


LWD MEMORY LOG										
<div>BAKER HUGHES</div> <div>a GE company</div> <div></div>			Gamma Ray							
Scale:			Company: Noble Energy							
1:240			Well: Guttersen State DD30-735							
Measured Depth			Field: Wattenberg							
County:			Weld							
Country: United States			State: Colorado							
Driller's Depth			Other Services:							
Depth Reference:			Surface Location:							
Status:			Latitude: 40° 11' 25.656" N							
Final Print			Longitude: 104° 28' 27.444" W							
API No: 05-123-48668-00			Directional							
Job ID: 110097046			SEC: 30 TWN: 3N RGE: 63W							
Permanent Datum (P.D.): Mean Sea Level			Elevation: 0.00 ft							
Log Measured From: Rig Floor			Above P.D.: 4853.00 ft							
Elev. KB: 4853.00 ft			Elev. DF: 4823.00 ft							
Elev. GL: 4823.00 ft										
Dates			Magnetic Field Reference							
Interval										
From: 2019-12-01			Drilled (ft)		Logged (ft)		Azi Reference North:		Grid Dip Angle: (deg)	66.58
To: 2019-12-02			Top: 1934.00		Top: 1934.00		Total Magnetic Field Strength: (nT)		52079	
Spud: 2019-11-22			Bottom: 17052.00		Bottom: 17039.00		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	1934.00	9.625	36.00	30.00	1924.00		
8.500			1934.00	17052.00						
Mud Record										
Deviation Record										
Type			From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)		
Oil Based Mud			1934.00	17052.00	8.500	15118.00	0.58 291.52	90.07 358.18		
Acquisition System										
Software Version			Other							
Cadence RT 5.4			Rig: H&P 321							
Pilot Studio 5.4.8632.4			Contractor: Helmerich & Payne Drilling Co							
			District: RMA							
			Unit: D&E							

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Log Run Summary												
Run No	Bit Run No.	Bit Size	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	8.500	PDC	3.00	AutoTrak Curve	1934.00	17039.00	1934.00	17052.00	2019-11-29 13:21	2019-12-01 14:00	42.05

Crew								
Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Andrew Hays	2019-11-28	2019-12-02						

Mud Properties Record											
Date / Time	Run No.	Depth	Mud Type	Density	Viscosity	pH	Fluid Loss	Oil / Water	Source	Total Chlorides	K+
		(ft)		(ppg)	(cP)		(cm3)			(ppm)	(%)
2019-11-29 05:28	1	1934.00	Oil Based Mud	9.4	15	N/A	N/A	67.3/22.3	Active Pit	27000	0.00
2019-11-30 16:00	1	9850.00	Oil Based Mud	9.4	12	N/A	N/A	70/19	Active Pit	32000	0.00
2019-12-01 05:00	1	14251.00	Oil Based Mud	9.7	14	N/A	N/A	69.5/18	Active Pit	30000	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	14186734	Near Bit VSS	5.93	6.73	7.000	4.330
1	AutoTrak Curve Steering Unit	14186734	Near Bit Inclination	5.93	6.73	7.000	4.330
1	AutoTrak Curve MWD	12109322	Gamma (single)	2.49	12.90	7.000	3.250
1	AutoTrak Curve MWD	12109322	Directional (mag)	12.27	22.68	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

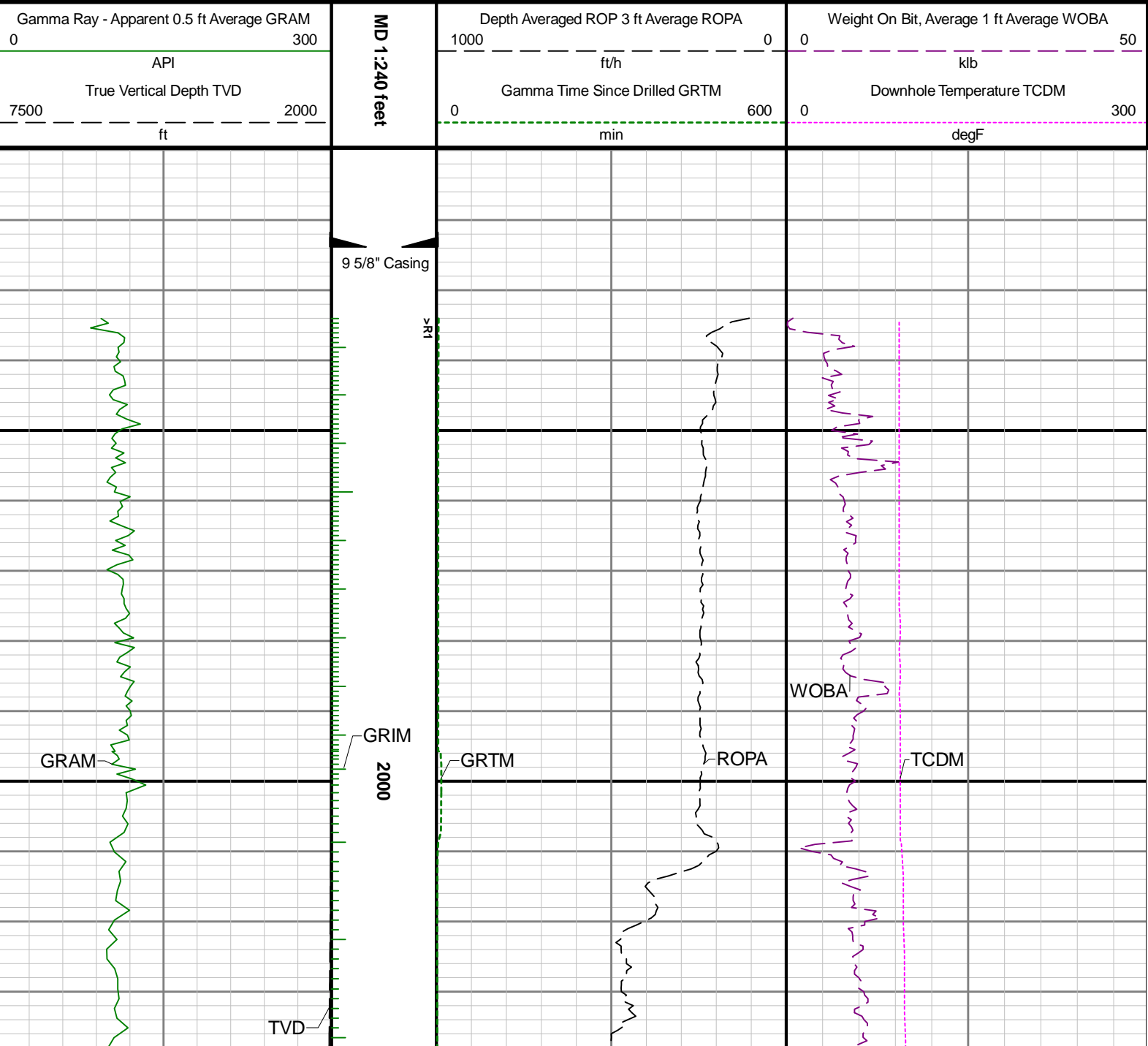
- 1
- Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.
- 2
- Baker Hughes LWD Run 1 utilized a 6.75 inch AutoTrak Curve service (Directional and Gamma Ray) behind an 8.5 inch bit and rotary steerable assembly from 1934 to 17052 feet MD (1934 to 6755 feet TVD).
- 3
- The Gamma Ray Apparent (GRAM) is presented 0 to 300 API, as per the customers request.
- 4
- Several gaps appear in the log due to drilling ahead before the assembly had time to properly power on.

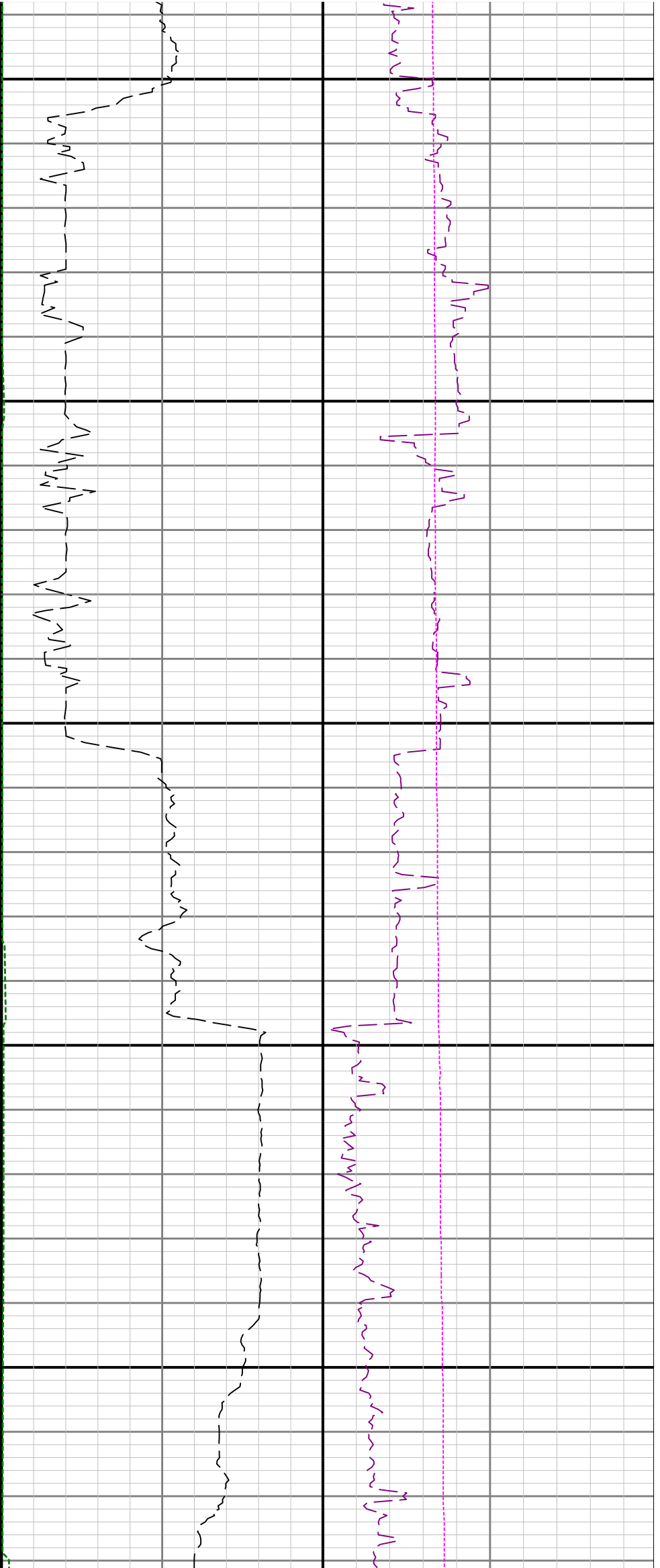
Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	17039.00	8.500	1	The interval from 17039 to 17052 feet MD (6755 feet TVD) was not logged due to the sensor offset to bit.

Curve Mnemonics

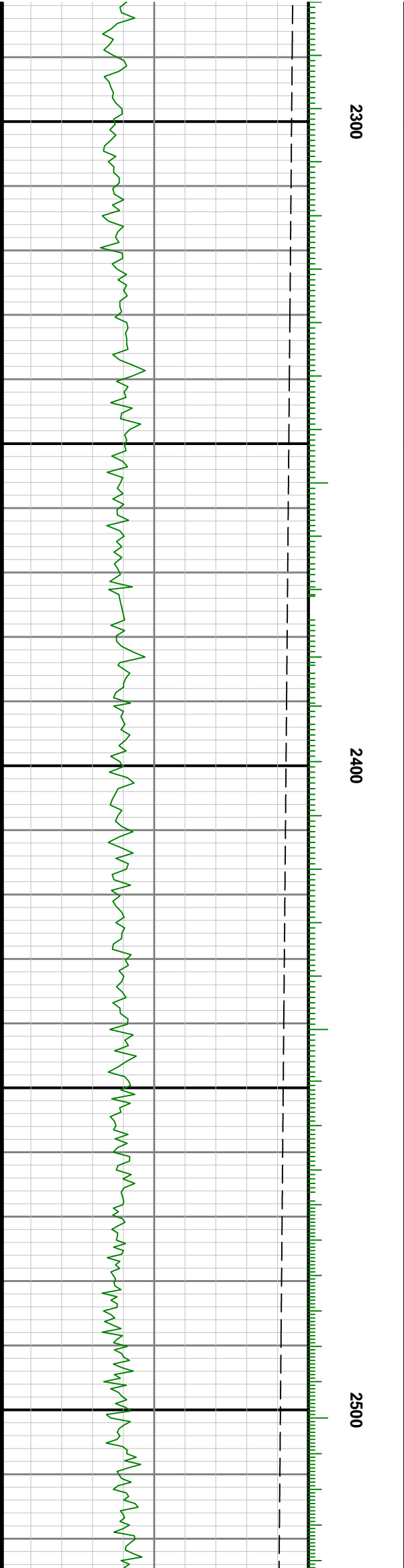
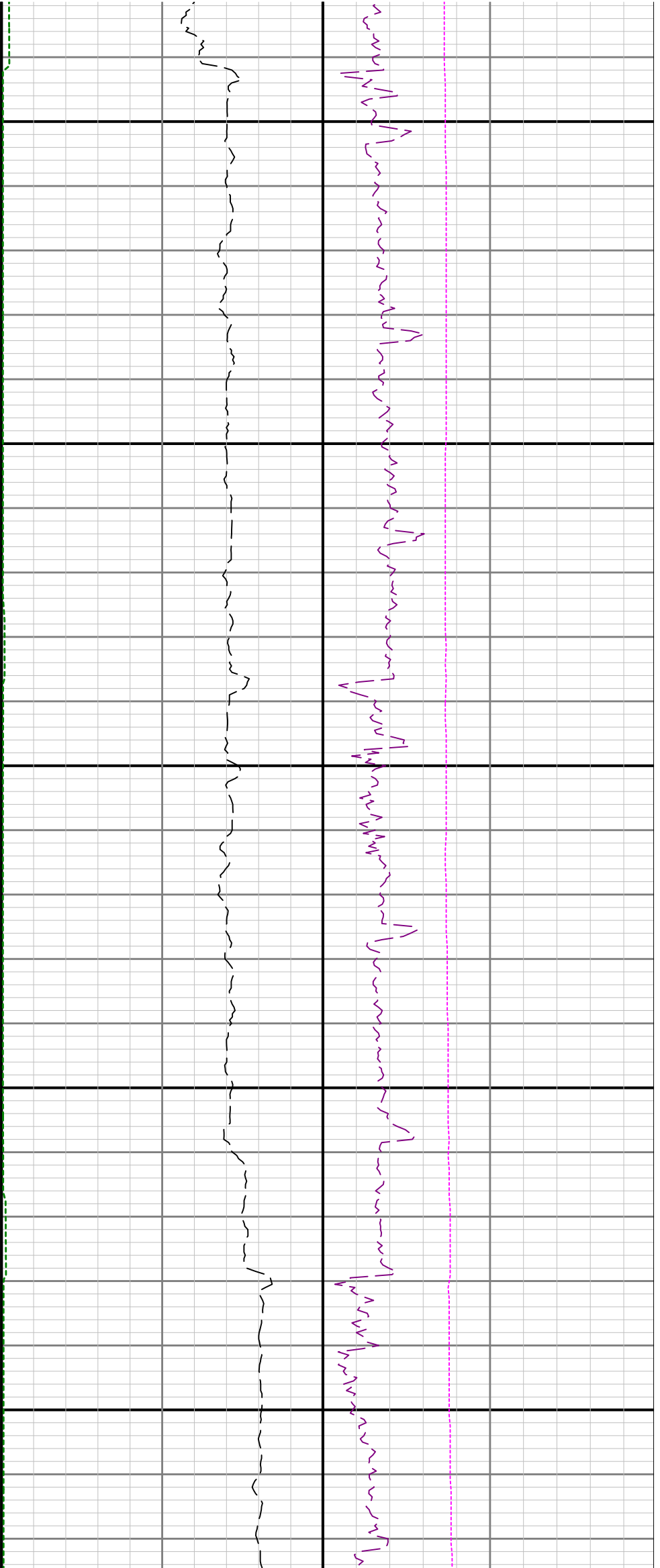
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory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

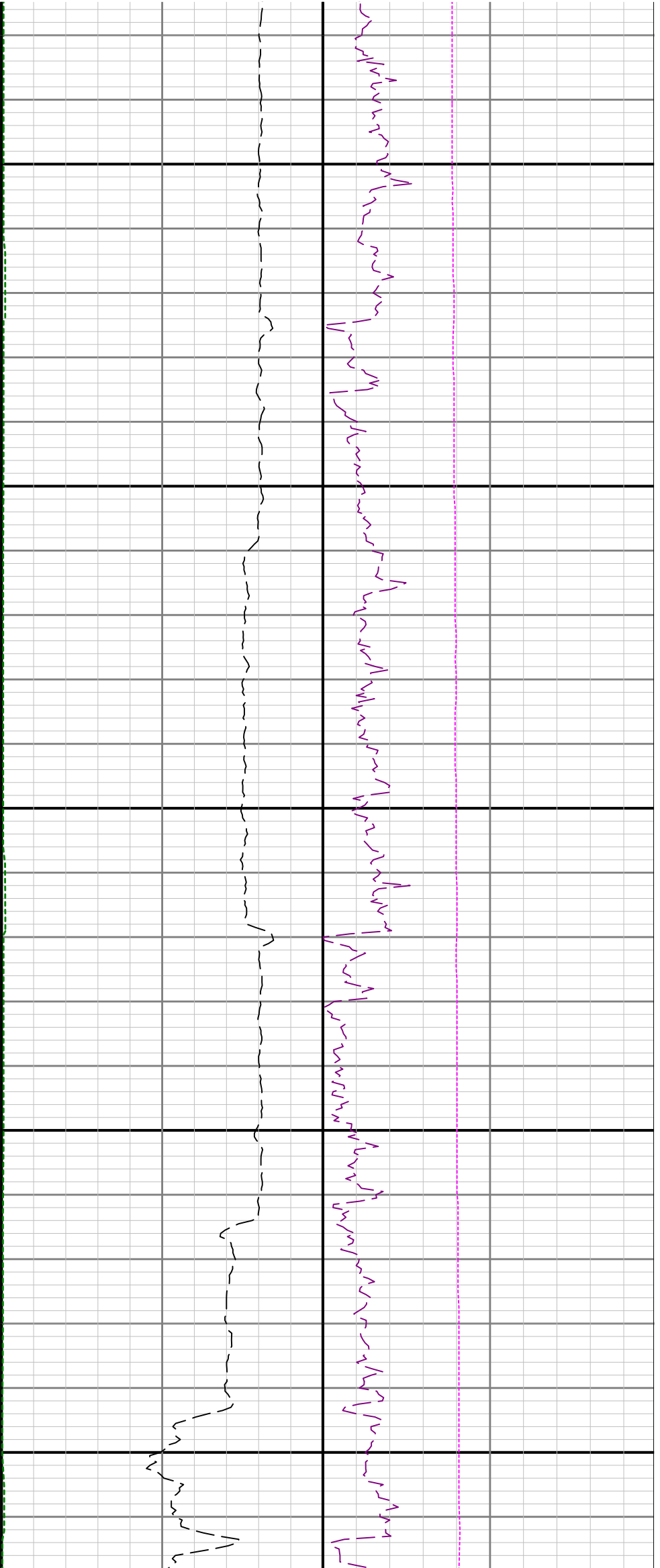




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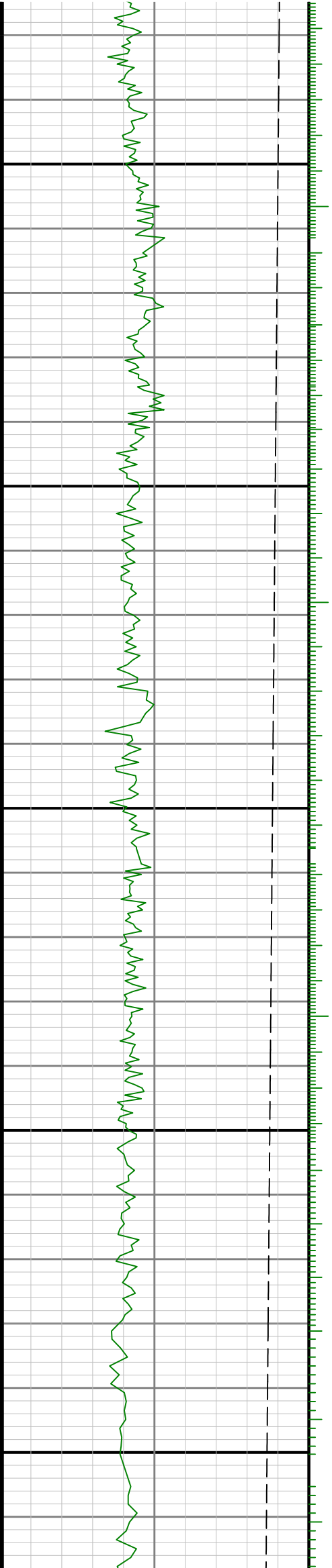
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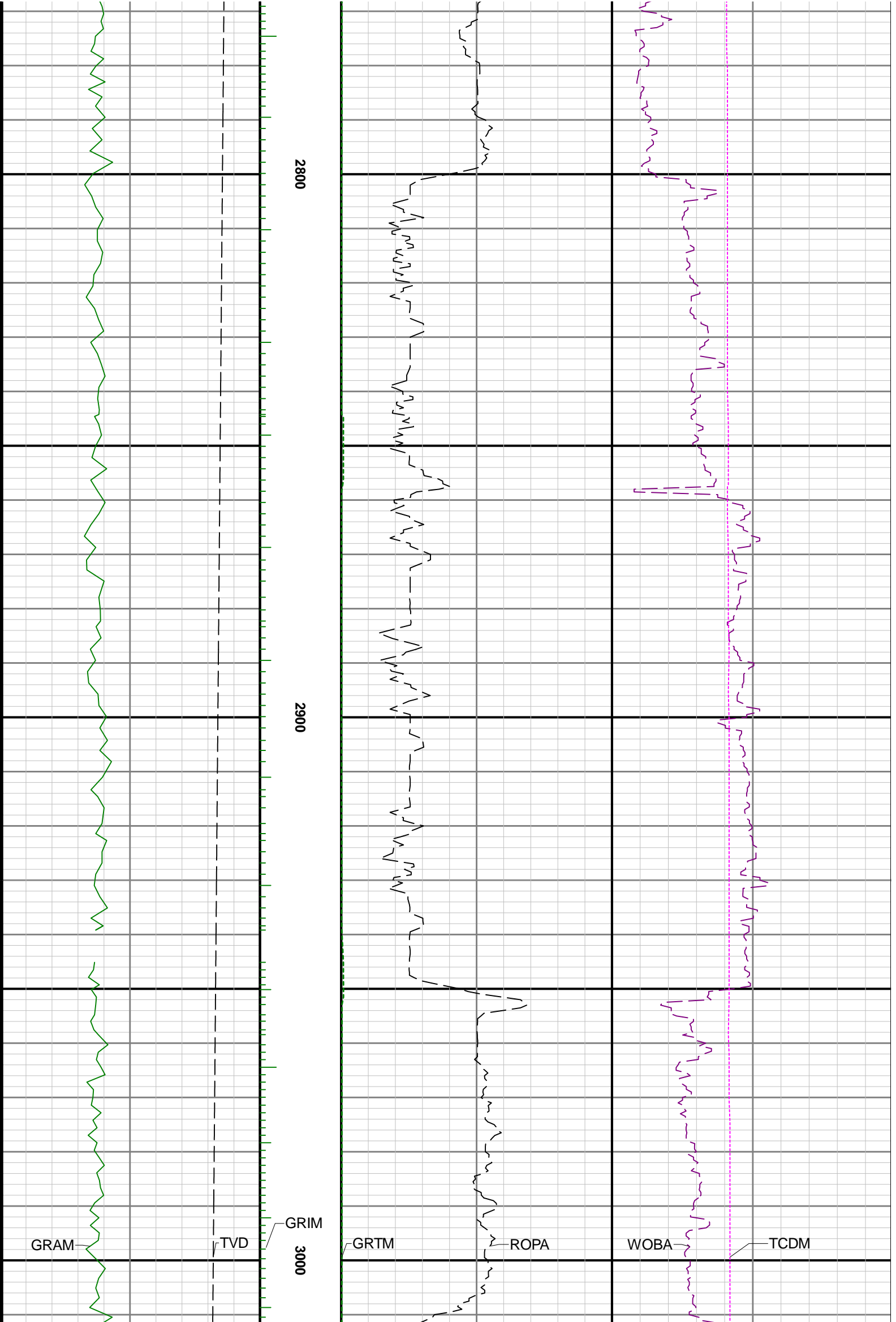


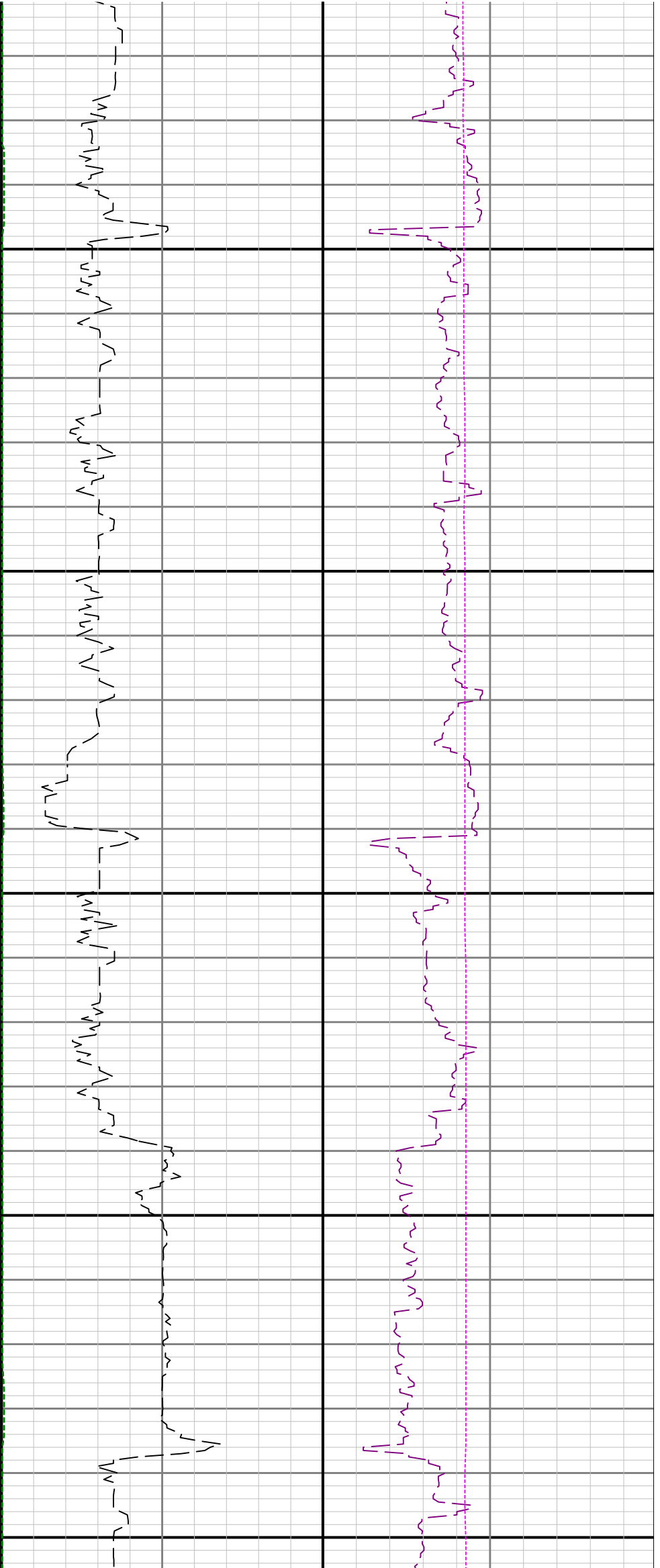


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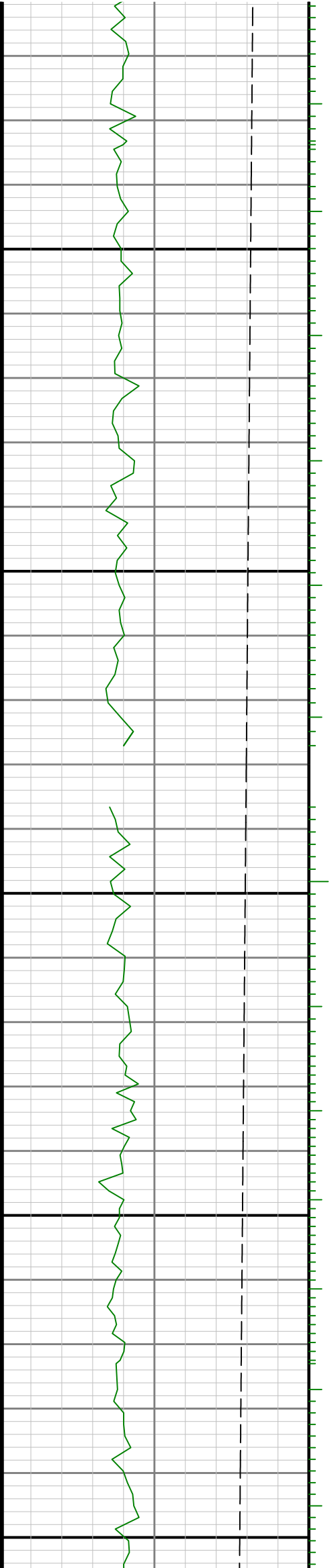


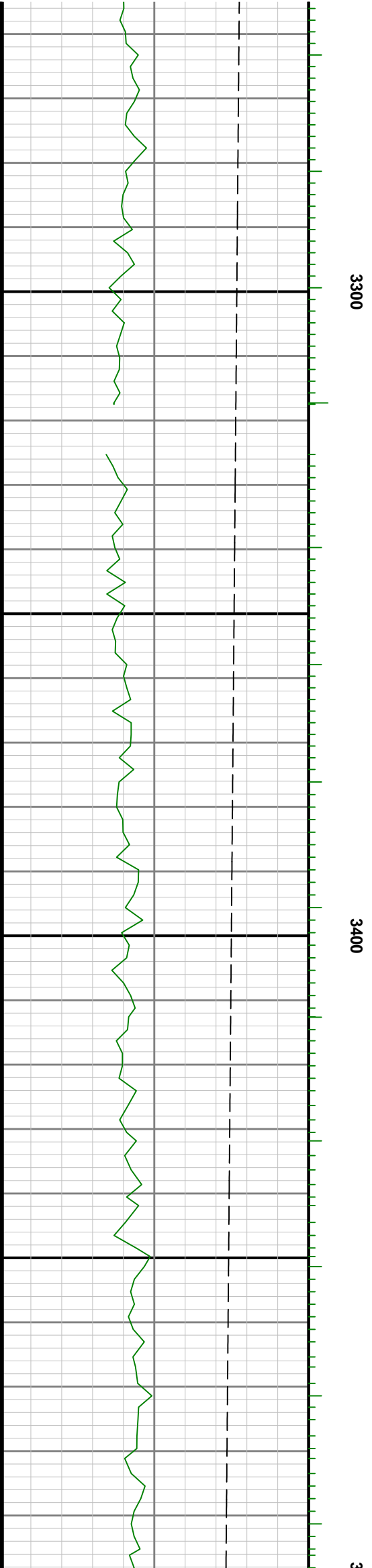
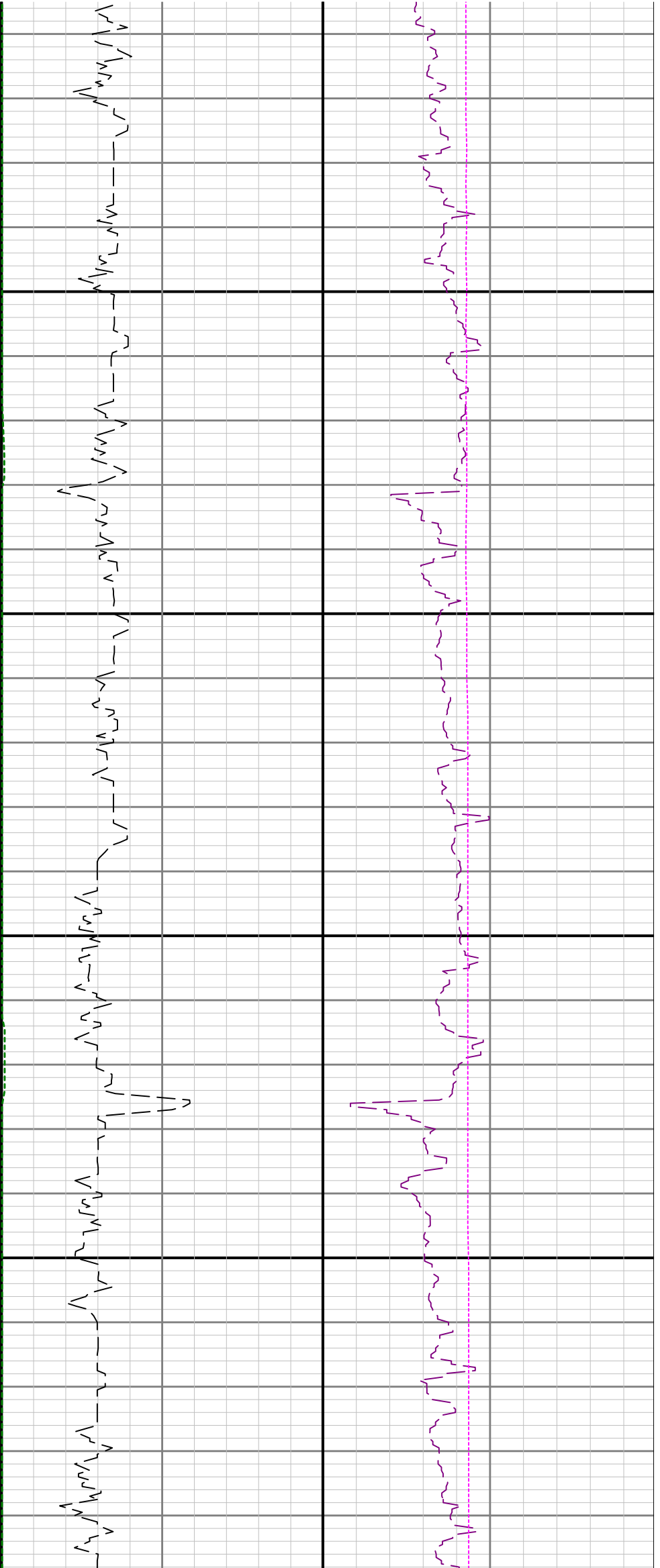


