



LWD MEMORY LOG

Gamma Ray
Azimuthal Gamma Ray

Company: Bonanza Creek Oil Company

Well: PRONGHORN 24-8-5XRLNB St 2

Field: Weld County

County: Weld Country: United States

State: Colorado

Surface Location:

Latitude:

Longitude:

040° 24' 33.098" N

104° 14' 17.150" W

Other Services:

Directional

API No: 05-123-45068-02

Job ID: 109524695

SEC:

8 TWN: 5N RGE: 61W

Permanent Datum (P.D.): Mean Sea Level

Log Measured From: Rig Floor

Elevation: Above P.D.

0.00 ft

Elev. KB: Elev. DF: Elev. GL:

N/A

4625.00 ft

4608.00 ft

Dates

Interval Drilled

Magnetic Field Reference

Date From: N/A

Date To: N/A

Spud Date: N/A

Top: (ft)

Bottom: (ft)

0.00

0.00

Azi Reference North: N/A

Total Magnetic Field Strength: (nT)

Mag to Reference North Correction: (deg)

Dip Angle: (deg)

N/A

N/A

N/A

Borehole Record

Casing Record

Hole Size (in)

13.500

8.500

8.500

From (ft)

17.00

1615.00

6343.00

To (ft)

1615.00

6343.00

16154.00

Size (in)

9.625

Weight (lb/ft)

36.00

From (ft)

17.00

To (ft)

1605.00

Mud Record

Deviation Record

Type

Water Based Mud

Diesel-Oil Based Mud

From (ft)

17.00

1615.00

To (ft)

1615.00

16154.00

Hole Size (in)

13.500

8.500

Interval (ft)

1598.00

14539.00

Inc | Az (Start)

0.33 | 89.31

0.79 | 347.46

Inc | Az (End)

0.79 | 347.46

90.18 | 357.87

Acquisition System

Software Version

Other

Baker Hughes Cadence

Plot Studio

RT 4.2

4.2.8155.1

Rig:

Contractor: Akita Drilling

District: RMA

Akita 519

Unit: D&E

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Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	13.500	PDC	4.00	Steerable	0.00	0.00	17.00	1615.00	N/A	N/A	4.93
2	2	8.500	PDC	2.00	Rotary Steerable	5000.00	11194.00	1615.00	11207.00	2018-12-01 10:50	2018-12-02 18:33	37.27
4	4	8.500	PDC	2.00	Rotary Steerable	6330.00	16141.00	6343.00	16154.00	2018-12-06 14:33	2018-12-08 05:40	38.94

Crew

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+ (%)
2018-11-24 22:48	1	17.00	Water Based Mud	8.6	3	9	N/A	N/A	Active Pit	400	9.00
2018-12-01 15:00	2	5936.00	Diesel-Oil Based Mud	9.1	7	N/A	0.0	78/12	Active Pit	22500	0.00
2018-12-02 17:00	2	10780.00	Diesel-Oil Based Mud	9.4	10	N/A	0.0	75/13.5	Active Pit	22500	0.00
2018-12-03 12:00	2	11203.00	Diesel-Oil Based Mud	9.5	10	N/A	0.0	75/13	Active Pit	22500	0.00
2018-12-06 16:00	4	6310.00	Diesel-Oil Based Mud	9.2	10	N/A	0.0	77/13	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	NaviTrak	10350729	Directional (mag)	16.84	52.91	8.000	0.000
1	NaviTrak	10350729	VSS	16.84	52.91	8.000	0.000
2	ATC_SU	12273681	Near Bit VSS	5.93	6.83	7.000	4.330
2	ATC_SU	12273681	Near Bit Inclination	5.93	6.83	7.000	4.330
2	ATC_MWD	14281557	Gamma (single)	2.77	13.00	7.000	3.250
2	ATC_MWD	14281557	Directional (mag)	12.27	22.50	7.000	3.250
4	ATC_SU	12273681	Near Bit VSS	5.93	6.83	7.000	4.330
4	ATC_SU	12273681	Near Bit Inclination	5.93	6.83	7.000	4.330
4	ATC_MWD	14281557	Gamma (single)	2.77	13.00	7.000	3.250
4	ATC_MWD	14281557	Directional (mag)	12.27	22.50	7.000	3.250

Service and Tool Mnemonics

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_LCPM	ATC_LCPM	Auto Trak Curve LCPM

Comments

- 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 used the 8 inch NaviTrak service (Directional) behind a 13 1/2 inch bit and steerable assembly to drill from 17 to 1615 feet MD (17 to 1614 feet TVD).
 - 3 Baker Hughes LWD Run 2 and Sidetrack Run 4 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 1615 to 16154 feet MD (1614 to 6092 feet TVD).
 - 4 The Gamma Ray Apparent (GRAM) data is presented from 0 to 200 APL per customer's request.


Remarks

Remarks				
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	5051.00	8.500	2	The Gamma Ray Apparent (GRAM) log starts at 5000 feet, per customer's request.
2	16149.00	9.500	4	The interval from 16144 to 16154 feet M.D. (6000 feet T.V.D.) was not logged due to apparent bit effect at well TD.

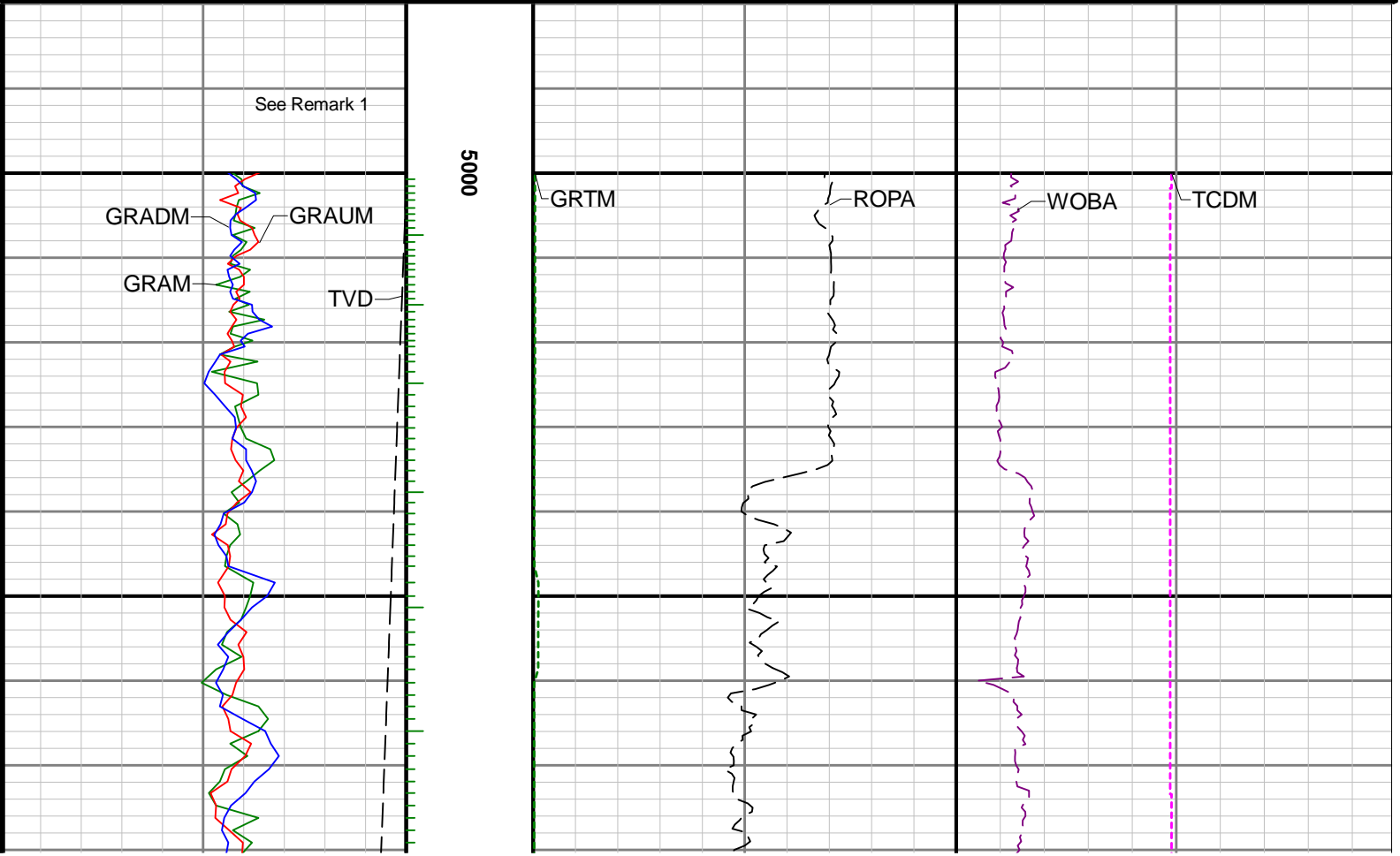
Curve Mnemonics

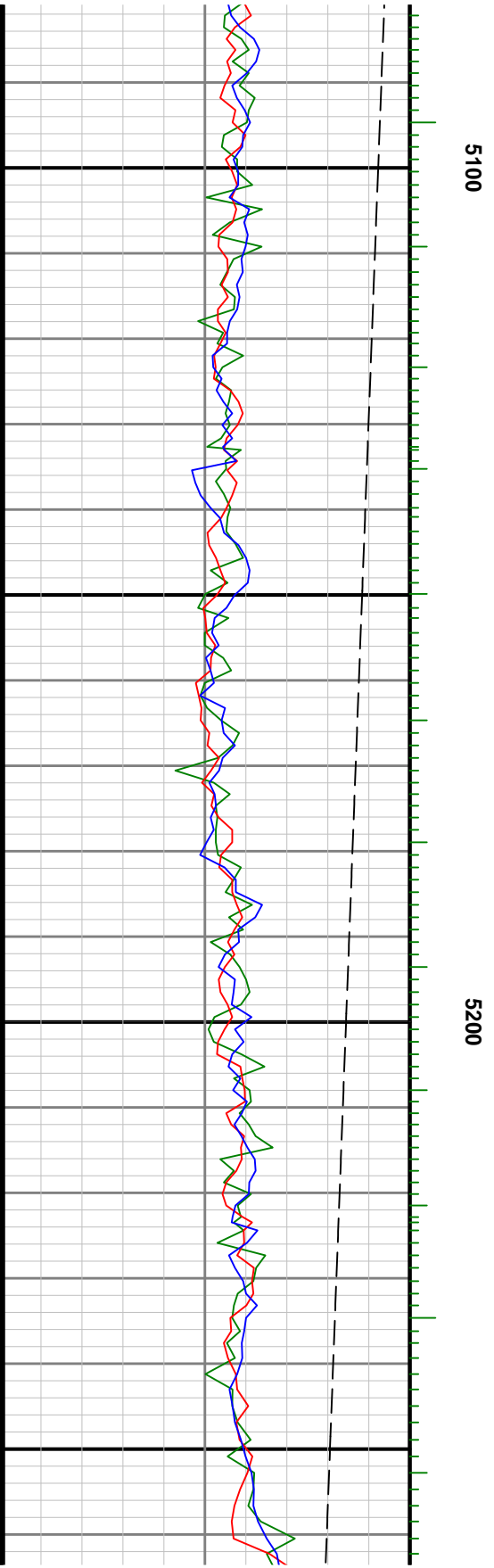
Curve Mnemonics		
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless

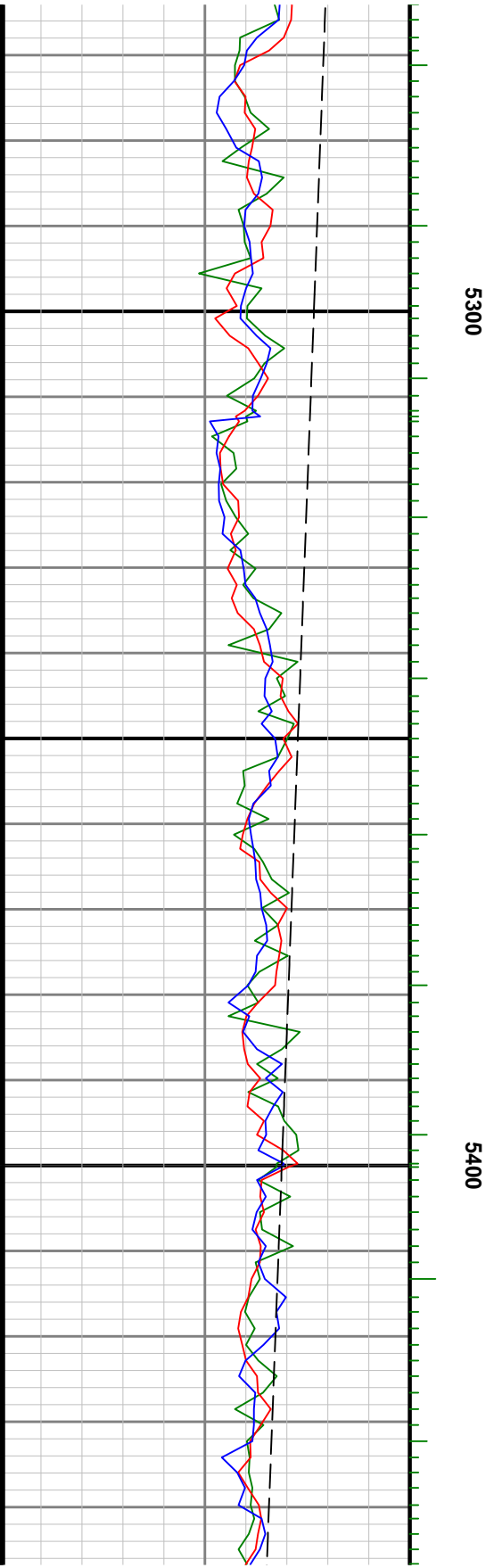
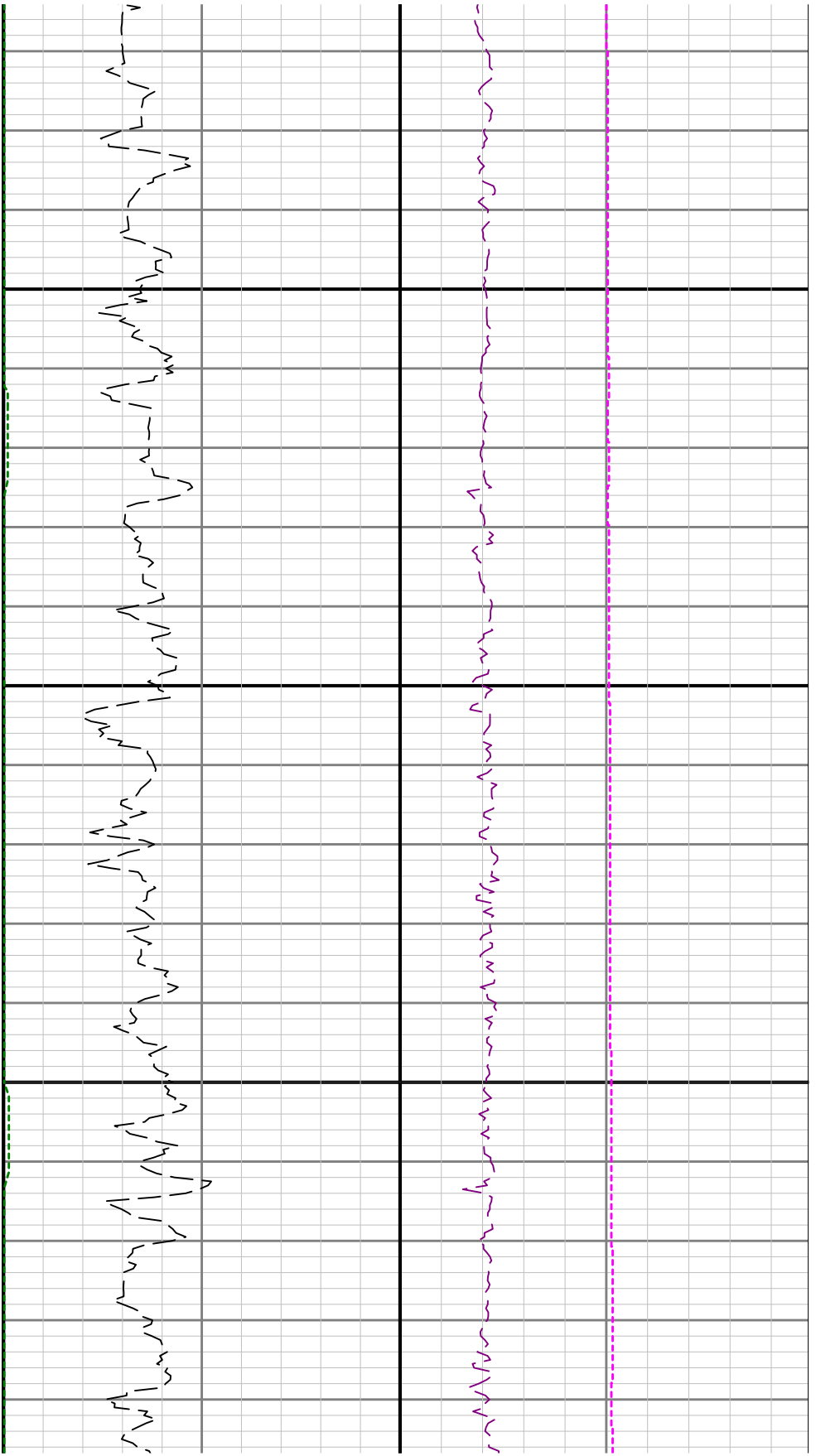
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory	min
GRADM	Gamma Ray - Apparent - Down Quadrant - Memory 0.5 ft Average	API
GRAUM	Gamma Ray - Apparent - Up Quadrant - Memory 0.5 ft Average	API
TCDM	Directional Real-Time Survey Temperature	degF

