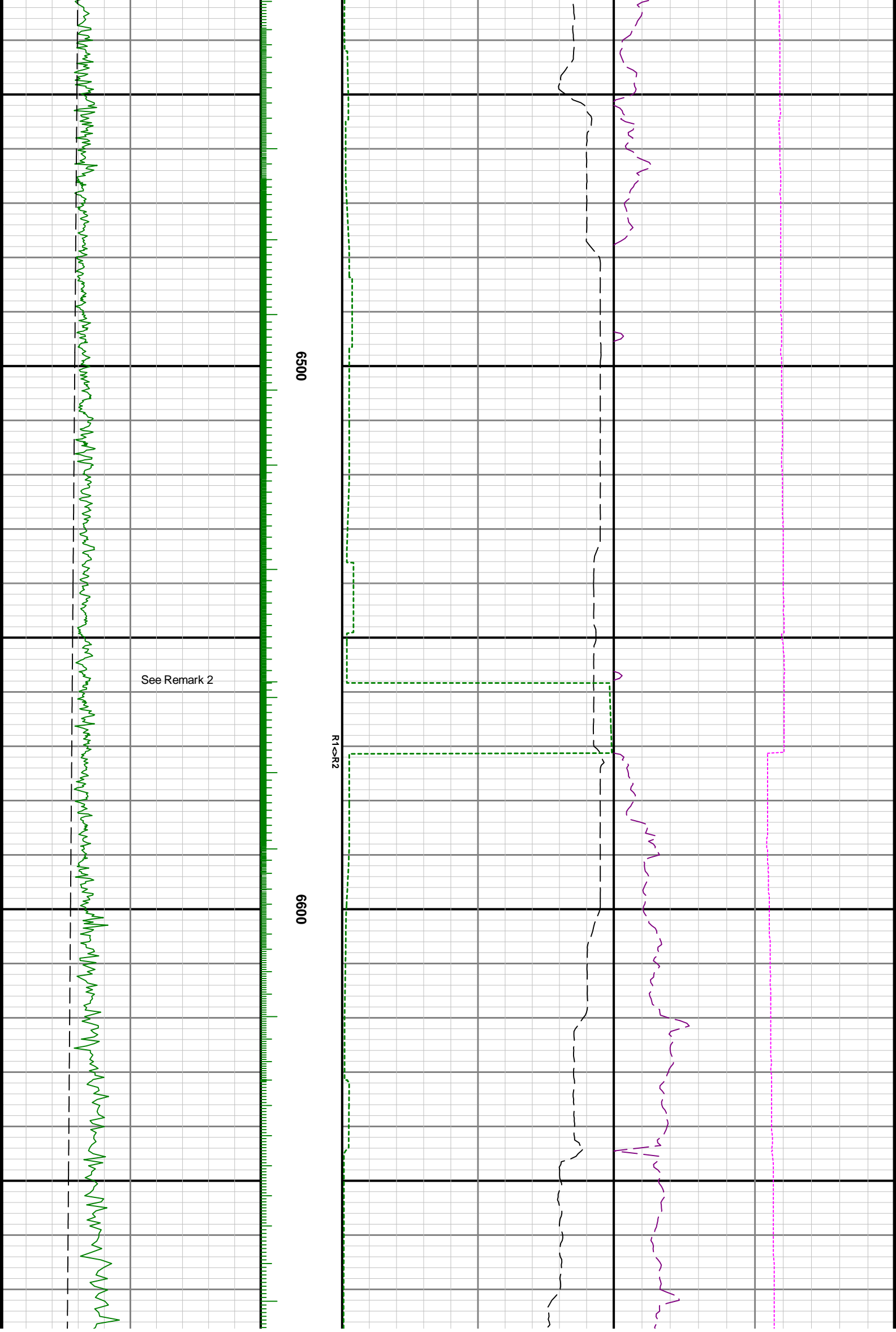


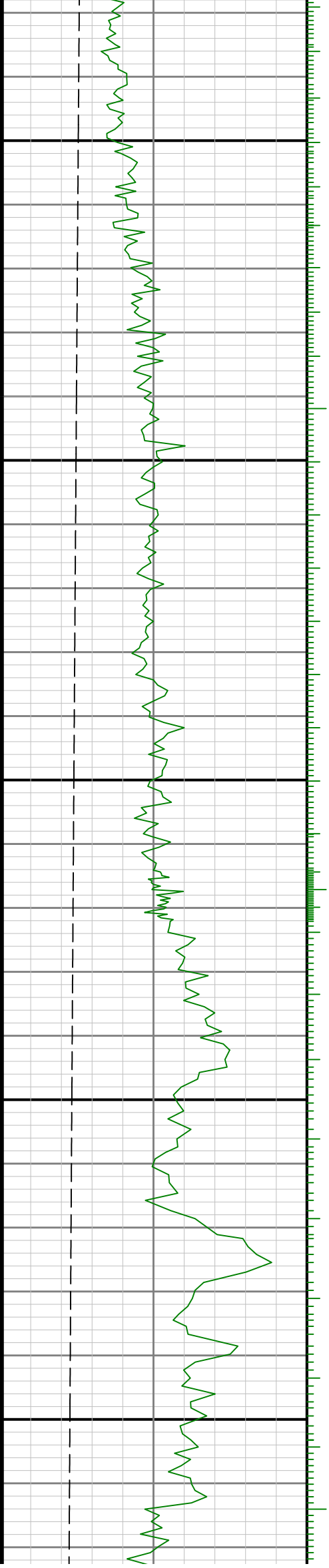
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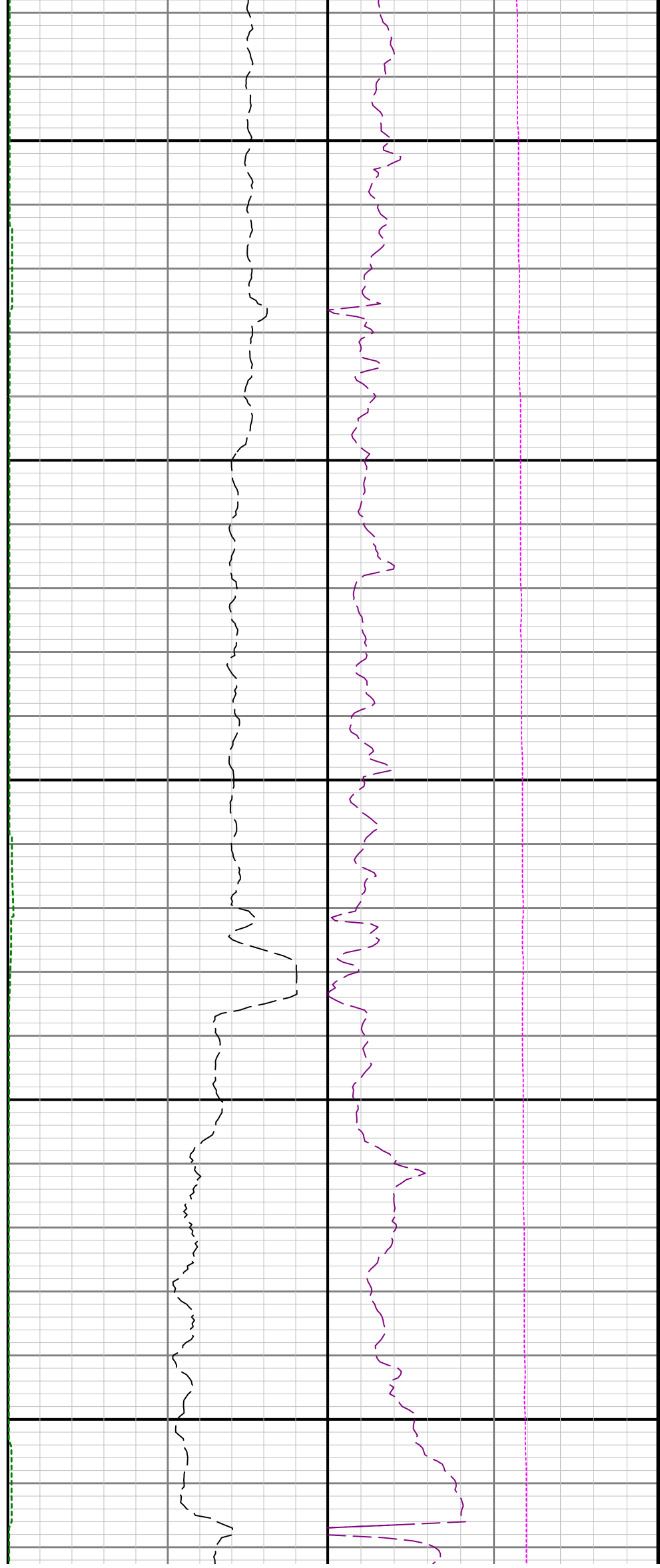


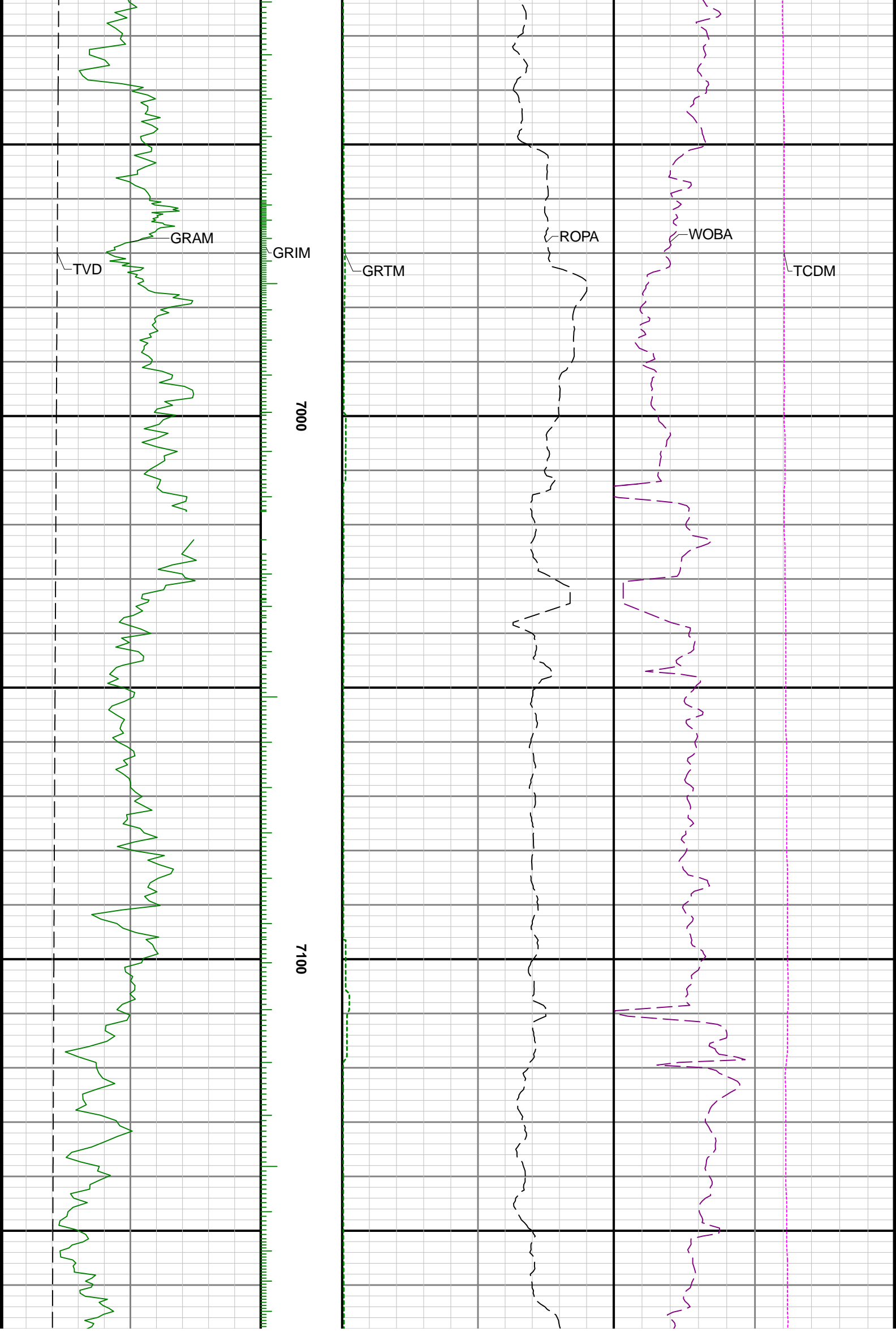


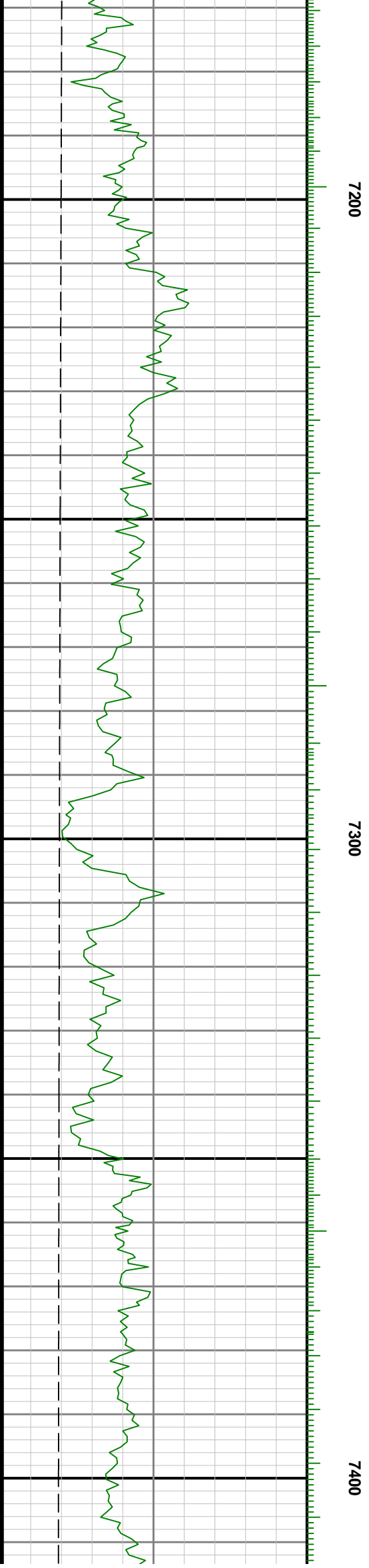
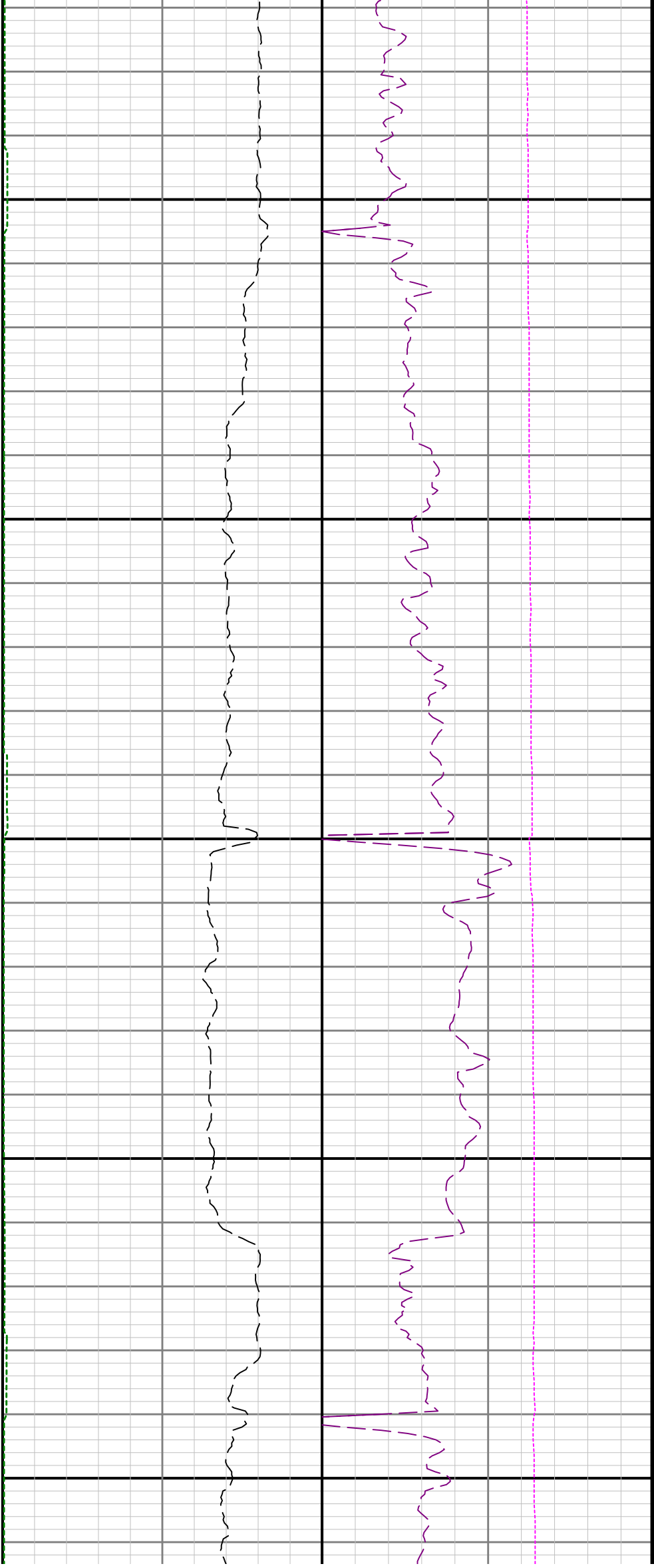
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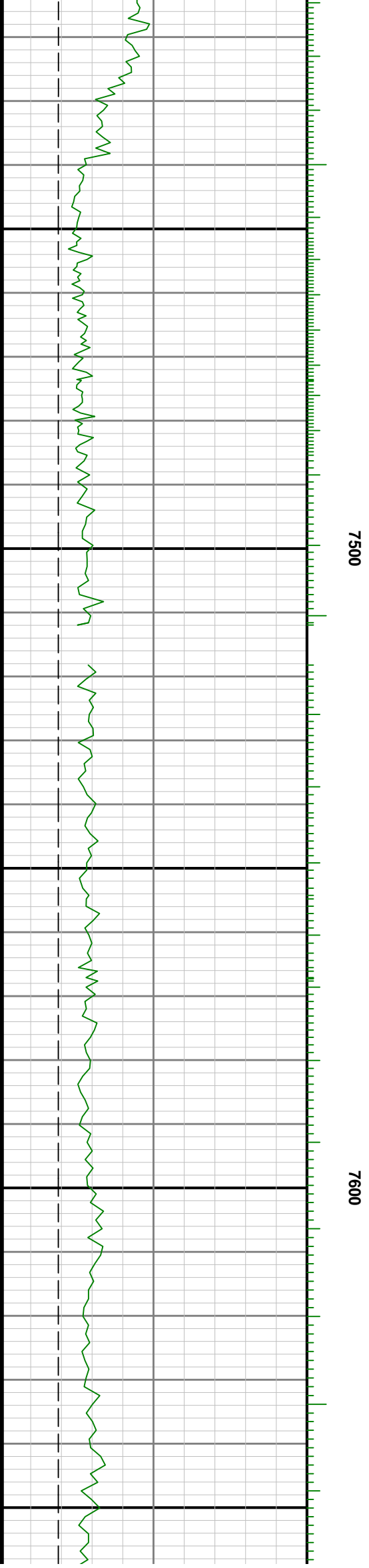
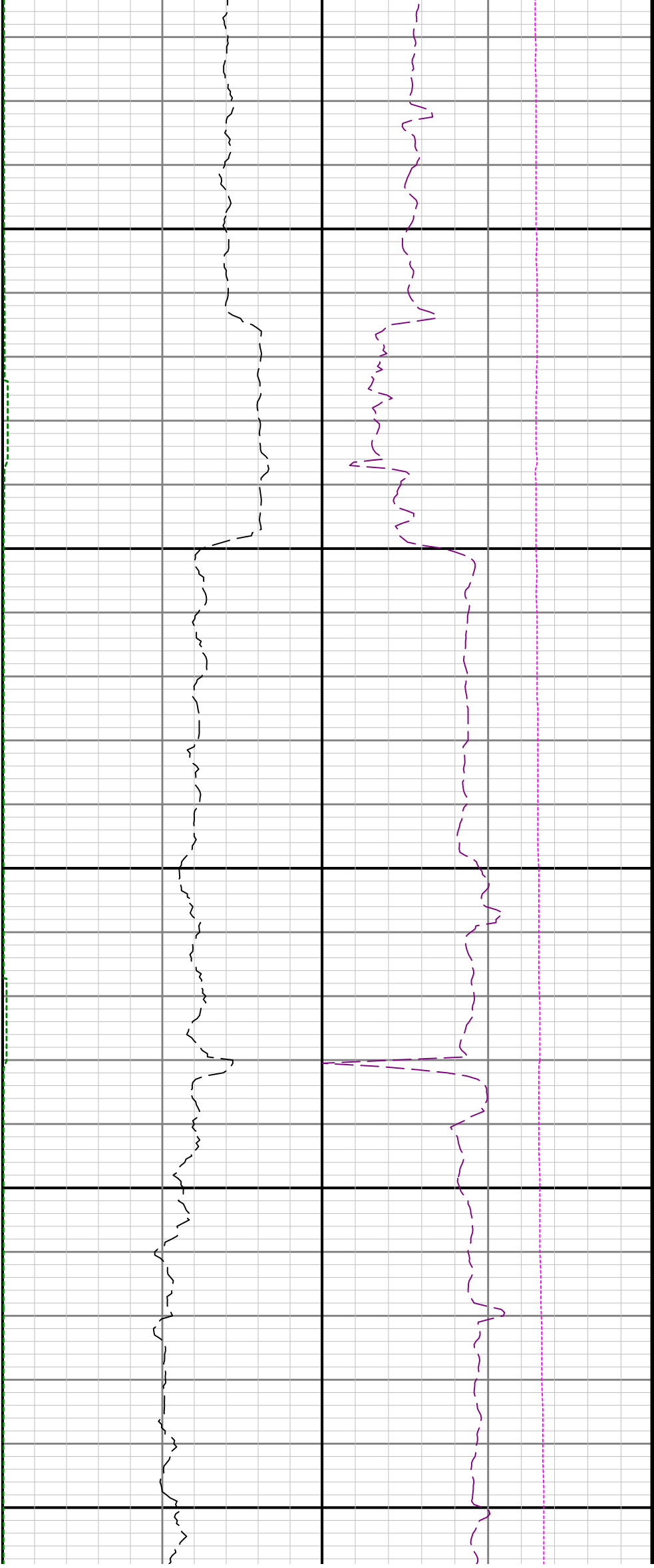
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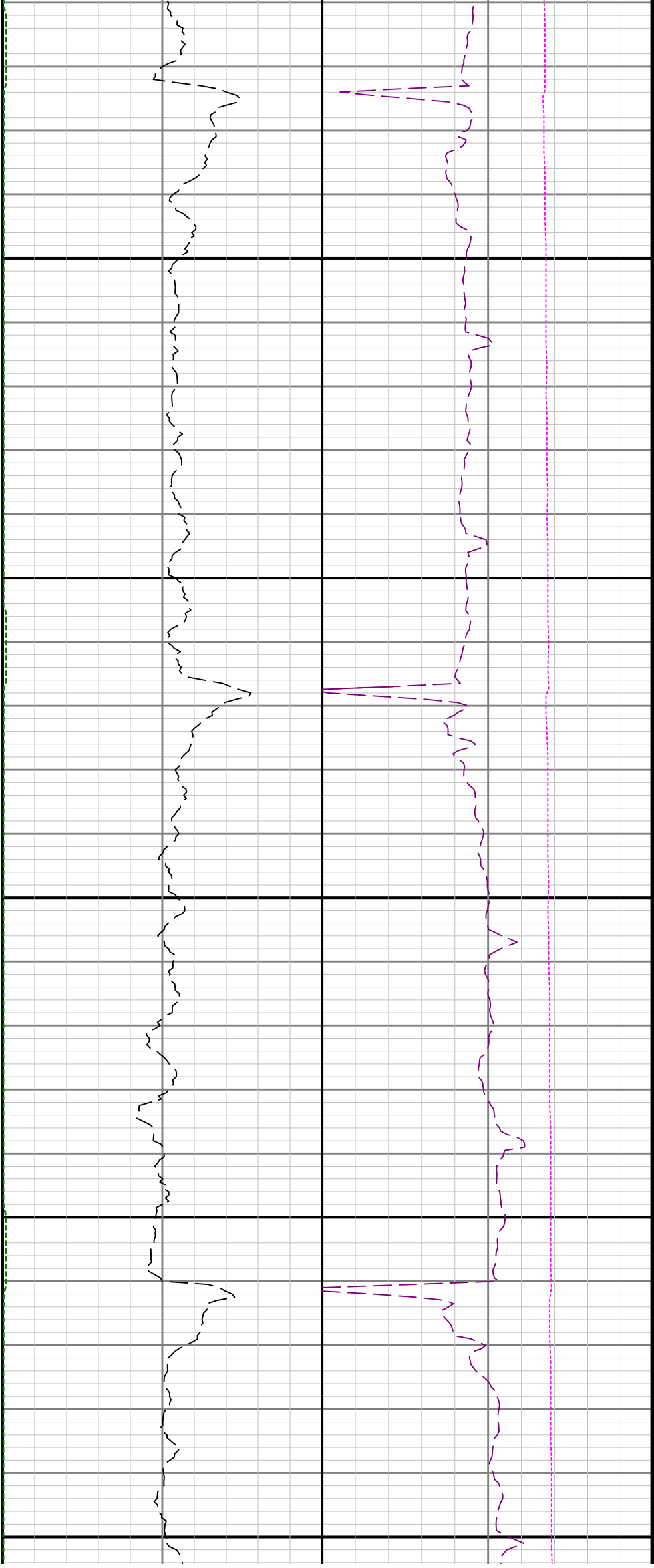
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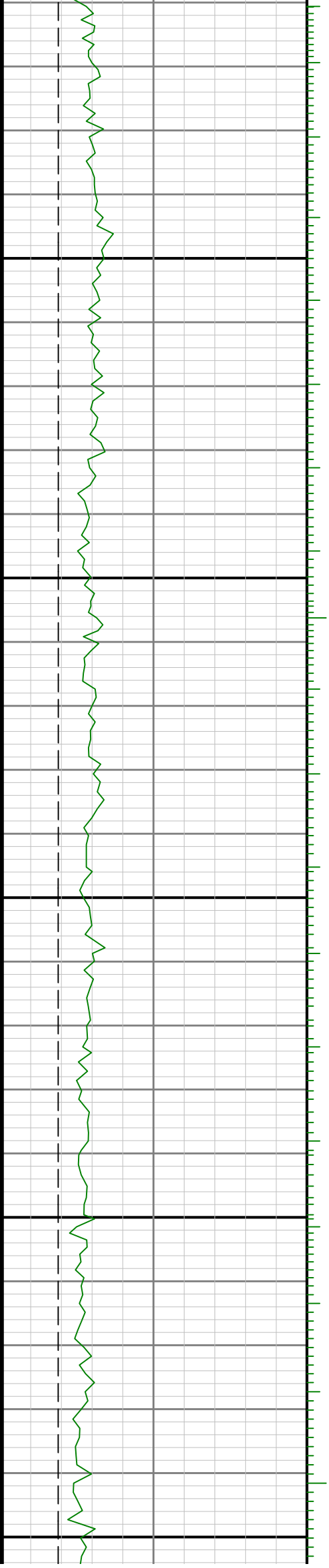