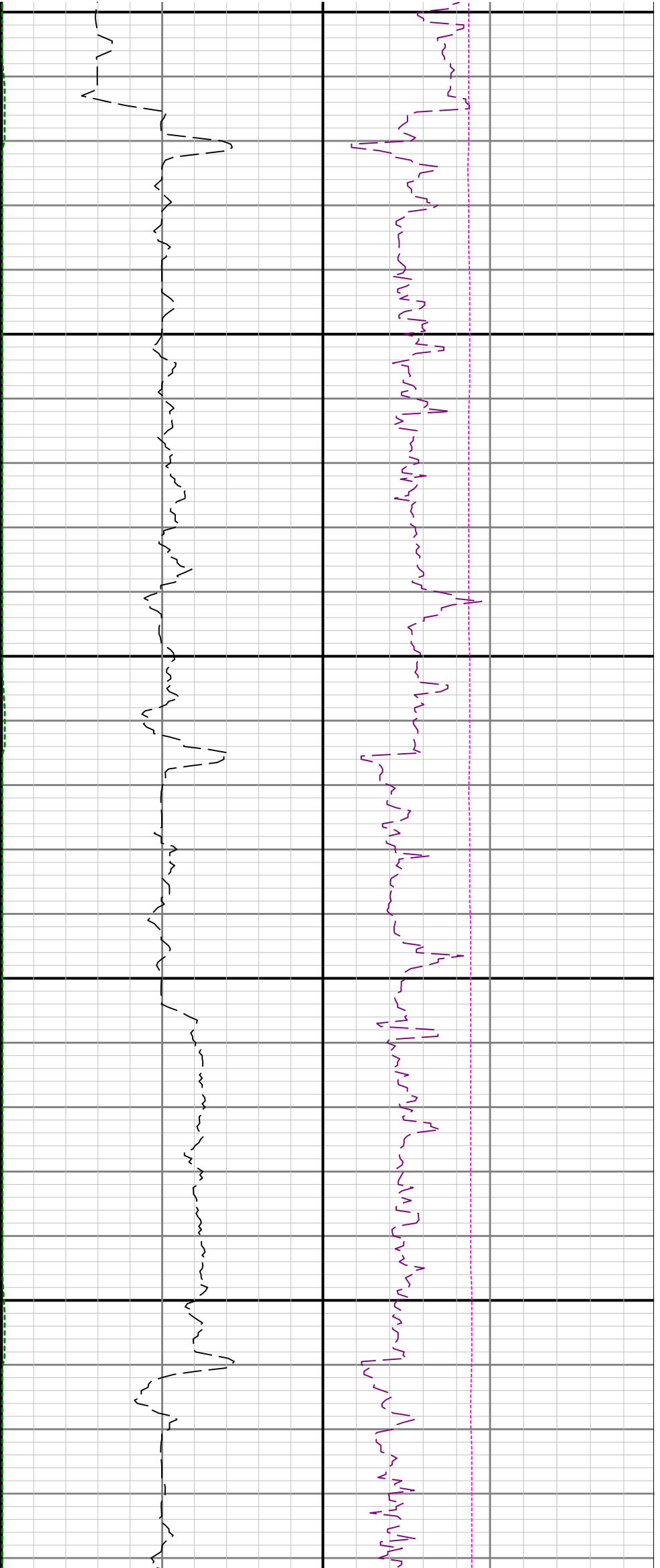


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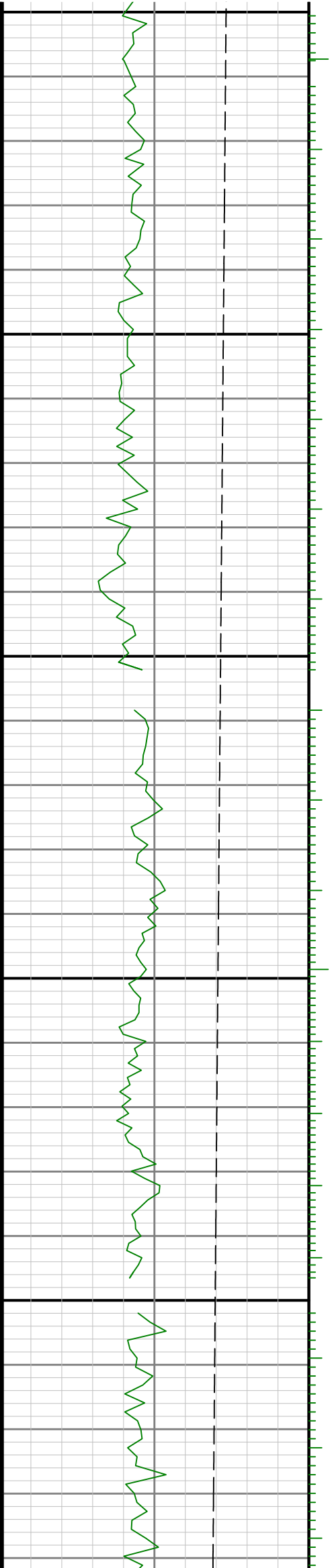


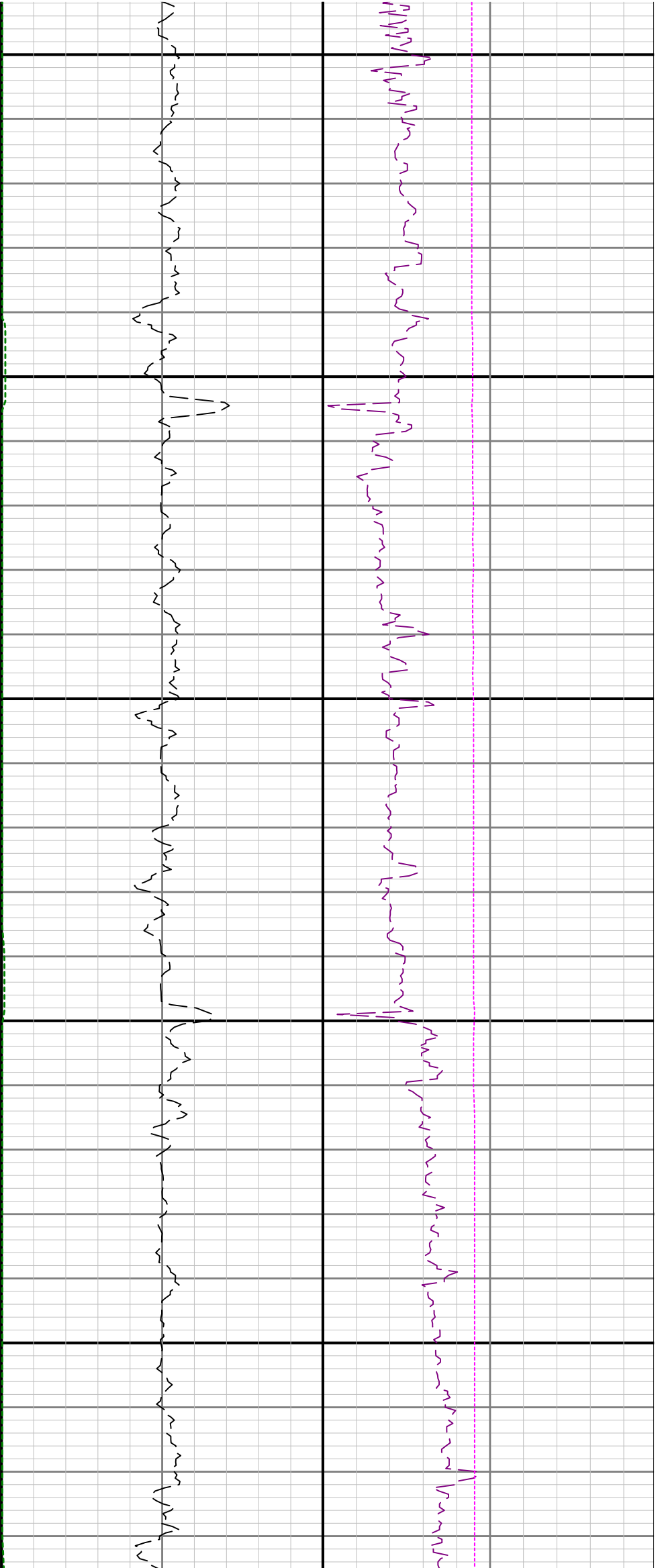


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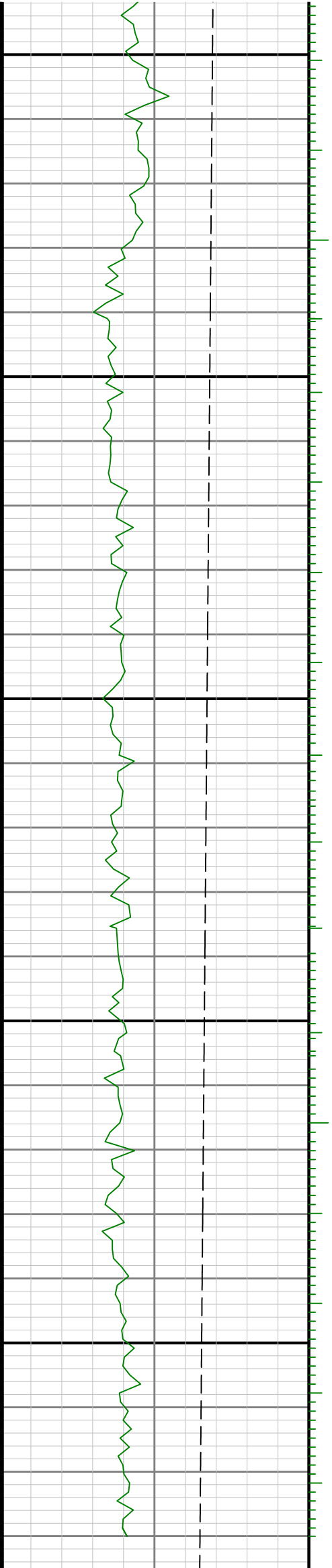
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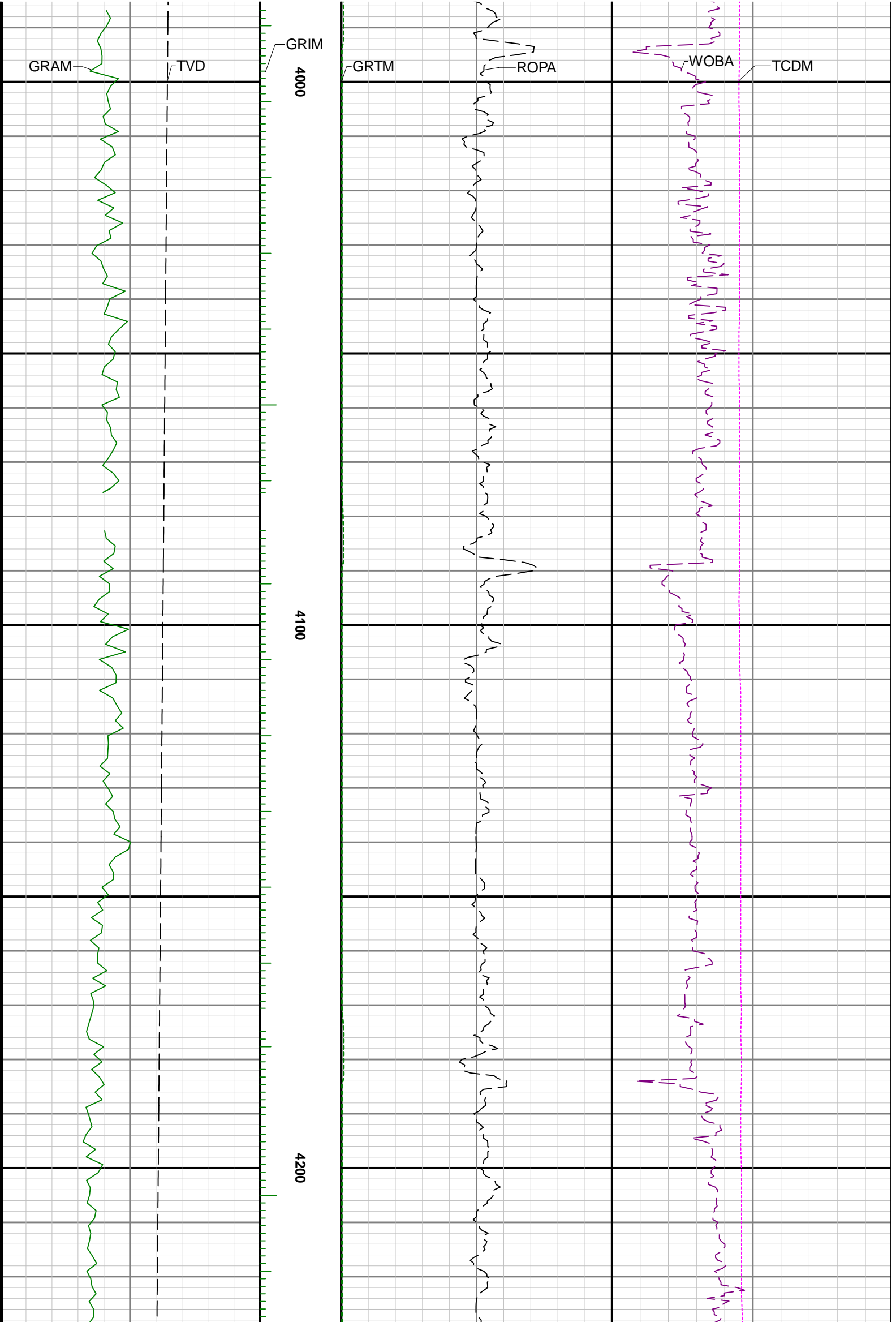


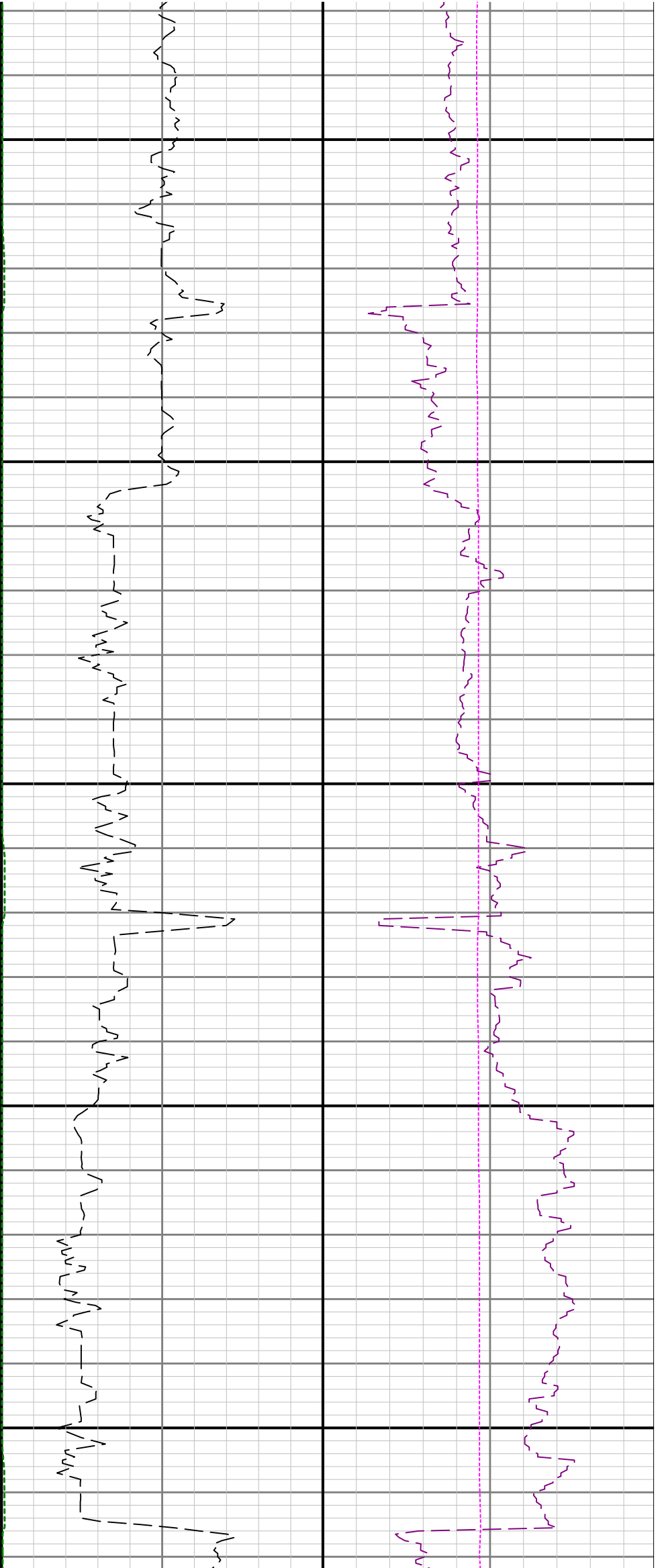


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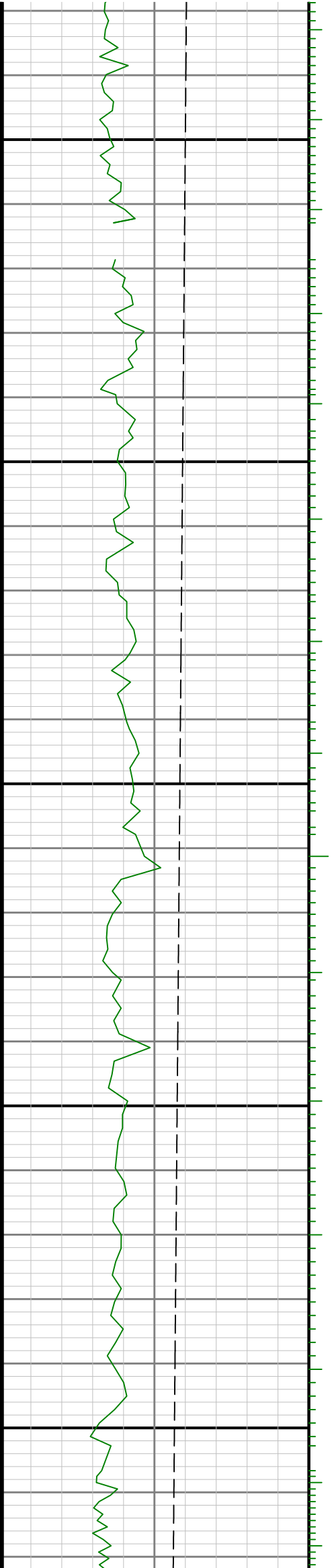


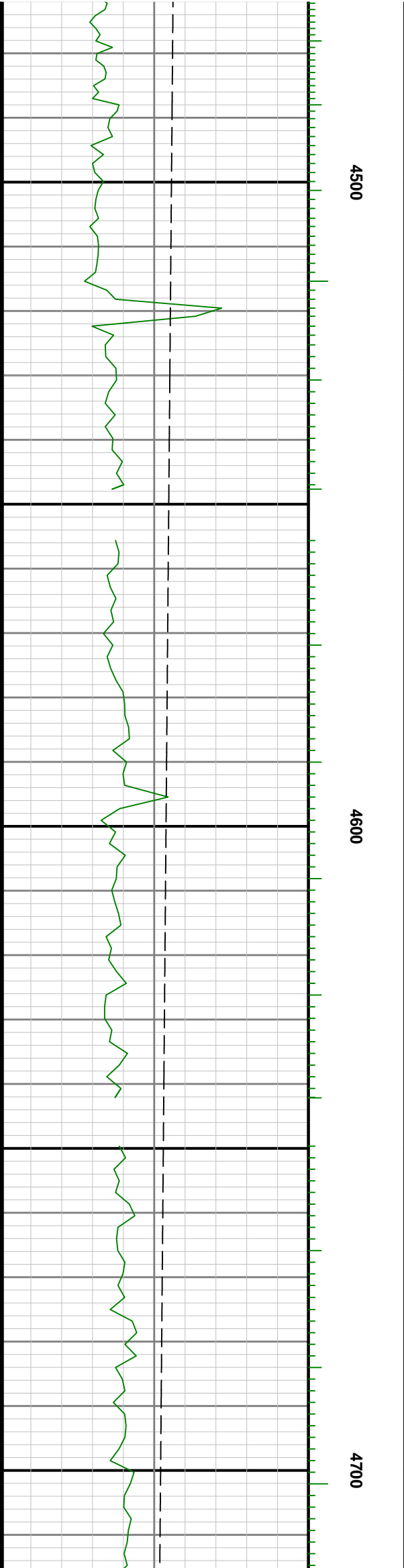
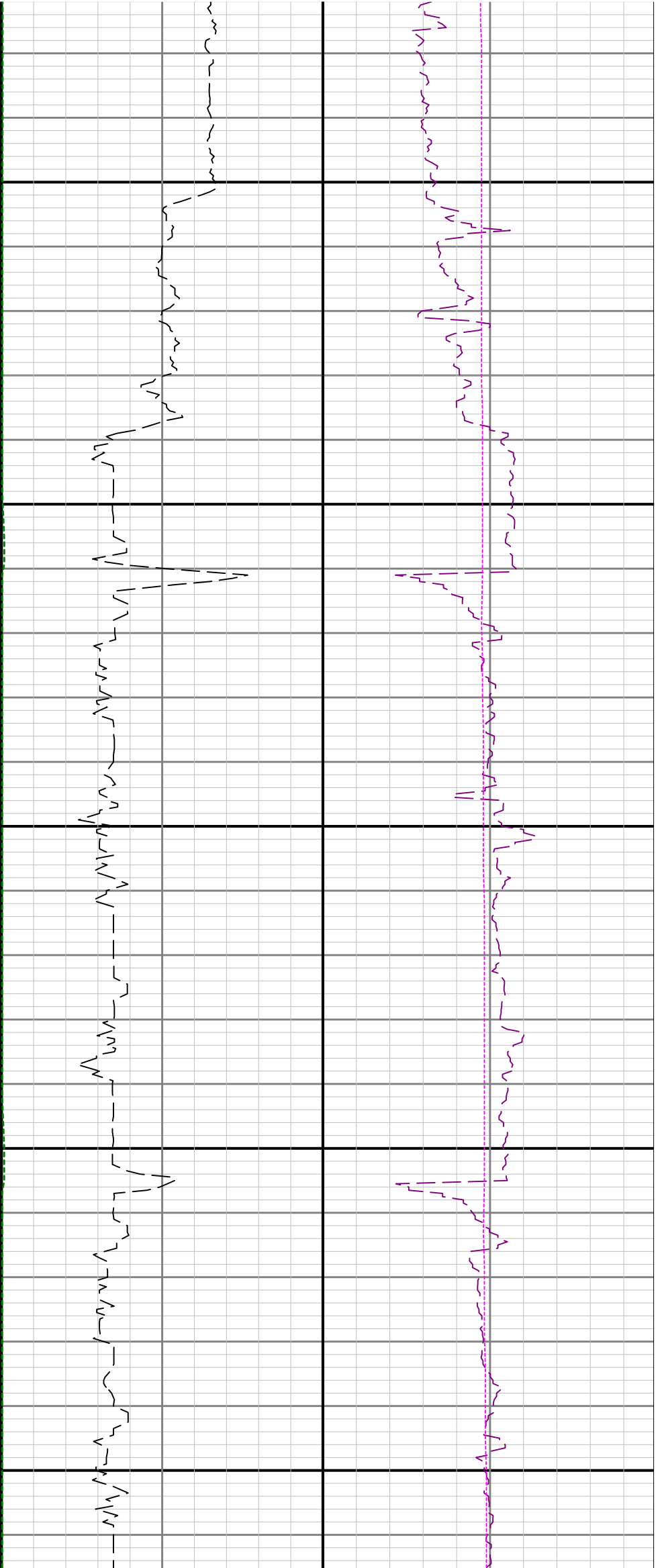


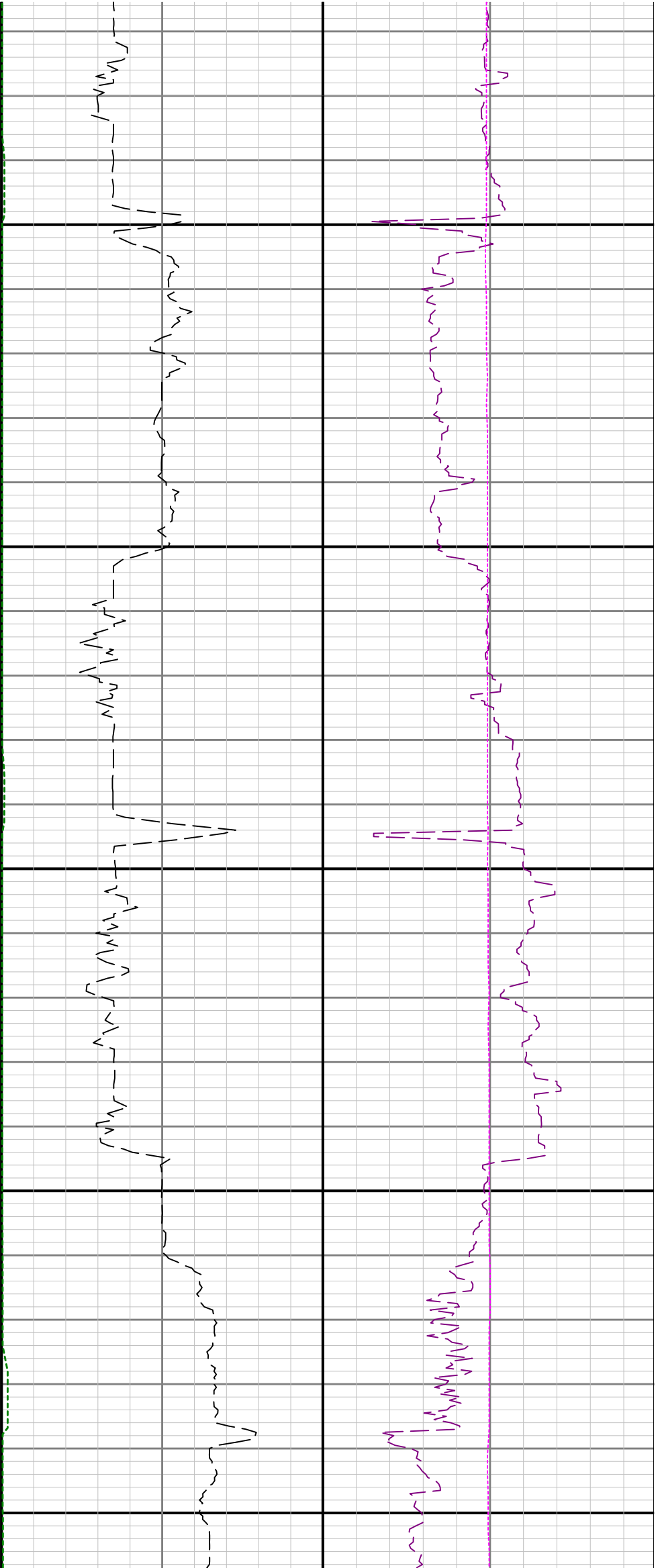


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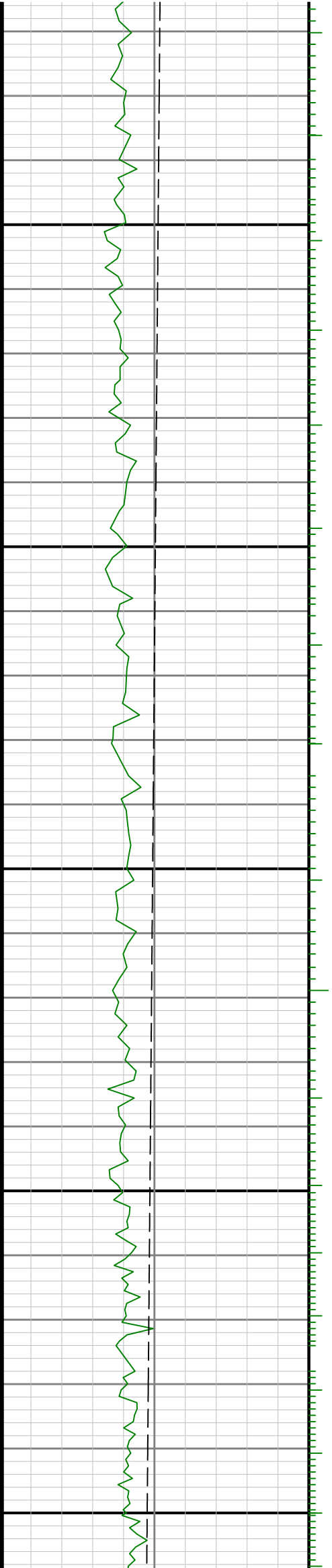


