



Gamma Ray
Azimuthal Gamma Ray

LWD MEMORY LOG

Company: Bonanza Creek Oil Company

Well: North Platte 31-35-2MRLNC

Field: Weld County

County: Weld **Country:** United States

State: Colorado

Status: Surface Location:

Field Print

Latitude: $\text{40}^{\circ}\text{47}'\text{N}$

Longitude: $\text{107}^{\circ}\text{32}'\text{W}$

SEC: 26 TWN: 5N RGE: 63W

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

Log Measured From: Rig Floor

Elevation: 0.00 ft

Above P.D. 4567.00 ft

Elev. KB: N/A

Elev. DF: 4567.00 ft

Elev. GL: 4550.00 ft

Other Services:

Directional

Interval Logged

Date From: 2018-04-17 Top: (ft) 5000.00

Date To: 2018-04-19 Bottom: (ft) 11599.00

Spud Date: 2018-03-26

Magnetic Field Reference

Azi Reference North: True Dip Angle: (deg) 66.86

Total Magnetic Field Strength: (nT) 52367

Mag to Reference North Correction: (deg) 8.11 E

Borehole Record

| Hole Size (in) | From (ft) | To (ft) | Size (in) | Weight (lb/ft) | From (ft) | To (ft) |
|----------------|-----------|----------|-----------|----------------|-----------|---------|
| 13.500 | 17.00 | 1547.00 | 9.625 | 36.00 | 17.00 | 1537.00 |
| 8.500 | 1547.00 | 11599.00 | | | | |

Casing Record

Mud Record

| Type | From (ft) | To (ft) | Hole Size (in) | Interval (ft) | Inc Az (Start) | Inc Az (End) |
|----------------------|-----------|----------|----------------|---------------|------------------|----------------|
| Water Based Mud | 17.00 | 1547.00 | 13.500 | 1530.00 | 0.63 111.70 | 1.35 65.81 |
| Diesel-Oil Based Mud | 1547.00 | 11599.00 | 8.500 | 10052.00 | 1.22 61.61 | 89.91 172.65 |

Deviation Record

| Type | From (ft) | To (ft) | Hole Size (in) | Interval (ft) | Inc Az (Start) | Inc Az (End) |
|------|-----------|---------|----------------|---------------|------------------|----------------|
| | | | | | | |

Acquisition System

Baker Hughes Cadence RT4.1 R14.1
PlotStudio 4.1.7763.3

Software Version

Rig: Xtreme 19
Contractor: Xtreme Drilling
District: RMA Unit: D&E

Other

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Log Run Summary

| Run No | Bit Run No | Bit Size (in) | Bit Type | Bit Gauge Length (in) | Assembly Type | Logged Interval | | Bit Depth Interval | | Date / Time | | Circ. Hours (h) |
|--------|------------|---------------|----------|-----------------------|----------------|-----------------|-------------|--------------------|----------|------------------|------------------|-----------------|
| | | | | | | Top (ft) | Bottom (ft) | From (ft) | To (ft) | Start Logging | End Logging | |
| 1 | 1 | 13.500 | PDC | 4.00 | Steerable | 0.00 | 0.00 | 17.00 | 1547.00 | 2018-03-26 21:06 | 2018-03-27 03:27 | 4.87 |
| 2 | 2 | 8.500 | PDC | 4.00 | AutoTrak Curve | 5000.00 | 11586.00 | 1547.00 | 11599.00 | 2018-04-17 16:27 | 2018-04-19 21:34 | 45.39 |

Crew

| Name | Arrive Wellsite | Depart Wellsite | Name | Arrive Wellsite | Depart Wellsite | Name | Arrive Wellsite | Depart Wellsite |
|---------------|-----------------|-----------------|---------------|-----------------|-----------------|------|-----------------|-----------------|
| Steve Bueghly | 2018-03-26 | 2018-03-27 | Alex Robinson | 2018-04-17 | 2018-04-20 | | | |

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+ (%) |
|------------------|---------|---------------------|----------------------|---------------|----------------|-----|------------------|-------------|------------|-----------------------|--------|
| 2018-03-26 12:11 | 1 | 17.00 | Water Based Mud | 8.7 | 32 | 8 | 0.0 | 0/100 | Active Pit | 800 | 0.00 |
| 2018-04-16 18:00 | 2 | 1547.00 | Diesel-Oil Based Mud | 9.2 | 44 | N/A | 0.0 | 80/20 | Active Pit | 36000 | 0.00 |
| 2018-04-17 09:00 | 2 | 1547.00 | Diesel-Oil Based Mud | 9.0 | 42 | N/A | 8.2 | 83/17 | Active Pit | 34500 | 0.00 |
| 2018-04-17 17:00 | 2 | 1901.00 | Diesel-Oil Based Mud | 8.9 | 41 | N/A | 8.2 | 83/17 | Active Pit | 35000 | 0.00 |
| 2018-04-18 06:15 | 2 | 4588.00 | Diesel-Oil Based Mud | 8.7 | 41 | N/A | 8.0 | 83/17 | Active Pit | 34000 | 0.00 |
| 2018-04-18 22:00 | 2 | 7038.00 | Diesel-Oil Based Mud | 9.0 | 40 | N/A | 7.8 | 83/17 | Active Pit | 34500 | 0.00 |
| 2018-04-19 07:30 | 2 | 8912.00 | Diesel-Oil Based Mud | 9.3 | 42 | N/A | 7.6 | 82/18 | Active Pit | 34000 | 0.00 |
| 2018-04-19 18:00 | 2 | 10701.00 | Diesel-Oil Based Mud | 9.6 | 41 | N/A | 7.6 | 82/18 | Active Pit | 34000 | 0.00 |
| 2018-04-20 06:00 | 2 | 11599.00 | Diesel-Oil Based Mud | 9.6 | 41 | N/A | 7.6 | 83/17 | Active Pit | 34000 | 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 | 1371947 | Directional (mag) | 15.12 | 51.02 | 8.000 | 0.000 |
| 1 | NaviTrak | 1371947 | VSS | 15.12 | 51.02 | 8.000 | 0.000 |
| 2 | ATC_SU | 14316022 | Near Bit Inclination | 5.93 | 6.93 | 7.000 | 4.330 |
| 2 | ATC_SU | 14316022 | Near Bit VSS | 5.93 | 6.93 | 7.000 | 4.330 |
| 2 | ATC_MWD | 12914616 | Gamma (single) | 2.80 | 13.10 | 7.000 | 3.250 |
| 2 | ATC_MWD | 12914616 | Directional (mag) | 12.32 | 22.62 | 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_LCPM | ATC_LCPM | Auto Trak Curve LCPM |

Comments

- 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.
- Logging was performed using a steerable assembly from 1547 to 11599 feet MD (1547 to 6374 feet TVD). No logging data was acquired throughout that run.
- Logging was performed using a steerable assembly from 1547 to 11599 feet MD (1547 to 6374 feet TVD).
- The GRAM, GRAUM, and GRADM data are presented from 0 to 200 API, per customer's request.

Remarks

| Number | Measured Depth (ft) | Hole Section (in) | Run No. | Remark |
|--------|---------------------|-------------------|---------|---|
| 1 | 5000.00 | 8.500 | 2 | The Gamma Ray Apparent (GRAM) log starts at 5000 feet, per customer's request. |
| 2 | 11586.00 | 8.500 | 2 | The interval from 11586 to 11599 feet MD (6374 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 | Downhole Temperature | degF |



