



LWD MEMORY LOG

Gamma Ray

LWD MEMORY LOG										
<div>Baker Hughes</div>			Gamma Ray							
Scale: 1:240			Company: Noble Energy							
Measured Depth			Well: Gutteresen Y05-749							
			Field: Wattenberg							
			County: Weld		Country: United States					
Depth Reference:			State: Colorado		Other Services:					
Driller's Depth										
Status: Final Print			Surface Location:			40° 11' 50.933" N				
API No: 05-123-48047-00			Latitude: Longitude:			104° 34' 33.863" W				
Job ID: 110182366			SEC: 29 TWN: 3N RGE: 64W			Directional				
Permanent Datum (P.D.): Mean Sea Level			Elevation: Above P.D.:			0.00 ft 4810.00 ft		Elev. KB: Elev. DF: Elev. GL: N/A 4810.00 ft 4780.00 ft		
Log Measured From: Rig Floor										
Dates			Interval			Magnetic Field Reference				
From: 2020-01-16			Drilled (ft)		Logged (ft)		Azi Reference North: Grid Dip Angle: (deg) 66.63			
To: 2020-01-18			Top: 1937.00		Top: 1937.00		Total Magnetic Field Strength: (nT) 51983			
Spud: 2020-01-07			Bottom: 20036.00		Bottom: 20022.00		Mag to Reference North Correction: (deg) 7.39			
Borehole Record										
Casing Record										
Hole Size (in)			From (ft)		To (ft)		Size (in)		Weight (lb/ft)	
13.500			30.00		1937.00		9.625		36.00	
8.500			1937.00		20036.00					
Mud Record										
Deviation Record										
Type			From (ft)		To (ft)		Hole Size (in)		Interval (ft)	
Oil Based Mud			1937.00		20036.00		8.500		18099.00	
									0.41 268.76	
									90.09 178.77	
Acquisition System										
Software Version			Other							
Cadence RT 5.5			Rig: H&P 321							
DeliverableGen 5.5.8715.2			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	1937.00	20022.00	1937.00	20036.00	2020-01-14 03:27	2020-01-16 13:31	52.75

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Tien Bui	2020-01-13	2020-01-17						

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+ (%)
2020-01-13 12:04	1	1937.00	Oil Based Mud	9.2	10	N/A	19.5	76.8/23.2	Active Pit	30000	0.00
2020-01-14 09:10	1	3807.00	Oil Based Mud	9.6	14	N/A	22.0	80.7/19.3	Active Pit	29200	0.00
2020-01-15 09:01	1	11410.00	Oil Based Mud	9.8	13	N/A	19.8	81.6/18.4	Active Pit	28000	0.00
2020-01-16 10:25	1	19175.00	Oil Based Mud	9.8	12	N/A	22.0	83.8/16.2	Active Pit	24200	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	14868420	Near Bit Inclination	5.93	6.78	7.000	4.330
1	AutoTrak Curve Steering Unit	14868420	Near Bit VSS	5.93	6.78	7.000	4.330
1	AutoTrak Curve MWD	14334114	Gamma (single)	2.74	12.95	7.000	3.250
1	AutoTrak Curve MWD	14334114	Directional (mag)	12.27	22.48	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

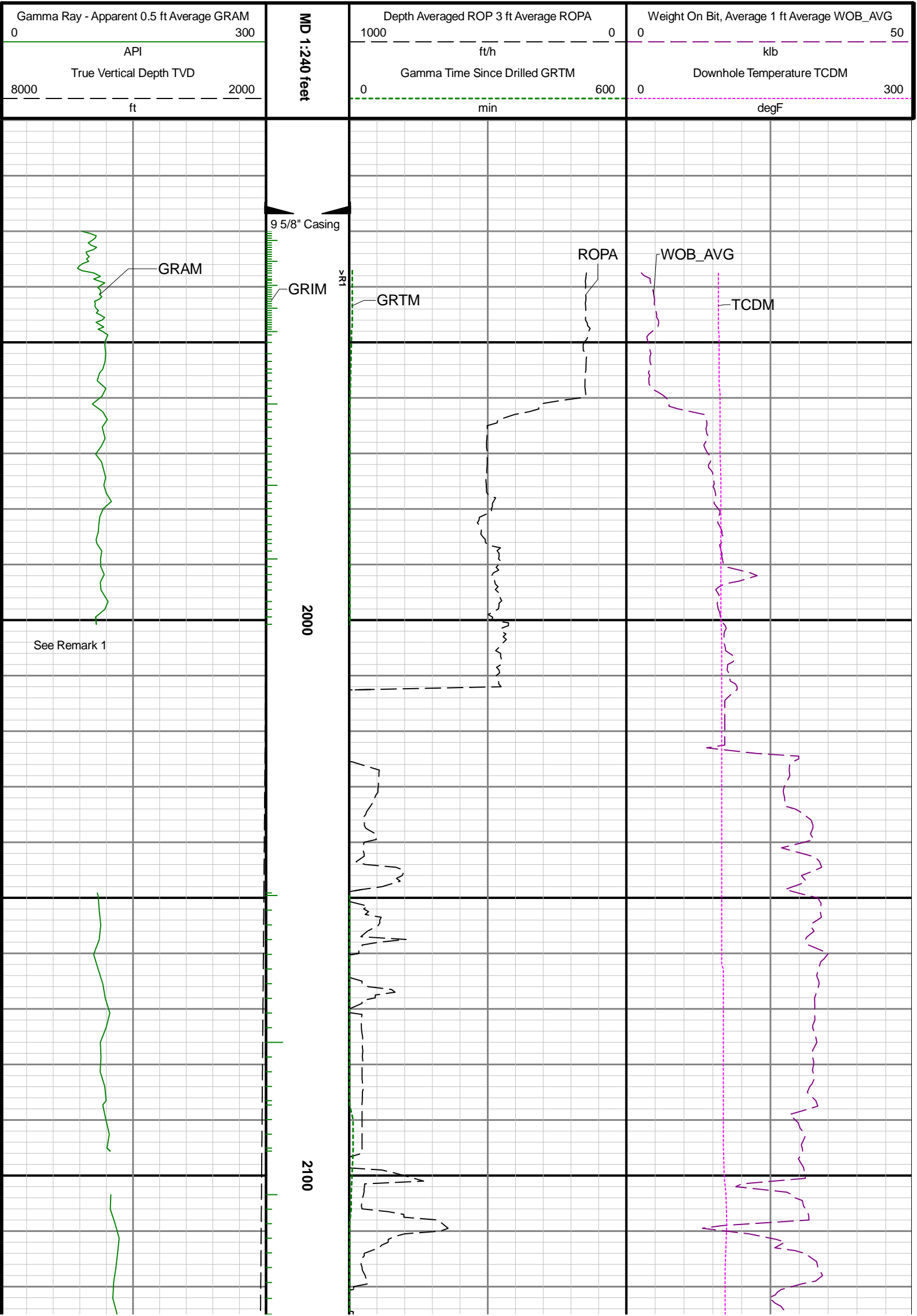
Comments

- 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 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 1937 to 20036 feet MD (1937 to 6873 feet TVD).
- 3 The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's 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	2000.00	8.500	1	There are several gaps due to drilling ahead before the assembly had time to properly power on.
2	20022.00	8.500	1	The interval from 20022 to 20036 feet MD (6873 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 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

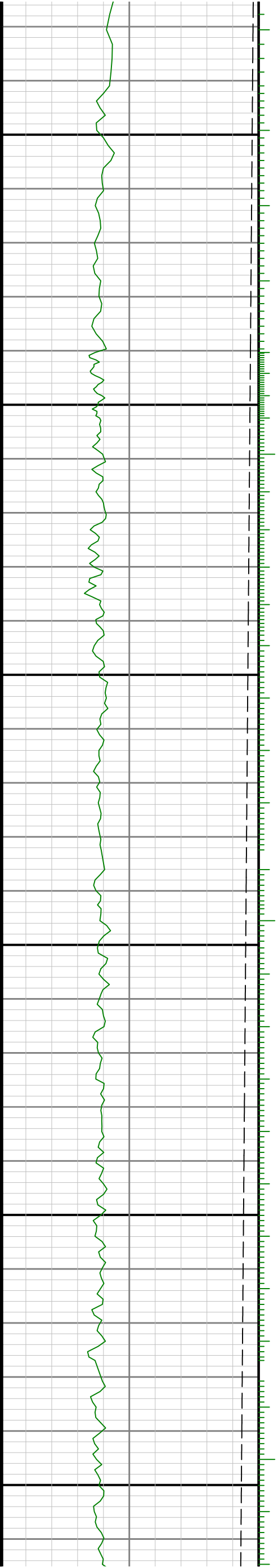


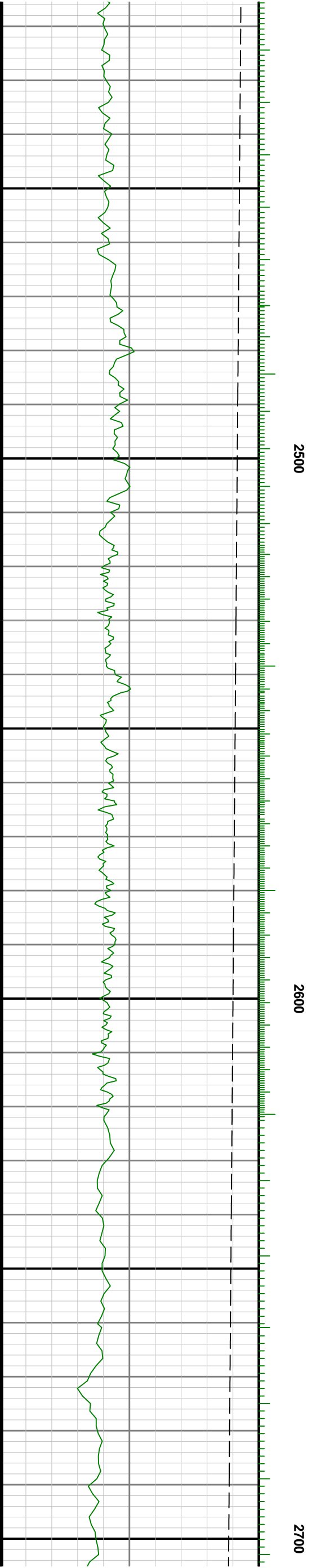
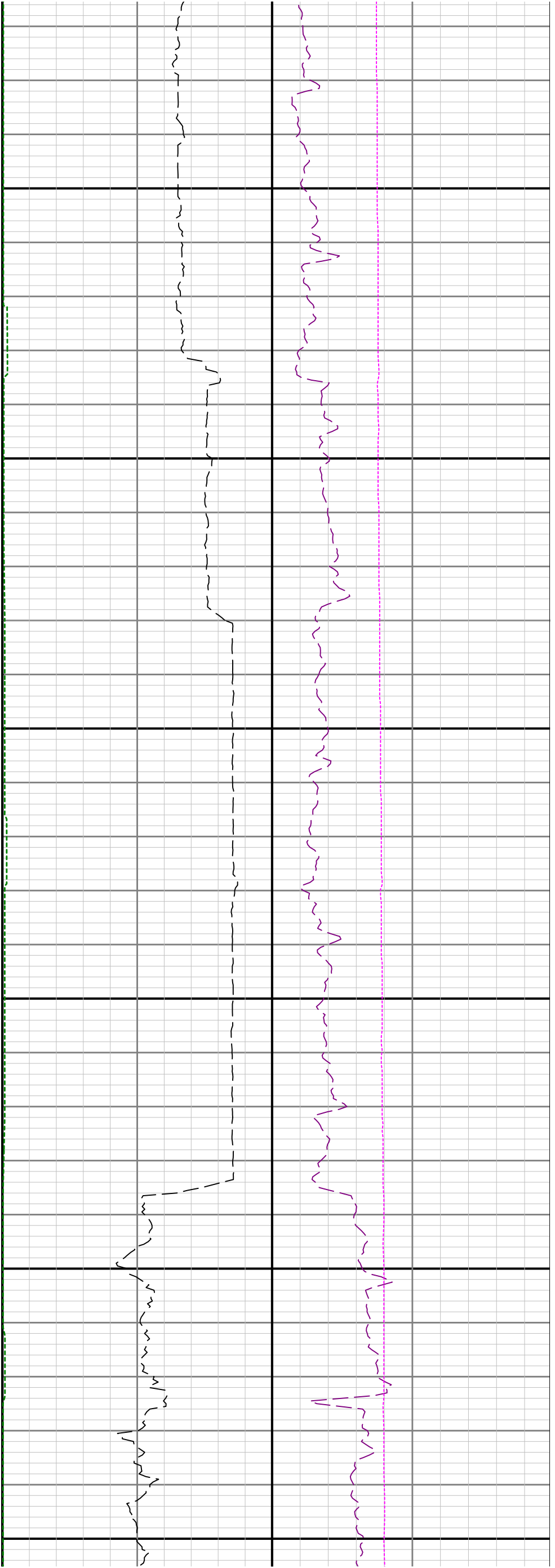


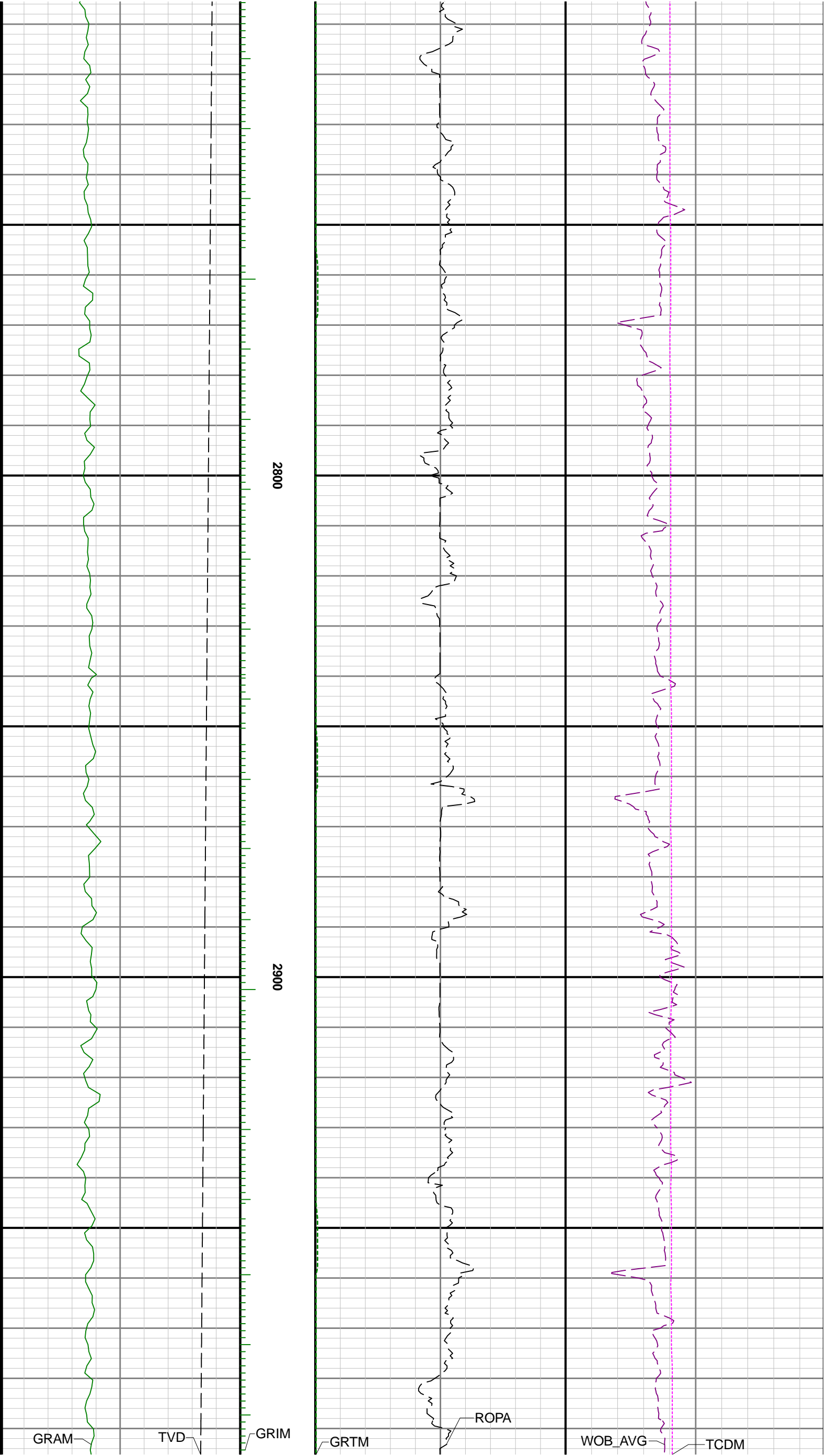
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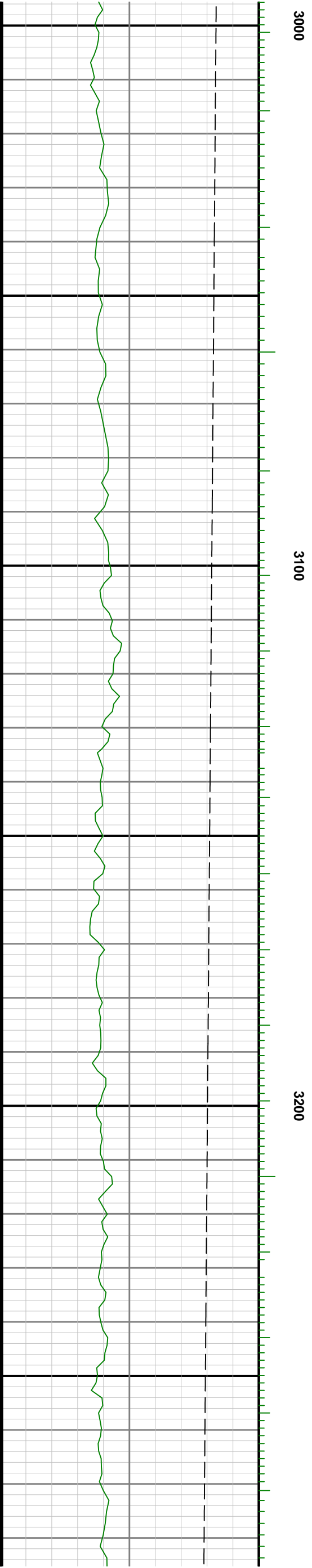
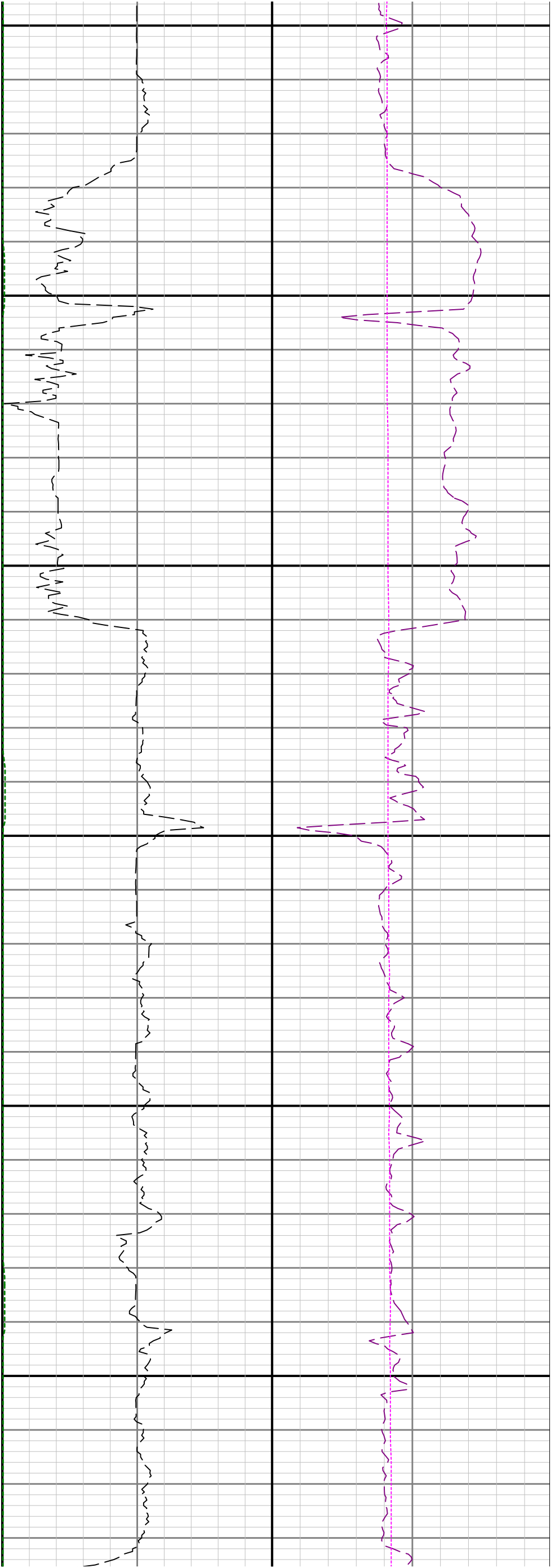
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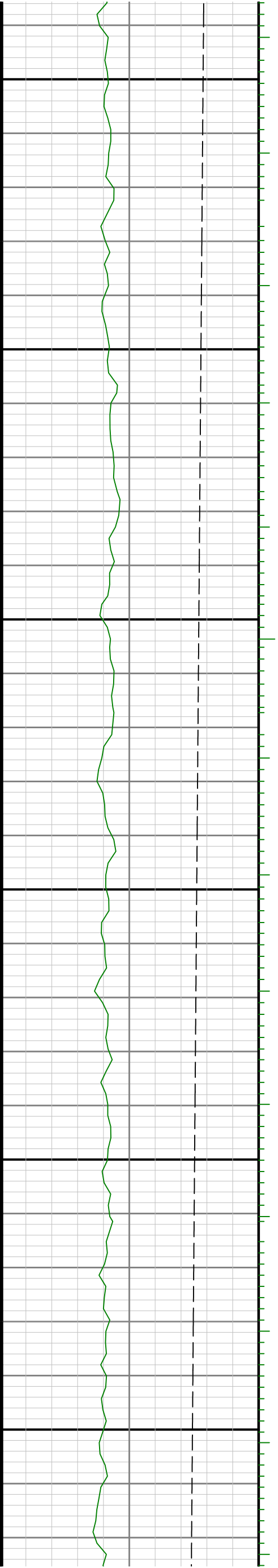
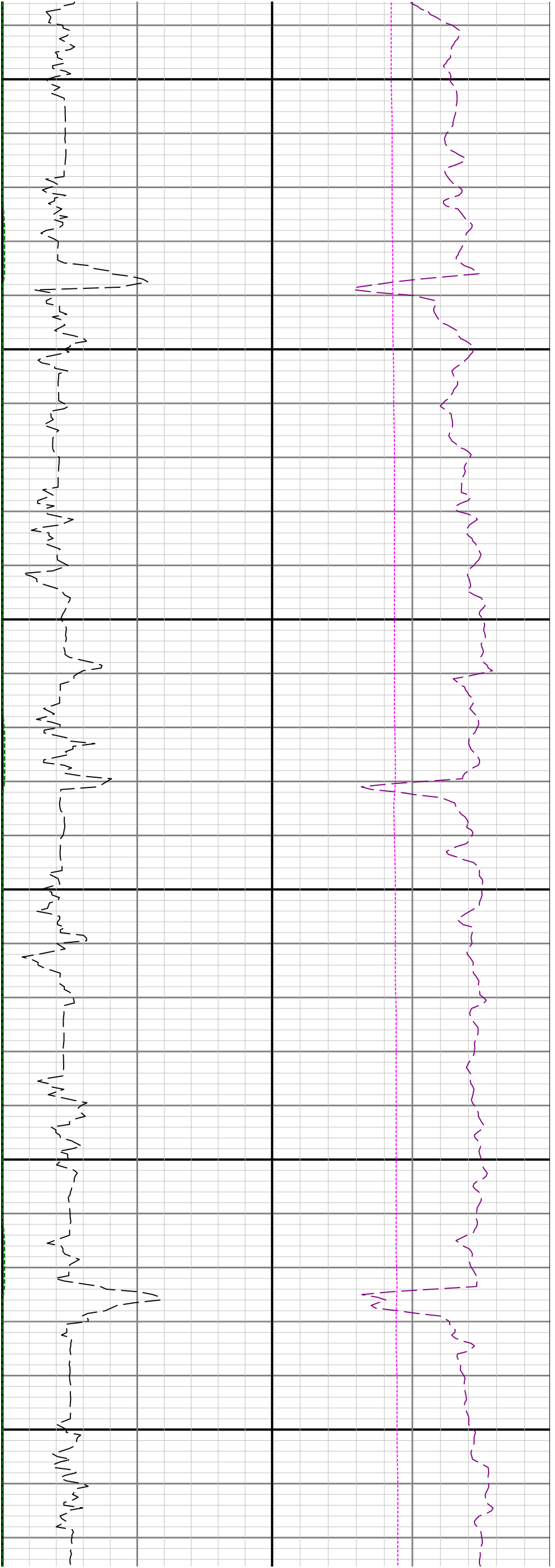
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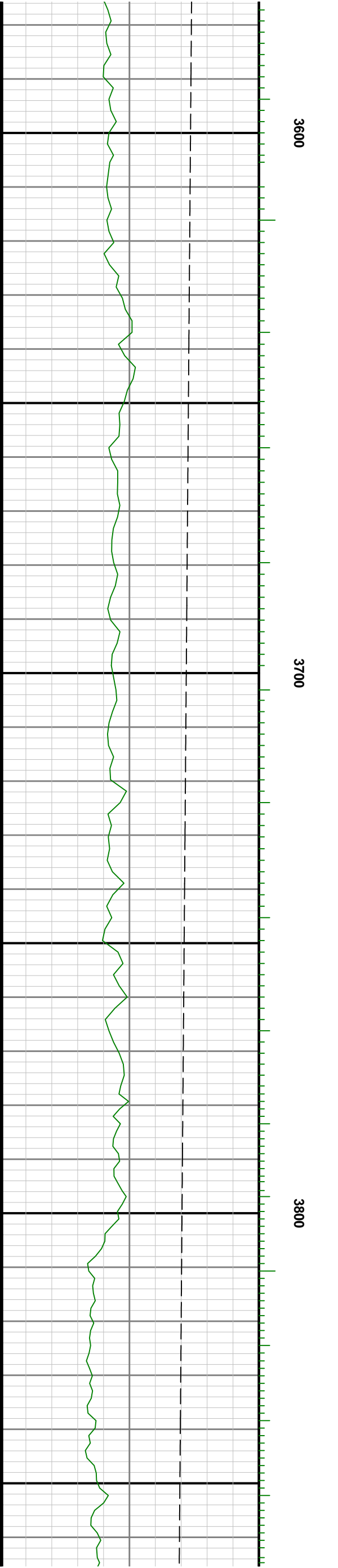
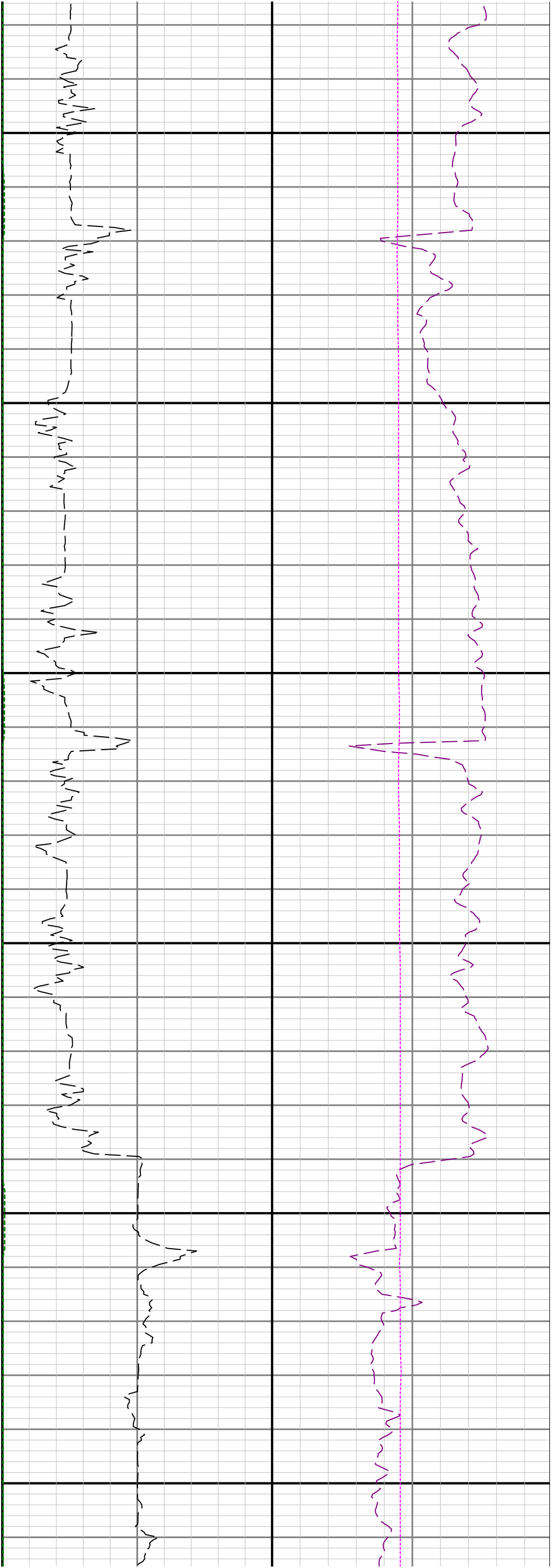


