

BAKER HUGHES				LWD MEMORY LOG									
Scale: 1:240 MD				Company: Noble Energy									
Depth Reference: Driller's Depth				Well: Wells Ranch AF07-651									
Status: Final Print				Field: Weld County(Noble NAD 83 GRID)									
API No: 05-123-44248-00				County: Weld County State: Colorado									
Job ID: 8645437				Surface Location: Latitude: 040° 24' 54.252" N Longitude: 104° 20' 18.096" W UTM: N/A SEC: 8 TWN: 5N RGE: 62W Other Services: Directional									
Permanent Datum (P.D.): Ground Level				Elevation: 4704.00 ft									
Log Measured From: Rig Floor				Above P.D. 30.00 ft									
Dates				Magnetic Field Reference									
Interval Logged				Azi Reference North: Grid Dip Angle: (deg)									
Date From: 2017-07-12 Top: (ft) 1948.00				Total Magnetic Field Strength: (nT) 52288									
Date To: 2017-07-15 Bottom: (ft) 15940.00				Mag to Reference North Correction: (deg) 7.13 E									
Spud Date: 2017-07-12													
Borehole Record				Casing Record									
Hole Size (in)				From (ft) To (ft)									
13.500				30.00 1948.00									
8.500				1948.00 15940.00									

"These interpretations and analyses ("Interpretations") are opinions provided by Baker Hughes Oilfield Operations, Inc ("Baker Hughes"), based upon industry practice, empirical relationships, assumptions and measurements, (many of which may be provided by the customer). The Interpretations are not infallible and may be subject to different opinions. Thus, Baker Hughes does not warrant their accuracy, correctness, or completeness, or that the customer's and/or any third party's reliance on such Interpretations will accomplish any particular results. The customer assumes full responsibility for the use of the Interpretations and for decisions based thereon and the customer agrees to release, defend and indemnify Baker Hughes, its parent, subsidiaries and affiliated or related entities, and subcontractors, together with its and their officers, directors, employees, agents and invitees against, any and all claims, losses, damages, or expenses sustained by the customer or any third party arising out of reliance upon or use of the Interpretations, without regard to the cause(s) thereof, including without limitation any form of negligence on the part of Baker Hughes. Unless other contract terms have been agreed to by the parties, each party's liabilities and obligations shall be governed by Baker Hughes Incorporated's Worldwide Terms and Conditions."

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 (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
1	1	8.500	PDC	3.00	Rotary Steerable	1948.00	15927.00	1948.00	15940.00	2017-07-12 22:25	2017-07-15 04:08	47.30

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Alberto Cova Hernandez	2017-07-12	2017-07-15	Emi Iyalla	2017-07-12	2017-07-13	Adam Schlenz	2017-07-14	2017-07-15

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+ (%)
2017-07-13 04:00	1	3740.00	Oil Based Mud	9.1	13	N/A	17.0	74/16	Active Pit	20000	0.00
2017-07-13 14:30	1	6540.00	Oil Based Mud	9.0	10	N/A	17.0	75/15.5	Active Pit	21500	0.00
2017-07-14 04:00	1	9753.00	Oil Based Mud	9.2	11	N/A	18.0	74/15.5	Active Pit	21000	0.00
2017-07-14 14:30	1	12438.00	Oil Based Mud	9.3	12	N/A	17.0	74.5/14.5	Active Pit	23000	0.00
2017-07-15 04:00	1	15878.00	Oil Based Mud	9.4	11	N/A	18.0	75/13.3	Active Pit	23000	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	12536524	Near Bit Inclination	5.93	6.73	7.000	2.250
1	ATC_SU	12536524	Near Bit VSS	5.93	6.73	7.000	2.250
1	ATC_MWD	13067101	Gamma (single)	2.75	12.90	7.000	2.250
1	ATC_MWD	13067101	Directional (mag)	12.27	22.42	7.000	2.250

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

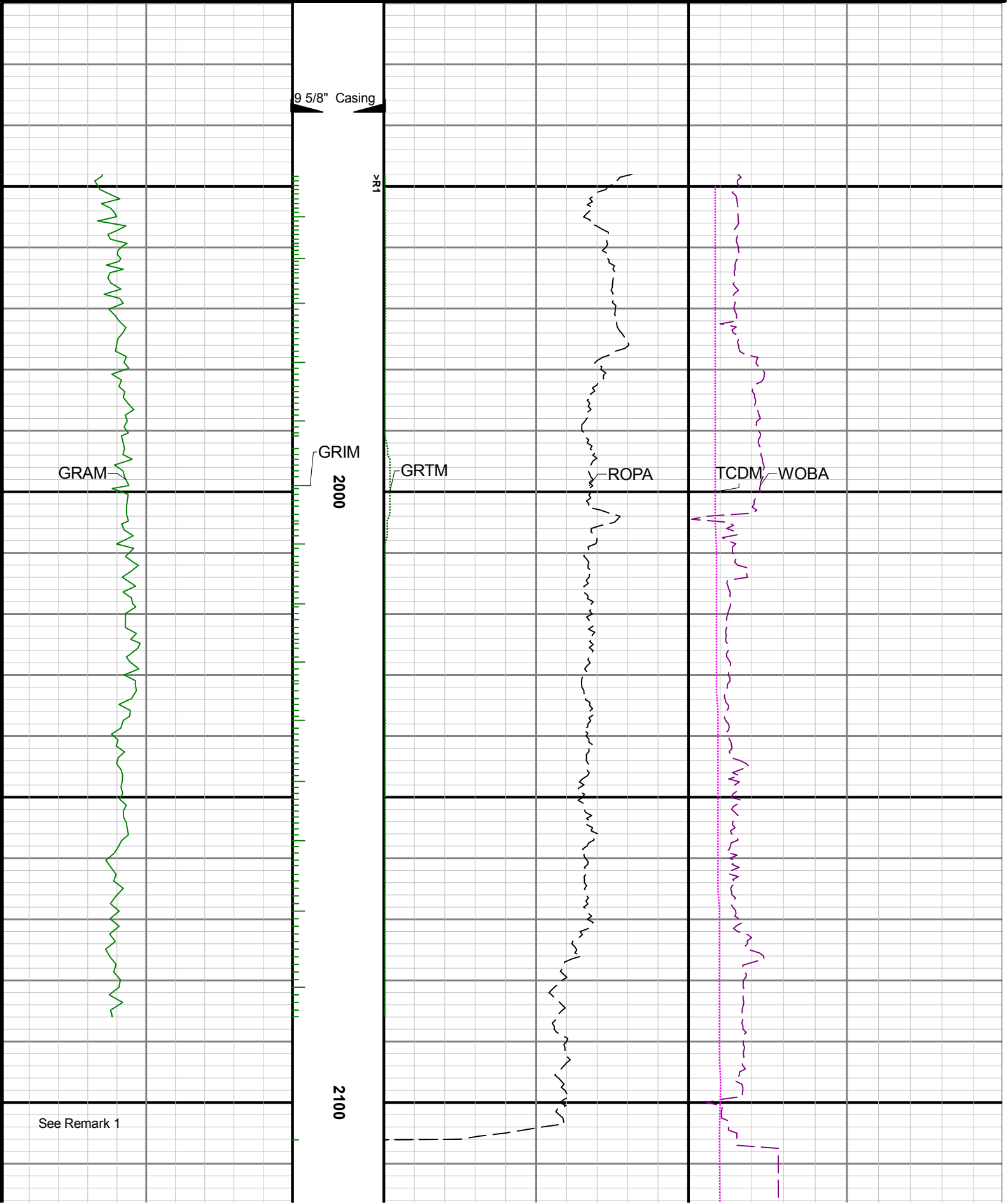
Comments	
1	Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.
2	Baker Hughes LWD run 1 utilized a 6.75 inch NaviGamma (Directional and Gamma Ray) services behind a 8.5 inch bit and rotary steerable assembly from 1948 to 15940 feet MD (1948 to 6475 feet TVD).
3	To fulfill the customer's request, Gamma Ray Apparent (GRAM) data is presented 0 to 300 API.

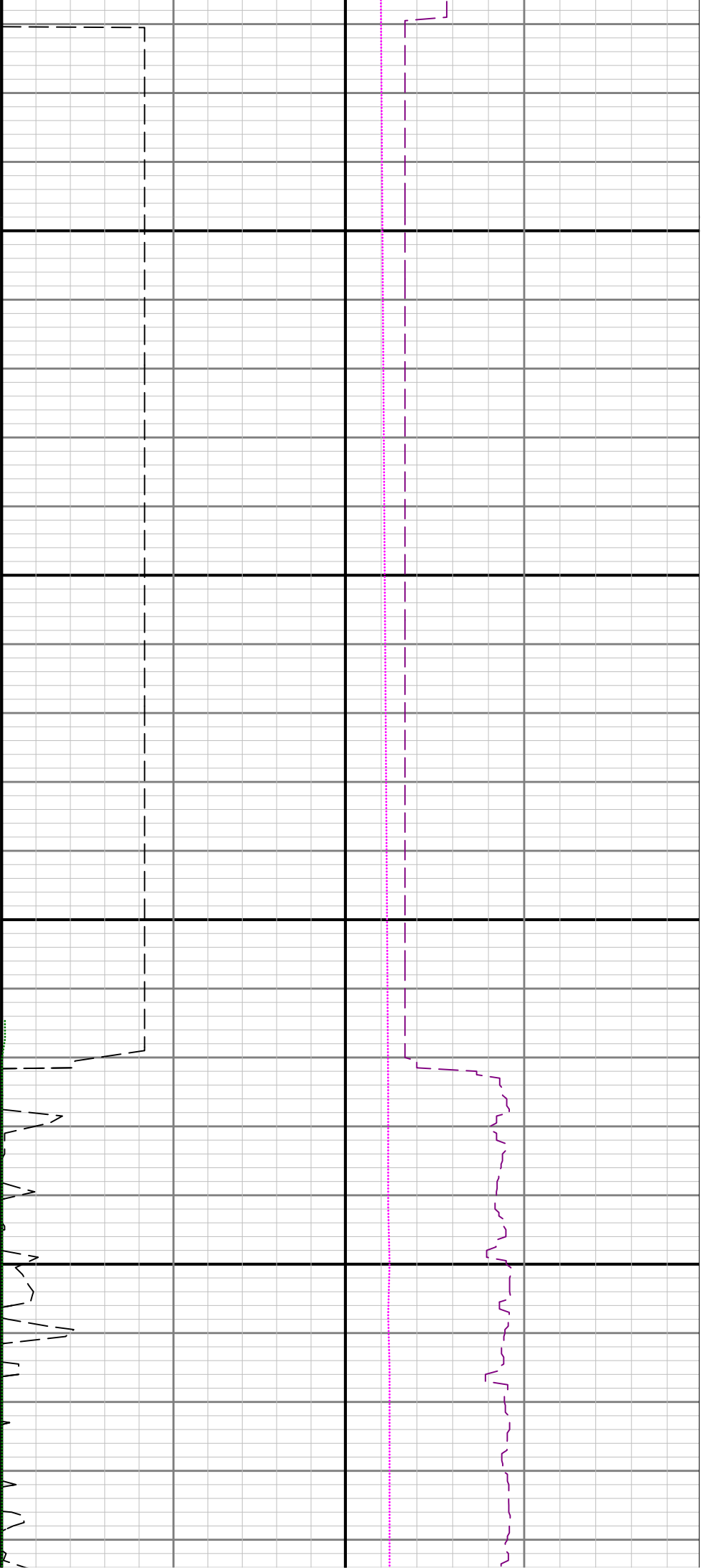
Remarks				
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	2104.00	8.500	1	The interval from 2104 to 2384 feet MD (2104 to 2384 feet TVD) has a gap in gamma ray data due to, the surface gear not tracking depth correctly.
2	15940.00	8.500	1	The interval from 15927 to 15940 feet MD (6475 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, Average 1 ft Average	klb
GRAM	OnTrak - Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	OnTrak - Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	OnTrak - Gamma Ray - Time Since Drilled - Memory	min
TCDM	Downhole Temperature	degF

	Company		Noble Energy	
	Well		Wells Ranch AF07-651	
	Date From:	2017-07-12 22:25:59	To:	1948.00

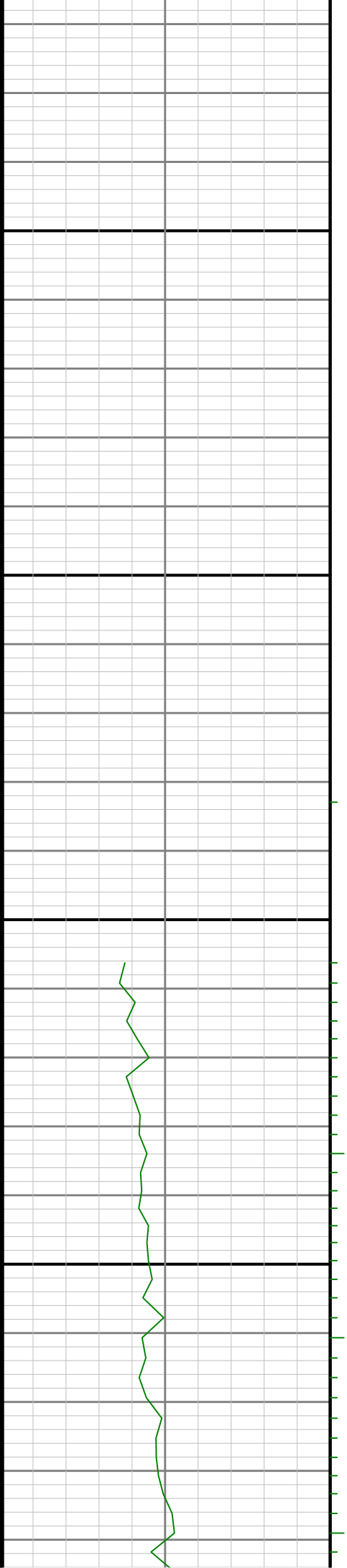
Gamma Ray - Apparent 0.5 ft Average GRAM 0 300	MD 1:240 feet	Depth Averaged ROP 3 ft Average ROPA 1000 0	Weight On Bit, Average 1 ft Average WOBA 0 50
API		ft/h	klb
True Vertical Depth TVD 6600 5600		Gamma Time Since Drilled GRTM 0 600	Downhole Temperature TCDM 100 300
ft		min	degF

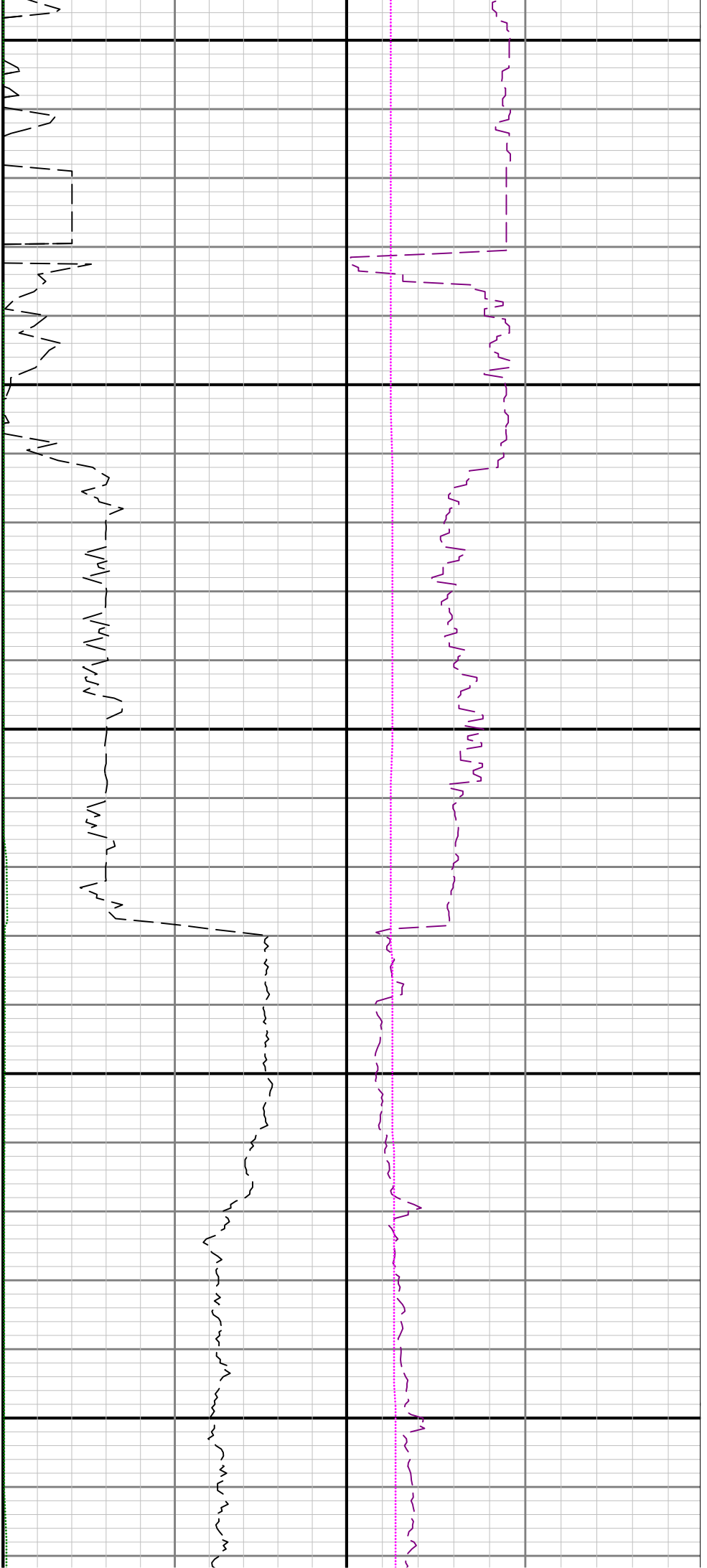




2200

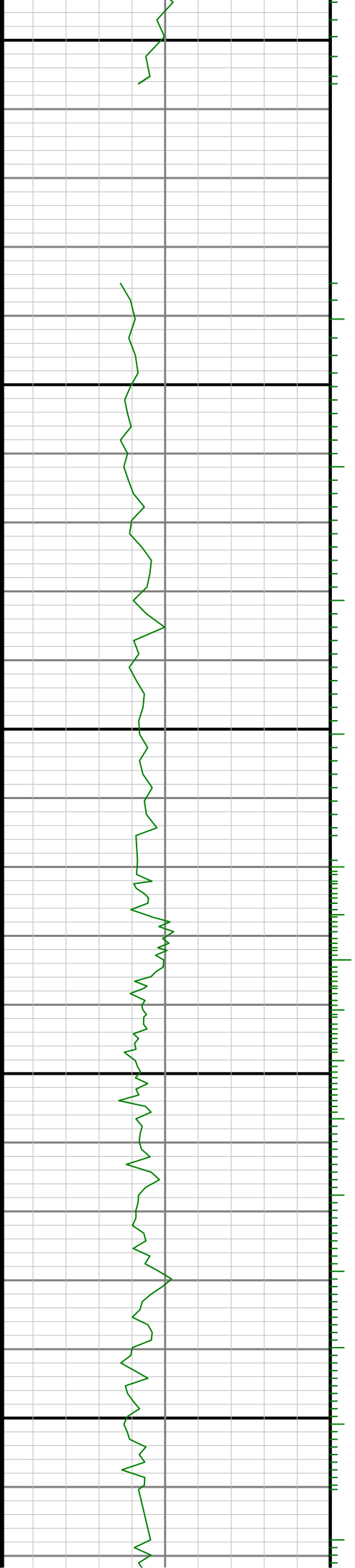
2300

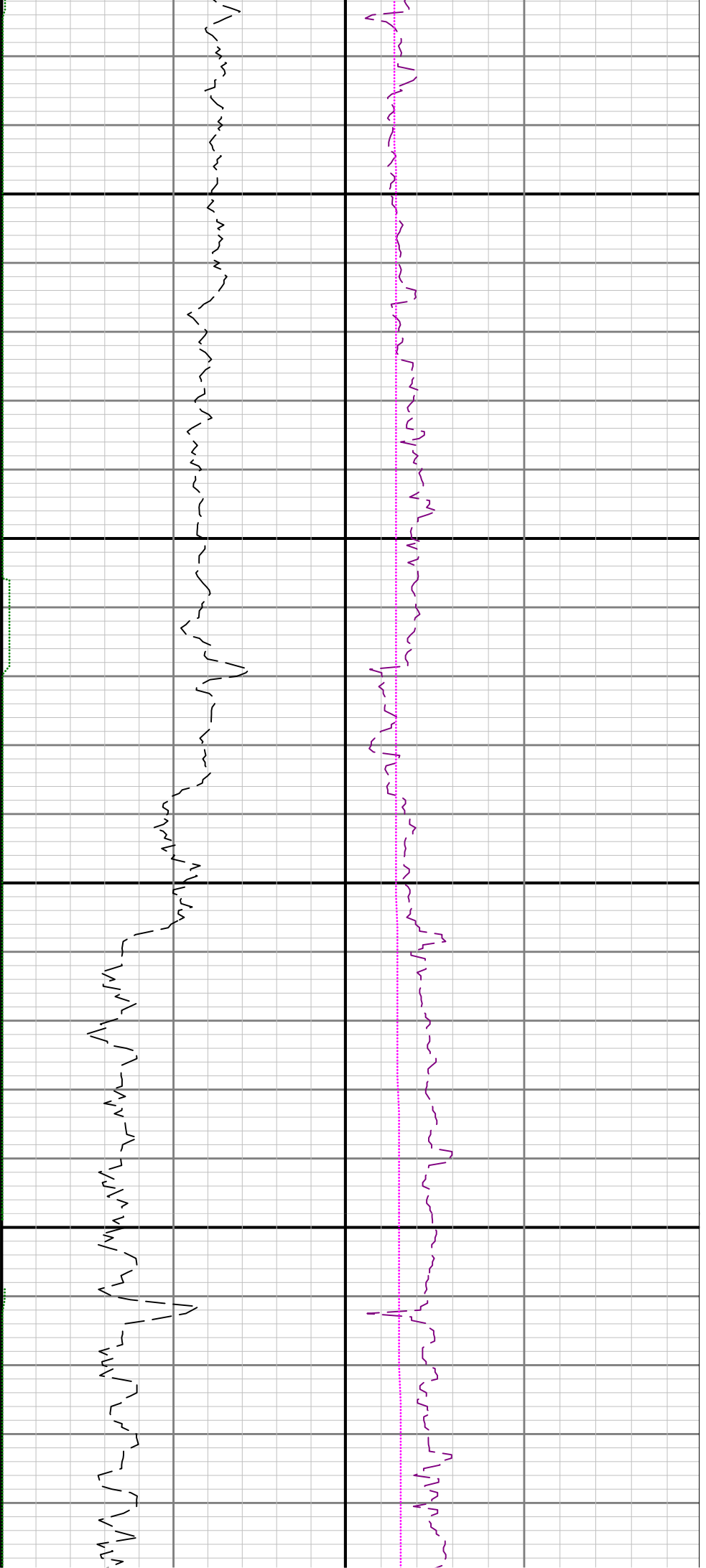




2400

2500

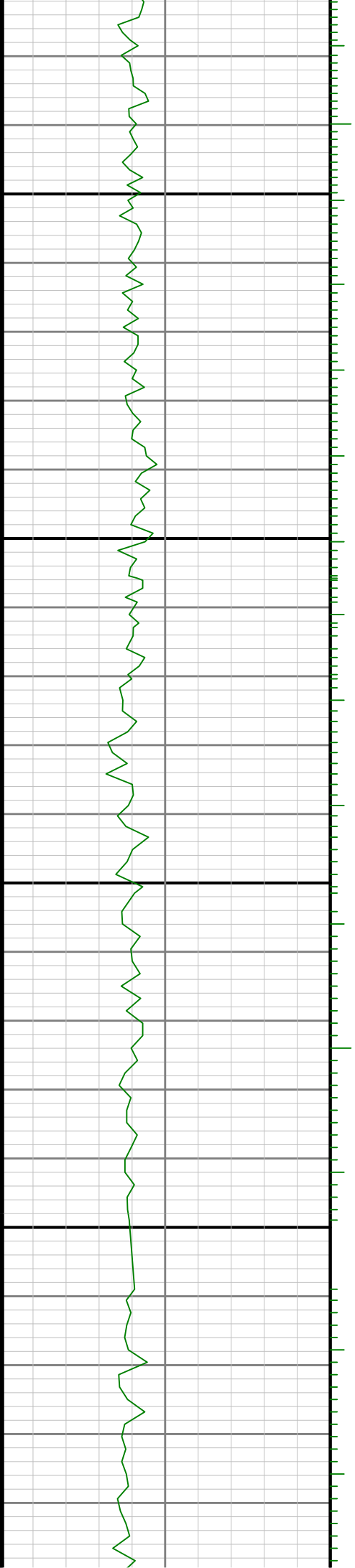


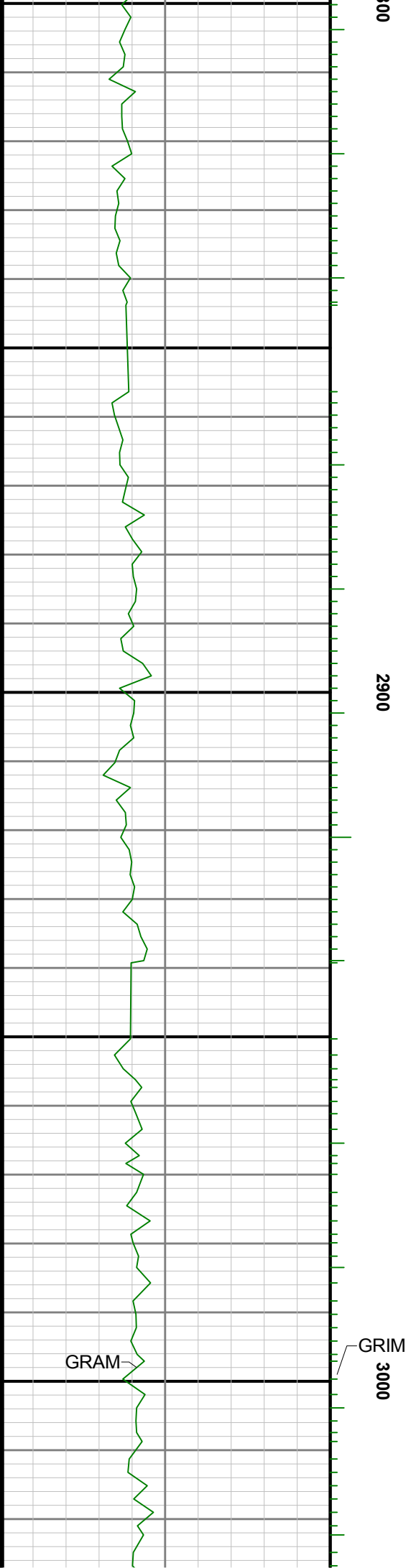
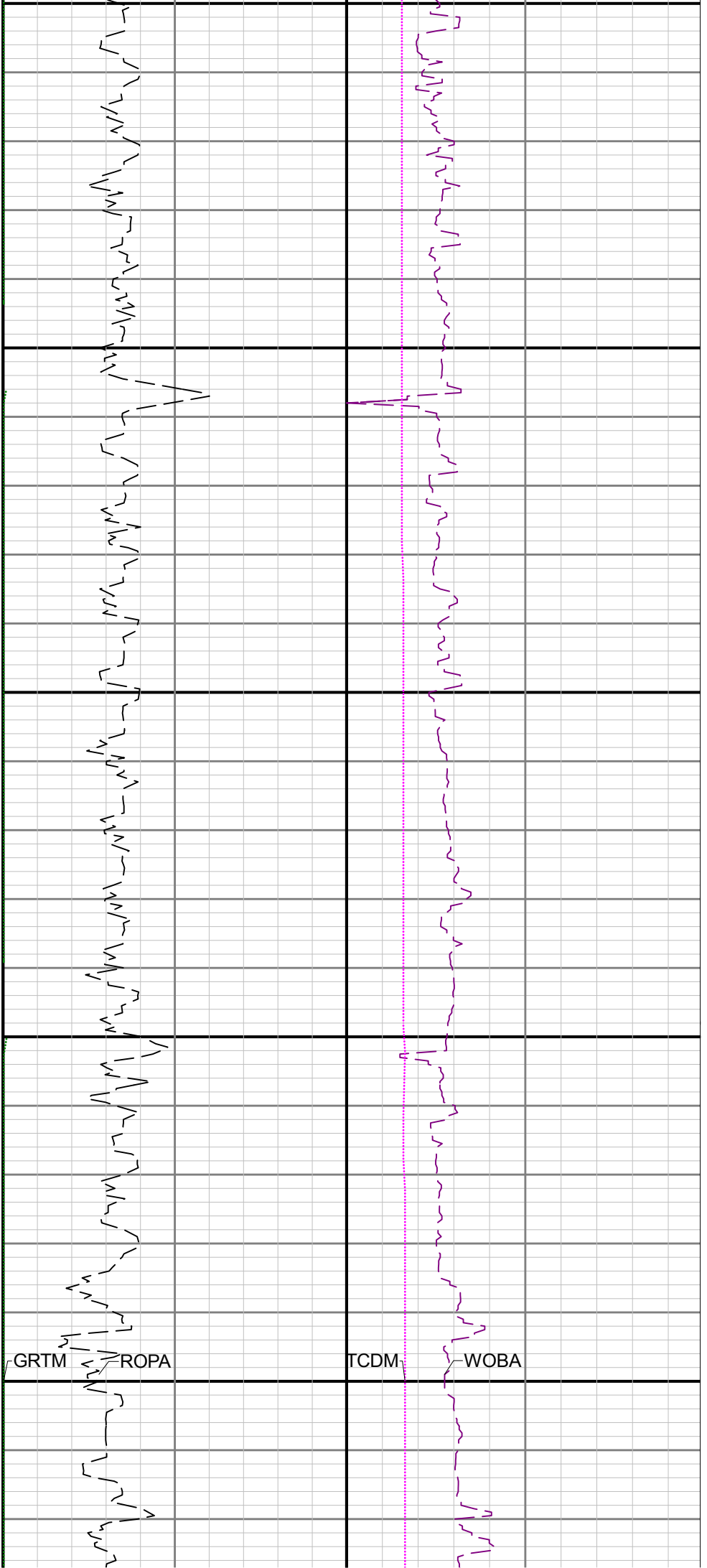


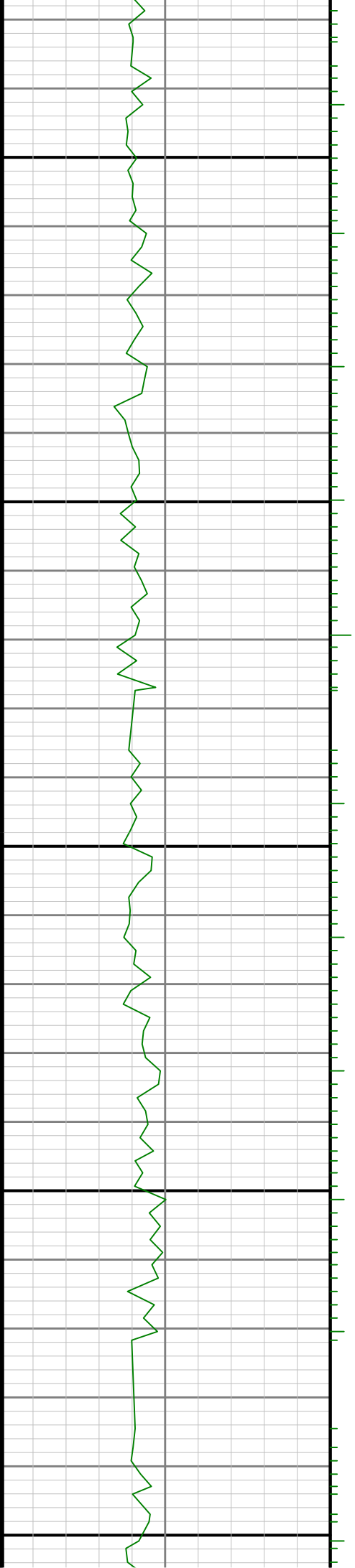
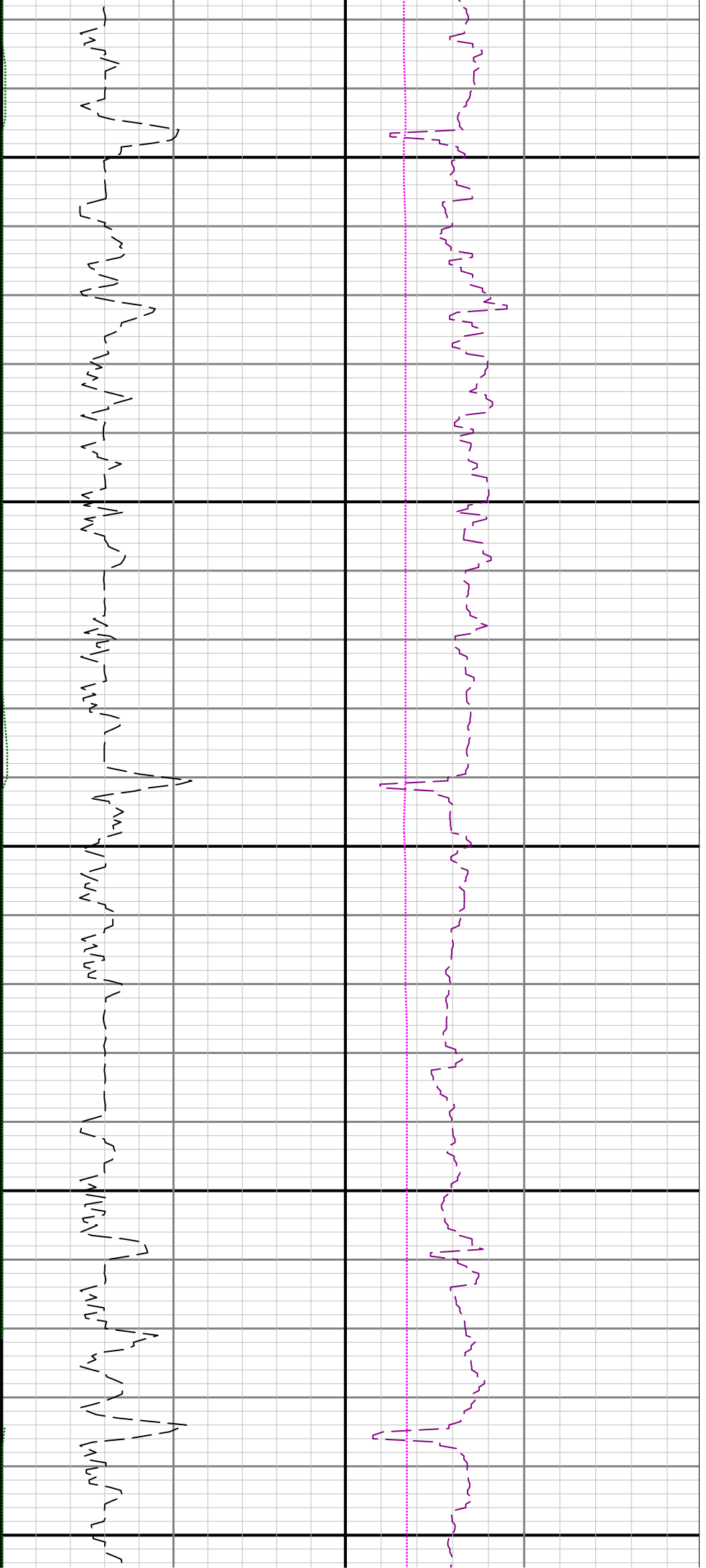
2600