Company Bonanza Creek Oil Company

Well North Platte 31-35-2MRLNC

Interval

Date From: 2018-04-17 07:45:00

Top: 1547.00

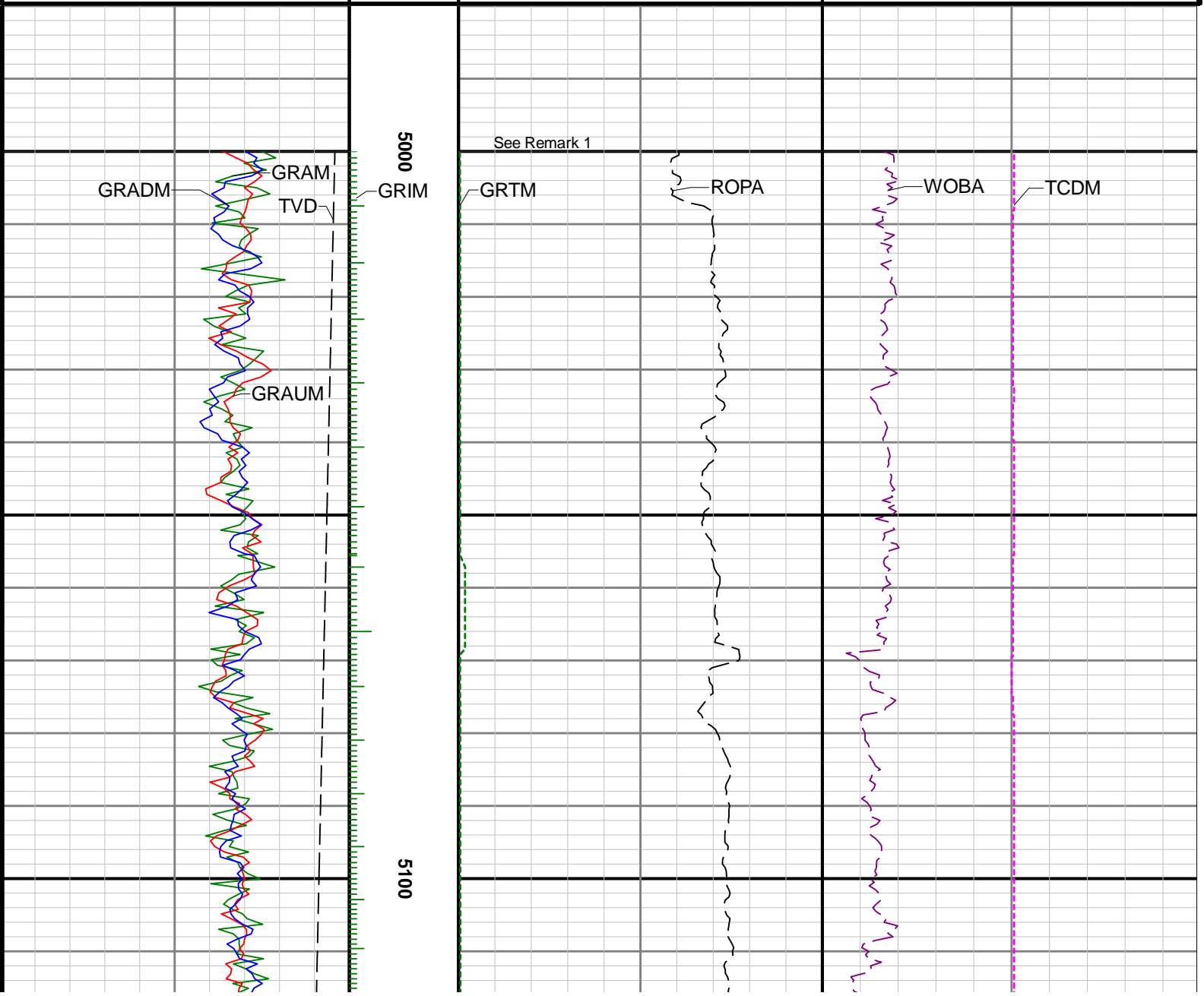
Date To: 2018-04-19 23:23:00

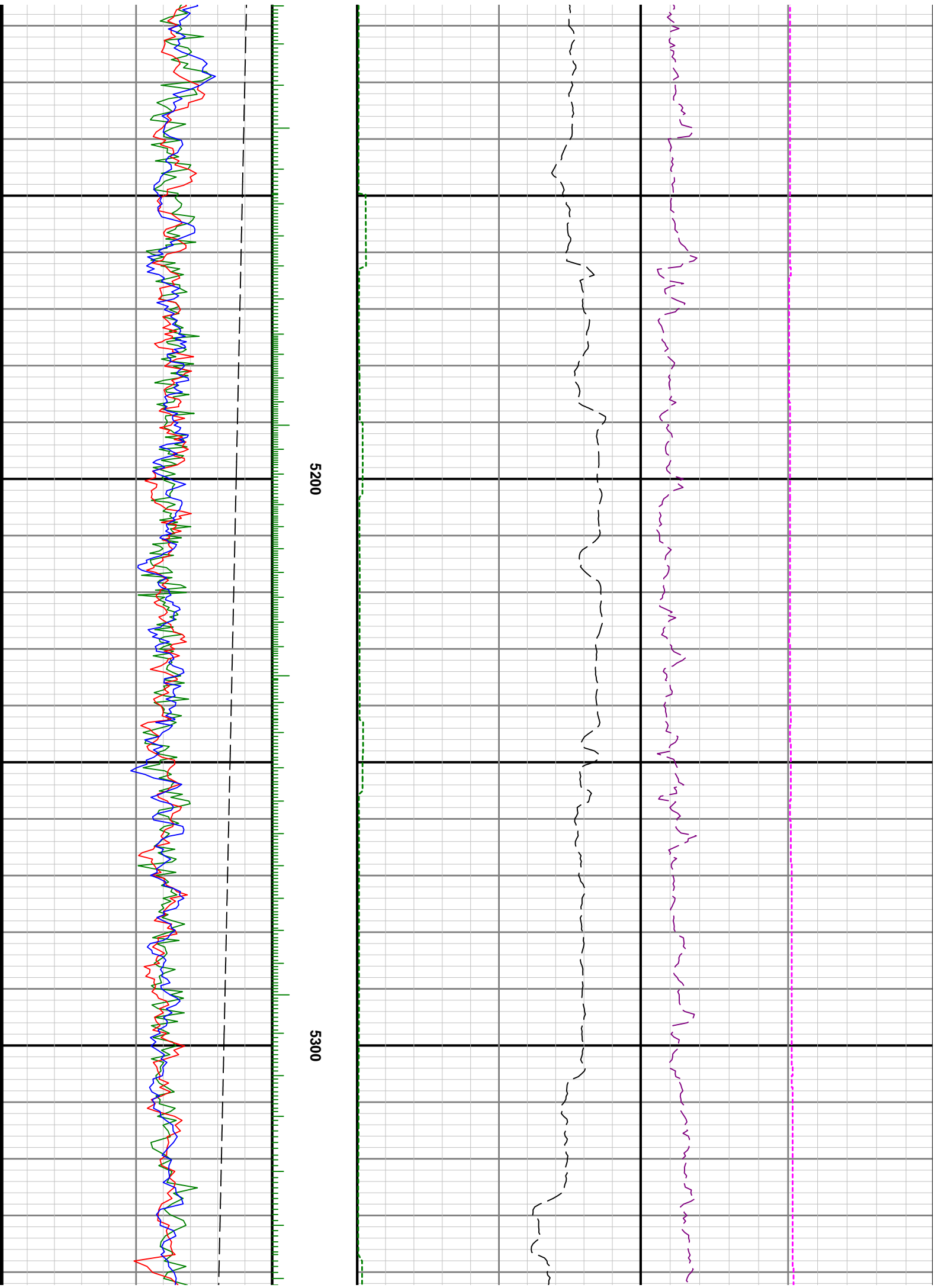
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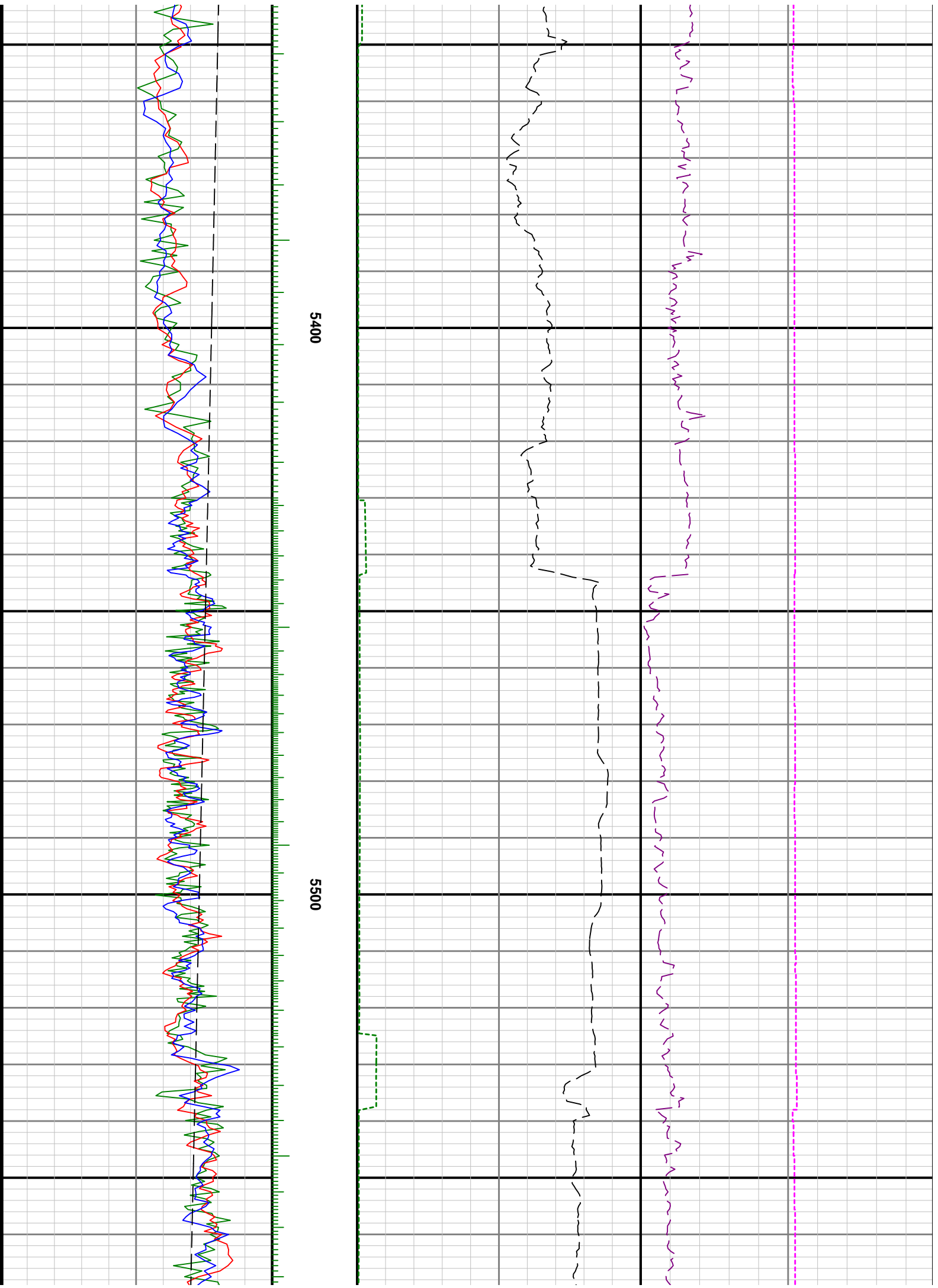
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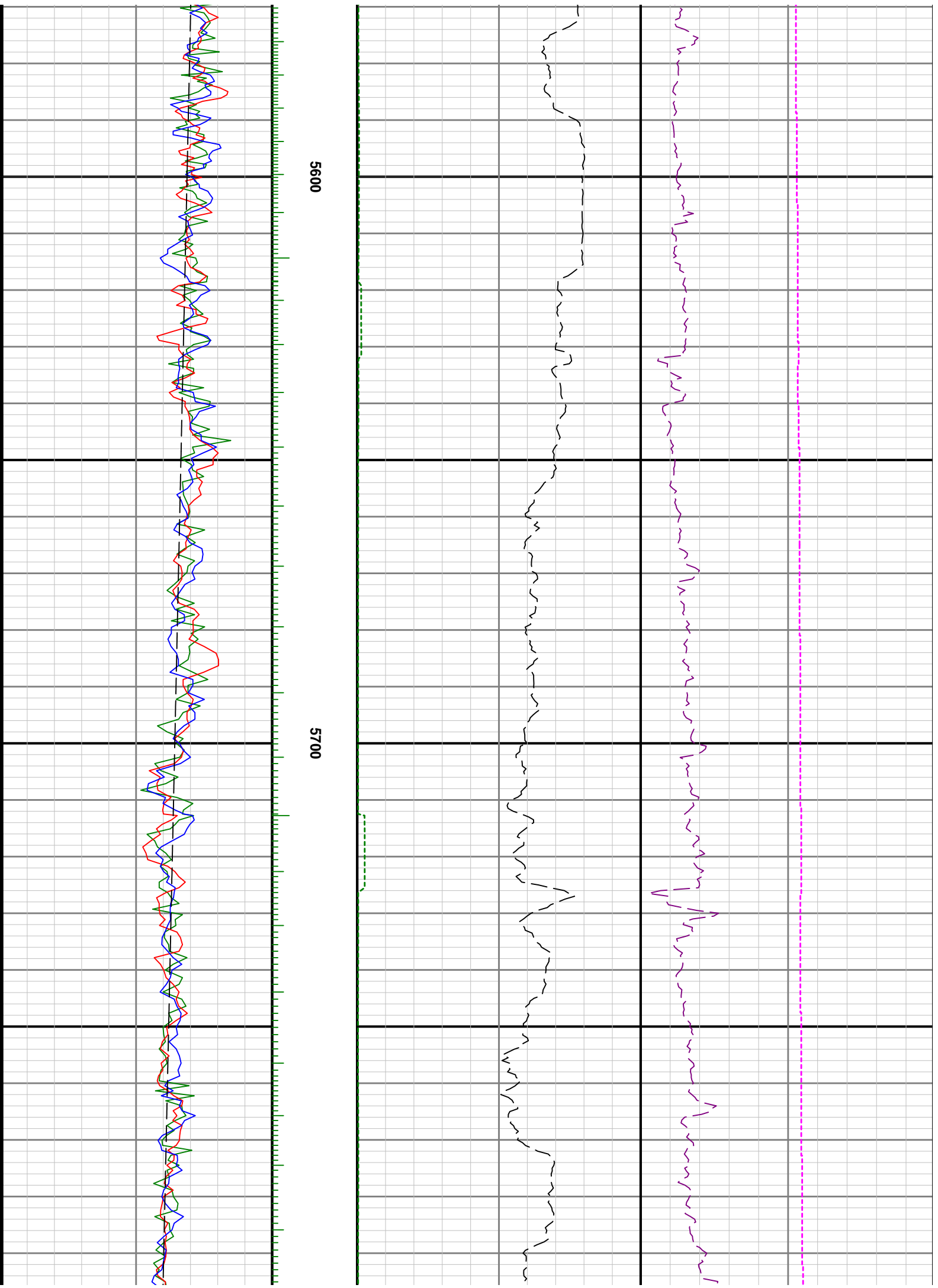
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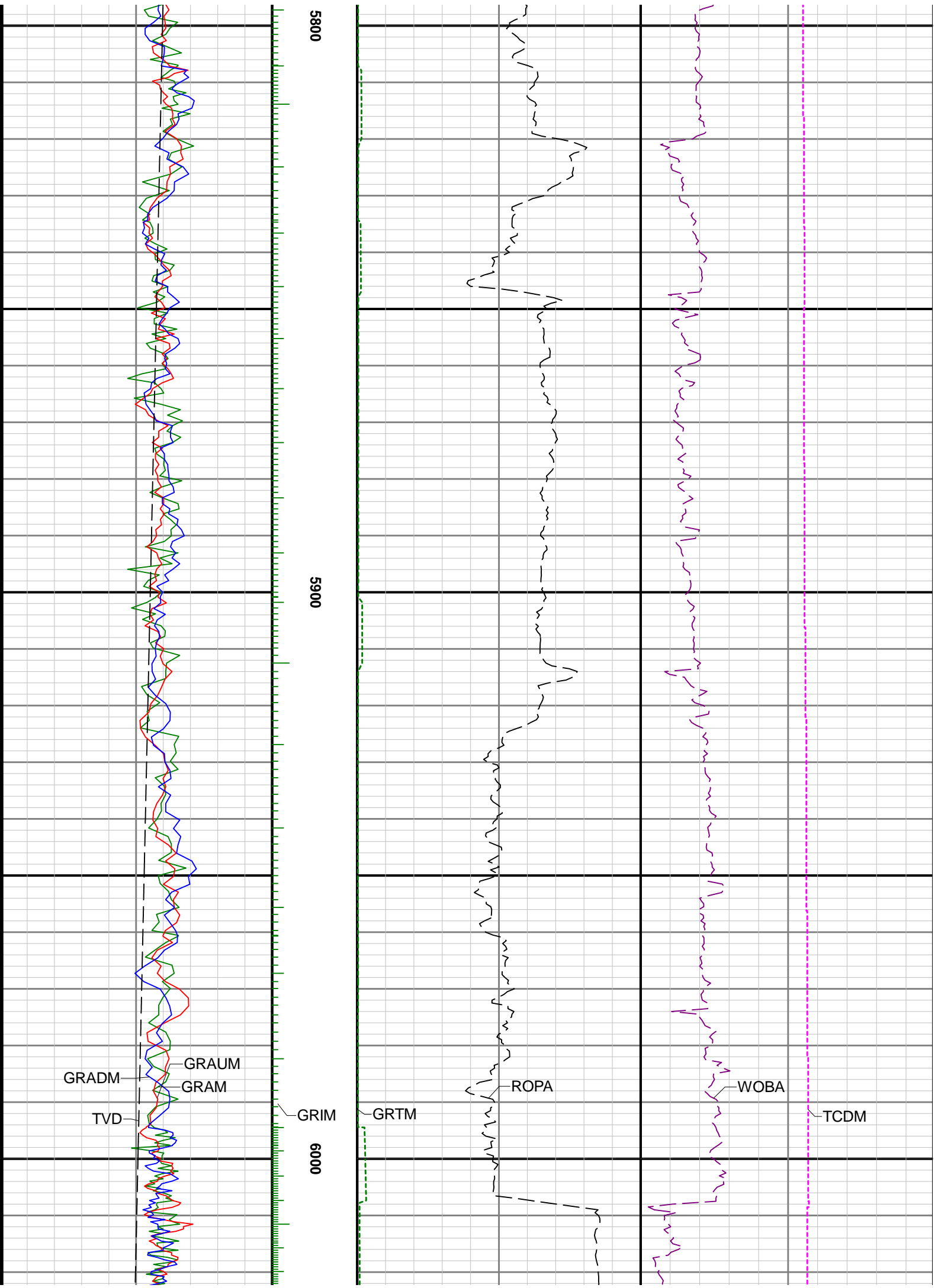
| | | | |
|---|----------------------|--|--|
| Gamma Ray - Apparent 0.5 ft Average GRAM 0 200 API | MD 1:240 feet | Depth Averaged ROP 3 ft Average ROPA 1000 0 ft/h | Weight On Bit, Average 1 ft Average WOBA 0 100 klb |
| Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM 0 200 API | | Gamma Time Since Drilled GRTM 0 600 min | Downhole Temperature TCDM 0 300 degF |
| Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM 0 200 API | | | |
| True Vertical Depth TVD 7000 4850 ft | | | |