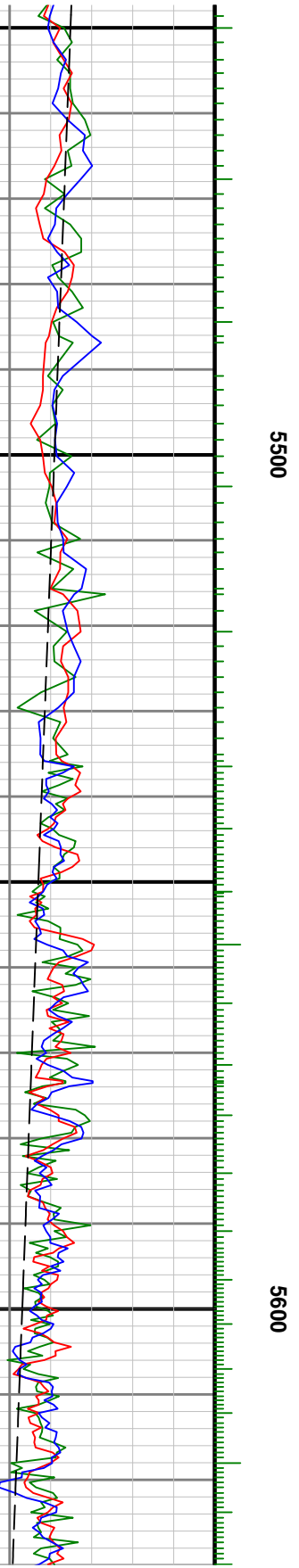
<div><div><div>BAKER HUGHES</div><div>a GE company</div></div><div></div></div>	Company	Bonanza Creek Oil Company			
	Well	PRONGHORN 24-8-5XRLNB St 2			
	Interval	Date From:	N/A	Top:	0.00 ft
		Date To:	N/A	Bottom:	0.00 ft
	Created	2018-12-08 19:15:41			

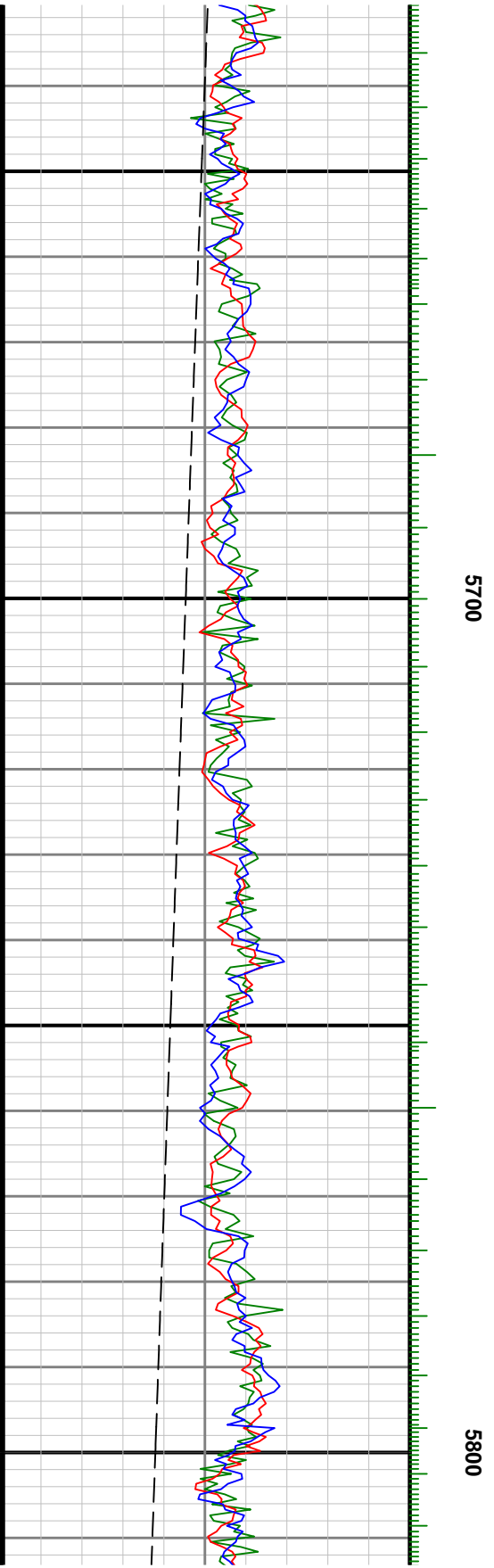
Gamma Ray - Apparent 0.5 ft Average GRAM	MD 1:240 feet	Depth Averaged ROP 3 ft Average ROPA	Weight On Bit, Average 1 ft Average WOBA
0 200		1000 0	0 100
API		ft/h	klb
Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM		Gamma Time Since Drilled GRTM	Downhole Temperature TCDM
0 200		0 600	0 300
API		min	degF
Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM			
0 200			
API			
True Vertical Depth TVD			
6200 4950			
ft			