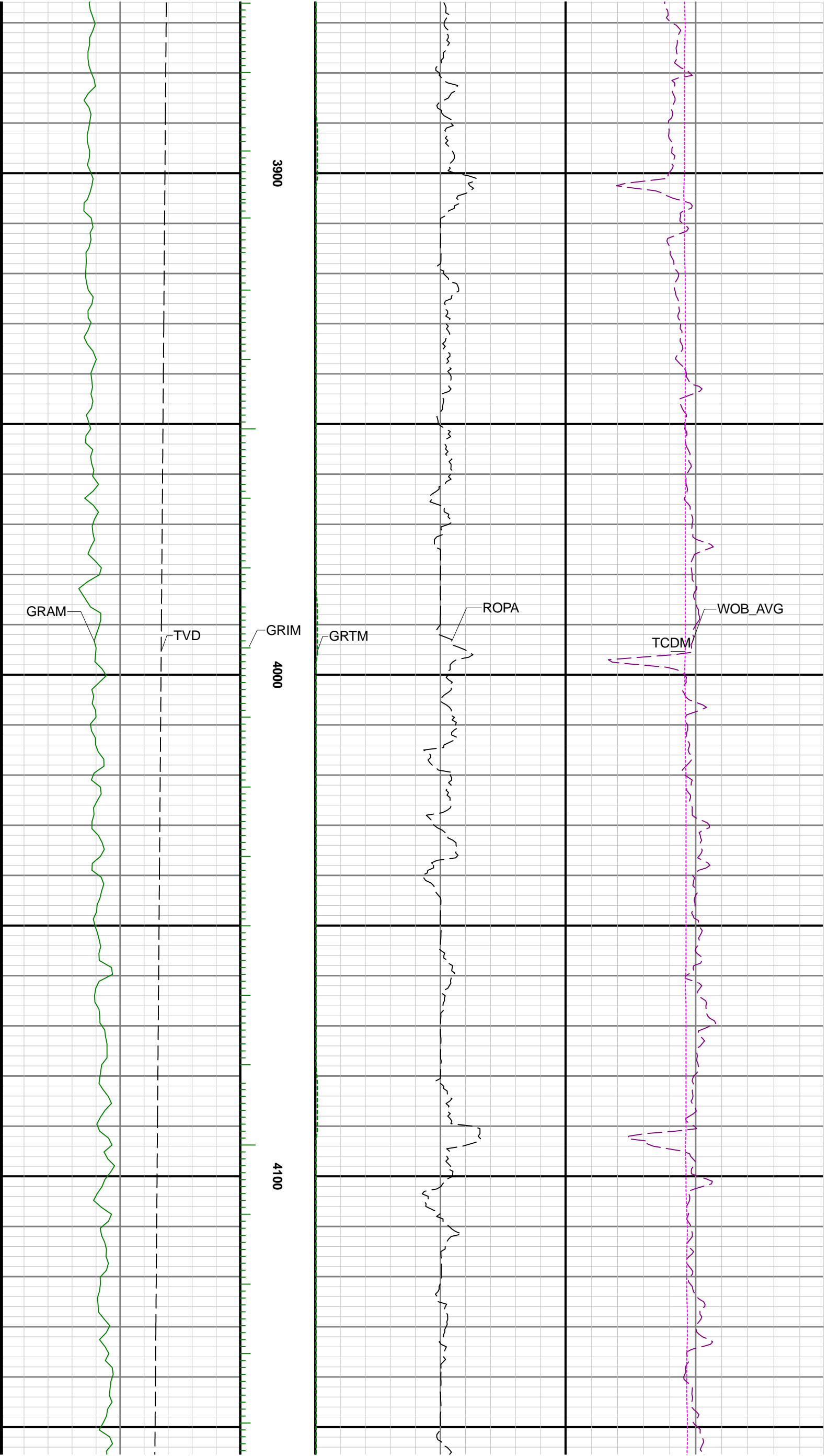


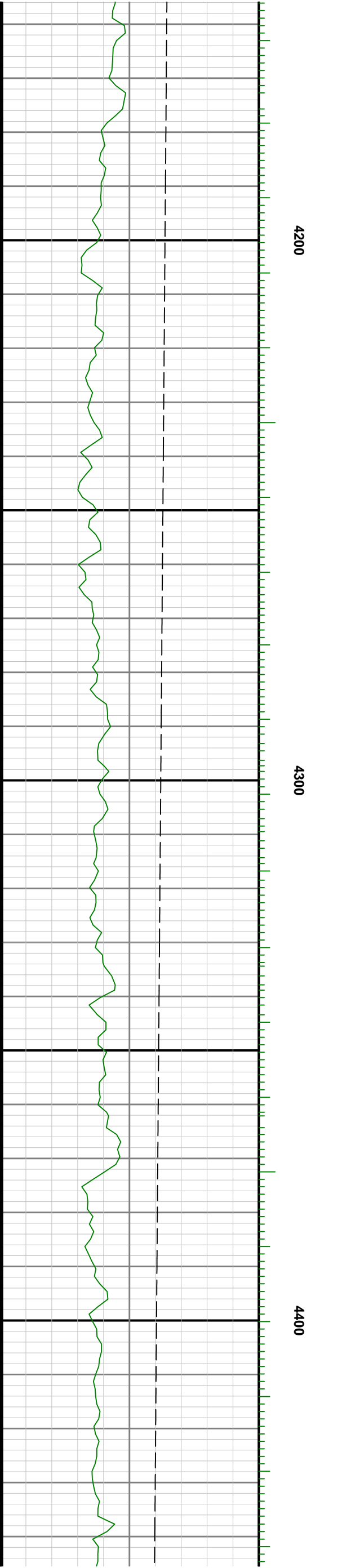
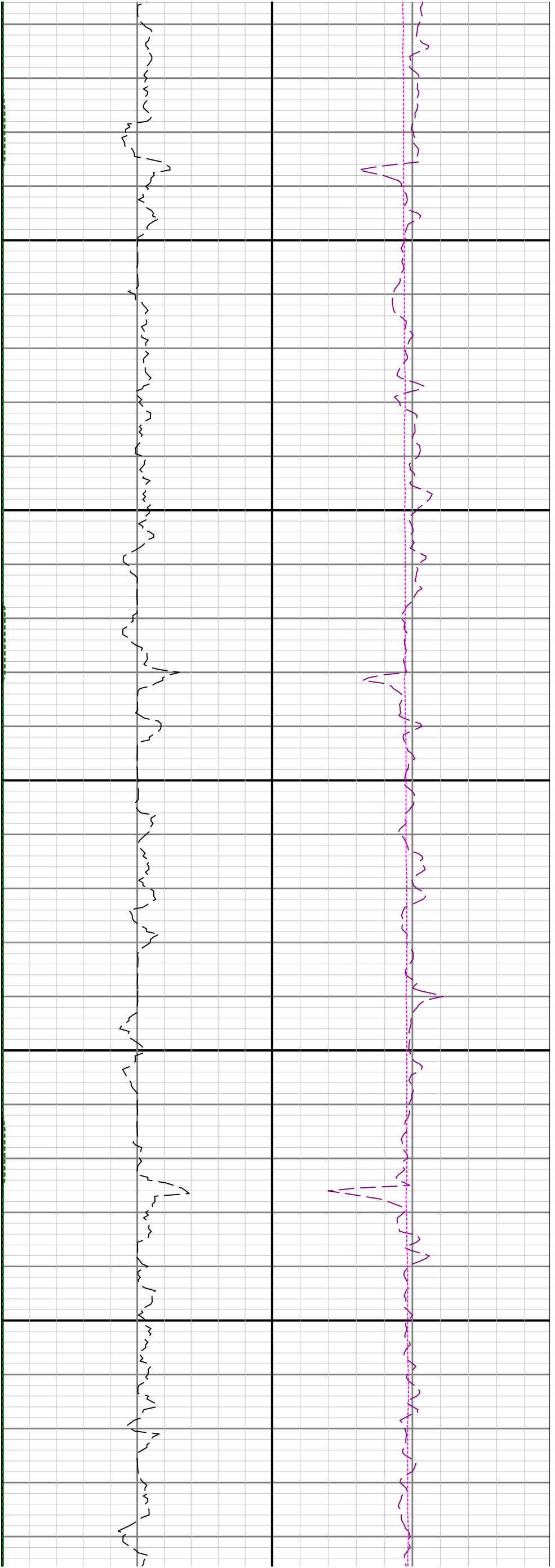


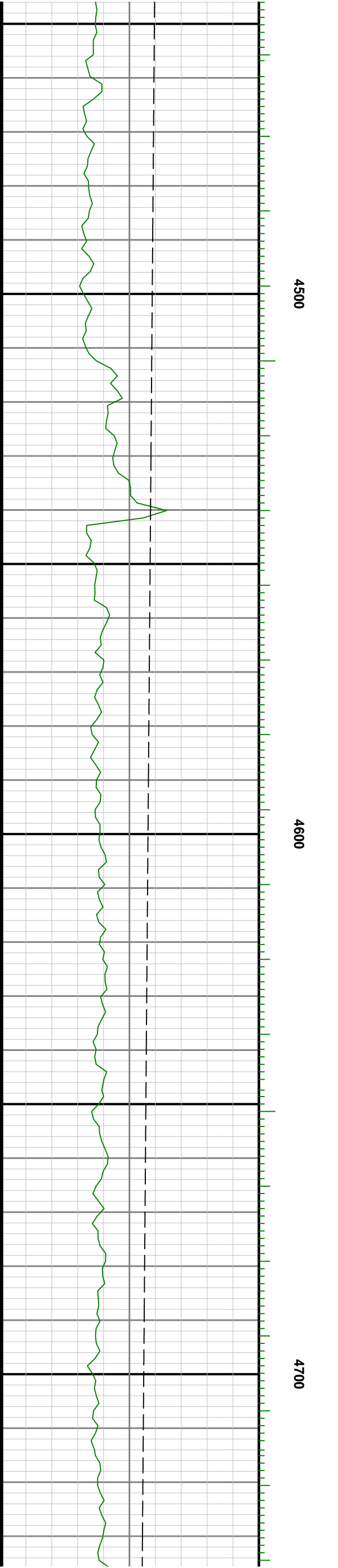
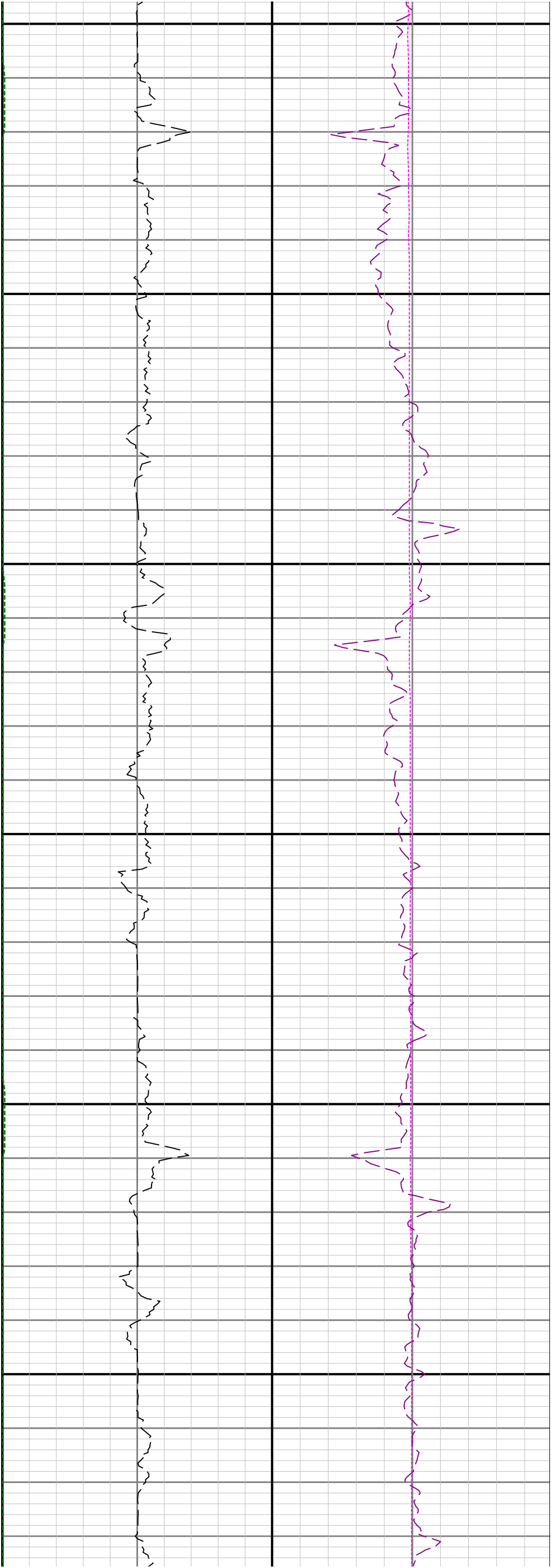


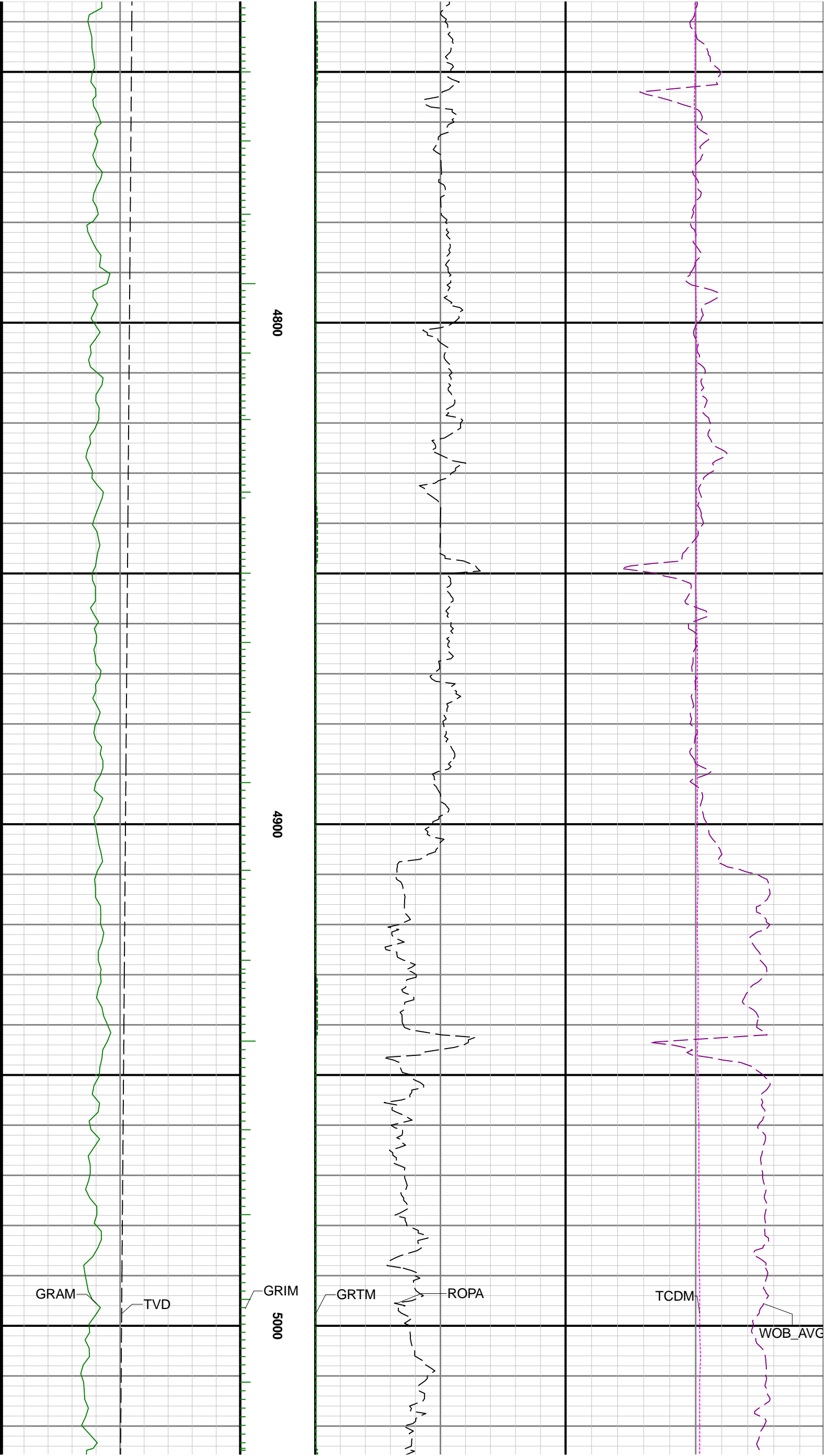










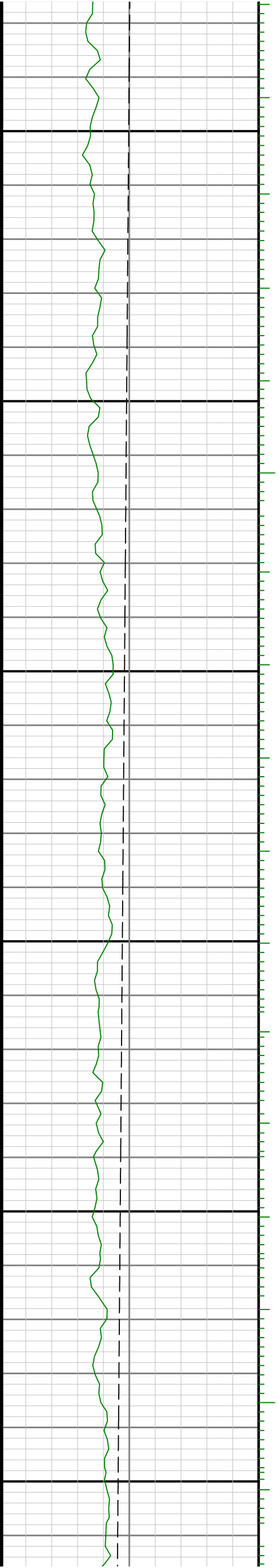


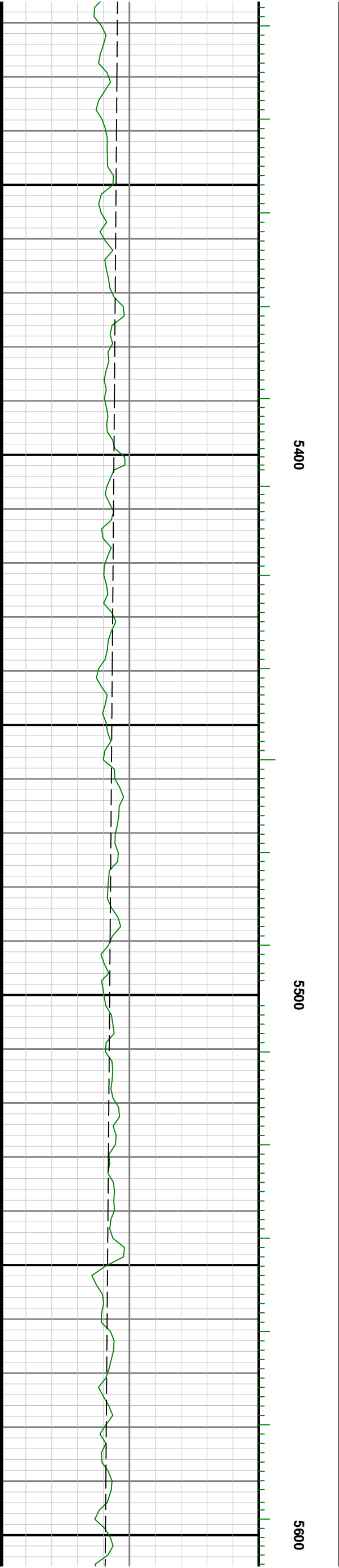
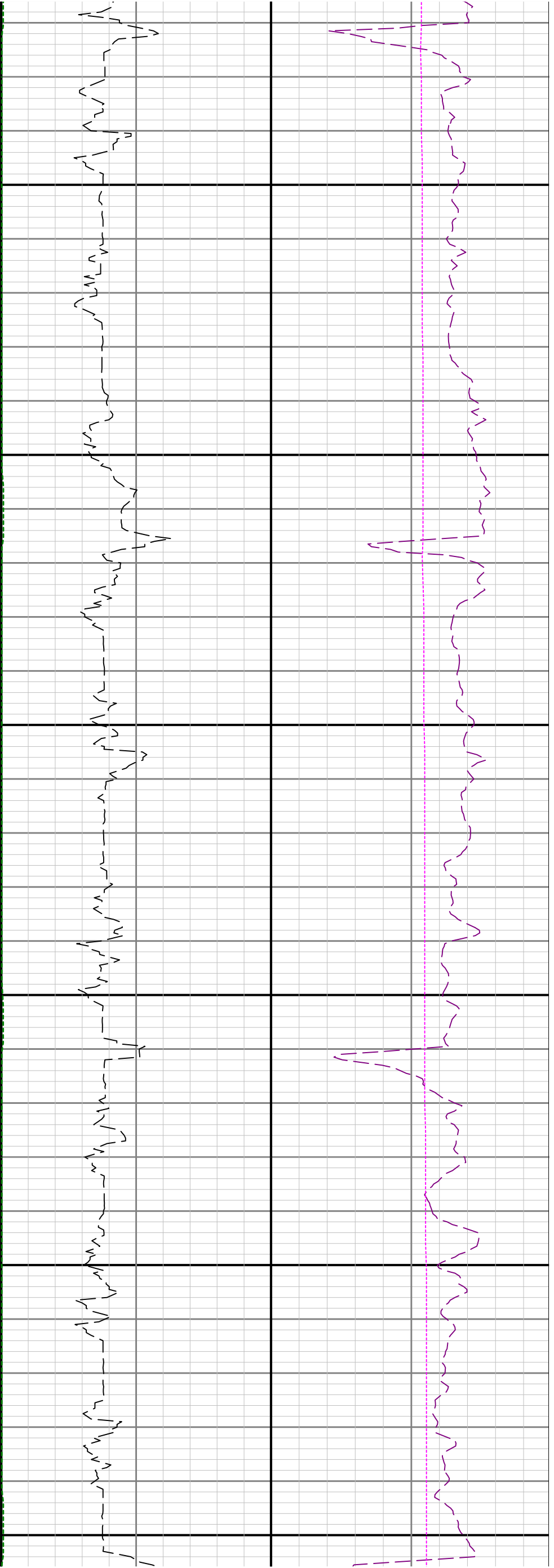


