



LWD MEMORY LOG

Gamma Ray

LWD MEMORY LOG									
<div><div><div><div><div><div>BAKER</div><div>HUGHES</div><div>a GE company</div></div></div><div><div><div><div><div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div></div></div></div></div></div></div></div></div></div>				Gamma Ray					
Scale:		Company: Noble Energy							
1:240		Well: Gutteresen D35-760							
Measured Depth		Field: Wattenberg							
Depth Reference:		County: WeldCountry: United States							
Driller's Depth		State: Colorado							
Status:		Surface Location:				Other Services:			
Final Print		Latitude: 40° 12' 21.072" N Longitude: 104° 31' 13.790" W				Directional			
API No: 05-123-48592-00		SEC: 23 TWN: 3N RGE: 64W							
Job ID: 110346199		Elevation: 0.00 ft				Elev. KB: N/A			
Permanent Datum (P.D.): Mean Sea Level		Above P.D.: 4859.00 ft				Elev. DF: 4859.00 ft			
Log Measured From: Rig Floor		Mag to Reference North Correction: (deg)				Elev. GL: 4829.00 ft			
Dates		Interval		Magnetic Field Reference					
From: 2020-03-26		Drilled (ft)		Logged (ft)		Azi Reference North:		Grid Dip Angle: (deg)	
To: 2020-03-29		Top: 1944.00		Top: 1944.00		Total Magnetic Field Strength: (nT)		51994	
Spud: 2020-03-20		Bottom: 17411.00		Bottom: 17398.00		Mag to Reference North Correction: (deg)		7.37	
Borehole Record									
Casing Record									
Hole Size (in)		From (ft)		To (ft)		Size (in)		Weight (lb/ft)	
13.500		30.00		1944.00		9.625		36.00	
8.500		1944.00		17411.00					
Mud Record									
Deviation Record									
Type		From (ft)		To (ft)		Hole Size (in)		Interval (ft)	
Oil Based Mud		1944.00		17411.00		8.500		15467.00	
Acquisition System									
Cadence		RT 5.5		H&P 517		Other			
Plot Studio		5.5.8765.1		Contractor: Helmerich & Payne Drilling Co		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	1944.00	15825.00	1944.00	15838.00	2020-03-26 19:36	2020-03-29 01:11	47.96
2	2	8.500	PDC	3.00	AutoTrak Curve	15825.00	17398.00	15838.00	17411.00	2020-03-29 16:45	2020-03-29 23:27	12.19

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Andrew Hays	2020-03-25	2020-03-30						

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+ (%)
2020-03-27 03:30	1	5140.00	Oil Based Mud	9.6	11	N/A	22.2	70/18	Active Pit	25267	0.00
2020-03-27 15:30	1	7102.00	Oil Based Mud	9.4	10	N/A	21.8	70/18.5	Active Pit	26239	0.00
2020-03-28 13:30	1	13755.00	Oil Based Mud	10.0	16	N/A	21.2	68/18	Active Pit	26239	0.00
2020-03-29 10:31	2	15838.00	Oil Based Mud	10.0	16	N/A	21.2	68/18	Active Pit	26239	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	14262241	Near Bit VSS	5.93	6.73	7.500	4.330
1	AutoTrak Curve Steering Unit	14262241	Near Bit Inclination	5.93	6.73	7.500	4.330
1	AutoTrak Curve MWD	12558532	Gamma (single)	2.74	12.90	7.000	3.250
1	AutoTrak Curve MWD	12558532	Directional (mag)	12.27	22.43	7.000	3.250
2	AutoTrak Curve Steering Unit	14881461	Near Bit Inclination	5.93	6.73	7.500	4.330

2	AutoTrak Curve Steering Unit	14881461	Near Bit VSS	5.93	6.73	7.500	4.330
2	AutoTrak Curve MWD	14391880	Gamma (single)	2.75	12.90	7.000	3.250
2	AutoTrak Curve MWD	14391880	Directional (mag)	12.27	22.42	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

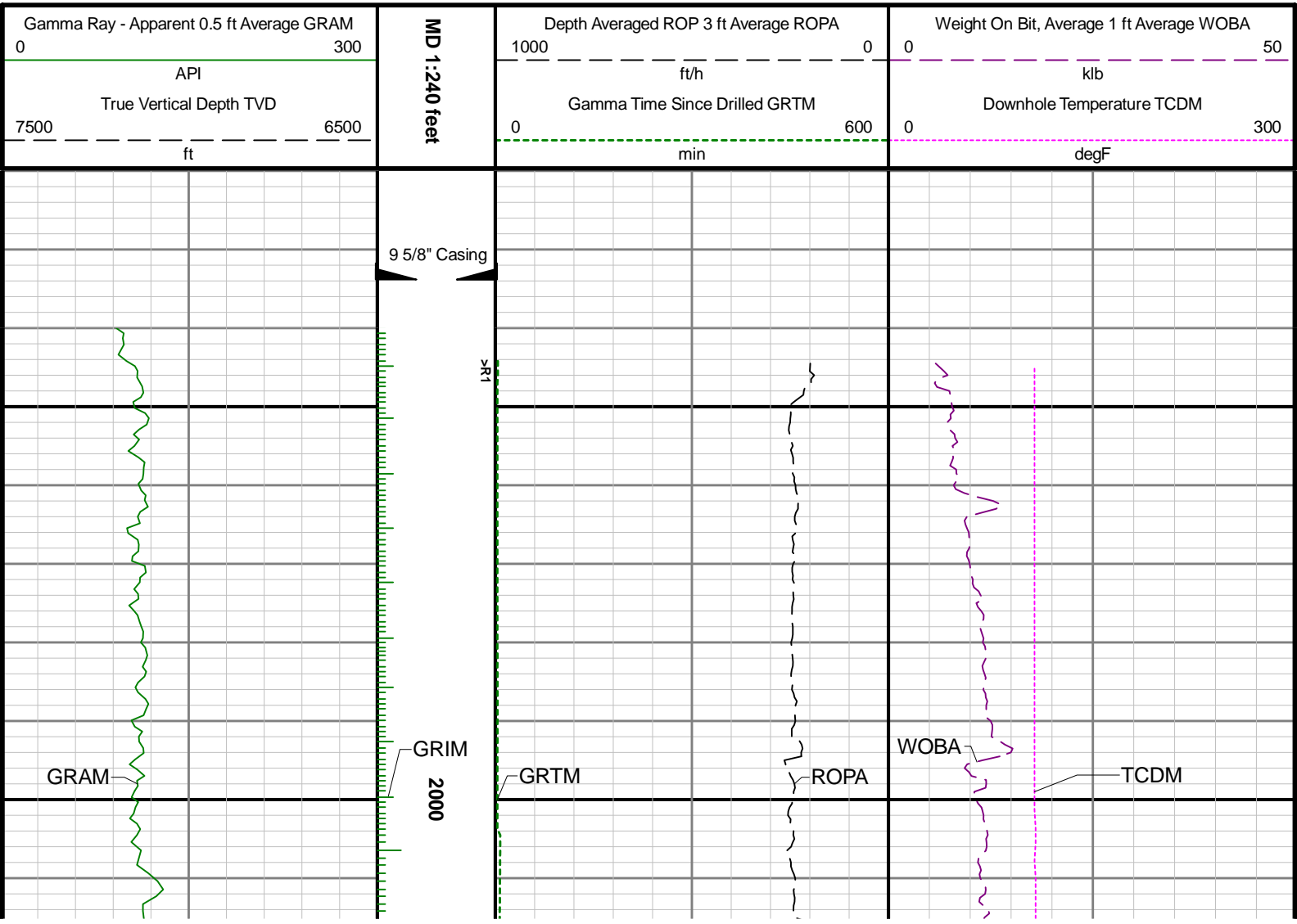
1	Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.
2	Baker Hughes LWD runs 1 and 2 utilized 6.75 inch NaviGamma services (Directional and Gamma Ray) behind a 8.5 inch bit and rotary steerable assembly from 1944 to 17411 feet MD (1944 to 6712 feet TVD).
3	The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

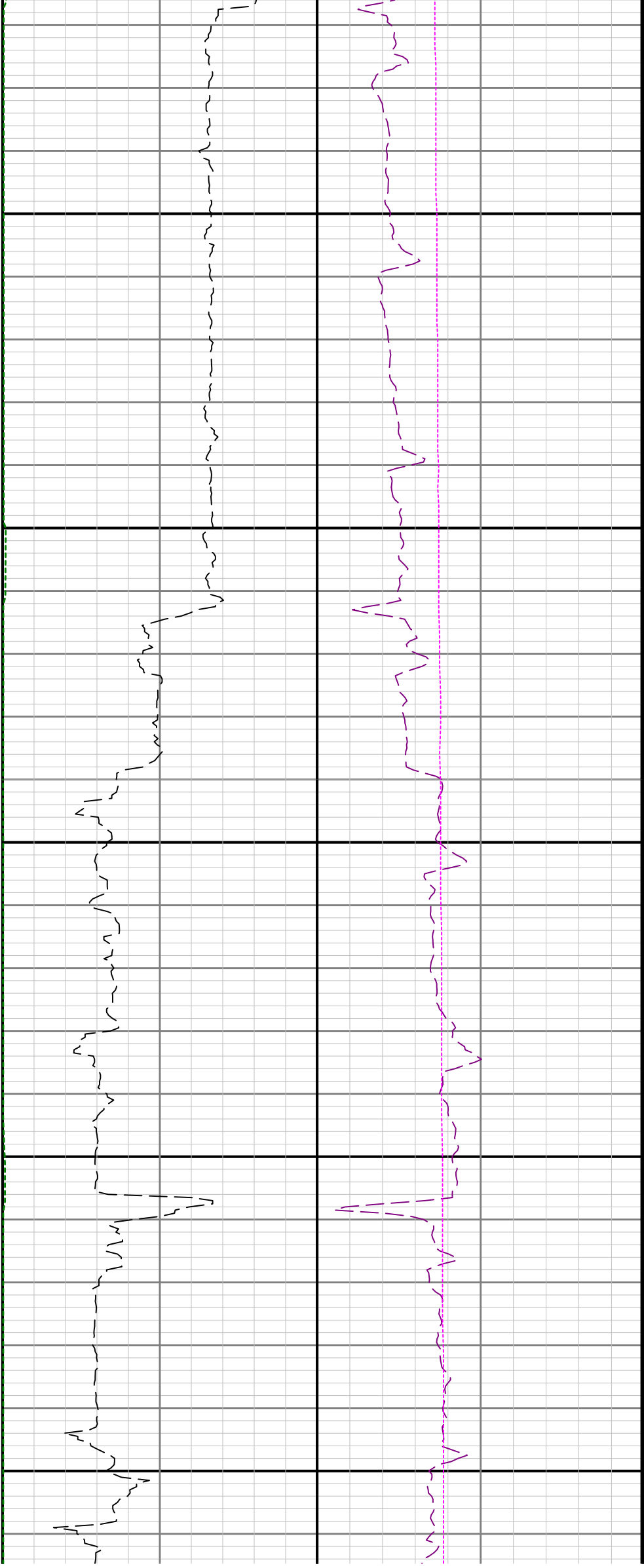
Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	11755.00	8.500	1	The interval from 11755 to 11766 feet MD (6804 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
2	11945.00	8.500	1	The interval from 11945 to 11960 feet MD (6803 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
3	12229.00	8.500	1	The interval from 12229 to 12257 feet MD (6796 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
4	12702.00	8.500	1	The interval from 12702 to 12727 feet MD (6788 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
5	12796.00	8.500	1	The interval from 12796 to 12825 feet MD (6787 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
6	12891.00	8.500	1	The interval from 12891 to 12917 feet MD (6786 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
7	13648.00	8.500	1	The interval from 13648 to 13662 feet MD (6722 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
8	13743.00	8.500	1	The interval from 13743 to 13758 feet MD (6770 feet TVD) has gaps in gamma ray data due to a downhole MWD power issue.
9	15825.00	8.500	2	The interval from 15825 to 15838 feet MD (6736 feet TVD) was logged 12 hours after being drilled, due to a trip out of the hole to pick up a new bottom hole assembly.
10	17398.00	8.500	2	The interval from 17398 to 17411 feet MD (6712 feet TVD) was not logged after being drilled due to sensor to bit offset at well TD.

Curve Mnemonics

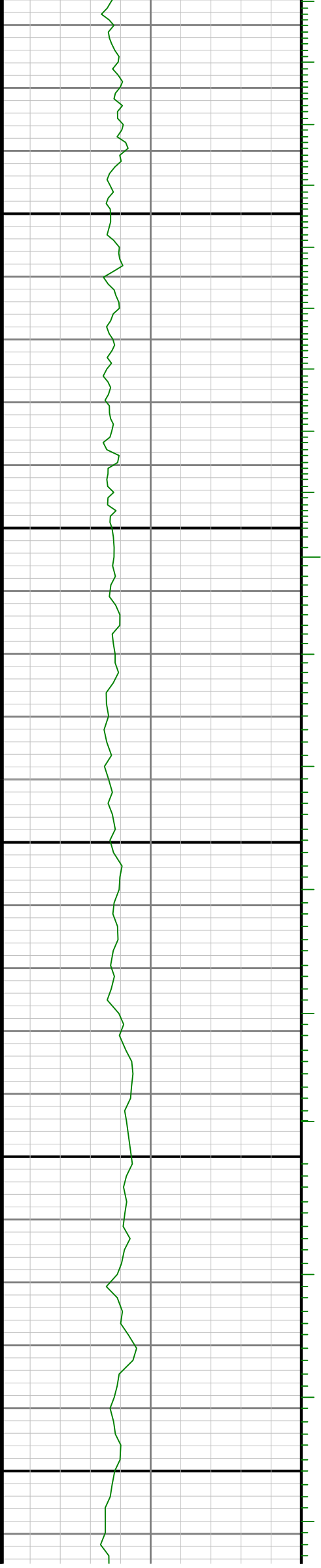
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory	min
TCDM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

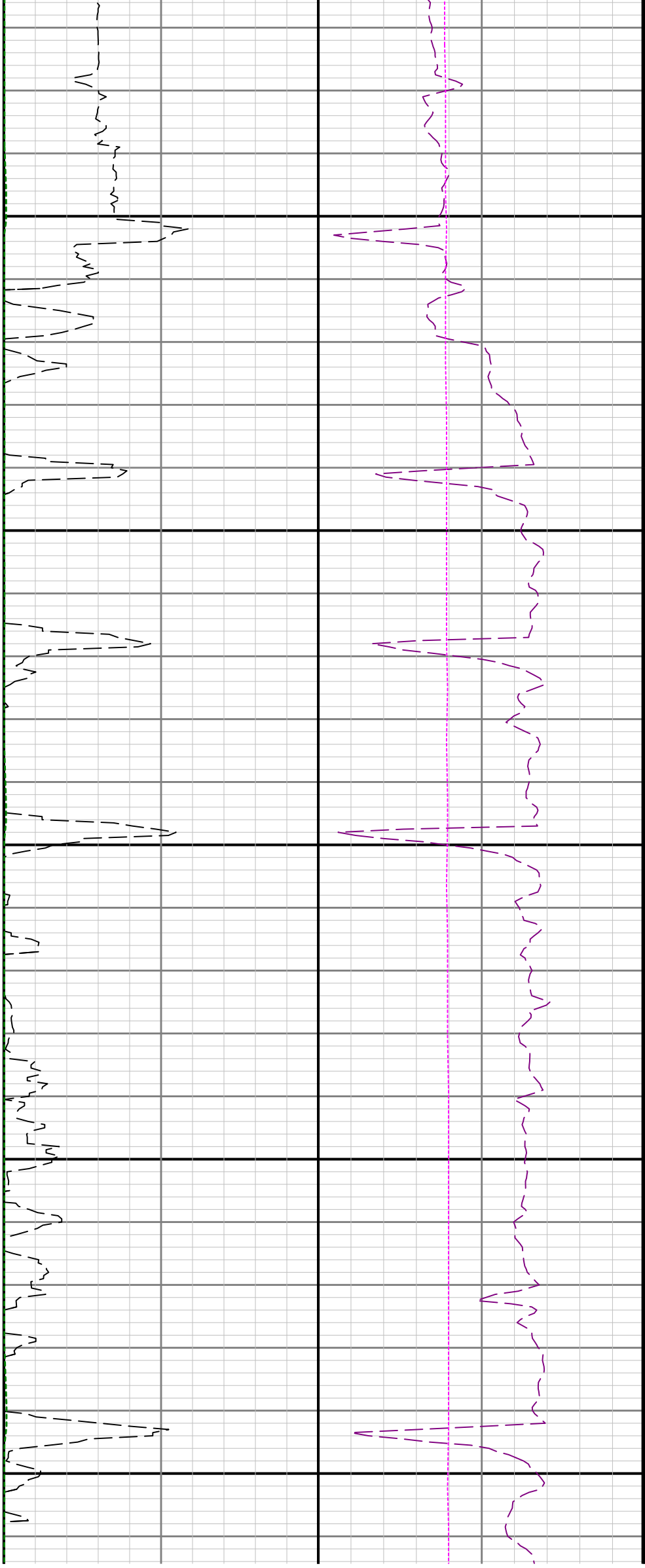




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2200

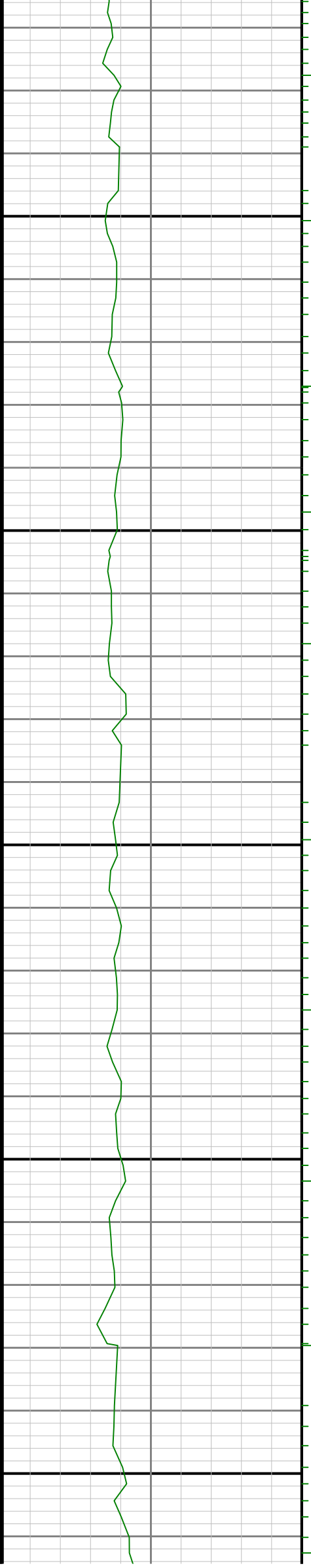


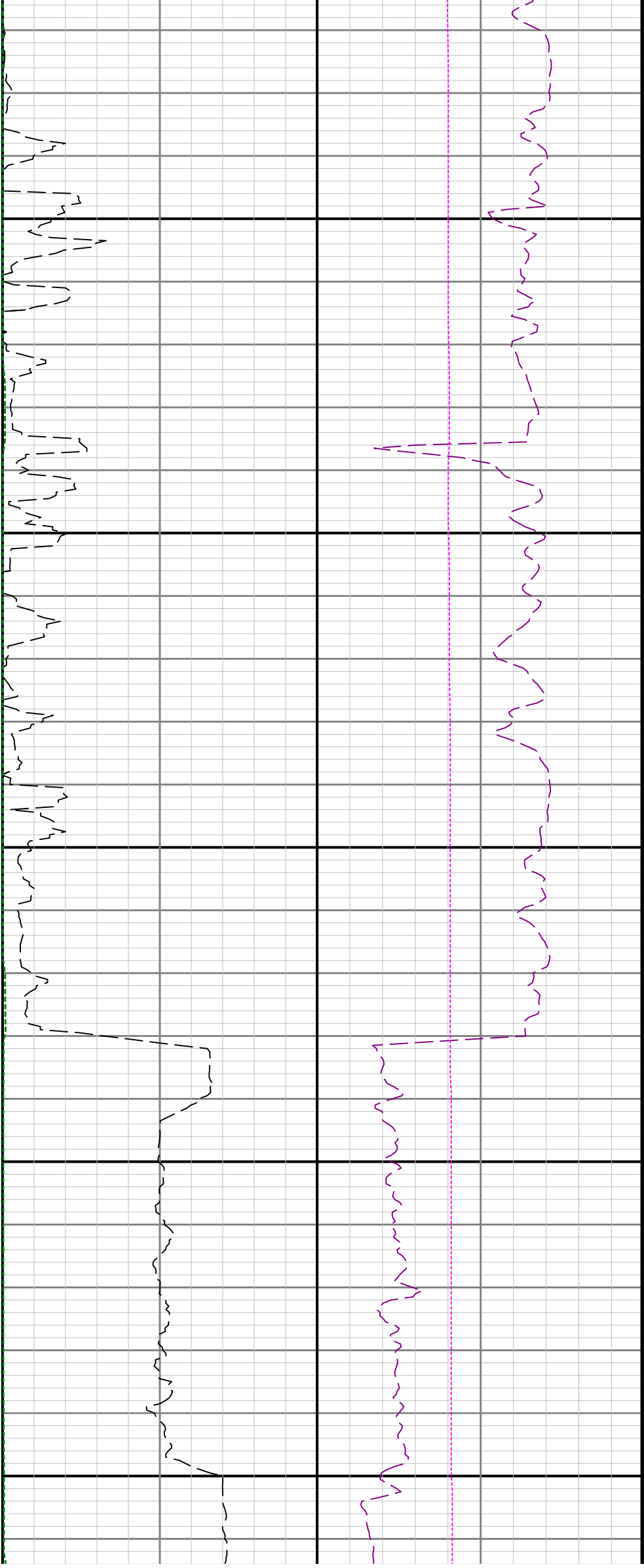


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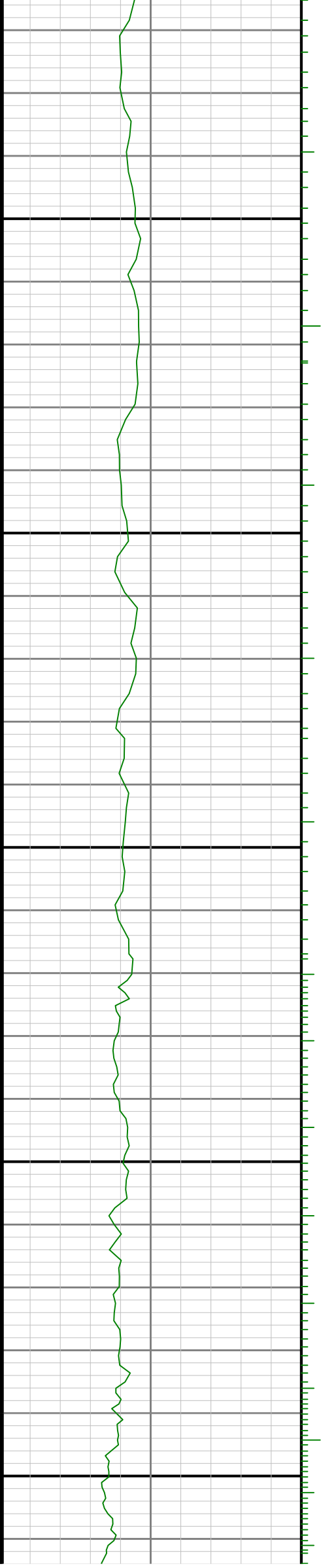
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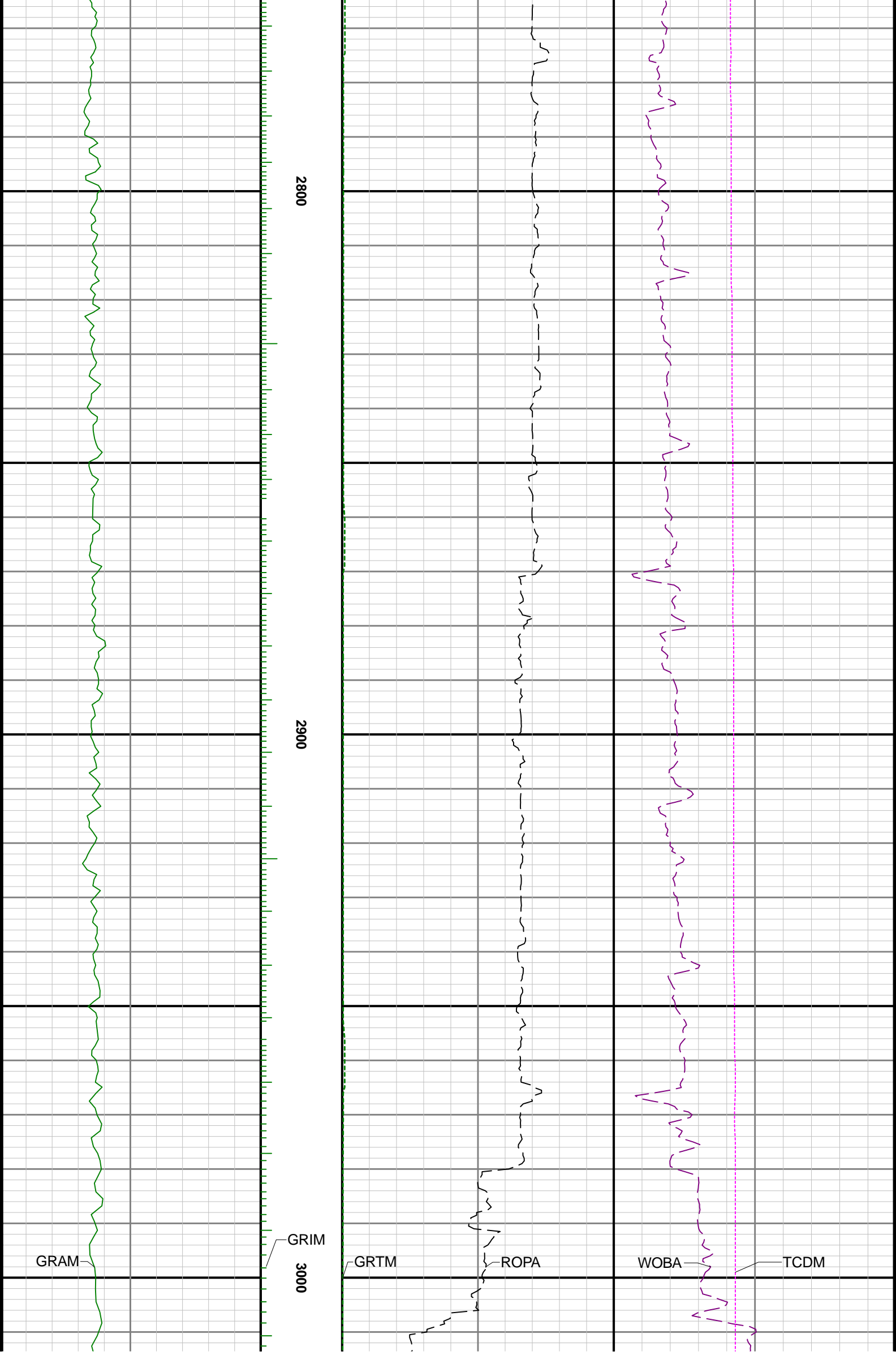


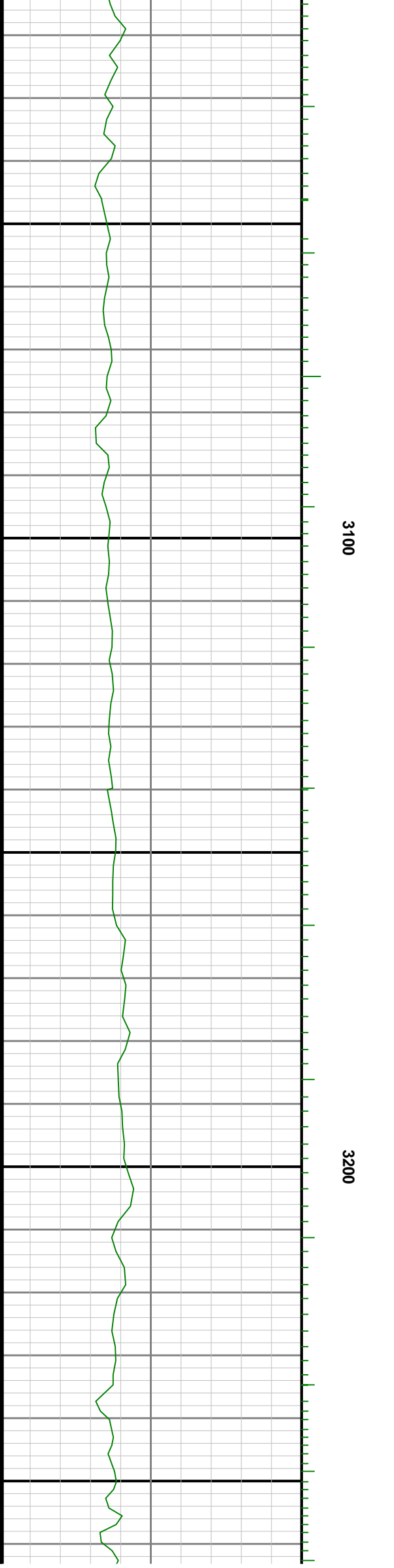
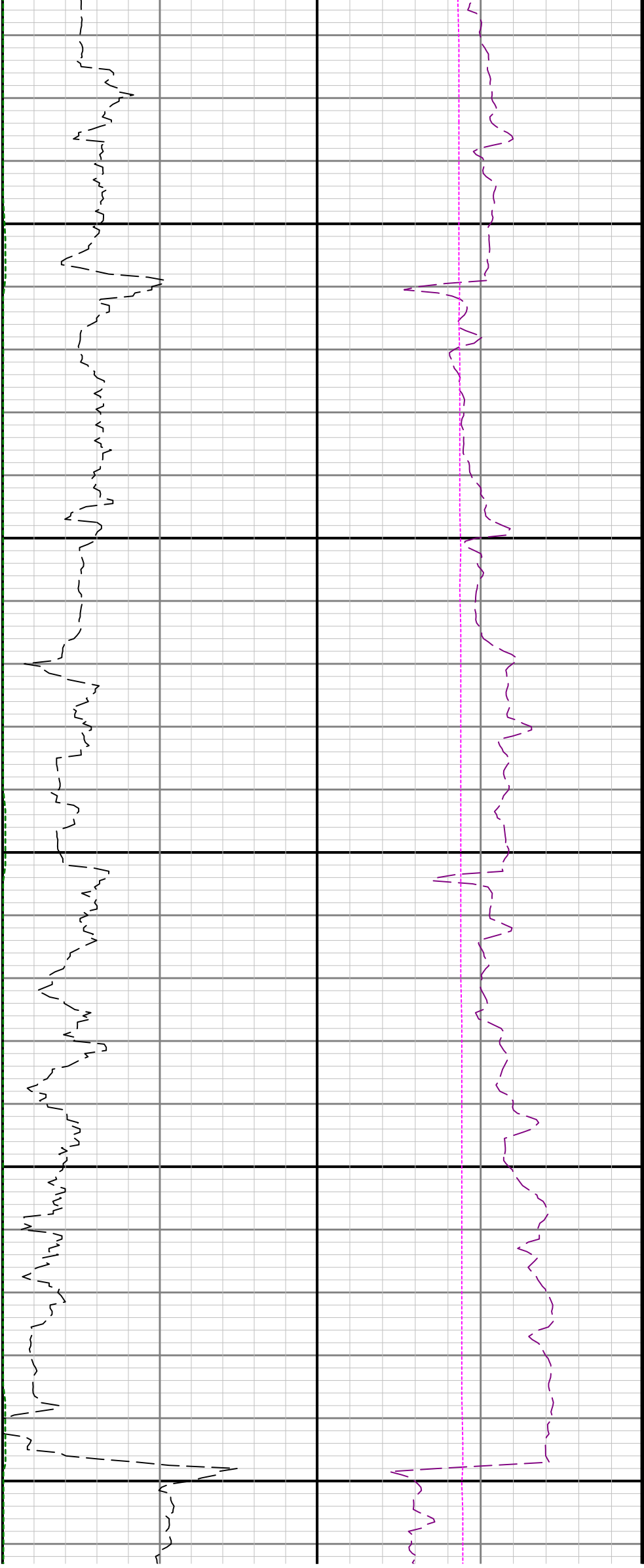