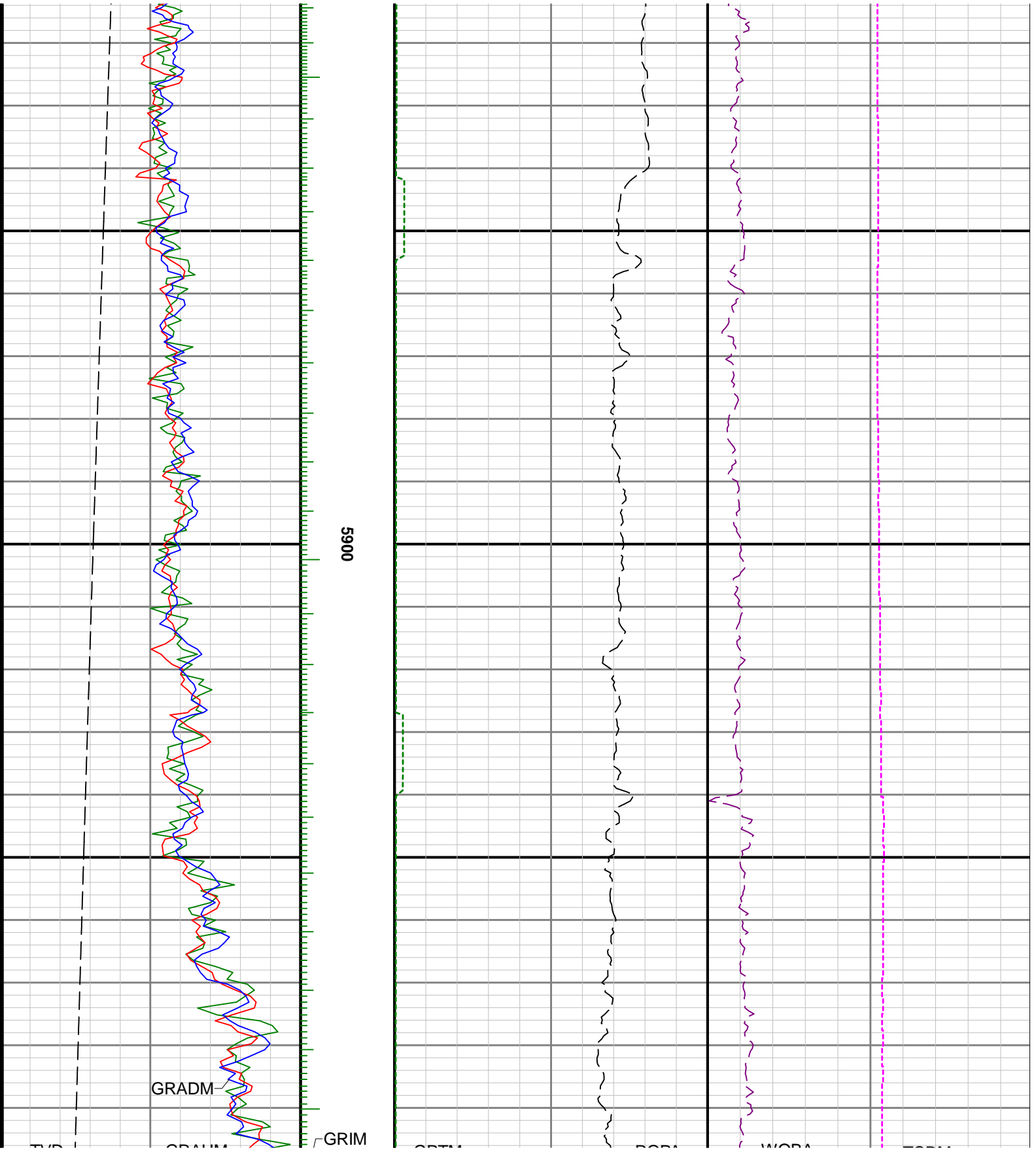


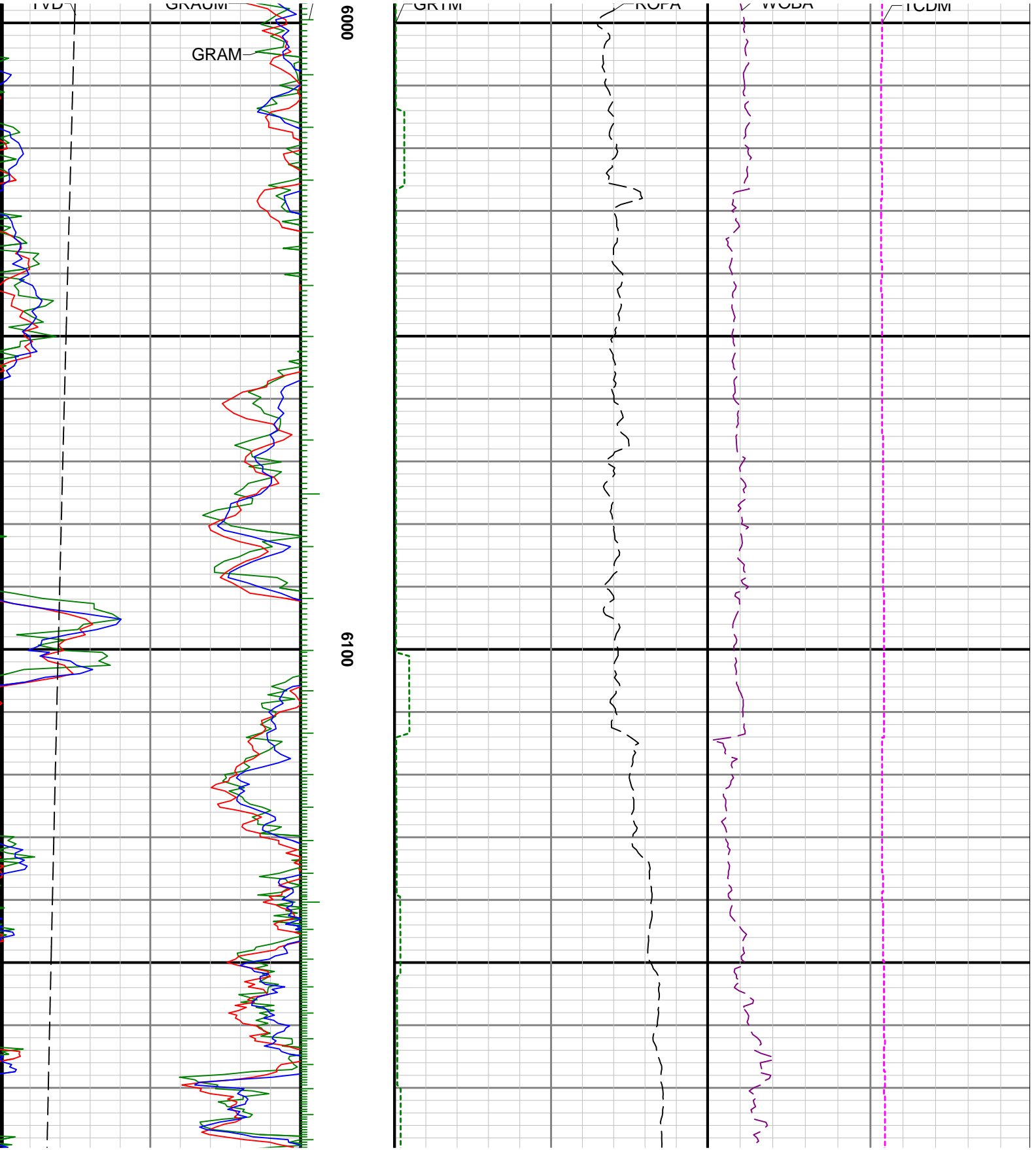


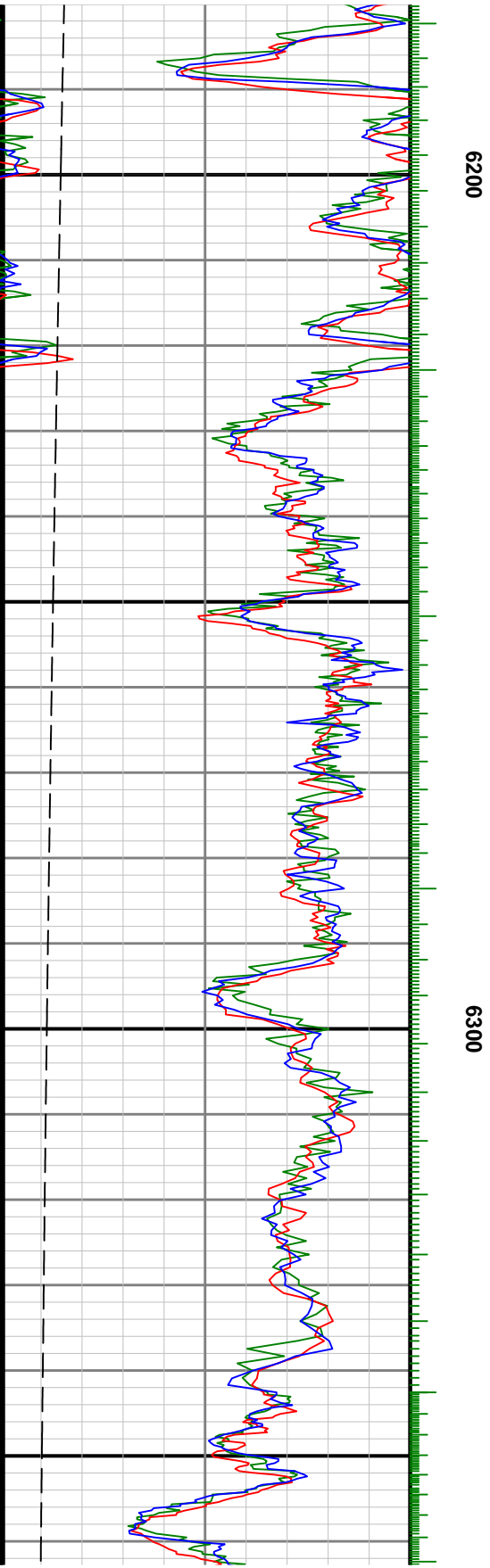
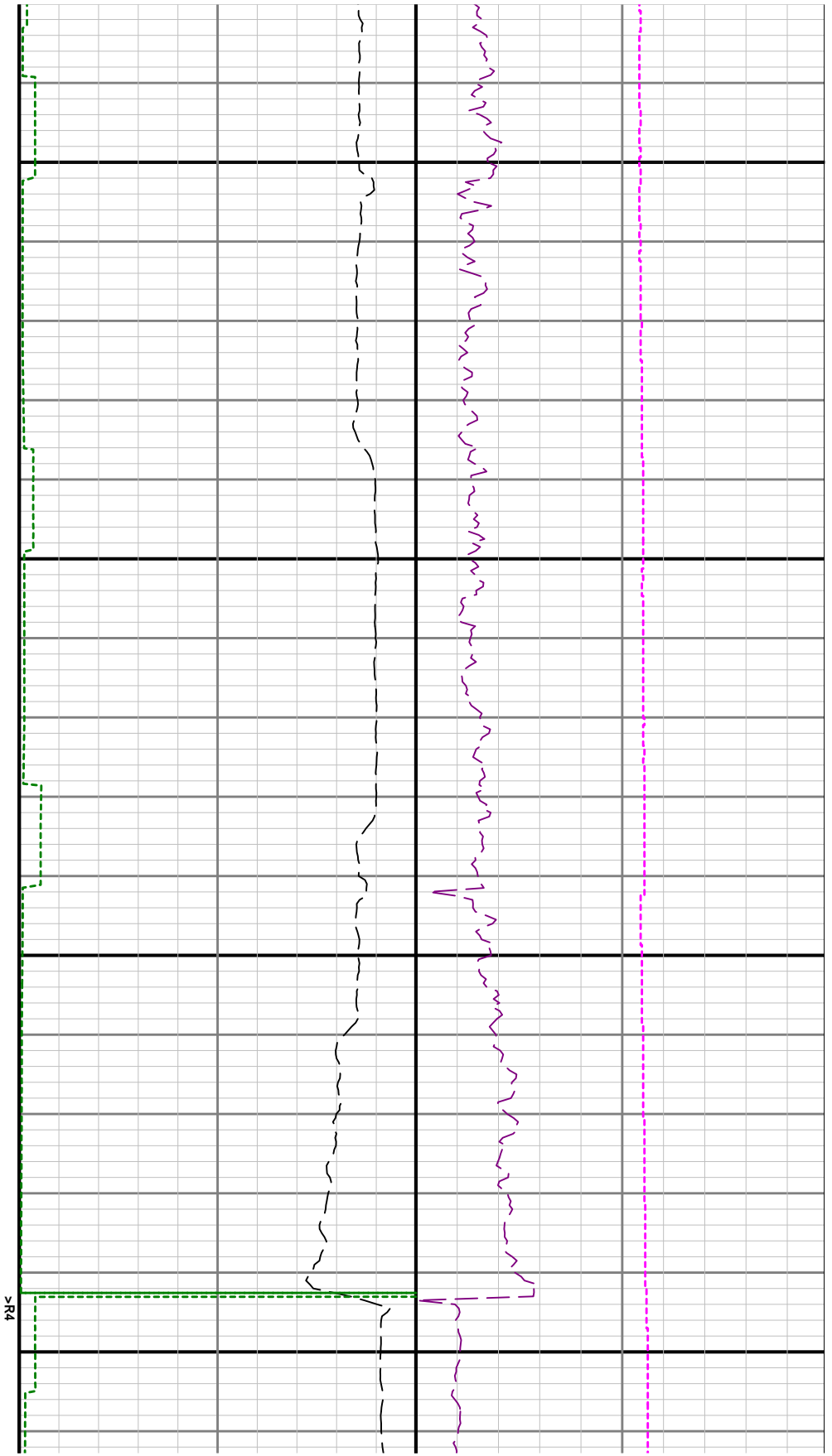