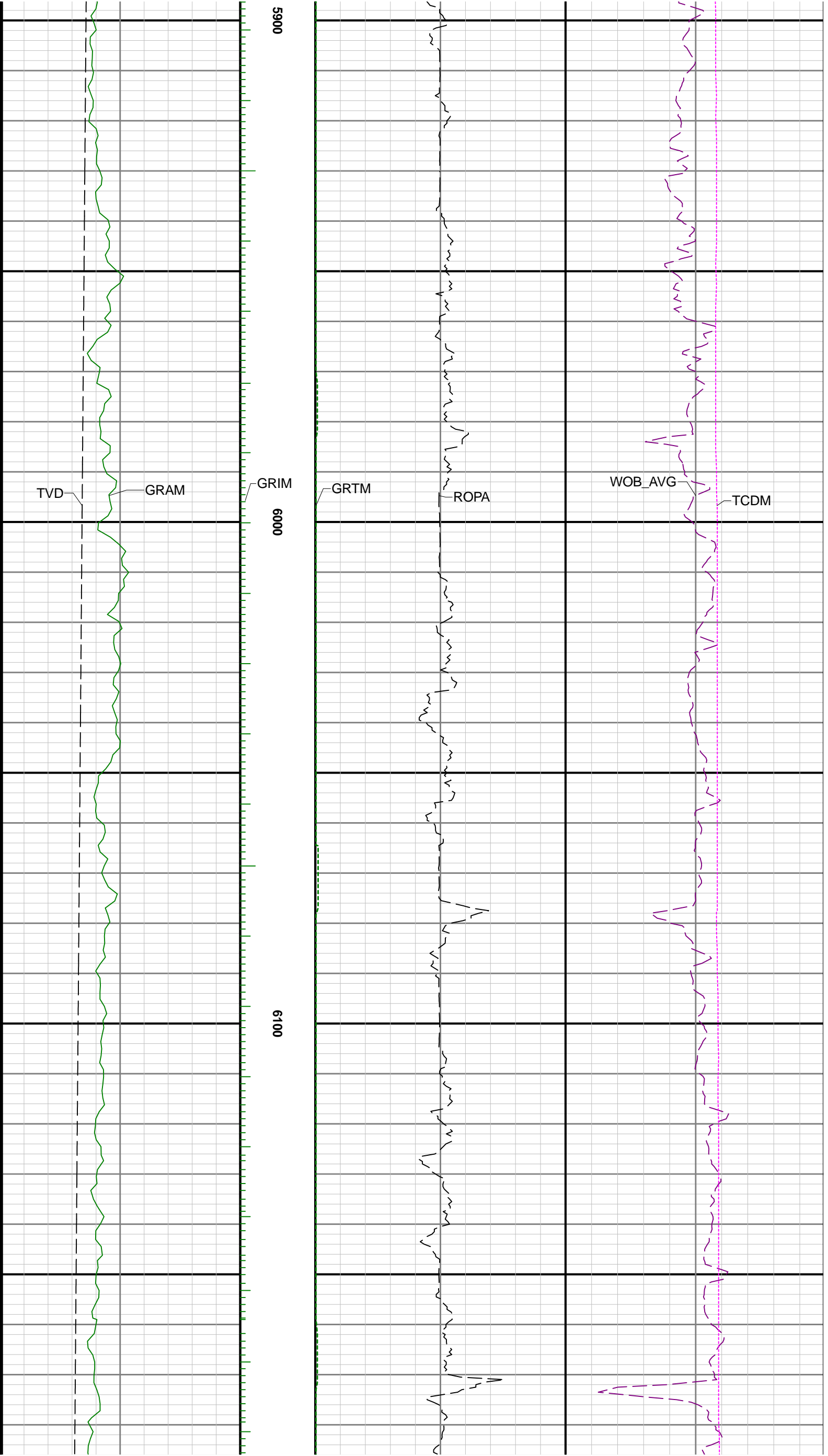
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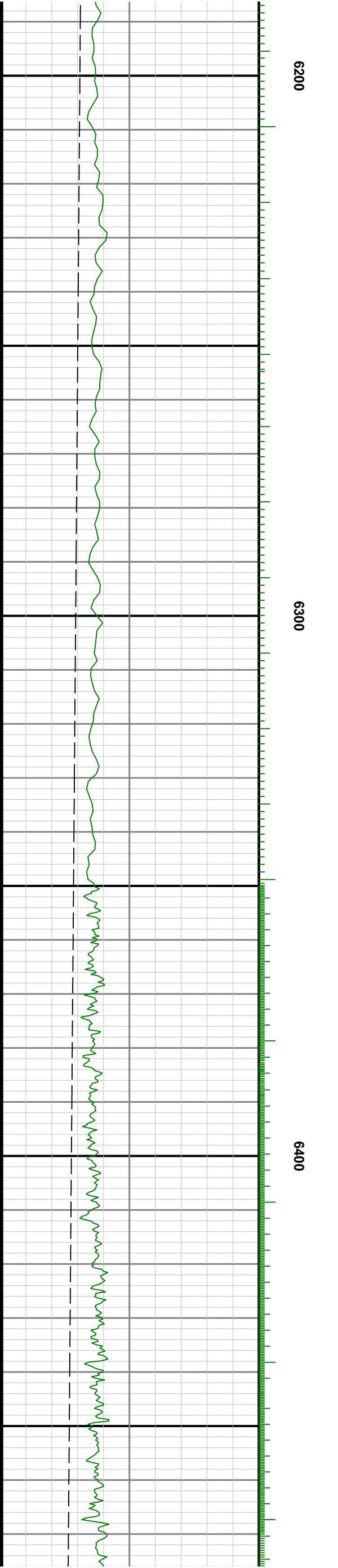
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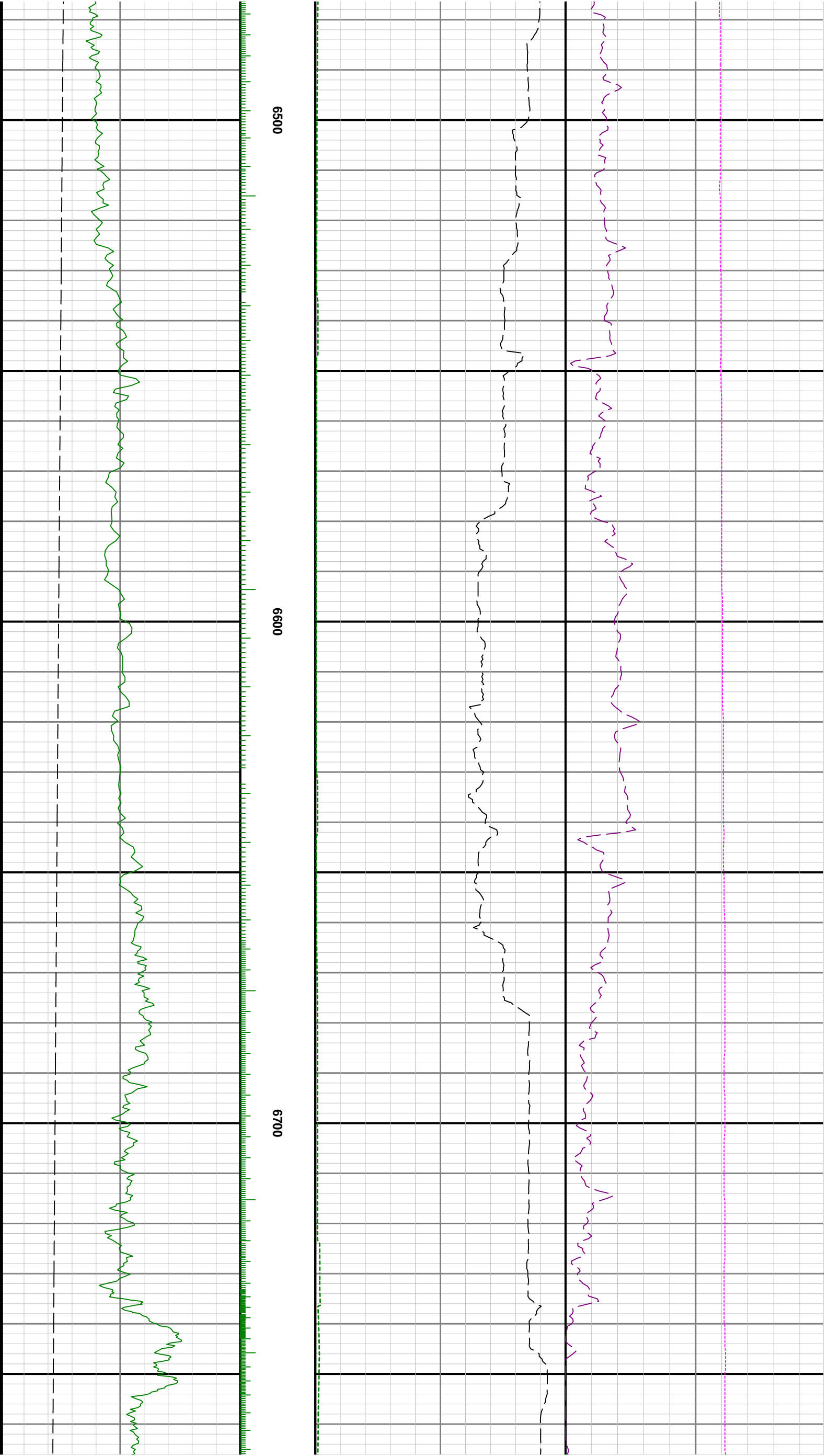
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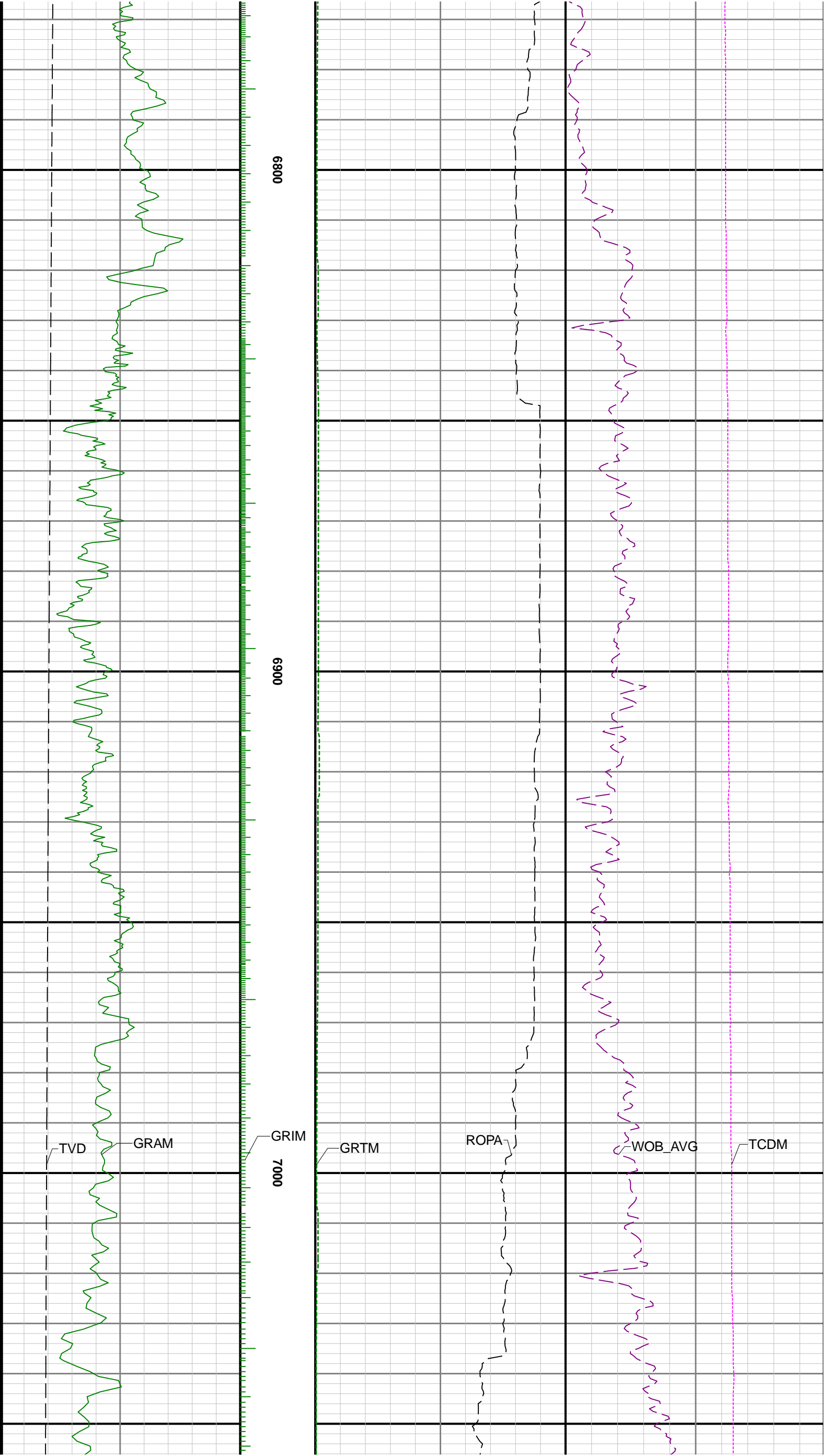


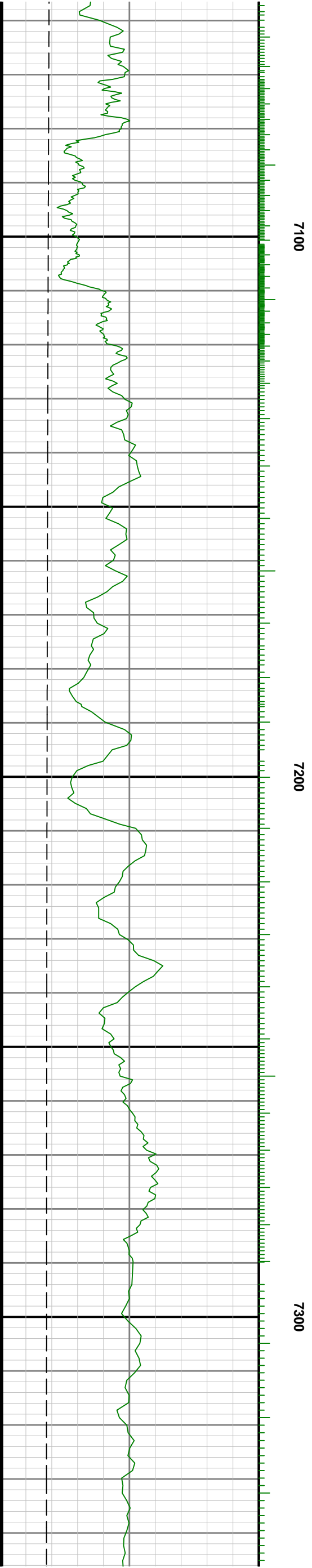
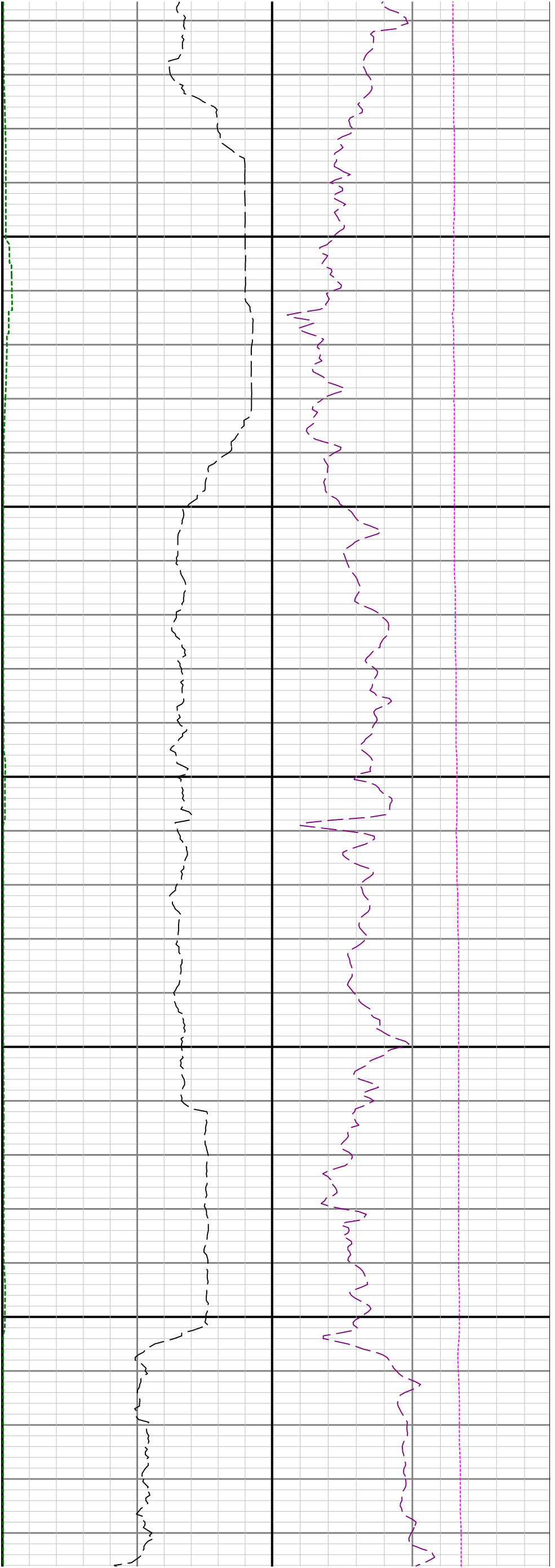


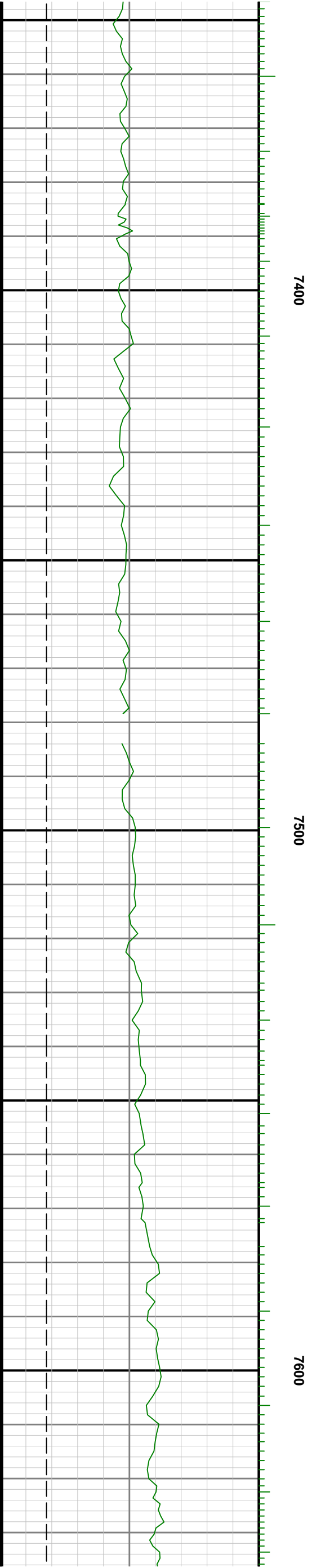
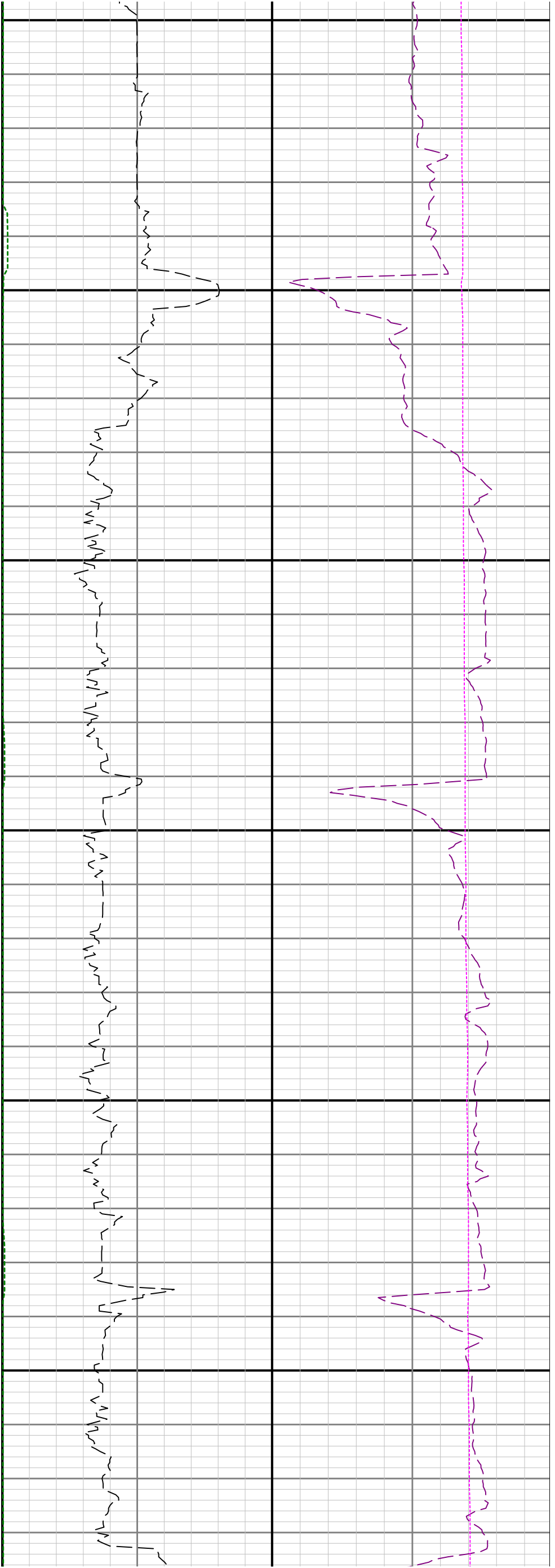


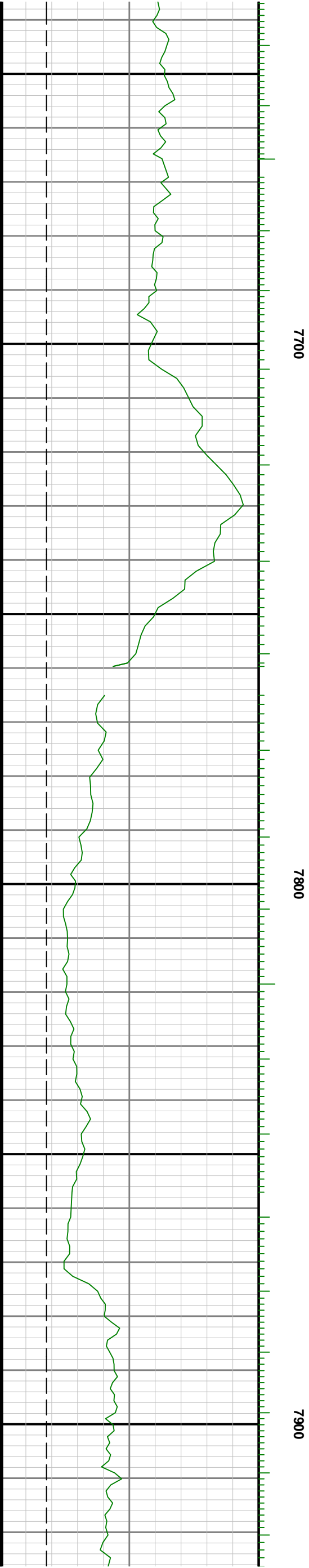
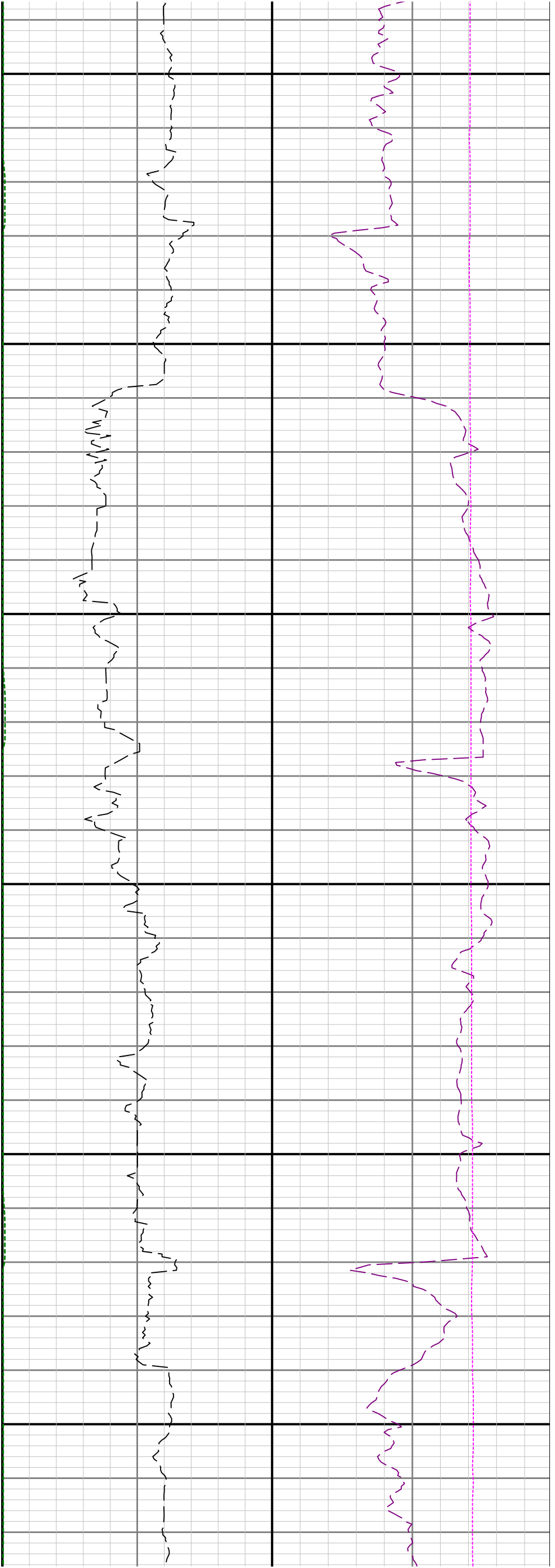


