


LWD MEMORY LOG									
<div><div><div>BAKER HUGHES</div><div>a GE company</div></div><div></div></div>				Gamma Ray					
Scale:		Company: Noble Energy							
1:240 MD		Well: Wells Ranch BB09-665							
Depth Reference:		Field: Weld County							
Driller's Depth		County: Weld Country							
		State: Colorado Country: United States							
Status:		Surface Location:				Other Services:			
Final Print		Latitude: 040° 25' 09.588" N Longitude: 104° 24' 45.648" W				Directional			
API No: 05-123-44967									
Job ID: 109324030		SEC: 11		TWN: 5N		RGE: 63W			
Permanent Datum (P.D.): Ground Level		Elevation: Above P.D.		4685.00 ft		30.00 ft		Elev. KB: 4715.00 ft Elev. DF: 4685.00 ft	
Log Measured From: Rig Floor									
Dates				Interval Drilled		Magnetic Field Reference			
Date From: 2018-08-24		Top: (ft) 1951.00		Azi Reference North: Grid		Dip Angle: (deg)		67.03	
Date To: 2018-08-30		Bottom: (ft) 17087.00		Total Magnetic Field Strength: (nT)				52195	
Spud Date: 2018-08-23				Mag to Reference North Correction: (deg)				7.18	
Borehole Record				Casing Record					
Hole Size (in)		From (ft)		To (ft)		Size (in)		Weight (lb/ft)	
13.500		30.00		1951.00		9.625		36.00	
8.500		1951.00		17175.00					

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Log Run Summary												
Run No	Bit Run No.	Bit Size	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	
				(in)				(ft)	(ft)	(ft)	(ft)	
1	1	8.500	PDC	2.50	AutoTrak Curve	1938.62	7006.12	1951.00	7018.50	2018-08-24 10:48	2018-08-25 07:53	19.17
2	2	8.500	PDC	2.50	AutoTrak Curve	7006.00	17073.00	7018.00	17087.00	2018-08-25 18:38	2018-08-29 11:07	79.97

Crew									
Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite	Name	
Tien Bui		2018-08-23	2018-08-26						

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+ (%)
2018-08-23 21:07	1	1951.00	Oil Based Mud	9.3	10	N/A	10.0	81/19	Active Pit	25000	0.00
2018-08-25 05:05	1	6458.00	Oil Based Mud	9.3	13	N/A	19.0	81/19	Active Pit	25000	0.00
2018-08-25 11:45	2	7018.00	Oil Based Mud	9.3	13	N/A	19.0	81/19	Active Pit	25000	0.00
2018-08-26 15:18	2	10790.00	Oil Based Mud	9.3	12	N/A	22.0	81.6/18.4	Active Pit	23500	0.00
2018-08-27 07:10	2	12762.00	Oil Based Mud	9.4	13	N/A	21.0	84.1/15.9	Active Pit	25000	0.00
2018-08-29 09:33	2	16960.00	Oil Based Mud	9.5	12	N/A	20.0	85.1/14.9	Active Pit	25000	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			14279933	Near Bit Inclination			5.93	6.75	7.000	4.330
	ATC_SU			14279933	Near Bit Inclination			5.93	6.75	7.000	4.330

1	ATC_SU	14279933	Near Bit VSS	5.93	6.75	7.000	4.330
1	ATC_MWD	14322606	Gamma (single)	2.20	12.38	7.000	3.250
1	ATC_MWD	14322606	Directional (mag)	12.27	22.45	7.000	3.250
2	ATC_SU	14186737	Near Bit VSS	5.93	6.75	7.000	4.330
2	ATC_SU	14186737	Near Bit Inclination	5.93	6.75	7.000	4.330
2	ATC_MWD	14381899	Gamma (single)	2.75	12.92	7.000	3.250
2	ATC_MWD	14381899	Directional (mag)	12.27	22.44	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

Comments

1	Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
2	Baker Hughes LWD Run 1 and 2 utilized 6 ¾ inch NaviGamma service (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 1951 to 17087 feet MD (1951 to 6750 feet TVD).
3	The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

Remarks

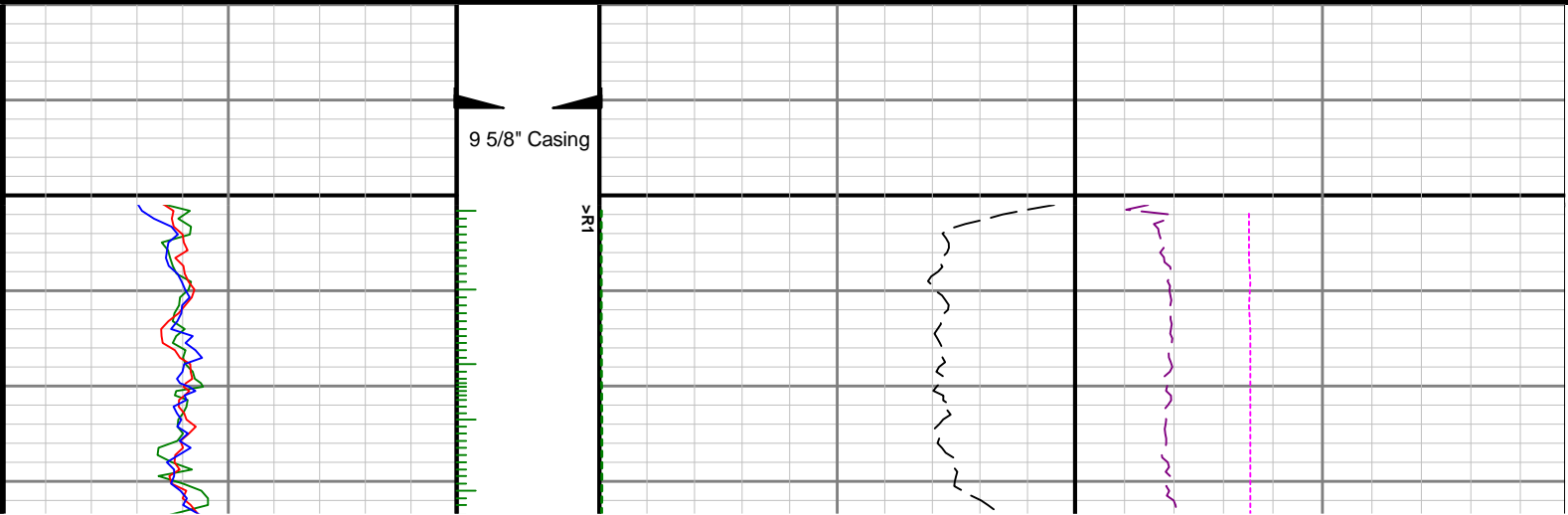
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	7005.00	8.500	2	The interval from 7005 to 7018 feet MD (6634 to 6636 feet TVD) was logged up to 11 hours after being drilled due to a trip out of hole to change out BHA.
2	17073.00	8.500	2	The interval from 17073 to 17087 feet MD (6750 feet TVD) was not logged due to sensor to bit offset at well TD.

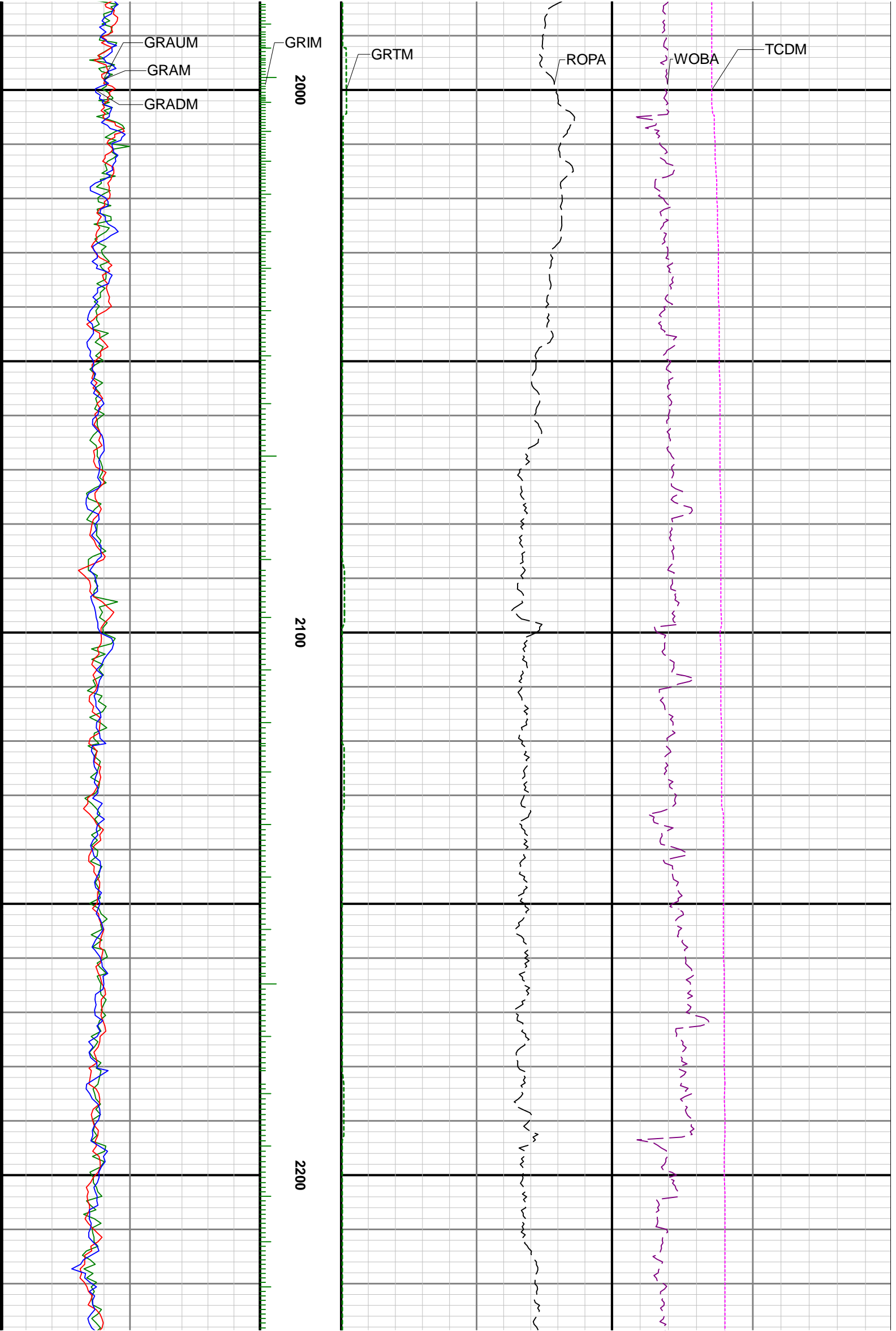
Curve Mnemonics

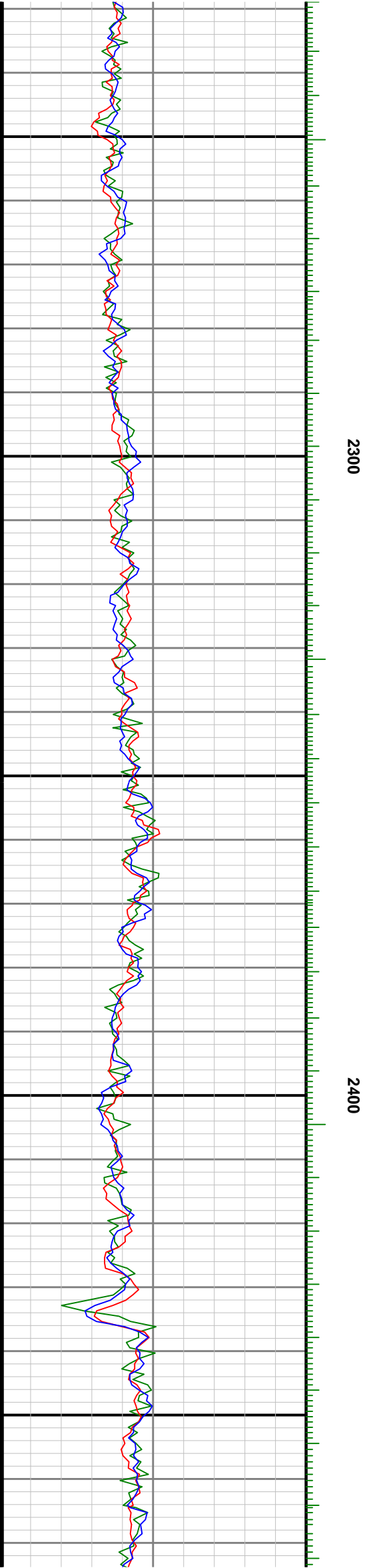
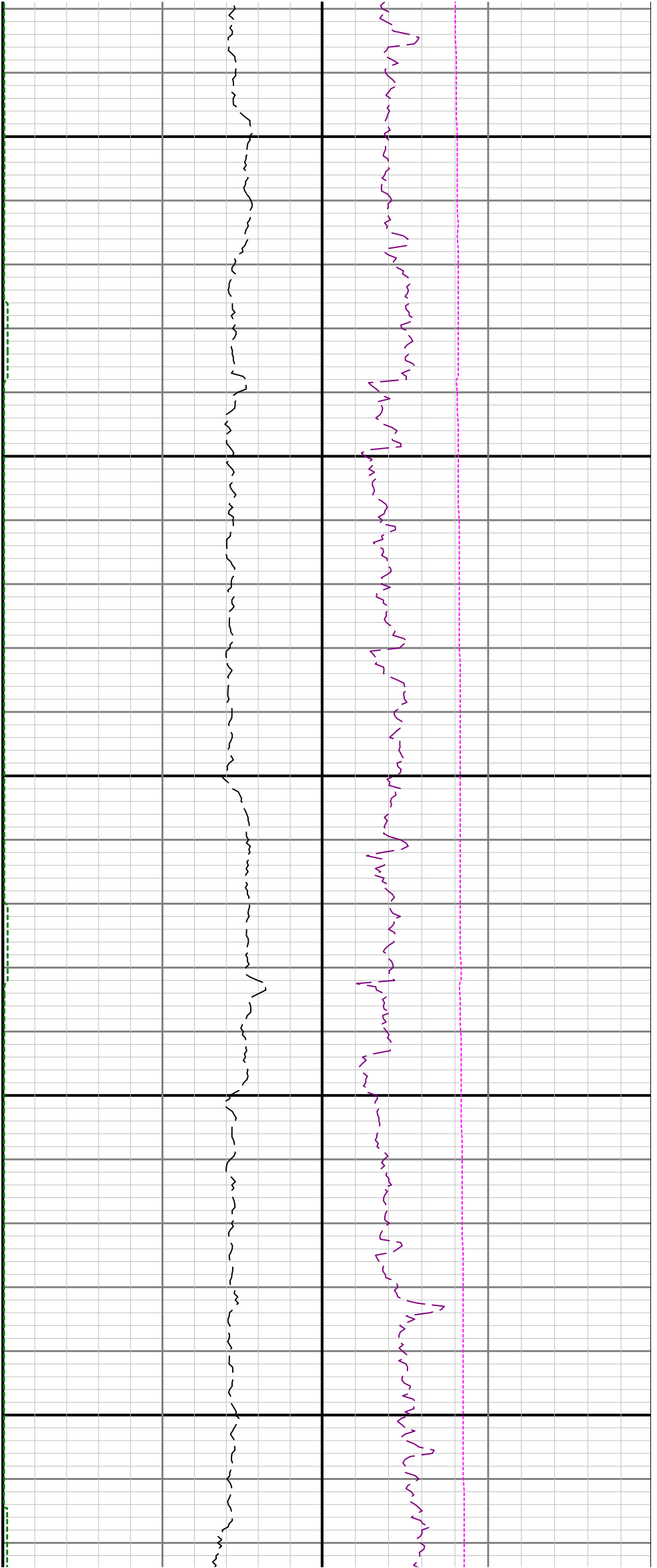
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory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

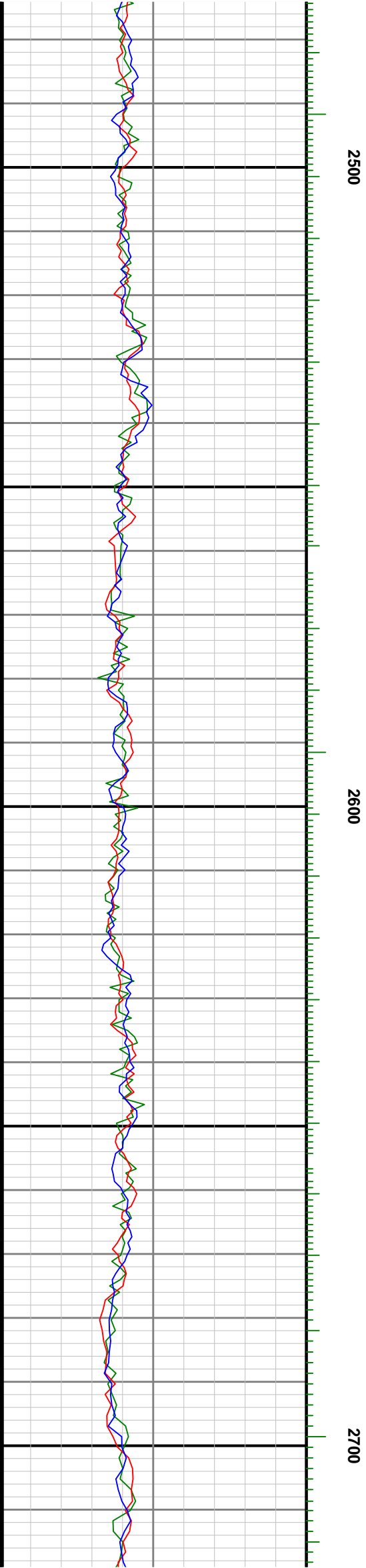
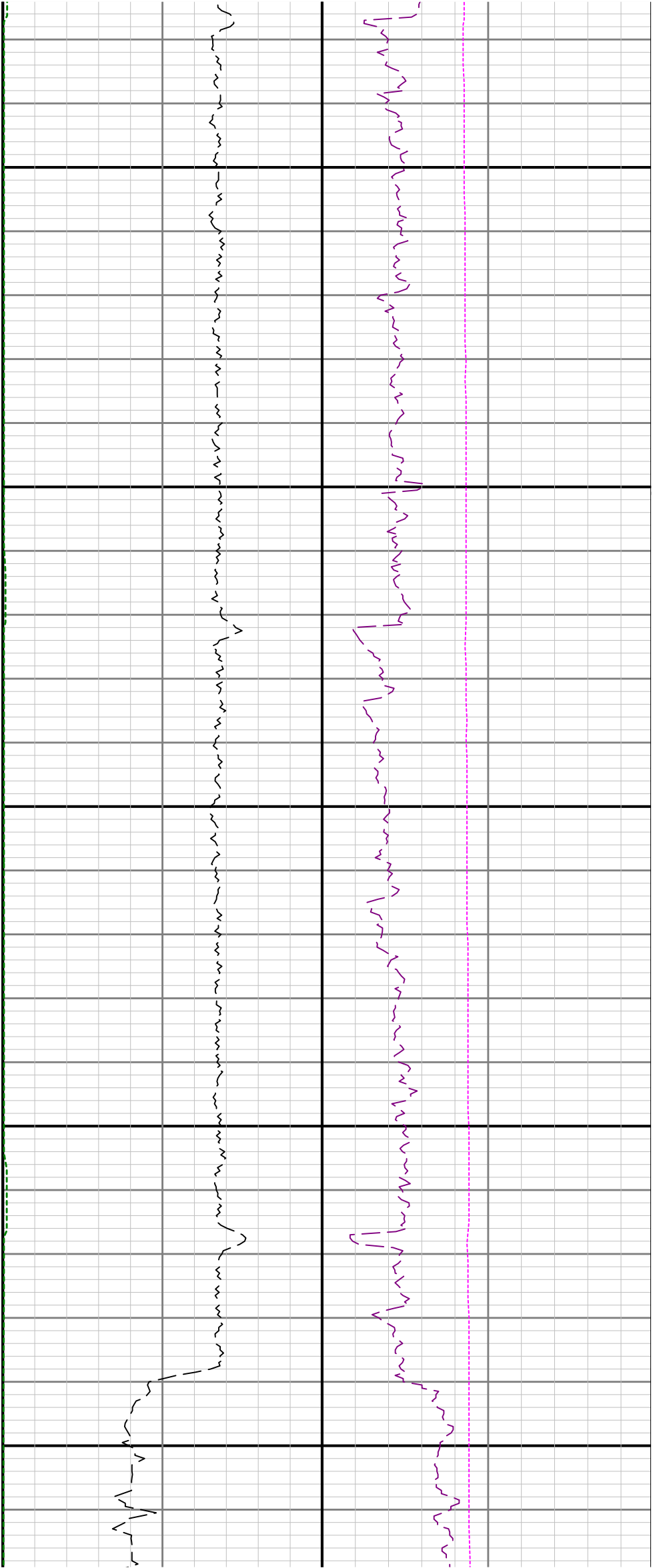
<div> <div>BAKER HUGHES</div> <div>a GE company</div> </div>	Company	Noble Energy			
	Well	Wells Ranch BB09-665			
	Interval	Date From:	2018-08-24 08:51	Top:	1951.00 ft
	Created	Date To:	2018-08-30 00:51	Bottom:	17087.00 ft
		2018-08-30 01:13:31			

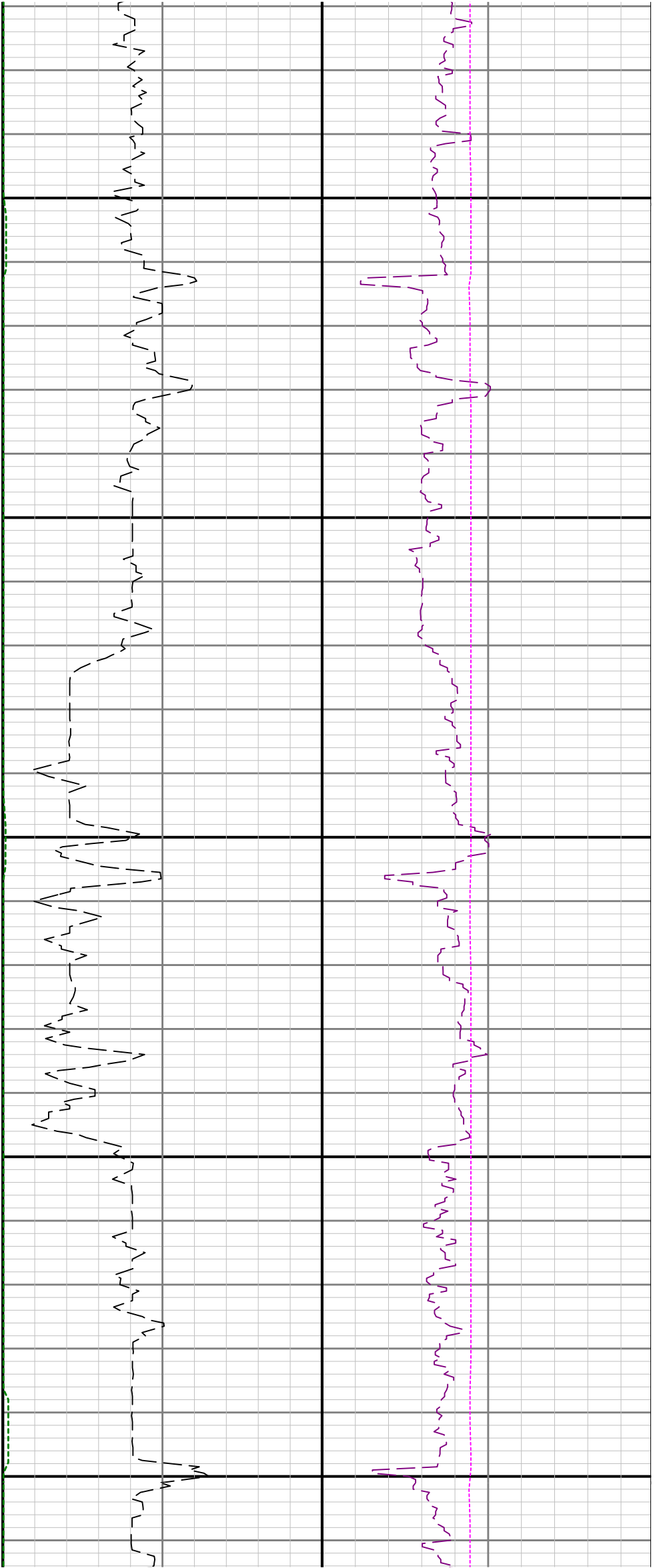
Gamma Ray - Apparent 0.5 ft Average GRAM	MD 1:240 feet	Depth Averaged ROP 3 ft Average ROPA	Weight On Bit, Average 1 ft Average WOBA
0 300		1000 0	0 50
API		ft/h	klb
Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM		Gamma Time Since Drilled GRTM	Downhole Temperature TCDM
0 300		0 600	0 300
API		min	degF
Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM			
0 300			
API			
True Vertical Depth TVD			
7500 6500			
ft			





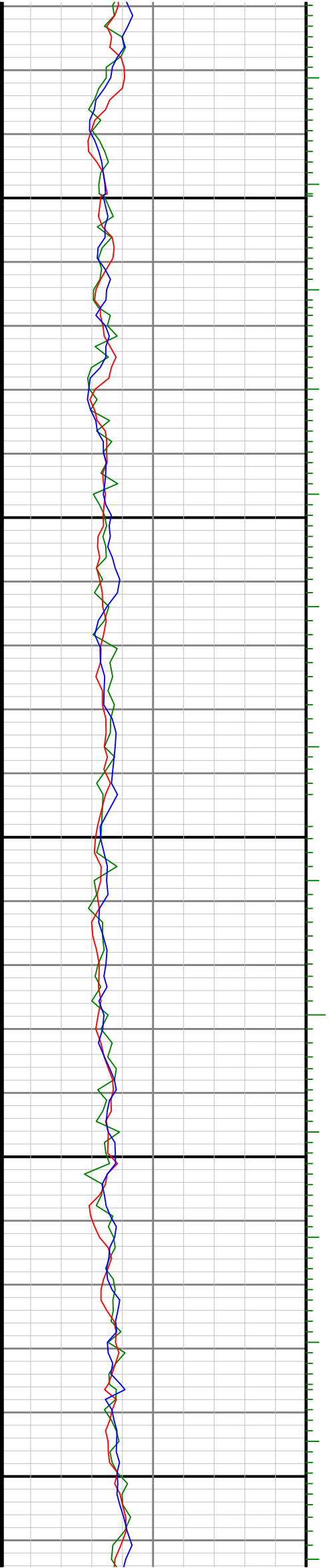


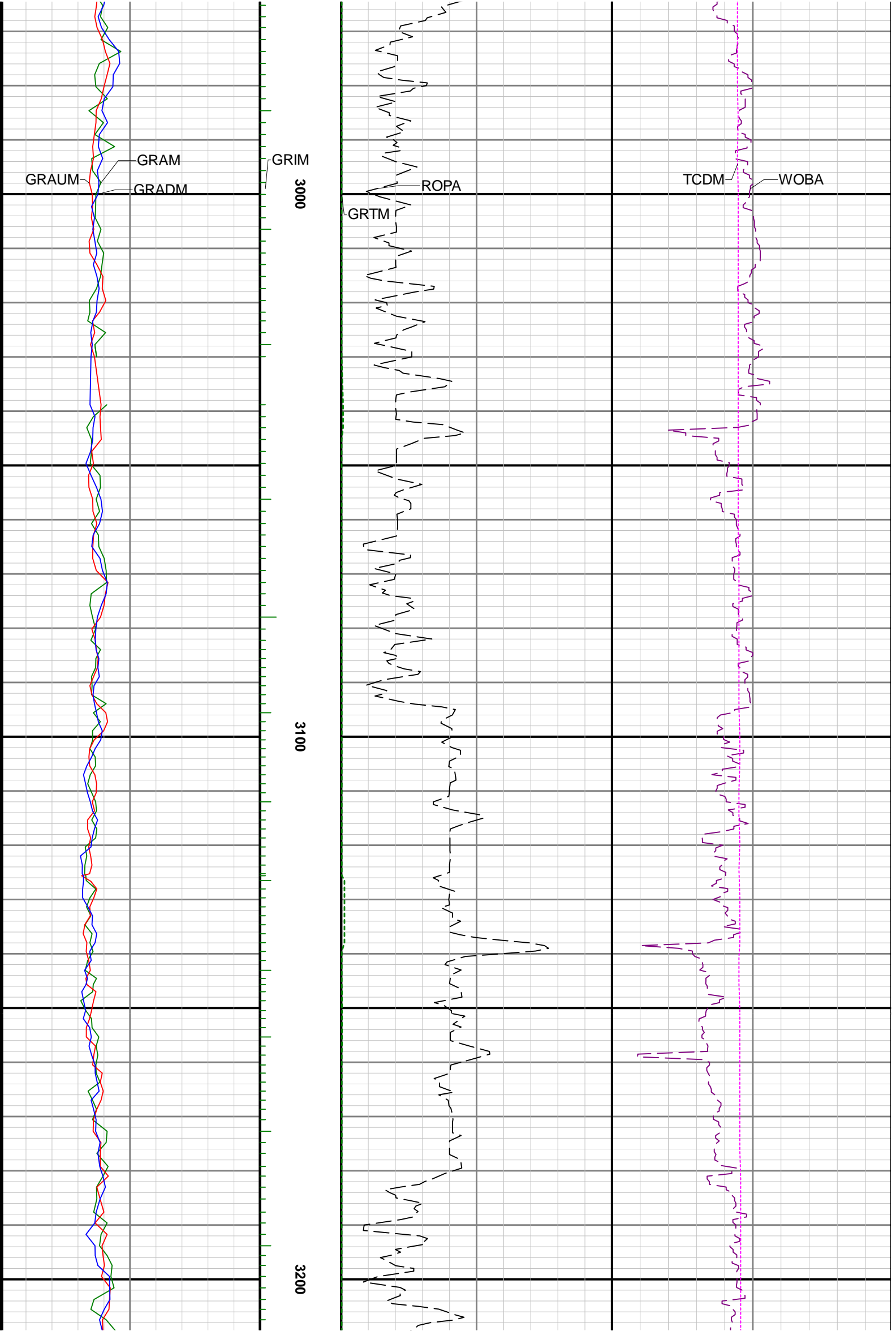


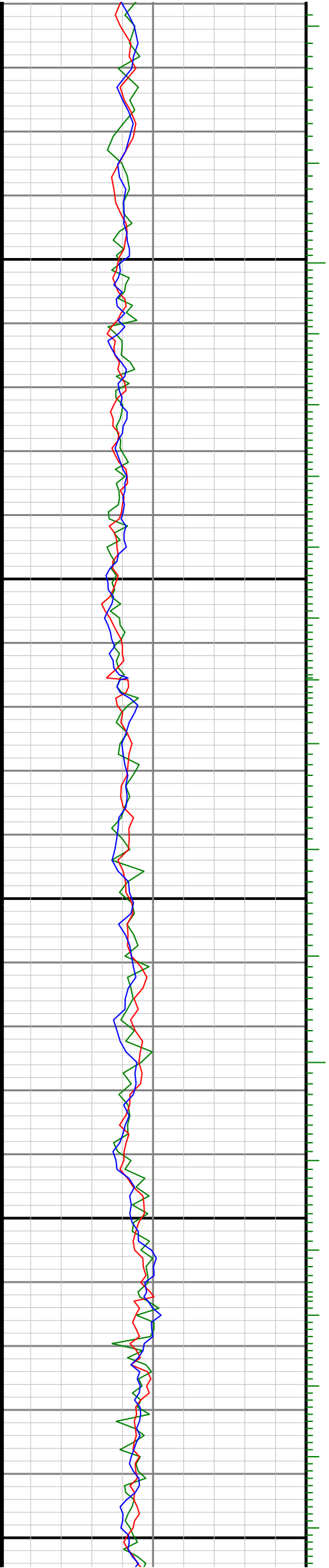
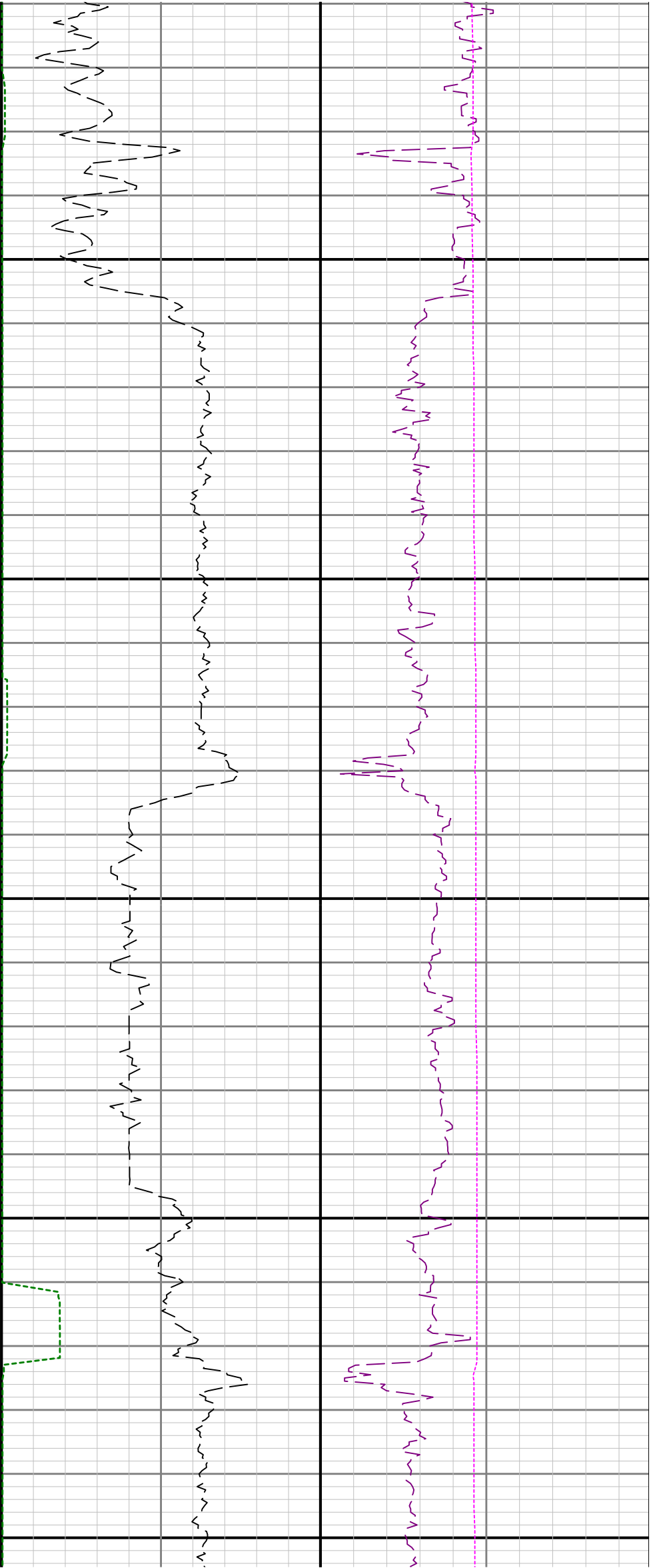