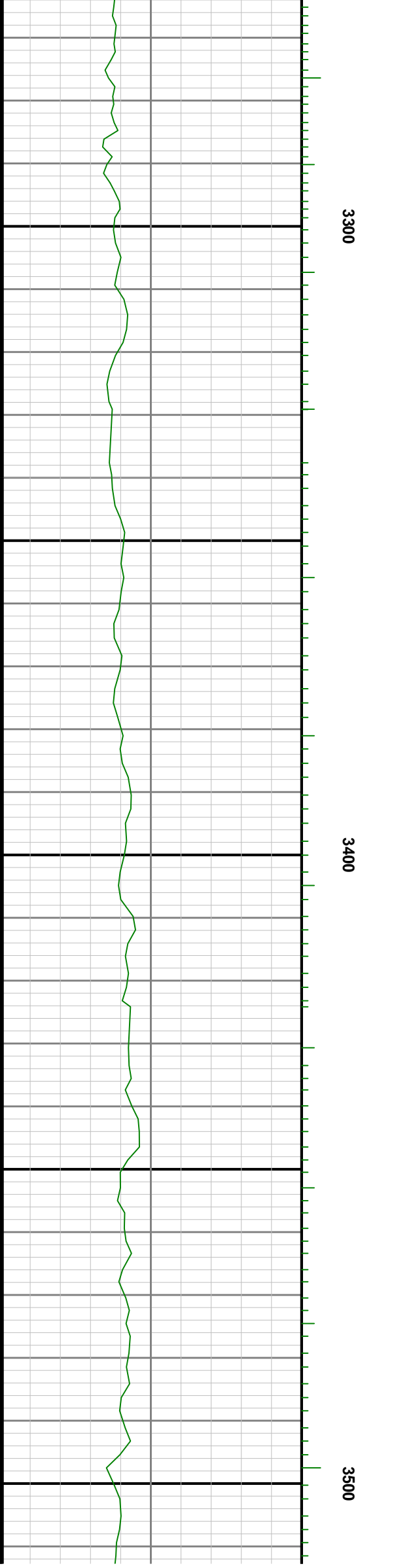
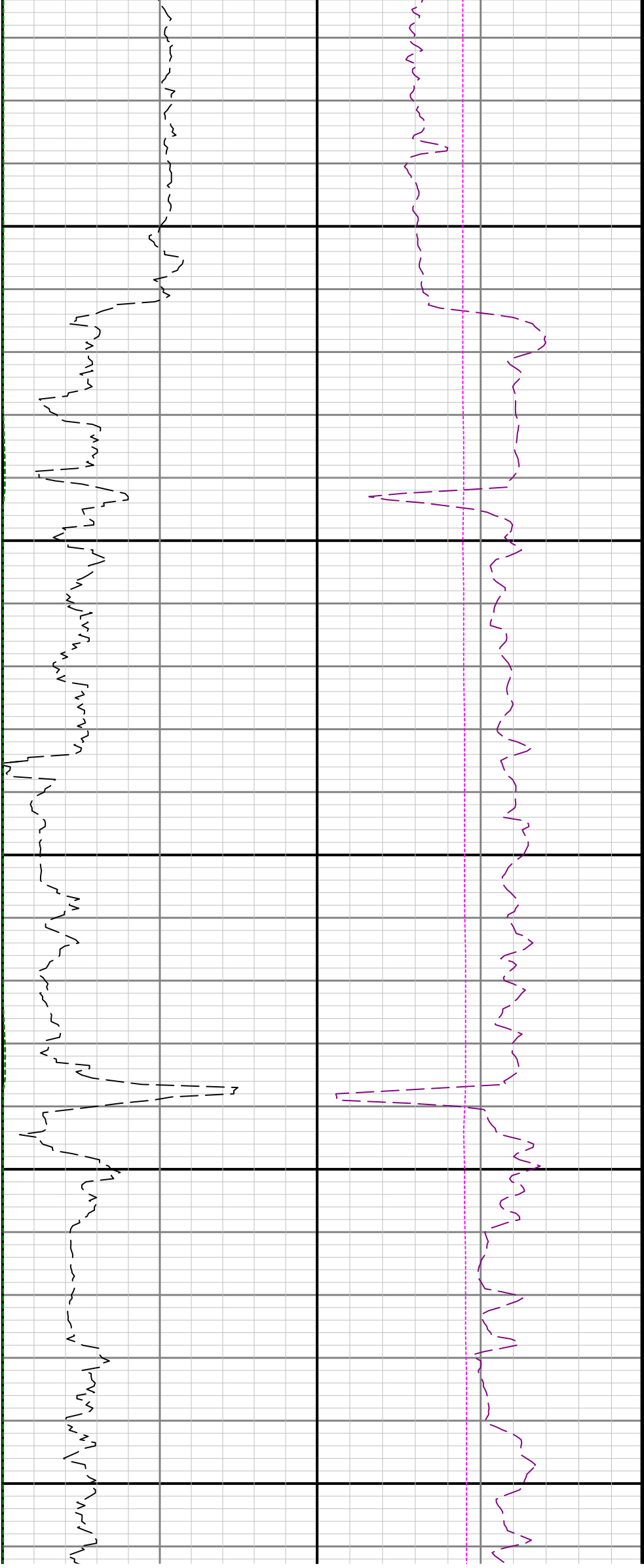
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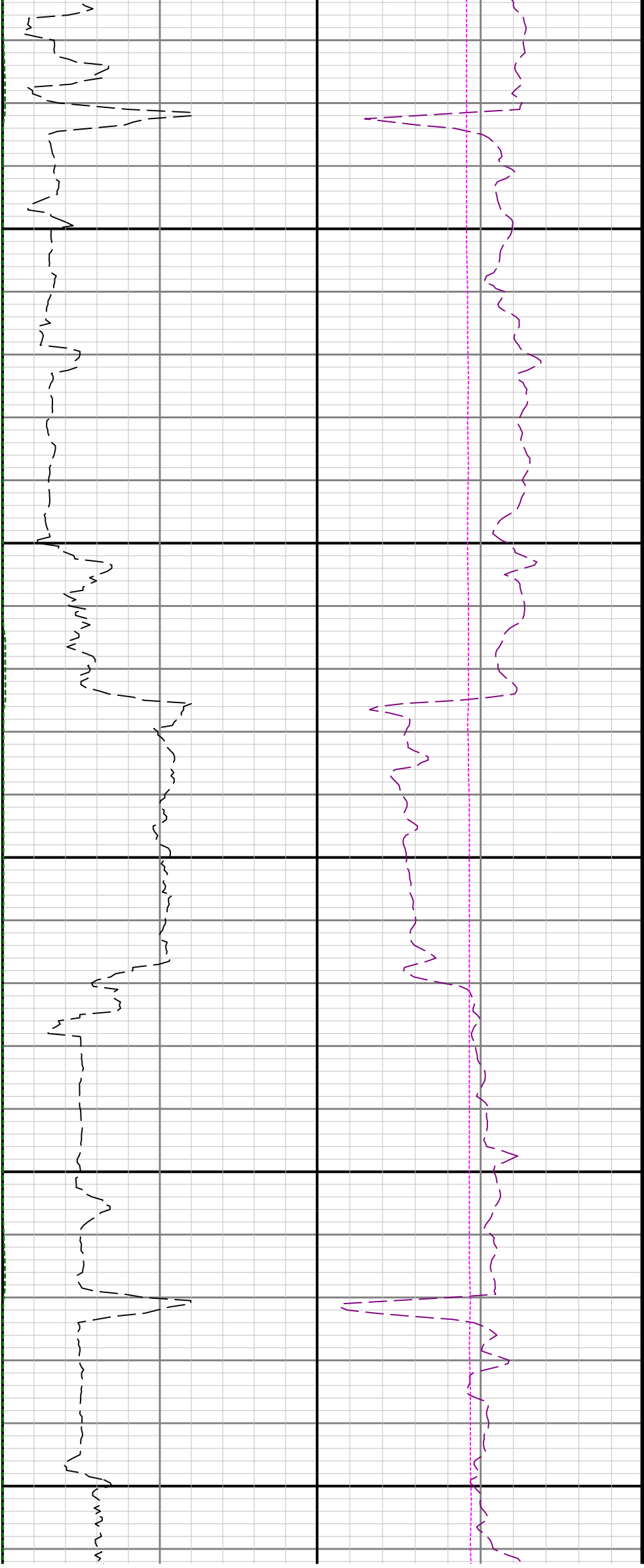
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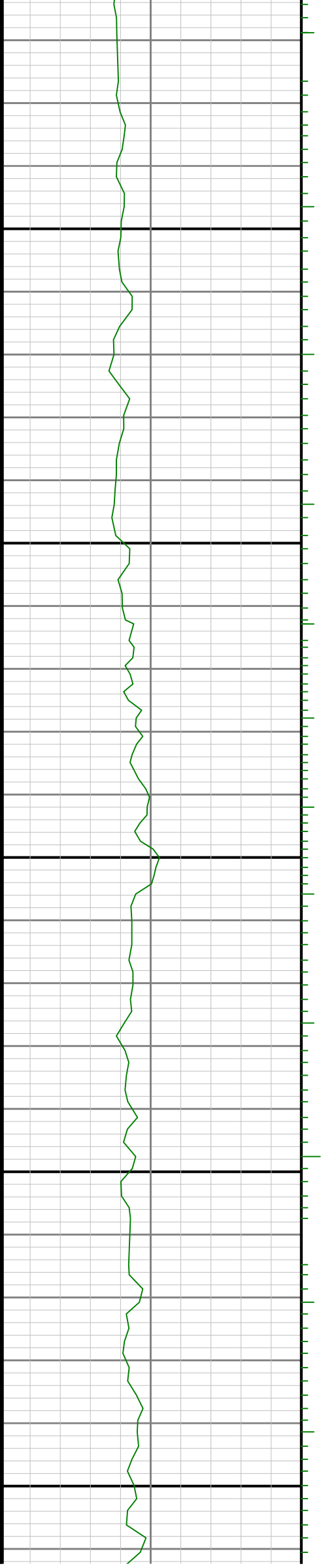


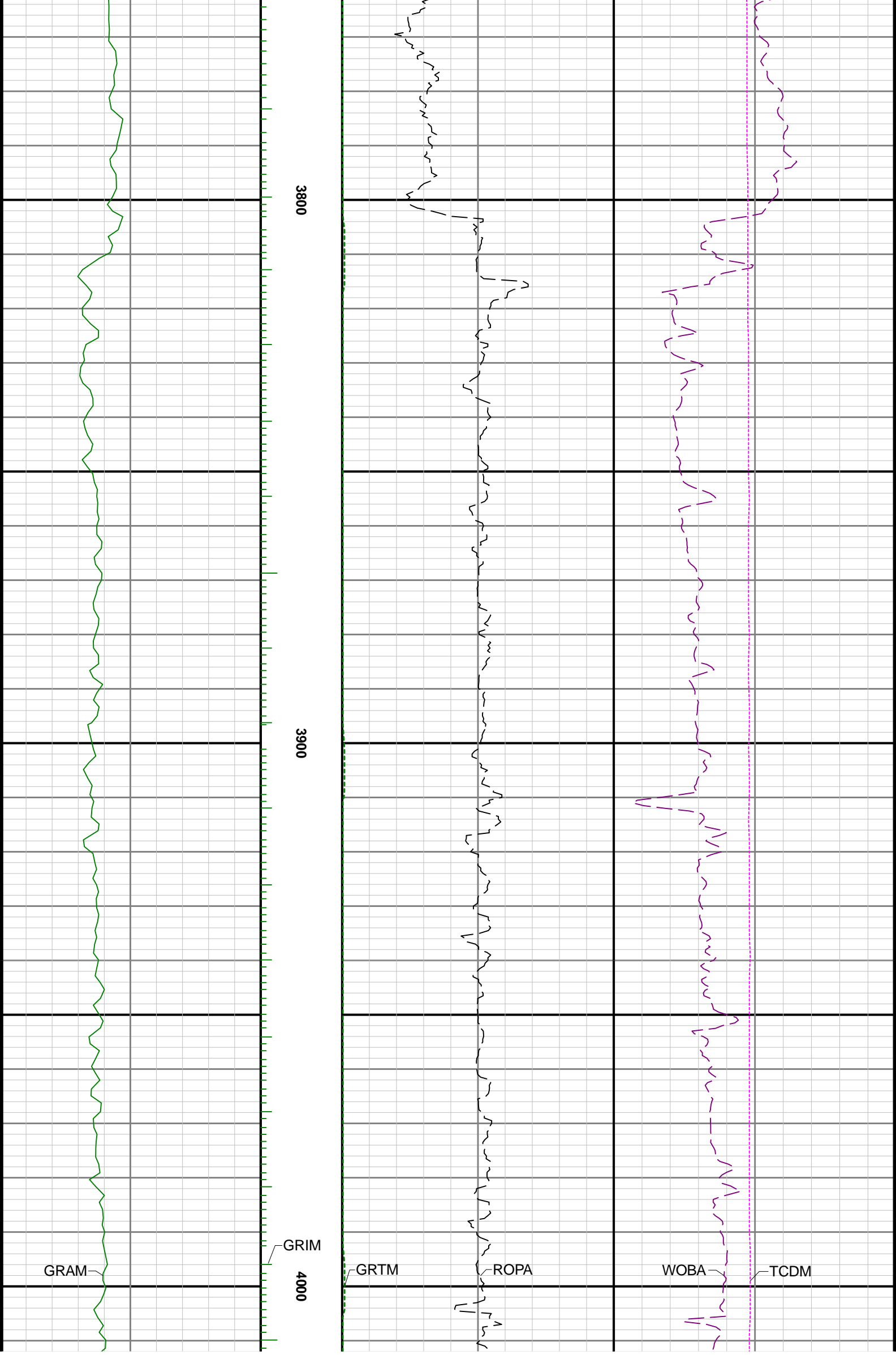


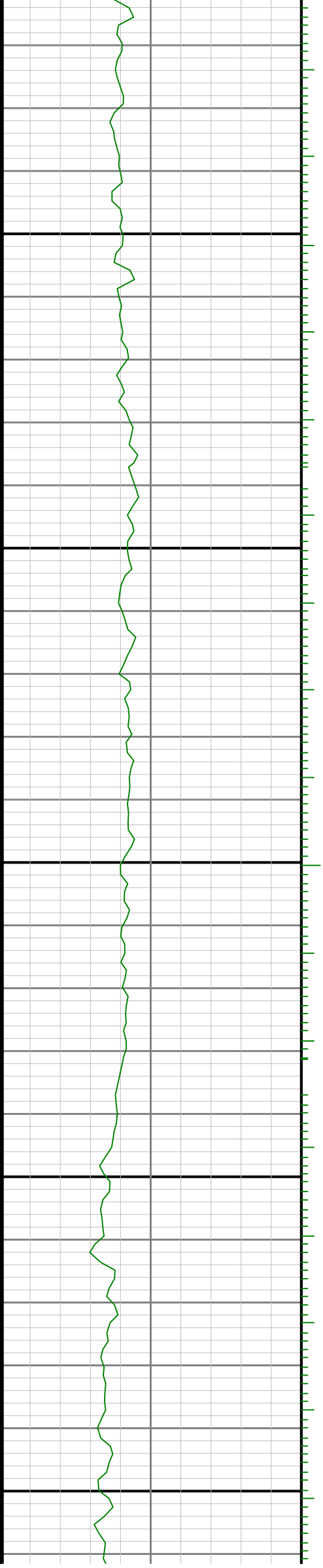


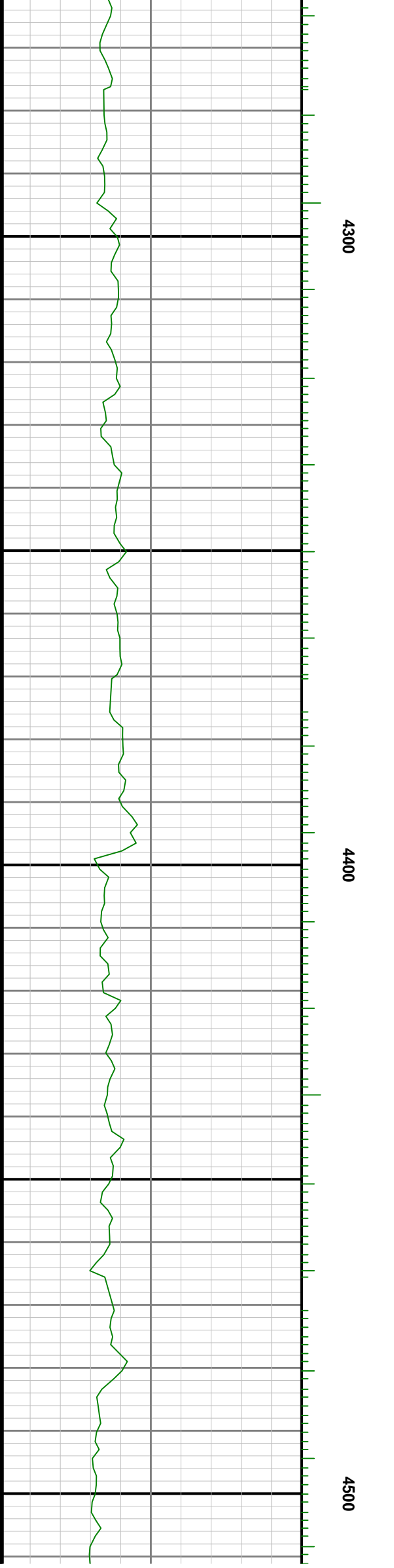
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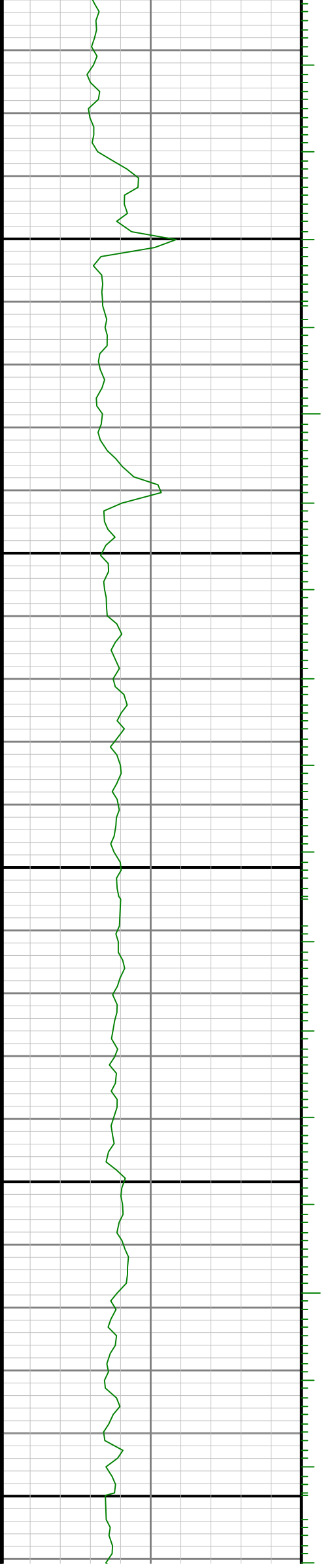
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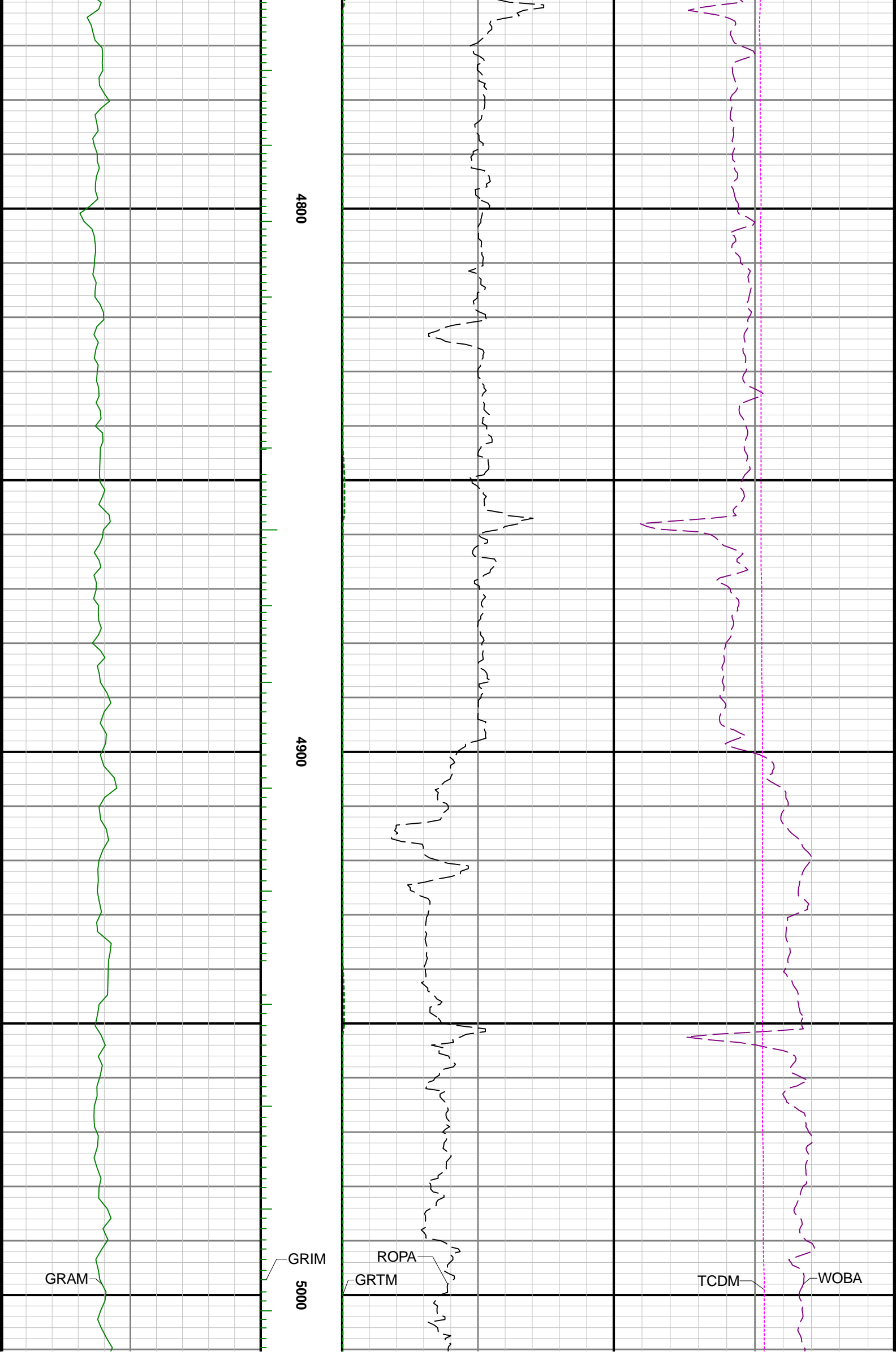


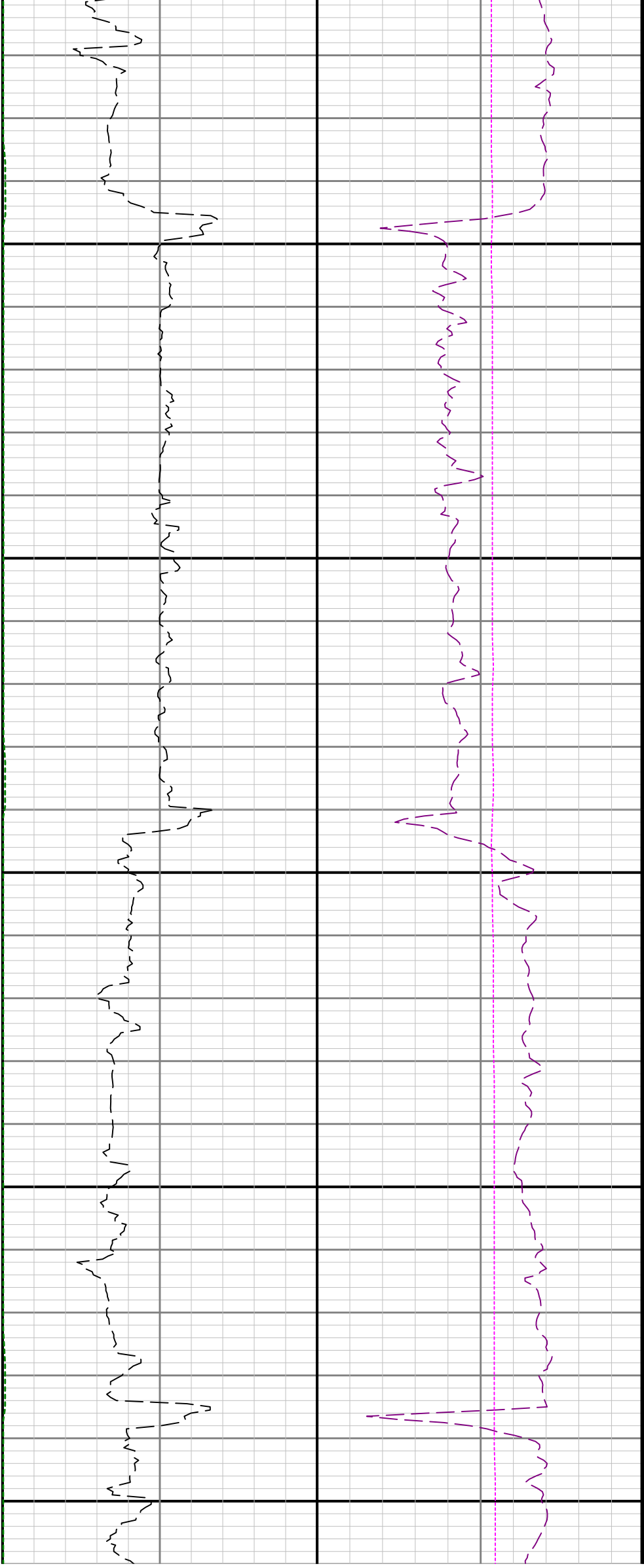






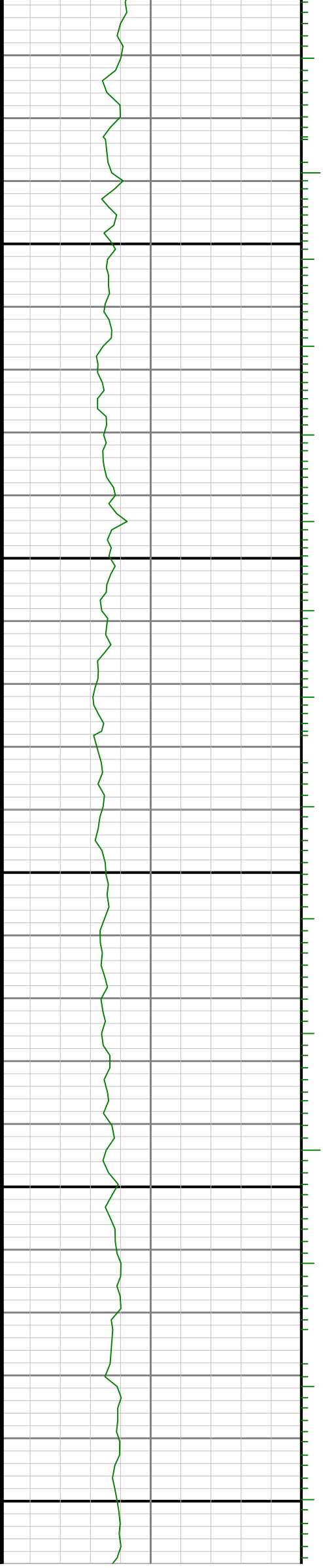


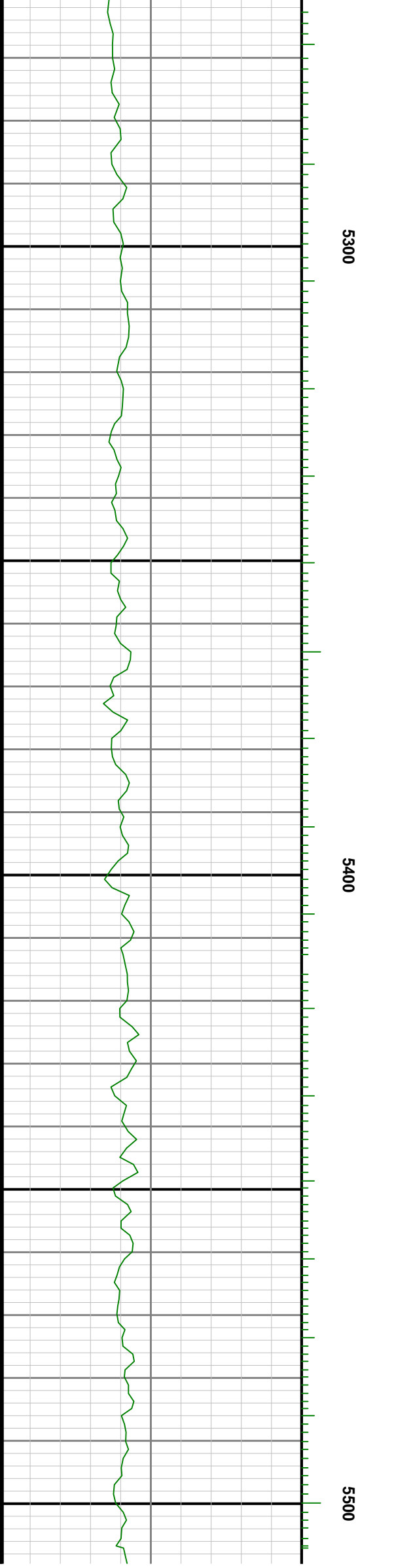


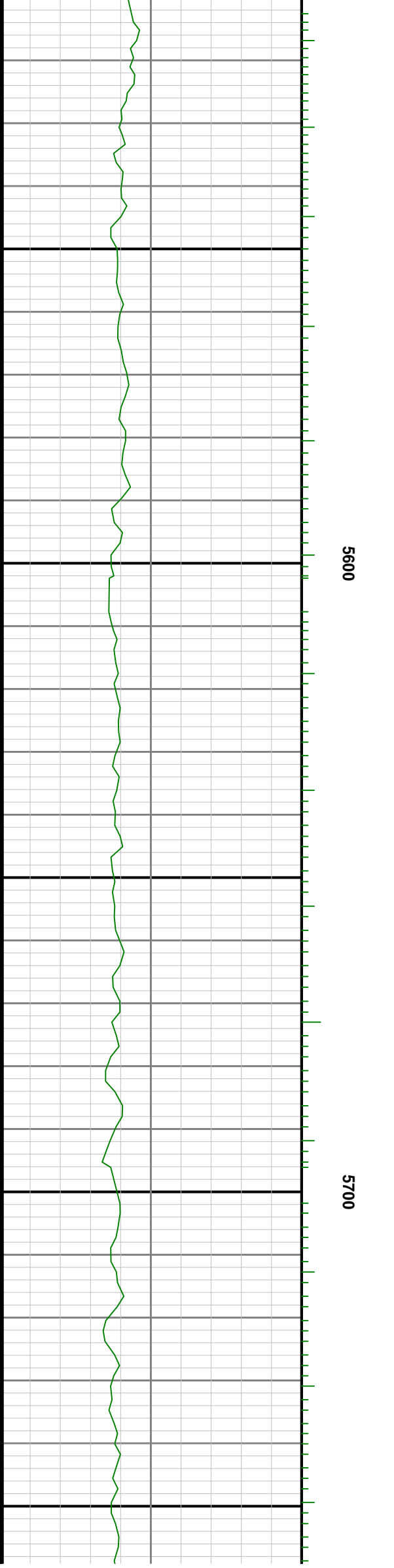
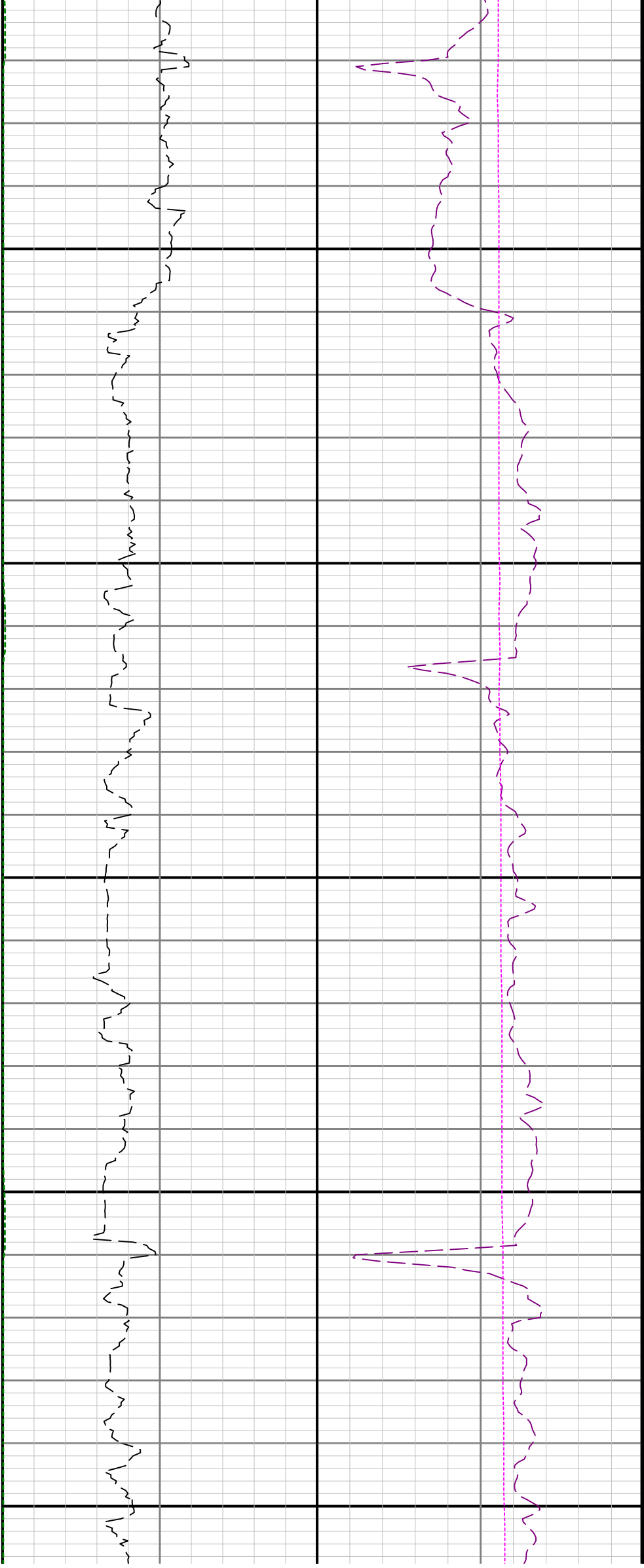


