



LWD Composite Log

Natural Formation Evaluation
Gamma Ray

Scale:

1:240 MD

Company: Noble Energy

Well: Wells Ranch AA22-612

Depth Reference:

Field: Weld County (Noble NAD 83 Grid)

Driller's Depth

County: Weld County State: Colorado

Status:

Final Print

Surface Location:

Latitude:

Longitude:

Directional
Rotary Steerable
VSS

Other Services:

API No: 05-123-42264-00

Job ID: 7874166

SEC: 22

TWN: 6N

RGE: 63W

Permanent Datum (P.D.): Ground Level

Elevation: 4745.00 ft

KB: N/A
DF: 4775.00 ft
GL: 4745.00 ft

Log Measured From: Rig Floor

Above P.D.

30.00 ft

Dates

Interval Logged

Magnetic Field Reference

Date From: 2016-04-14

Top: (ft)

1905.00

Azi Reference North: Grid

Dip Angle: (deg)

67.18

Date To: 2016-04-17

Bottom: (ft)

11828.00

Total Magnetic Field Strength: (nT)

52447

Spud Date: 2016-04-13

Mag to Reference North Correction: (deg)

7.26 E

Borehole Record

Casing Record

Hole Size (in)

From (ft)

To (ft)

11828.00

Size (in)

Weight (lb/ft)

From (ft)

To (ft)

8.500

1917.00

11828.00

9.625

36.00

0.00

1907.00

Mud Record

Deviation Record

Type

From (ft)

To (ft)

11828.00

Hole Size (in)

Interval (ft)

Inc | Az (Start)

Inc | Az (End)

Oil Based Mud

1917.00

11828.00

8.500

9911.00

0.30 | 295.27

89.85 | 90.92

Acquisition System

Software Version

Other

Baker Hughes Cadence

G3.2

Rig: H&P 321

Prior Studio

3.2.7268.7

Contractor: Helmerich & Payne Drilling Co

District:

RMD

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 (h)
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	2	8.500	PDC	2.00	AutoTrak Curve	1905.00	11828.00	1917.00	11828.00	2016-04-14 14:22	2016-04-17 01:18	51.26

Crew

Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite
Alex Osborne		2016-04-13	2016-04-17	Matthew Delmore		2016-04-13	2016-04-17	Mike Gurnsey		2016-04-13	2016-04-17
Will Drake		2016-04-13	2016-04-17								

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+ (%)
2016-04-14 13:30	1	1917.00	Oil Based Mud	9.8	14	N/A	16.4	62.0/24.5	Active Pit	46000	0.00
2016-04-15 02:30	1	5296.00	Oil Based Mud	9.8	16	N/A	16.0	60.5/26.0	Active Pit	42000	0.00
2016-04-15 13:30	1	6902.00	Oil Based Mud	9.8	14	N/A	15.8	62.0/24.0	Active Pit	46000	0.00
2016-04-16 02:30	1	9179.00	Oil Based Mud	9.8	13	N/A	15.6	63.5/23.0	Active Pit	43000	0.00
2016-04-16 13:30	1	10397.45	Oil Based Mud	9.9	13	N/A	15.2	66.0/20.0	Active Pit	50000	0.00
2016-04-17 02:45	1	11828.00	Oil Based Mud	9.9	13	N/A	15.2	65.0/21.0	Active Pit	48000	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	11813726	Near Bit Inclination	5.93	6.55	7.000	4.330
1	ATC_SU	11813726	Near Bit VSS	5.93	6.55	7.000	4.330
1	ATC_MWD	12049472	Gamma (single)	2.19	12.17	7.000	3.250
1	ATC_MWD	12049472	Directional (mag)	12.26	22.24	7.000	3.250

Comments

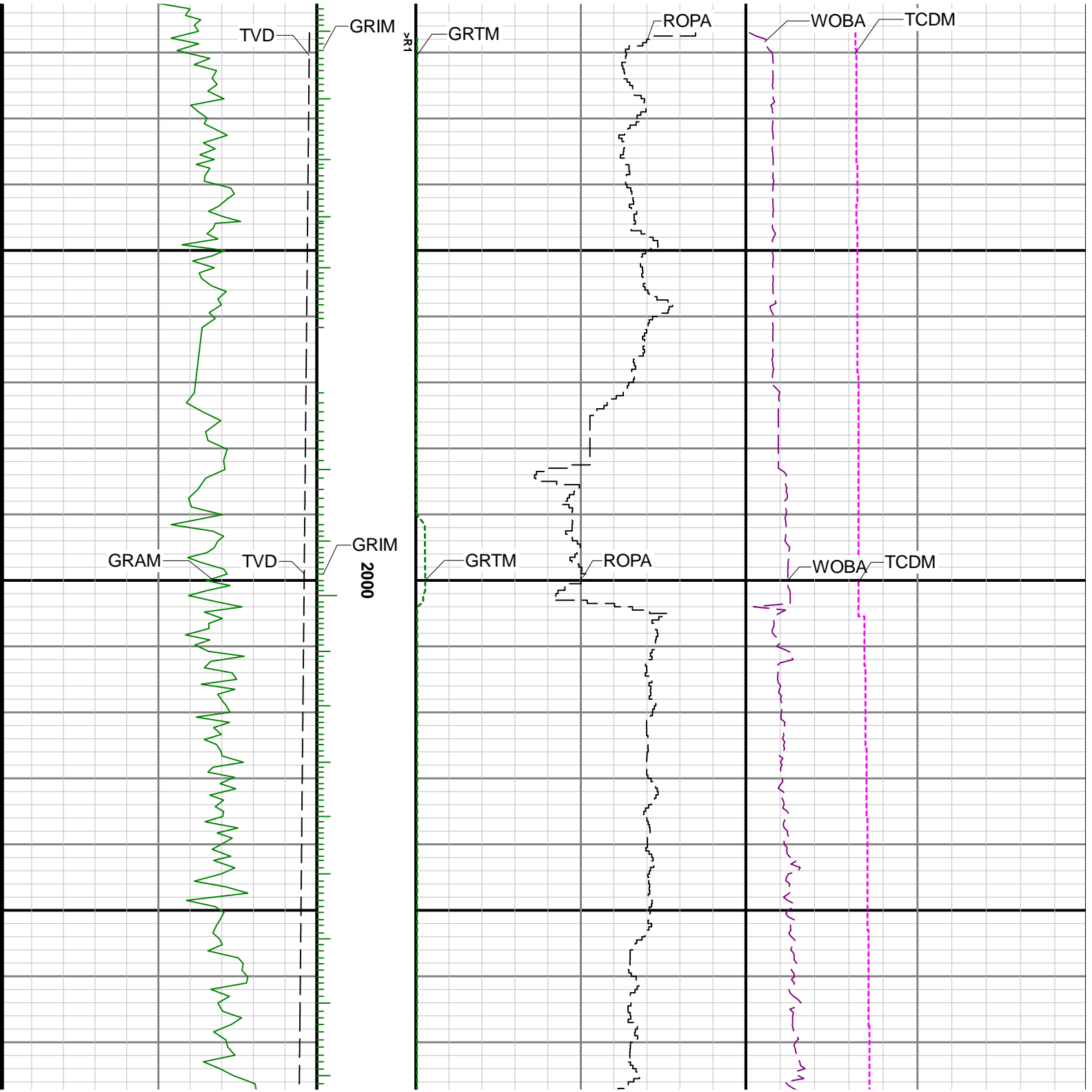
- 1 Baker Hughes Run 1 utilized a 6.50 inch AutoTrak Curve Rotary Steerable assembly tool behind a 8.50 inch bit from 1917 ft MD to 11828 ft MD (1916.98 ft TVD to 6681.60 ft TVD).
- 2 Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to a lack of control by Baker Hughes logging engineers,

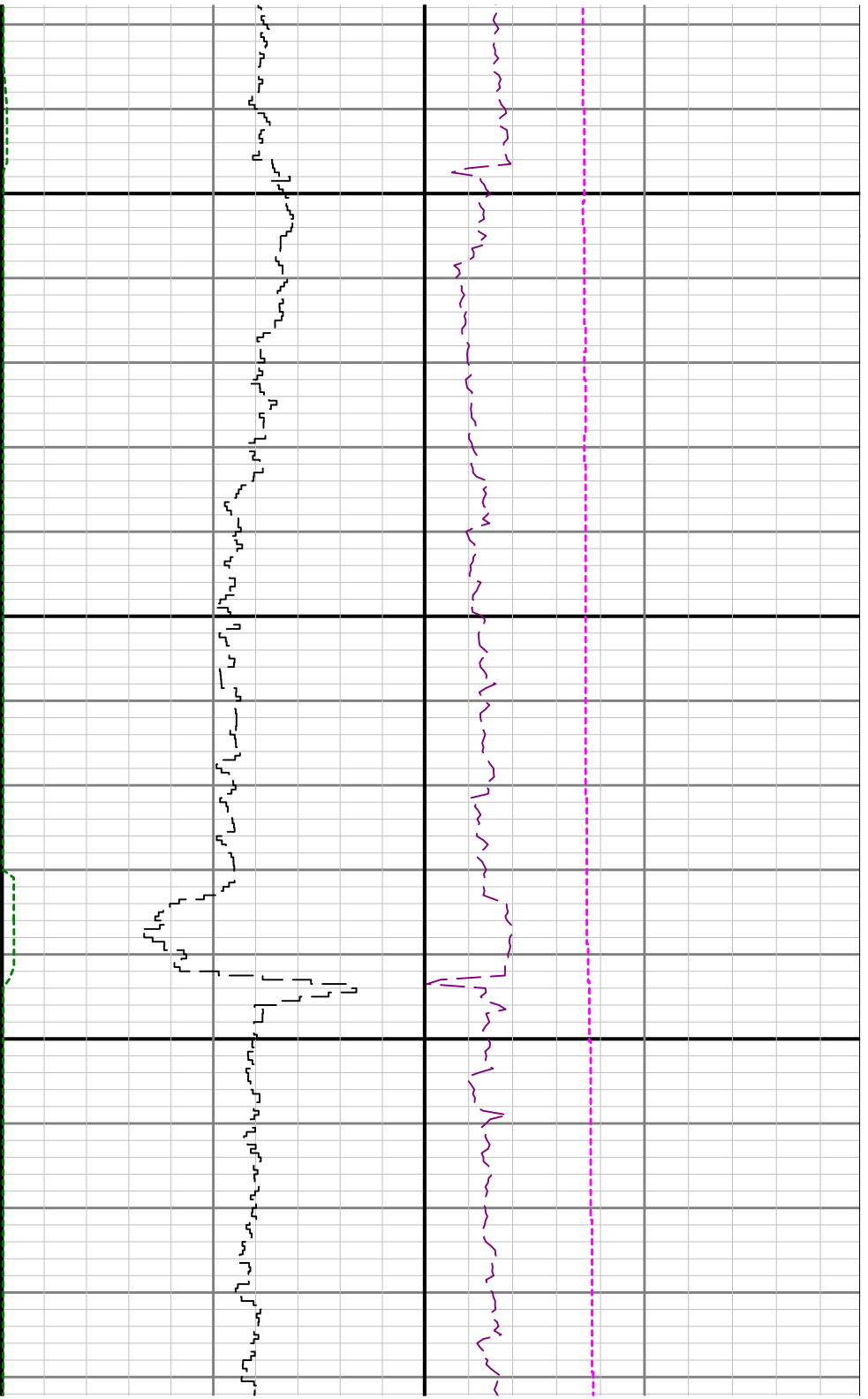
3 The gaps found in the gamma data are due to memory data not being recorded in these intervals.

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1910.00	8.500	1	The interval from 1905 ft MD to 1917 ft MD (1904.98 ft TVD to 1916.98 ft TVD) has no surface date due to the Gamma Ray sensor to bit offset
2	11820.00	8.500	1	The interval from 11816 ft MD to 11828 ft MD (6681.58 to 6681.60 ft TVD) has no Gamma data due to sensor to bit offset

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

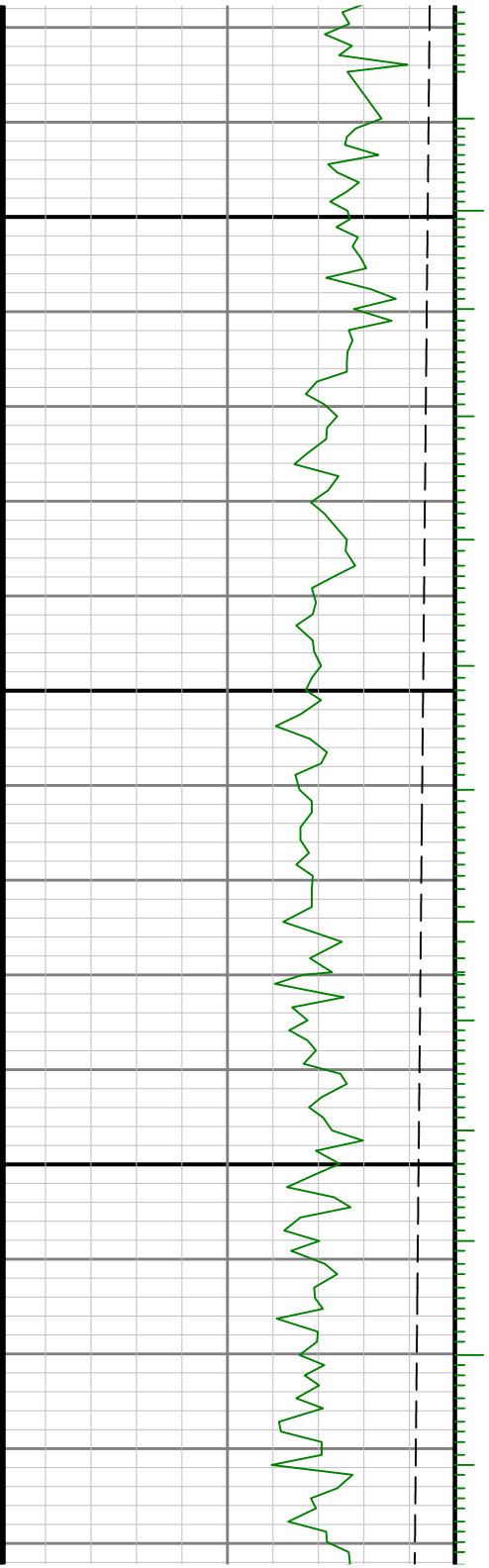
		Company	Noble Energy
		Well	Wells Ranch AA22-612
		Date From:	2016-04-14 14:22
		Date To:	2016-04-17 01:18
		Created	2016-04-21 17:12
		Interval	
		Top:	1905.00
		Bottom:	11828.00
Gamma Ray - Apparent 0.5 ft Average GRAM 0 _____ 150	MD 1 : 240 feet	Rate of Penetration 3 ft Average ROPA 1000 ----- 0	Surface Weight On Bit 1 ft Average WOBA 0 ----- 100
API True Vertical Depth TVD 6800 ----- 1800		ft/h Gamma Time Since Drilled GRTM 0 ----- 600	klb Downhole Temperature TCDM 0 ----- 300
ft		min	degF
	1900		
See Remark 1			

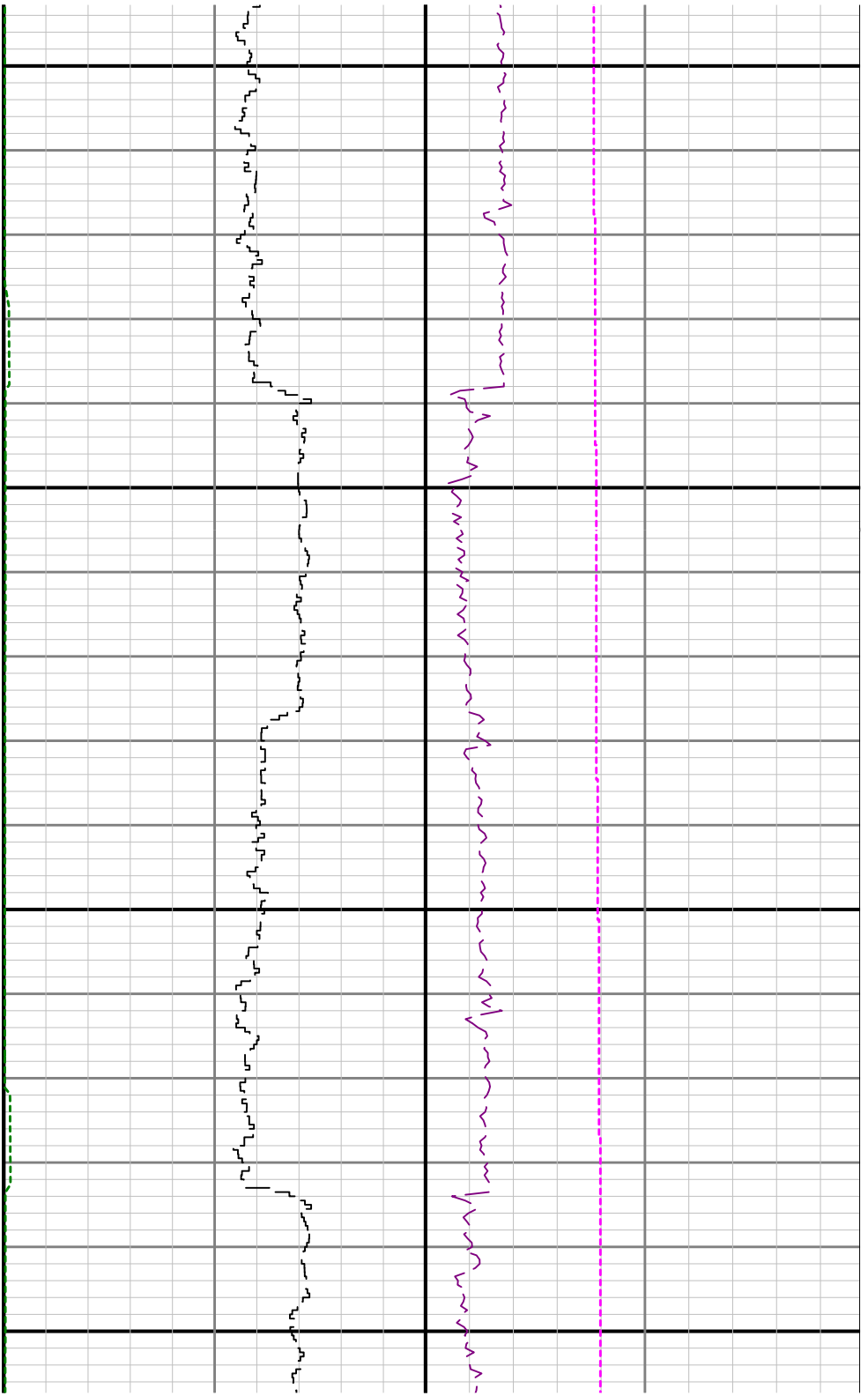




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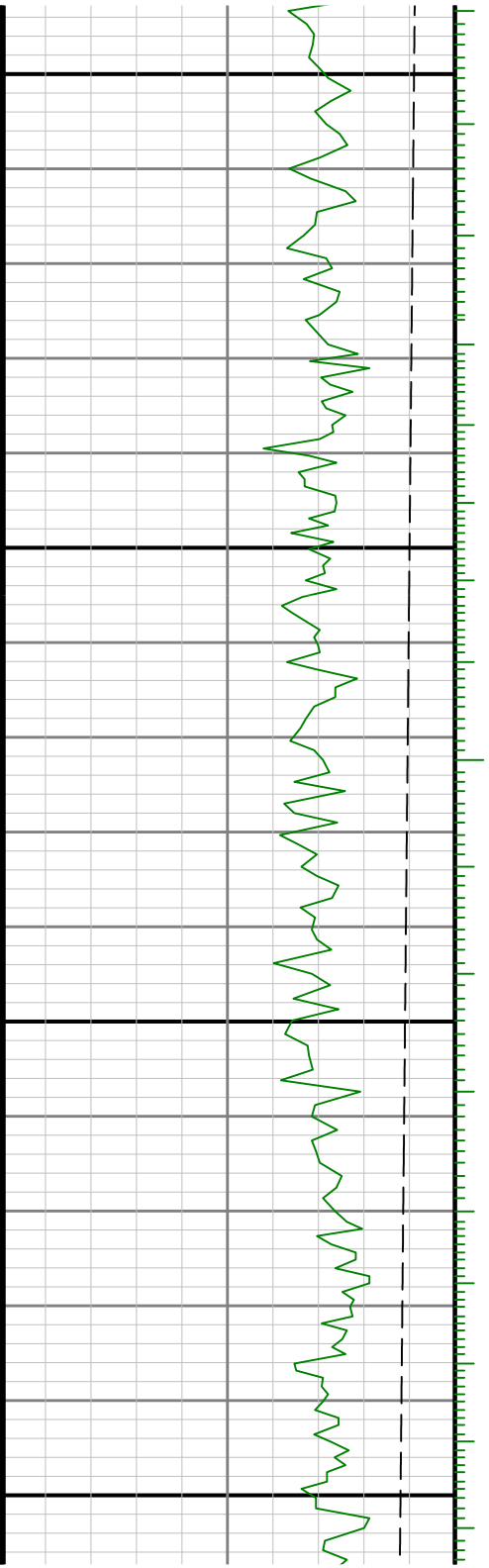
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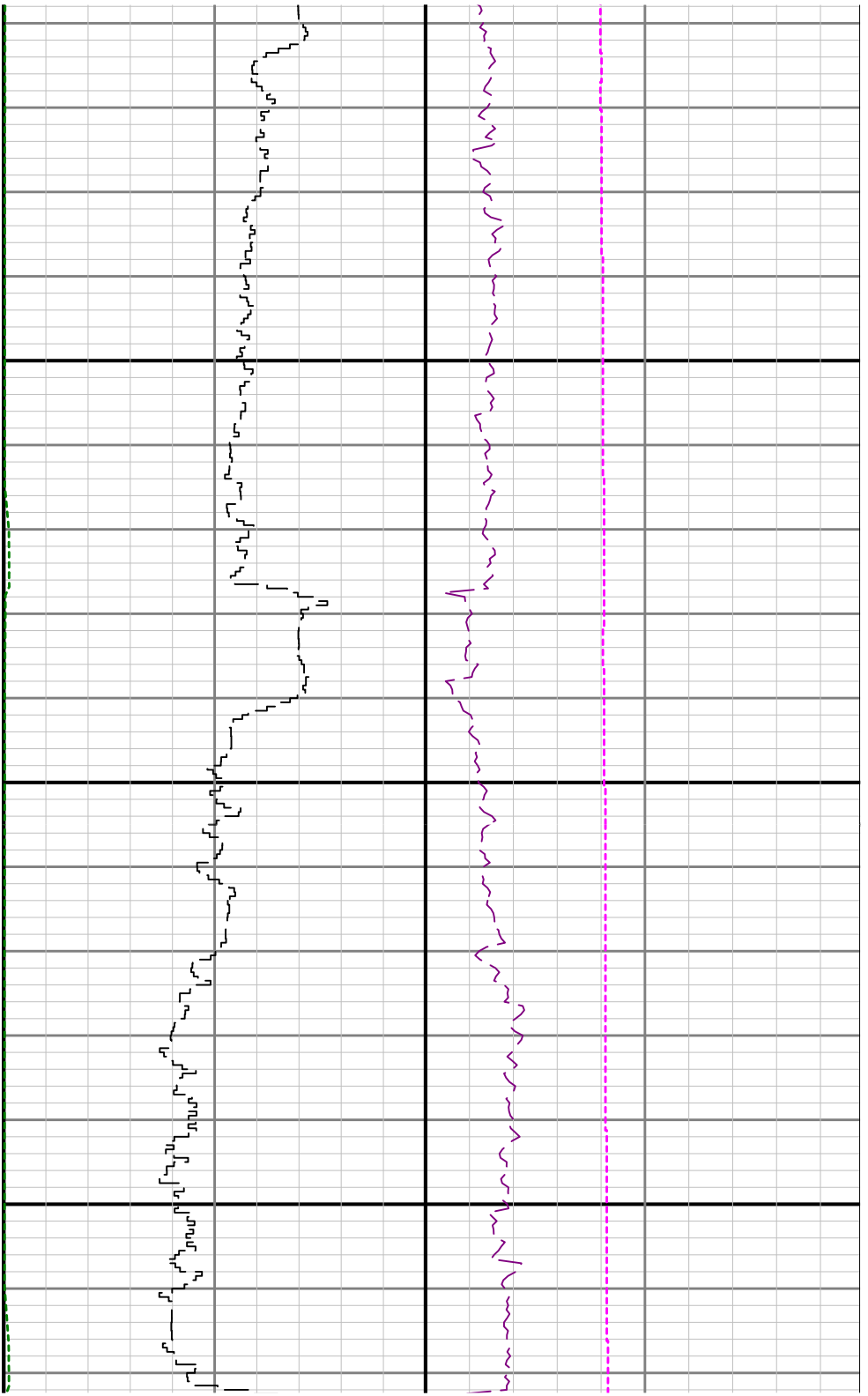




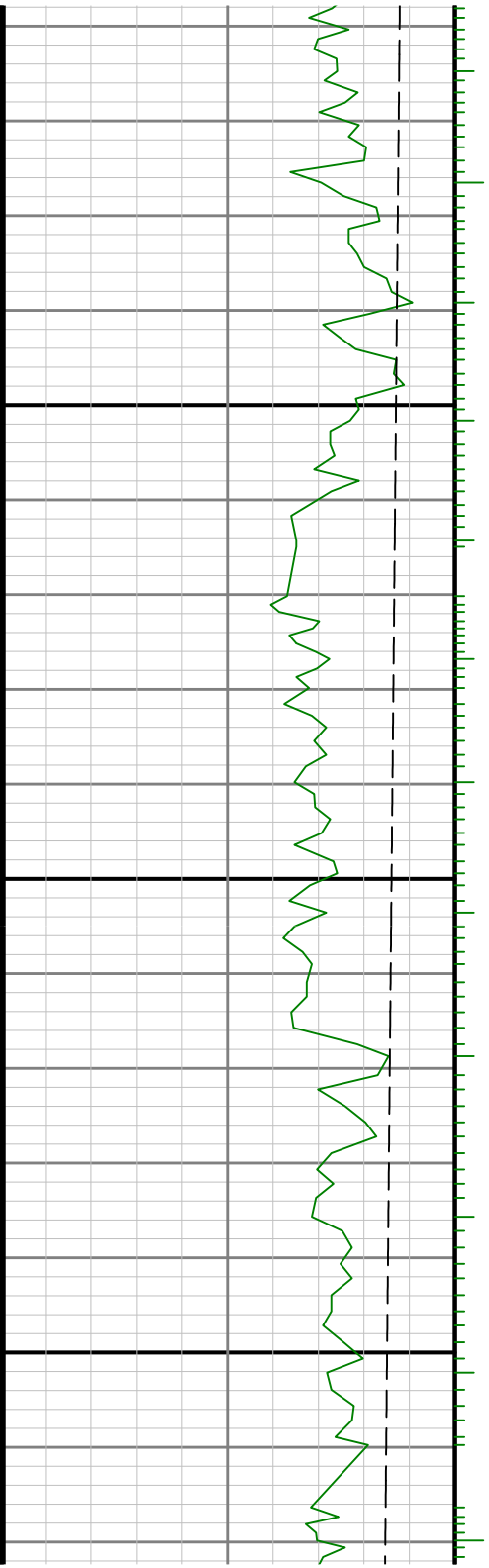
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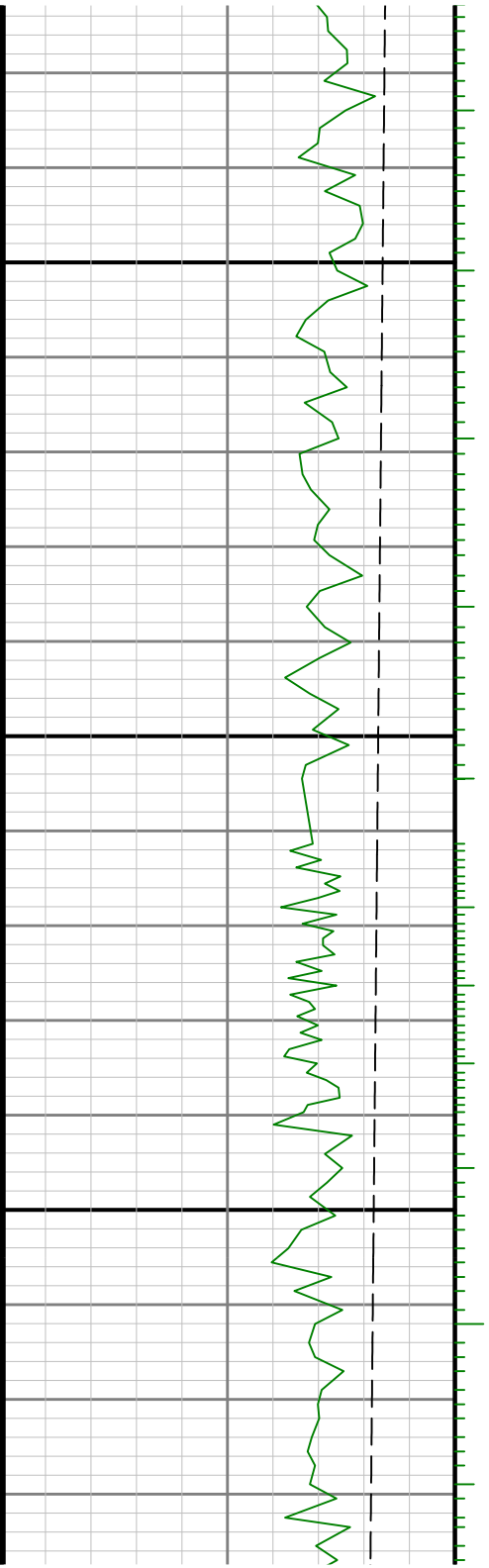
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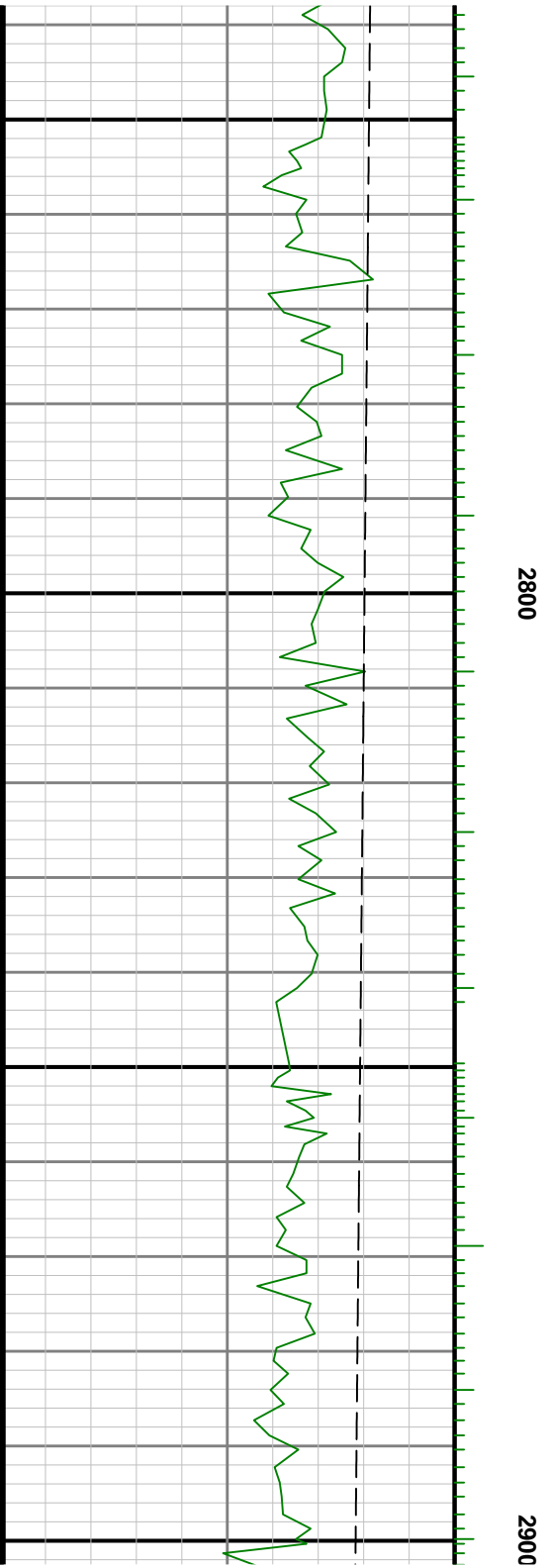
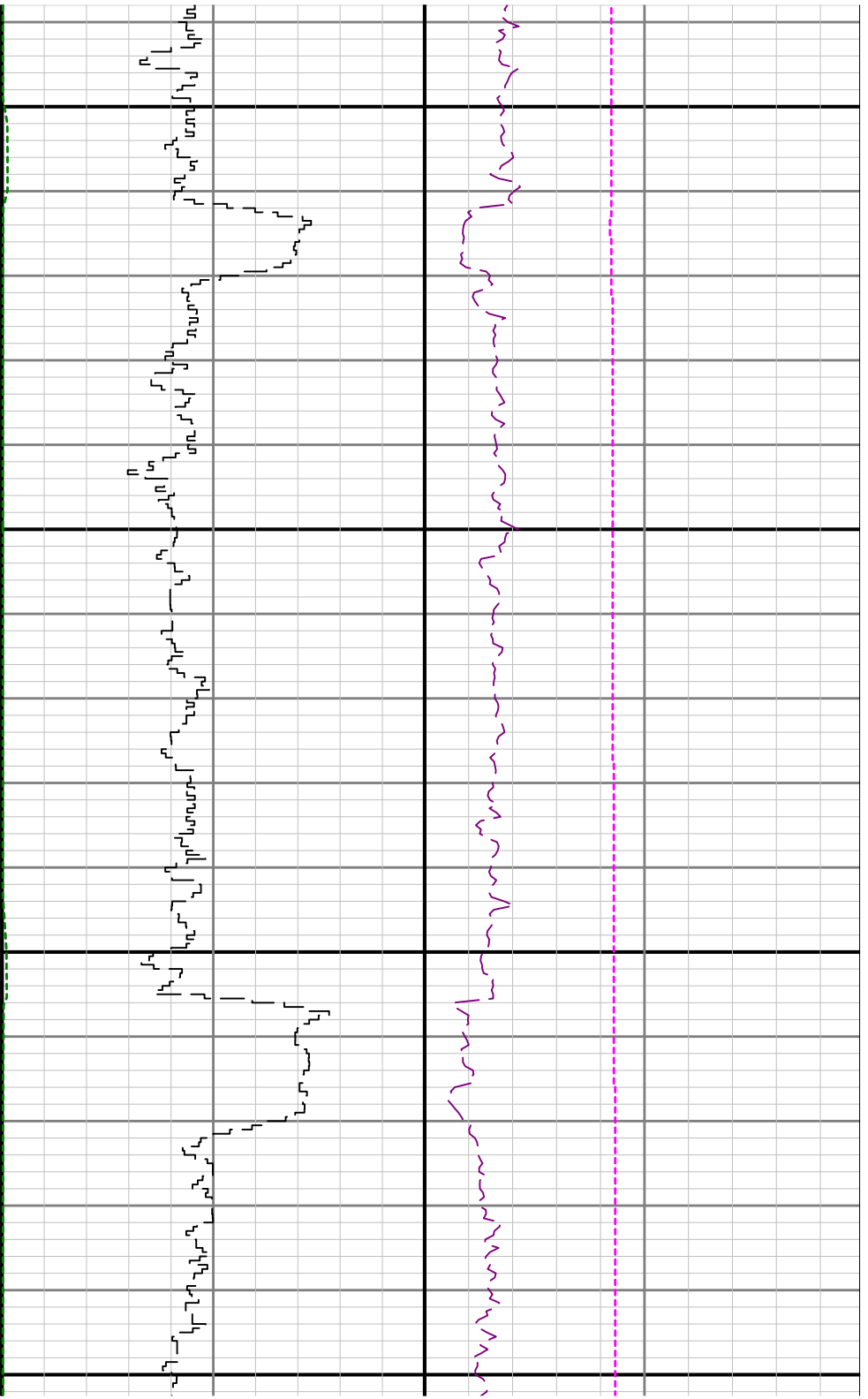


