



Gamma Ray

LWD MEMORY LOG

Scale: Company: Noble Energy

1:240 Well: Gutteresen D09-765

Measured Depth Field: Wattenberg

Depth Reference: County: Weld Country: United States

Driller's Depth State: Colorado

Status: Surface Location: 40° 15' 46.883" N Other Services:

Final Print Latitude: 104° 33' 35.744" W

API No: 05-123-48948-00 Longitude: Directional

Job ID: 110661664 SEC: 33 TWN: 4N RGE: 64W

Permanent Datum (P.D.): Mean Sea Level Elevation: 0.00 ft Elev. KB: N/A

Log Measured From: Rig Floor Above P.D.: 4755.00 ft Elev. DF: 4755.00 ft Elev. GL: 4725.00 ft

Dates Interval Magnetic Field Reference

From: 2020-12-05 Drilled (ft) Logged (ft) Azi Reference North: Grid Dip Angle: (deg) 66.61
To: 2020-12-07 Top: 1936.00 Bottom: 17350.00 Total Magnetic Field Strength: (nT) 51871
Spud: 2020-11-26 Bottom: 17363.00 Bottom: 17350.00 Mag to Reference North Correction: (deg) 7.33

Borehole Record Casing Record

Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
13.500	30.00	1936.00	9.625	36.00	30.00	1926.00
8.500	1936.00	17363.00				

Mud Record Deviation Record

Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)
Oil Based Mud	1936.00	17363.00	8.500	15427.00	2.34 227.79	89.84 181.03

Acquisition System Software Version Other

Cadence	RT 5.7	Rig: H&P 517
DeliverableGen	5.7.8878.1	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 (h)
						Top (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
1	1	8.500	PDC	3.00	AutoTrak Curve	1936.00	17350.00	1936.00	17363.00	2020-12-05 21:52	2020-12-07 20:43	44.81

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Tien Bui	2020-12-05	2020-12-08						

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+ (%)
2020-12-05 07:42	1	1936.00	Oil Based Mud	9.3	10	N/A	20.0	79.5/20.5	Active Pit	27000	0.00
2020-12-08 07:45	1	10584.00	Oil Based Mud	9.7	14	N/A	17.4	77.3/22.7	Active Pit	26000	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	14367829	Near Bit Inclination	5.93	6.80	7.000	4.330
1	AutoTrak Curve Steering Unit	14367829	Near Bit VSS	5.93	6.80	7.000	4.330
1	AutoTrak Curve MWD	14371880	Gamma (single)	2.76	12.97	7.000	3.250
1	AutoTrak Curve MWD	14371880	Directional (mag)	12.27	22.48	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
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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

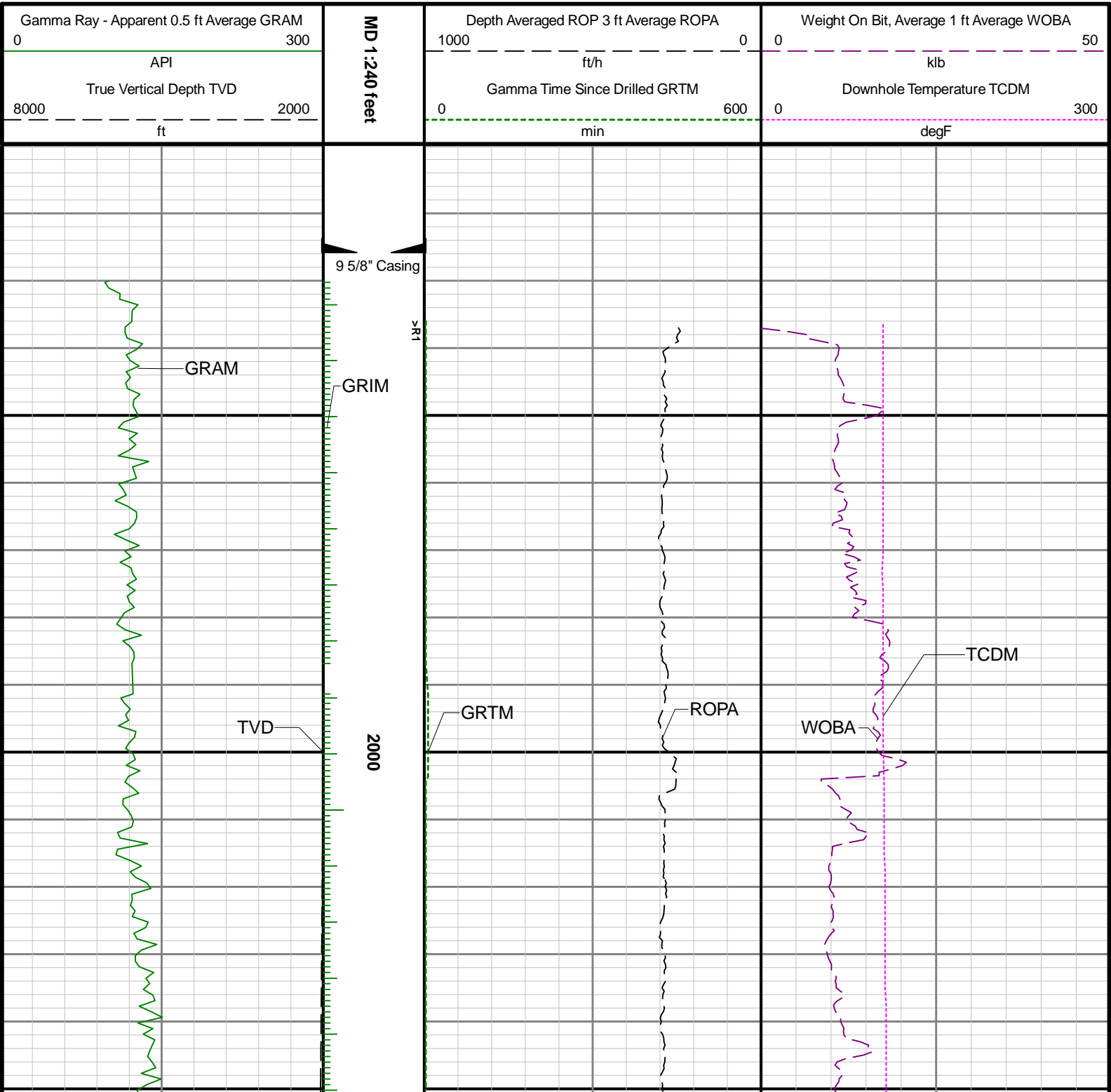
- 1
- Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
- 2
- Baker Hughes LWD Run 1 utilized 6 ¾ inch NaviGamma service (Gamma Ray and Directional) behind a 8 1/2 inch bit and rotary steerable assembly from 1936 to 17363 feet MD (1936 to 6808 feet TVD).
- 3
- The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.
- 4
- Several gaps appear in the log due to drilling ahead before the assembly had time to properly power on.

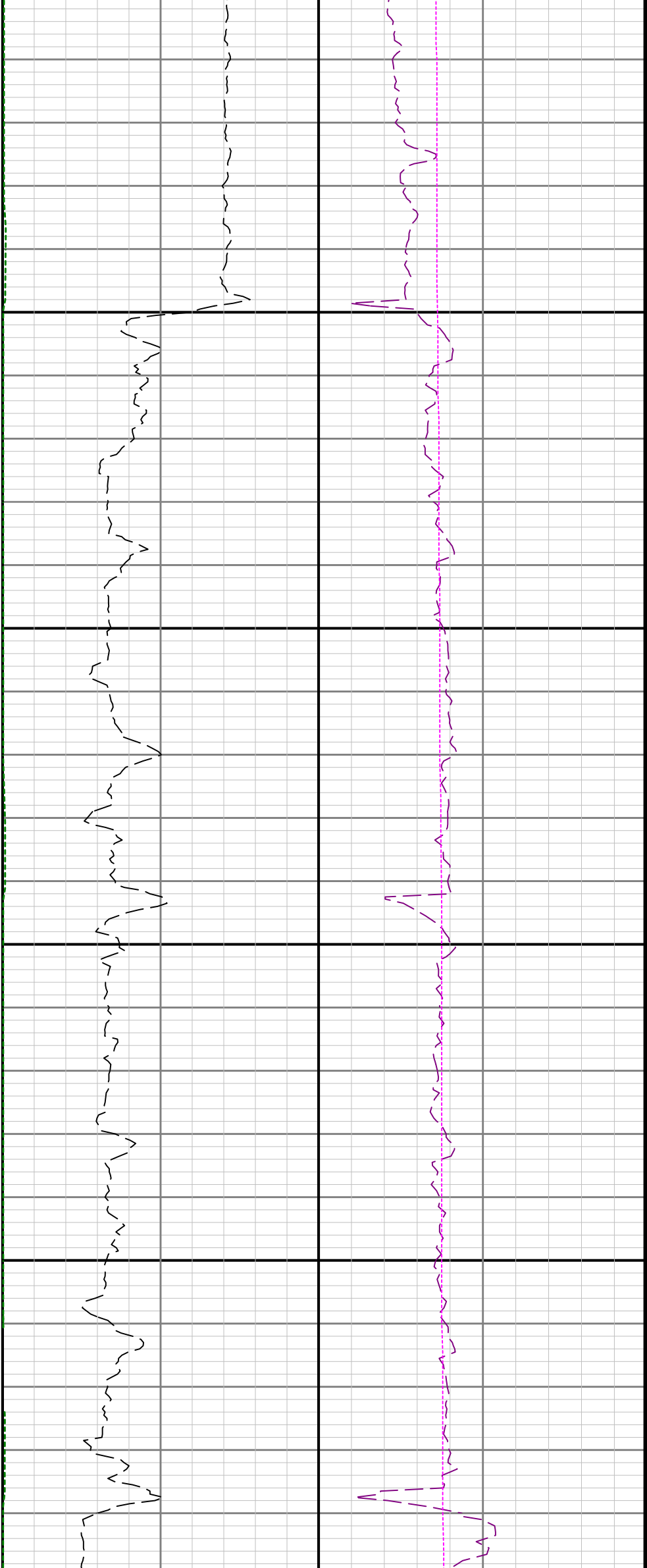
Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	17350.00	8.500	1	The interval from 17350 to 17363 feet MD (6808 feet TVD) was not logged due to sensor to bit offset at well TD.

Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	TVD	ft
WOBA	Weight On Bit 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory	min
TCDM	Directional Real-Time Survey Temperature	degF

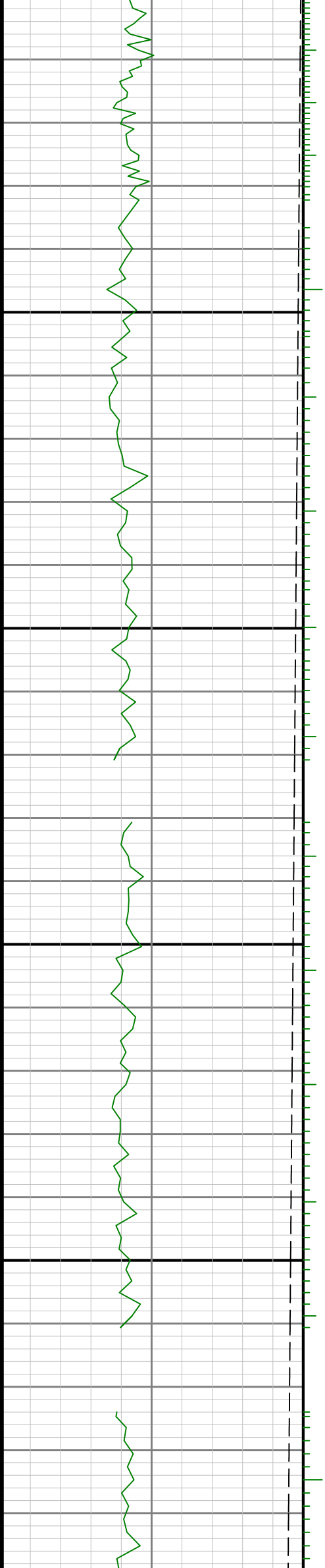


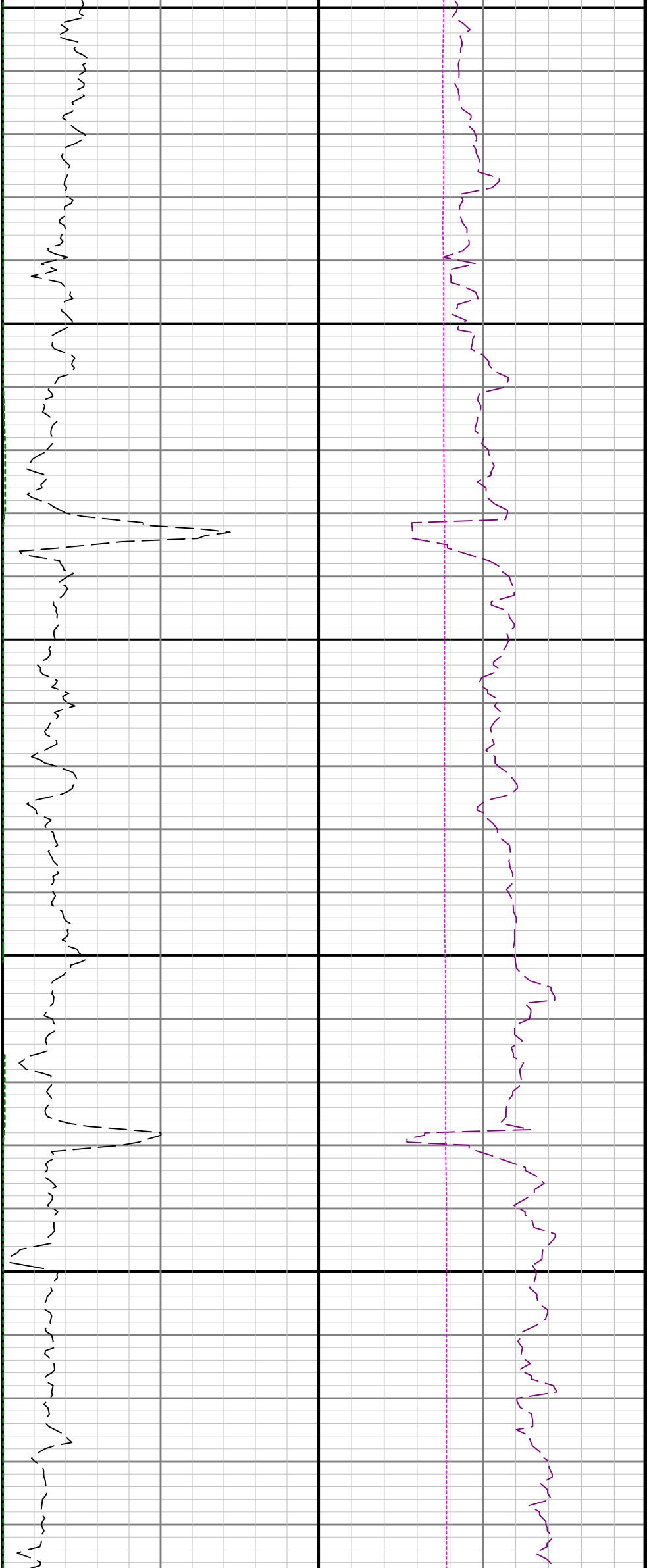


2100

2200

2

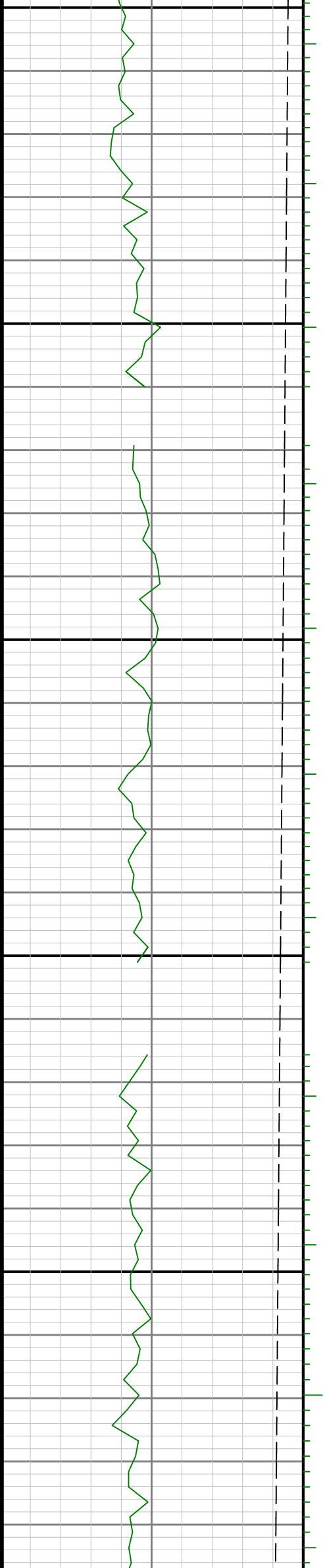


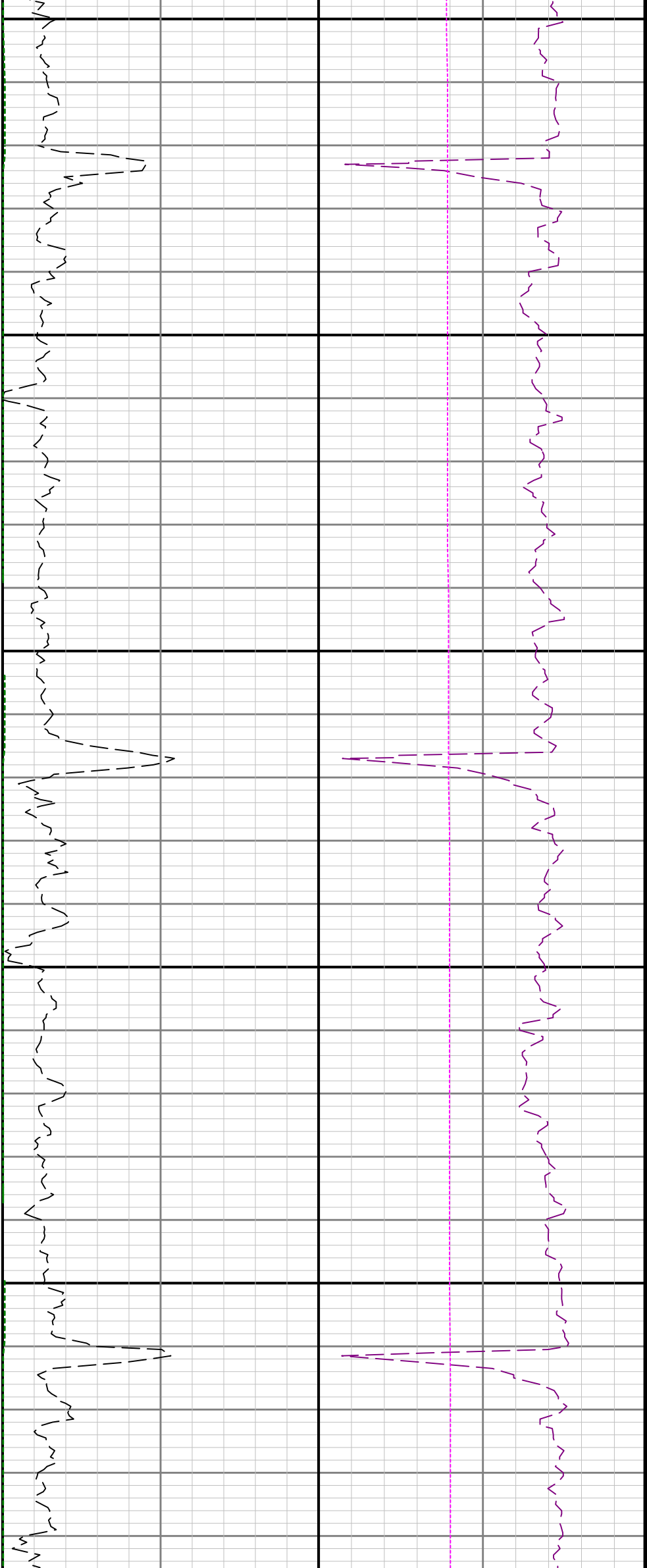


300

2400

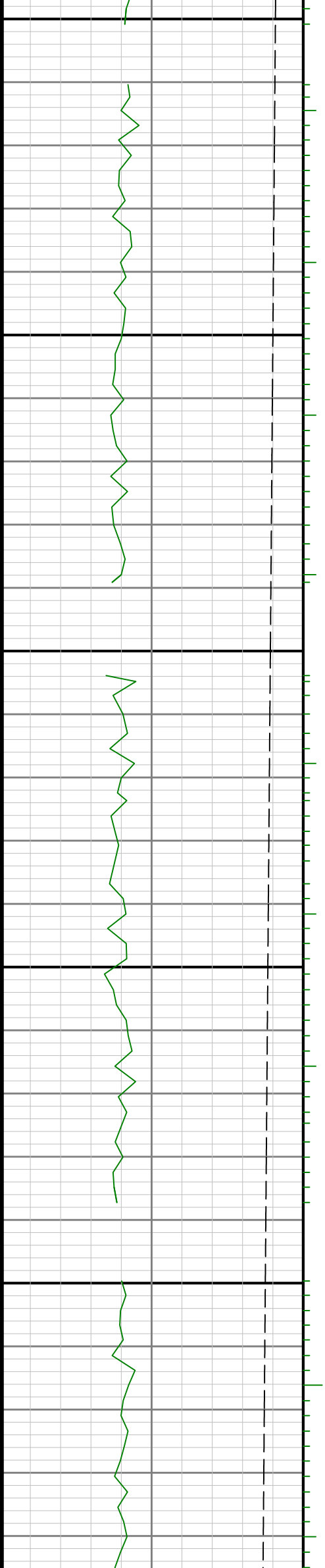
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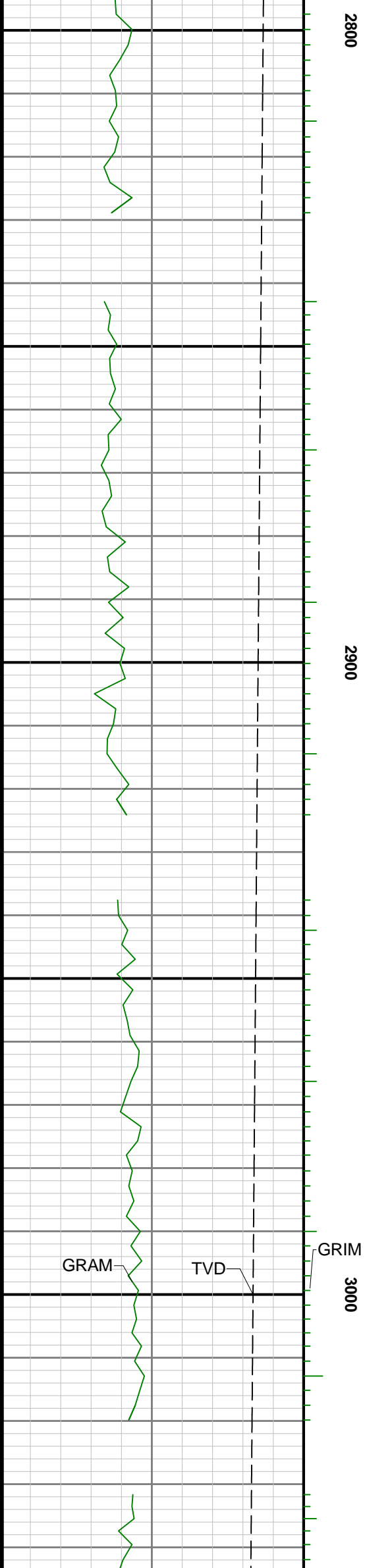
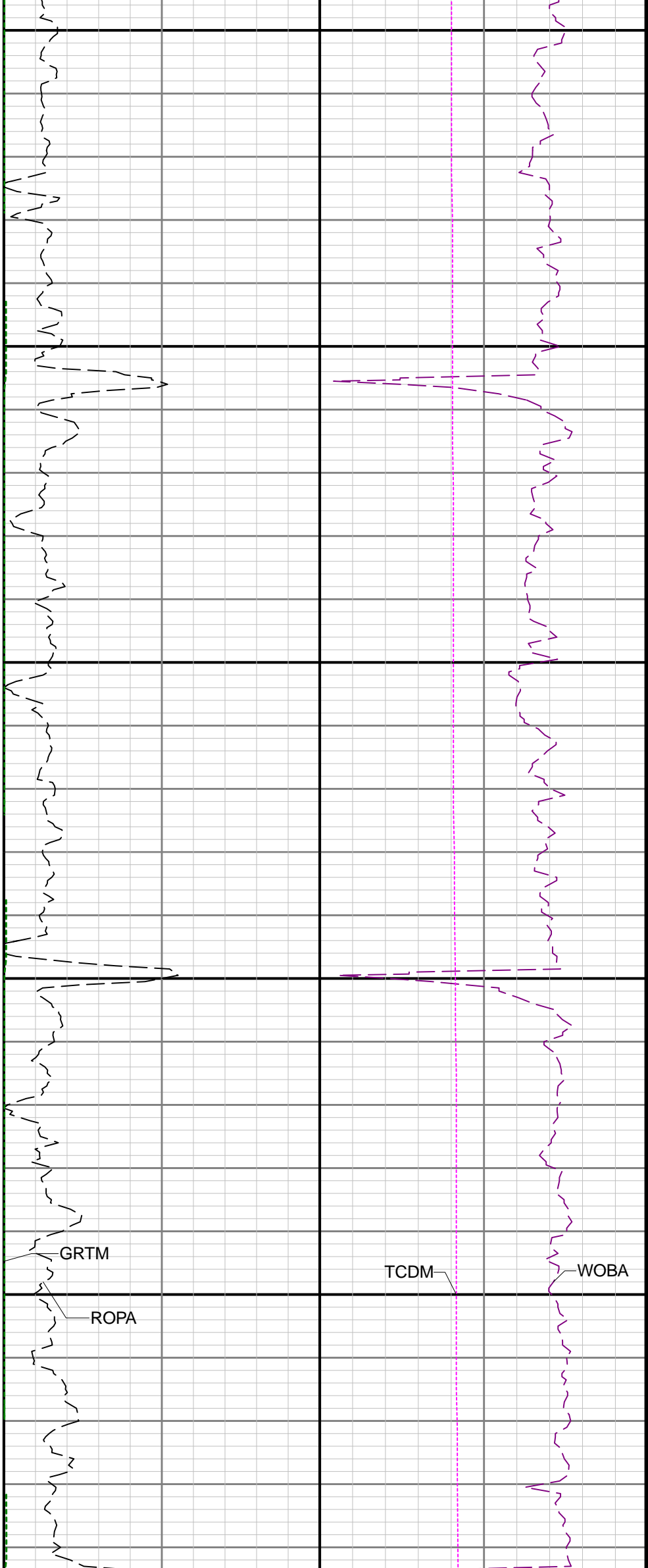


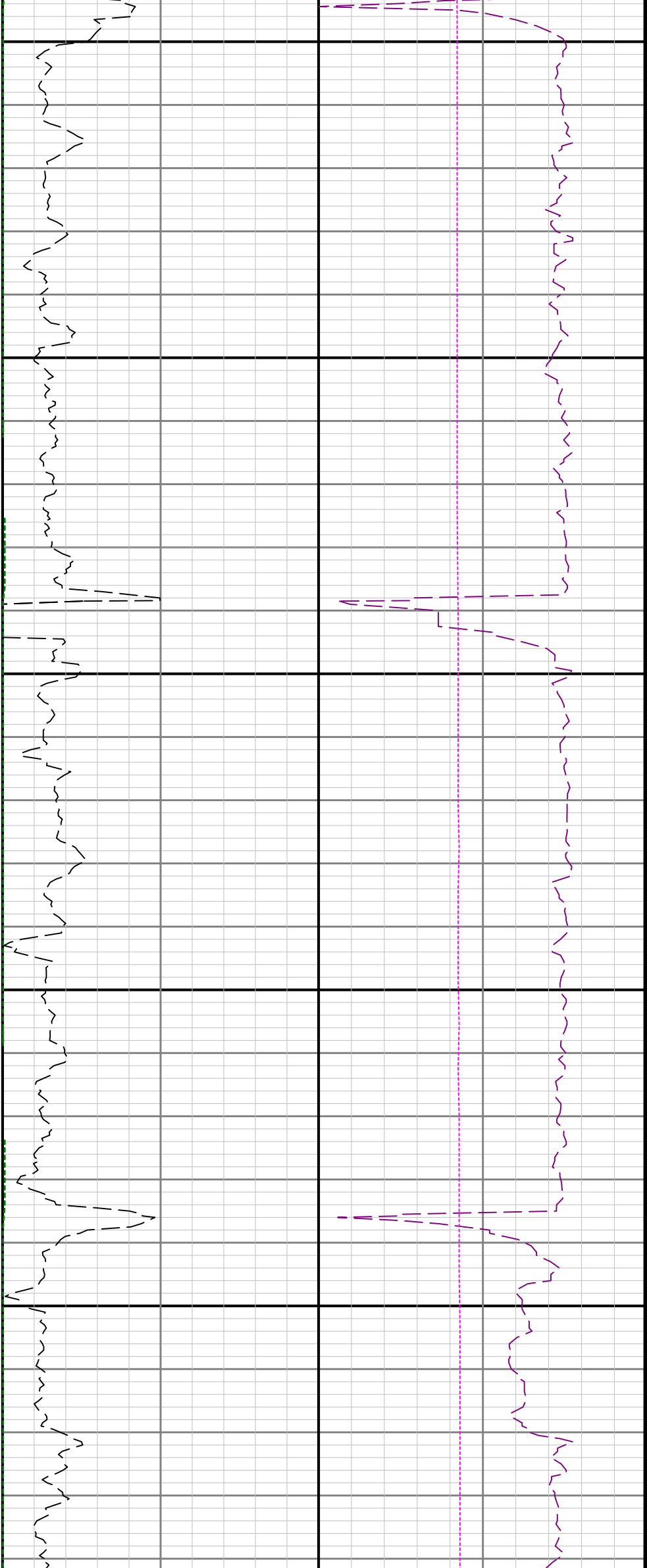


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2700

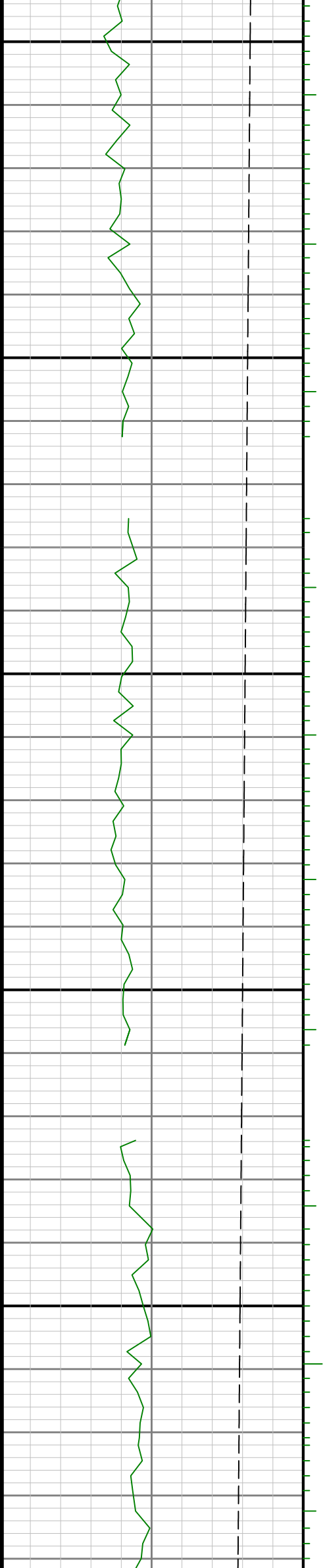


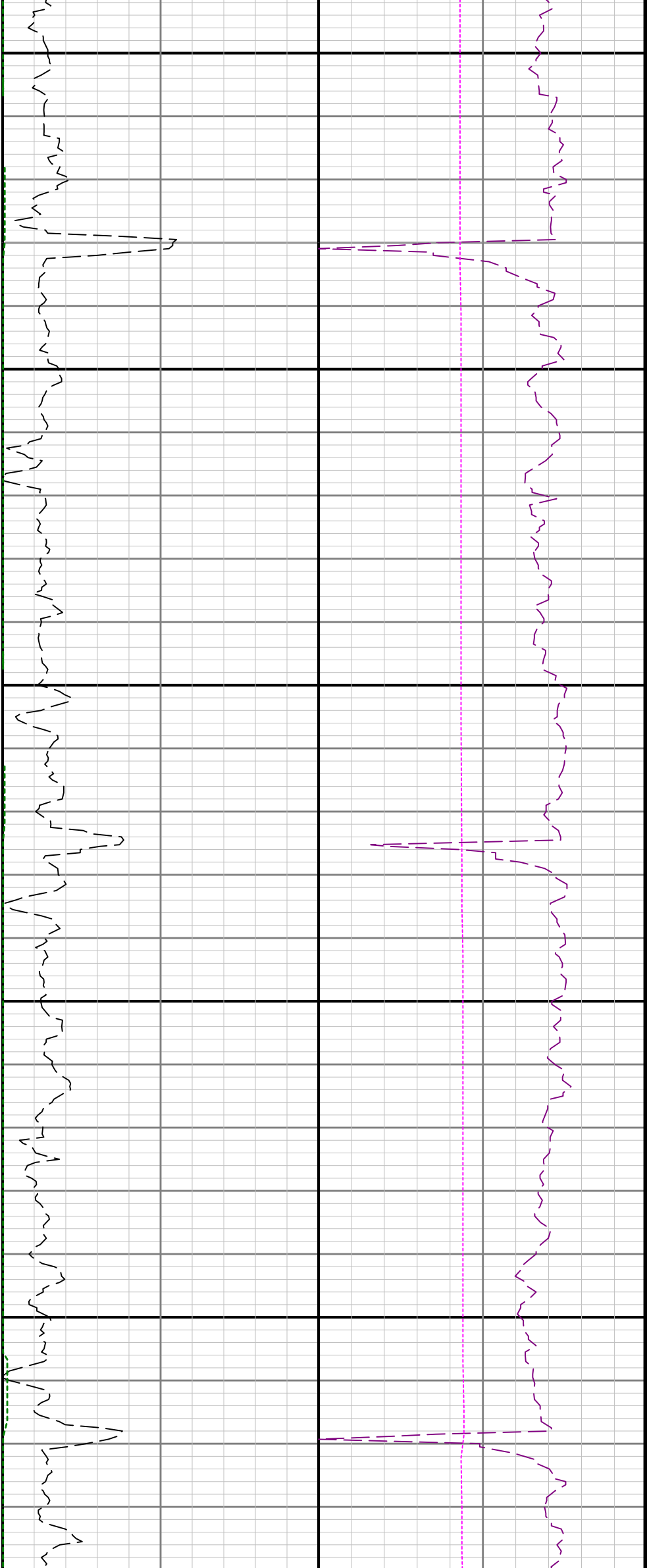




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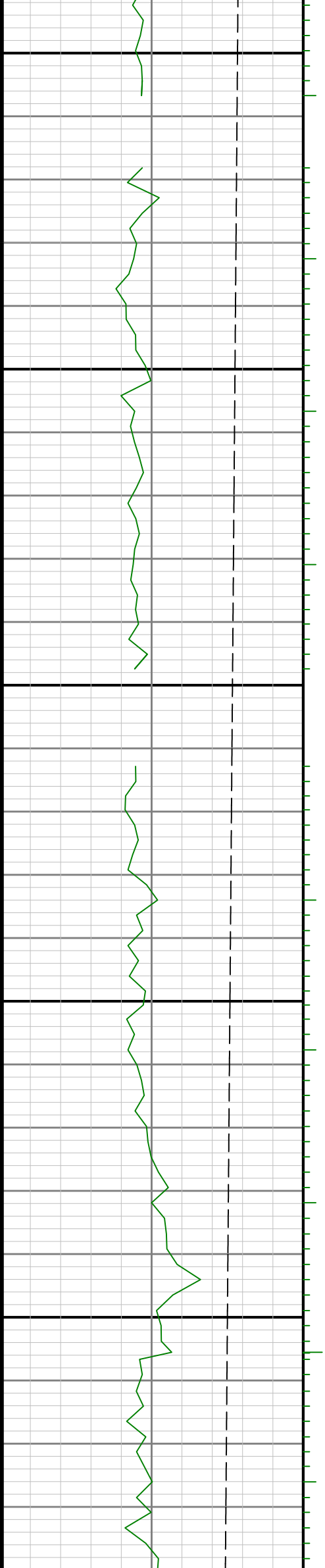