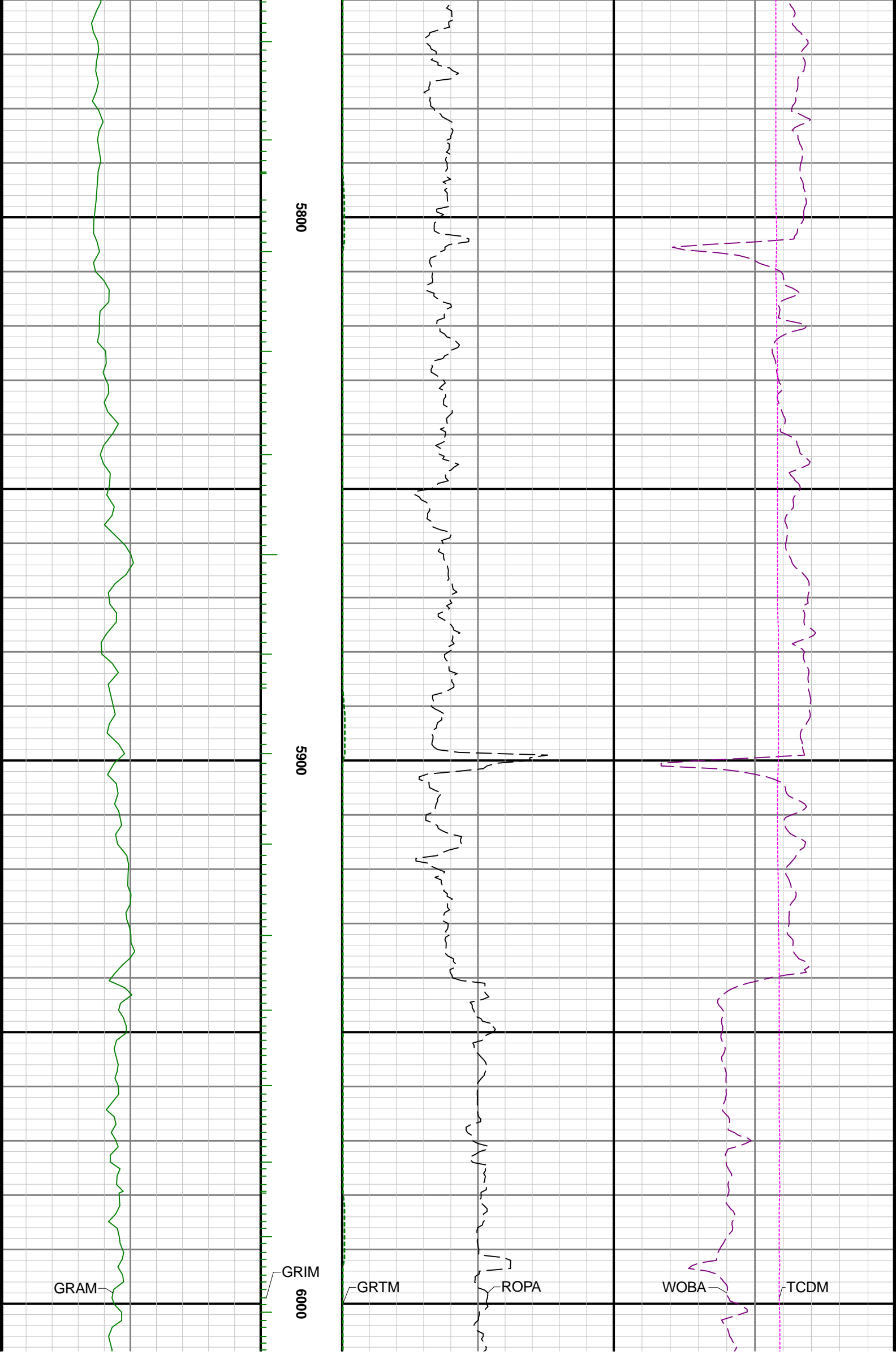
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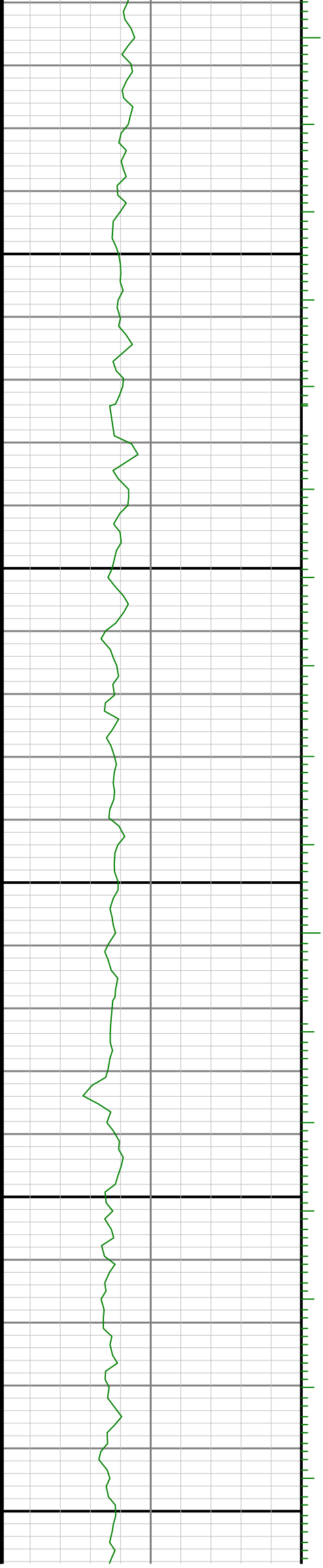
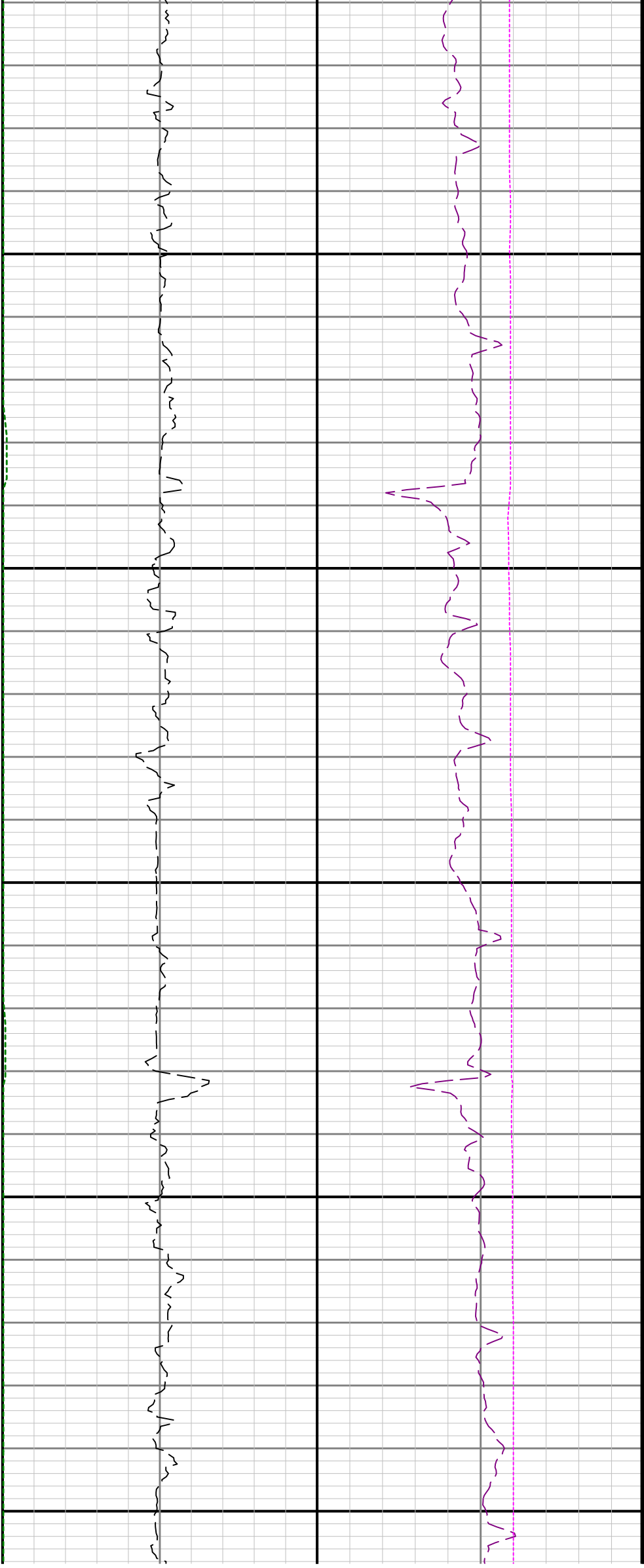
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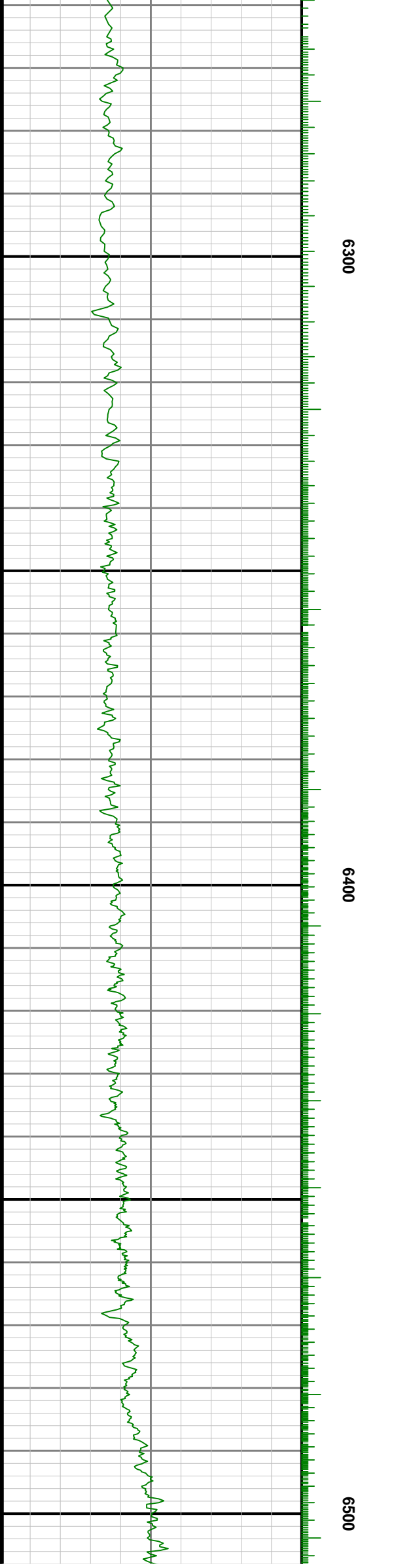
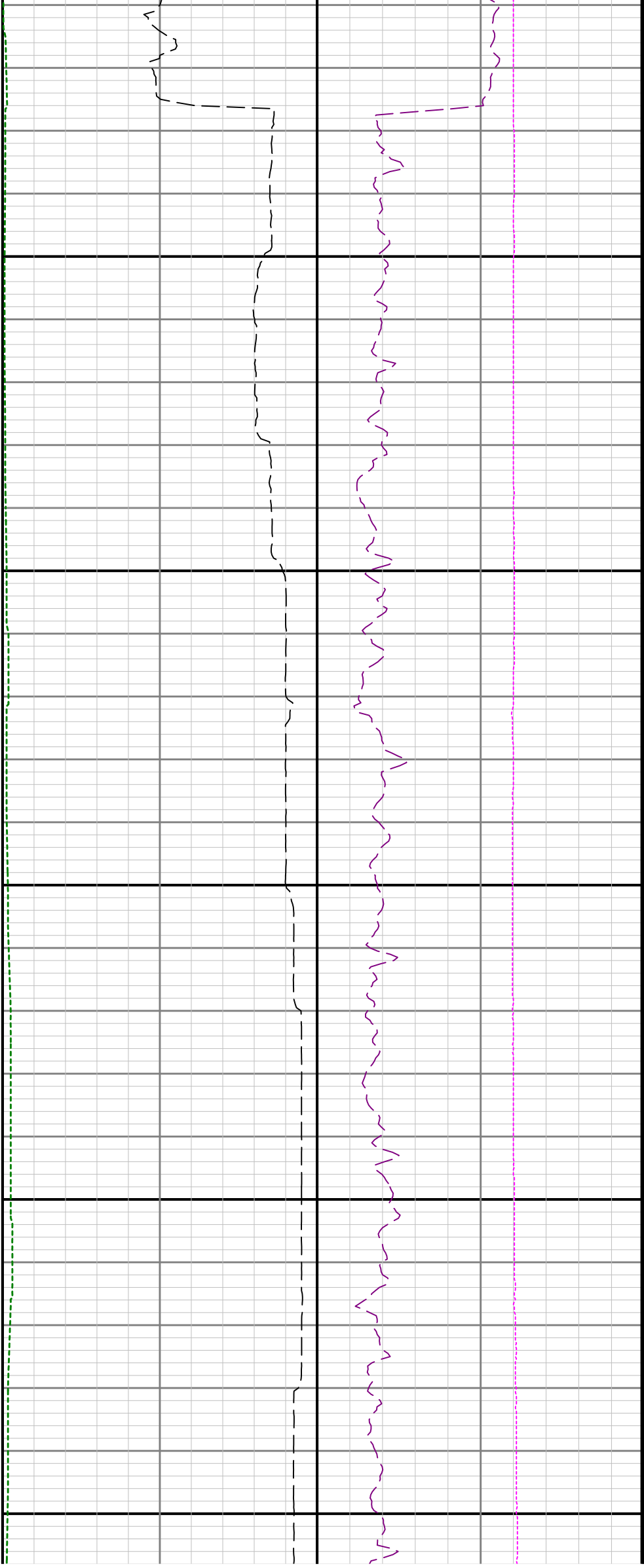


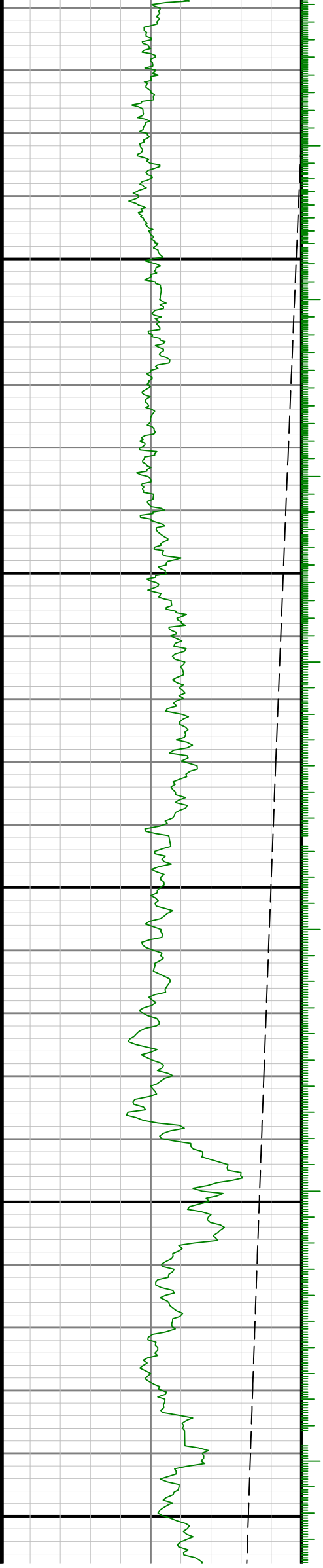






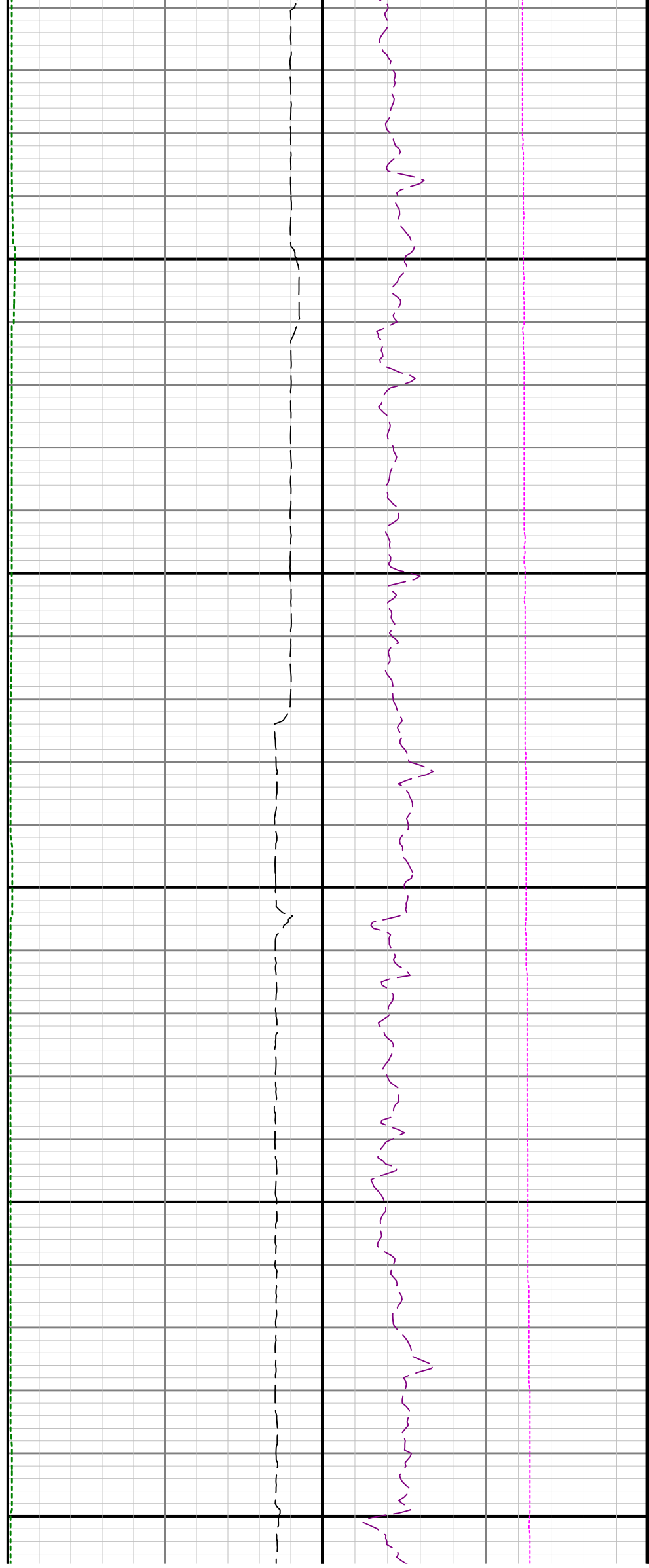


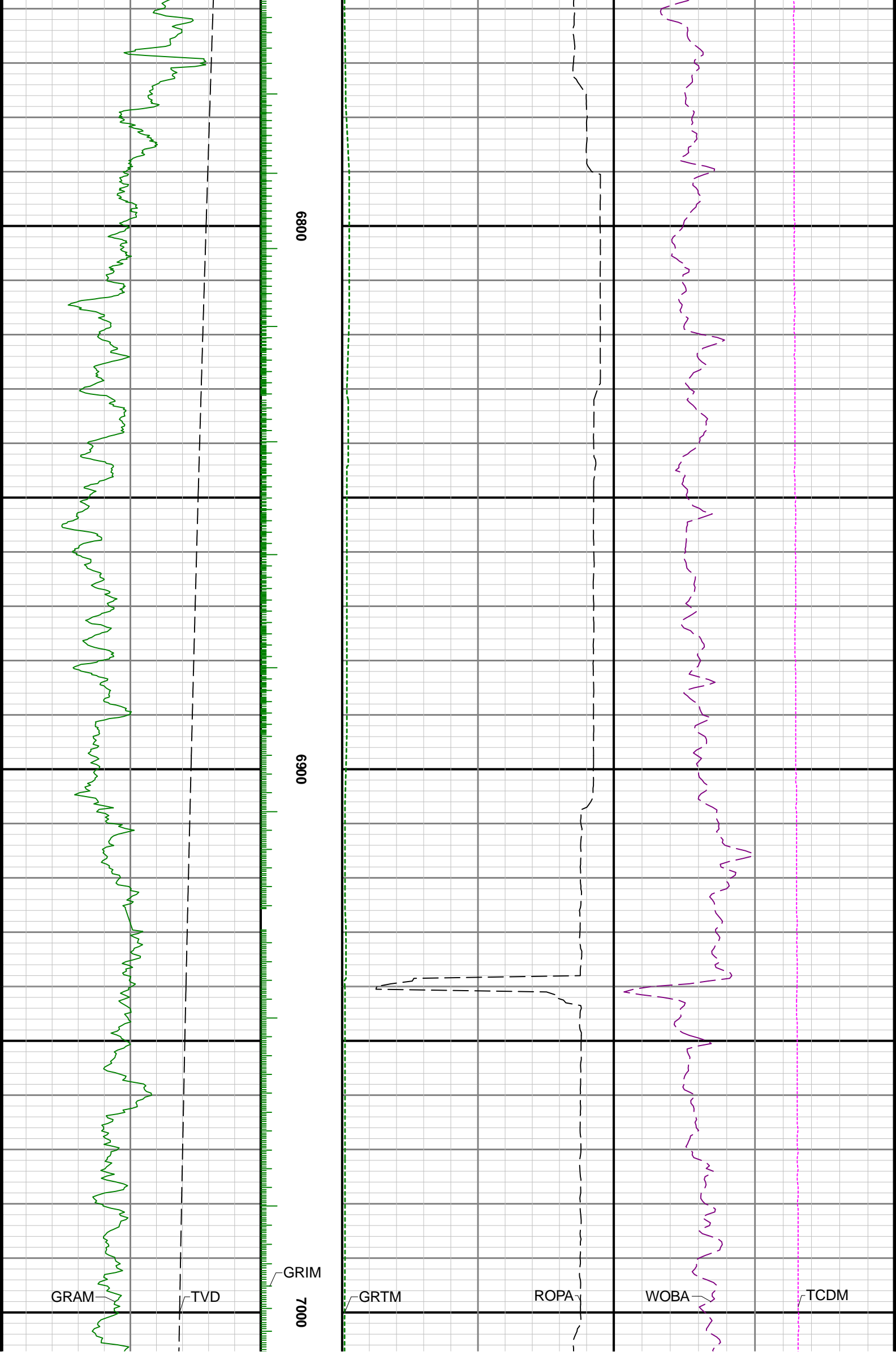


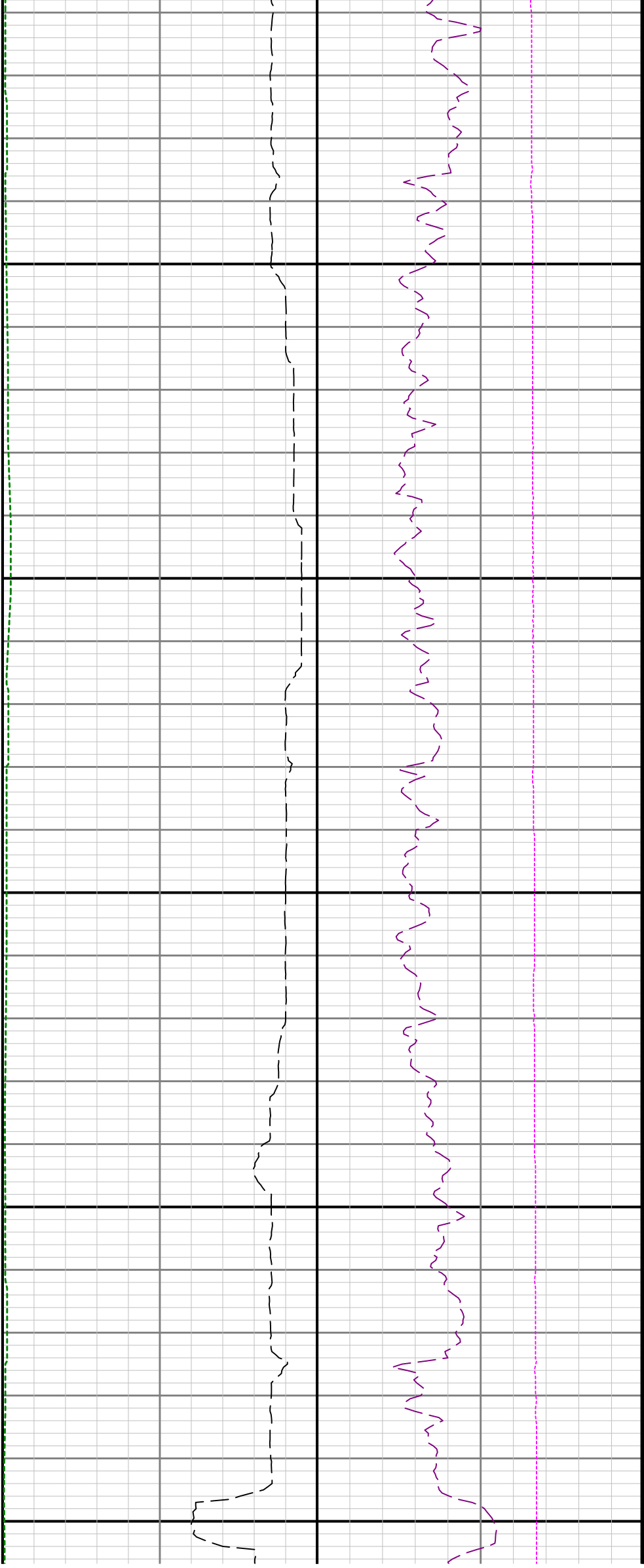


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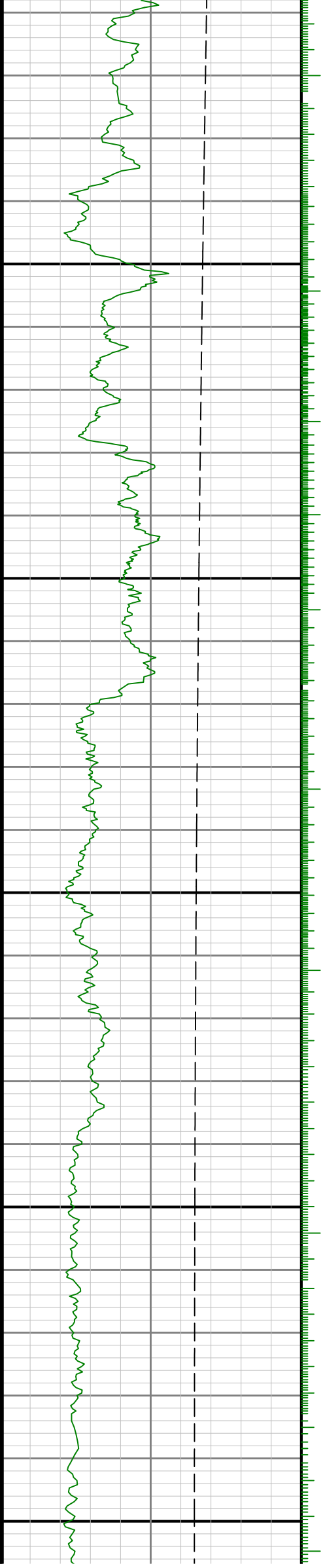