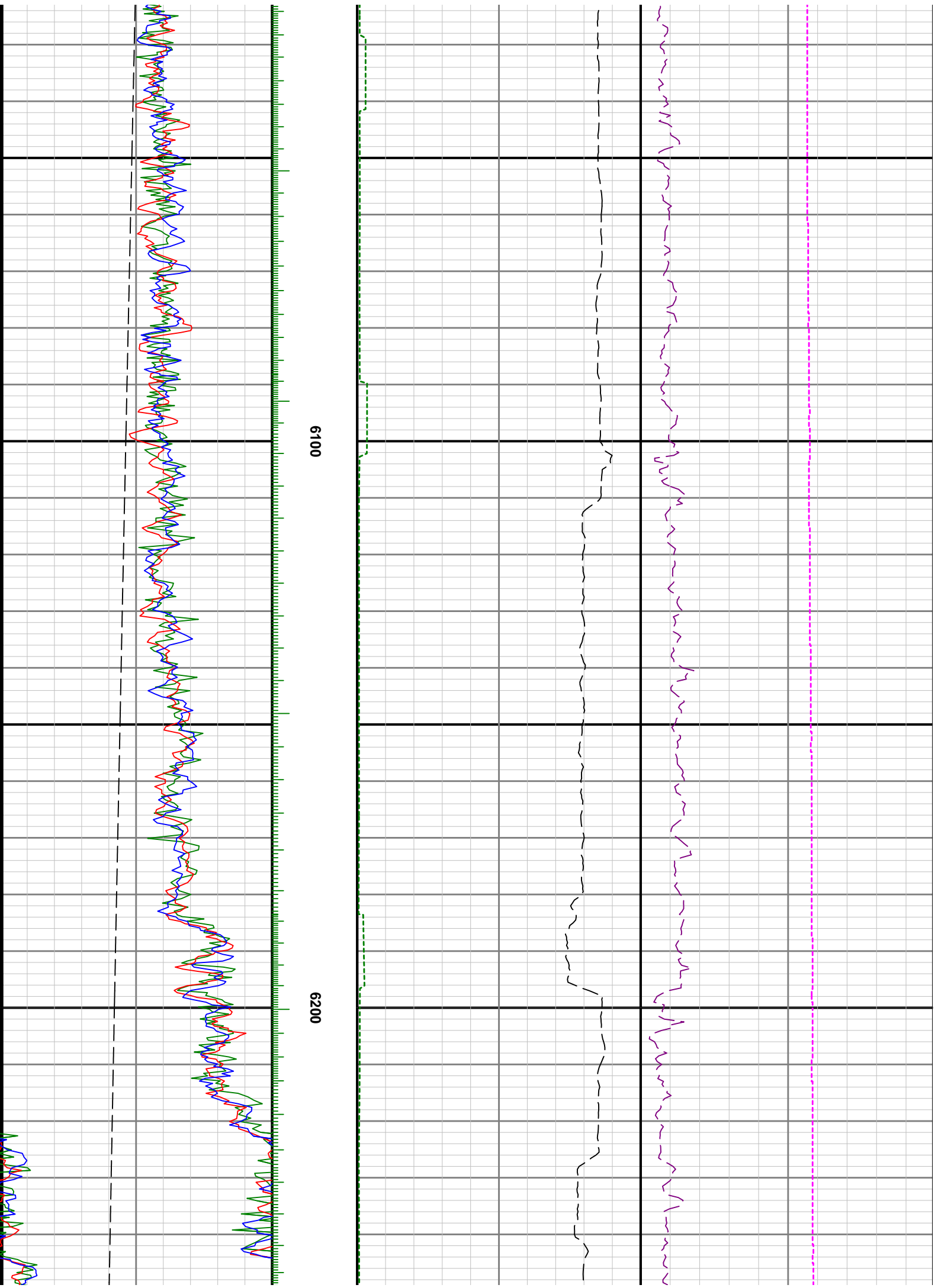


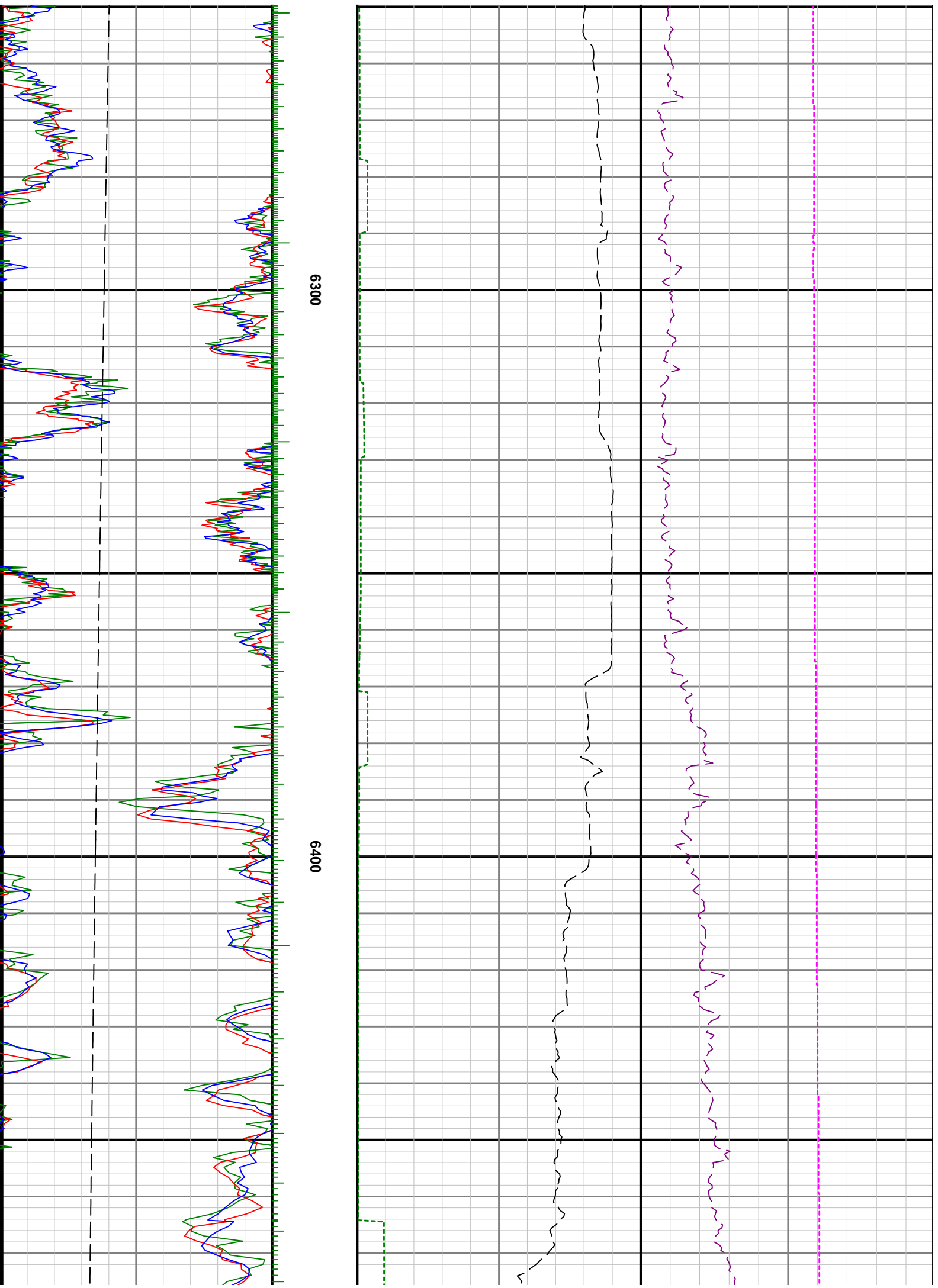


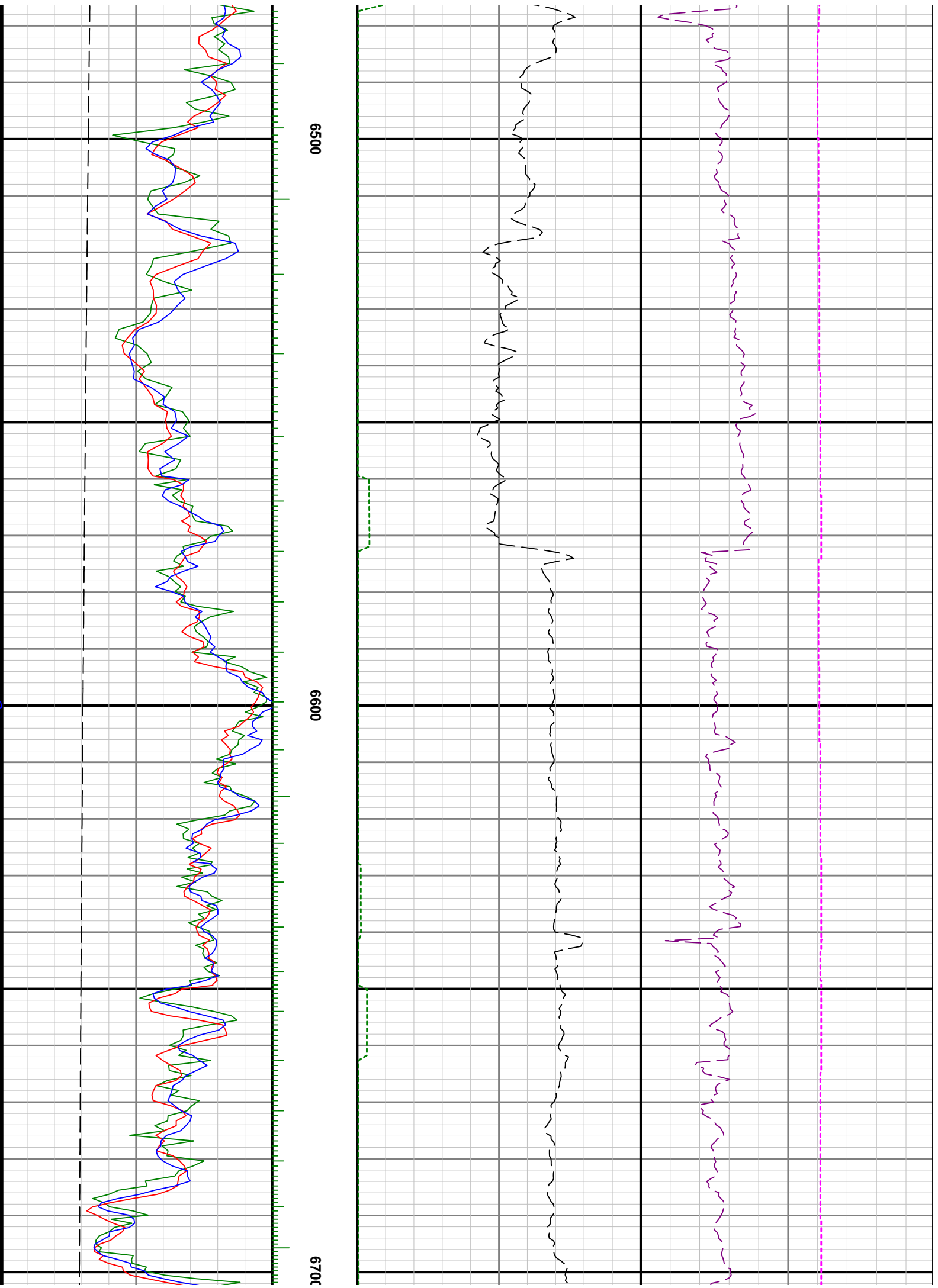


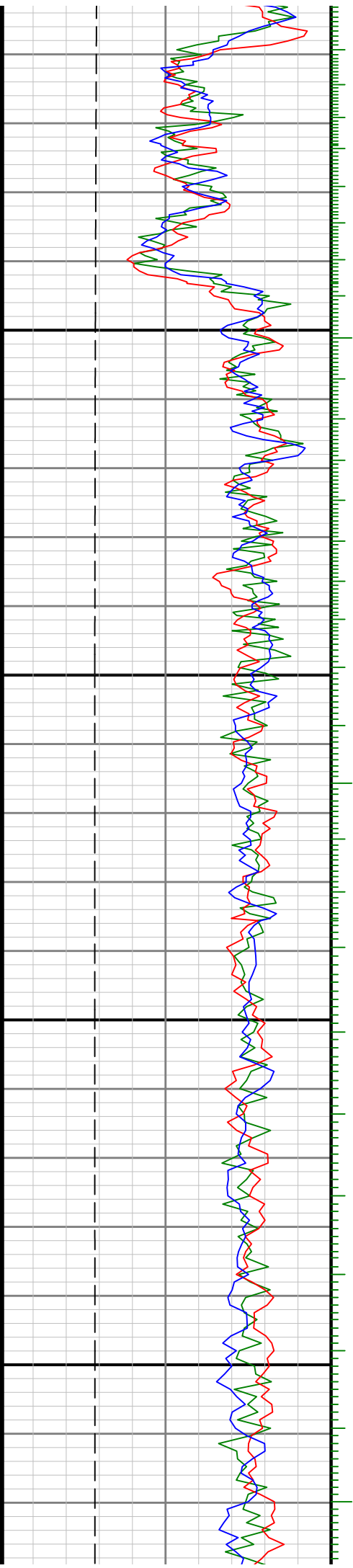