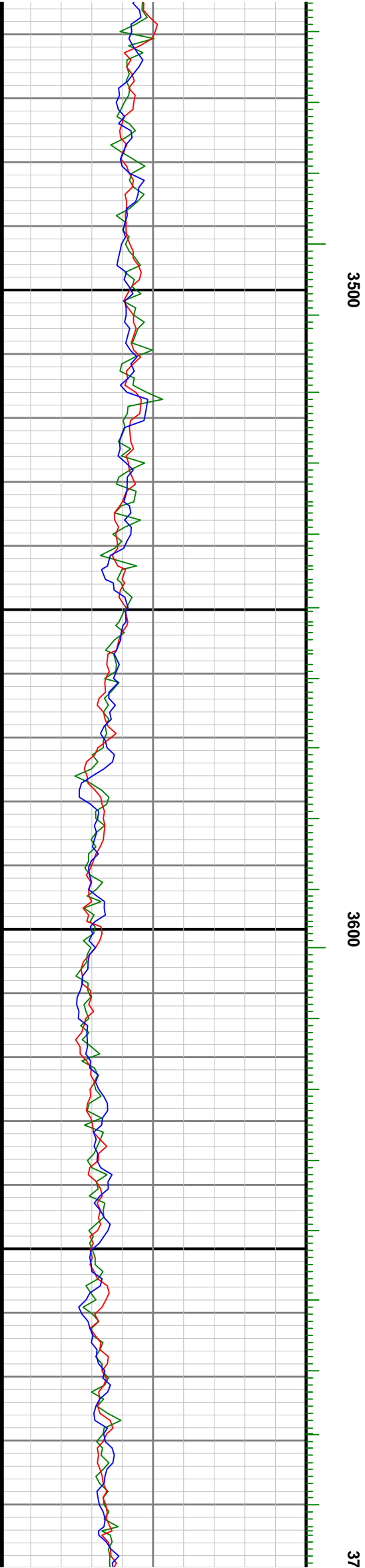
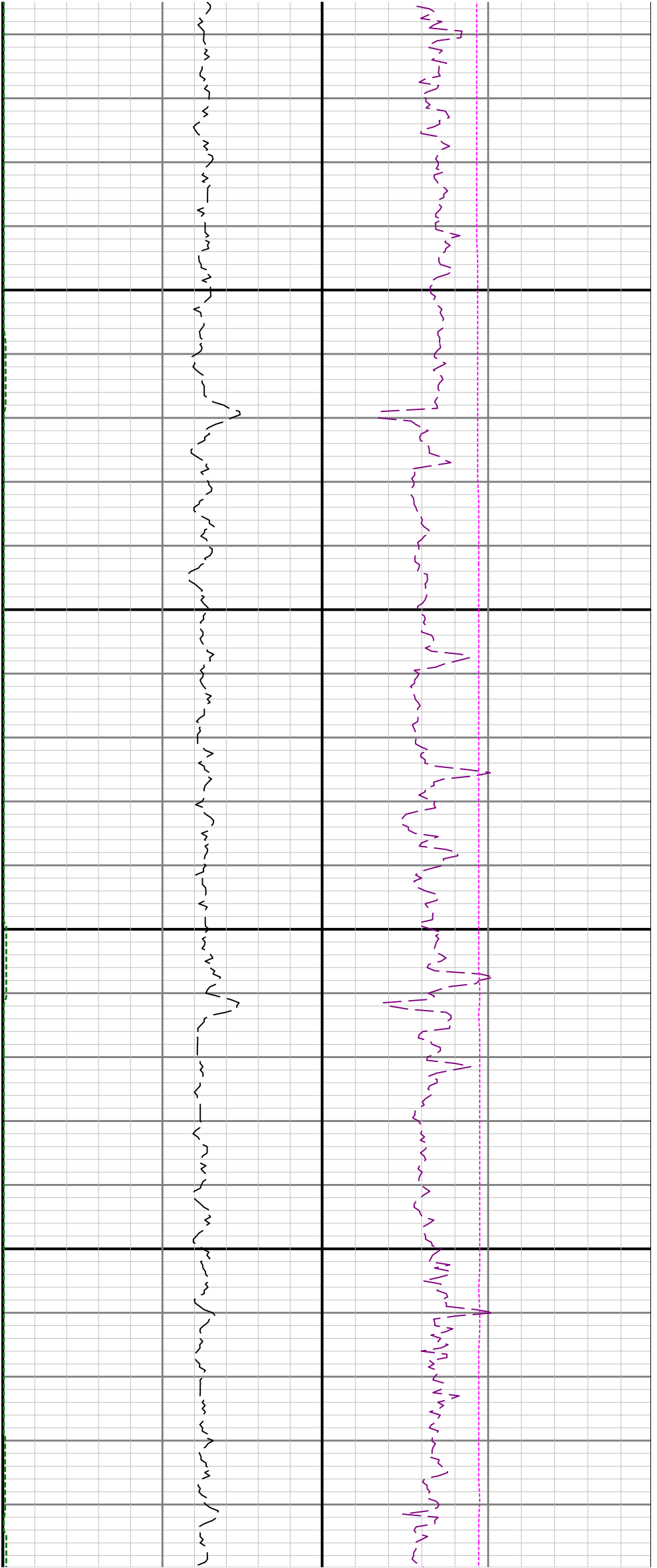
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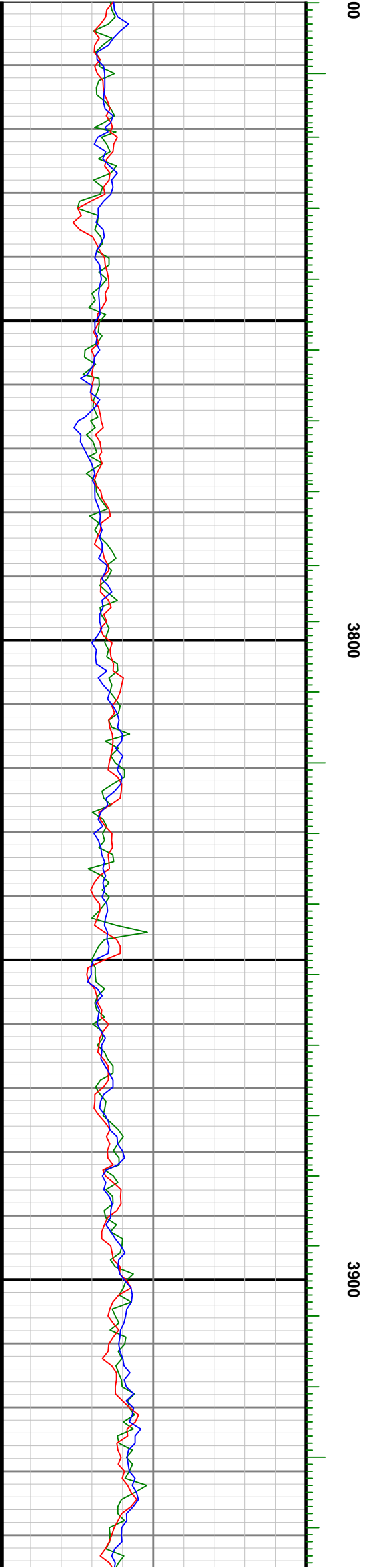
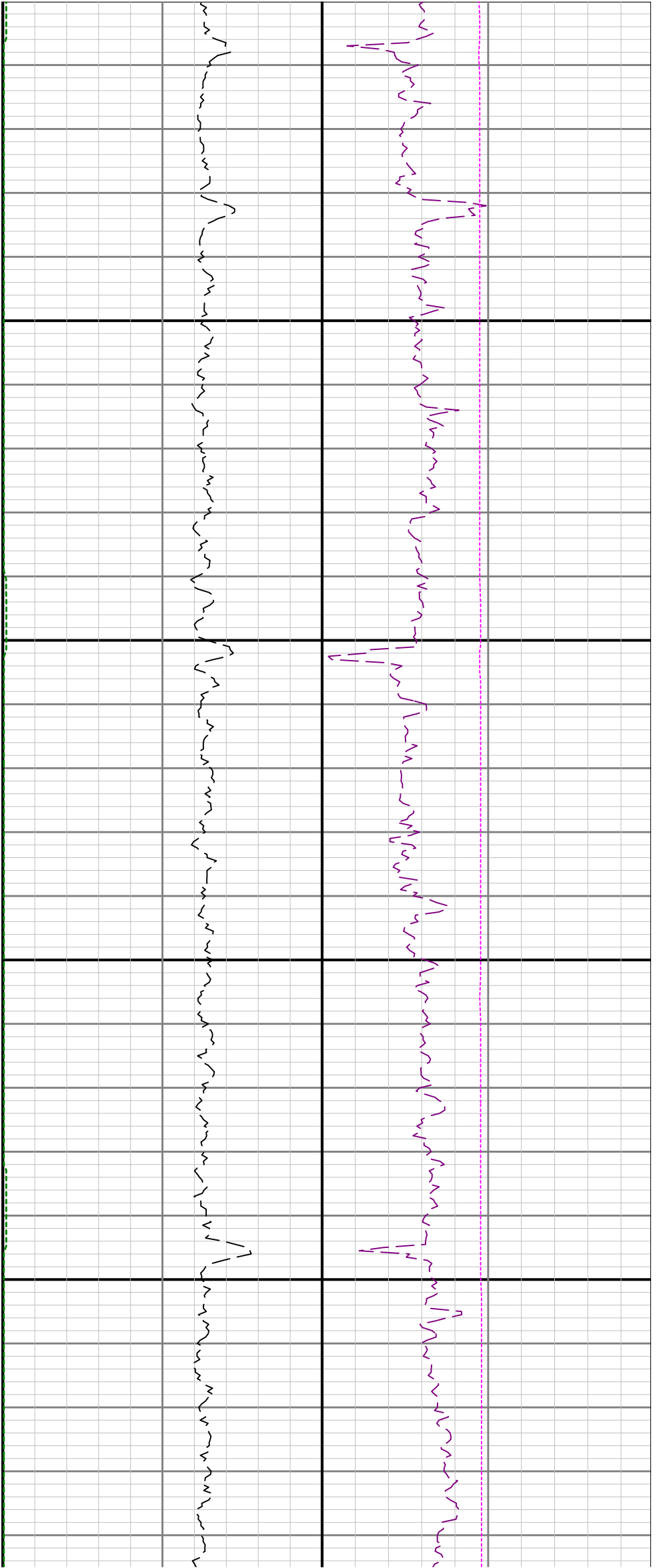
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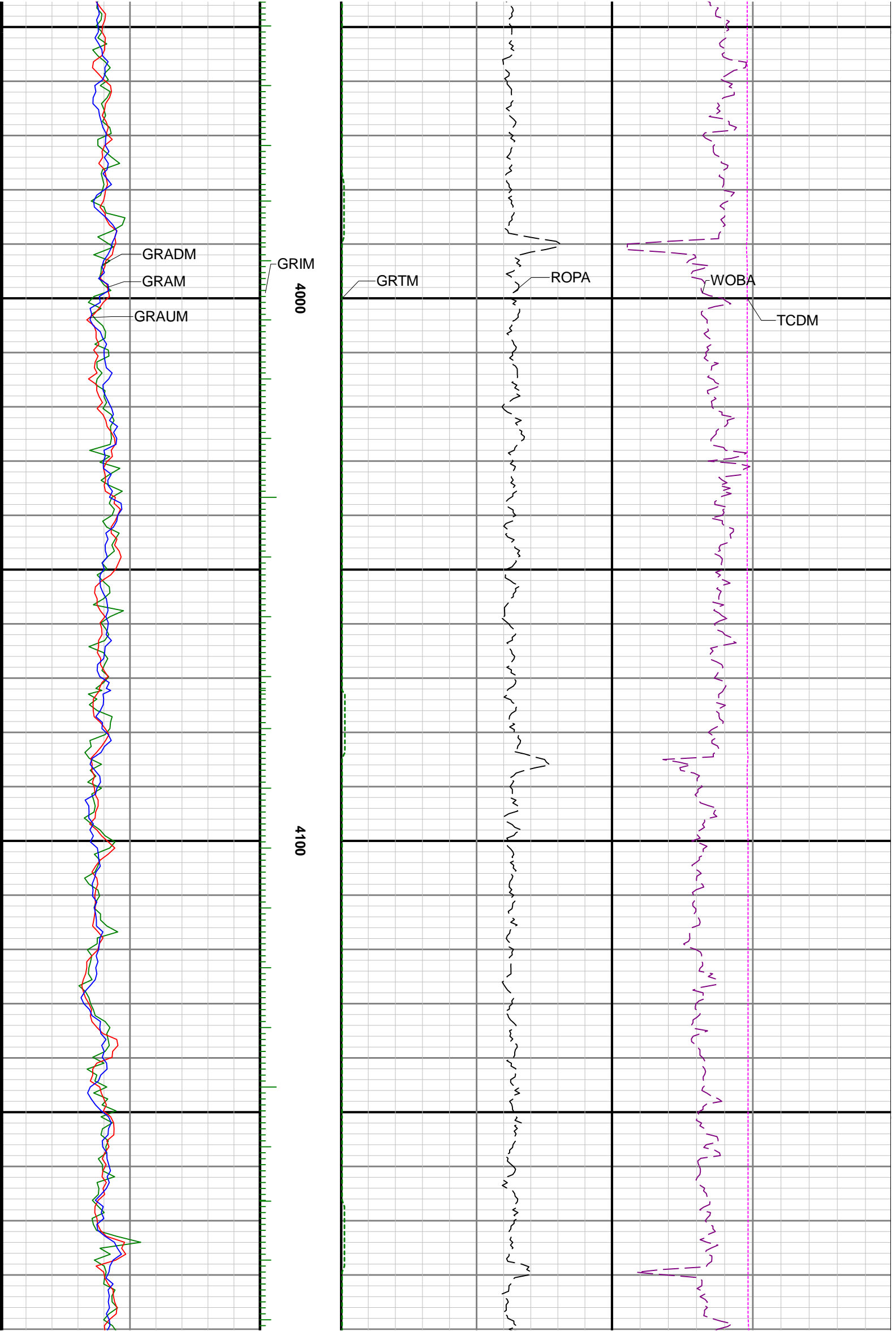


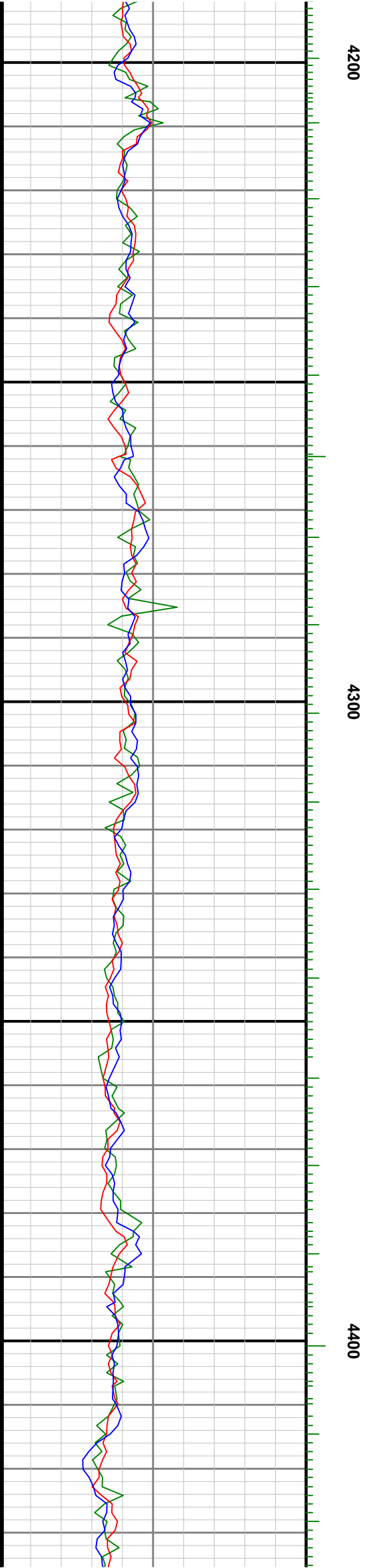
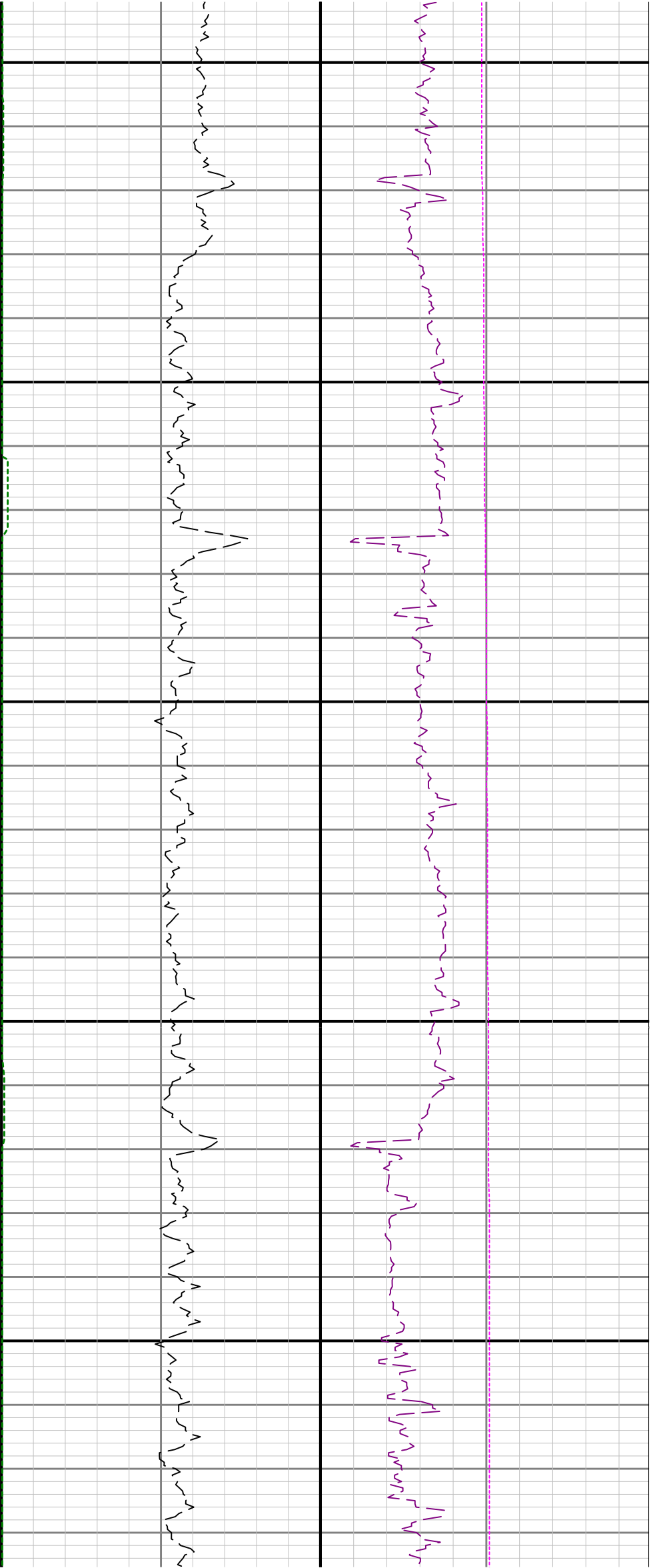


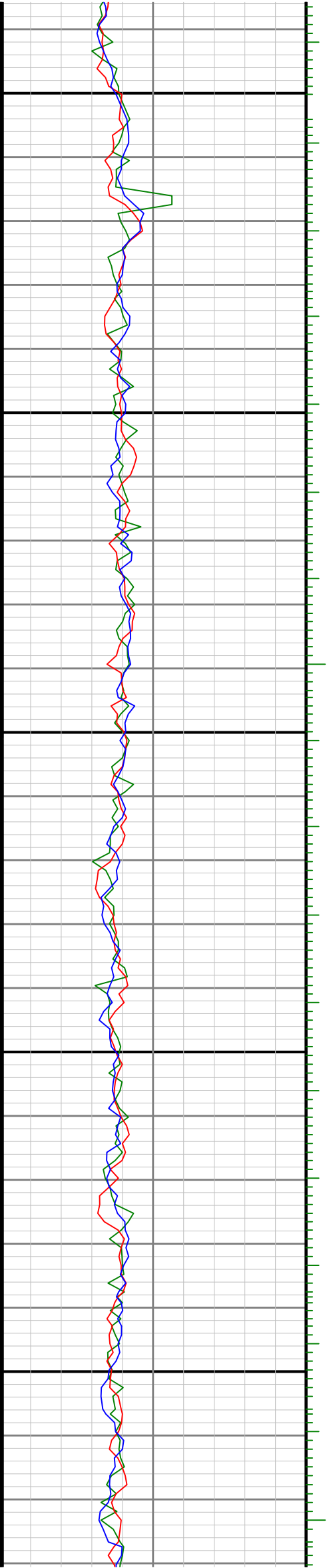
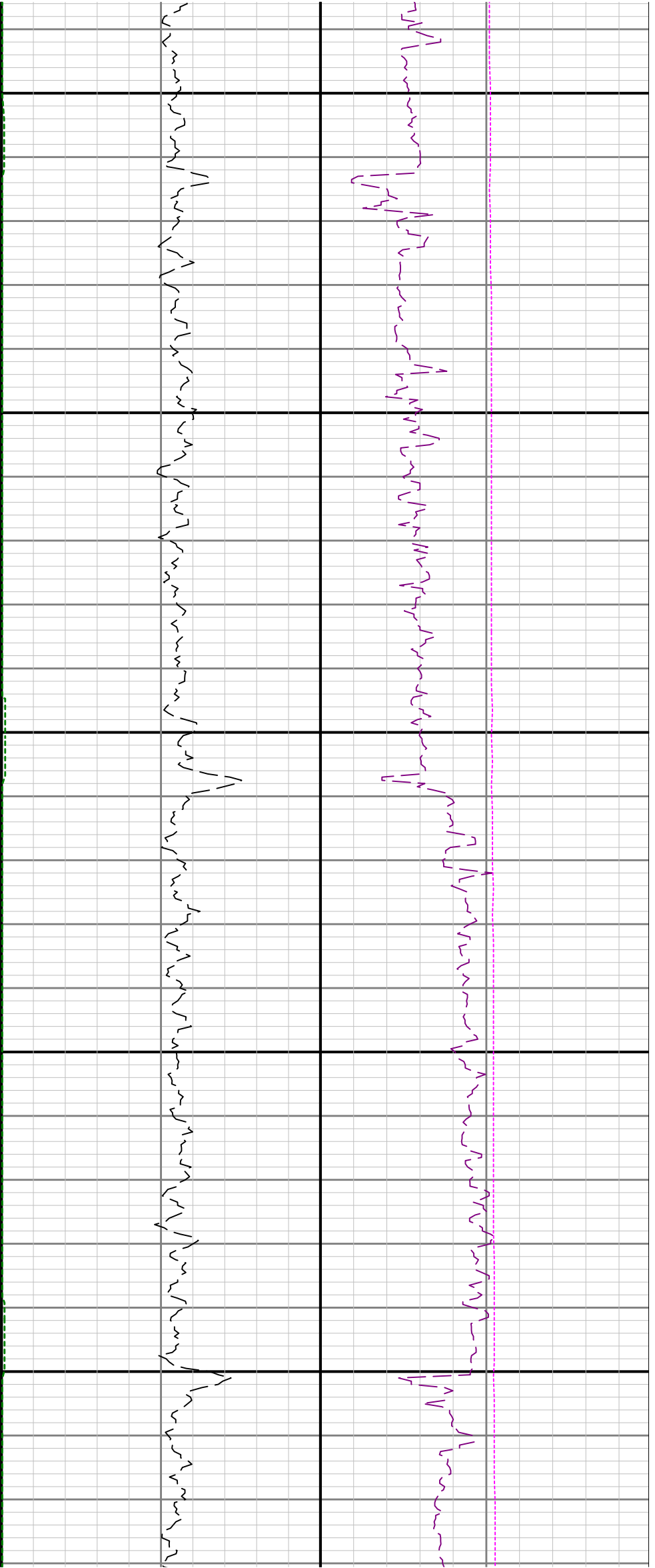


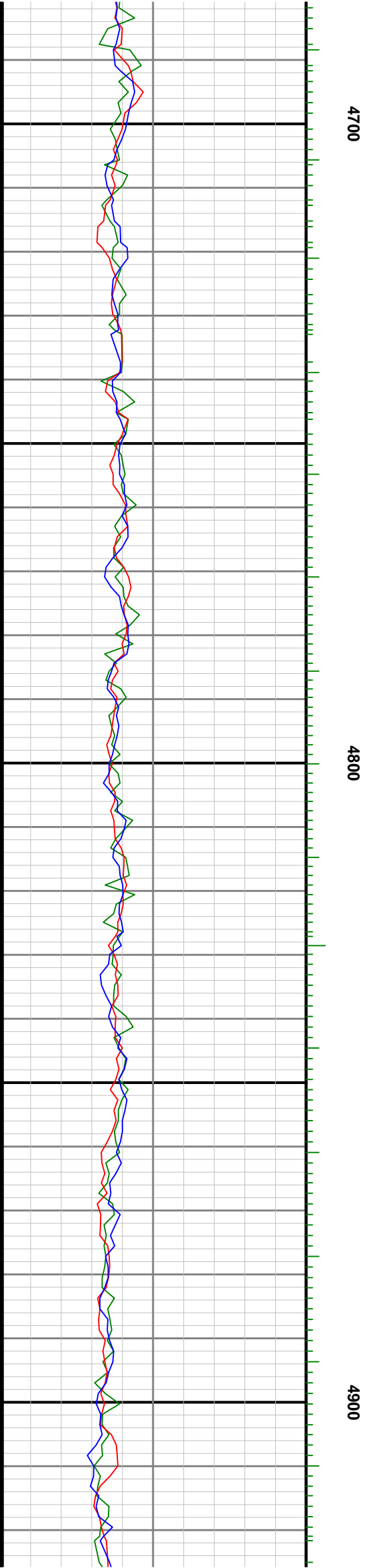
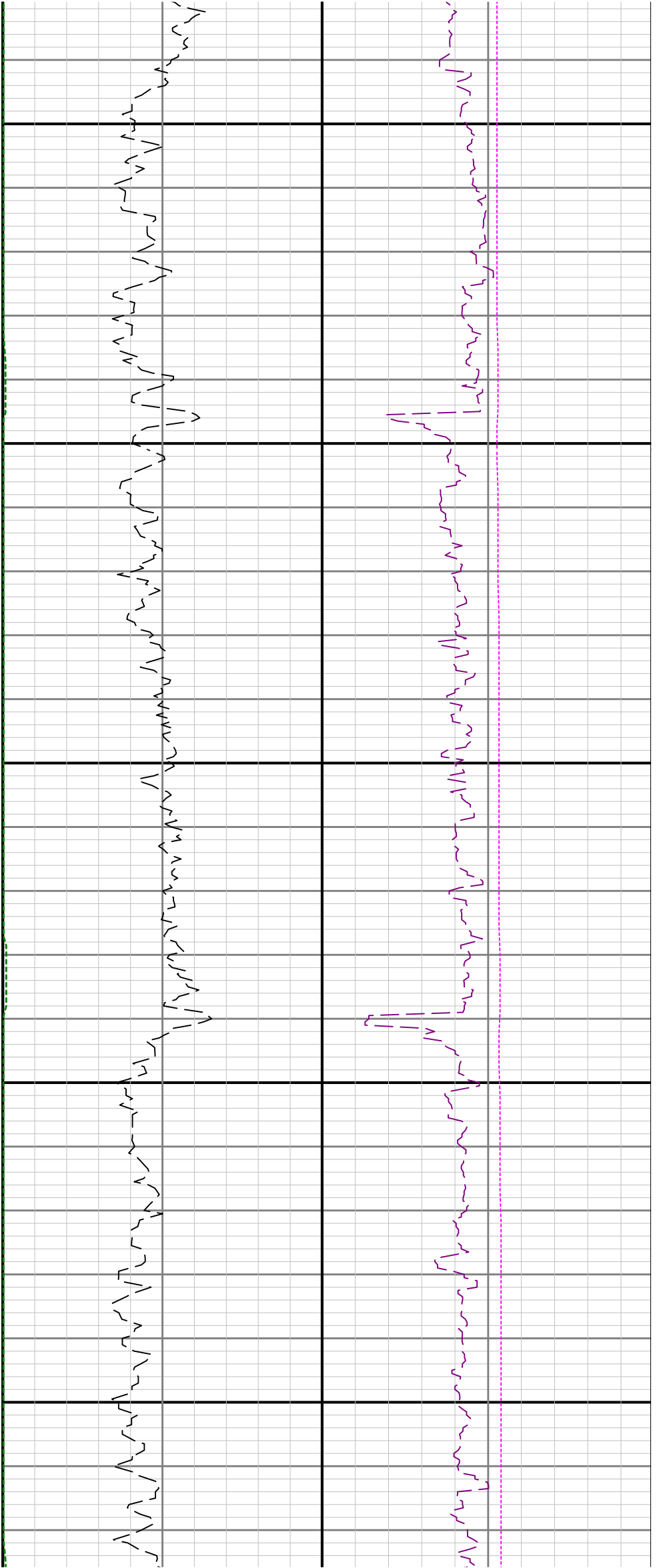


