



LWD MEMORY LOG

Gamma Ray

Scale: Company: Noble Energy

1:240 Well: Gutteresen D35-780

Measured Depth Field: Wattenberg

Depth Reference: County: Weld Country: United States
Driller's Depth State: Colorado

Status: Final Print Surface Location: 40° 12' 21.07" N
Latitude: 104° 31' 14.757" W
Longitude: Directional

API No: 05-123-48588-00 SEC: 23 TWN: 3N 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.: 4859.00 ft Elev. DF: 4859.00 ft
Elev. GL: 4829.00 ft

Magnetic Field Reference

Dates Interval
From: 2020-04-07 Drilled (ft) Logged (ft) Azi Reference North: Grid Dip Angle: (deg) 66.62
To: 2020-04-09 Top: 1943.00 Bottom: 1943.00 Total Magnetic Field Strength: (nT) 51994
Spud: 2020-03-19 Bottom: 17587.00 Bottom: 17575.00 Mag to Reference North Correction: (deg) 7.37

Borehole Record

Casing Record

Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
13.500	30.00	1943.00	9.625	36.00	30.00	1933.00
8.500	1943.00	17587.00				

Mud Record

Deviation Record

Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)
Oil Based Mud	1943.00	17587.00	8.500	15643.00	0.28 207.44	89.45 181.82

Acquisition System Software Version

Other

Cadence RT 5.5	Rig: H&P 517
Plot Studio 5.5.8765.1	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	Rotary Steerable	1943.00	17575.00	1943.00	17587.00	2020-04-07 08:10	2020-04-09 12:50	58.30

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Adam Schlenz	2020-04-06	2020-04-10						

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+ (%)
2020-04-07 03:30	1	1944.00	Oil Based Mud	10.0	19	N/A	19.5	68.5/17	Active Pit	25267	0.00
2020-04-07 15:30	1	3934.00	Oil Based Mud	9.5	13	N/A	19.6	69/18	Active Pit	25267	0.00
2020-04-08 03:30	1	7494.00	Oil Based Mud	9.7	13	N/A	19.2	69.5/17	Active Pit	25267	0.00
2020-04-08 15:30	1	11745.00	Oil Based Mud	9.8	12	N/A	19.4	70/16	Active Pit	25267	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	14382368	Near Bit Inclination	5.93	6.73	7.000	4.330
1	AutoTrak Curve Steering Unit	14382368	Near Bit VSS	5.93	6.73	7.000	4.330
1	AutoTrak Curve MWD	12304786	Gamma (single)	2.75	12.89	7.000	3.250
1	AutoTrak Curve MWD	12304786	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

Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.
- 2

Baker Hughes LWD run 1 utilized a 6.75 inch NaviGamma service (Directional and Gamma Ray) behind a 8.5 inch bit and rotary steerable assembly from 1943 to 17587 feet MD (1943 to 6847 feet TVD).
- 3

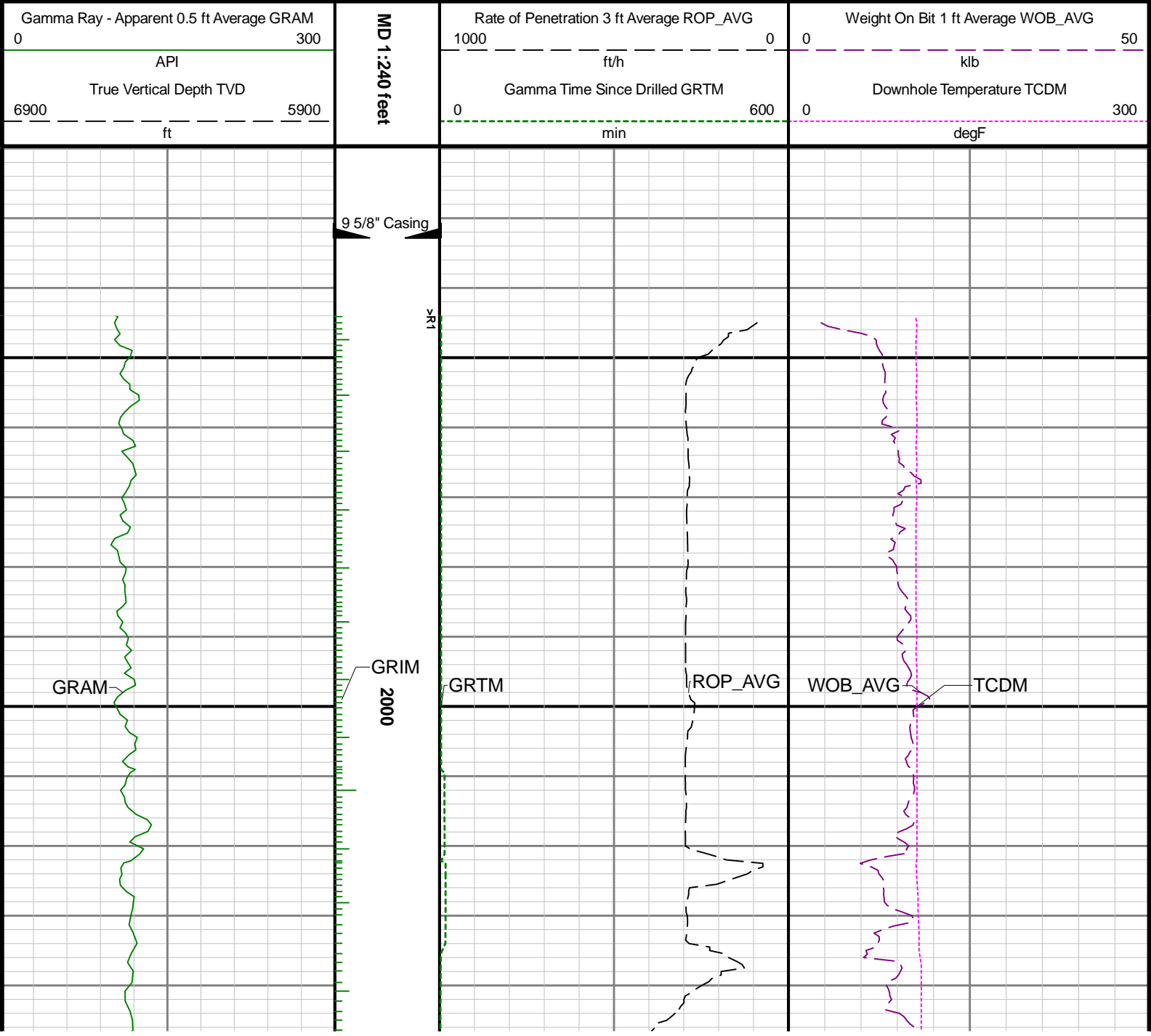
The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

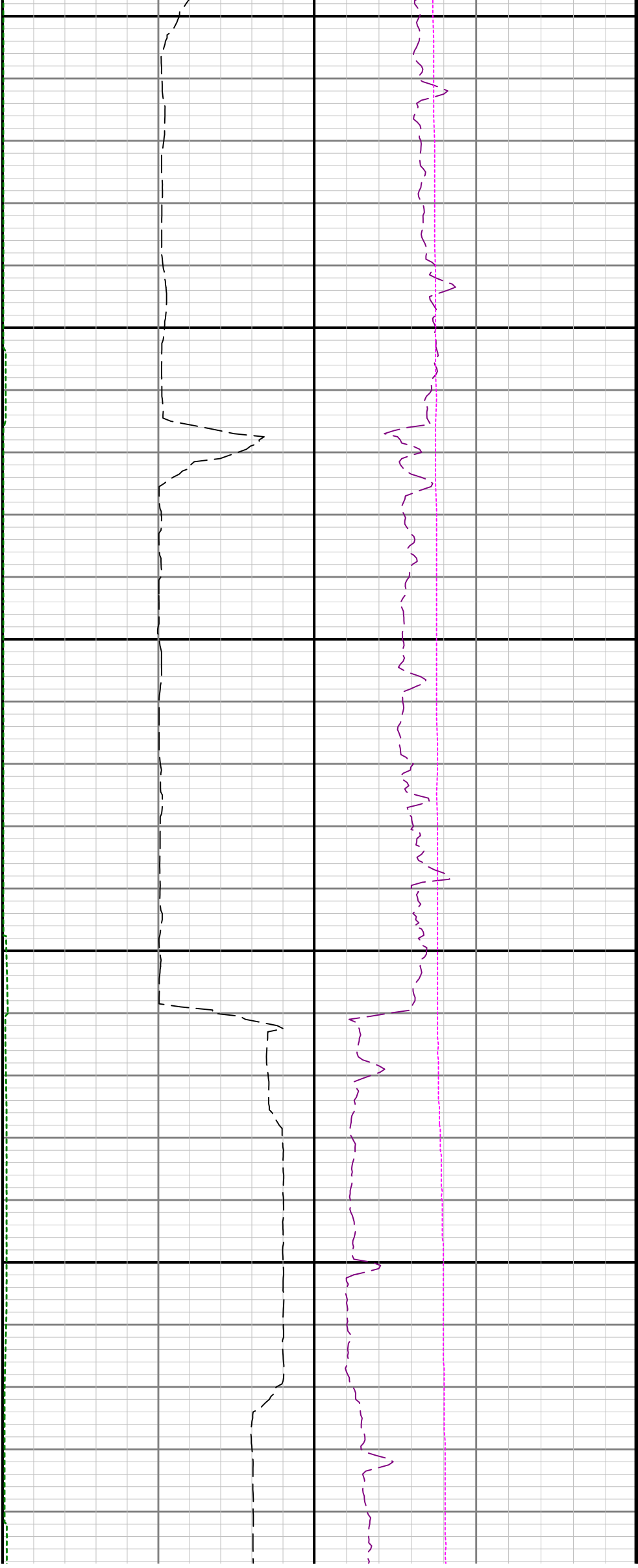
Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	15845.00	8.500	1	The interval from 15781 to 15832 feet MD (6842 feet TVD) is missing gamma ray data as a result of complications with the 3rd party, PASON, system.
2	17587.00	8.500	1	The interval from 17575 to 17587 feet MD (6847 feet TVD) was not logged after being drilled due to sensor to bit offset at well TD.

Curve Mnemonics

Presented Curves	Description	Units
ROP_AVG	Rate of Penetration 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOB_AVG	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

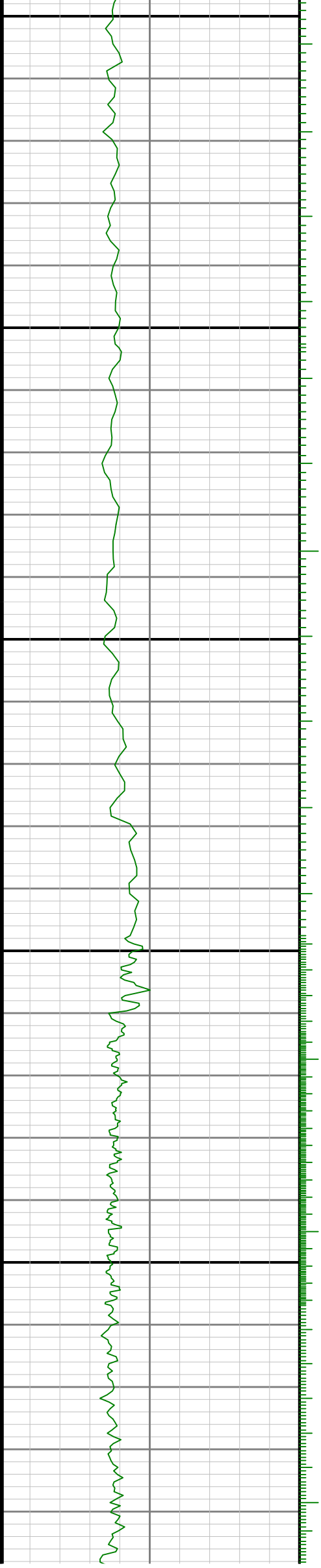


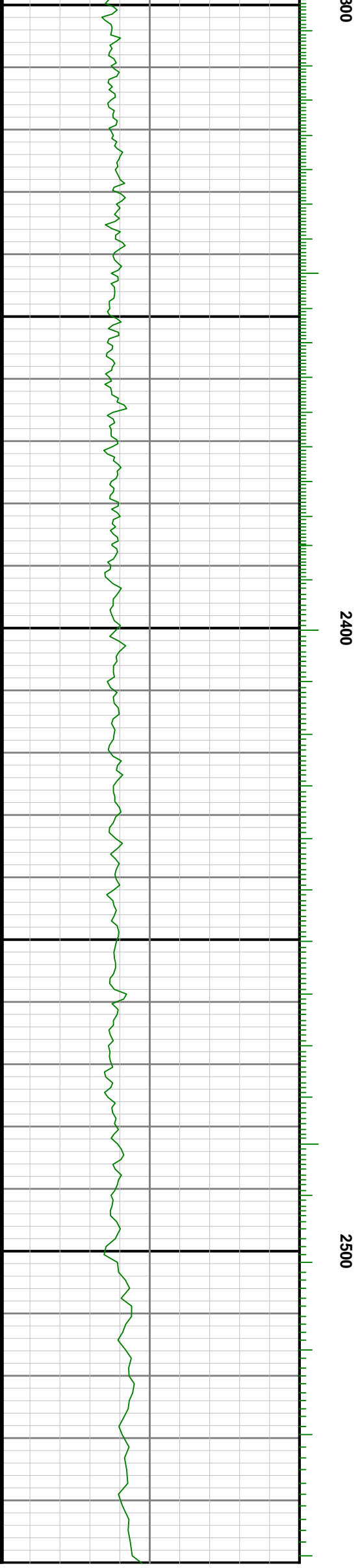
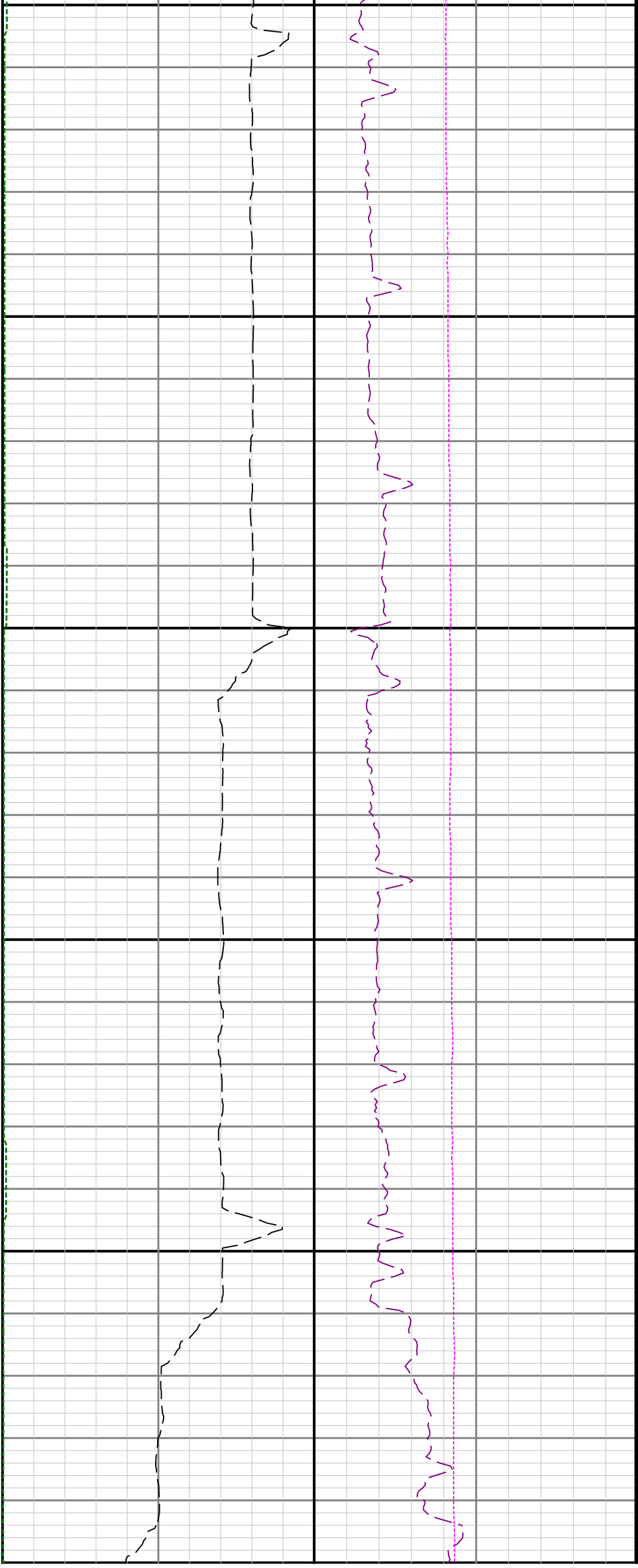


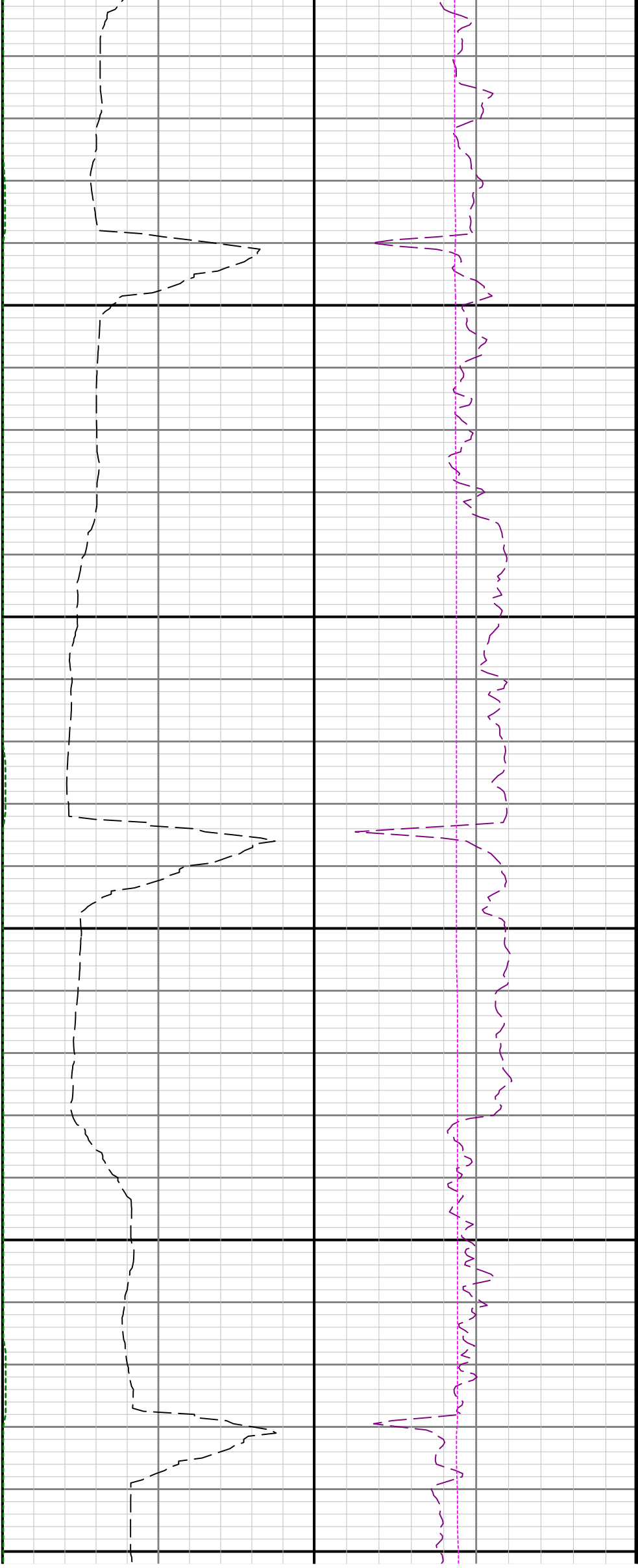
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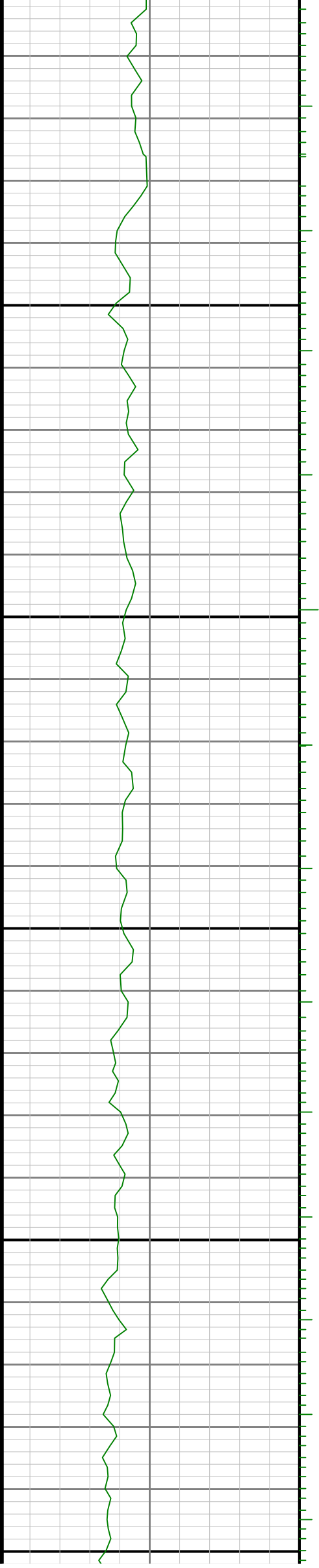


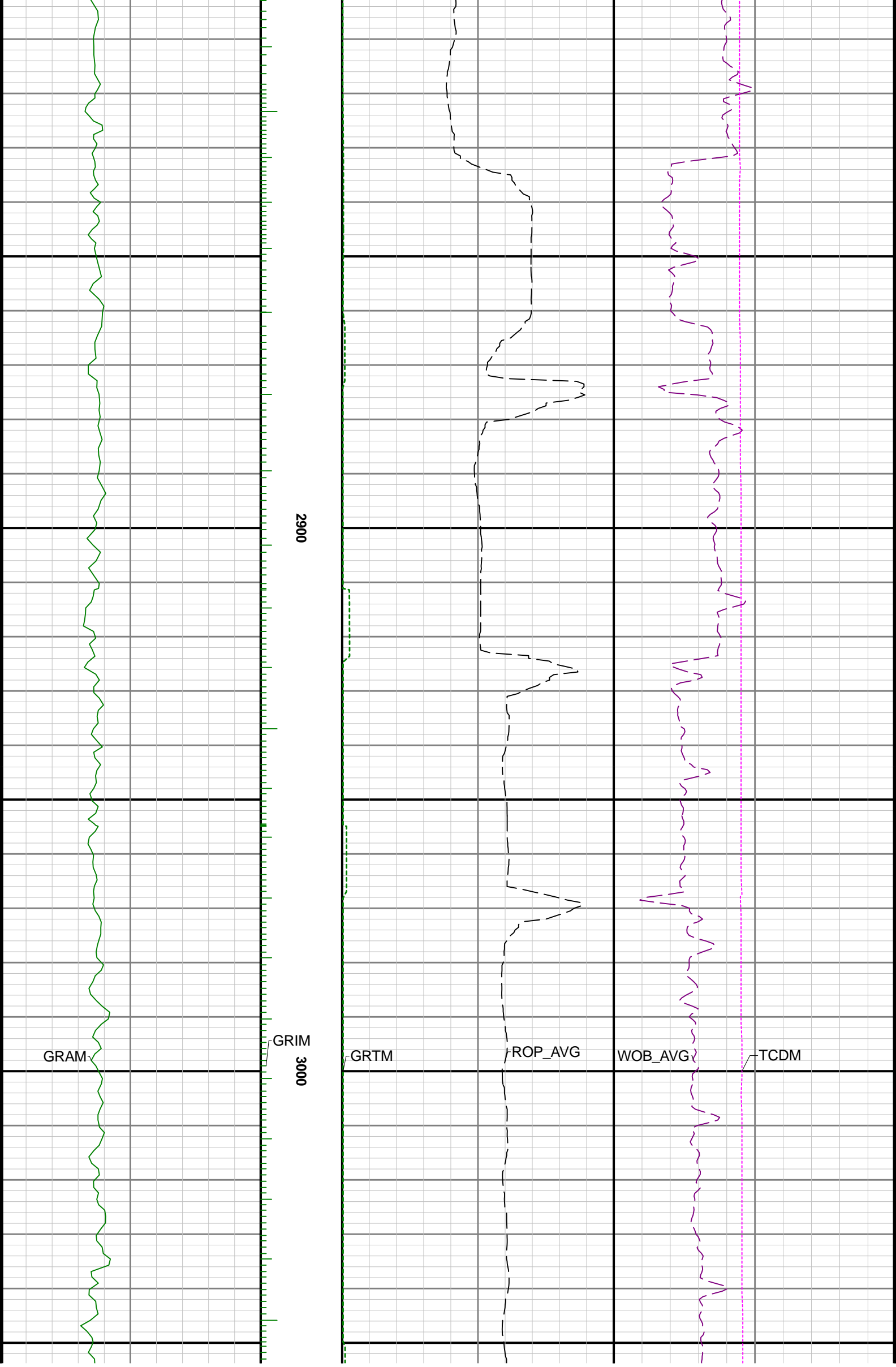


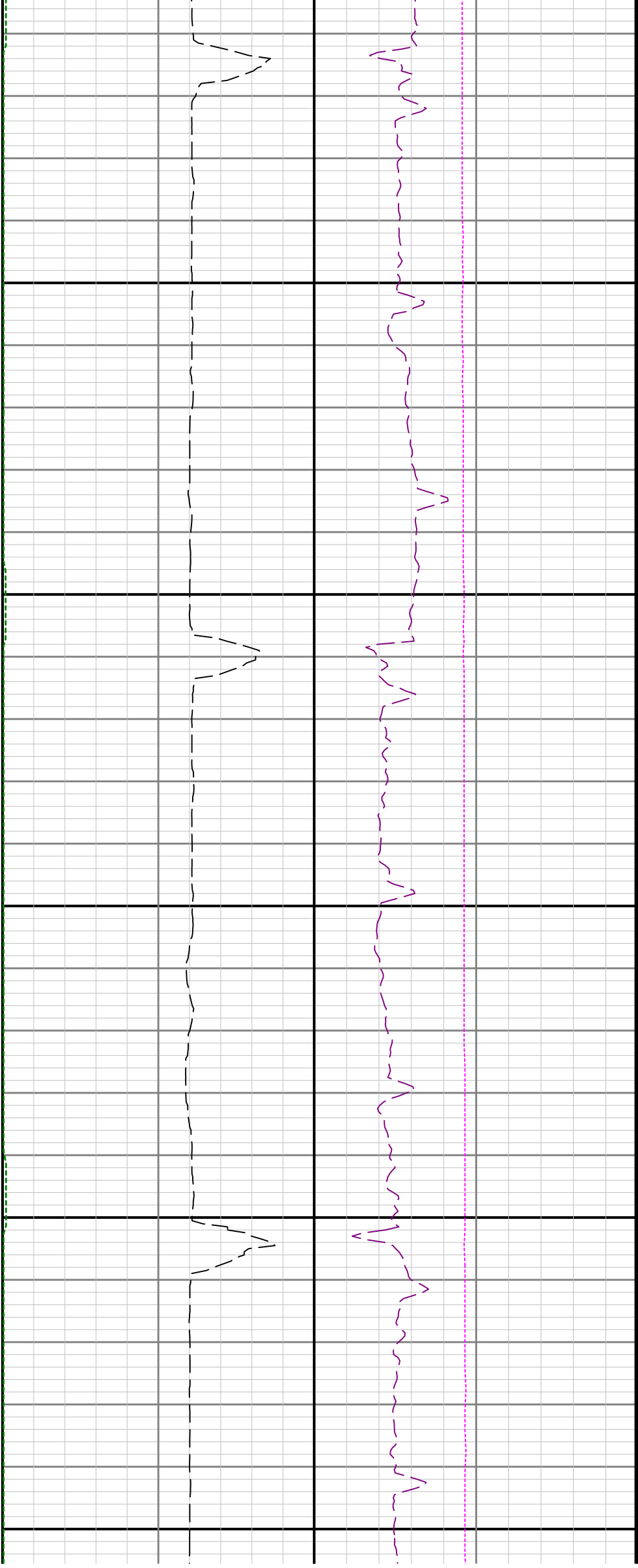
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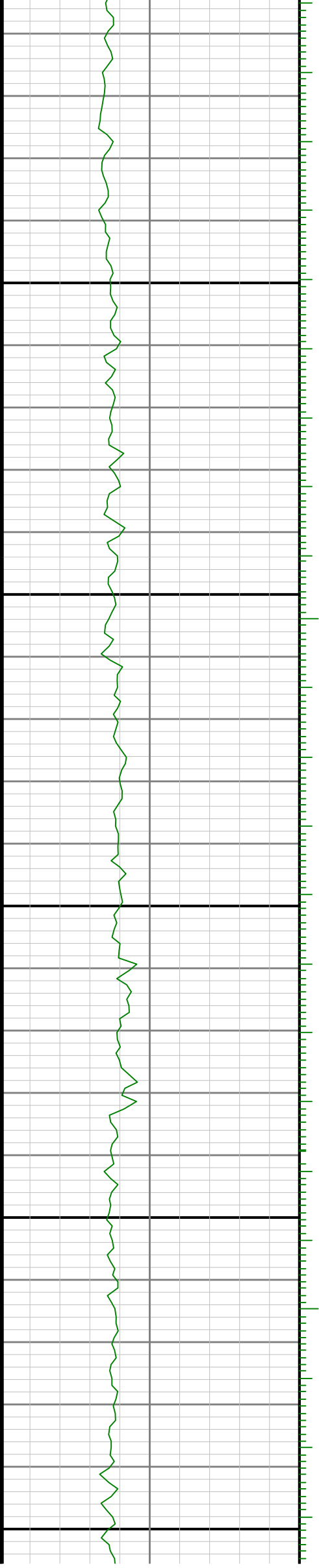