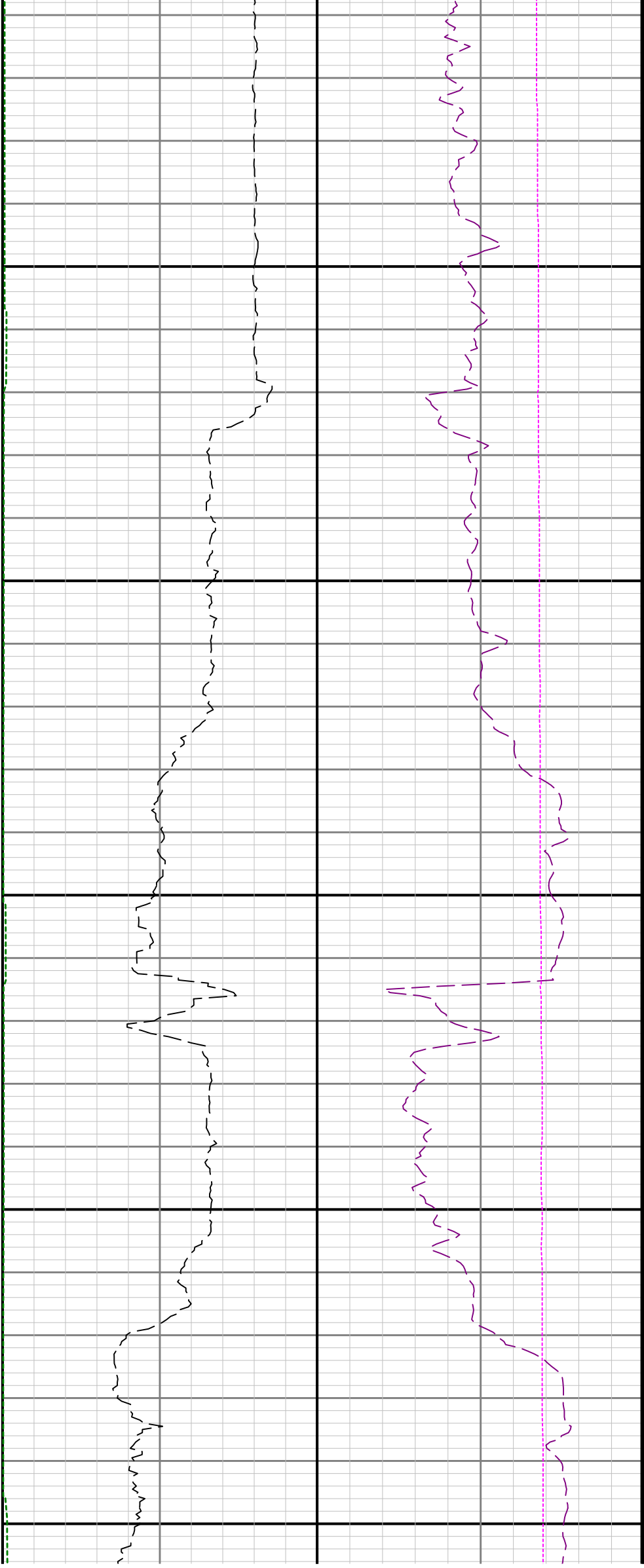




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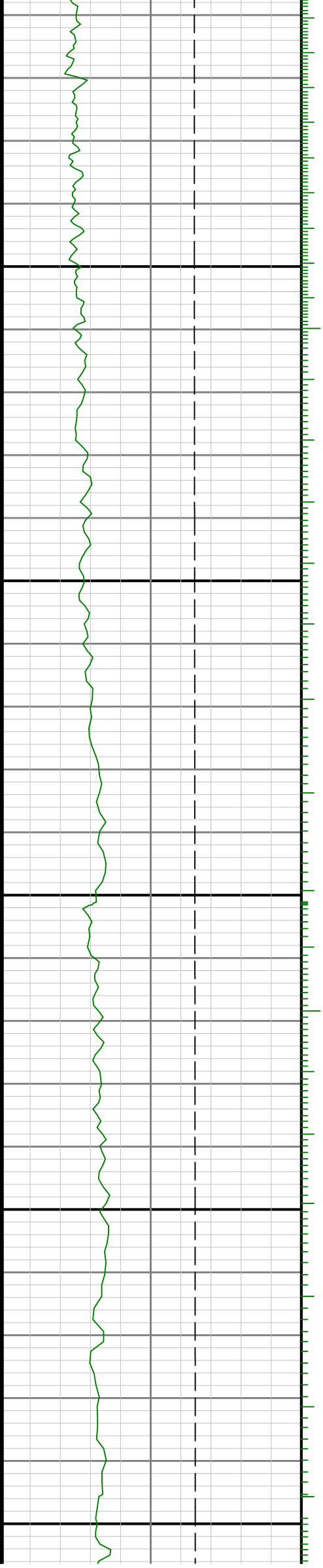


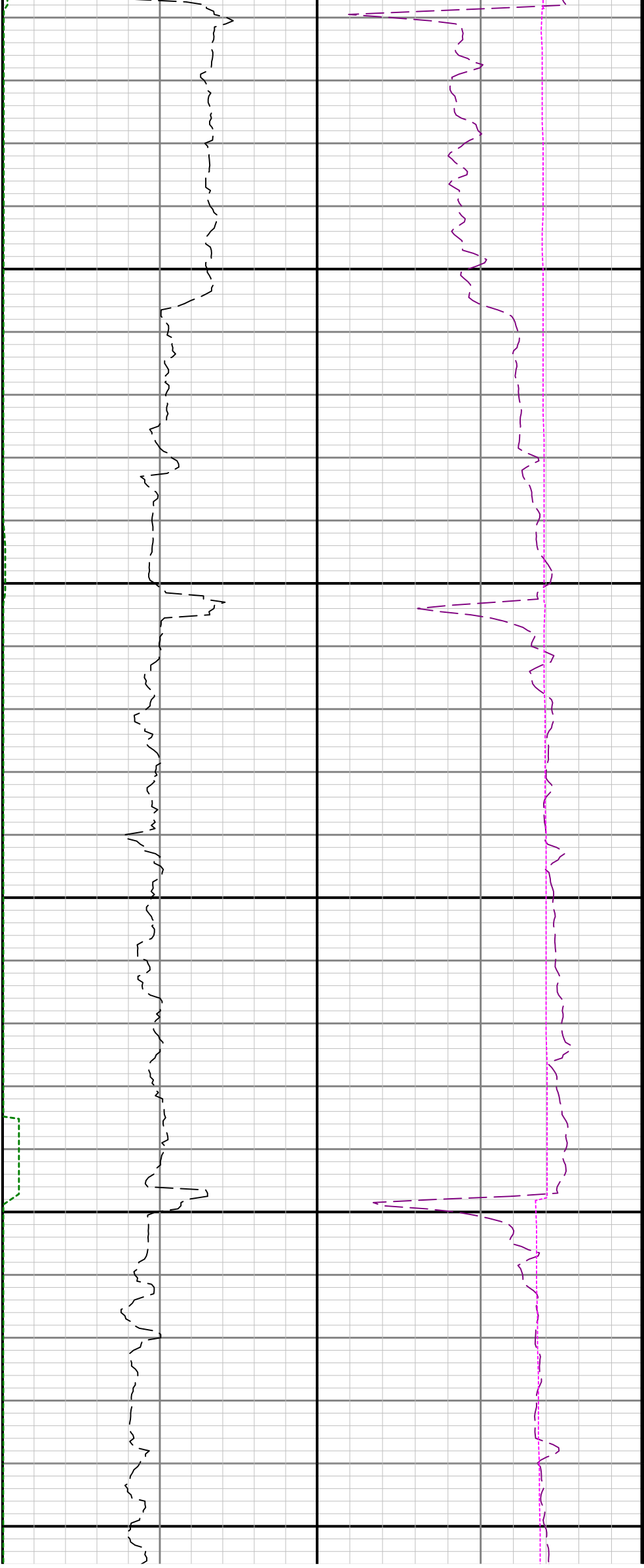


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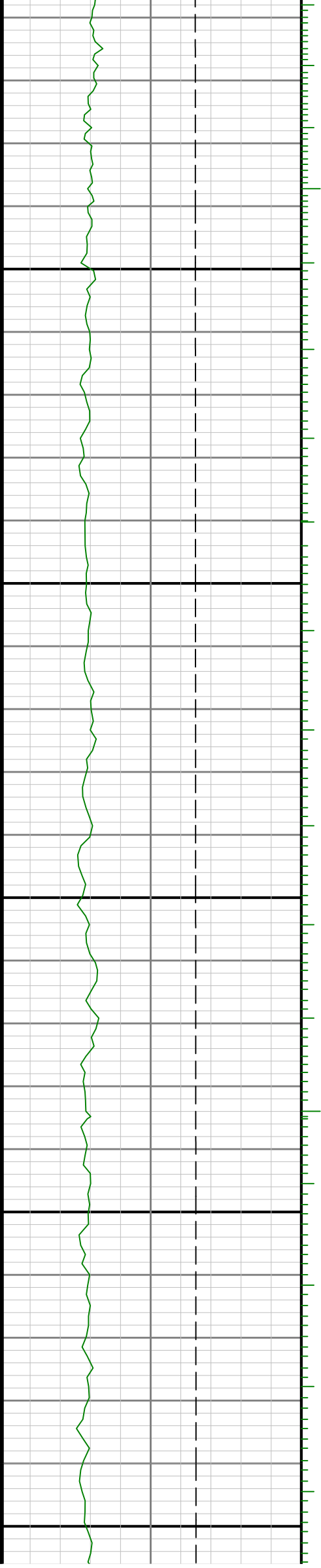
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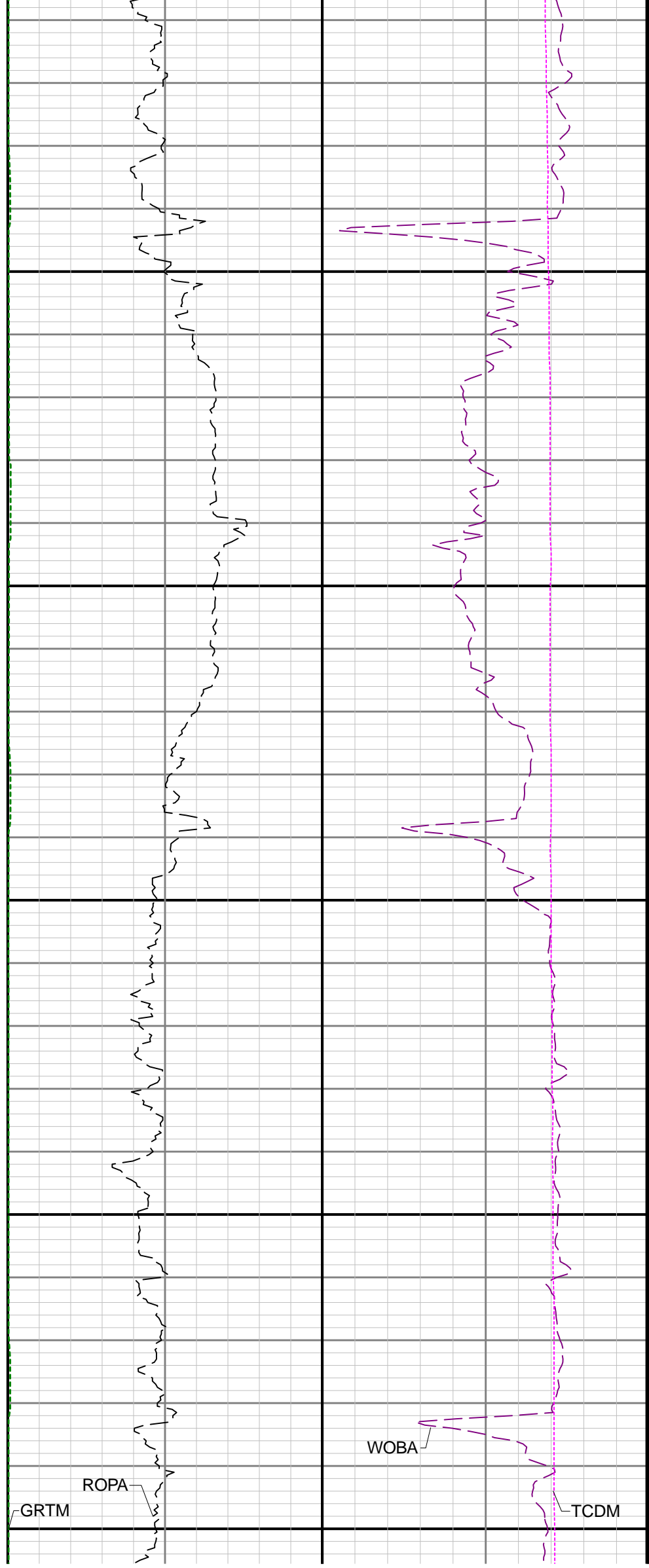
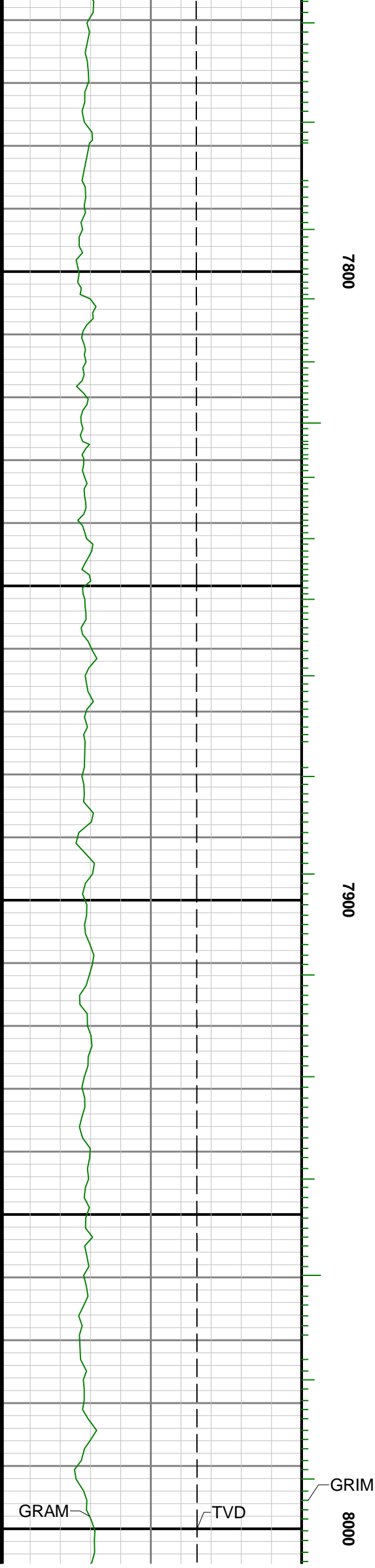




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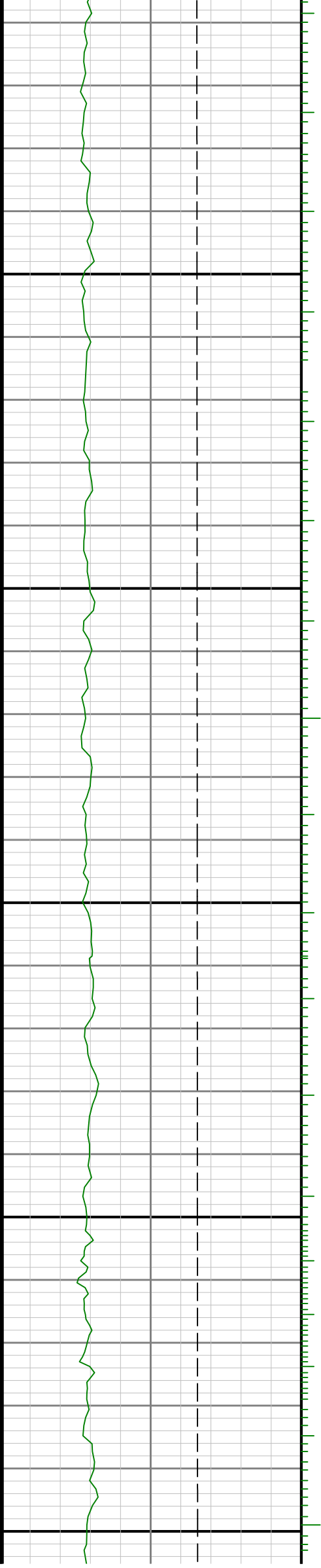


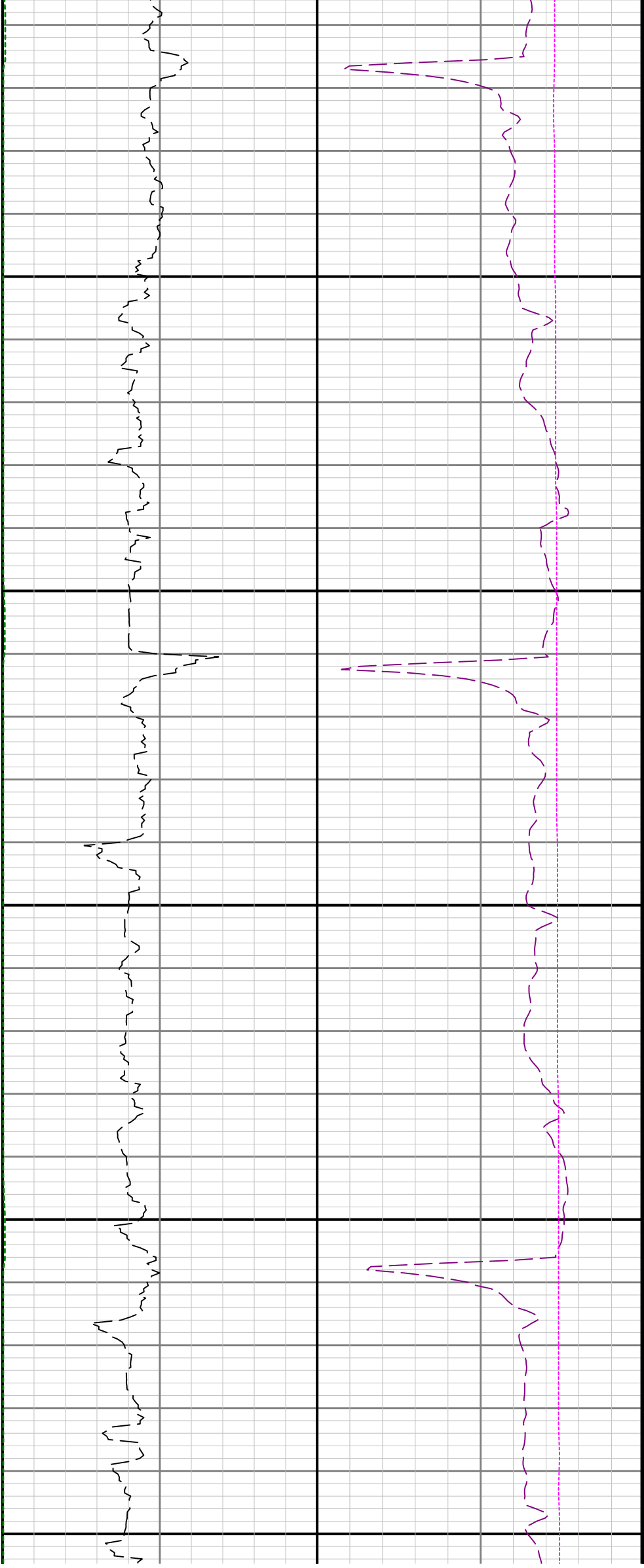




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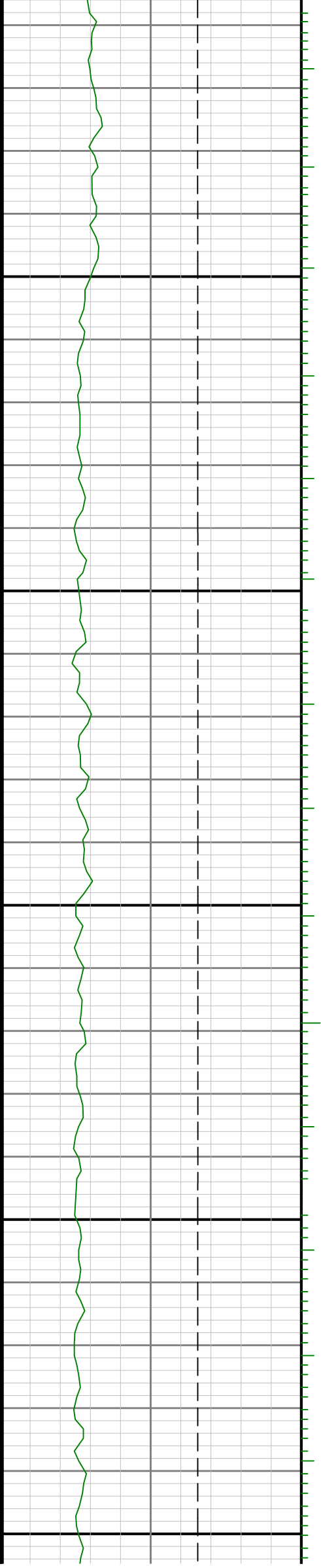


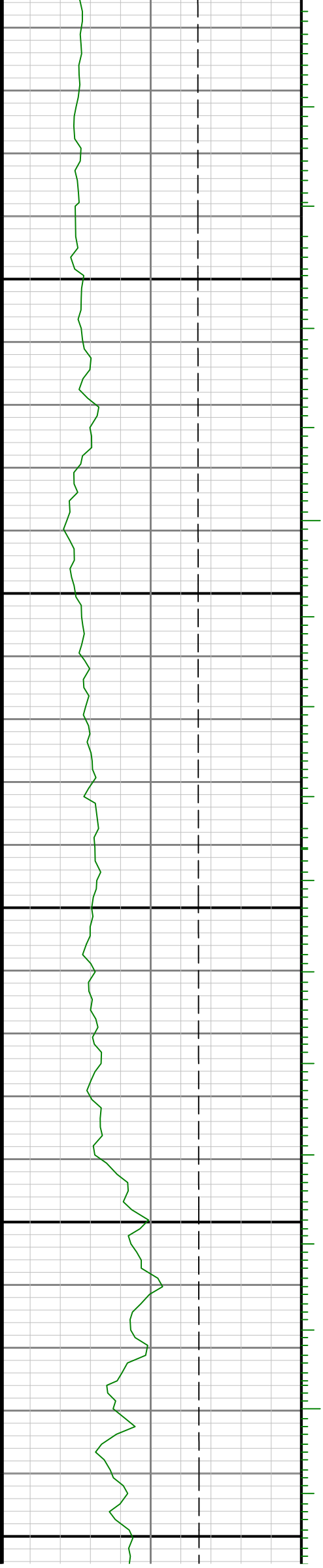


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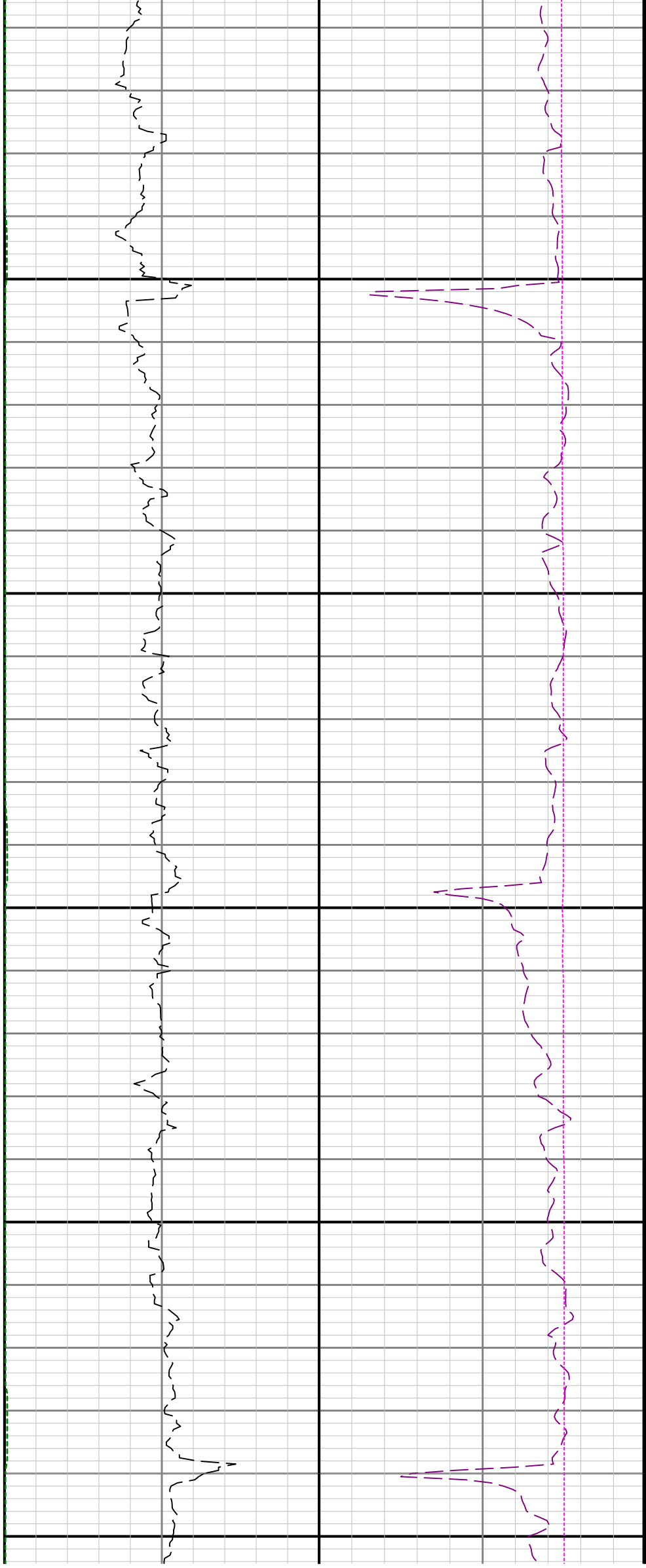
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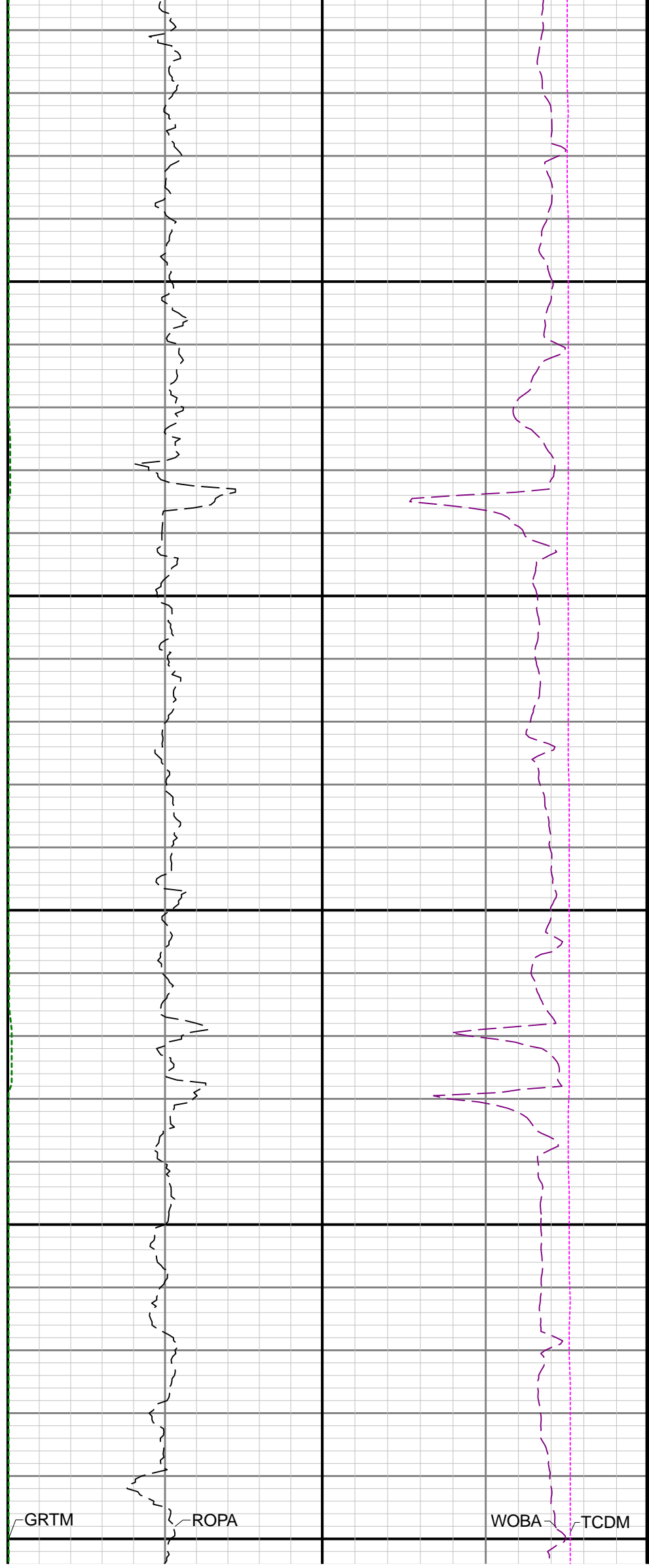
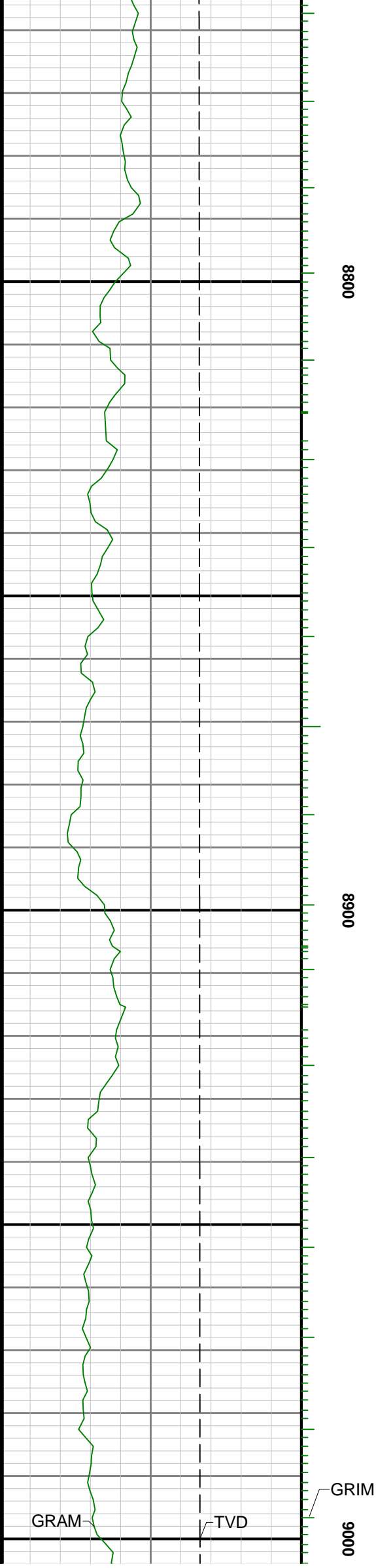