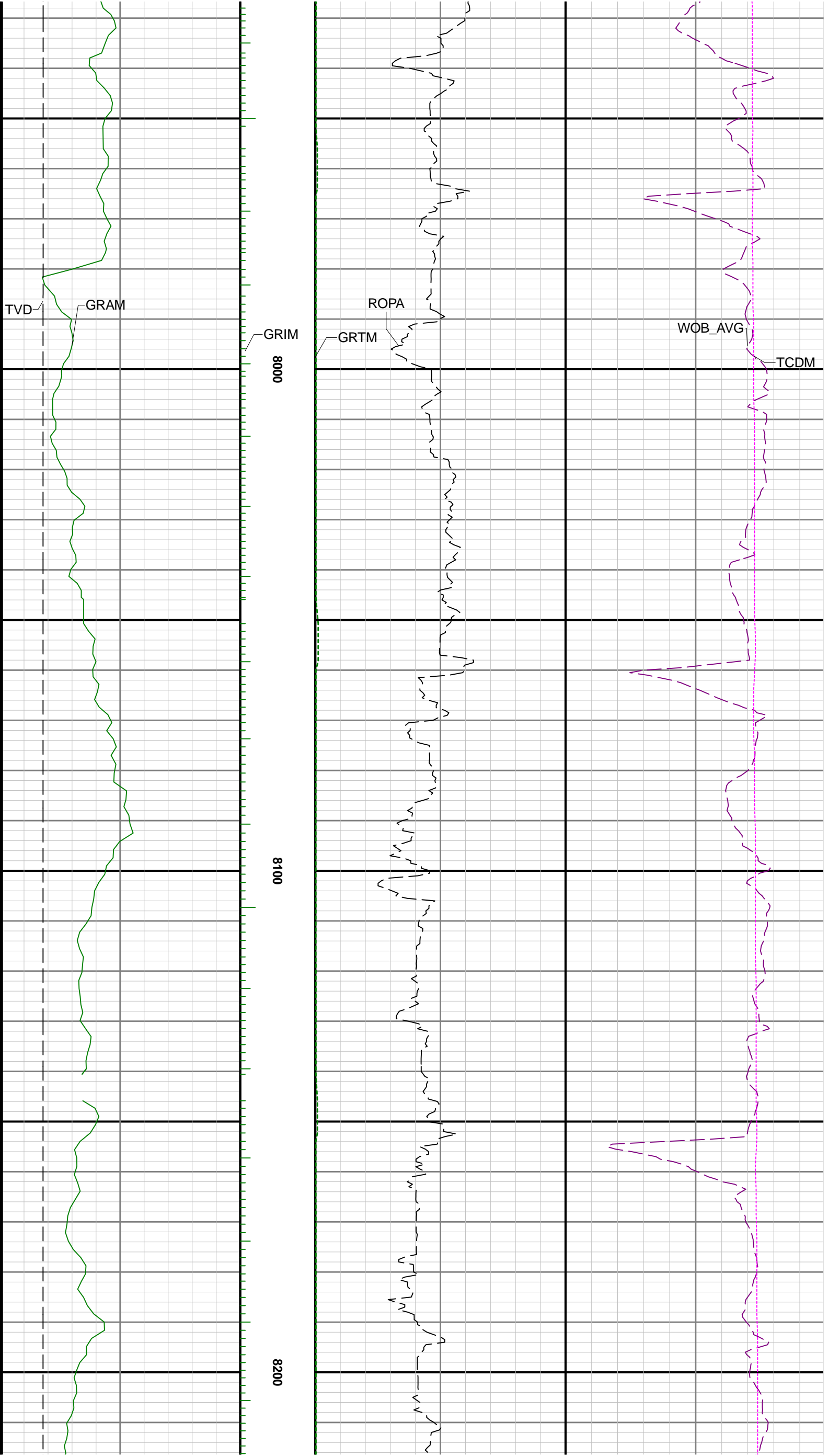


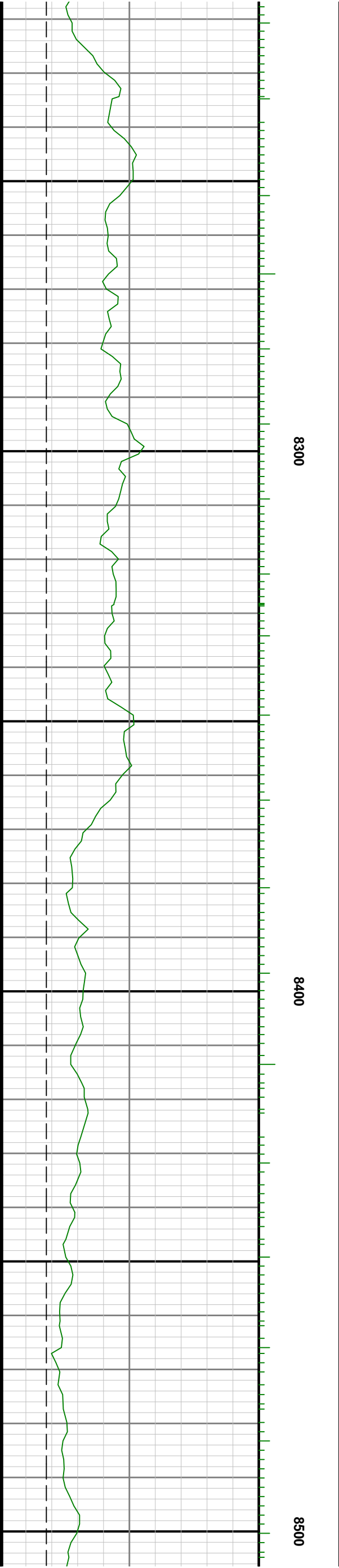
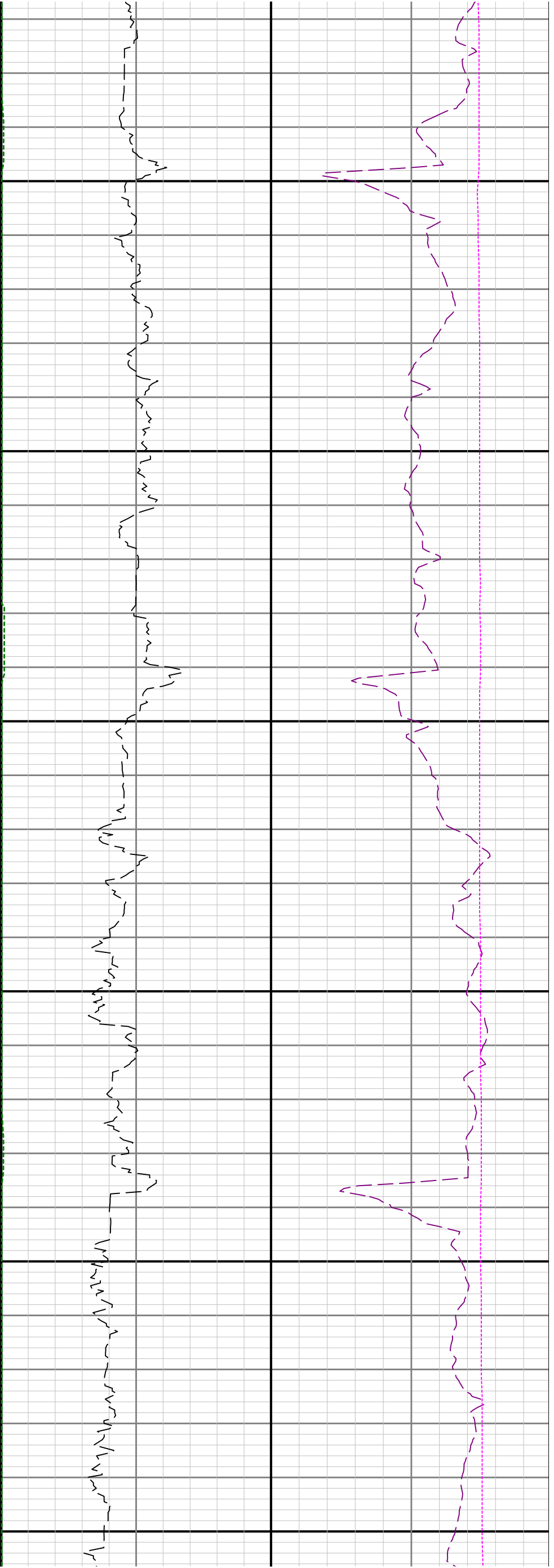


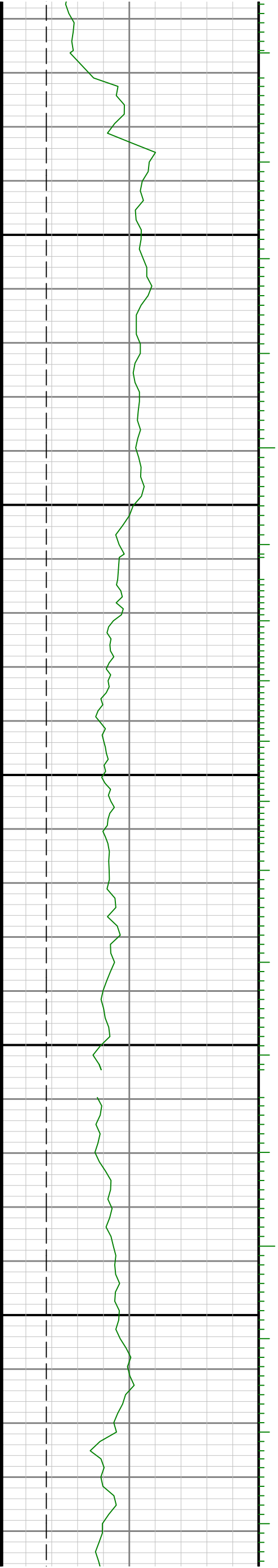
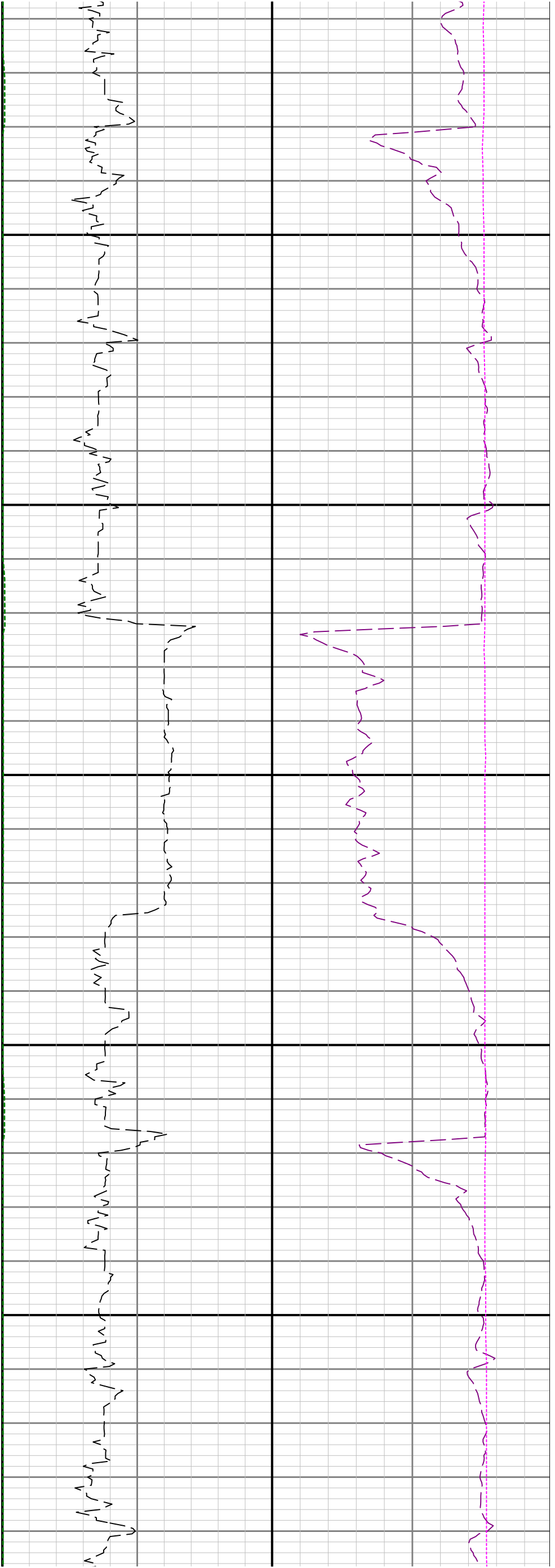


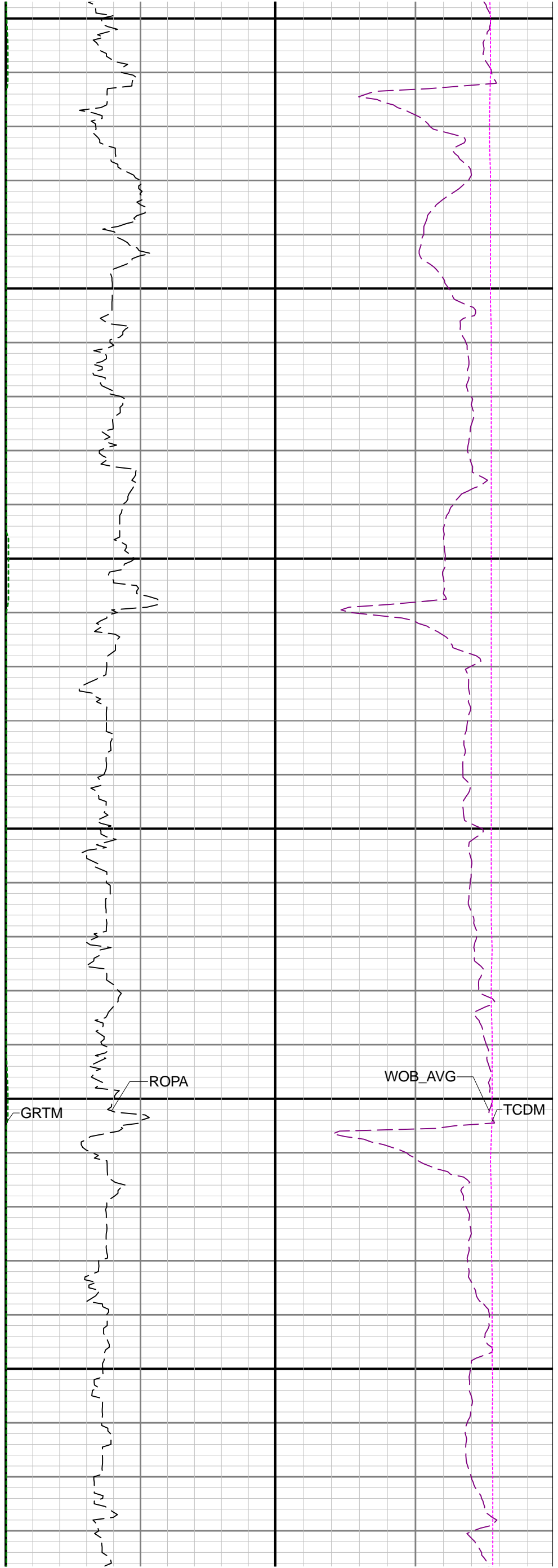
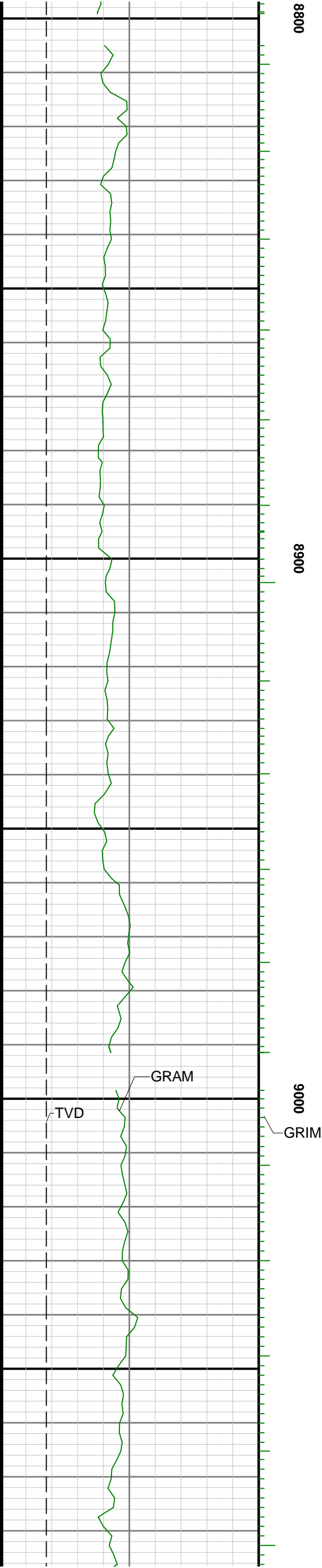


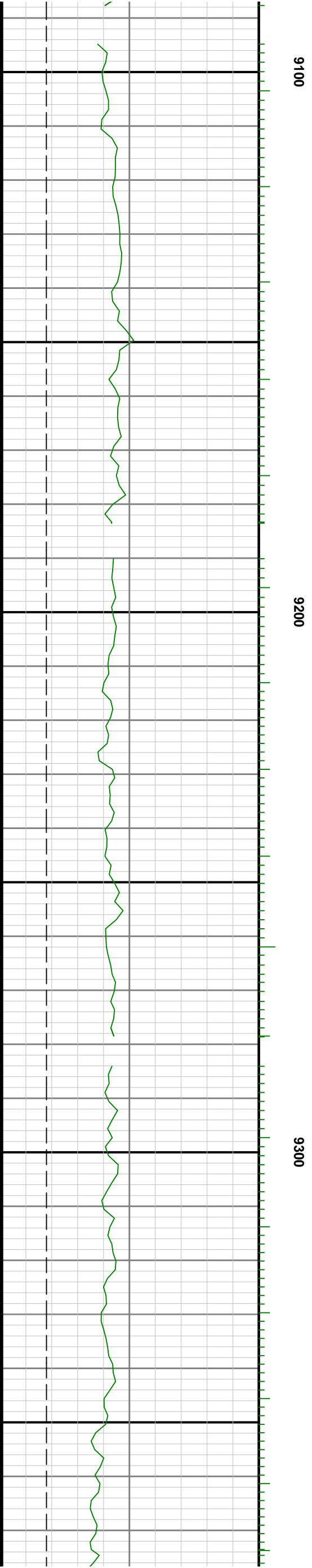
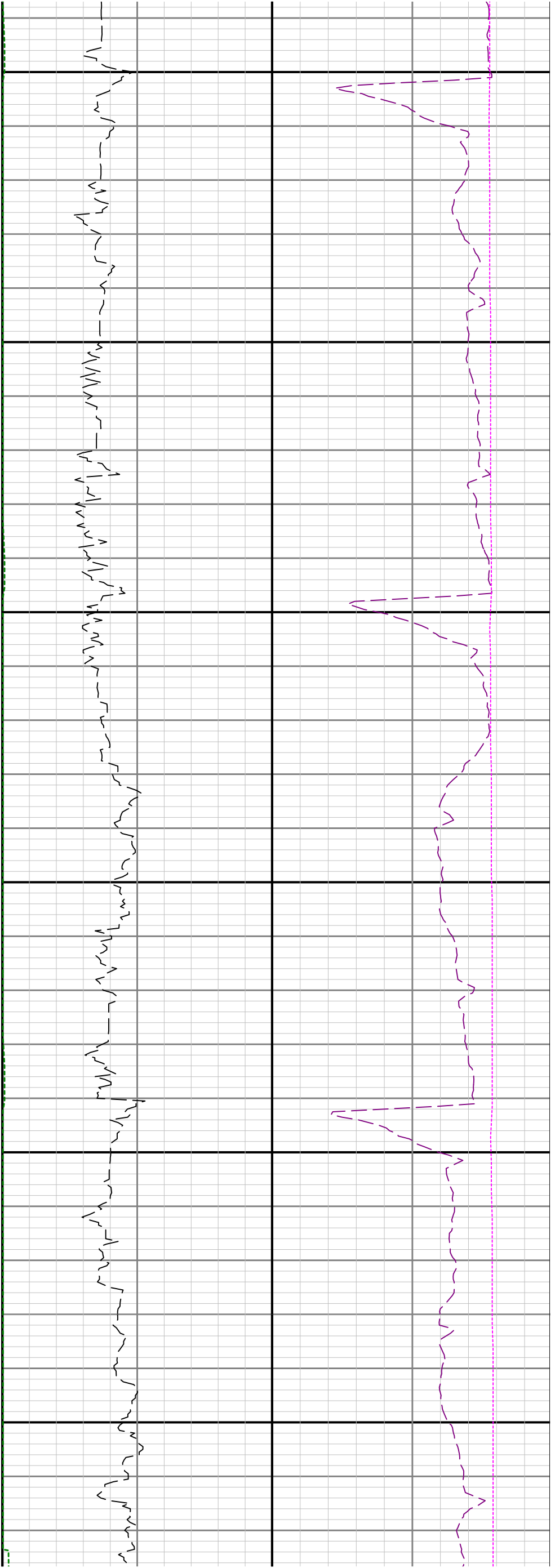


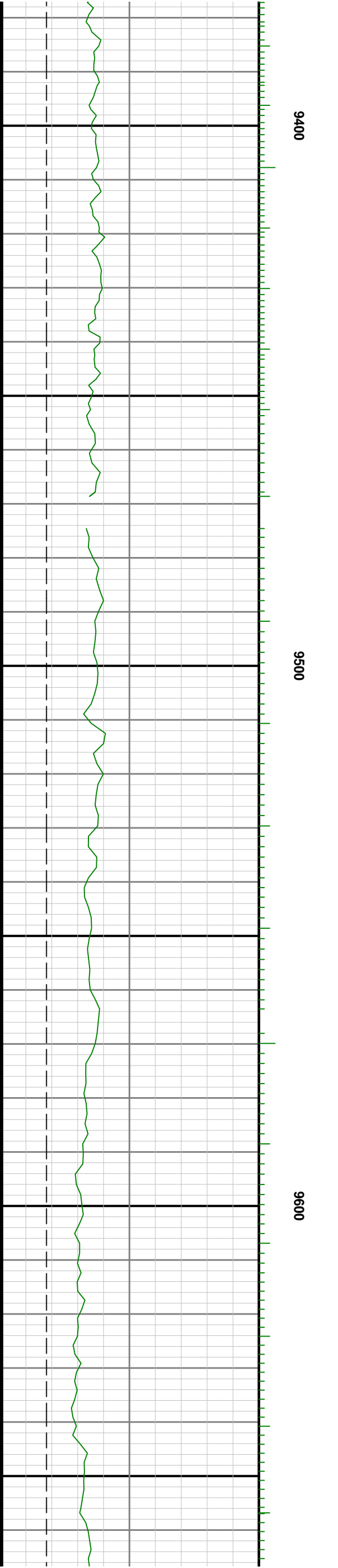
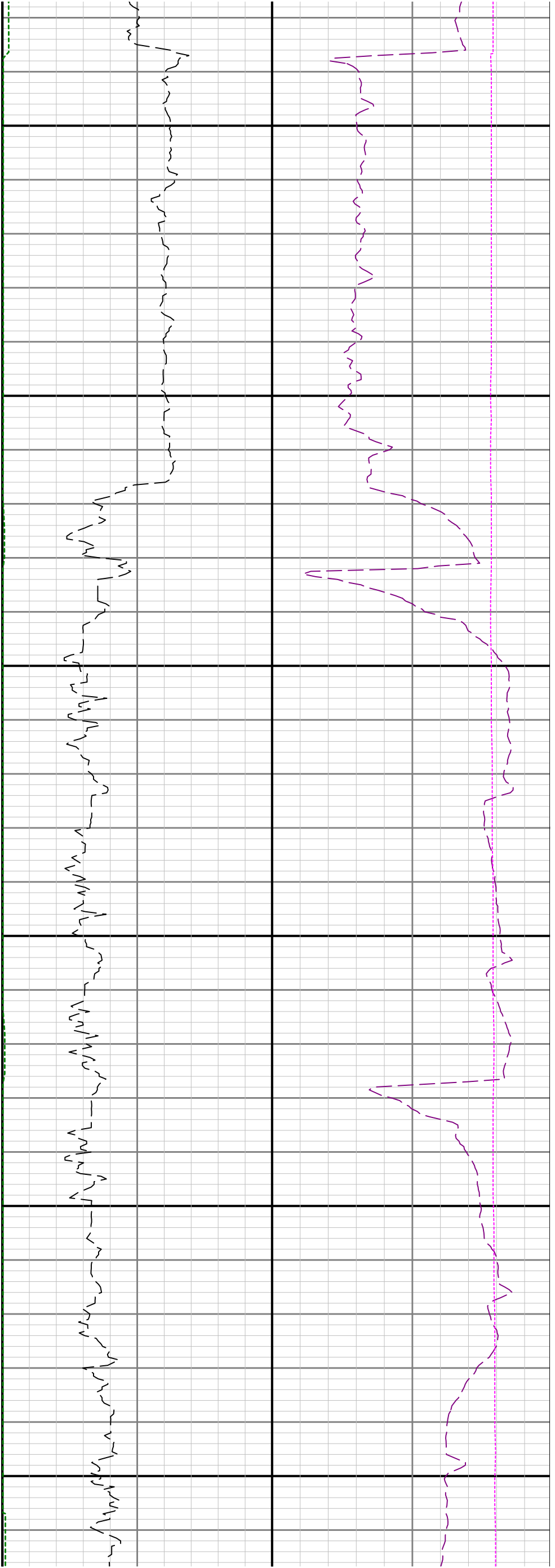