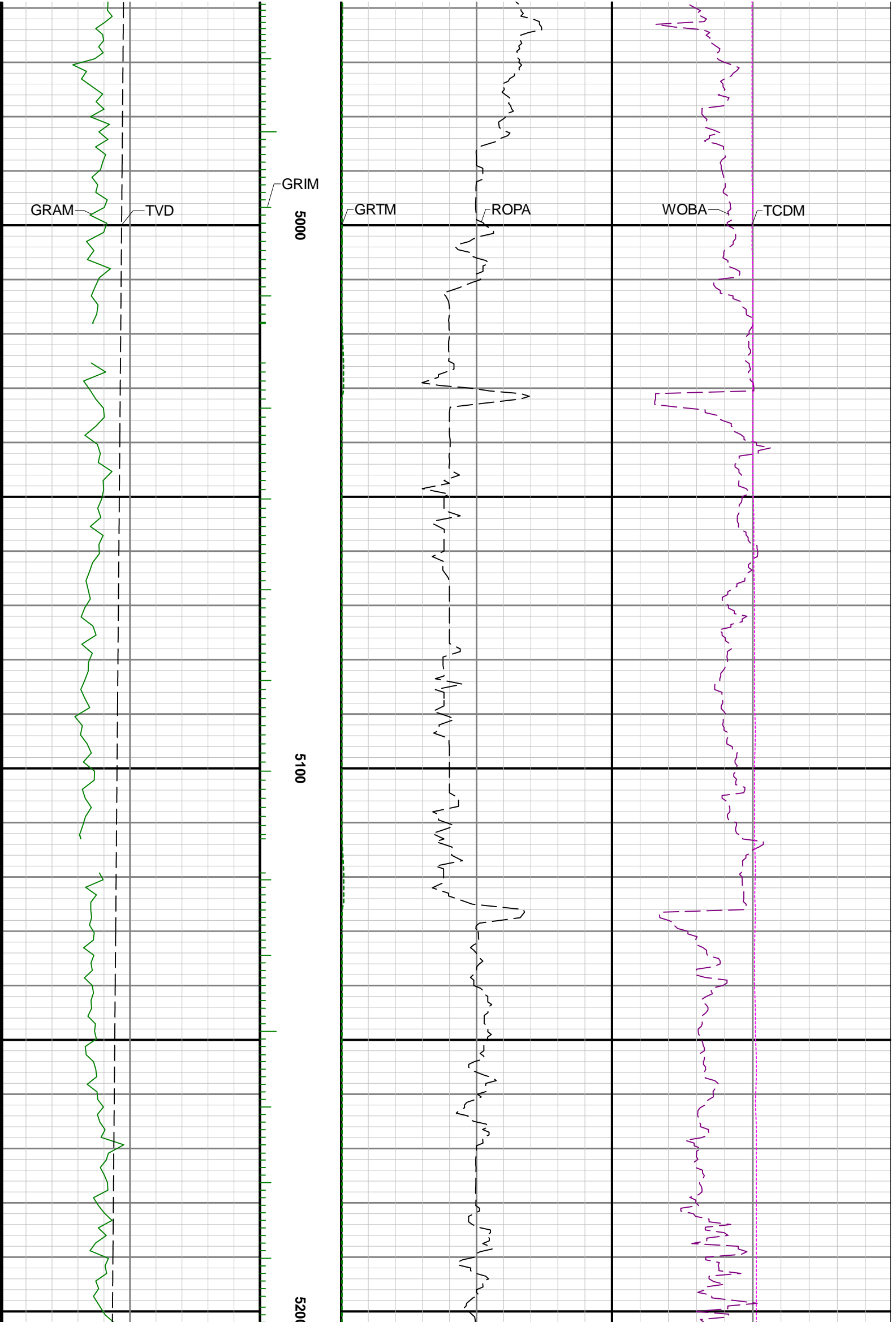




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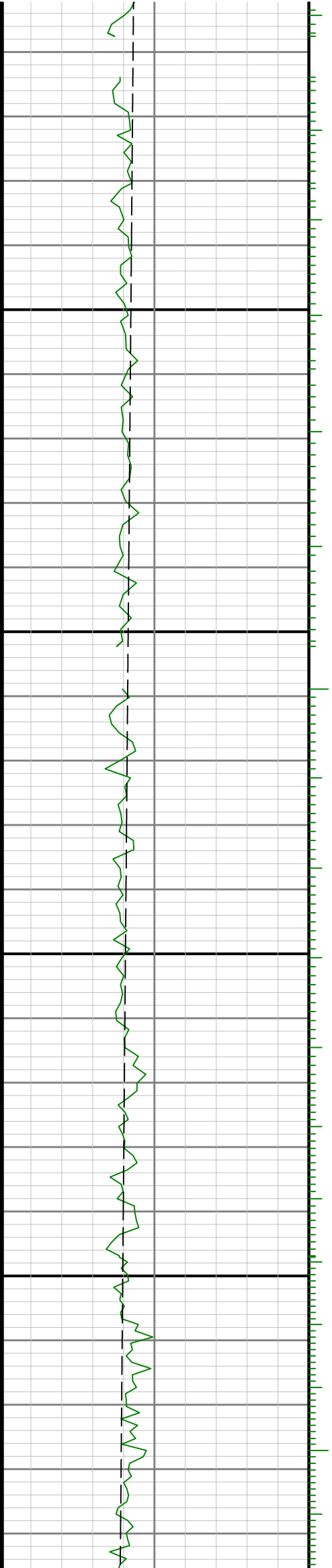


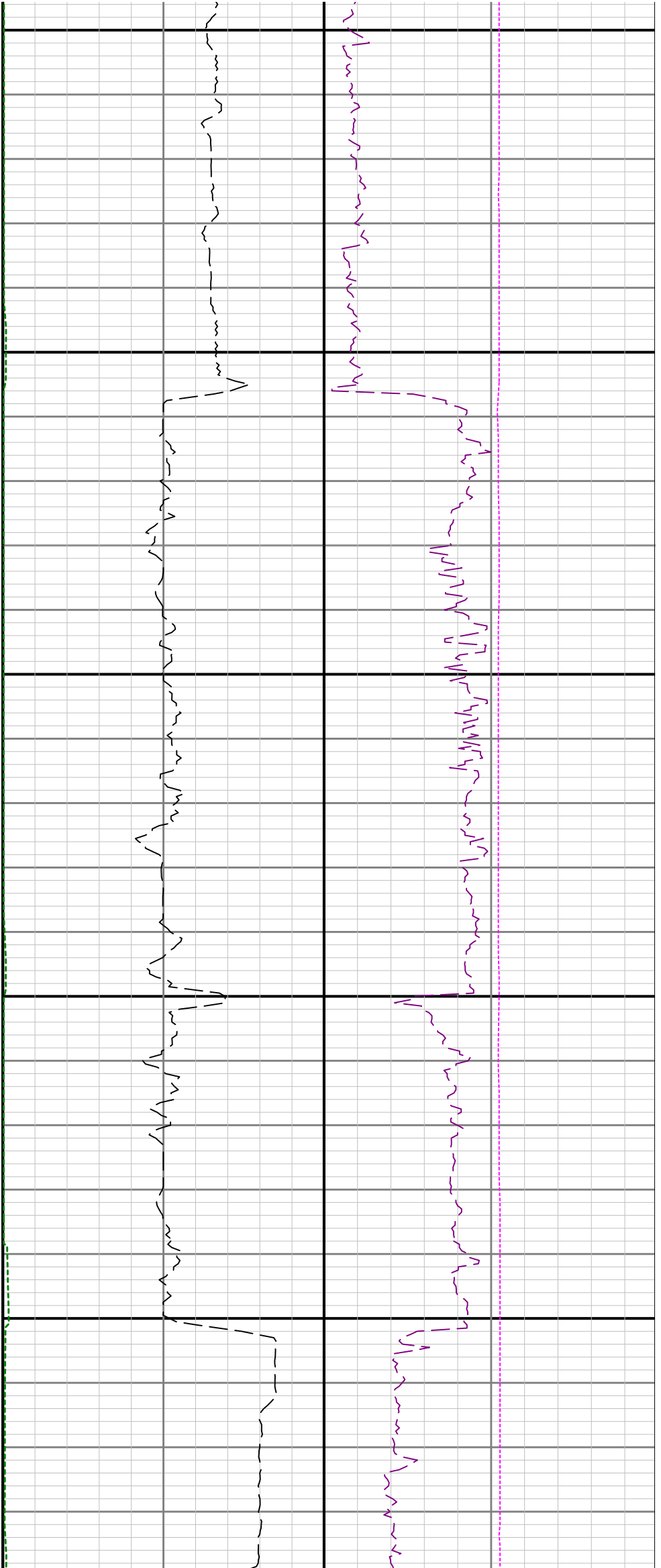




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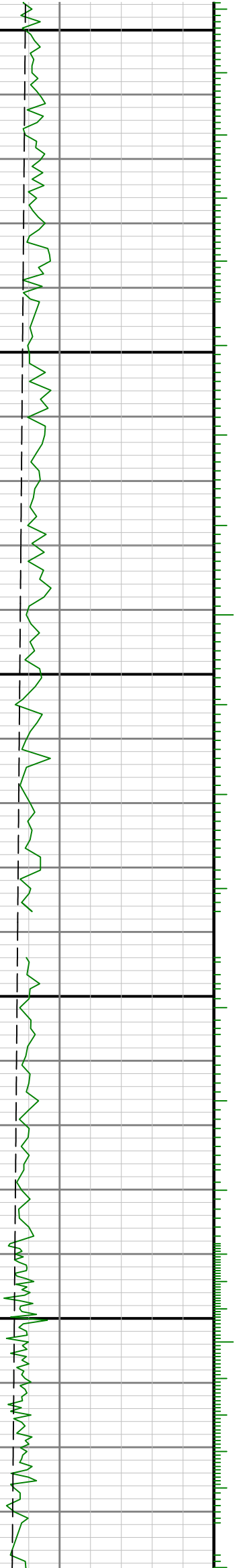
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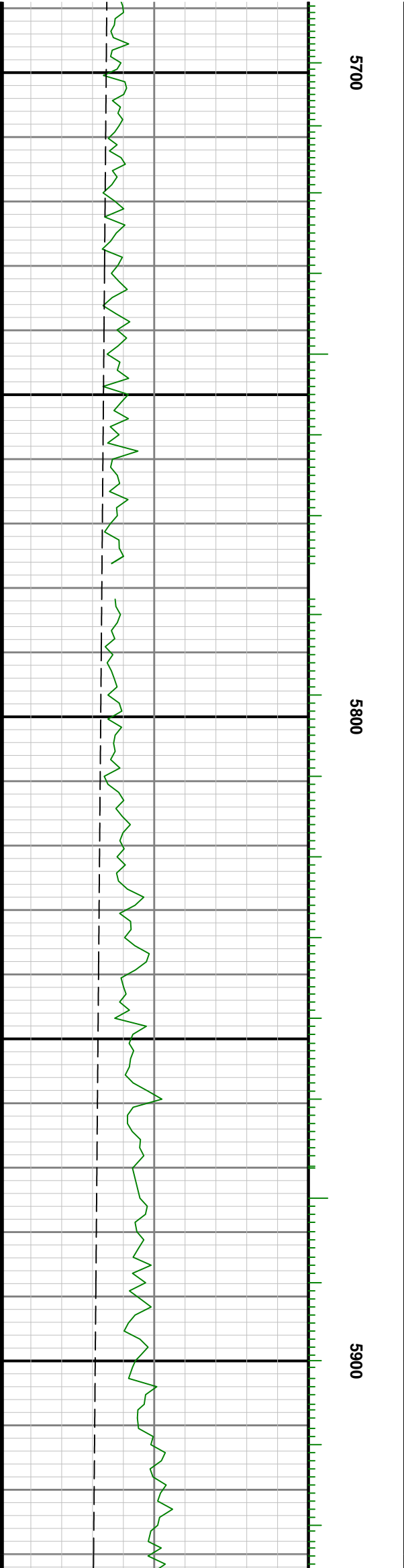


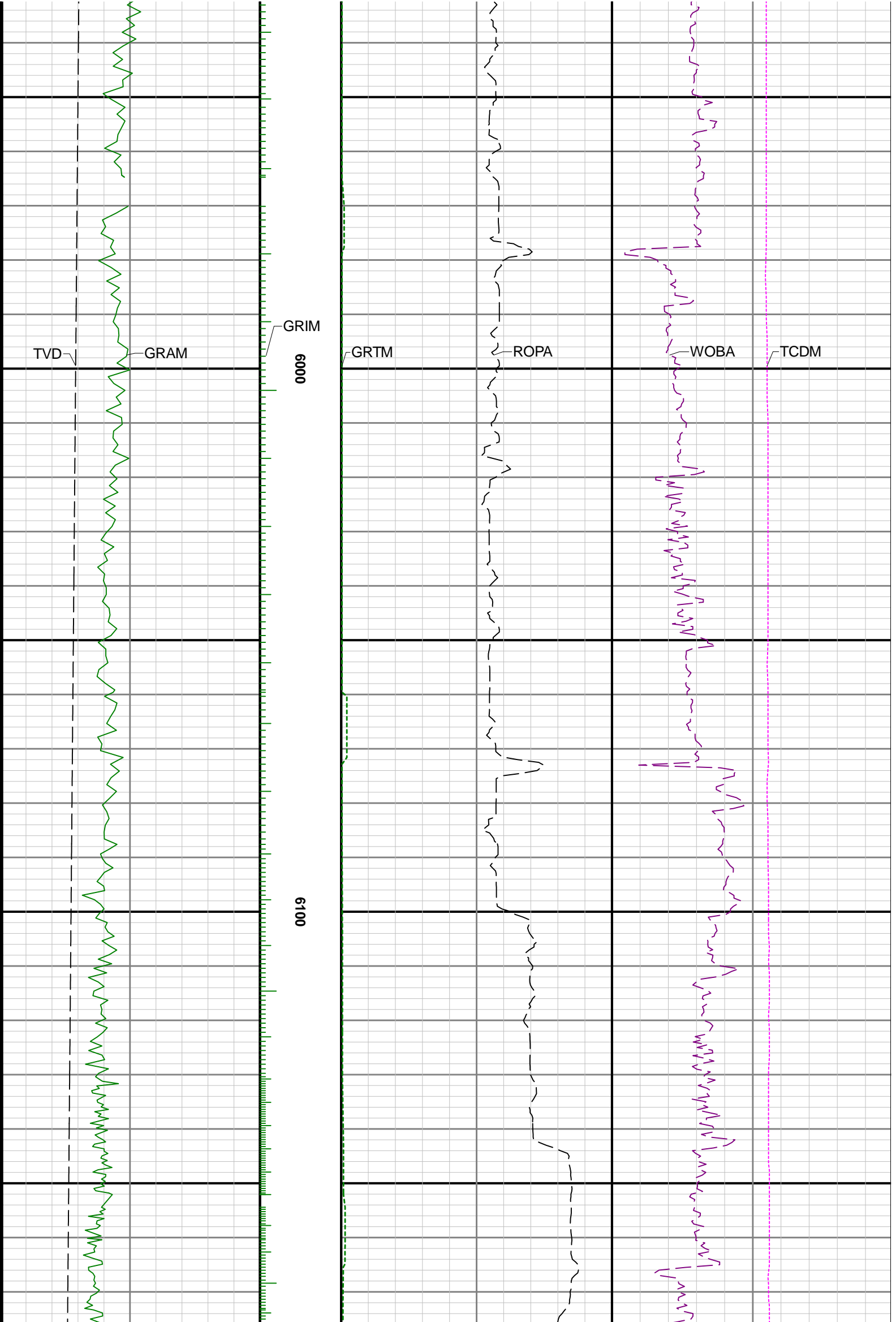


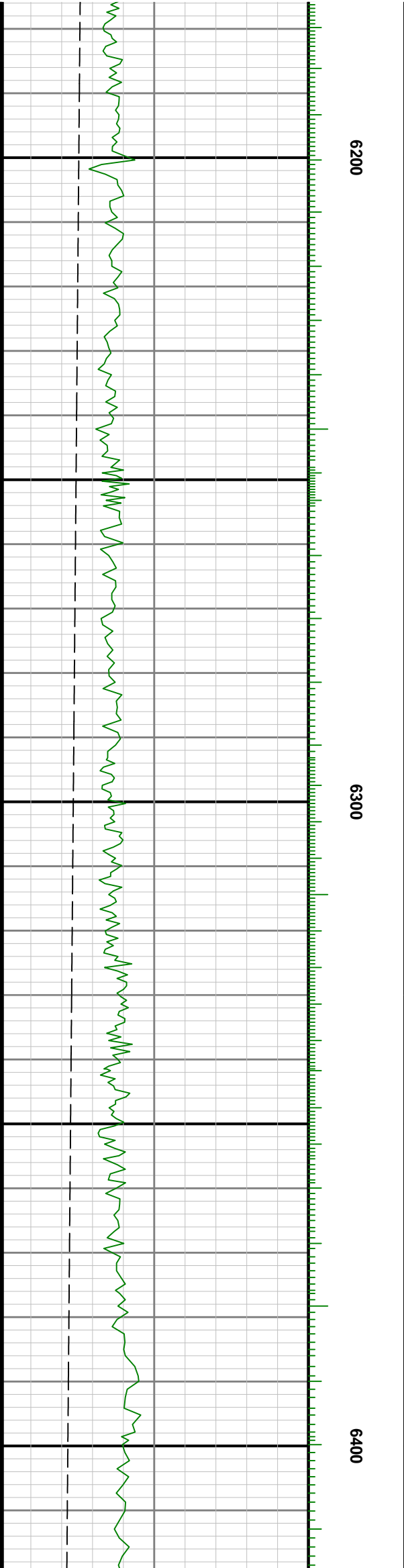
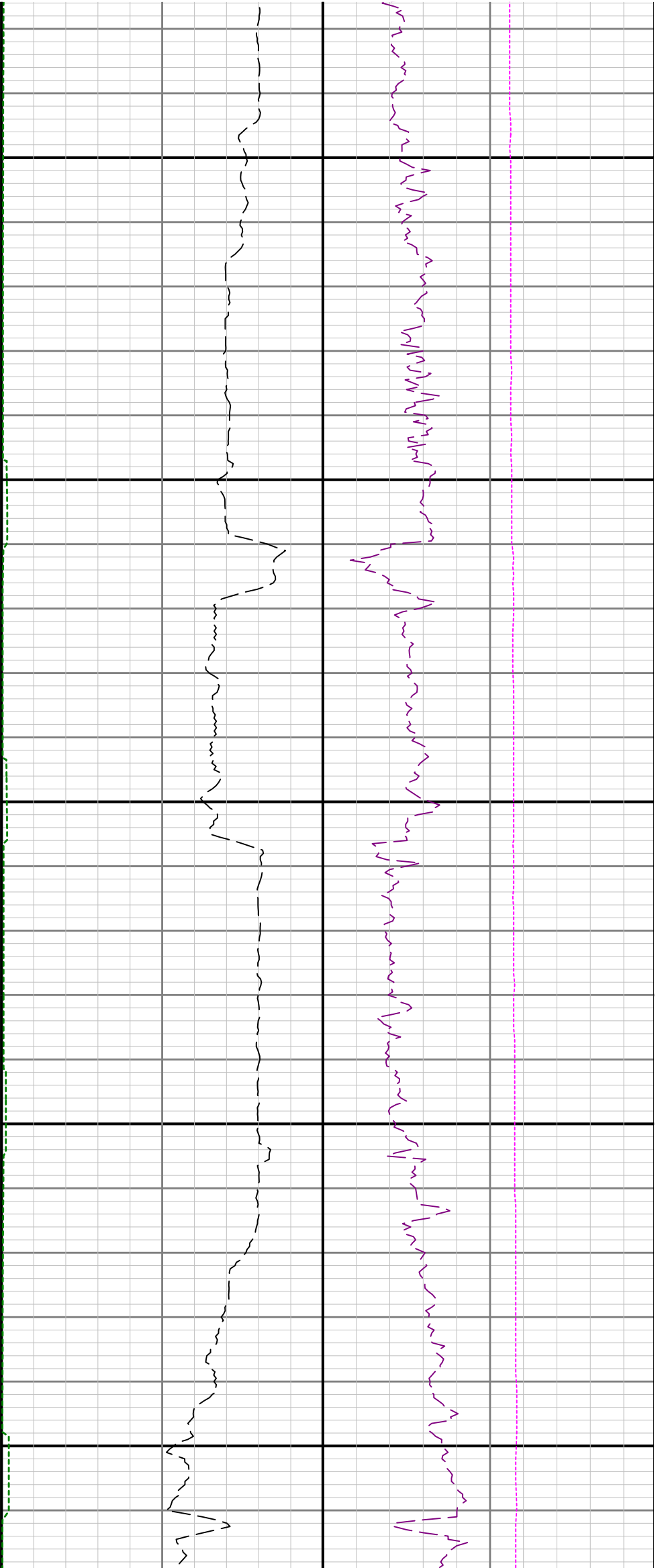
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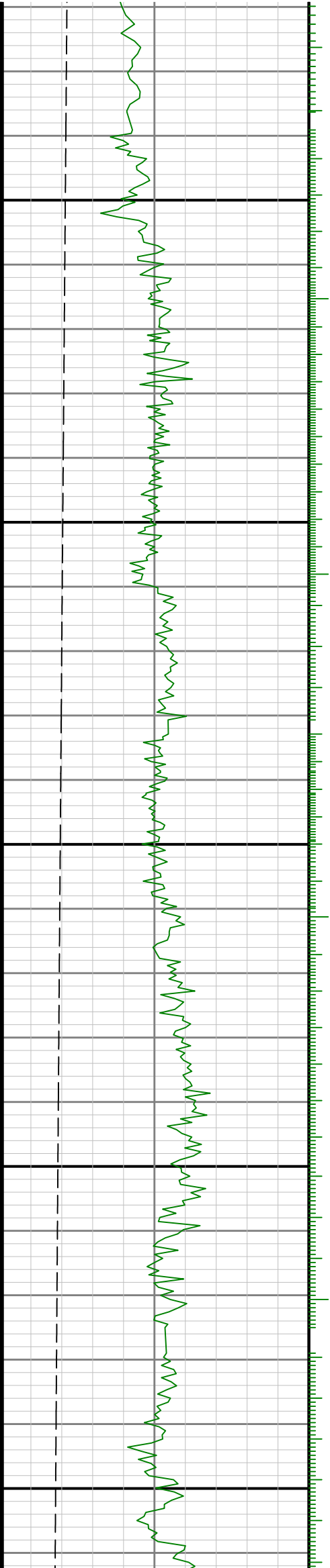
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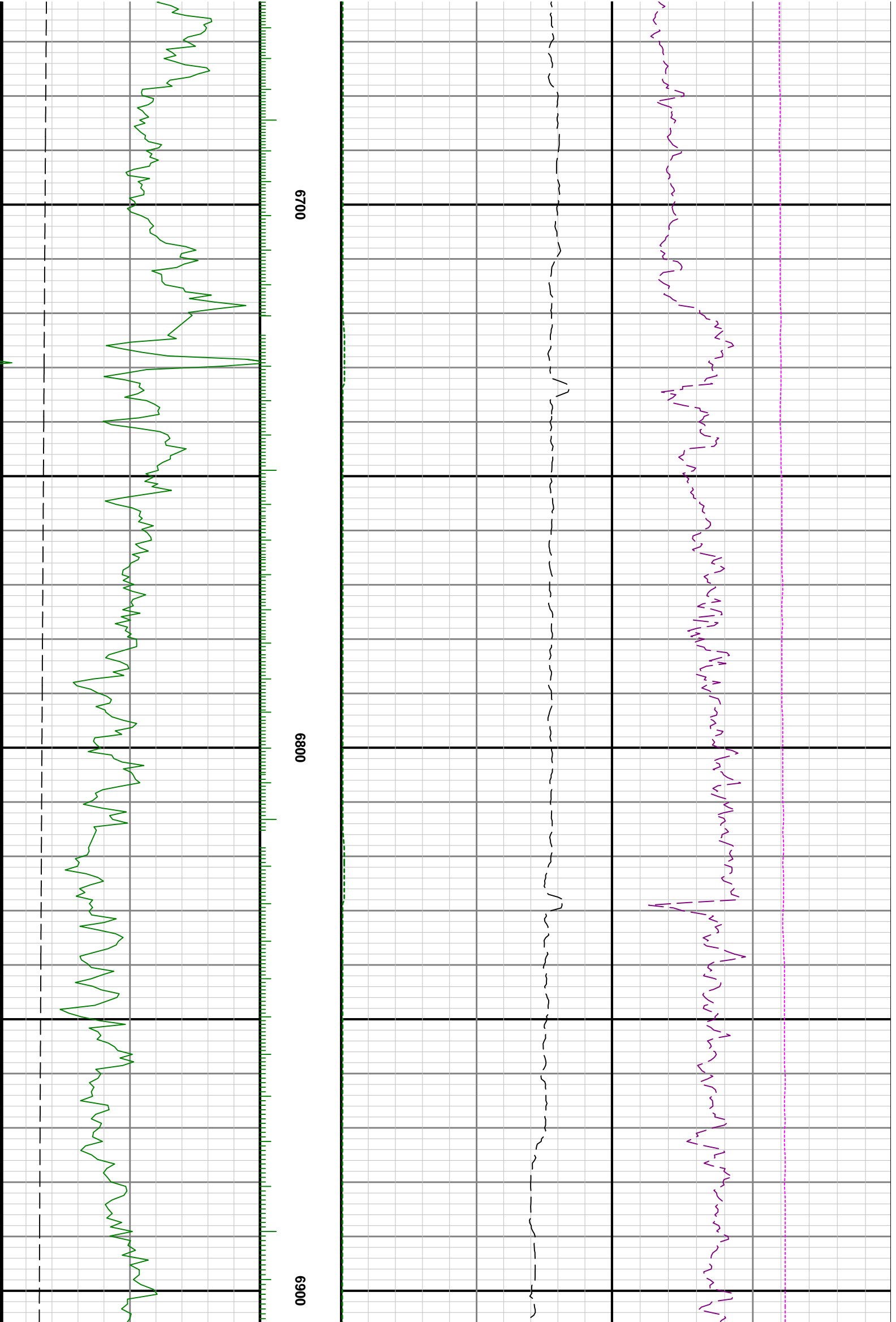


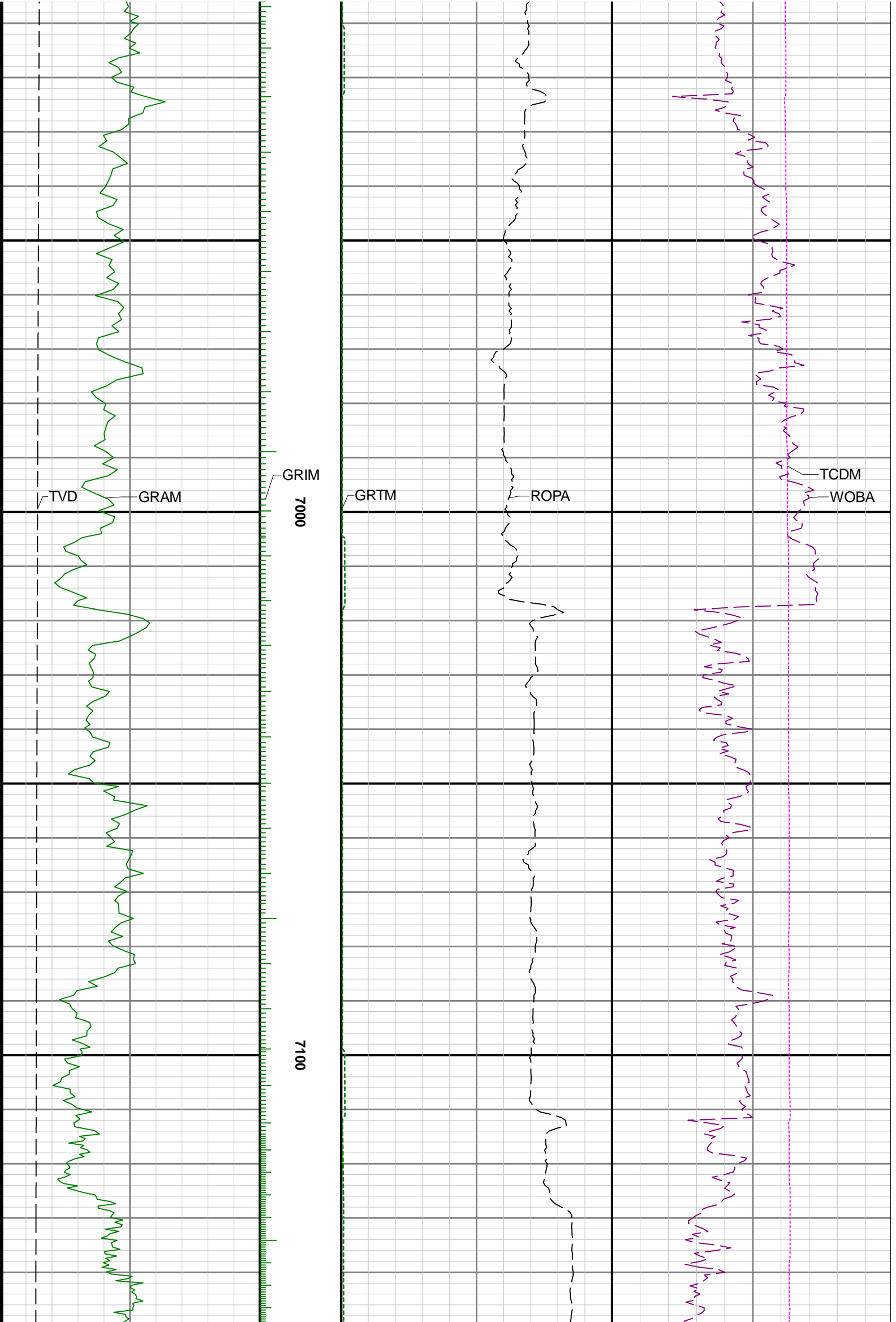


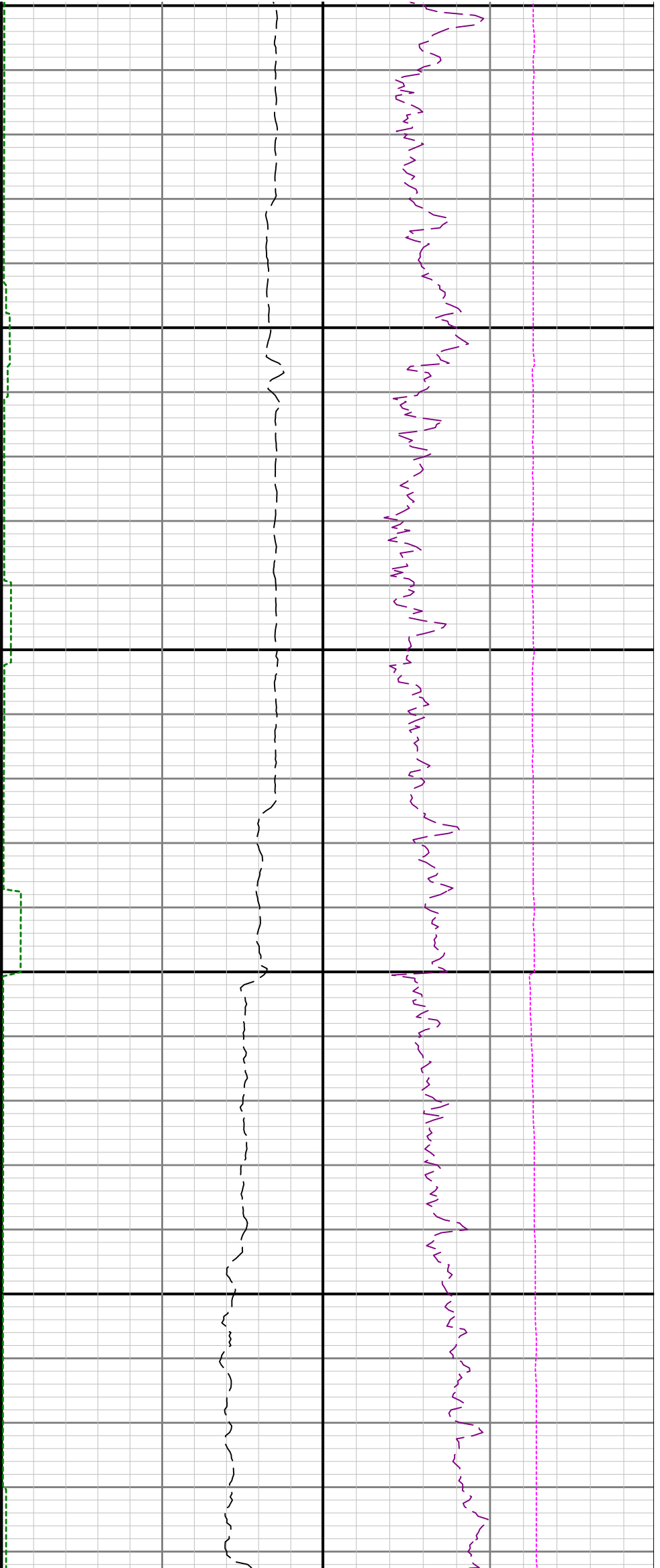
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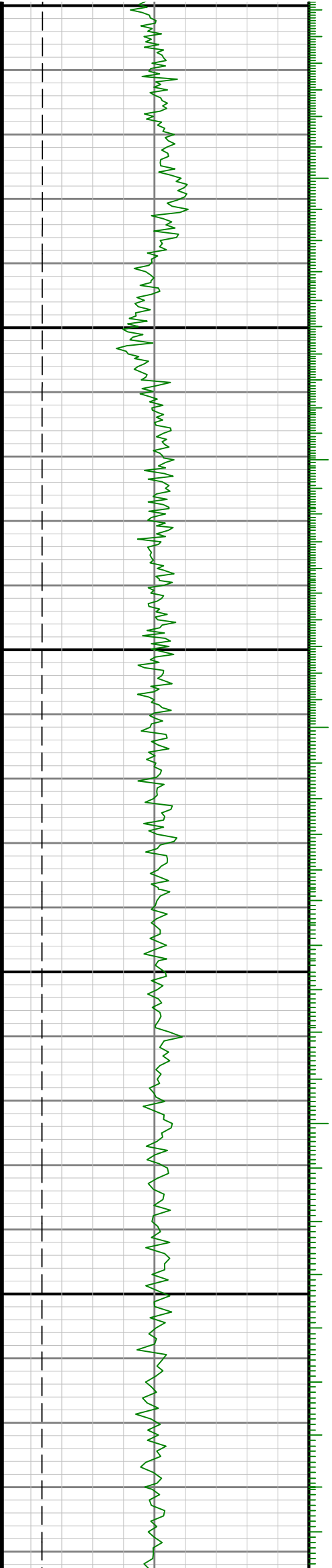