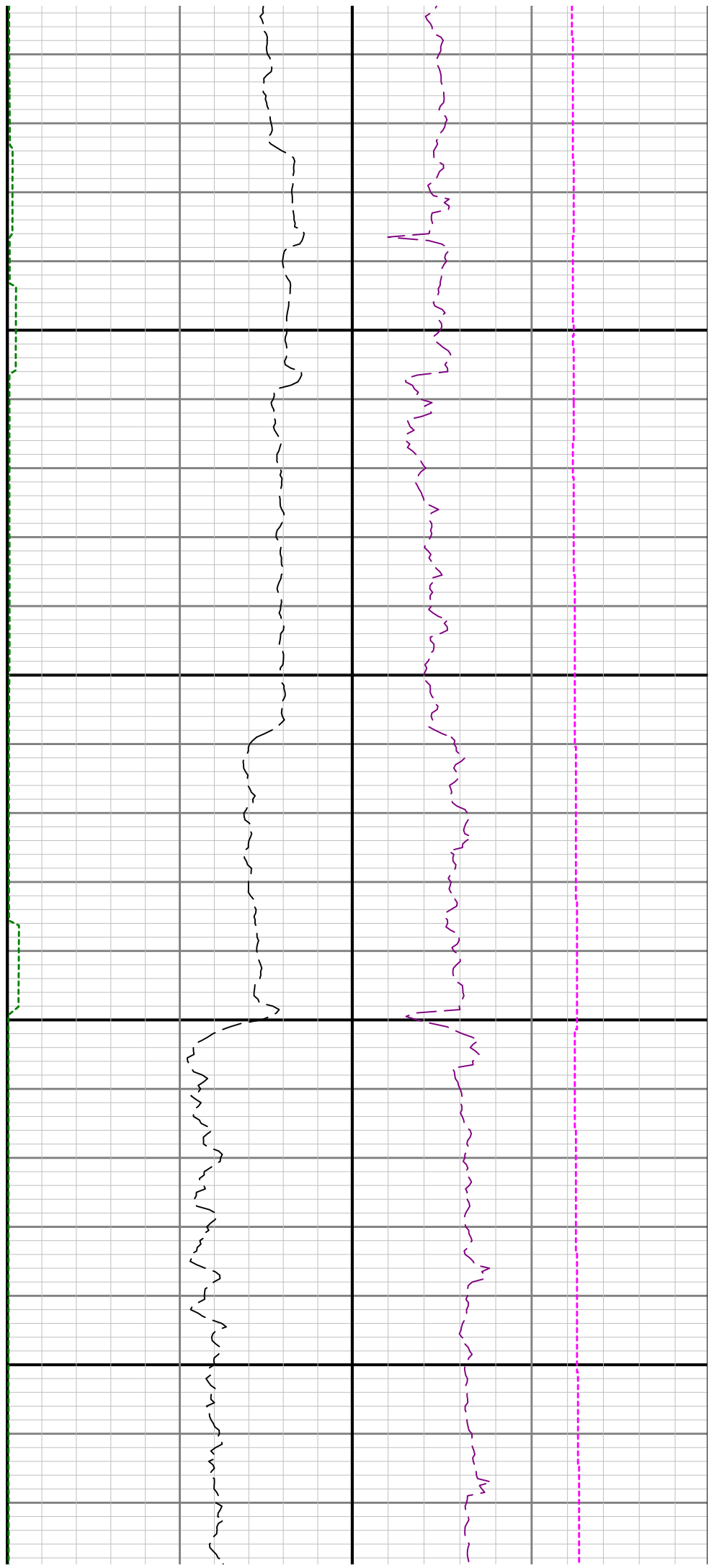


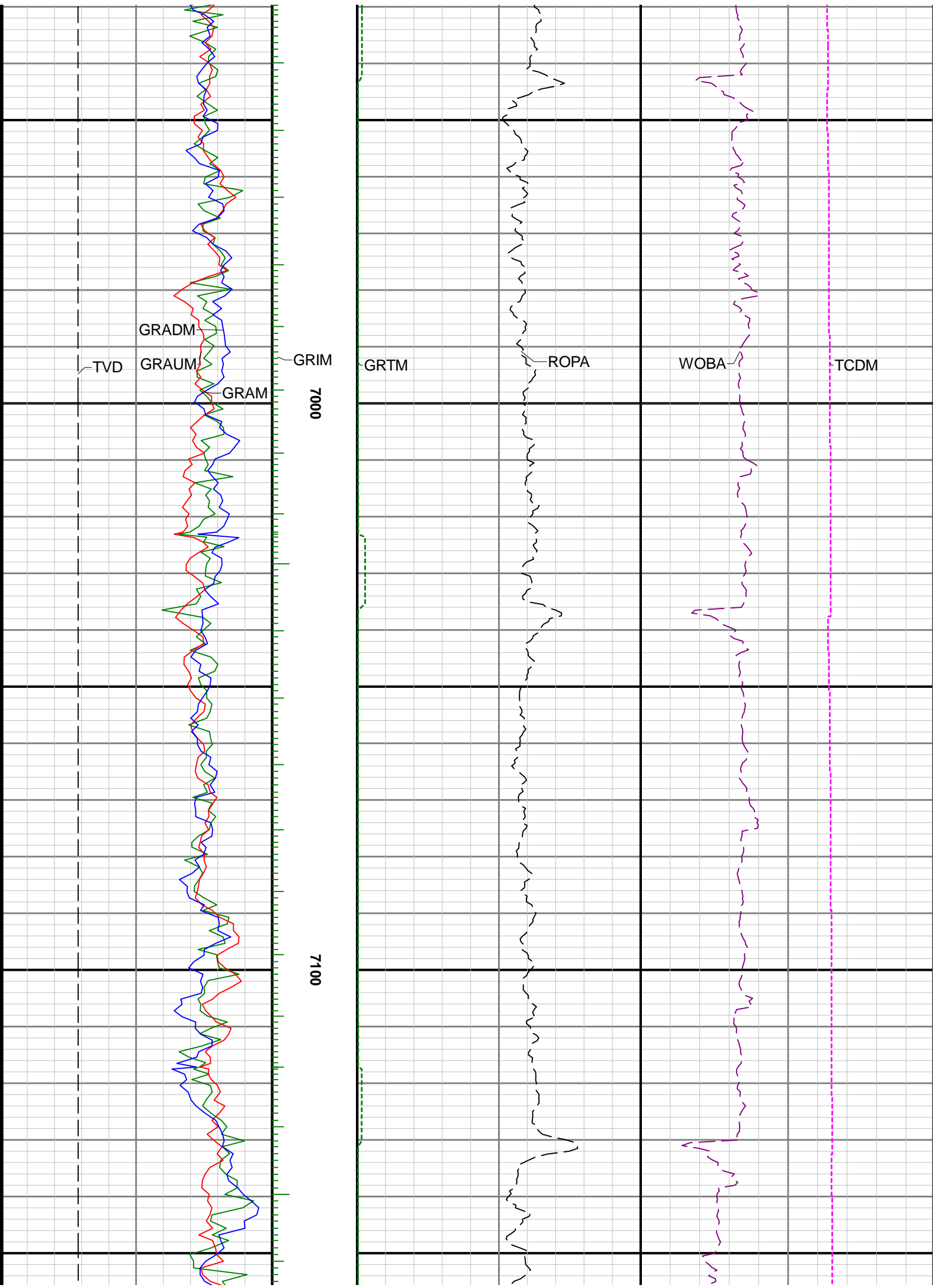


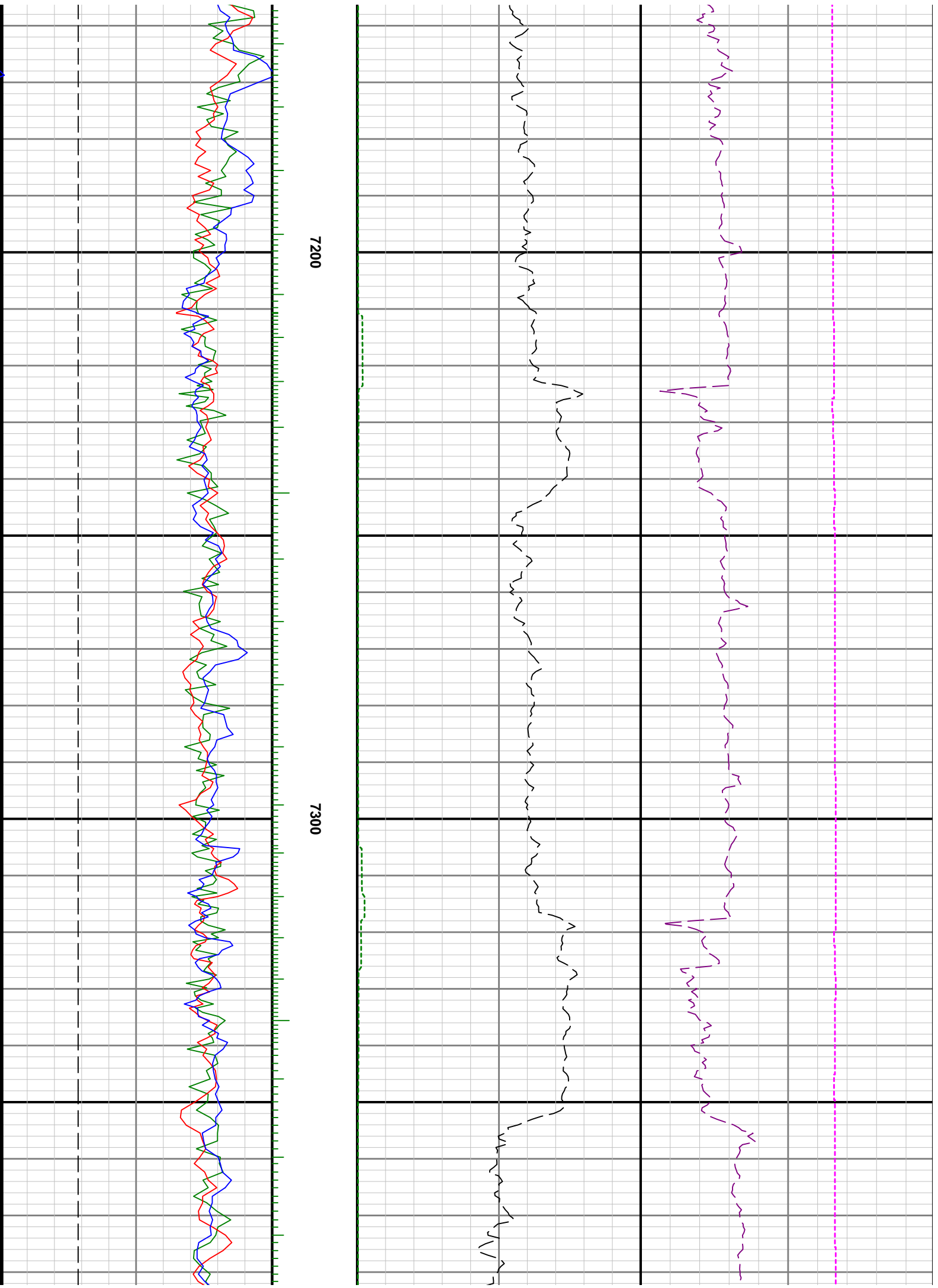


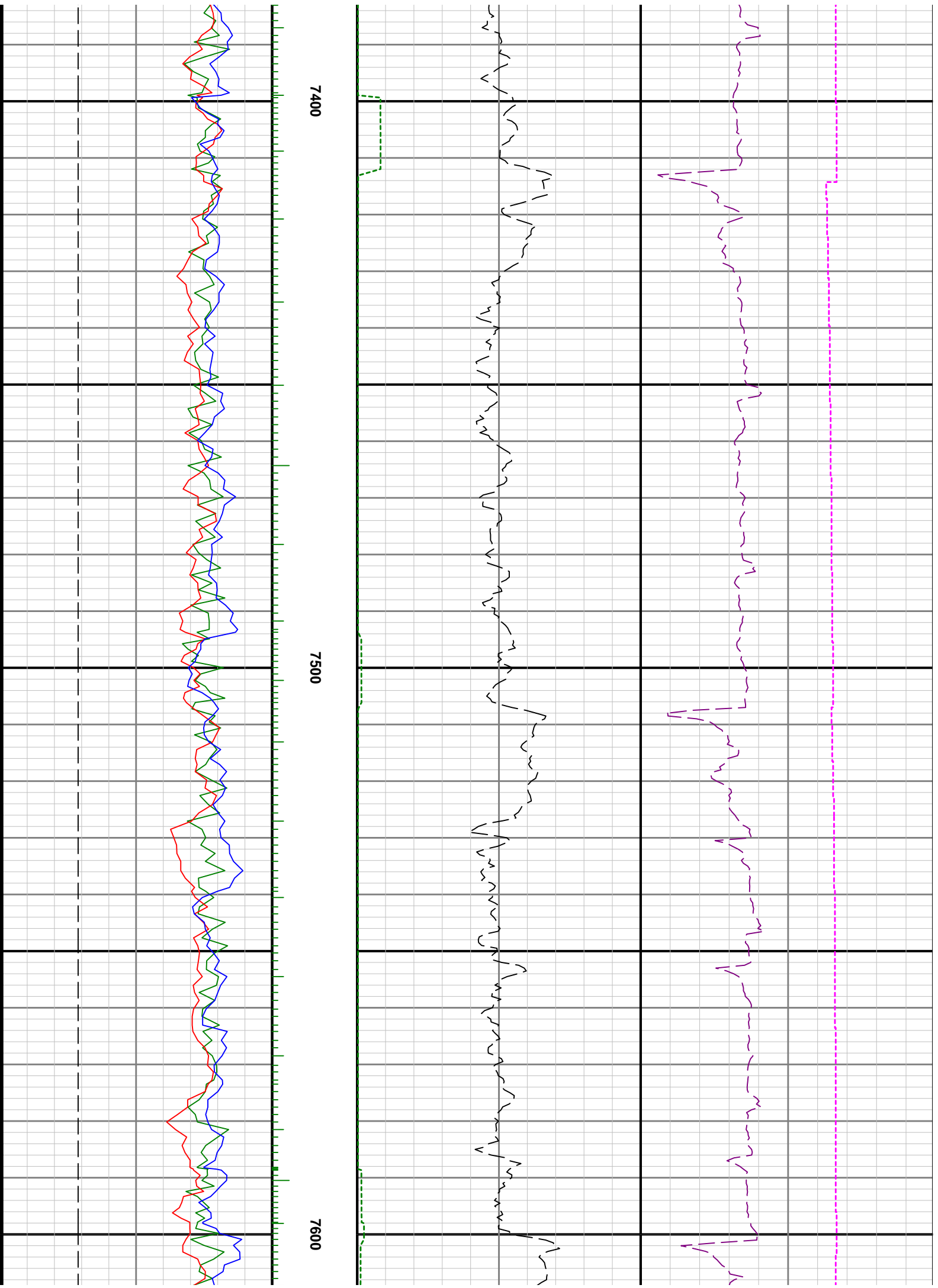
