



LWD MEMORY LOG

Gamma Ray
Azimuthal Gamma Ray

Company: Bonanza Creek Oil Company

Well: MUSTANG B11-23-24XRLNB

Field: Weld County

County: Weld County Country: United States

State: Colorado

Surface Location:

Latitude:
Longitude:

Other Services:

API No: 05-123-45803-00

Job ID: 8859011

SEC: 22 TWN: 4N RGE: 63W

Permanent Datum (P.D.):

Mean Sea Level

Elevation: 0.00 ft

Elev. KB: 4724.00 ft
Elev. DF: 4707.00 ft
Elev. GL:

Dates

Interval Logged

Magnetic Field Reference

Date From: 2017-11-23

Top: (ft) 5000.00

Date To: 2017-11-26

Bottom: (ft) 16575.00

Azi Reference North: True

Dip Angle: (deg) 66.82

Spud Date: 2017-11-21

Total Magnetic Field Strength: (nT) 52371

Mag to Reference North Correction: (deg) 8.16 E

Borehole Record

Casing Record

Hole Size (in)

From (ft)

To (ft)

Size (in)

Weight (lb/ft)

From (ft)

To (ft)

13.500

17.00

1740.00

9.625

36.00

17.00

1734.00

8.500

1740.00

16575.00

Mud Record

Deviation Record

Type

From (ft)

To (ft)

Hole Size (in)

Interval (ft)

Inc | Az (Start)

Inc | Az (End)

Water Based Mud

17.00

1740.00

13.500

1723.00

0.62 | 198.62

0.28 | 75.27

Oil Based Mud

1740.00

16575.00

8.500

14835.00

0.28 | 75.27

90.03 | 94.88

Acquisition System

Software Version

Other

Baker Hughes Cadence

RT4.1

Rig: Xtreme 19

PlotStudio

4.1.7763.3

Contractor: Xtreme

Unit: D&E

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Log Run Summary

Run	Bit Run	Bit Size	Bit Type	Bit Gauge	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours
						Top	Bottom	From	To	Start Logging	End Logging	

	No.	(in)		Length (in)		(ft)	(ft)	(ft)	(ft)			(h)
1	1	13.500	PDC	4.00	Steerable	0.00	0.00	17.00	1740.00	2017-11-21 06:27	2017-11-21 14:18	6.05
2	2	8.500	PDC	6.00	Rotary Steerable	5000.00	16563.00	1740.00	16575.00	2017-11-23 13:31	2017-11-27 04:32	77.49

Crew

Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite
Steve Bueghly		2017-11-20	2017-11-27								

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+ (%)
2017-11-21 20:28	1	1789.87	Water Based Mud	8.5	30	8	0.0	0/100	Active Pit	800	0.00
2017-11-22 20:25	2	1740.00	Oil Based Mud	9.0	52	N/A	0.0	75/25	Active Pit	35000	0.00
2017-11-23 18:30	2	2428.00	Oil Based Mud	8.5	40	N/A	0.0	73/27	Active Pit	34500	0.00
2017-11-24 19:00	2	6860.00	Oil Based Mud	9.0	47	N/A	0.0	71/29	Active Pit	32000	0.00
2017-11-25 19:30	2	11744.00	Oil Based Mud	9.4	47	N/A	0.0	68/32	Active Pit	30000	0.00
2017-11-26 20:00	2	15650.00	Oil Based Mud	9.3	45	N/A	0.0	68/32	Active Pit	31000	0.00
2017-11-27 17:00	2	16575.00	Oil Based Mud	9.5	44	N/A	0.0	68/32	Active Pit	30000	0.00

Mud Resistivity Record

				Surface				Downhole		
Date / Time	Run No.	Measured Depth (ft)	Surface Temp (degF)	Rm (ohm.m)	Rmf (ohm.m)	Rmc (ohm.m)	BHCT (degF)	Rm @ BHCT (ohm.m)	Rmf @ BHCT (ohm.m)	Rmc @ BHCT (ohm.m)
2017-11-23 18:30	2	2428.00	75.0	100.000	N/A	N/A	98.0	100.000	N/A	N/A
2017-11-24 19:00	2	6860.00	88.0	100.000	N/A	N/A	180.0	100.000	N/A	N/A
2017-11-25 19:30	2	11744.00	102.0	100.000	N/A	N/A	228.0	100.000	N/A	N/A
2017-11-26 20:00	2	15650.00	115.0	100.000	N/A	N/A	241.9	100.000	N/A	N/A
2017-11-27 17:00	2	16575.00	118.0	100.000	N/A	N/A	241.9	100.000	N/A	N/A

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	NaviTrak	12366178	Directional (mag)	14.82	50.68	8.000	0.000
1	NaviTrak	12366178	VSS	14.82	50.68	8.000	0.000
2	ATC_SU	11781618	Near Bit Inclination	5.93	6.93	7.000	4.330
2	ATC_SU	11781618	Near Bit VSS	5.93	6.93	7.000	4.330
2	ATC_MWD	12525579	Gamma (single)	2.71	13.10	7.000	3.250
2	ATC_MWD	12525579	Directional (mag)	12.27	22.66	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
NTK	NaviTrak	Probe Based Directional Module, NaviTrak Platform
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LSRM	ATC_LSRM	Auto Trak Curve LSRM

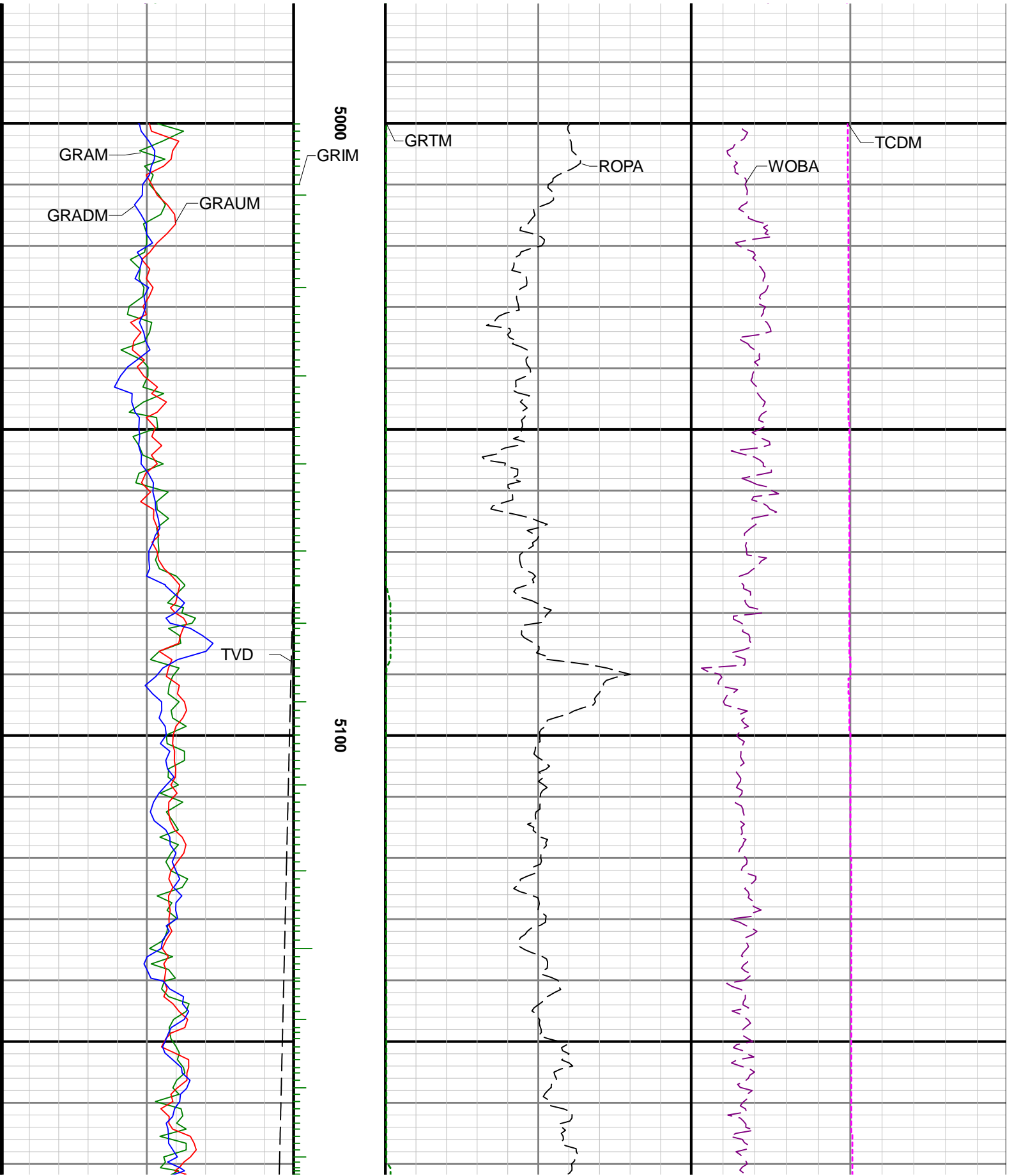
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM
BCPM	BCPM	Bi-Directional Communication and Power Module, OnTrak Platform

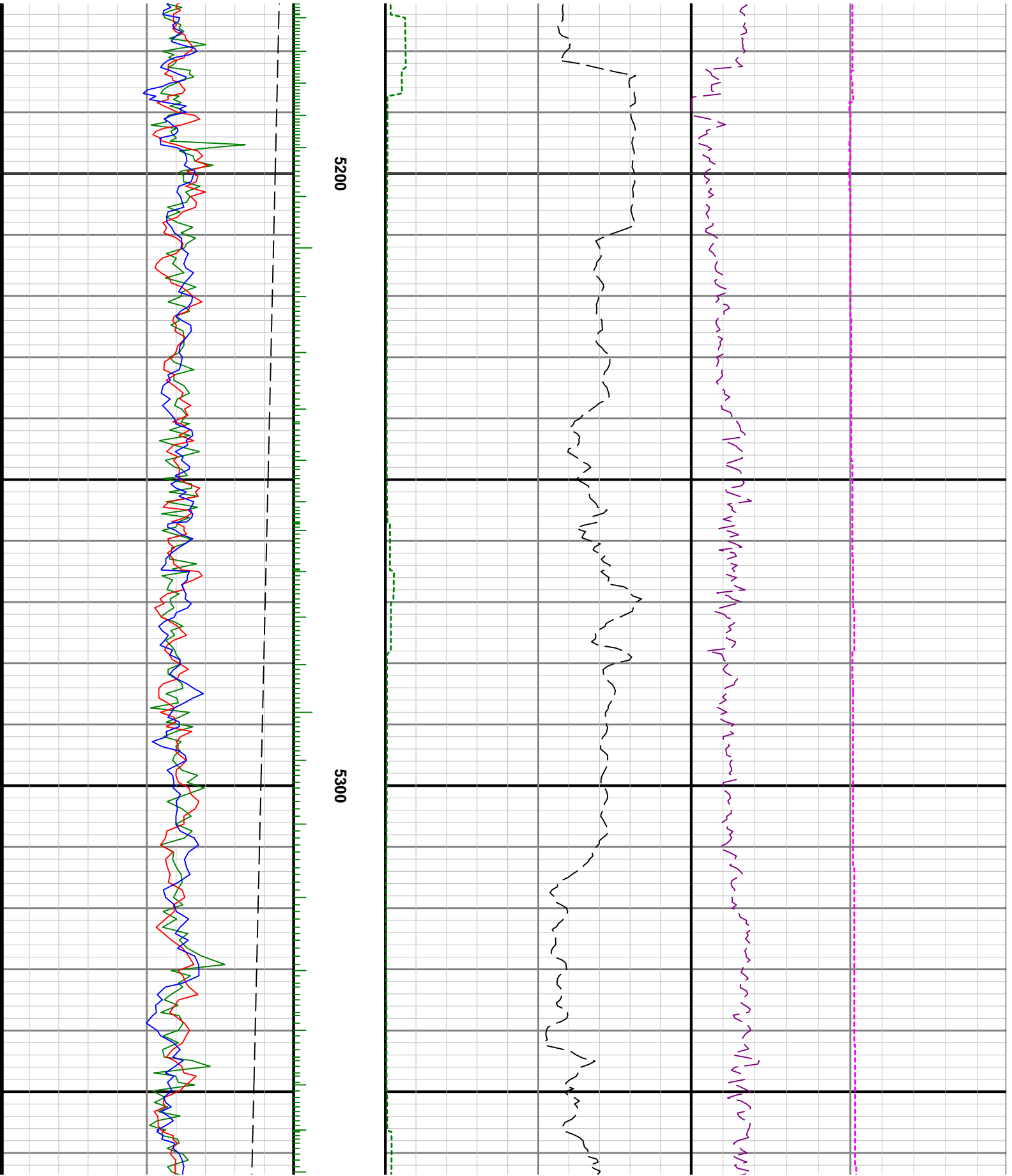
Comments
<div>1</div> <div>Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.</div> <div>2</div> <div>The Gamma Ray Apparent (GRAM) data is presented from 0 to 200 API, per customer's request.</div> <div>3</div> <div>The Gamma Ray Apparent (GRAM) log starts at 5000 feet, per customer's request.</div> <div>4</div> <div>Baker Hughes LWD Run 2 used the 6 3/4 inch NaviGamma service (Gamma Ray, Azimuthal Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly to drill from 1740 to 16575 feet MD (1739 to 6408 feet TVD).</div>

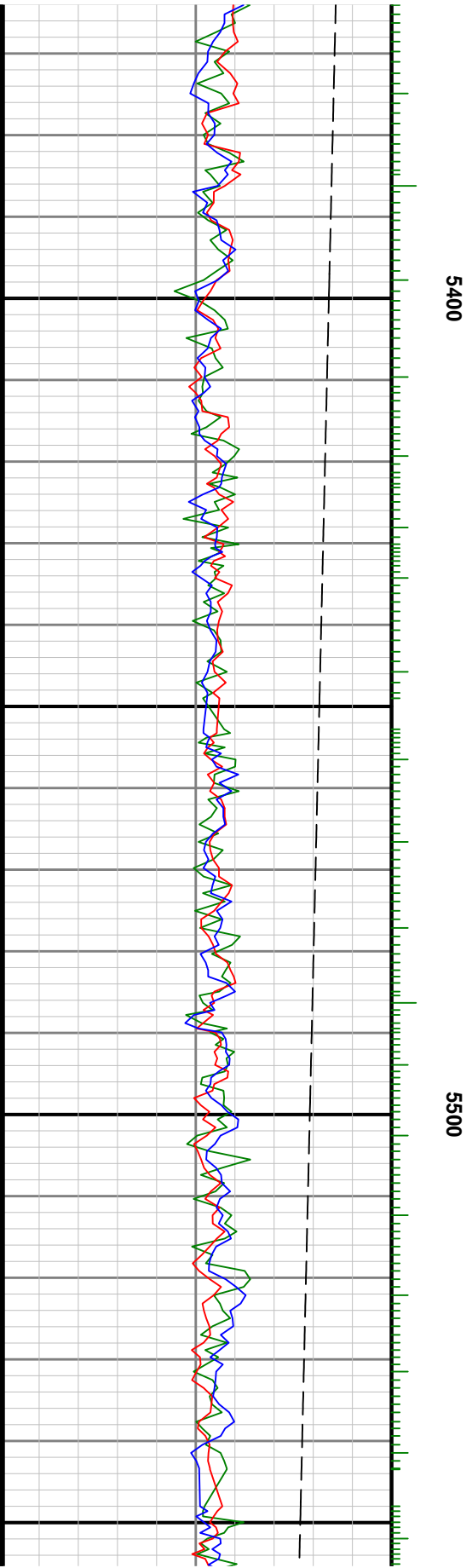
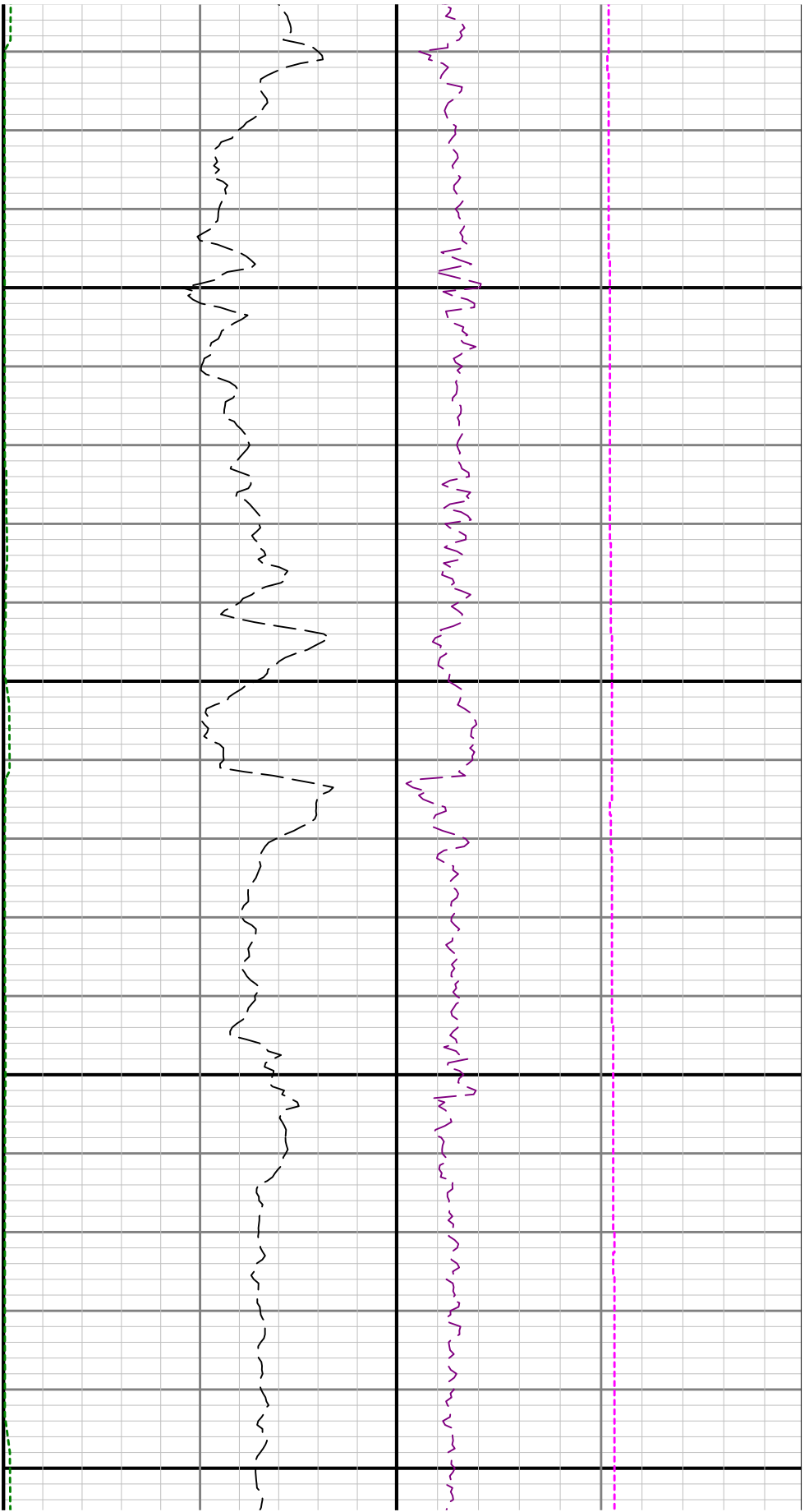
Remarks				
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	16568.00	8.500	2	The interval from 16562 to 16575 was not logged due to sensor to bit offset at well TD.

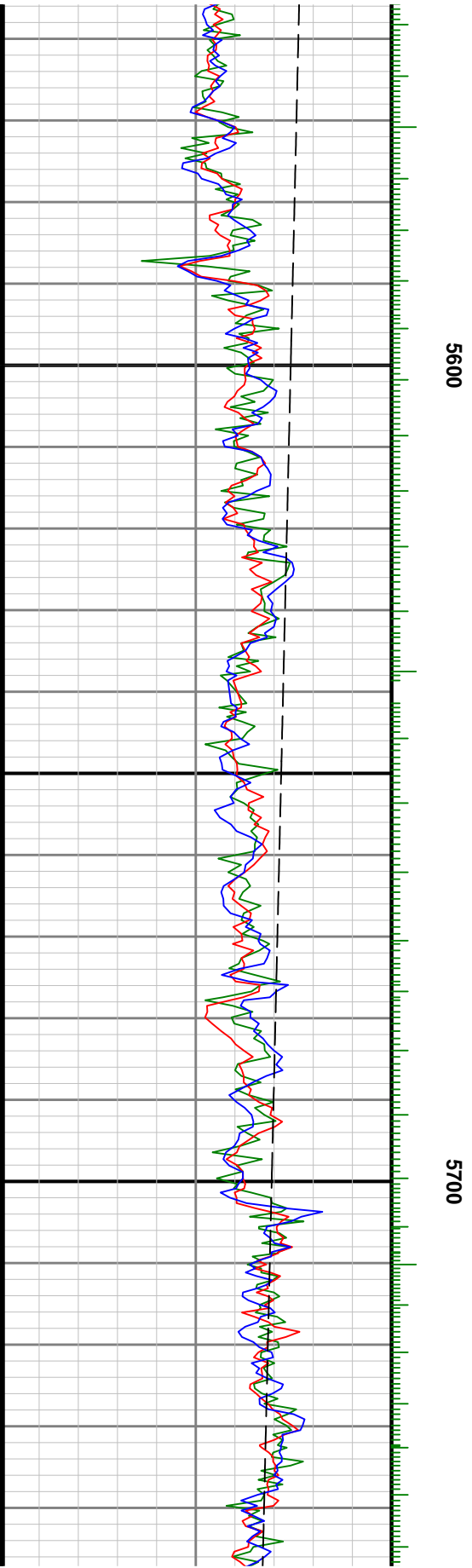
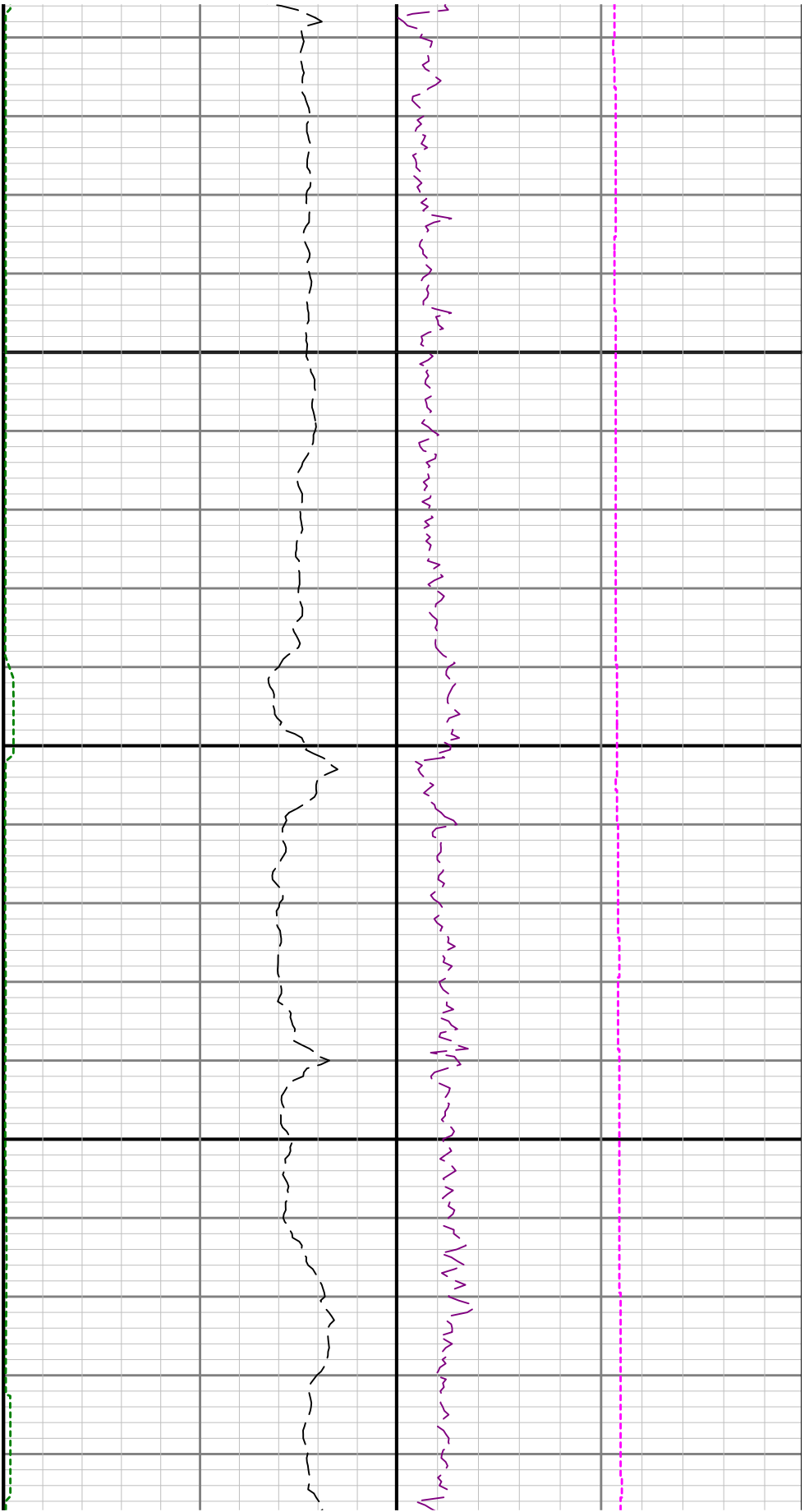
Curve Mnemonics		
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since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

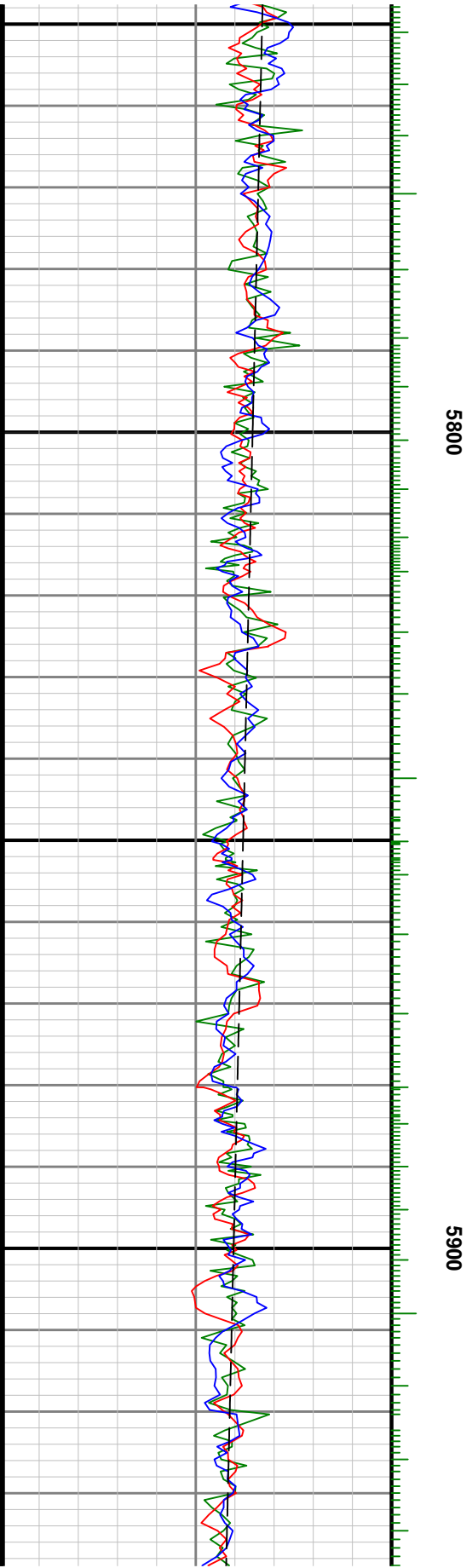
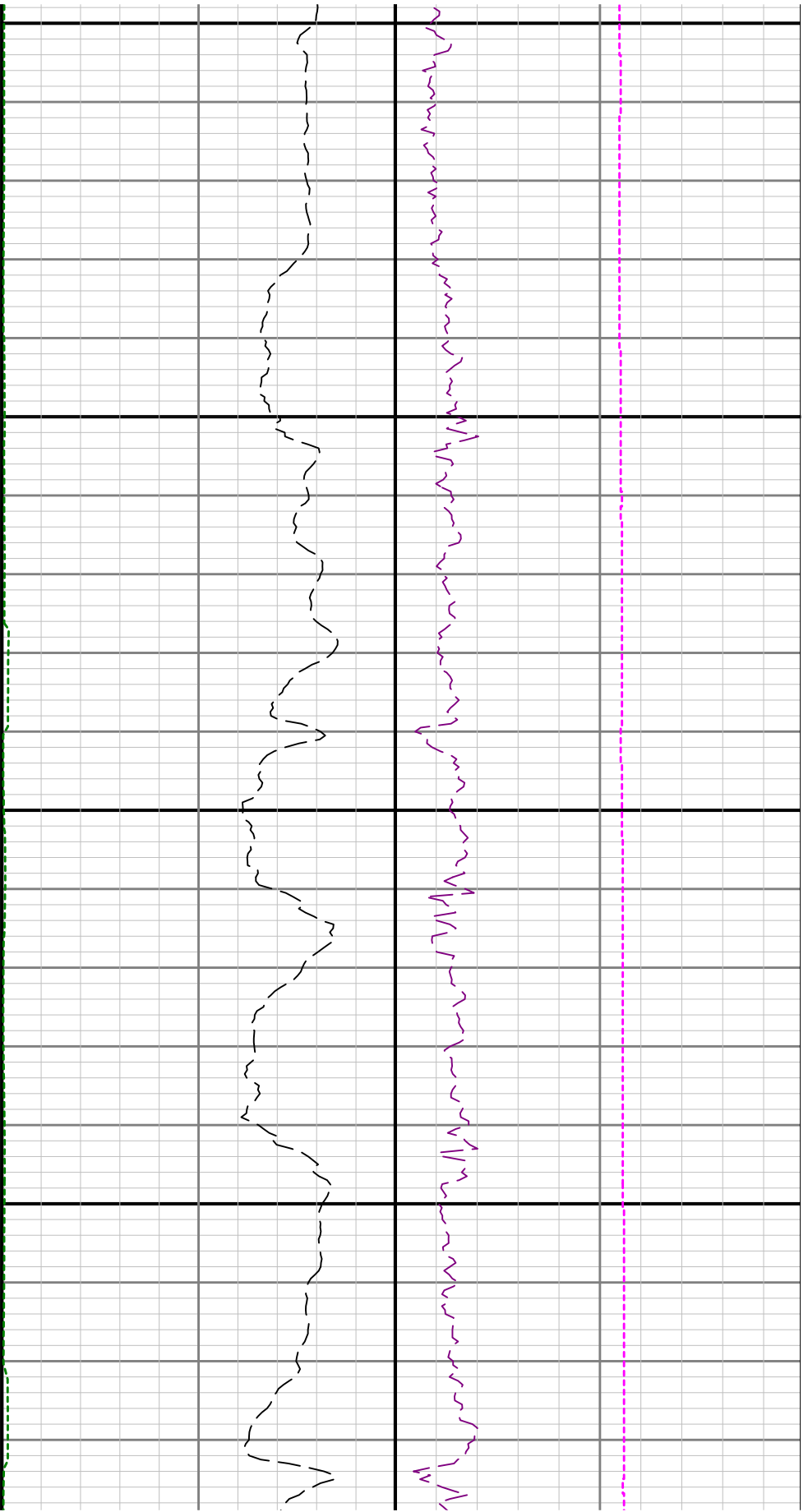
<div> <div>BAKER HUGHES</div> <div>a GE company</div> </div>	Company	Bonanza Creek Oil Company		
	Well	MUSTANG B11-23-24XRLNB		
	Interval	Date From:	2017-11-23 23:57:14	Top: 5000.00
		Date To:	2017-11-26 22:41:17	Bottom: 16577.00
	Created	2017-11-28 07:04:51		
Gamma Ray - Apparent 0.5 ft Average GRAM	MD 1:240 feet	Depth Averaged ROP 3 ft Average ROPA		Weight On Bit, Average 1 ft Average WOBA
0 200		1000 0		0 100
API		ft/h		klb
Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM		Gamma Time Since Drilled GRTM		Downhole Temperature TCDM
0 200		0 600		0 300
API		min		degF
Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM				
0 200				
API				
True Vertical Depth TVD				
7000 5000				
ft				

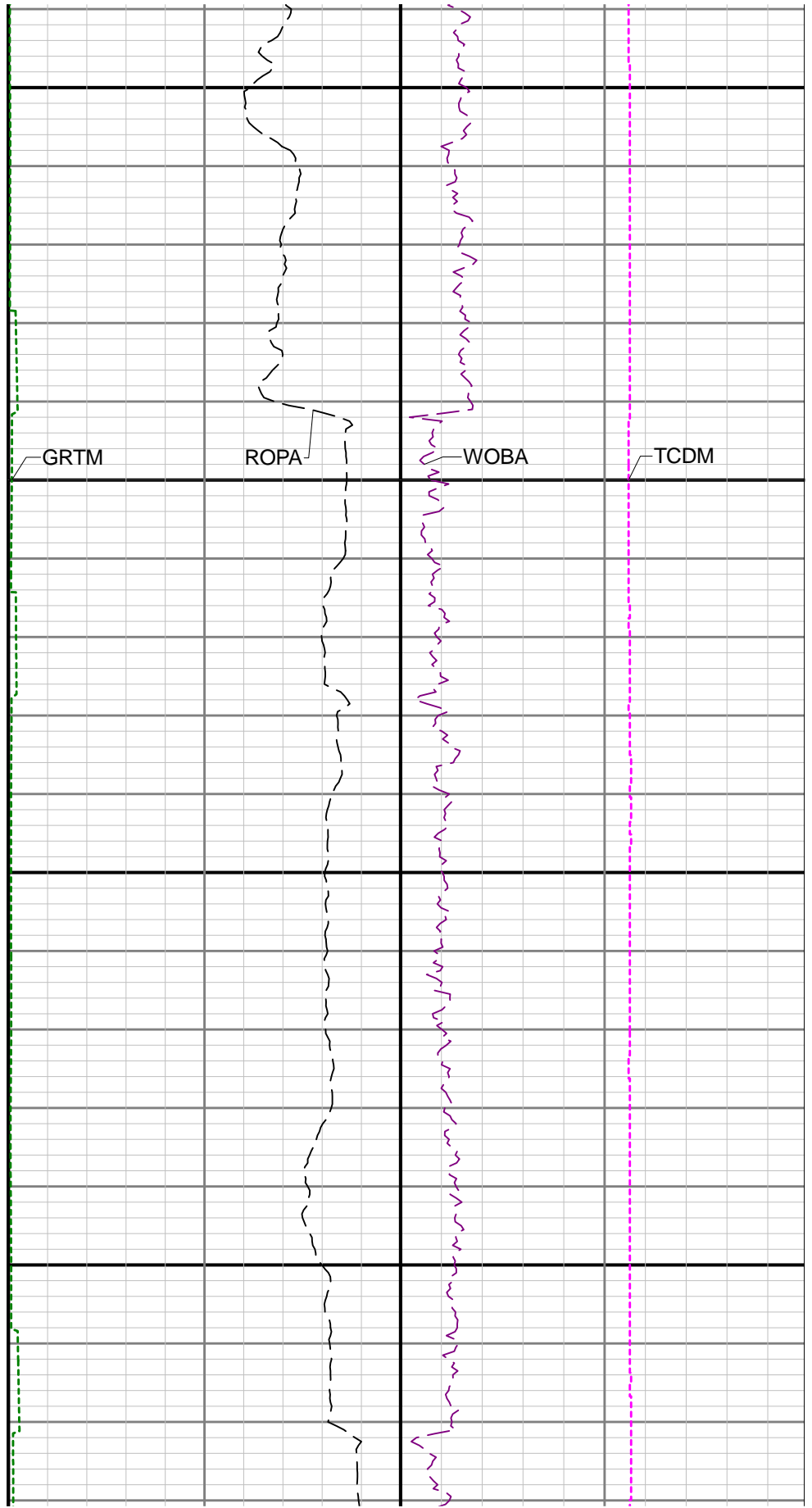
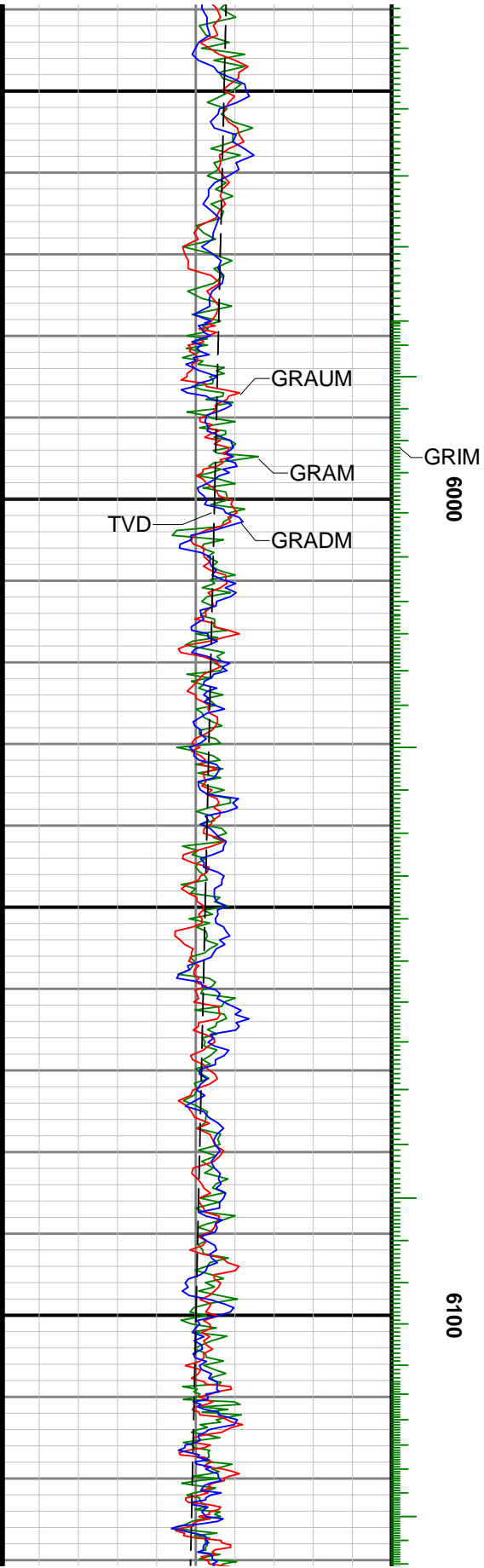


