



Gamma Ray

LWD MEMORY LOG

Scale:

1:240

Measured Depth

Depth Reference:

Driller's Depth

Status:

Final Print

API No: 05-123-51331-00

Job ID: 111055156

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

Log Measured From: Rlg Floor

Company: Noble Energy

Well: Roth A31-730

Field: Wattenberg

County:

Weld

Country: United States

State: Colorado

Surface Location:

Latitude:

Longitude:

SEC: 30

TWN: 6N

RGE: 64W

Elevation:

Above P.D.:

4728.00 ft

Elev. KB:

Elev. DF:

Elev. GL:

4728.00 ft

4698.00 ft

N/A

Directional

Other Services:

Dates

From: 2021-10-05

To: 2021-10-08

Spud: 2021-10-04

Drilled (ft)

Top: 1955.00

Bottom: 17204.00

Logged (ft)

Top: 1955.00

Bottom: 17191.00

Azi Reference North:

Grid

Dip Angle: (deg)

Magnetic Field Strength: (nT)

Total Magnetic Field Strength: (nT)

Mag to Reference North Correction: (deg)

66.75

51892

7.01

Borehole Record

Casing Record

Hole Size (in)

13.500

8.500

From (ft)

30.00

1955.00

To (ft)

1955.00

17204.00

Size (in)

9.625

Weight (lb/ft)

36.00

From (ft)

30.00

To (ft)

1945.00

Mud Record

Deviation Record

Type

Oil Based Mud

From (ft)

1955.00

To (ft)

17204.00

Hole Size (in)

8.500

Interval (ft)

15249.00

Inc | Az (Start)

0.23 | 100.72

Inc | Az (End)

90.12 | 179.65

Acquisition System

Software Version

Other

Cadence

DeliverableGen

RT 6.1

6.1.9214.1

Rig:

Contractor:

H&P 517

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 (h)
						Top (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
1	1	8.500	PDC	3.00	AutoTrak Curve	1955.00	2326.00	1955.00	2339.00	2021-10-05 03:20	2021-10-05 06:43	4.36
2	2	8.500	PDC	3.00	AutoTrak Curve	2326.00	15702.00	2339.00	15715.00	2021-10-05 11:29	2021-10-07 09:02	40.32
3	3	8.500	PDC	3.00	AutoTrak Curve	15702.00	17191.00	15715.00	17204.00	2021-10-08 00:48	2021-10-08 06:33	6.19

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Jeremiah Samson	2021-10-04	2021-10-08	Mike Gurnsey	2021-10-04	2021-10-08	Tien Bui	2021-10-04	2021-10-08
Andrea Guidry	2021-10-06	2021-10-08	Chris Campbell	2021-10-07	2021-10-08			

Witness

Name	Run
Dave Nielsen	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+ (%)
2021-10-04 14:07	1	1955.00	Oil Based Mud	9.3	10	N/A	18.0	79.5/20.5	Active Pit	25000	0.00
2021-10-05 10:04	2	2339.00	Oil Based Mud	9.3	10	N/A	18.0	79.5/20.5	Active Pit	25000	0.00
2021-10-06 13:14	2	7396.00	Oil Based Mud	10.1	14	N/A	4.0	79.2/20.8	Active Pit	29000	0.00
2021-10-07 07:36	2	15010.00	Oil Based Mud	10.1	15	N/A	4.0	80/20	Active Pit	28500	0.00
2021-10-07 16:30	3	15715.00	Oil Based Mud	10.1	15	N/A	4.0	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	14452345	Near Bit Inclination	5.93	6.76	7.000	4.330
1	AutoTrak Curve Steering Unit	14452345	Near Bit VSS	5.93	6.76	7.000	4.330
1	AutoTrak Curve MWD	12570158	Gamma (single)	2.77	12.93	7.000	3.250
1	AutoTrak Curve MWD	12570158	Directional (mag)	12.27	22.43	7.000	3.250
2	AutoTrak Curve Steering Unit	14382369	Near Bit VSS	5.93	6.76	7.000	4.330
2	AutoTrak Curve Steering Unit	14382369	Near Bit Inclination	5.93	6.76	7.000	4.330
2	AutoTrak Curve MWD	14452418	Gamma (single)	2.79	12.93	7.000	3.250
2	AutoTrak Curve MWD	14452418	Directional (mag)	12.27	22.41	7.000	3.250
3	AutoTrak Curve Steering Unit	14382369	Near Bit VSS	5.93	6.76	7.000	4.330
3	AutoTrak Curve Steering Unit	14382369	Near Bit Inclination	5.93	6.76	7.000	4.330
3	AutoTrak Curve MWD	14452418	Gamma (single)	2.79	12.93	7.000	3.250
3	AutoTrak Curve MWD	14452418	Directional (mag)	12.27	22.41	7.000	3.250

Service and Tool Mnemonics

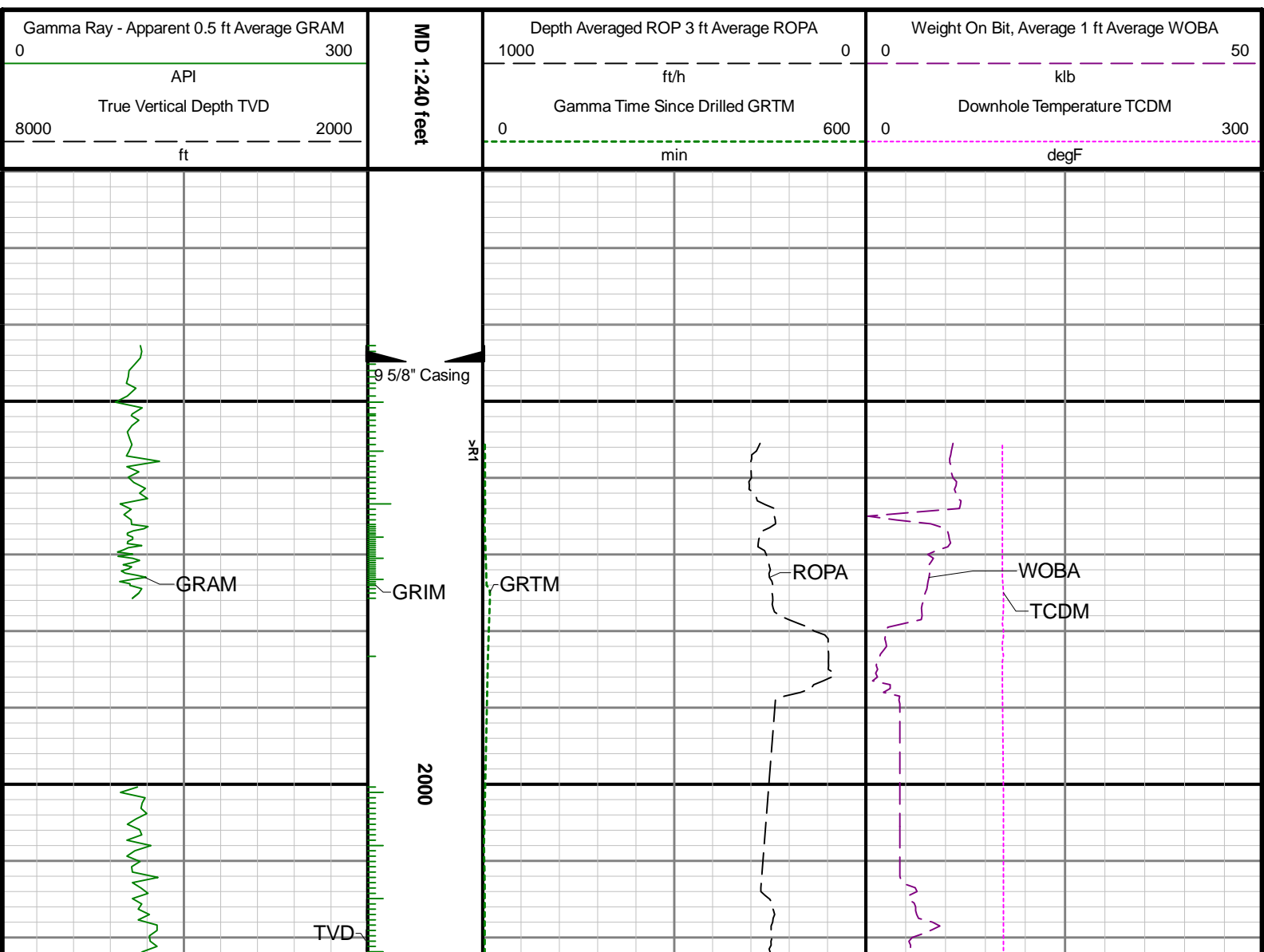
Mnemonic	Name	Description
ATC SU	AutoTrak Curve SU	Auto Trak Curve Steering Unit
ATC MWD	AutoTrak Curve MWD	Auto Trak Curve MWD
ATC LCPM	AutoTrak Curve LCPM	Auto Trak Curve LCPM

Comments

- 1 Baker Hughes Company runs 1 through 3 utilized 6 ¾ inch NaviGamma services (Gamma Ray and Directional) behind an 8 ½ inch PDC bit and rotary steerable assembly from 1955 to 17204 feet MD (1955 to 6853 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

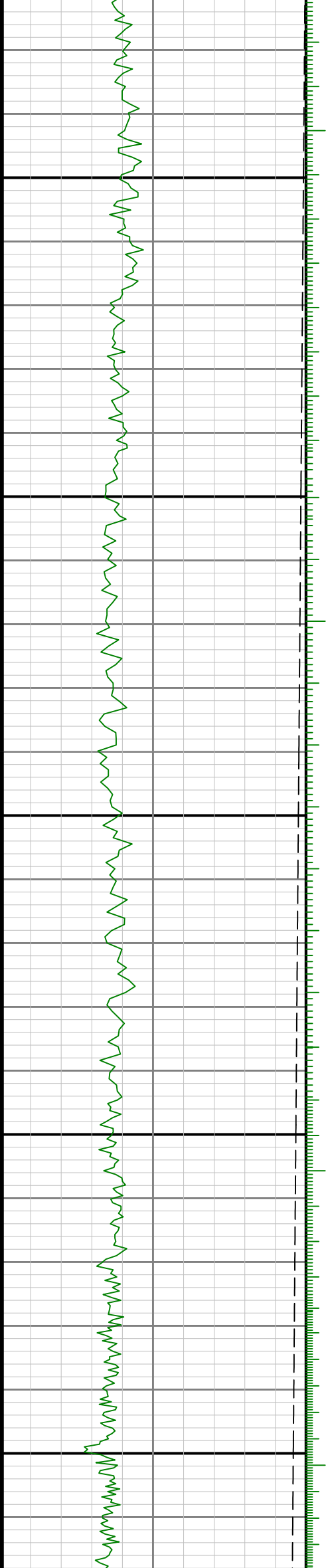
Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	2326.00	8.500	1	The interval from 2326 to 2339 feet MD (2325 to 2338 feet TVD) was logged up to 5 hours after being drilled due to trip out of hole to change BHA.
2	15702.00	8.500	3	The interval from 15702 to 15715 feet MD (6856 to 6856 feet TVD) was logged up to 13 hours after being drilled due to trip out of hole to change BHA.
3	17191.00	8.500	3	The interval from 17191 to 17204 feet MD (6853 to 6853 feet TVD) was not logged due to sensor to bit offset at well TD.

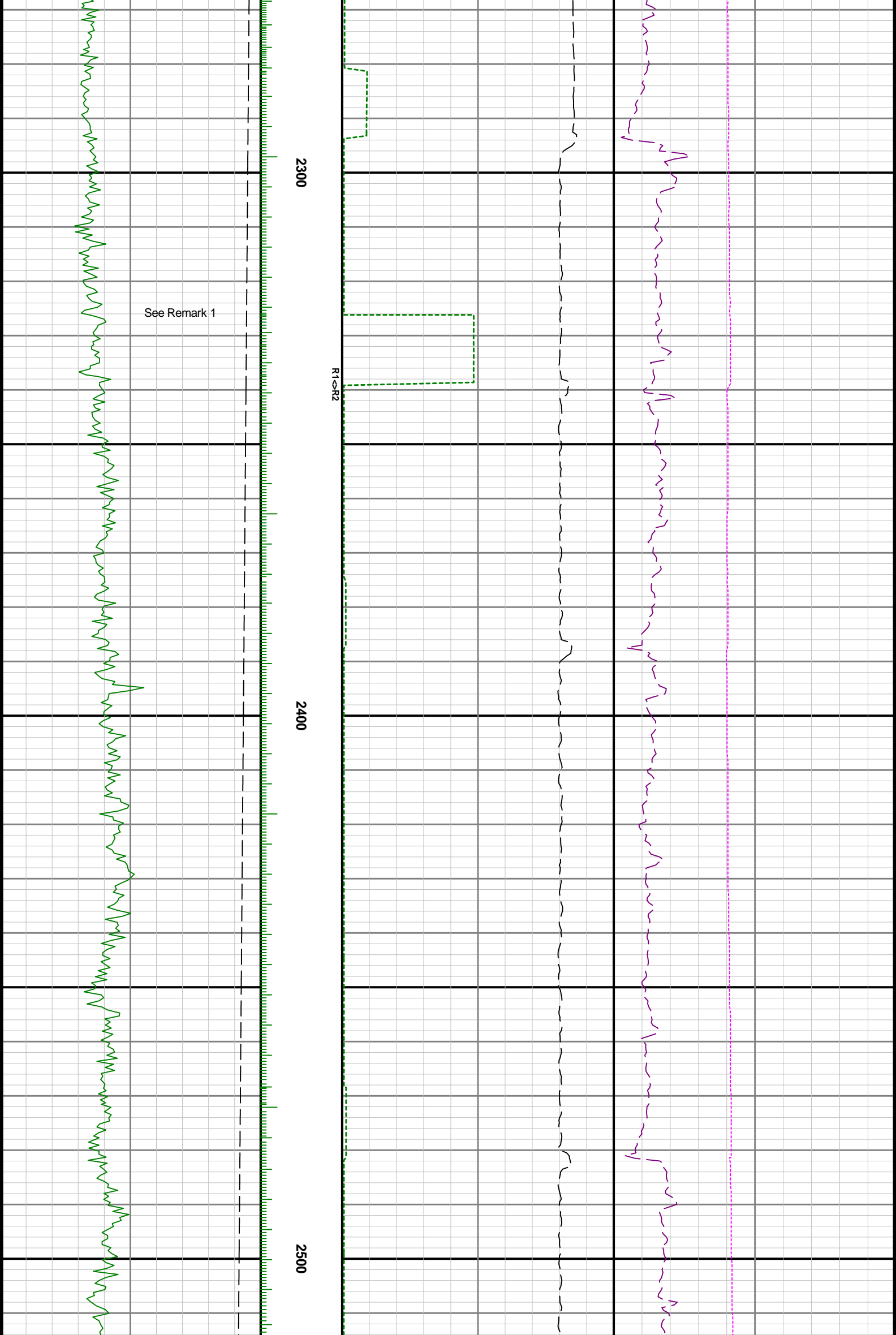


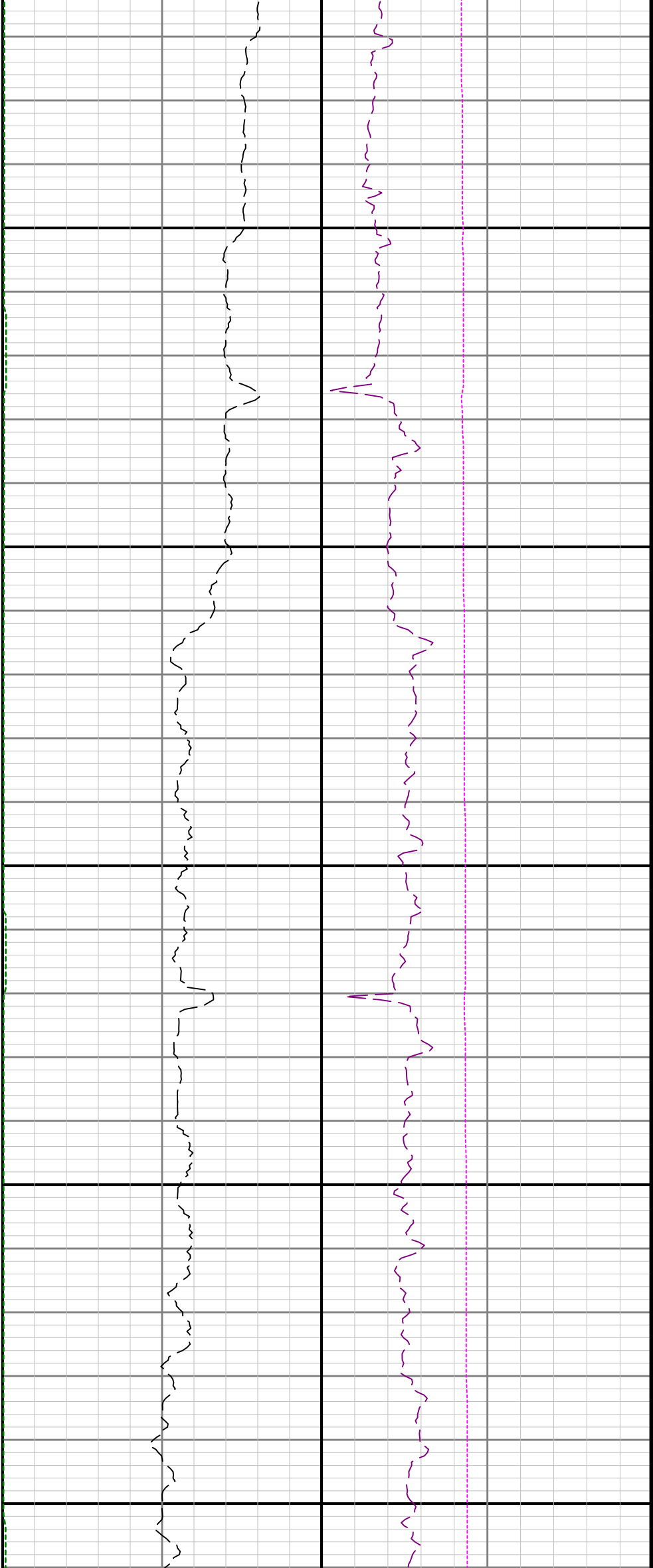


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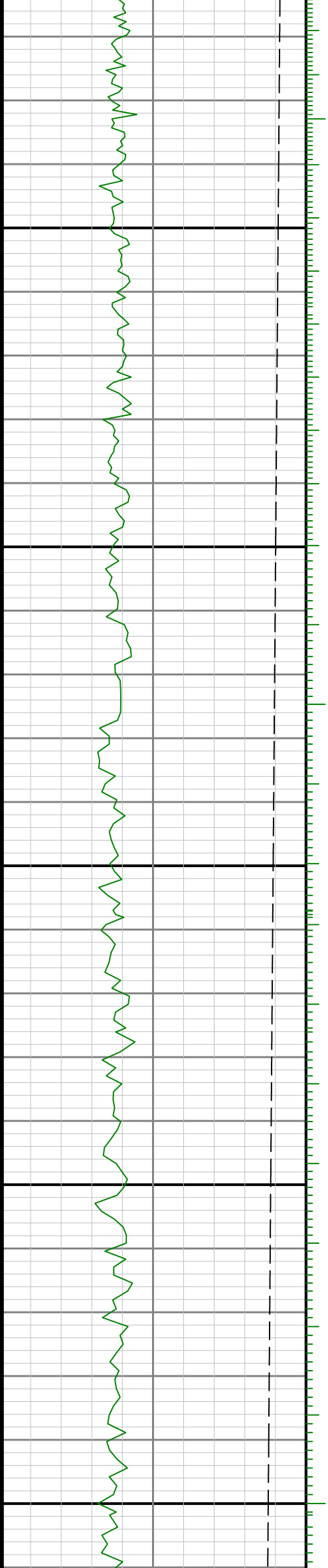


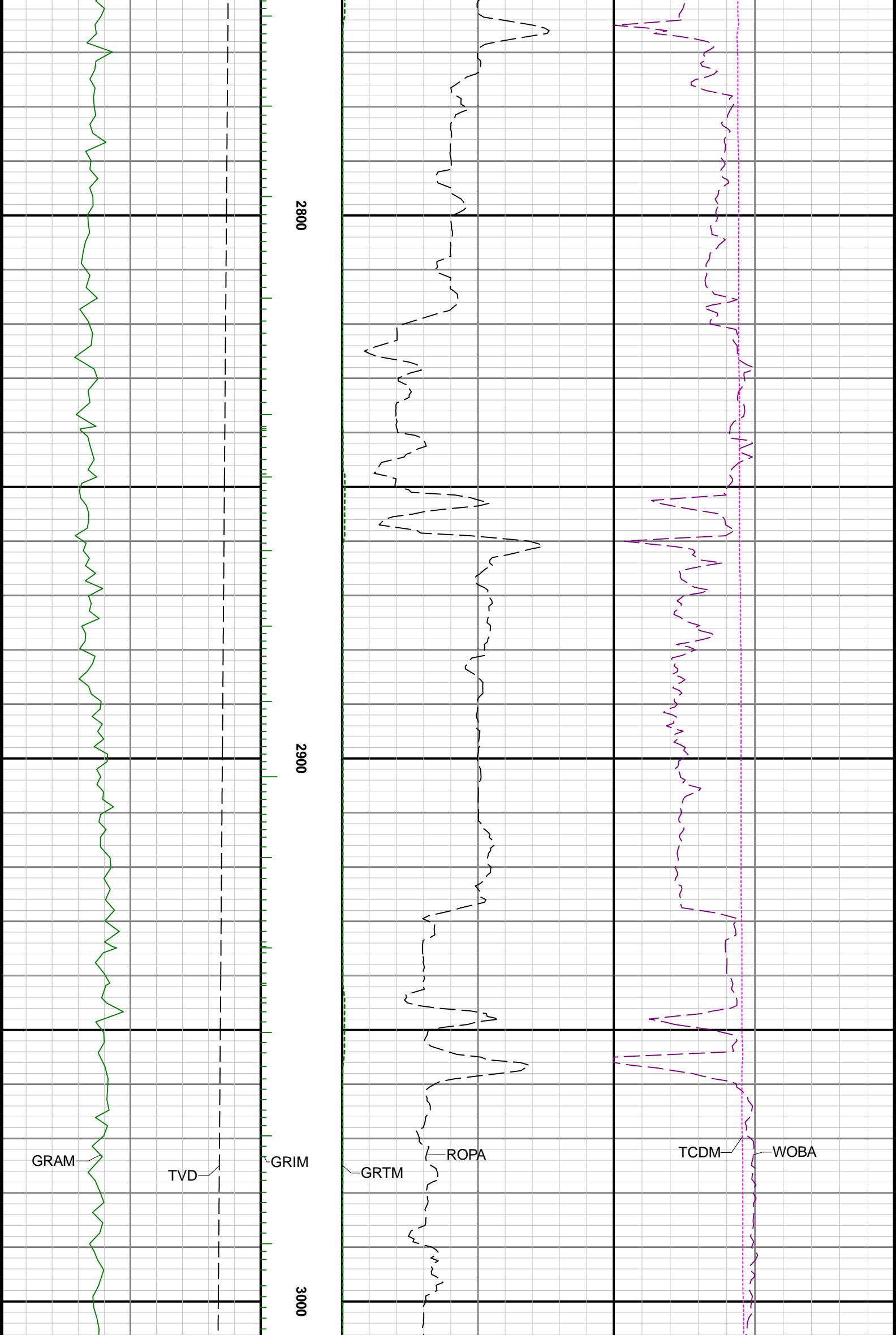


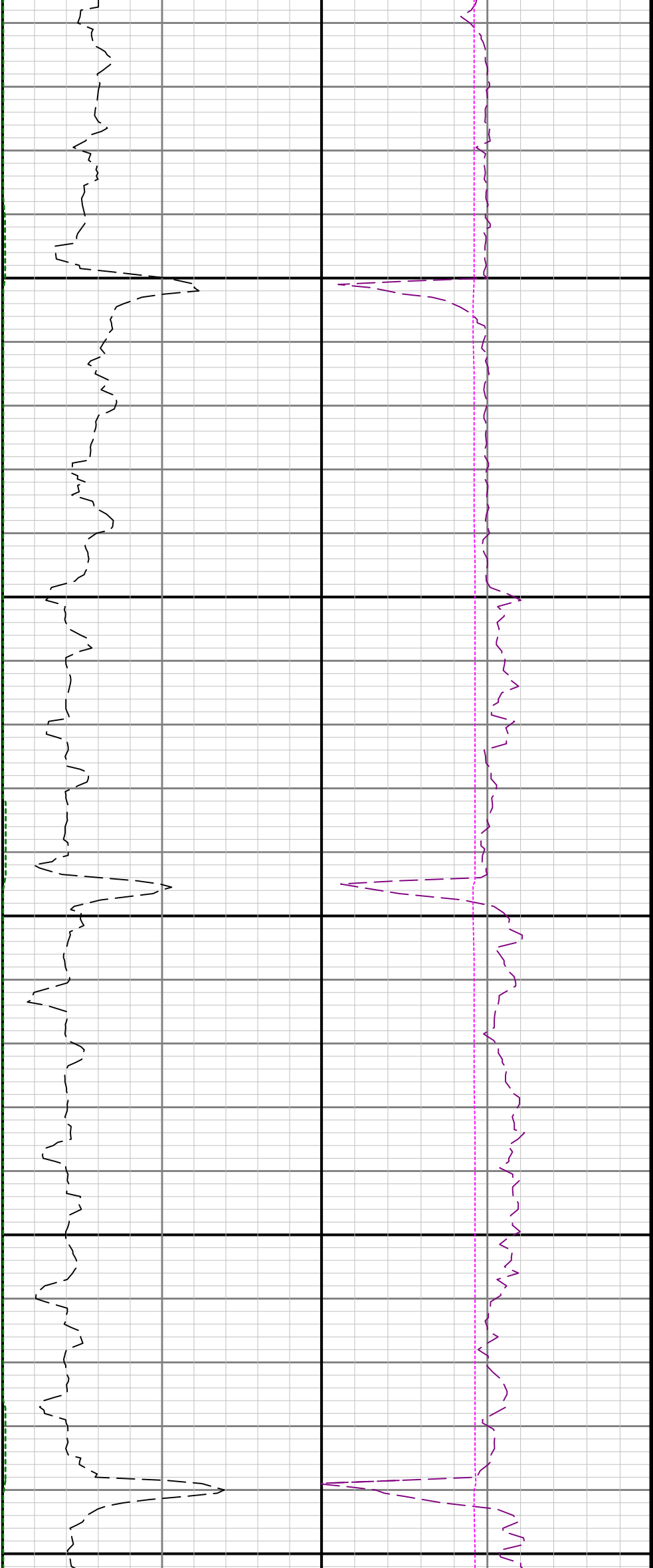


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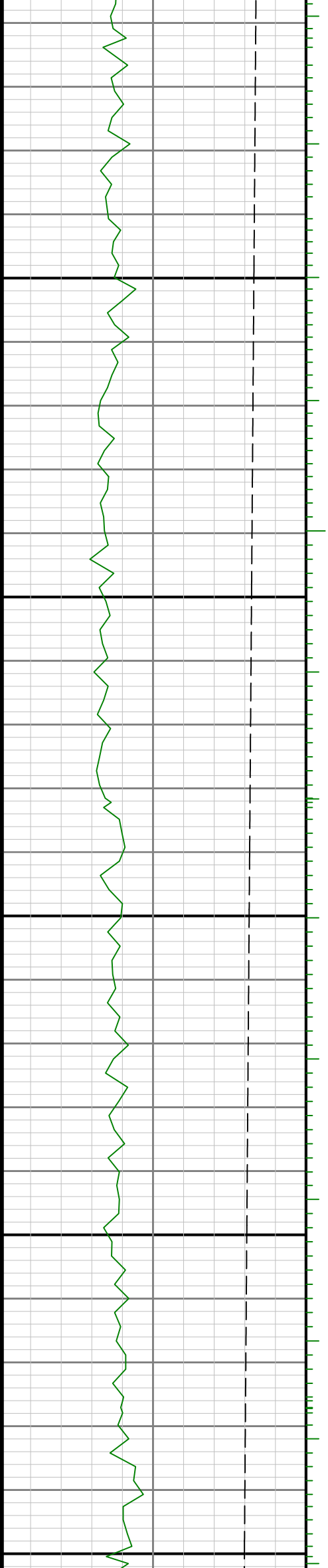