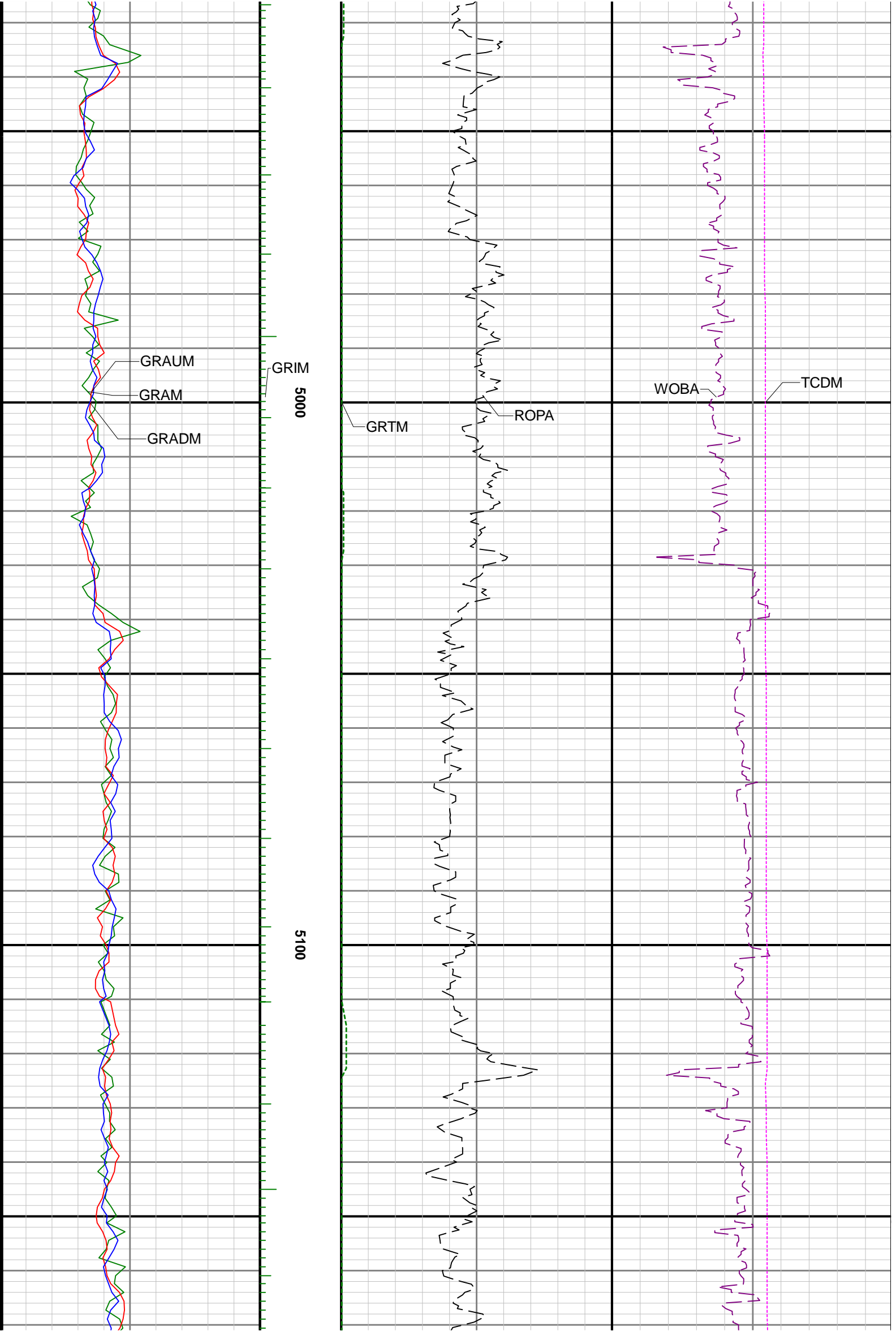


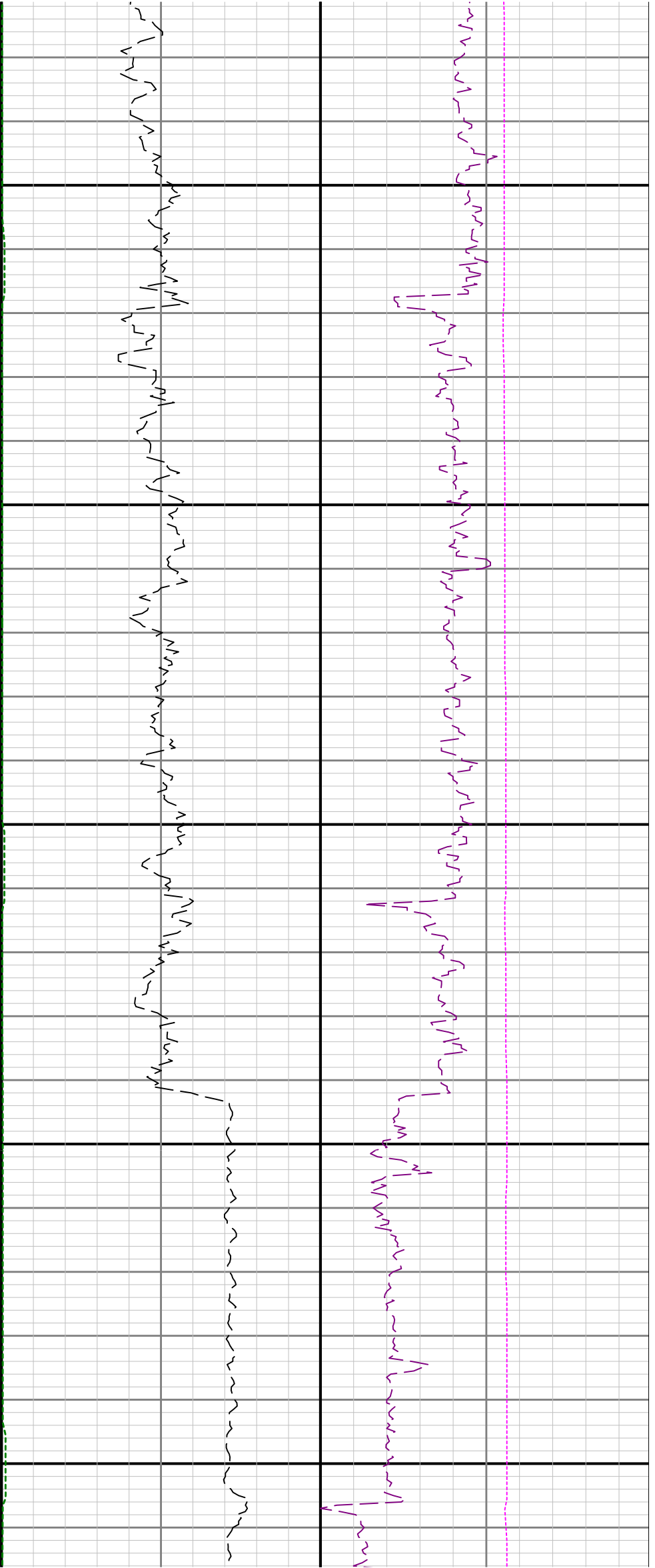








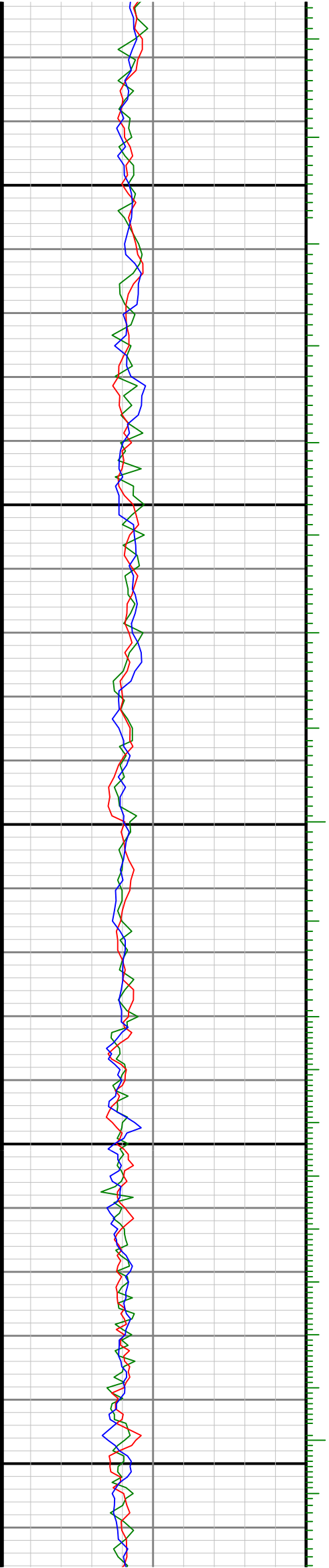


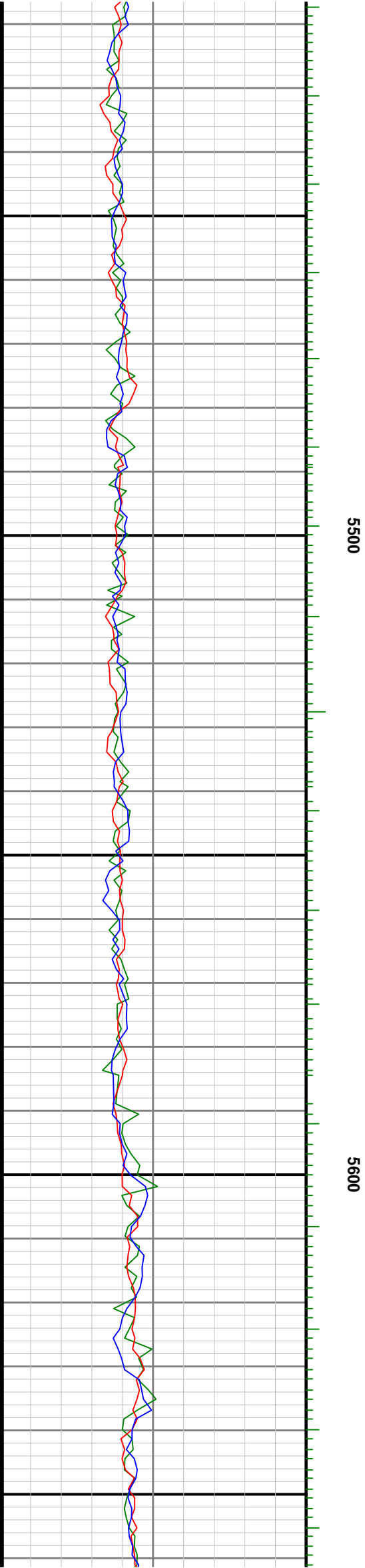
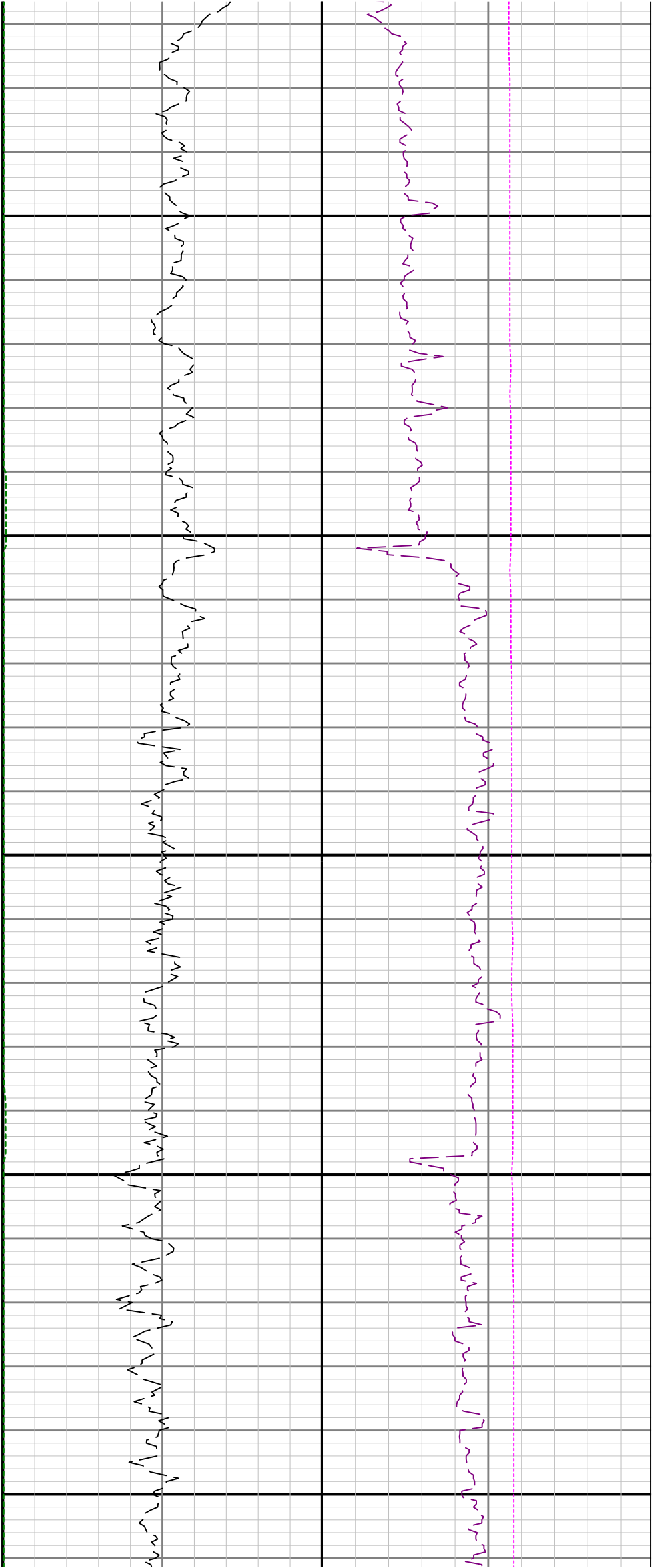


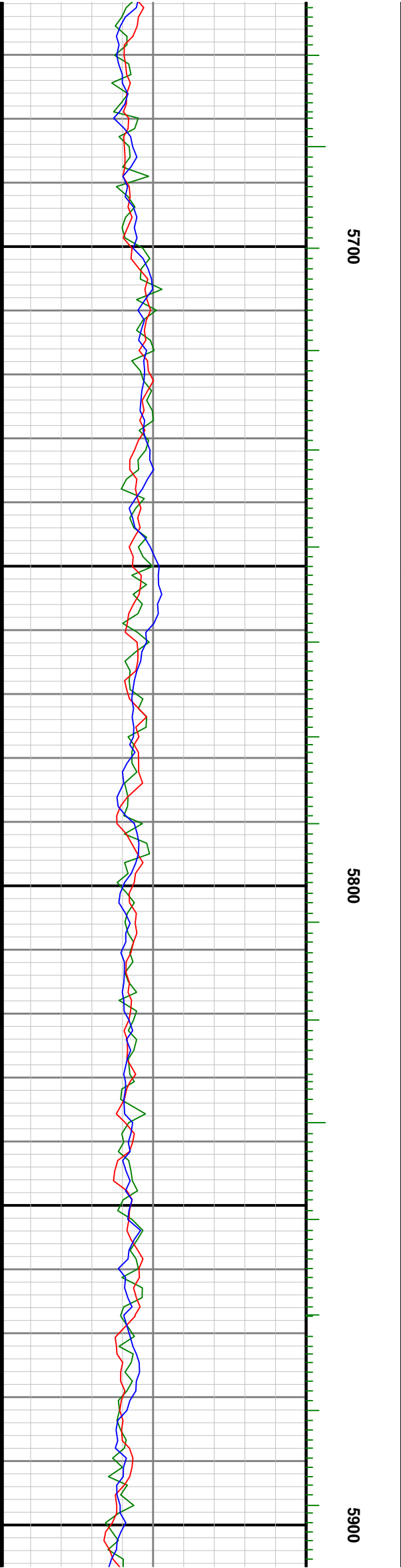
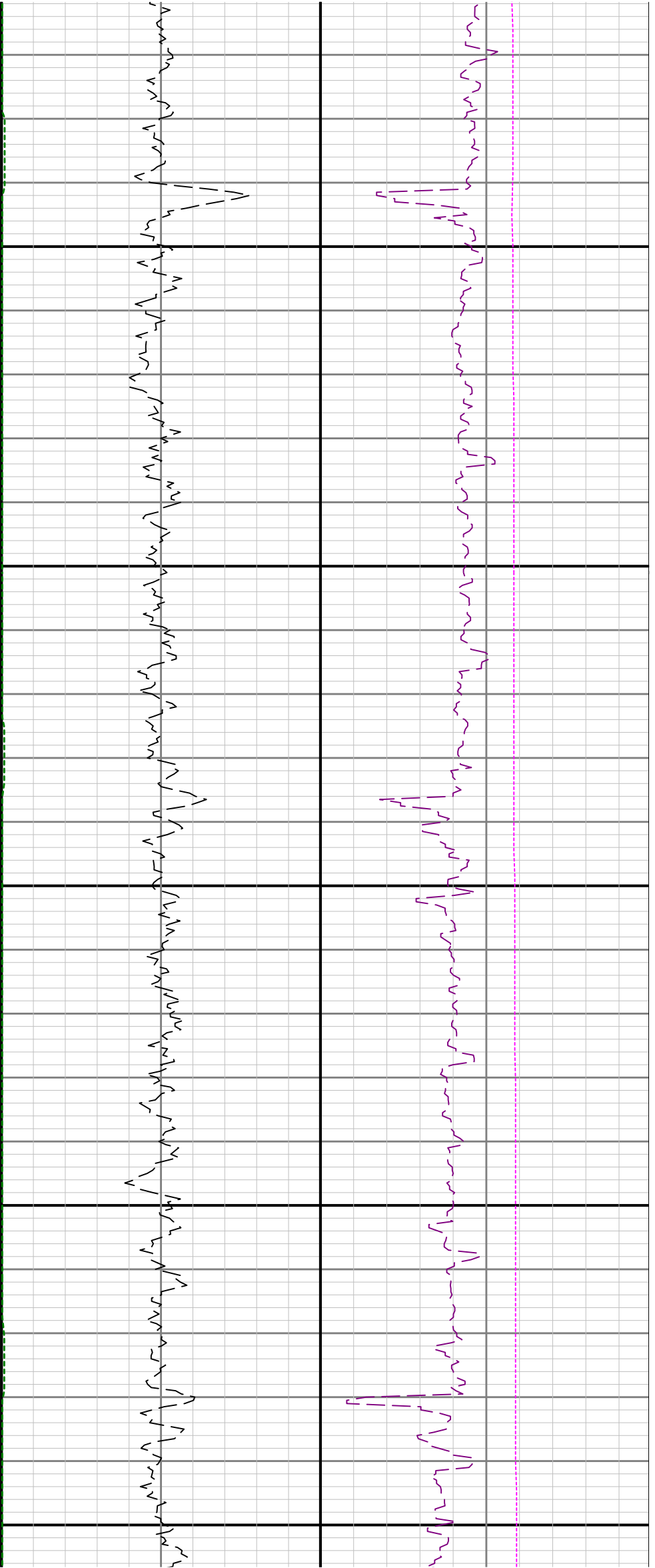
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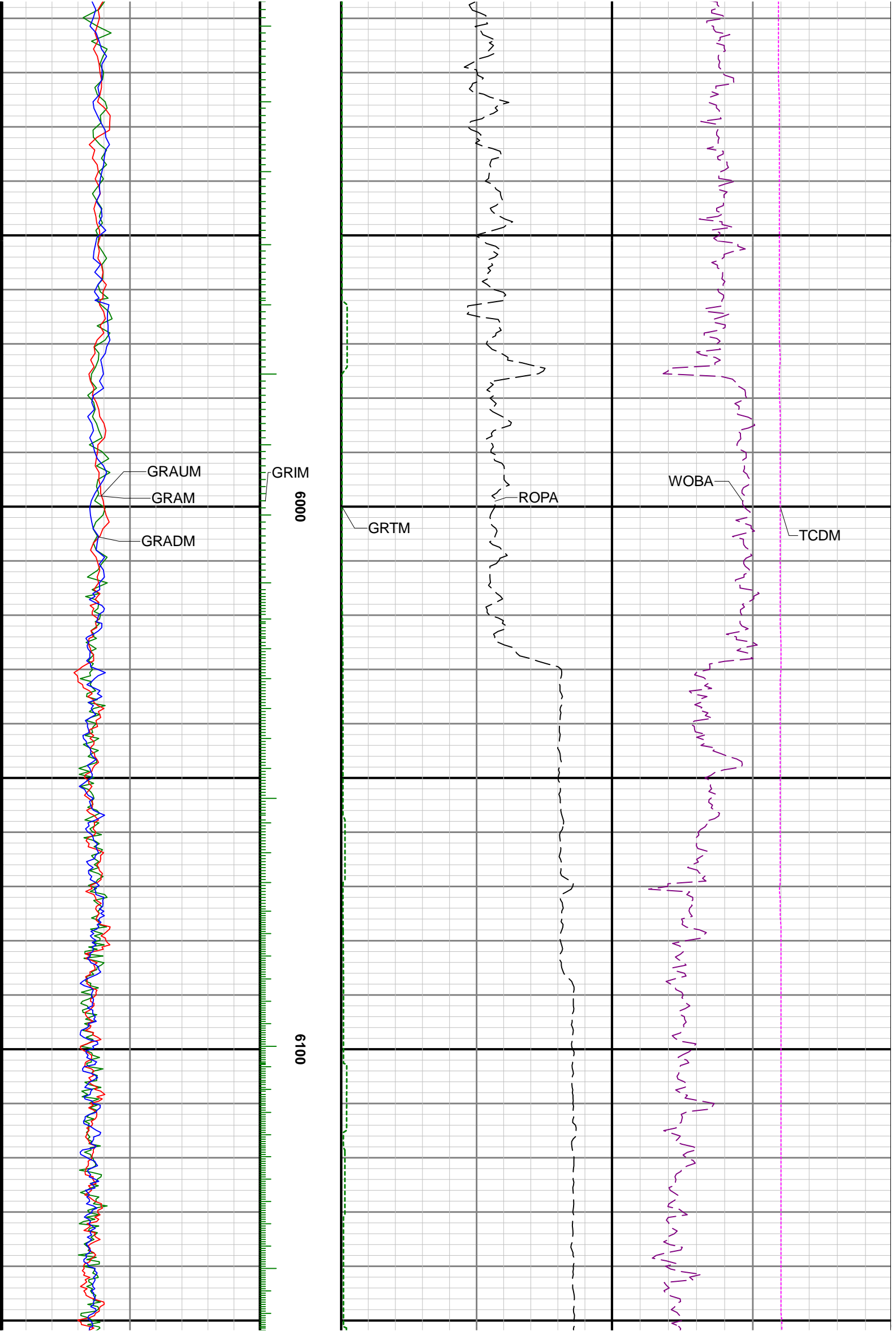
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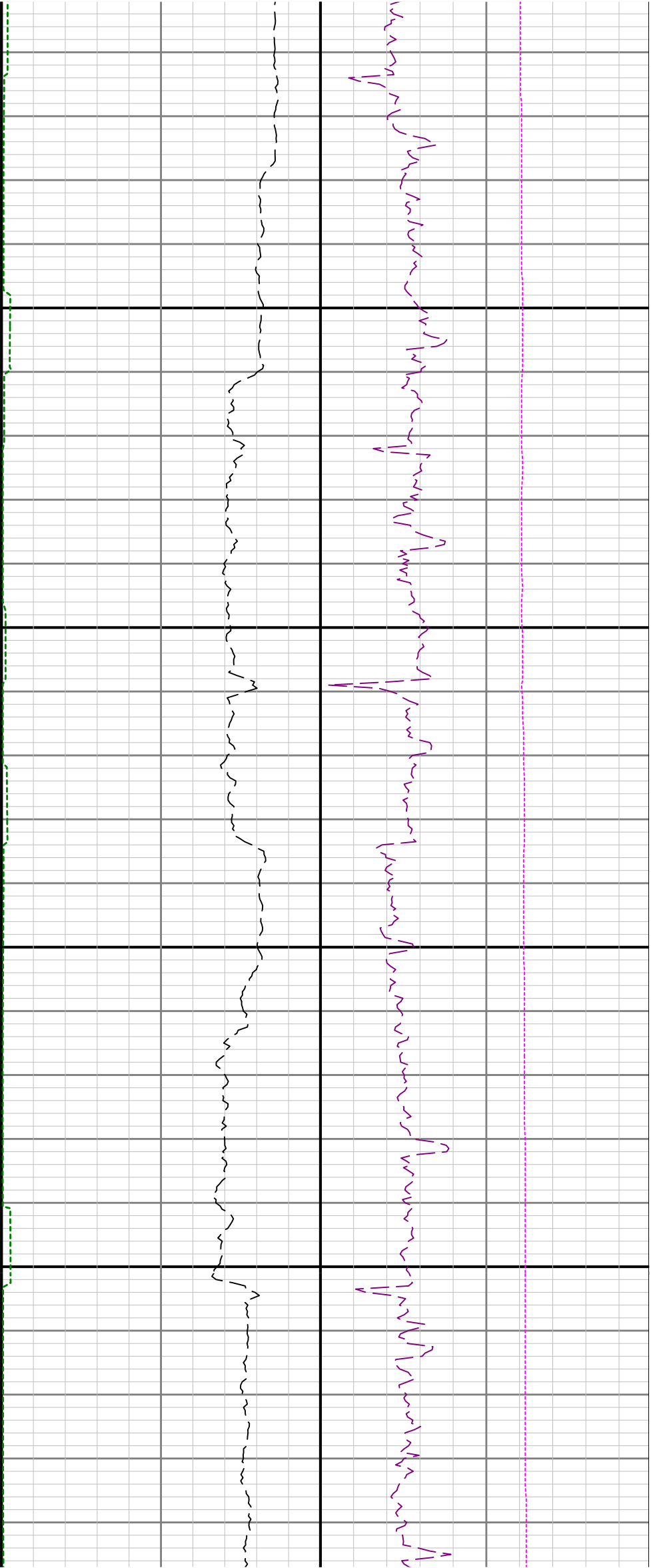
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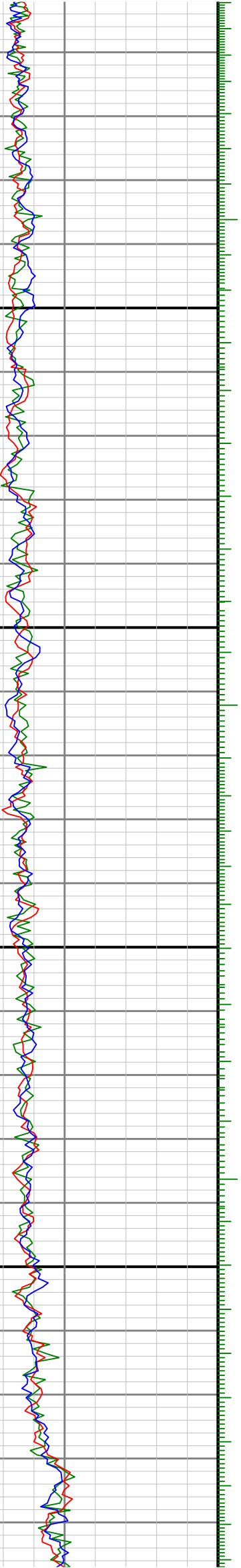


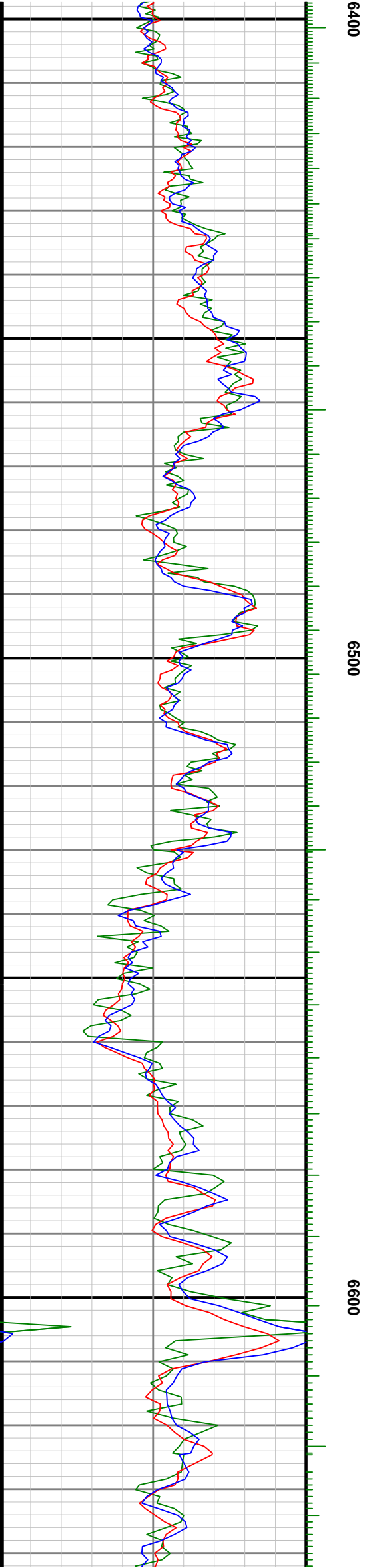
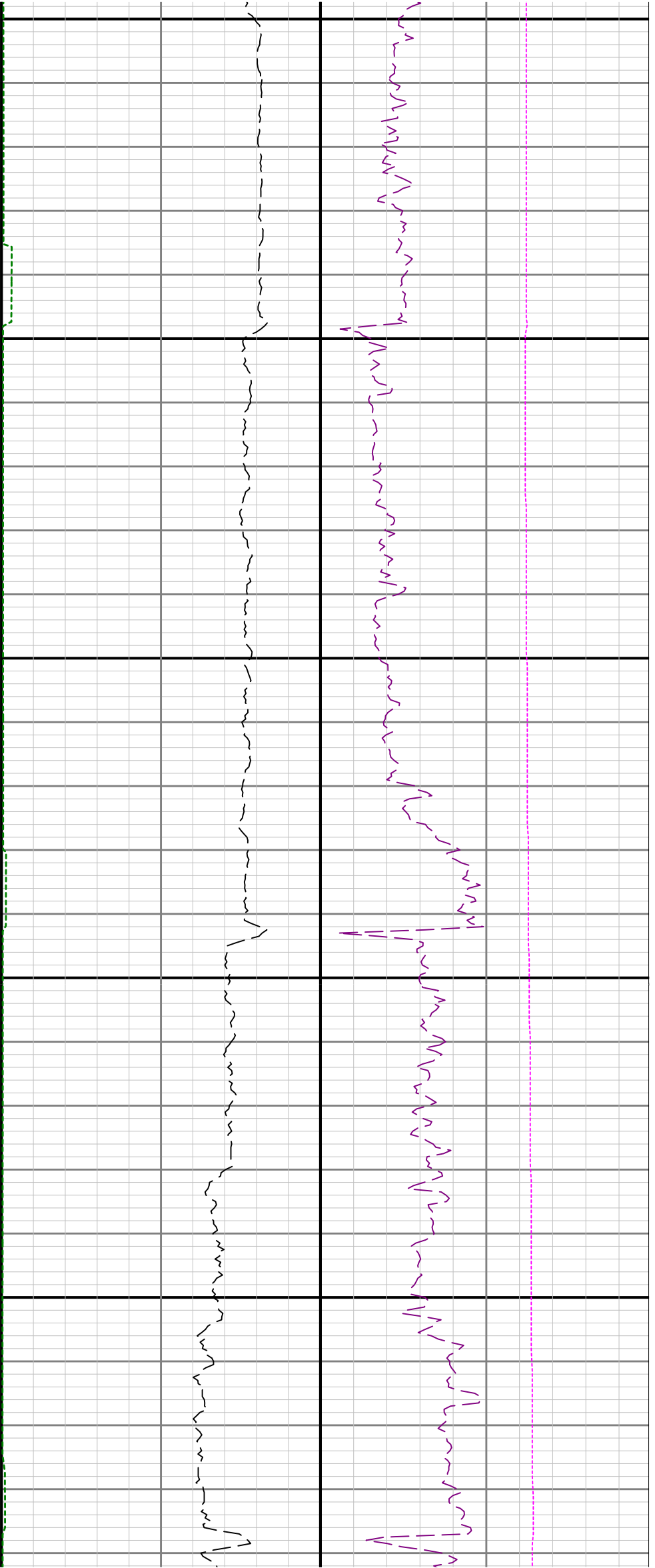