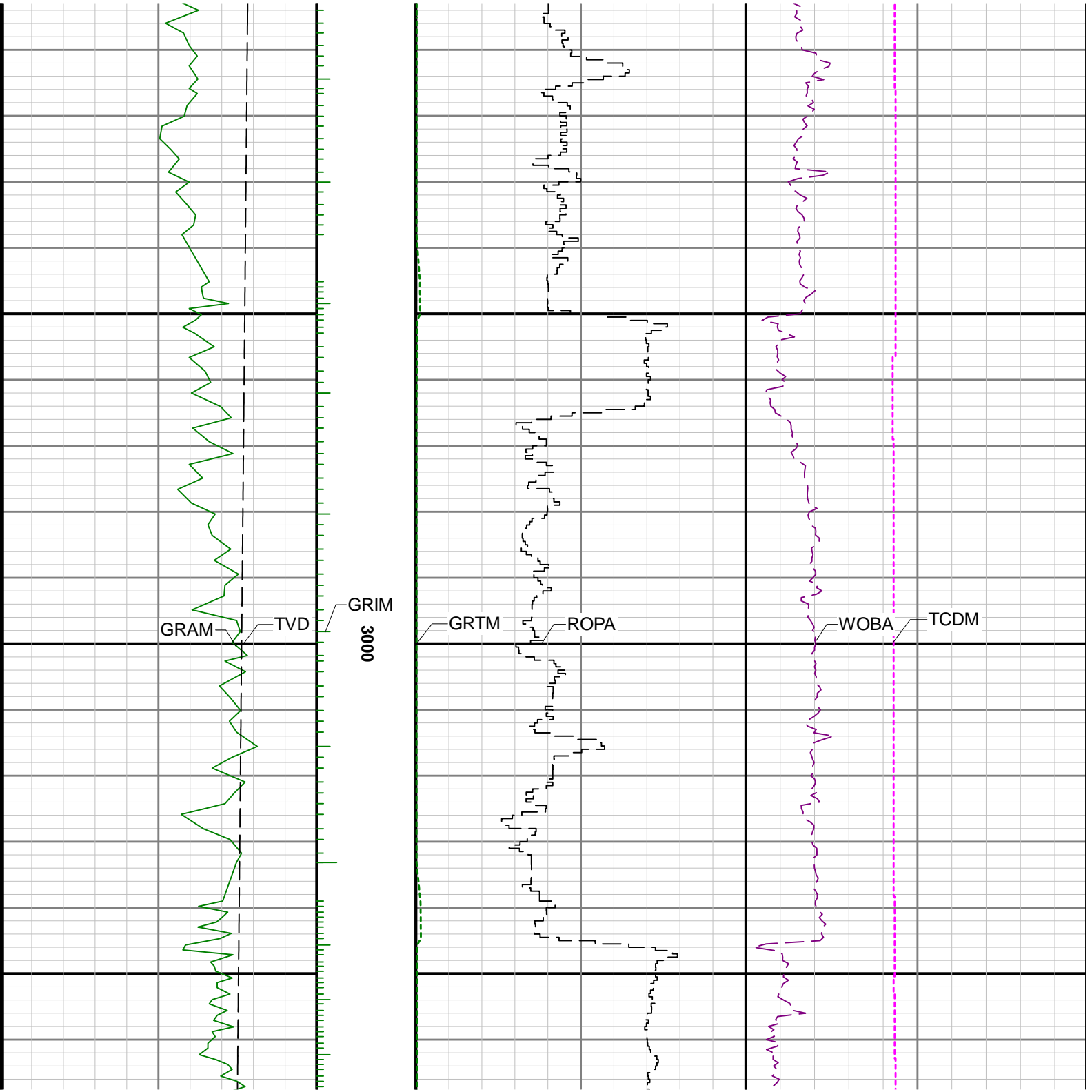


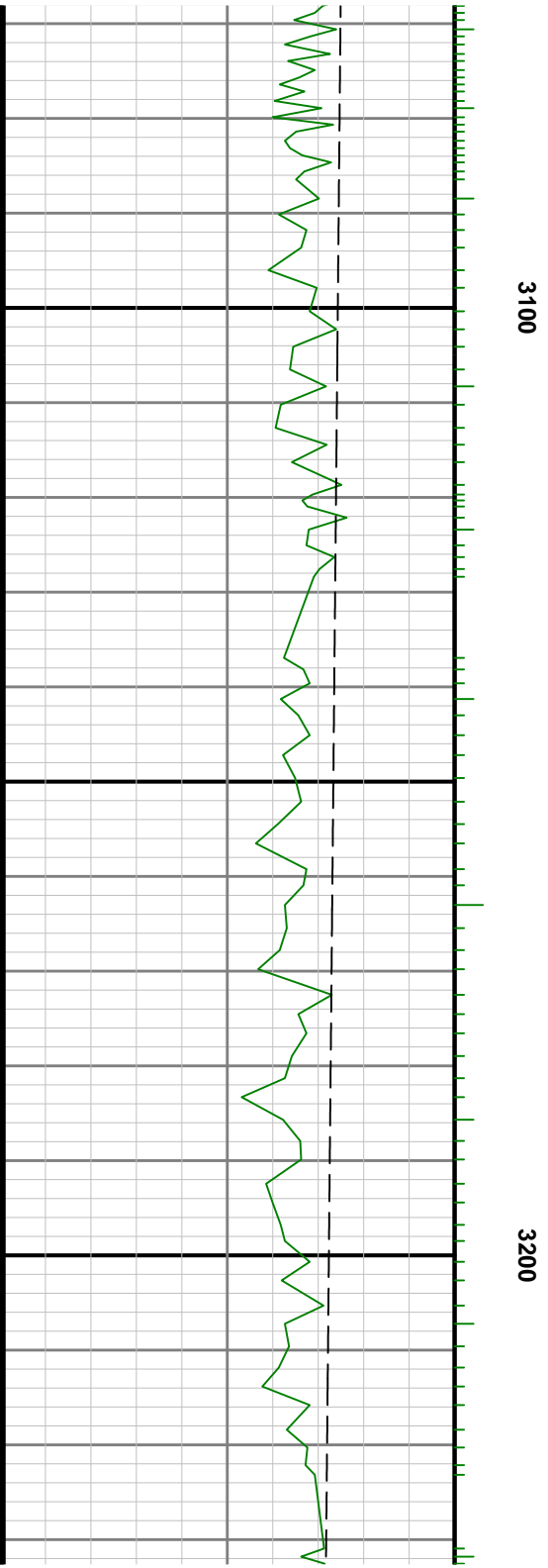
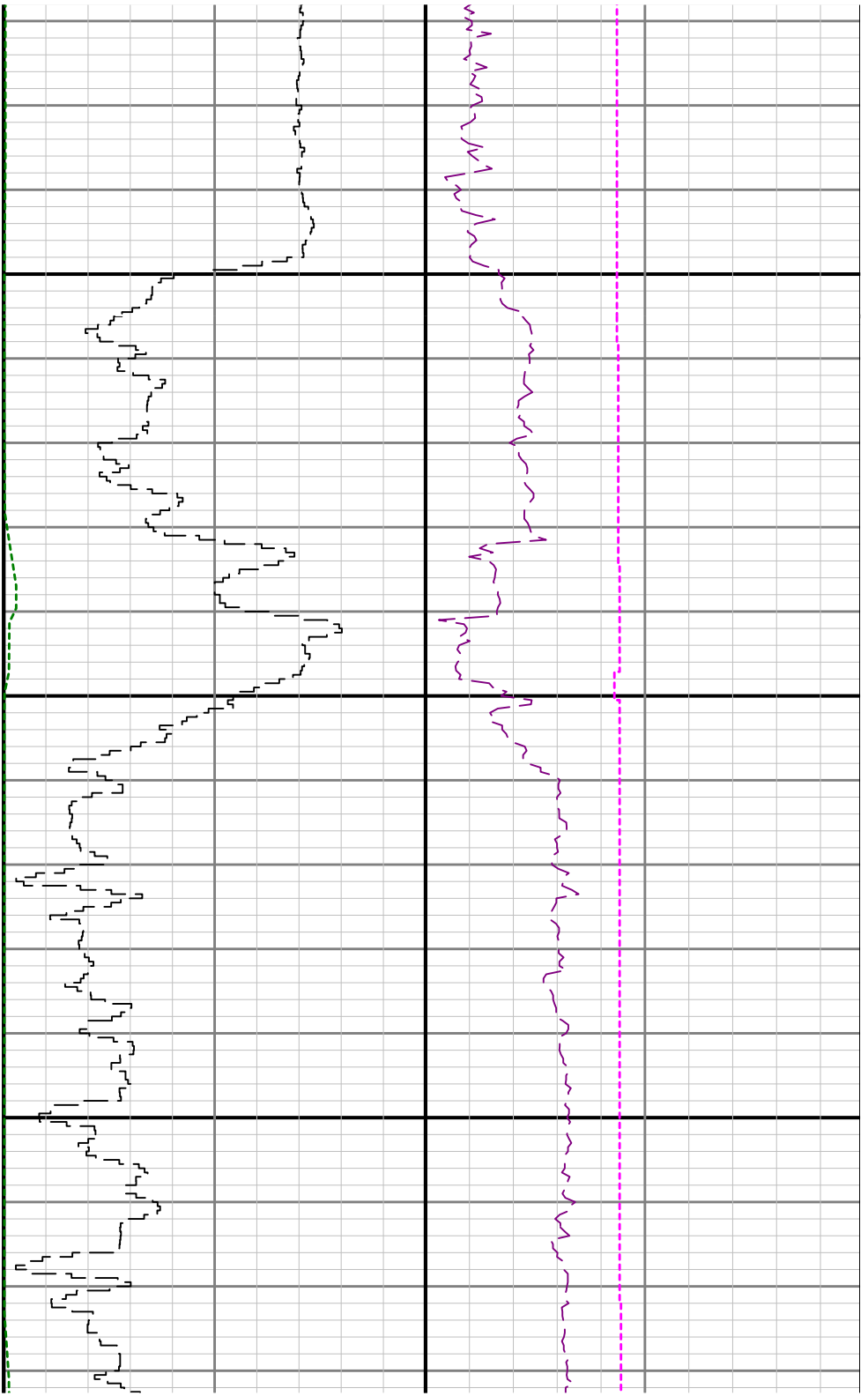
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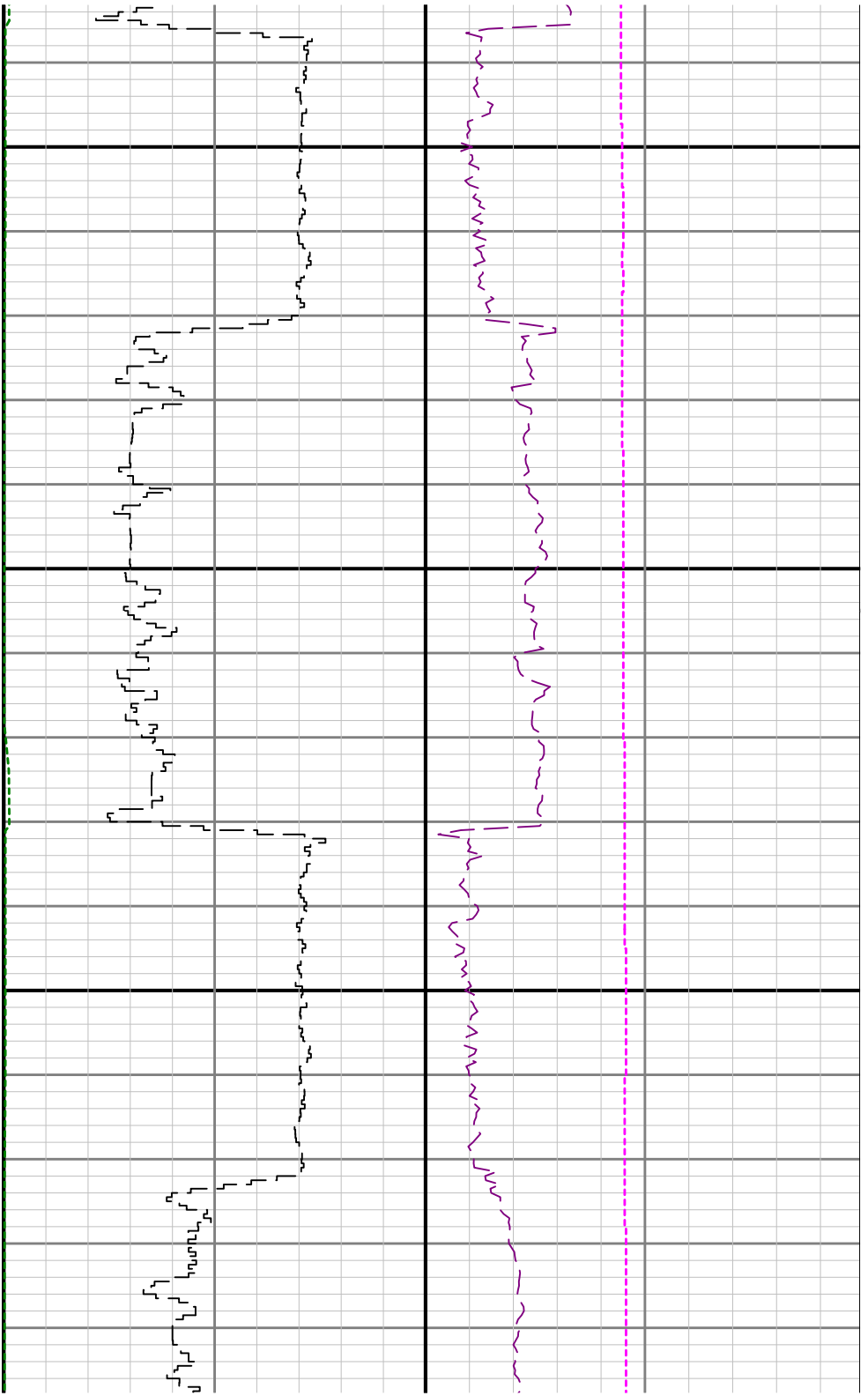
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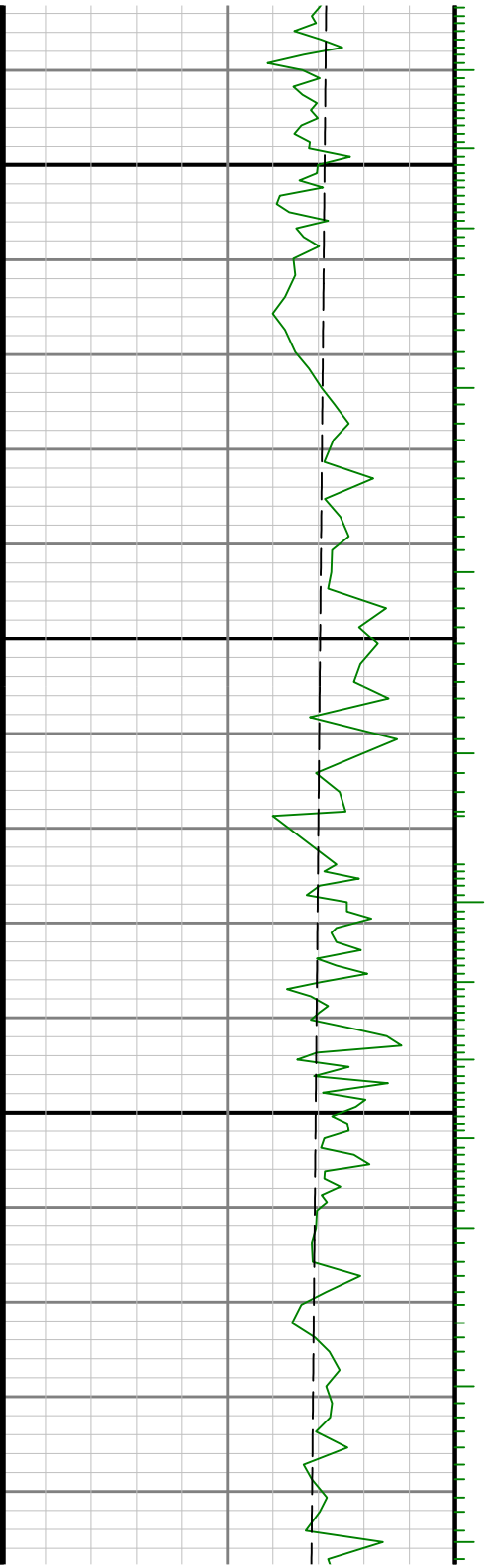


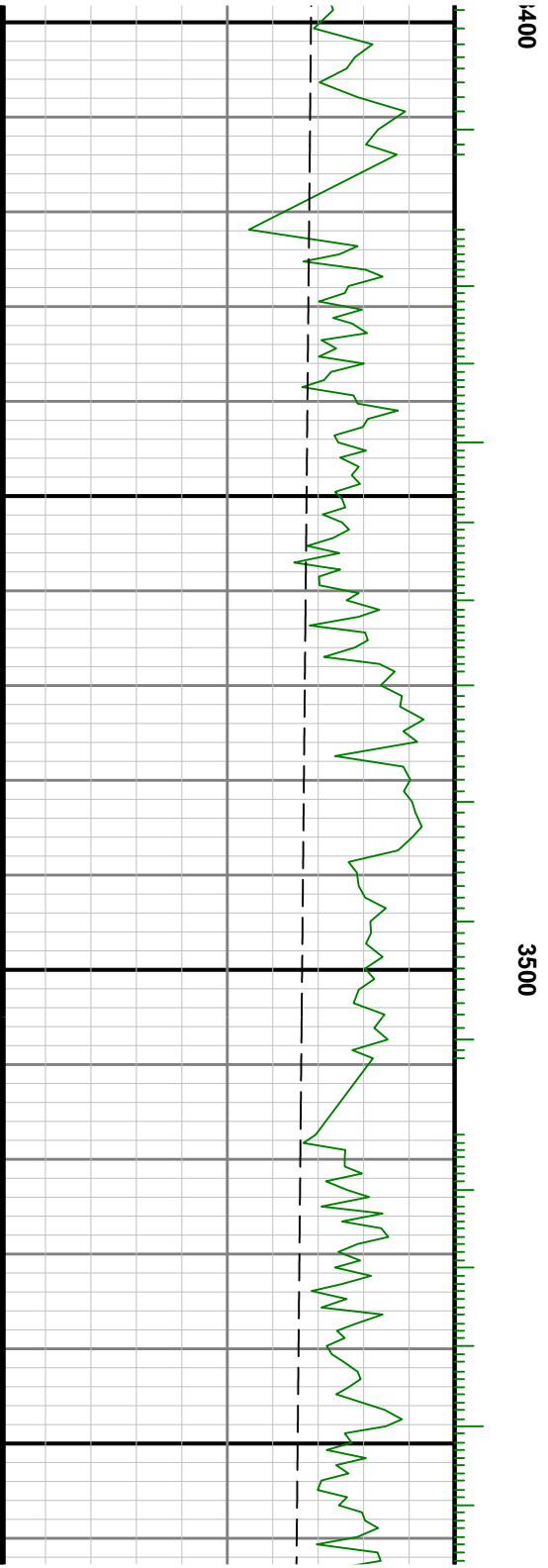
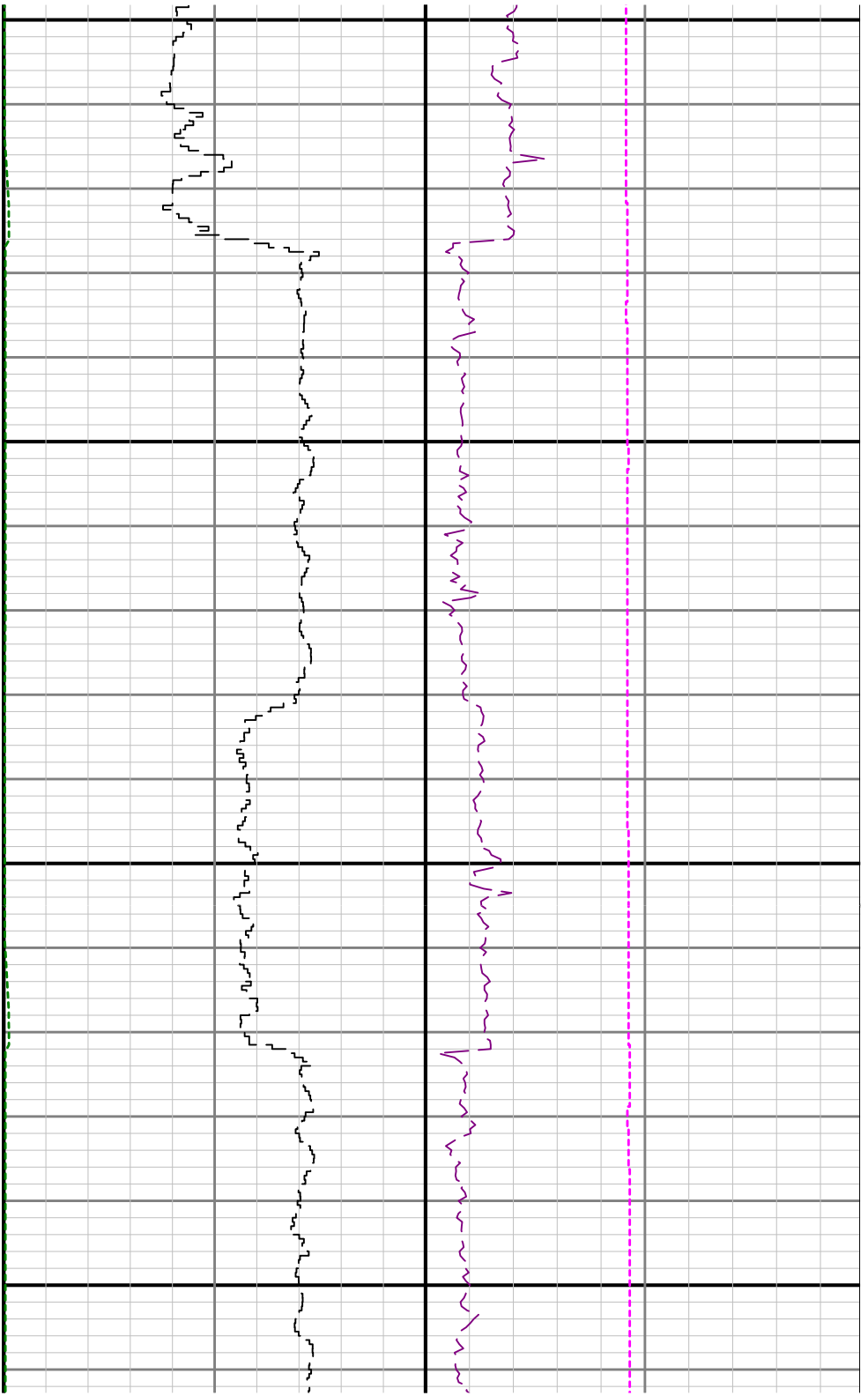


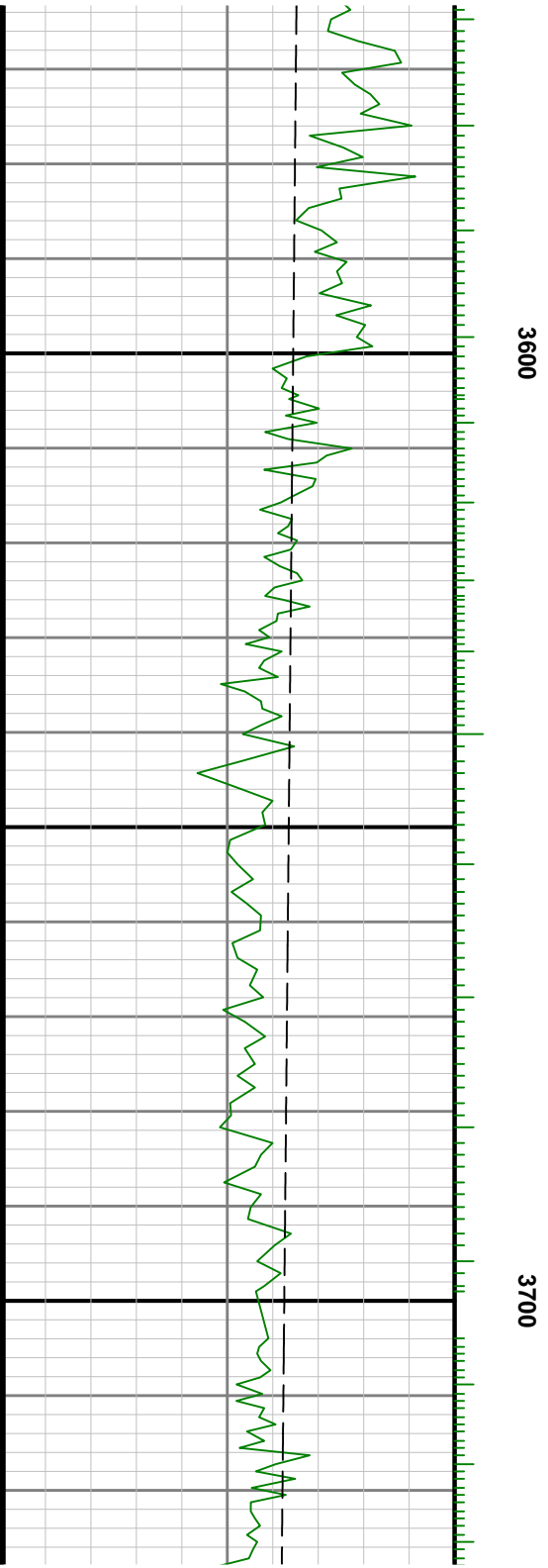
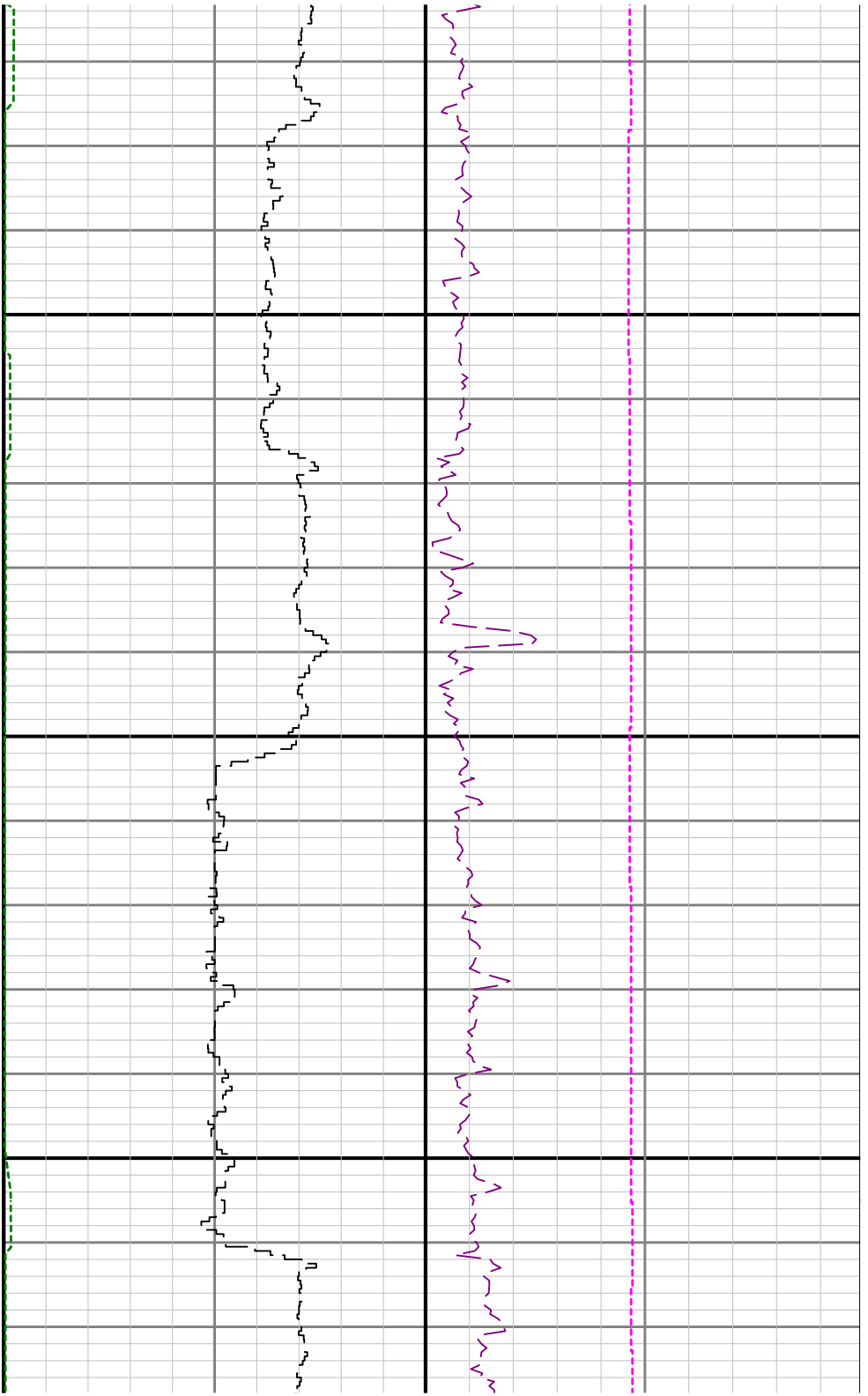


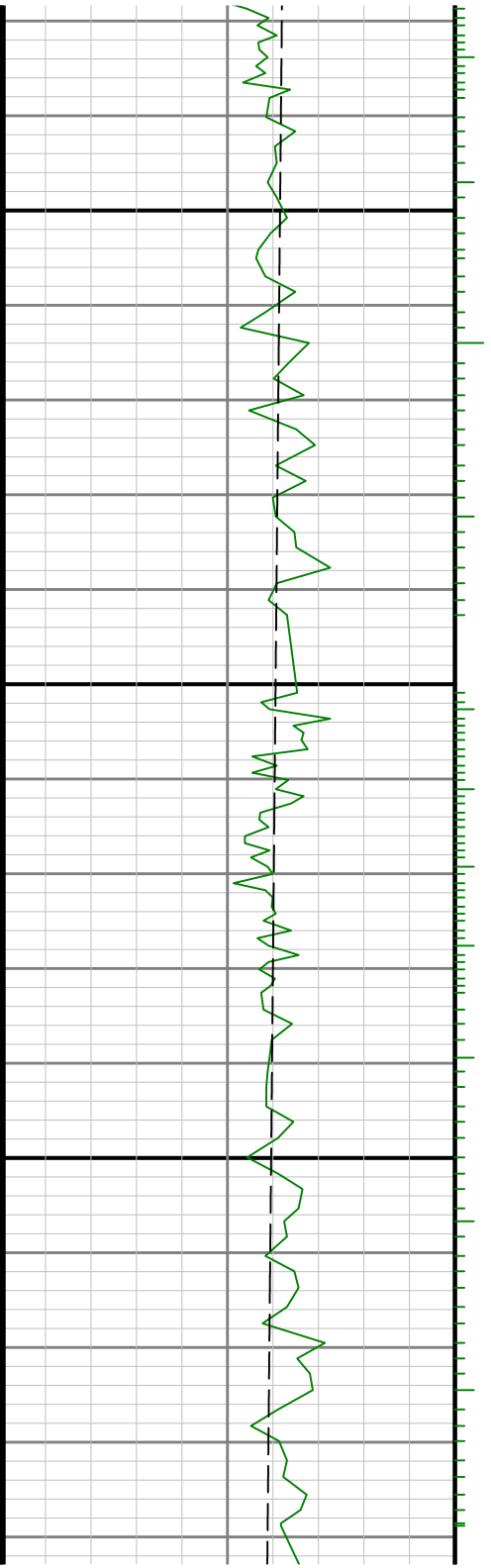
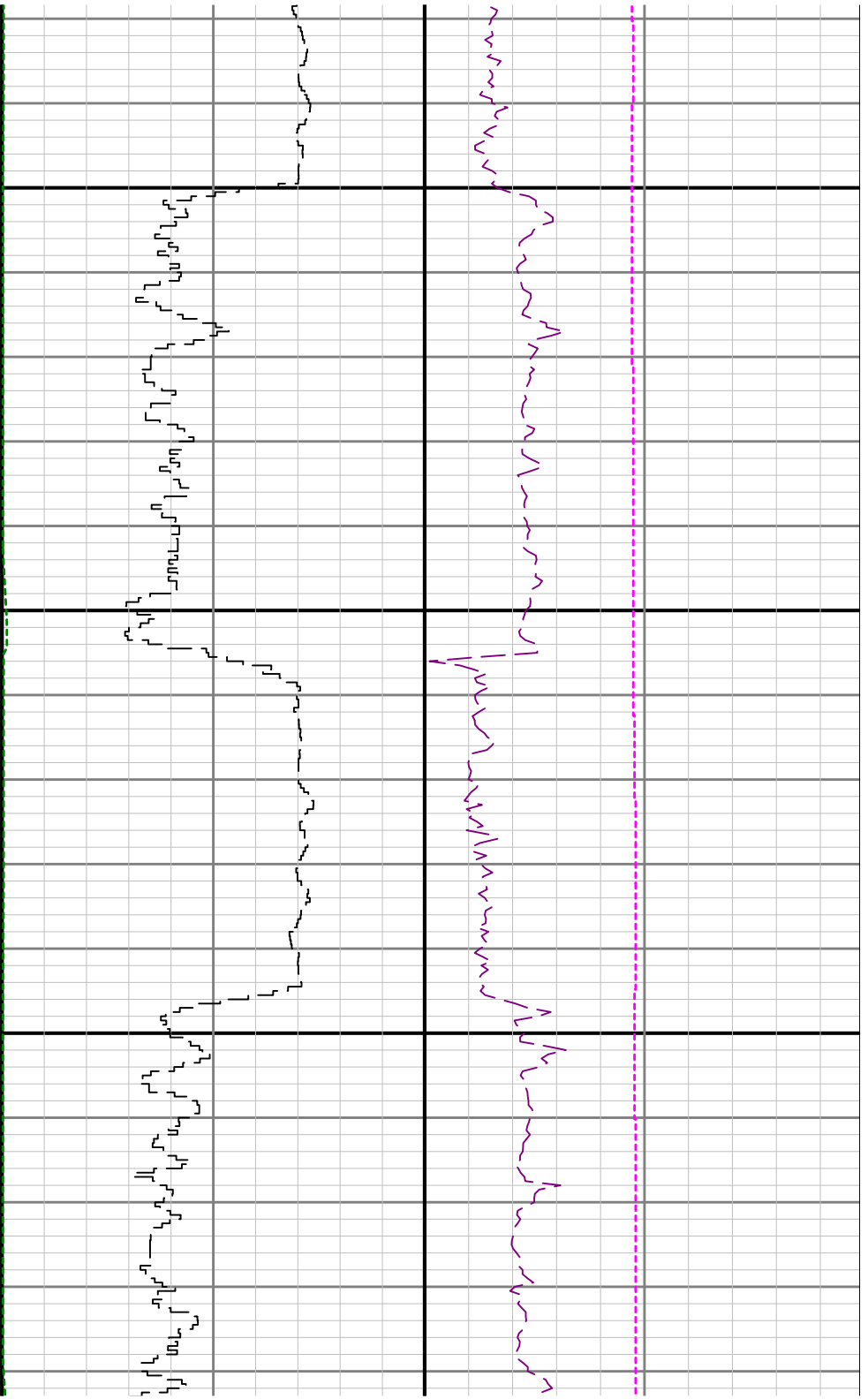


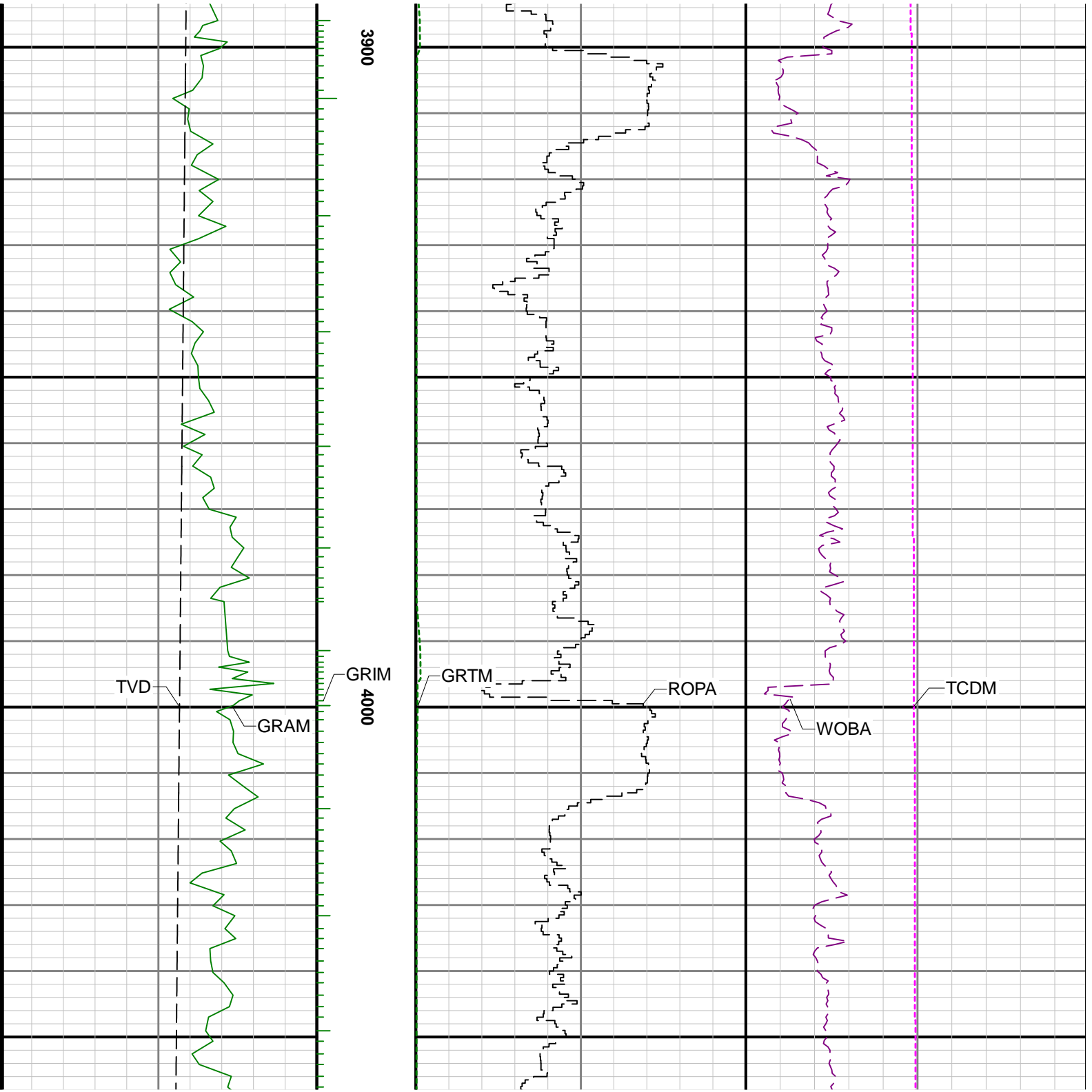
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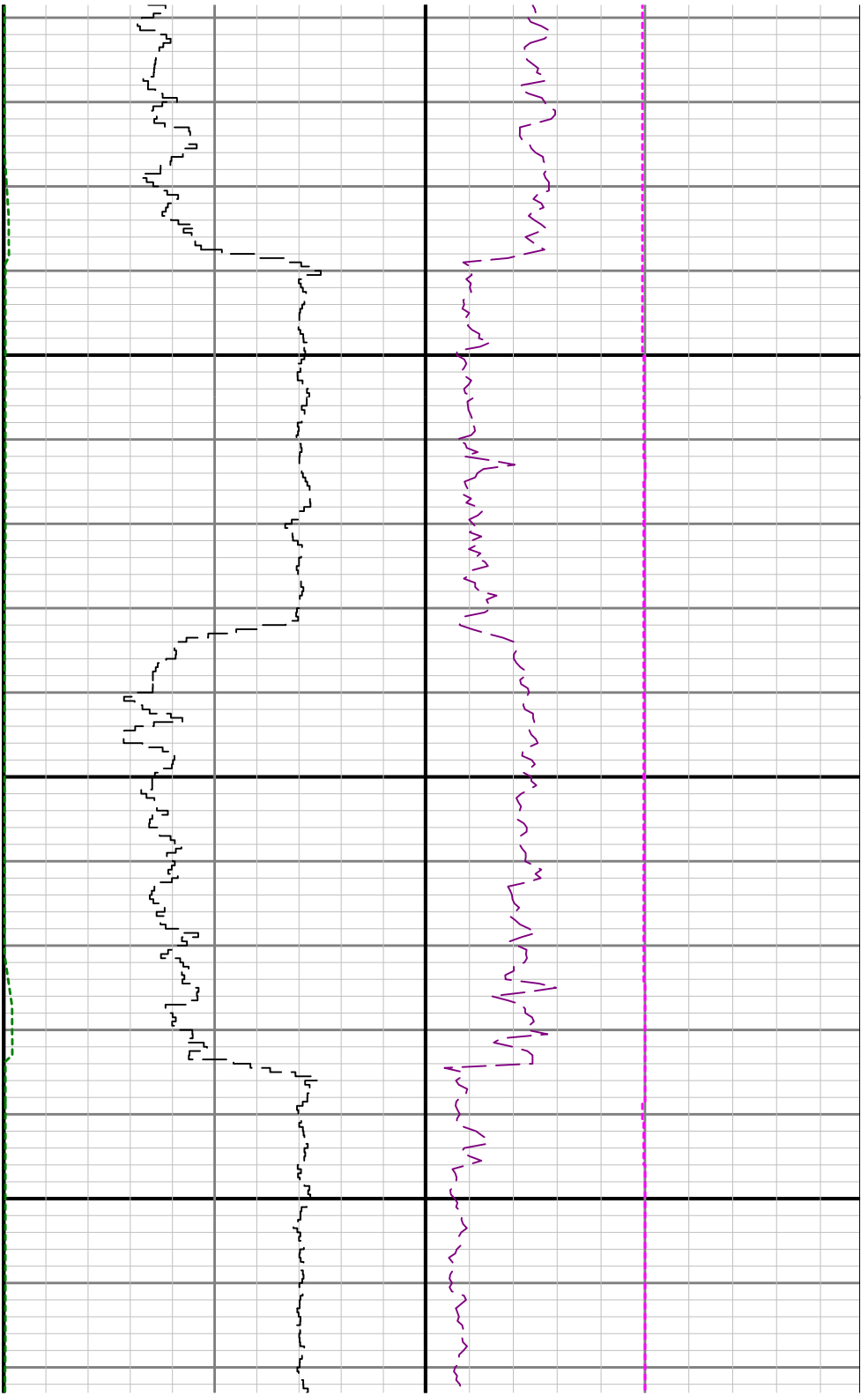