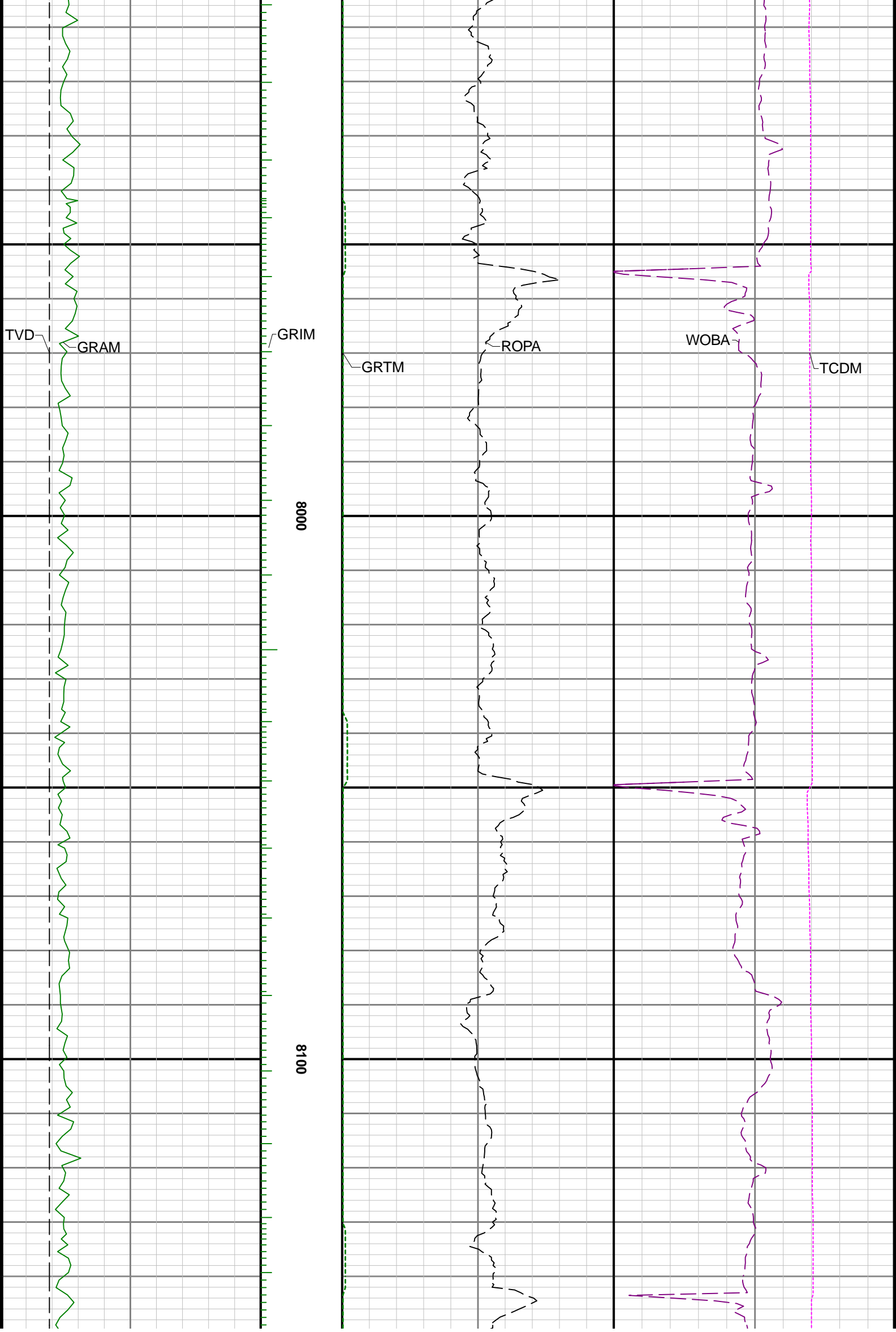


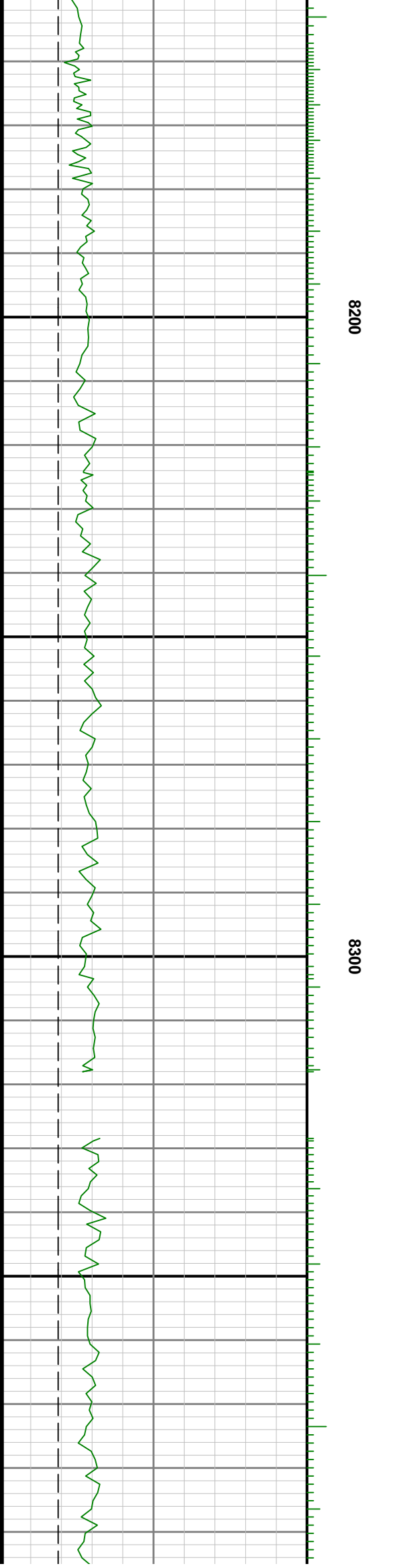
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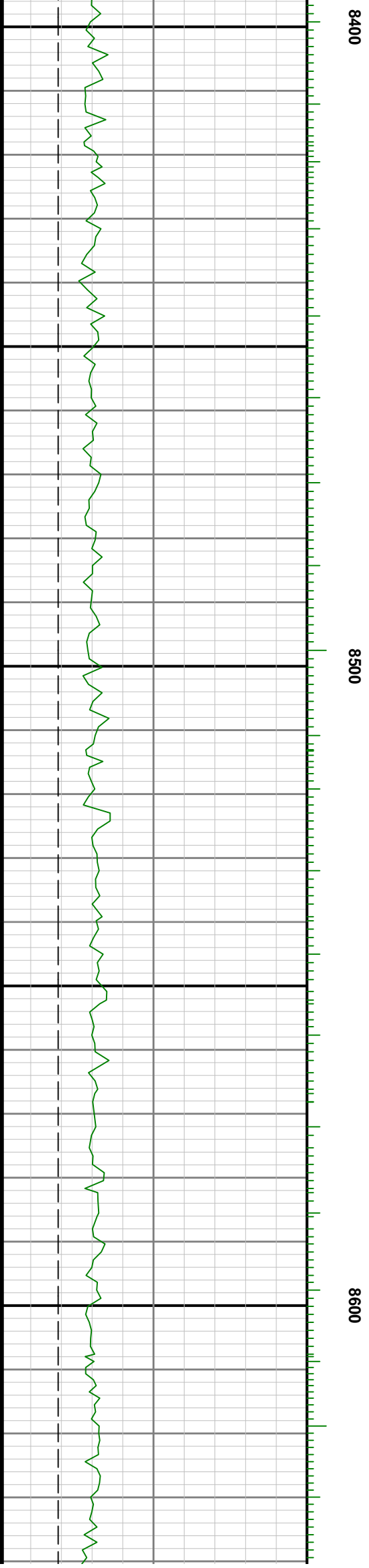
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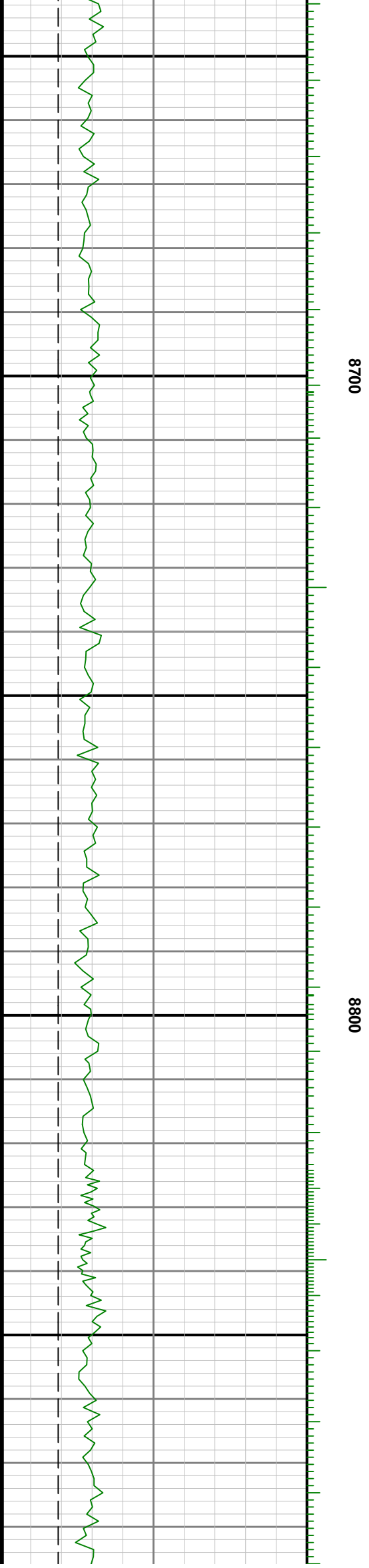
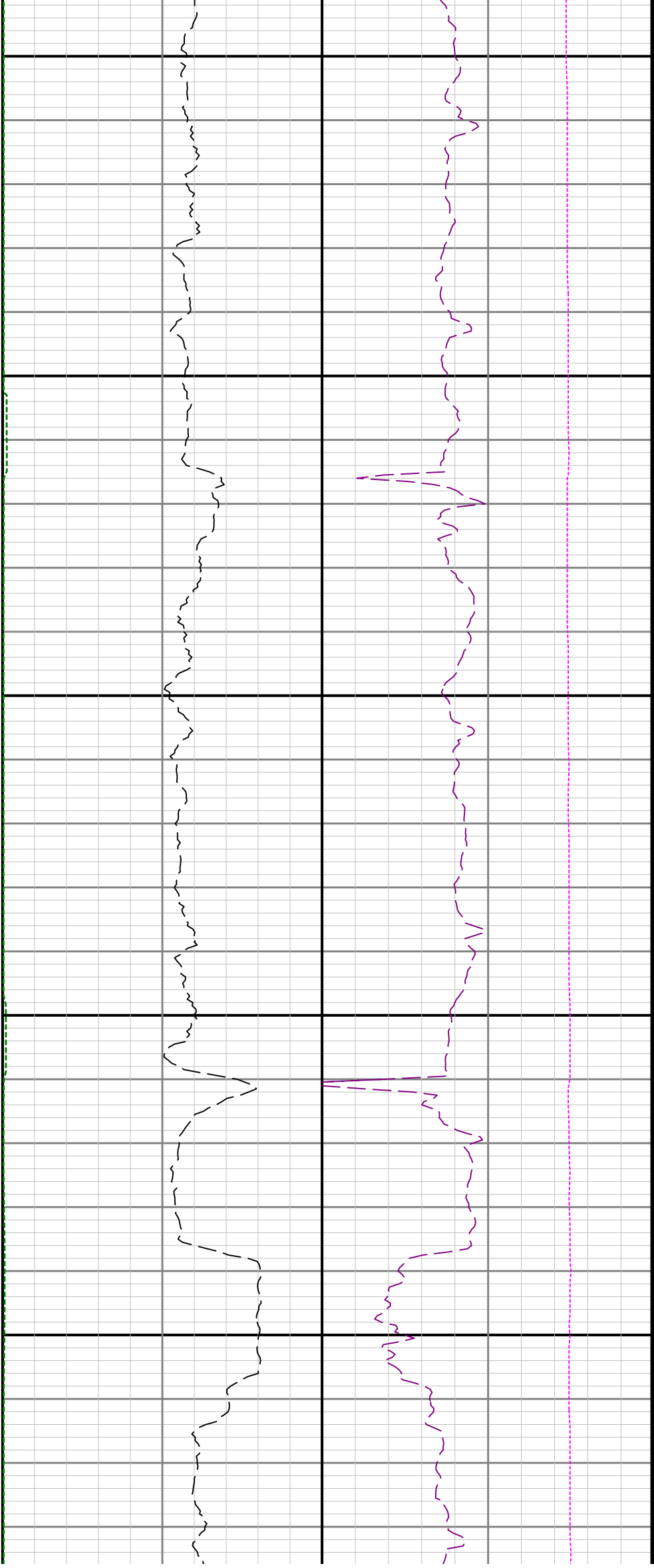
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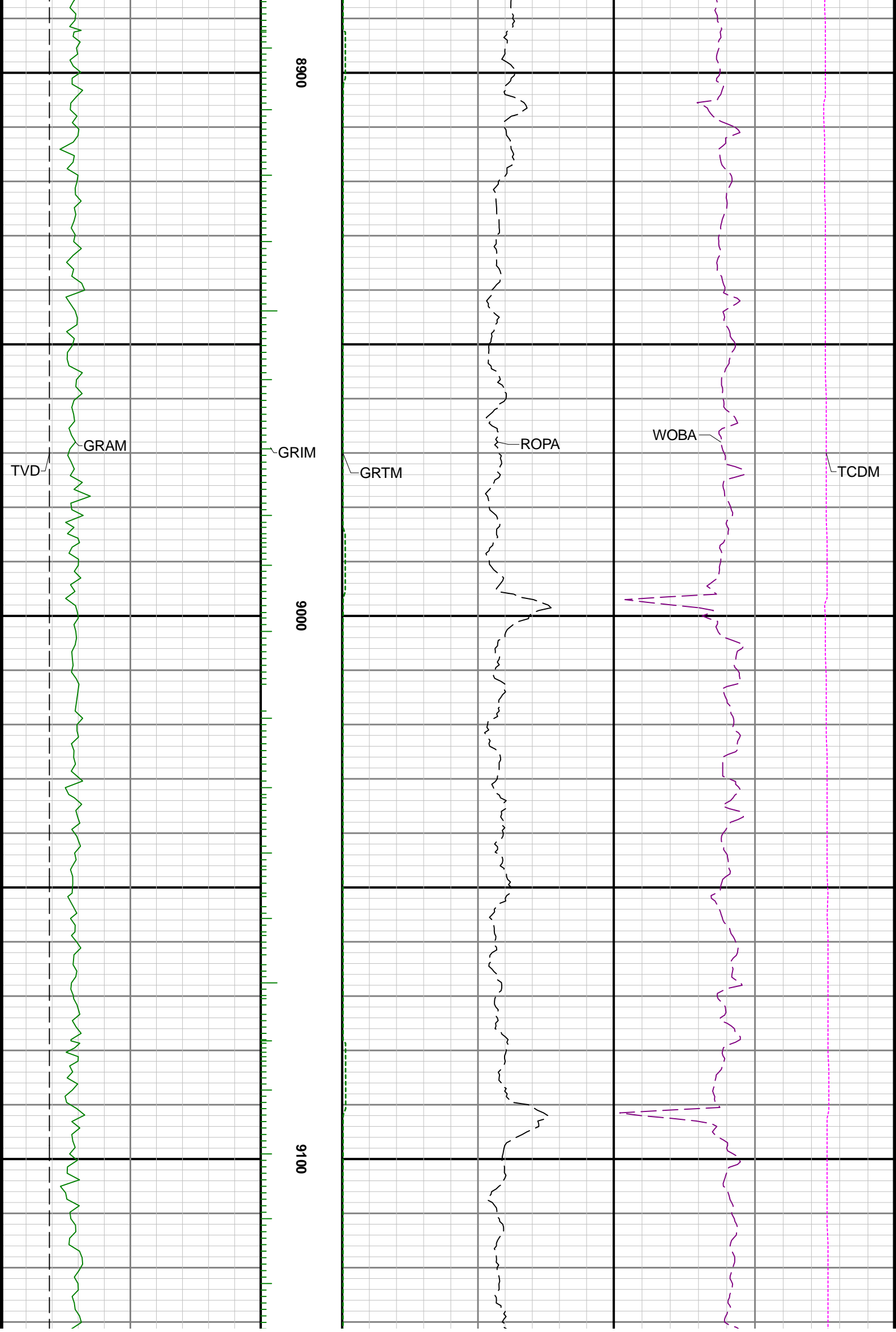