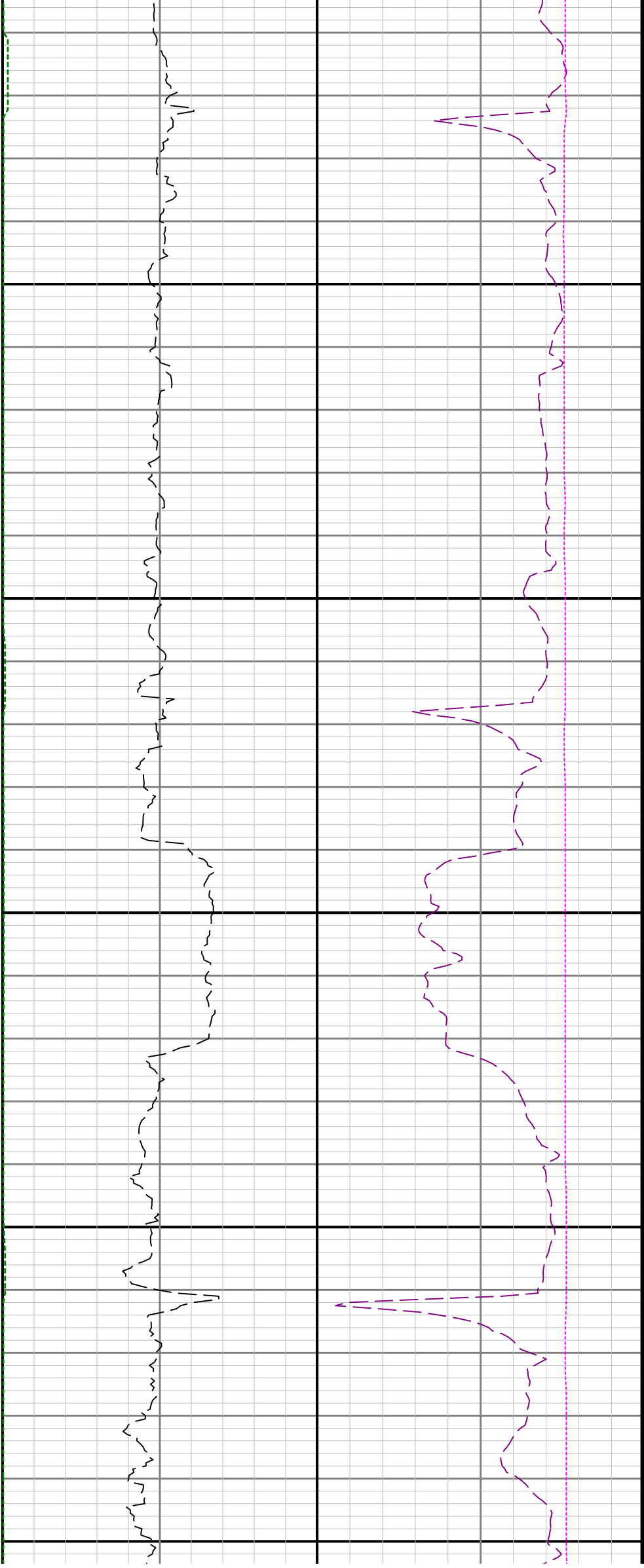


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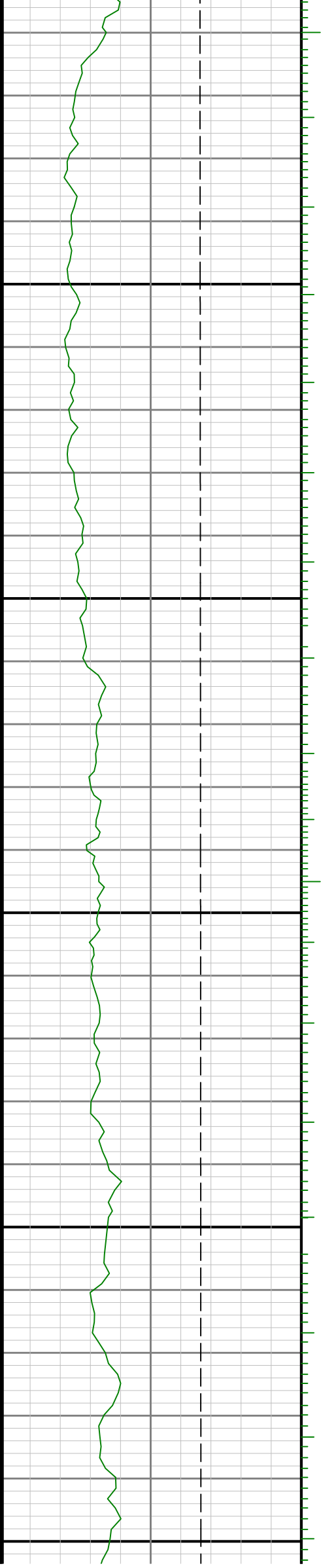


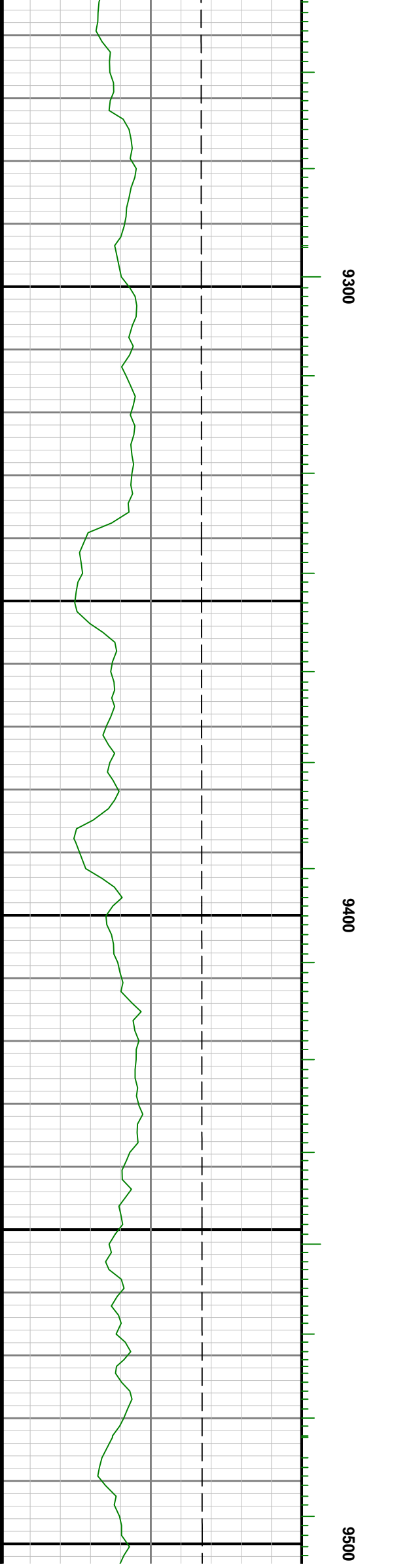
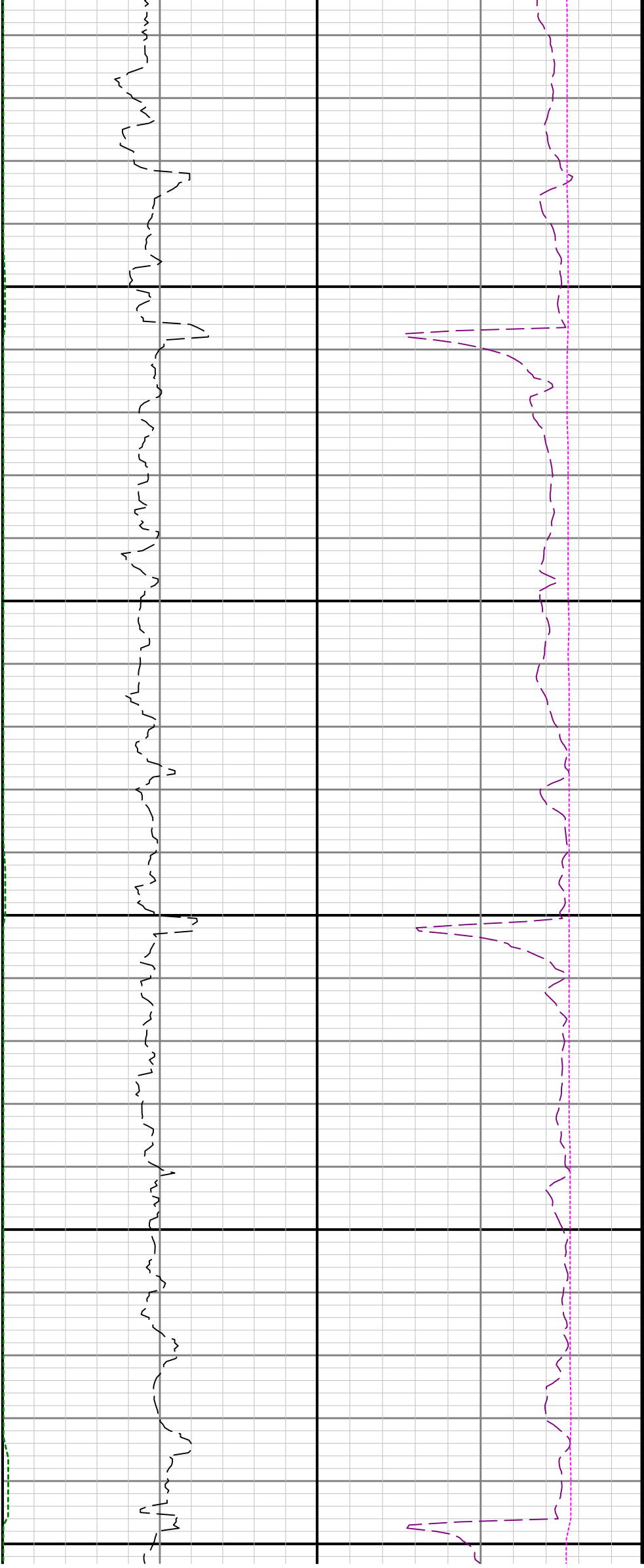


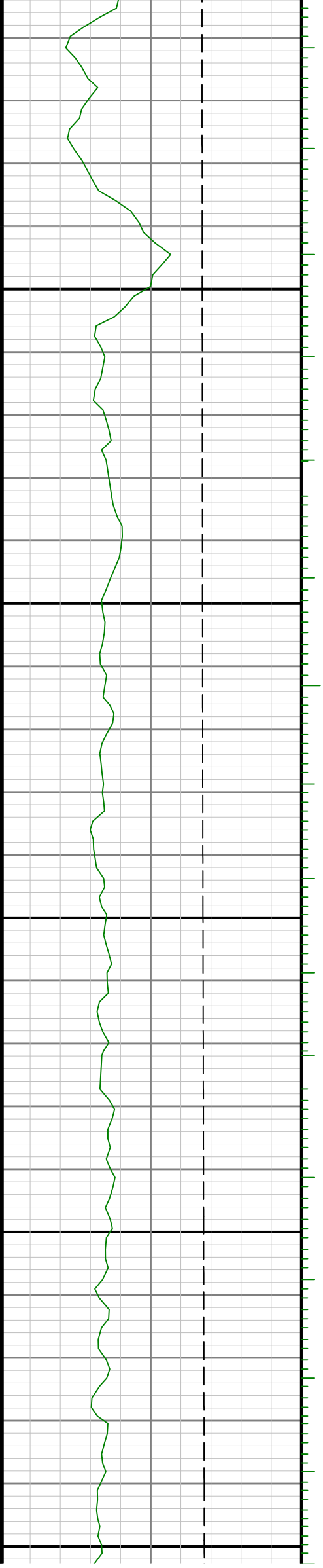


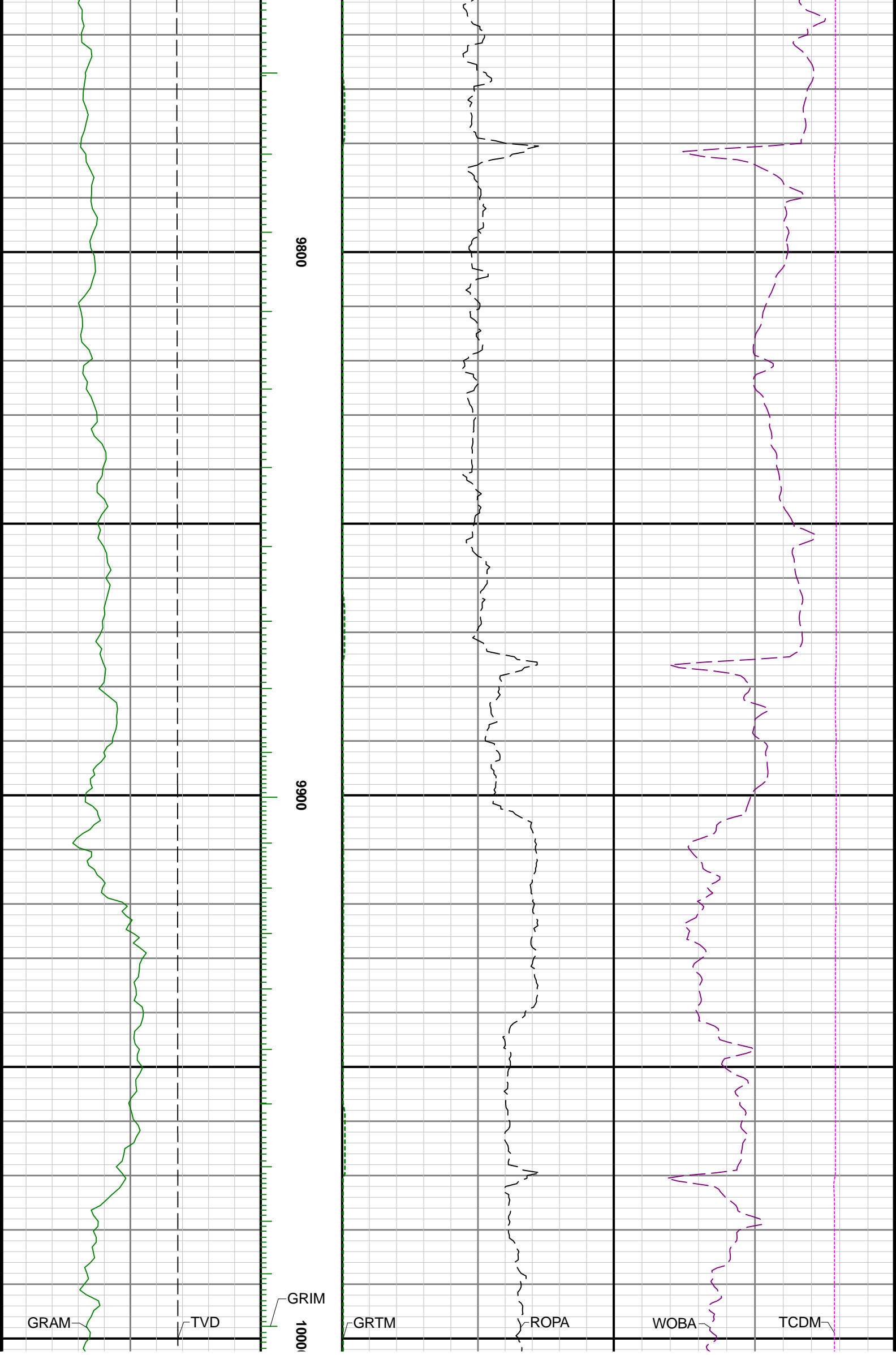
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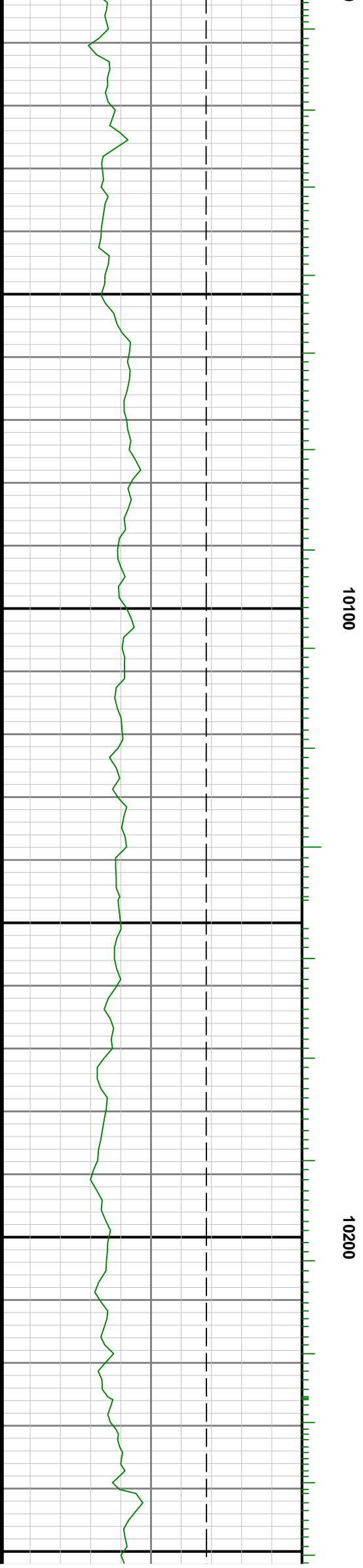
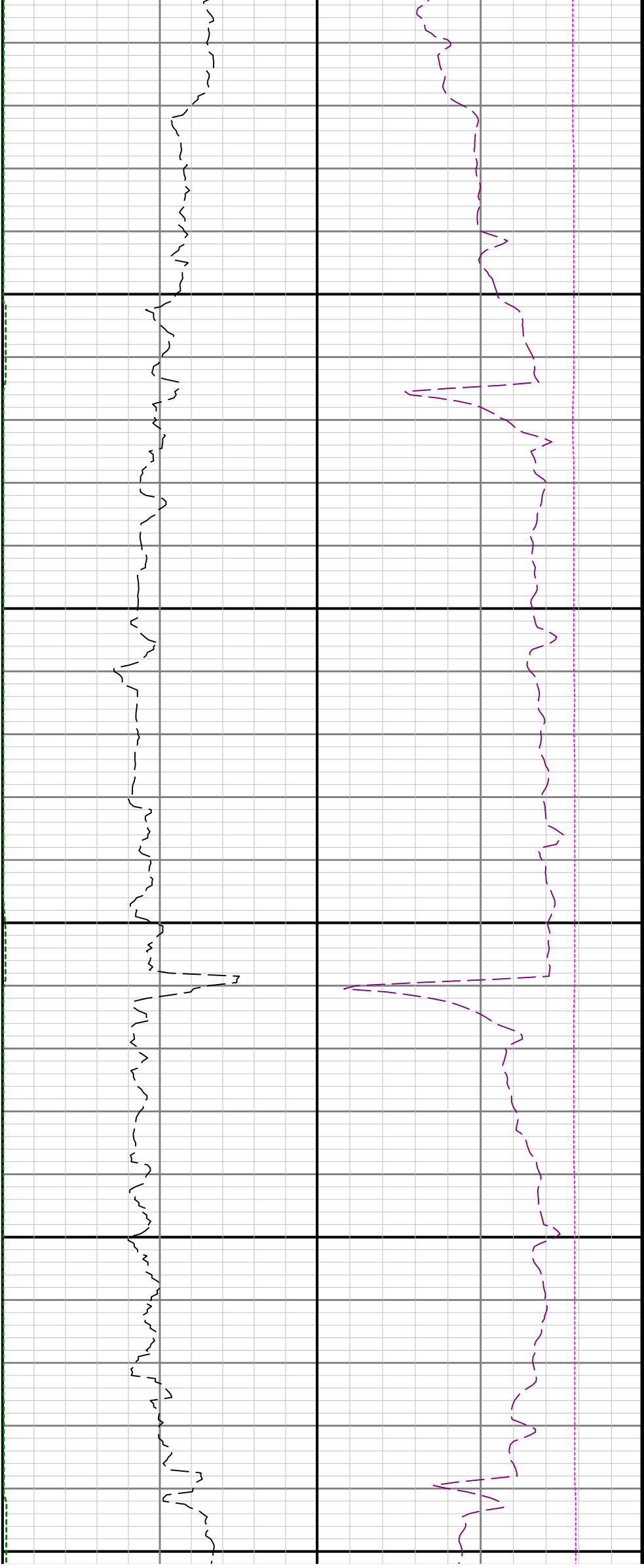
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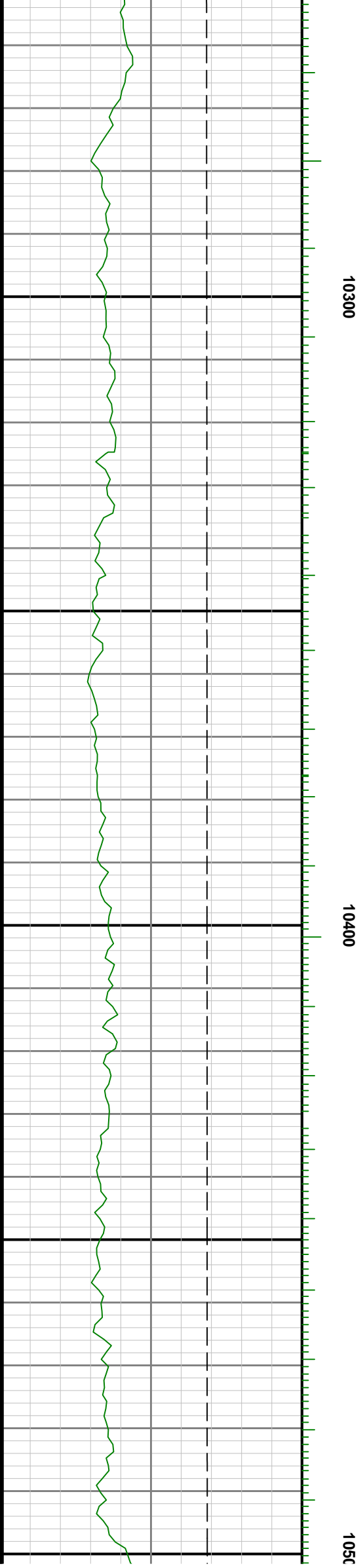
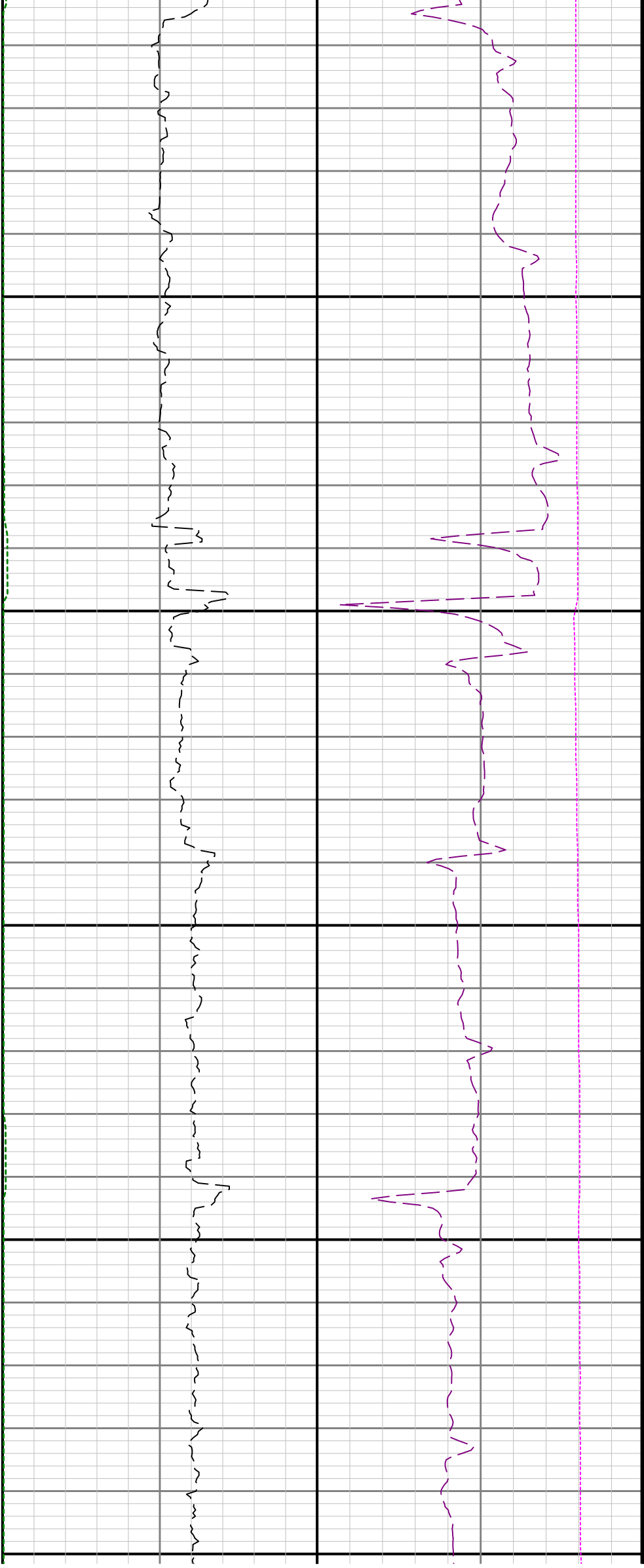


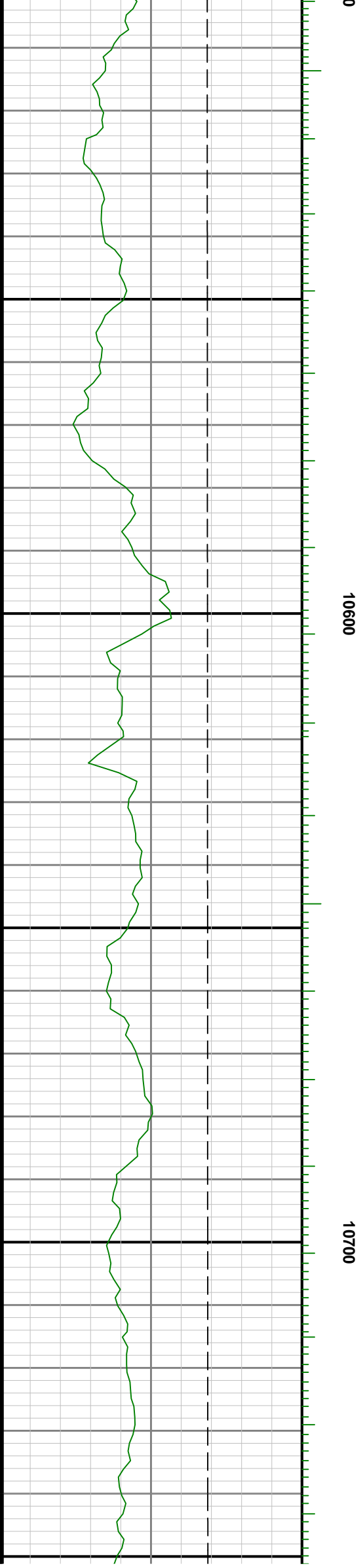
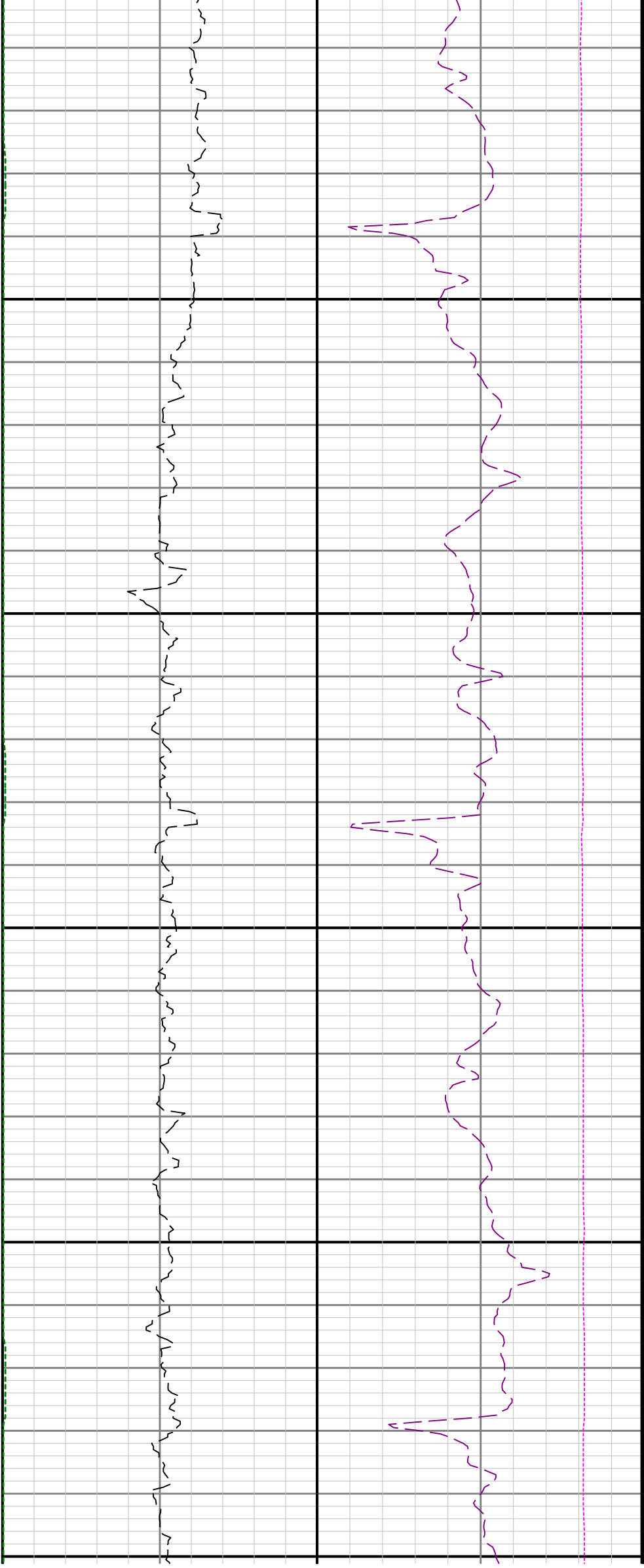




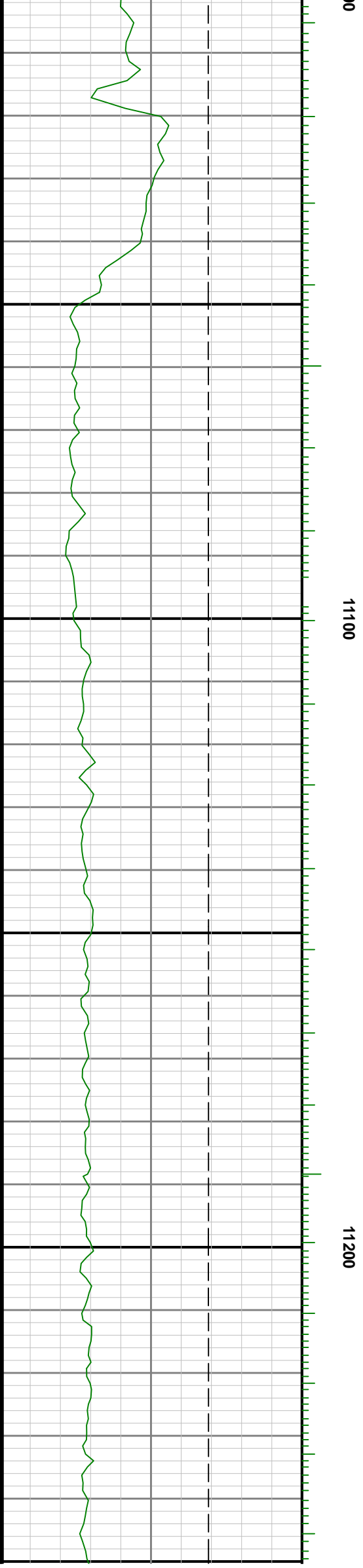
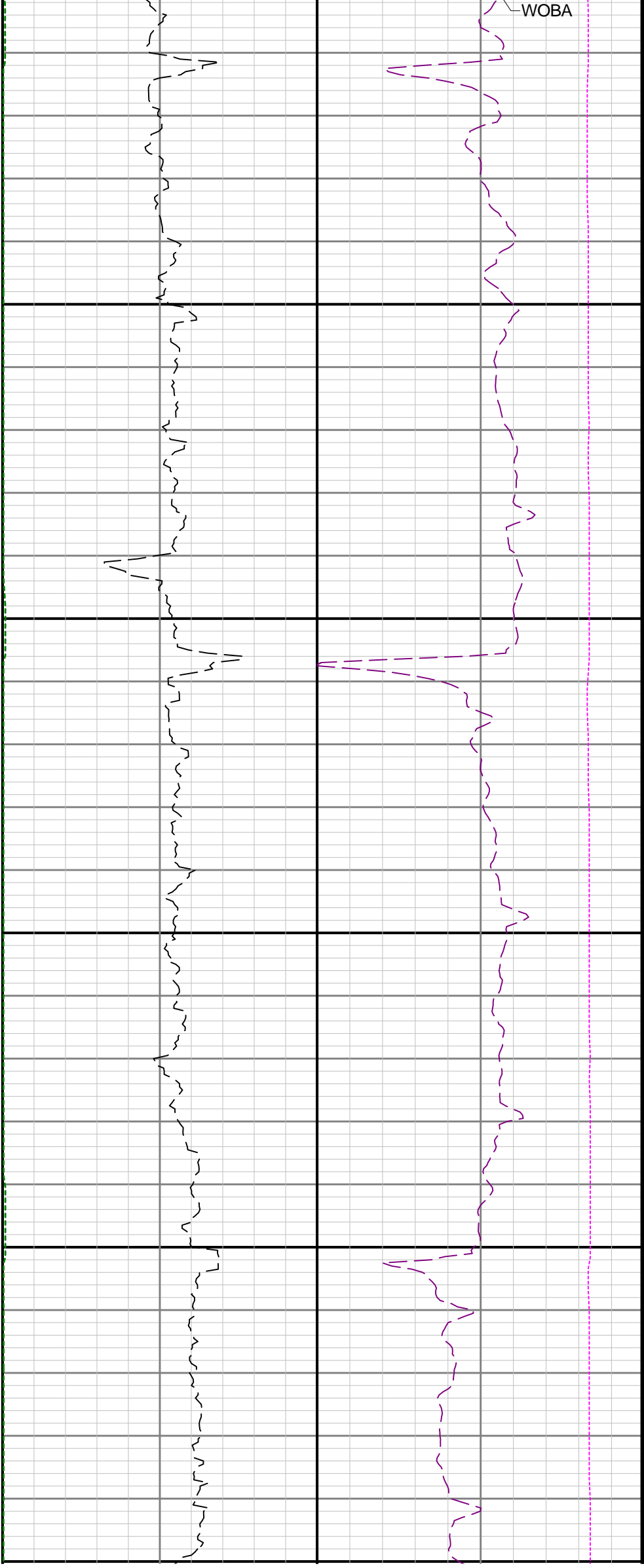


