



LWD MEMORY LOG

Gamma Ray

Scale:		Company: Noble Energy				
1:240 MD		Well: Hullahaloo Y21-769				
Depth Reference:		Field: Weld County(Noble NAD 83 Grid)				
Driller's Depth		County: Weld		Country: United States		
Status:		State: Colorado		Other Services:		
Final Print		Surface Location:		Directional		
API No: 05-123-45237-00		Latitude:		F 0° 11' 11" N 101° 00' 00" W		
Job ID: 8739671		Longitude:		Directional		
Permanent Datum (P.D.): Ground Level		SEC: 16		TWN: 20N		
Log Measured From: Rig Floor		Elevation: Above P.D.		RGE: 64W		
		4893.00 ft		Elev. KB: 4923.00 ft		
		30.00 ft		Elev. DF: 4893.00 ft		
Dates		Interval Logged		Magnetic Field Reference		
Date From: 2017-09-22		Top: (ft) 2042.00		Azi Reference North: Grid		
Date To: 2017-09-23		Bottom: (ft) 17358.00		Total Magnetic Field Strength: (nT) 52271		
Spud Date: 2017-09-21				Mag to Reference North Correction: (deg) 7.46 E		
Borehole Record						
Casing Record						
Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
13.500	30.00	2042.00	9.625	36.00	30.00	2032.00
8.500	2042.00	17358.00				
Mud Record						
Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)
Oil Based Mud	2042.00	17358.00	8.500	15316.00	0.63 59.89	90.09 178.73
Acquisition System						
Software Version		Other				
Baker Hughes Cadence	RT4.1	Rig: H&P 517				
PlotStudio	4.1.7f63.3	Contractor: Helmerich & Payne Drilling Co				
		District: RMA Unit: D&E				

"These interpretations and analyses ("Interpretations") are opinions provided by Baker Hughes Oilfield Operations, Inc ("Baker Hughes"), based upon industry practice, empirical relationships, assumptions and measurements, (many of which may be provided by the customer). The Interpretations are not infallible and may be subject to different opinions. Vjwu. "Dcmgt"Jwi jgu"fggu"pqv"ycttcpv"vjgk"ceewtce{"eqttgevpguu."qt"eqornvgvgpguu."qt"vjcv"vjg"ewuvqogtøu"cpflqt"cp{"vjktf"rctv{øu"tgnkcpeg"qp"uwej"Kpvgtrtgvcvkqpu"yknn"cee qornku j"cp{"rctvkewnct"tguwnvu0"Vjg"ewuvqogt"cuuwogu"hwnn"responsibility for the use of the Interpretations and for decisions based thereon and the customer agrees to release, defend and indemnify Baker Hughes, its parent, subsidiaries and affiliated or related entities, and subcontractors, together with its and their officers, directors, employees, agents and invitees against, any and all claims, losses, damages, or expenses sustained by the customer or any third party arising out of reliance upon or use of the Interpretations, without regard to the cause(s) thereof, including without limitation any form of negligence on the part of Baker Hughes. Unless other contract terms have been agreed to by the parties, each party's liabilities and qdnkicvkqpu"ujcnn"dg"iqxgtpgf"d{"Dcmgt"Jwi jgu"Kpeqtrqtcvgføu"Yqtnfykfg"Vgtou"cpf"Eqpfkvkqpu0\$""

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	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	8.500	PDC	3.00	Rotary Steerable	2042.00	17345.00	2042.00	17358.00	2017-09-22 10:02	2017-09-24 19:22	50.73

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Adam Schlenz	2017-09-21	2017-09-25	Emi Iyalla	2017-09-21	2017-09-25			

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2017-09-22 15:00	1	4055.00	Oil Based Mud	9.1	10	N/A	14.8	82/18	Active Pit	25000	0.00

2017-09-23 02:30	1	6890.00	Oil Based Mud	8.9	8	N/A	16.8	83/17	Active Pit	22500	0.00
2017-09-23 13:00	1	9275.00	Oil Based Mud	9.1	1	N/A	15.2	85/15	Active Pit	23000	0.00
2017-09-24 02:30	1	13056.00	Oil Based Mud	9.2	10	N/A	16.4	84/16	Active Pit	23500	0.00
2017-09-24 13:00	1	15857.00	Oil Based Mud	9.3	10	N/A	16.8	84/16	Active Pit	21500	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	ATC_SU	14236901	Near Bit Inclination	5.93	6.73	7.000	4.330
1	ATC_SU	14236901	Near Bit VSS	5.93	6.73	7.000	4.330
1	ATC_MWD	14179564	Gamma (single)	2.75	12.90	7.000	3.250
1	ATC_MWD	14179564	Directional (mag)	12.27	22.42	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_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 2042 to 17358 feet MD (2042 to 6950 feet TVD).
3	VOBA { 2042 to 17358 feet MD } was not logged after being drilled due to sensor to bit offset at well TD.

Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	17358.00	8.500	1	The interval from 17345 to 17358 feet MD (6950 feet TVD) was not logged after being drilled 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	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	OnTrak - Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	OnTrak - Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	OnTrak - Gamma Ray - Time Since Drilled - Memory	min
TCDM	Downhole Temperature	degF



Company Well

Interval

Created

Noble Energy

Hullabaloo Y21-769

Date From: 2017-09-22 04:02:18

Date To: 2017-09-23 00:49:03

2017-09-25 09:30:29

Top: 2042.00

Bottom: 6975.00

Gamma Ray - Apparent 0.5 ft Average GRAM

0300

API

True Vertical Depth TVD

72006200

ft

MD 1:240 feet

Depth Averaged ROP 3 ft Average ROPA

10000

ft/h

Gamma Time Since Drilled GRTM

0600

min

Weight On Bit, Average 1 ft Average WOBA

050

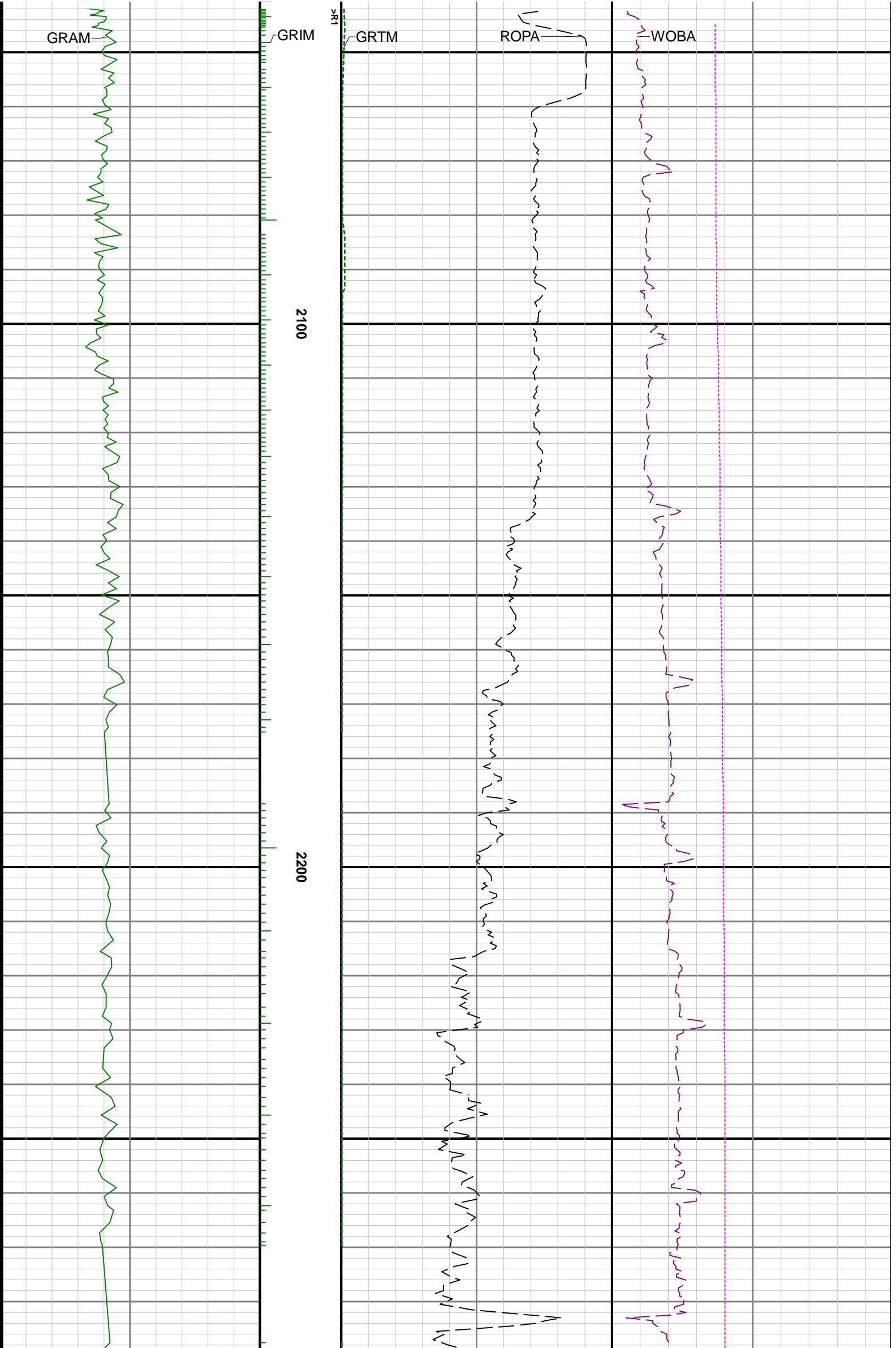
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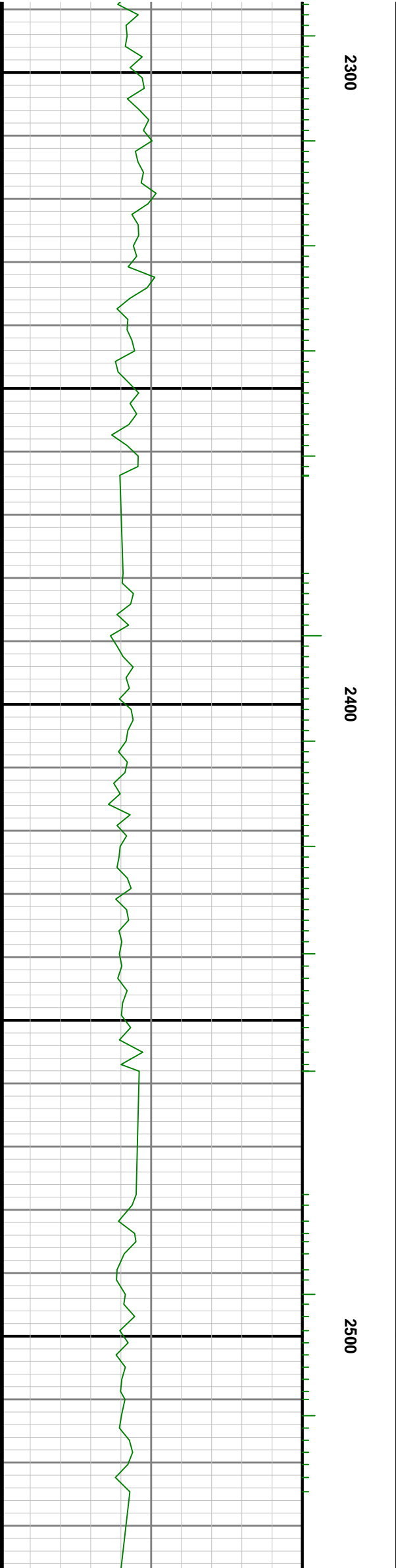
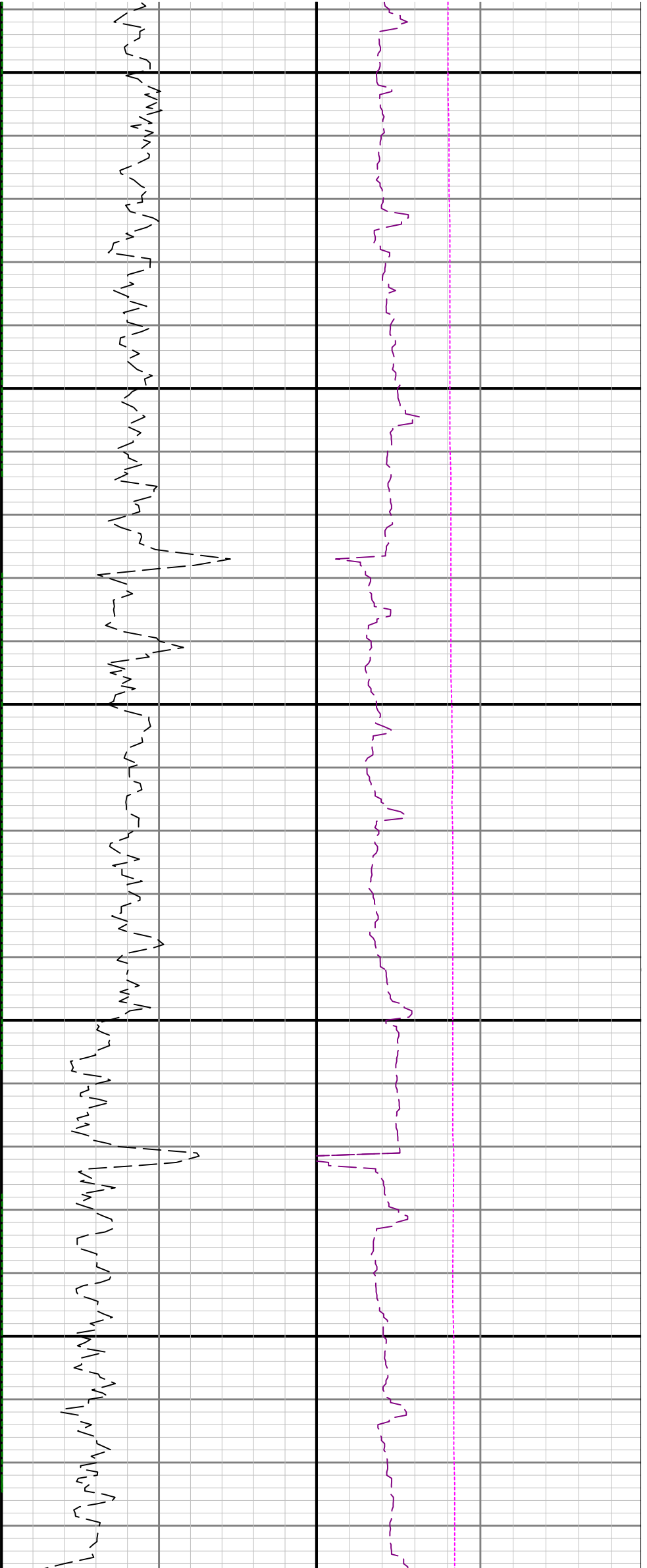
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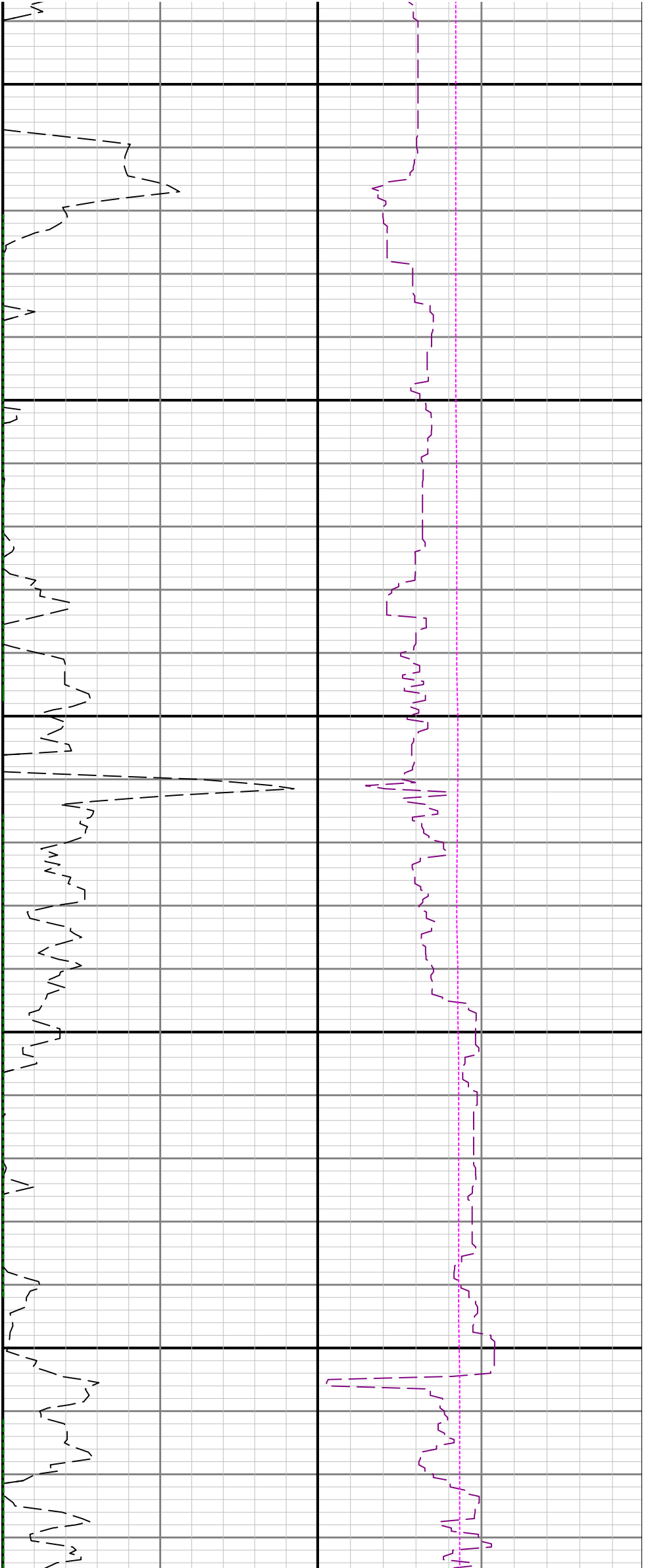
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degF

9 5/8" Casing

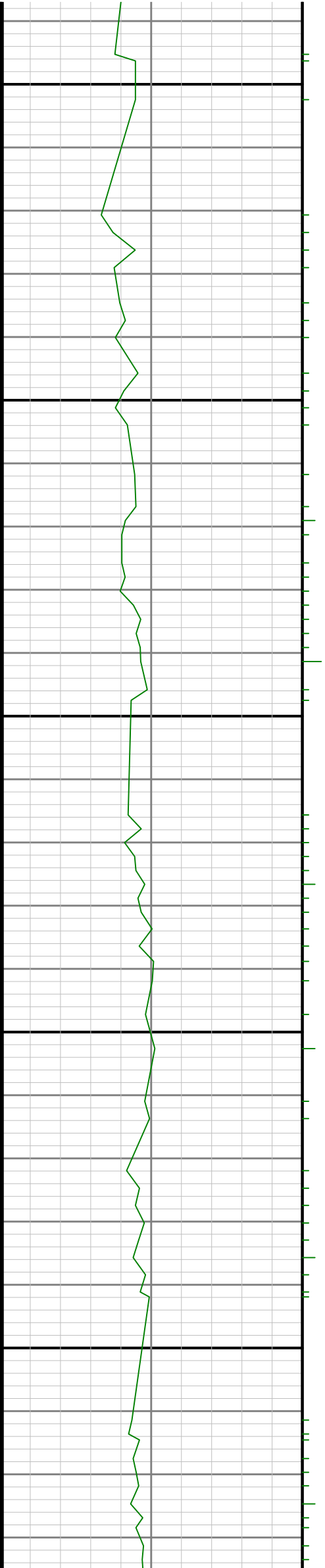


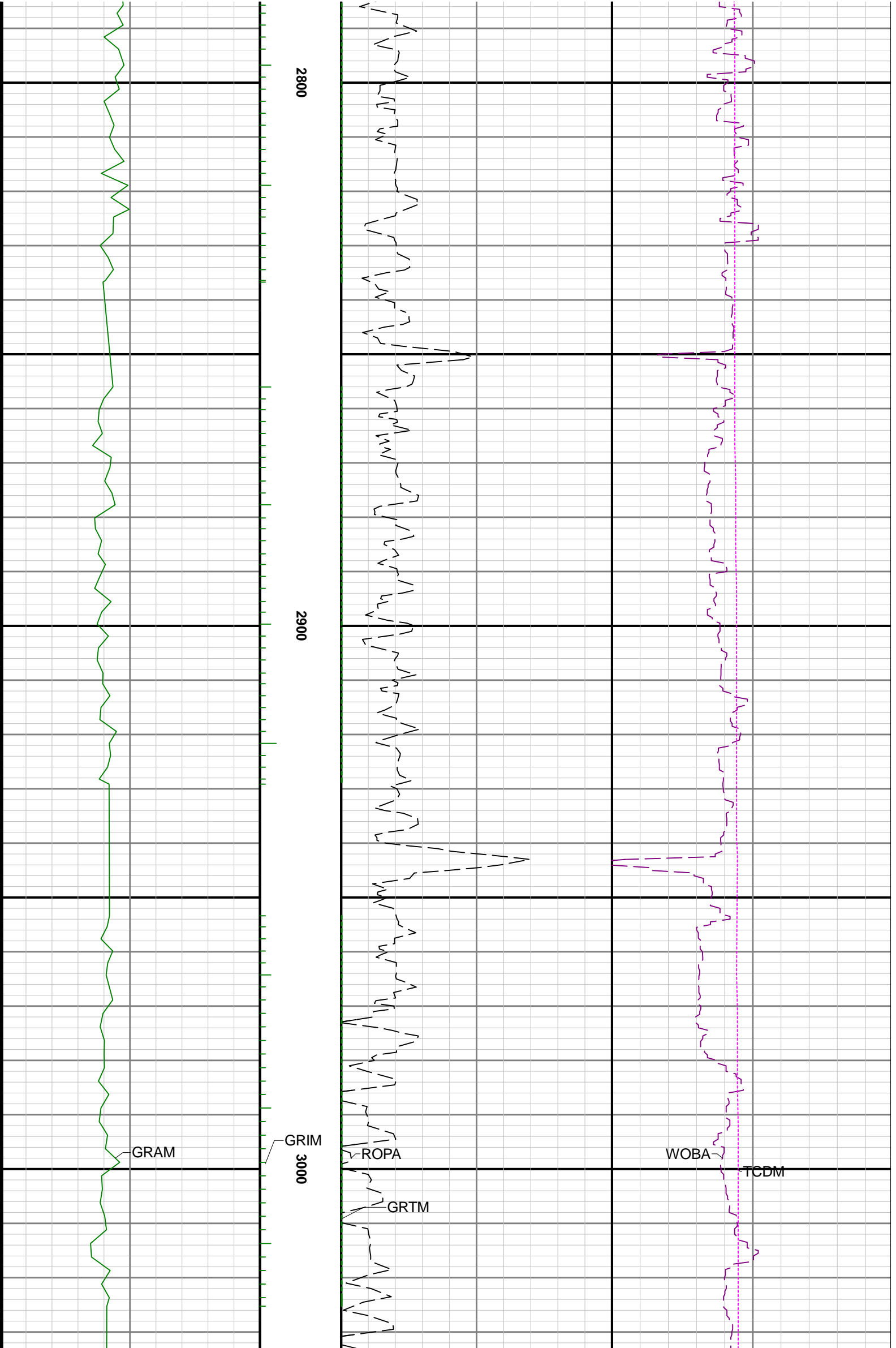


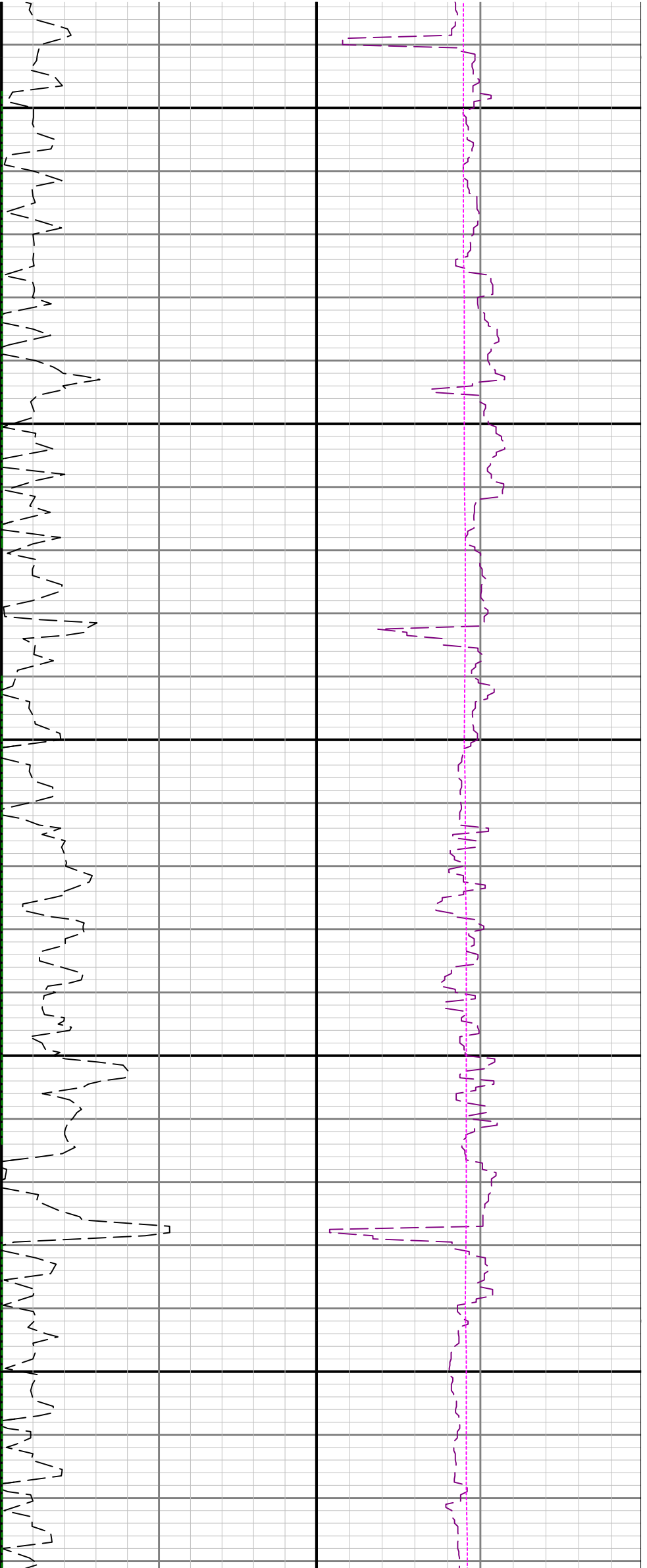


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2700

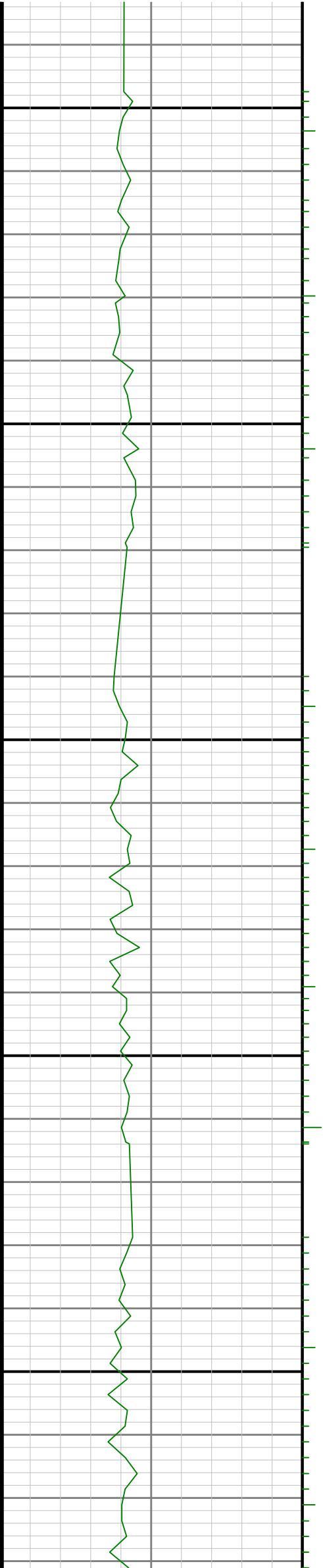


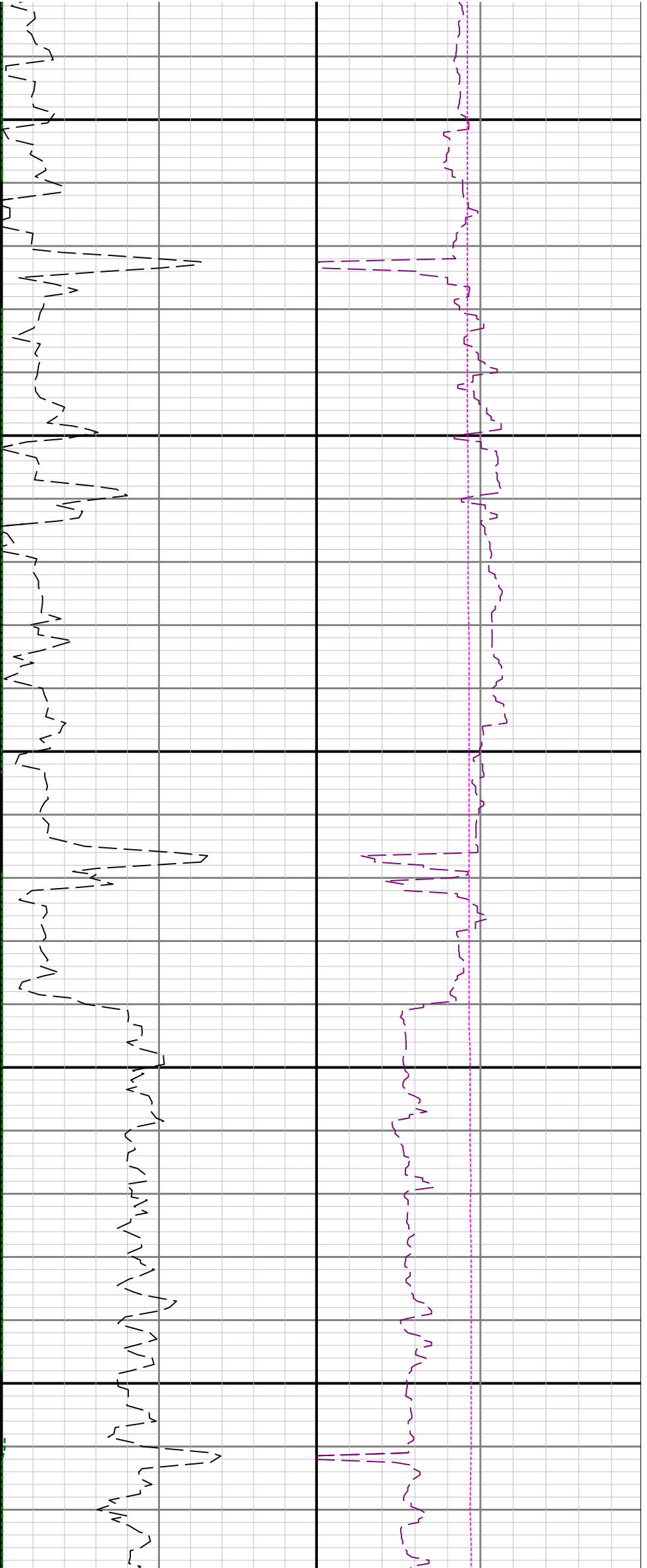




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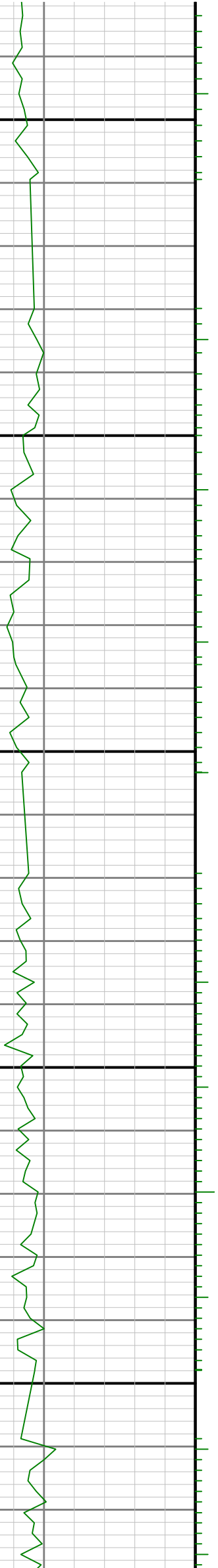