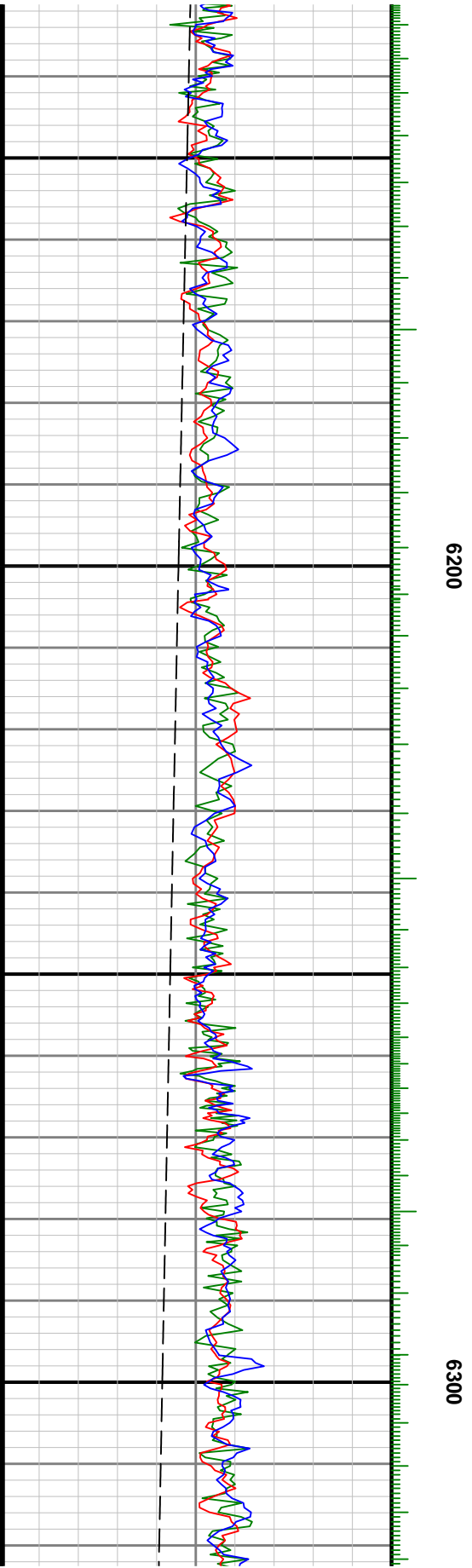
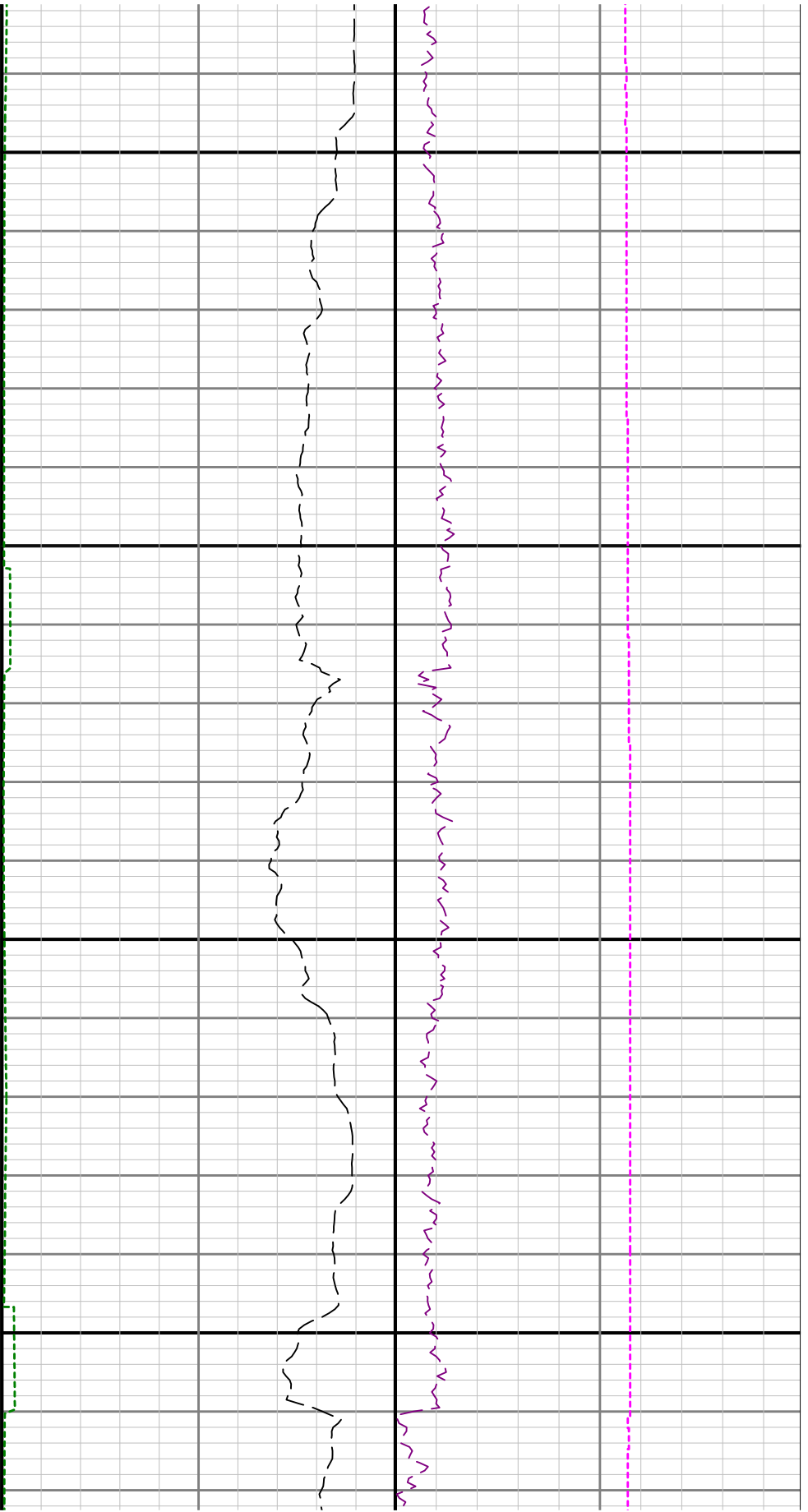


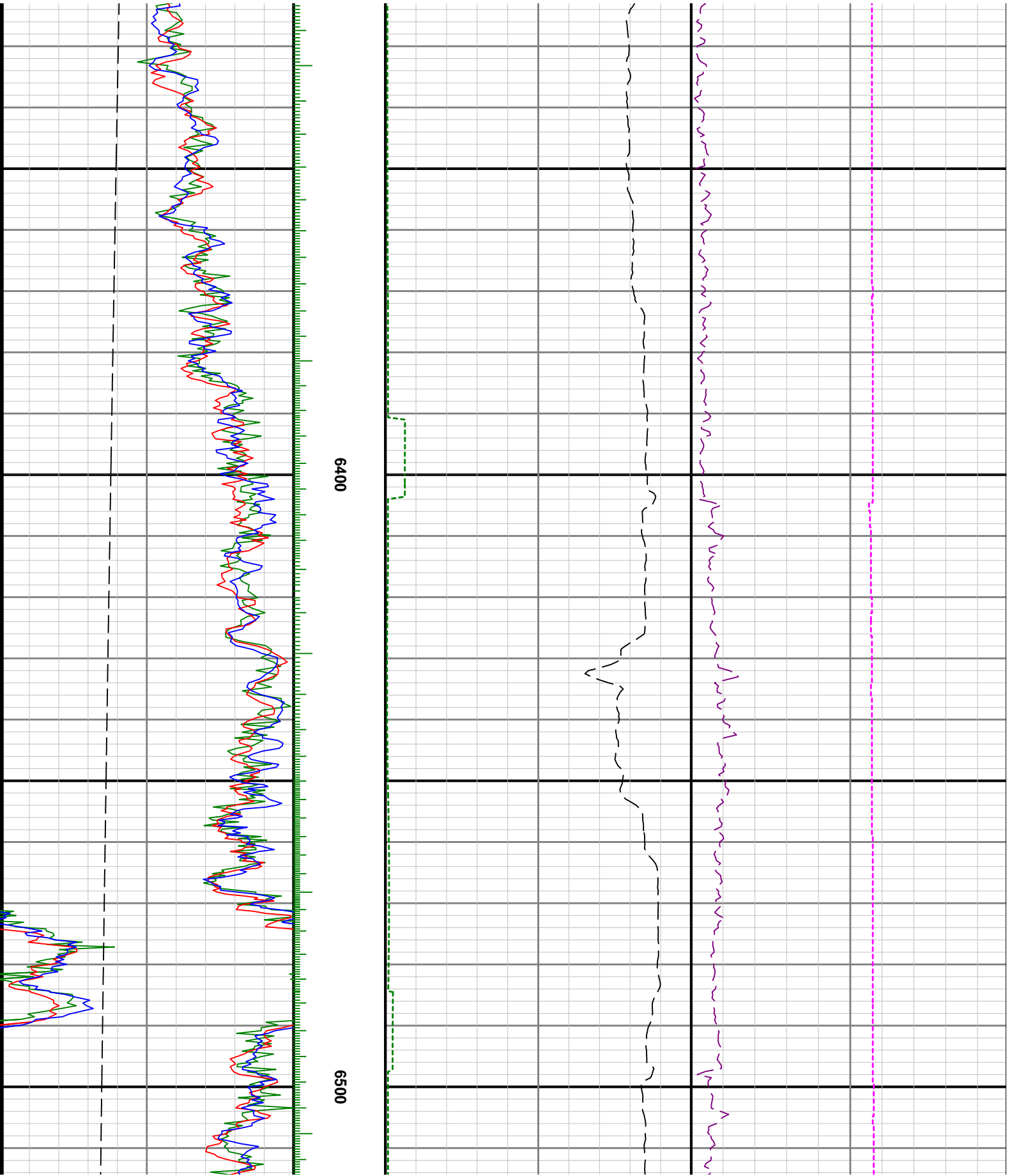


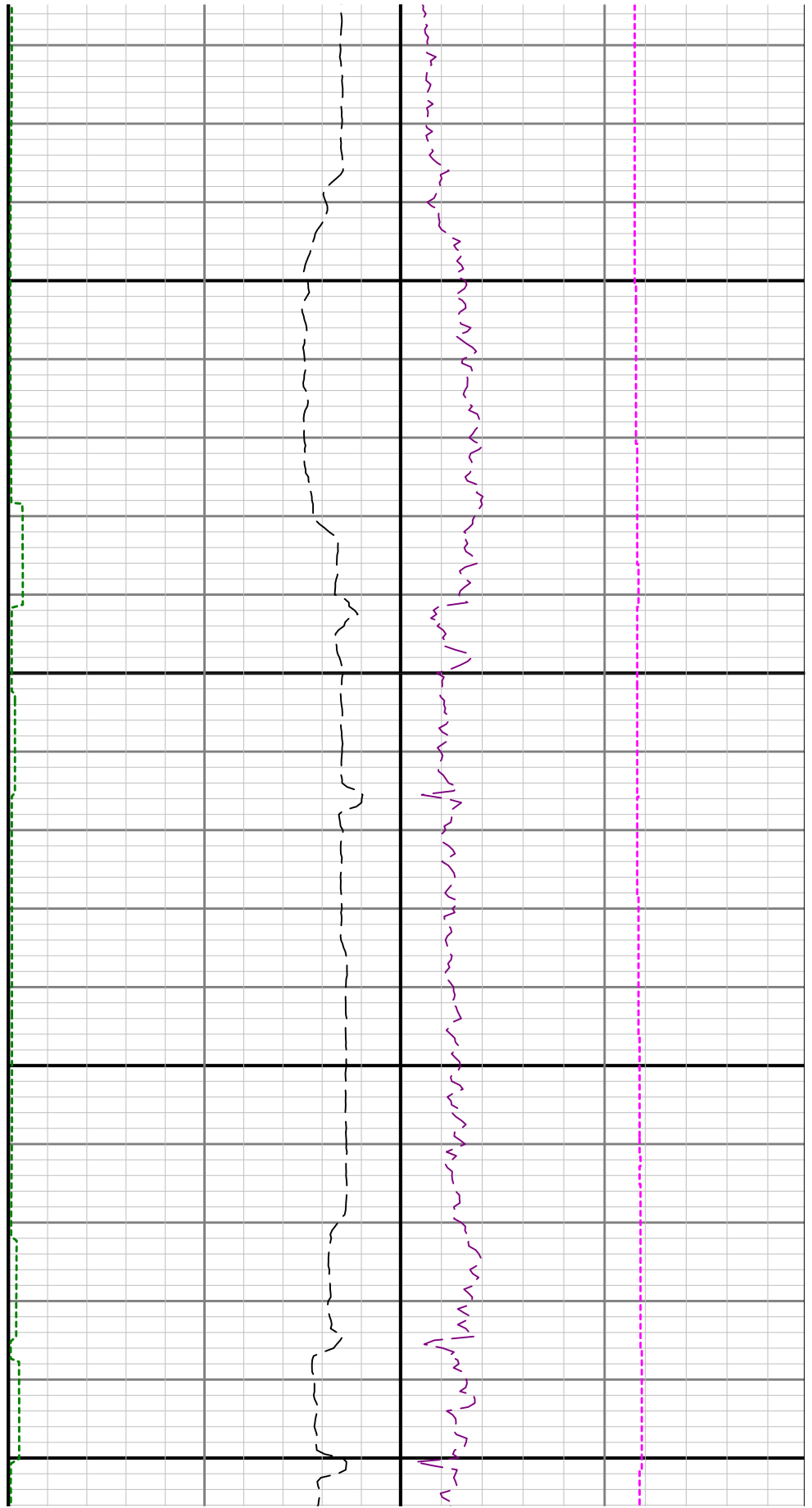
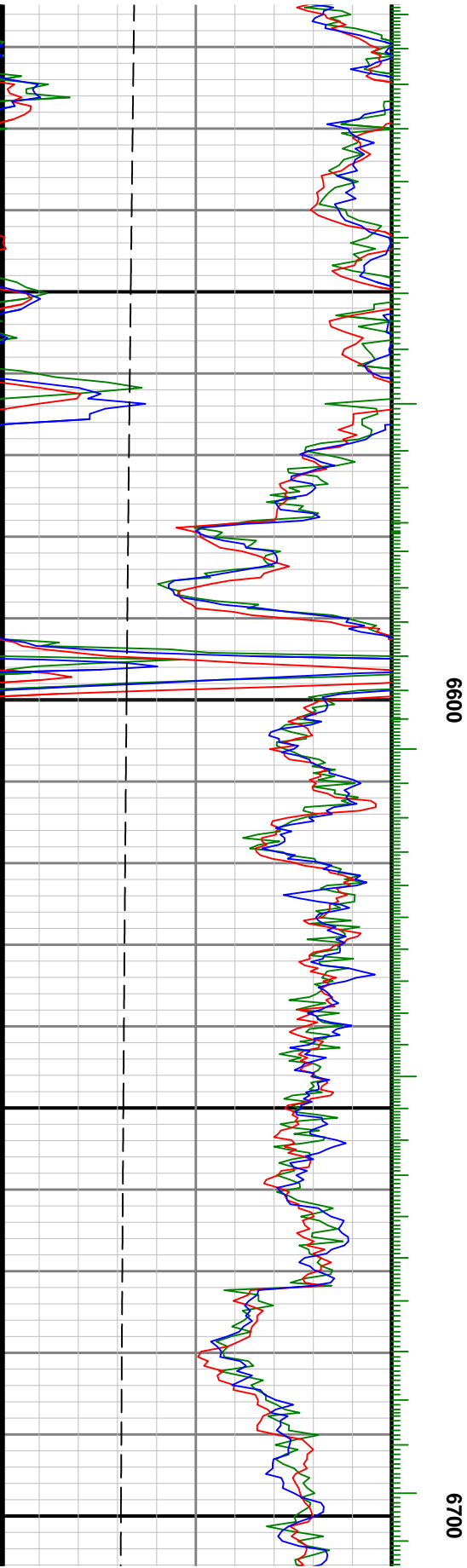


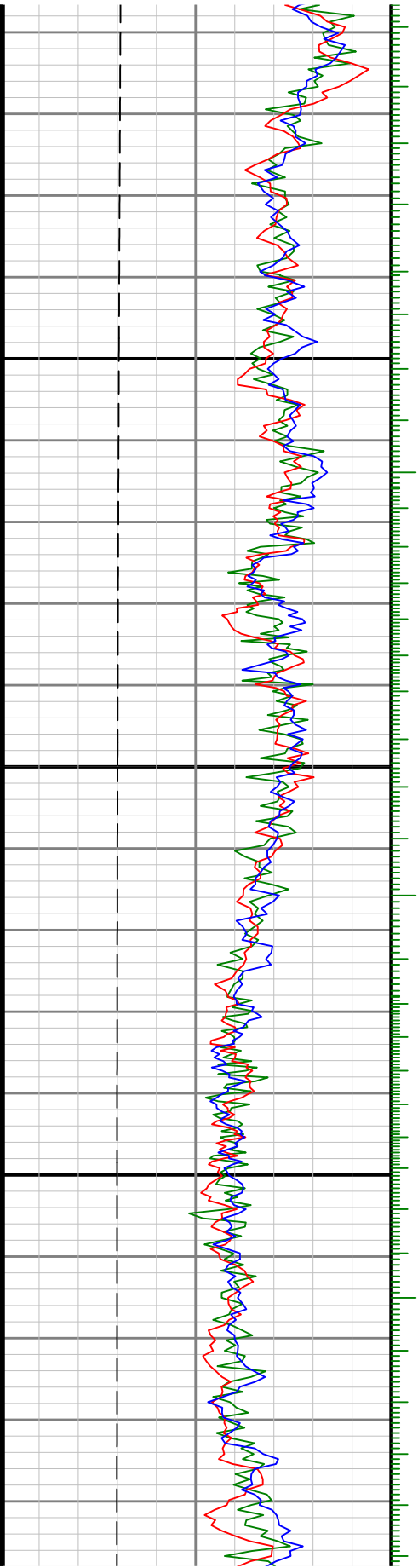




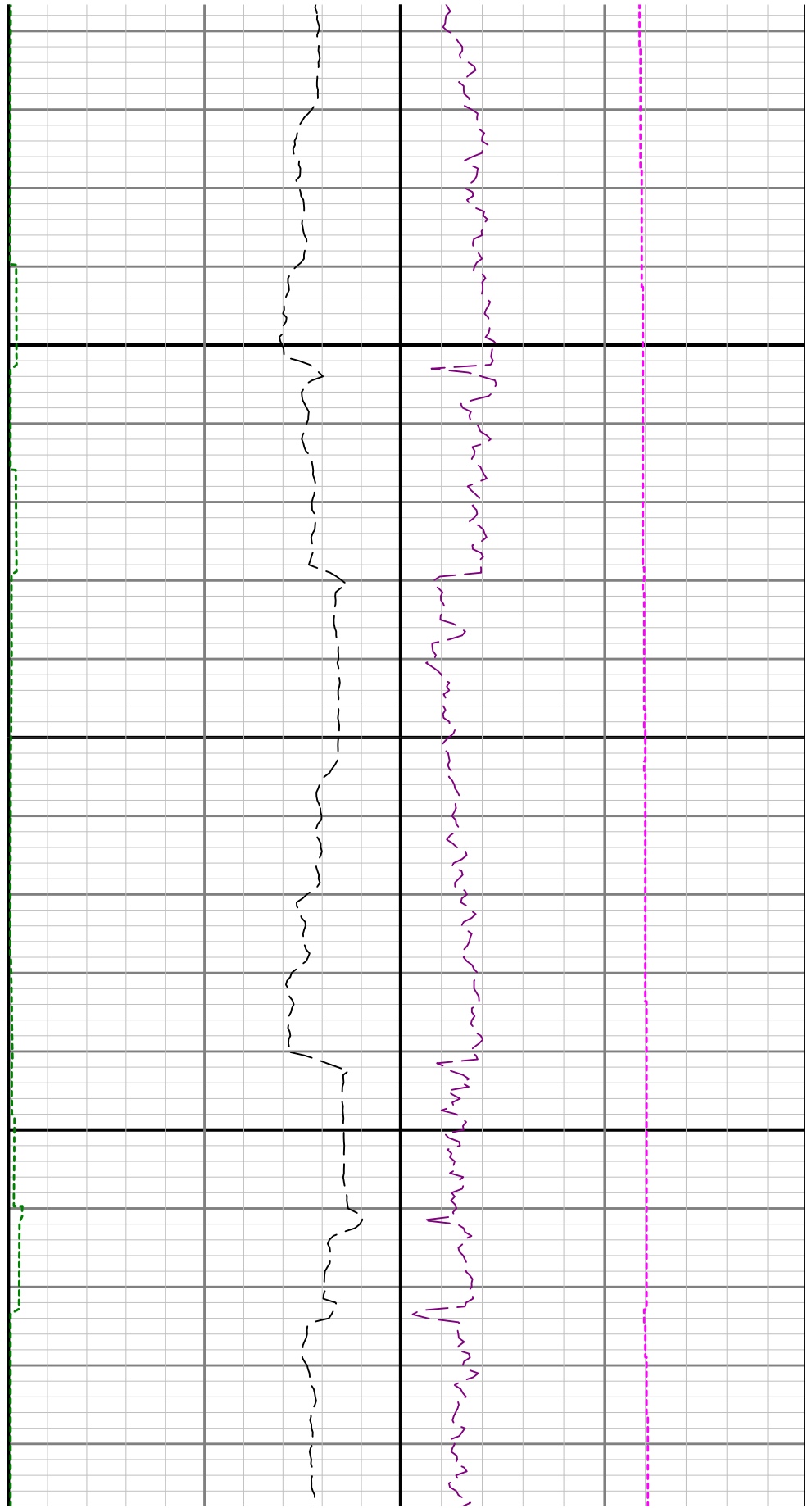


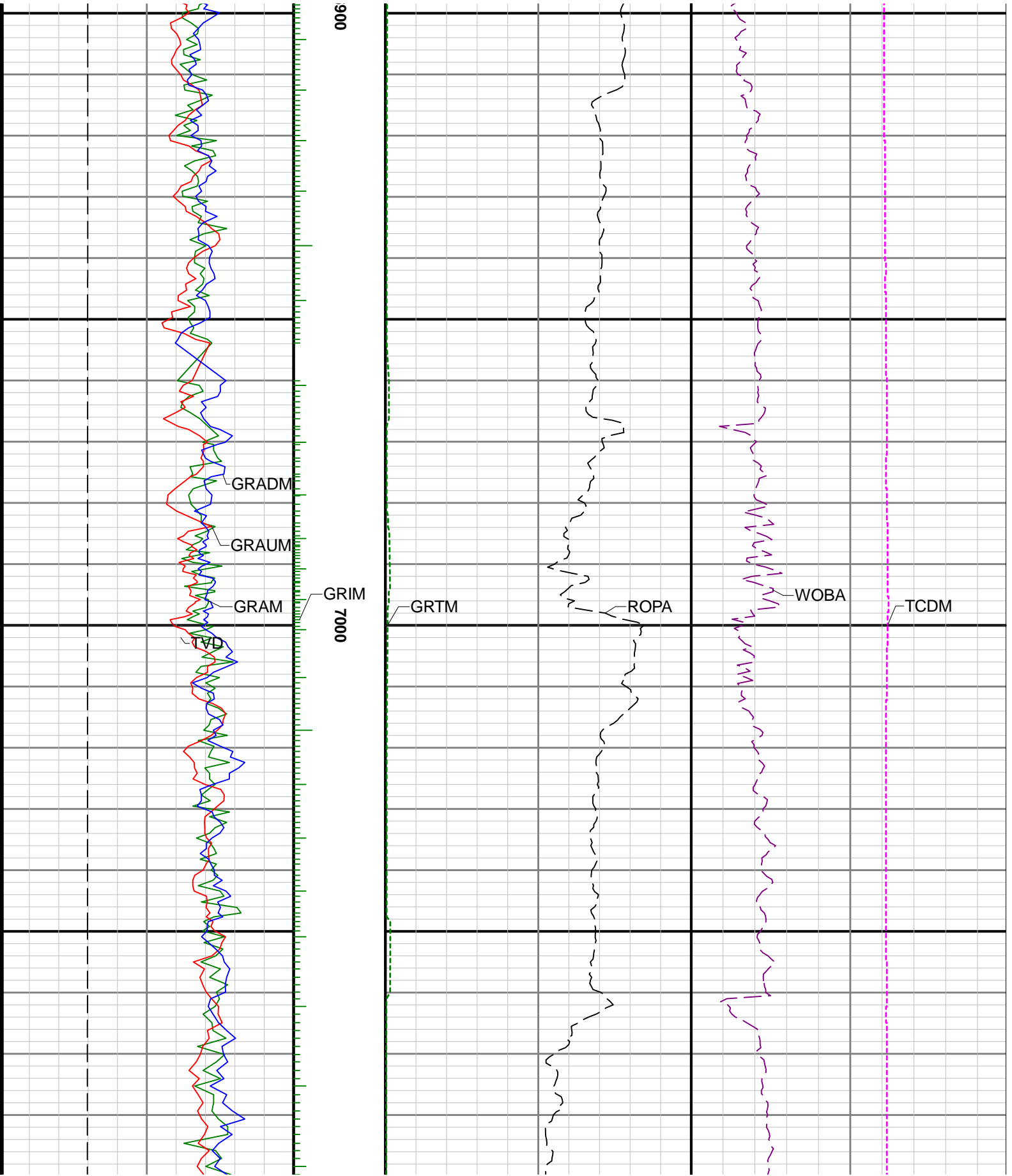


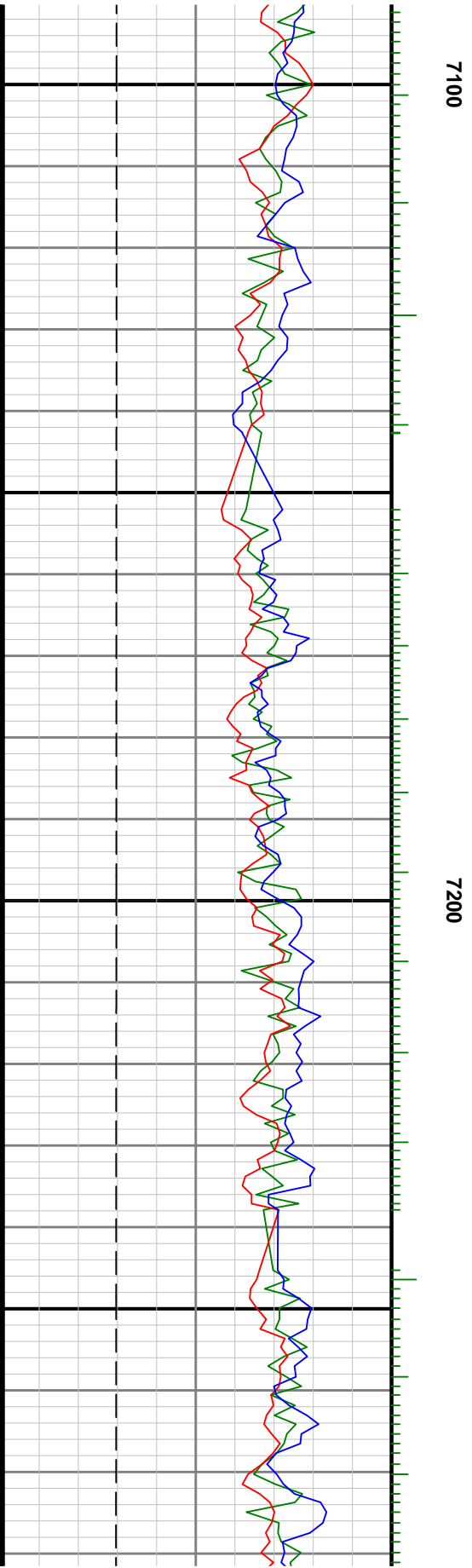
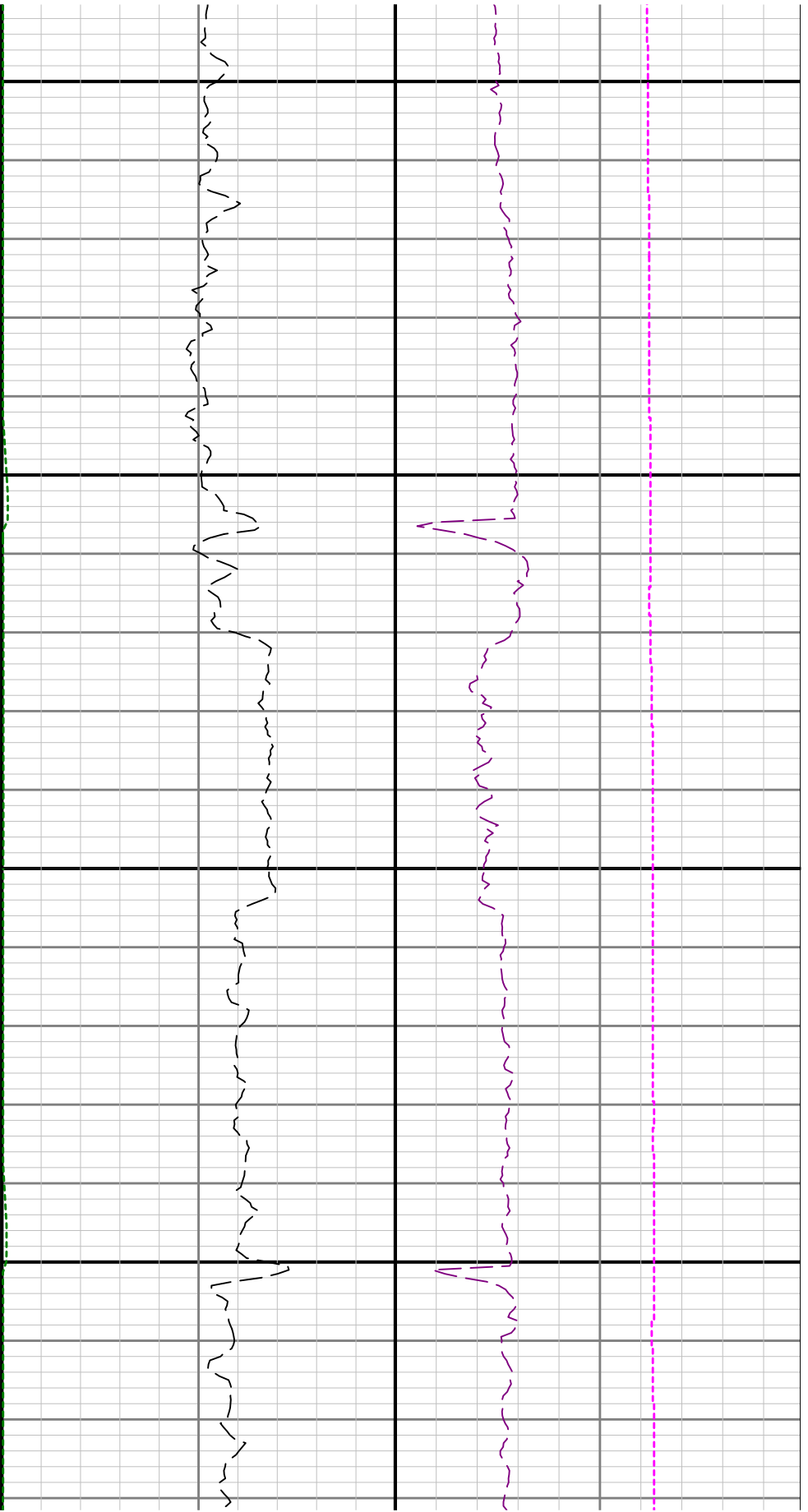