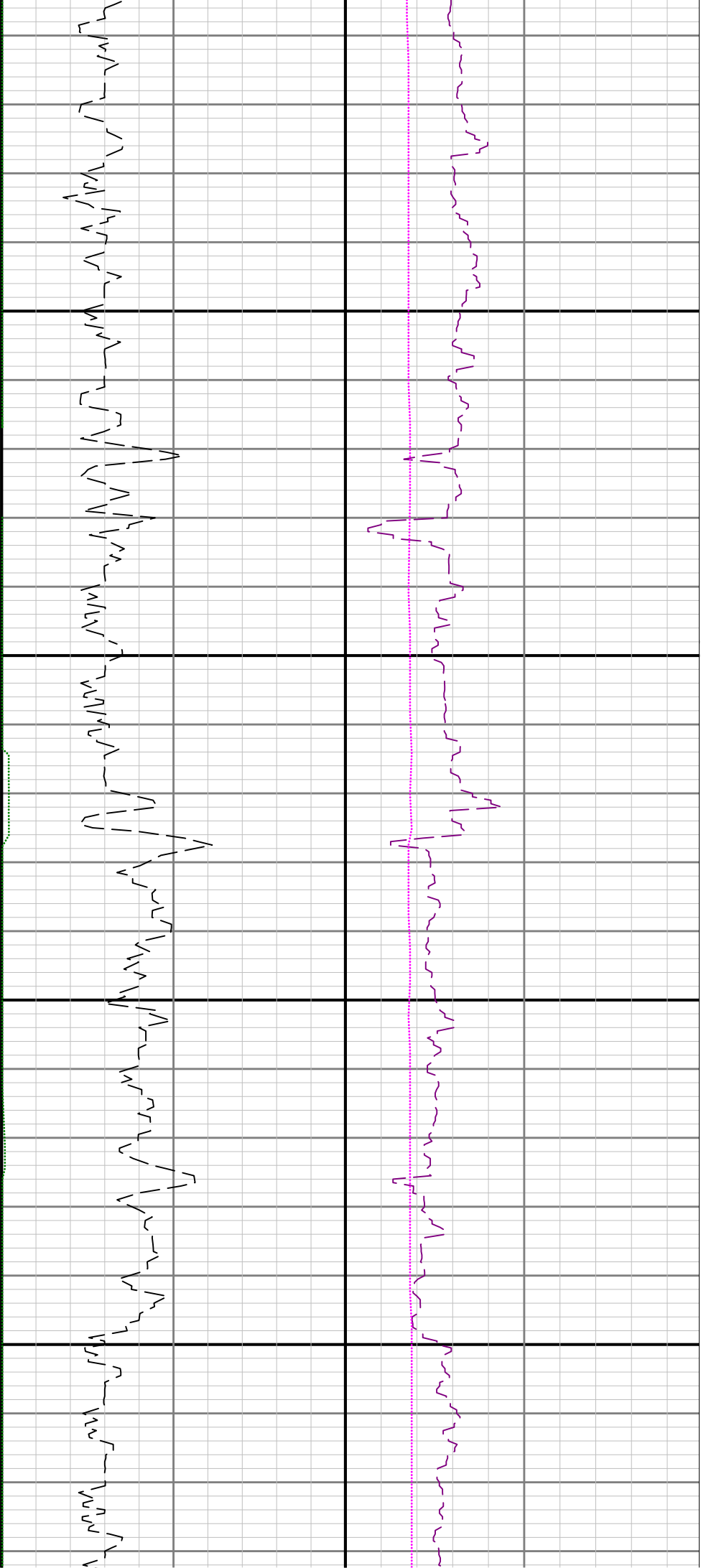
2700

28



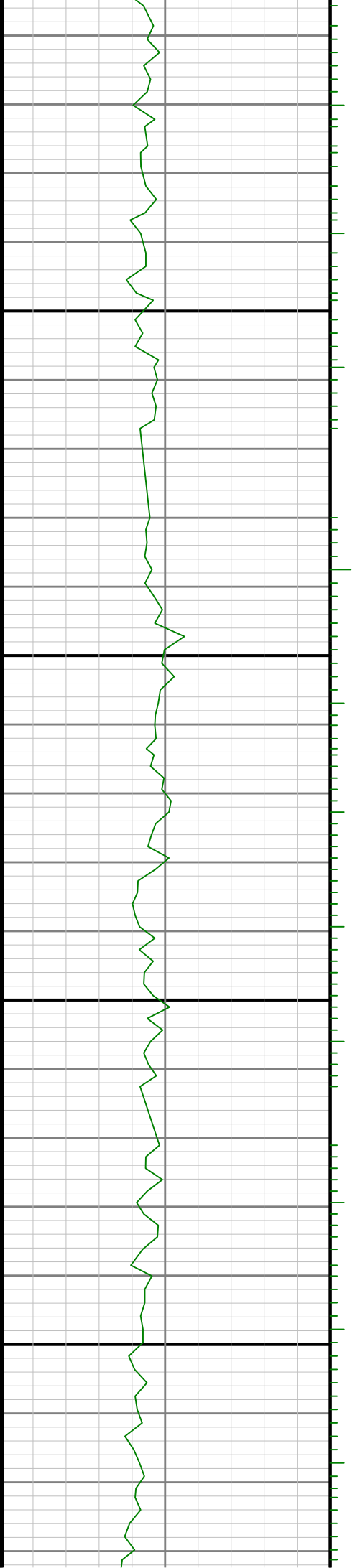
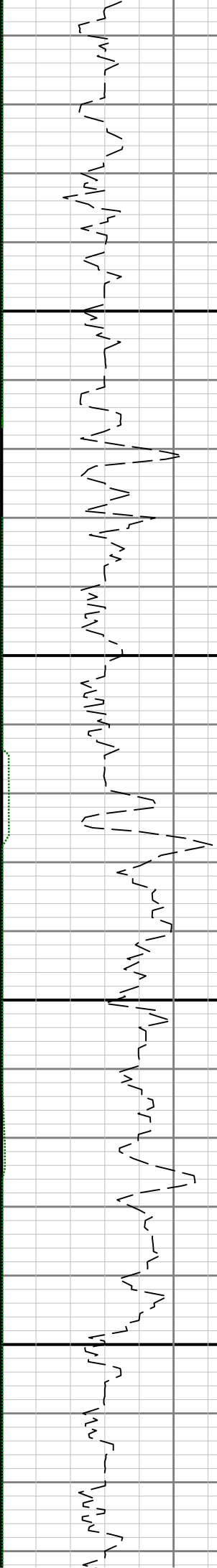