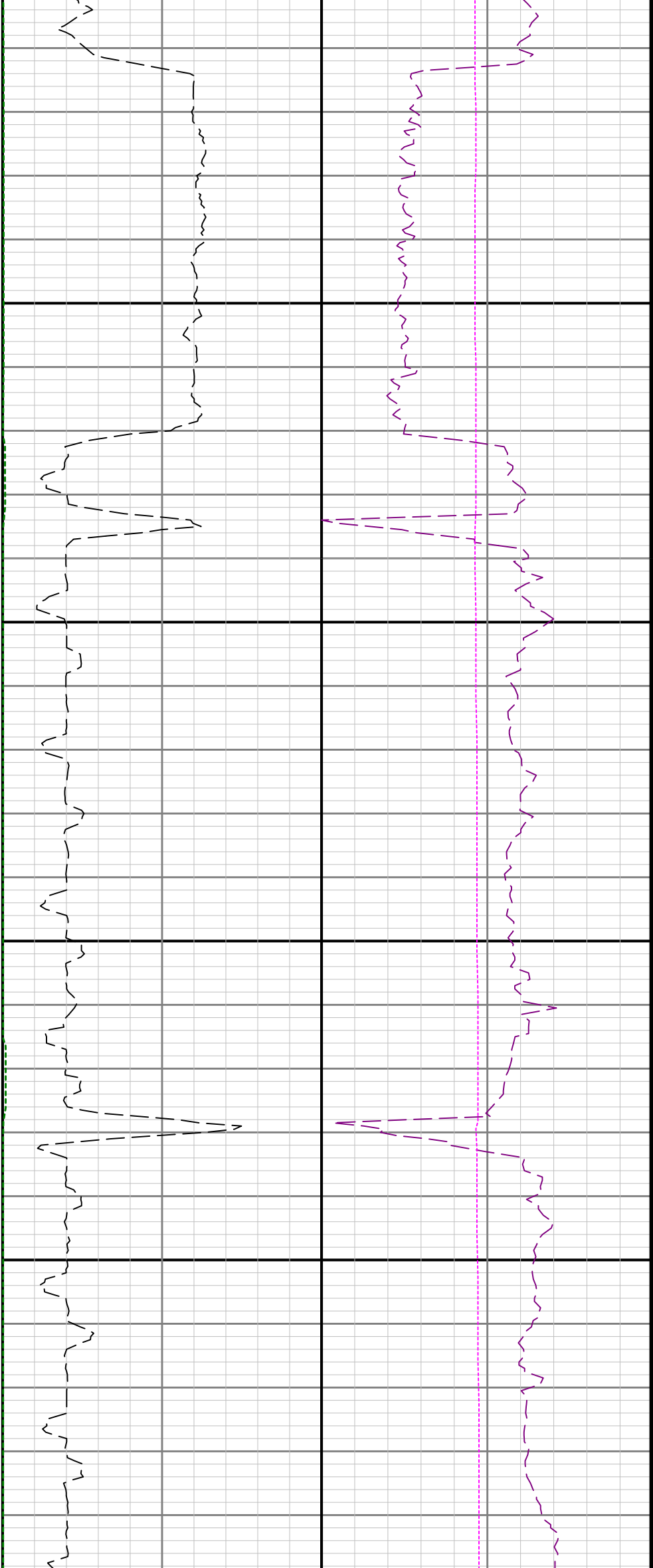




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3200

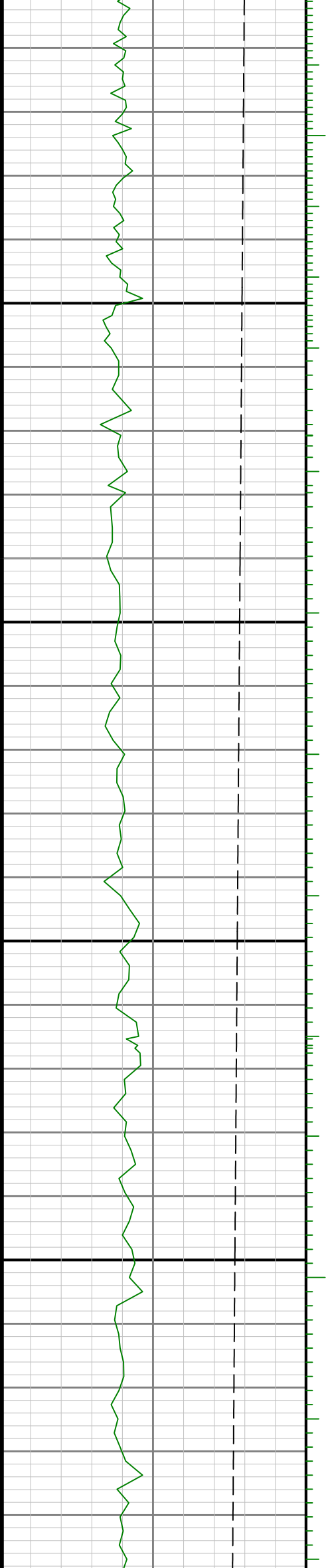


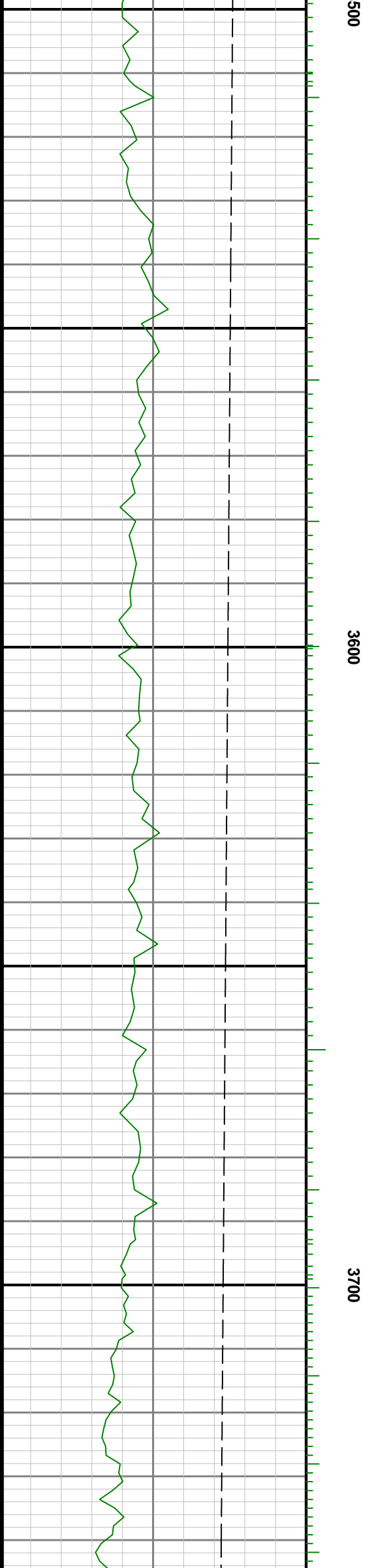
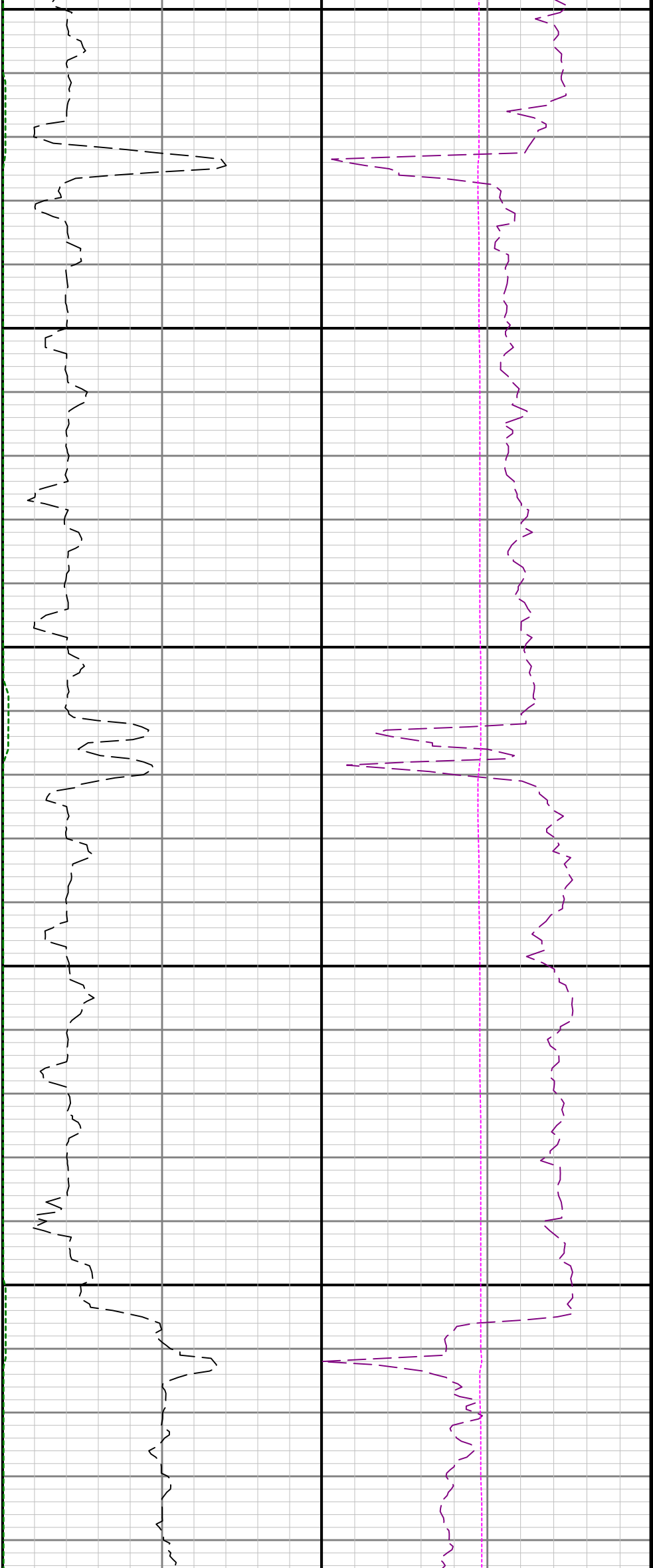


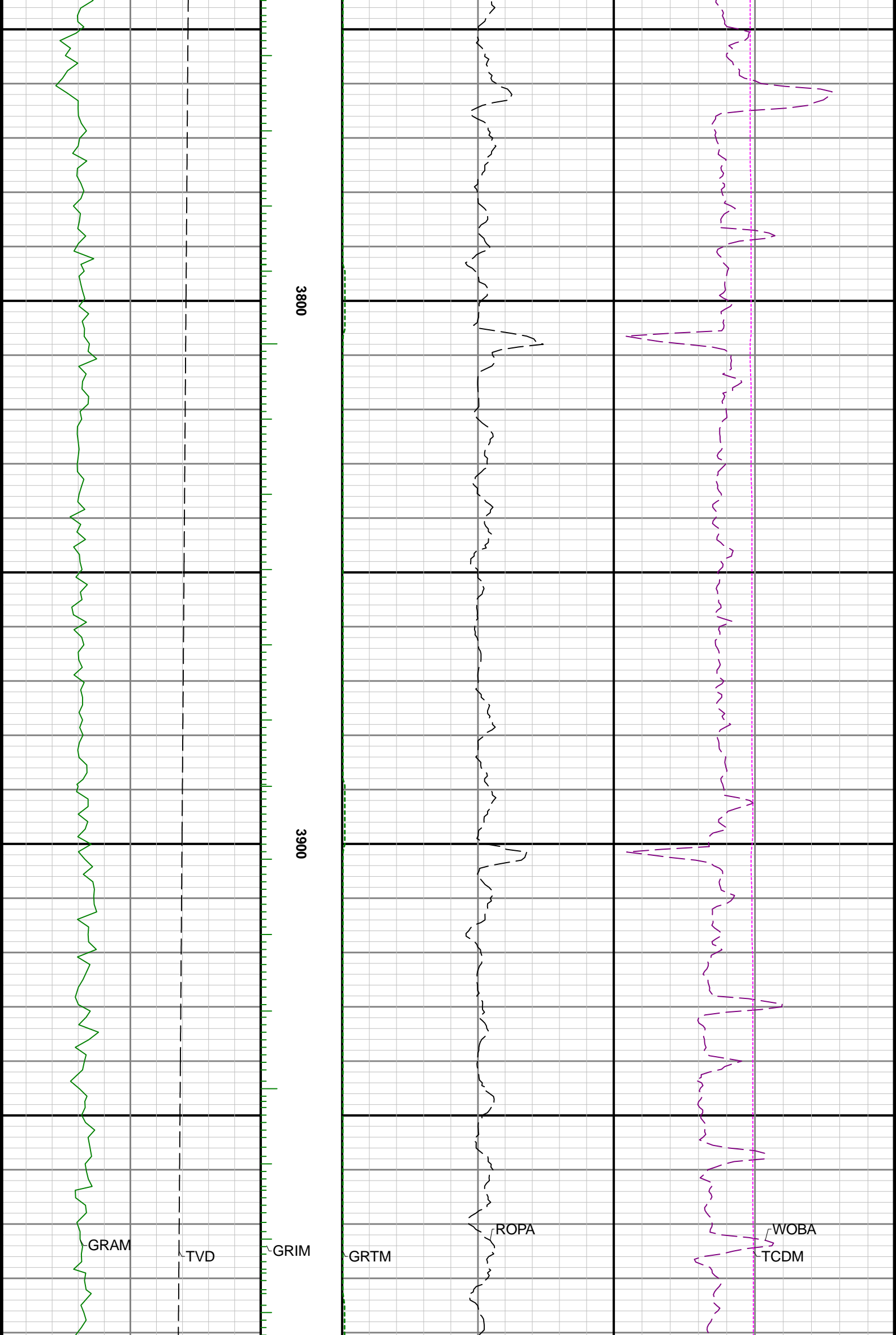
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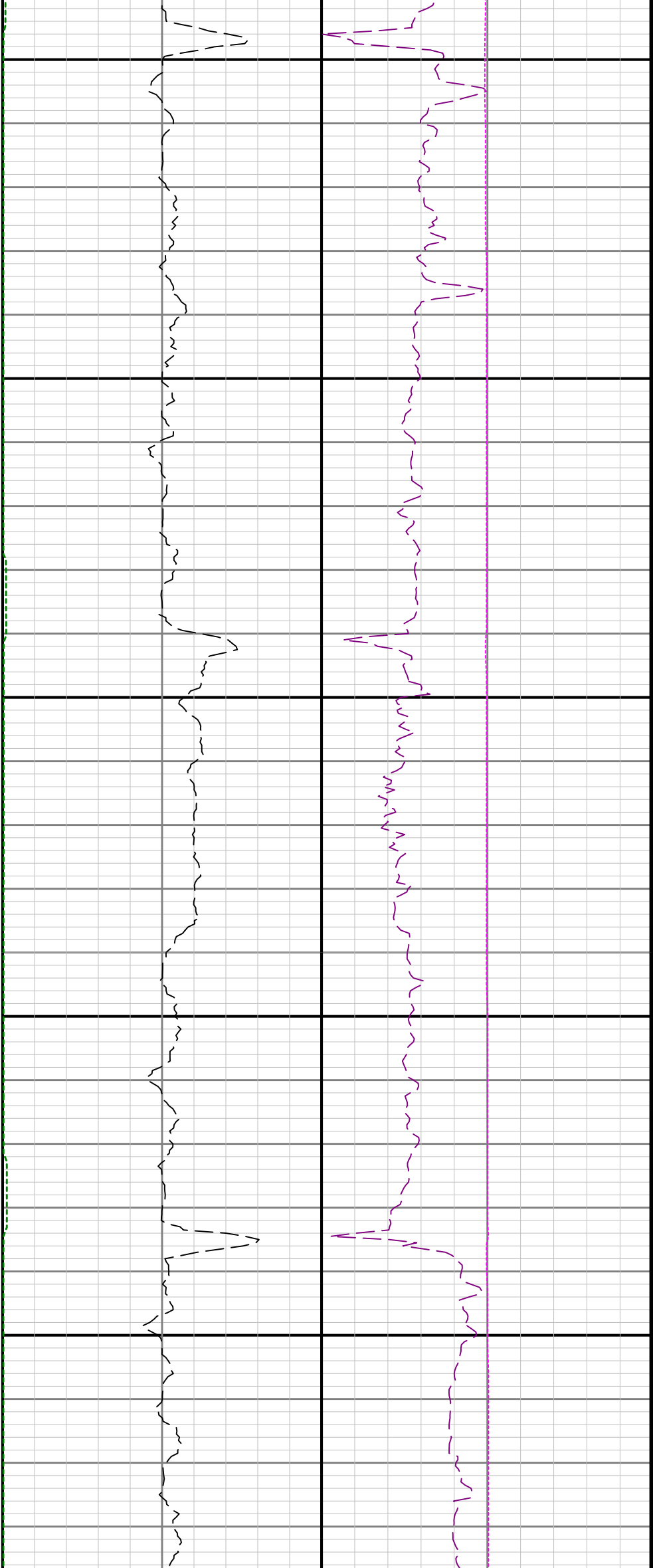
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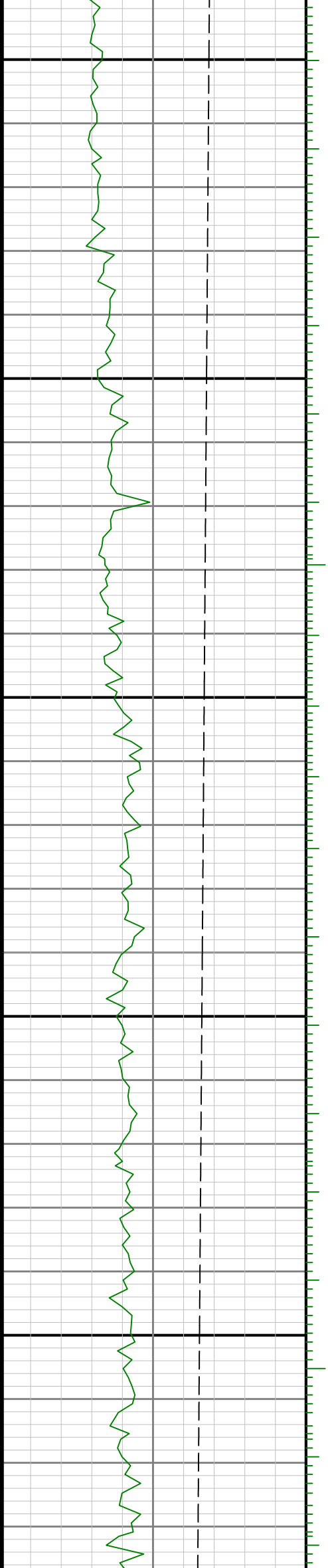


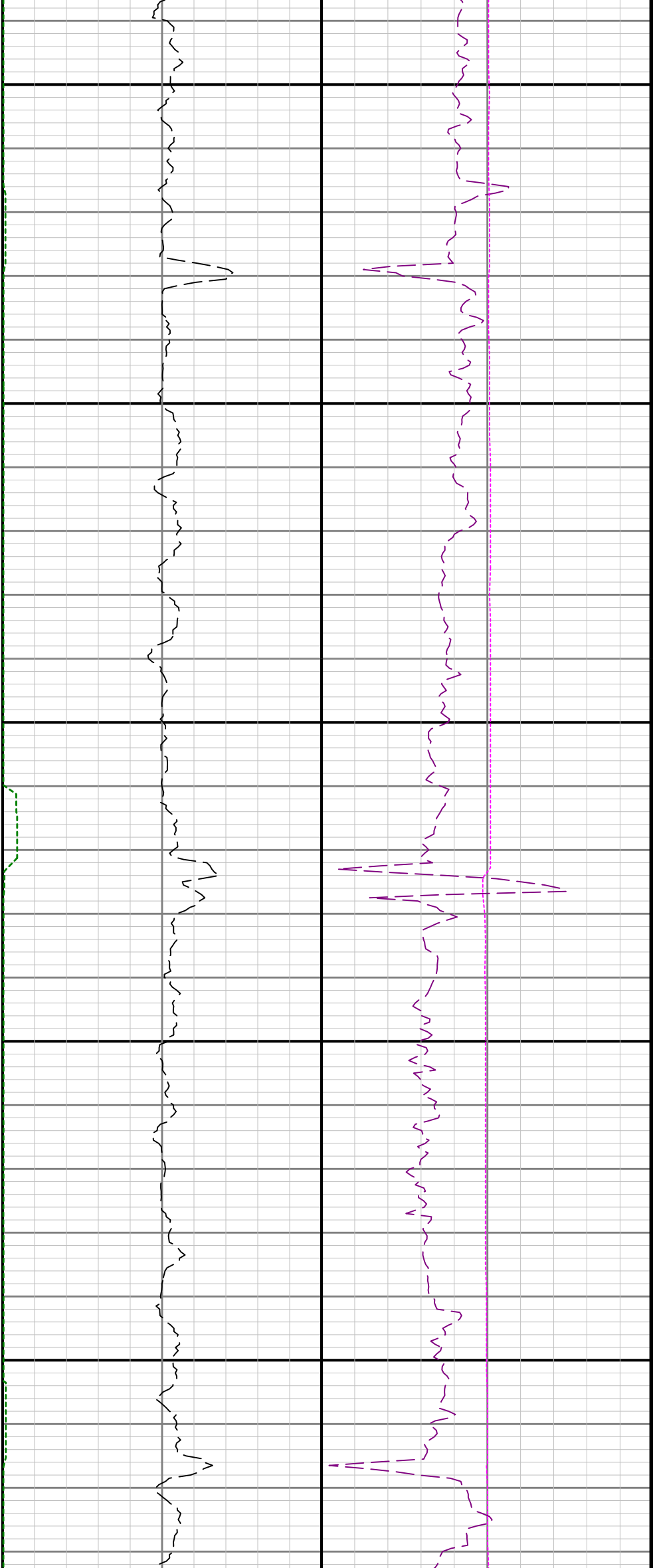


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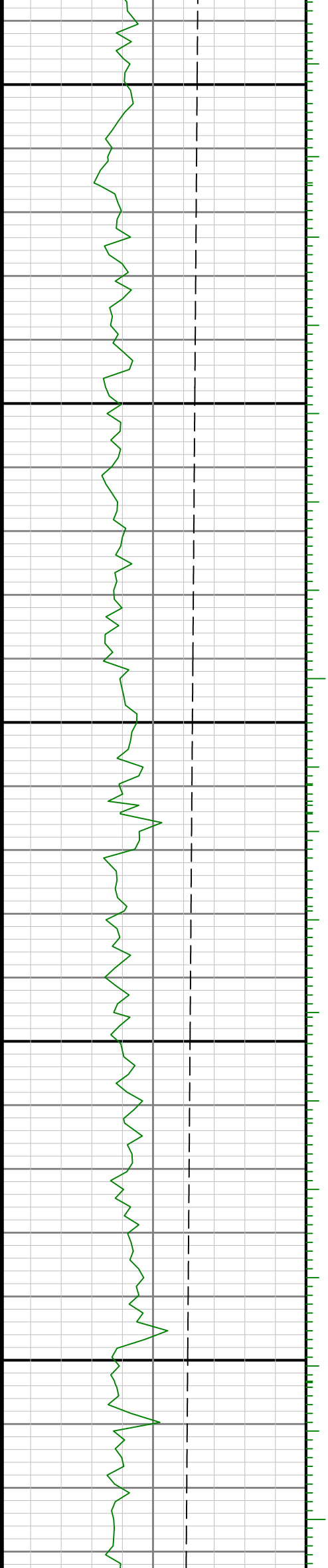
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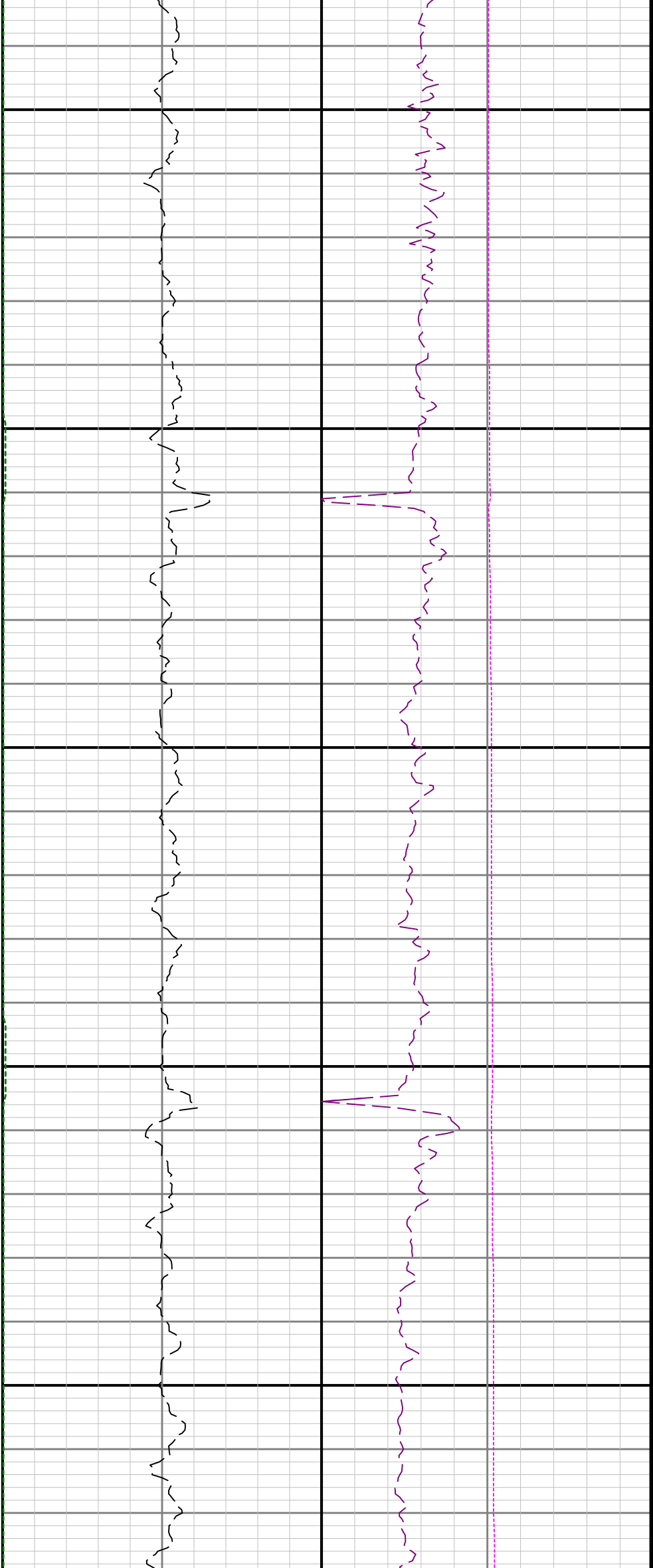




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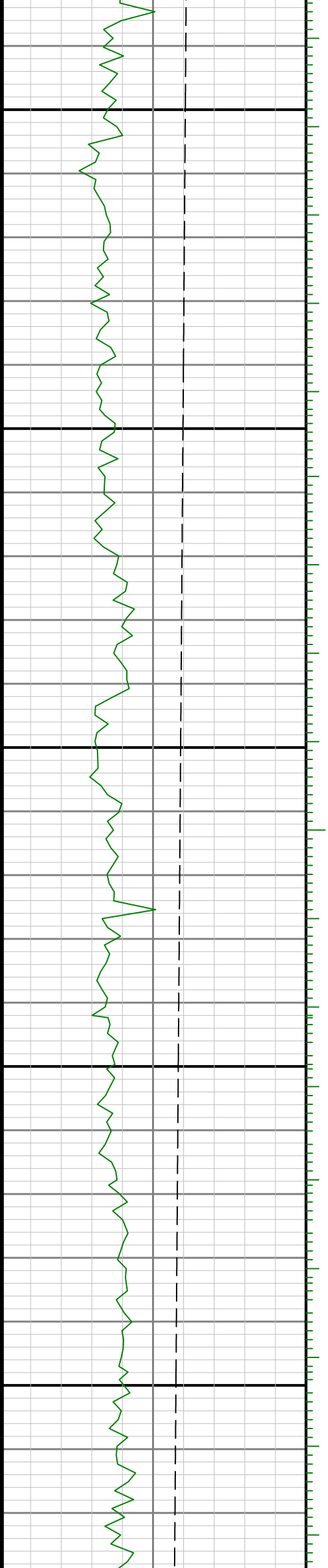


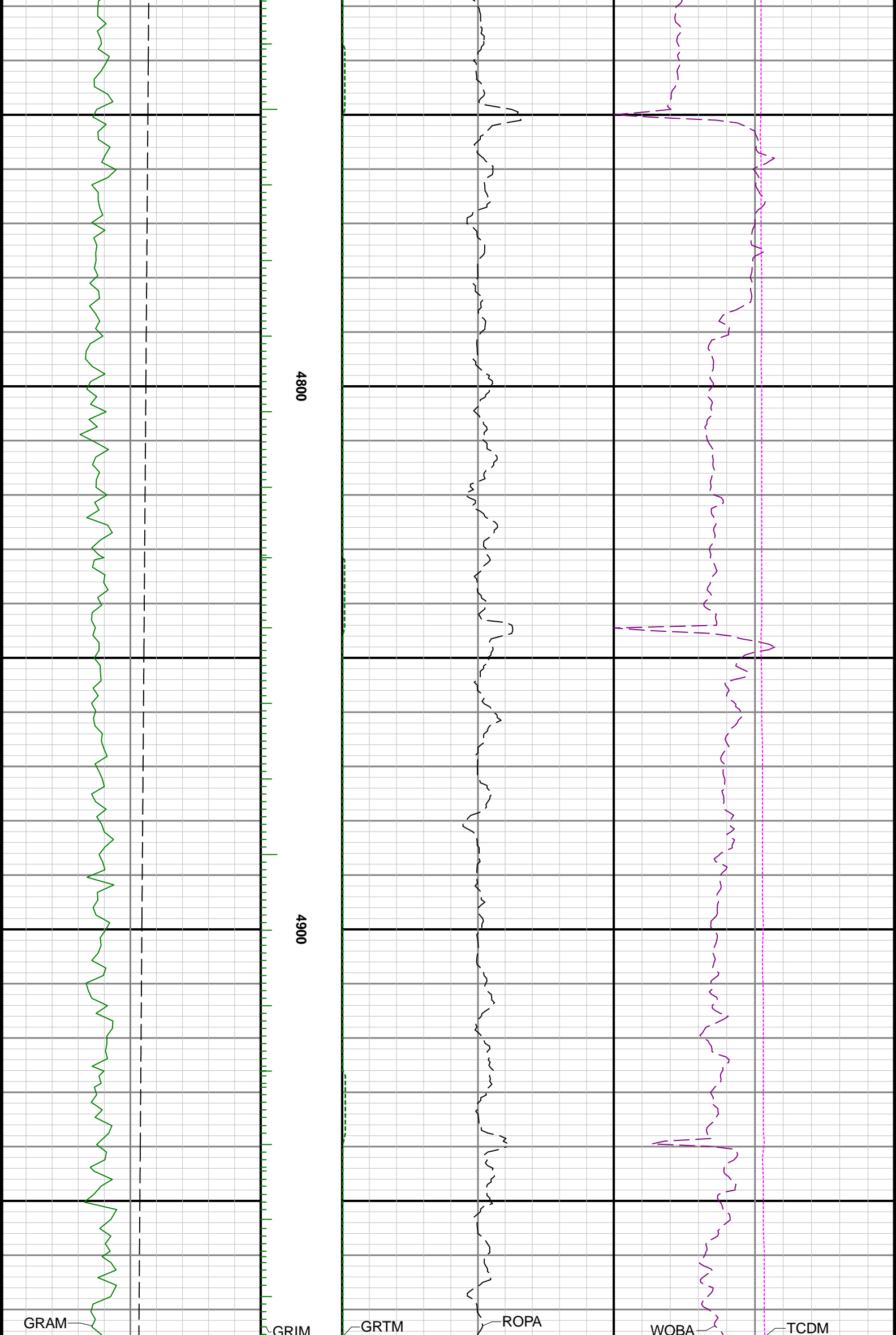


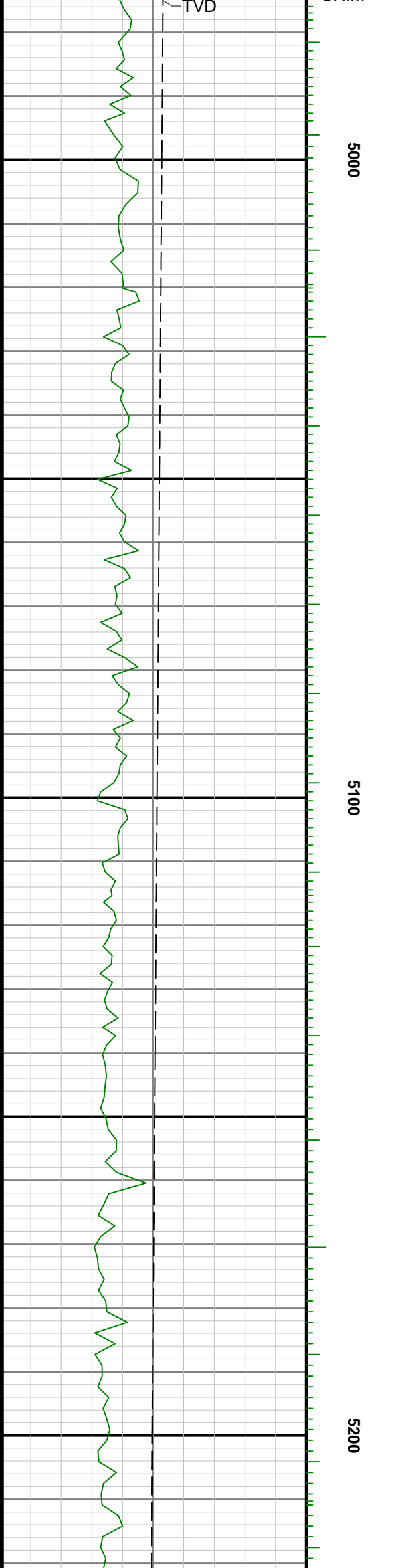
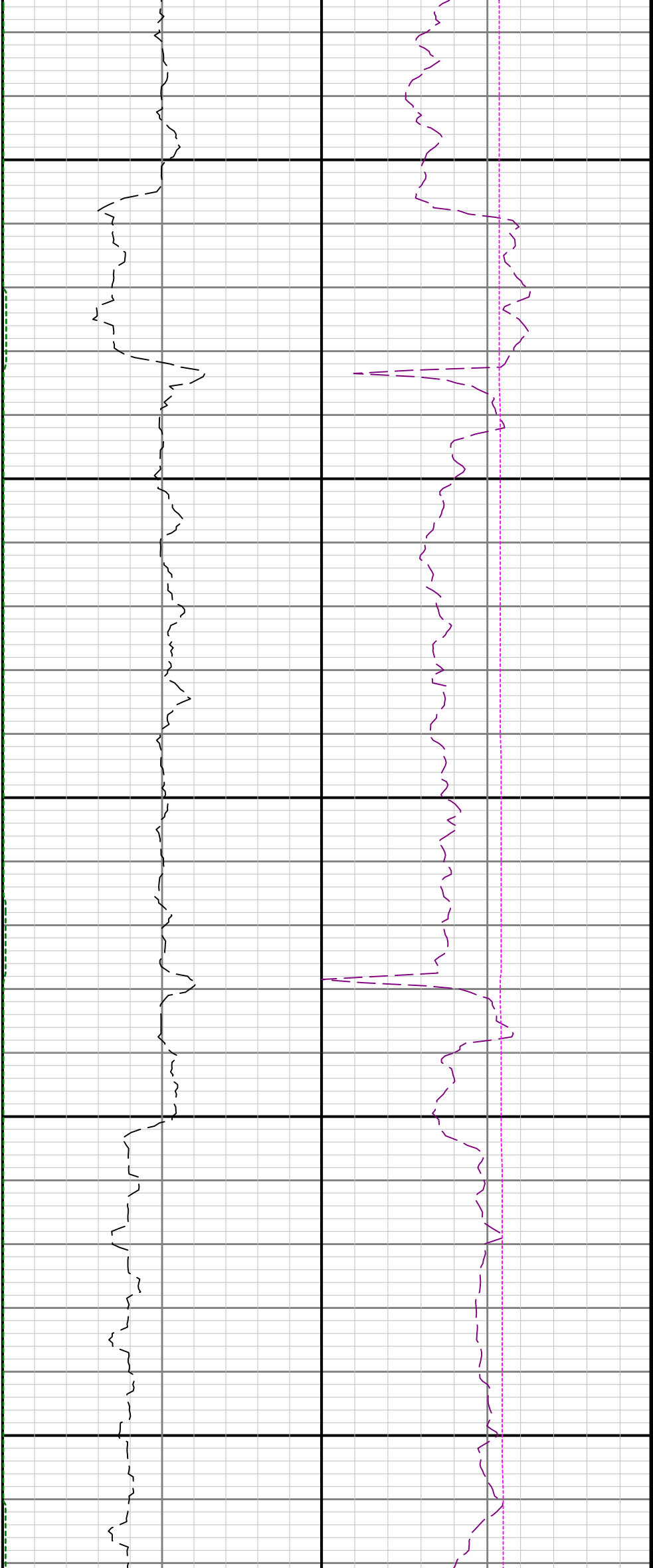
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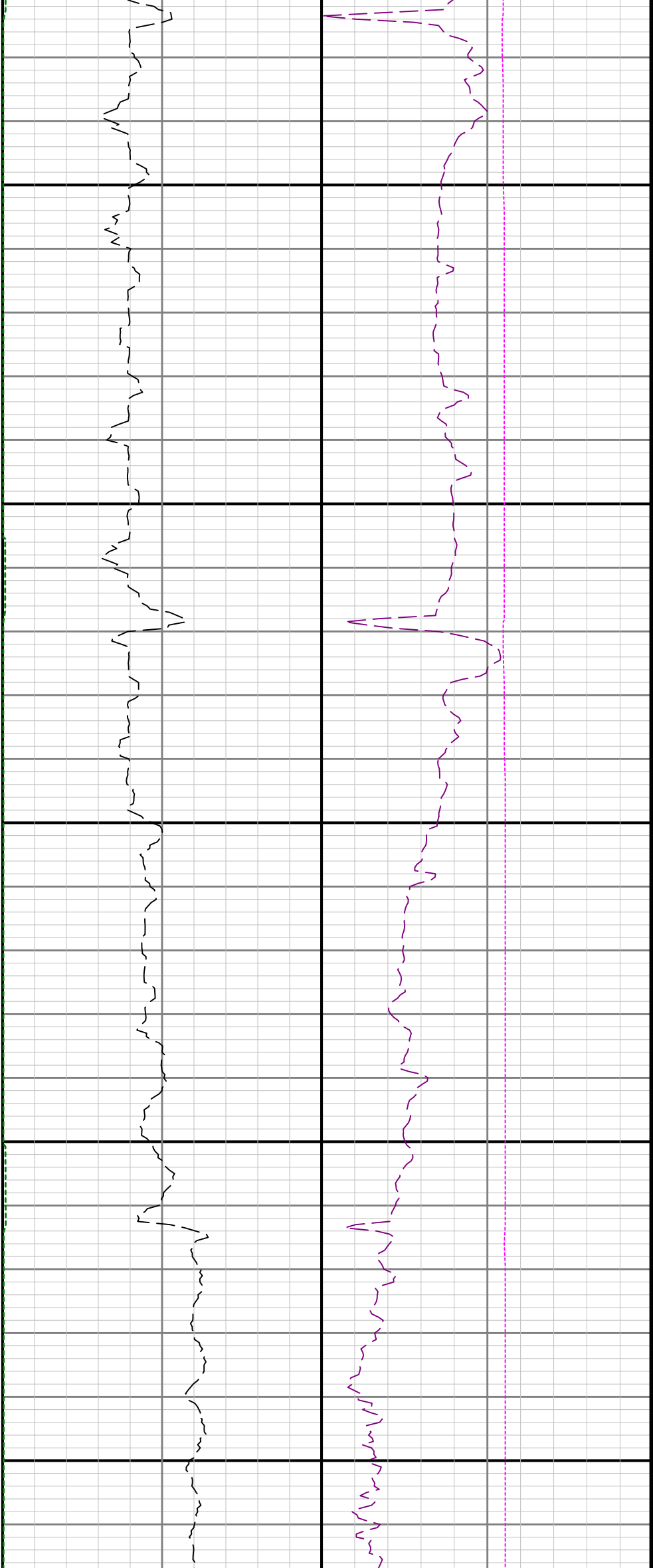
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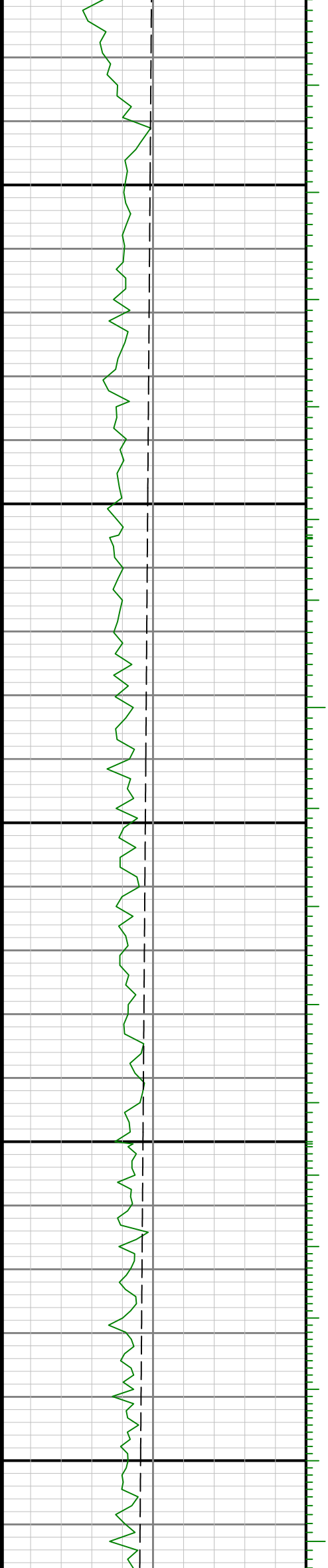