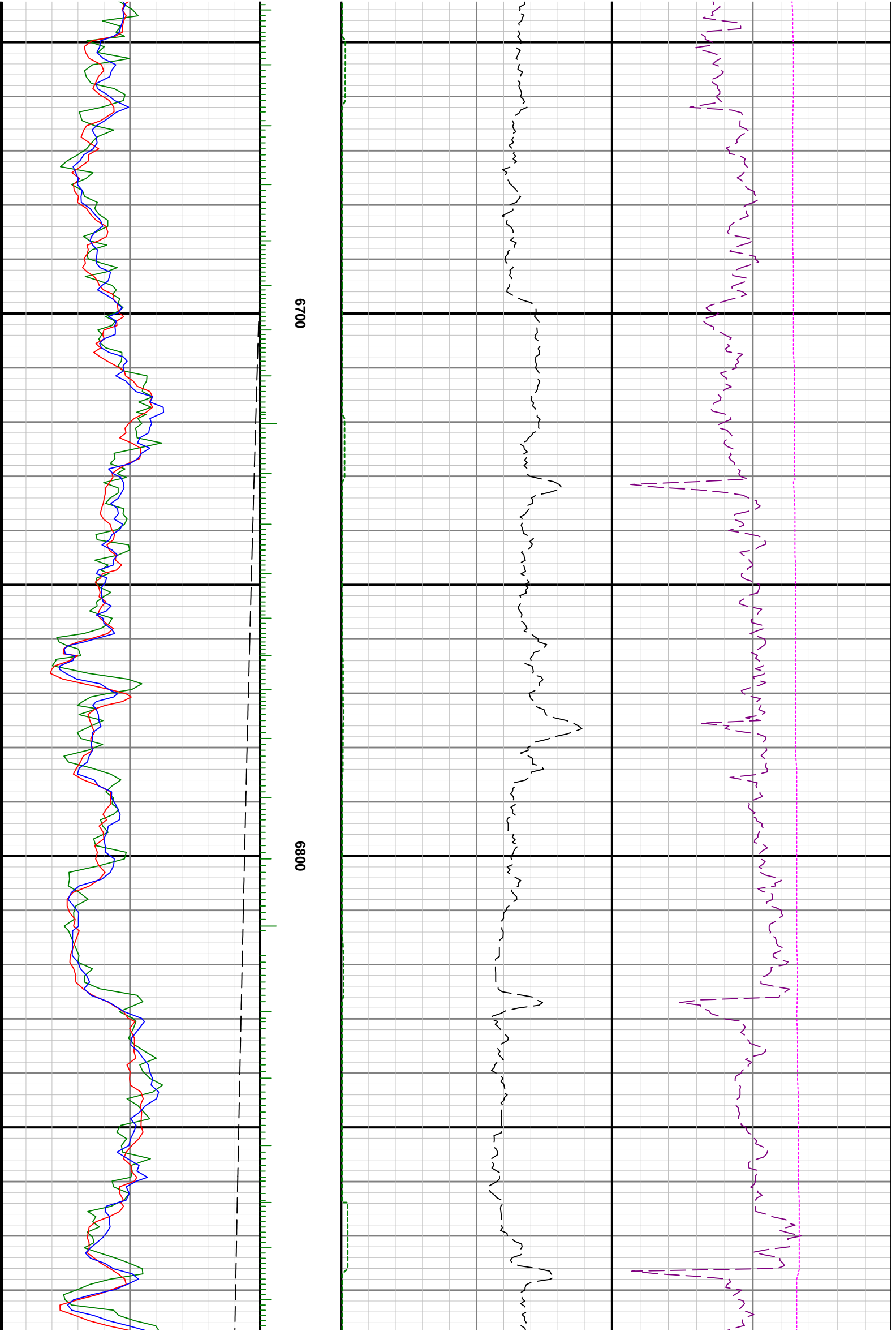


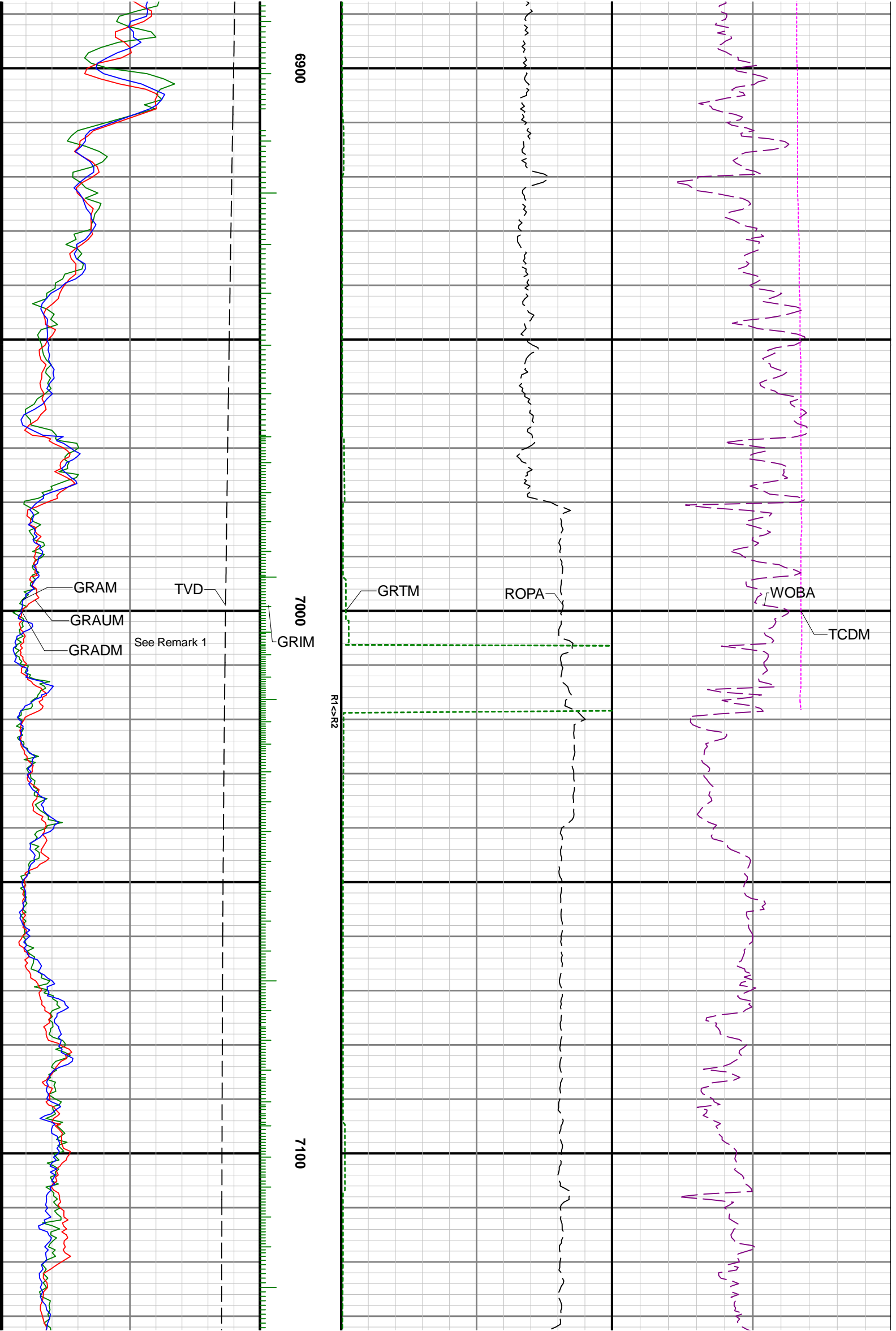
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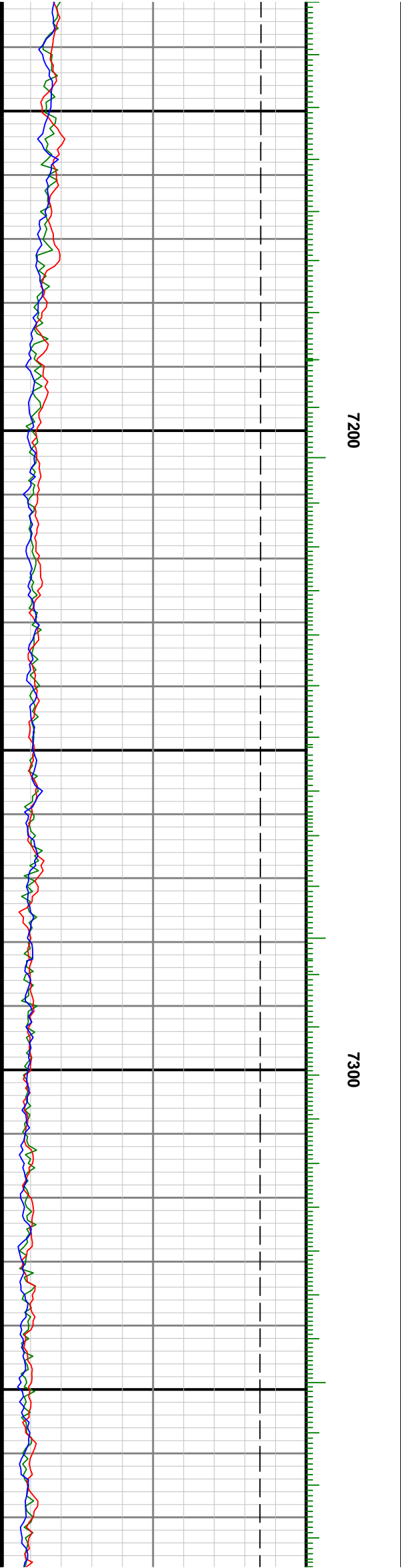
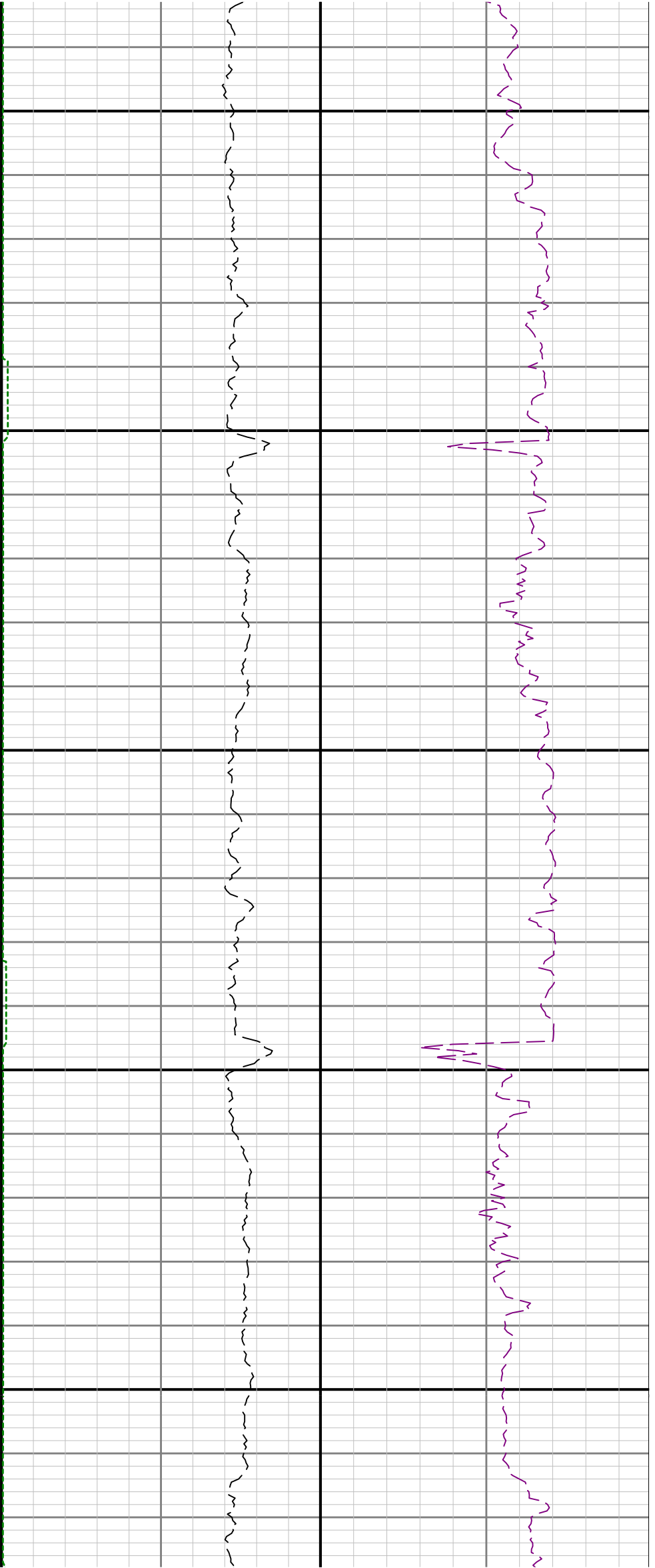
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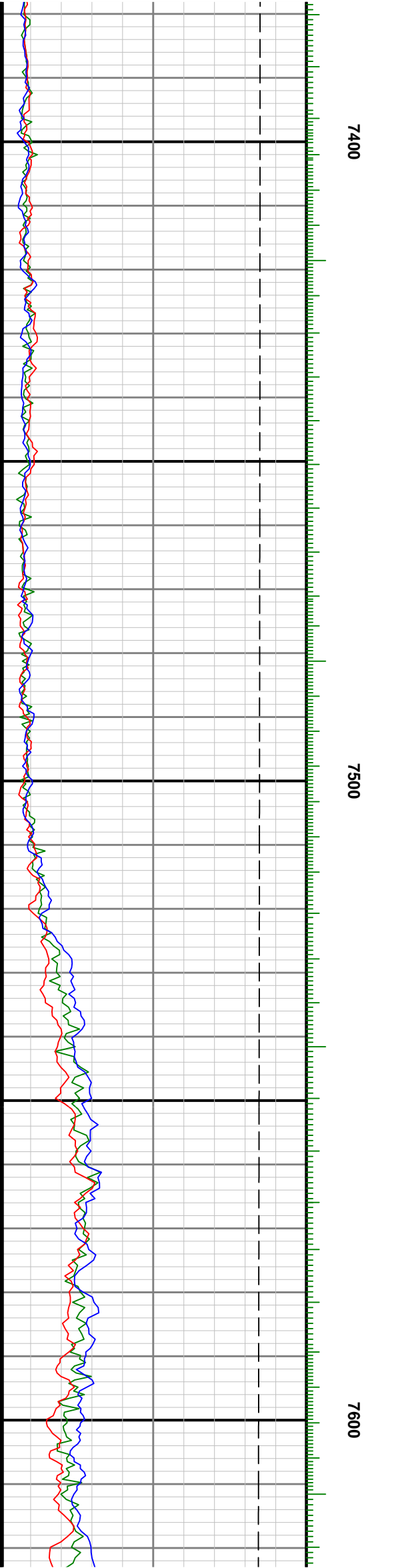
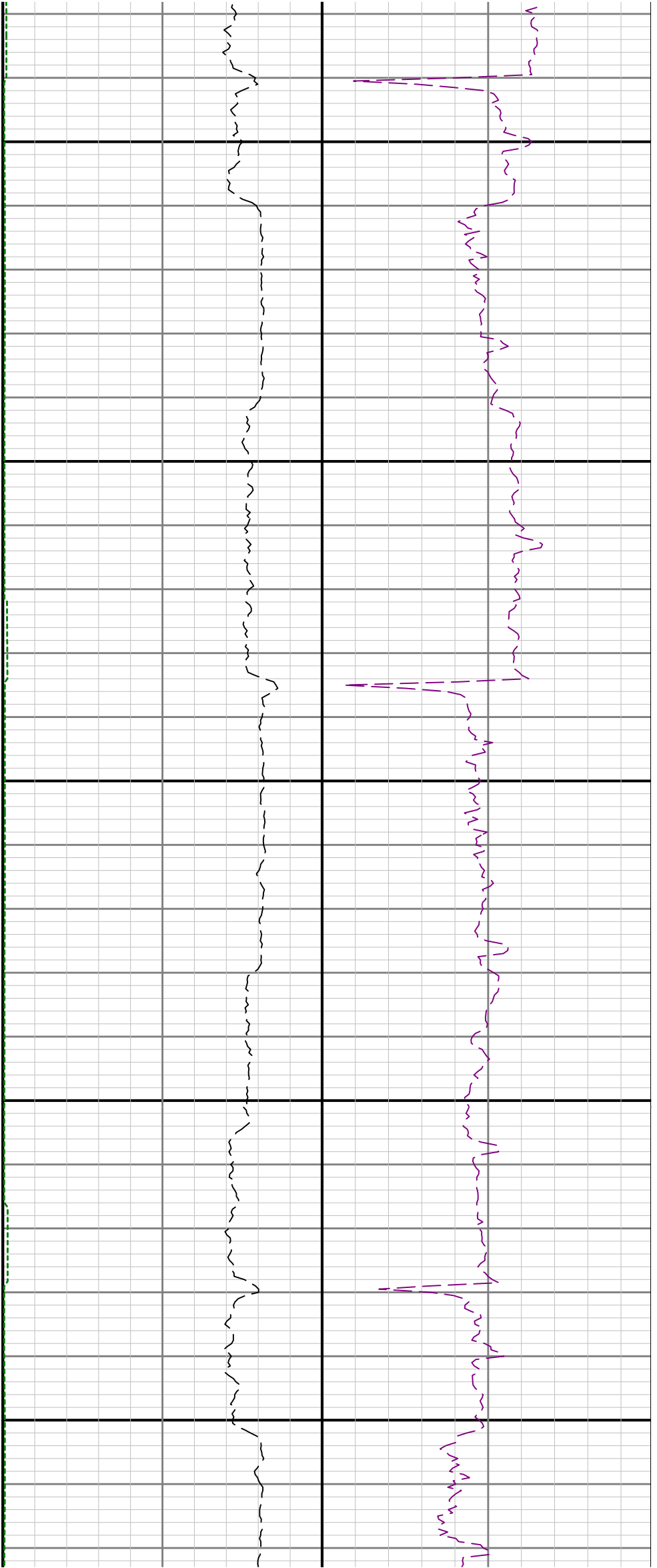


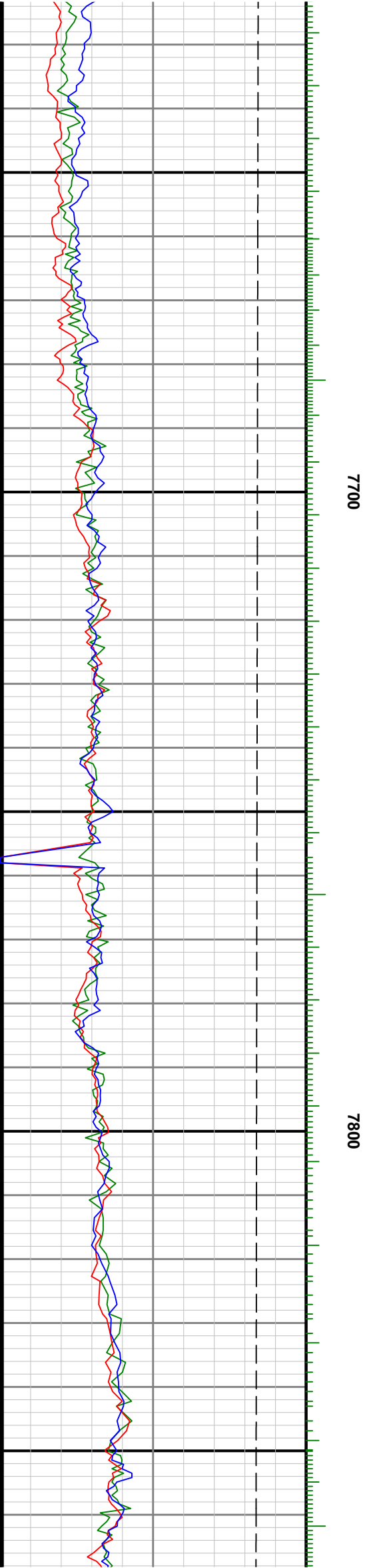
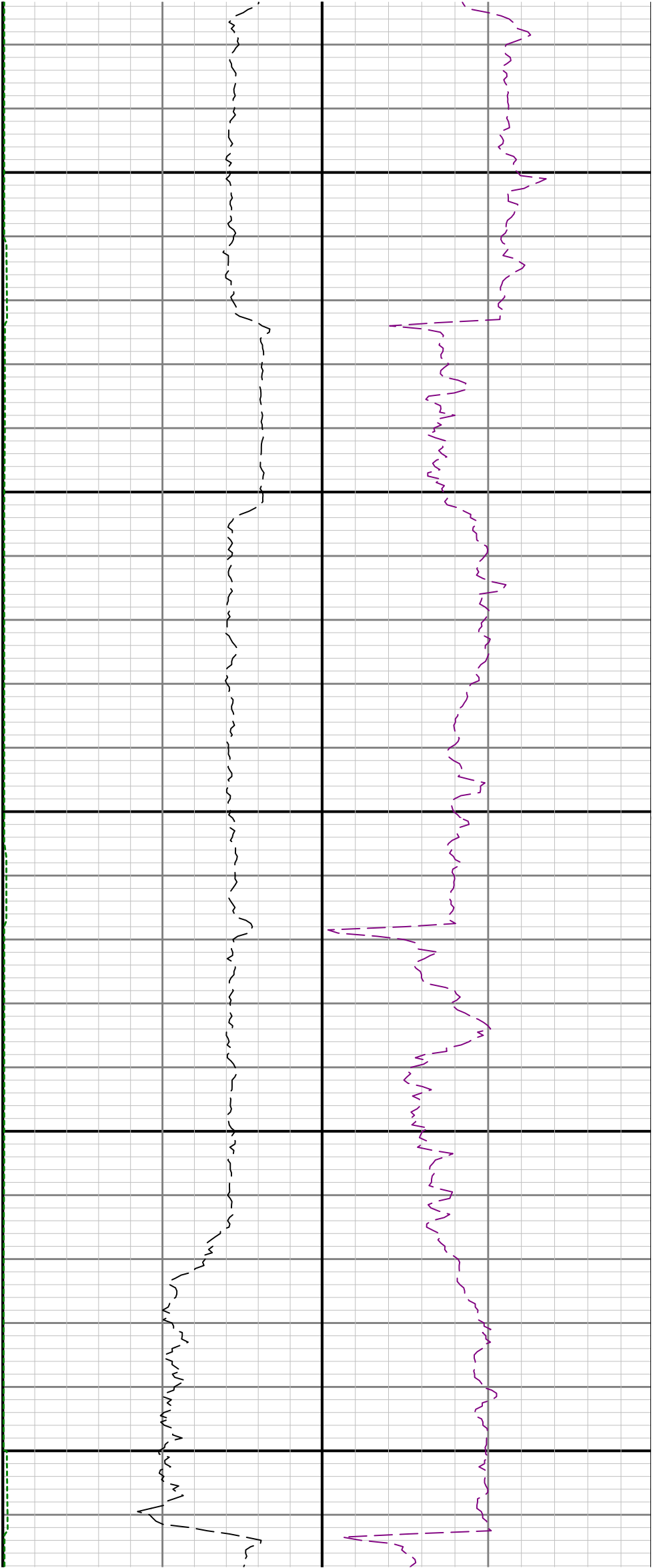