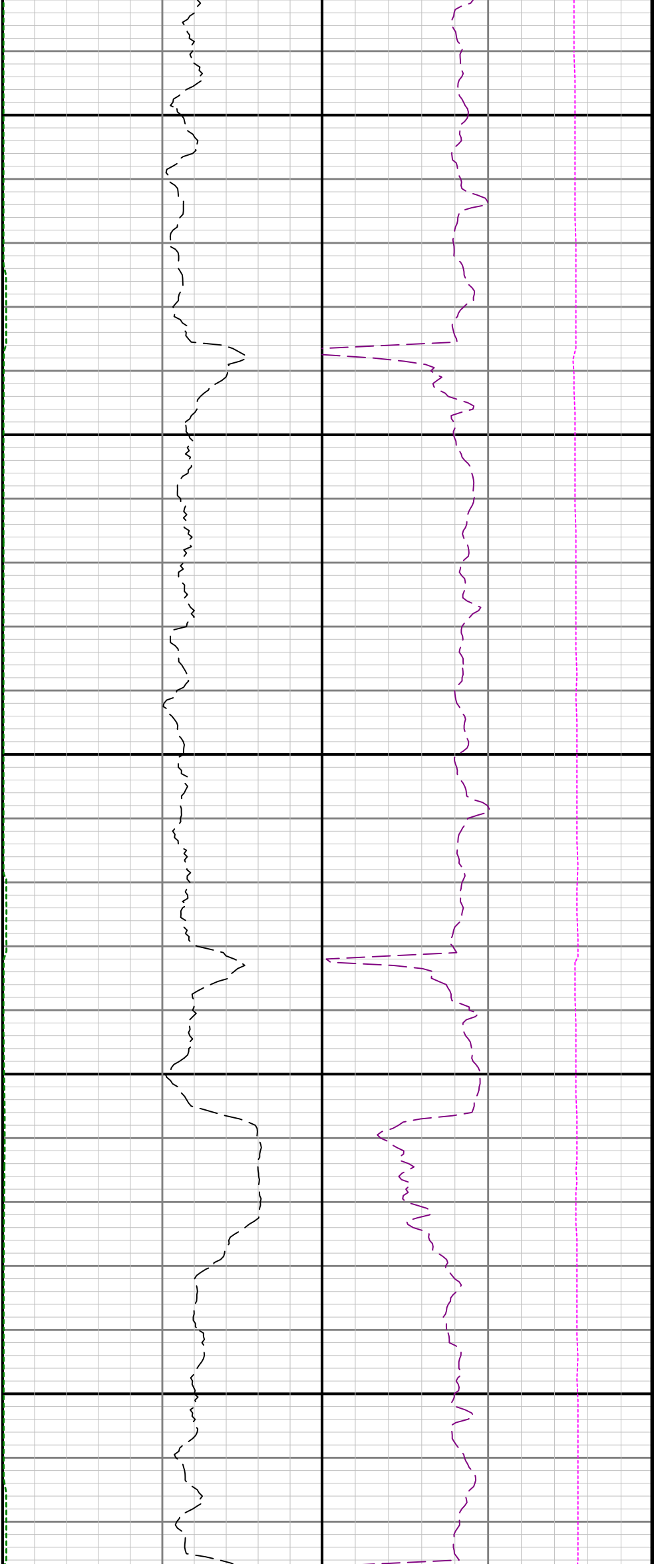






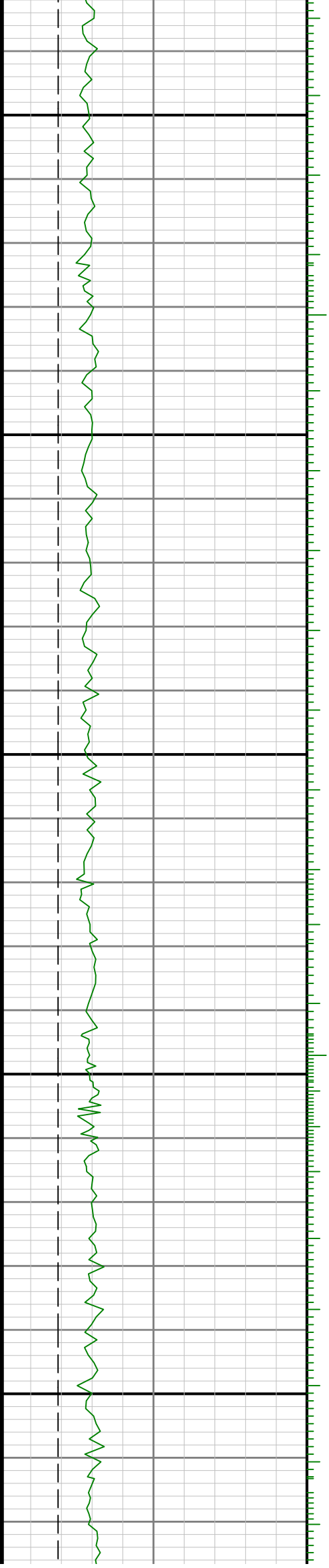


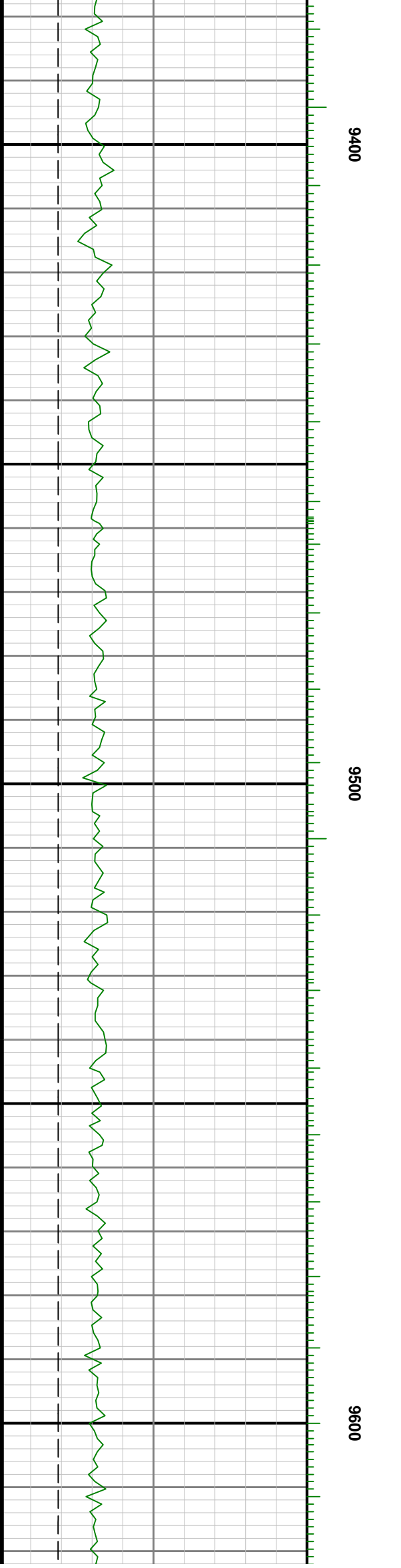
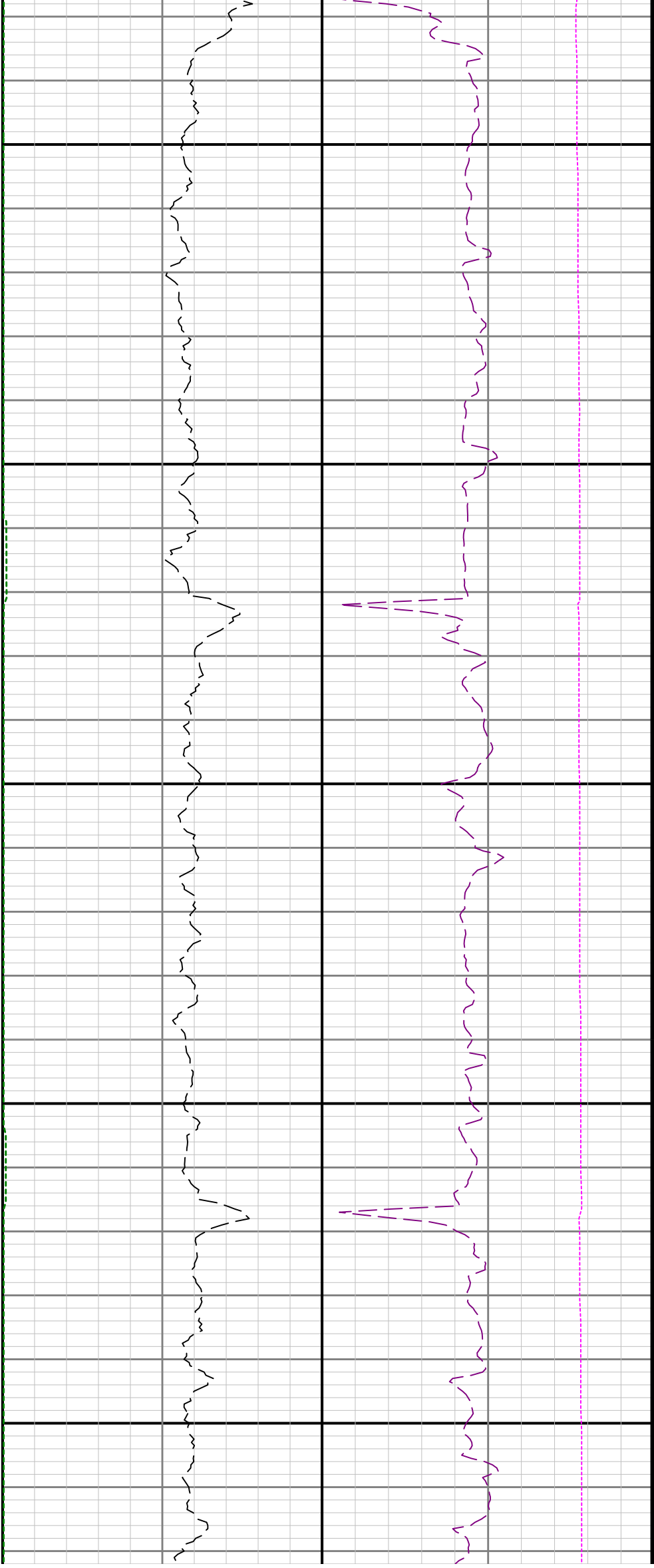


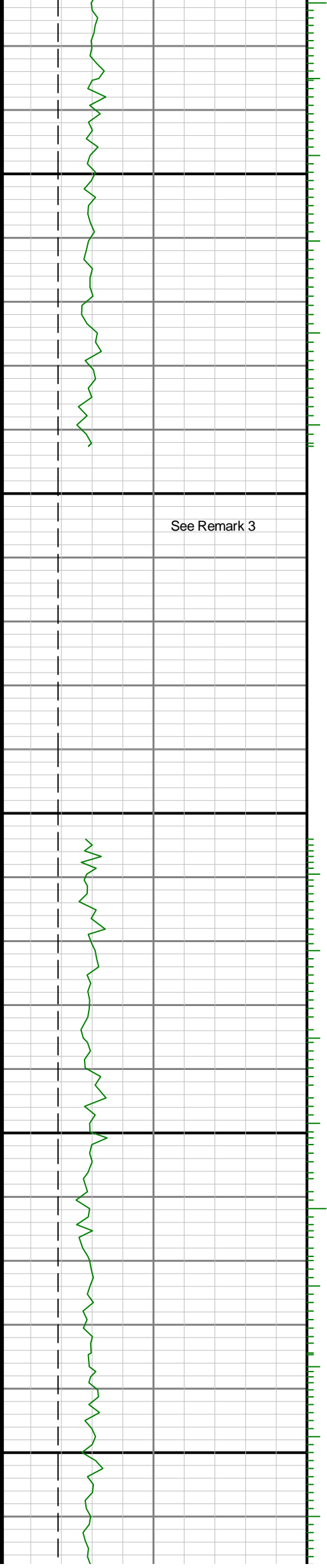


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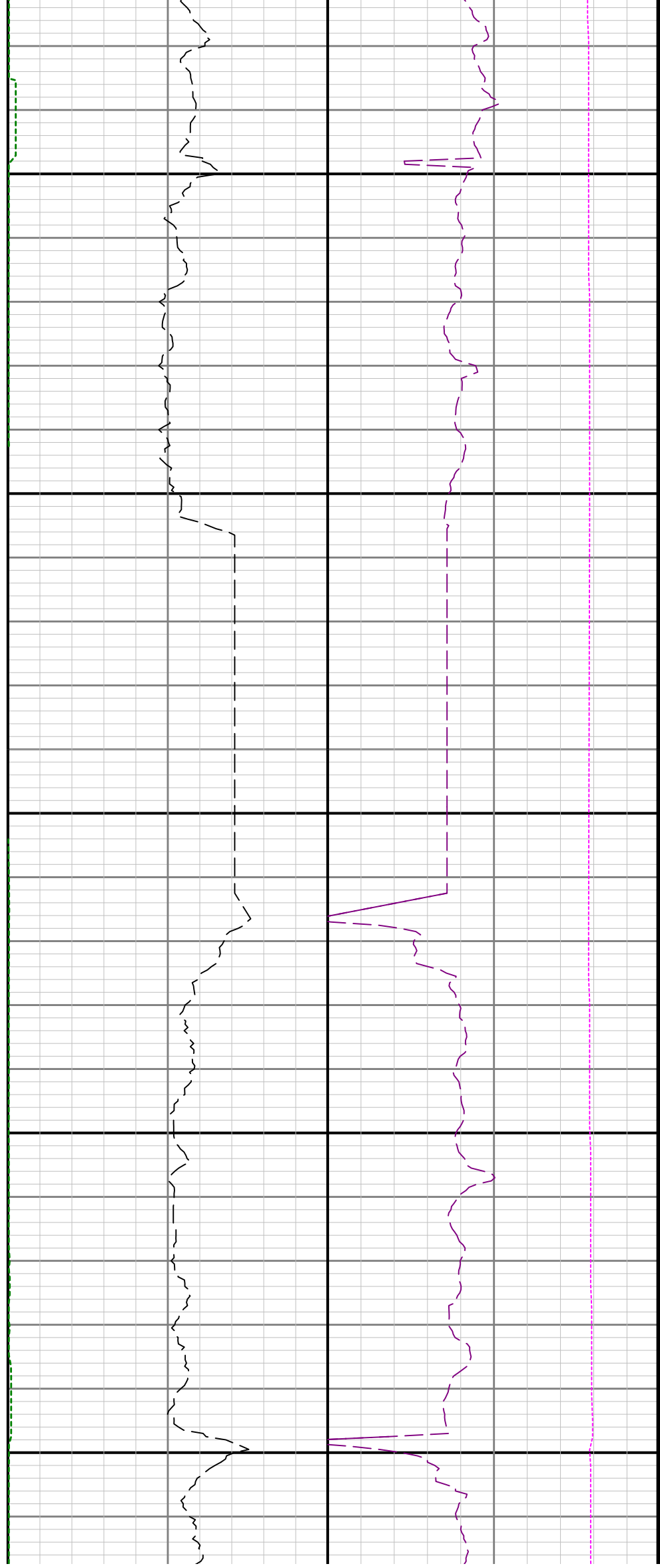


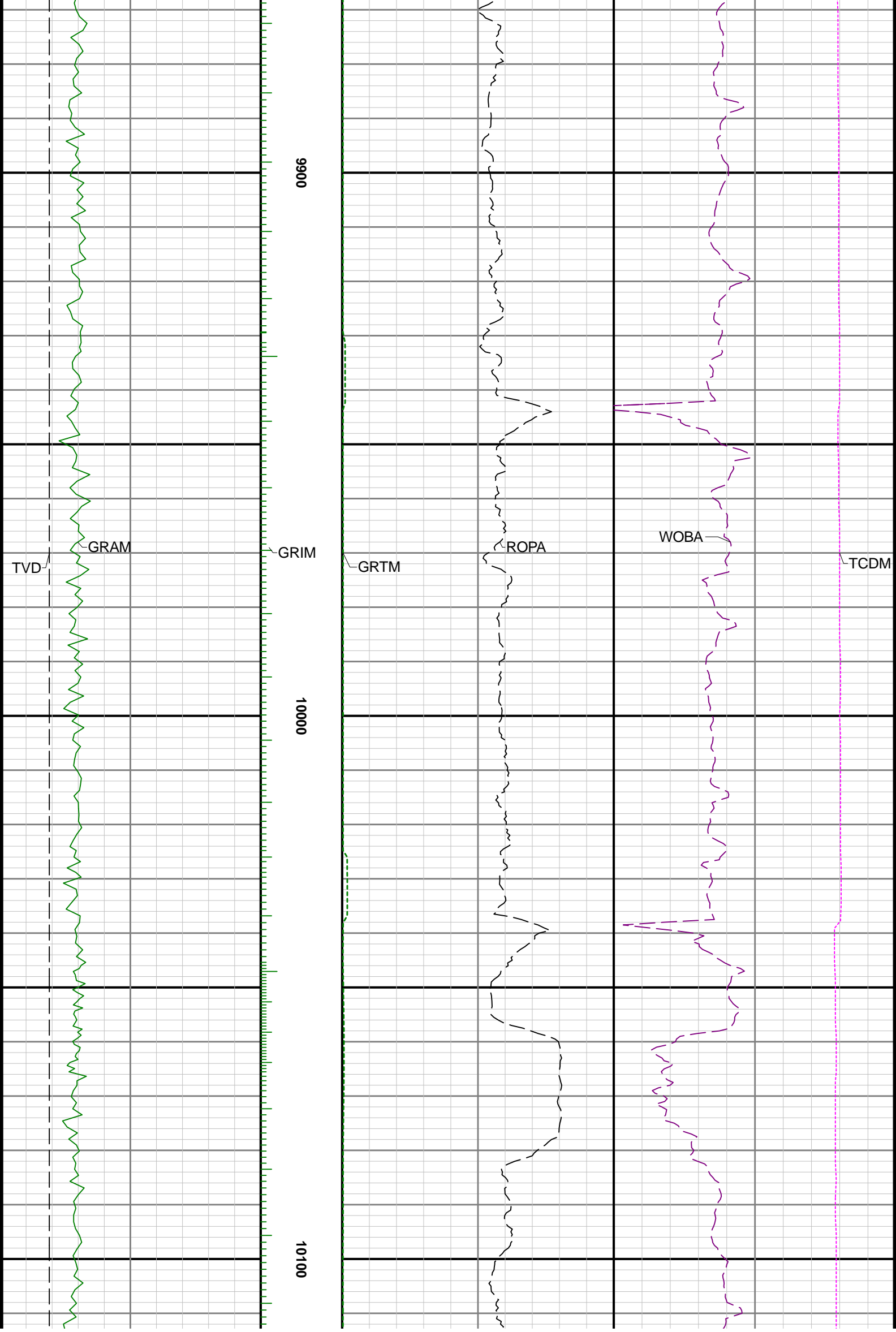


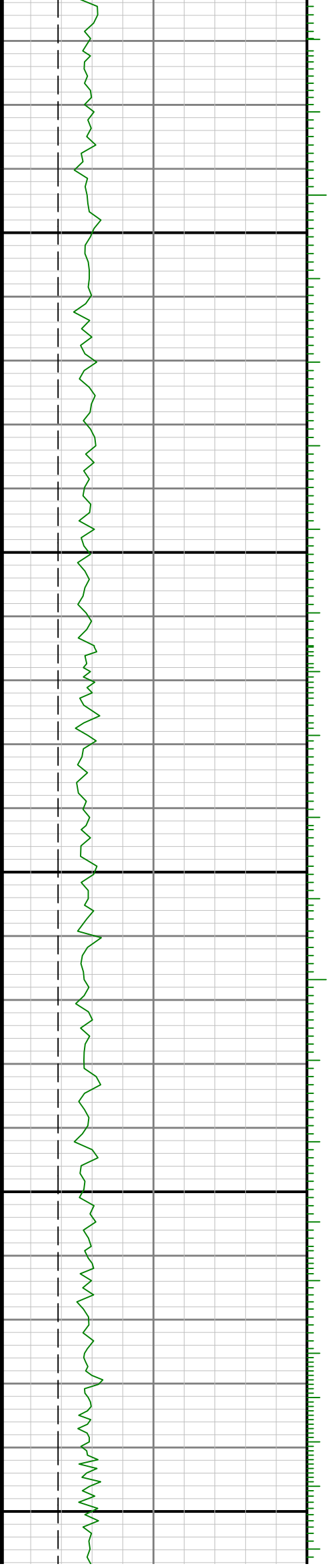
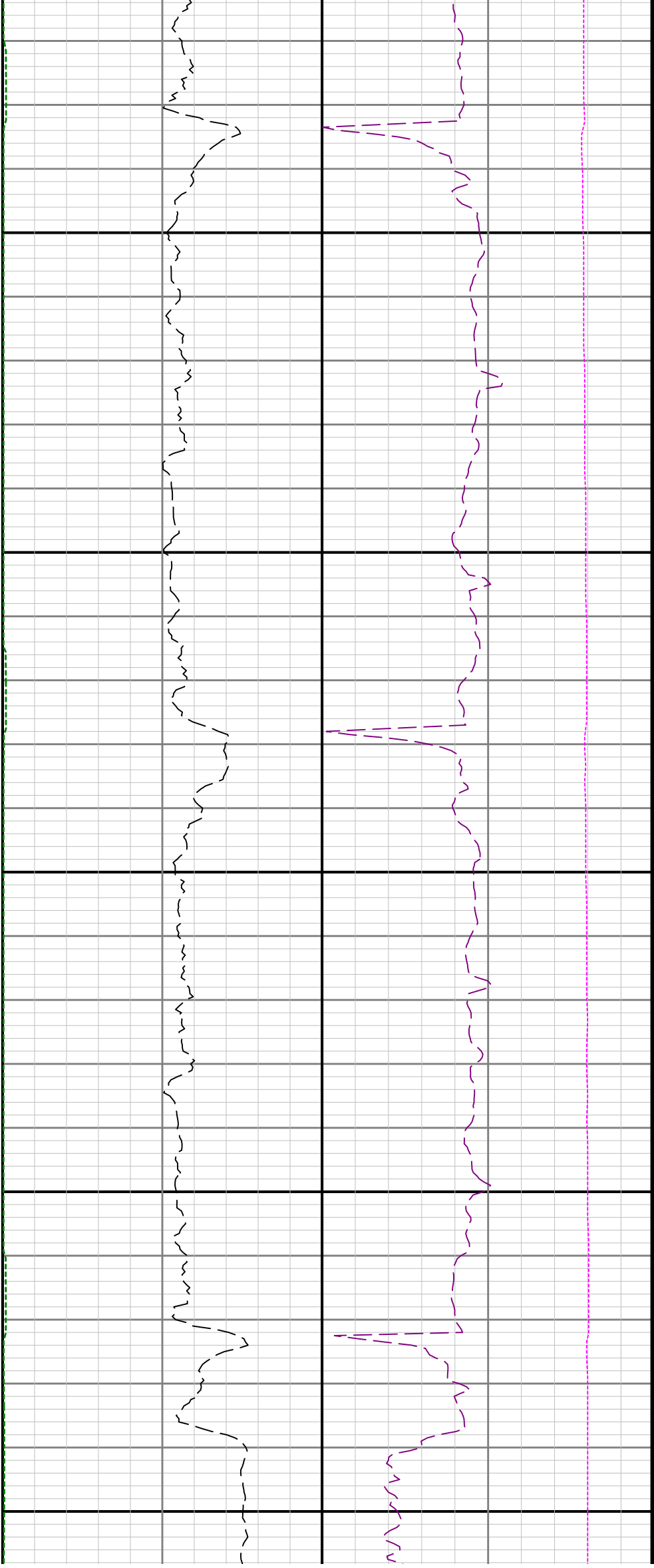