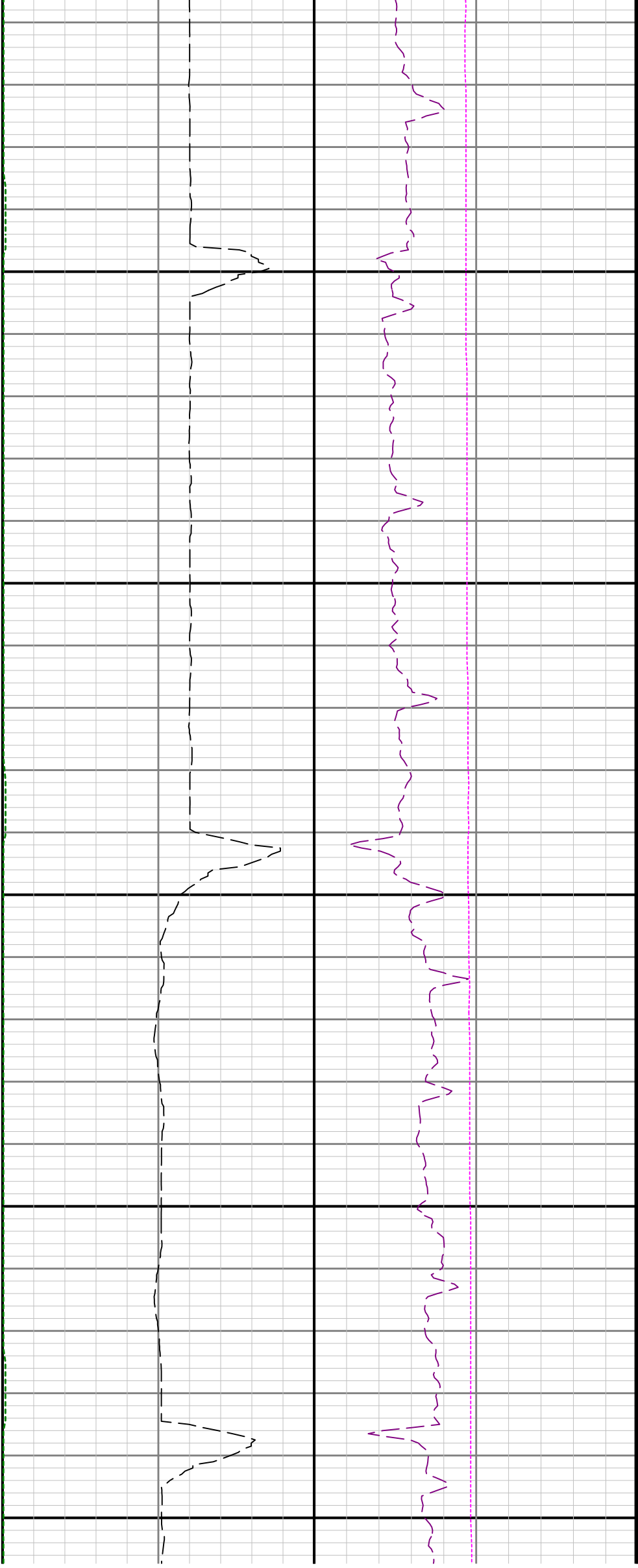


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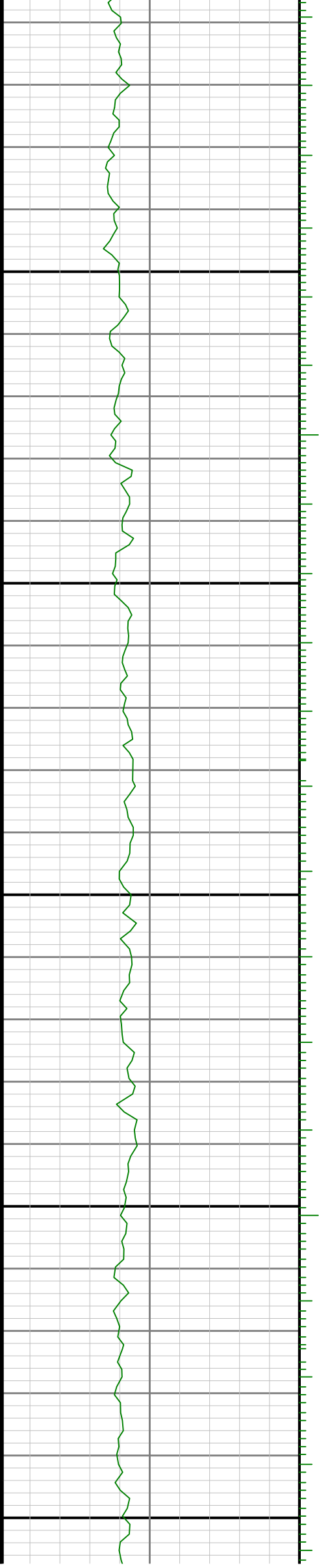
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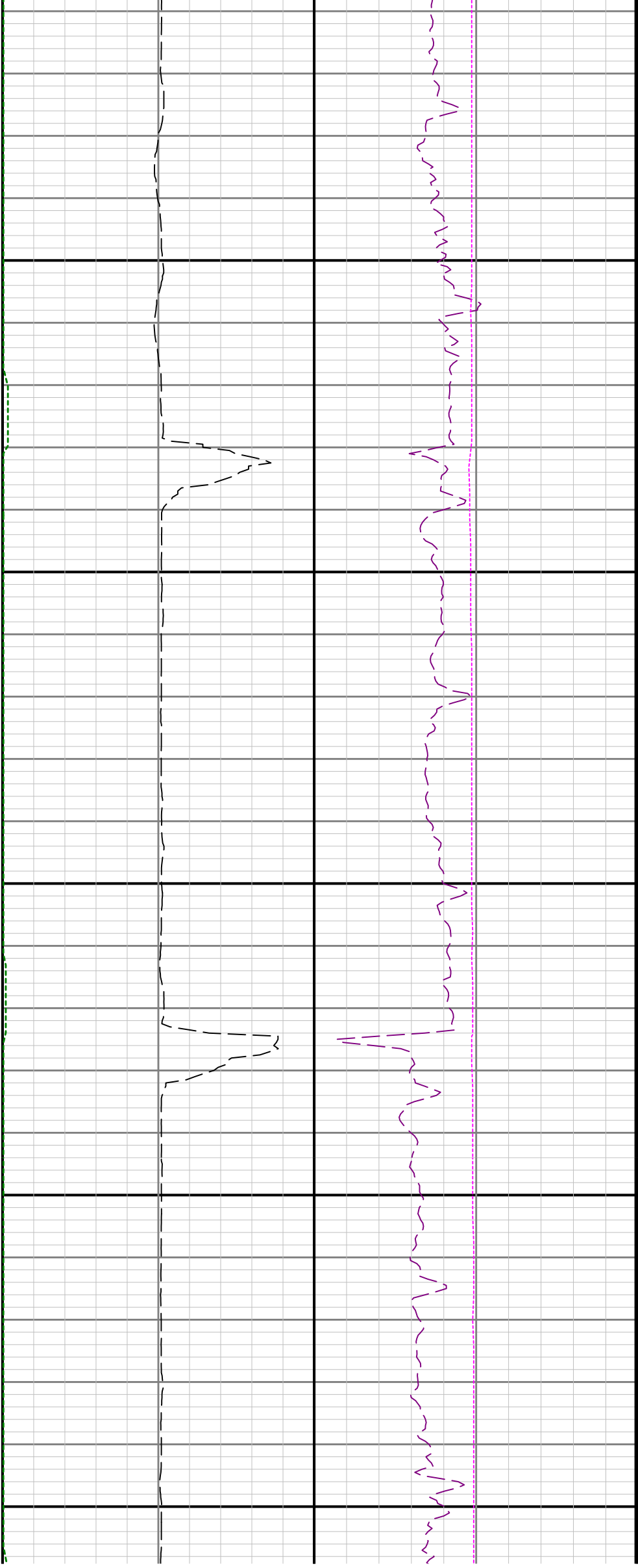




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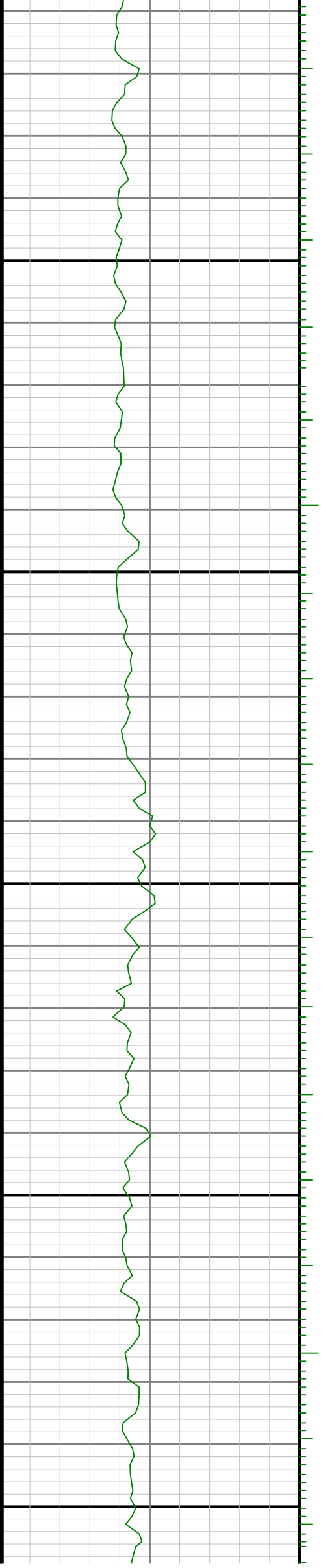


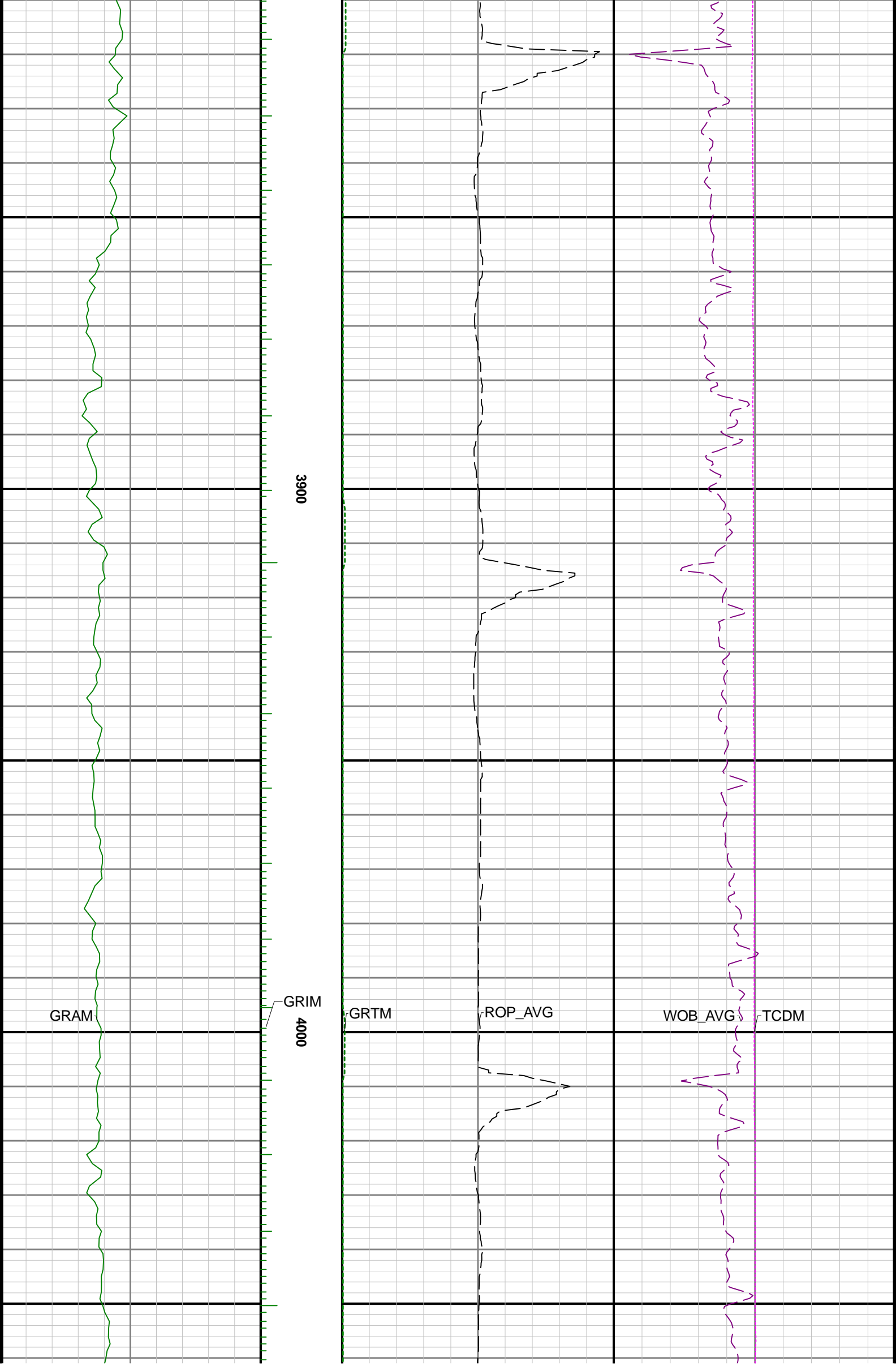


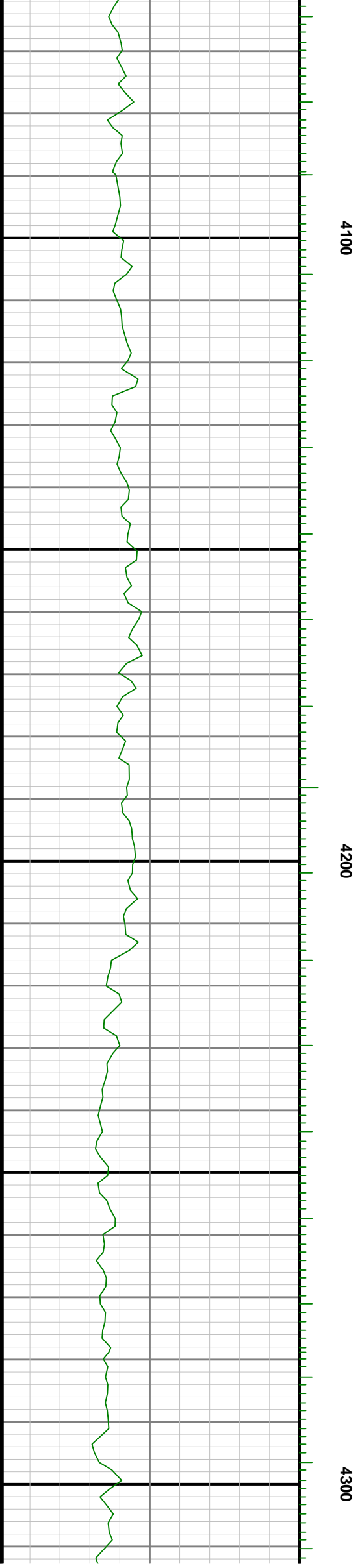
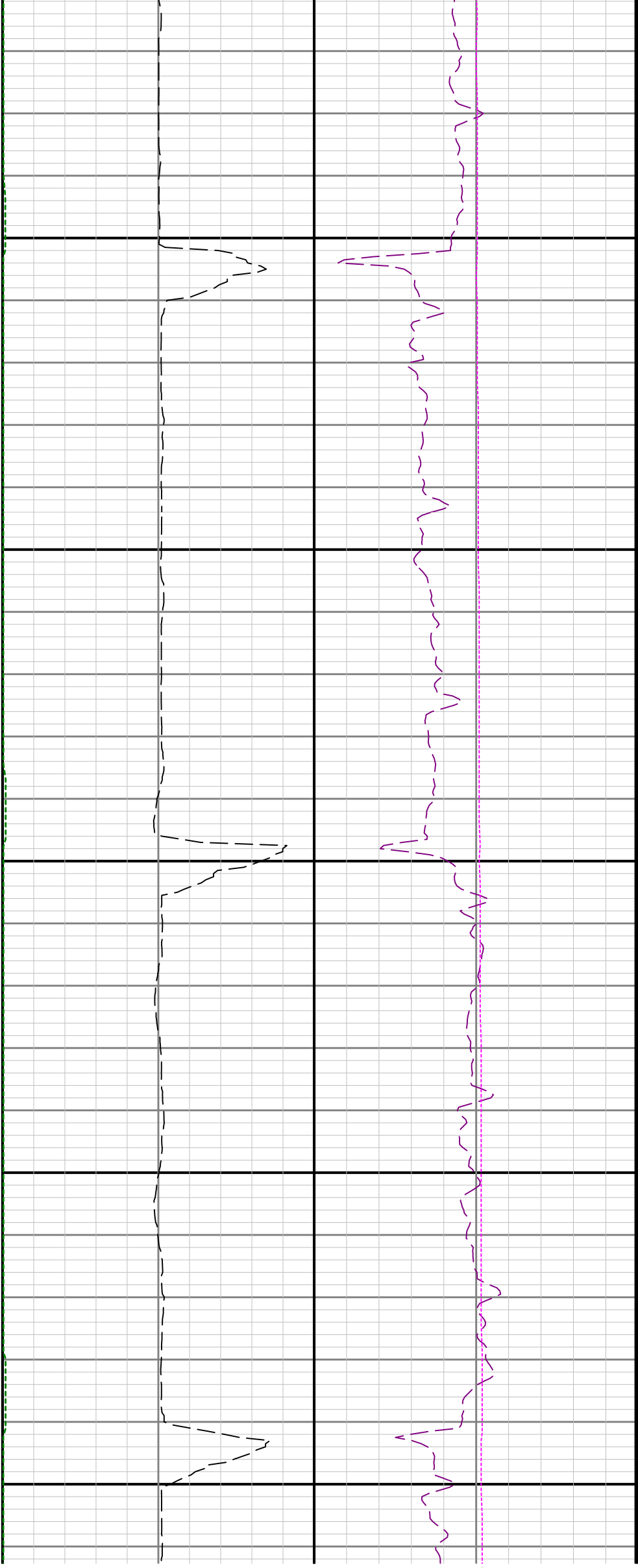
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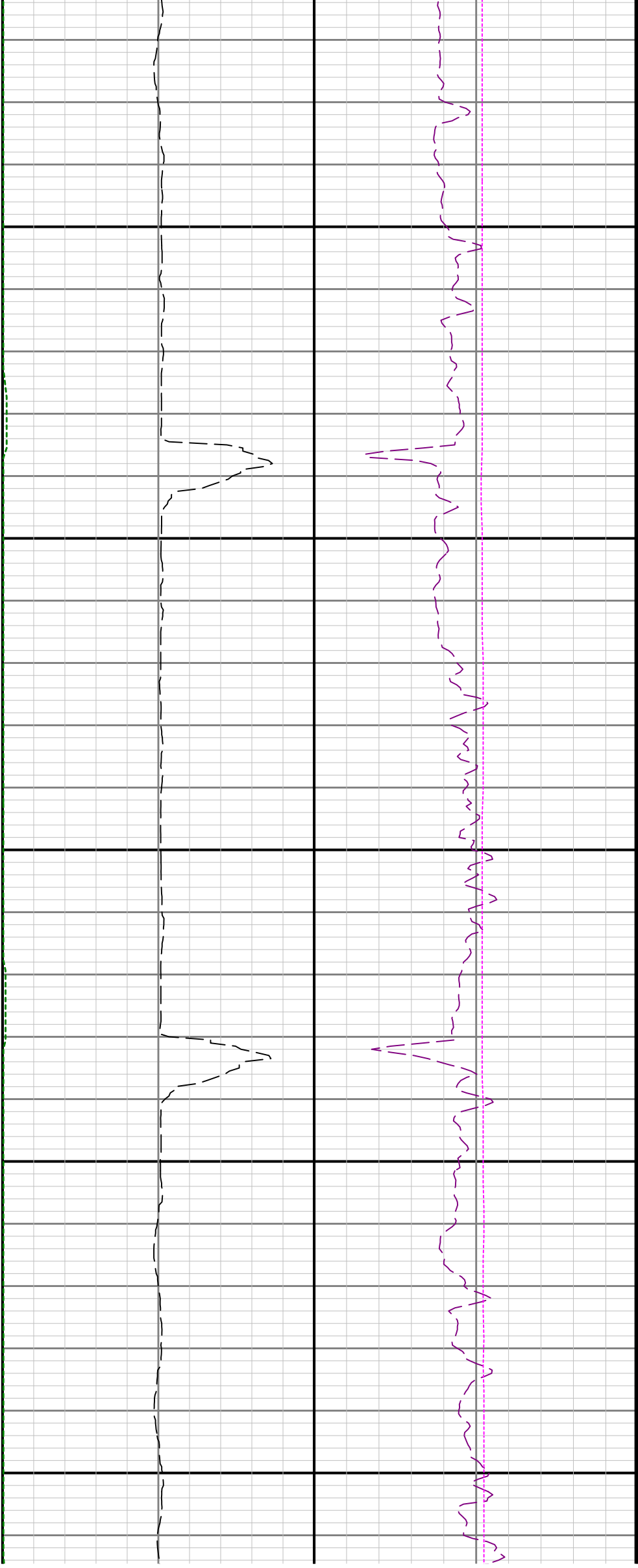
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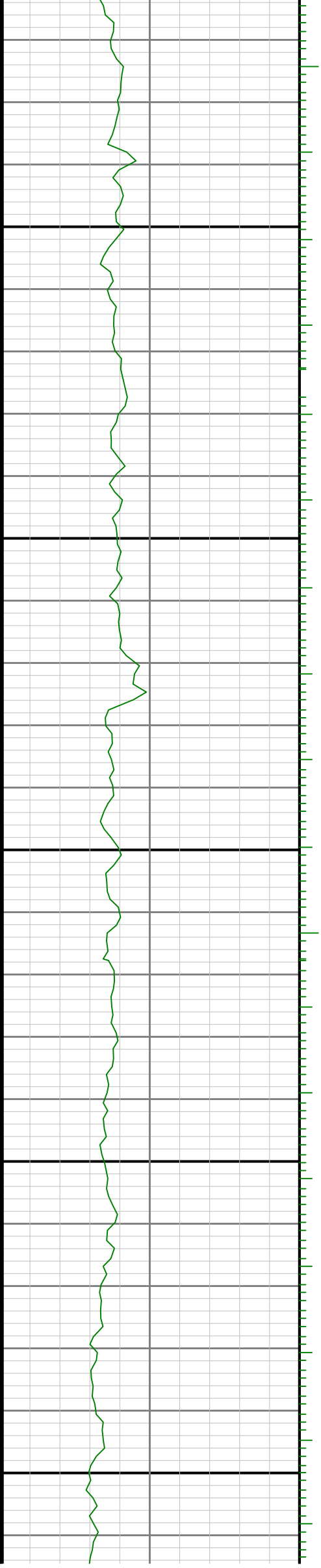


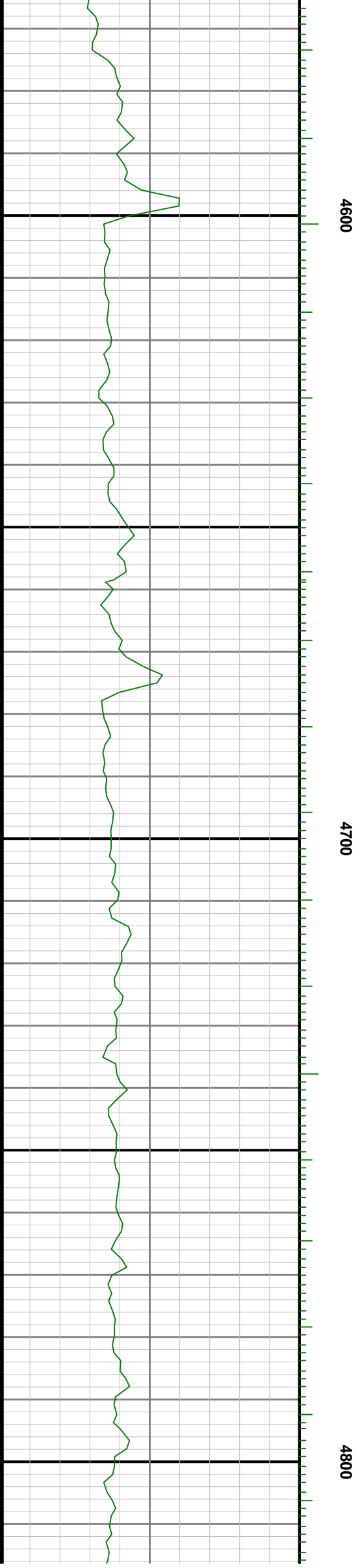
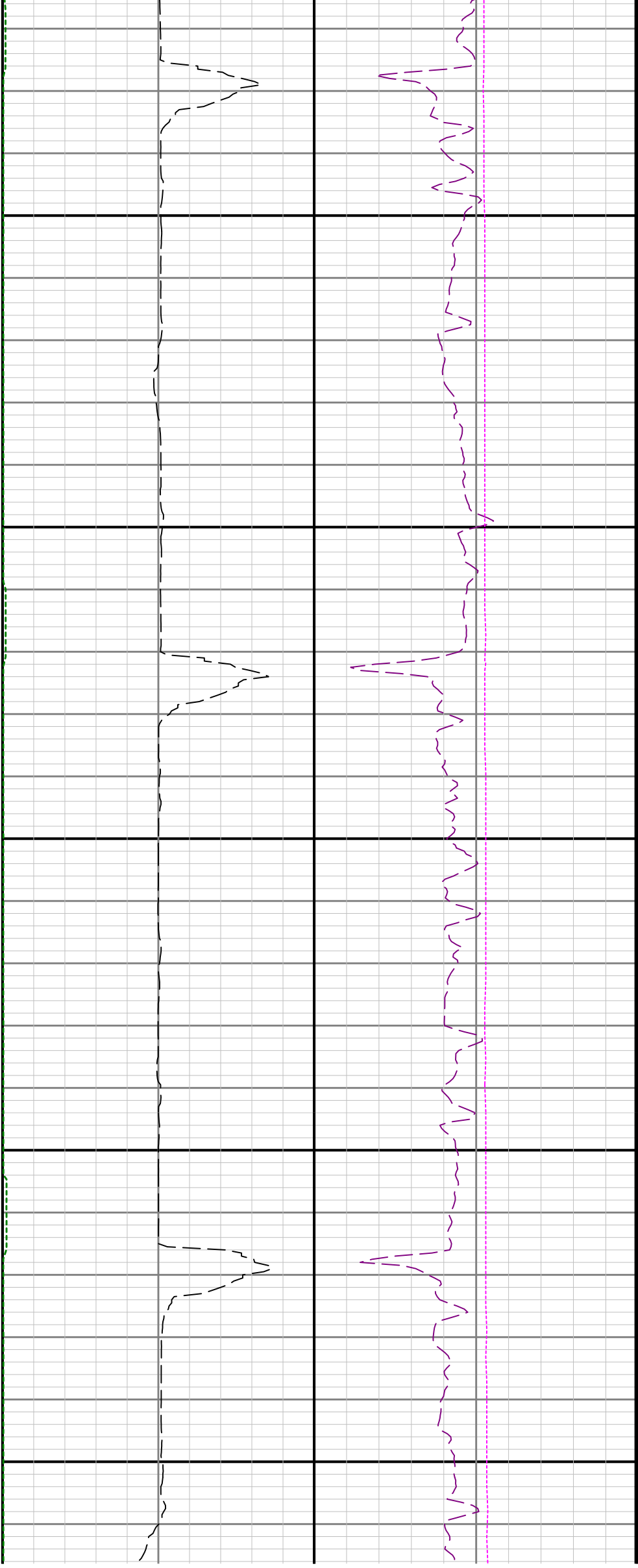