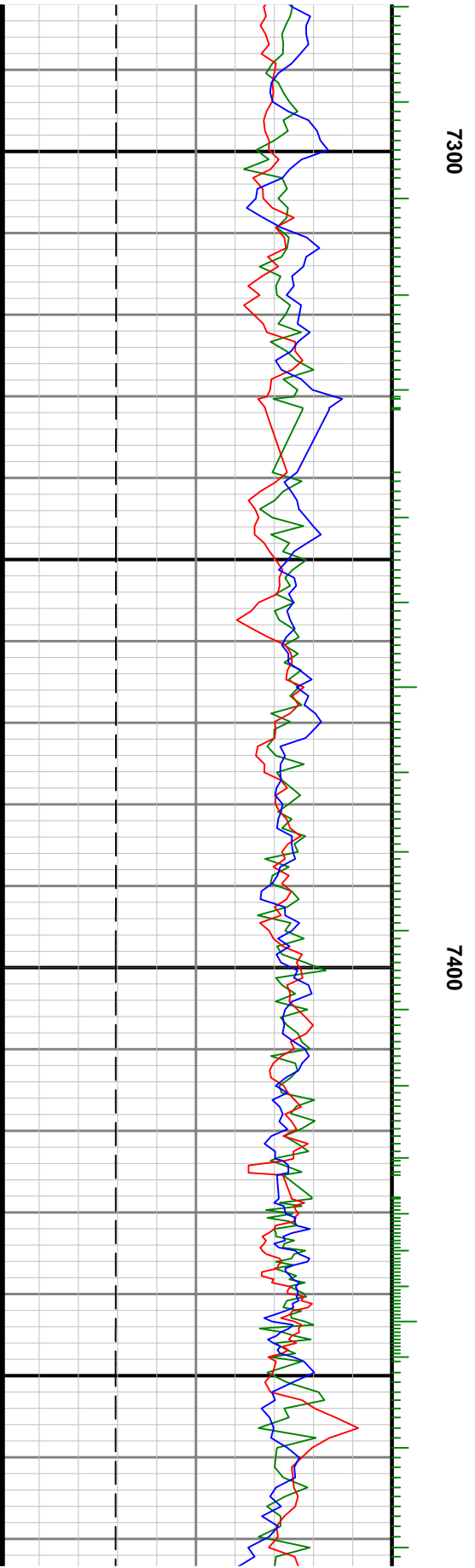


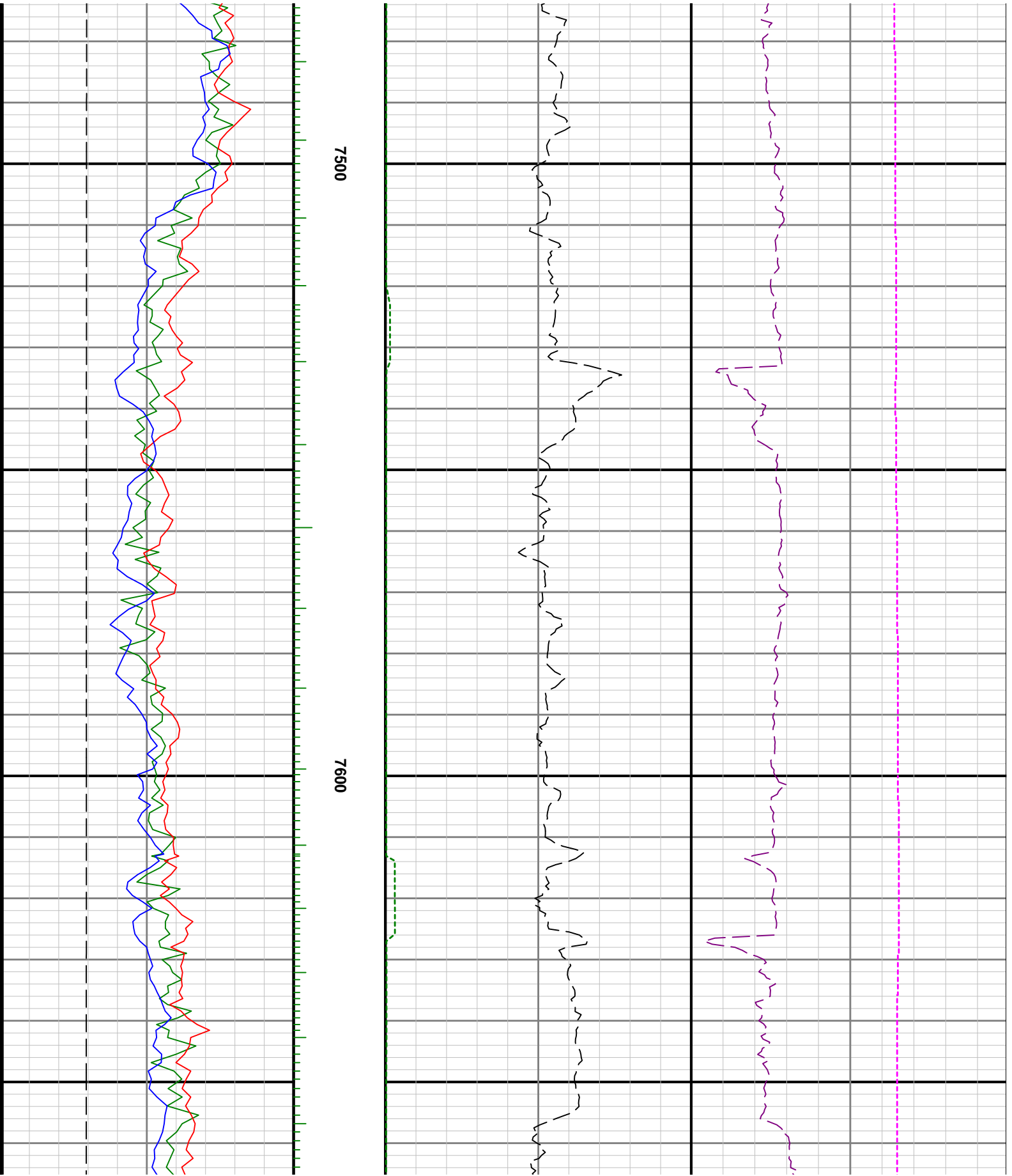
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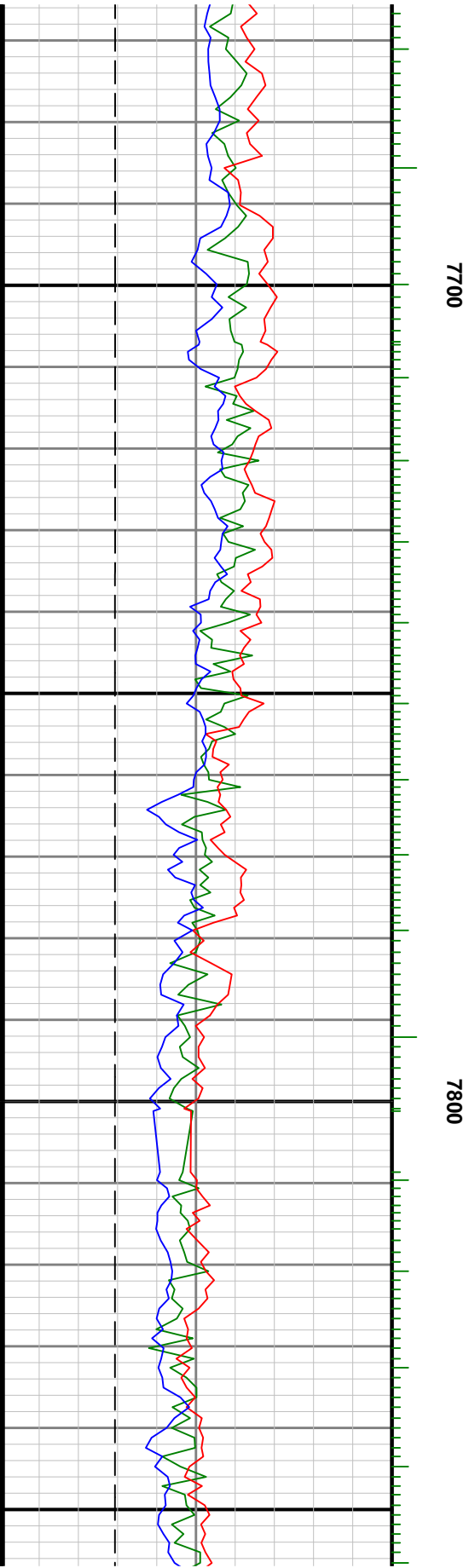
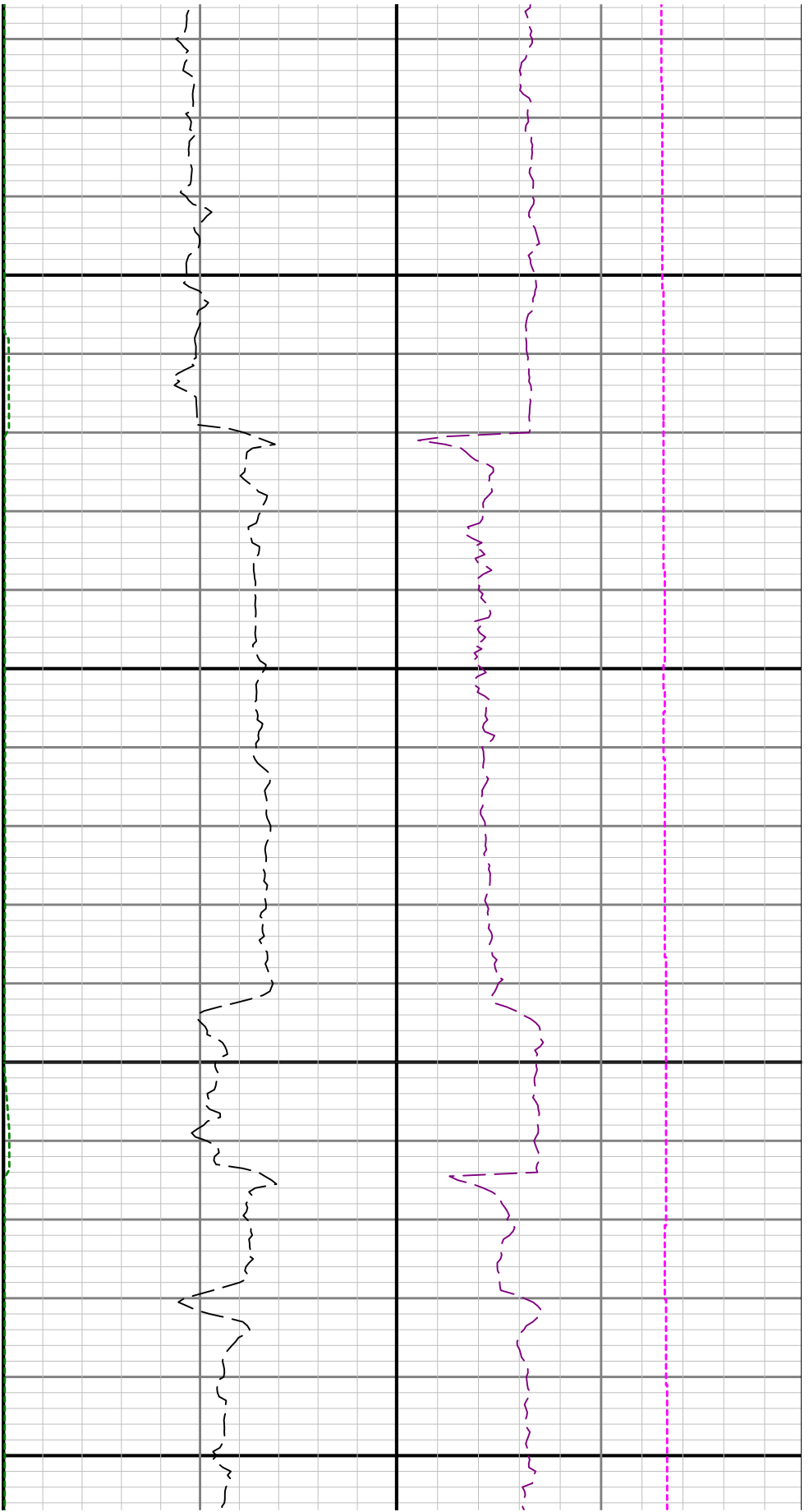


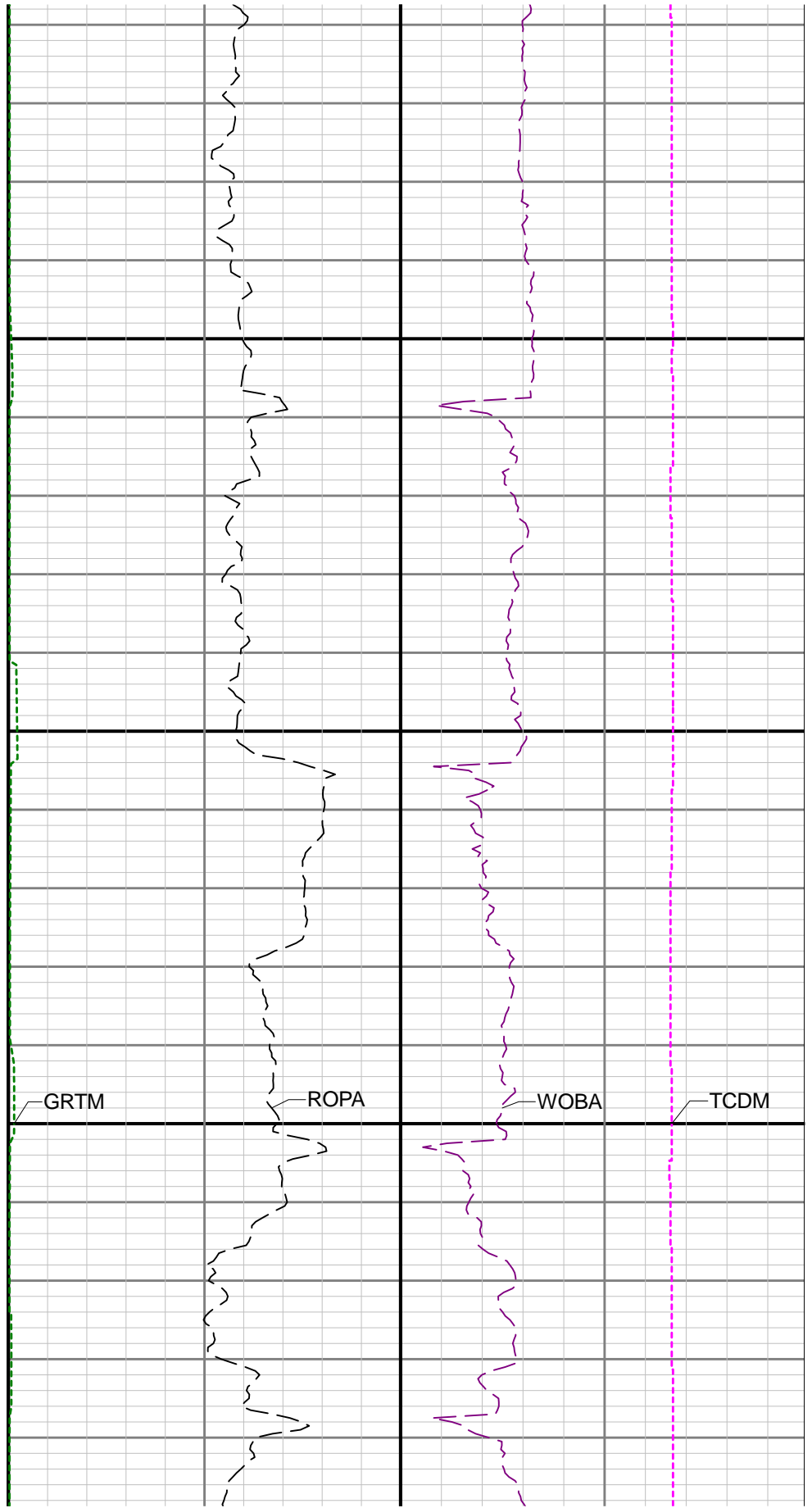
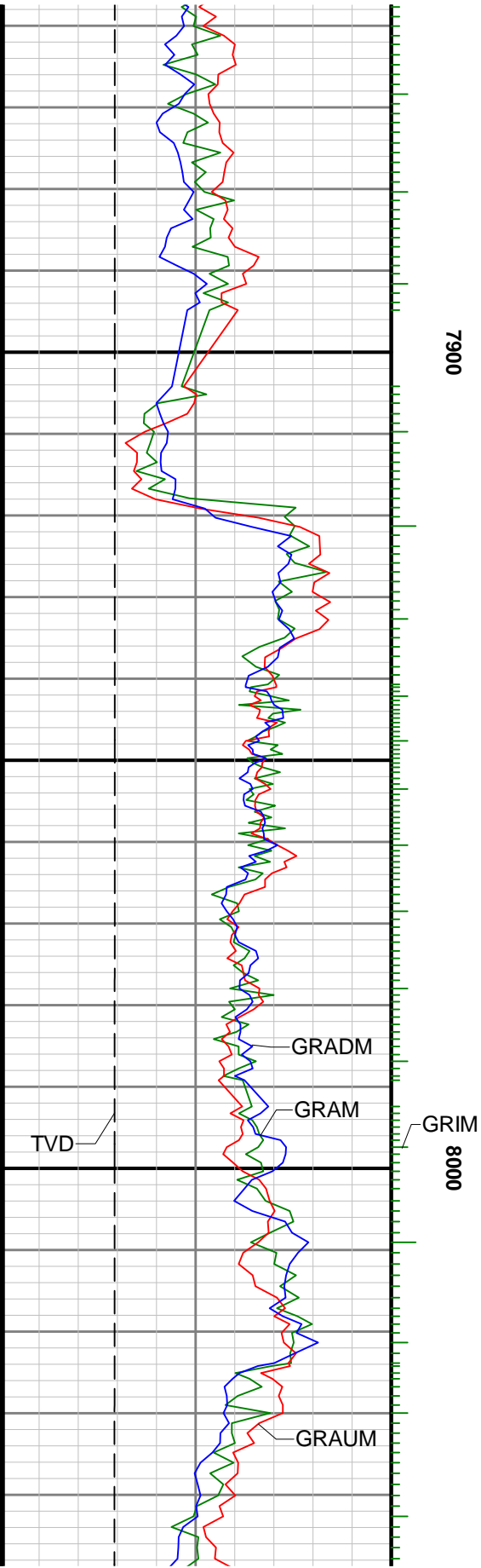


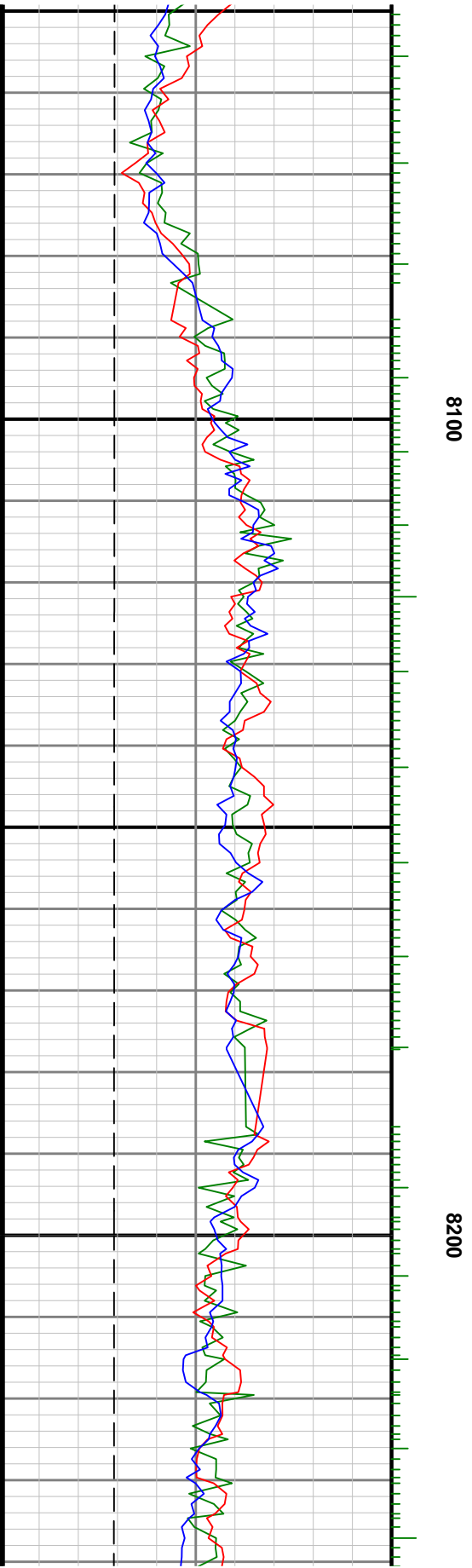
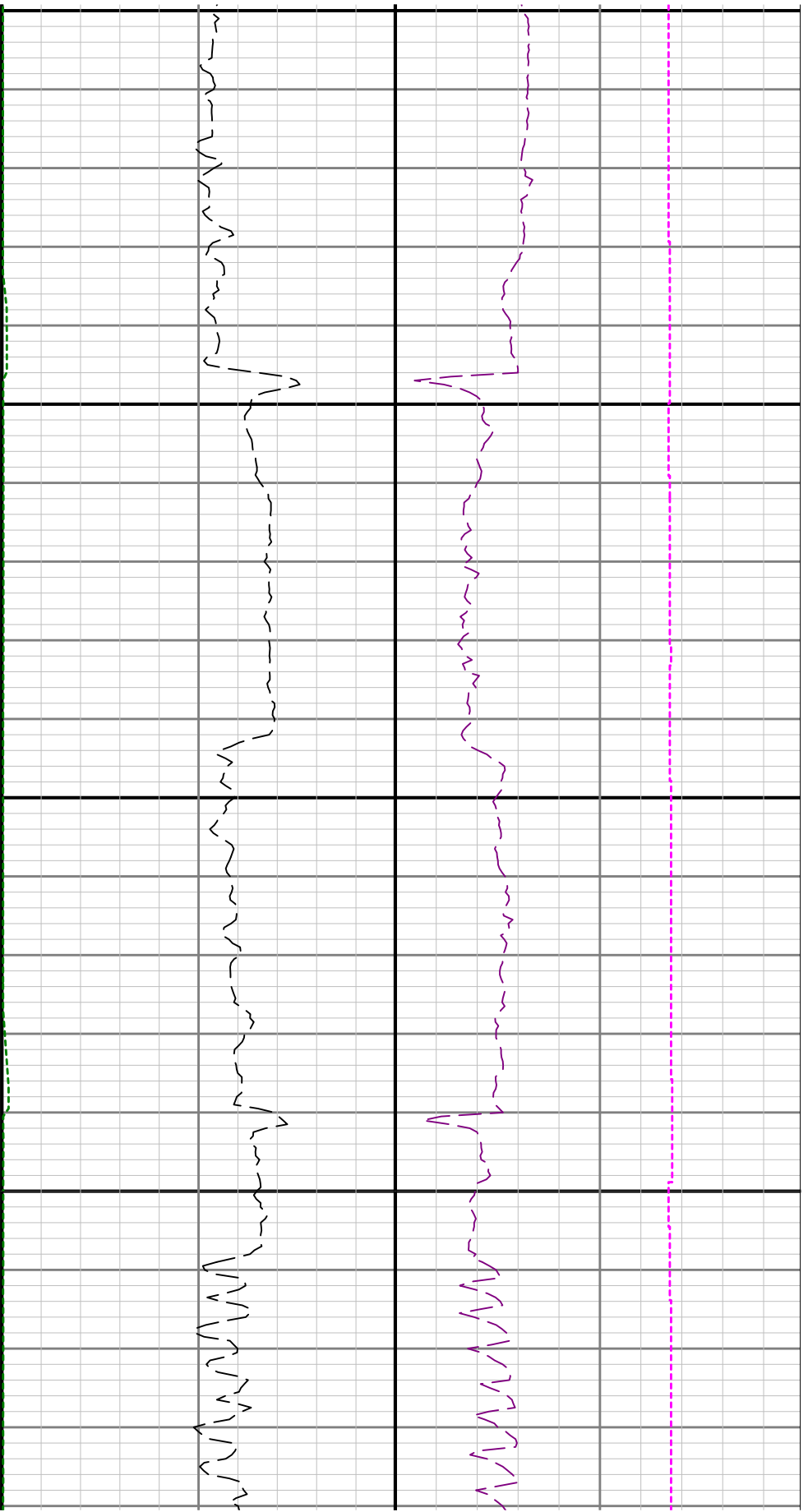


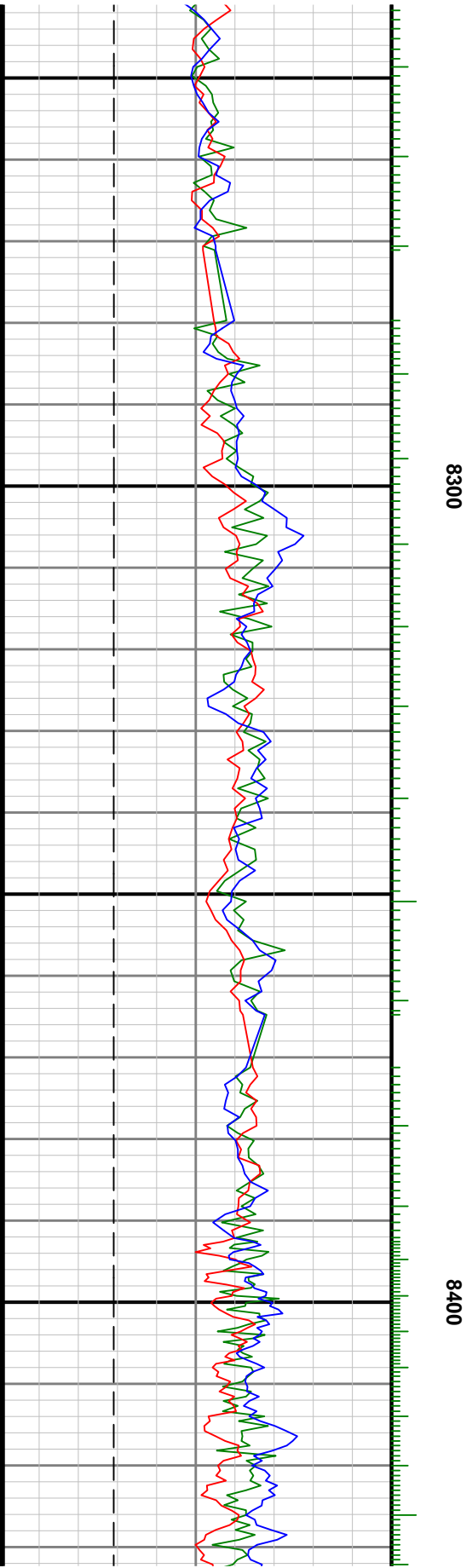
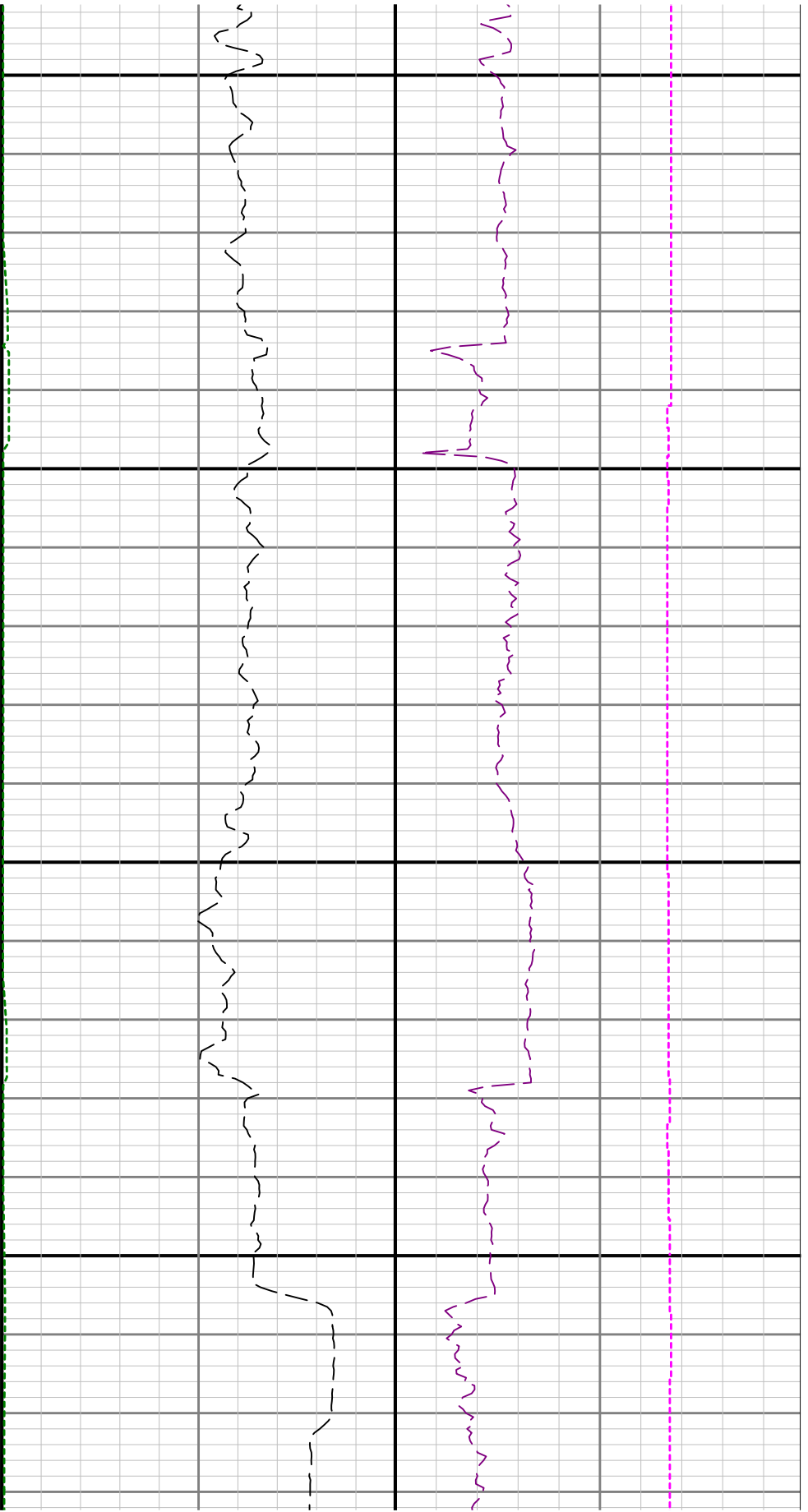


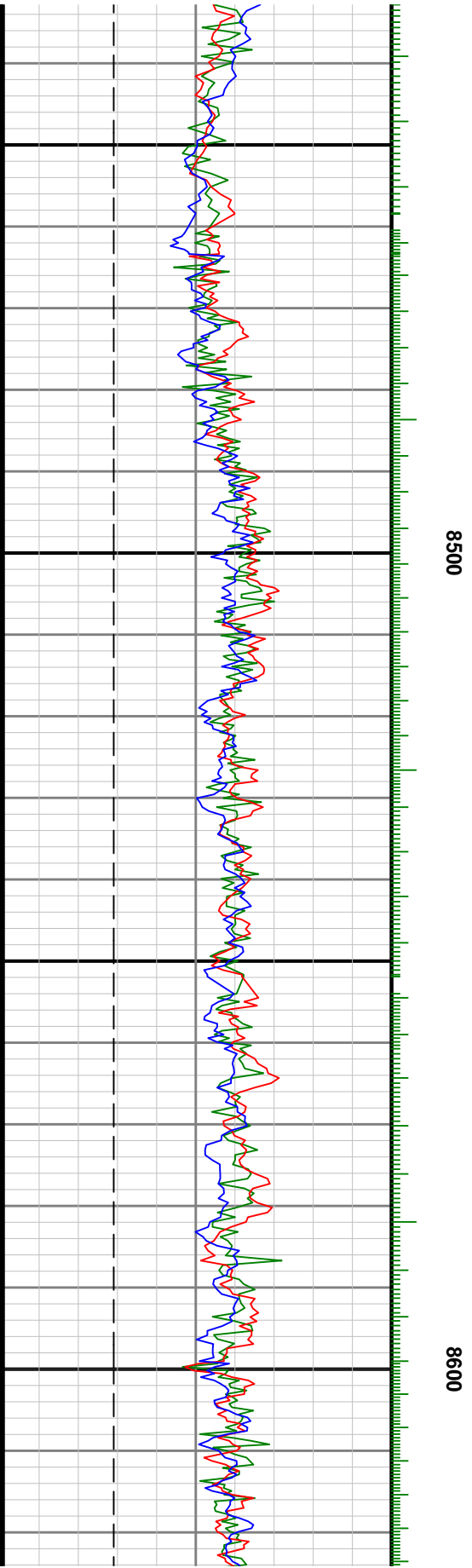
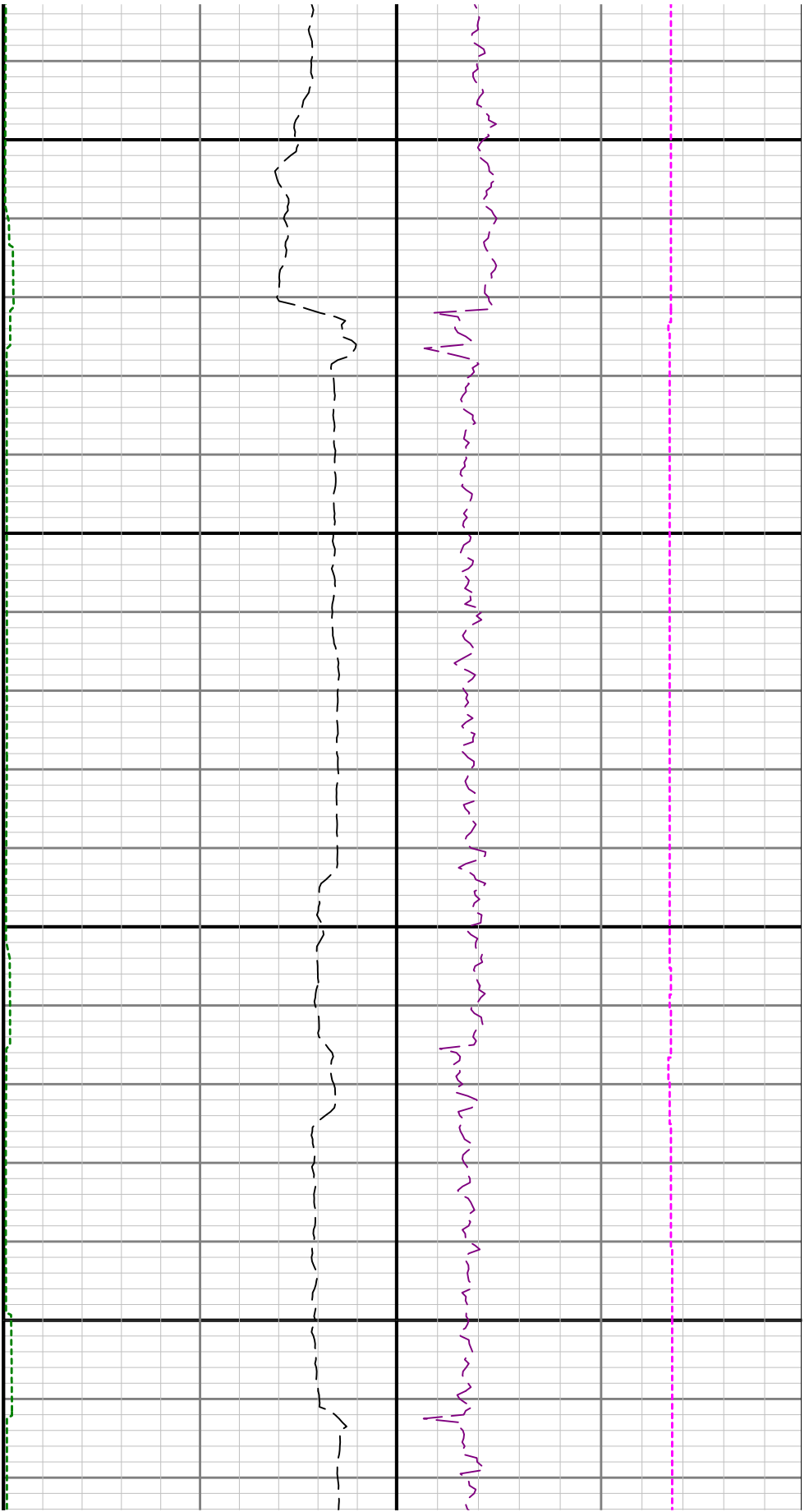


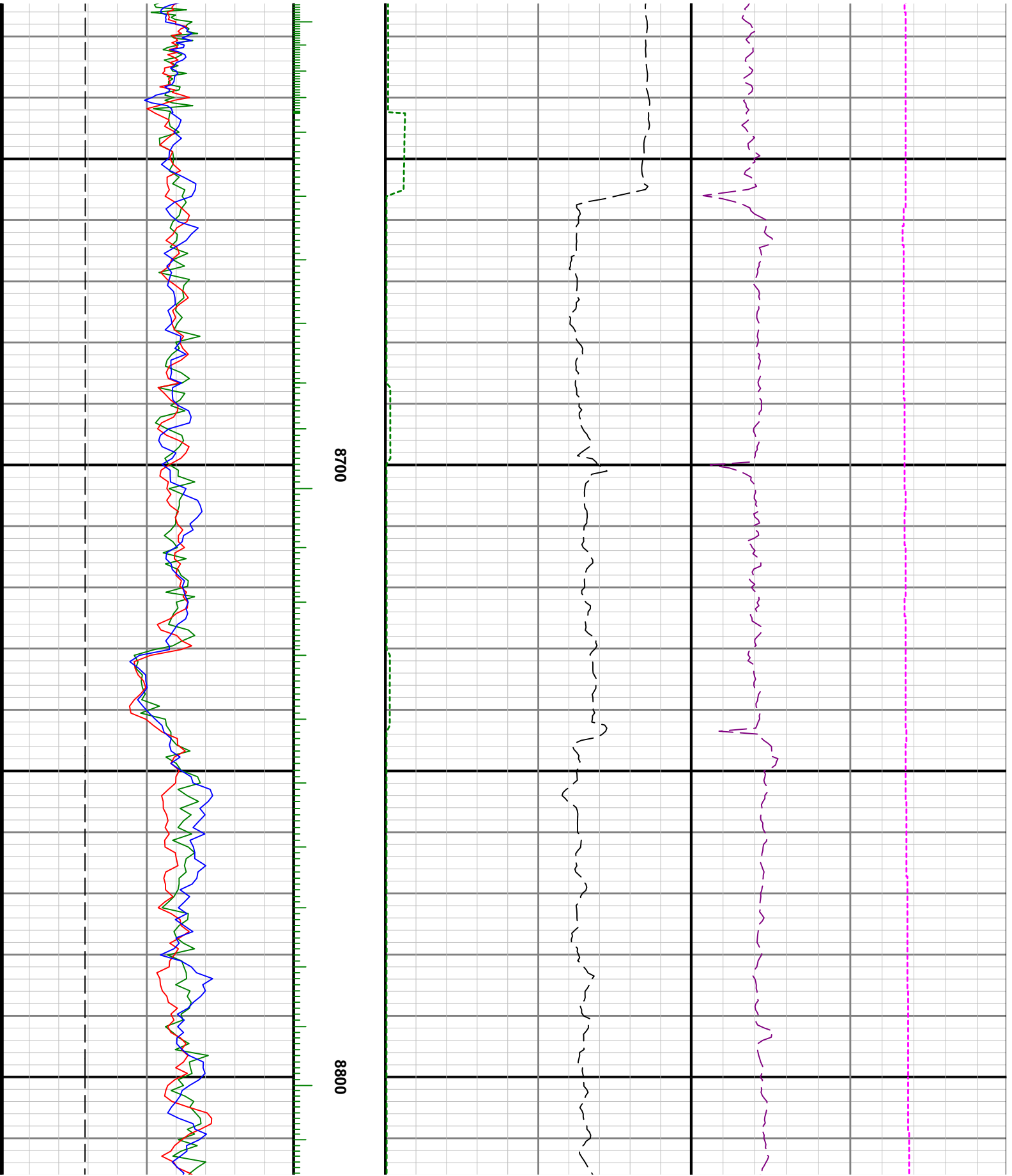


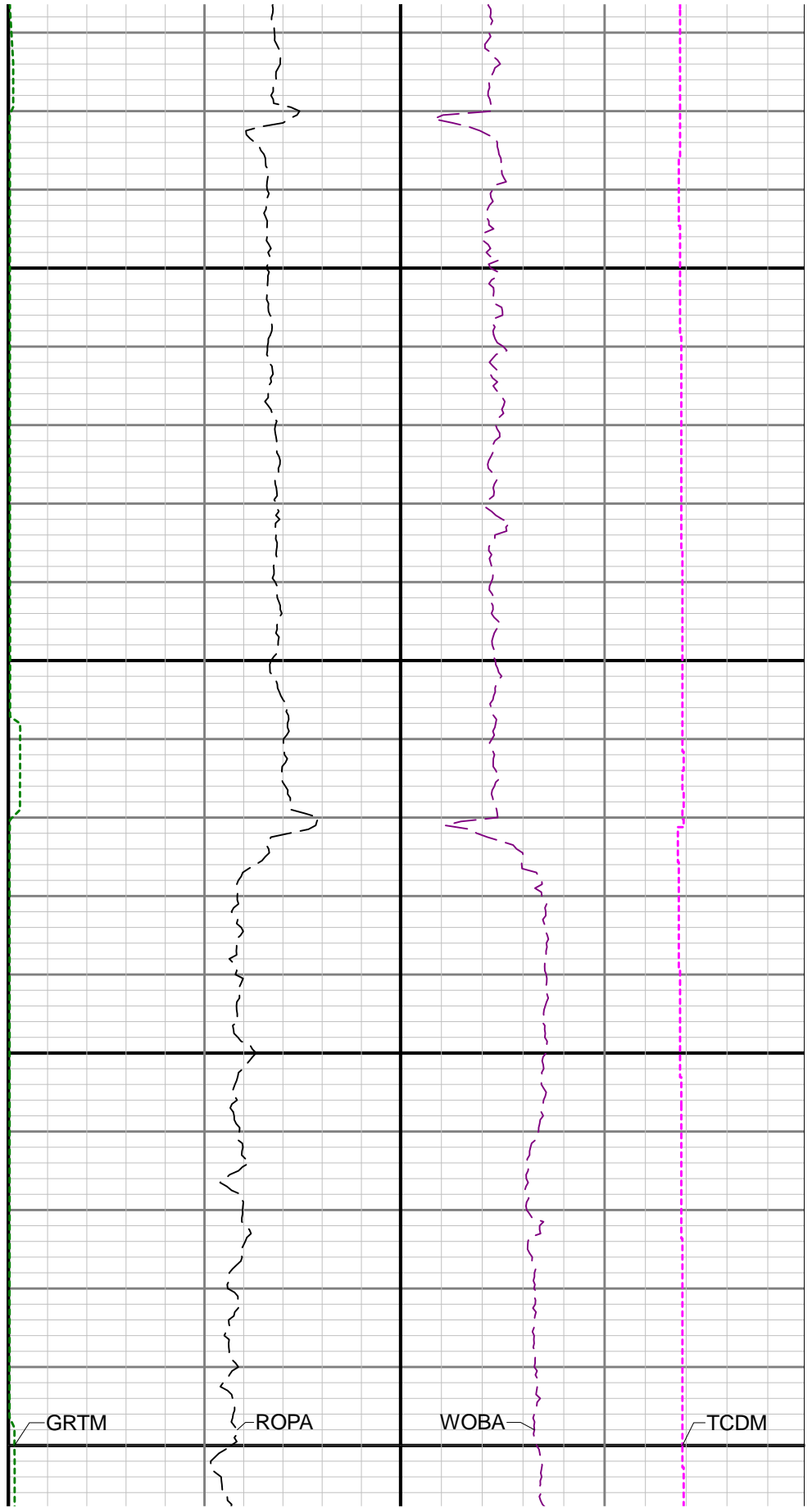
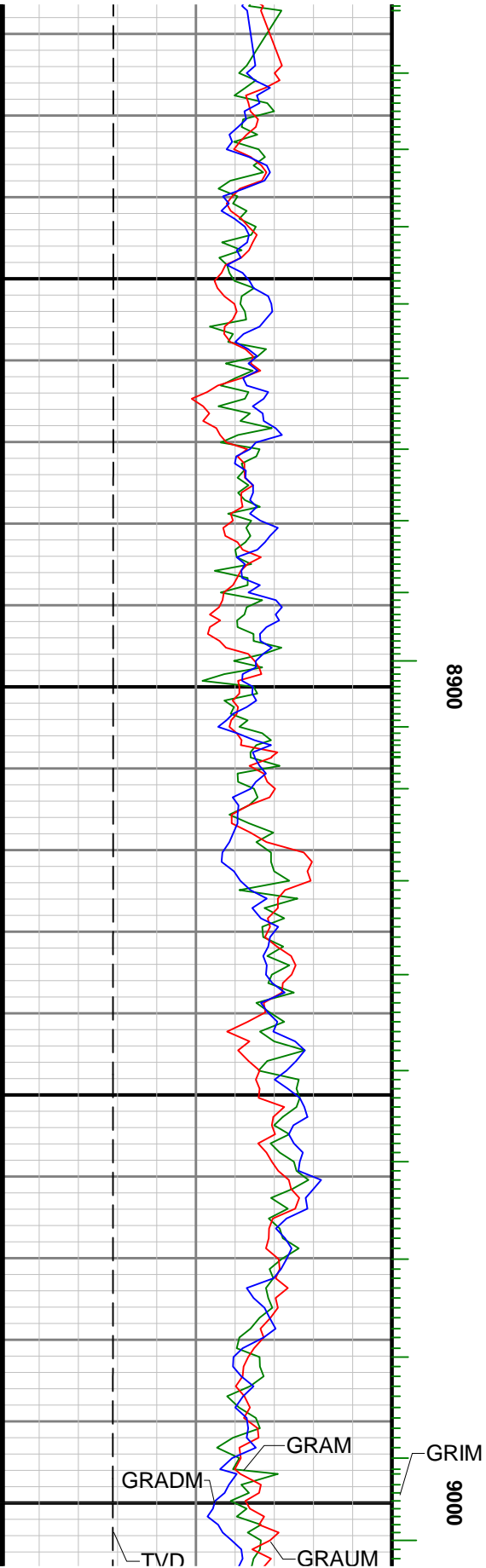