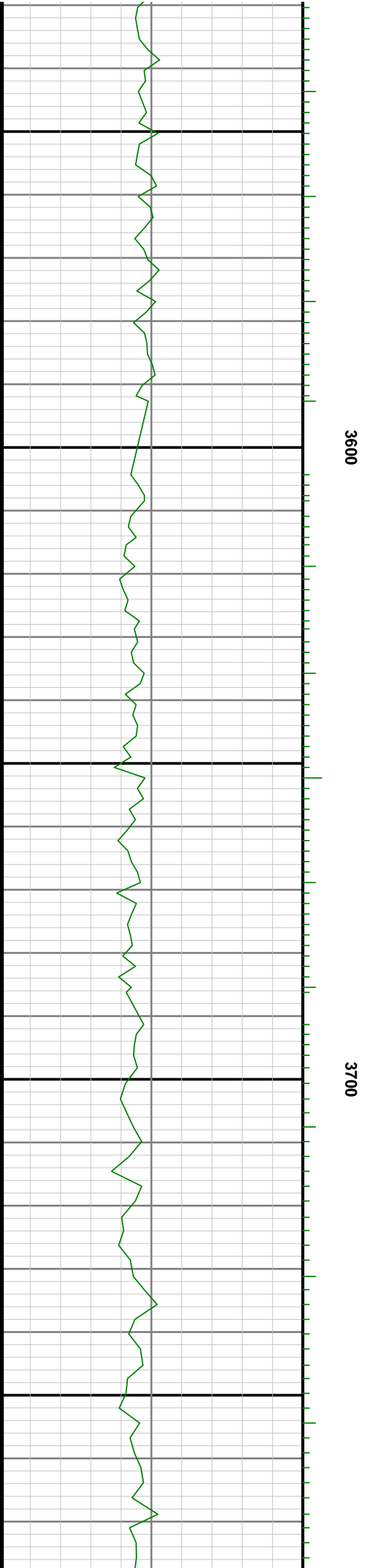
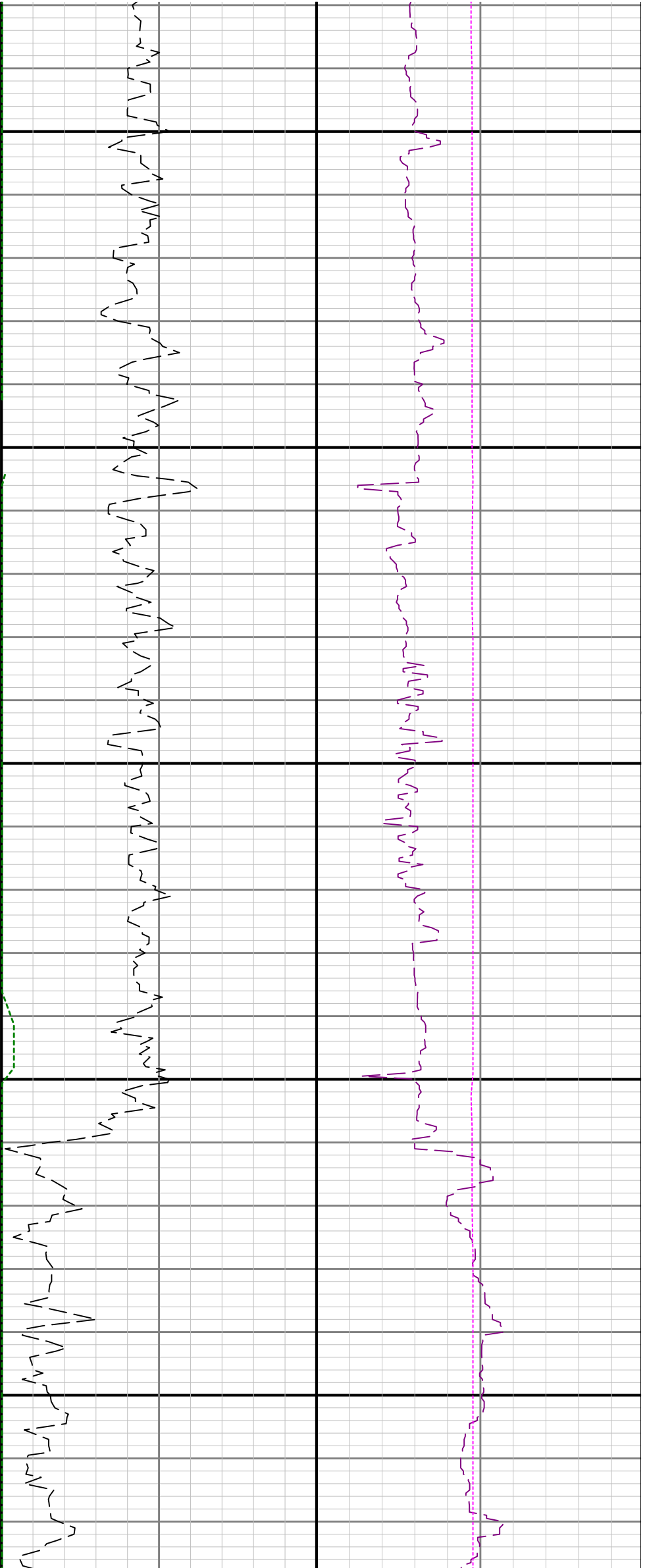


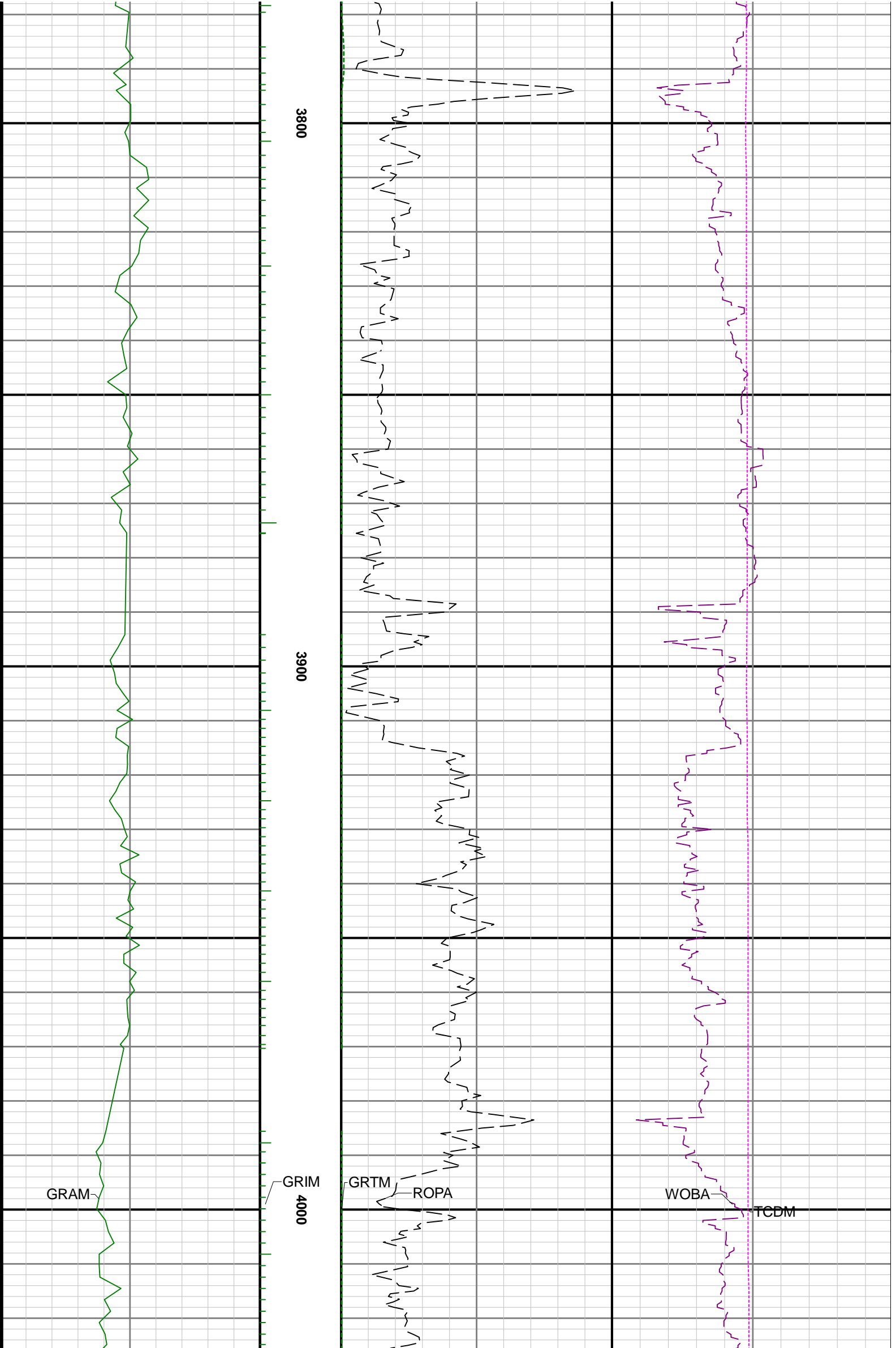
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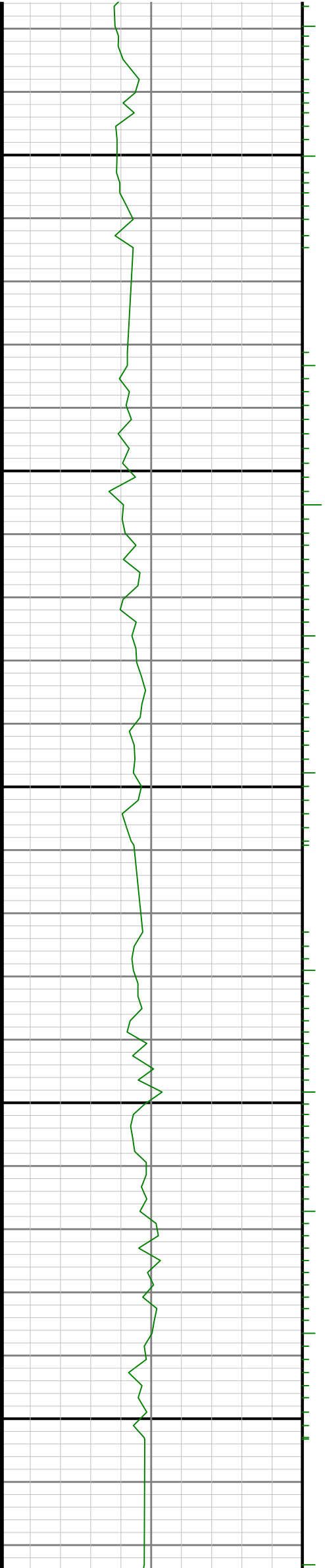
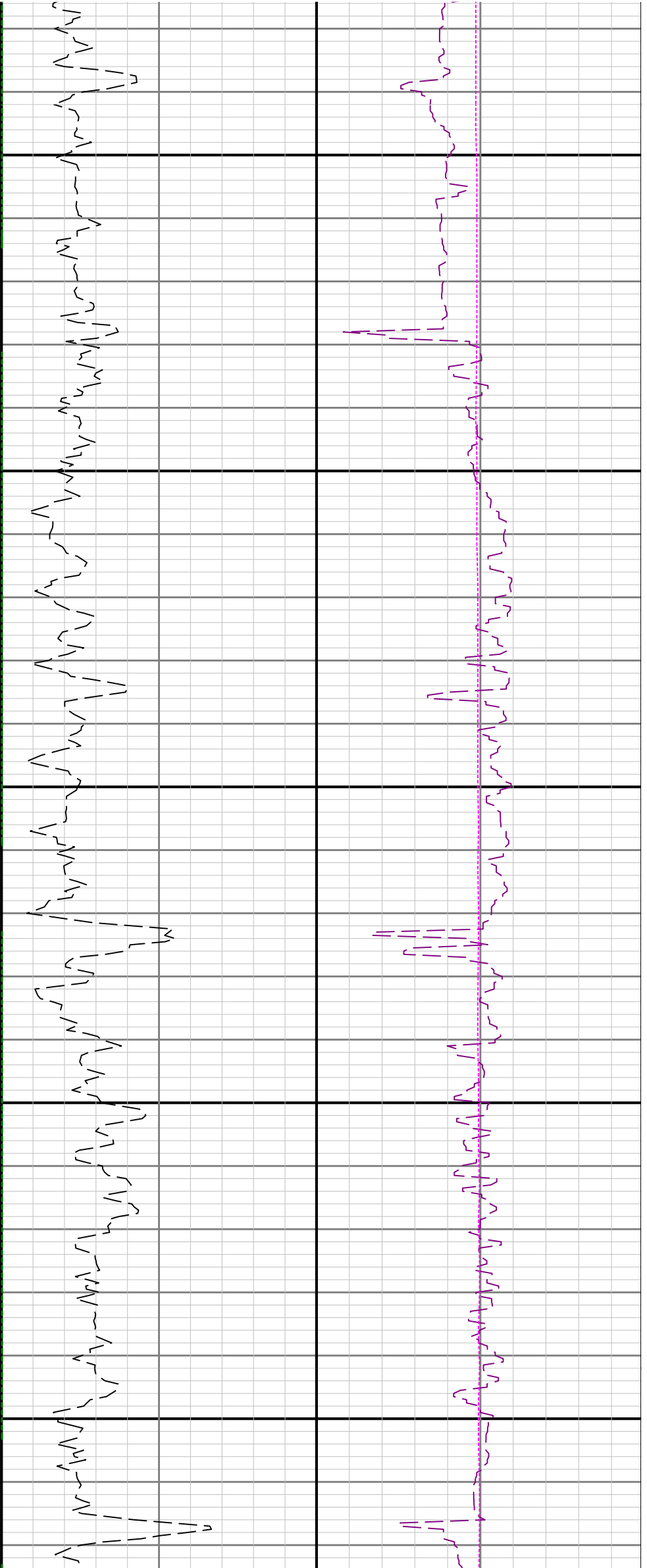
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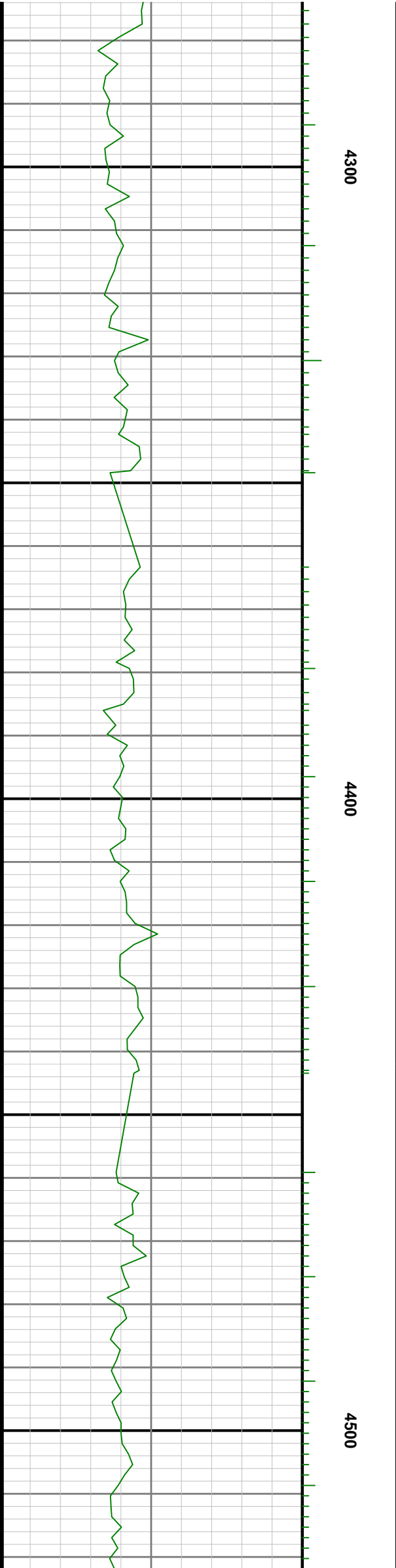
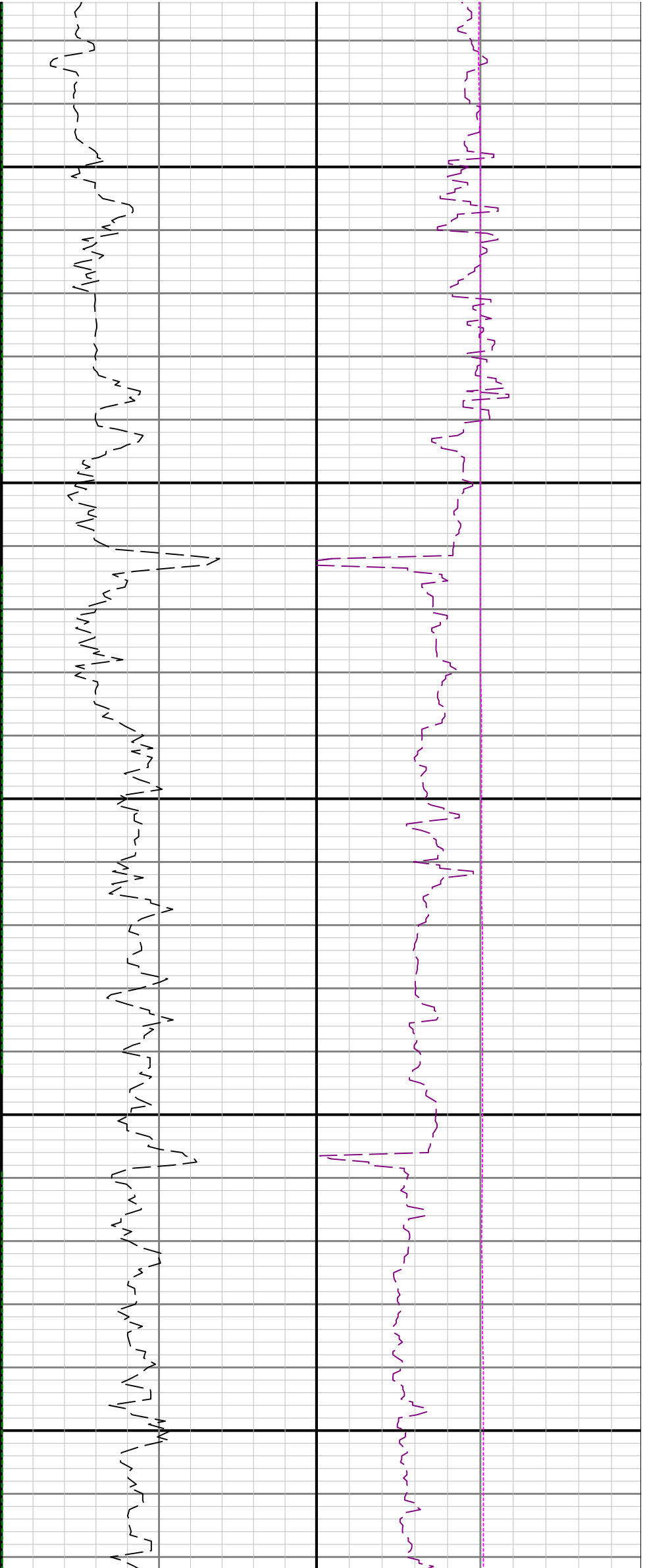
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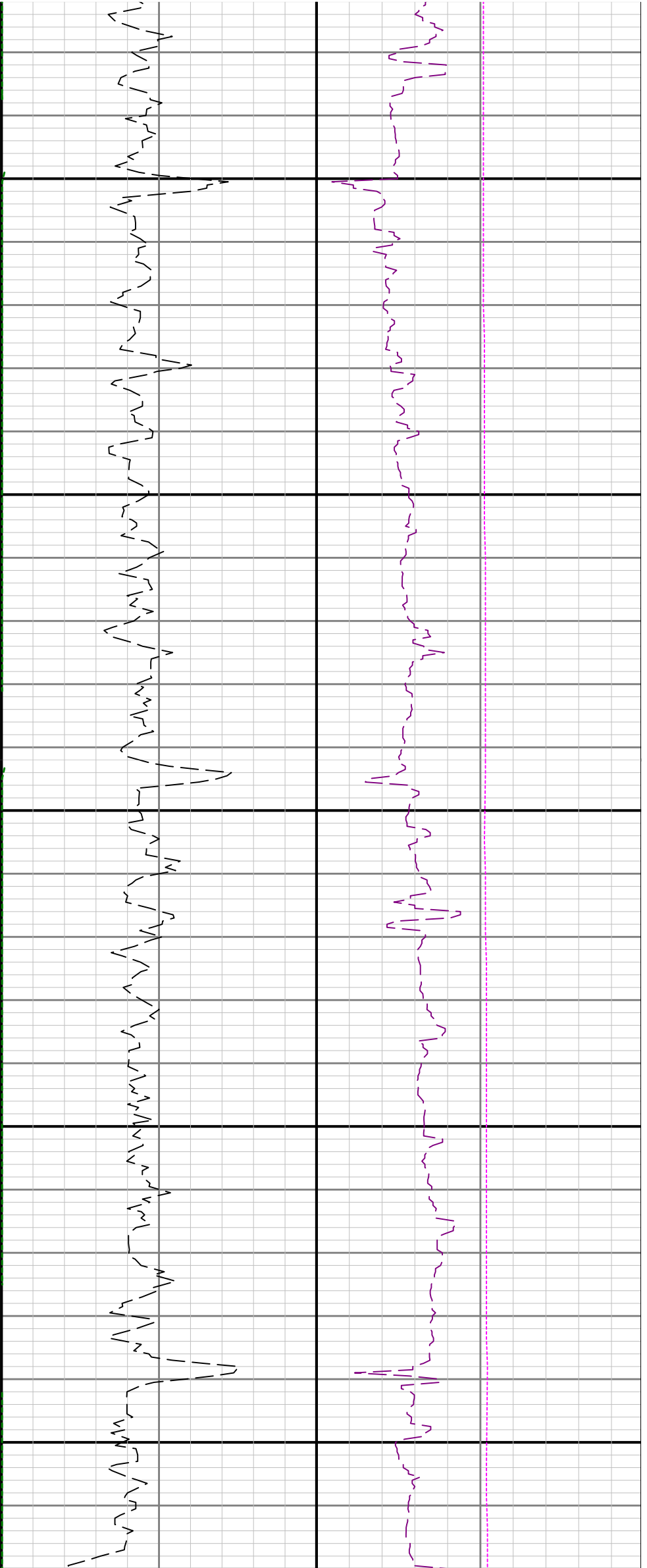






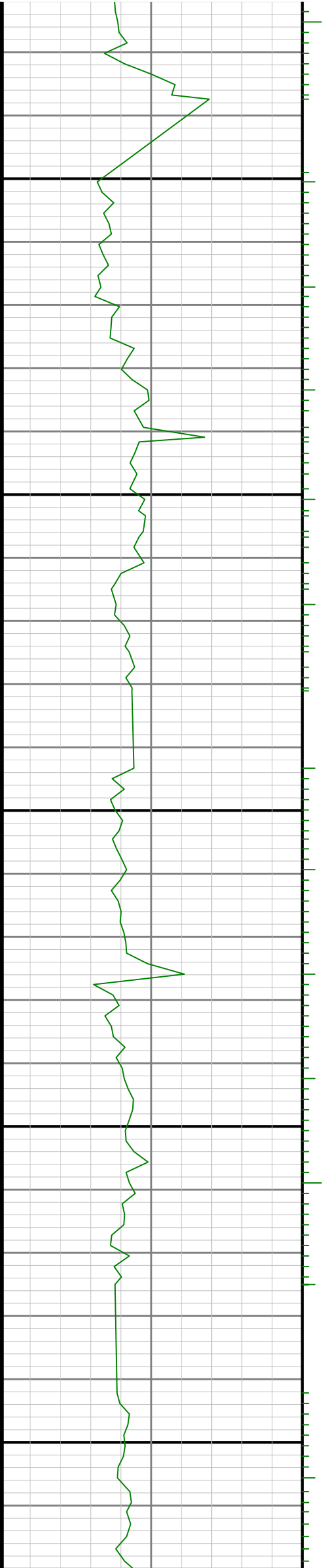


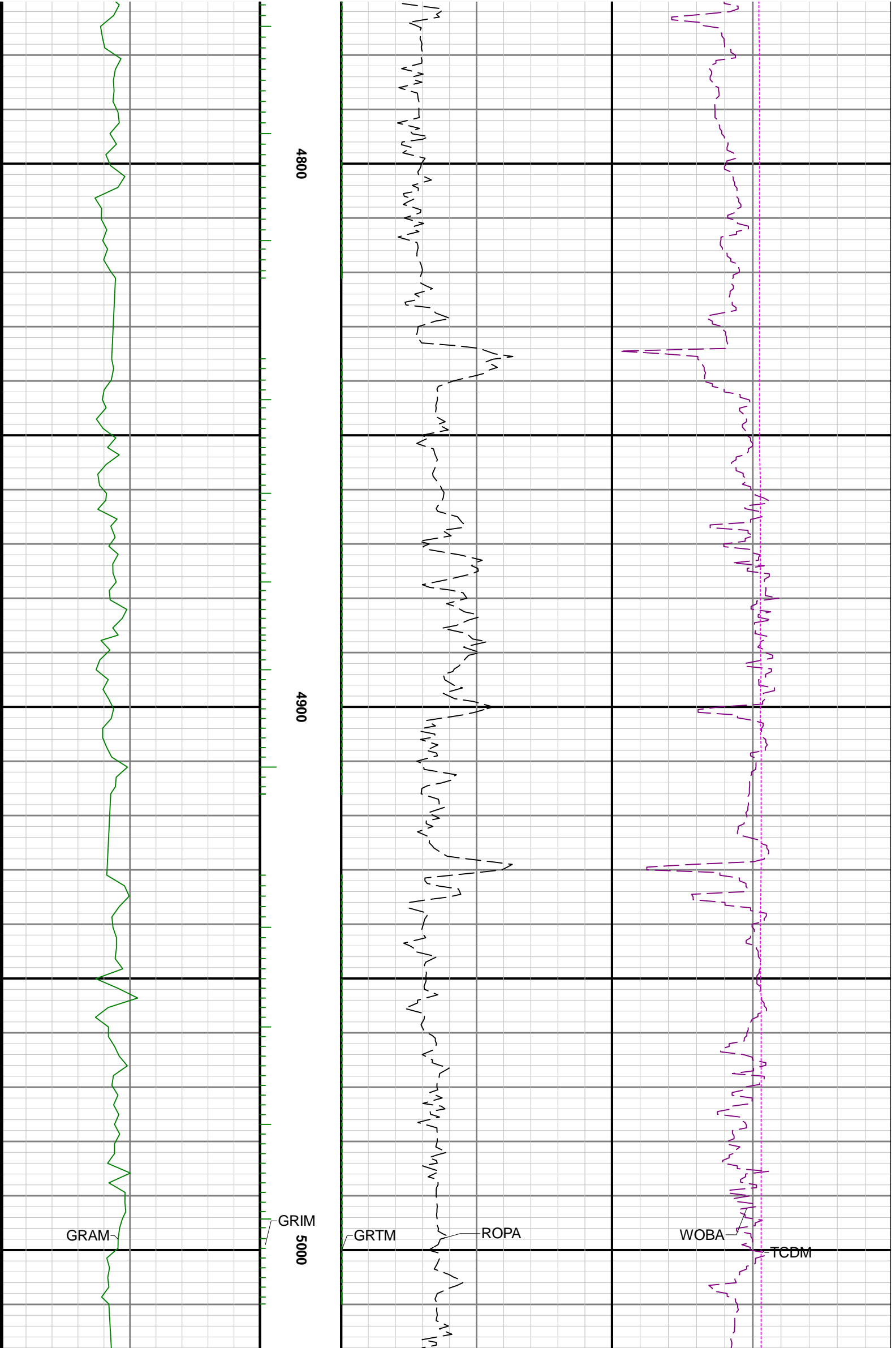


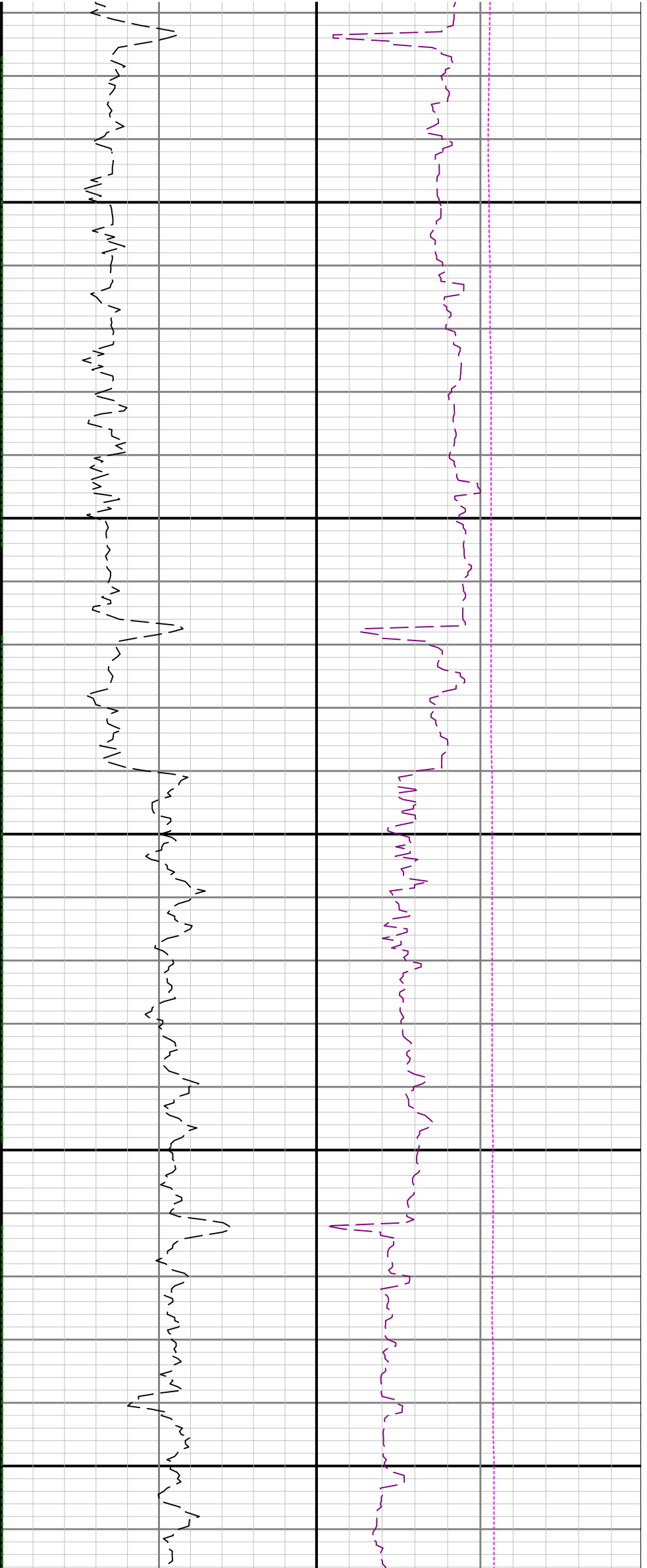


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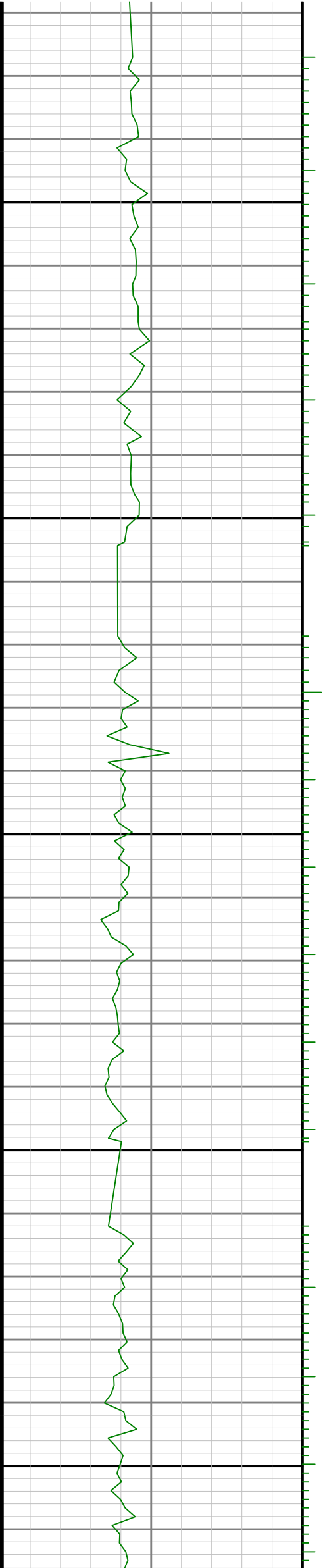