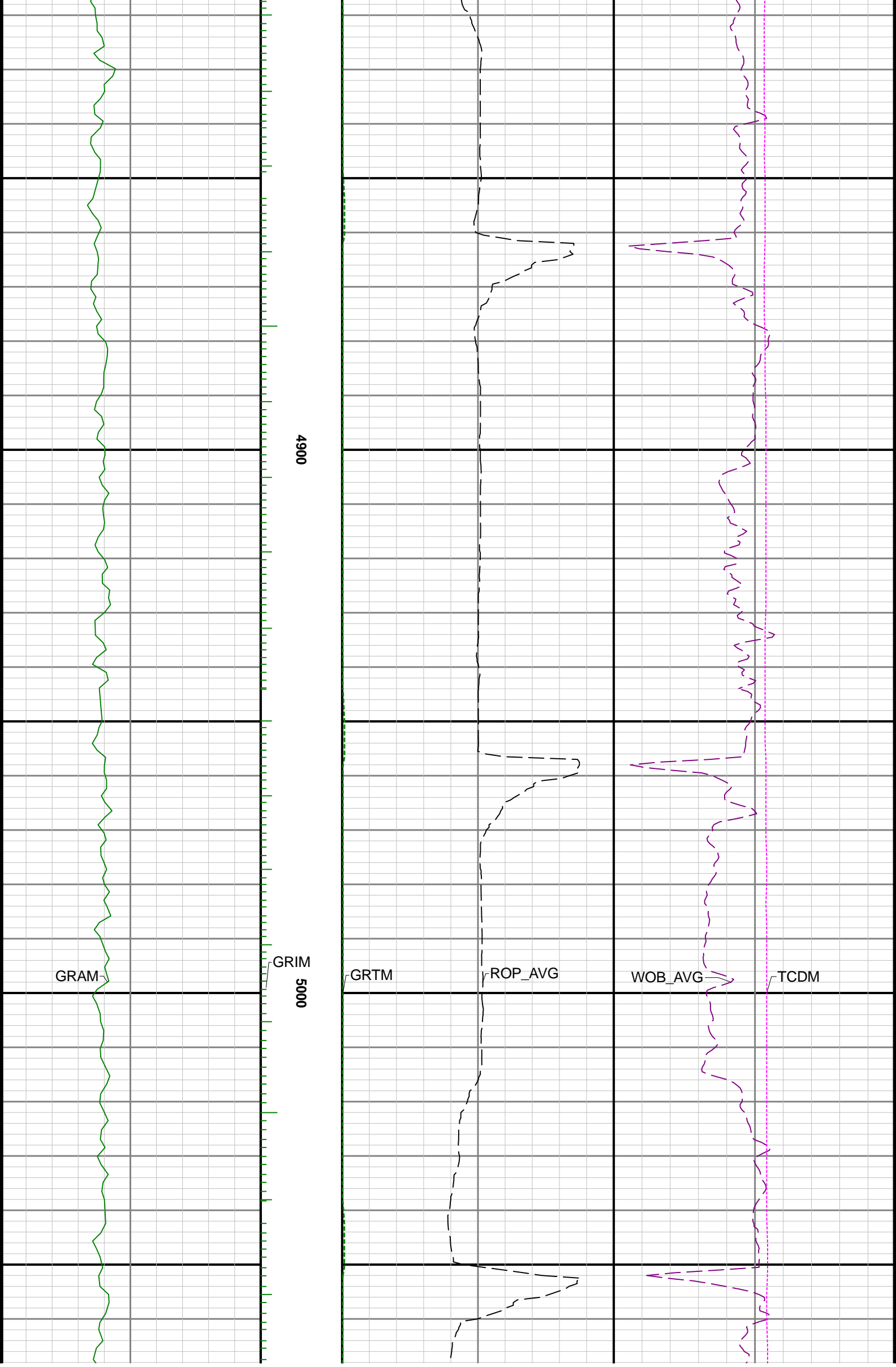


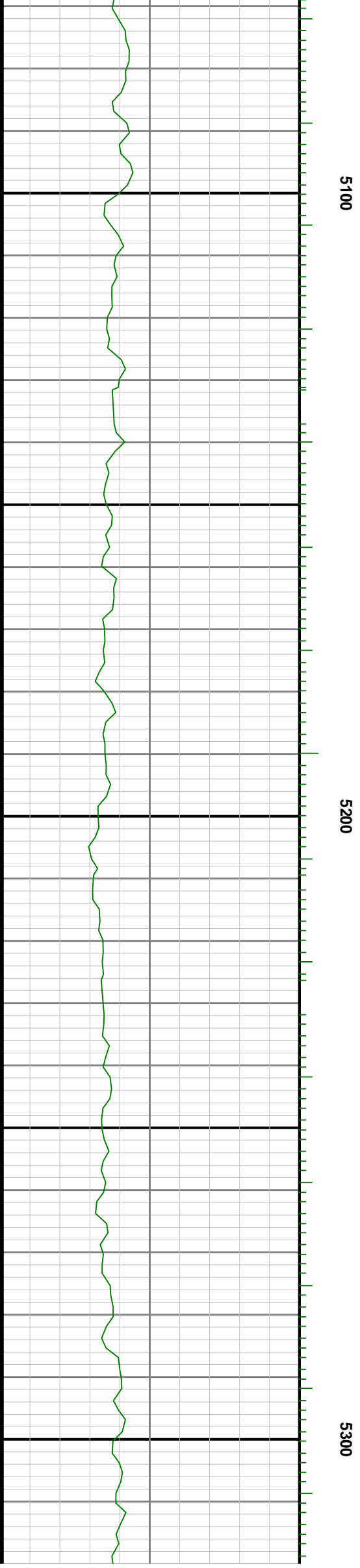
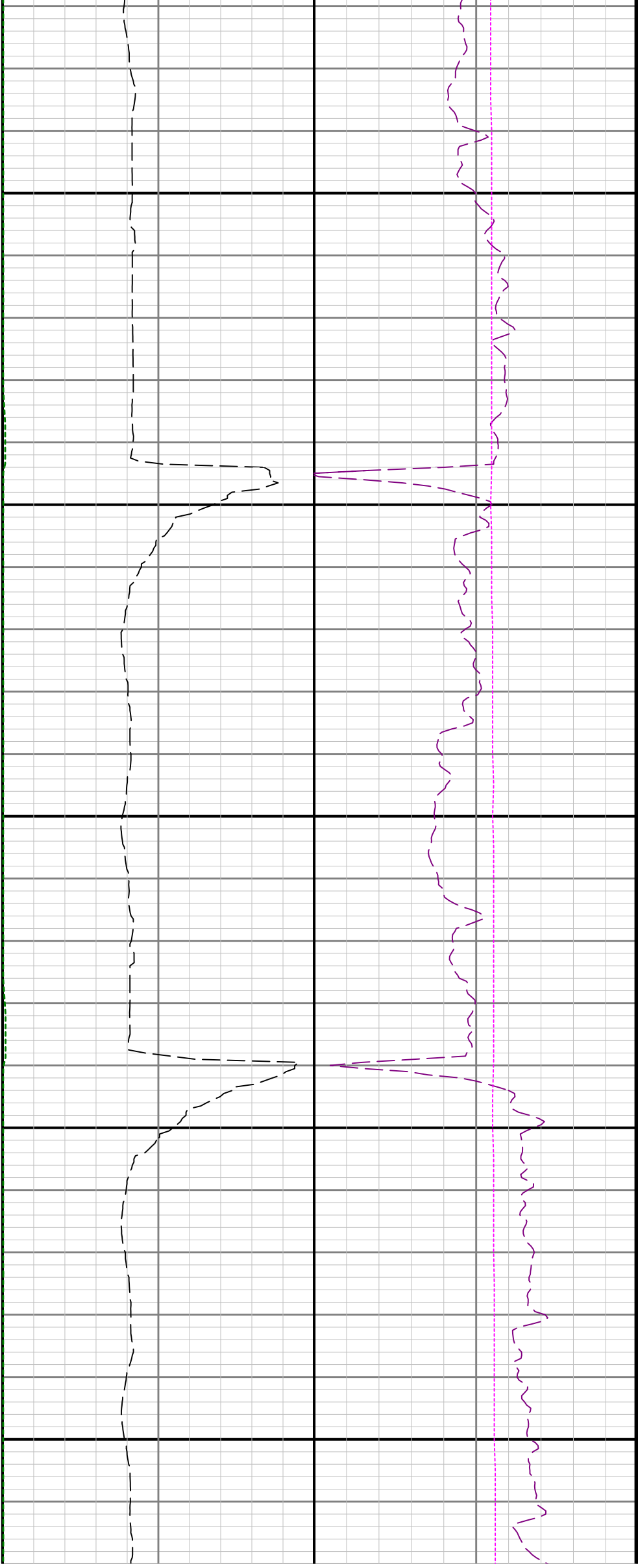
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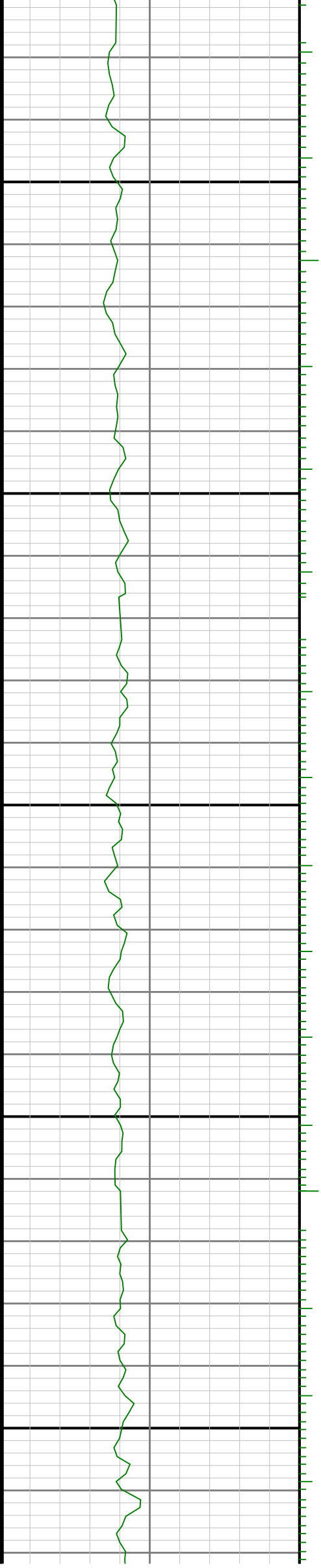
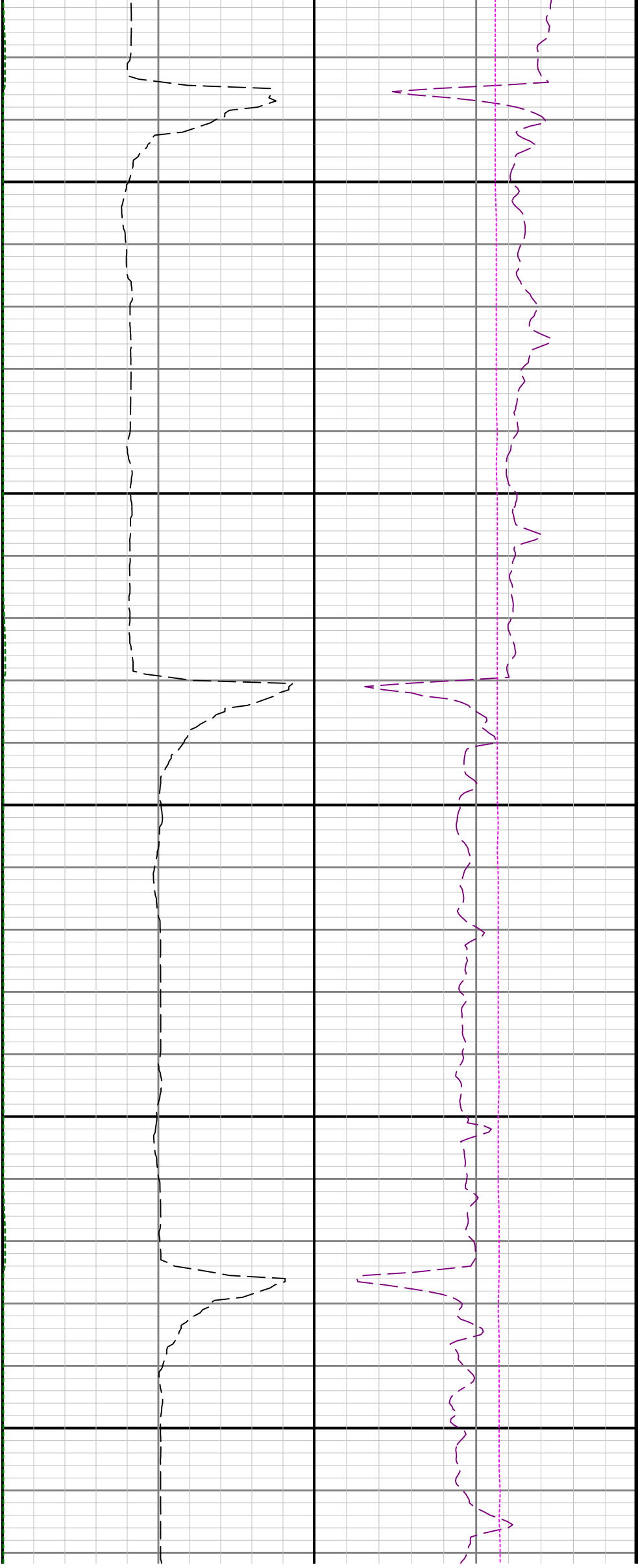
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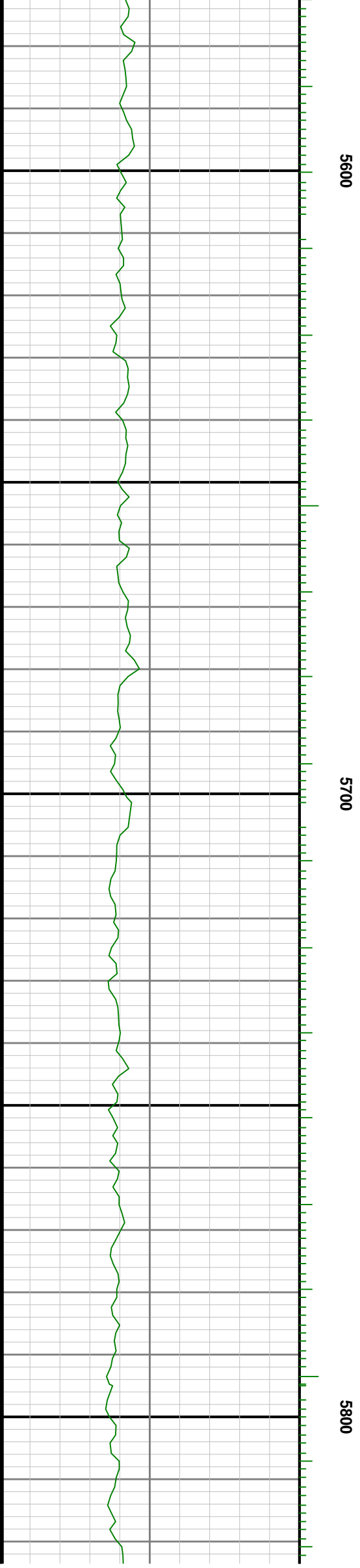
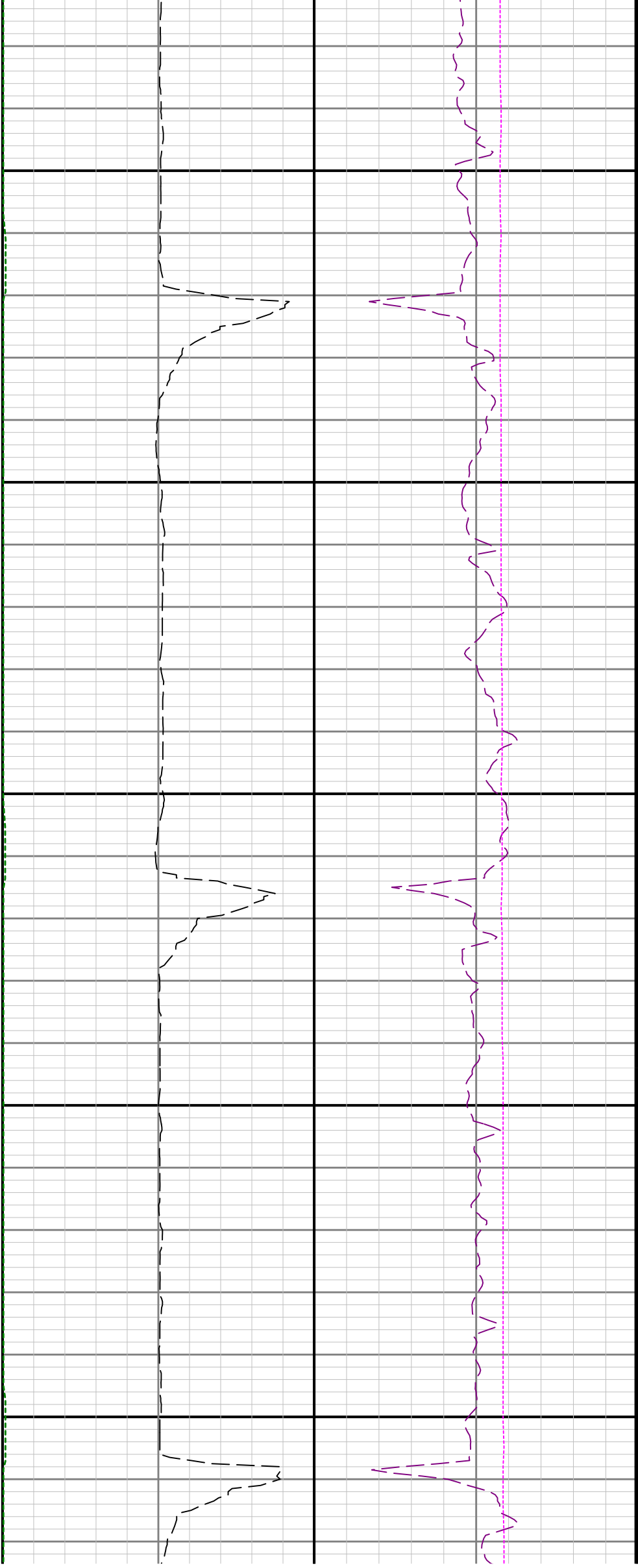


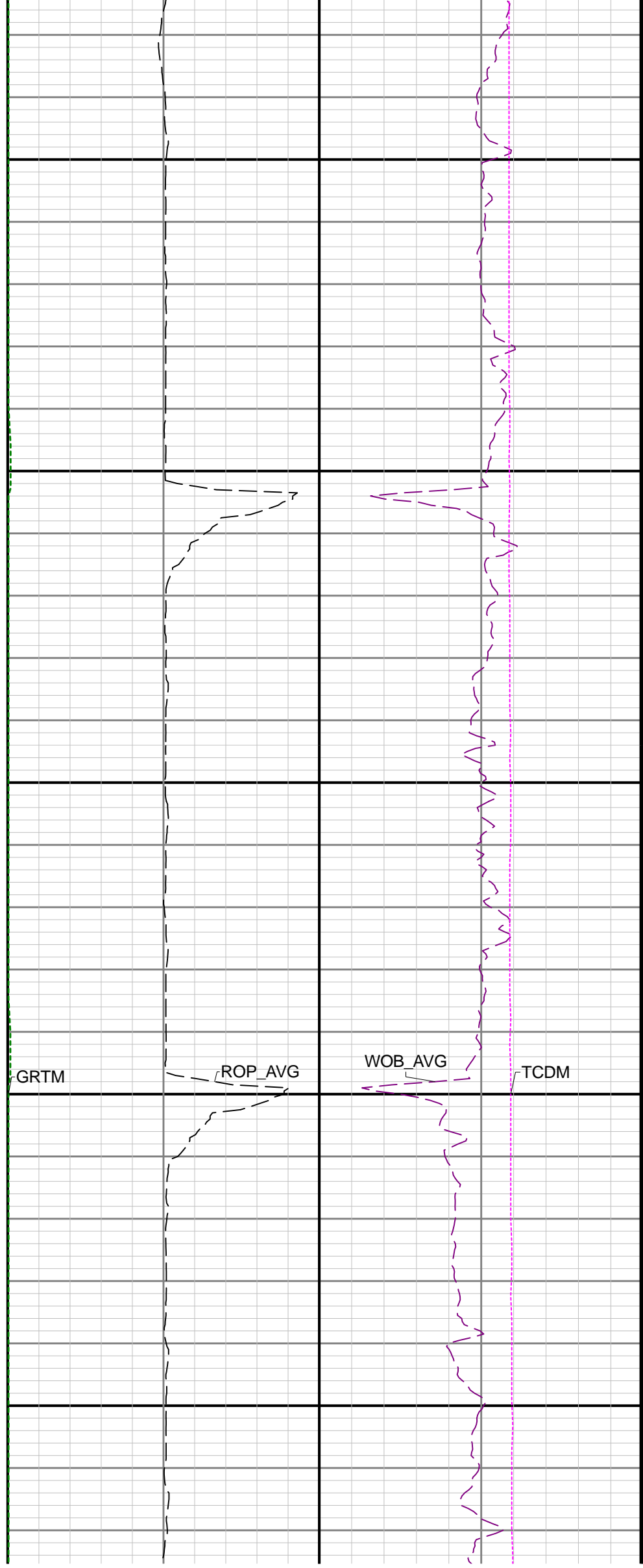
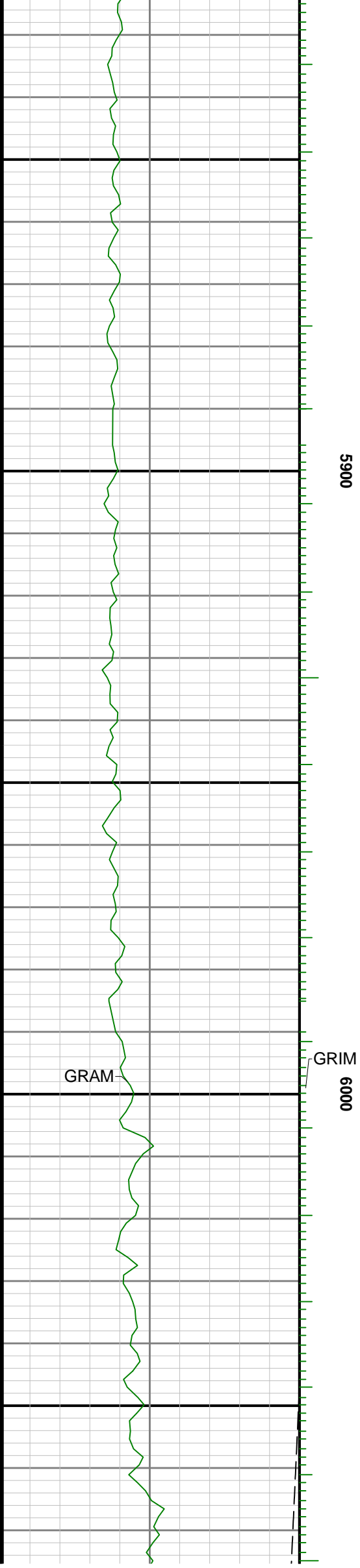


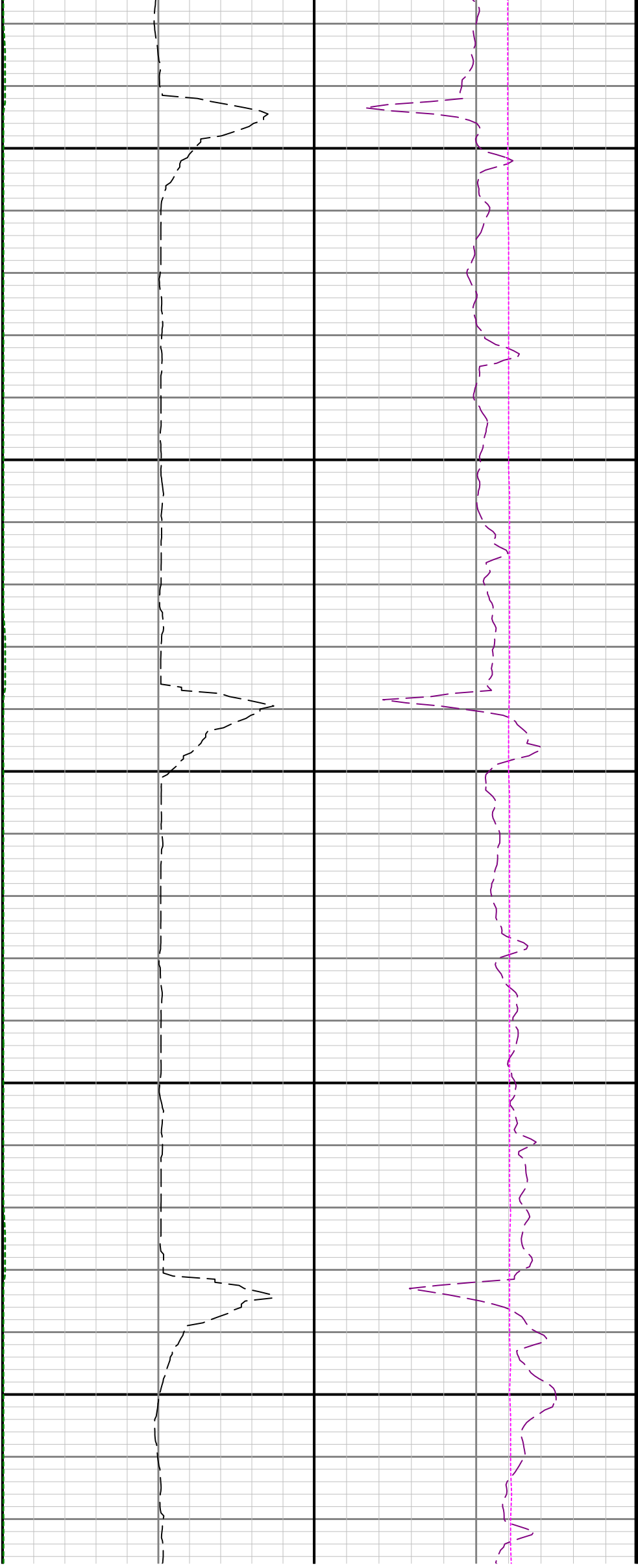








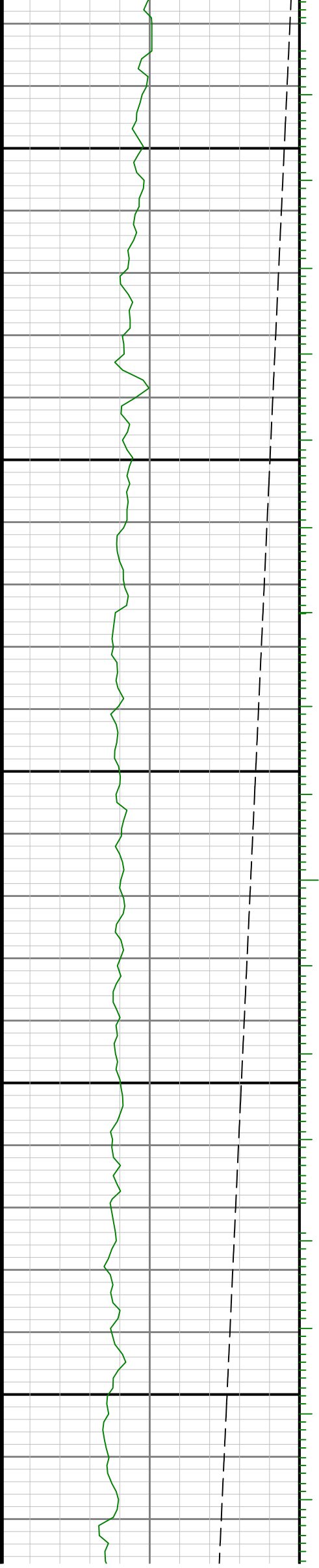


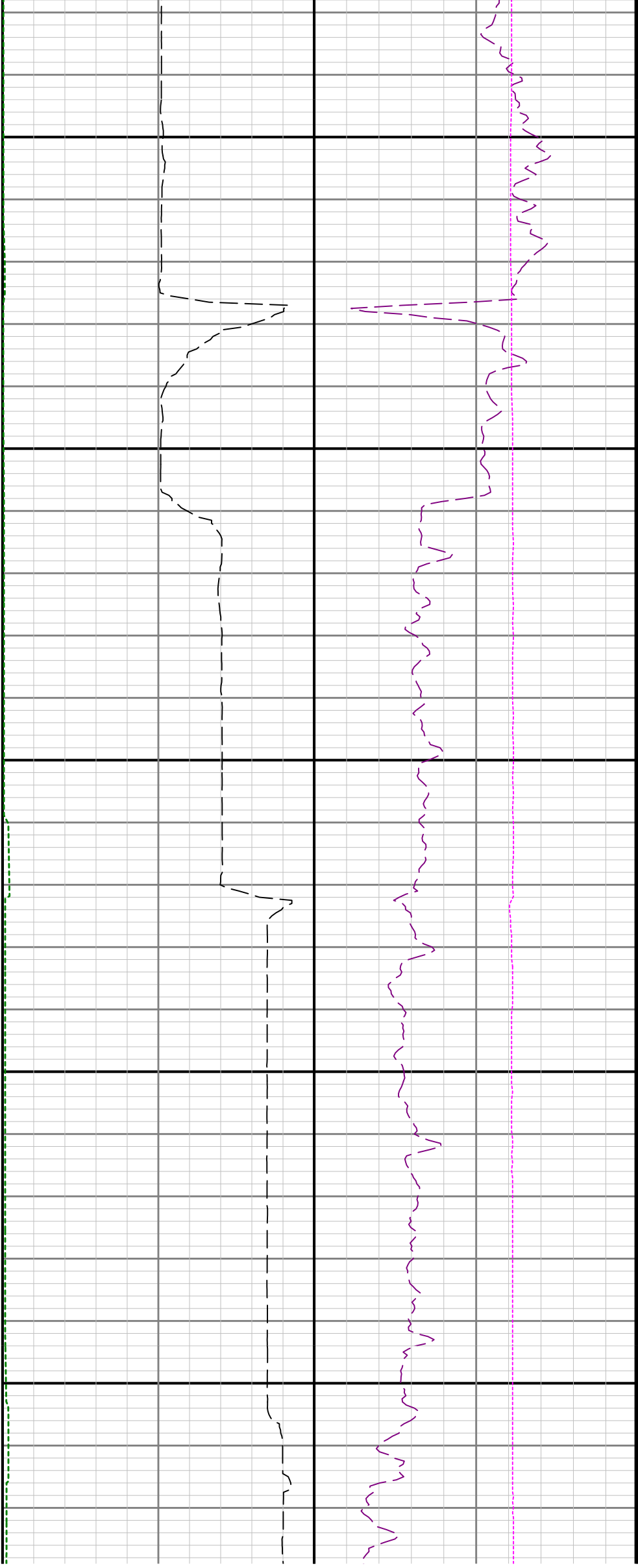


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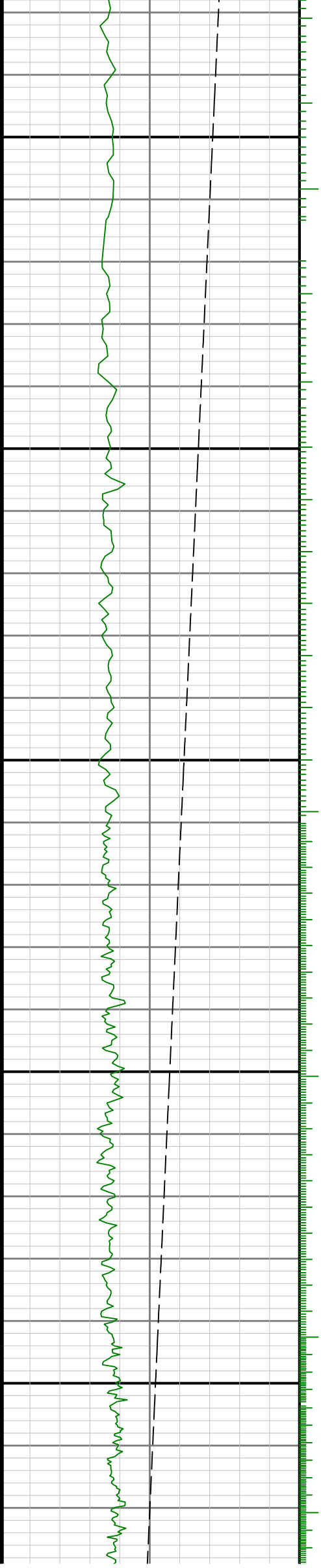
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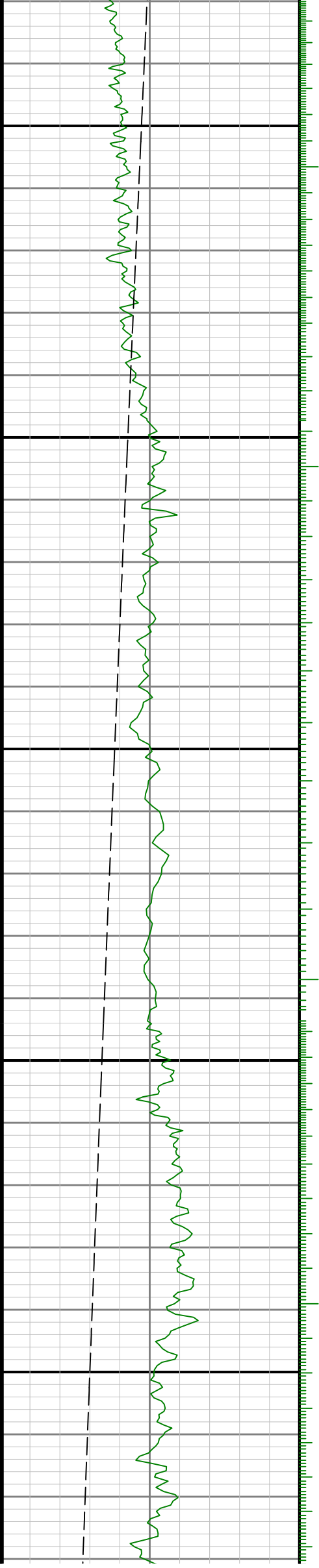




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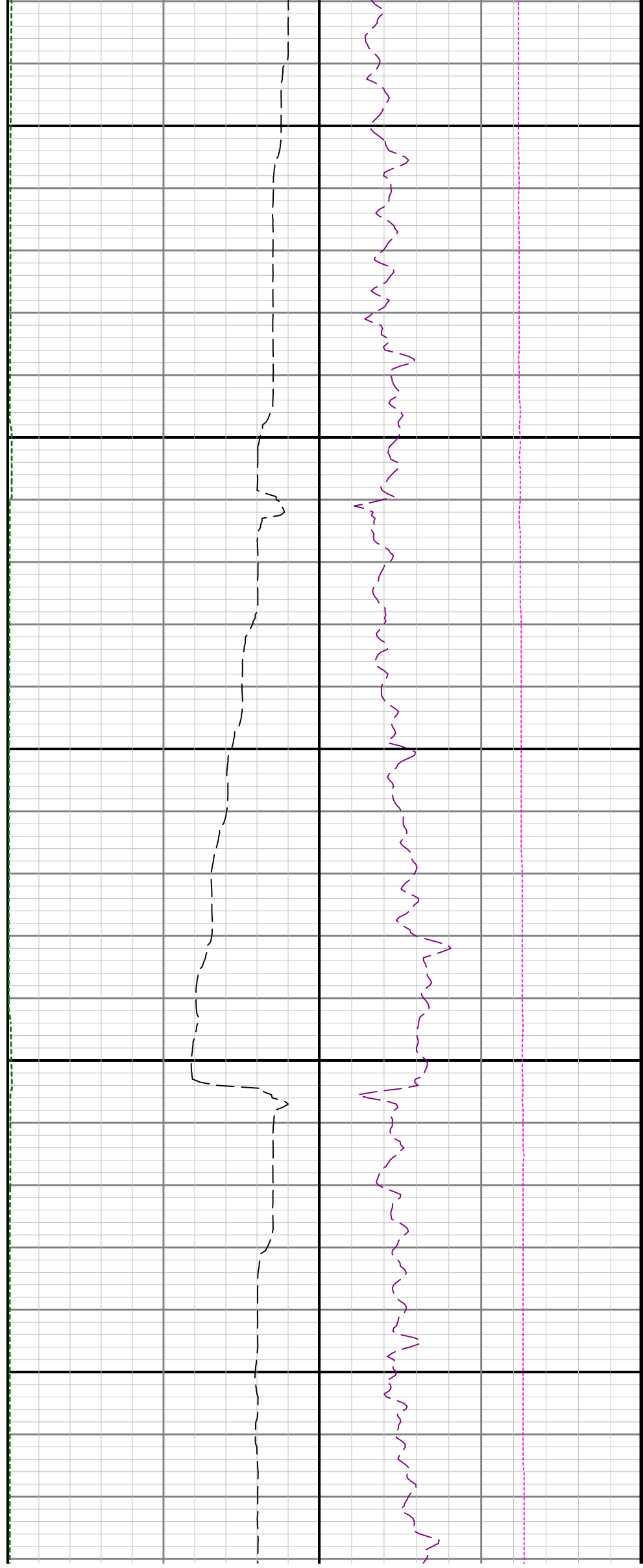


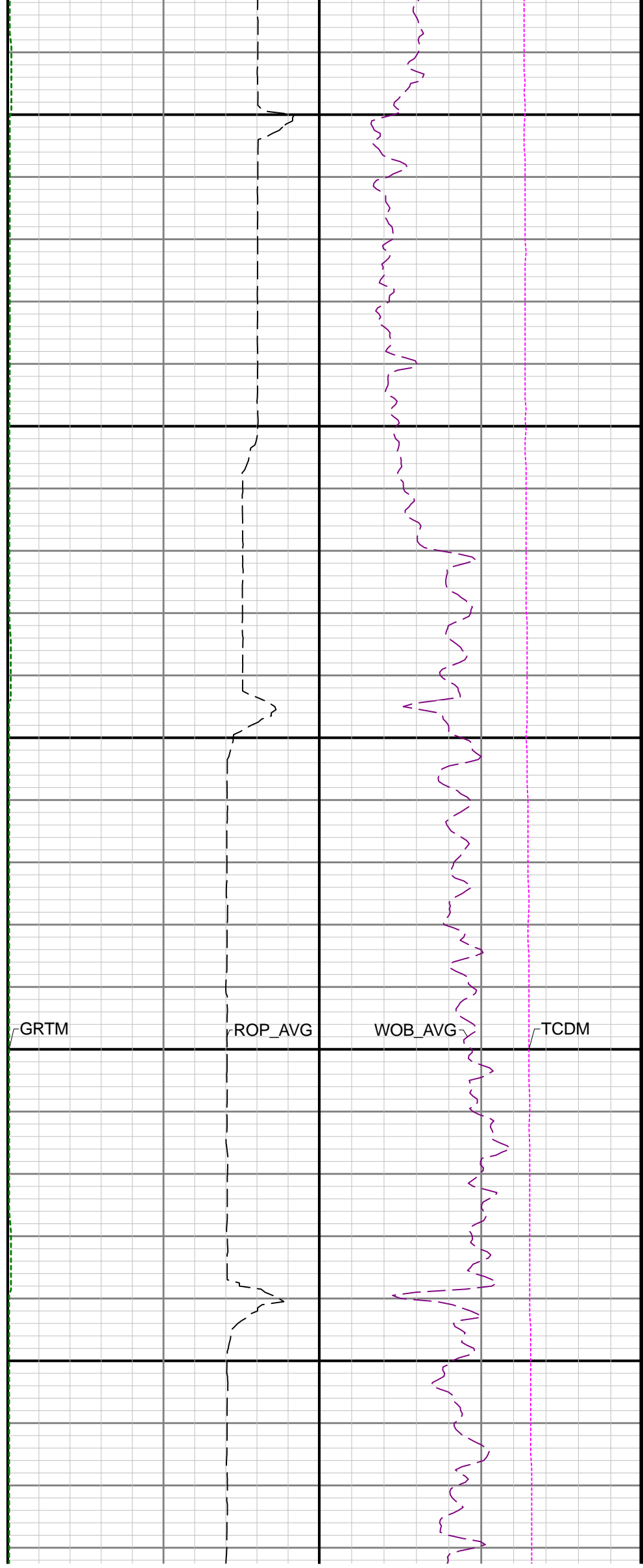
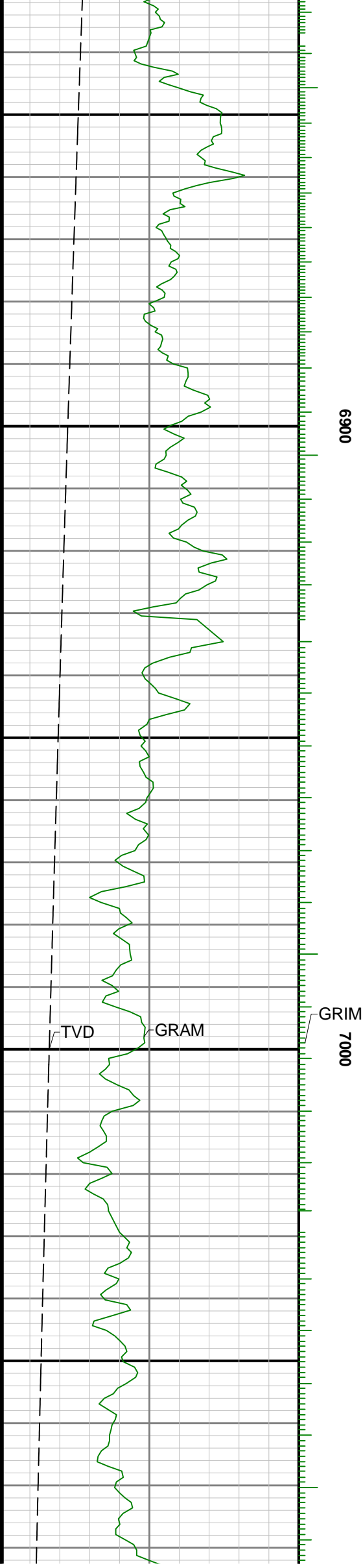