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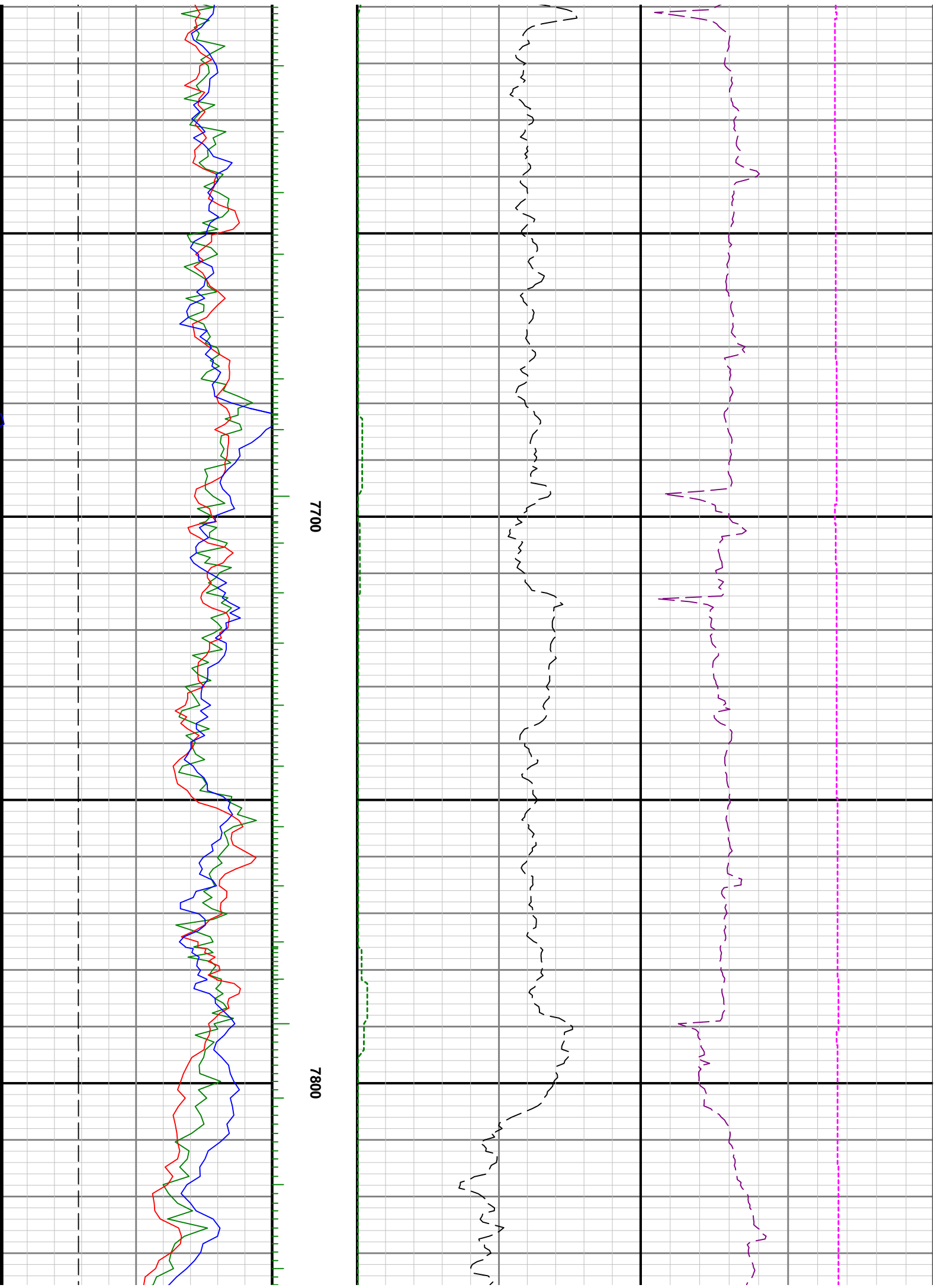
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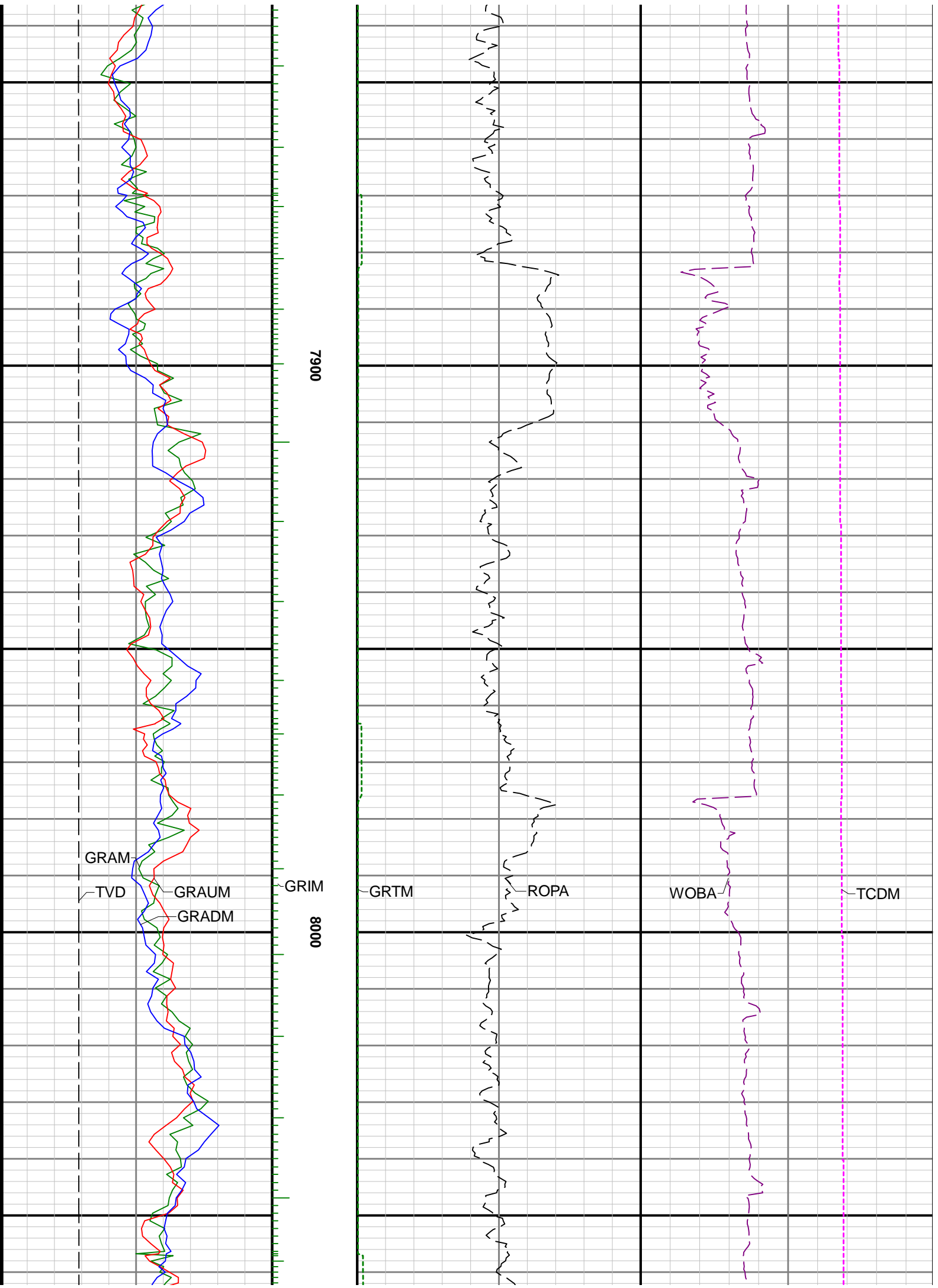