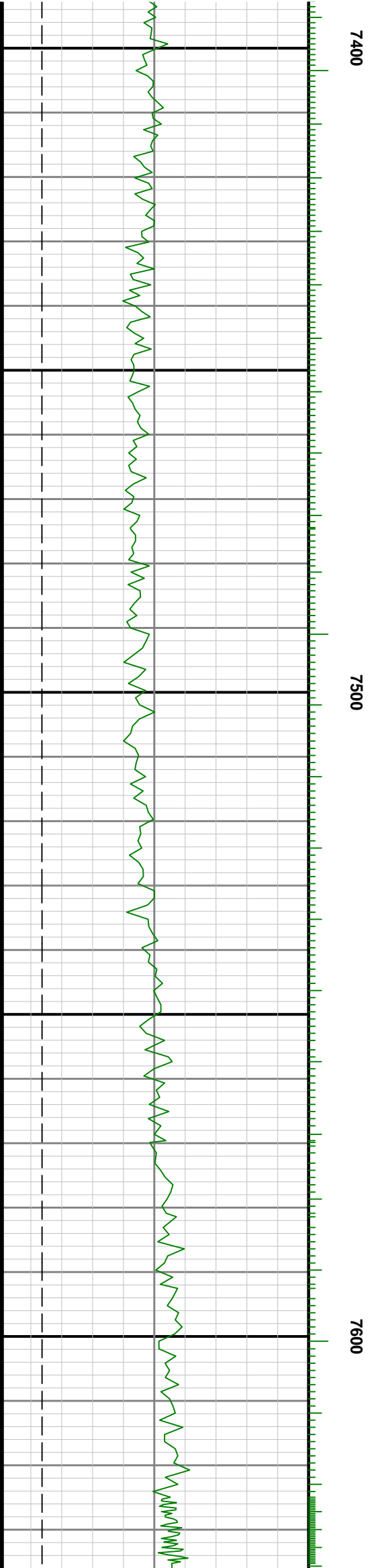
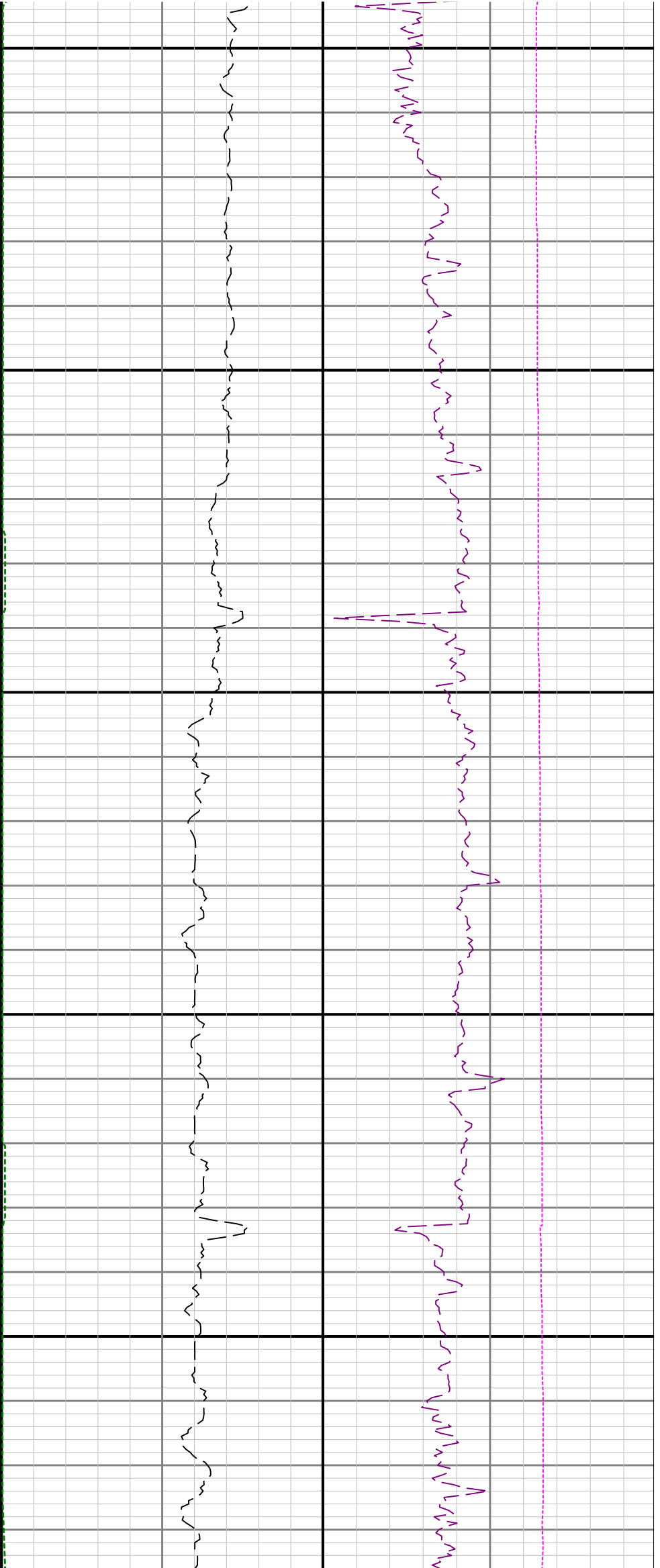


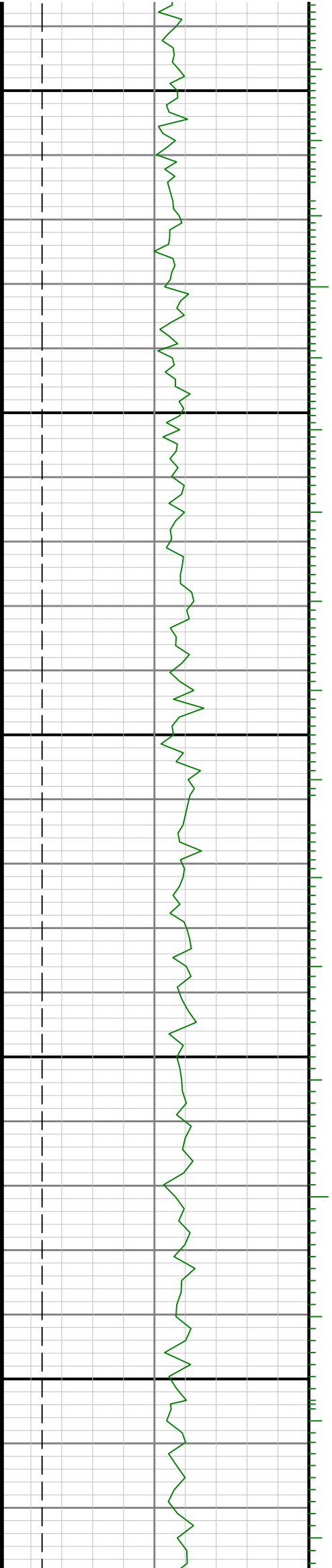
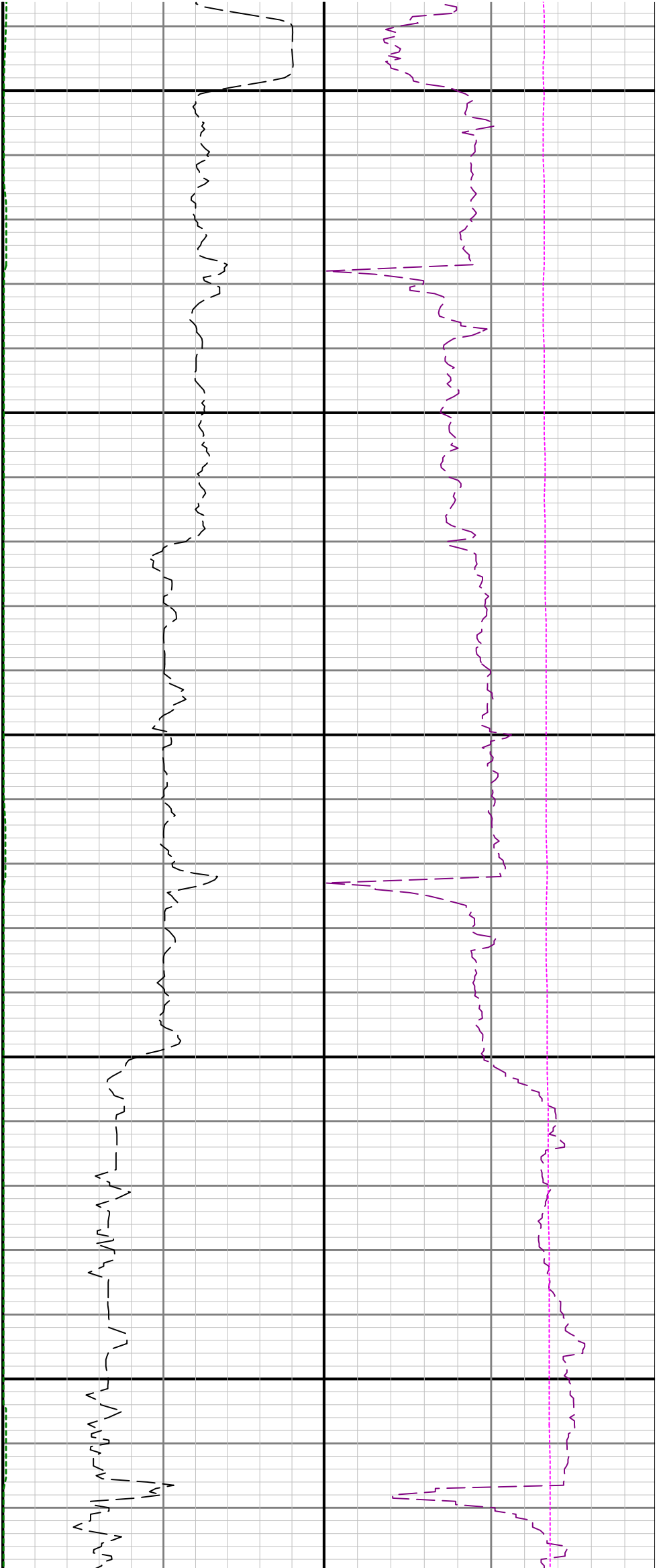


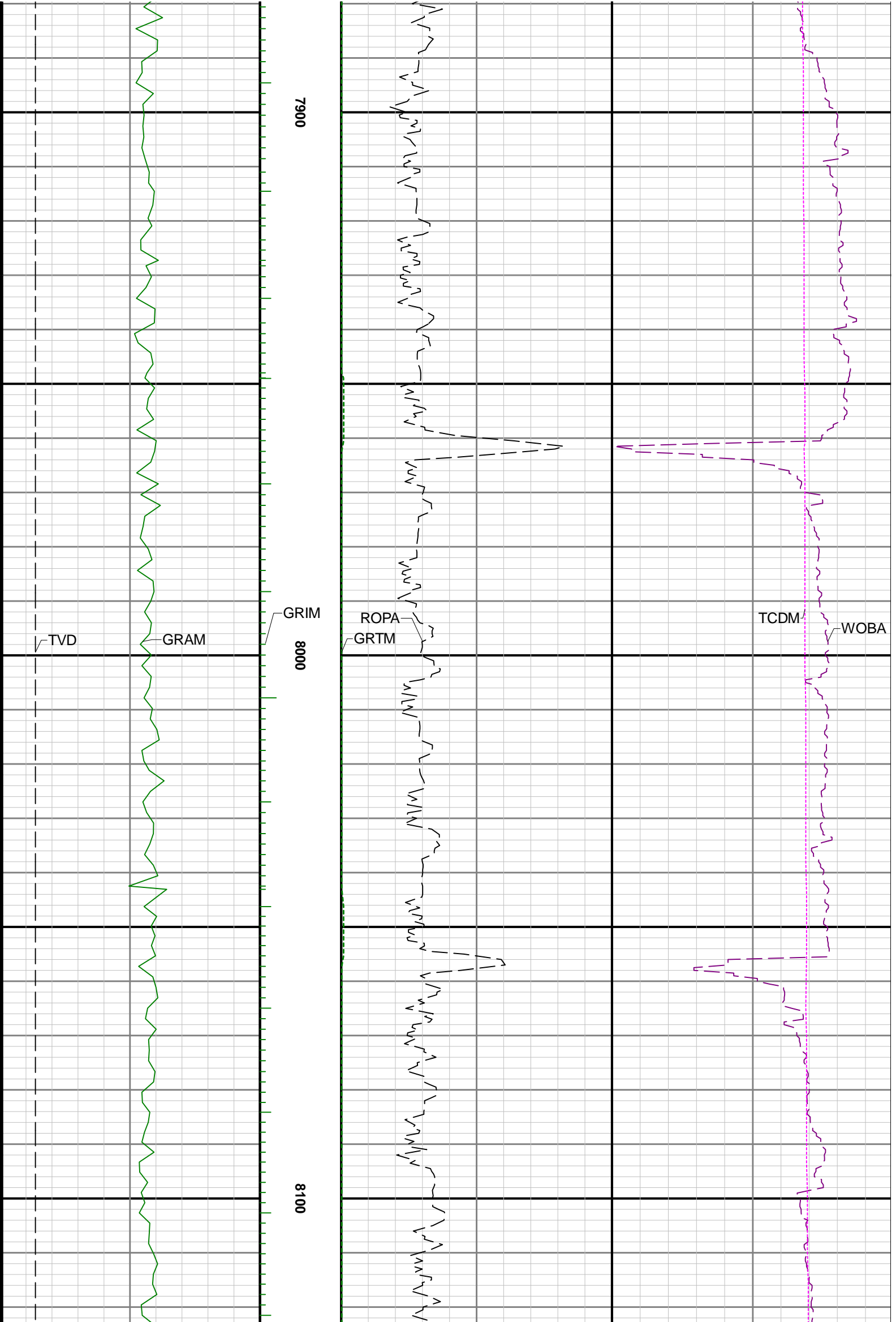
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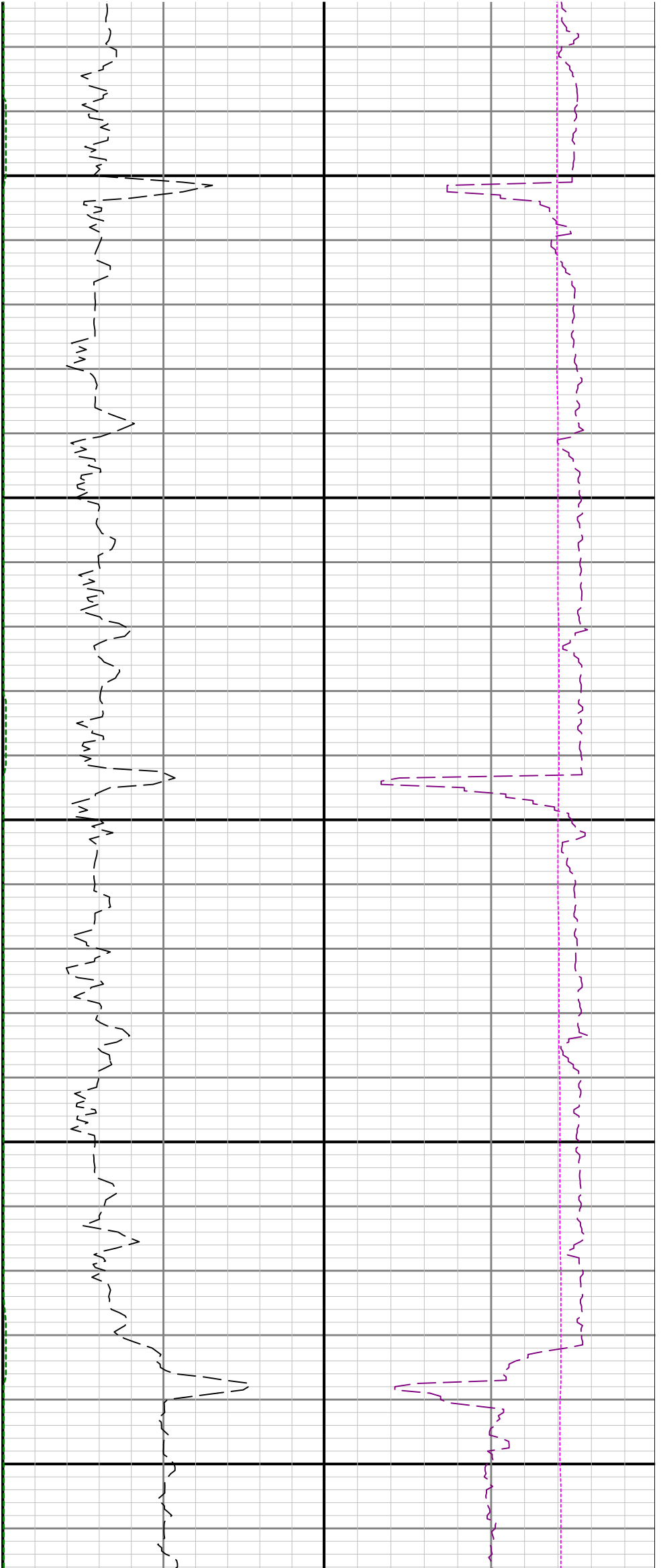
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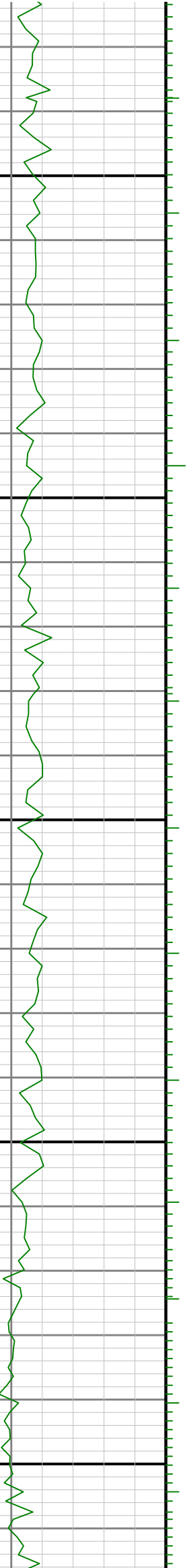
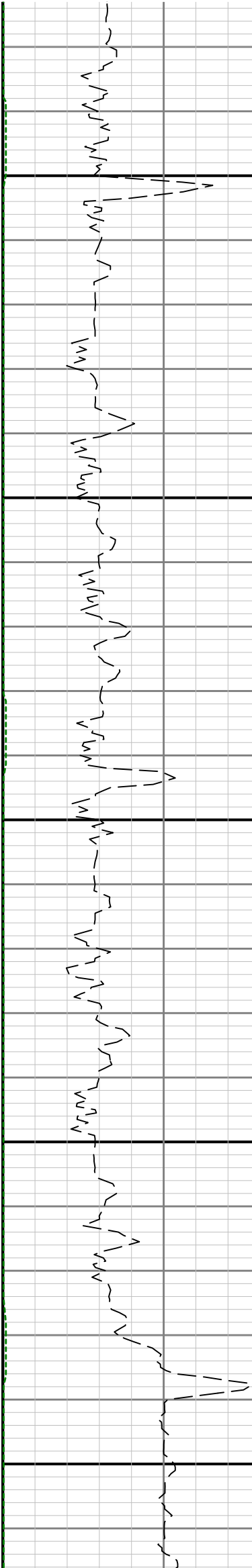


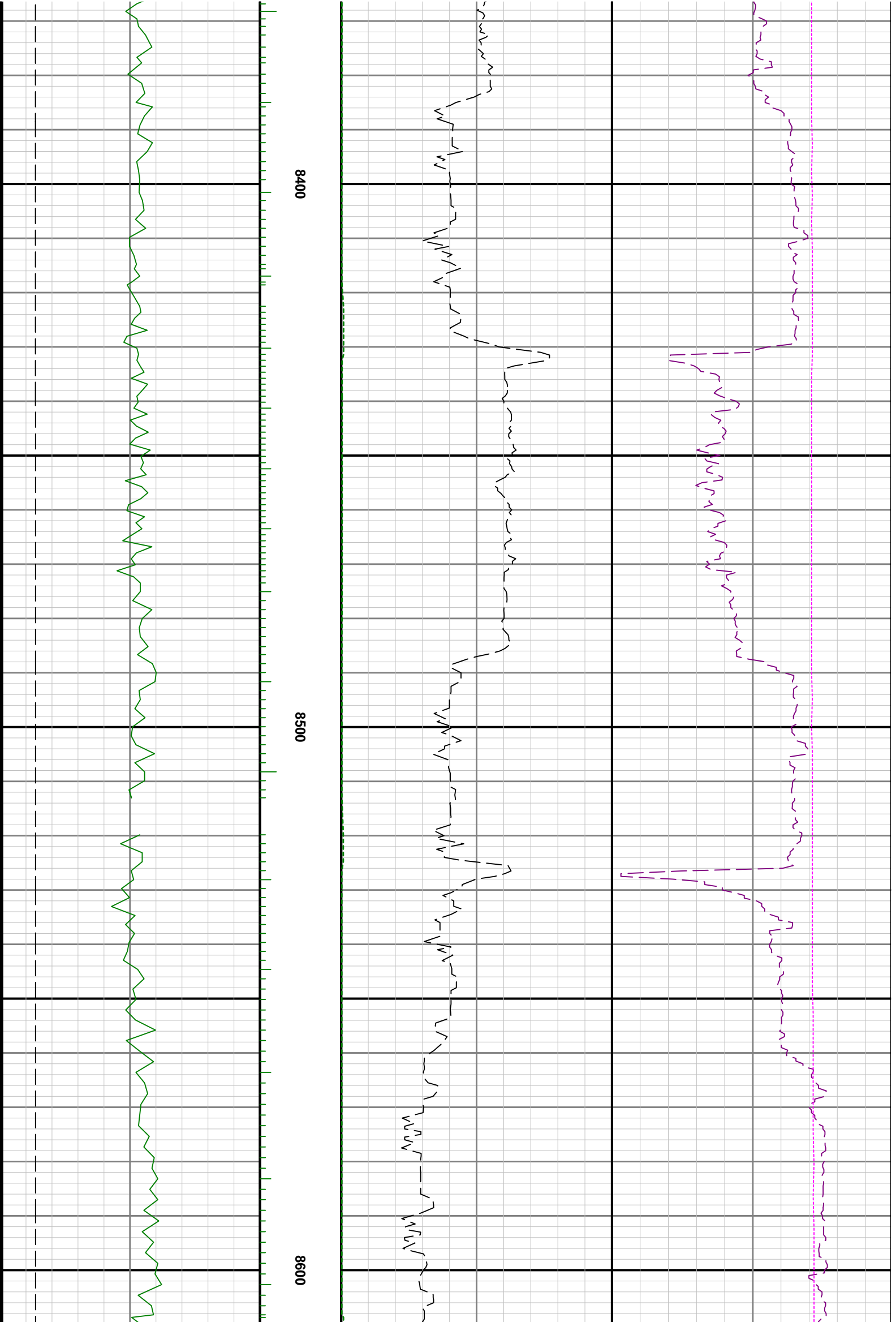


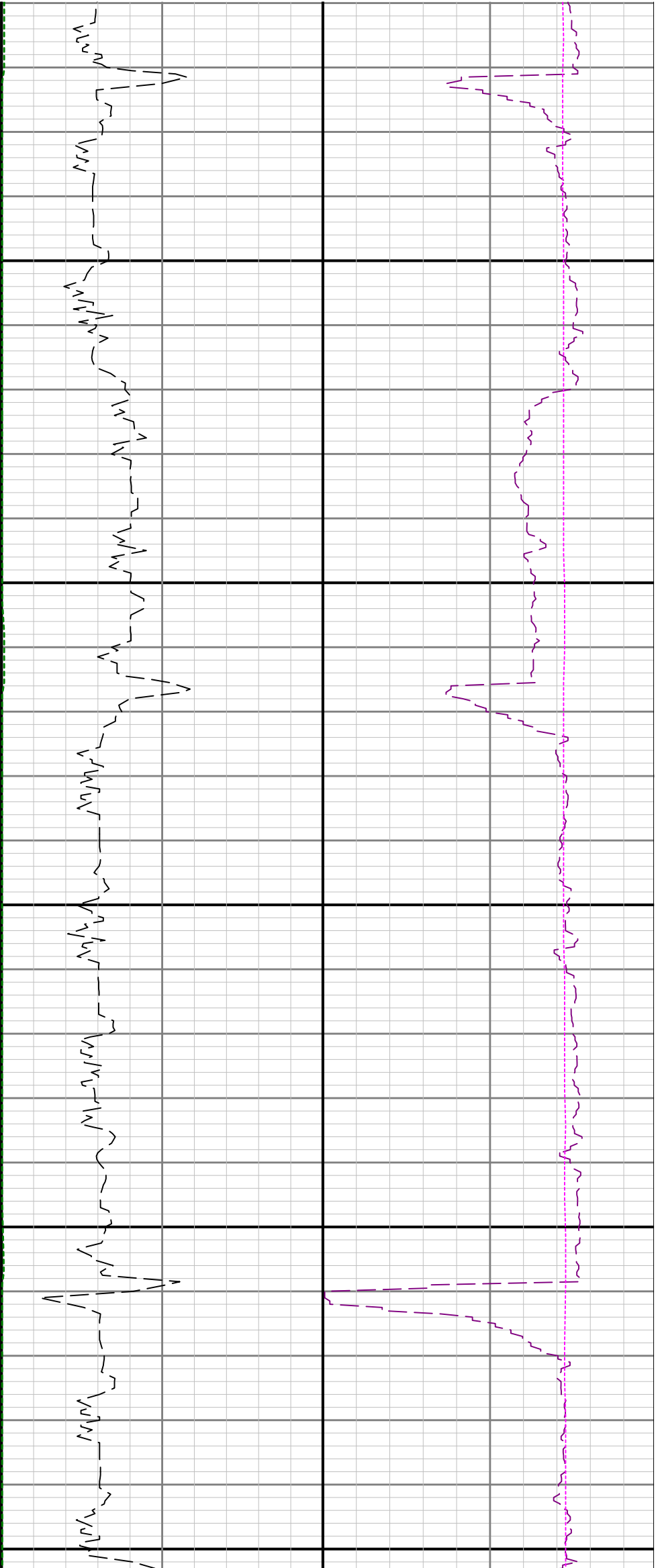


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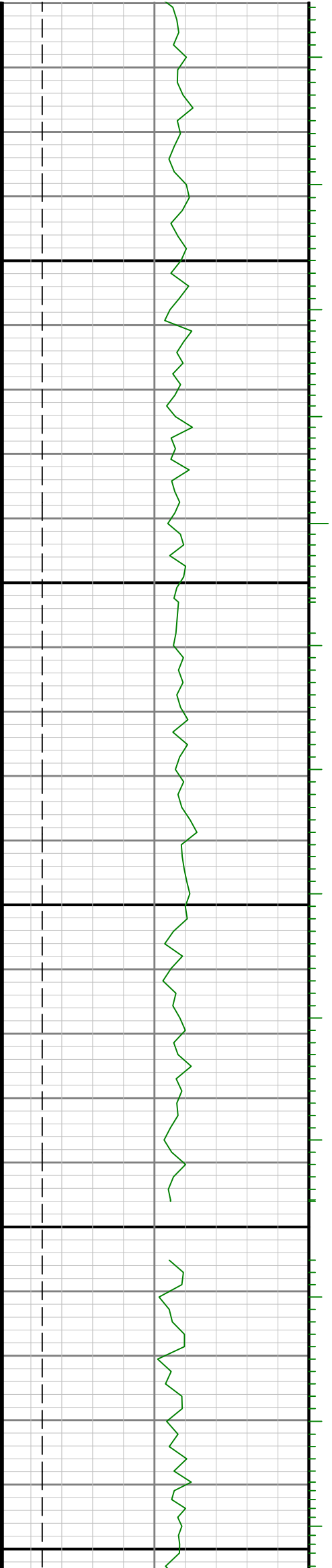


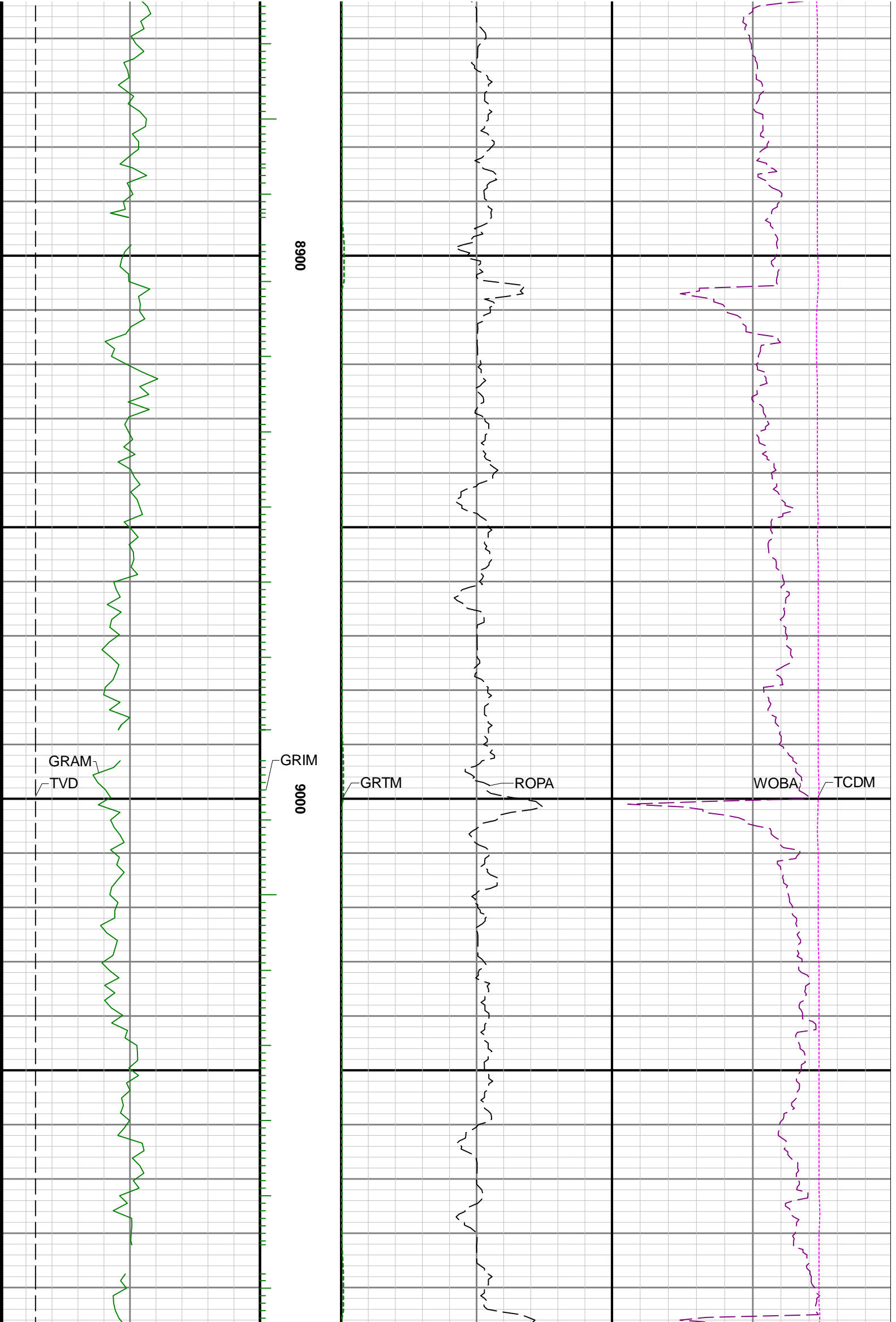


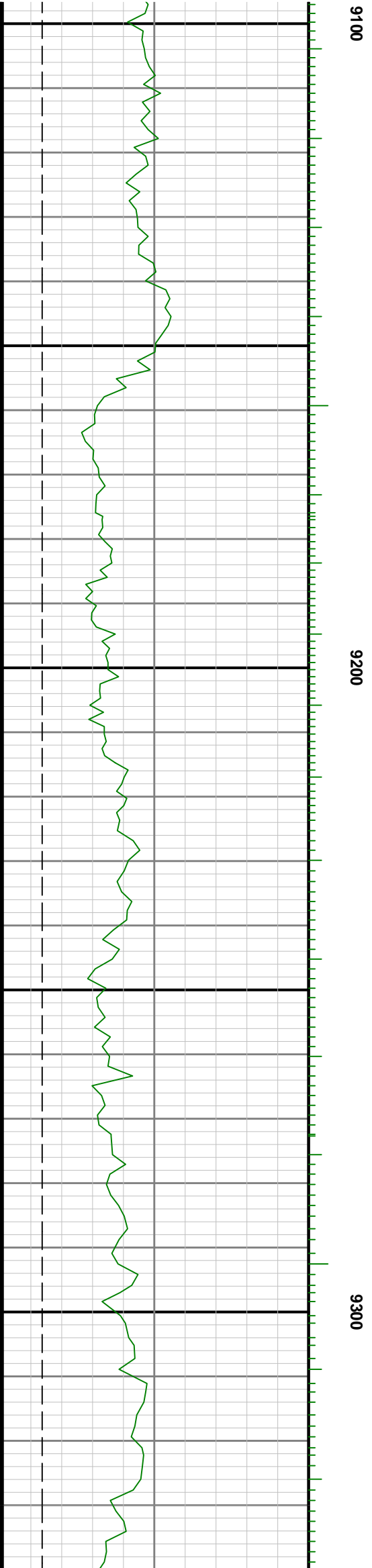
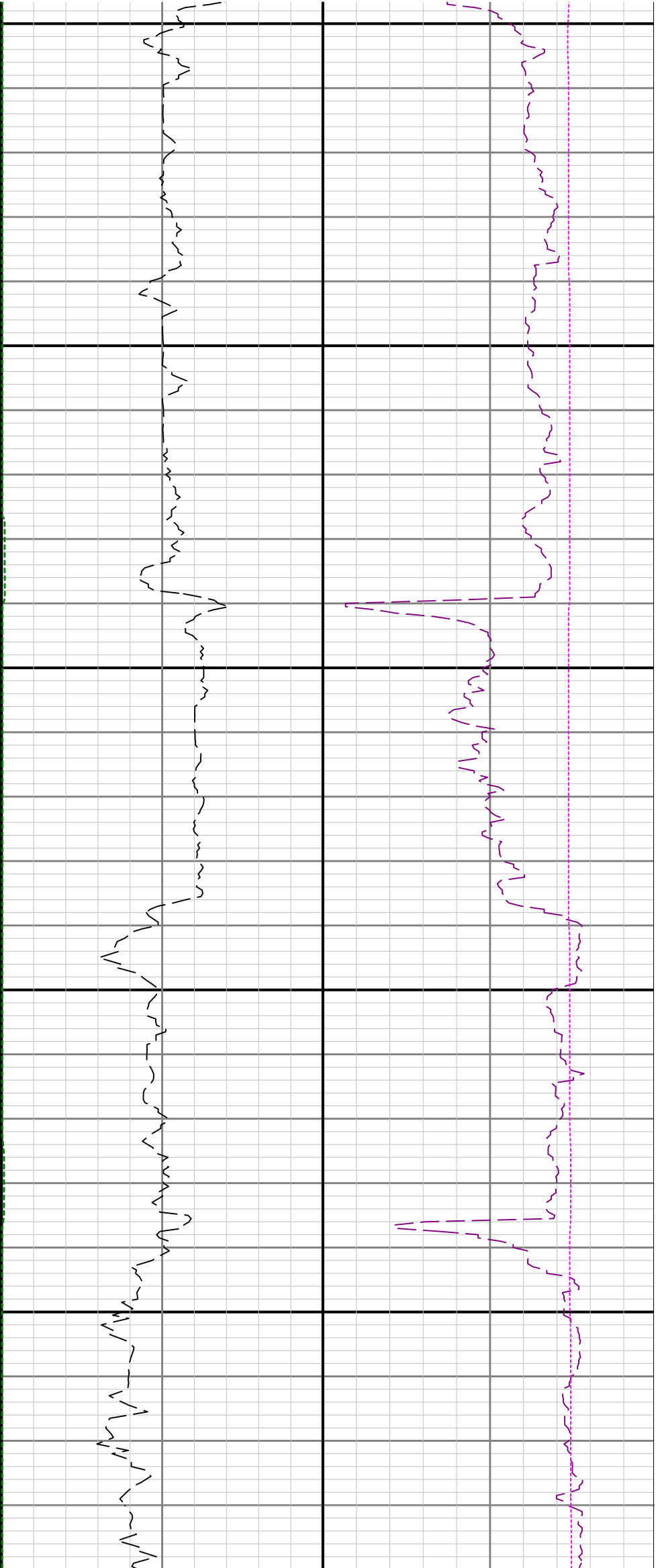