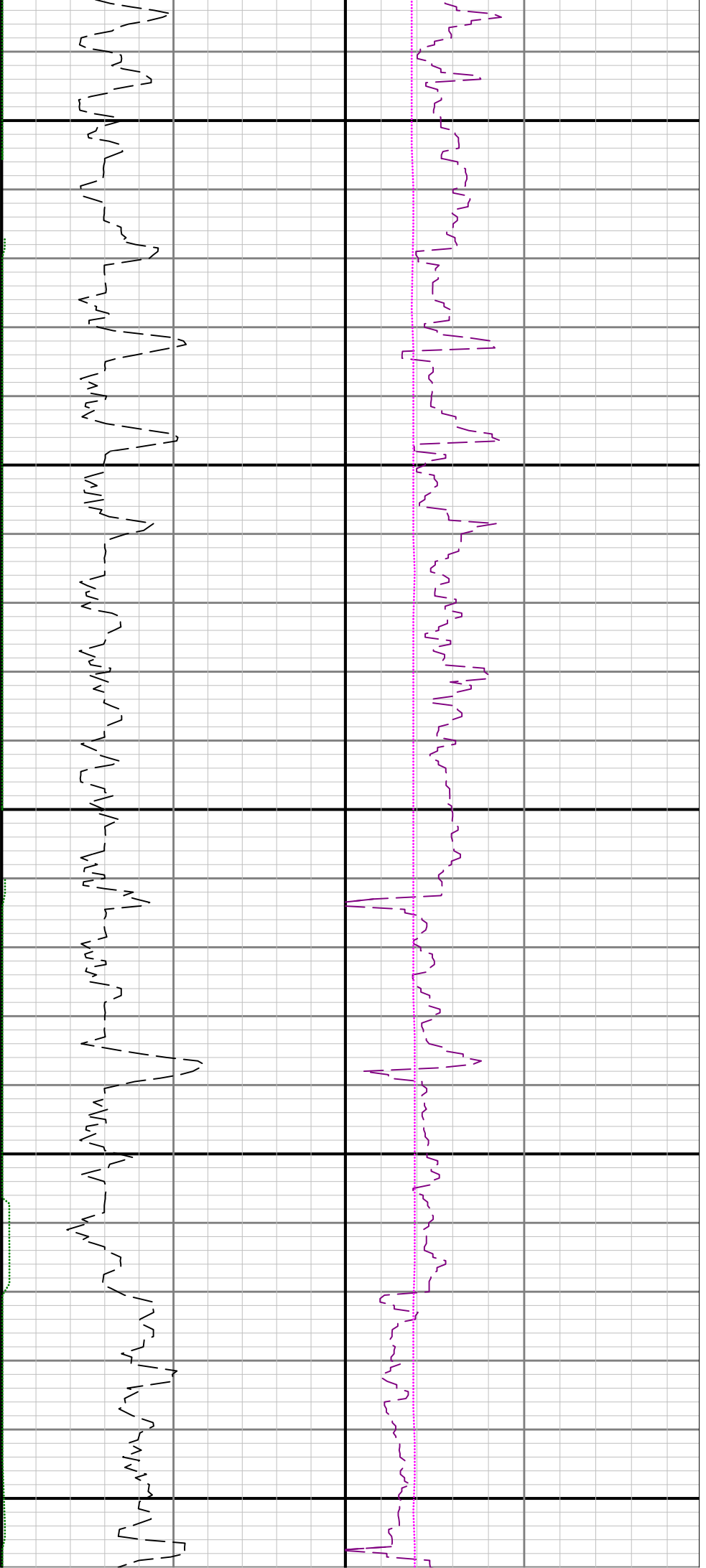




3300

3400

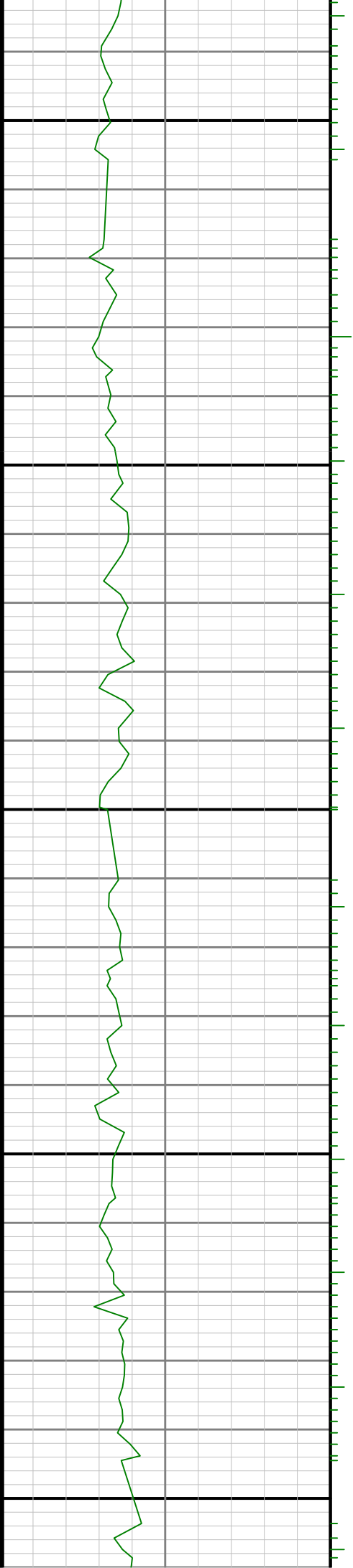


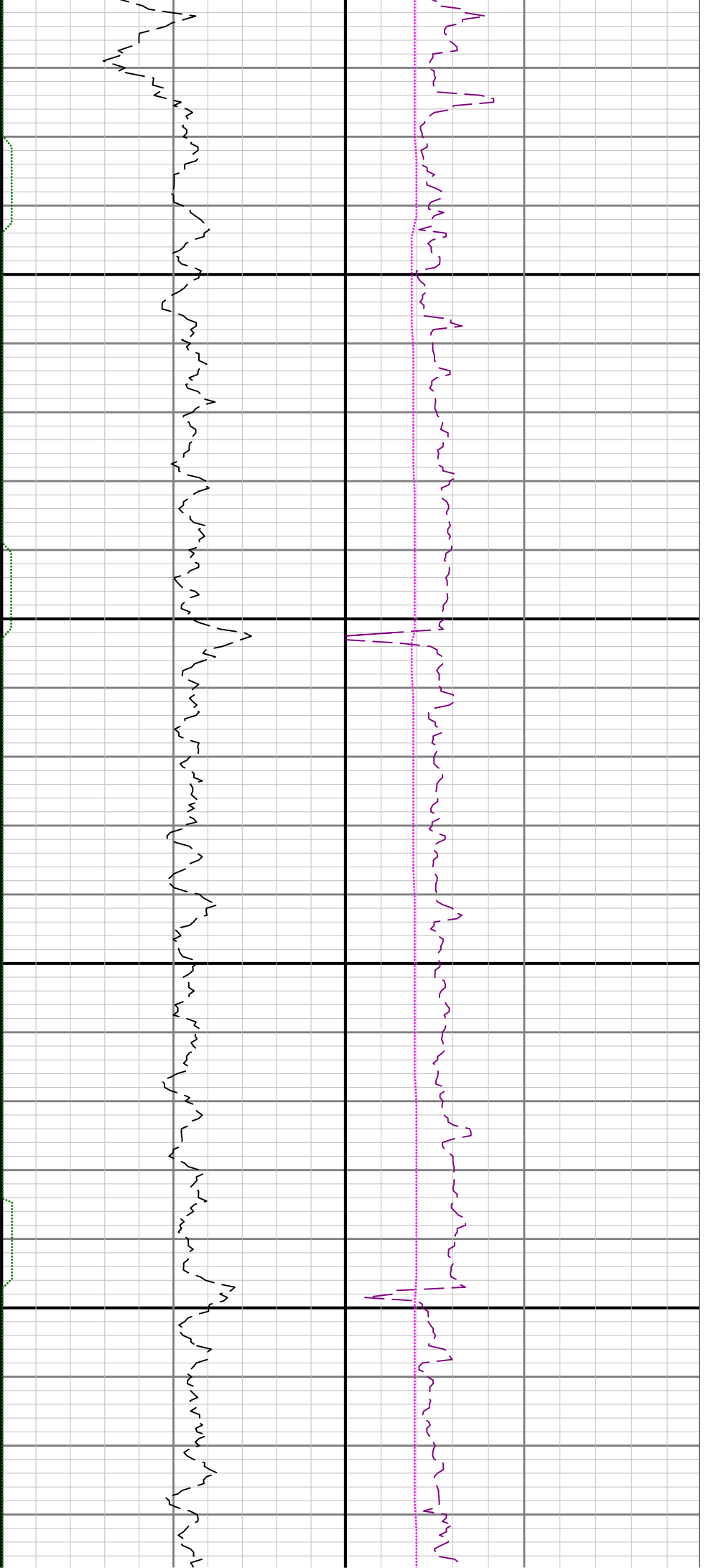


3500

3600

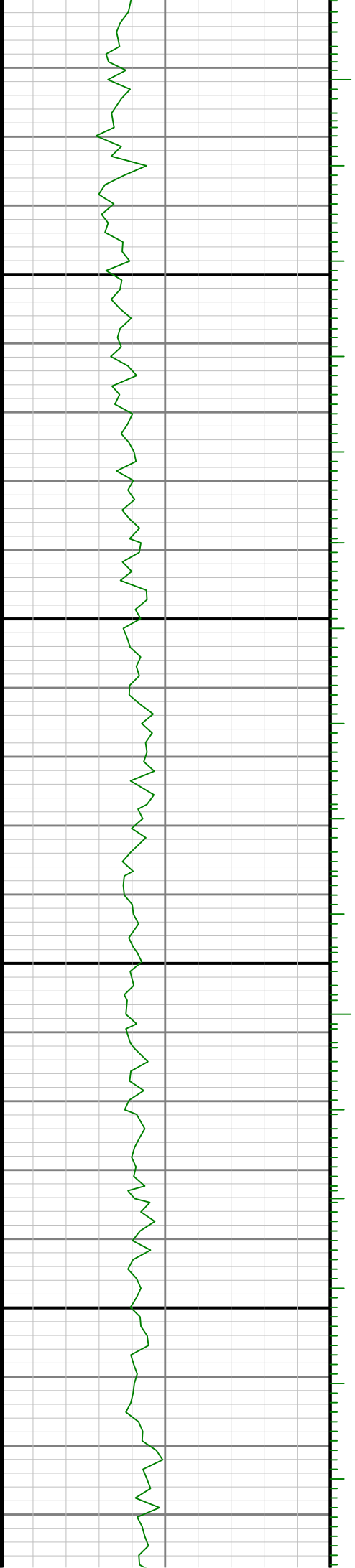
3700

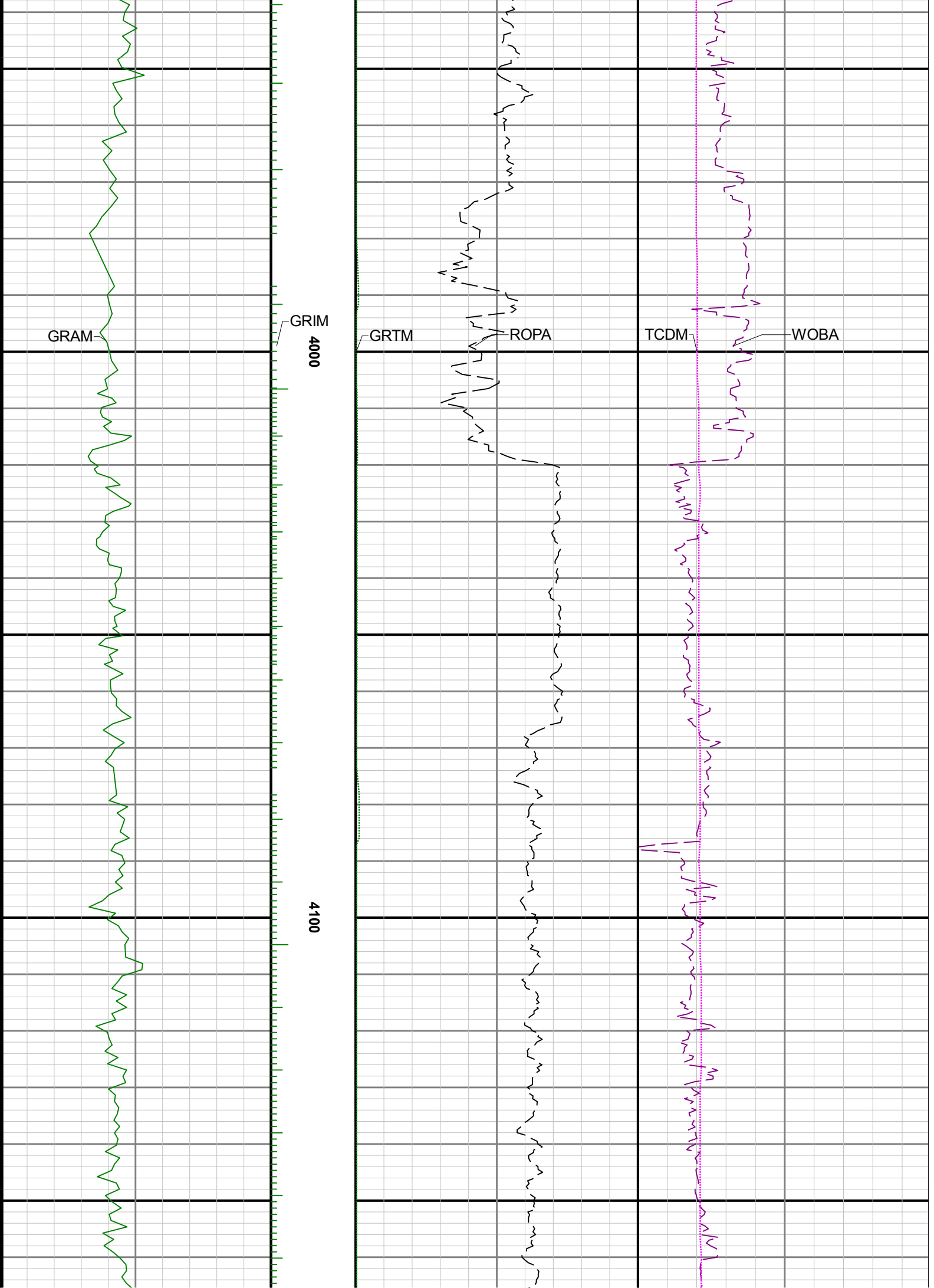


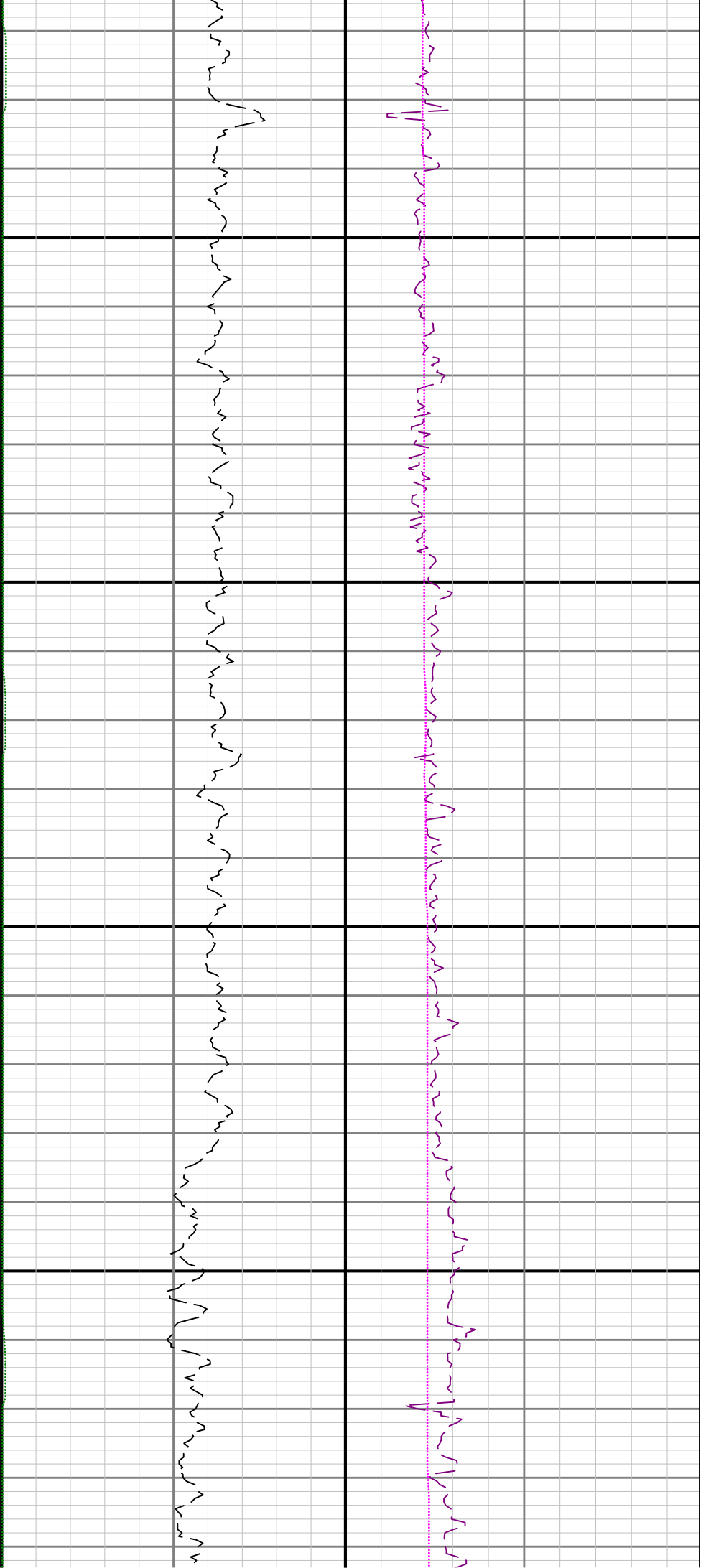


3800

3900

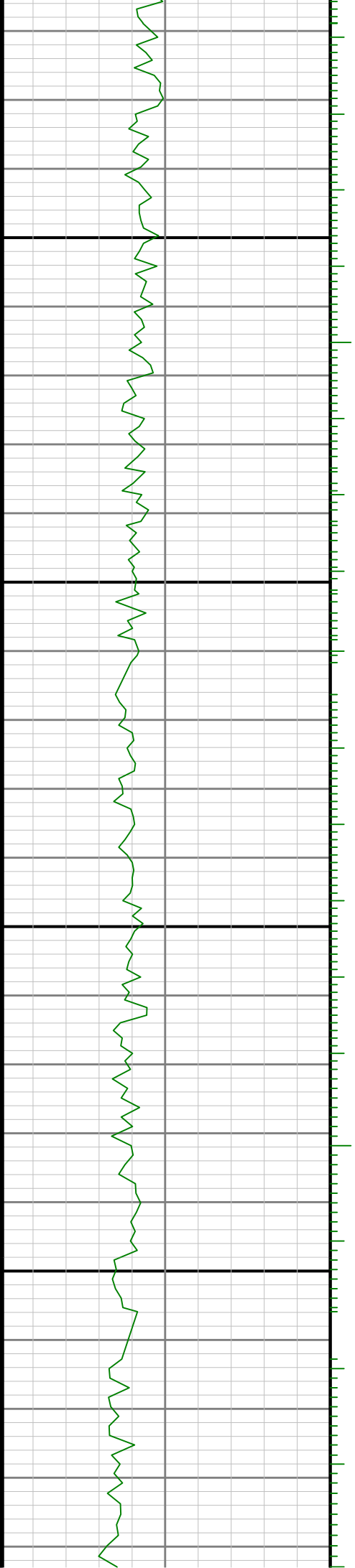


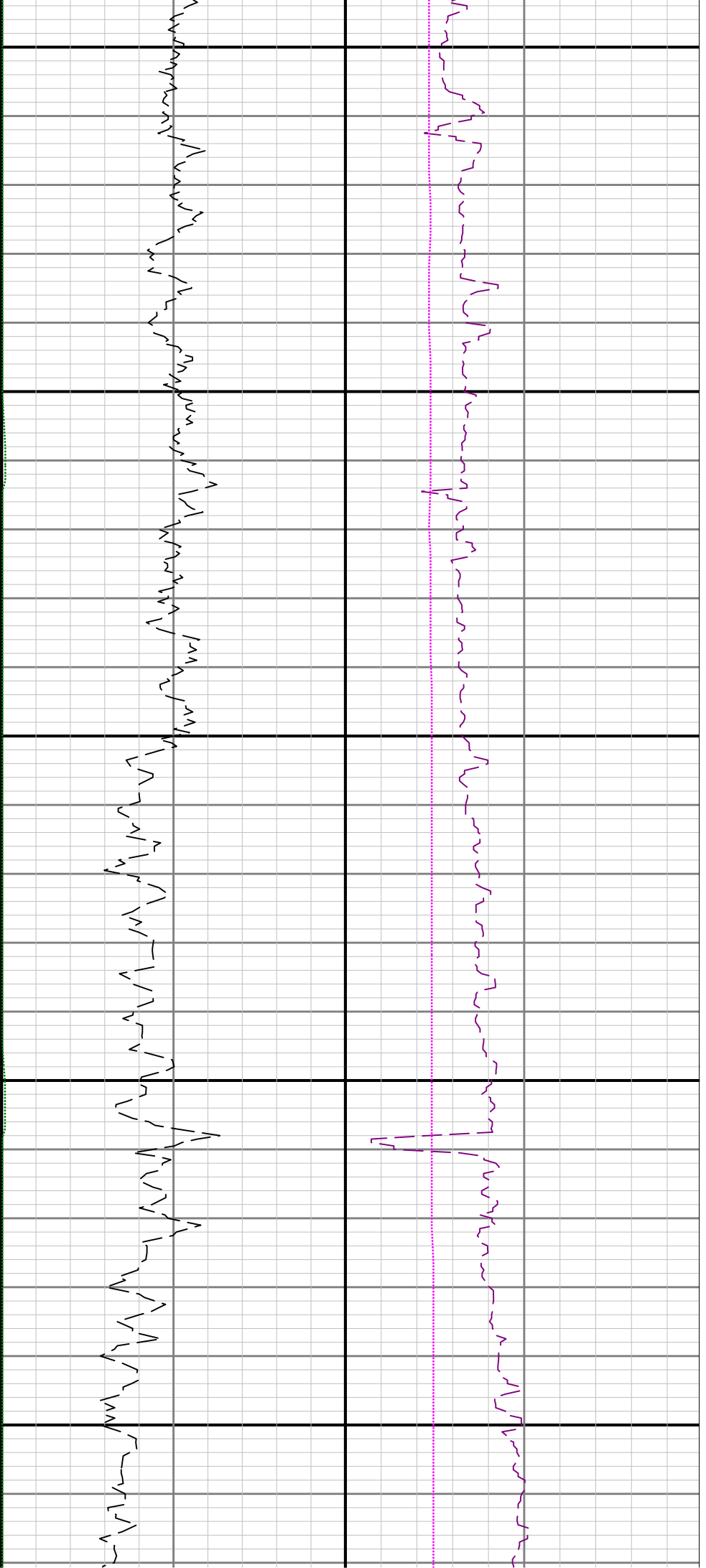




4200

4300

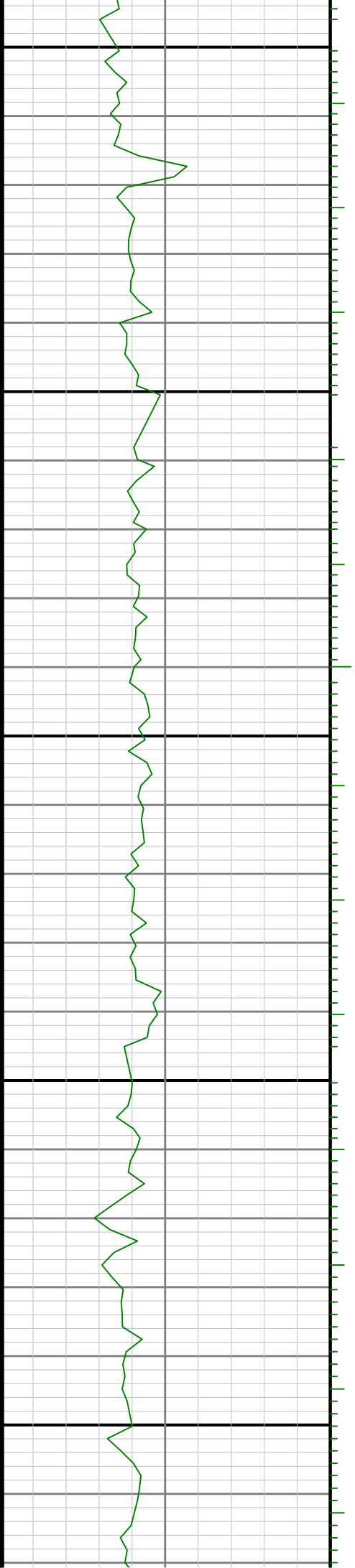


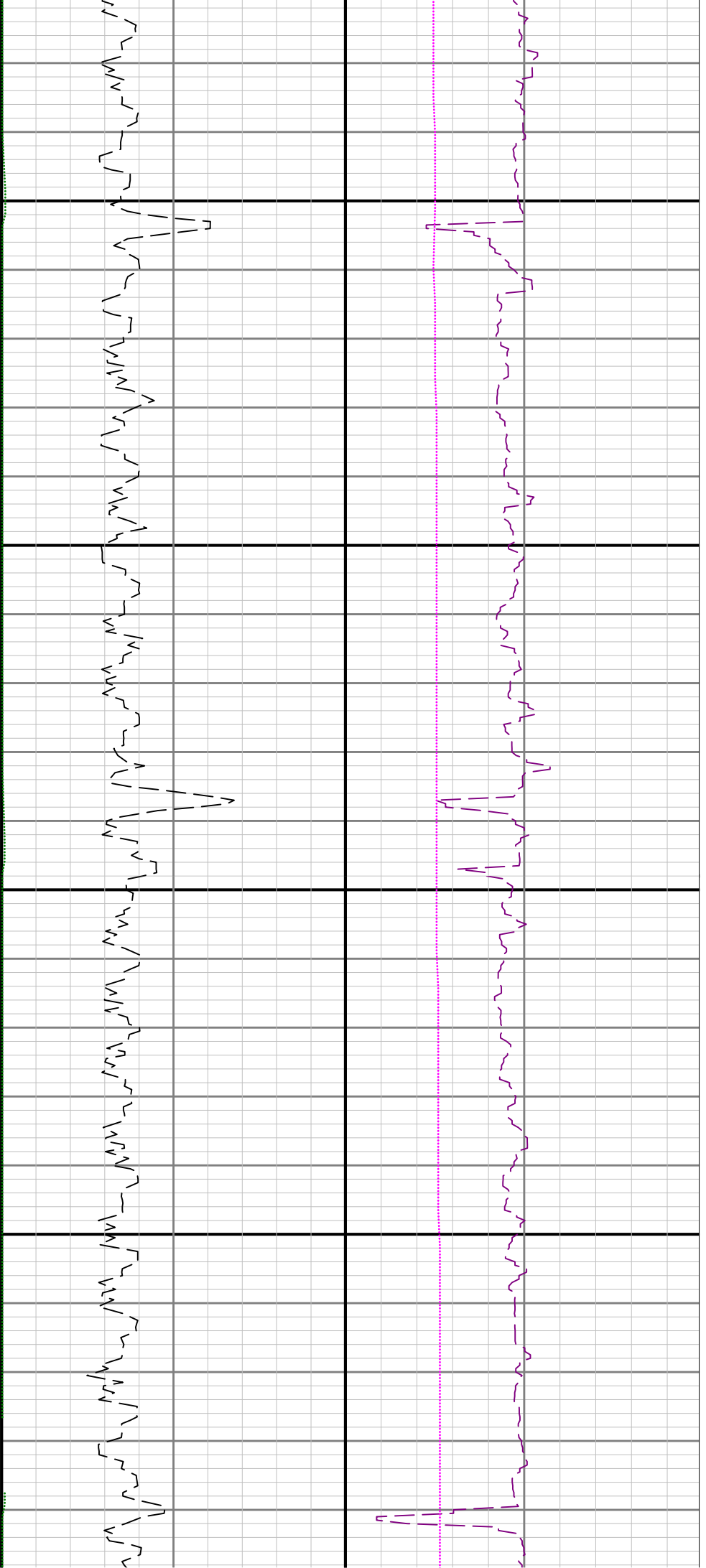


4400

4500

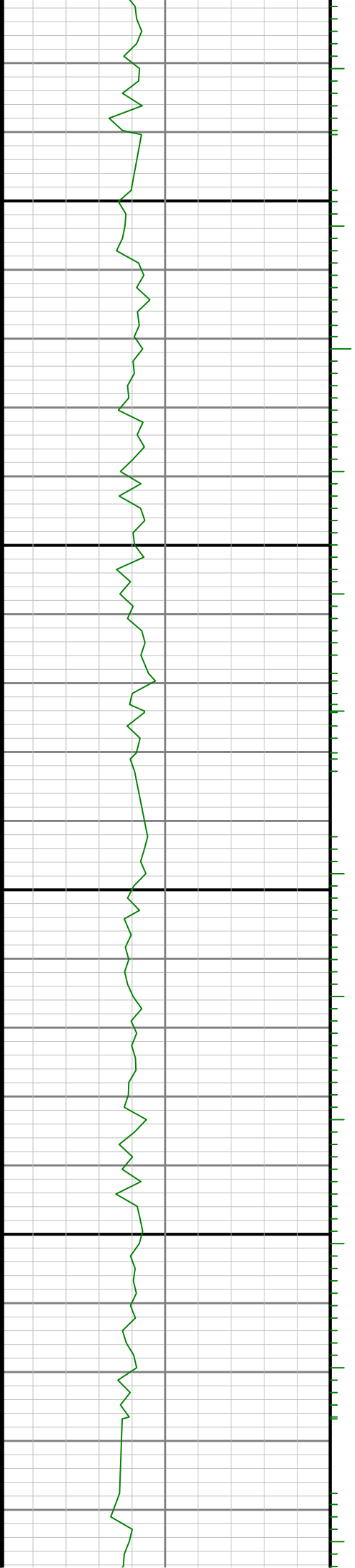
4600

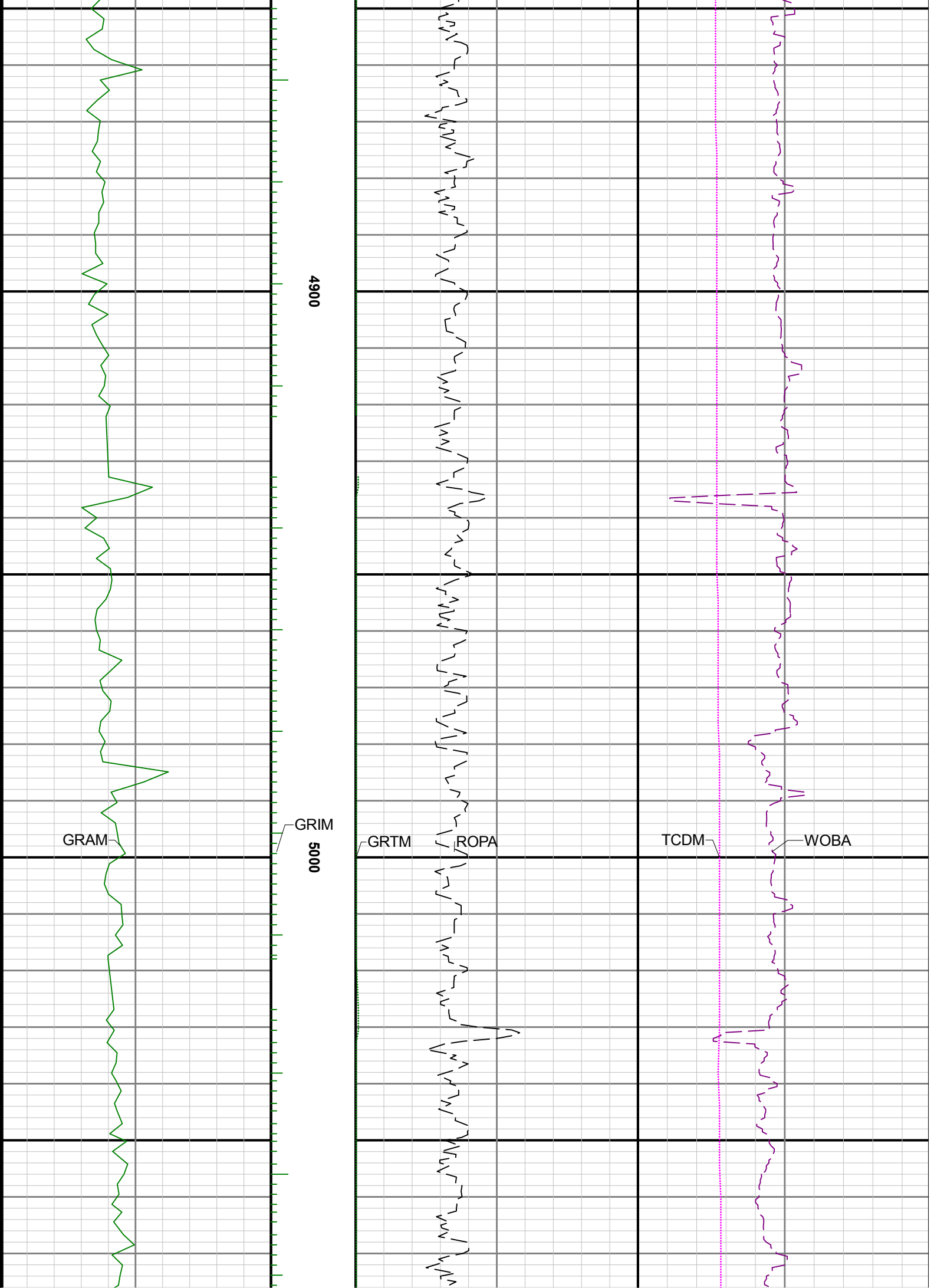


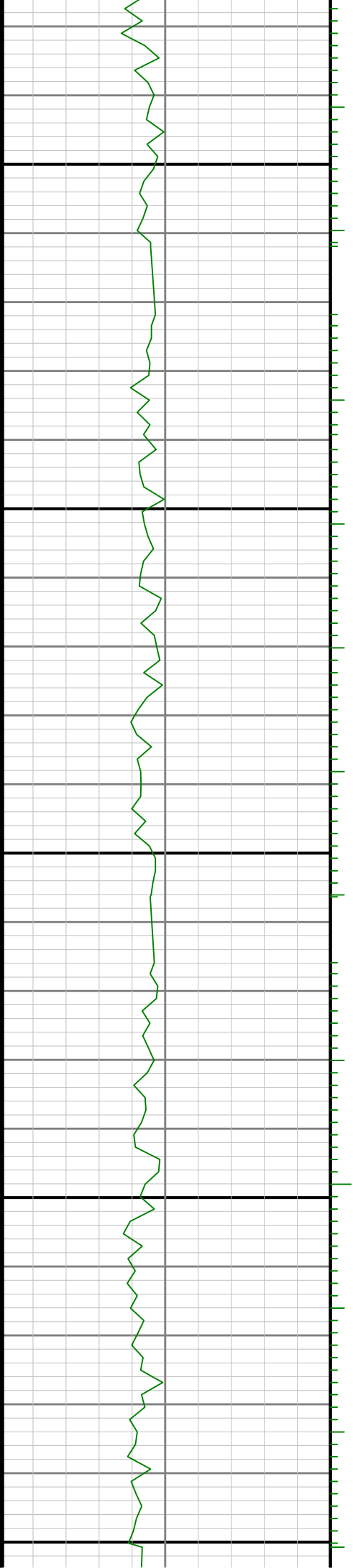
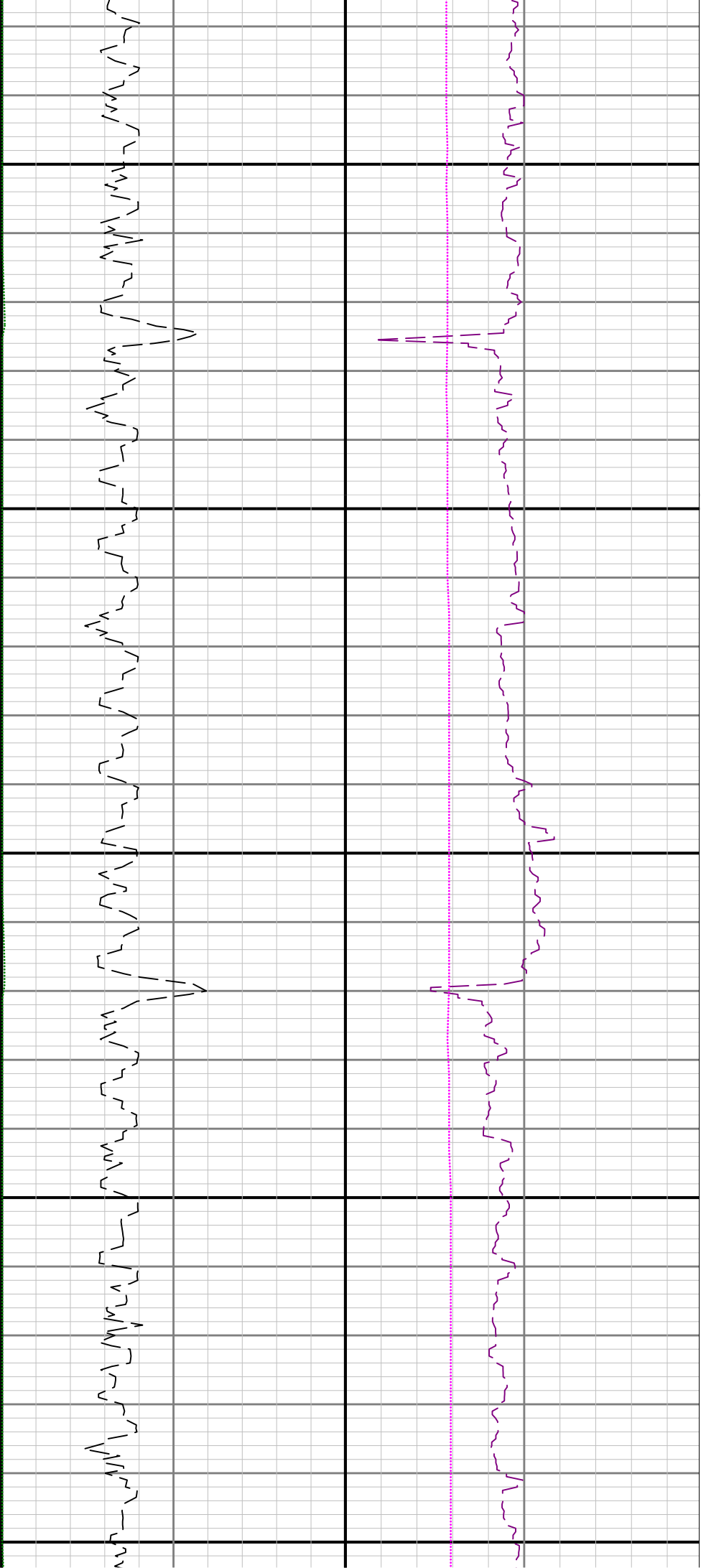