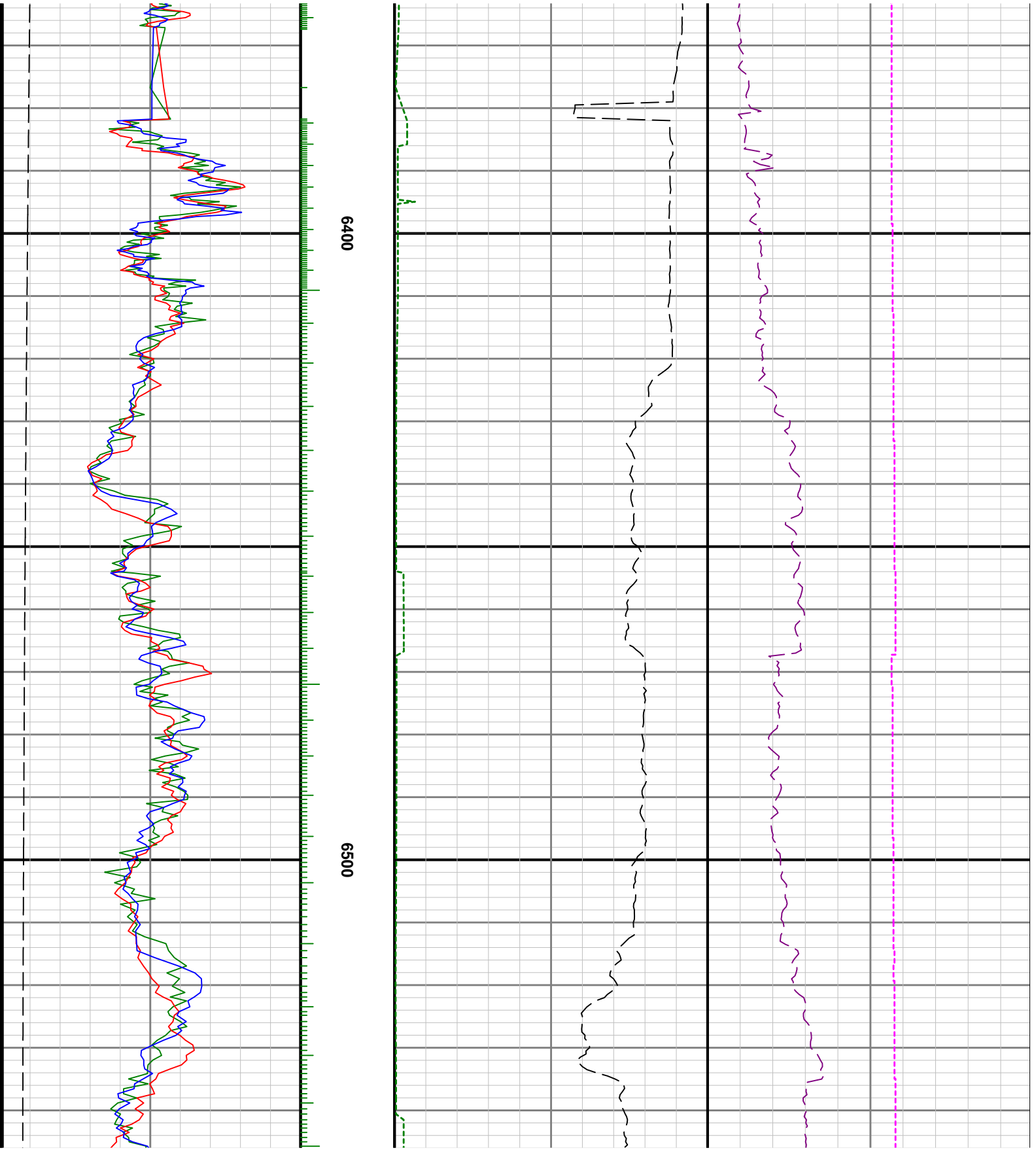


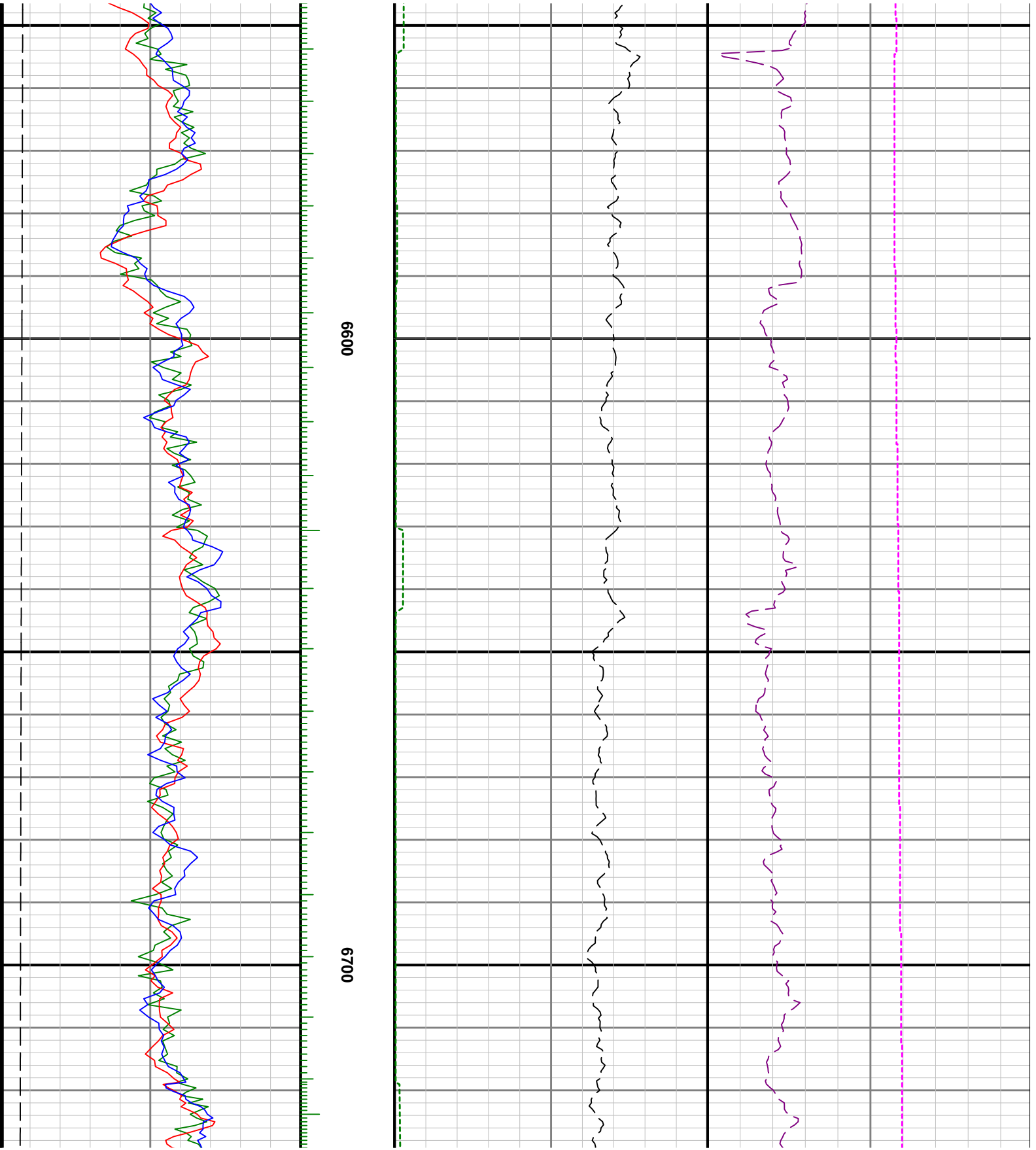


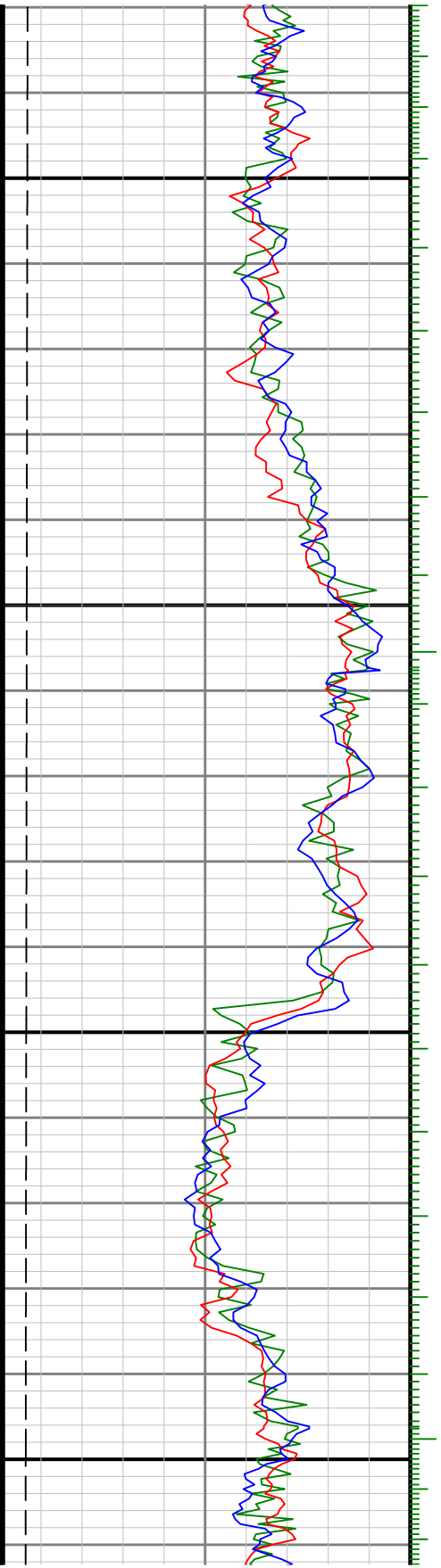






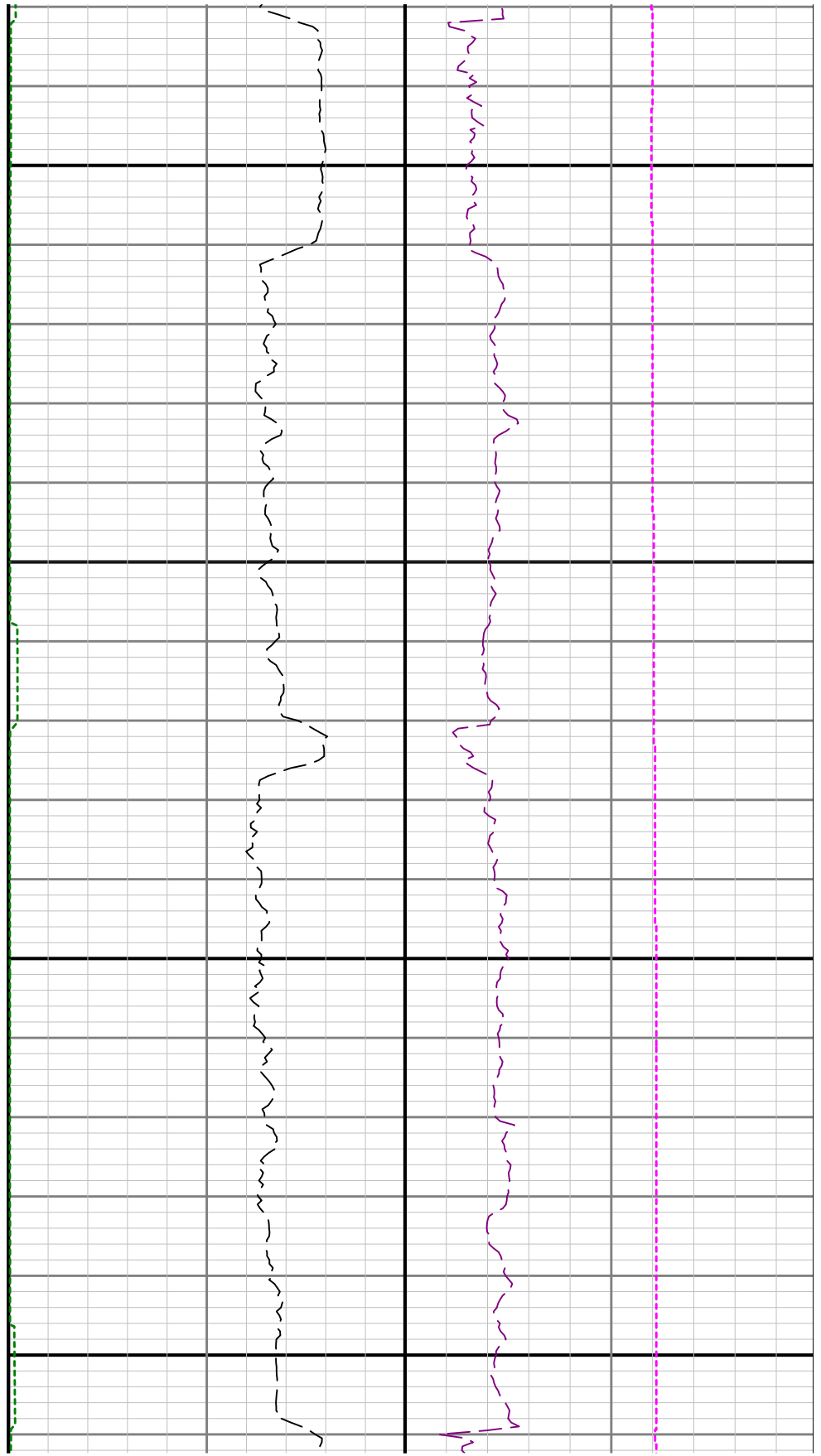


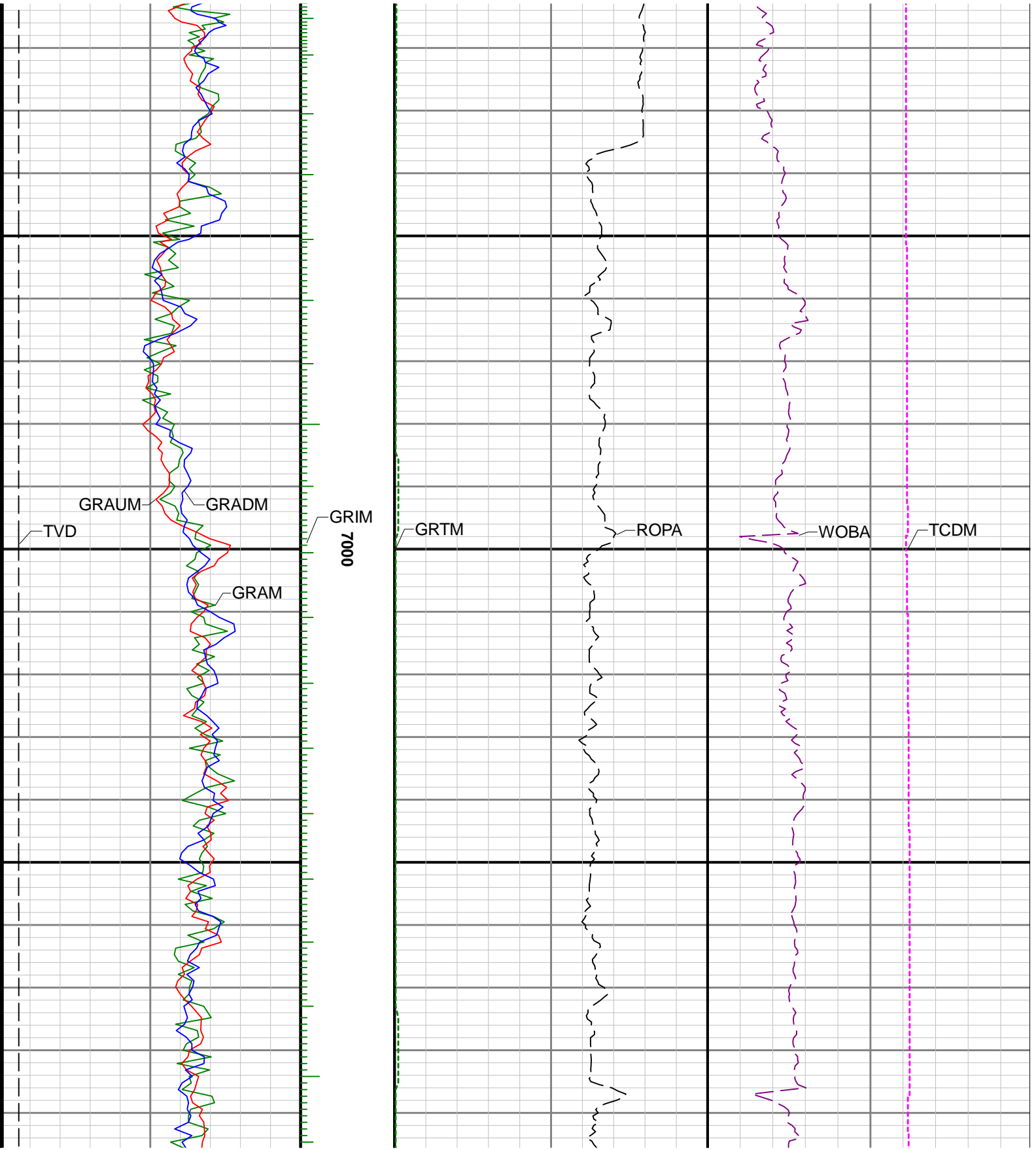


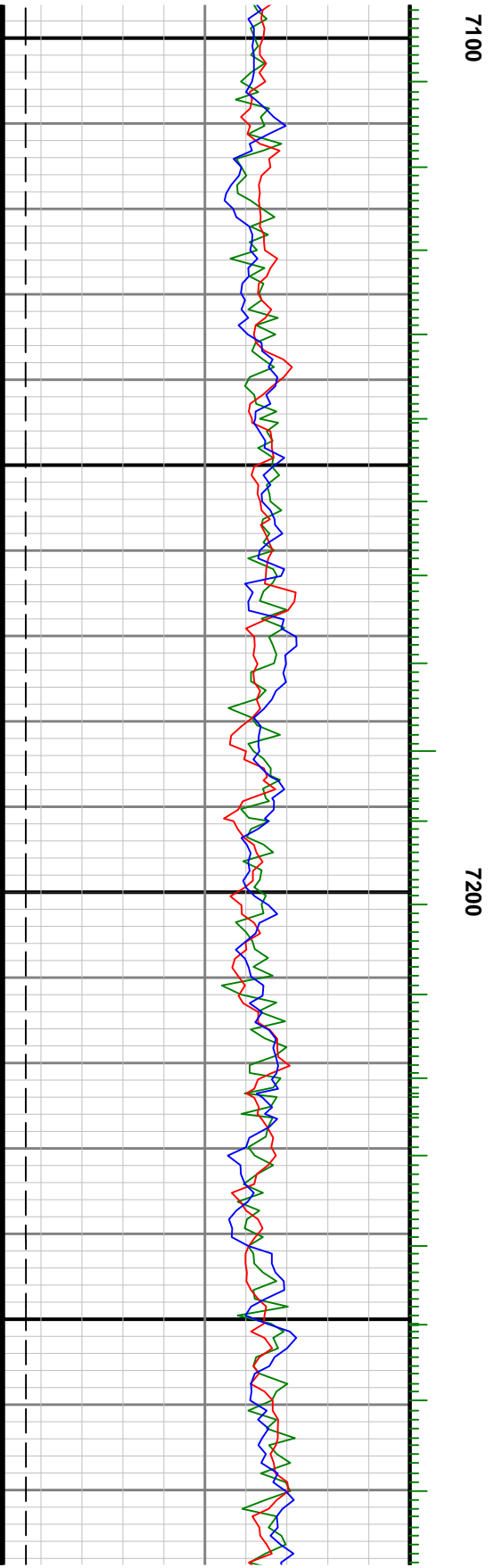
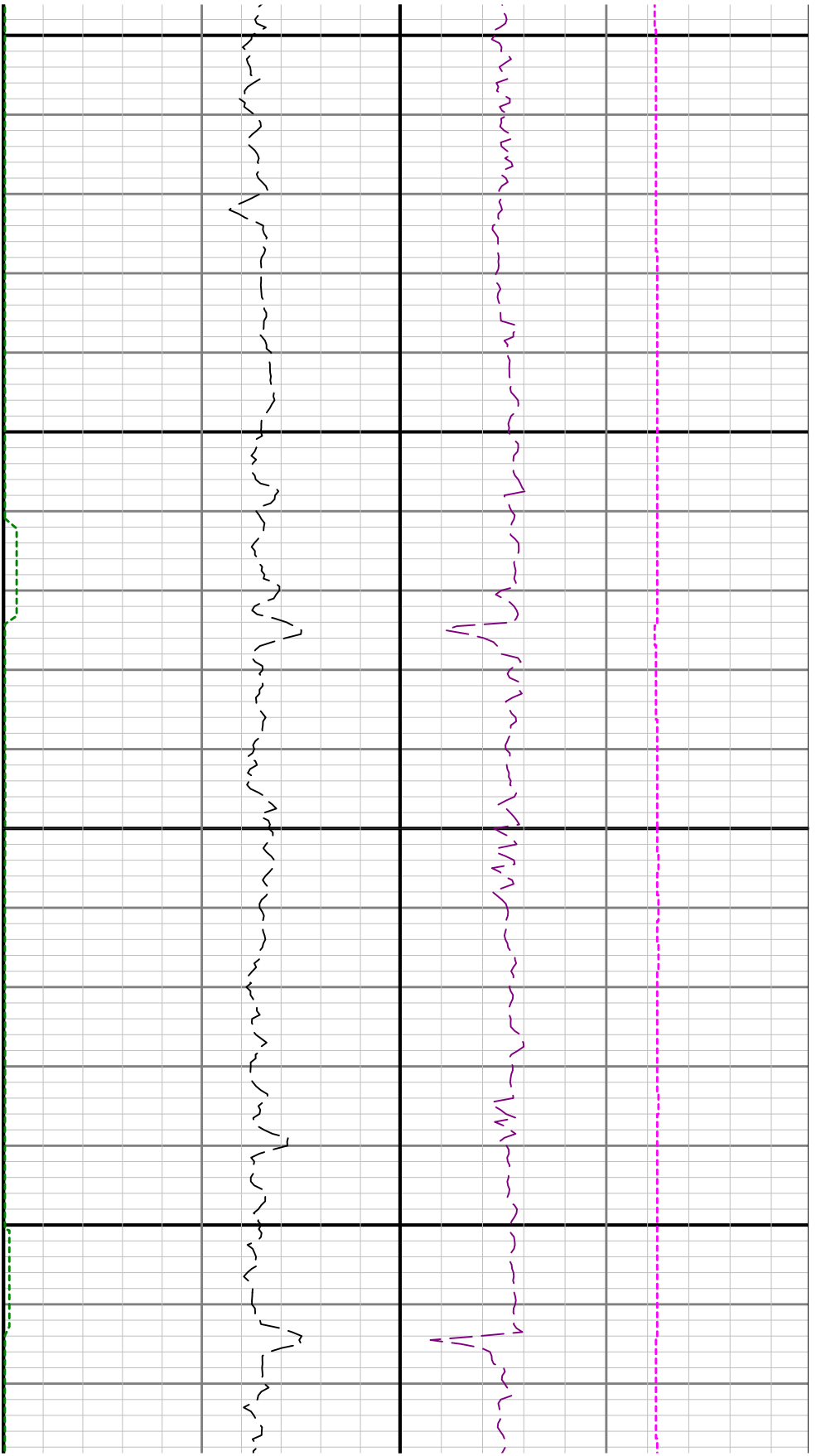