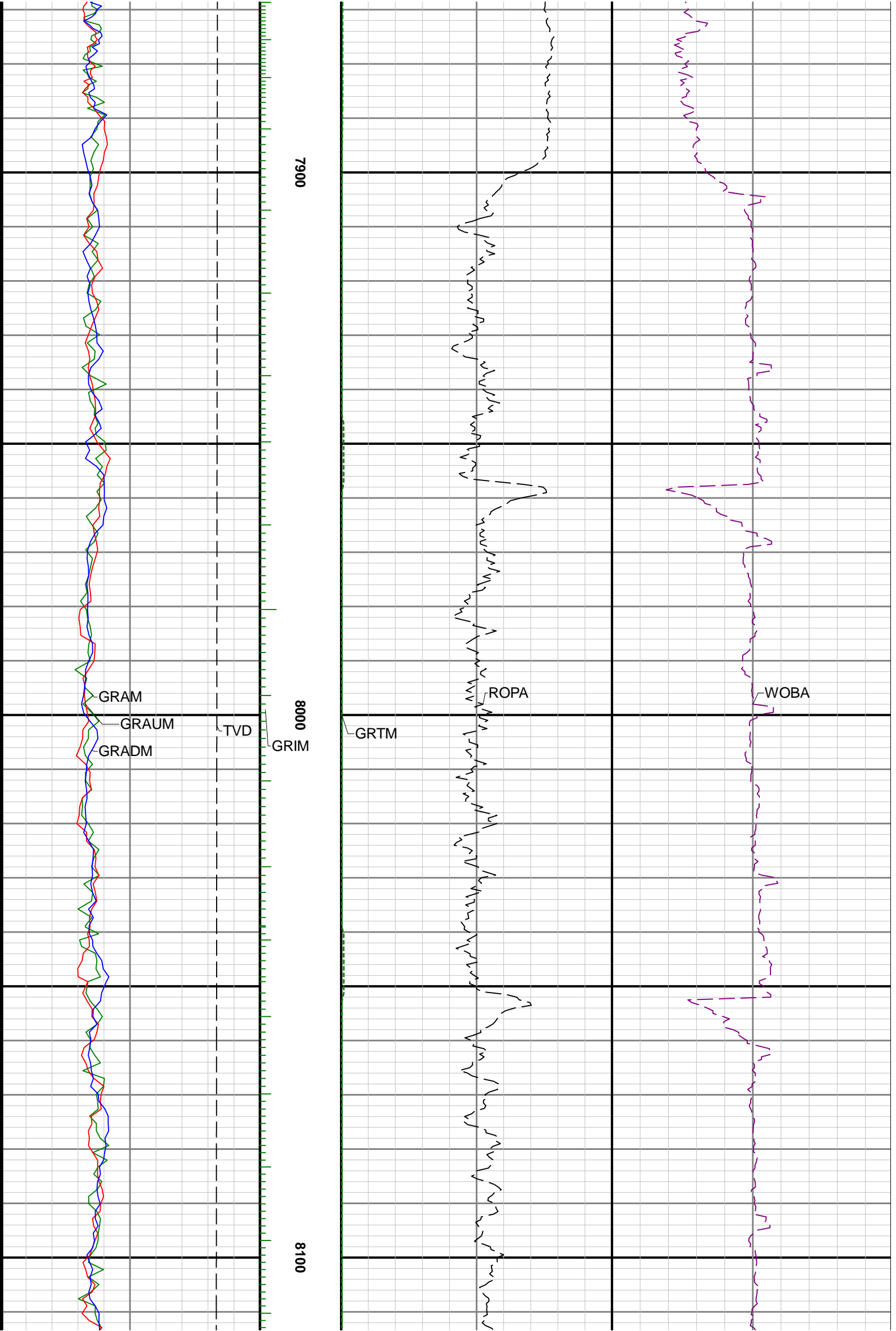


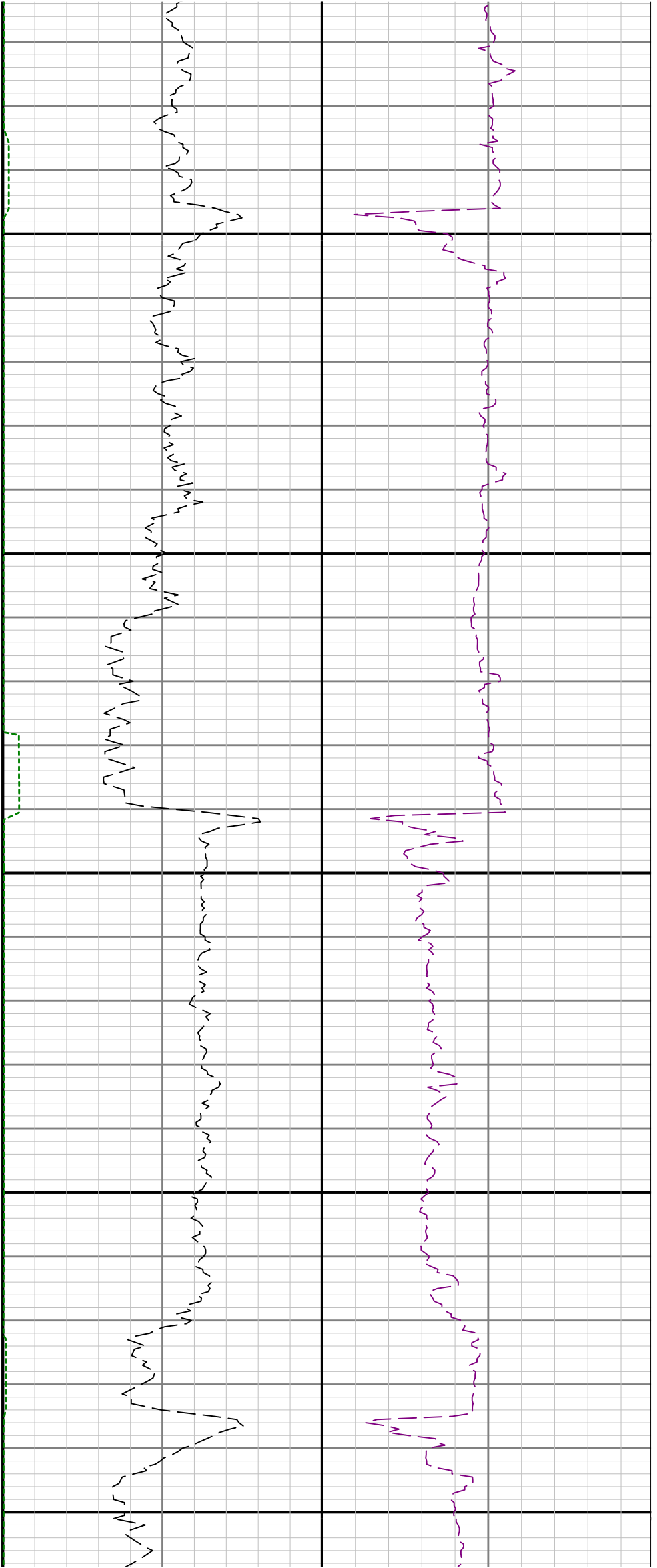






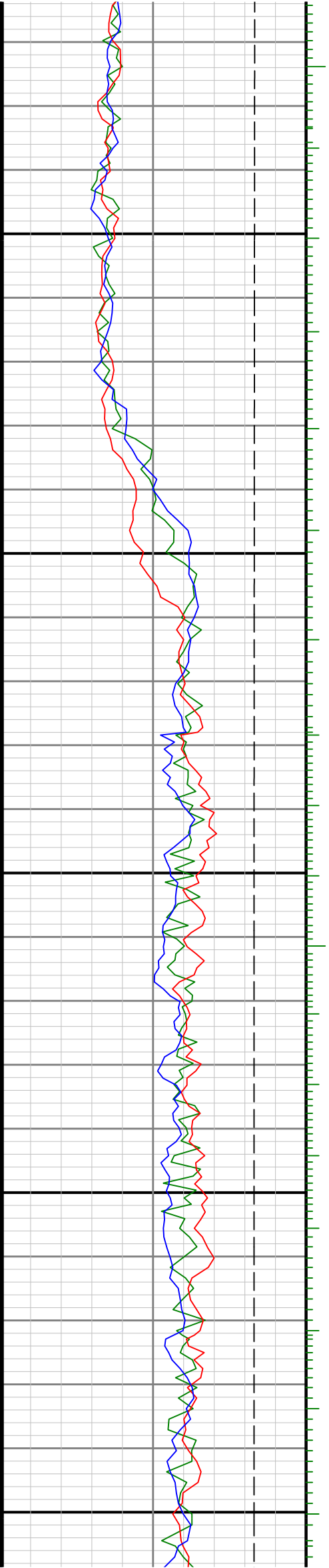


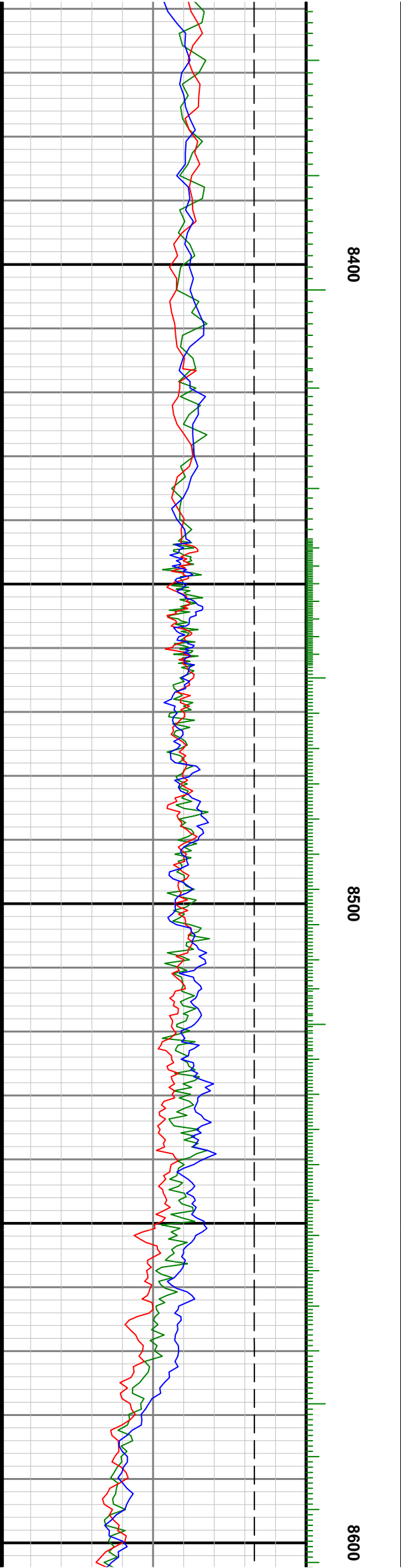
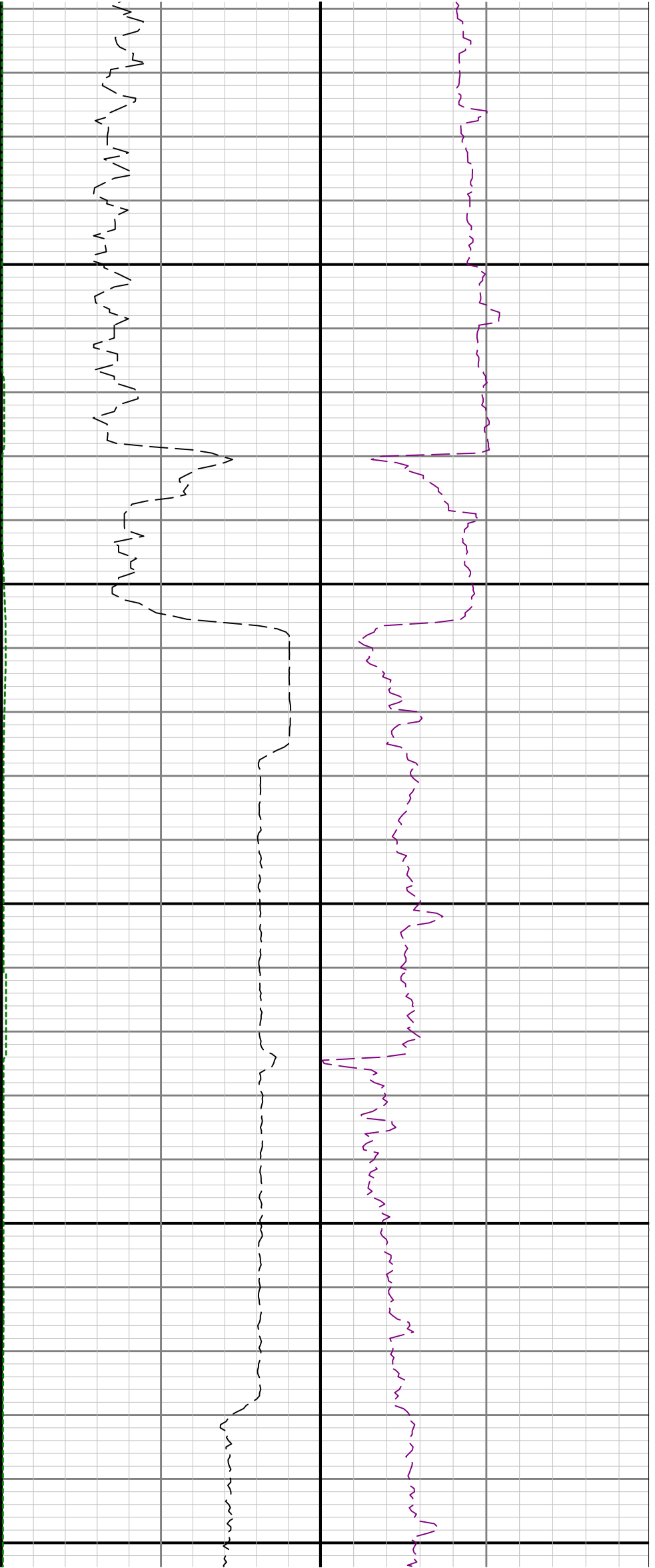


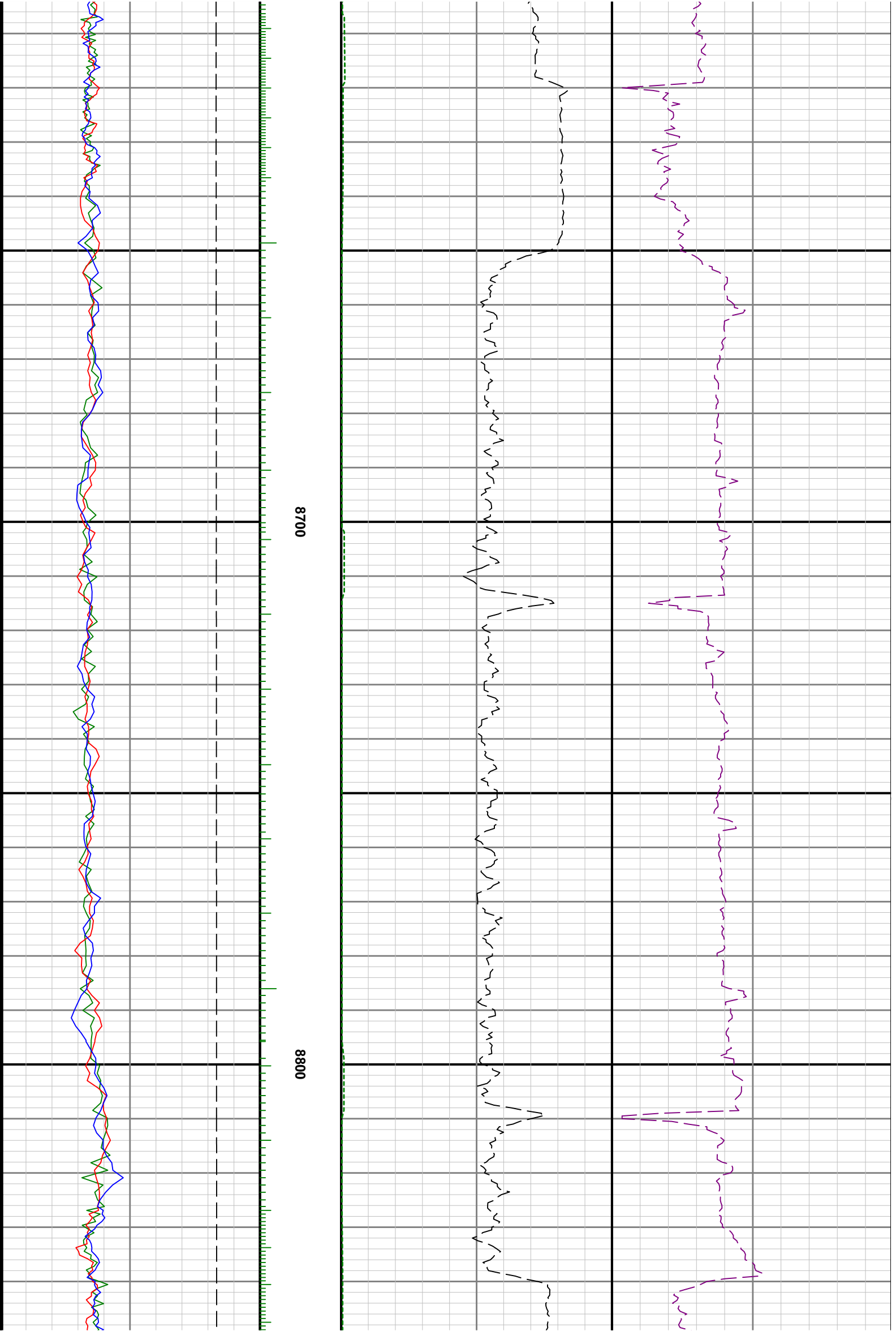


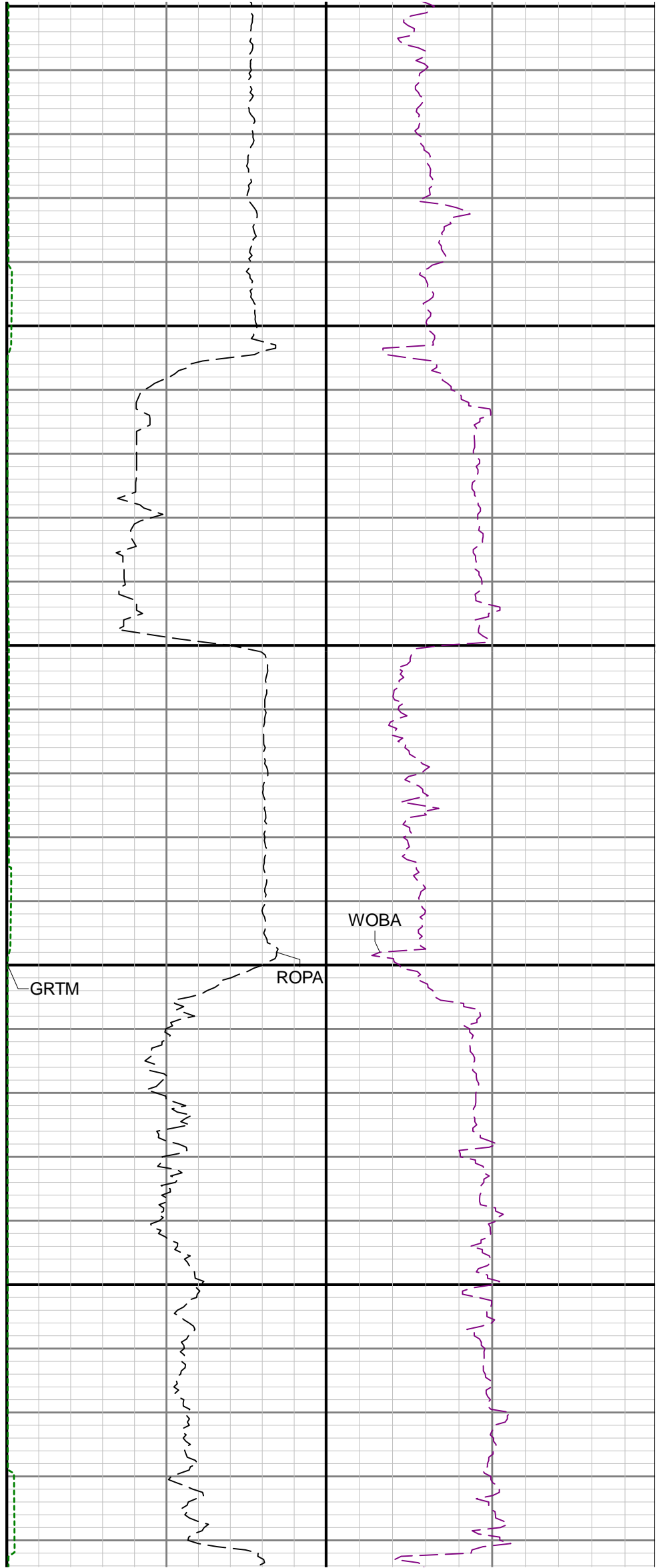
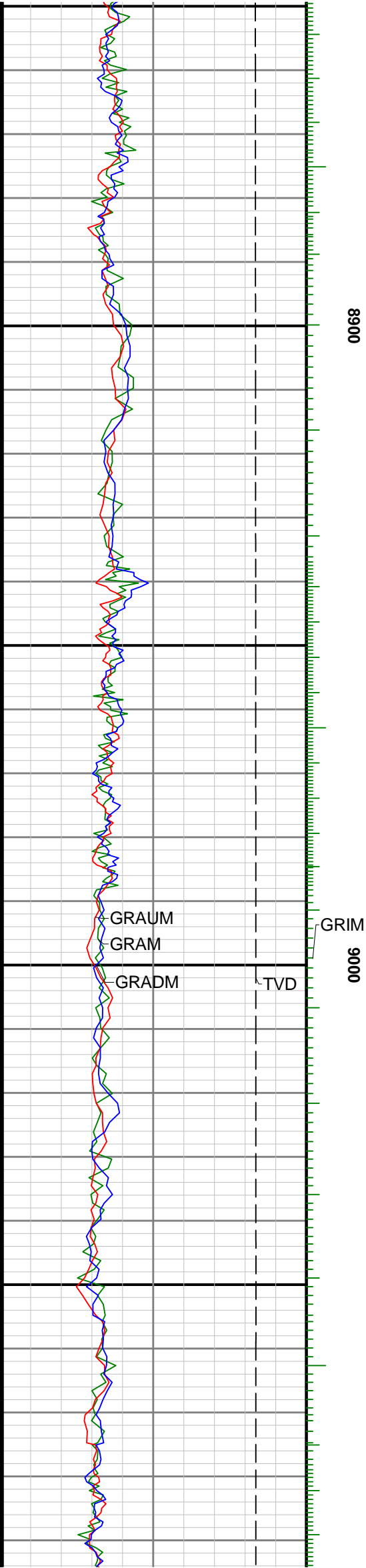
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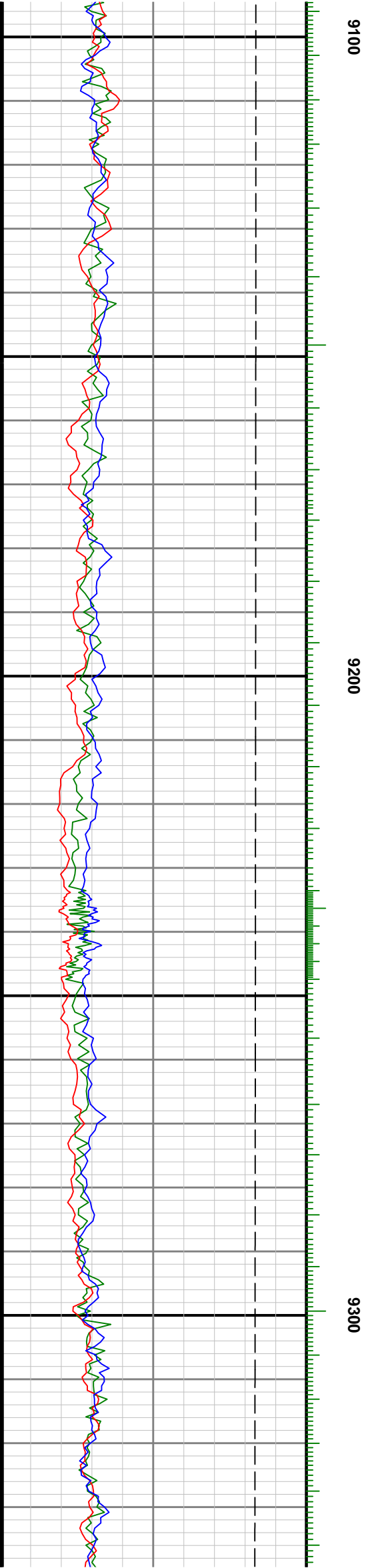
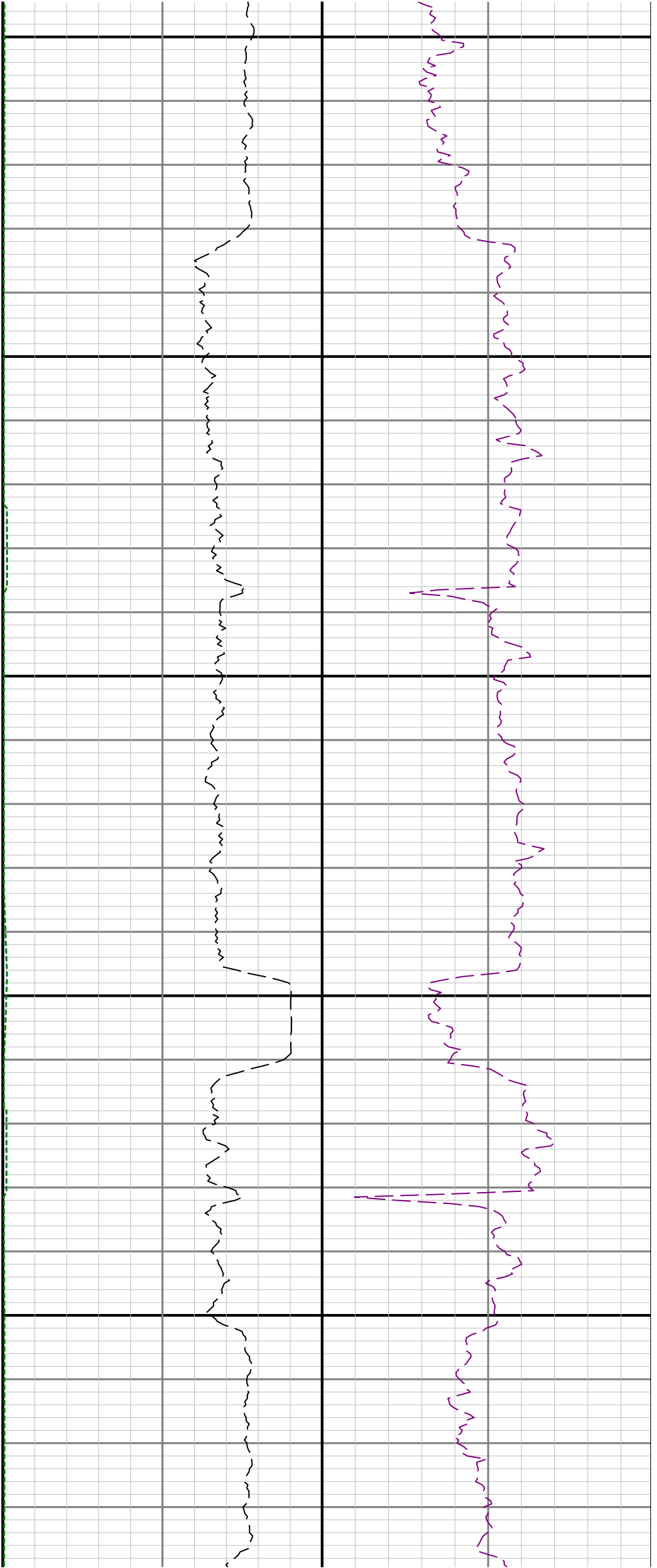
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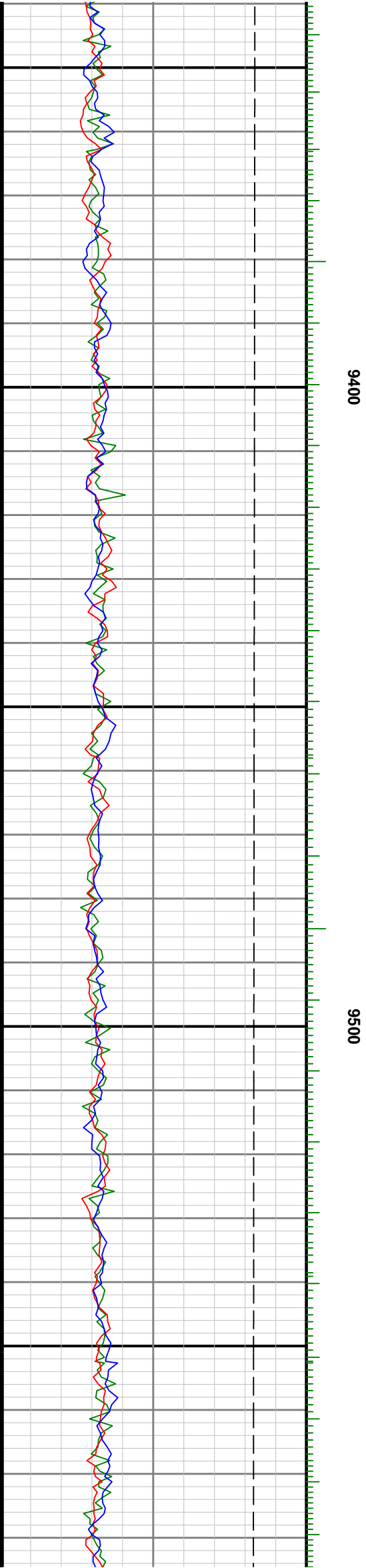
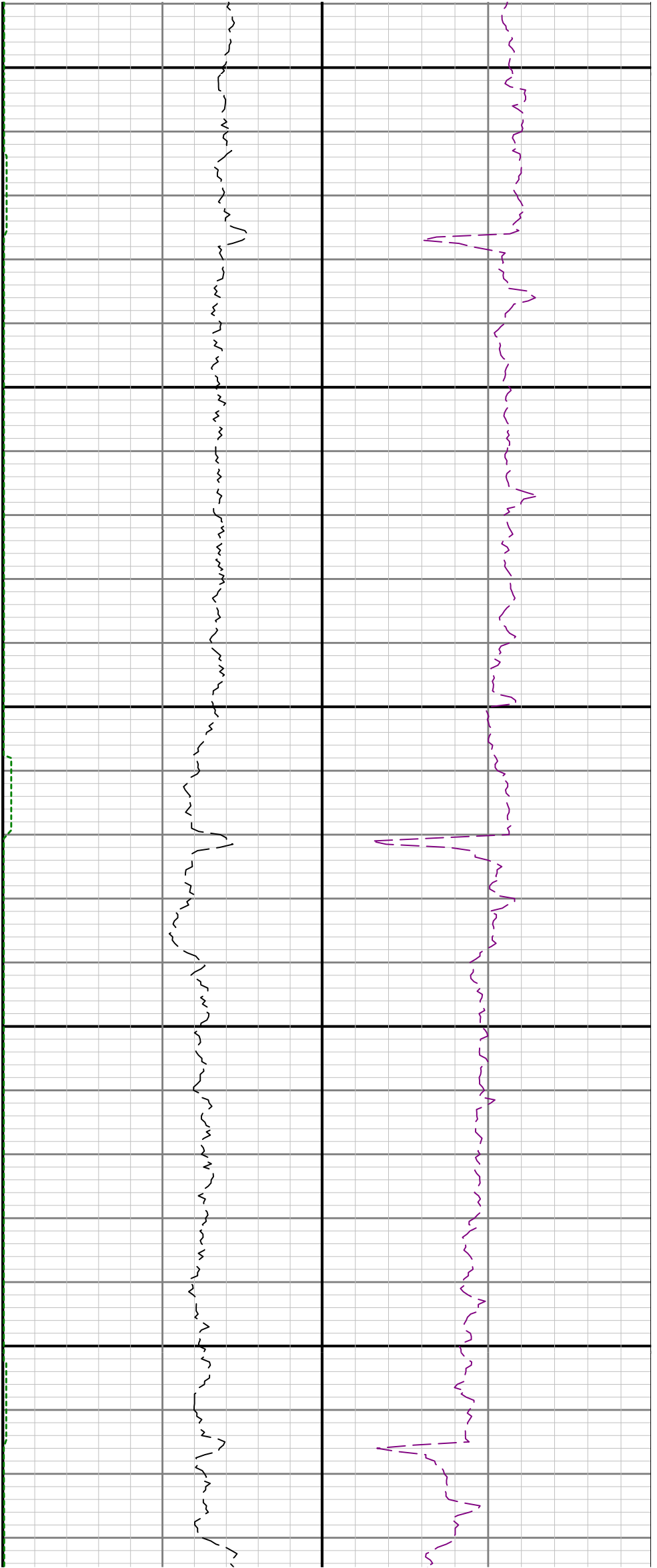