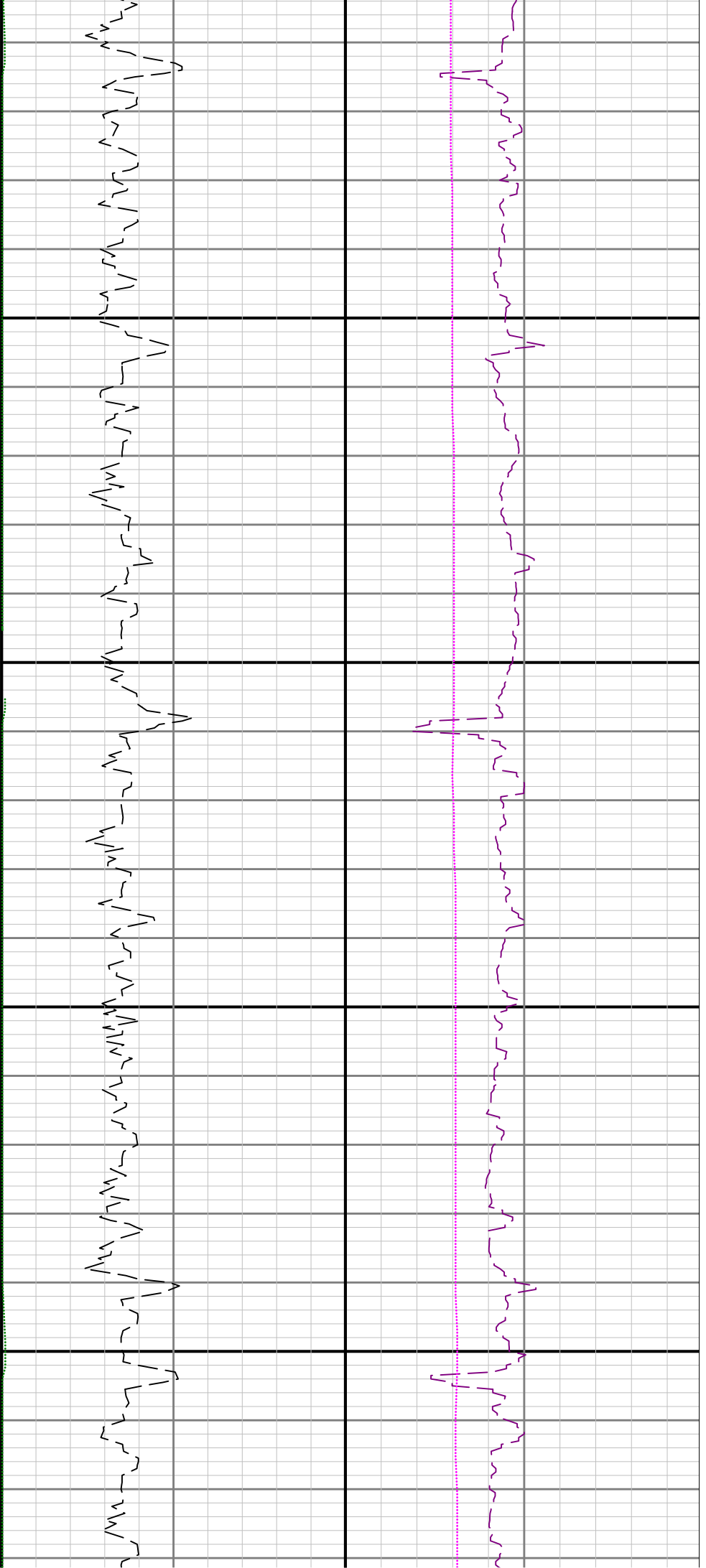
4700

4800



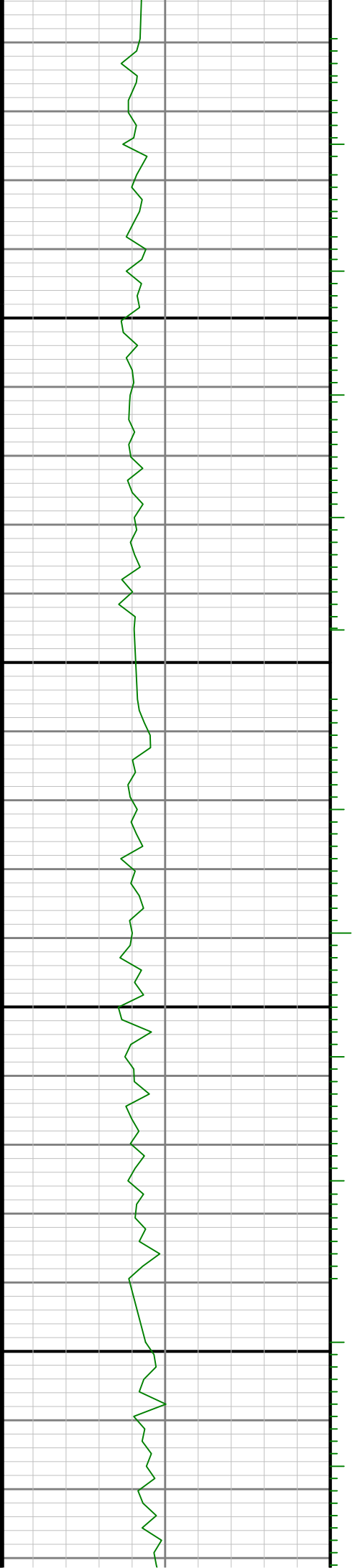


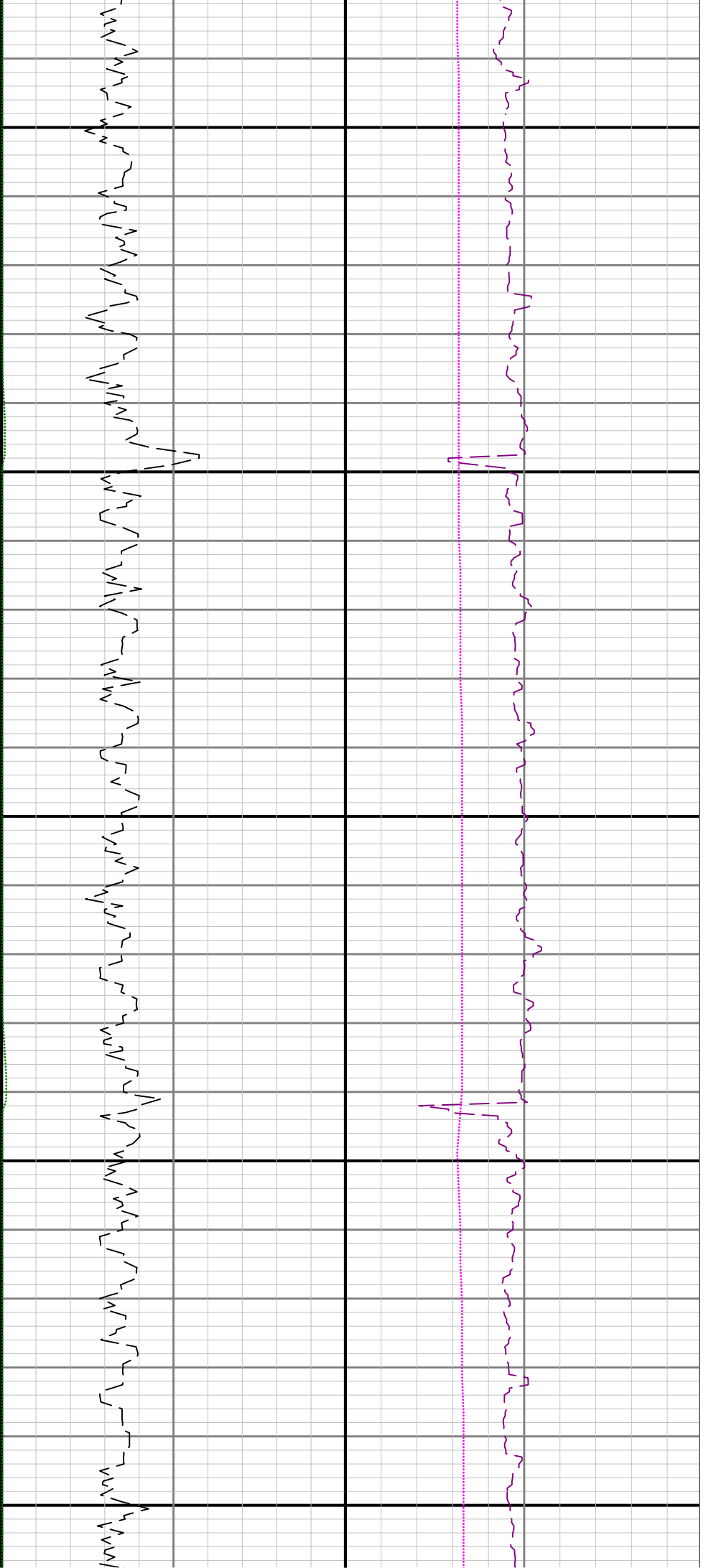




5400

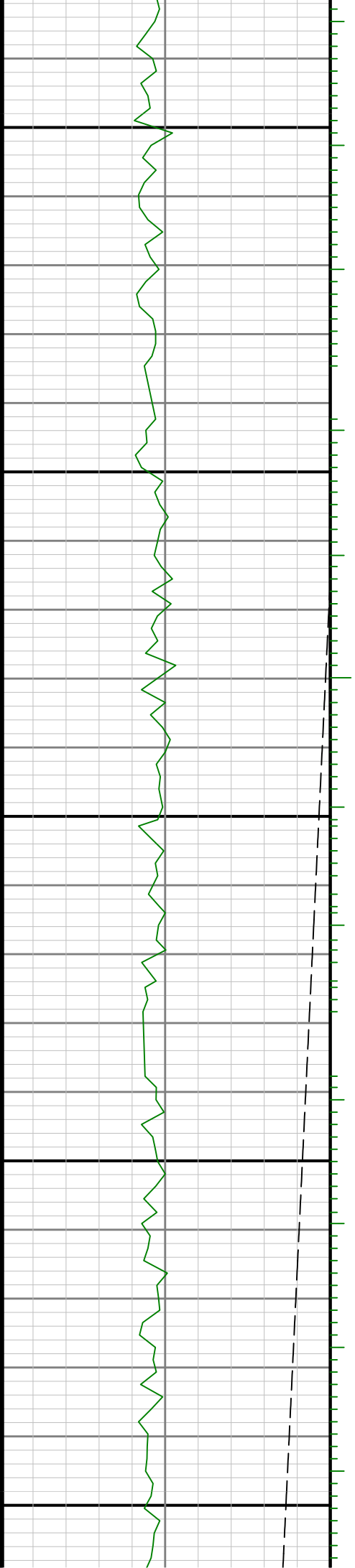
5500

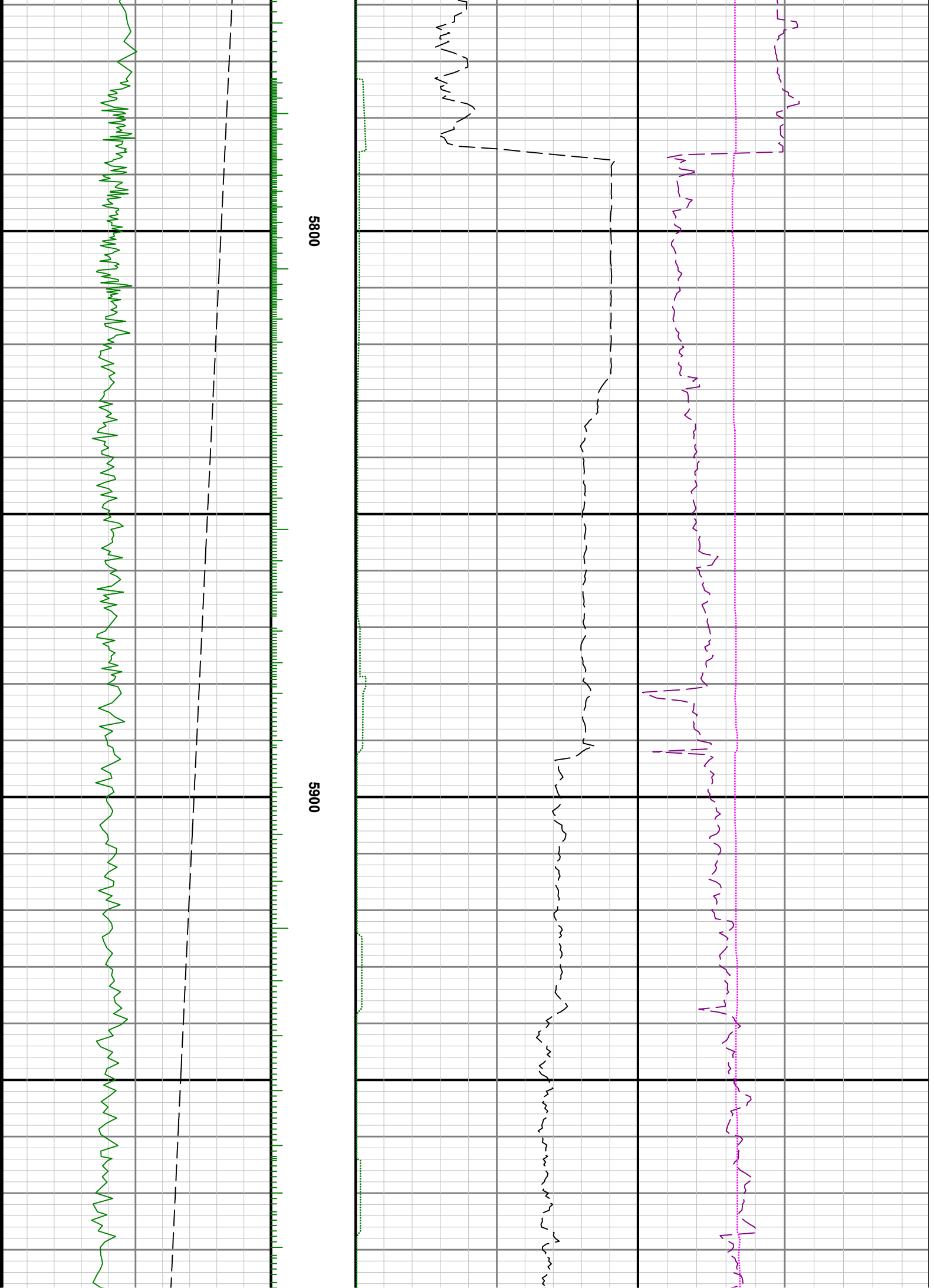


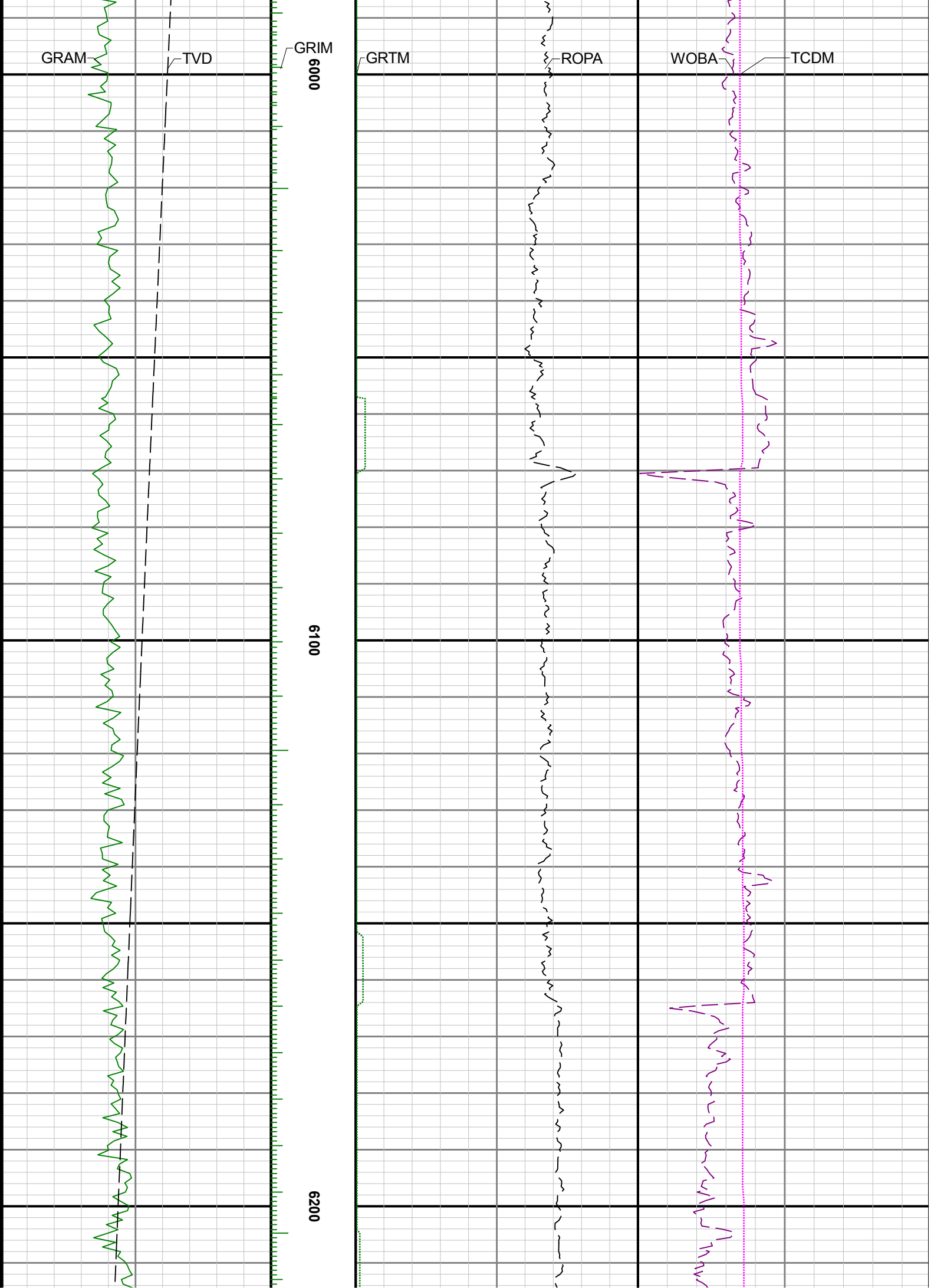


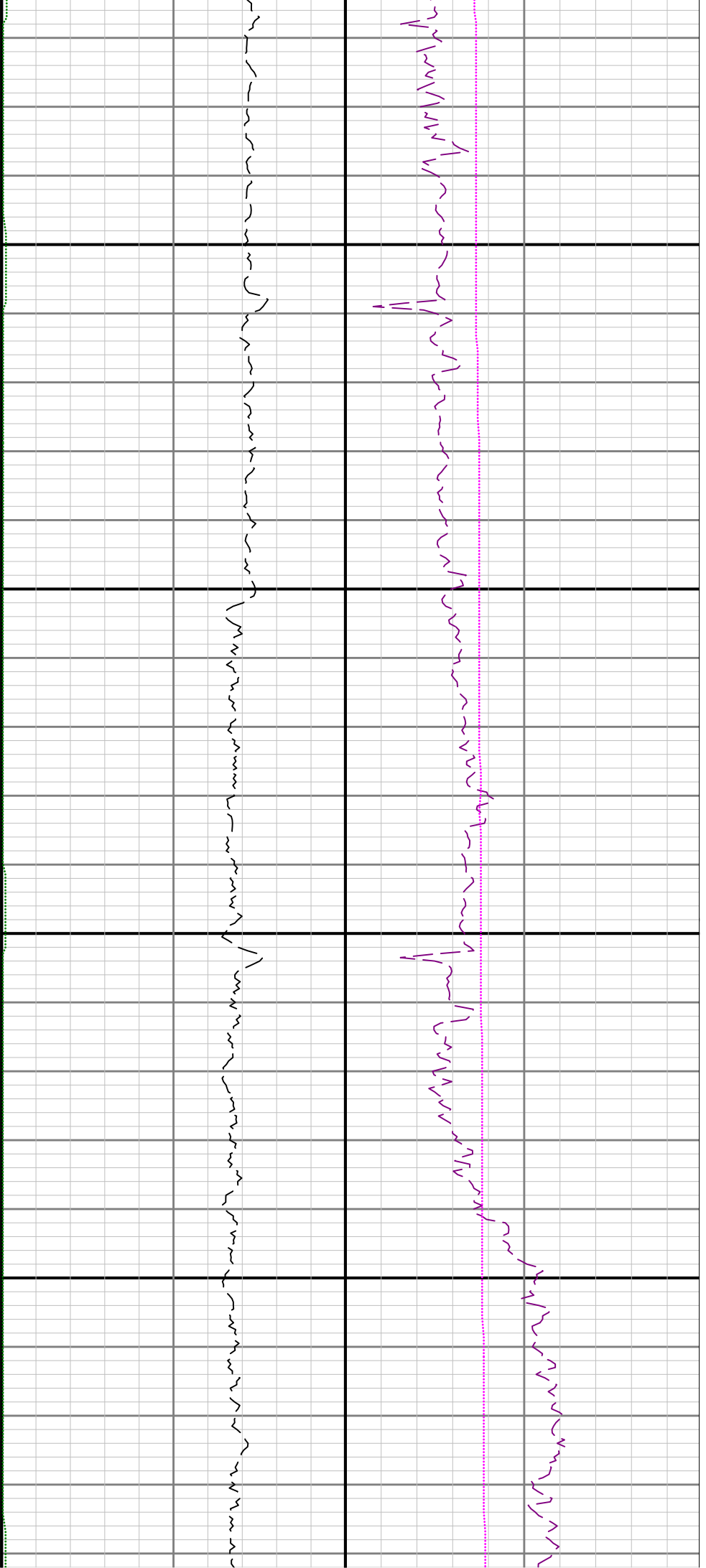
5600

5700



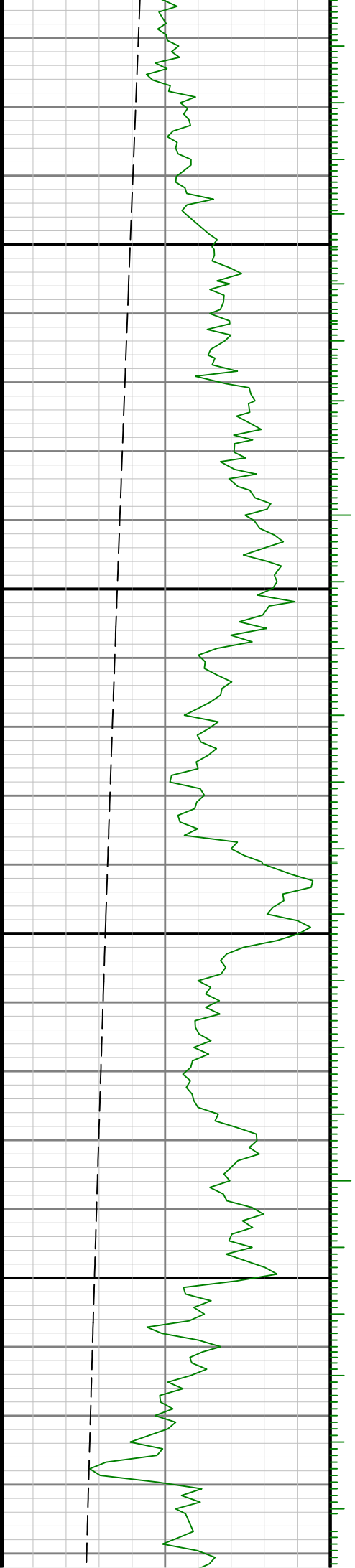


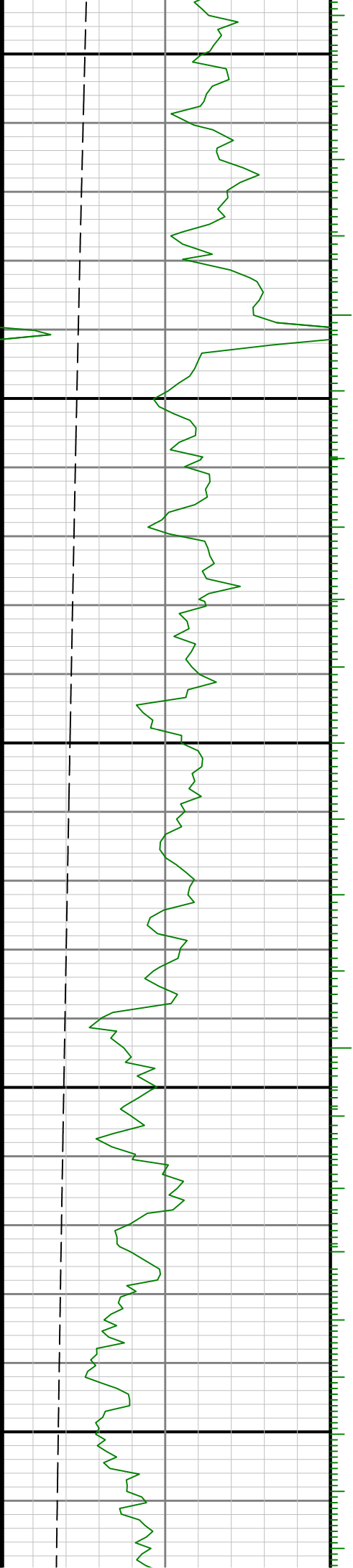




6300

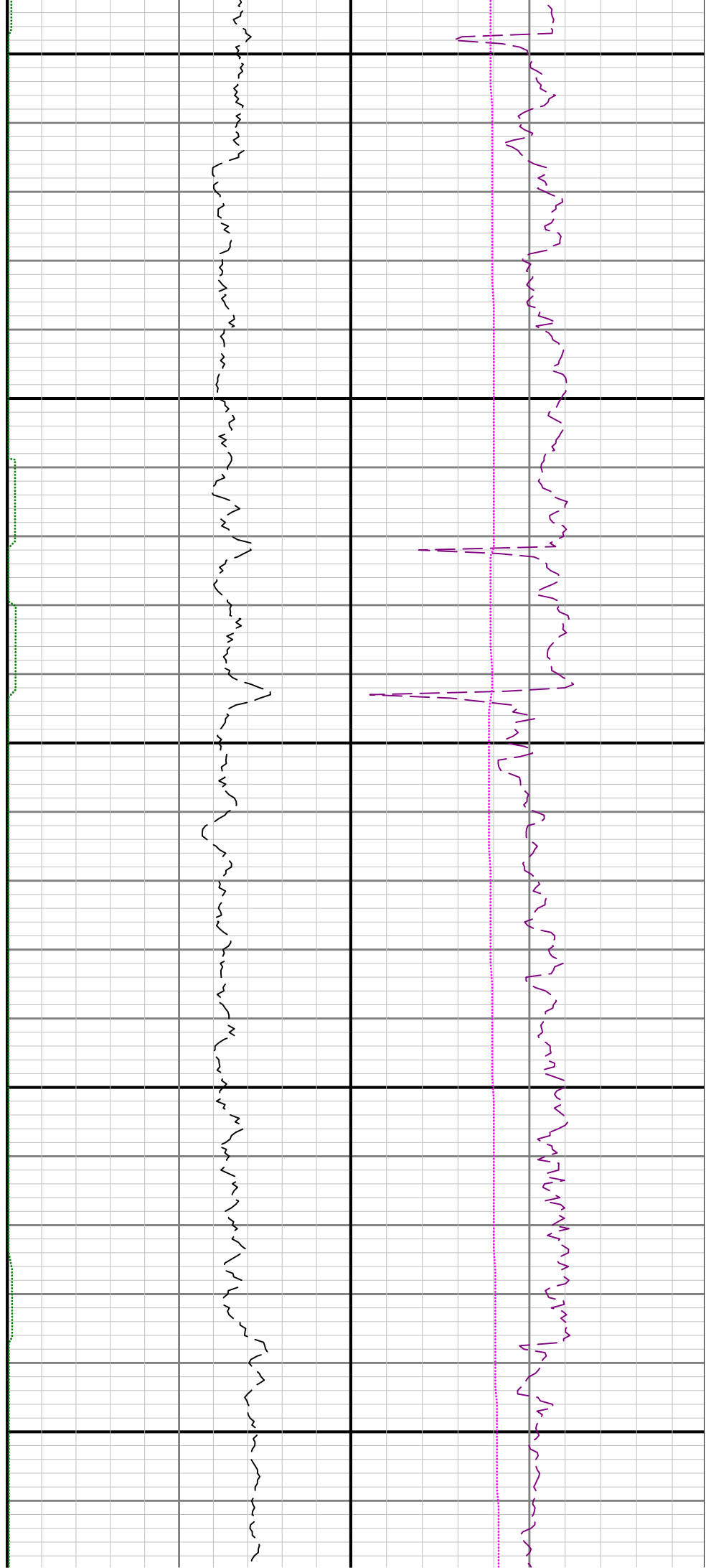
6400

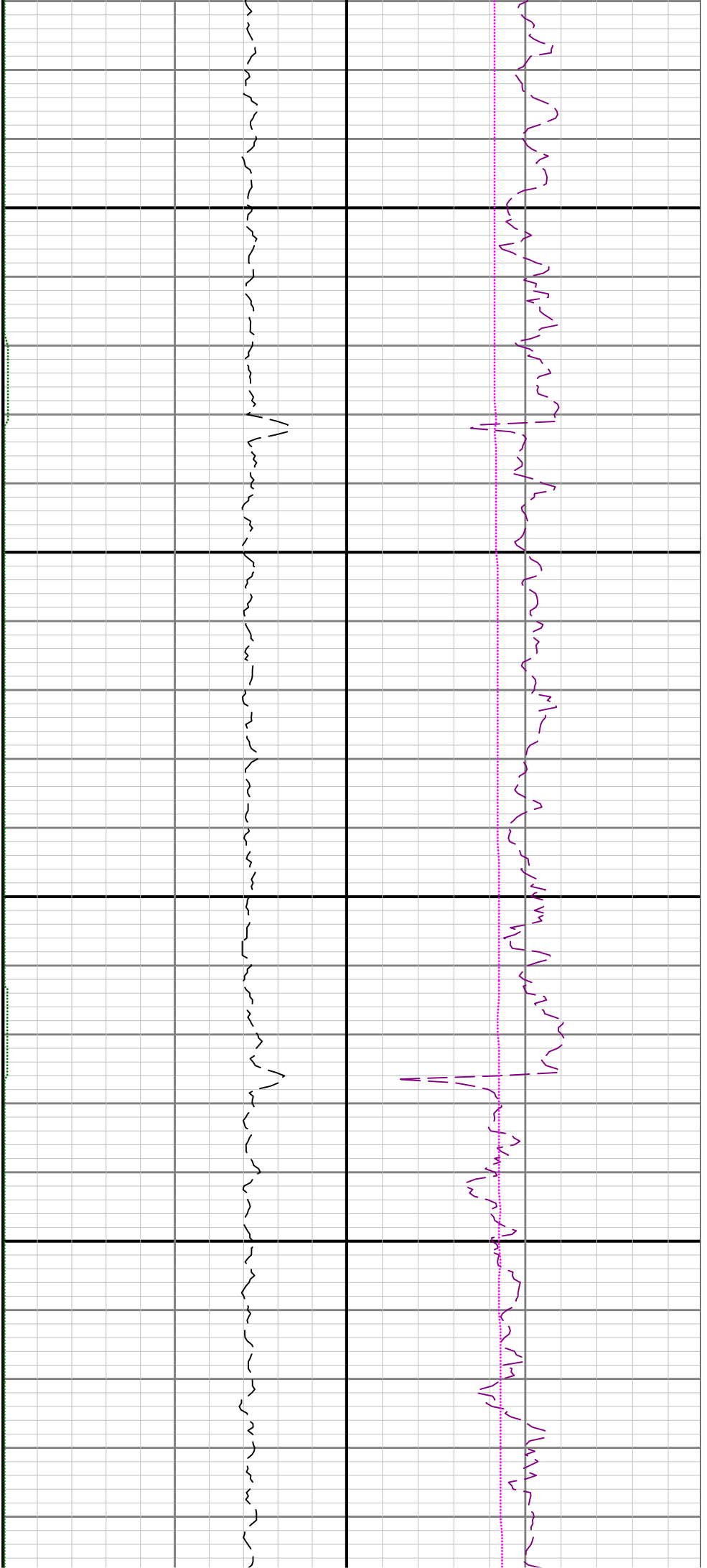




0099

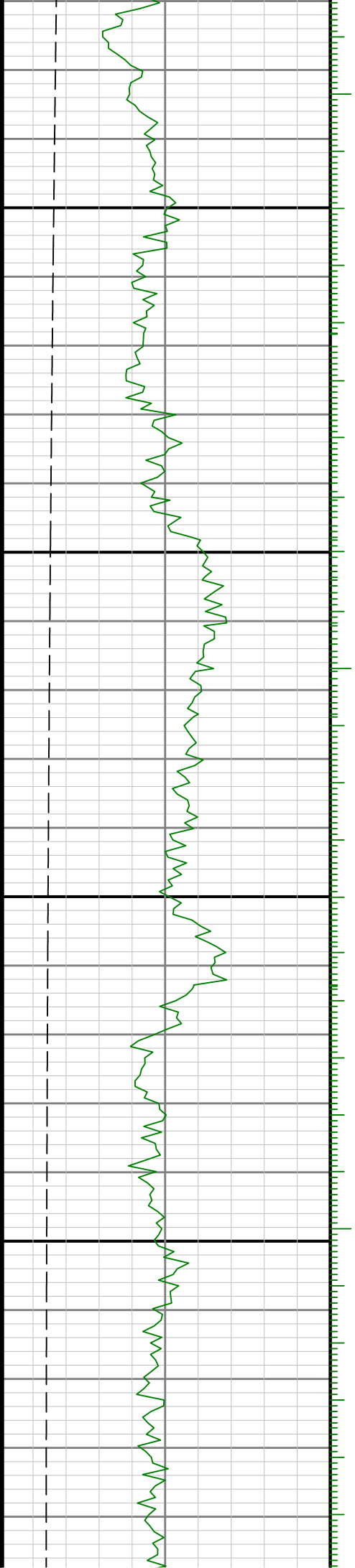
6500

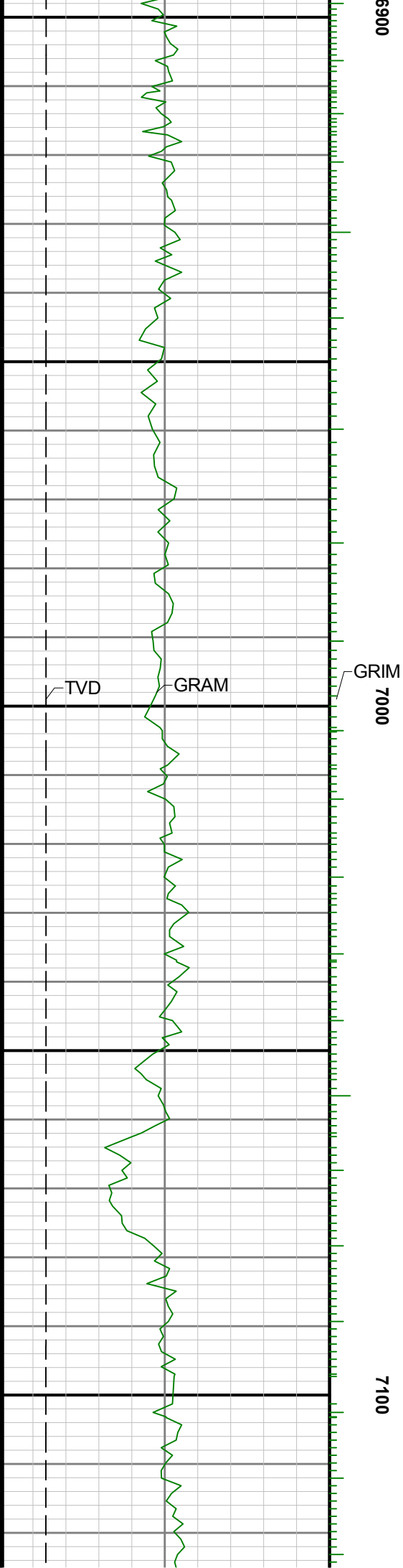
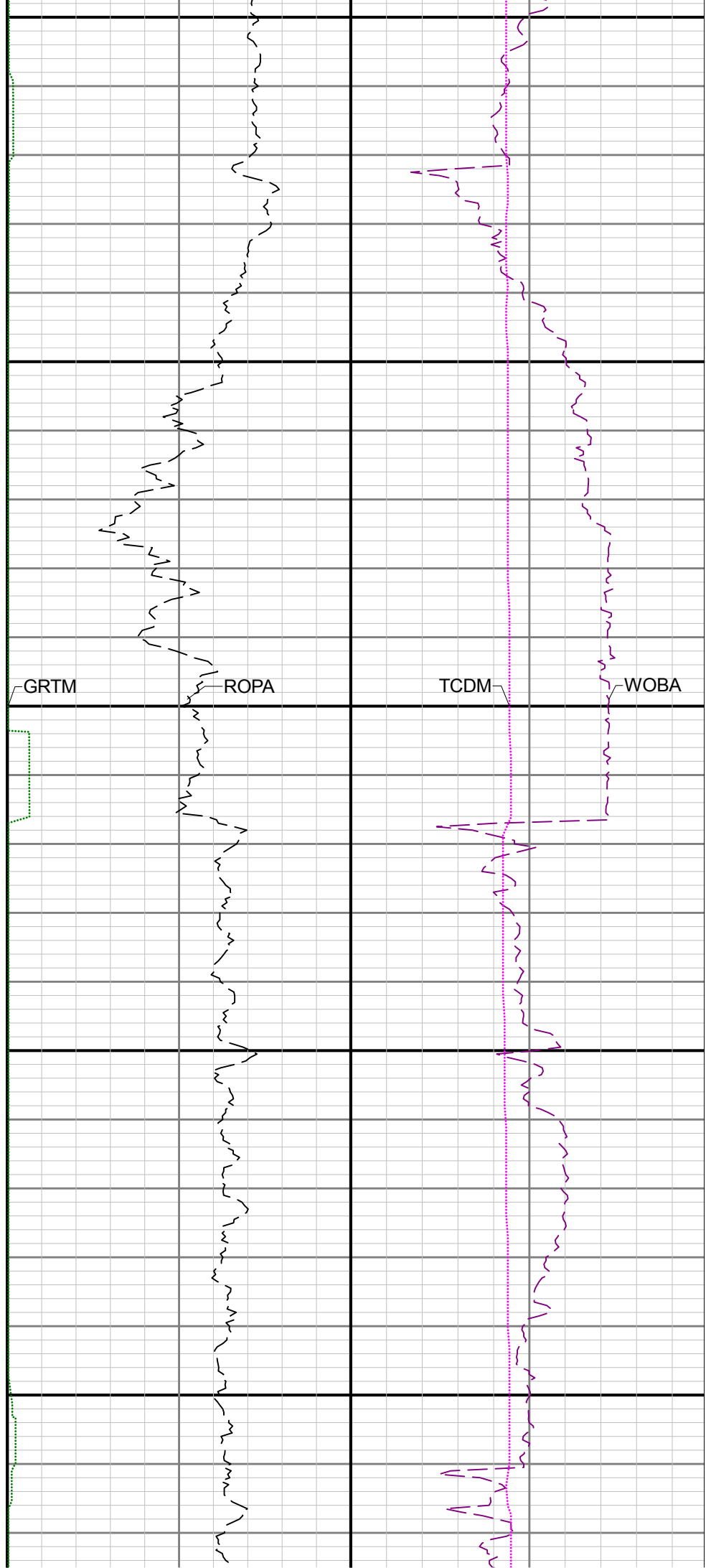


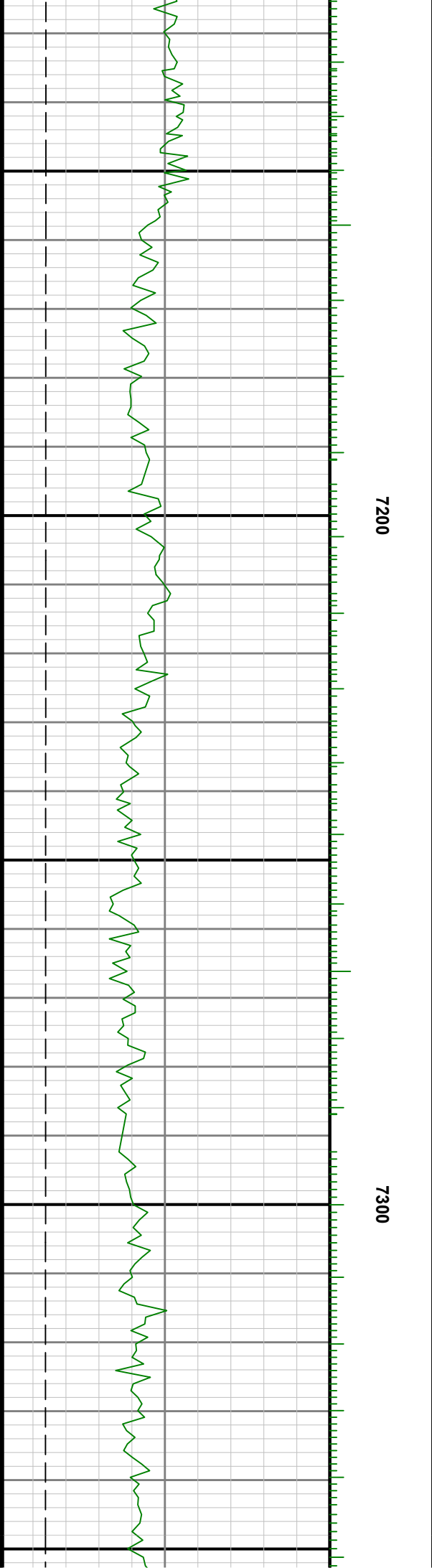
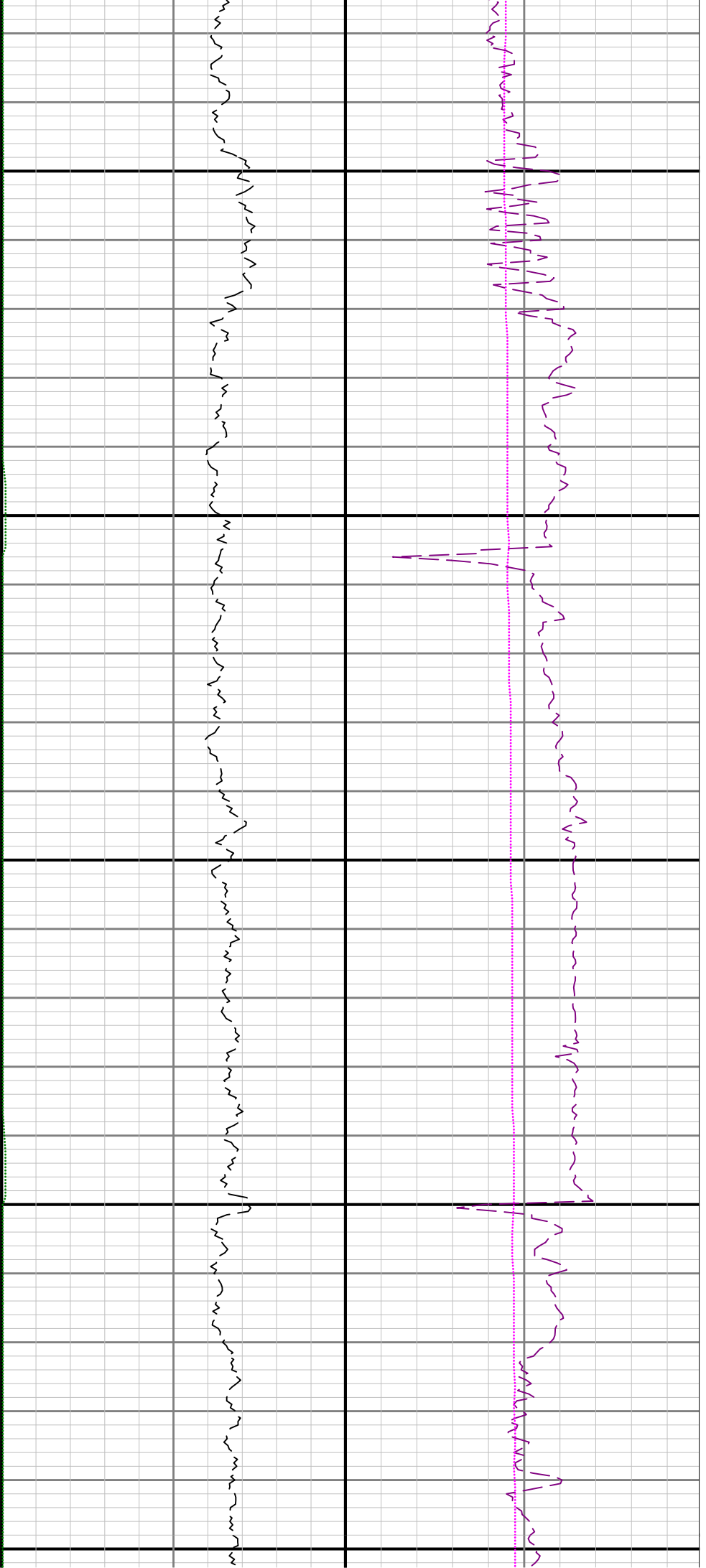


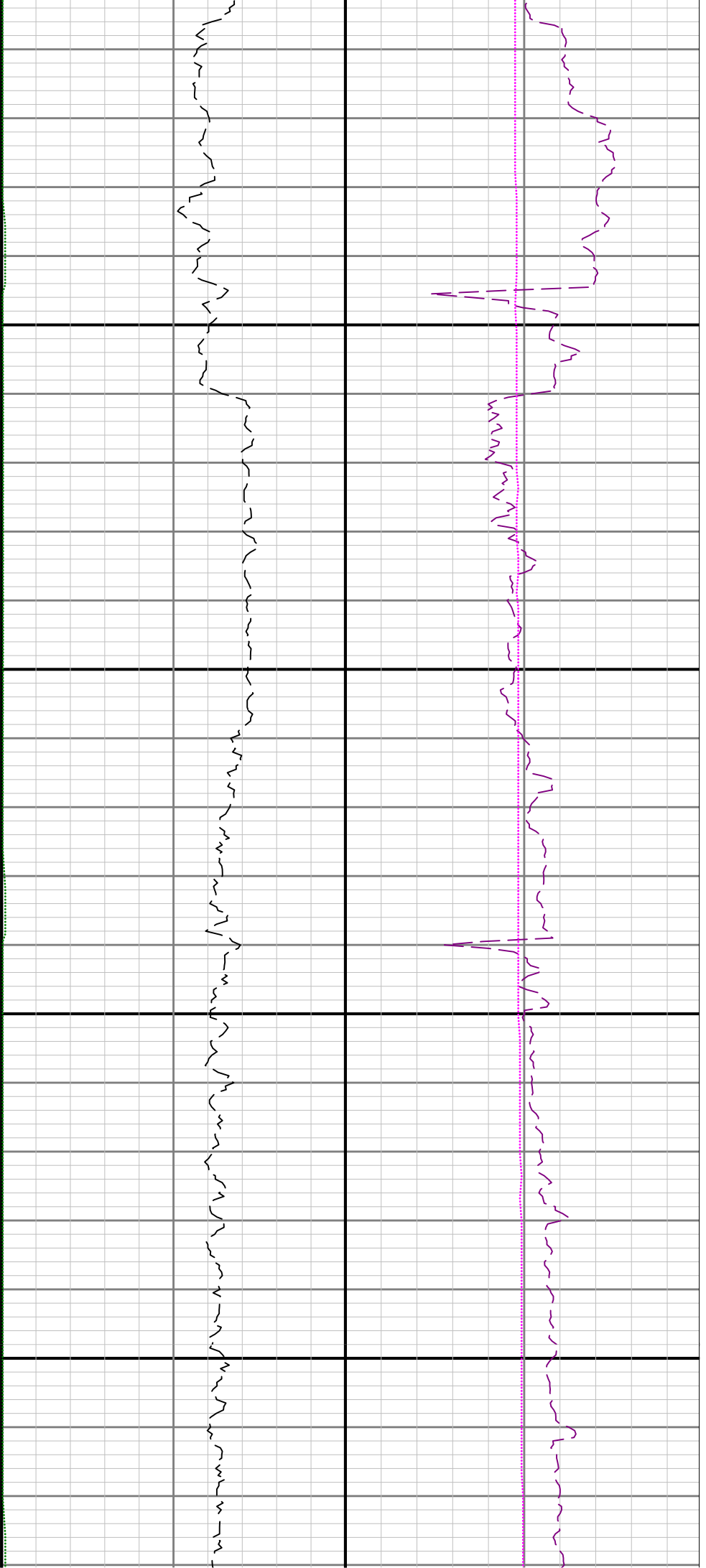
6700

6800



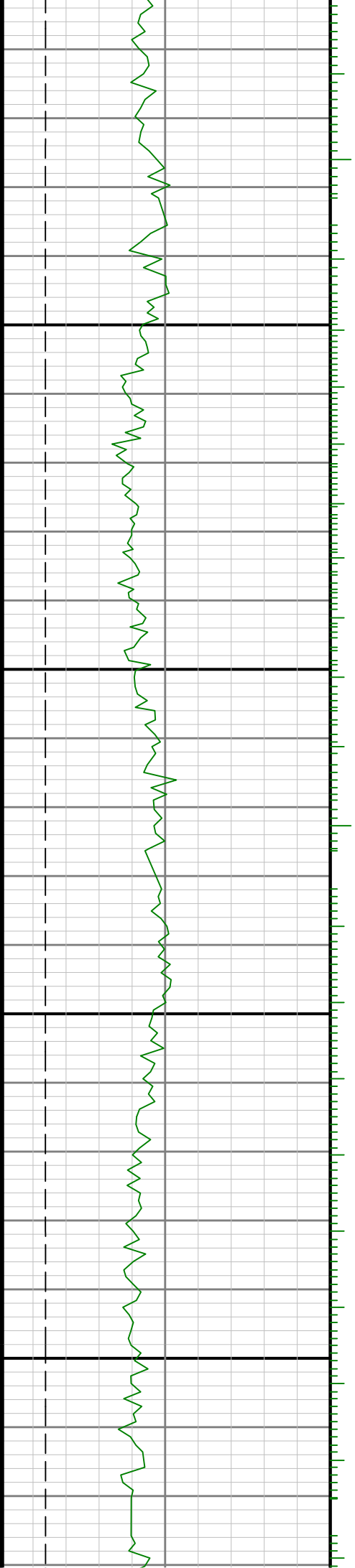


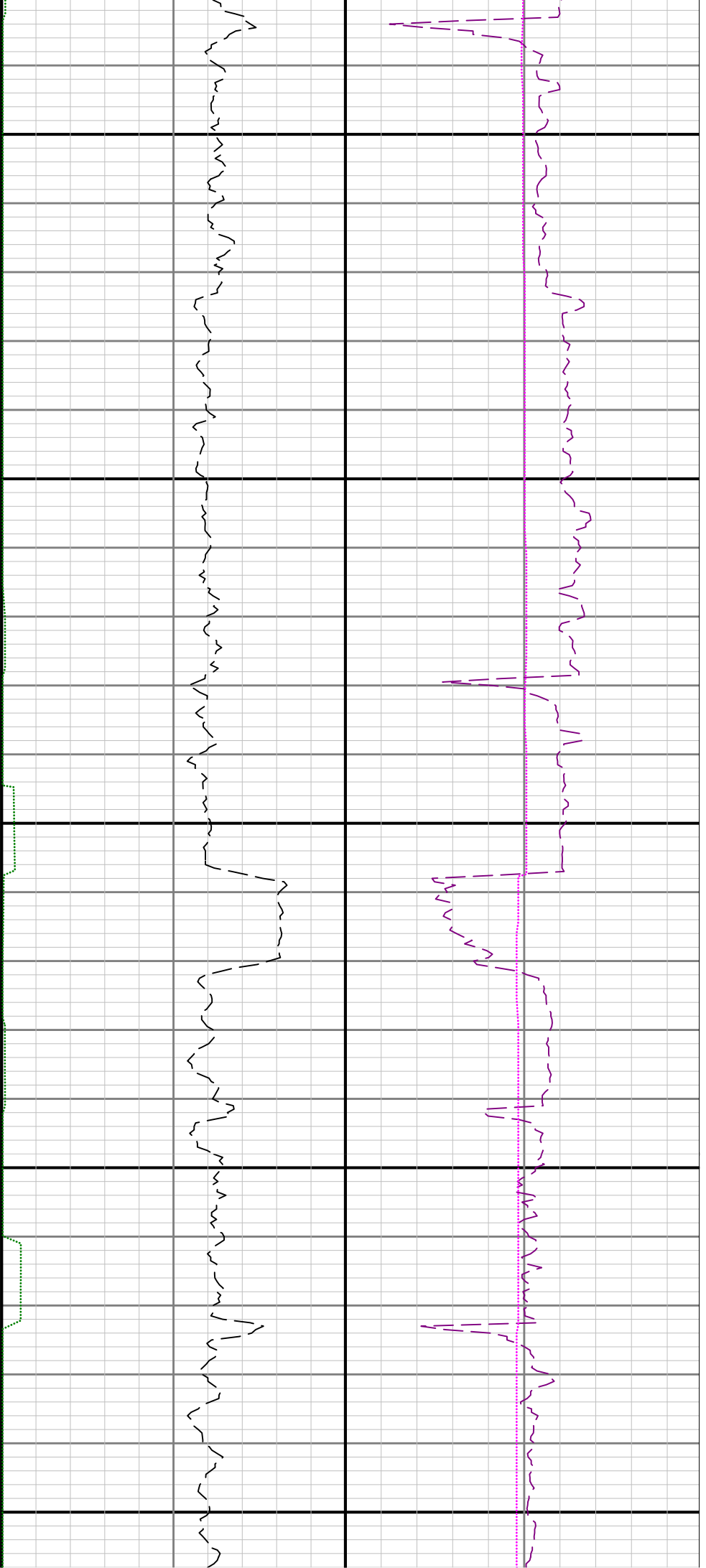




7400

7500

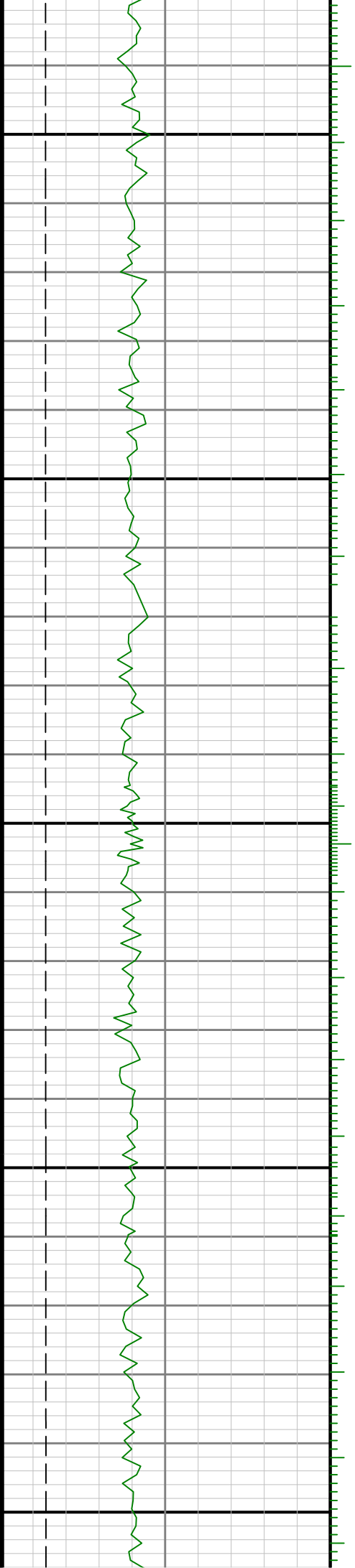


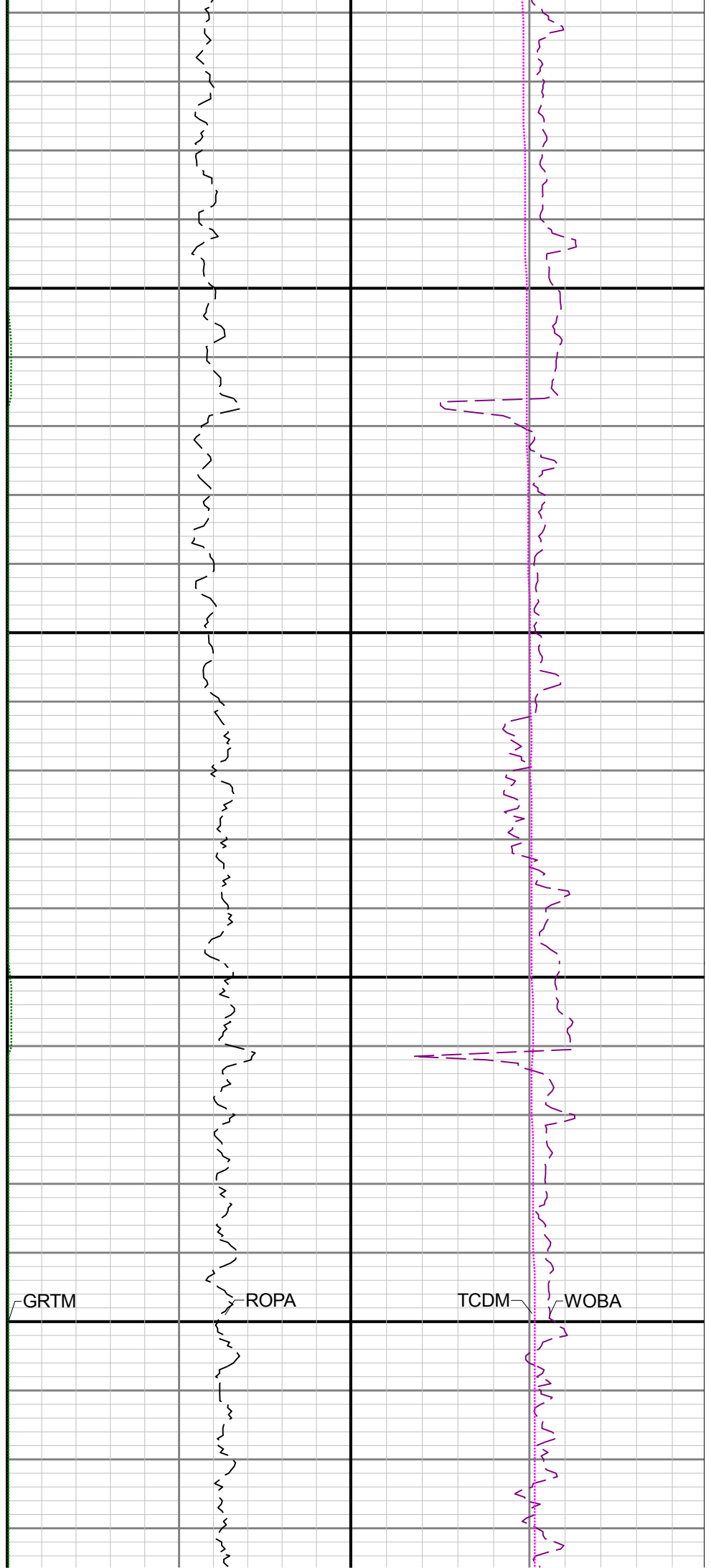
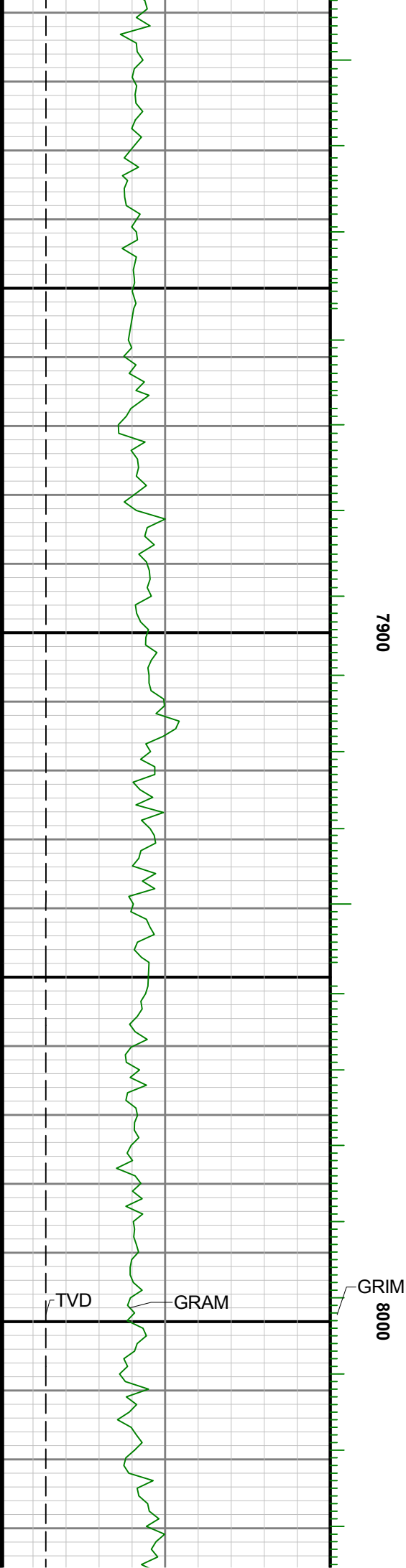