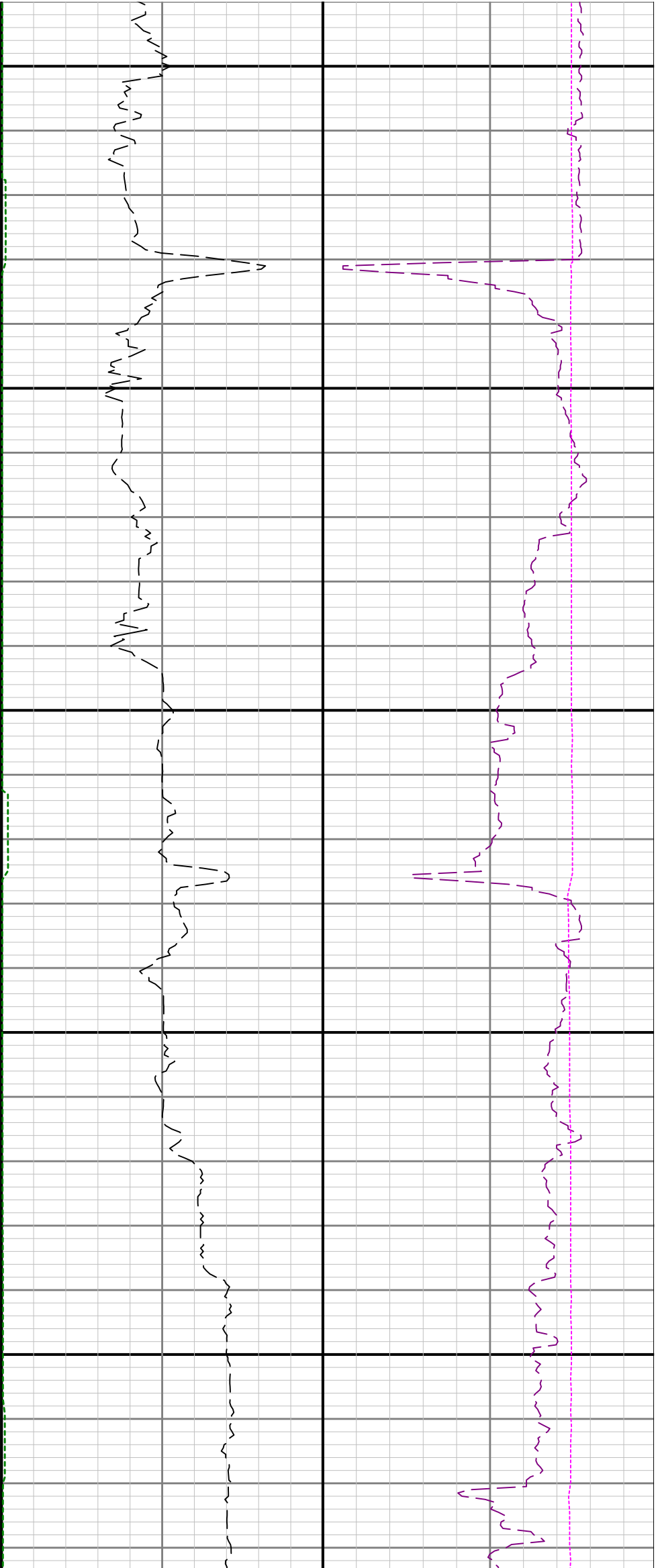
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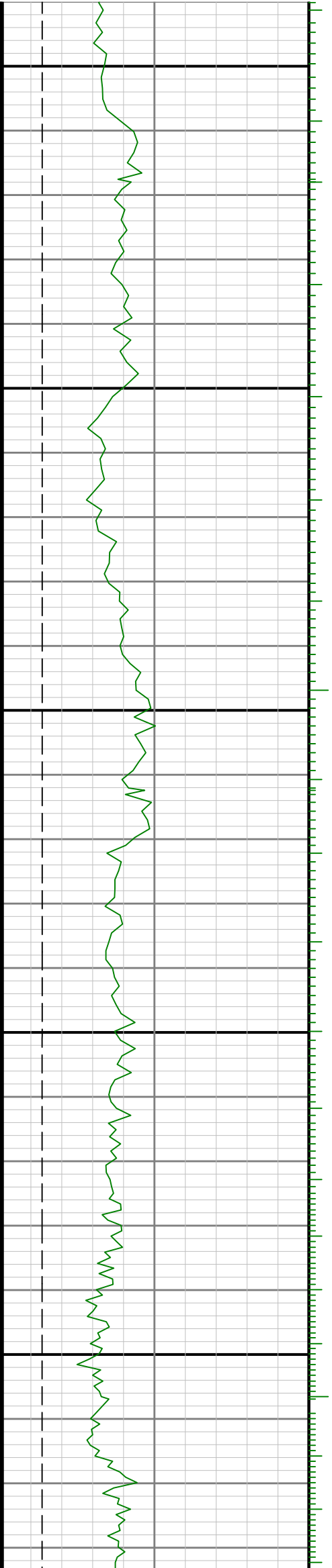


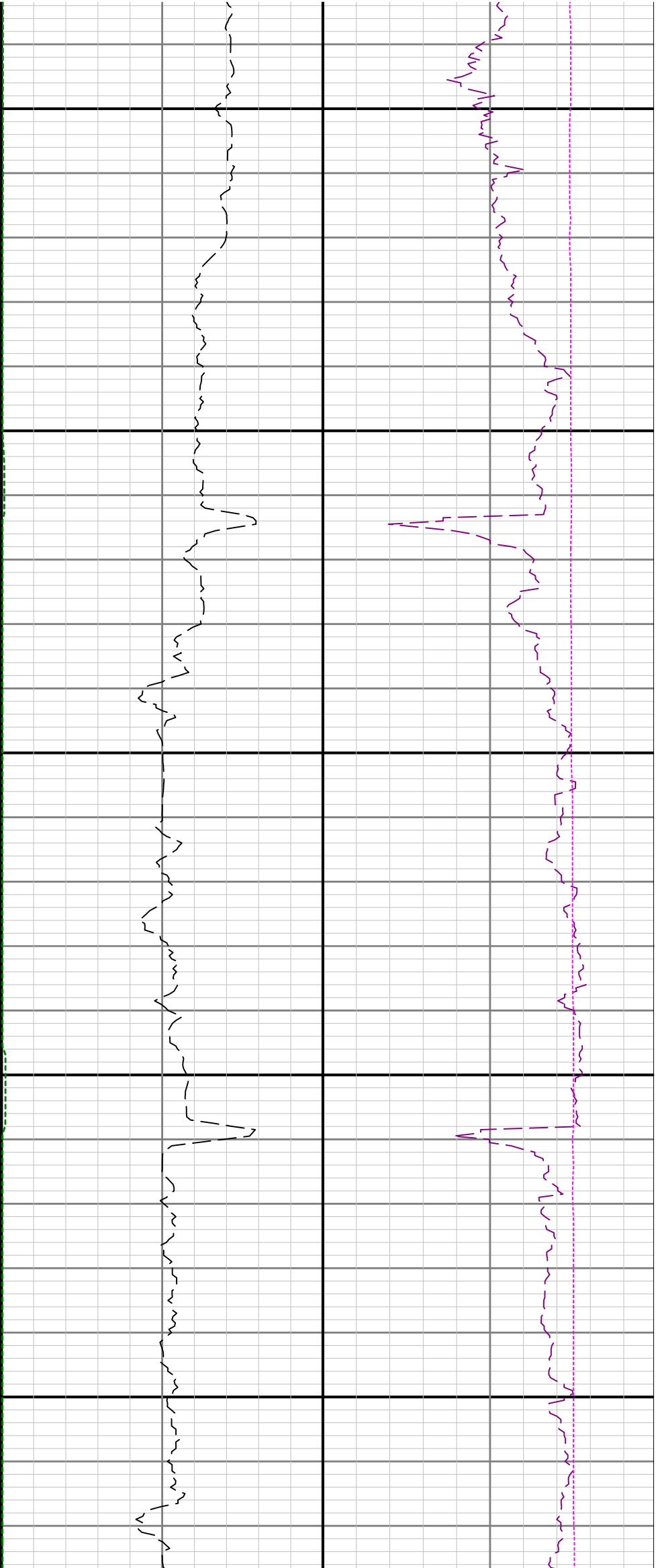




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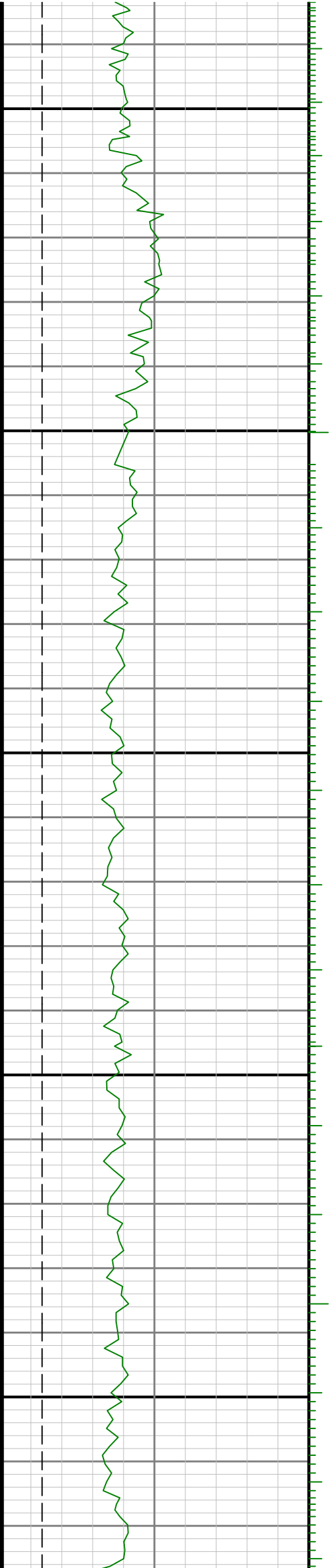


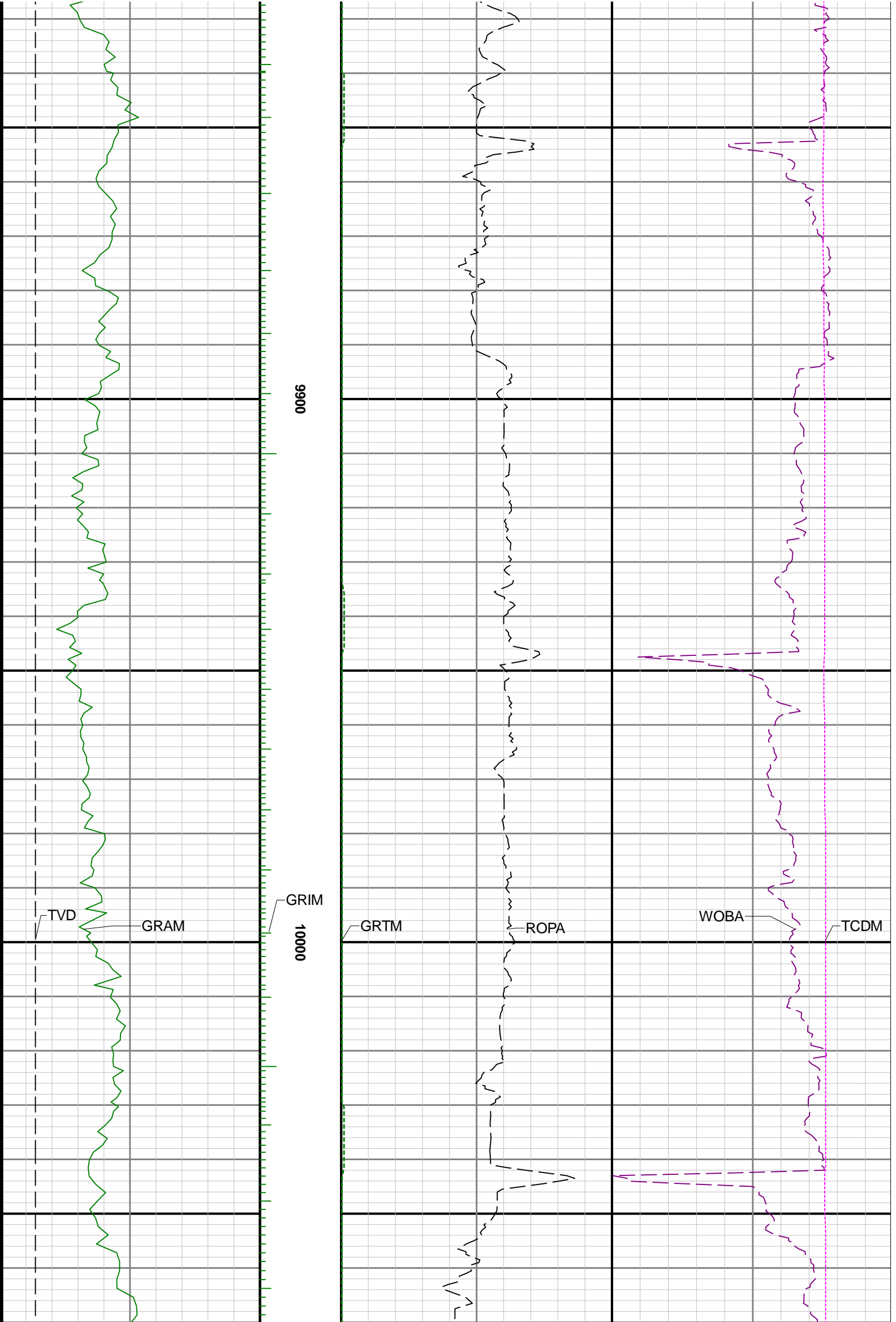


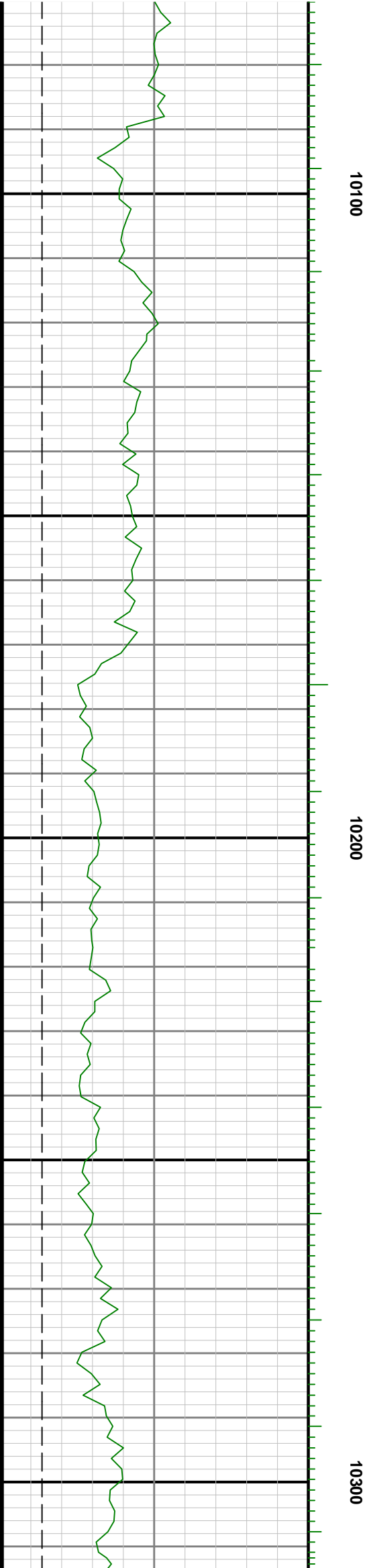
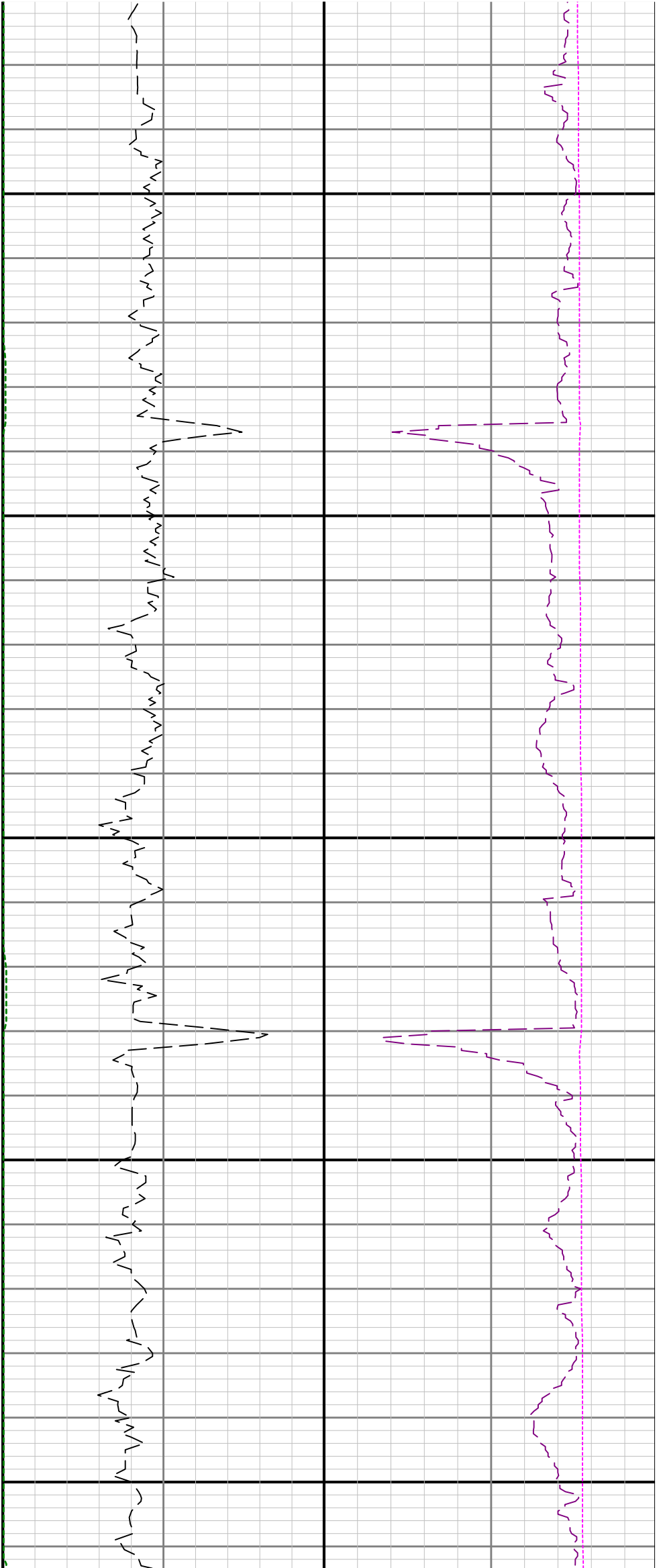
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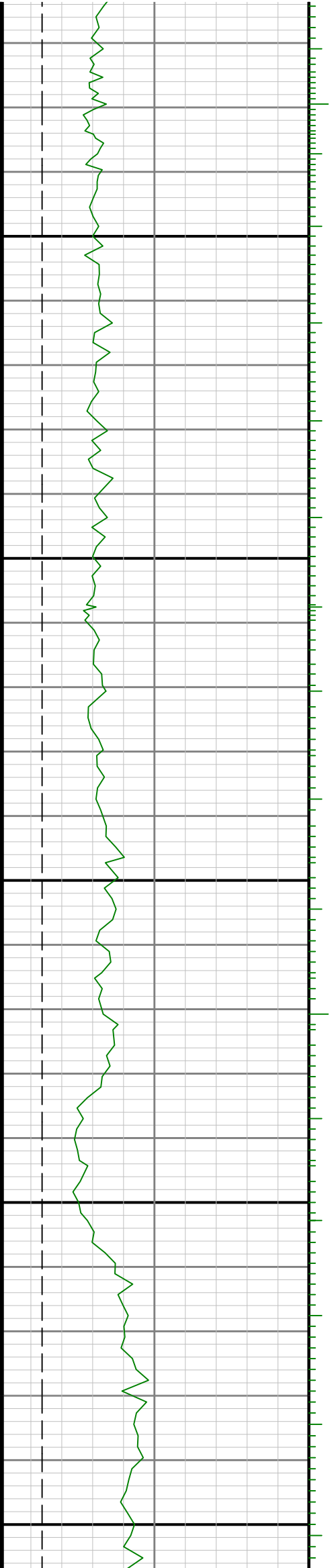


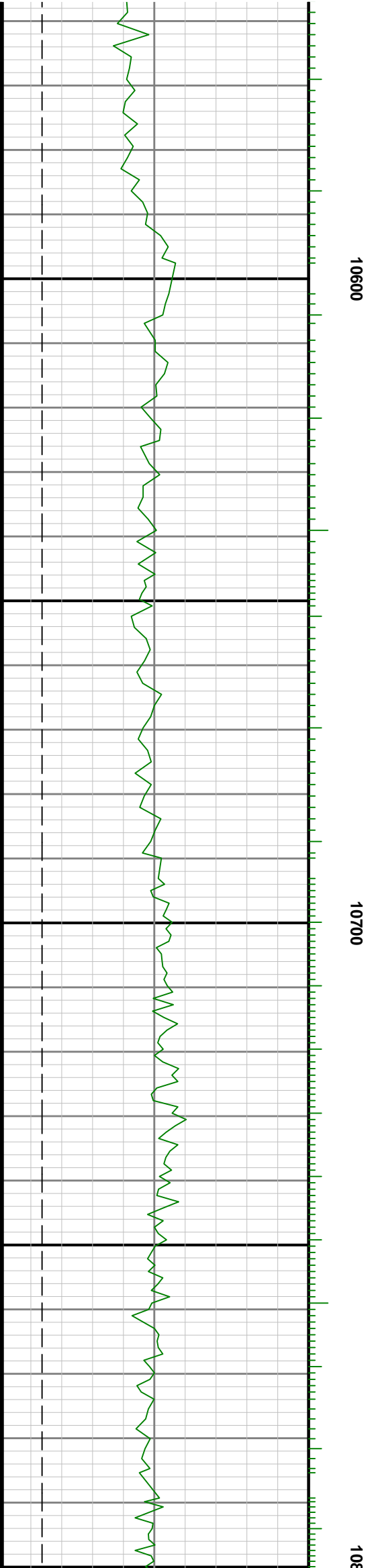
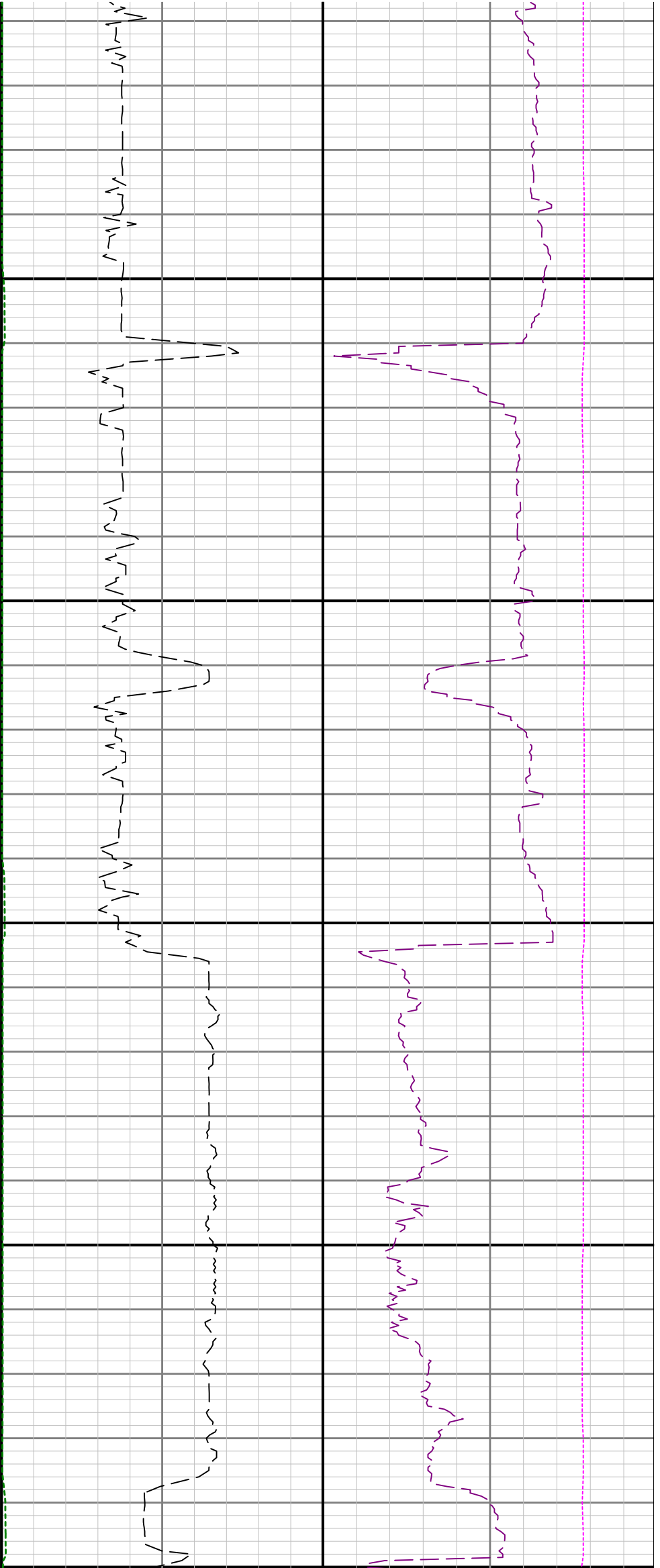


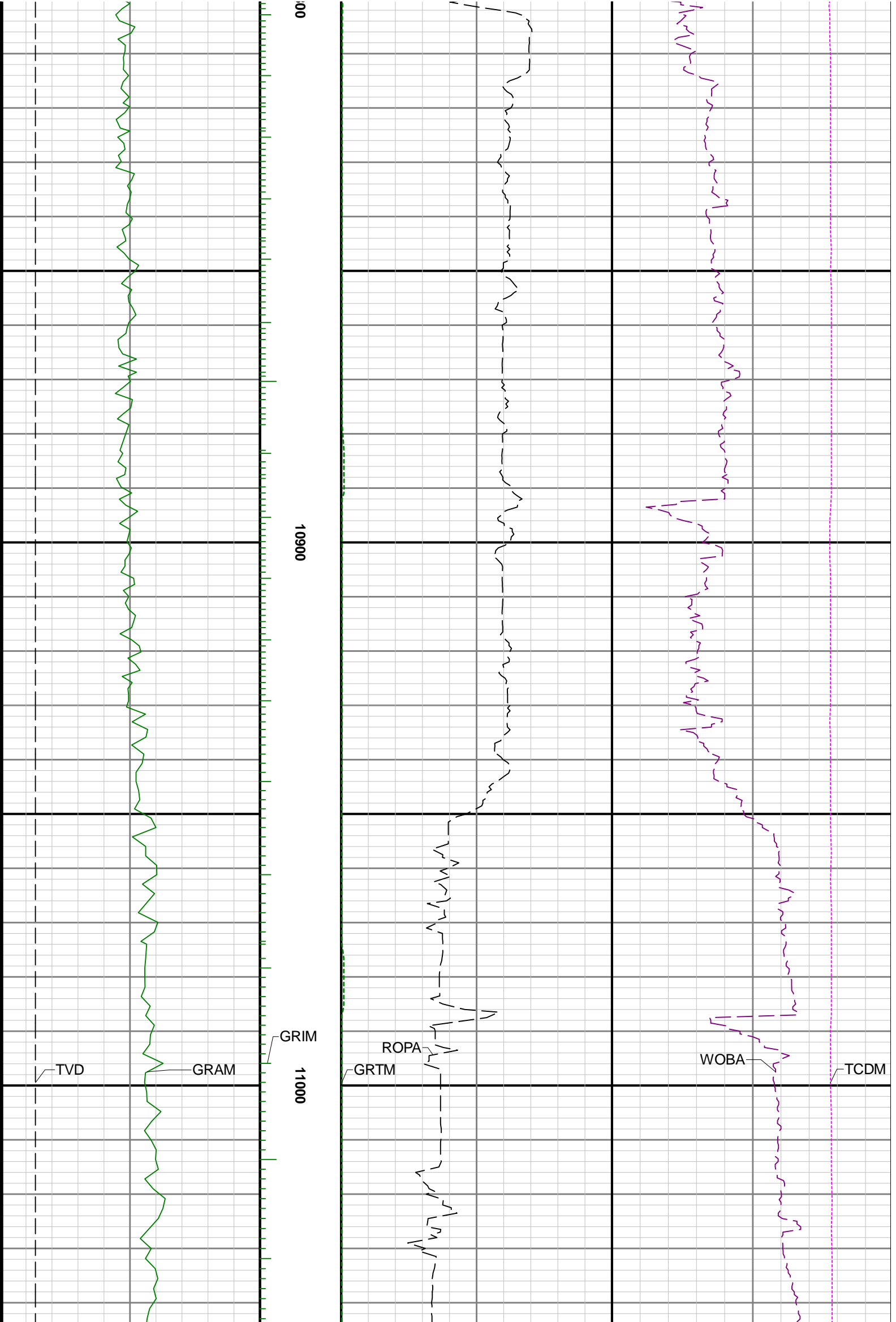


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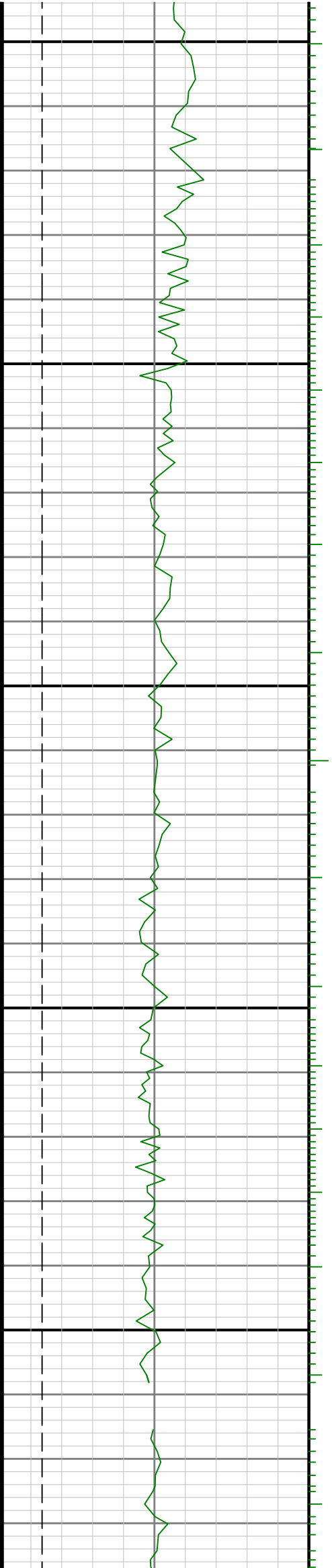