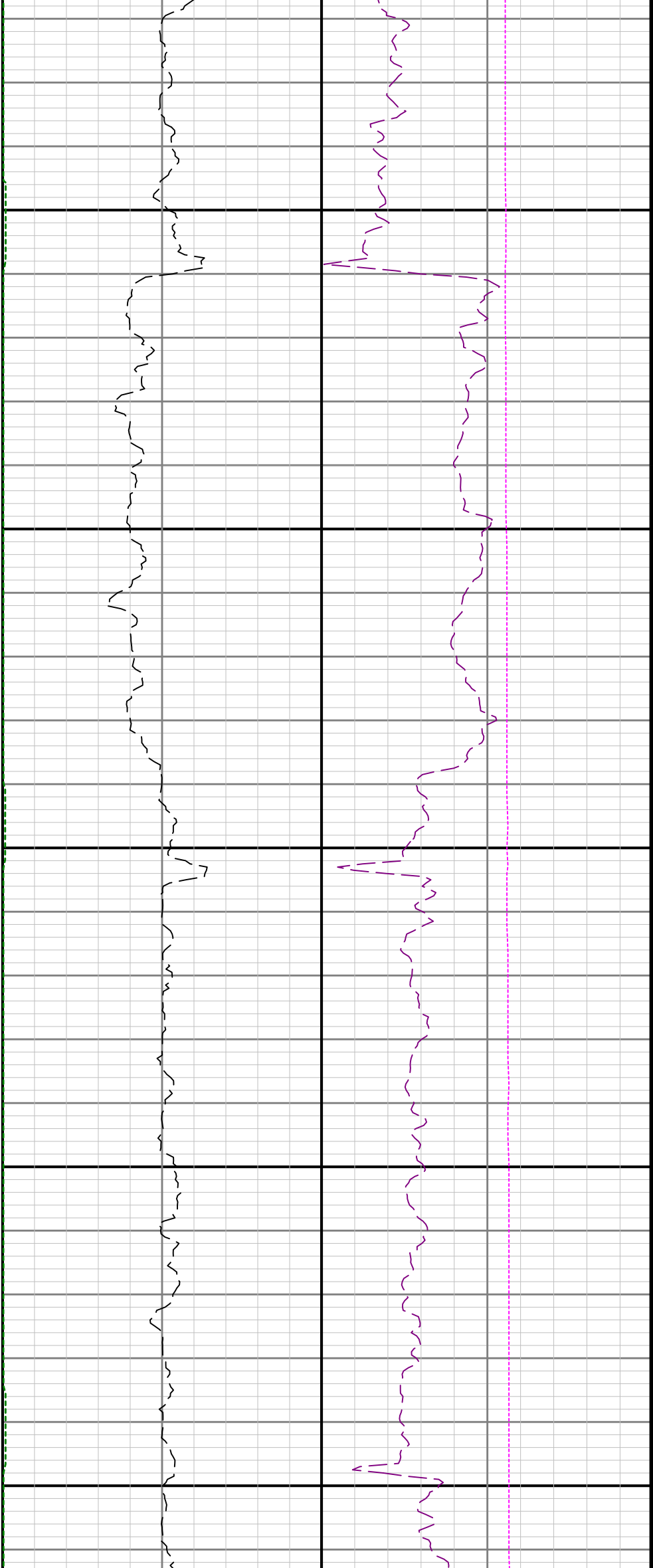




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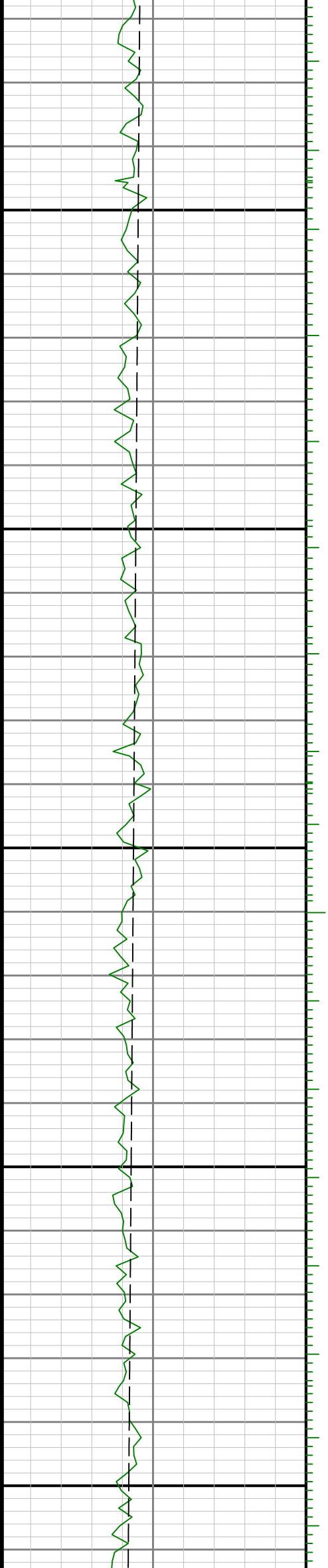


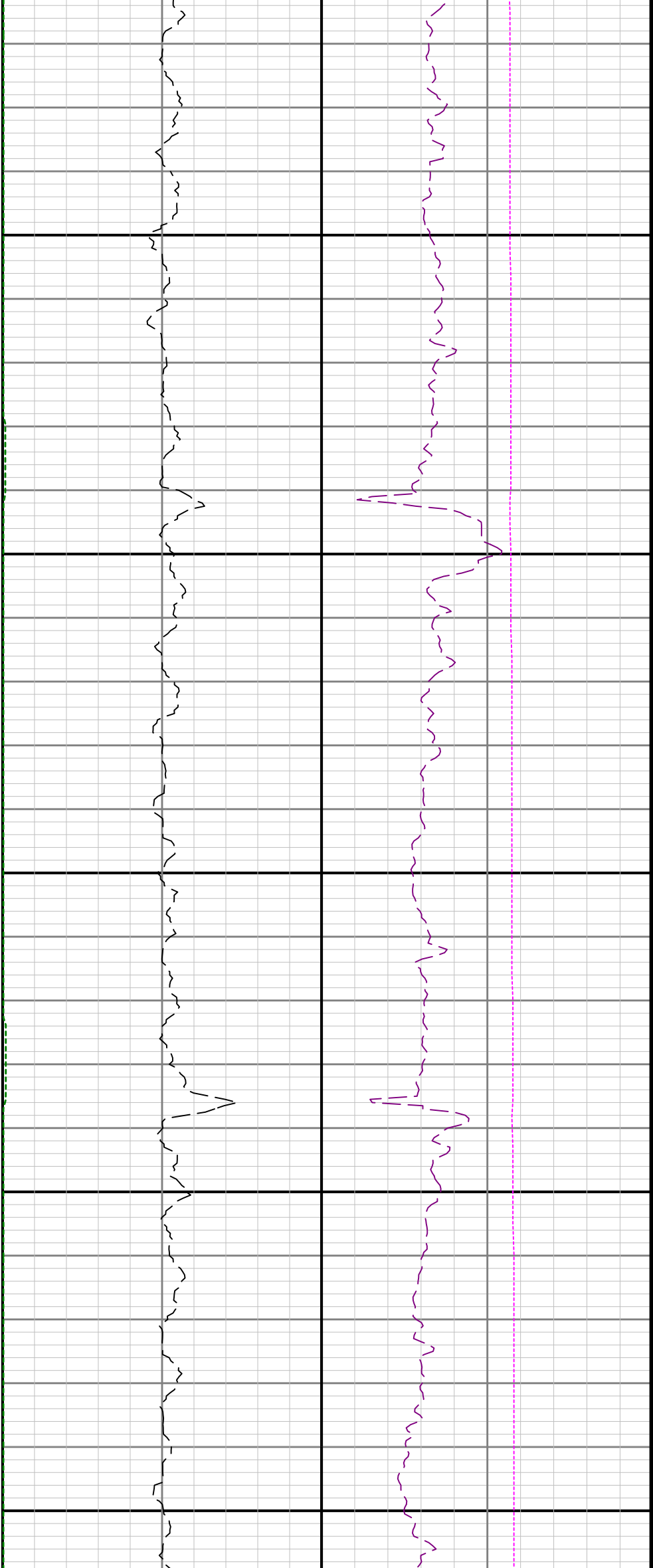


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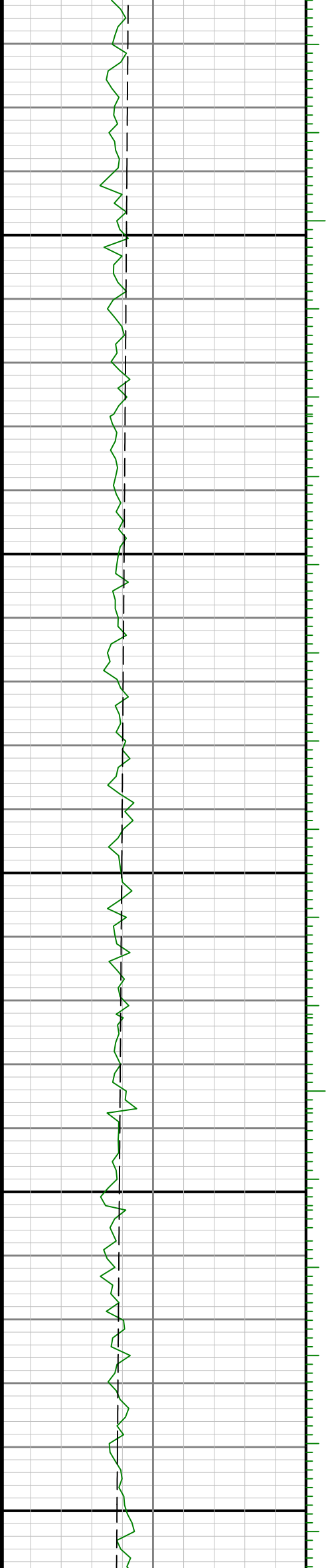
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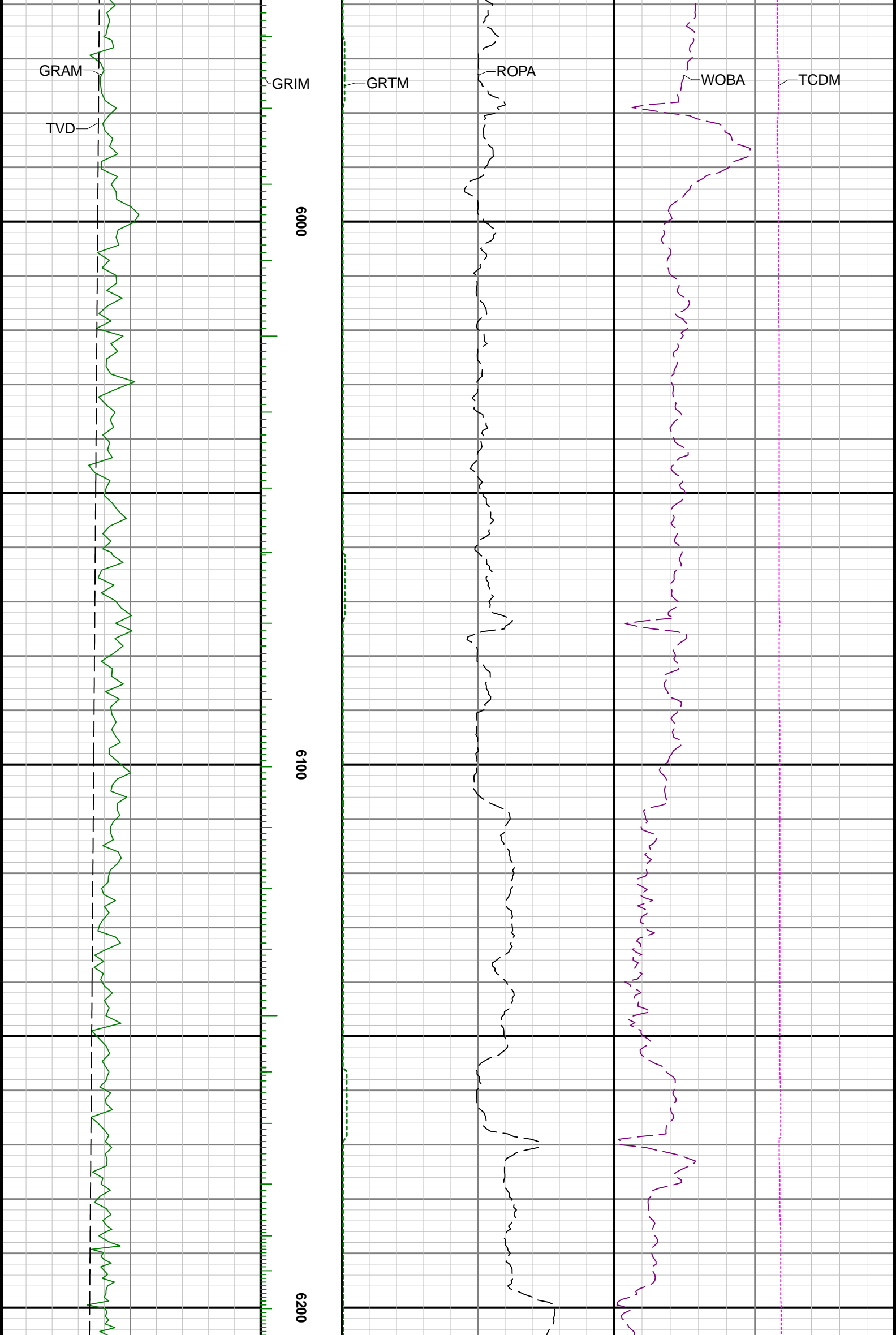


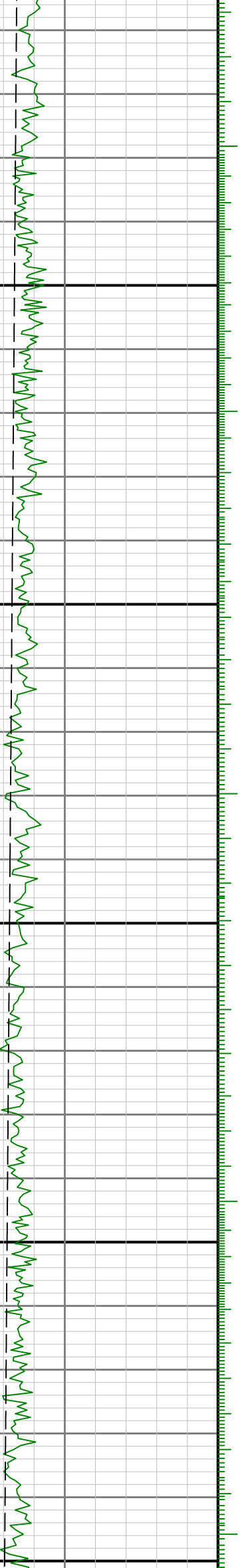
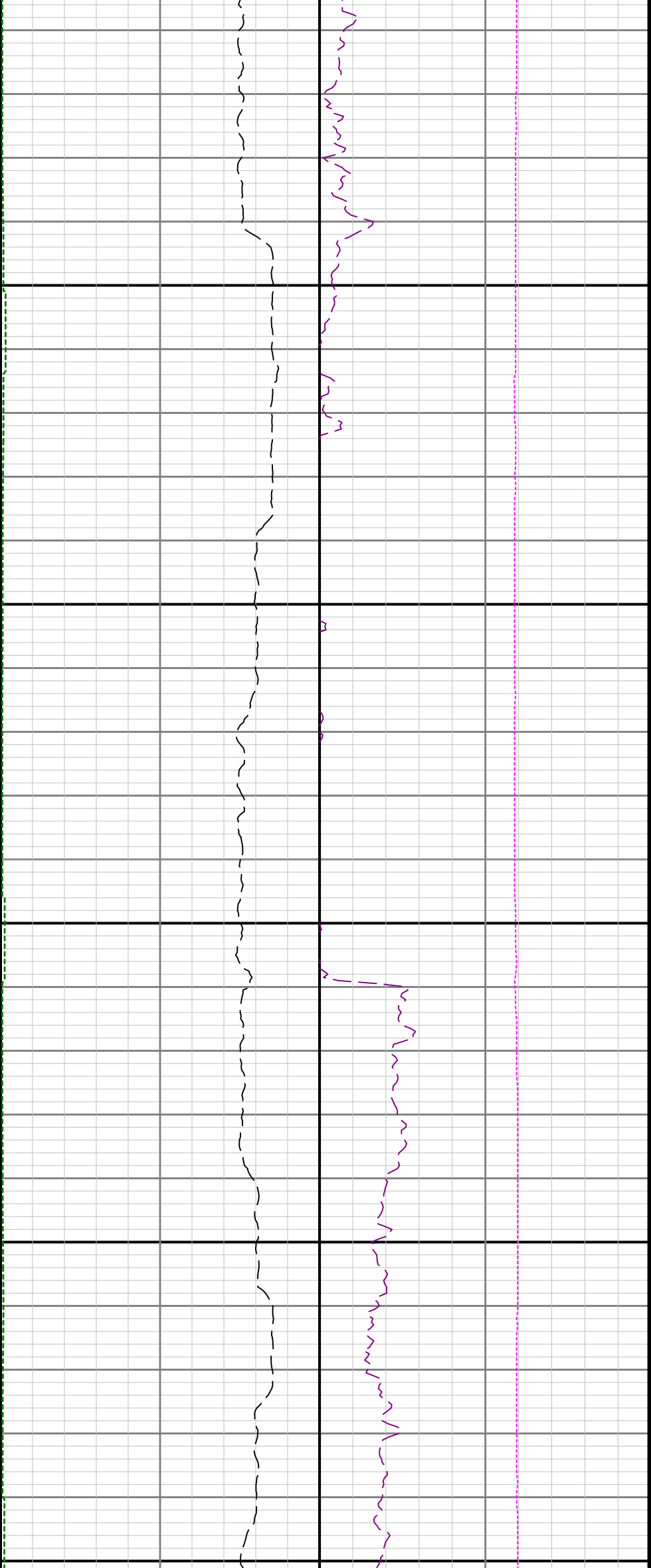


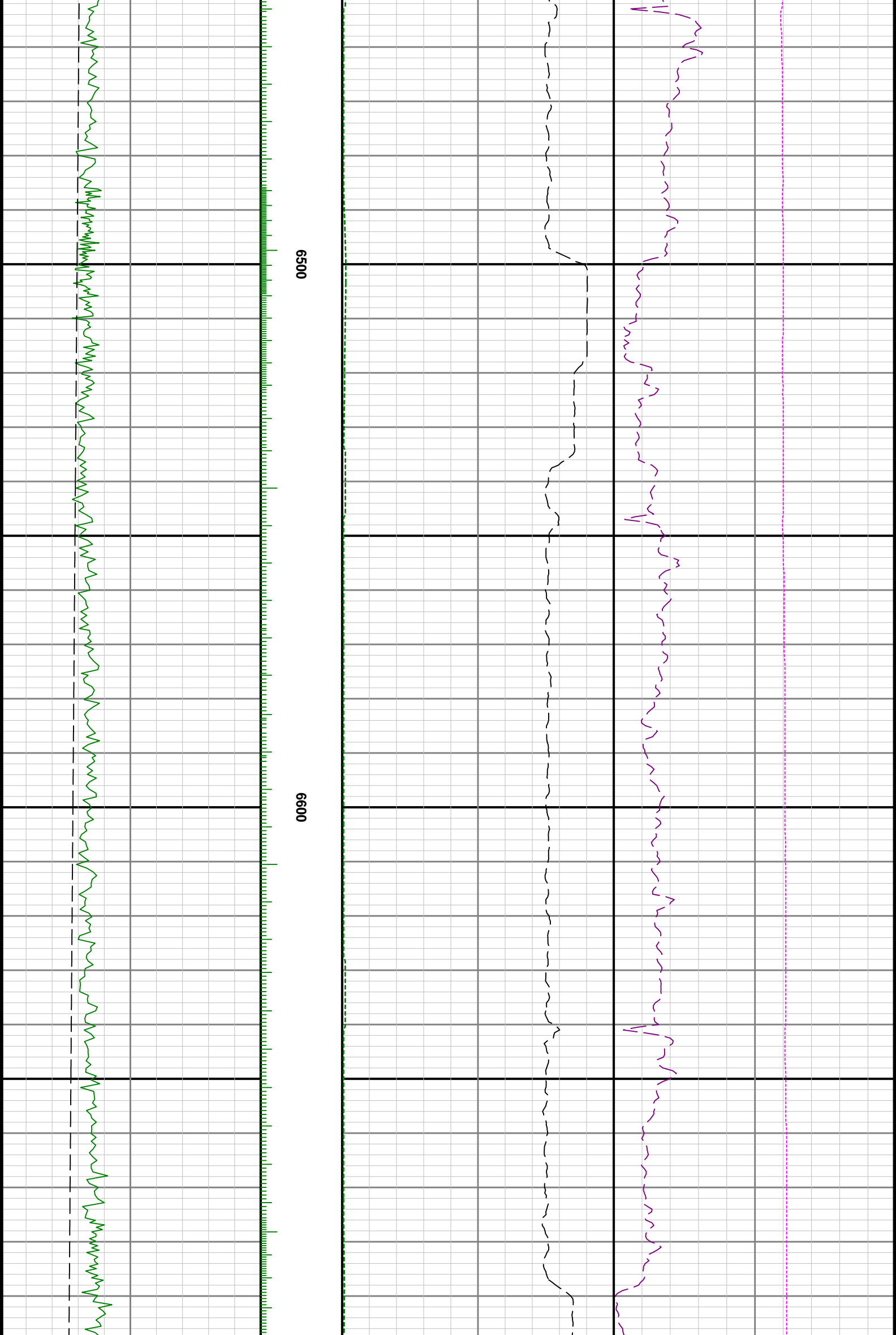
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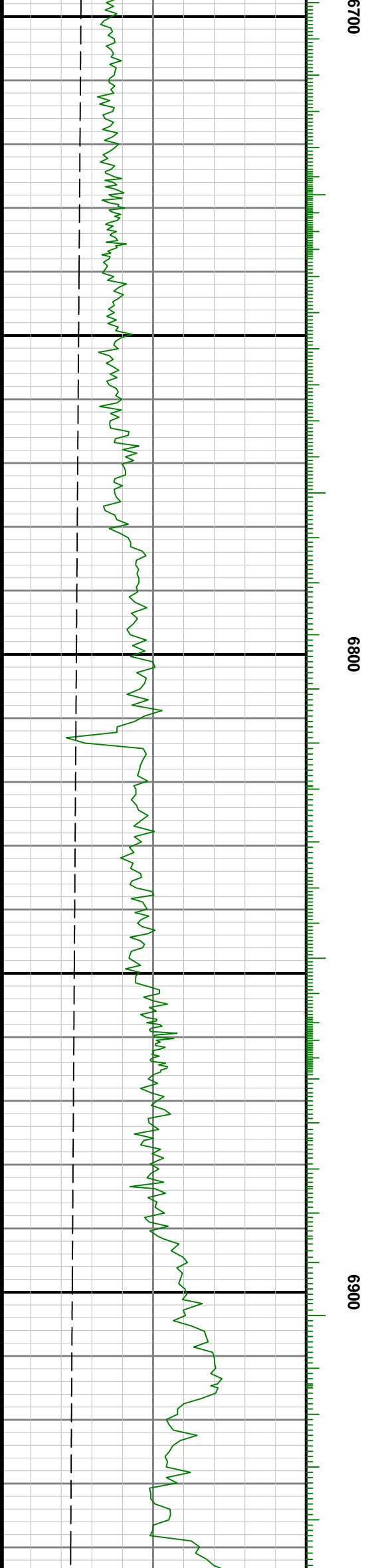
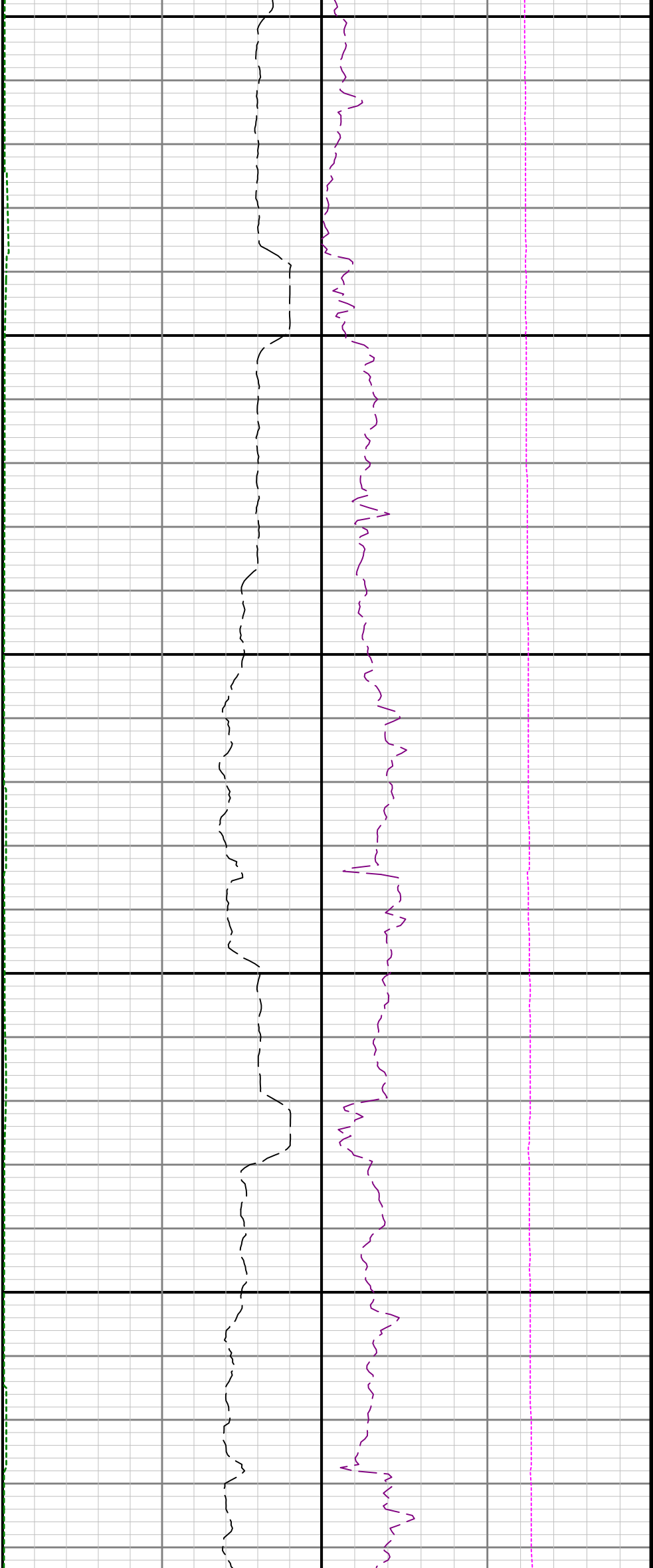
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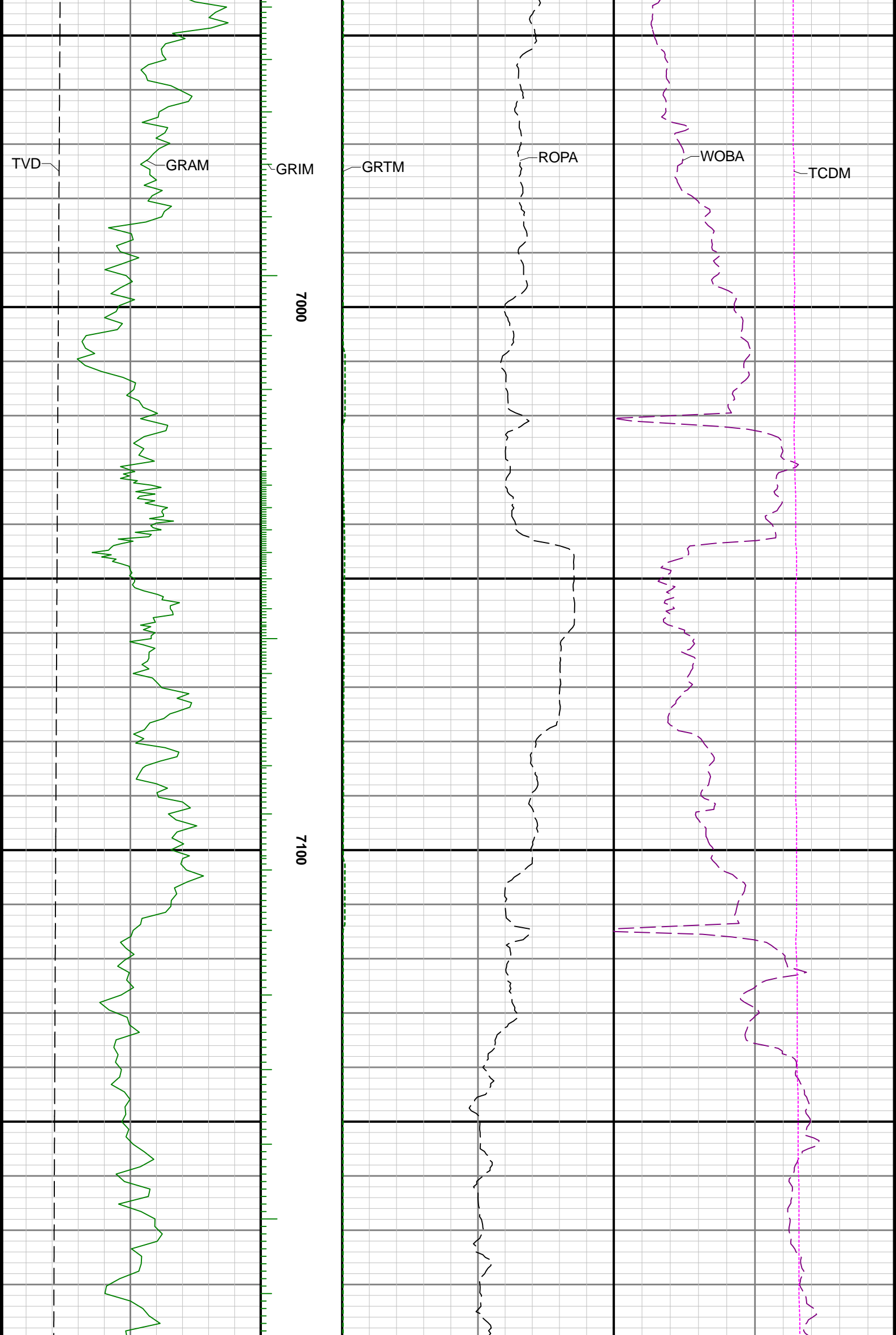