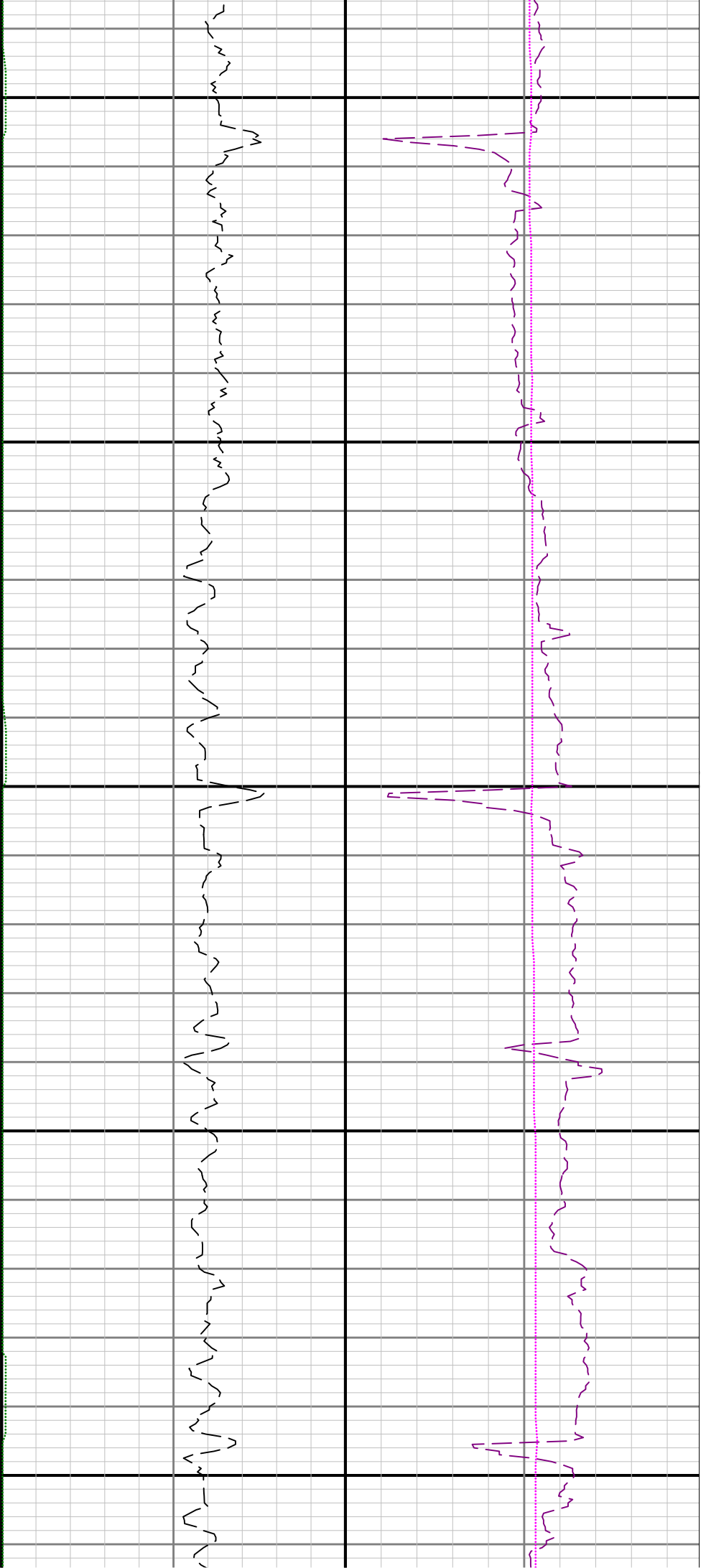
7600

7700

7800

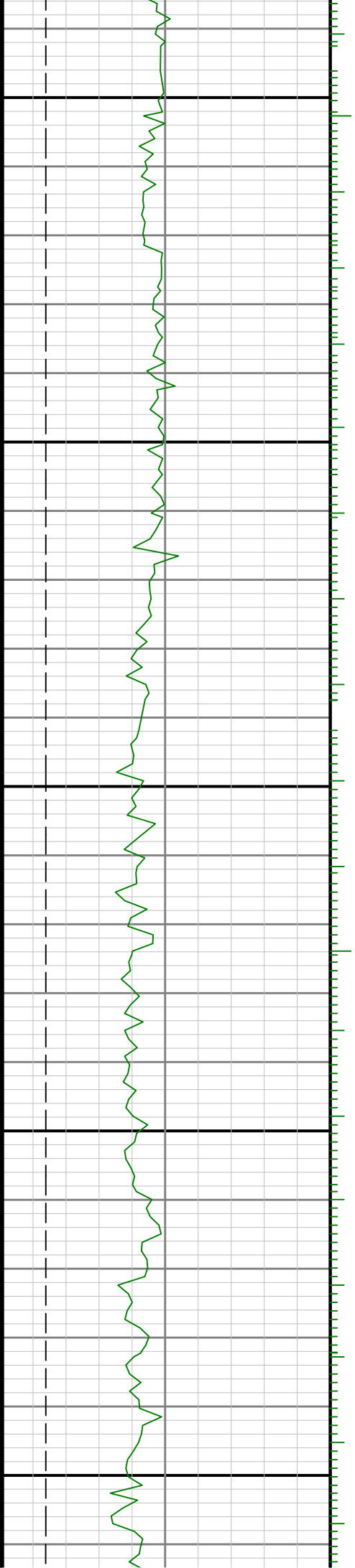






8100

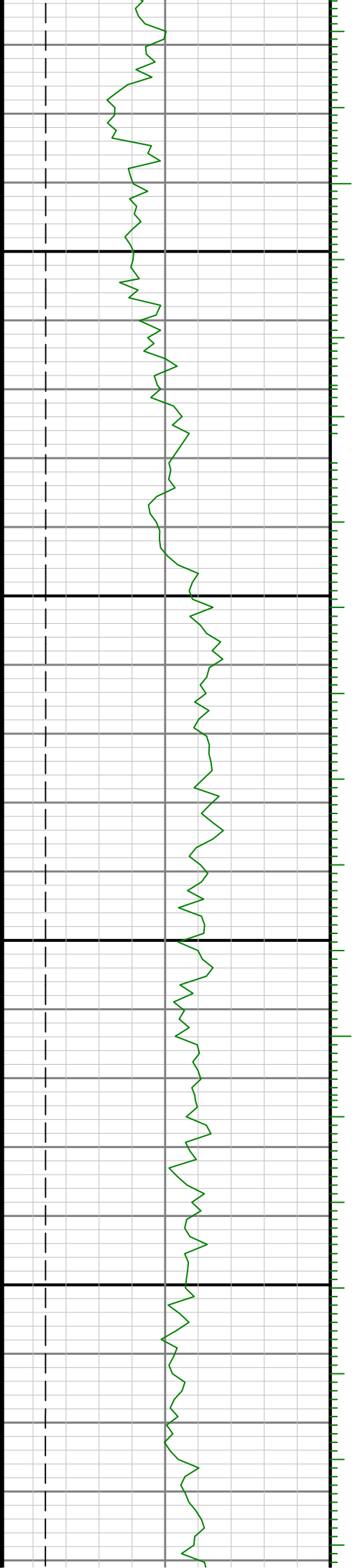
8200

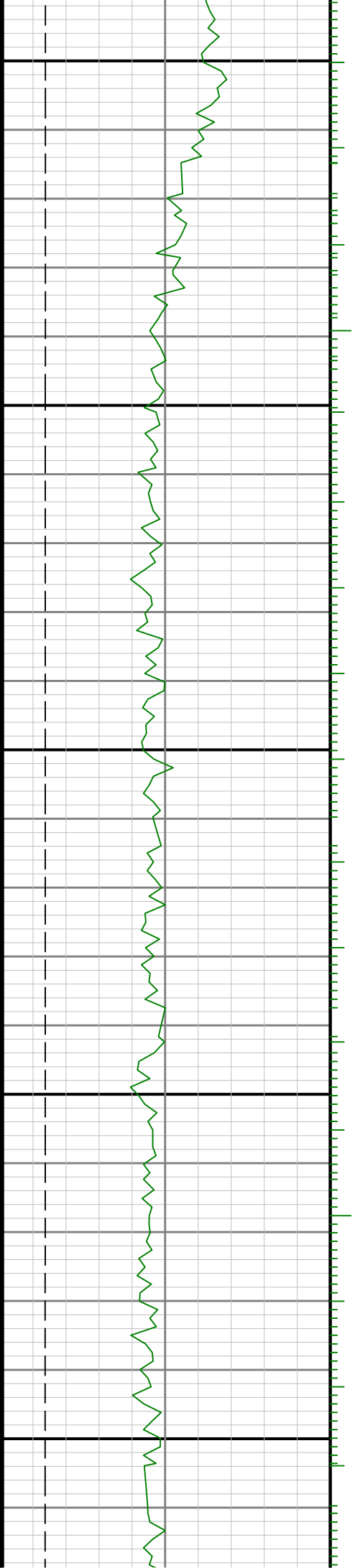




8300

8400

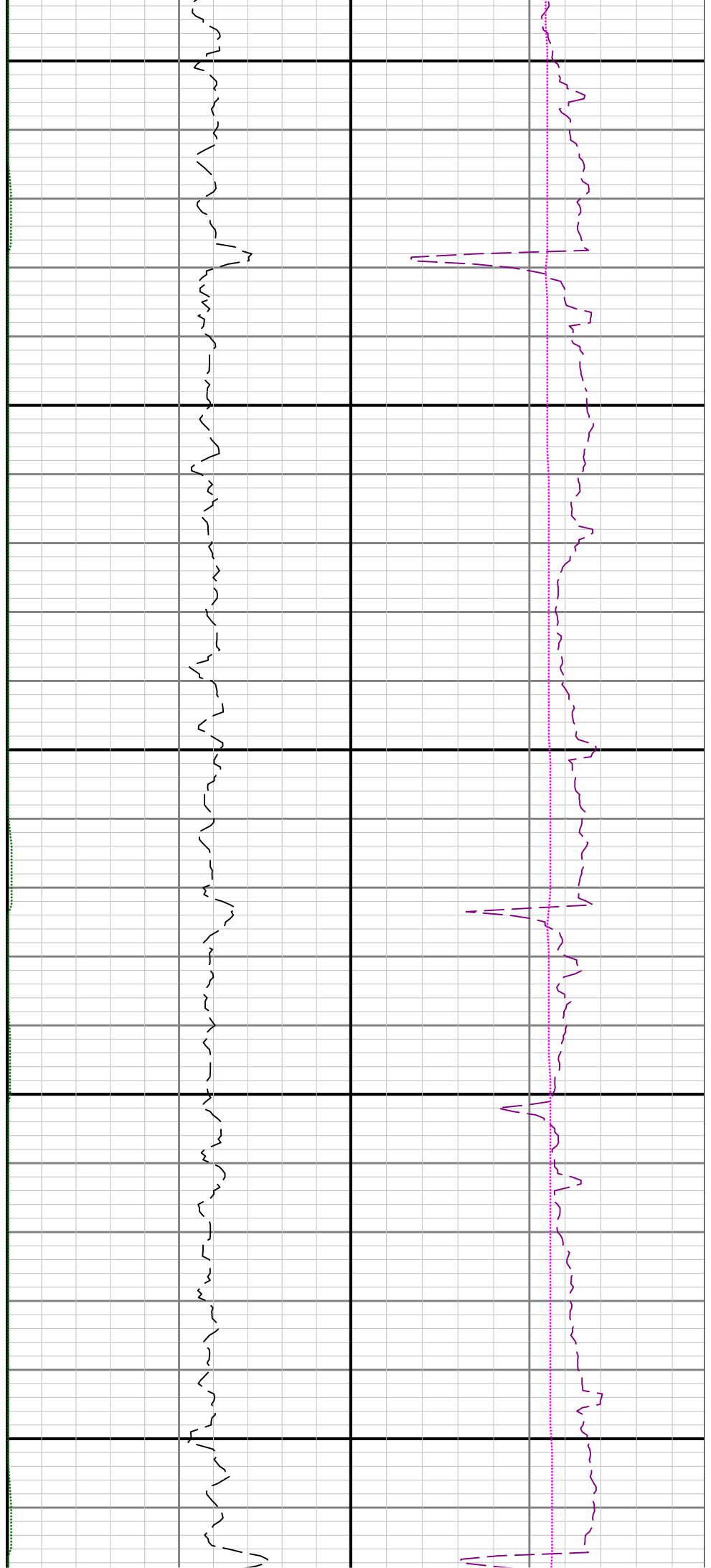


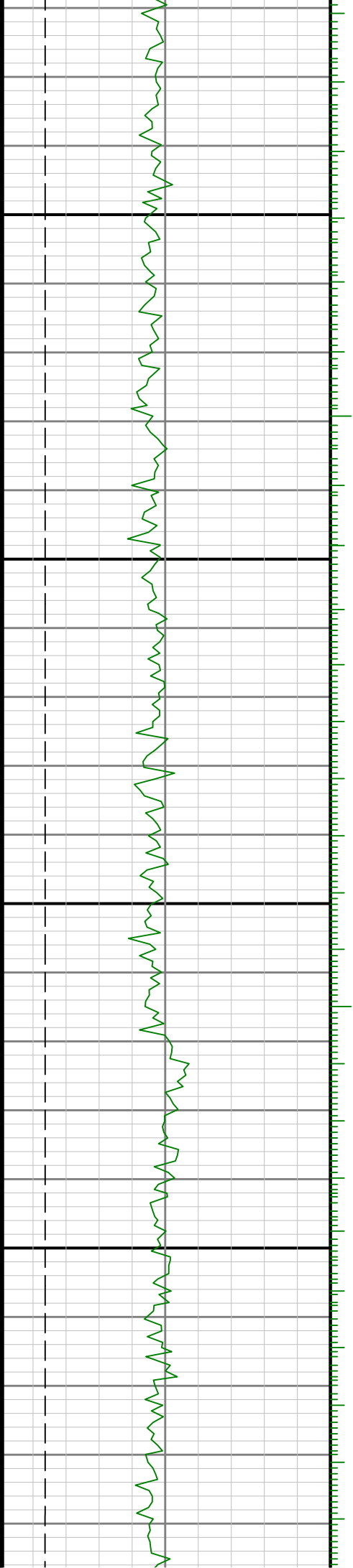


8500

8600

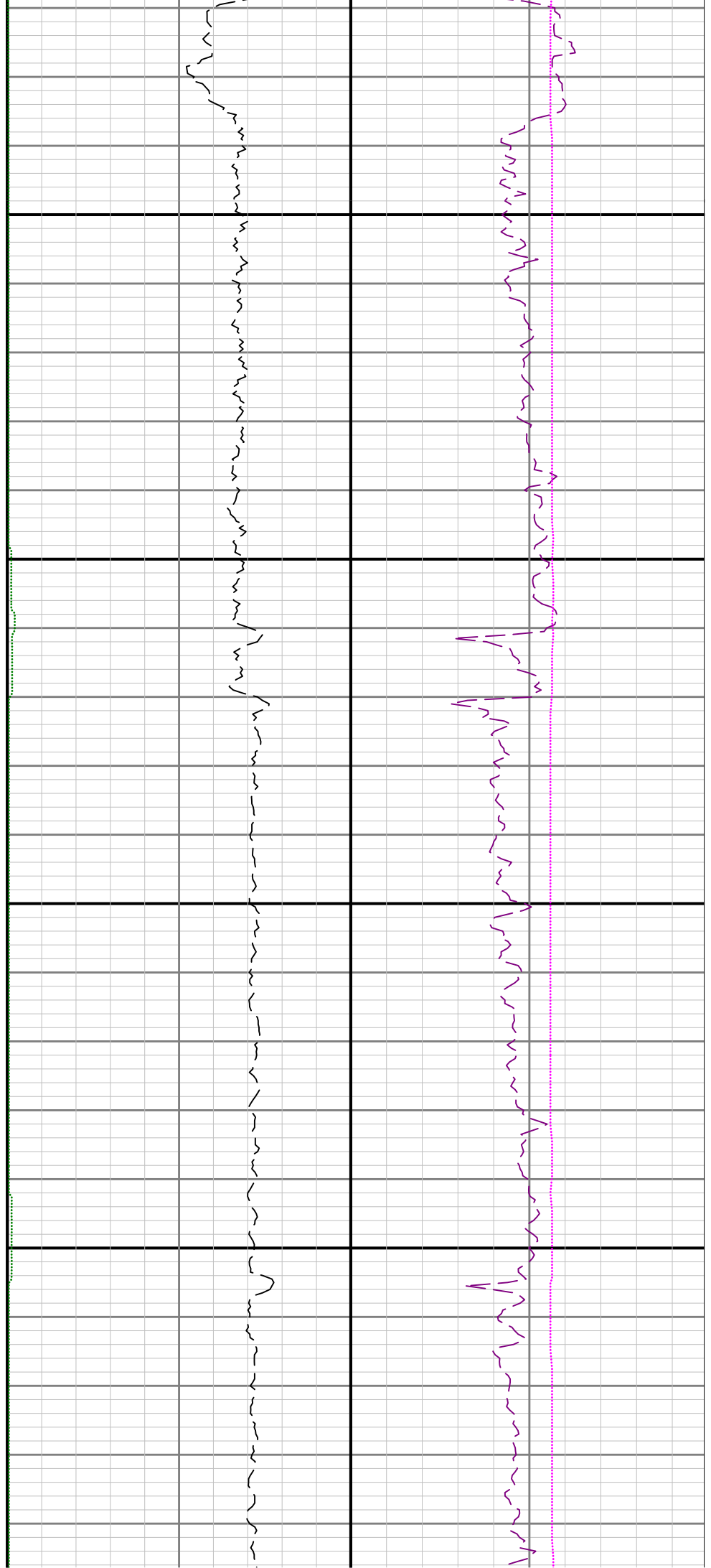
8700

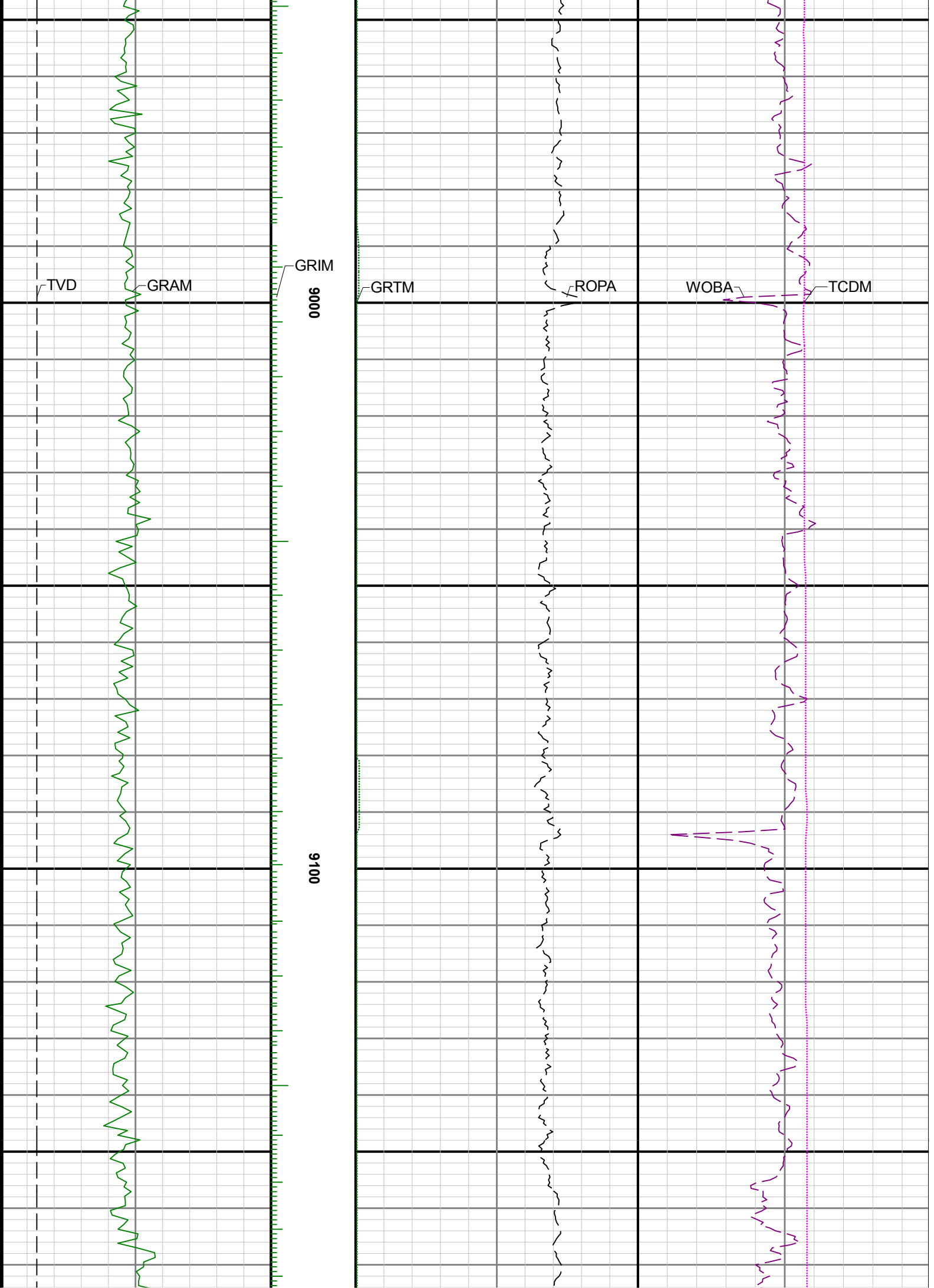


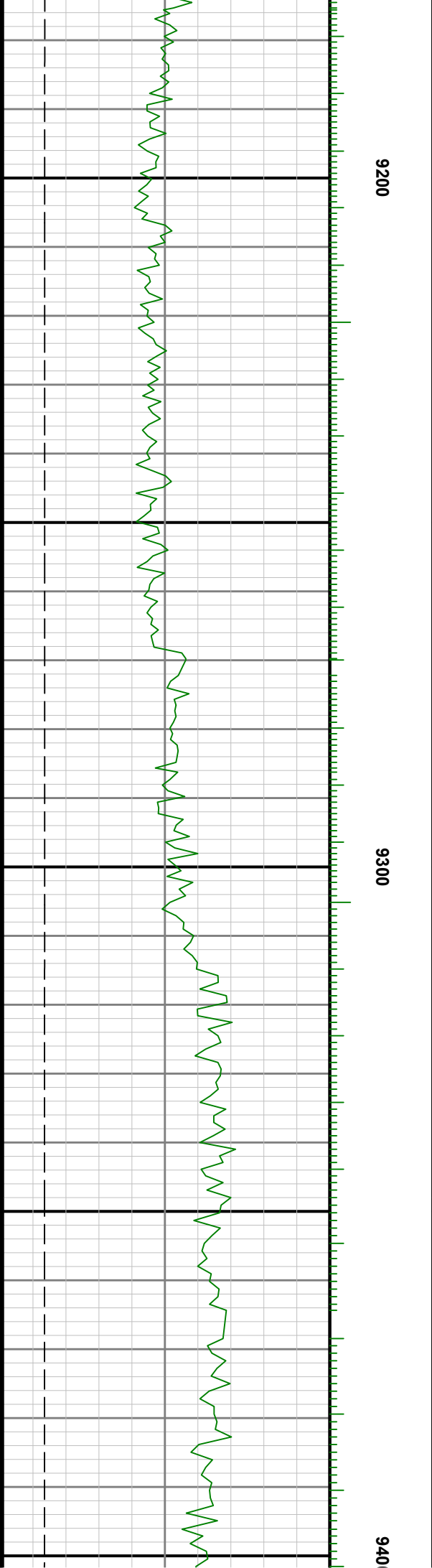
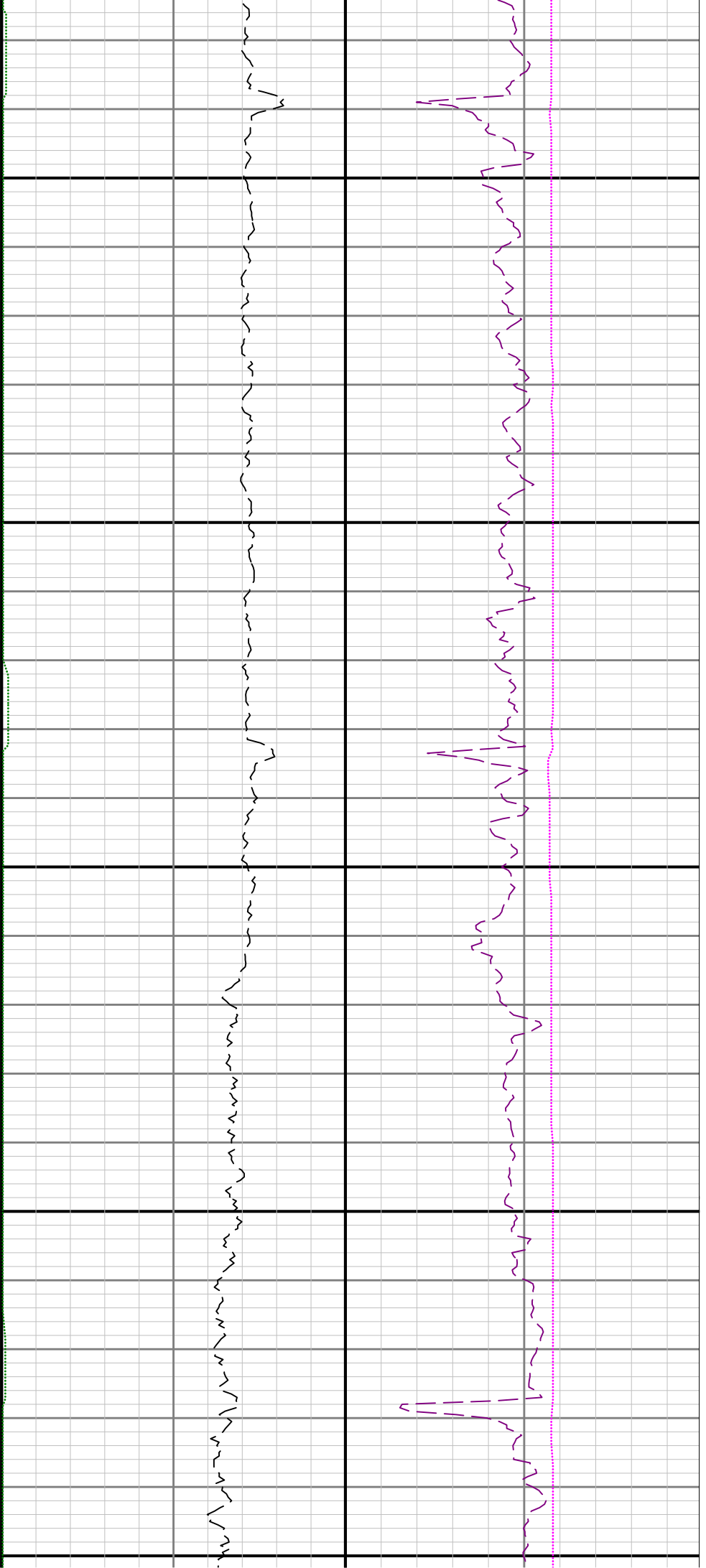