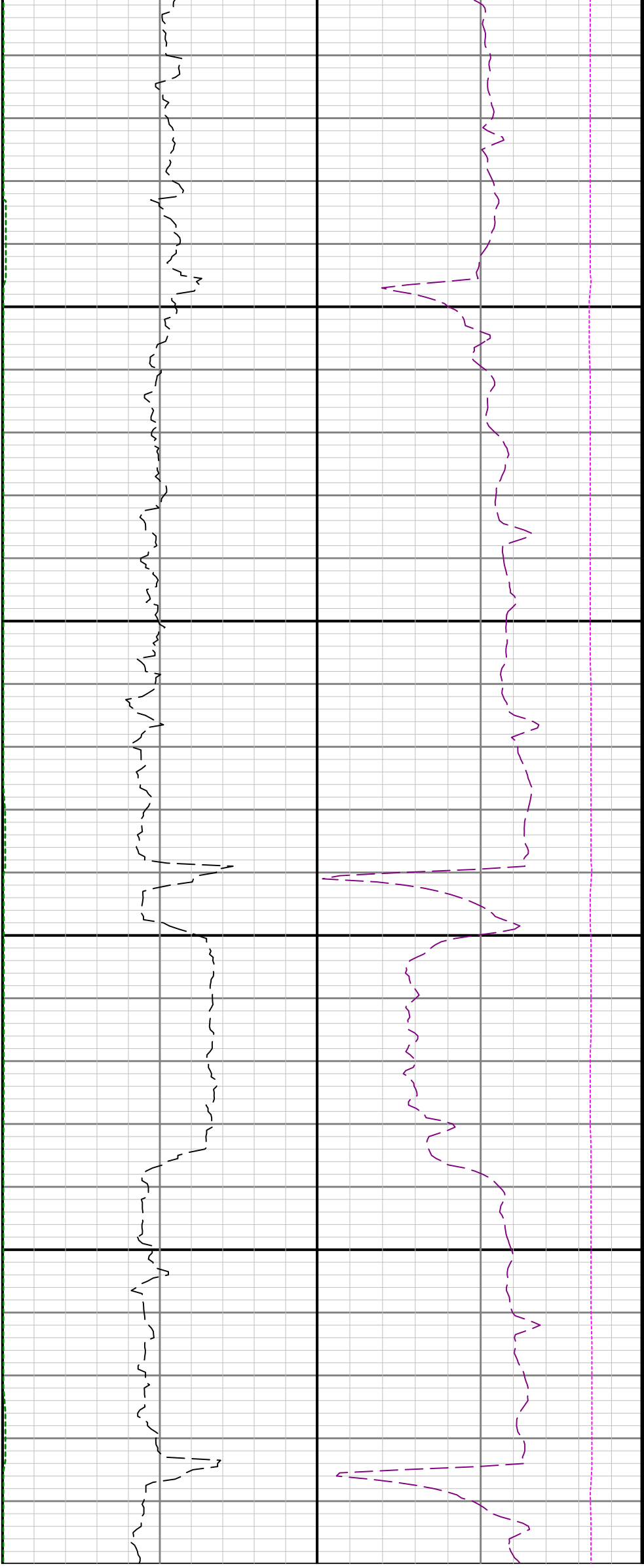








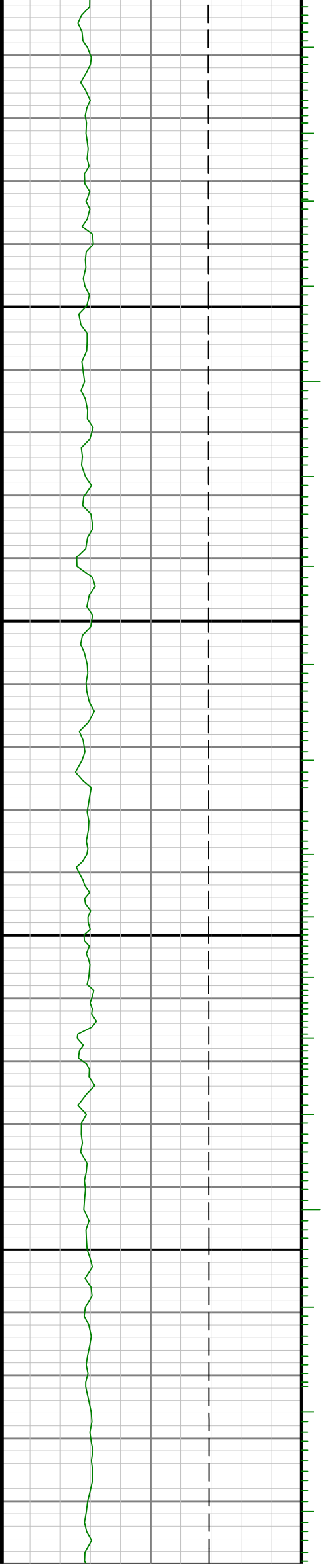


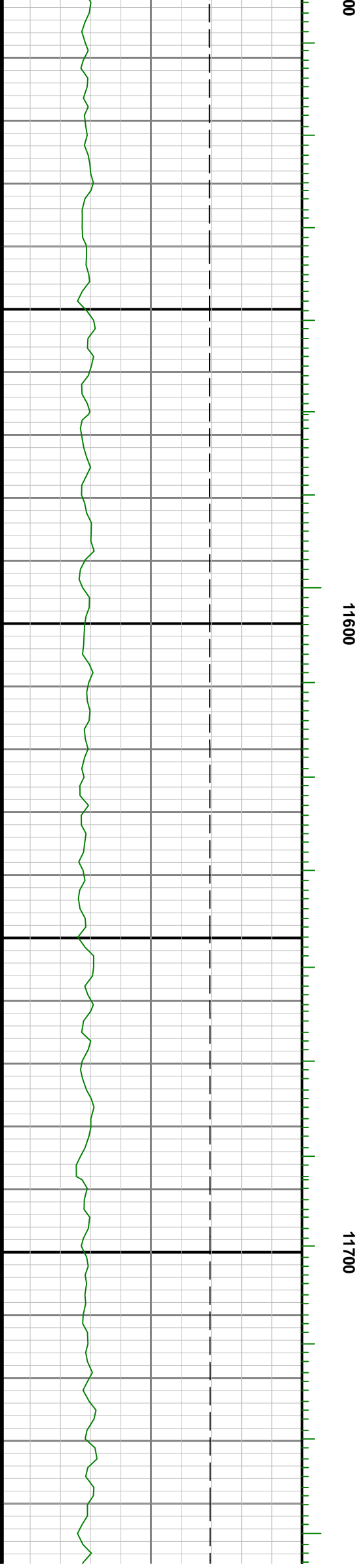


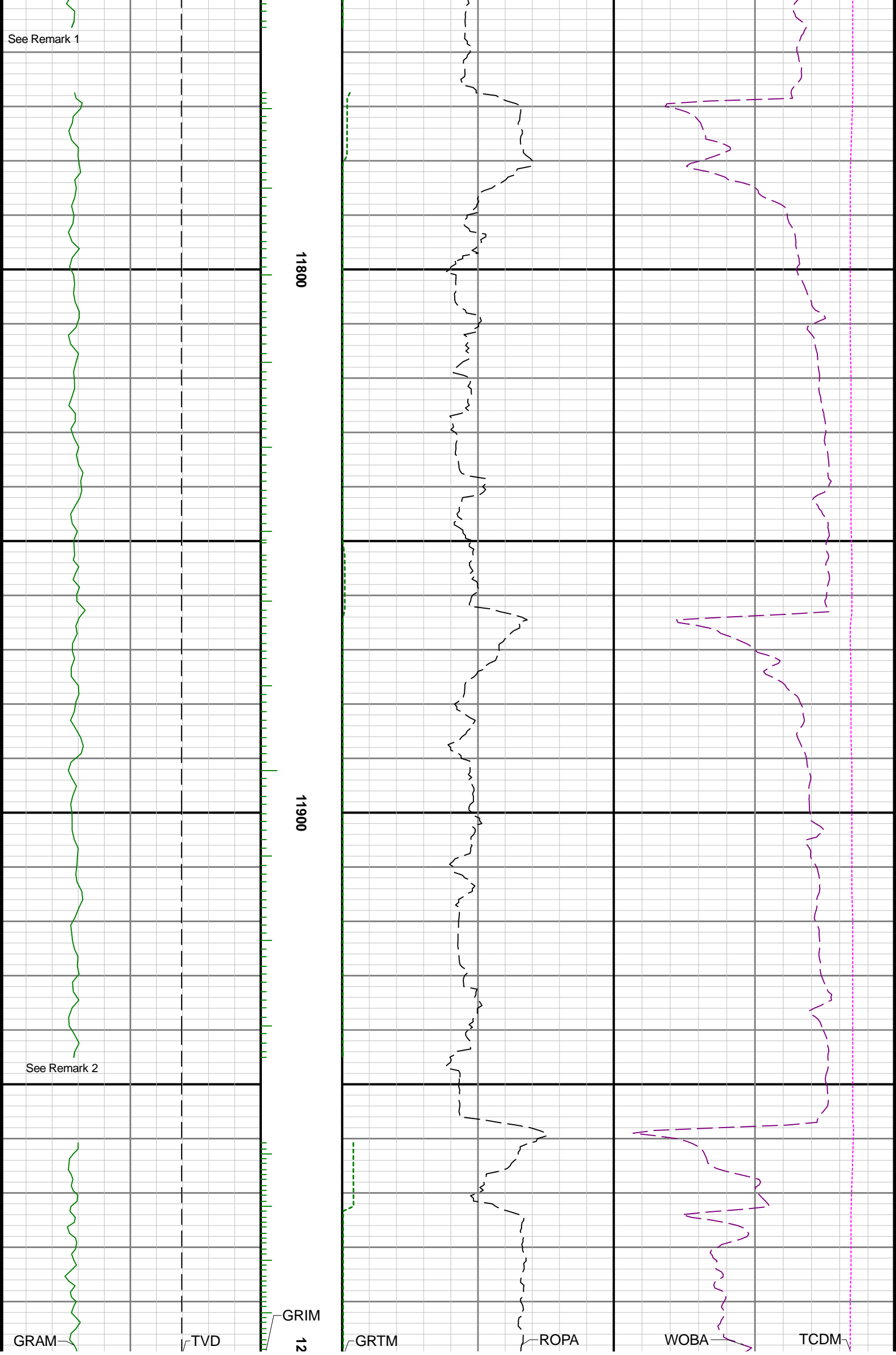
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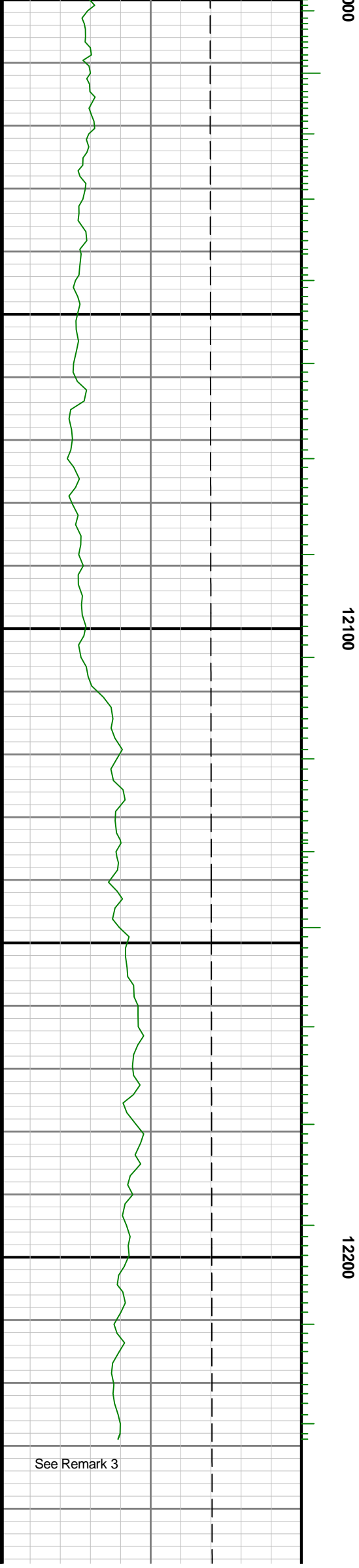
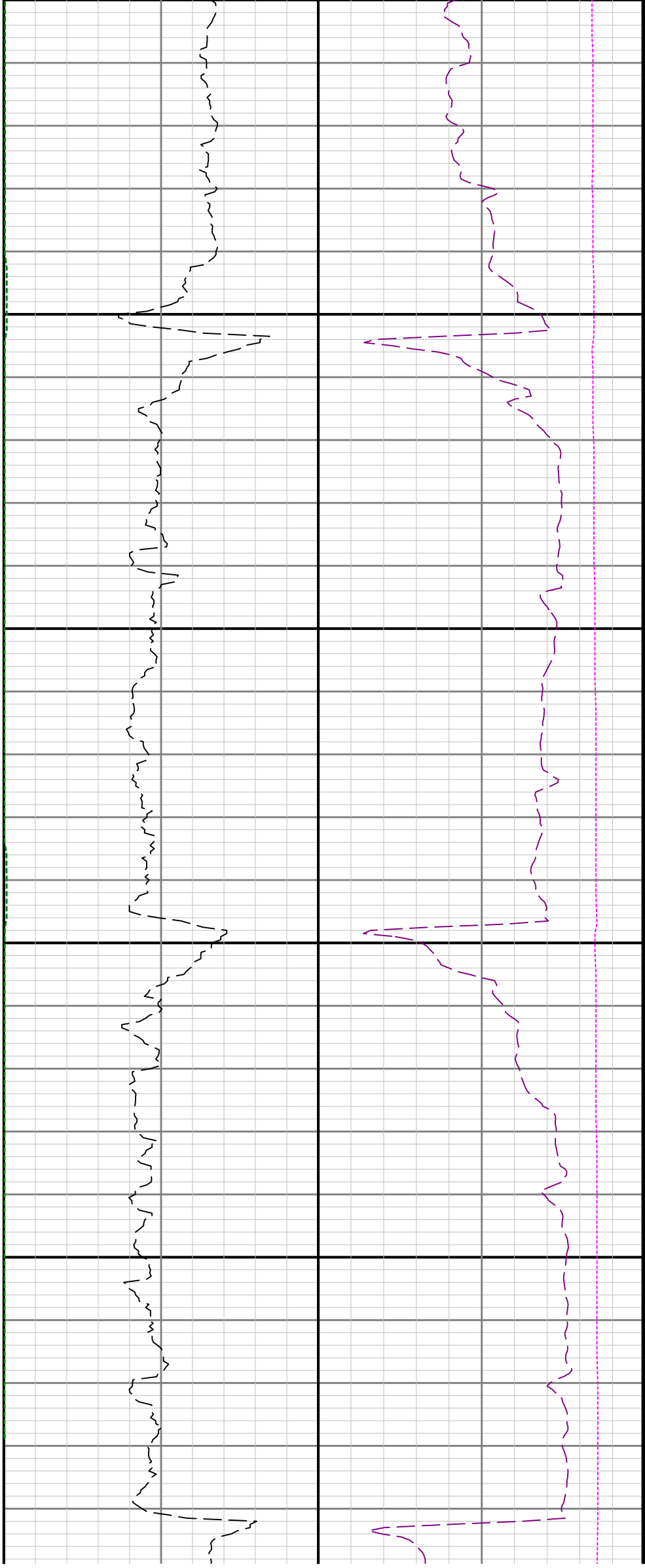
11400

11500

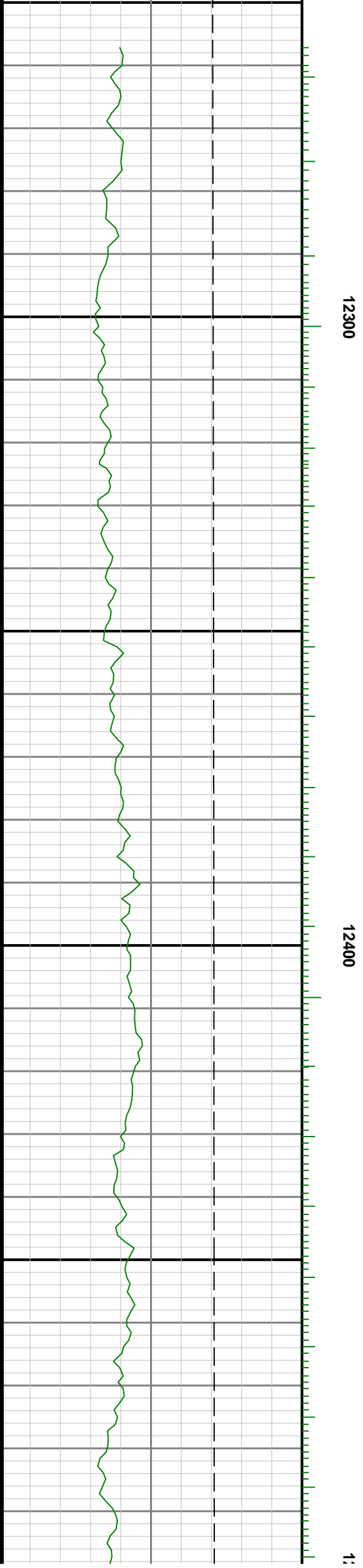
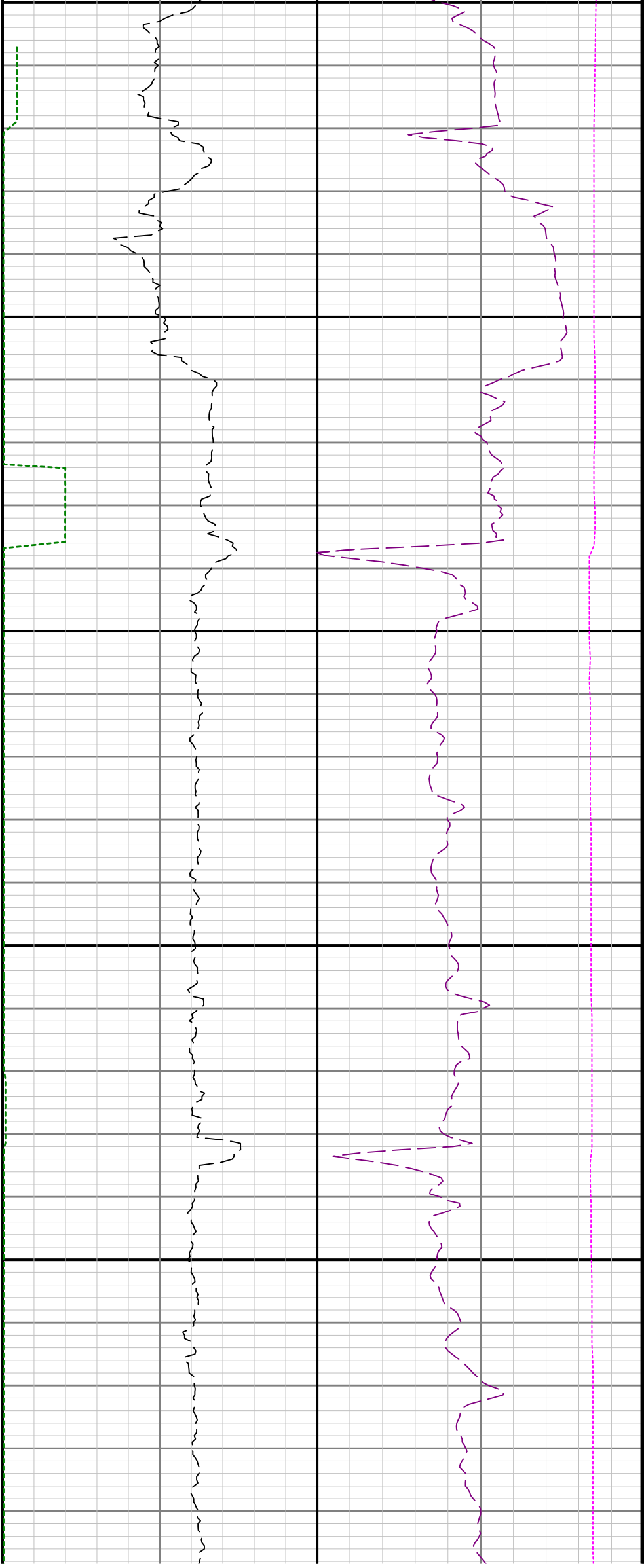


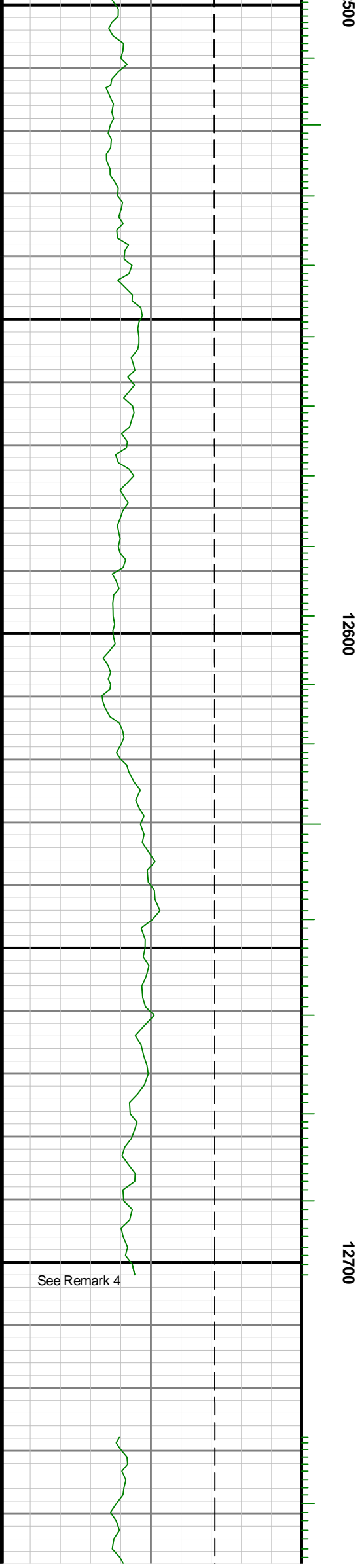
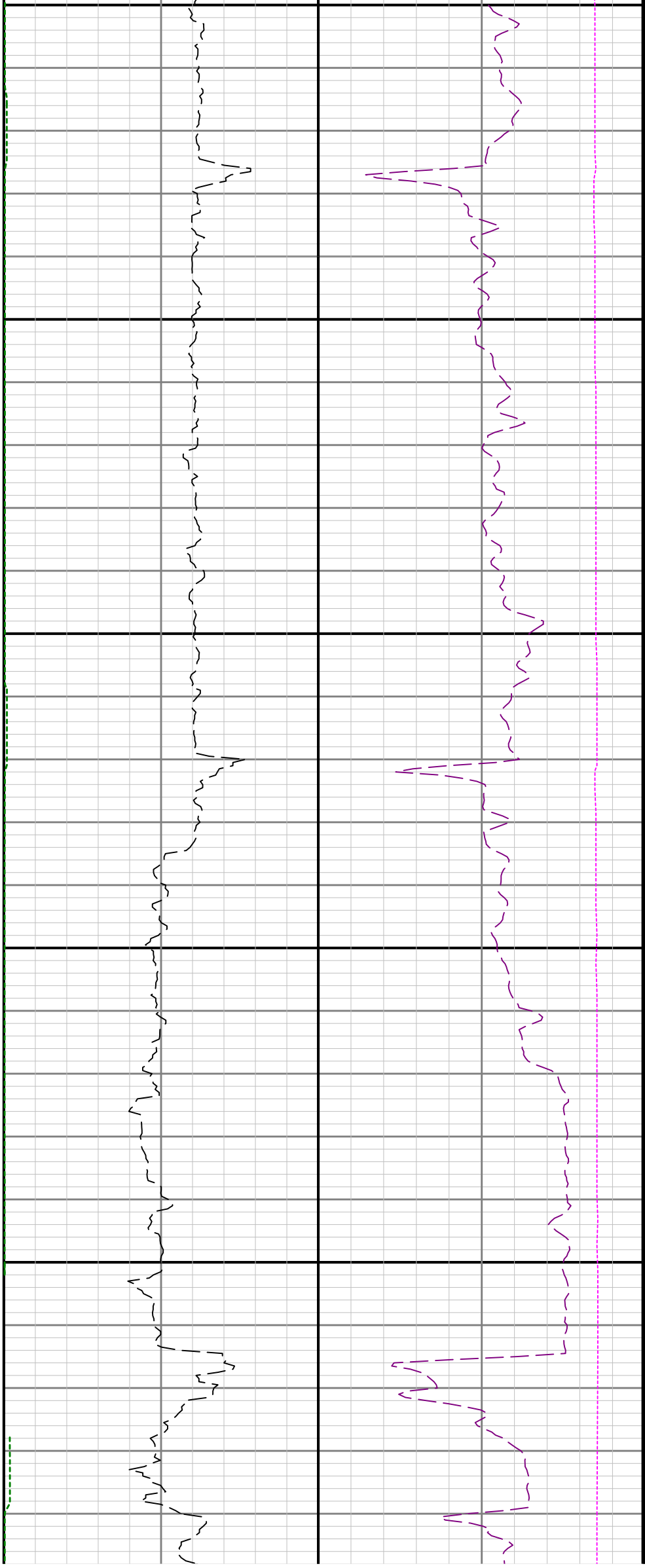


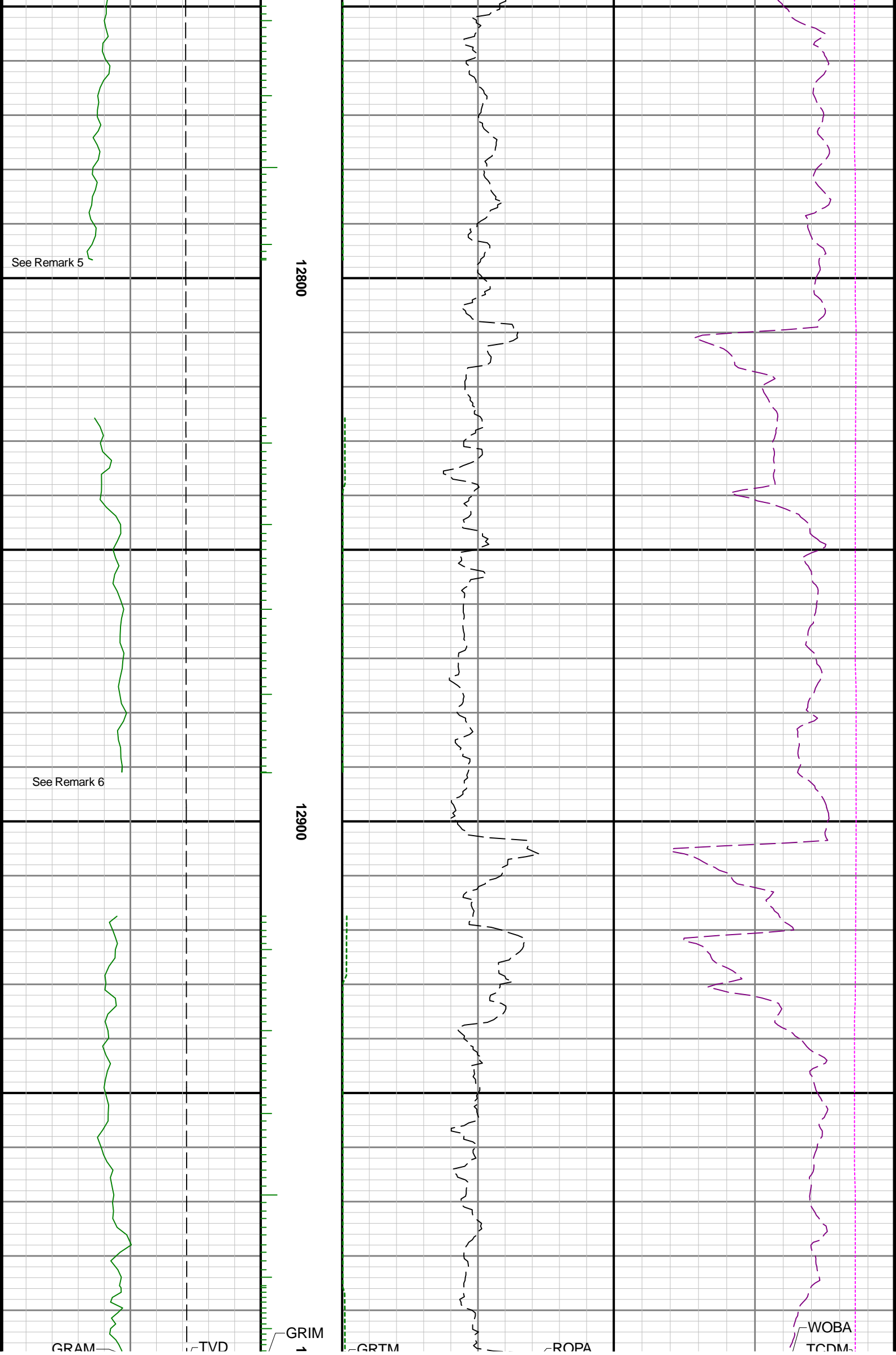


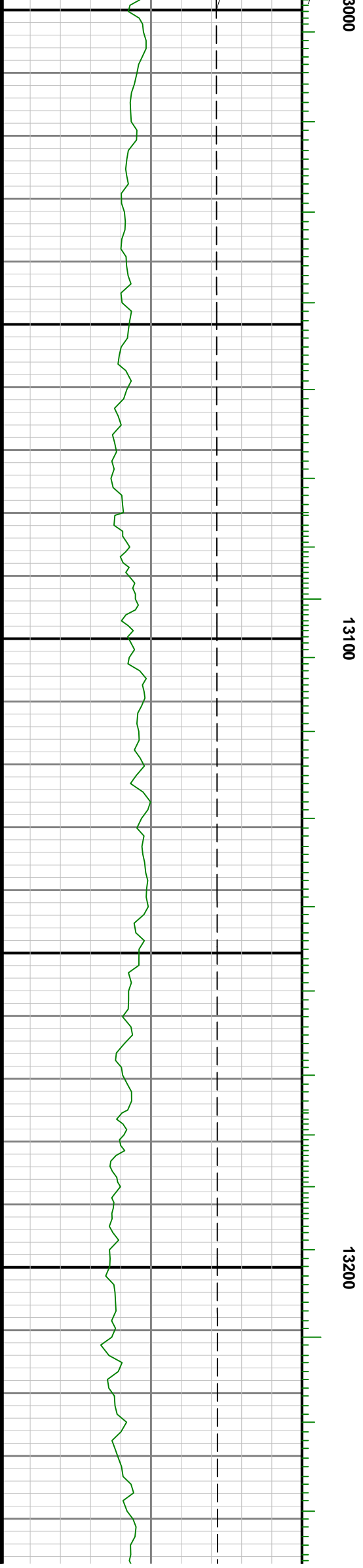
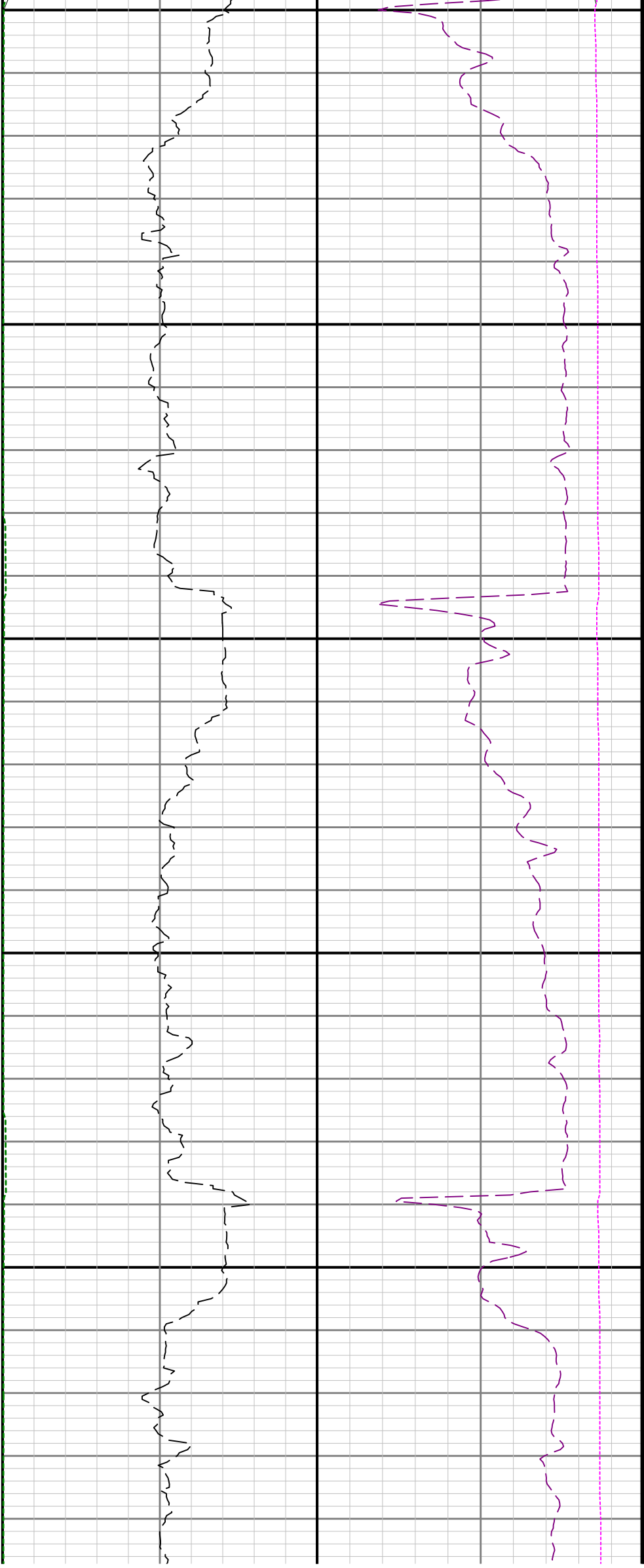