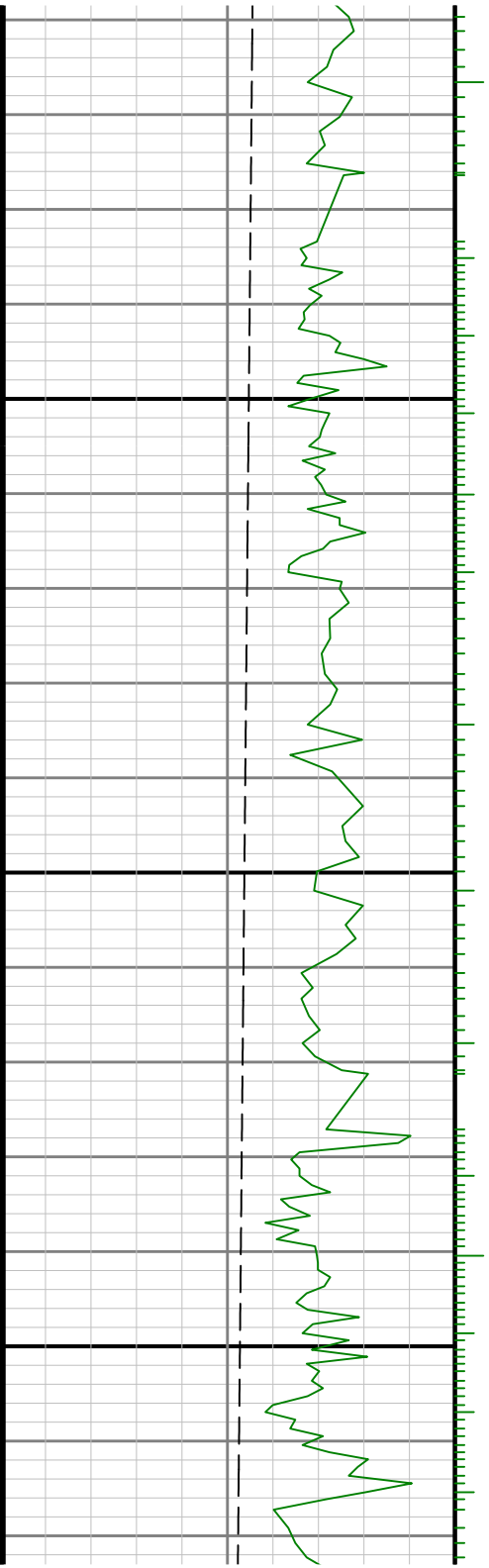


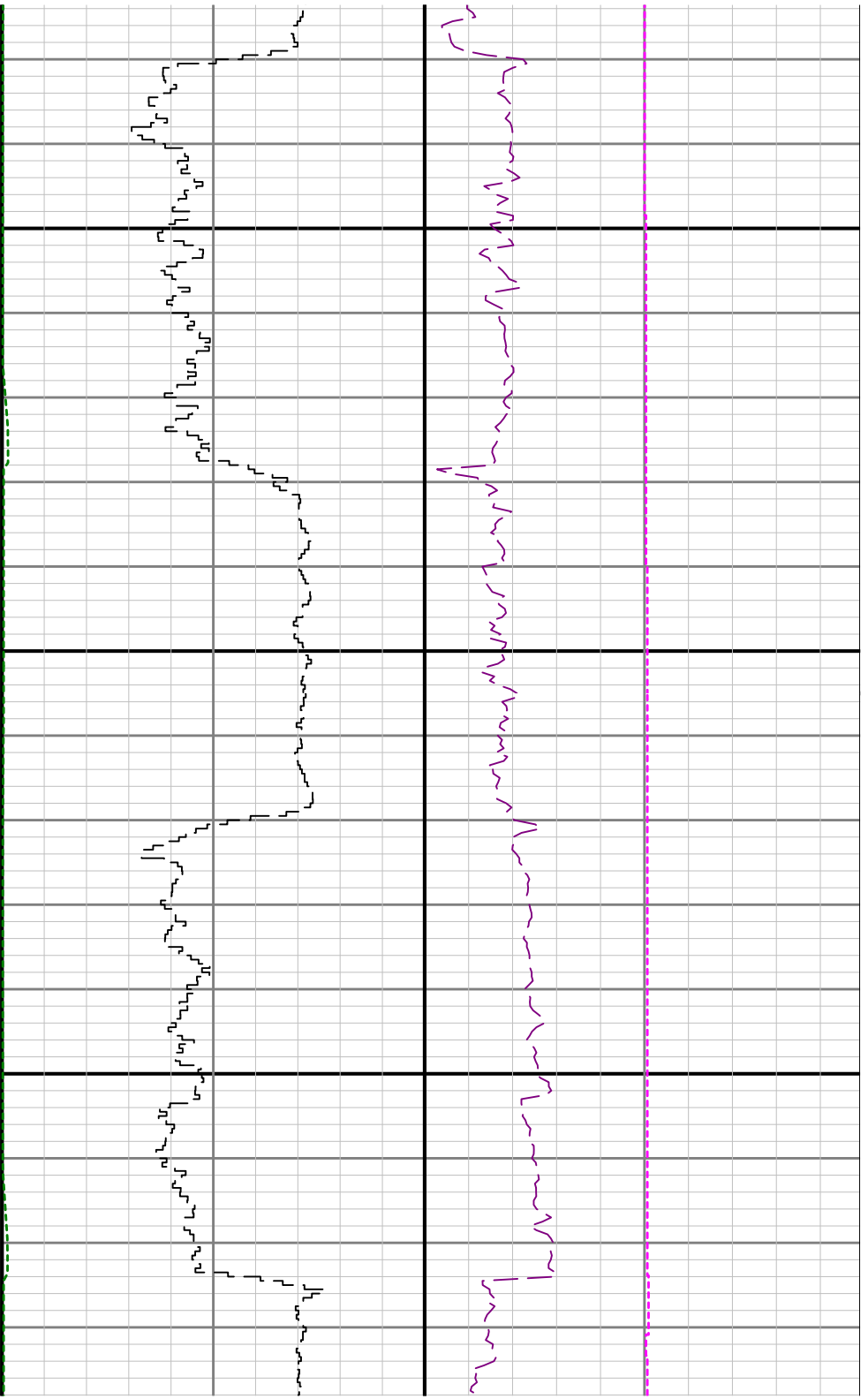




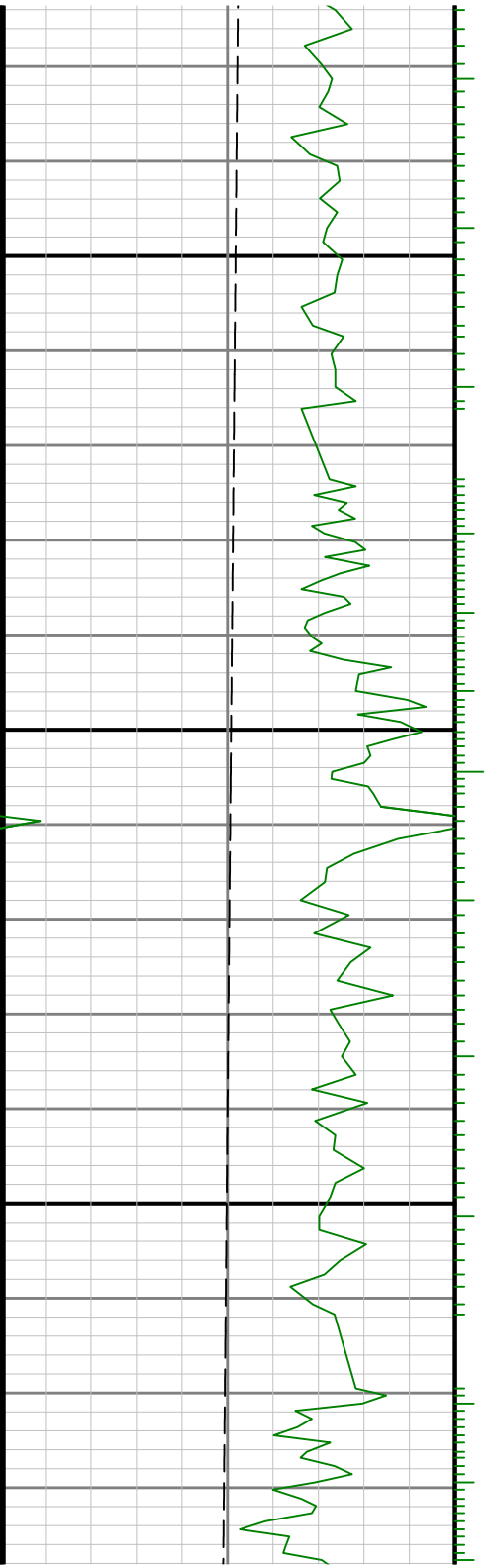
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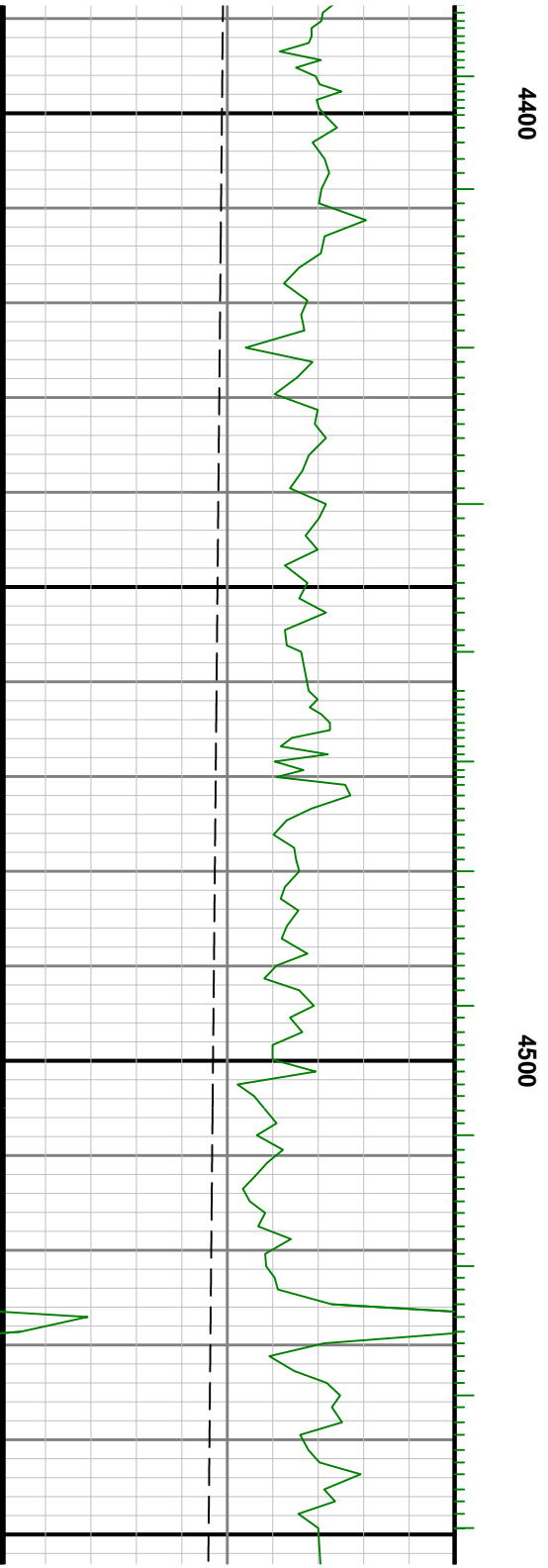
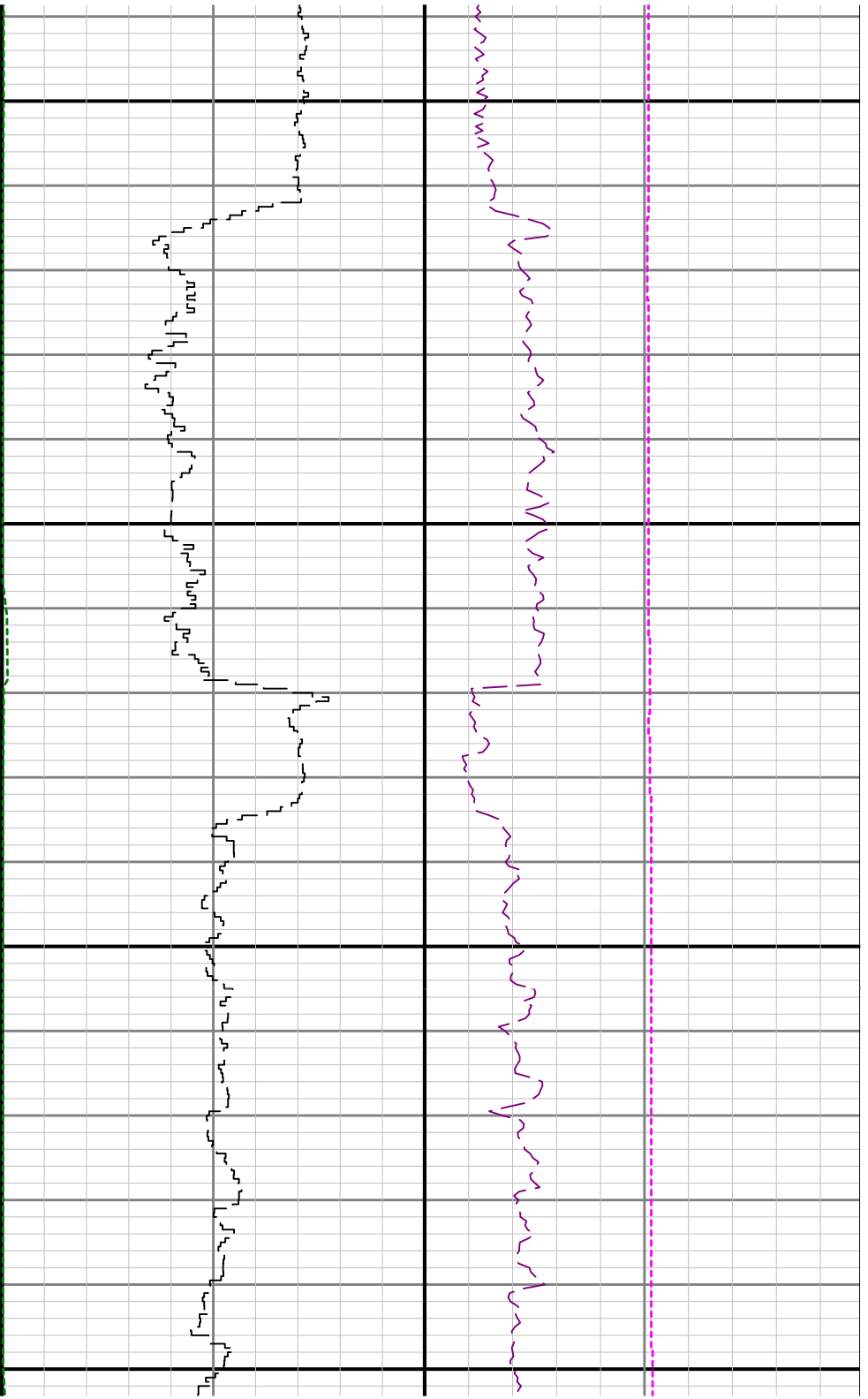
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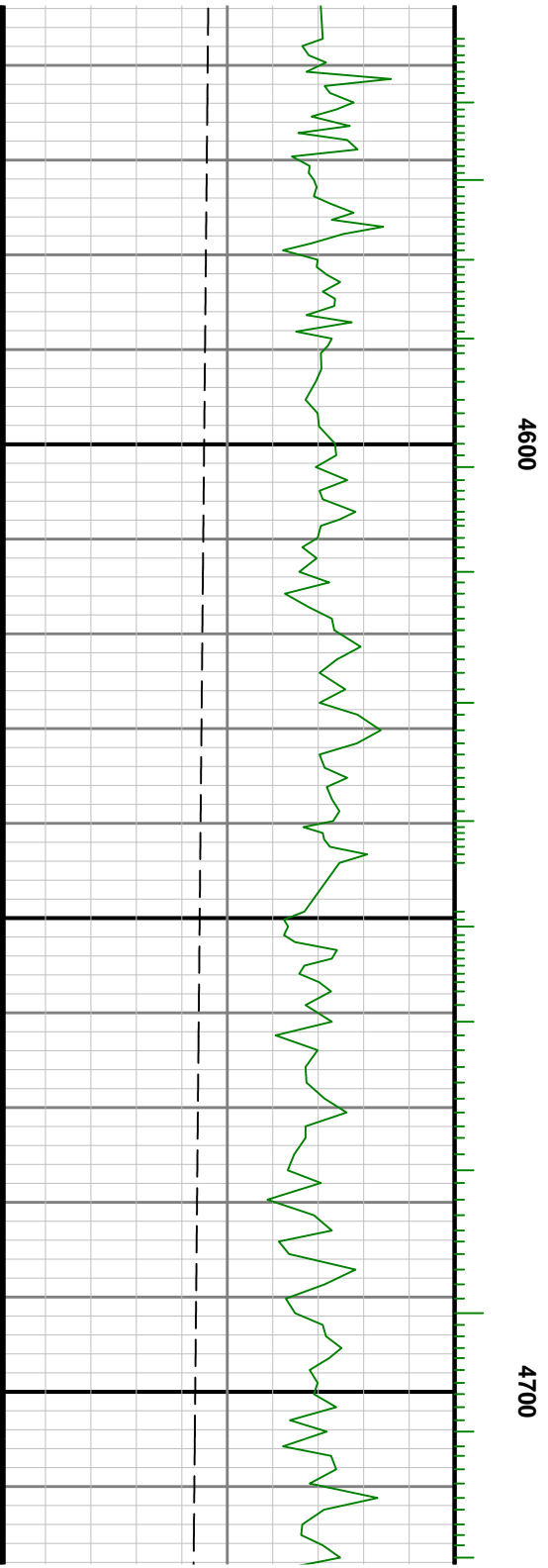
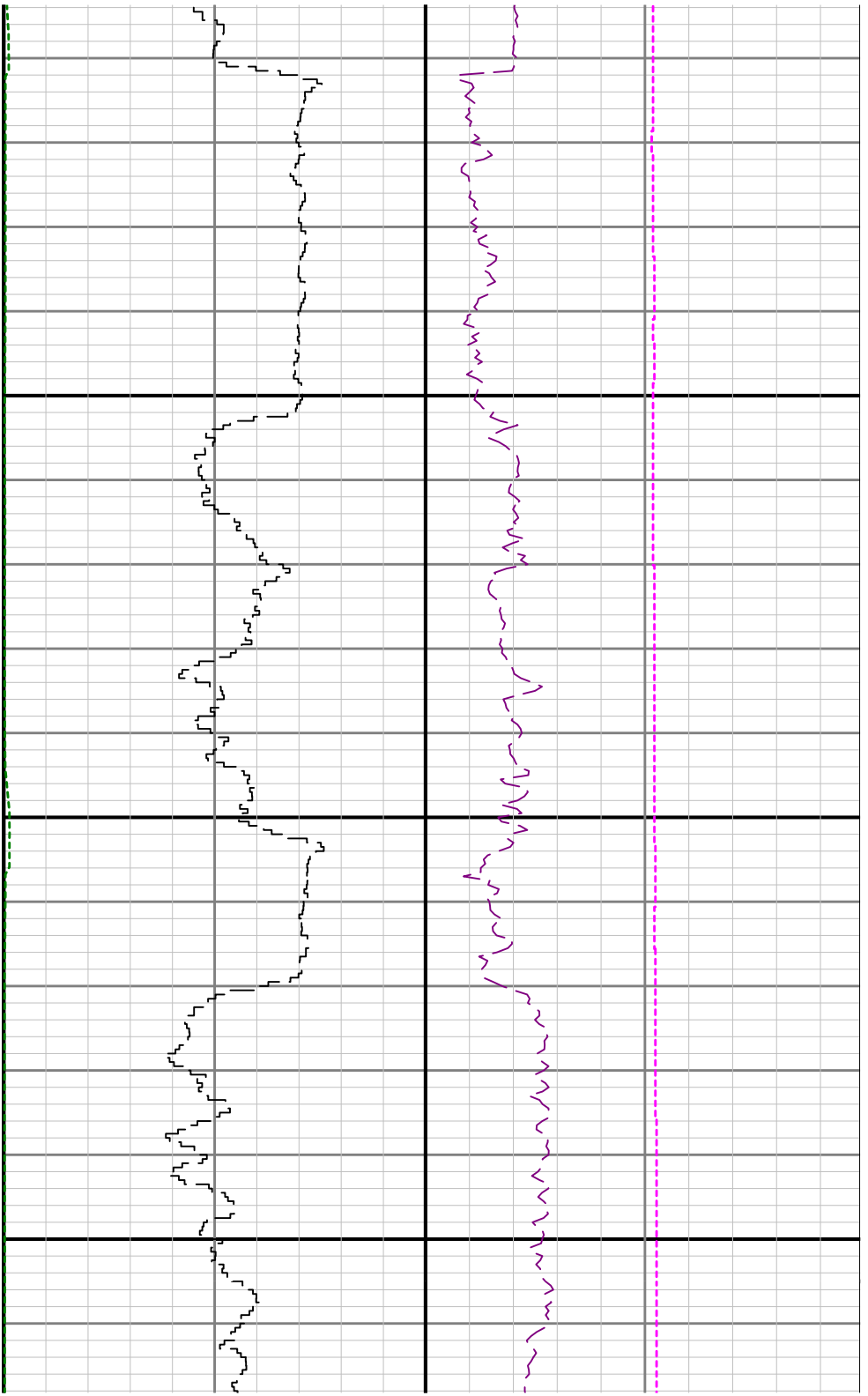


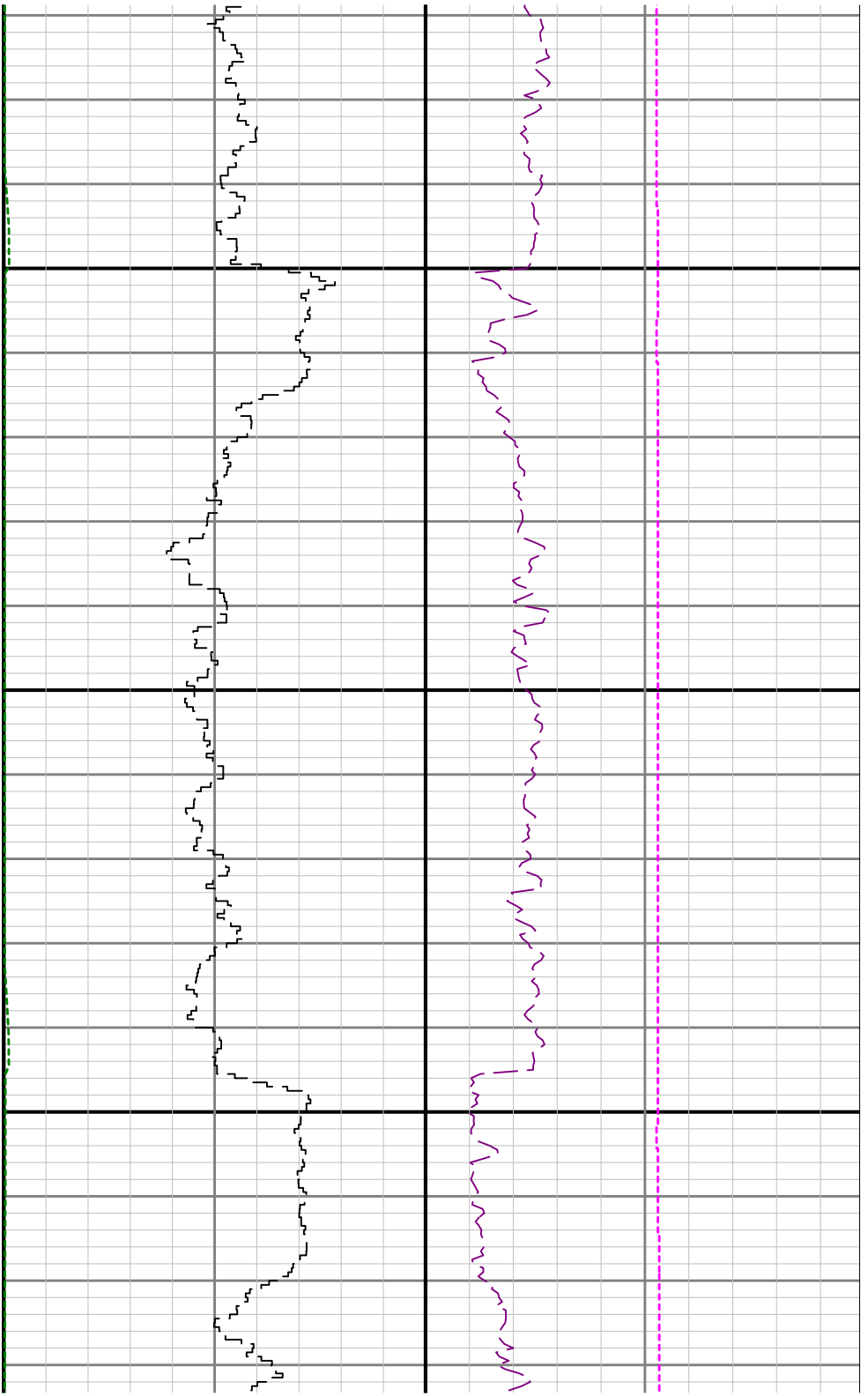


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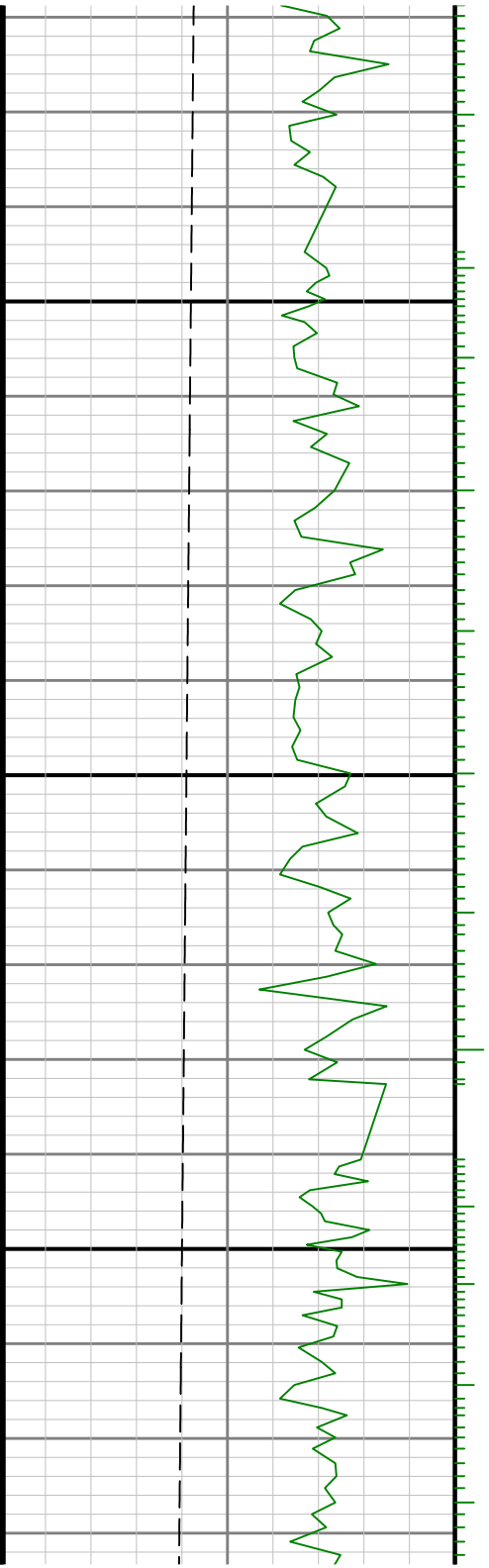


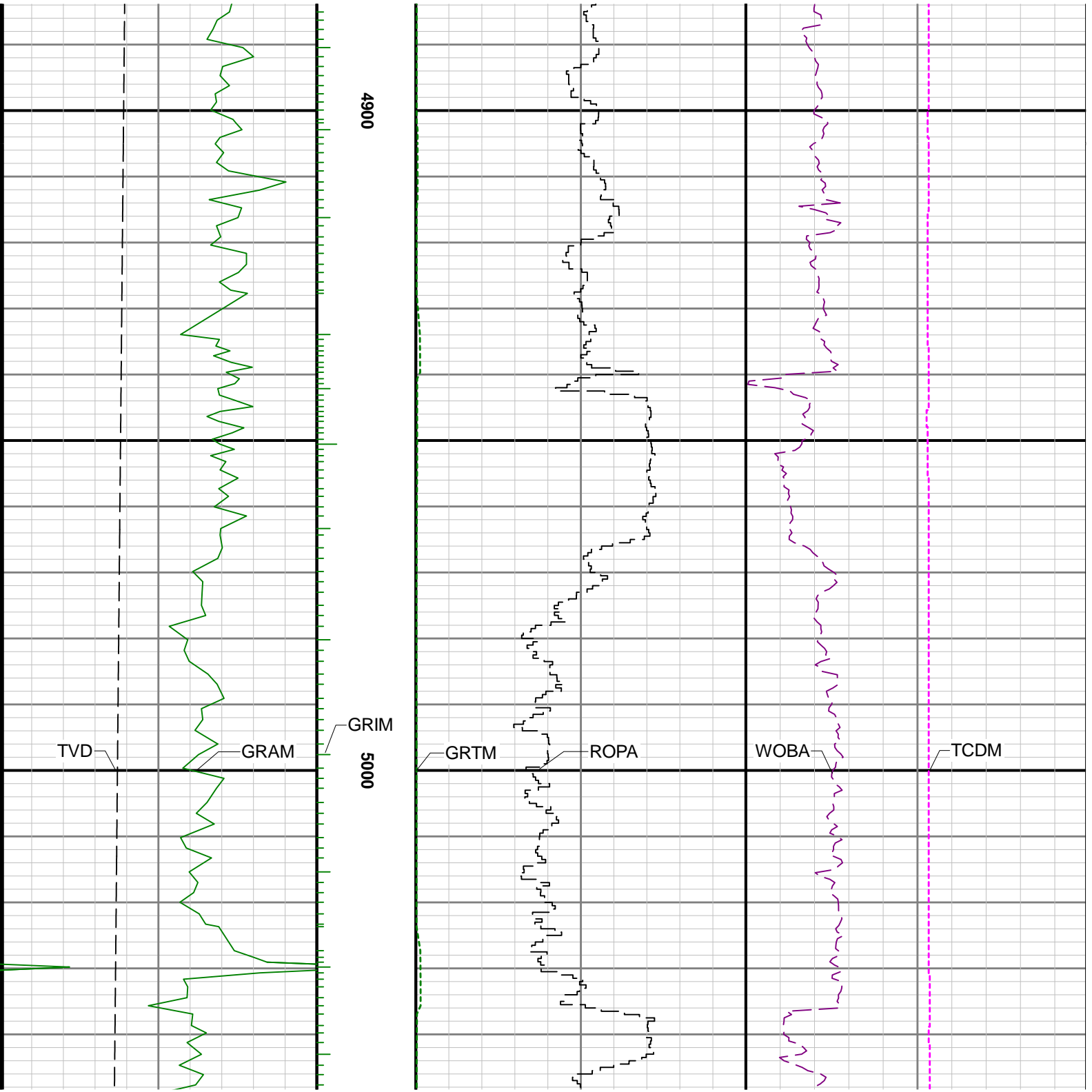


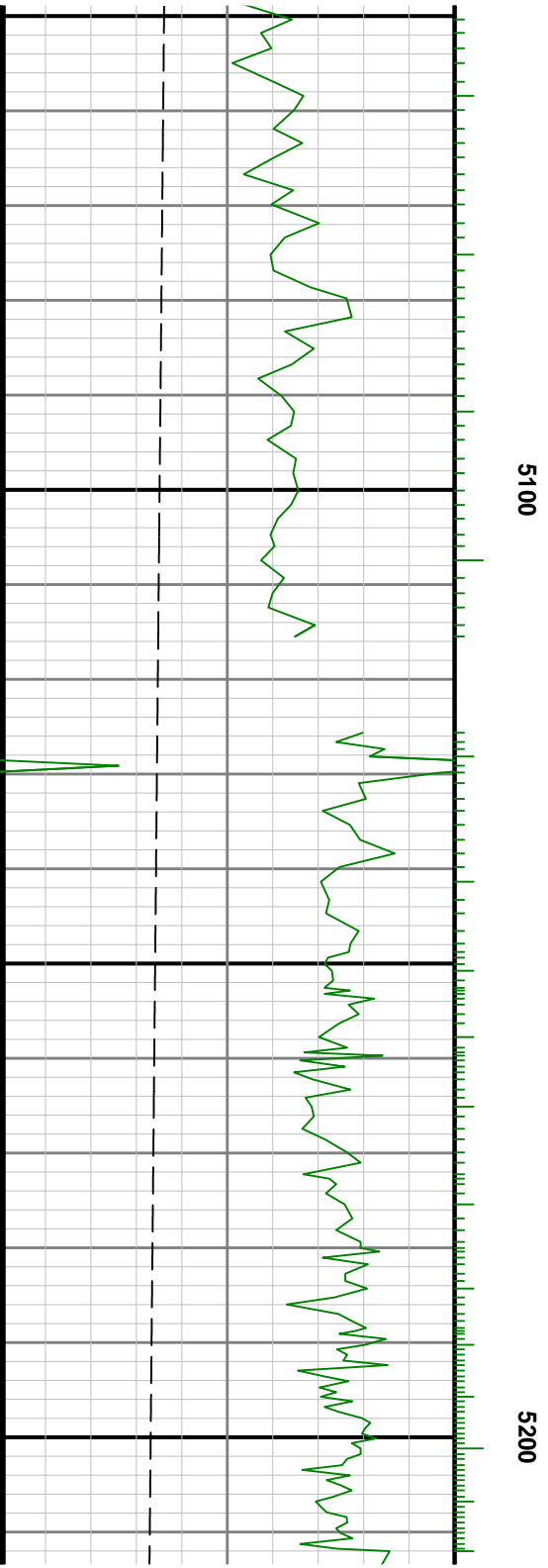
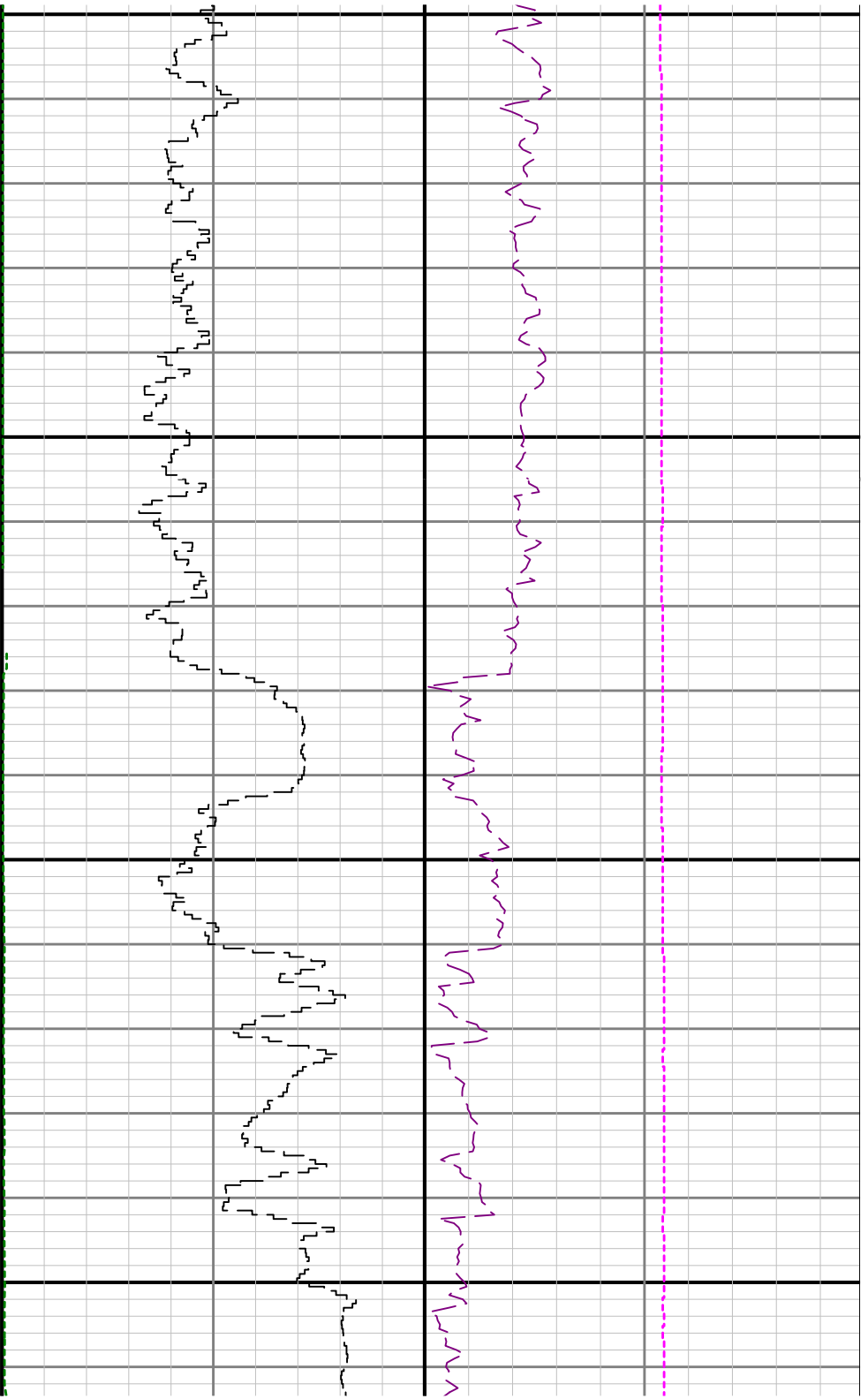


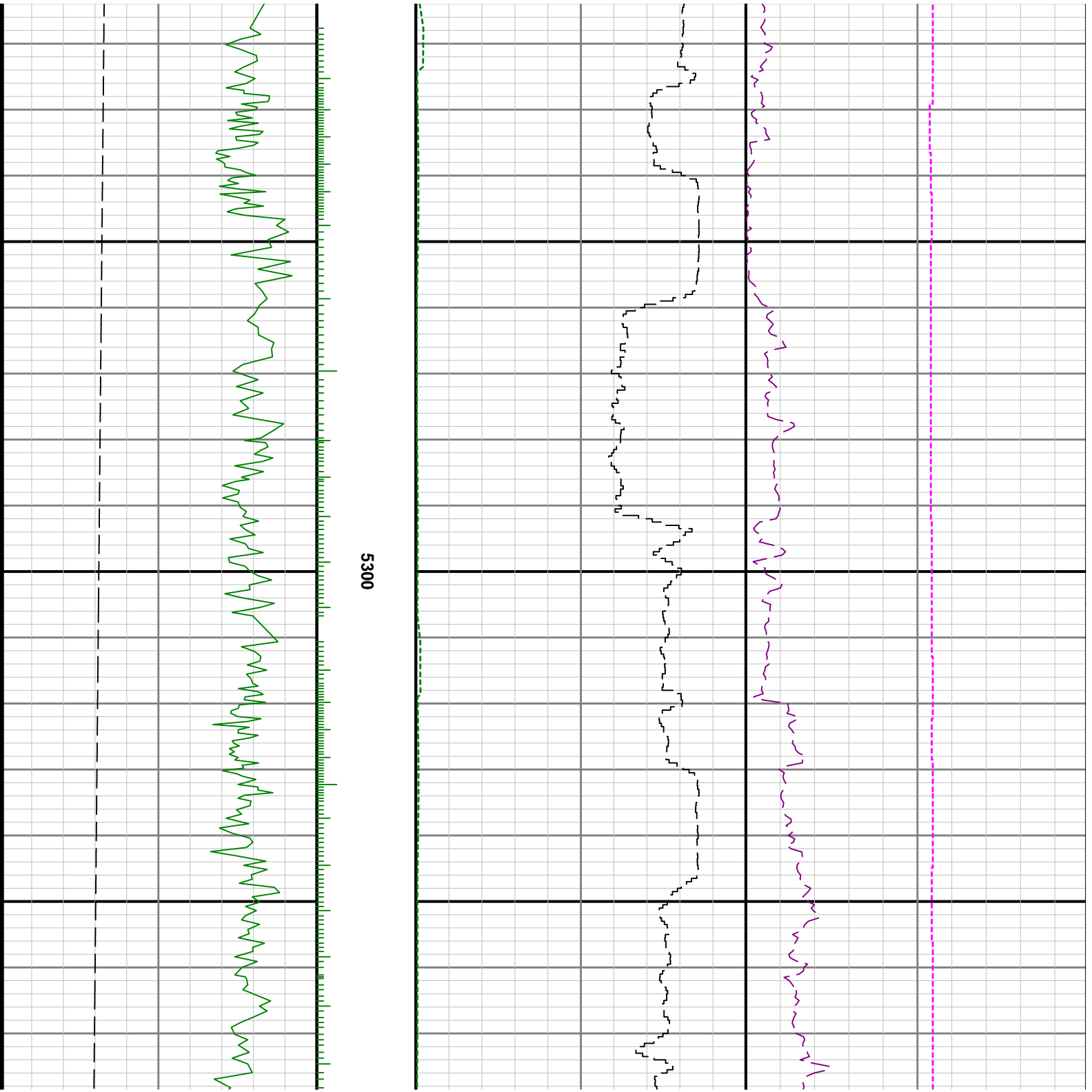


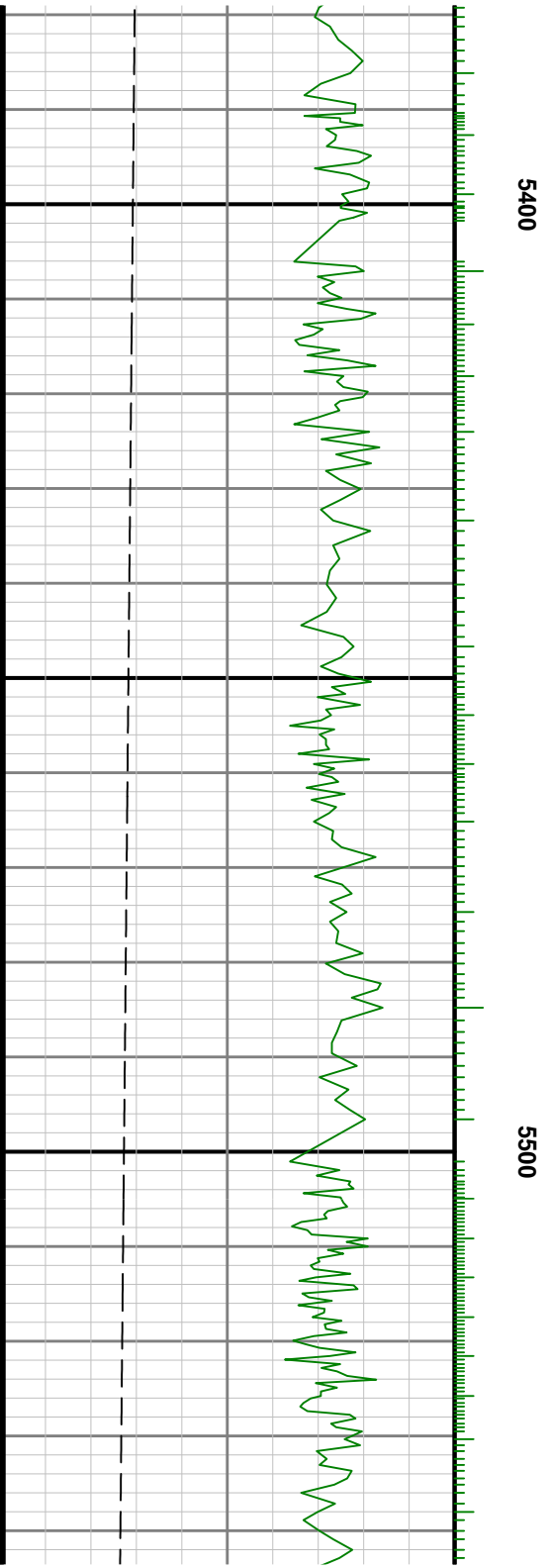
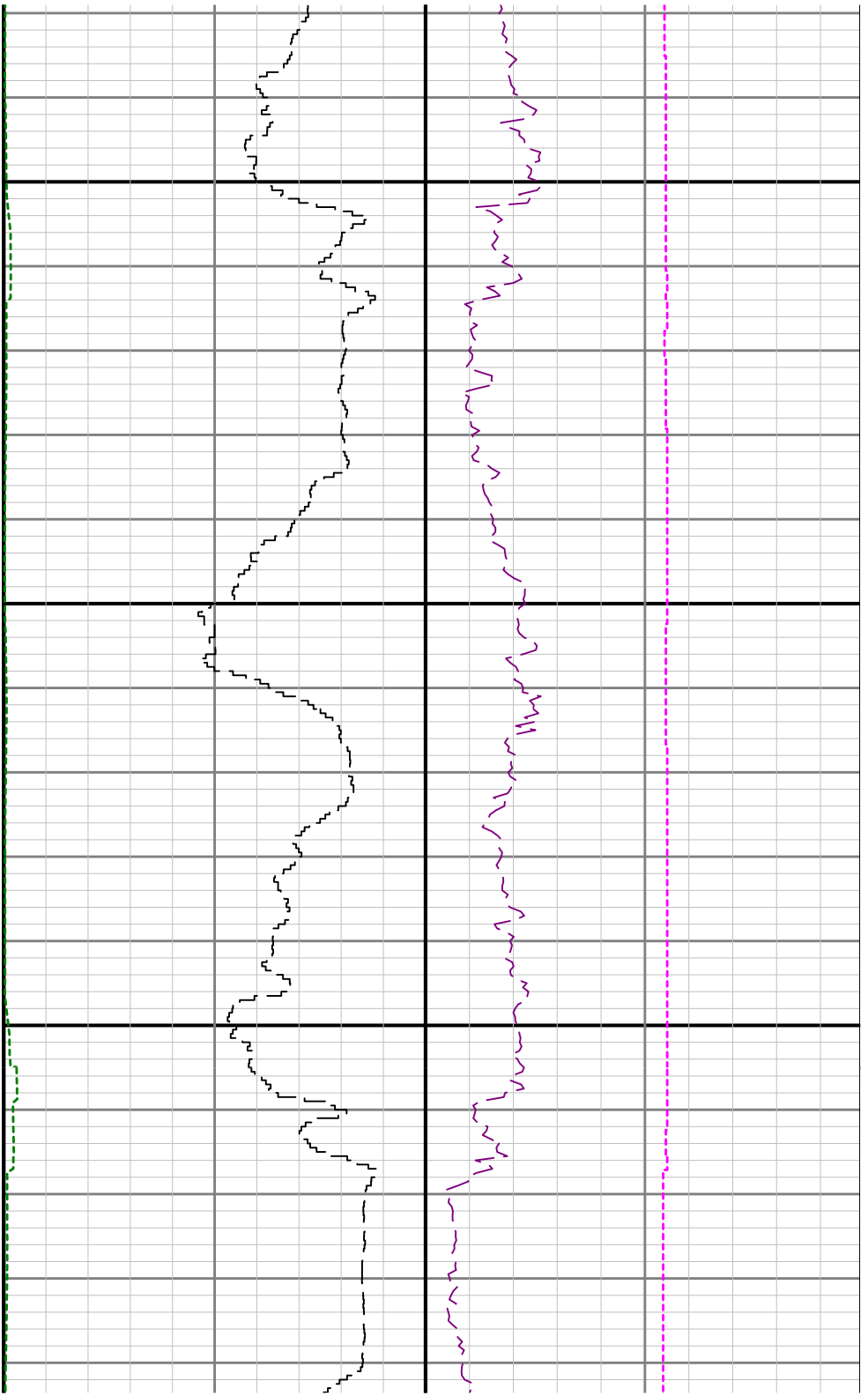
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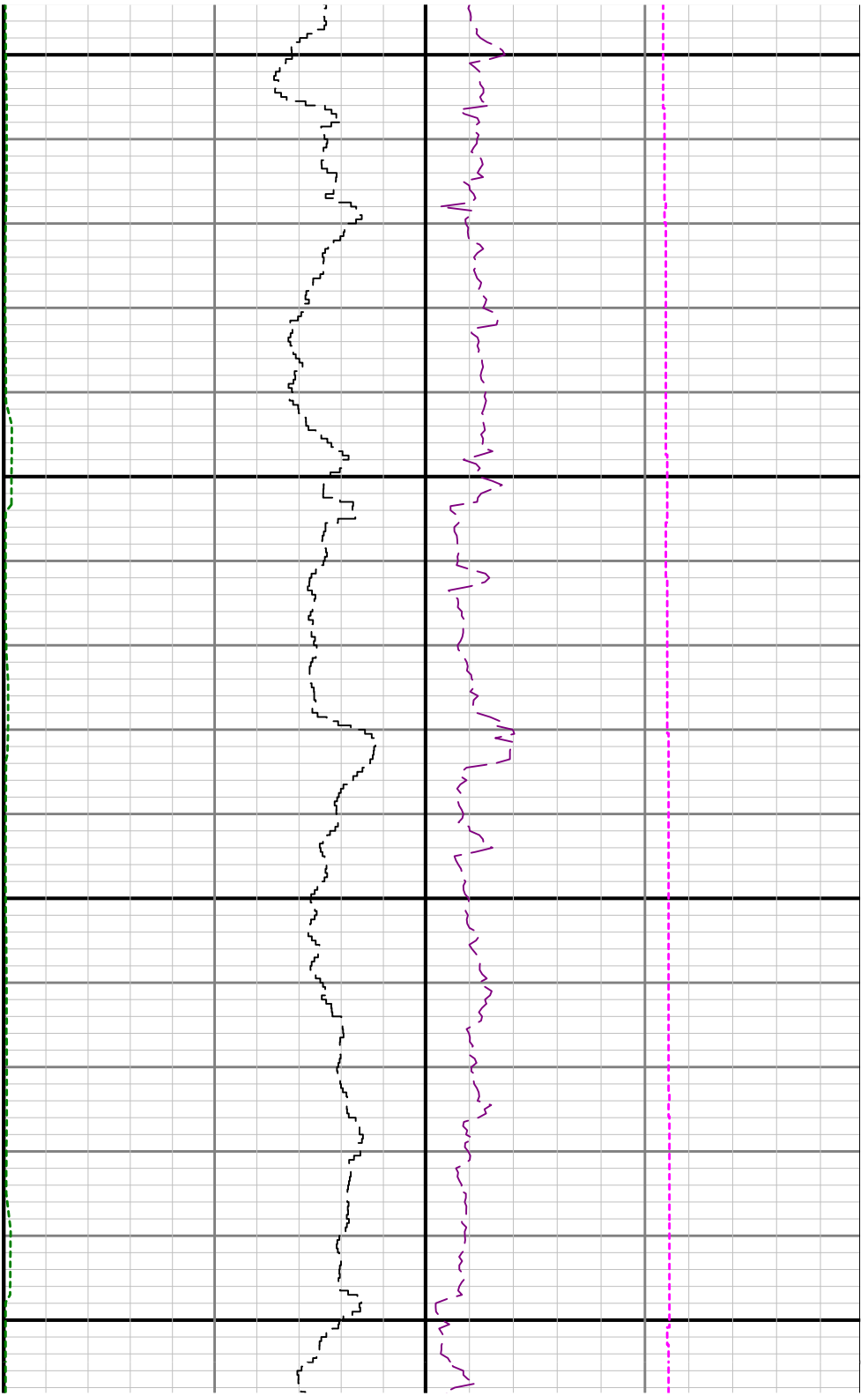