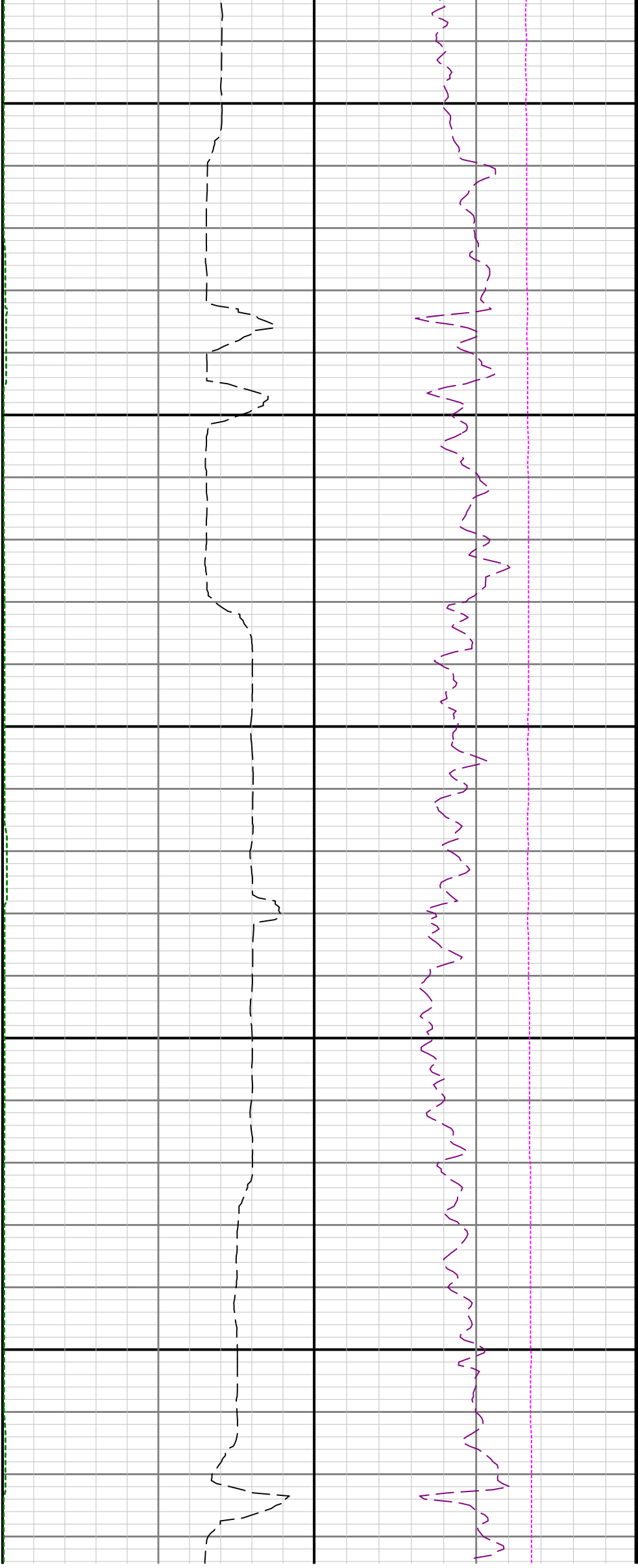
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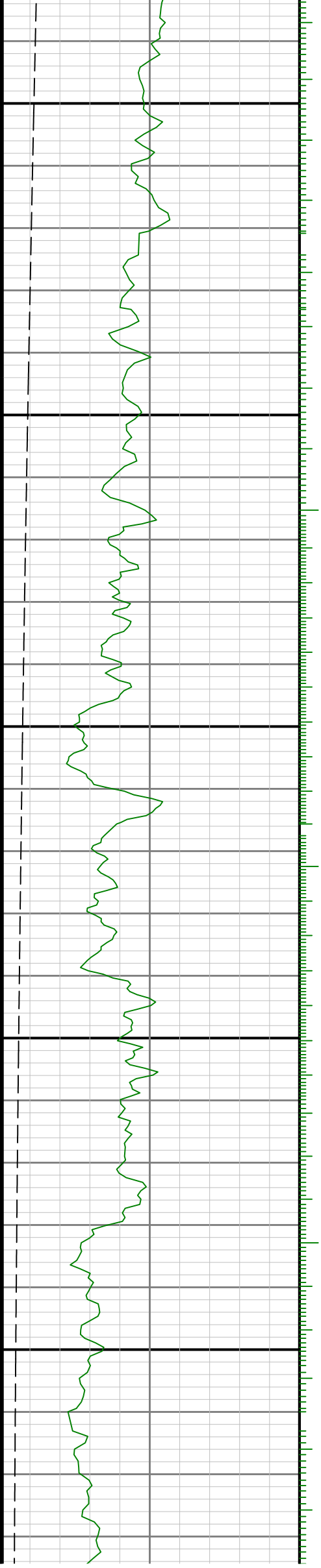


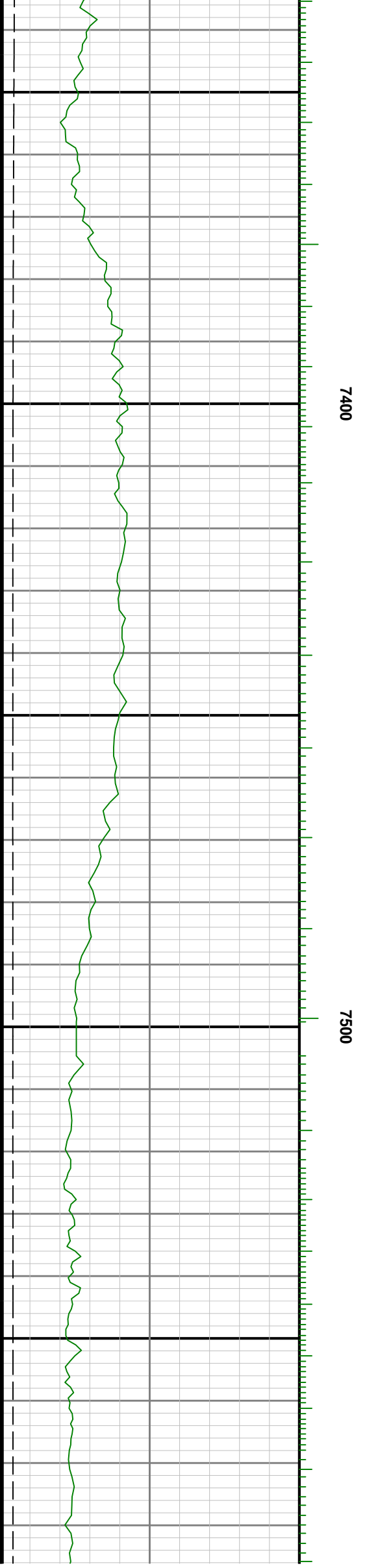
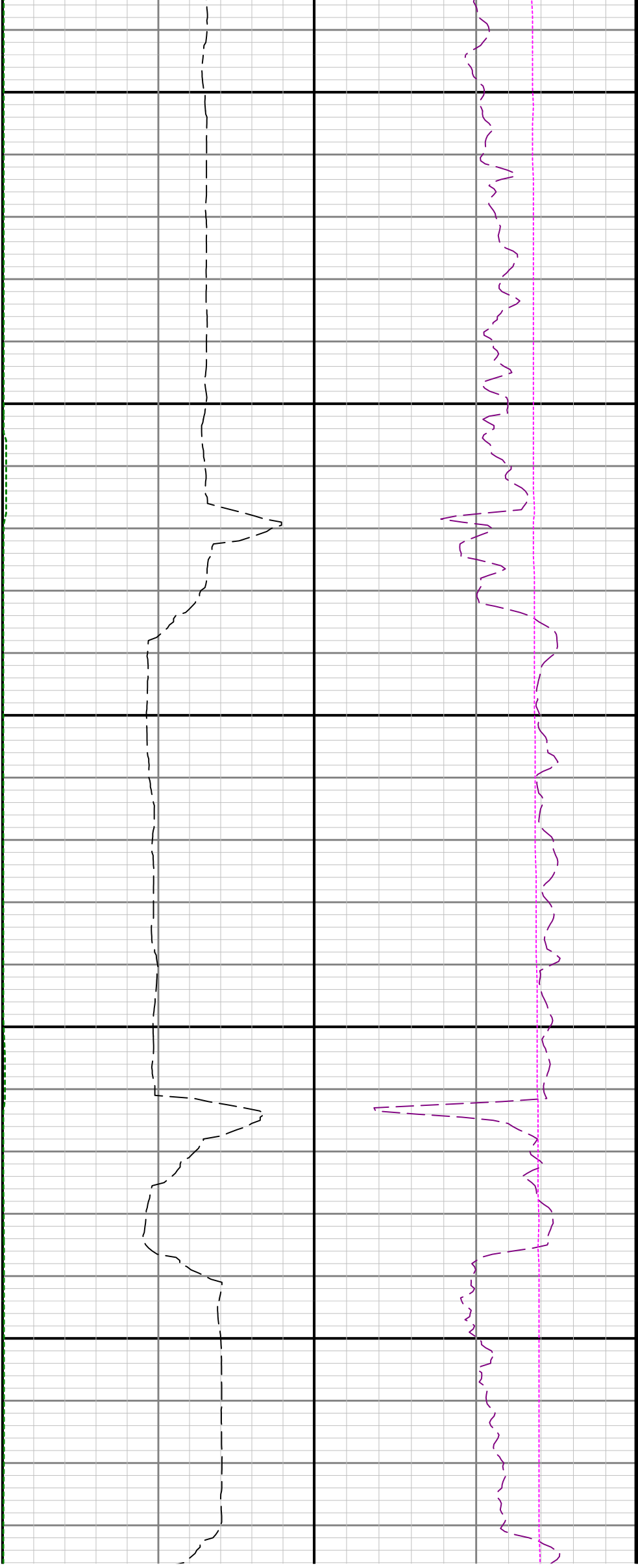


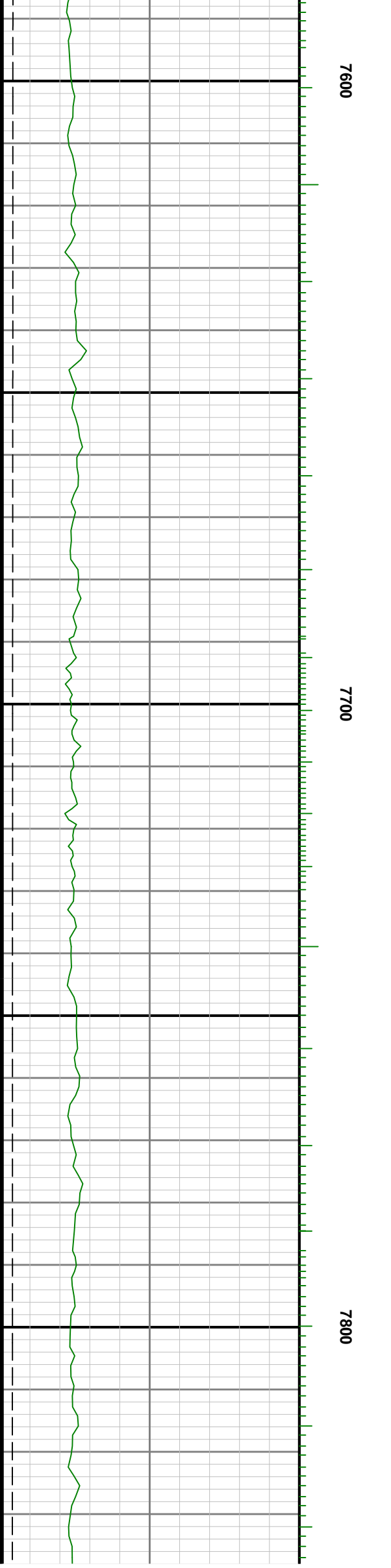
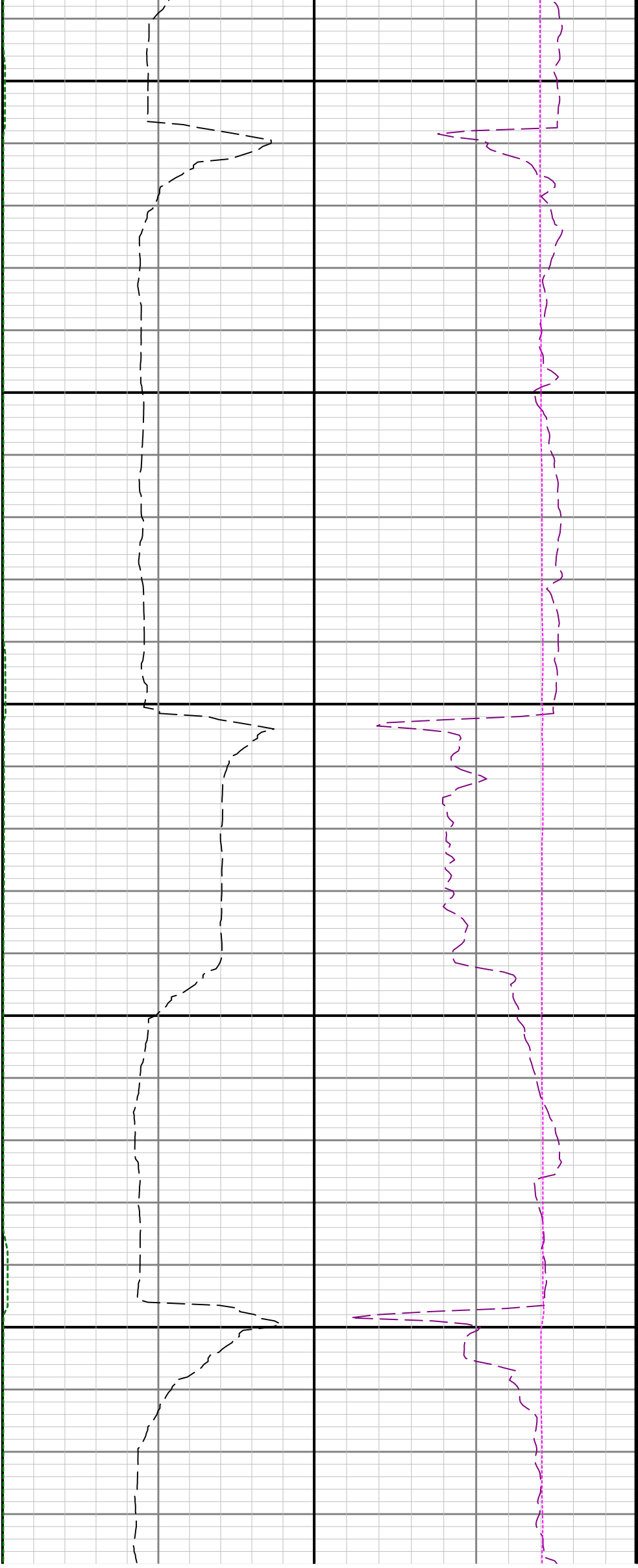
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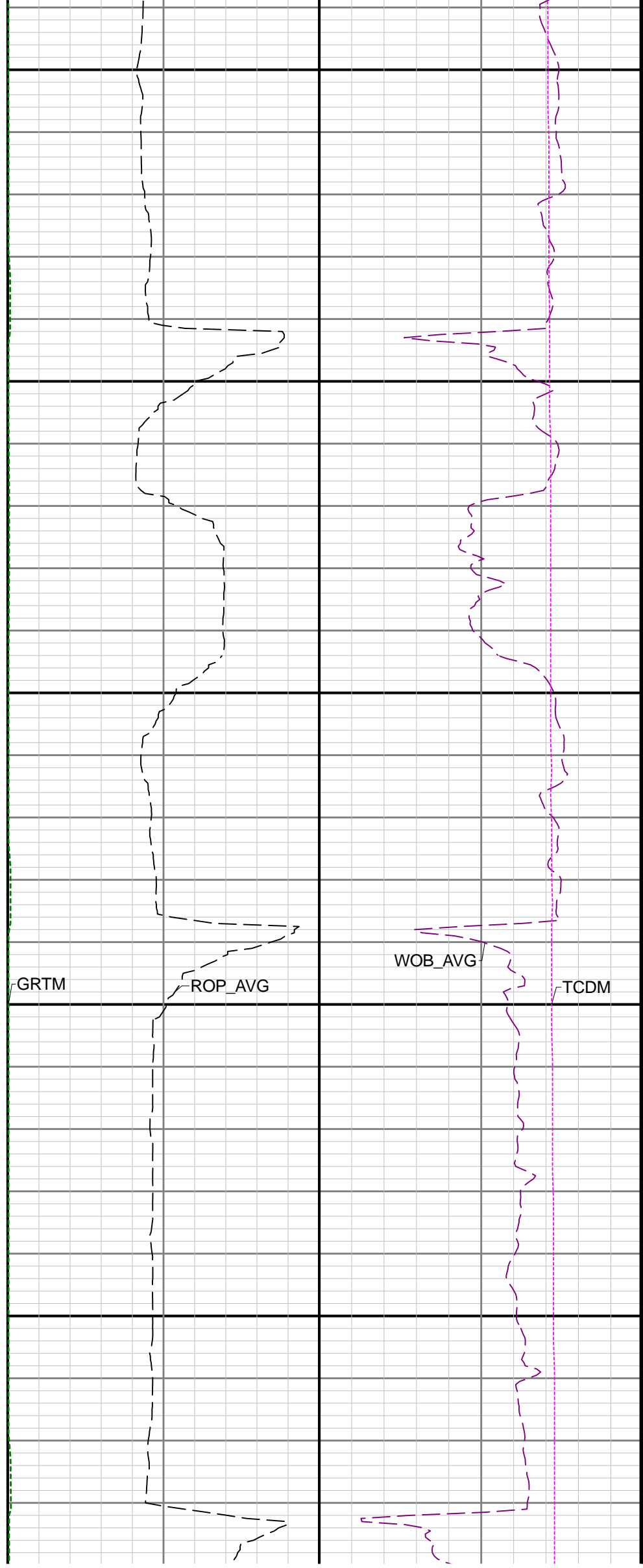
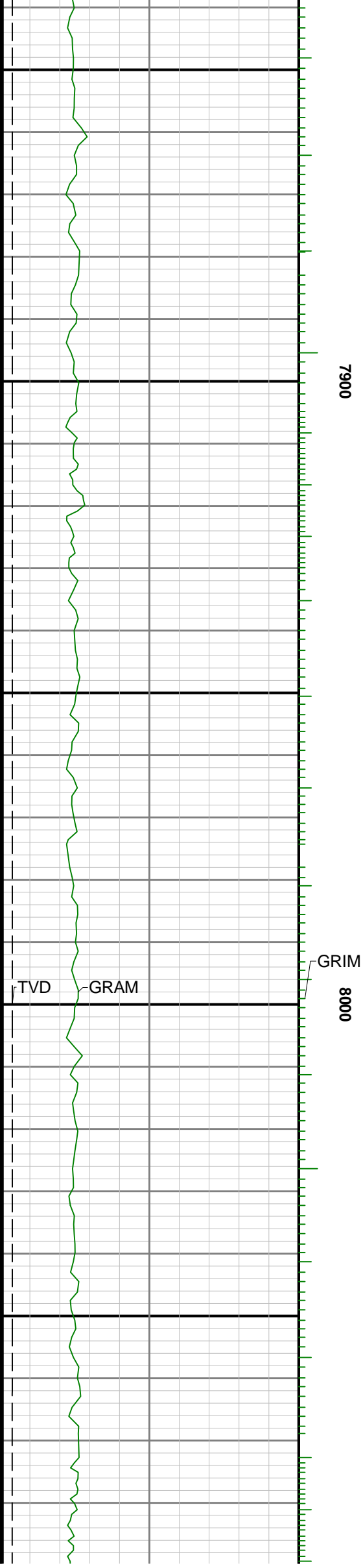
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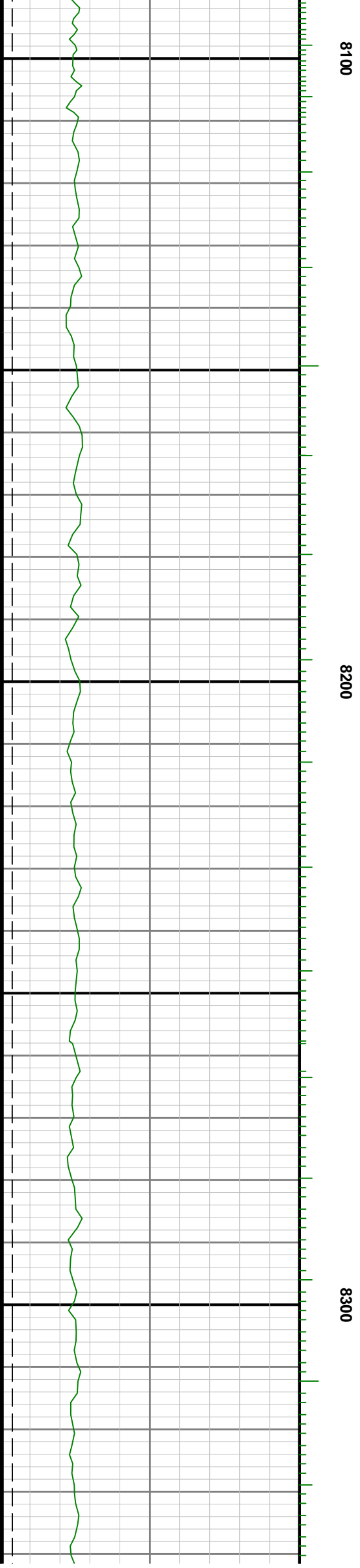
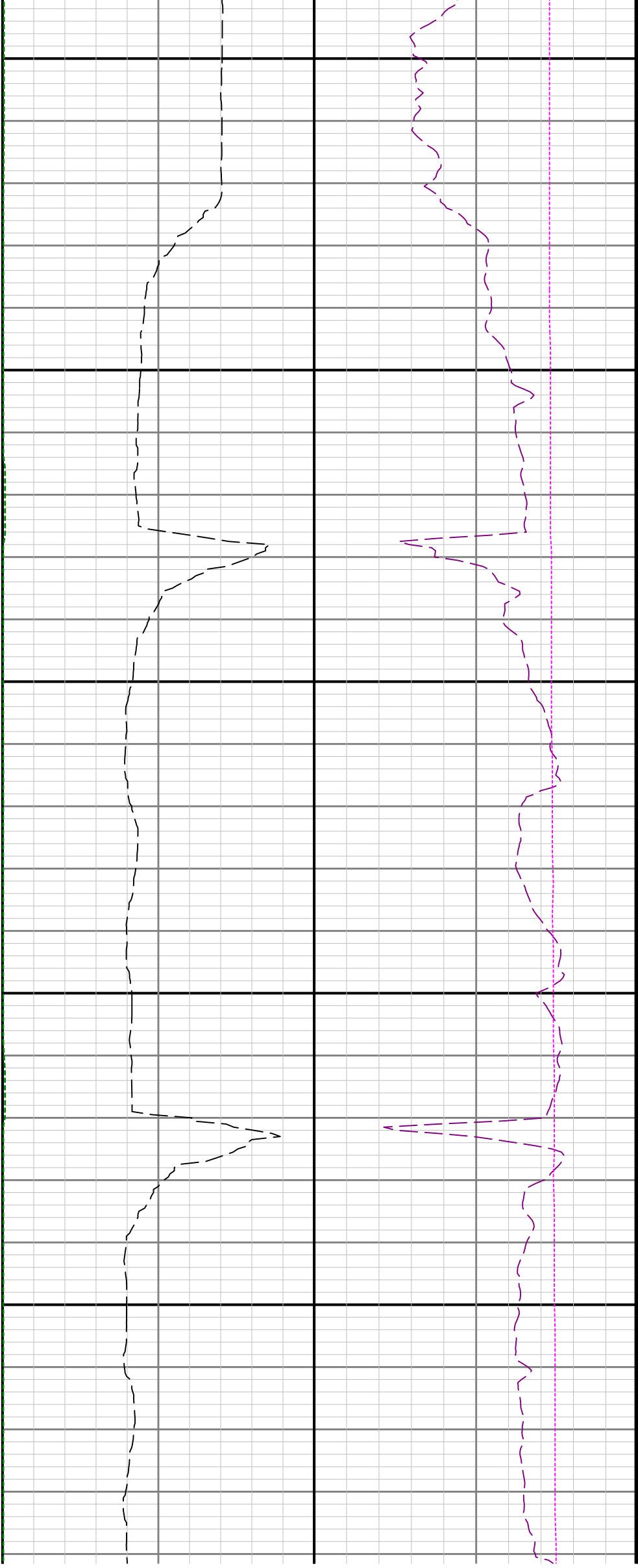
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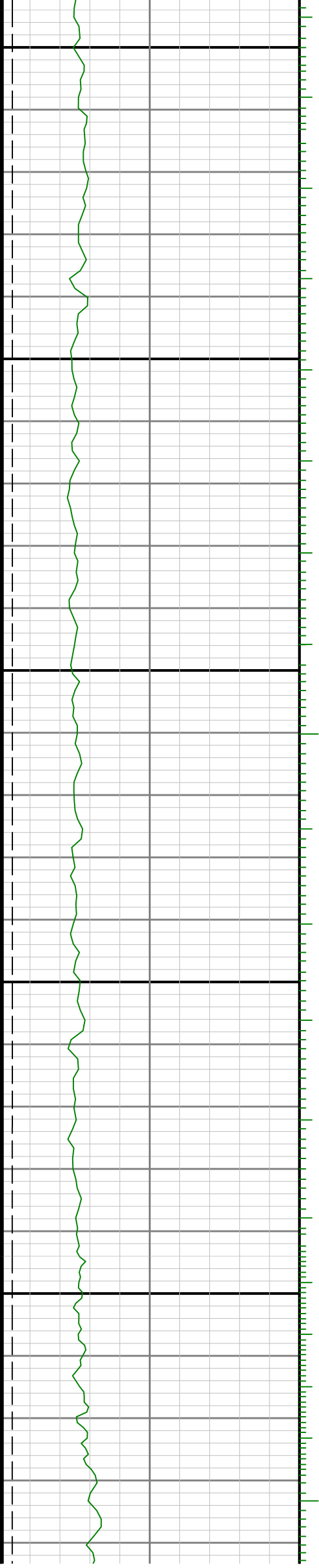


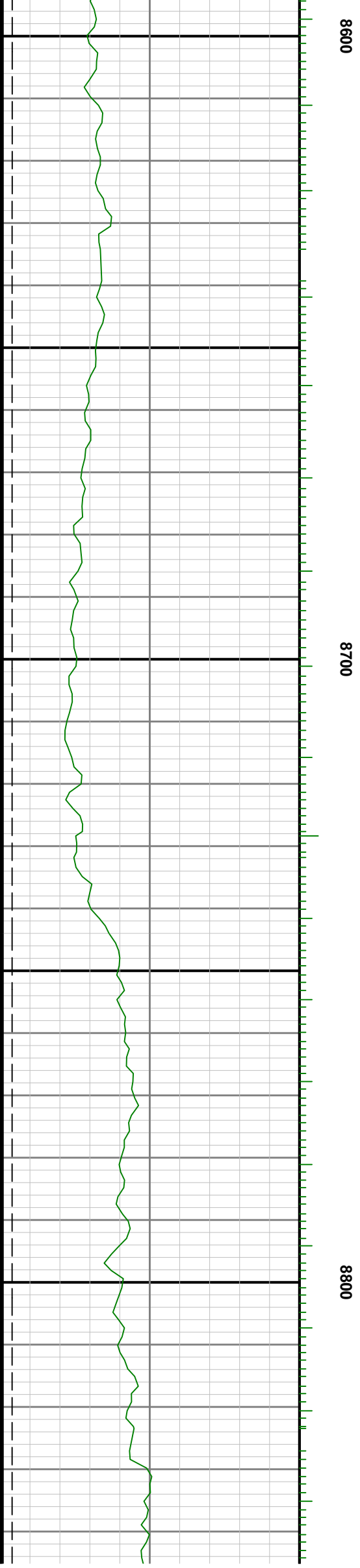


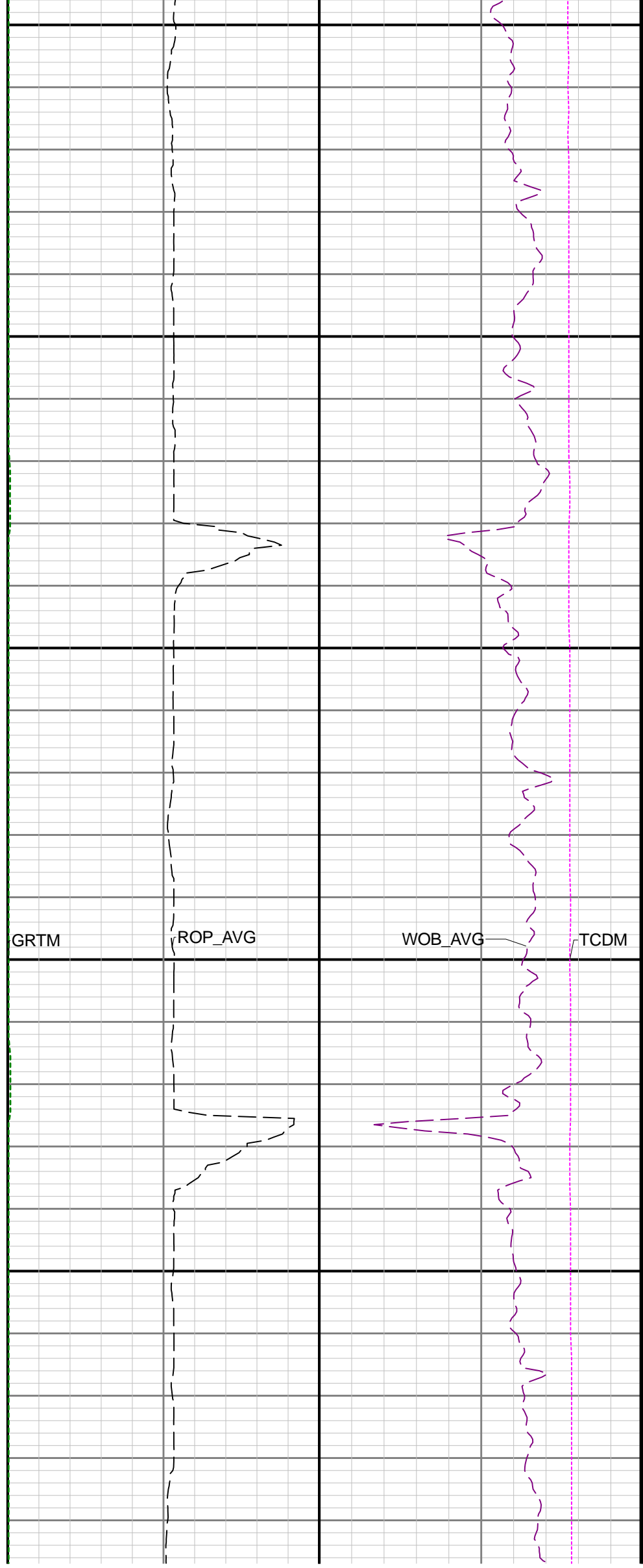
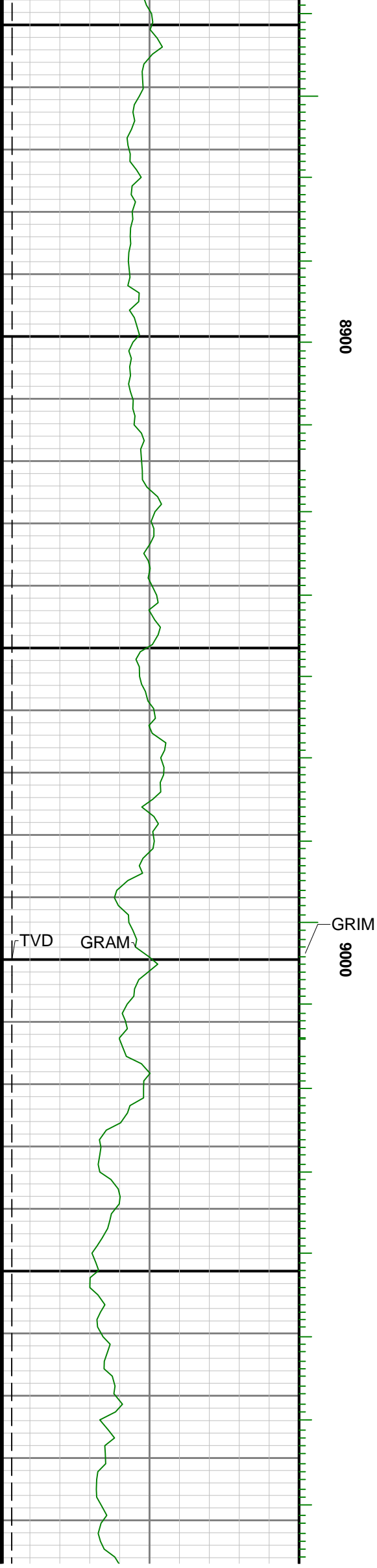