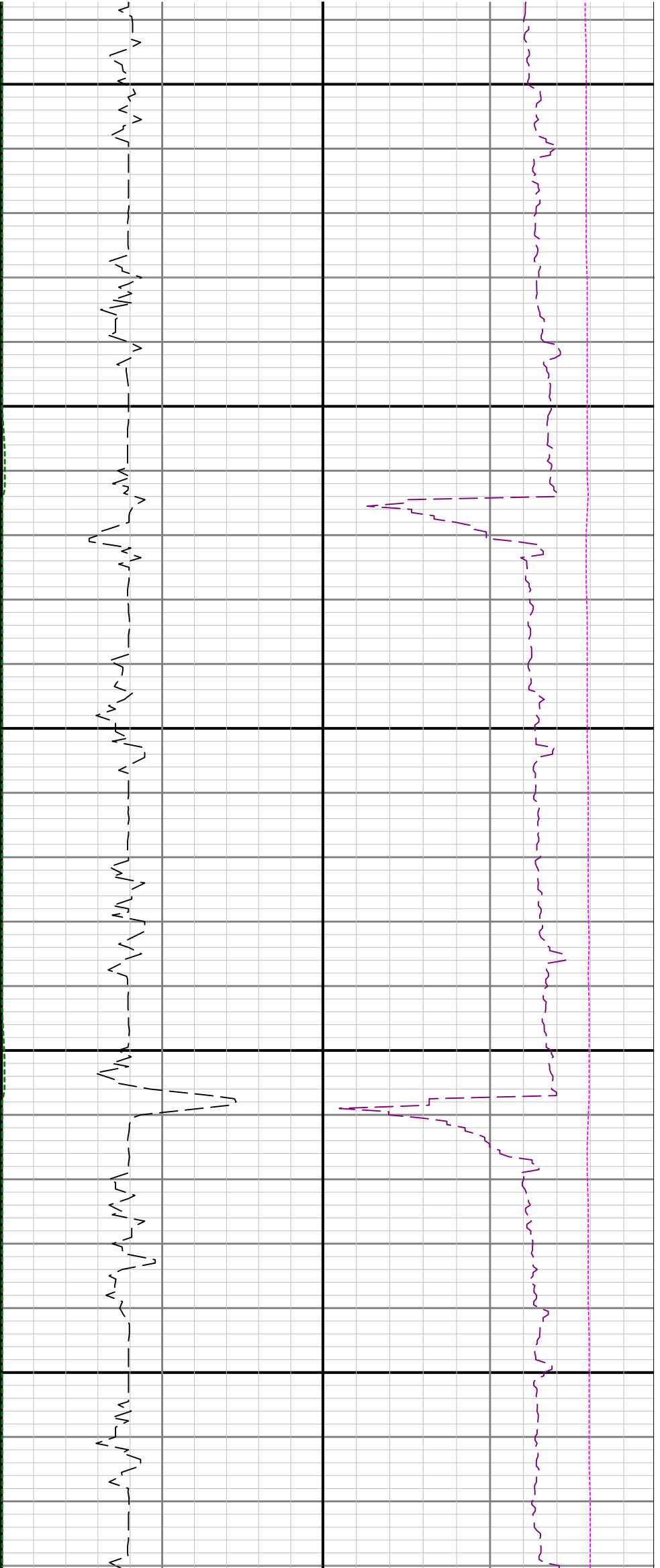




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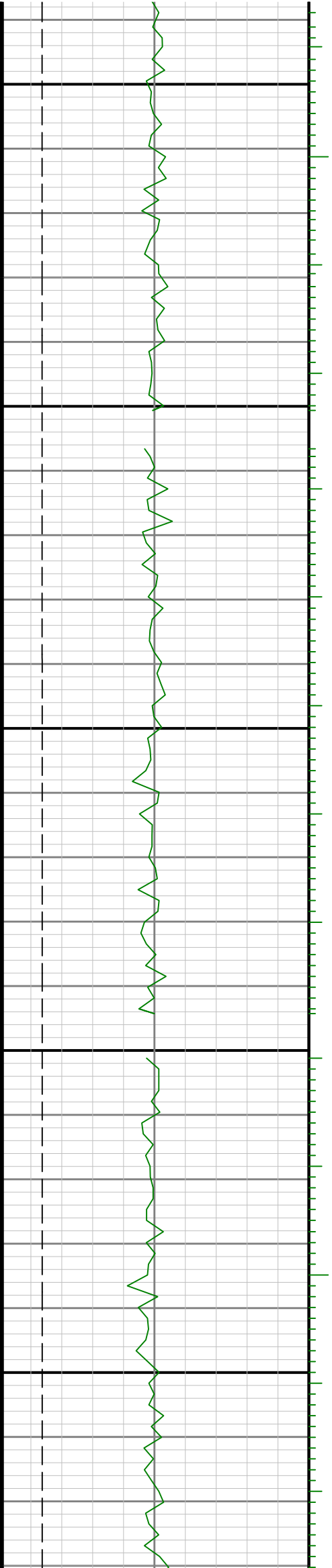


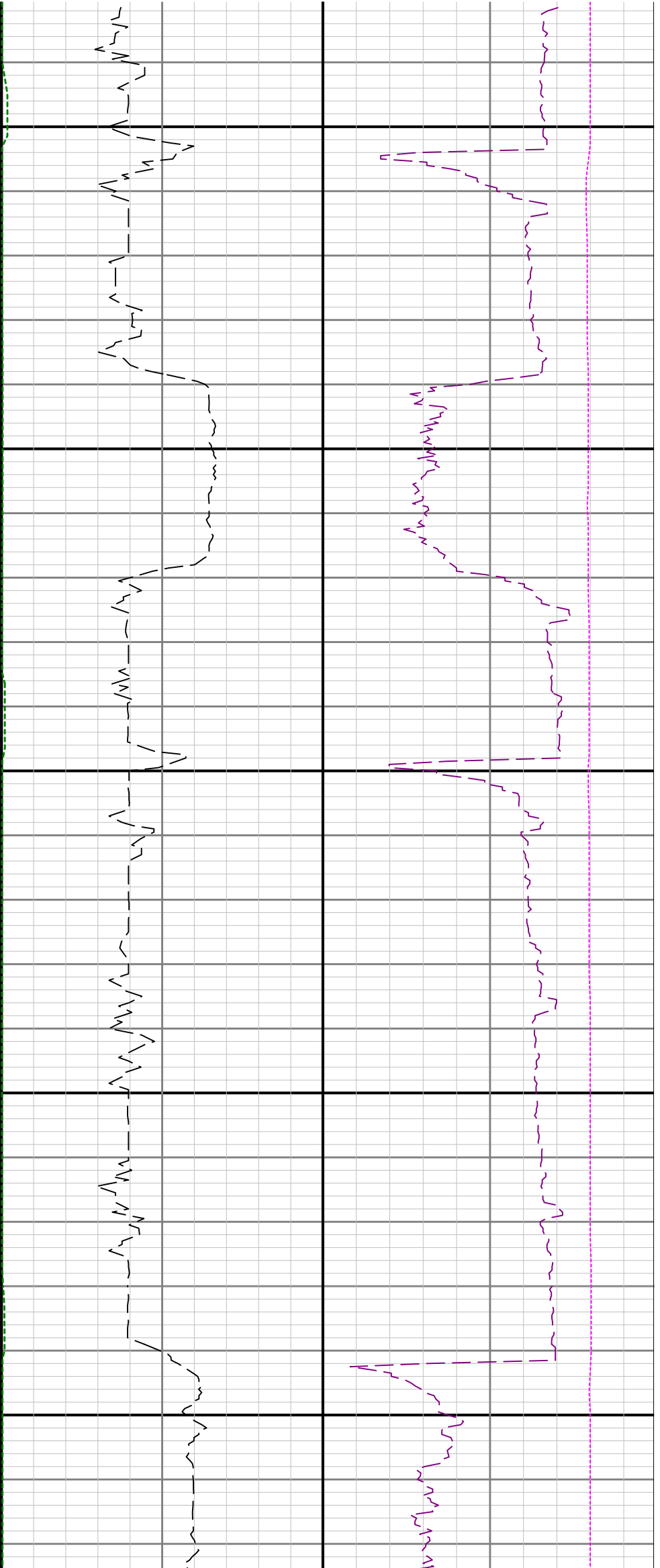


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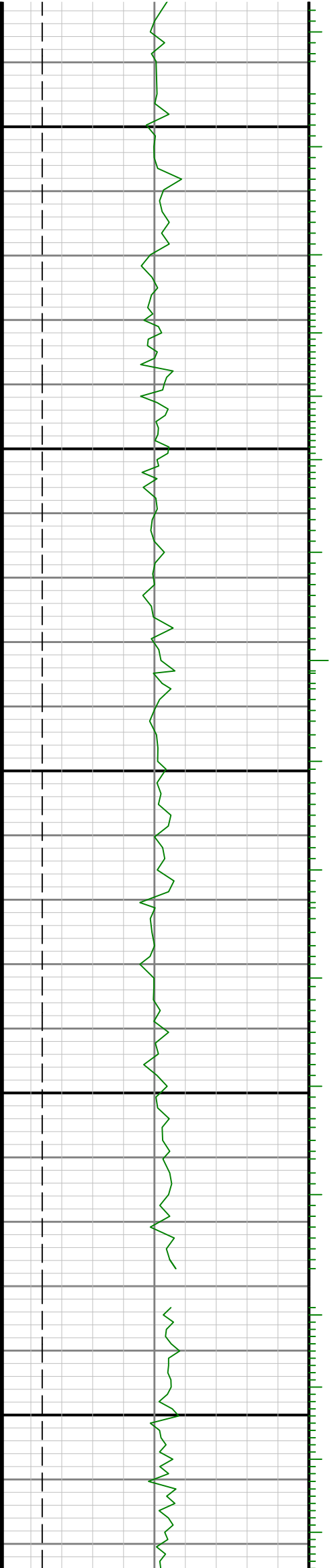
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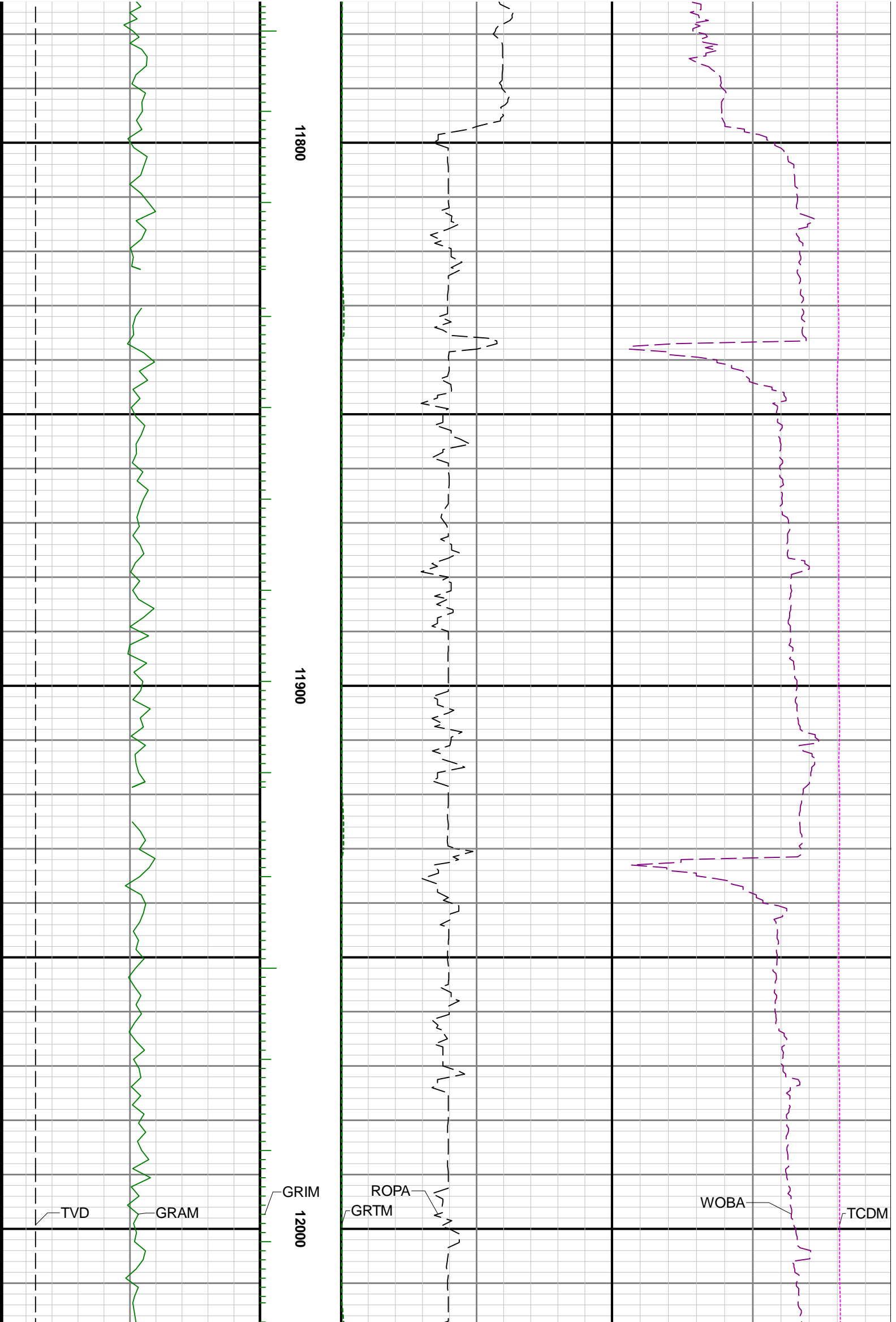


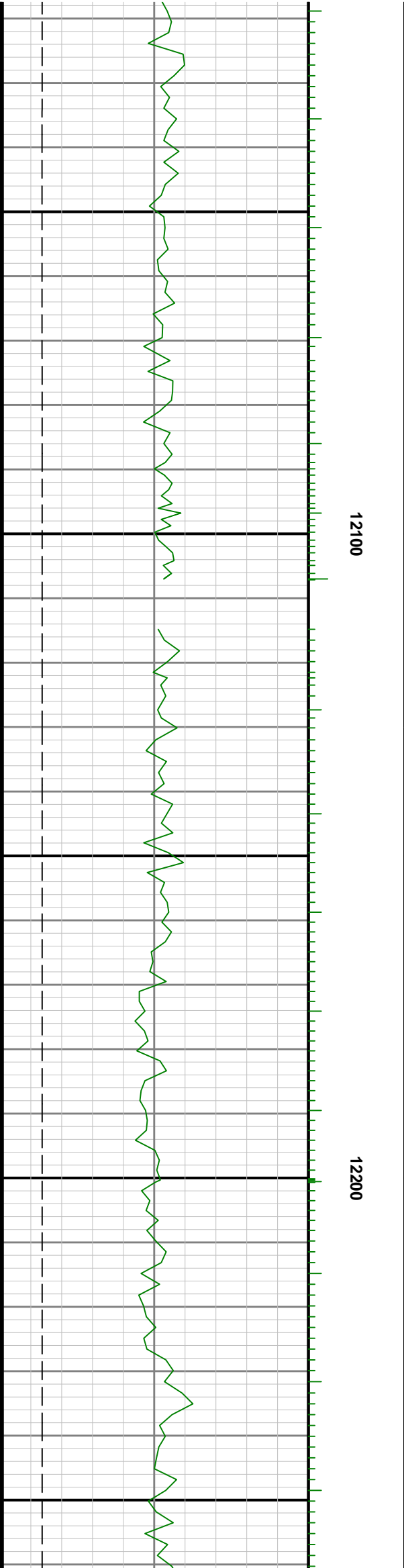
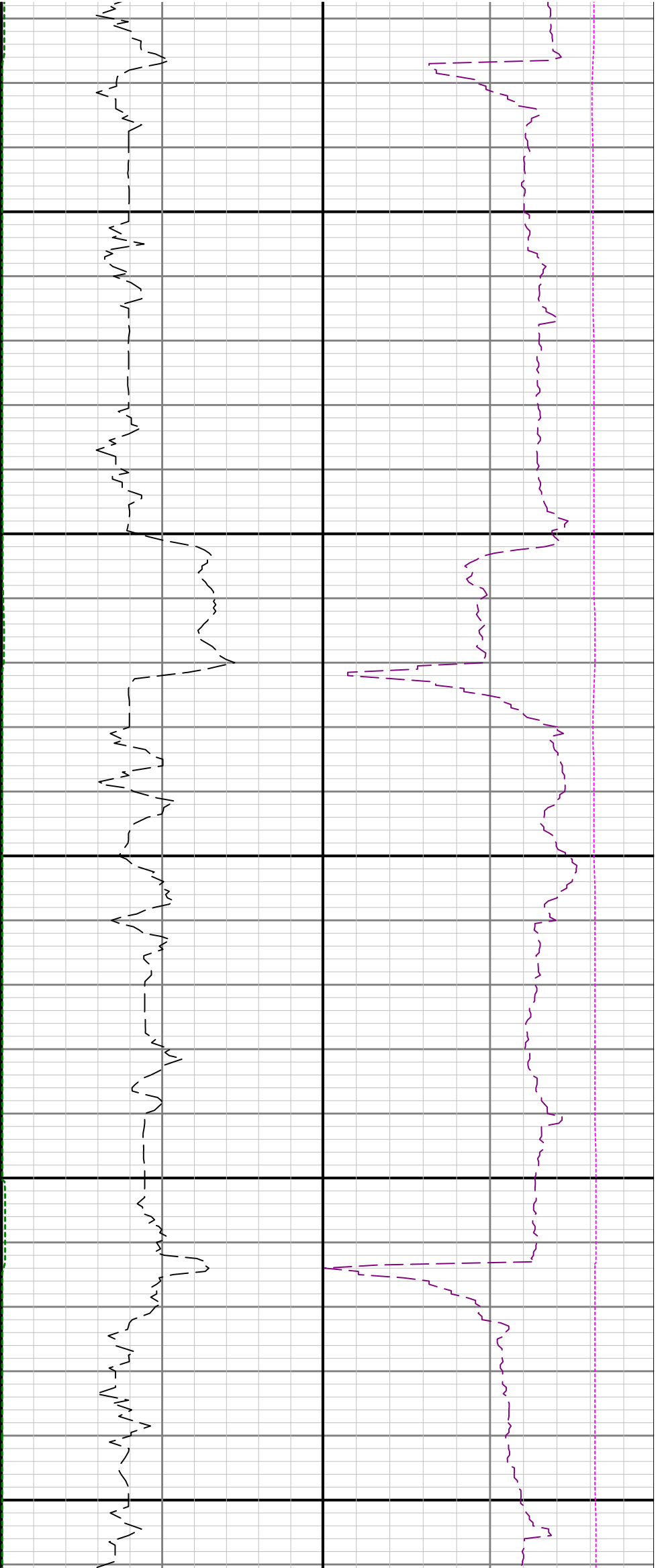


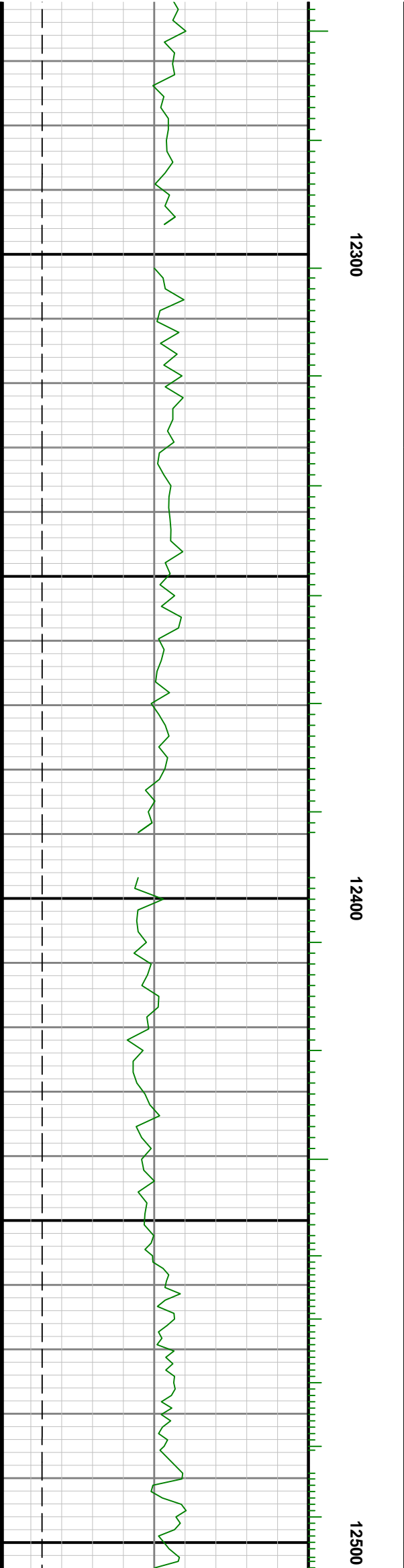
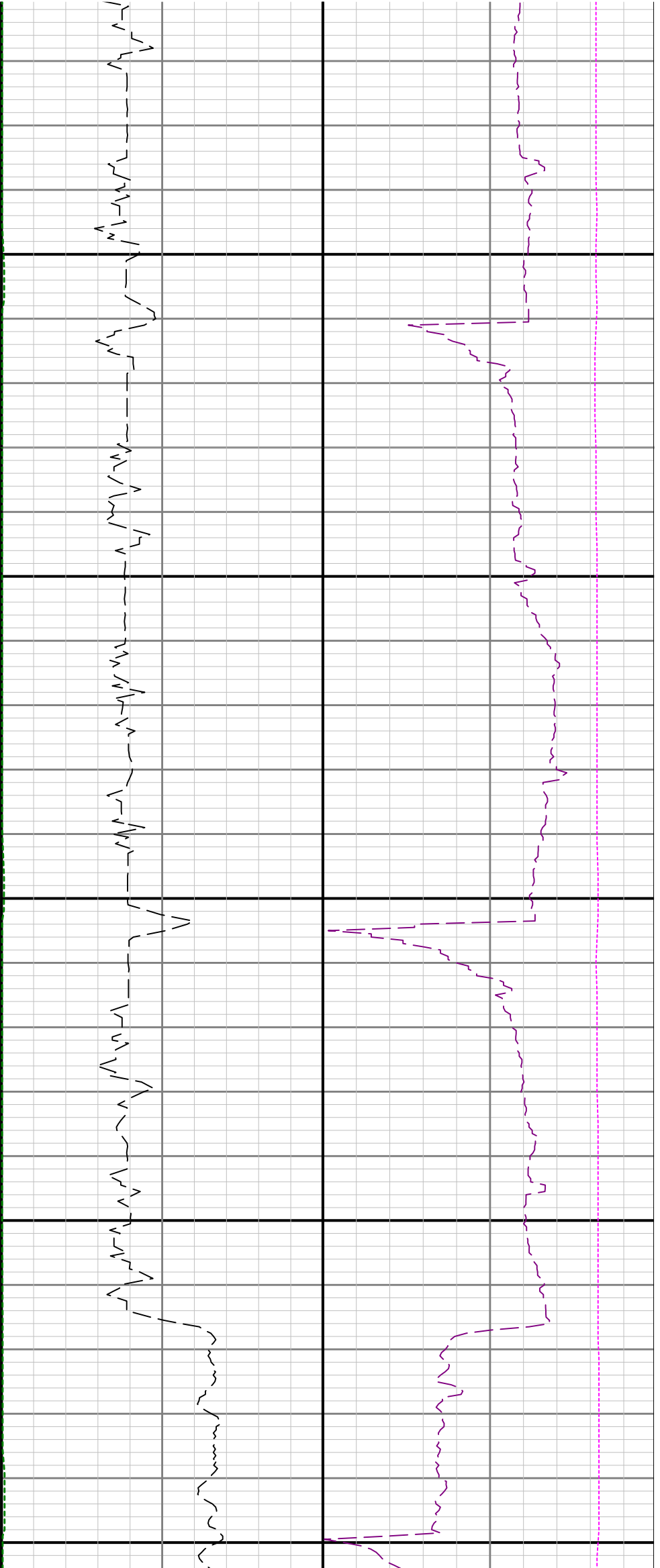
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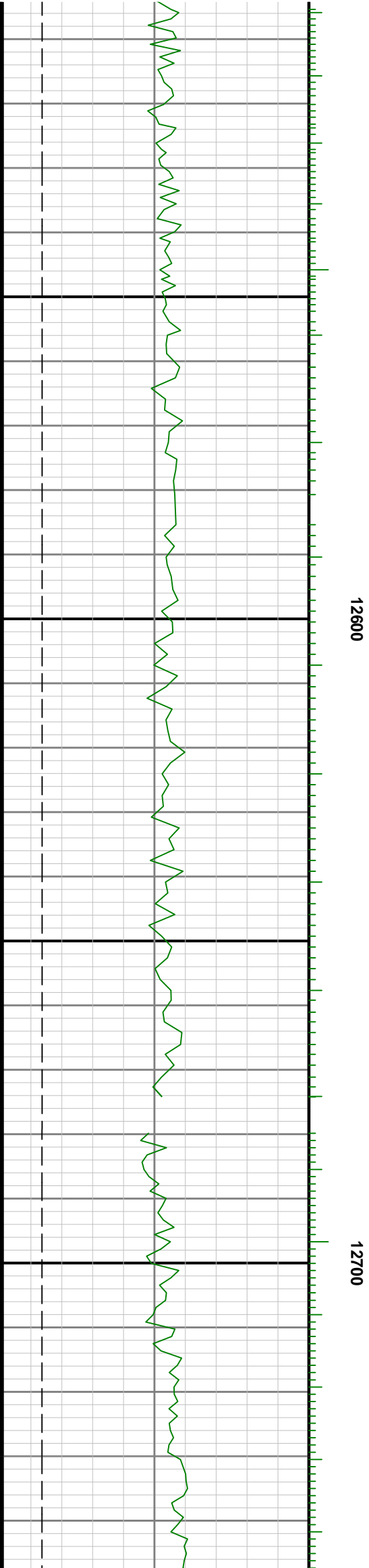
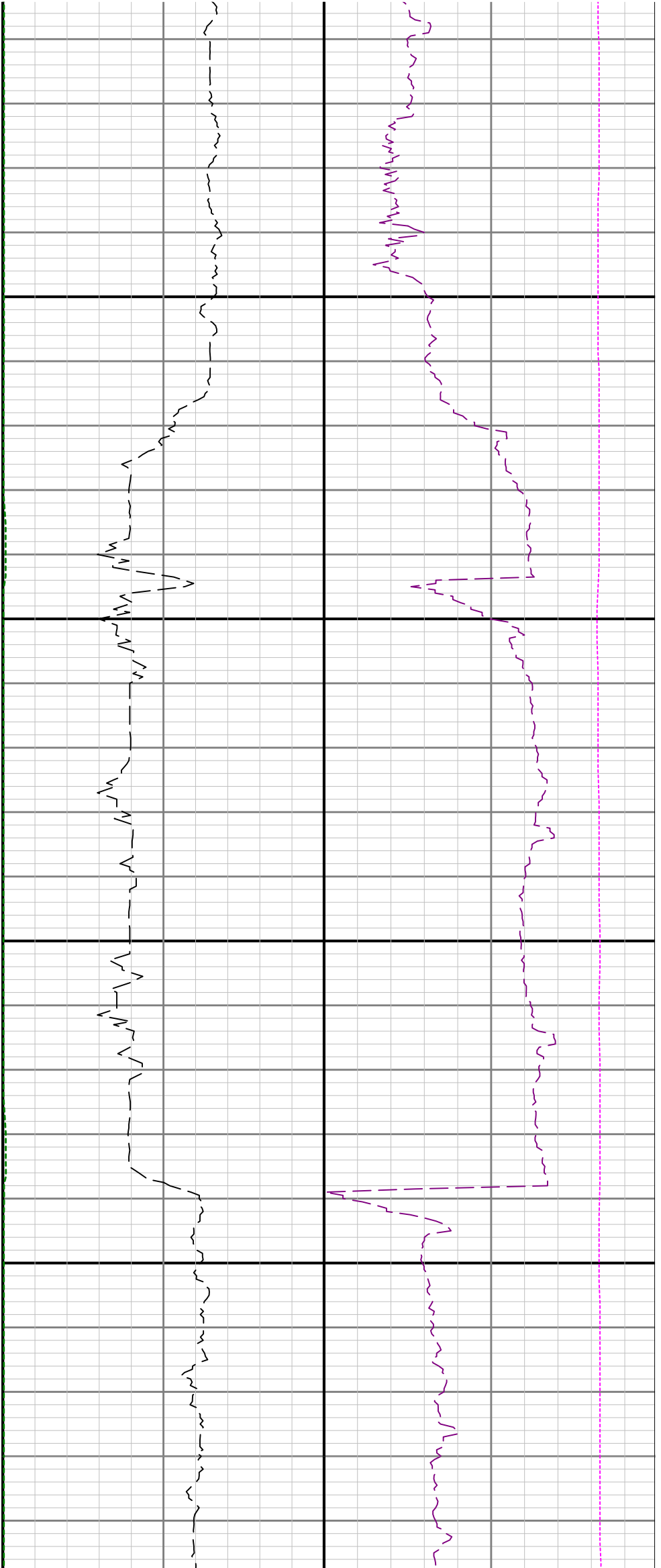
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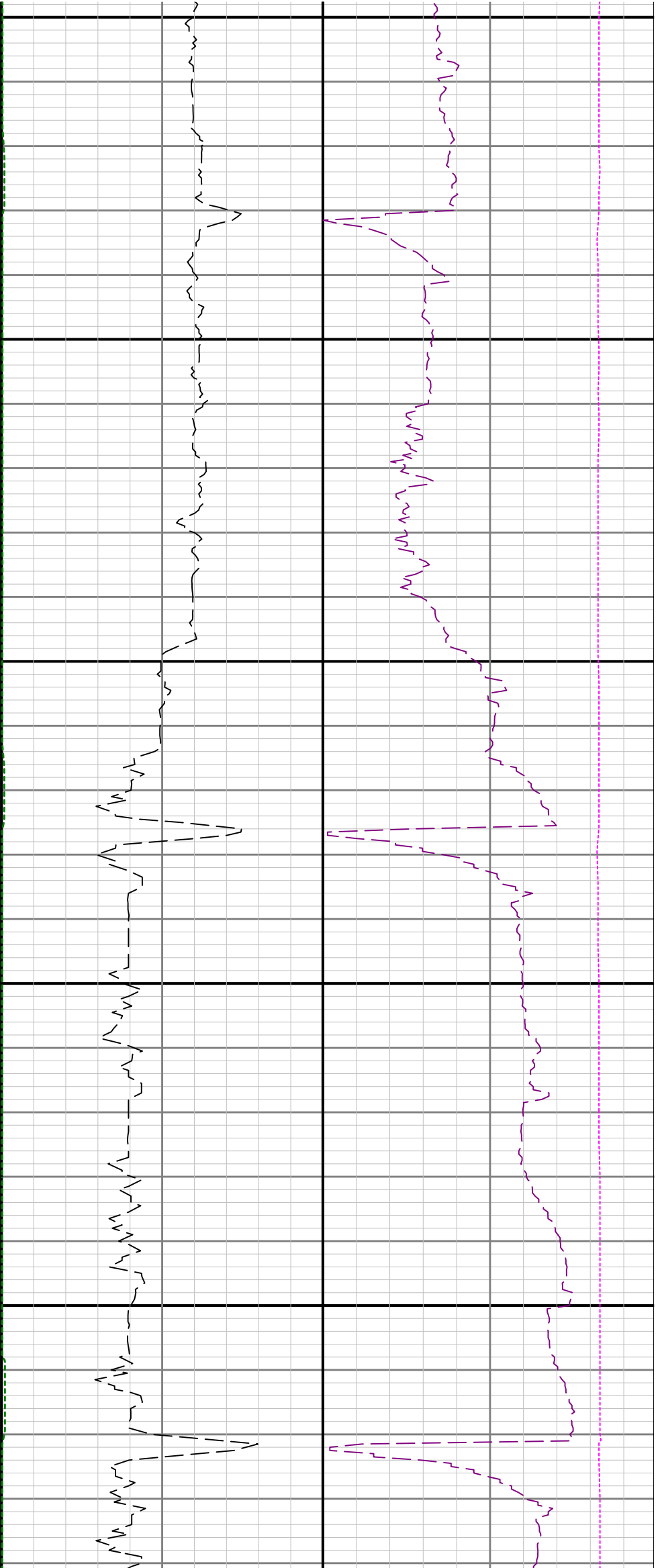