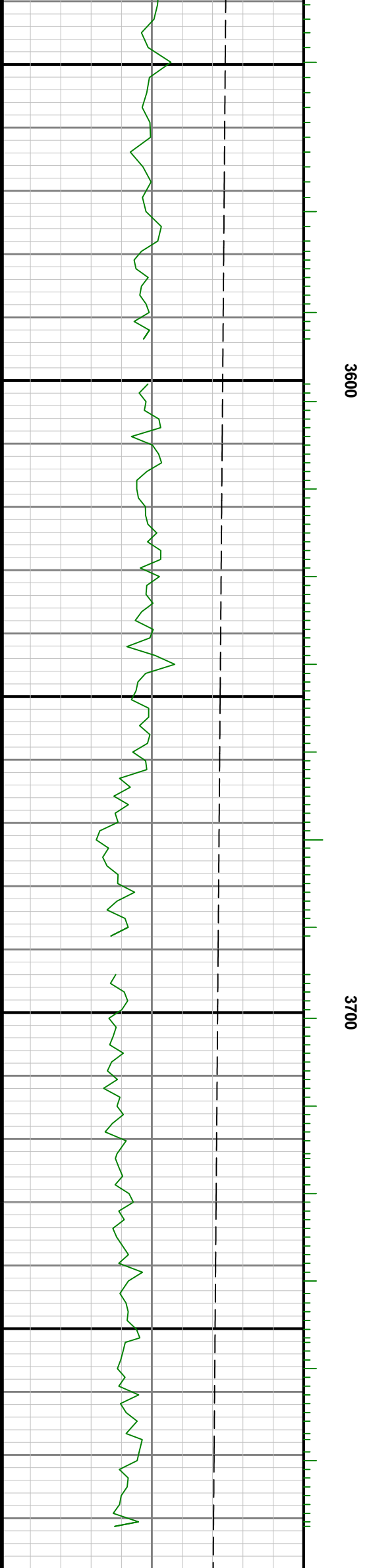
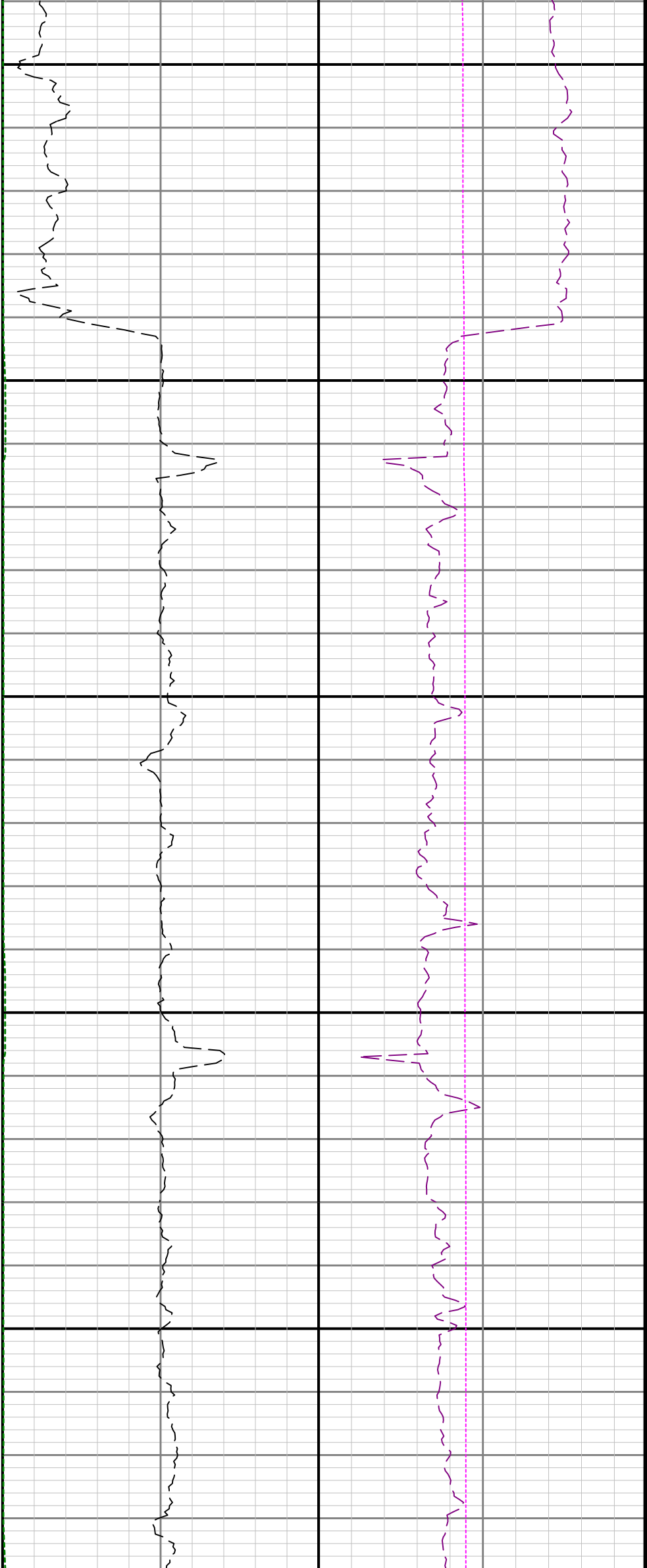


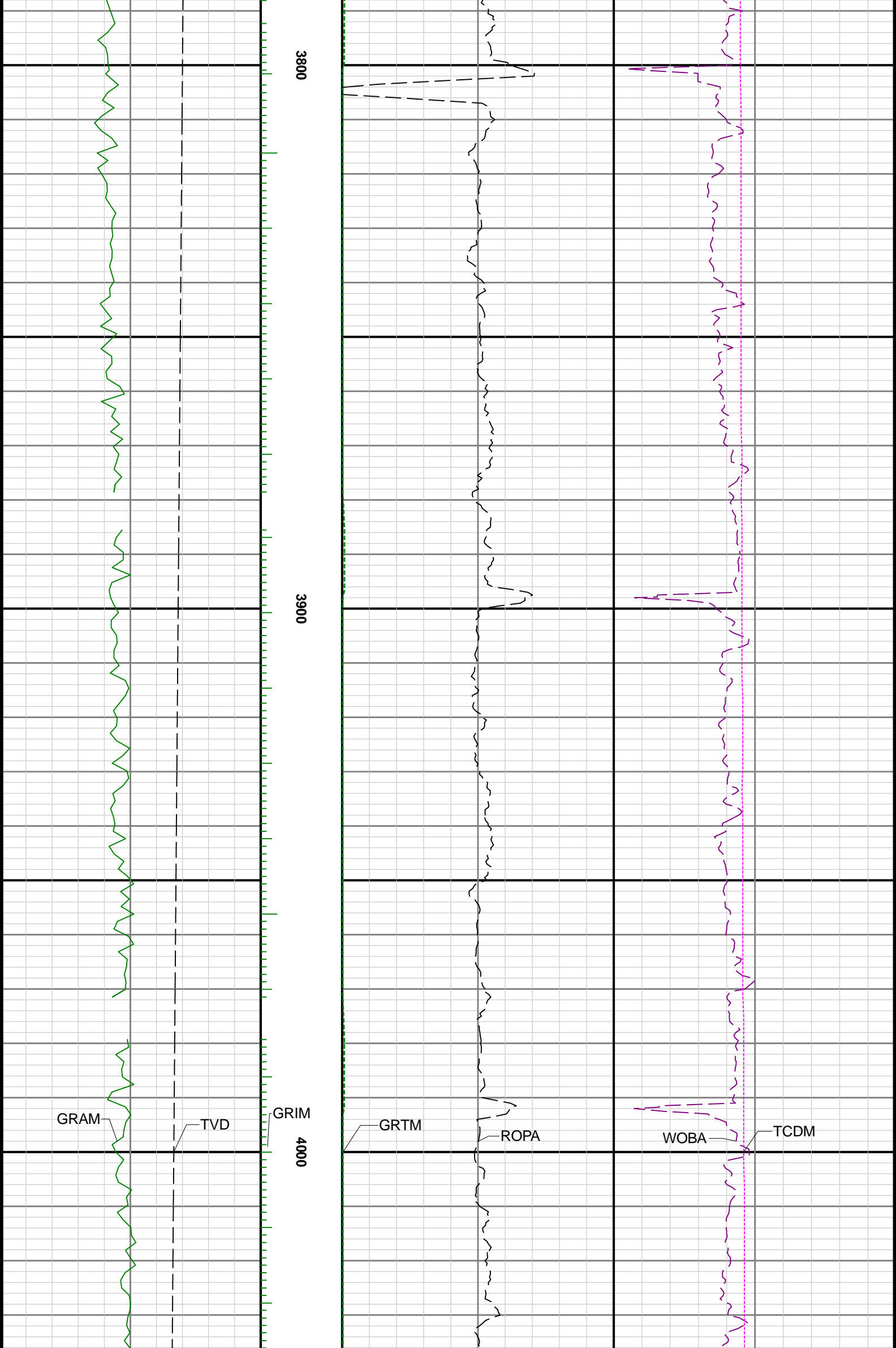
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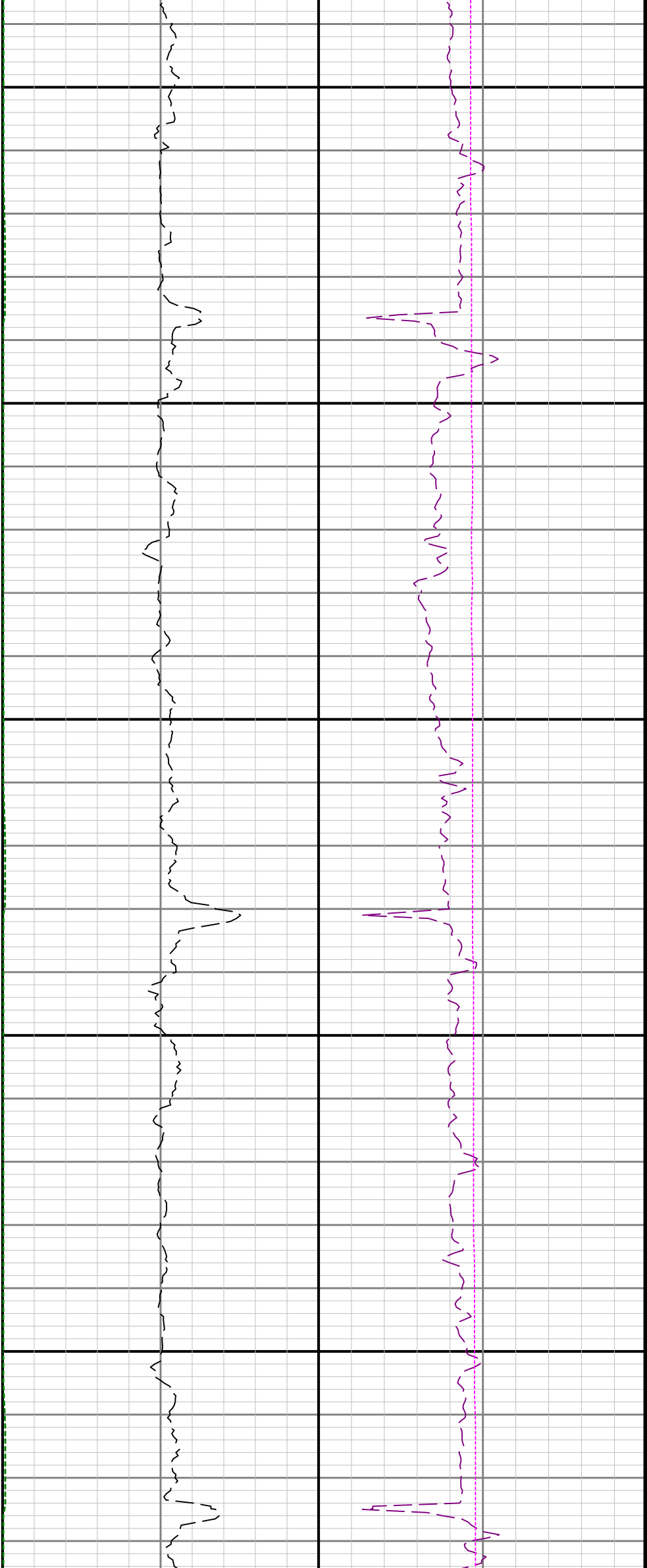
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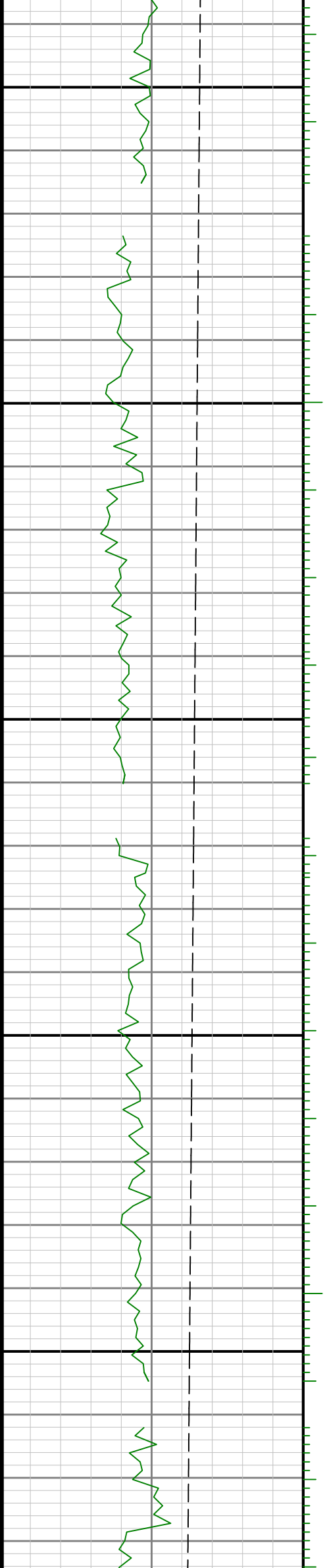


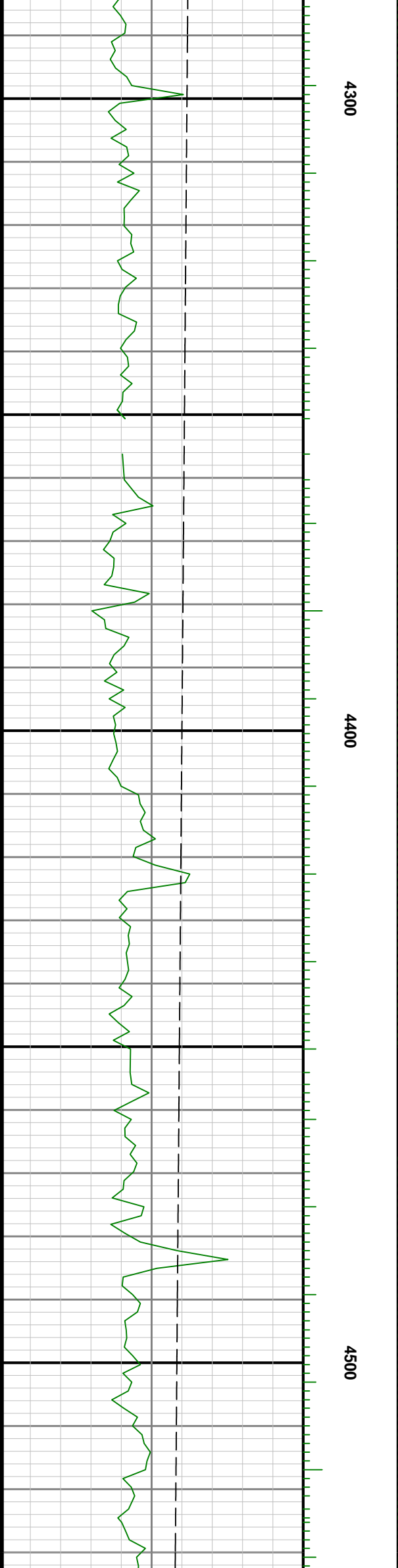
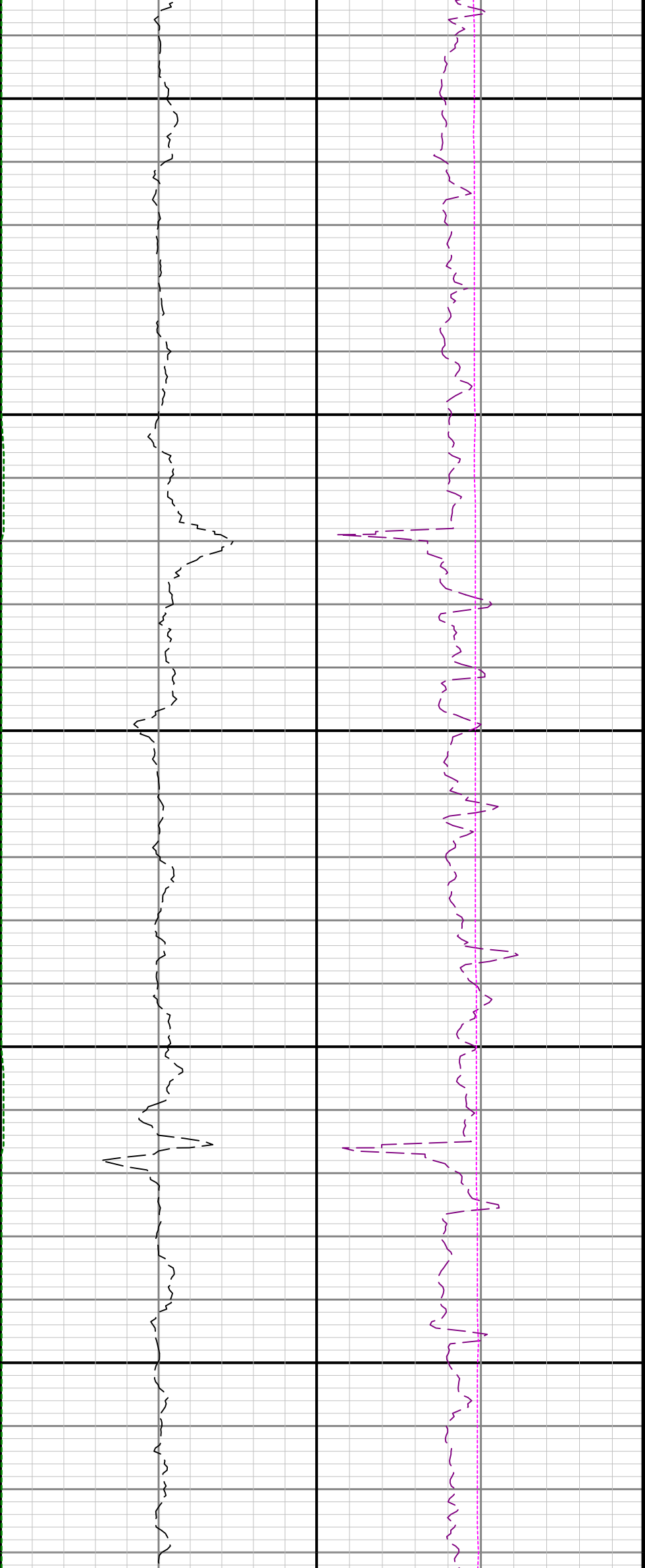


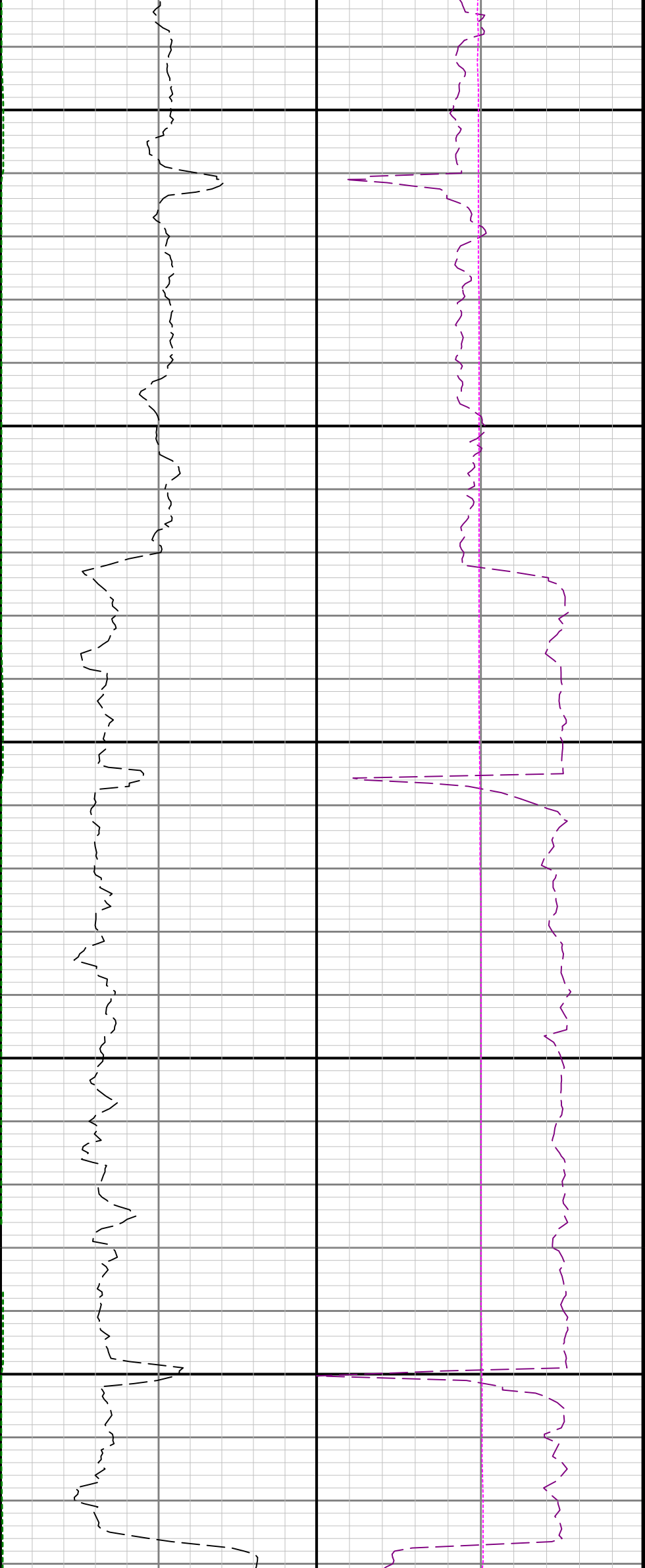


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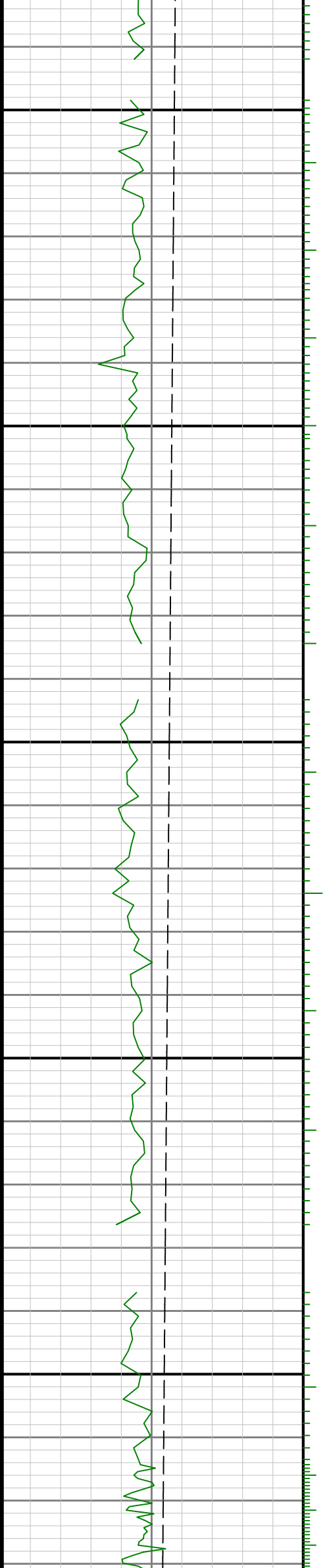