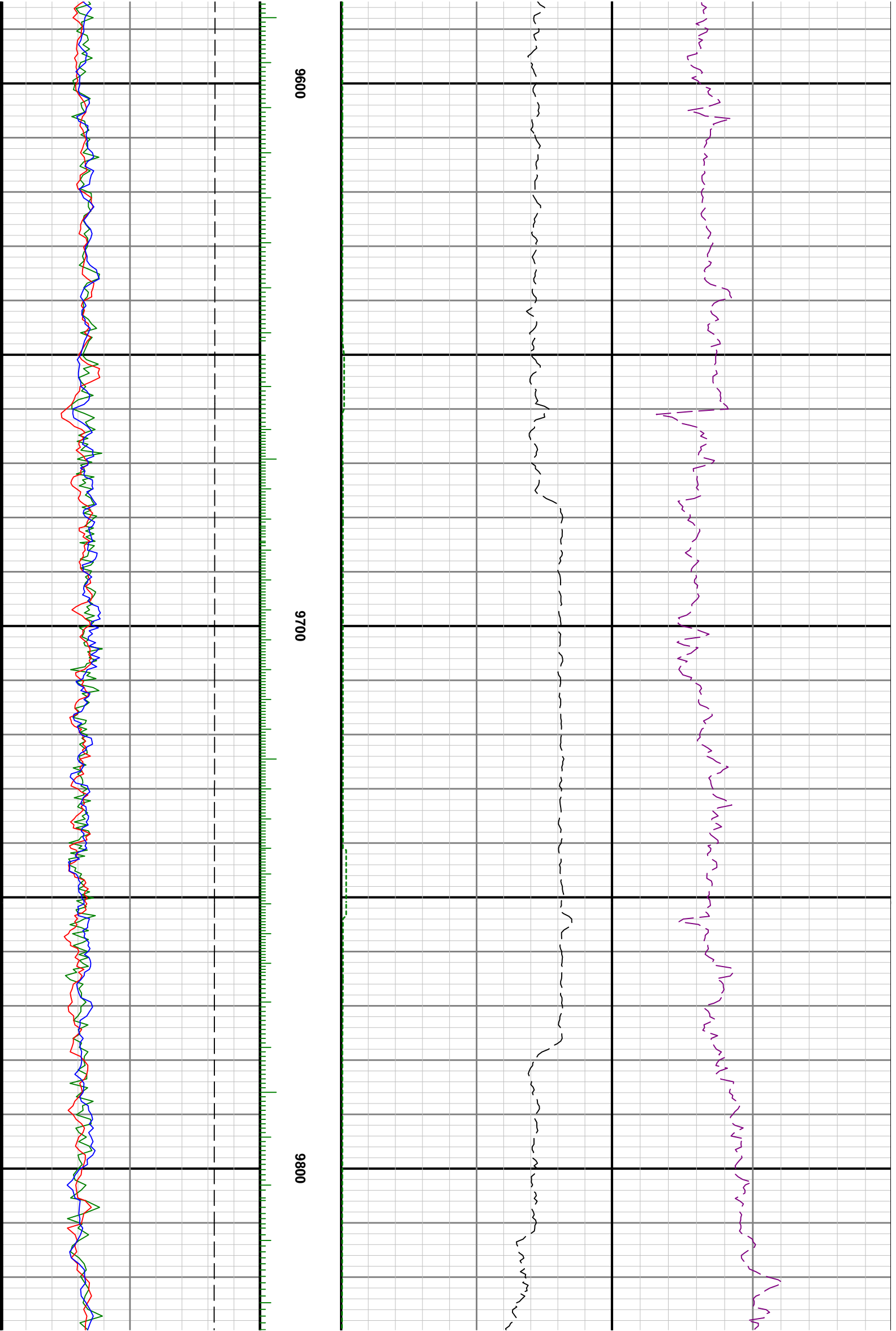


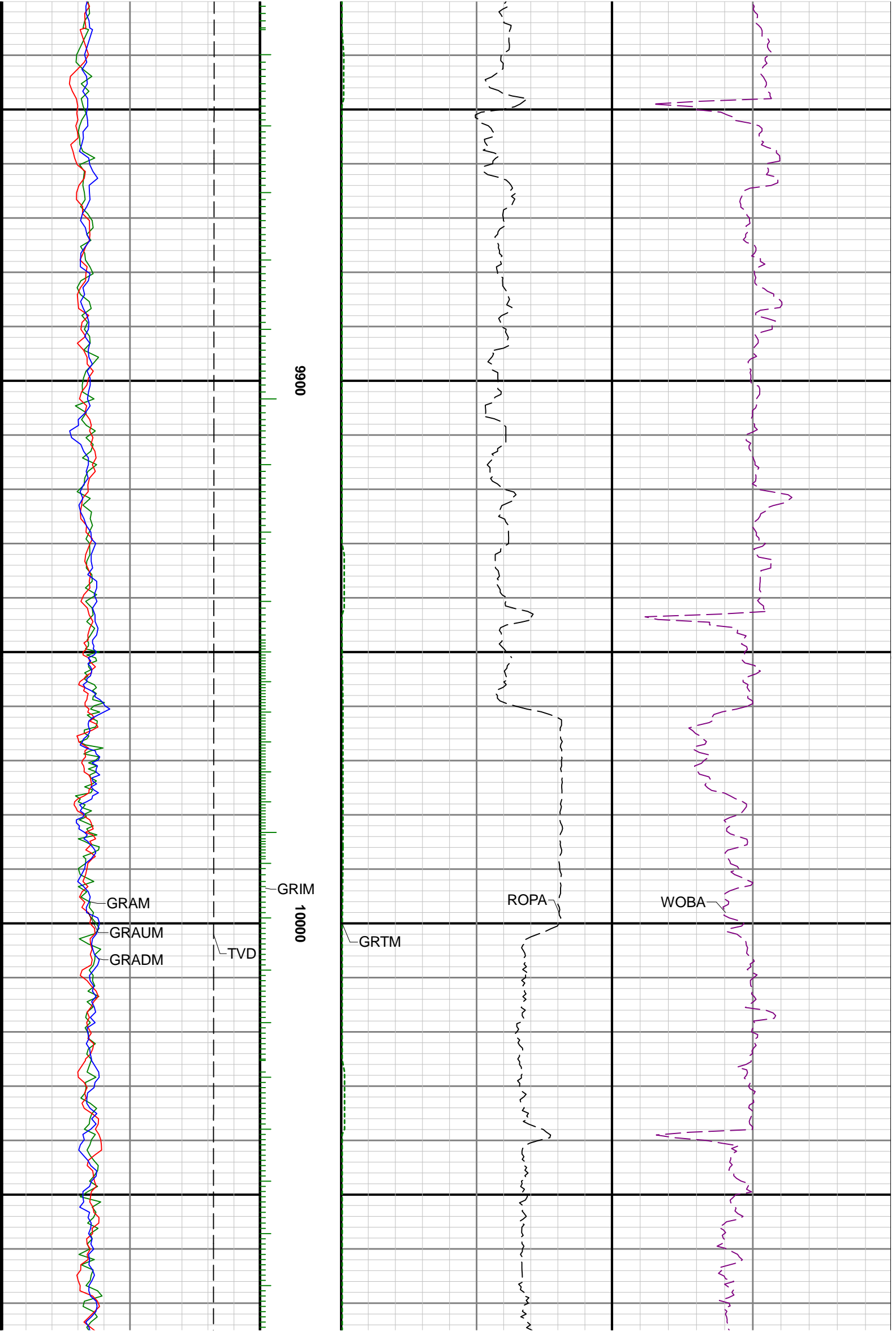


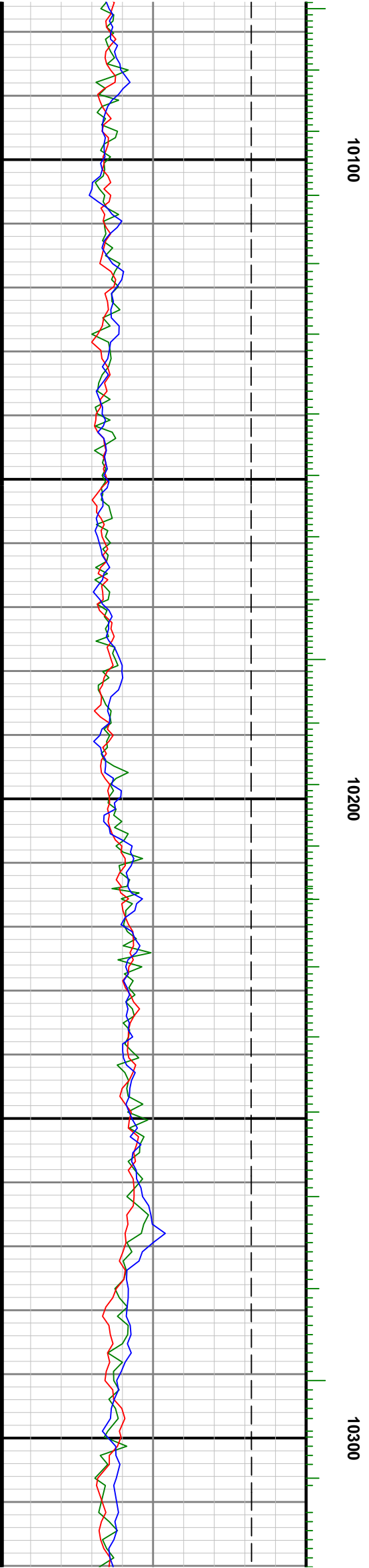
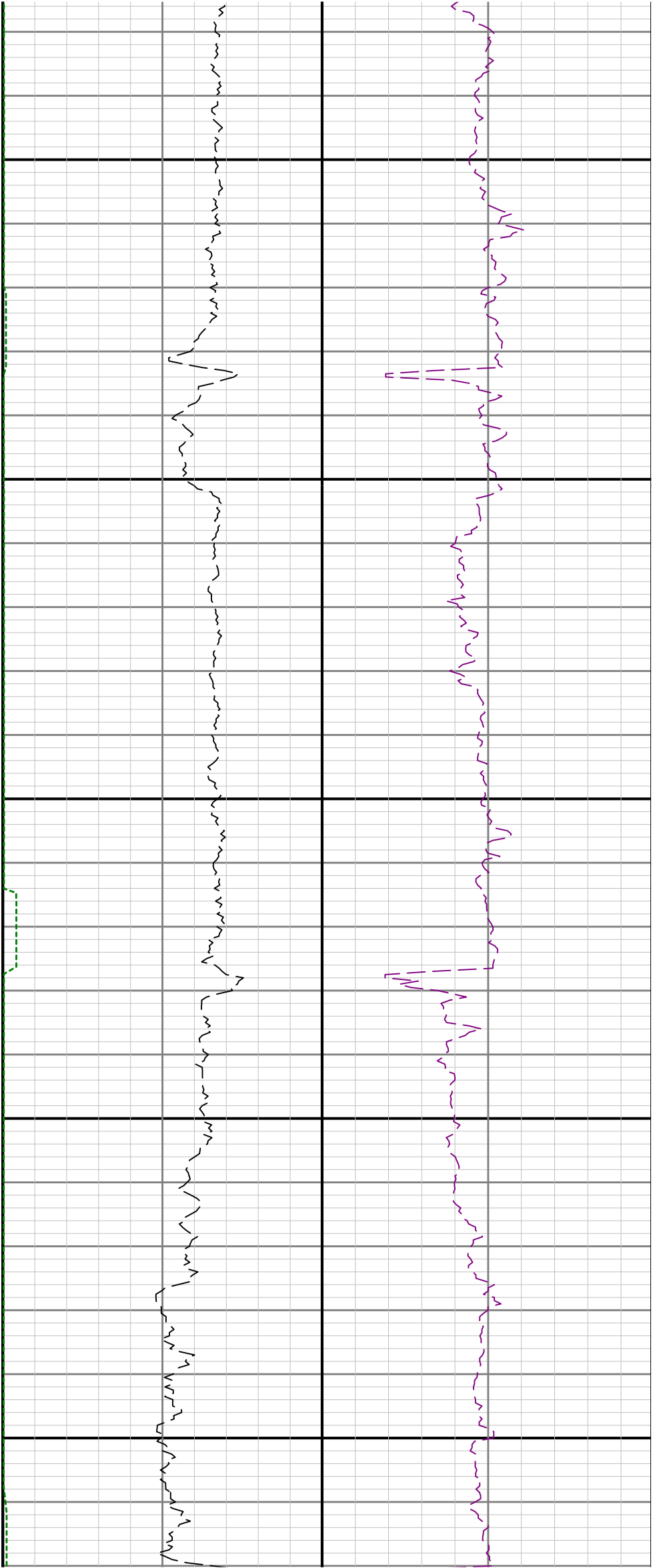


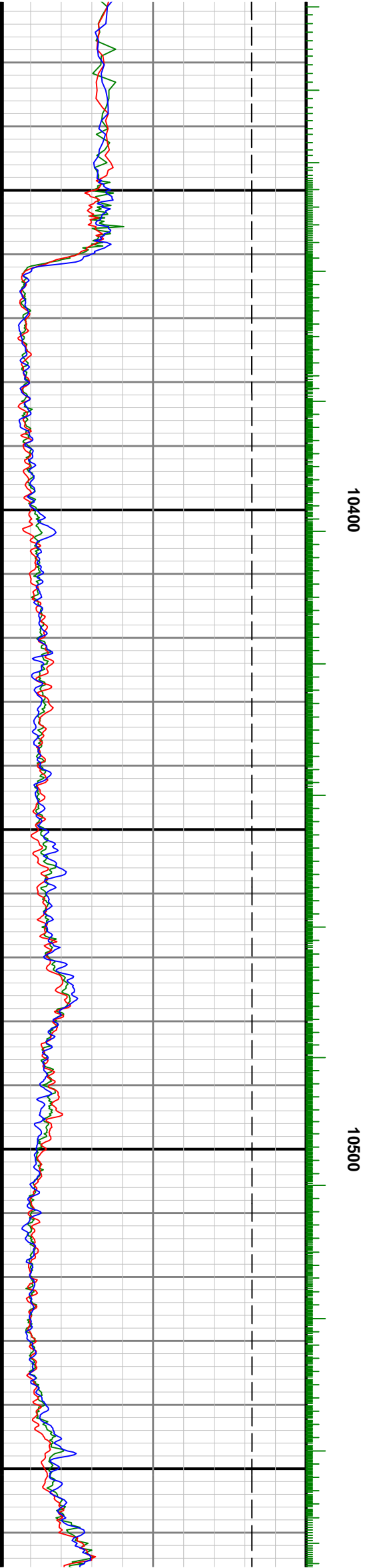
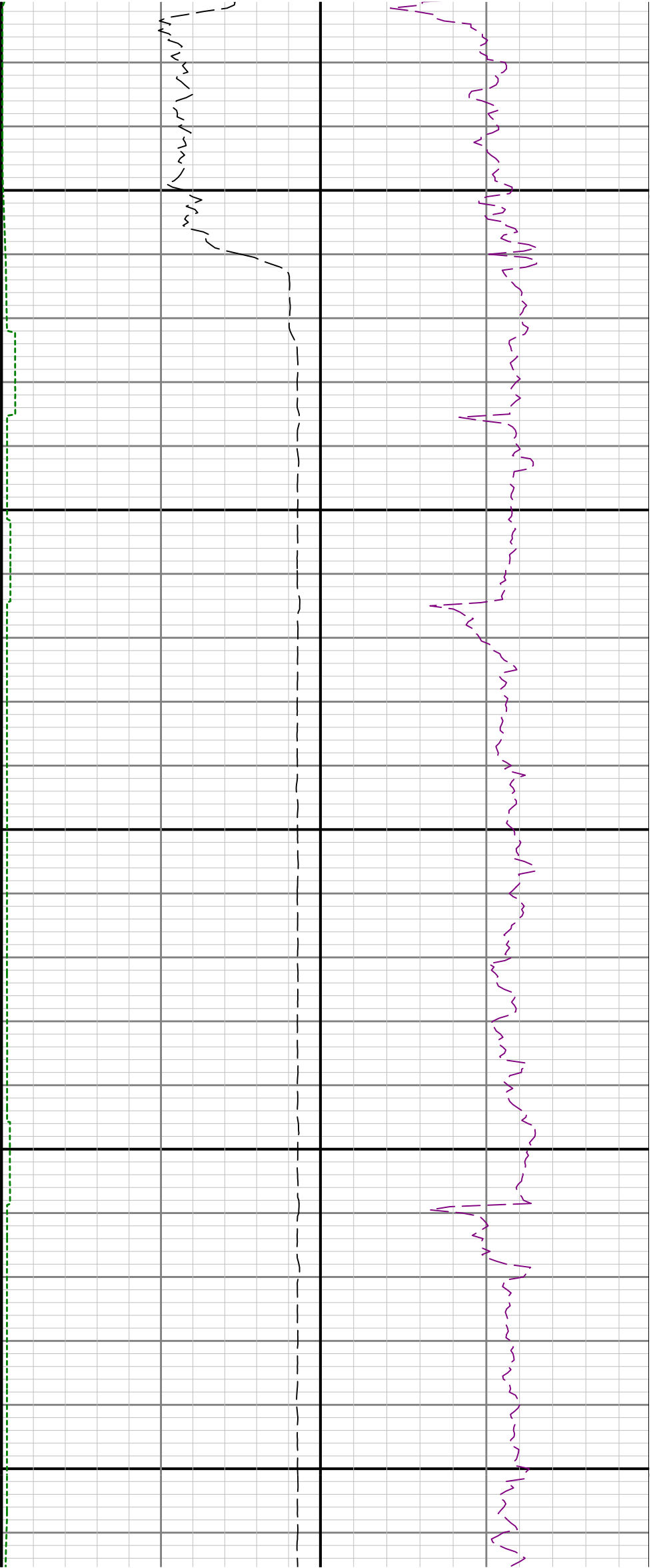


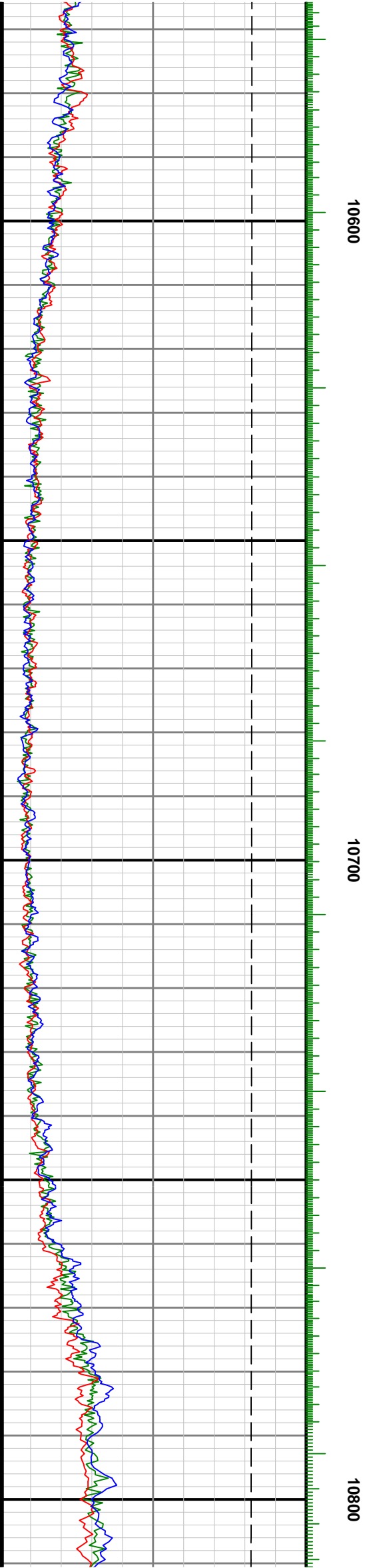
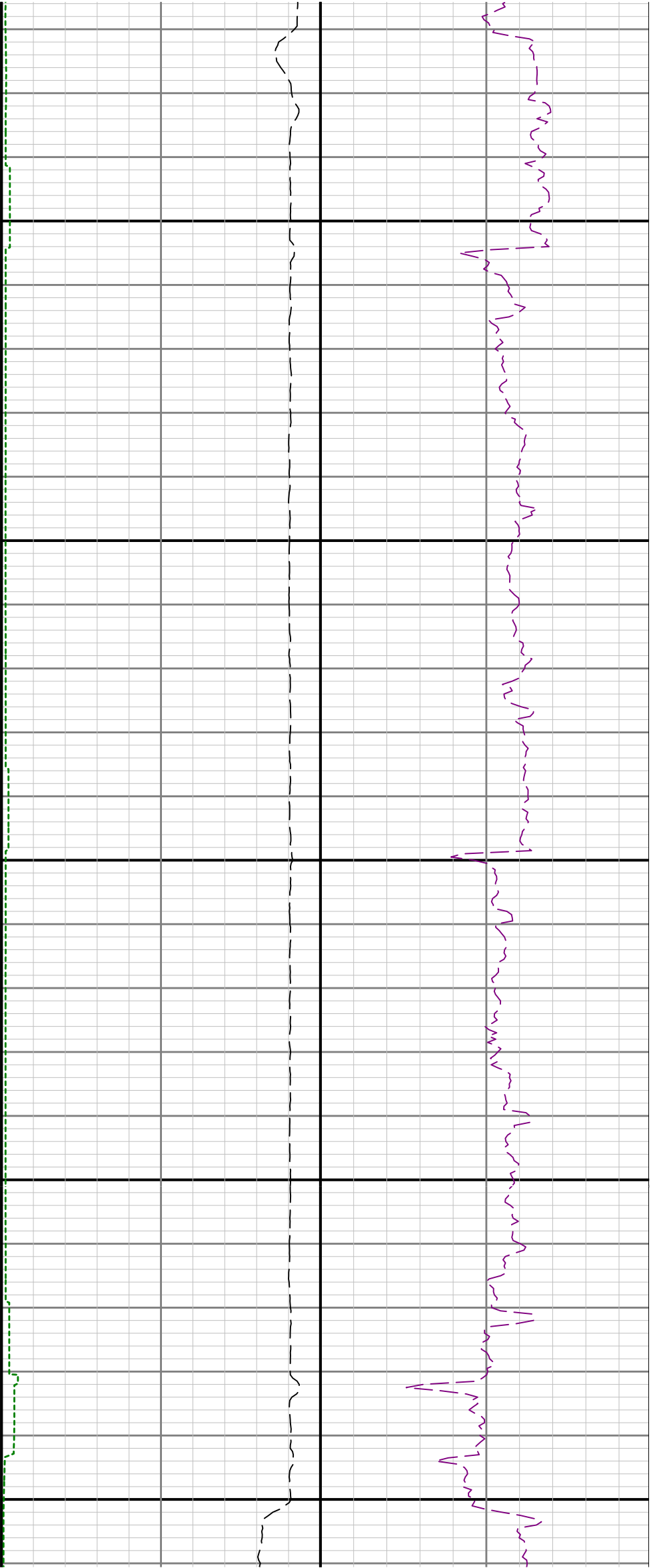


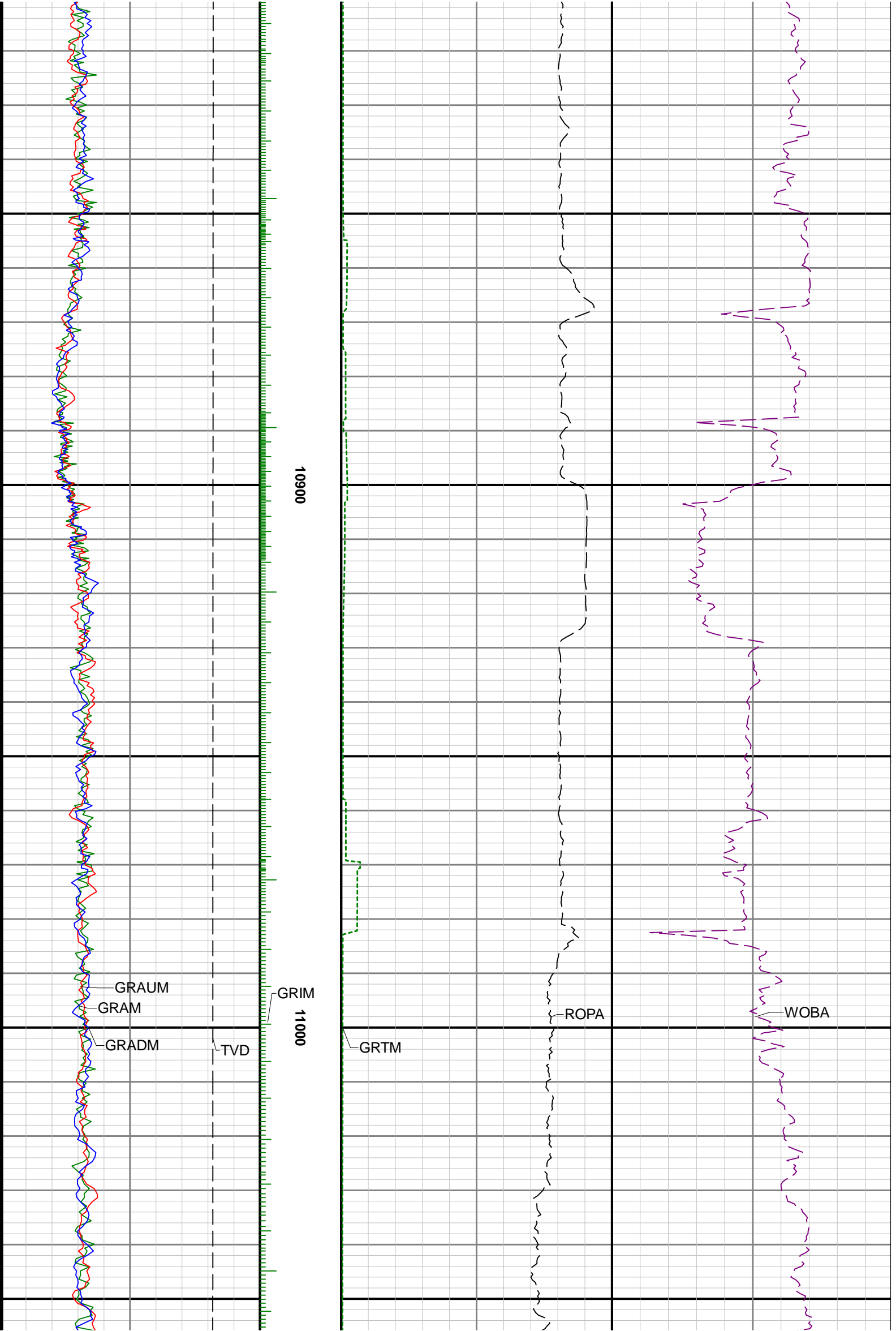


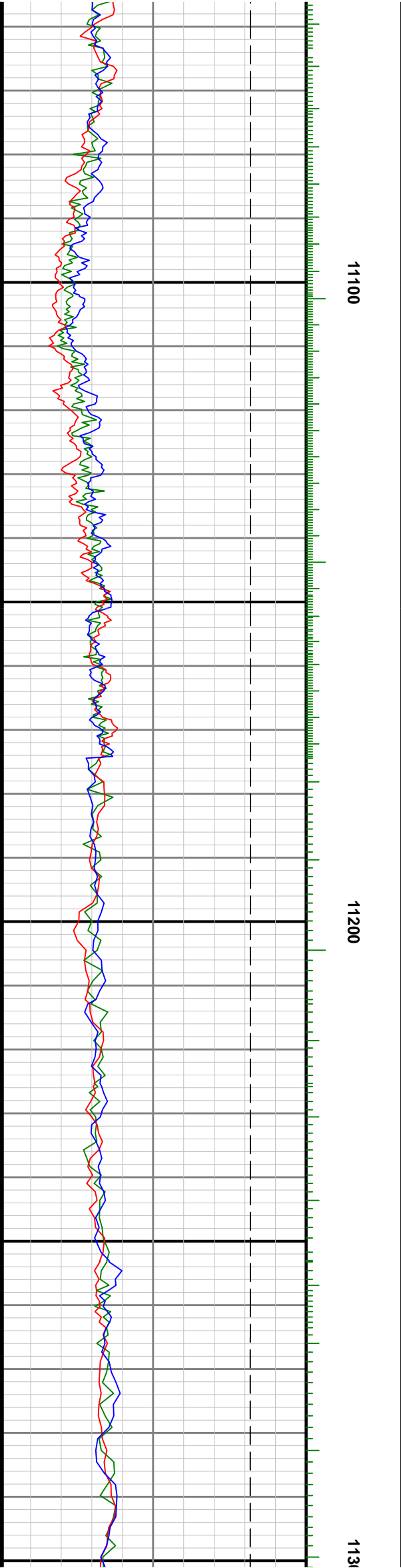
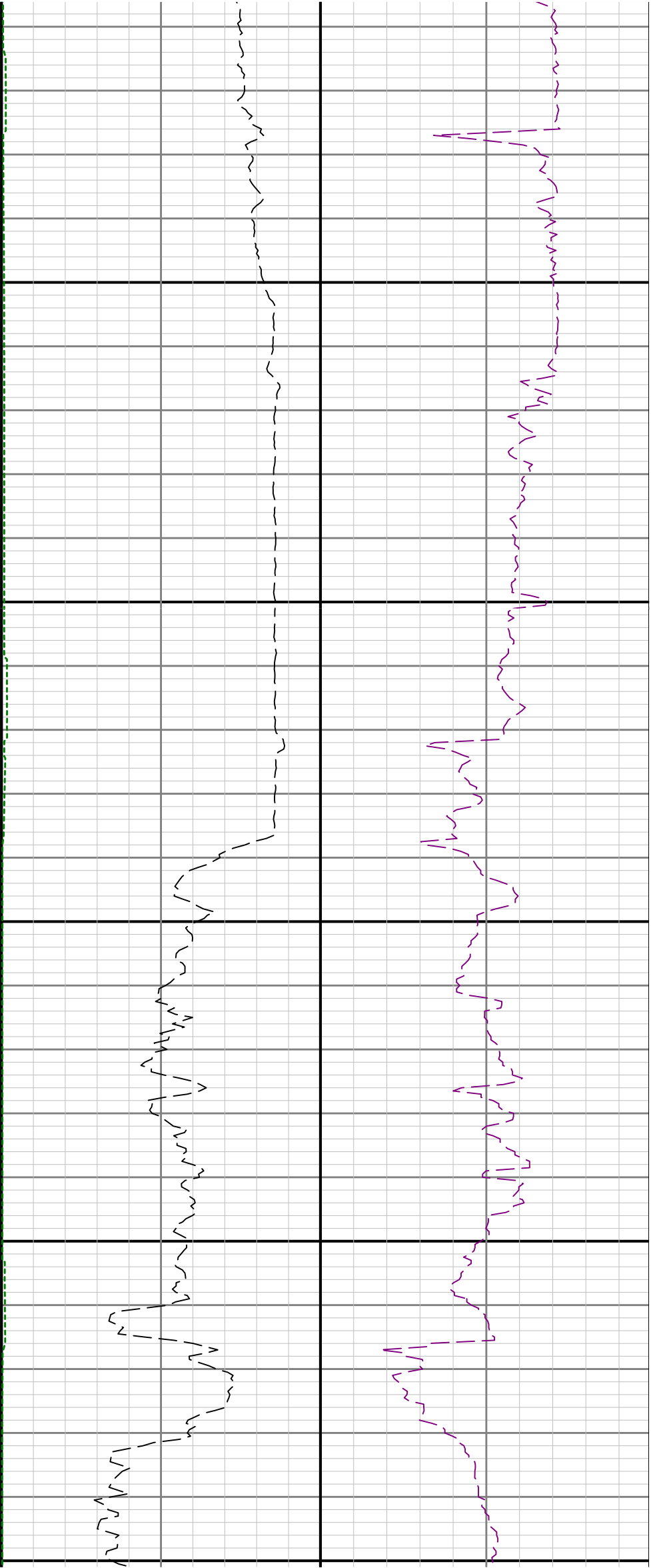