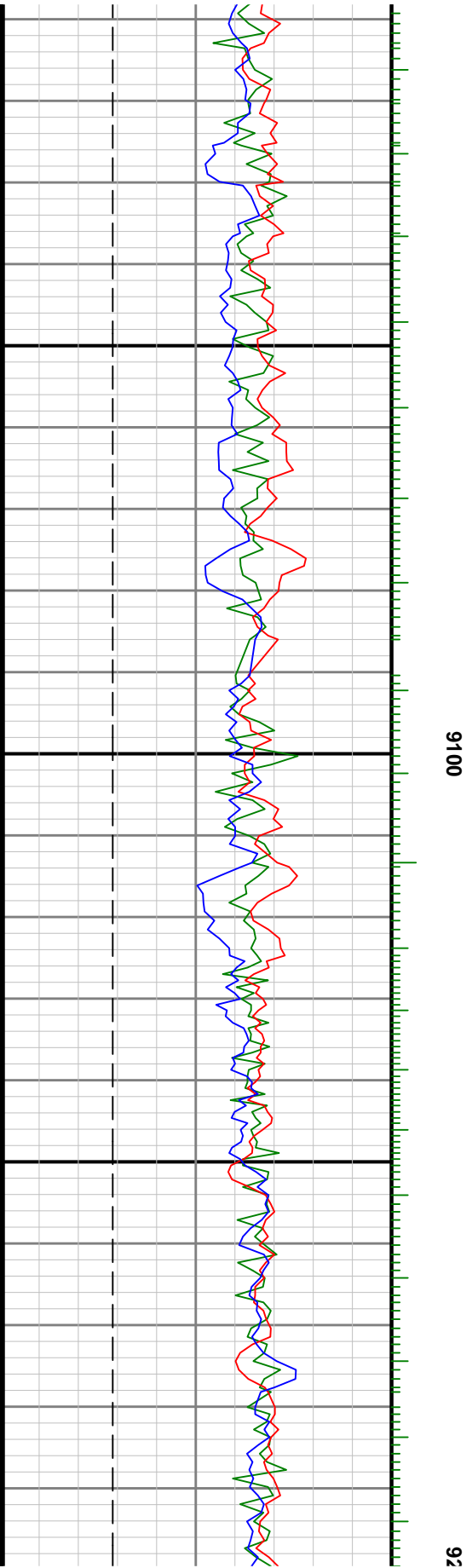
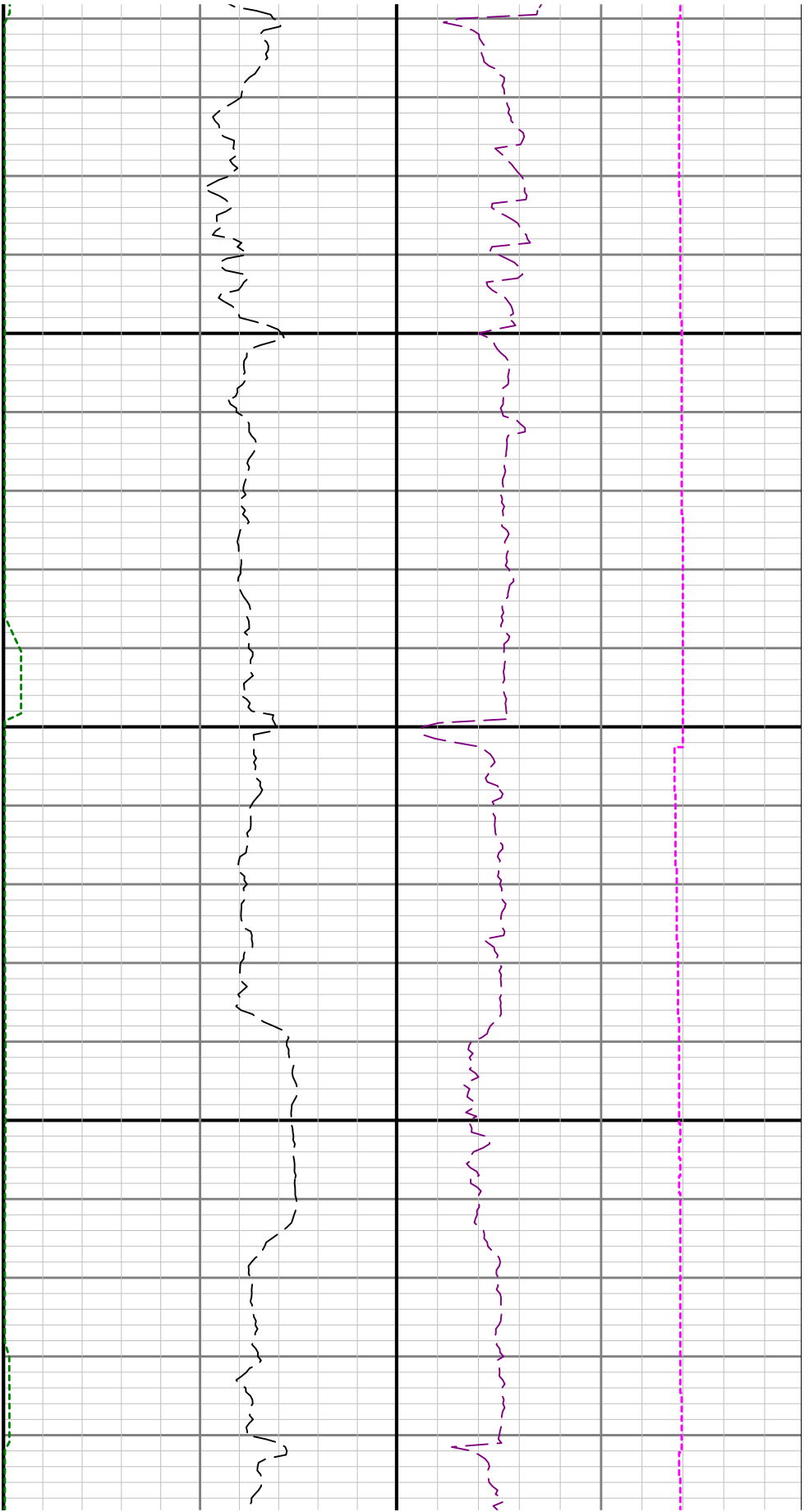


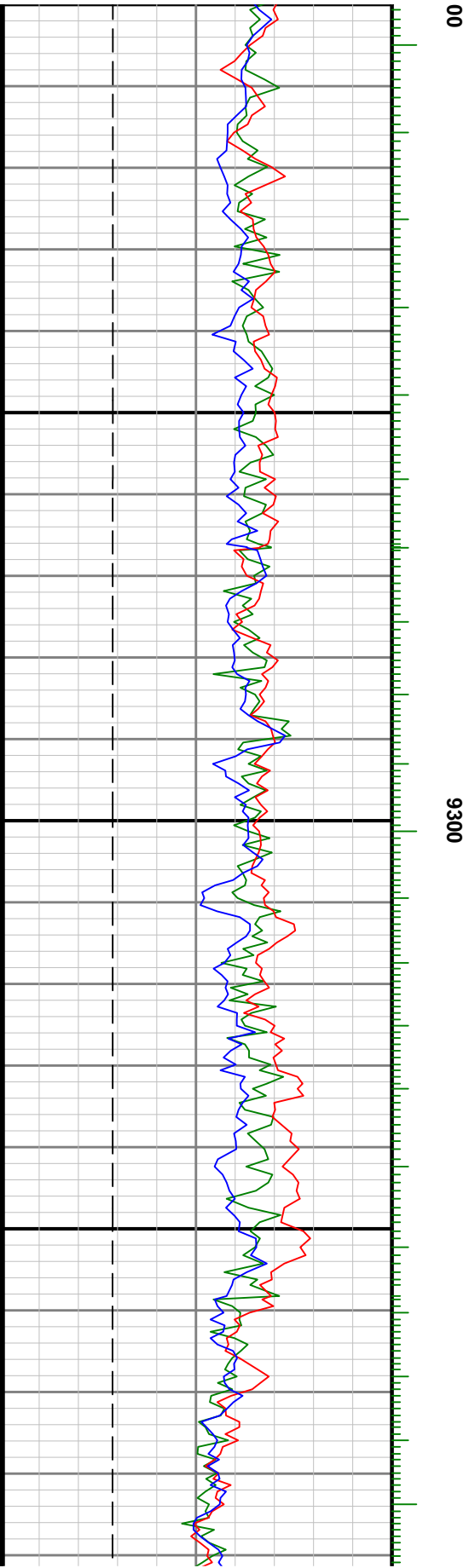
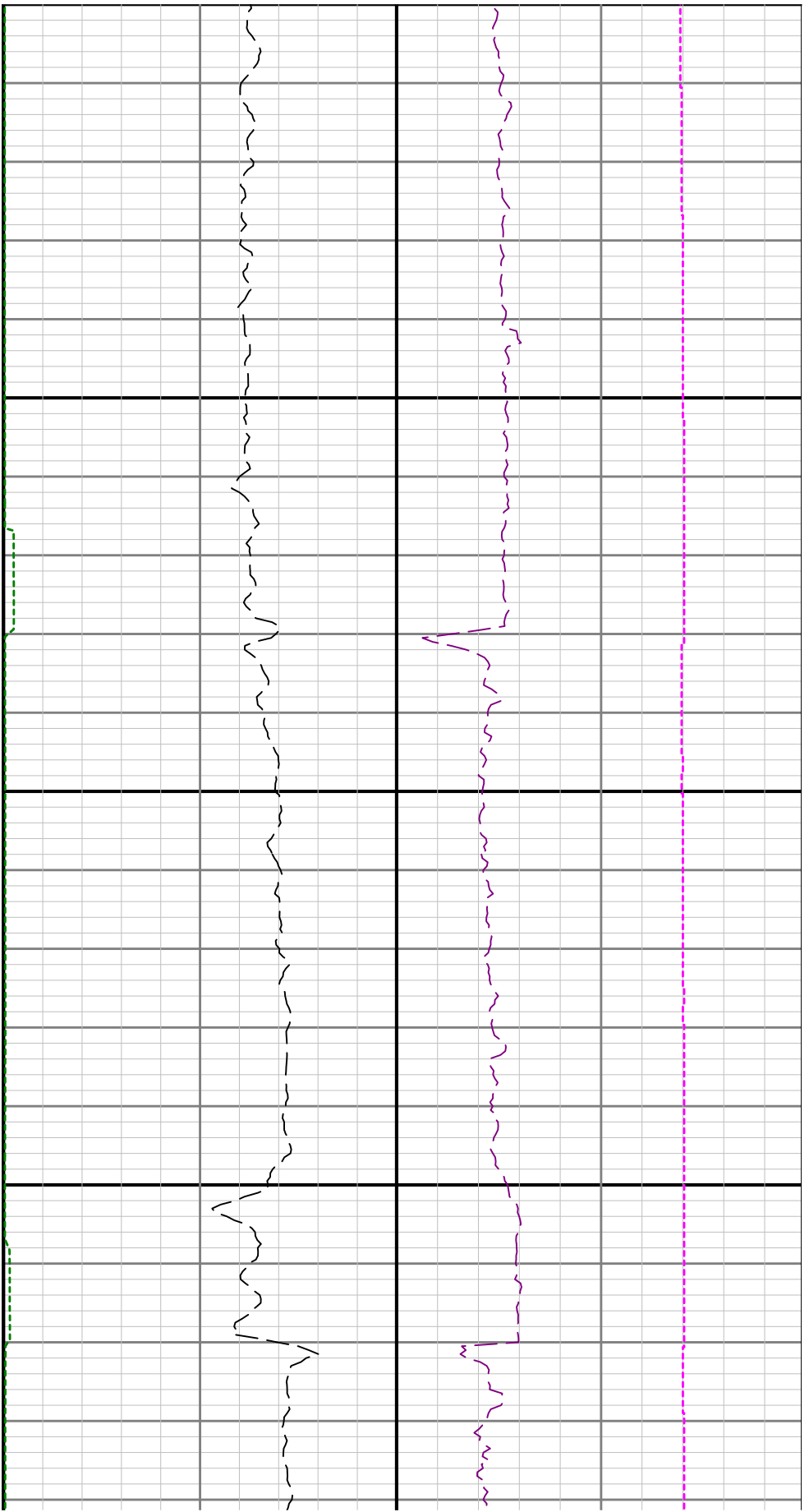


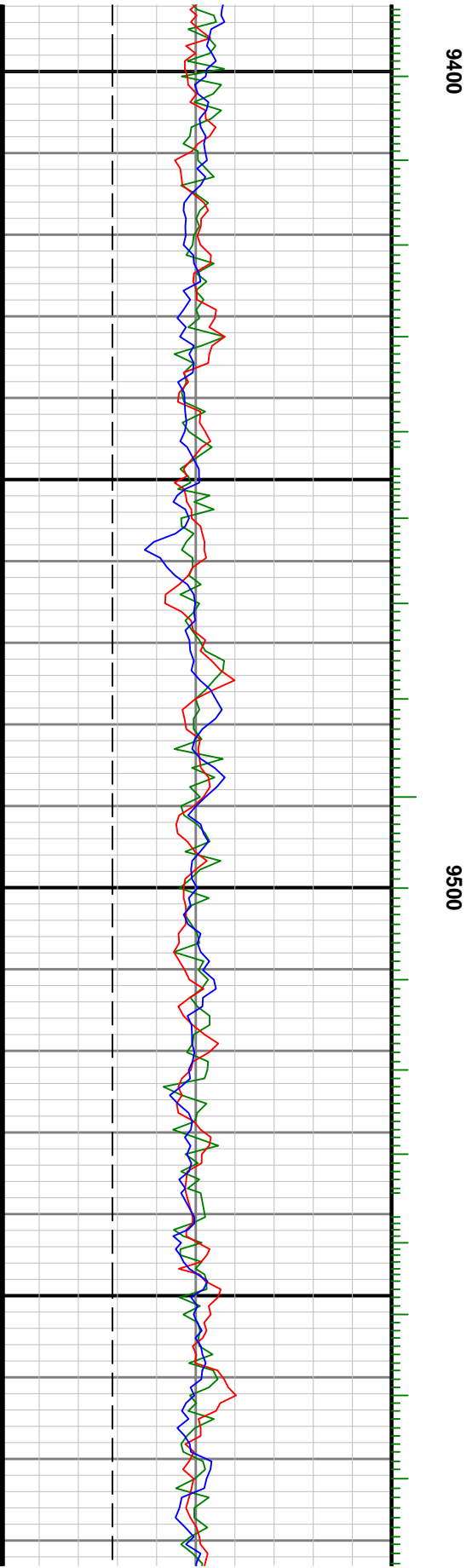
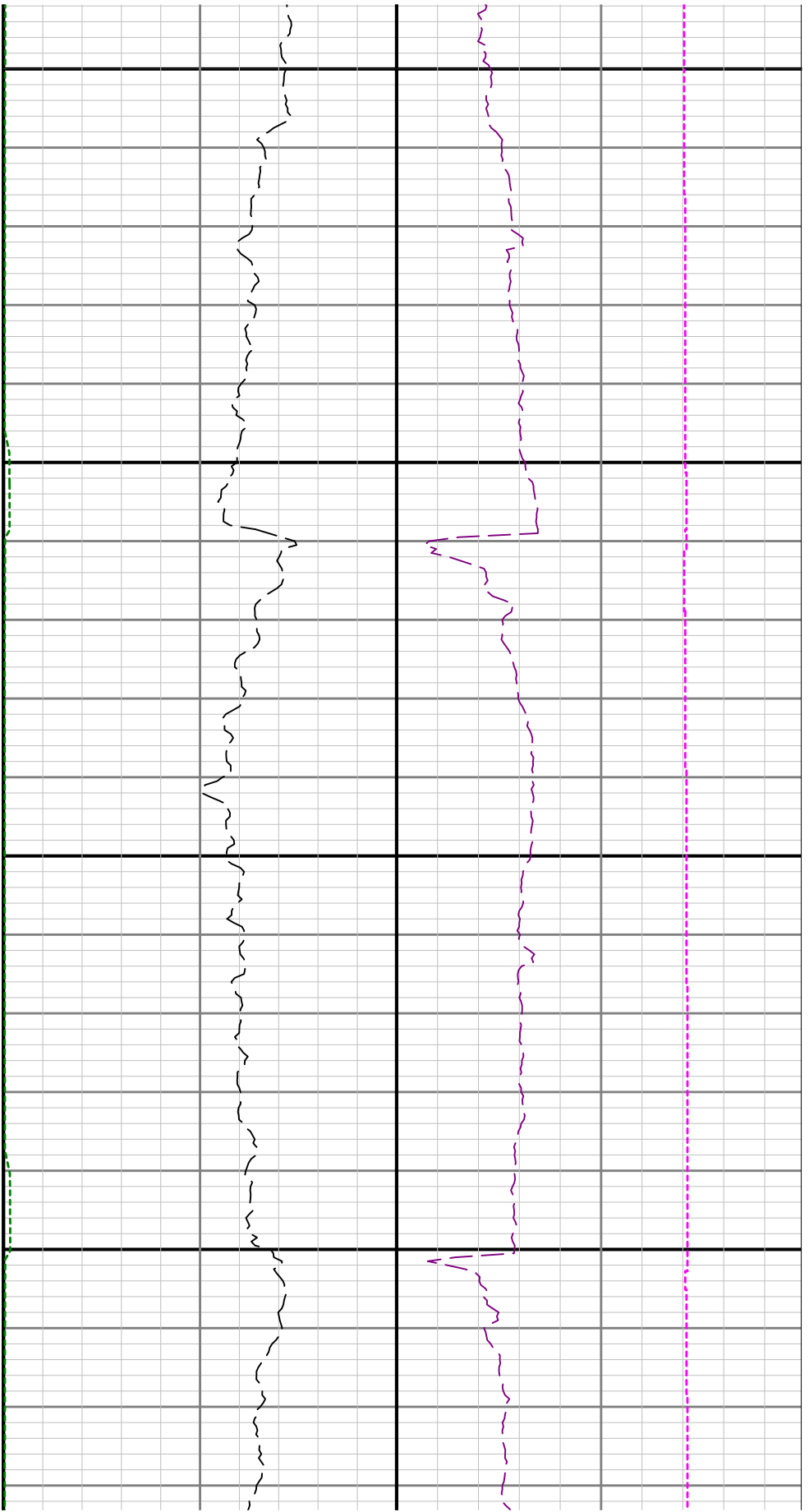


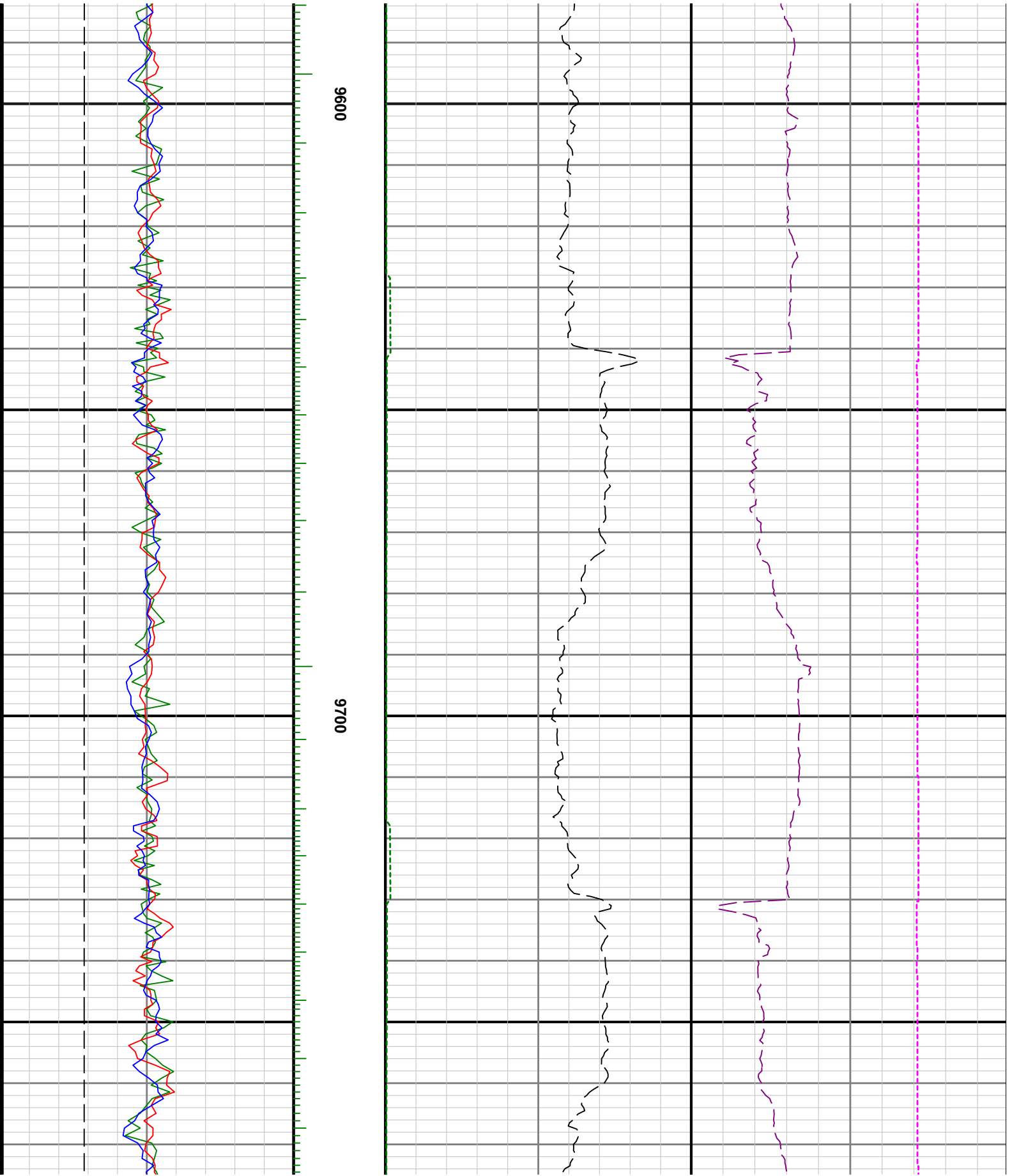


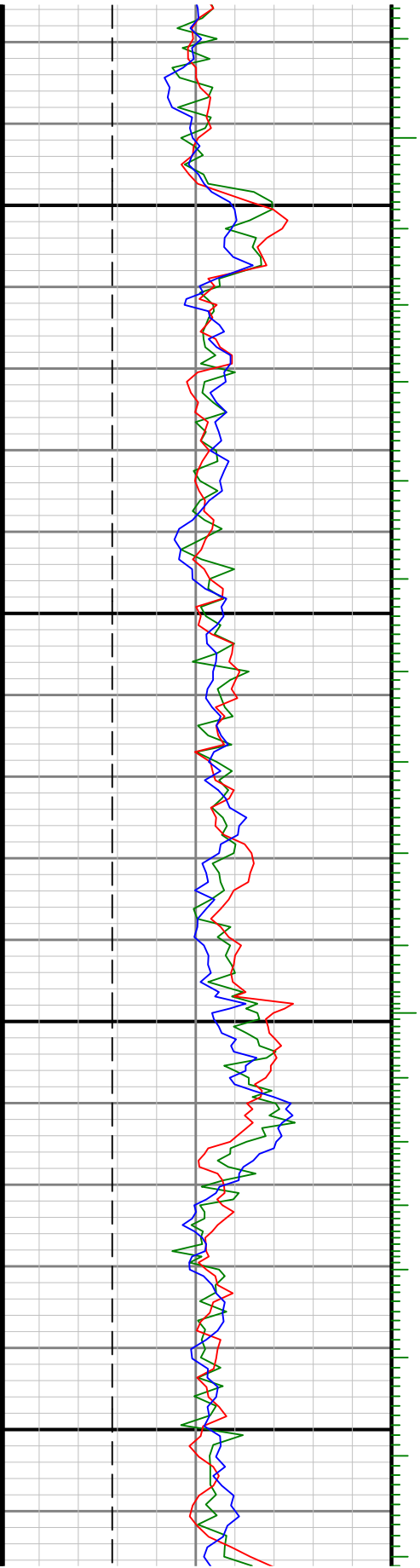






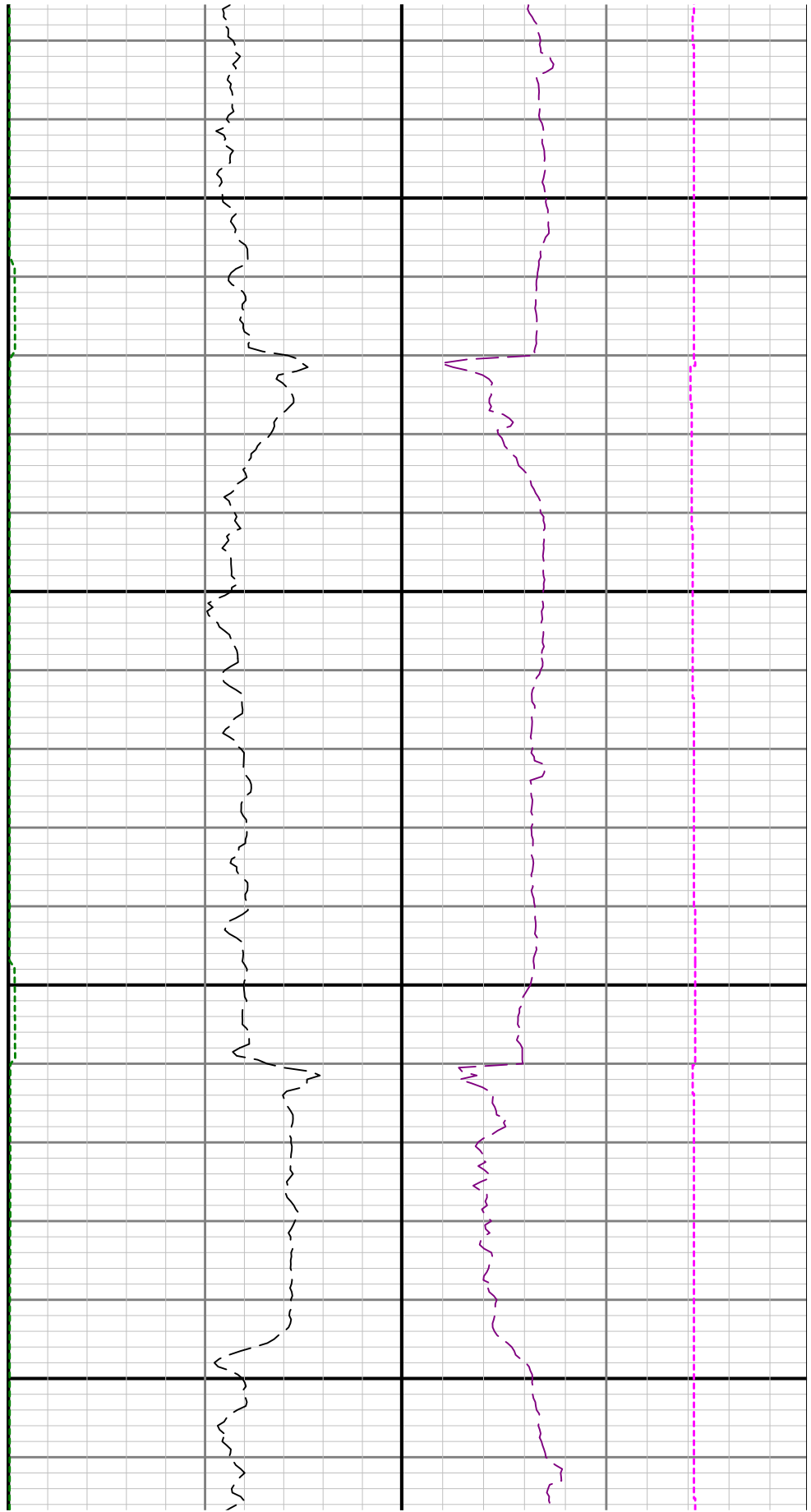


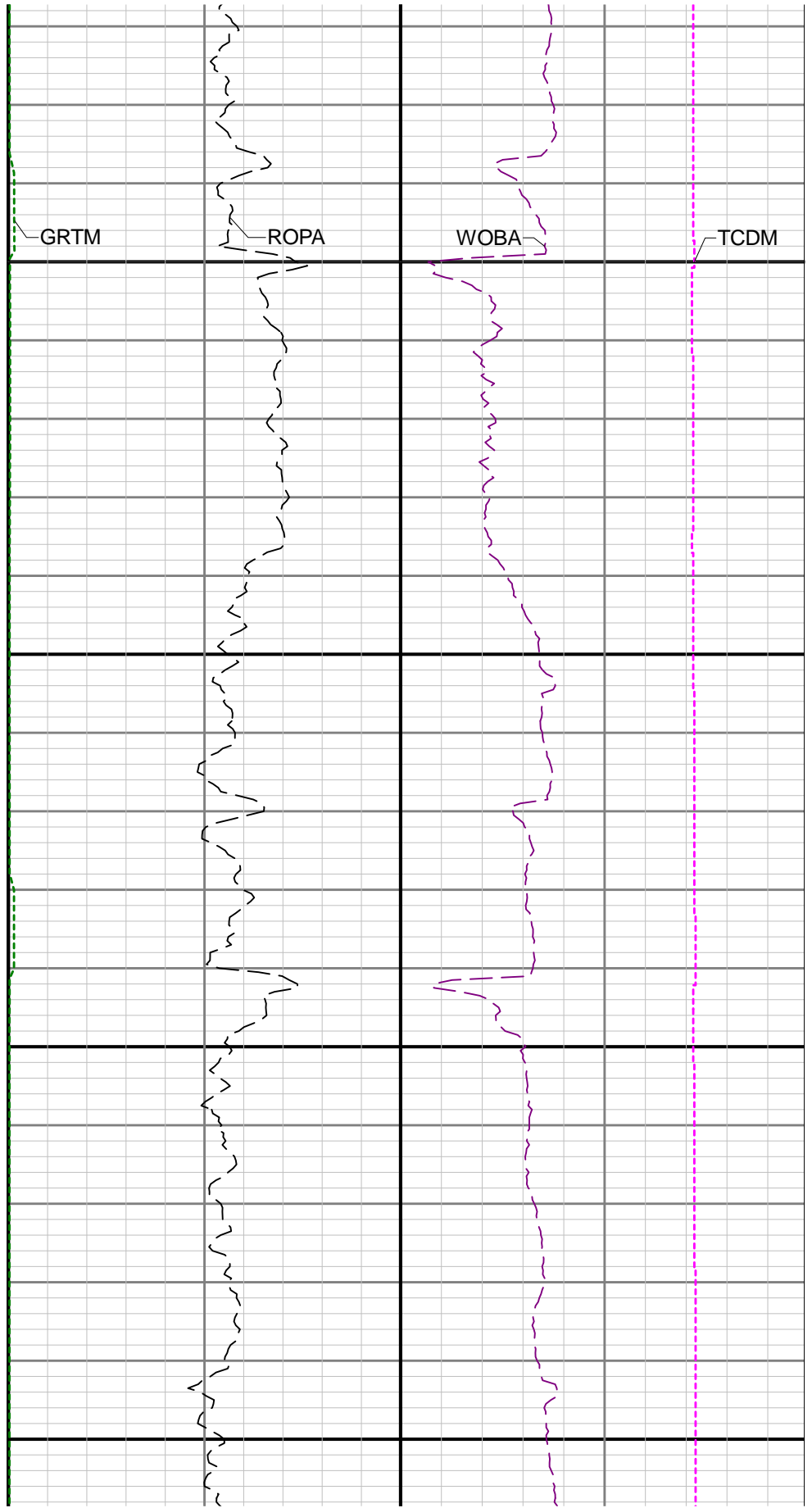
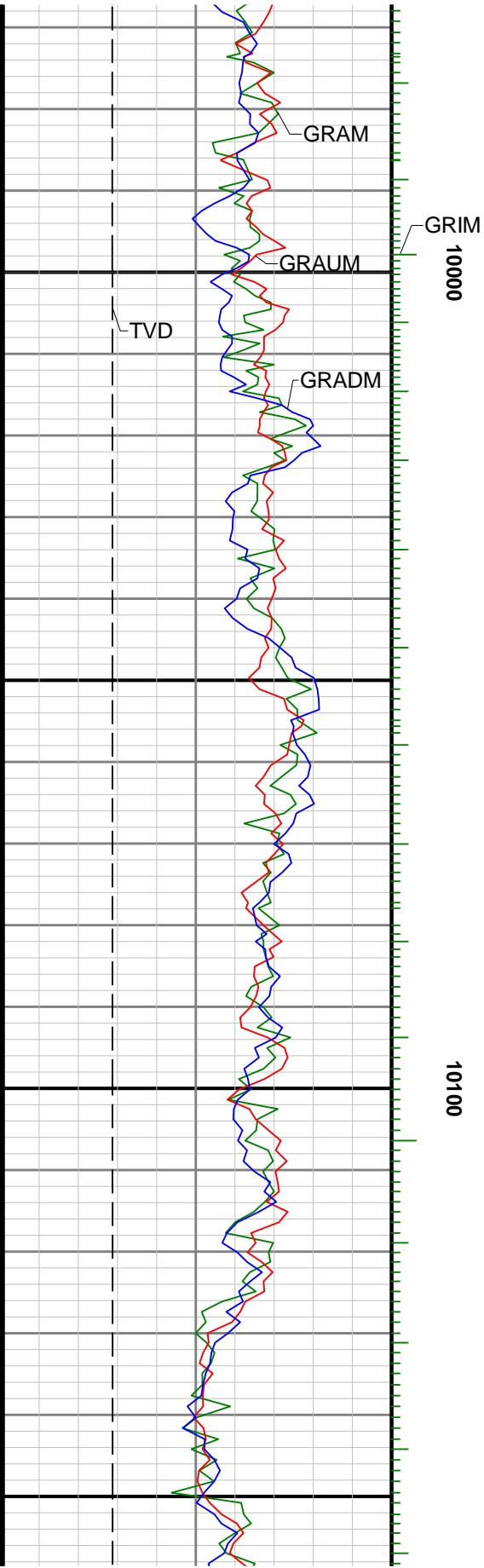