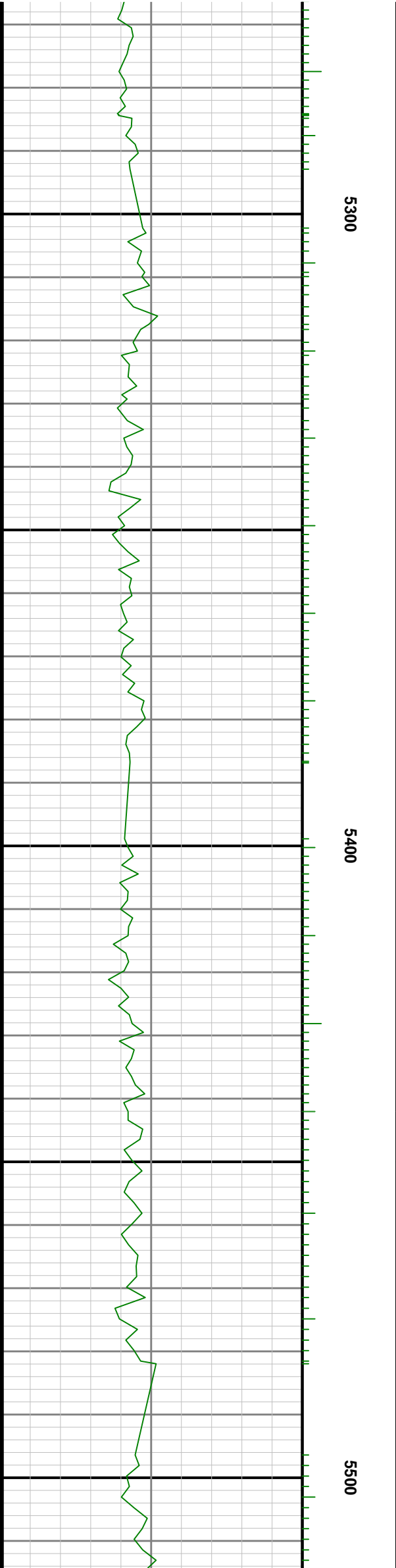
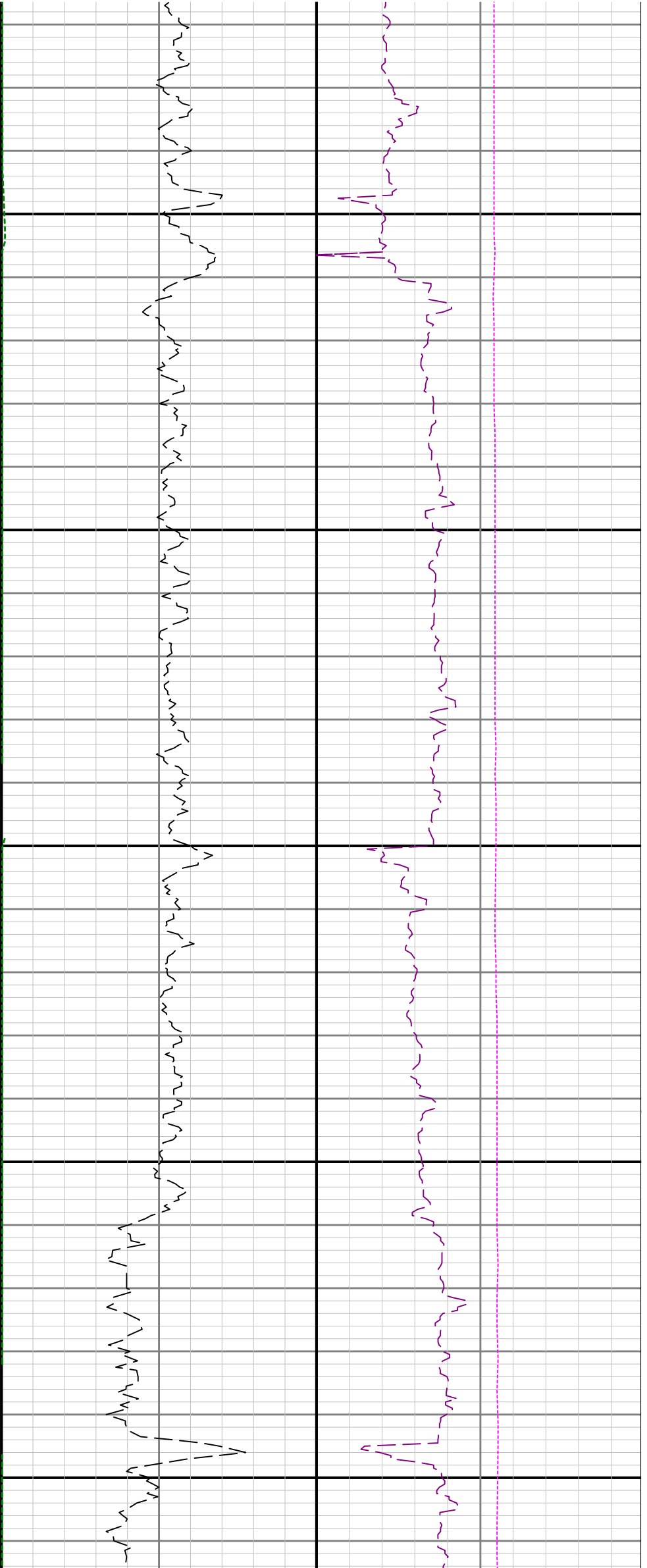


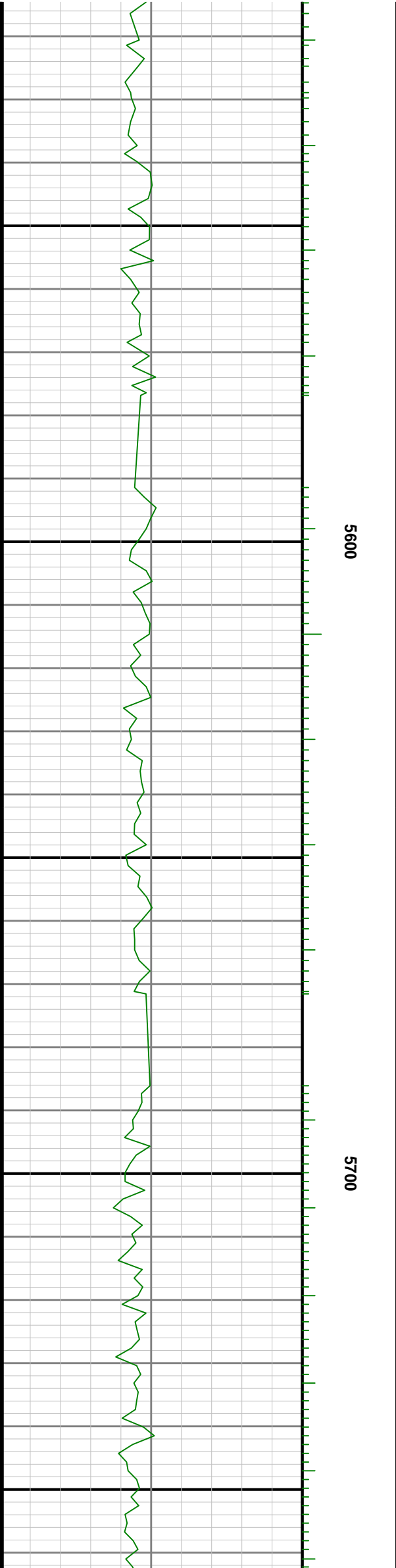
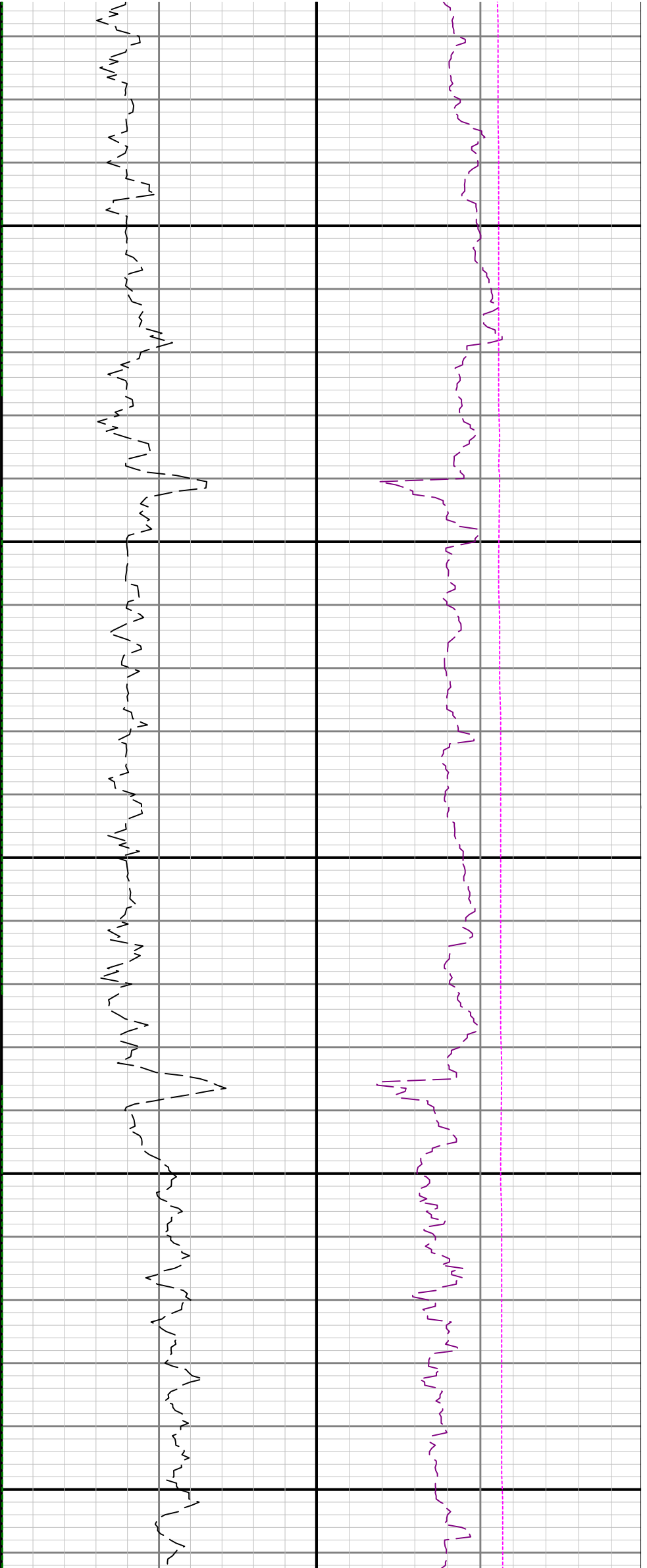


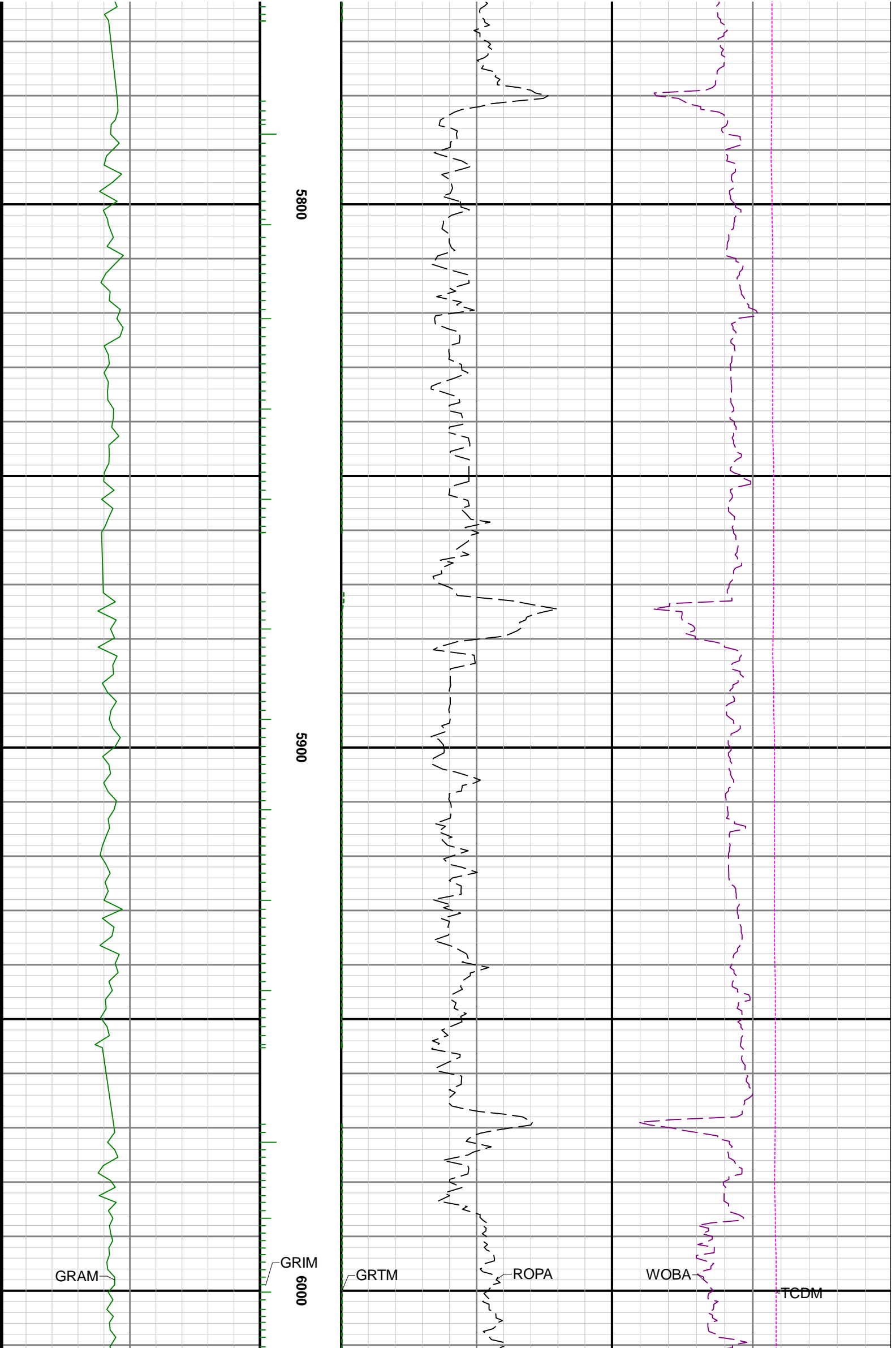
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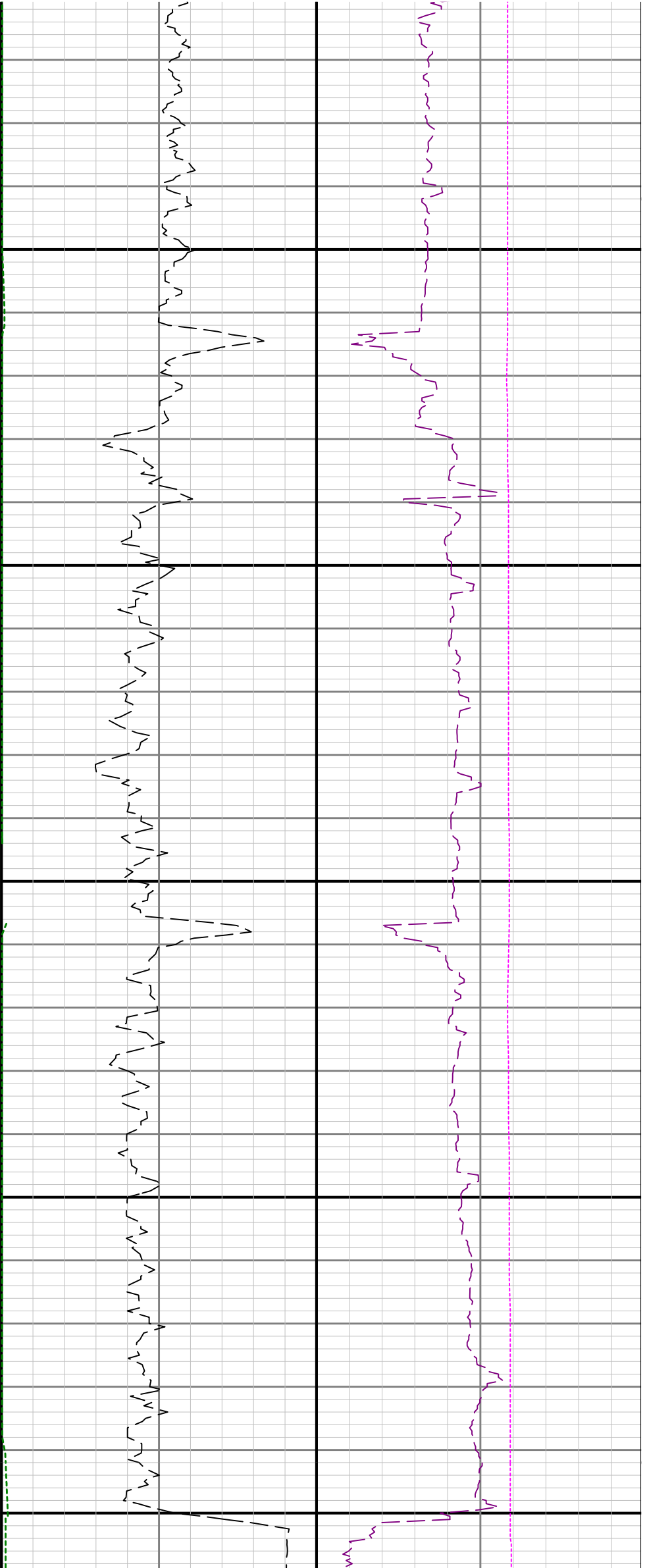
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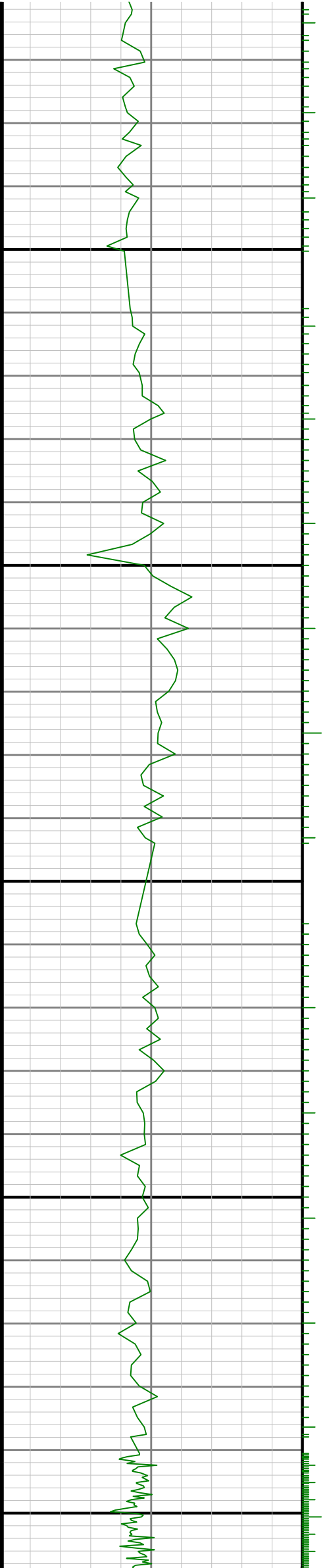


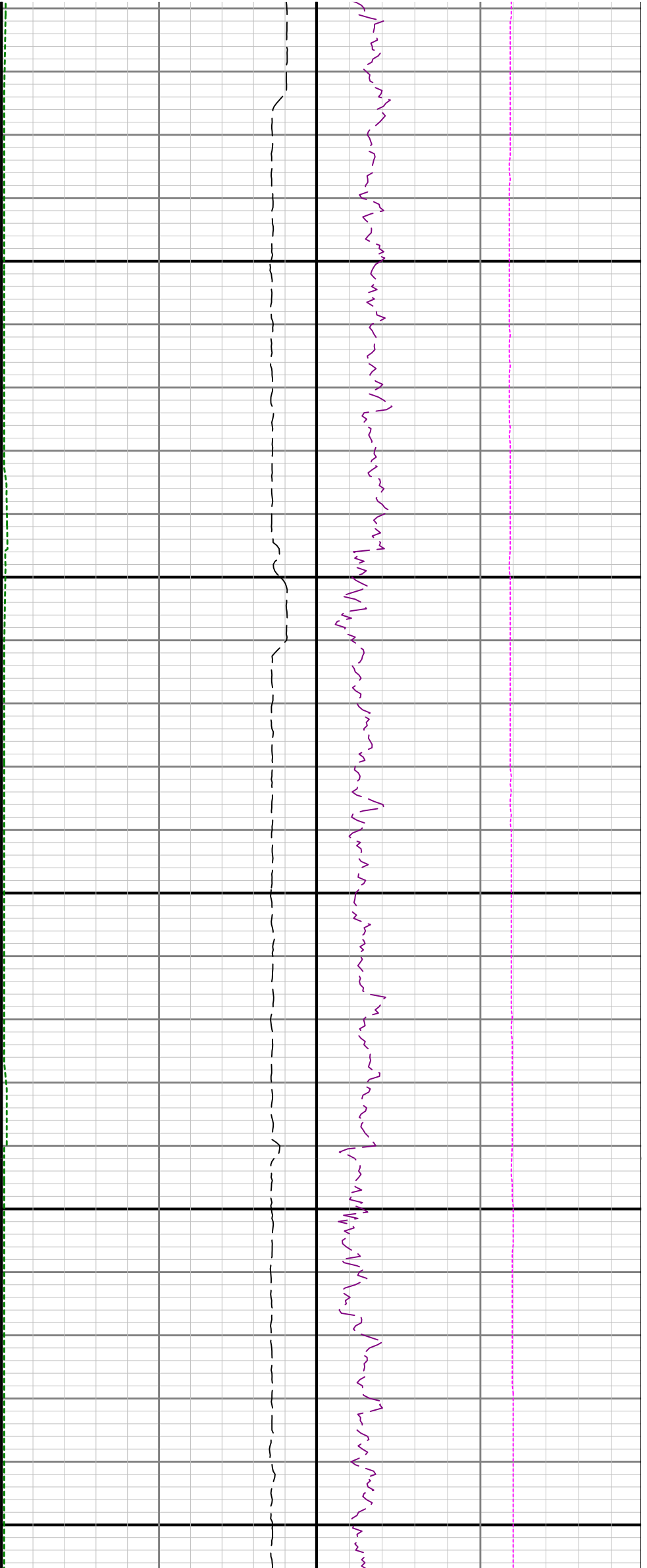




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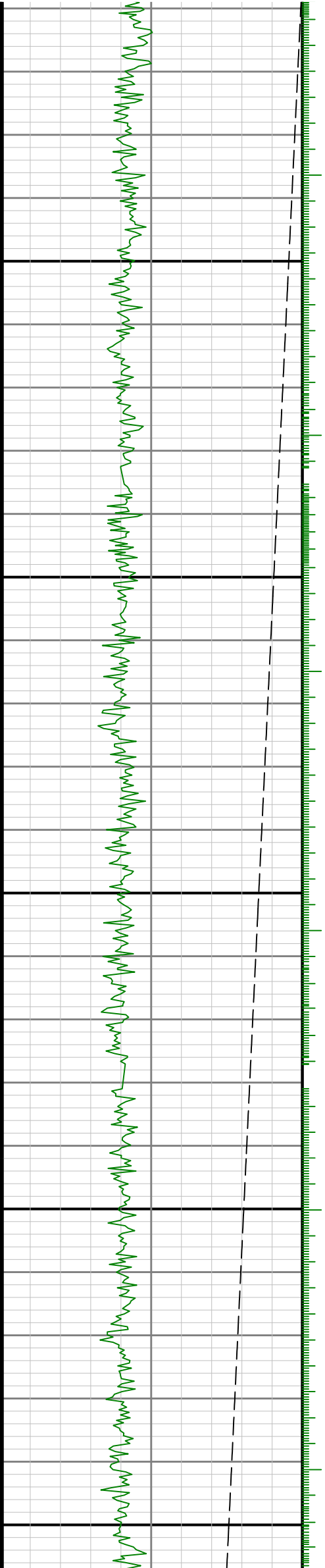