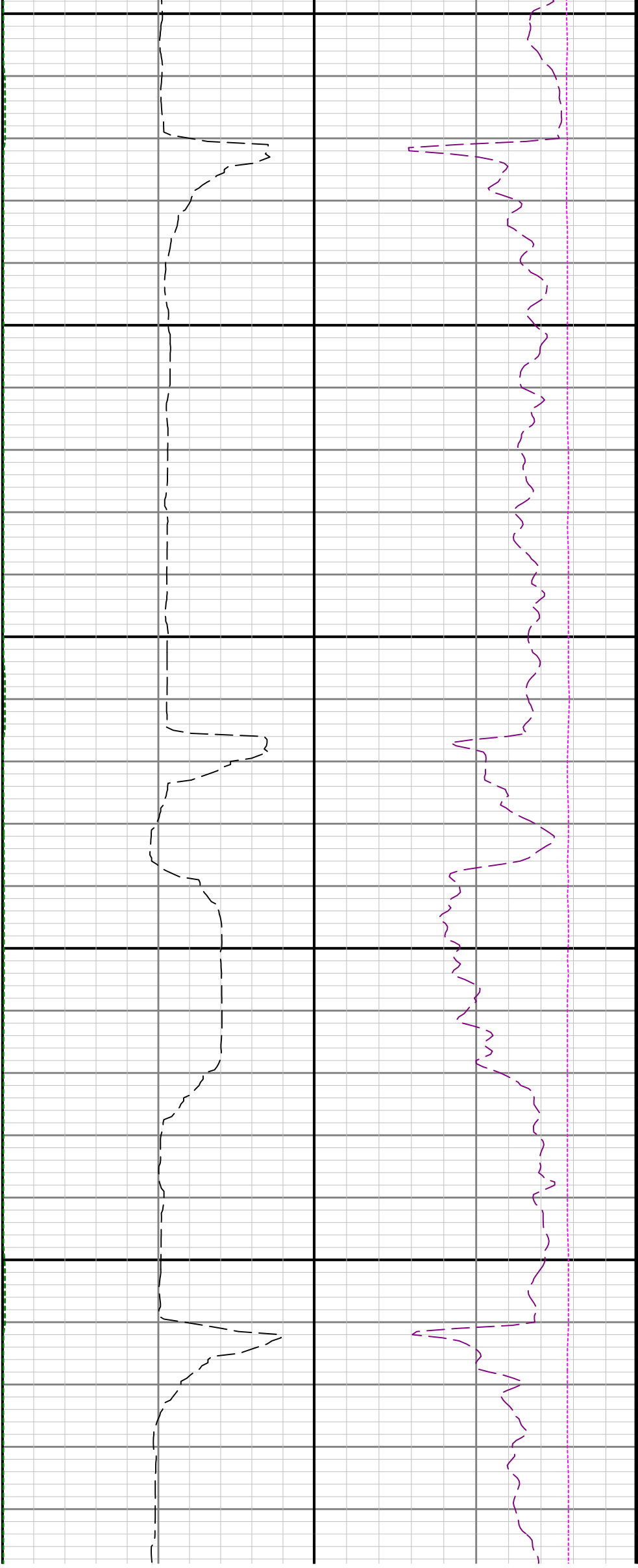
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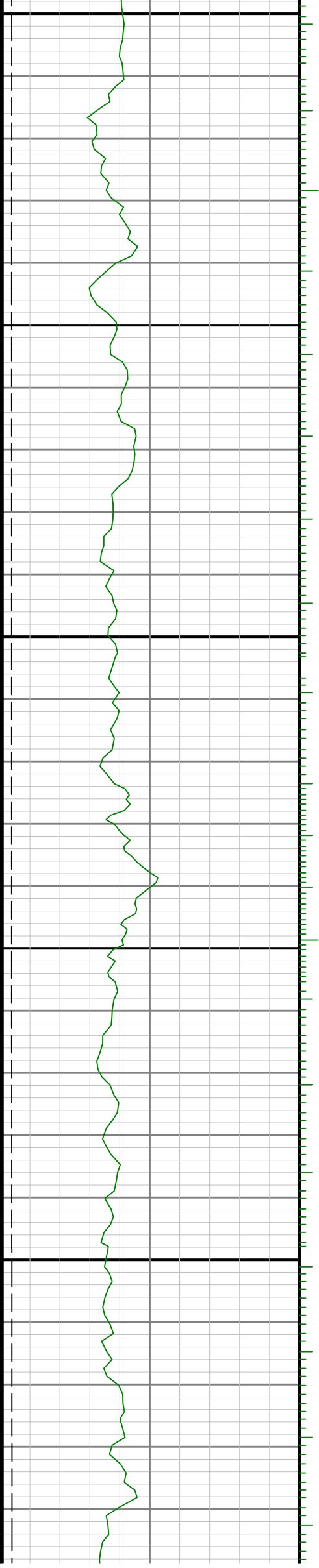


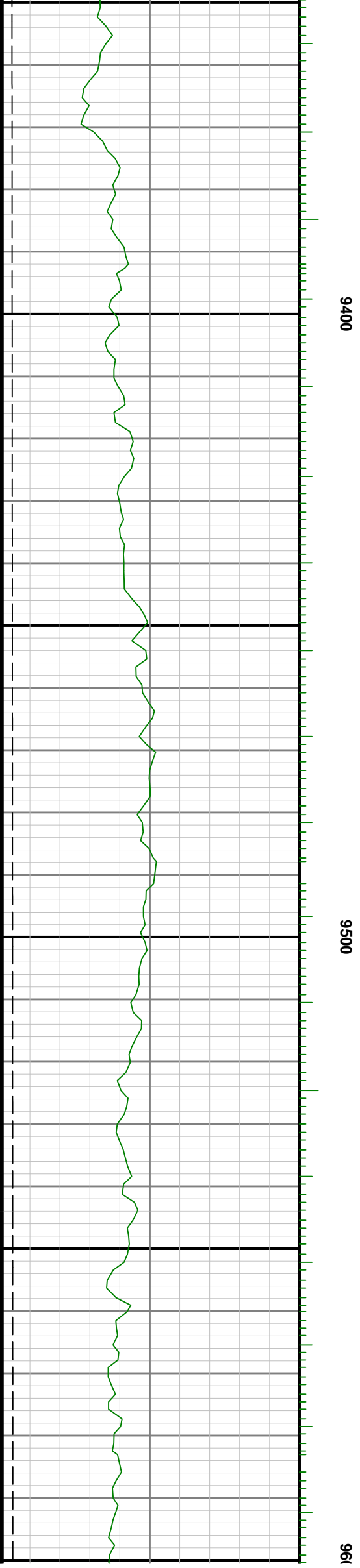
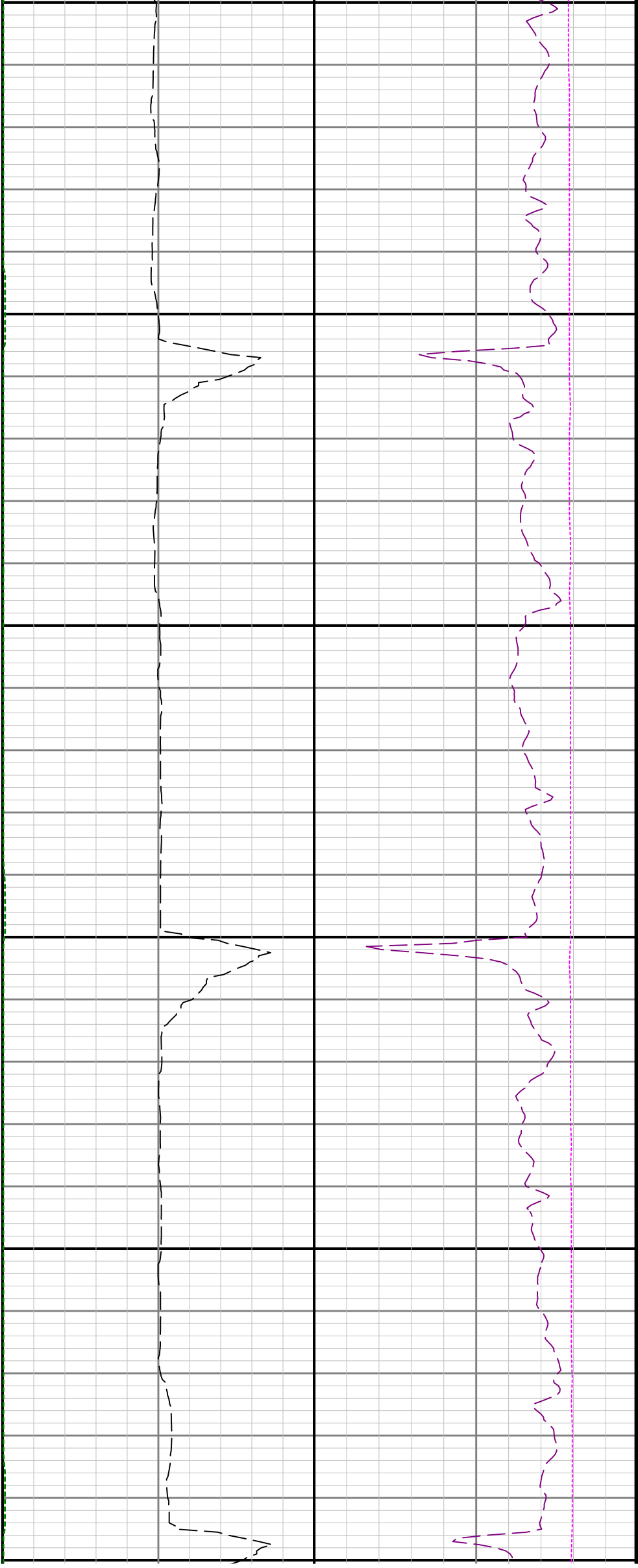


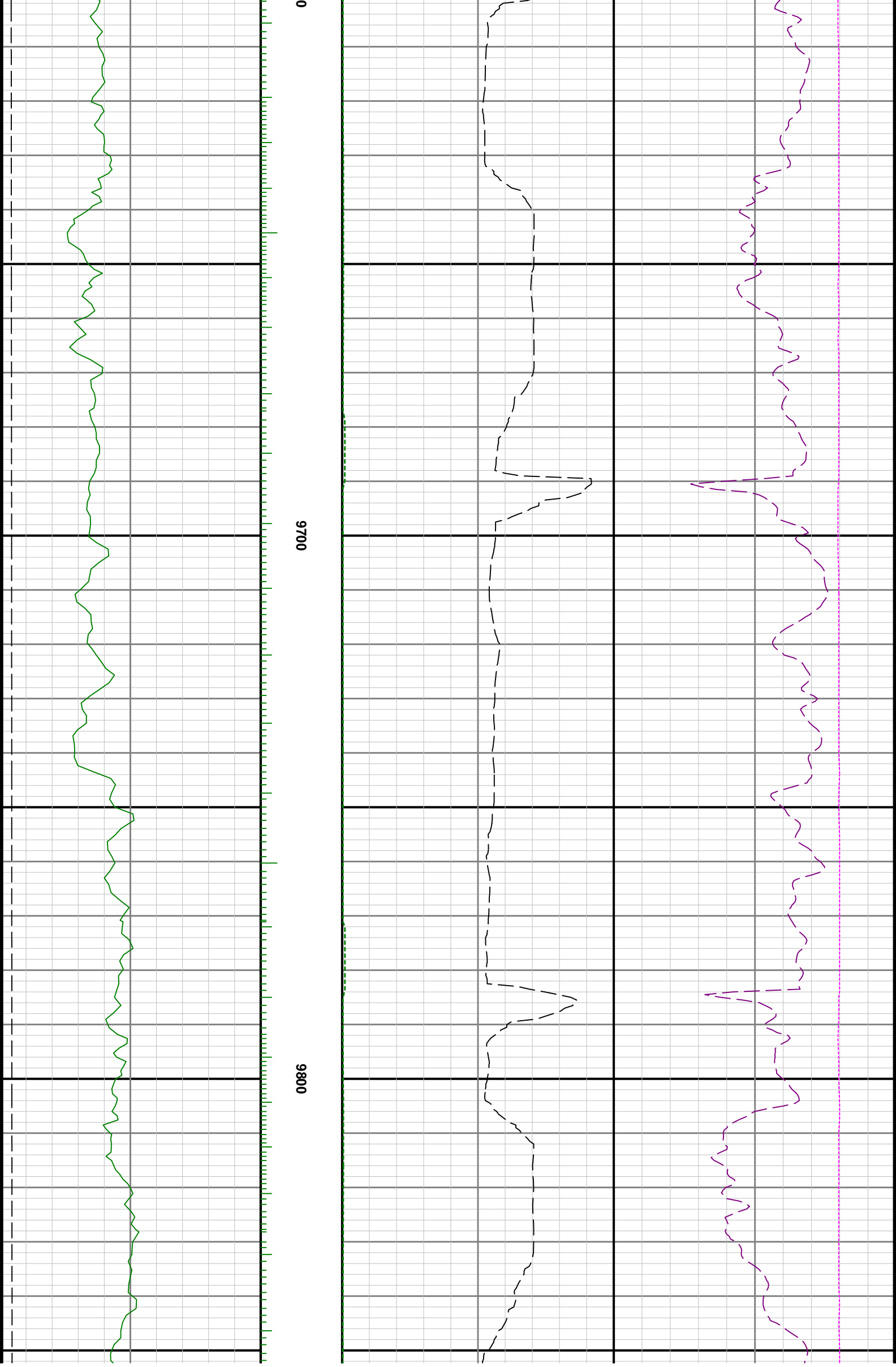
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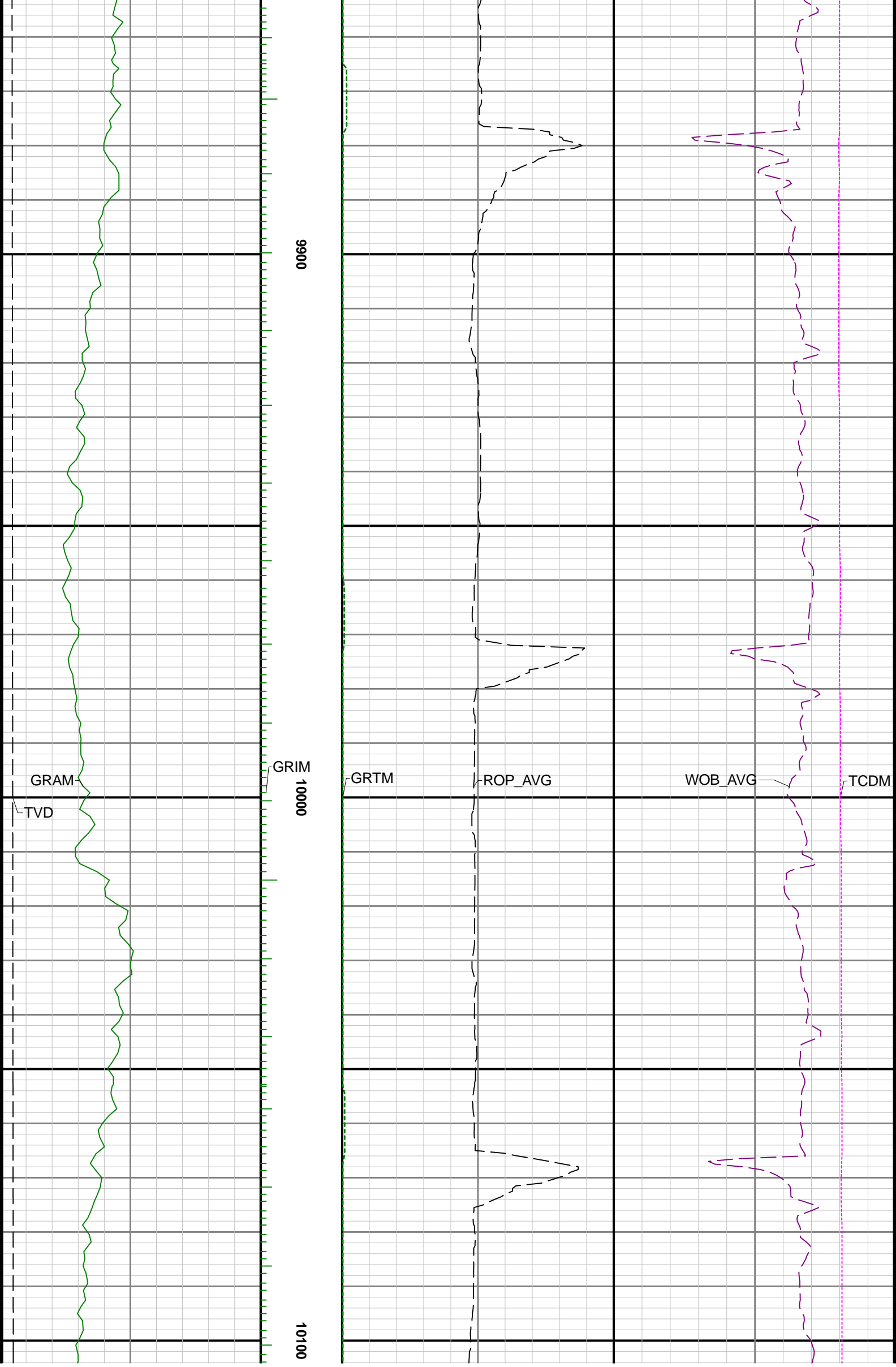
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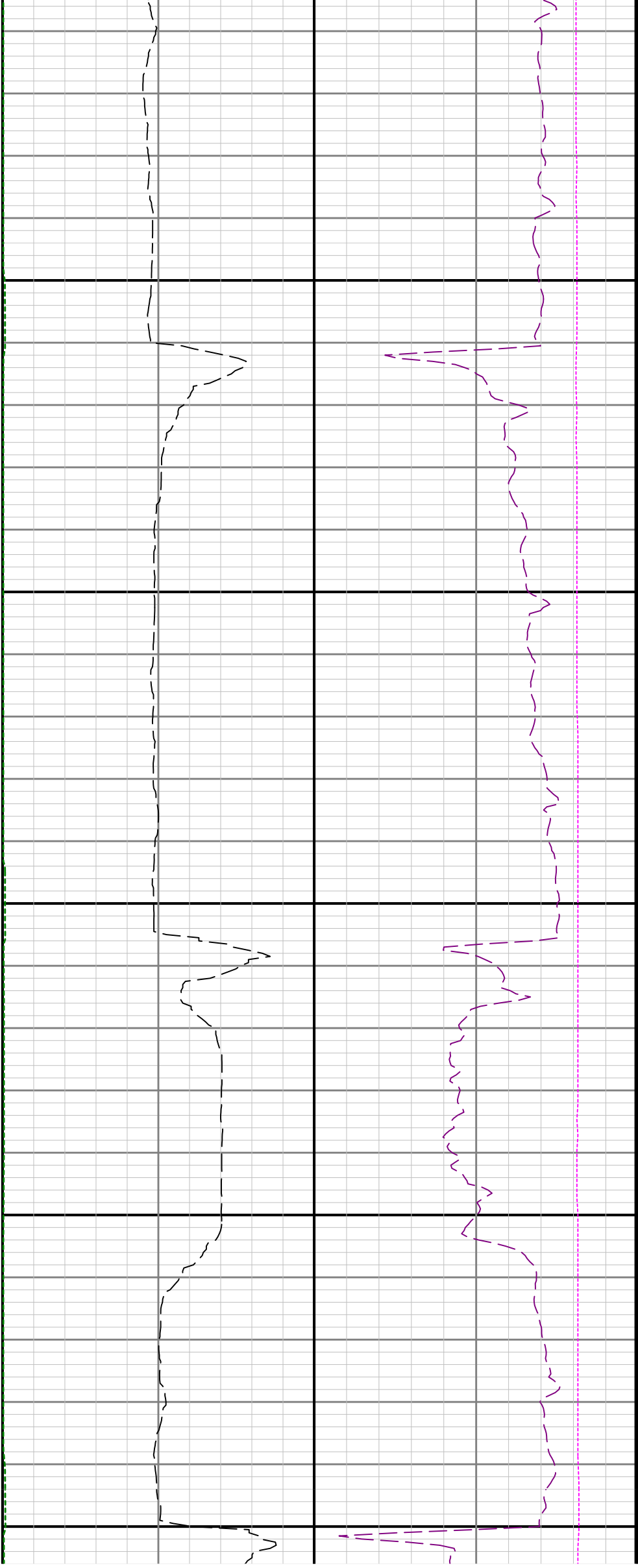
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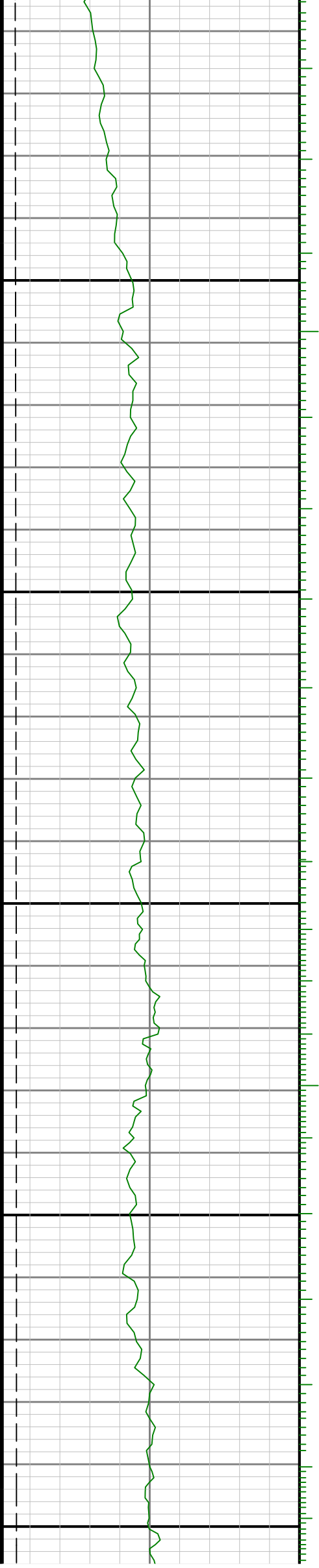


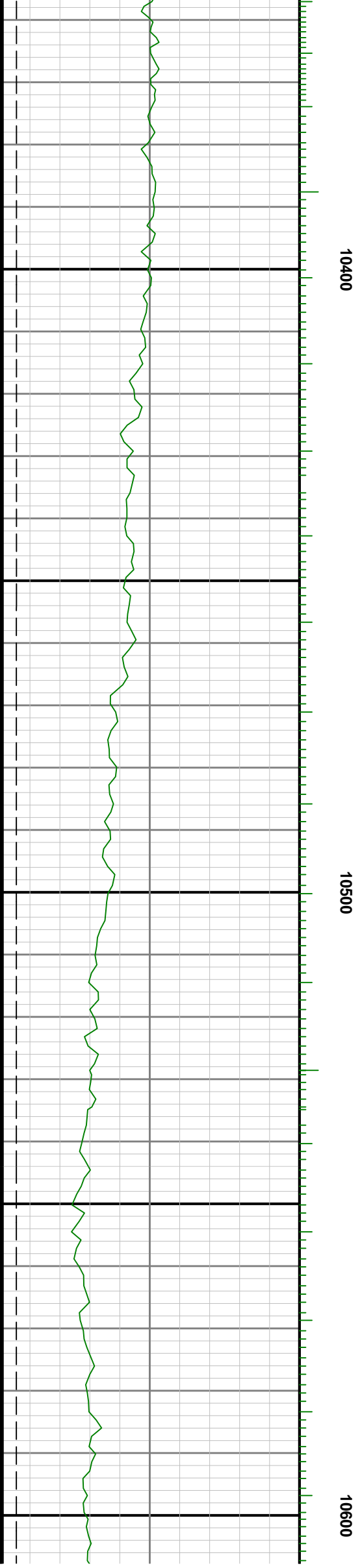
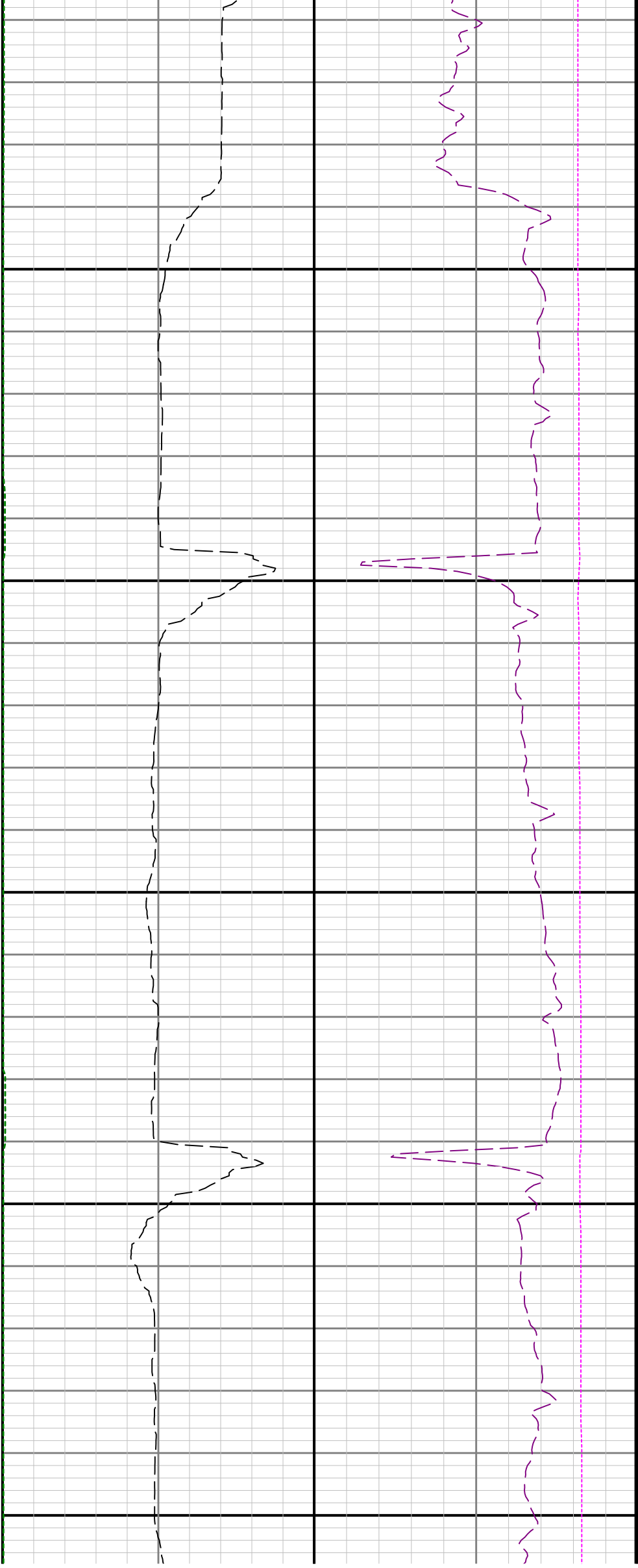