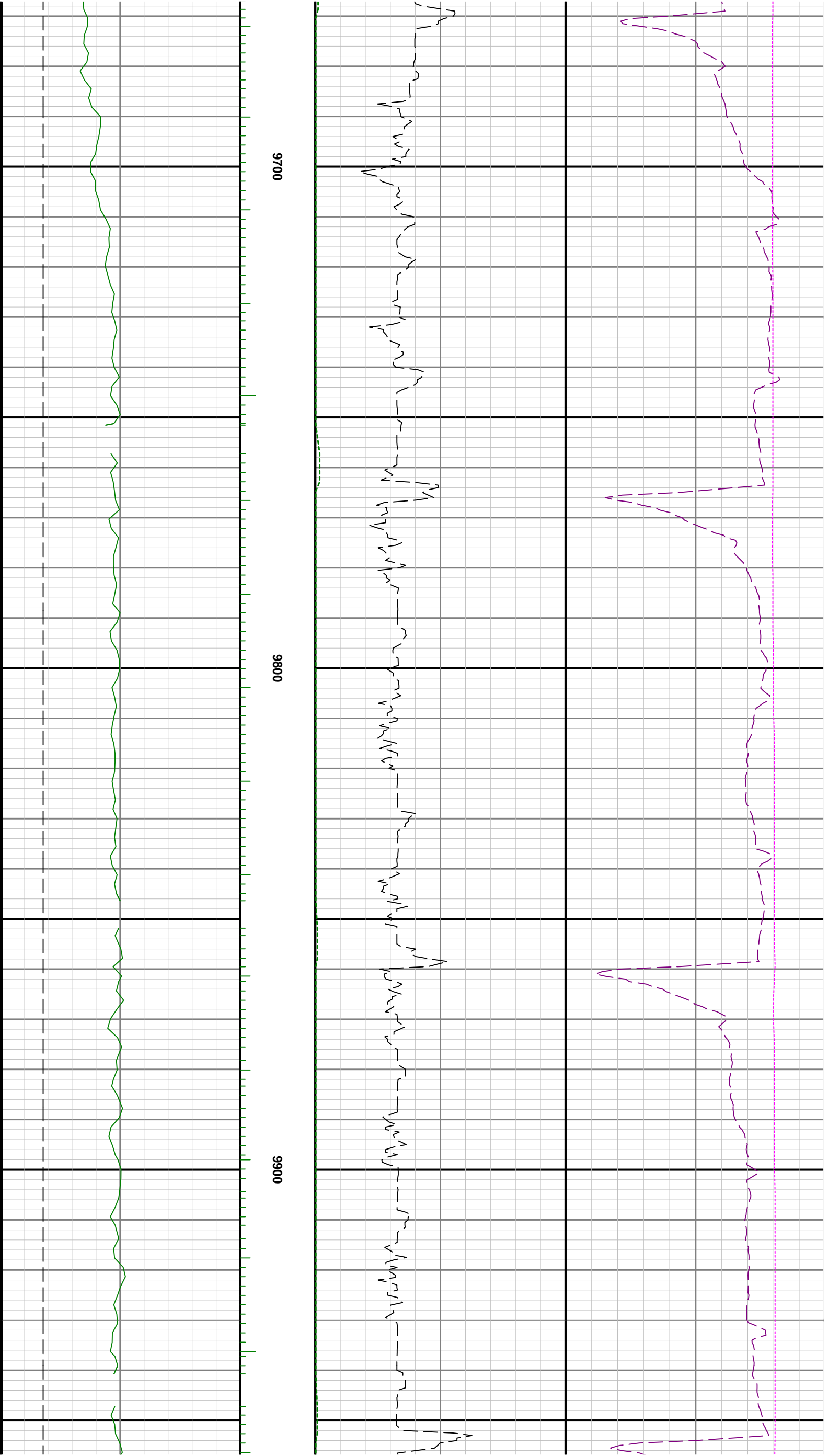


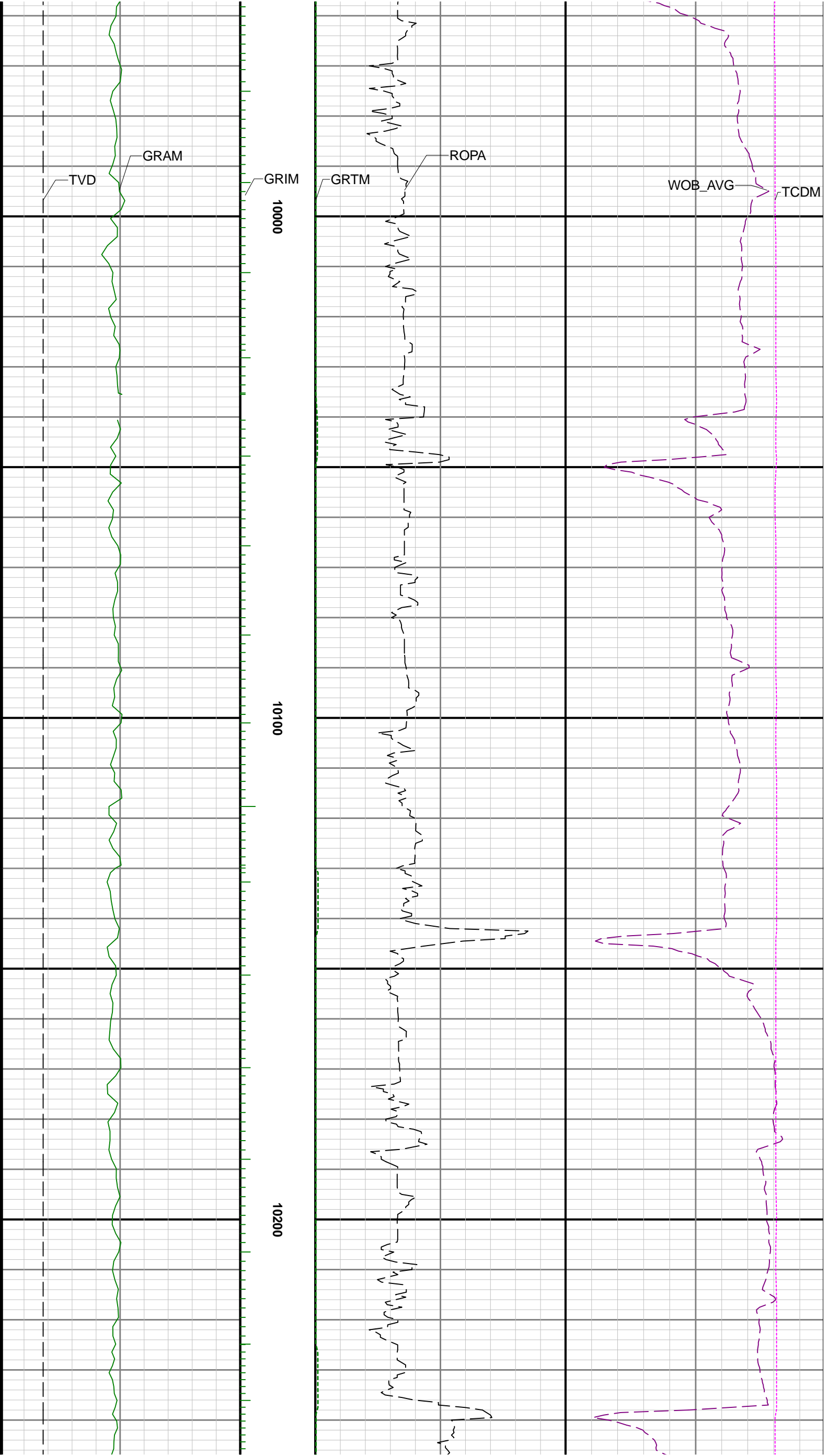


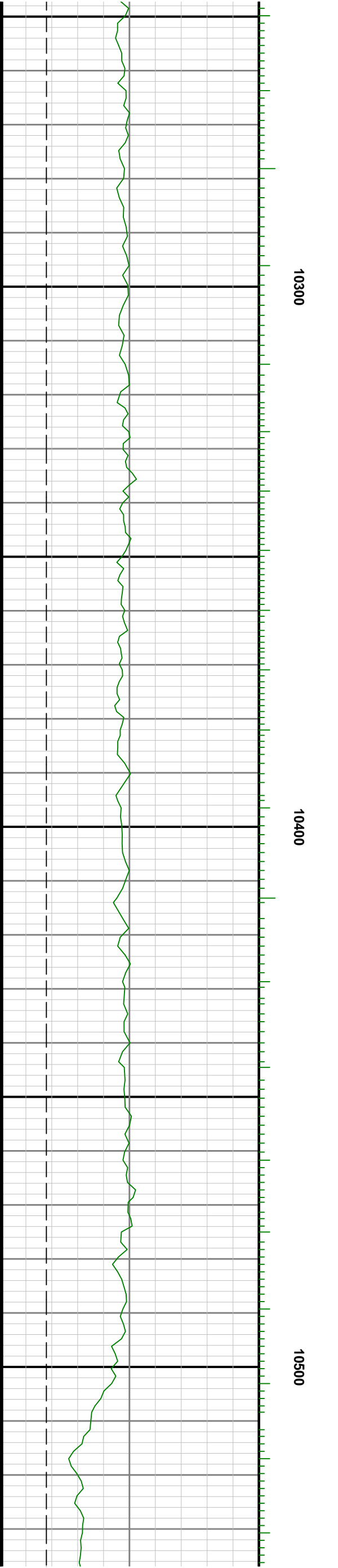


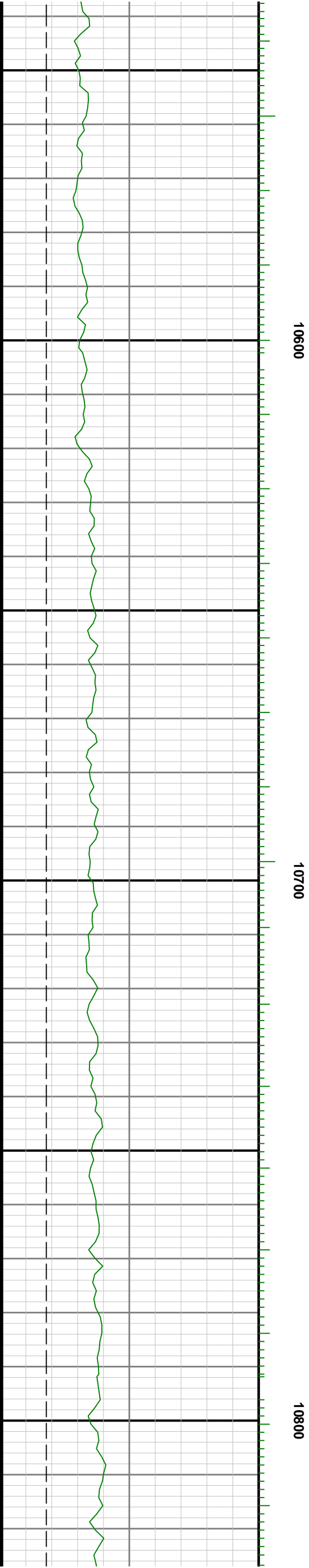


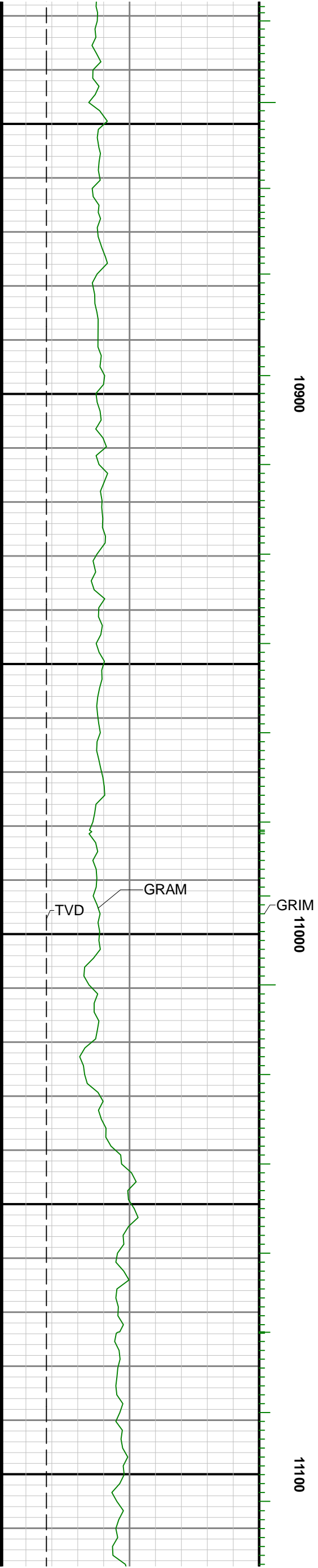
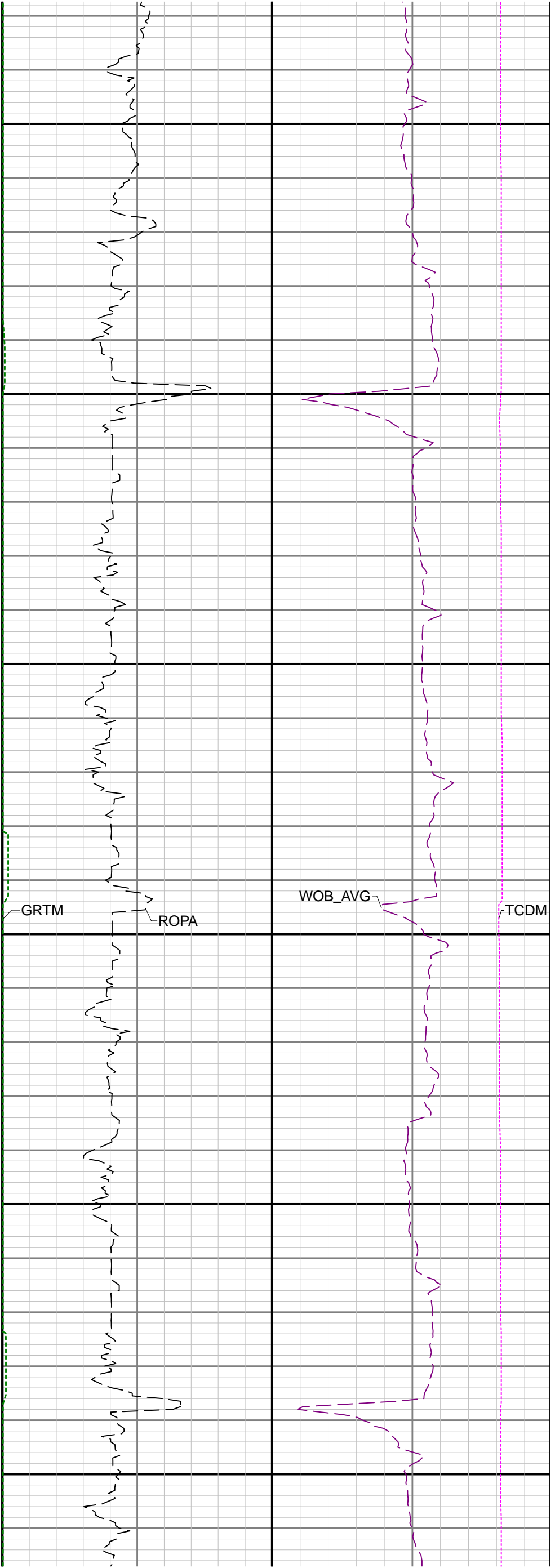










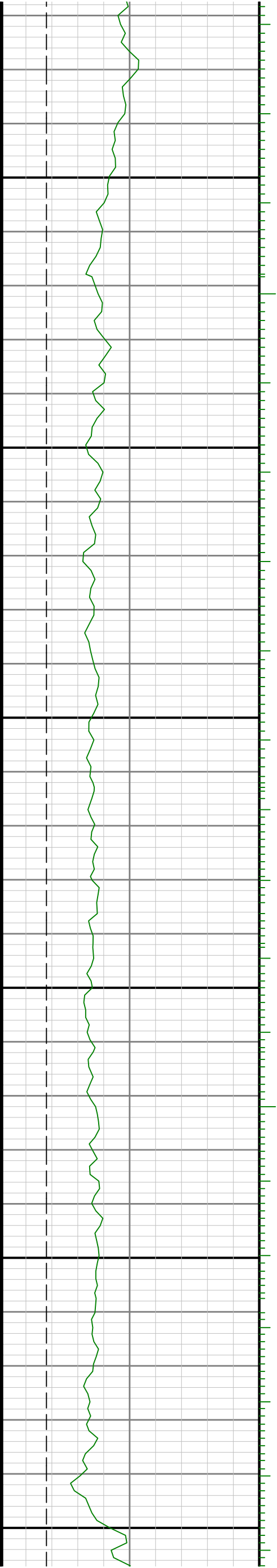




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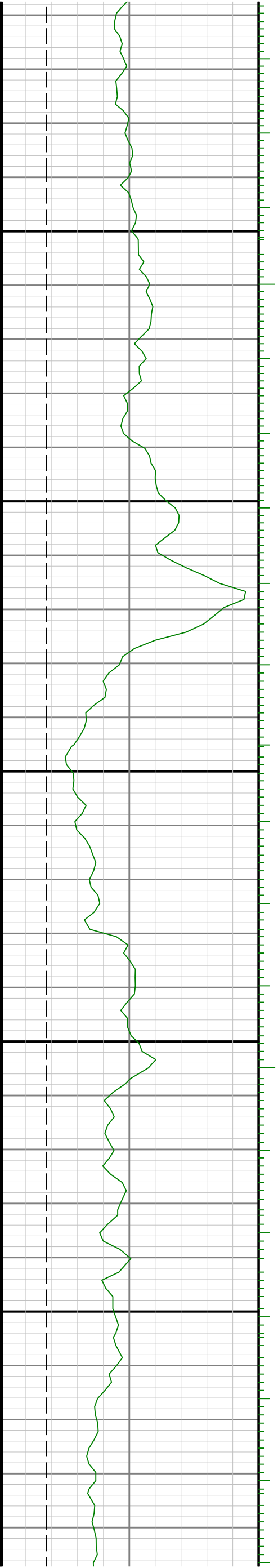
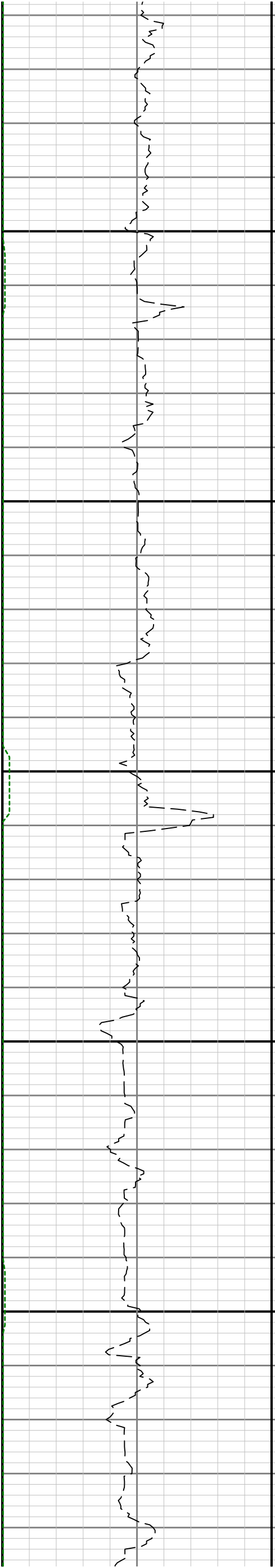
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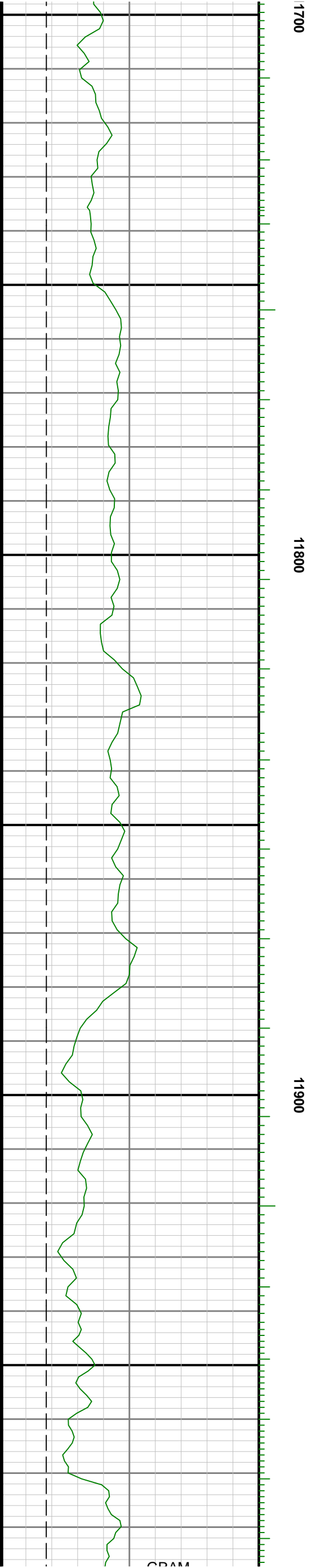
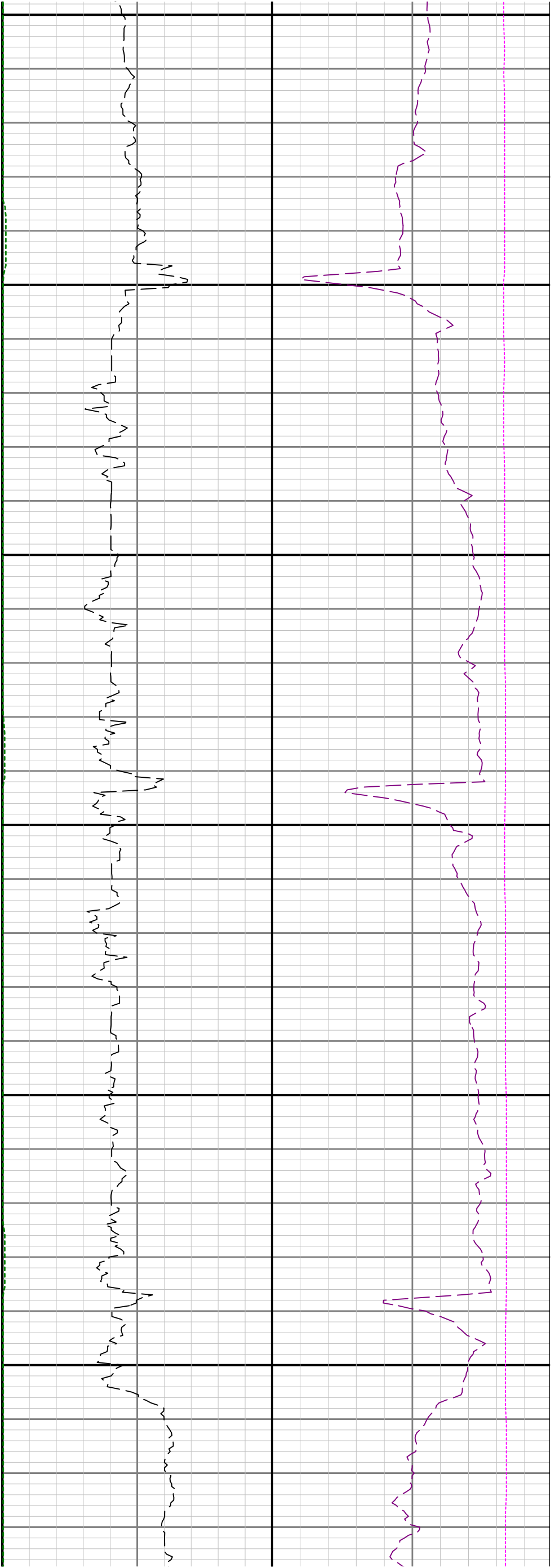