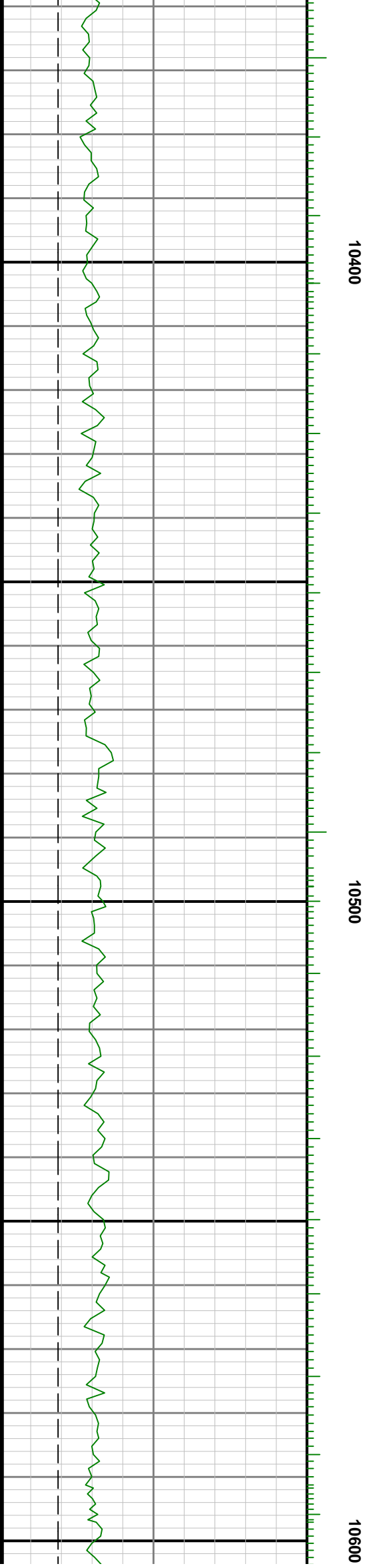
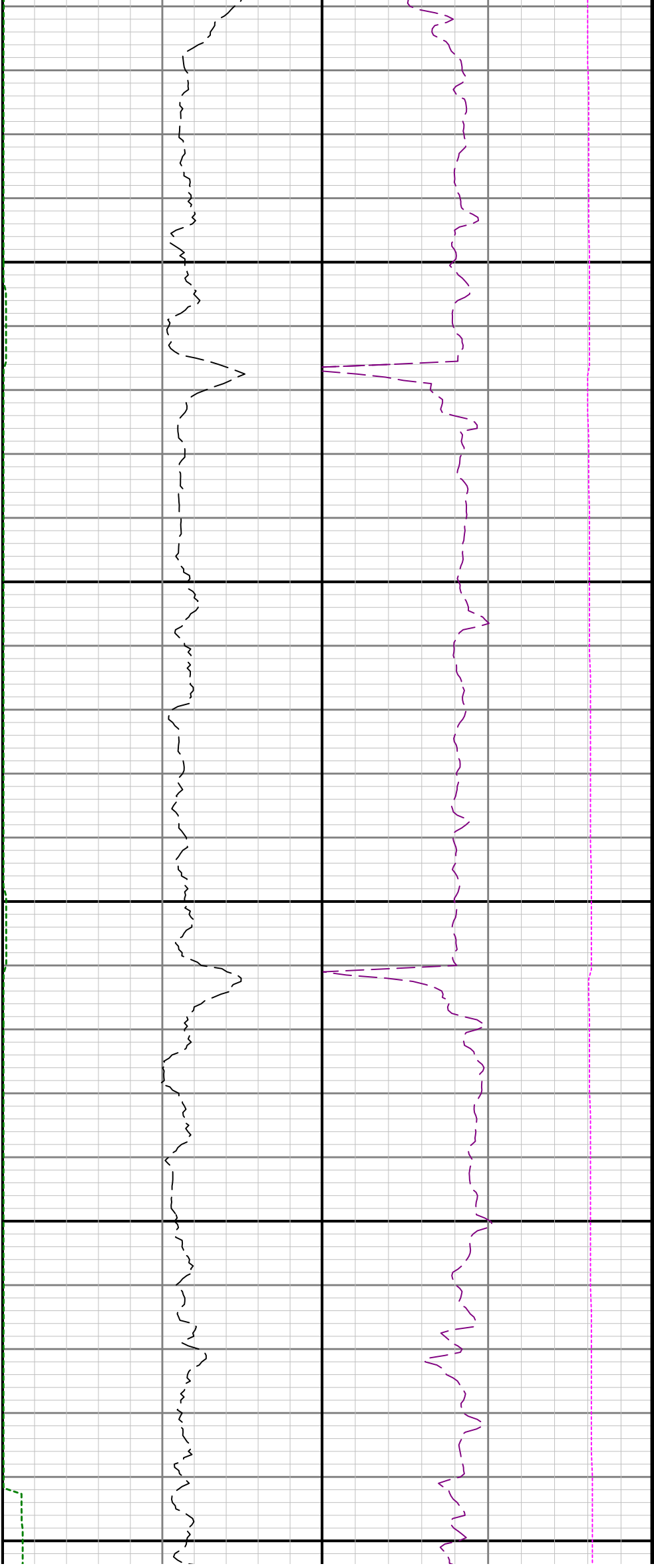
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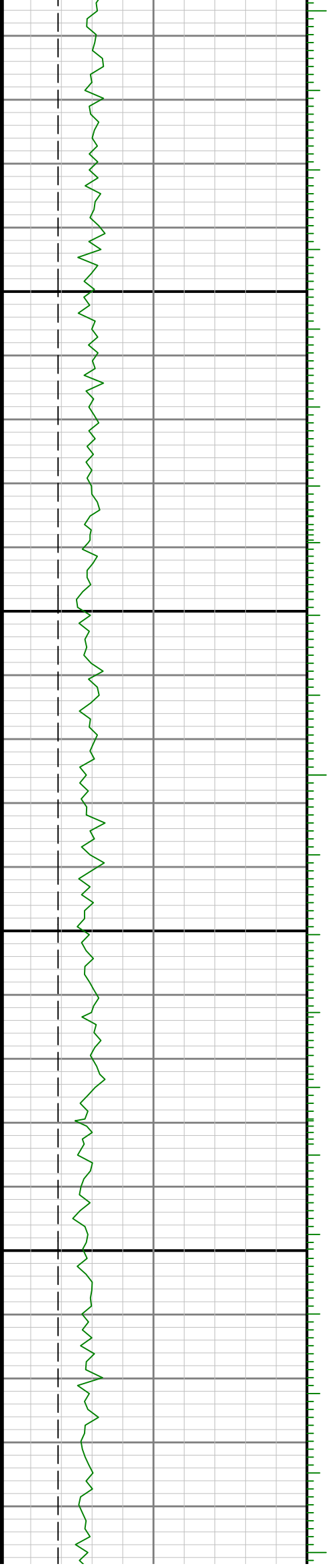
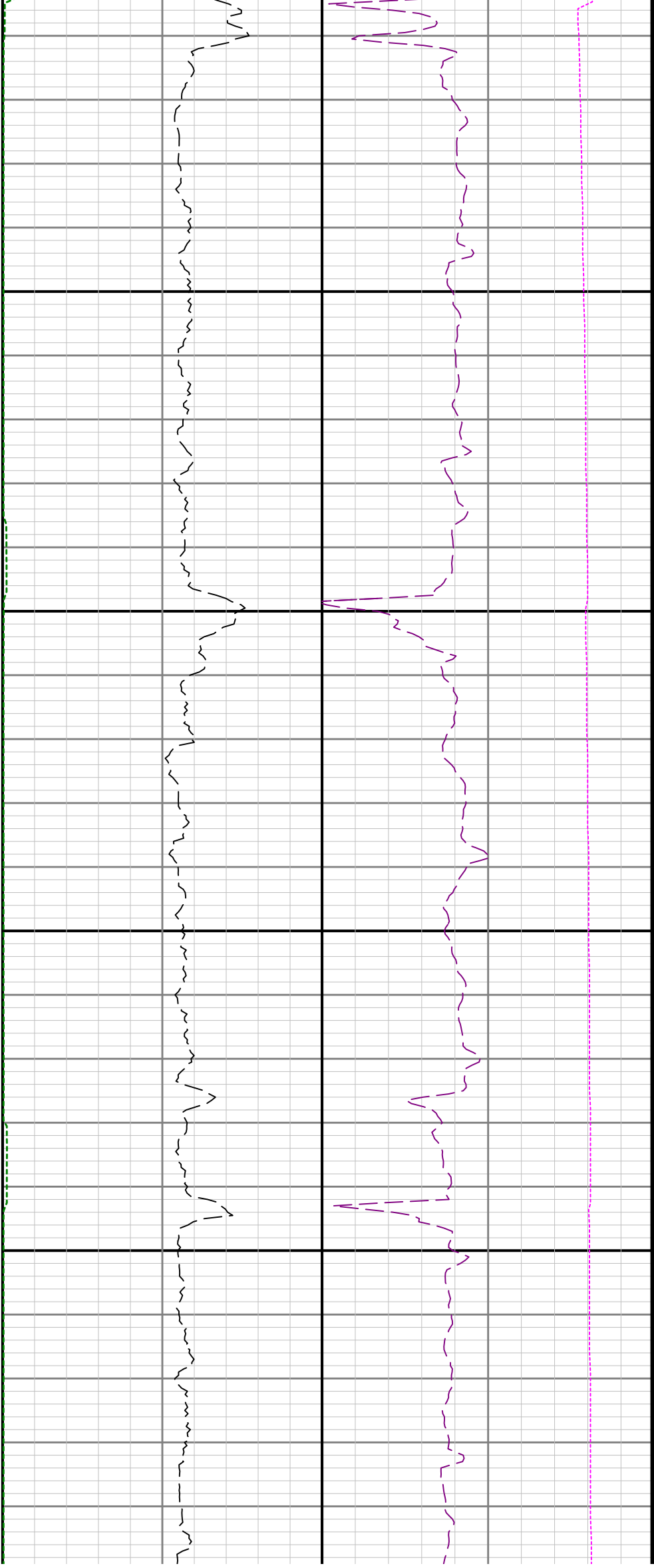
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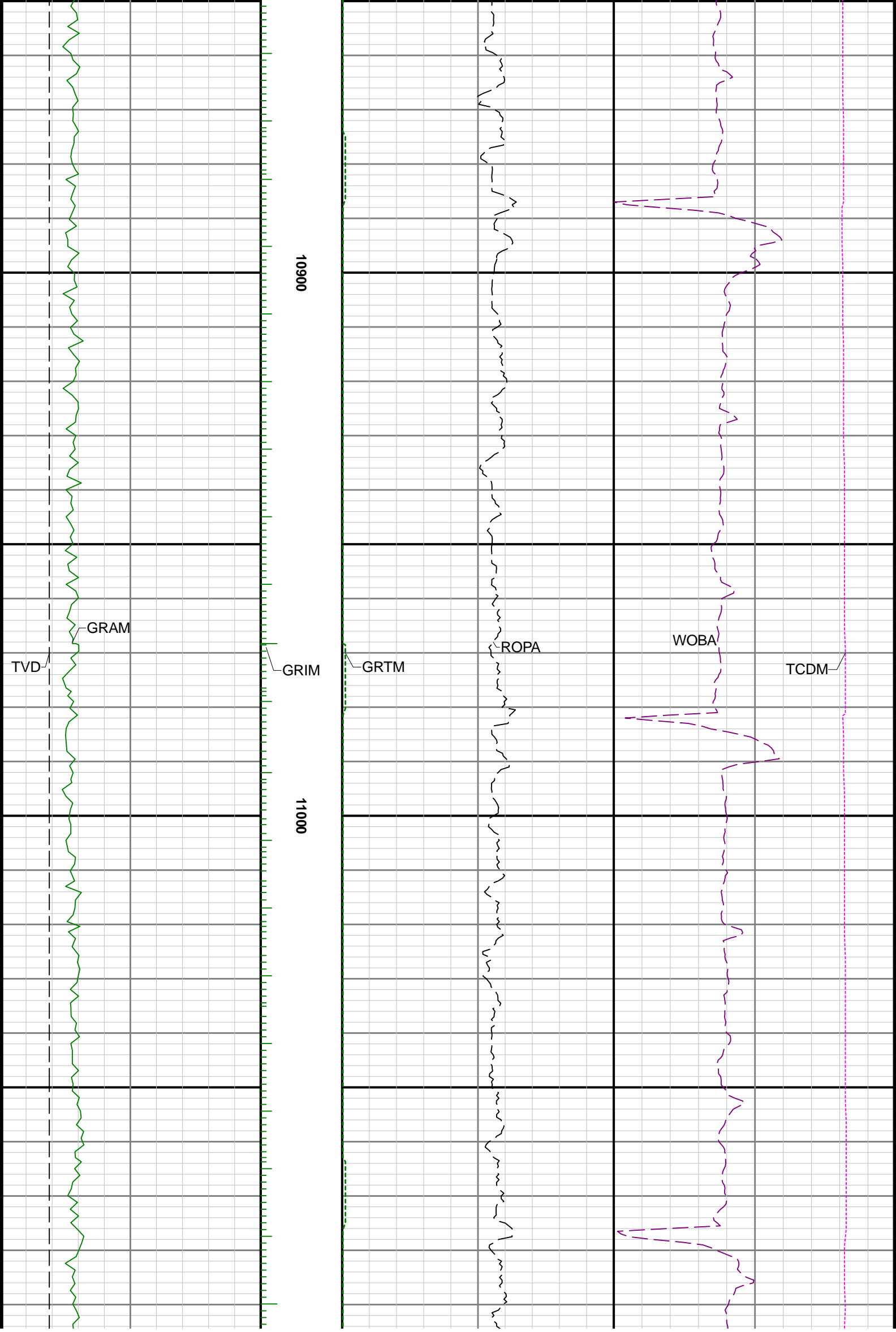