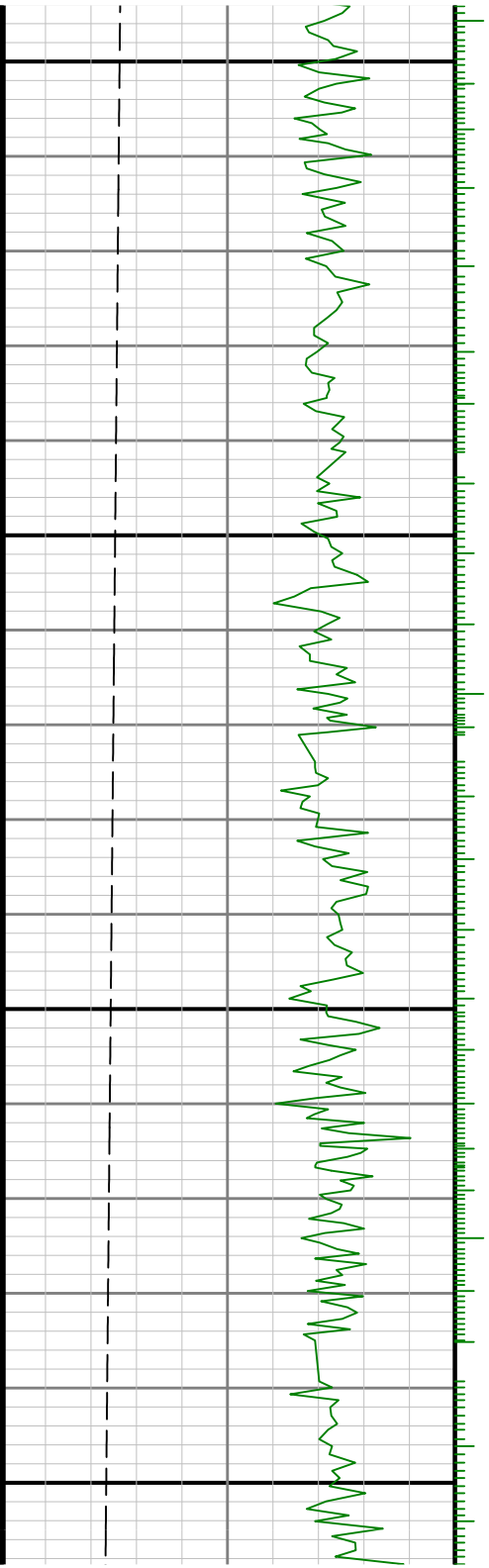


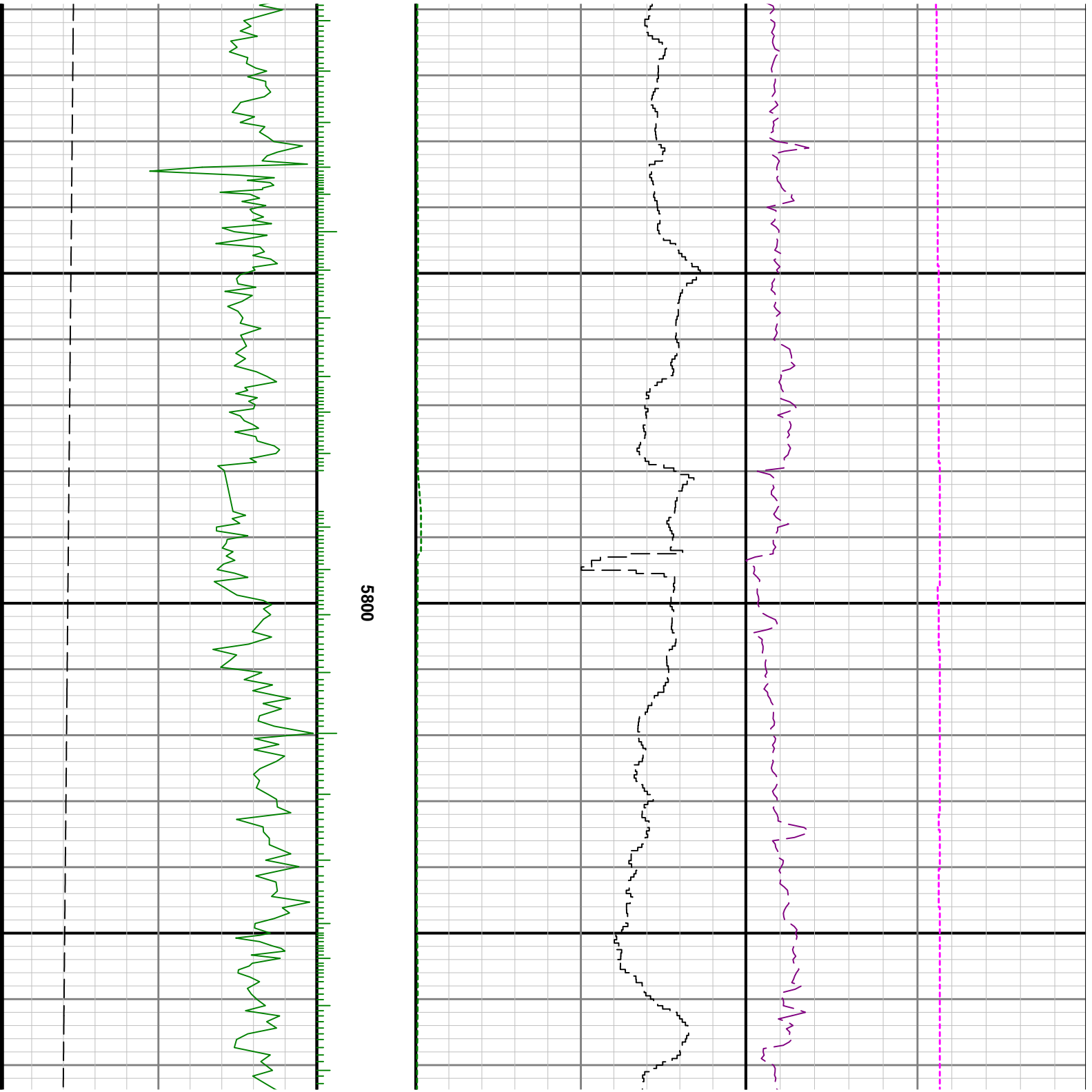


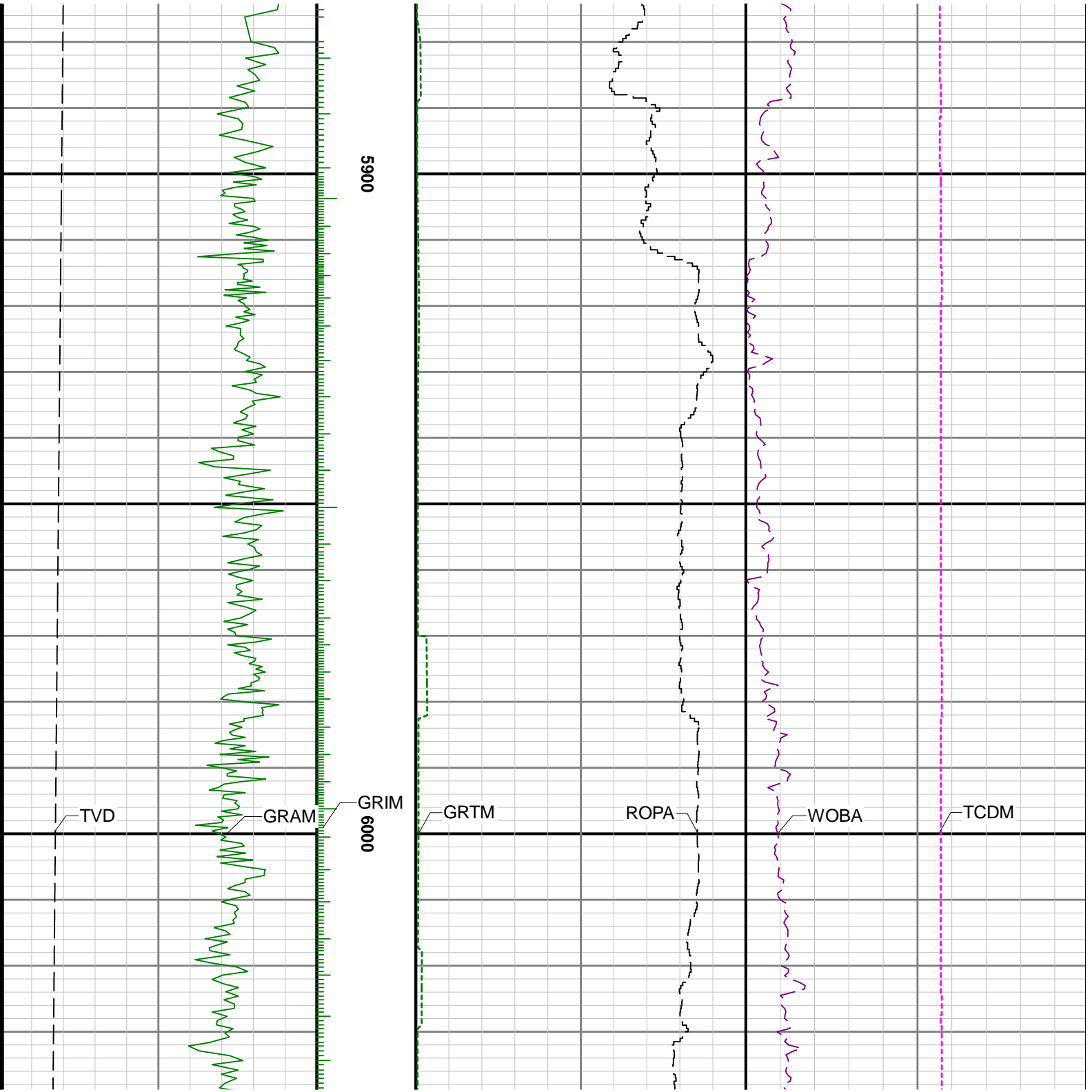


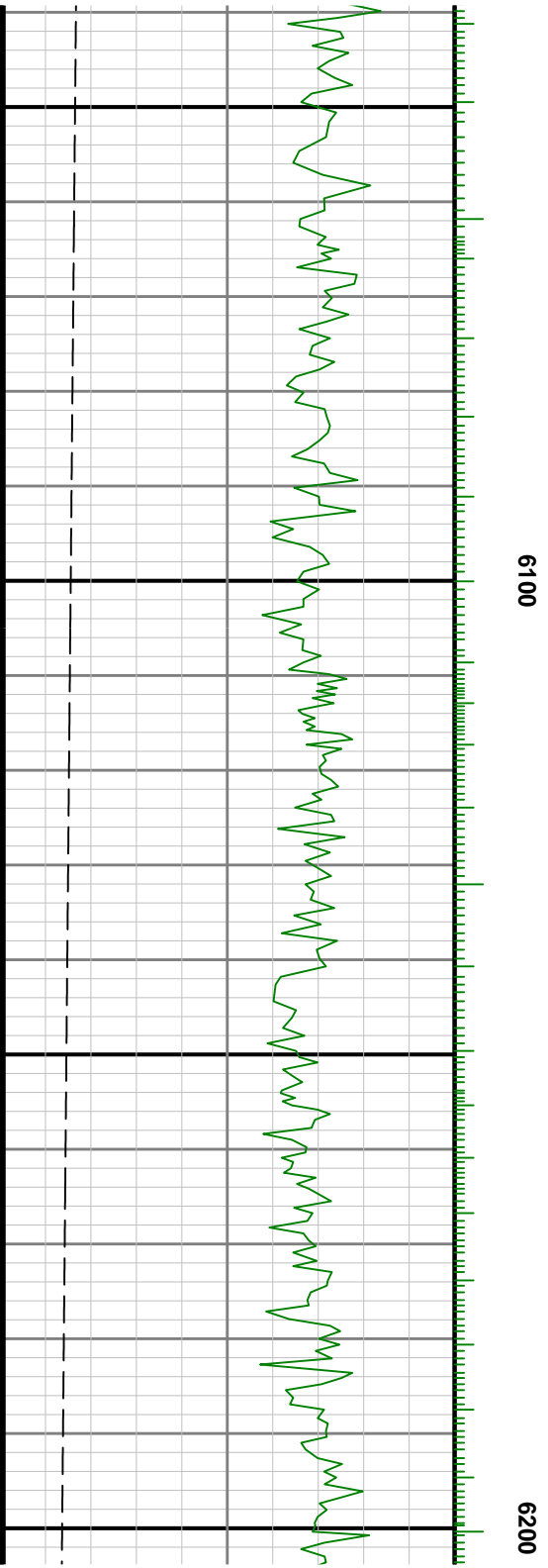
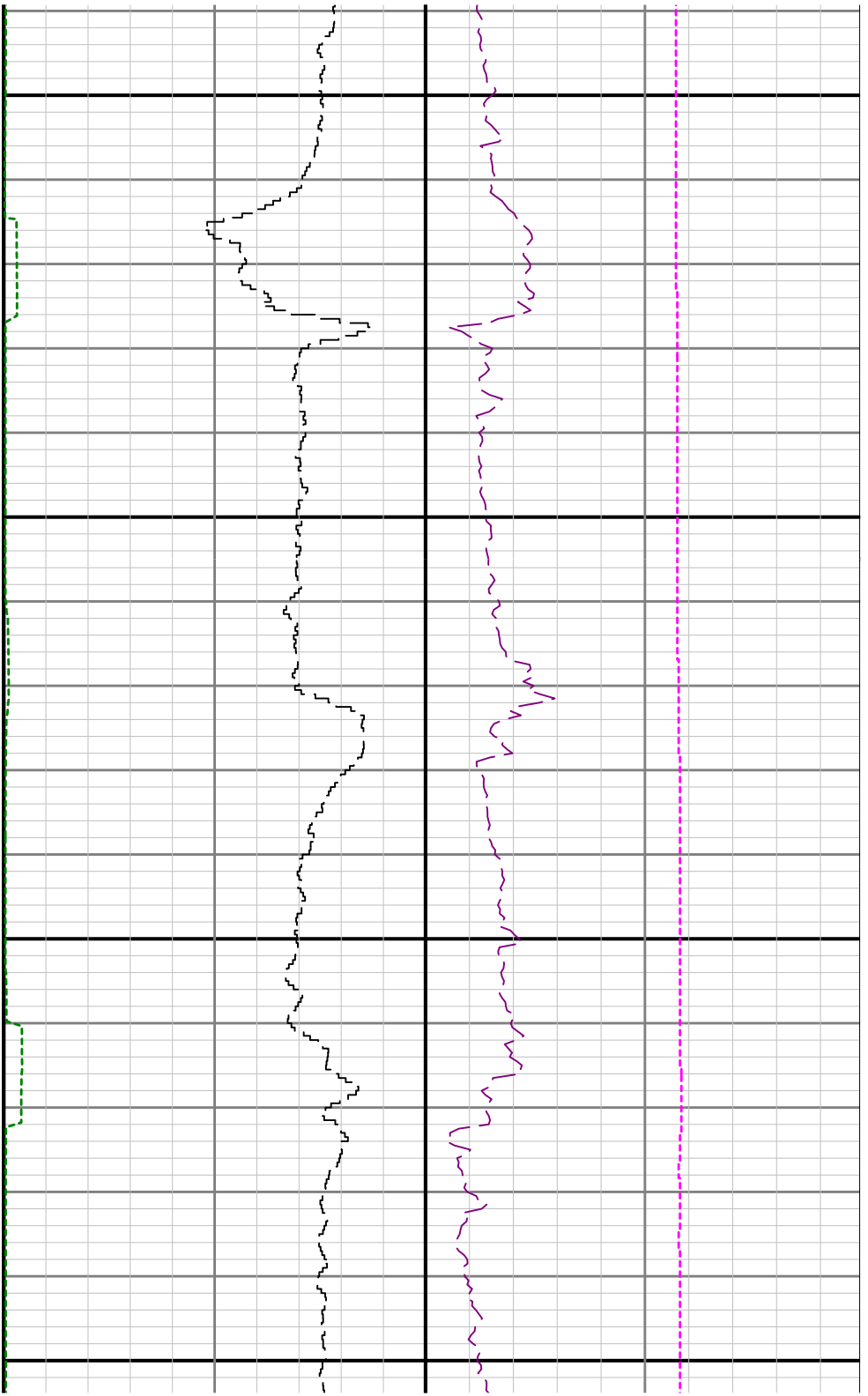
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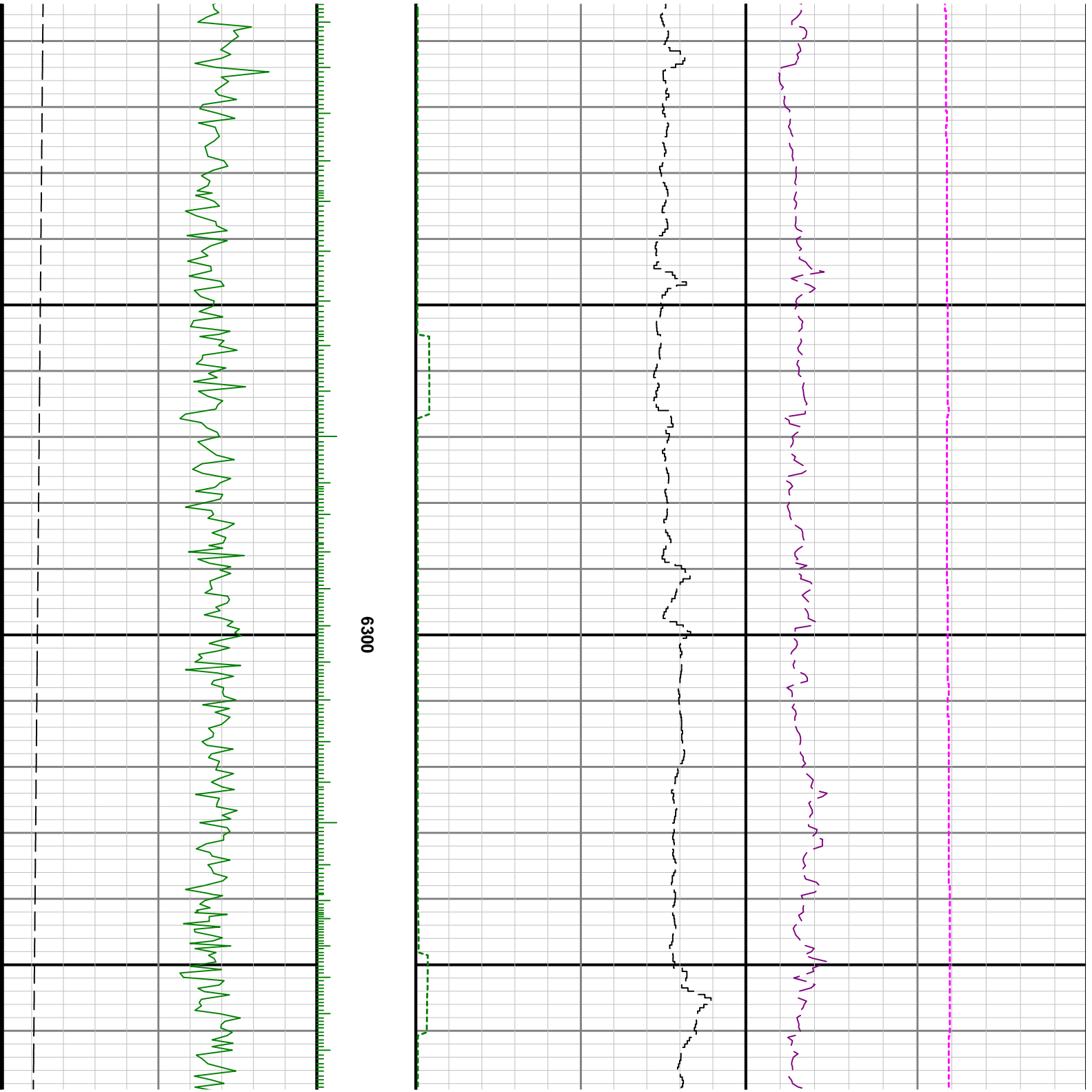
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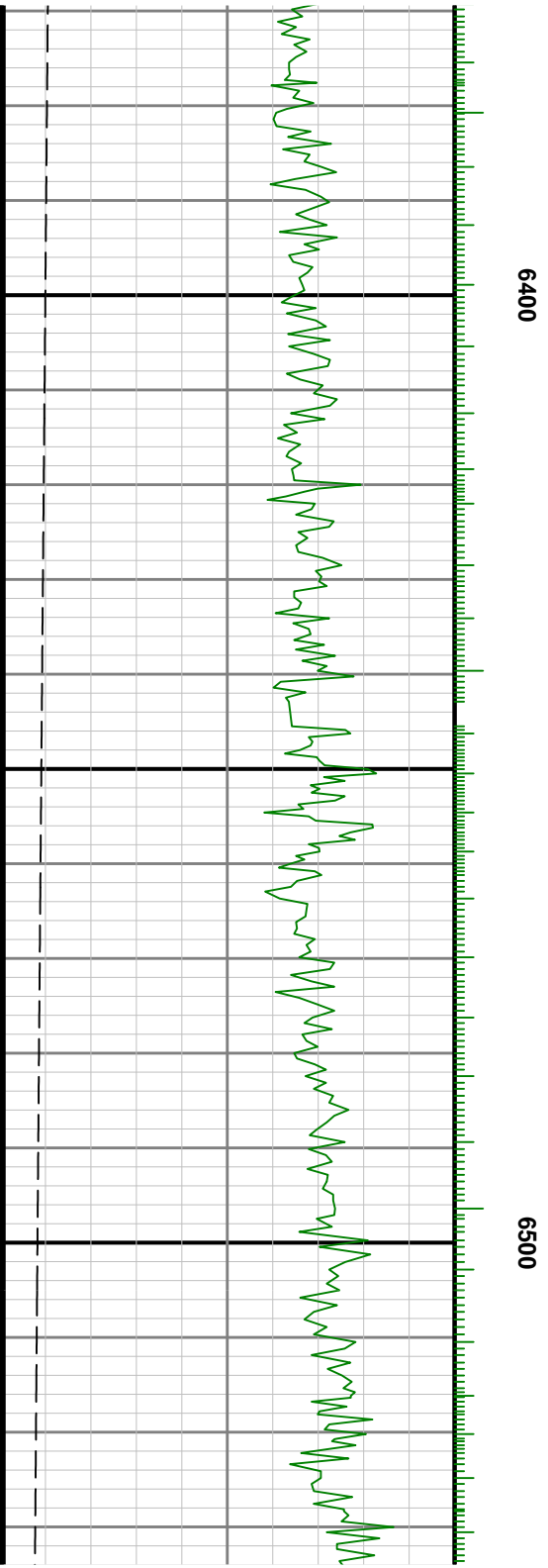
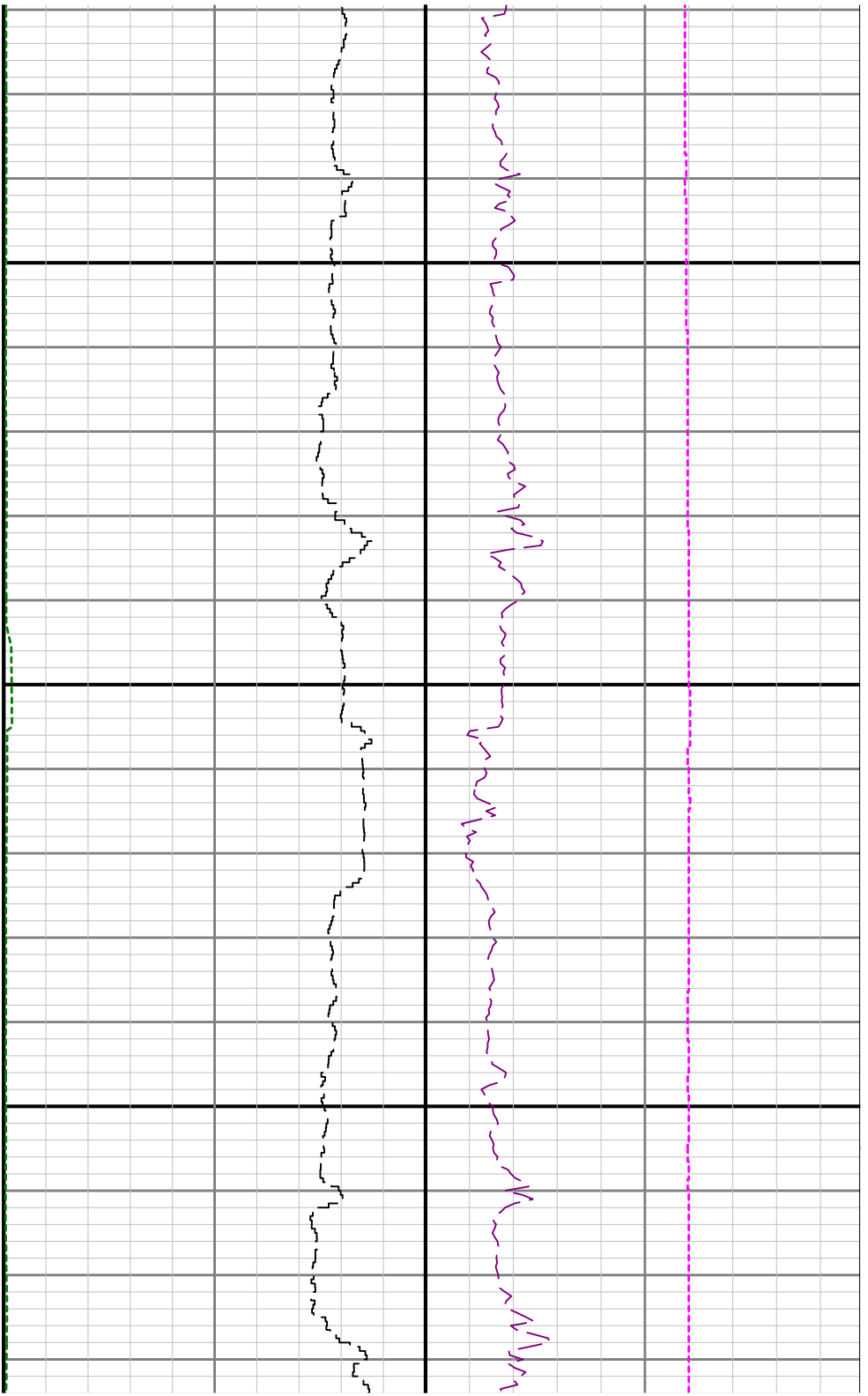


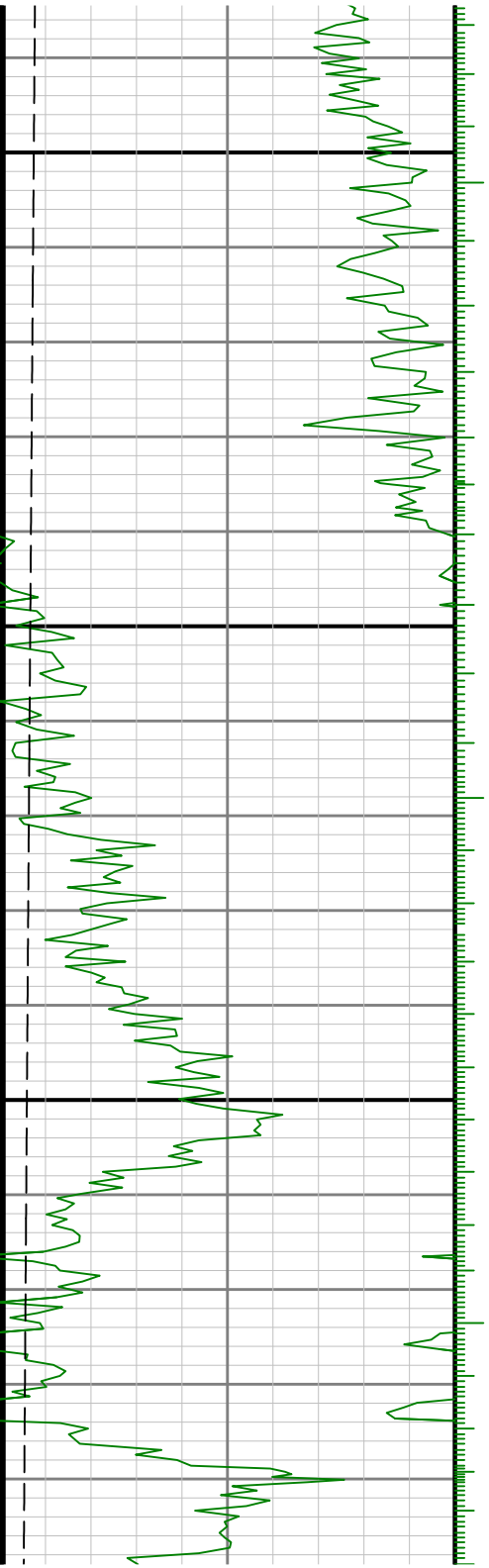






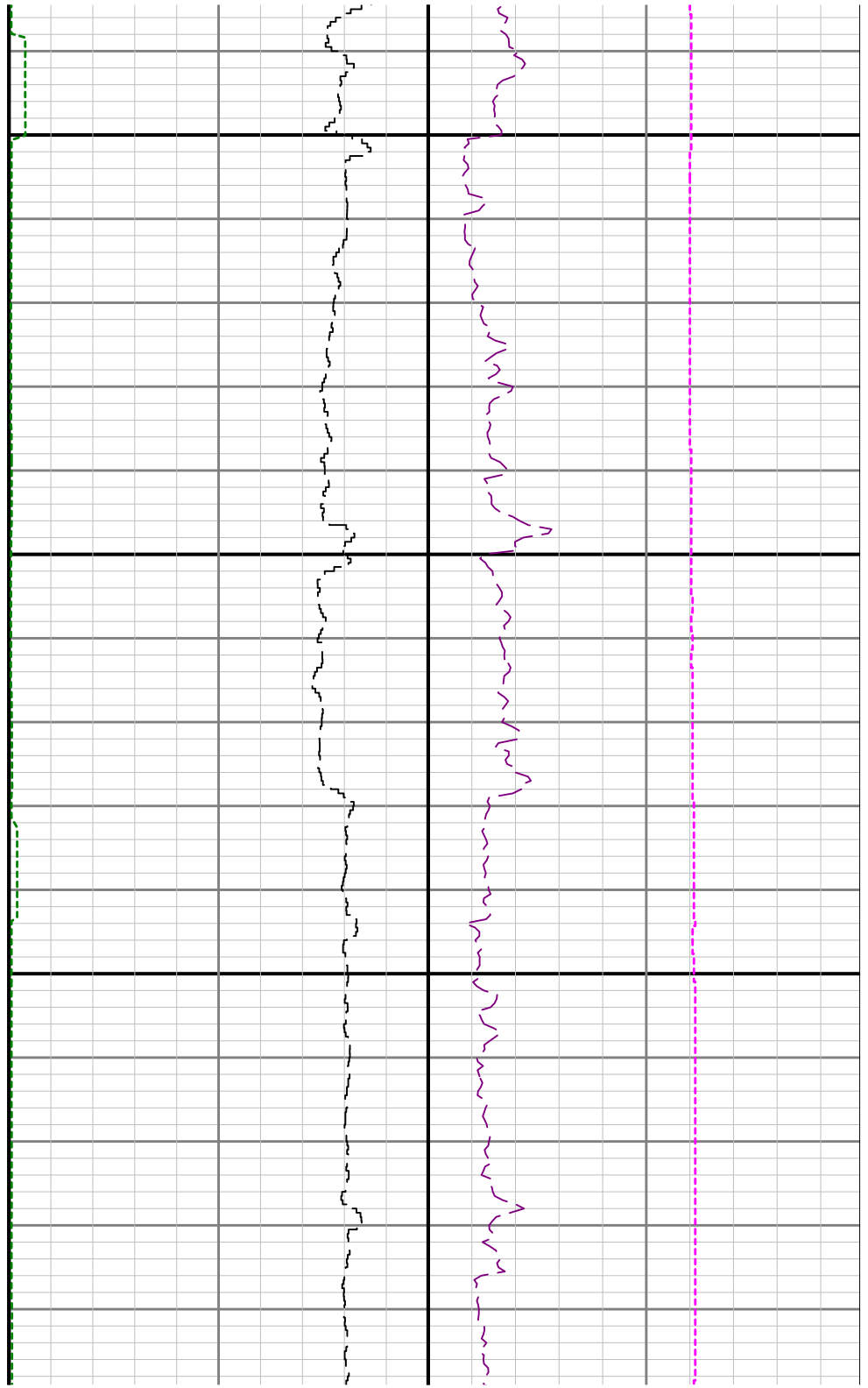


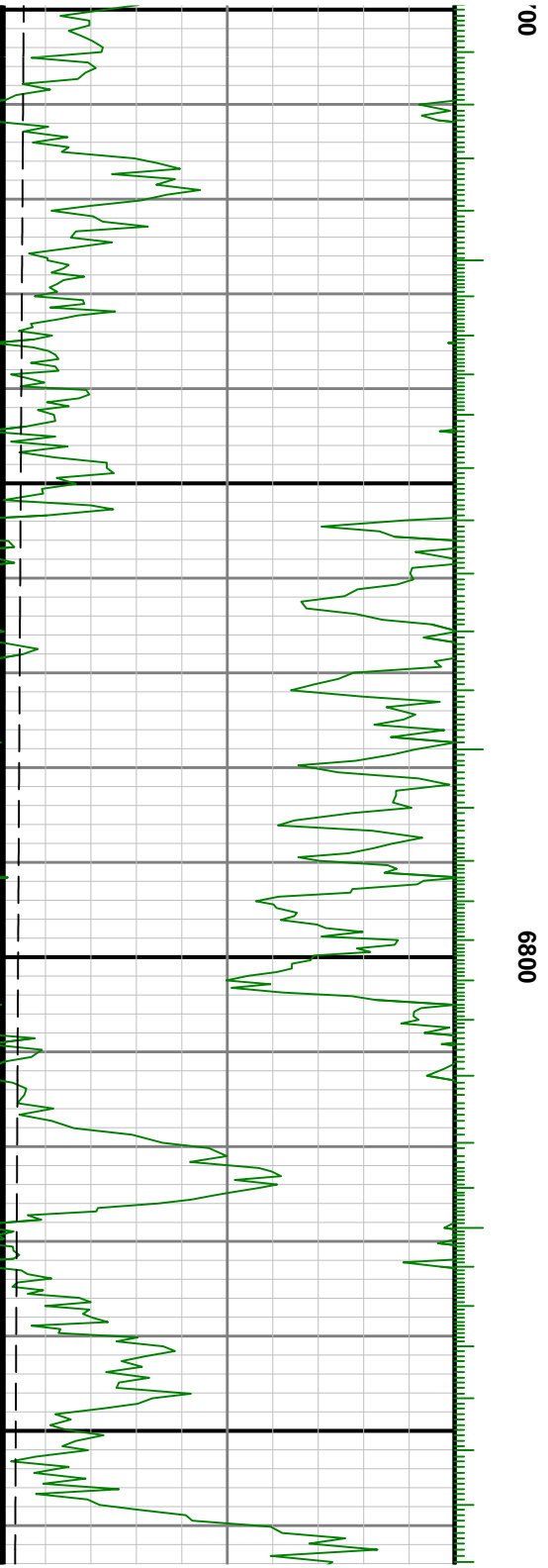
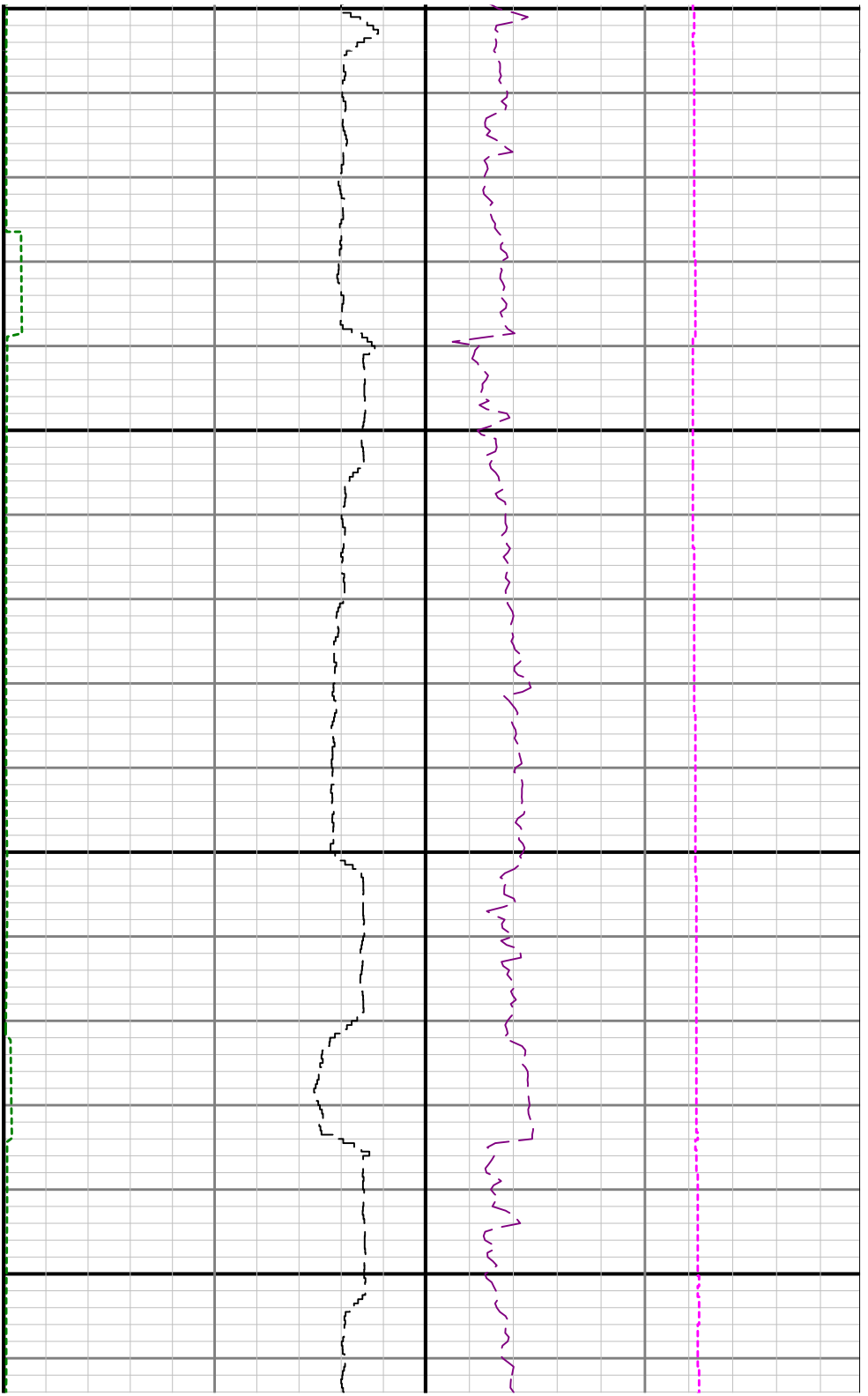