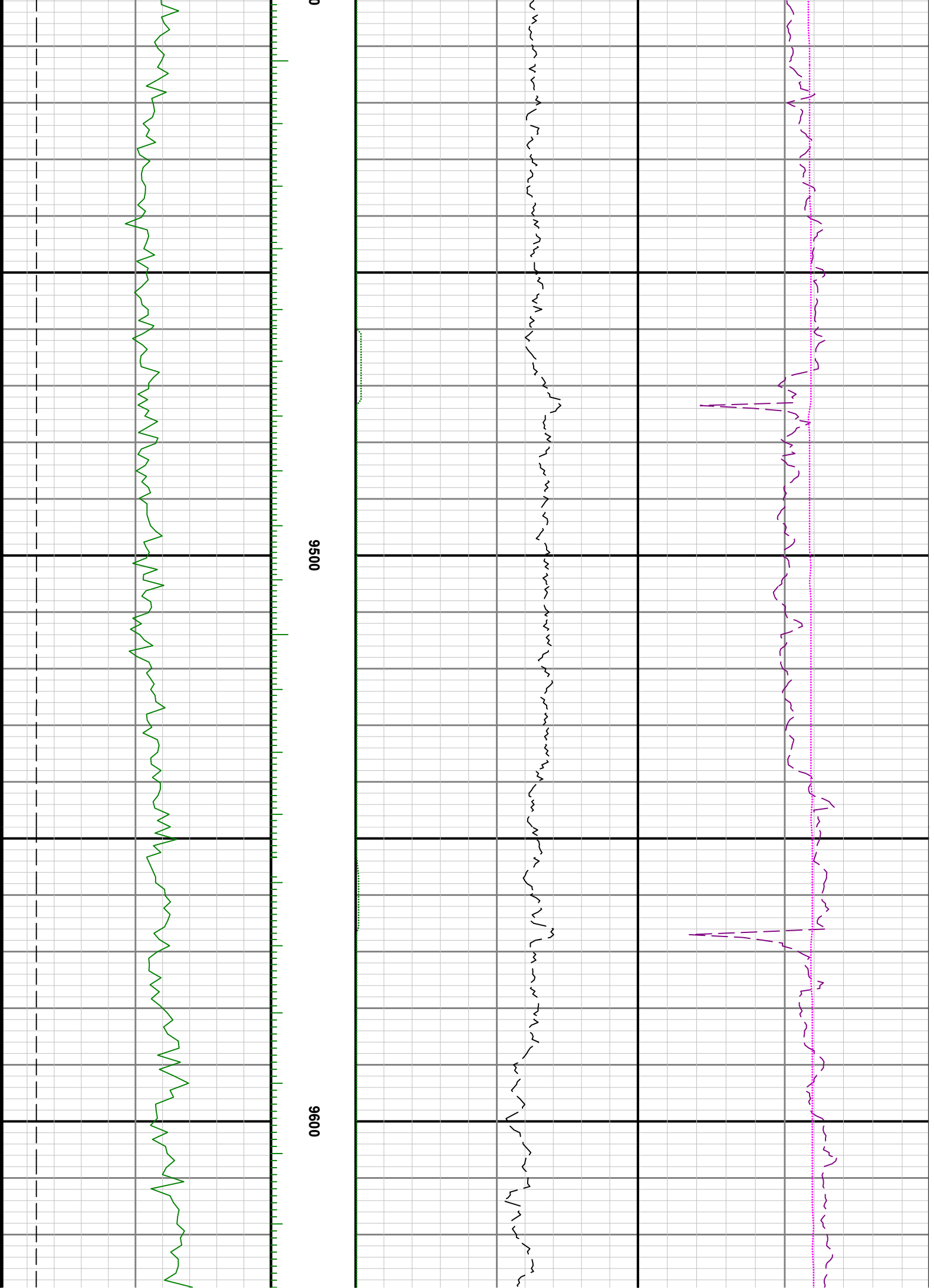
0080

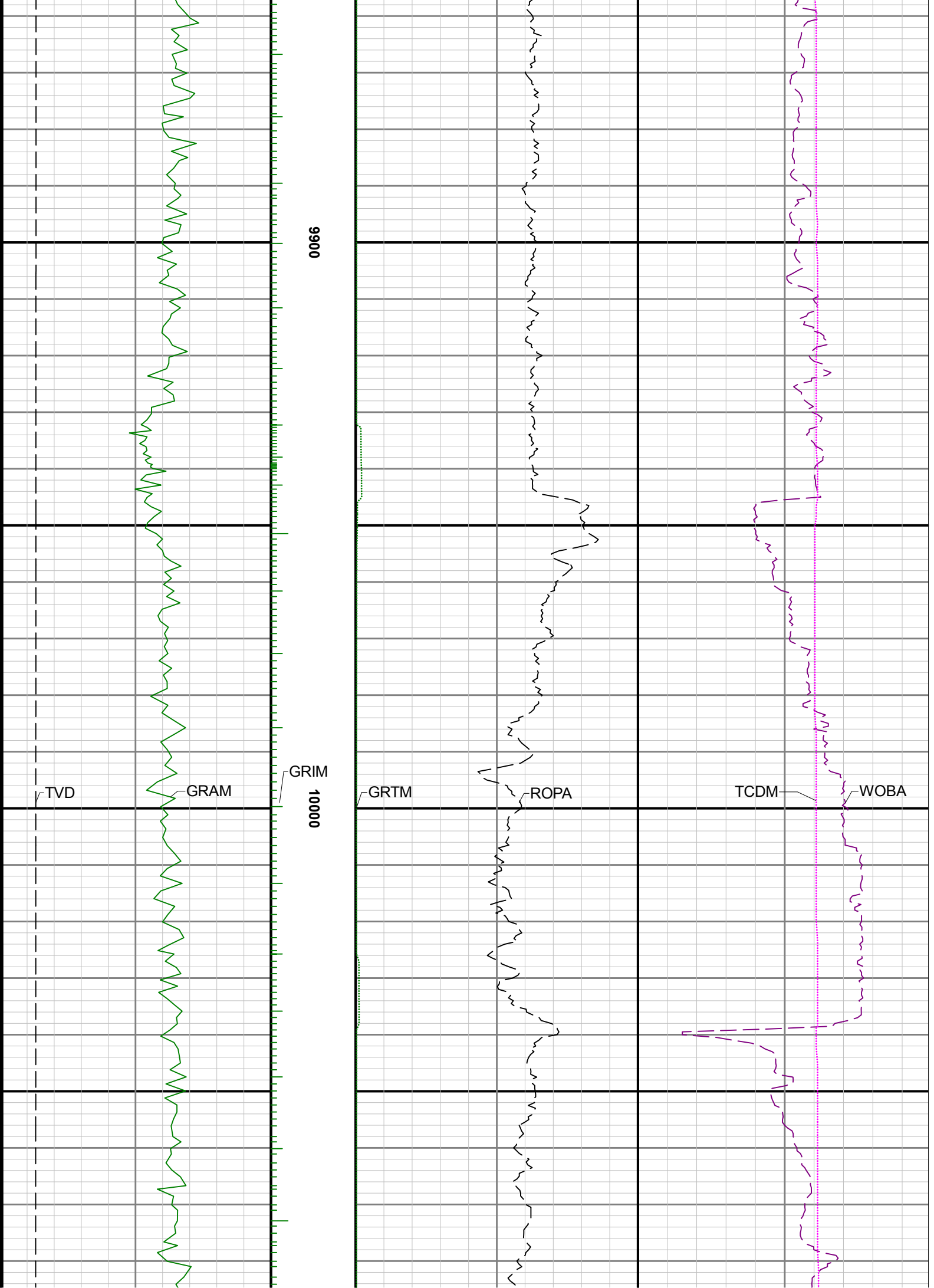
0068

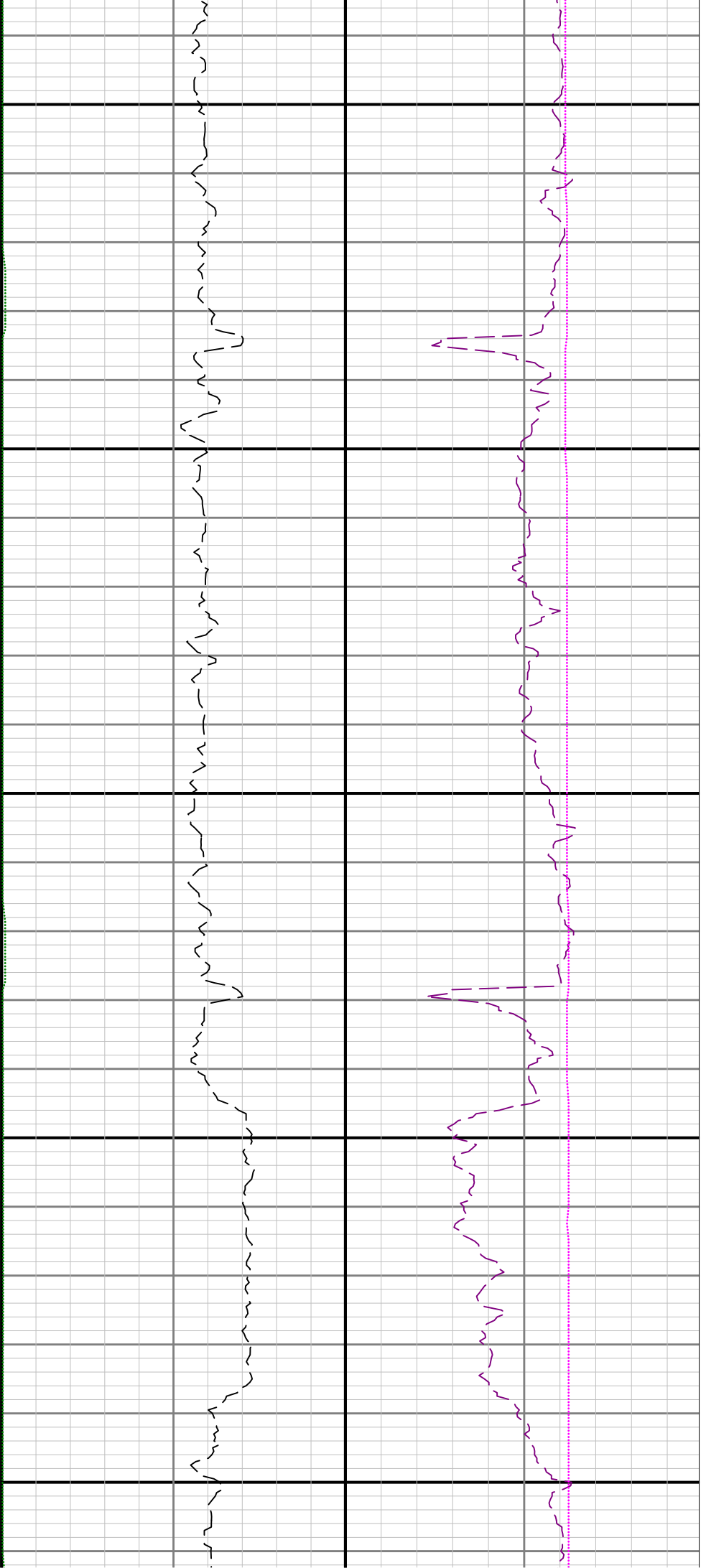








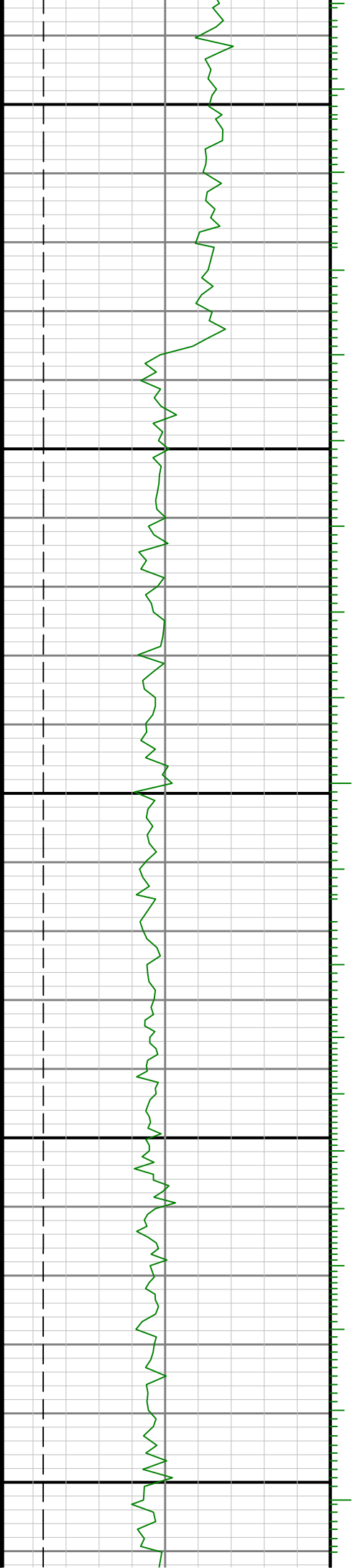




10100

10200

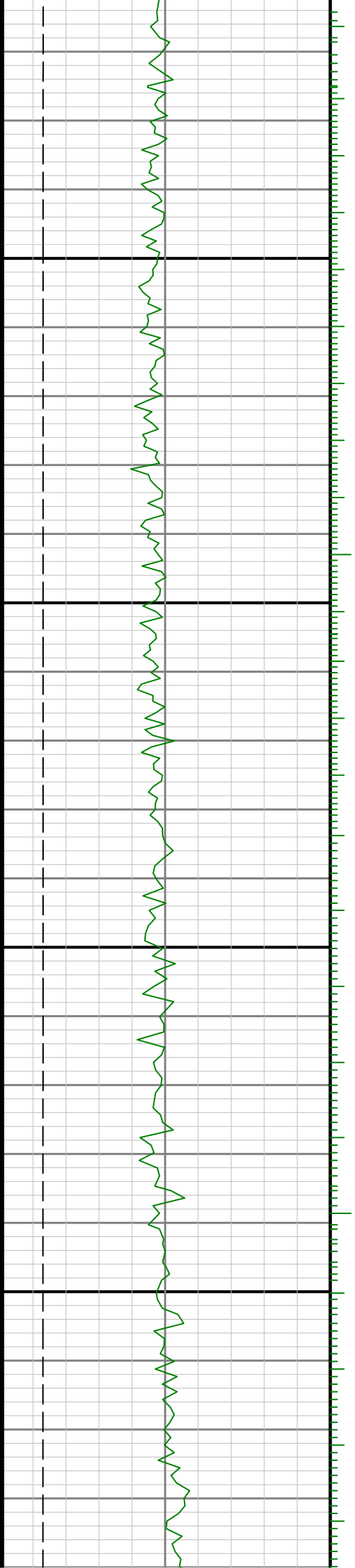
10300

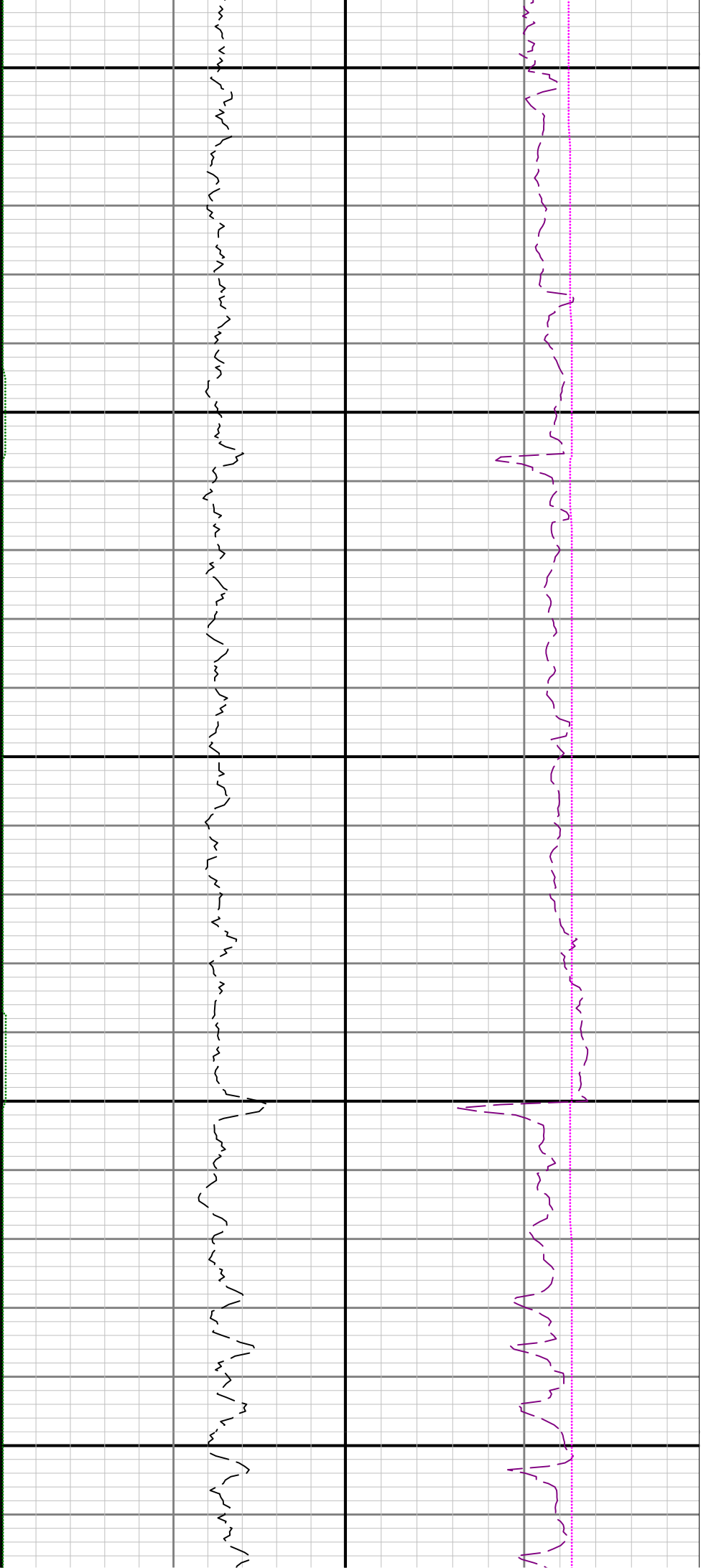




10400

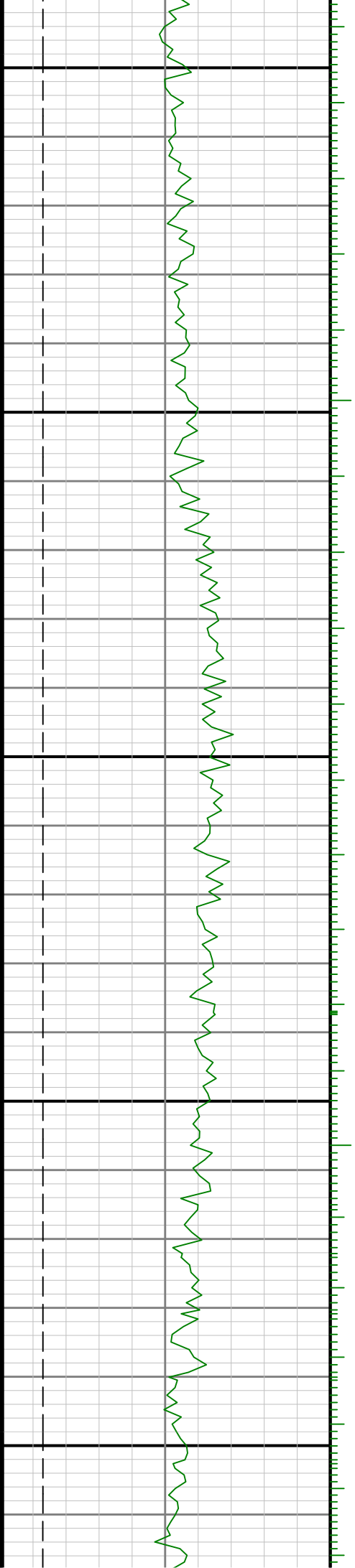
10500

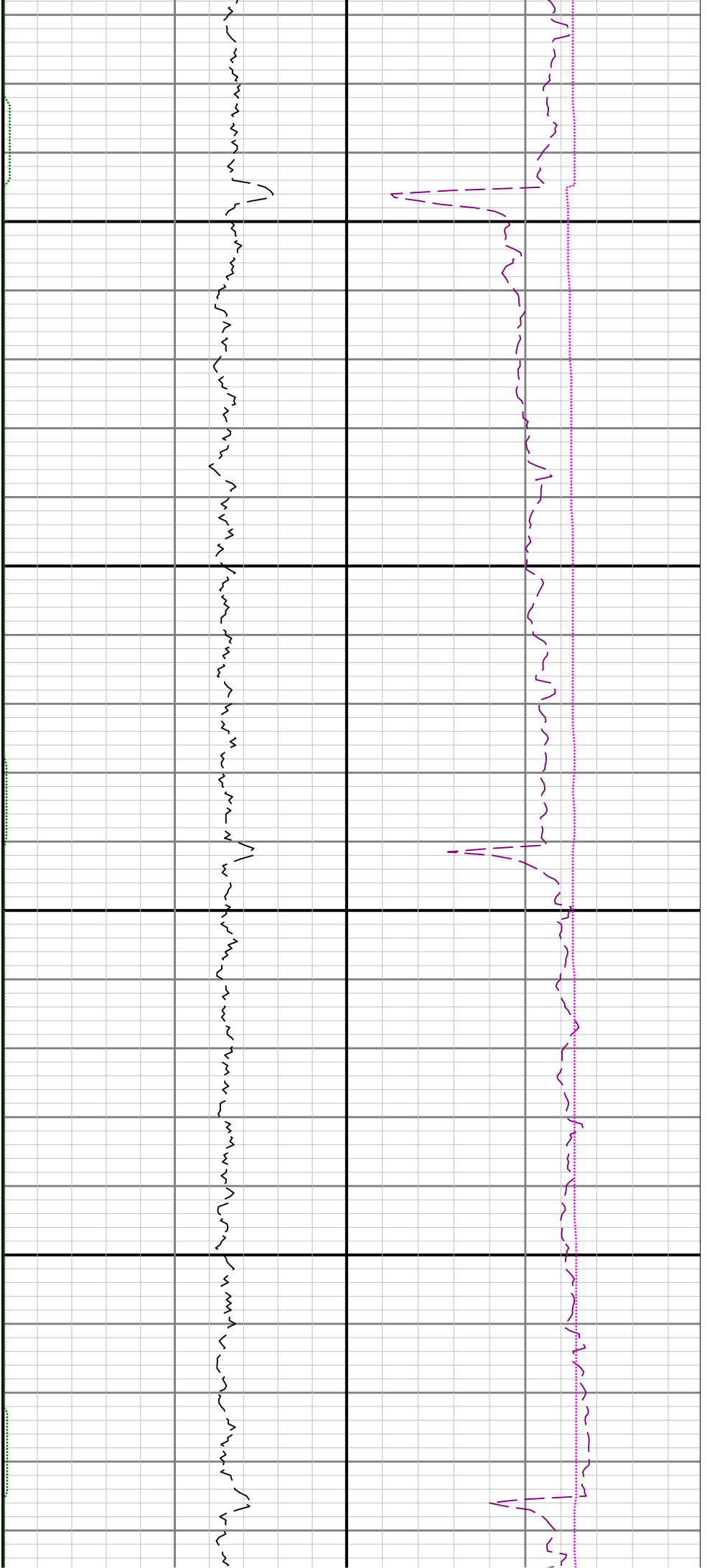




10600

10700

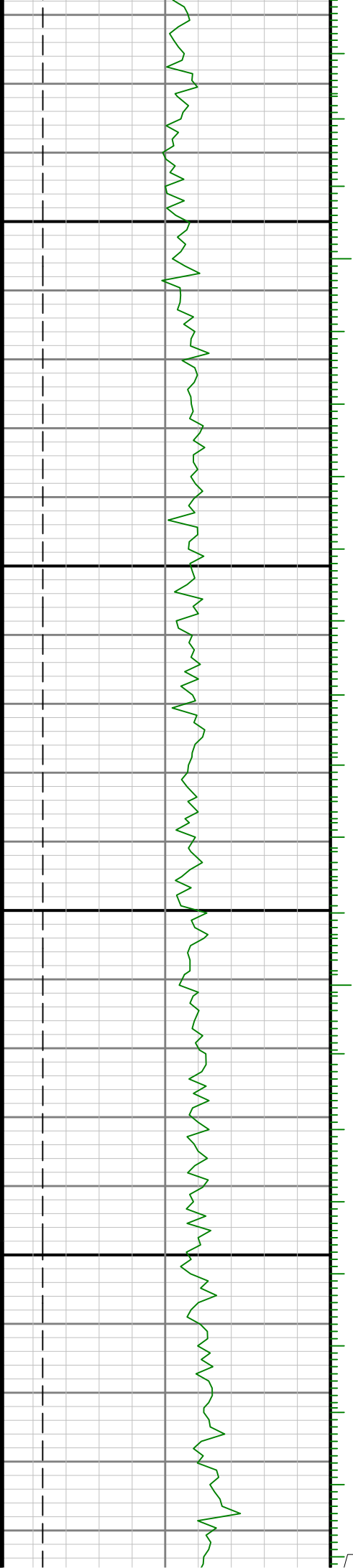


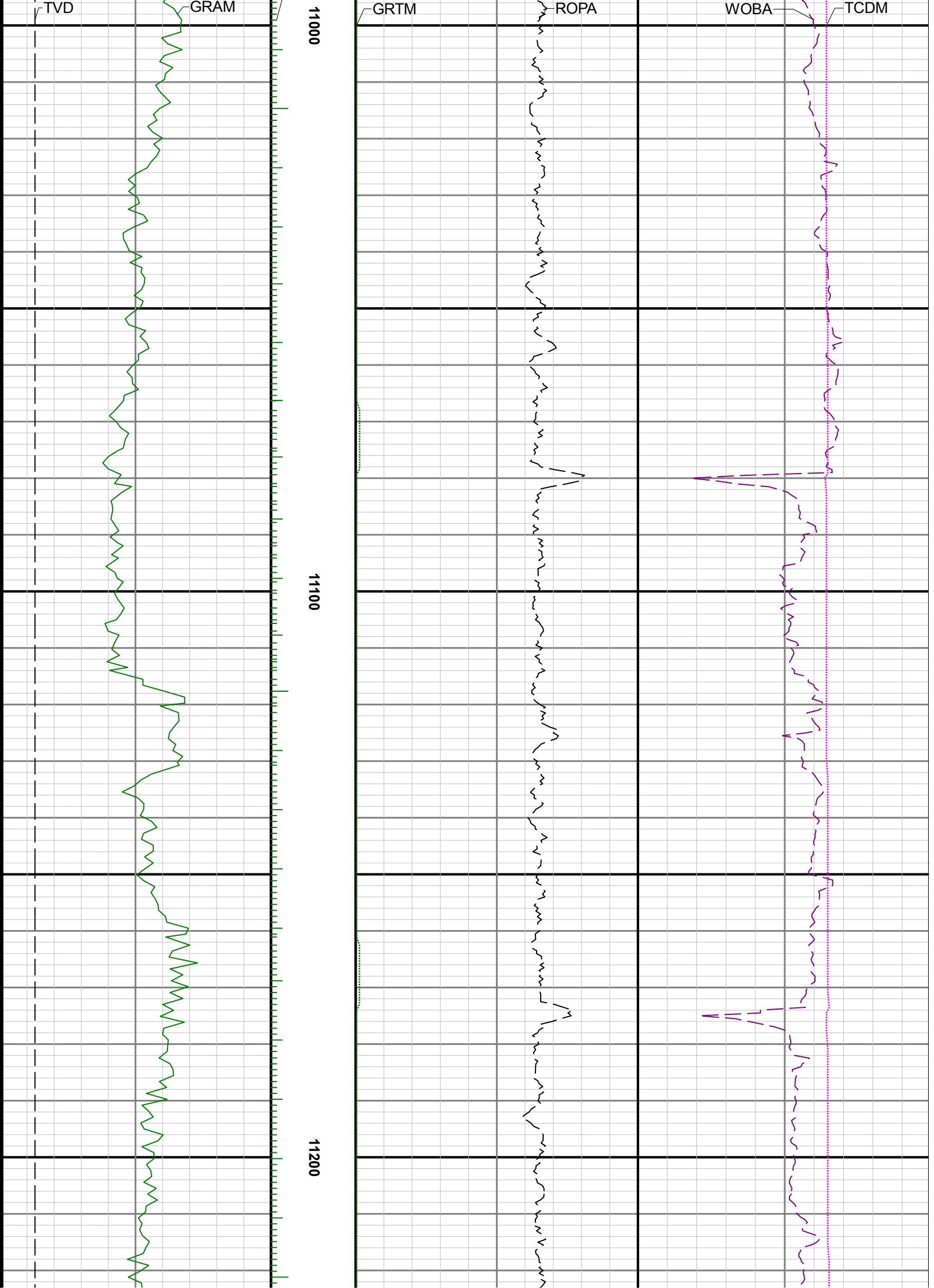


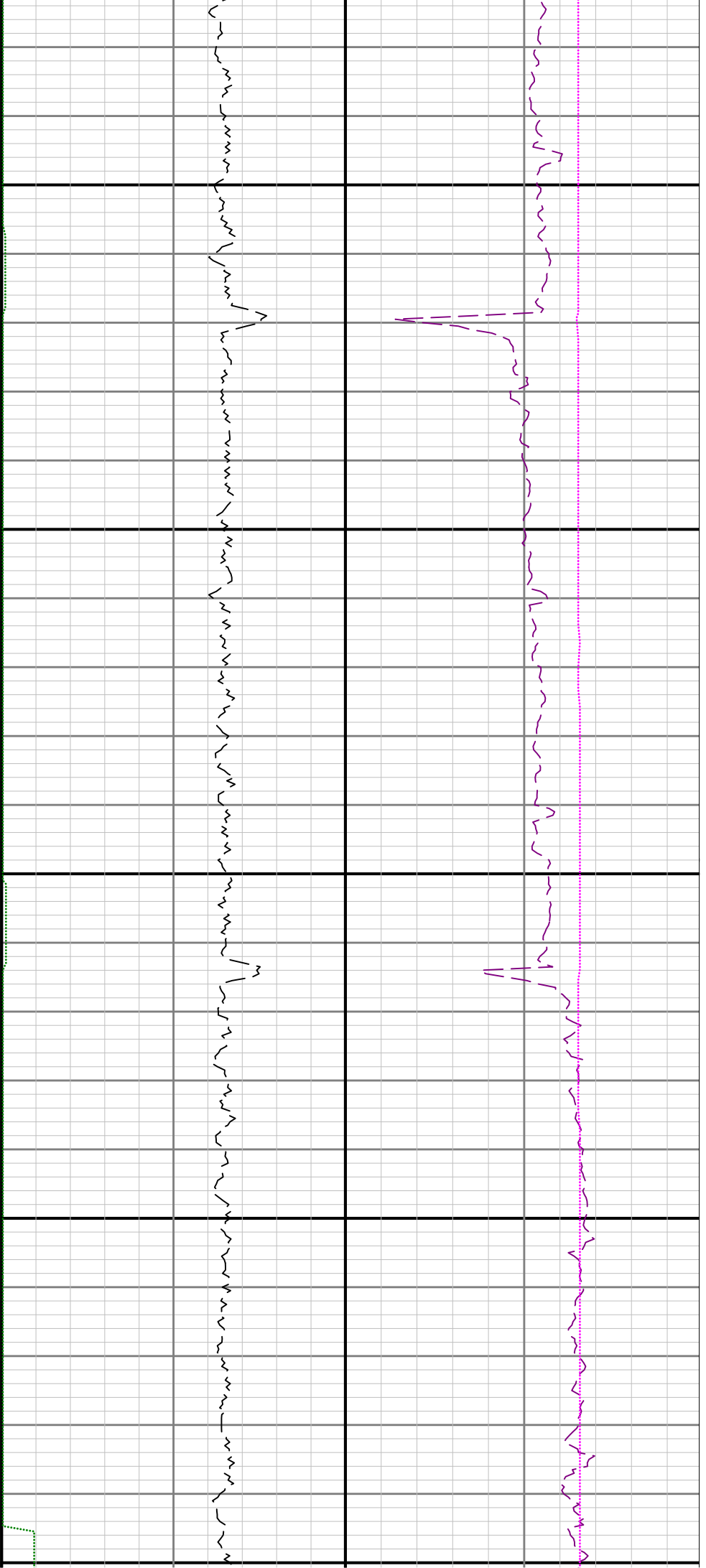
10800