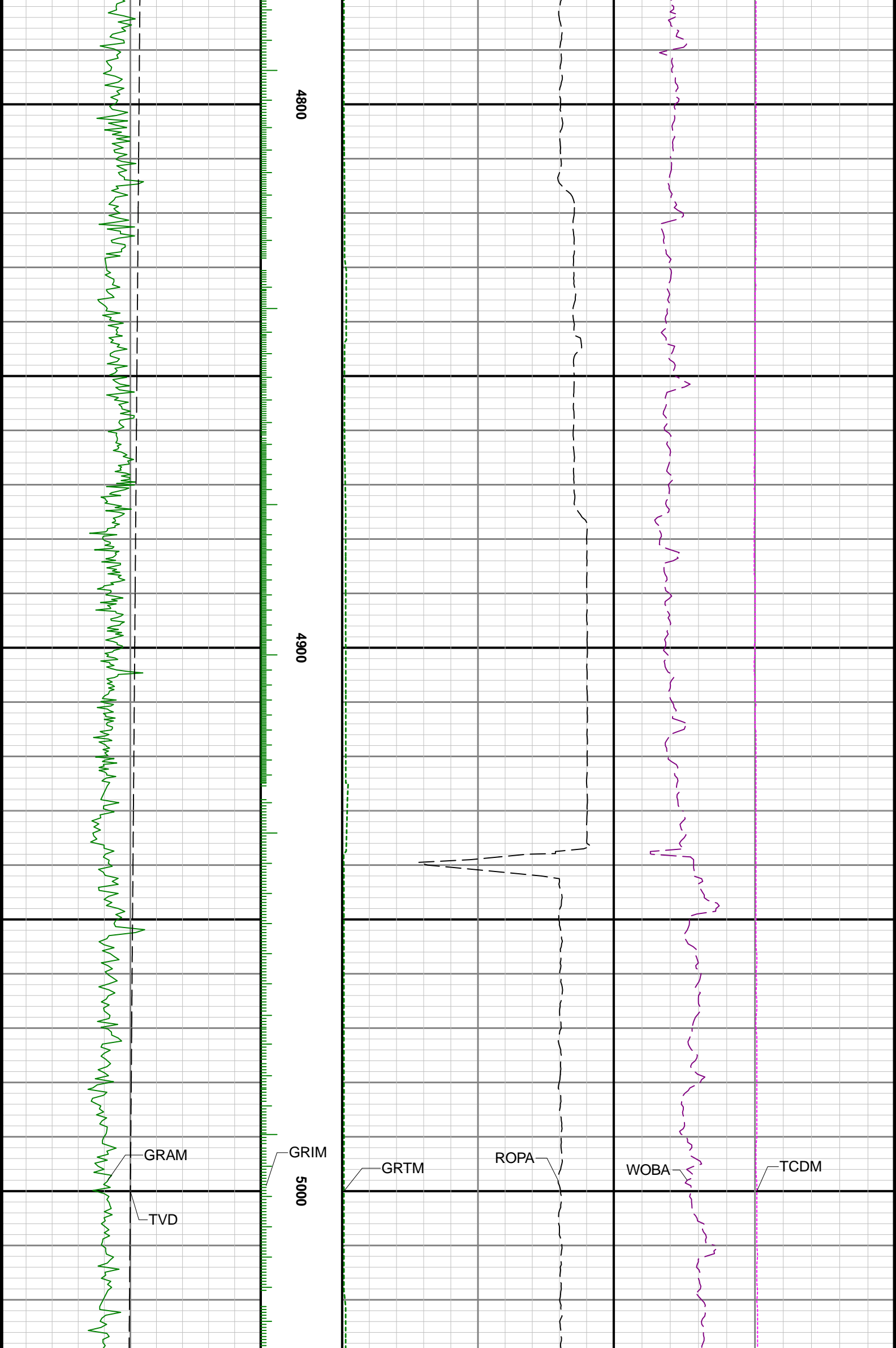


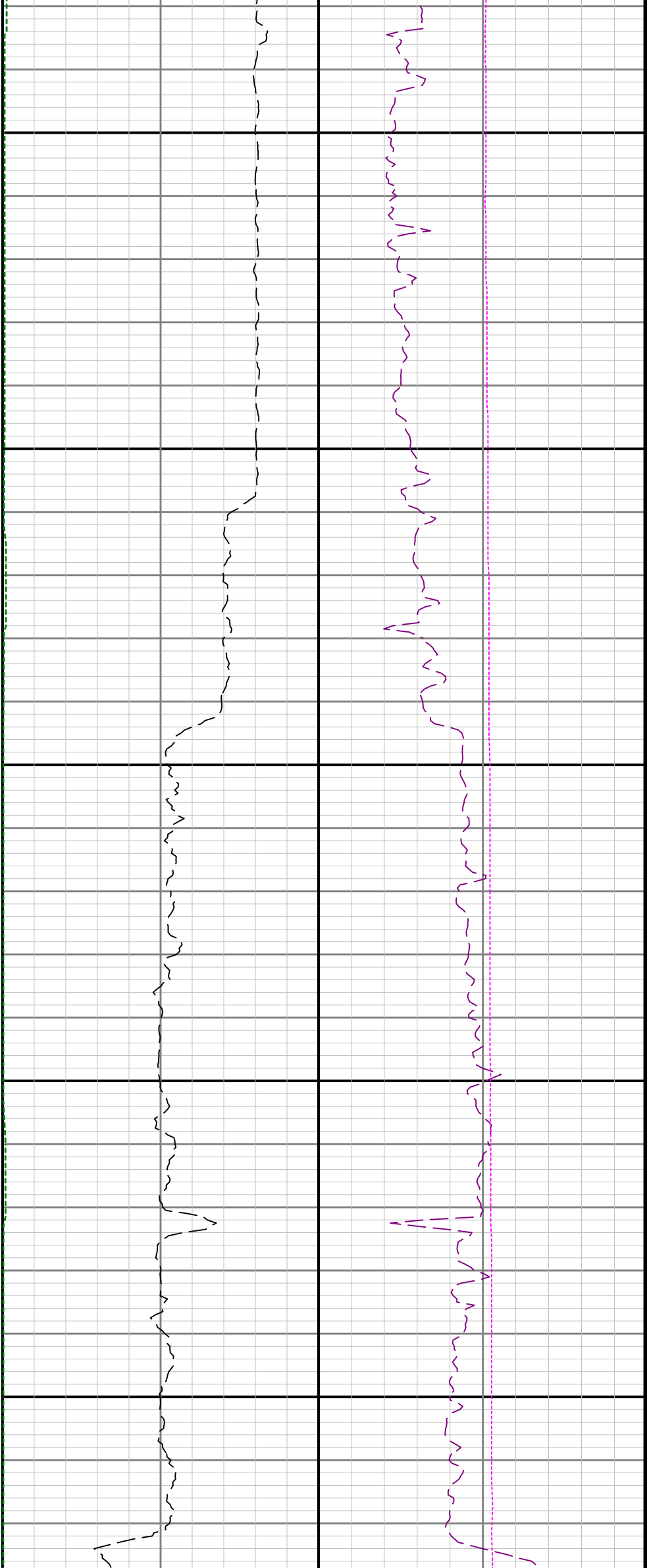


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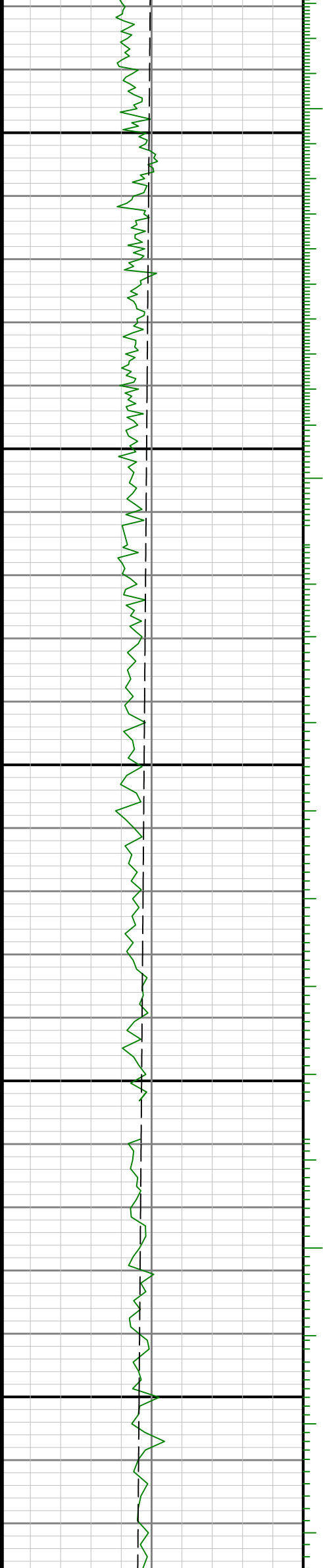


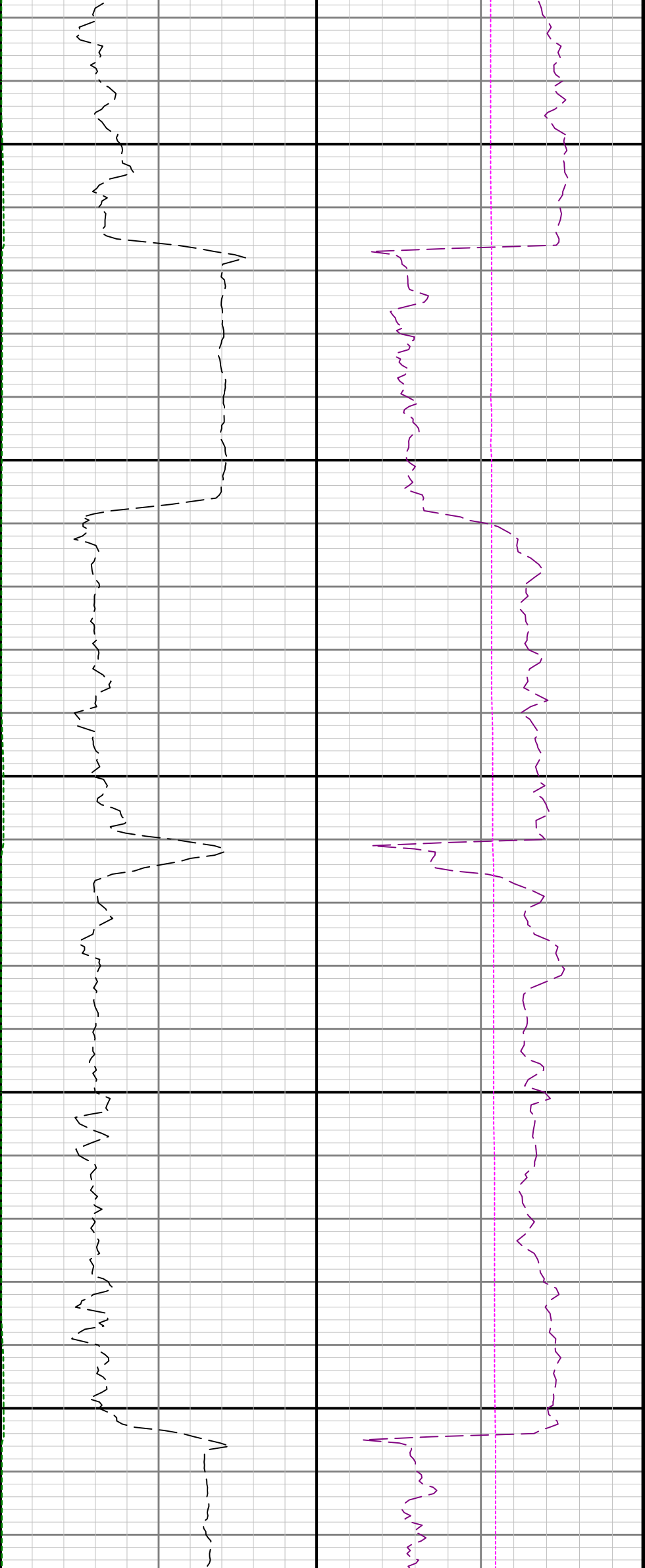




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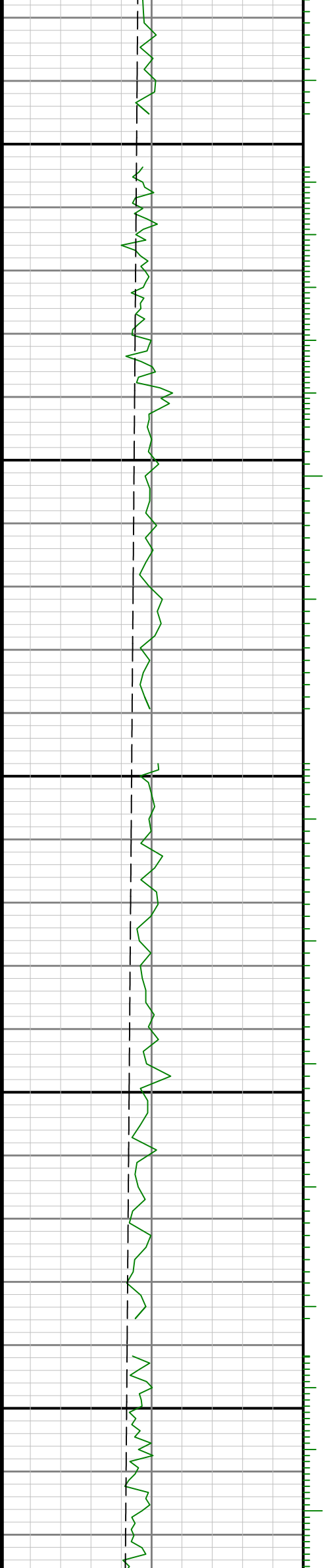


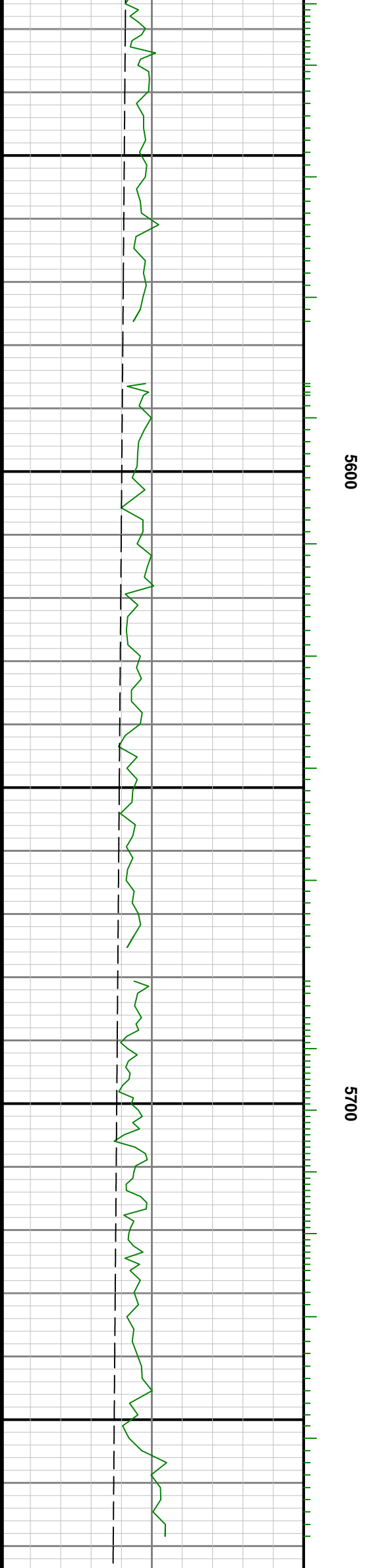
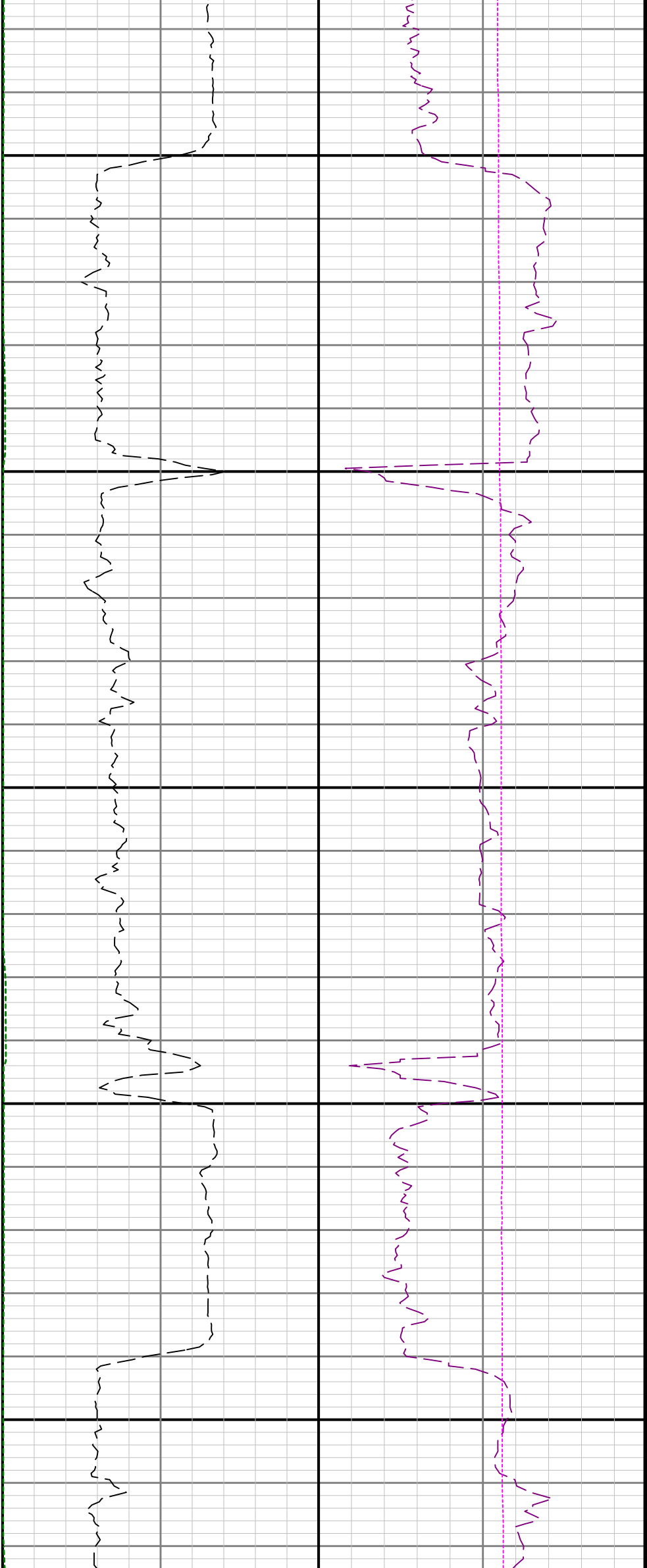


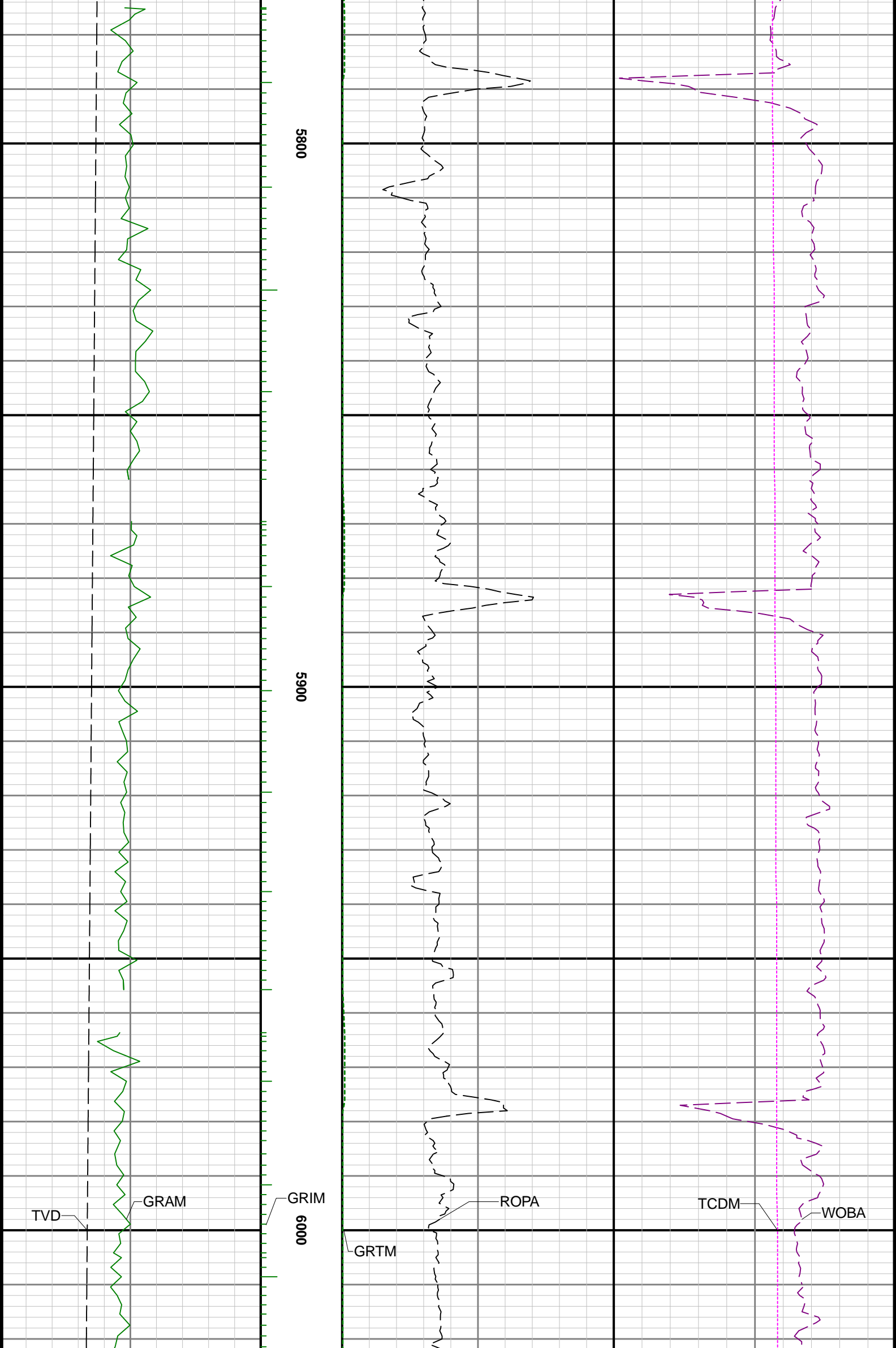
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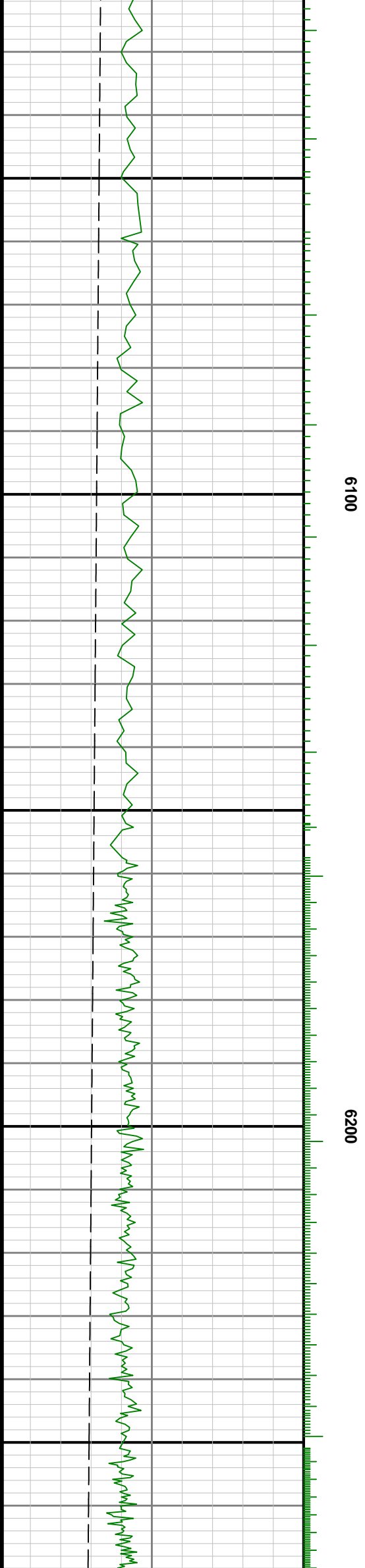
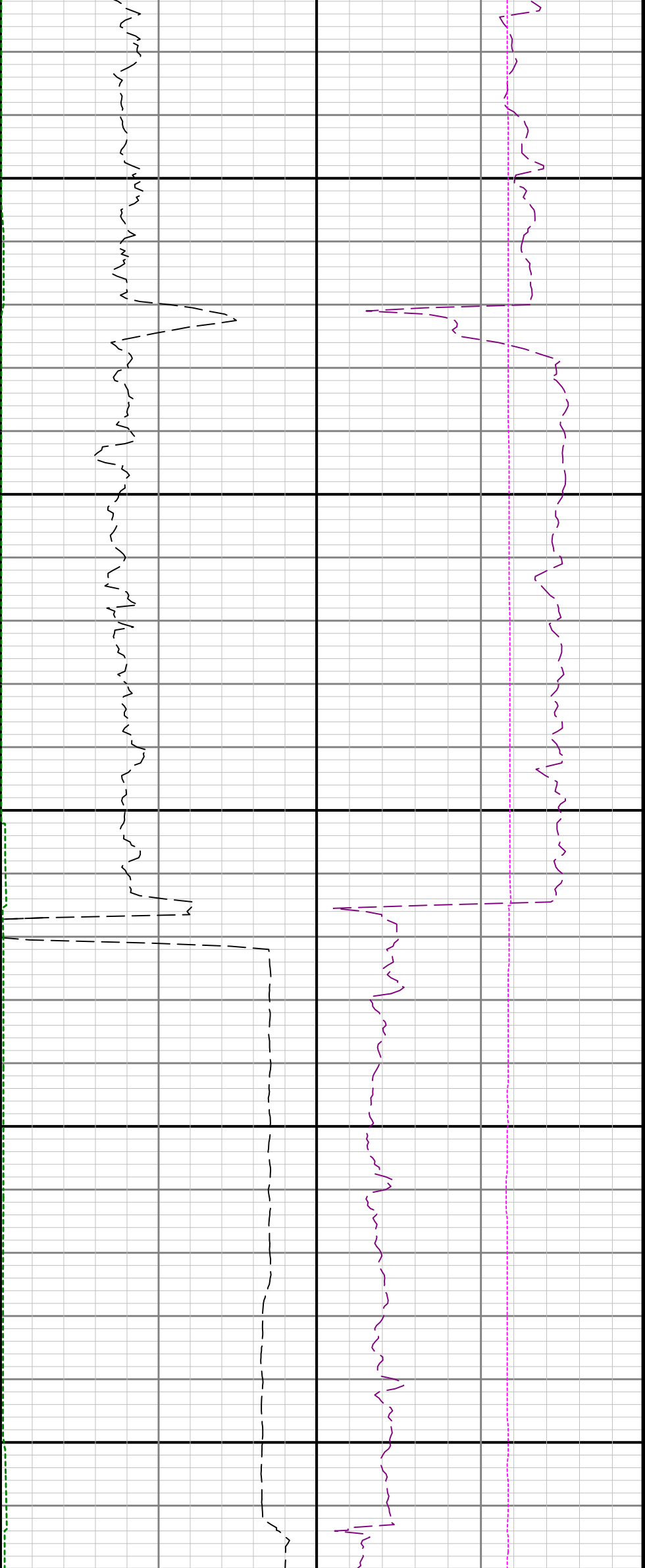
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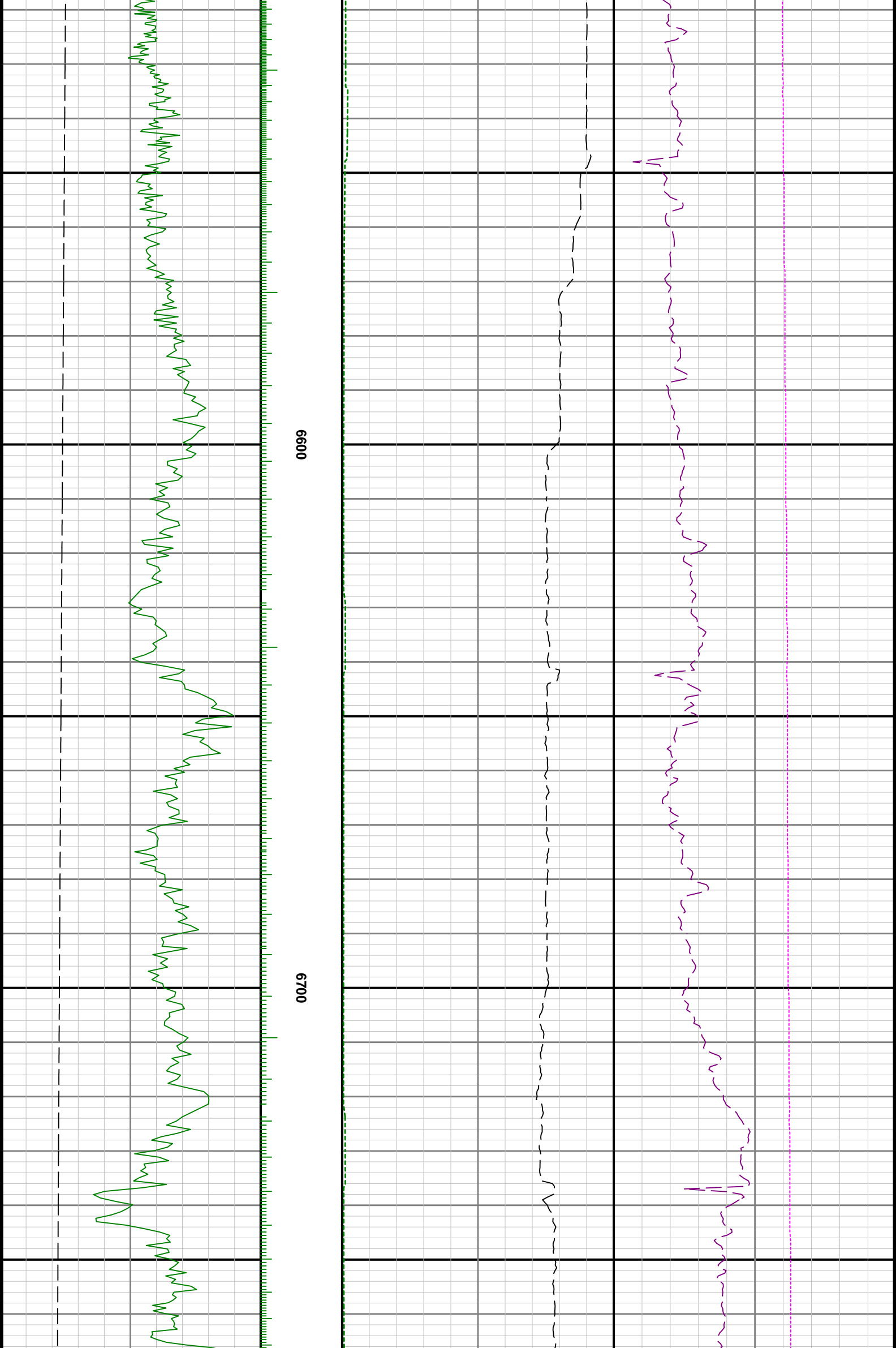
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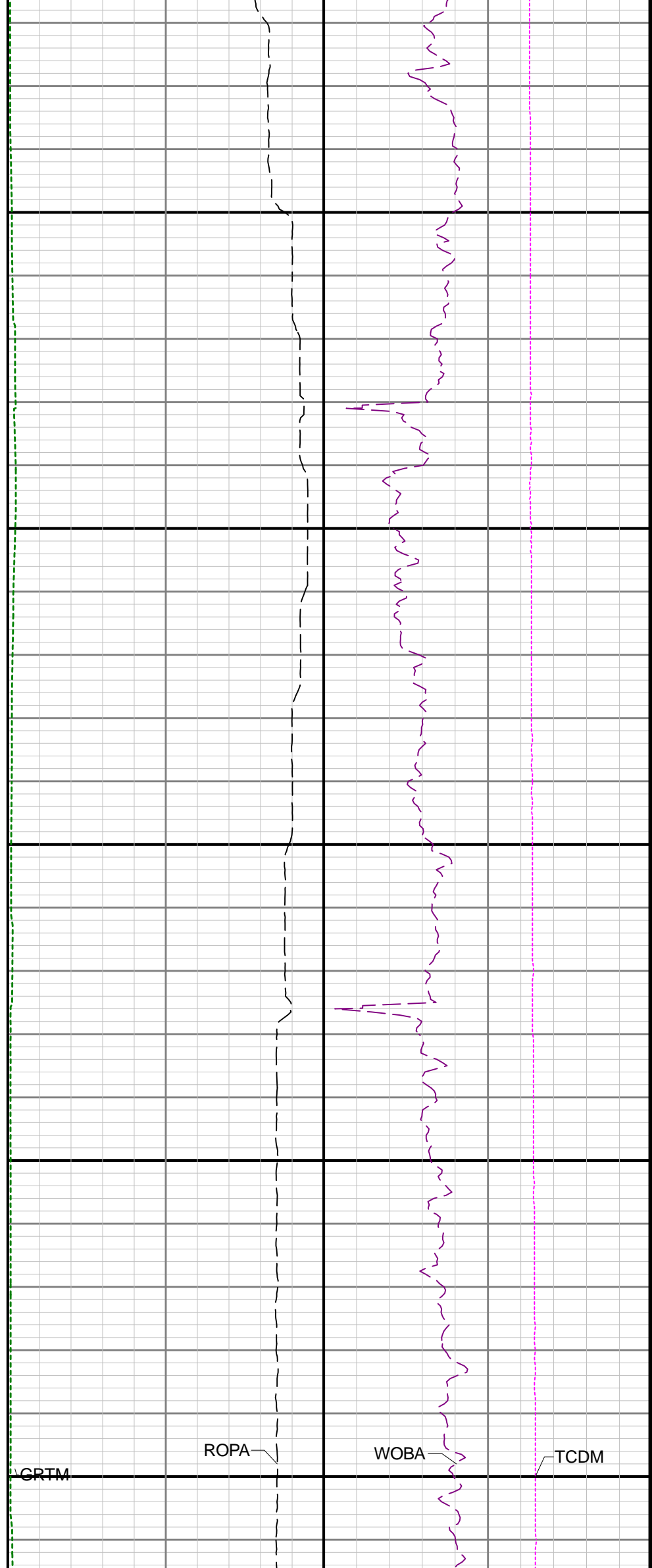
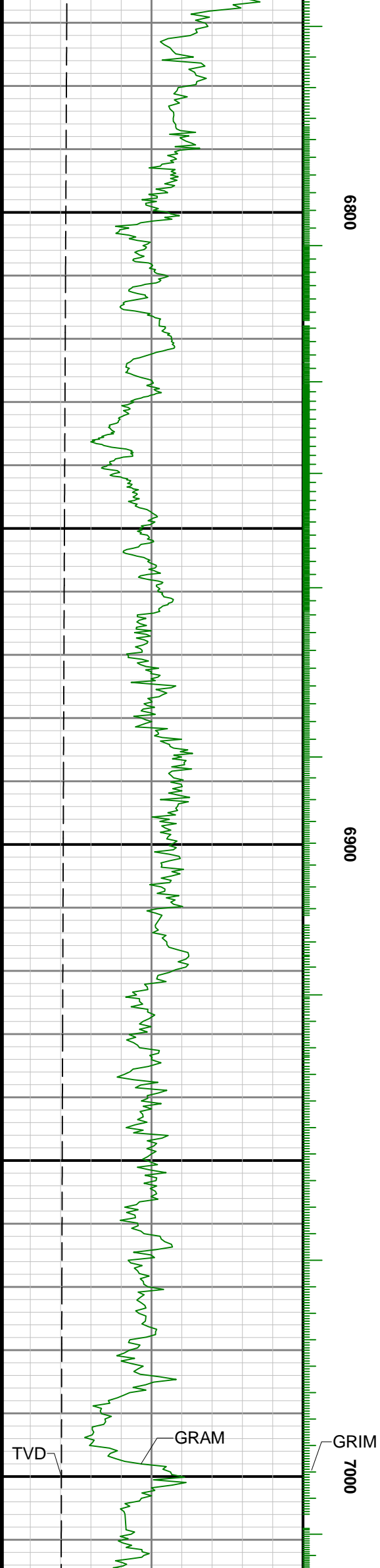