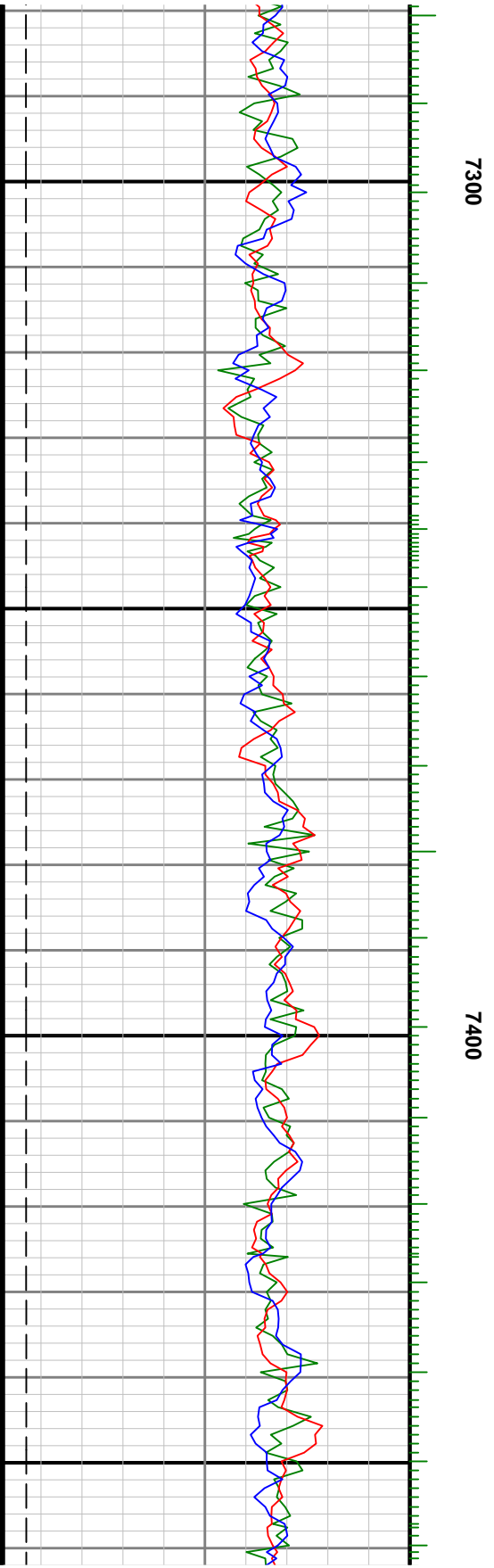
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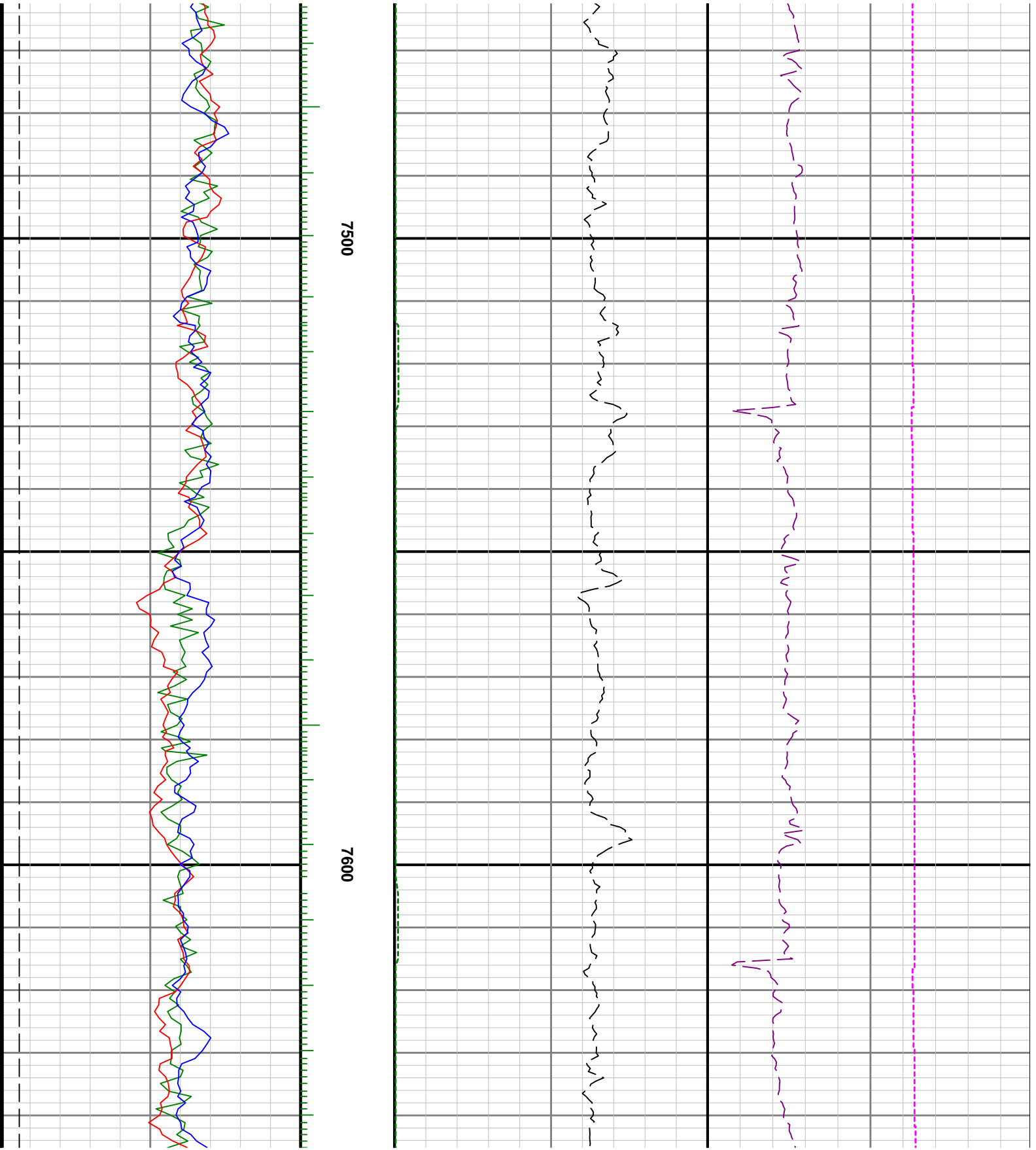
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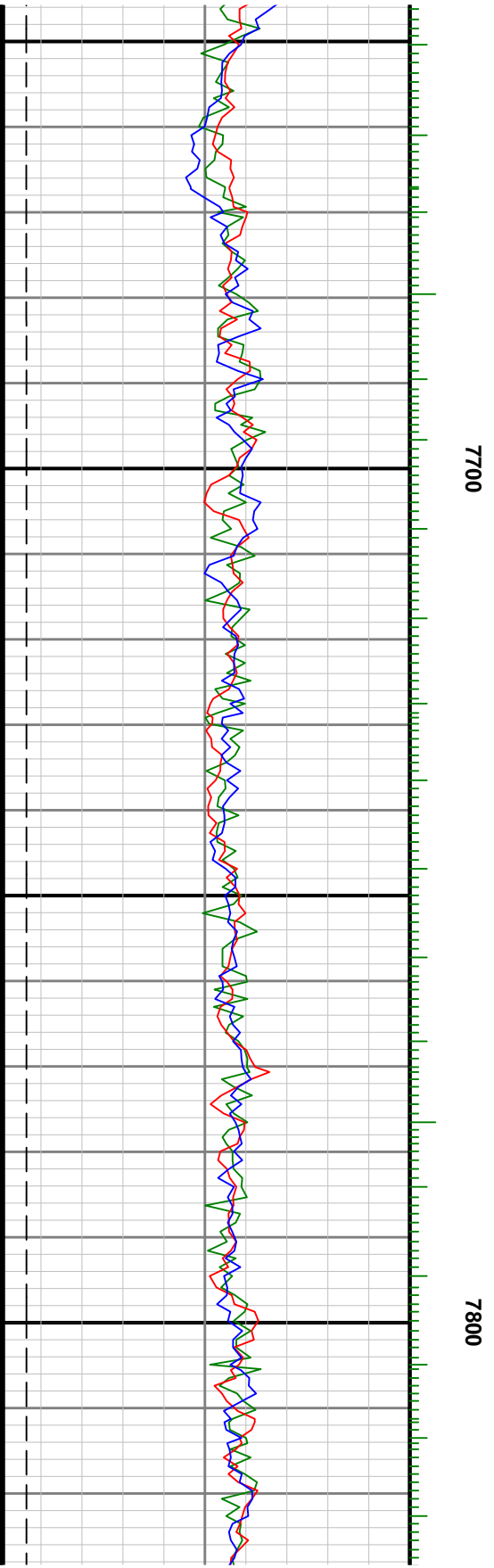
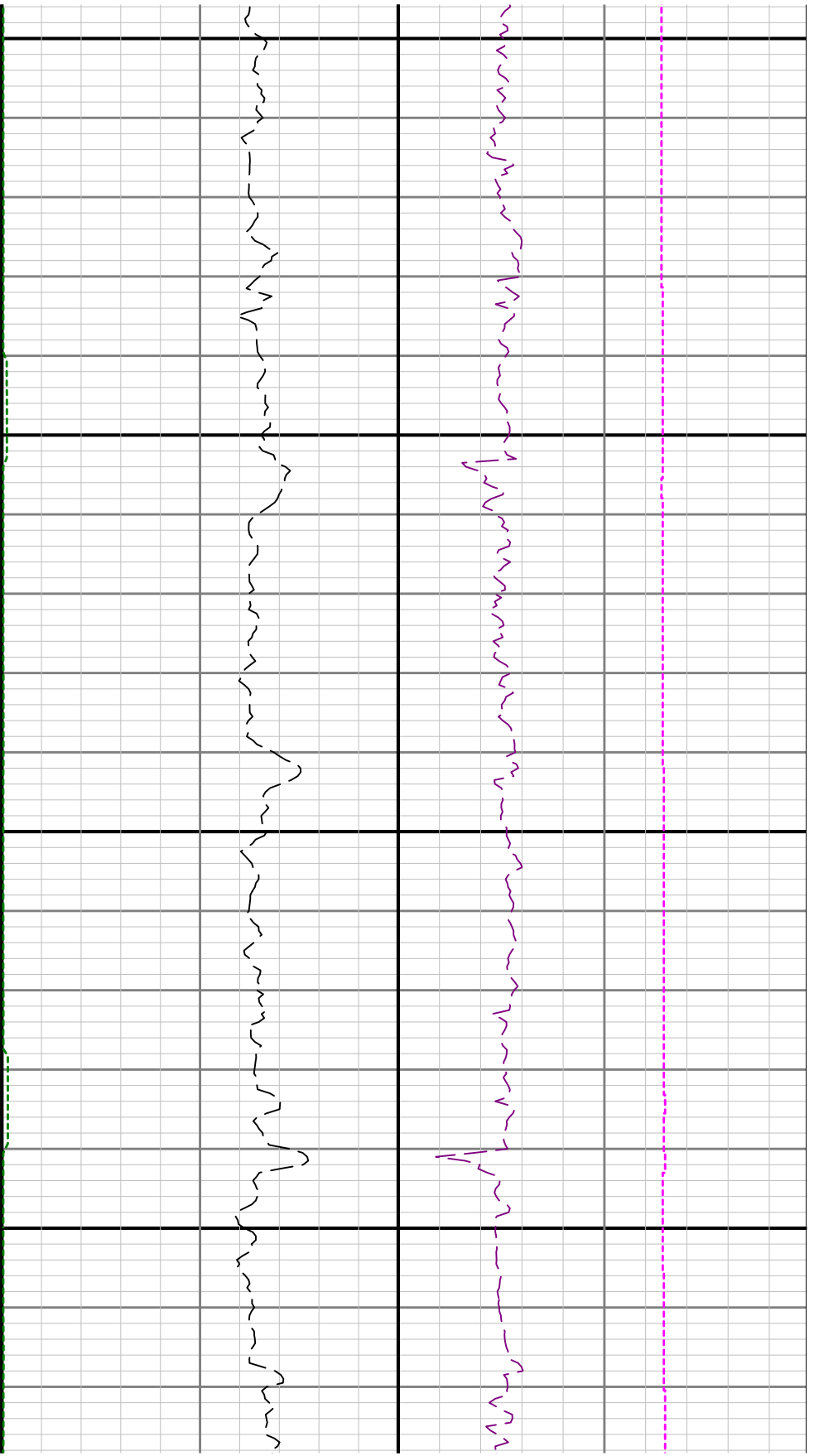


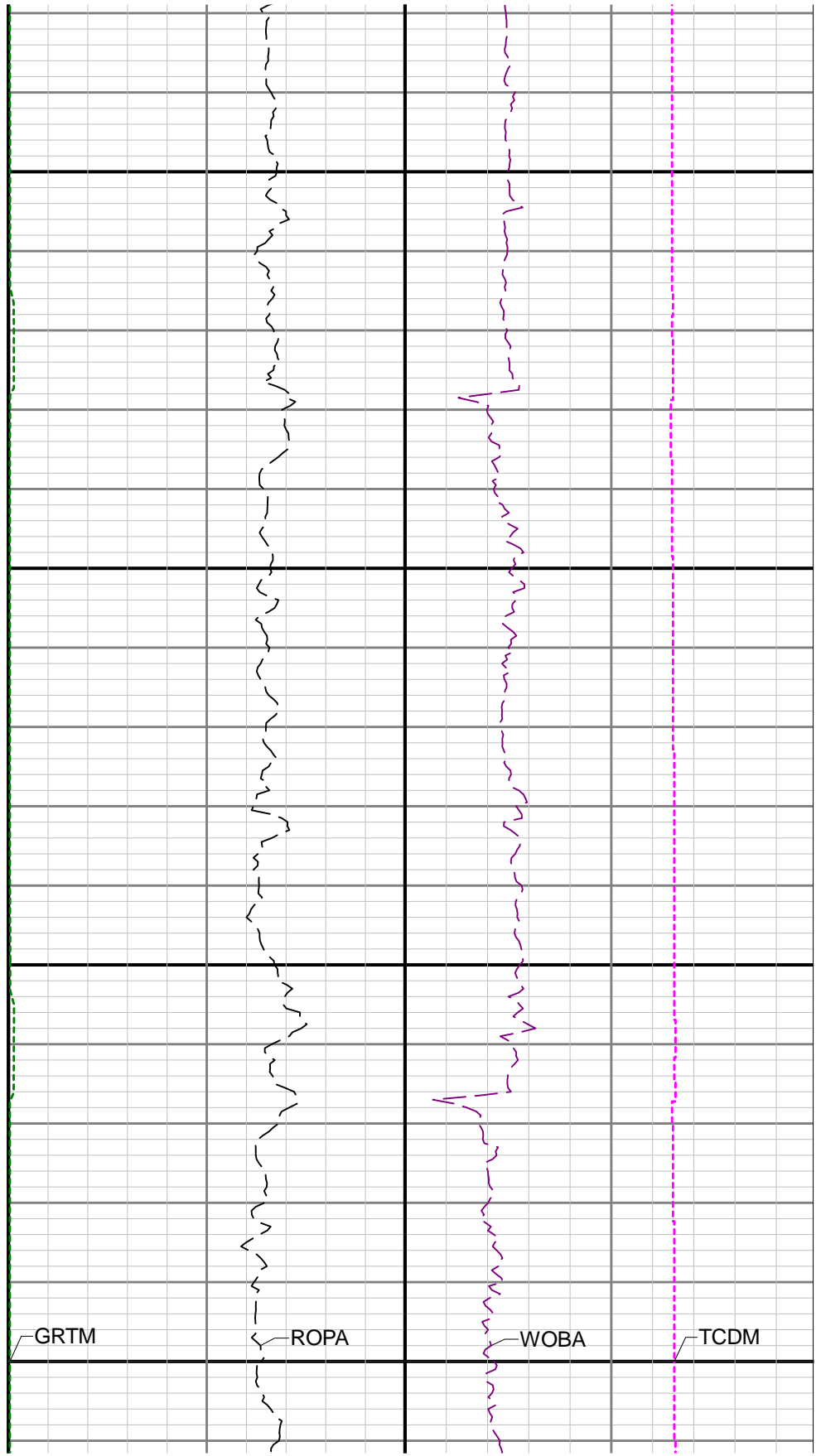
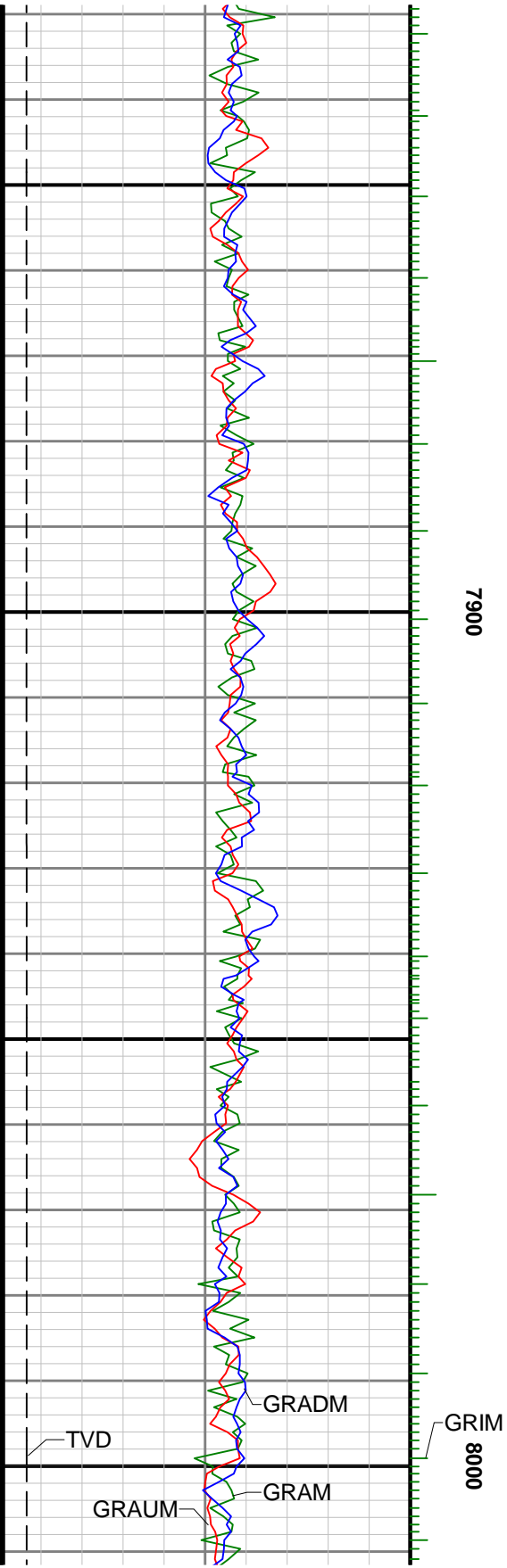