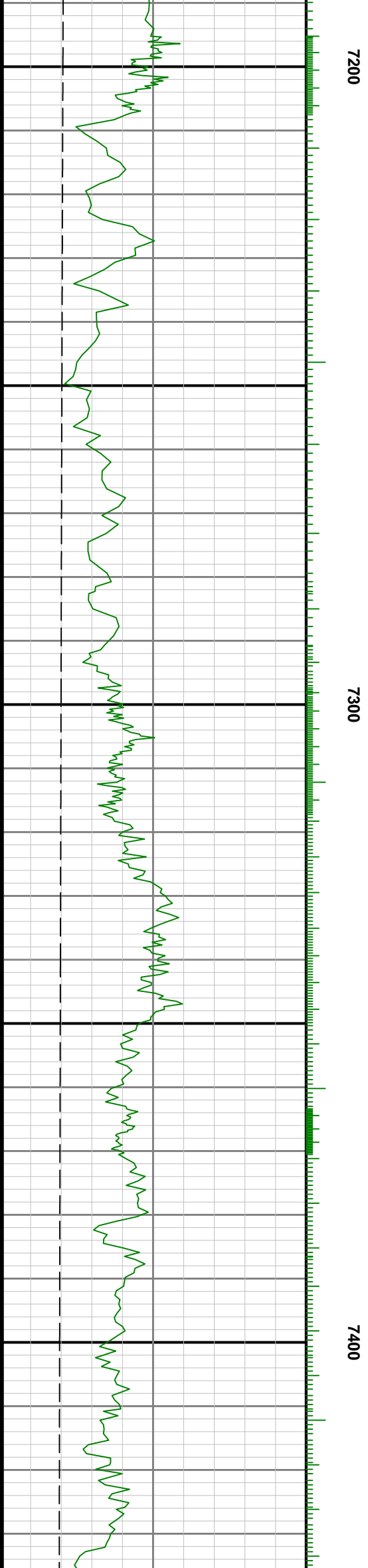
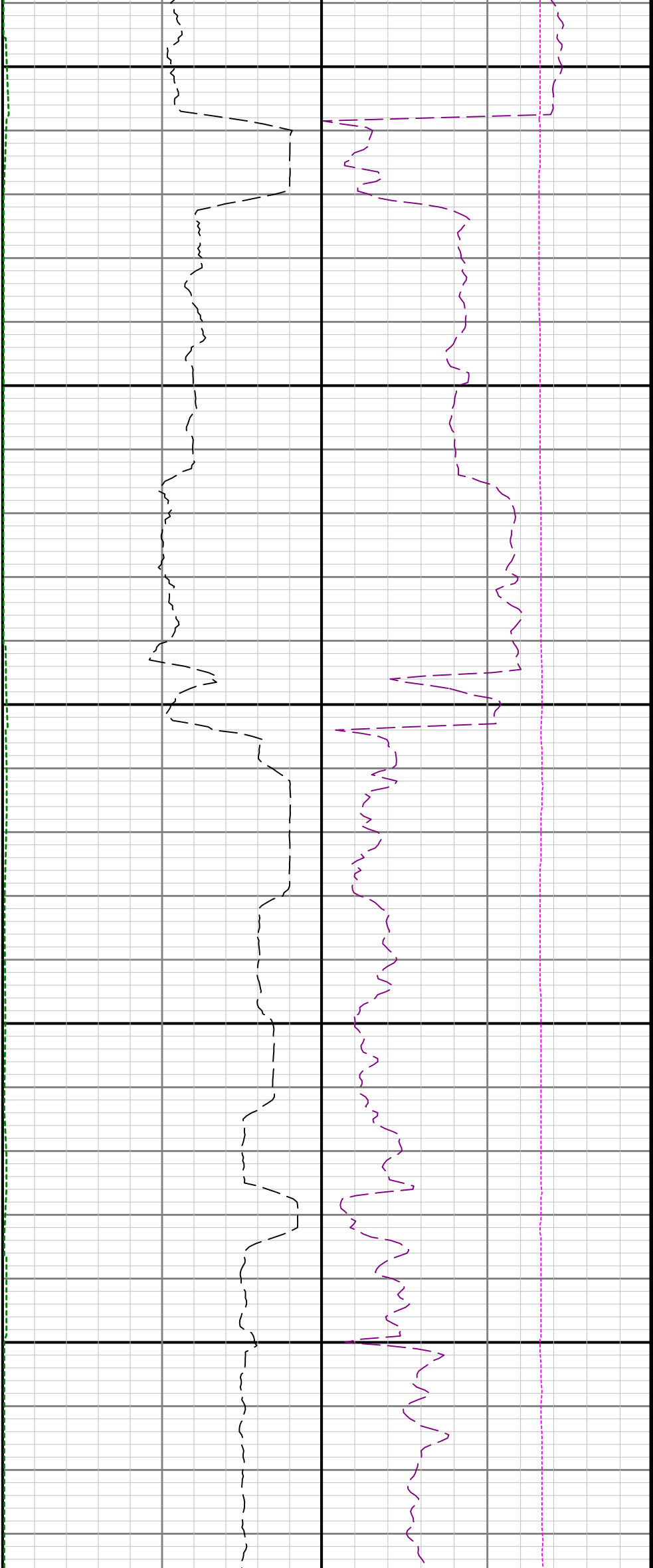


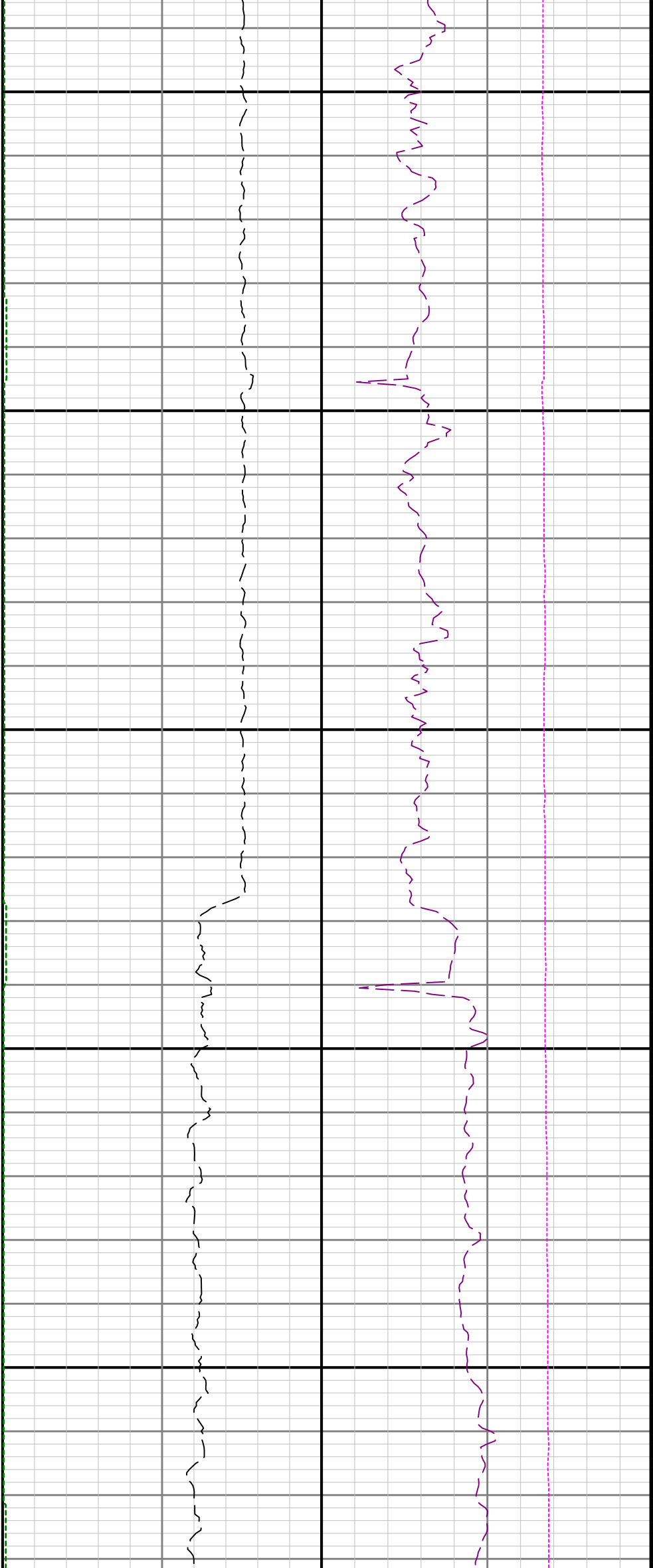






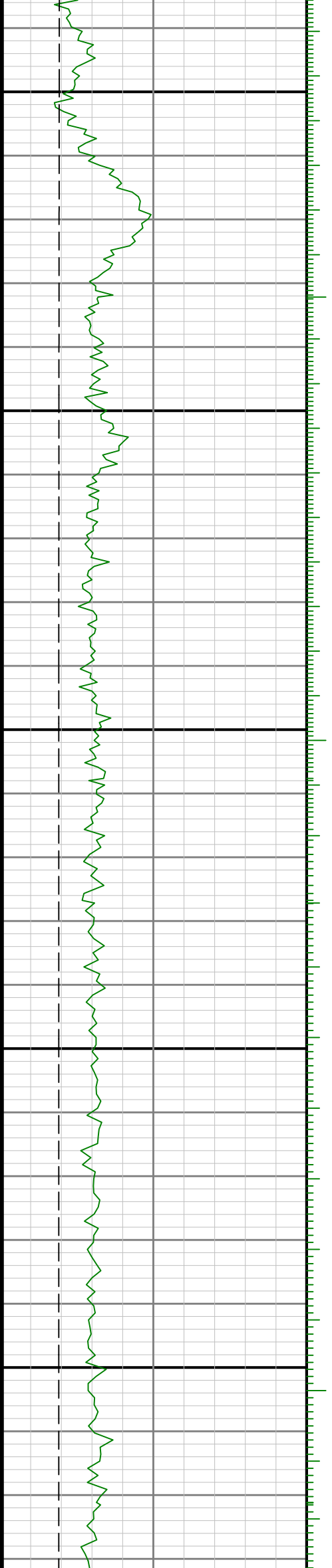


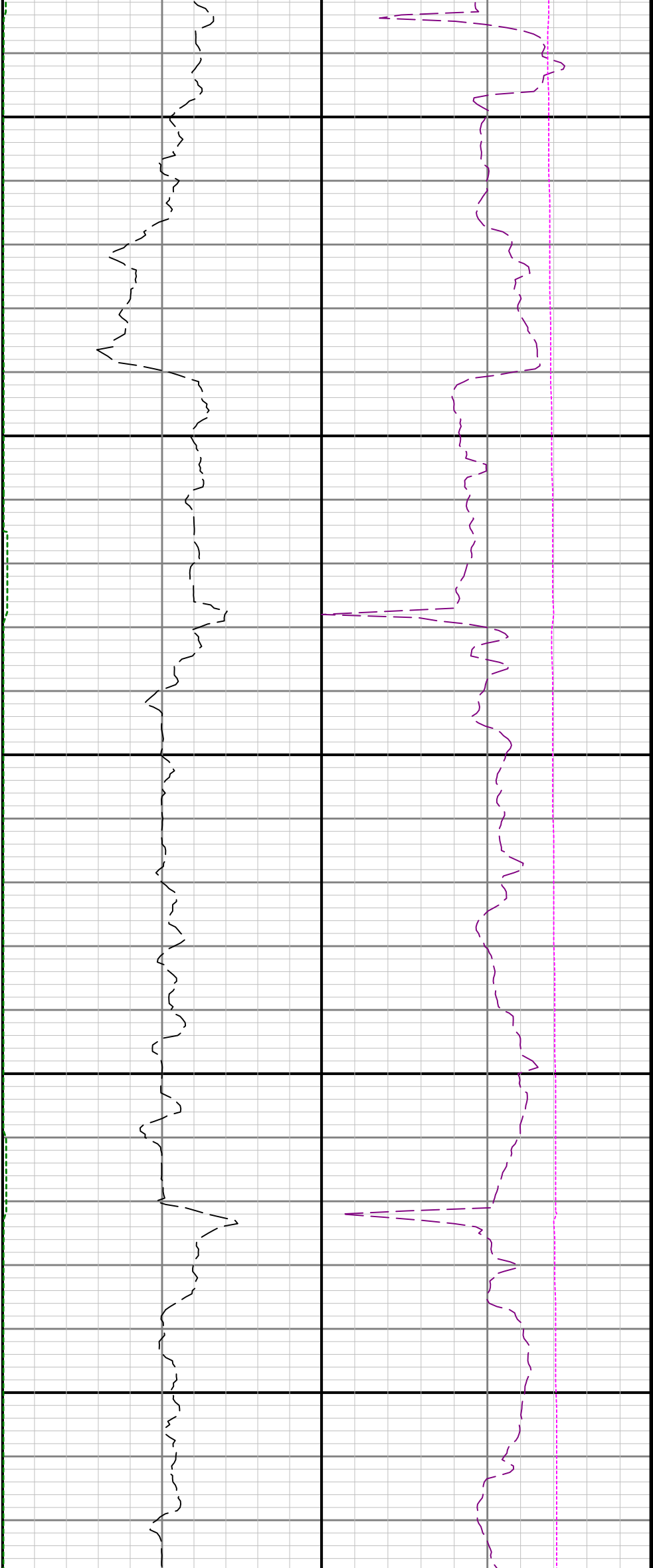




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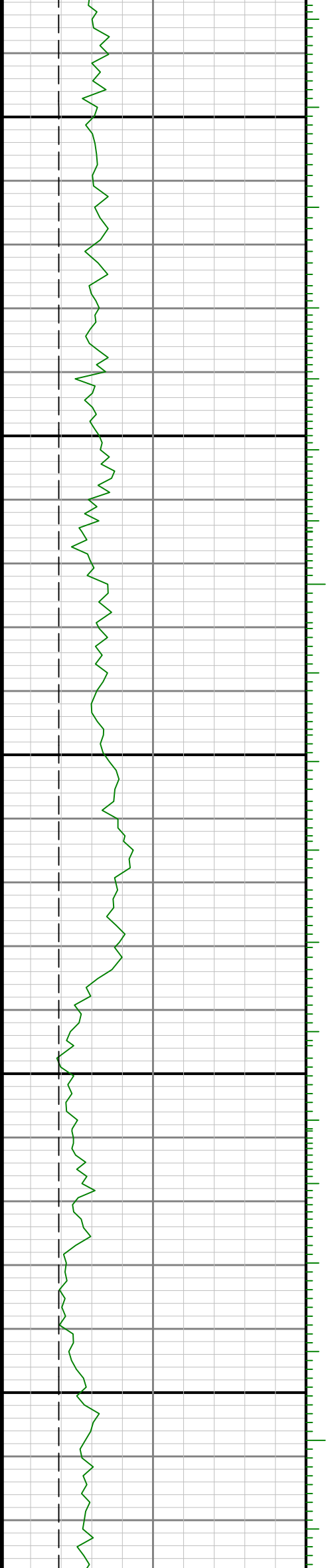


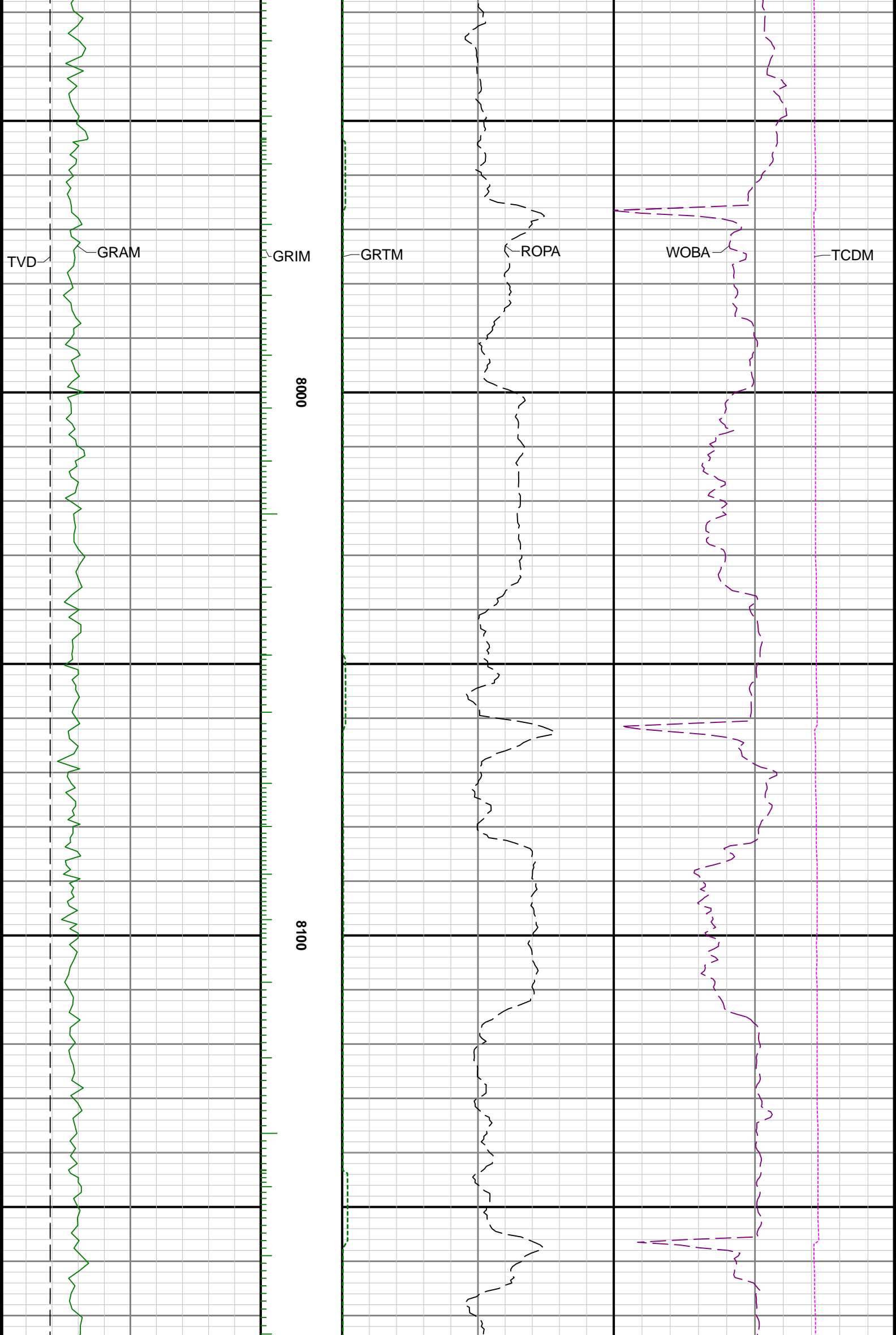


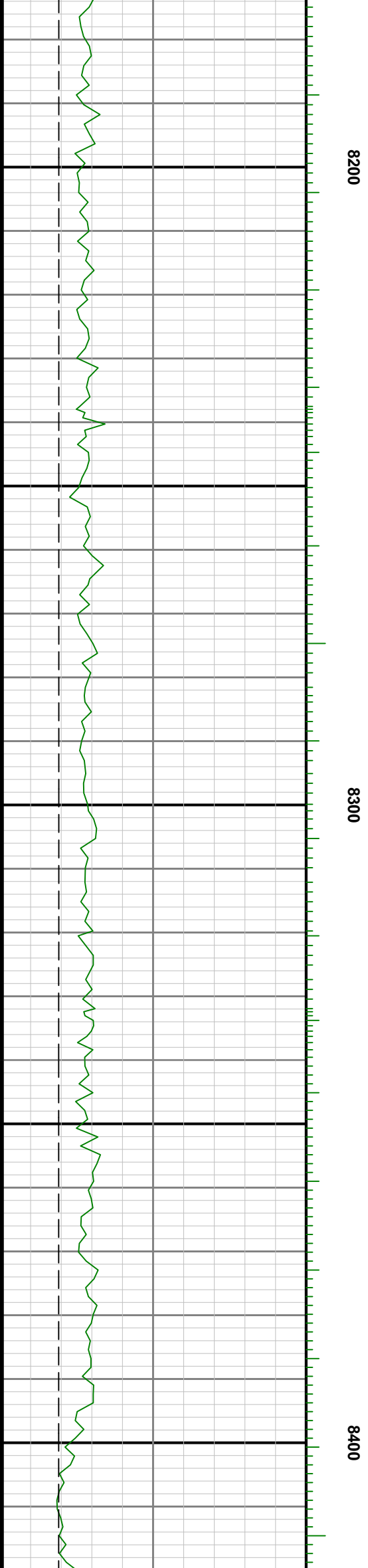
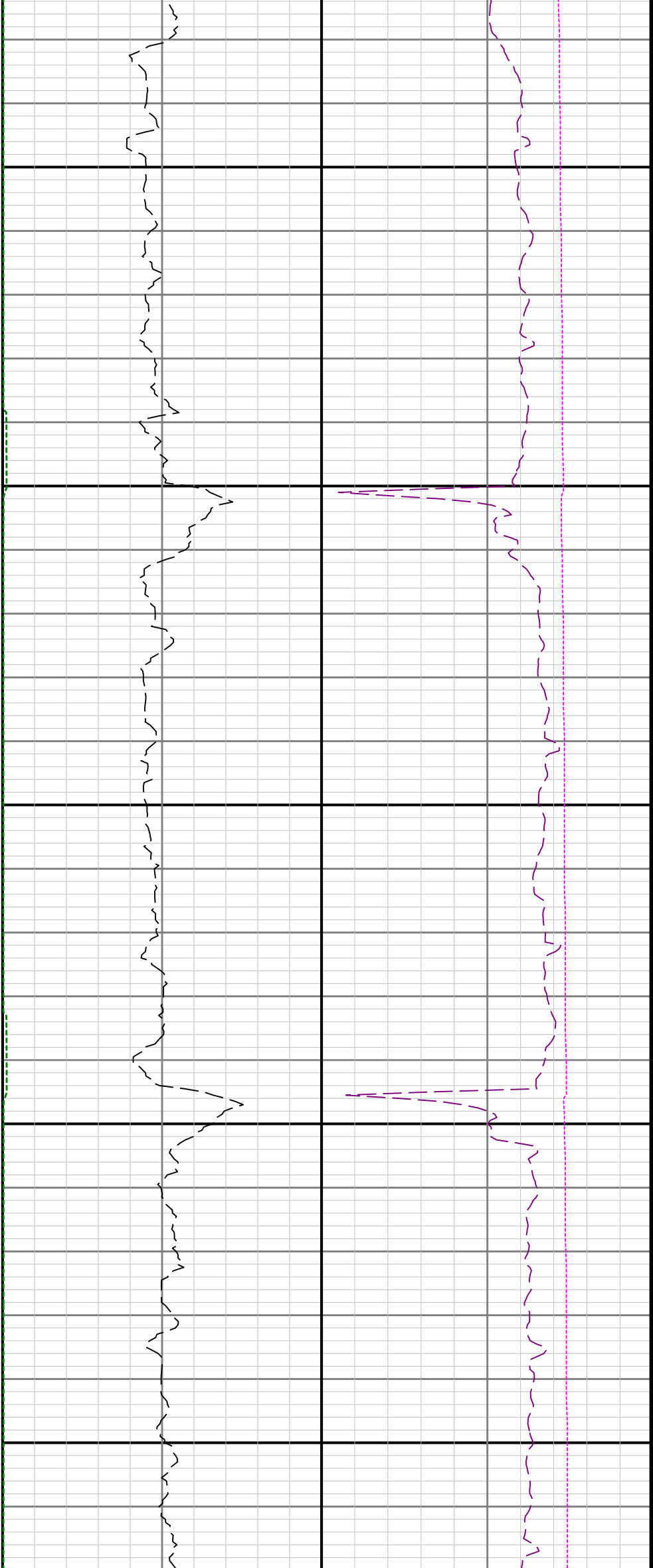
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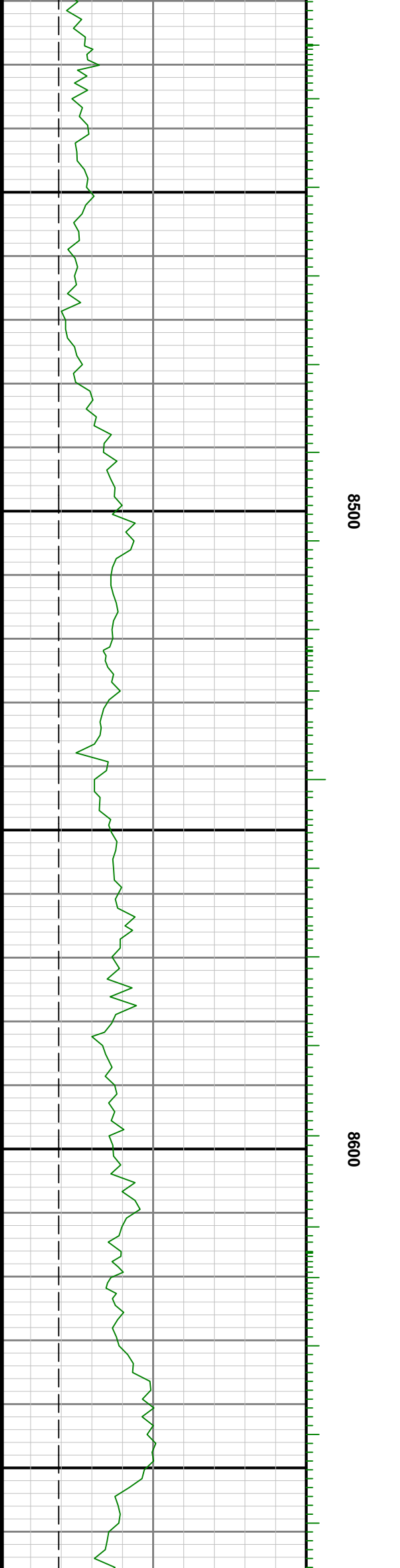
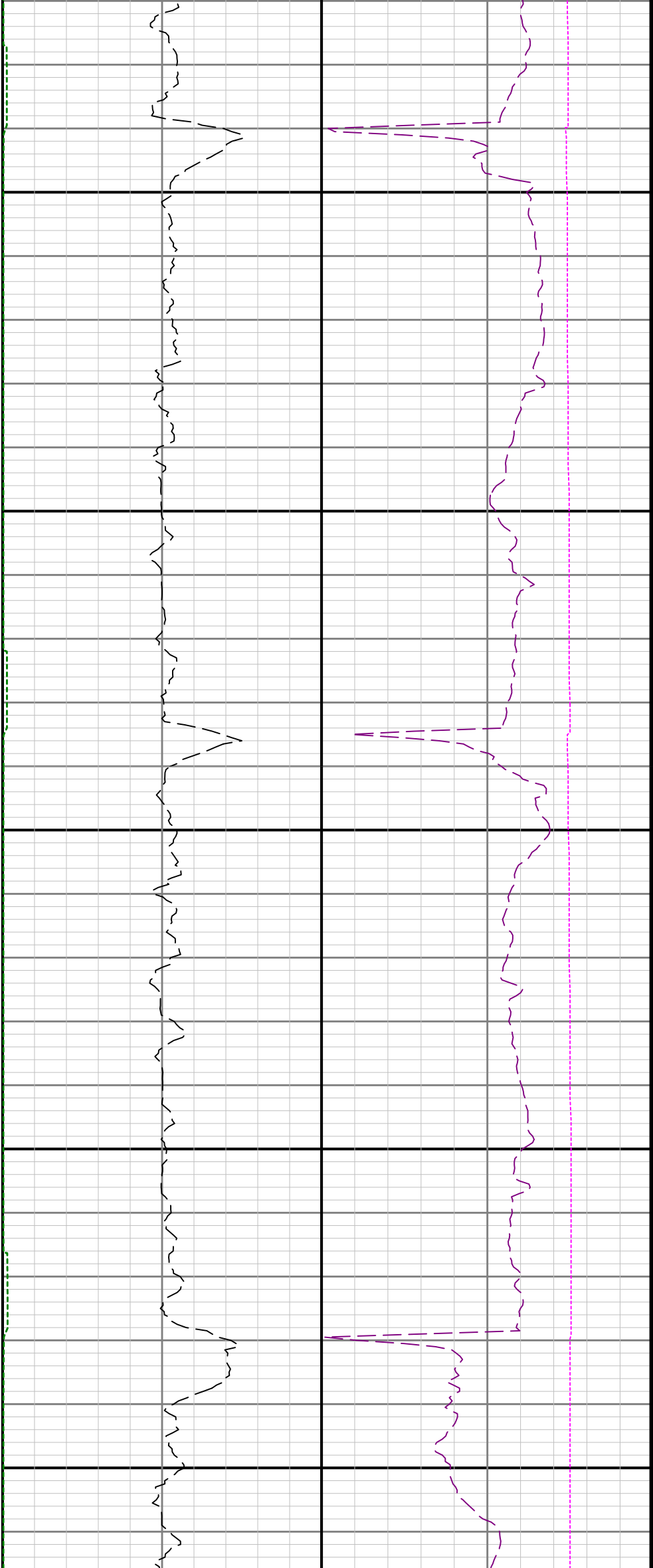
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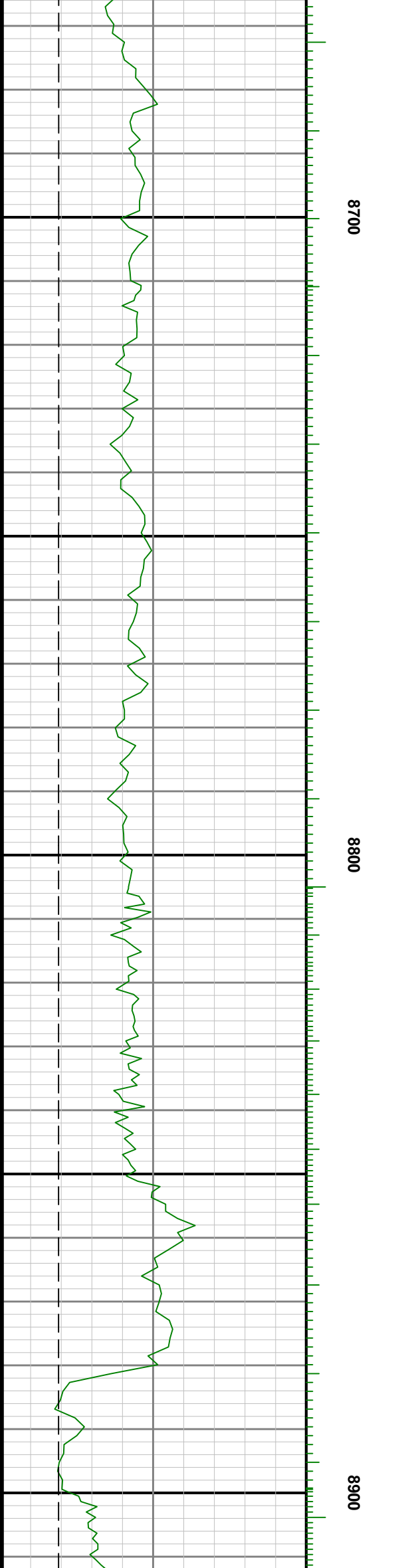
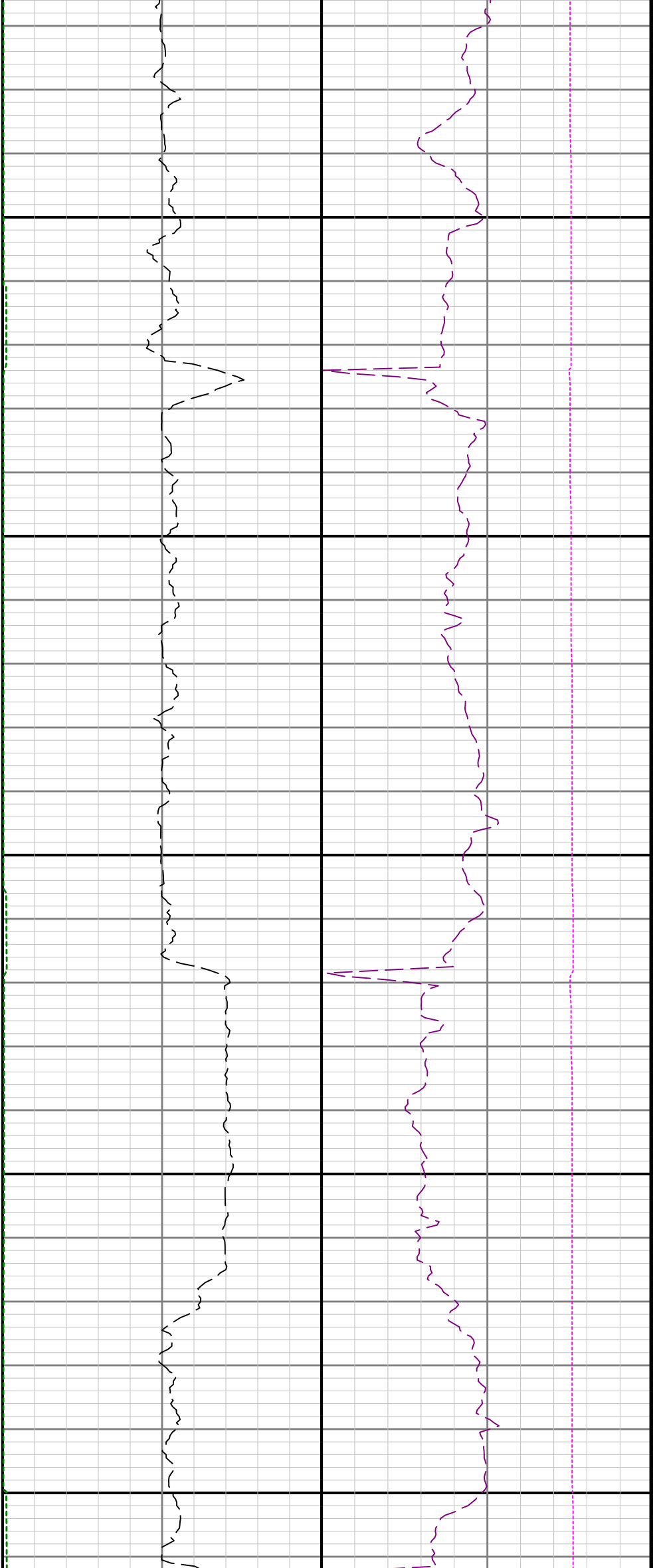
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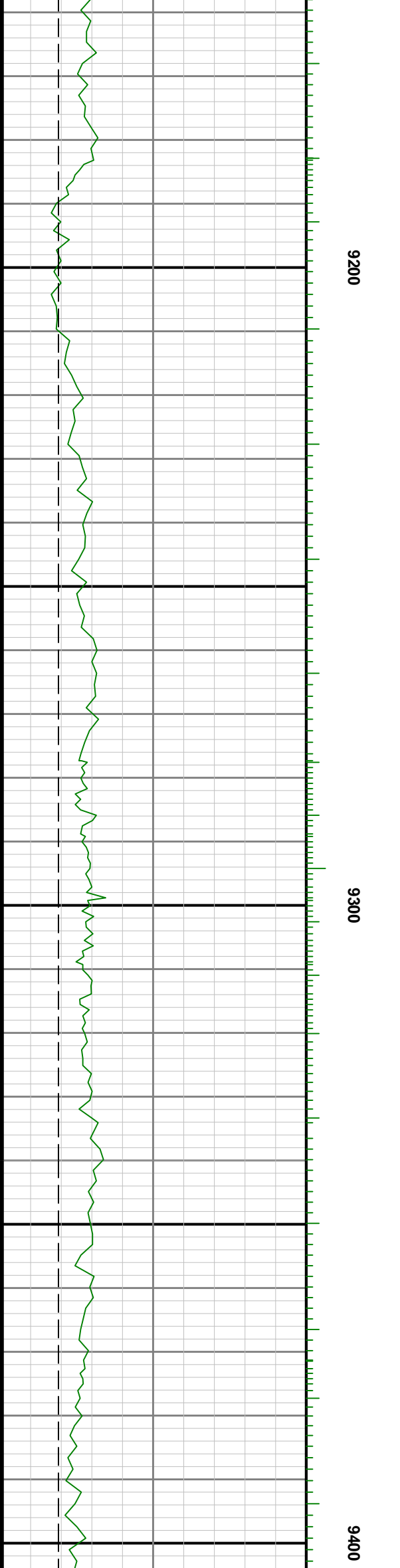
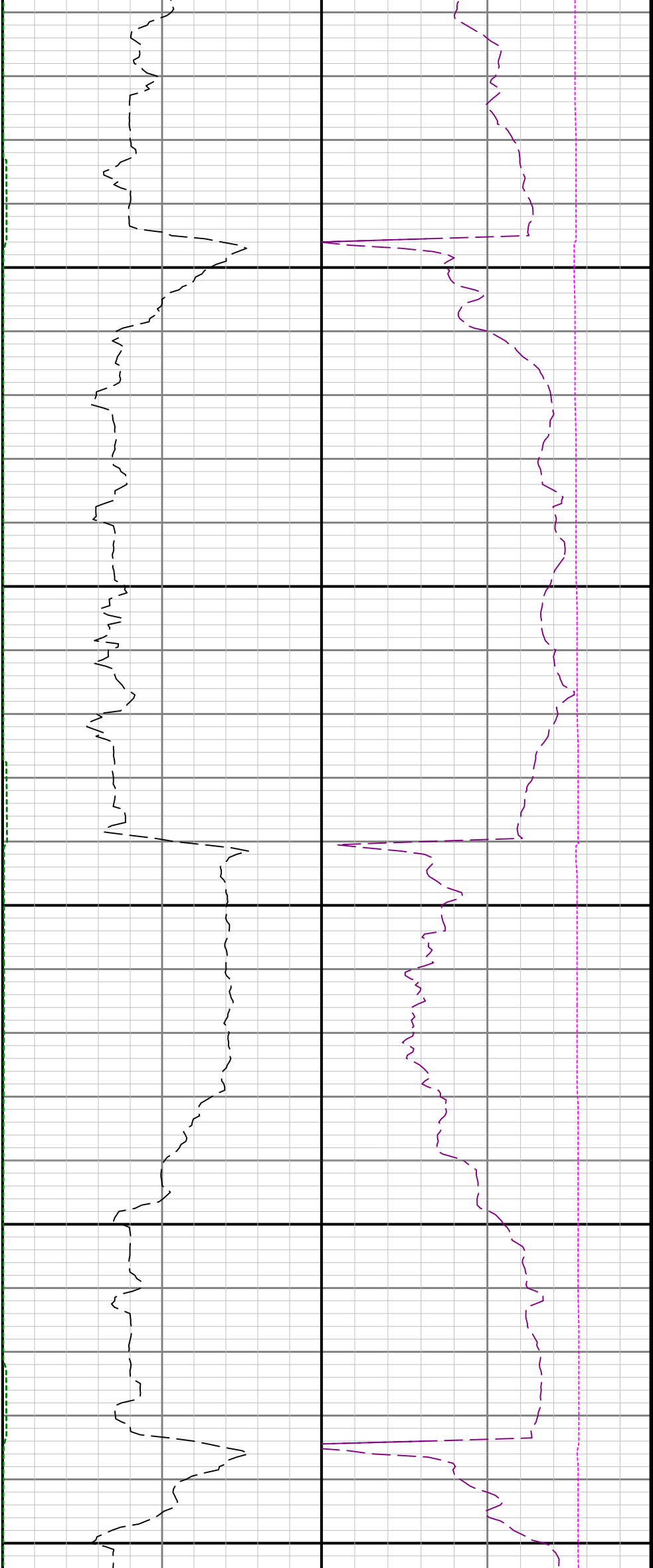