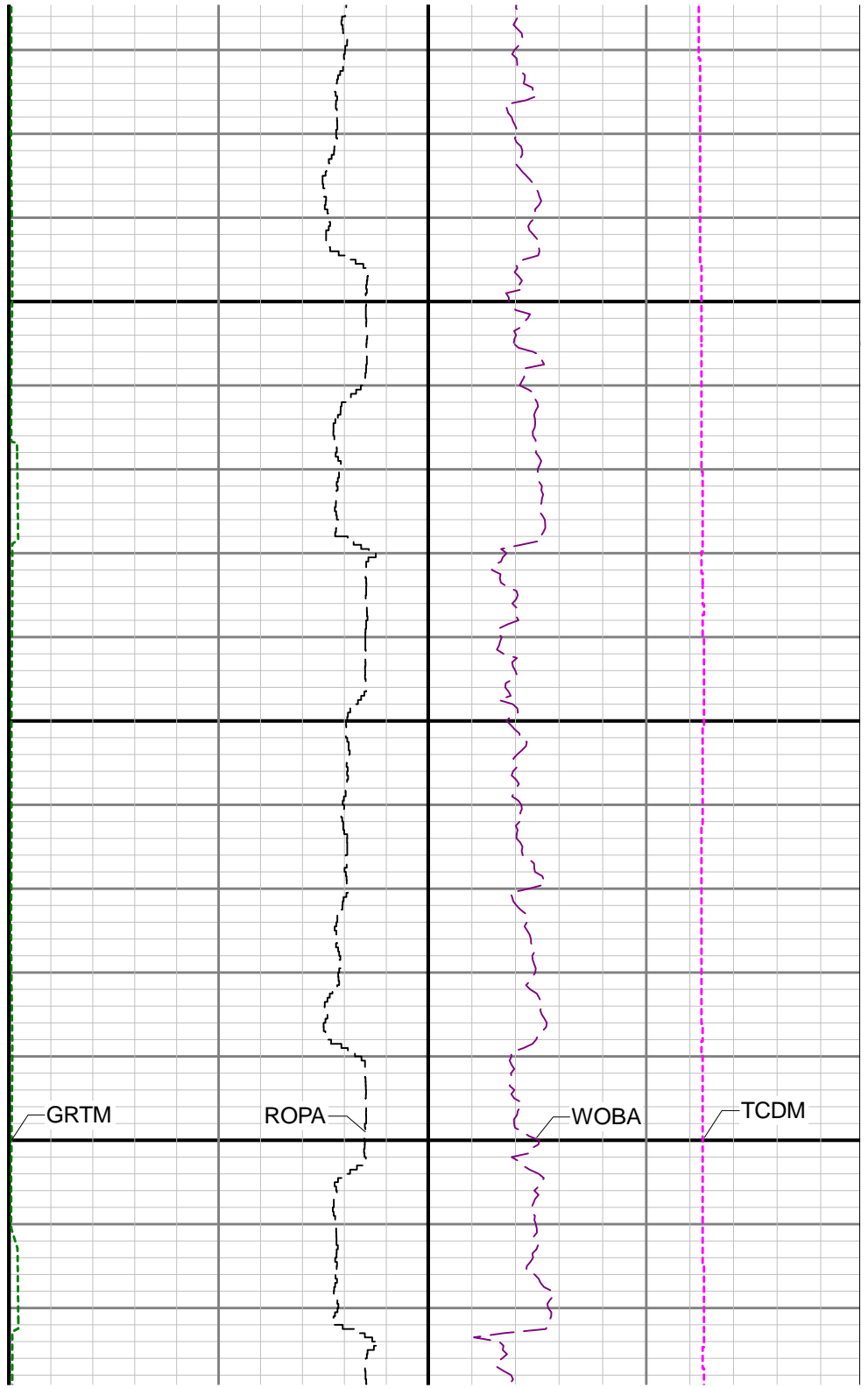
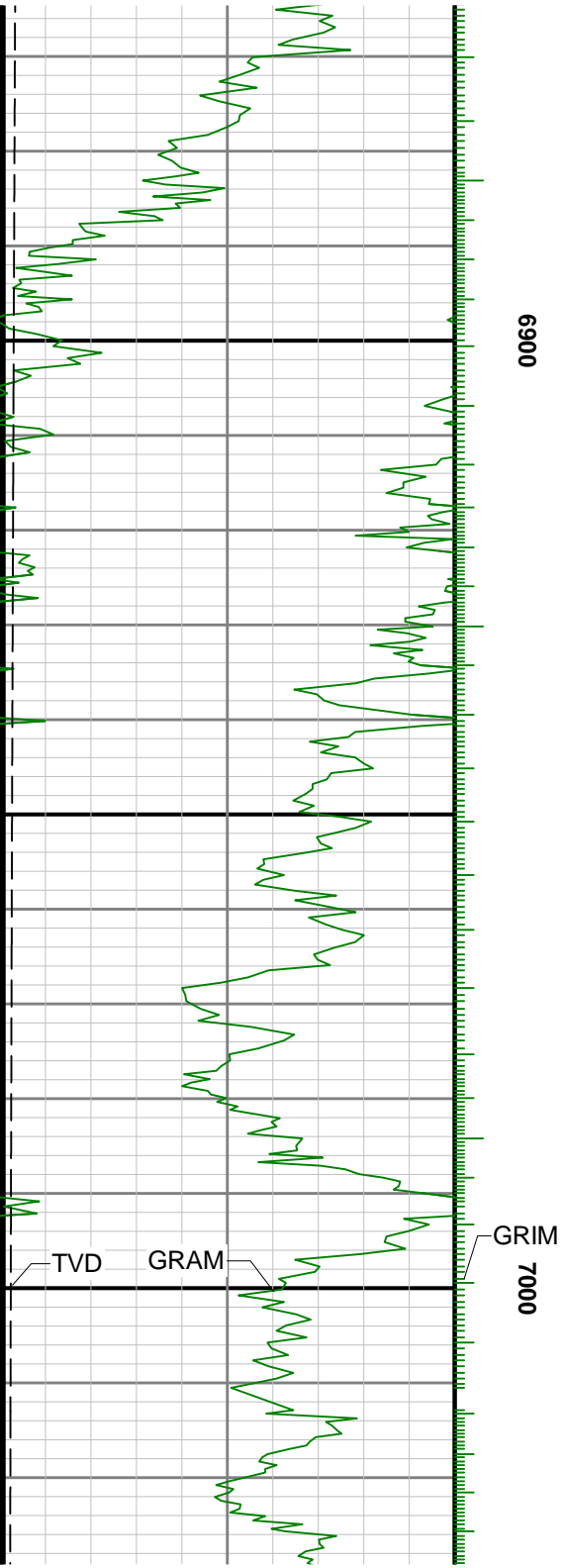


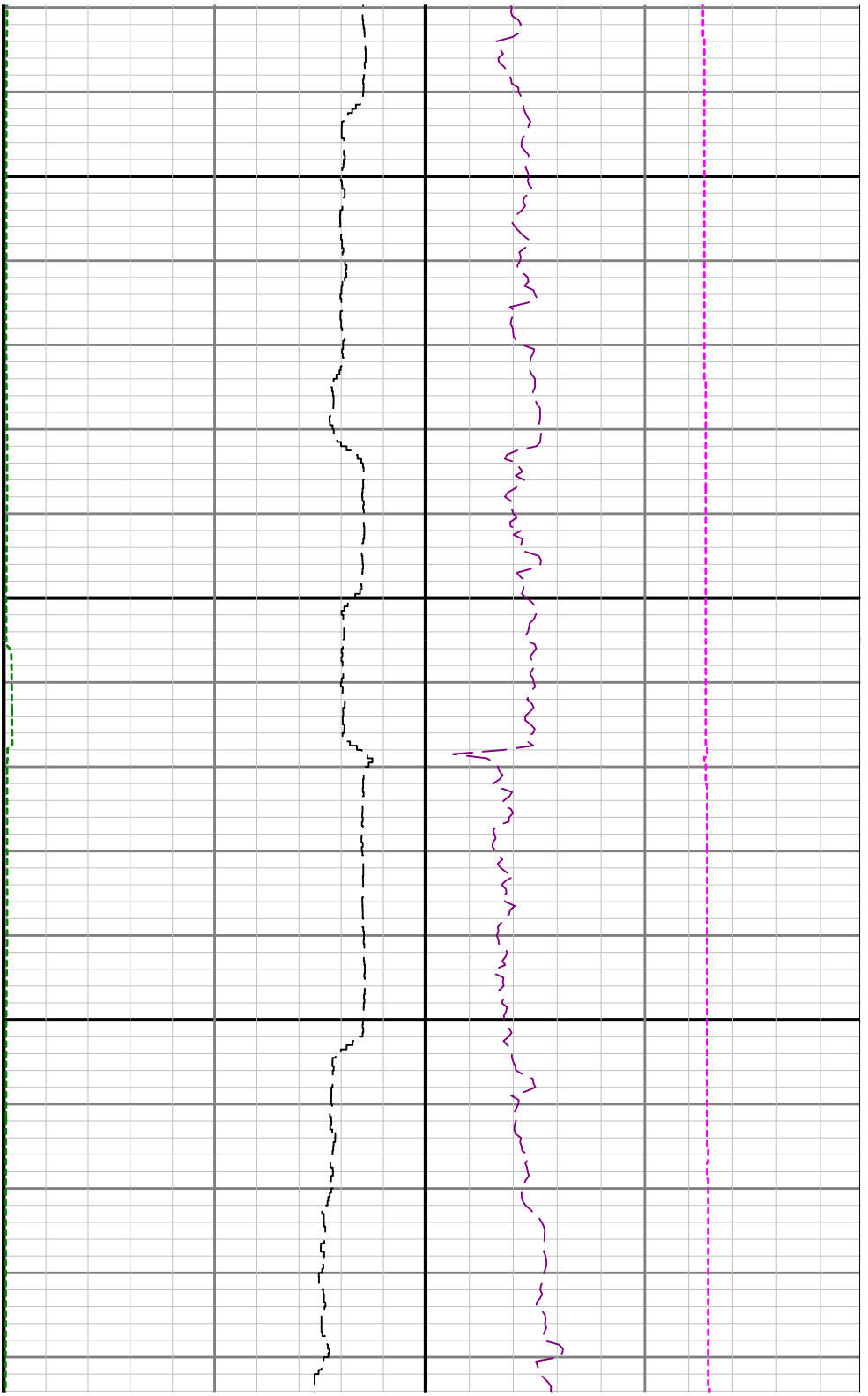
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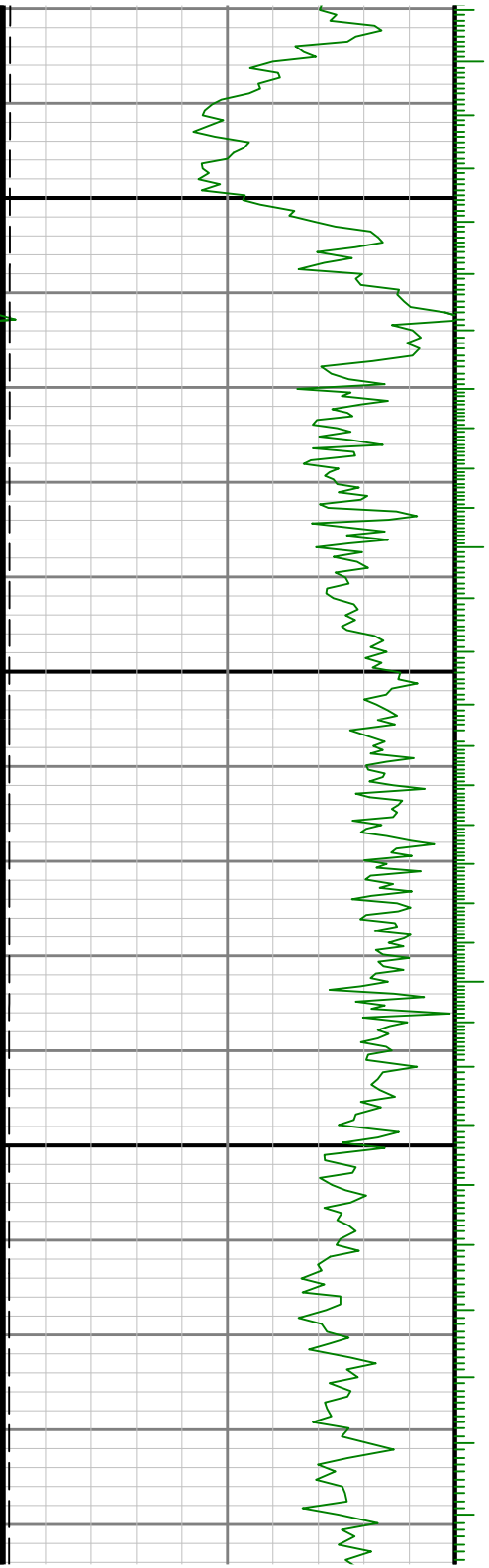


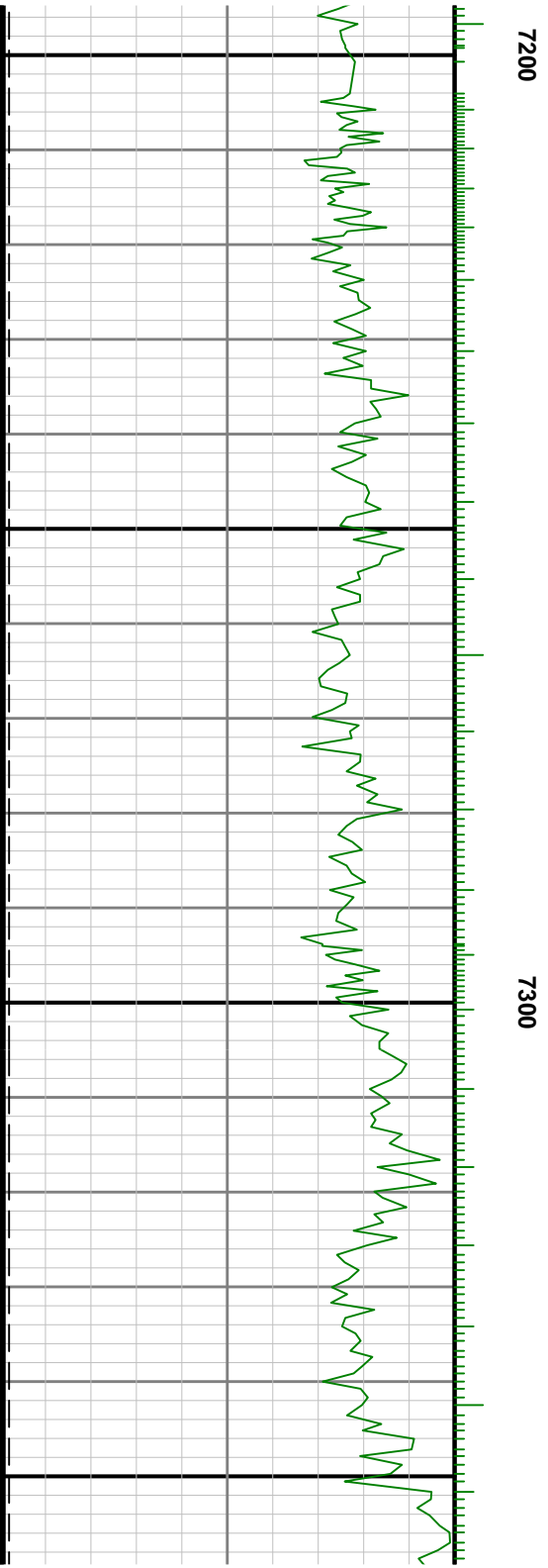
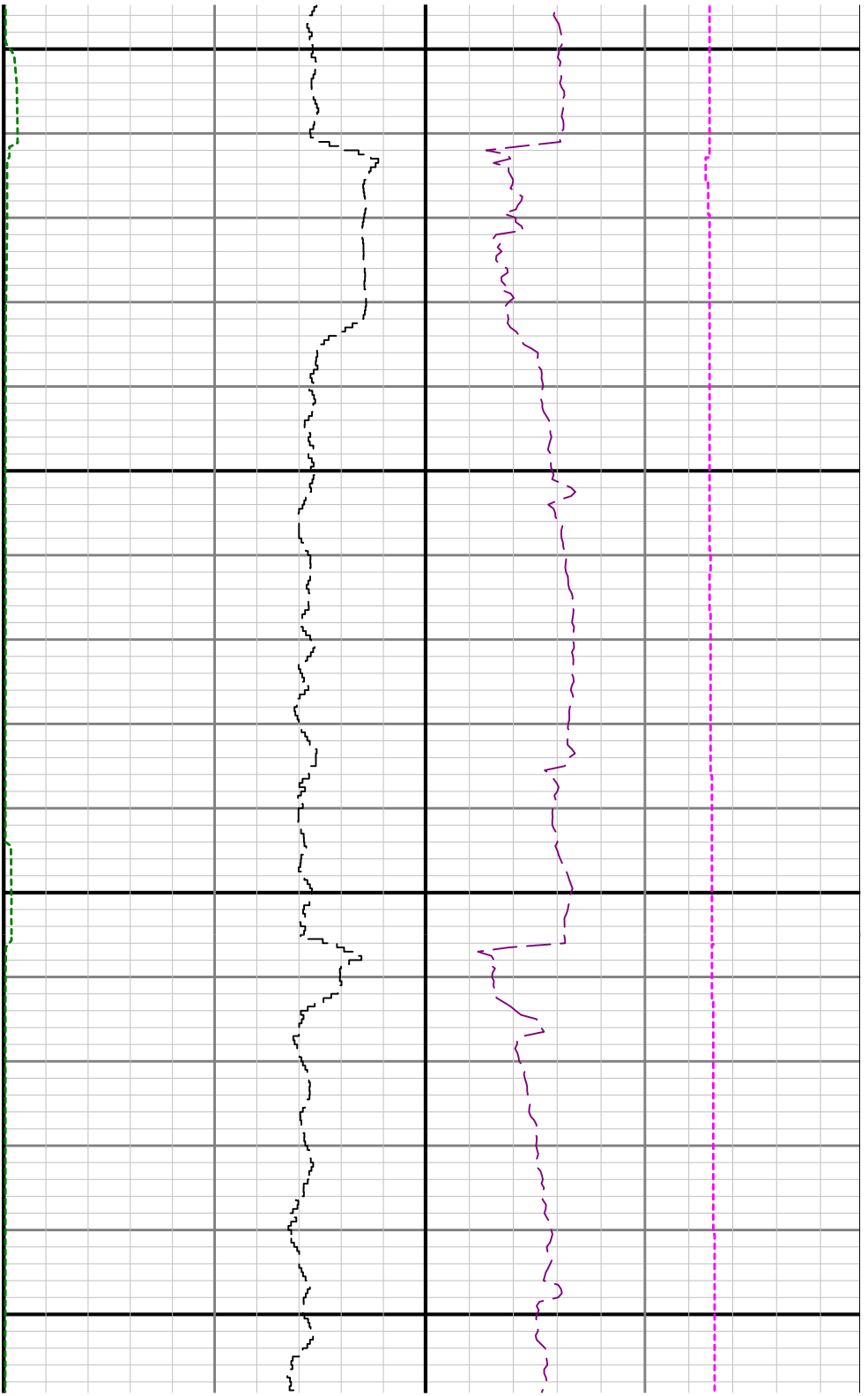


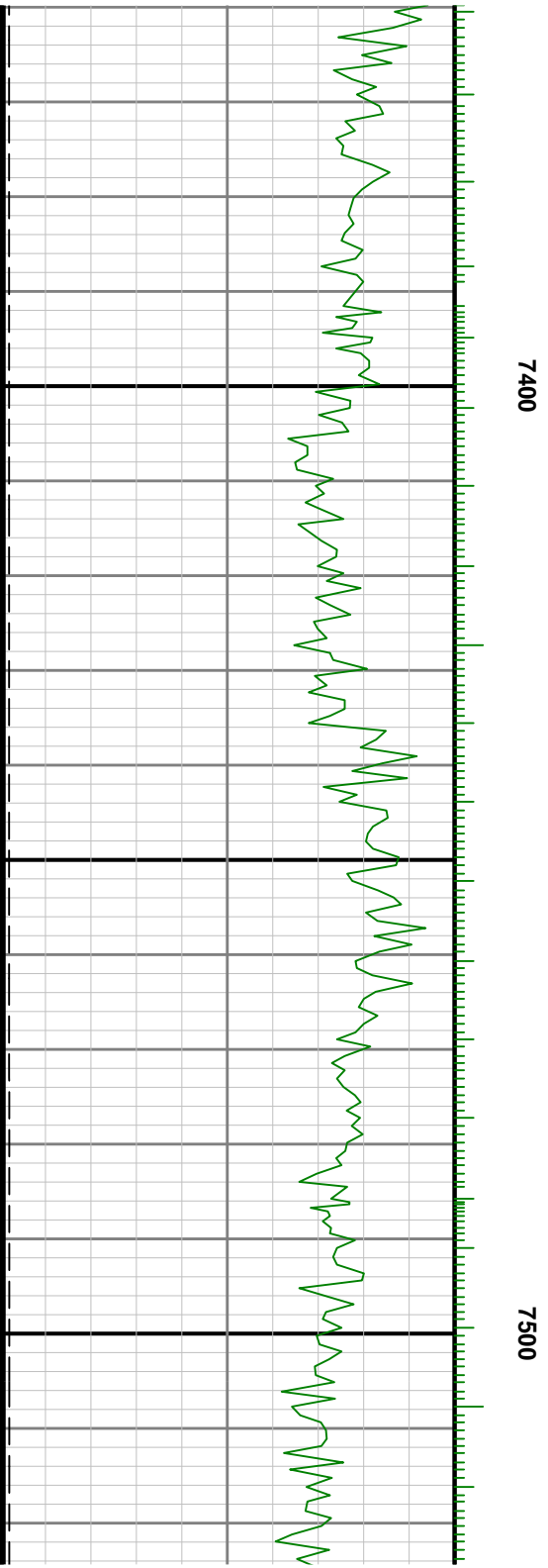


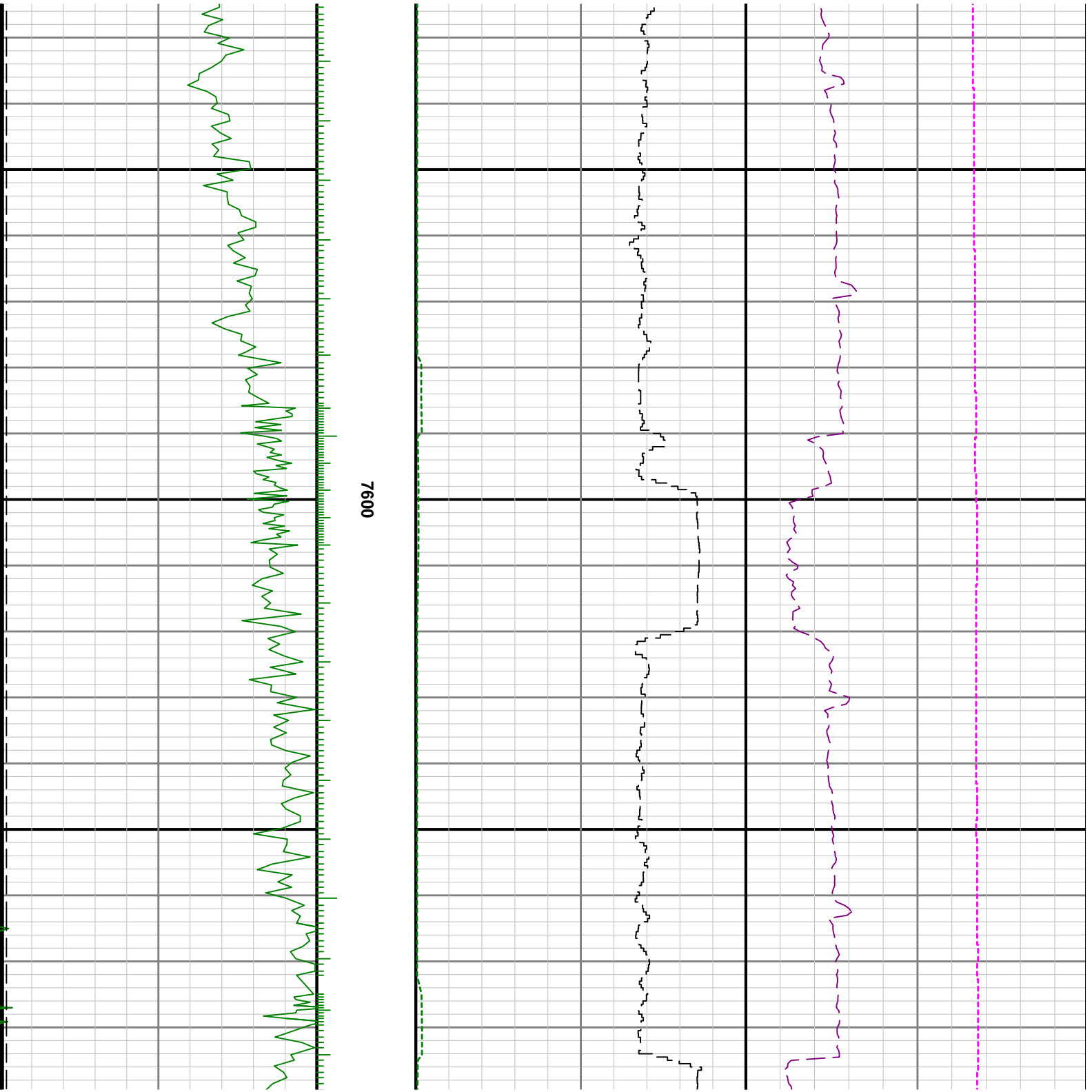


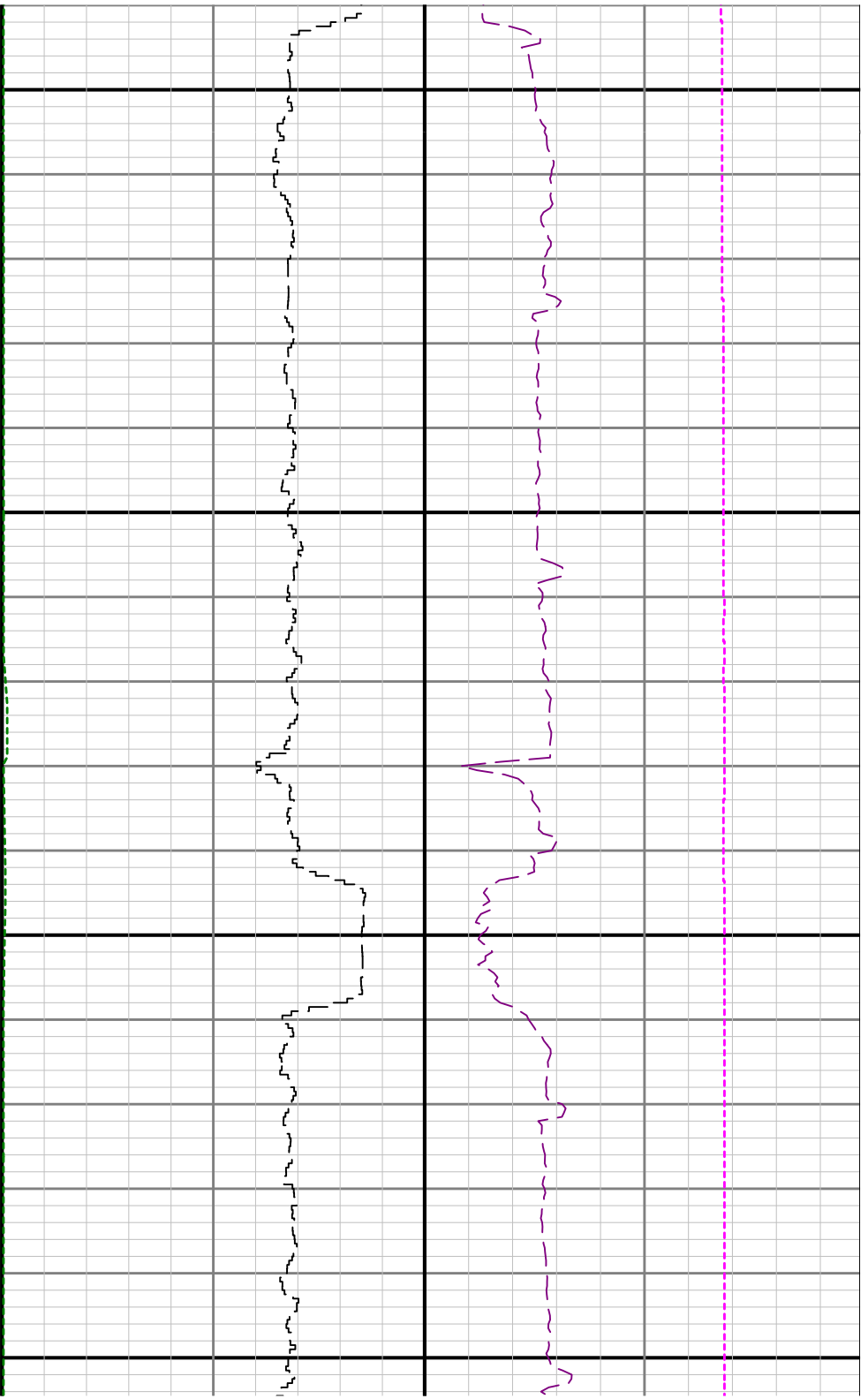
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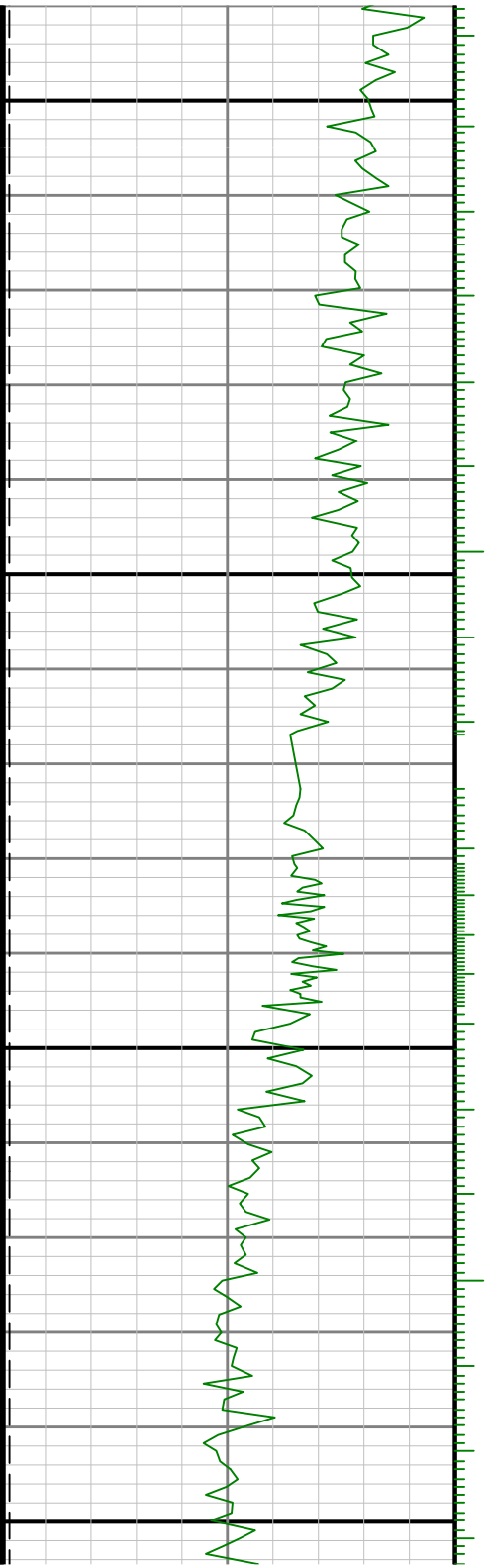