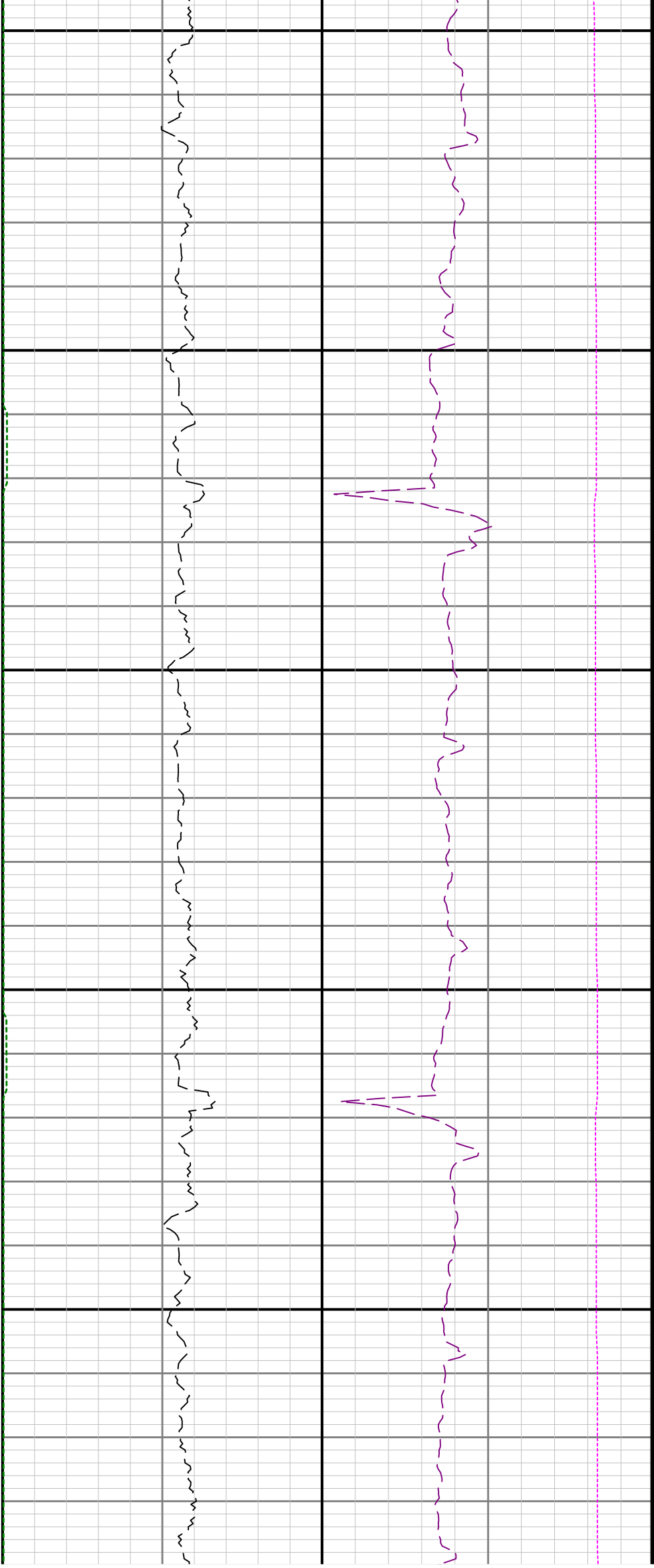








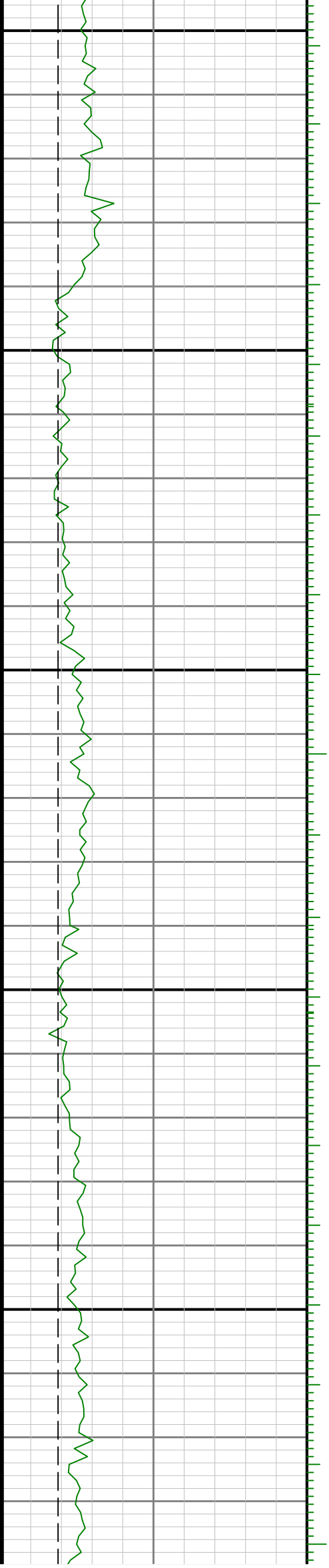


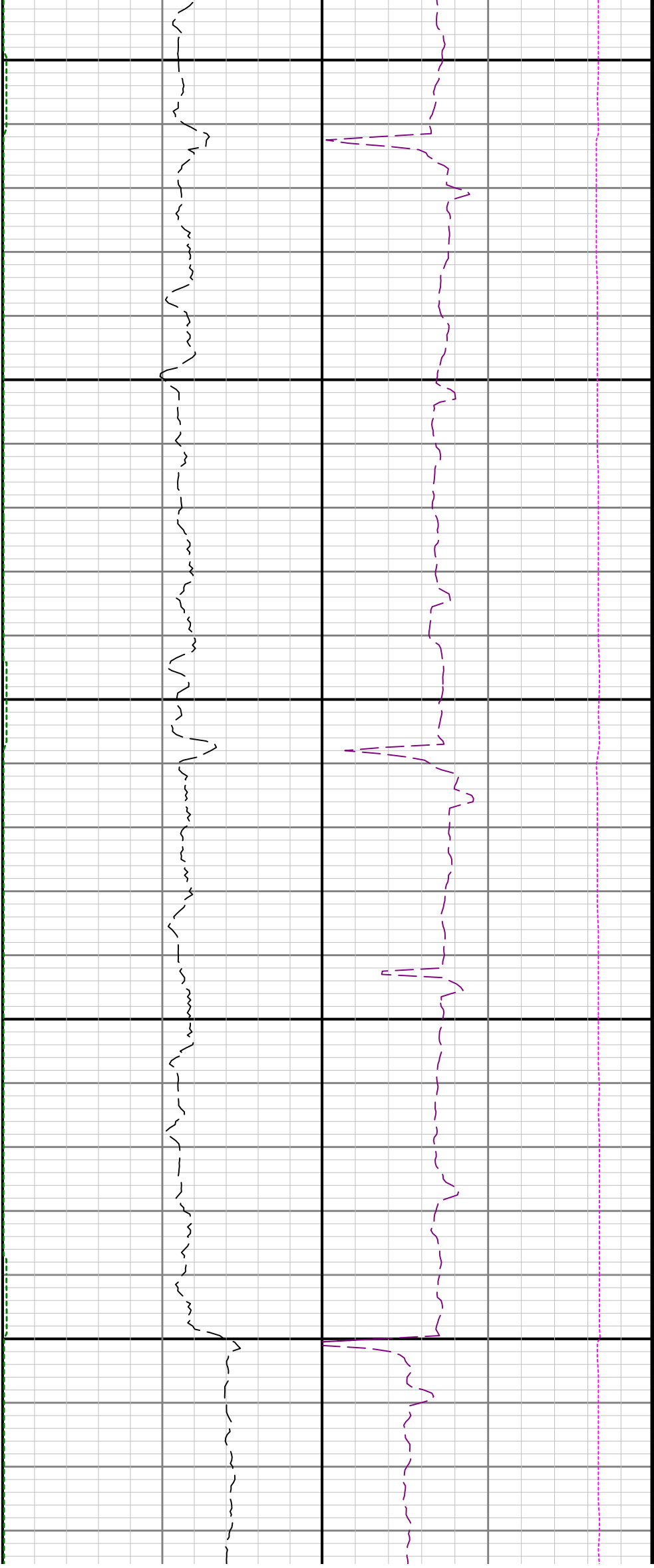


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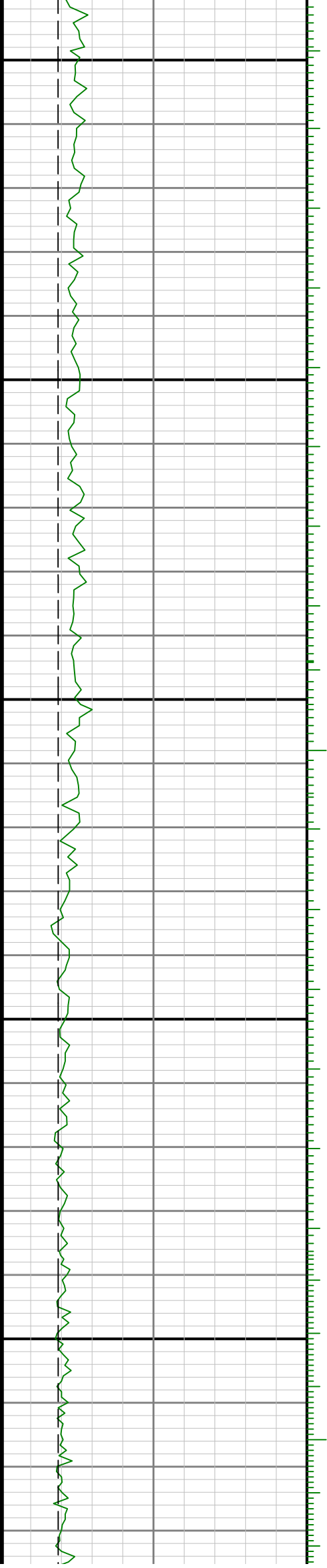
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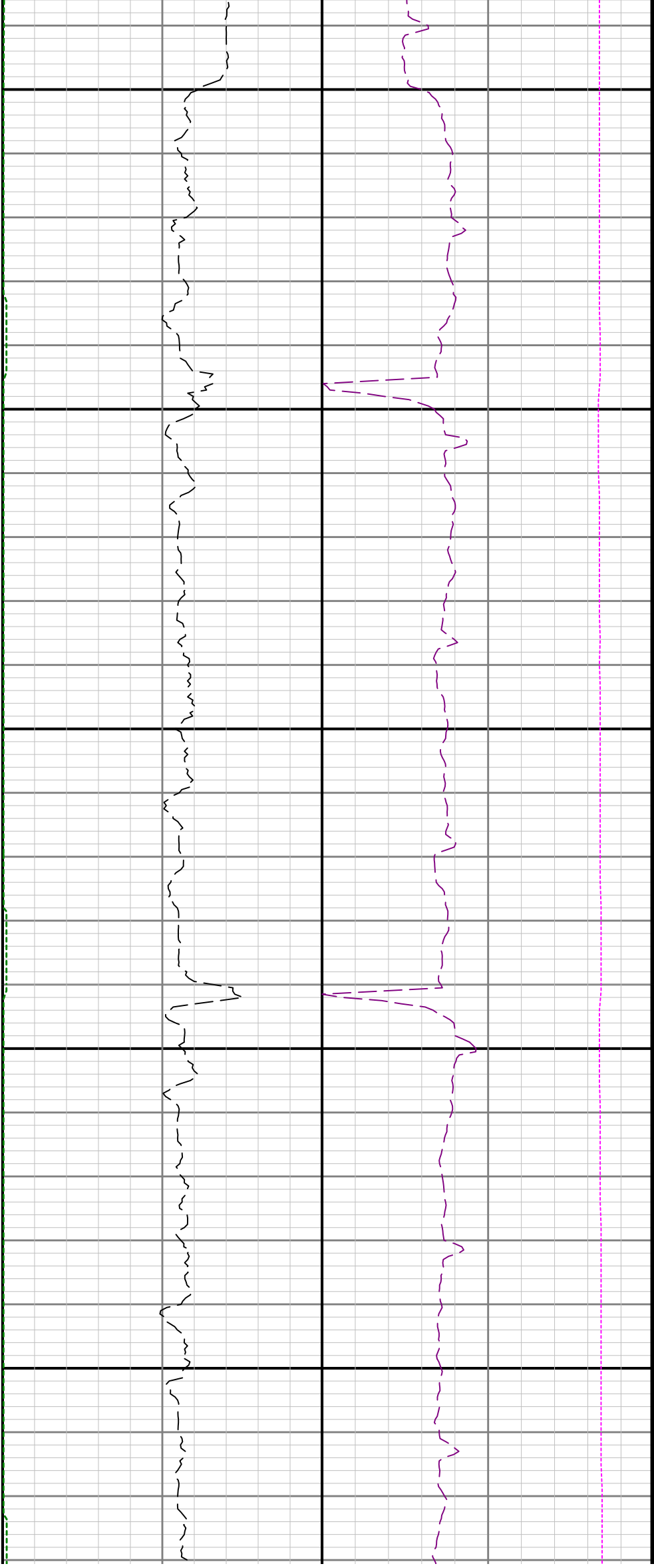




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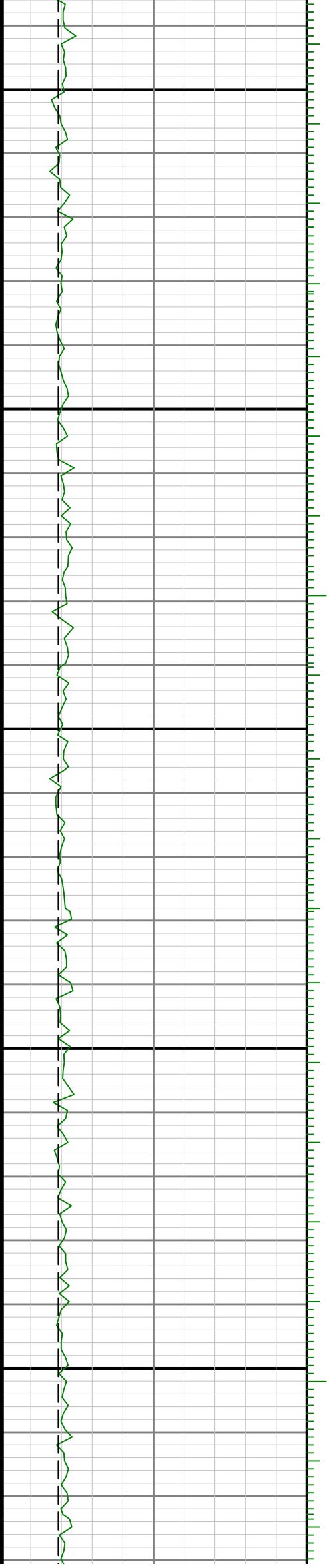


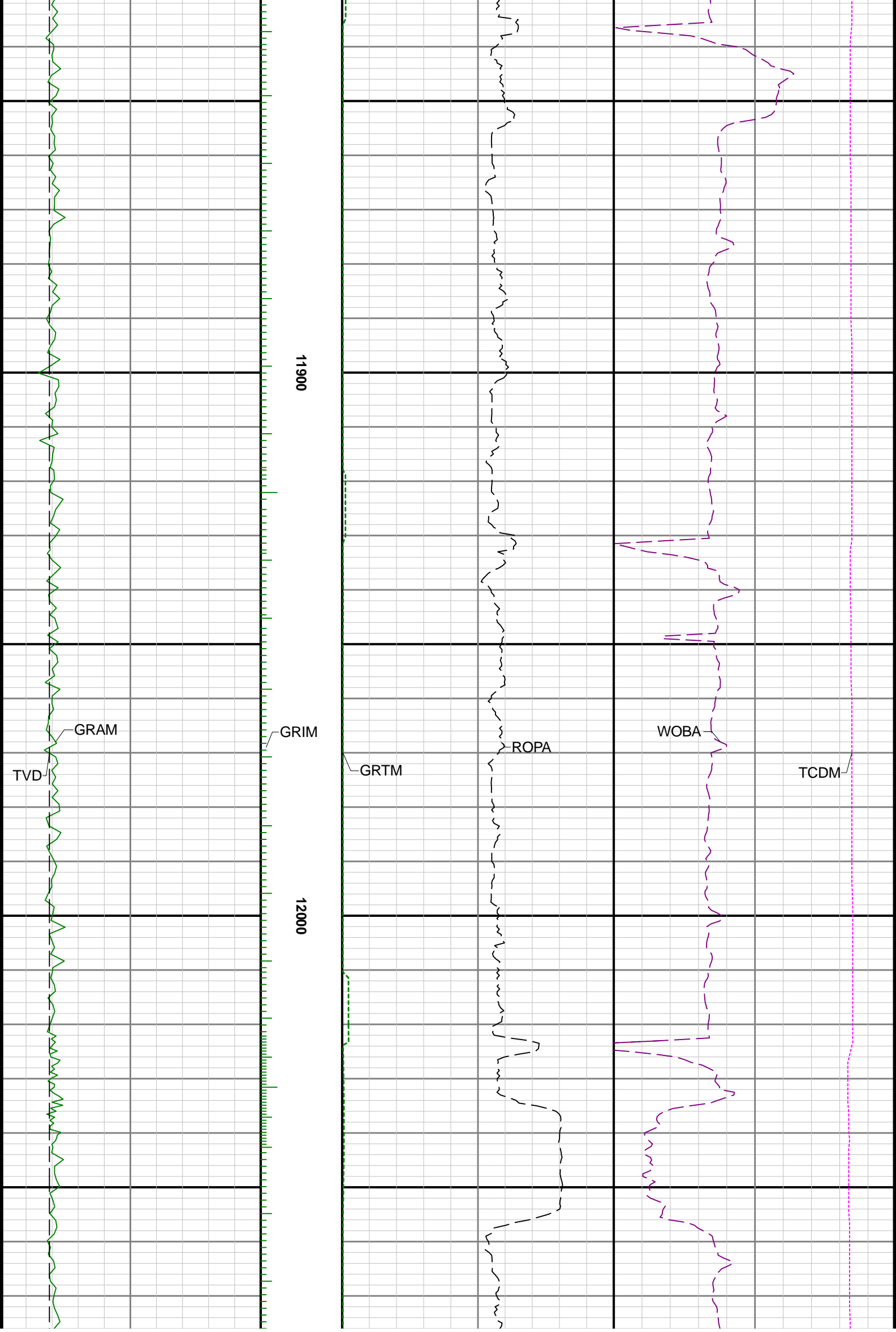


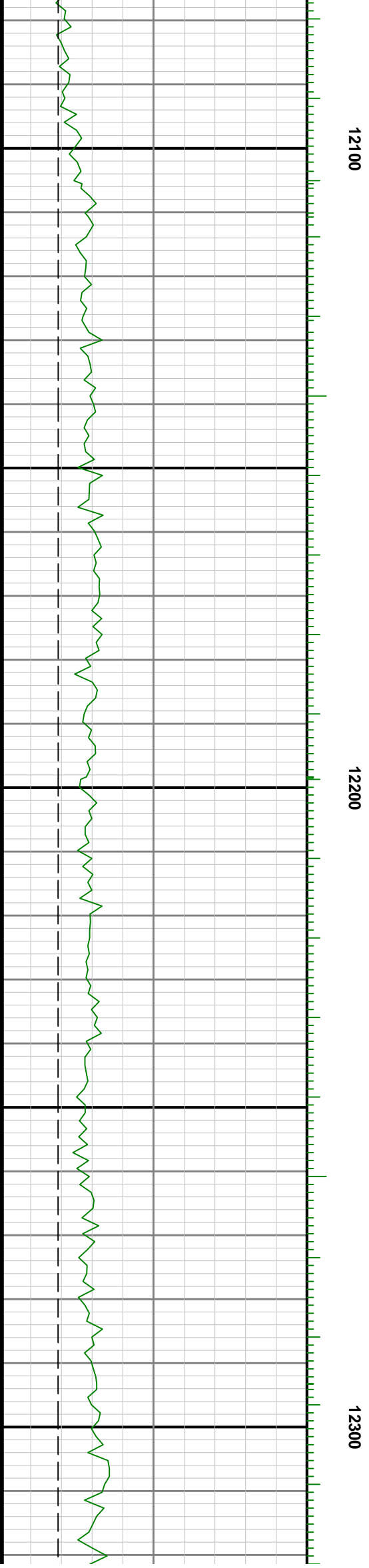
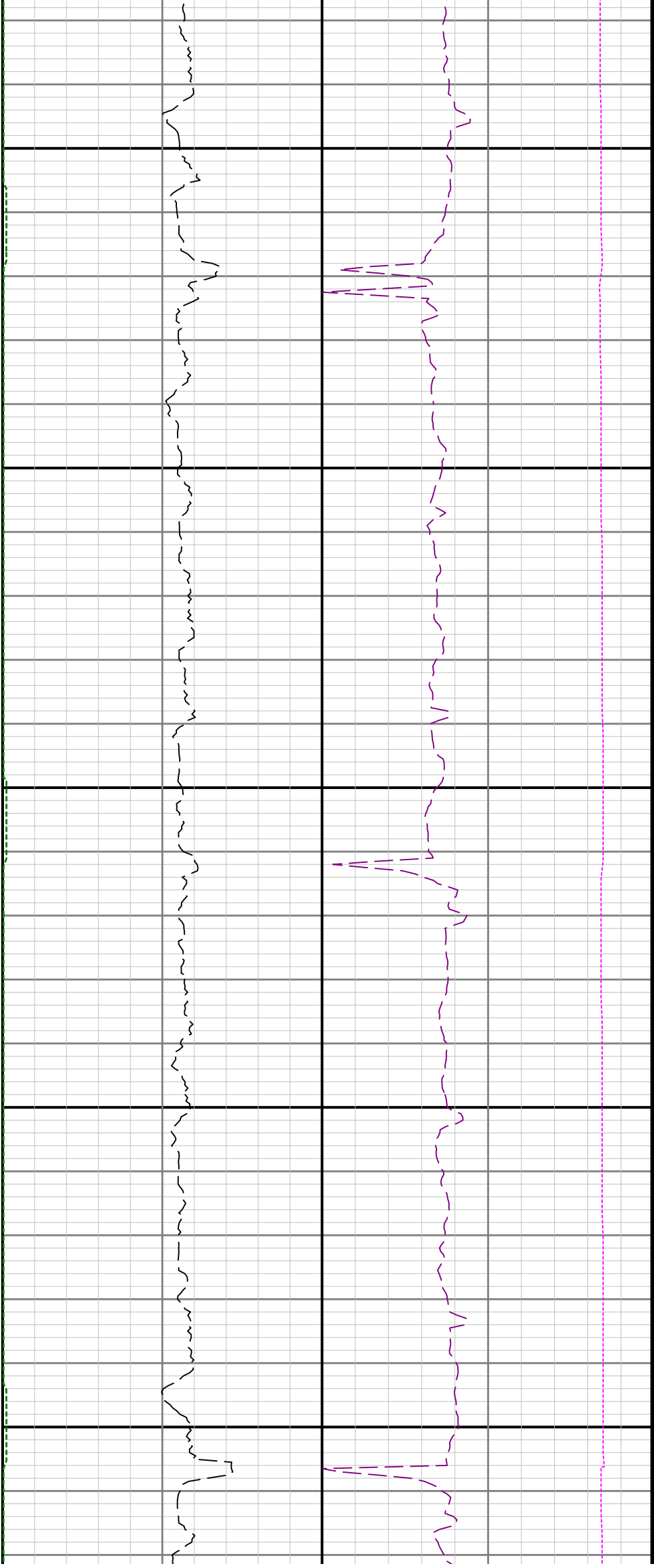
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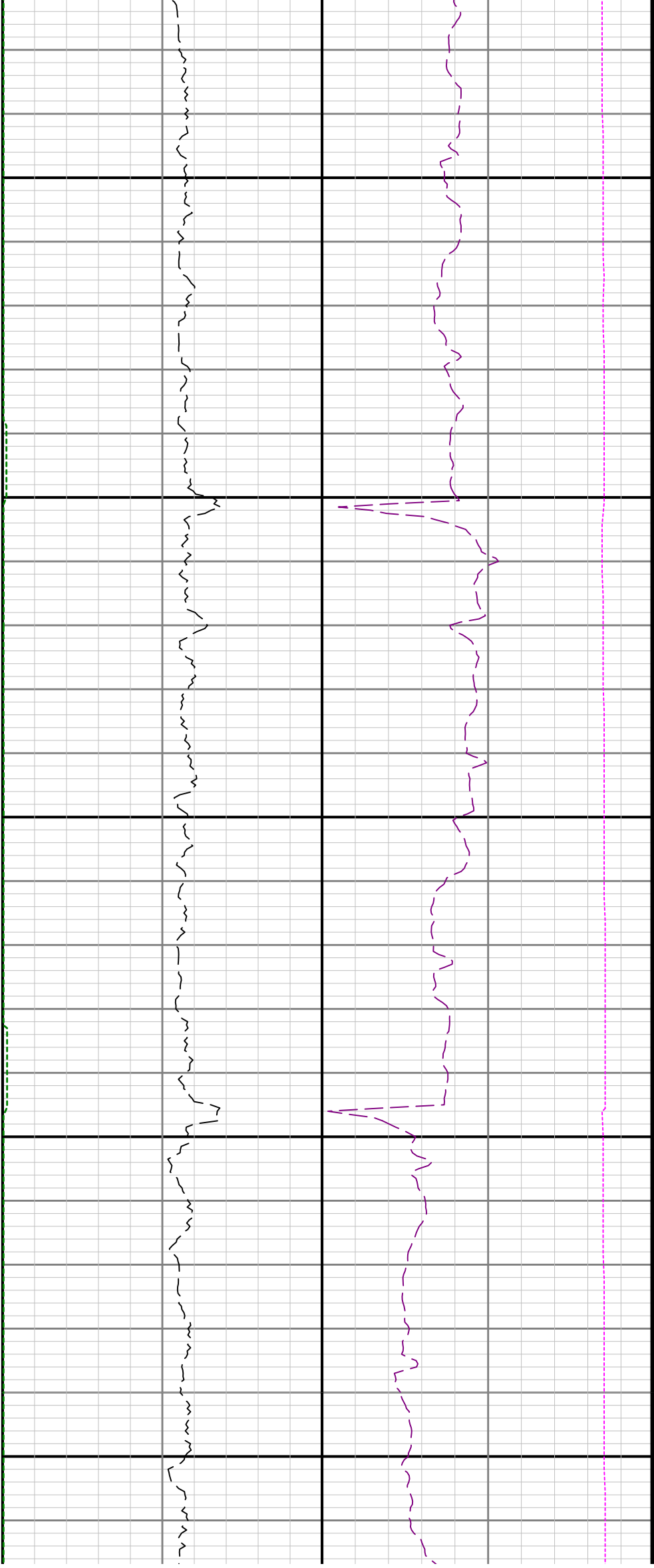
11700

