



LWD MEMORY LOG

Gamma Ray

Company: Noble Energy

Well: Guttersten State DD30-755

Measured Depth	Field: Wattenberg
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Depth Reference:	
Country:	Weld
Country:	United States

Driller's Depth | State: Colorado

Status:	Surface Location:	Other Services
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Latitude: 40° 11' 25.368" N

API No:	05-123-48661-00	Directional
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Job ID: 110089489

SEC:	30	TWN:	3N	RGE:	63W
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Permanent Datum (P.D.):	Mean Sea Level	Elevation:	0.00 ft	Elev. KB:
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Log Measured From:	Rig Floor	Above P.D.:	4823.00 ft	Elev. G.I.:	47
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From: 2019-11-16	Drilled (ft)	Logged (ft)	Azi Reference North:	Grid	Dip Angle: (deg)	66.59
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10.	2019-11-17	10p.	1340.00	10p.	1340.00	Total Magnificent Field Strength: (111)	32061
Count:	2010.40.07	D-Max:	400050.00	D-Max:	400045.00	Magnificent North Component (111)	7004

Borah	Pacard
Casim	Pacard

Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
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13.500	30.00	1940.00	9.625	36.00	30.00	1930.00
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8.500	1940.00	16659.00			

[illegible]

Mind Record	Deviation Record

Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)
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Oil Based Mud	1940.00	16659.00	8.500	14719.00	0.58 326.18	90.39 0.73
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Conformation of system	Conformational version	Order
Cadence	BT 5 A	Pic: H&D 321

DeliverableGen 5.4.8627.1 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
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	8.500	PDC	3.00	AutoTrak Curve	1940.00	16645.00	1940.00	16659.00	2019-11-14 12:26	2019-11-16 06:21	38.23

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Tien Bui	2019-11-13	2019-11-17						

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+ (%)
2019-11-13 15:07	1	1940.00	Oil Based Mud	9.2	10	N/A	19.5	76.8/23.2	Active Pit	30000	0.00
2019-11-15 09:14	1	7926.00	Oil Based Mud	9.3	12	N/A	18.5	76.7/23.3	Active Pit	32200	0.00
2019-11-16 06:00	1	16200.00	Oil Based Mud	9.5	16	N/A	17.0	76.8/23.2	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	14316022	Near Bit VSS	5.93	6.78	7.000	4.330
1	AutoTrak Curve Steering Unit	14316022	Near Bit Inclination	5.93	6.78	7.000	4.330
1	AutoTrak Curve MWD	14371880	Gamma (single)	2.77	12.95	6.938	3.250

1	AutoTrak Curve MWD	14371880	Gamma (single)	12.27	22.45	6.938	3.250
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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

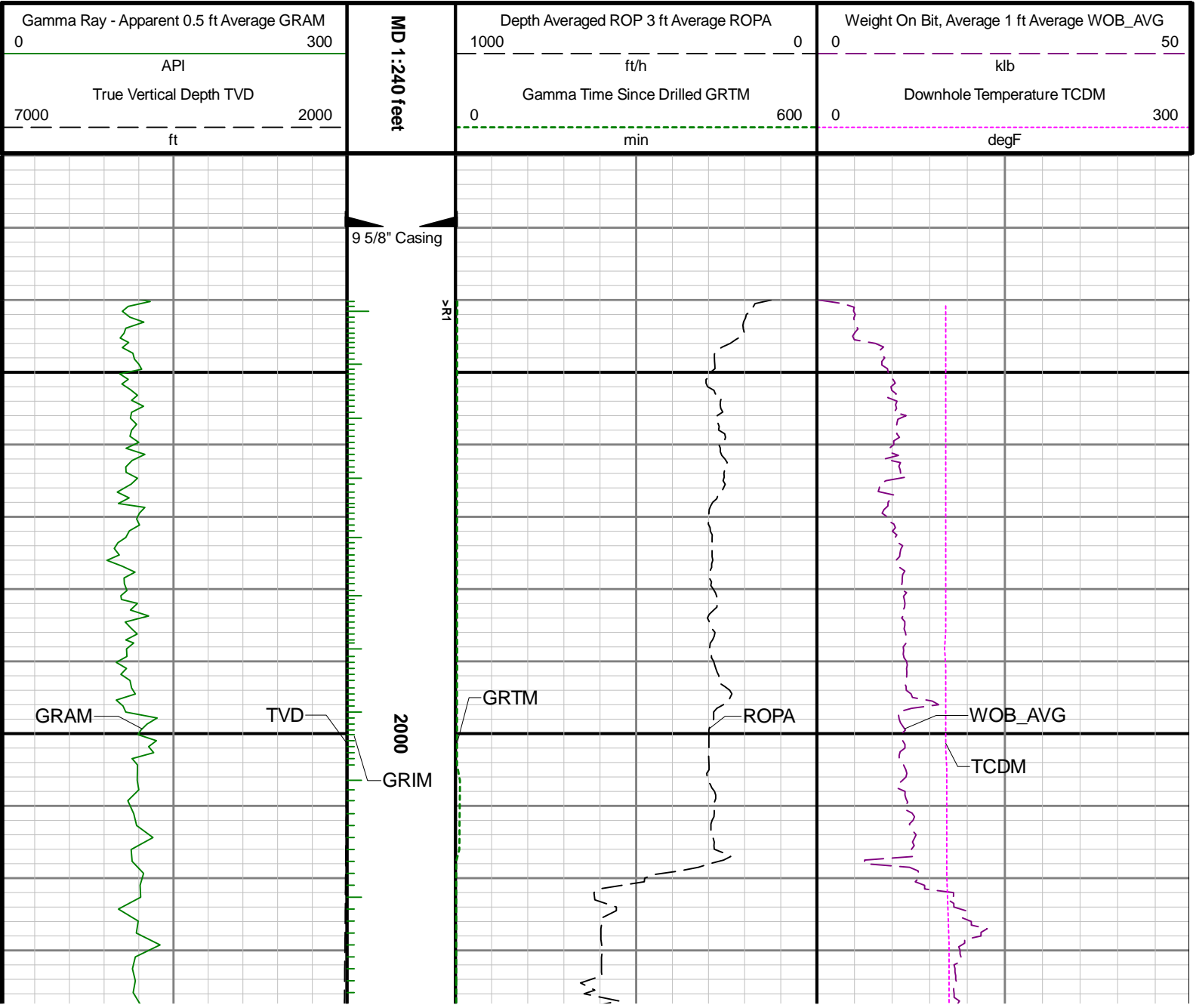
- 1 Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
- 2 Baker Hughes LWD Run 1 utilized 6 ¾ inch NaviGamma service (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 1940 to 16659 feet MD (1940 to 6702 feet TVD).
- 3 The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

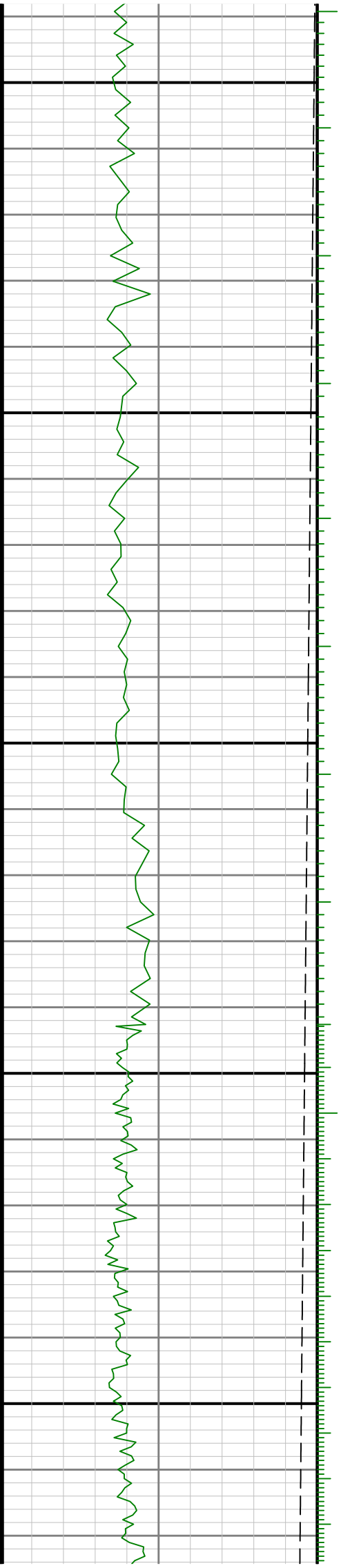
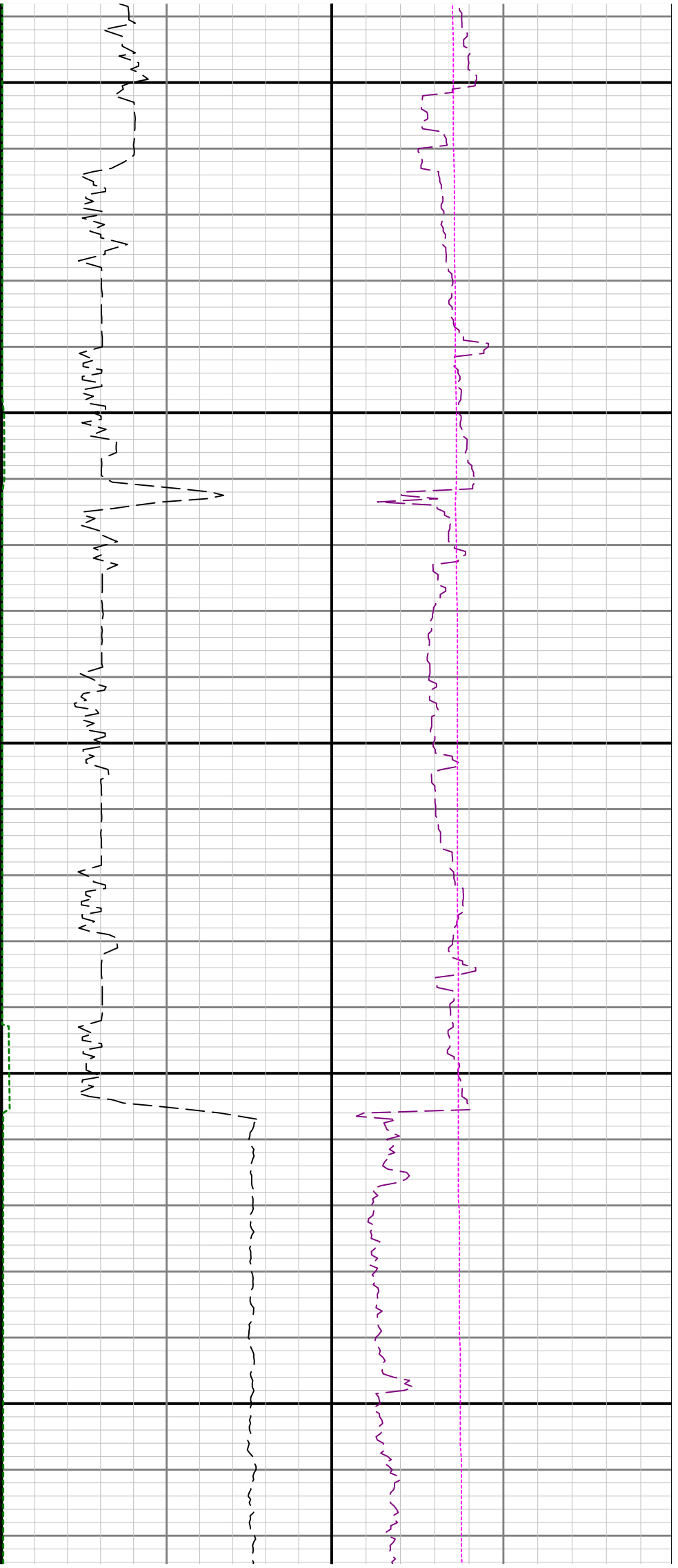
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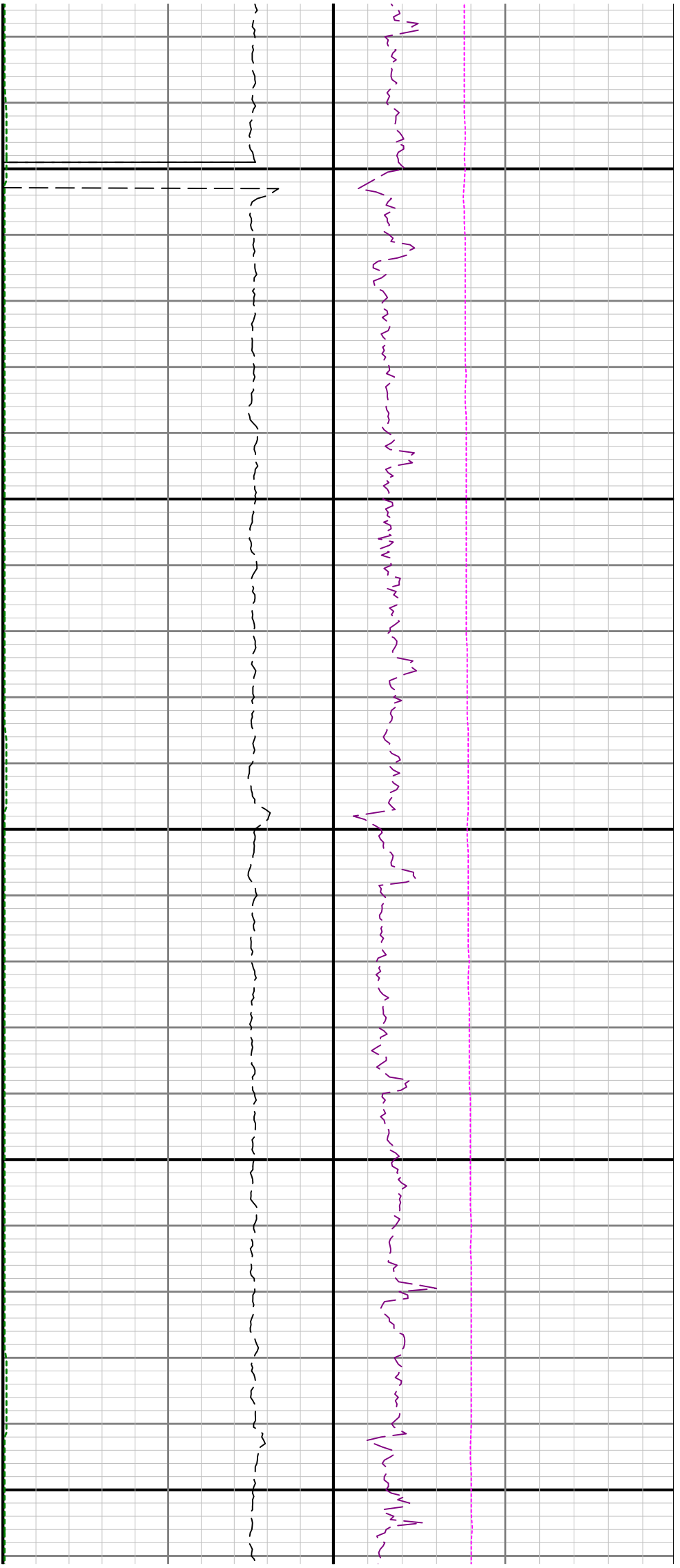
Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	16645.00	8.500	1	The interval from 16645 to 16659 feet MD (6702 feet TVD) was not logged due to sensor to bit offset at well TD.

Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOB_AVG	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



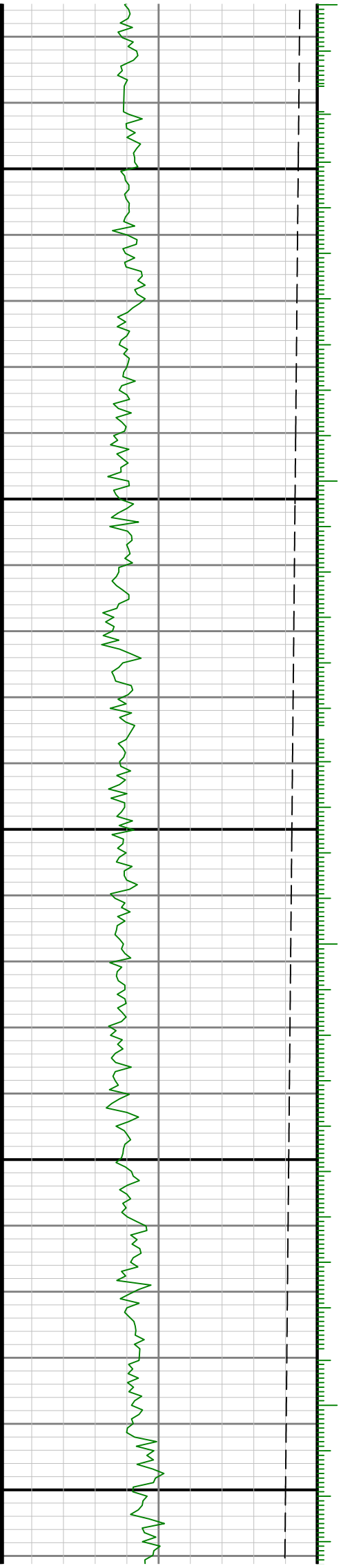


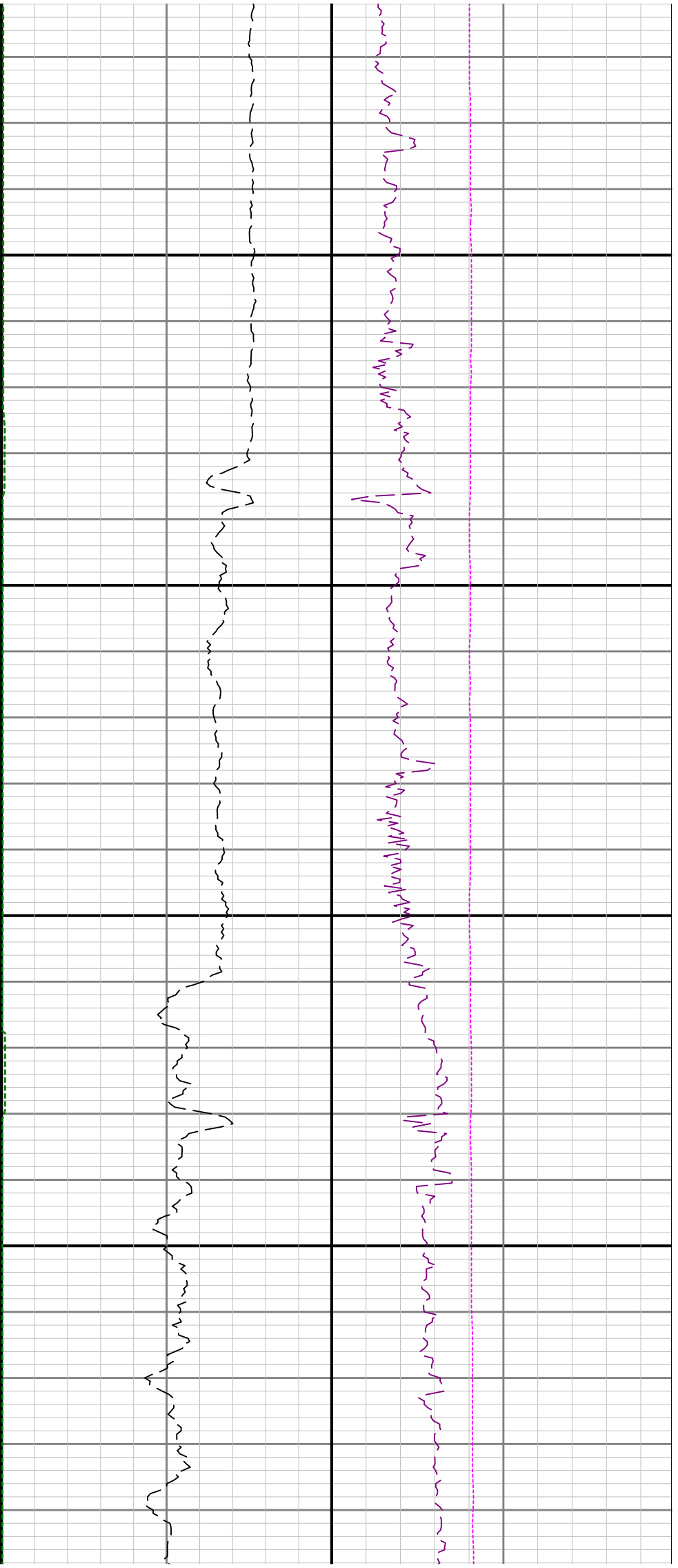


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2400

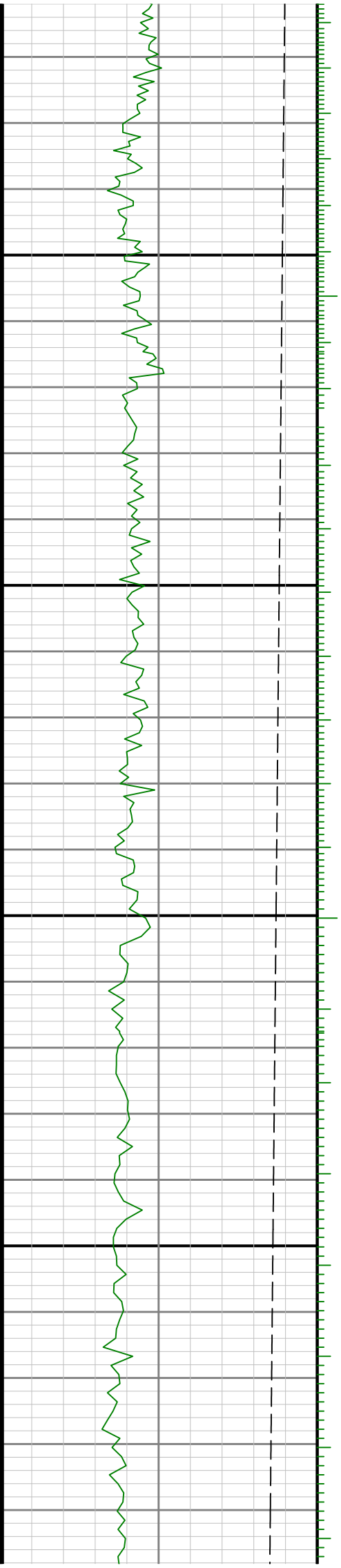
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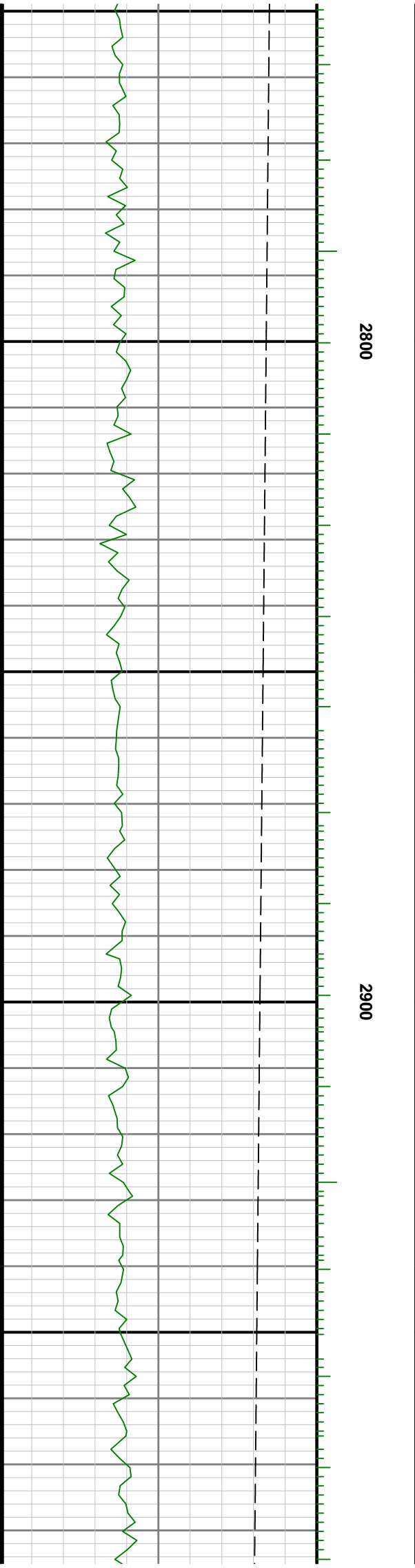
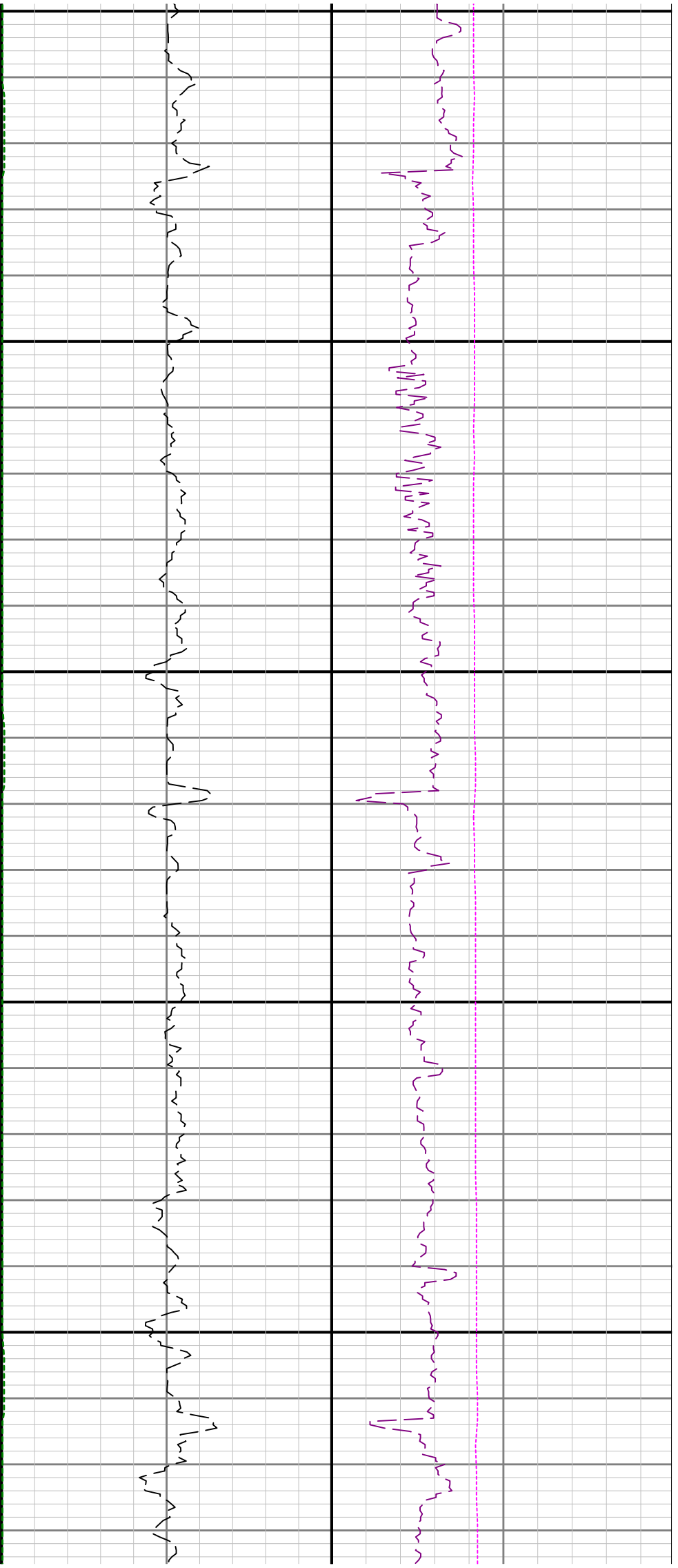