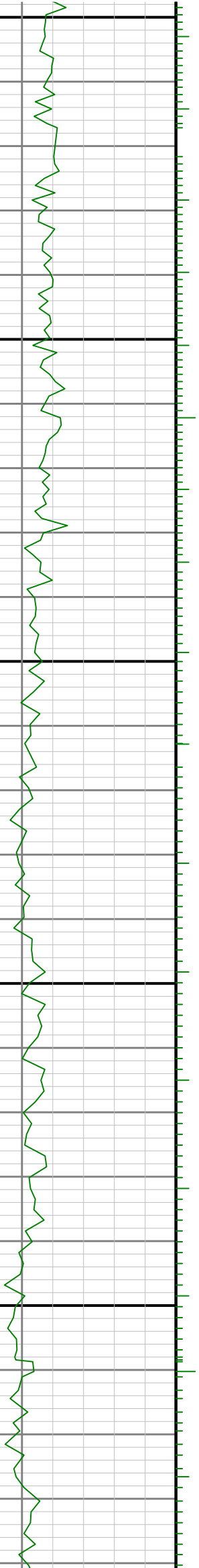
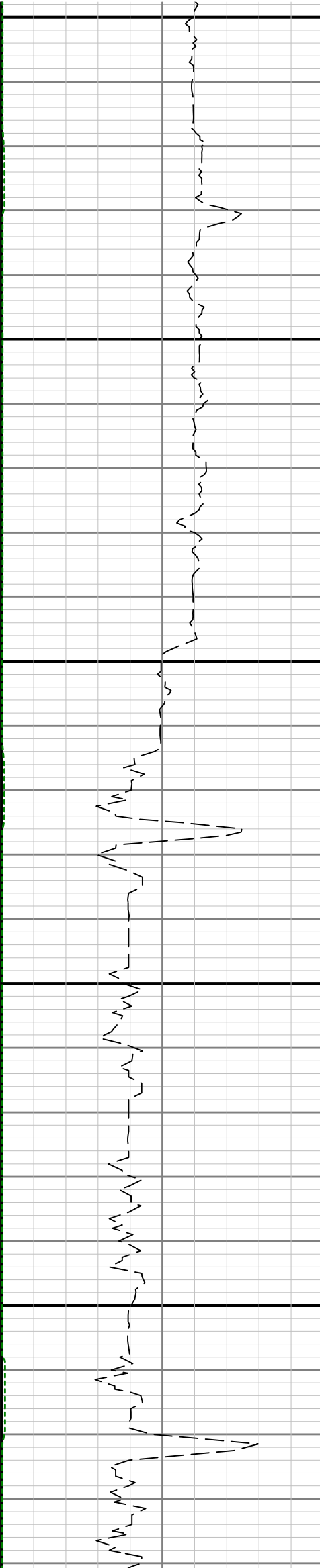


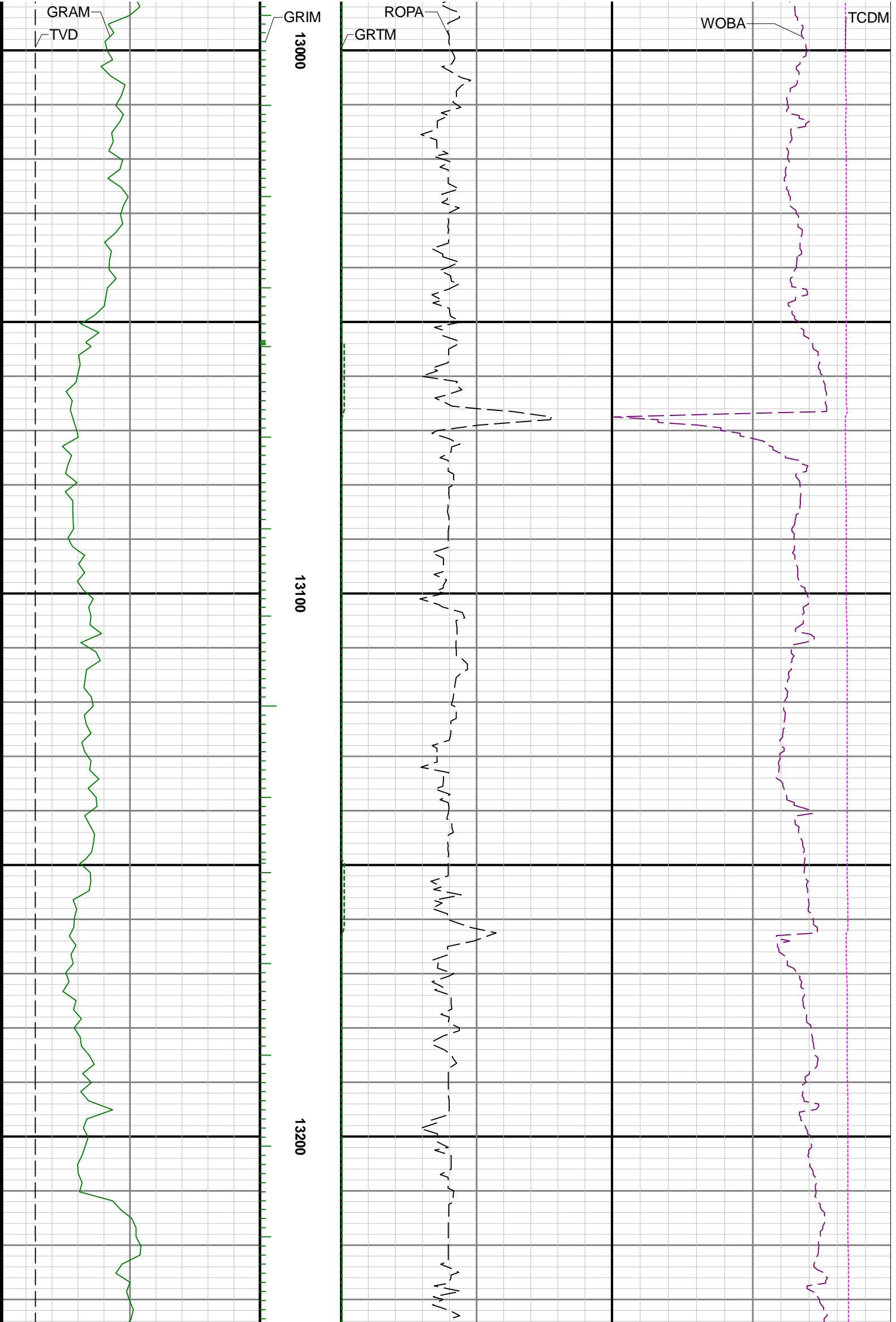




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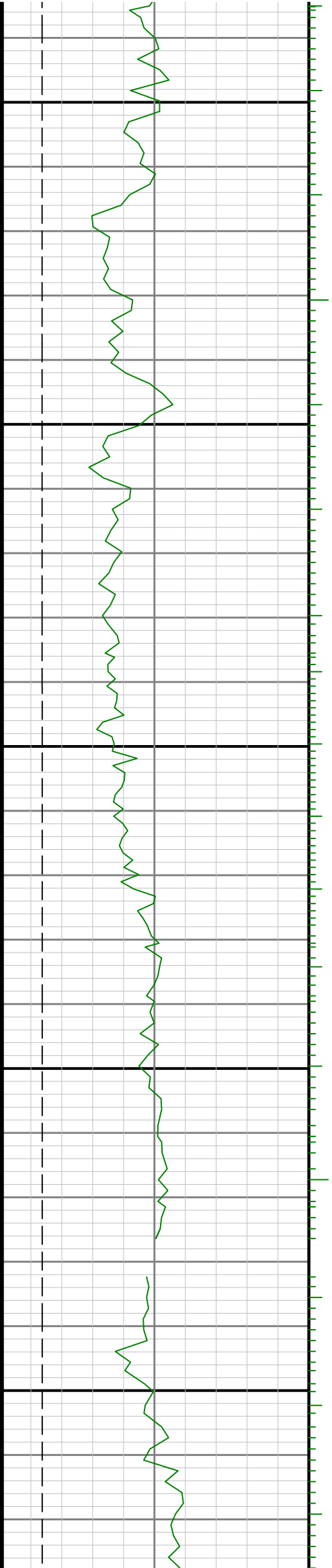


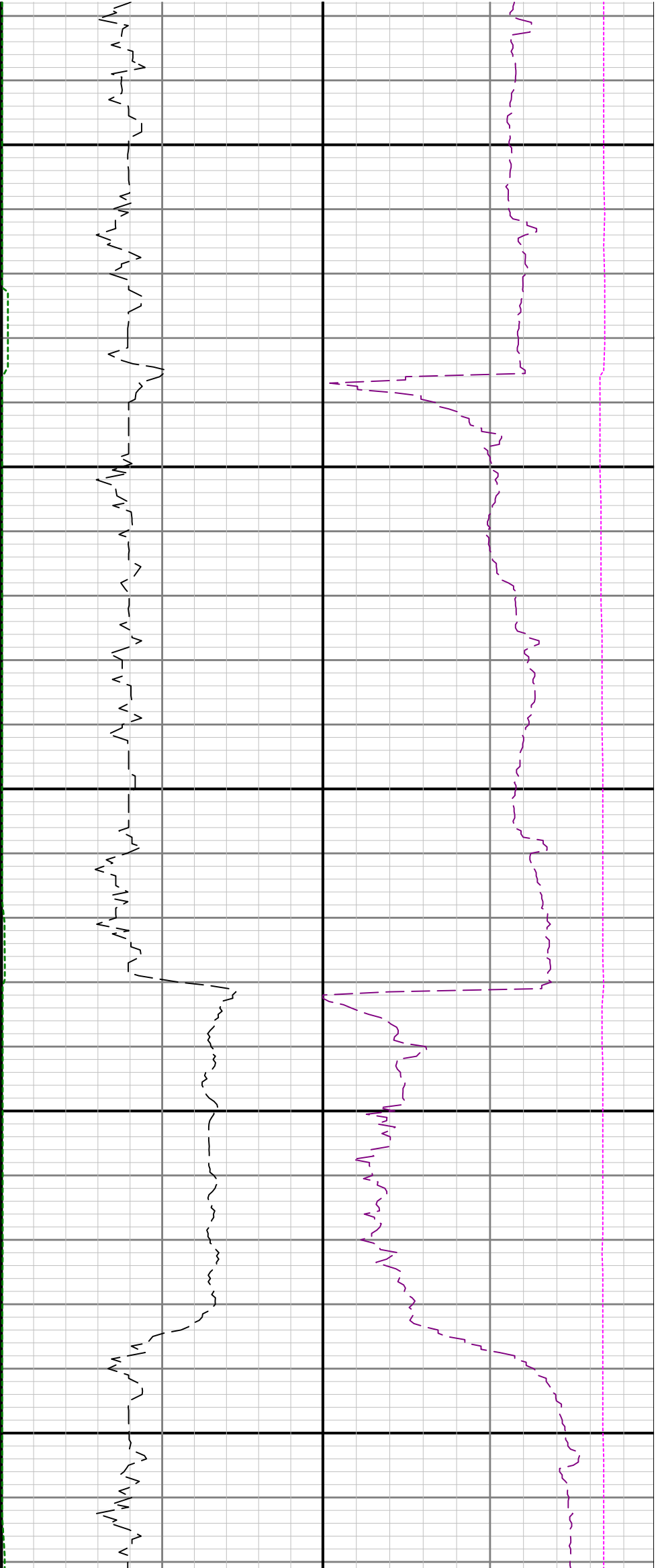




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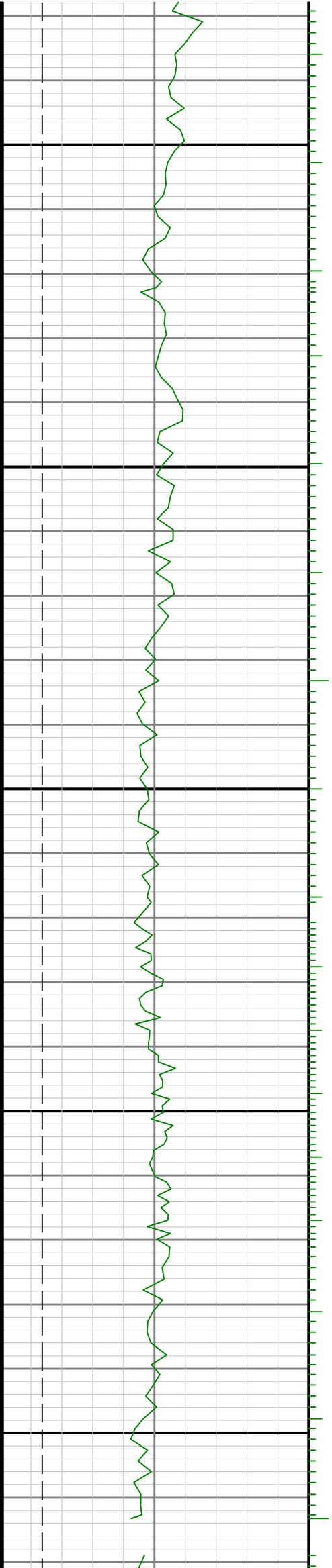


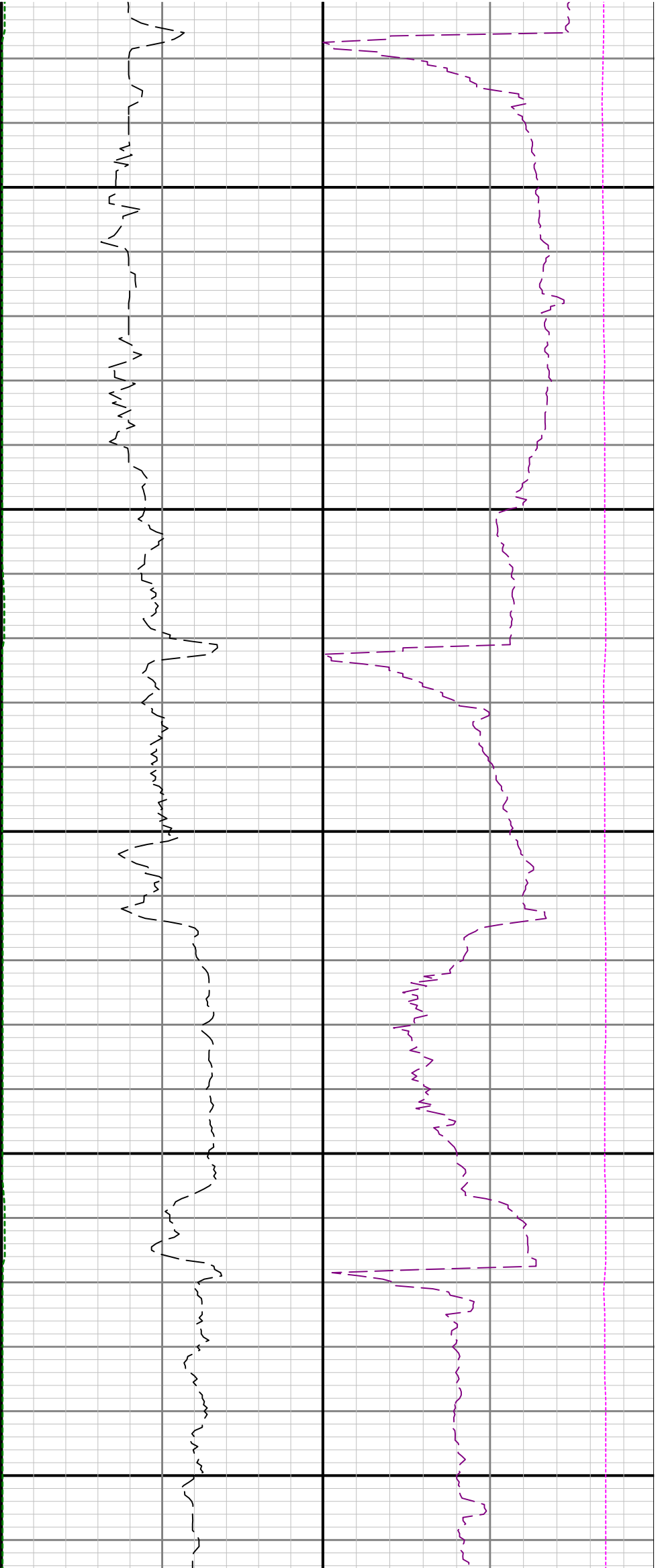


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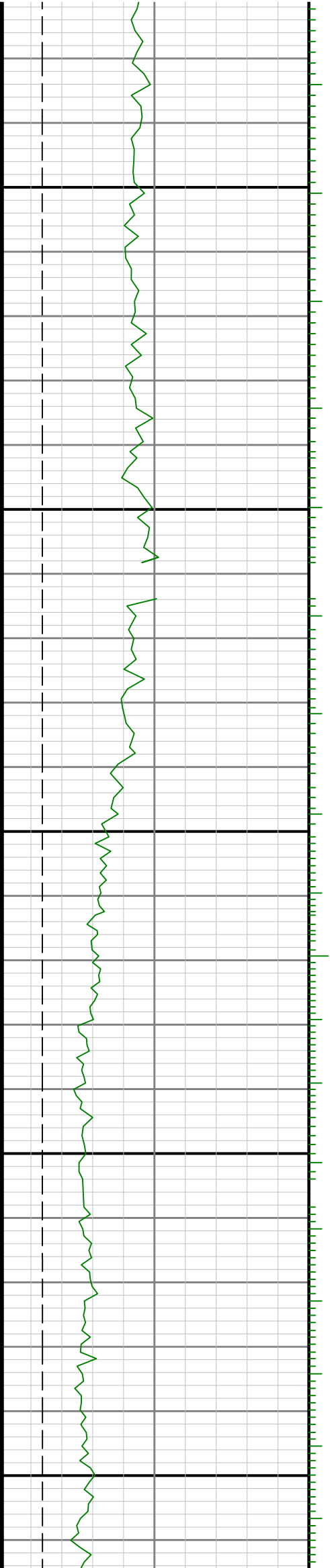
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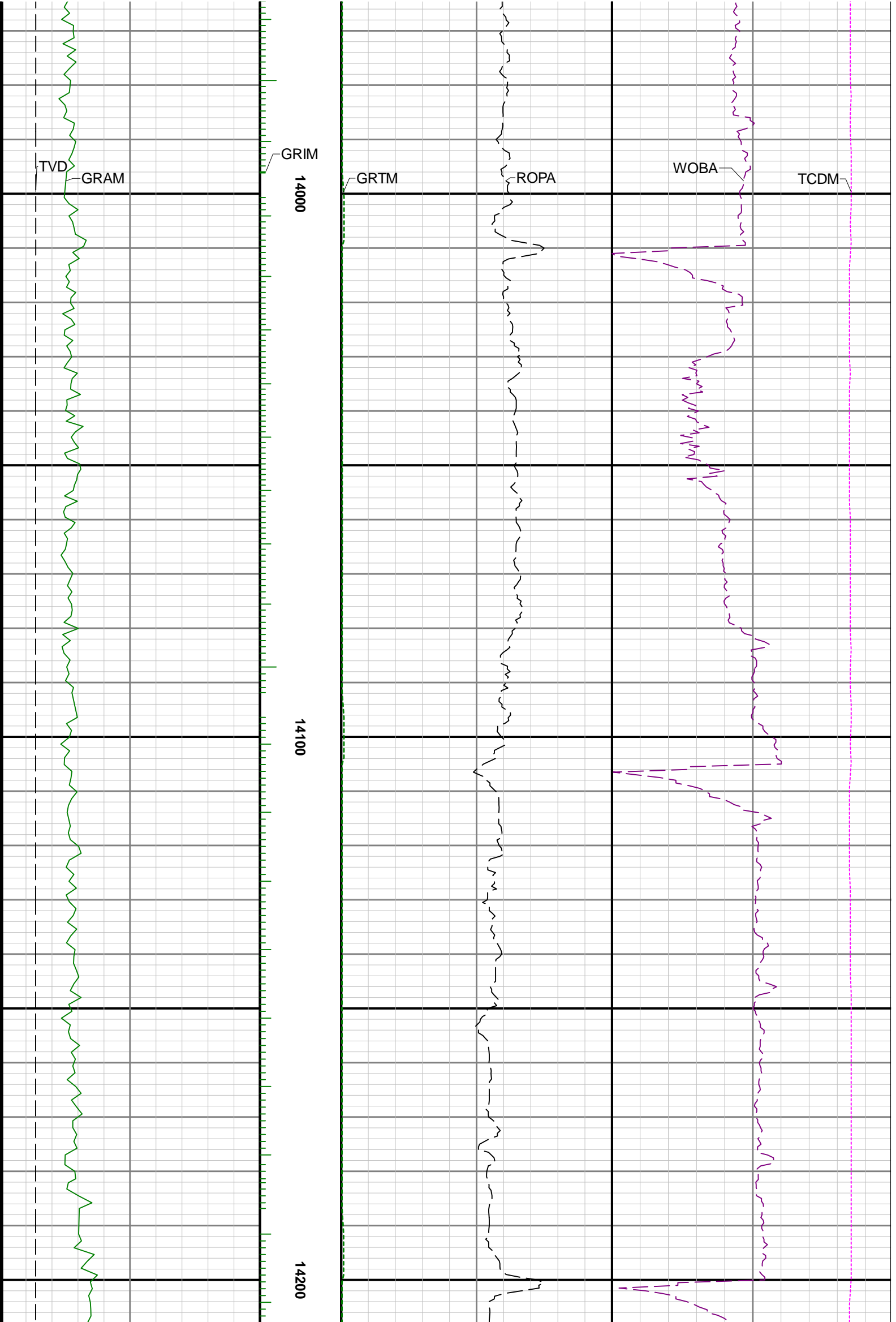


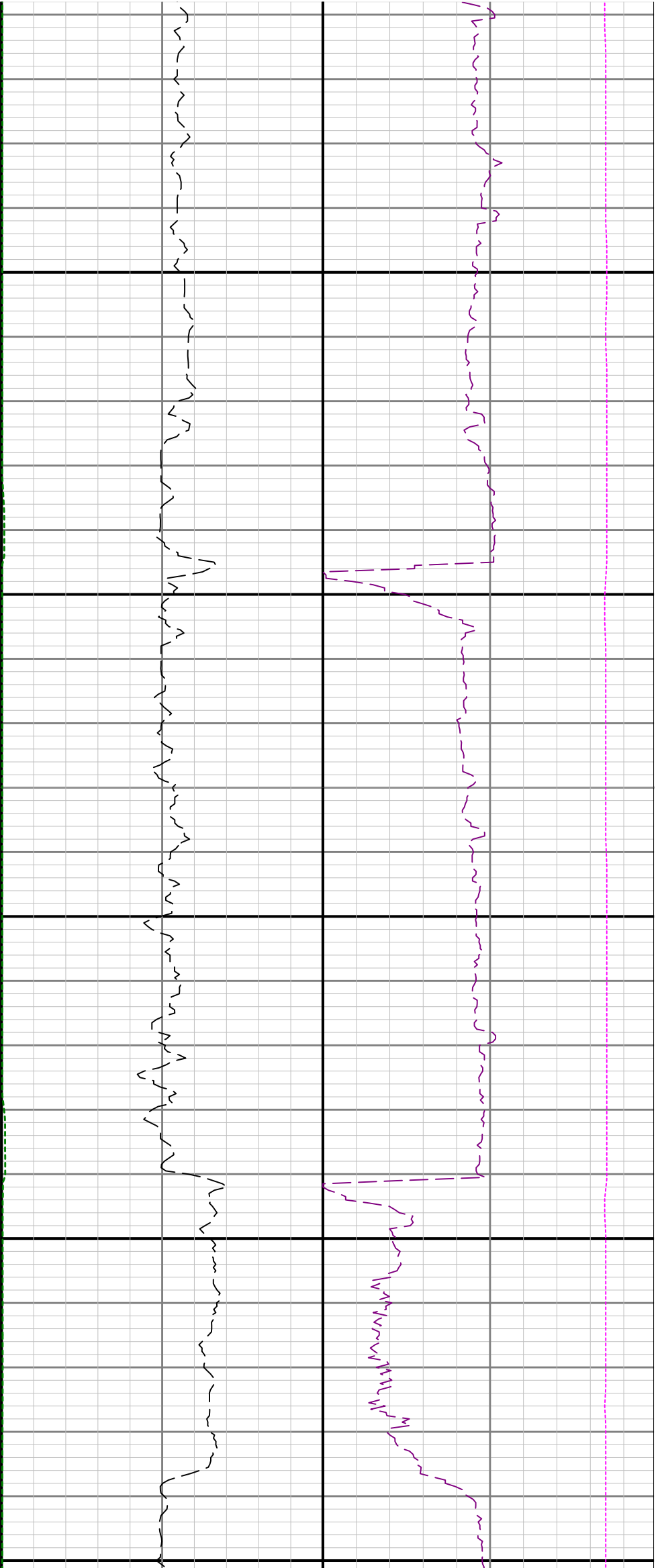


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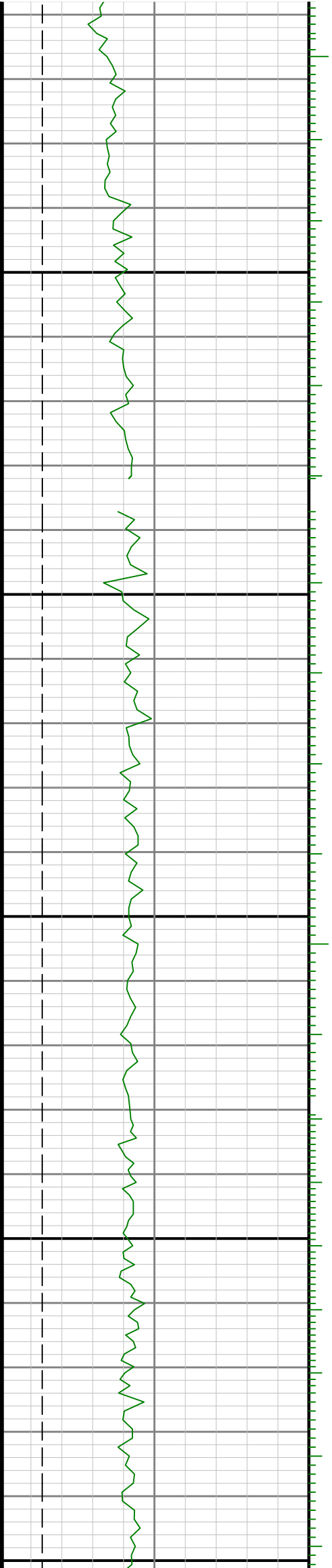


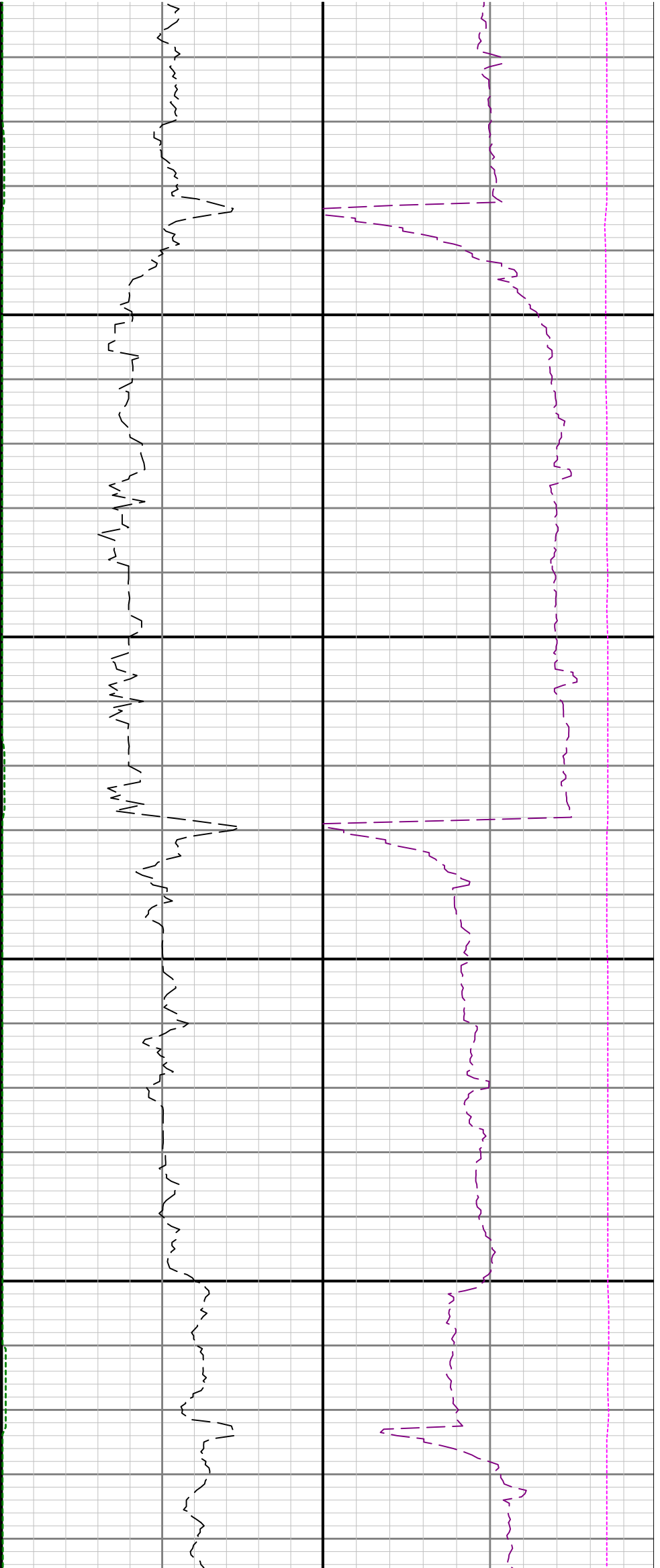




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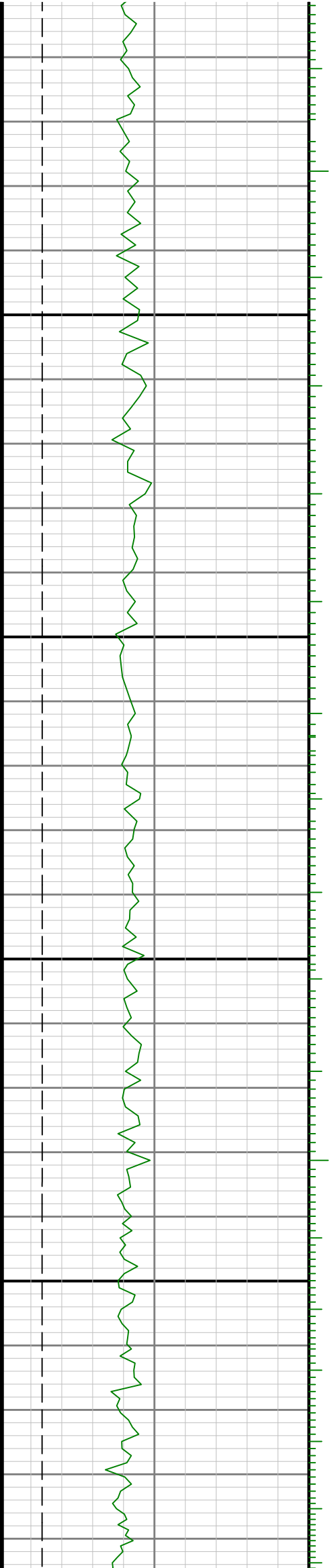
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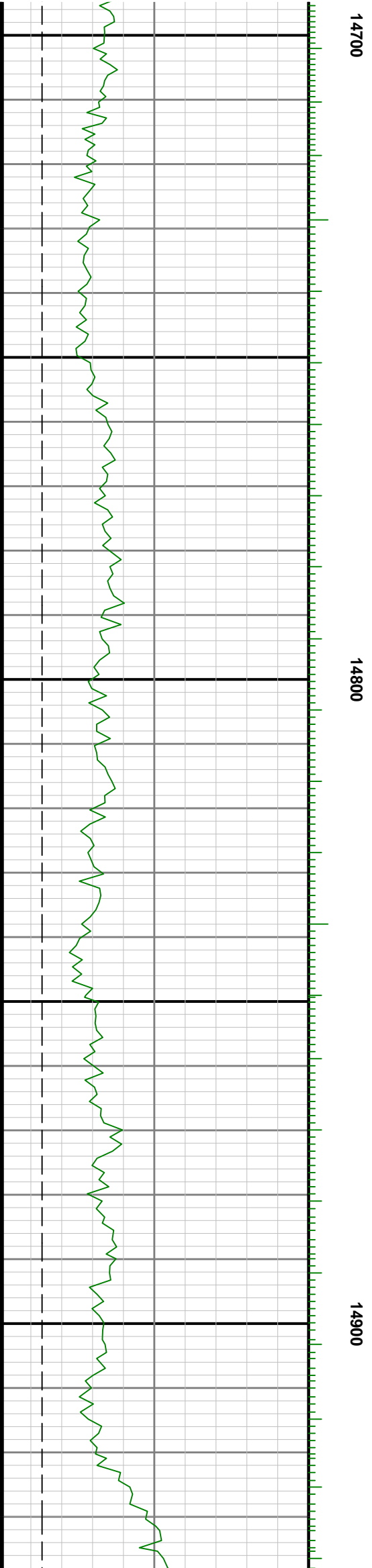