11800



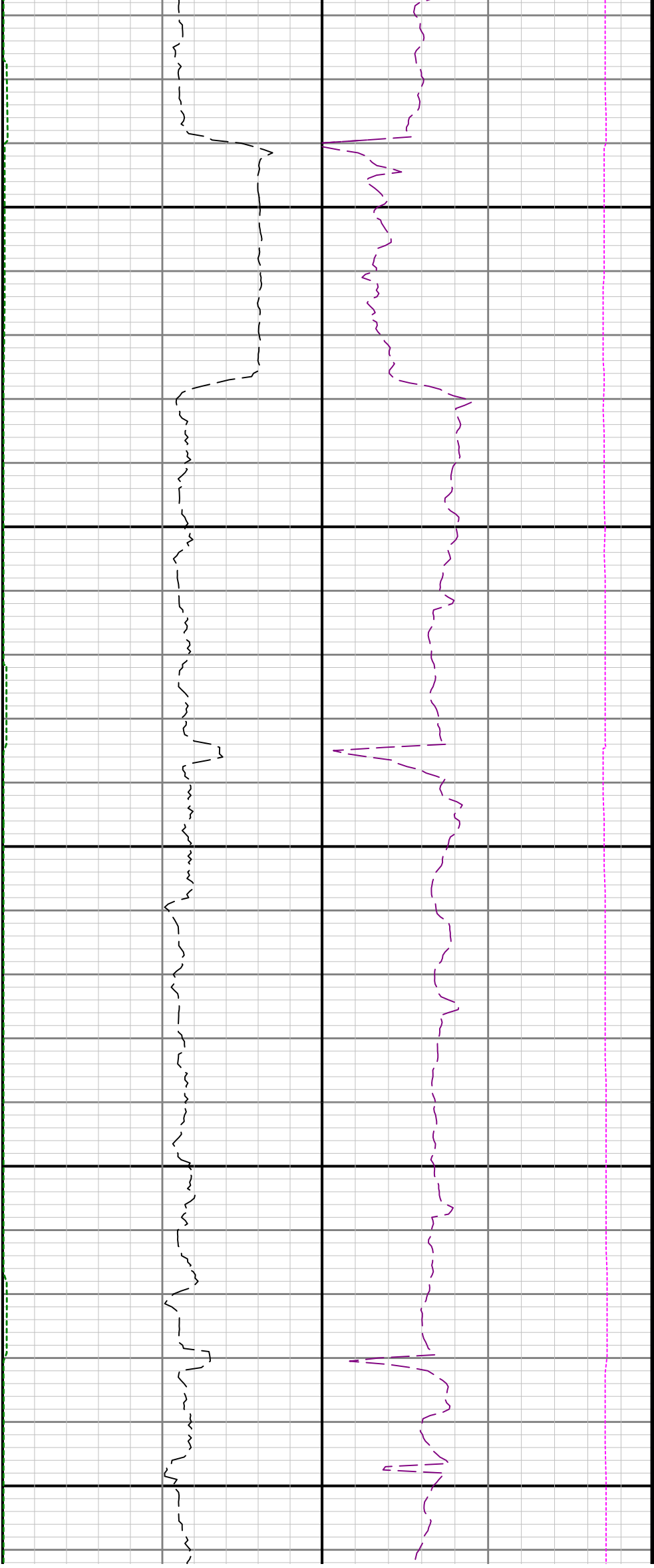






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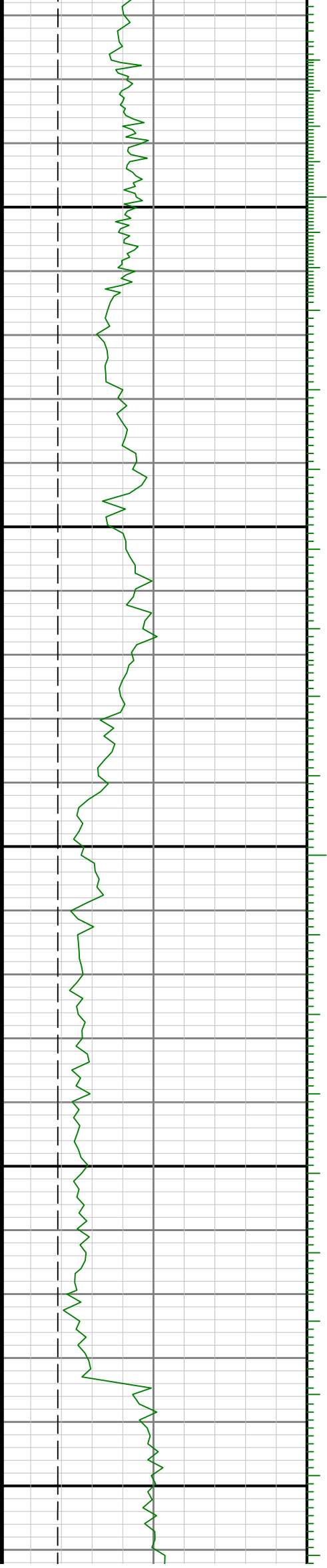
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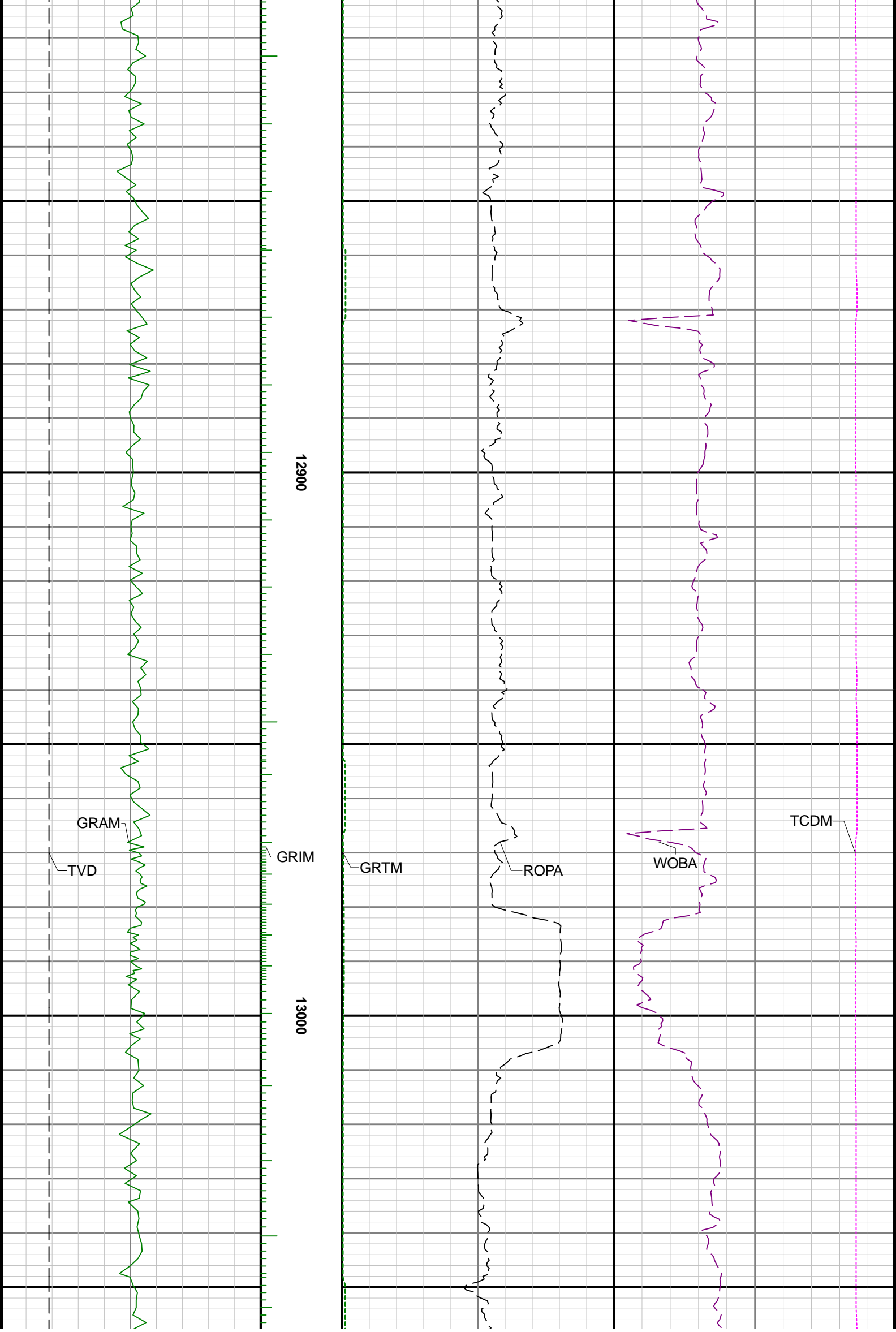


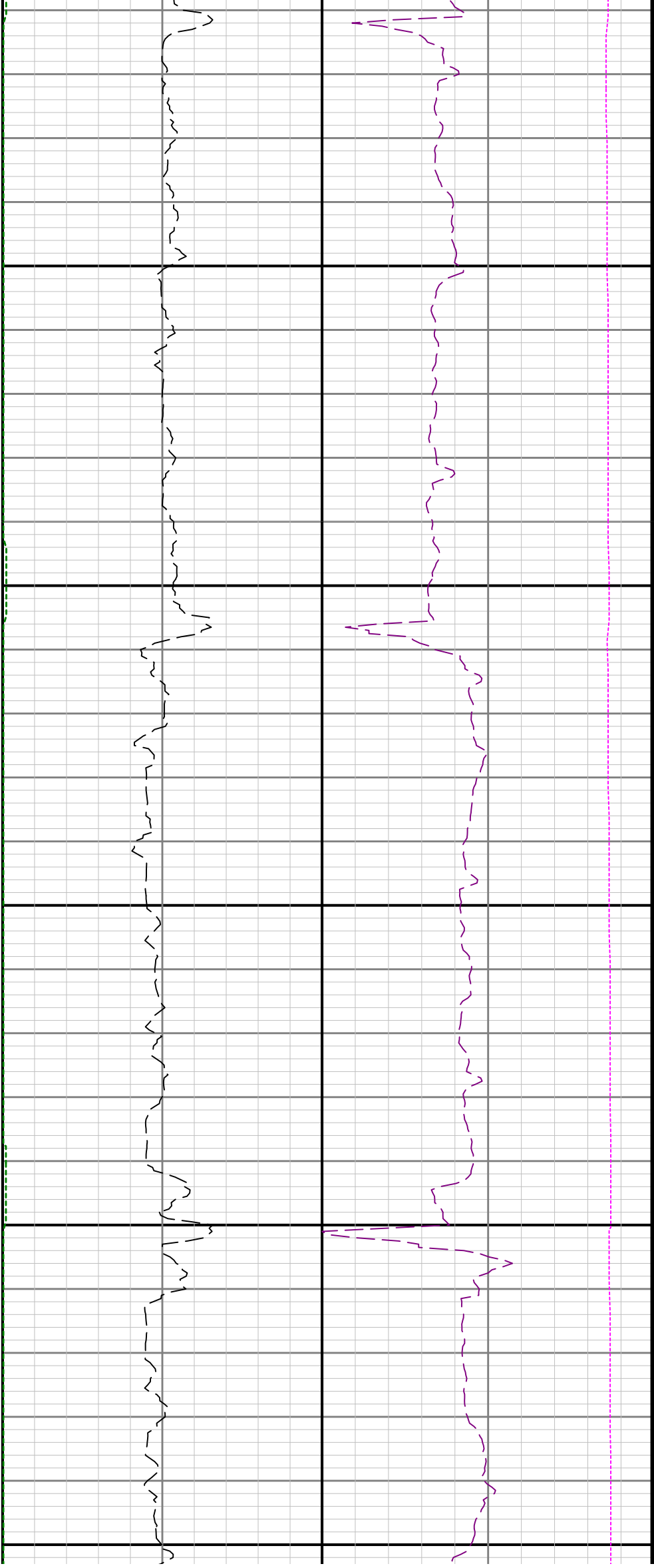
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12700

12800



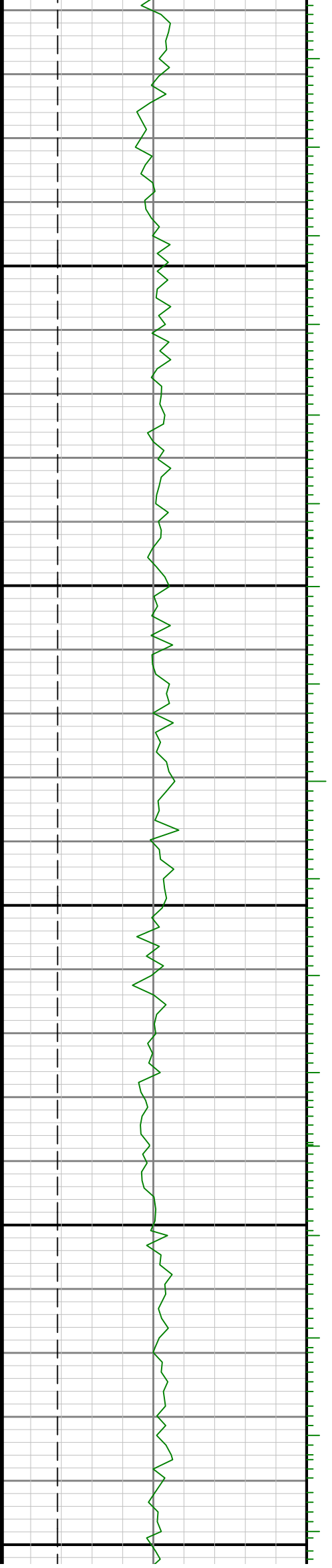


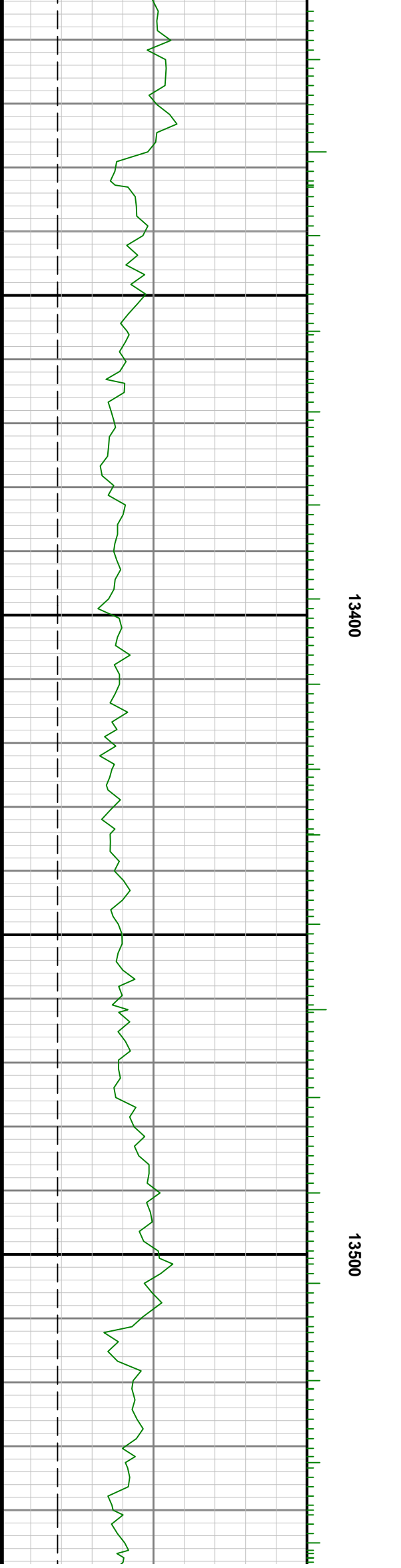
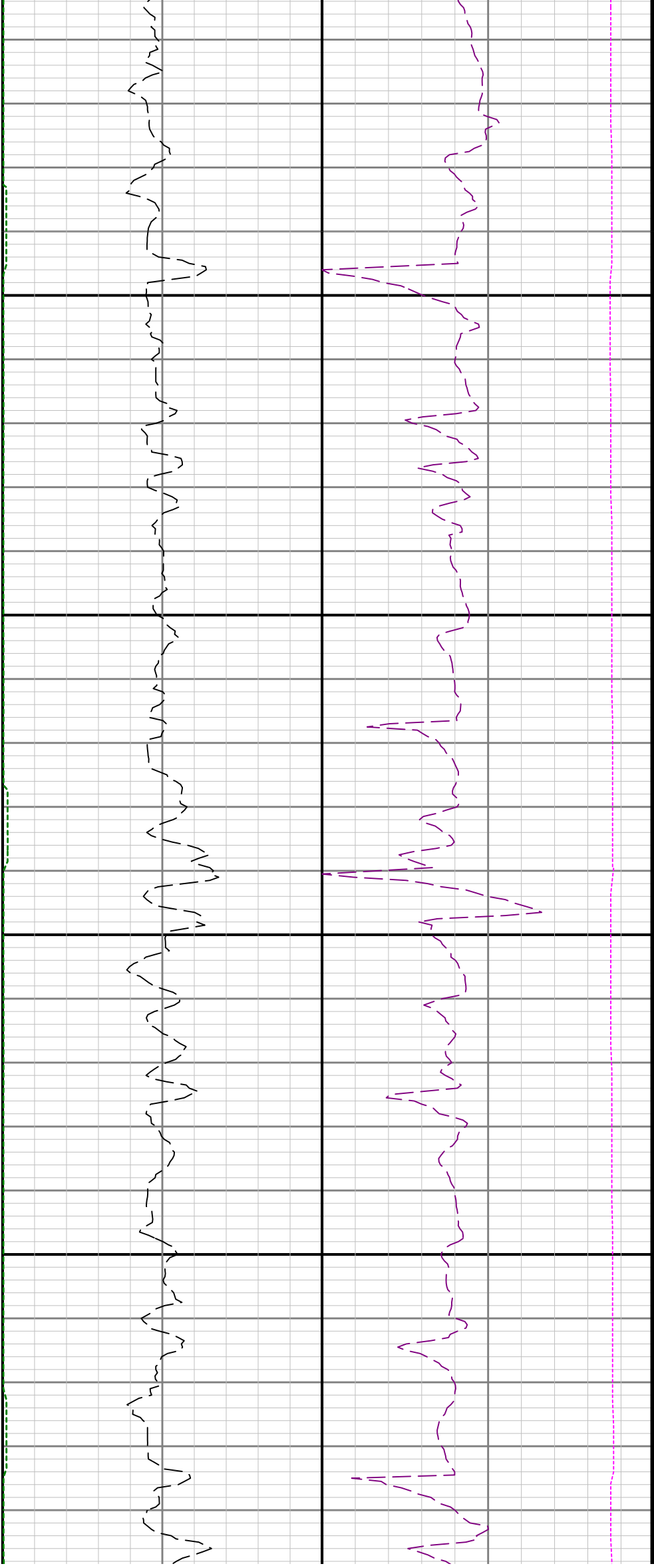