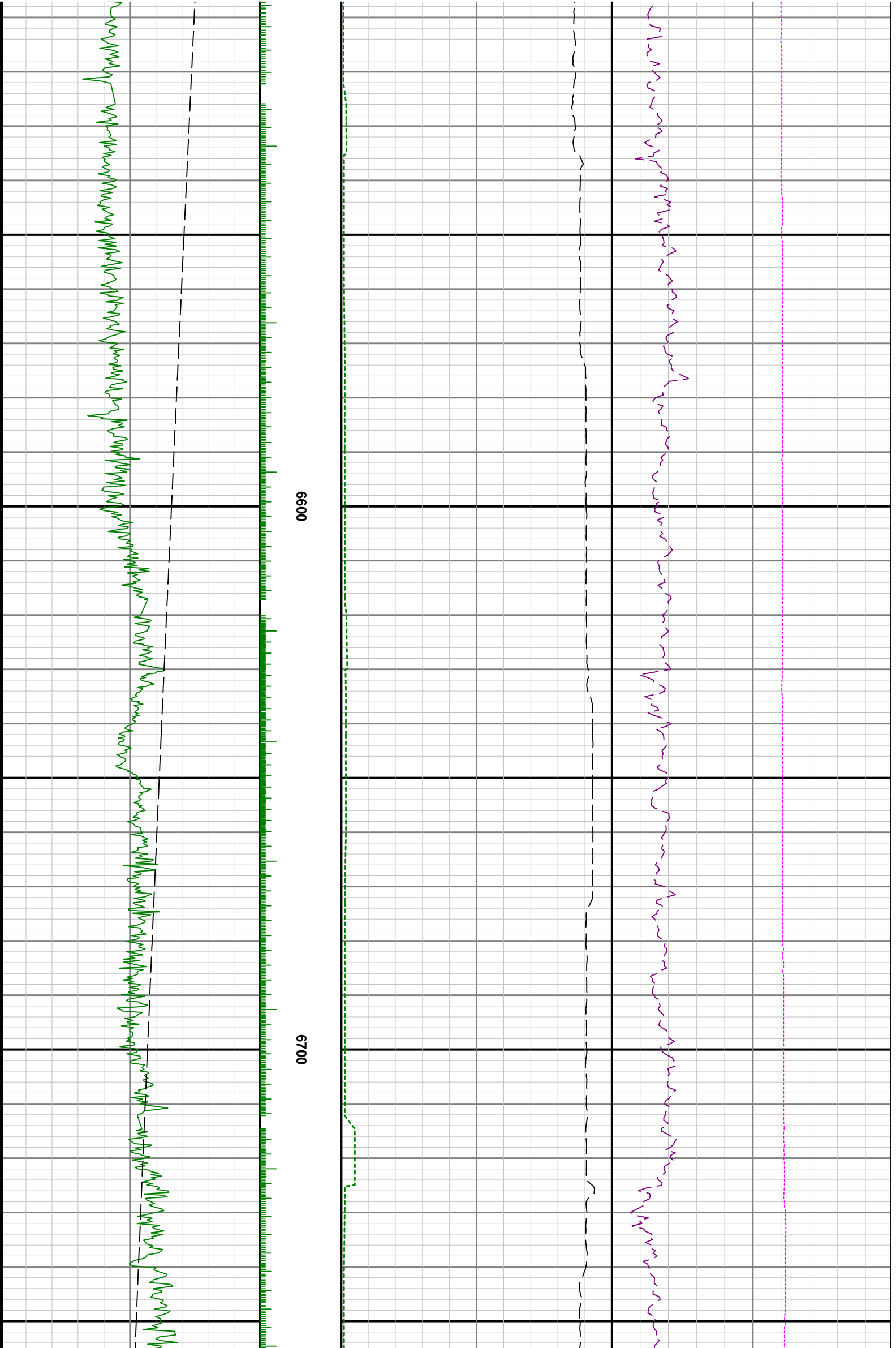


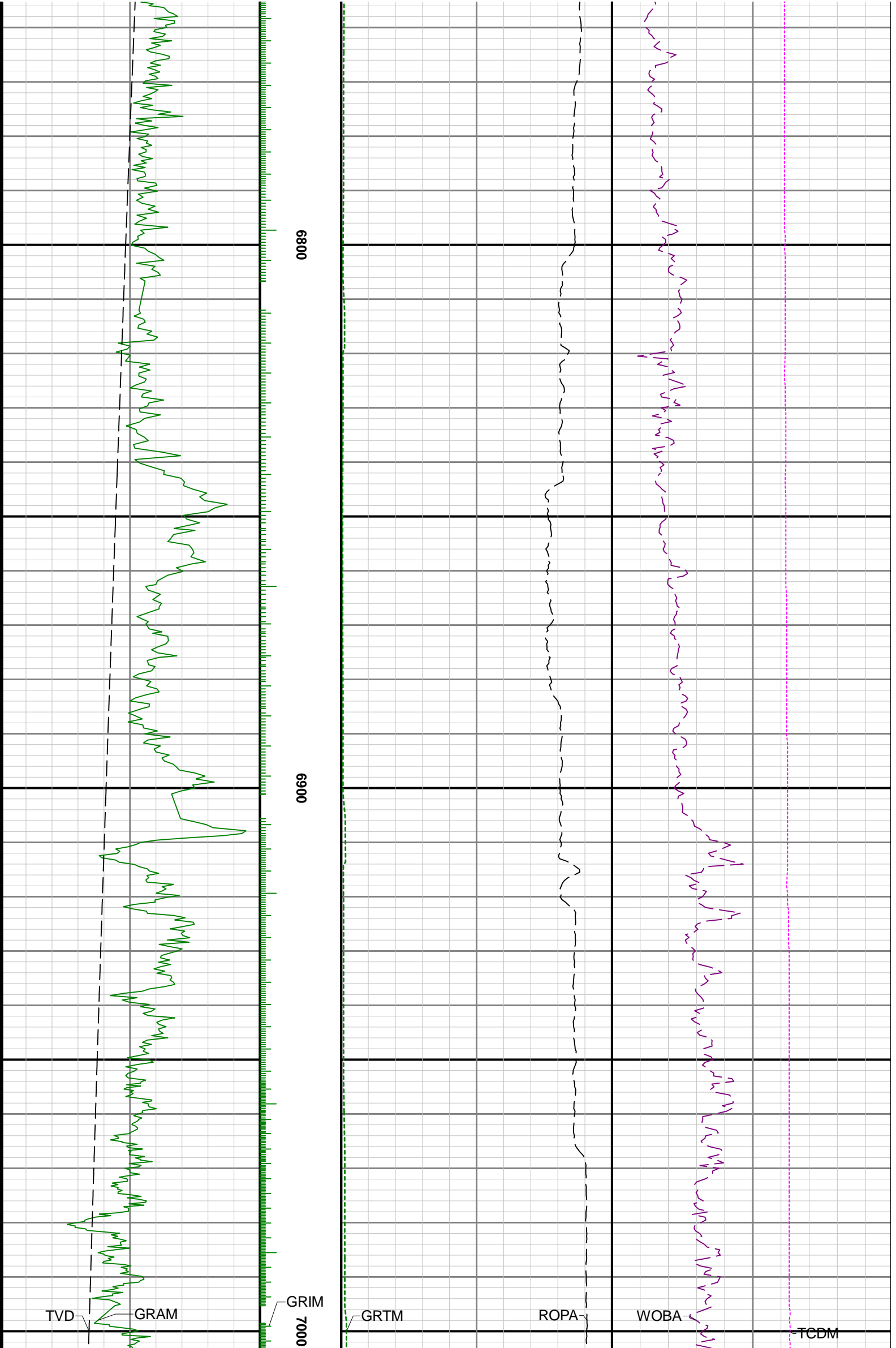
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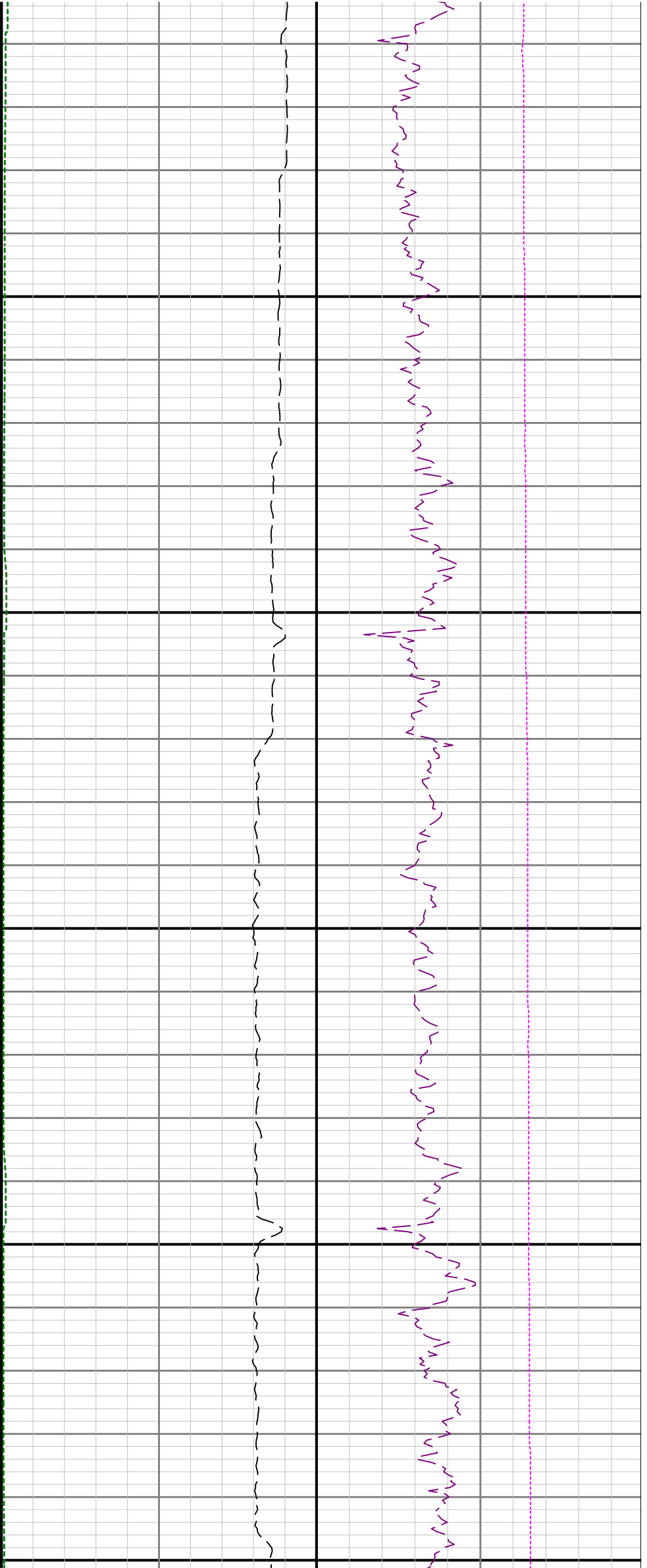
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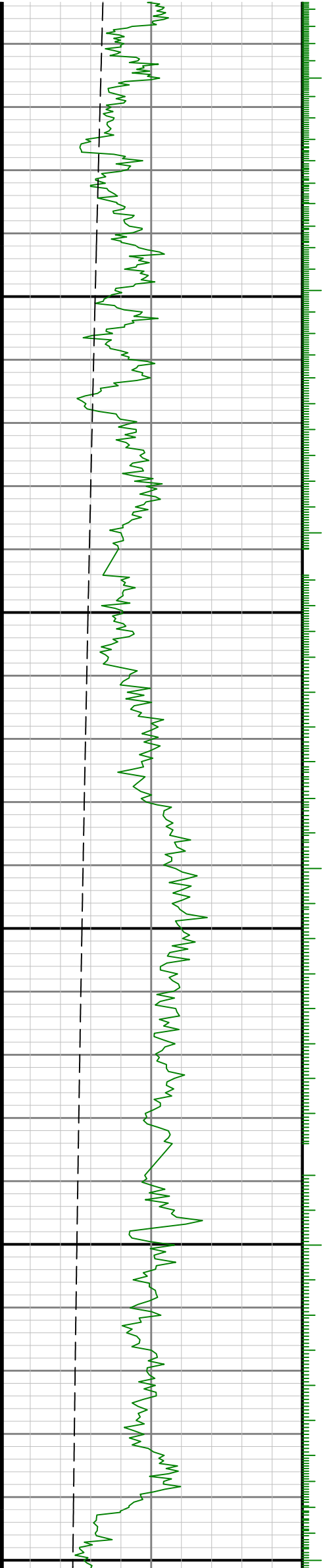


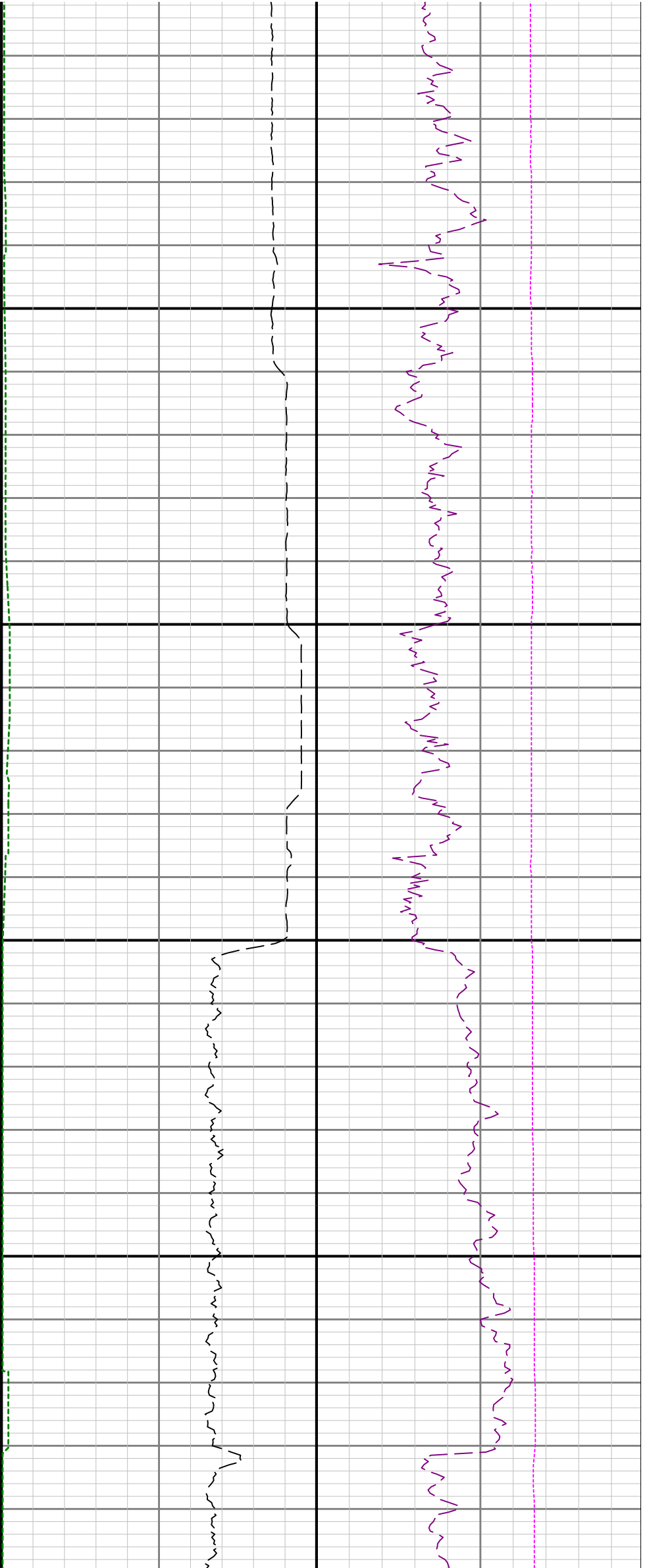




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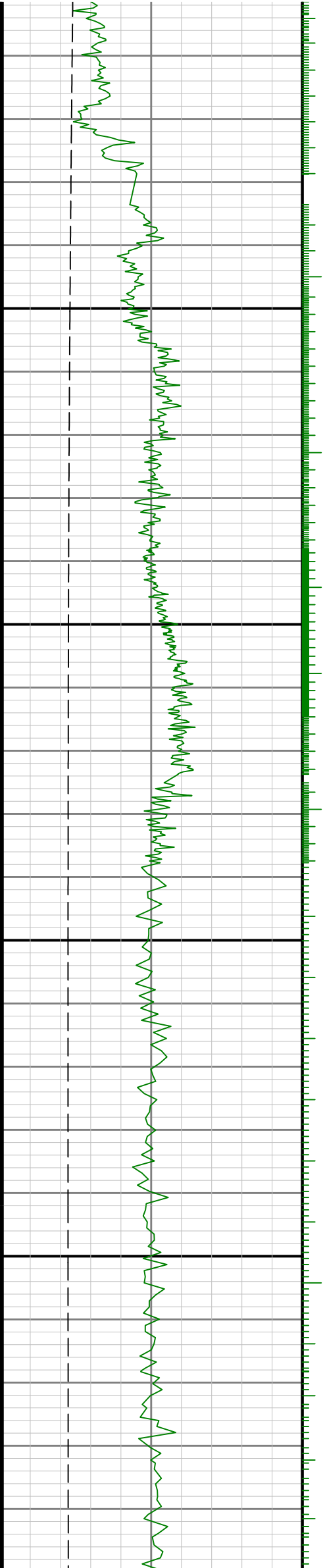


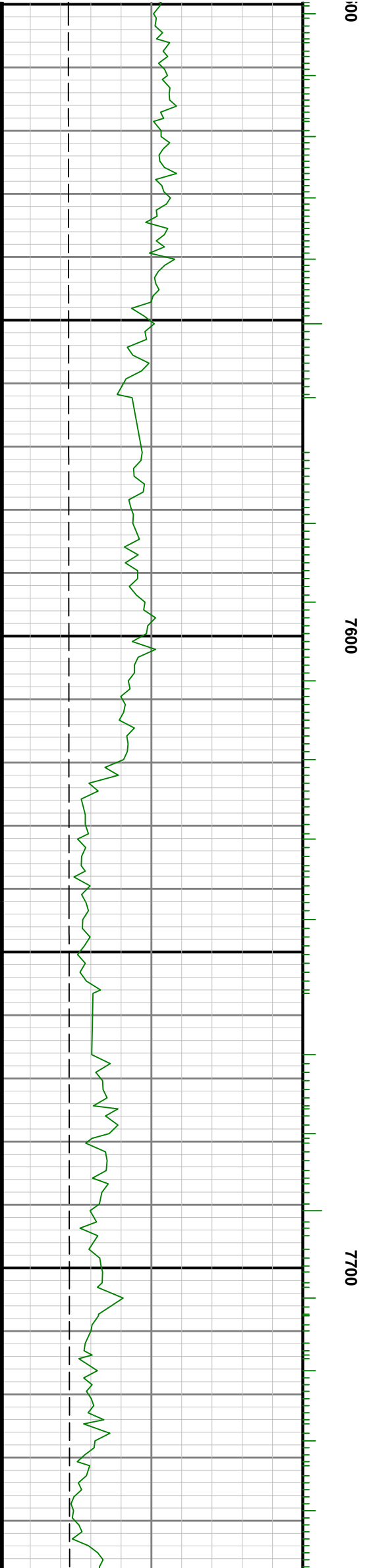


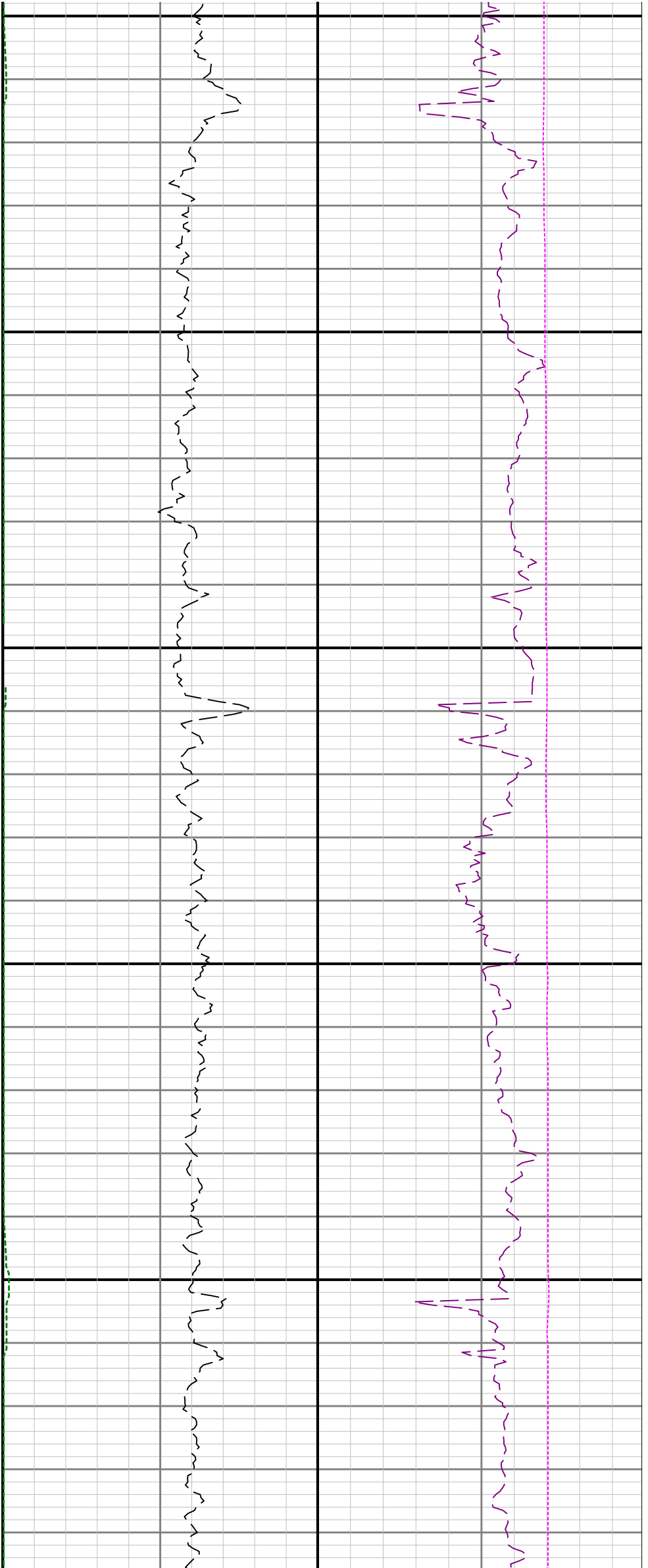
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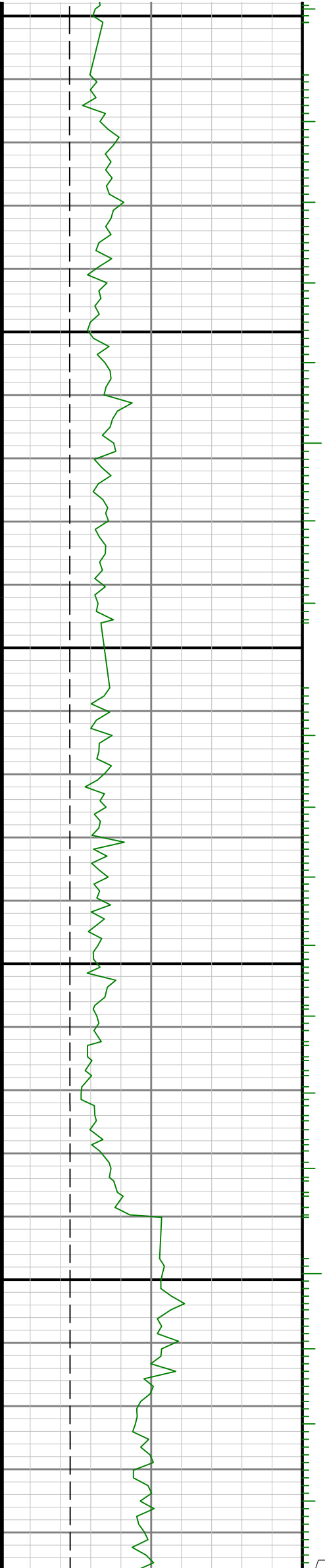


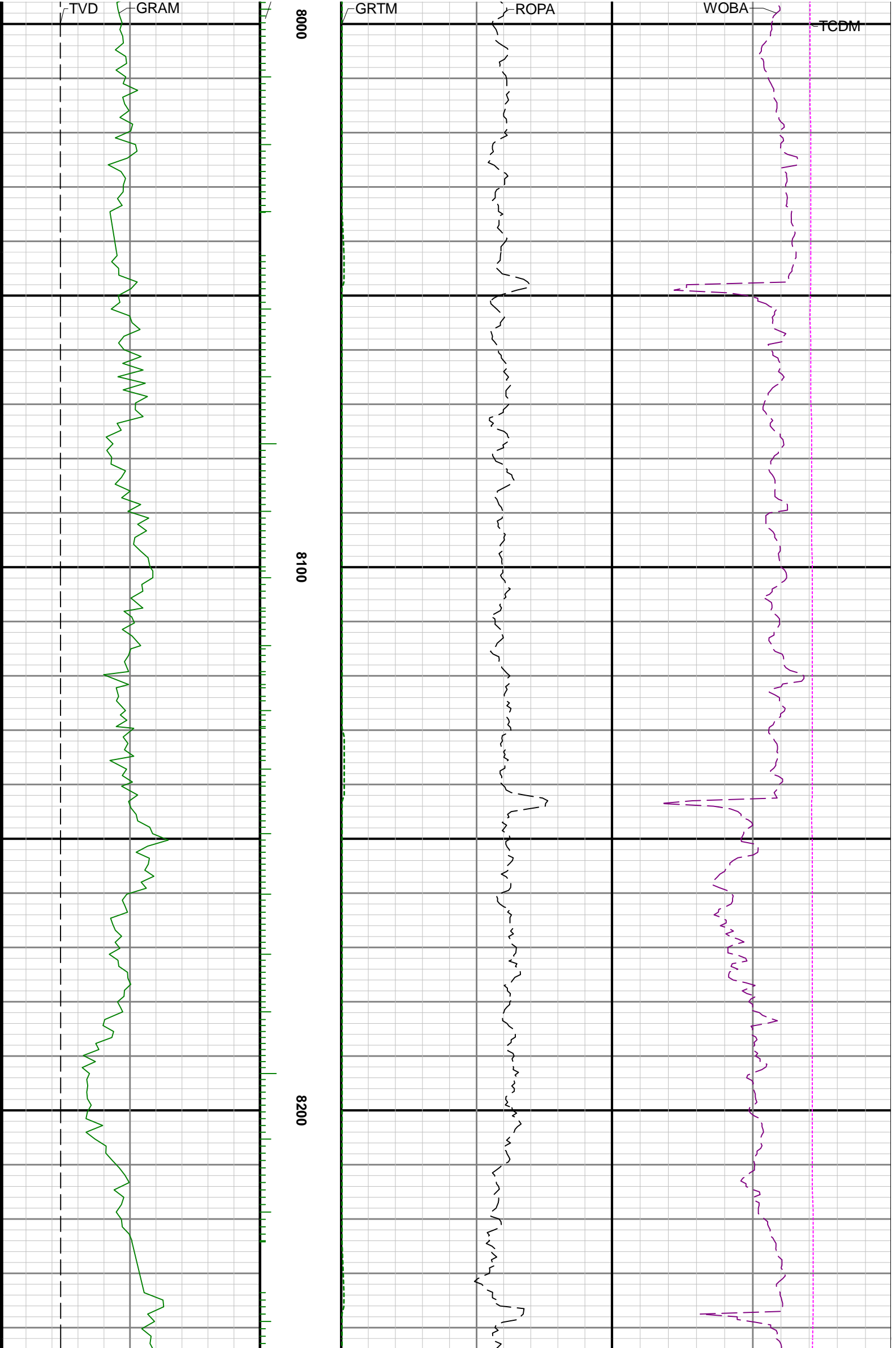


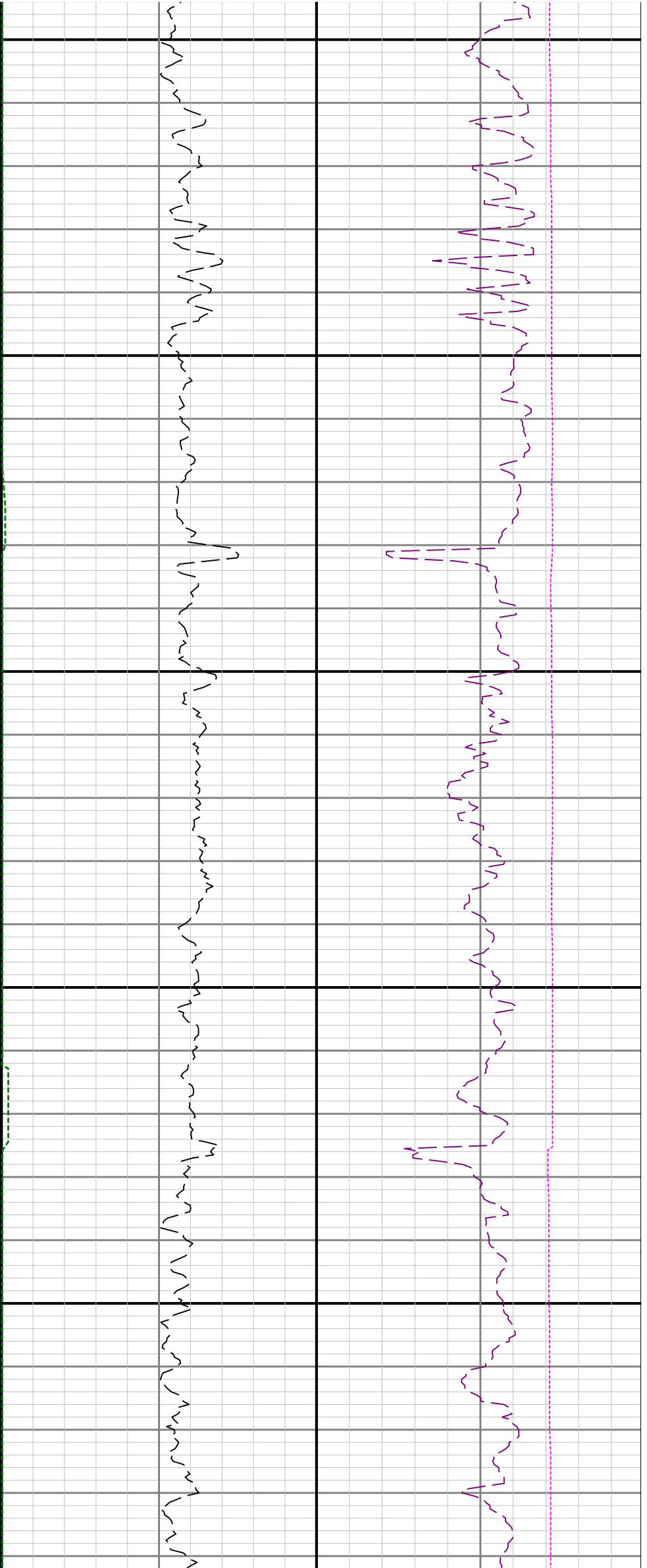
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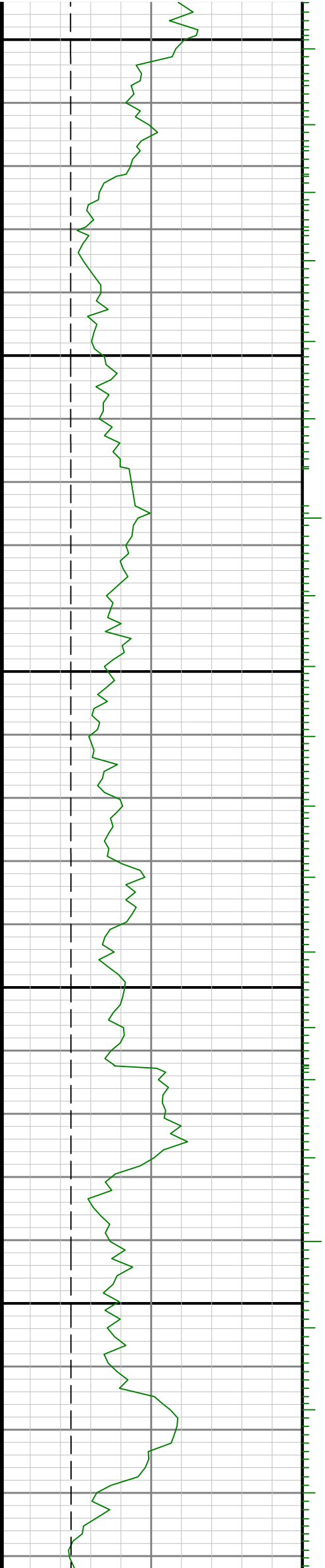


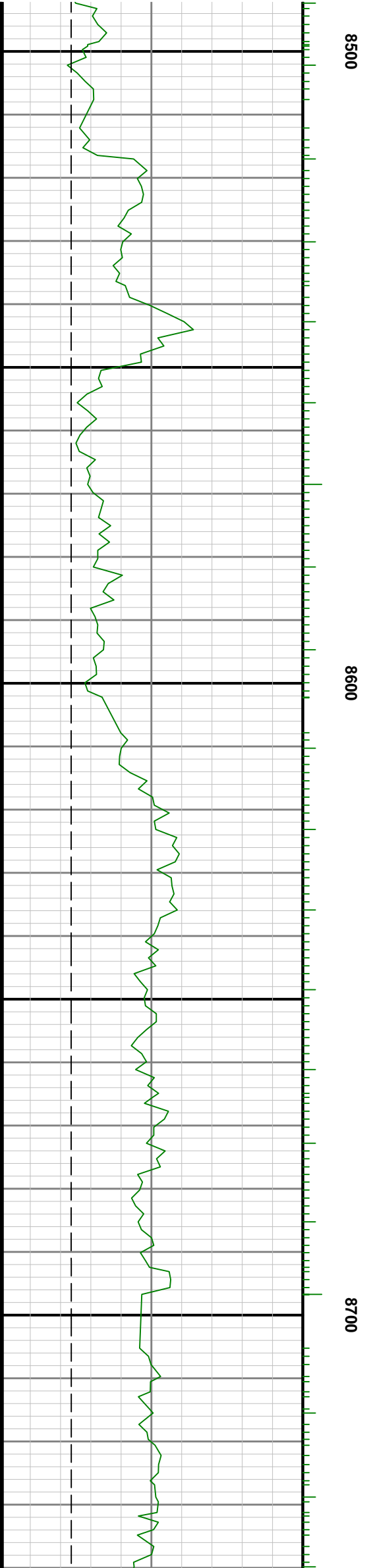
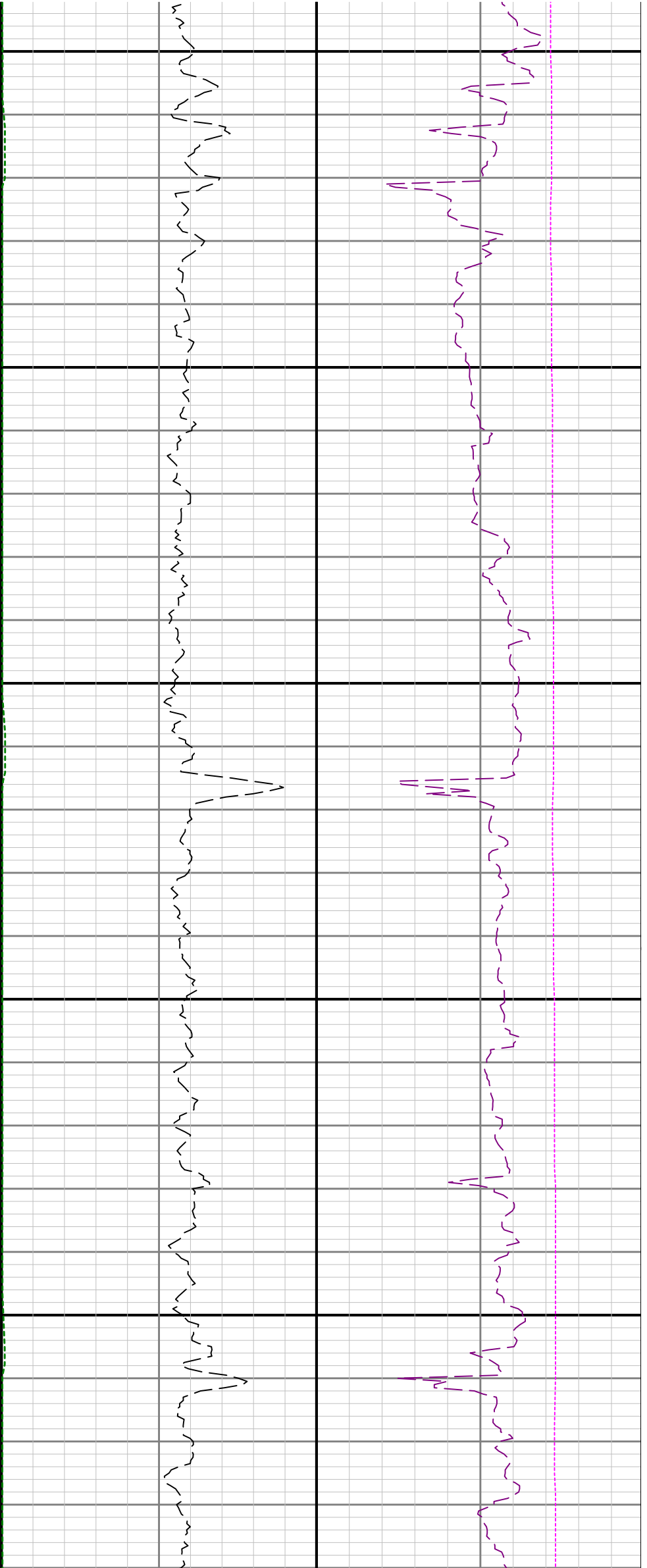