10900

GRIM

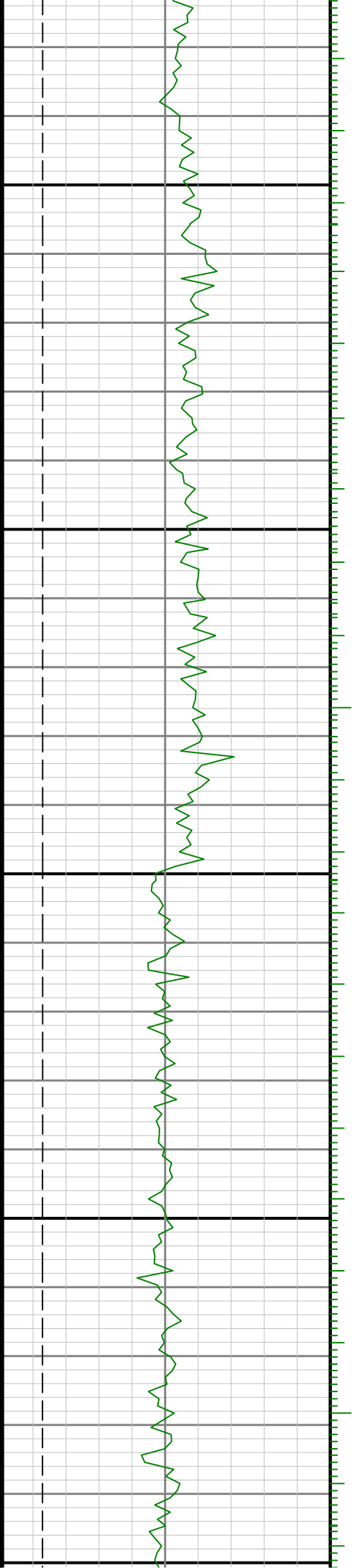


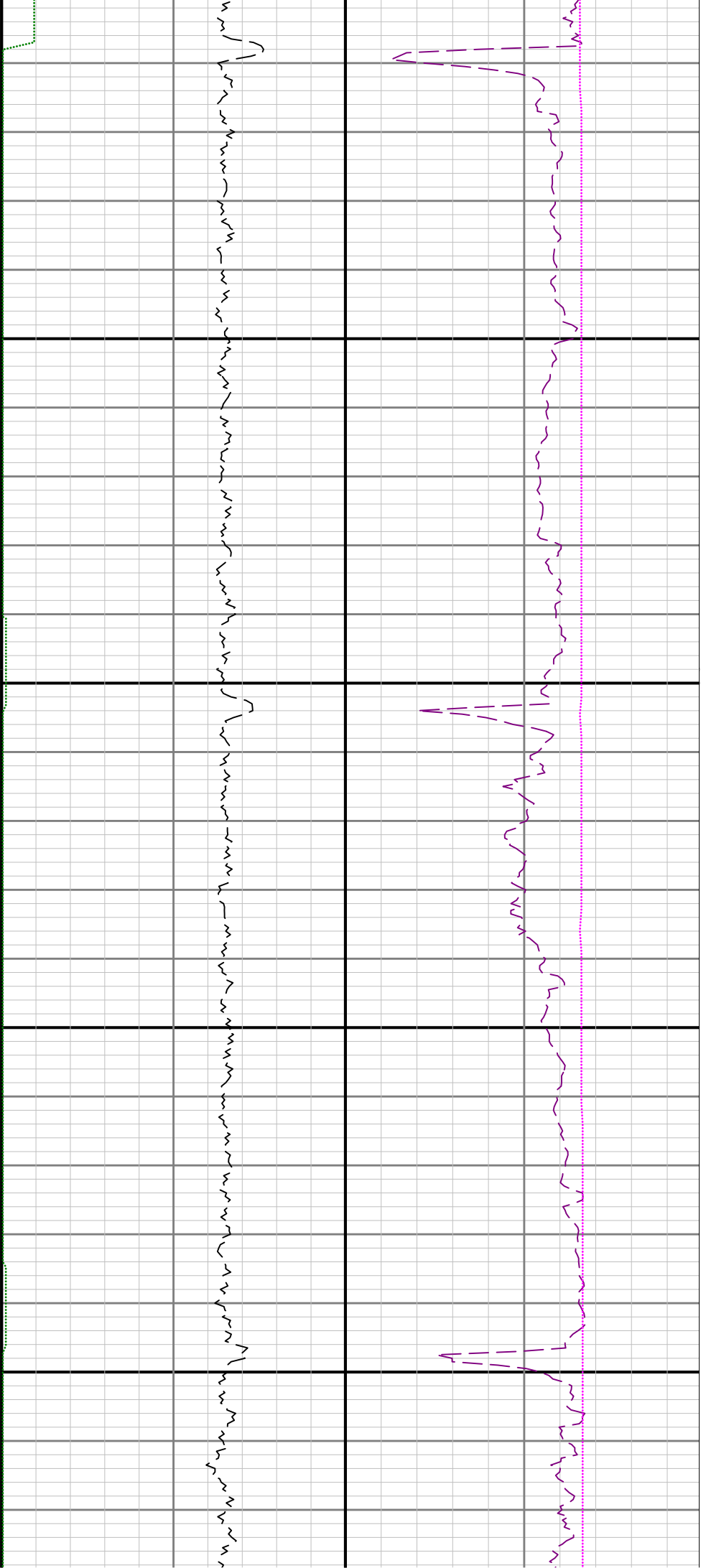




11300

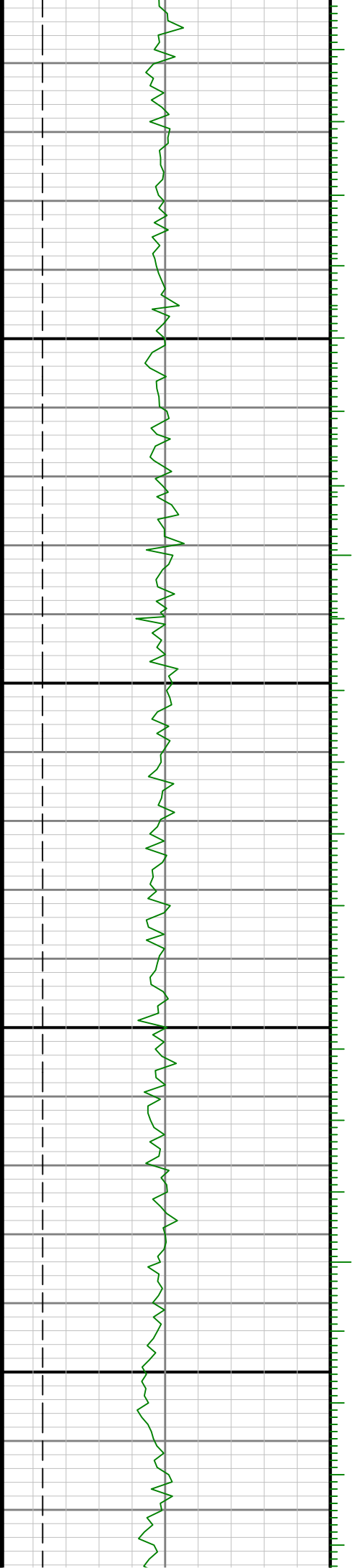
11400

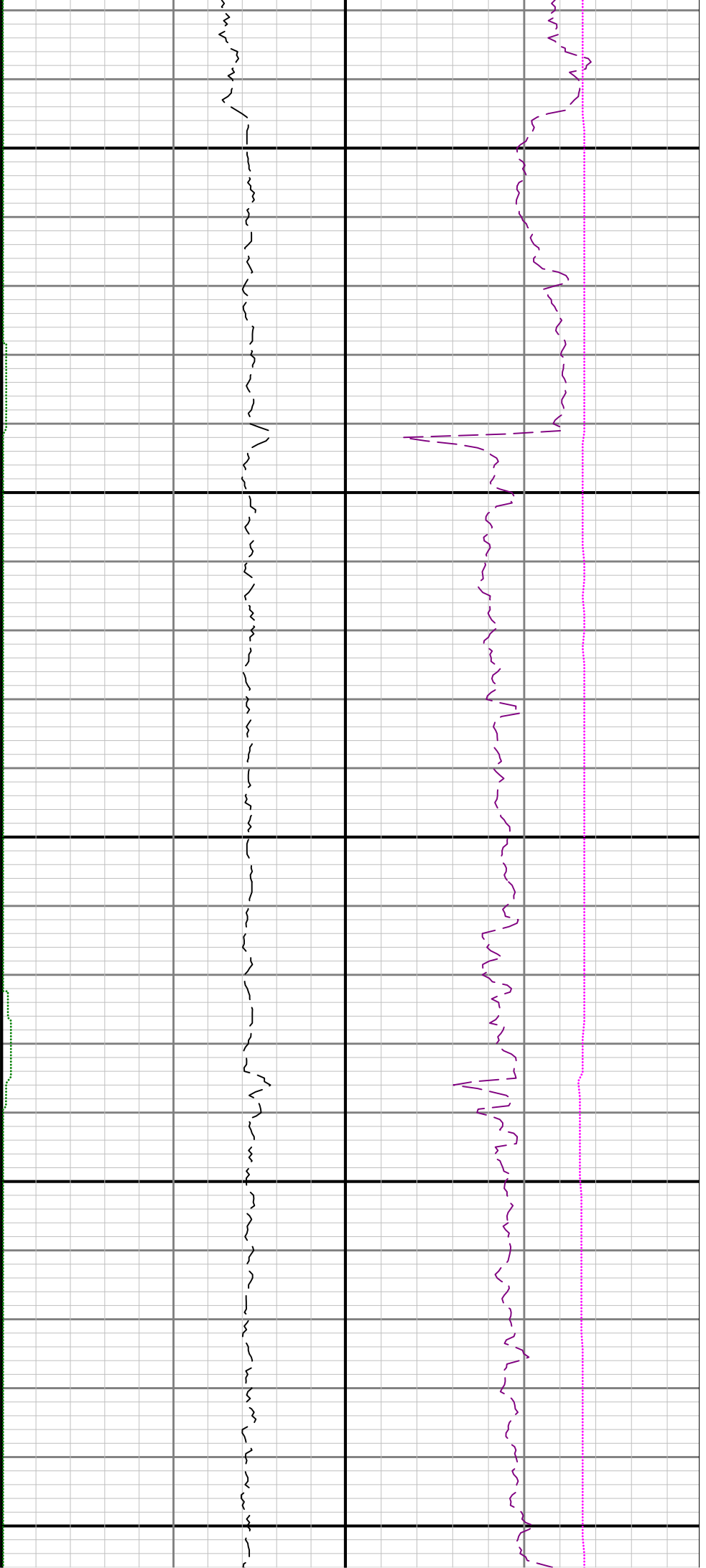




11500

11600

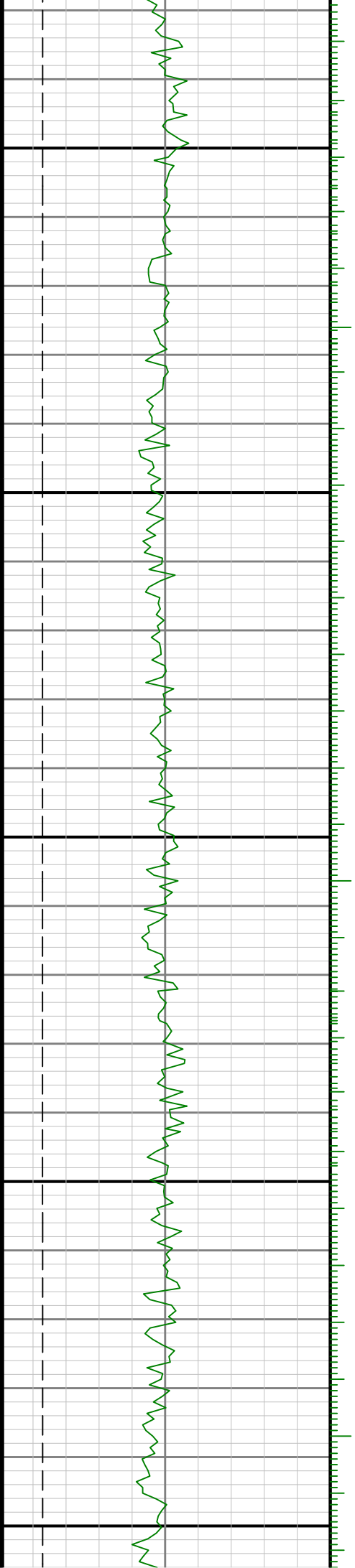


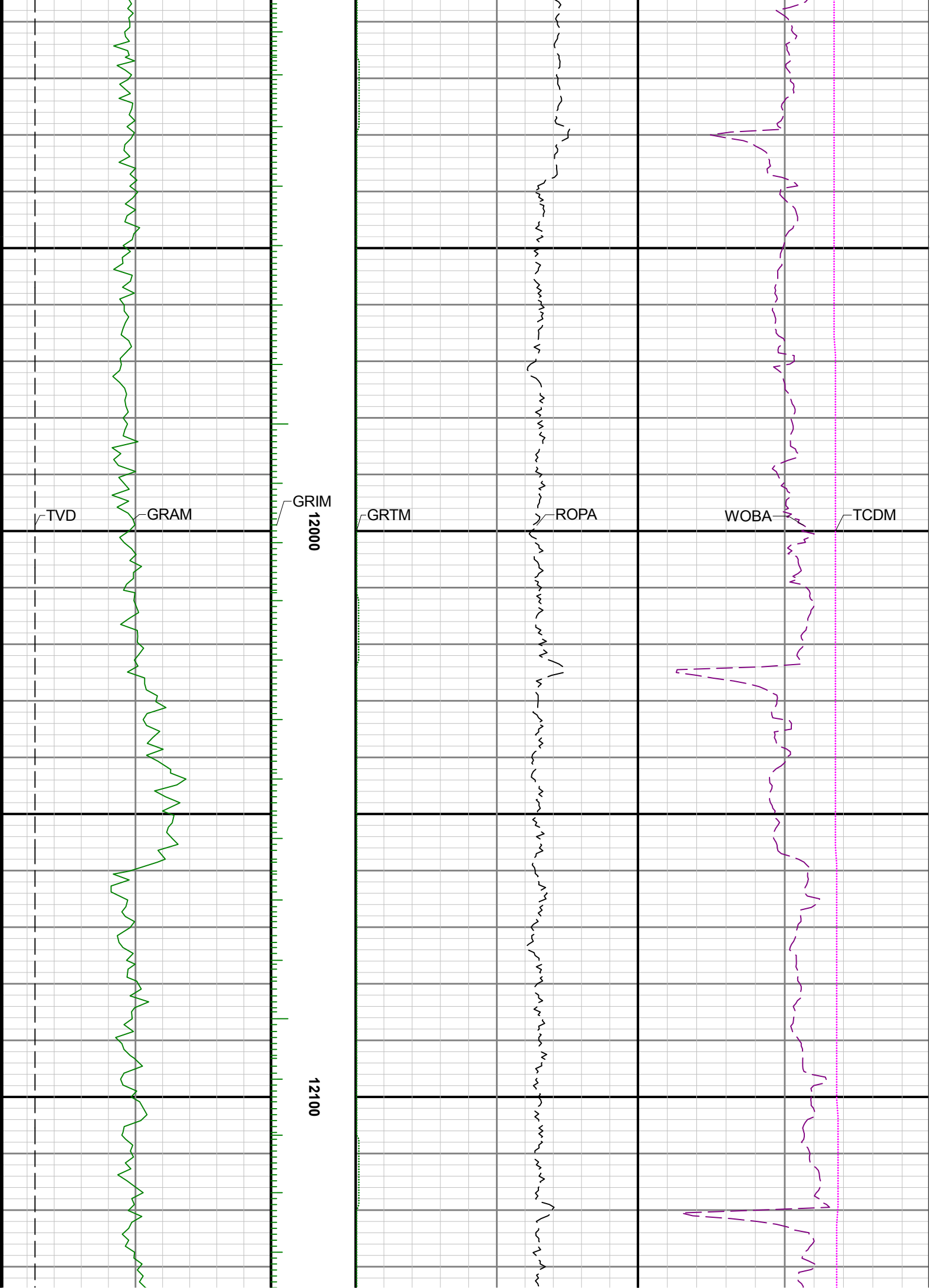


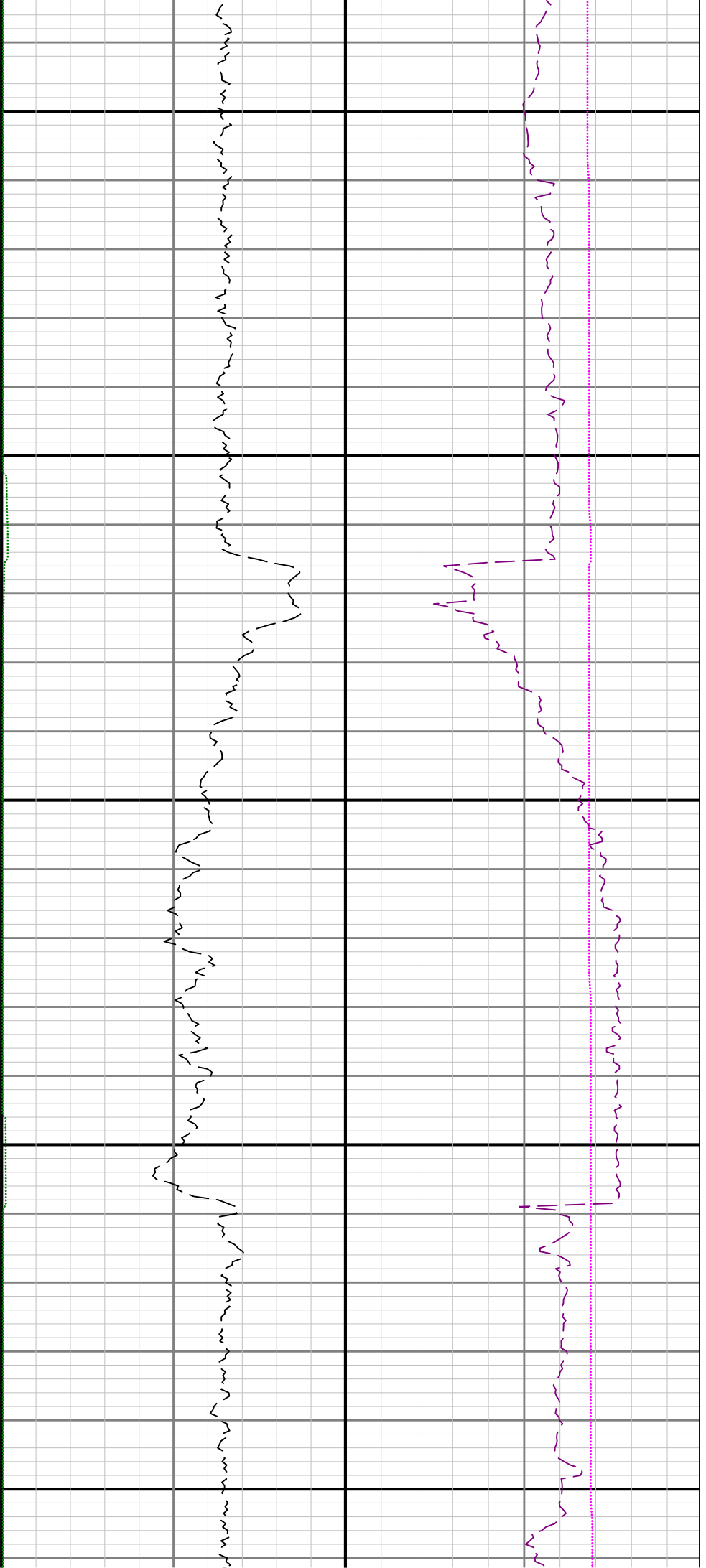
11700

11800

11900

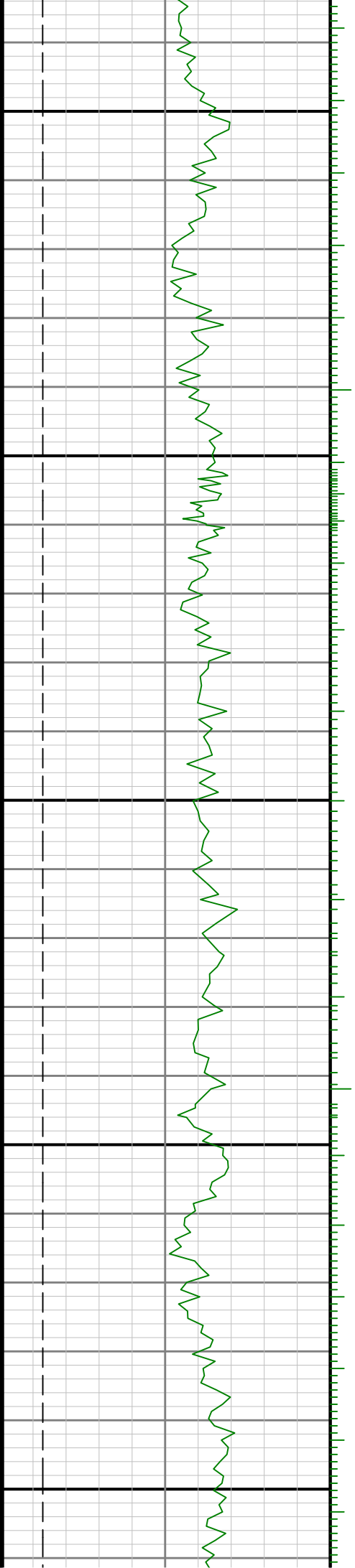






12200

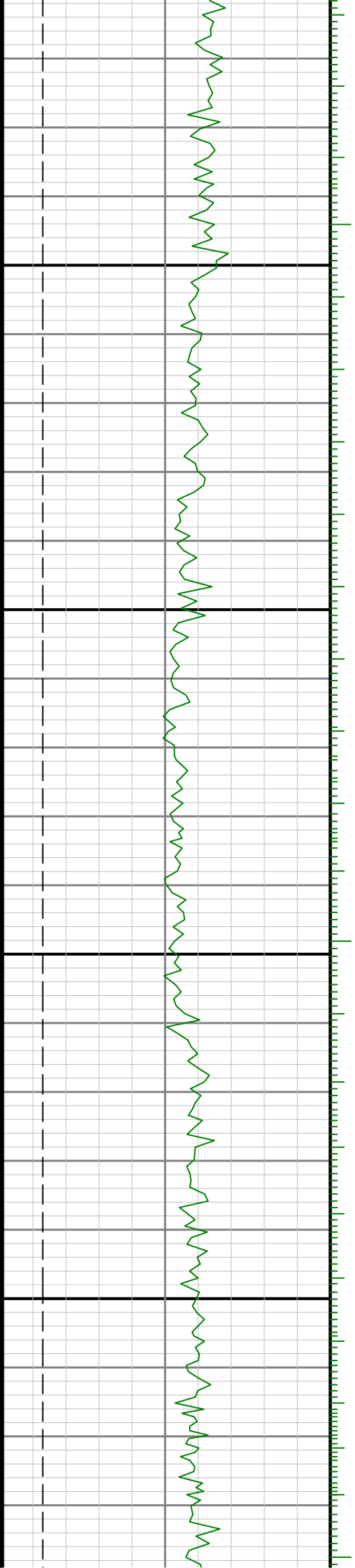
12300

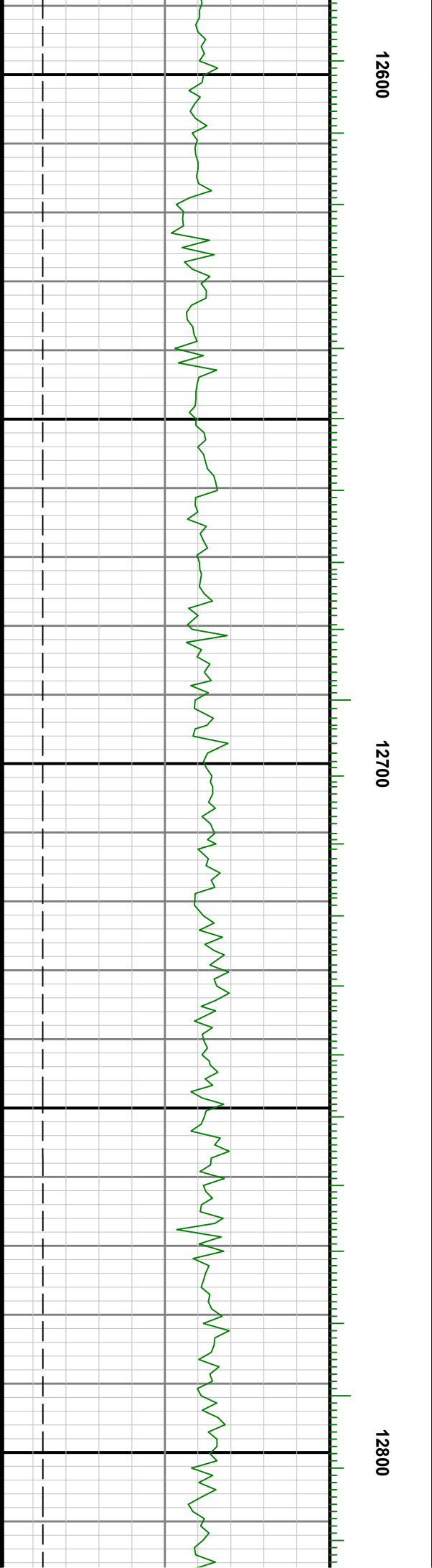
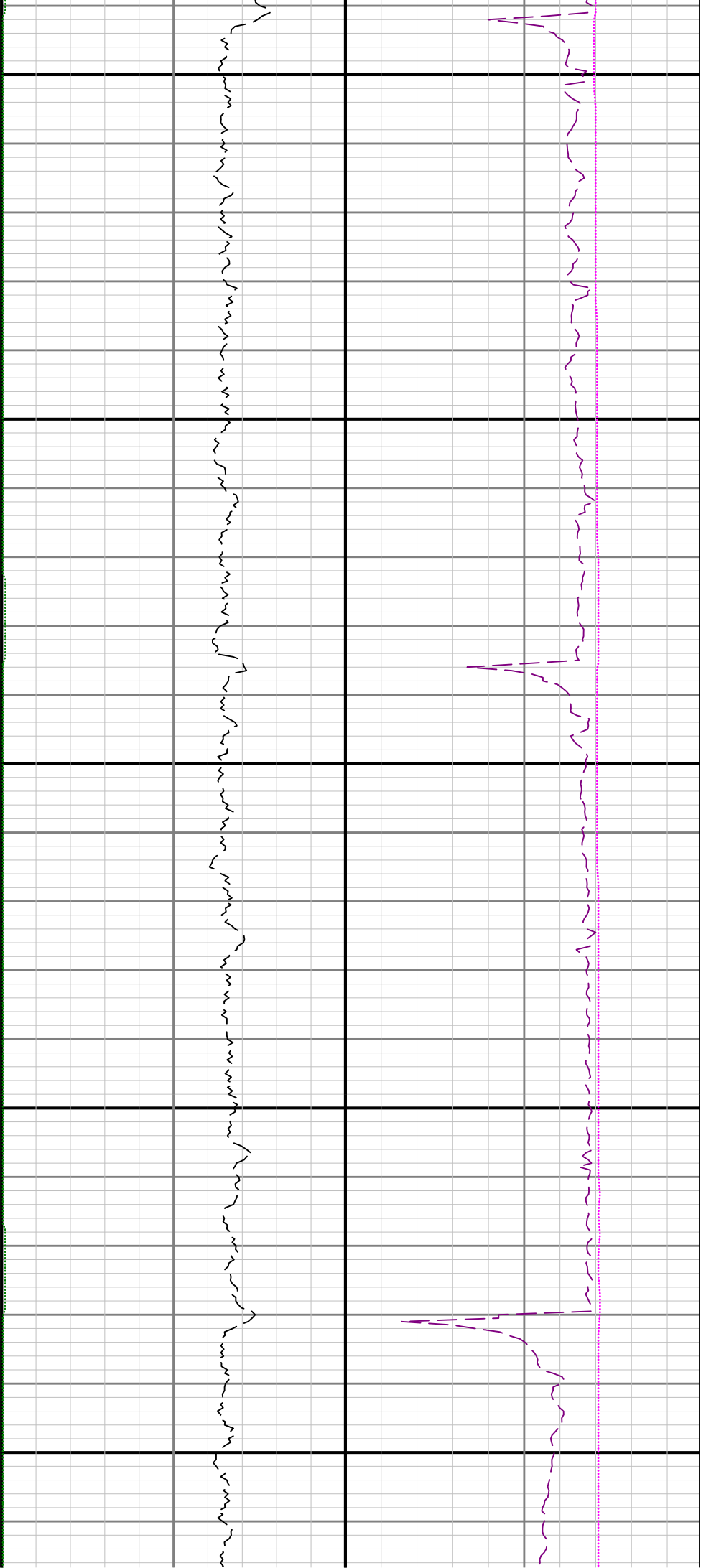