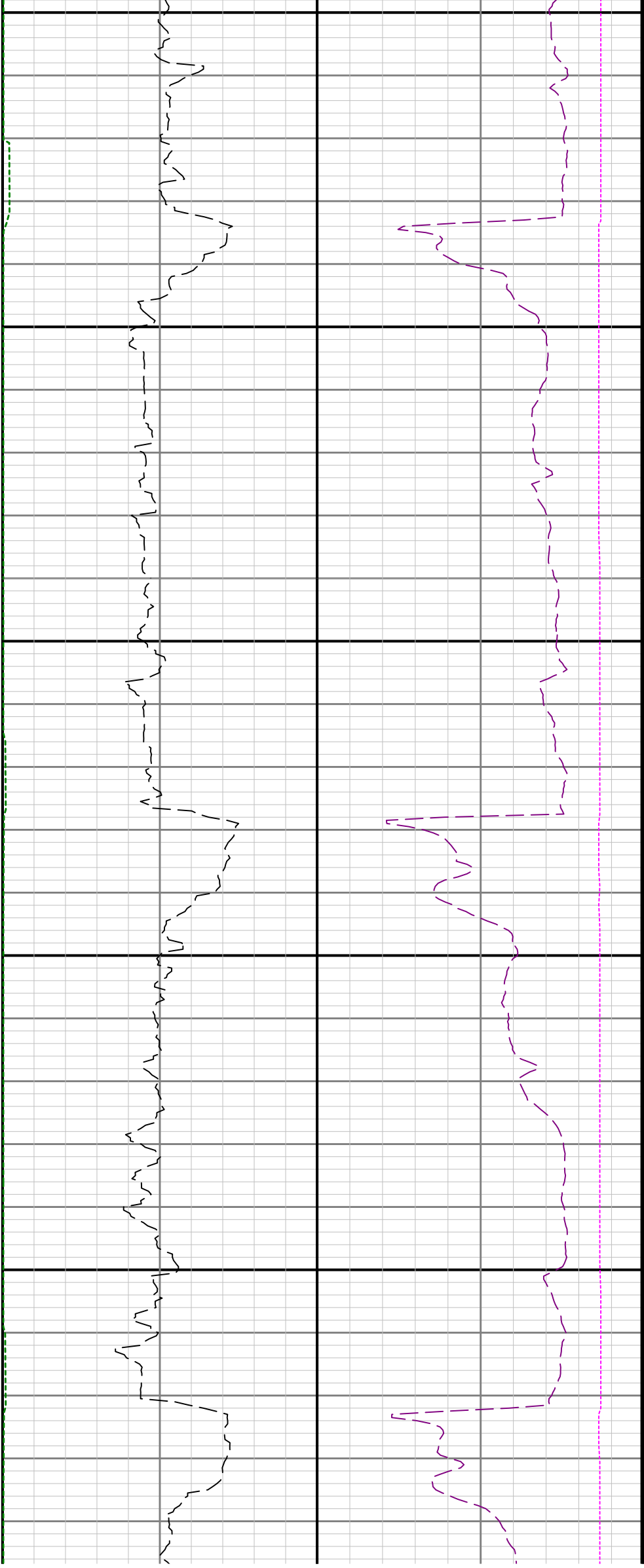
See Remark 3





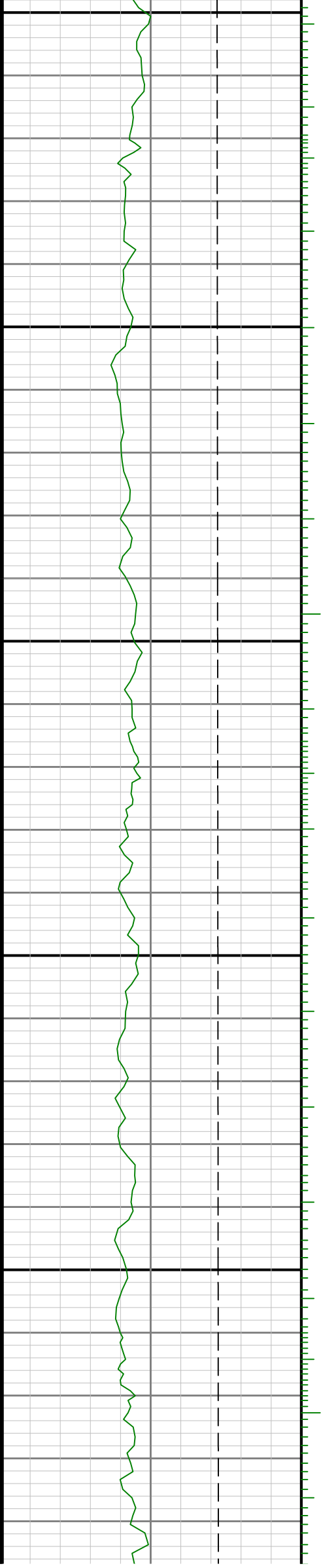


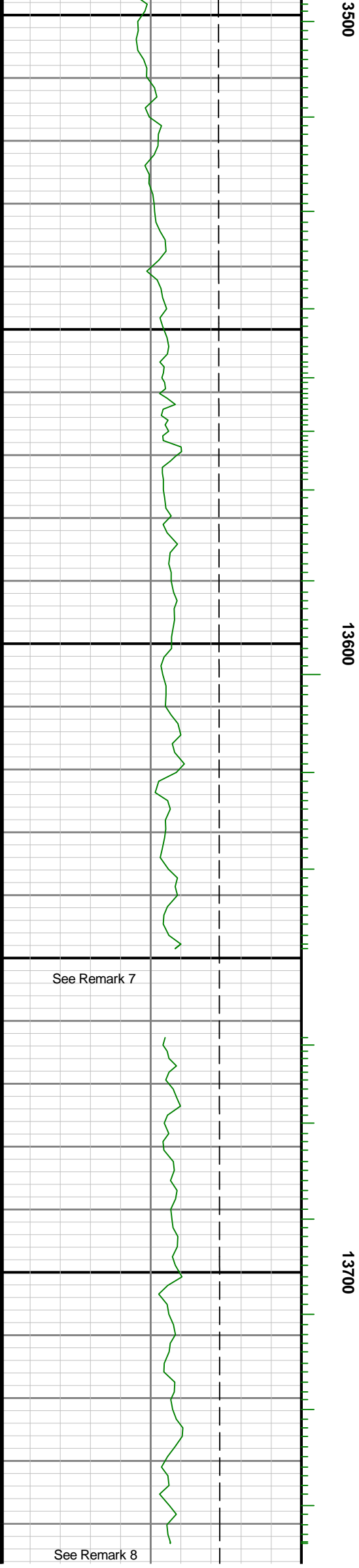
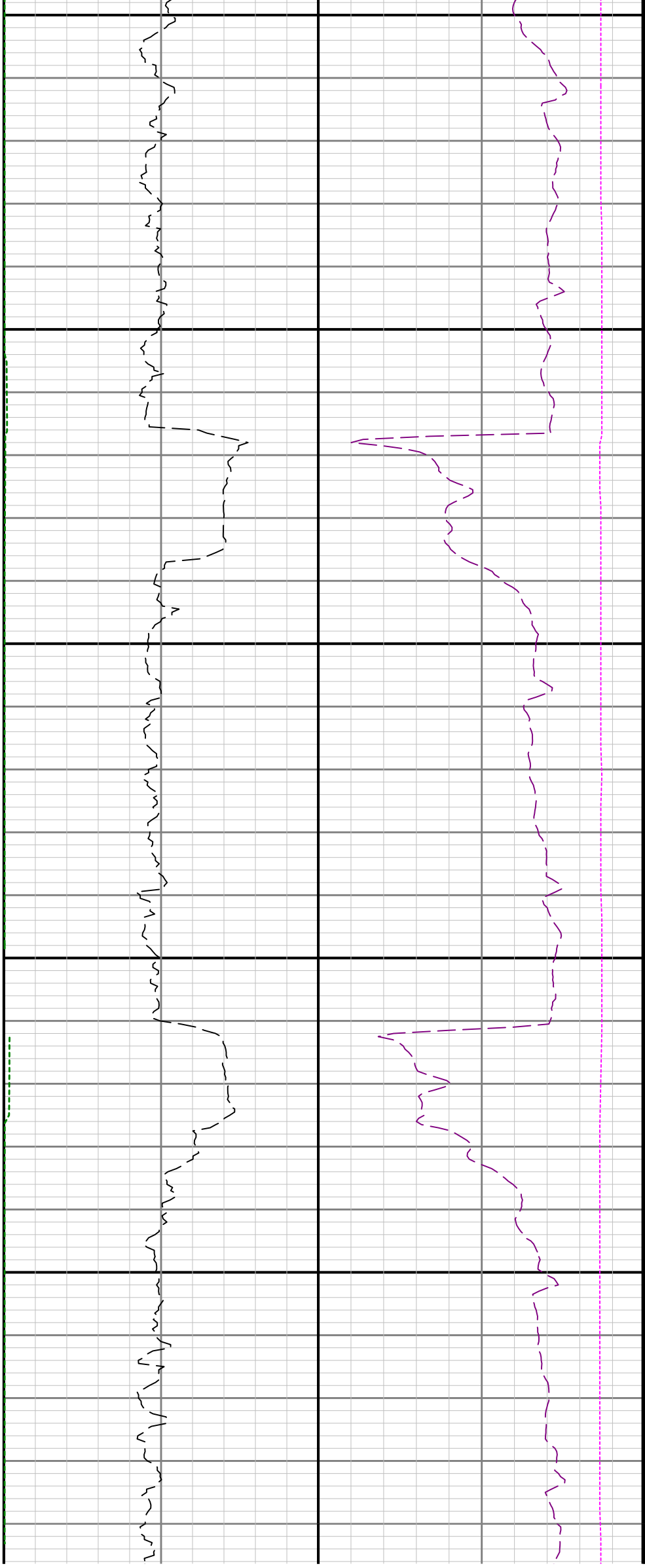


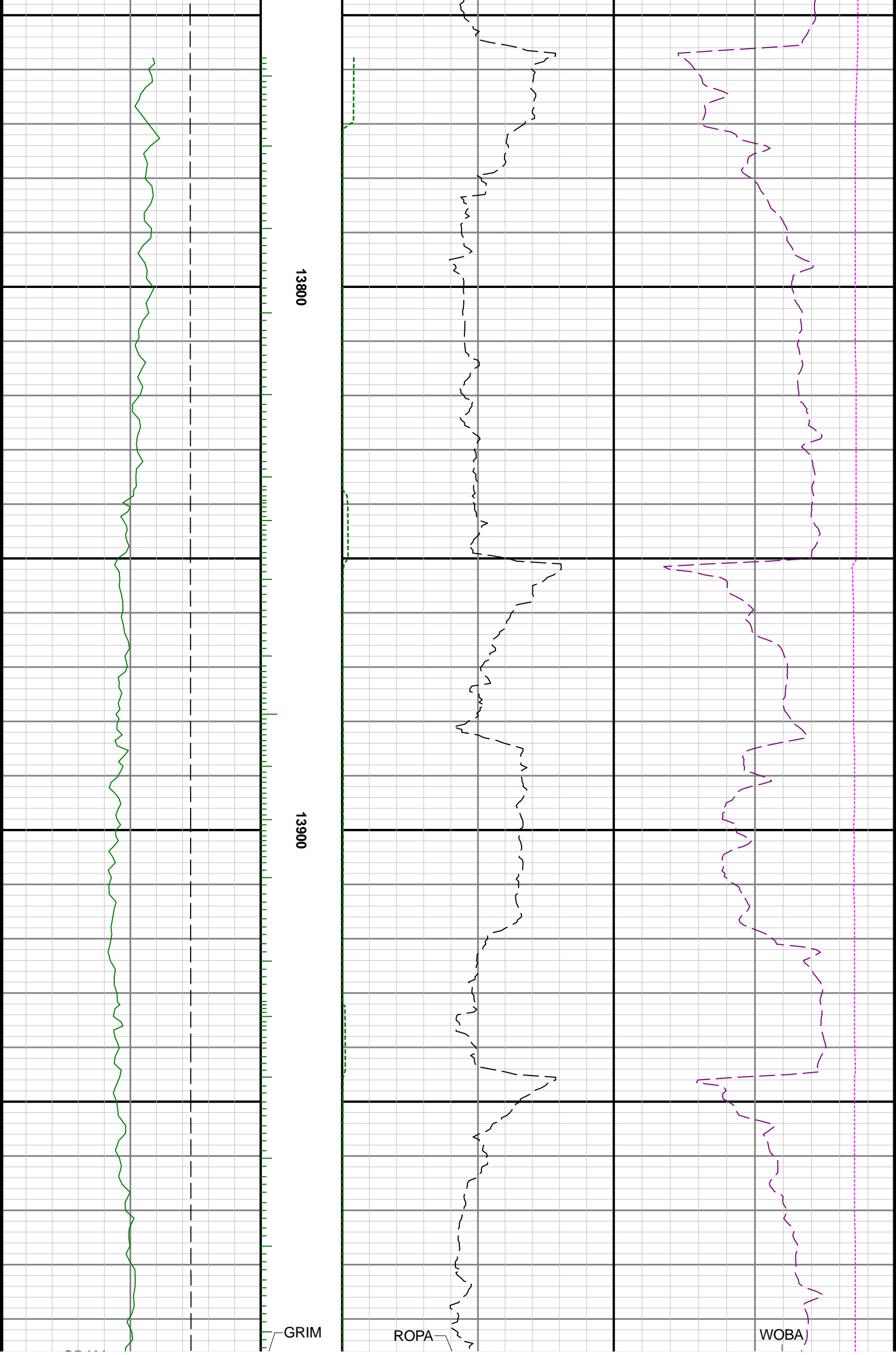


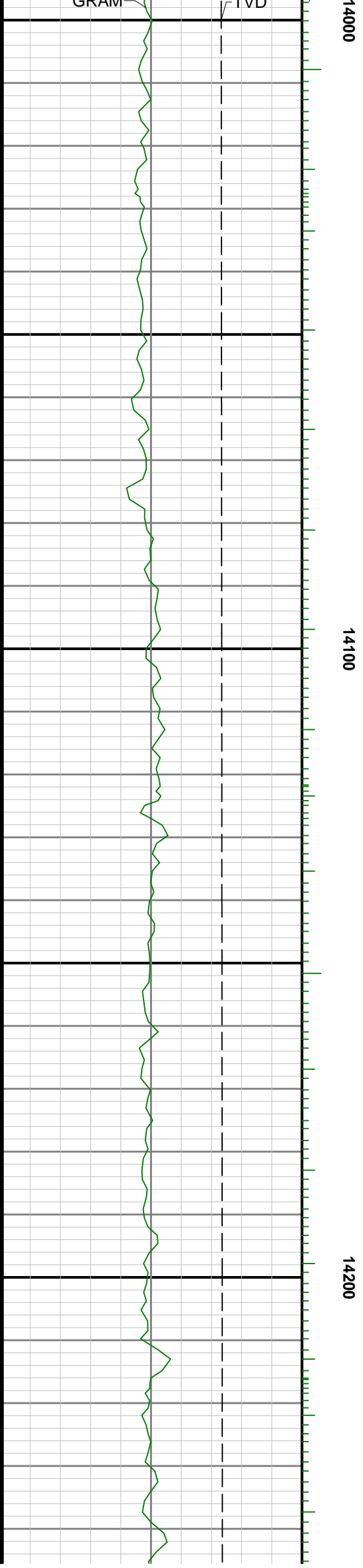
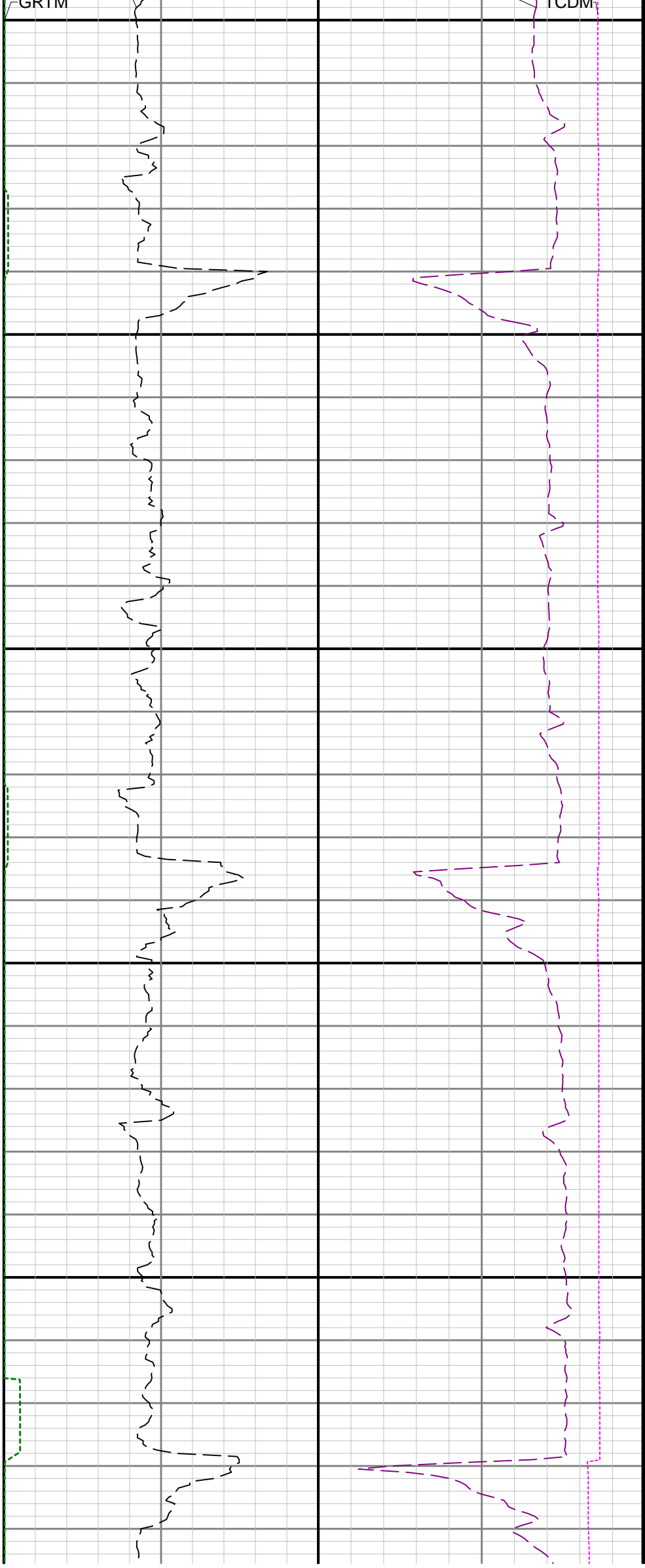
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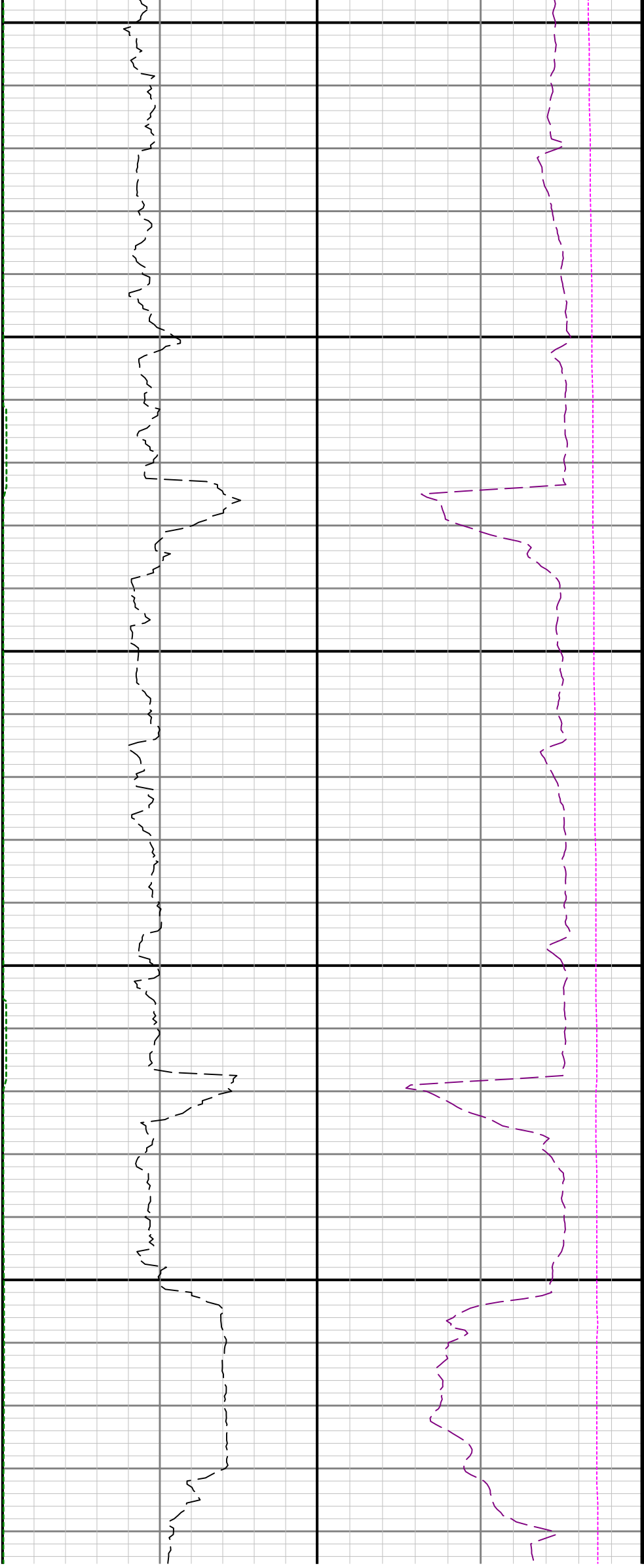
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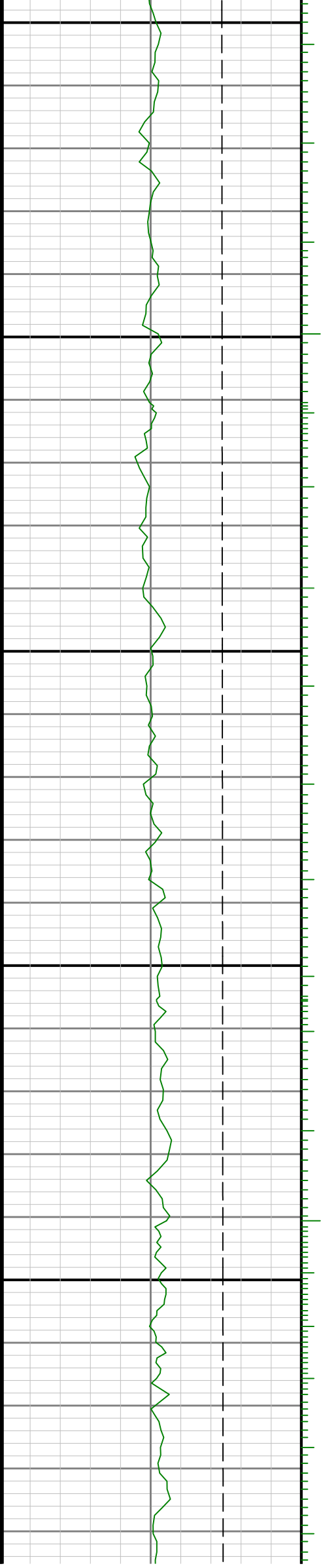