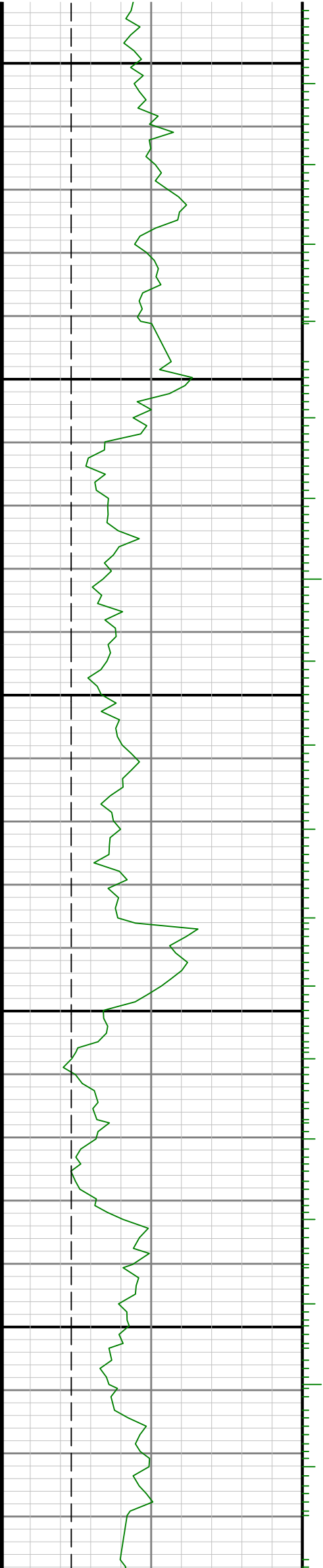


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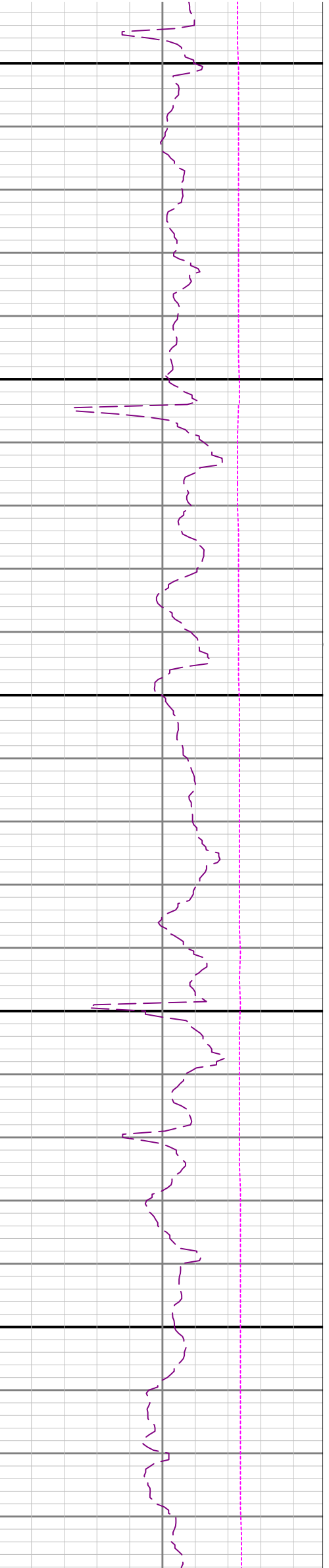


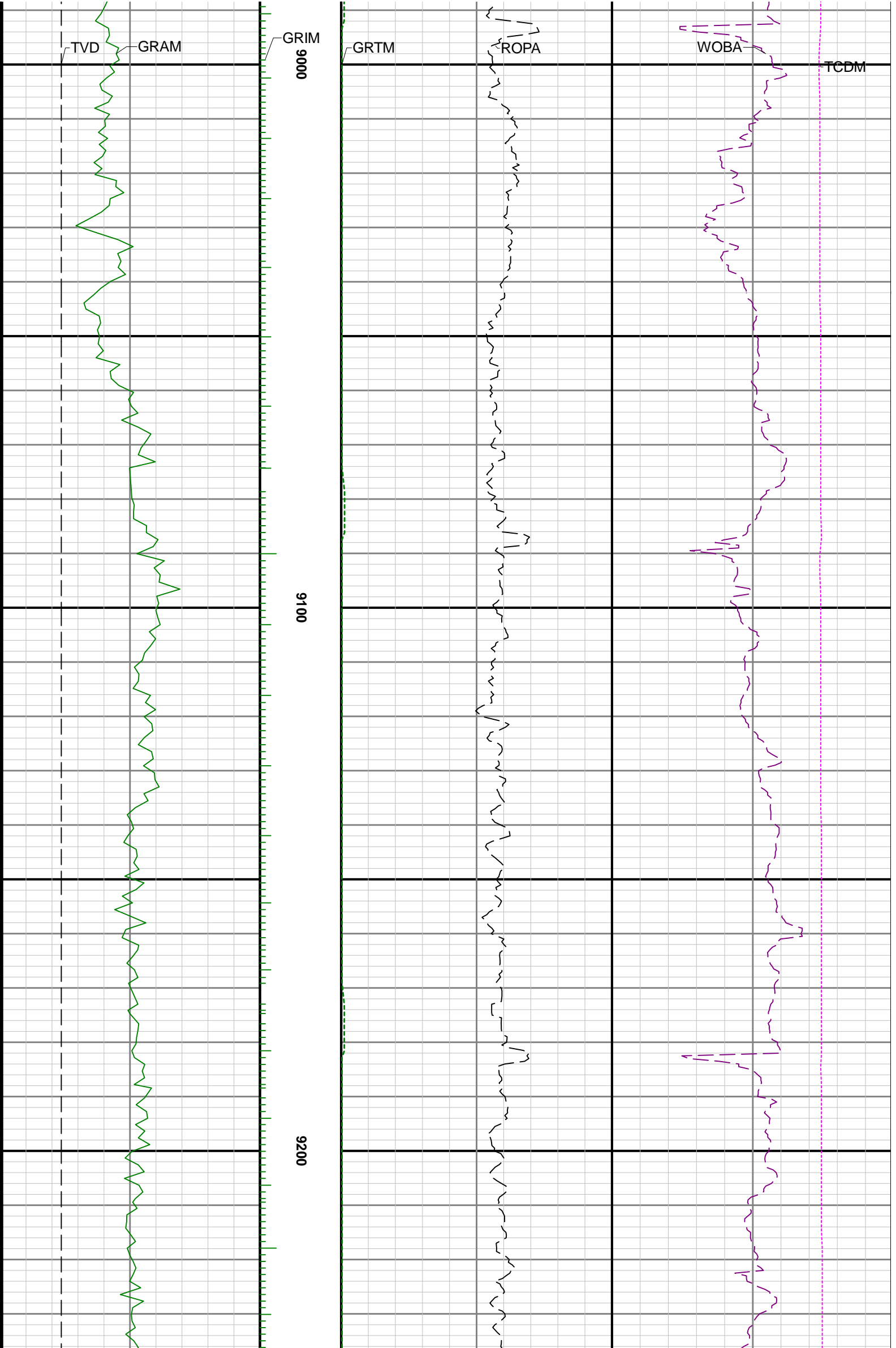


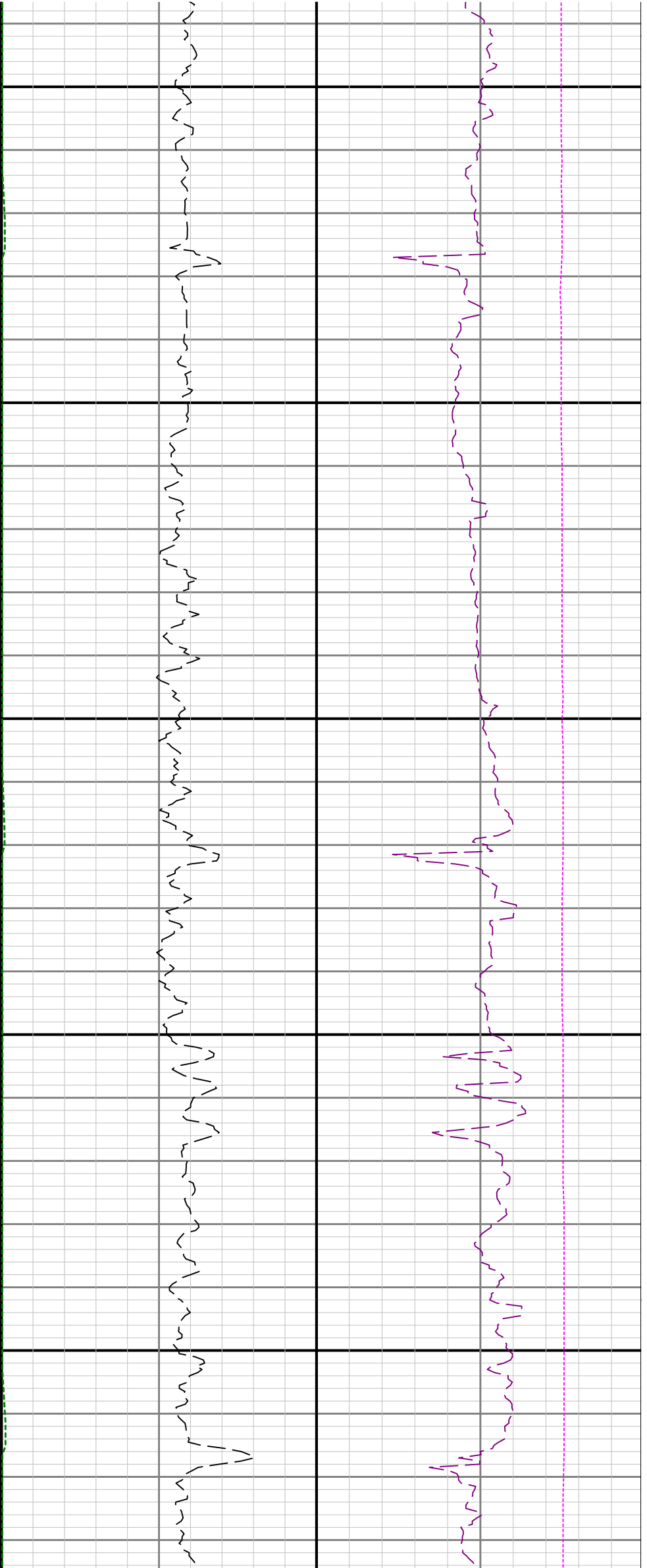


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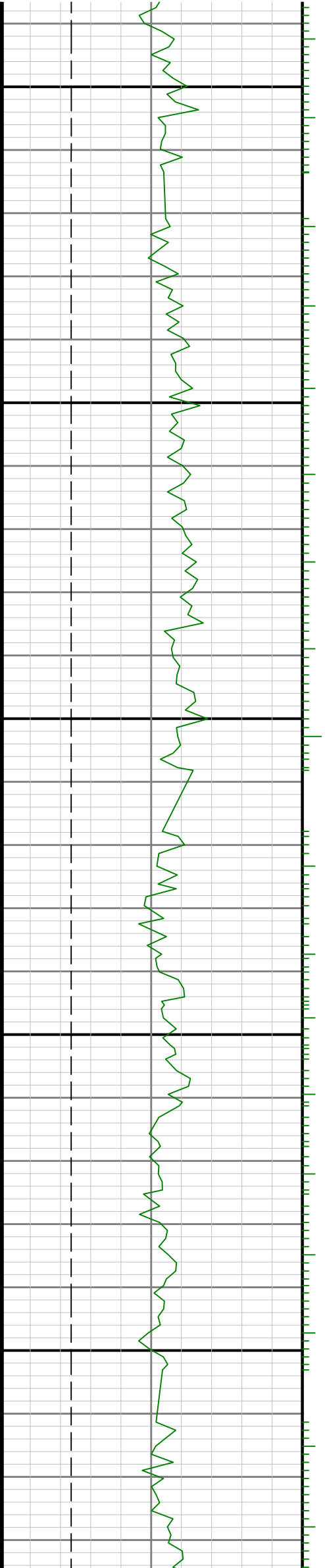


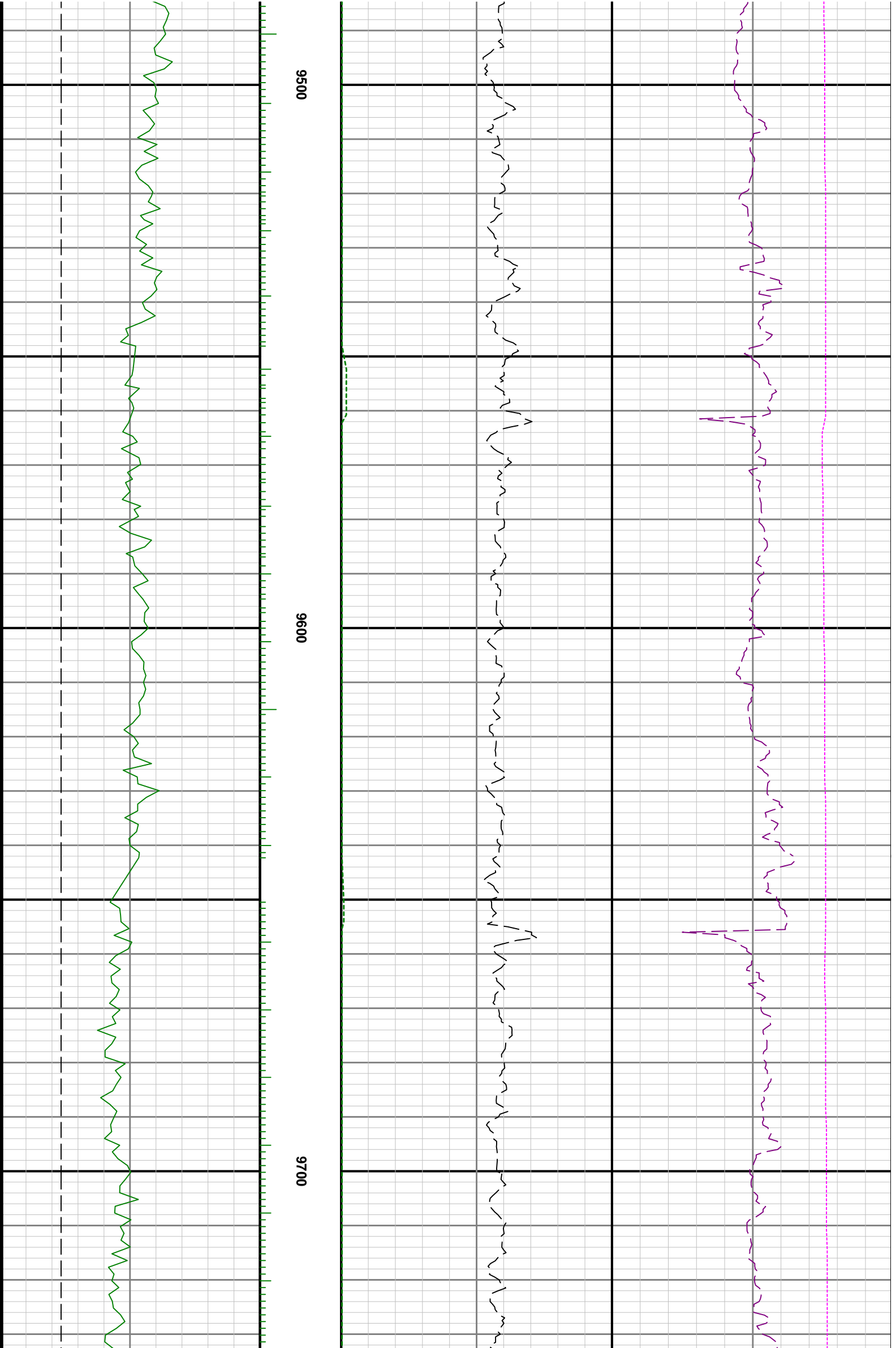


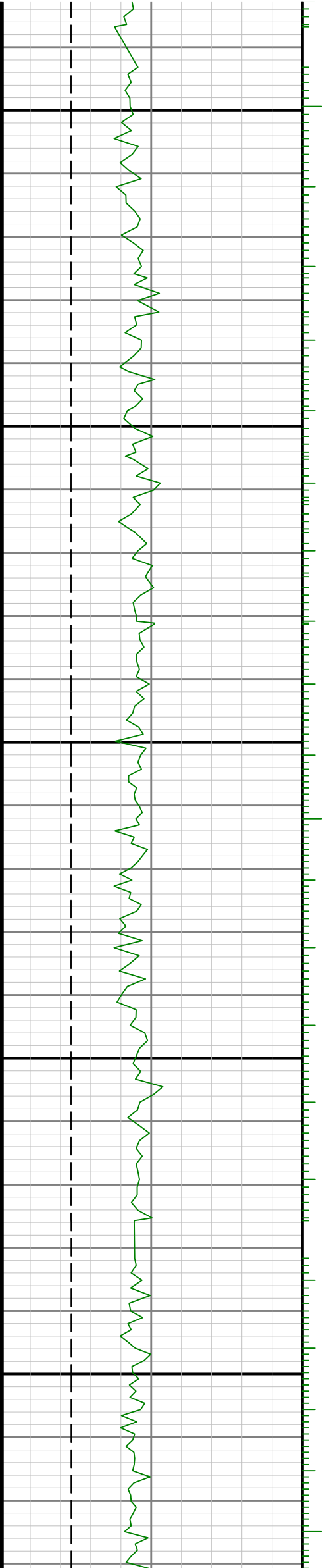


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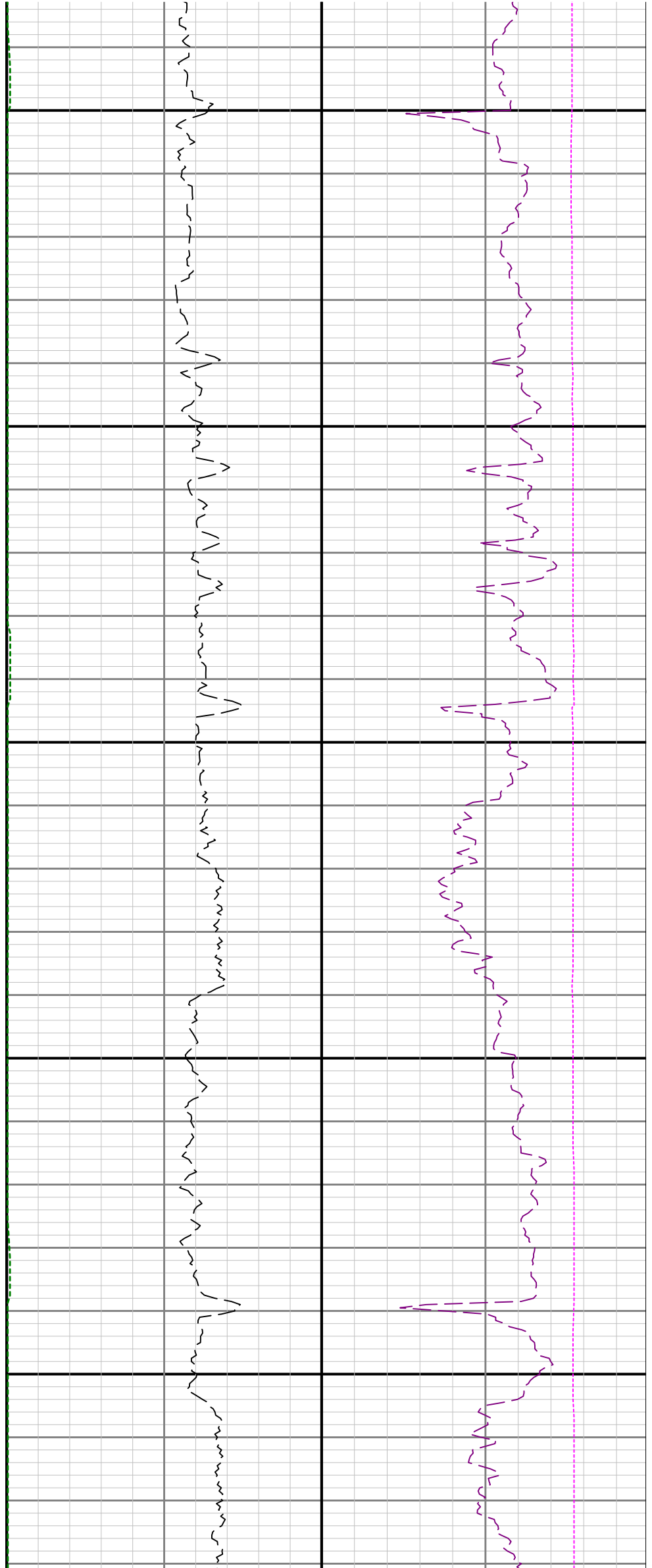


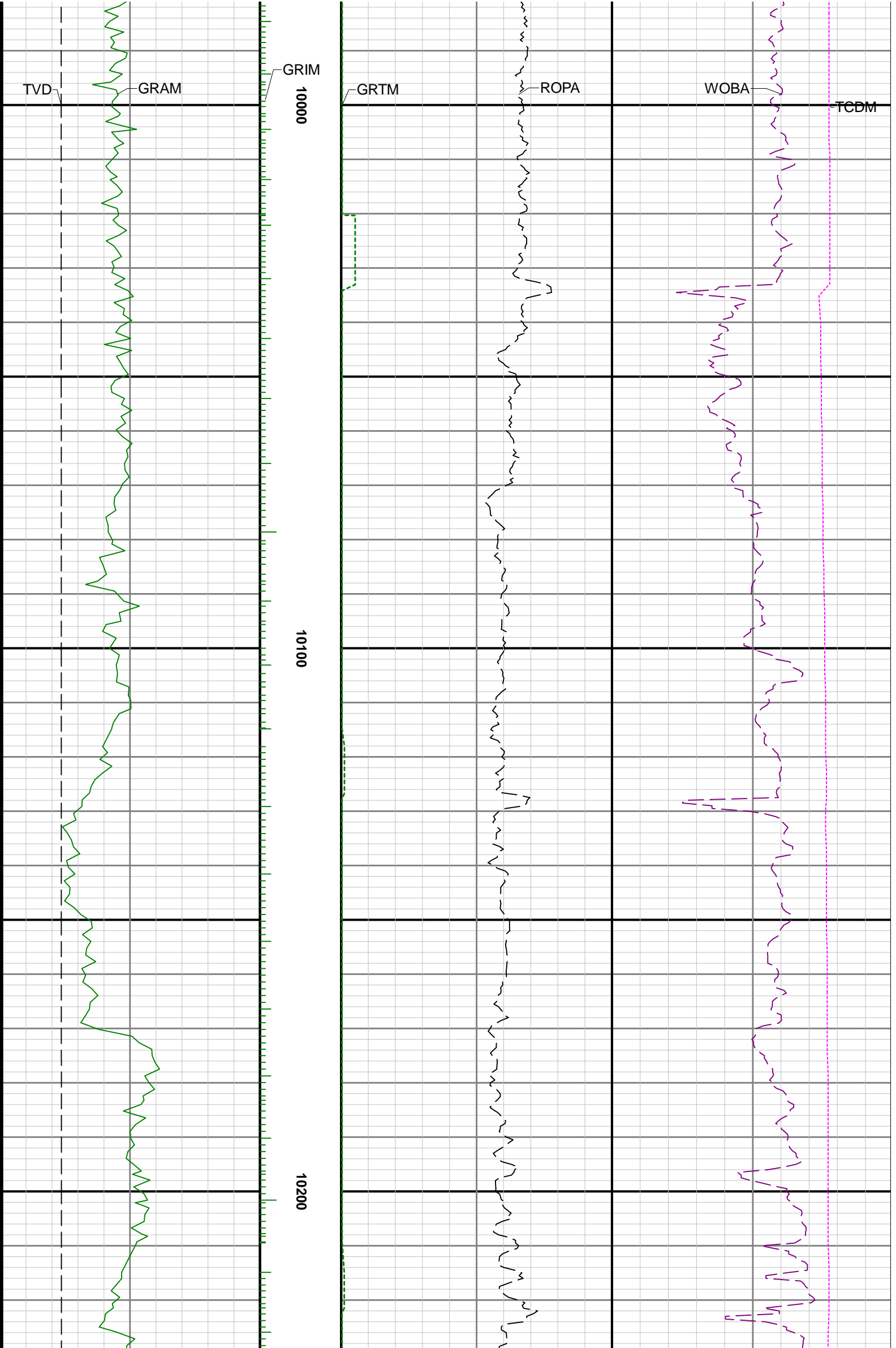


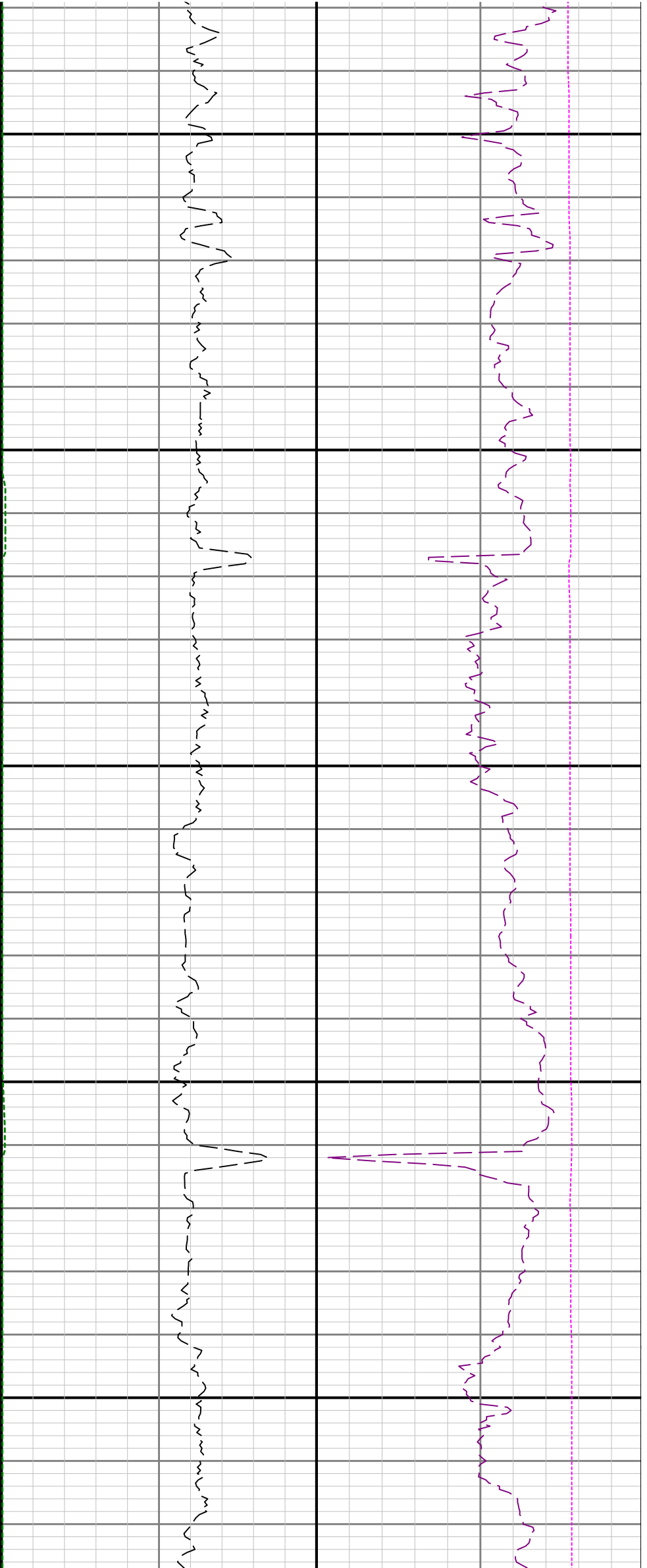


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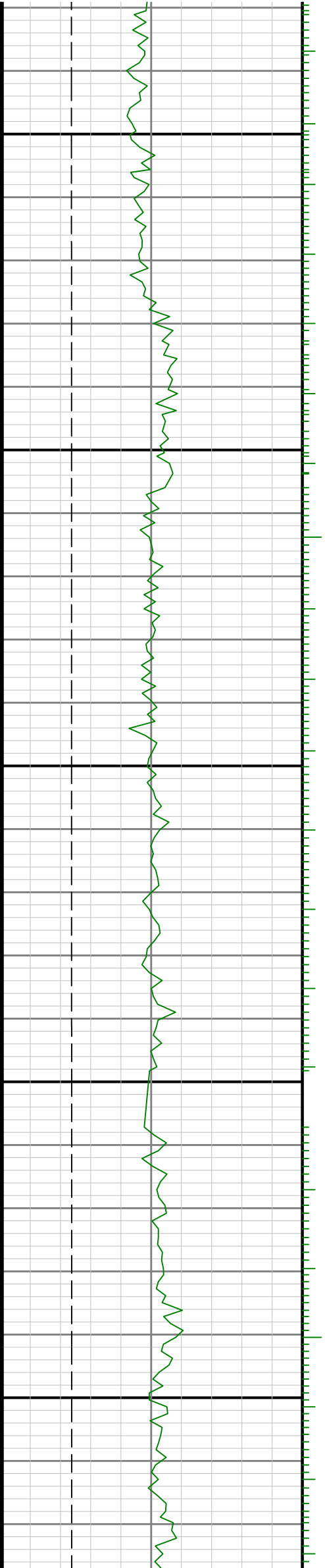


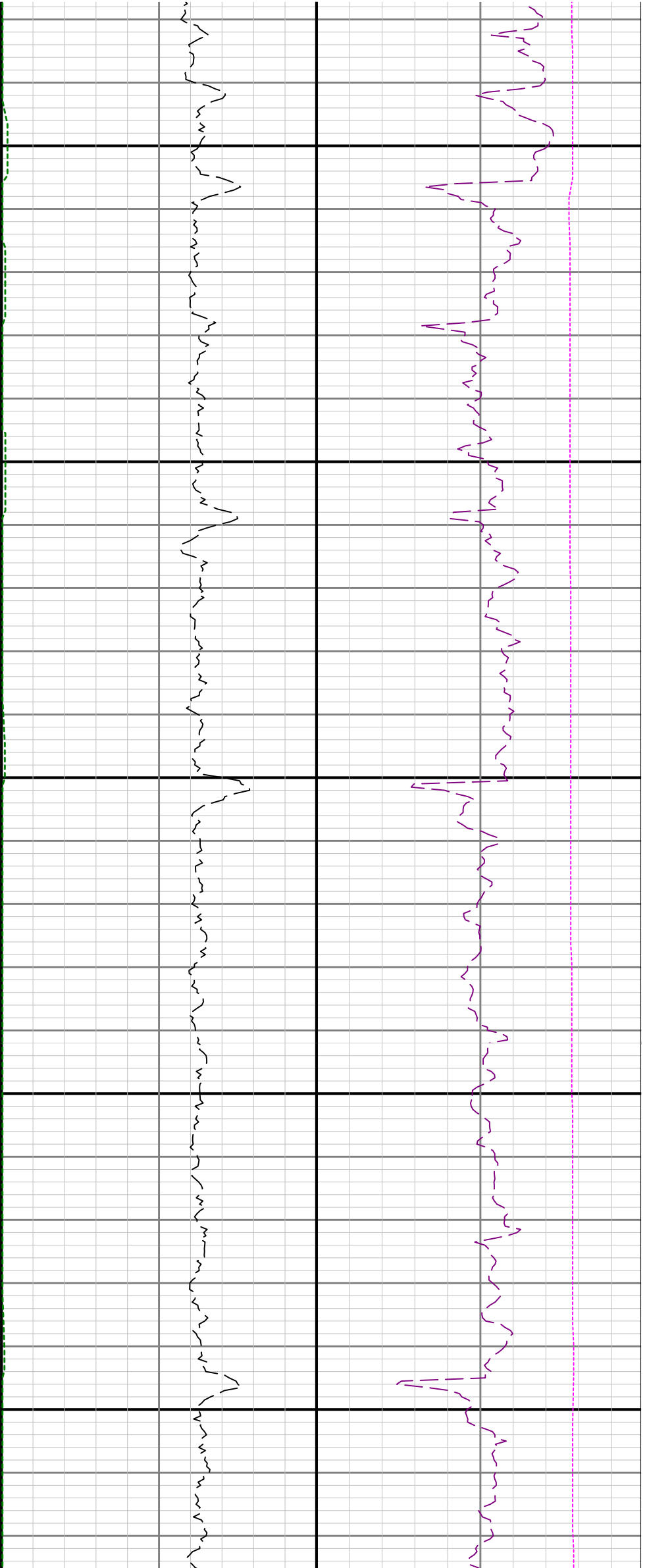




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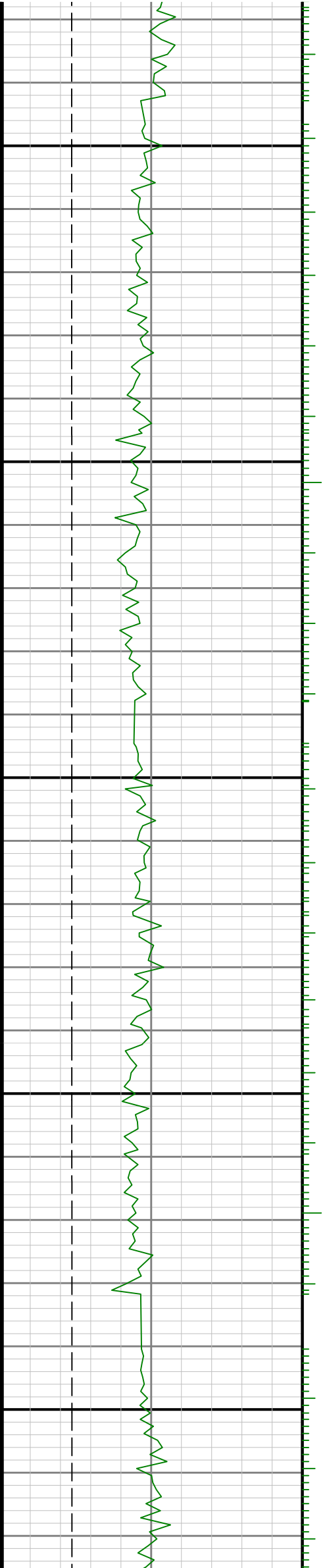