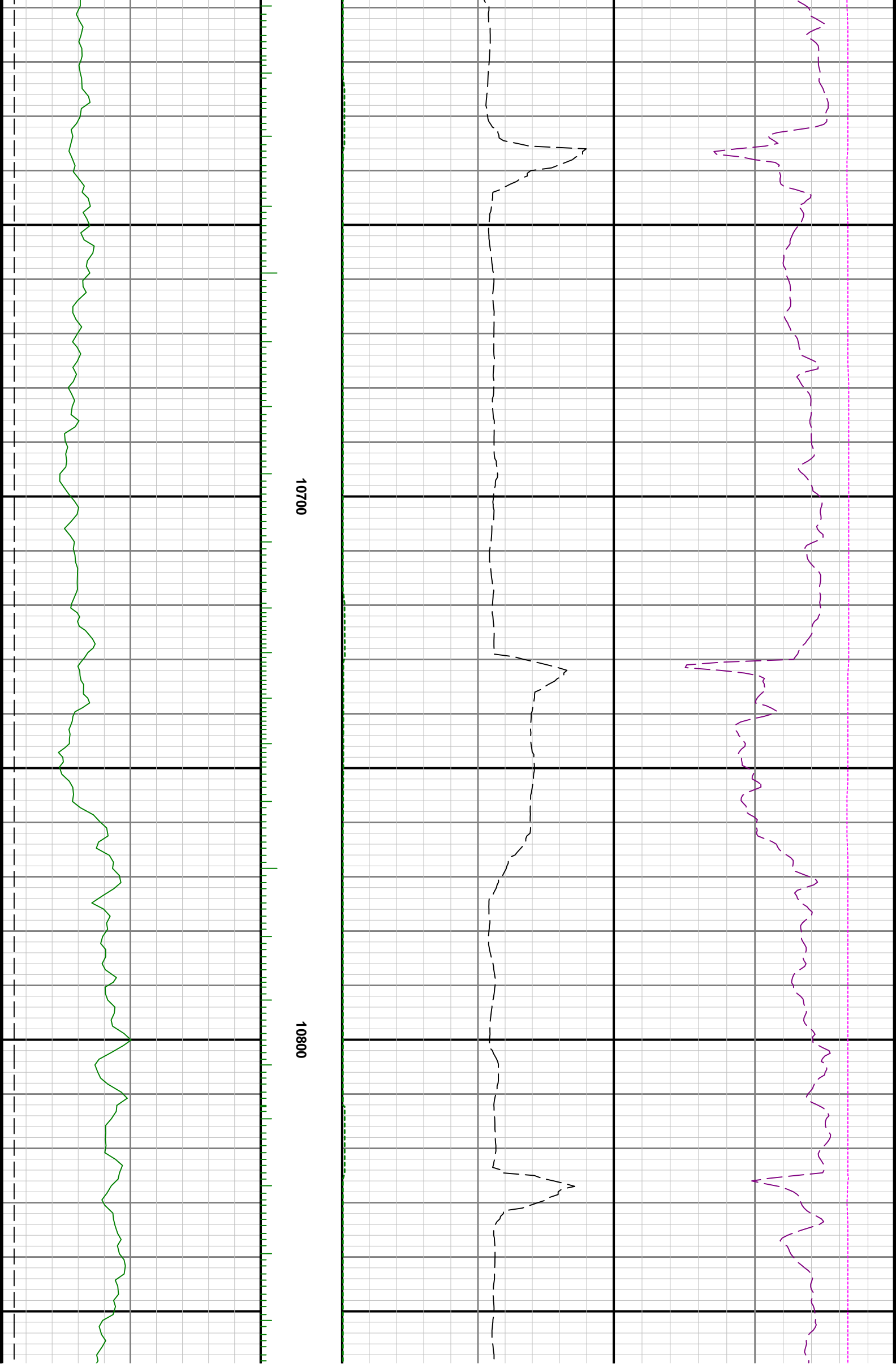


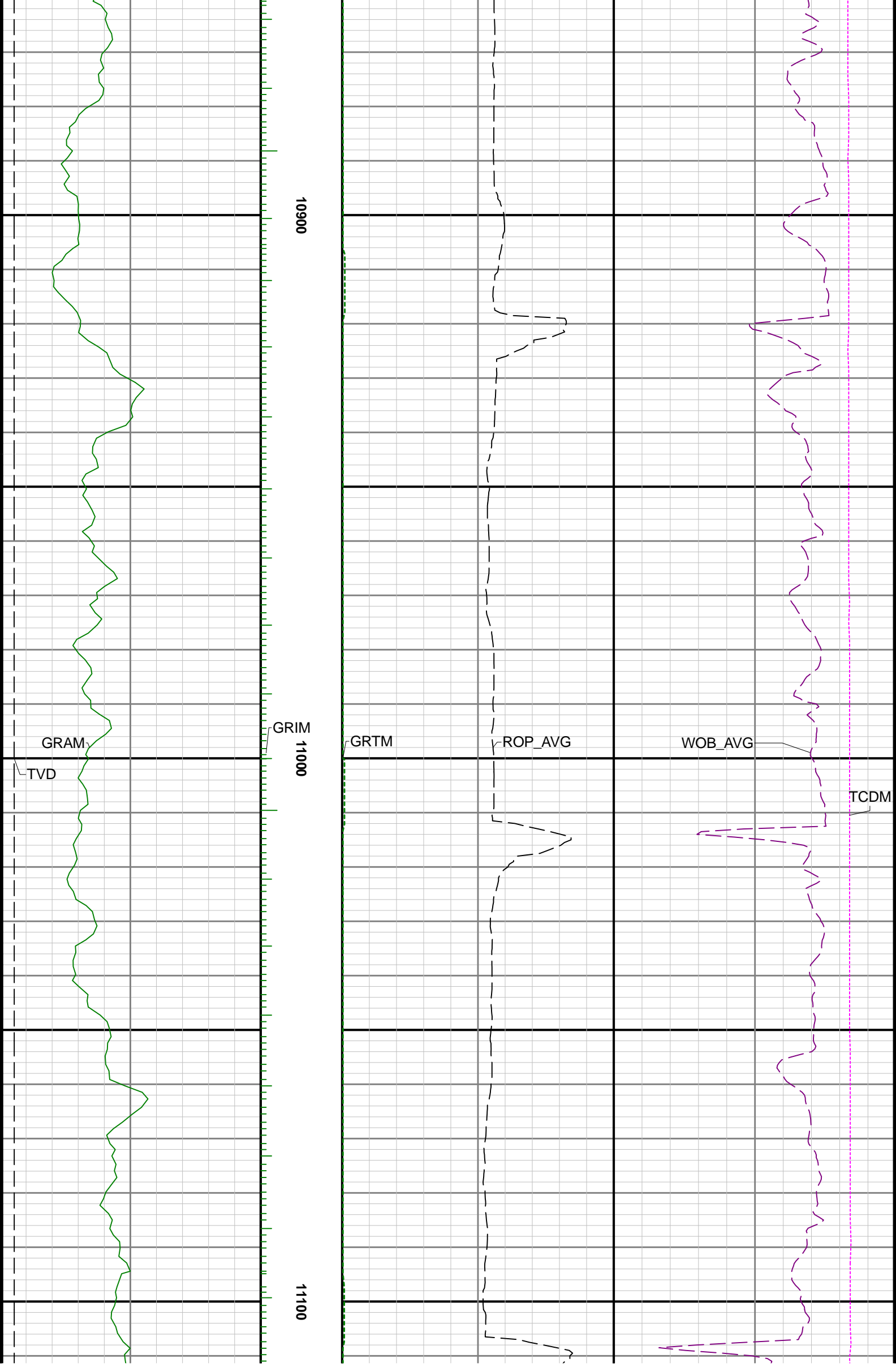
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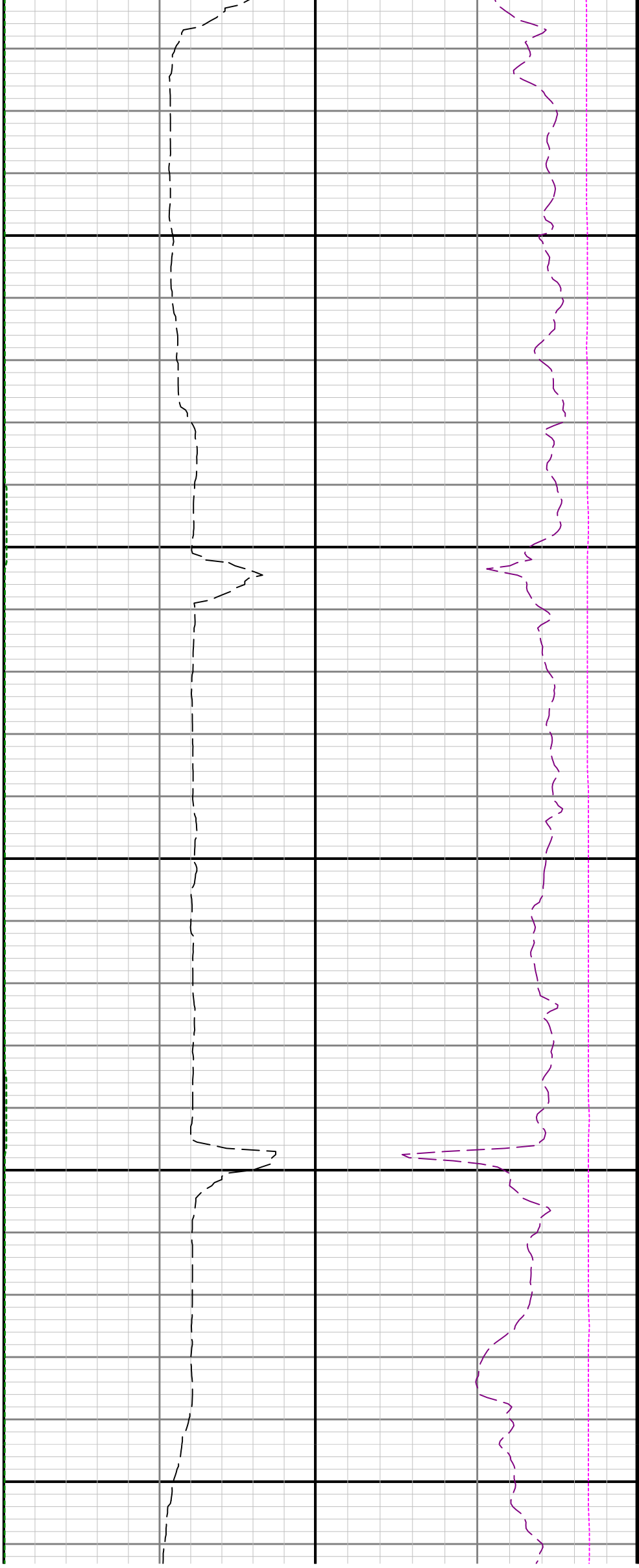
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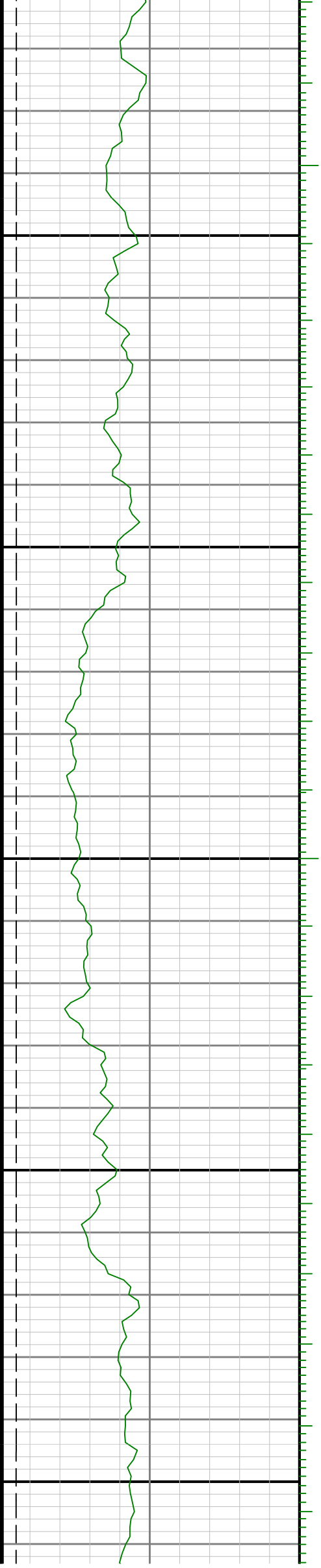


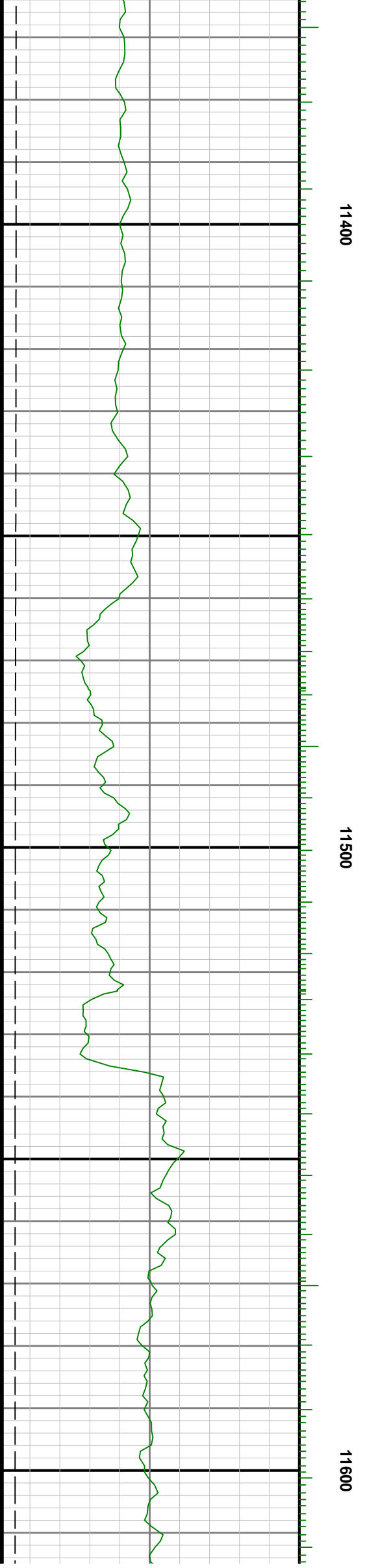
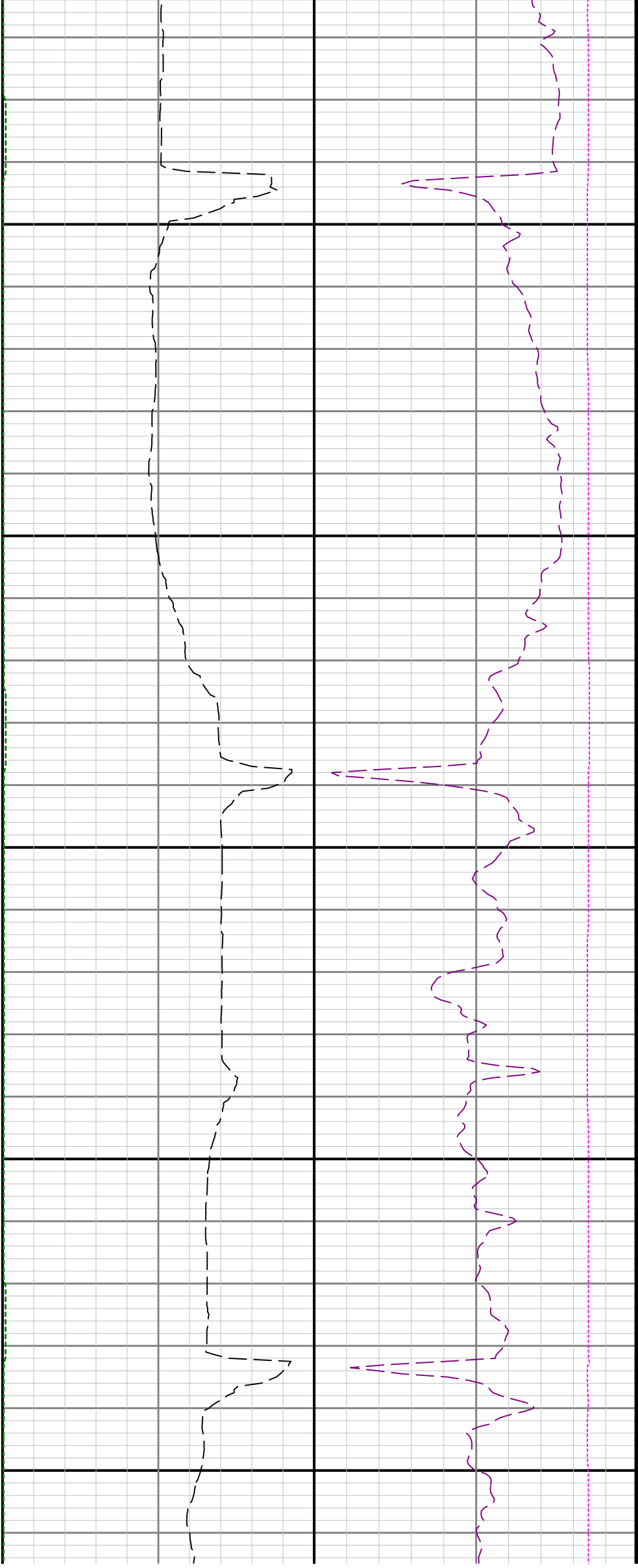


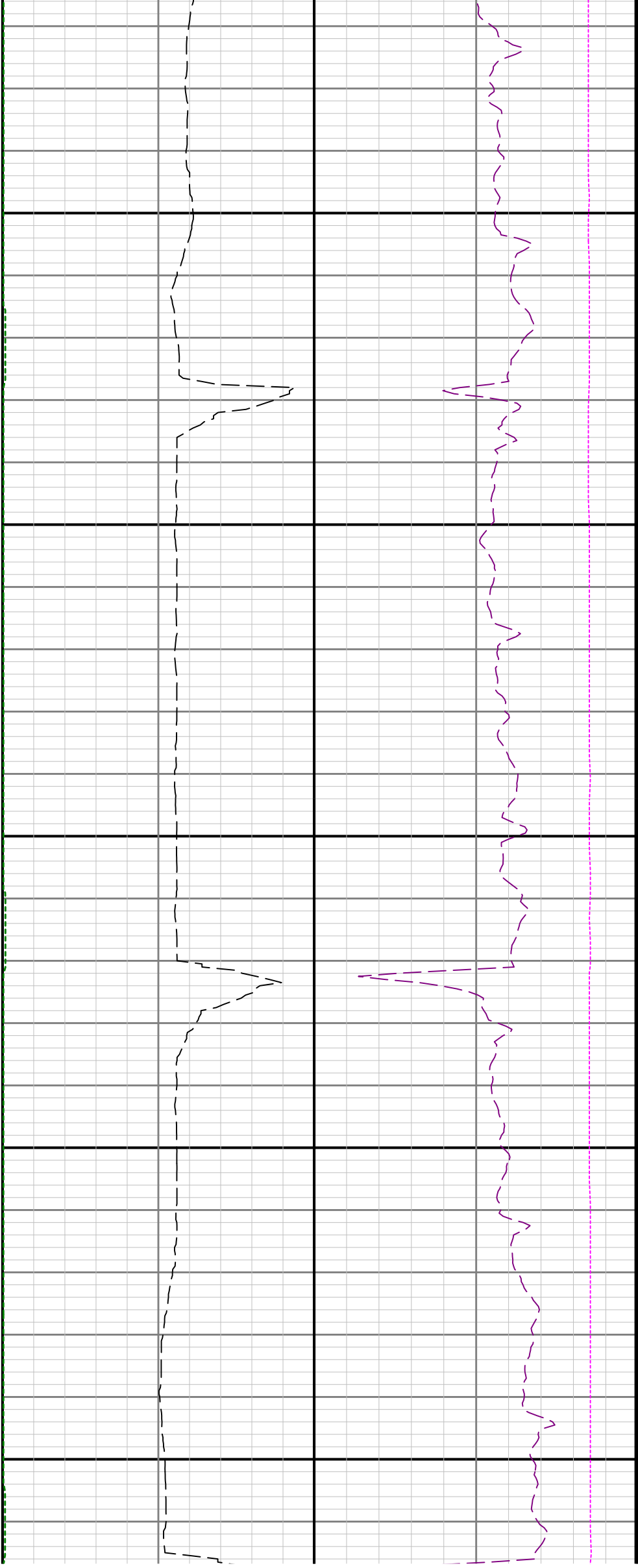


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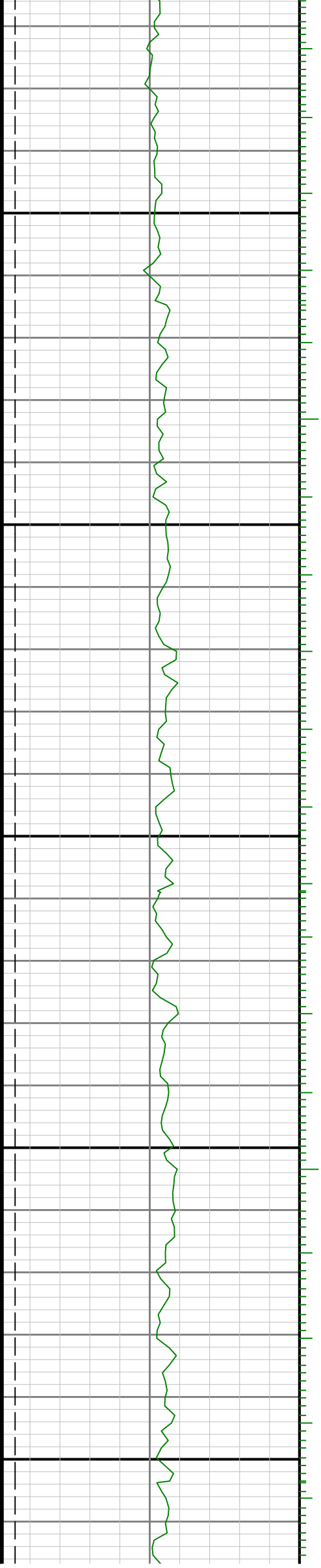


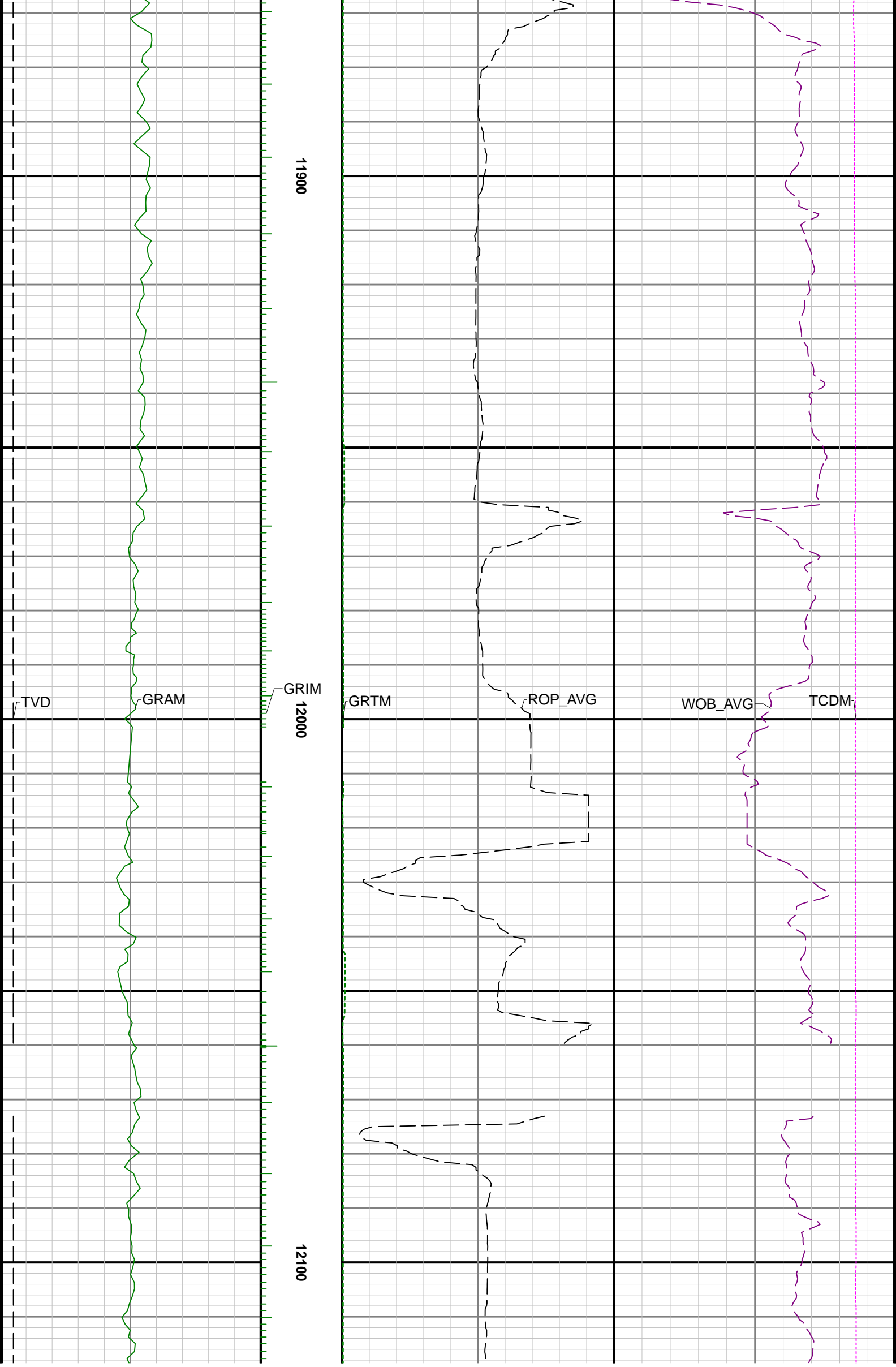


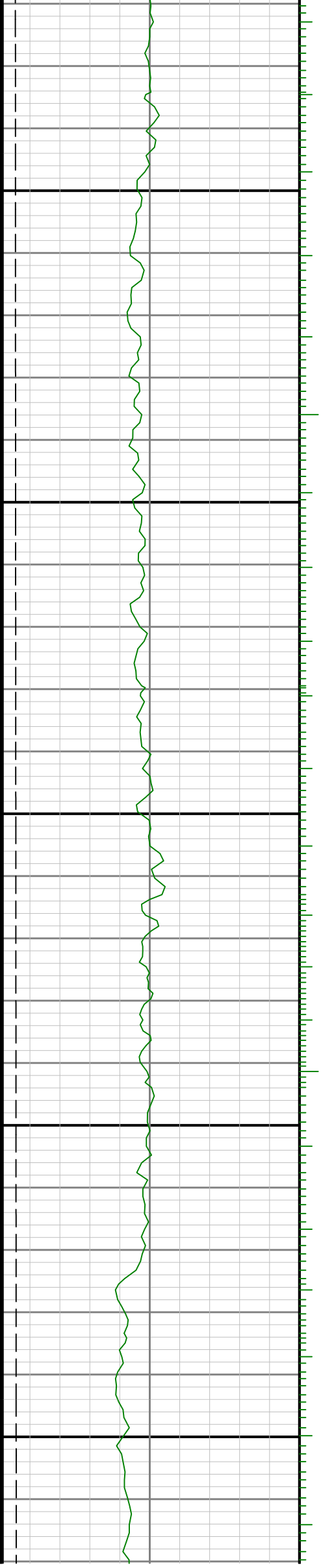
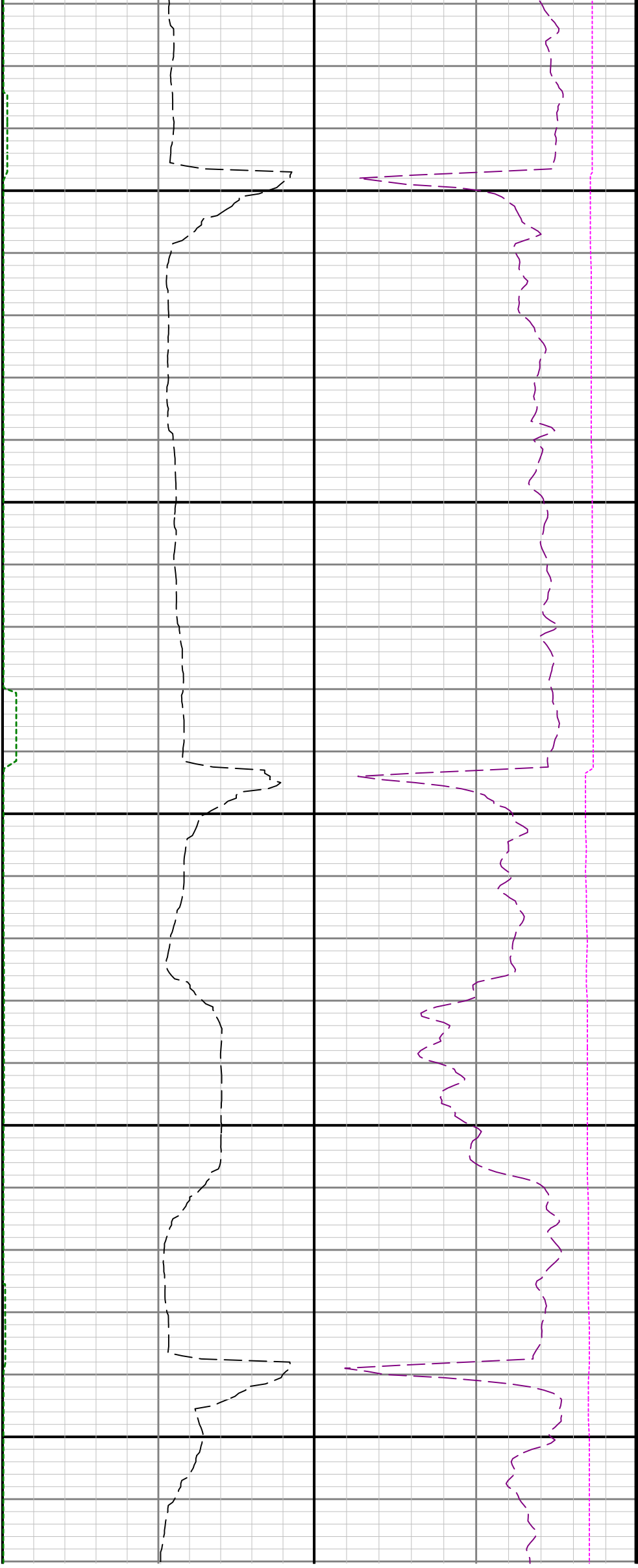


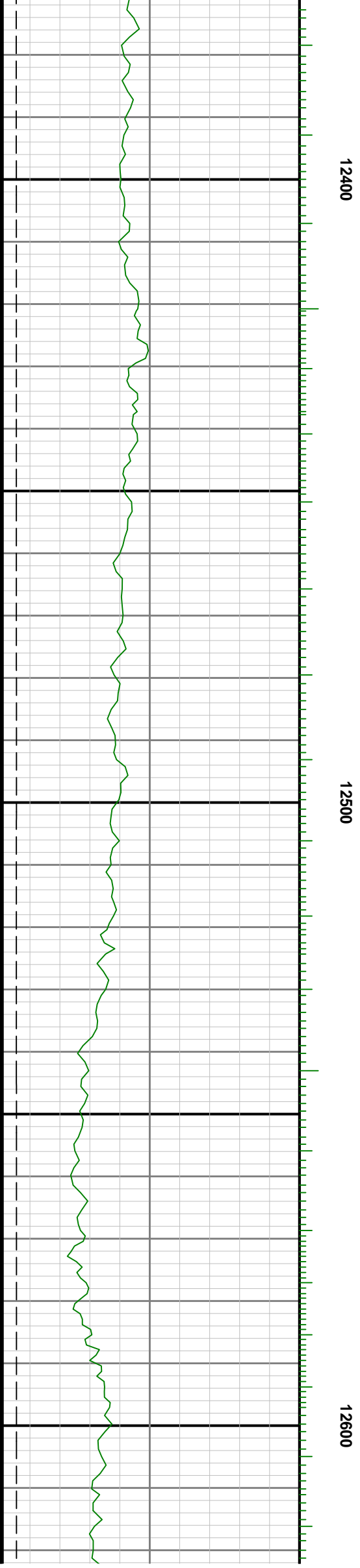
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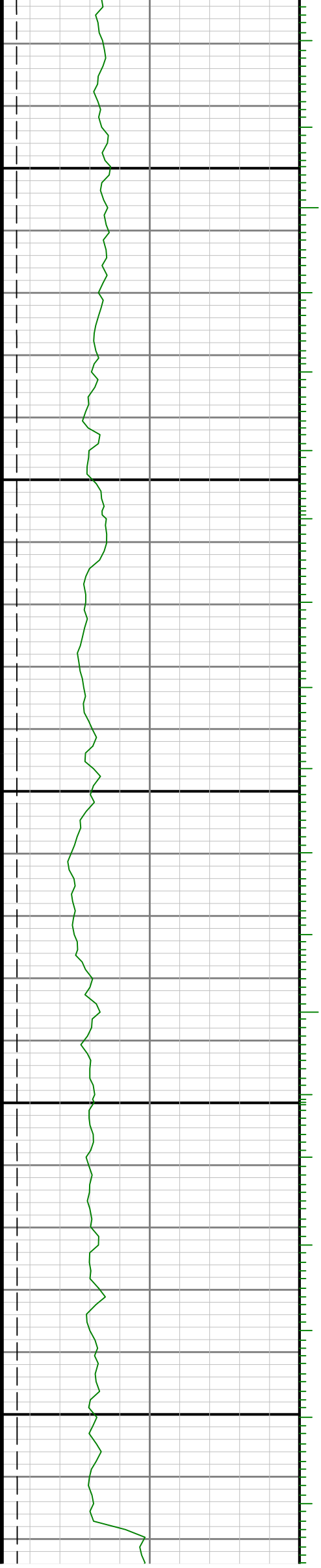