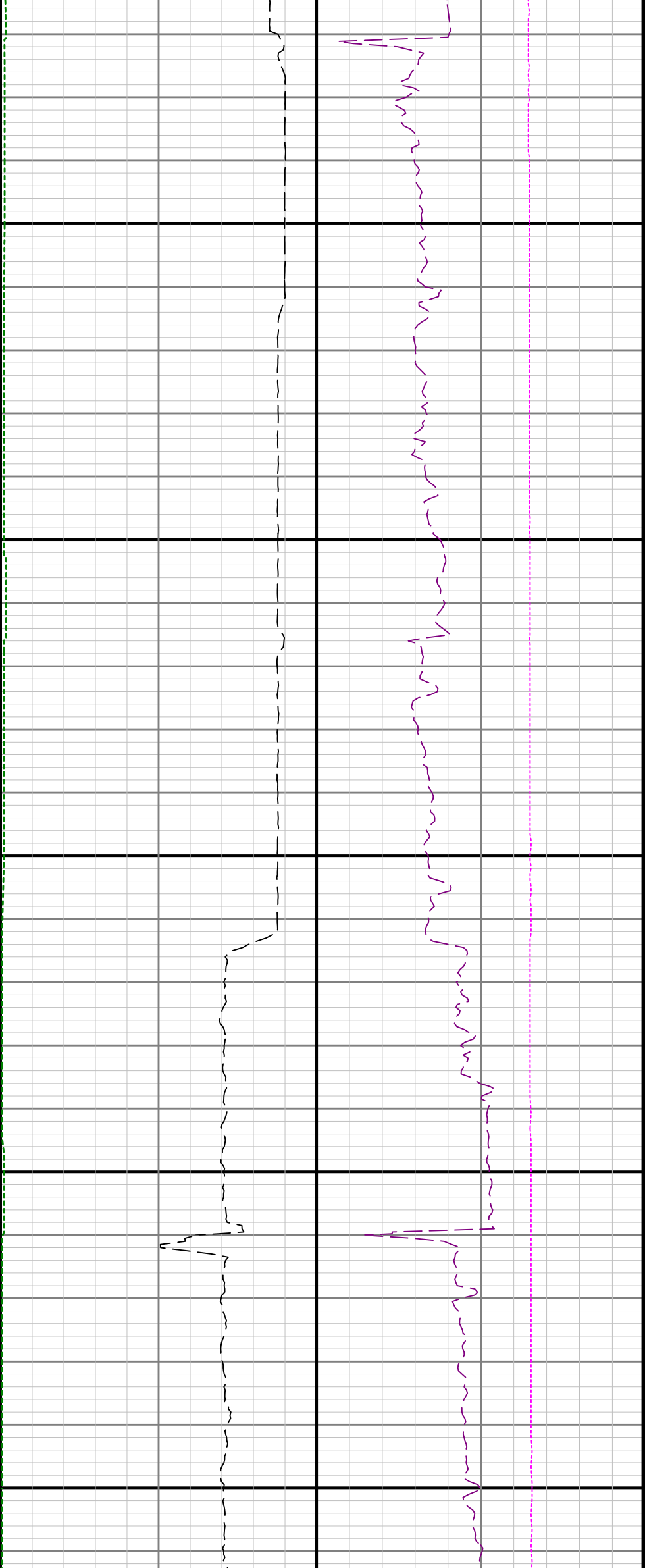






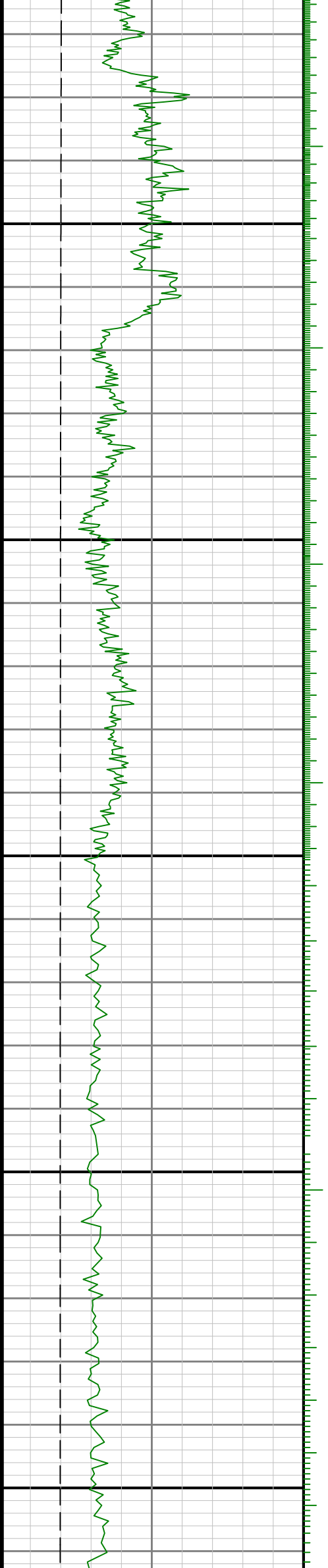


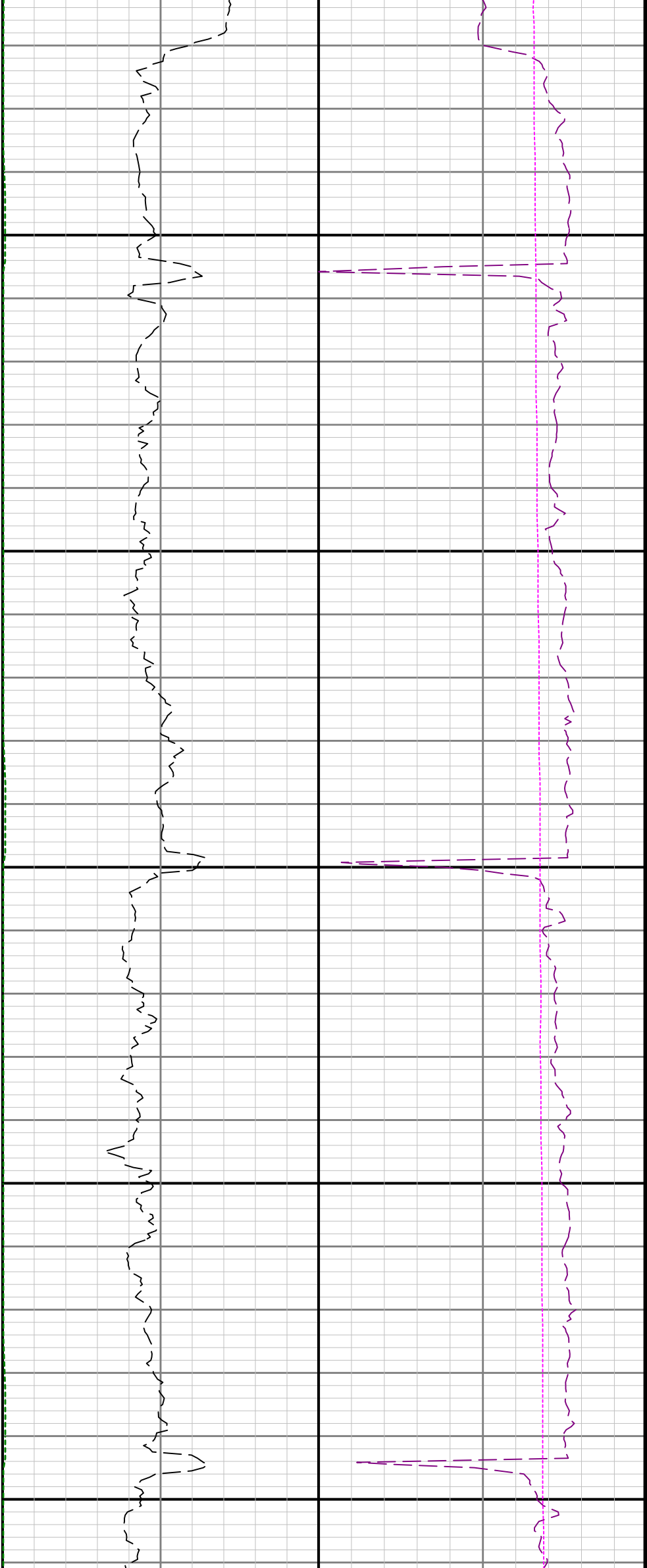




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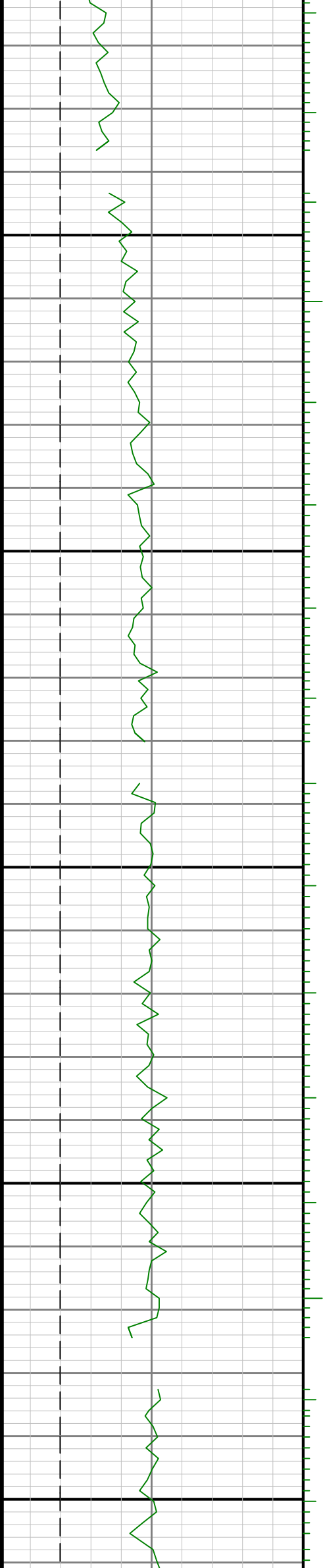


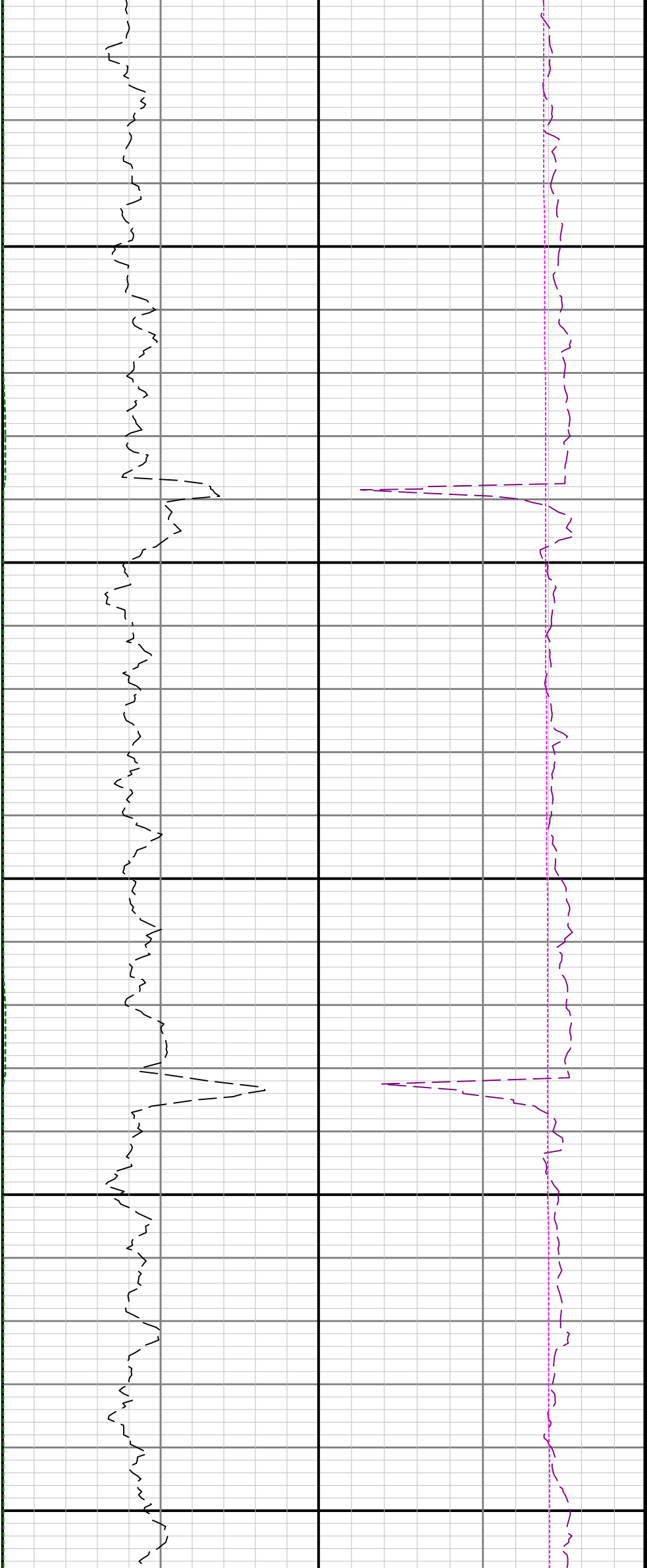


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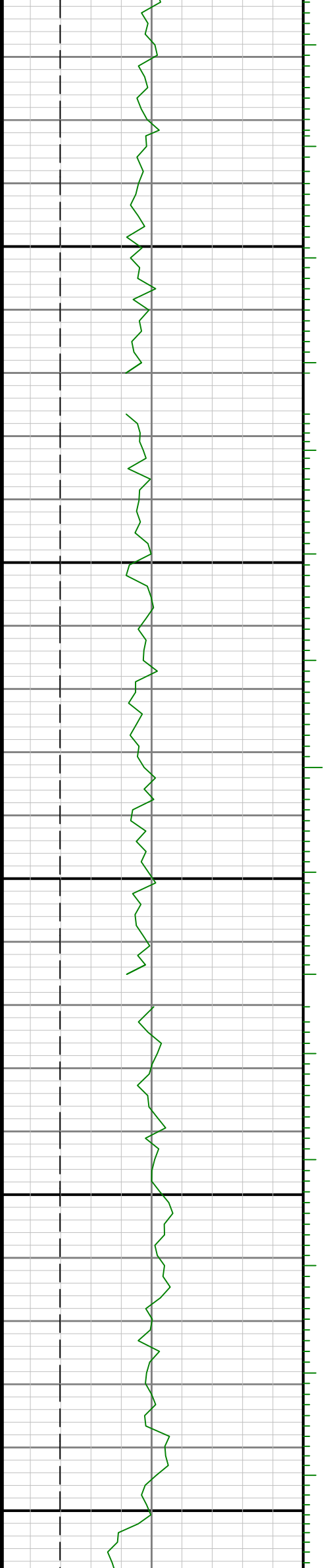
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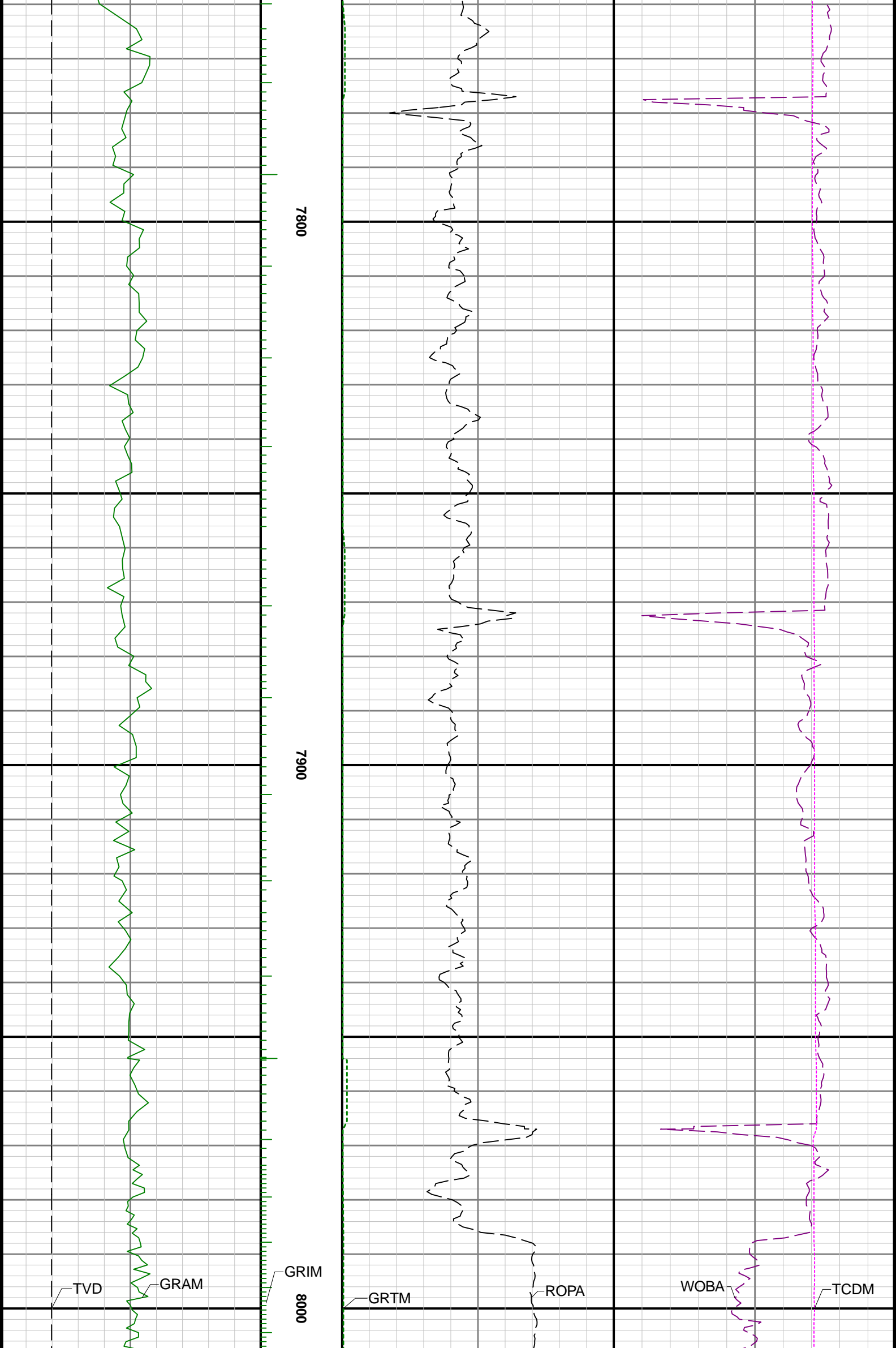


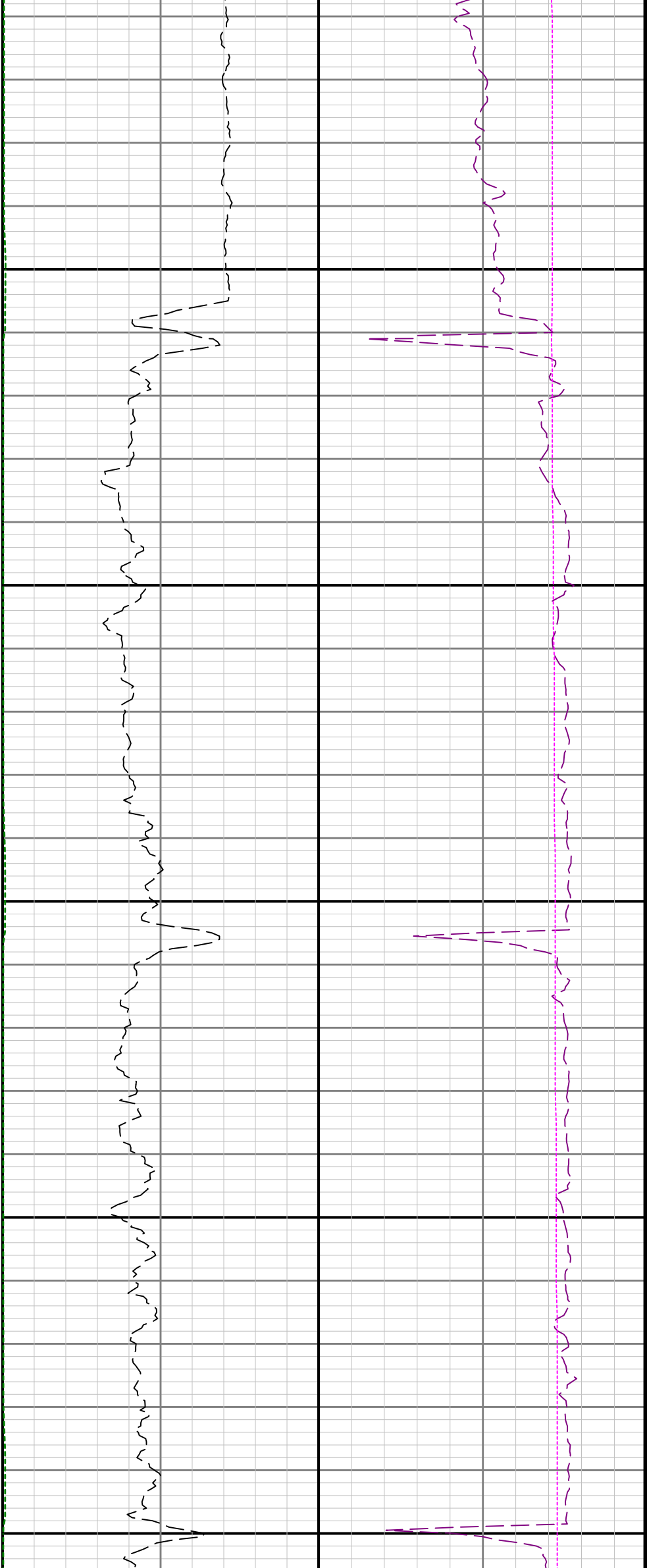


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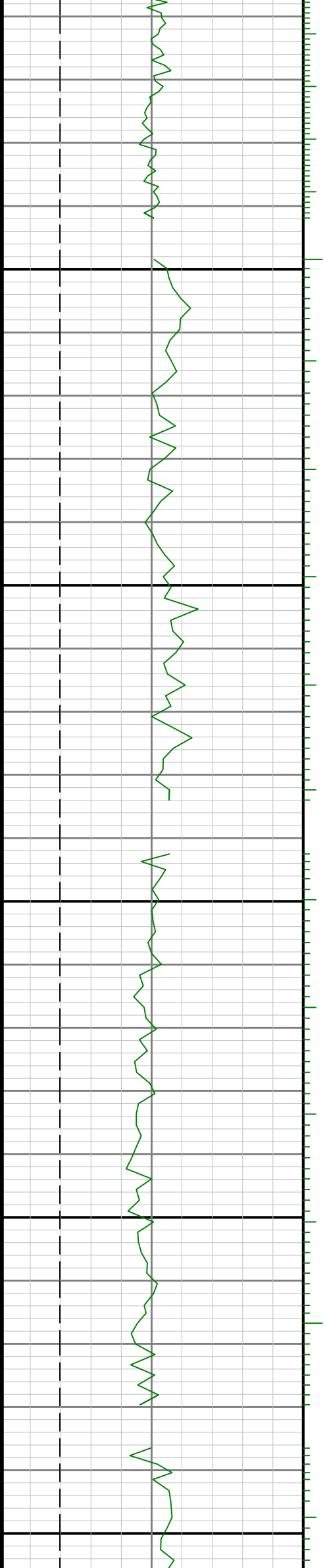


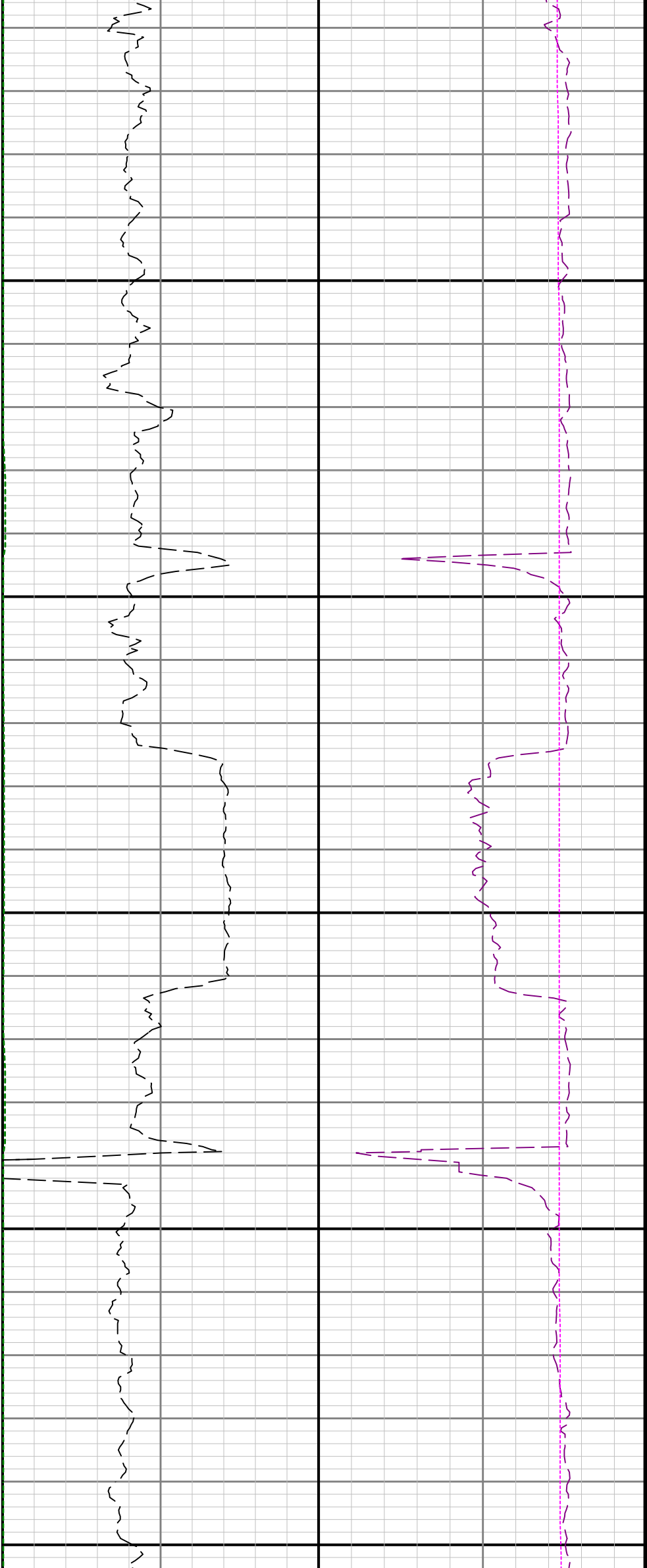




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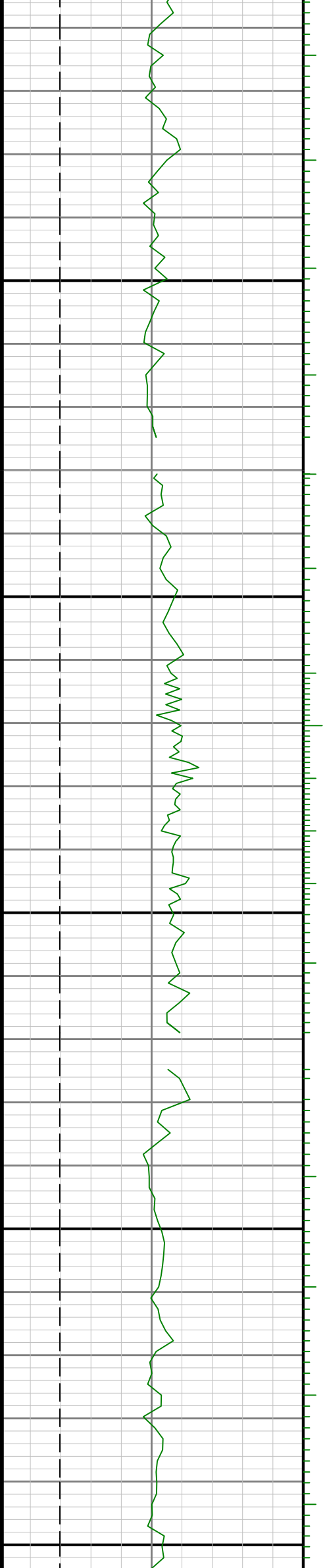