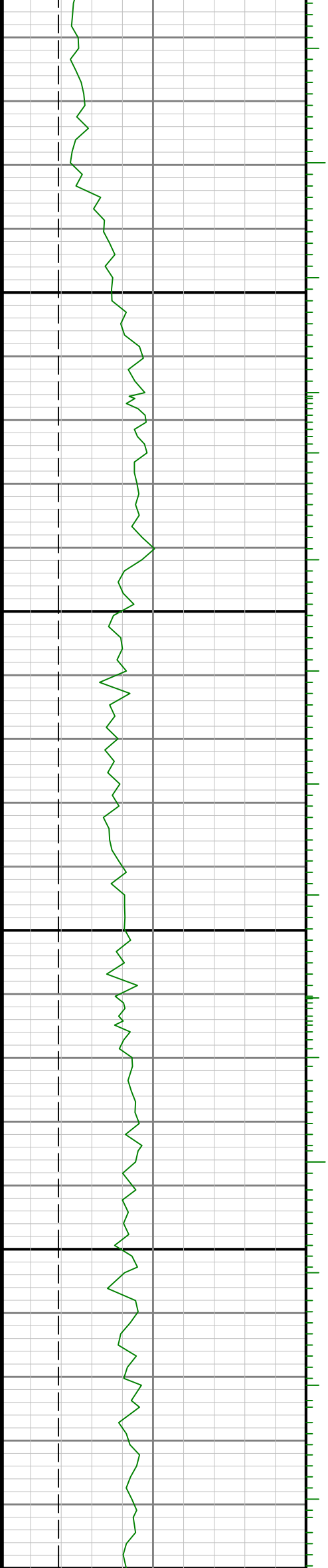






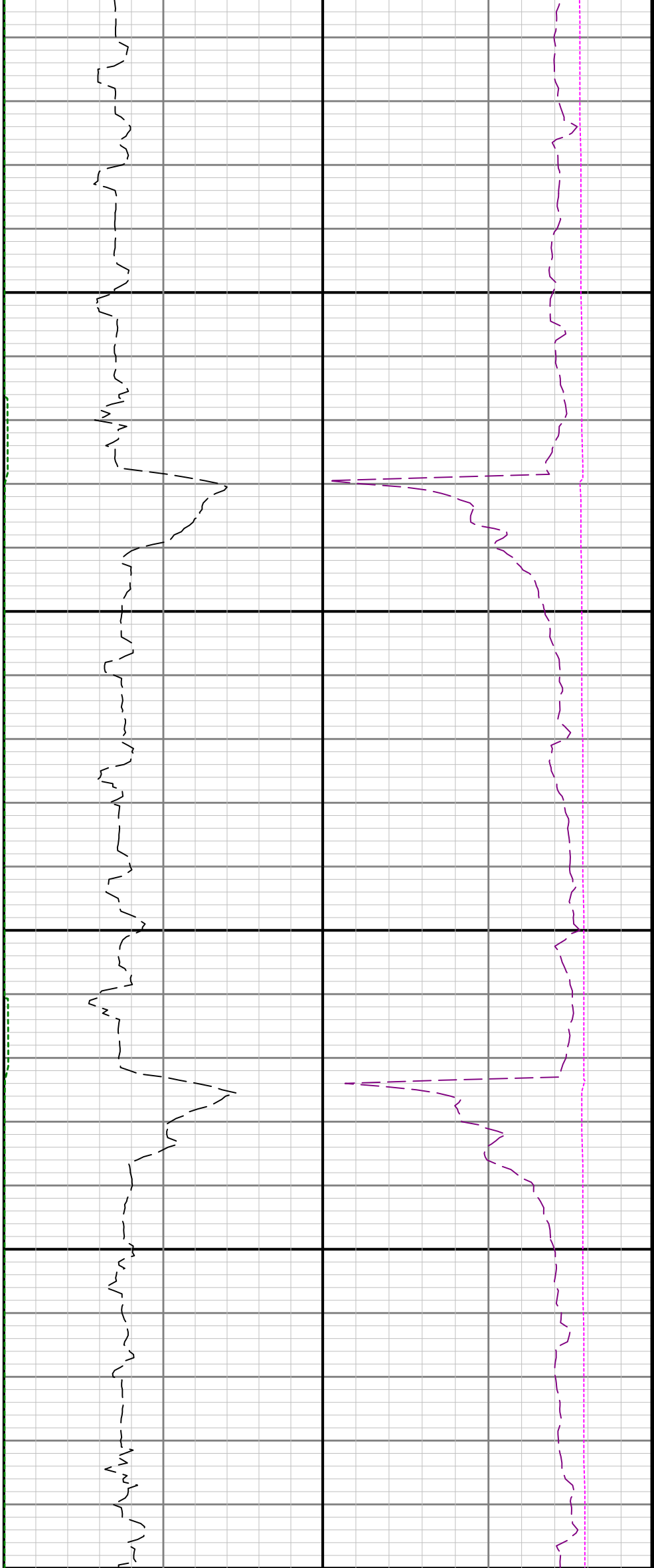






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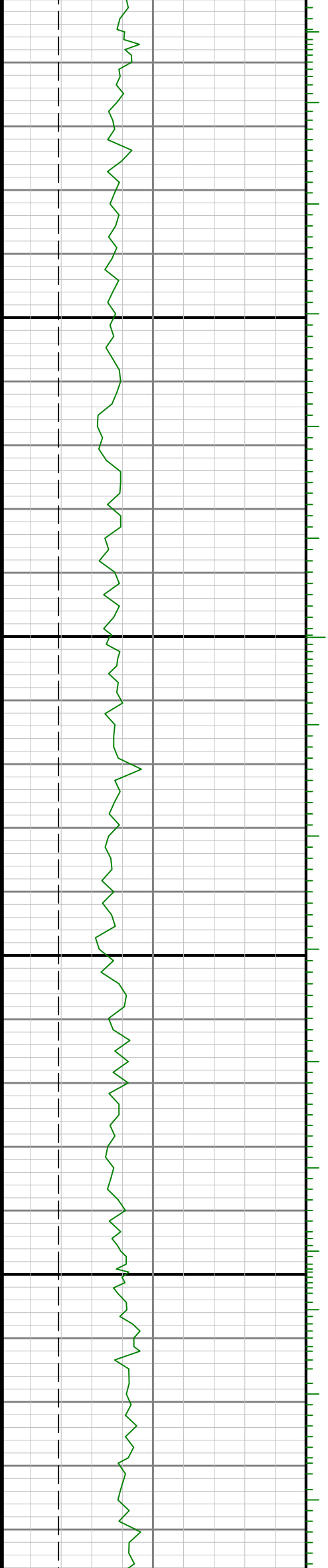
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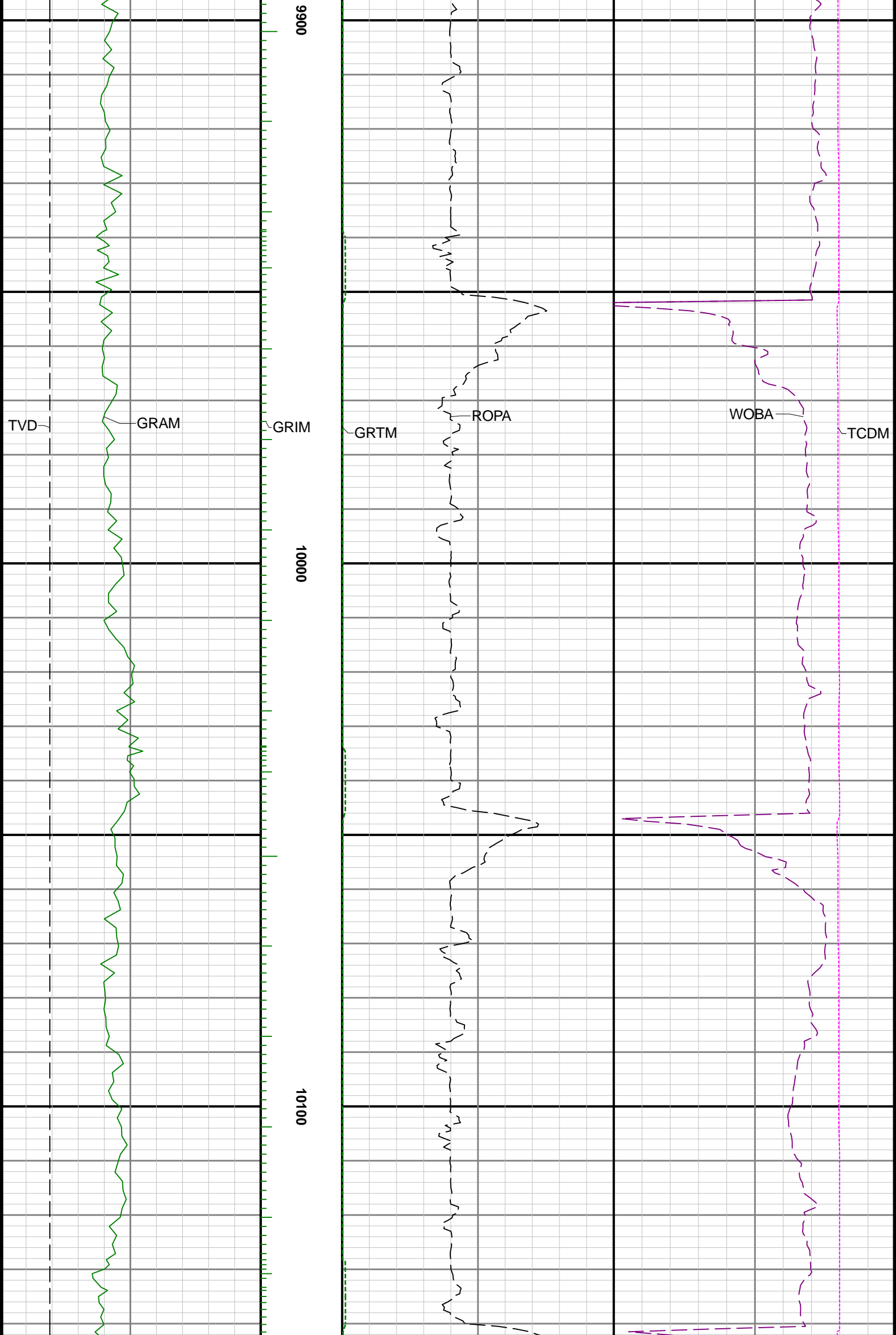


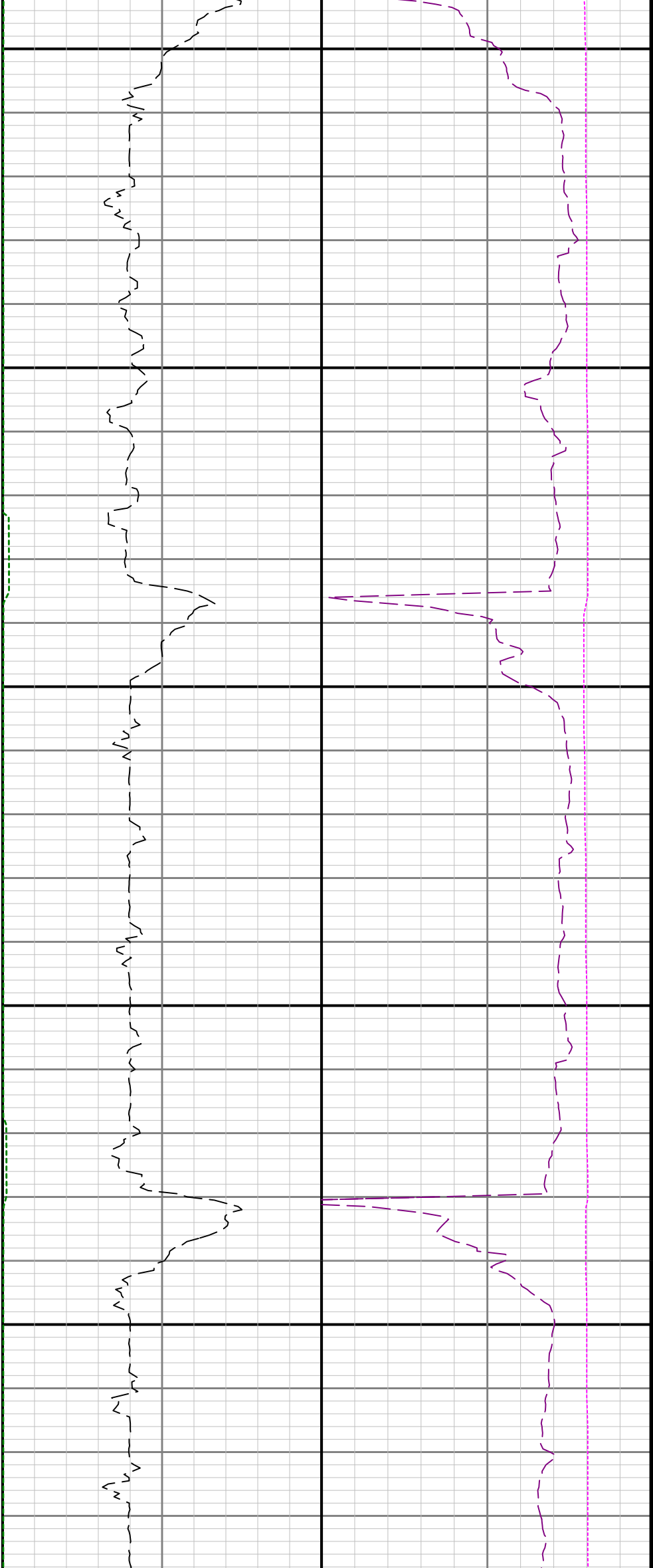


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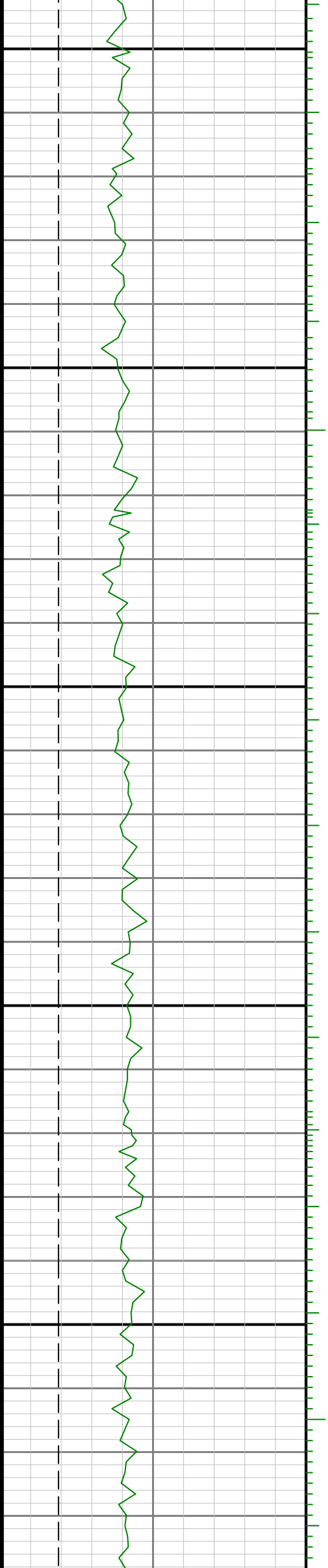


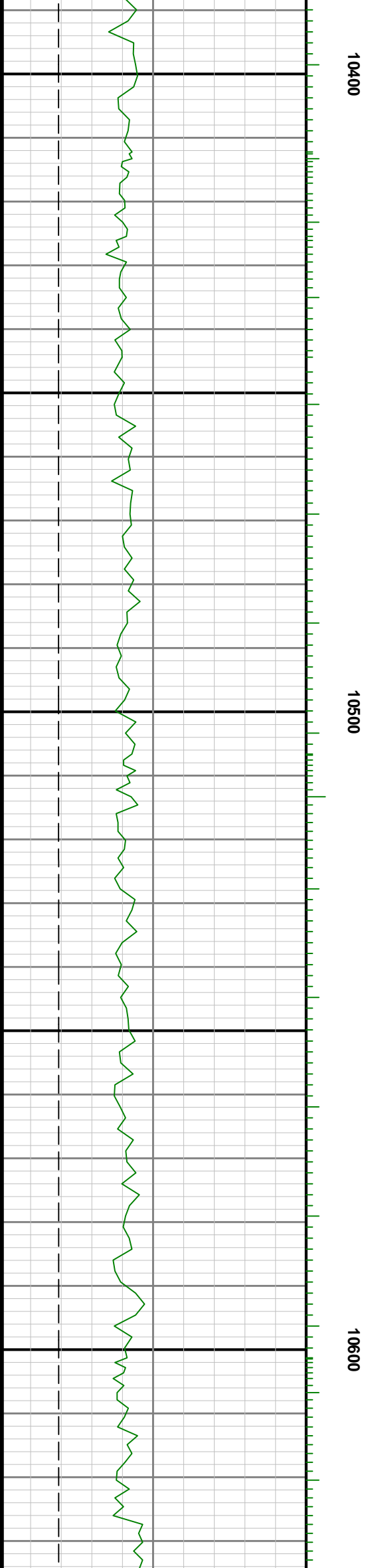
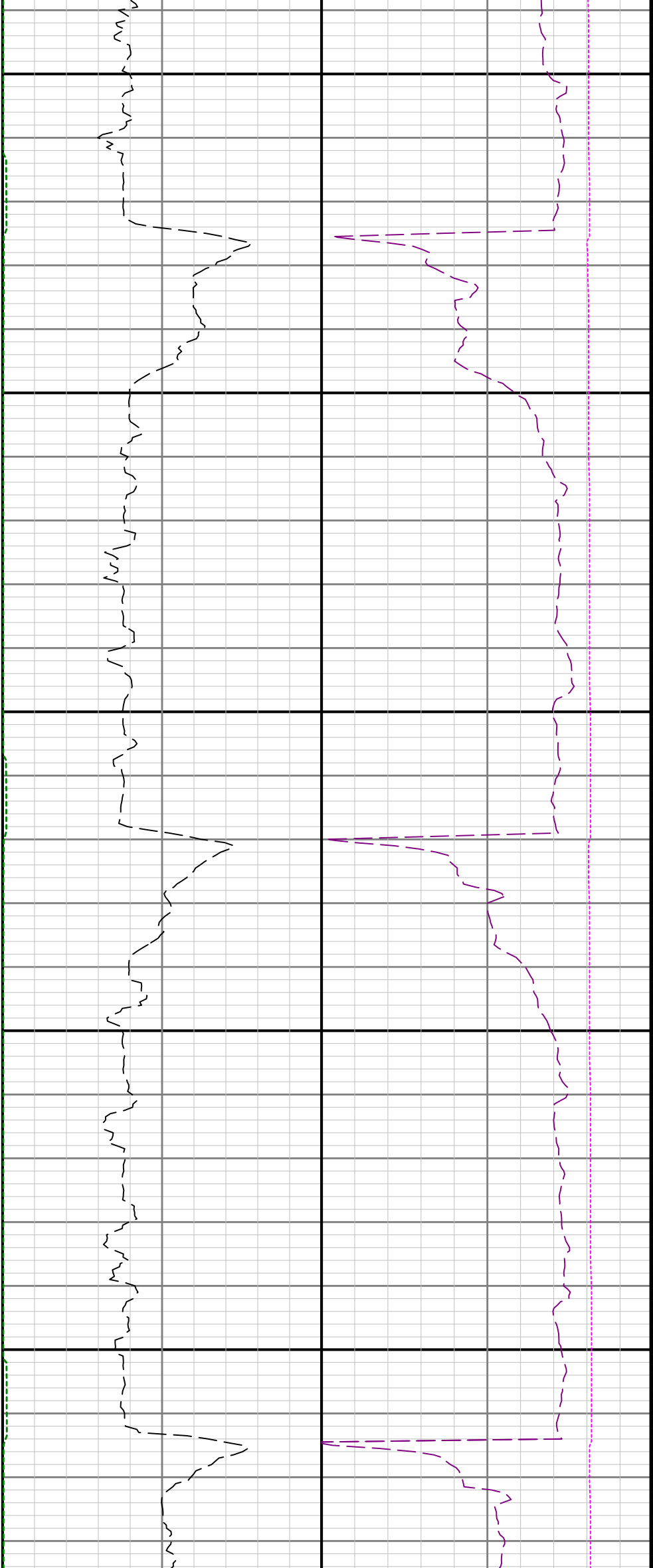


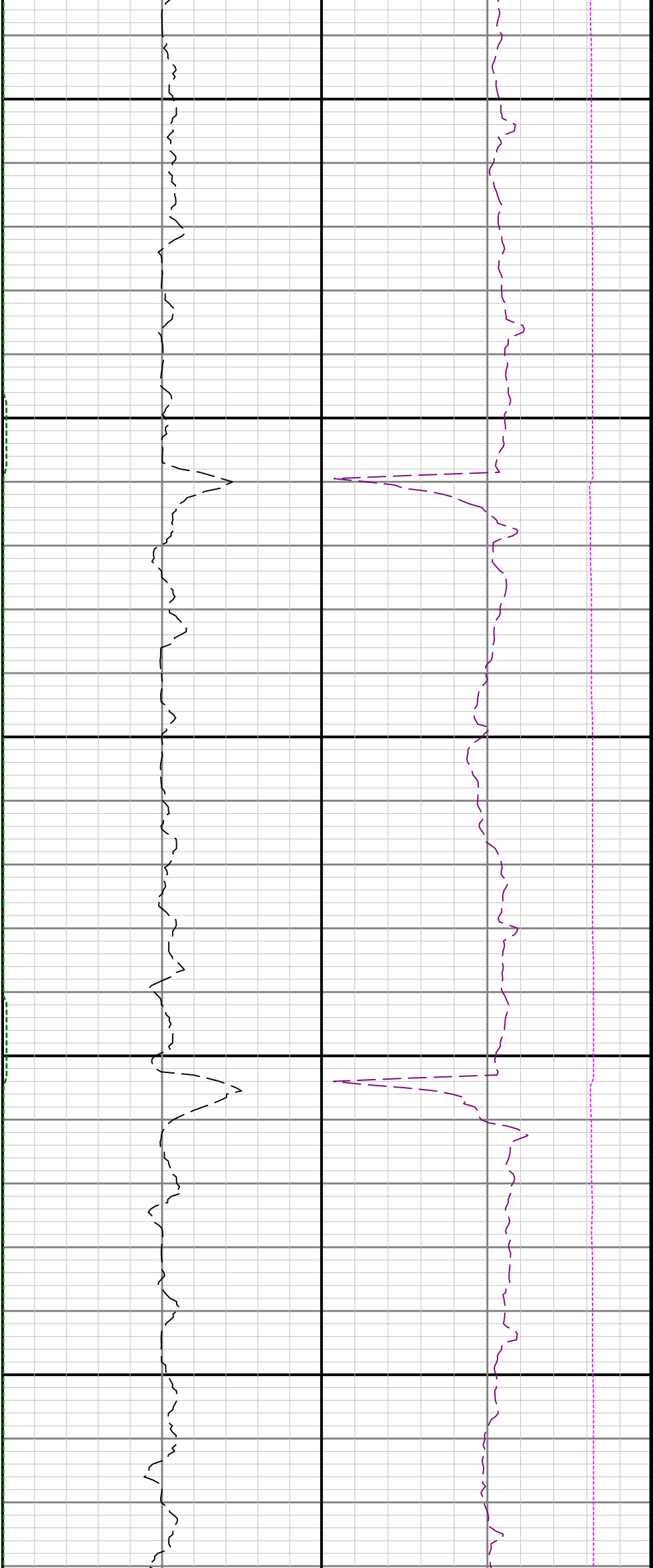


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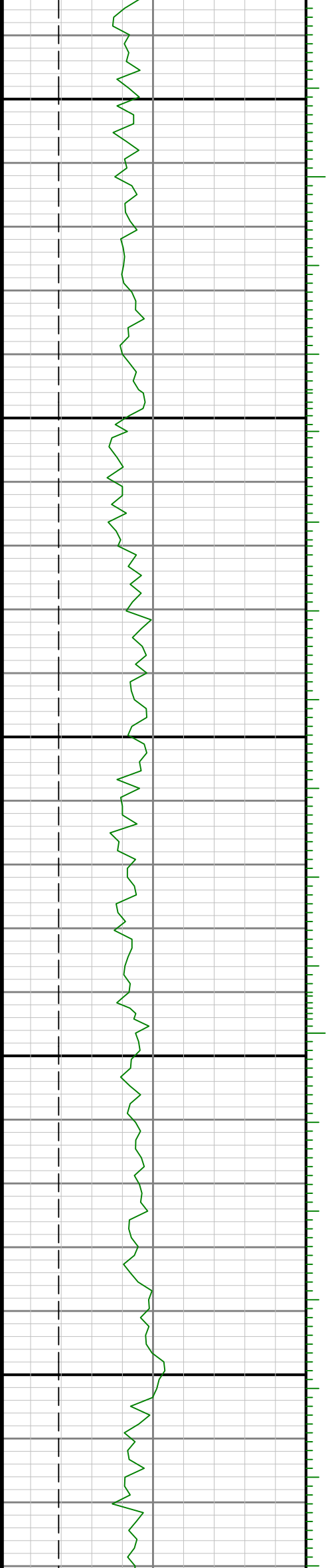