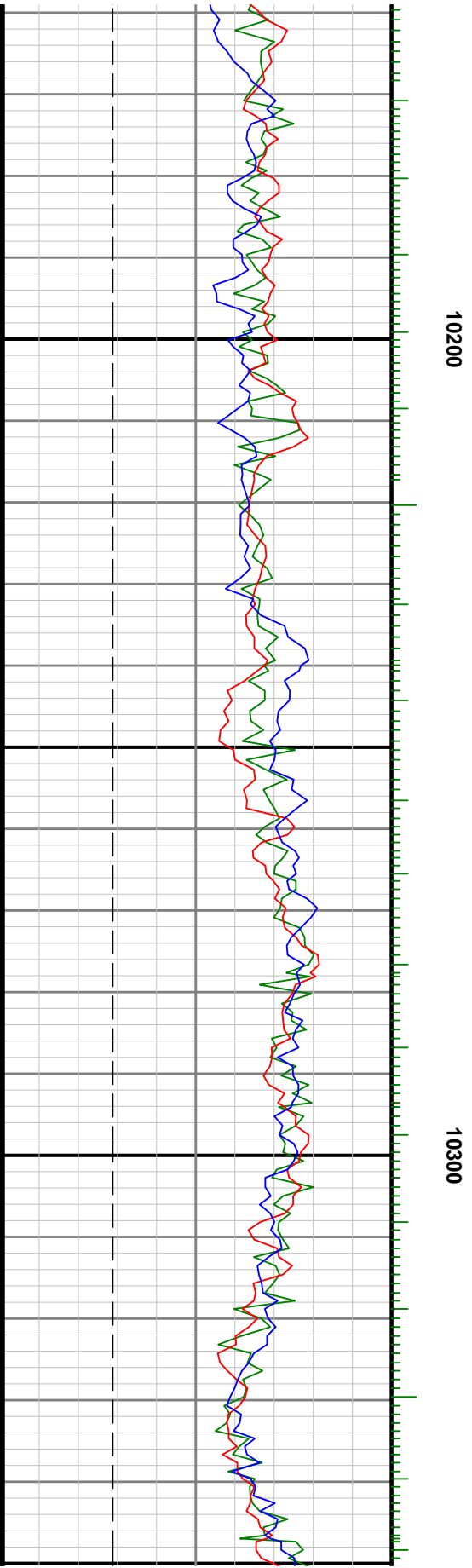
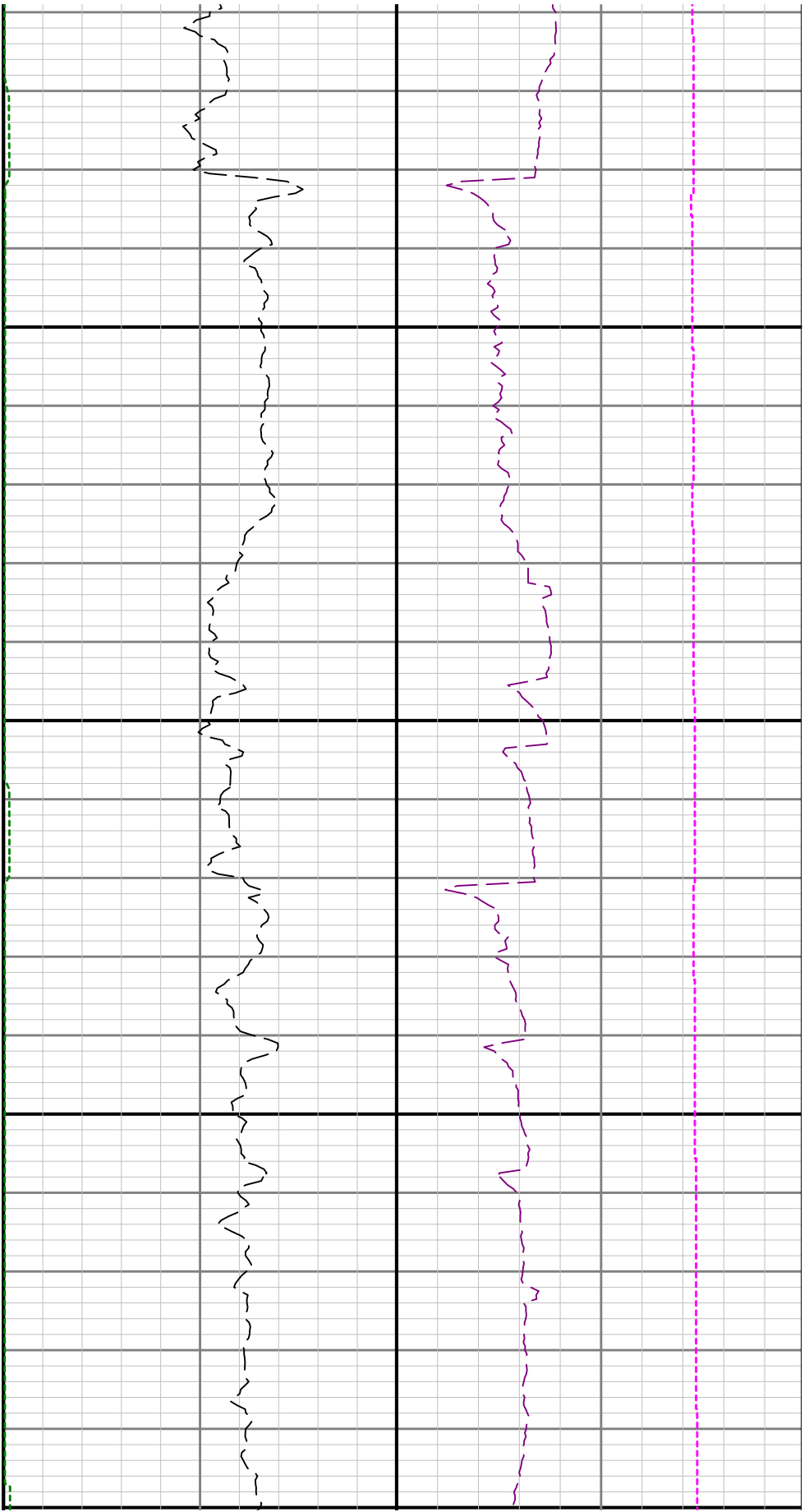


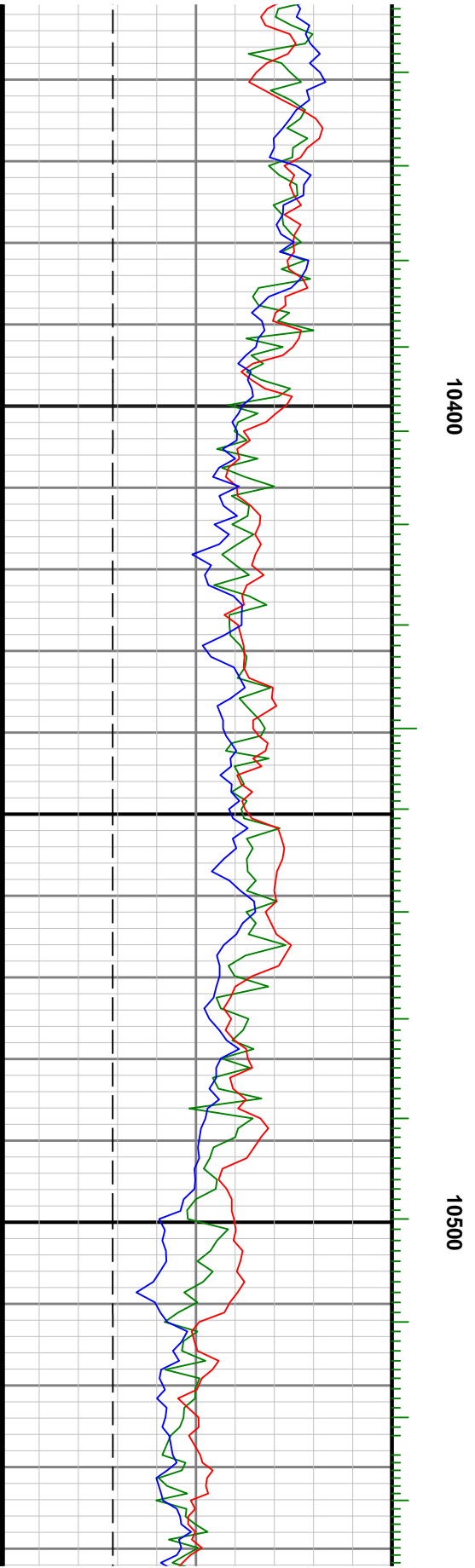
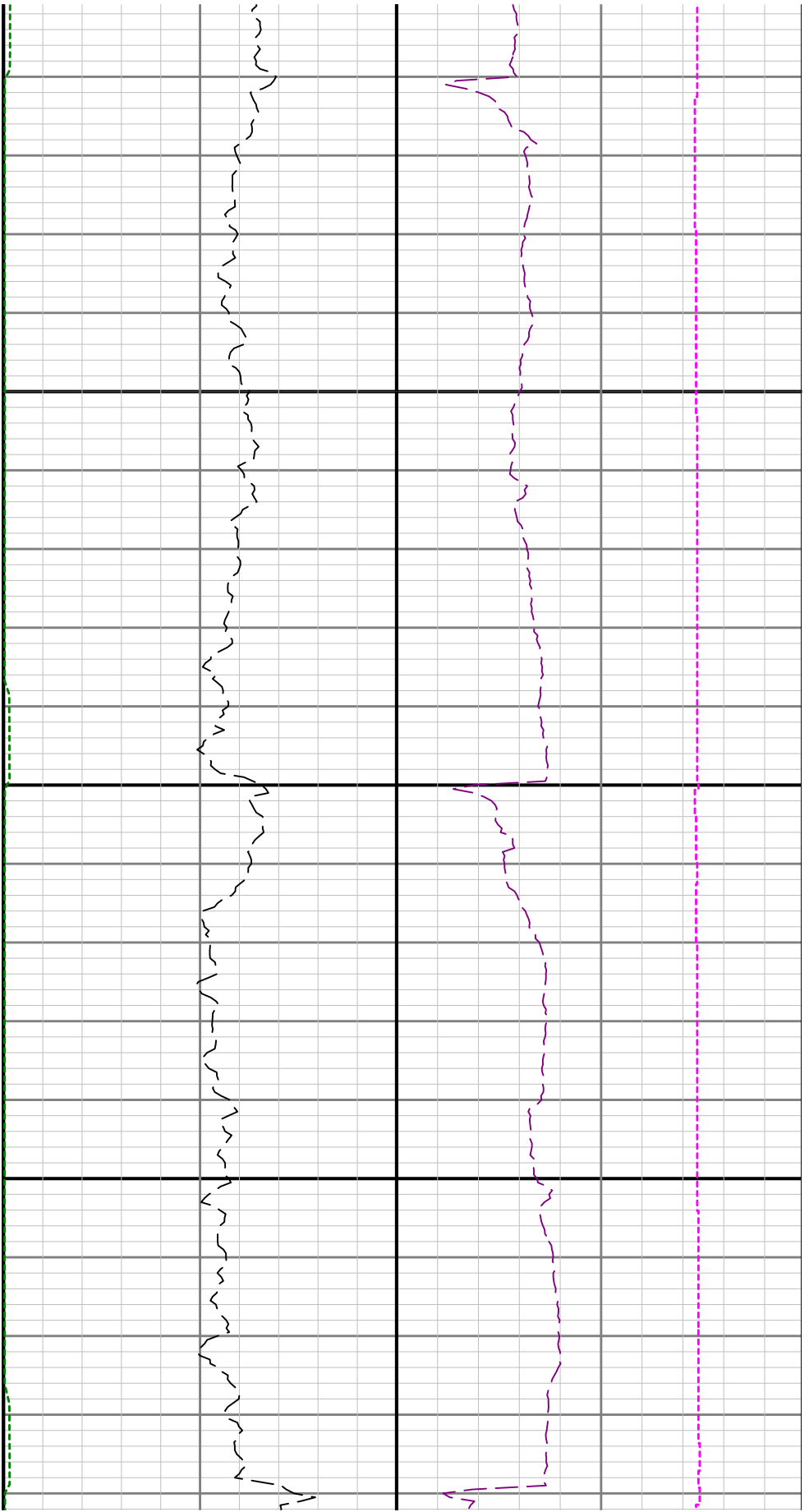
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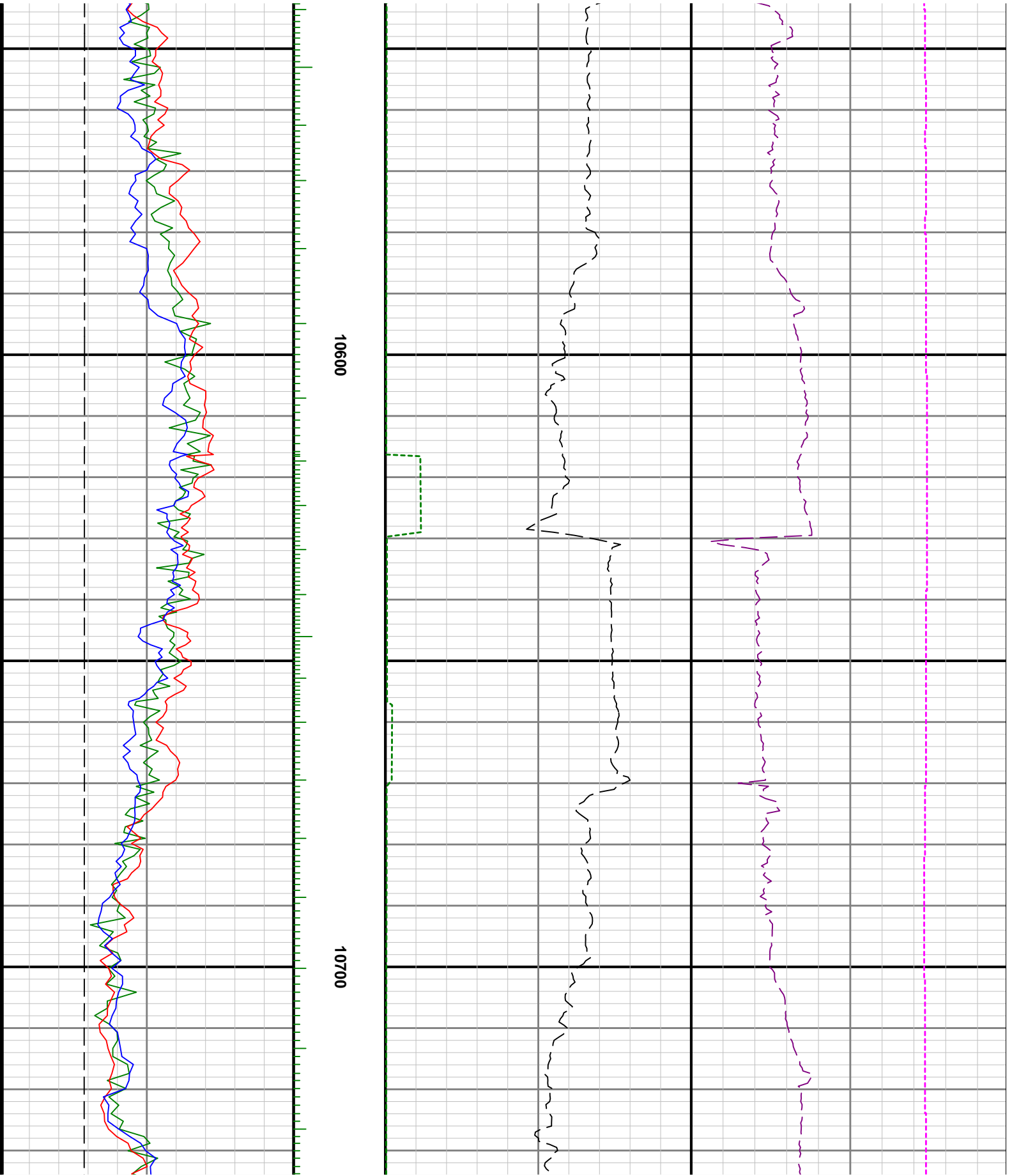
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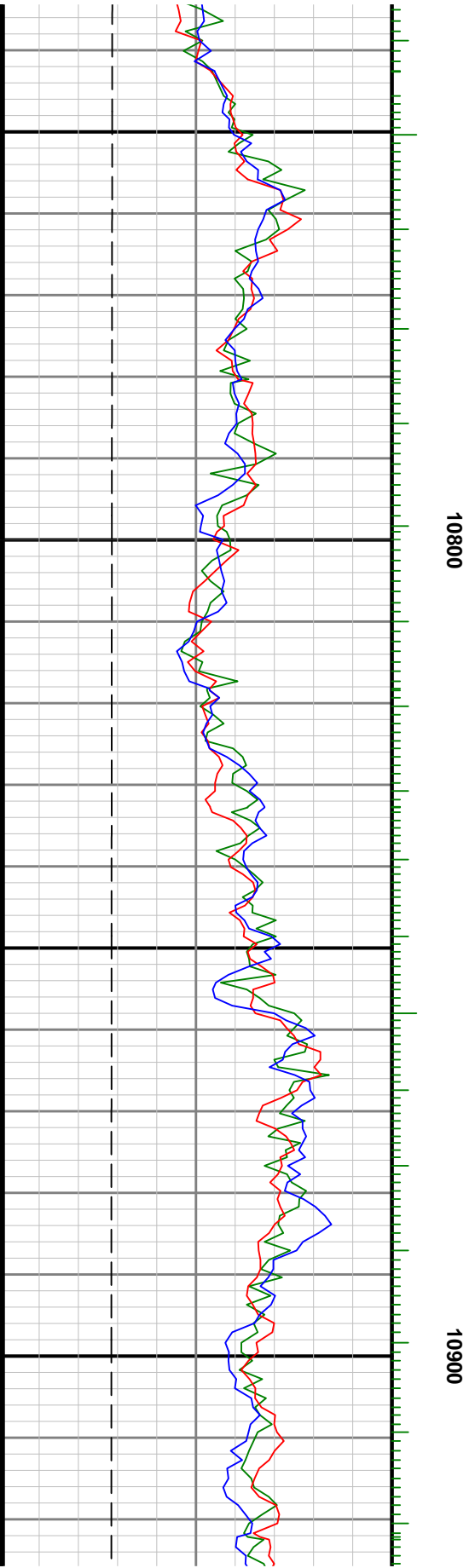
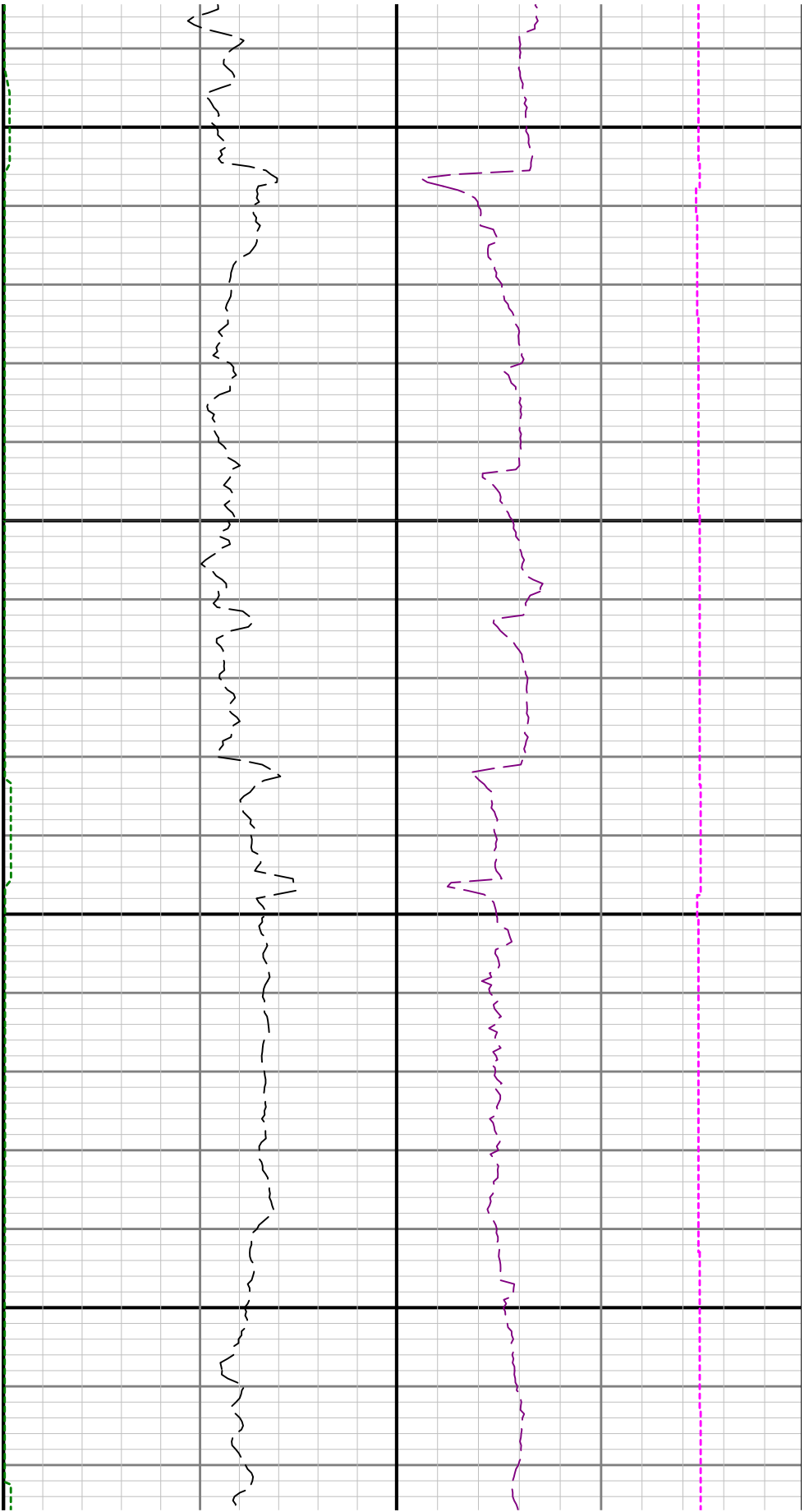


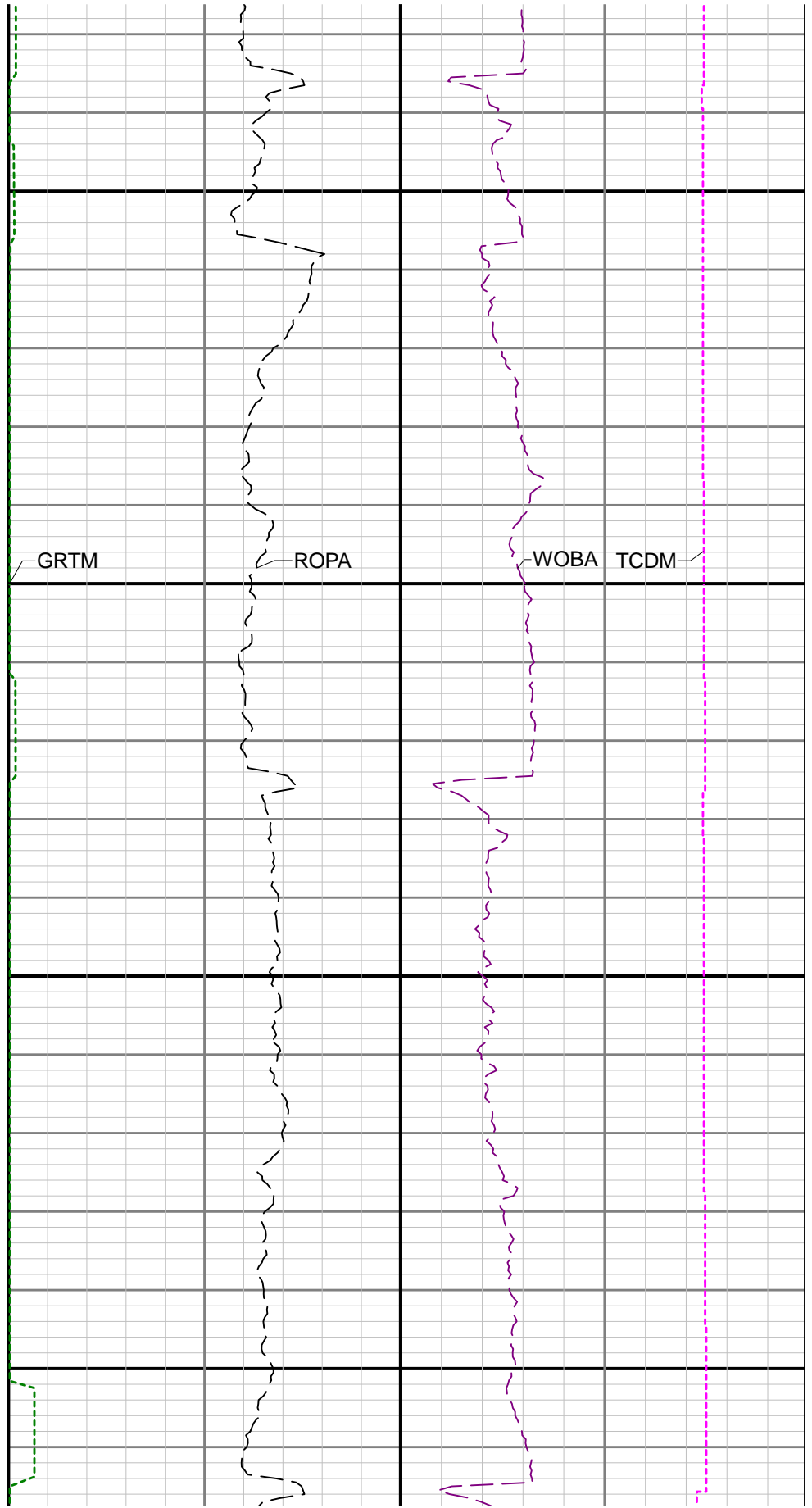
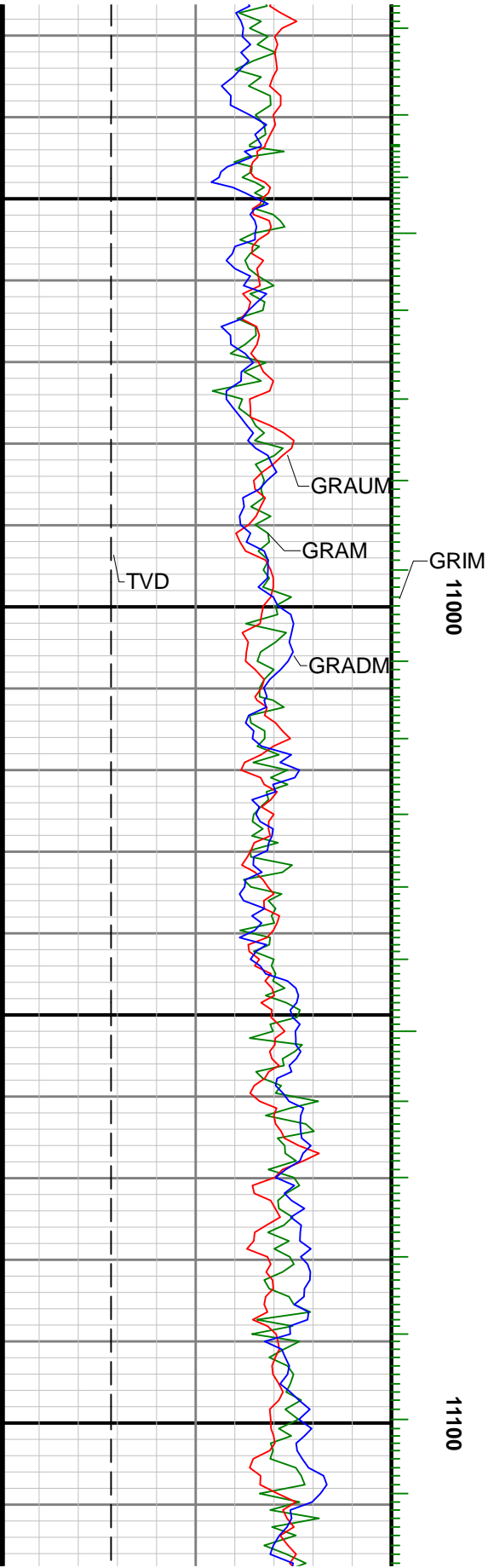


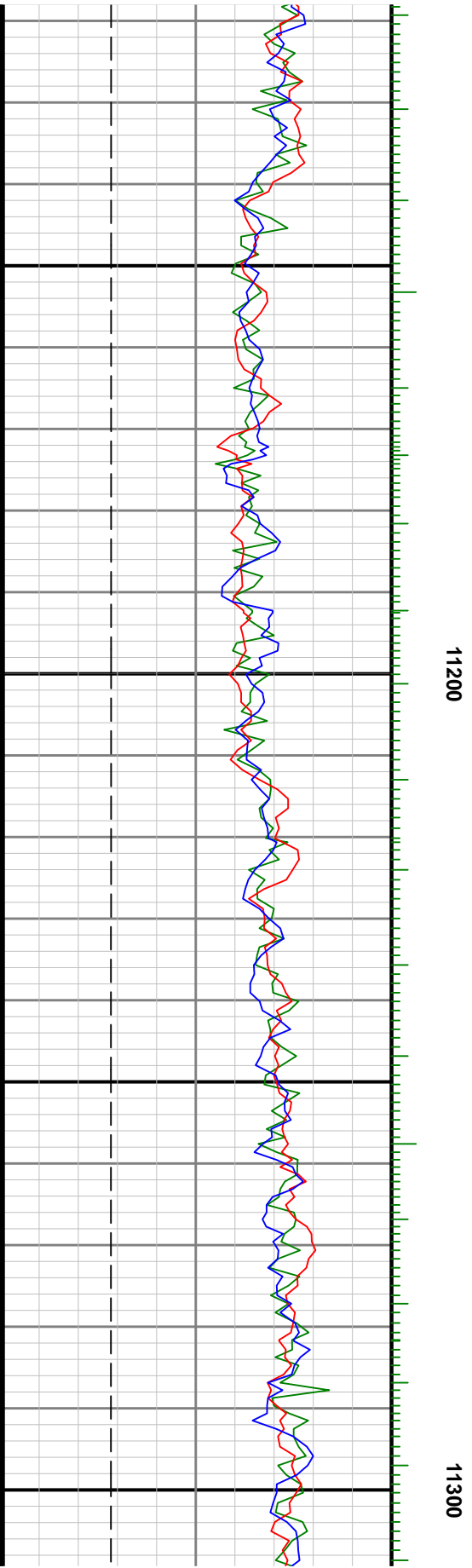
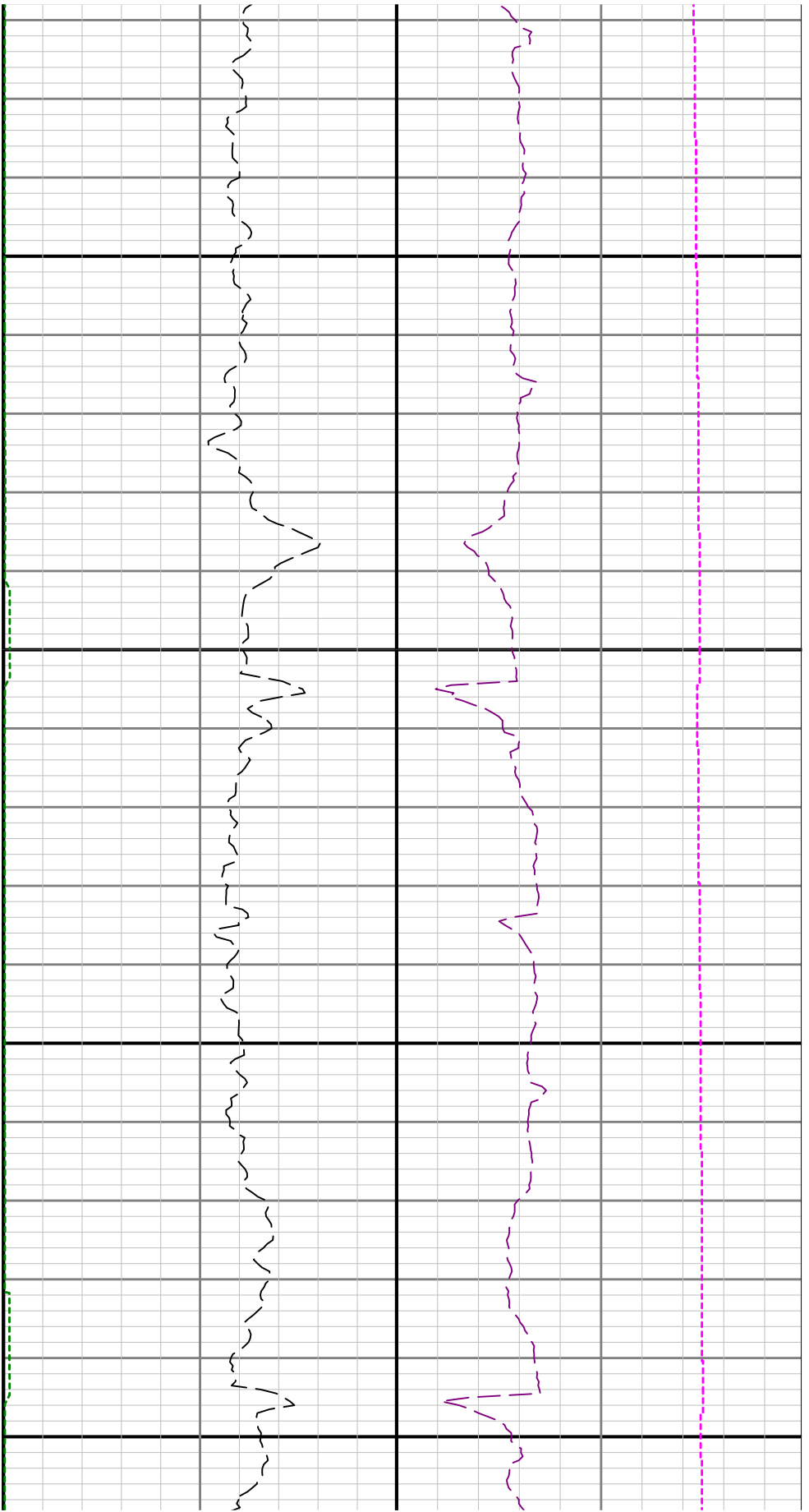


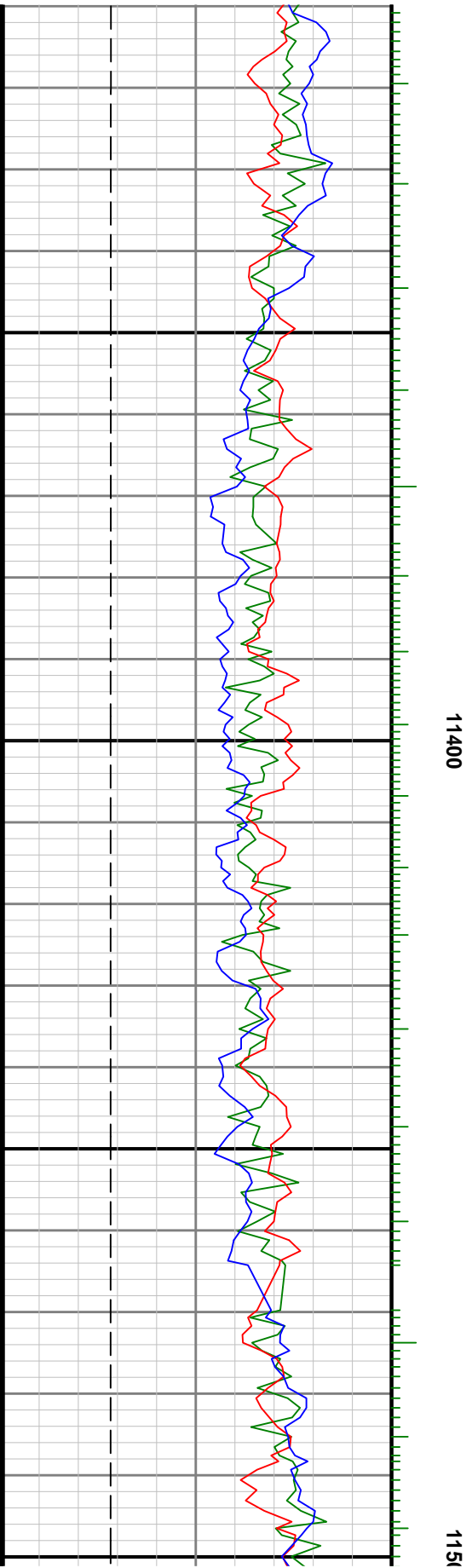
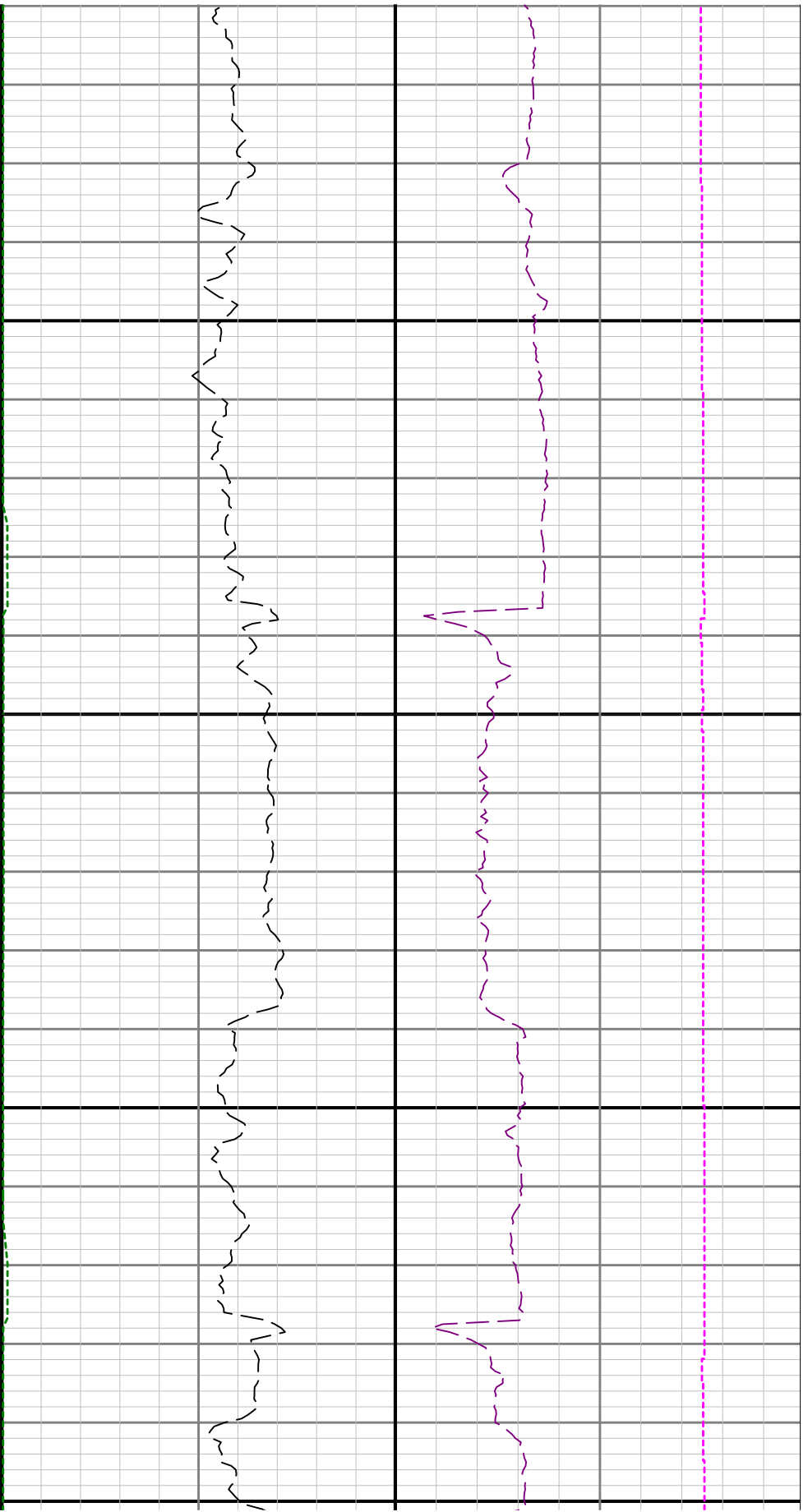