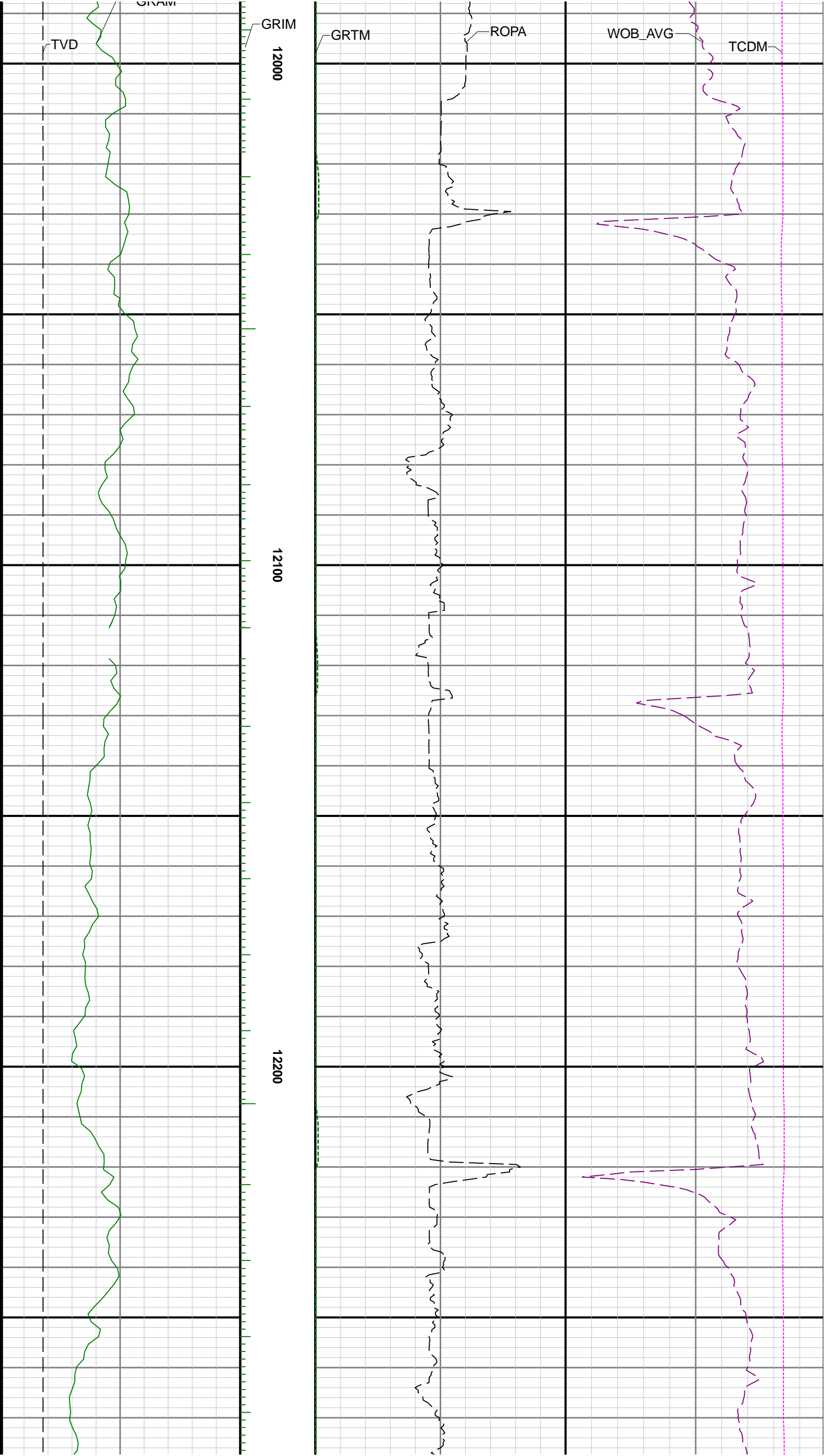


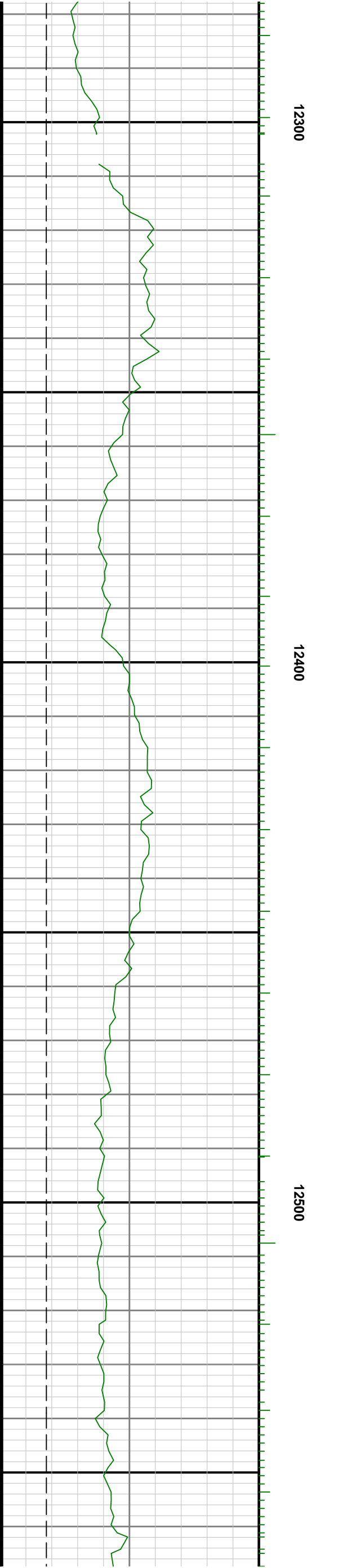
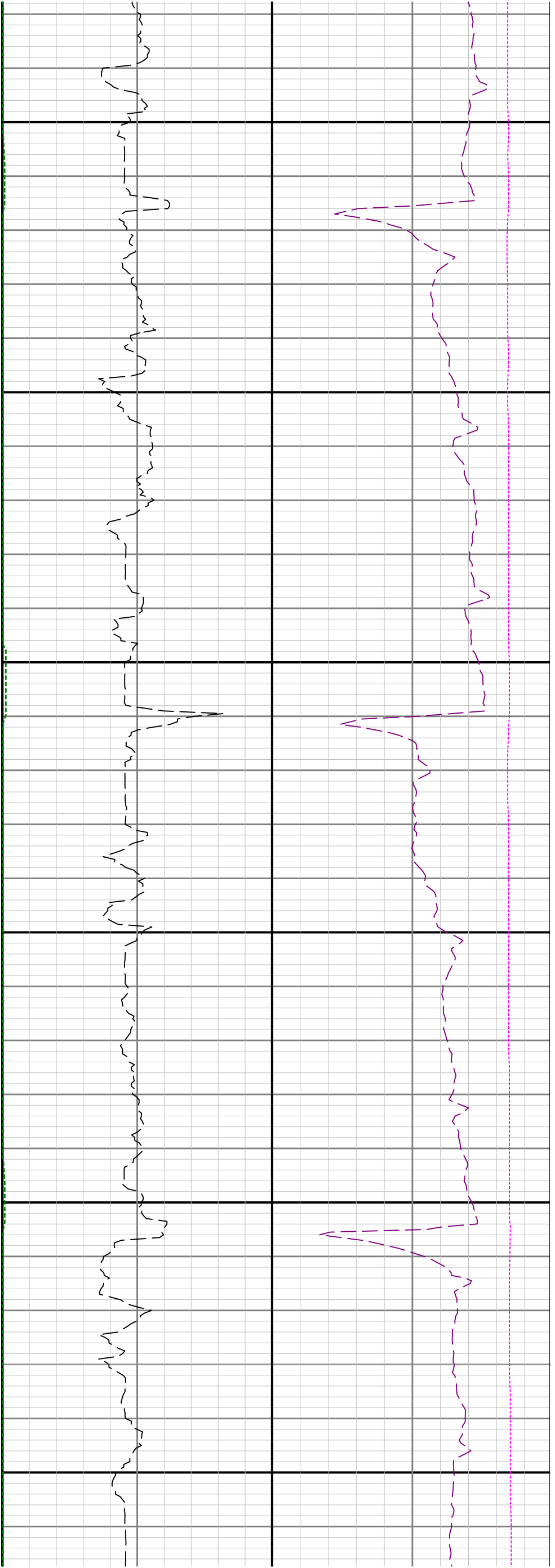
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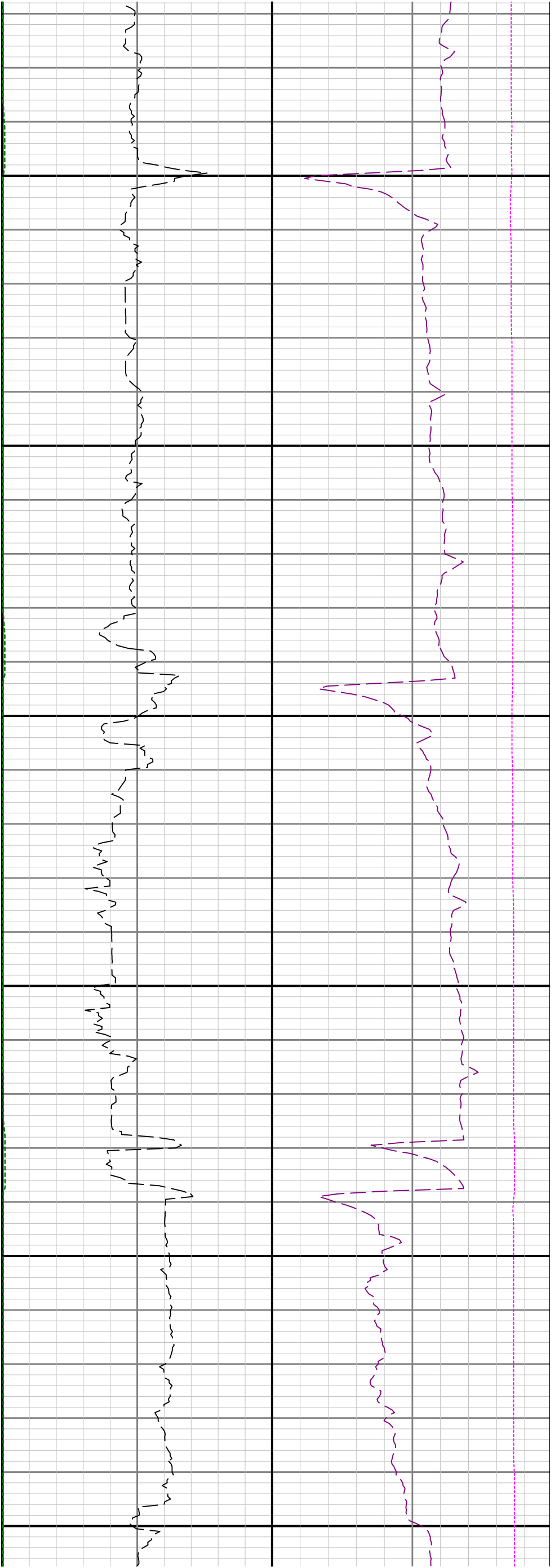
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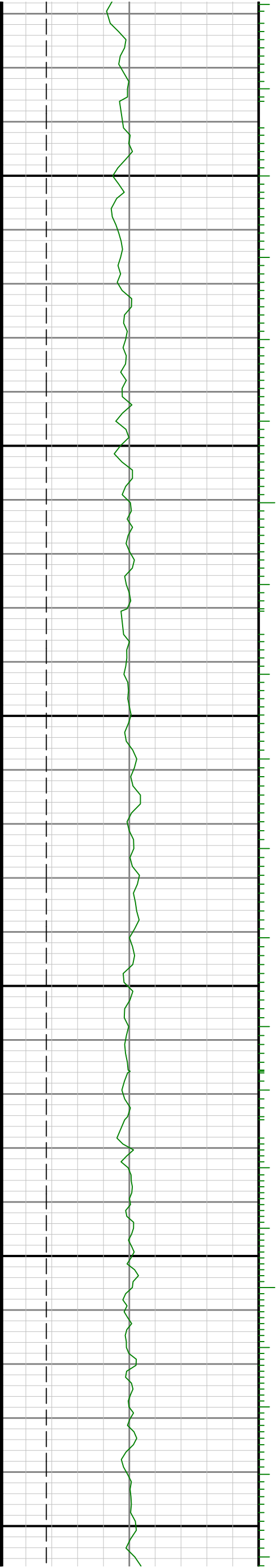


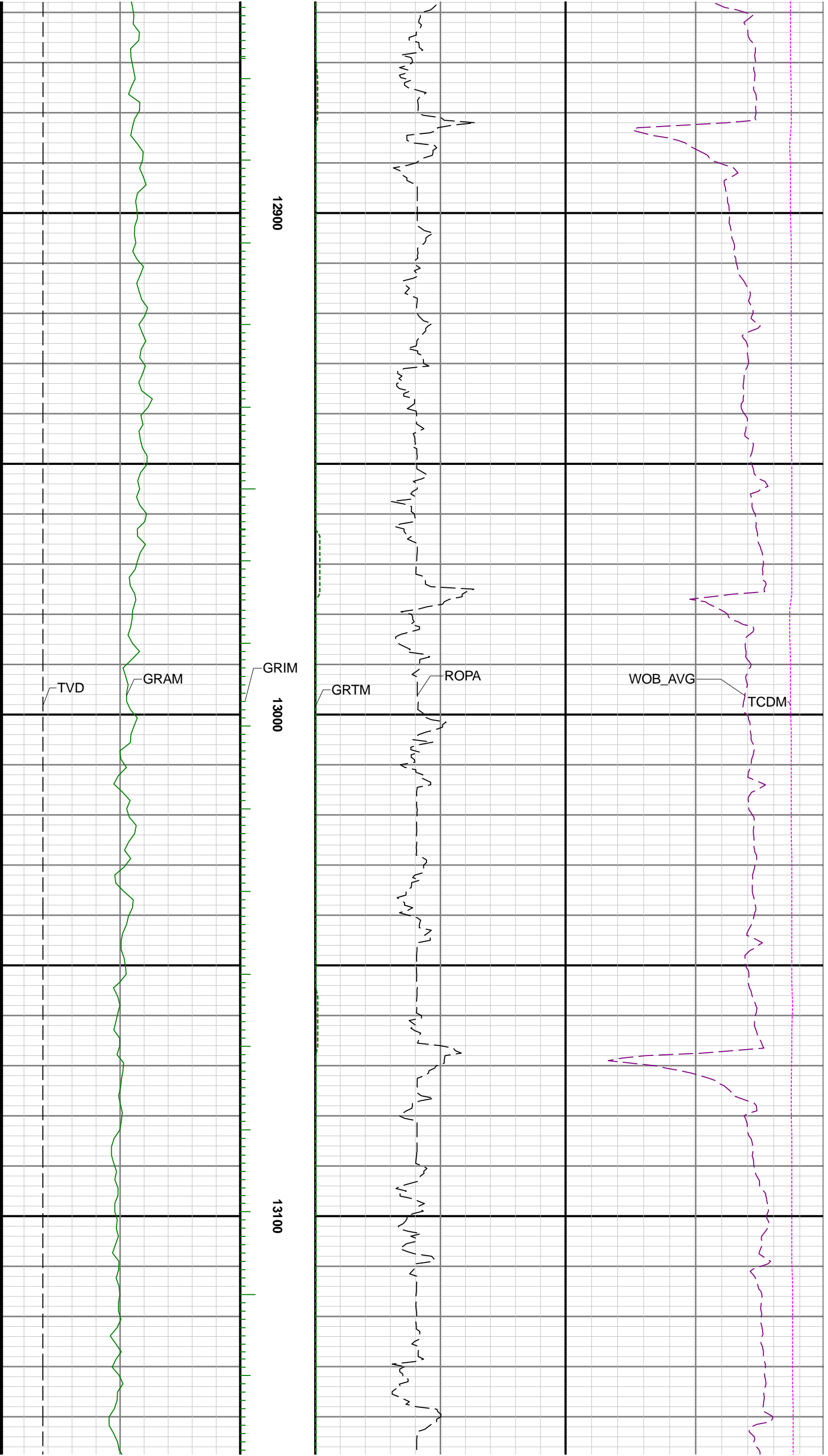


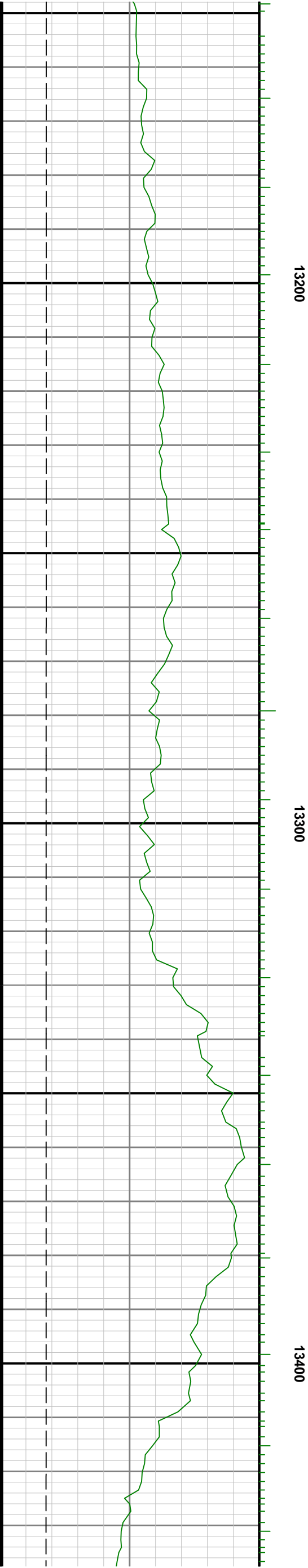
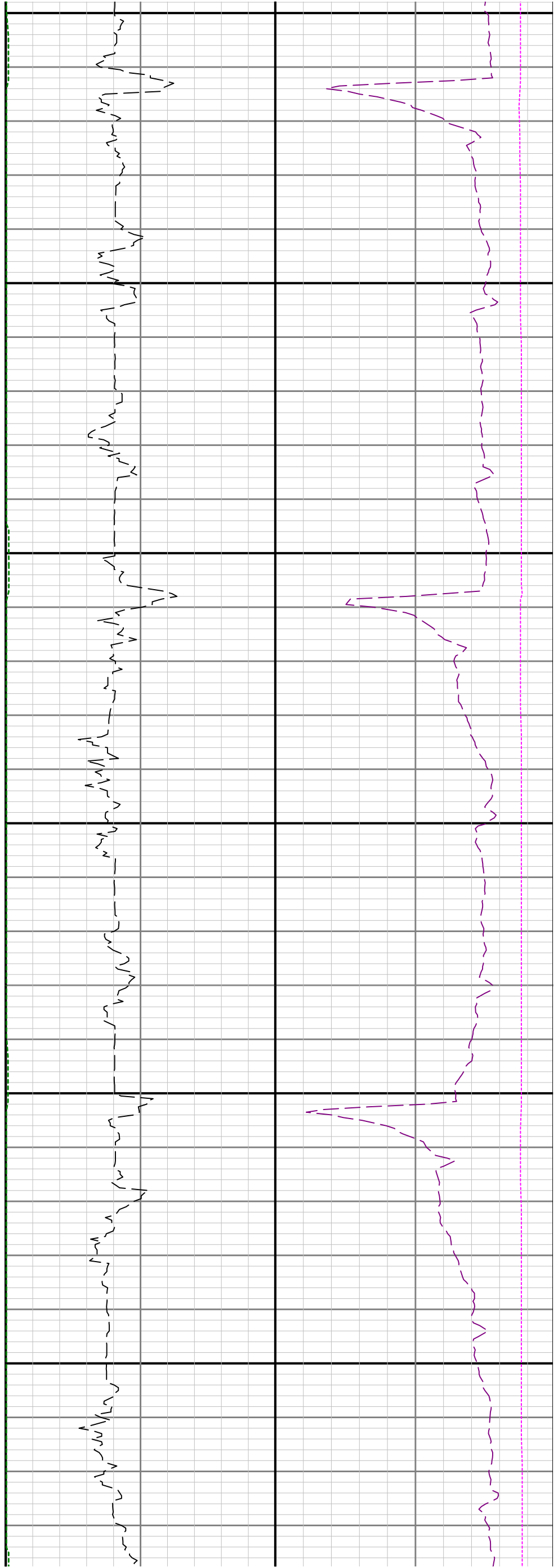
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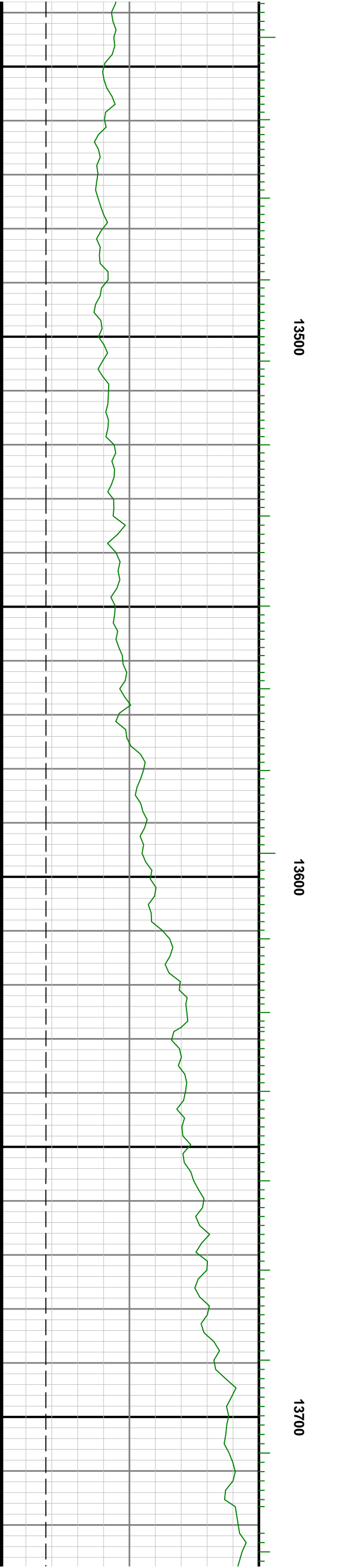
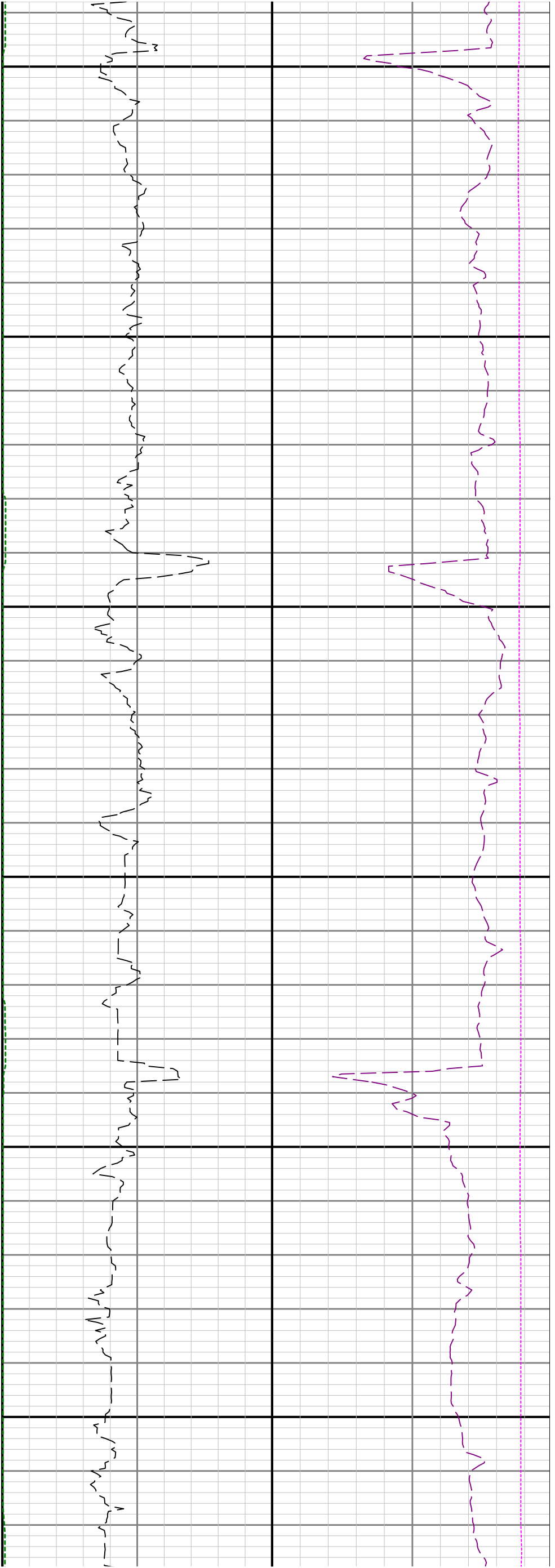
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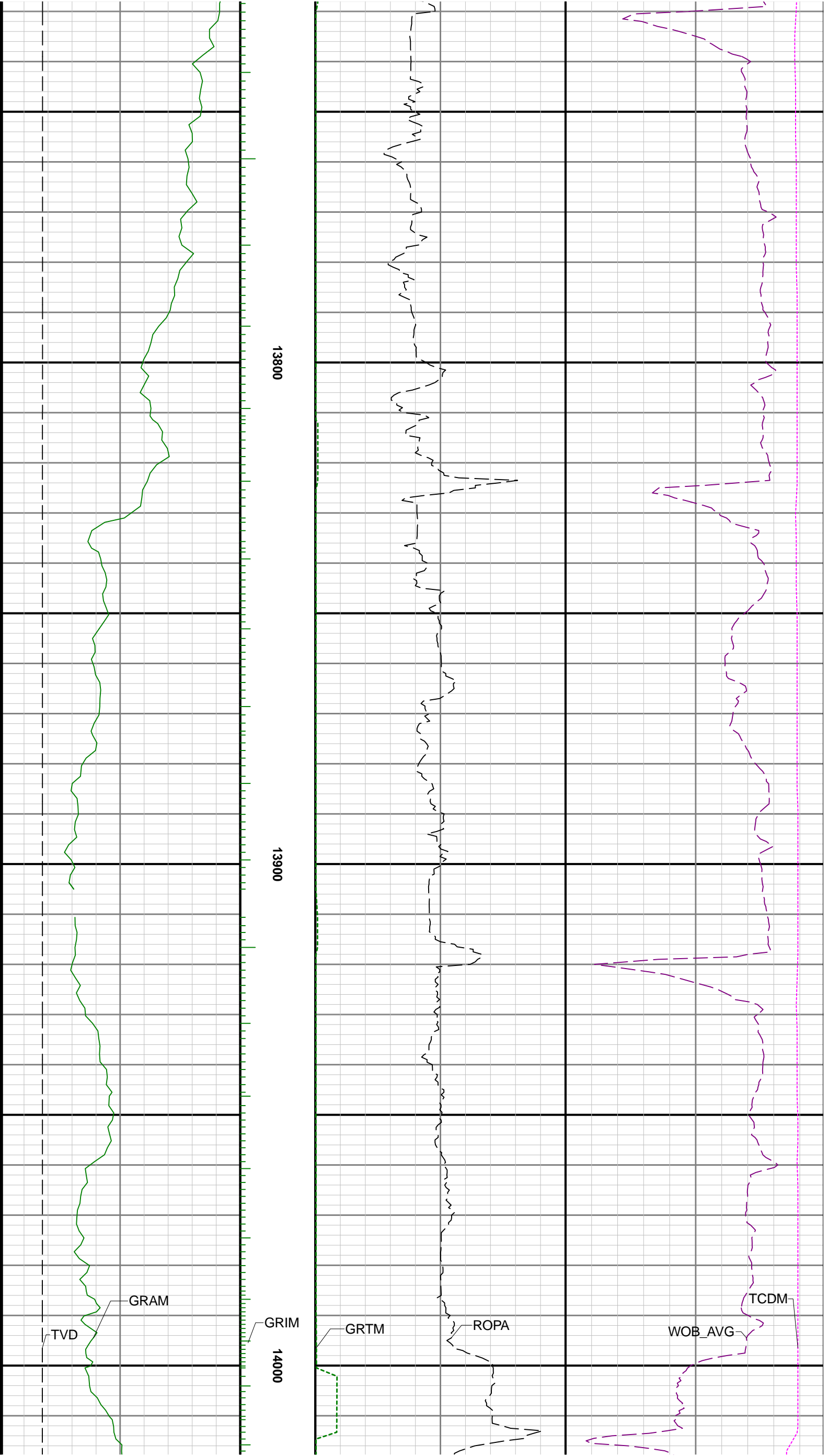
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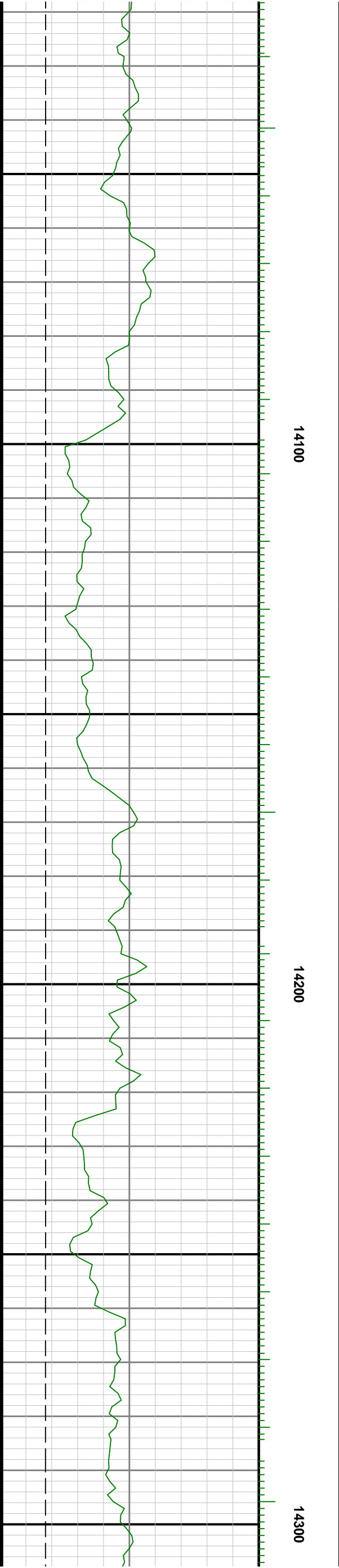
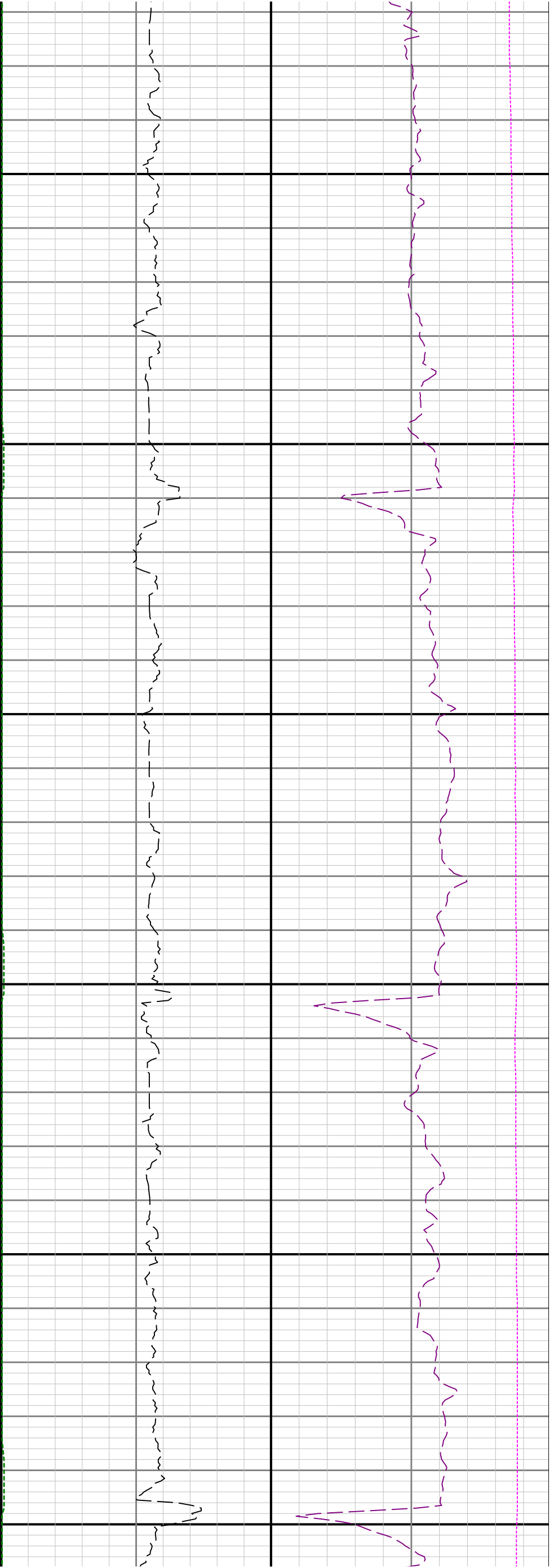