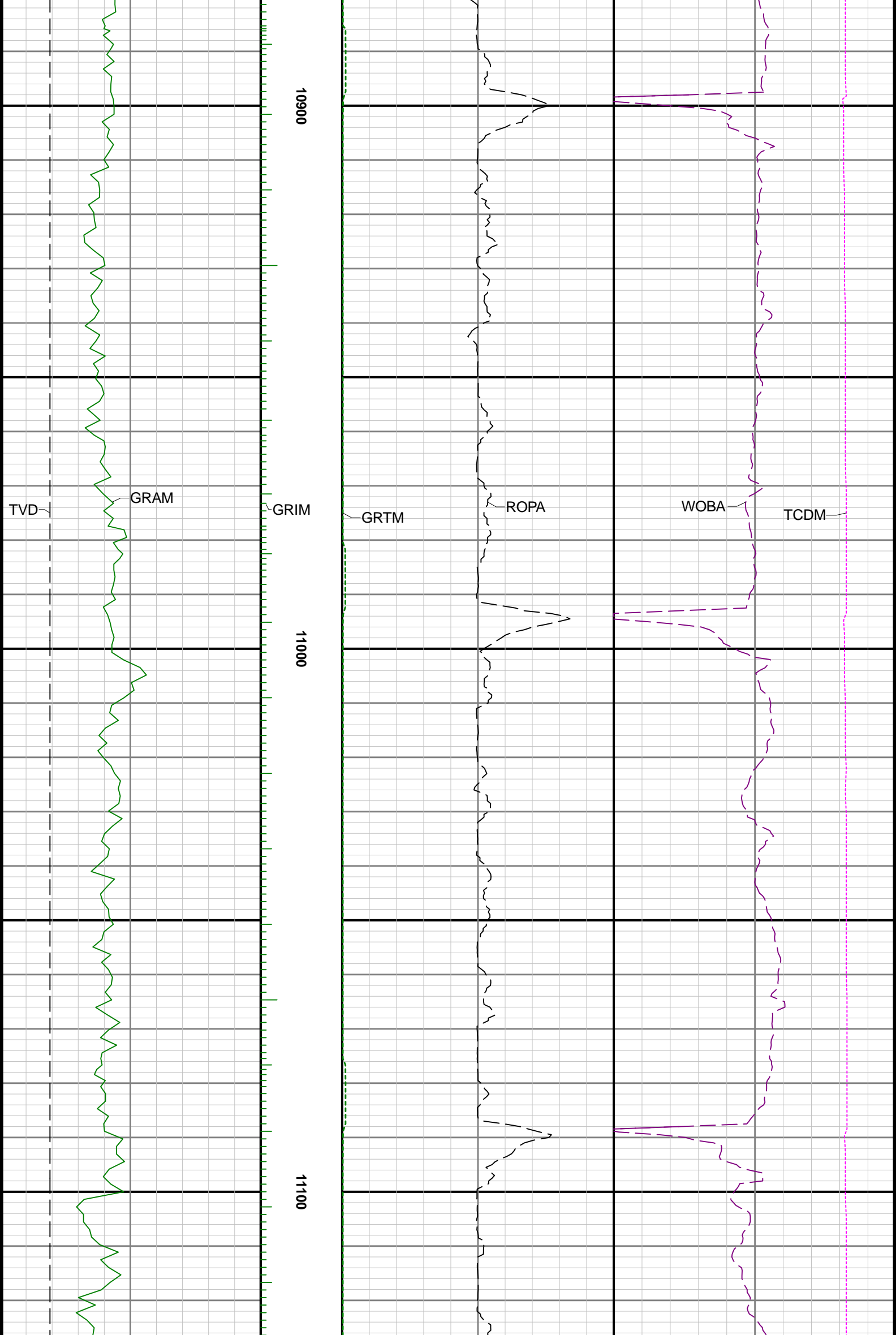




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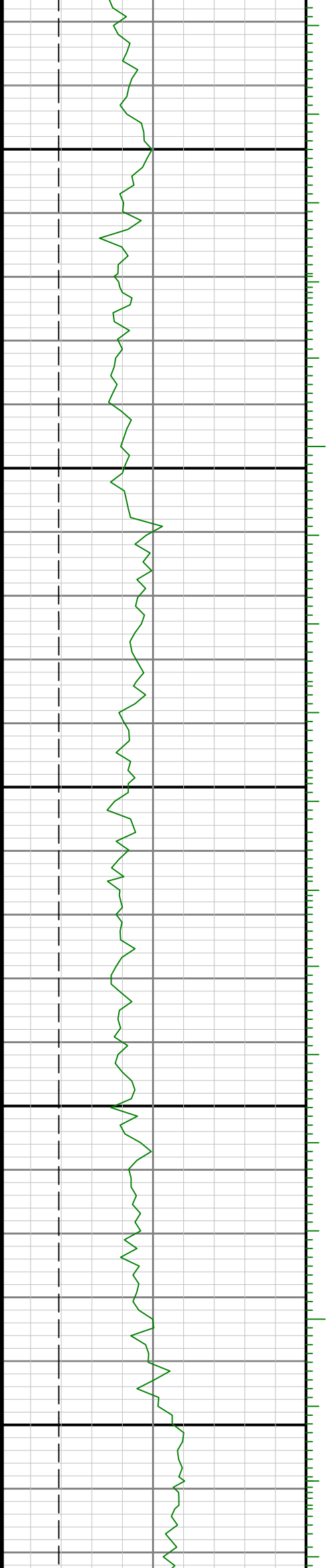


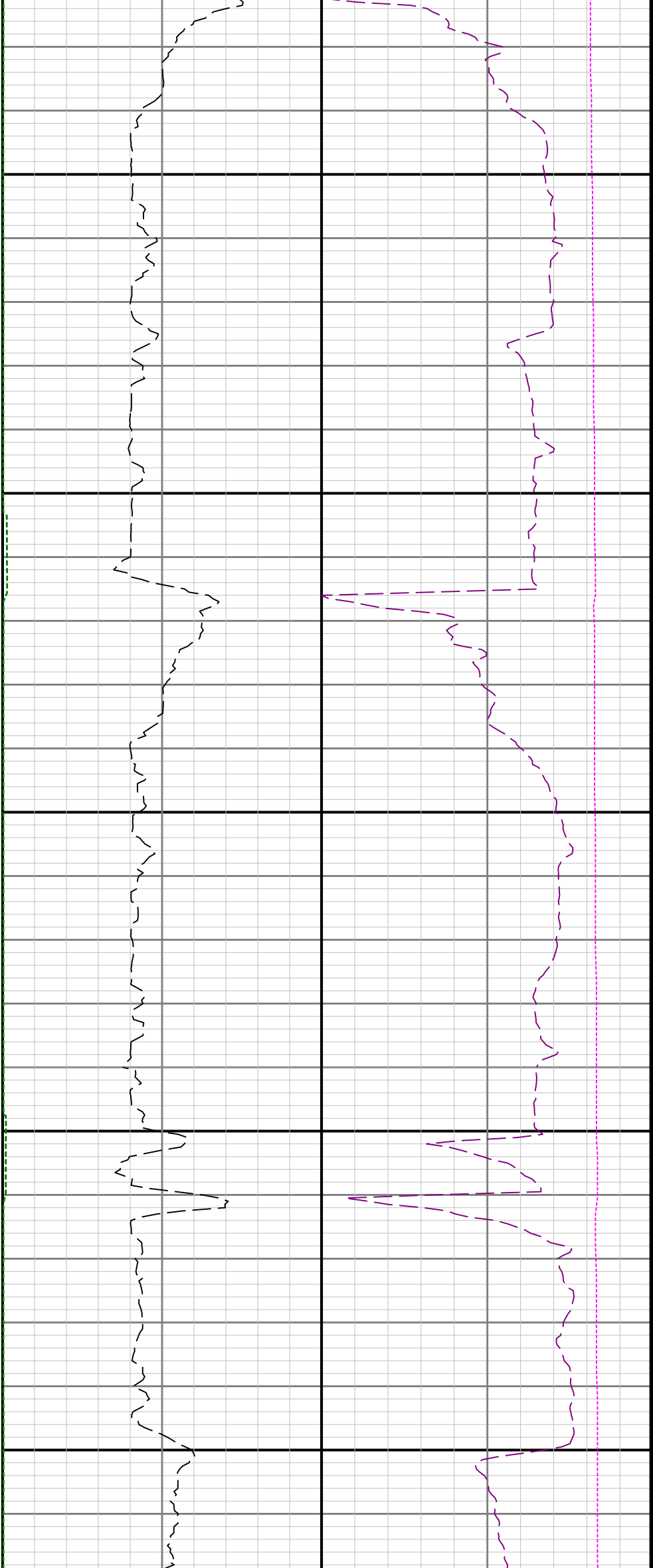




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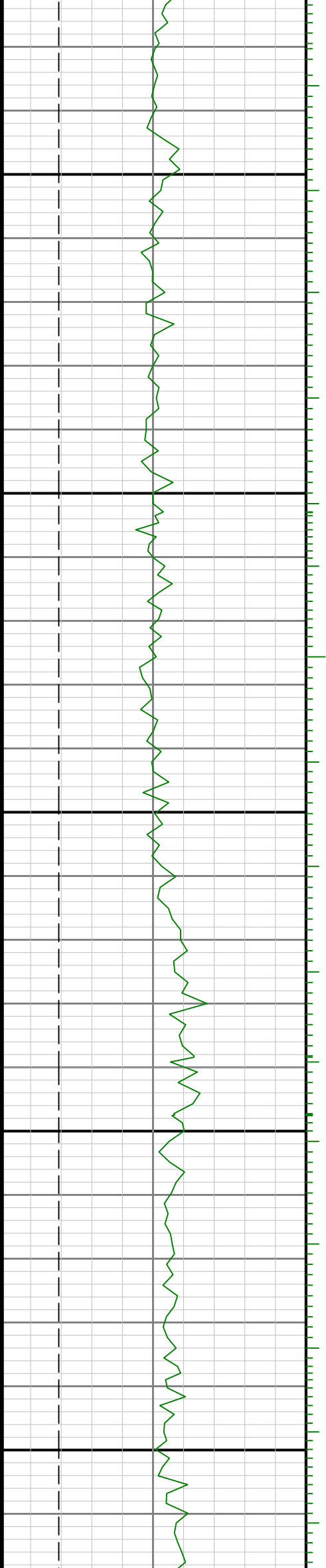


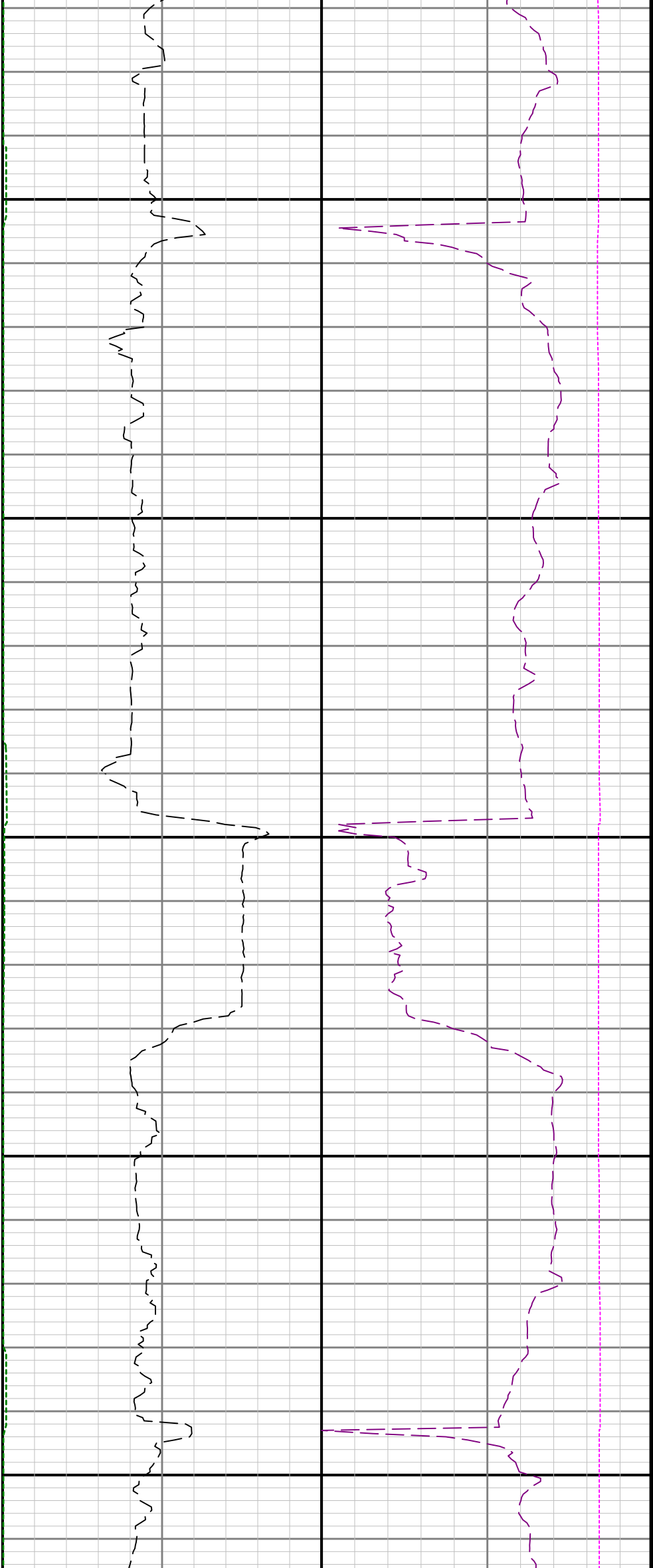


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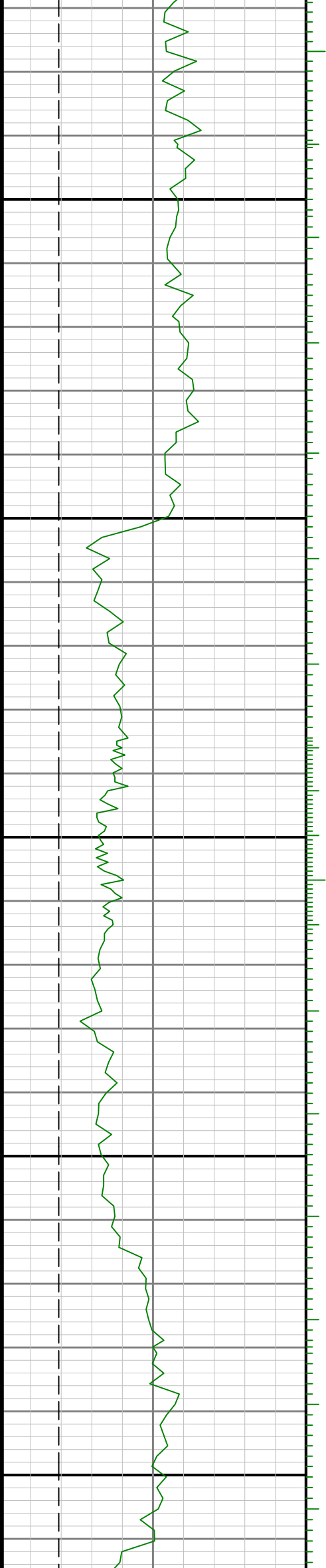
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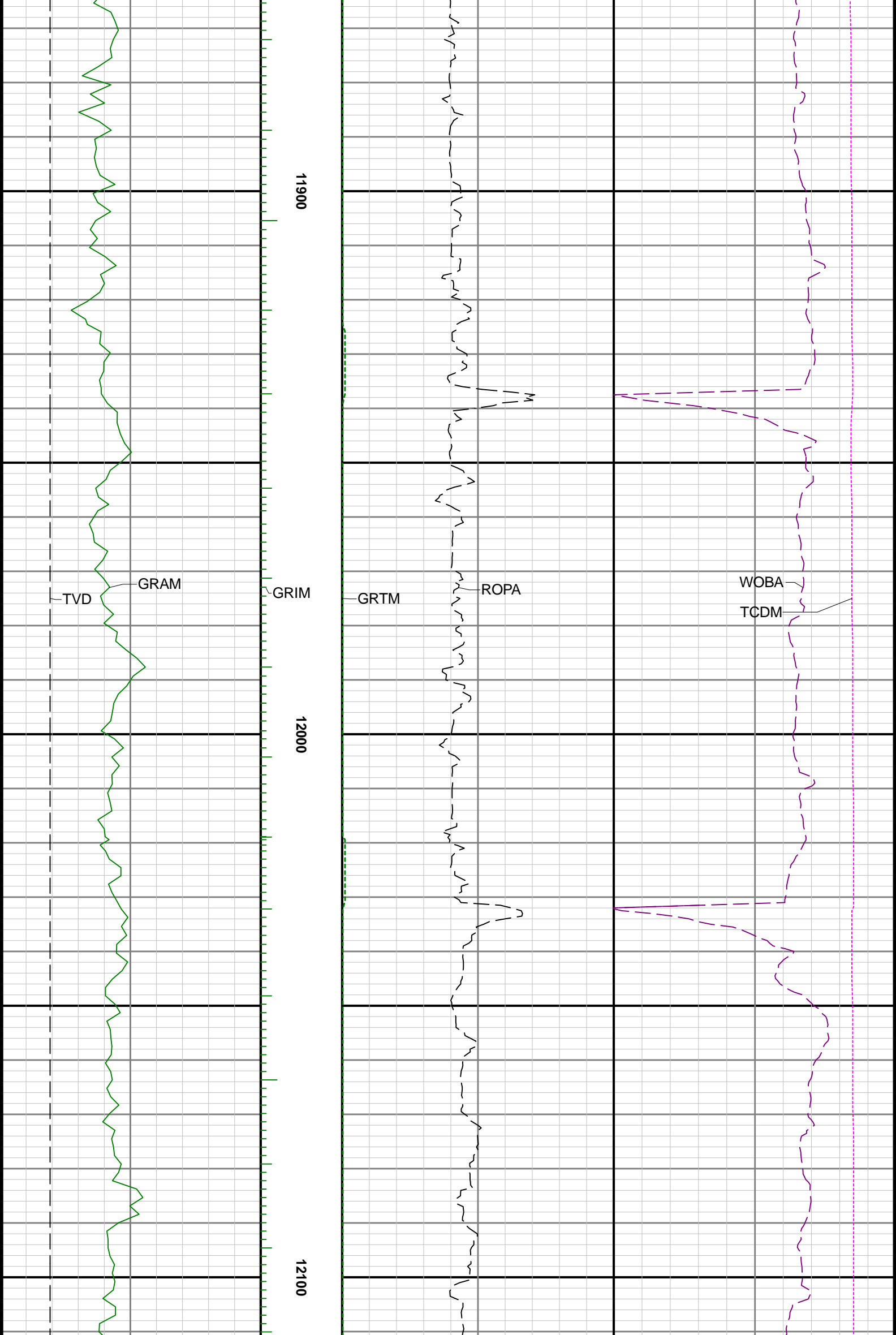


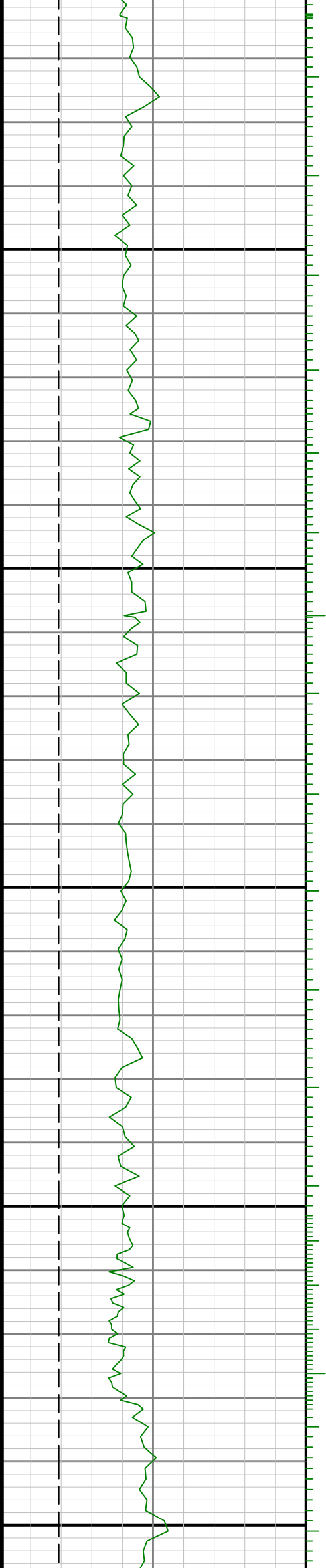
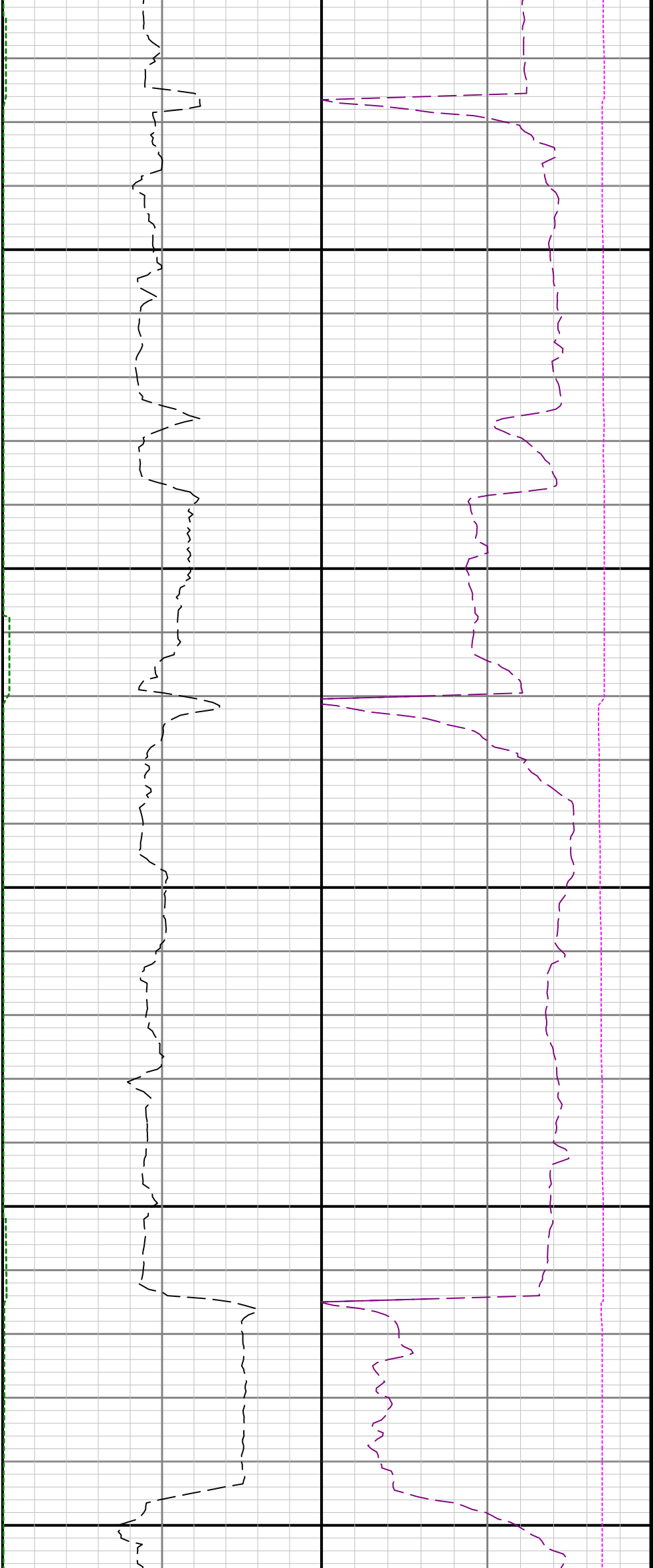


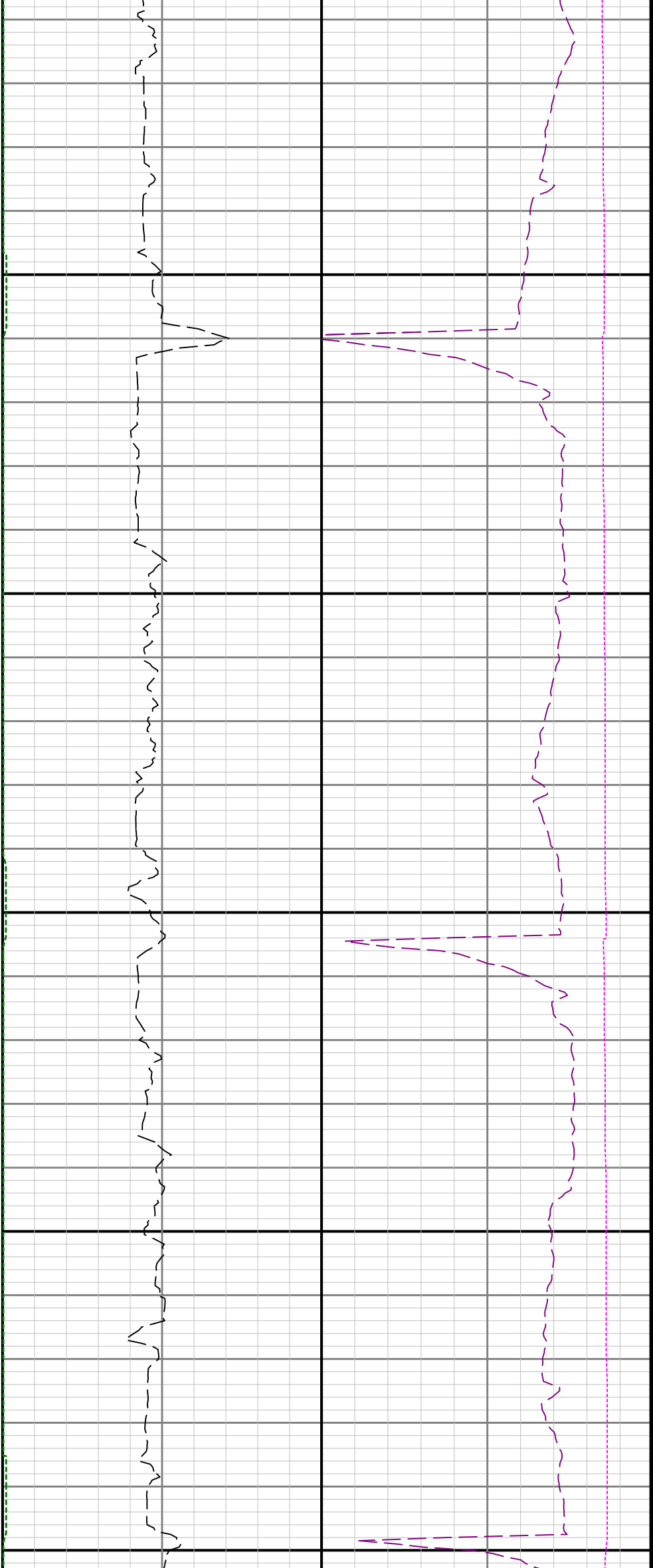
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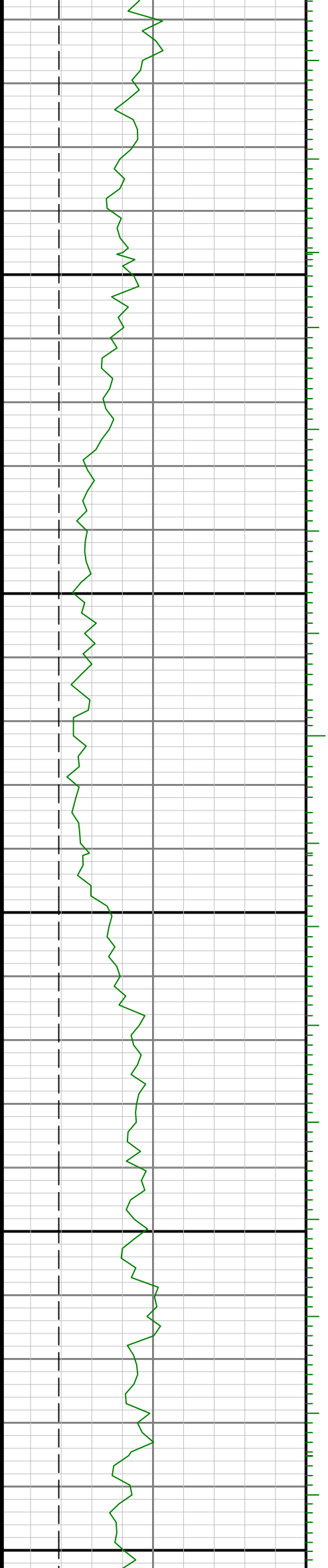