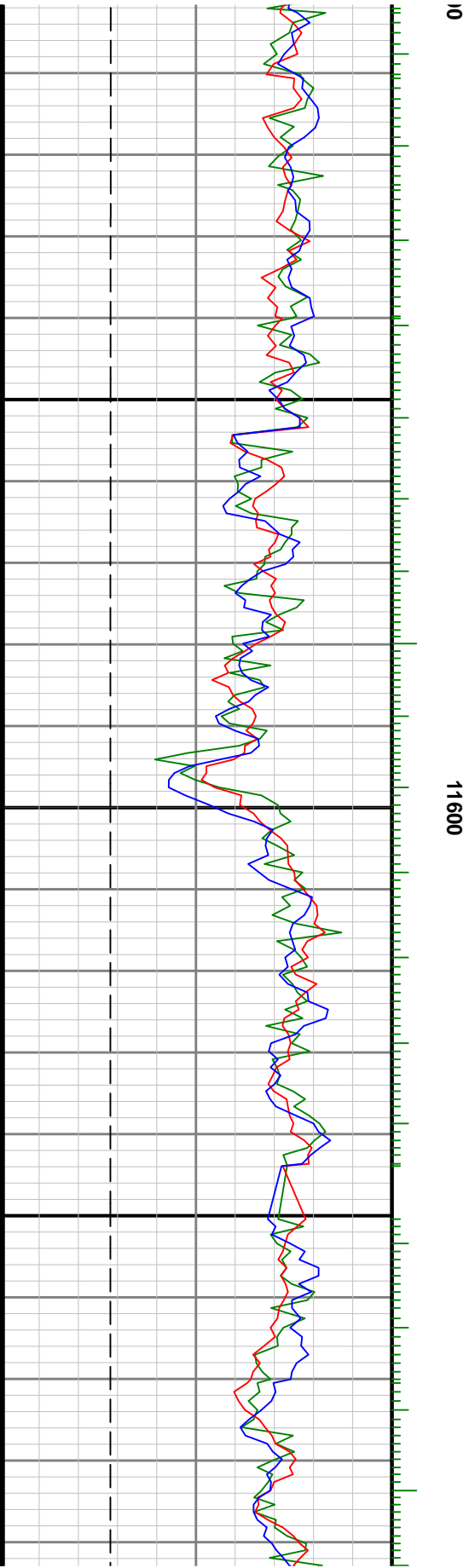
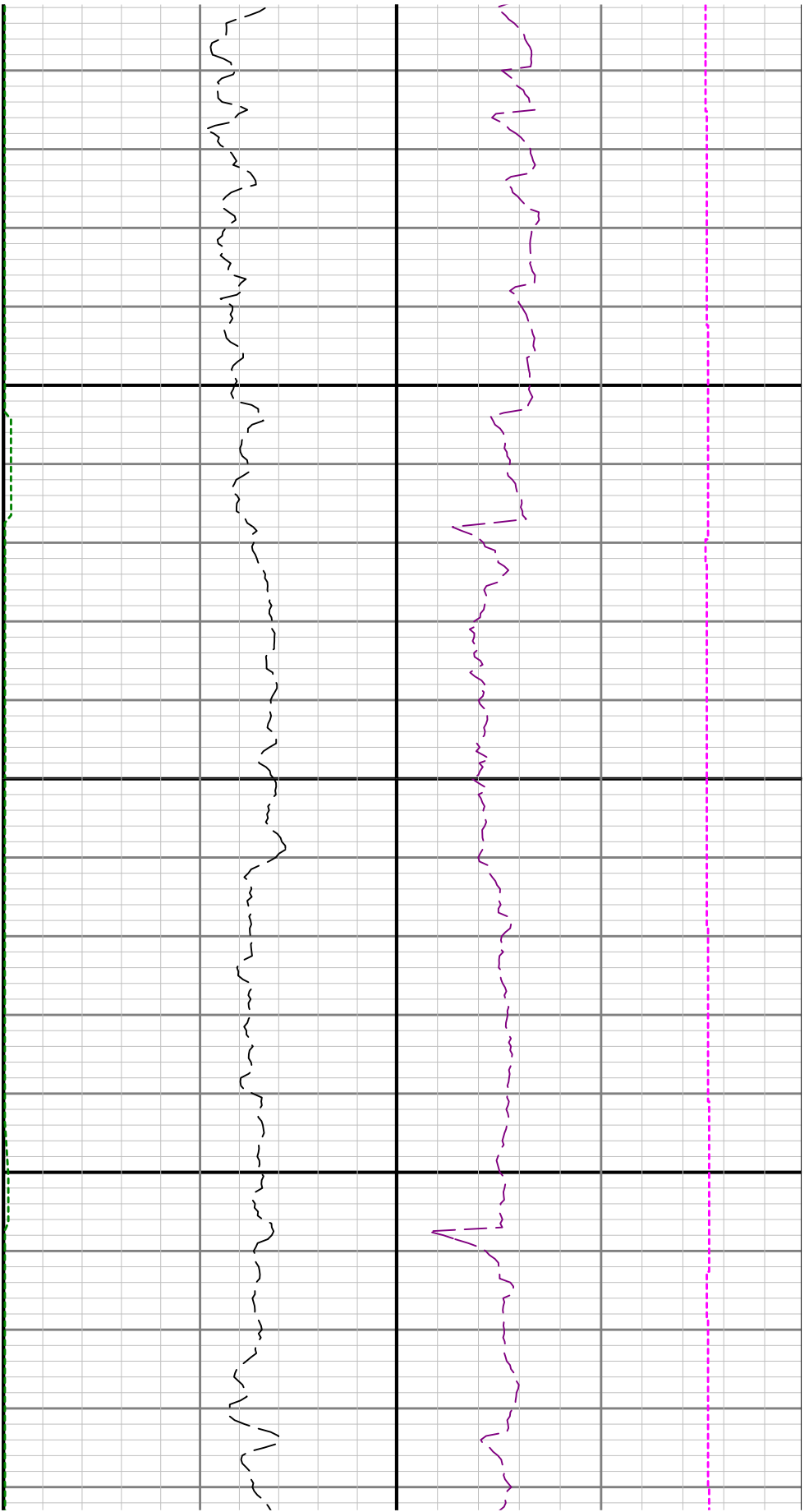


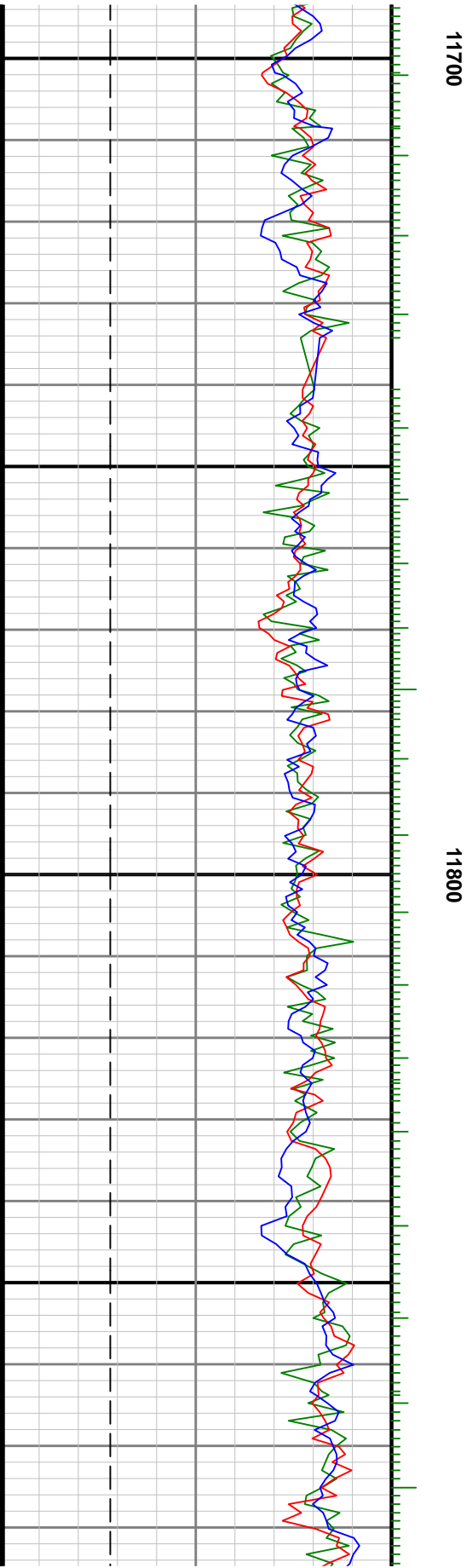


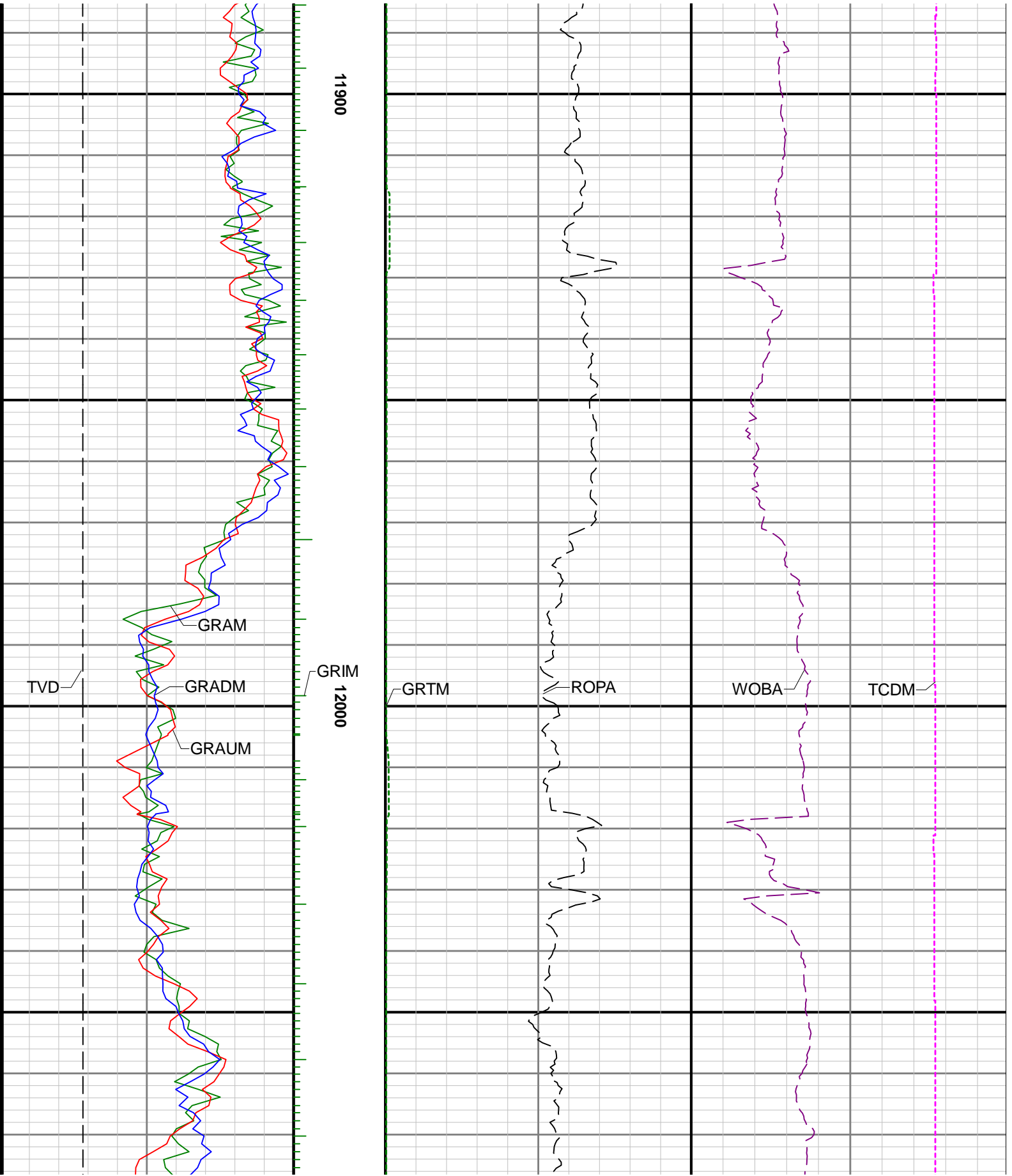


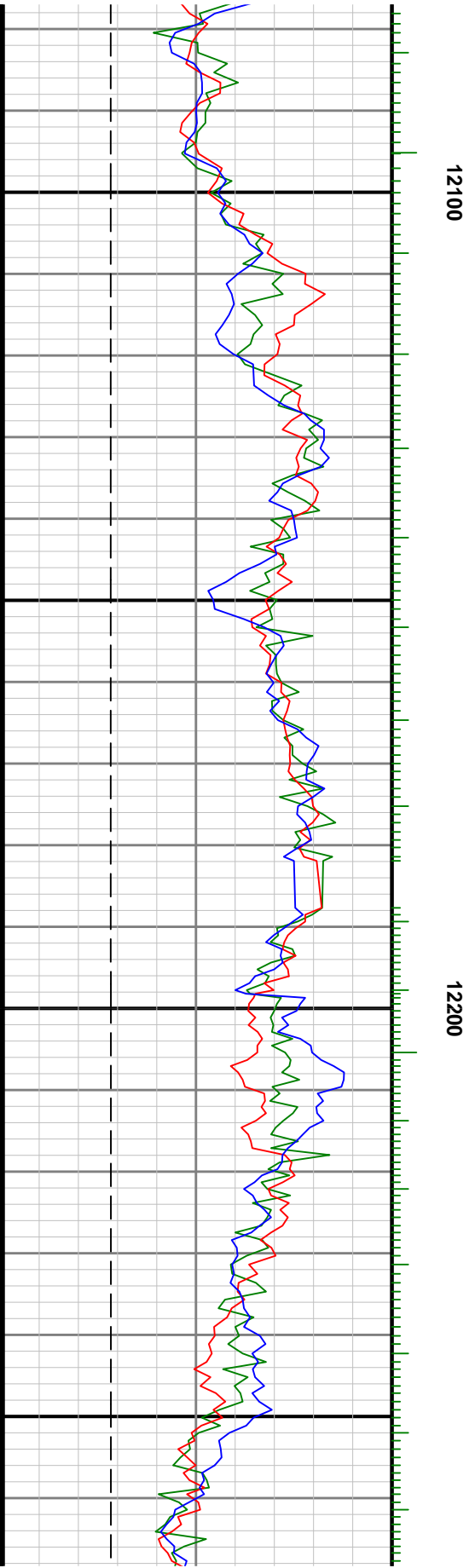
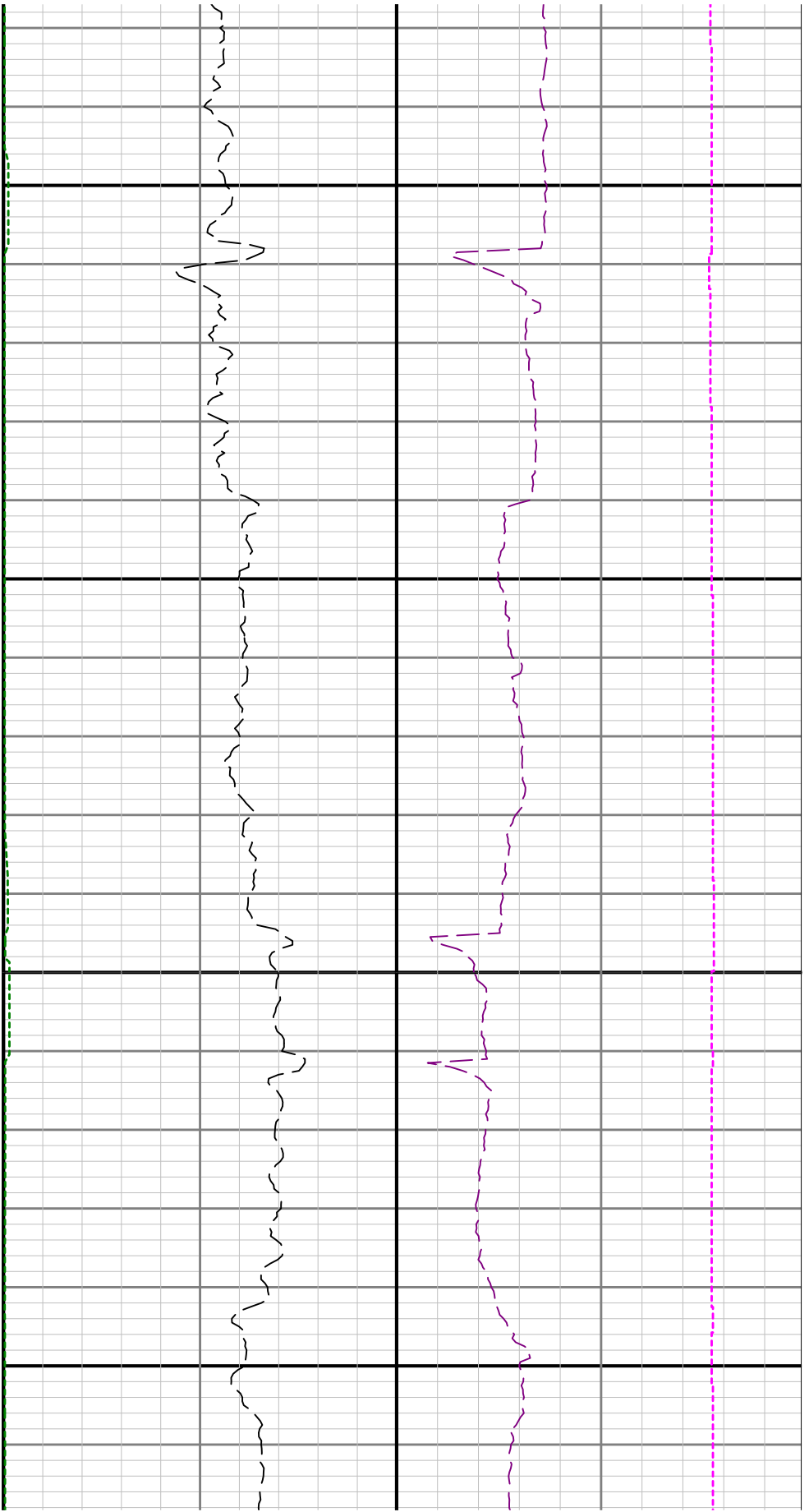


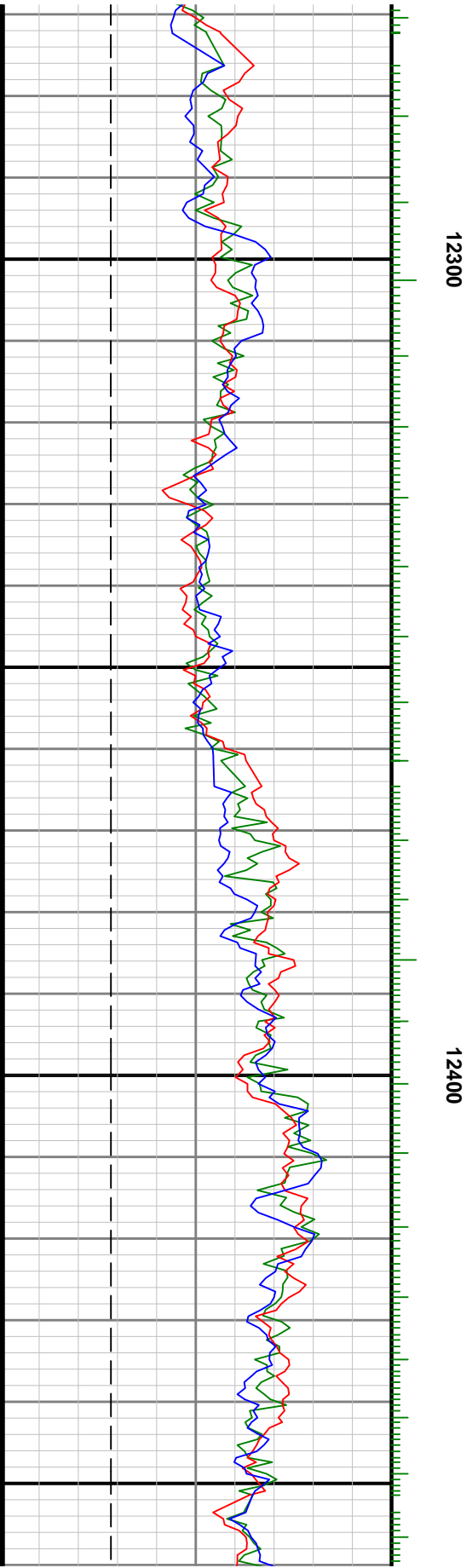


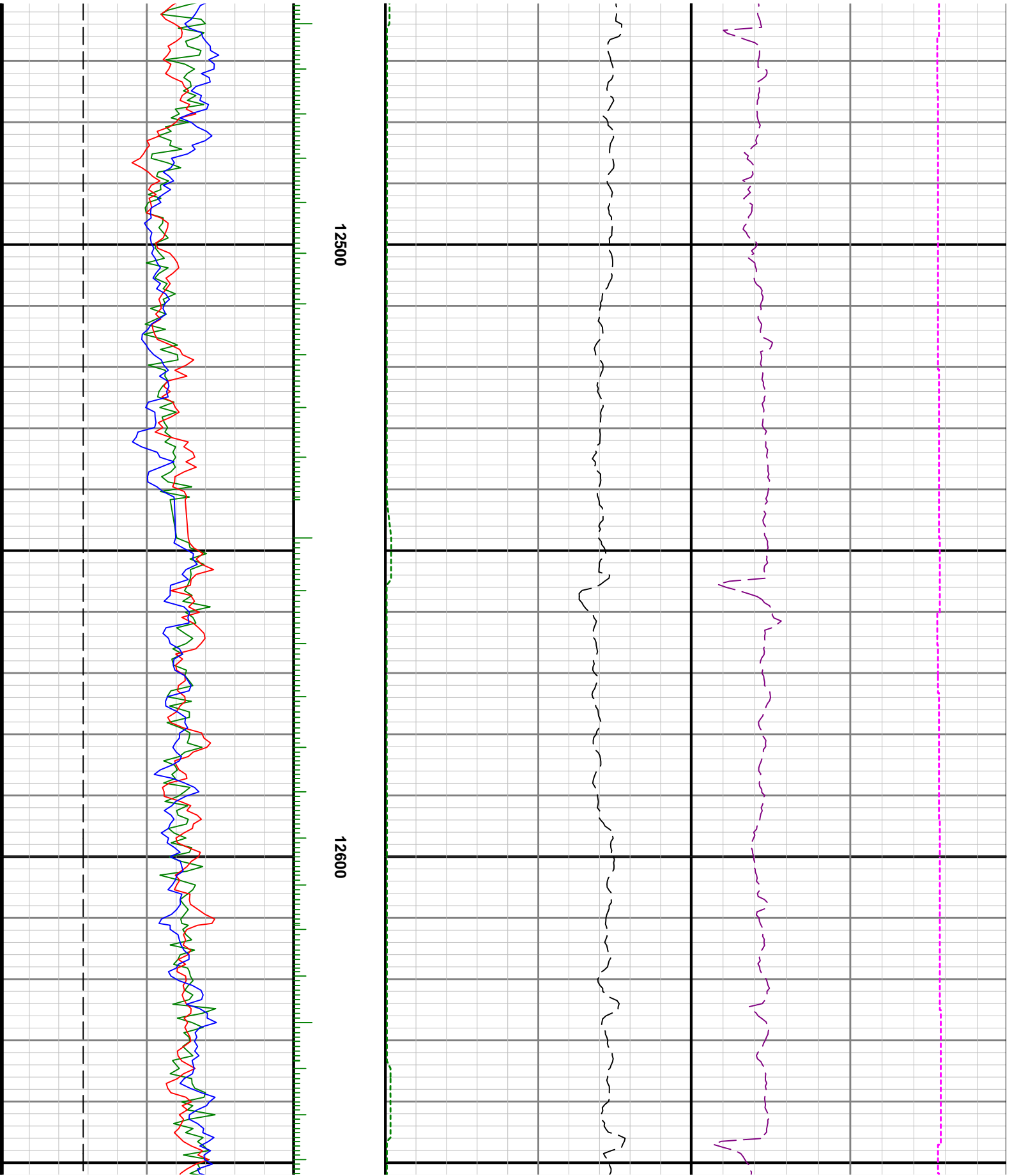


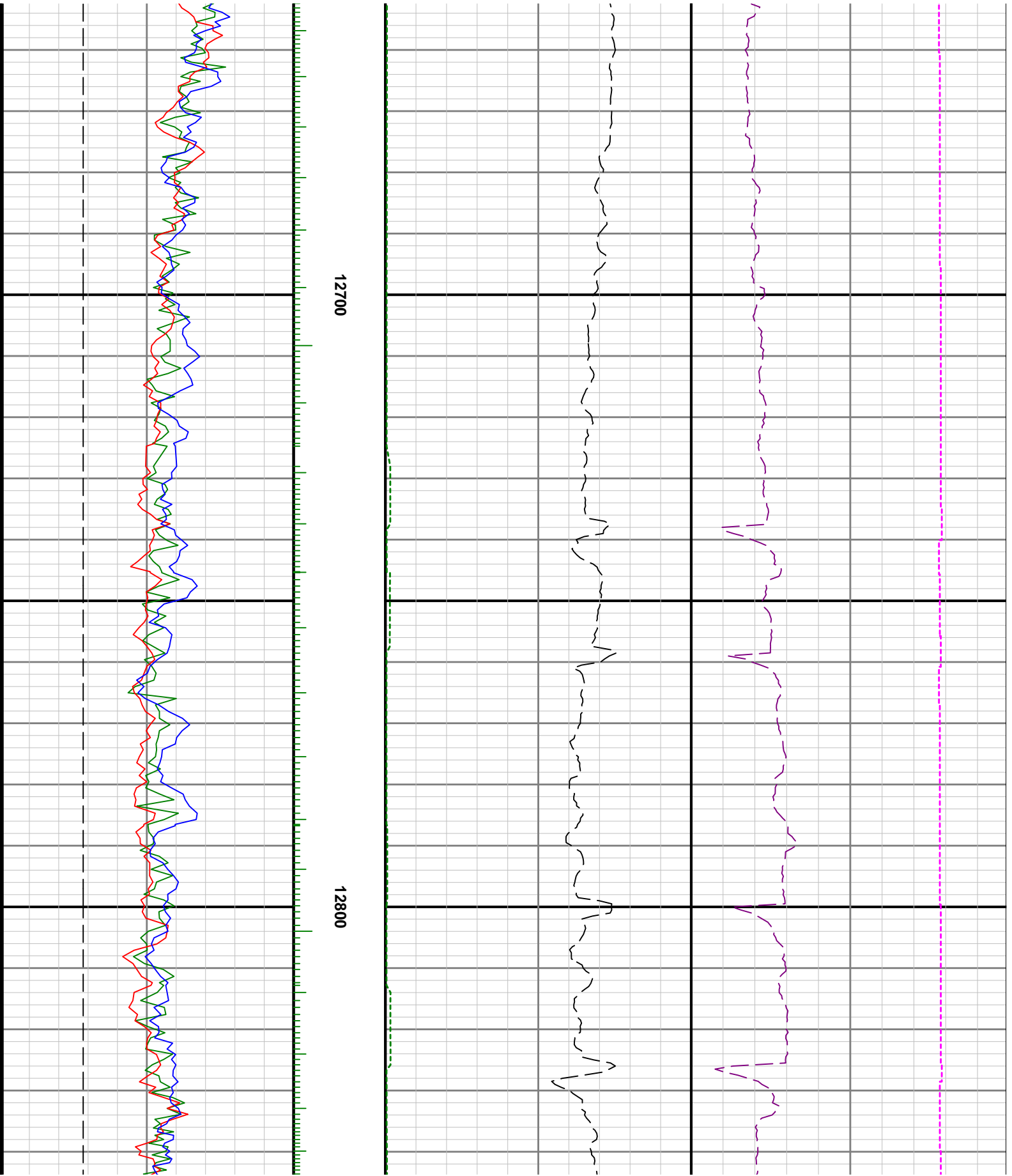


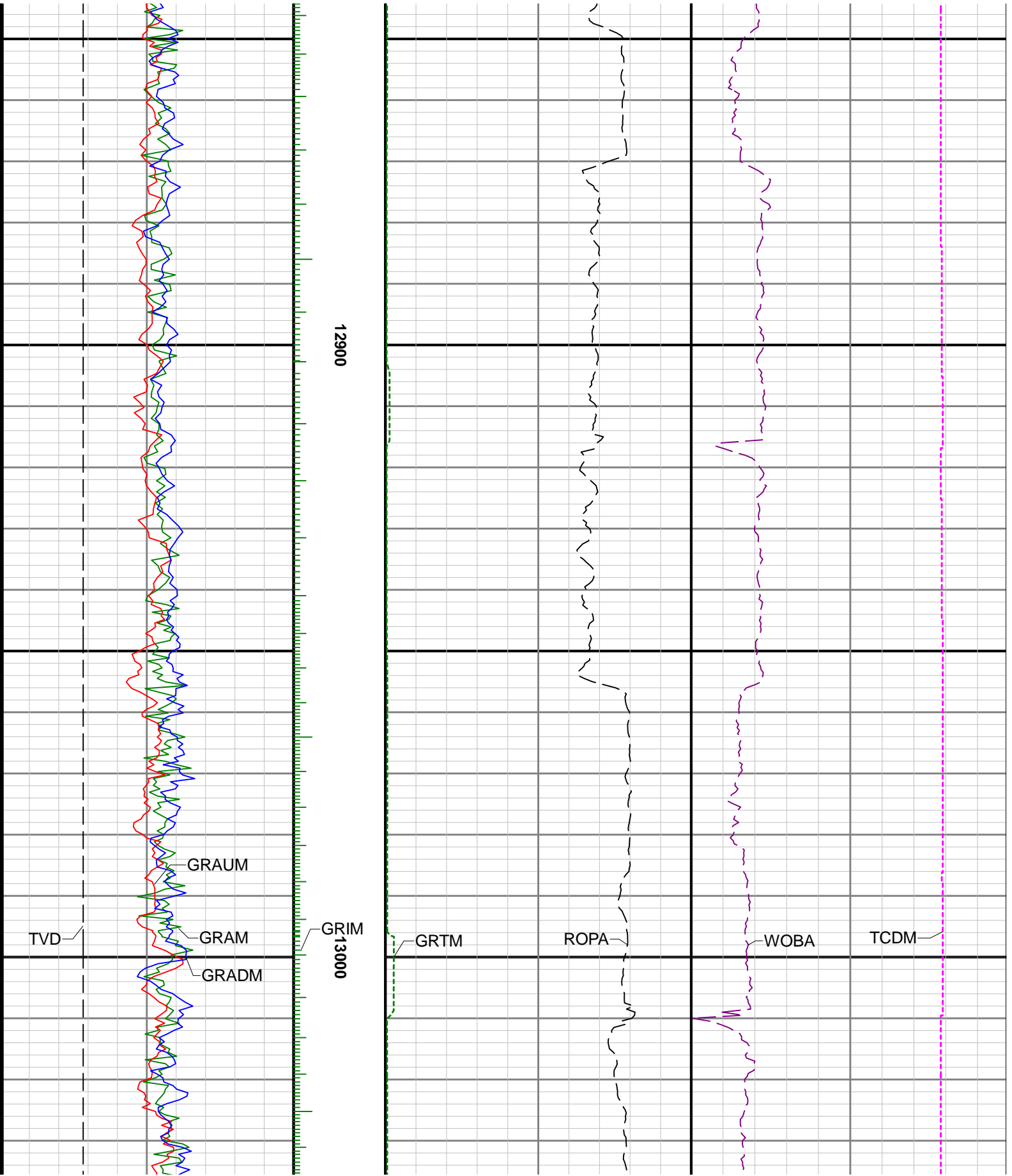


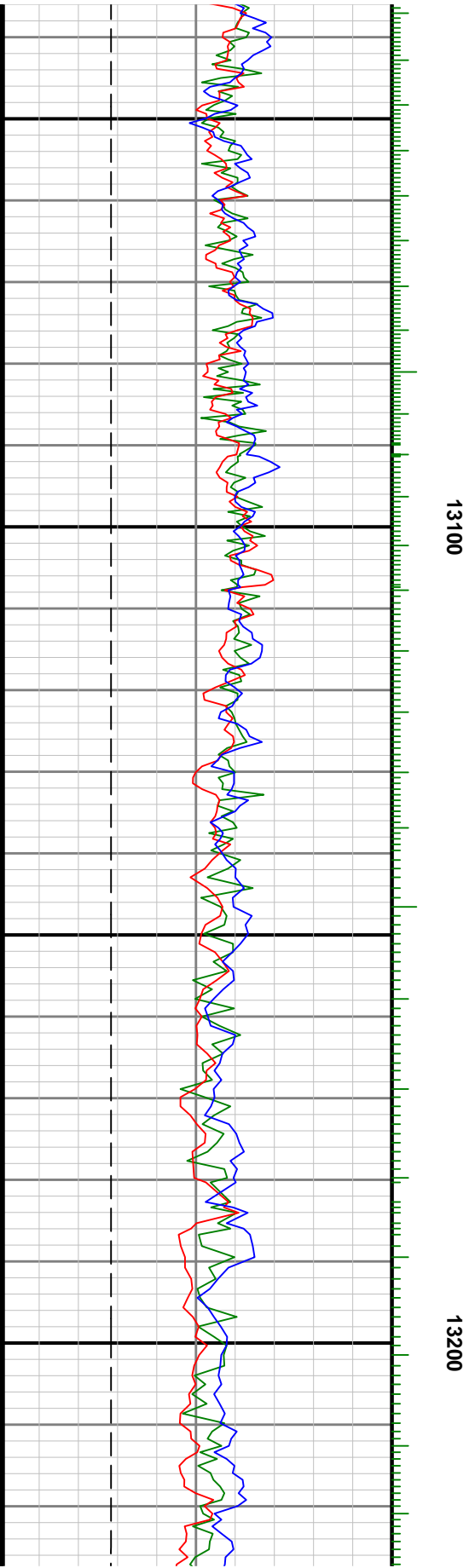


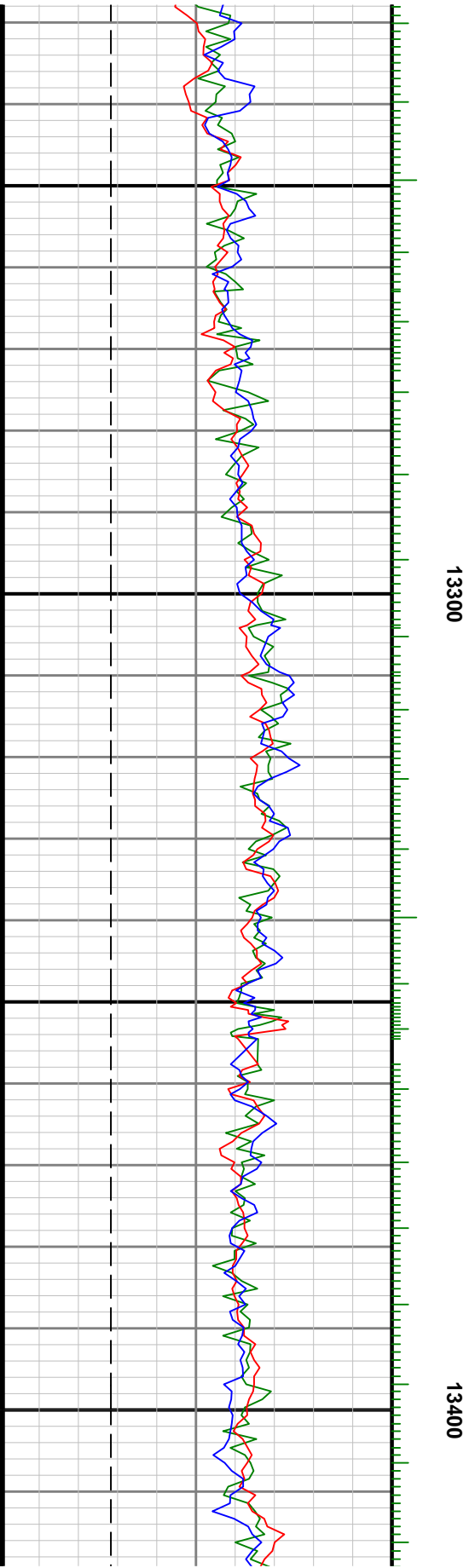
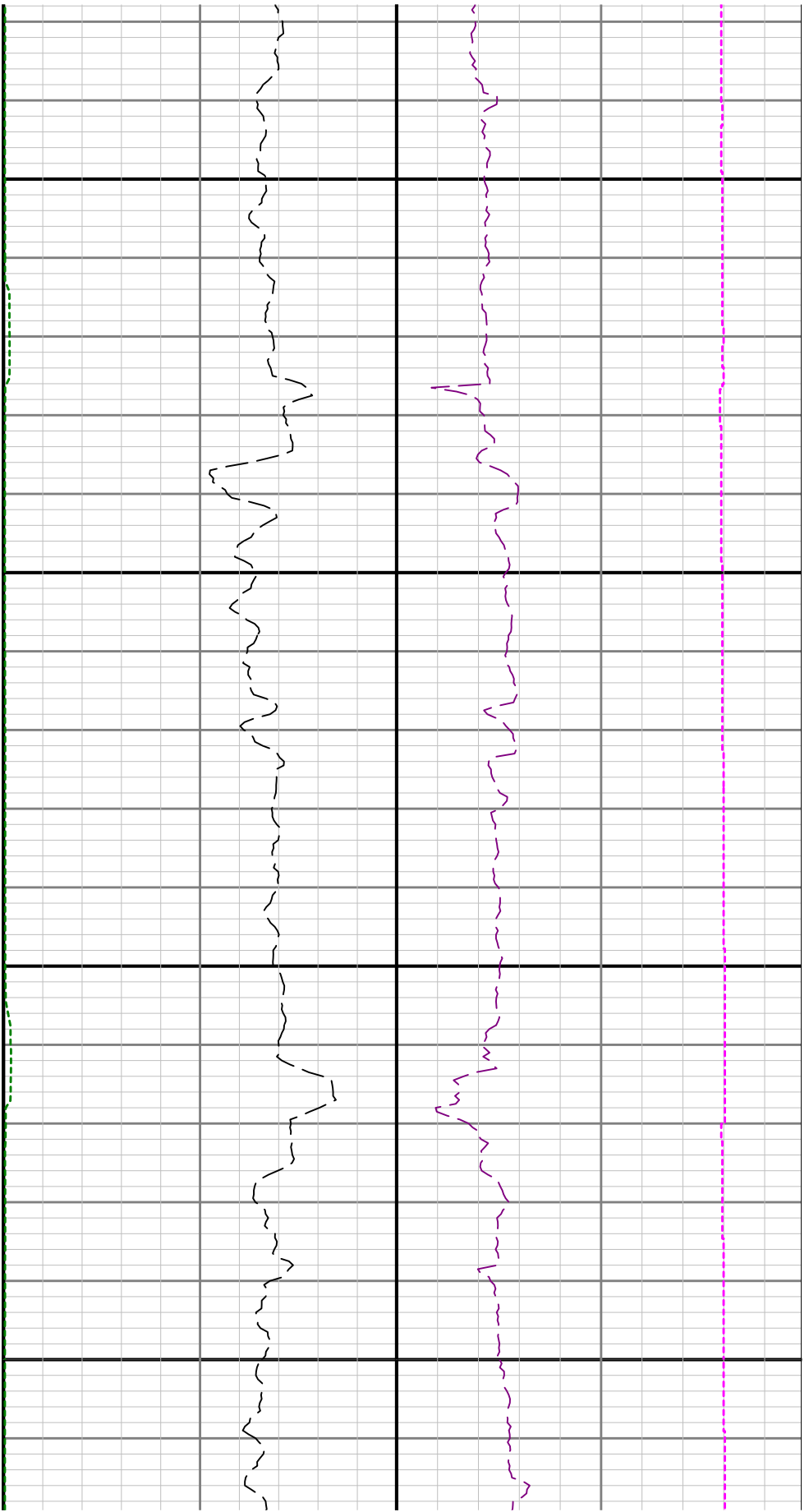