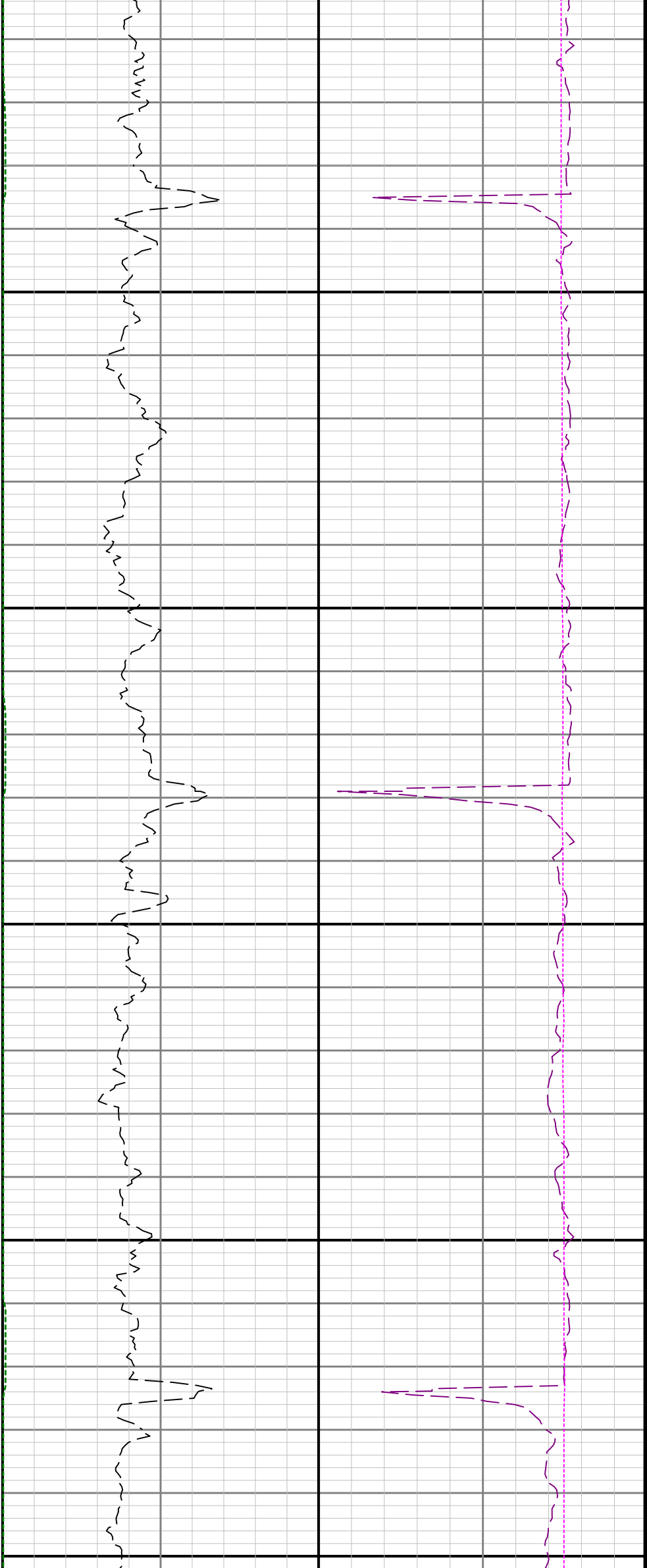


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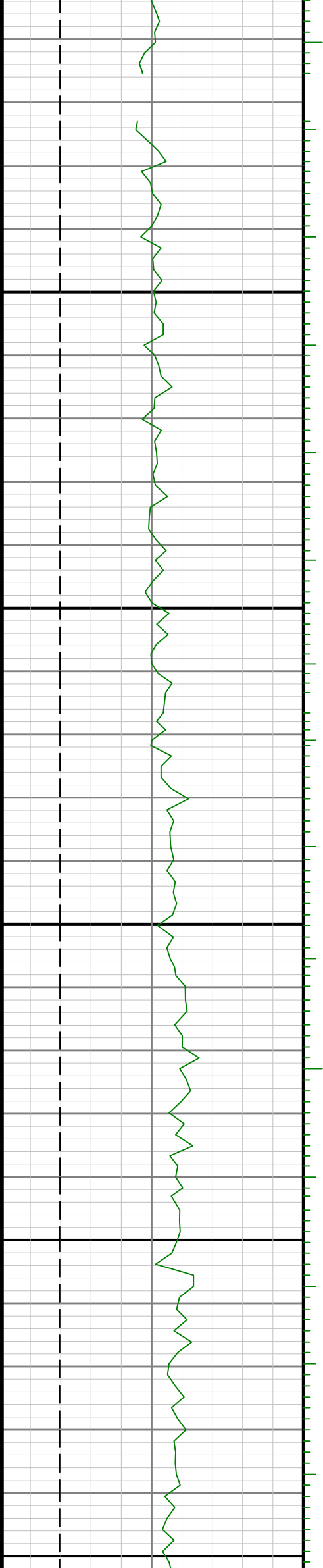
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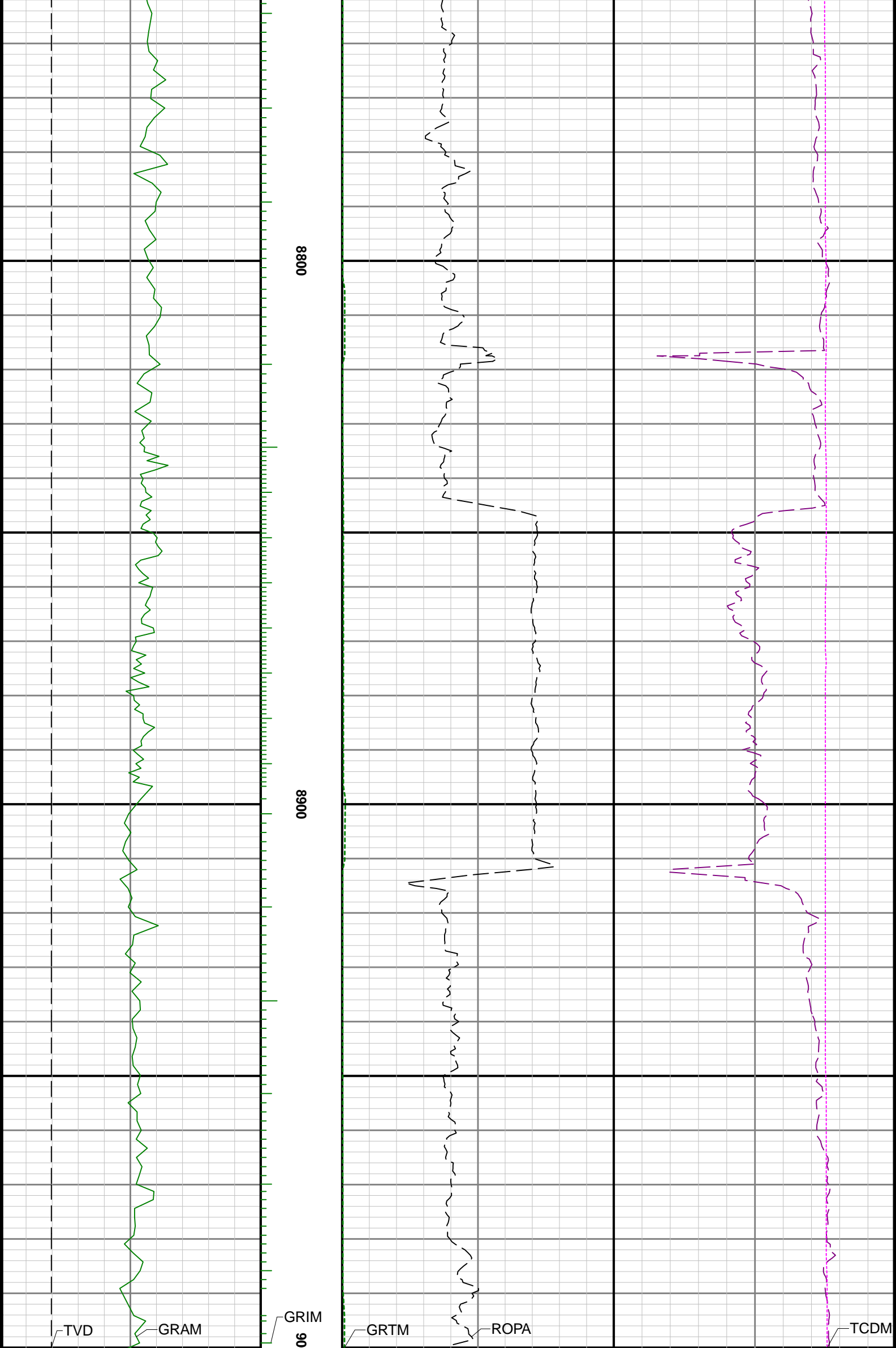


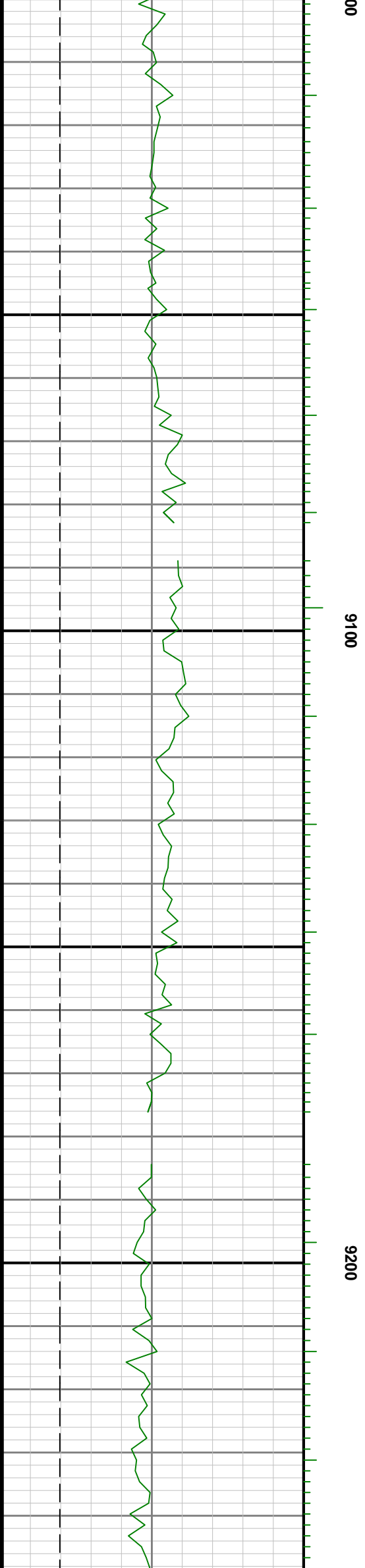
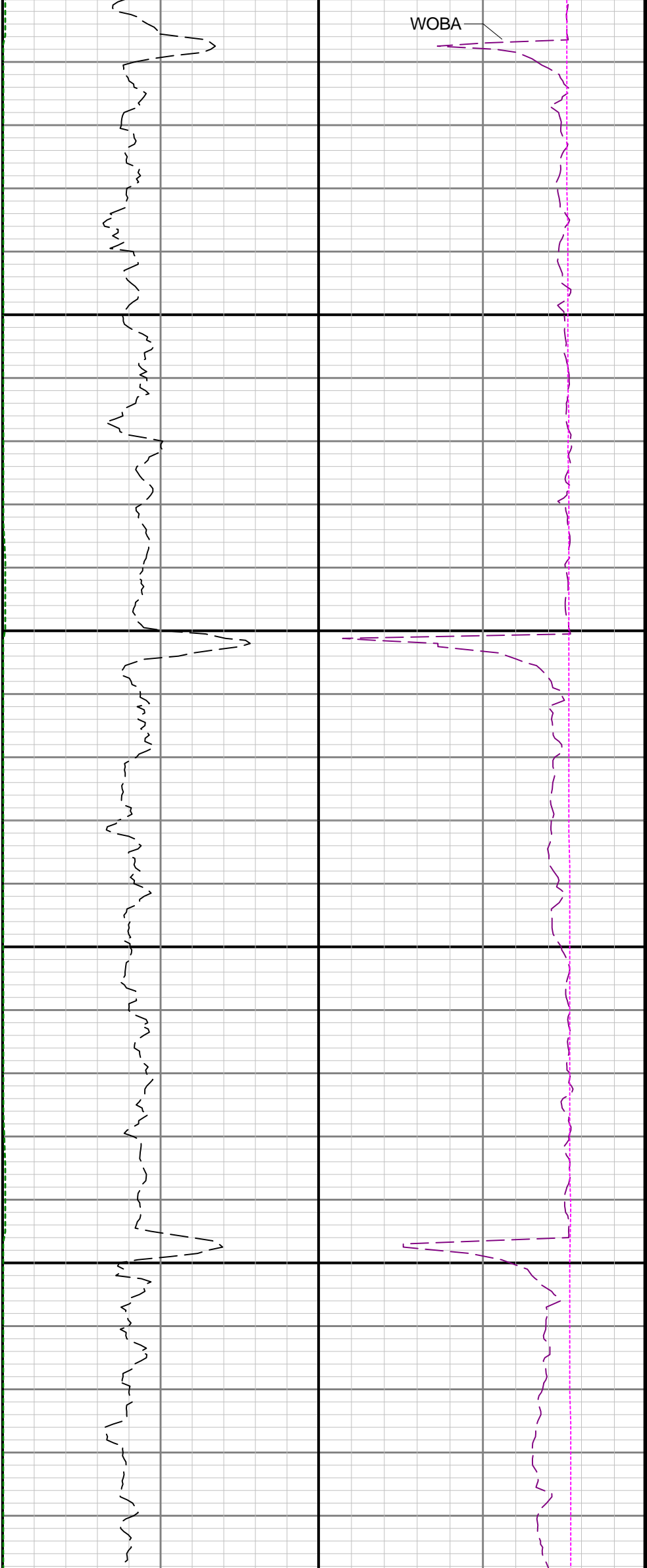


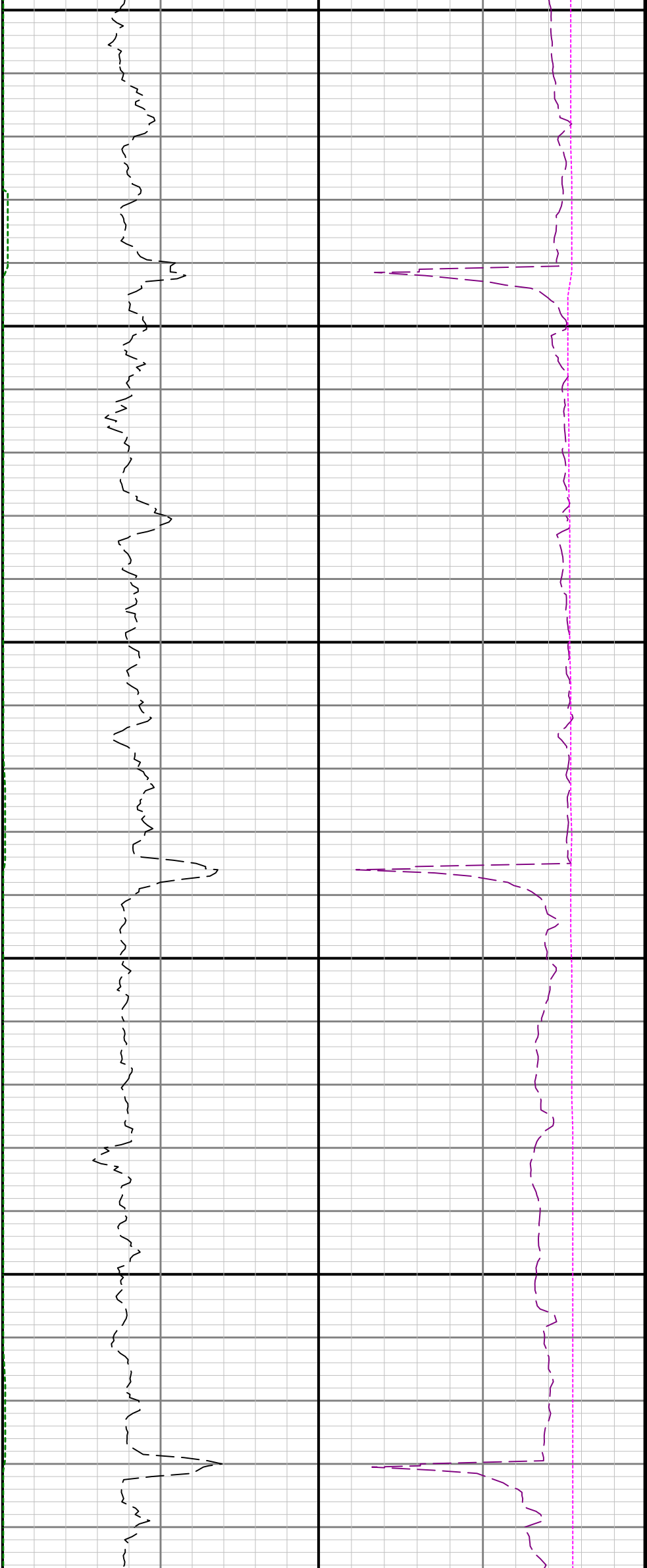
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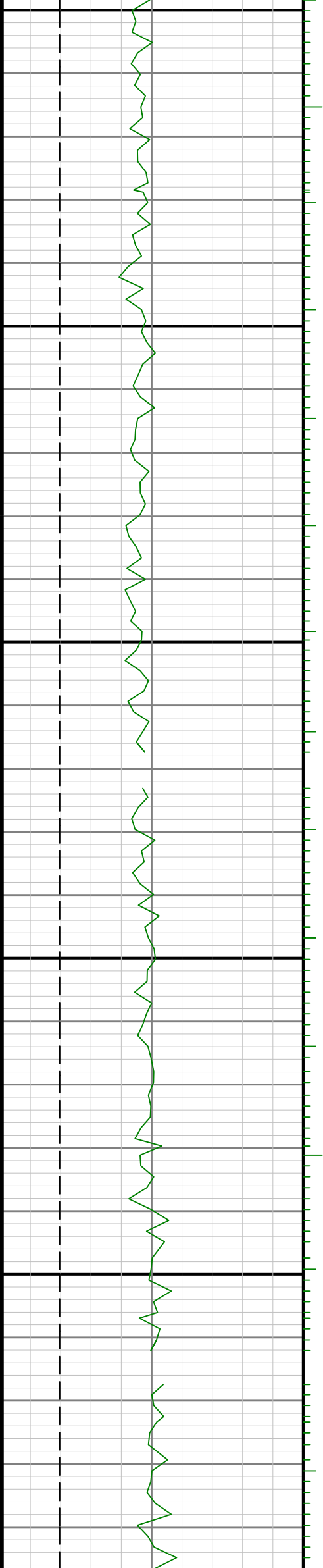


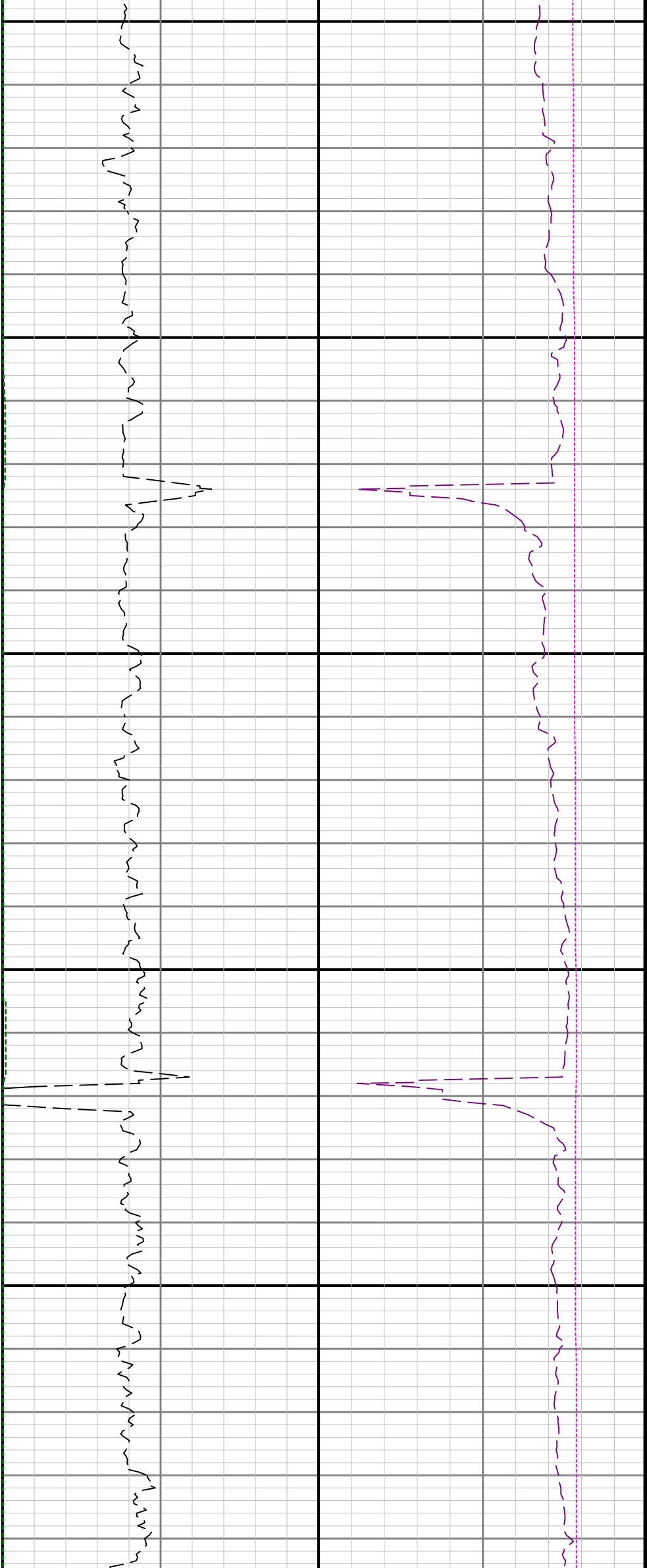




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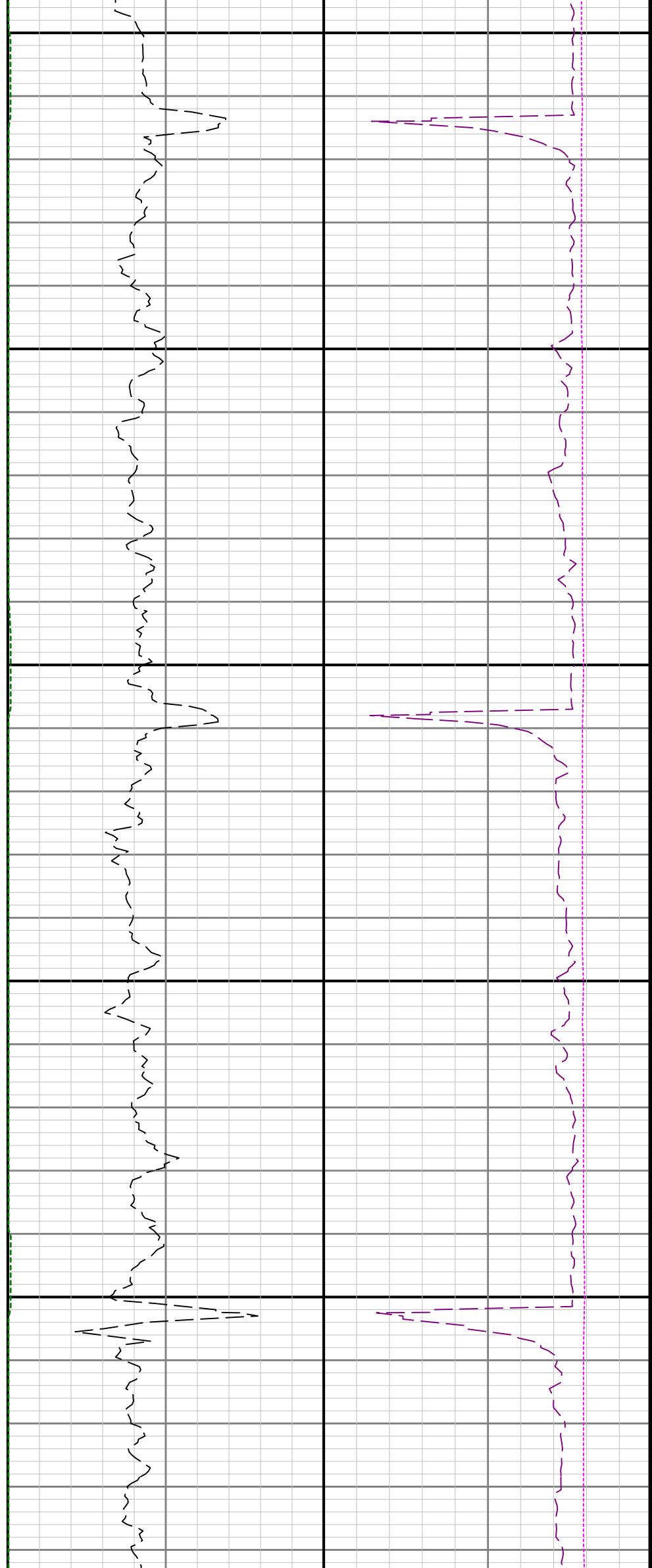
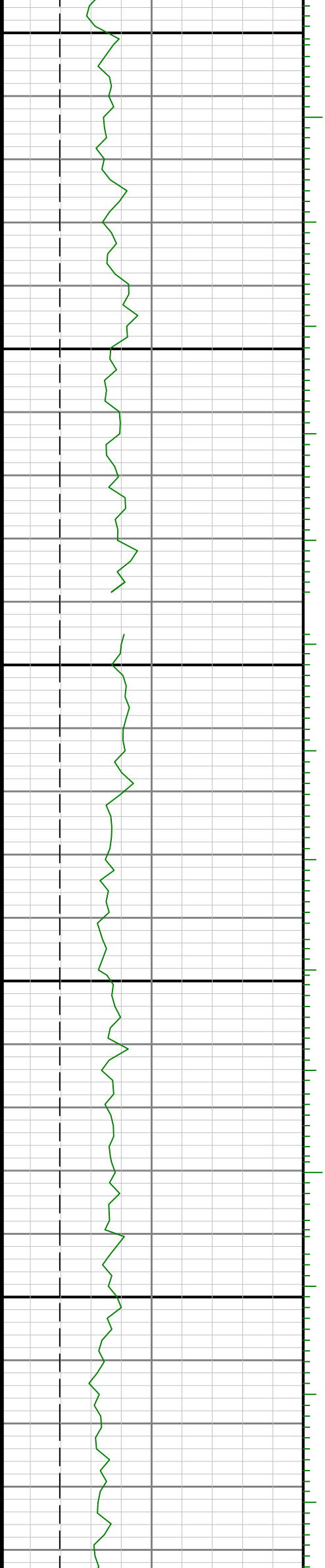


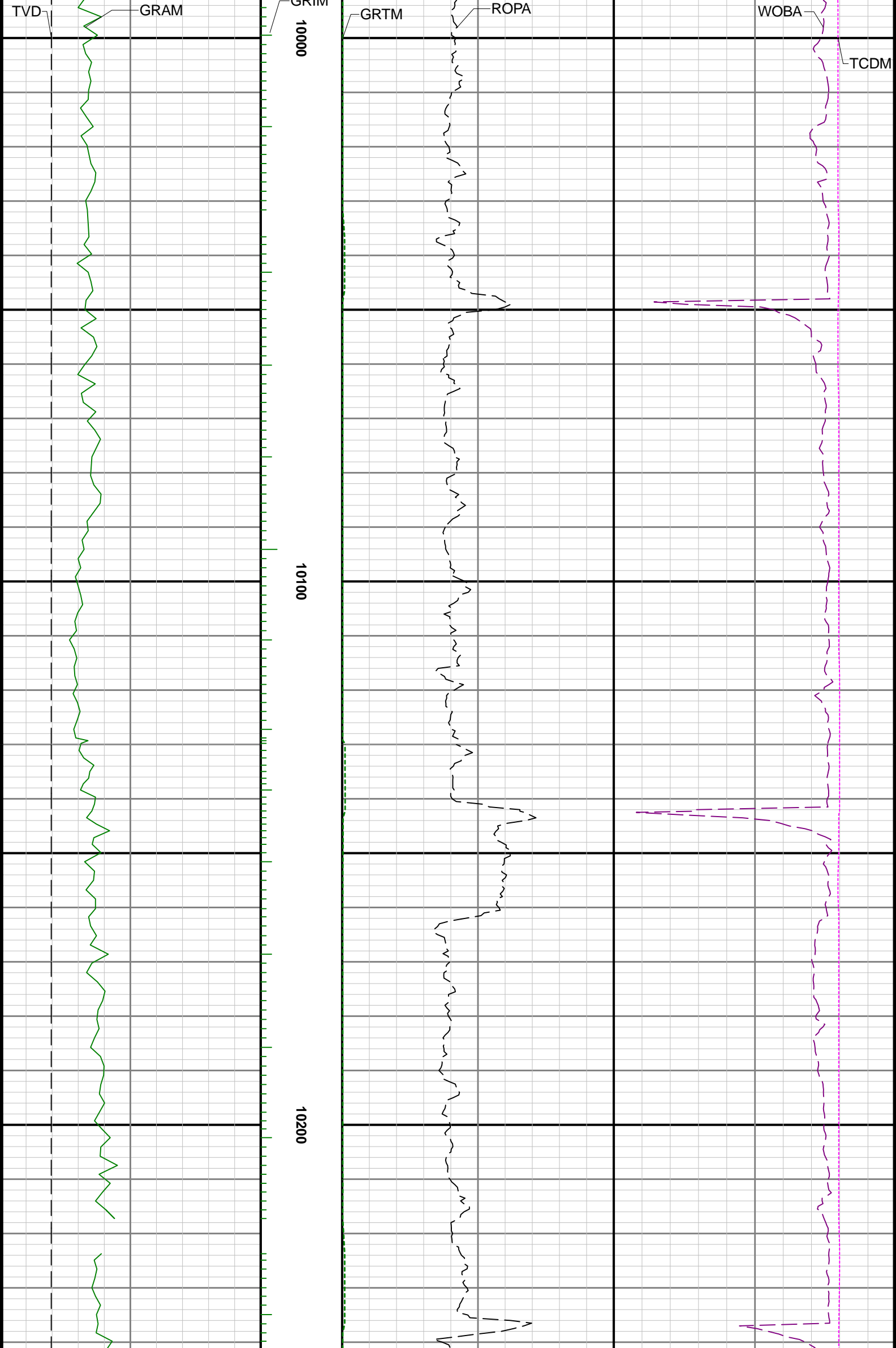


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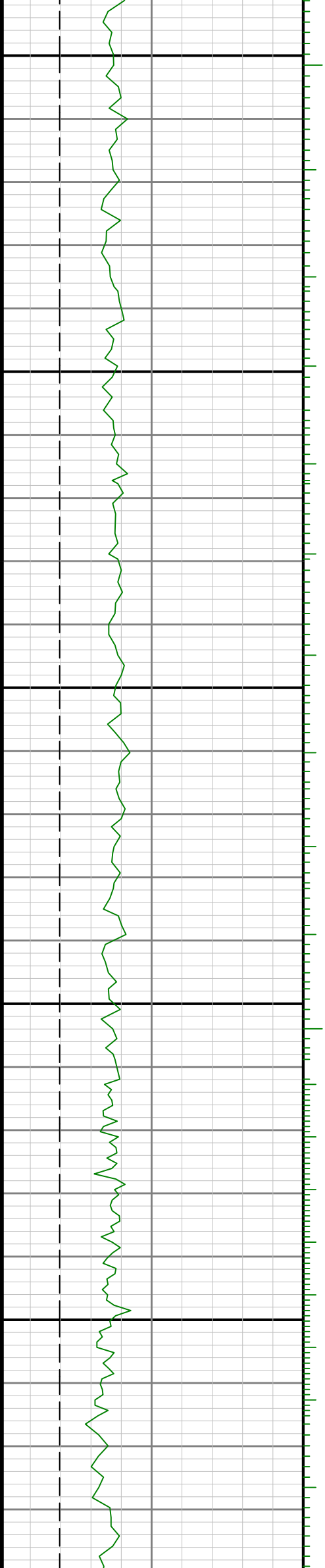






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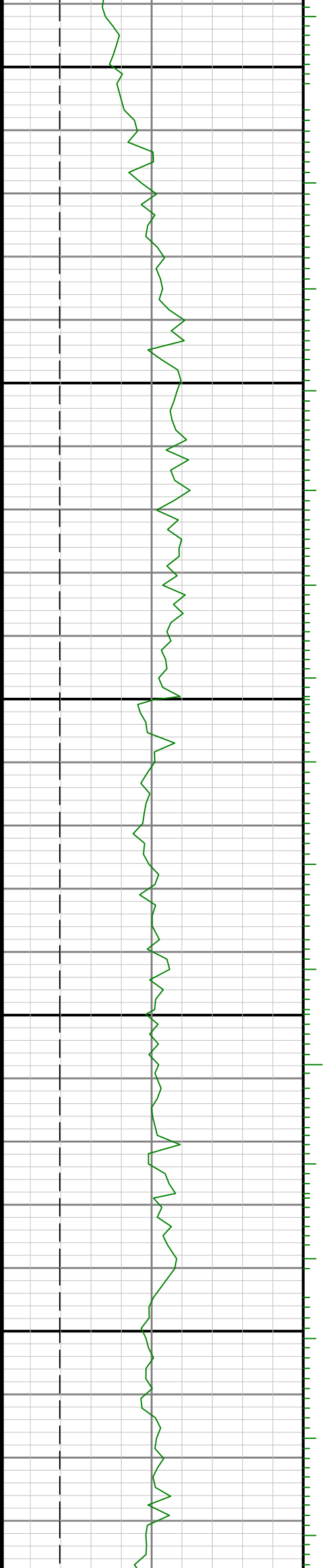