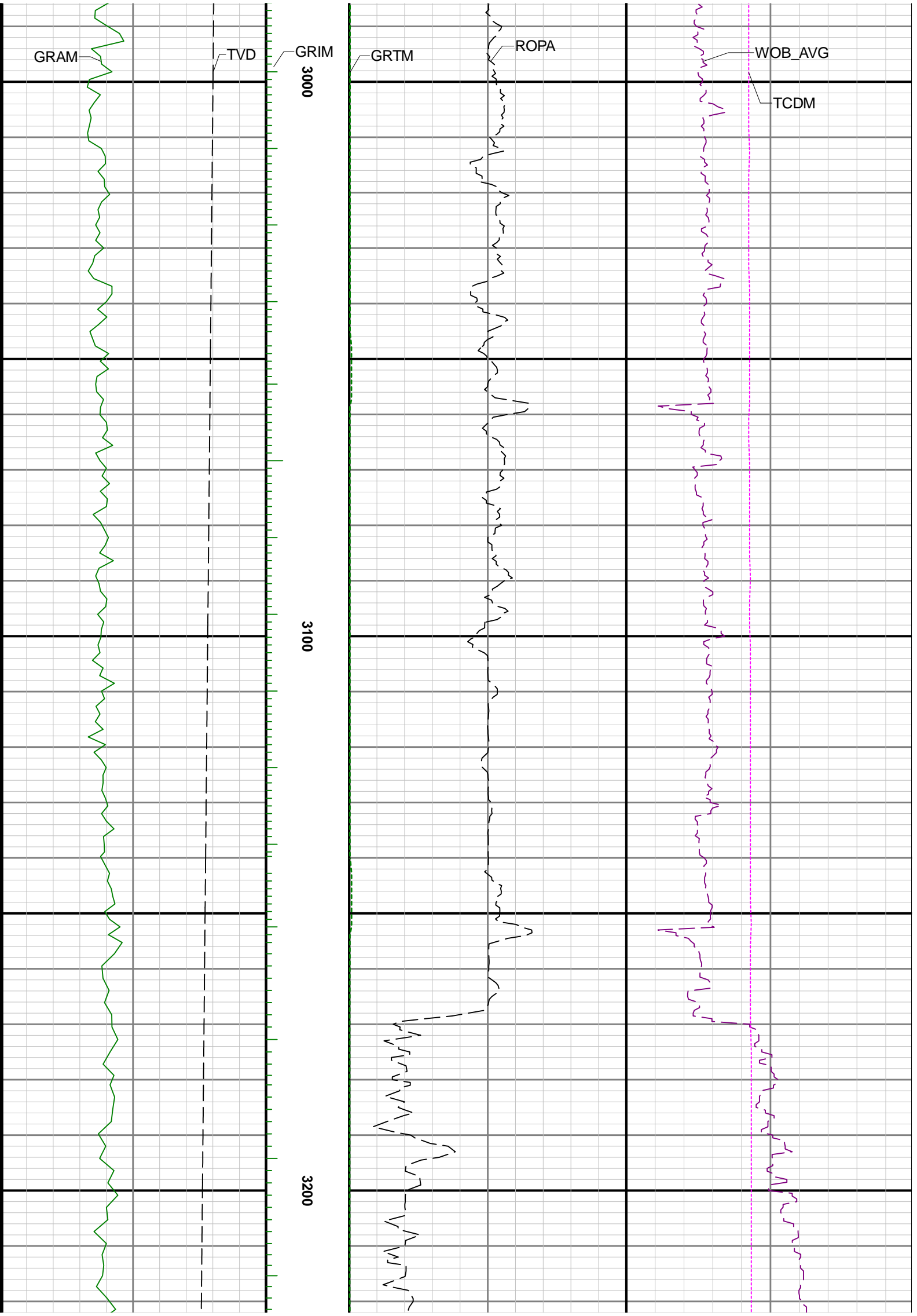


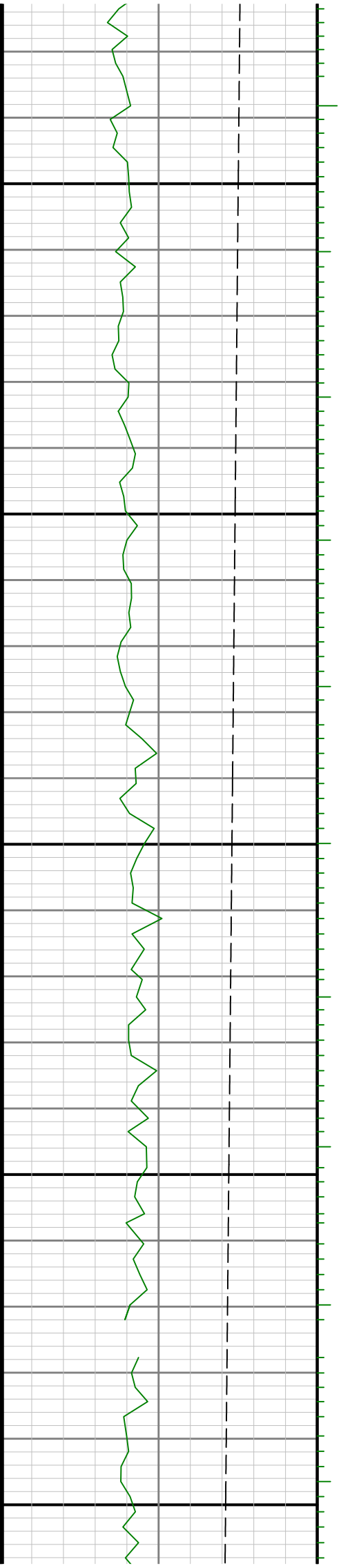
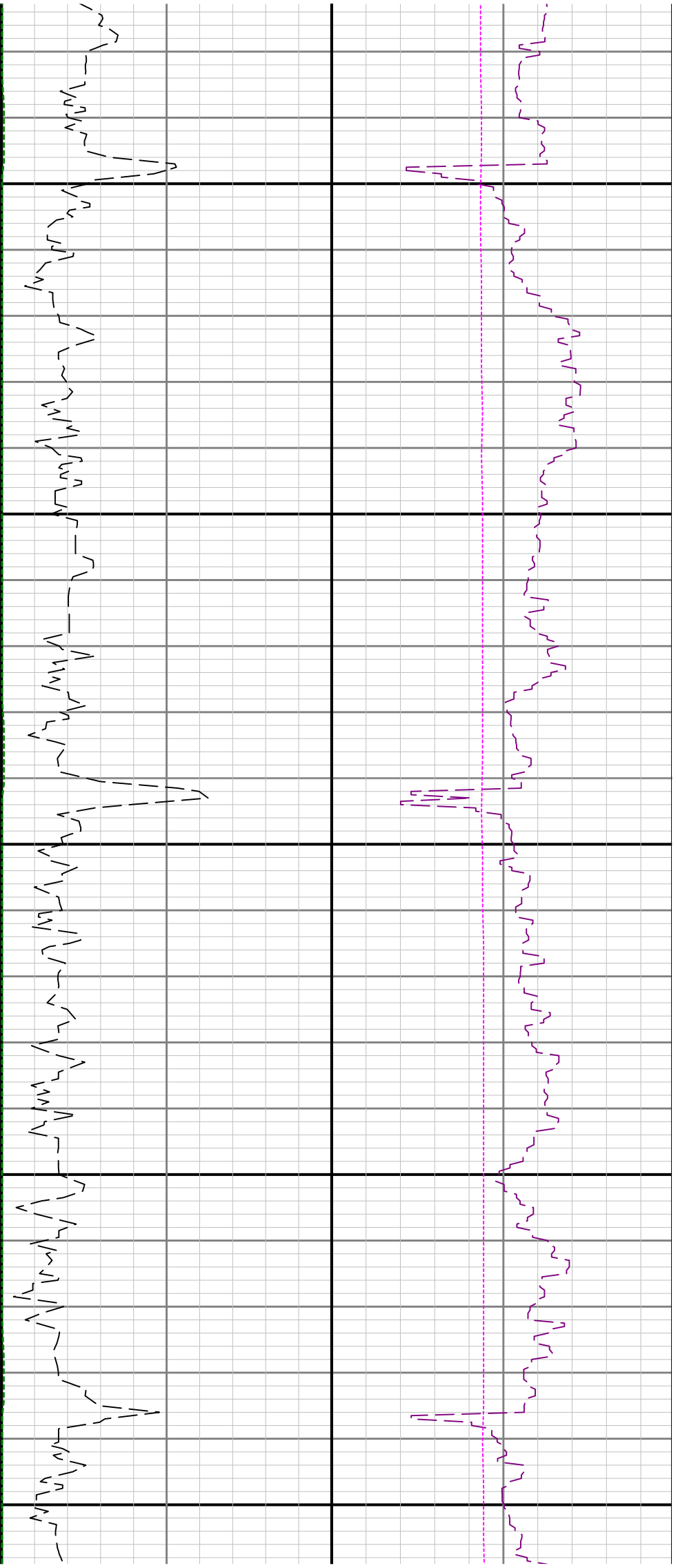
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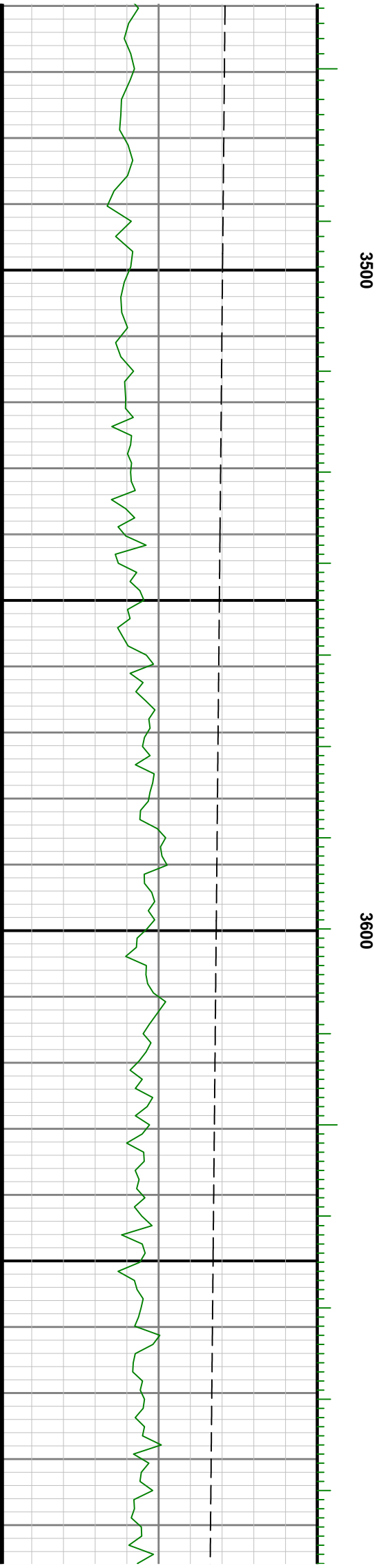
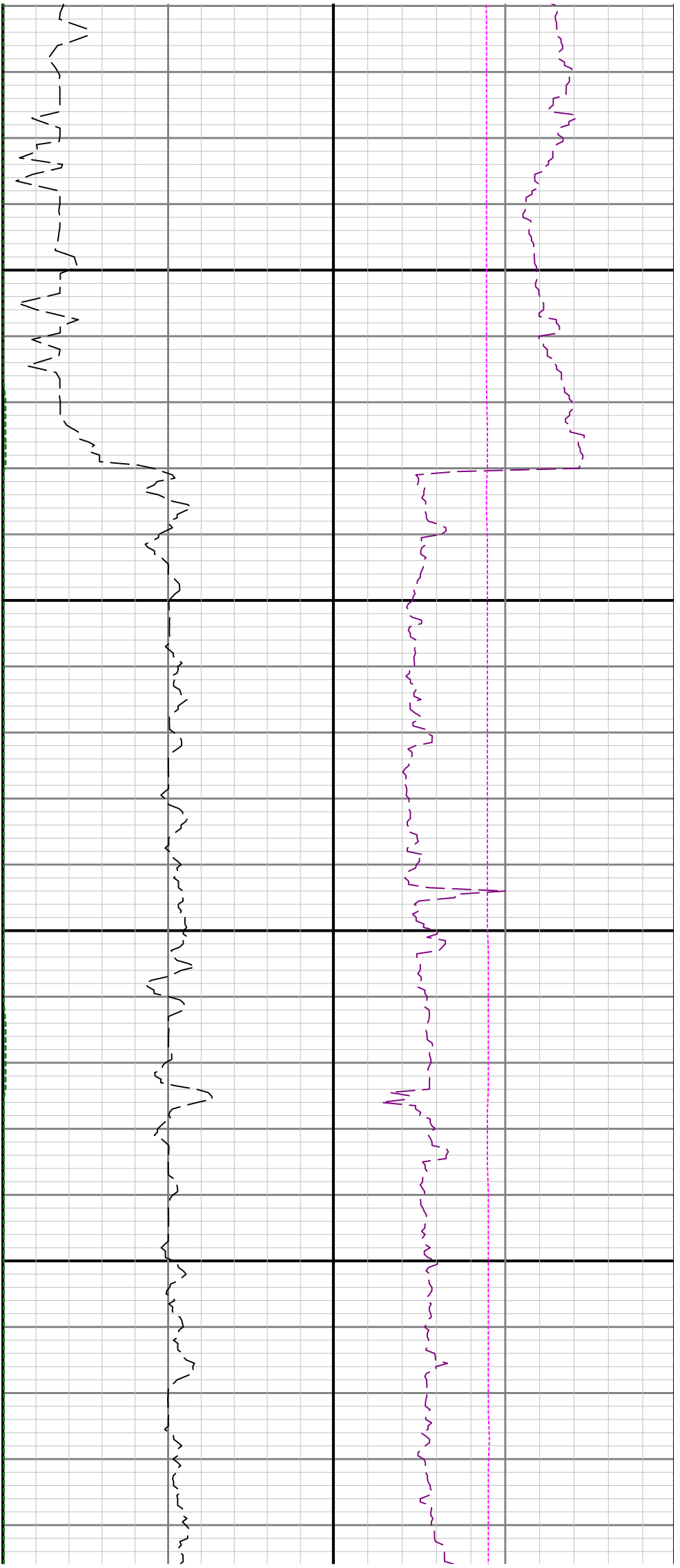
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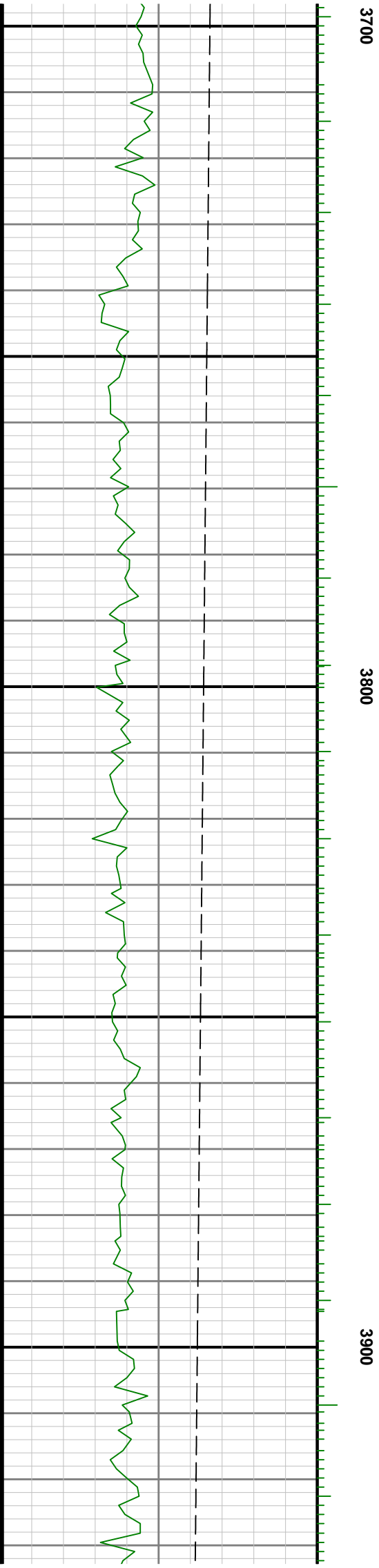
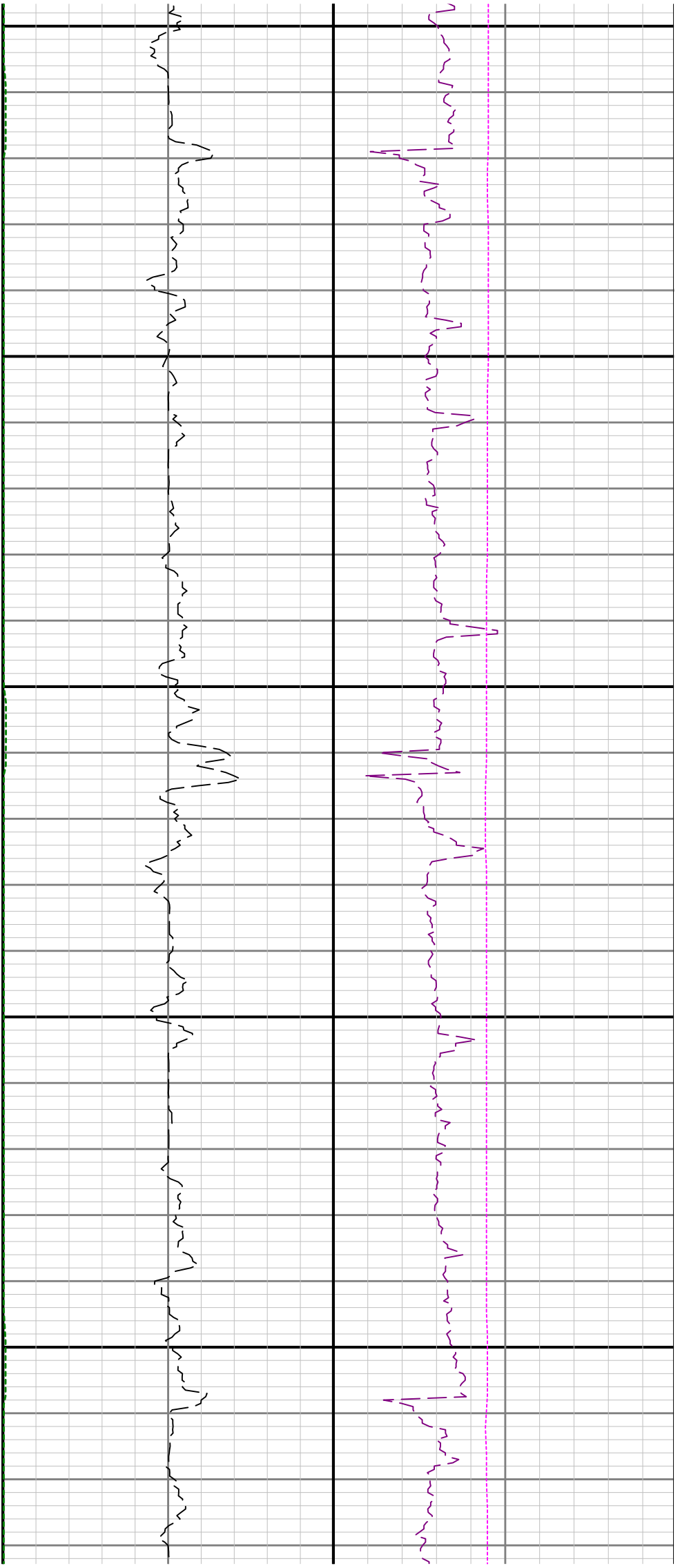


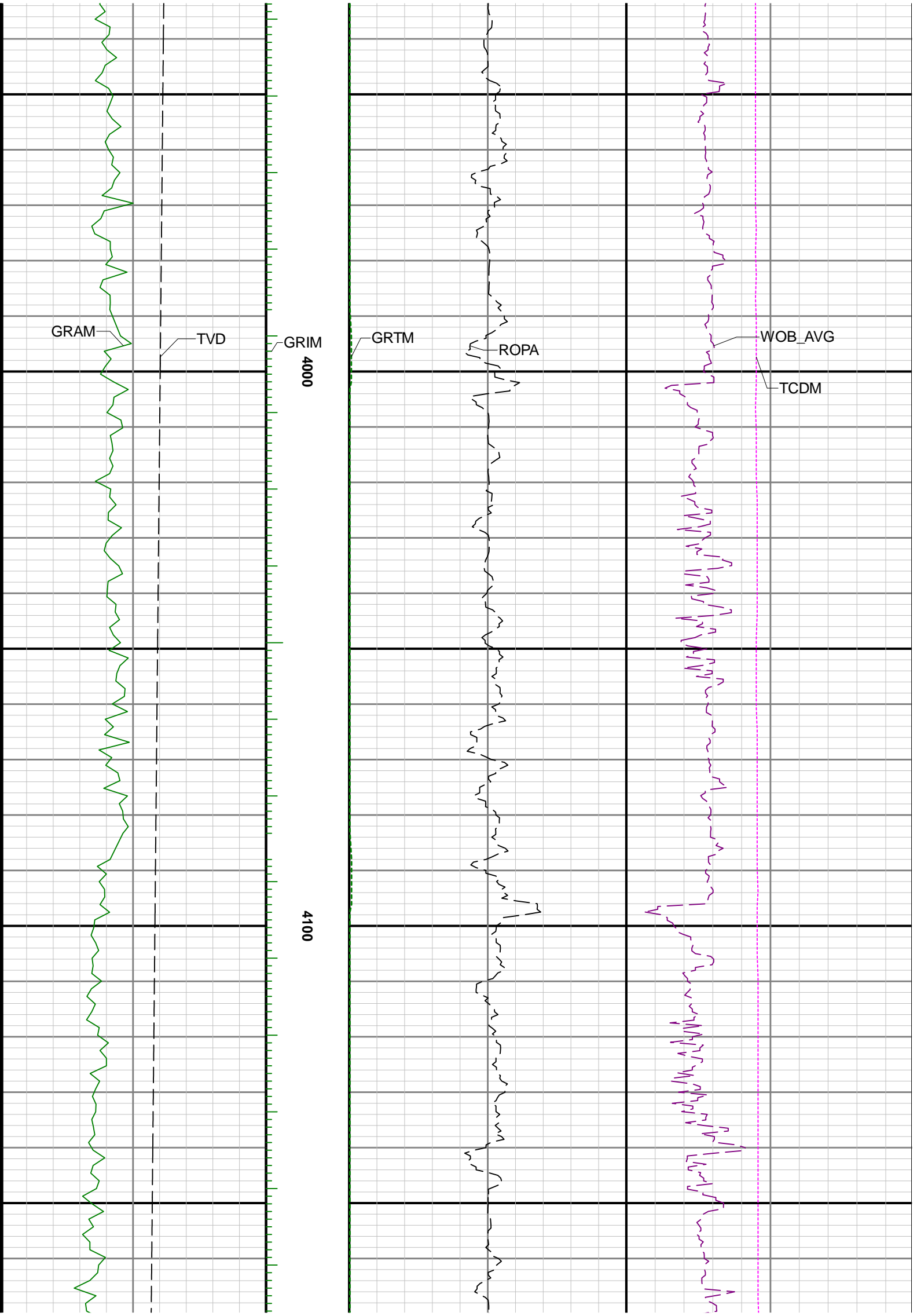


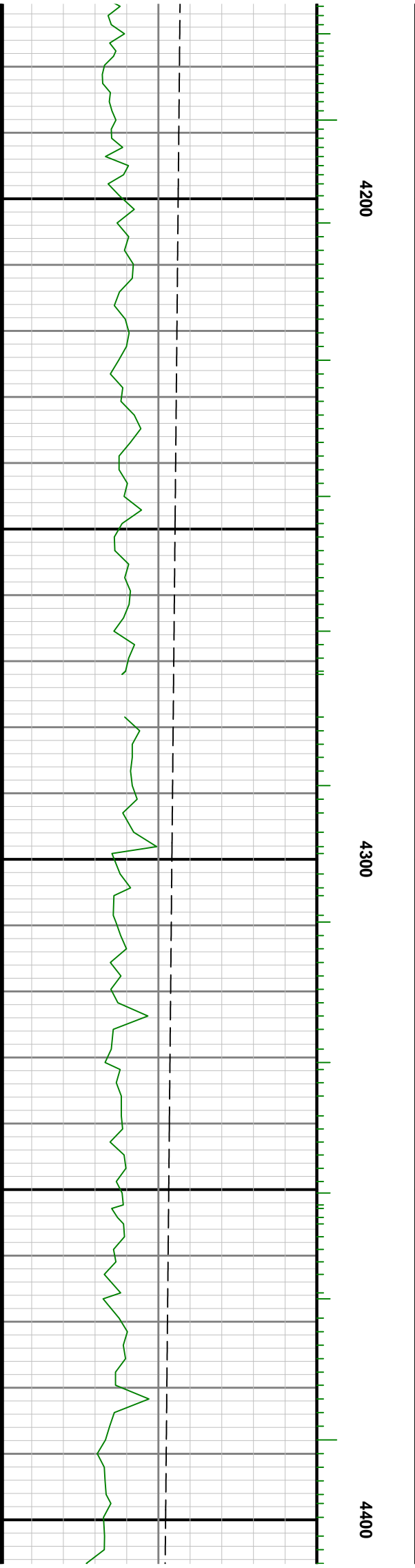
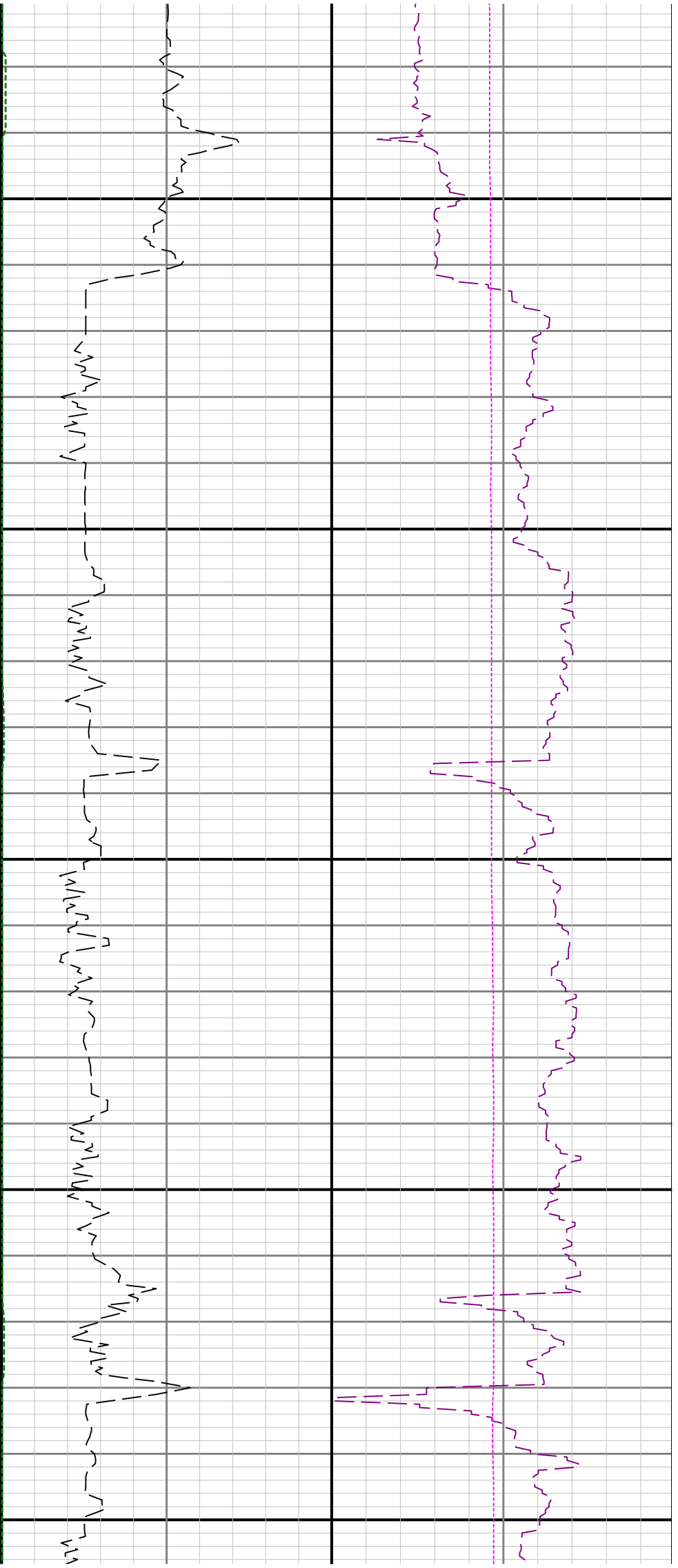


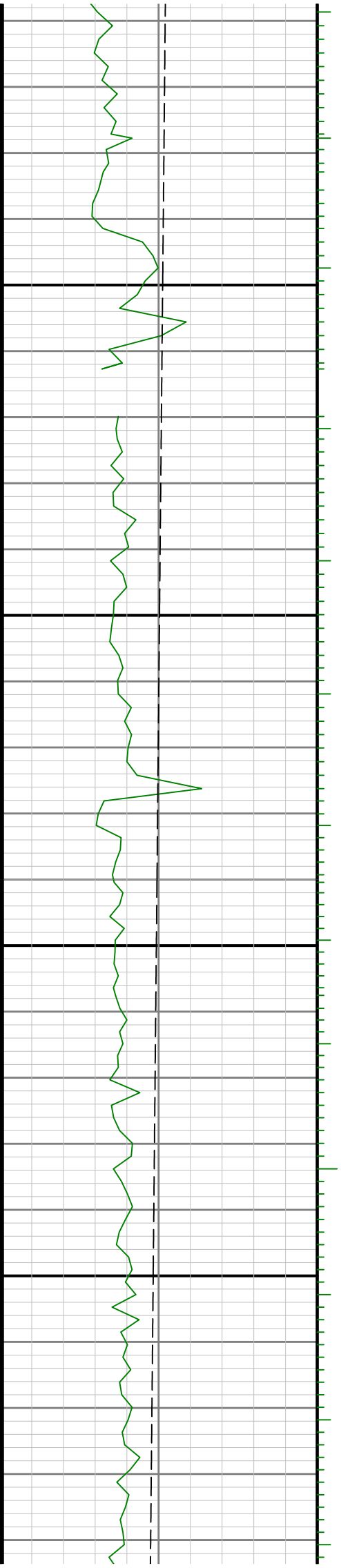
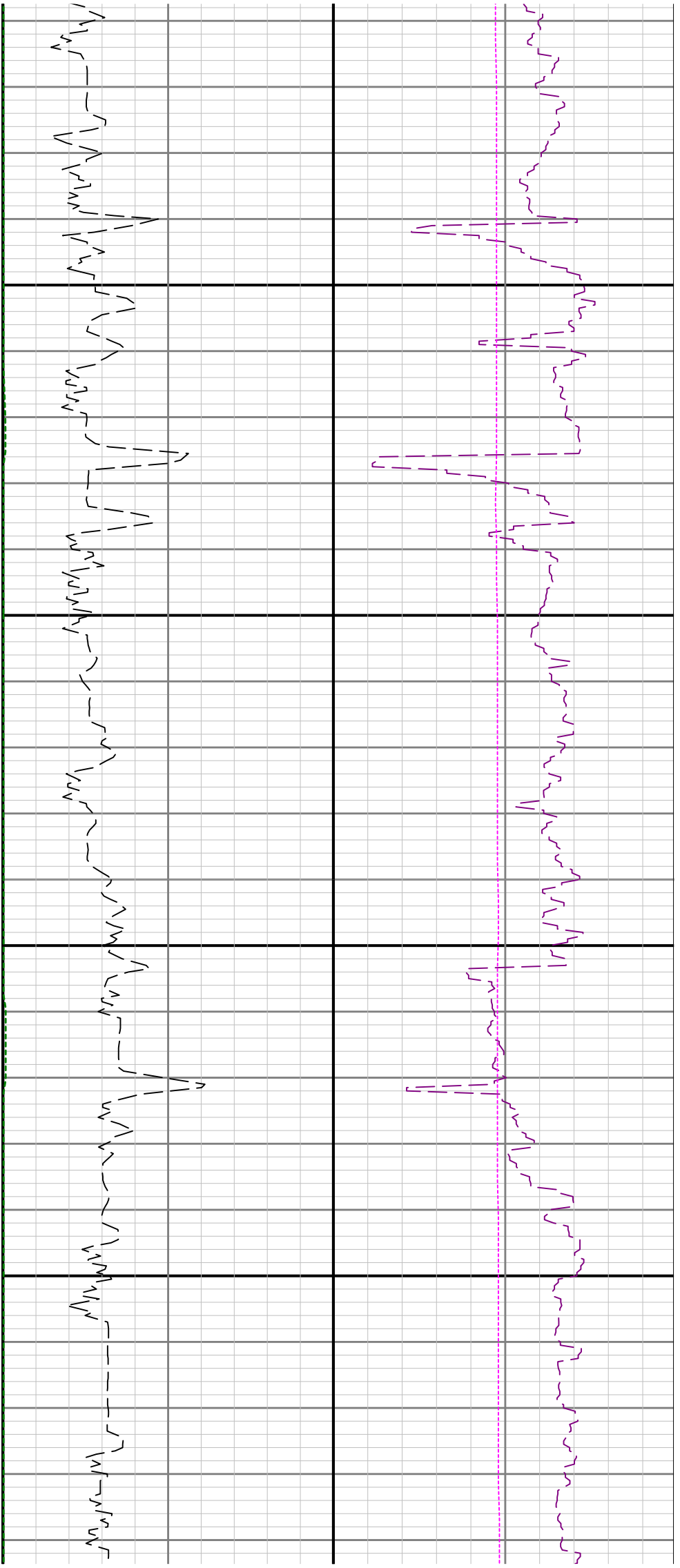