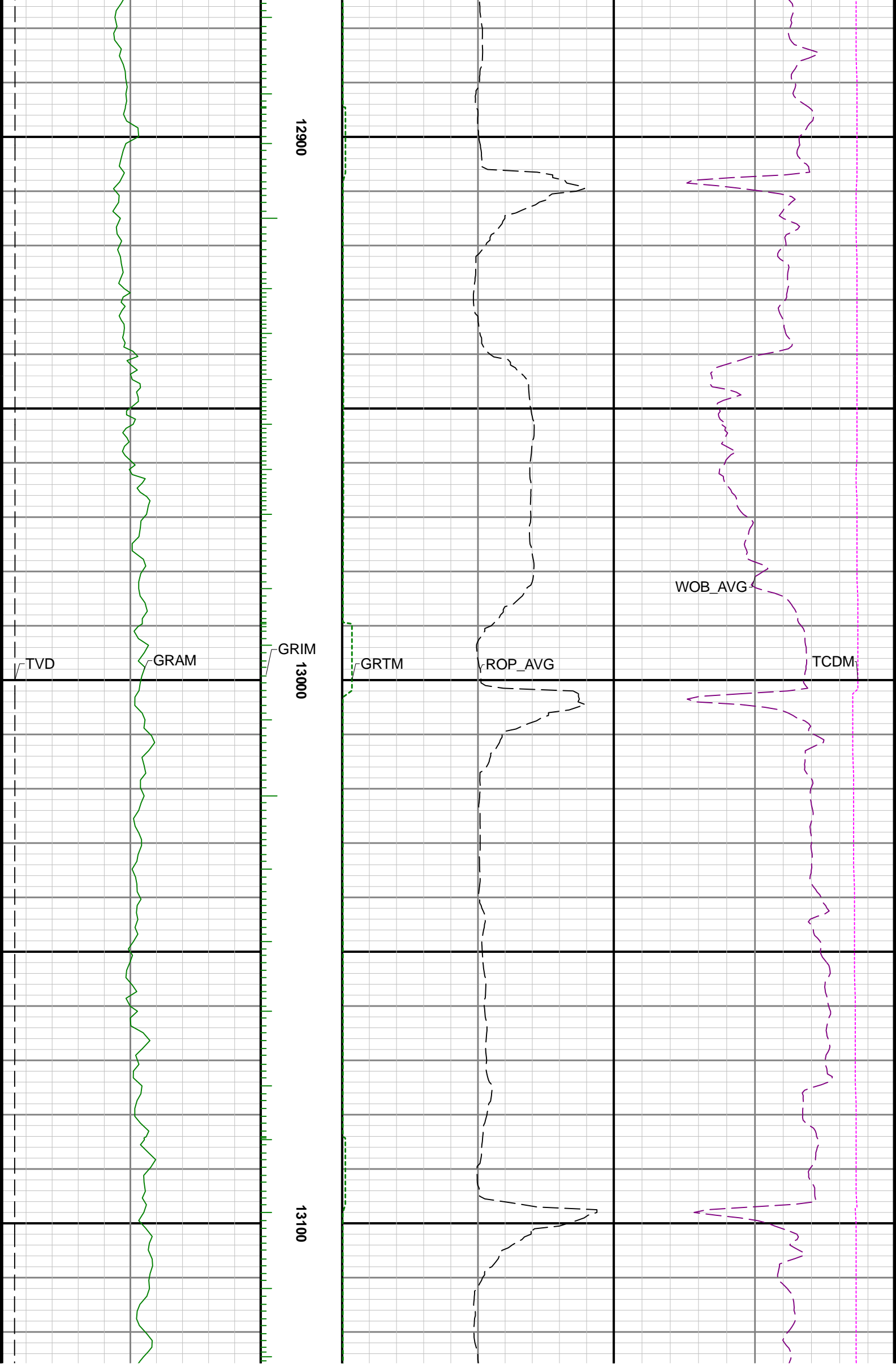


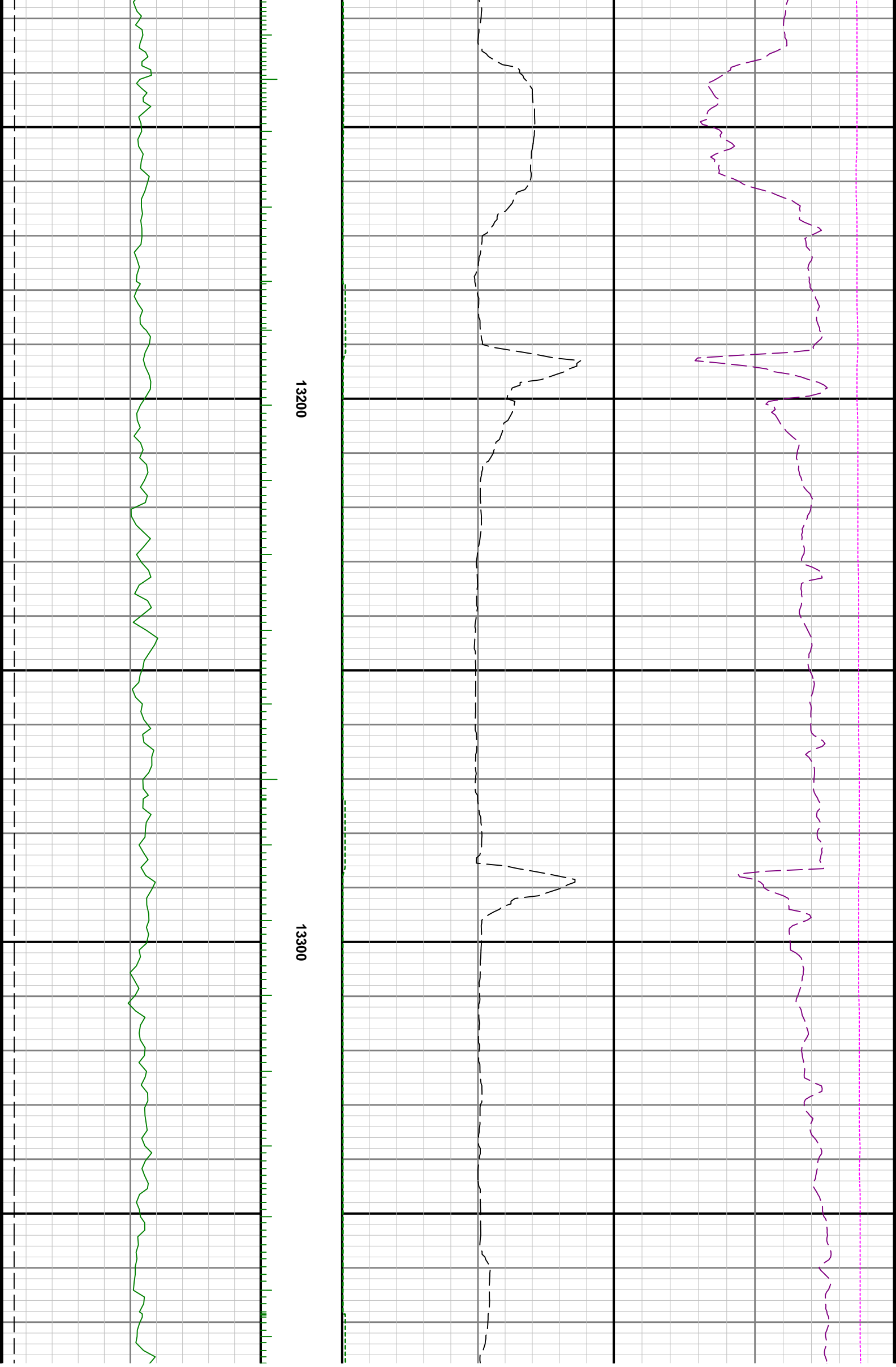


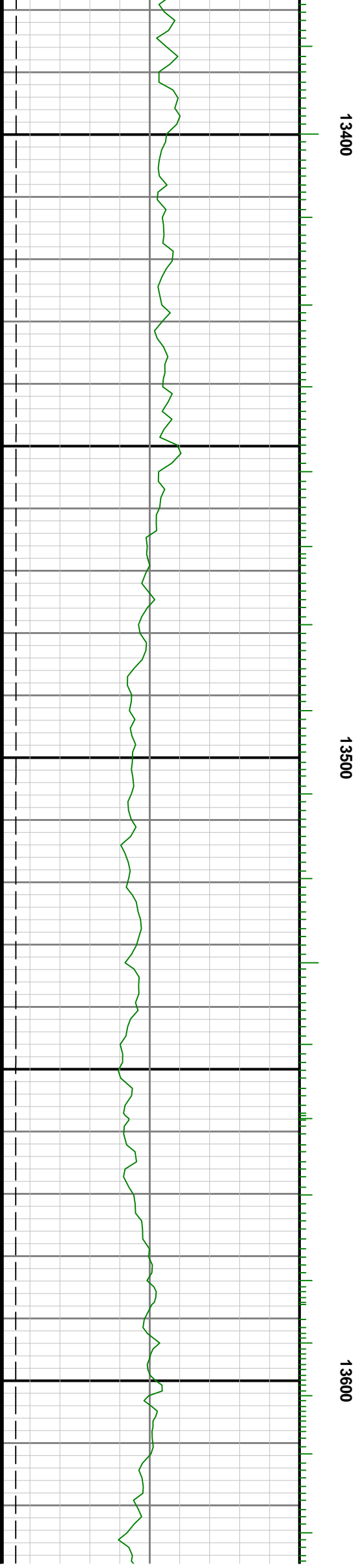
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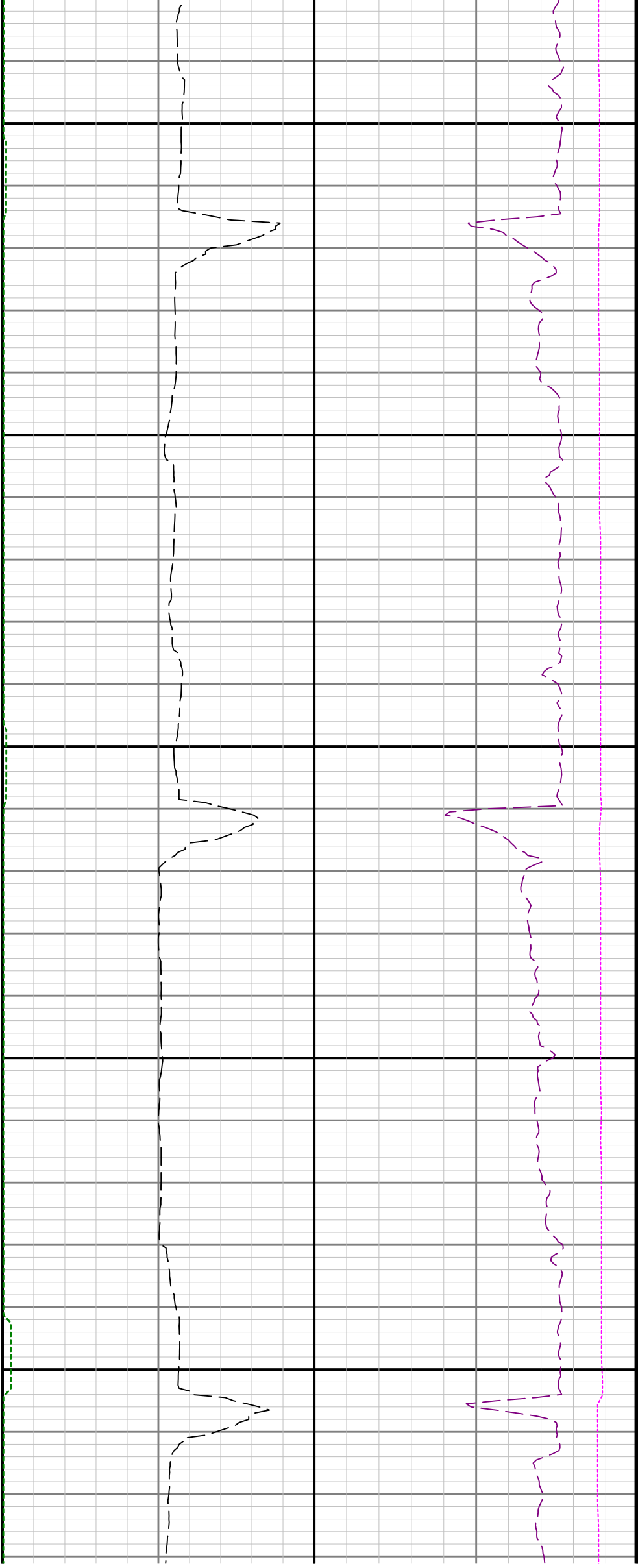
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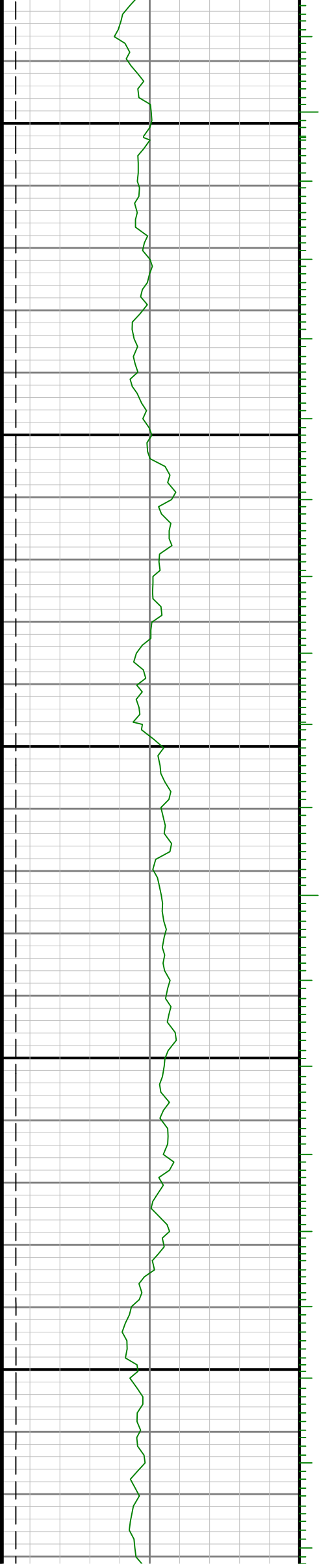


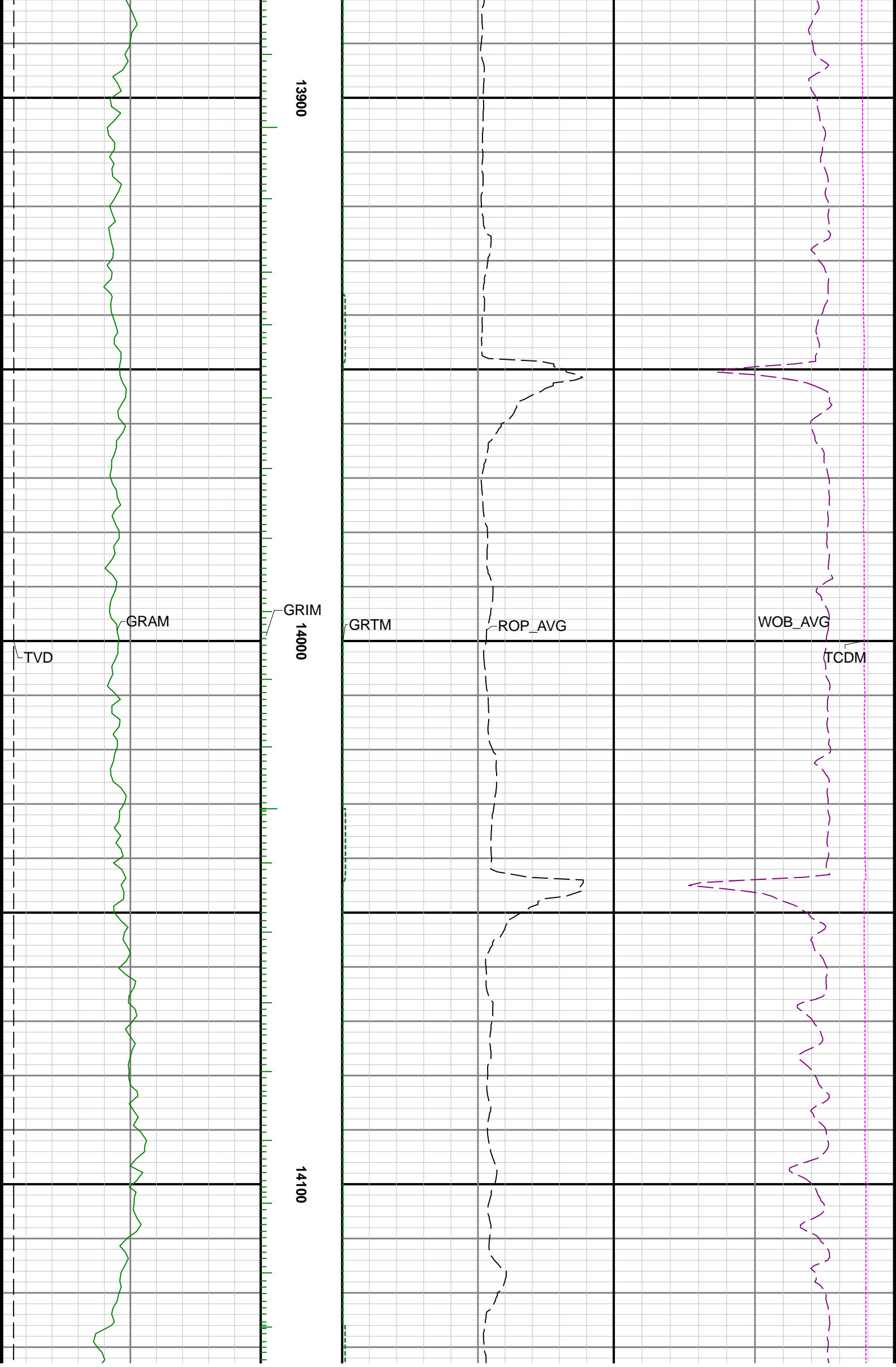


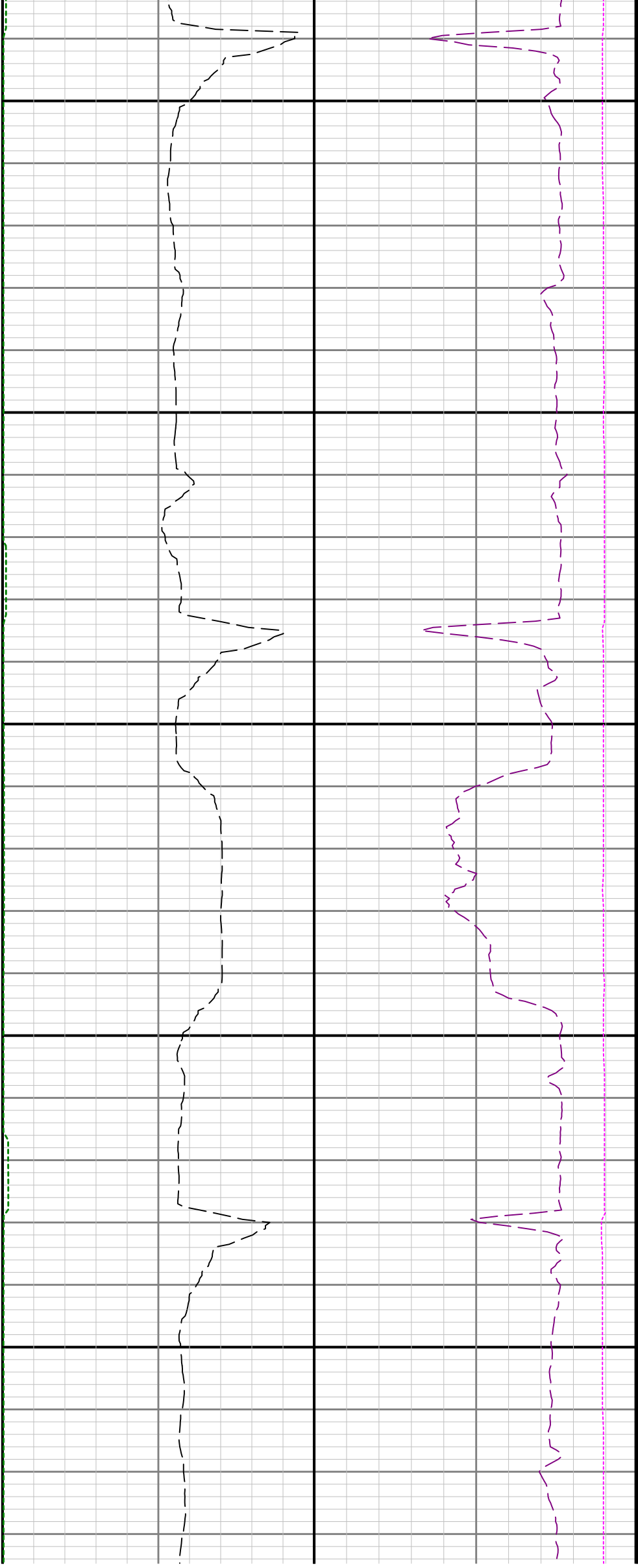


13700

13800

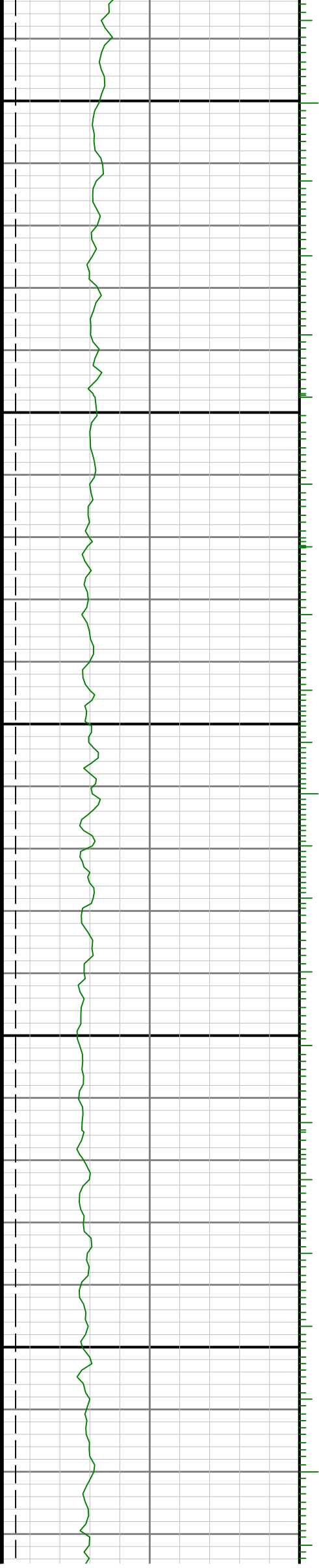






14200

14300

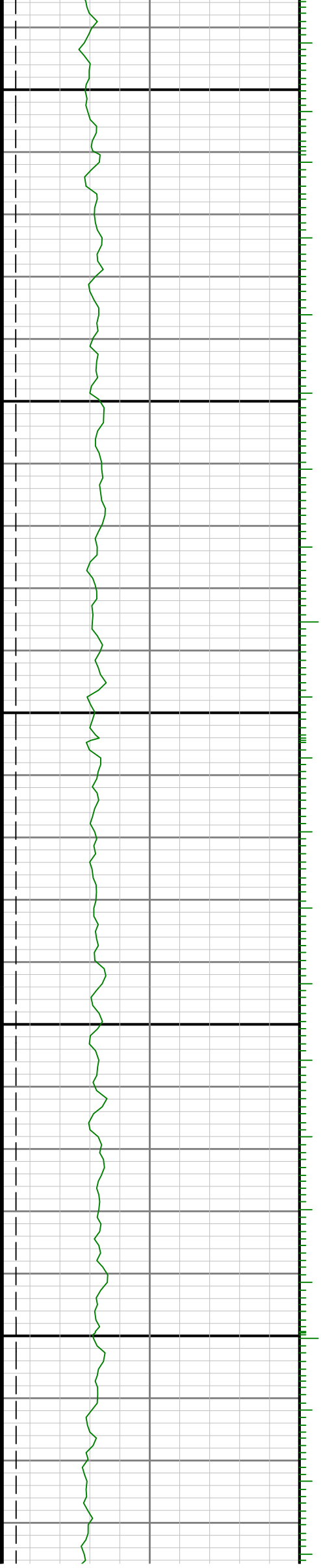


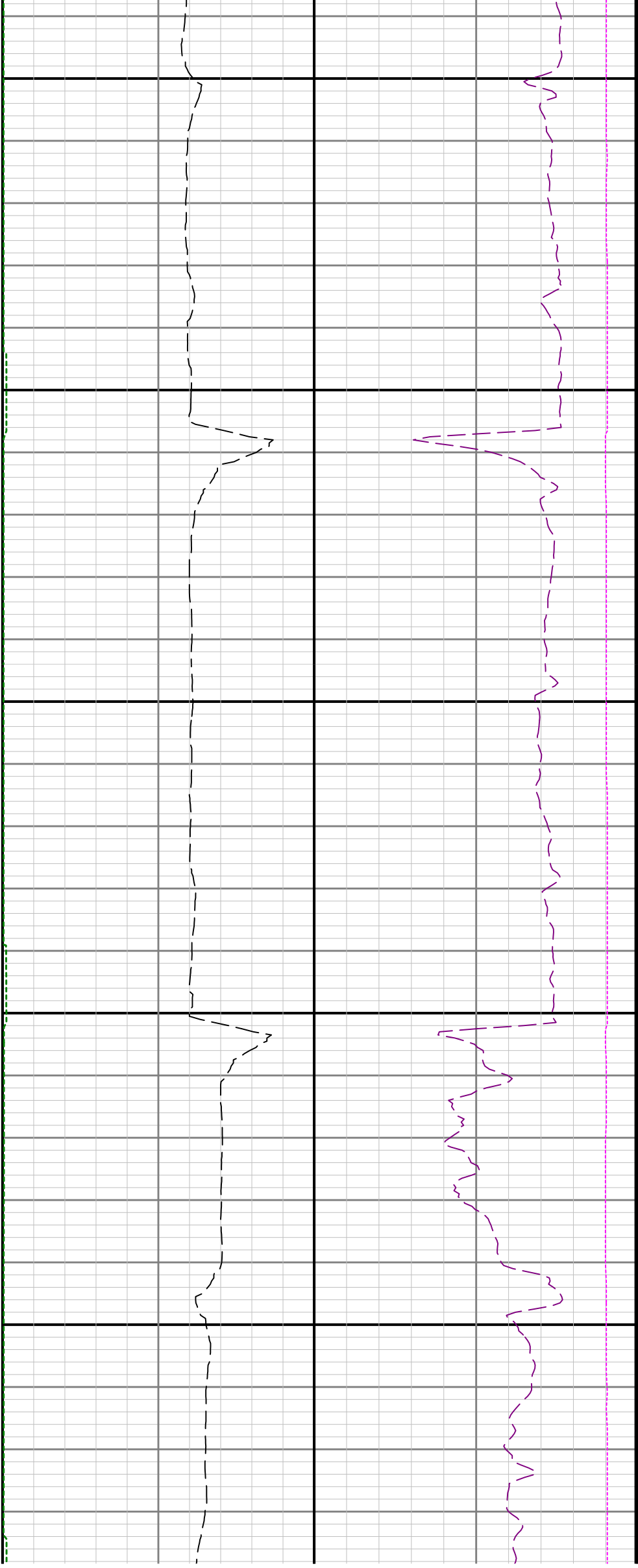


14400

14500

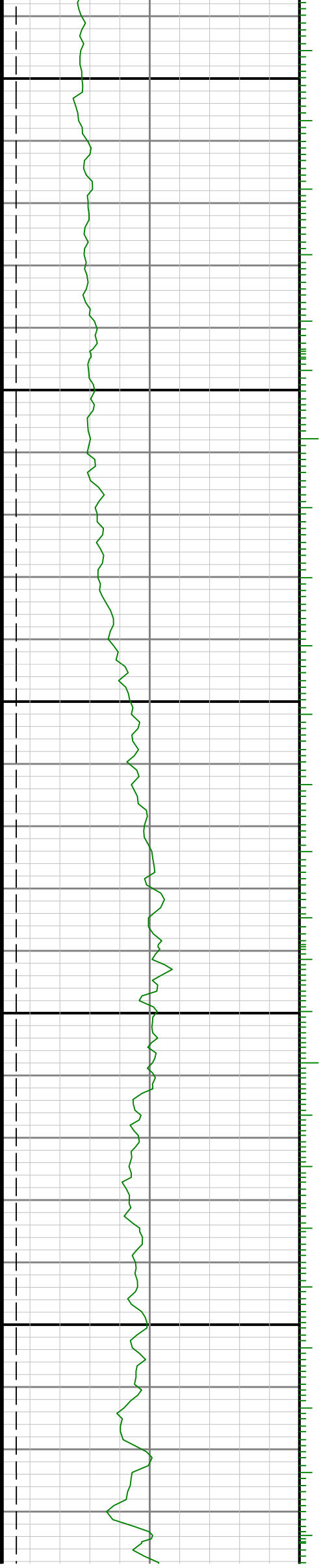
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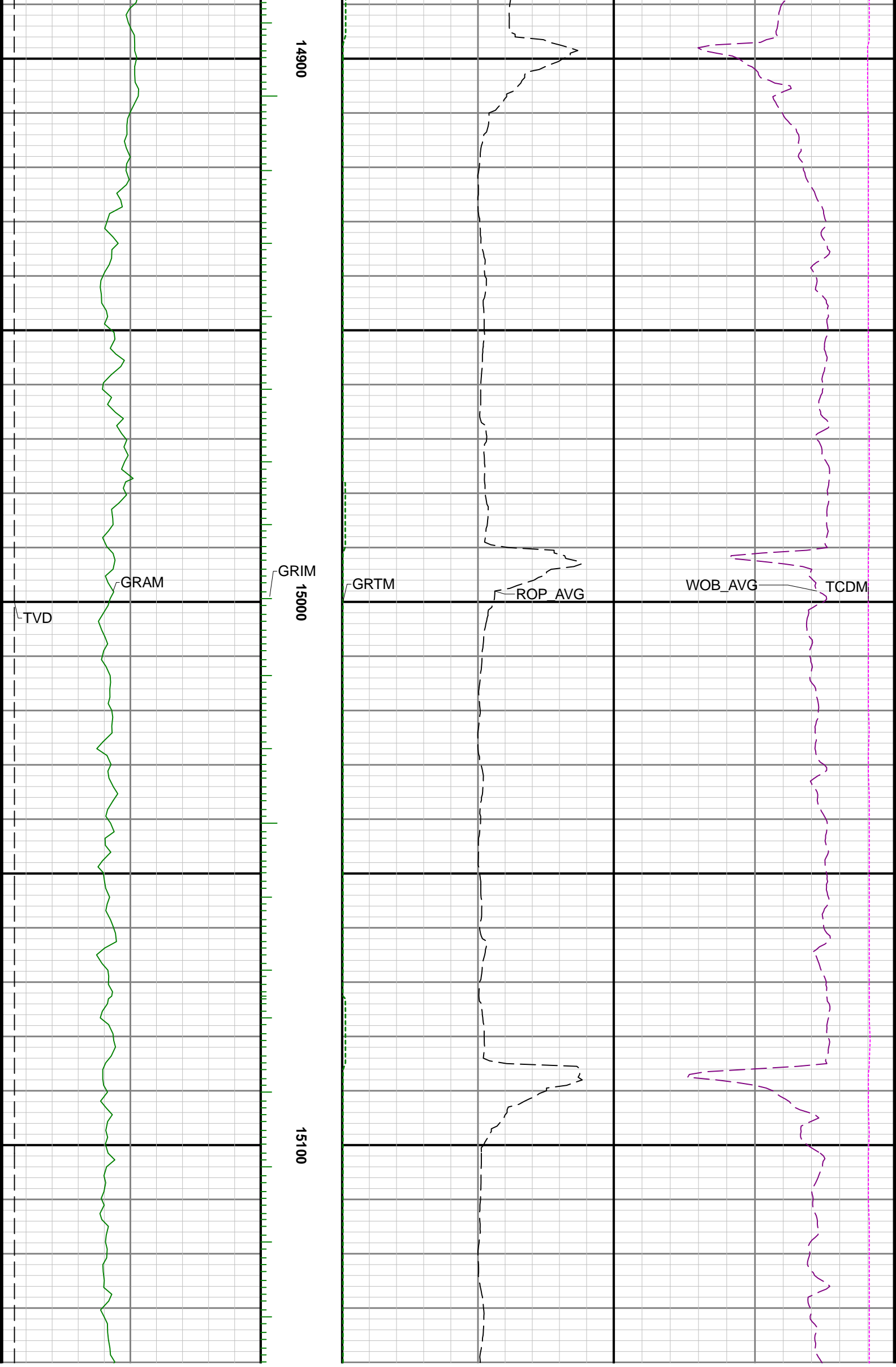