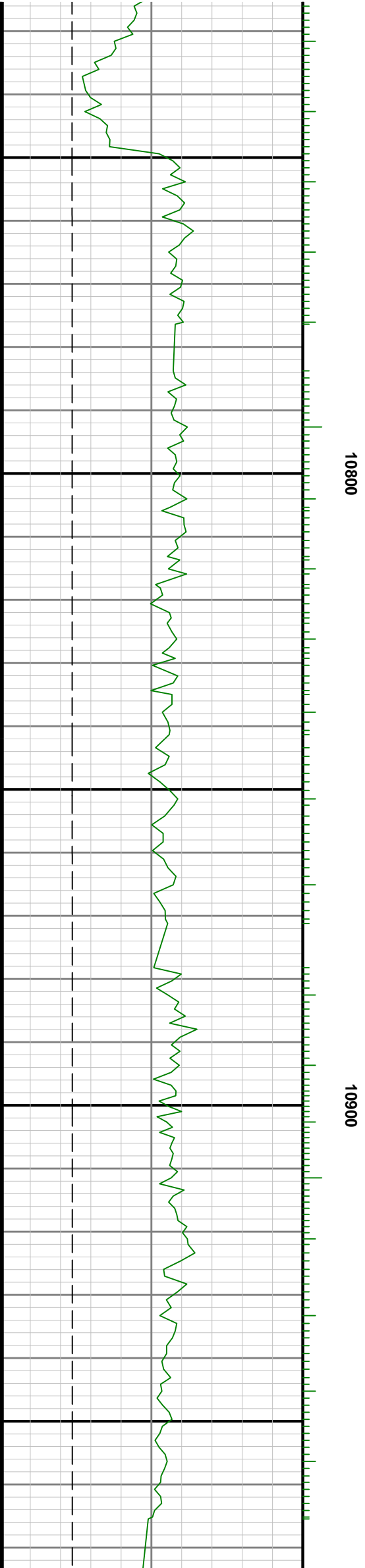
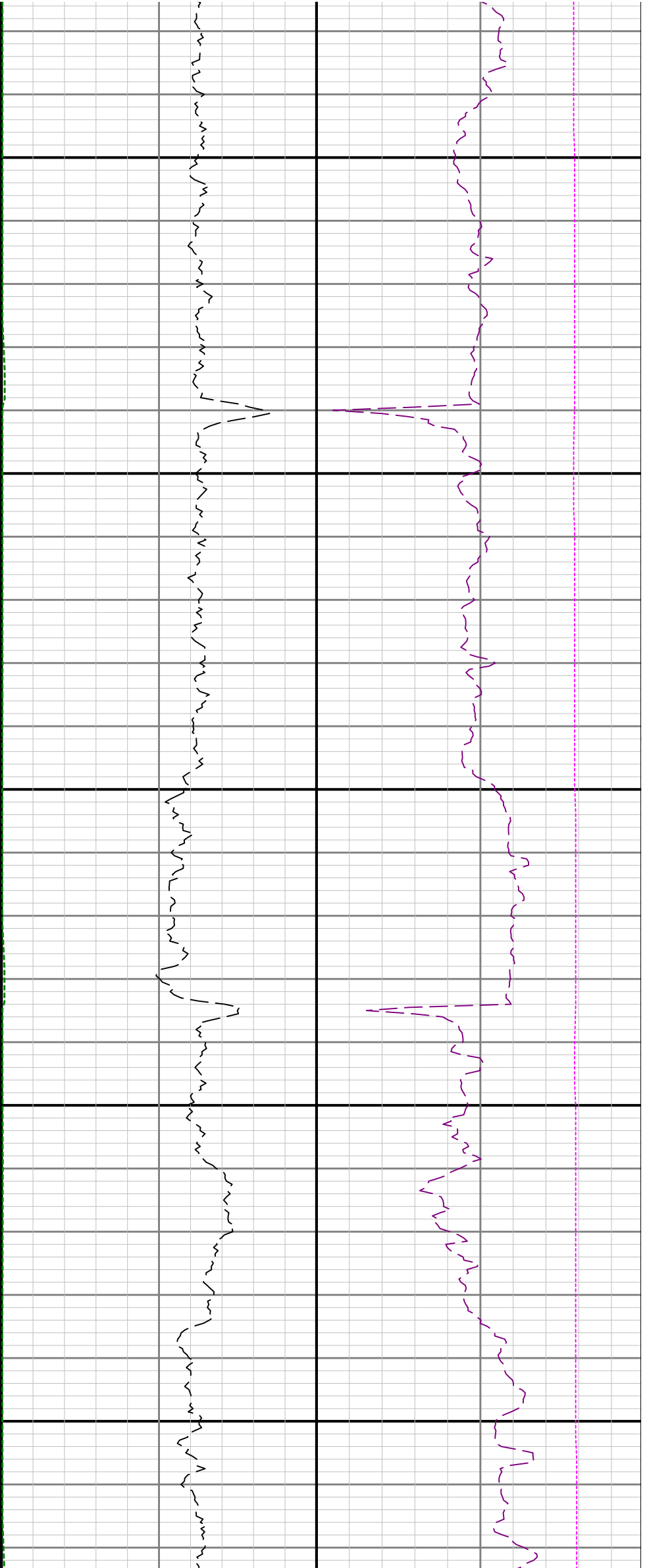


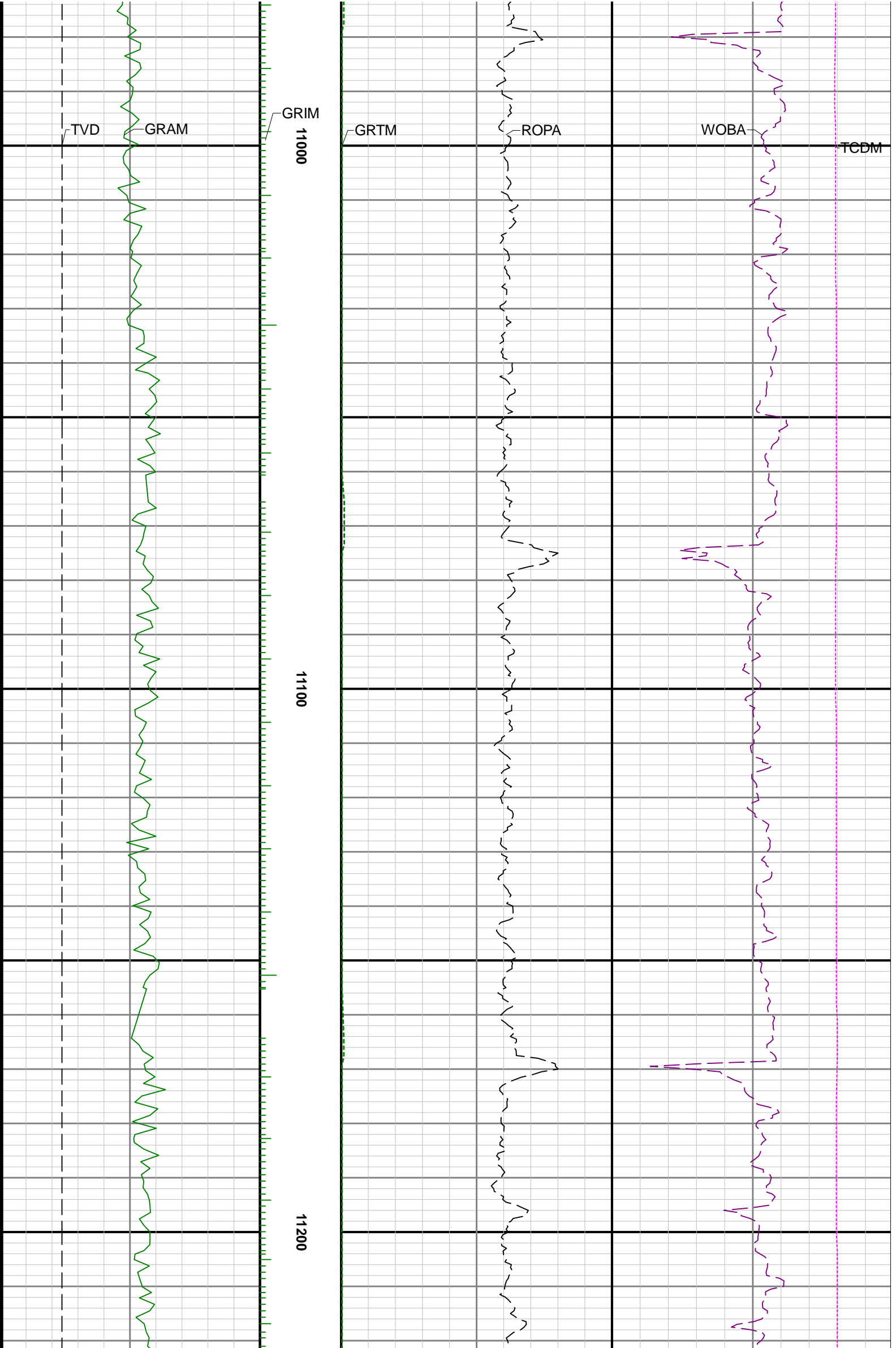
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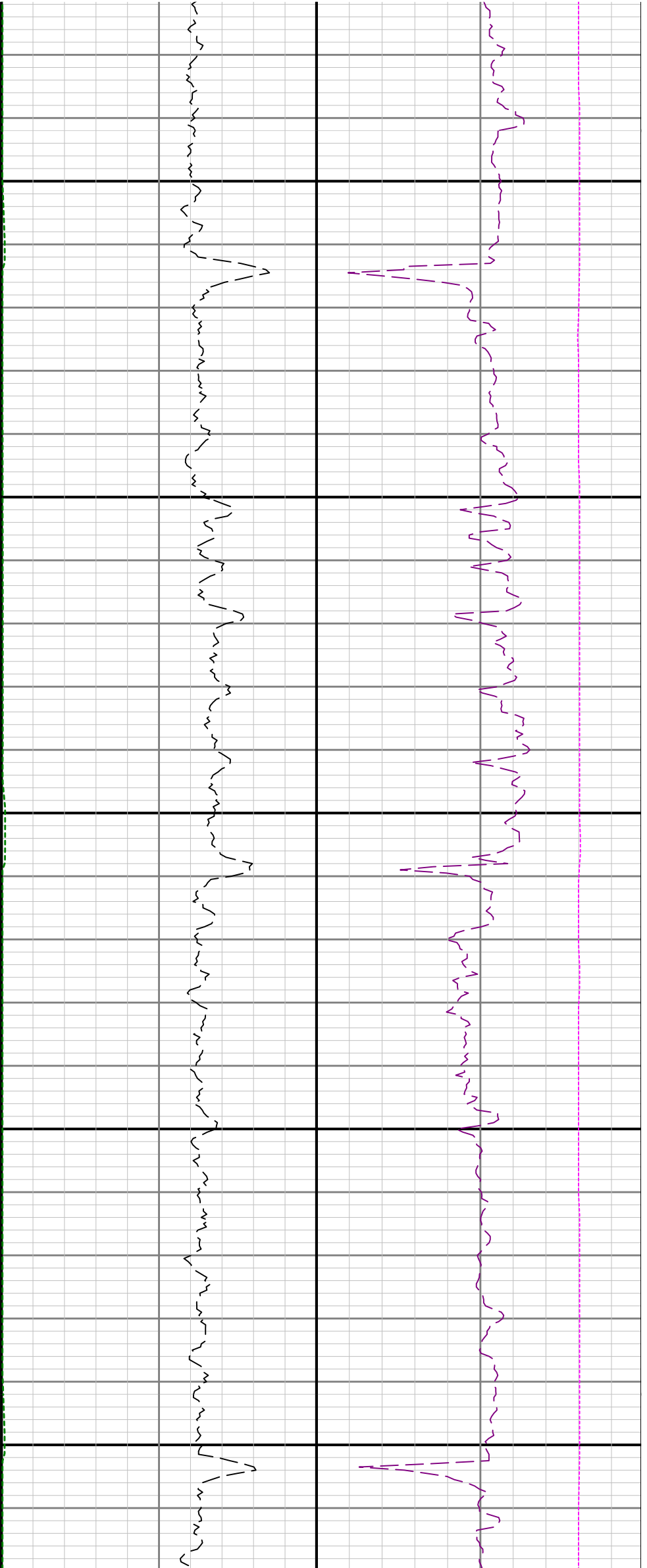
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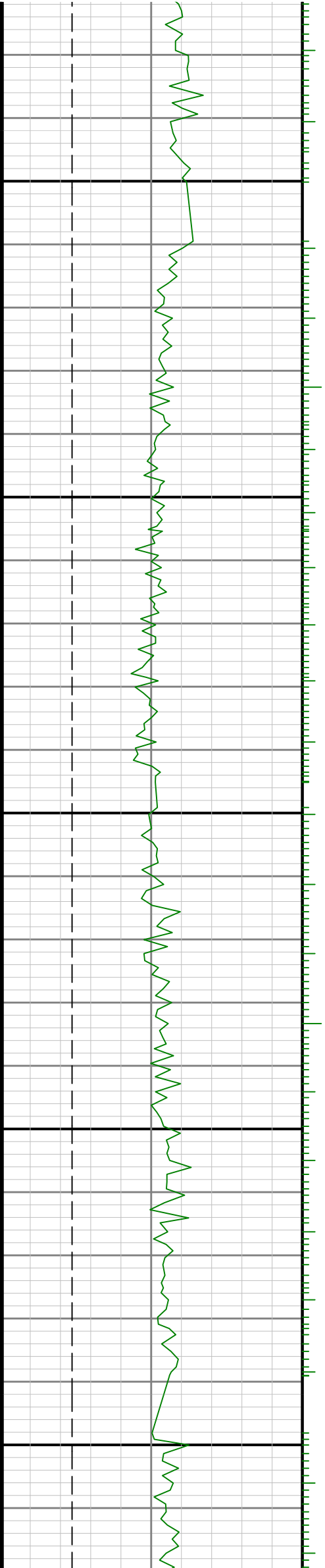


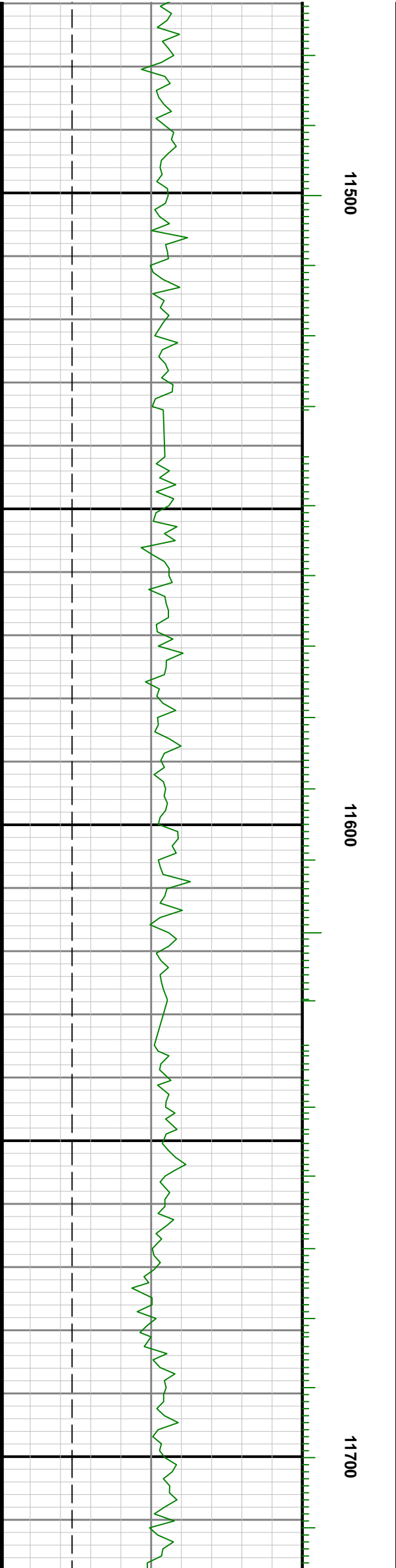
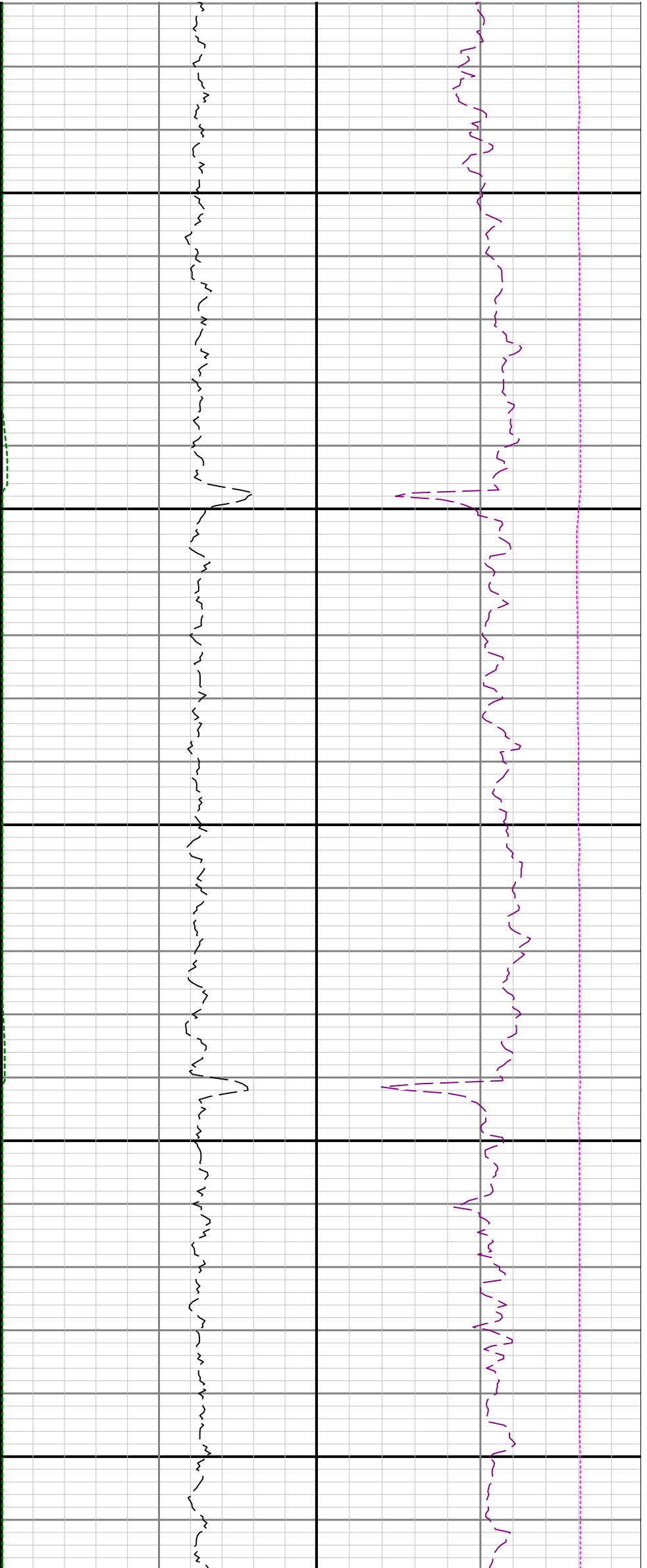


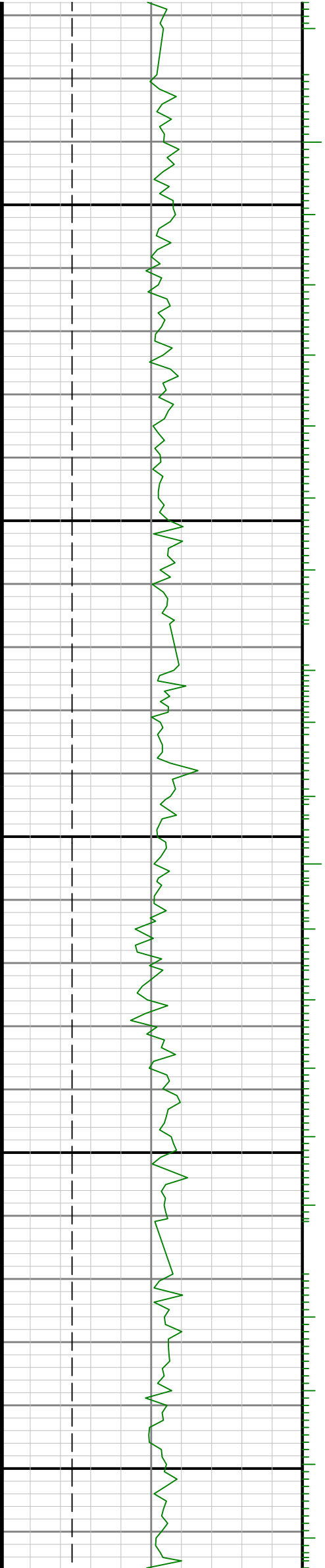
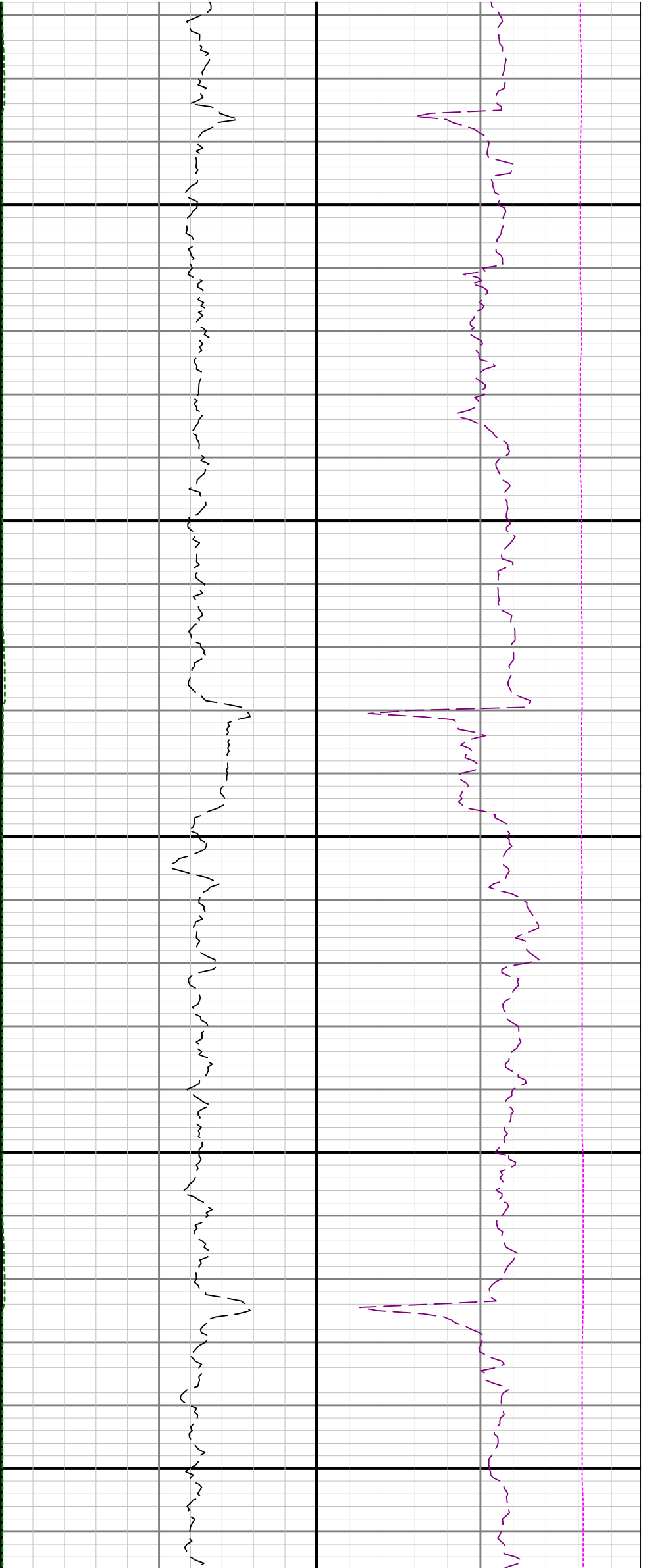


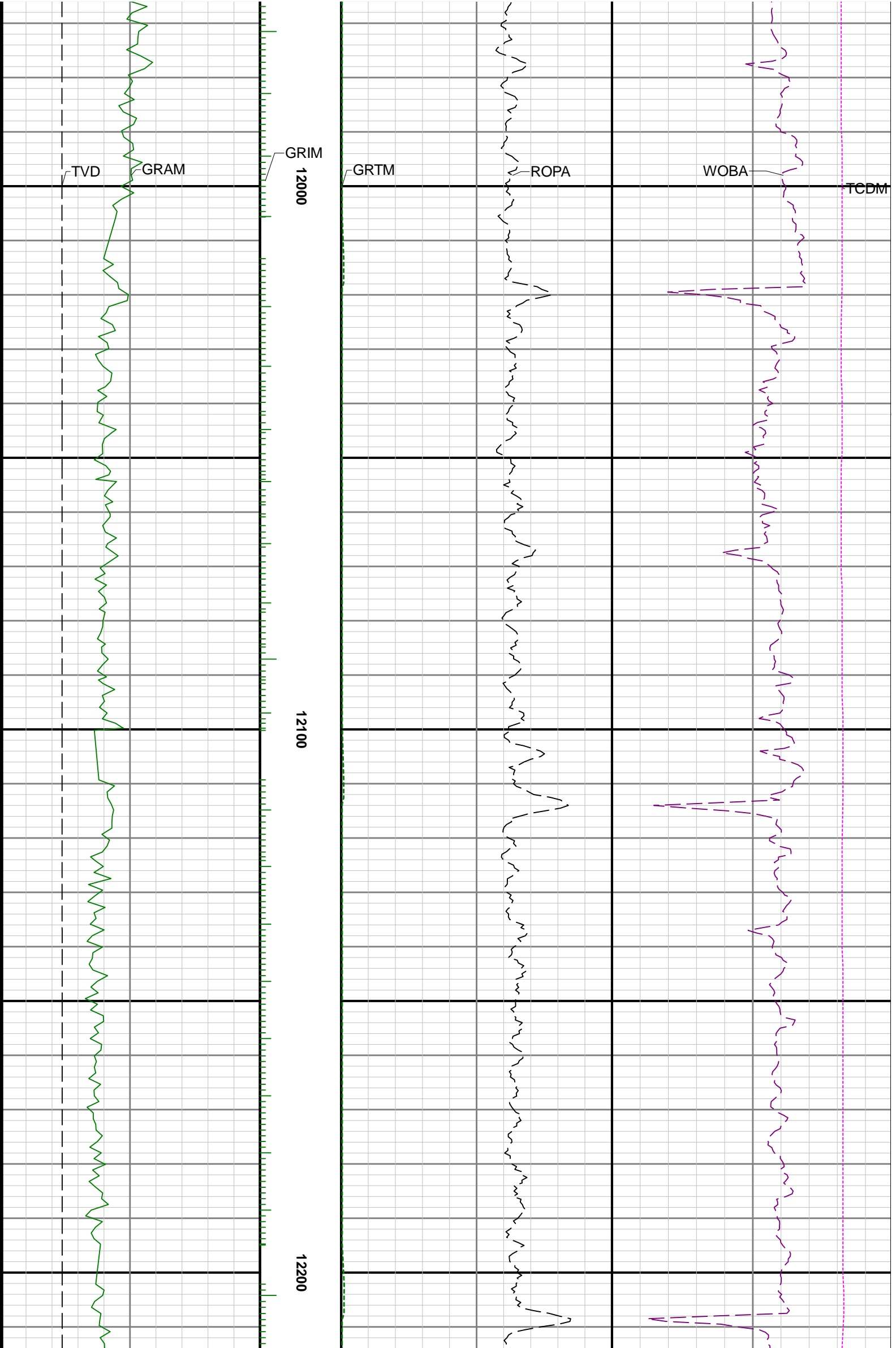
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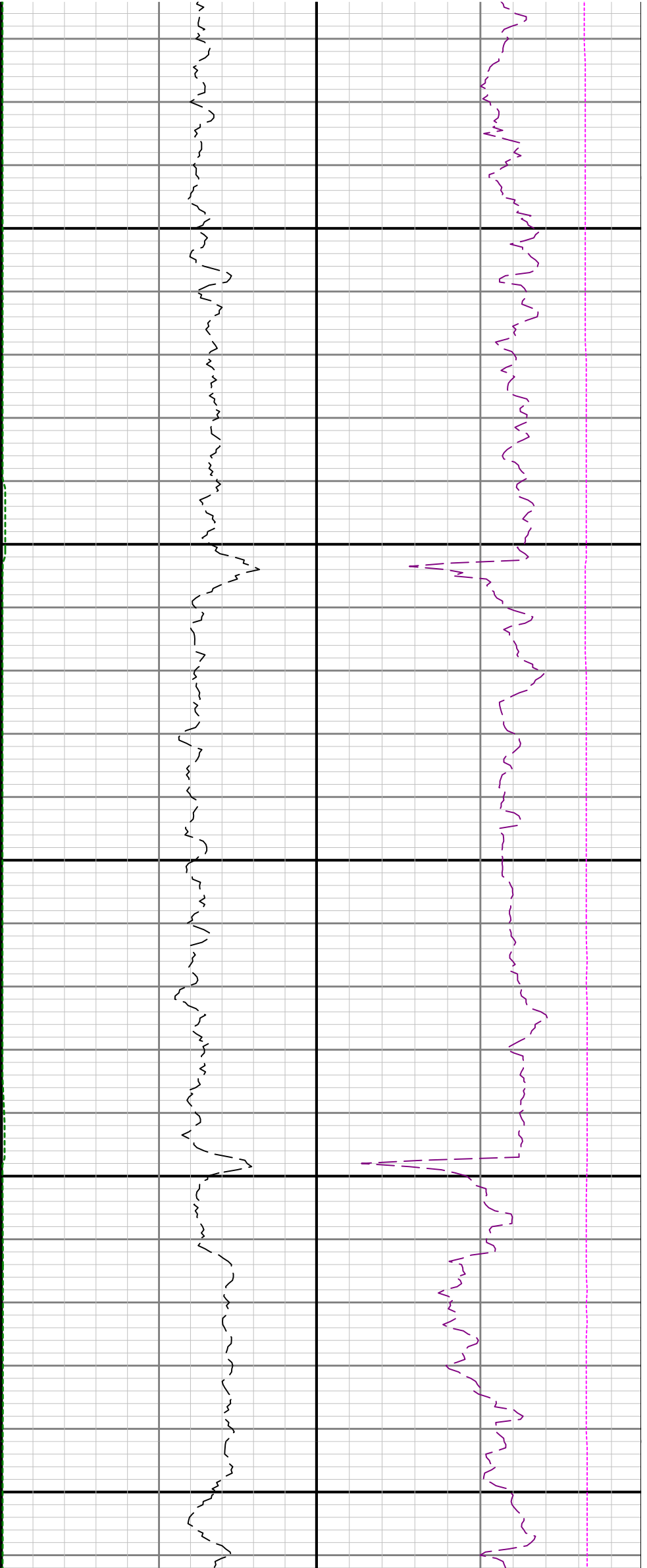
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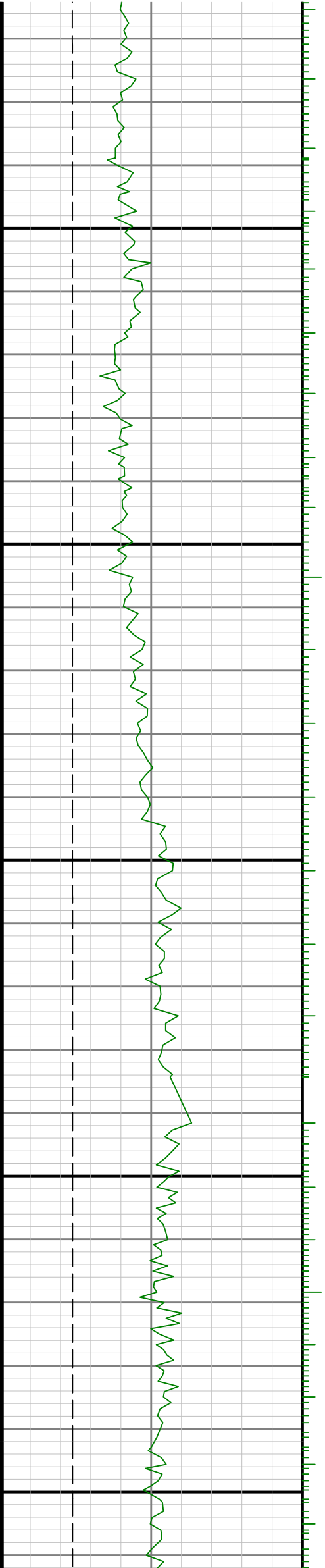