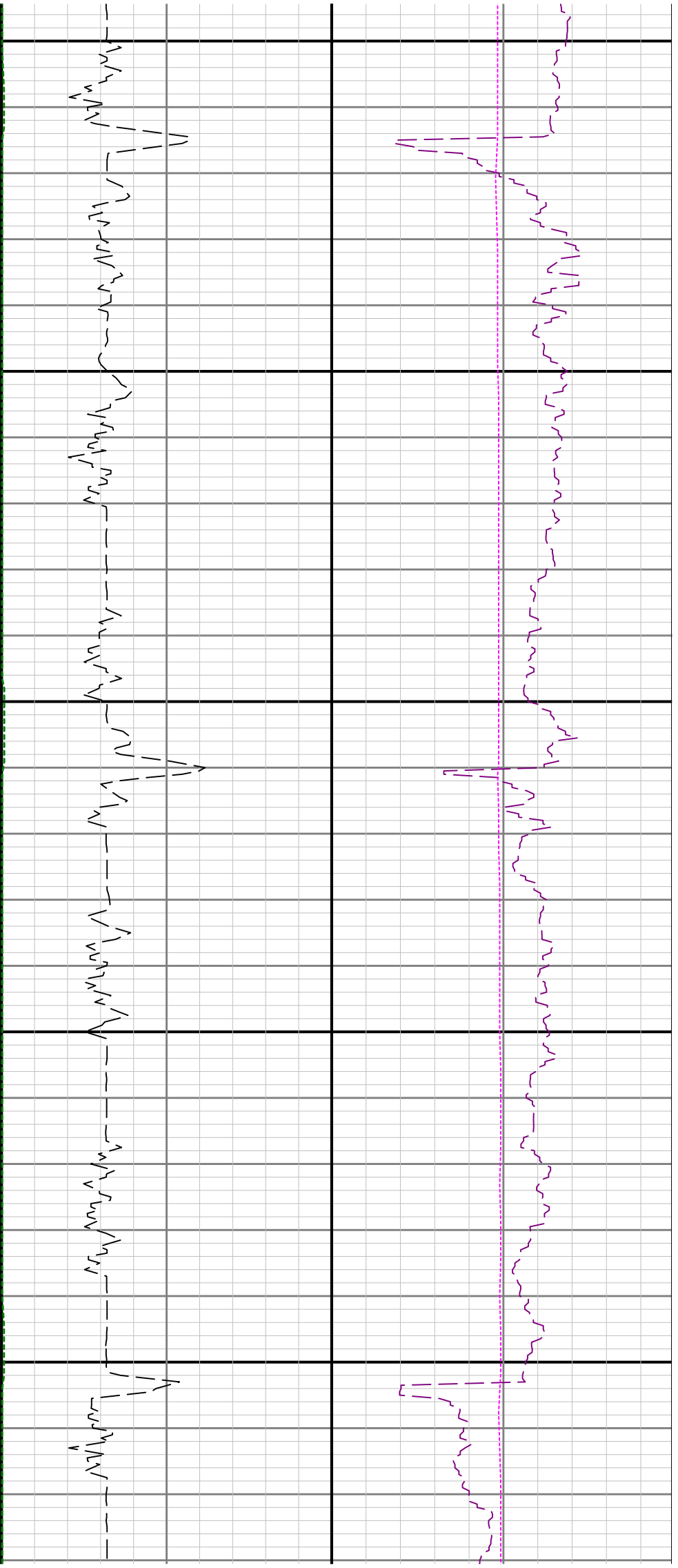






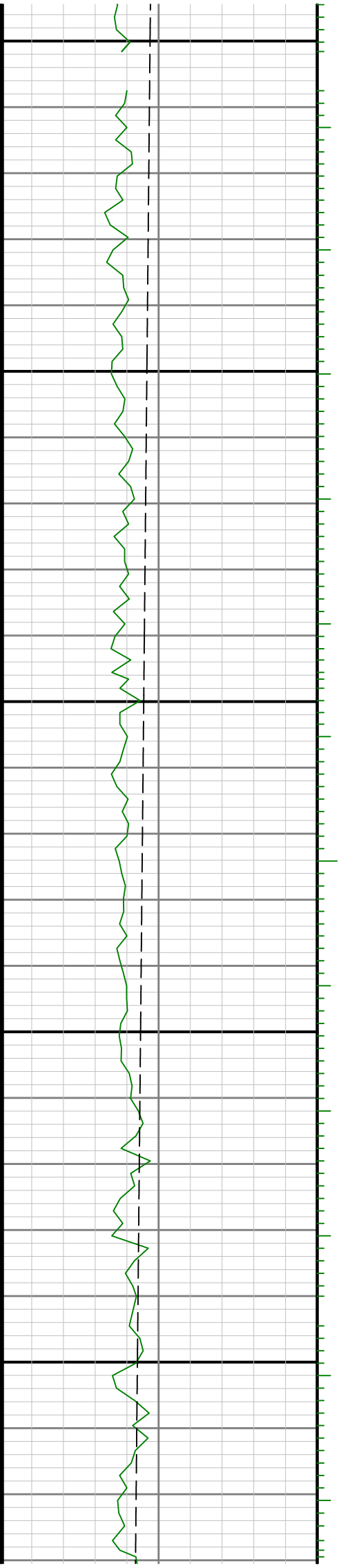


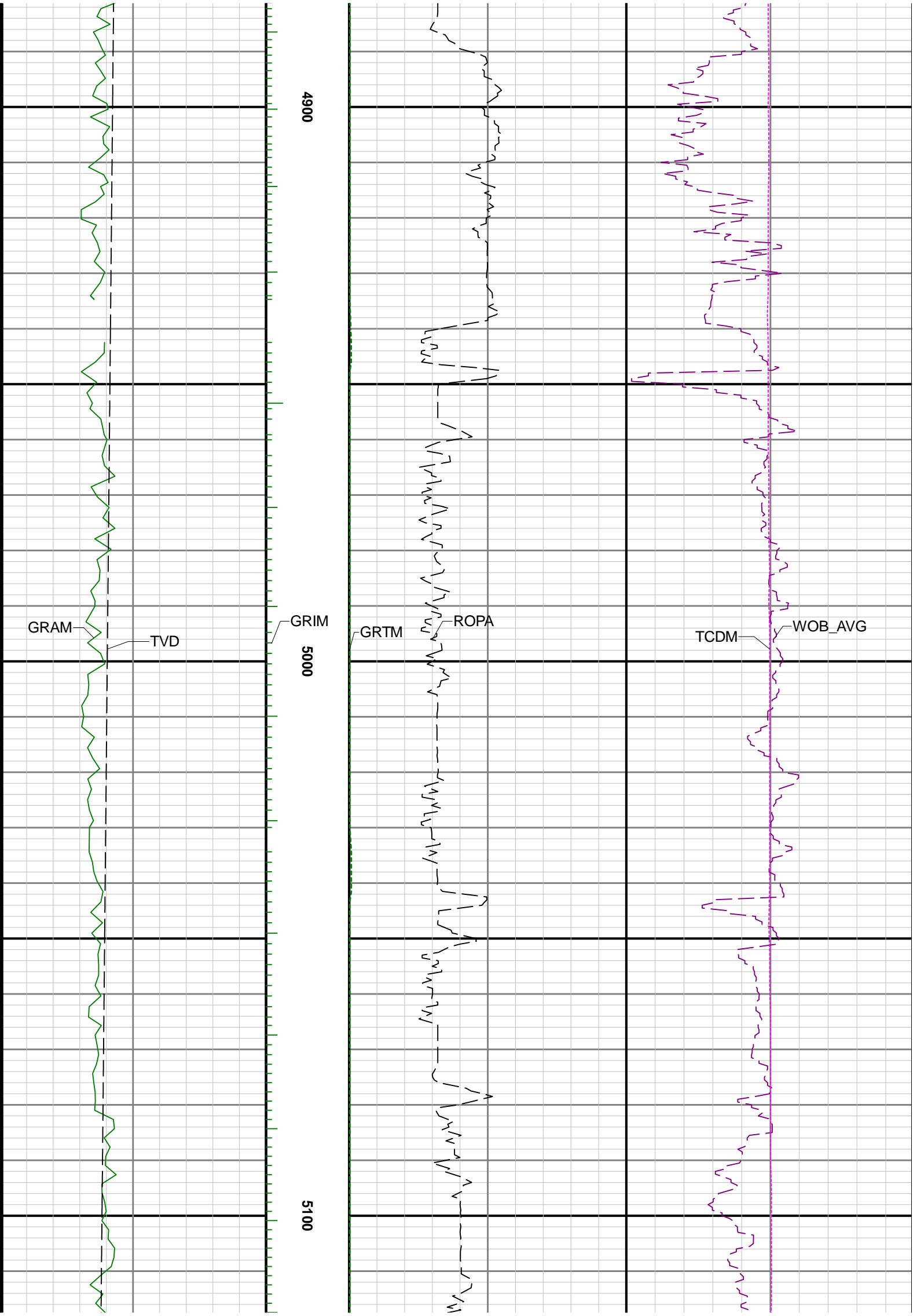


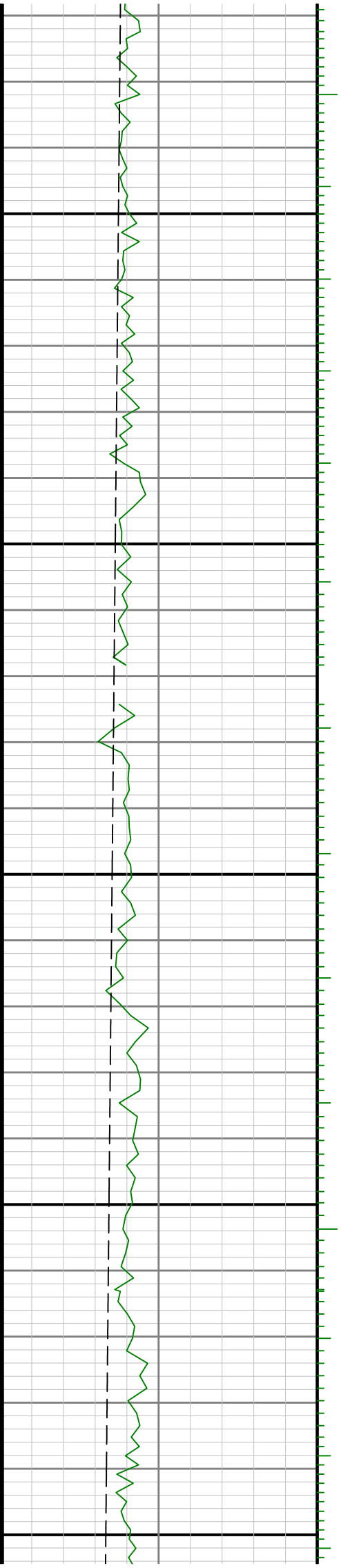


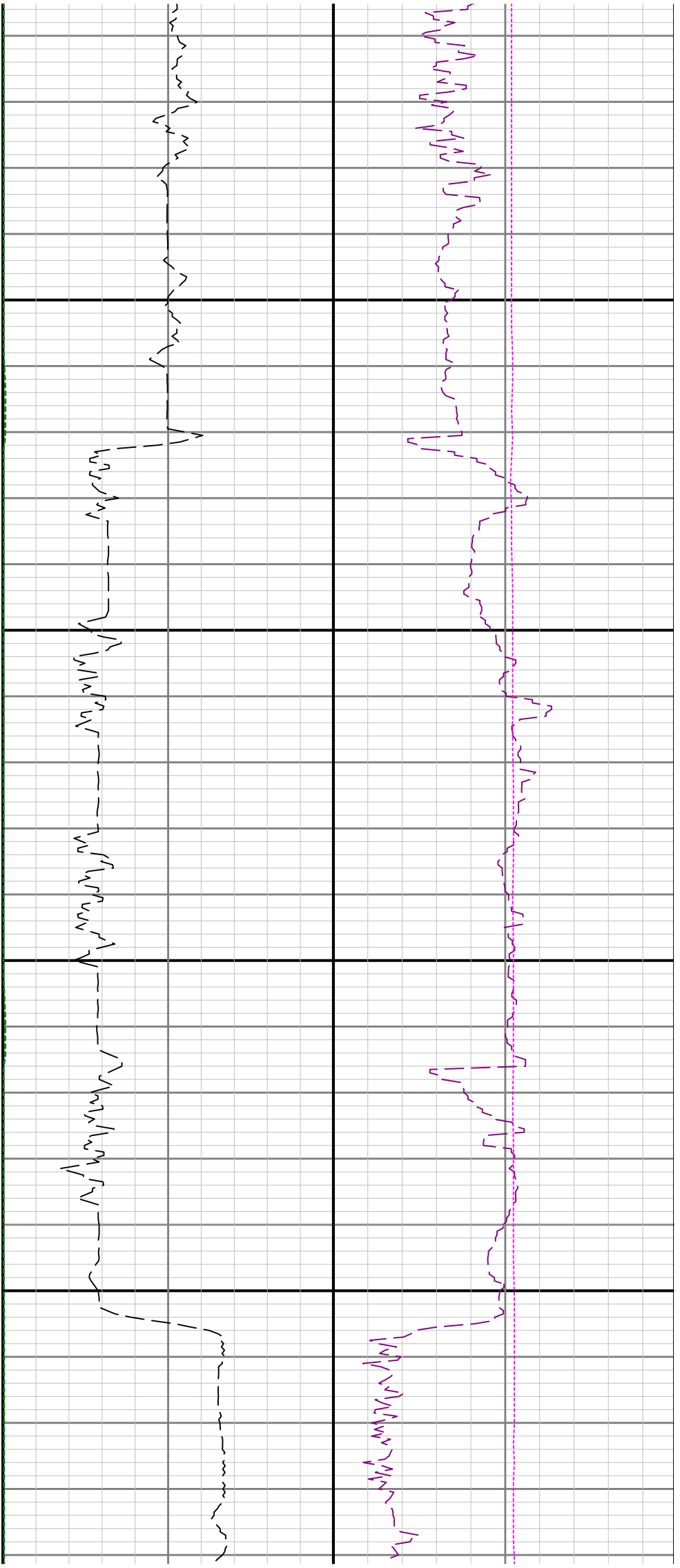
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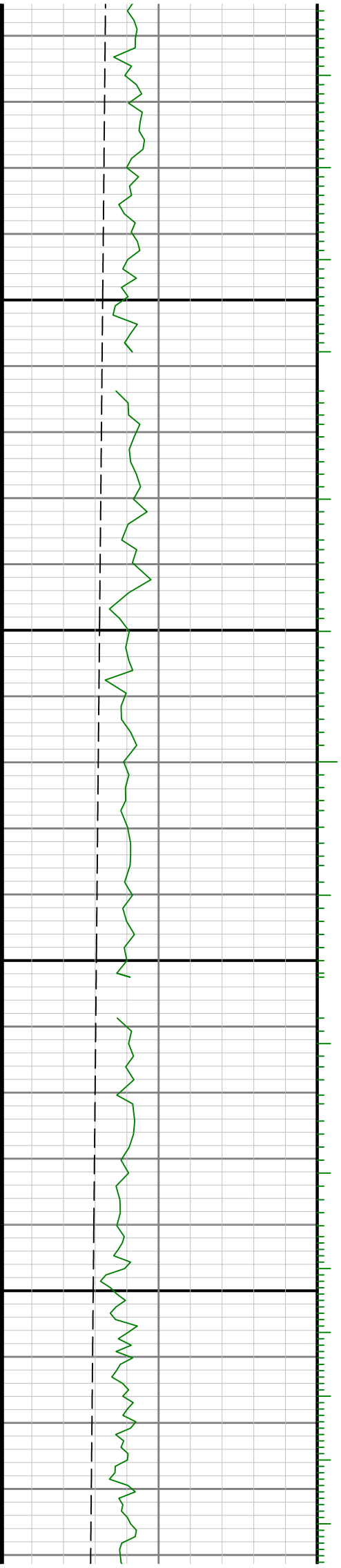


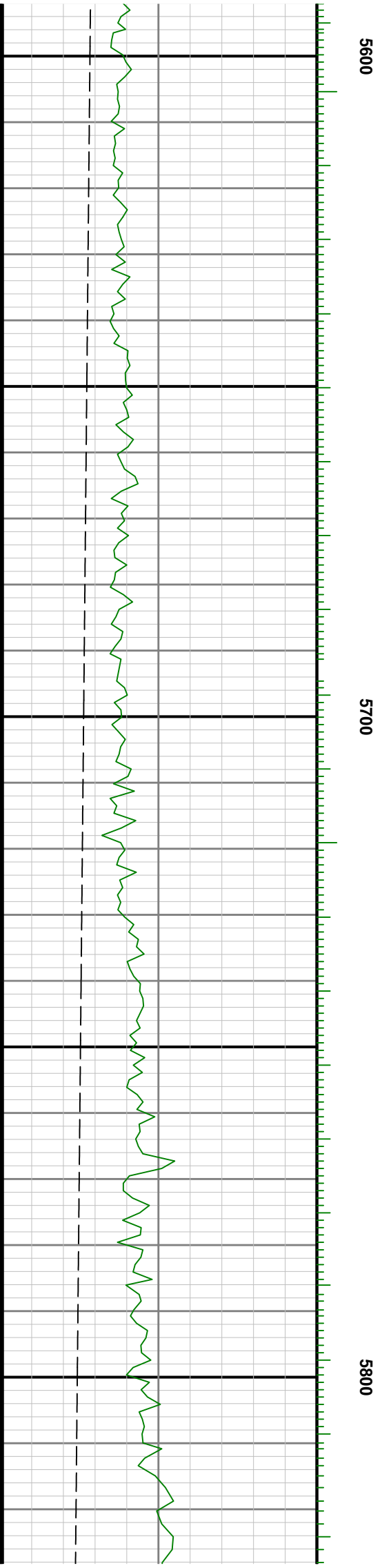
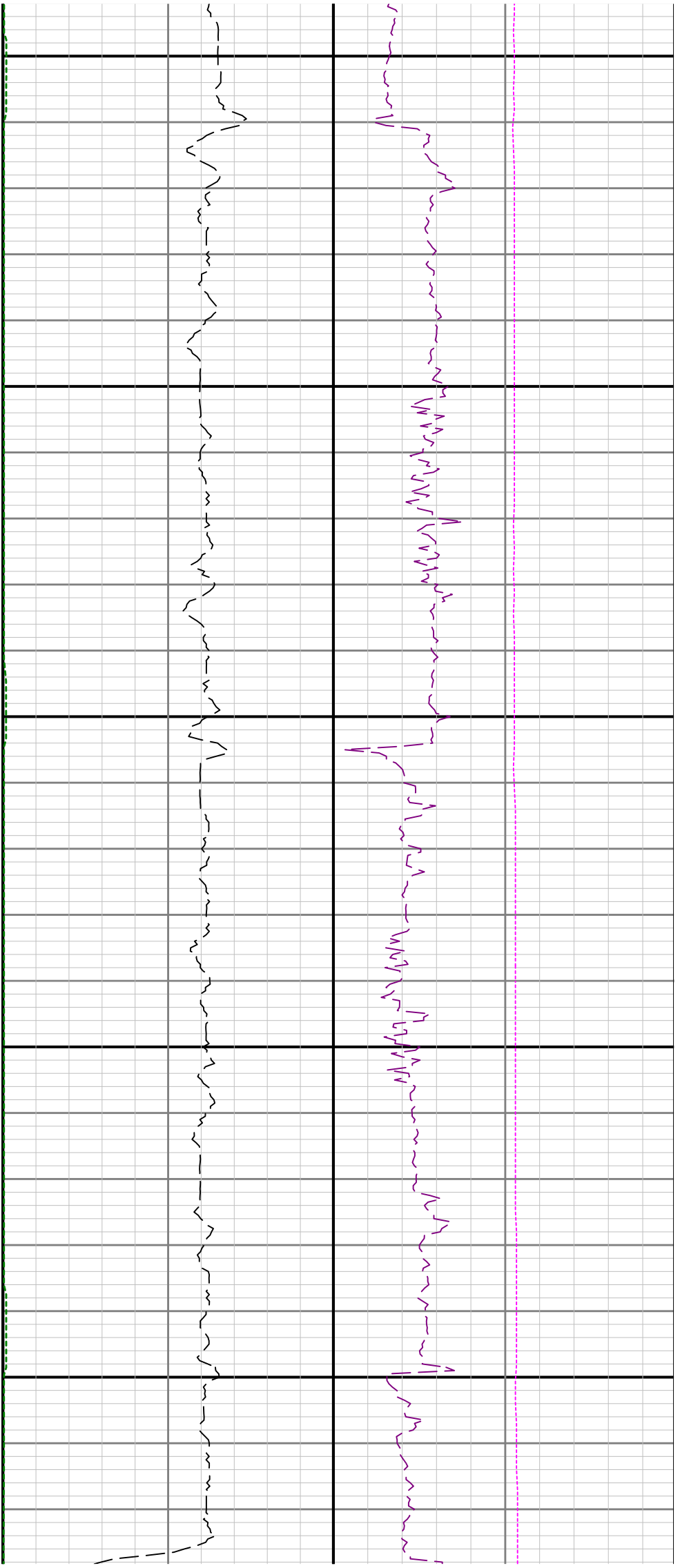


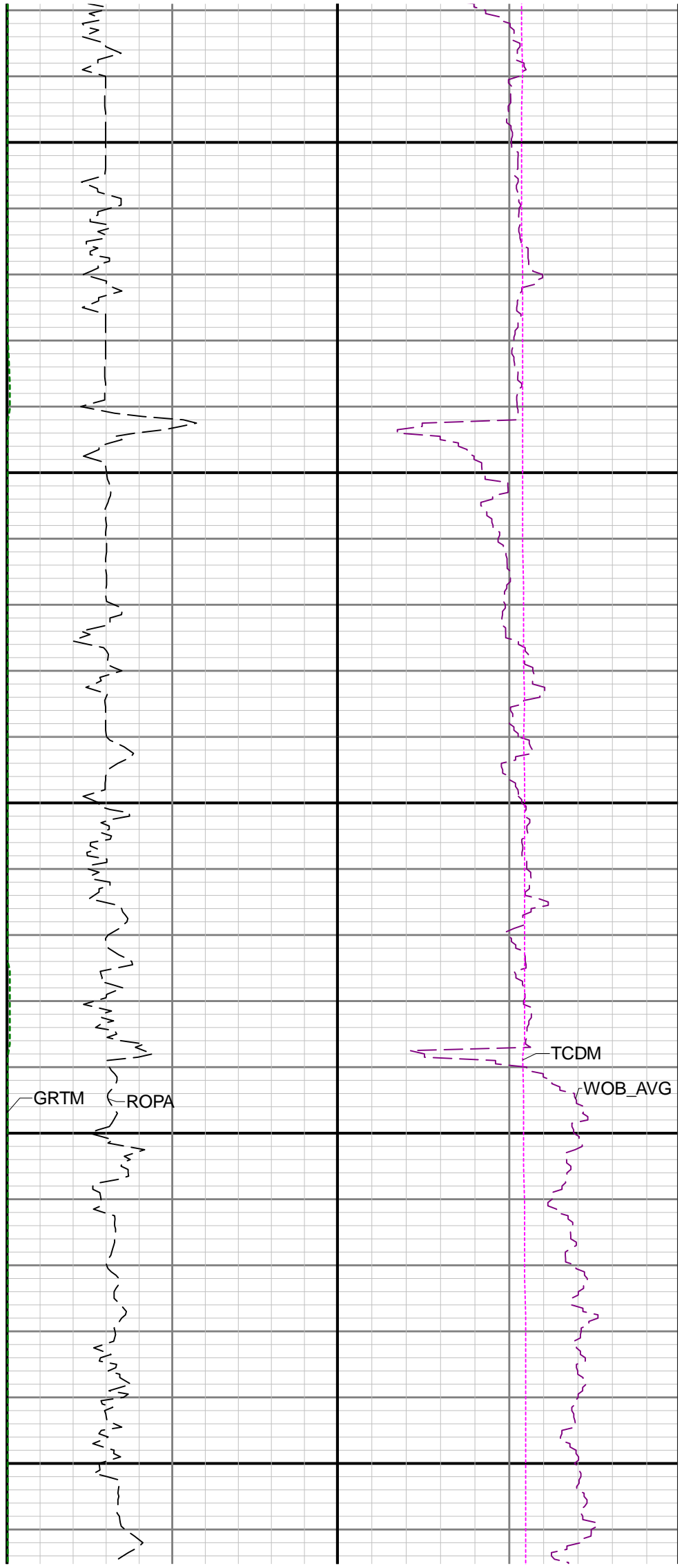
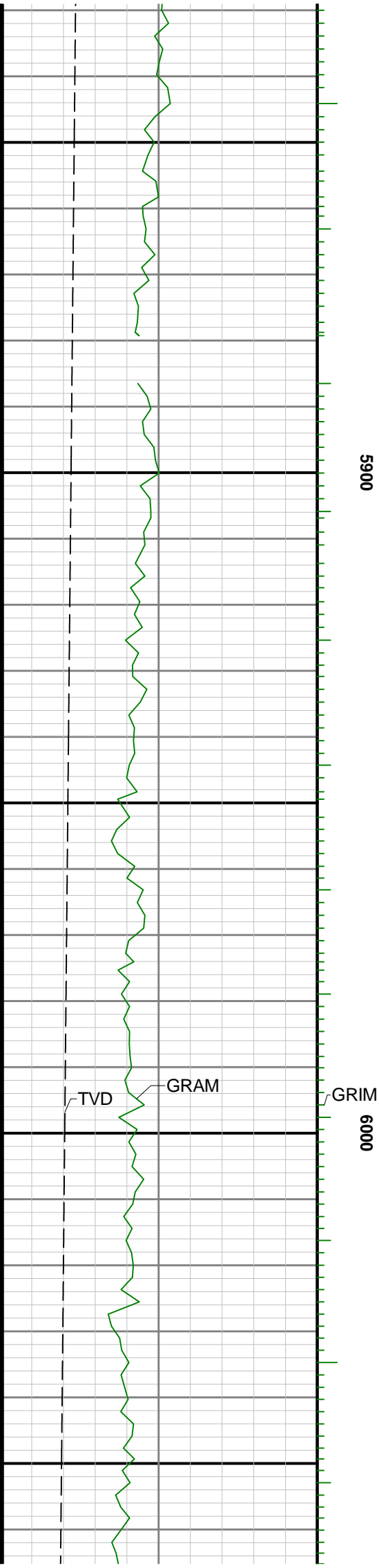


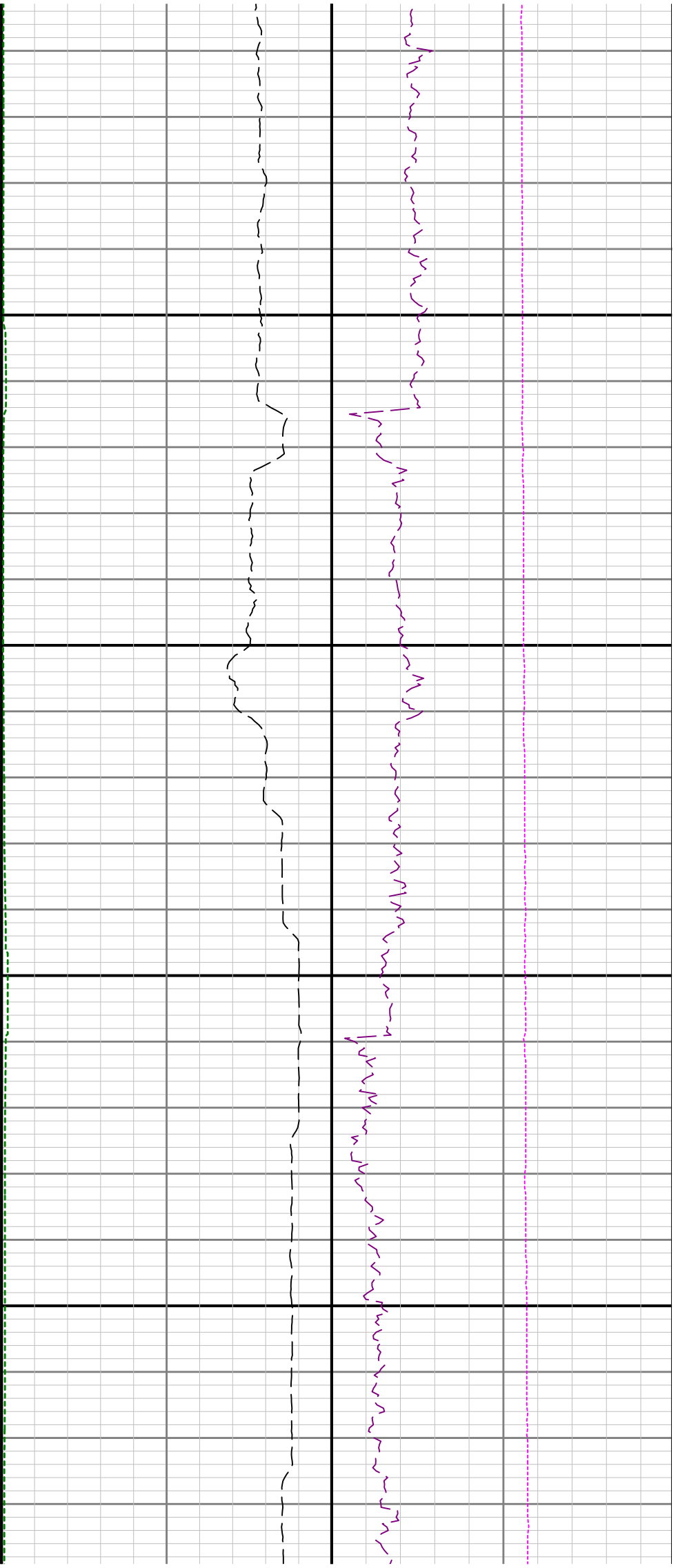
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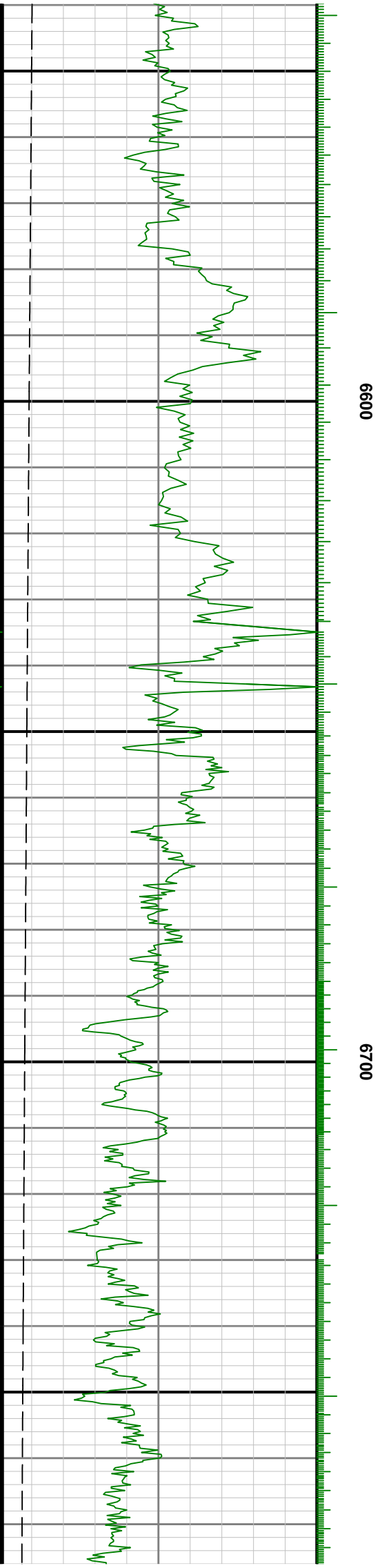
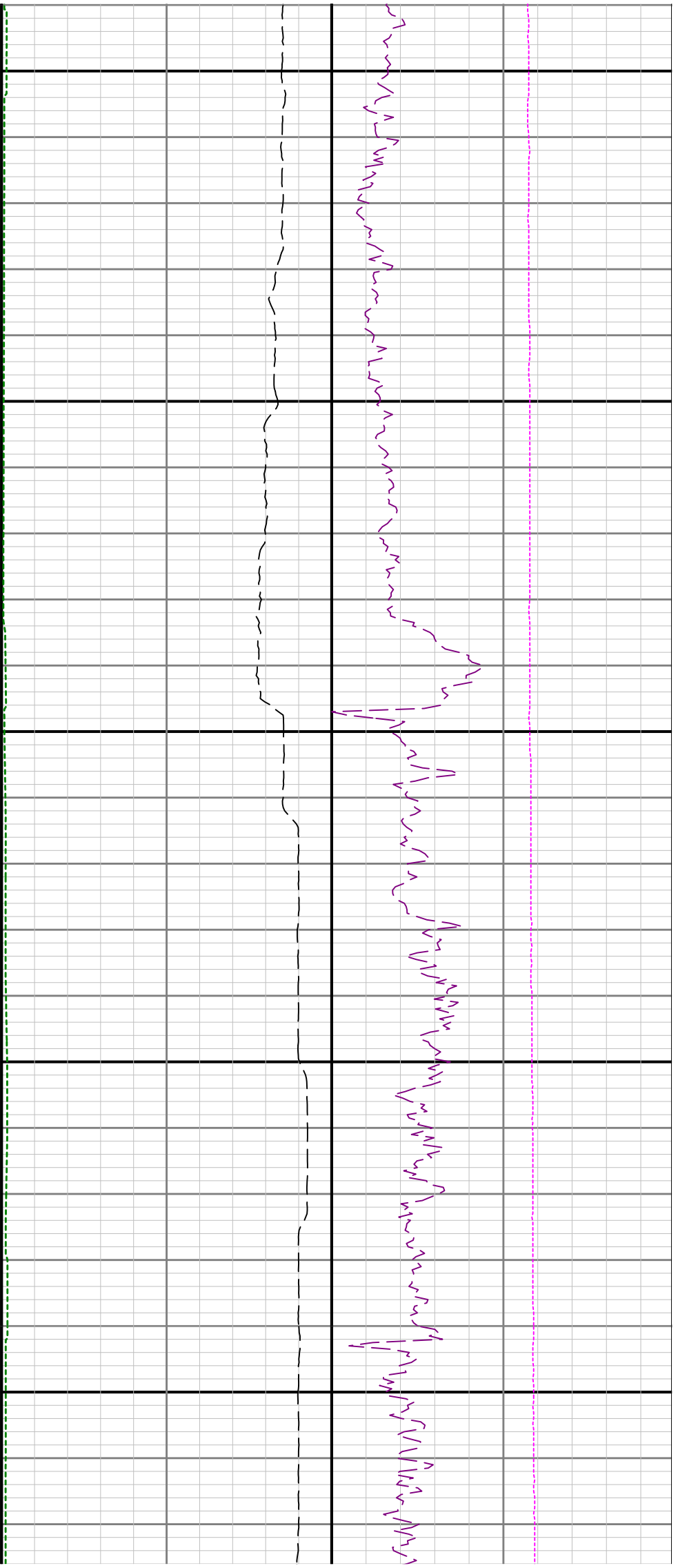


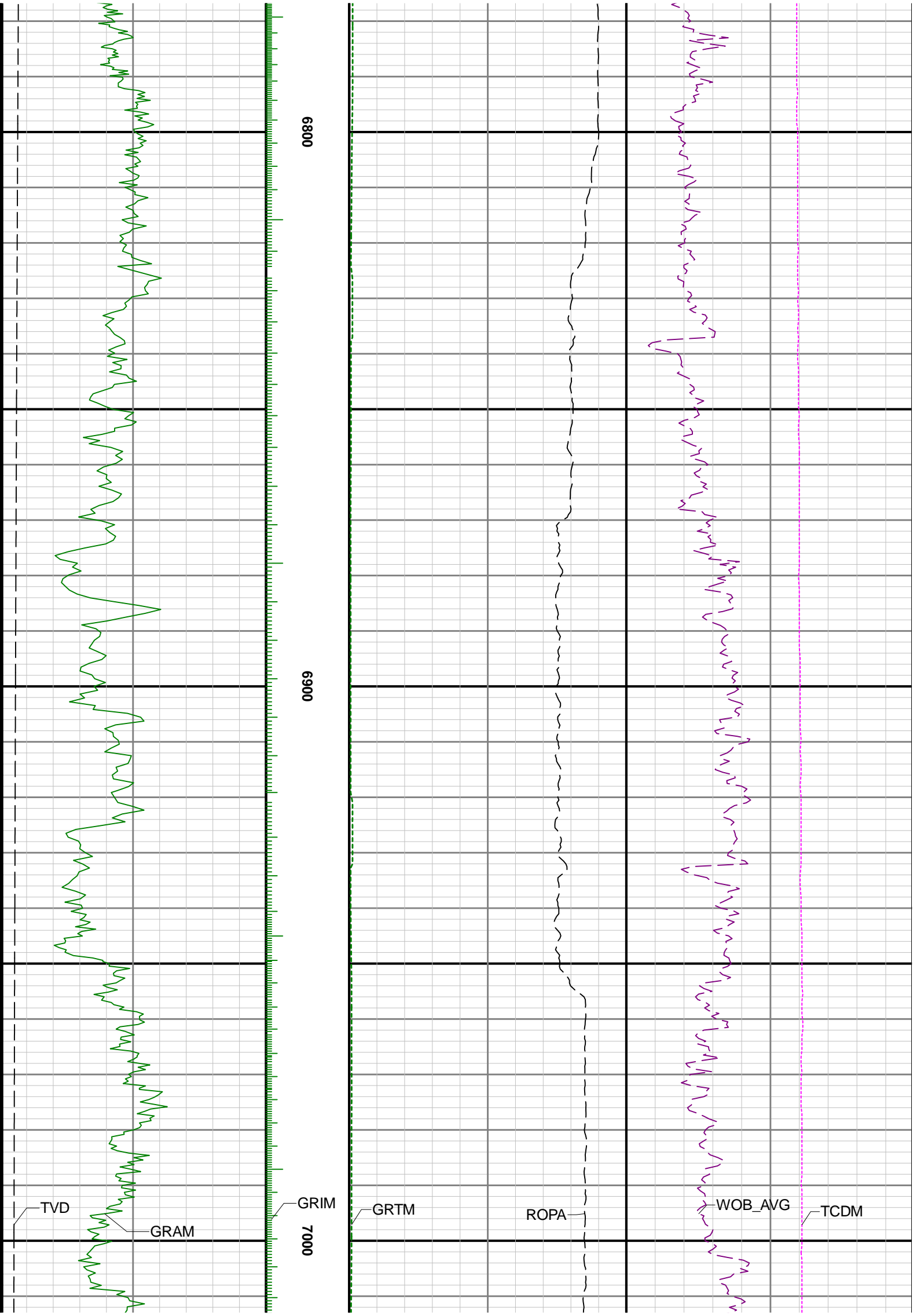


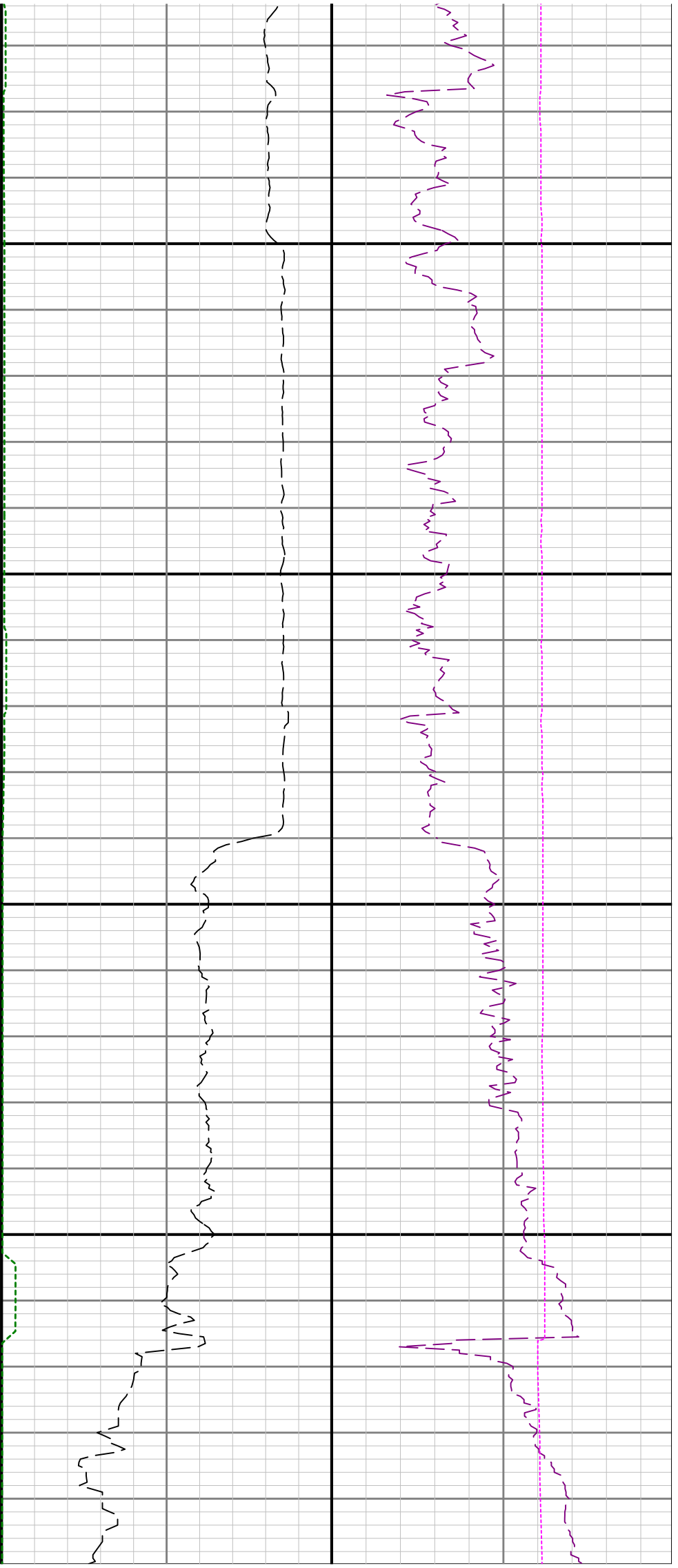


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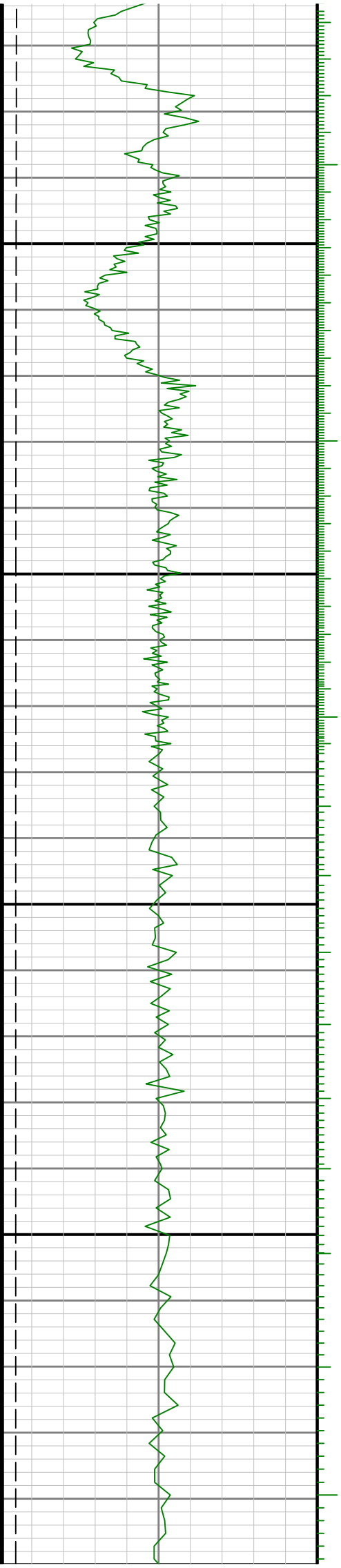