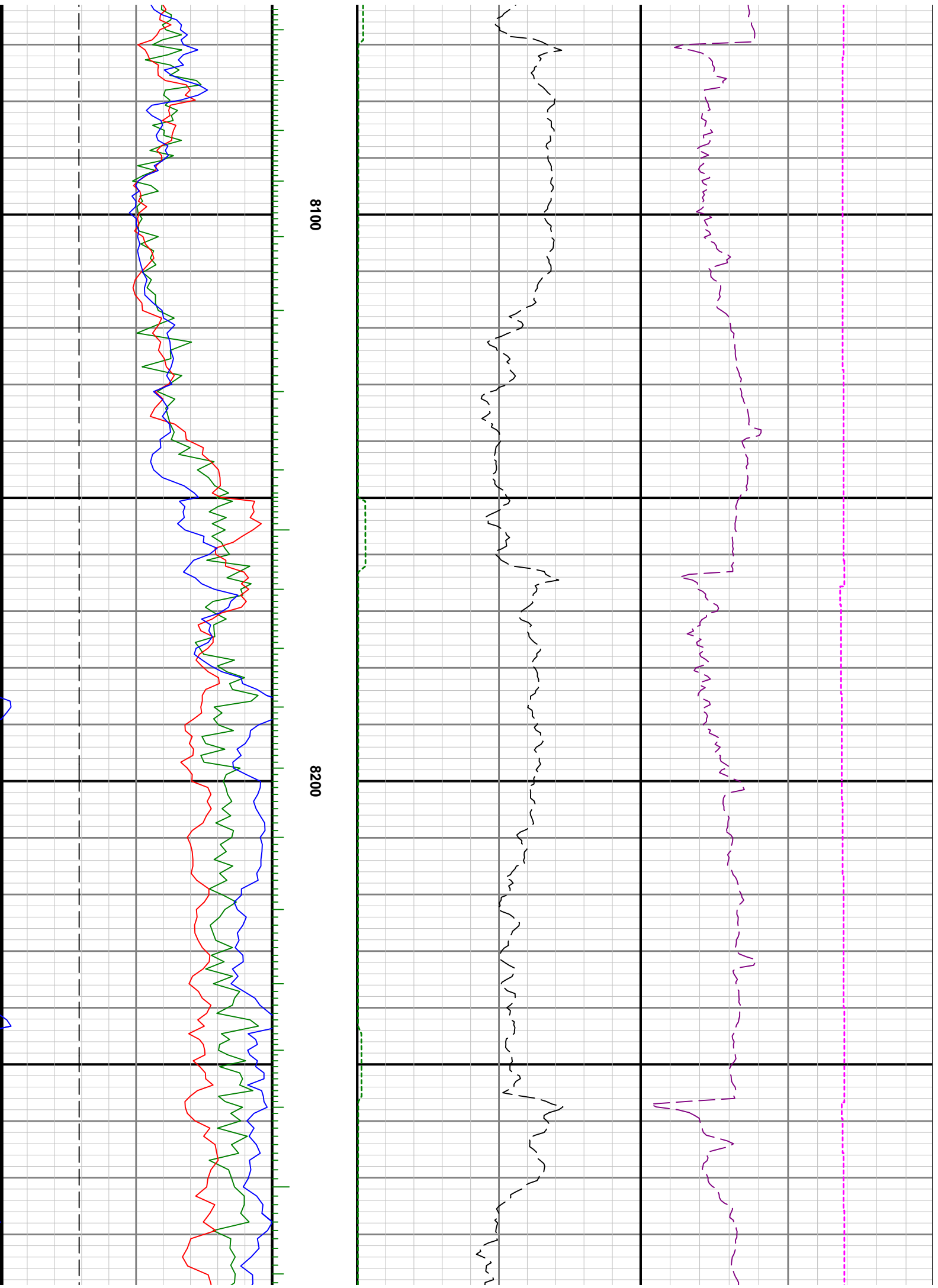


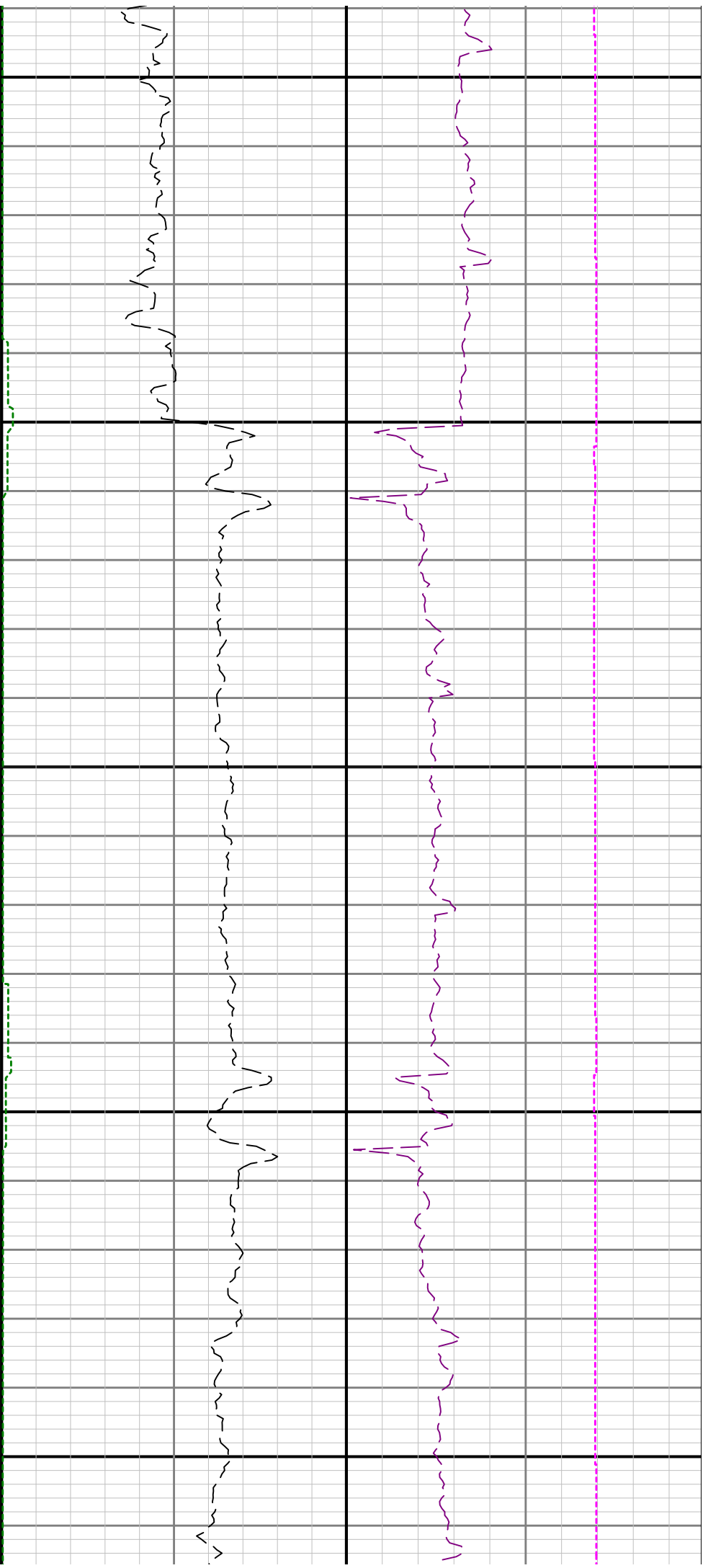








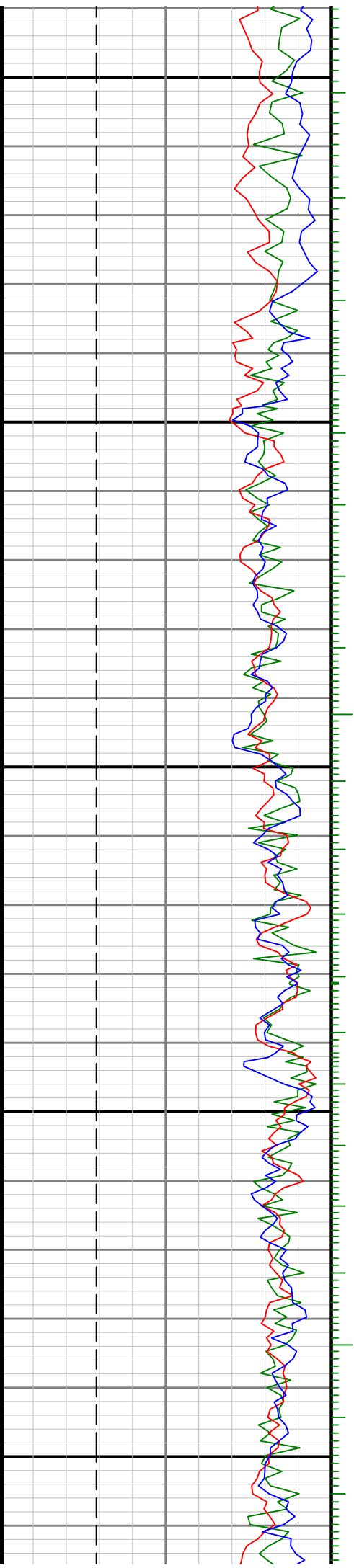


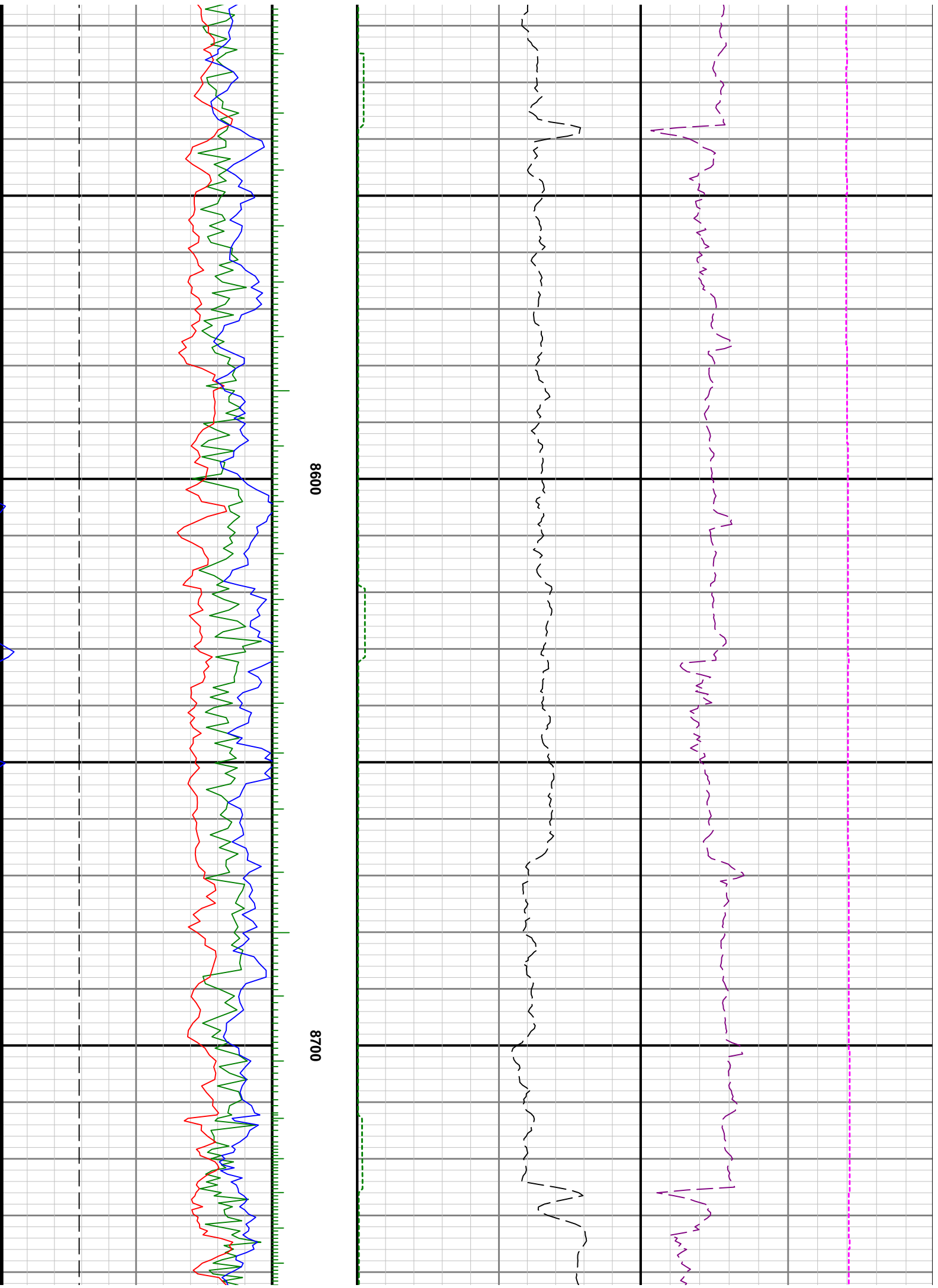