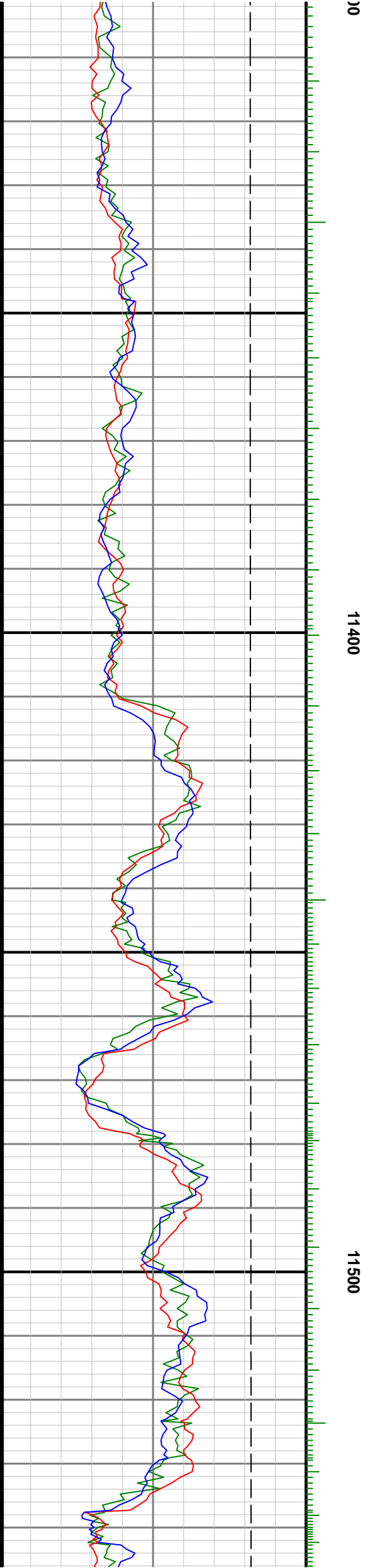


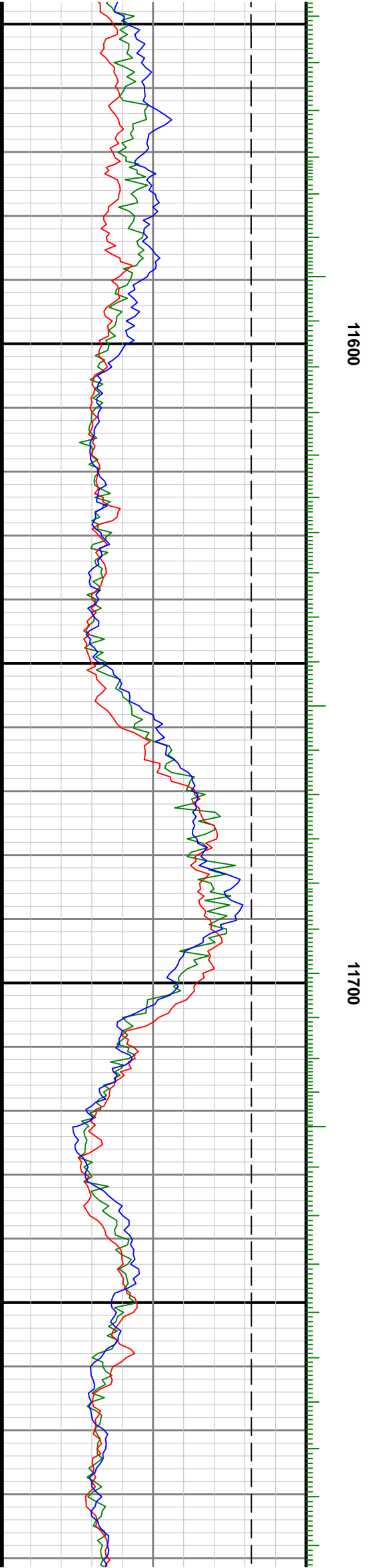


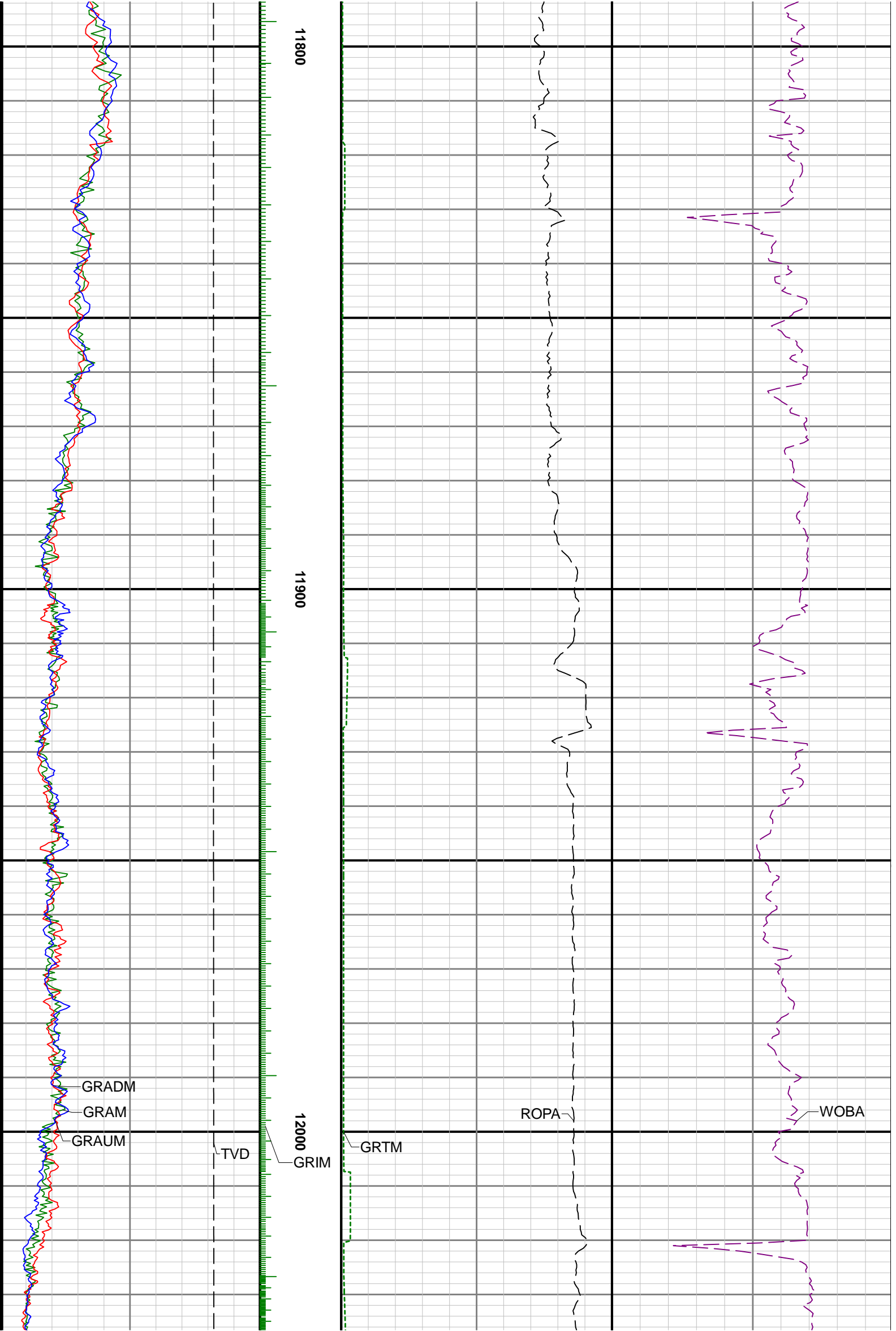


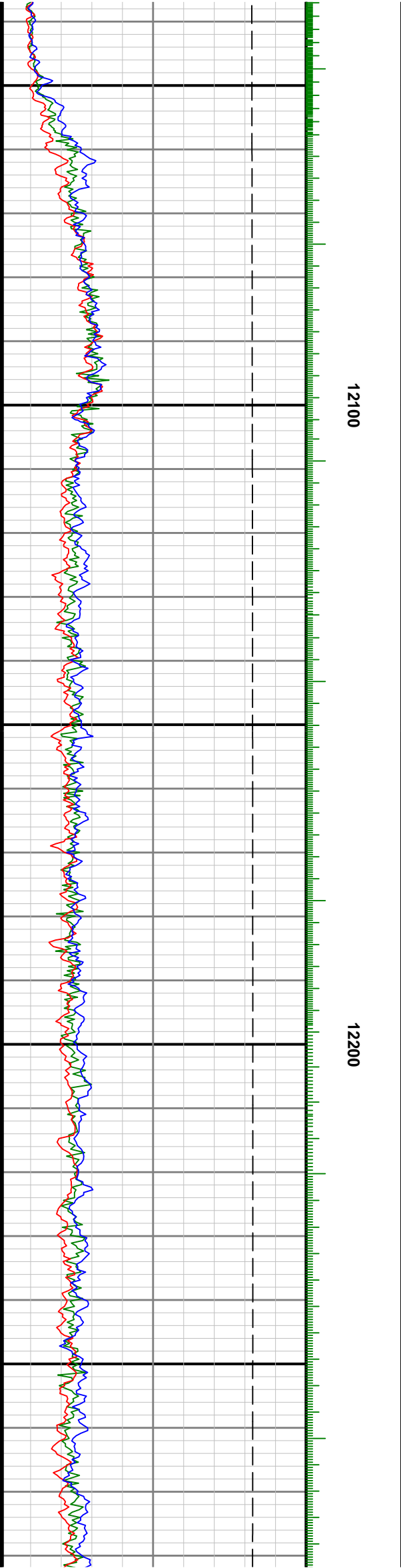
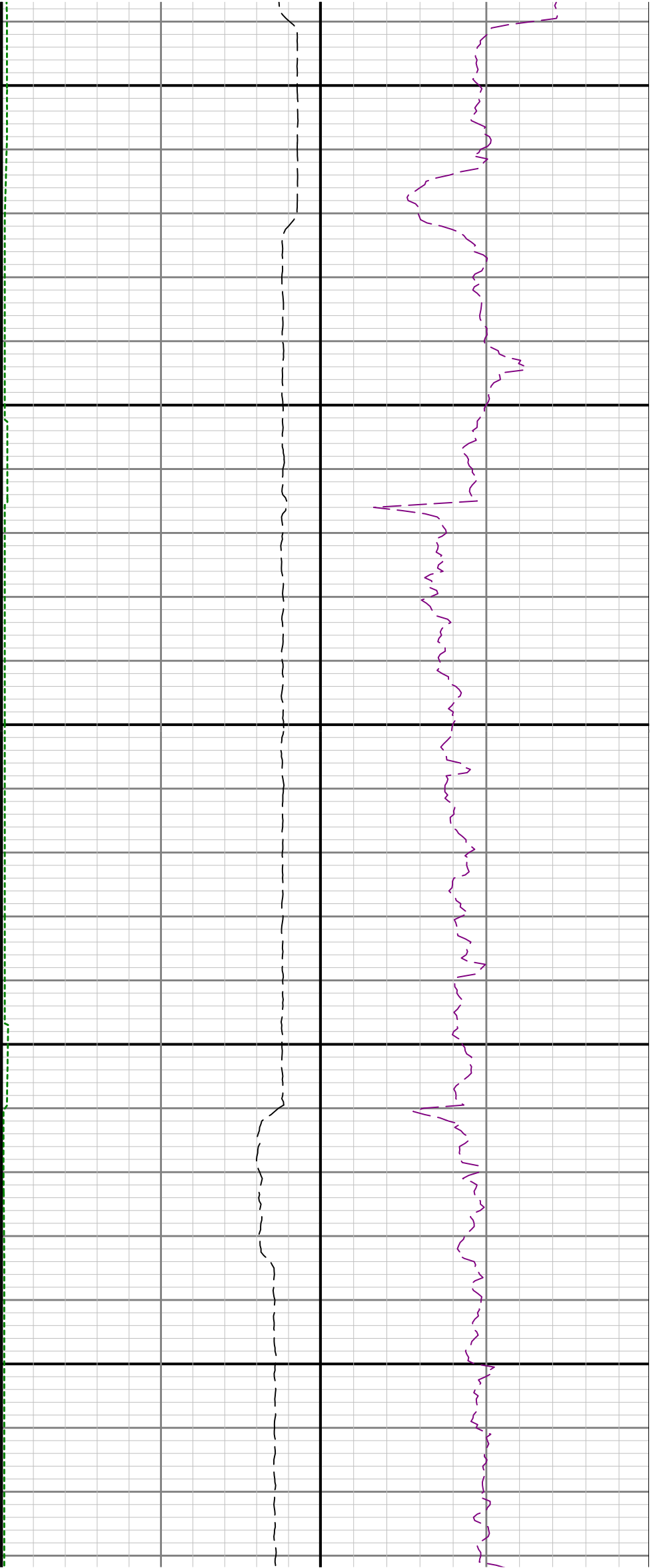


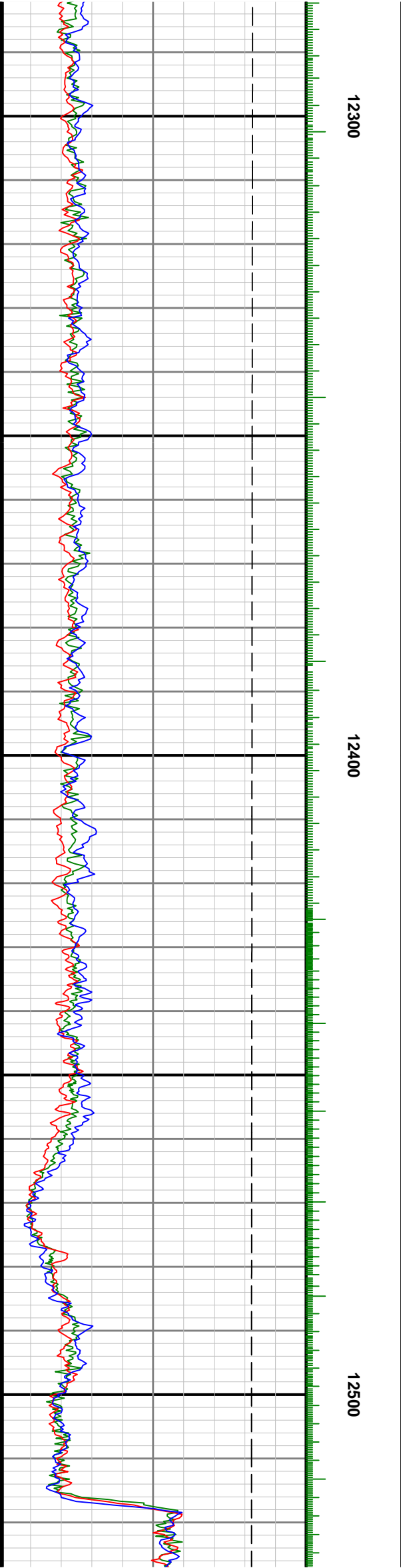
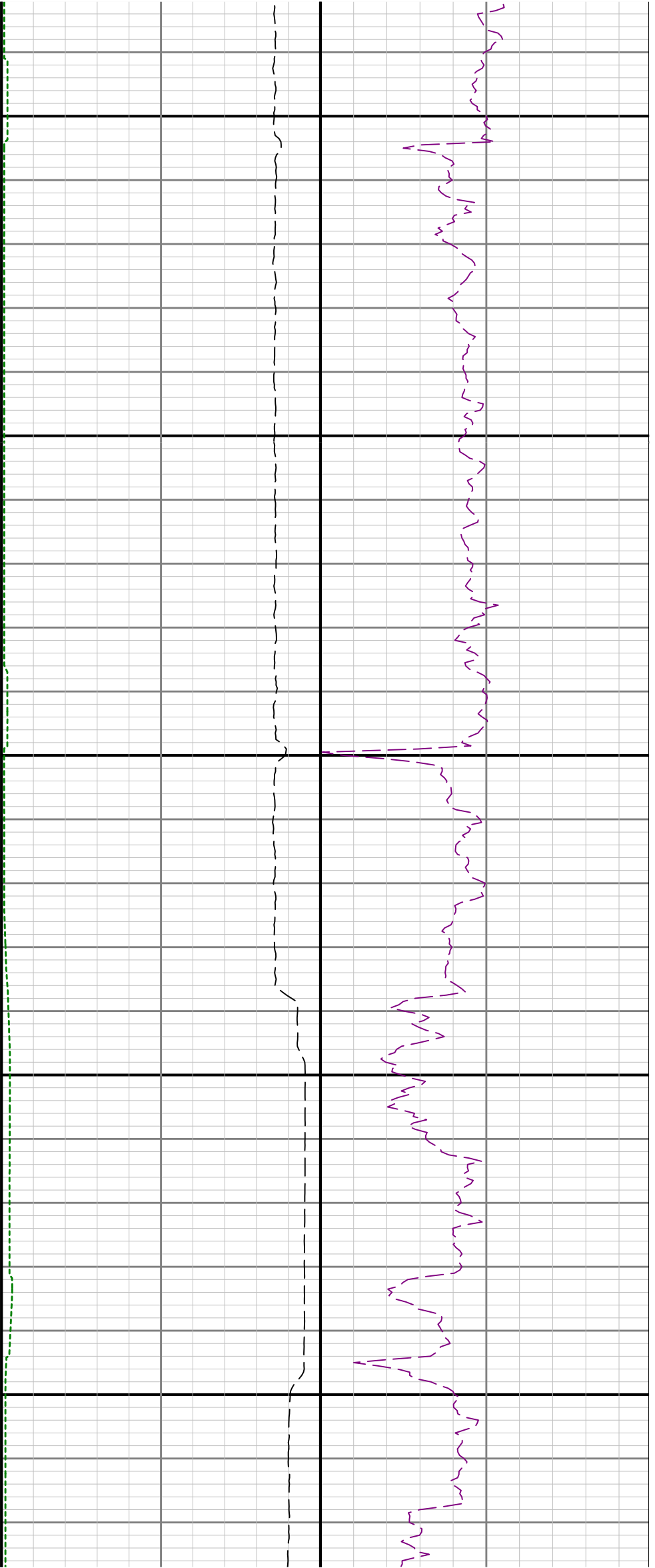


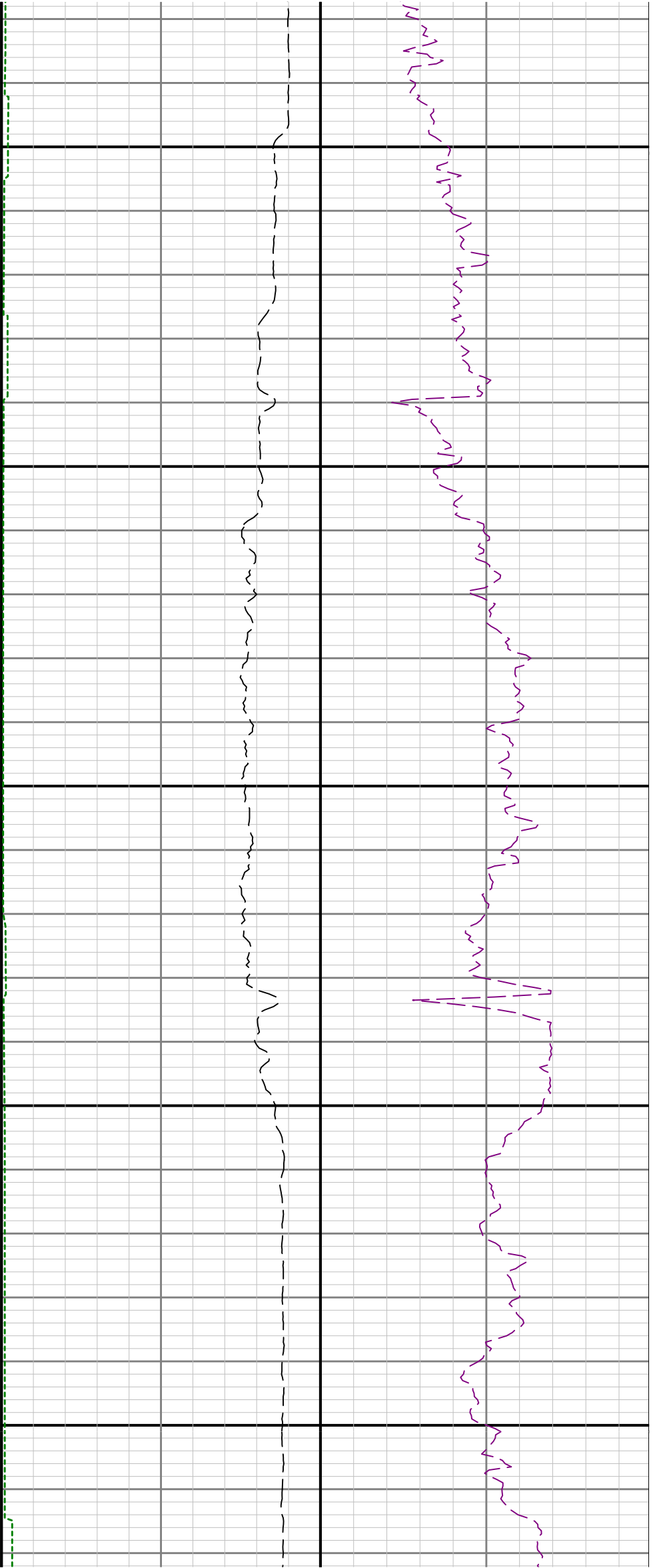






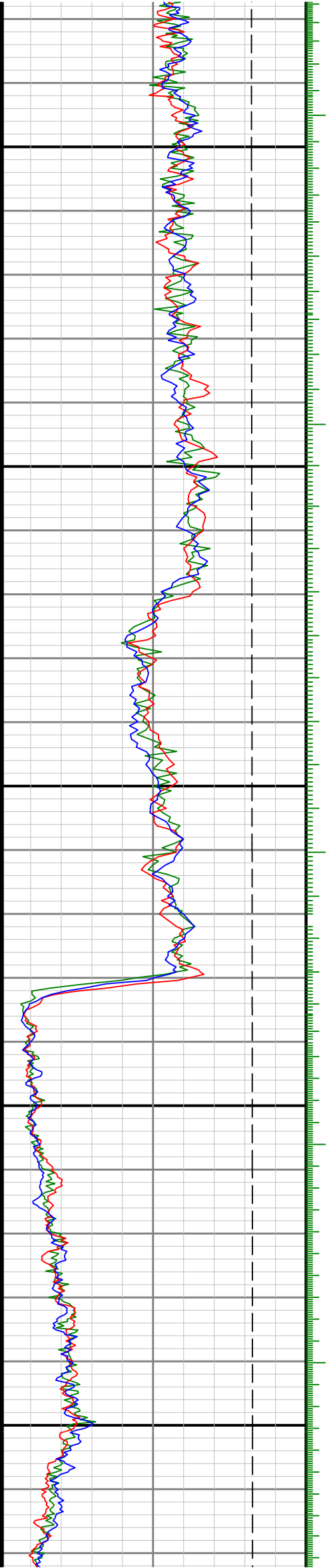


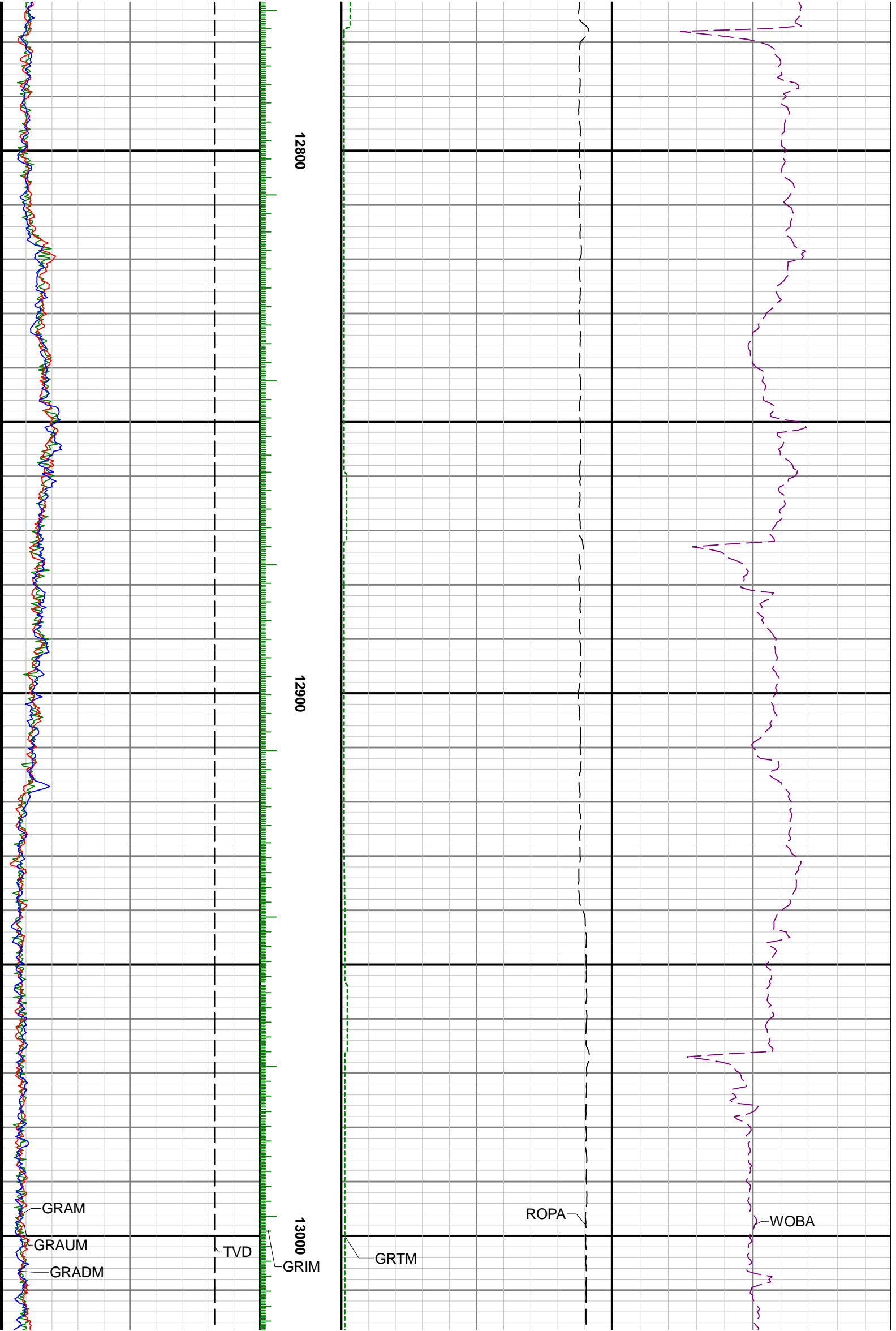


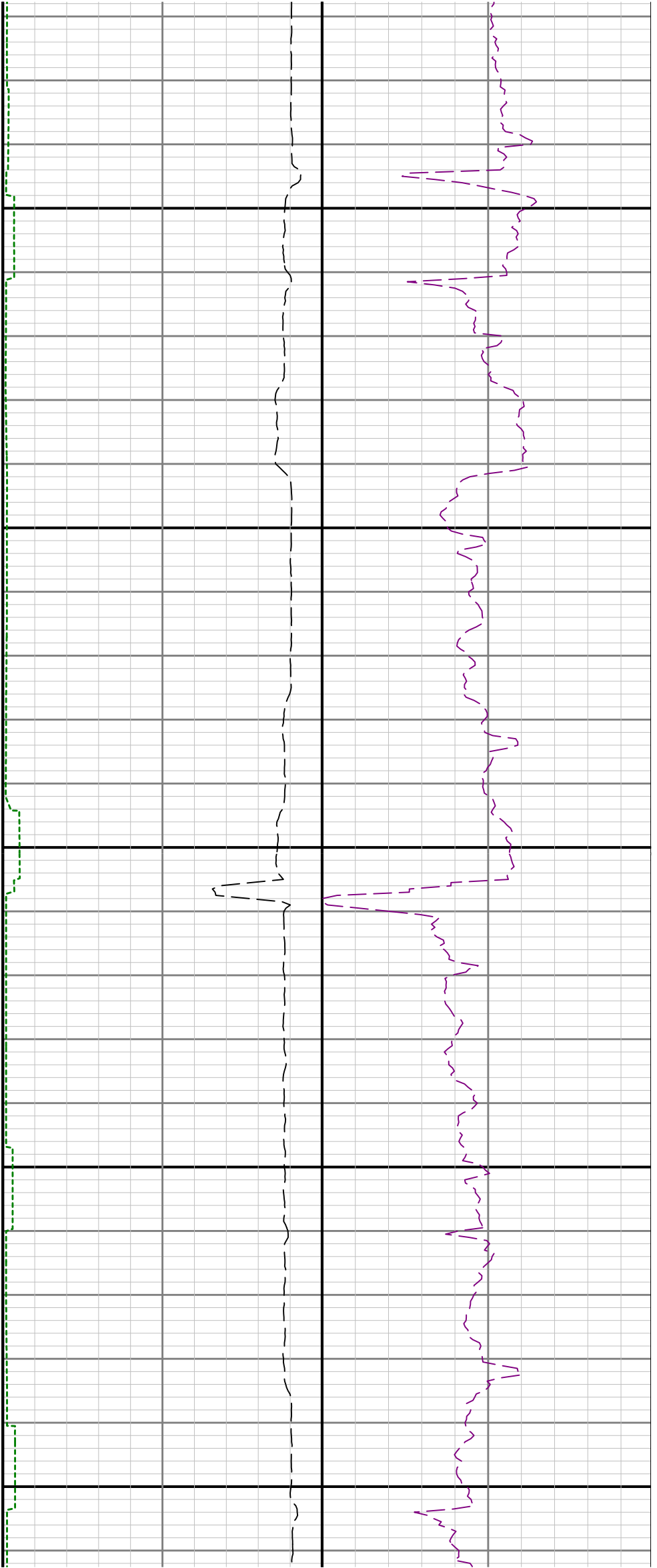


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12700

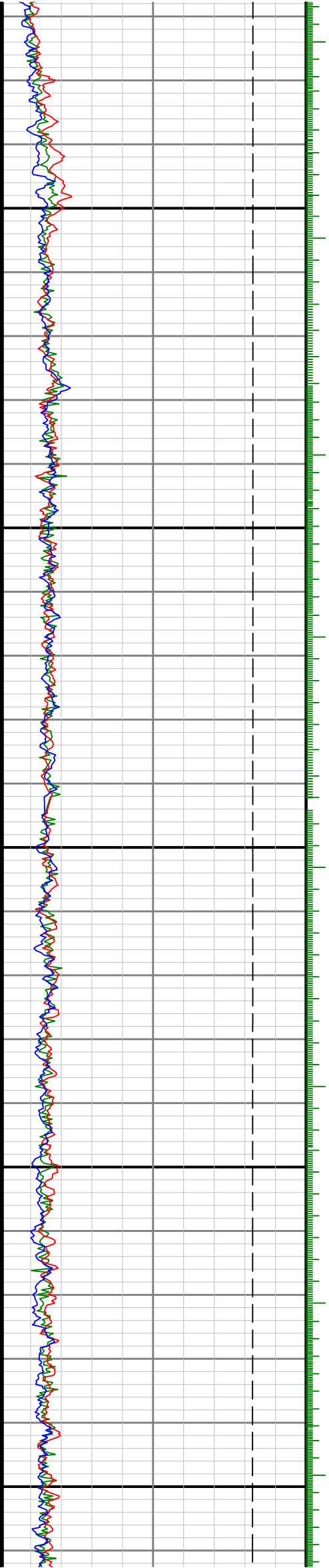


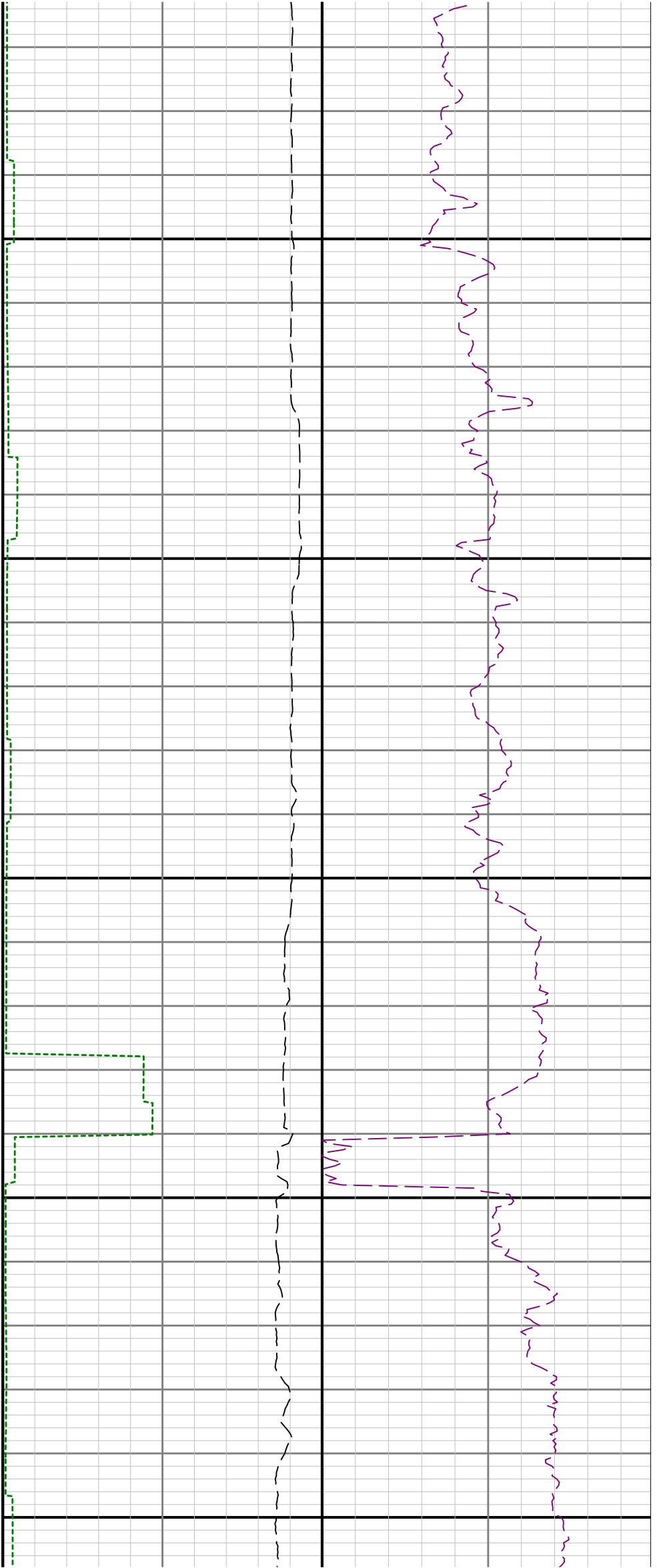




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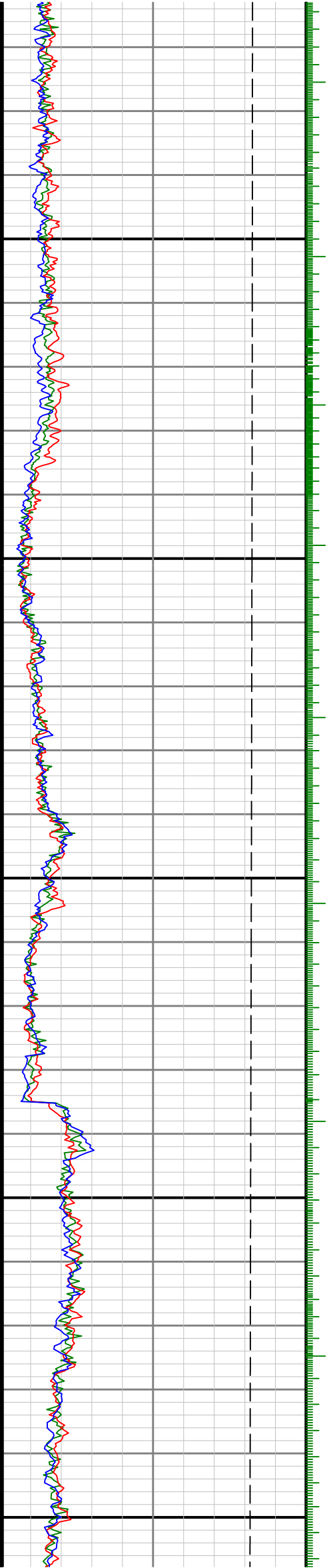