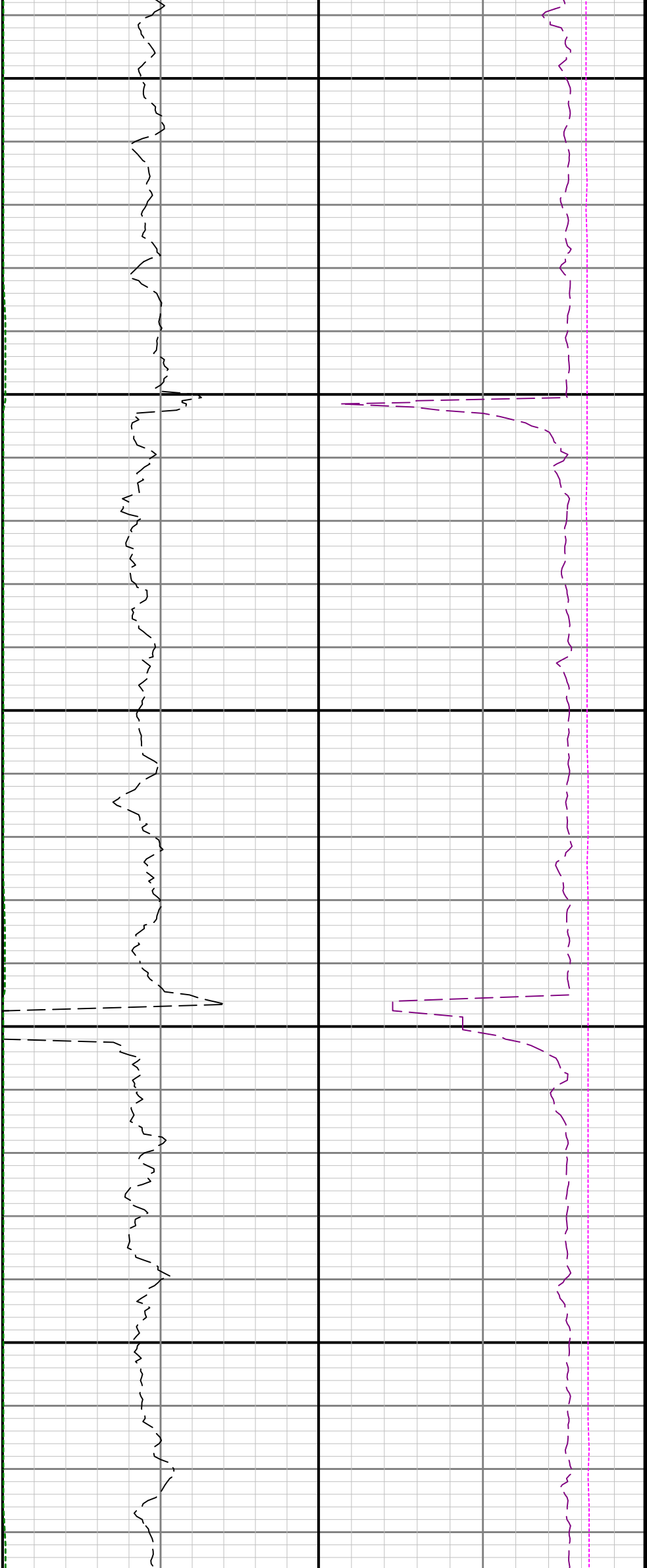


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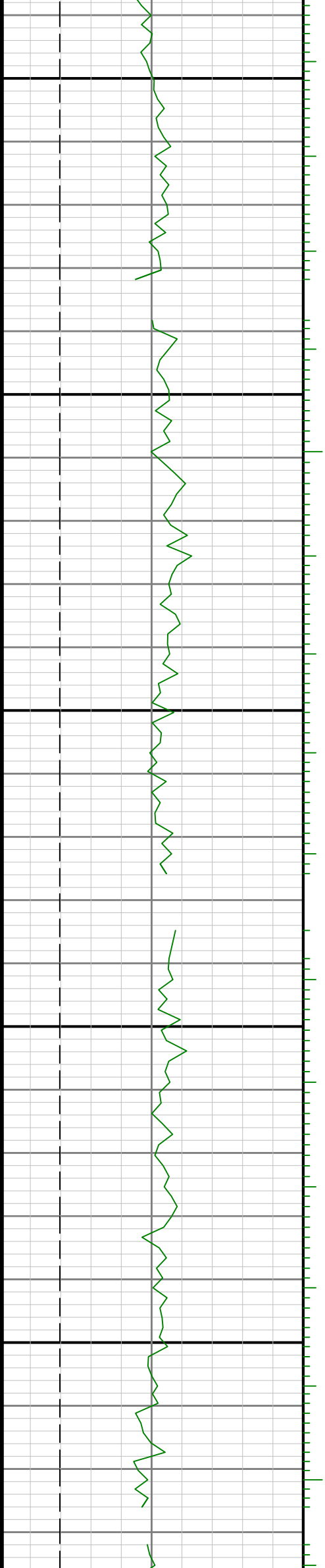
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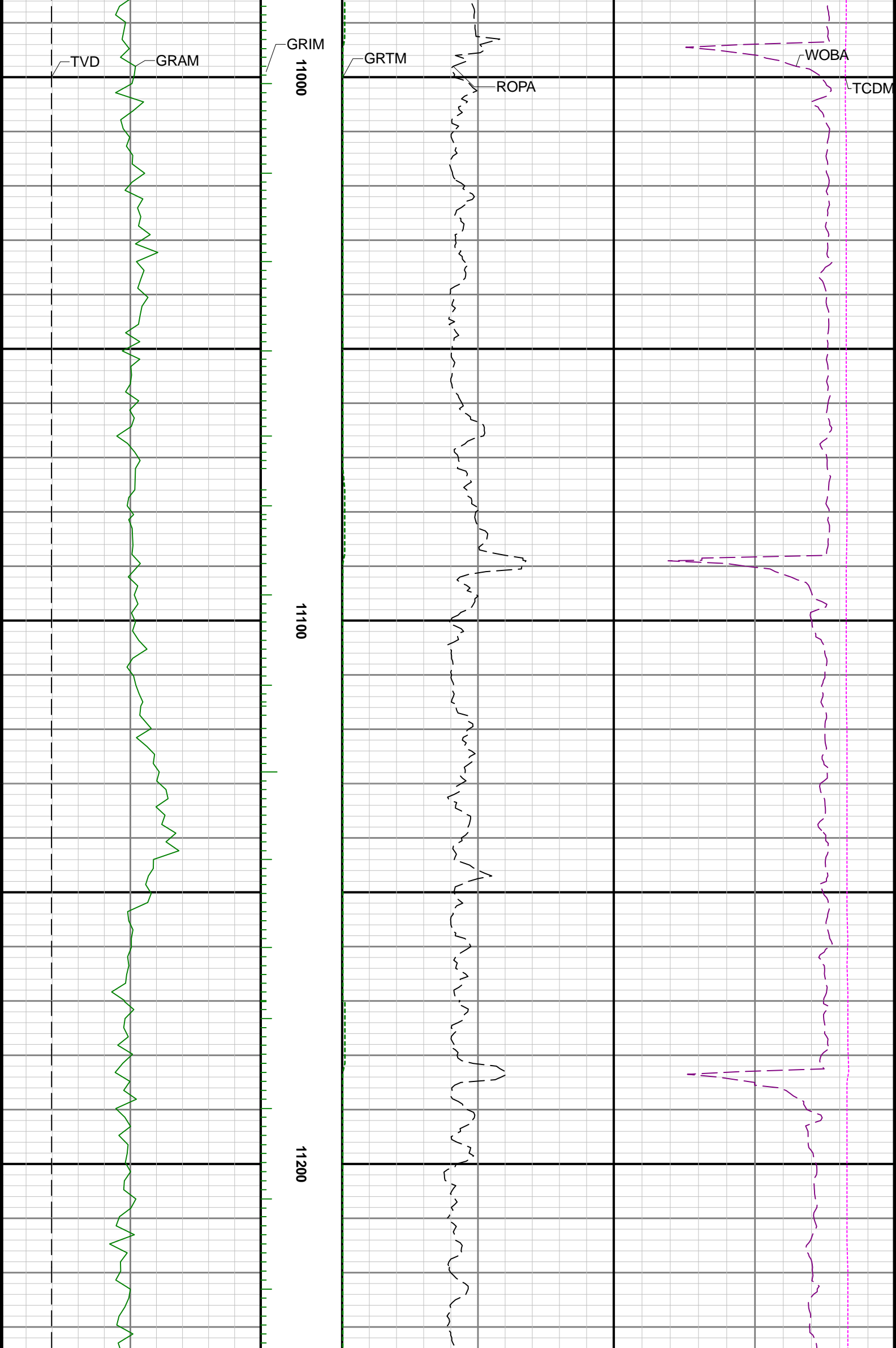


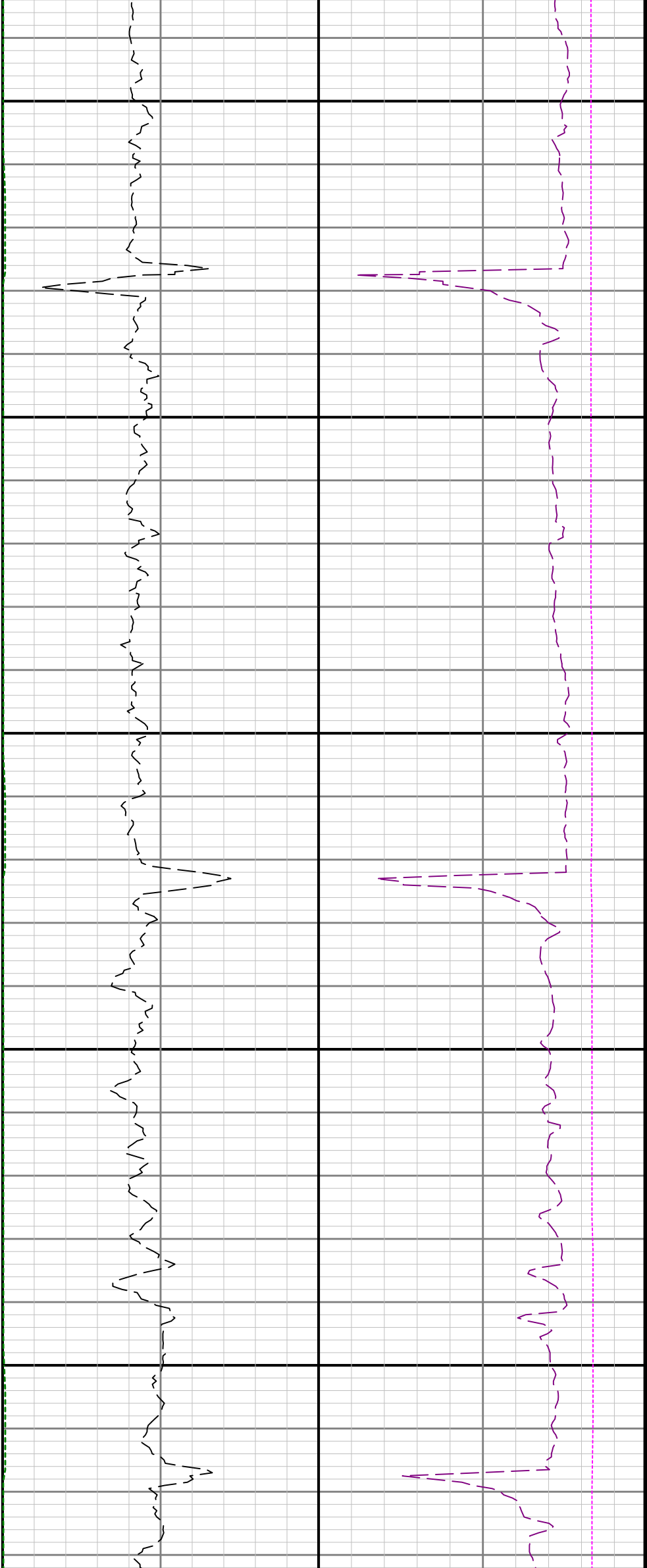


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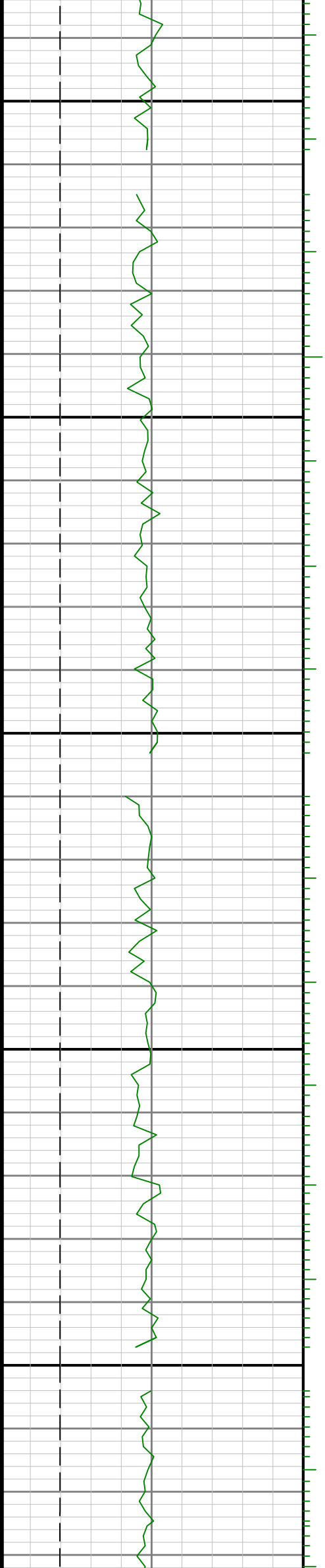


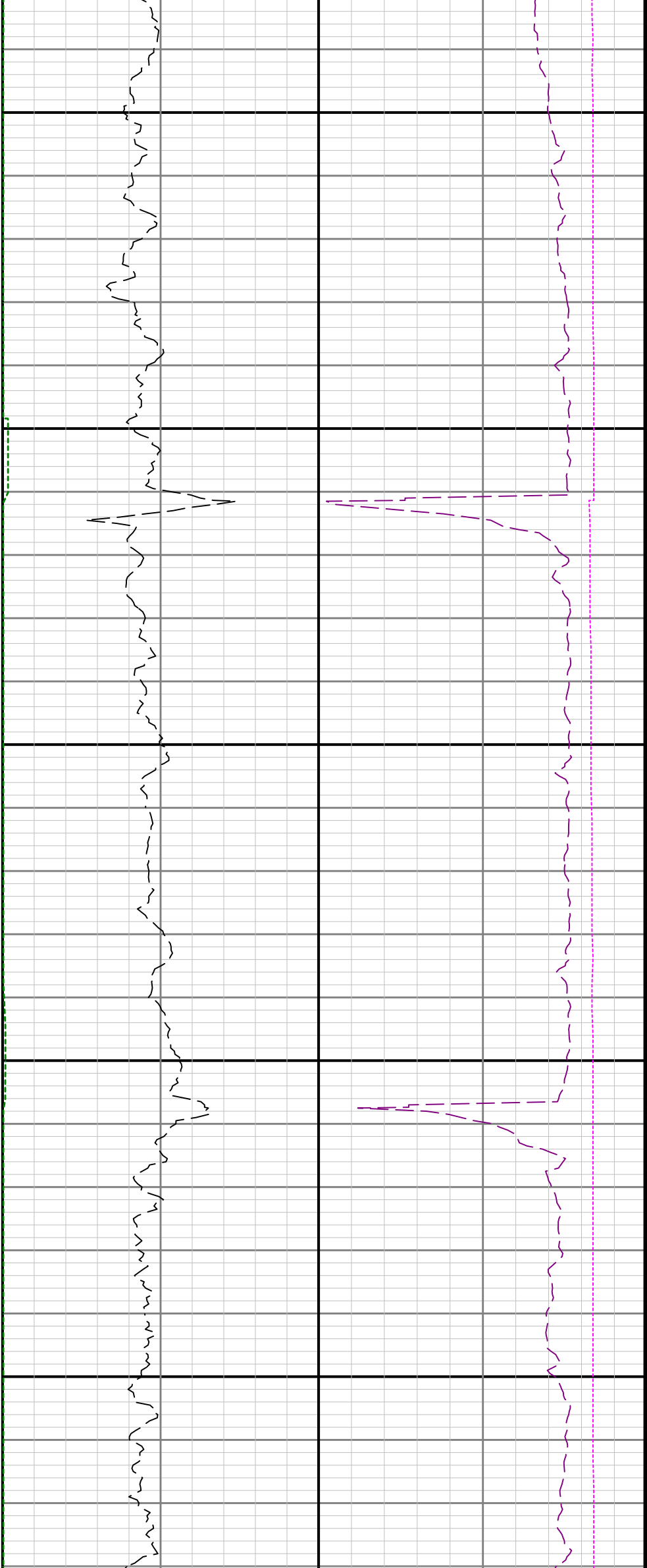




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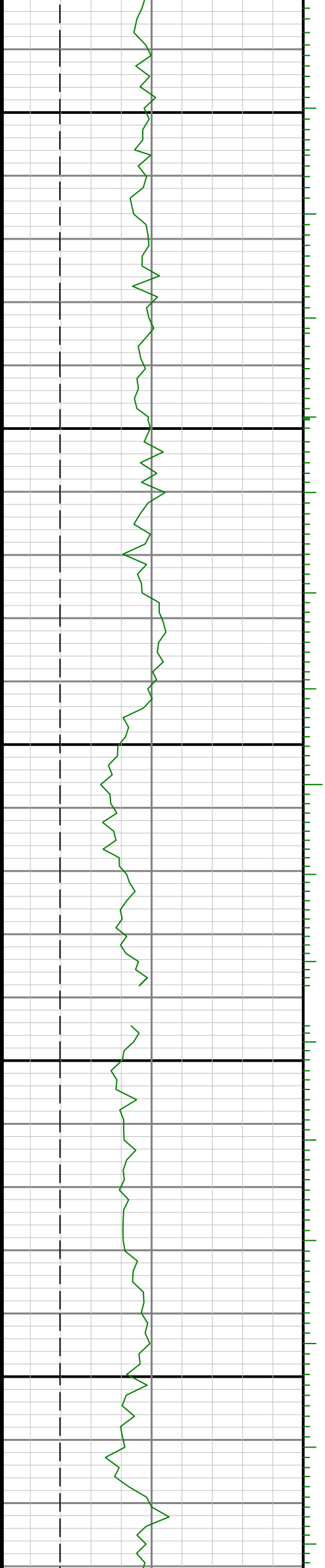


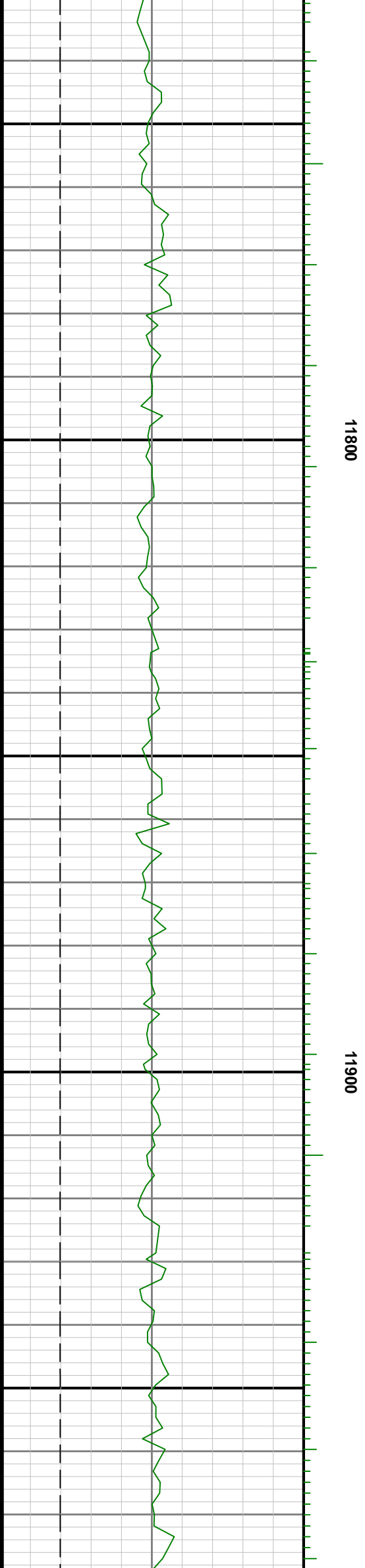
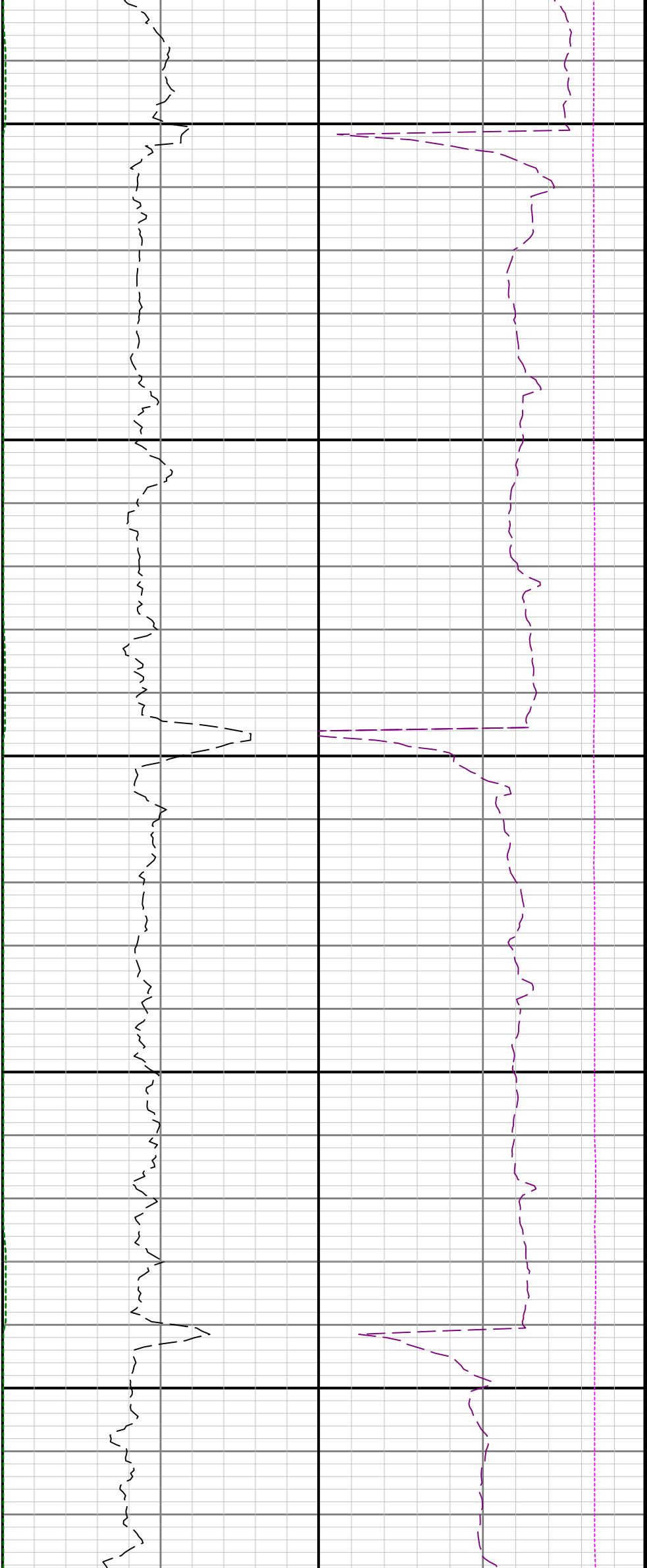


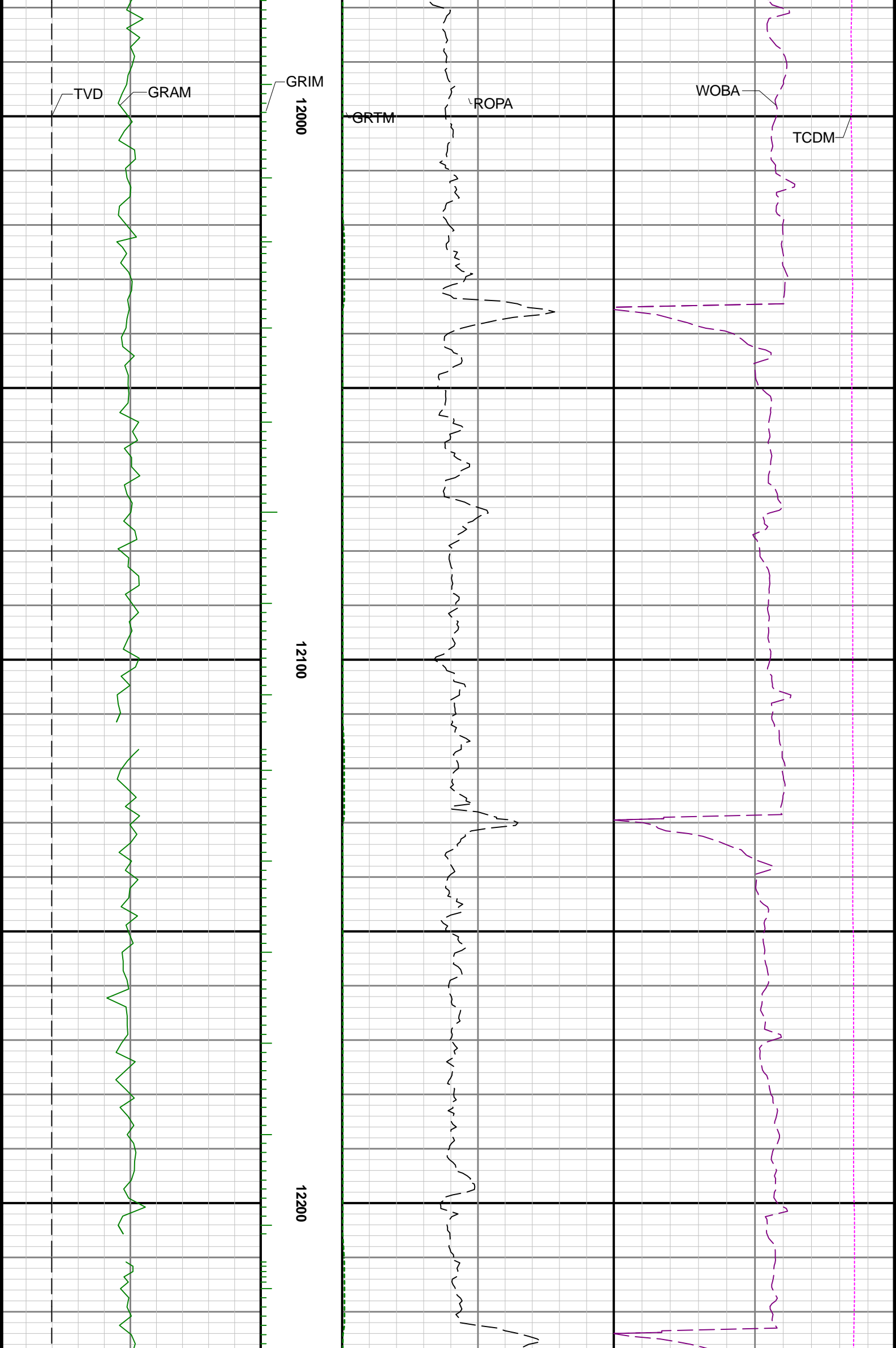
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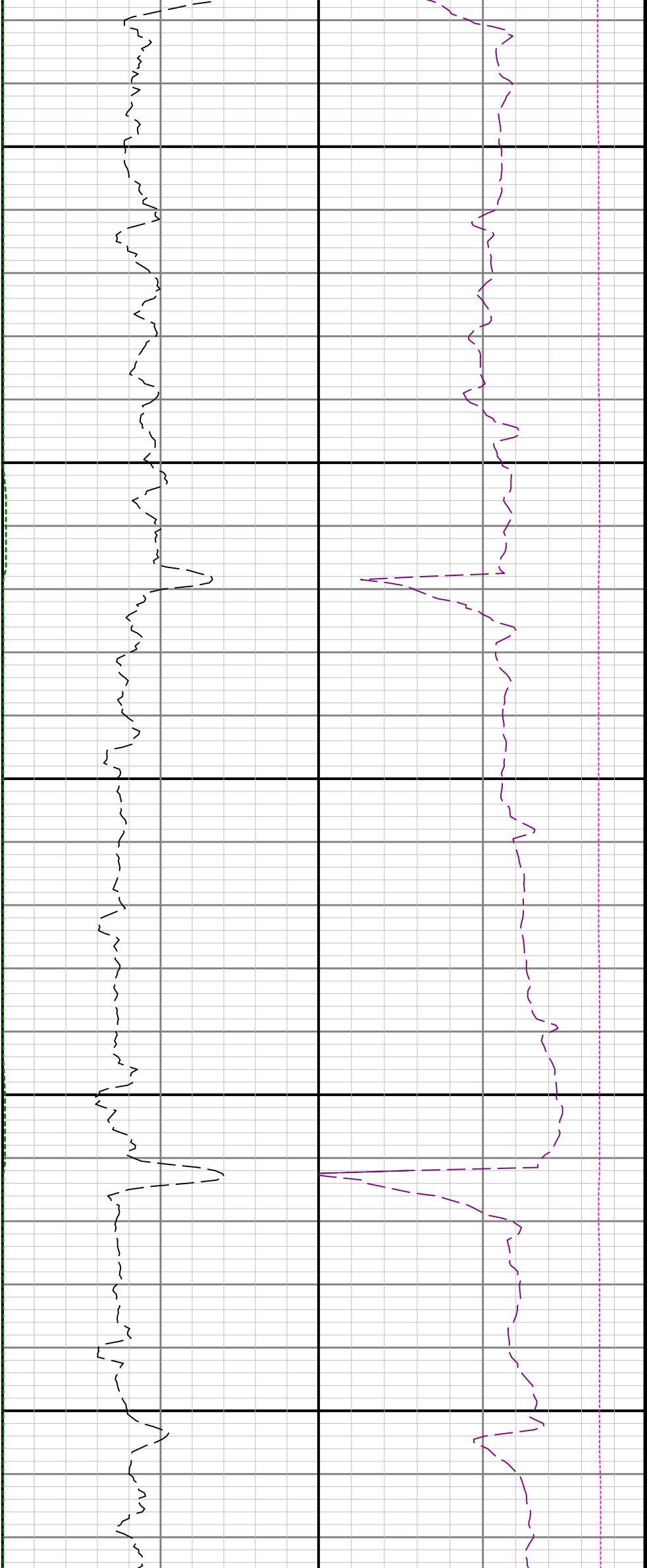
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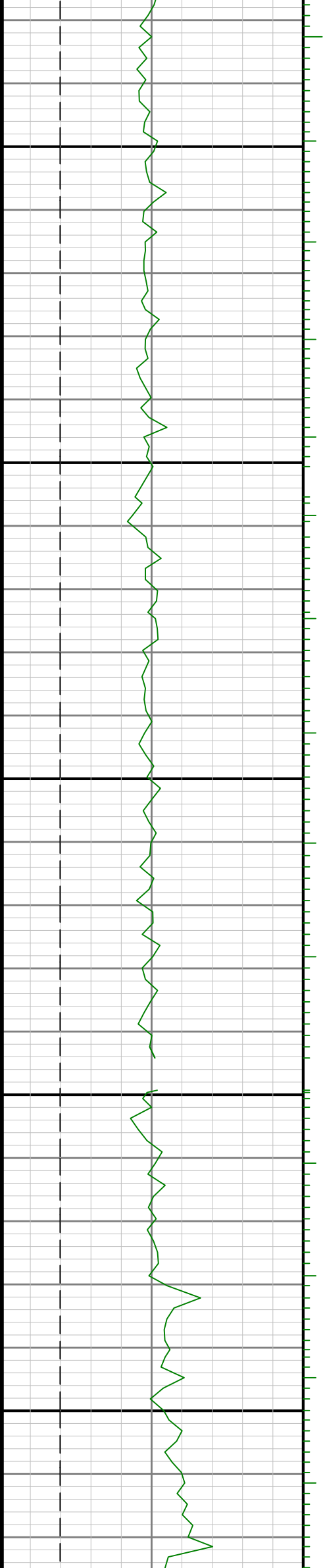