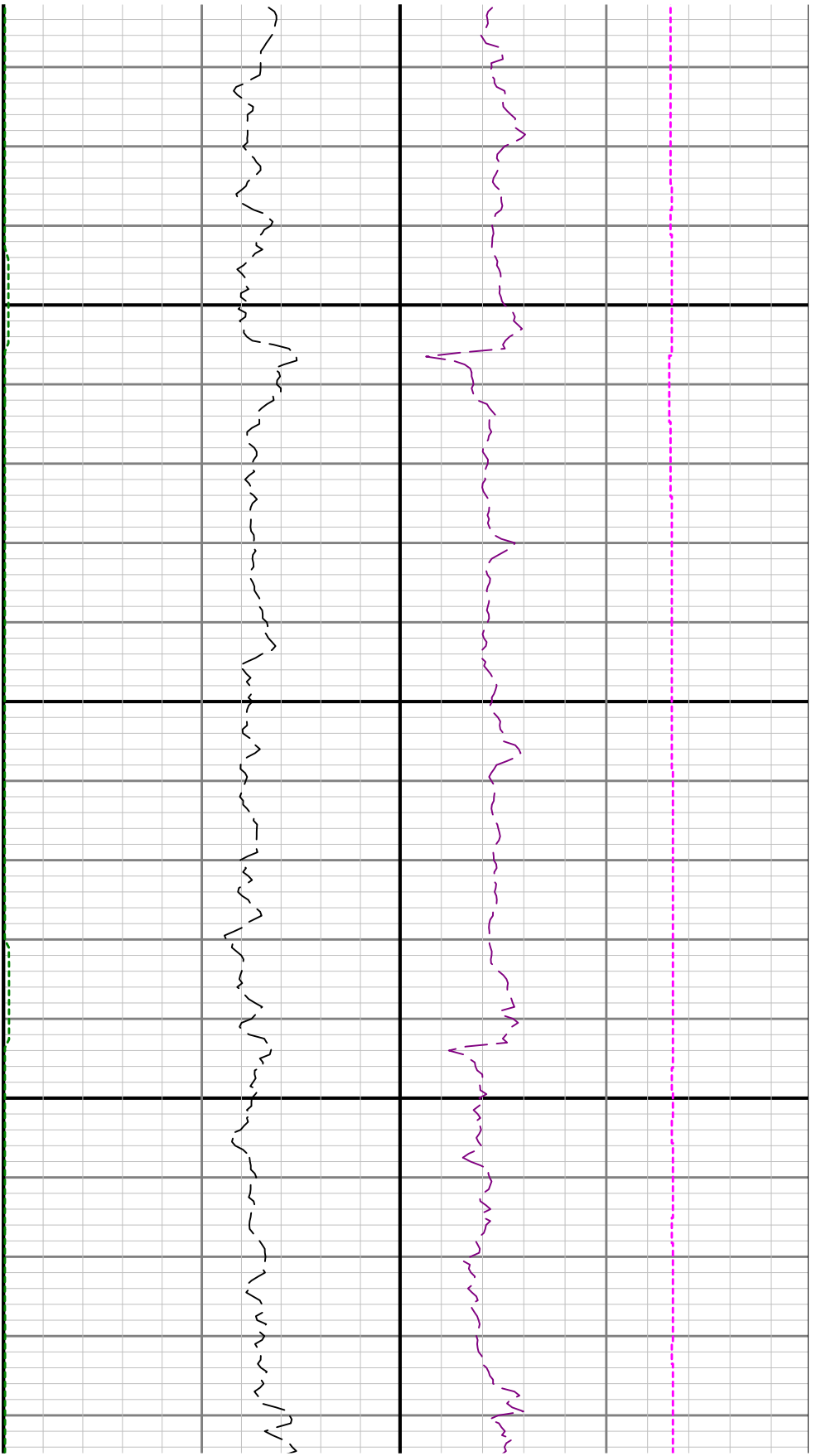




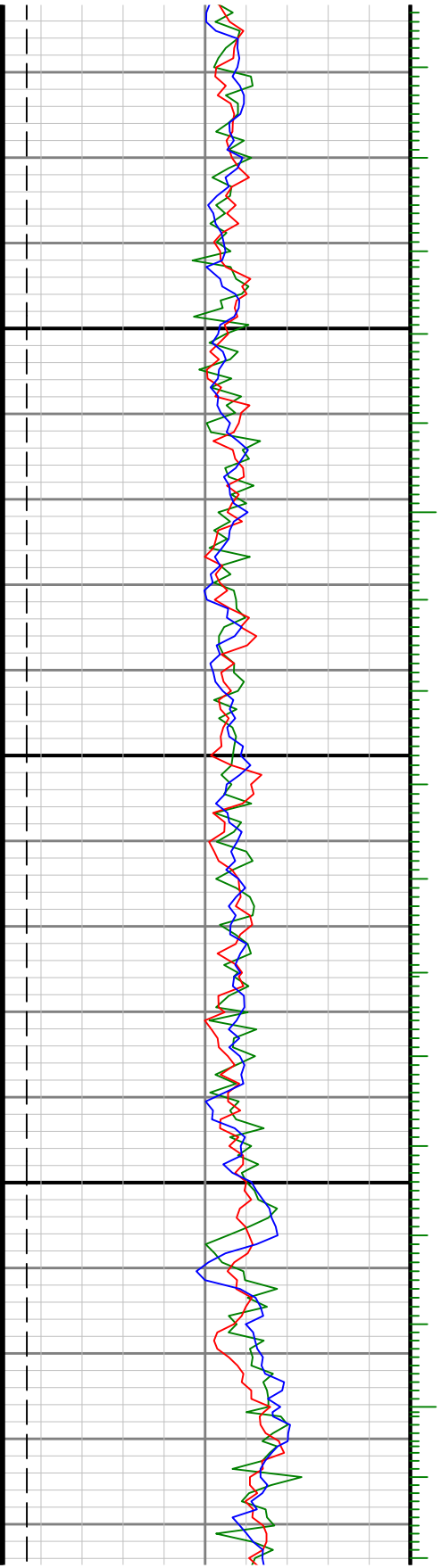


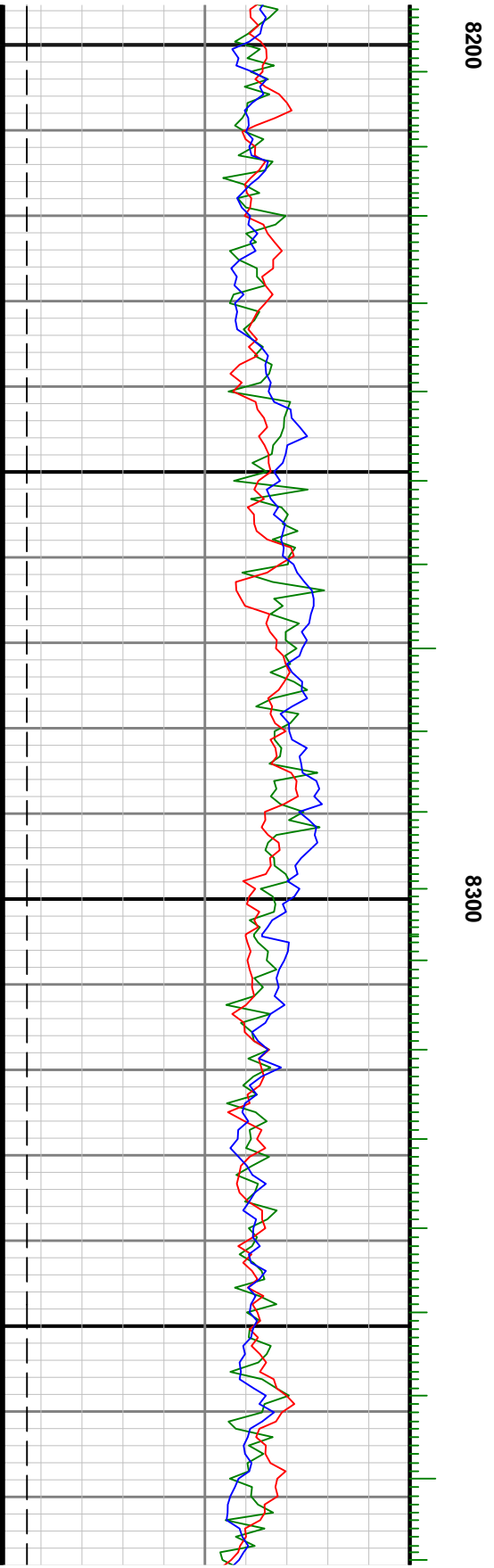
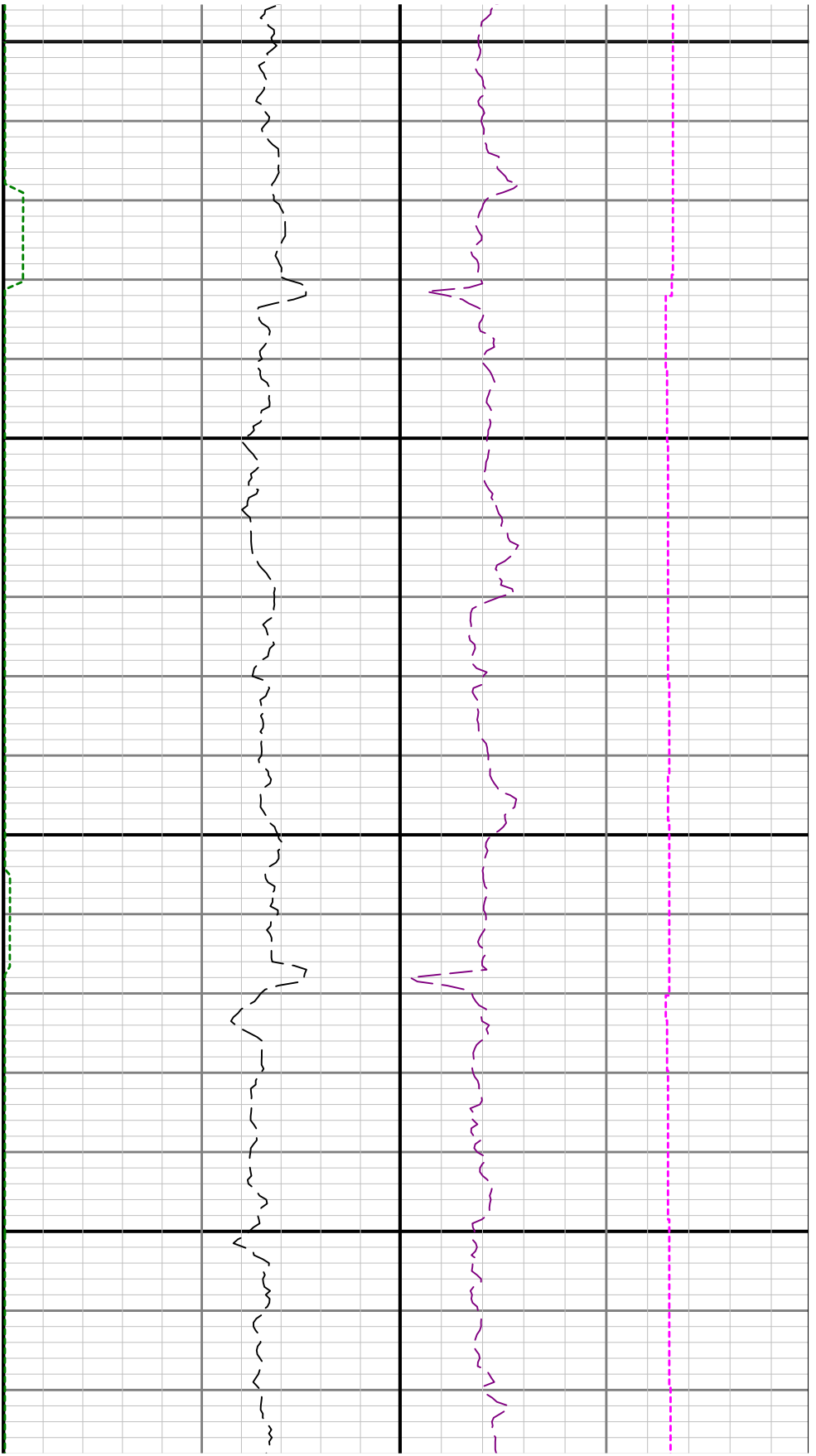


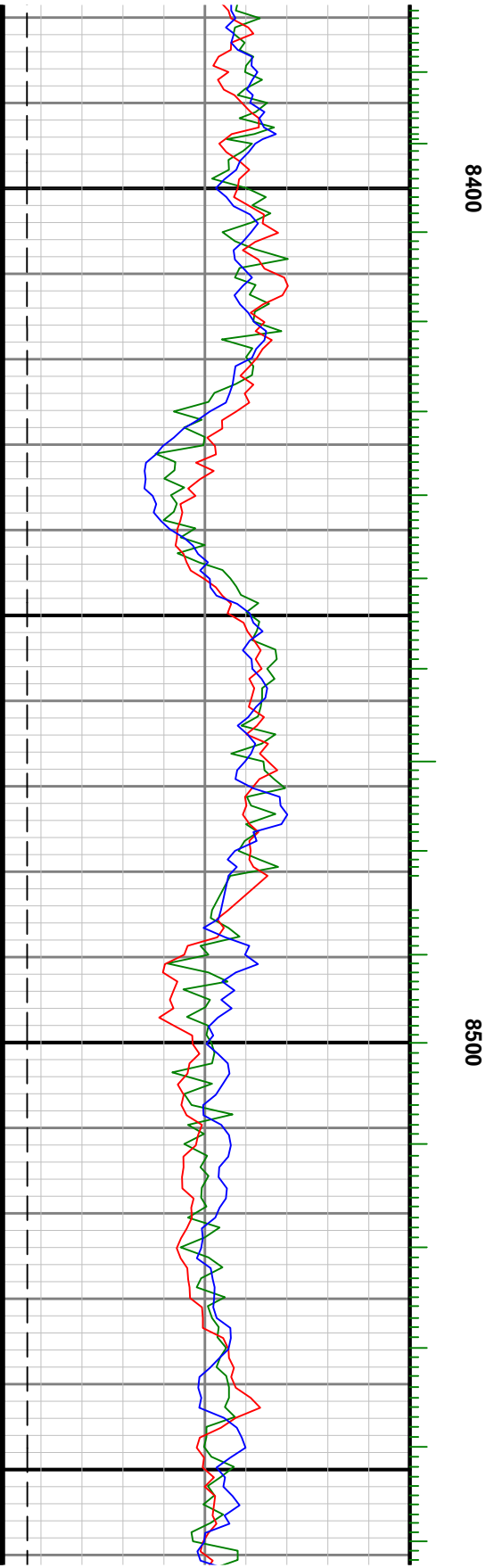
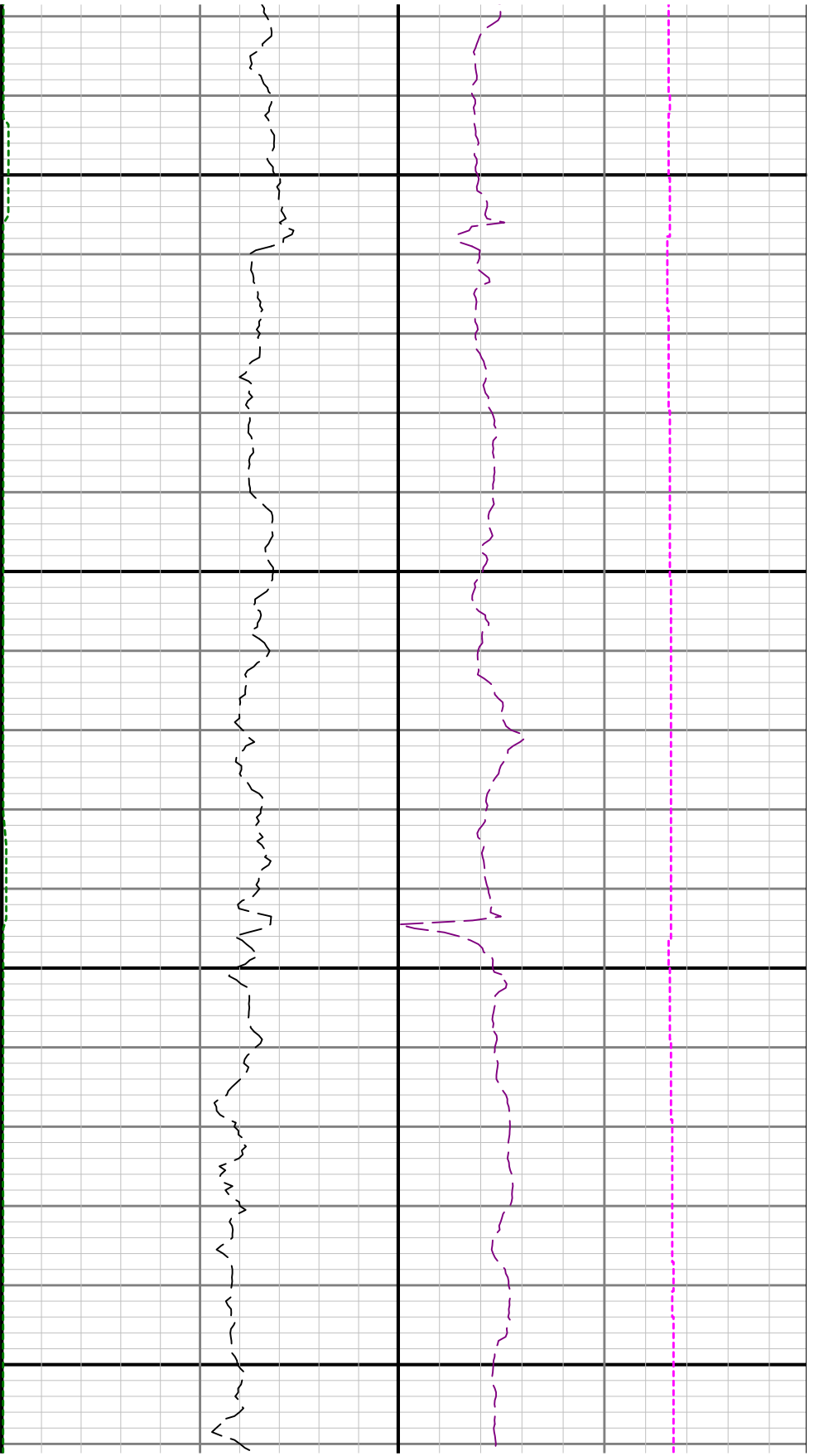