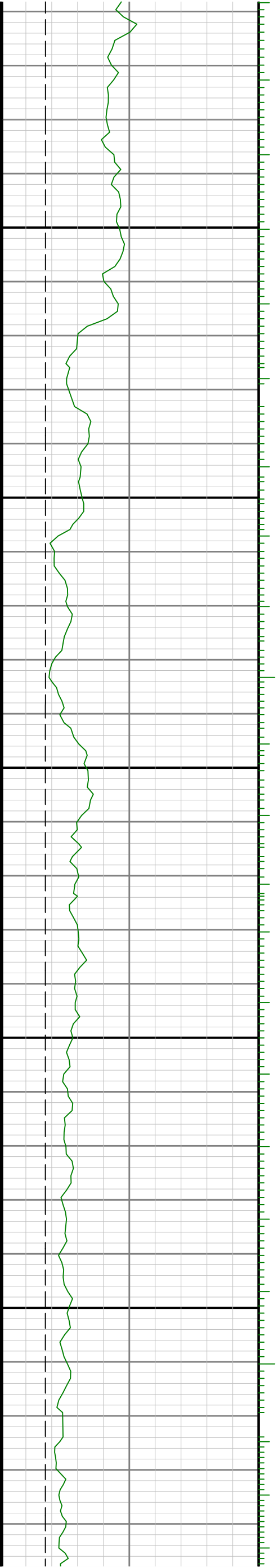


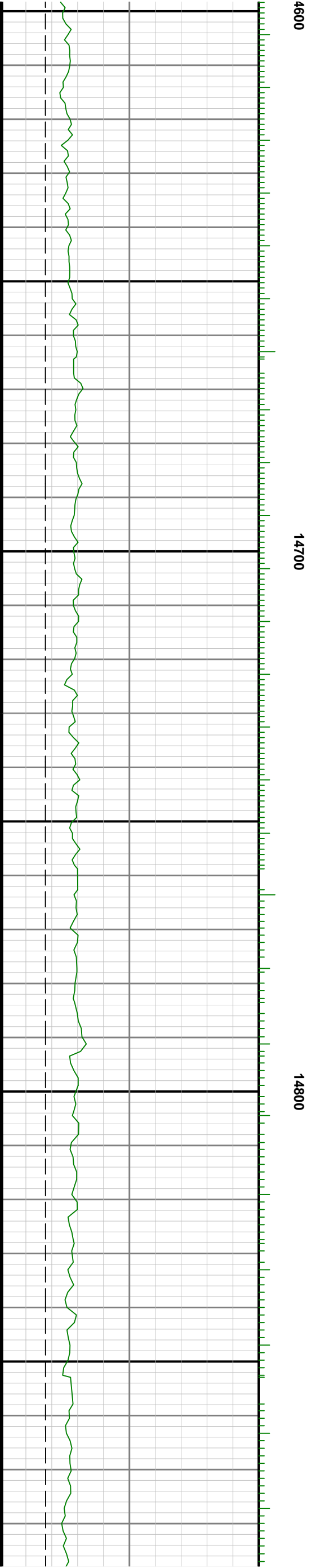


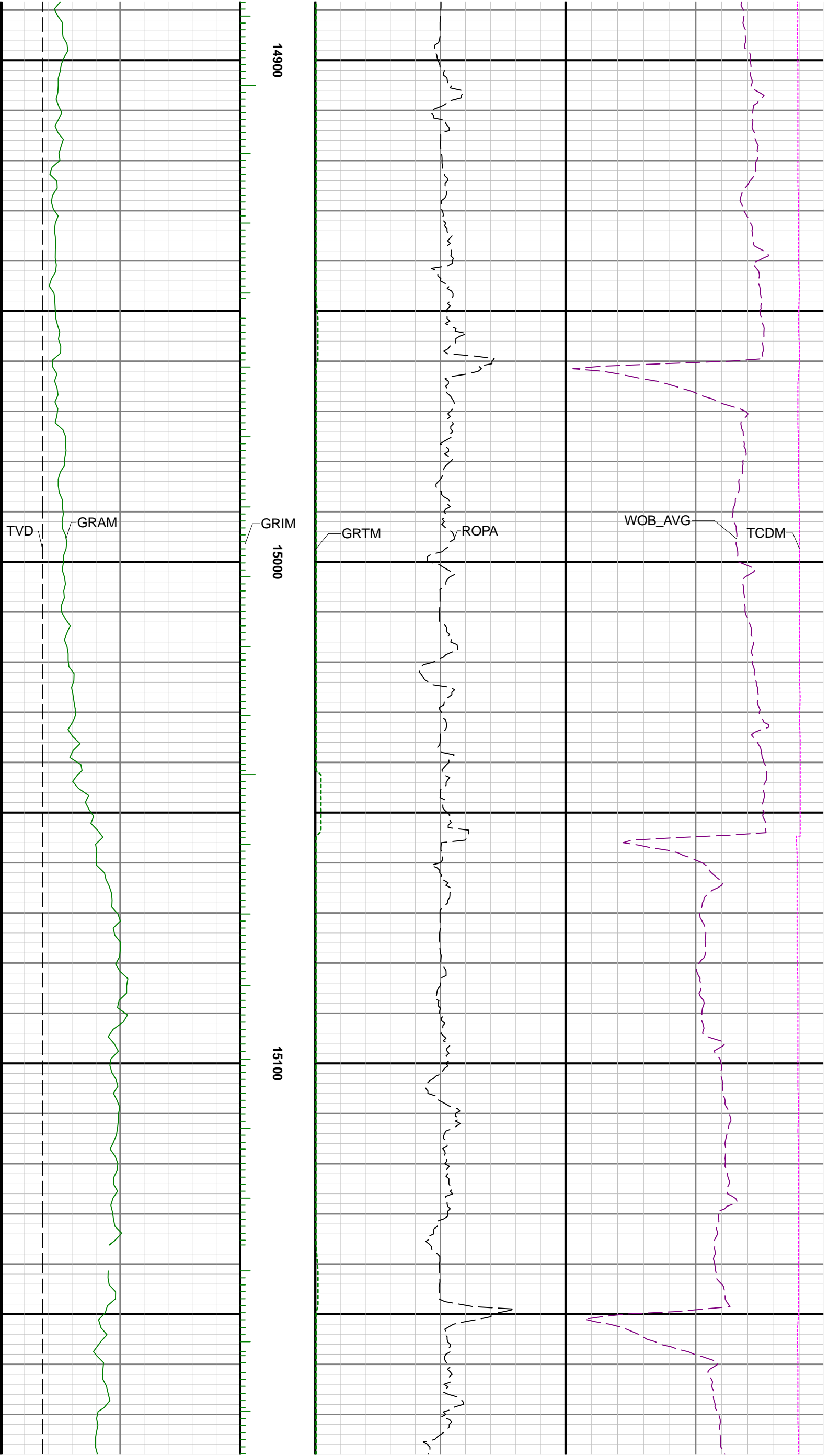
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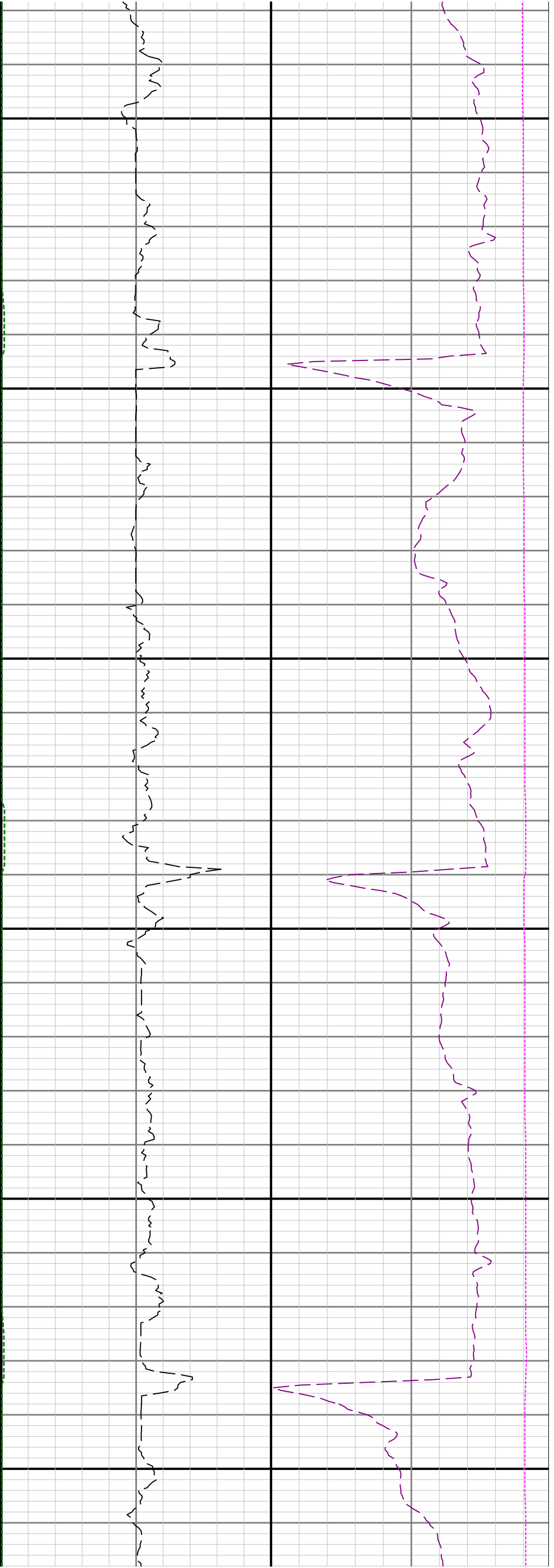
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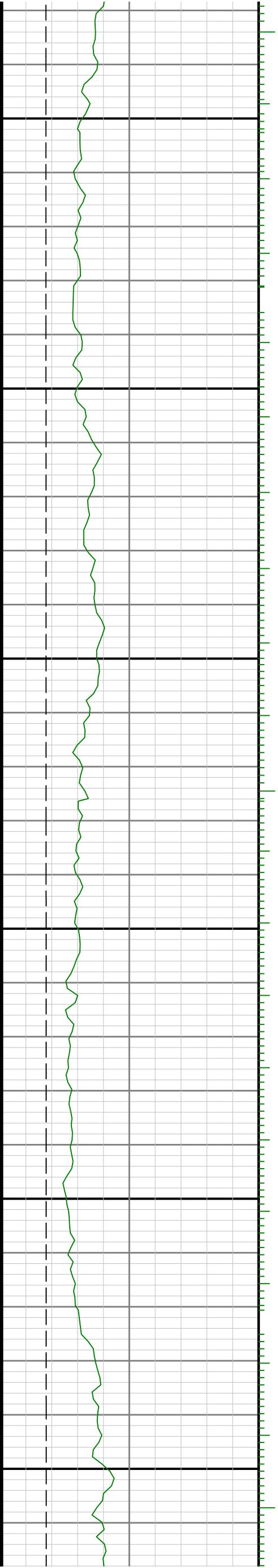


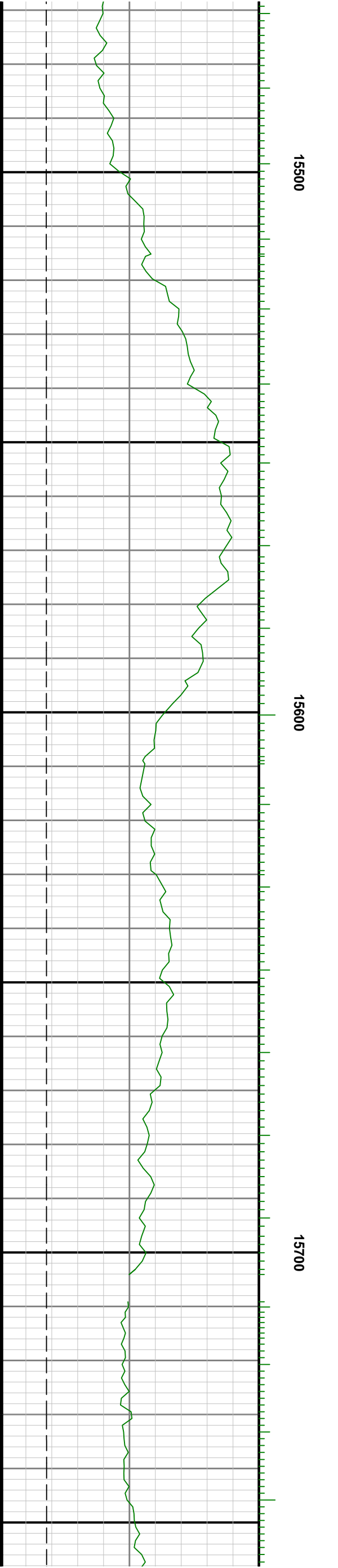
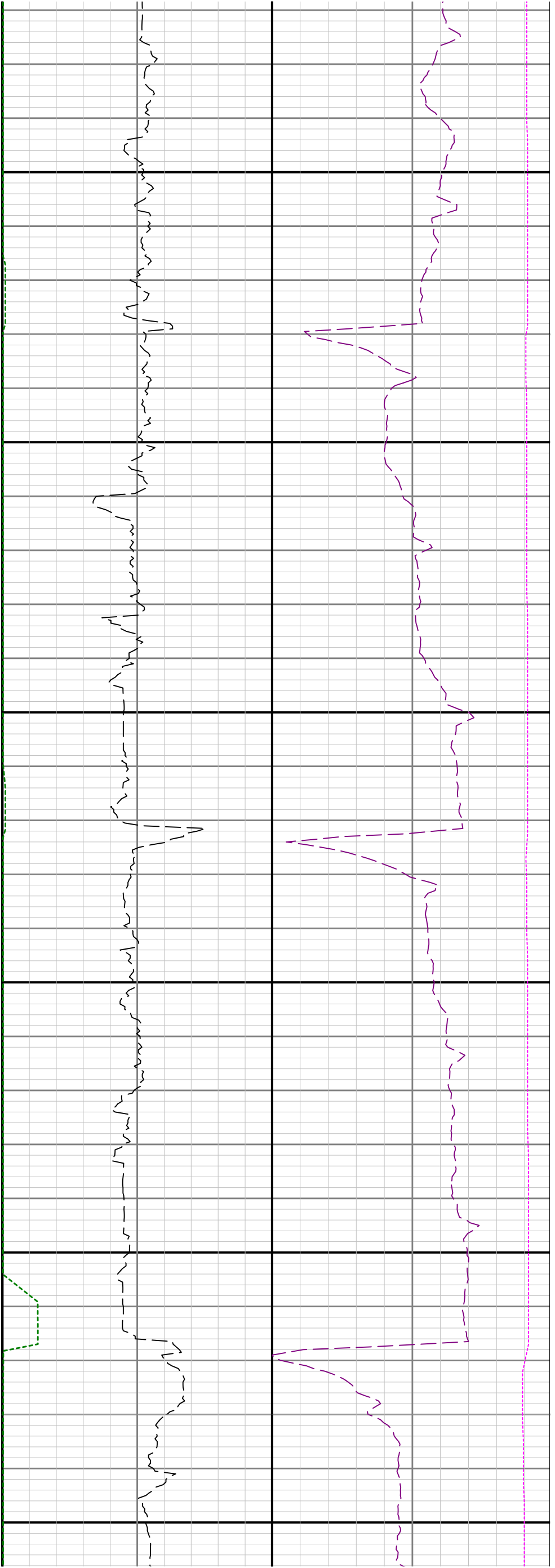


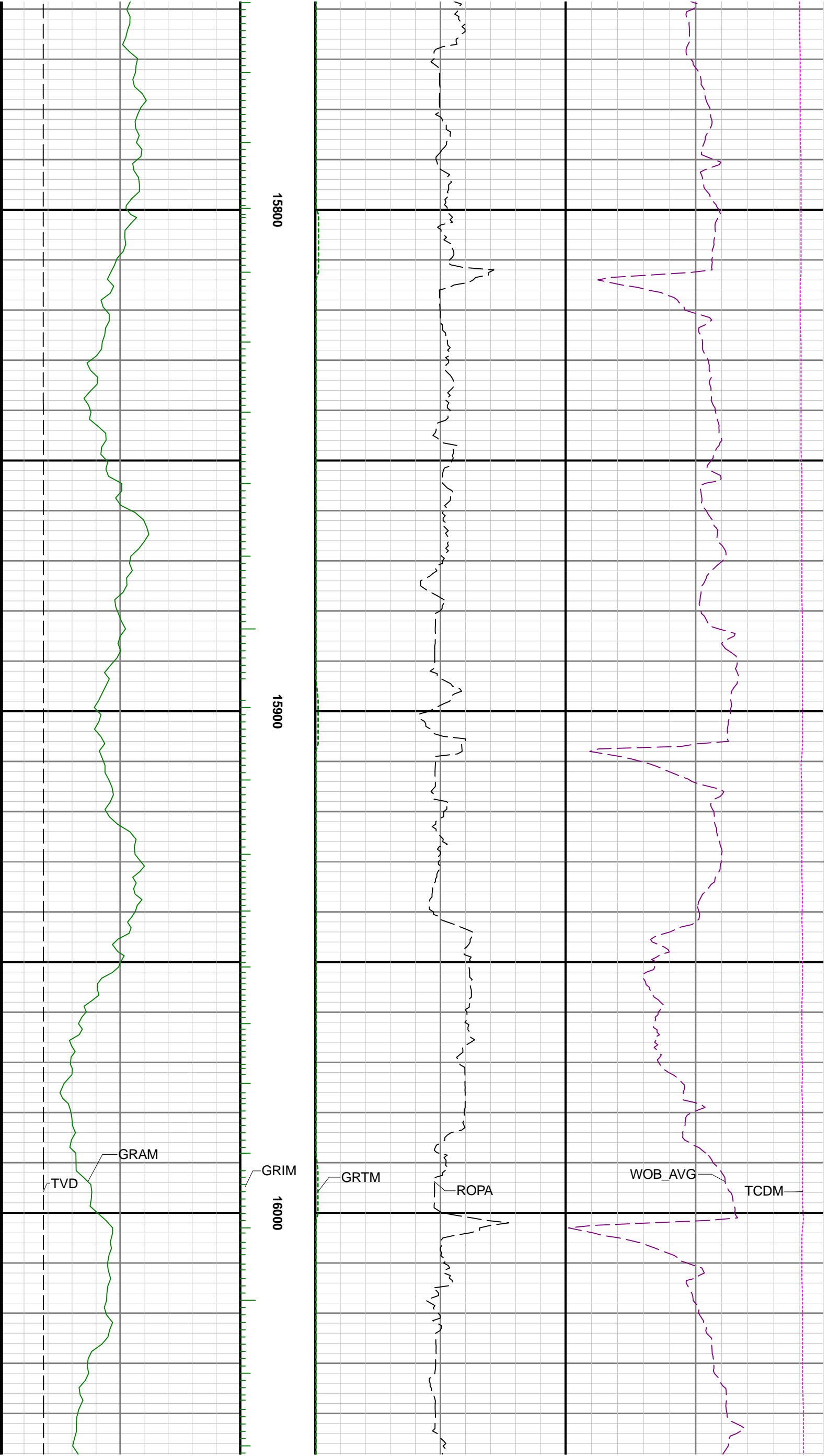
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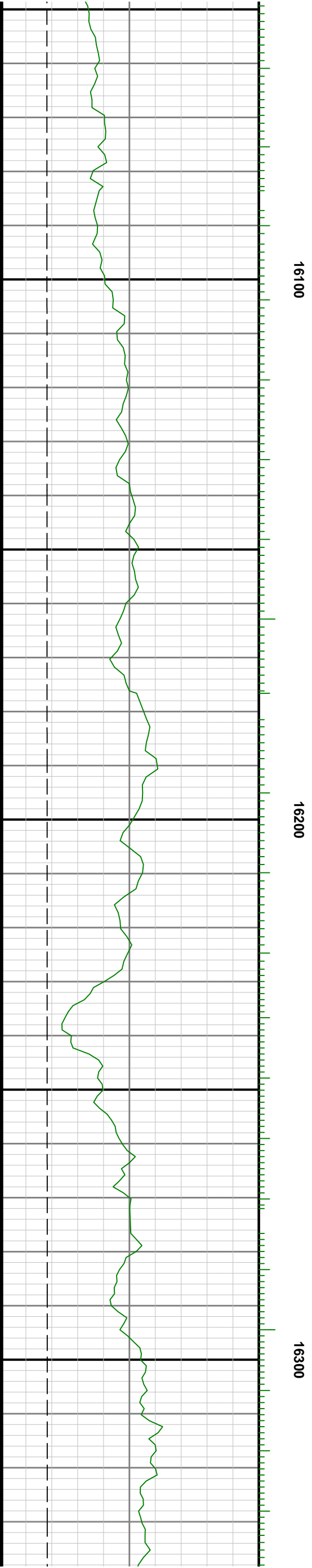
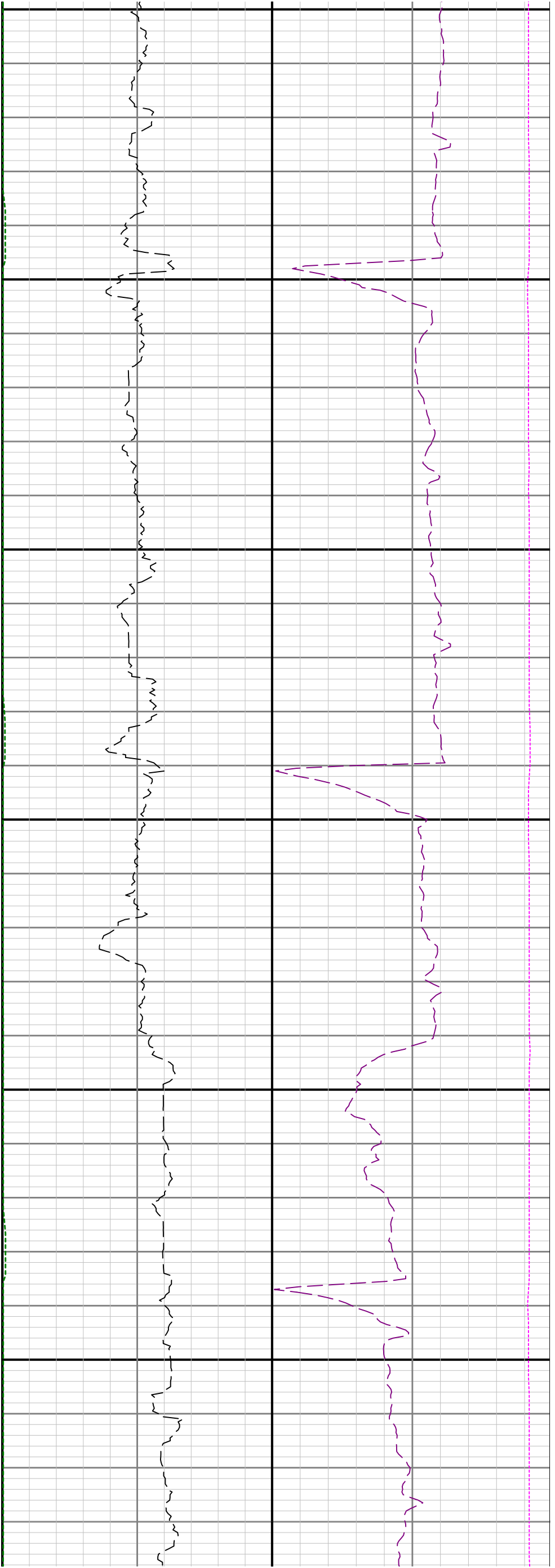
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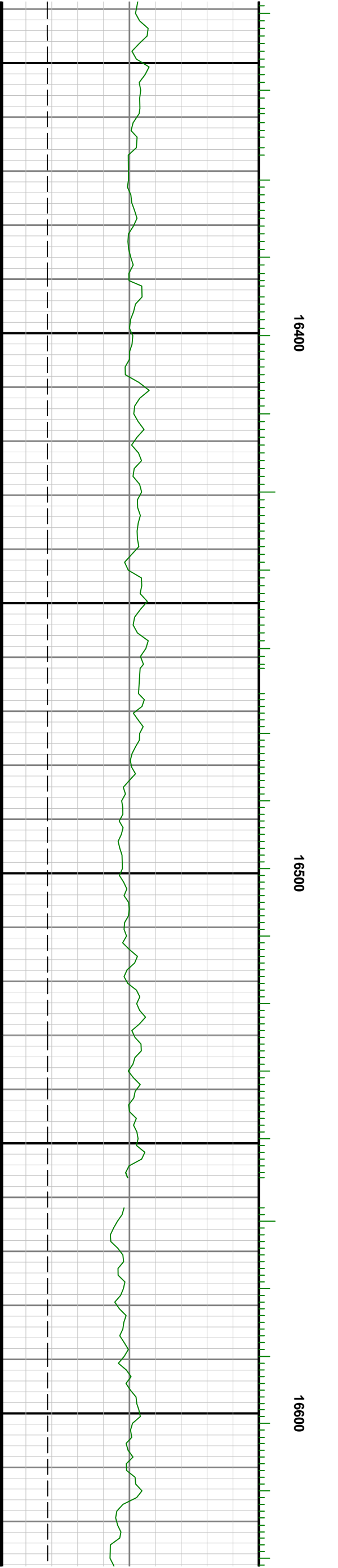
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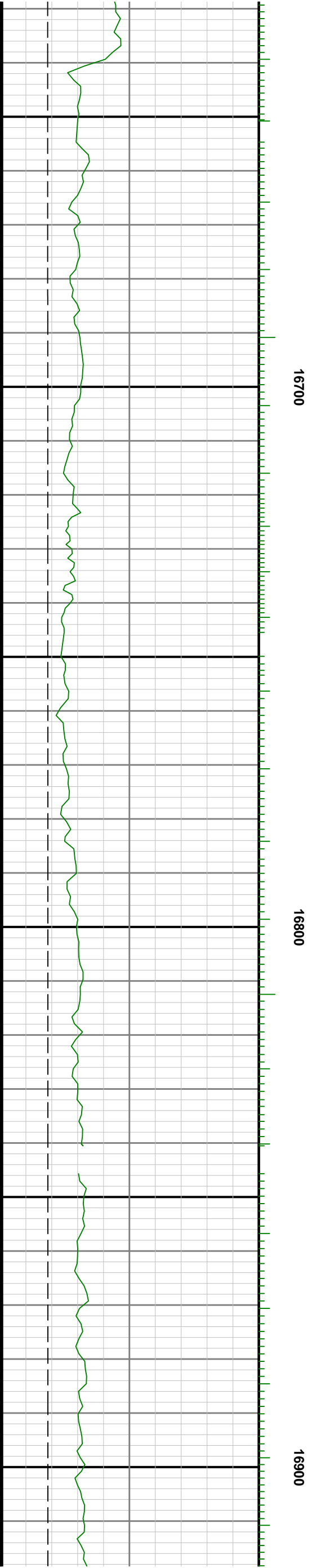
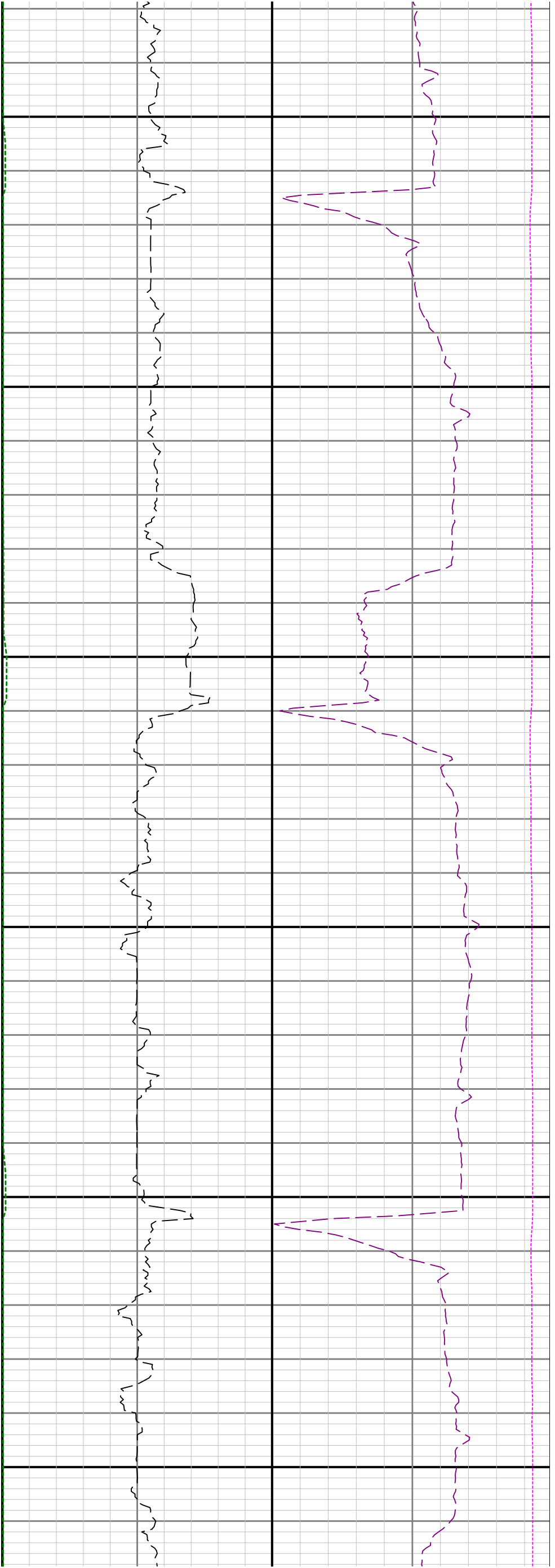