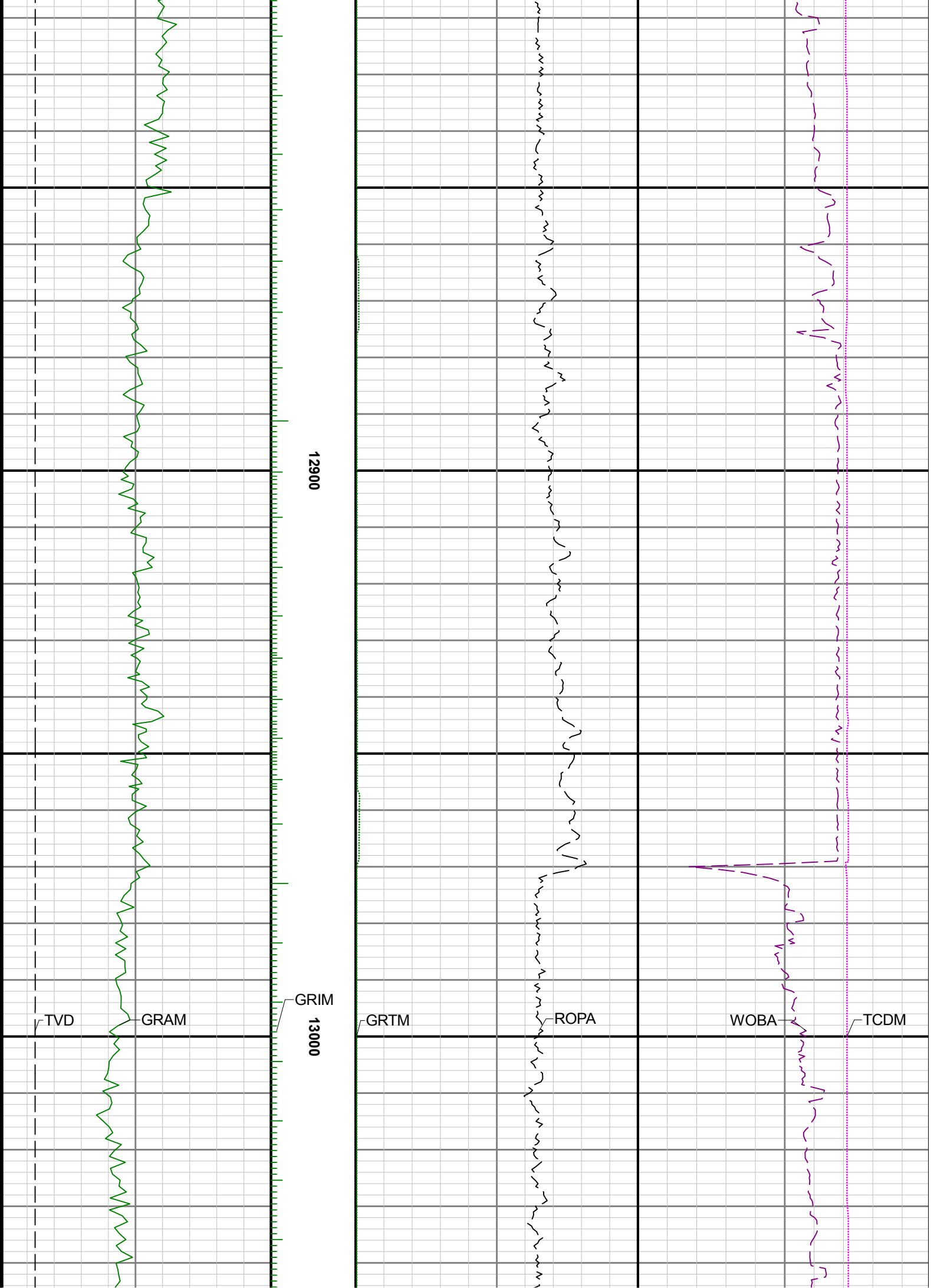


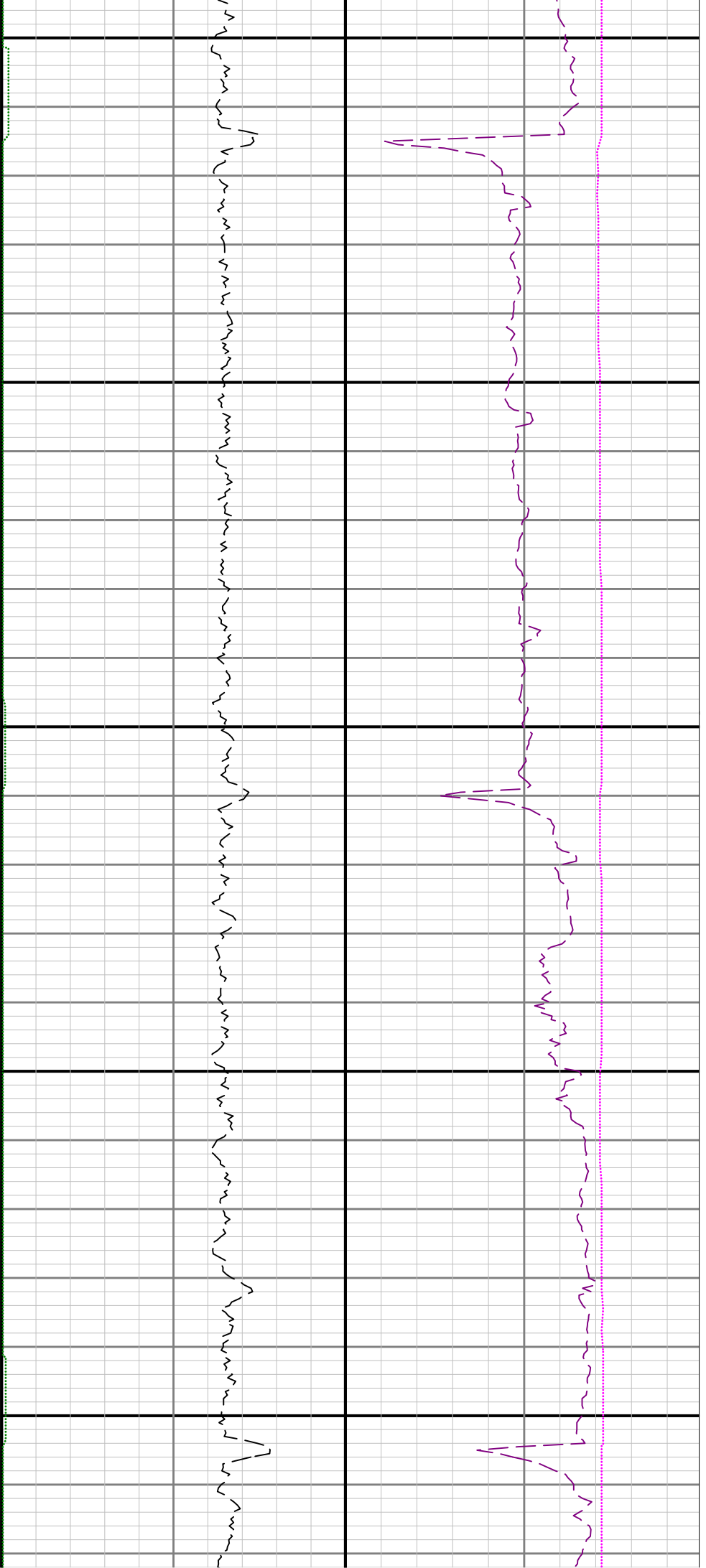
12400

12500



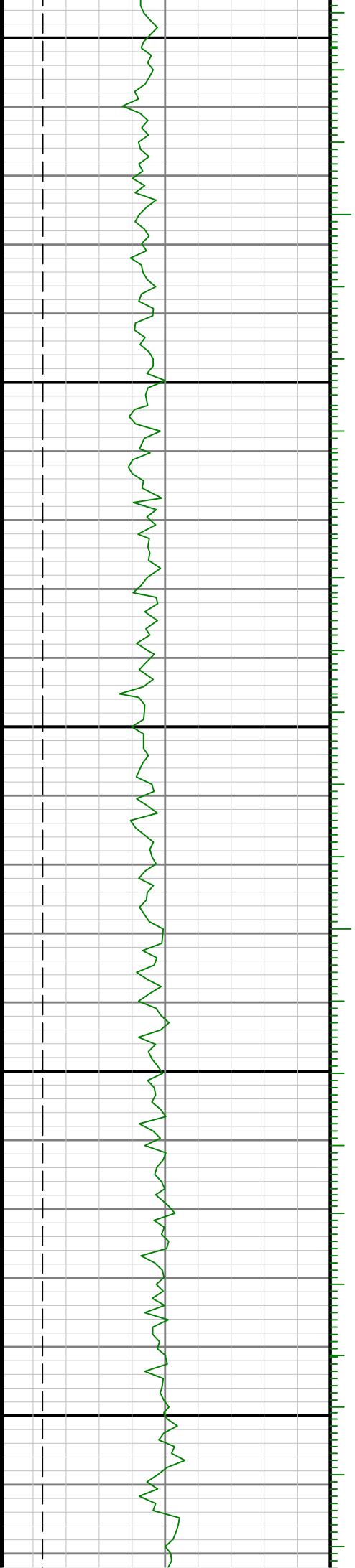


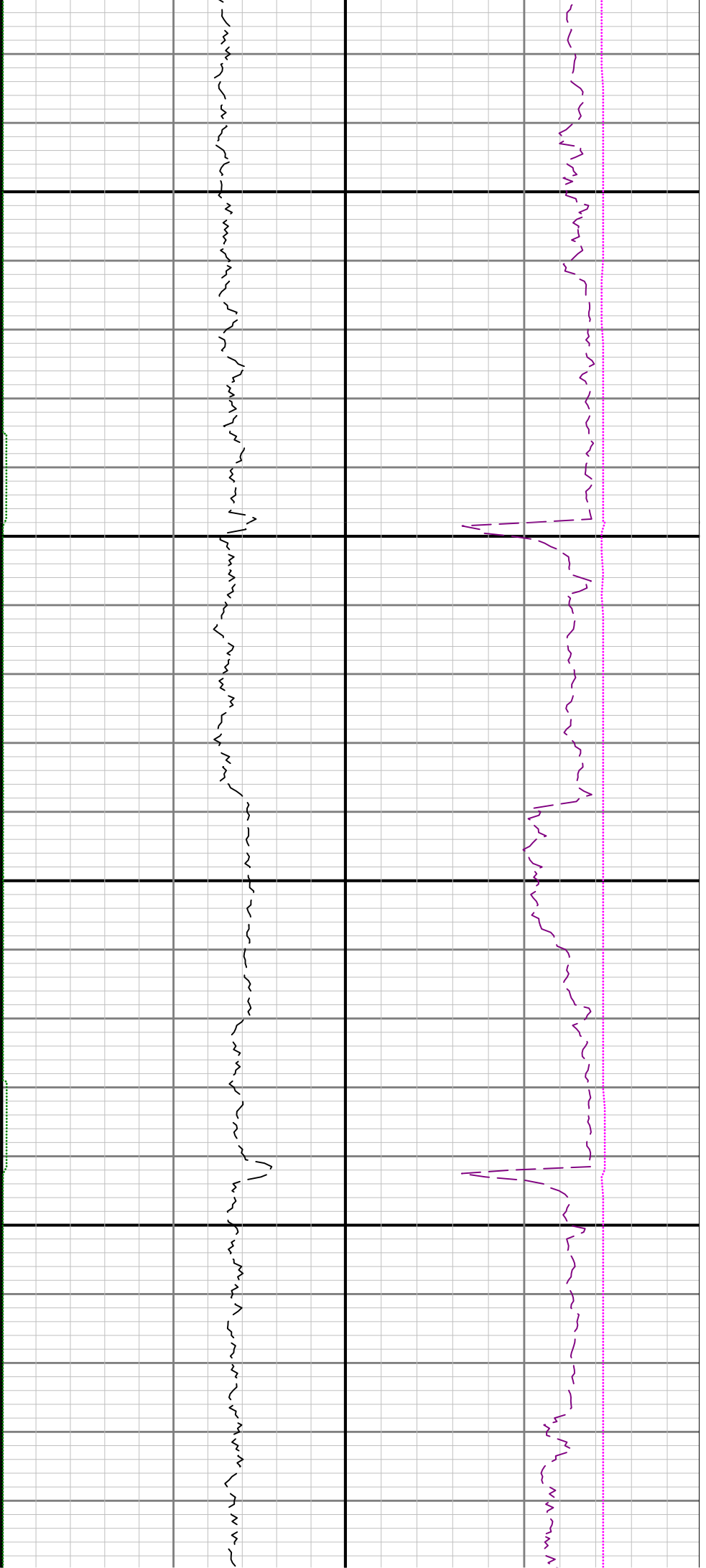




13100

13200

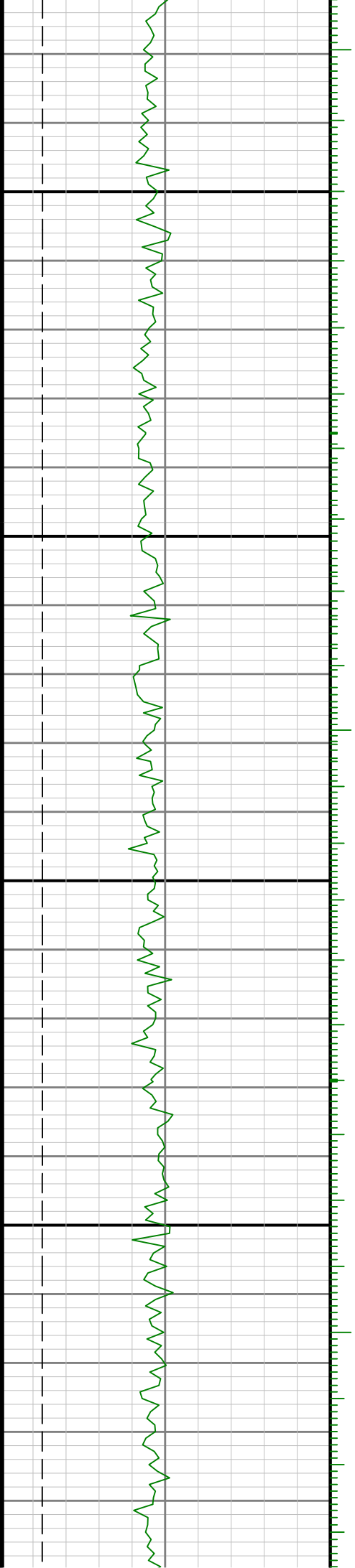


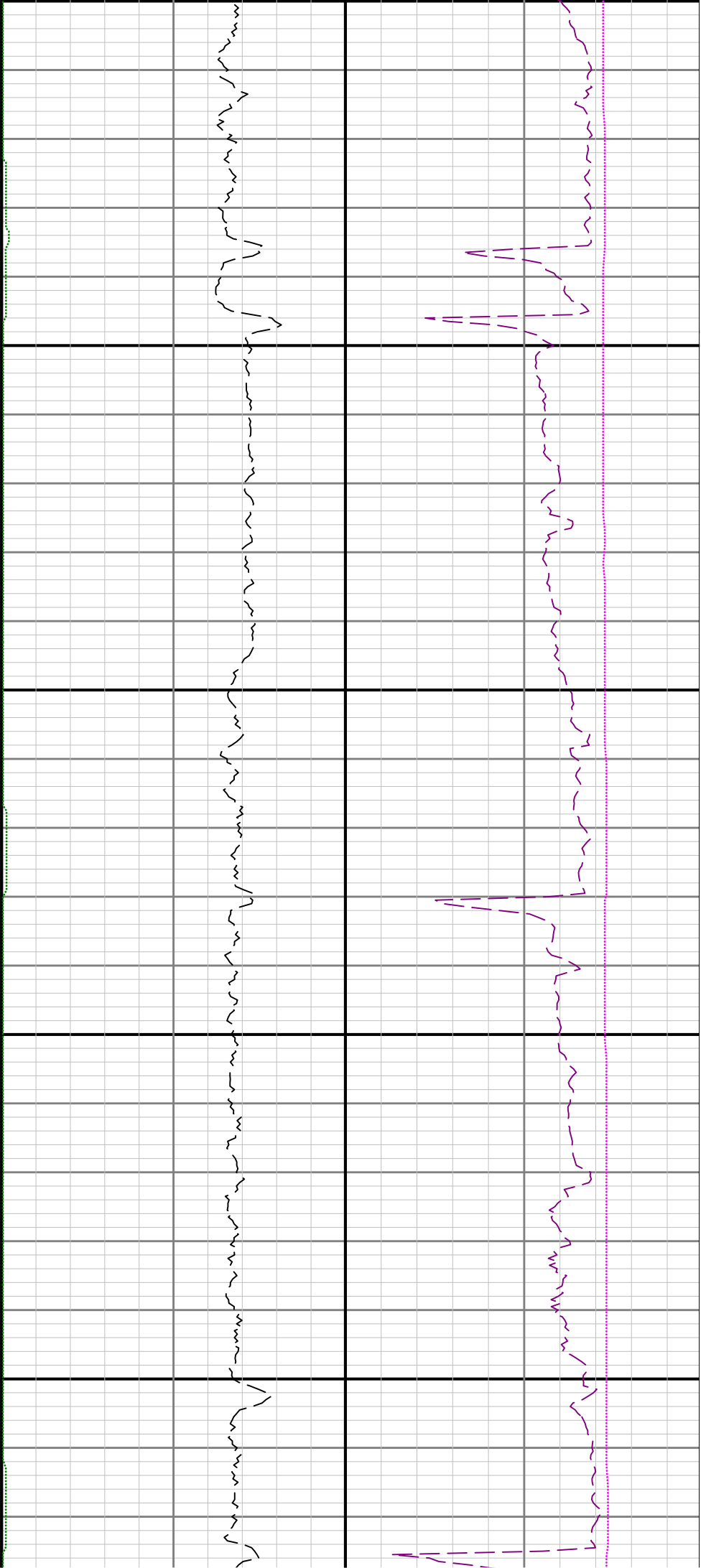


13300

13400

13

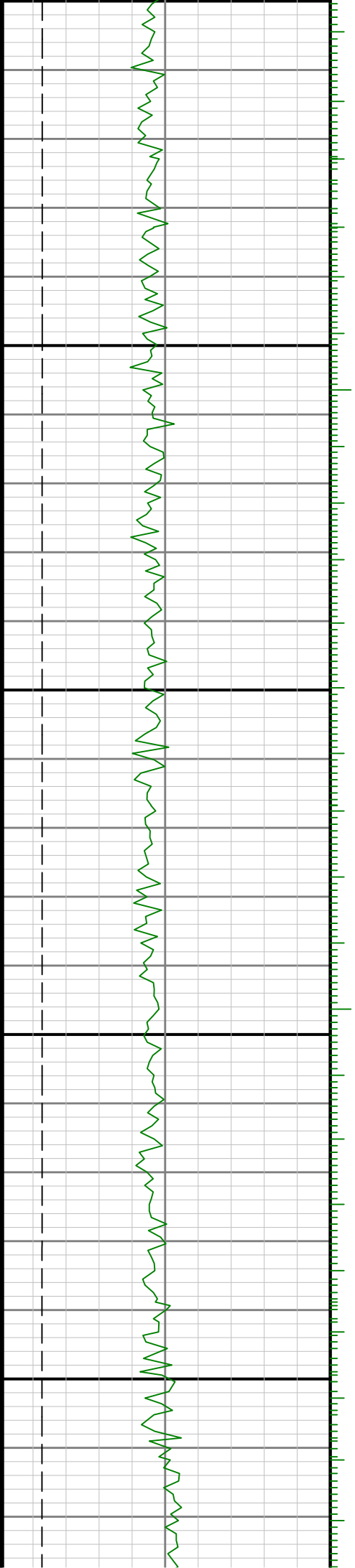


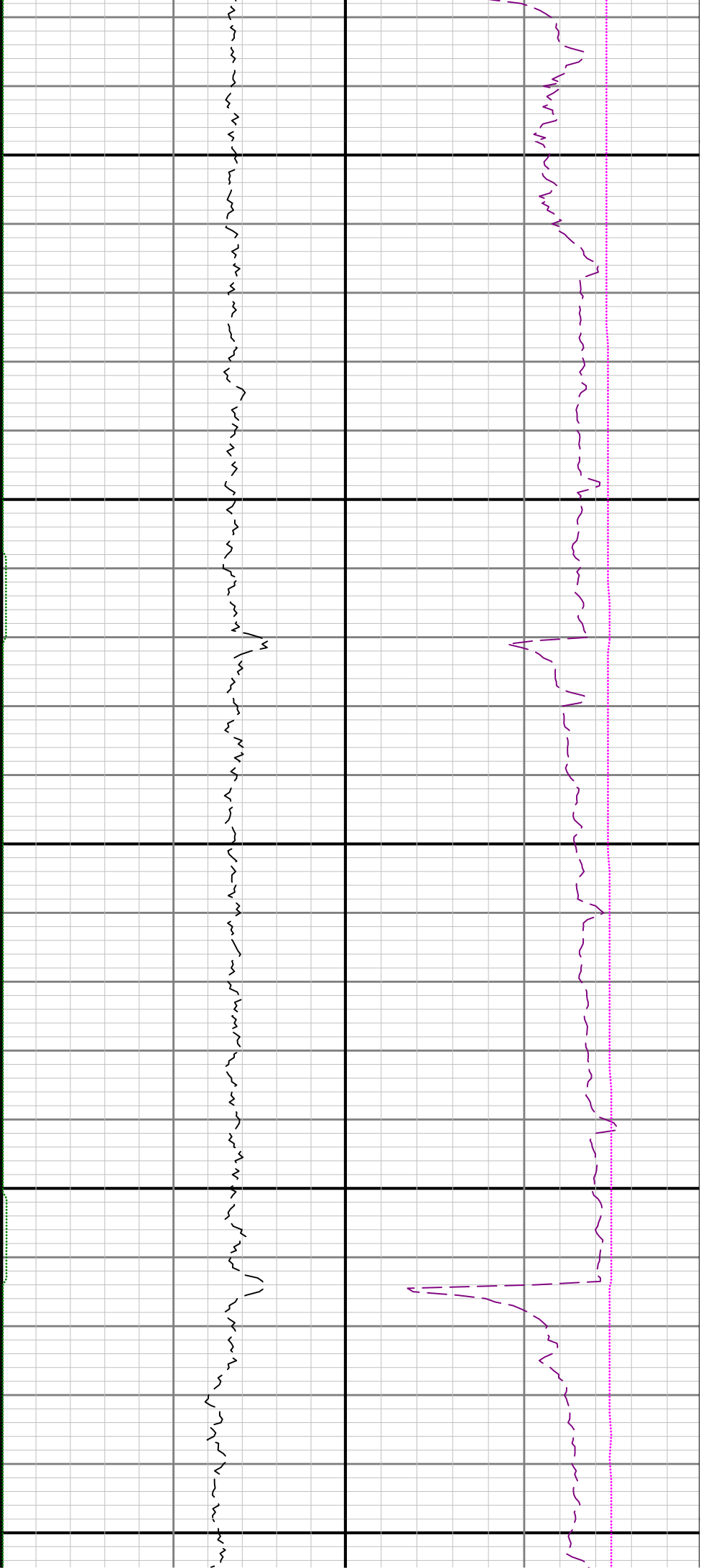


500

13600

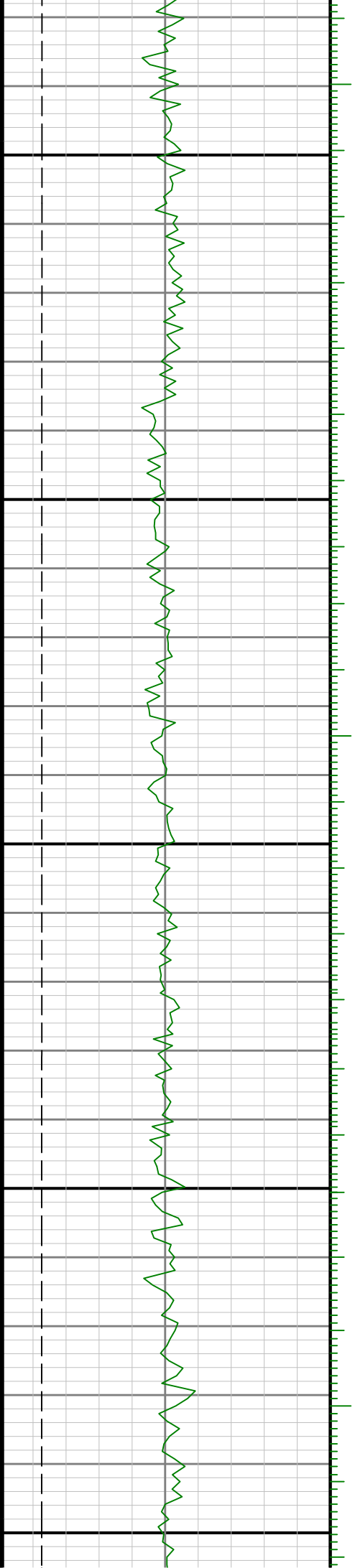
13700

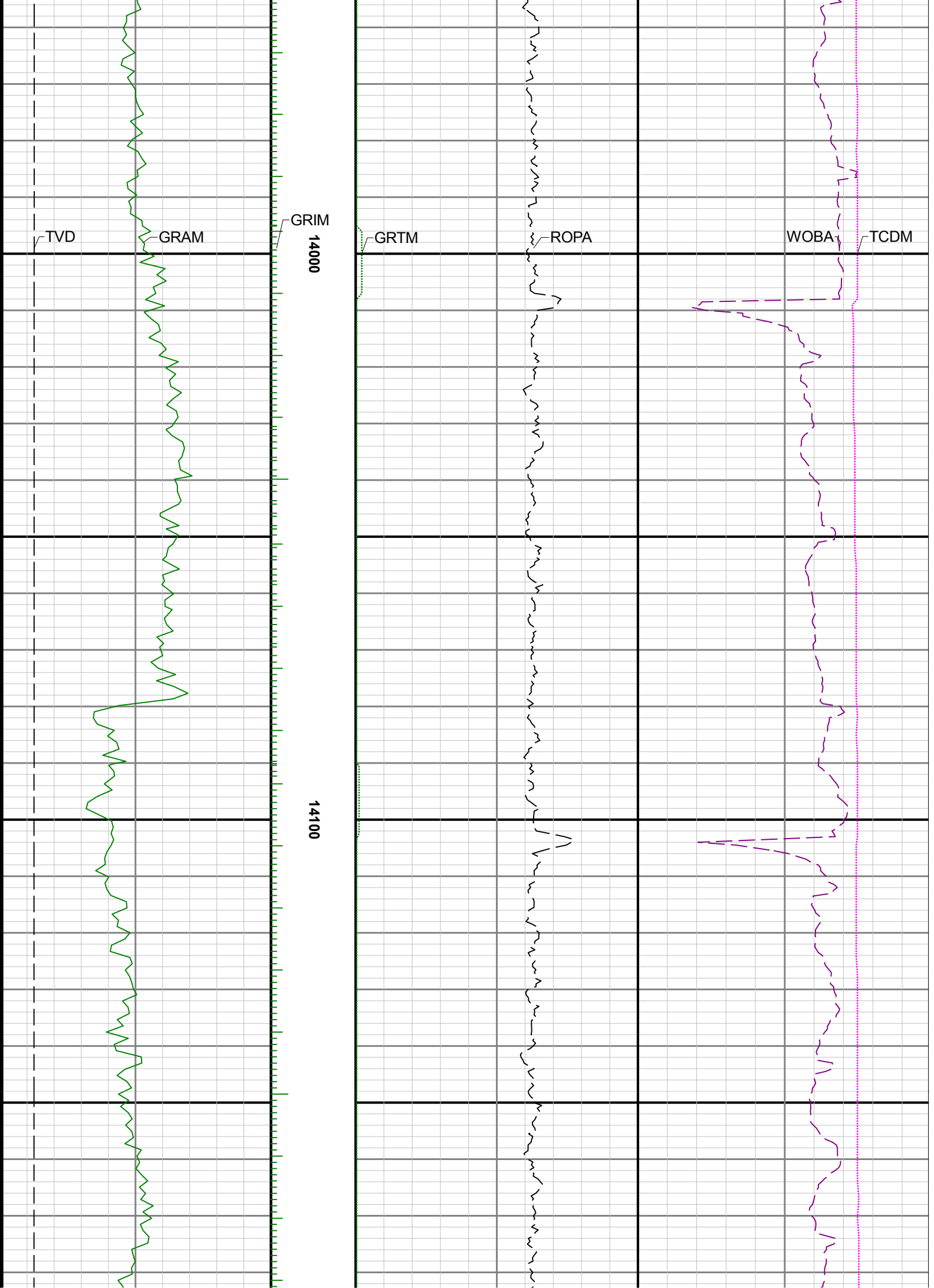


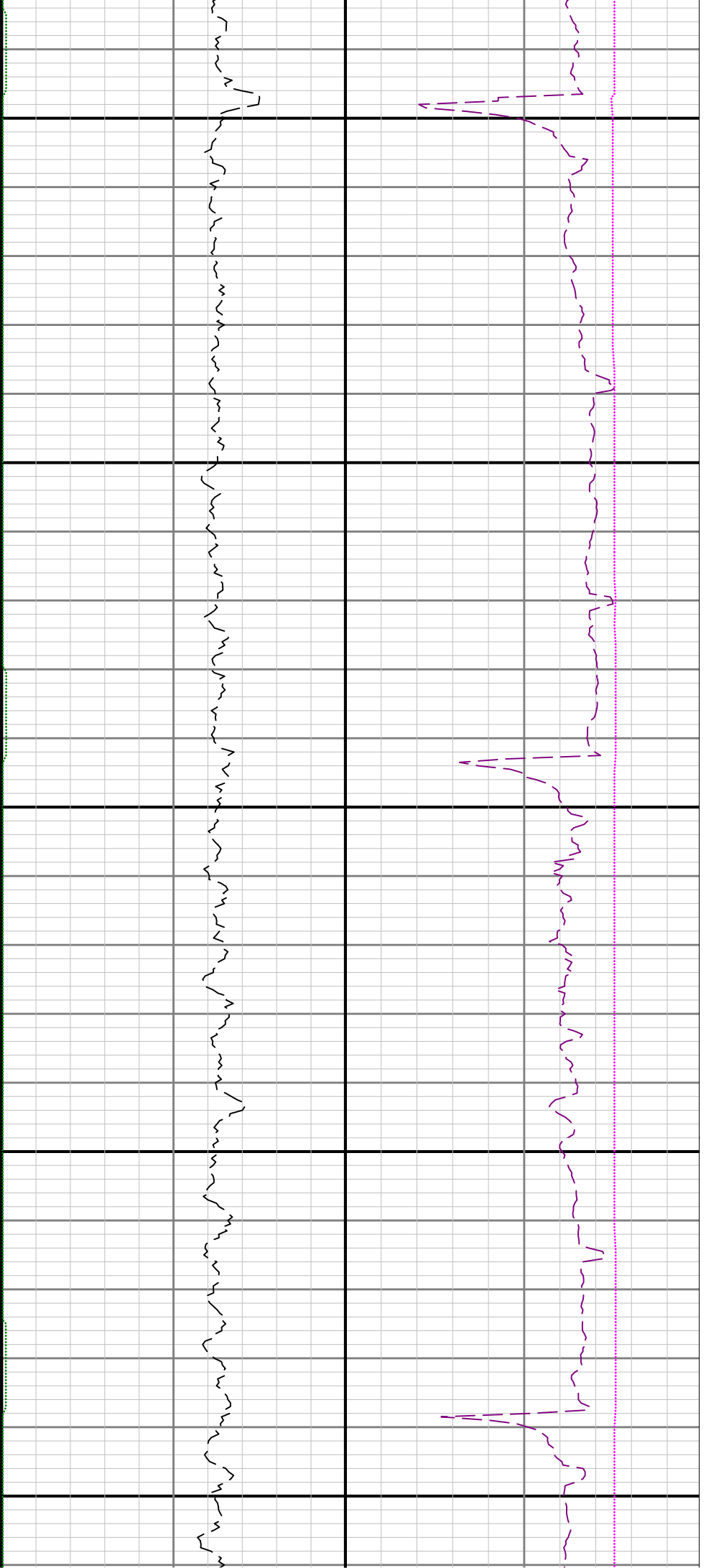


13800

13900



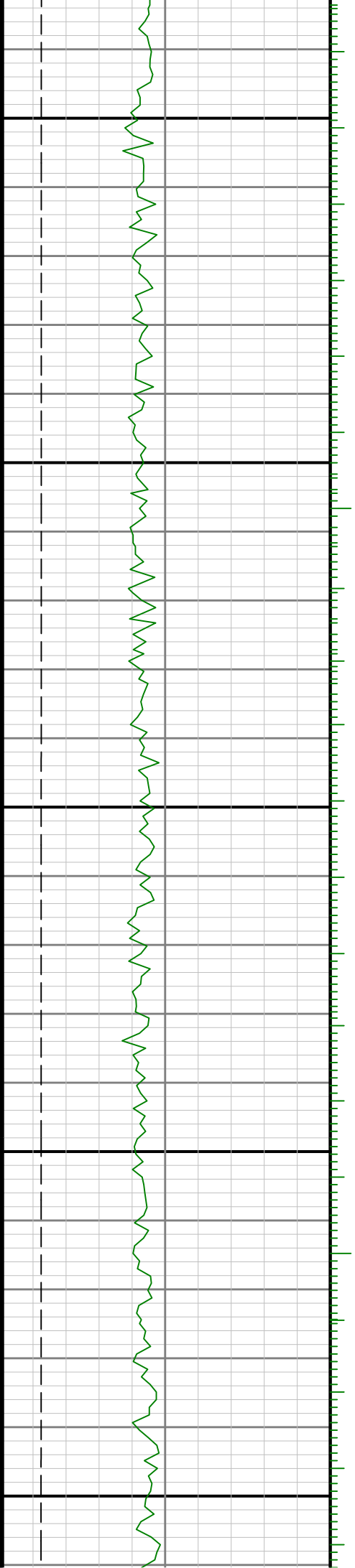


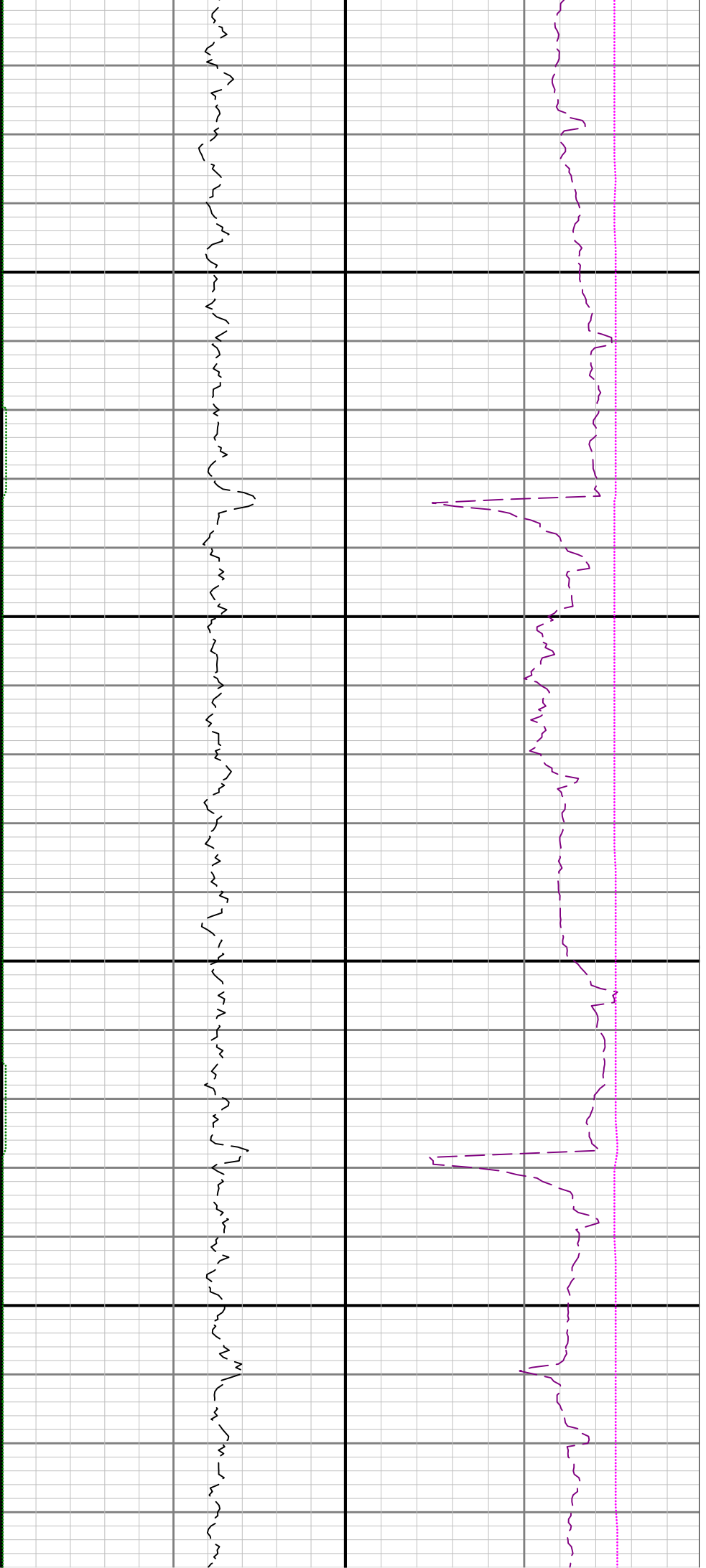


14200

14300

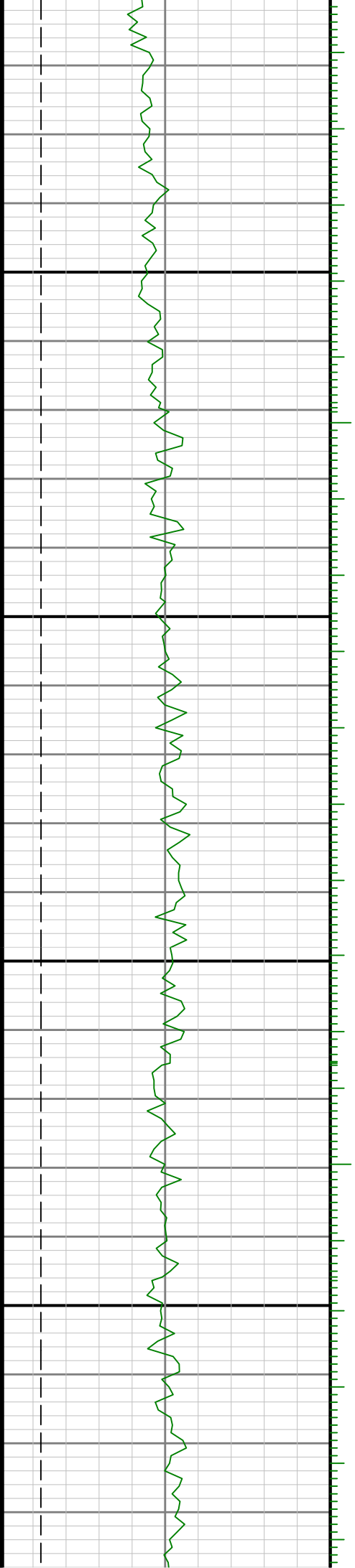
14400

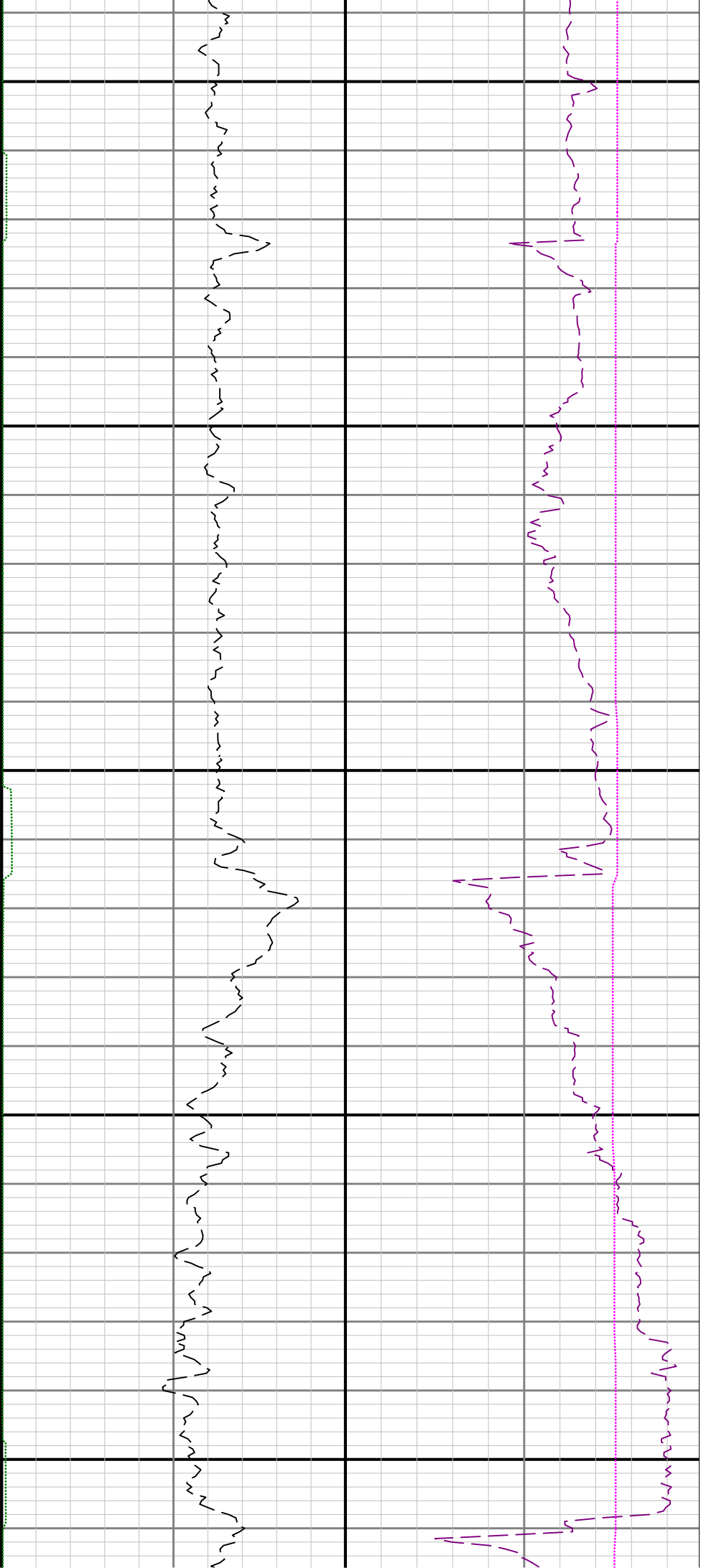




14500

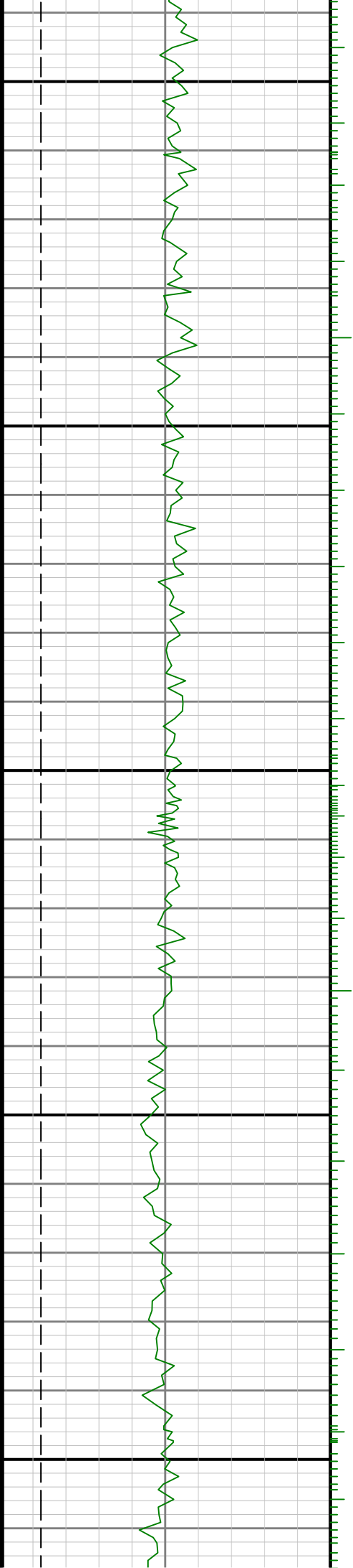
14600

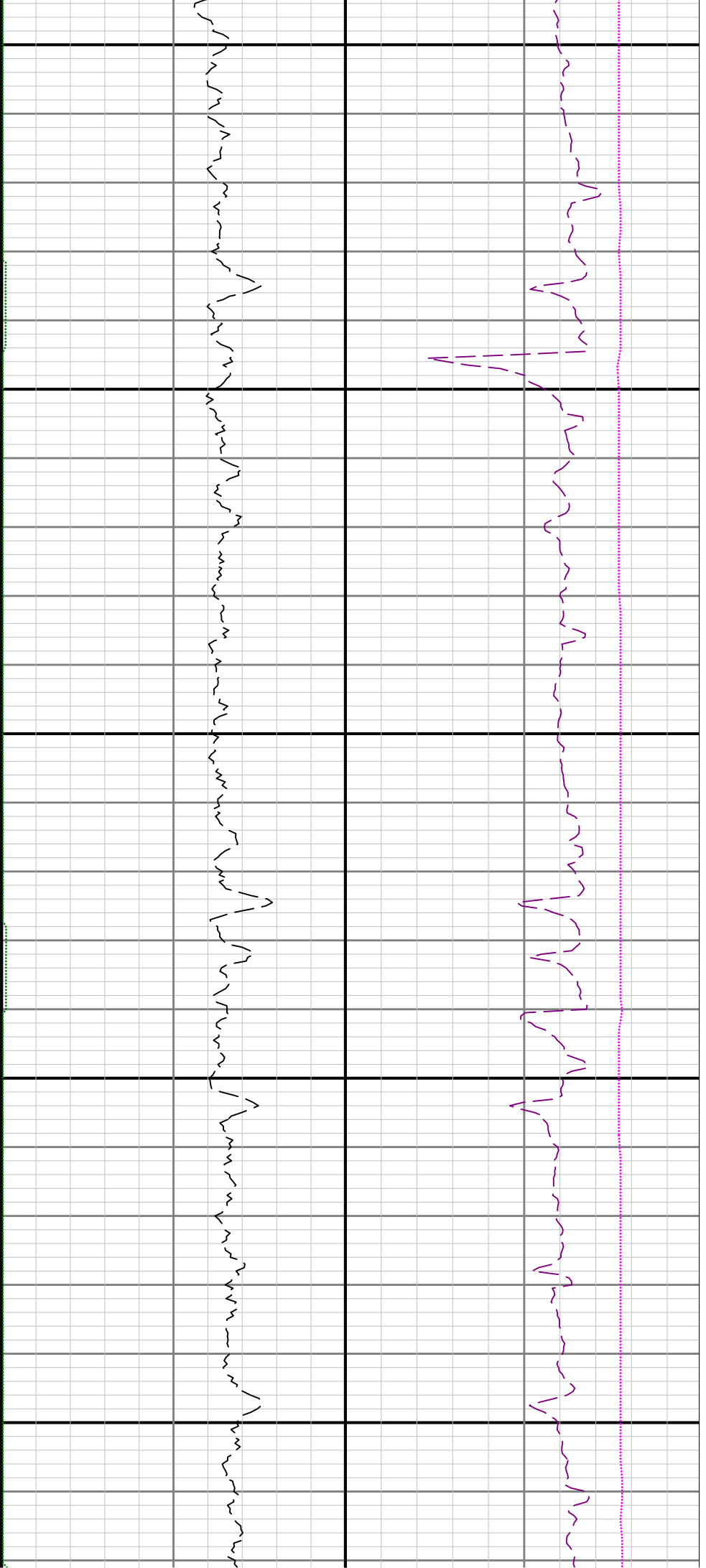




14700

14800

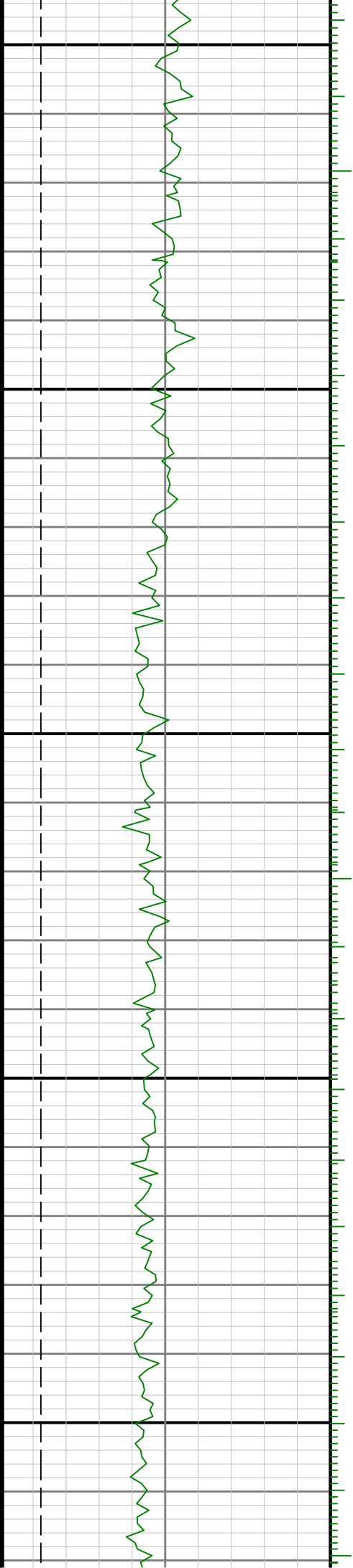


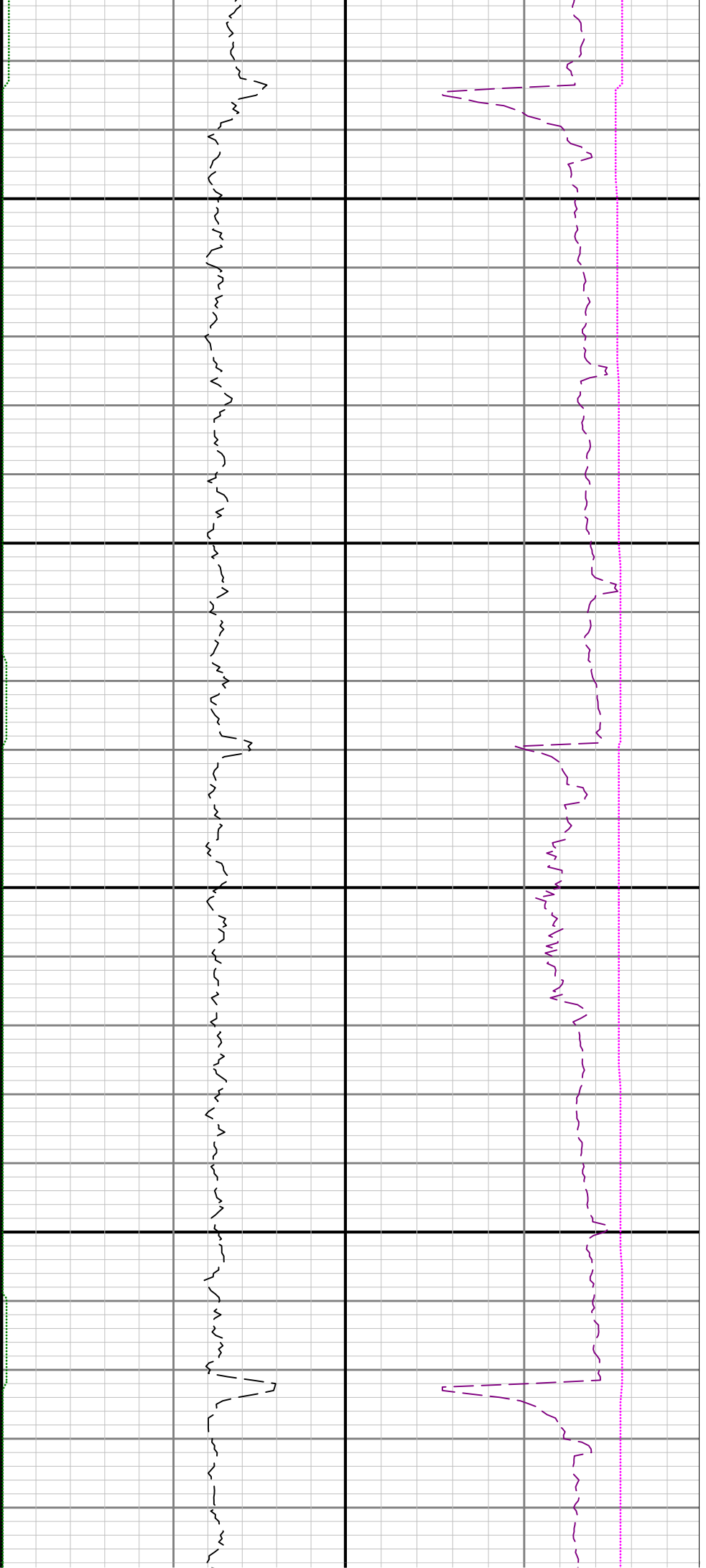


15100

15200

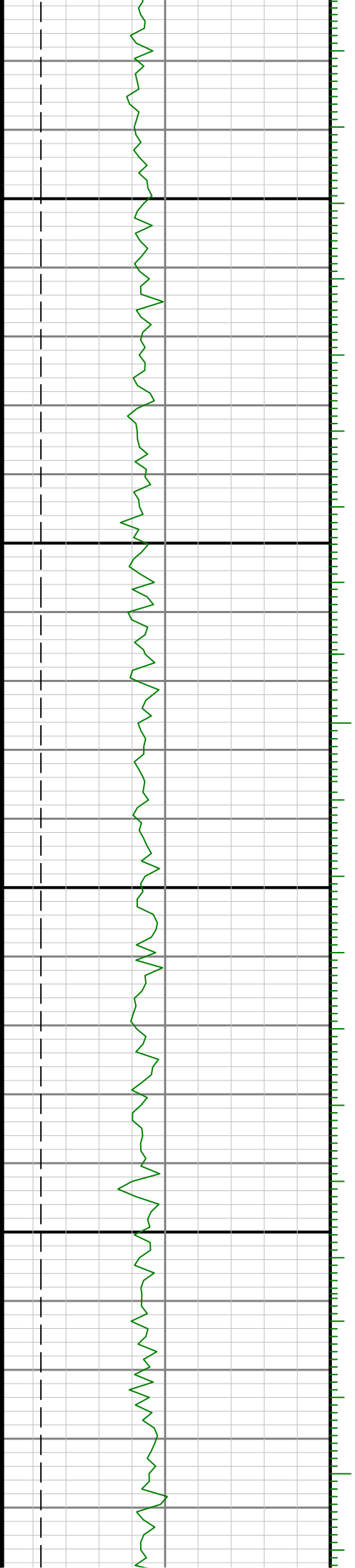
15300

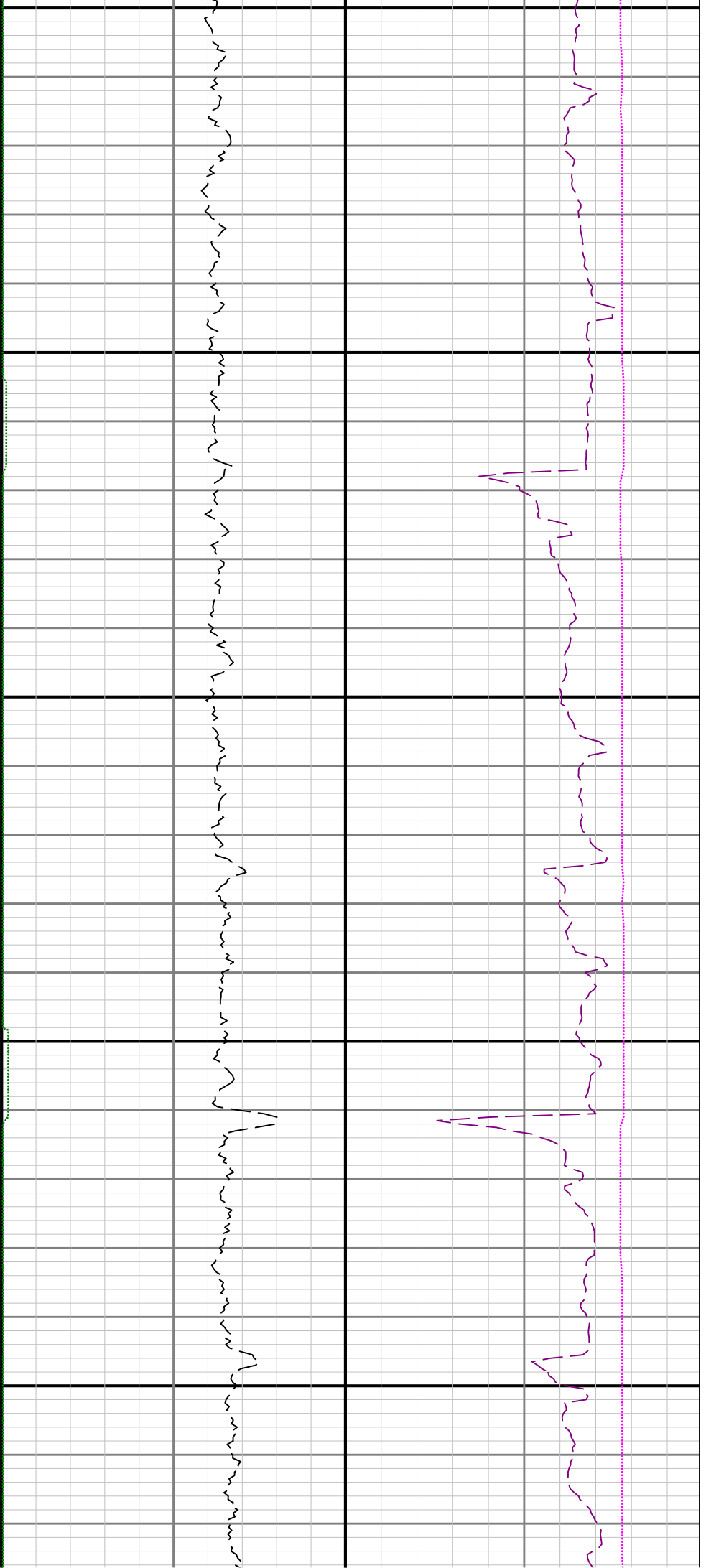




15400

15500





15600

15700