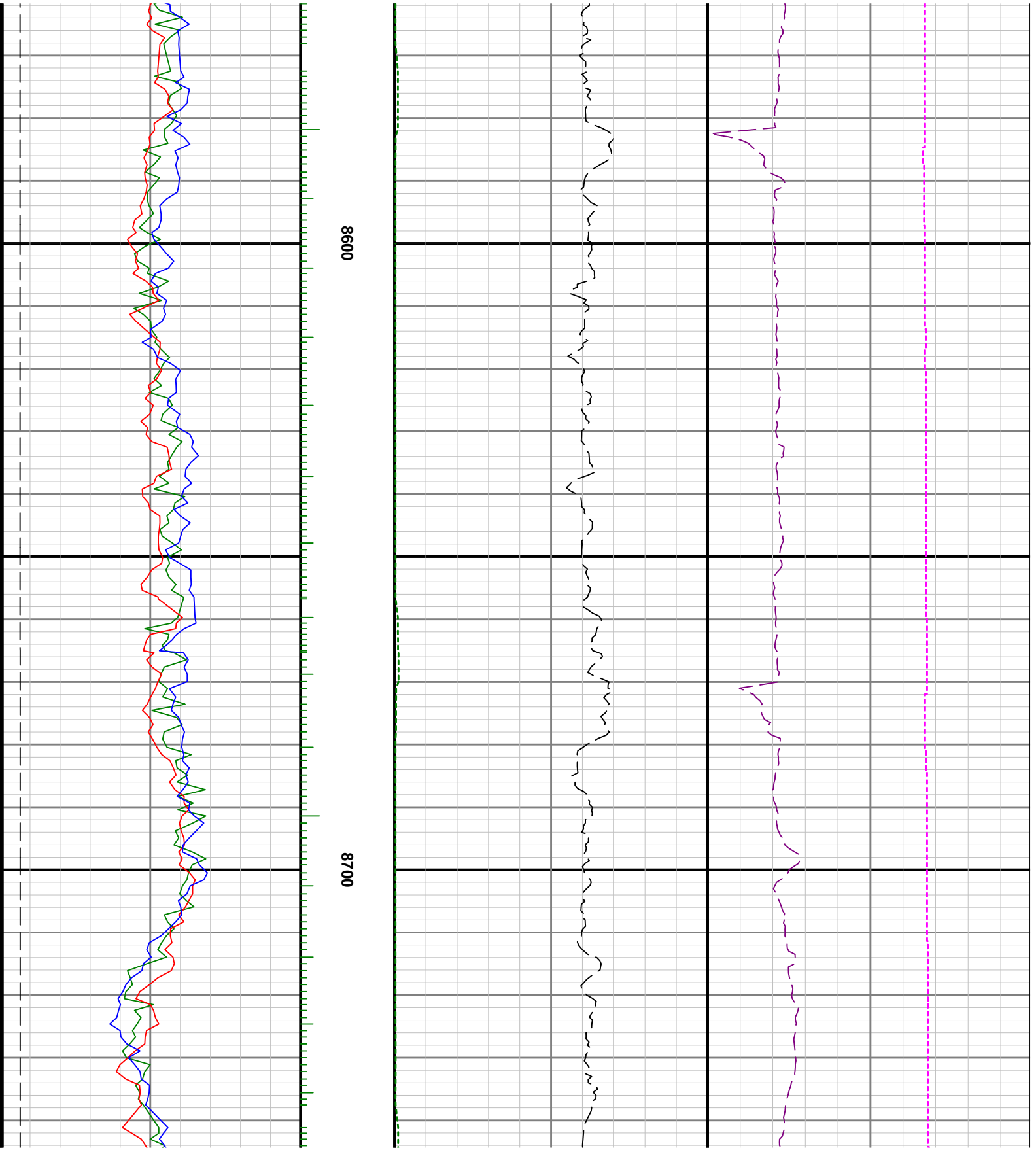


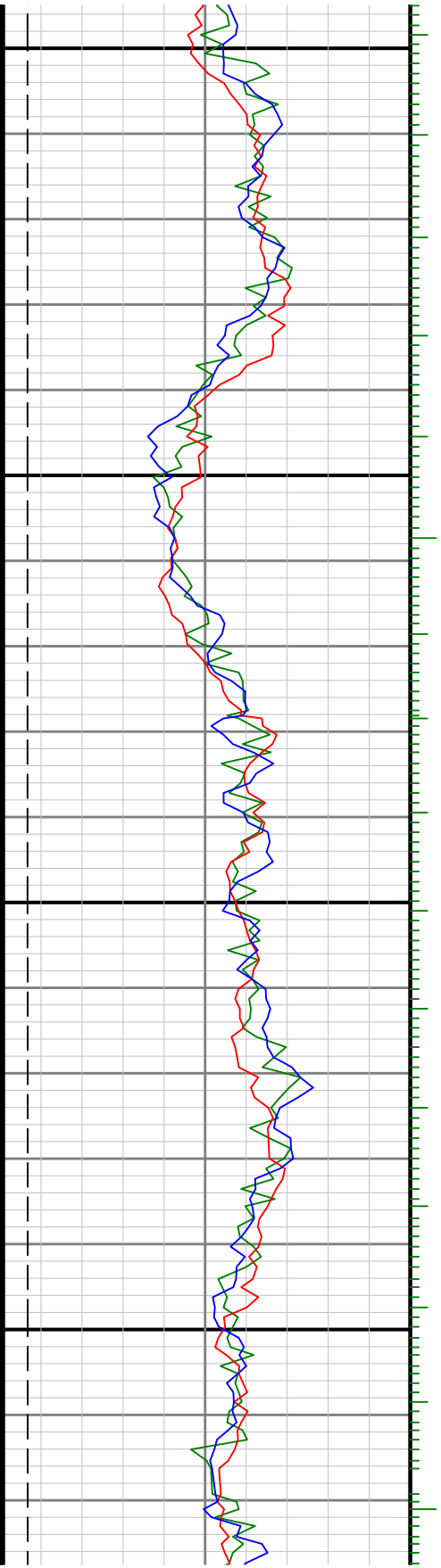
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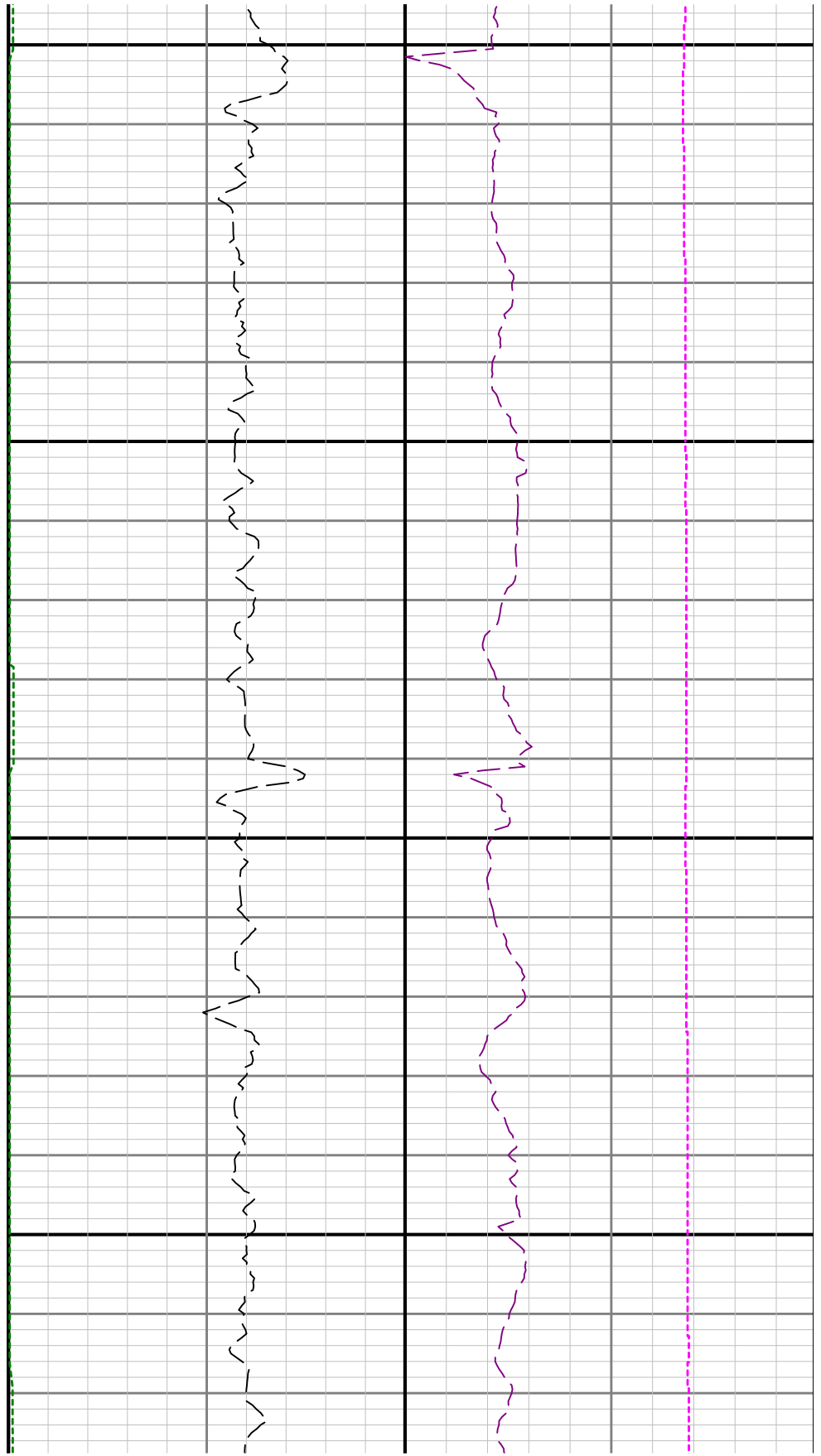


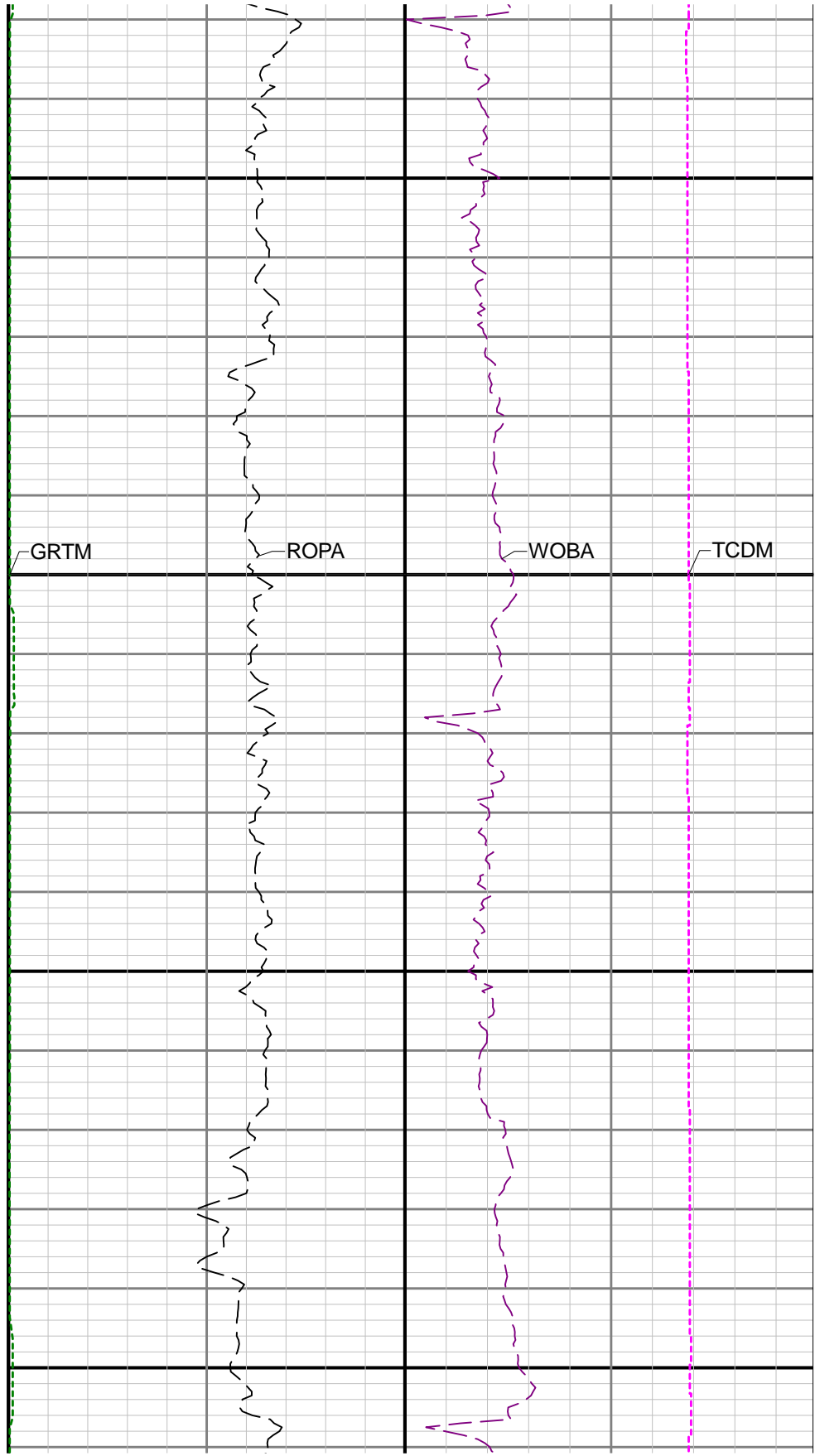
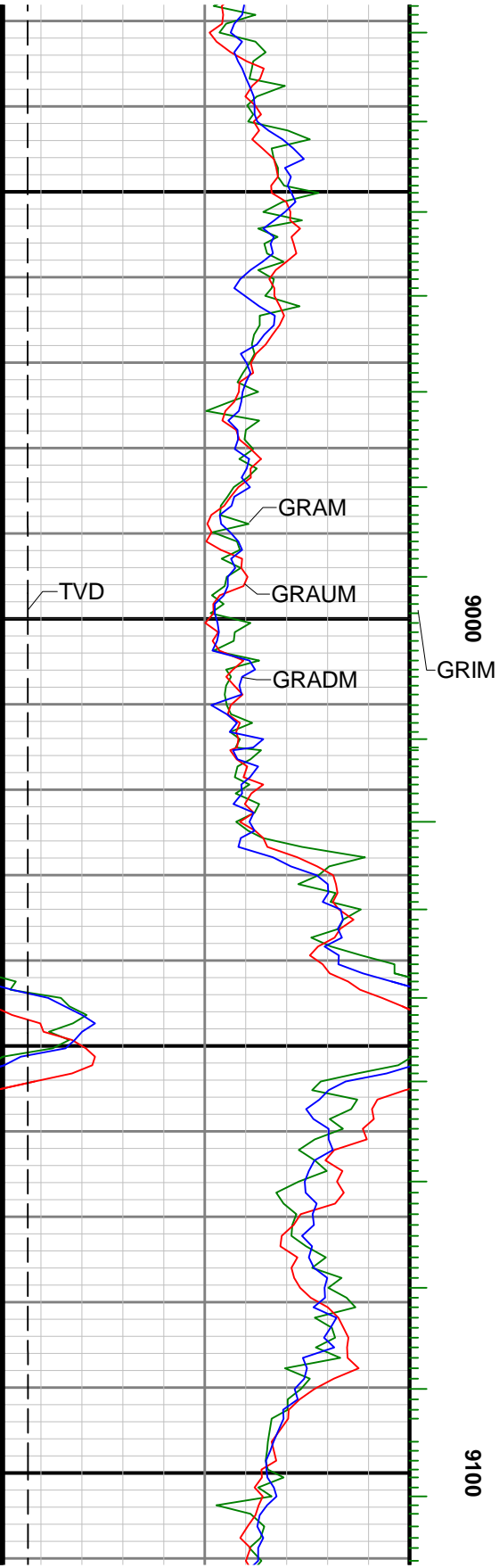