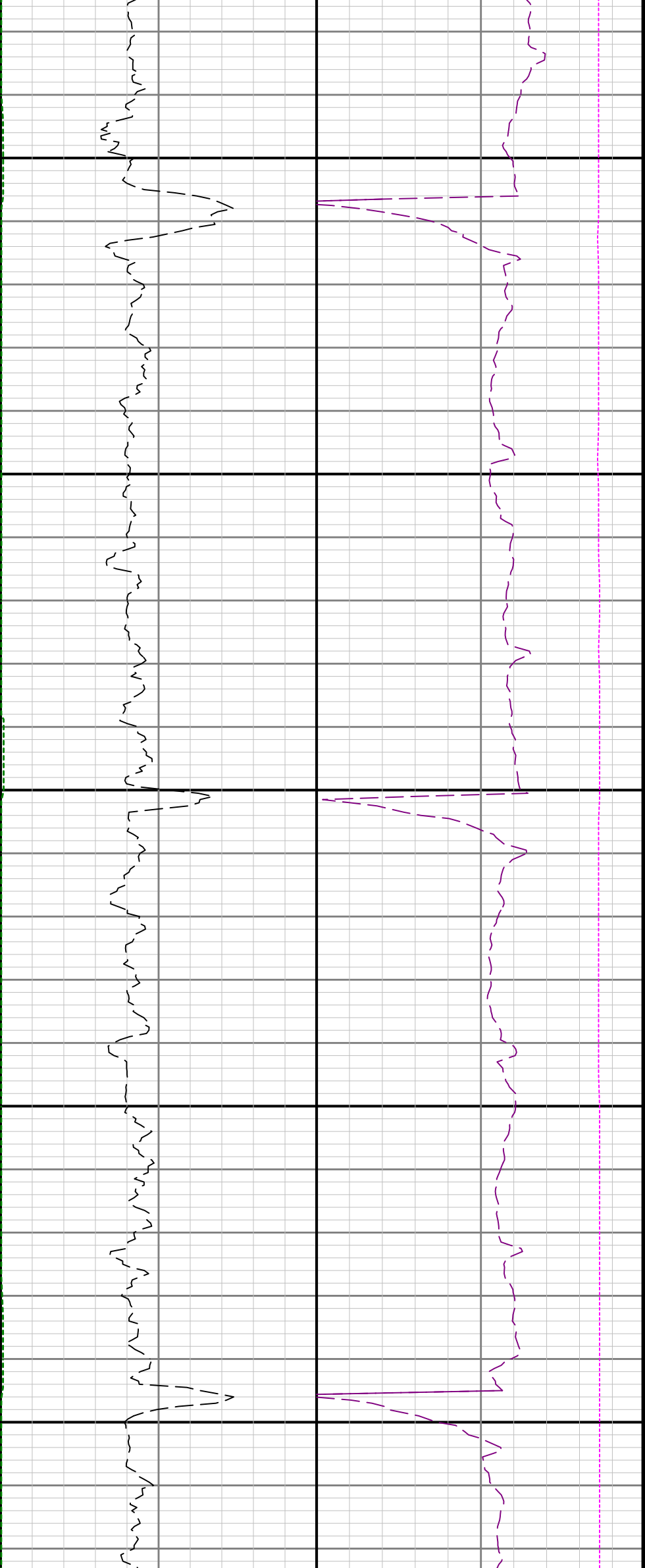




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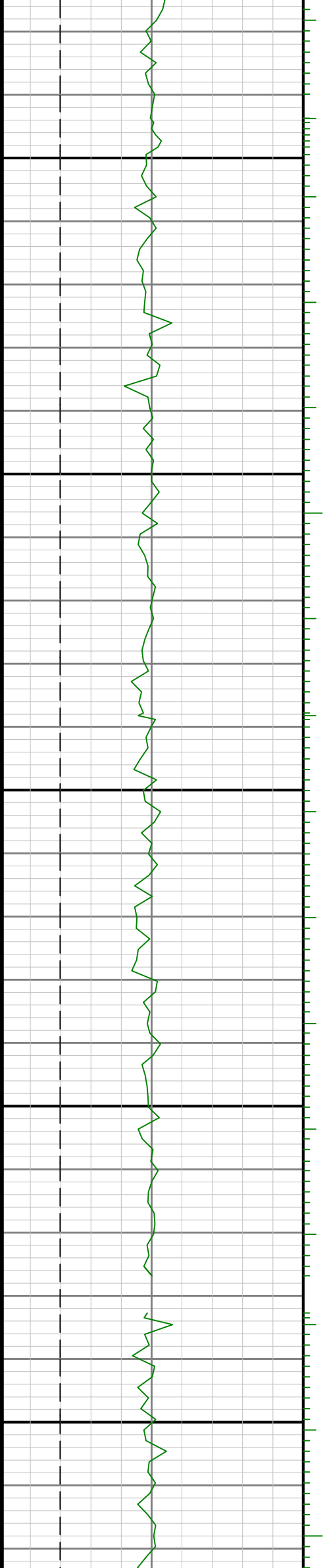


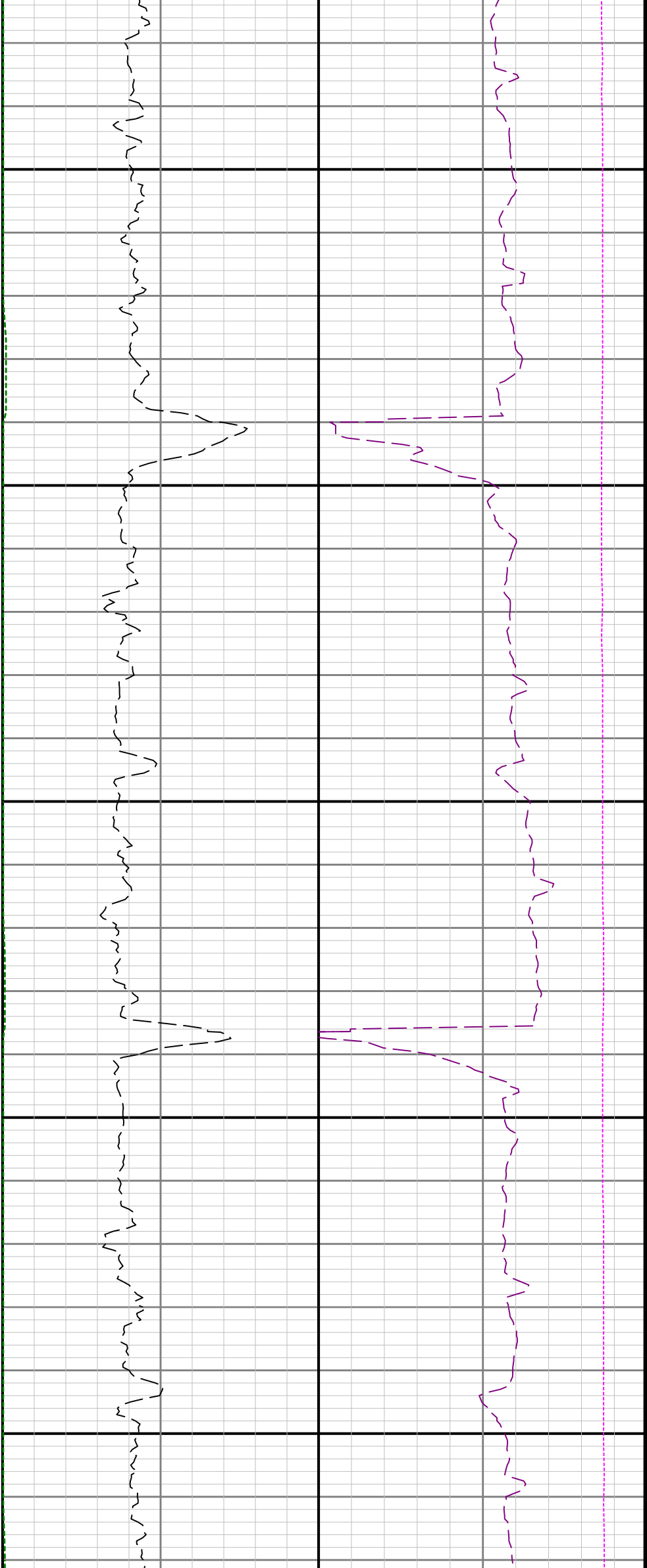


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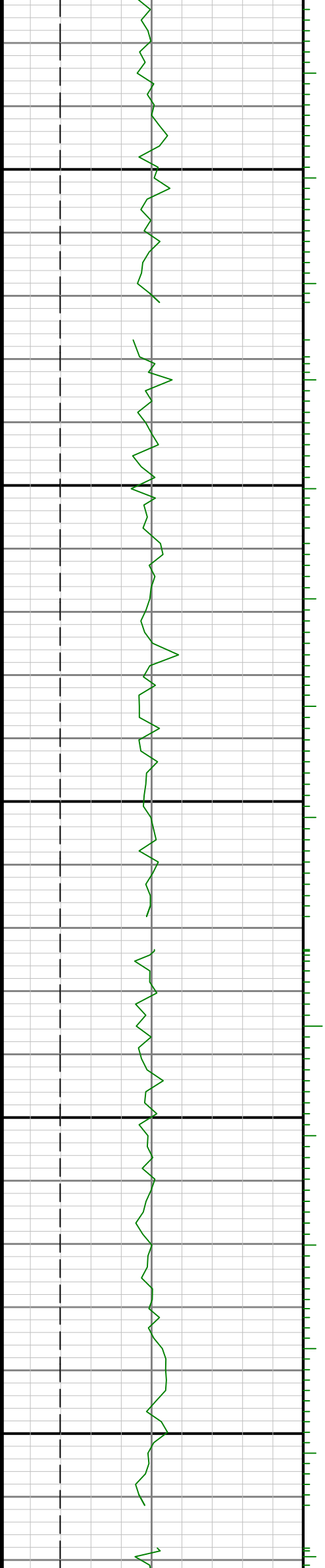
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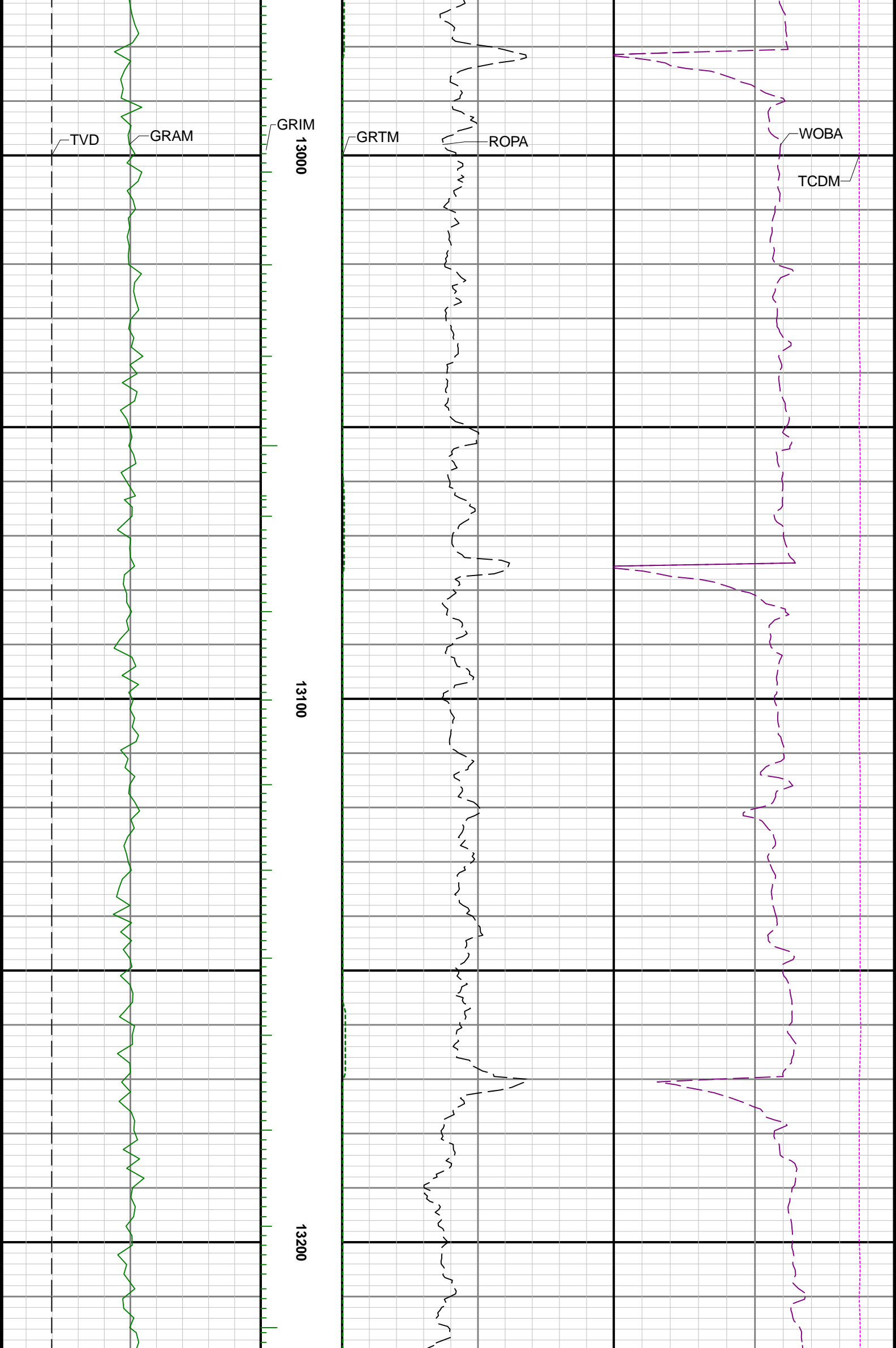


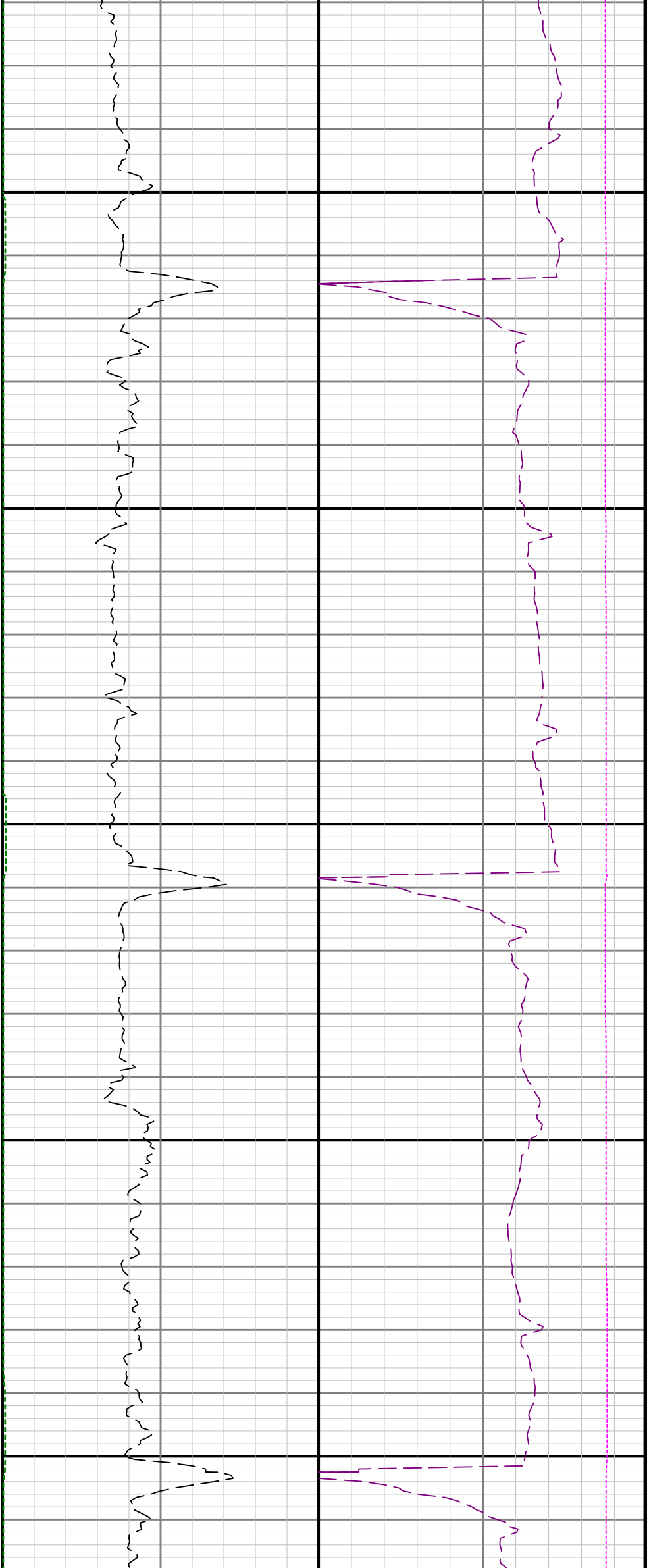


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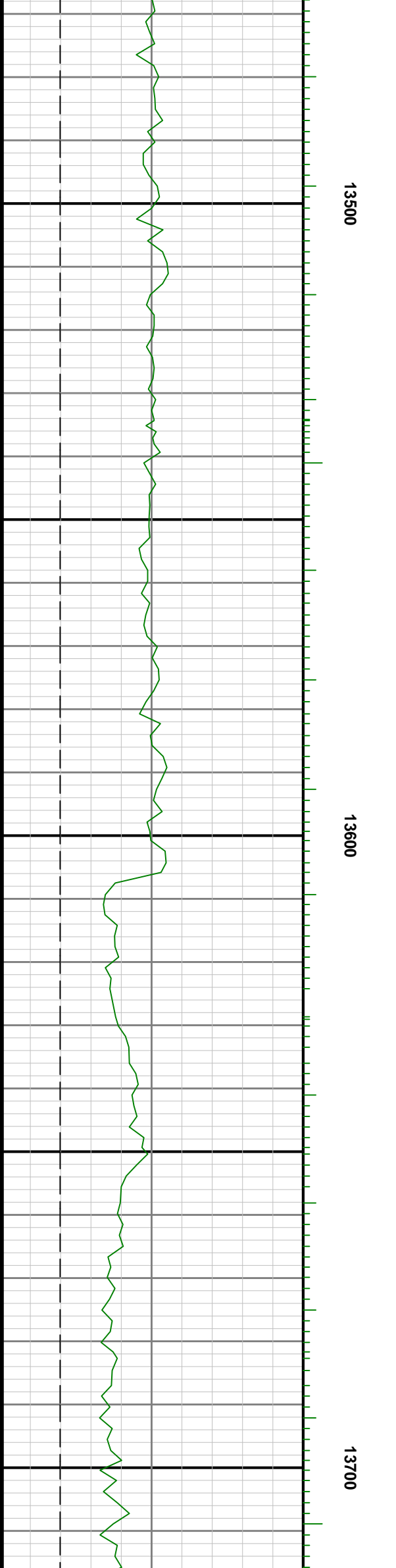
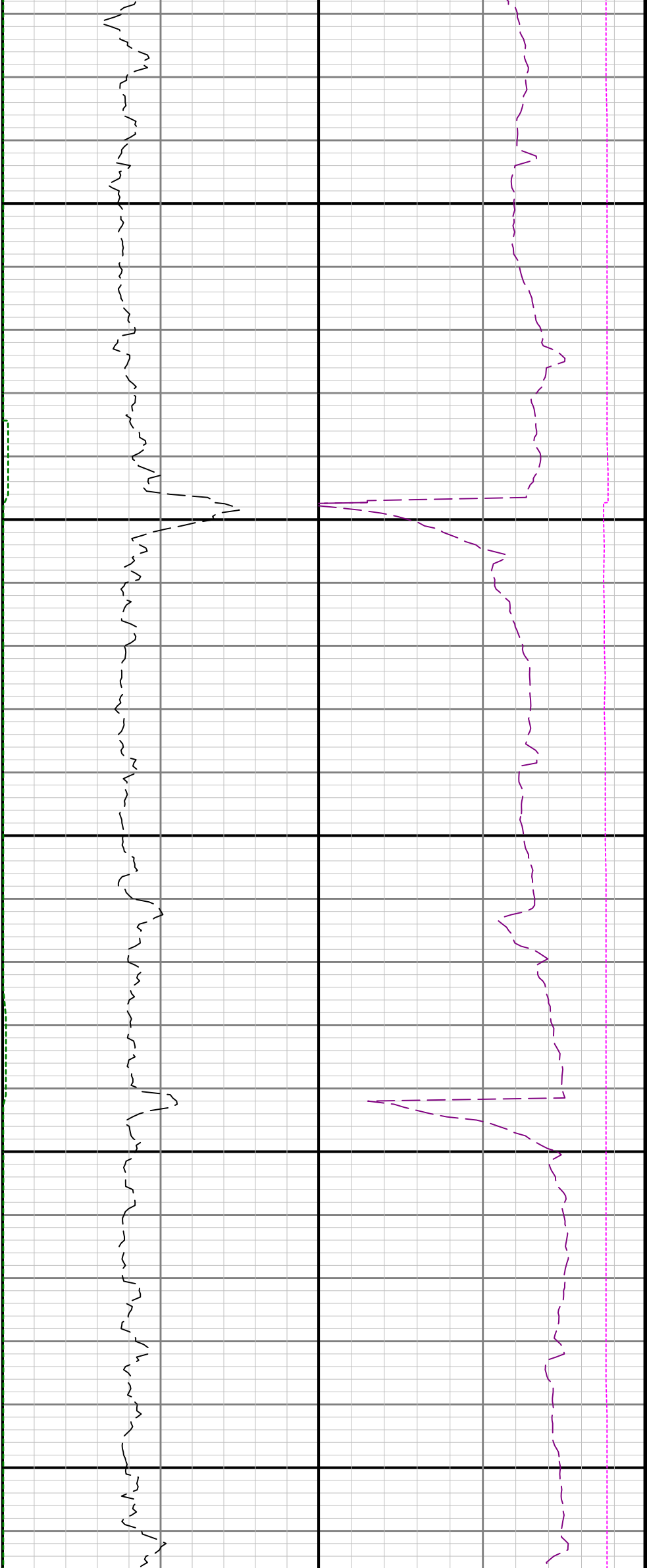


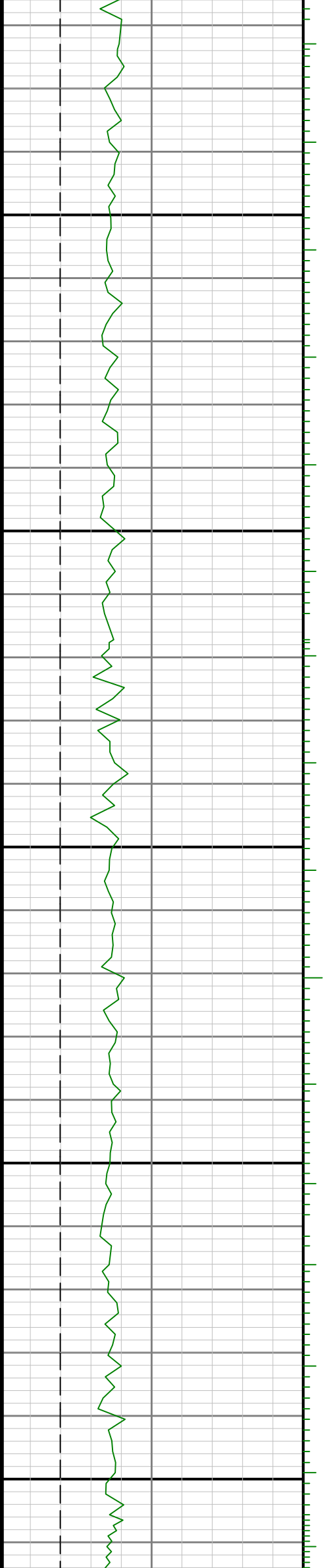


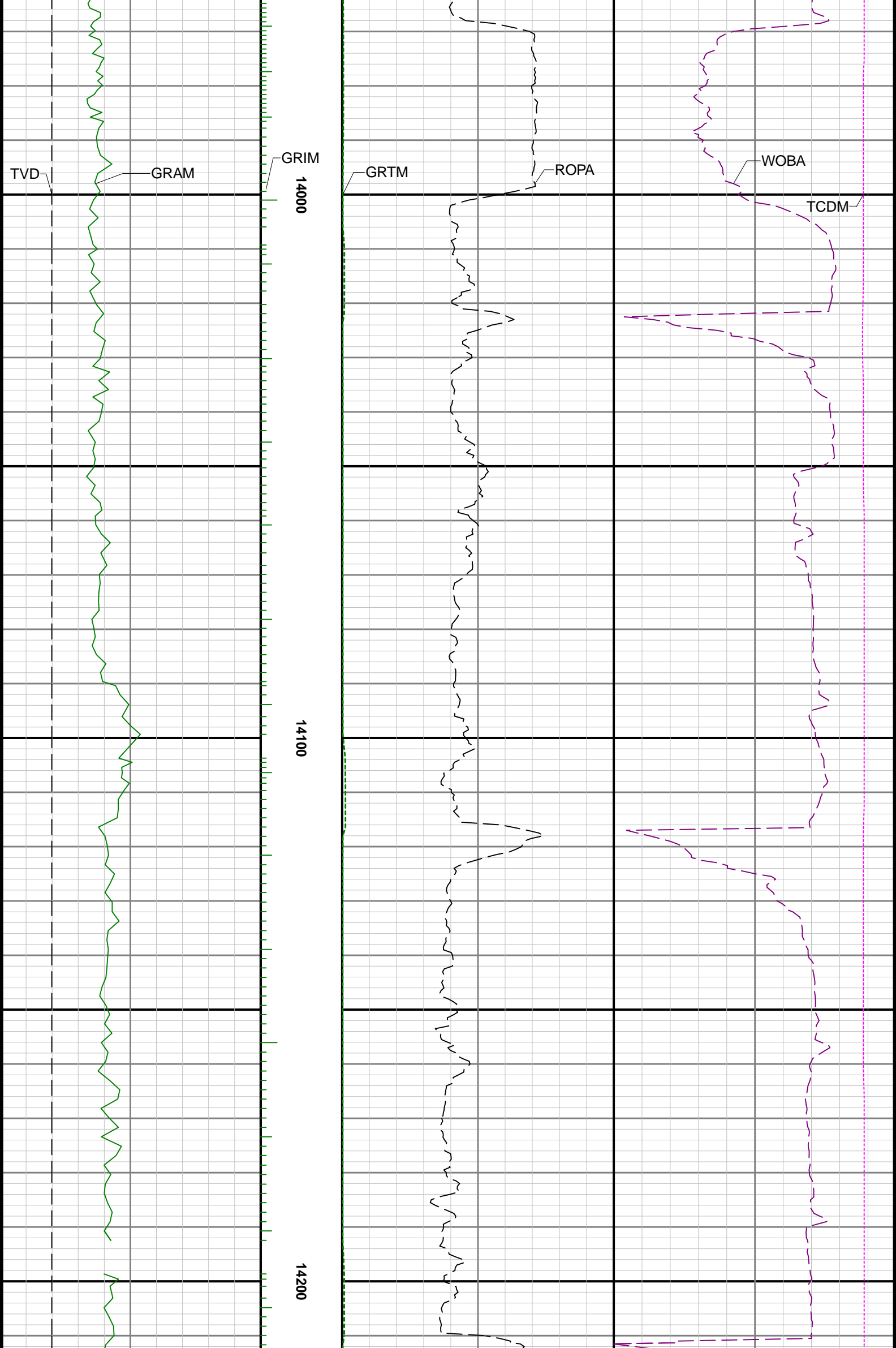


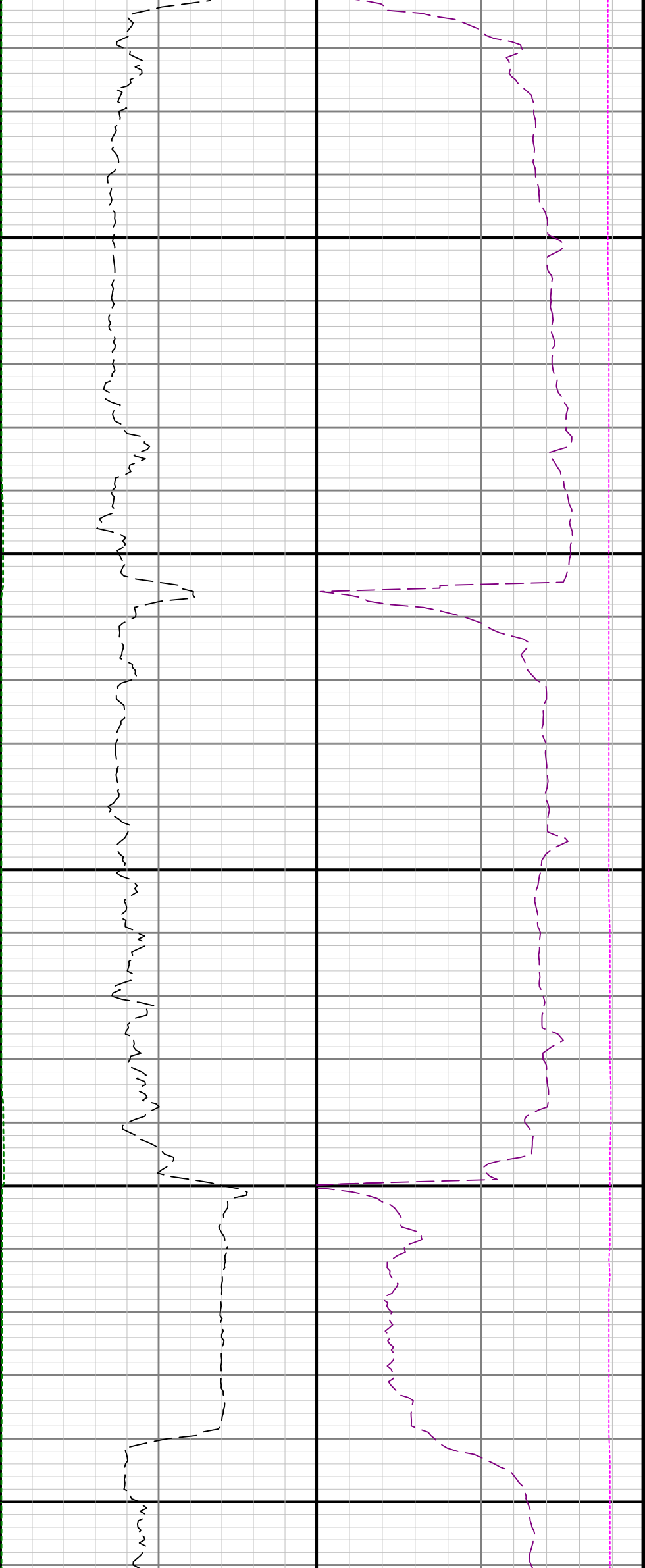
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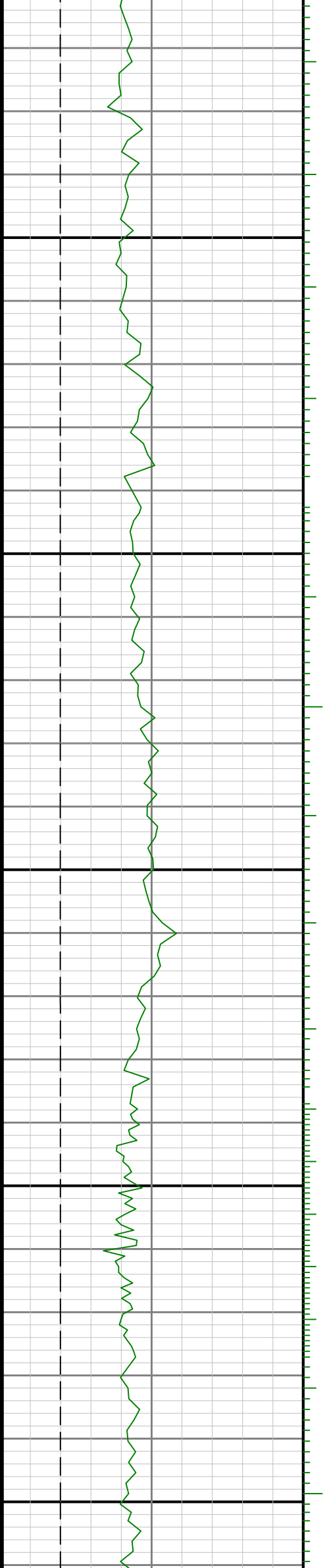