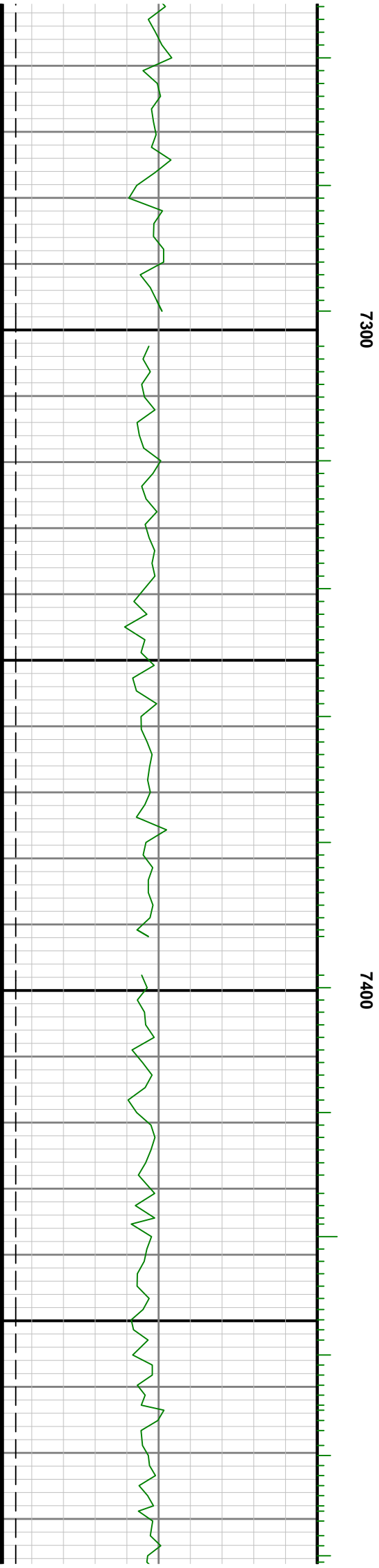
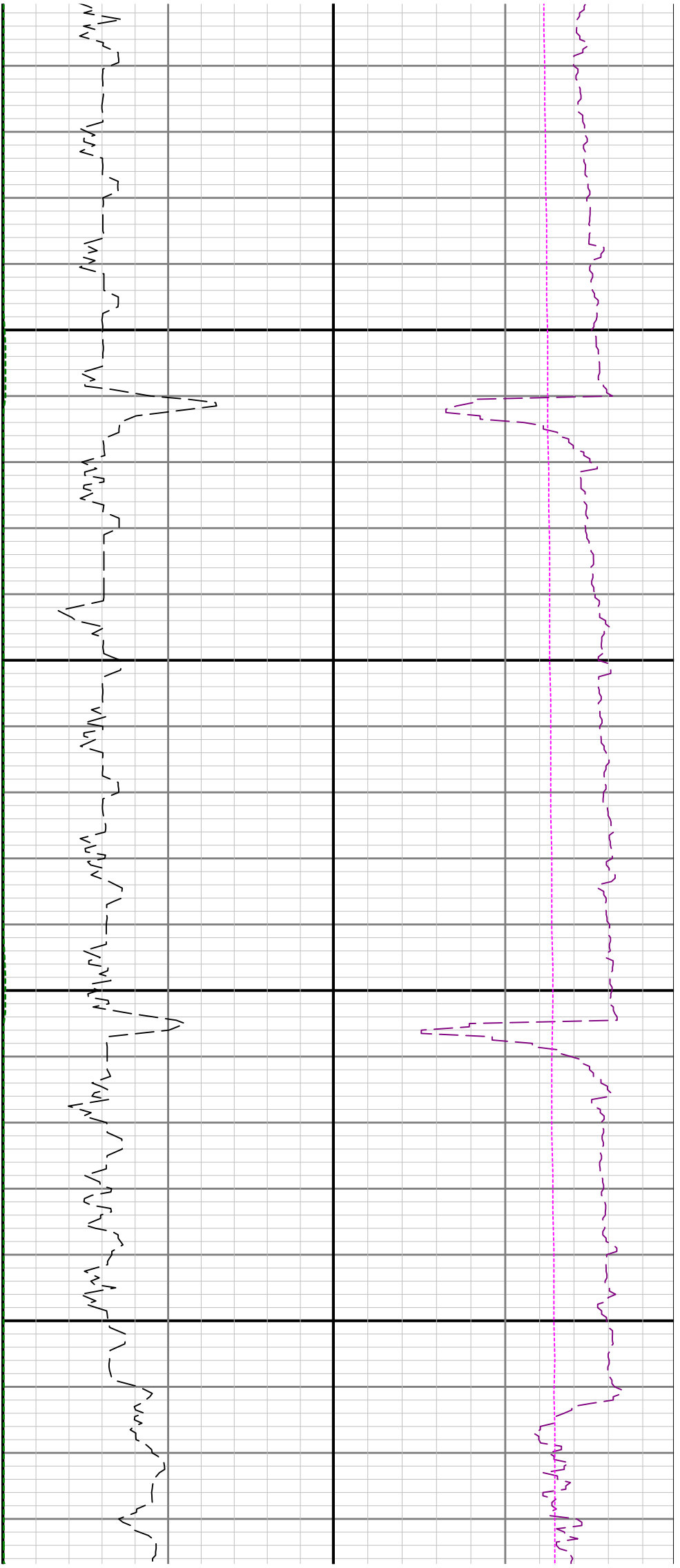


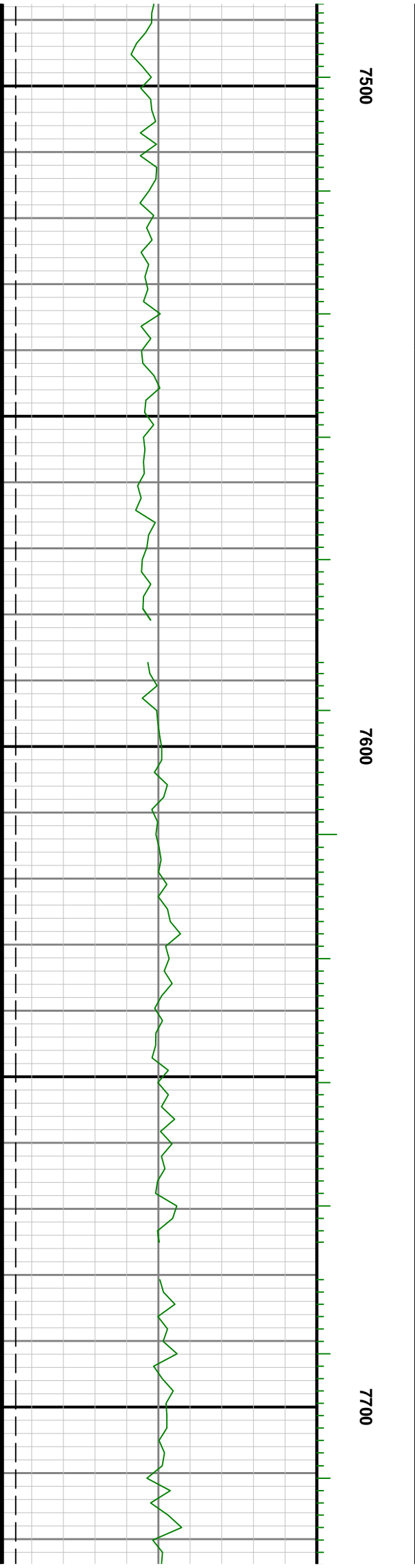
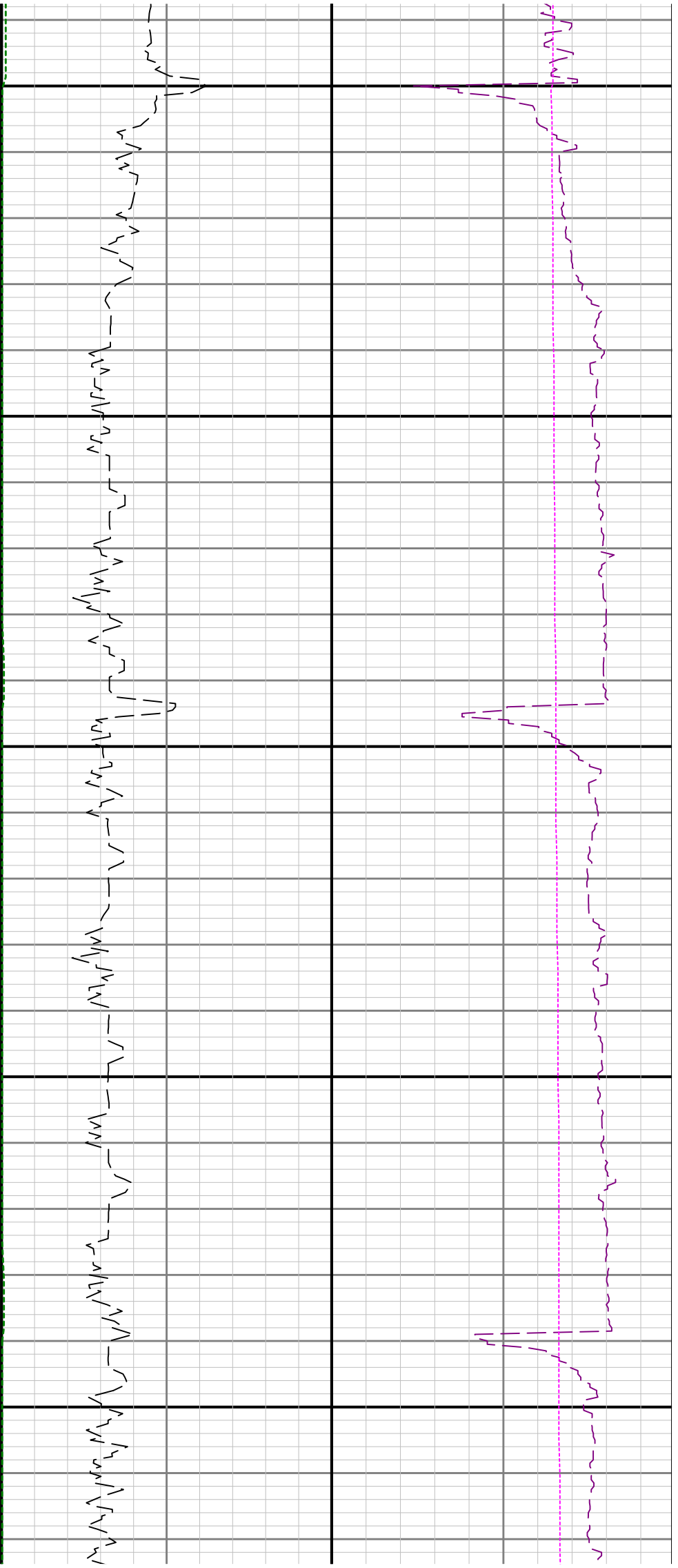


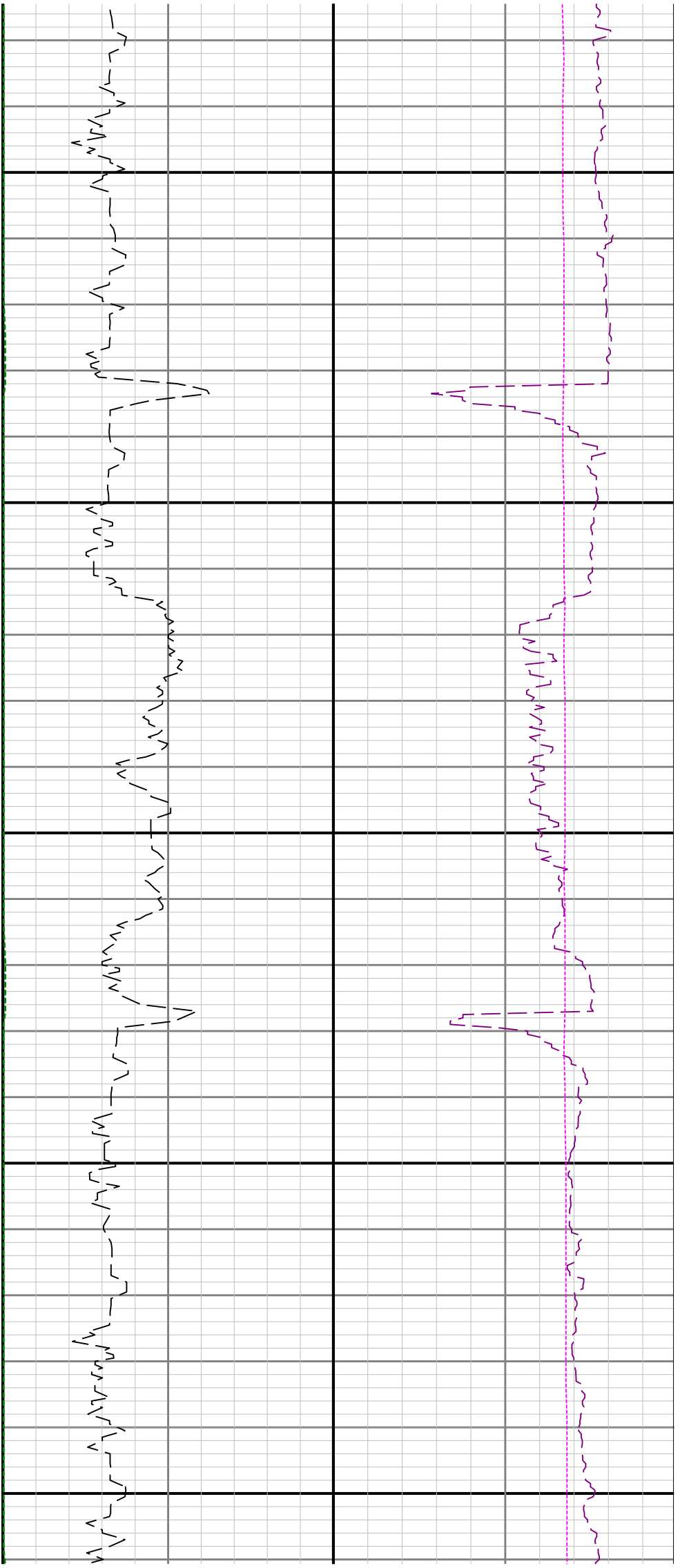
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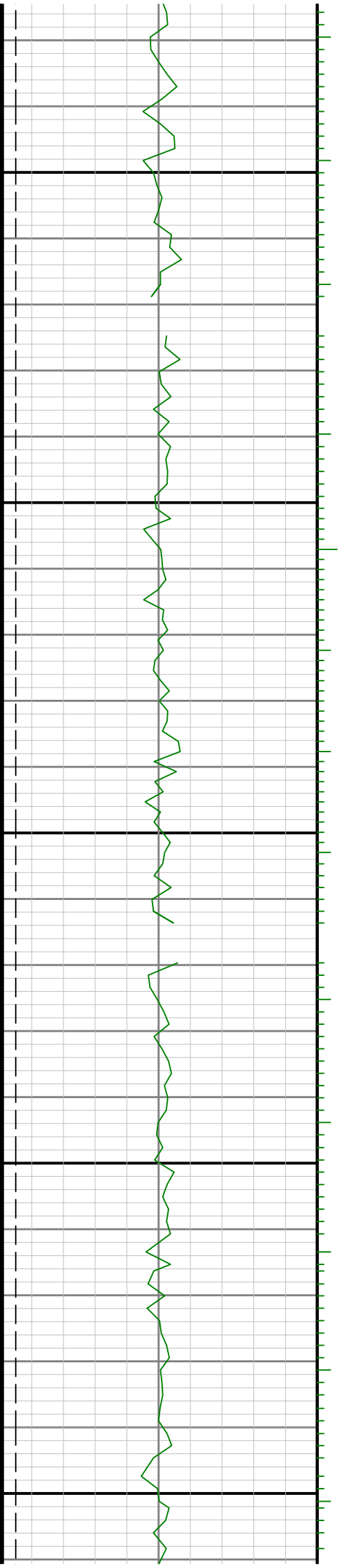


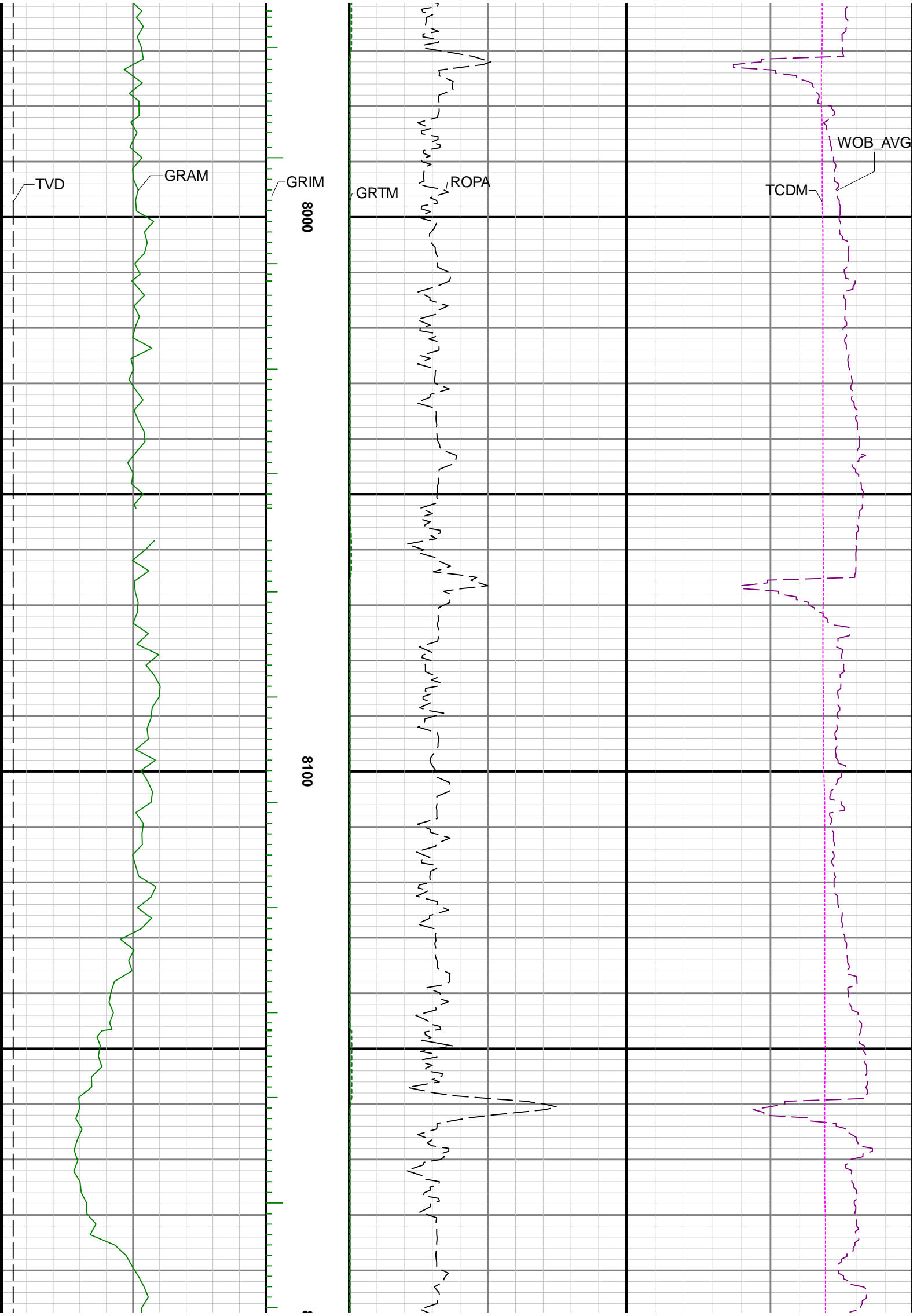


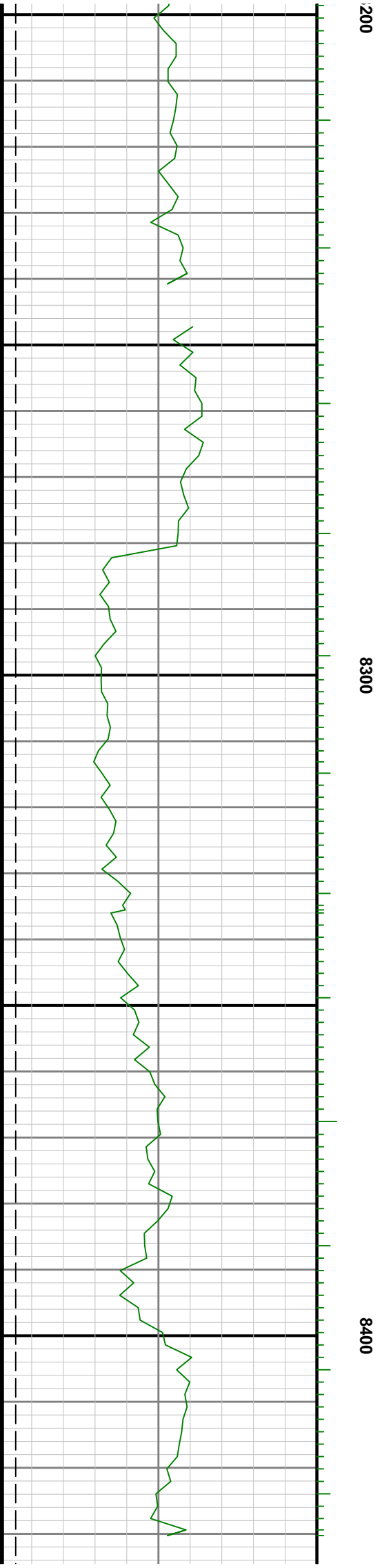
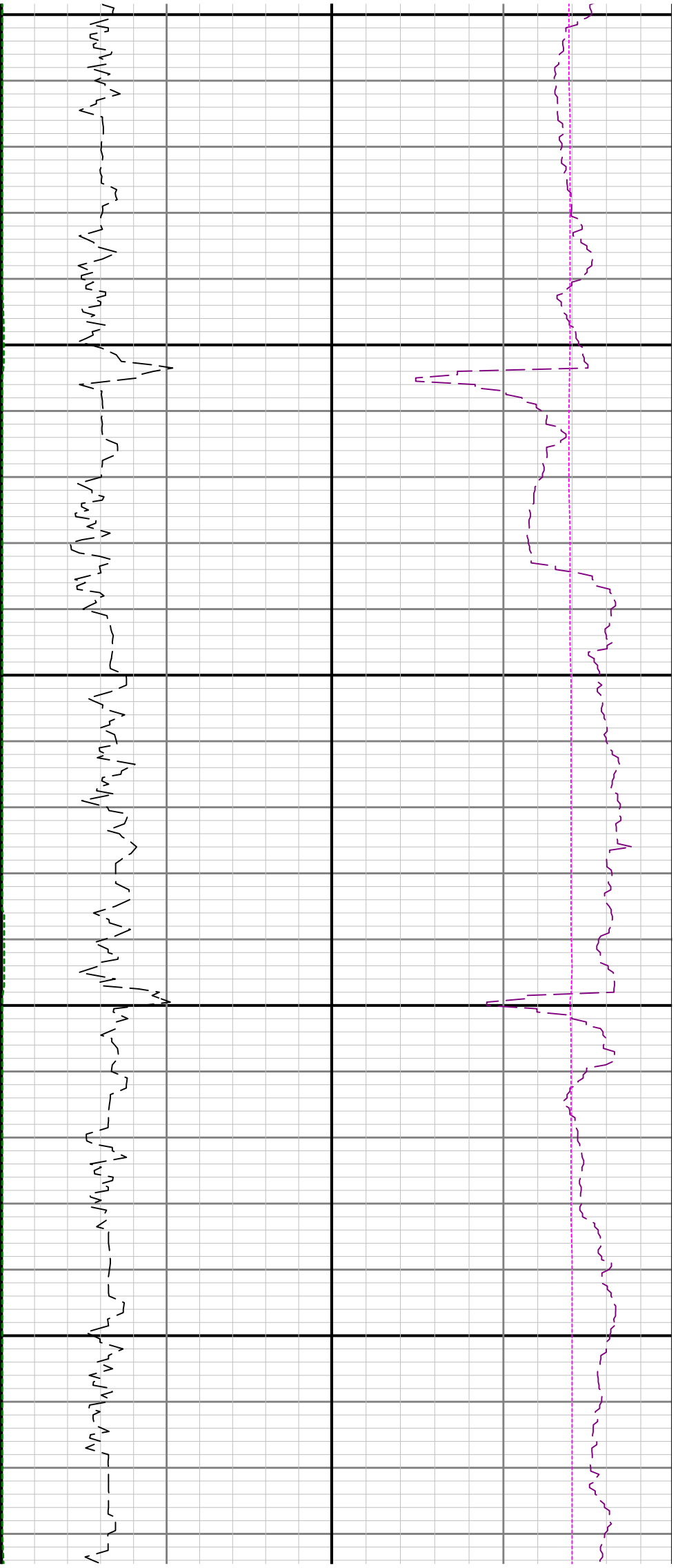


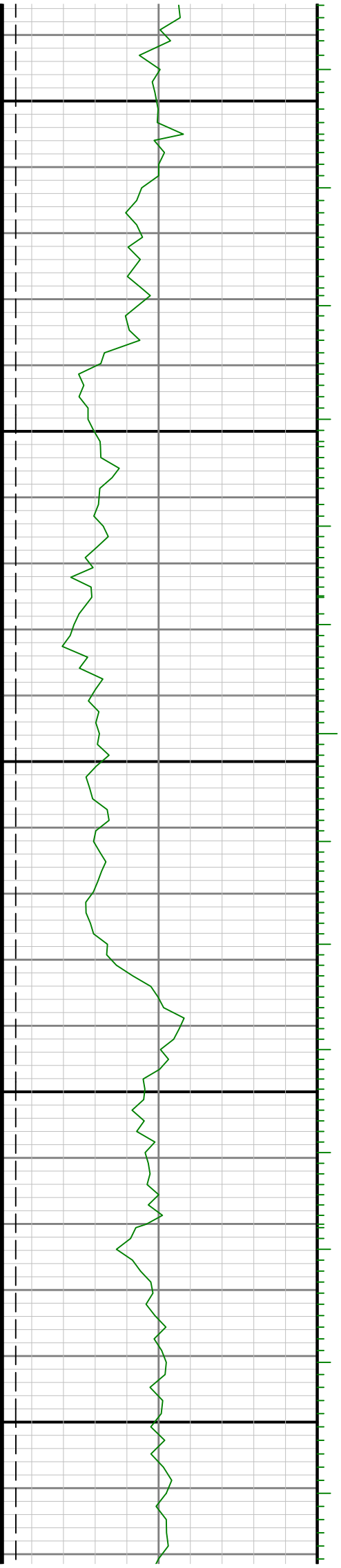
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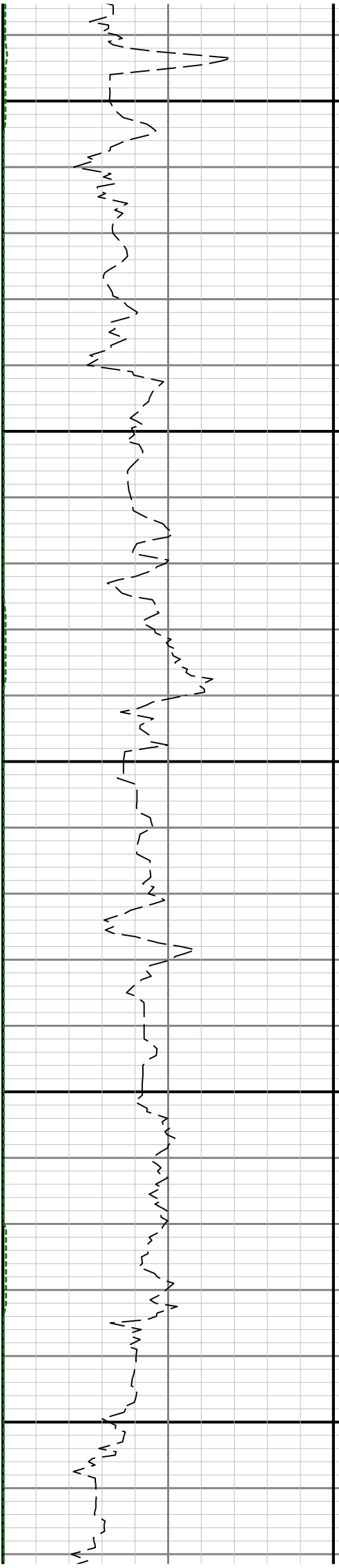


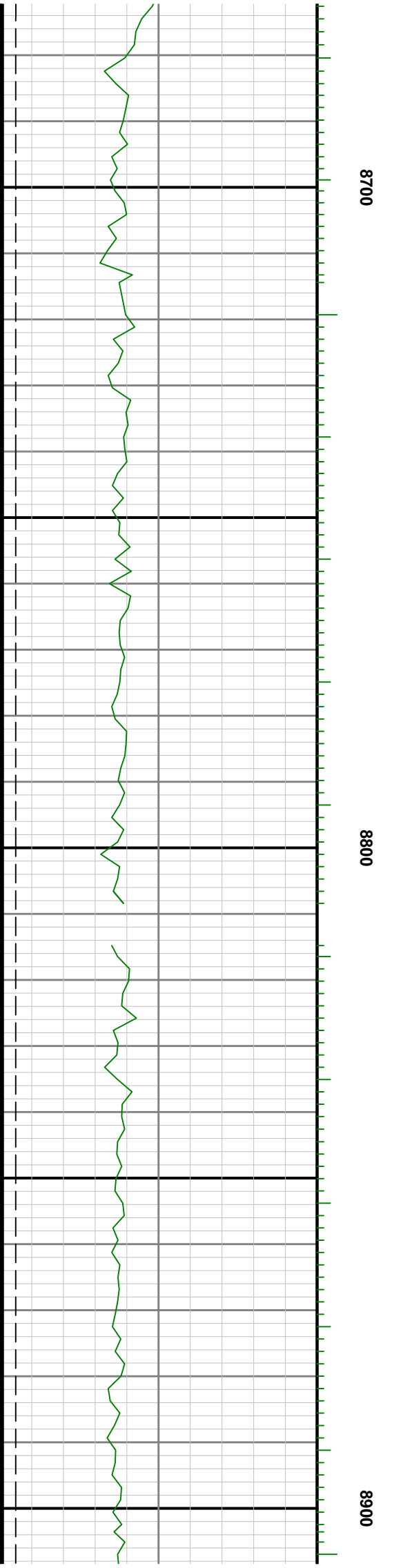
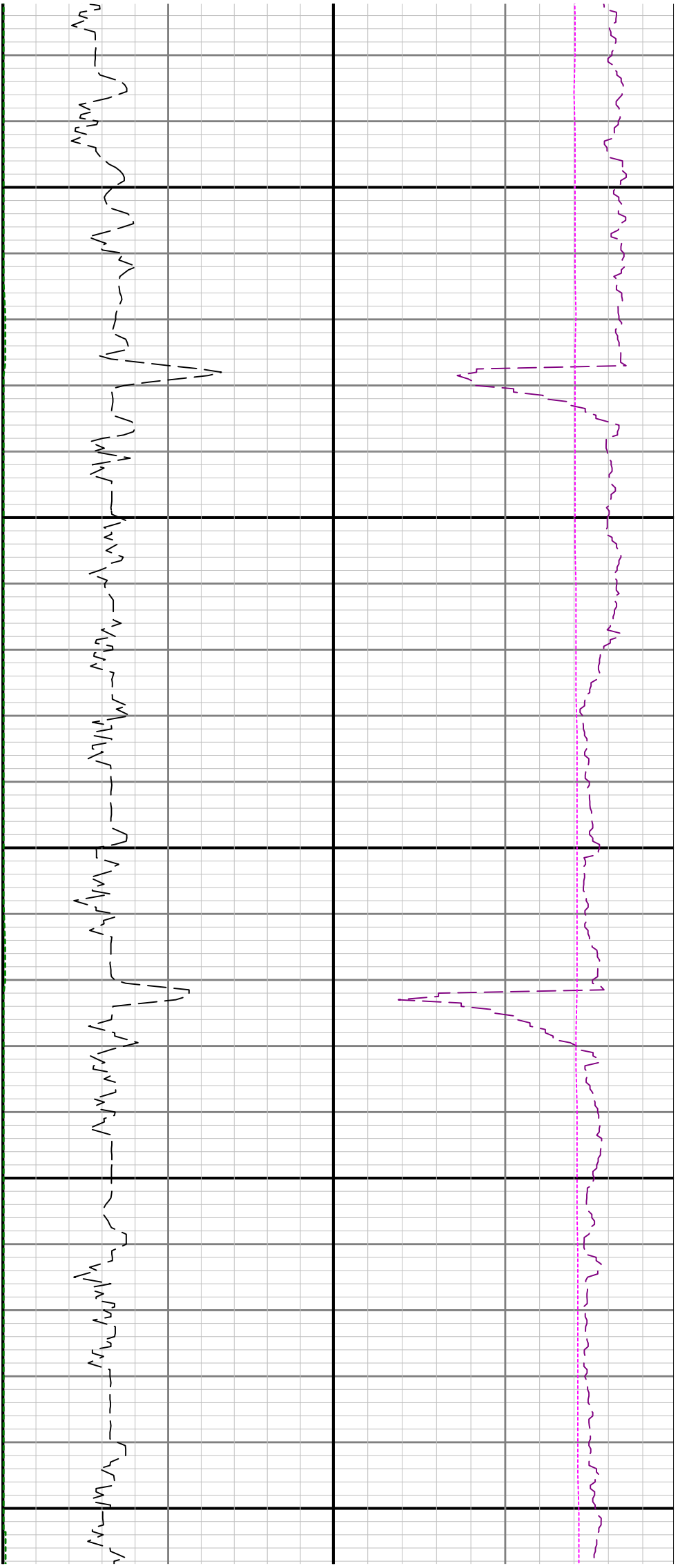