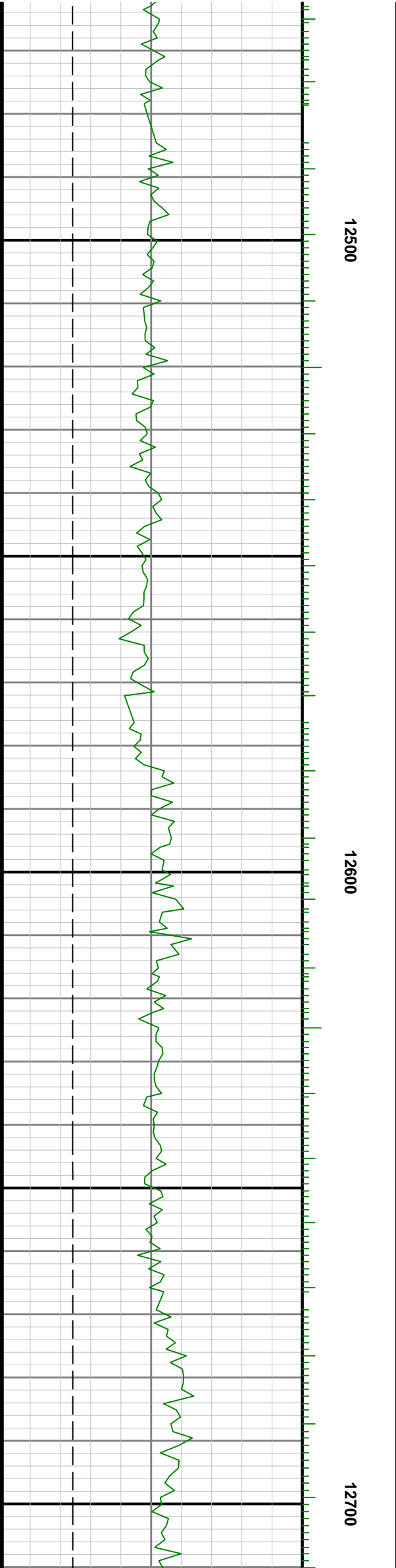
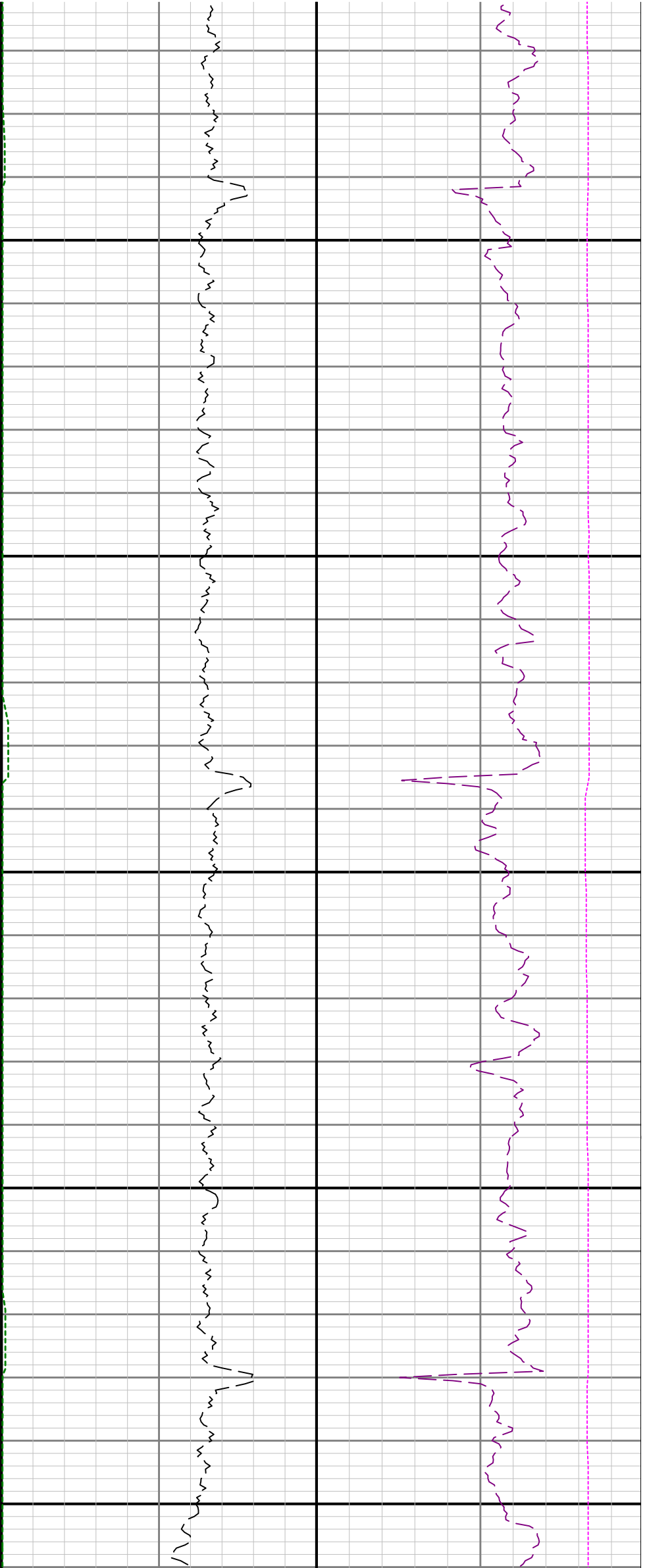


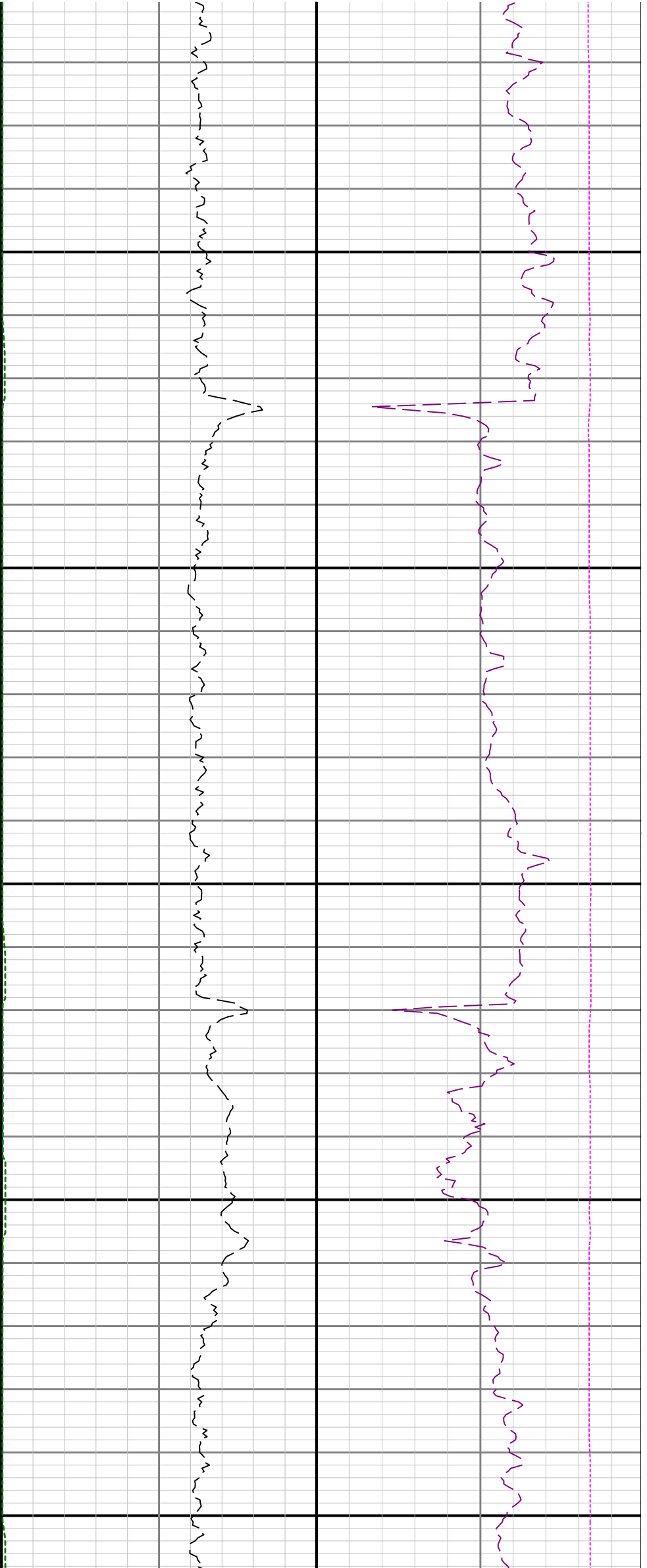


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12400

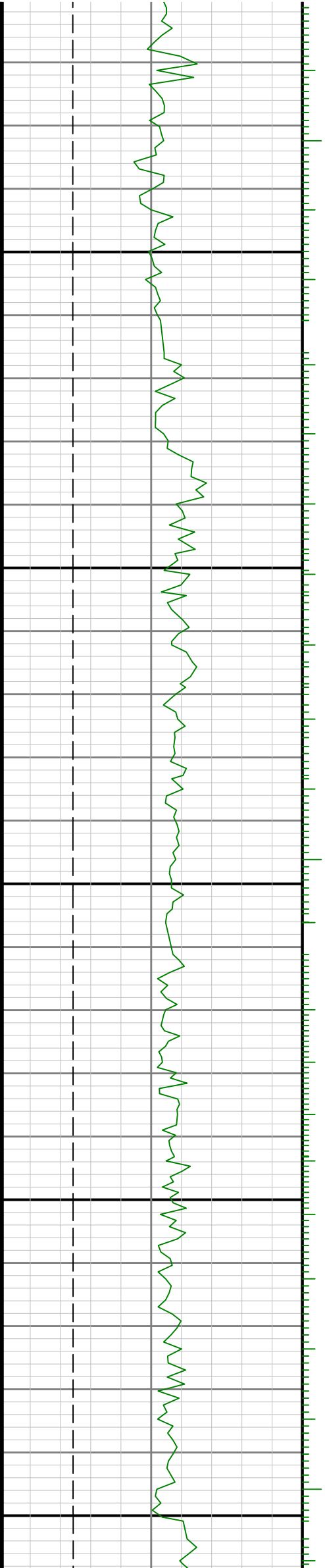


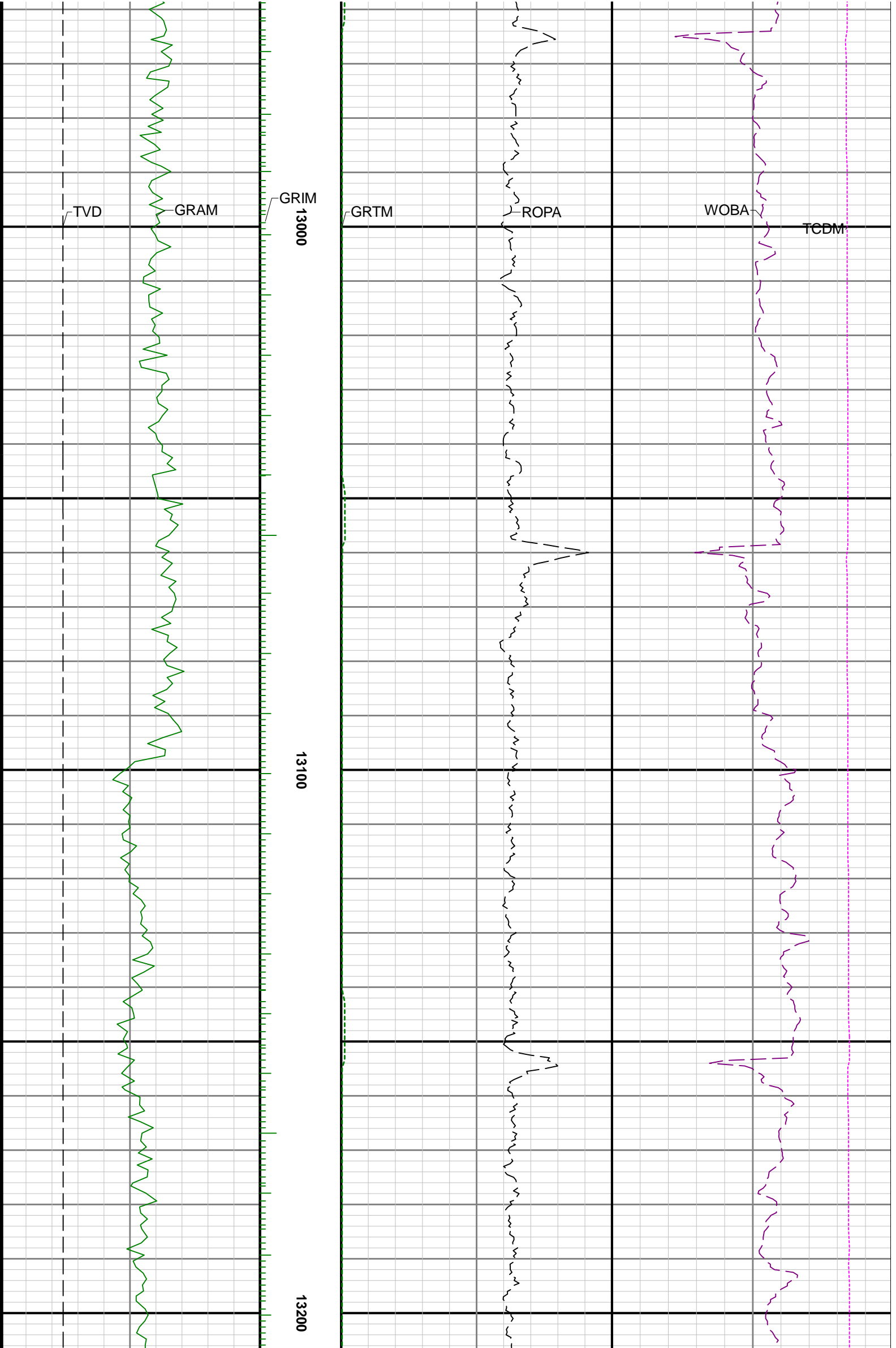


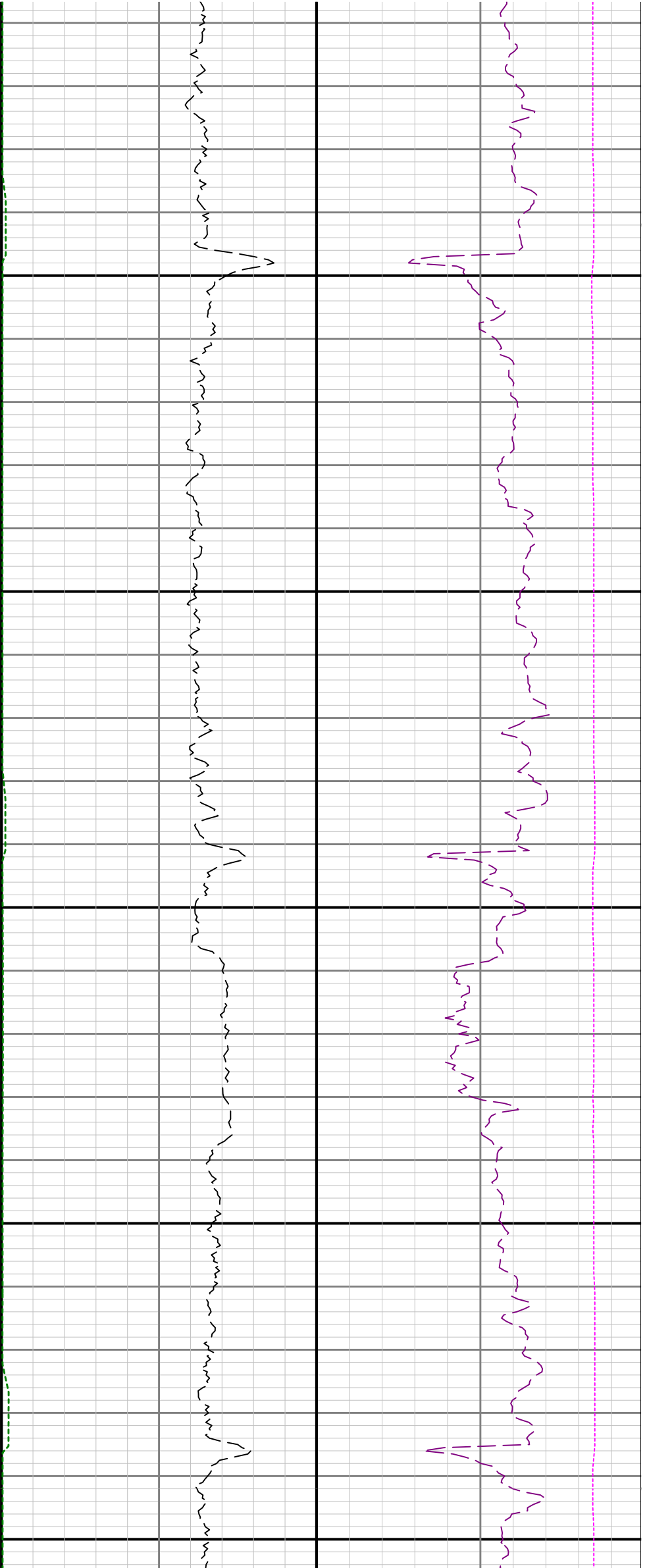


12800

12900

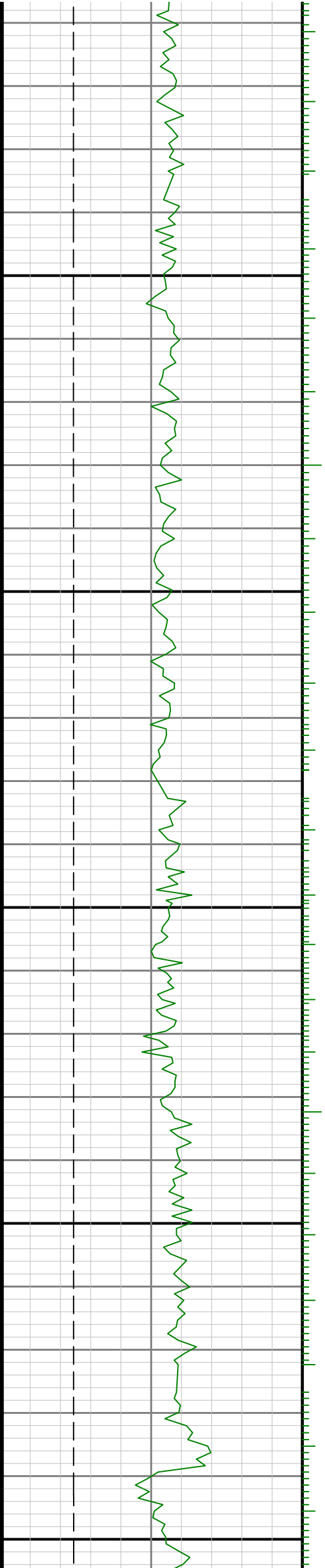


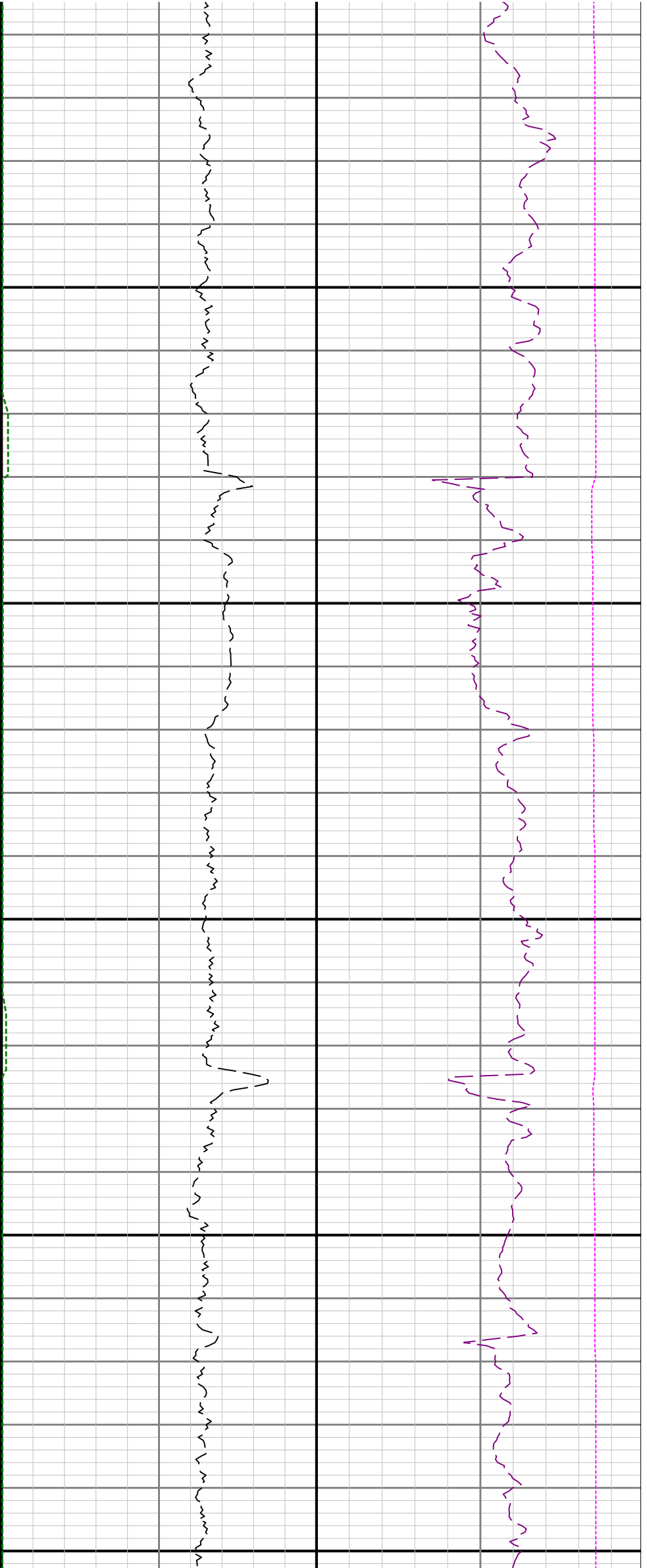




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13400

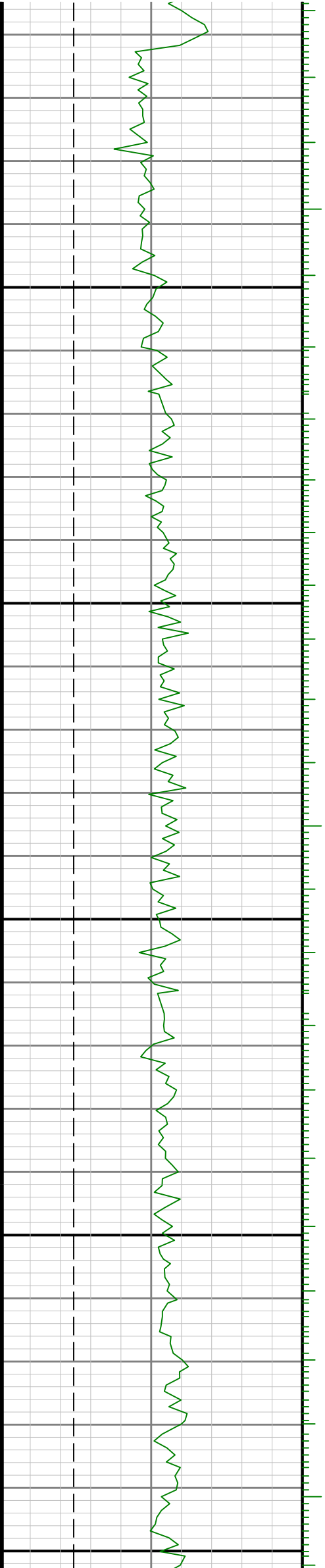


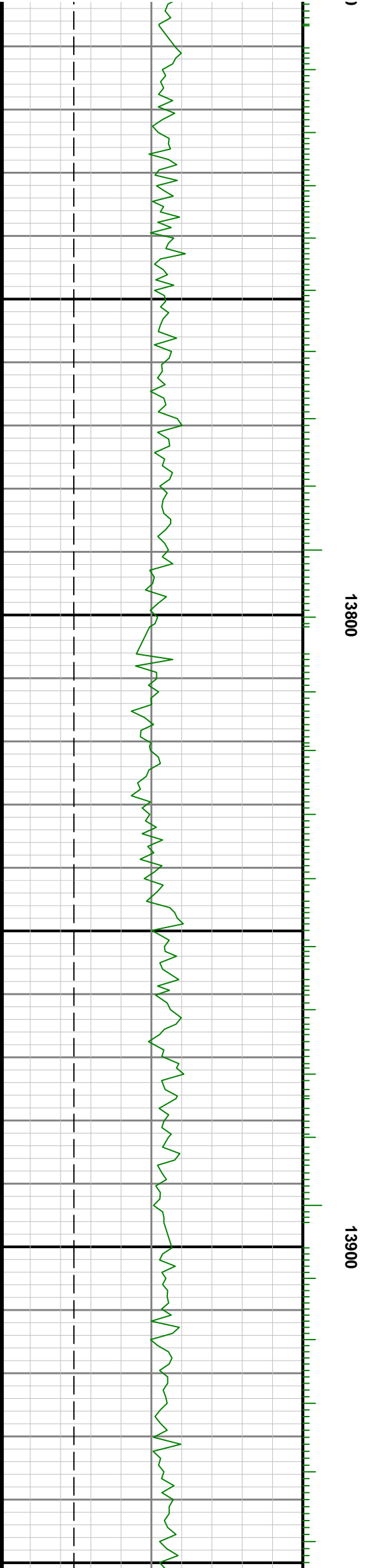
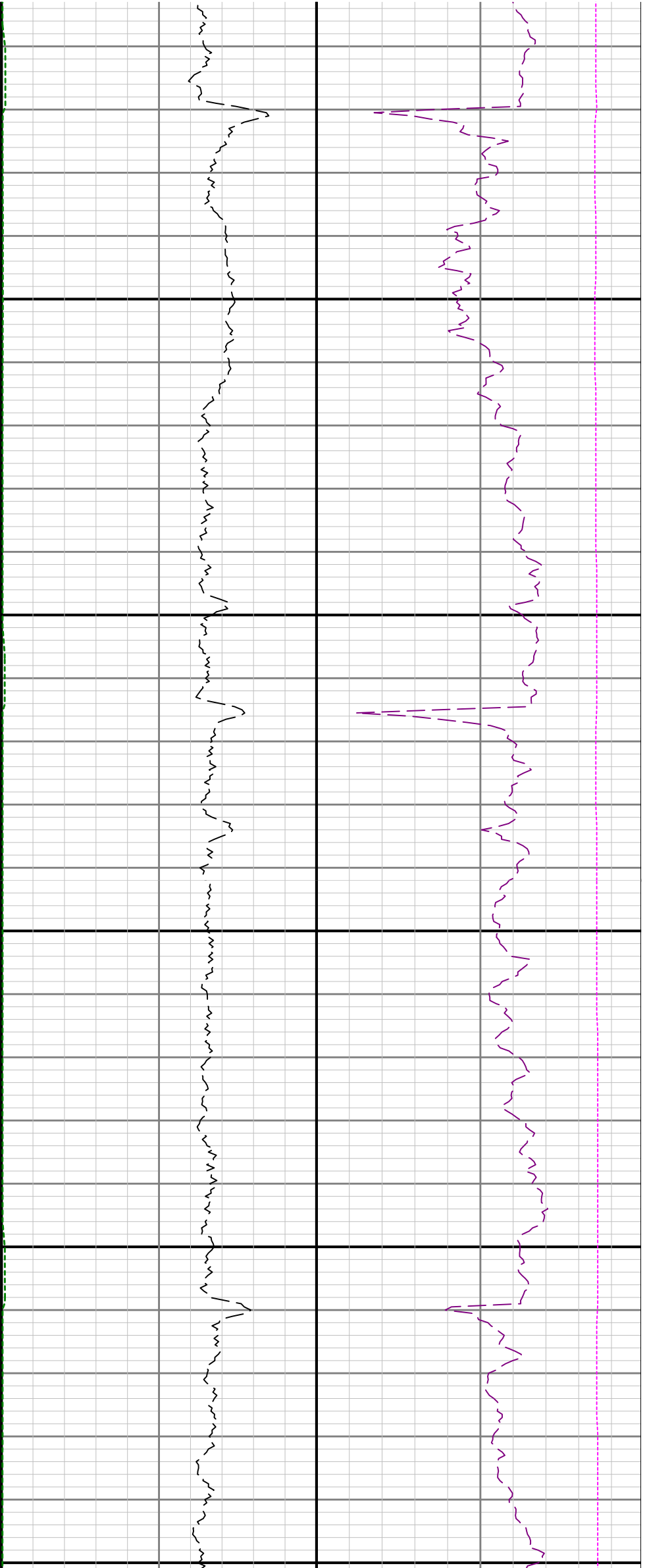