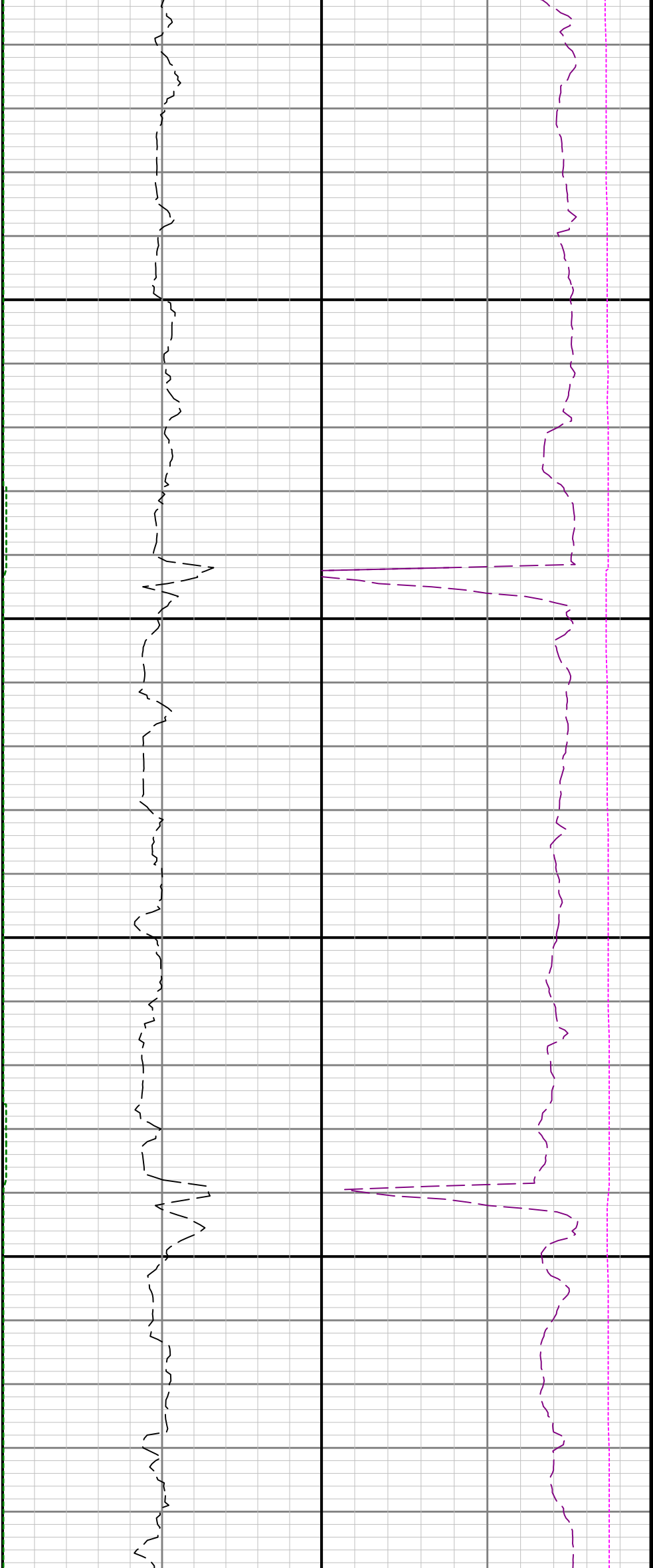


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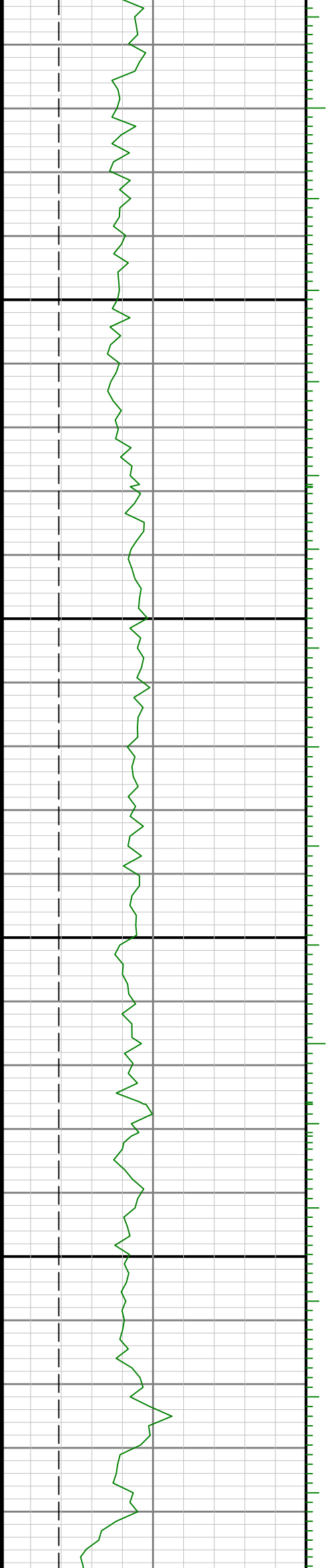
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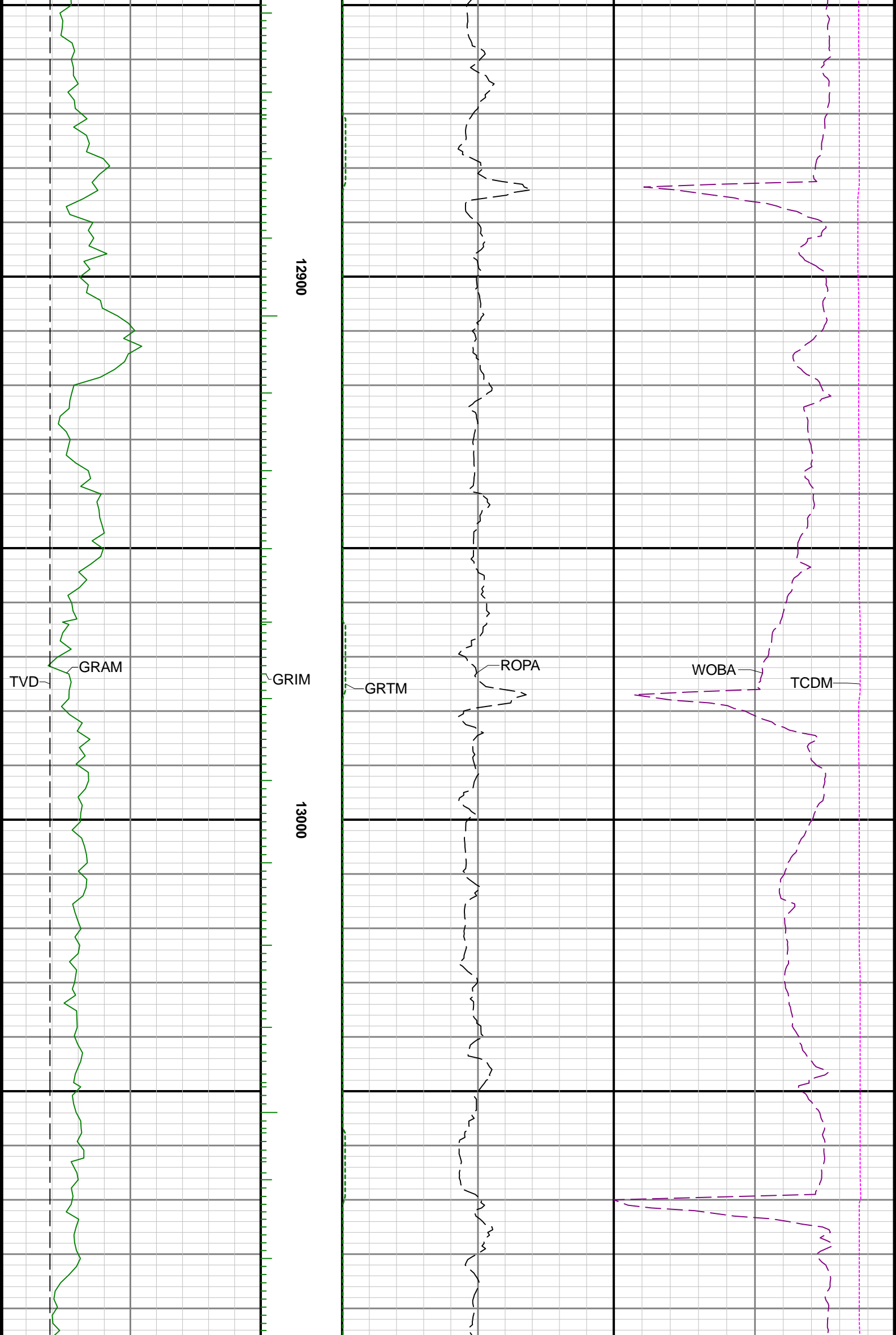


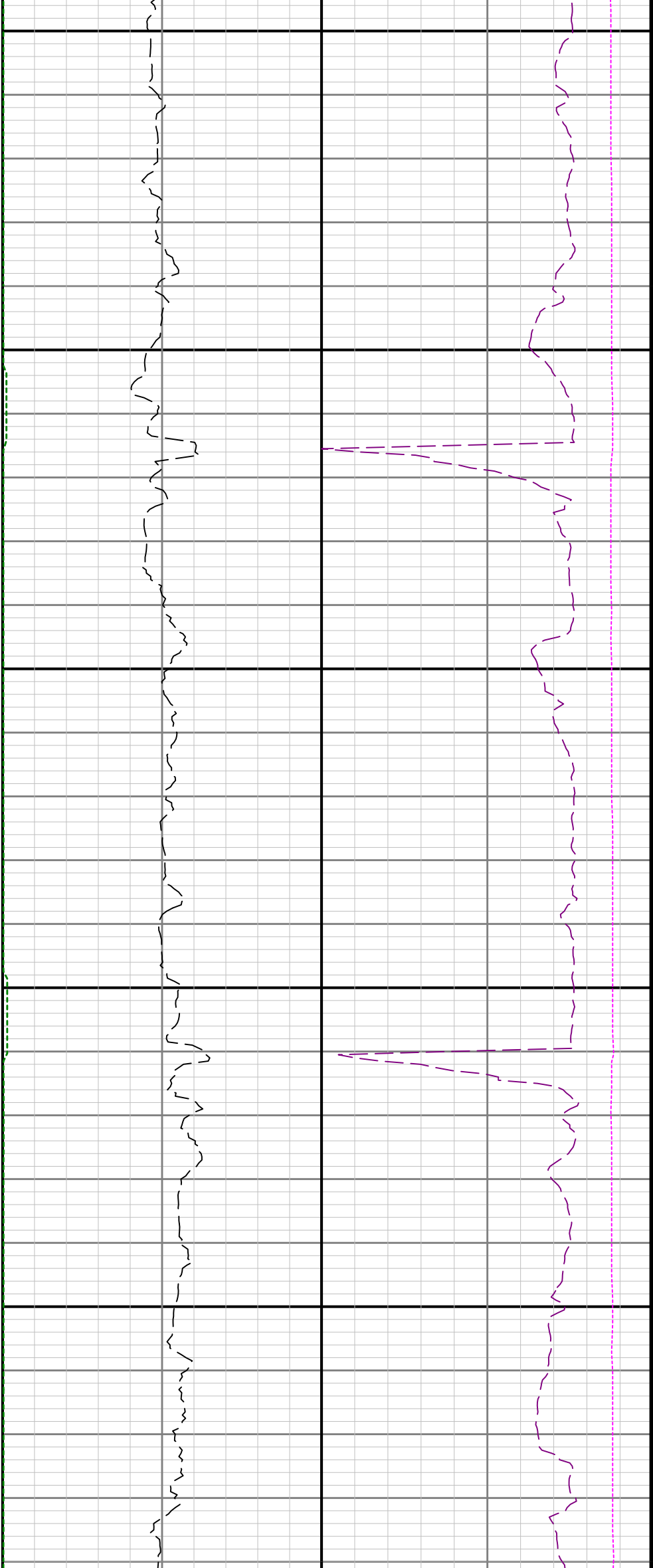


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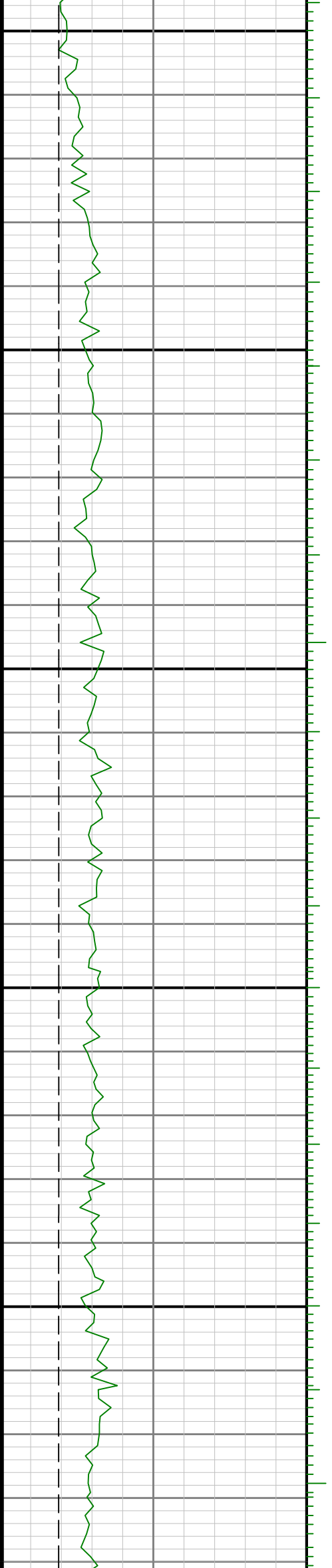


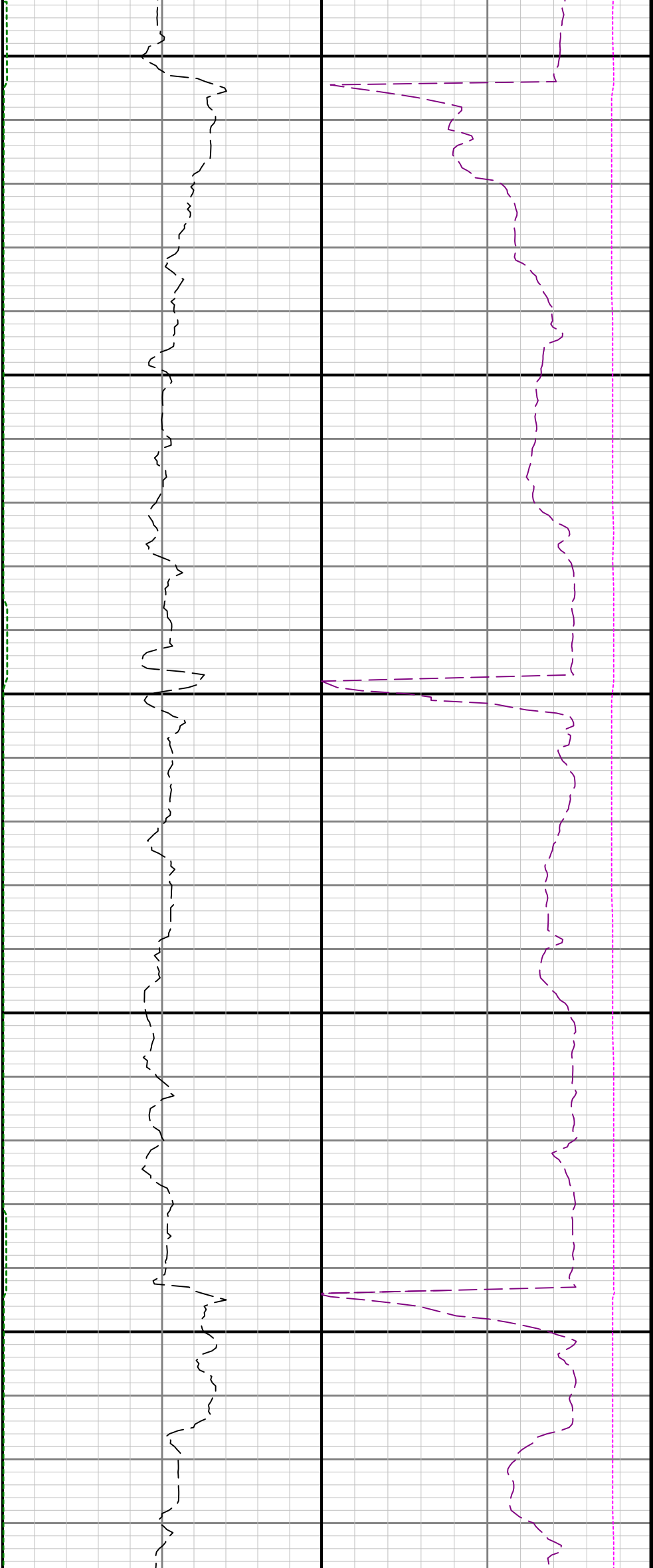


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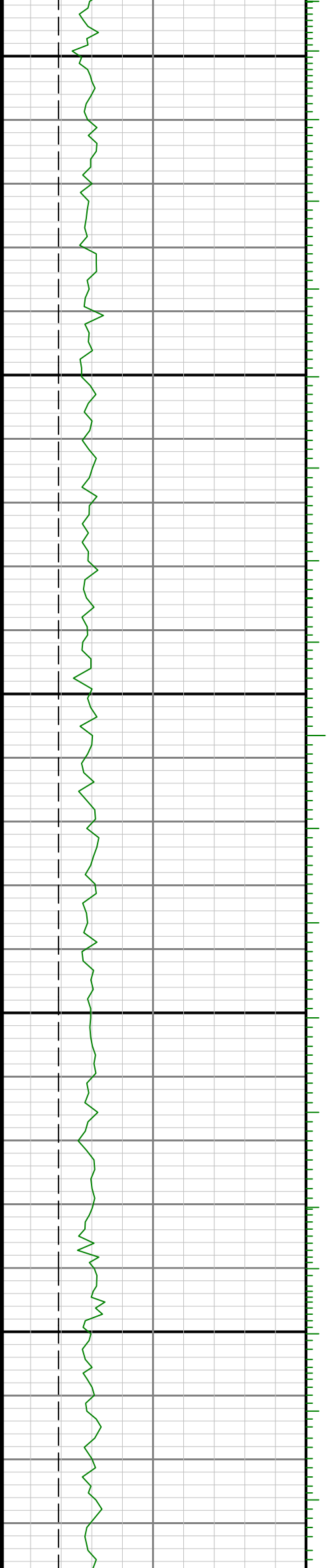
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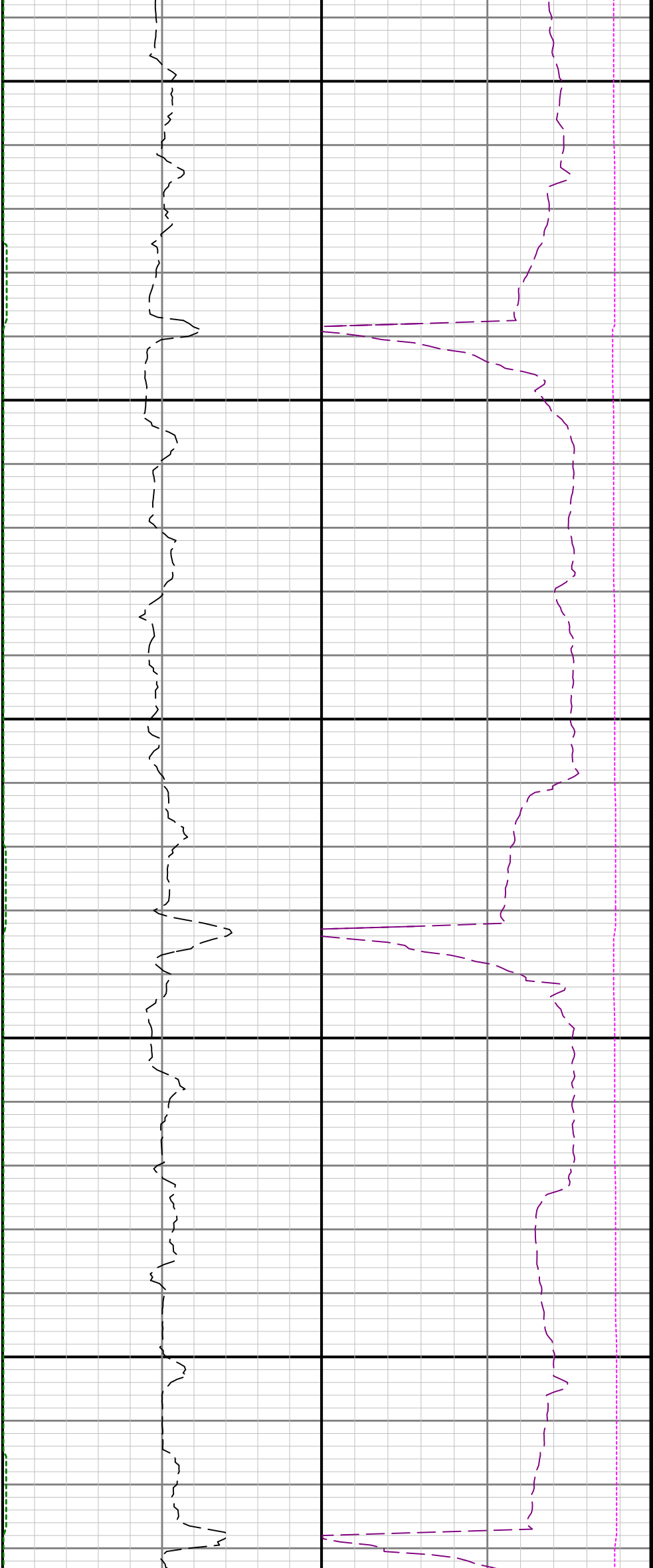




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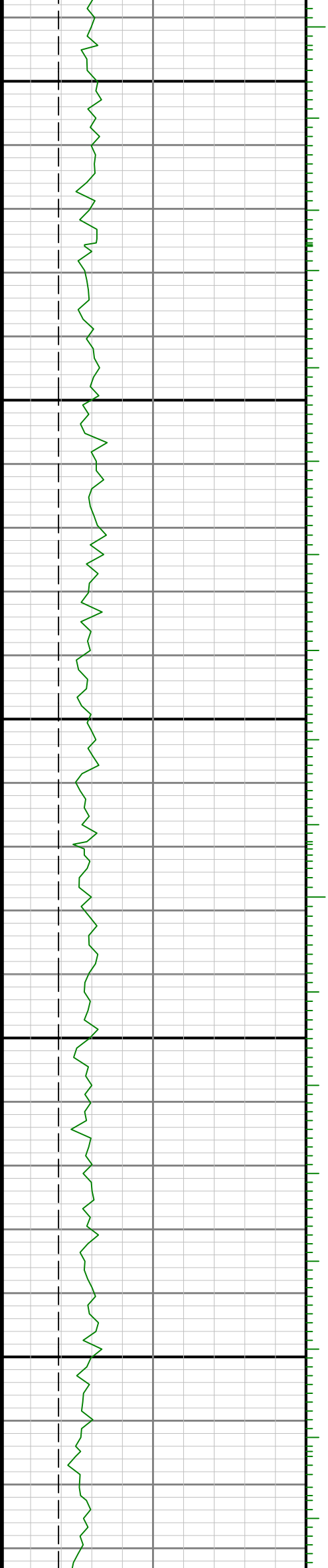


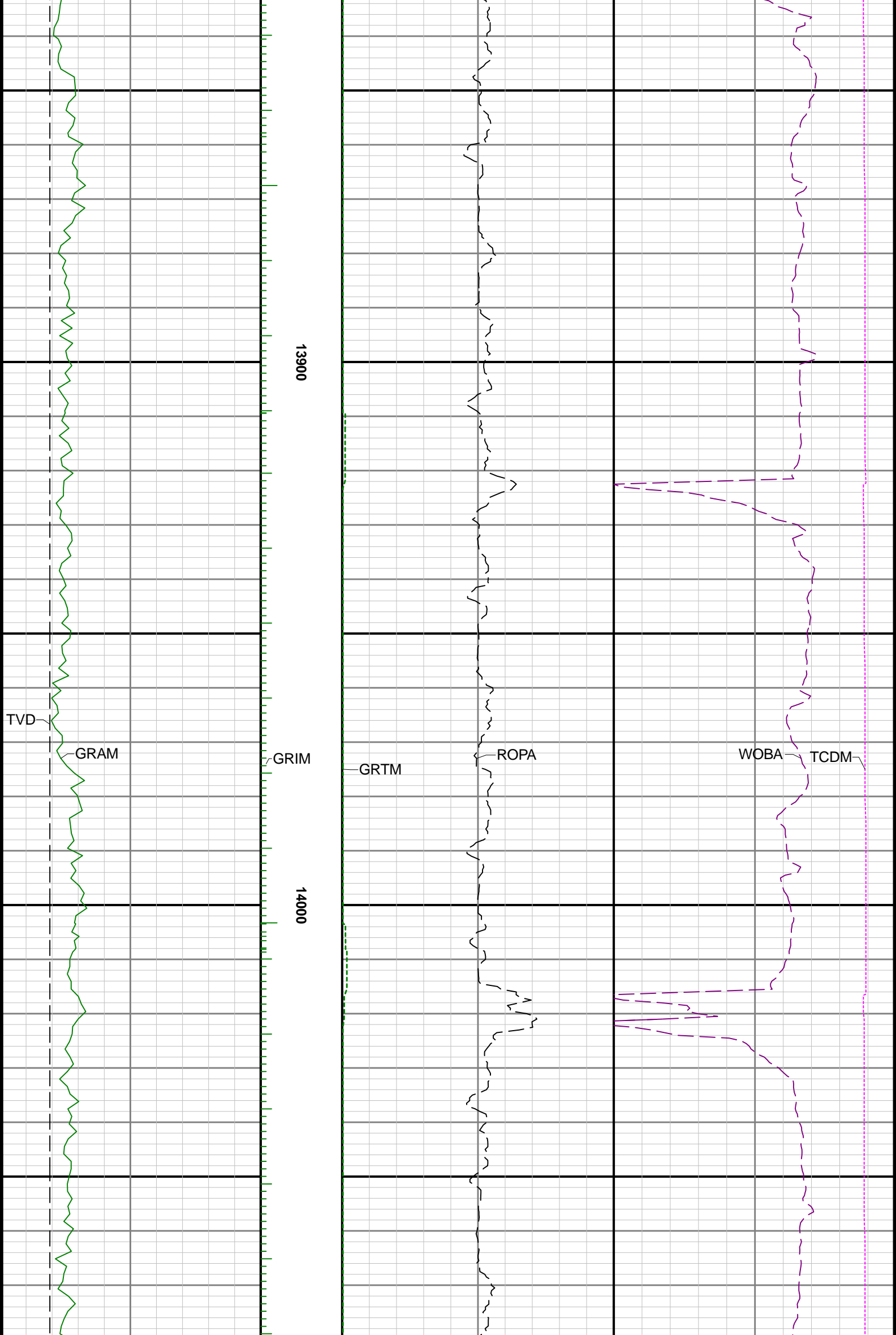


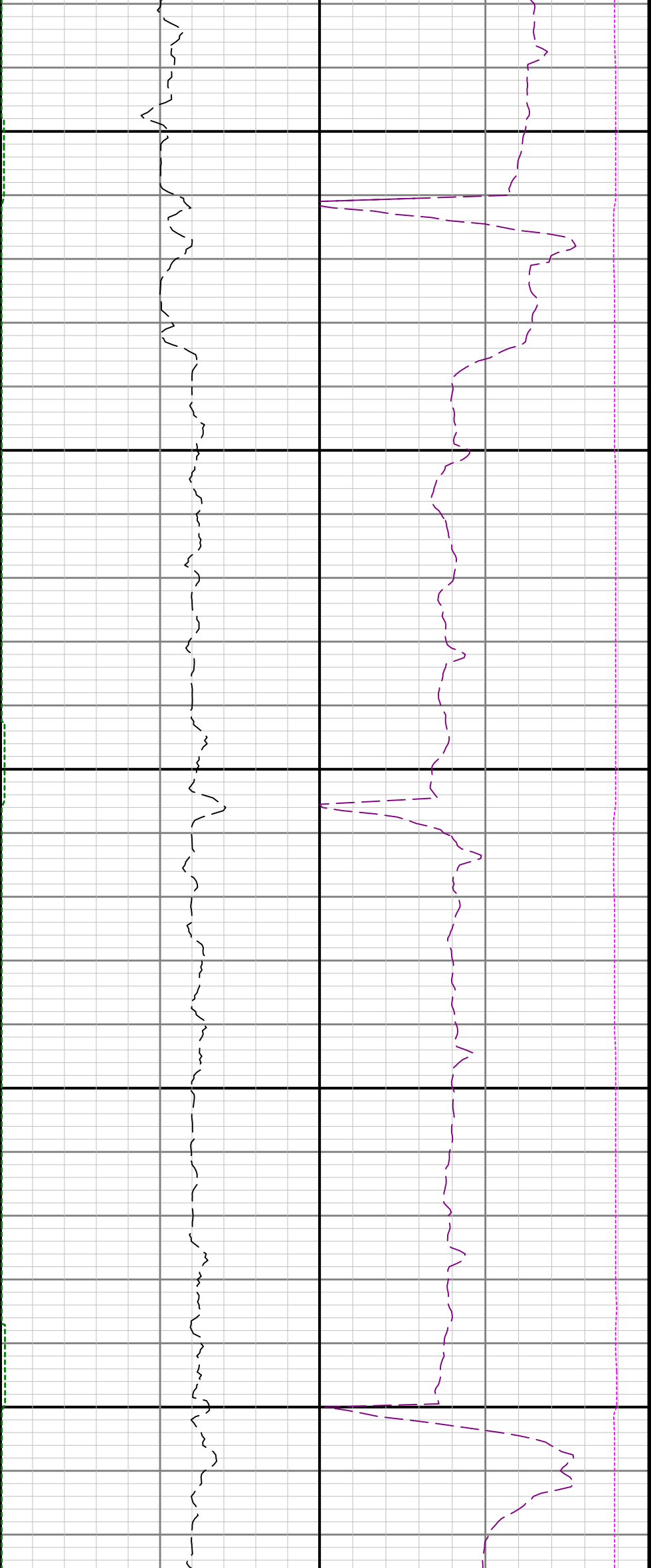
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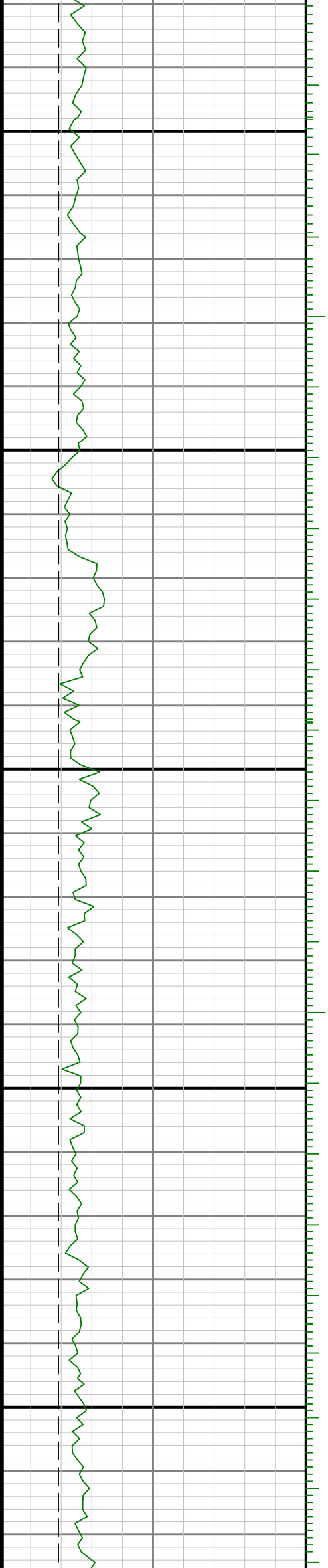


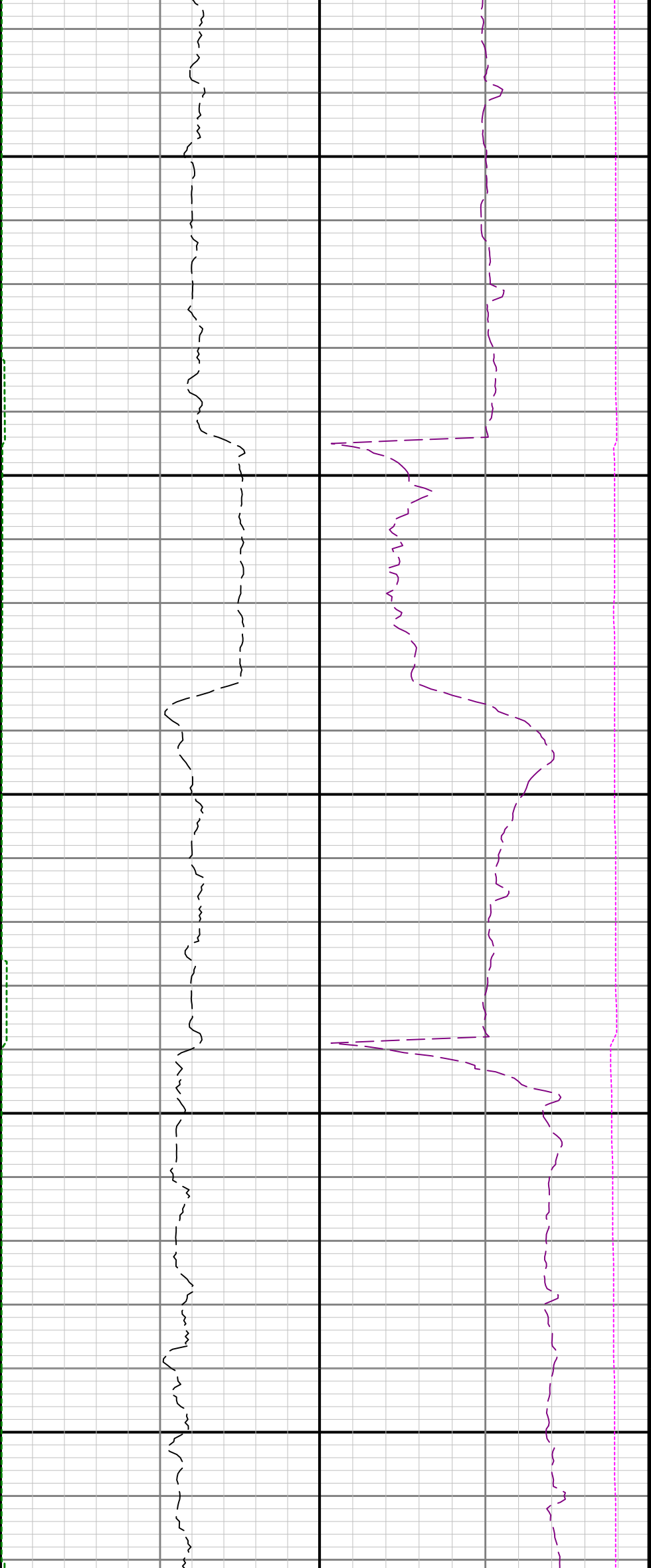


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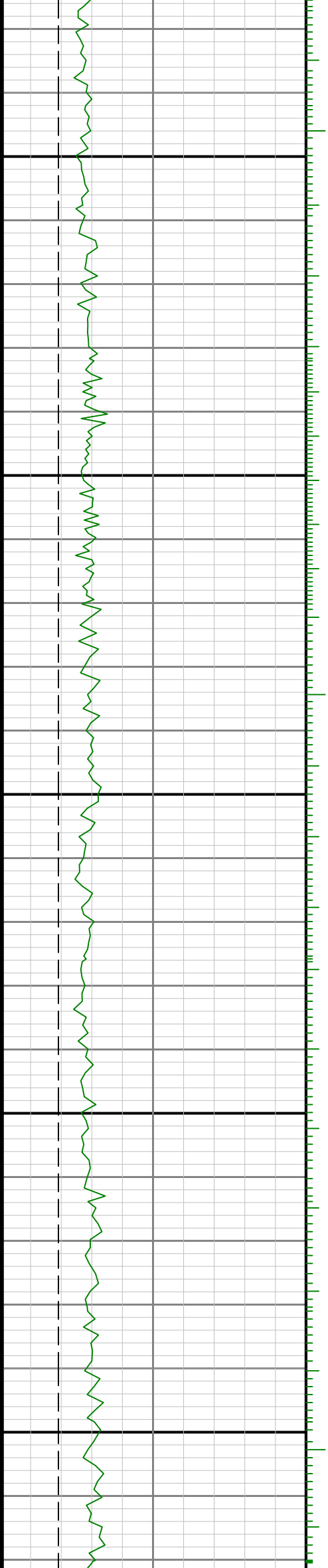
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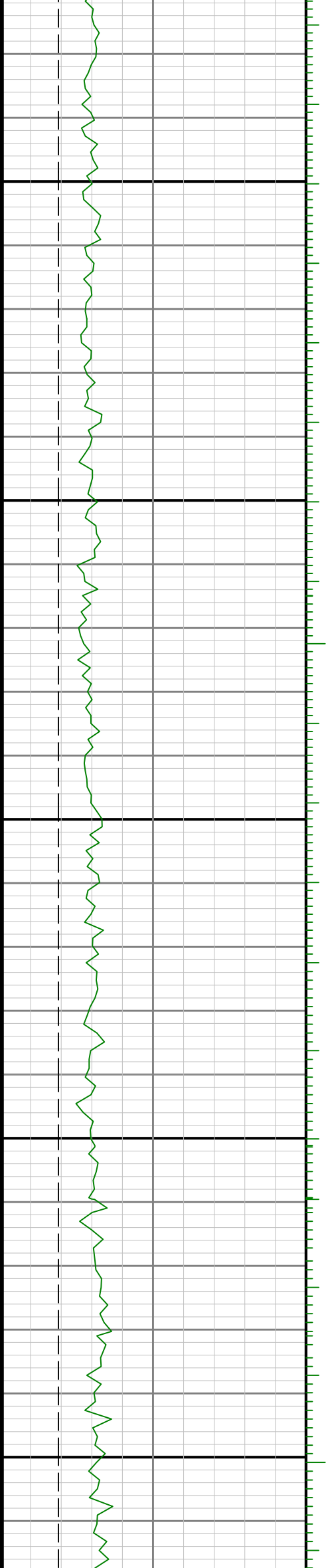