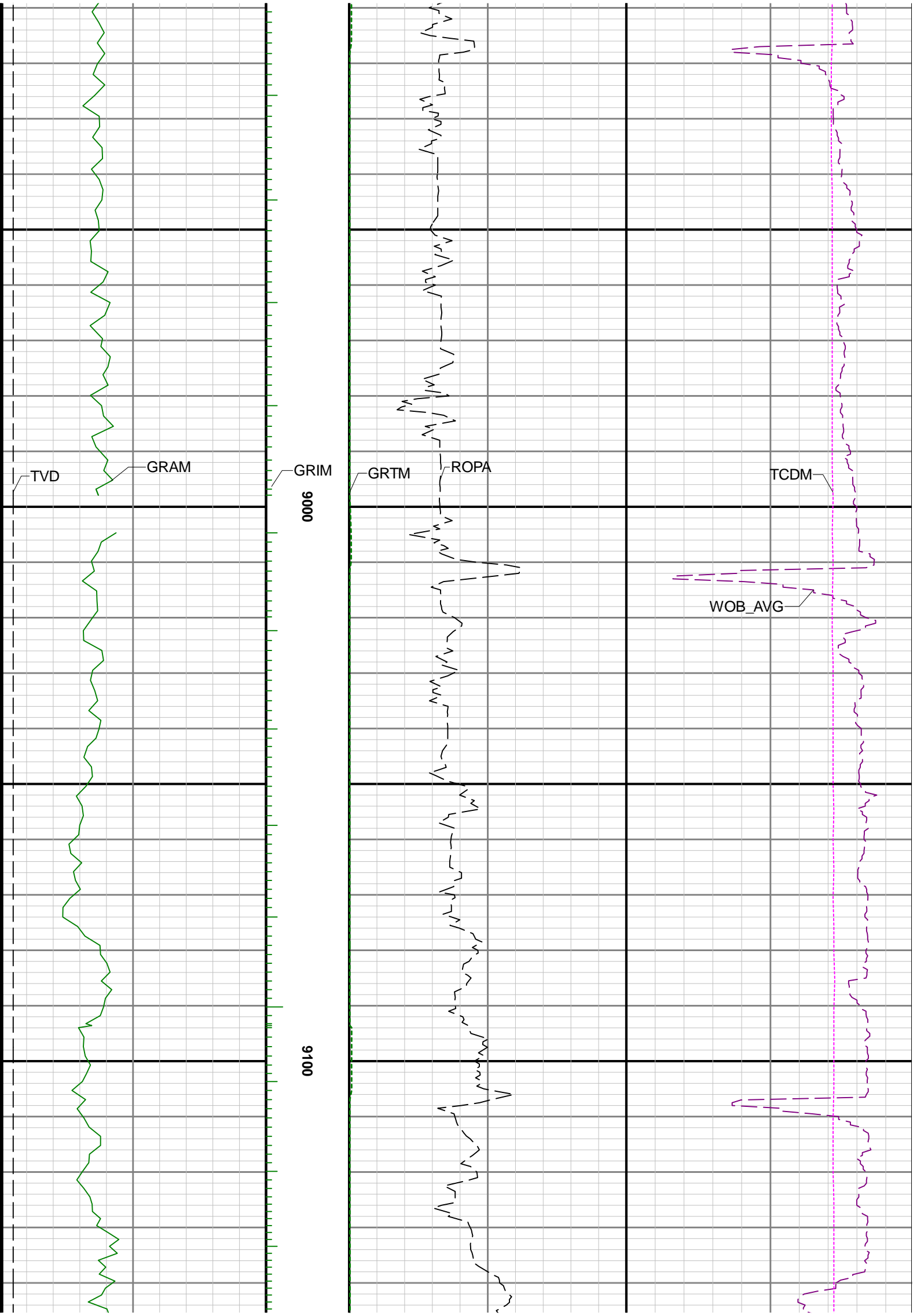


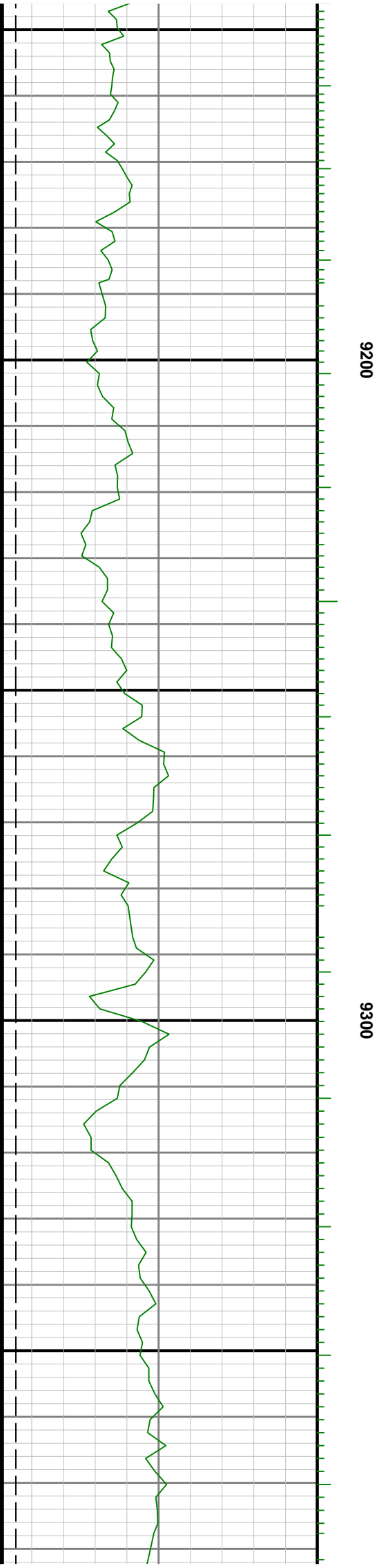
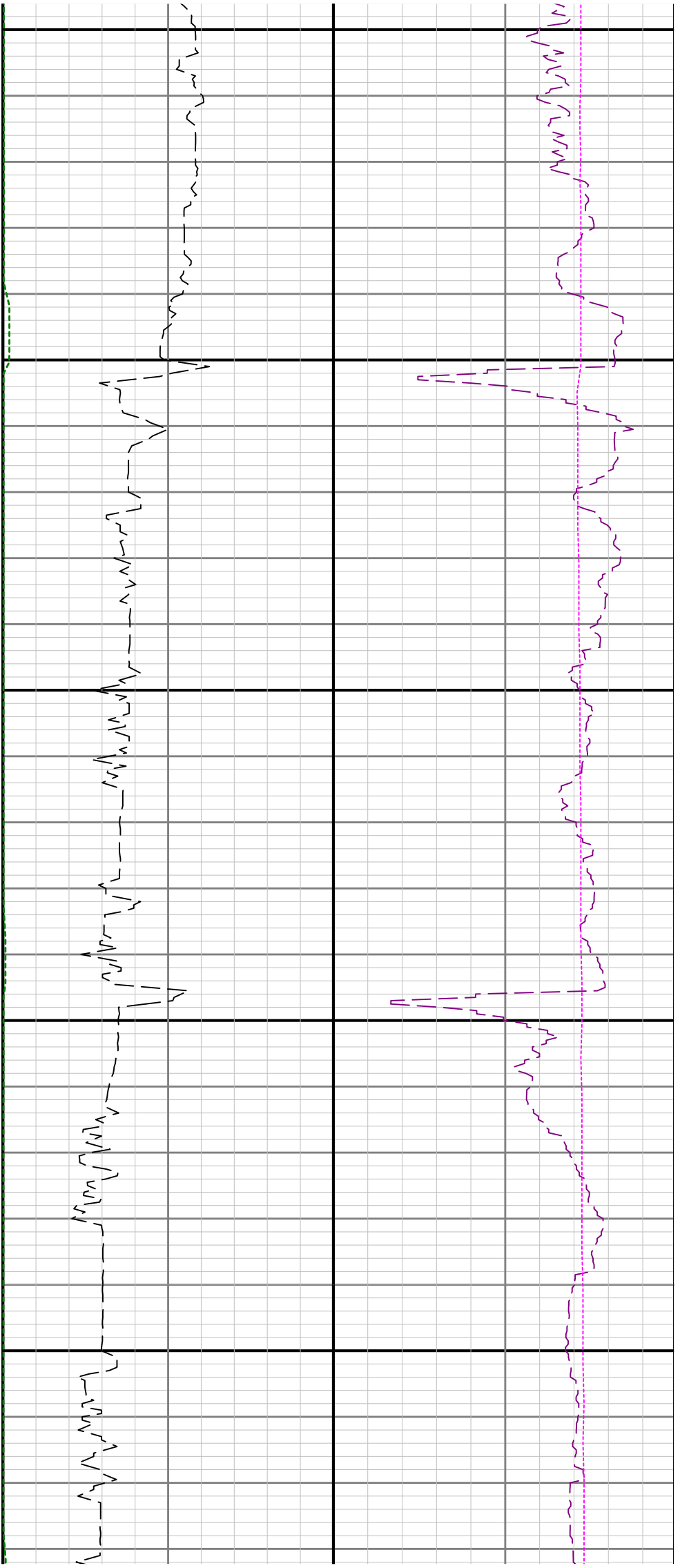
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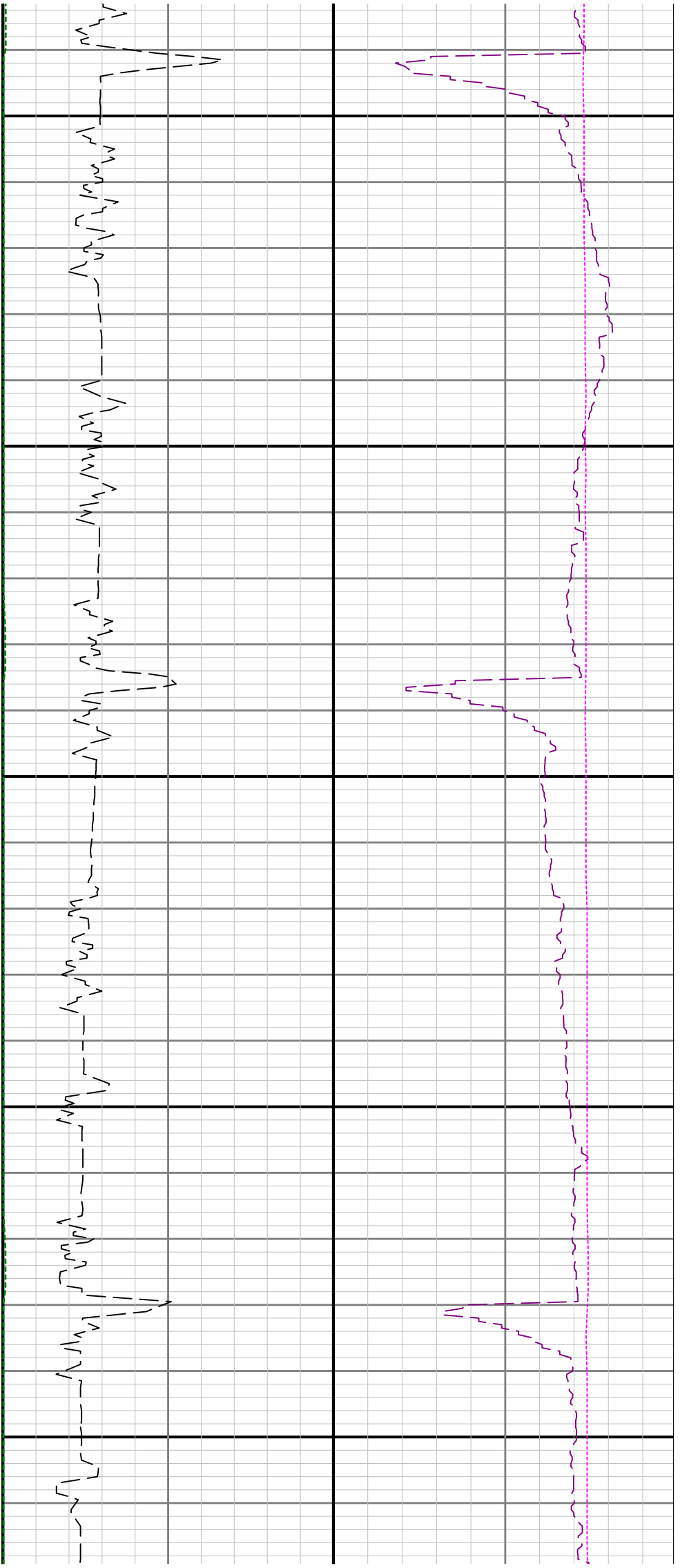
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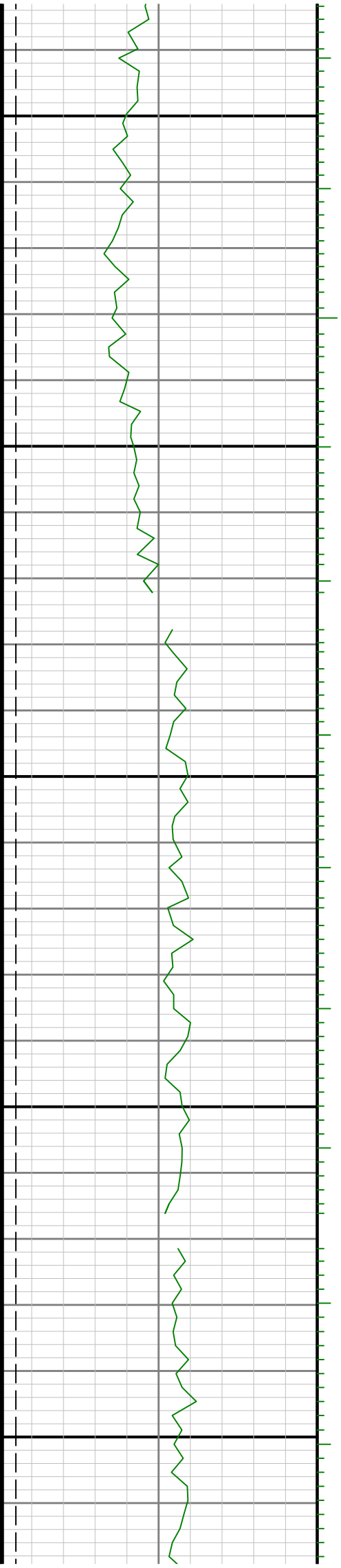


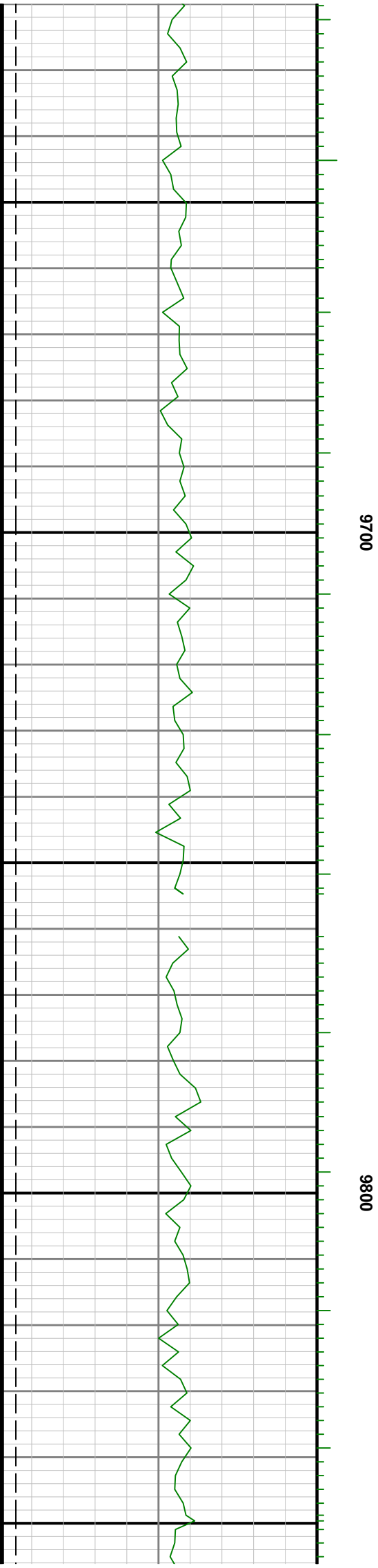
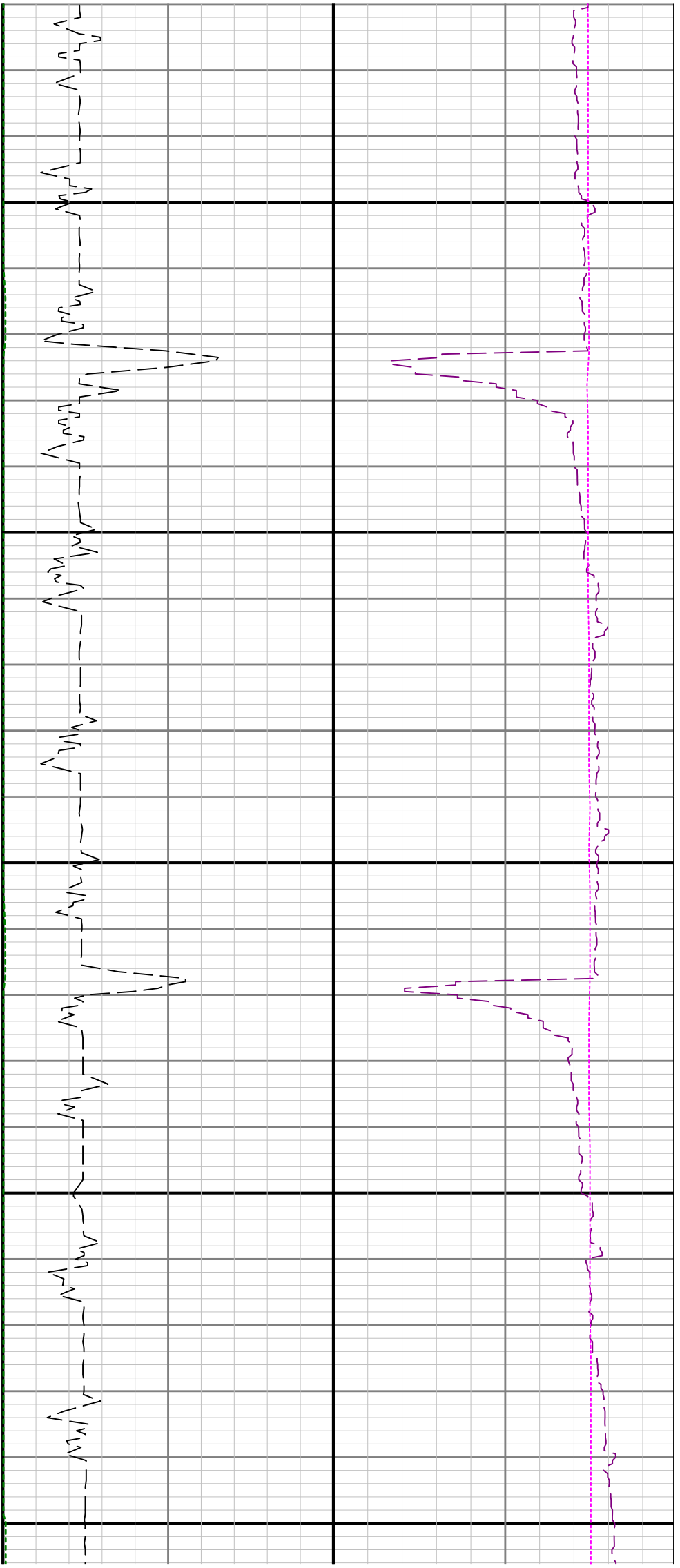


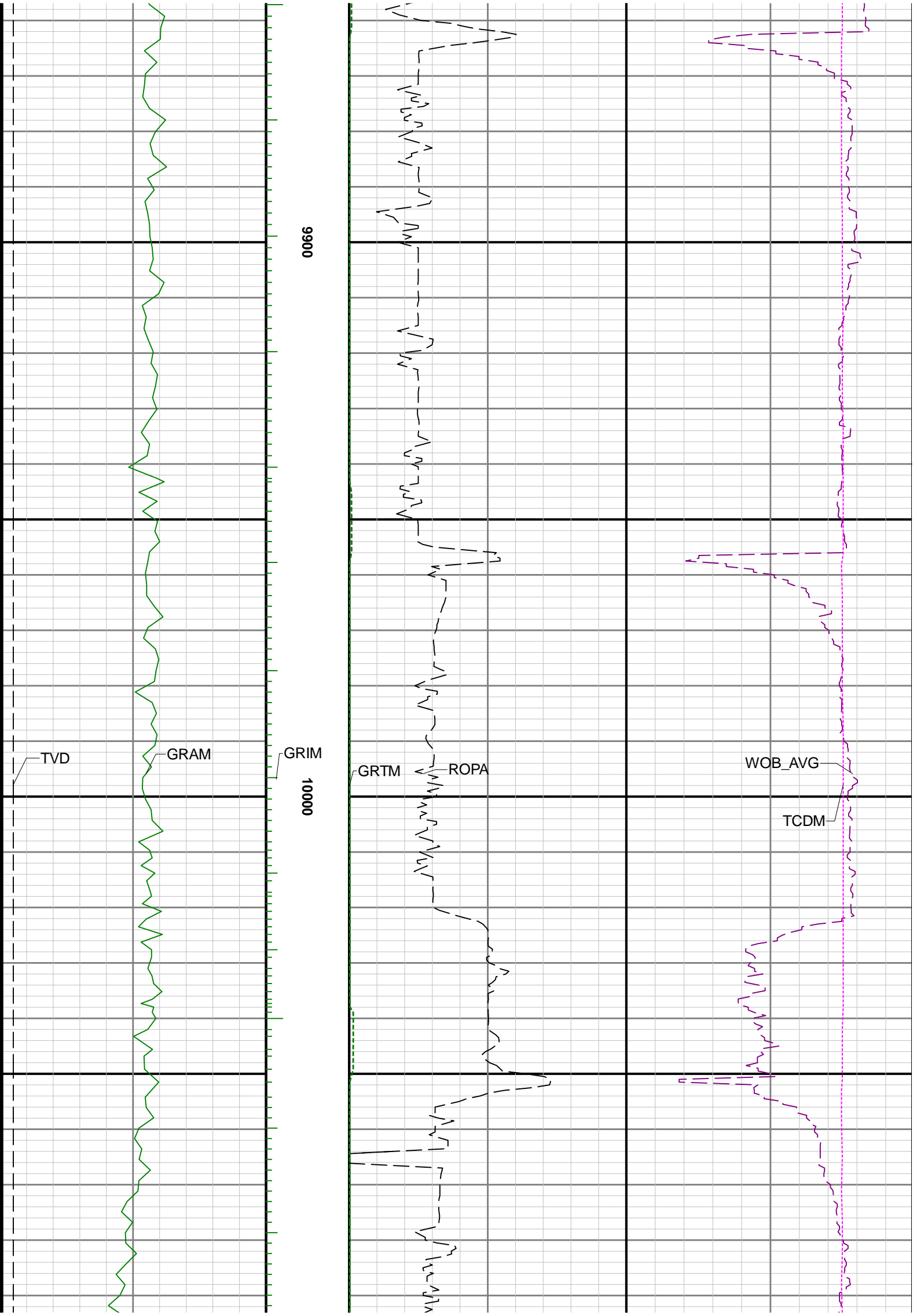
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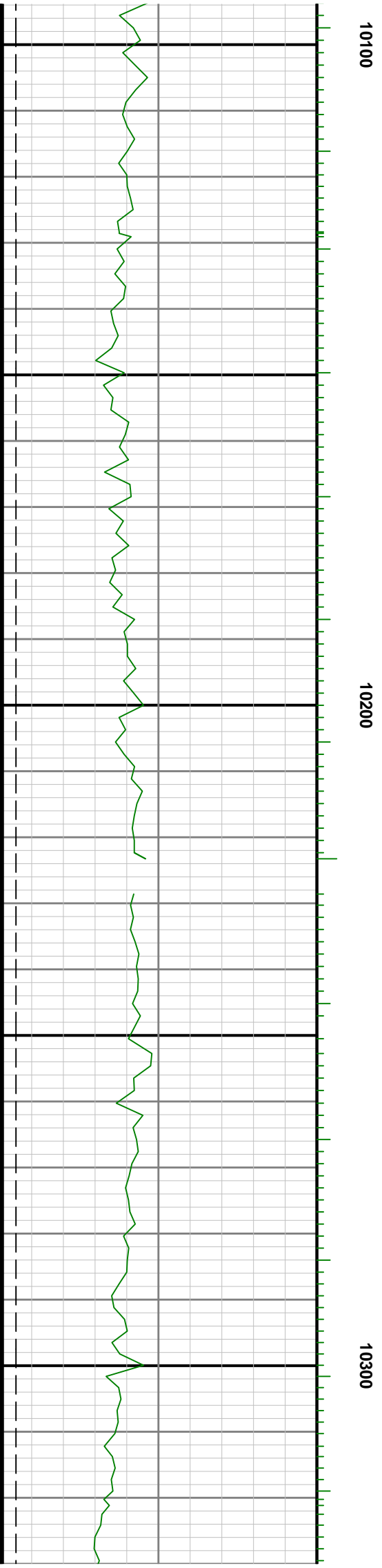
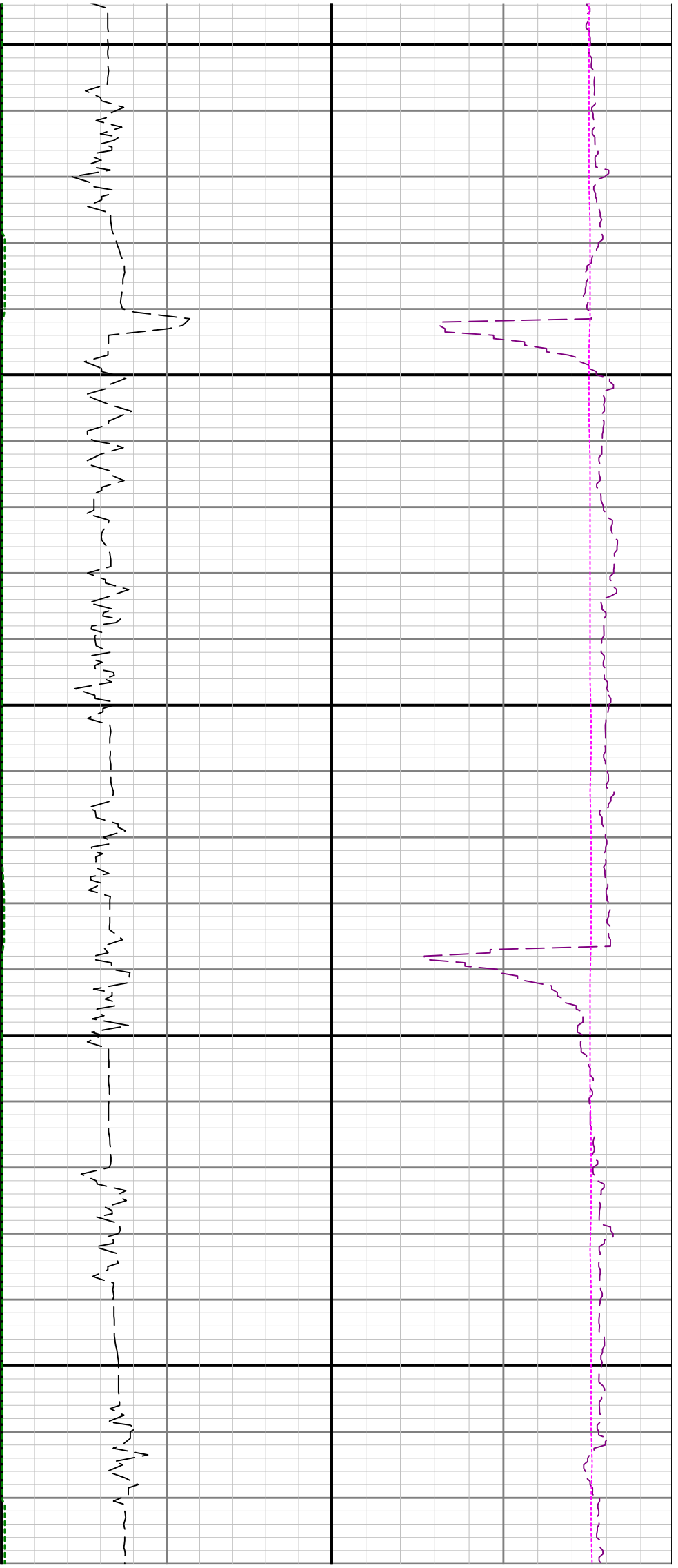
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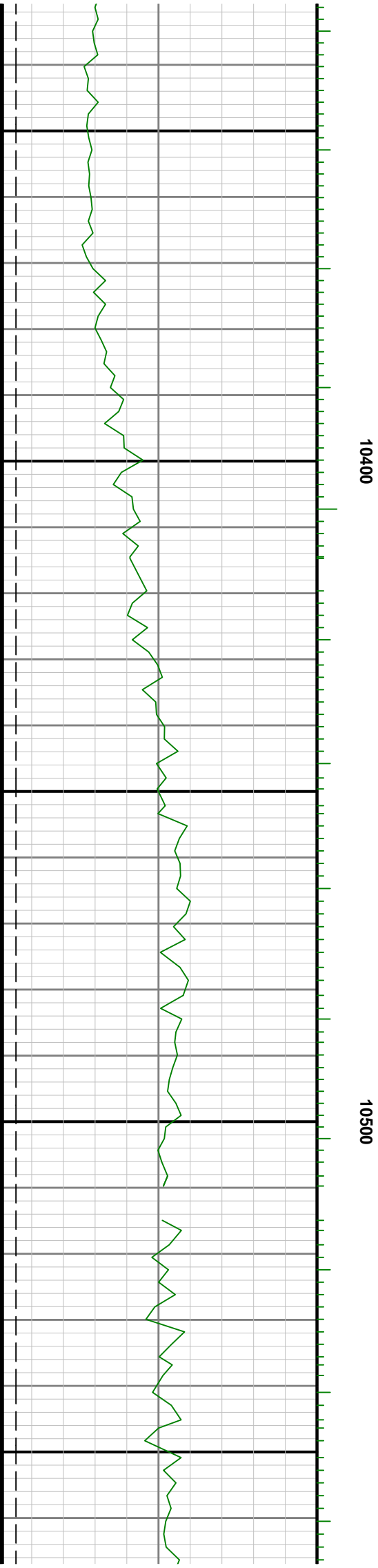
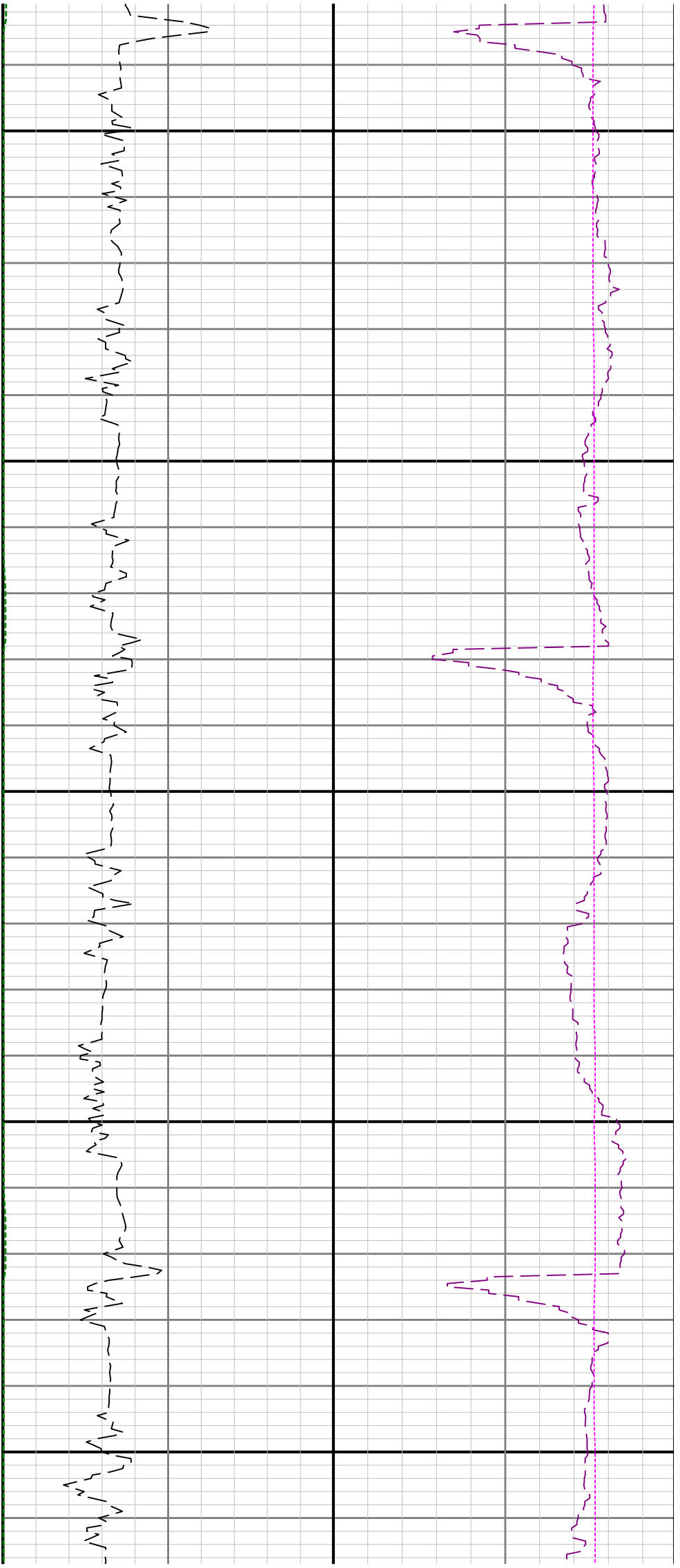
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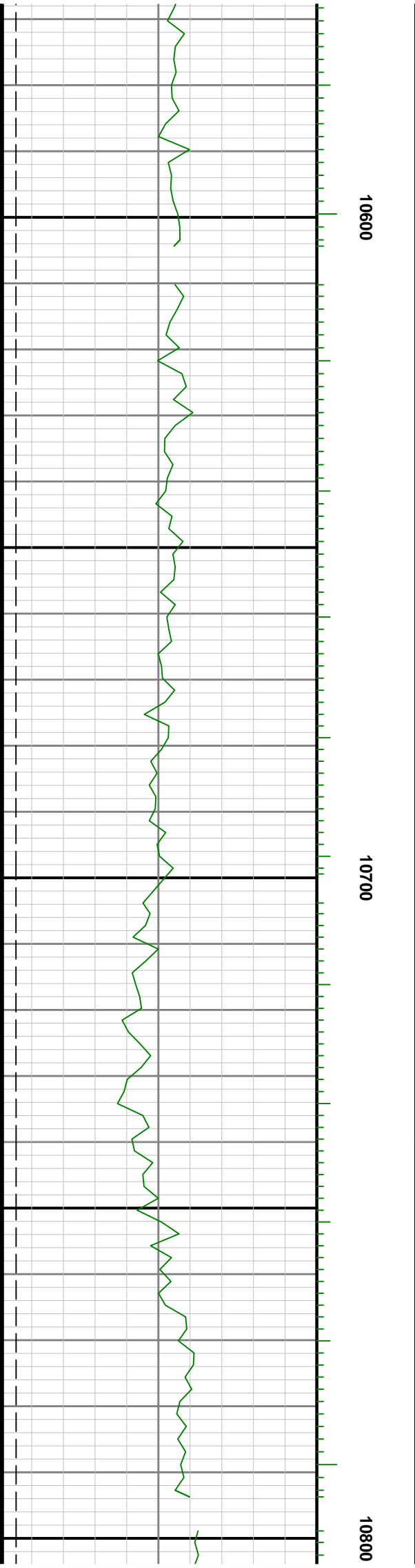
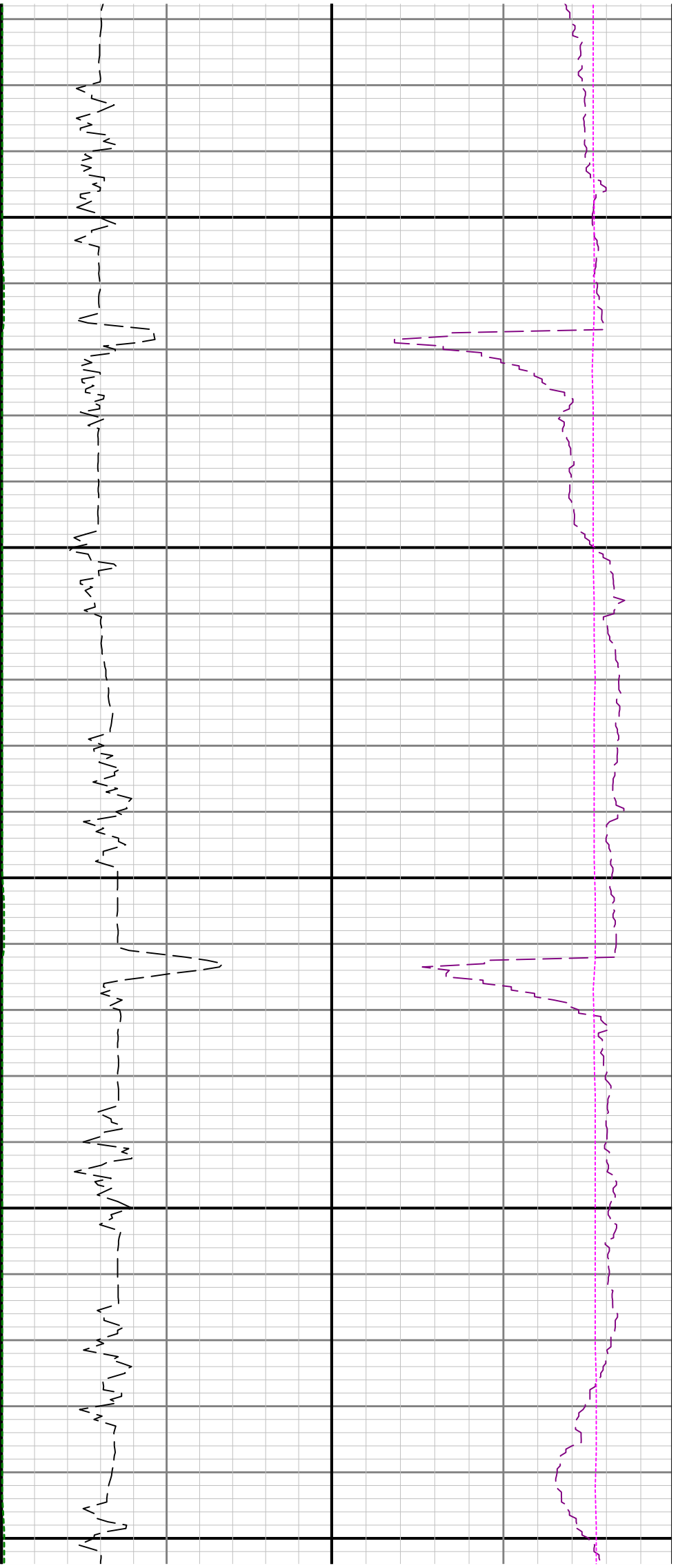