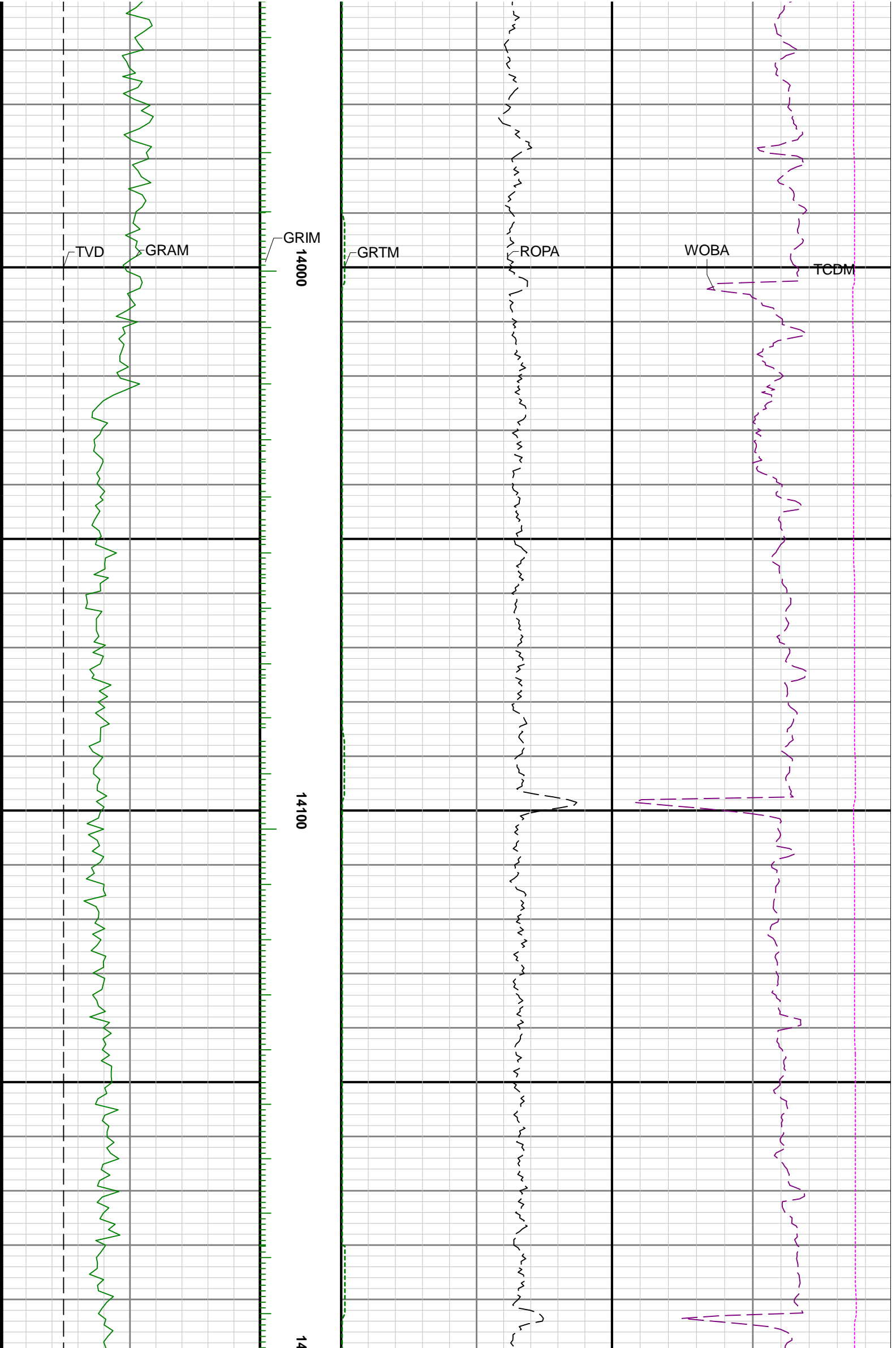
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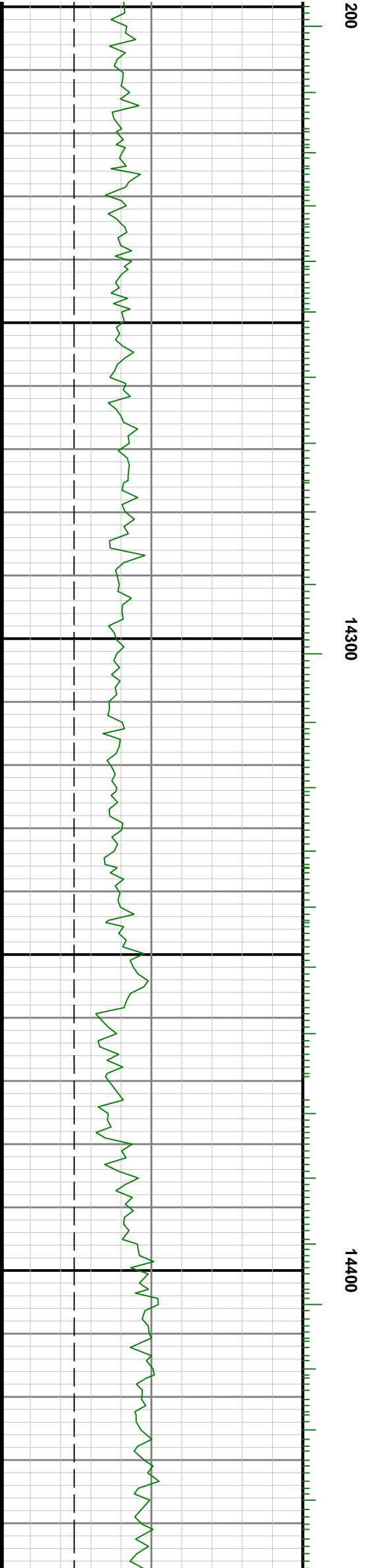
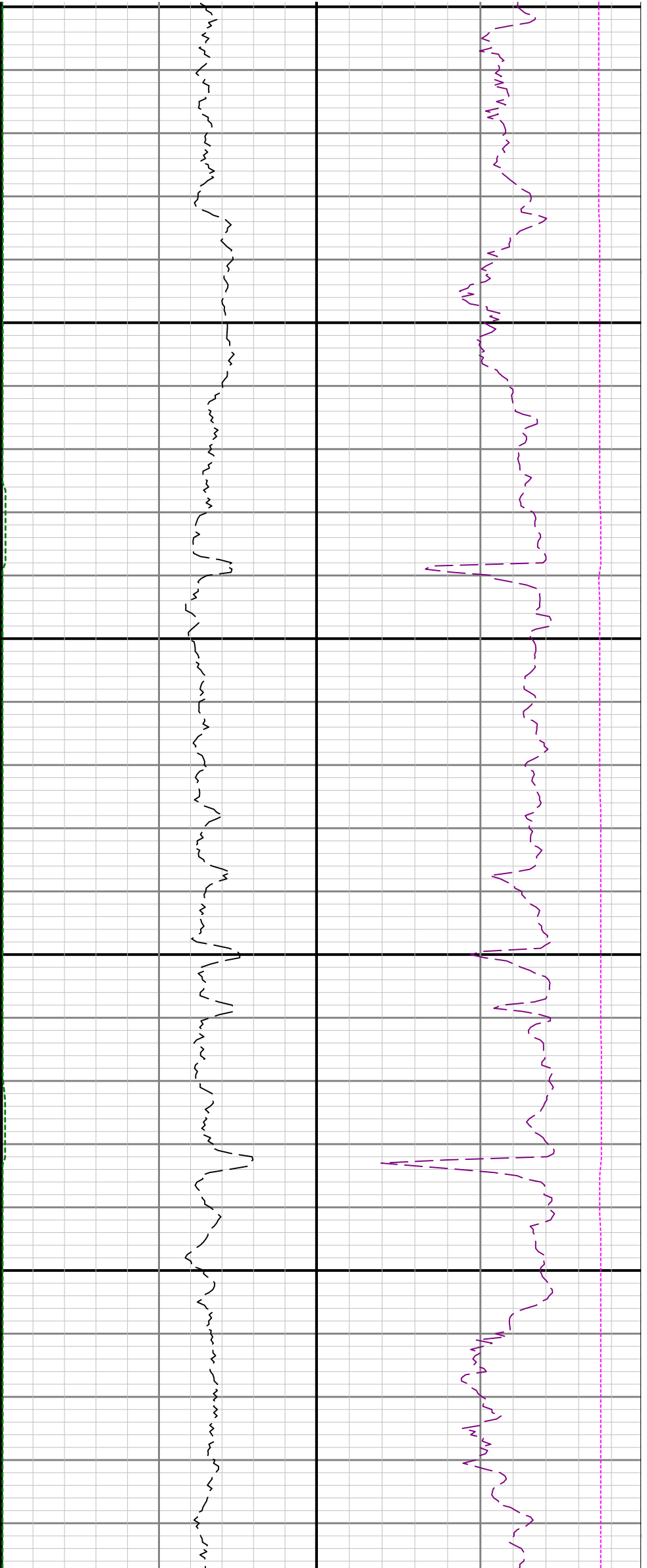
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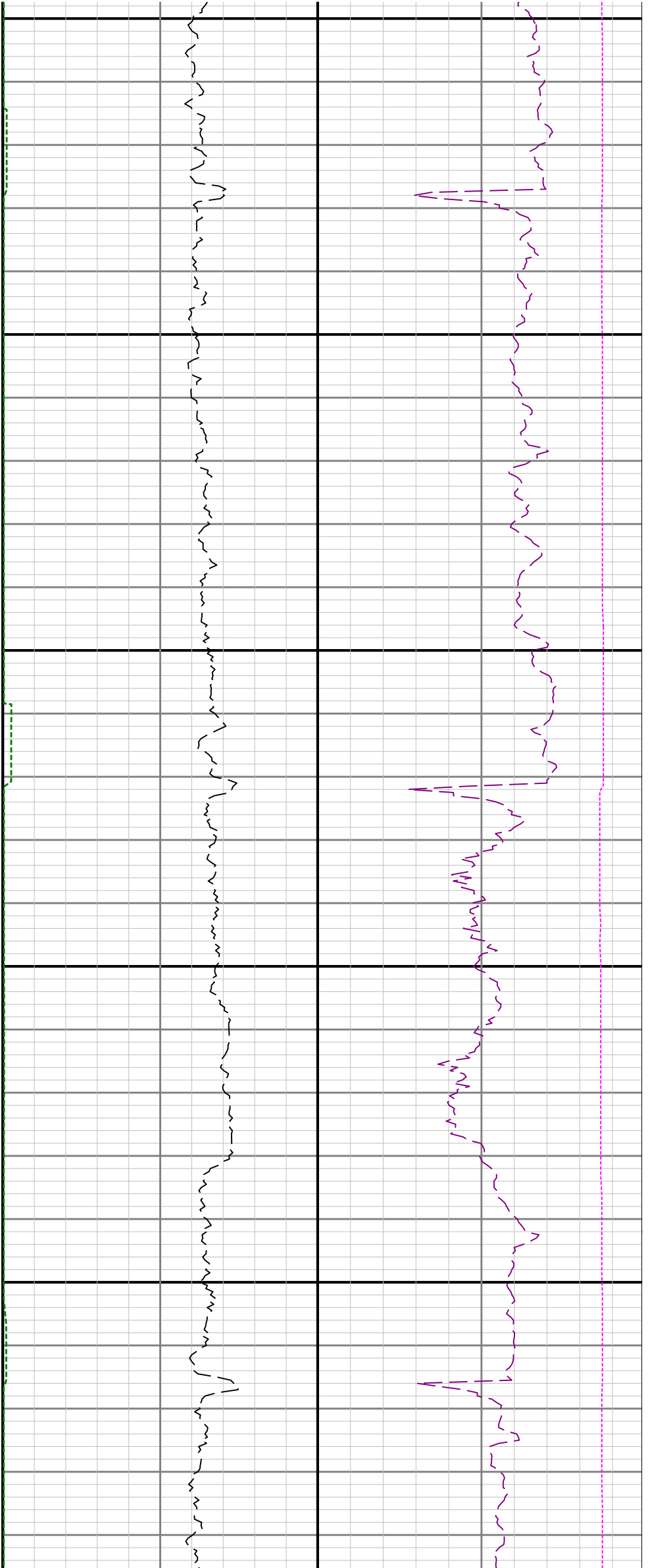
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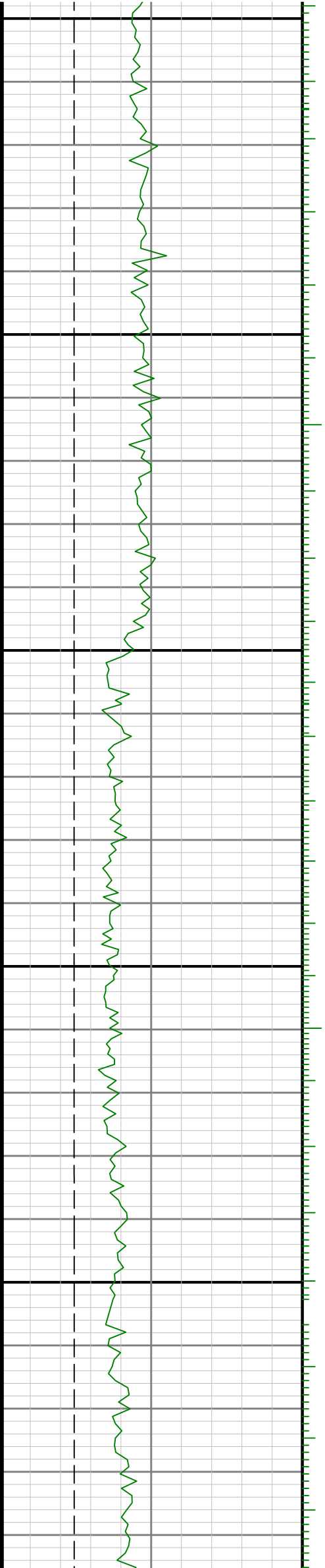


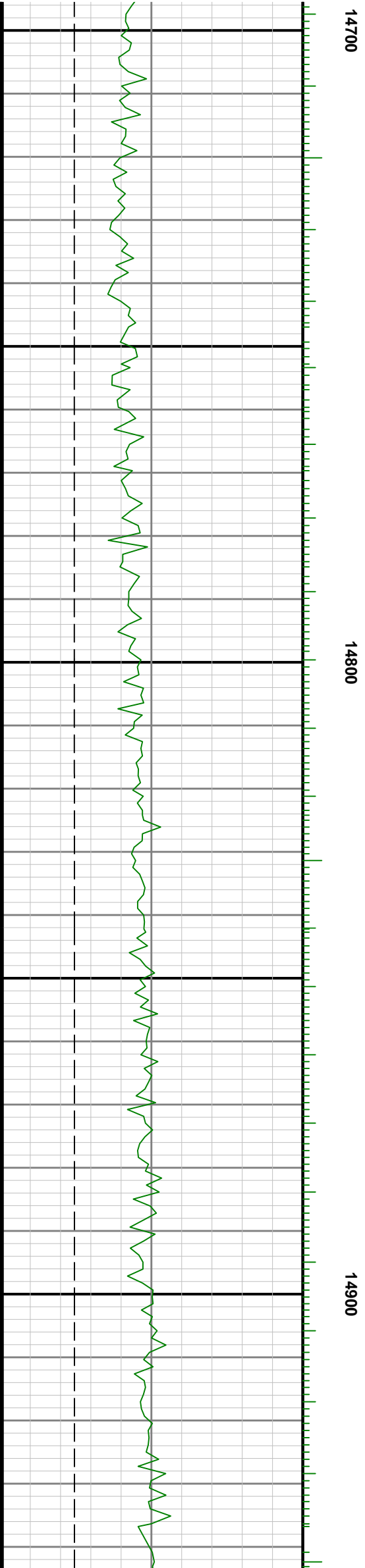
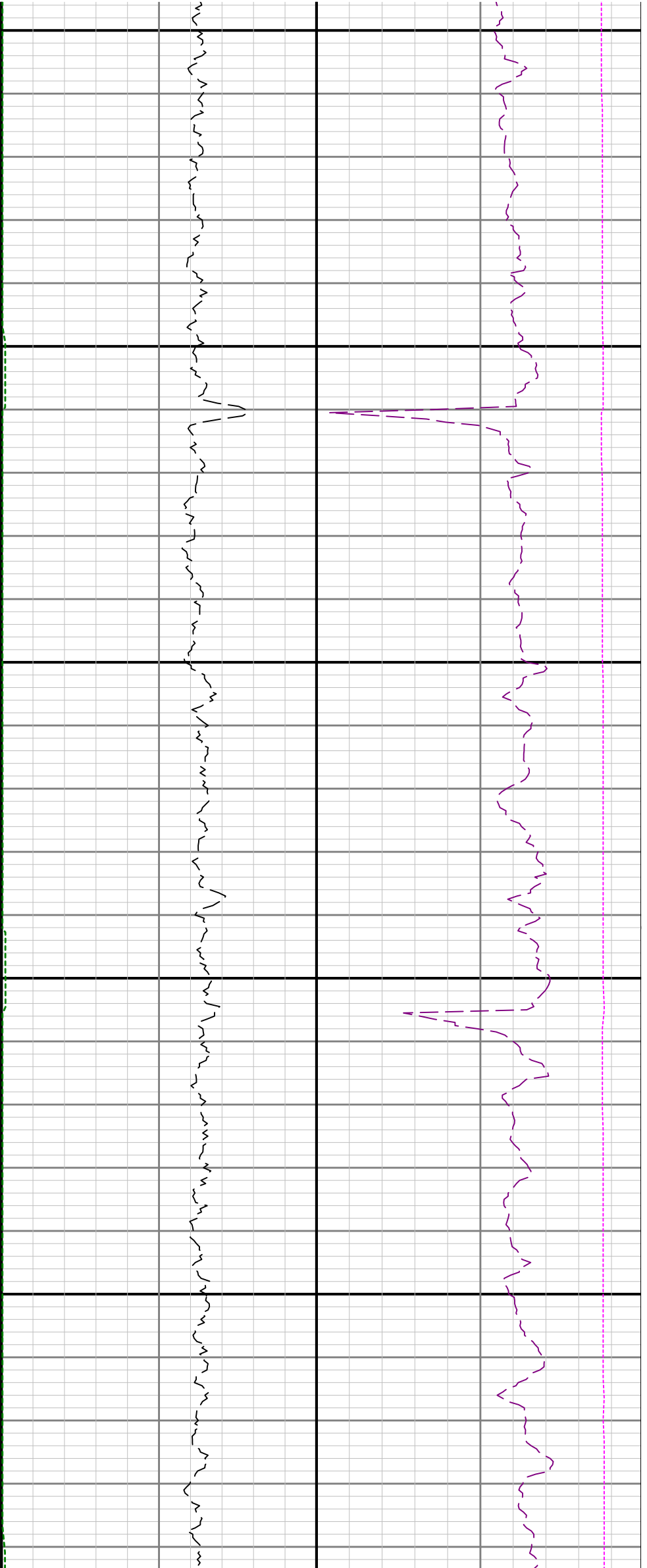


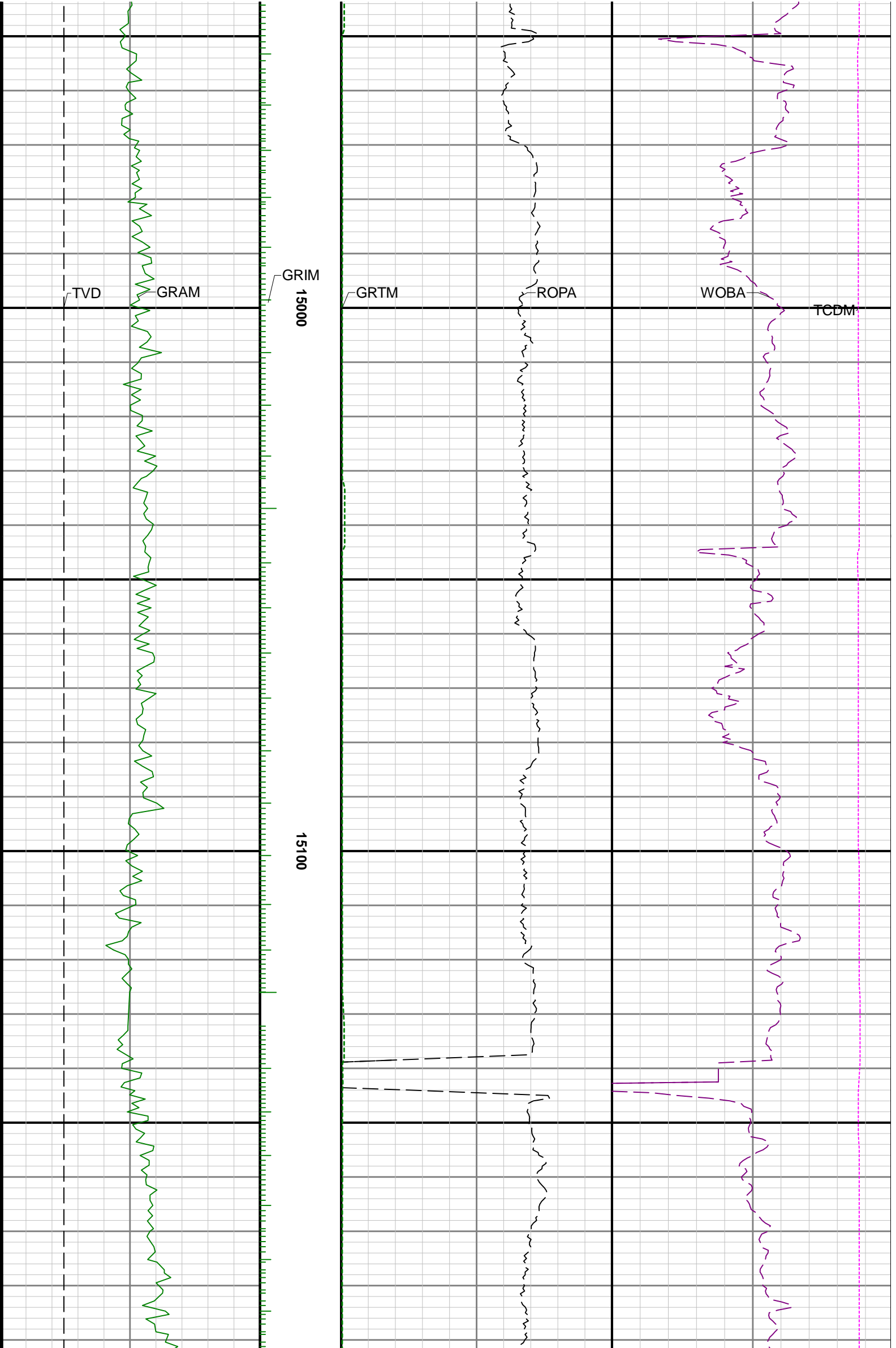


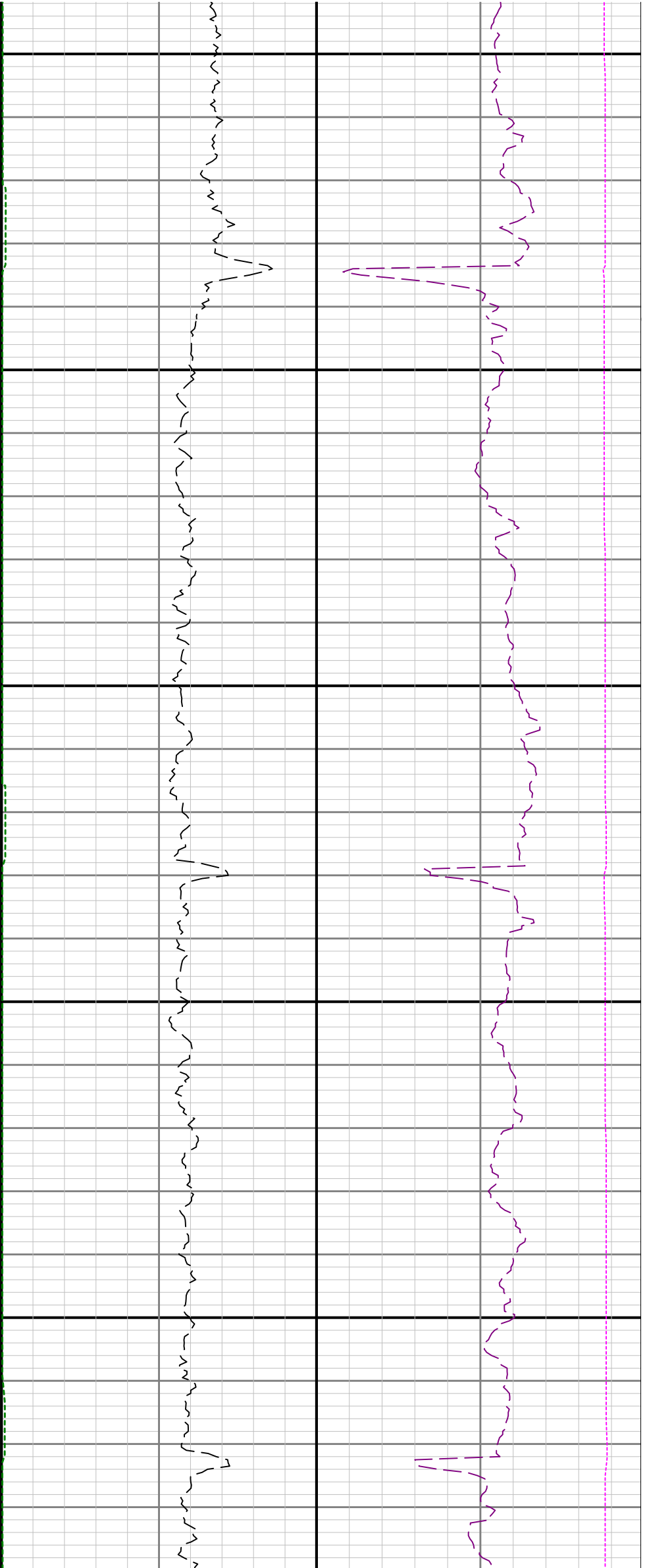
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14600





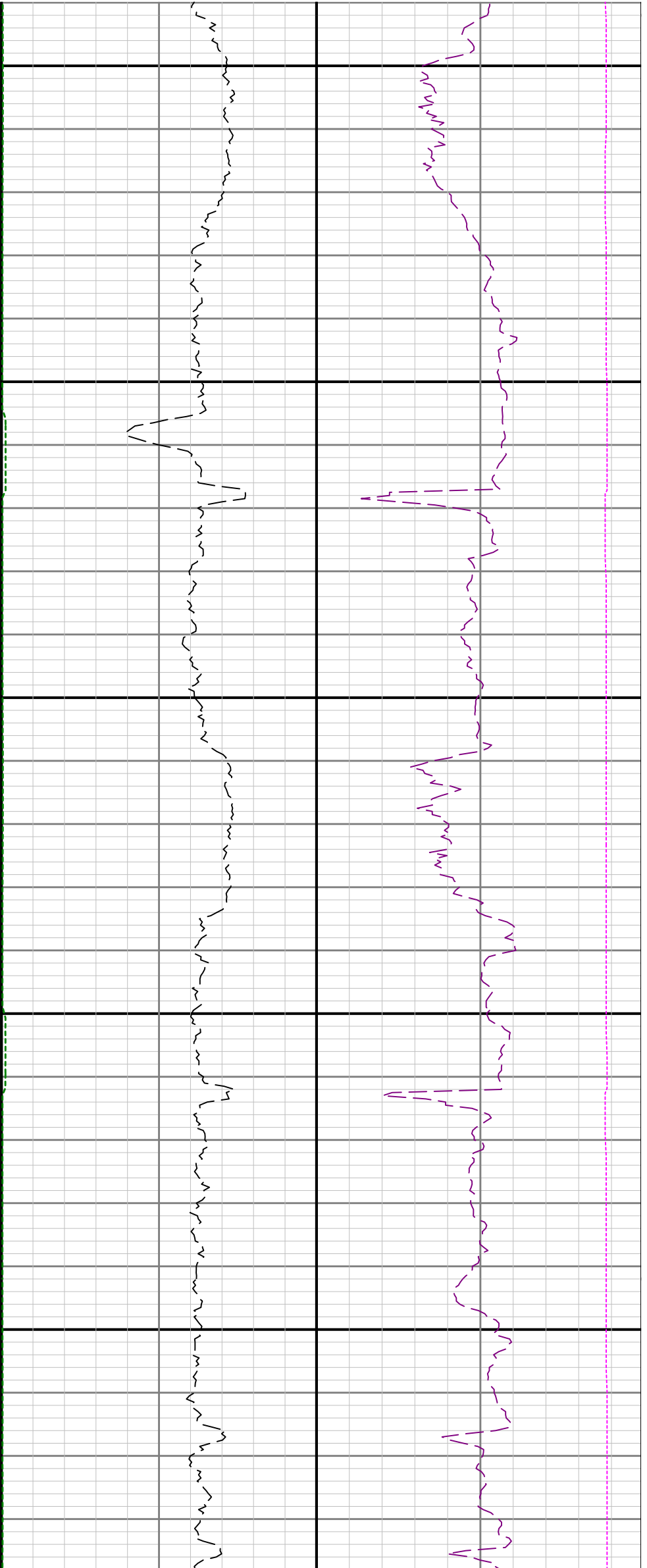




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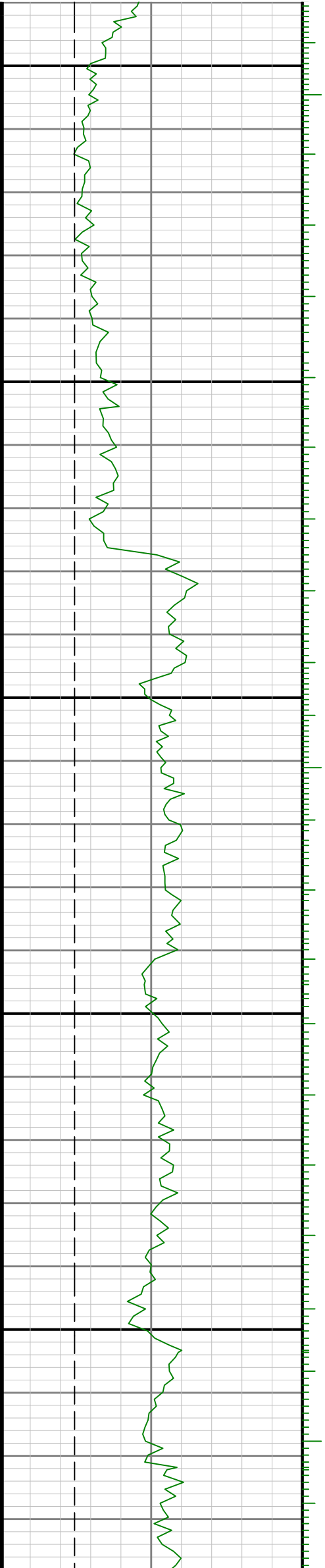
15300

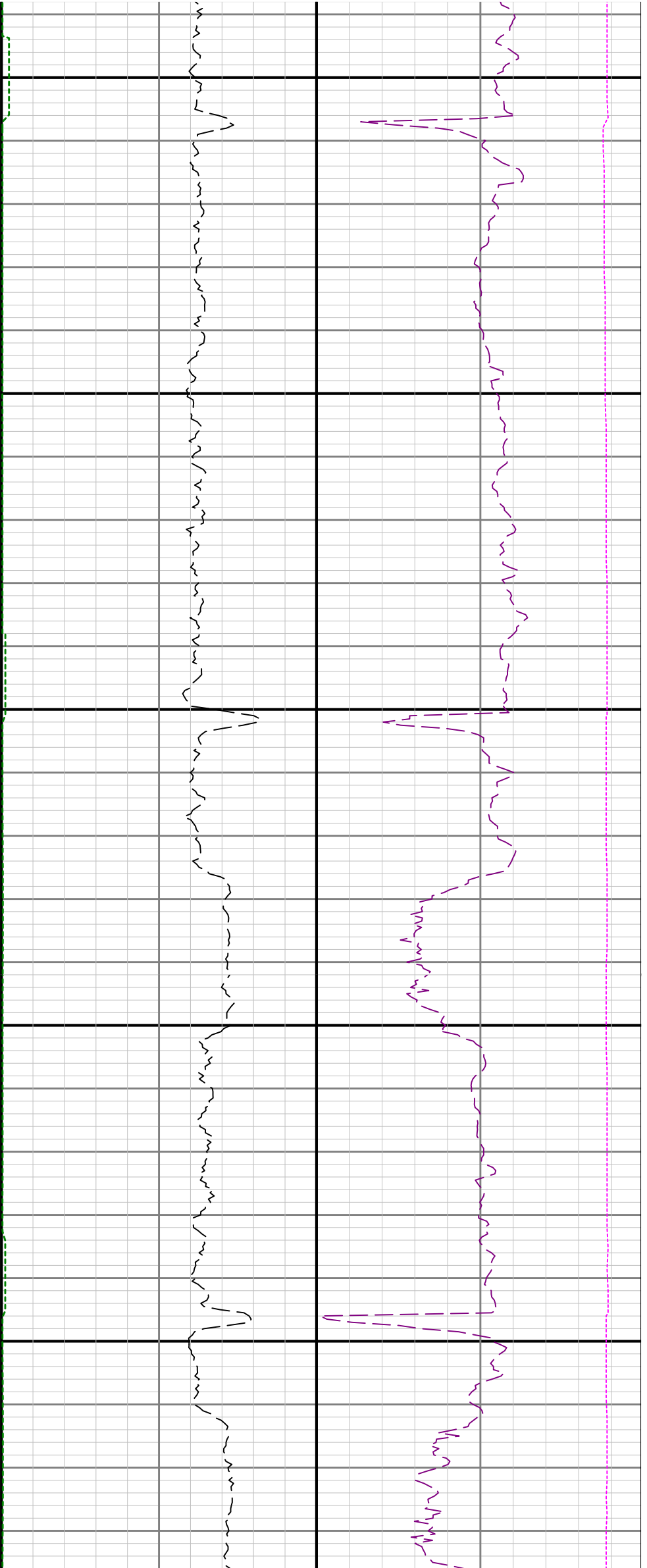
15400



15500

15600





15700

15800

15900