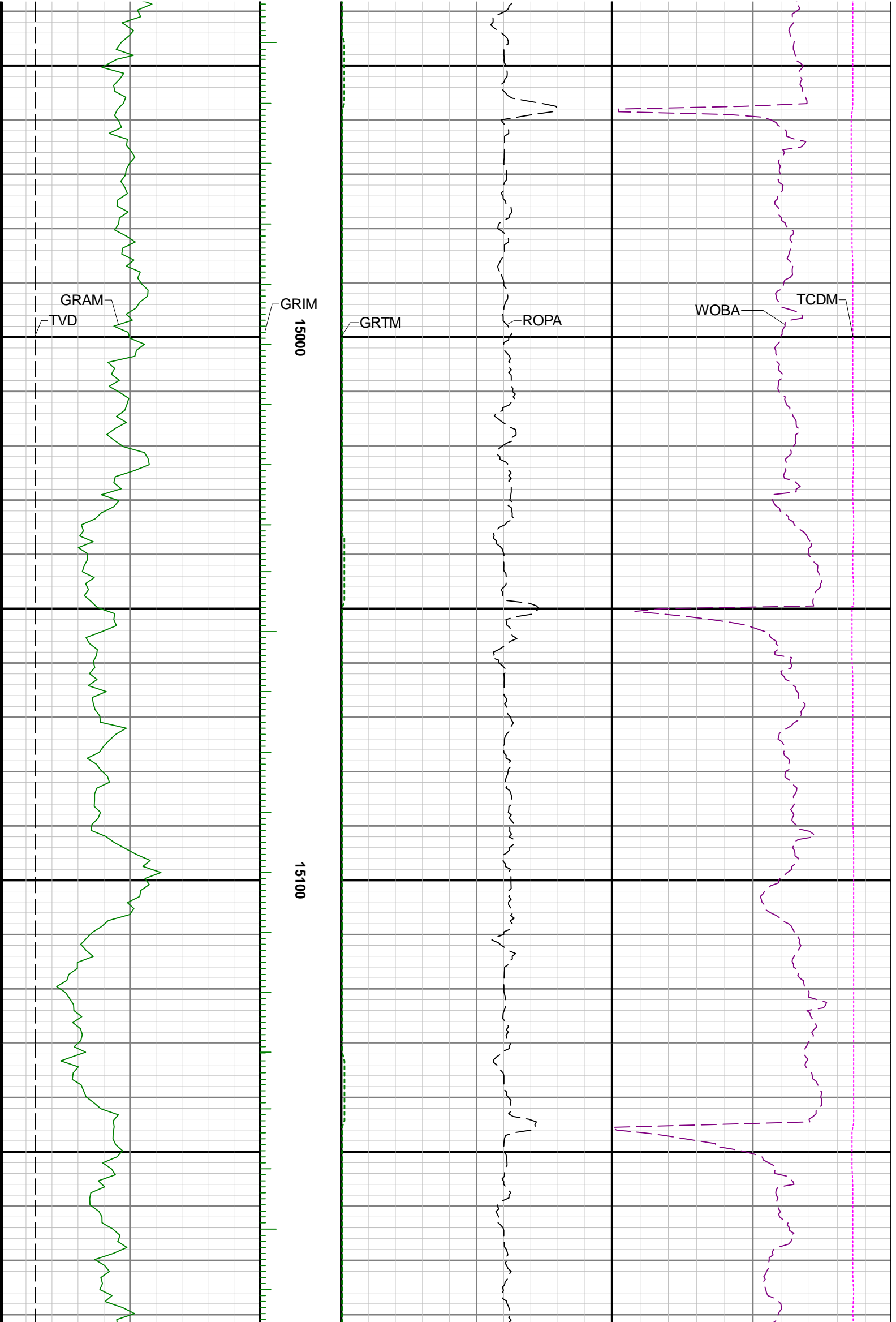


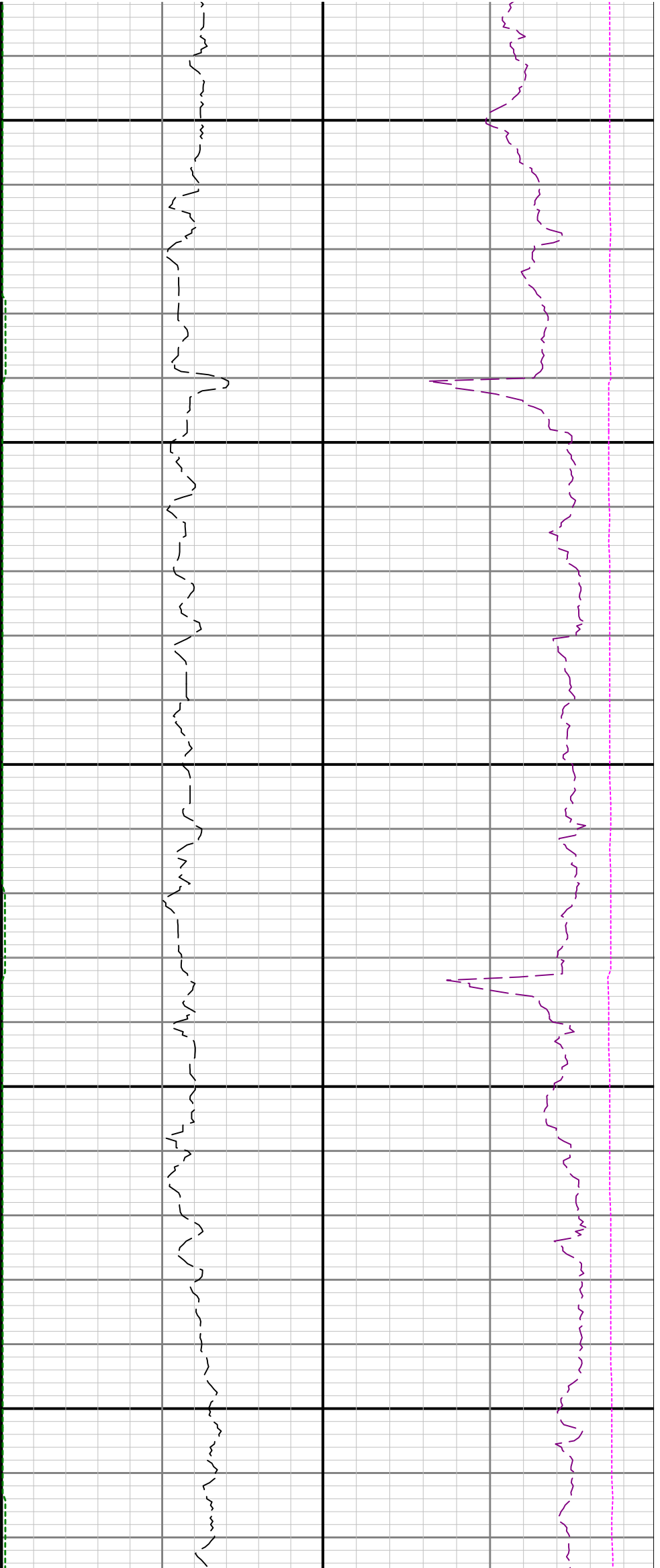
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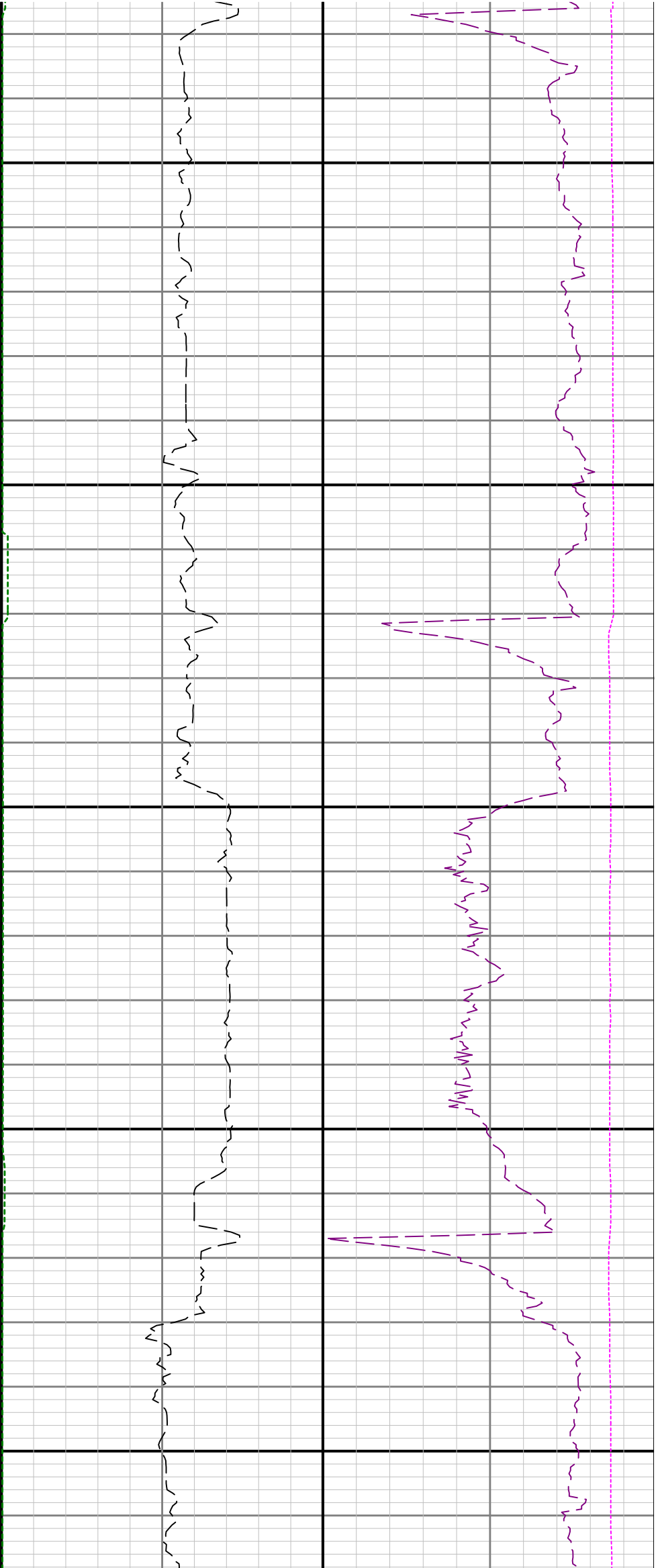




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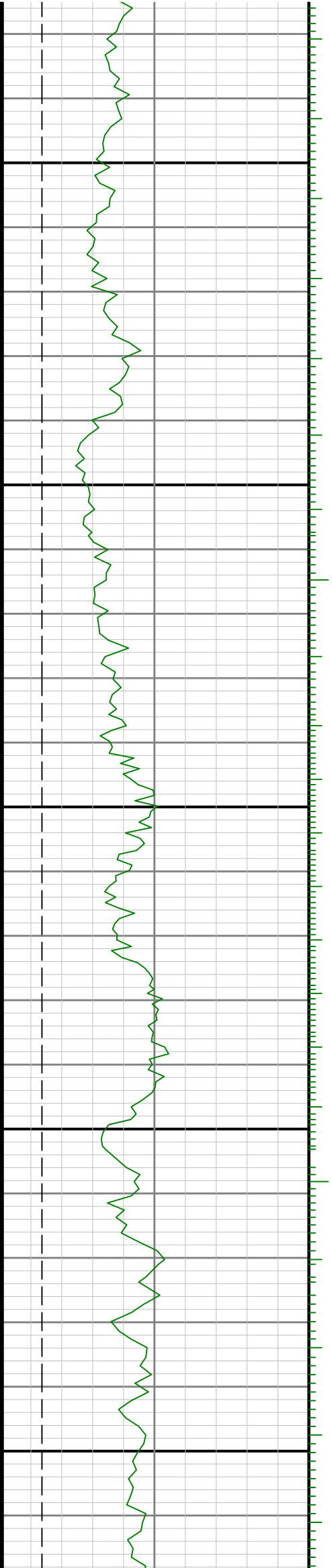
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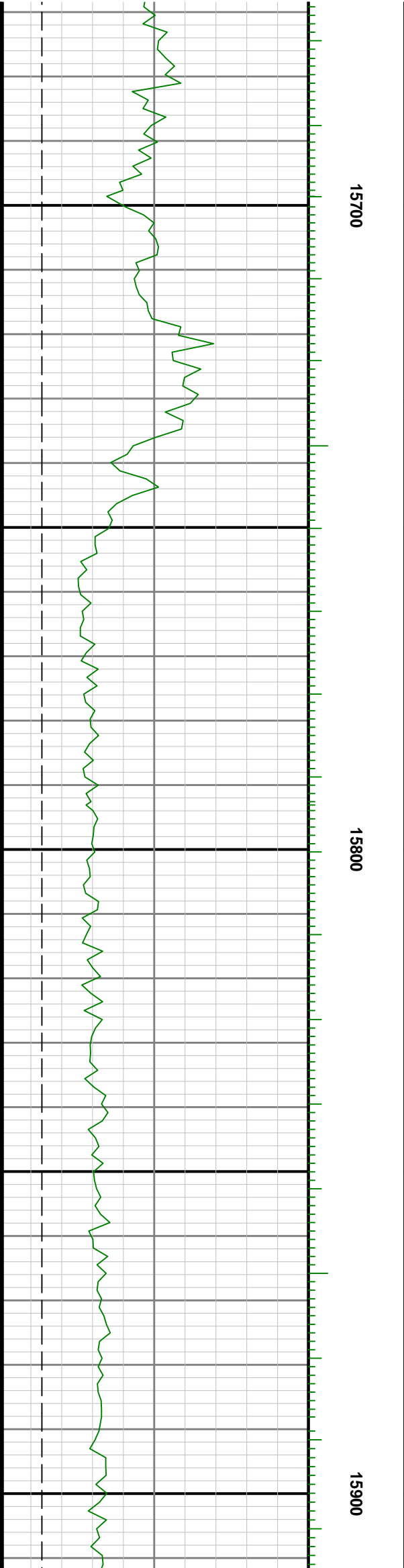
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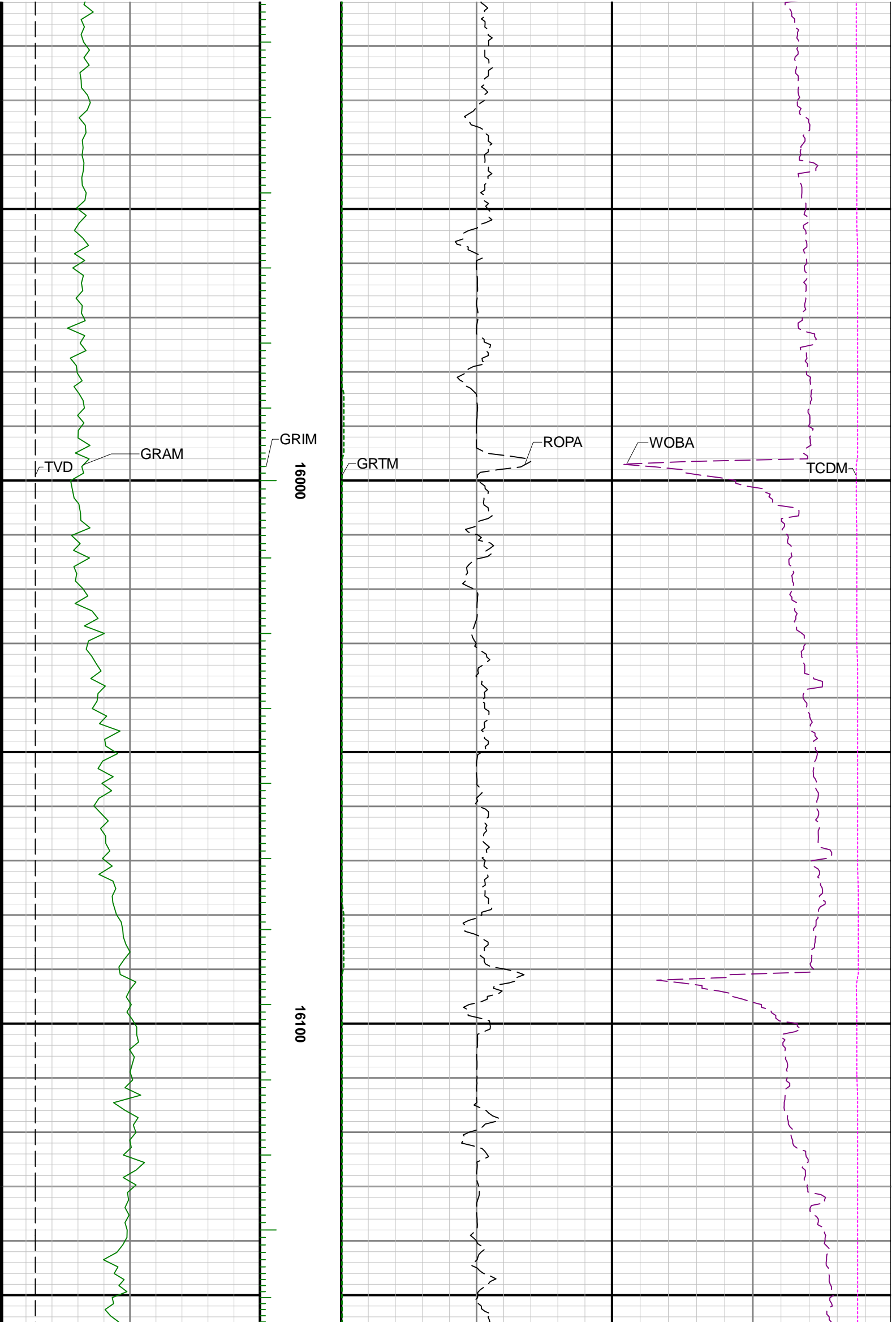


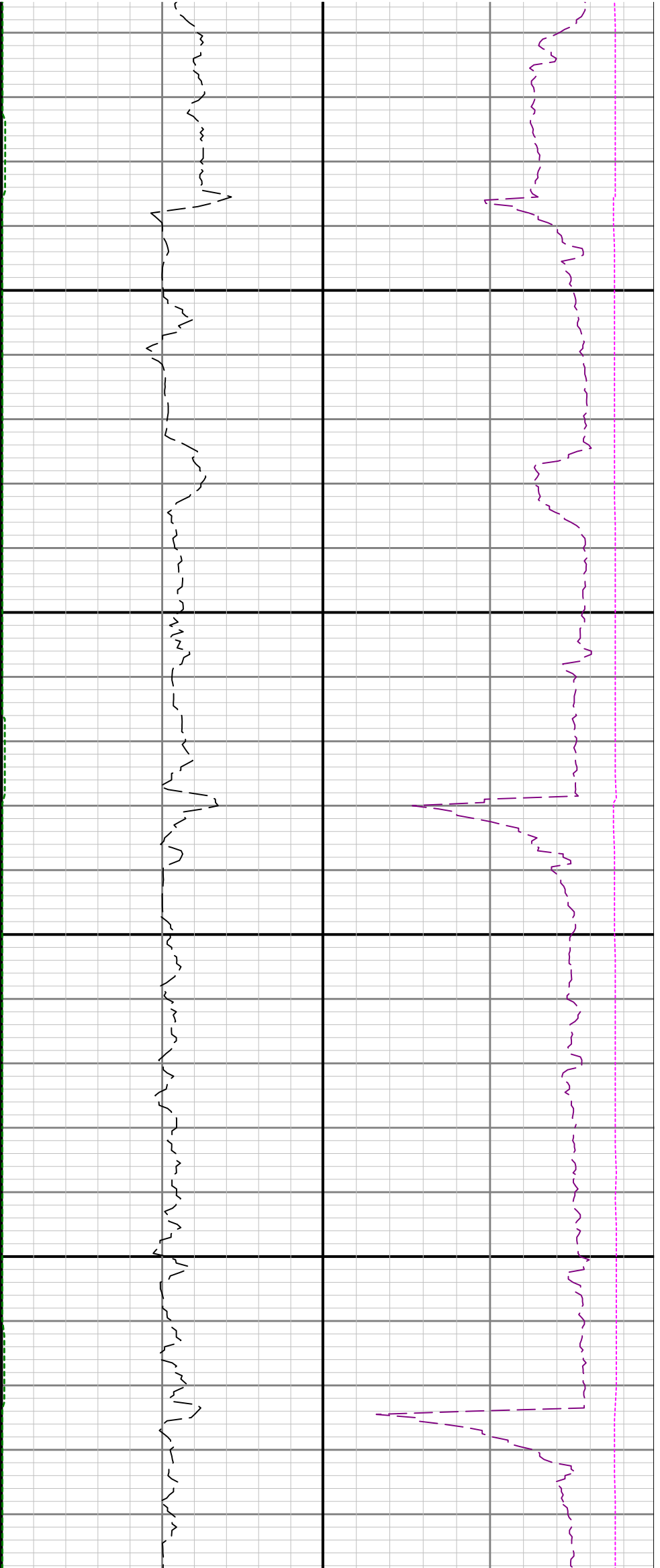
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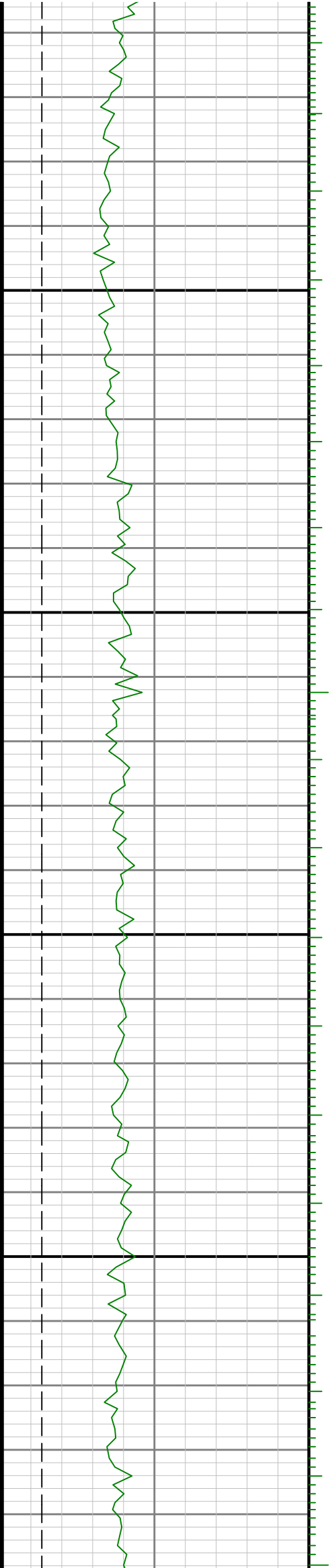


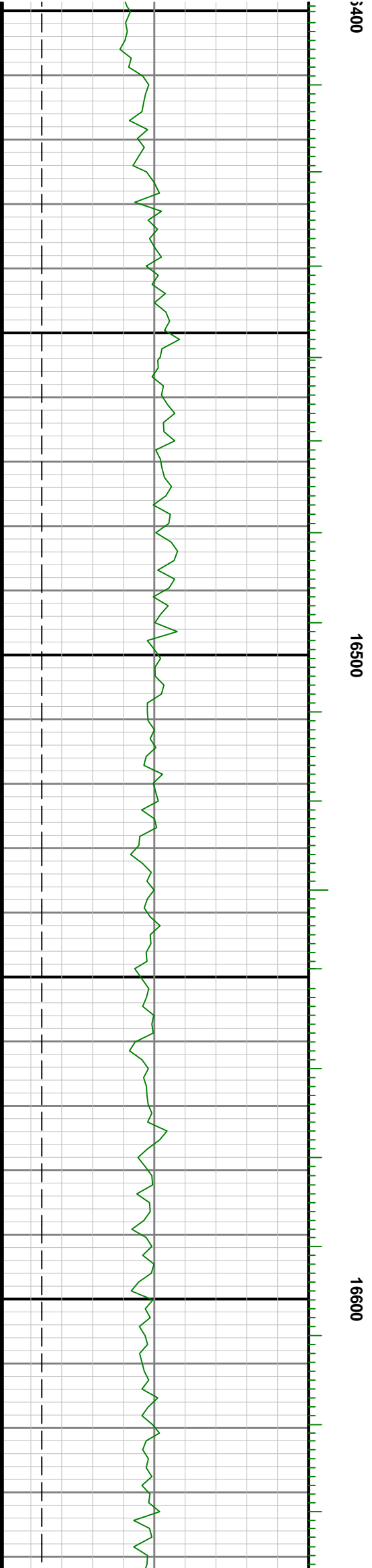
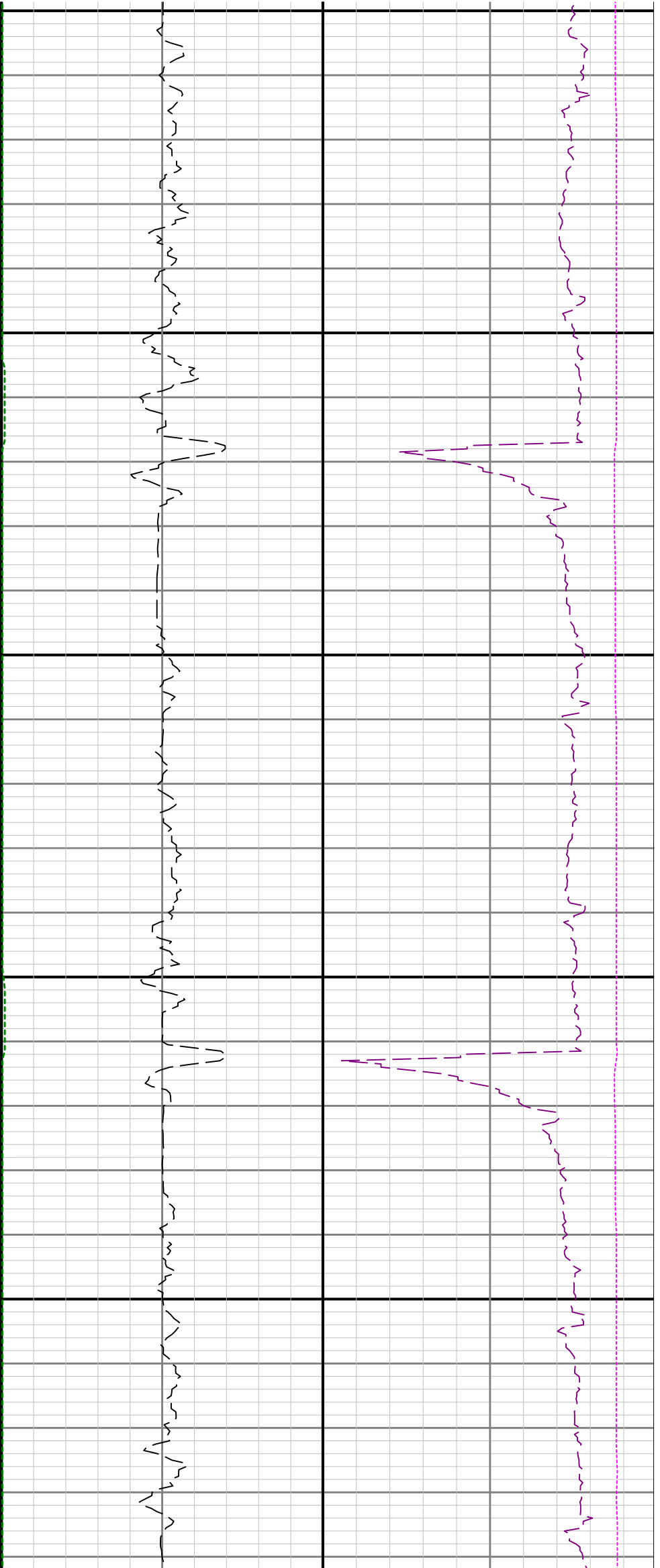


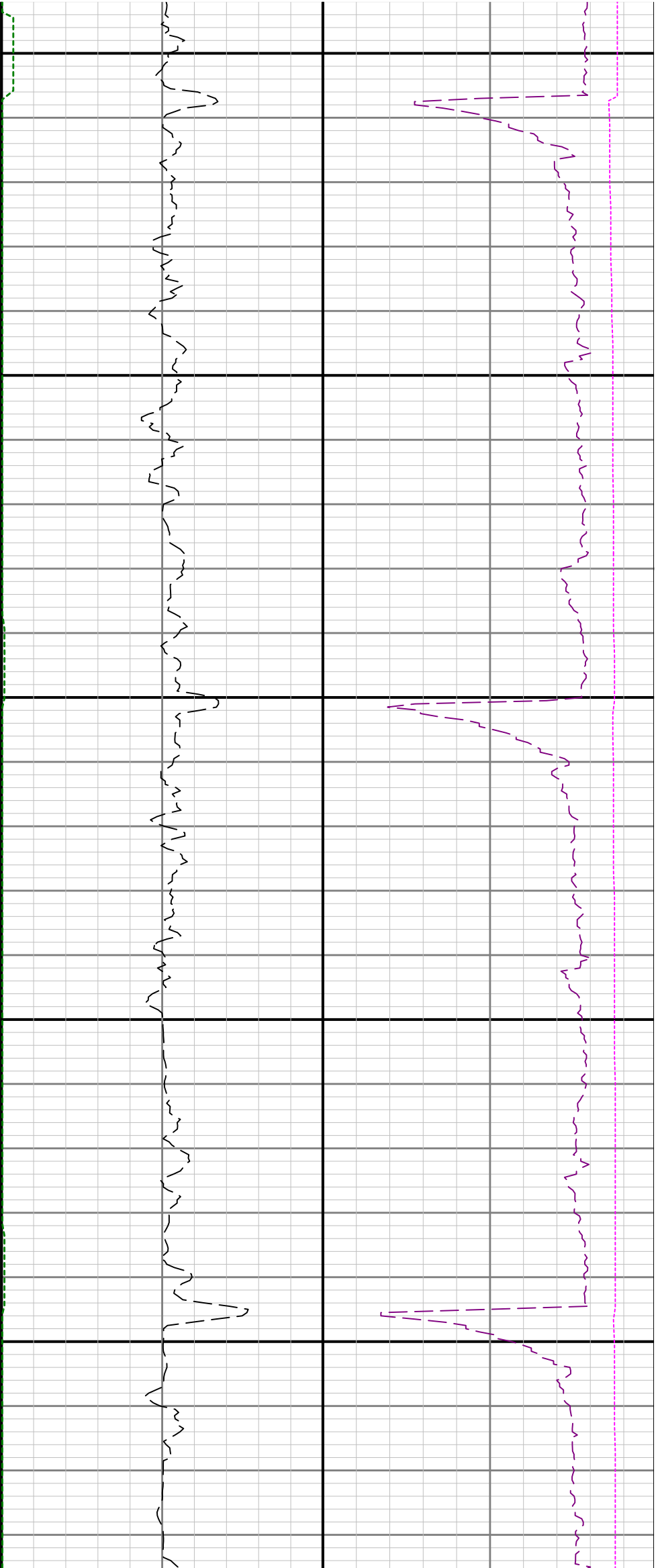
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