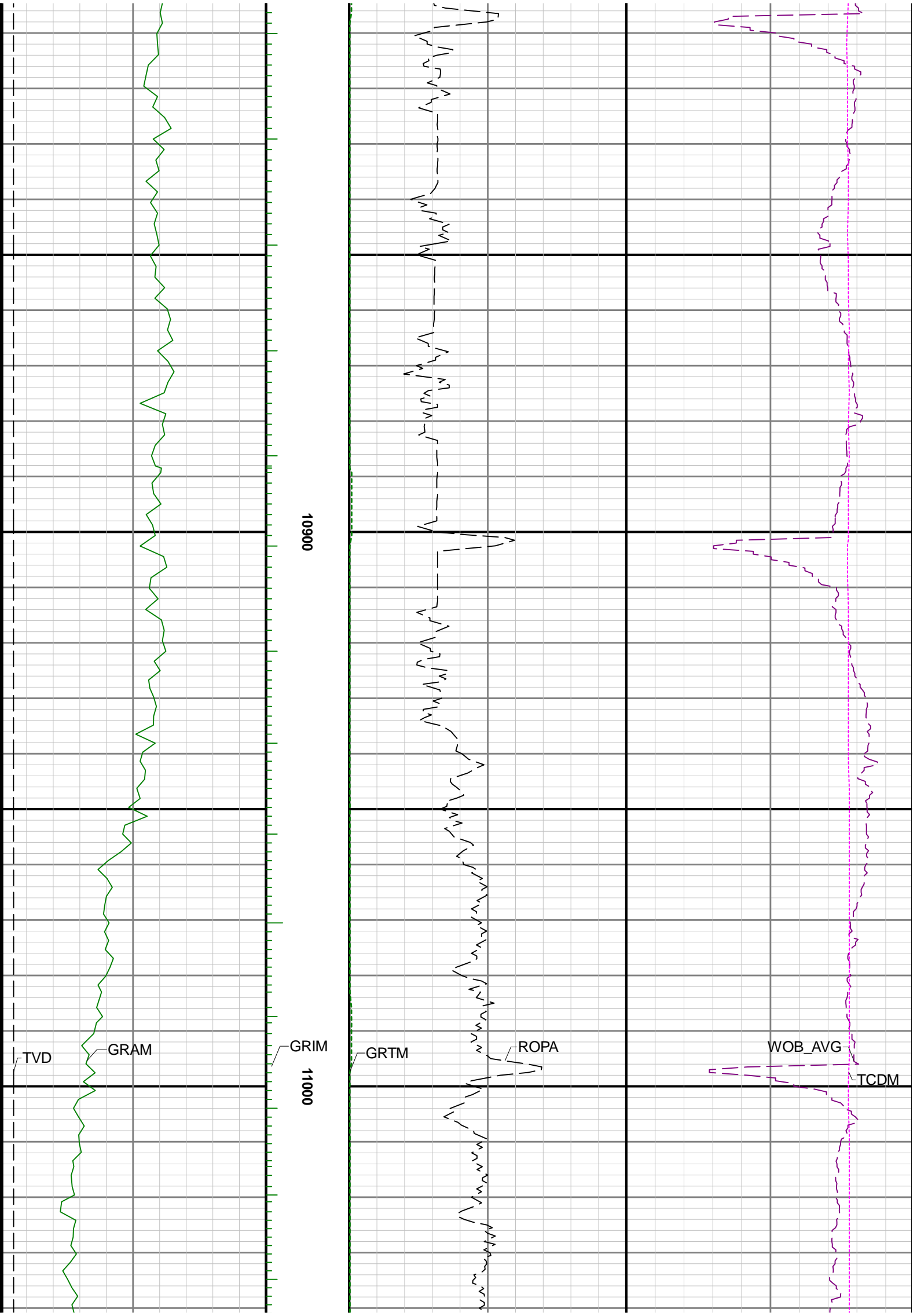


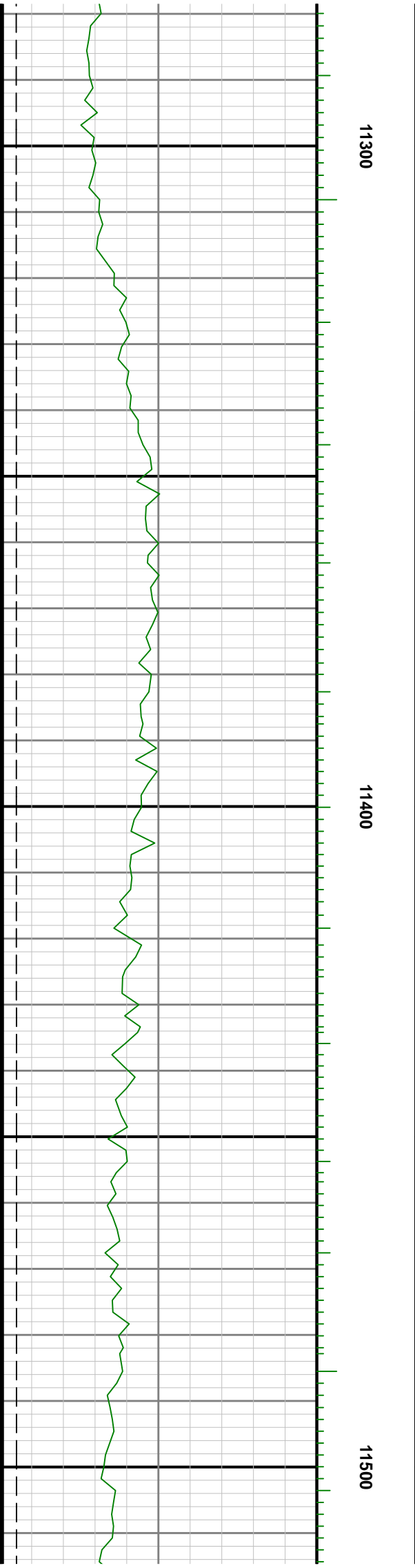
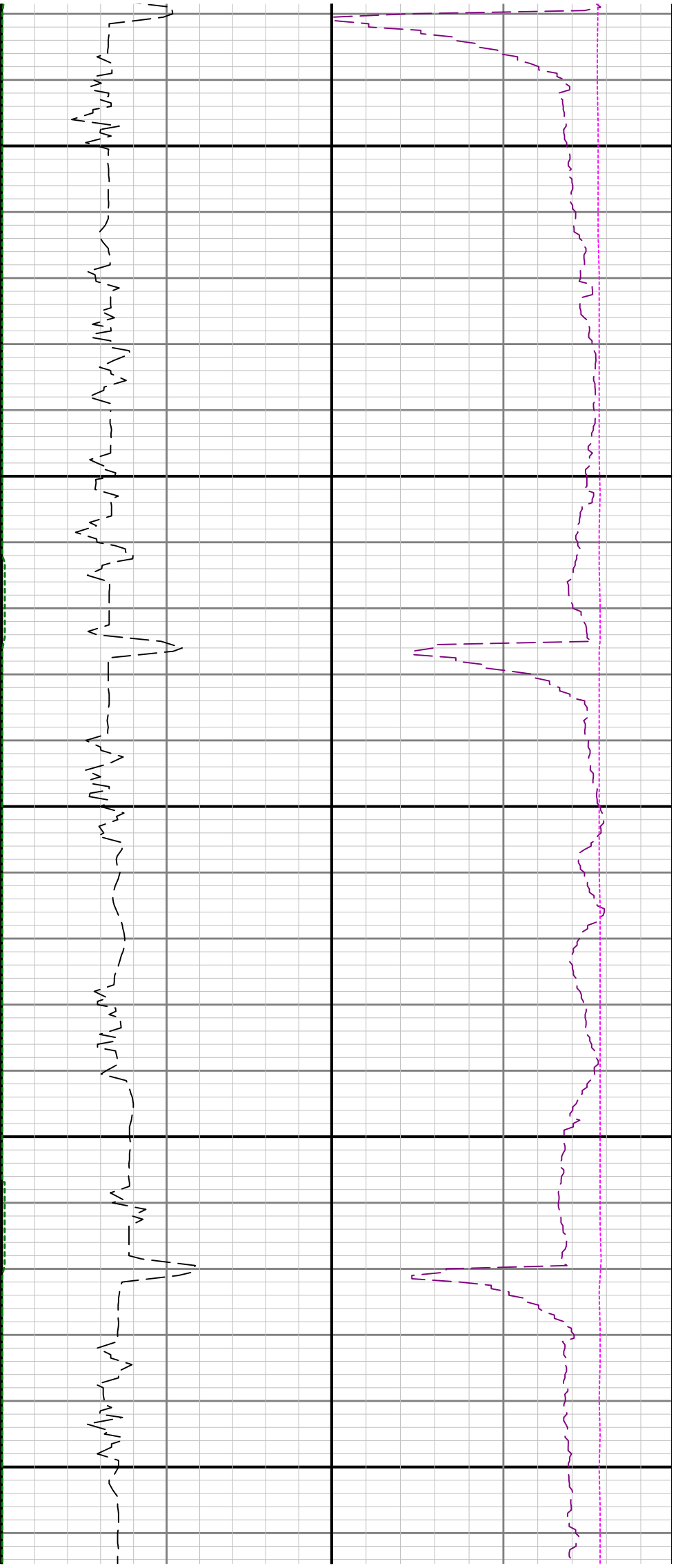


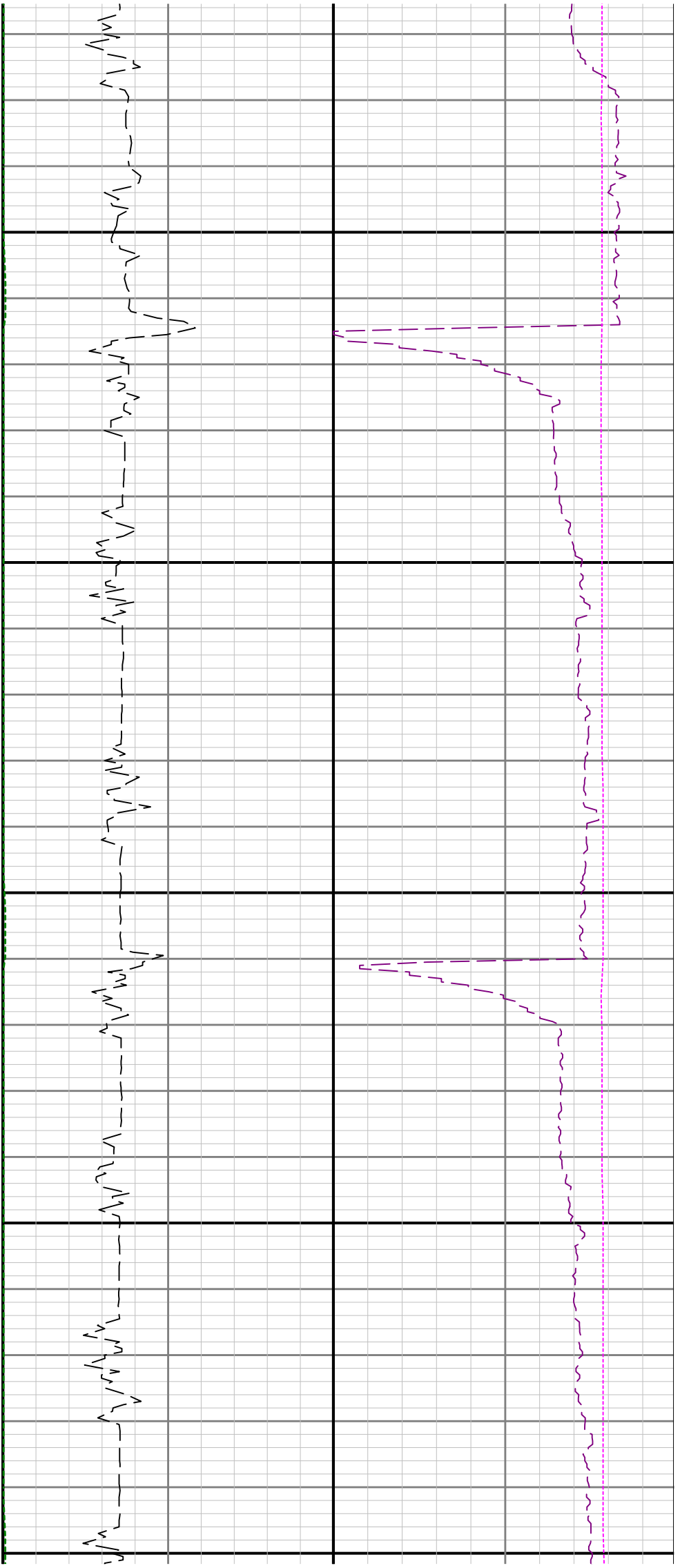






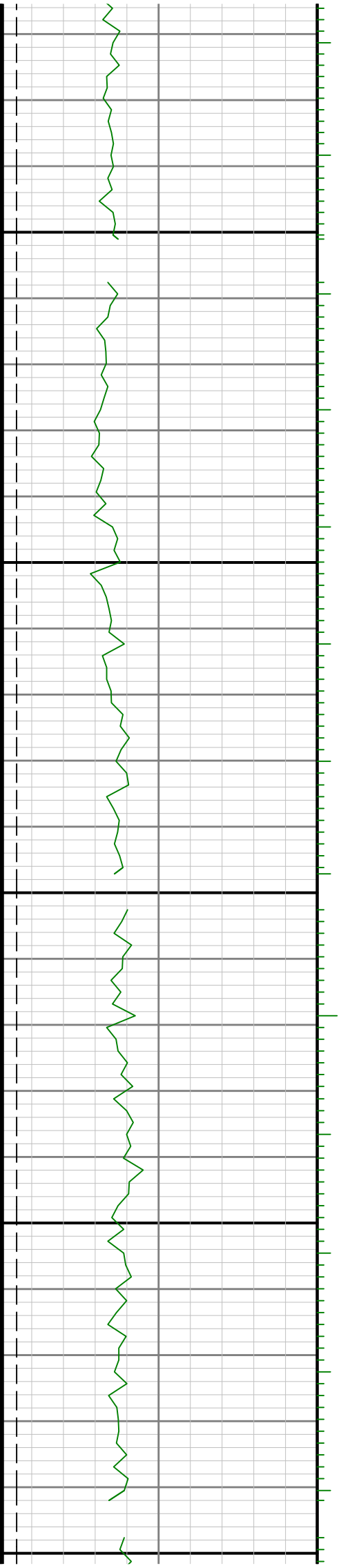


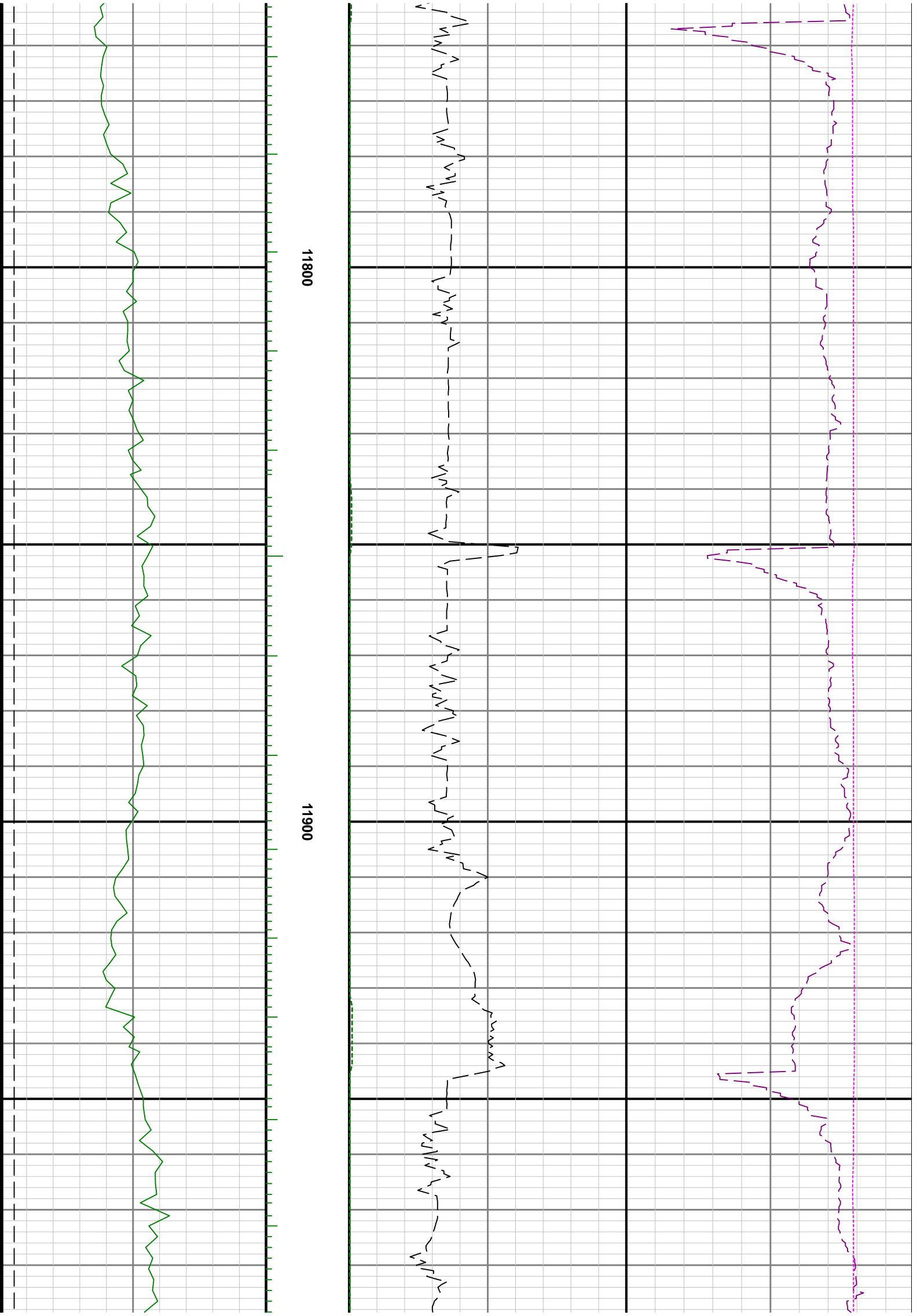


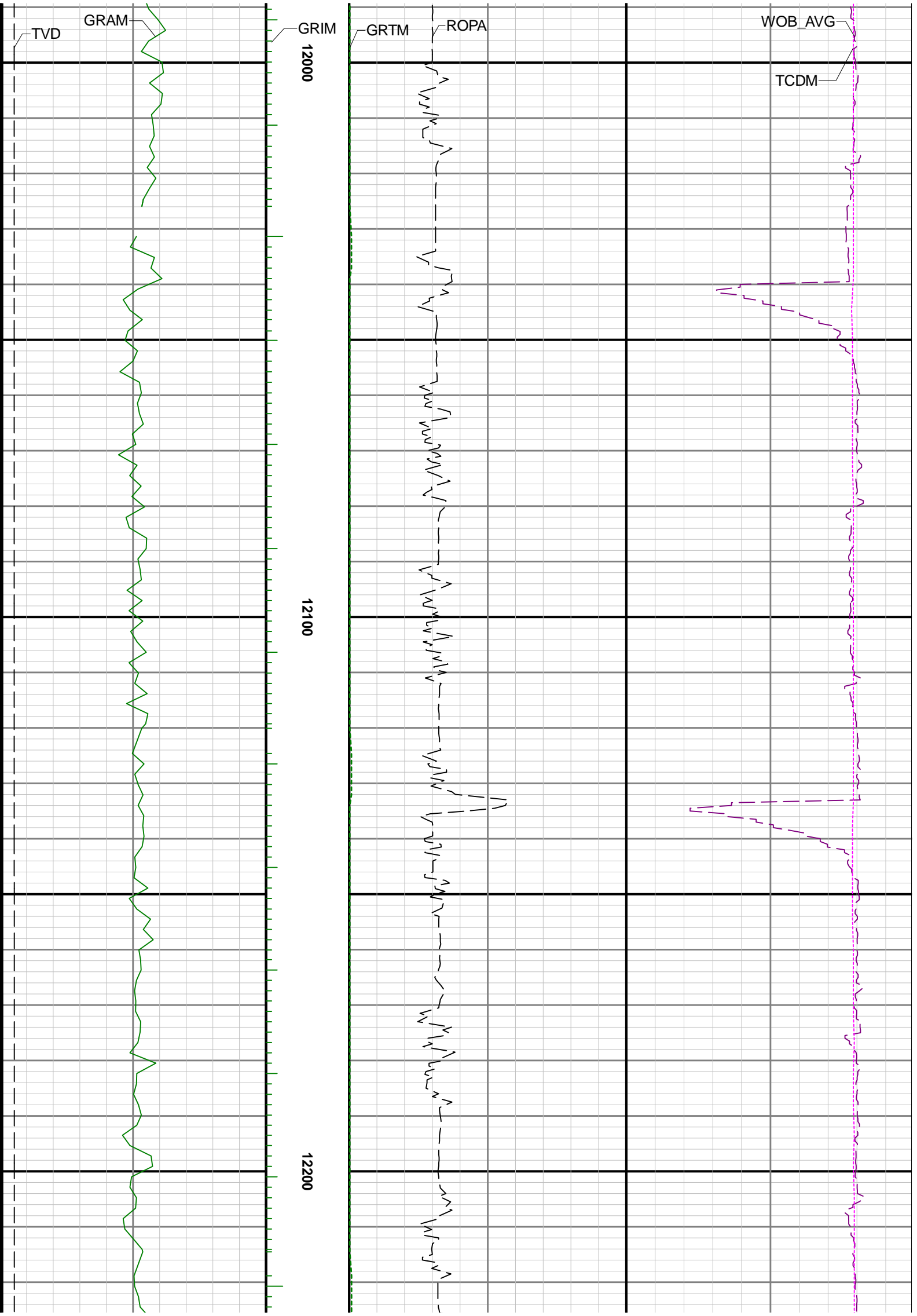


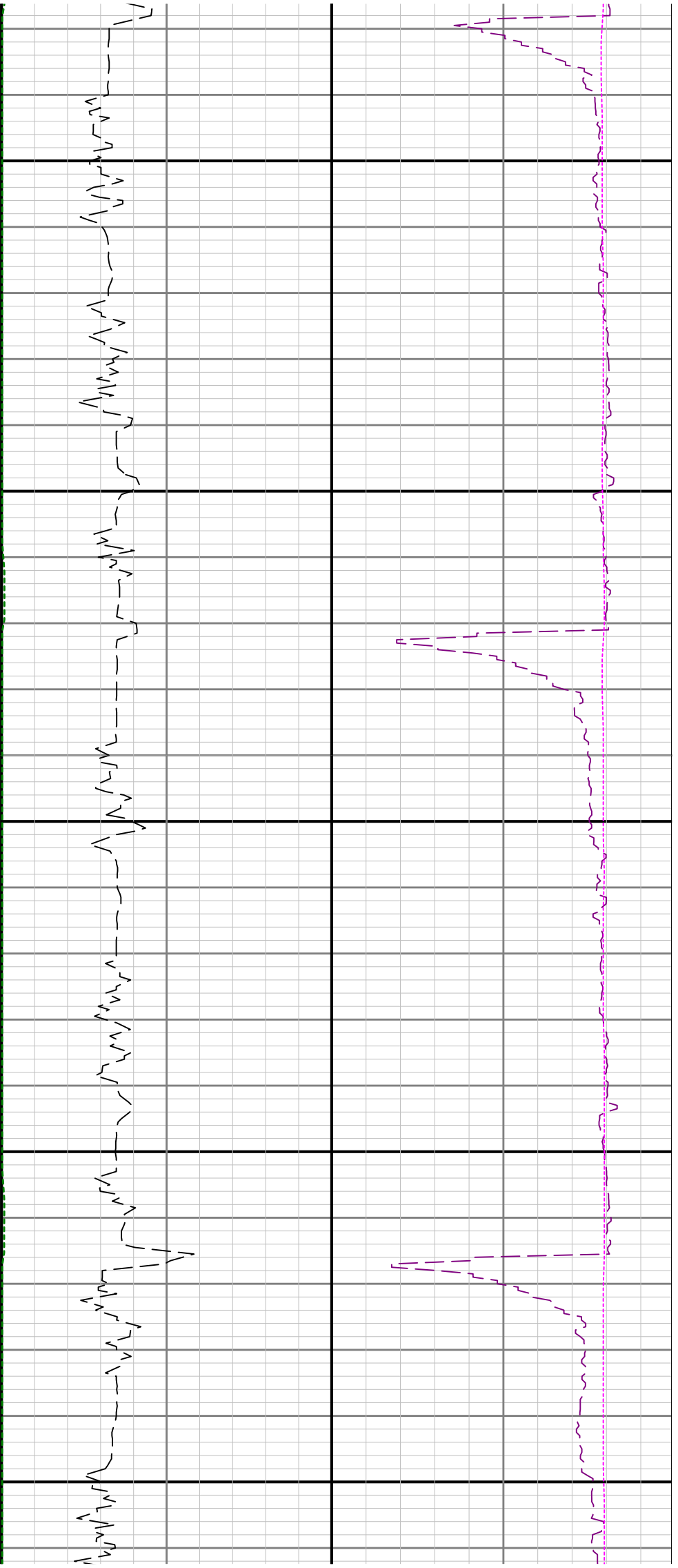
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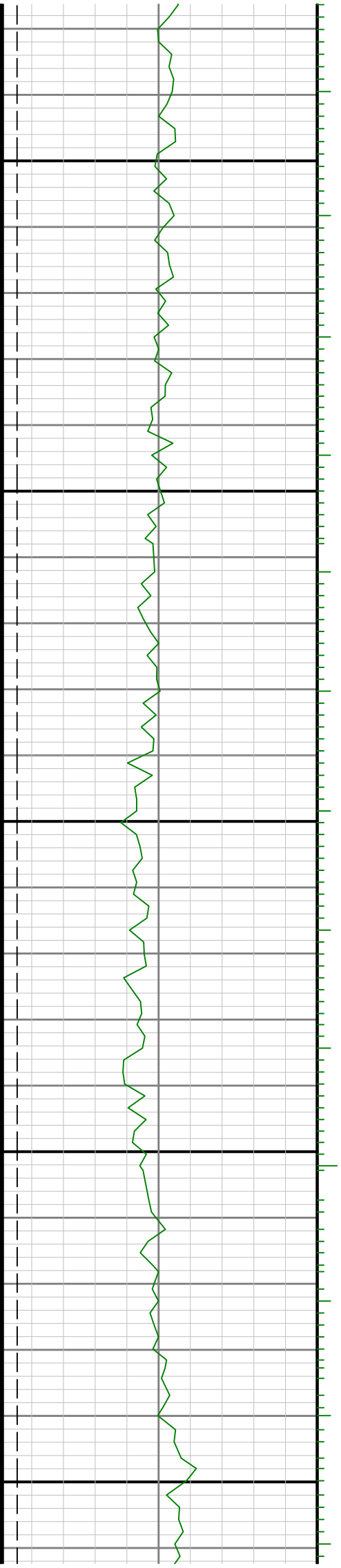


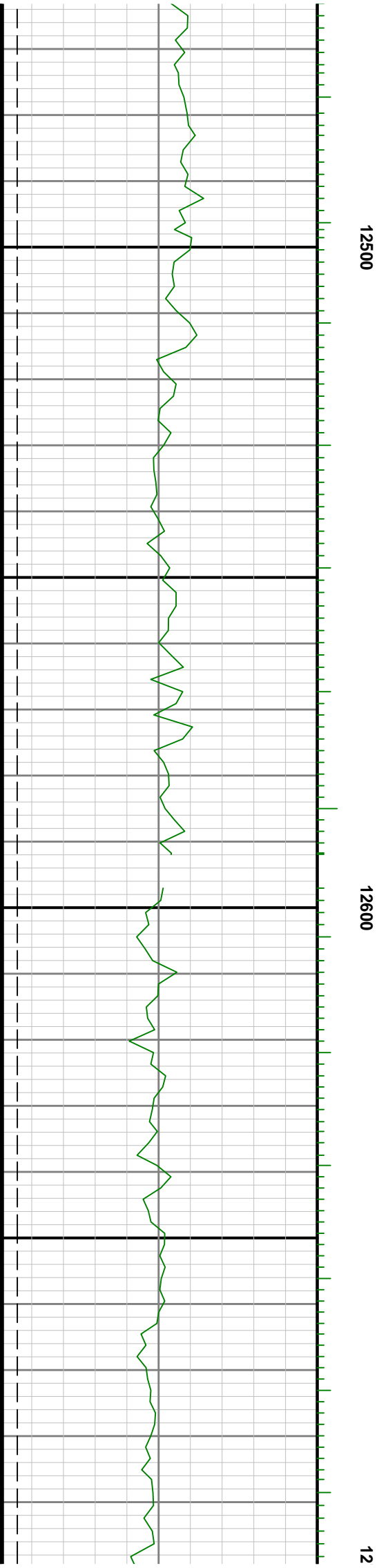
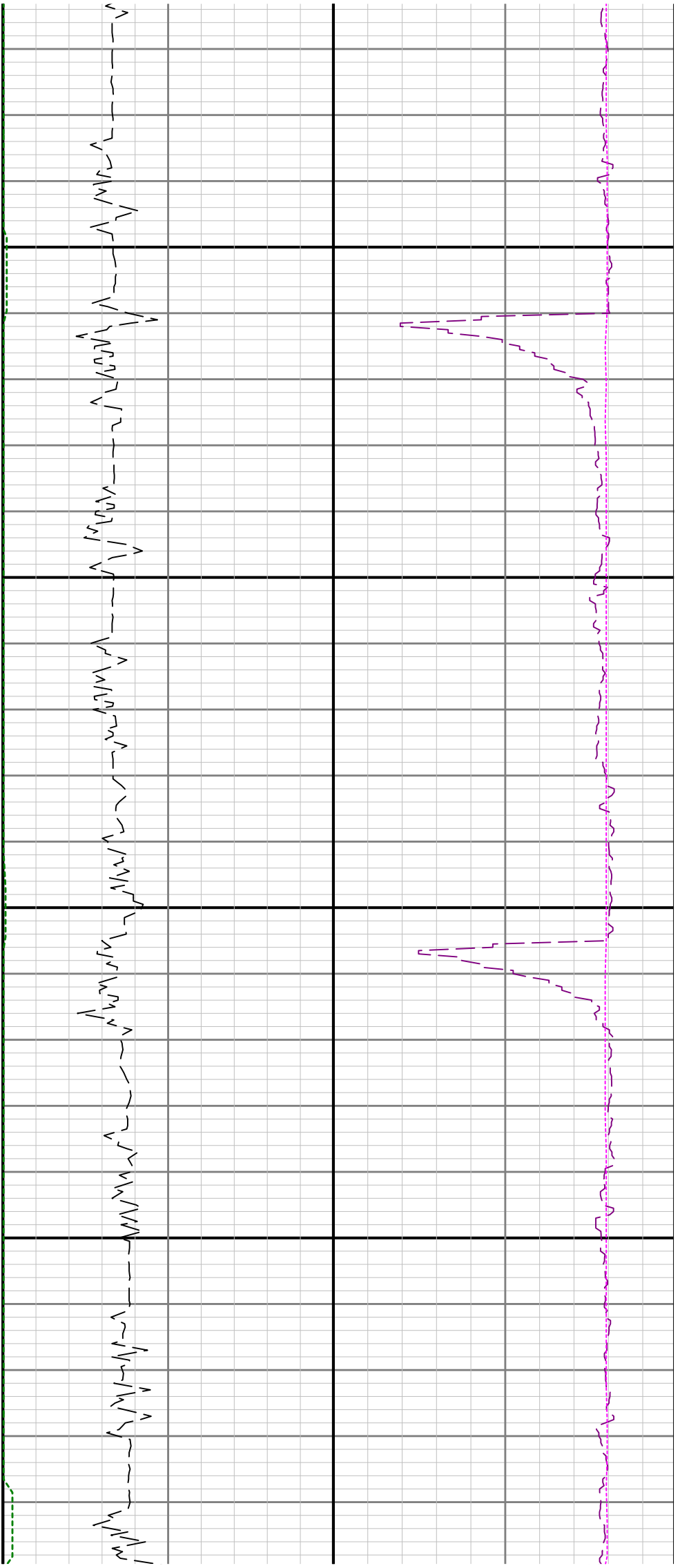