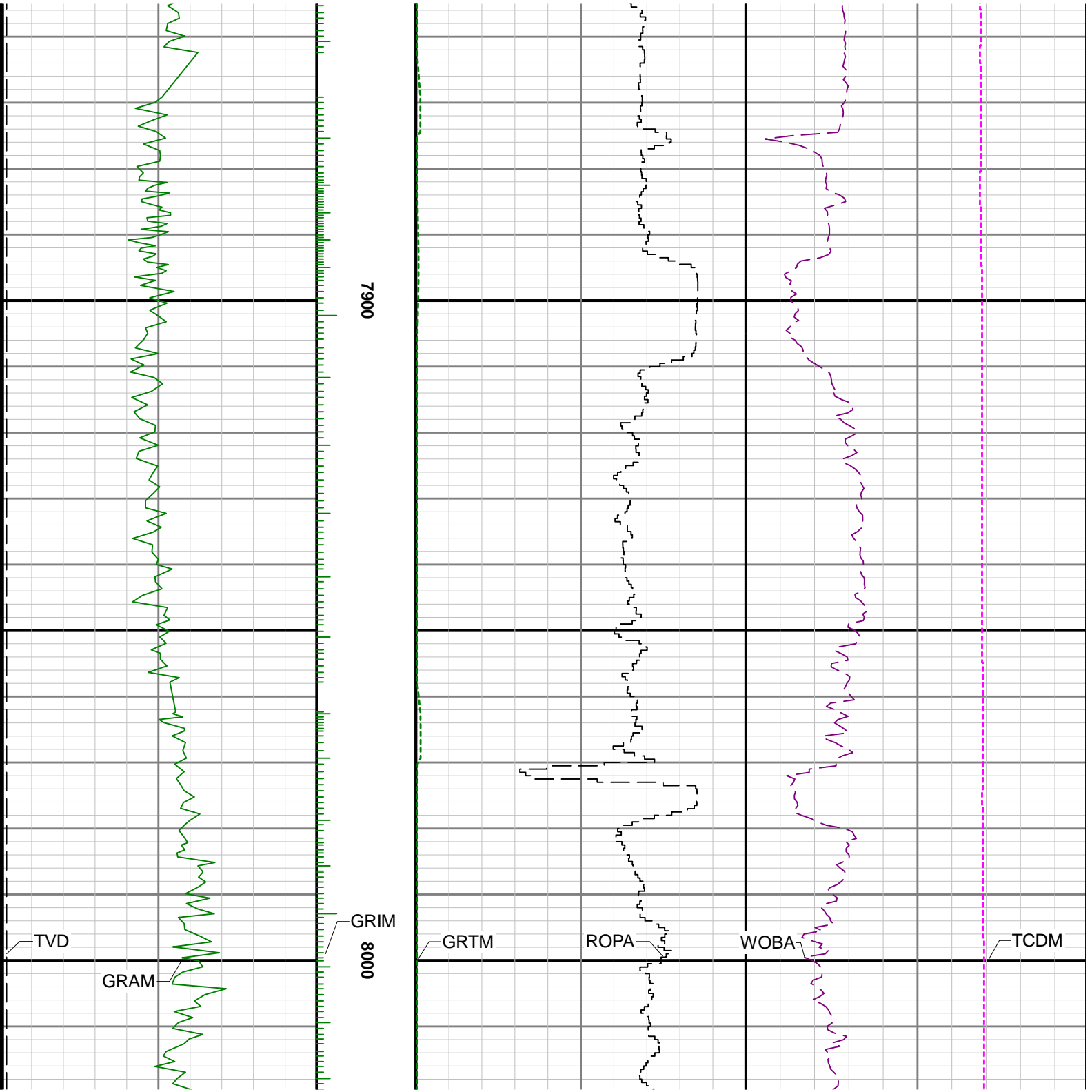


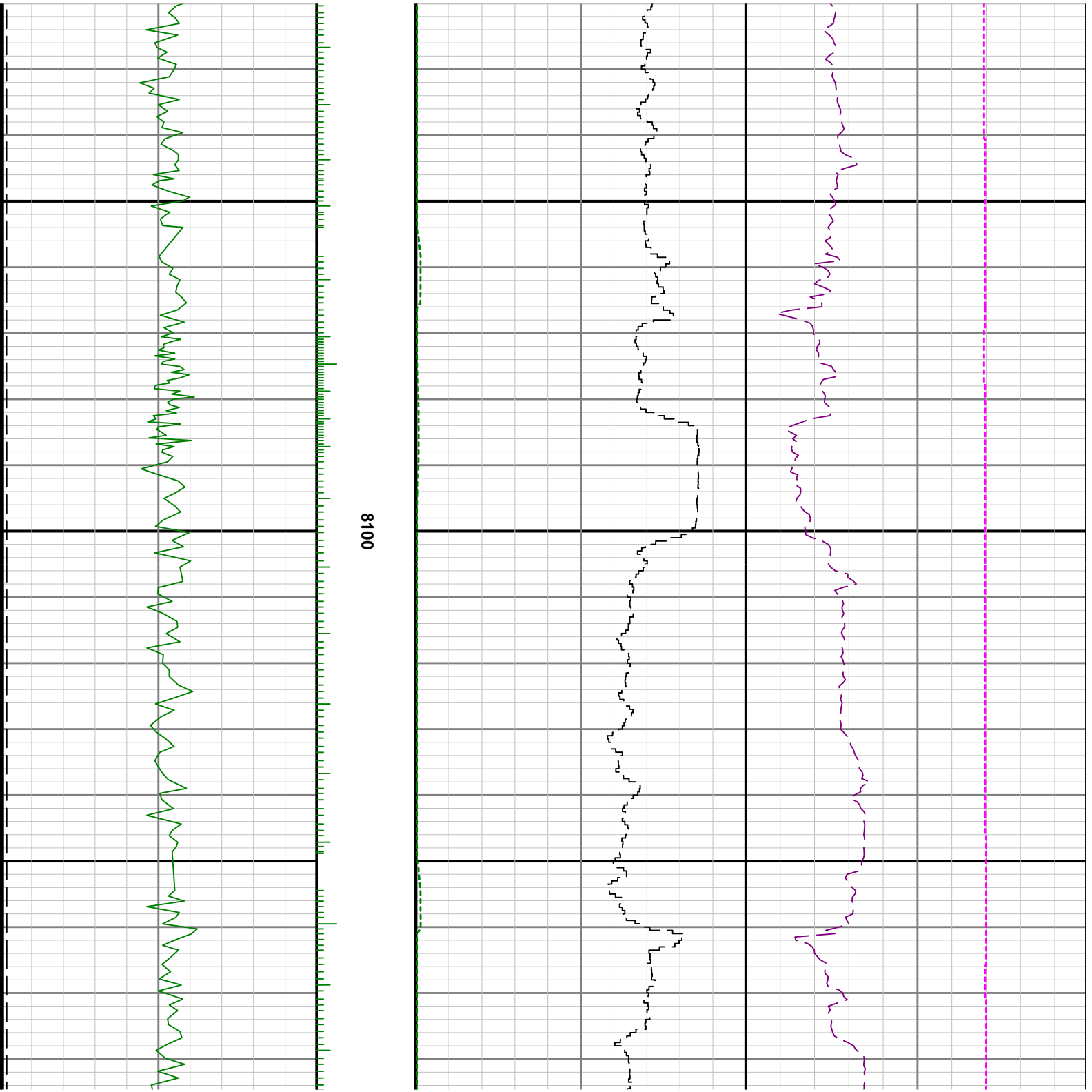


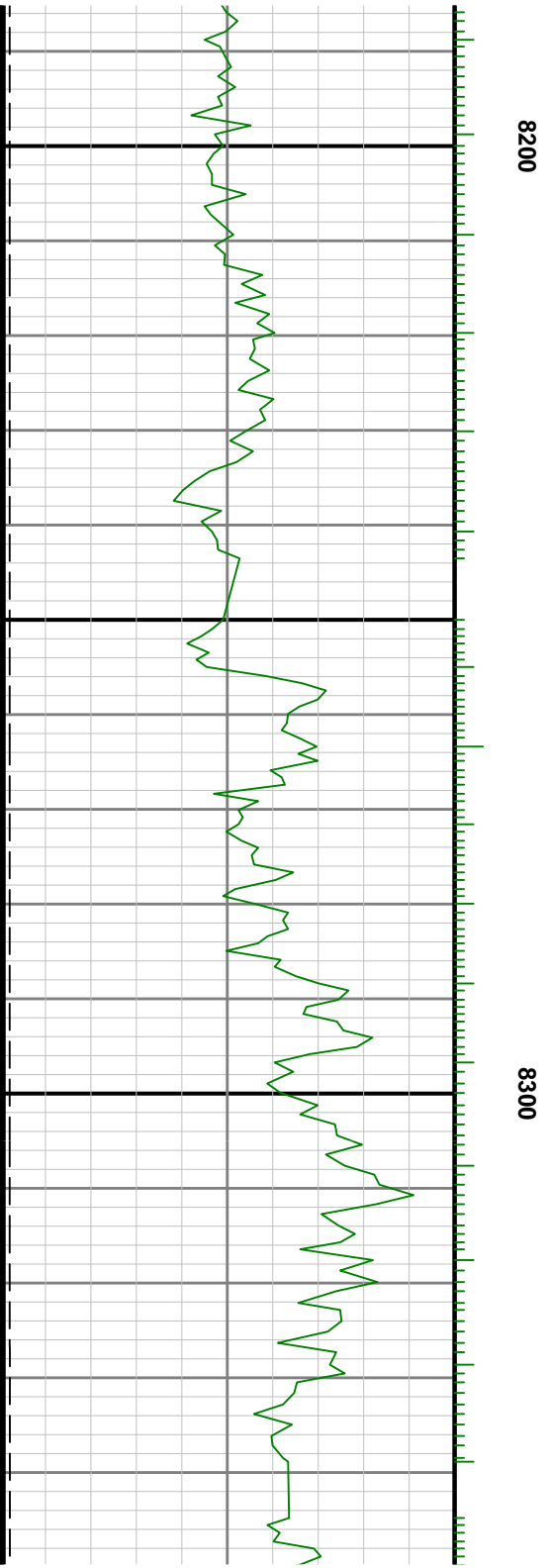
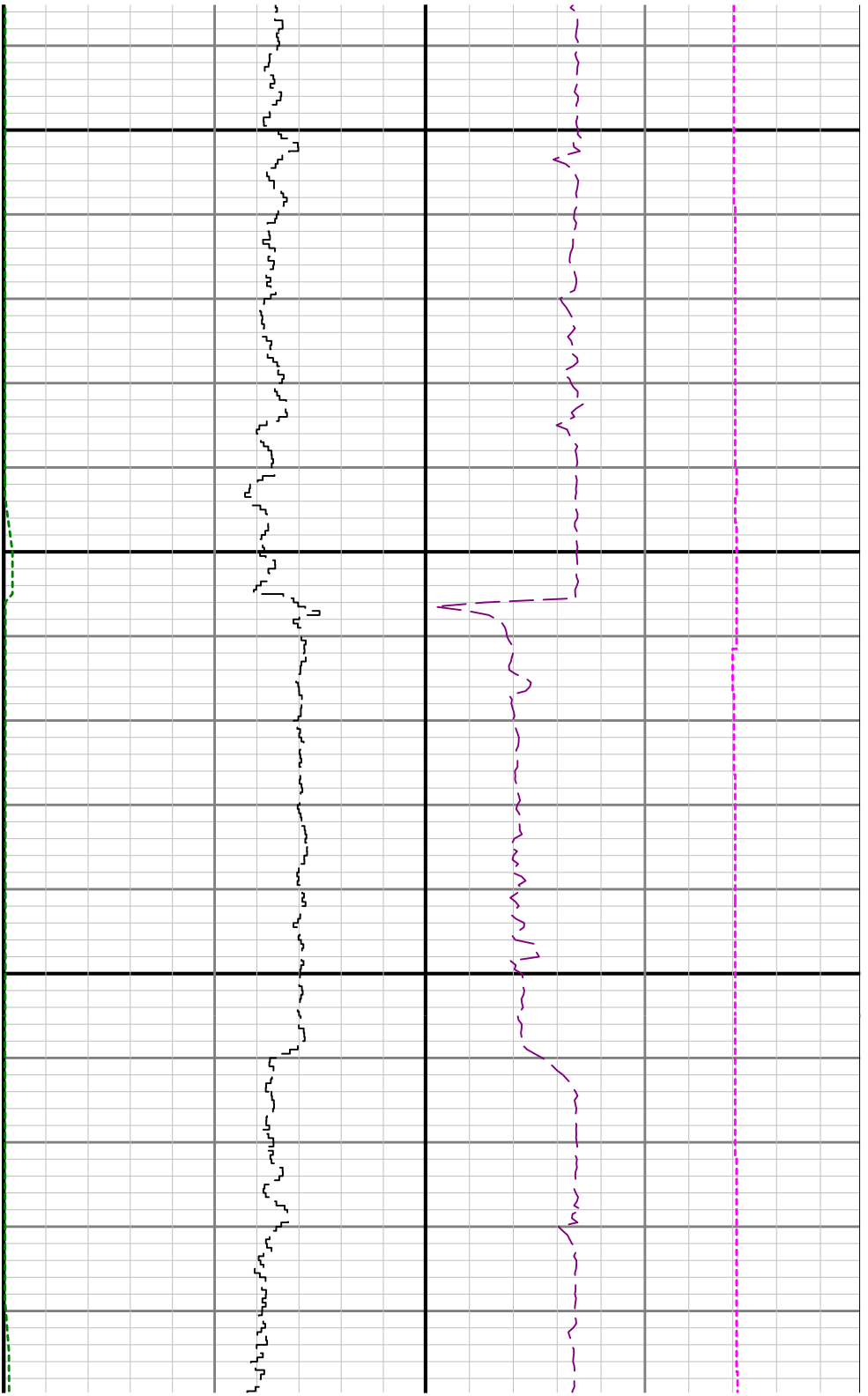
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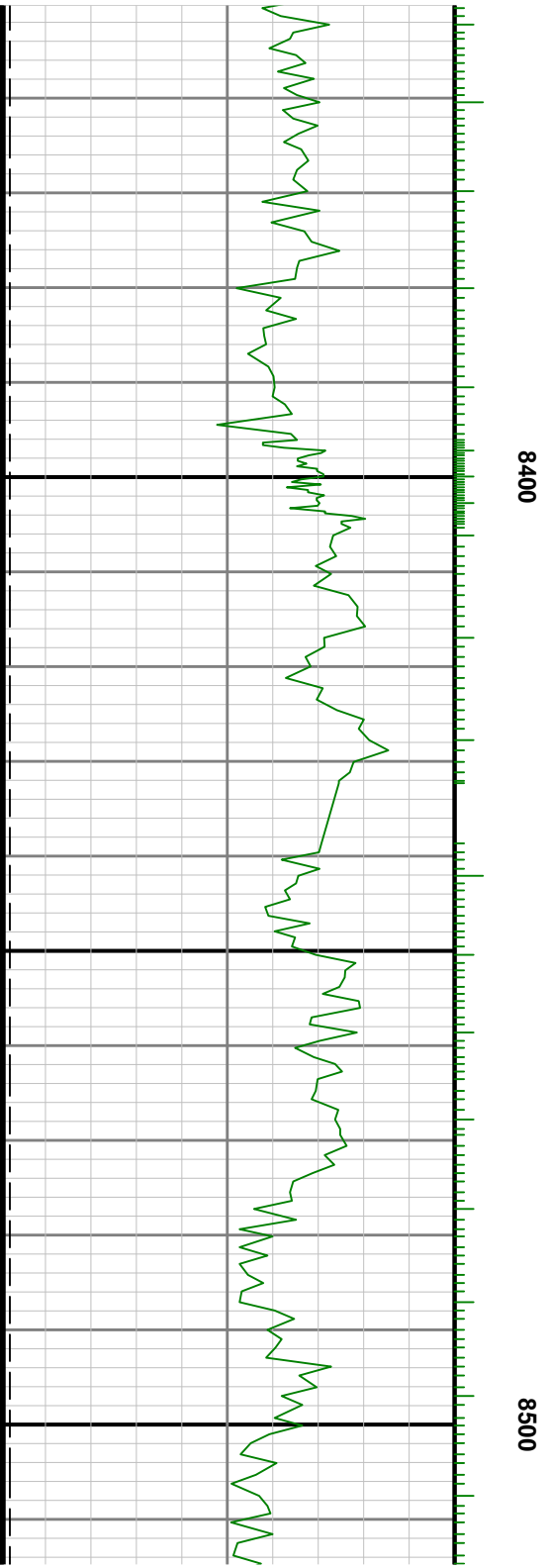
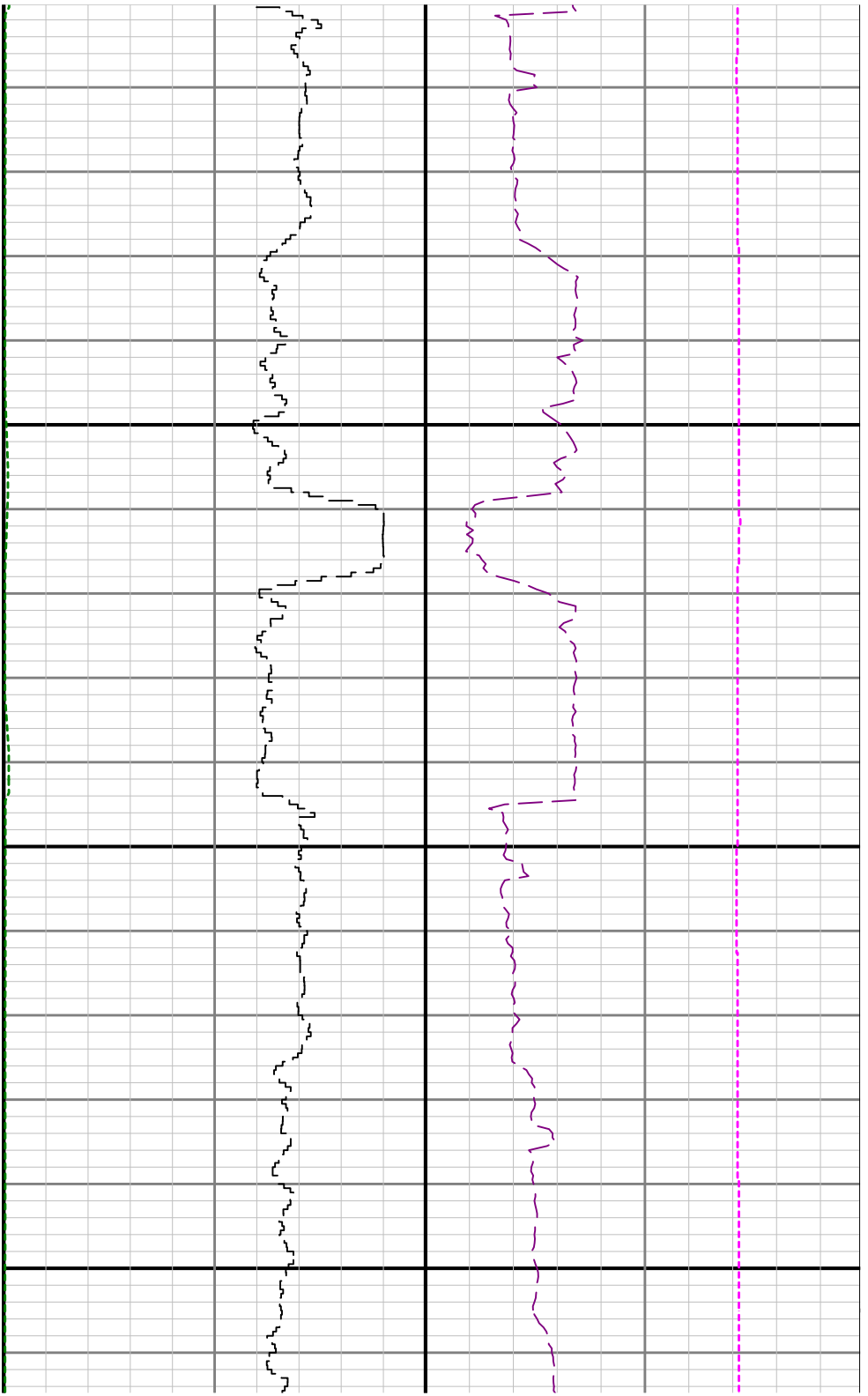
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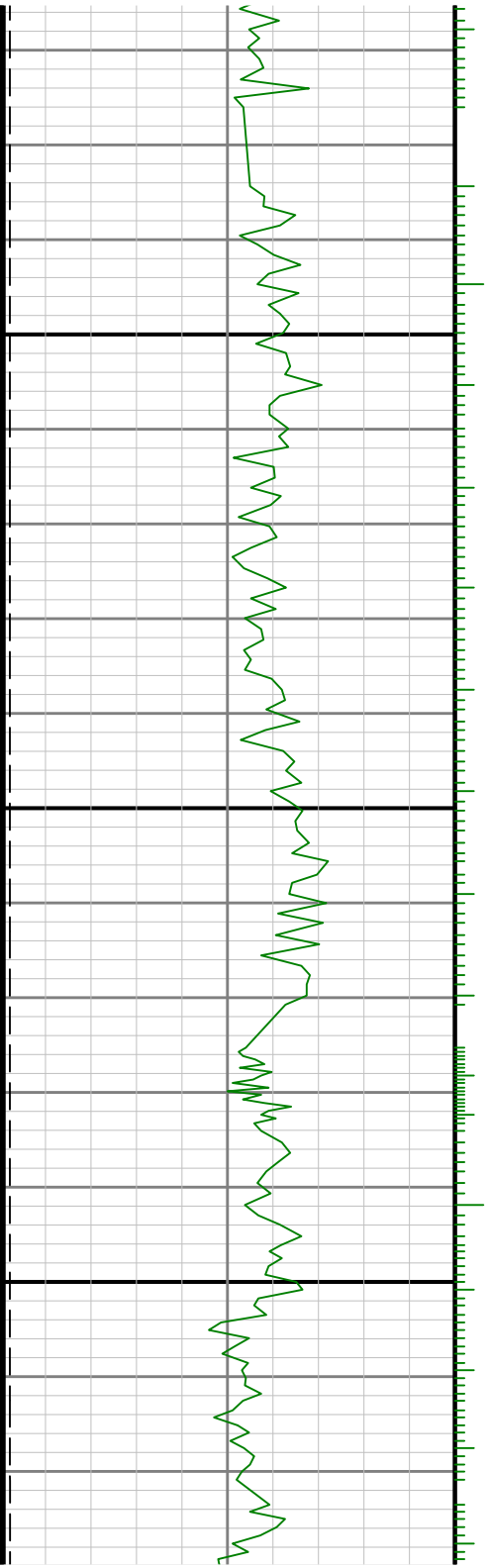




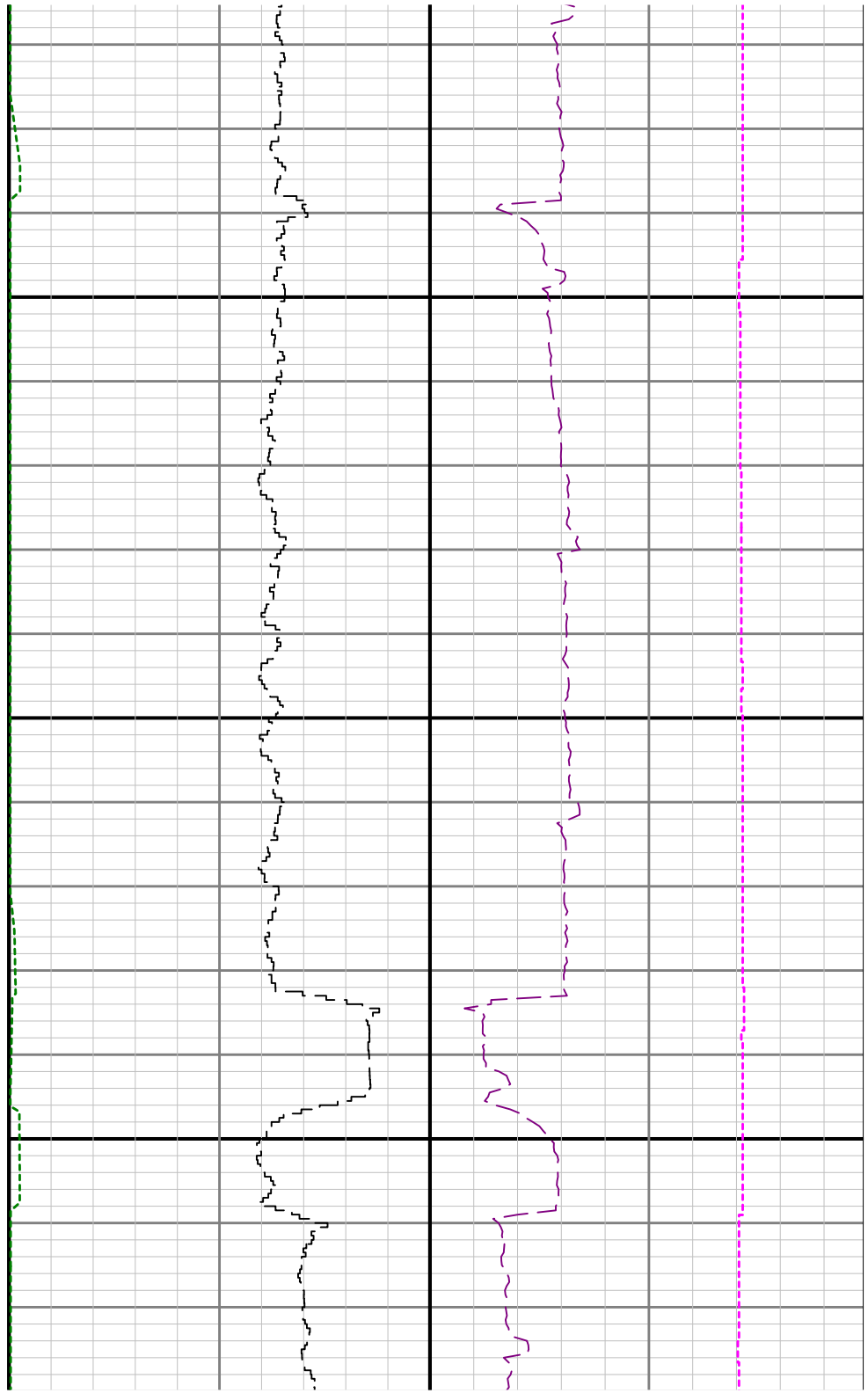


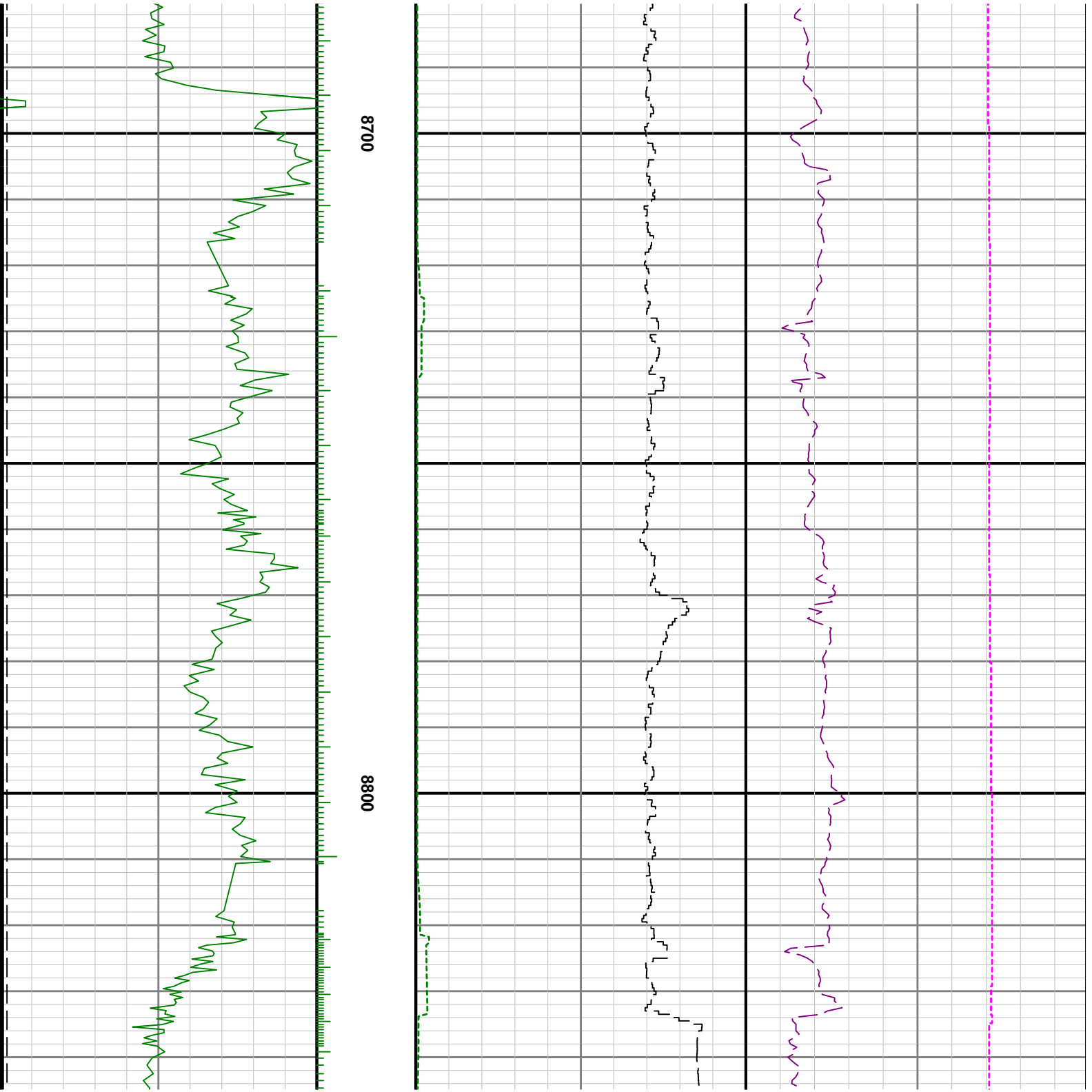


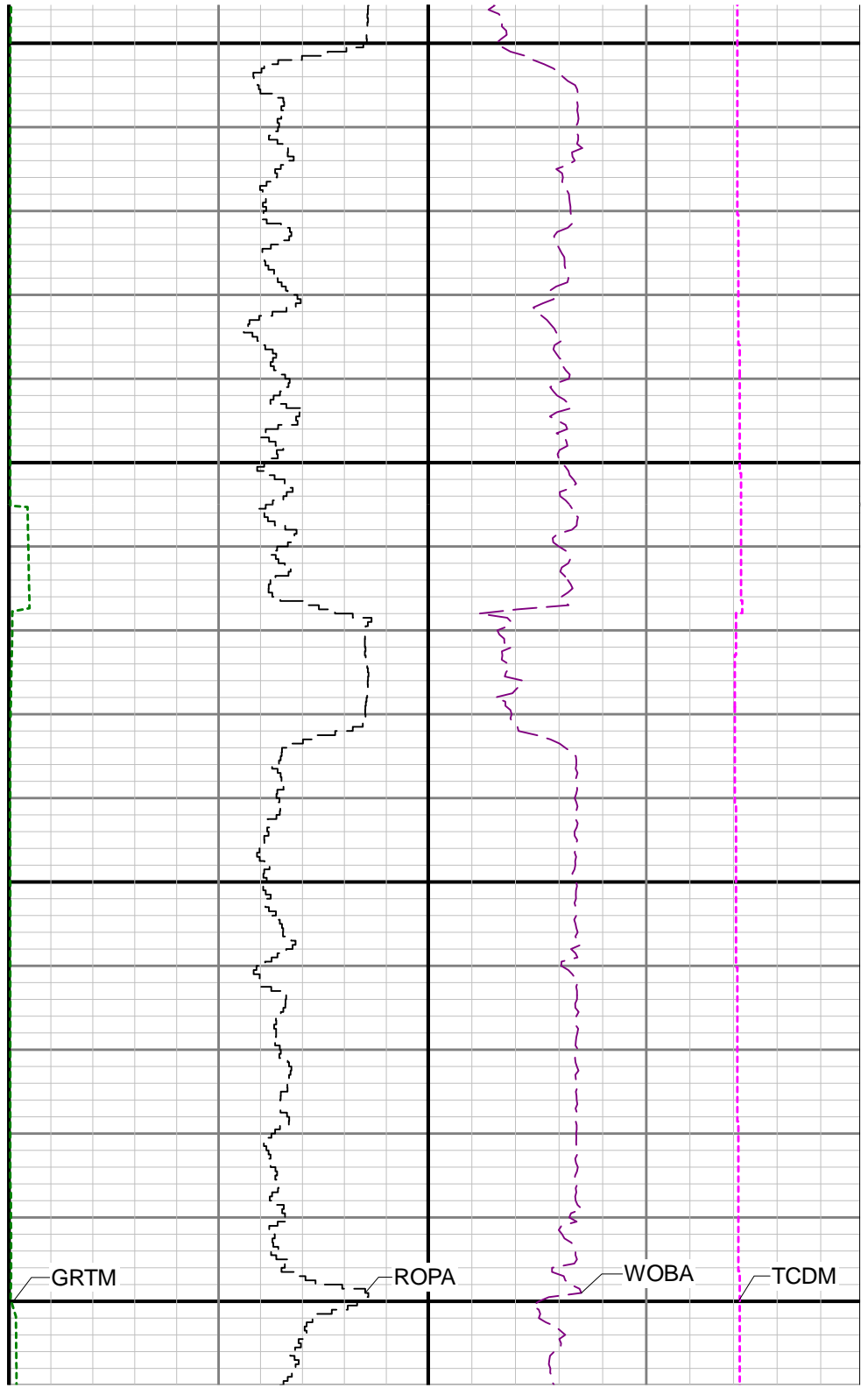
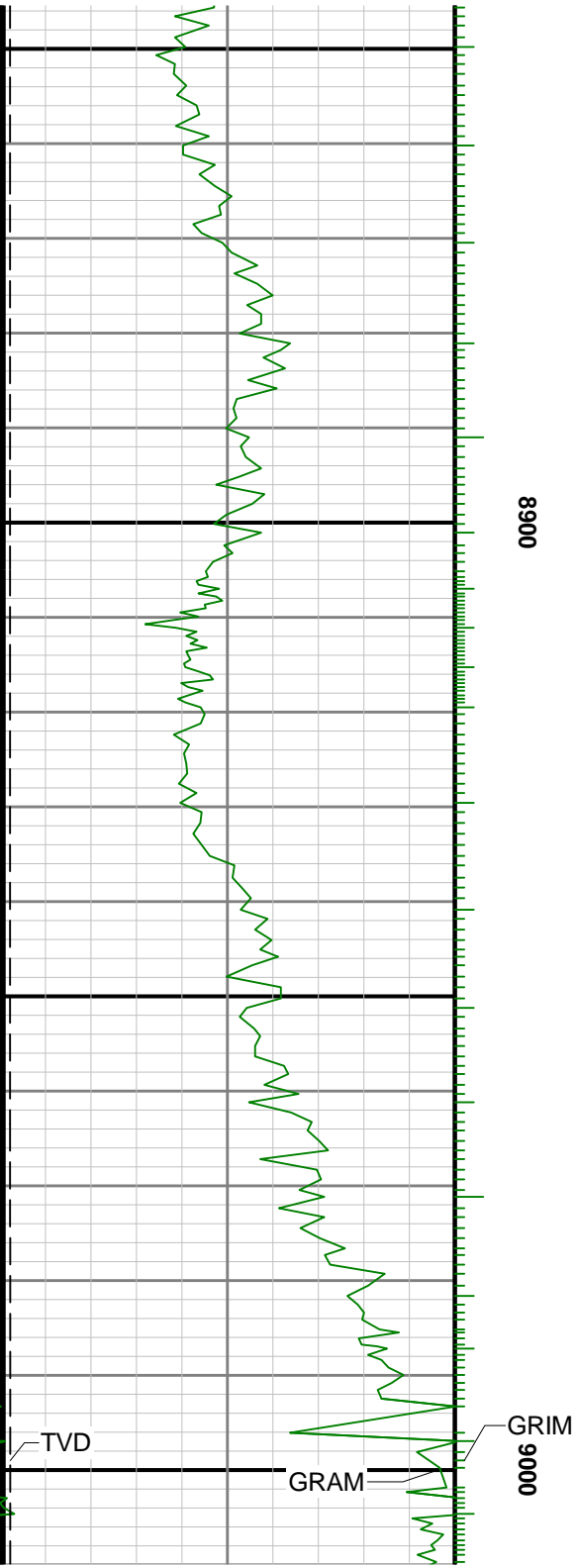


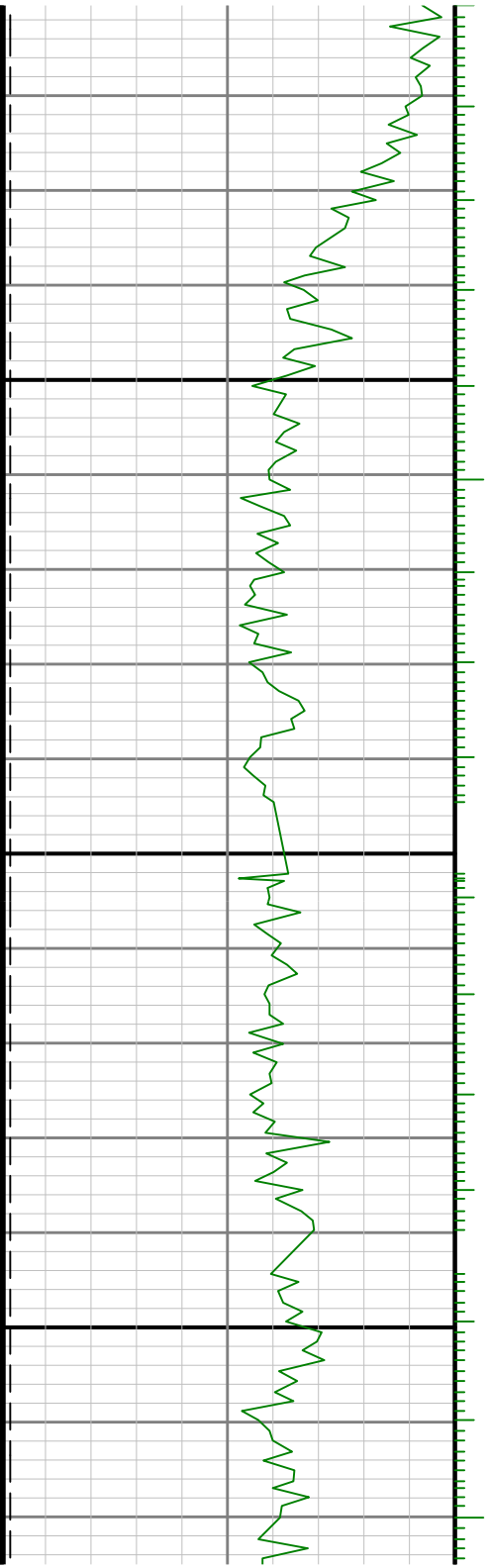


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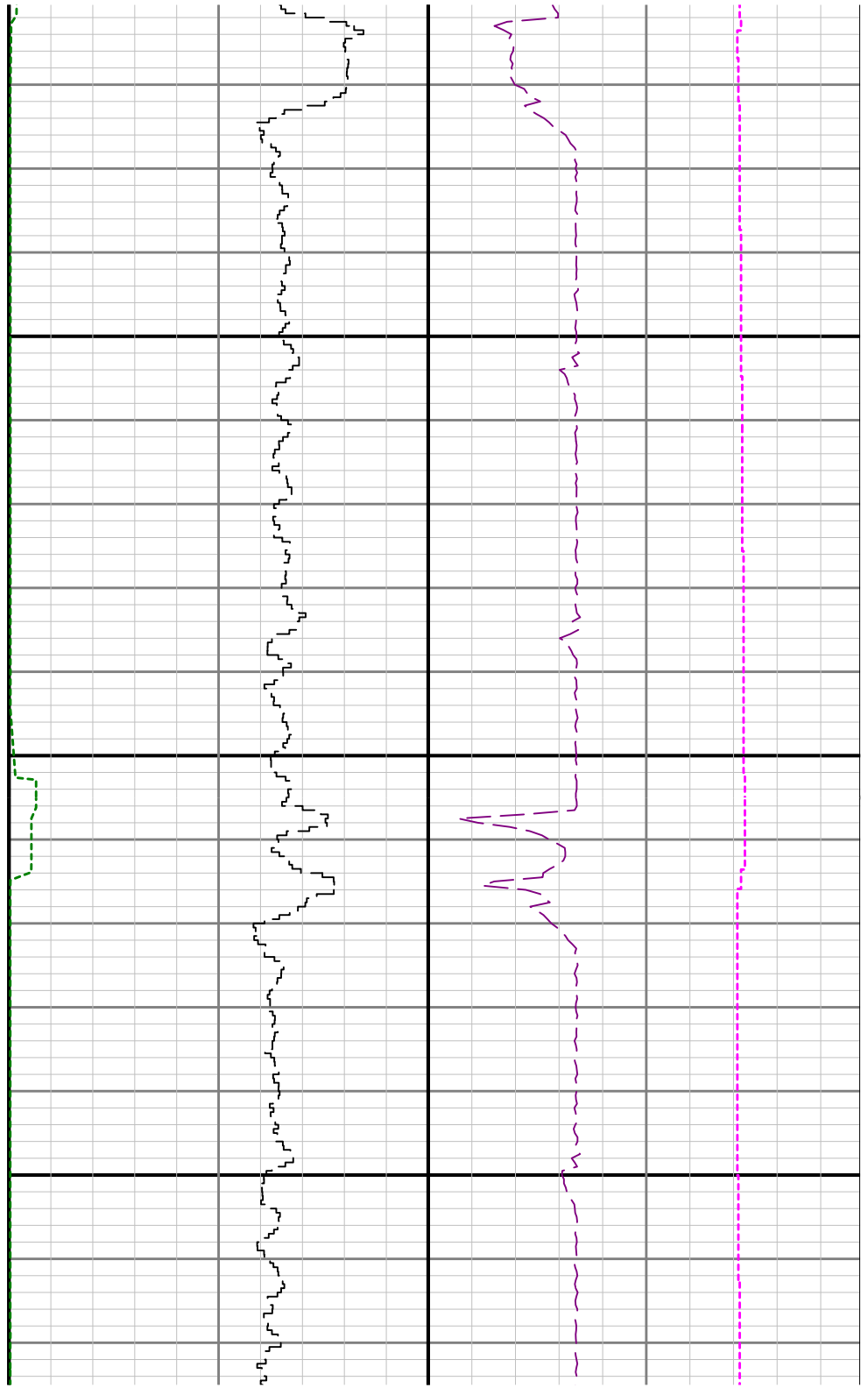


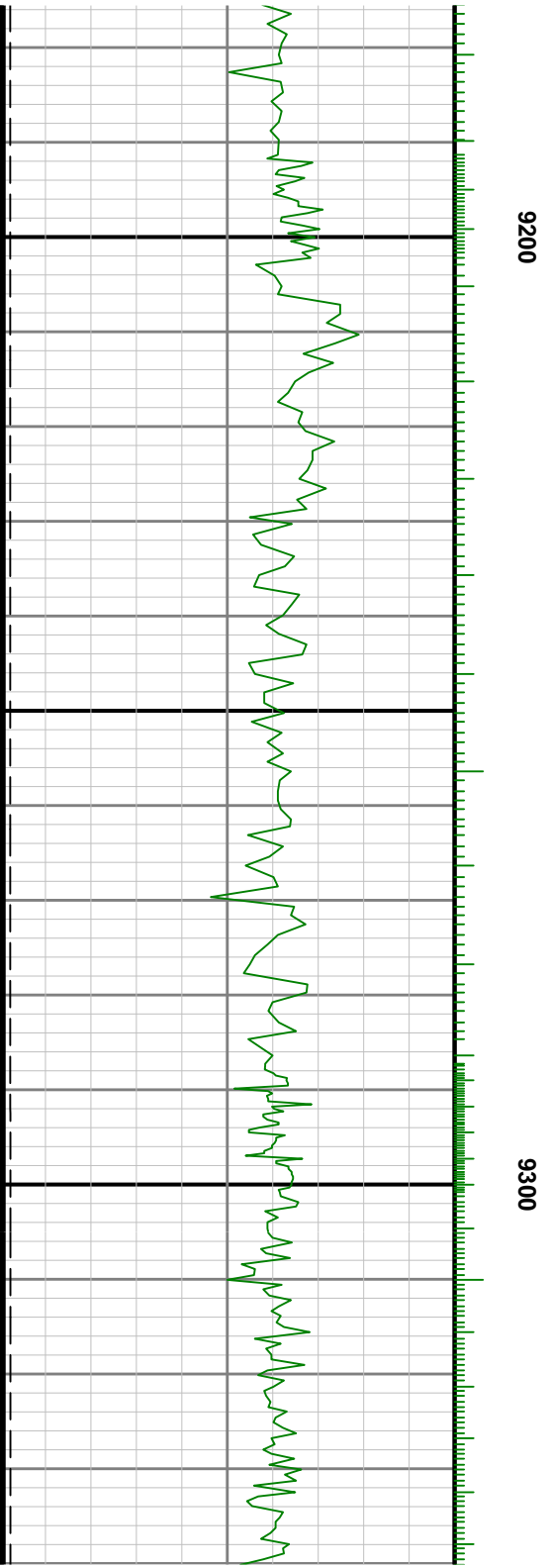
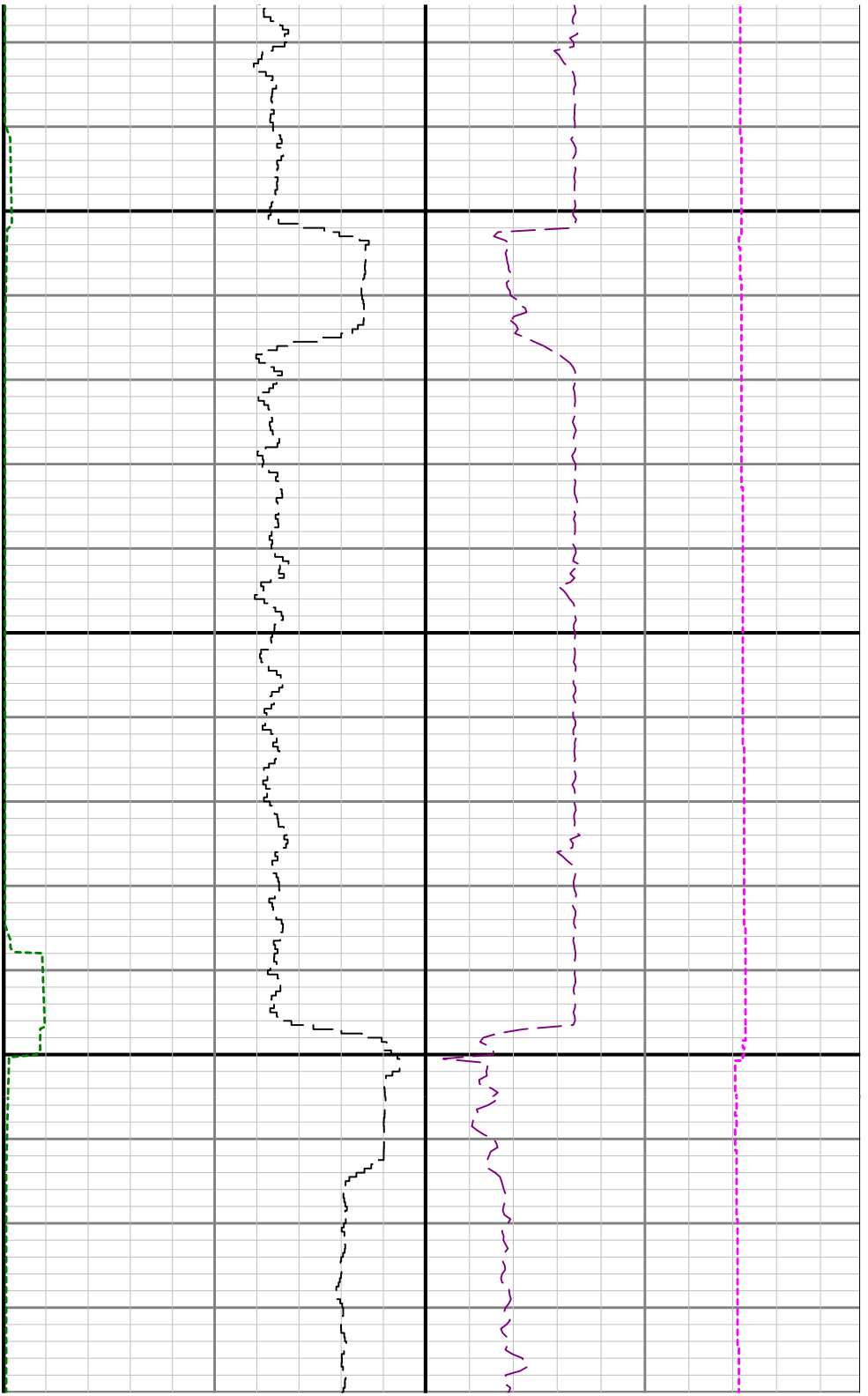