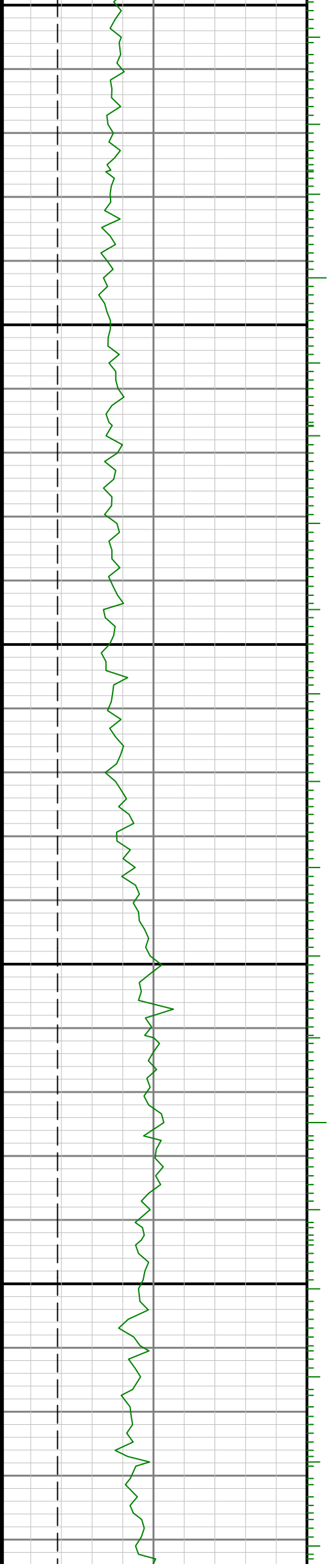
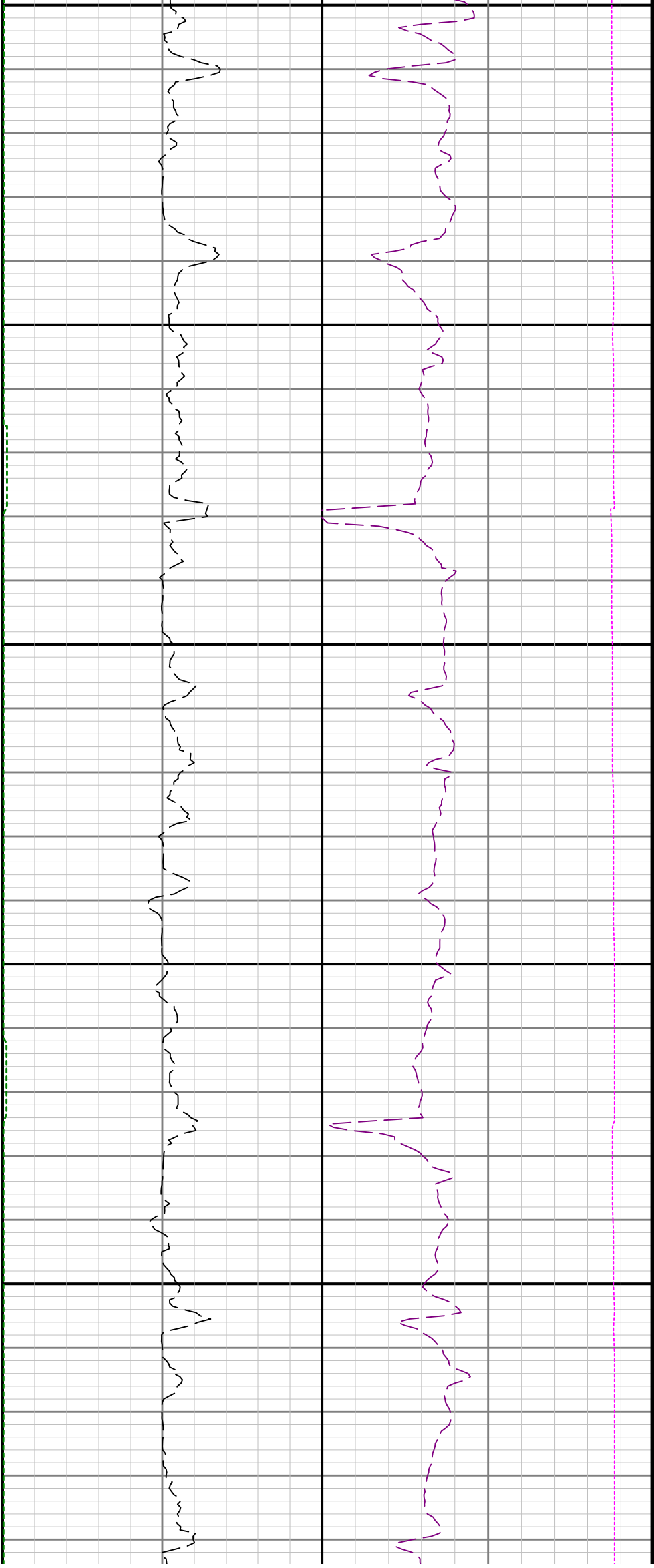
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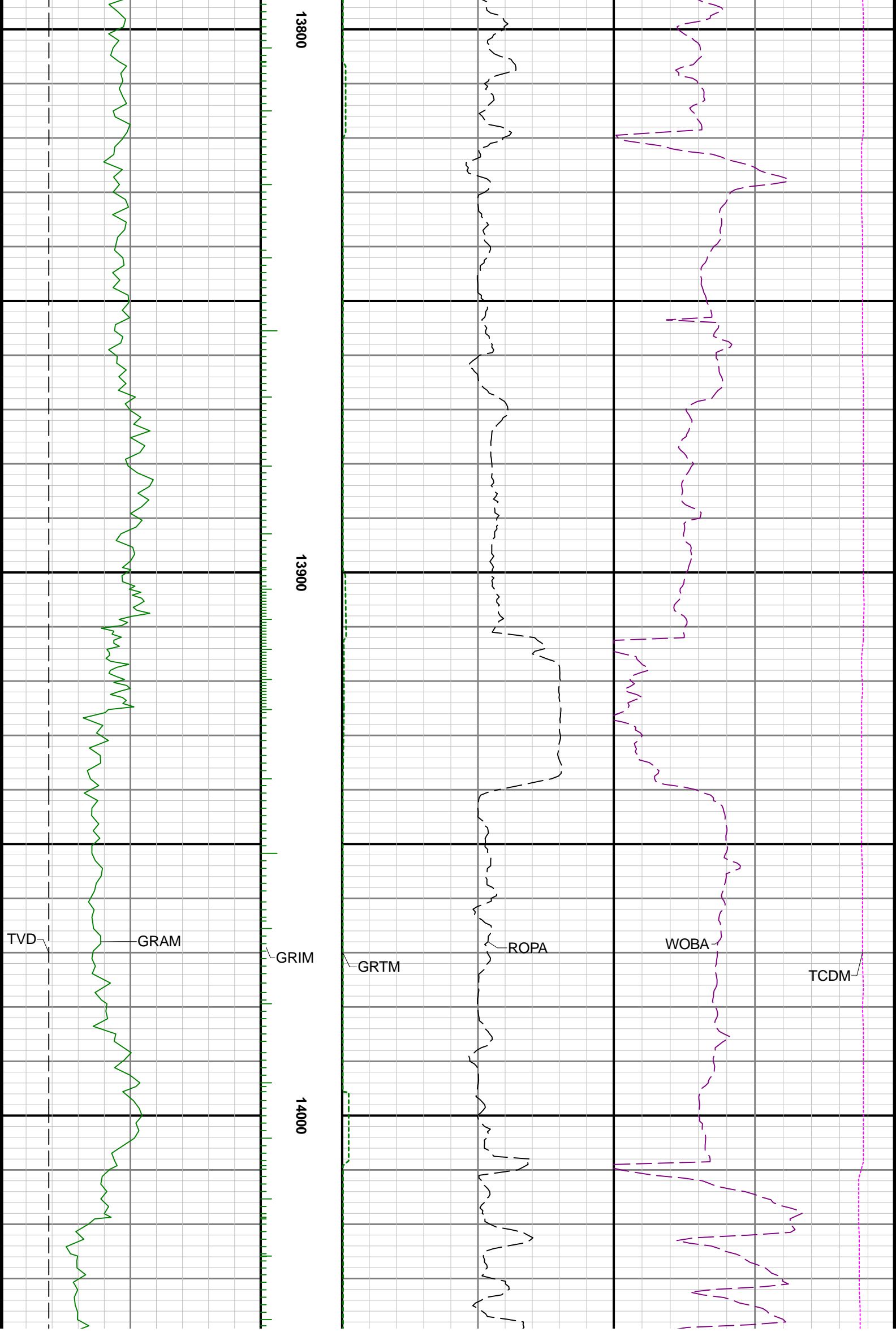
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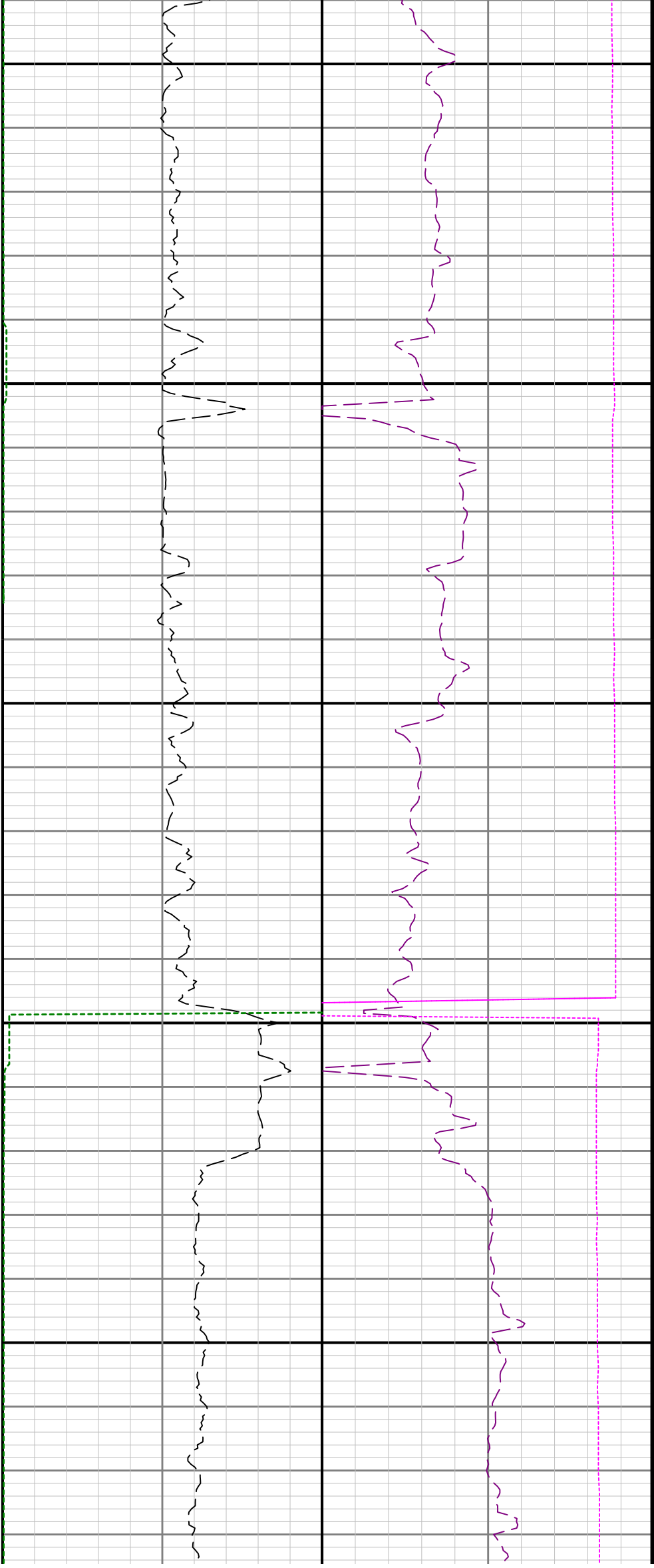
13300









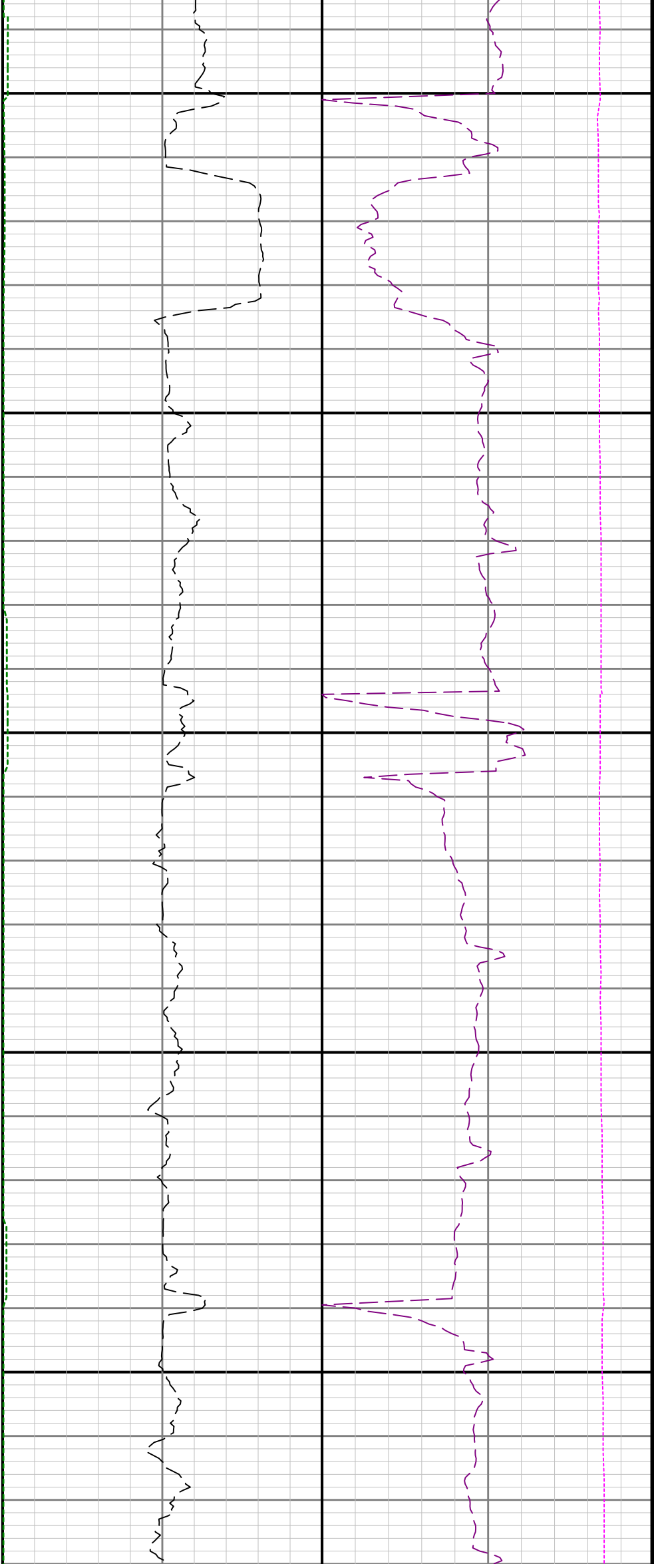


14100

14200

R2↔R3

See Remark 4



14300

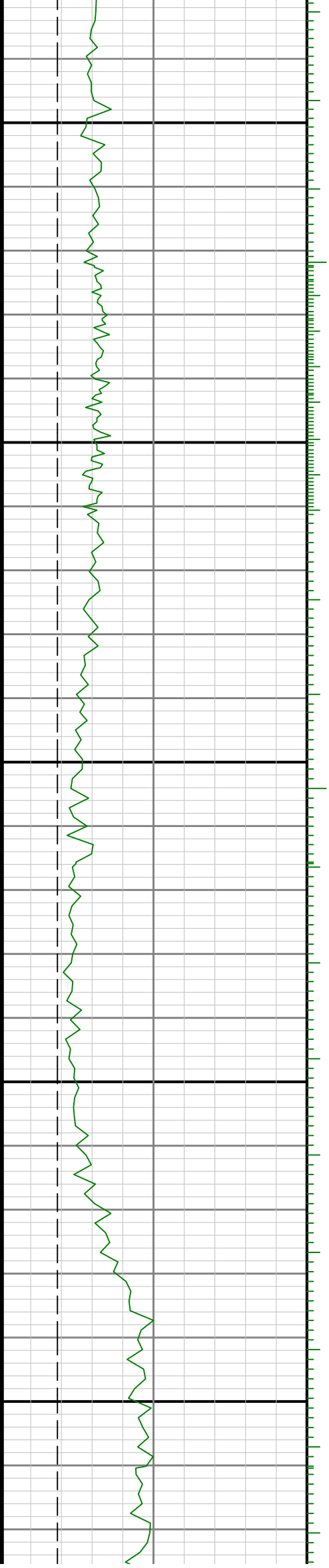
14400

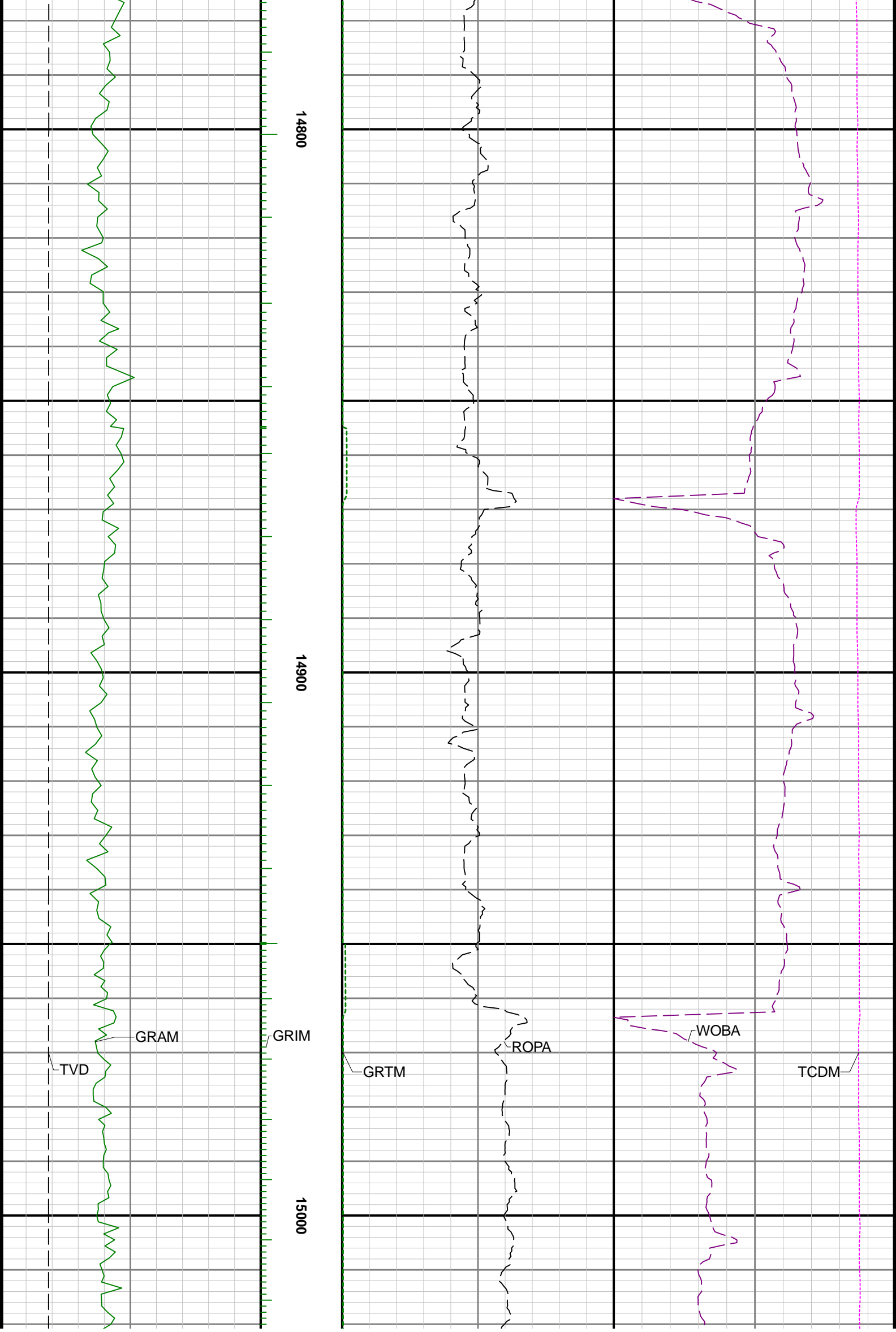
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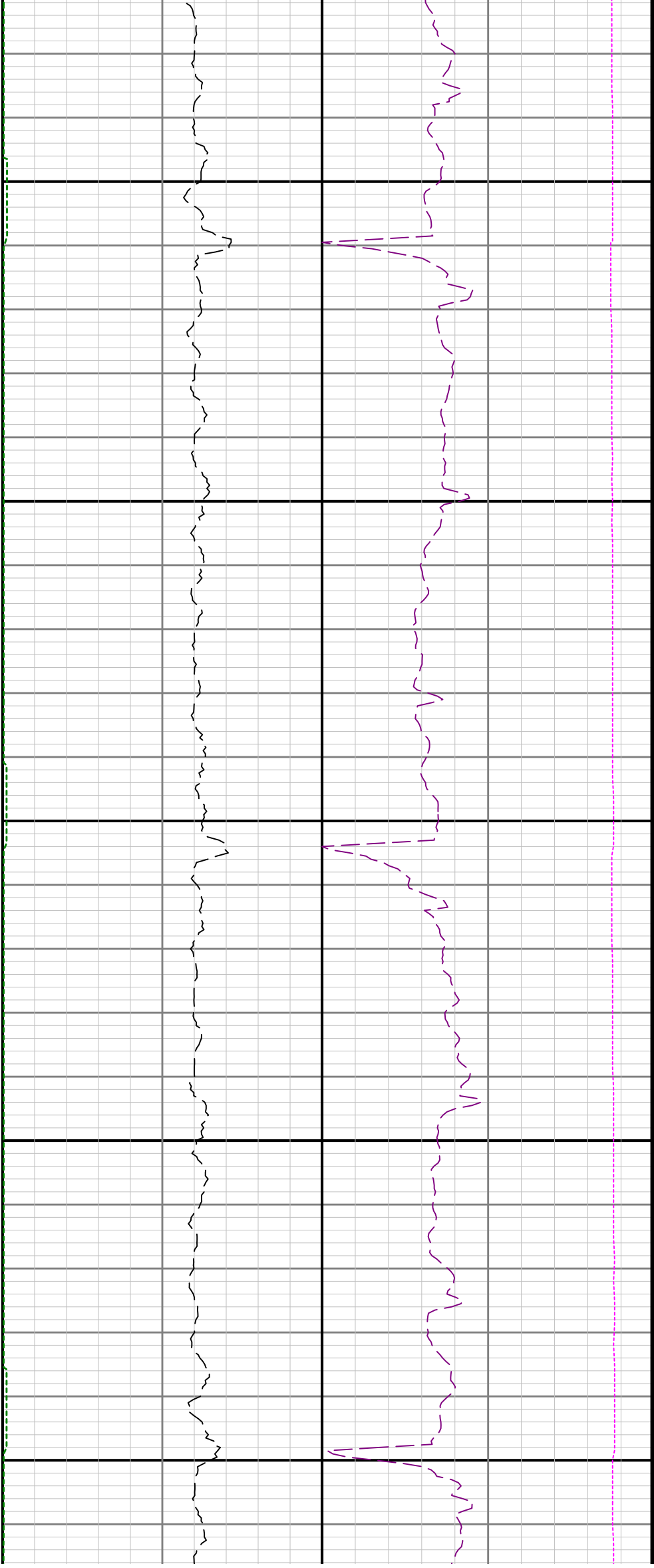