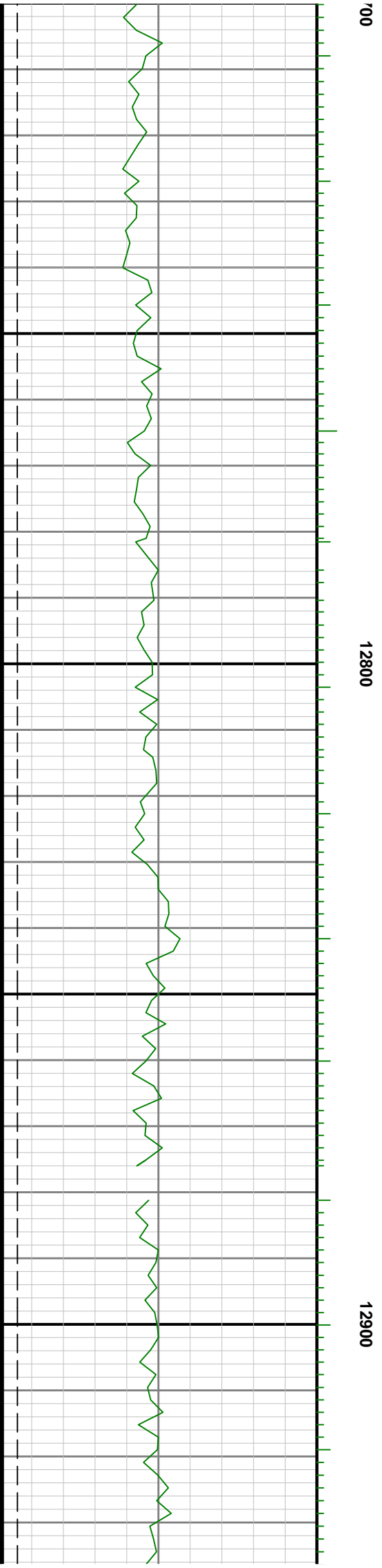
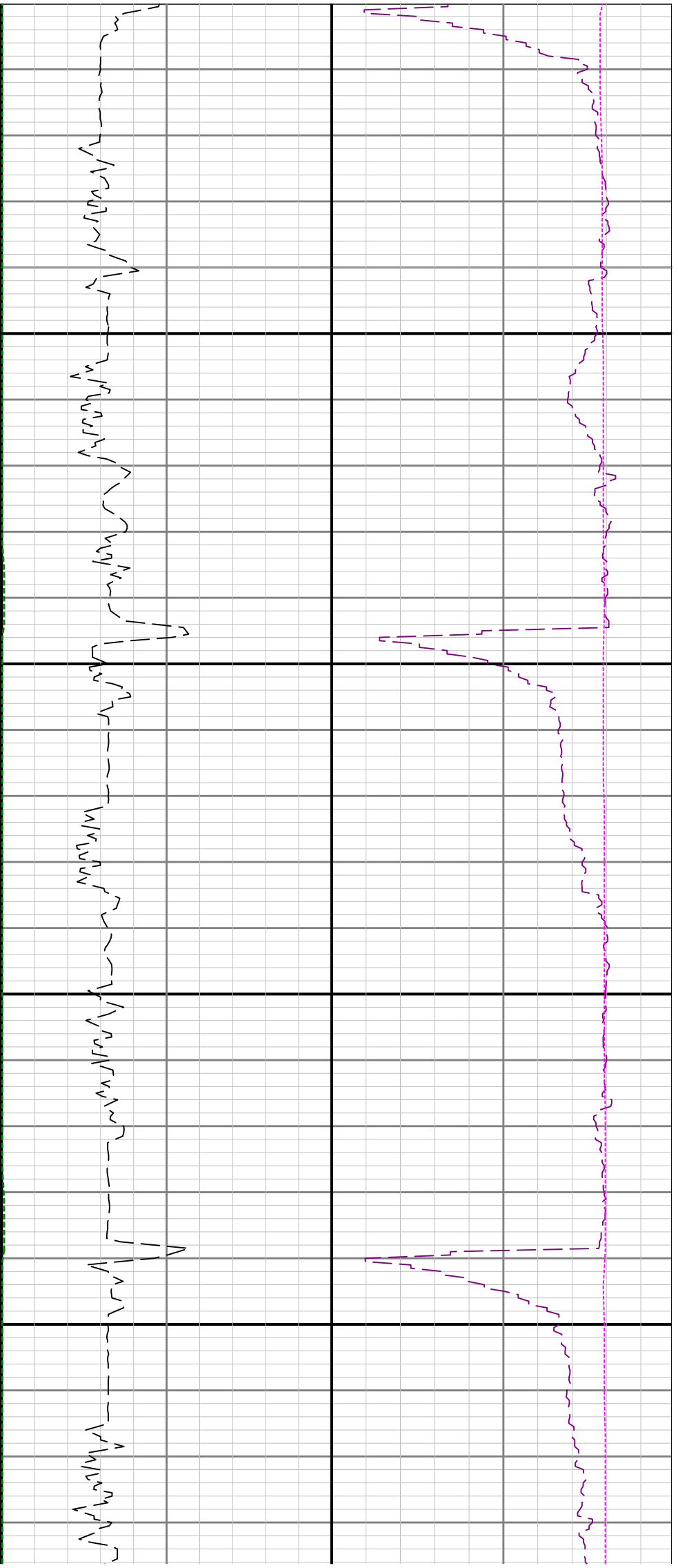


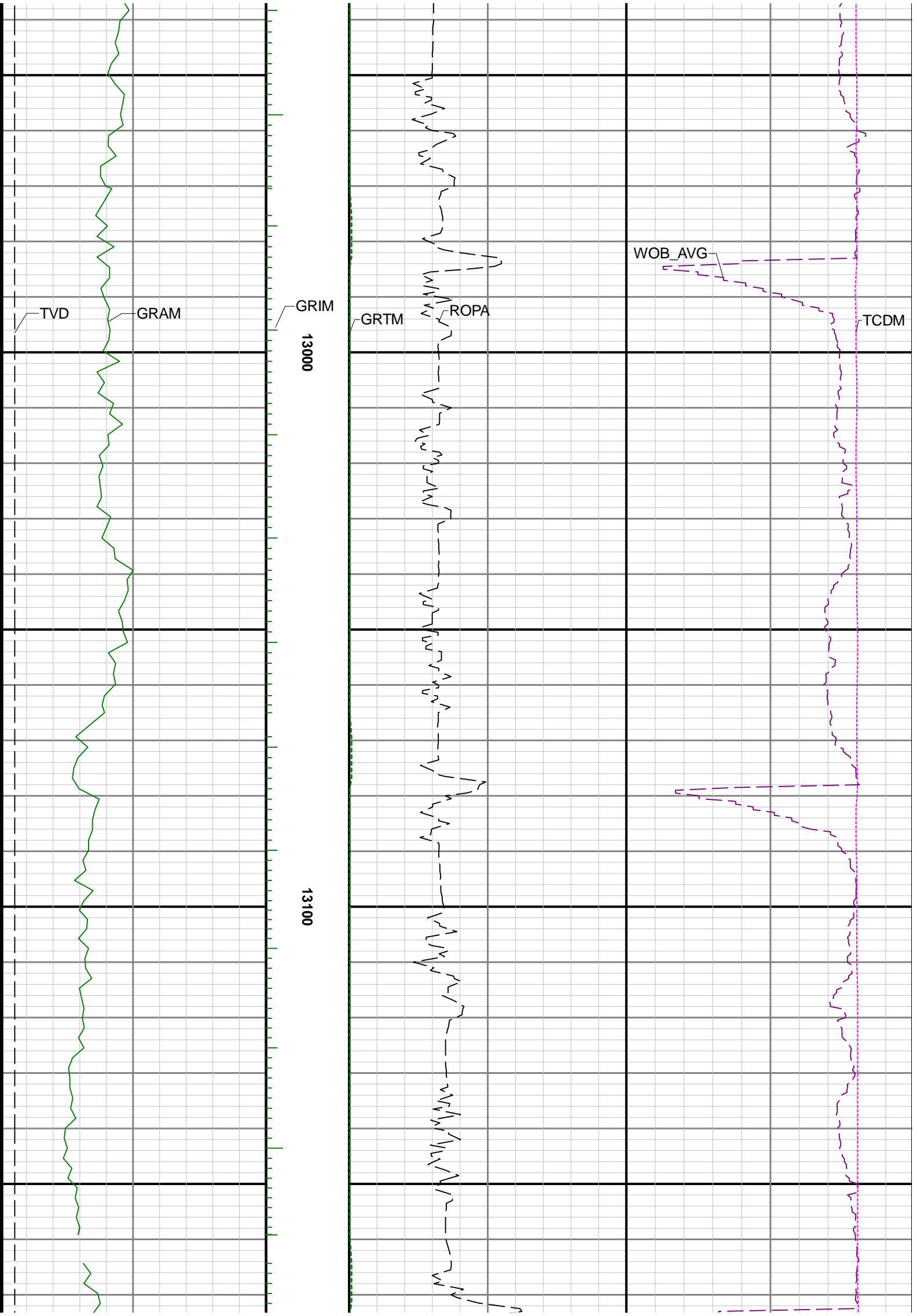
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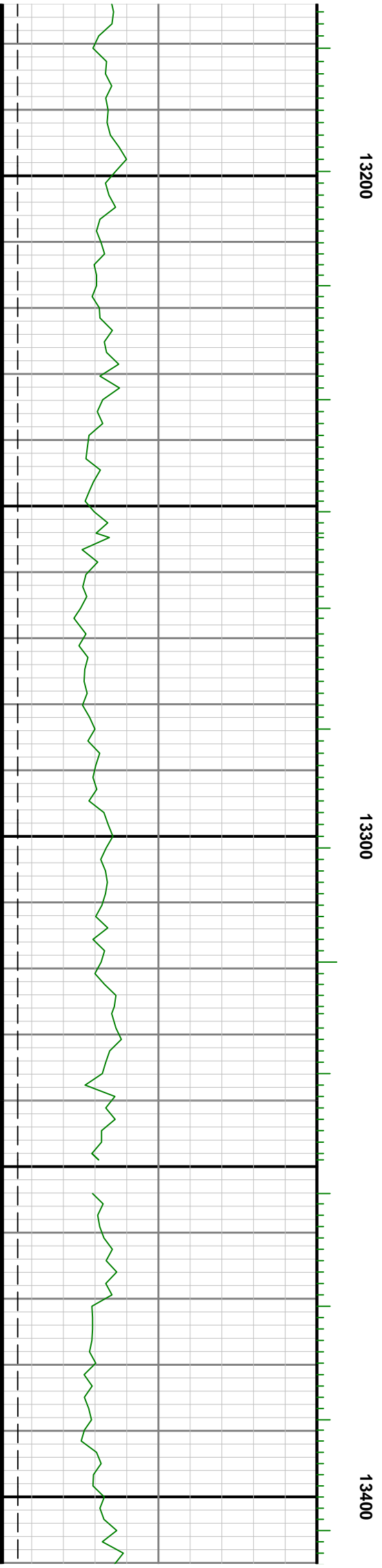
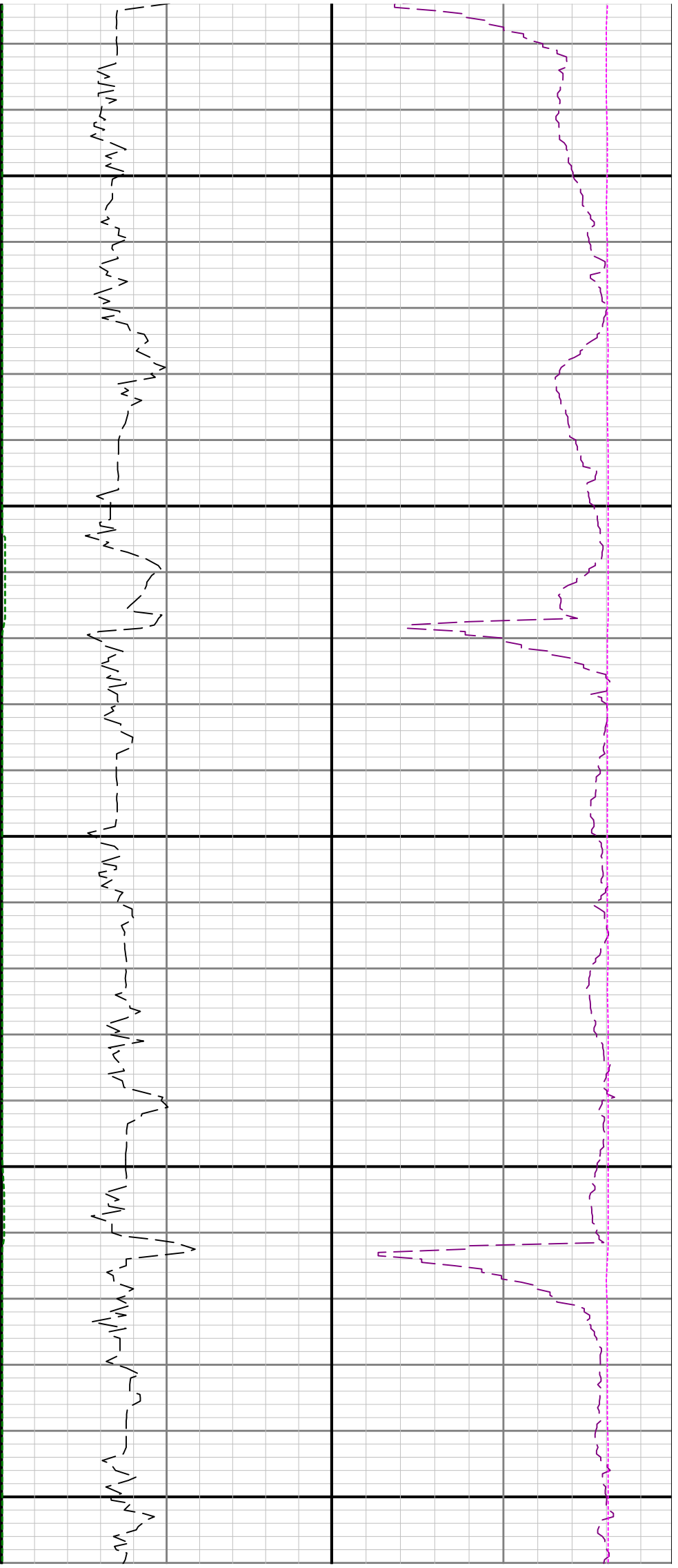
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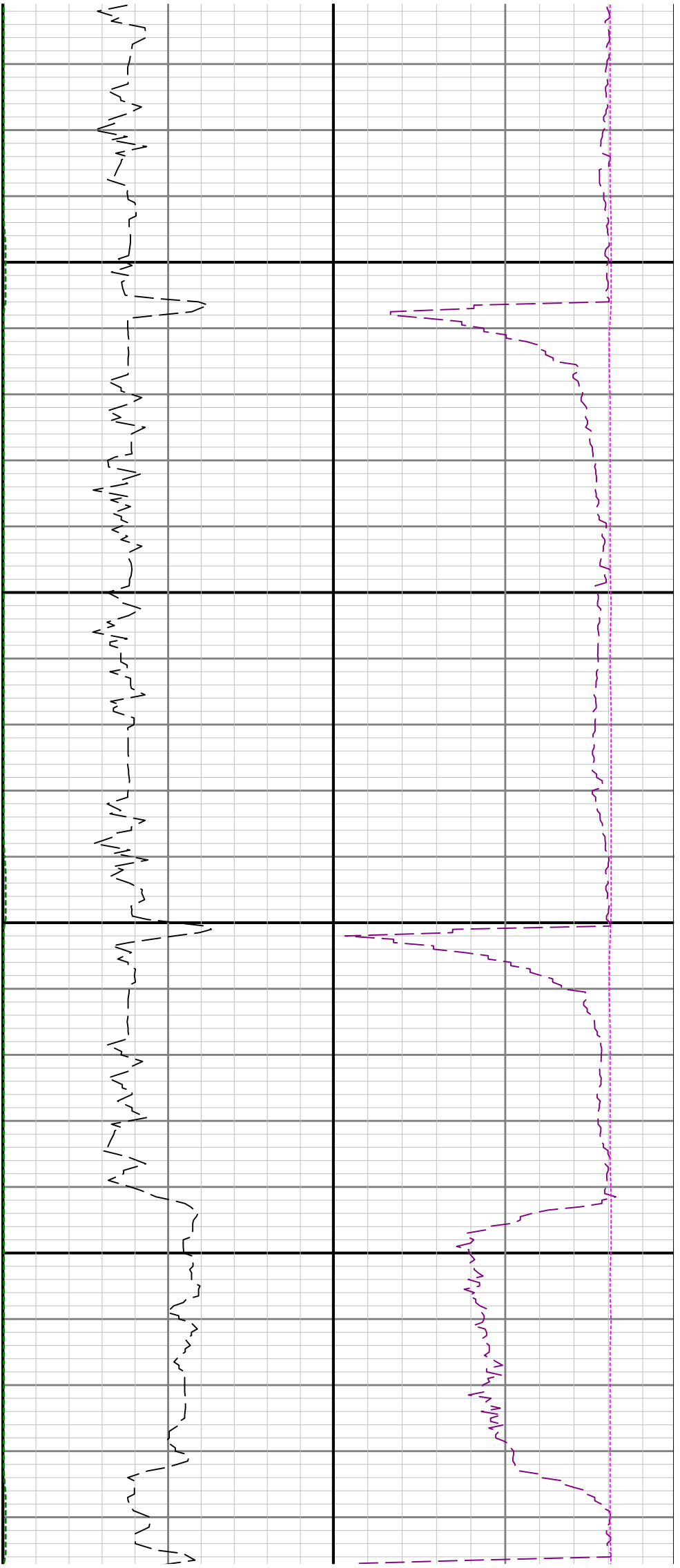






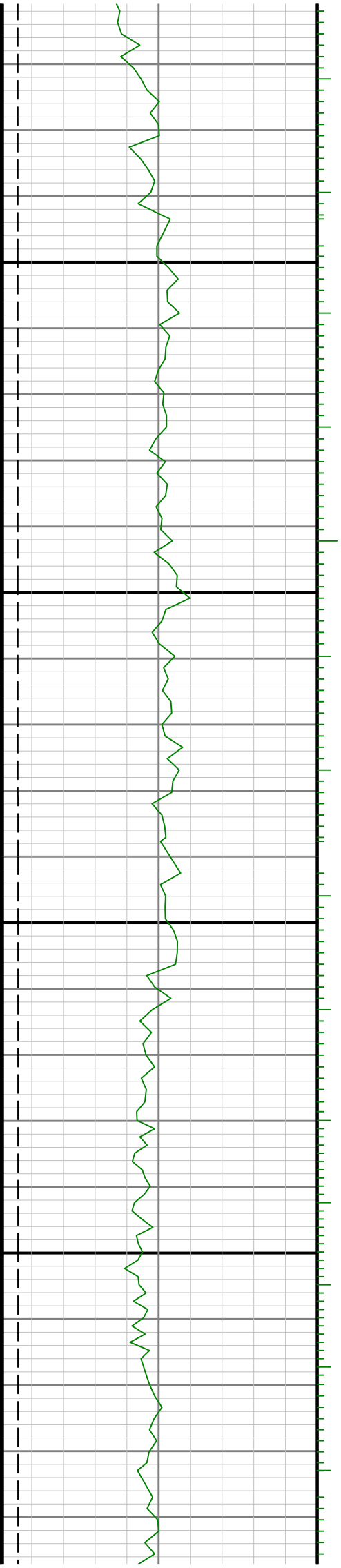


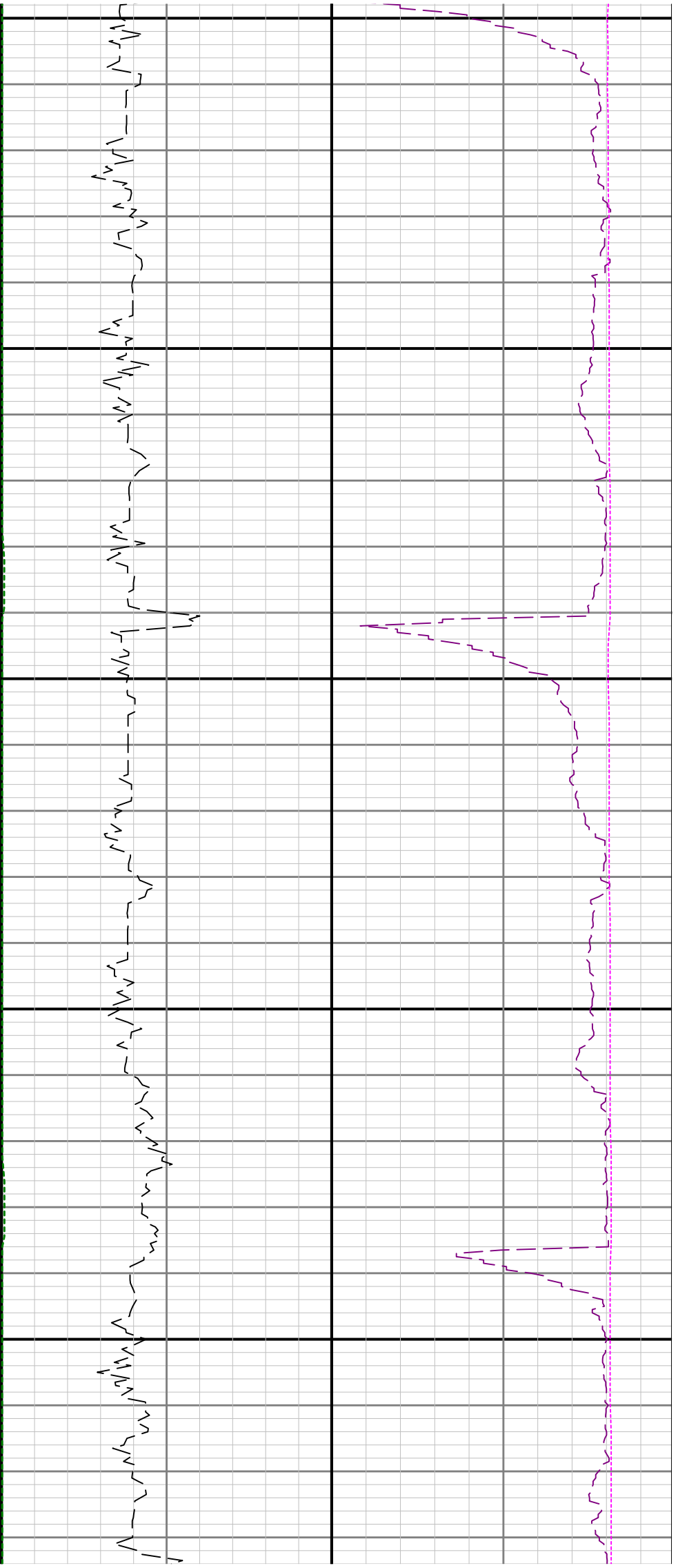




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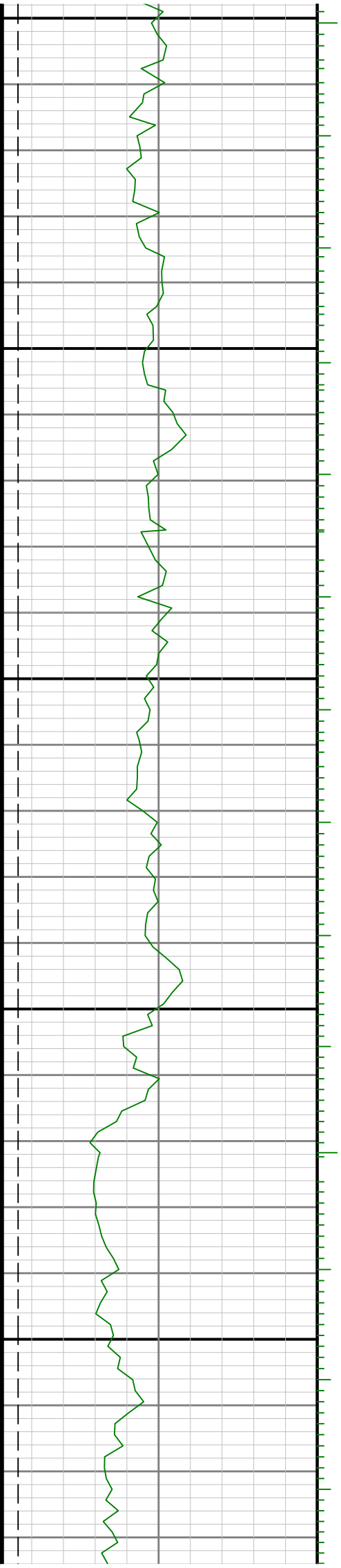
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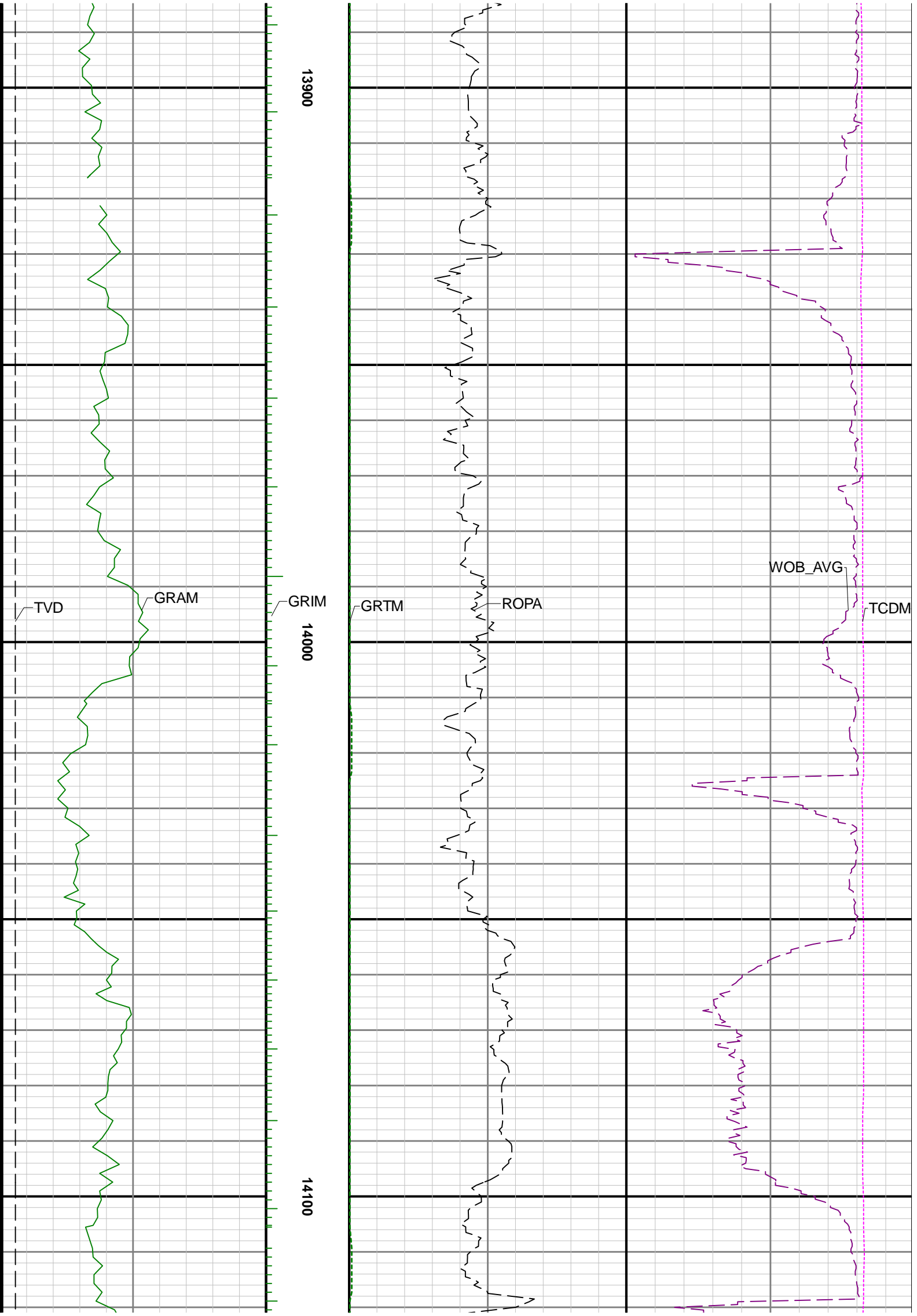


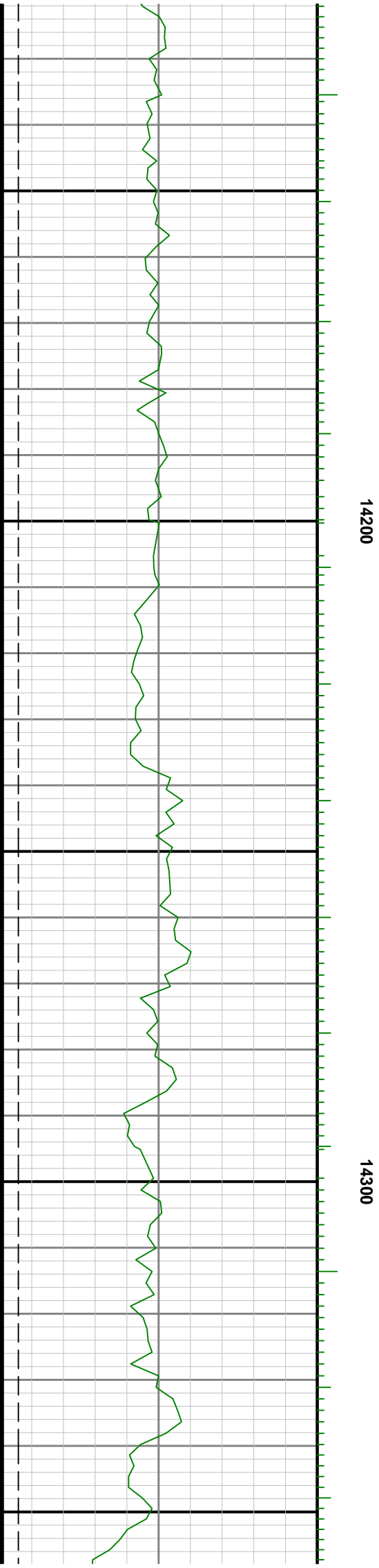
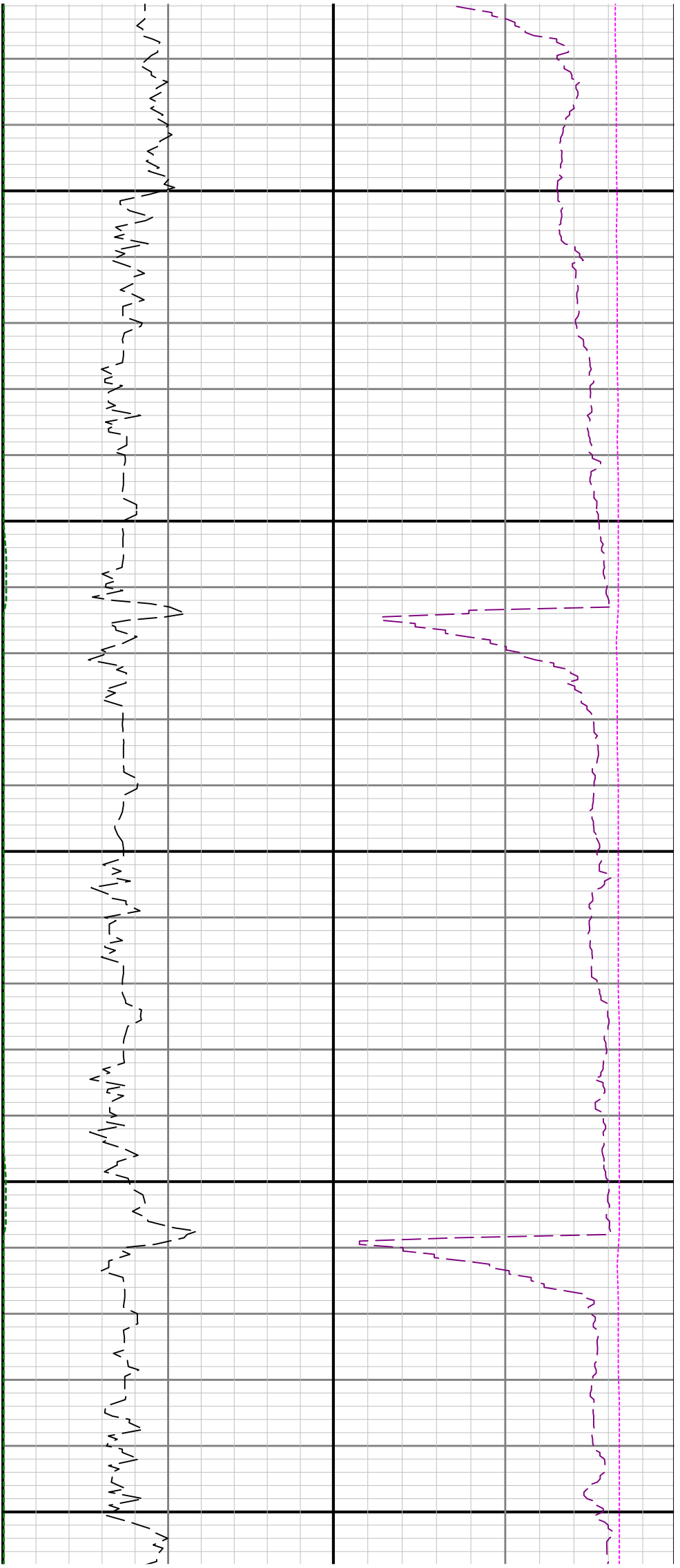