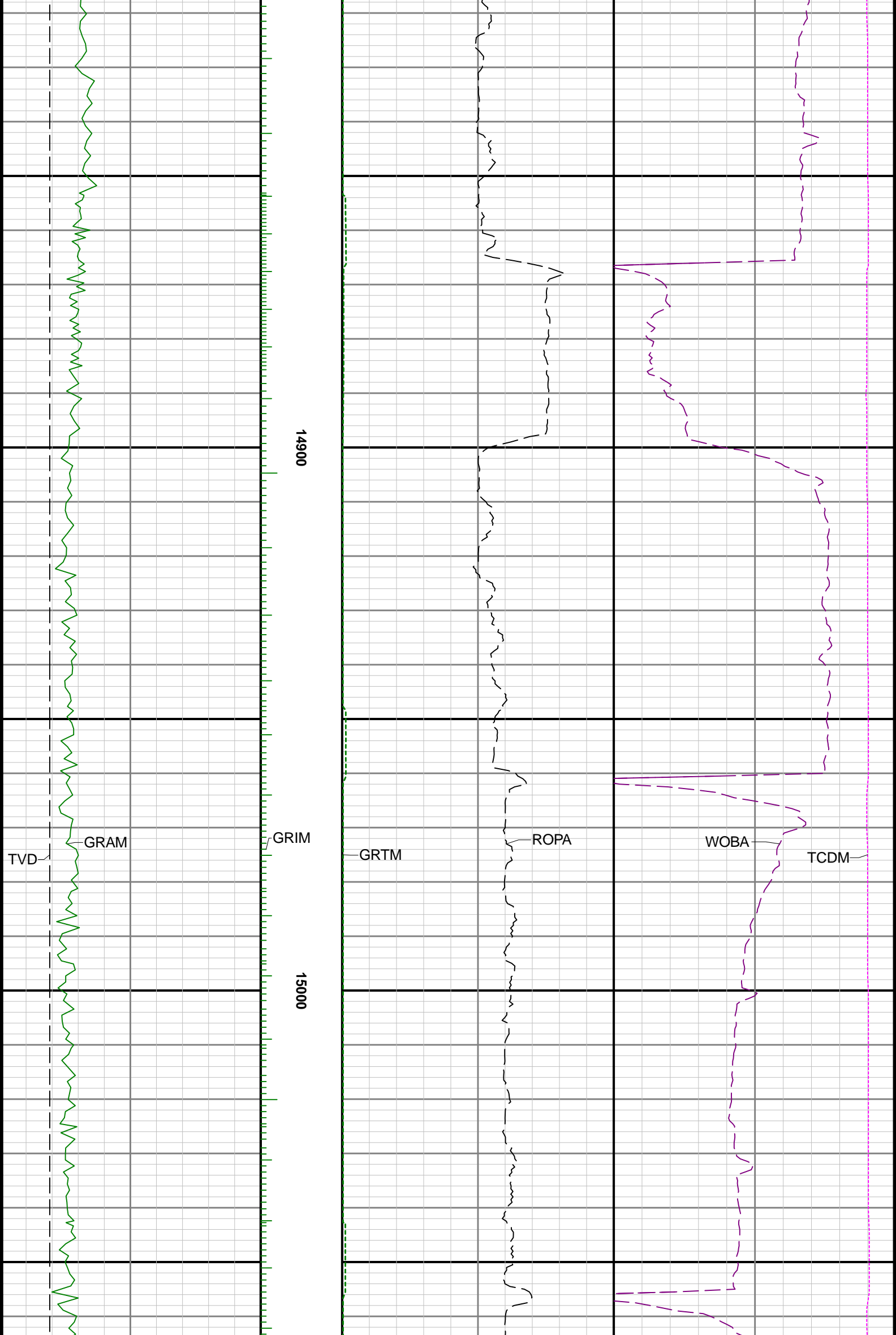


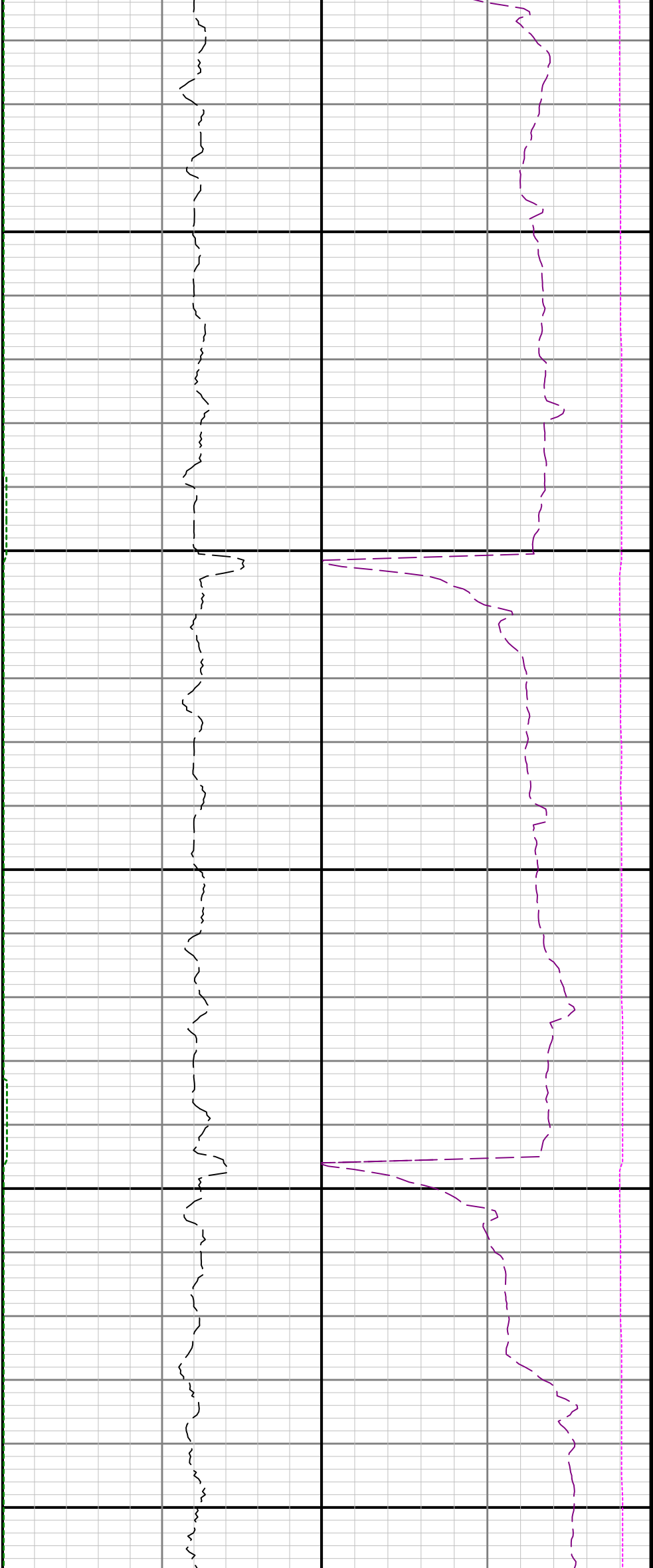
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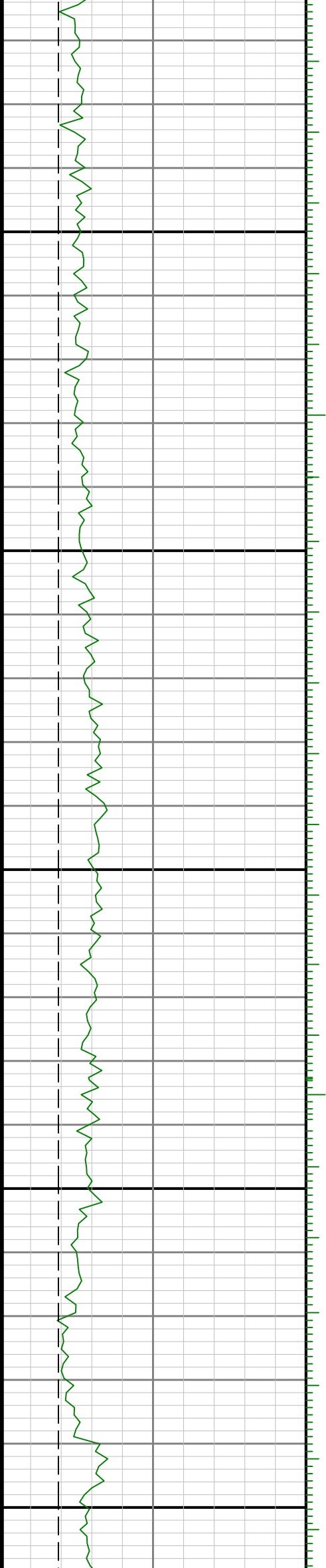


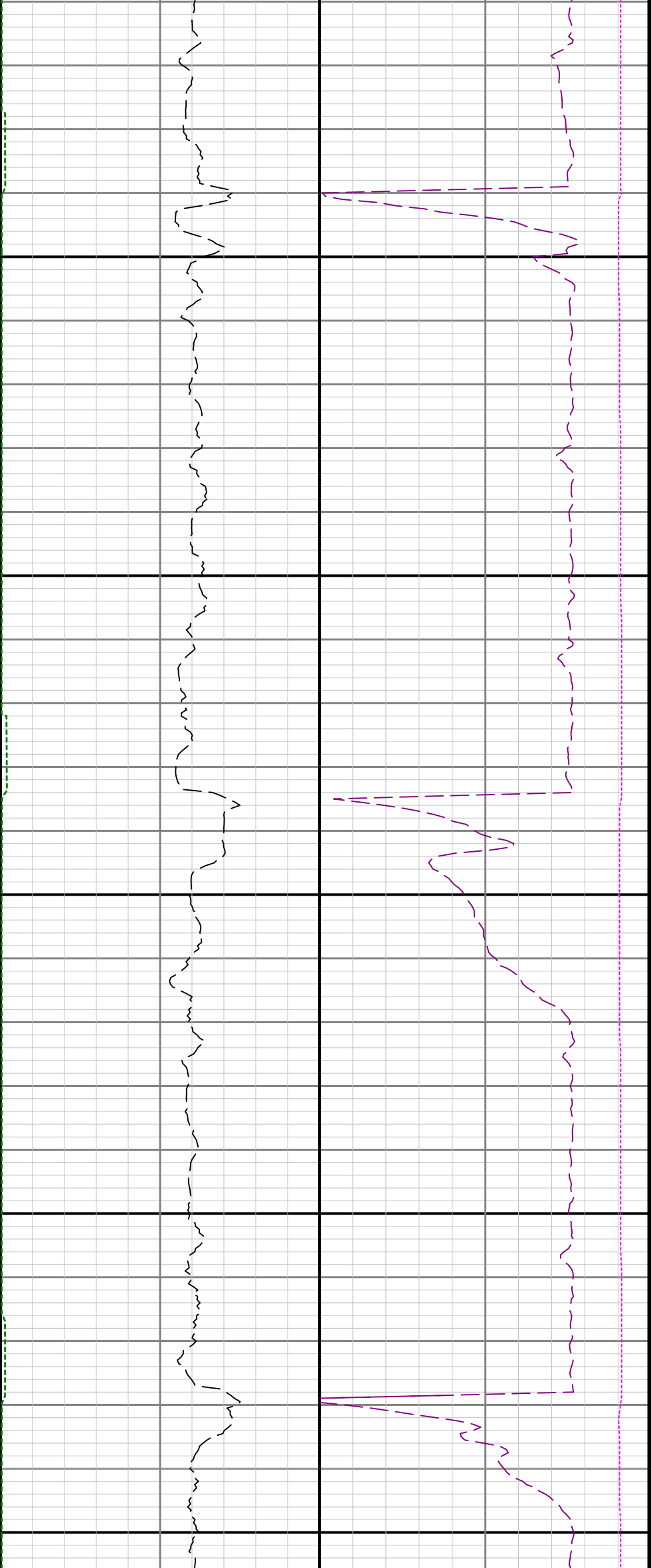


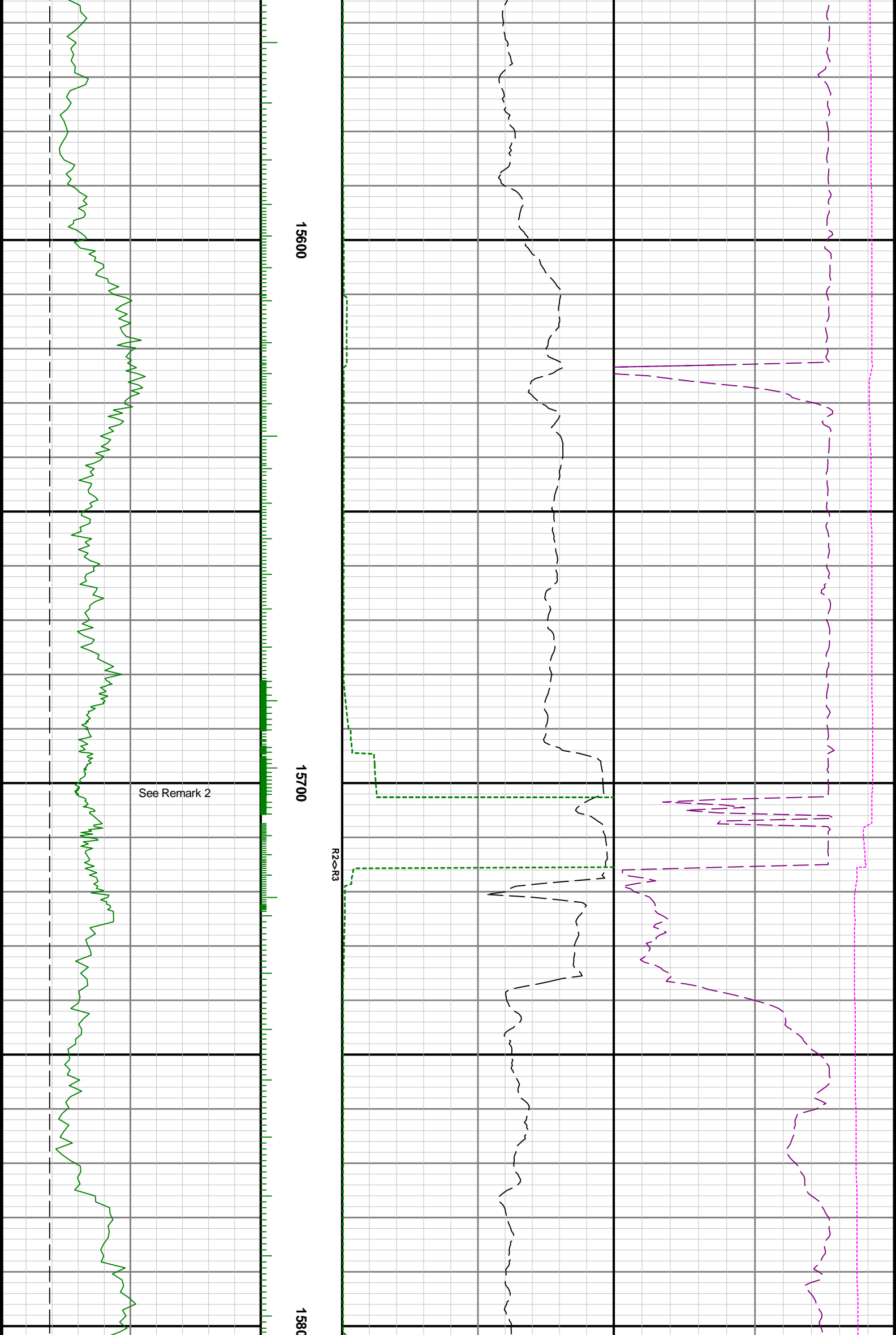
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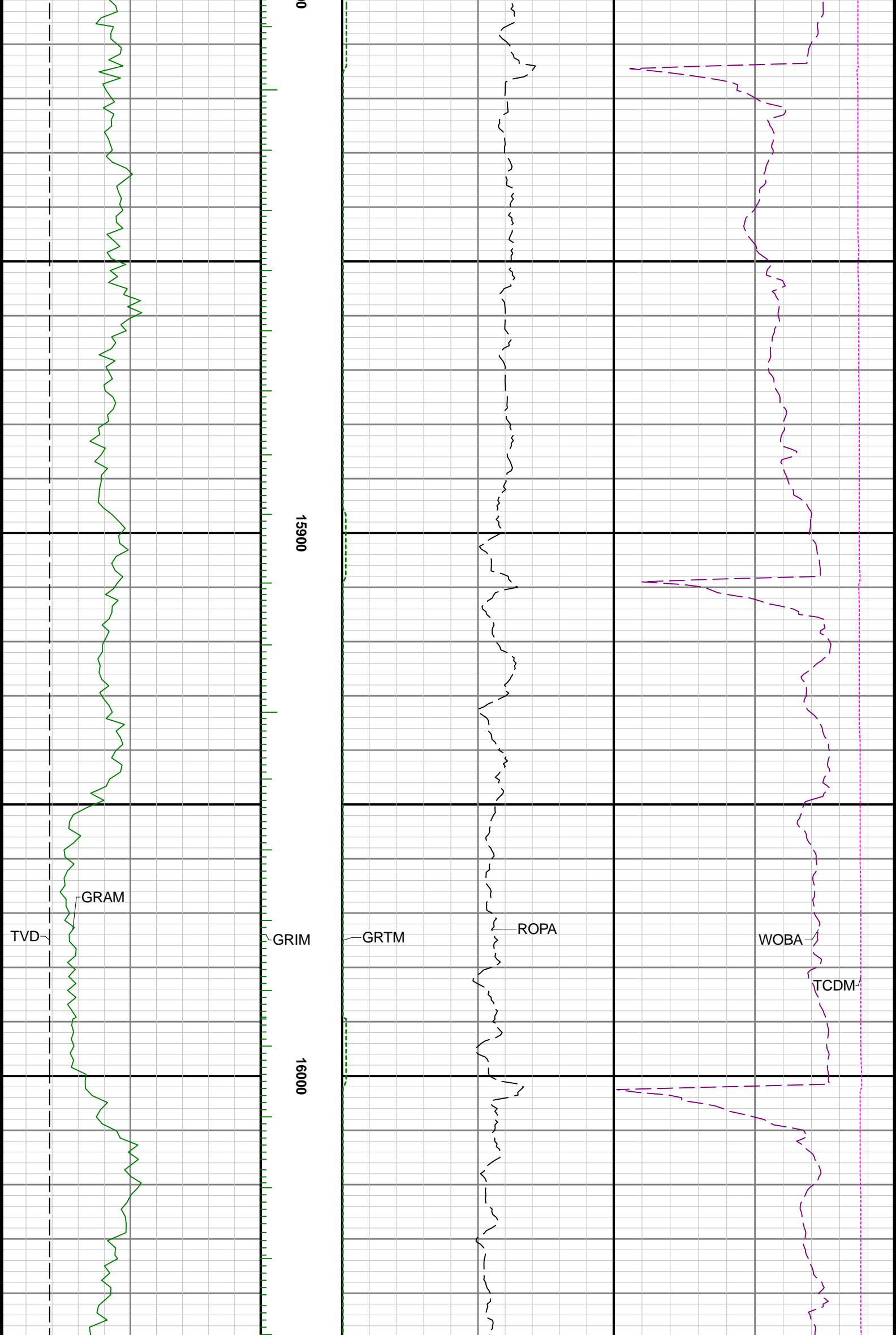
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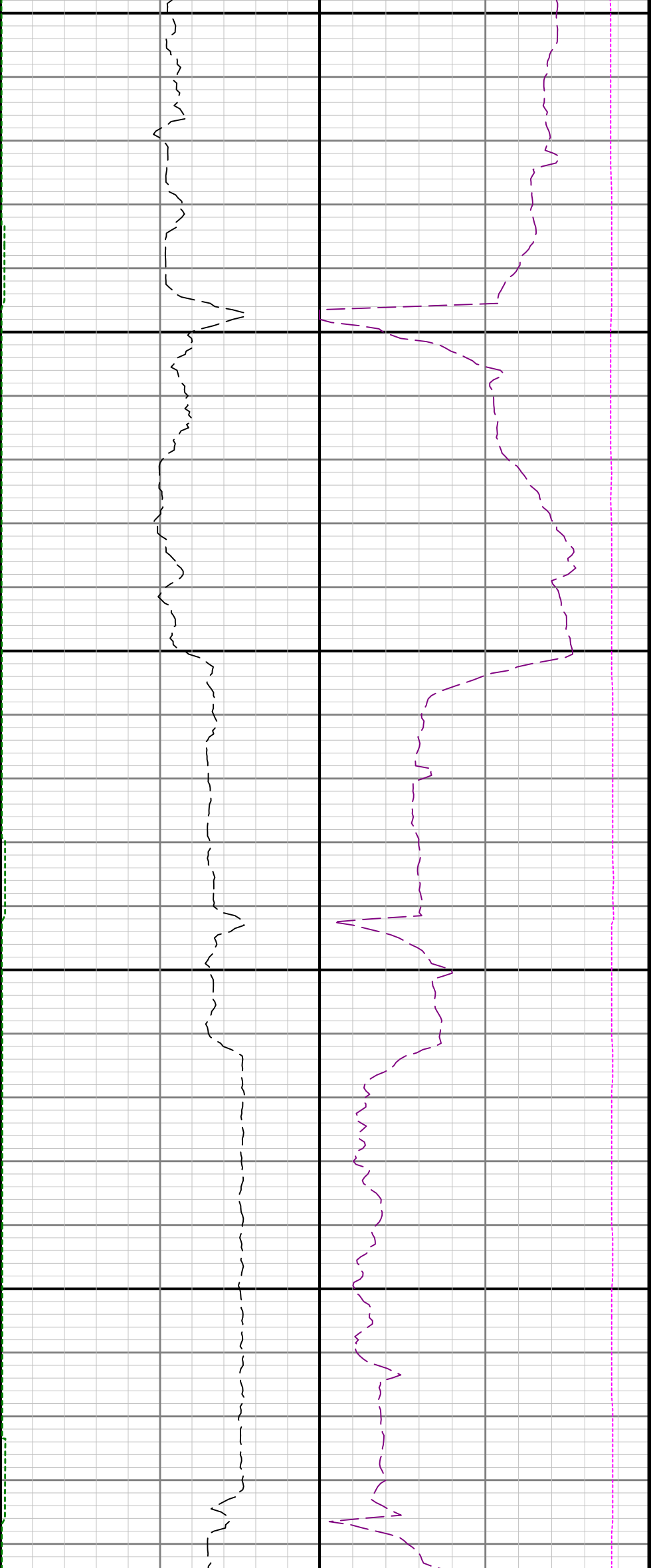
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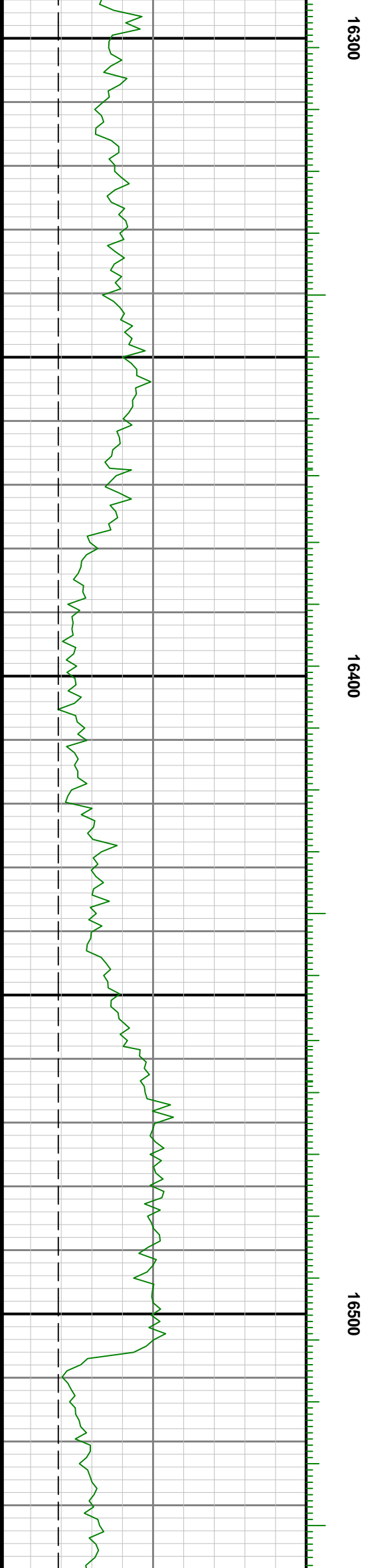
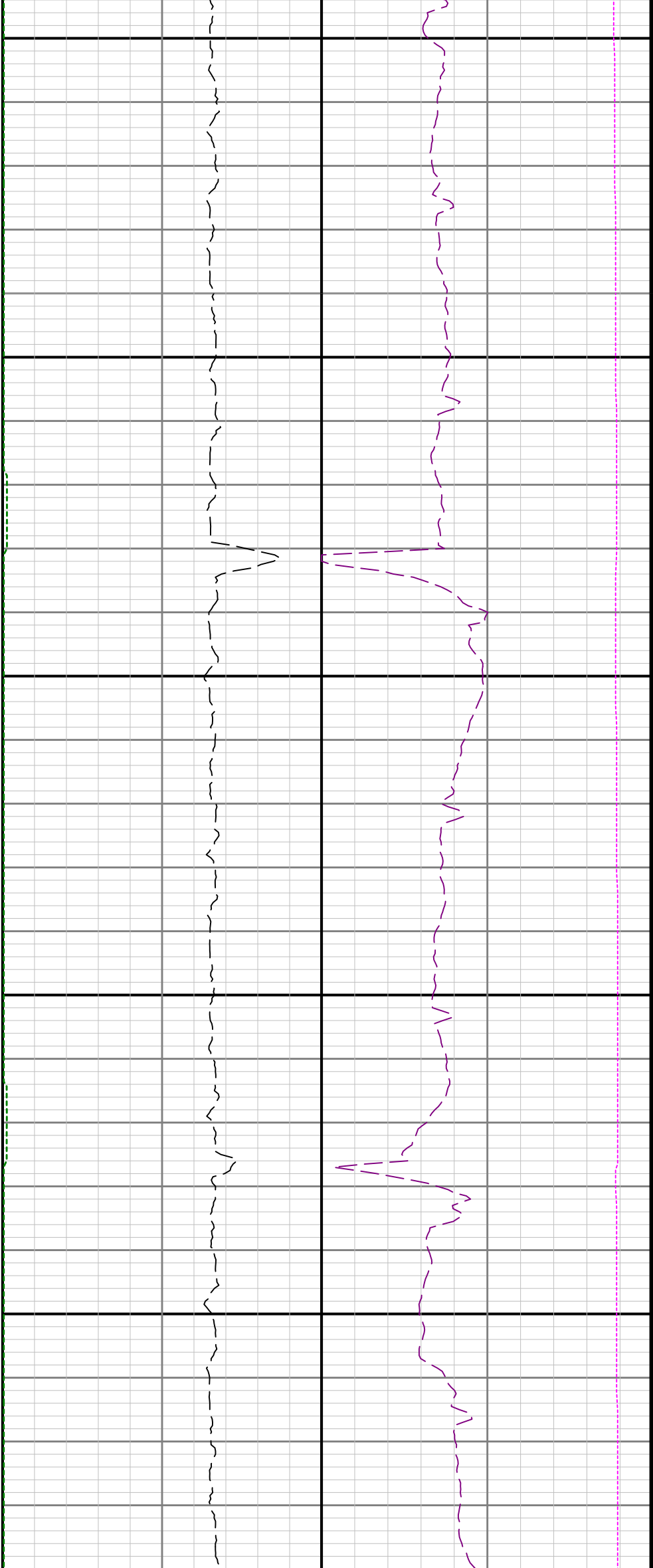


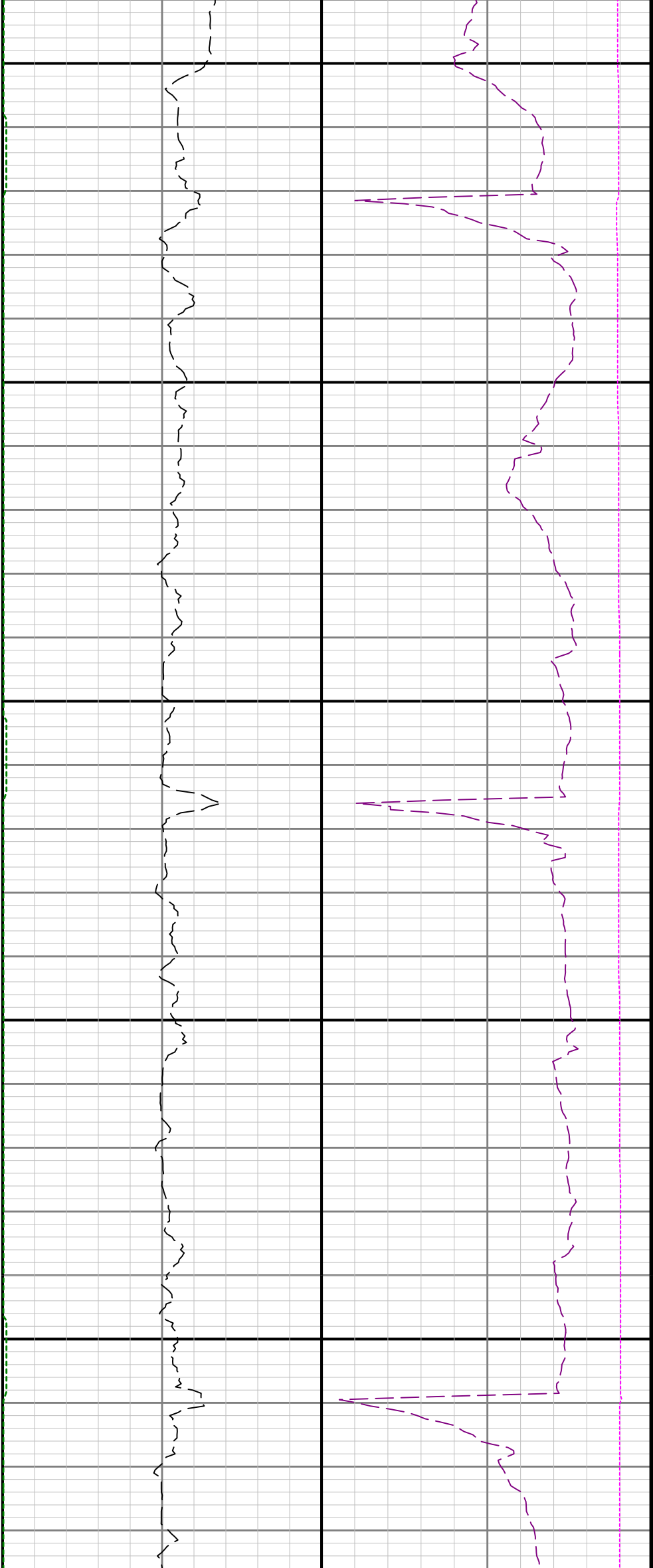




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