14600

14700

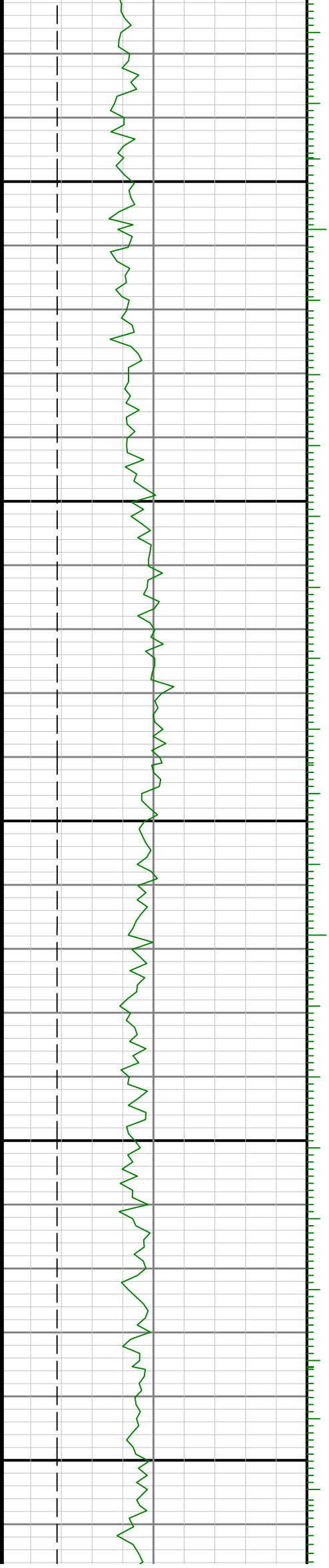


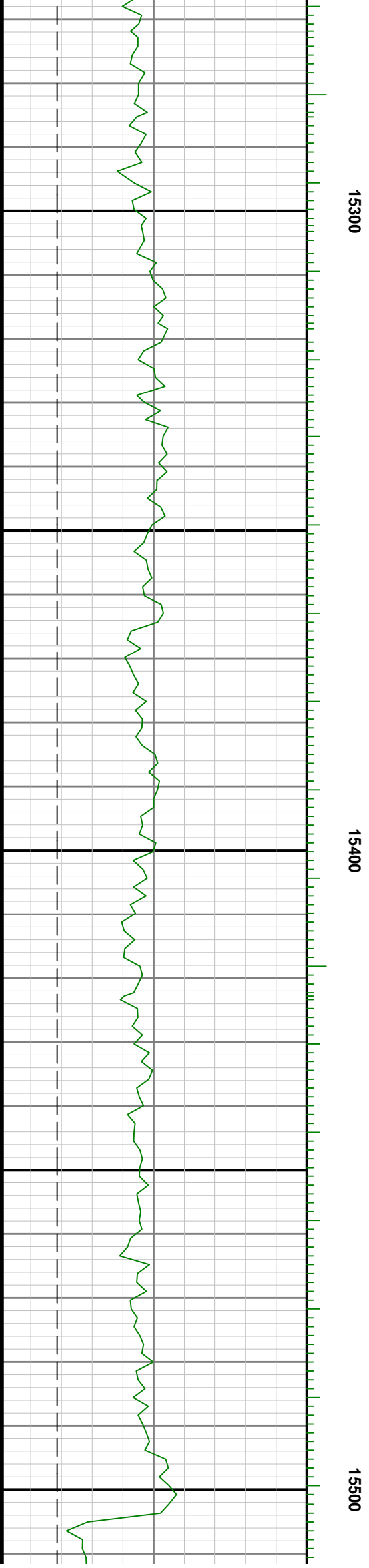
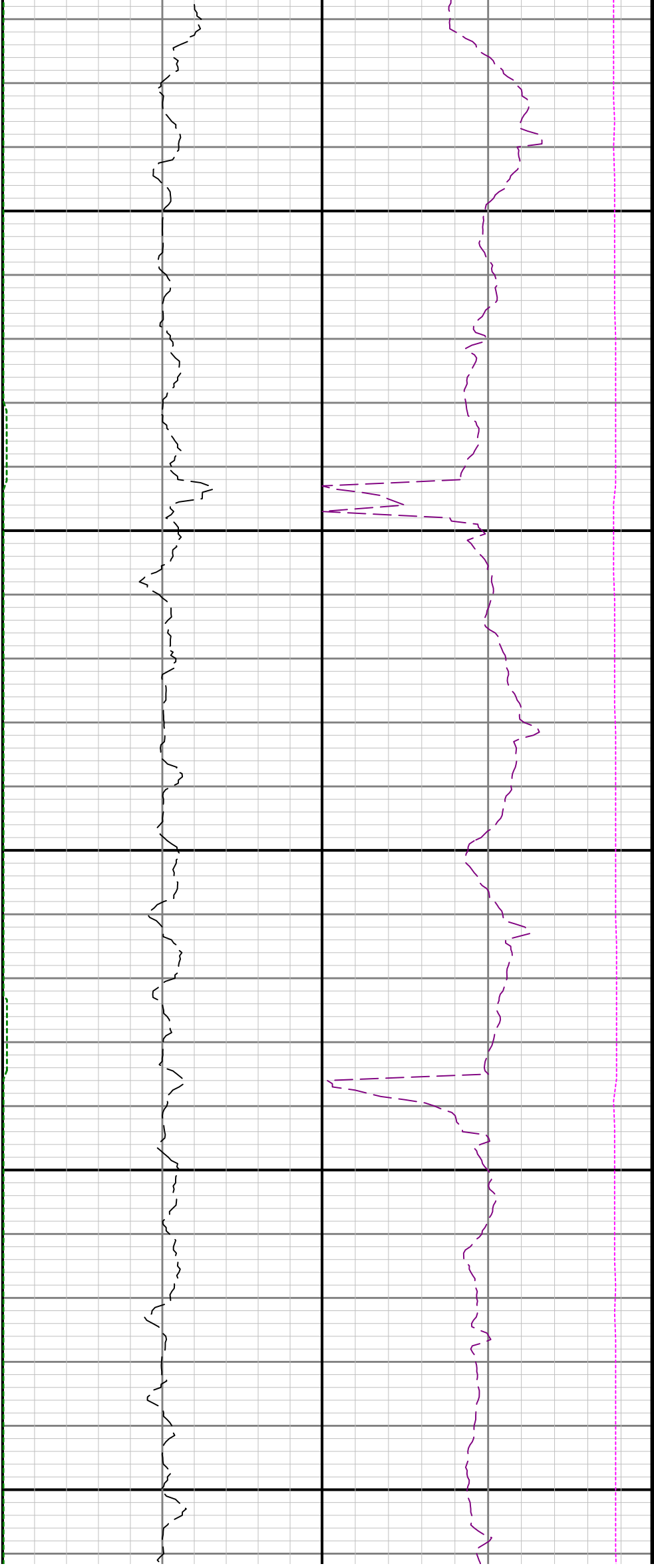


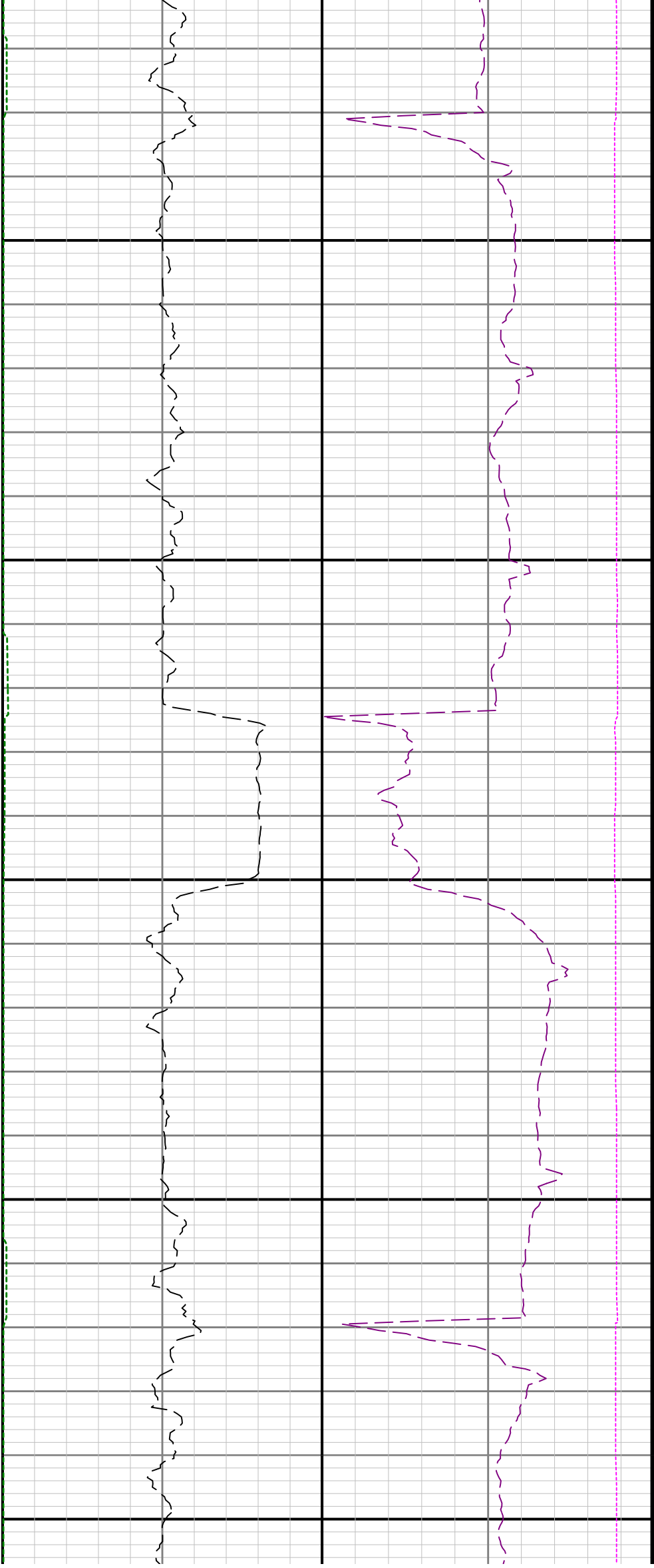


15100

15200

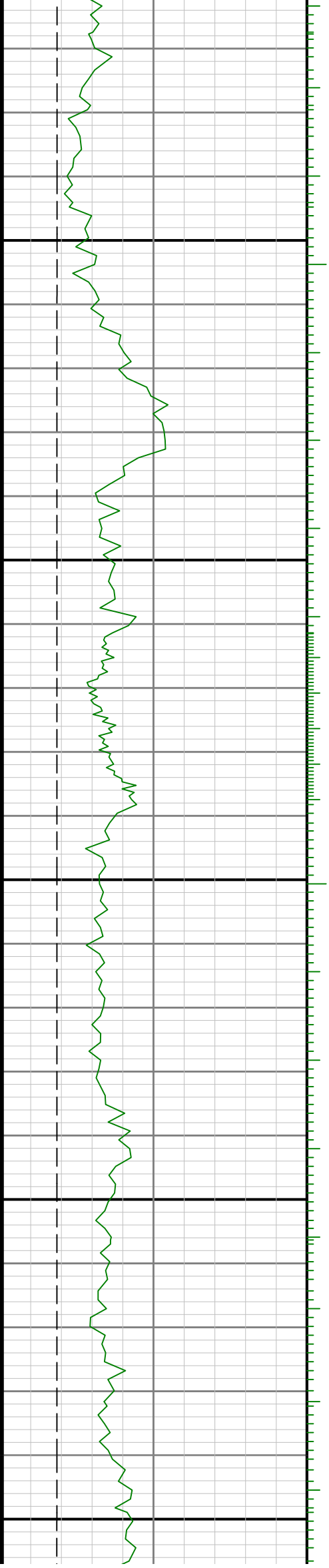


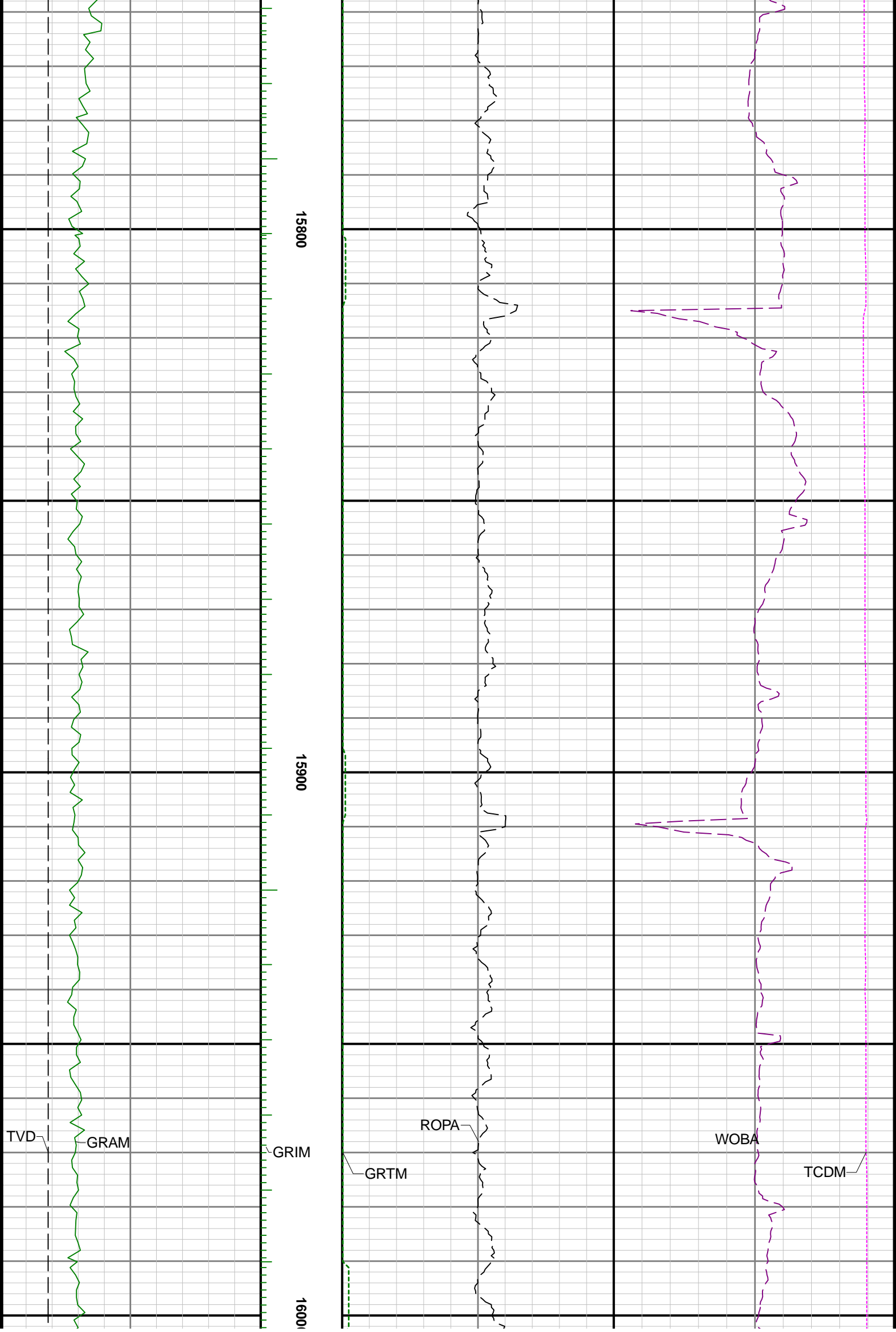


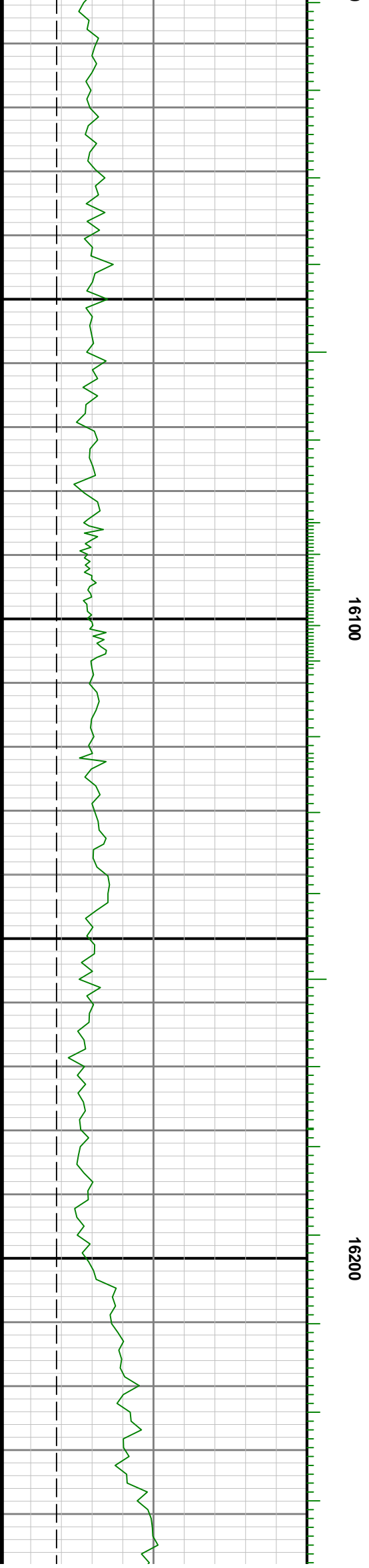
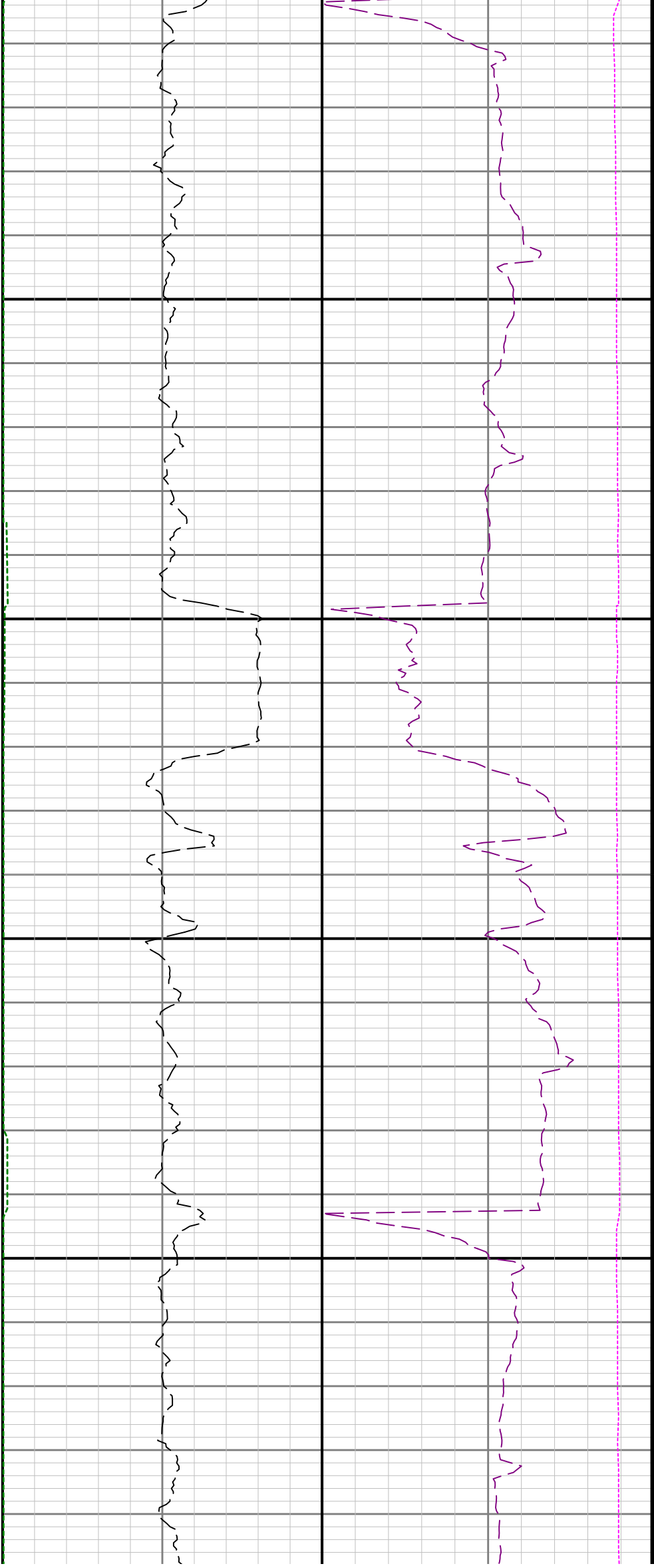


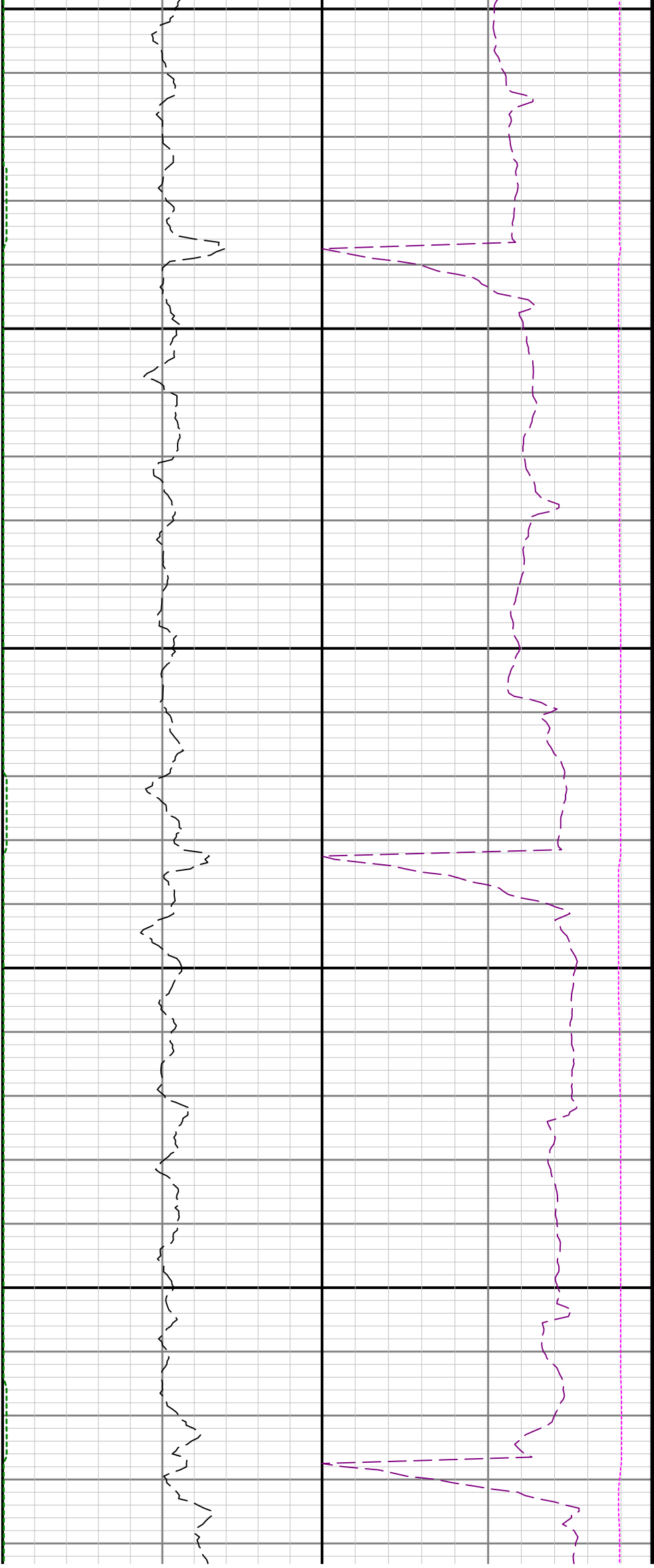
15600

15700









16300

16400