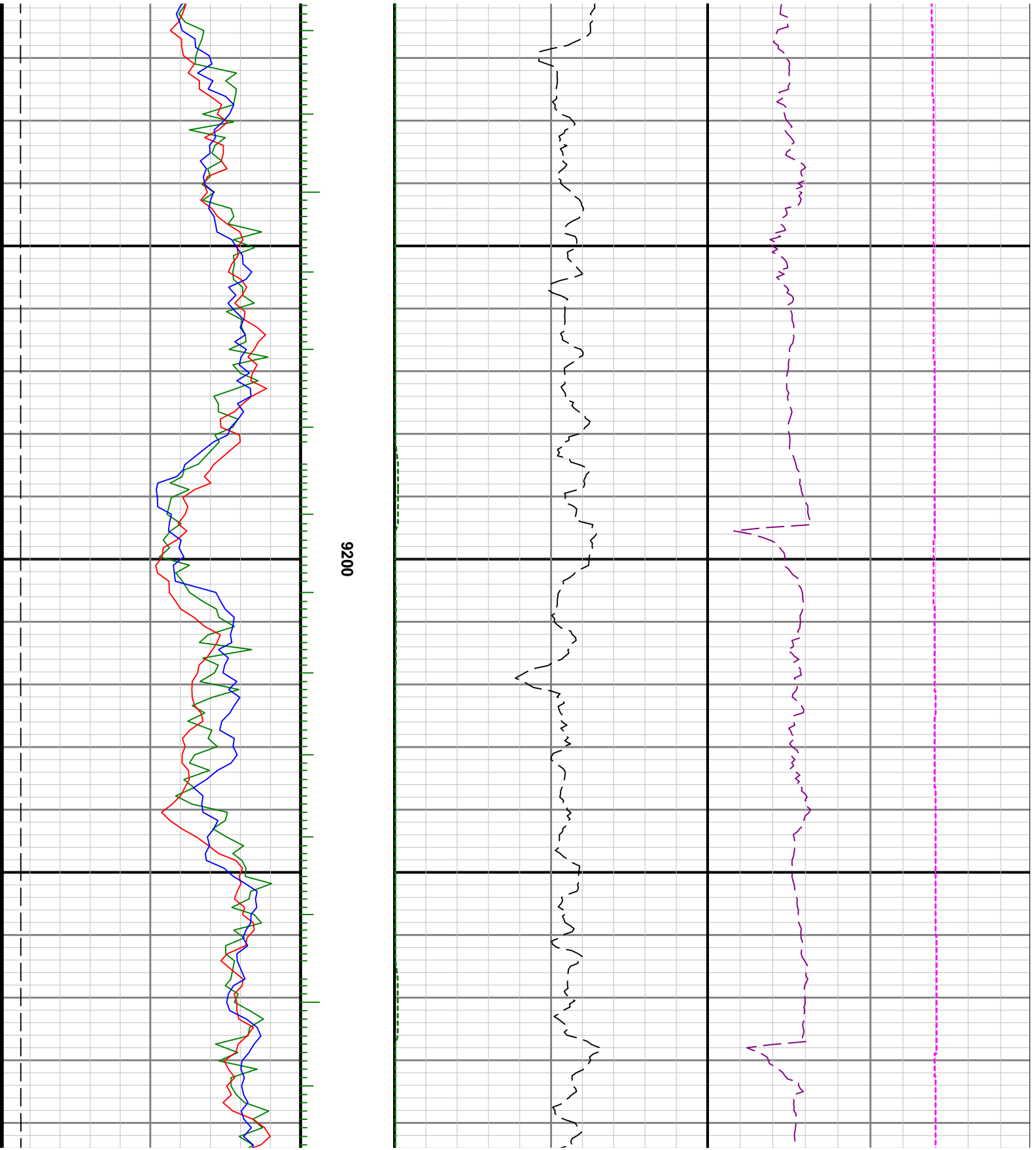


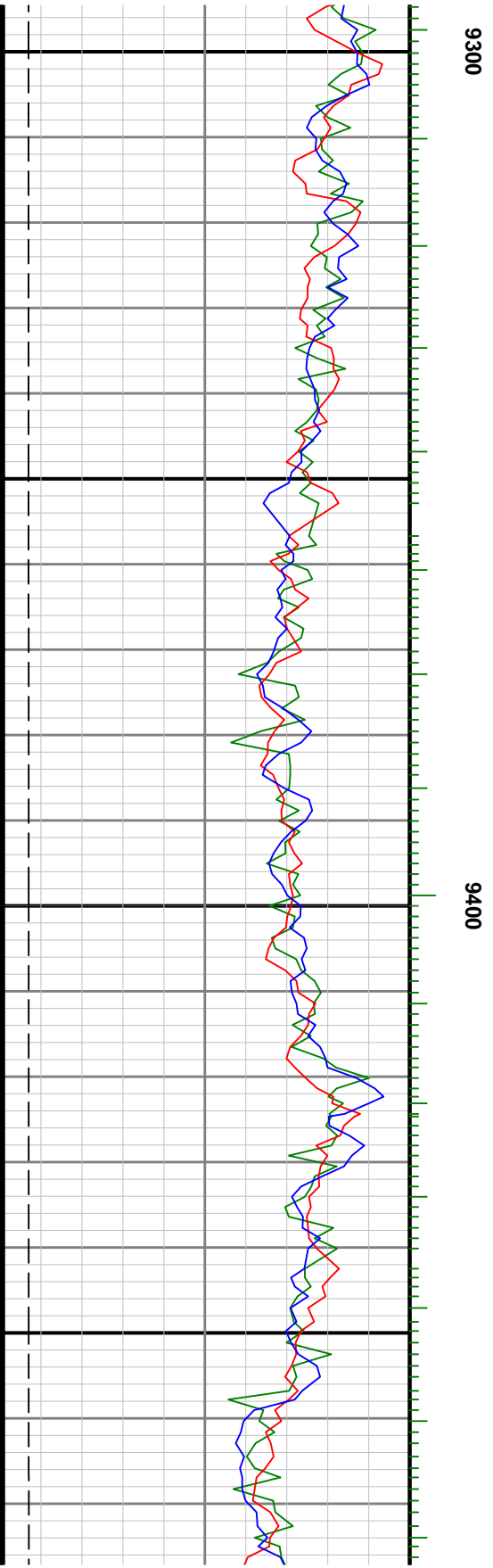
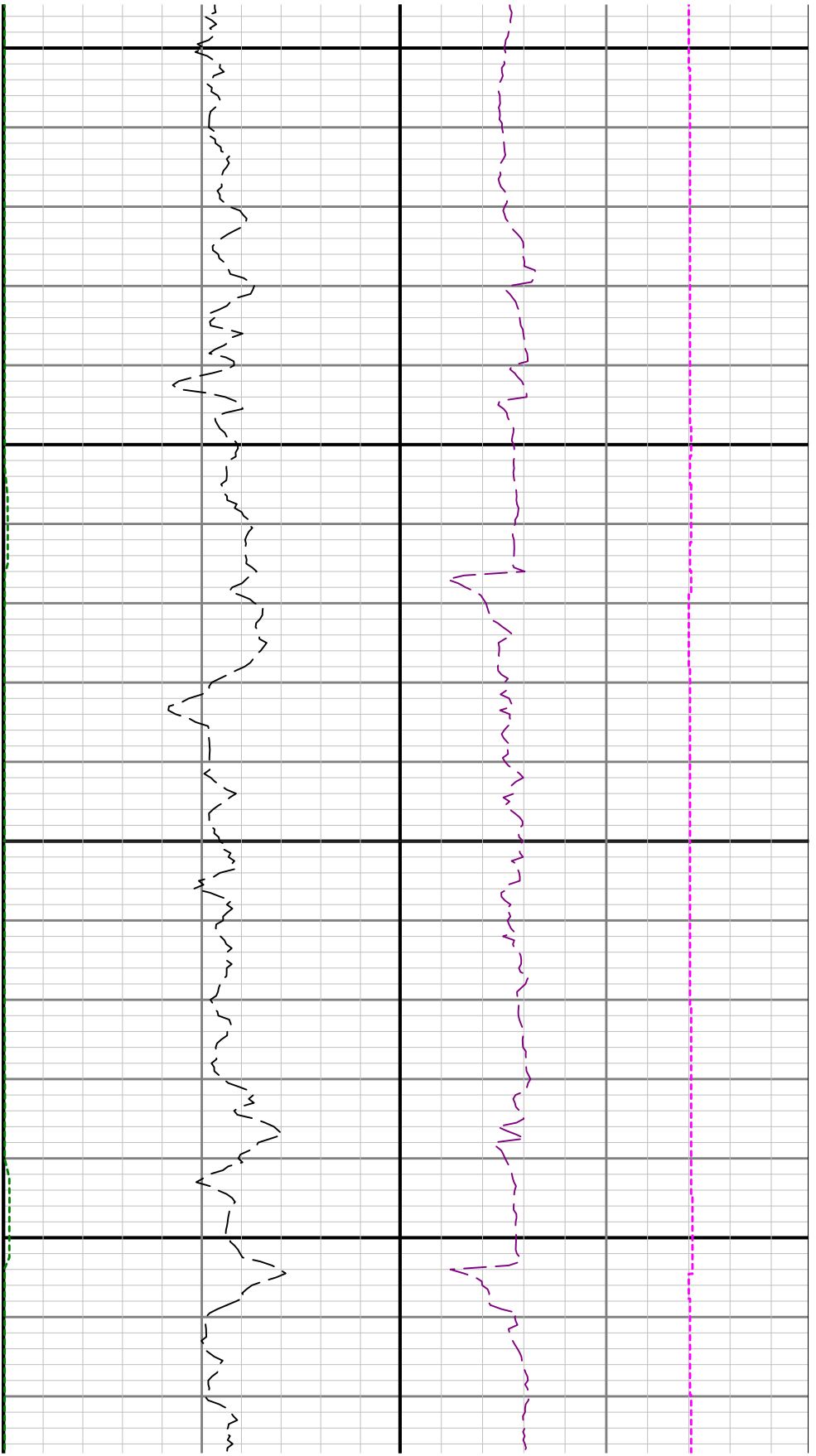
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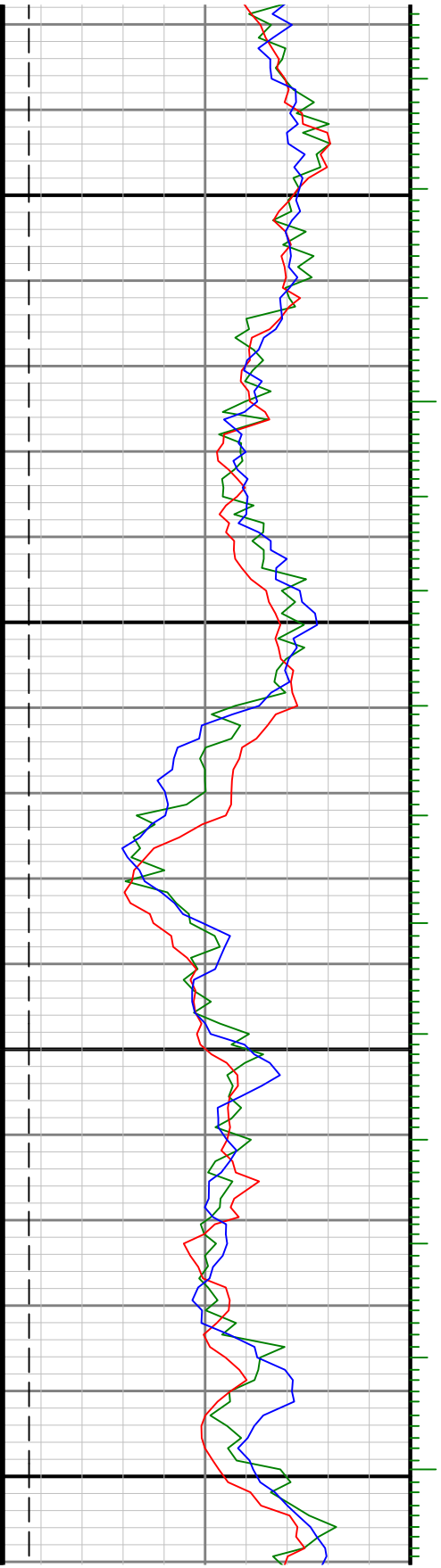
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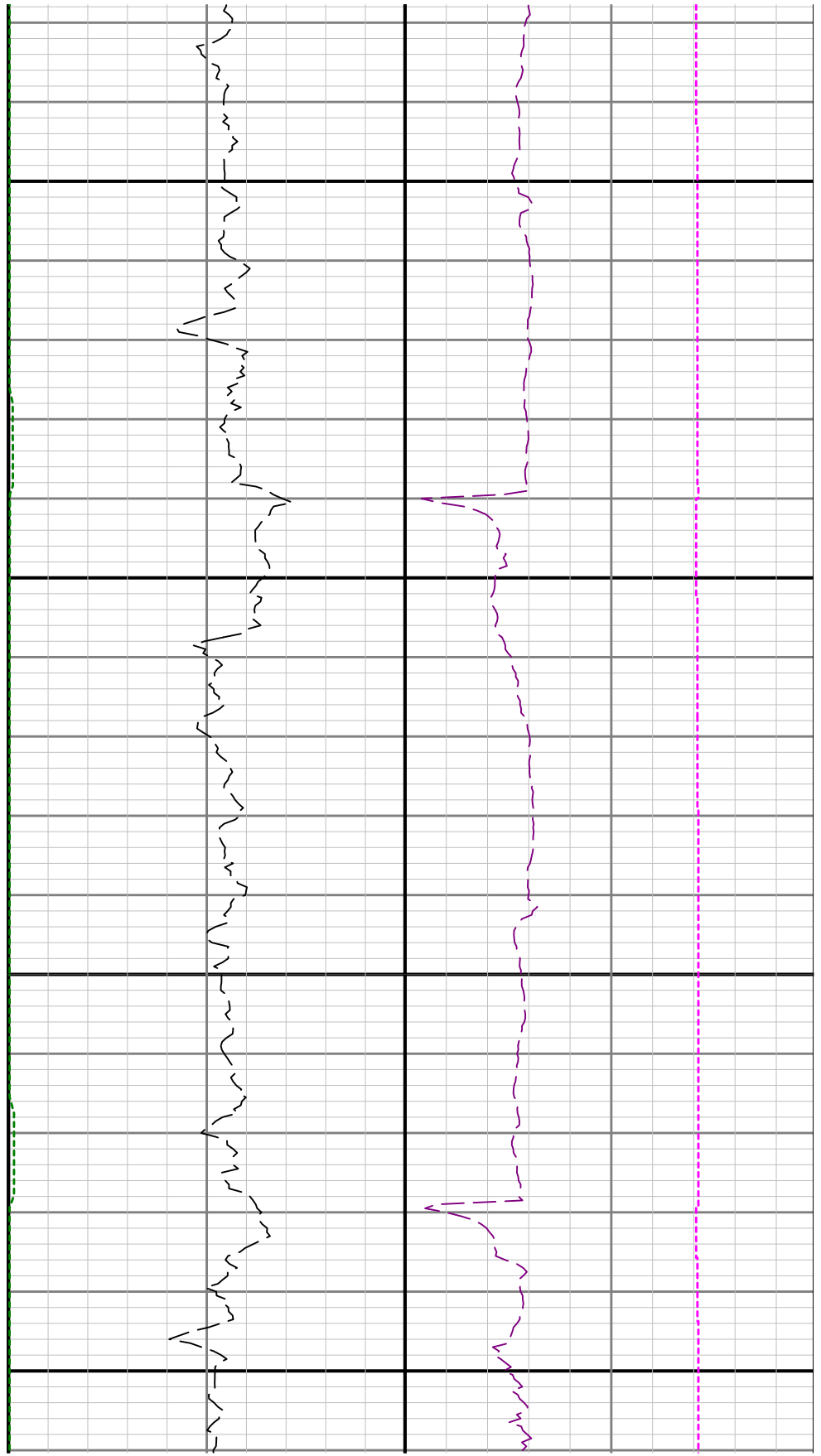


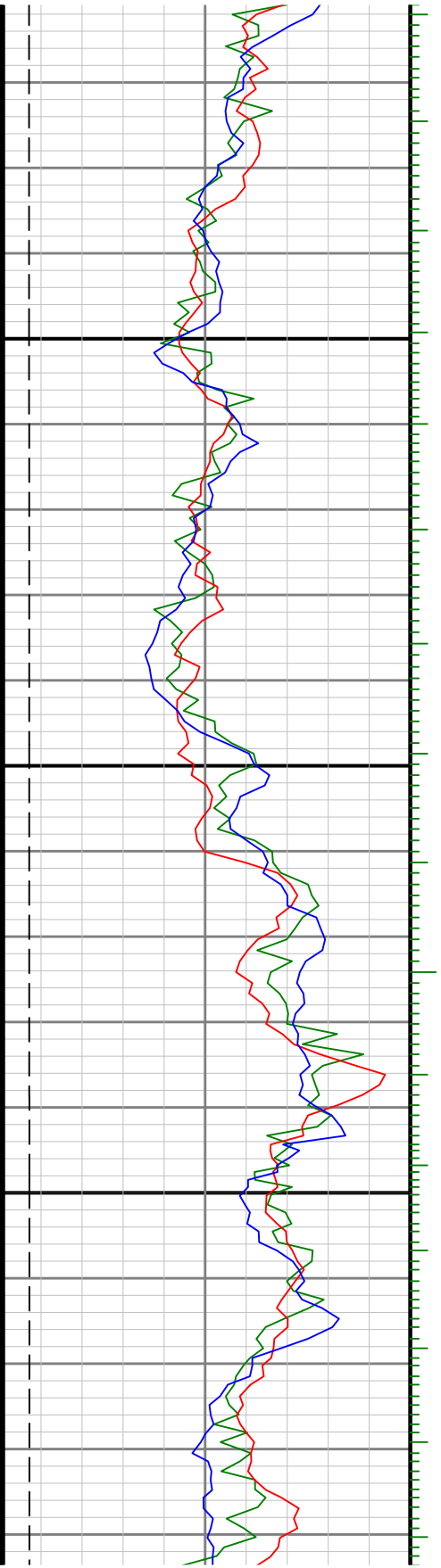




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