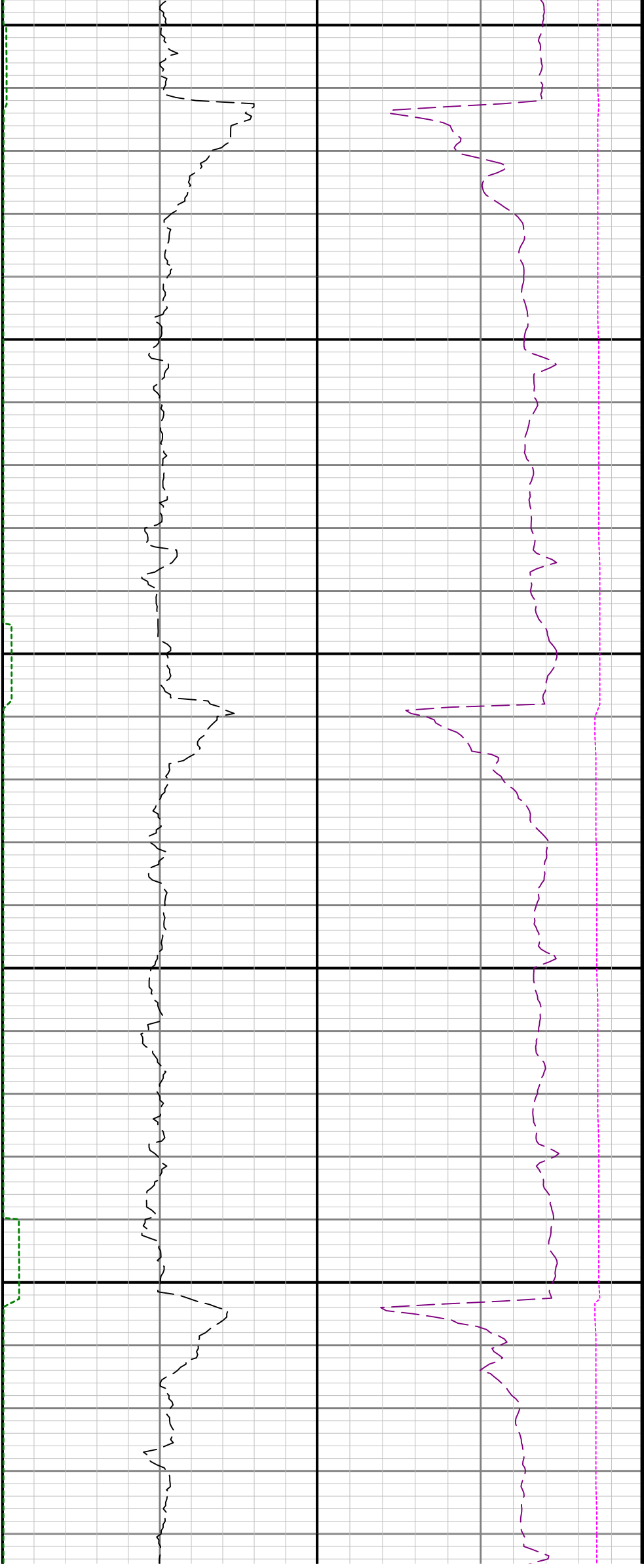




14300

14400

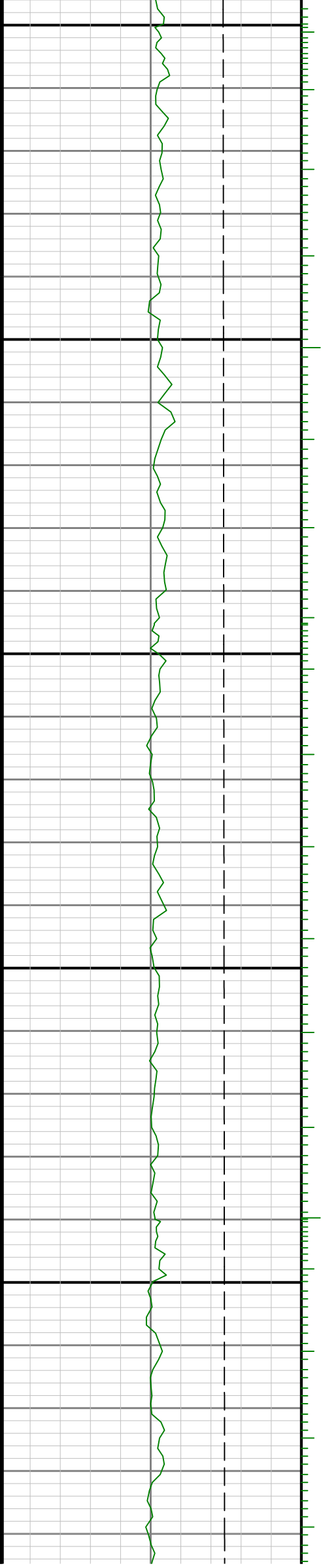


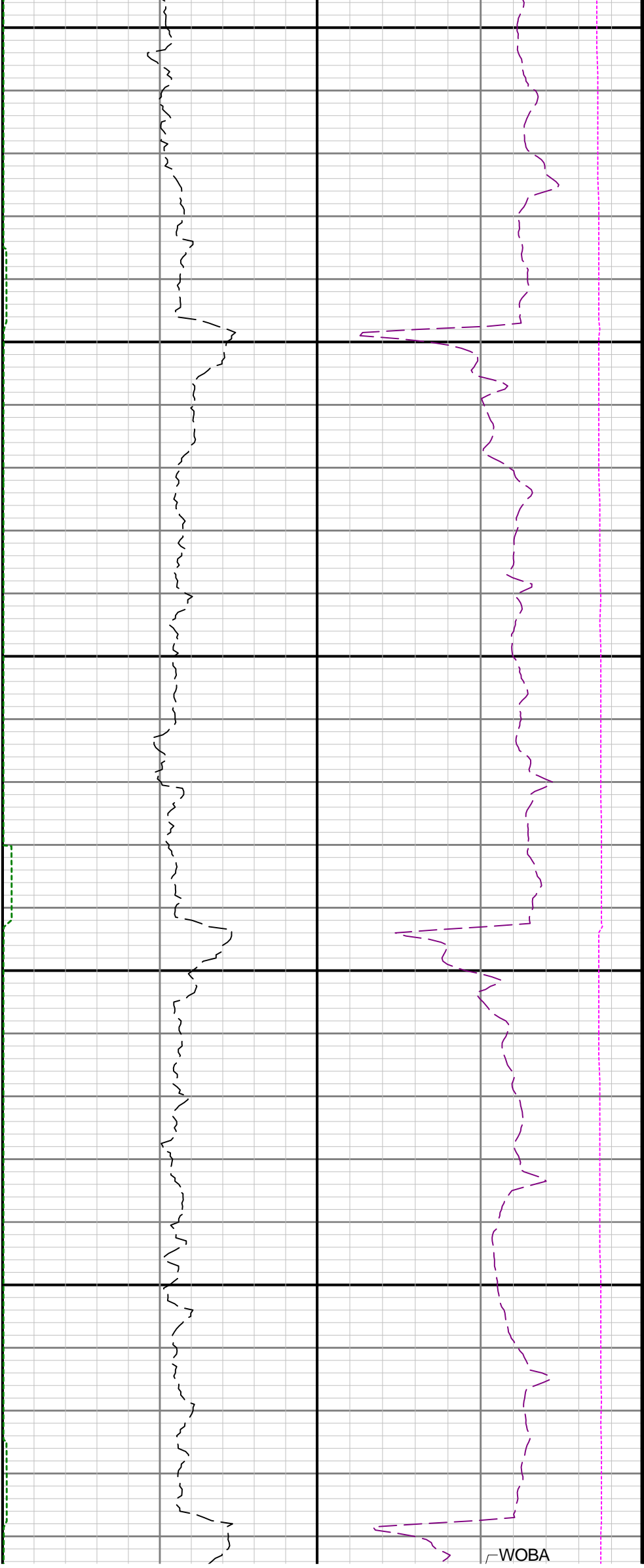


14500

14600

14700



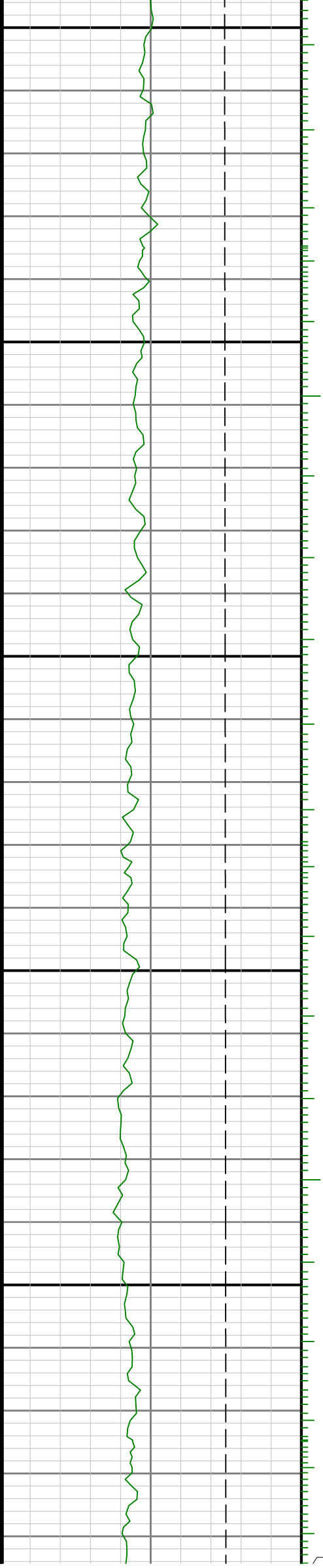


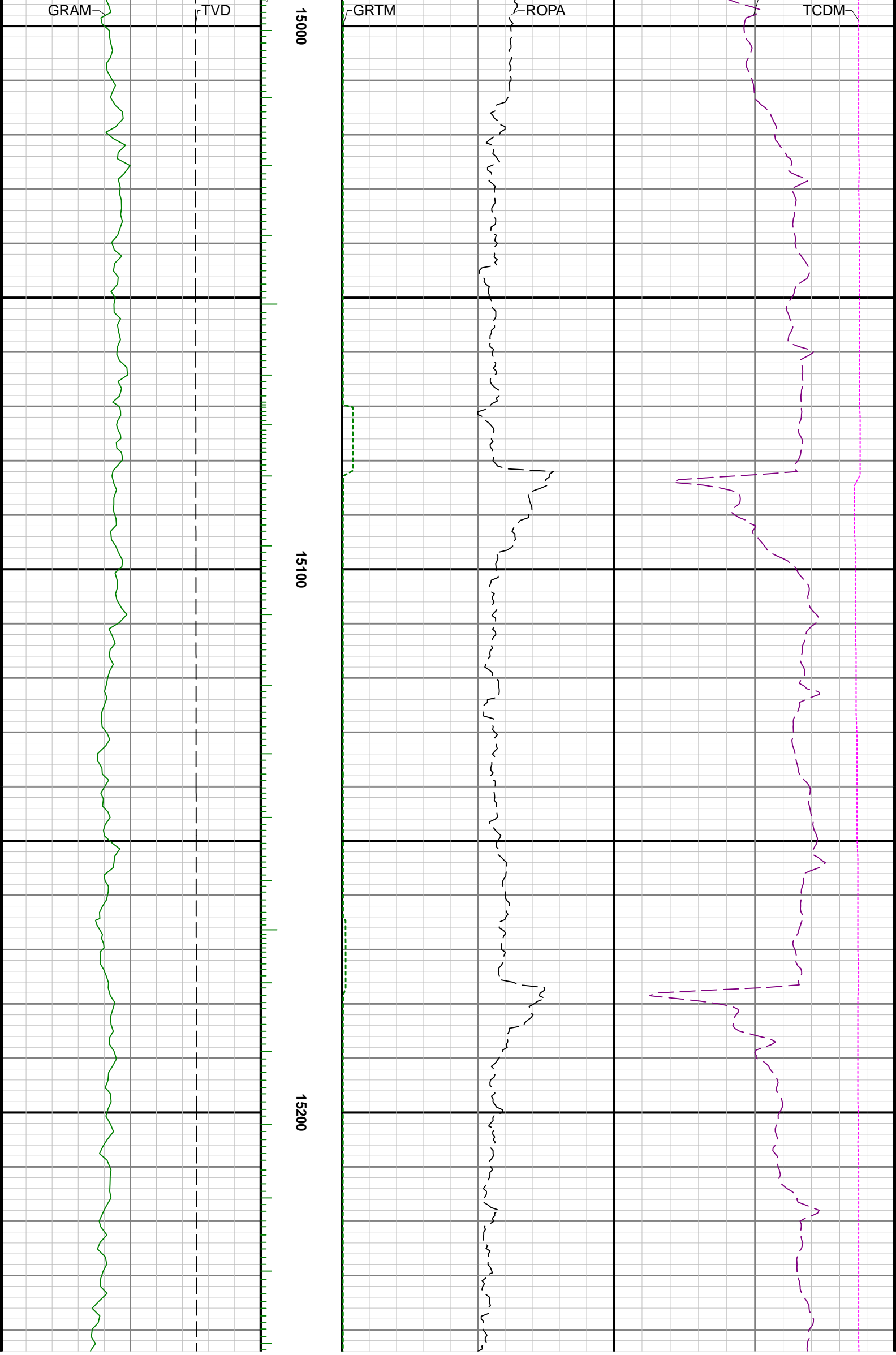
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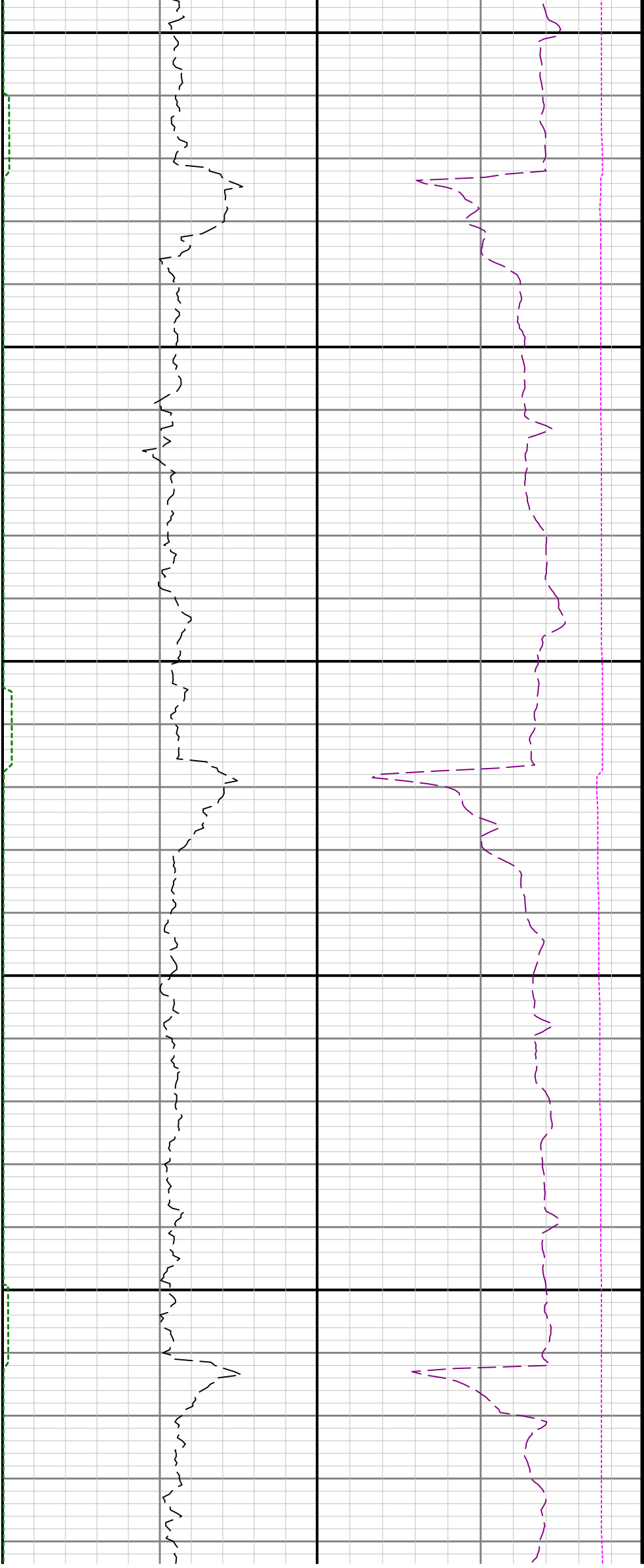
14900

GRIM

WOBA

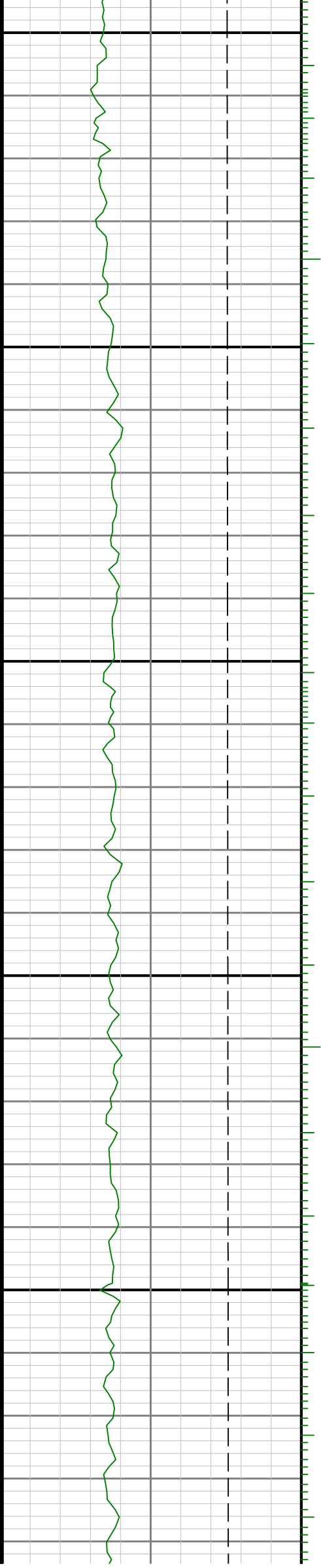


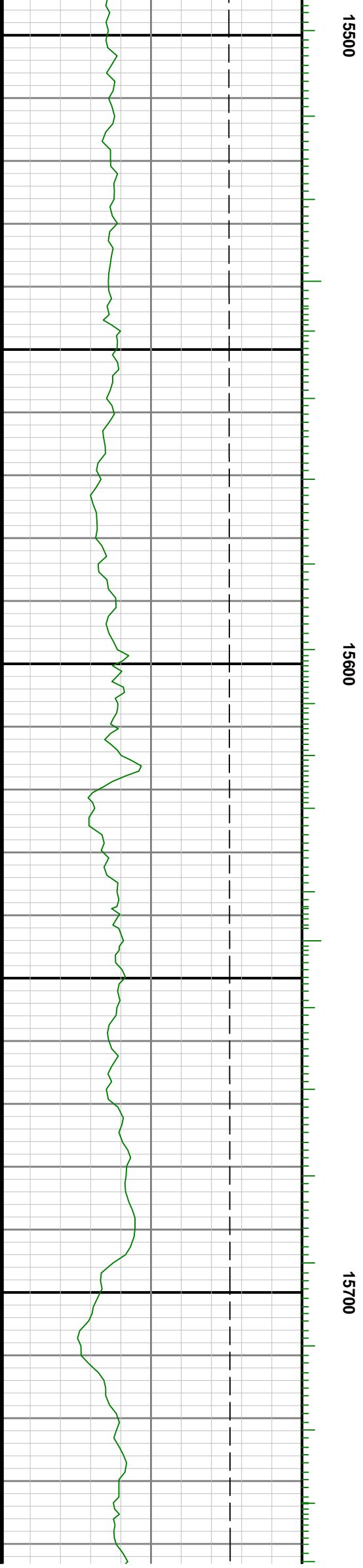
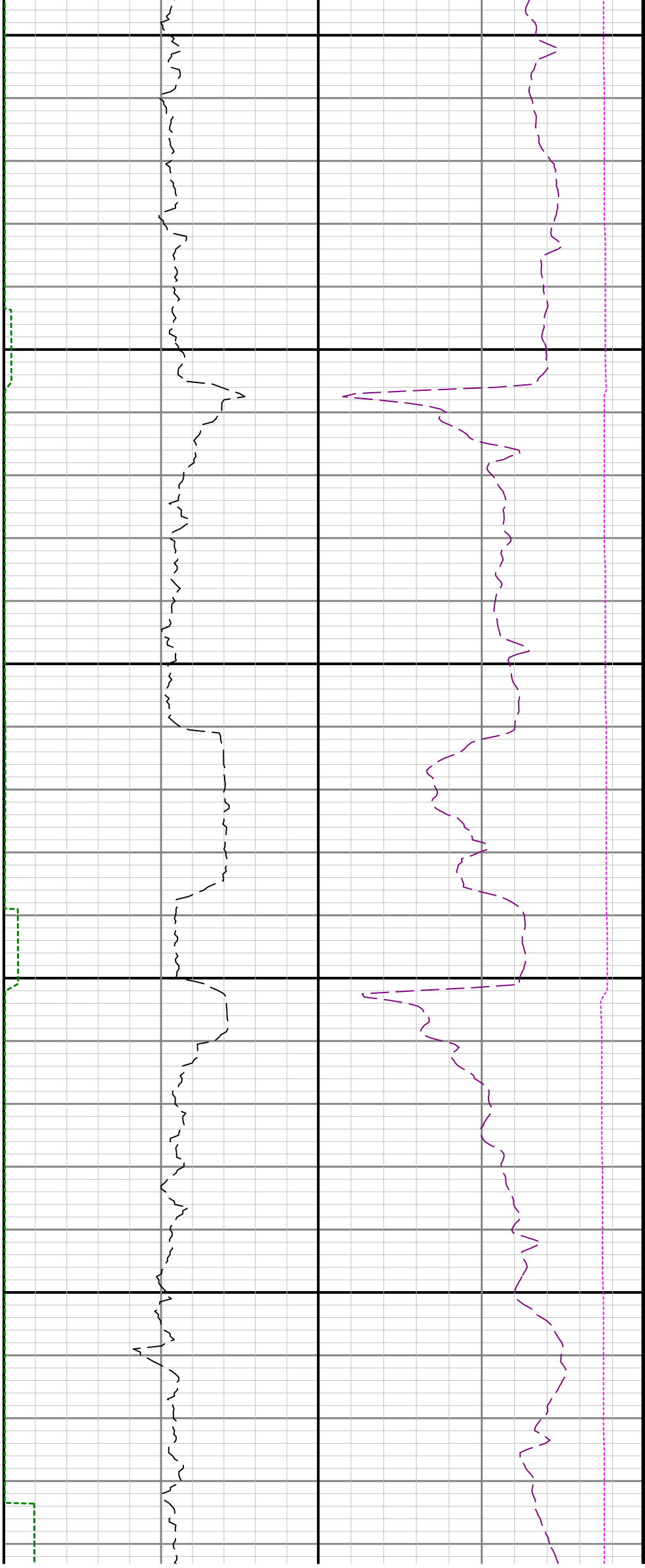




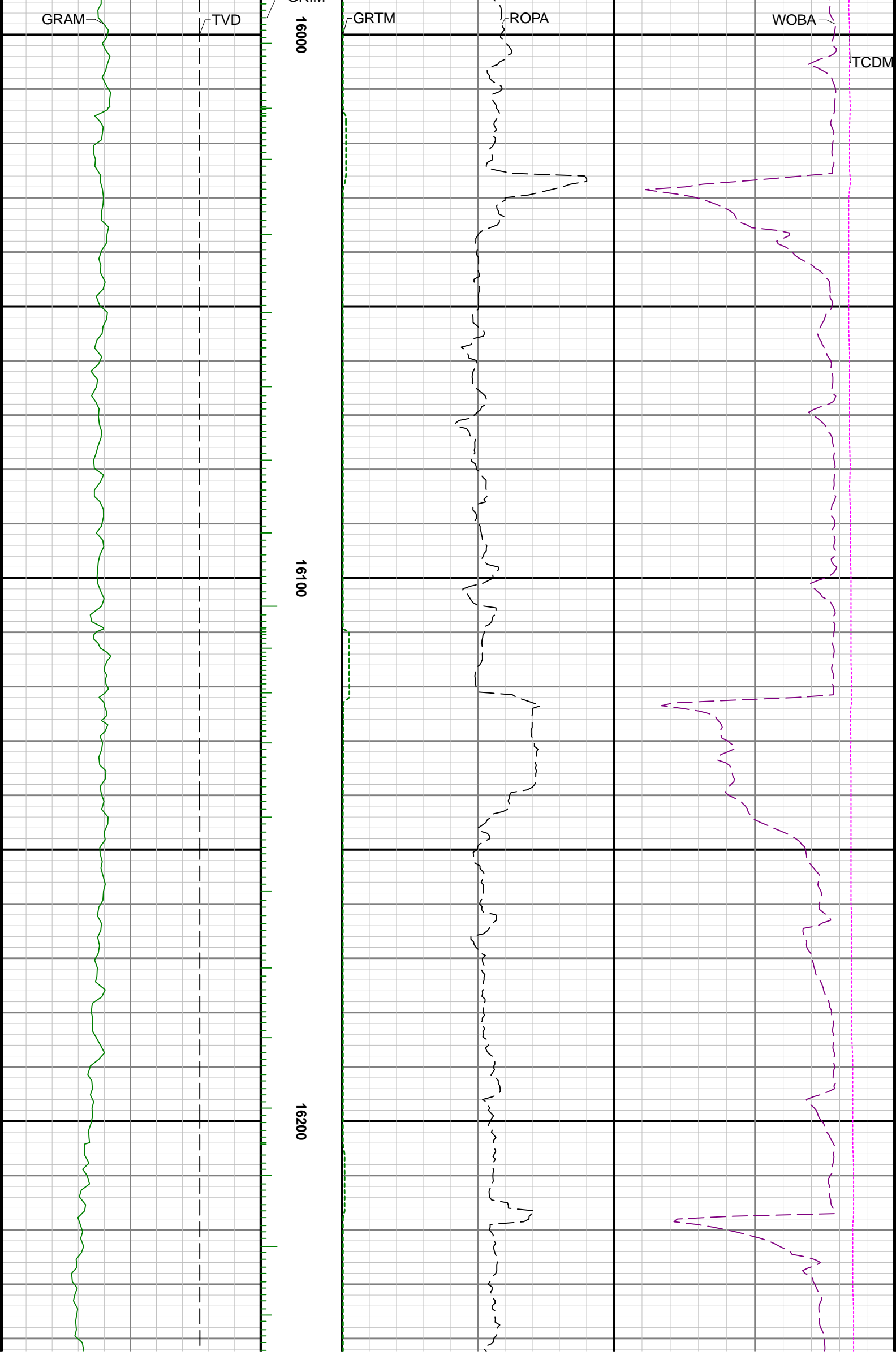
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15400





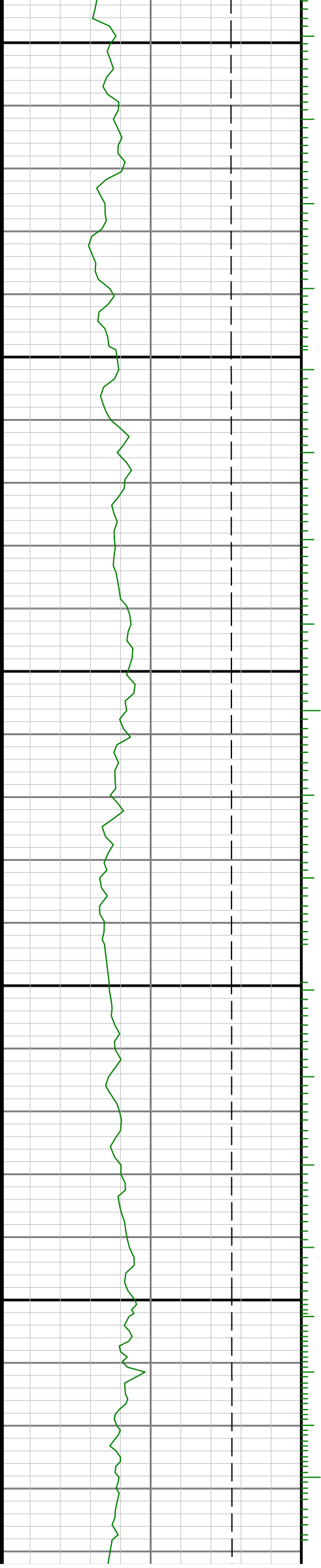


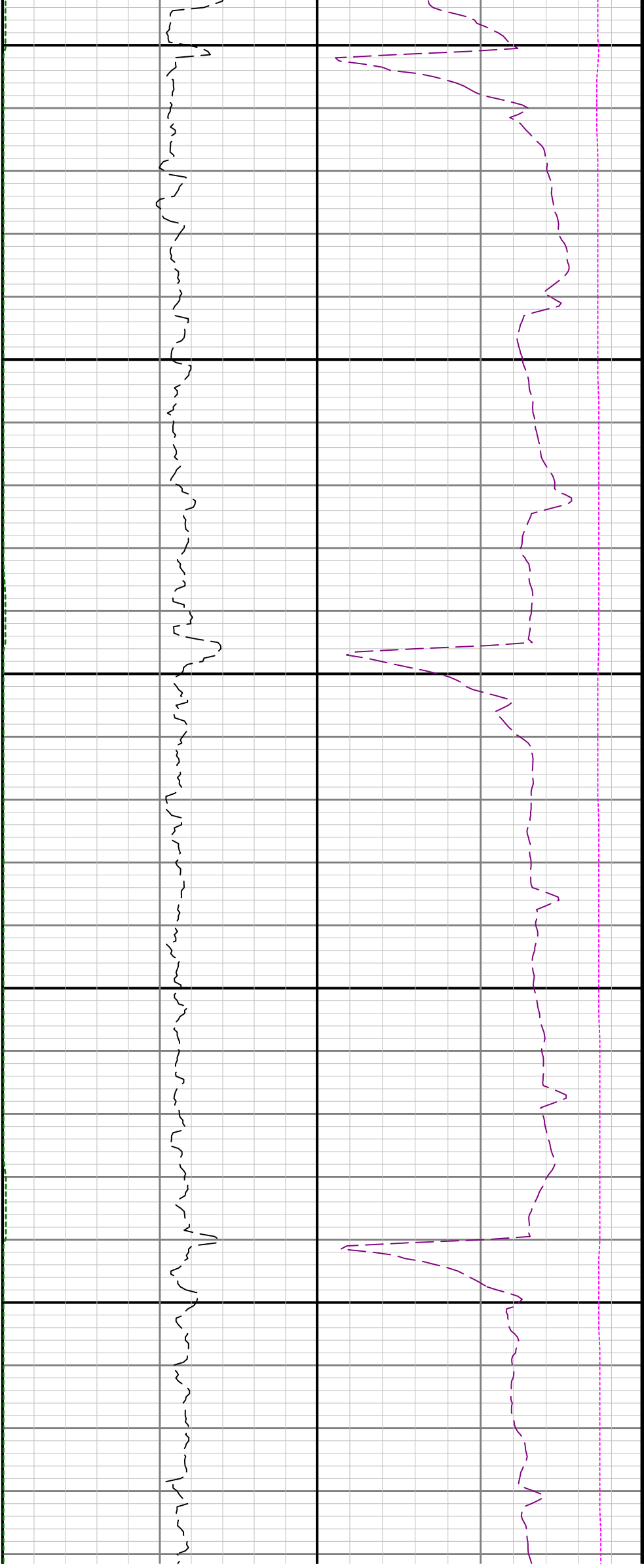




16300

16400

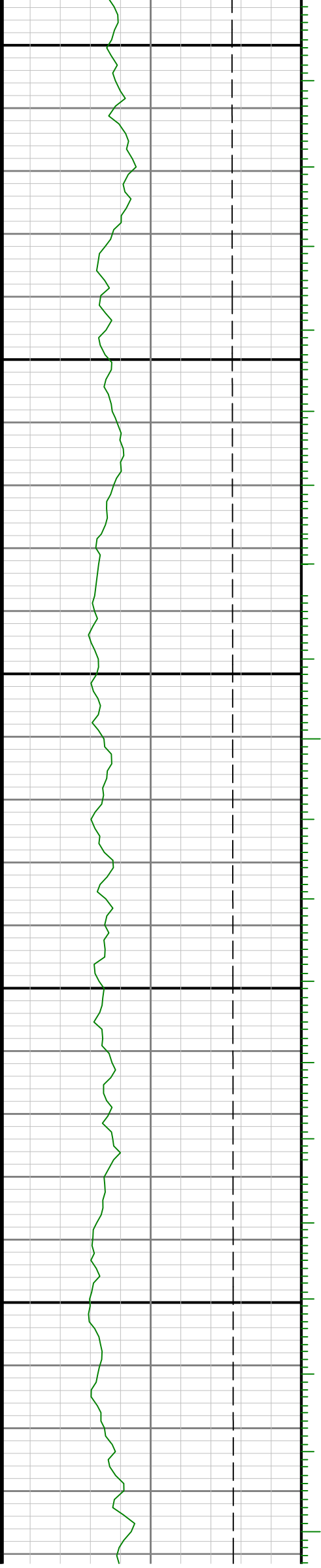


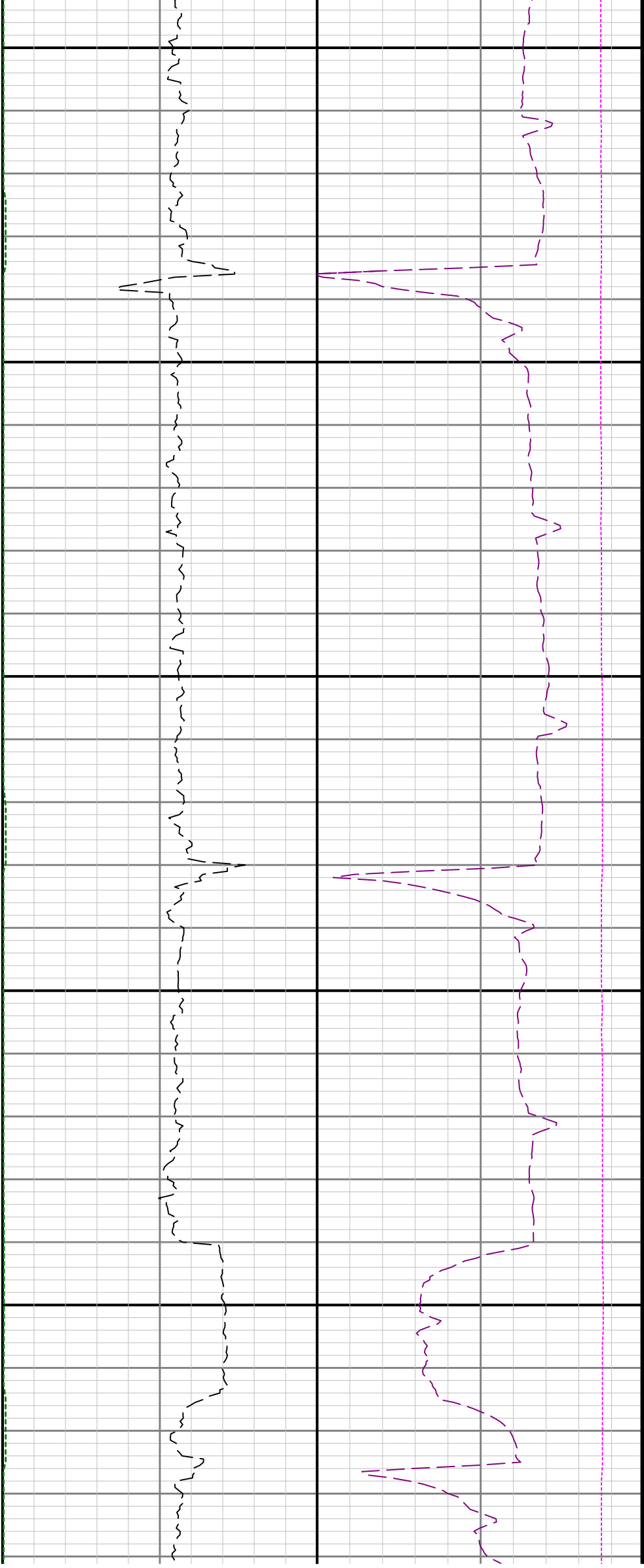


16500

16600

16700





16800

16900