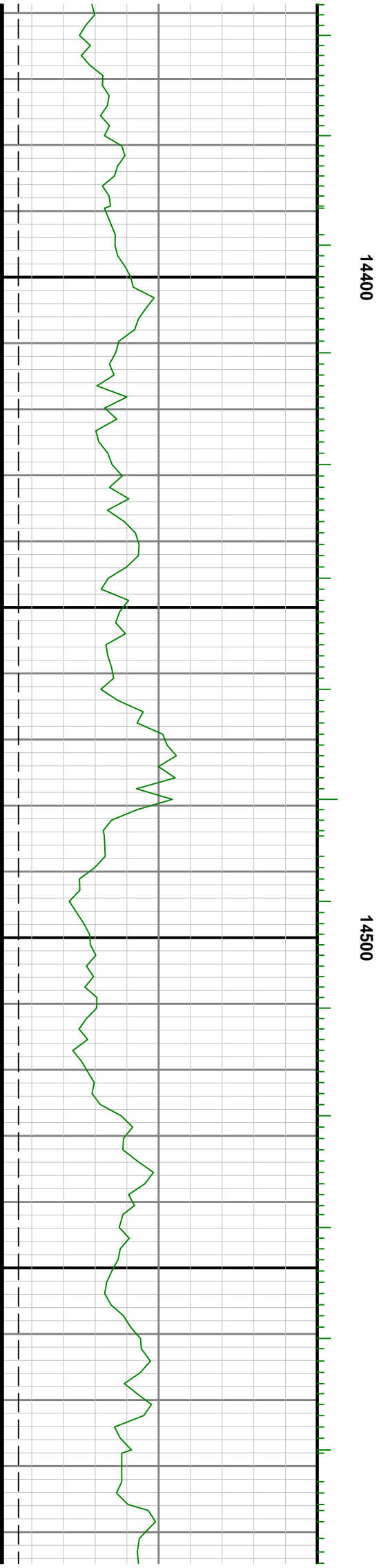
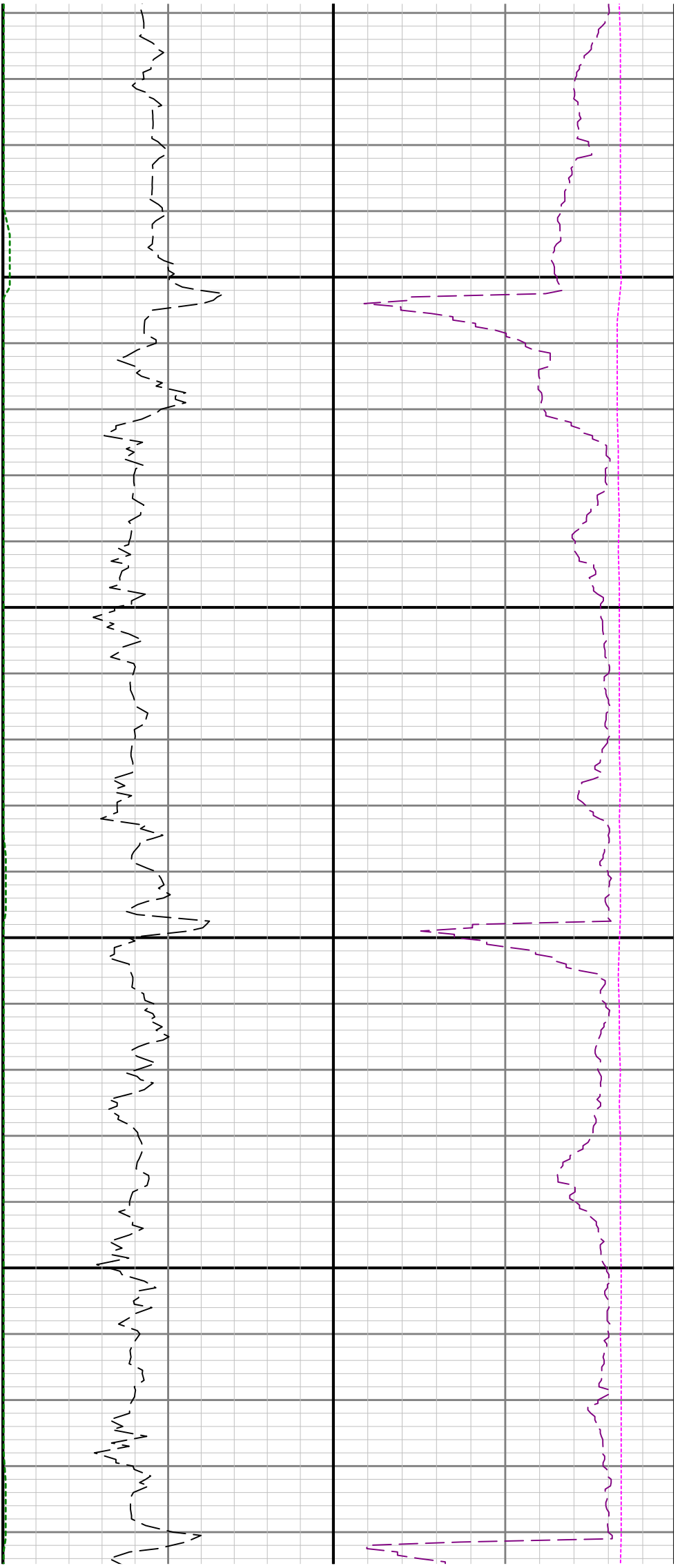
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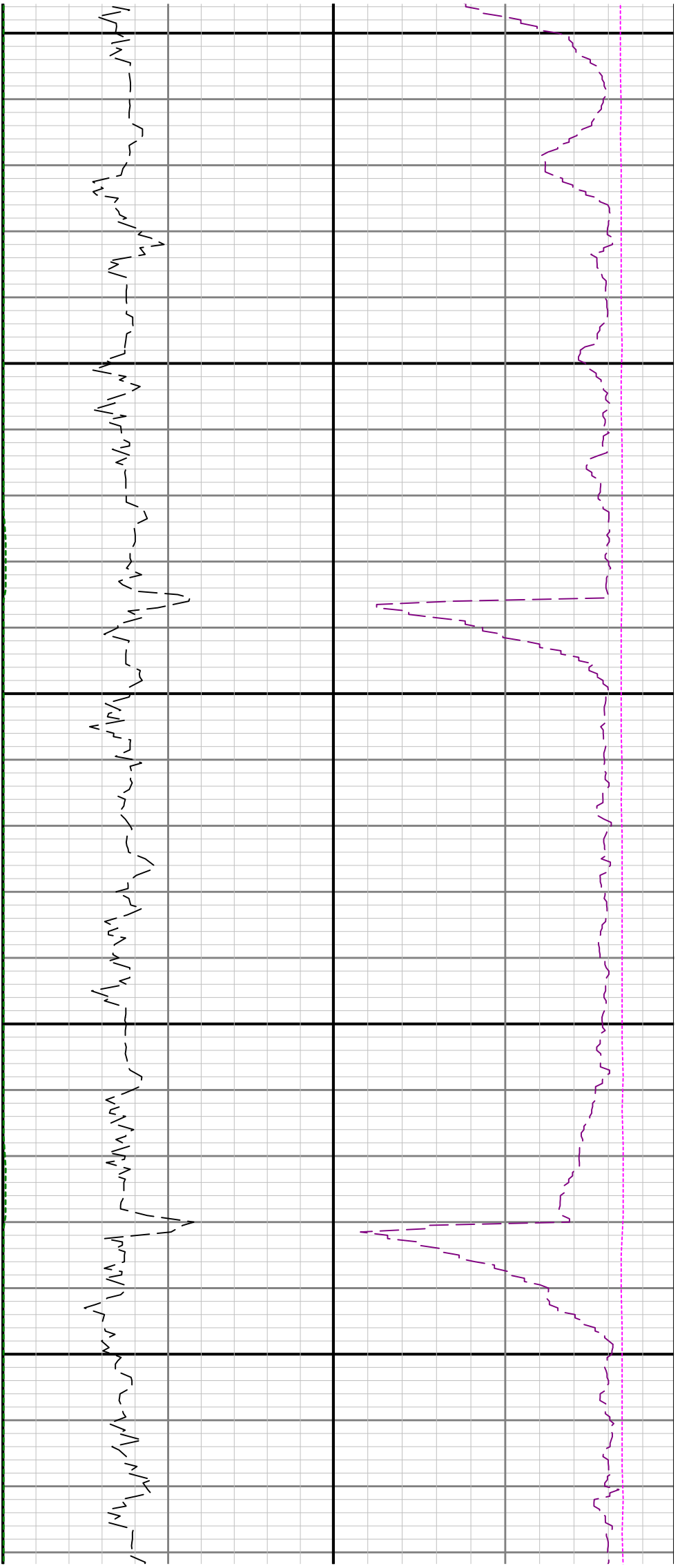
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14600

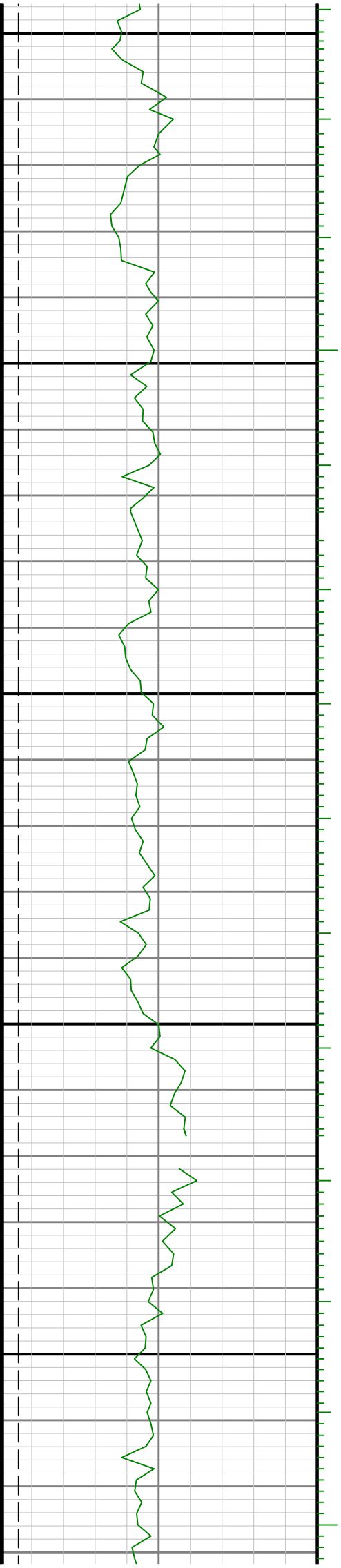
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14800

14600

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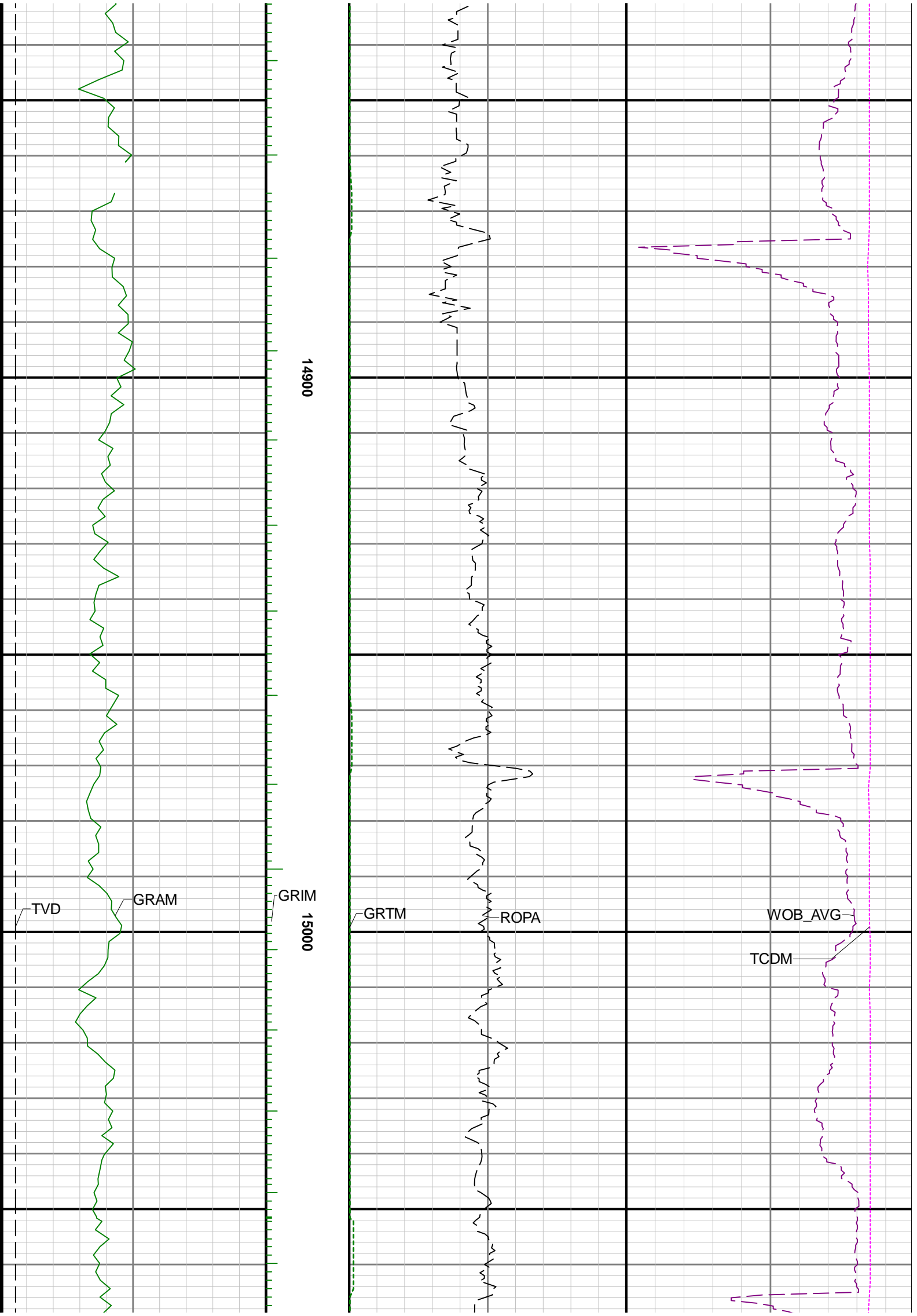
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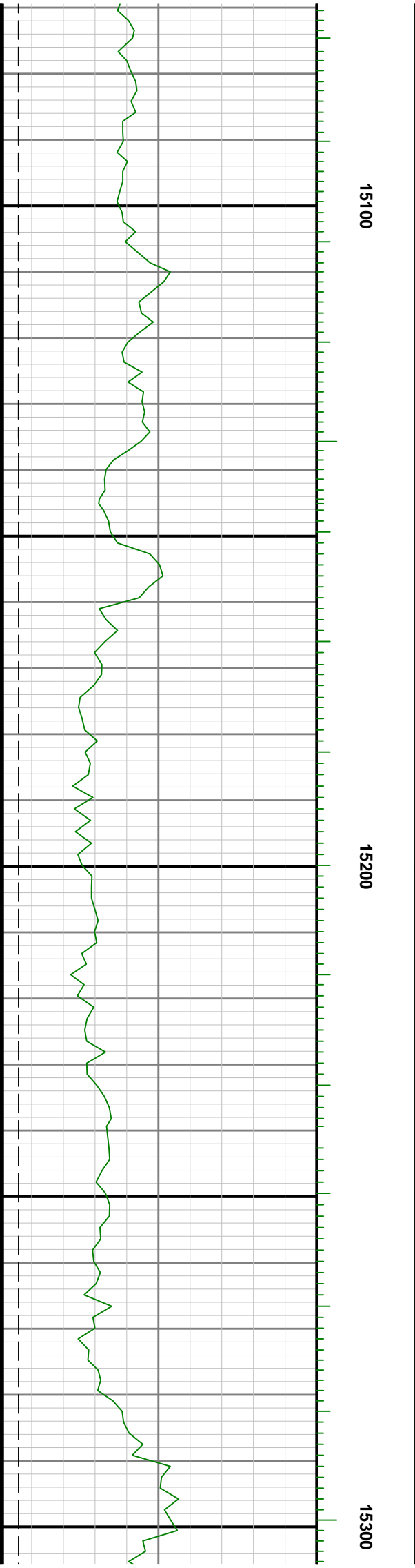
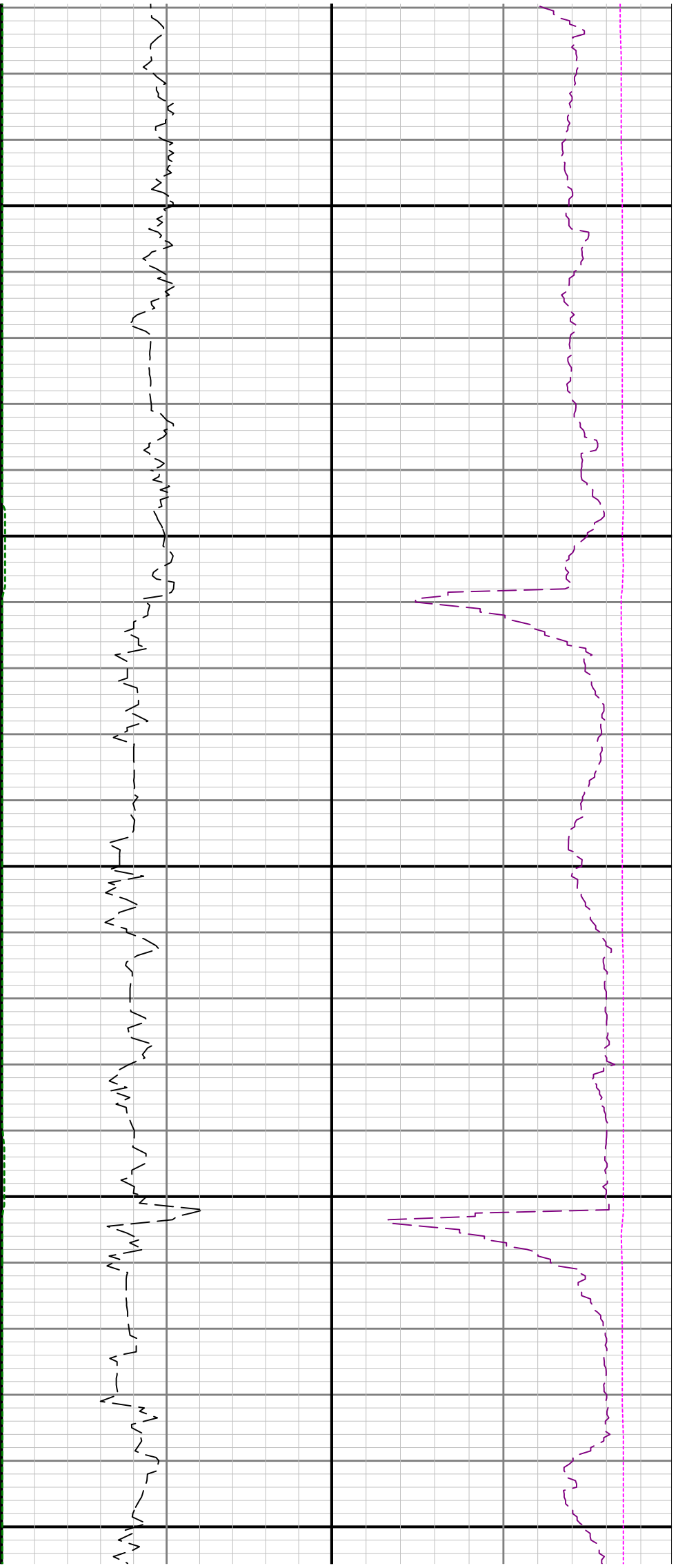


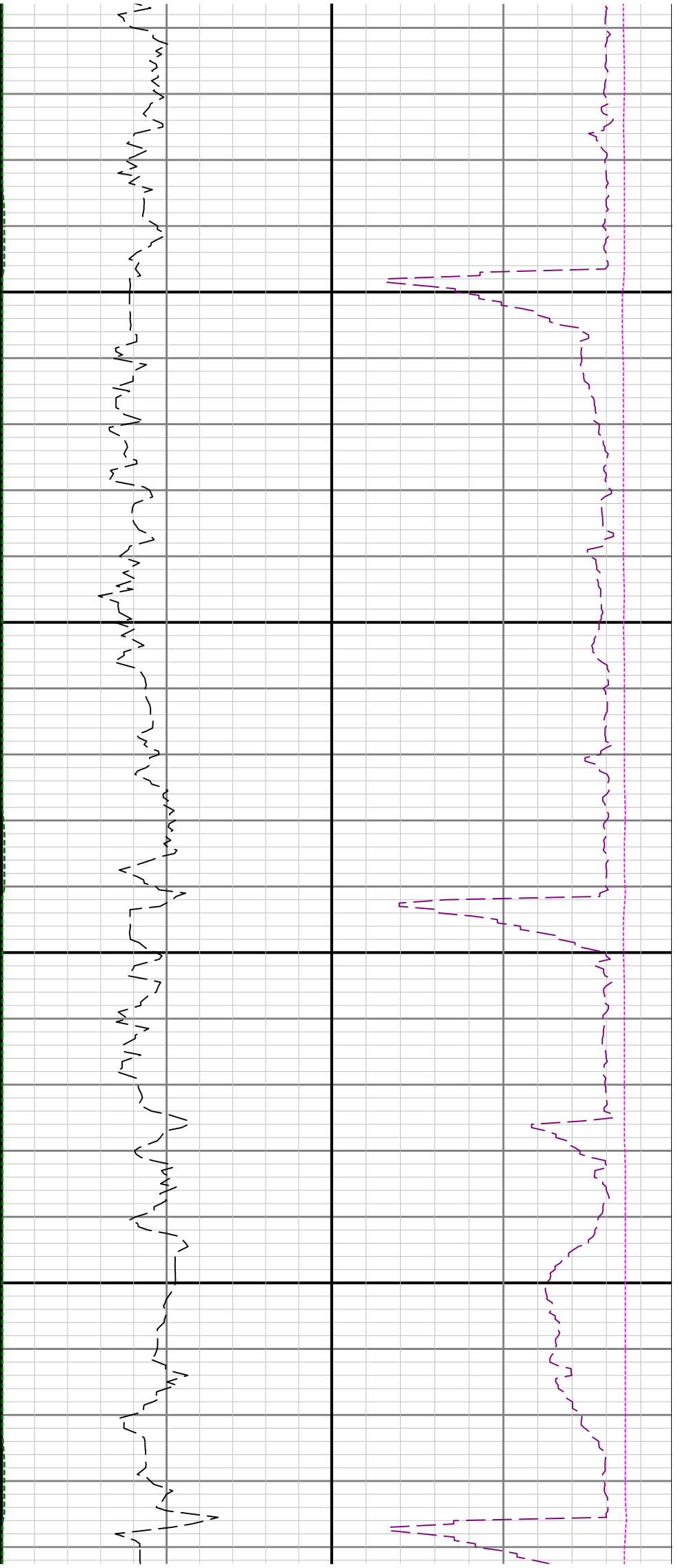
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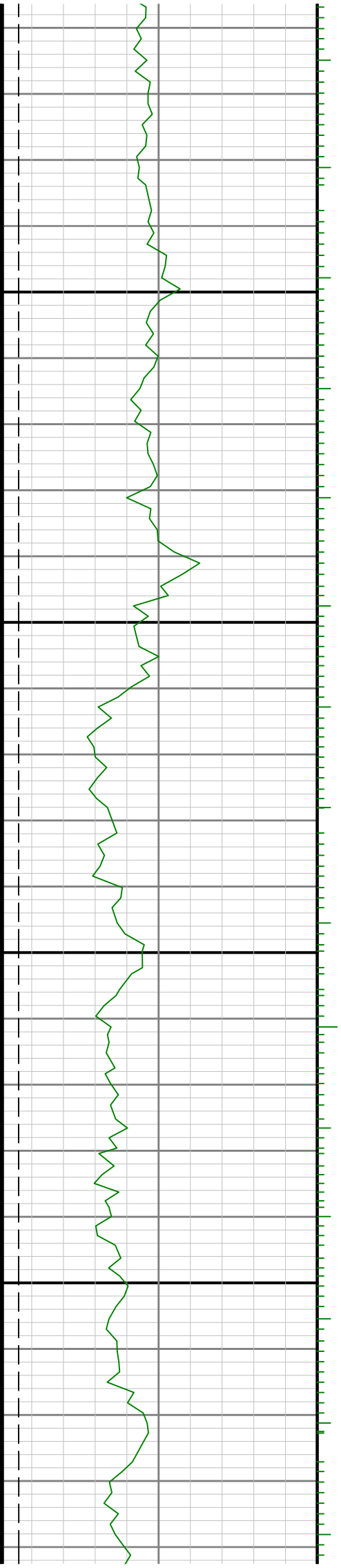






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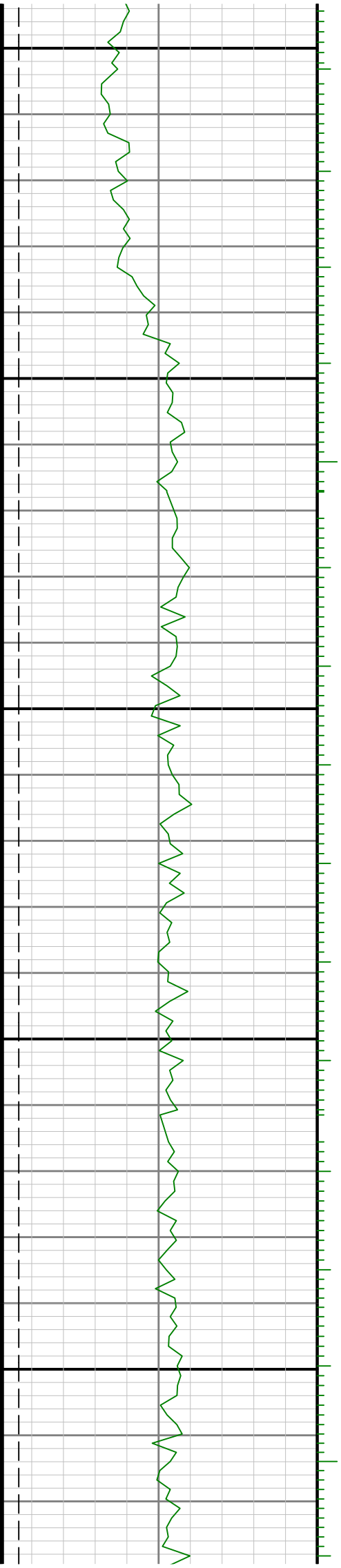
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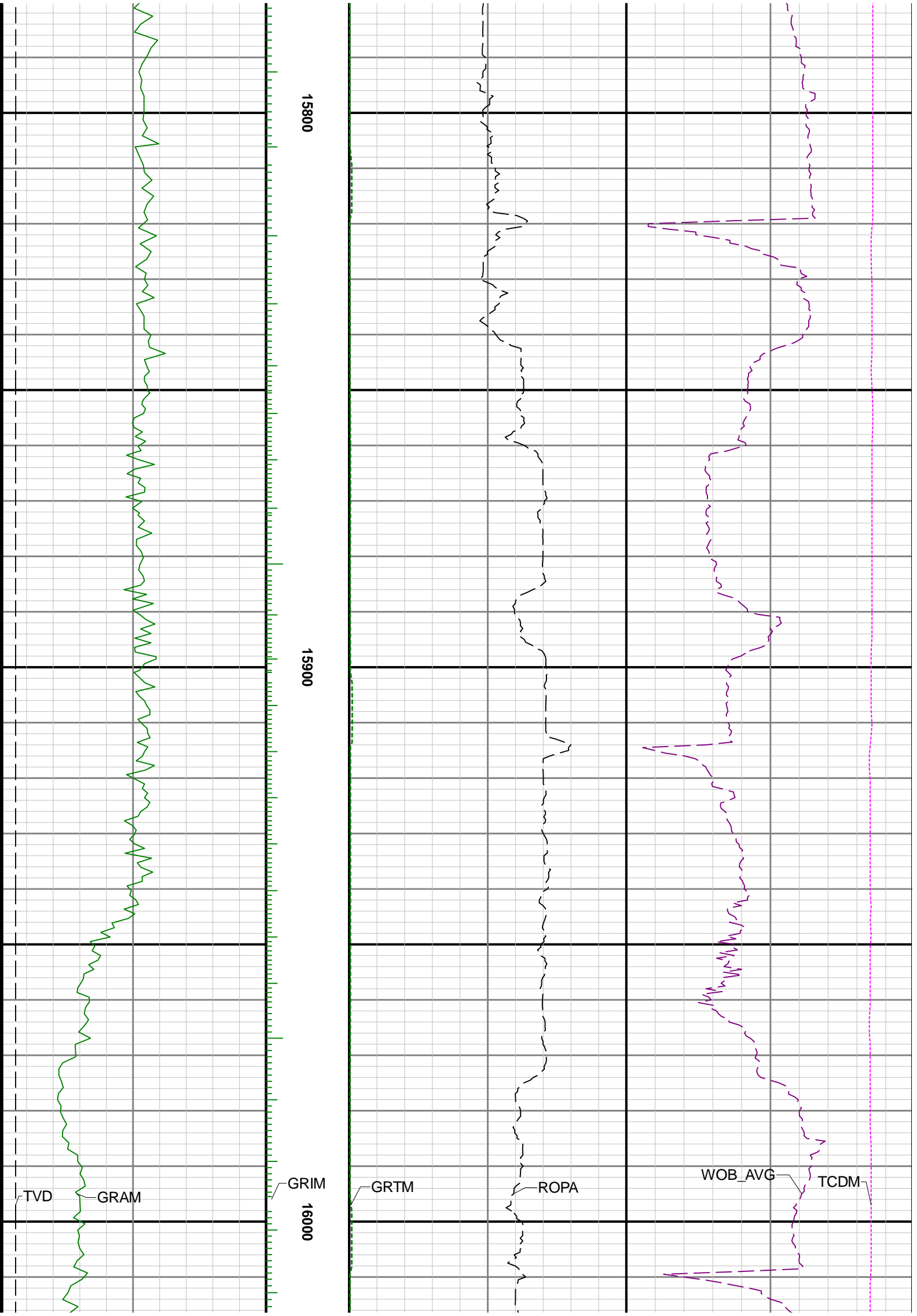


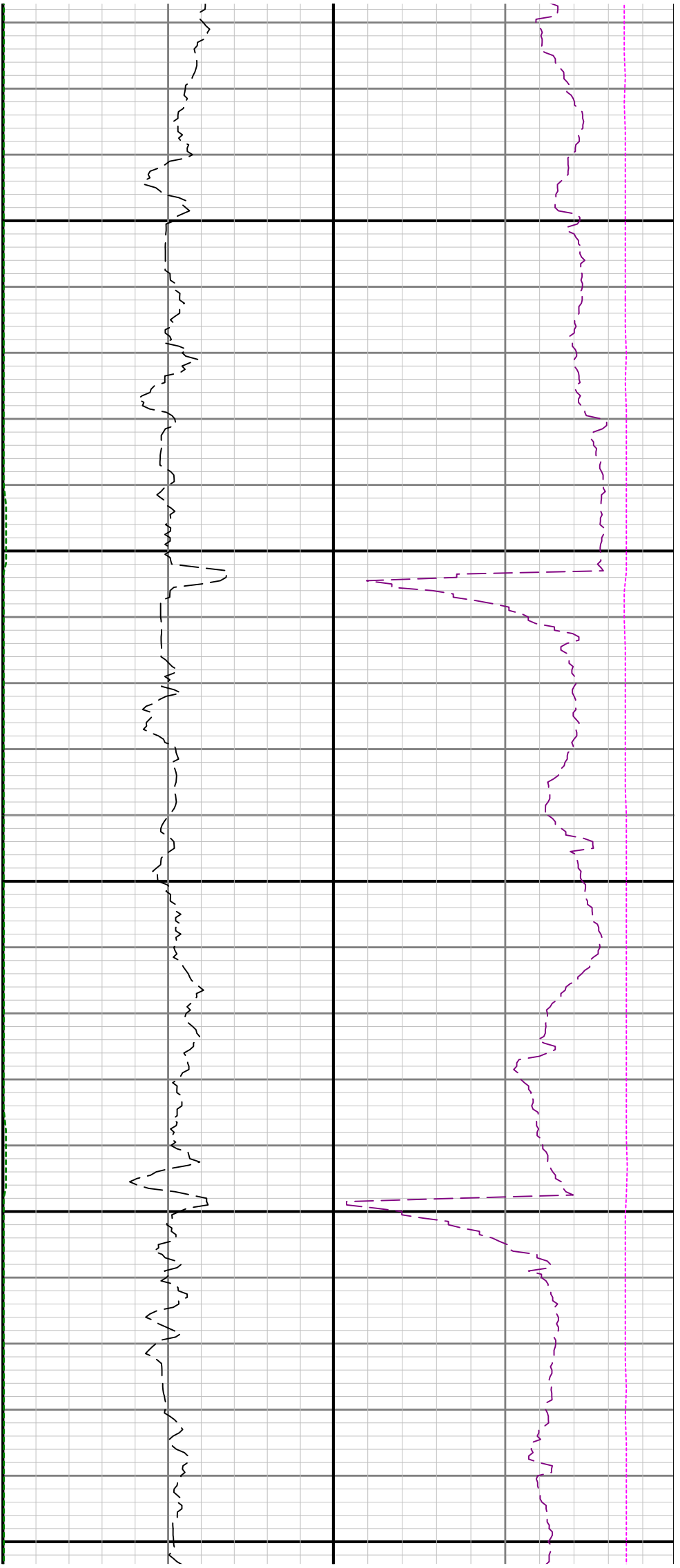


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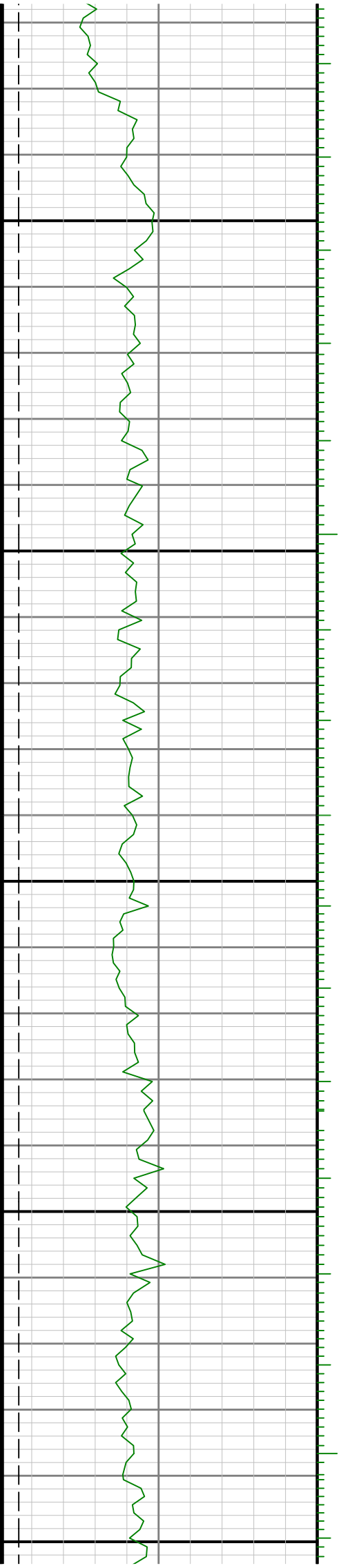


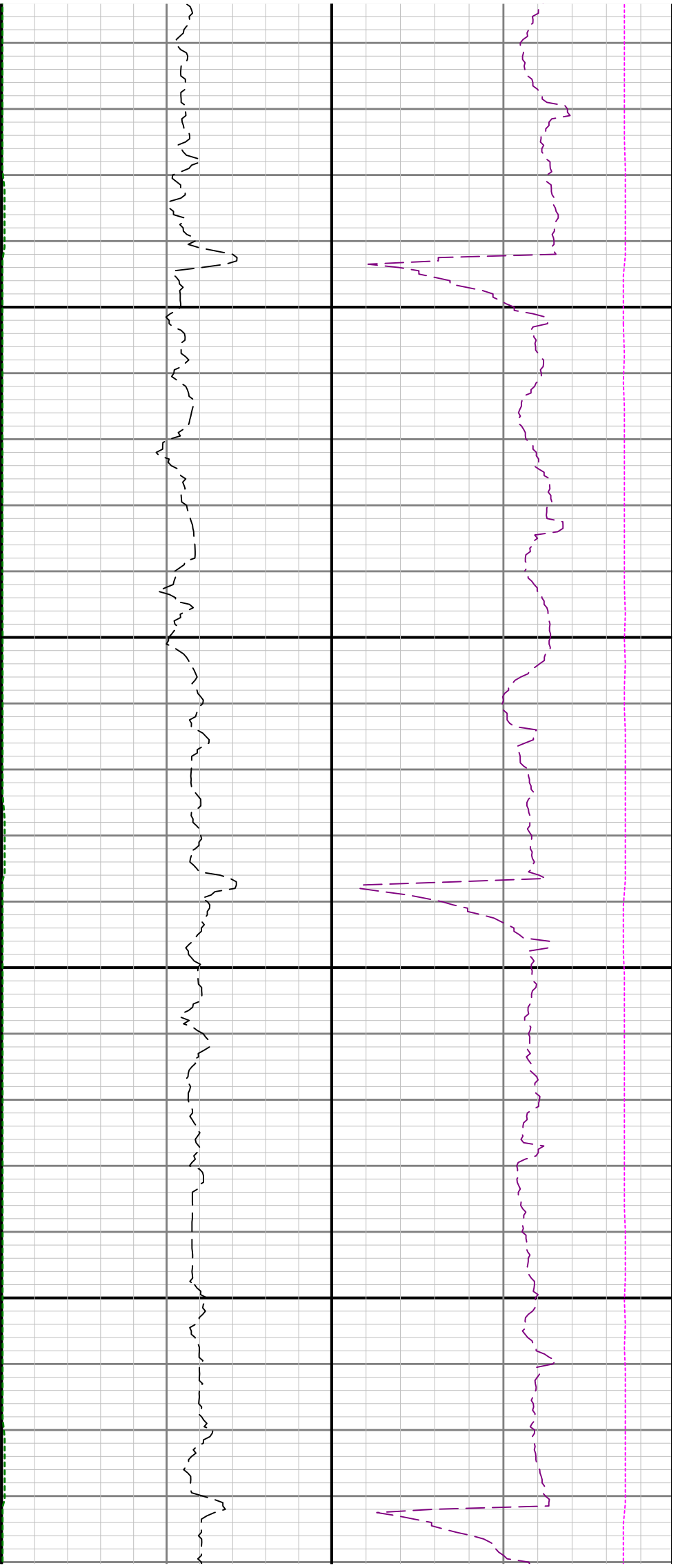




16100

16200





16300

16400