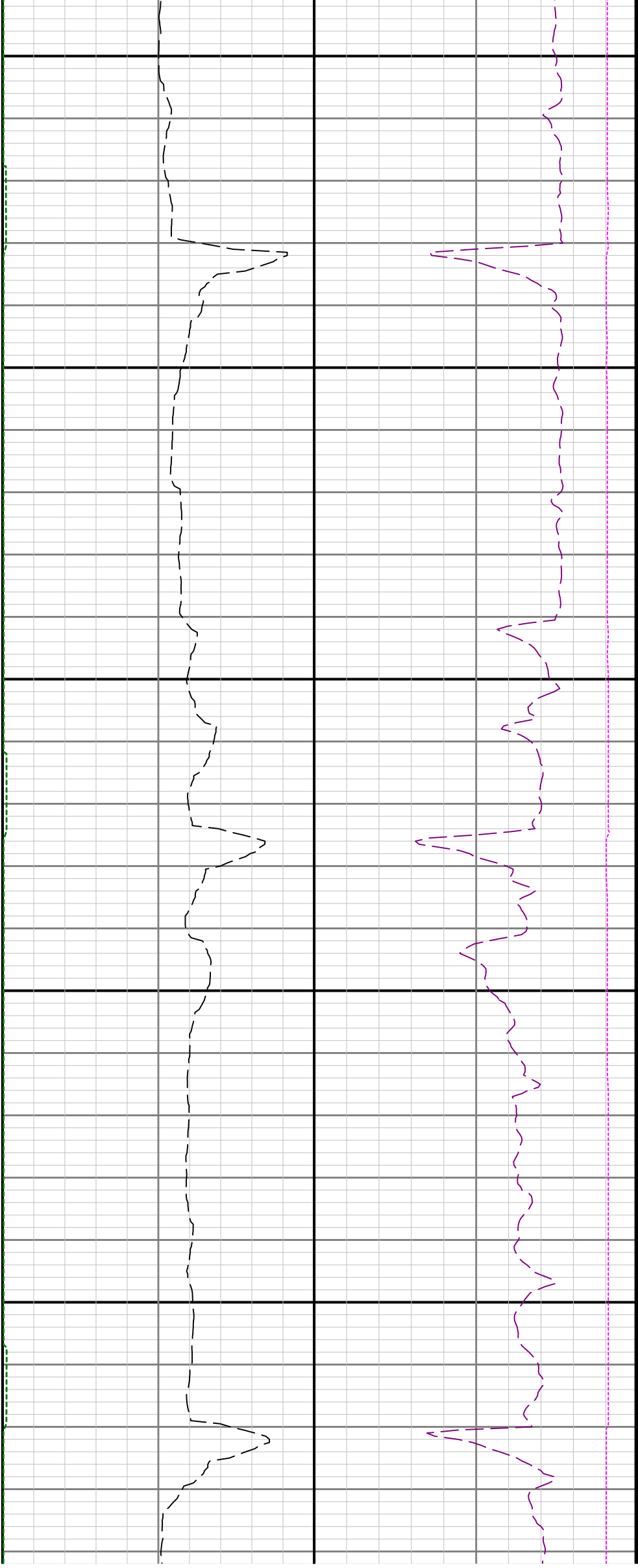


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14800

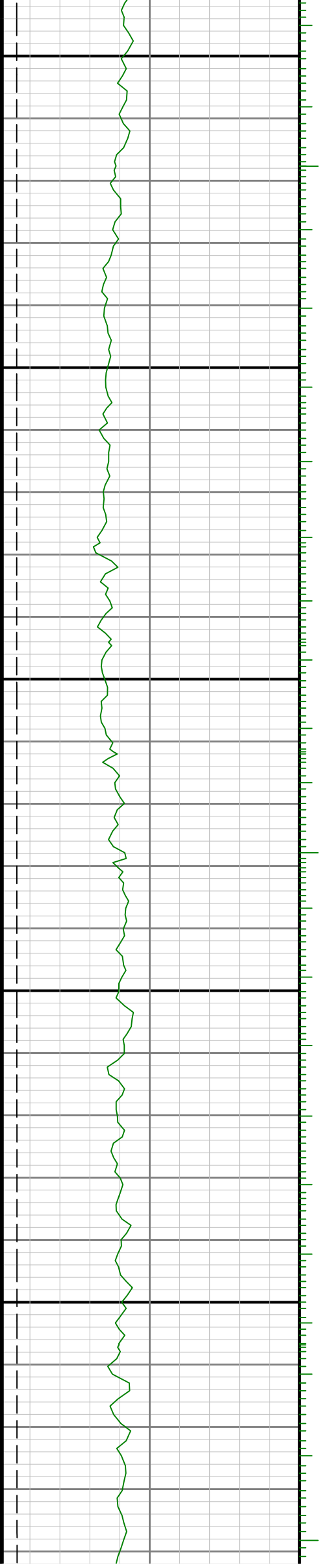


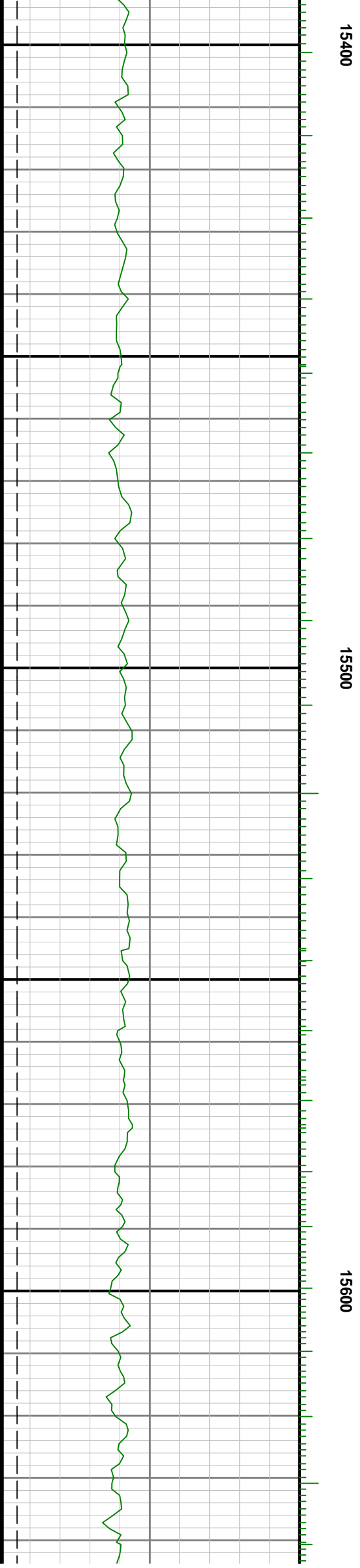
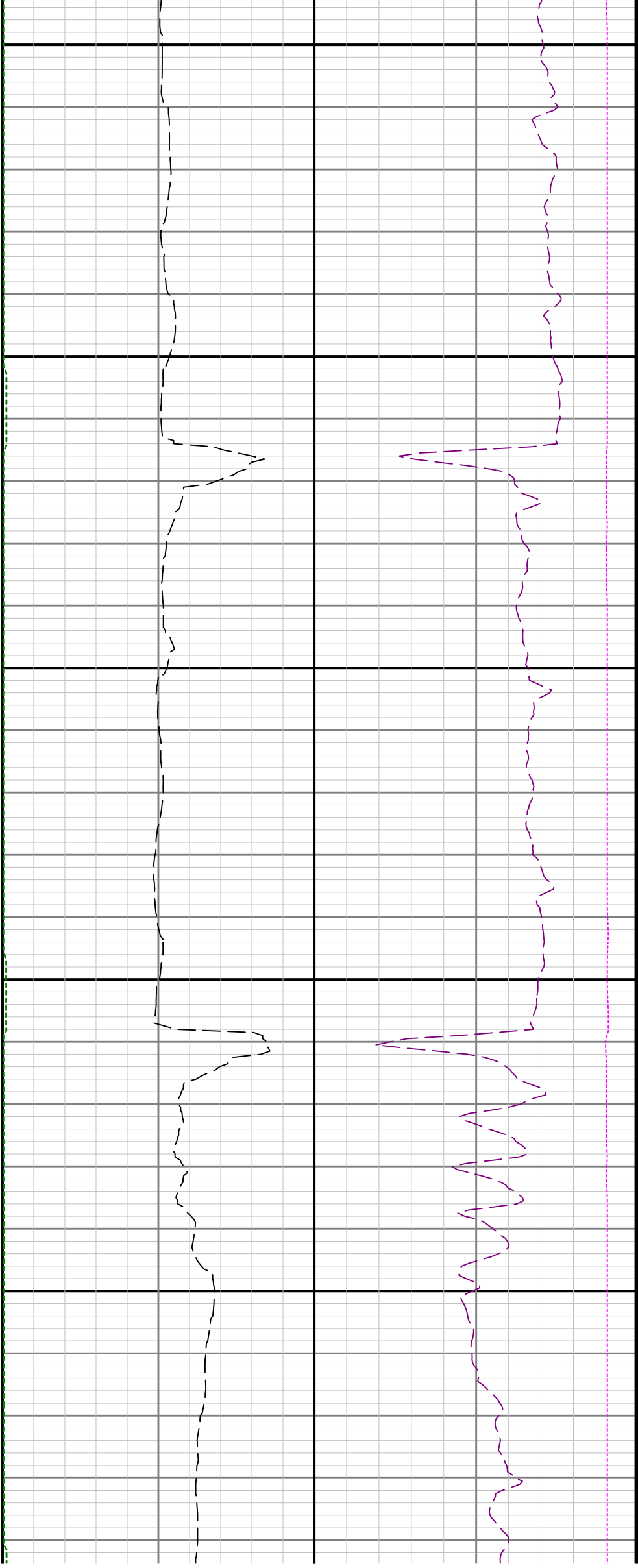


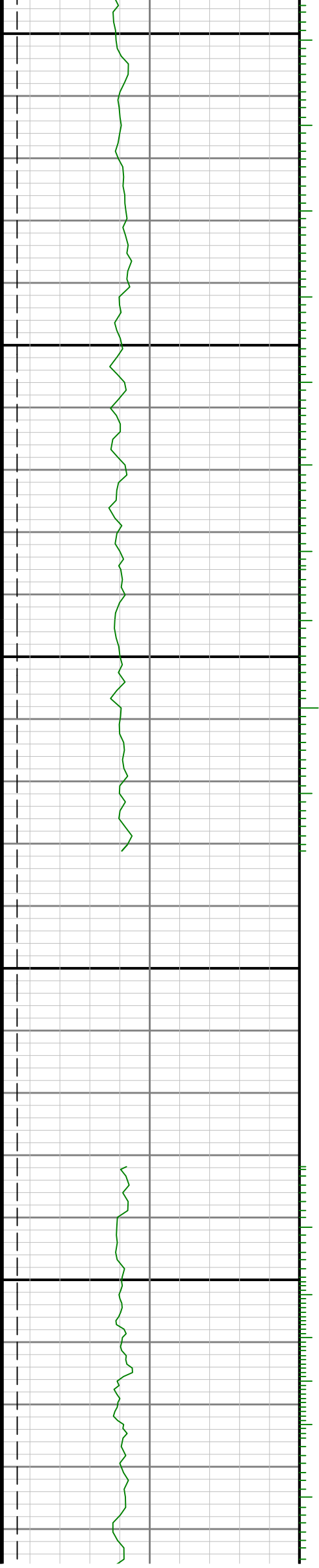


15200

15300





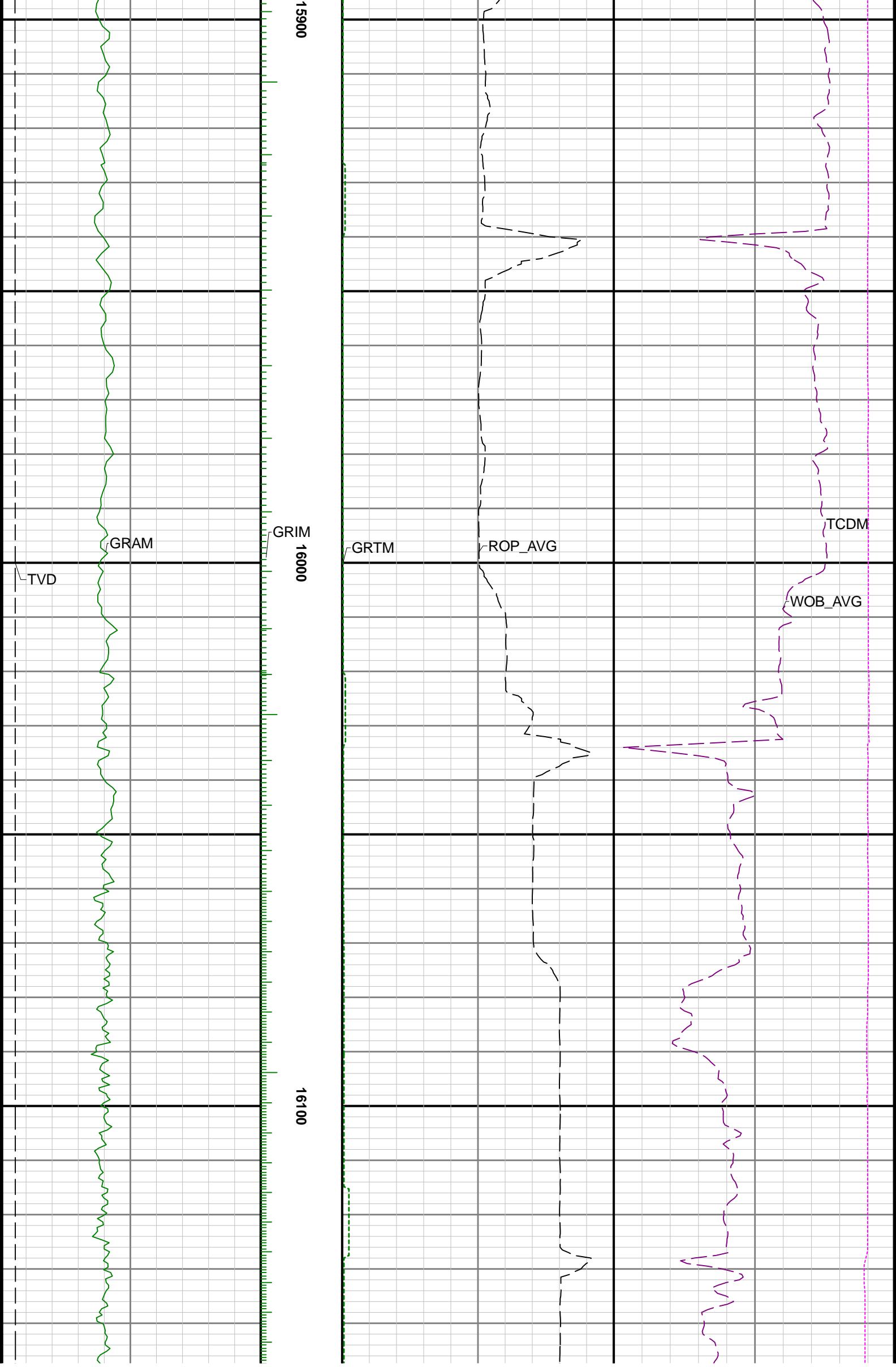


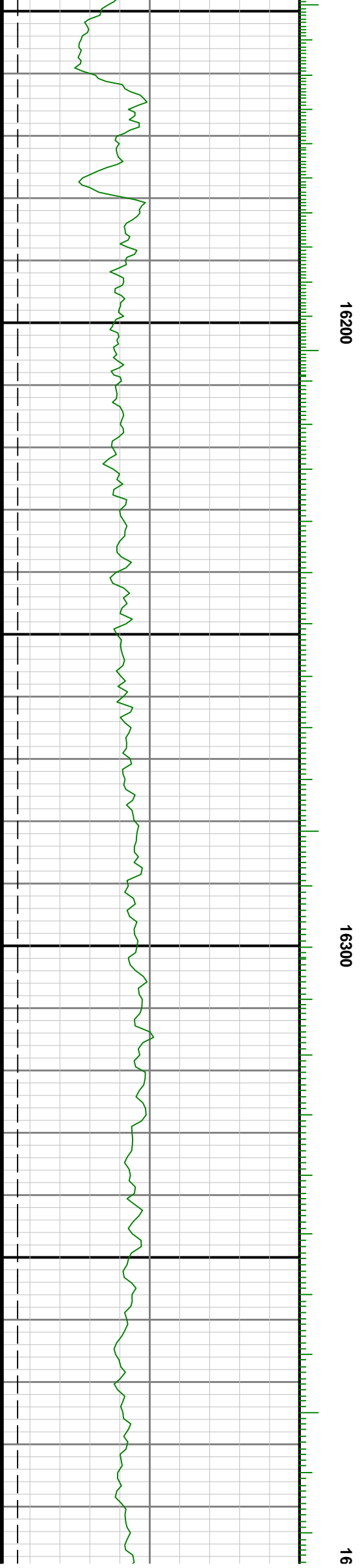
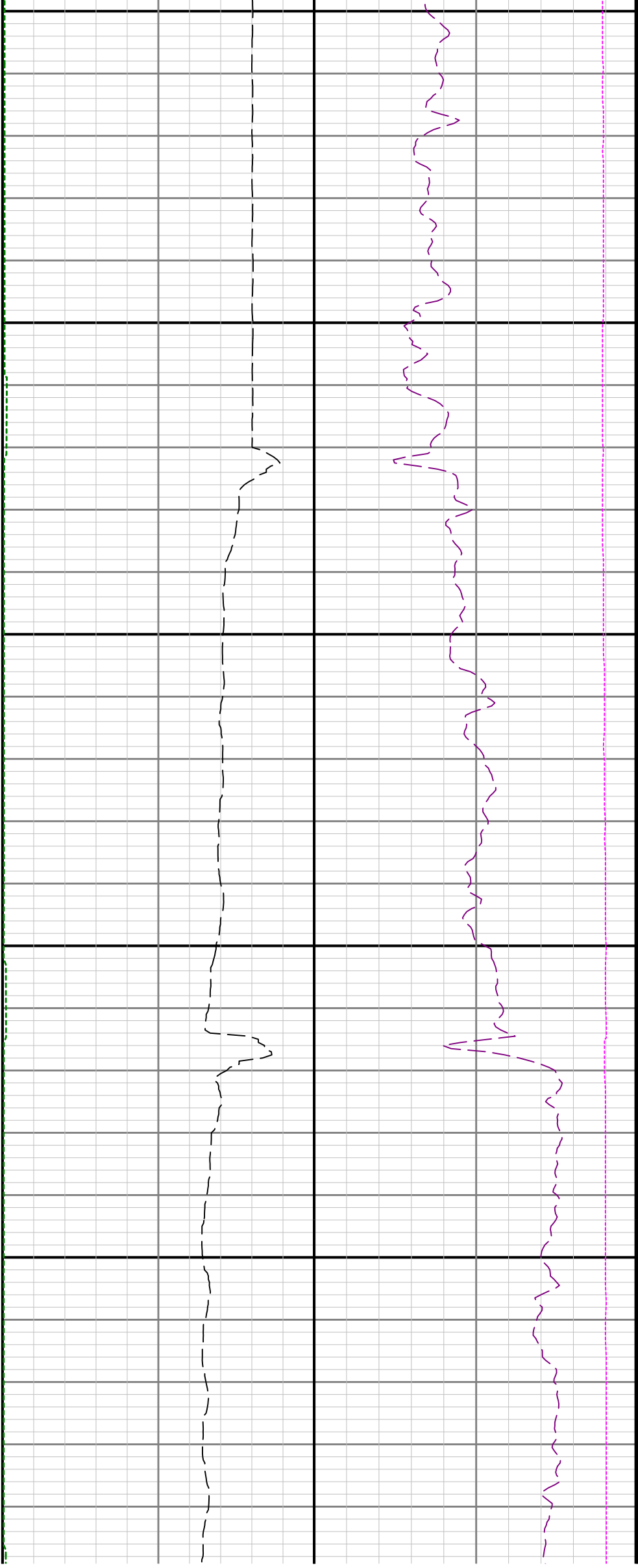
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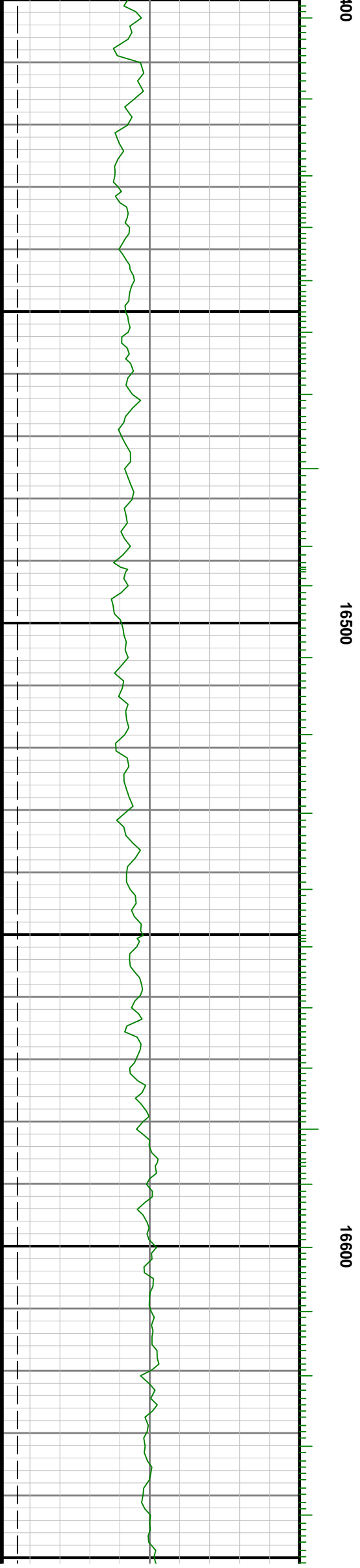
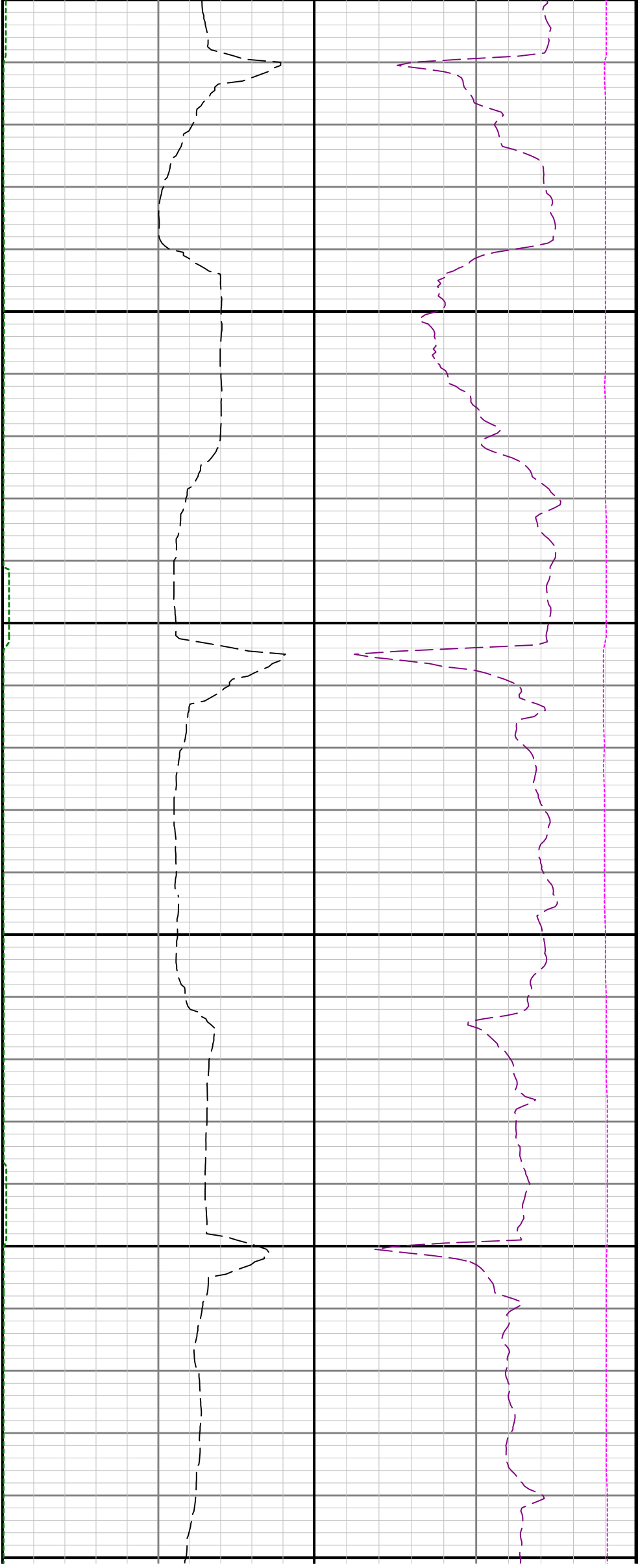
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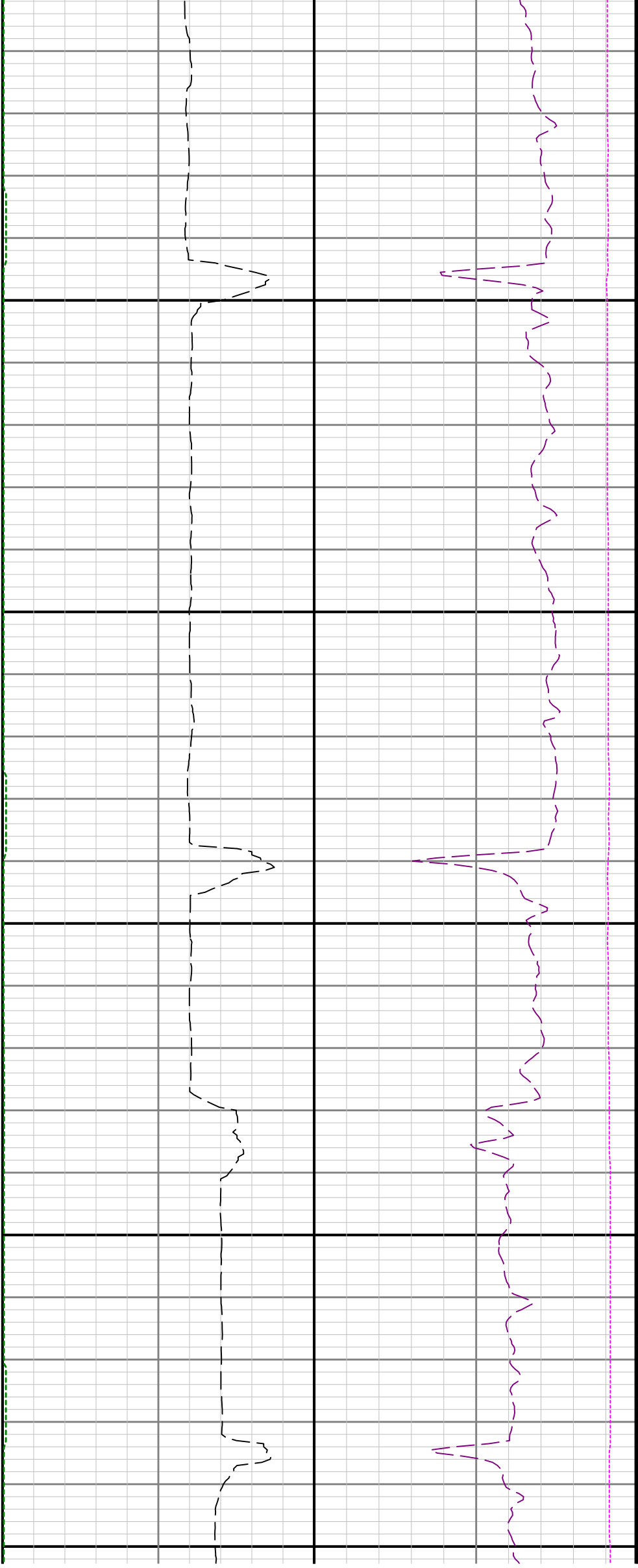


See Remark 1





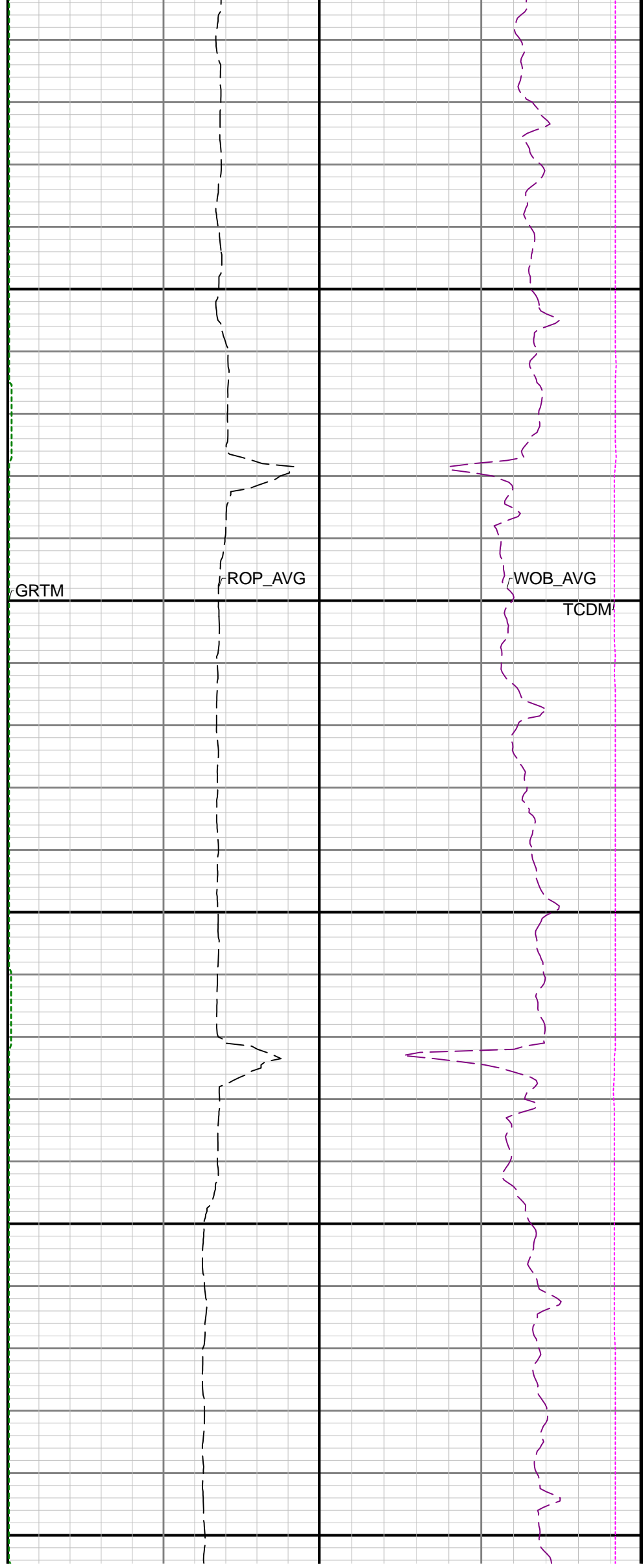
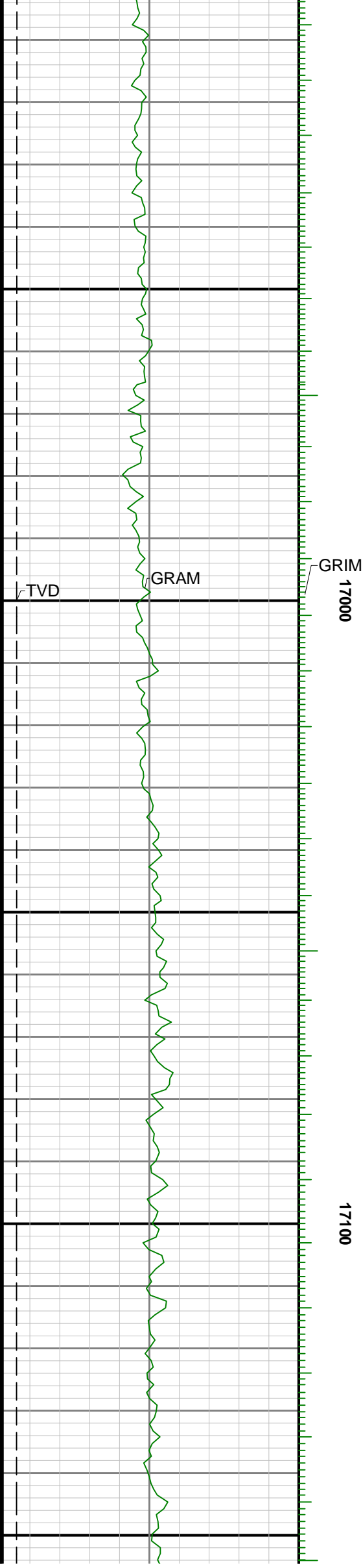


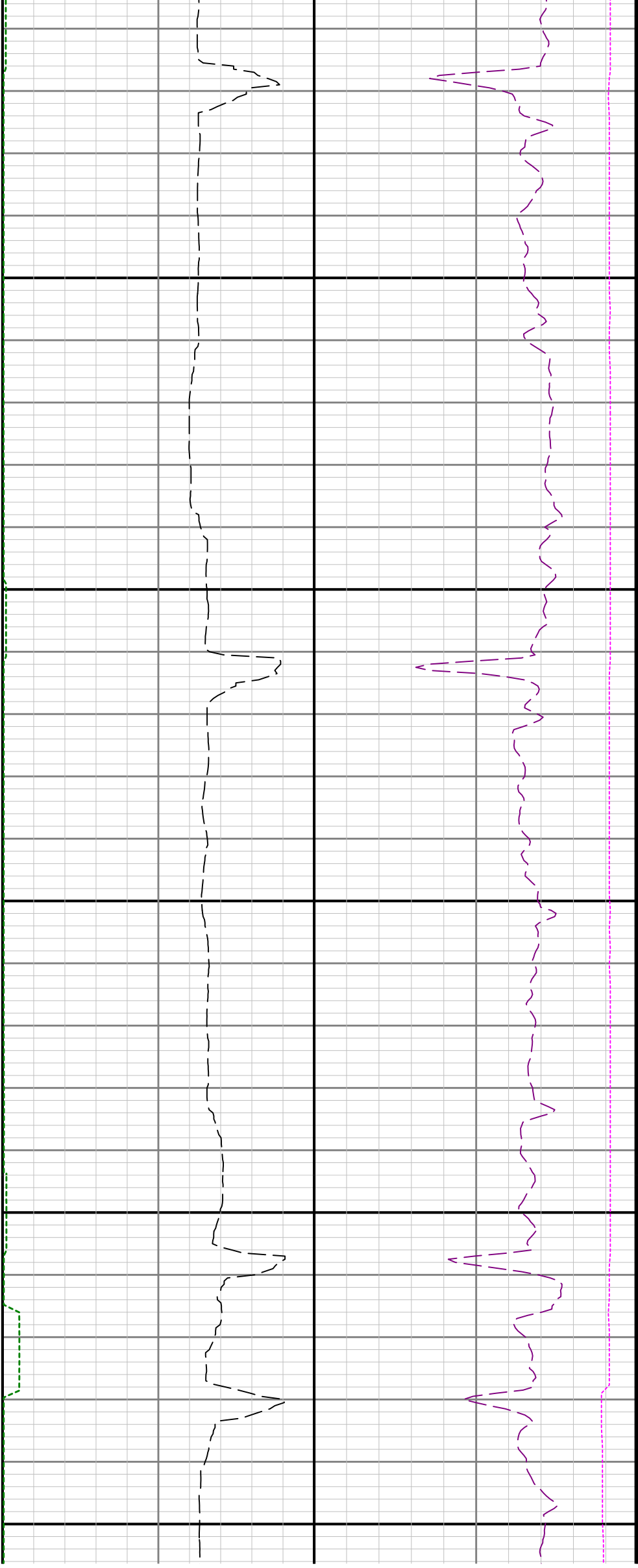


16700

16800

16900





17200

17300

17400