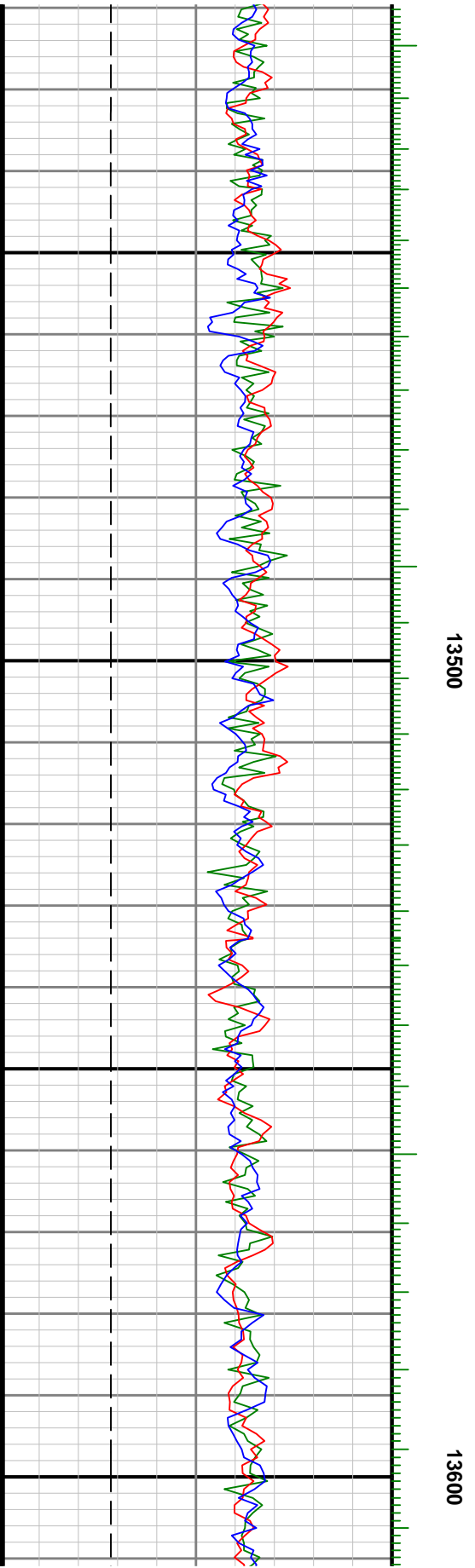
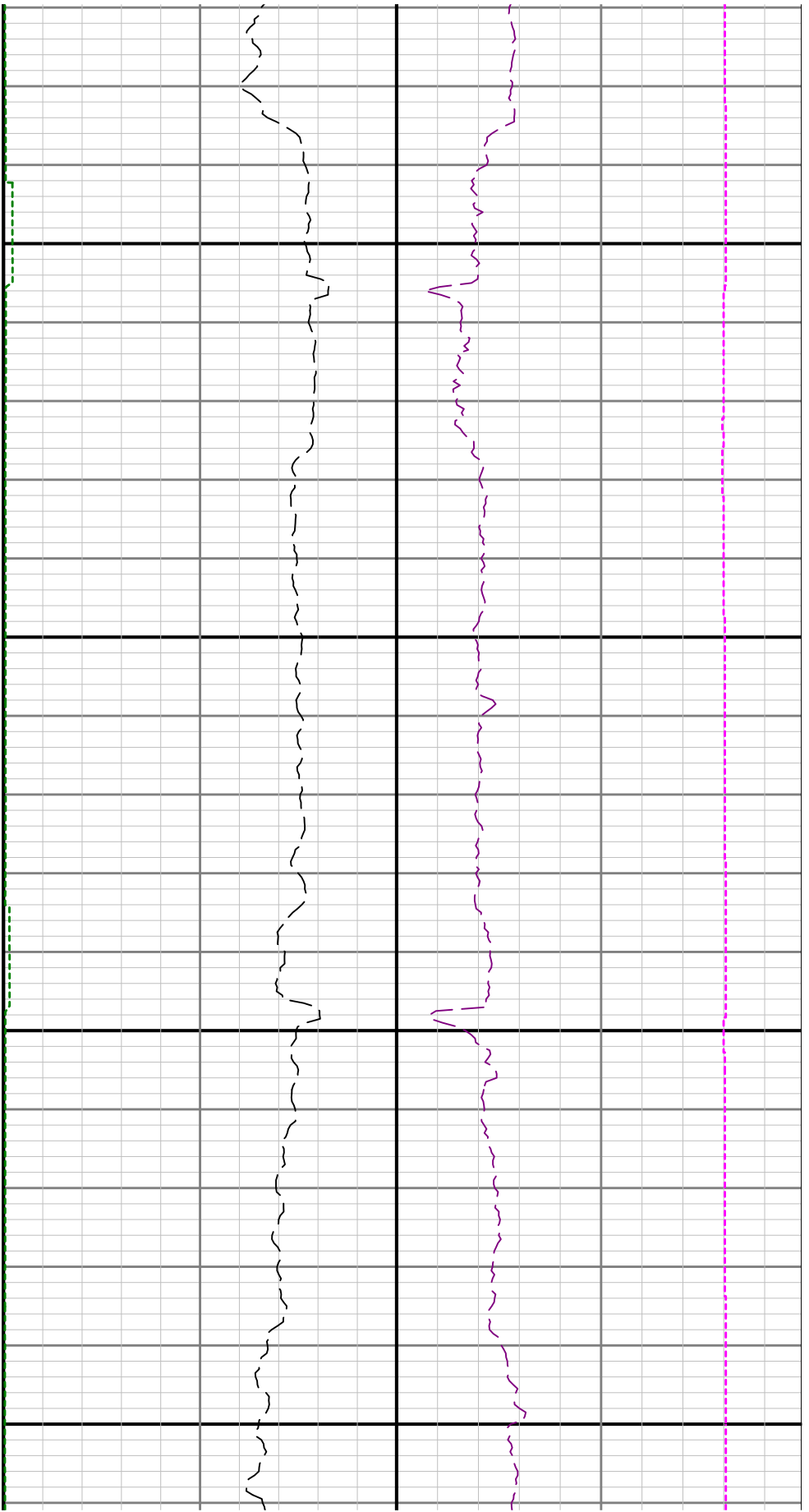


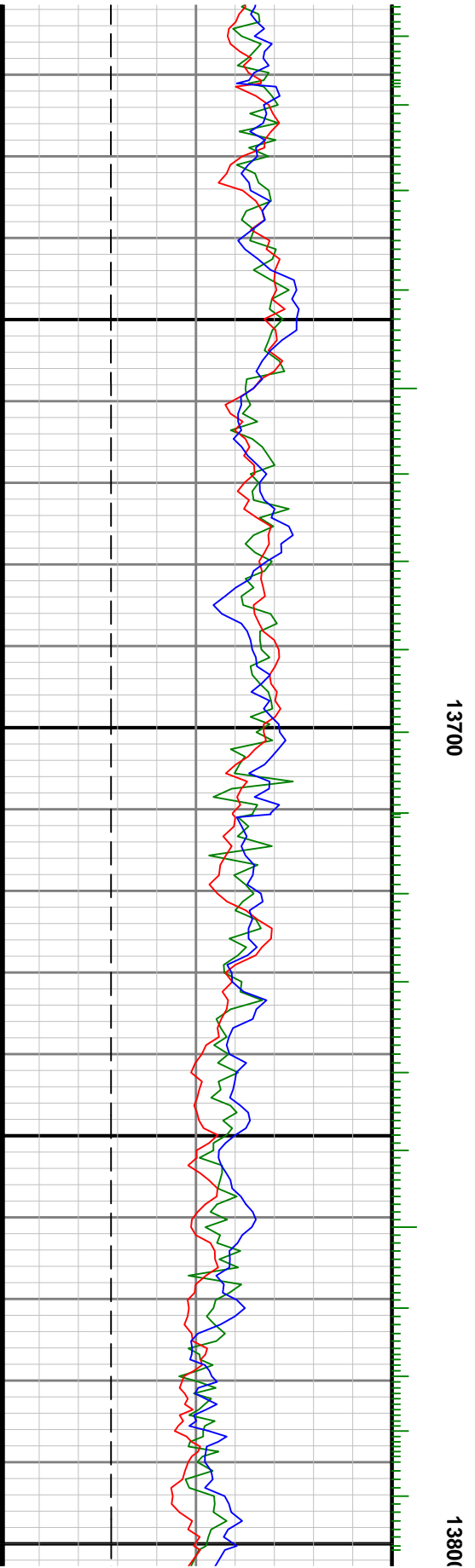
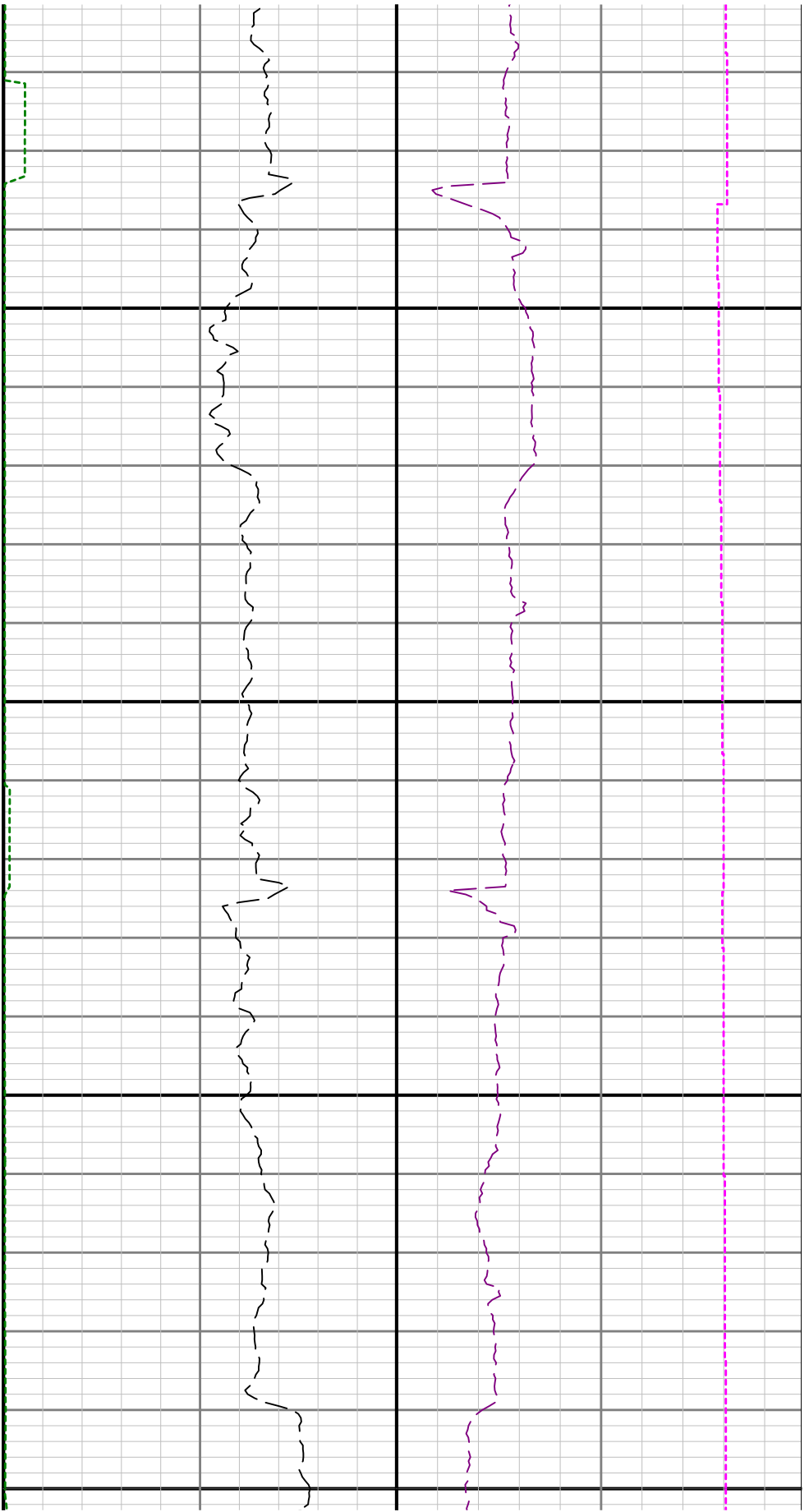


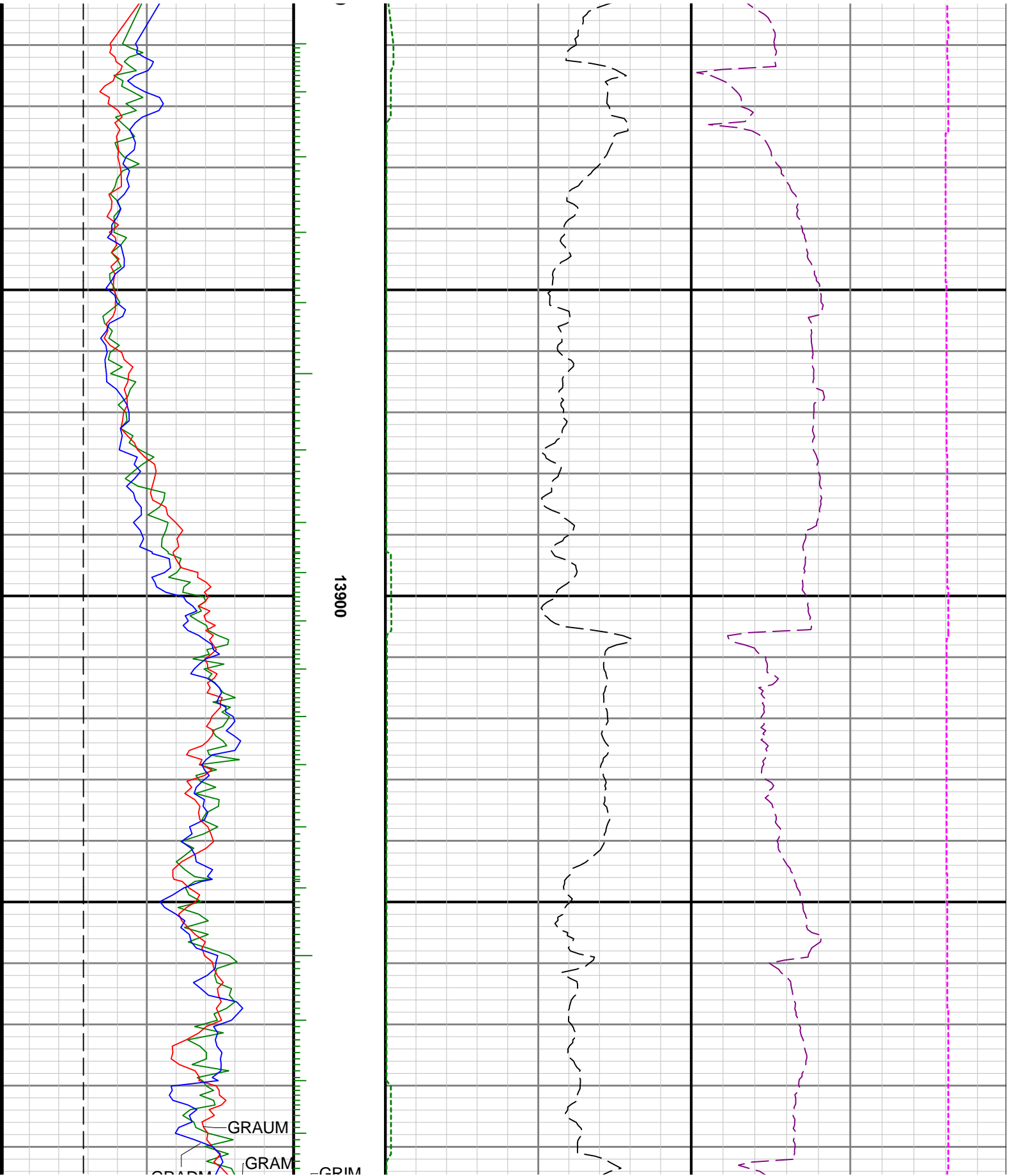


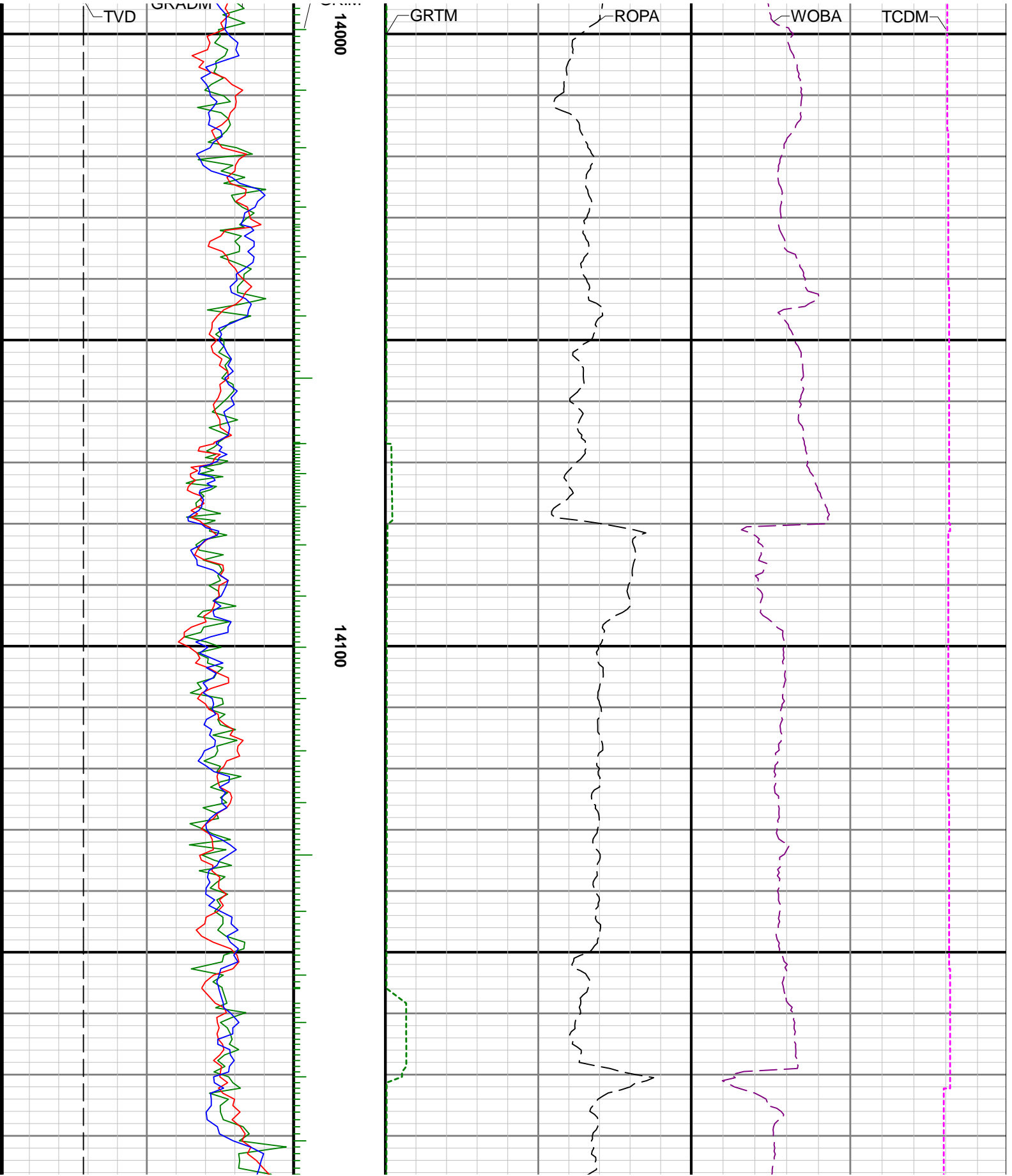


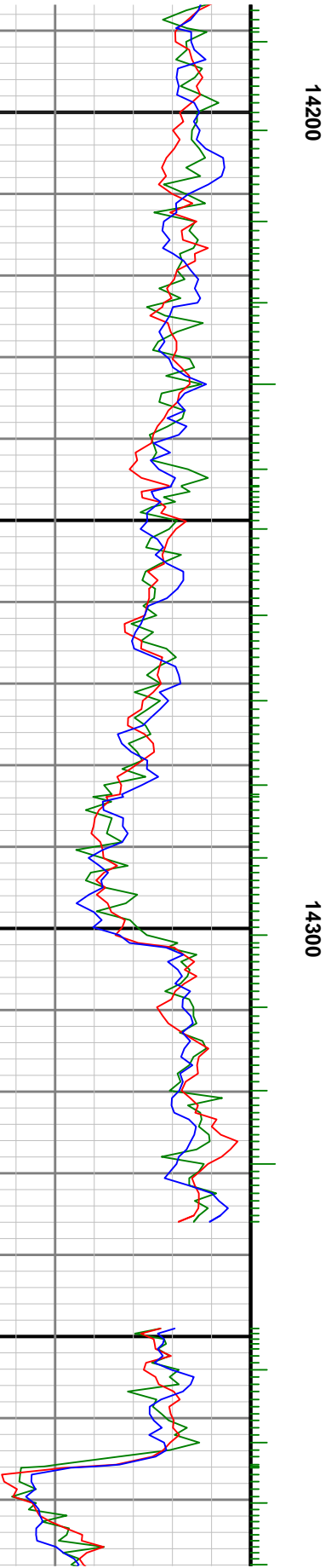
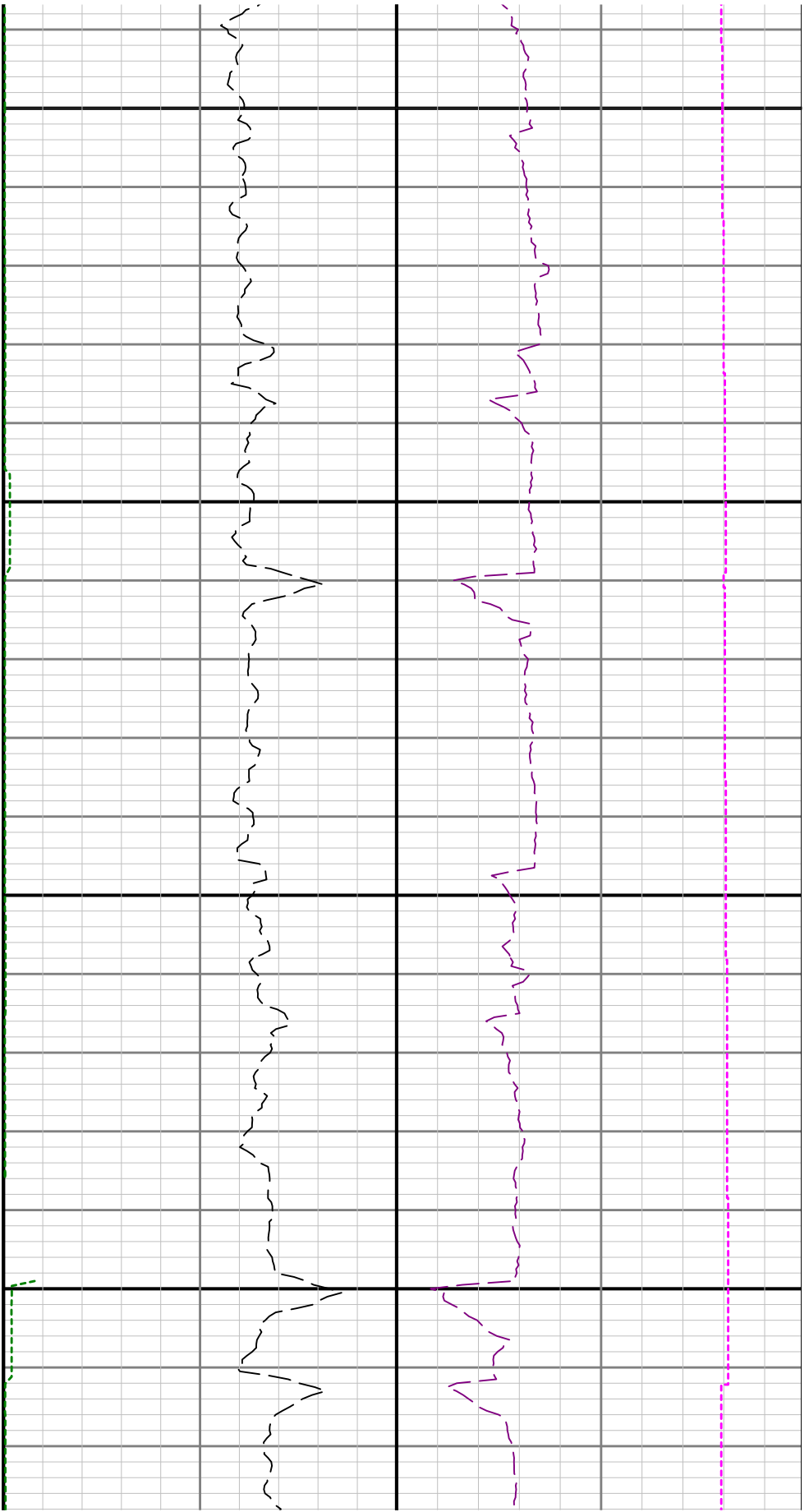


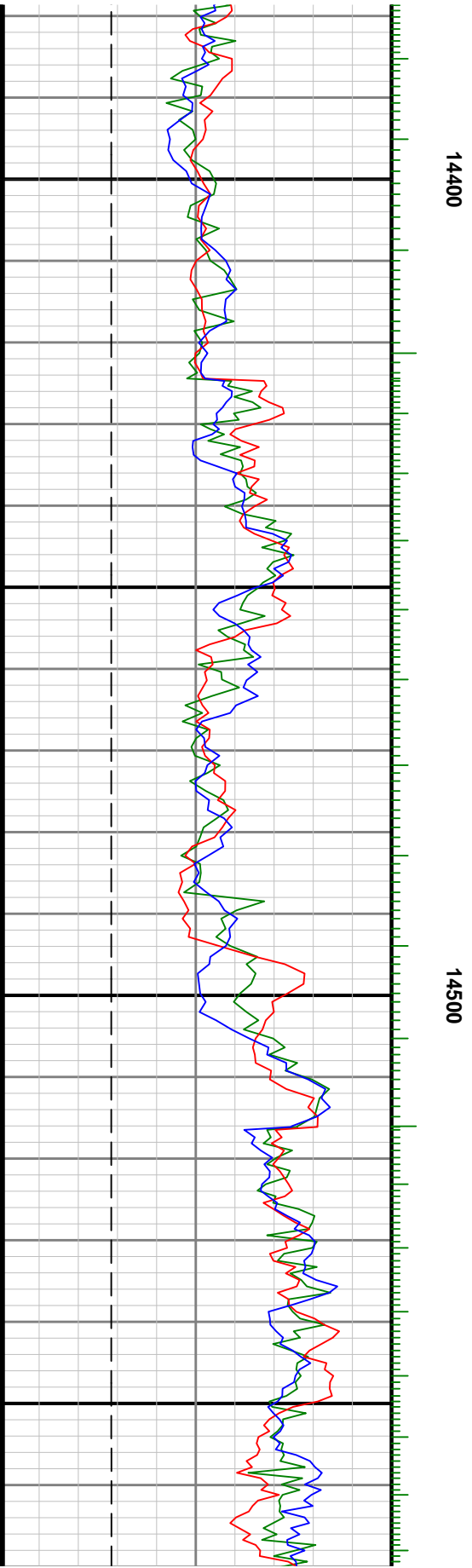


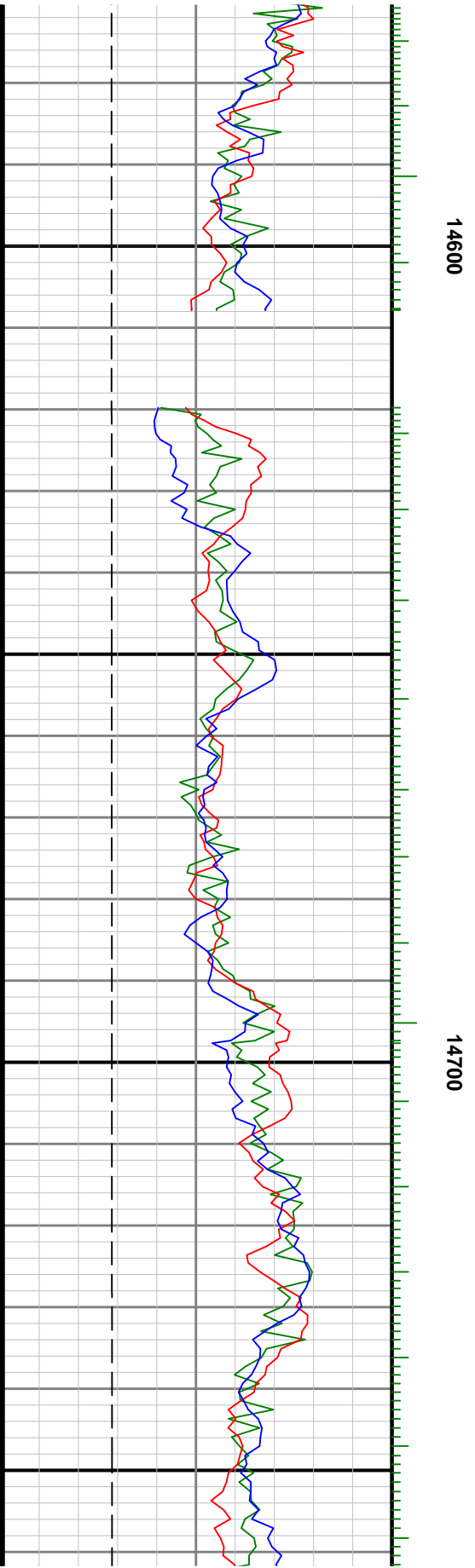
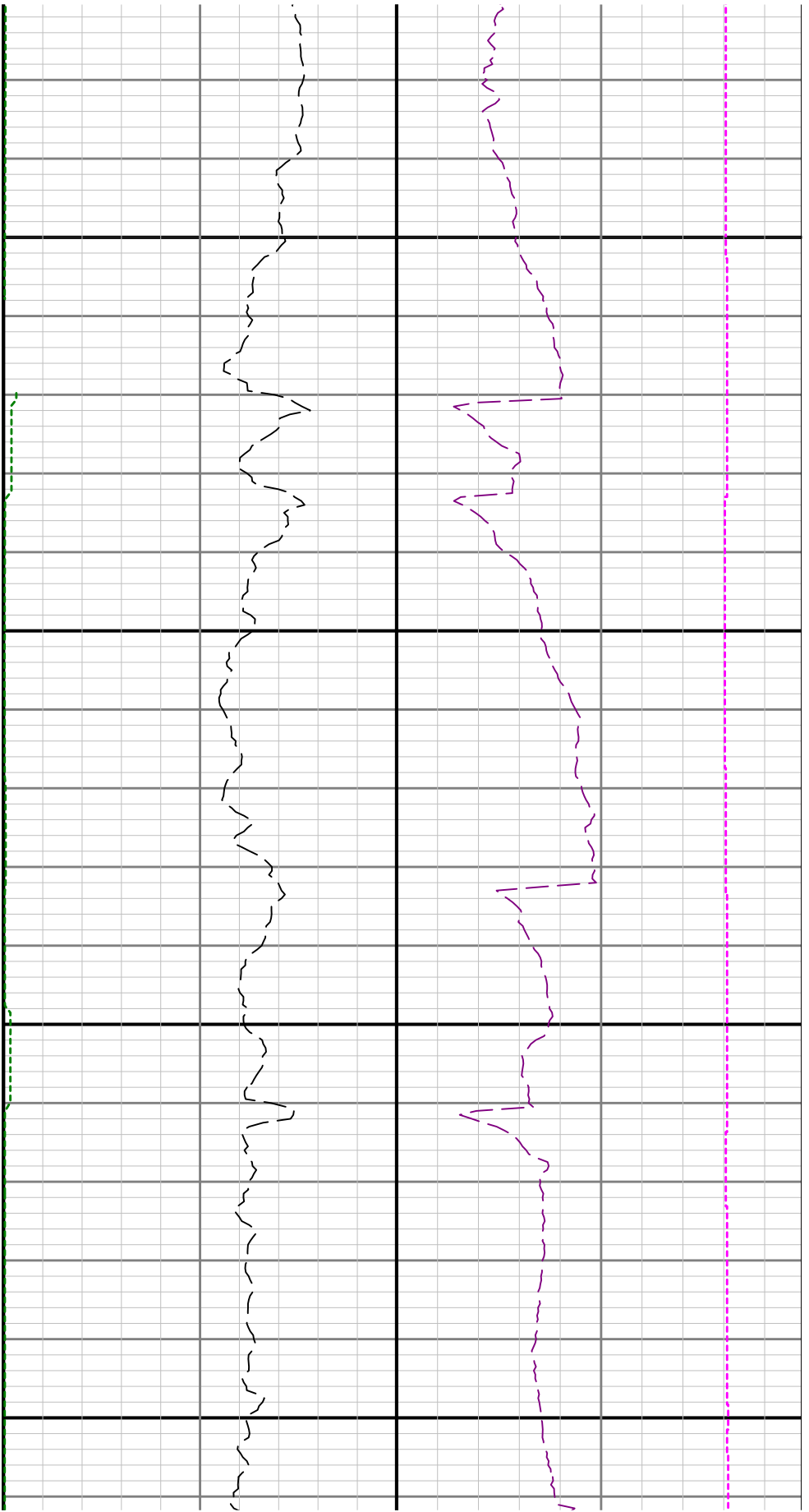