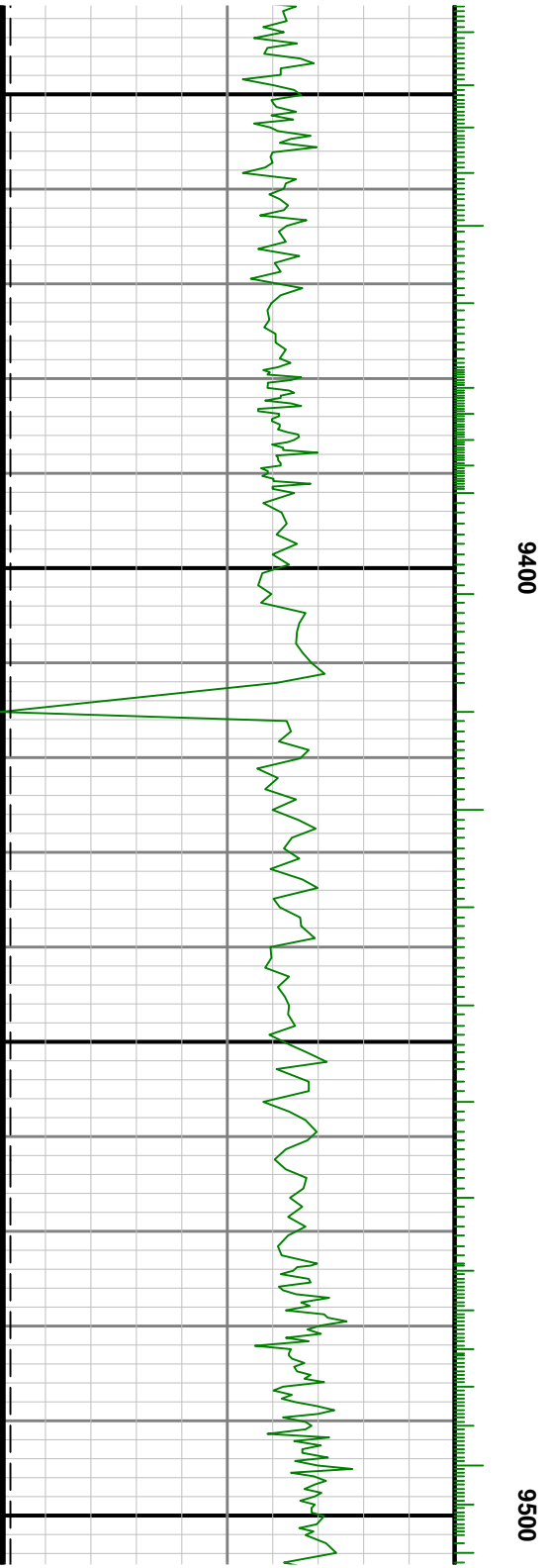
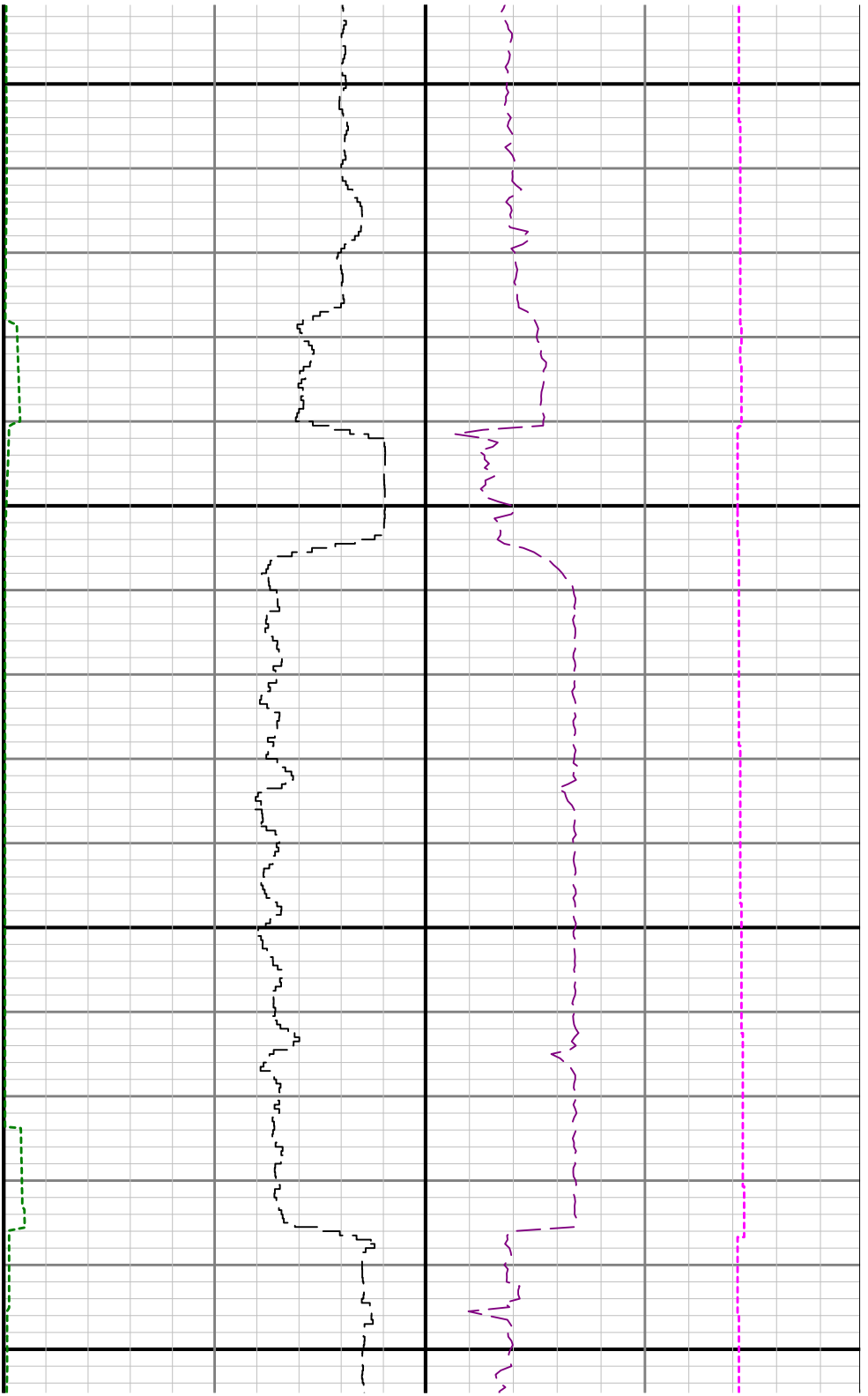


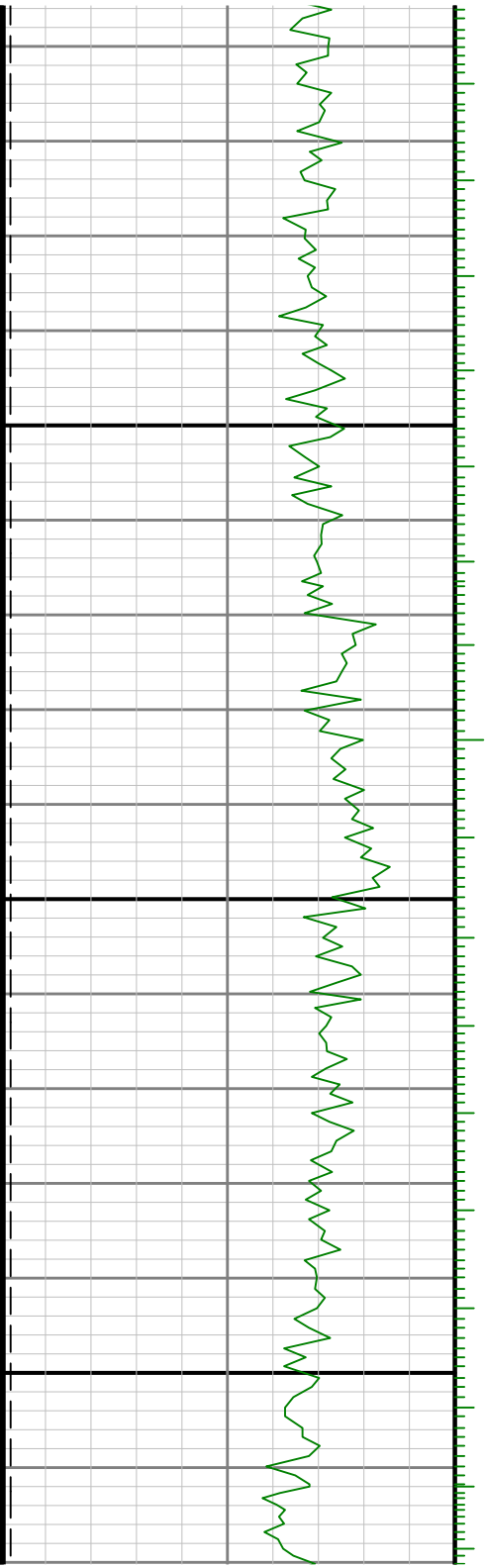


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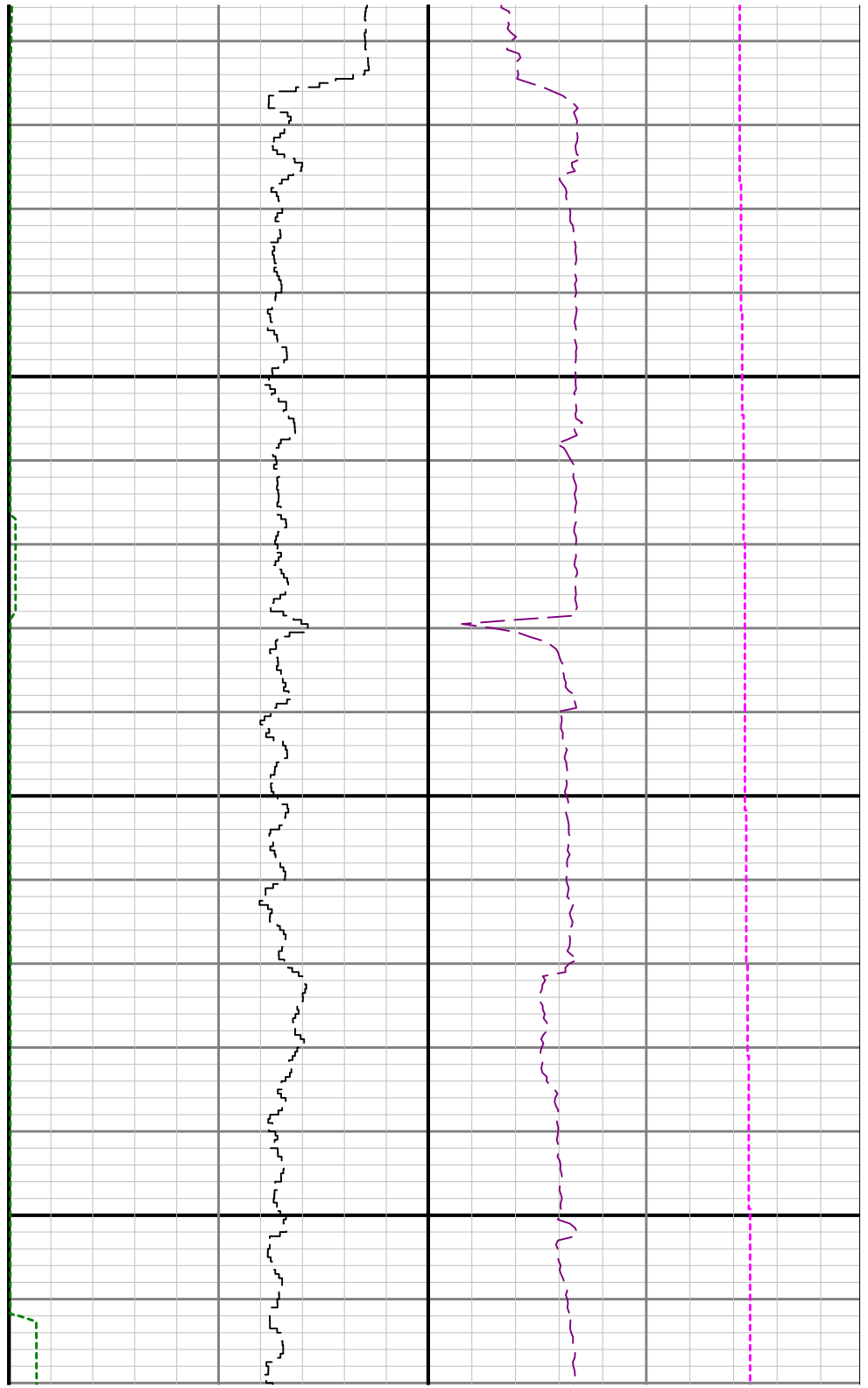


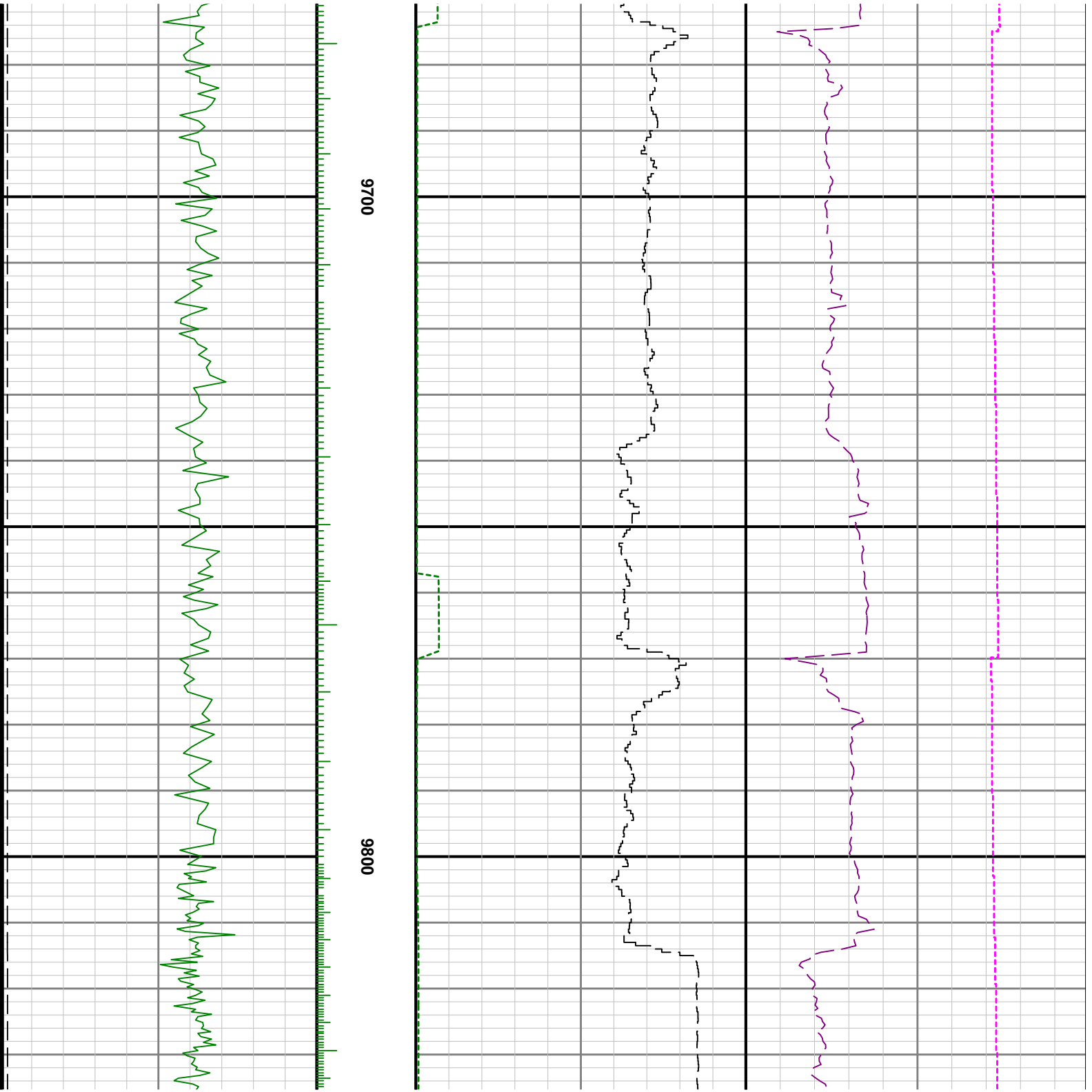


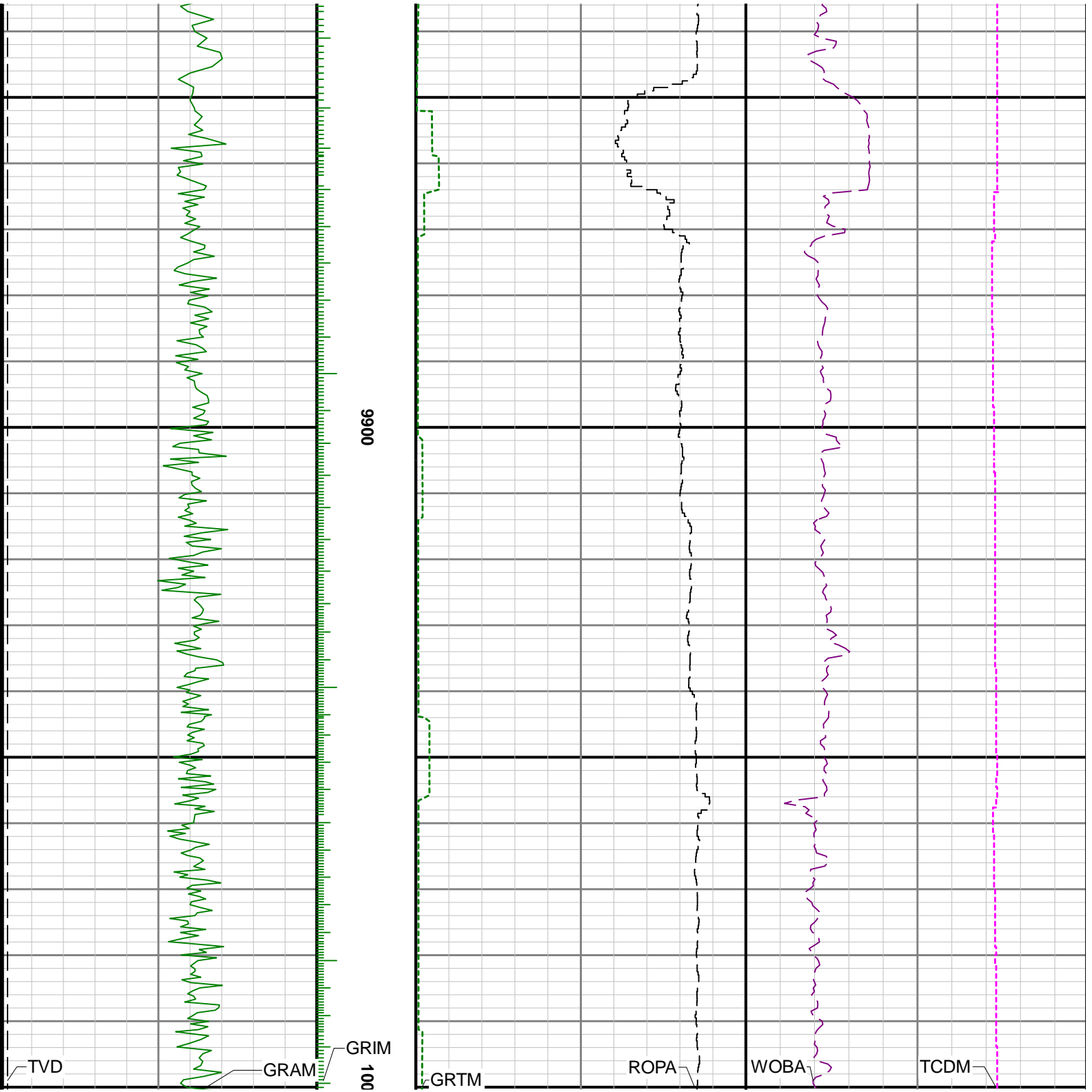


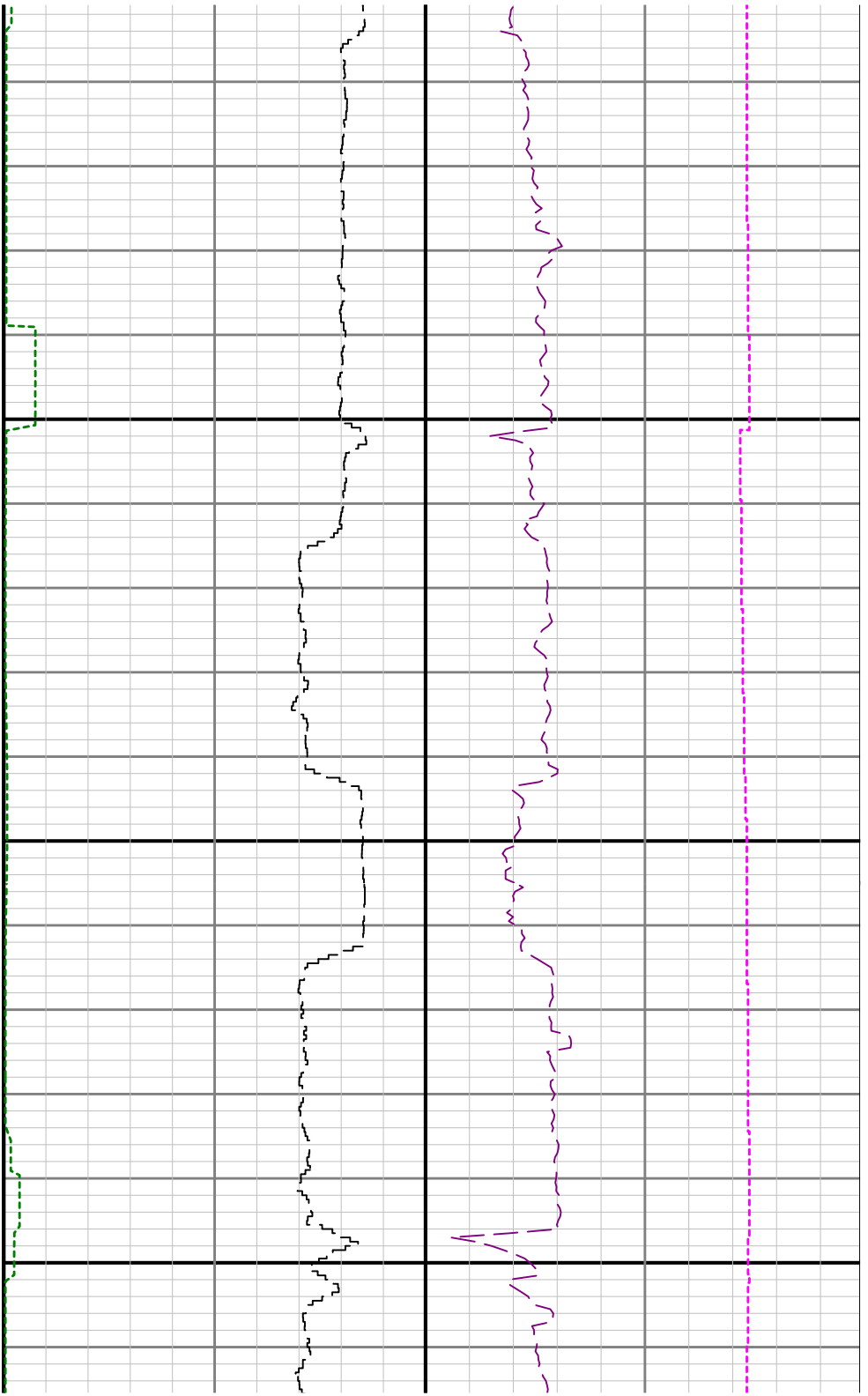


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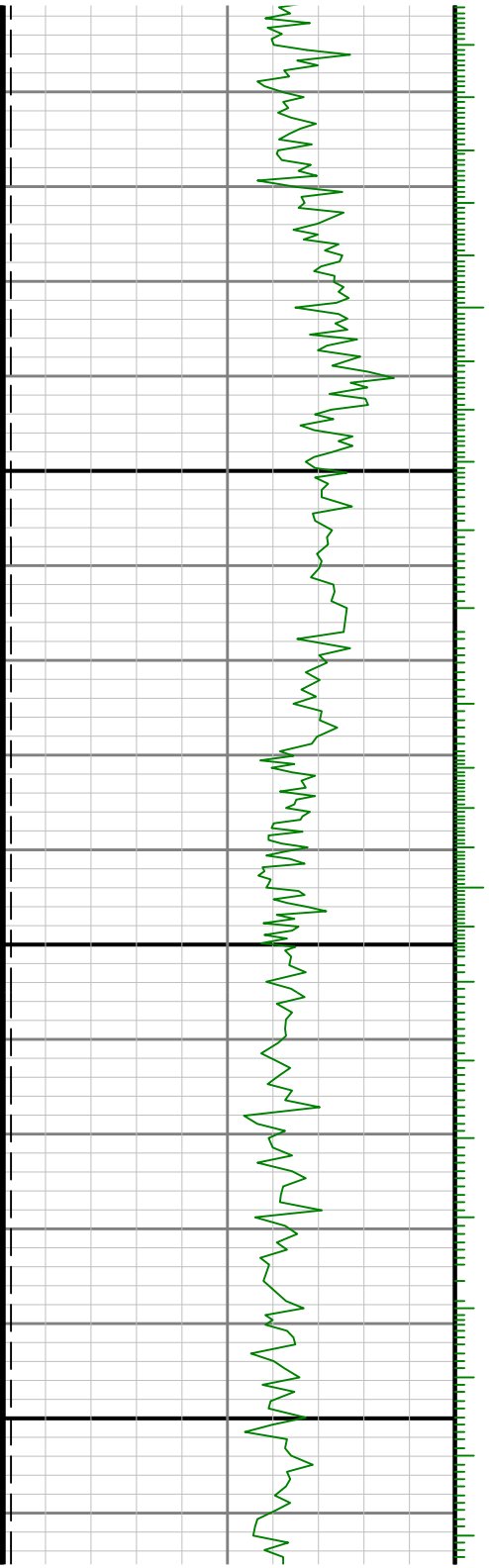


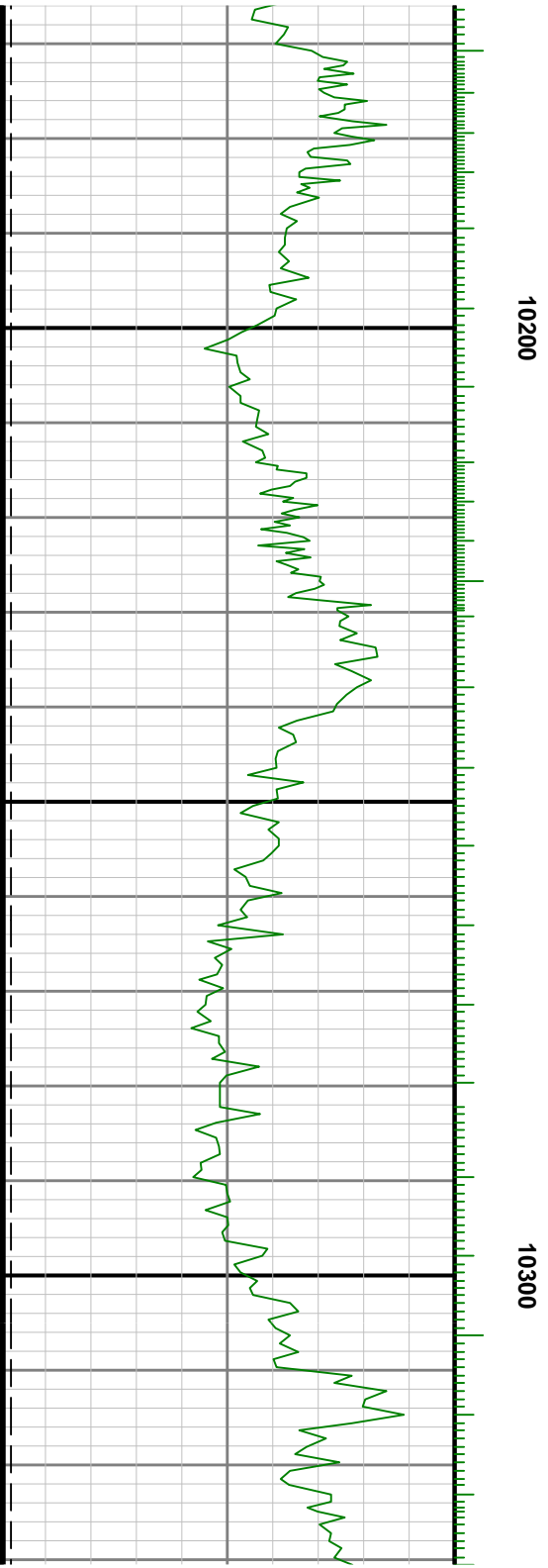
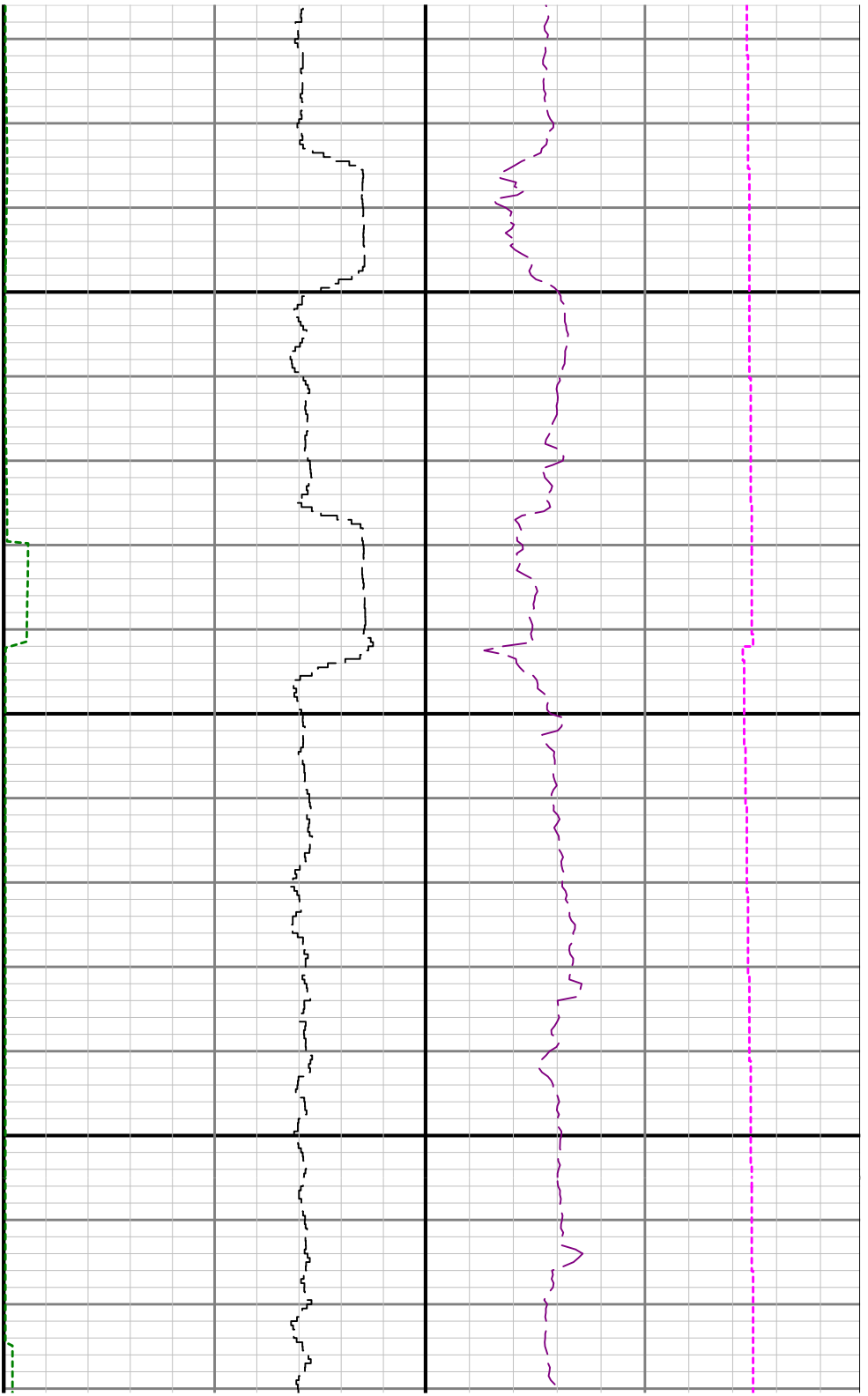


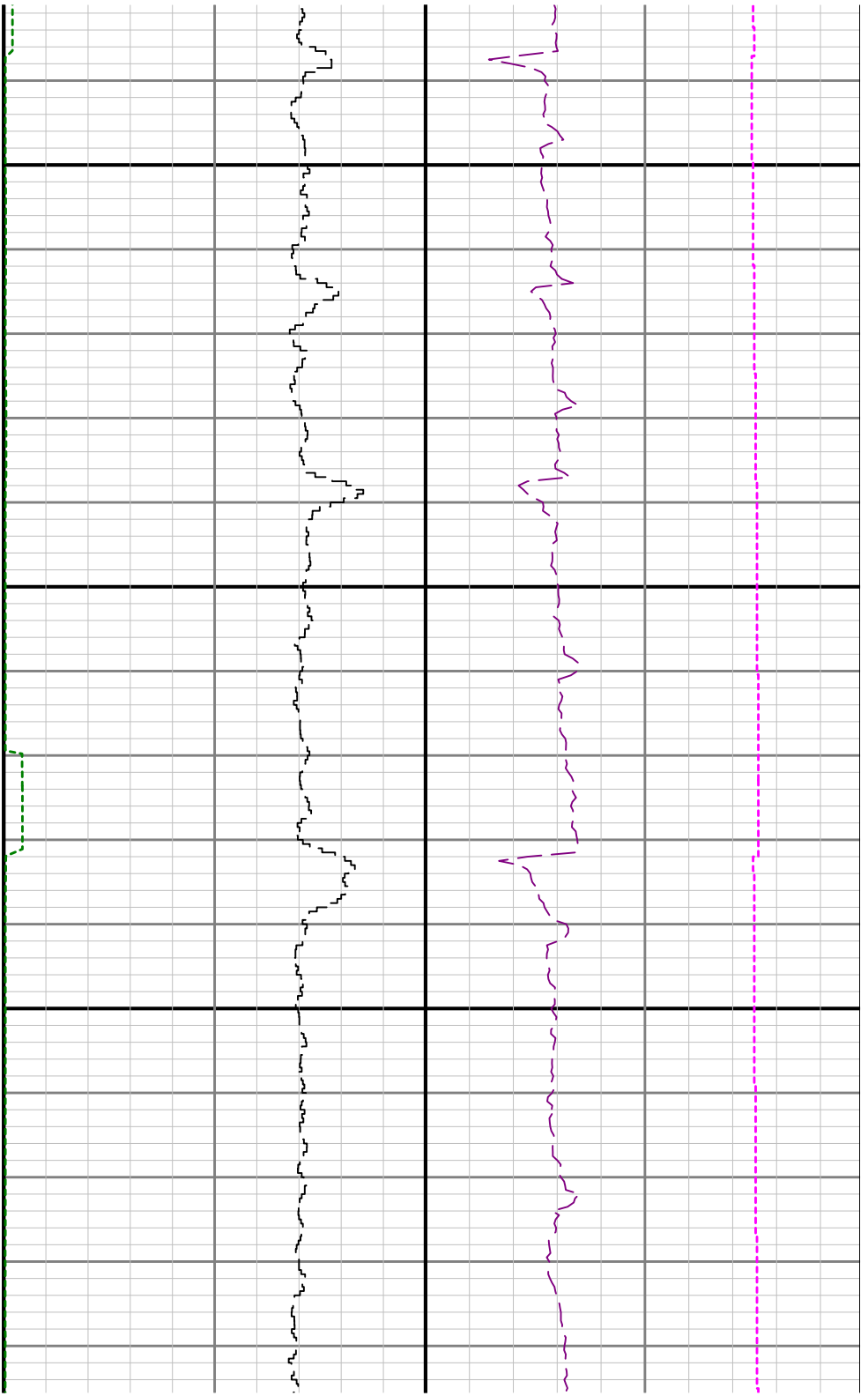


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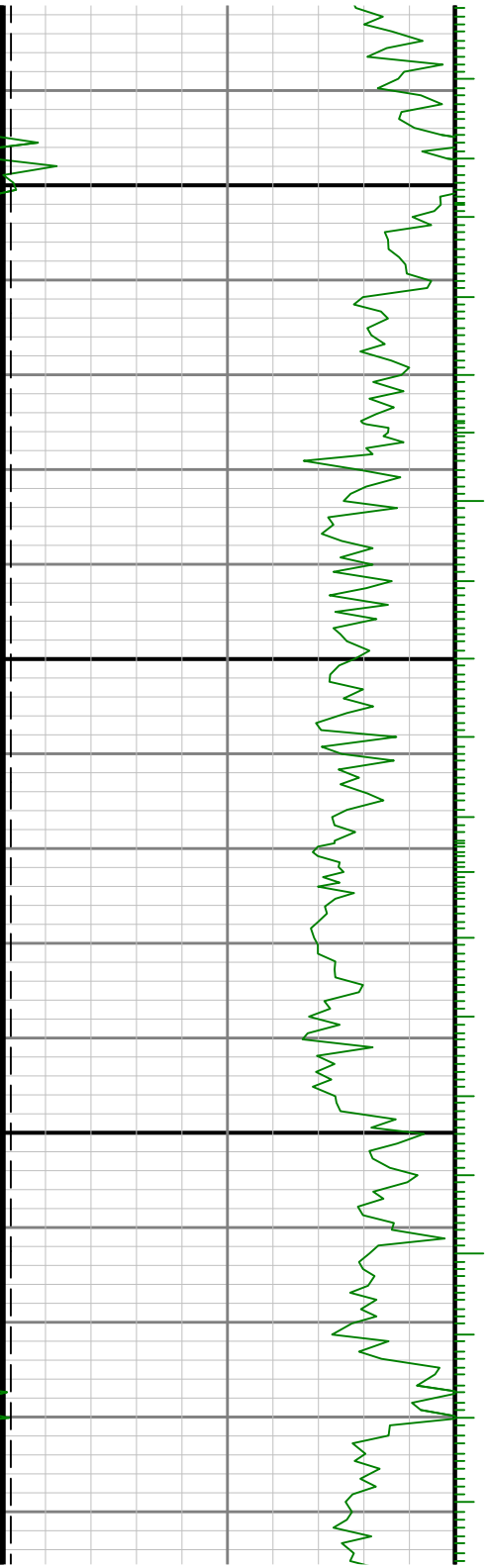
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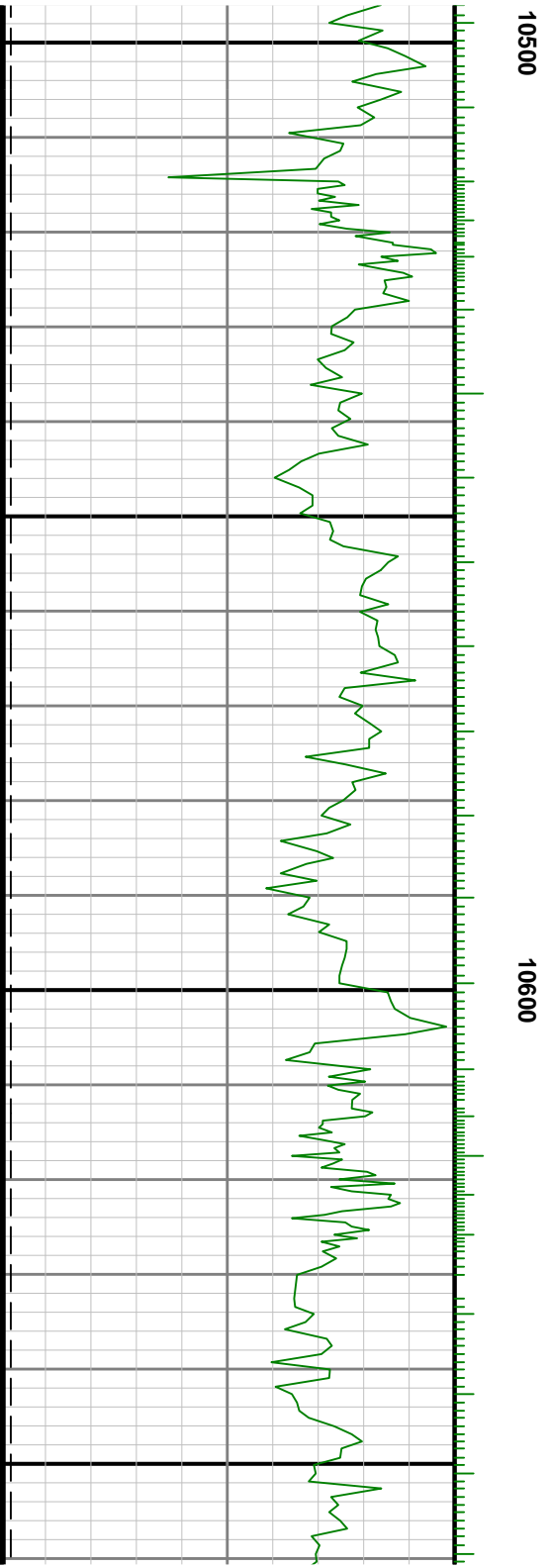
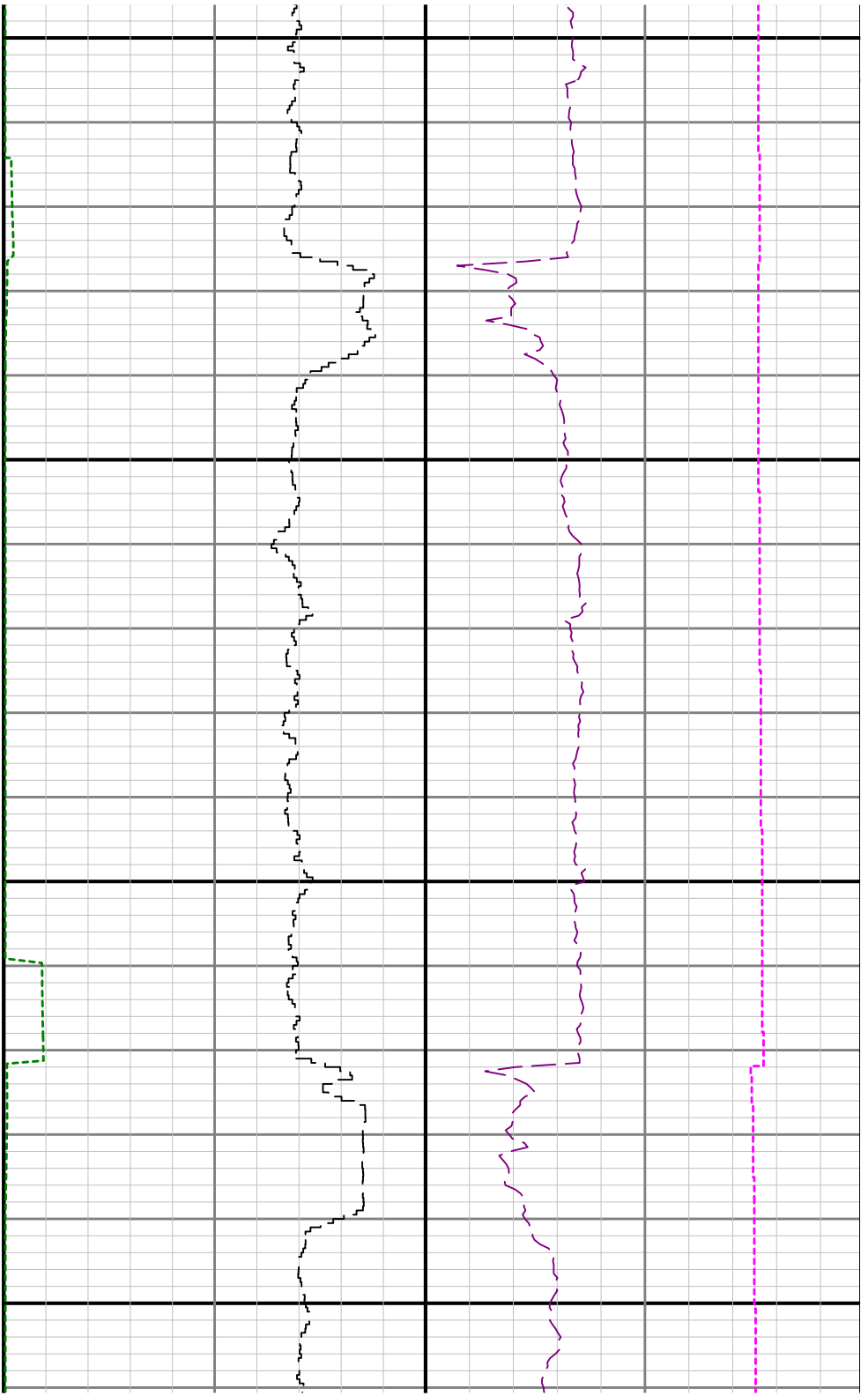