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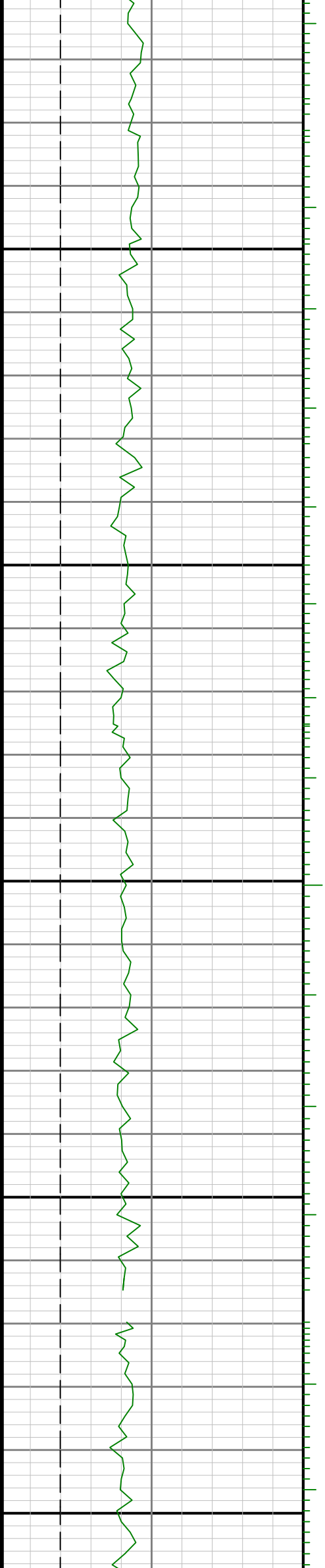


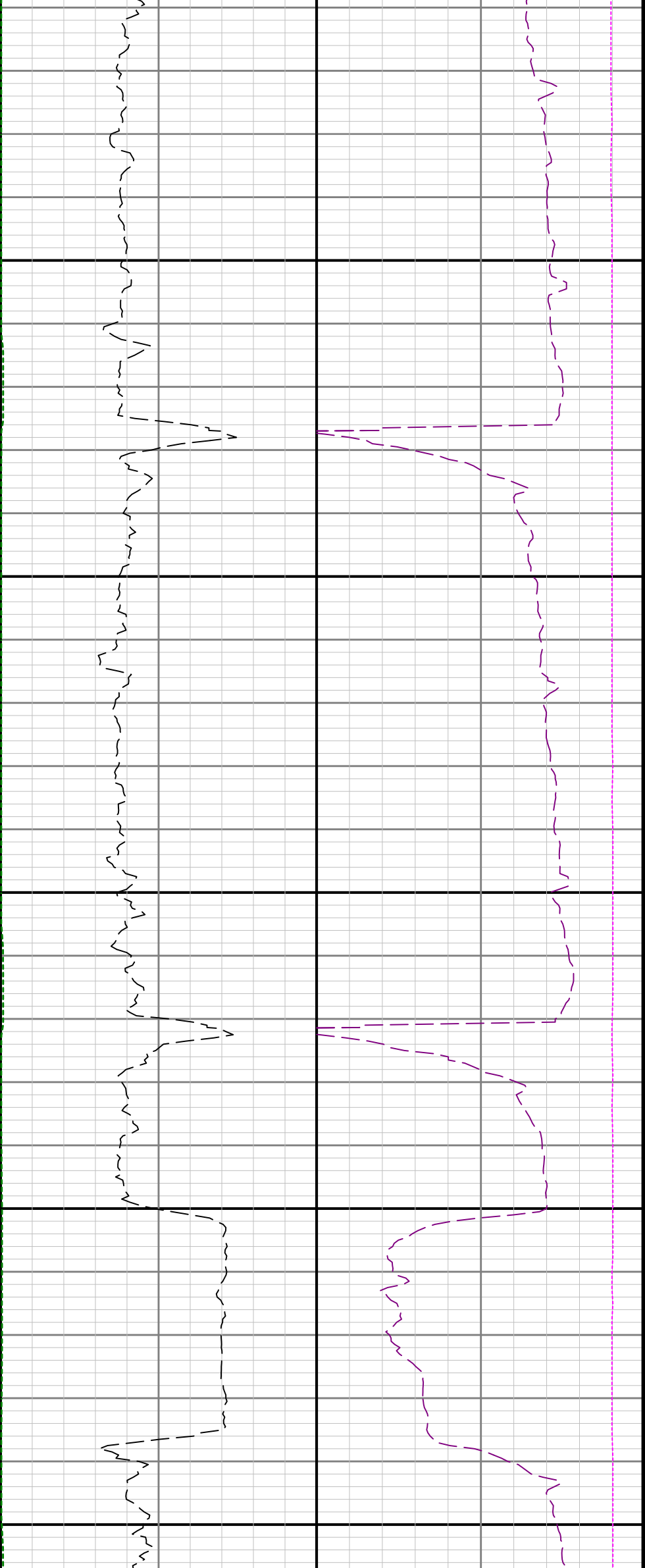


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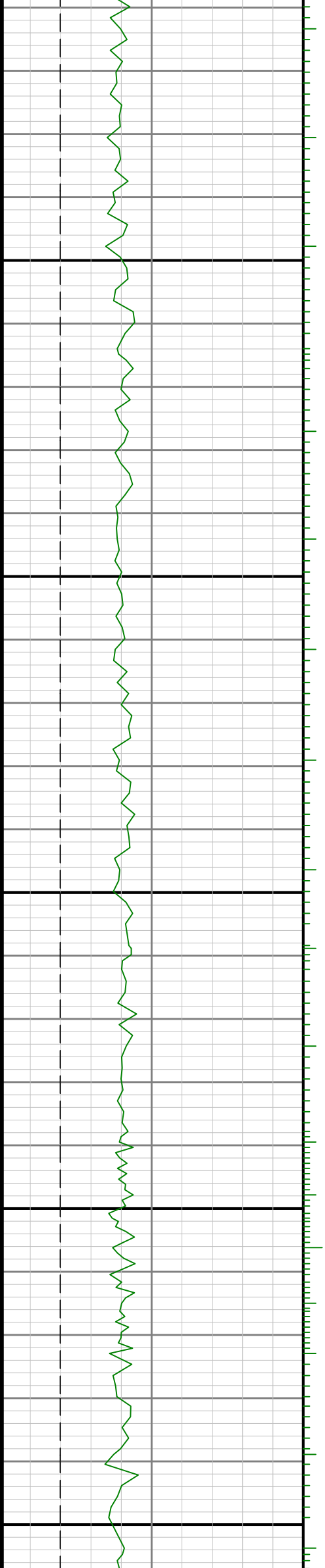
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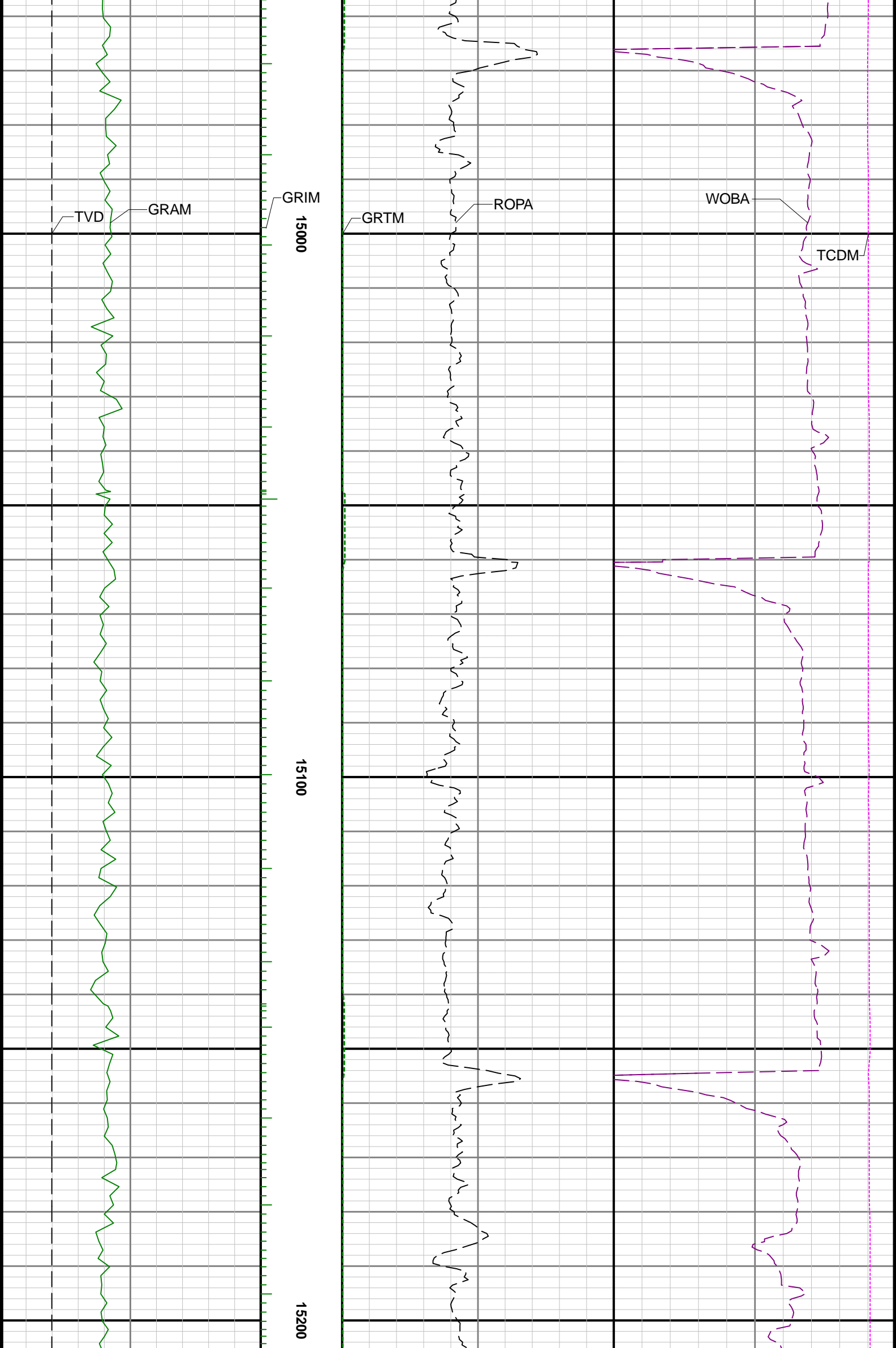


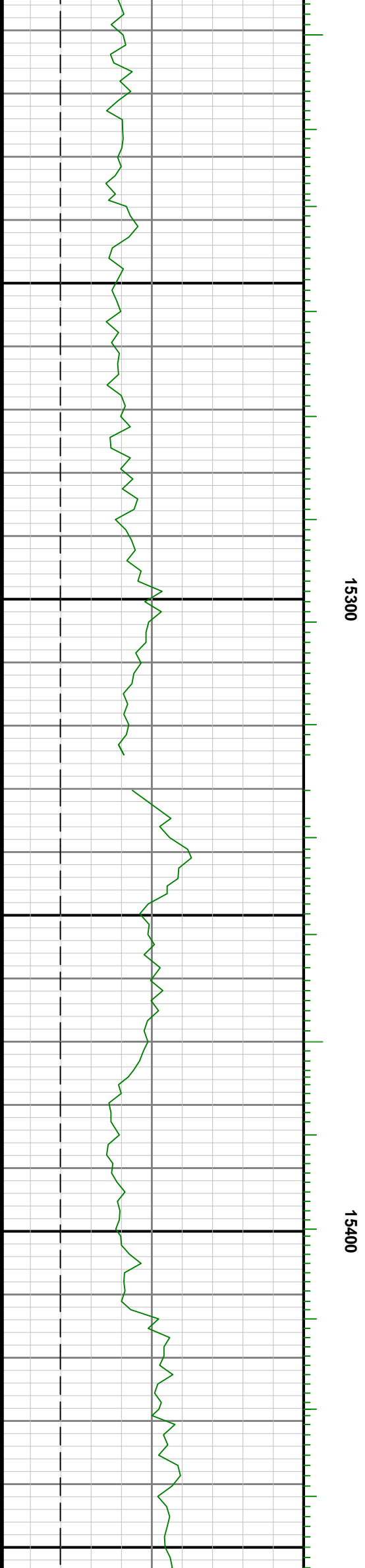
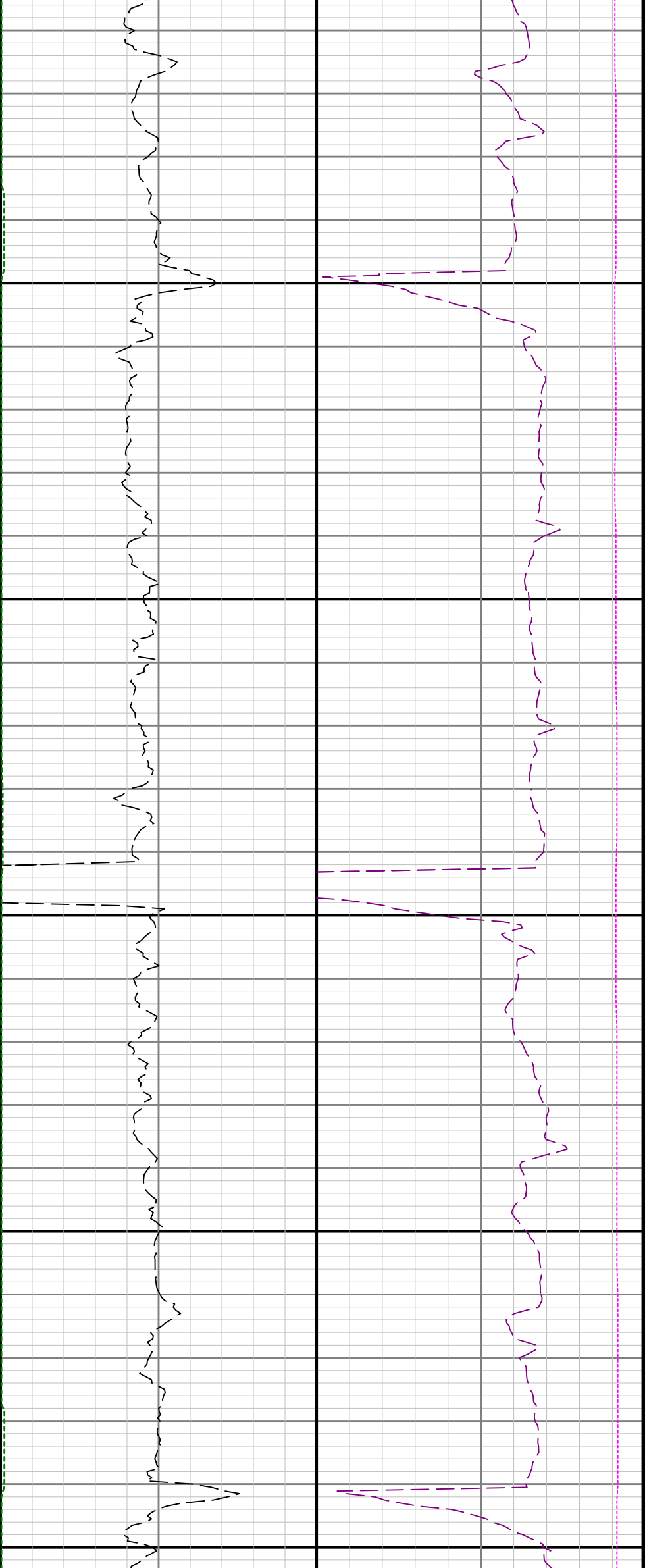


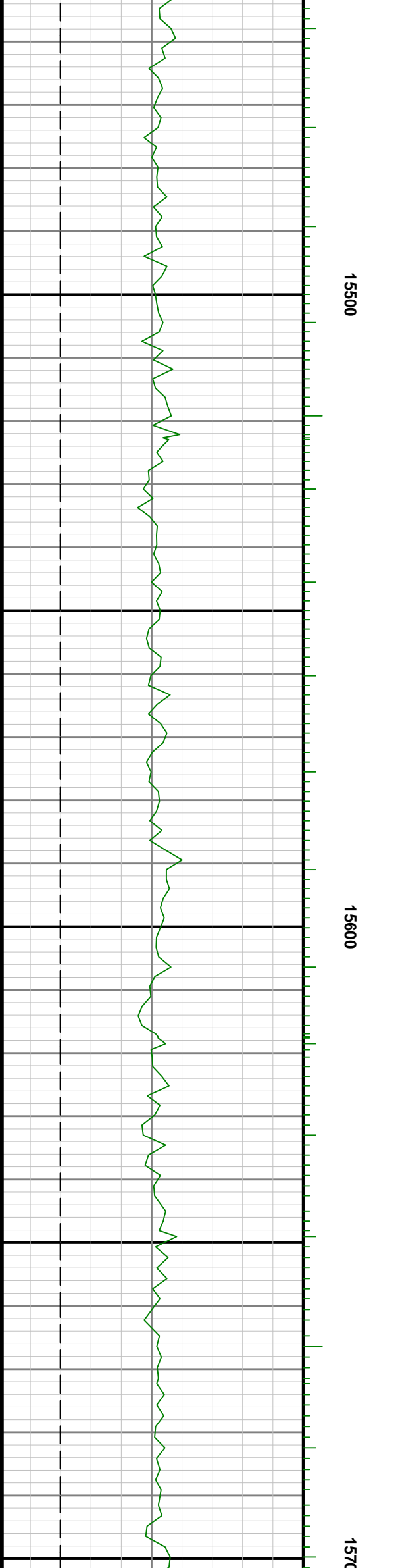
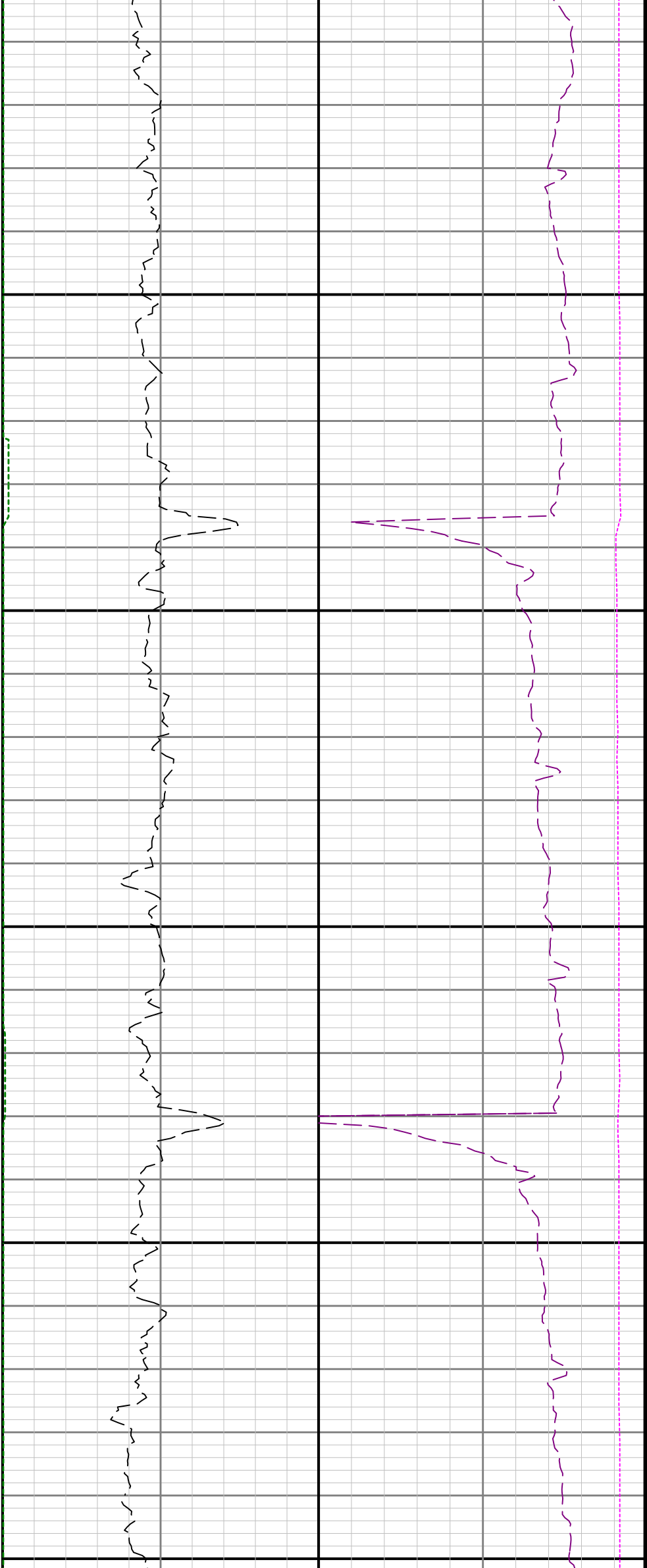
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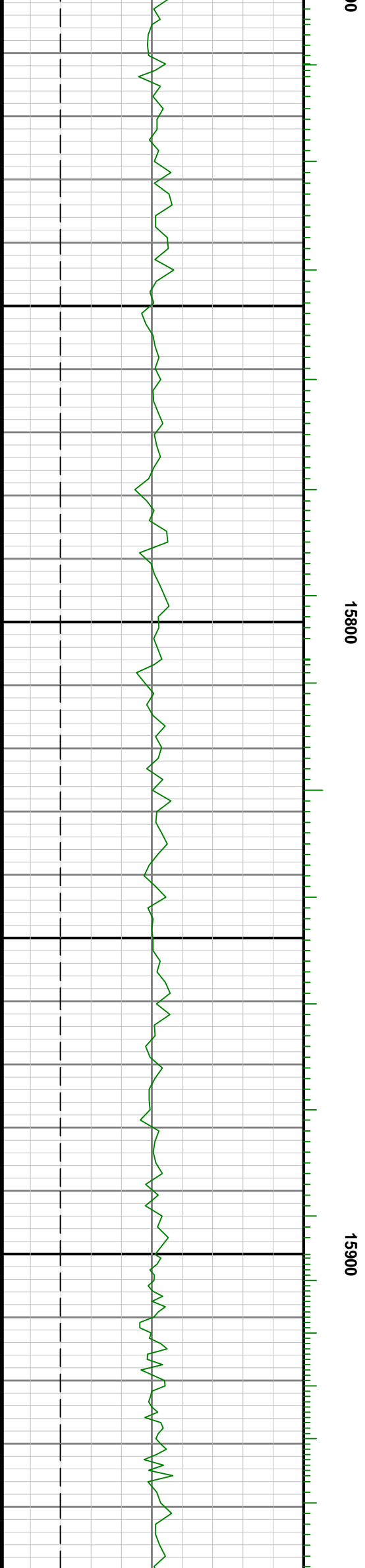
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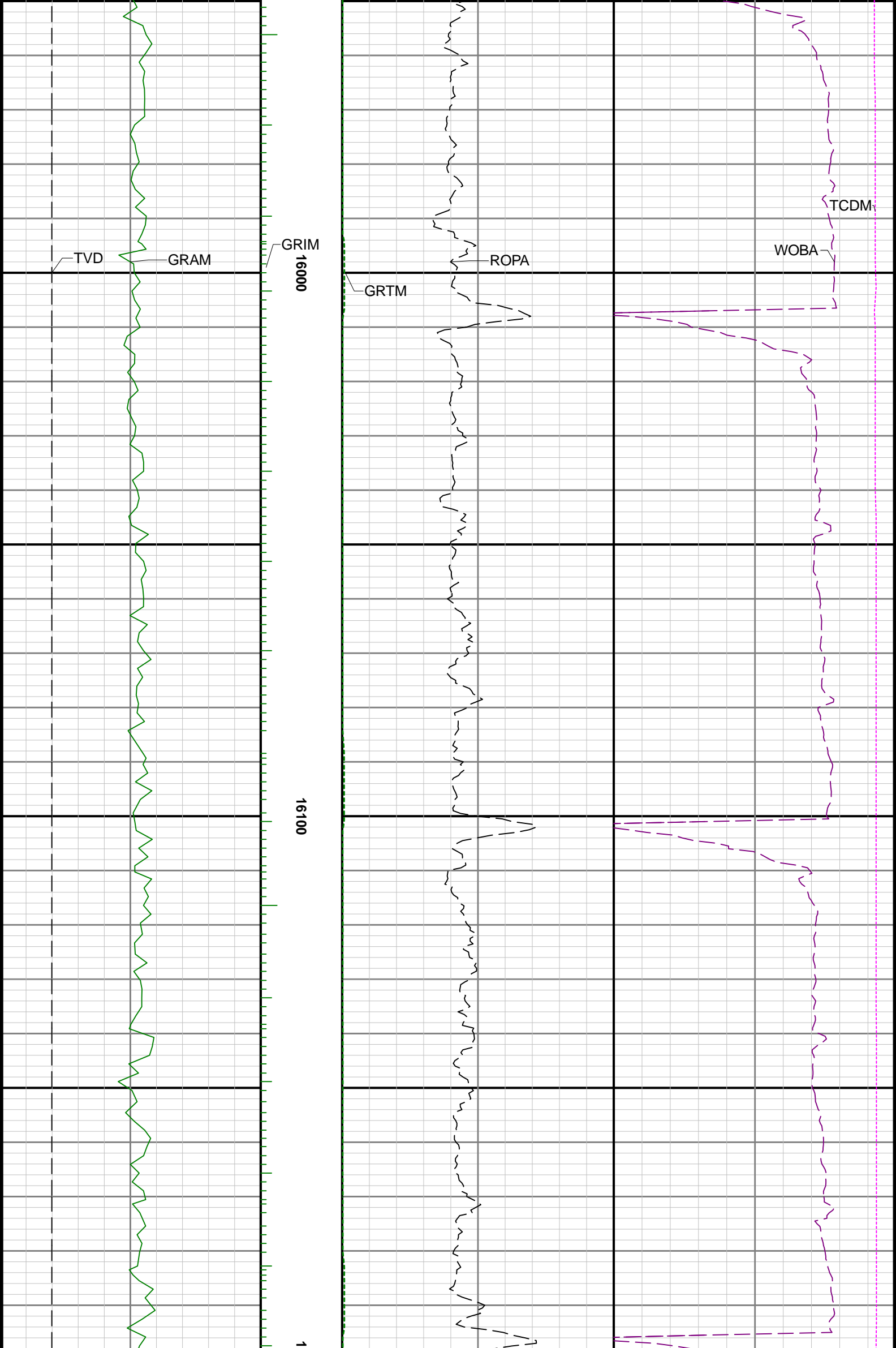


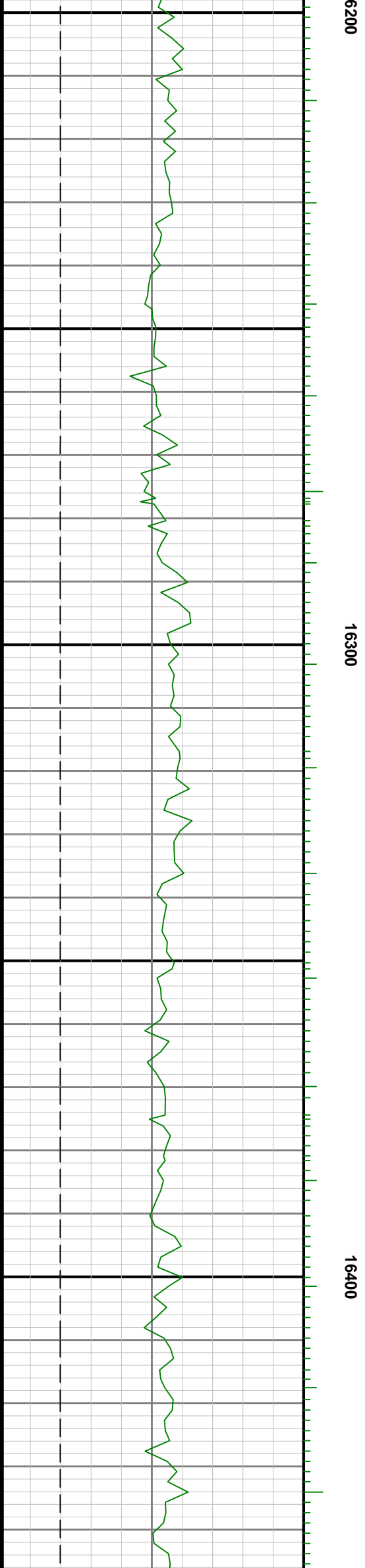


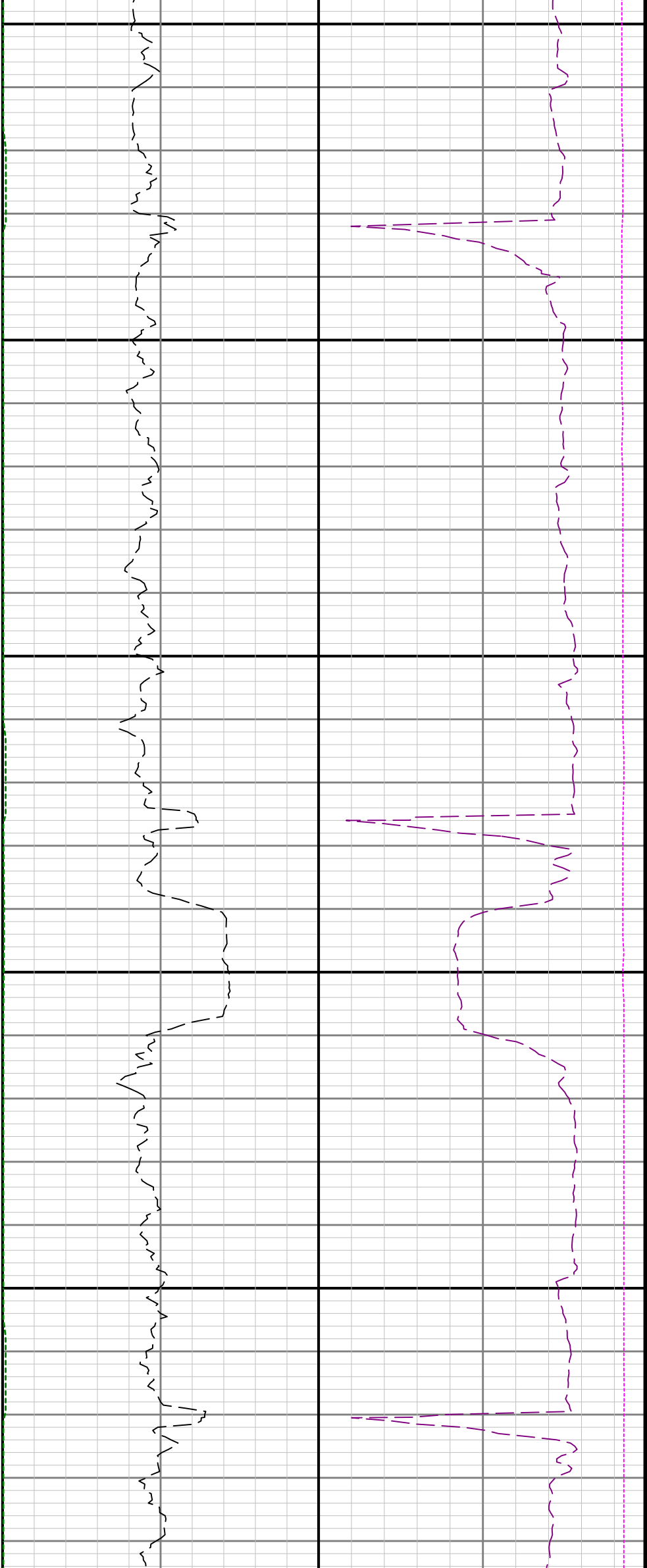












16500

16600