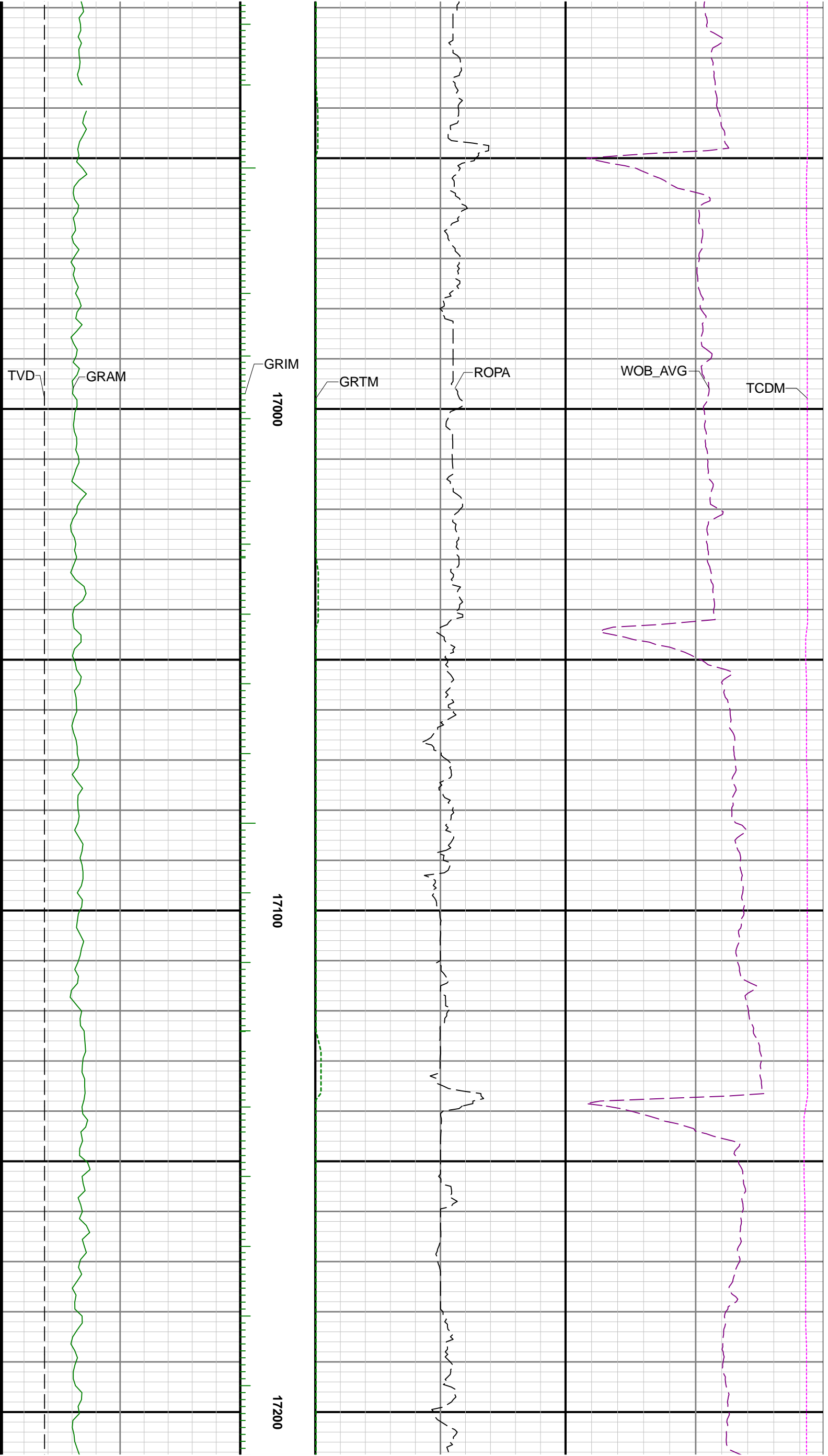


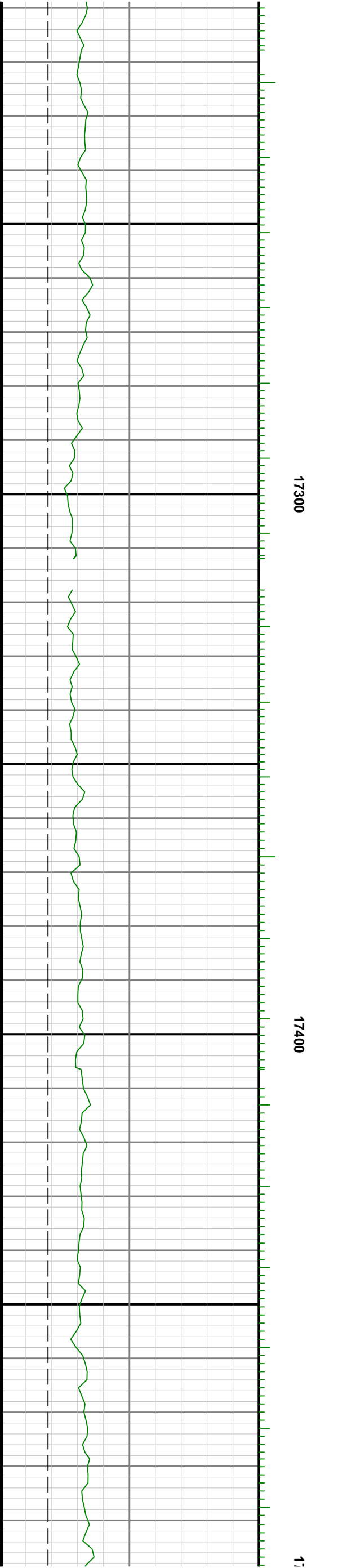
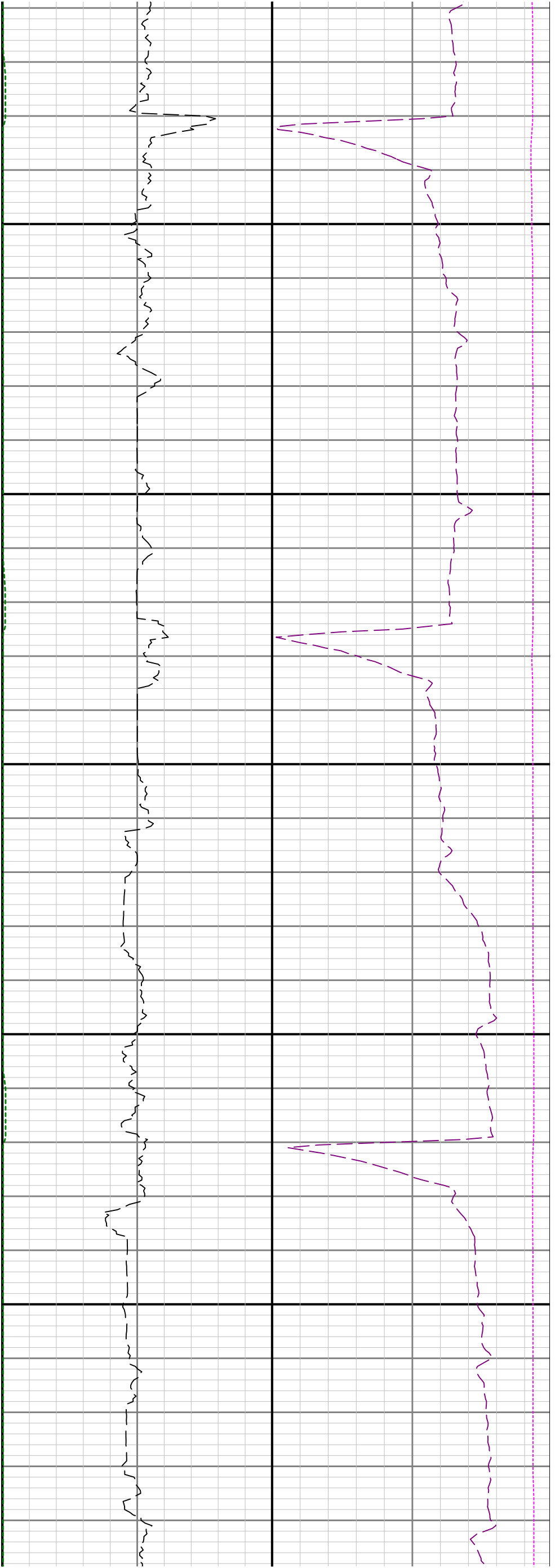


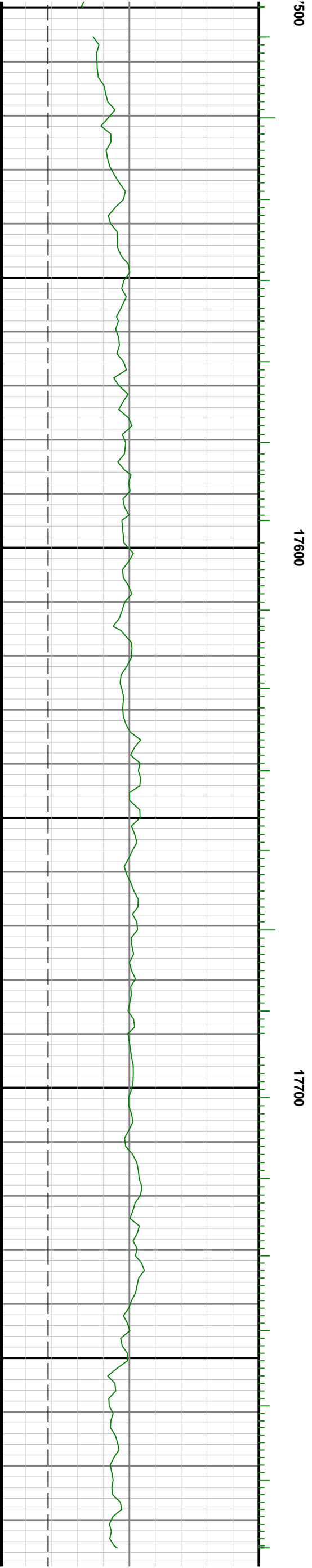
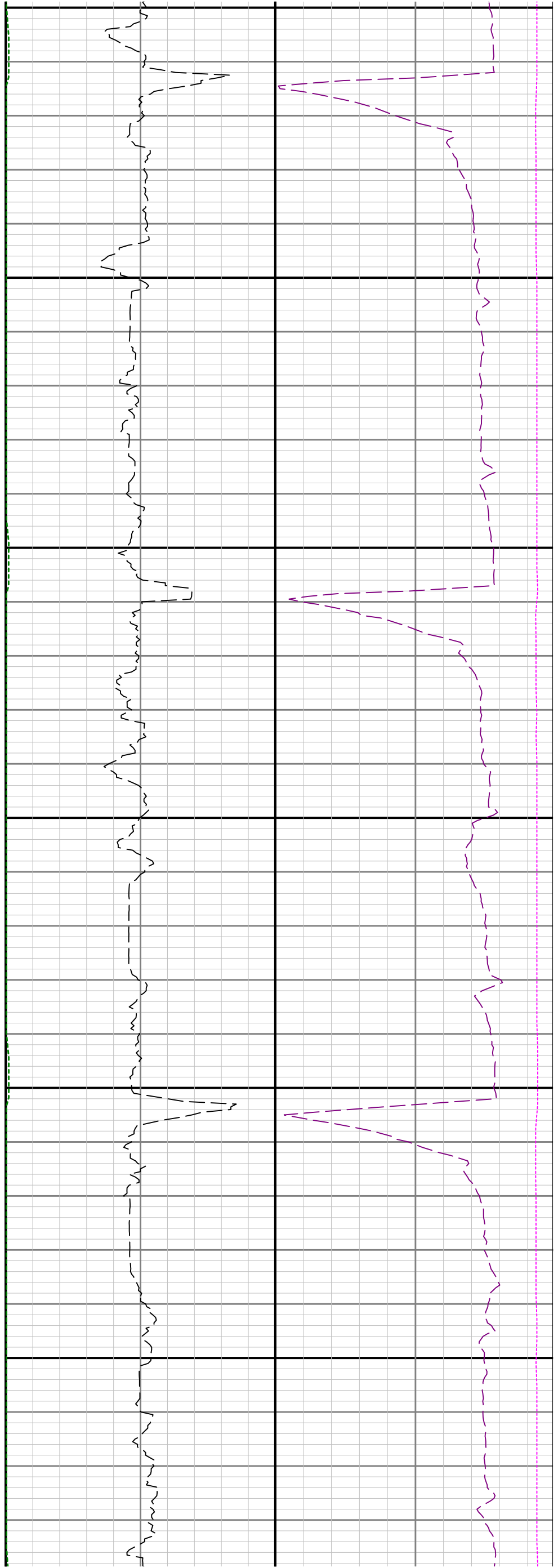


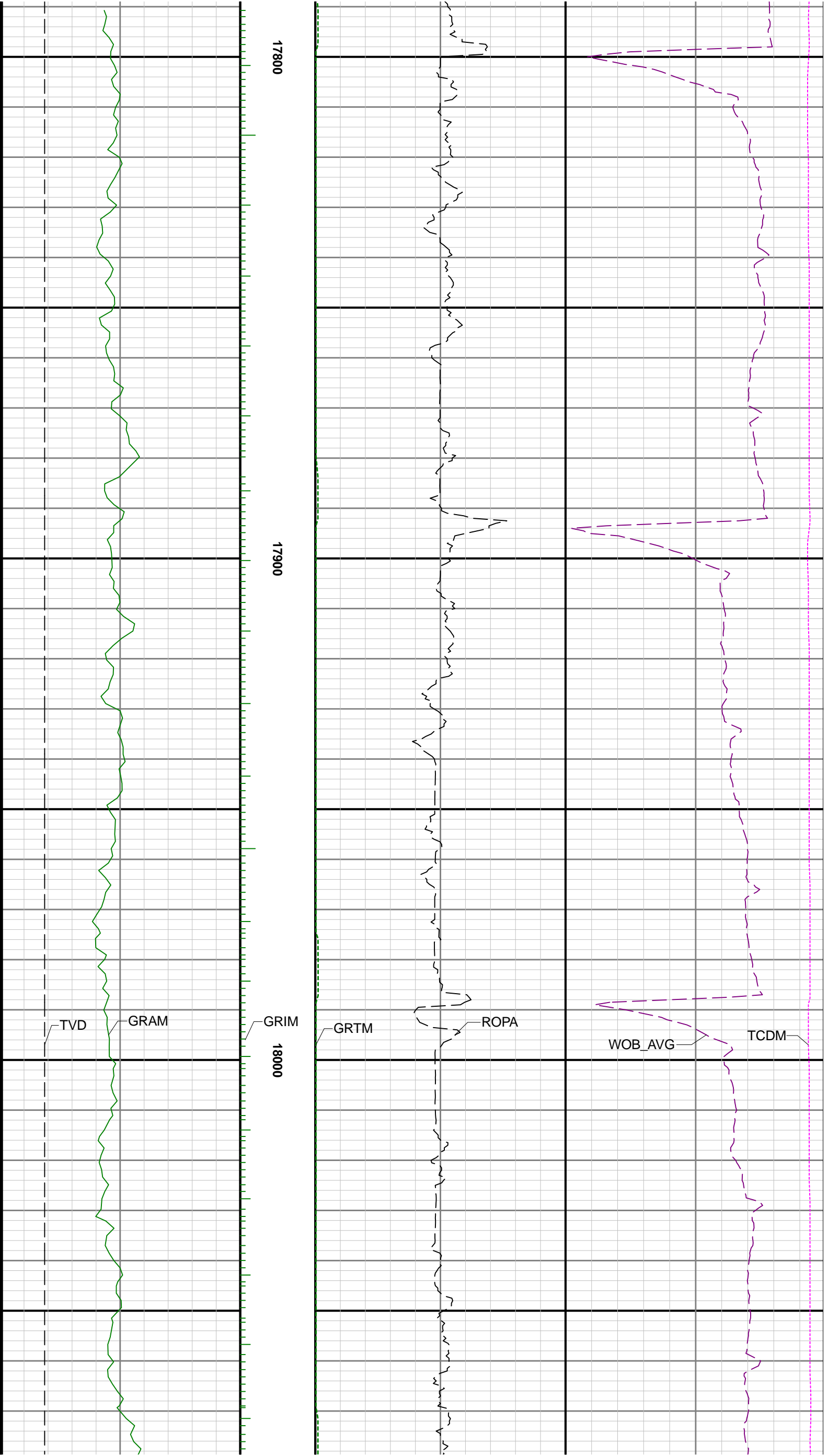


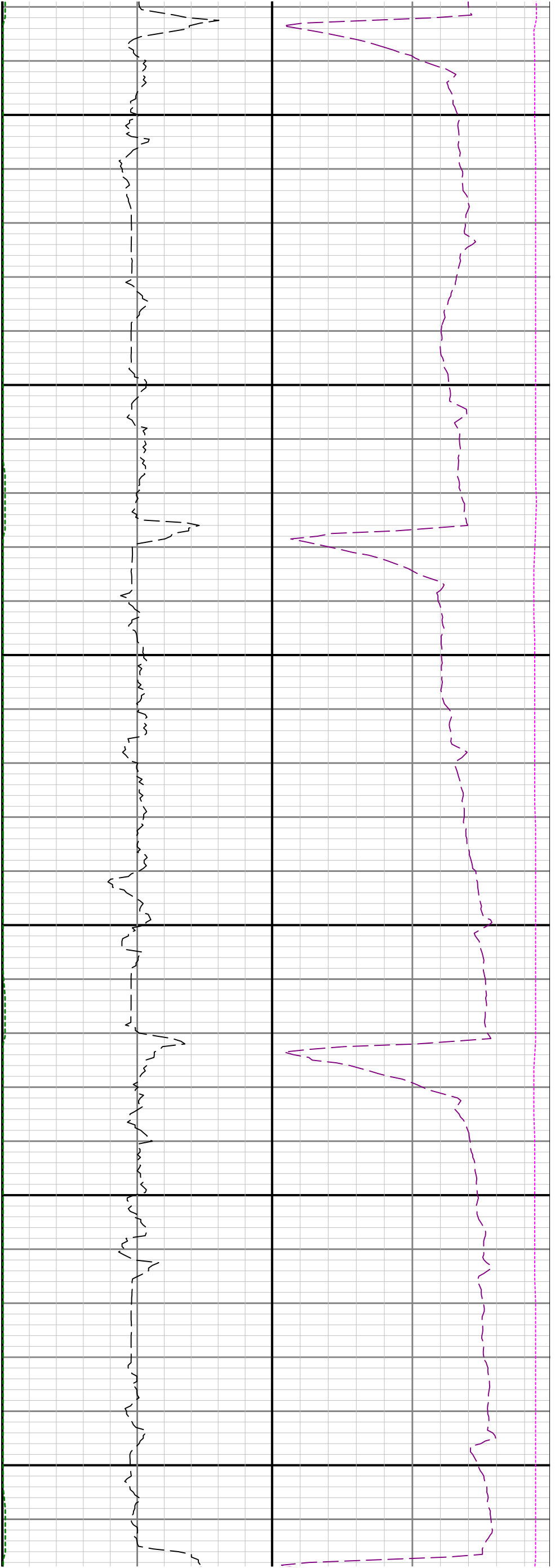












18100

18200

18300