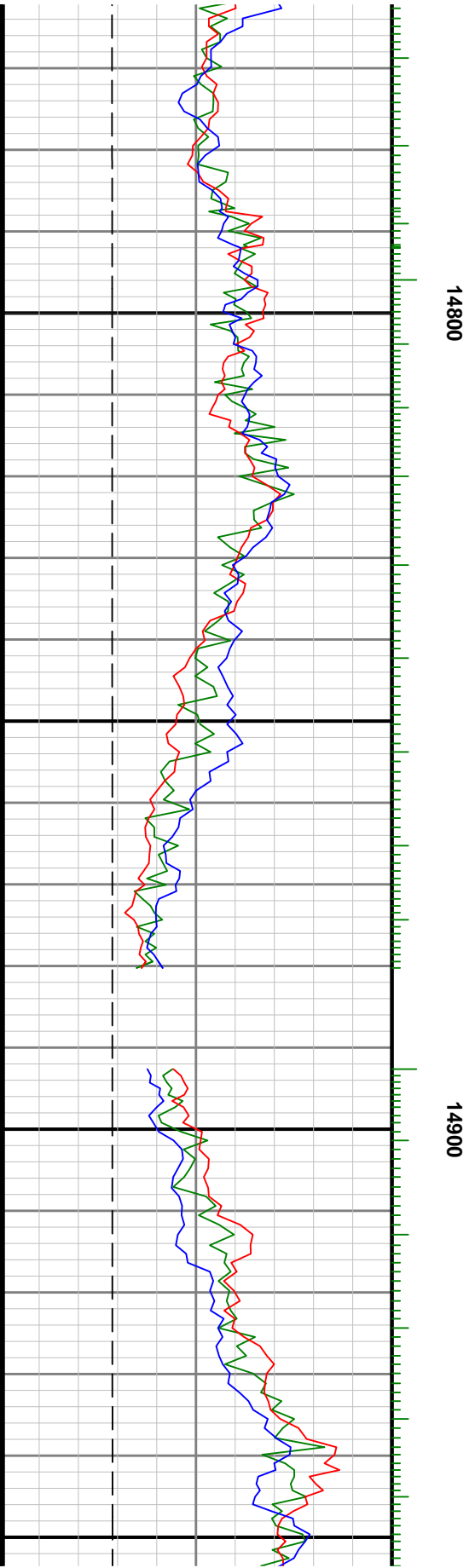
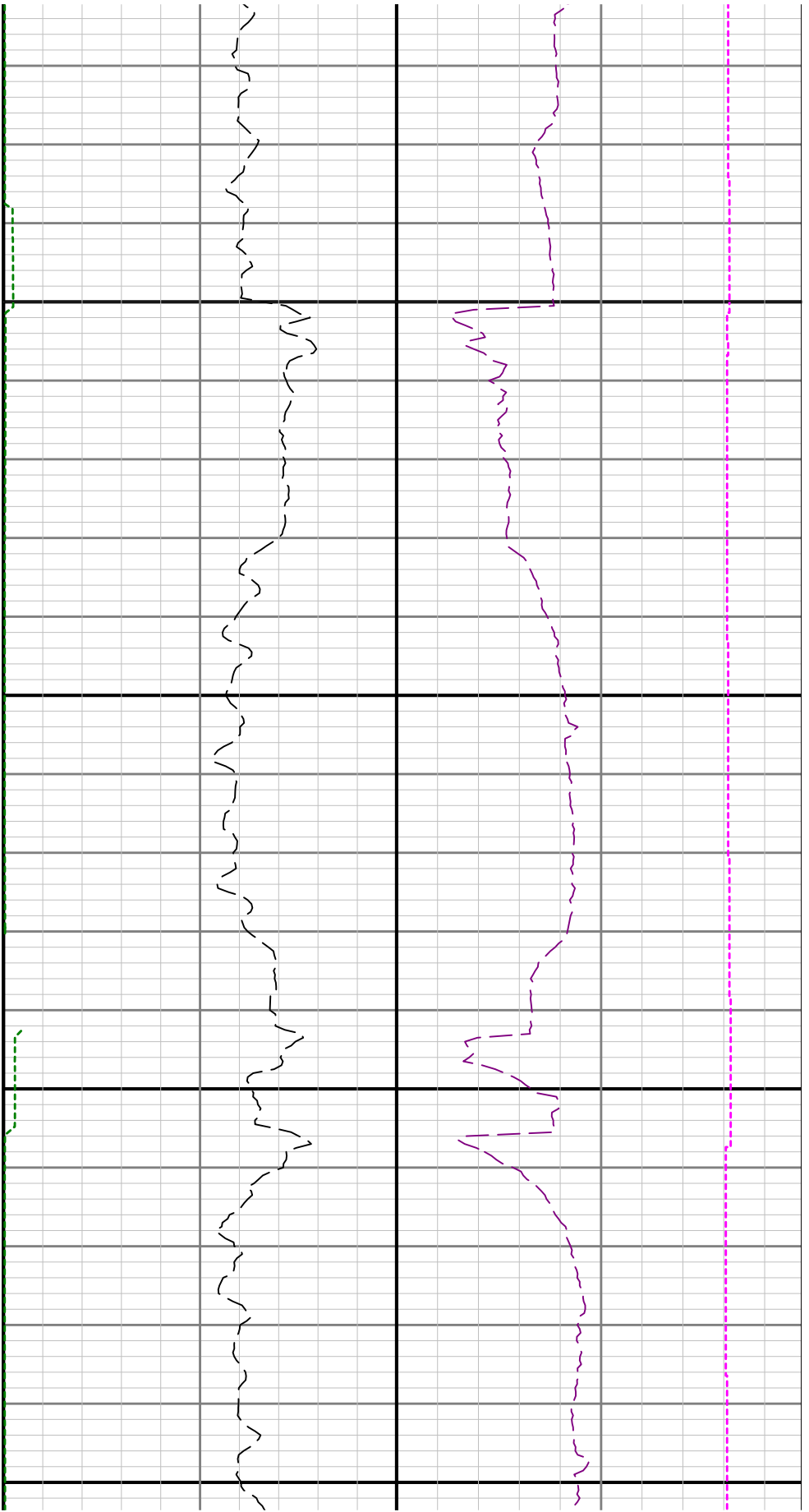


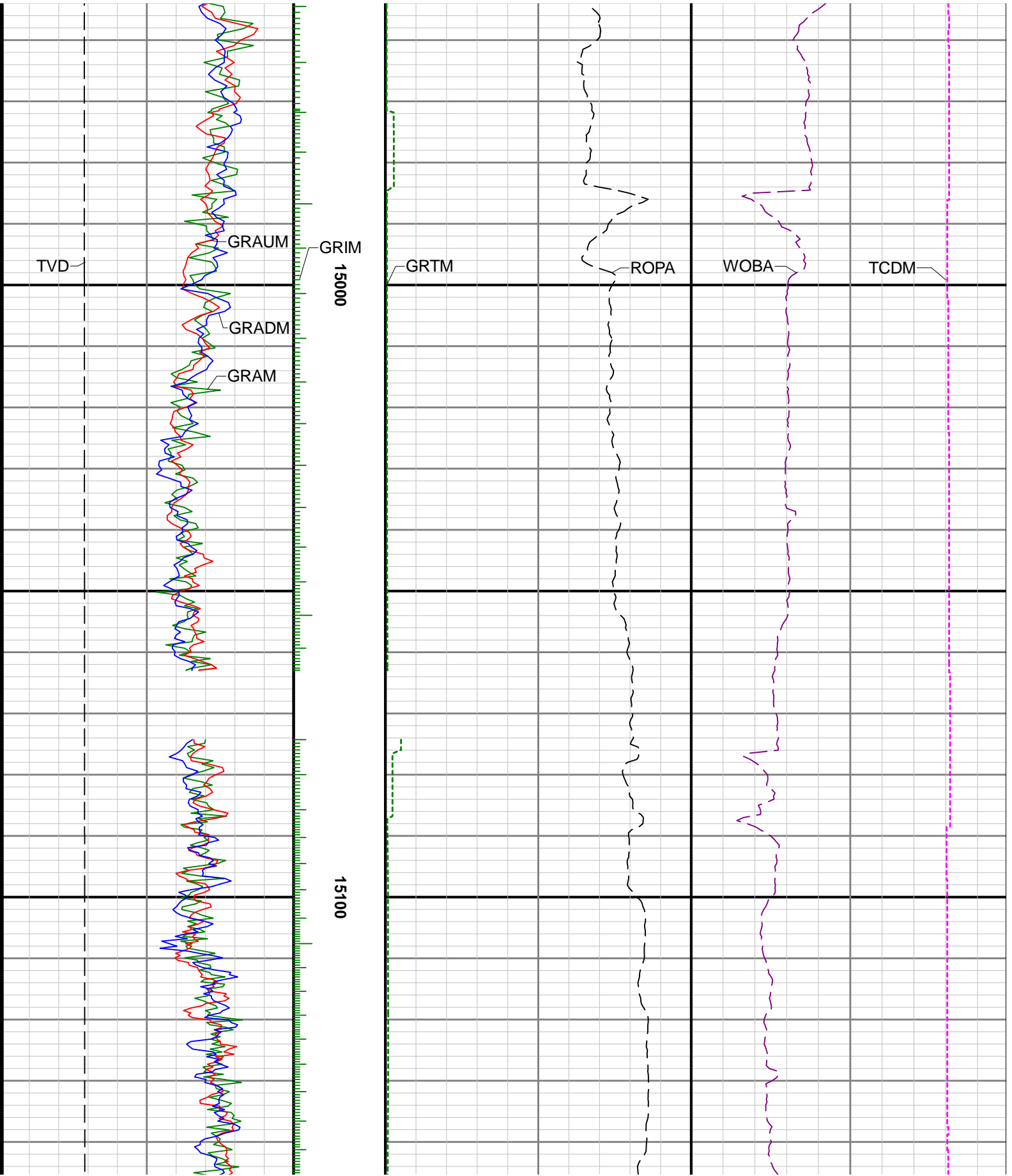


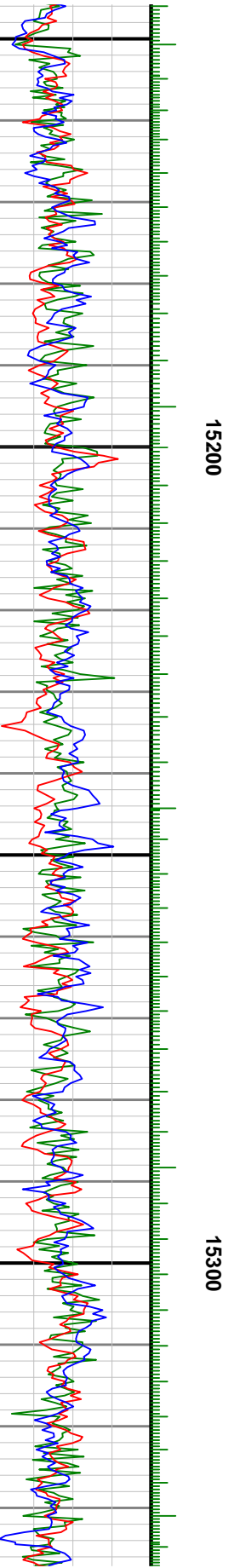
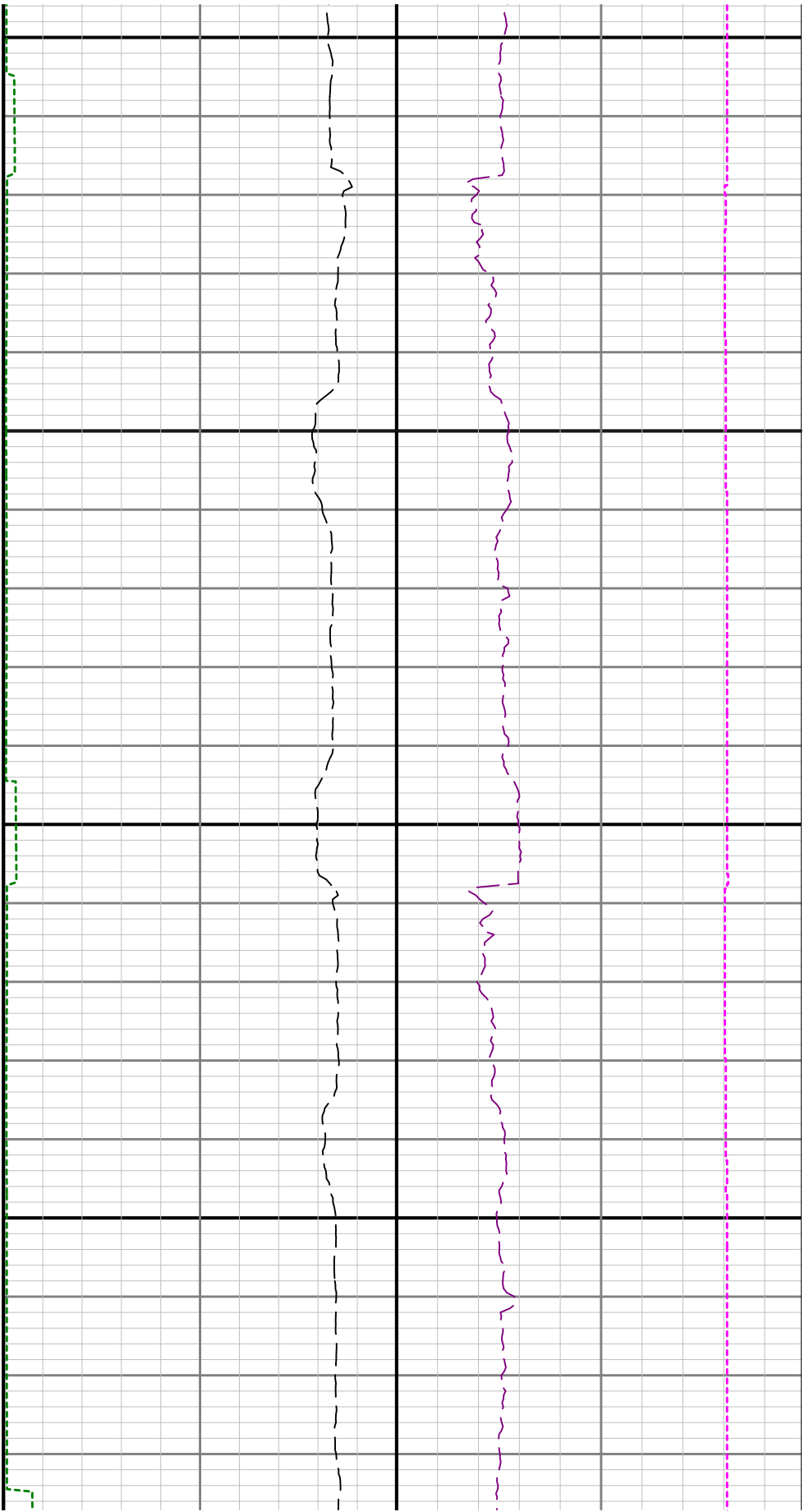


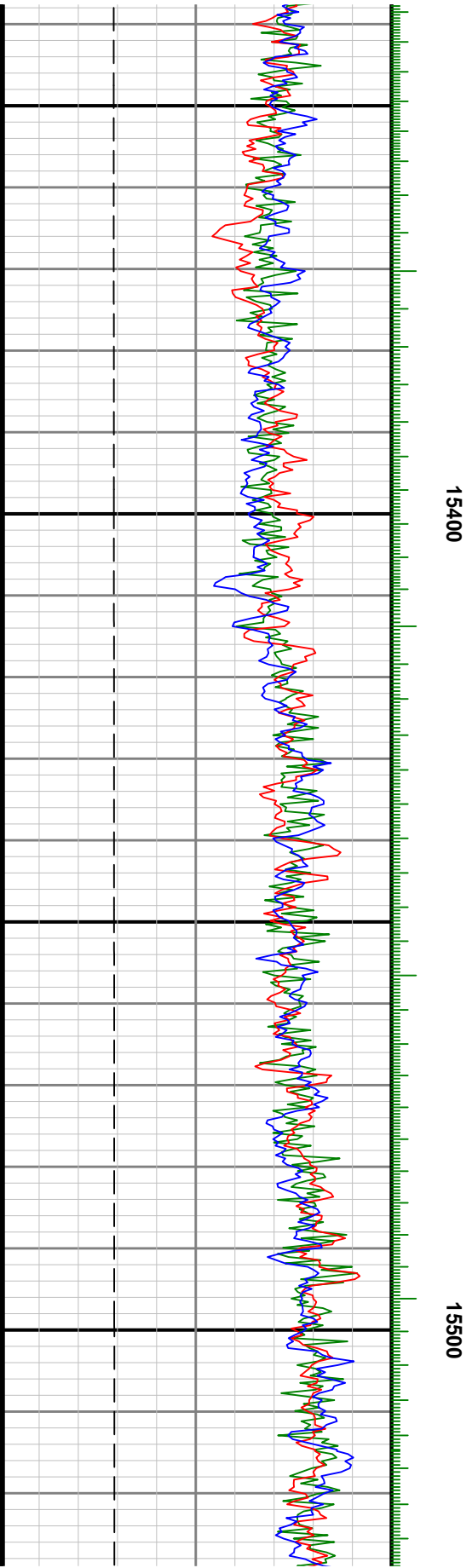
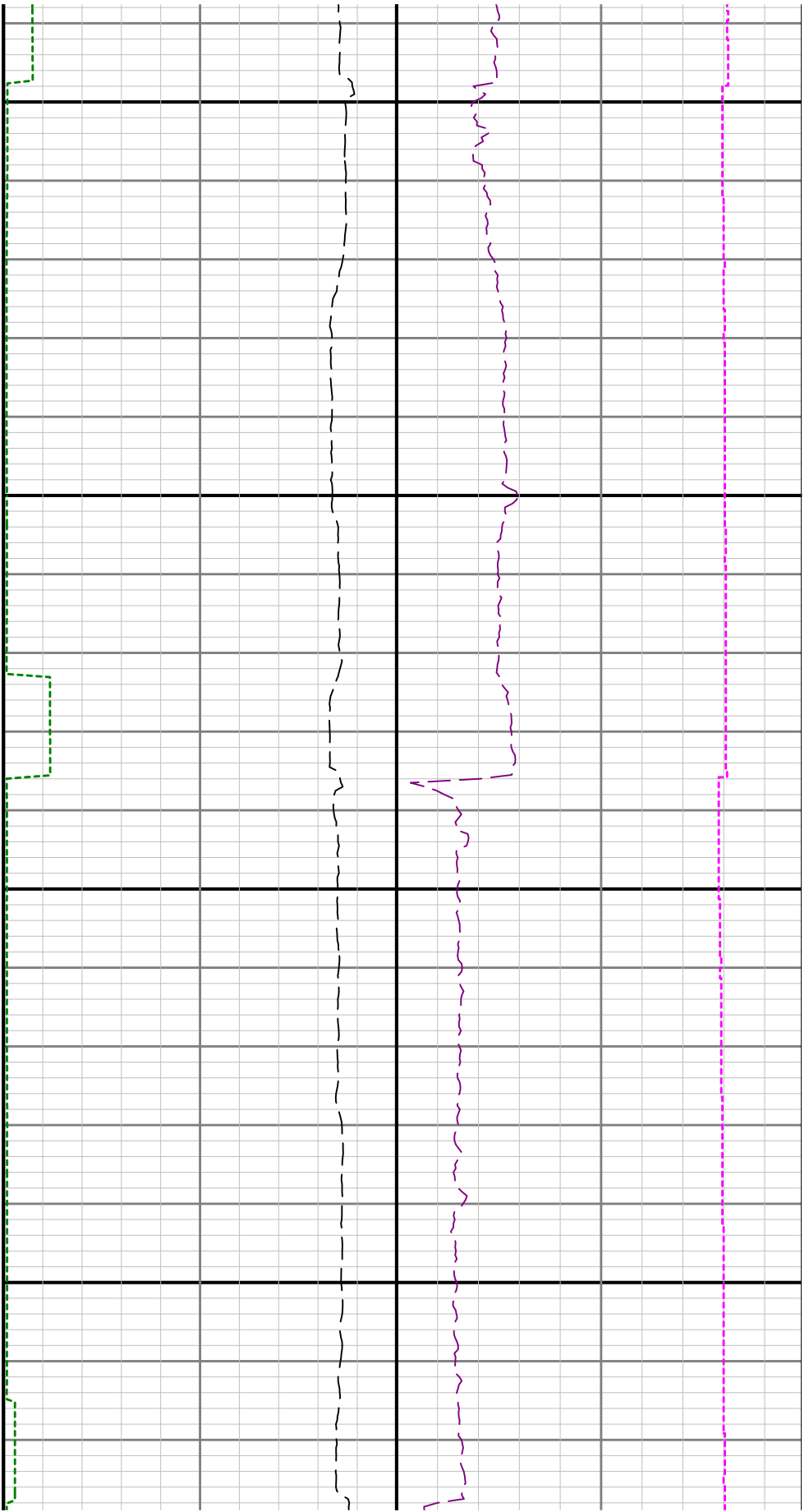


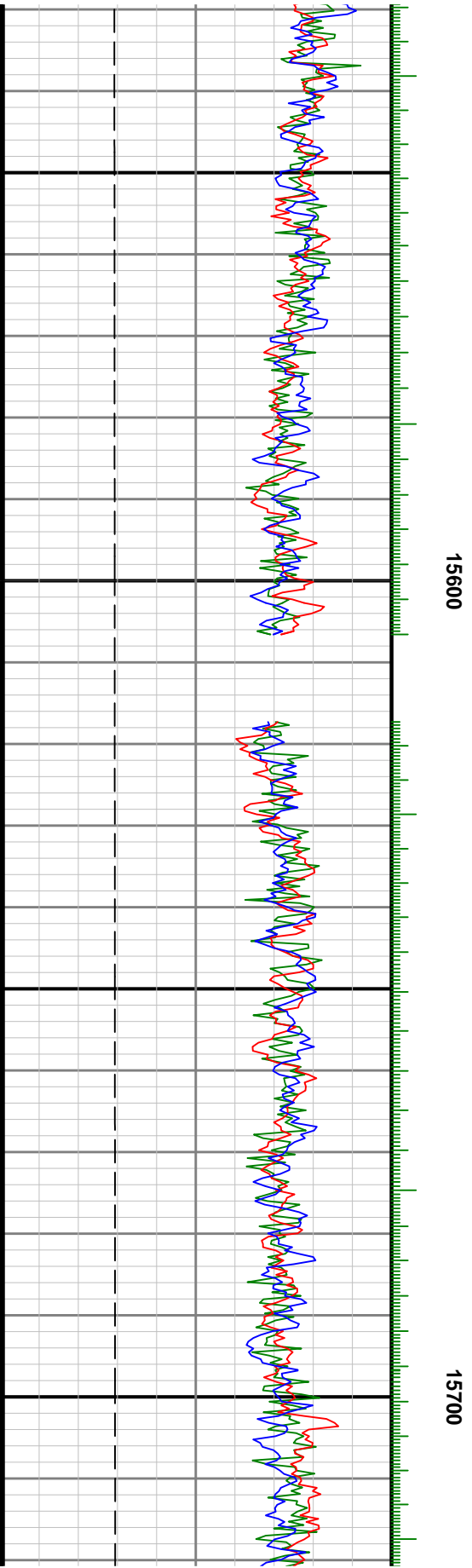
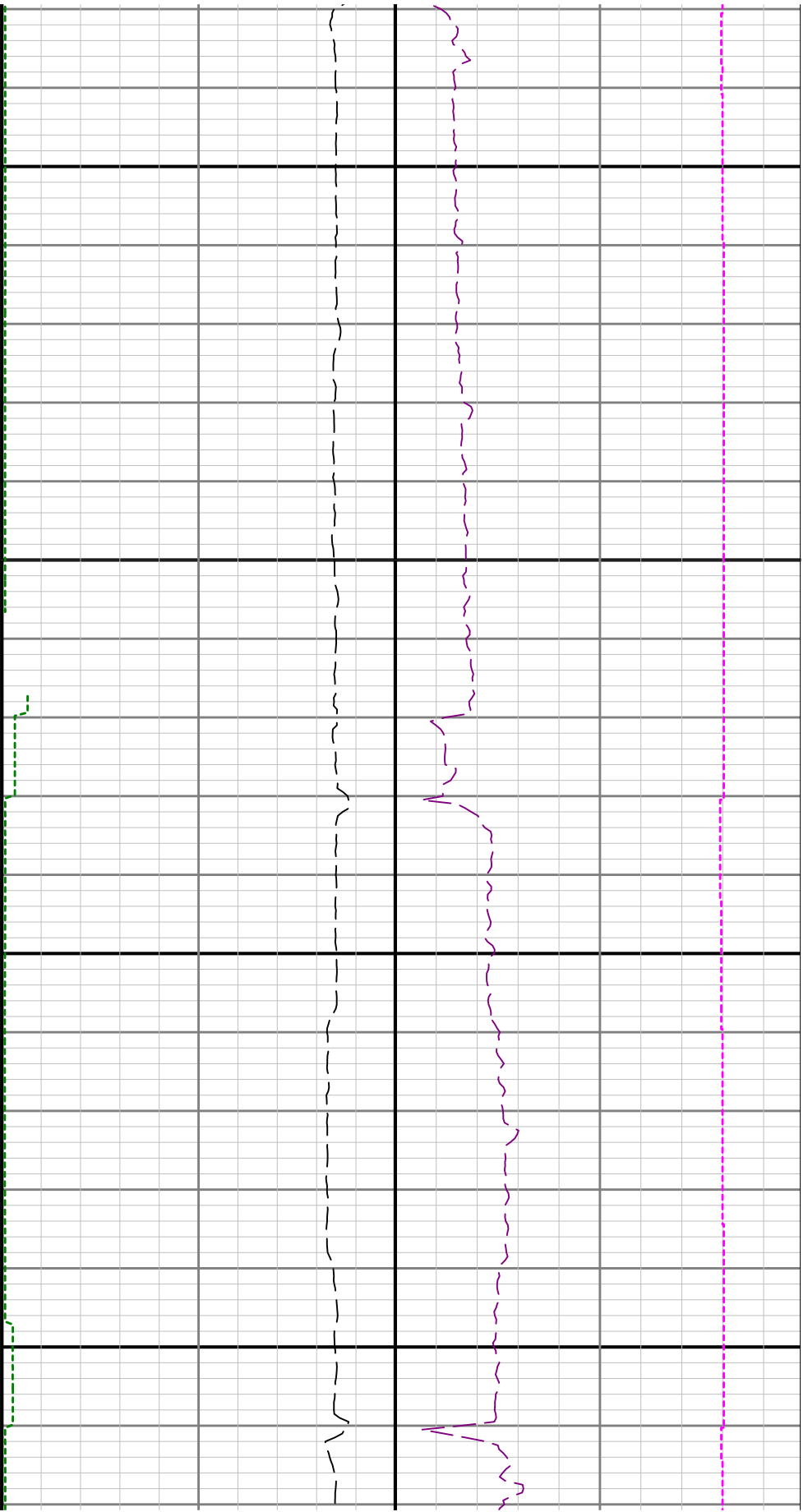


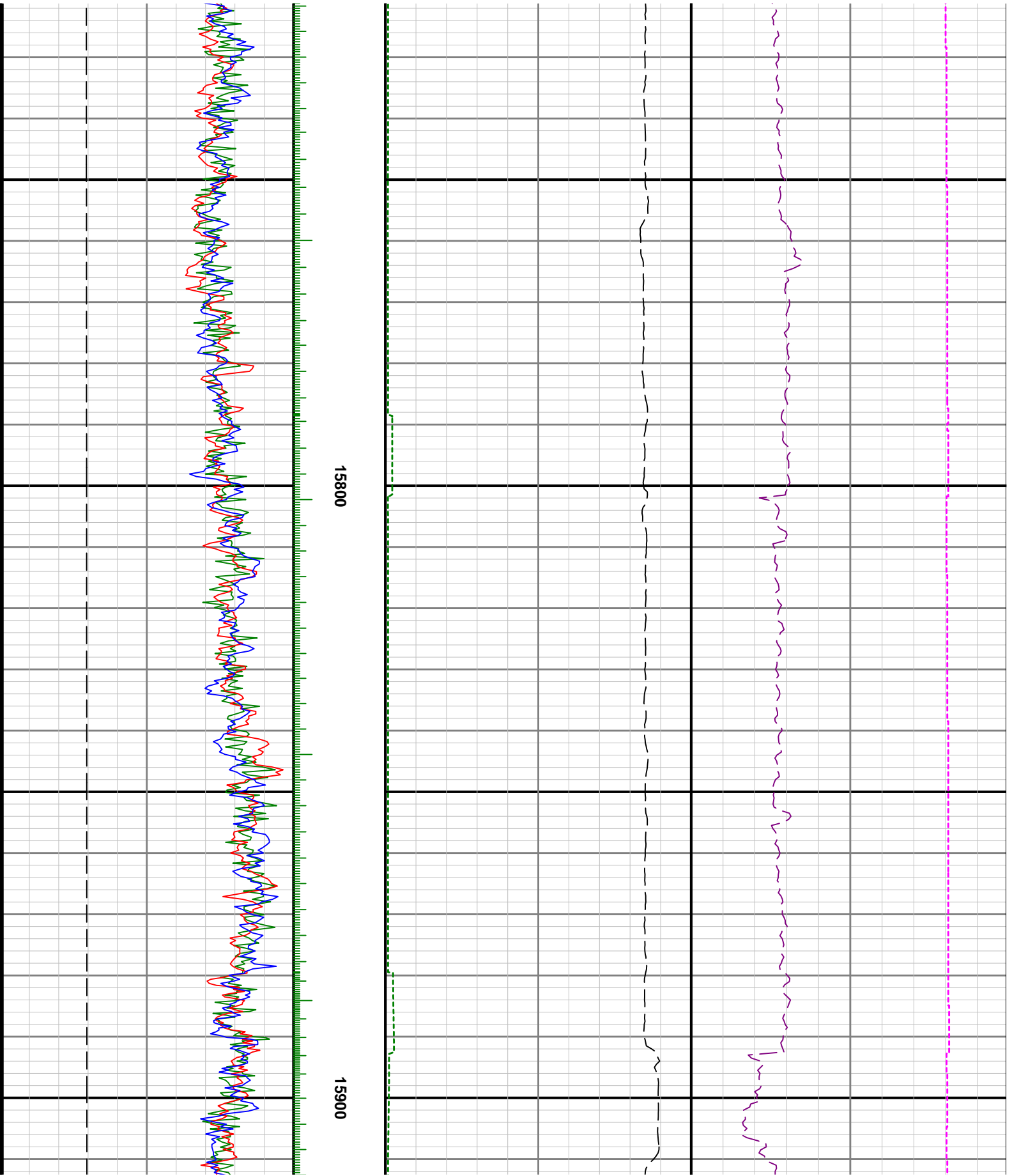


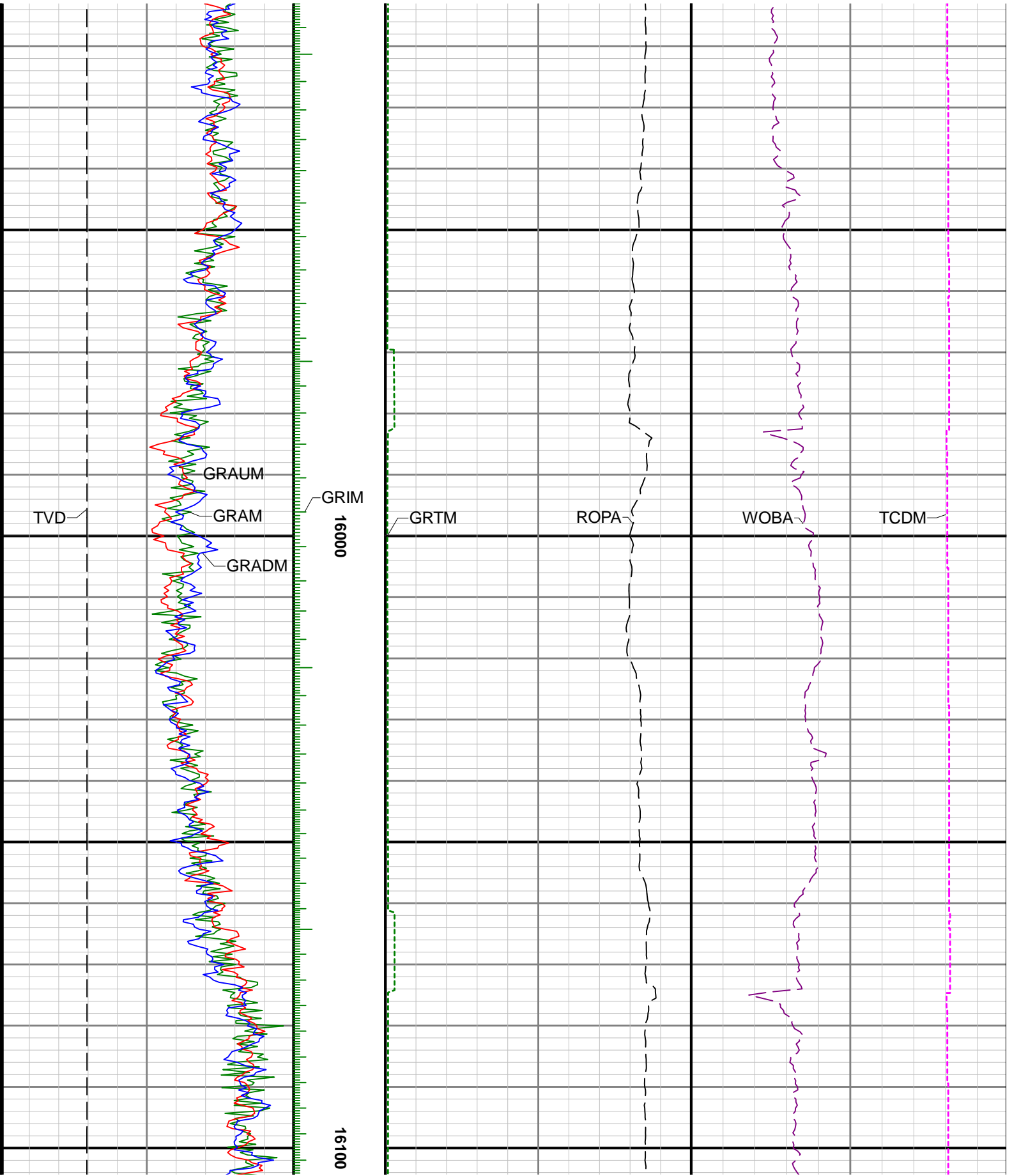






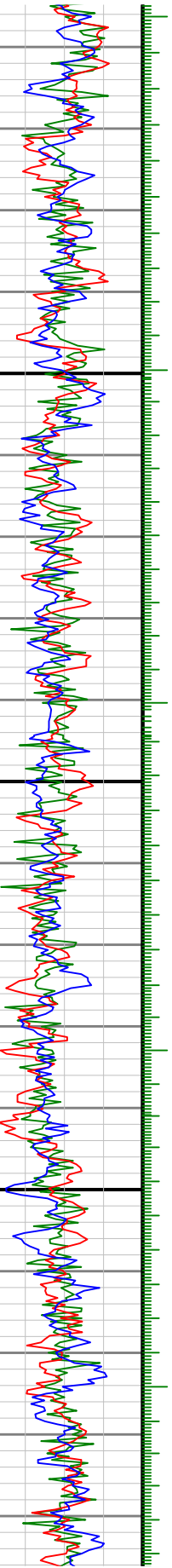


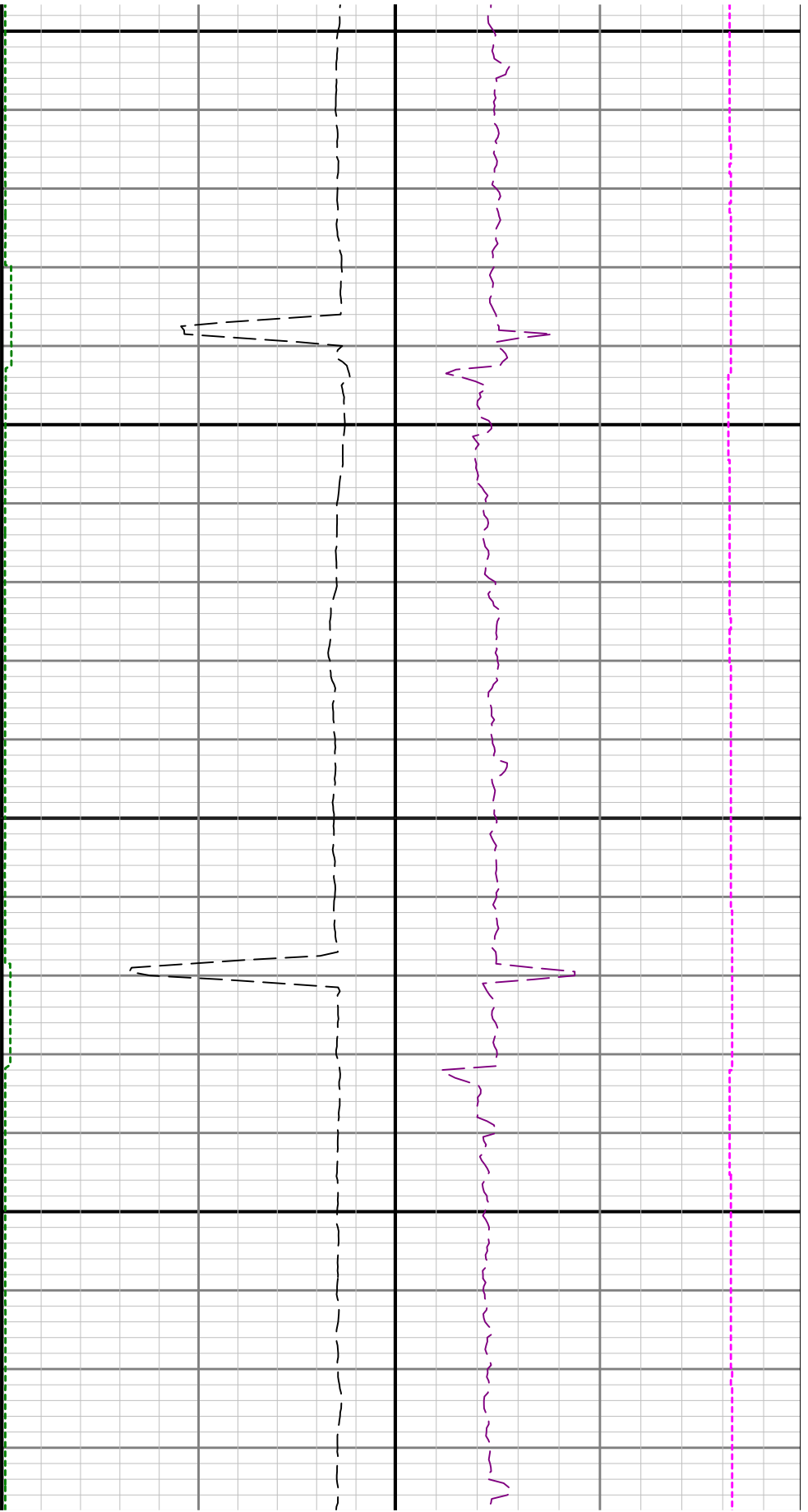






16200





16300

16400