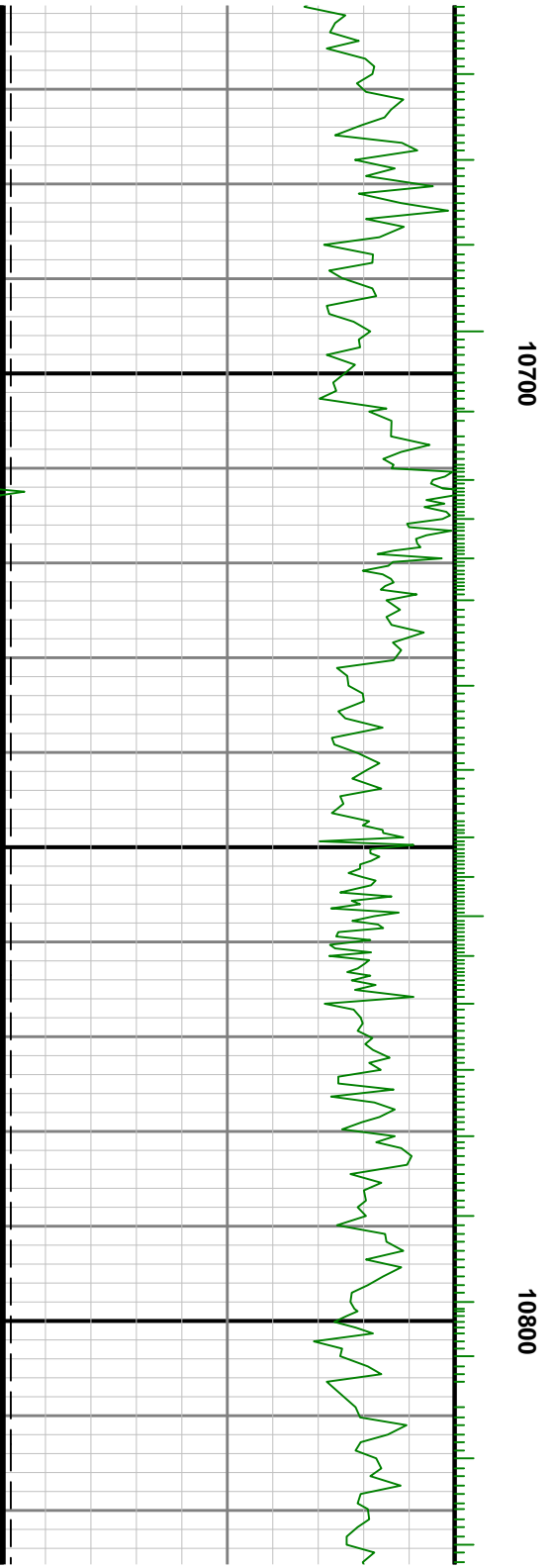
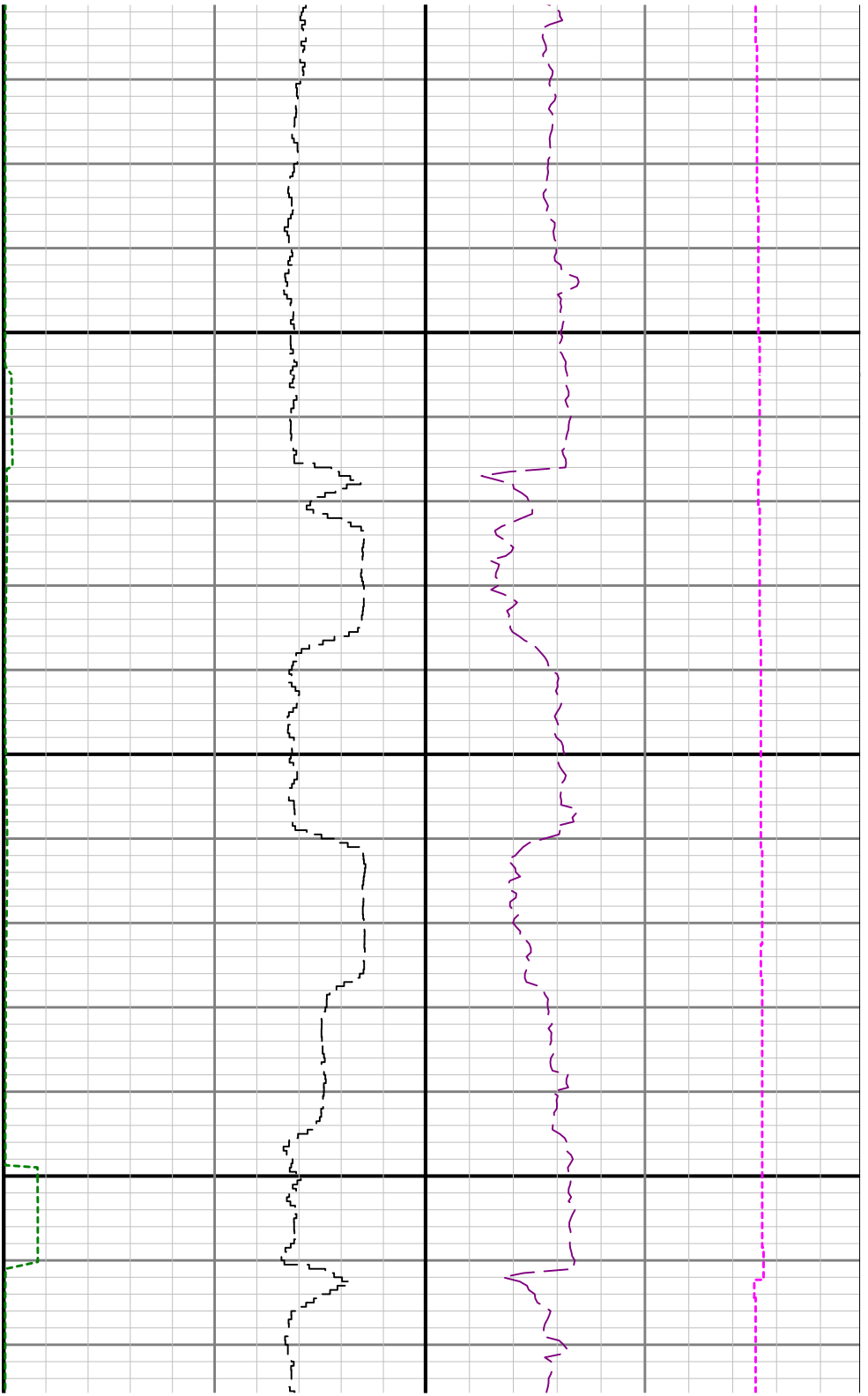


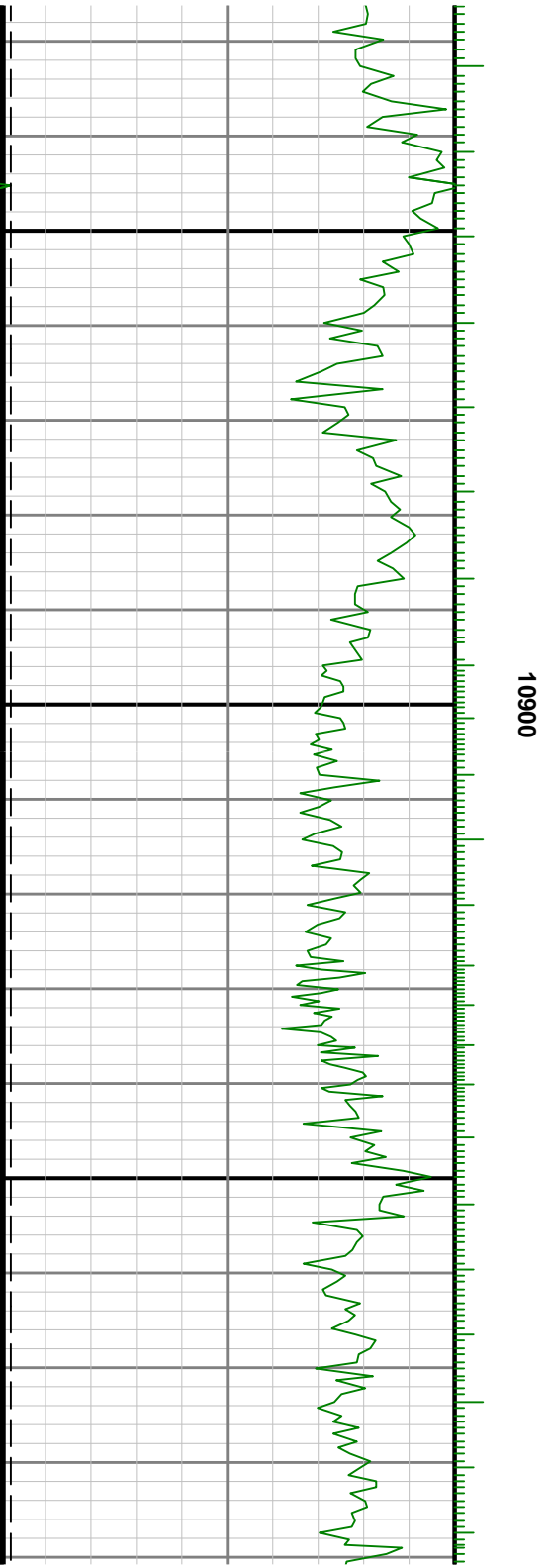
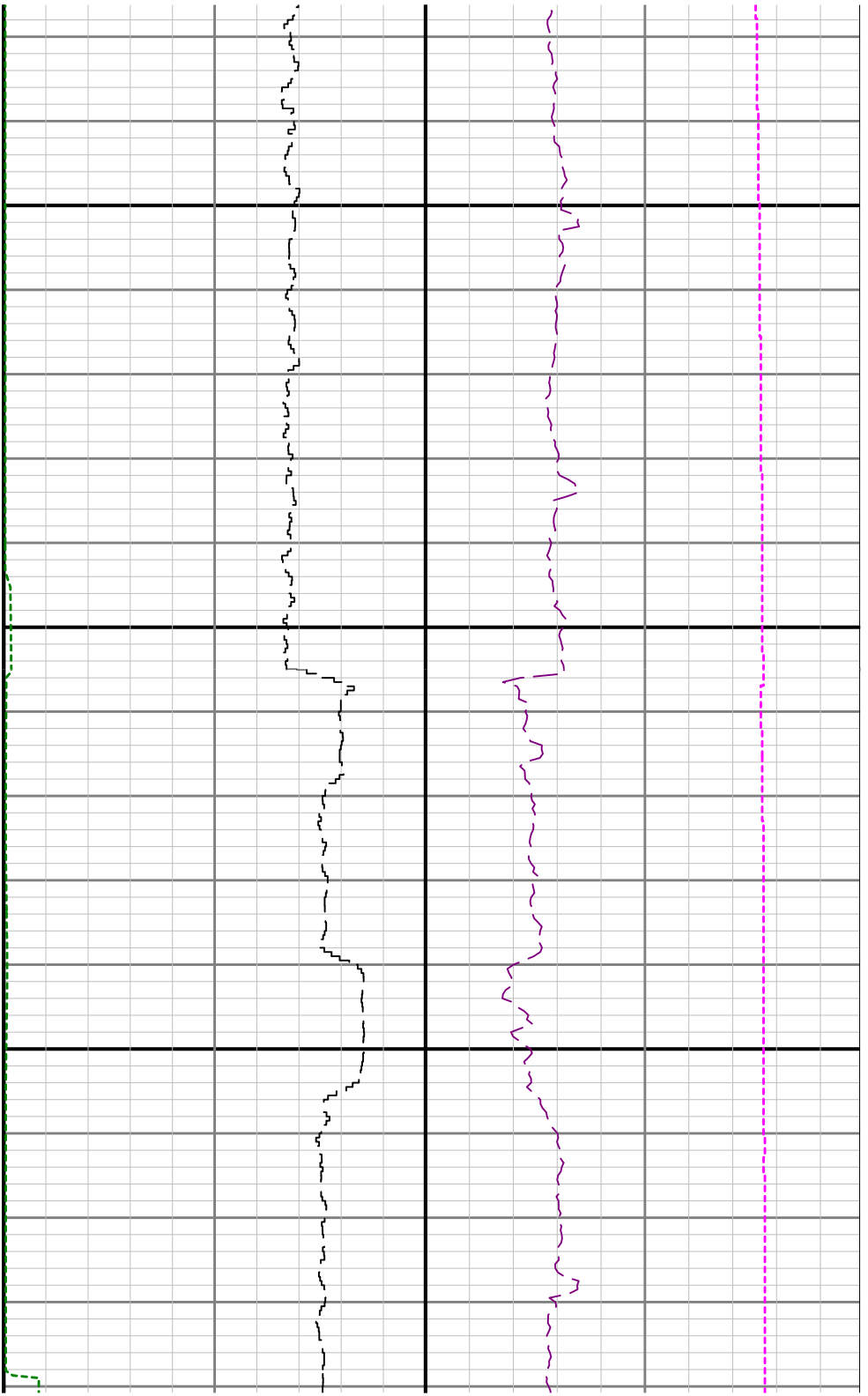


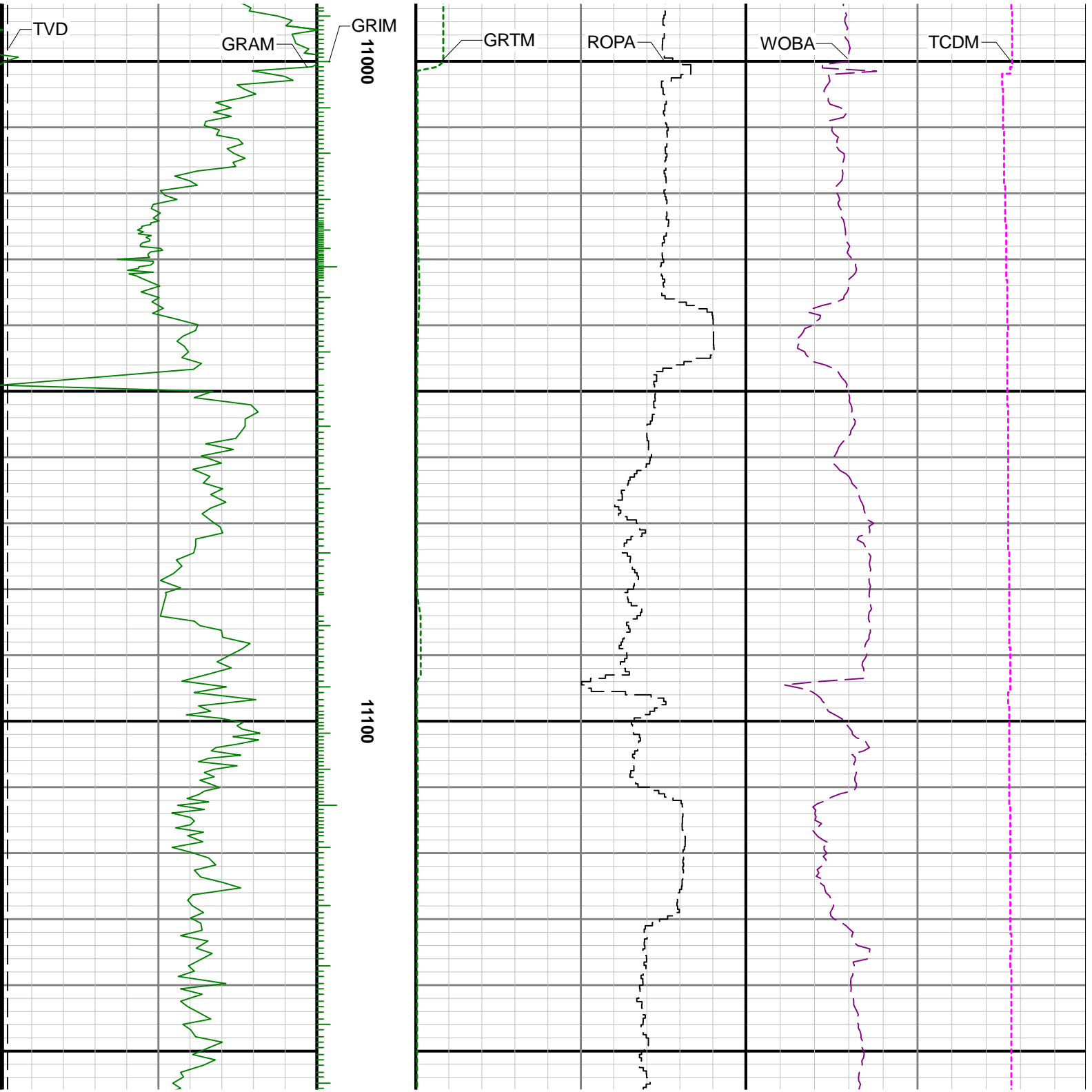
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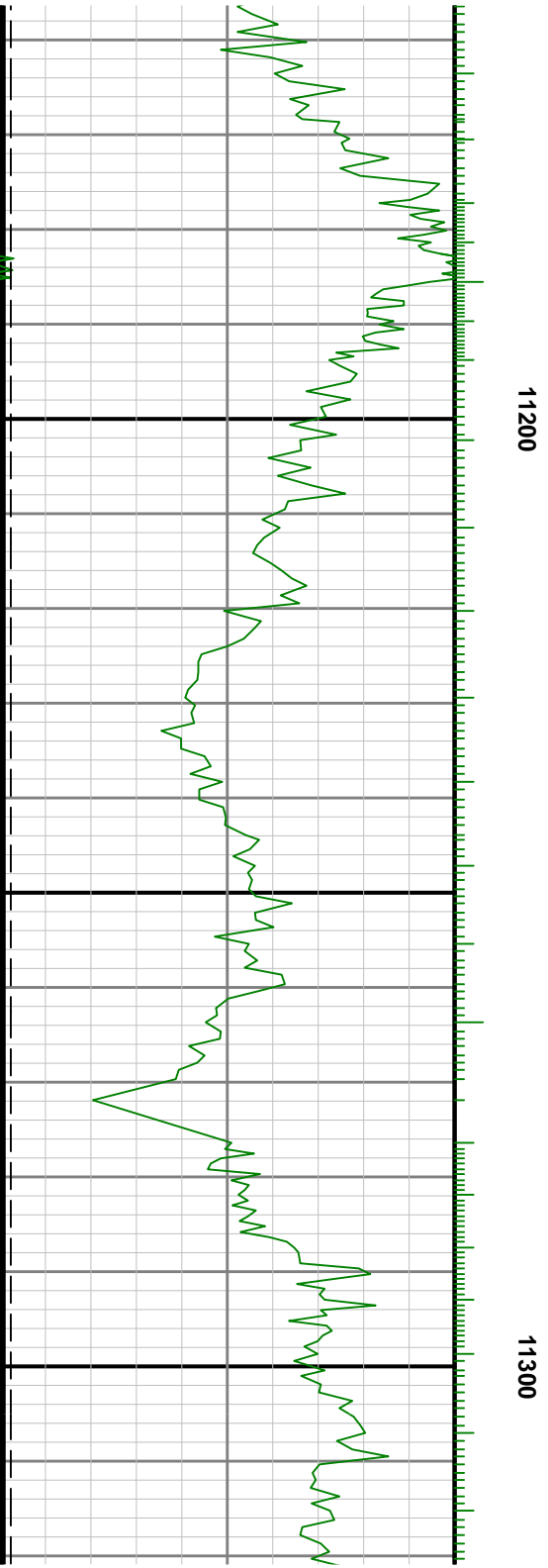
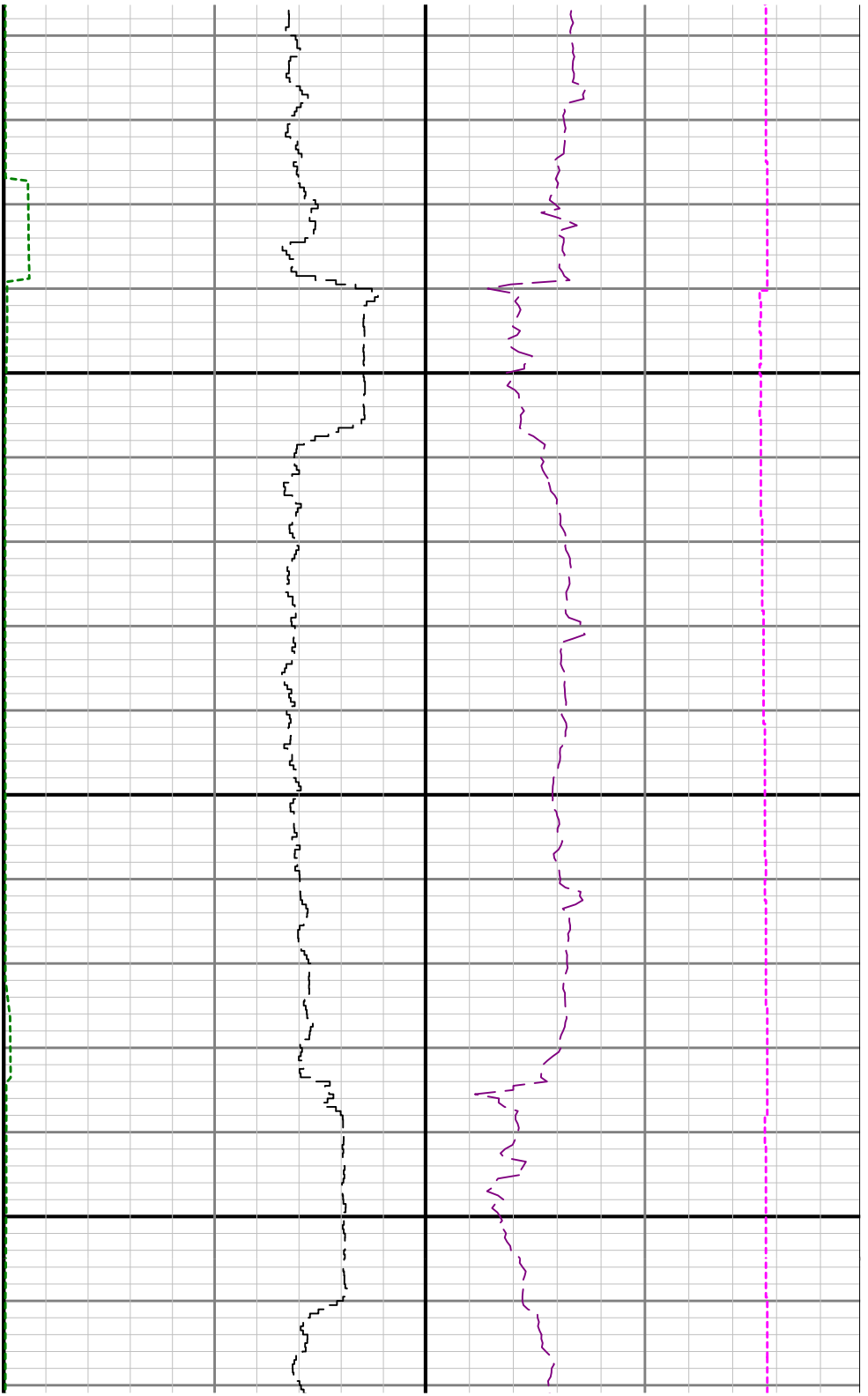


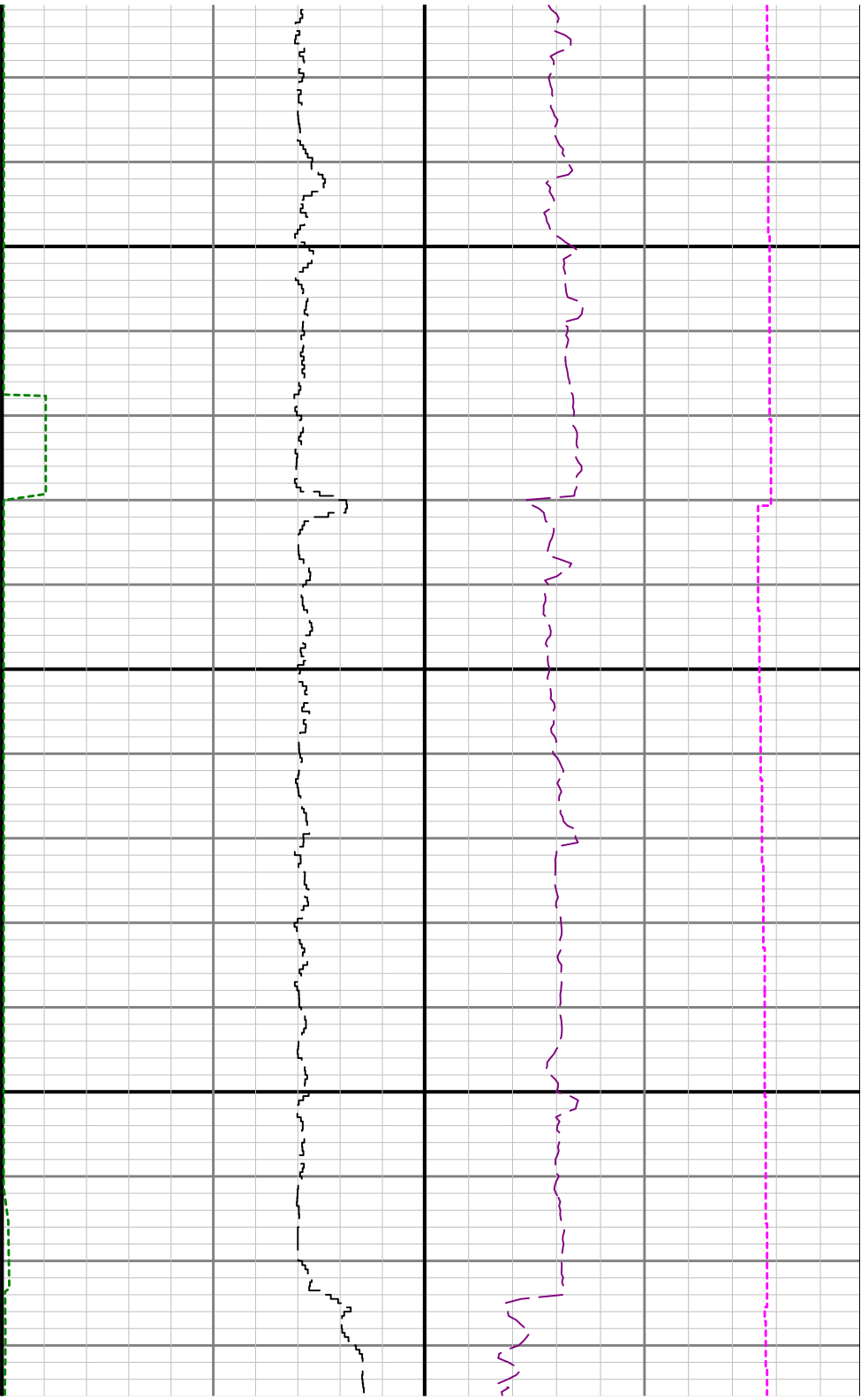




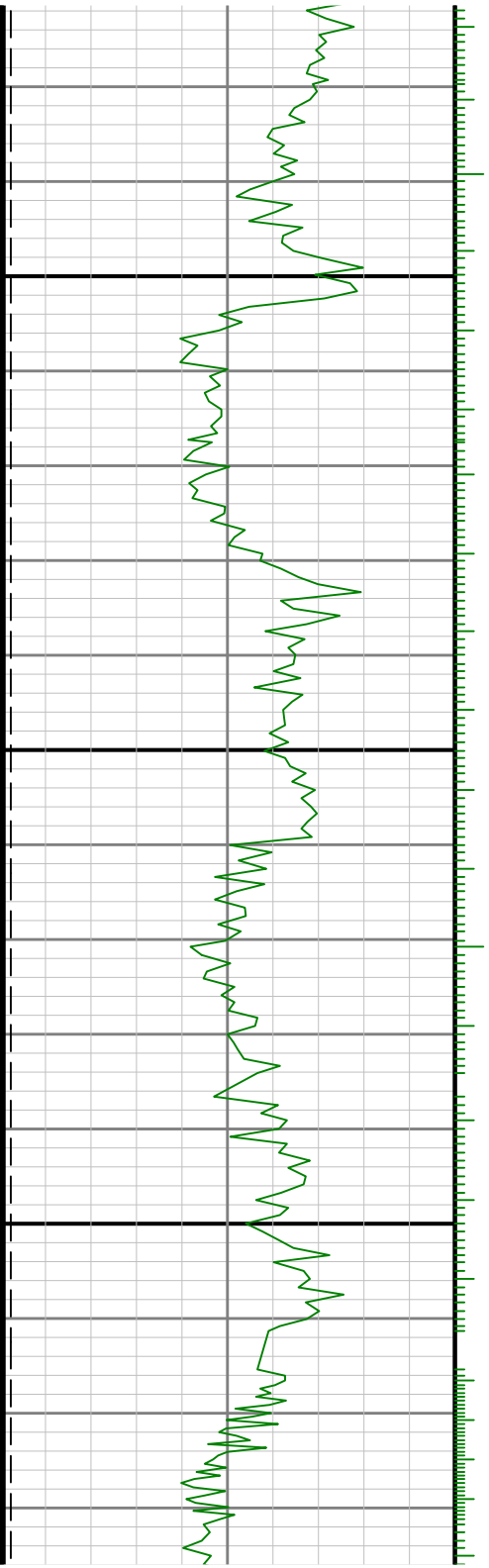


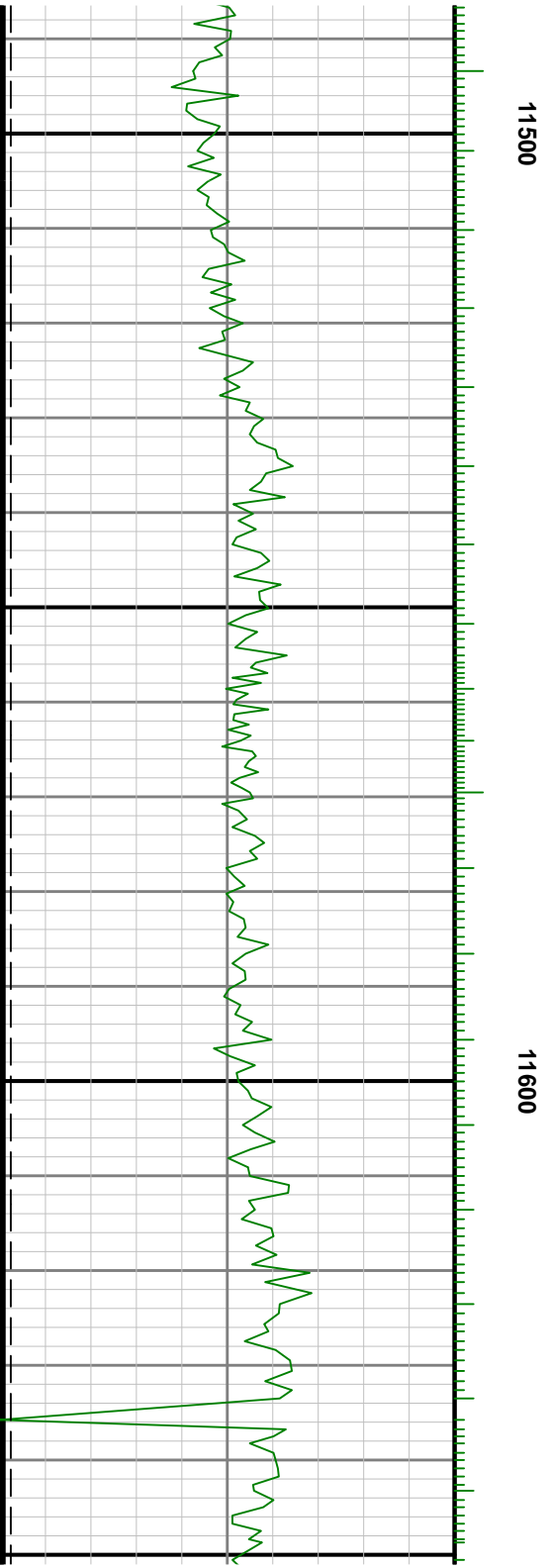
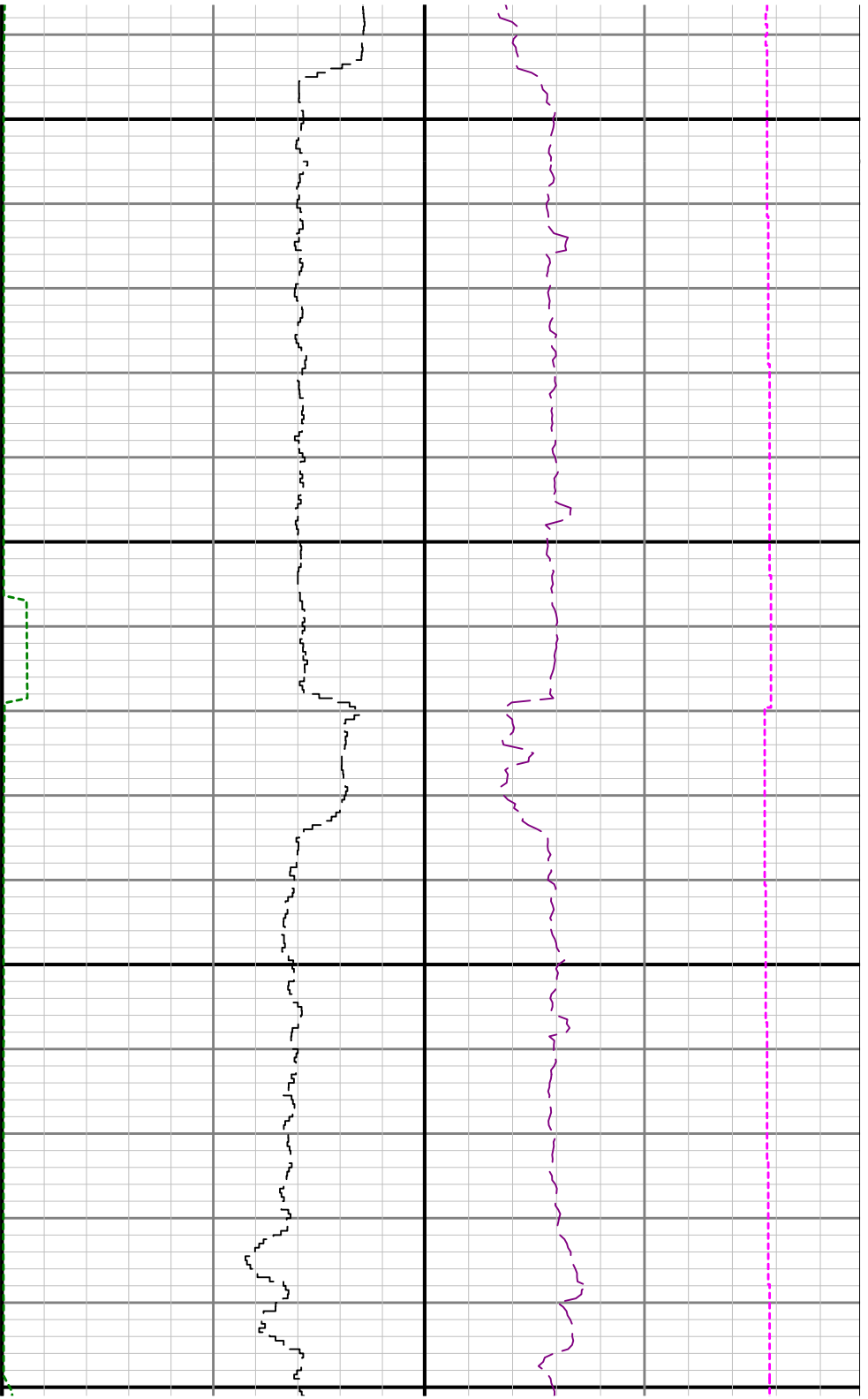


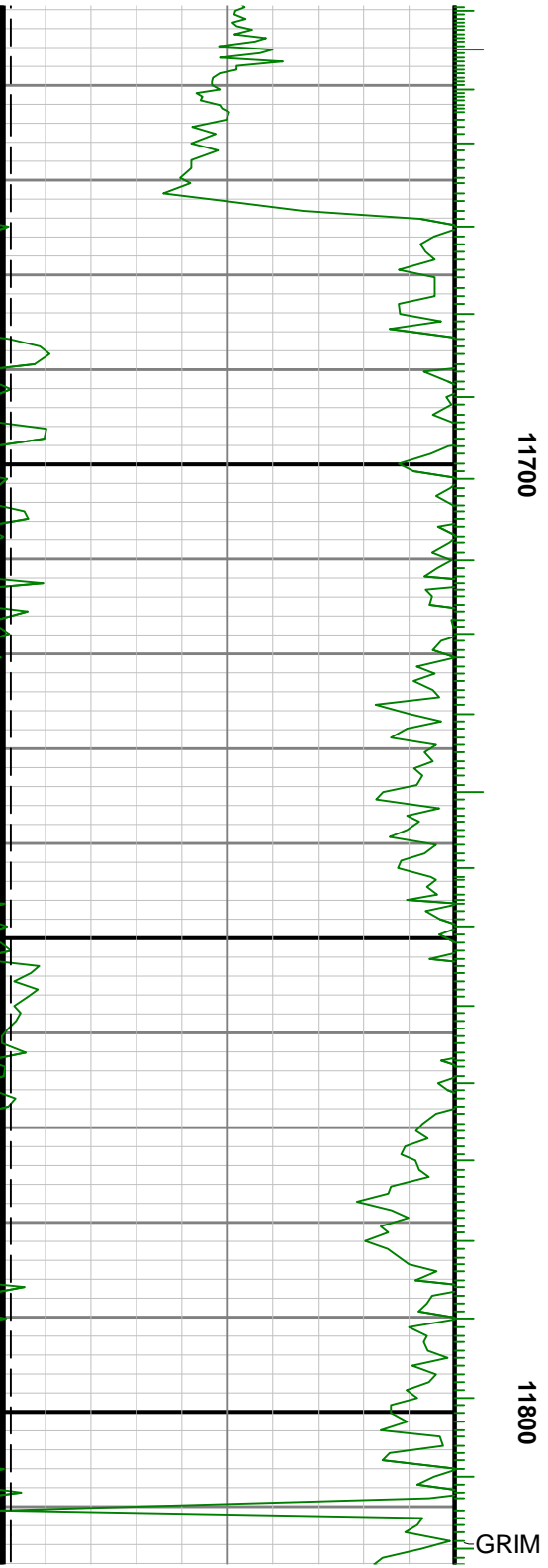
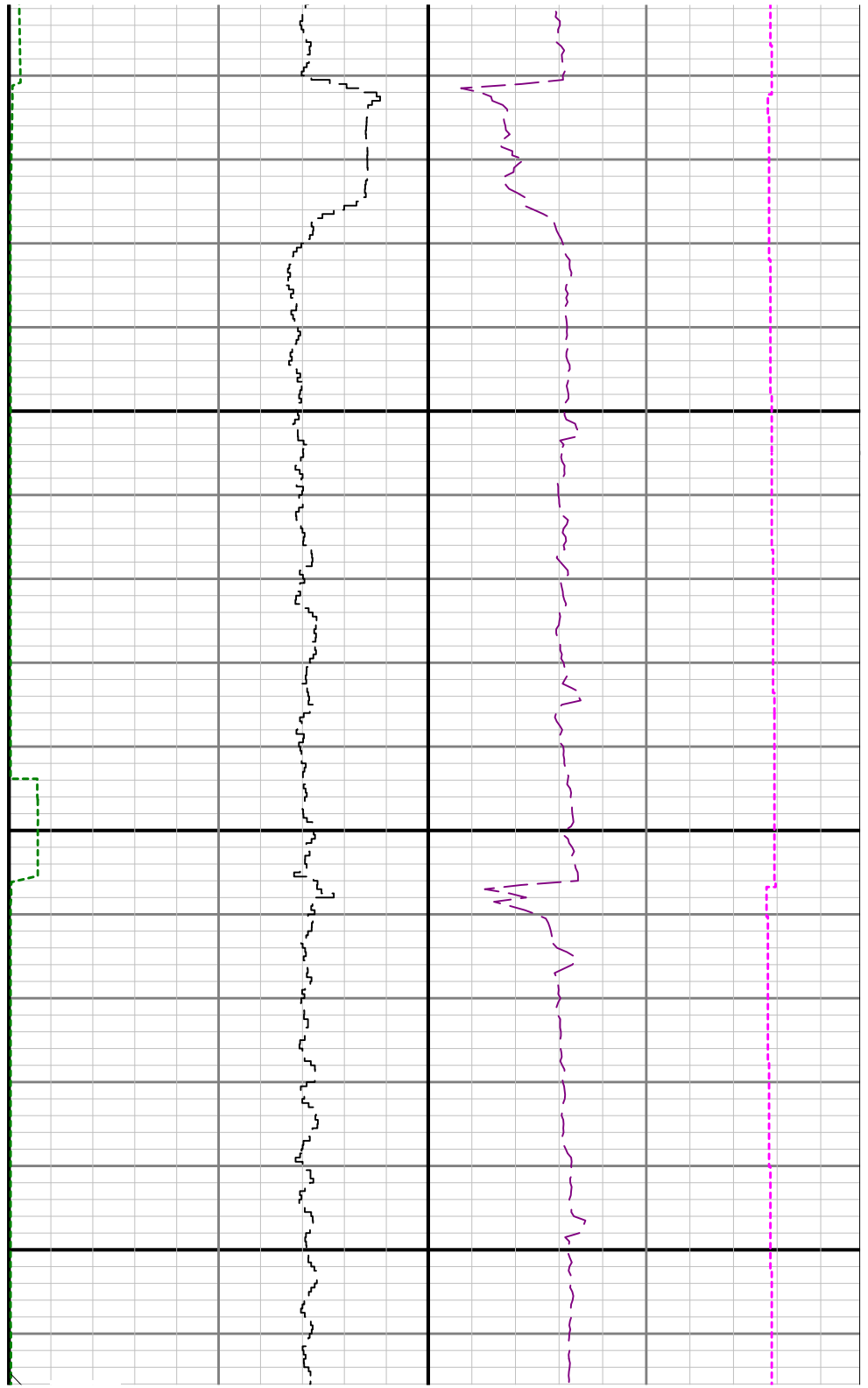




11400







See Remark 2	GRAM		GRTM	ROPA	WOBA	TCDM
TVD		TD	R1 >			
Gamma Ray - Apparent 0.5 ft Average GRAM		MD 1:240 feet	Rate of Penetration 3 ft Average ROPA		Surface Weight On Bit 1 ft Average WOBA	
0150			1000ft/h0		0100	
API					klb	
True Vertical Depth TVD			Gamma Time Since Drilled GRTM		Downhole Temperature TCDM	
68001800			0600		0300	
ft			min		degF	