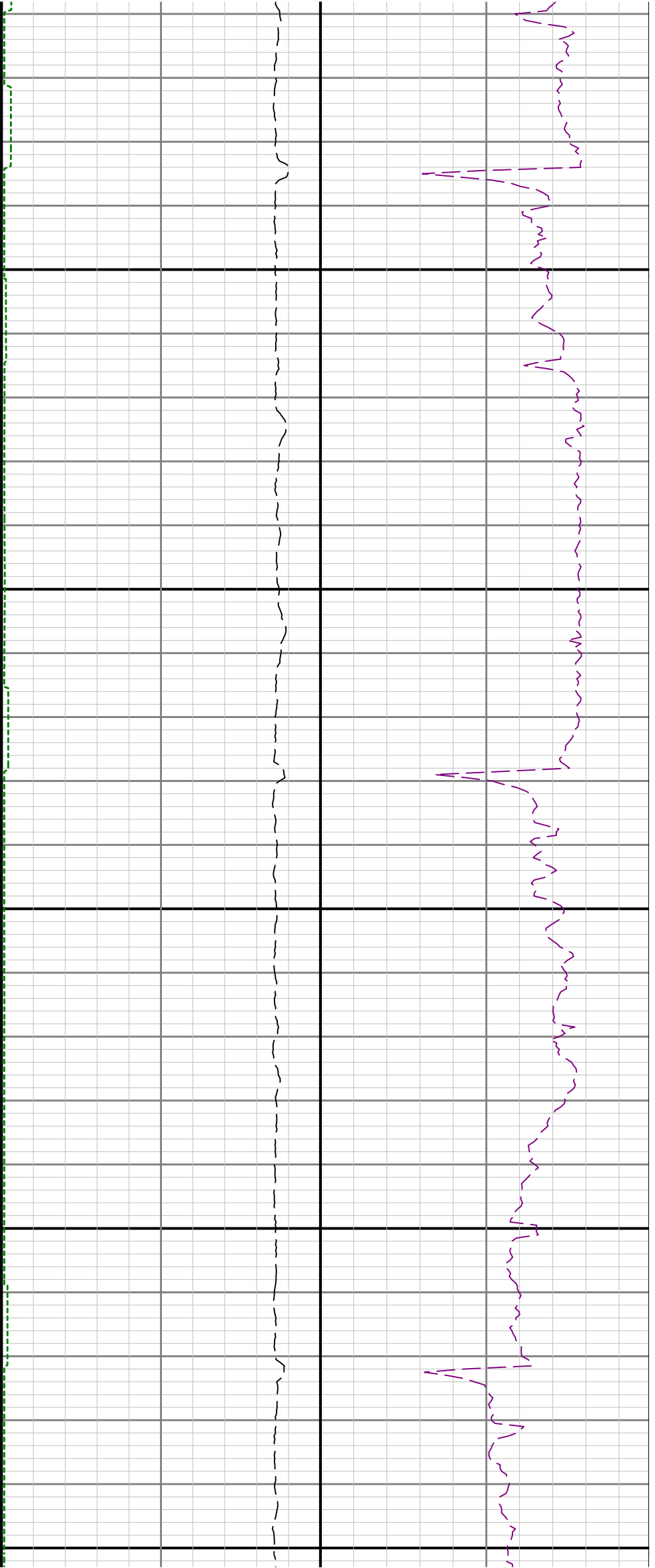


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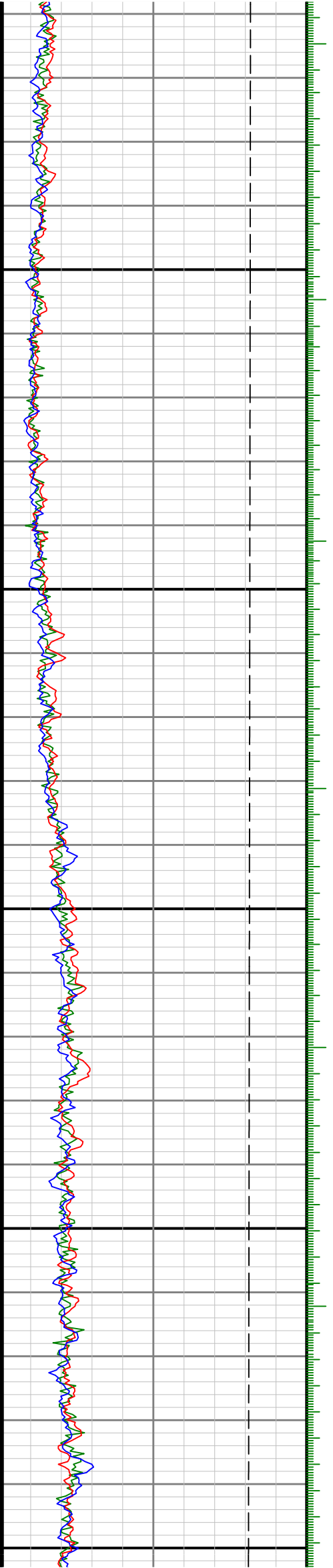
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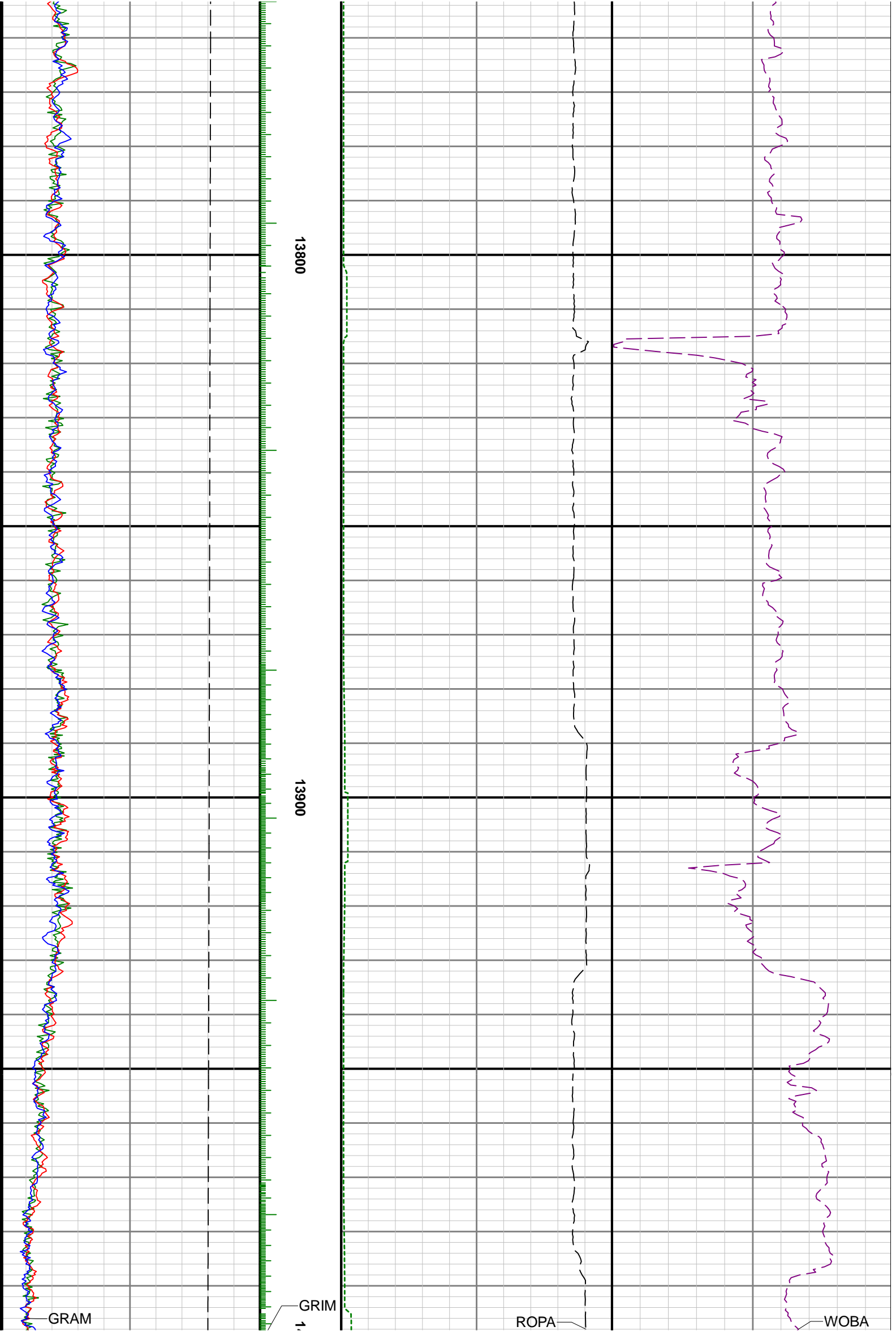


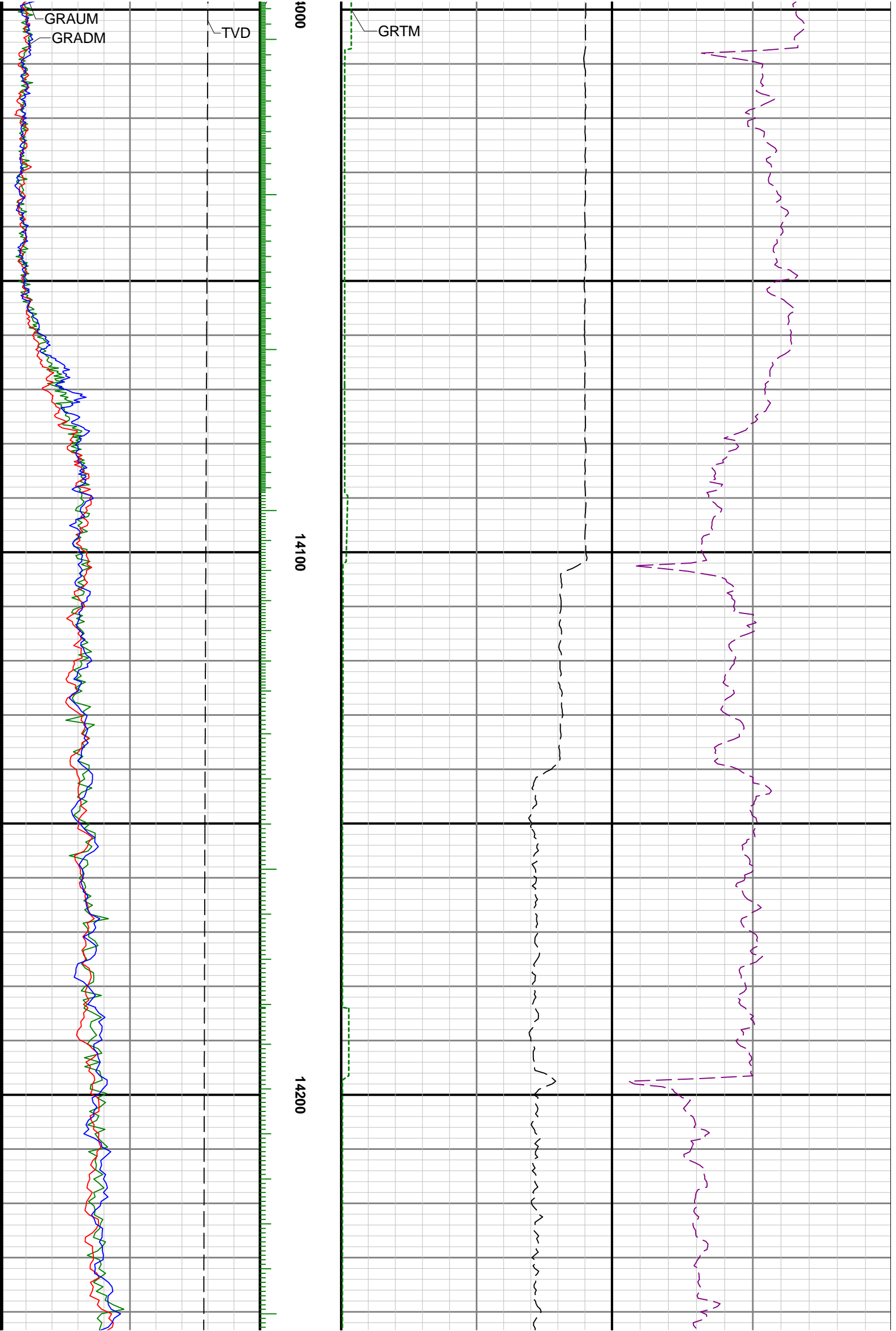


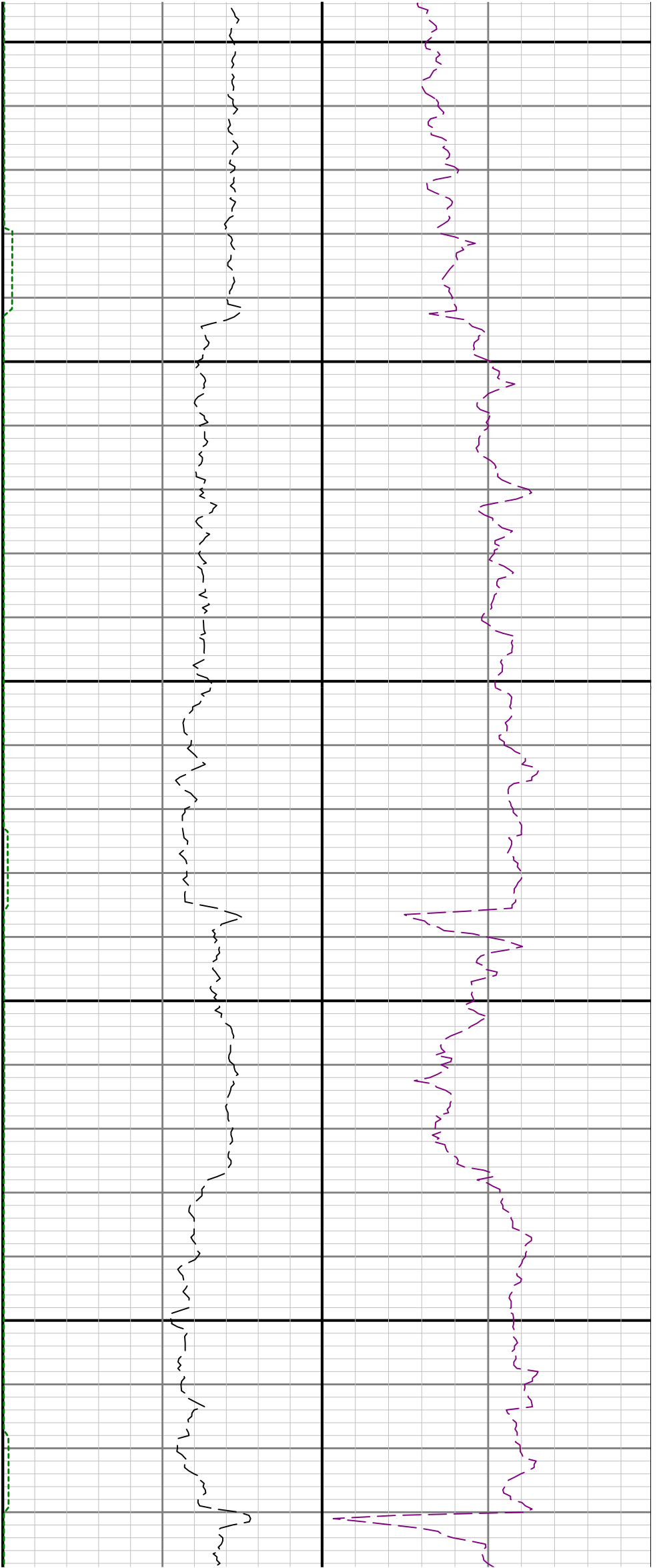
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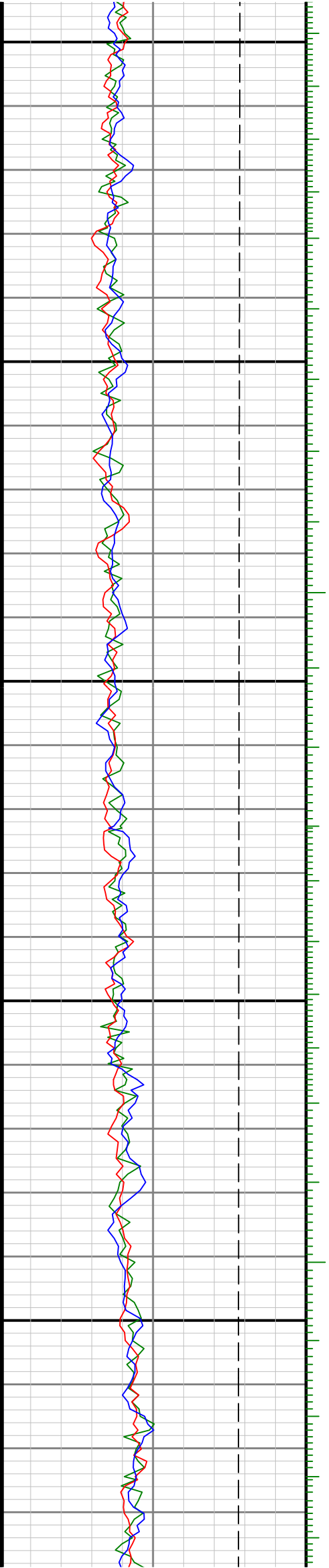


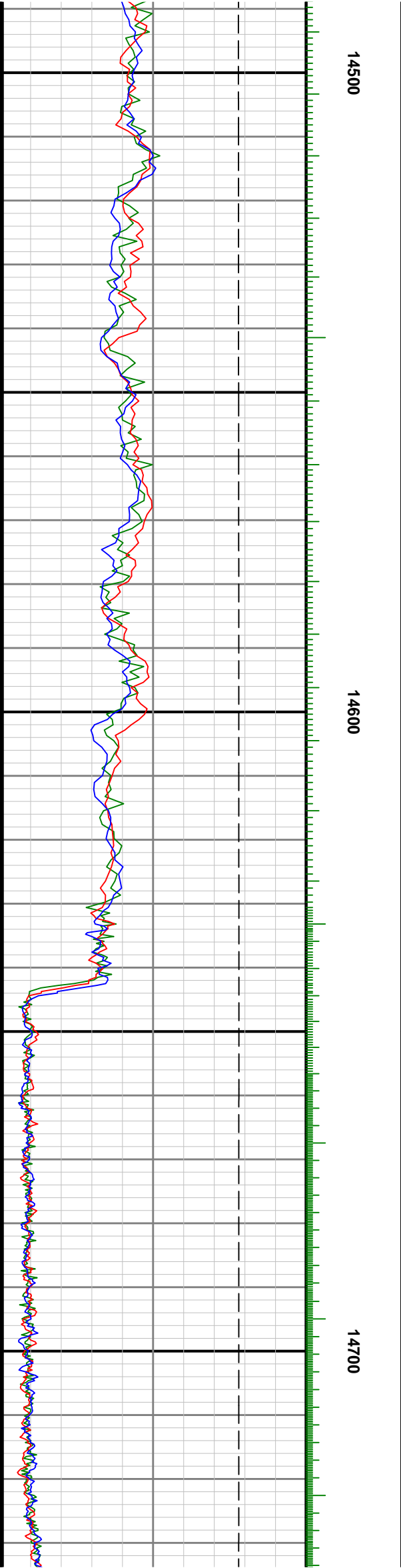
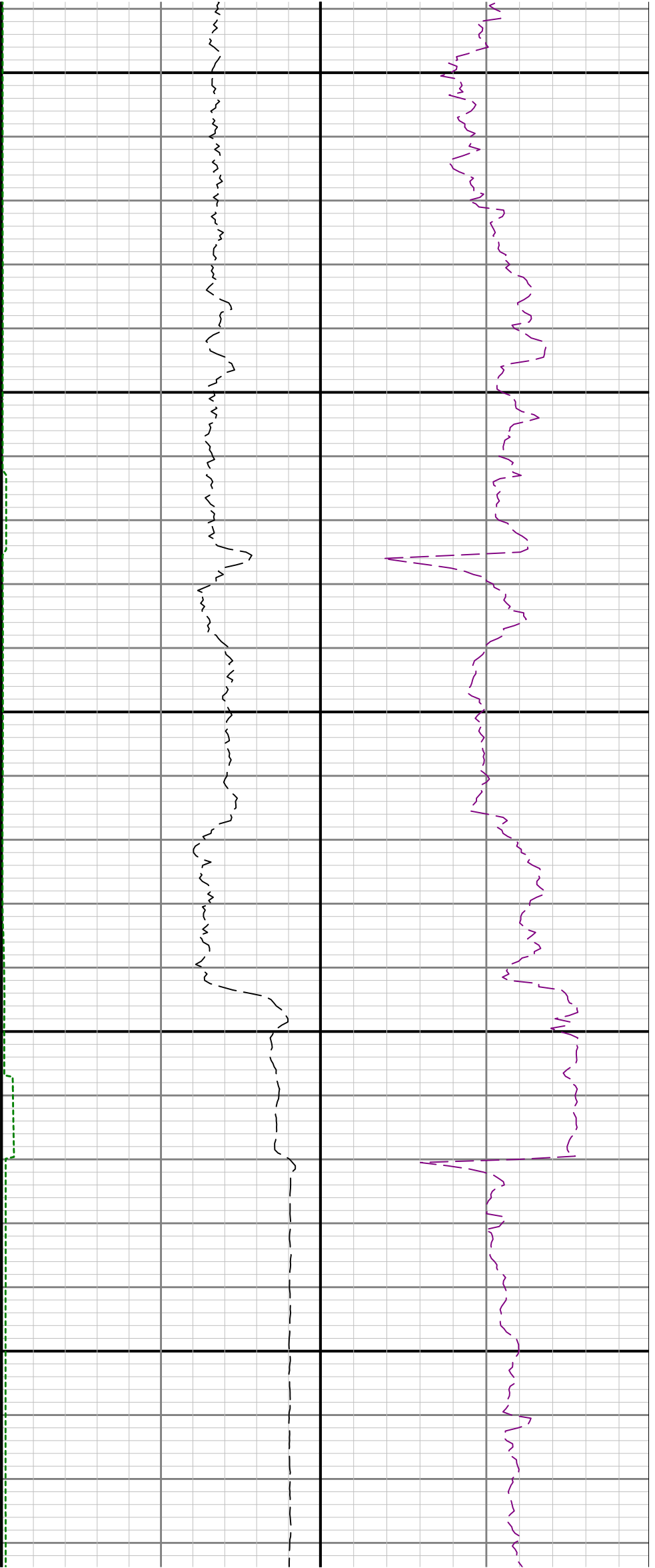


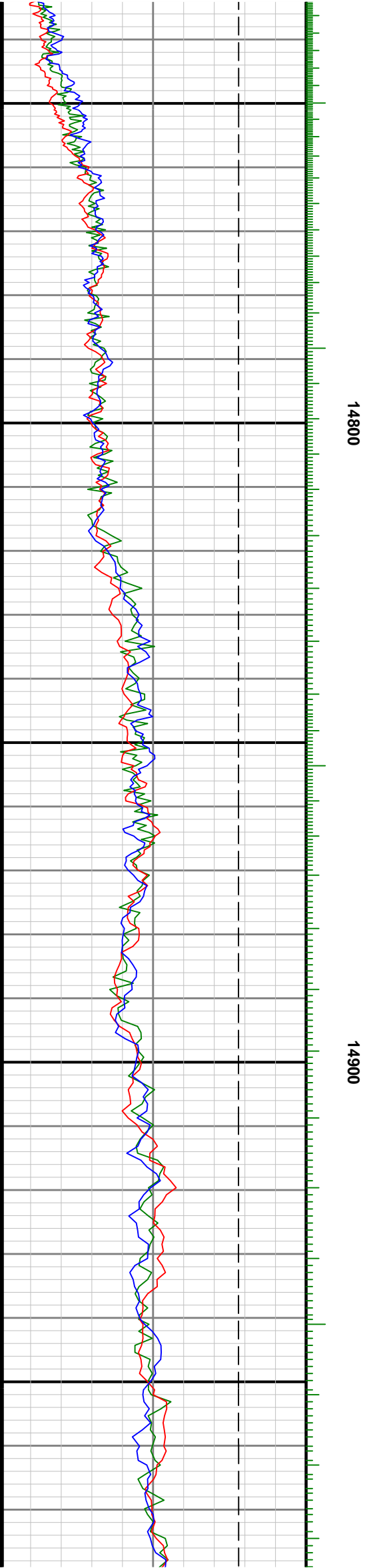
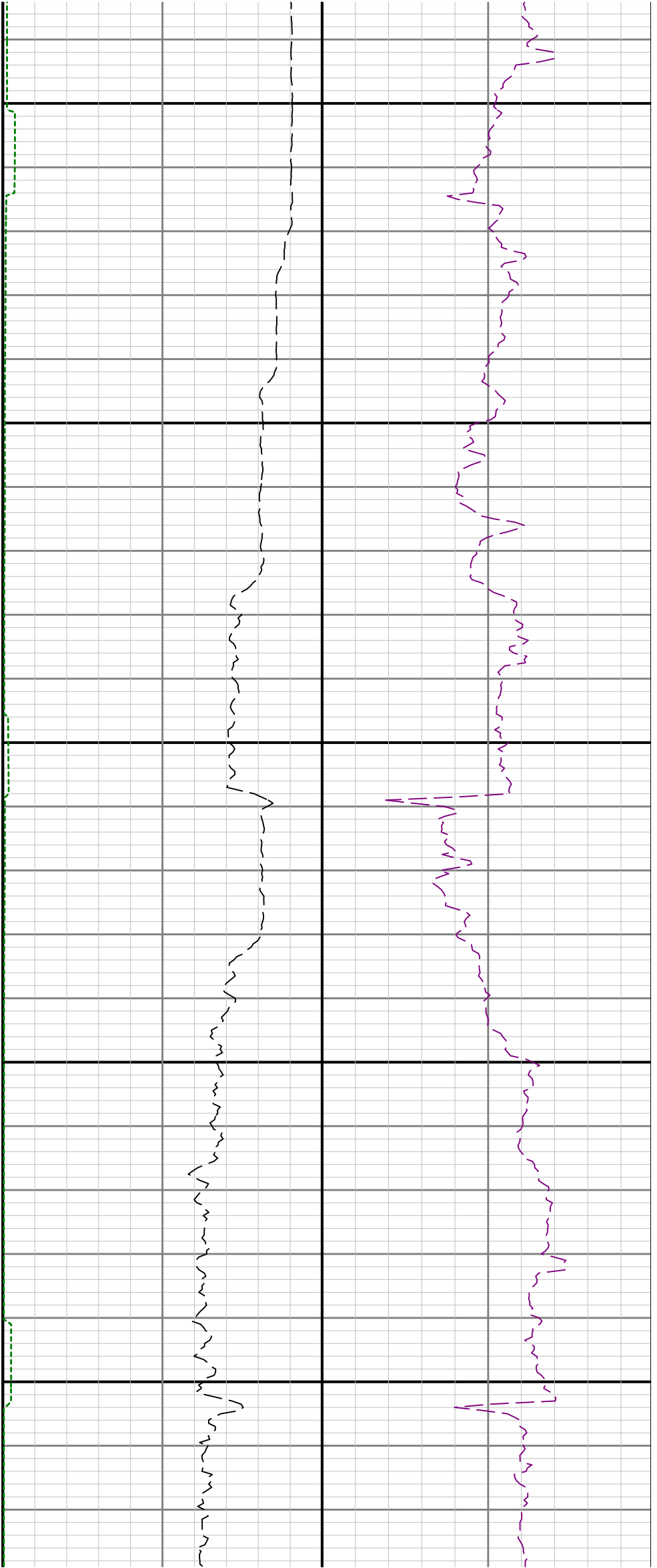


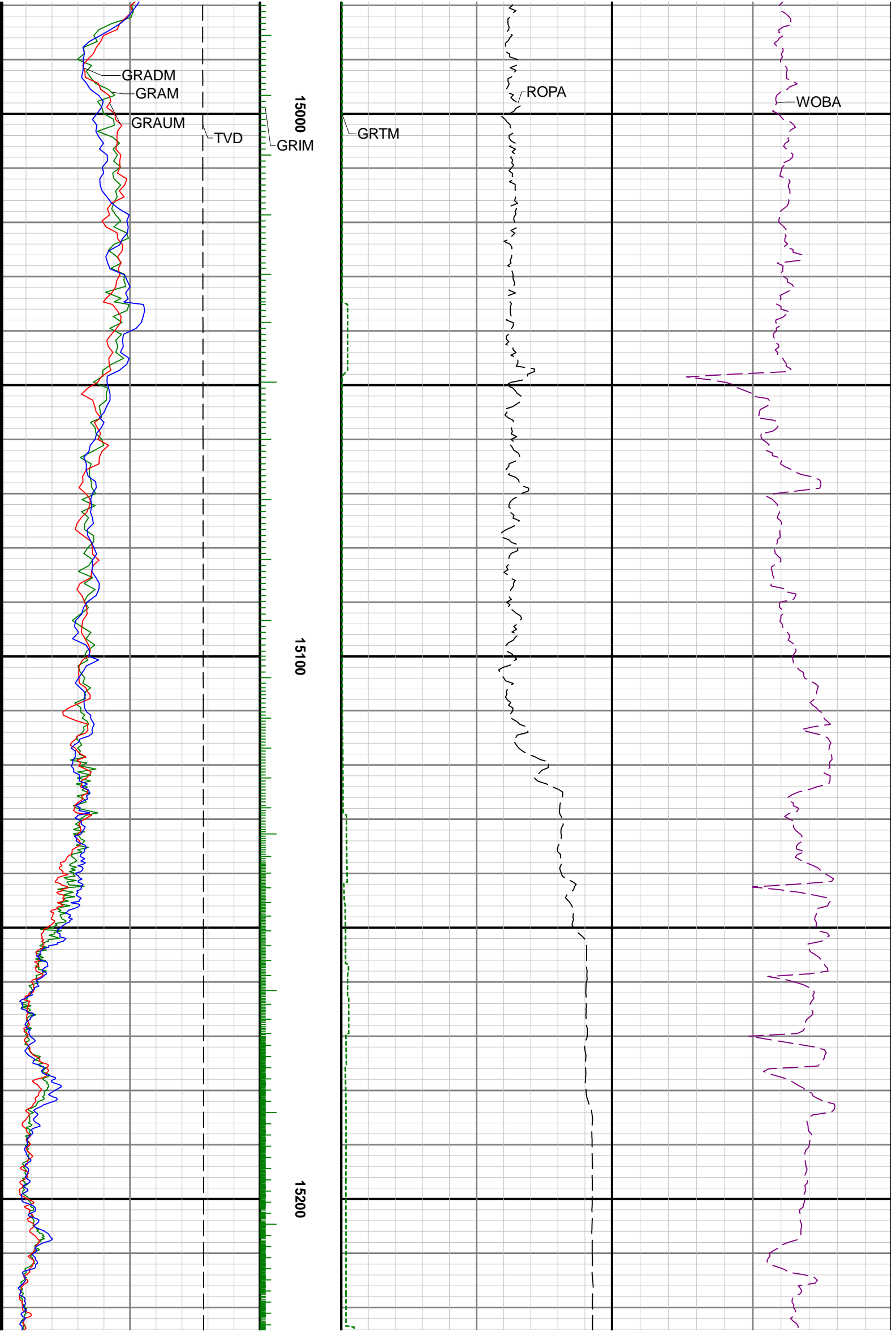
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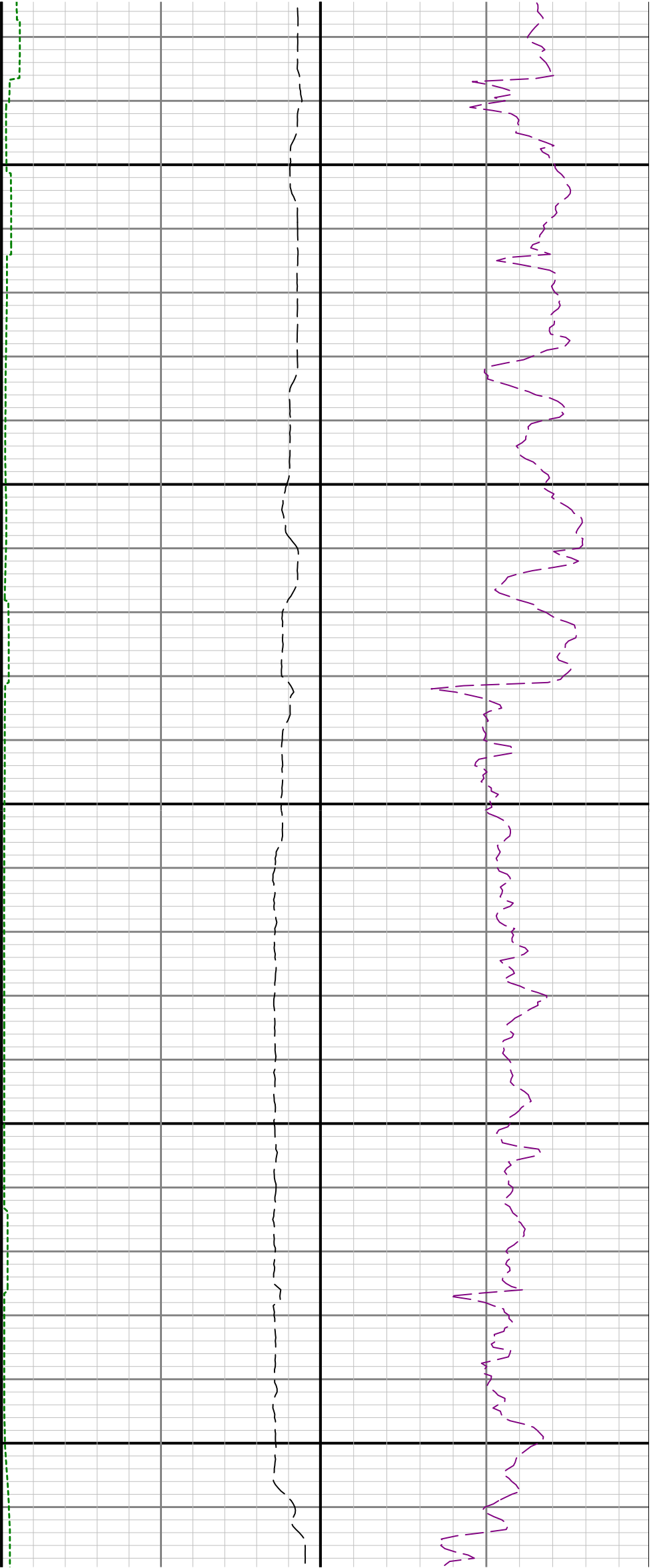
14400











15300

15400