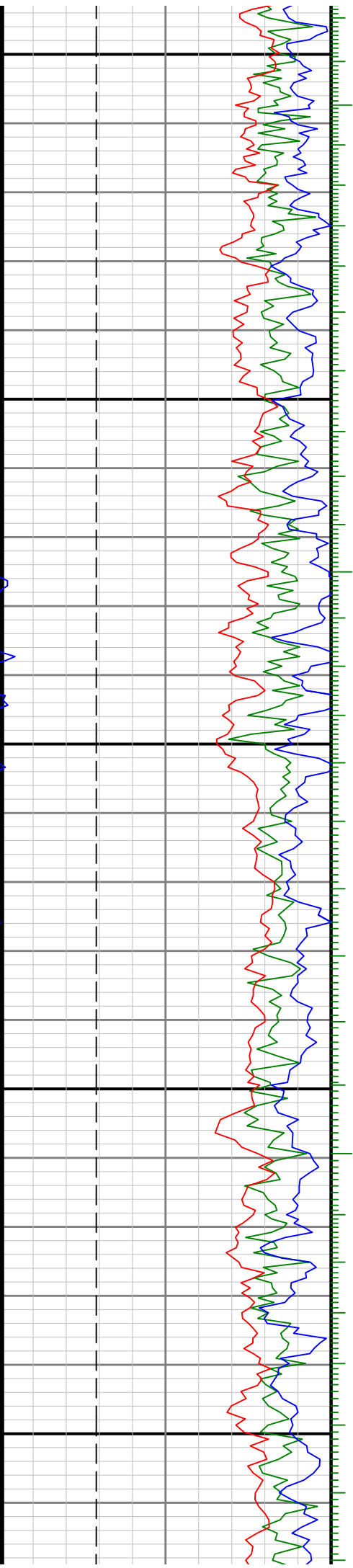
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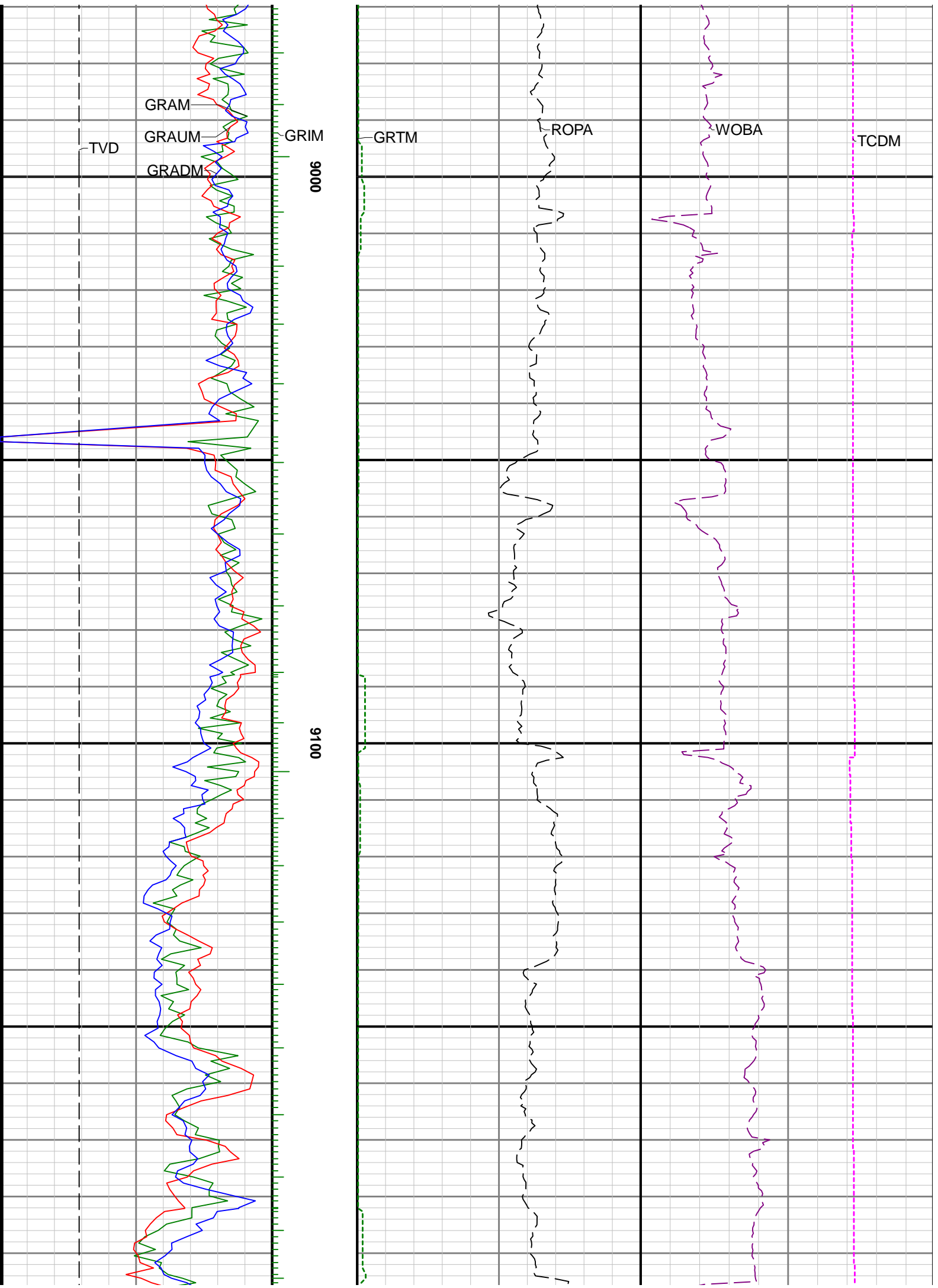


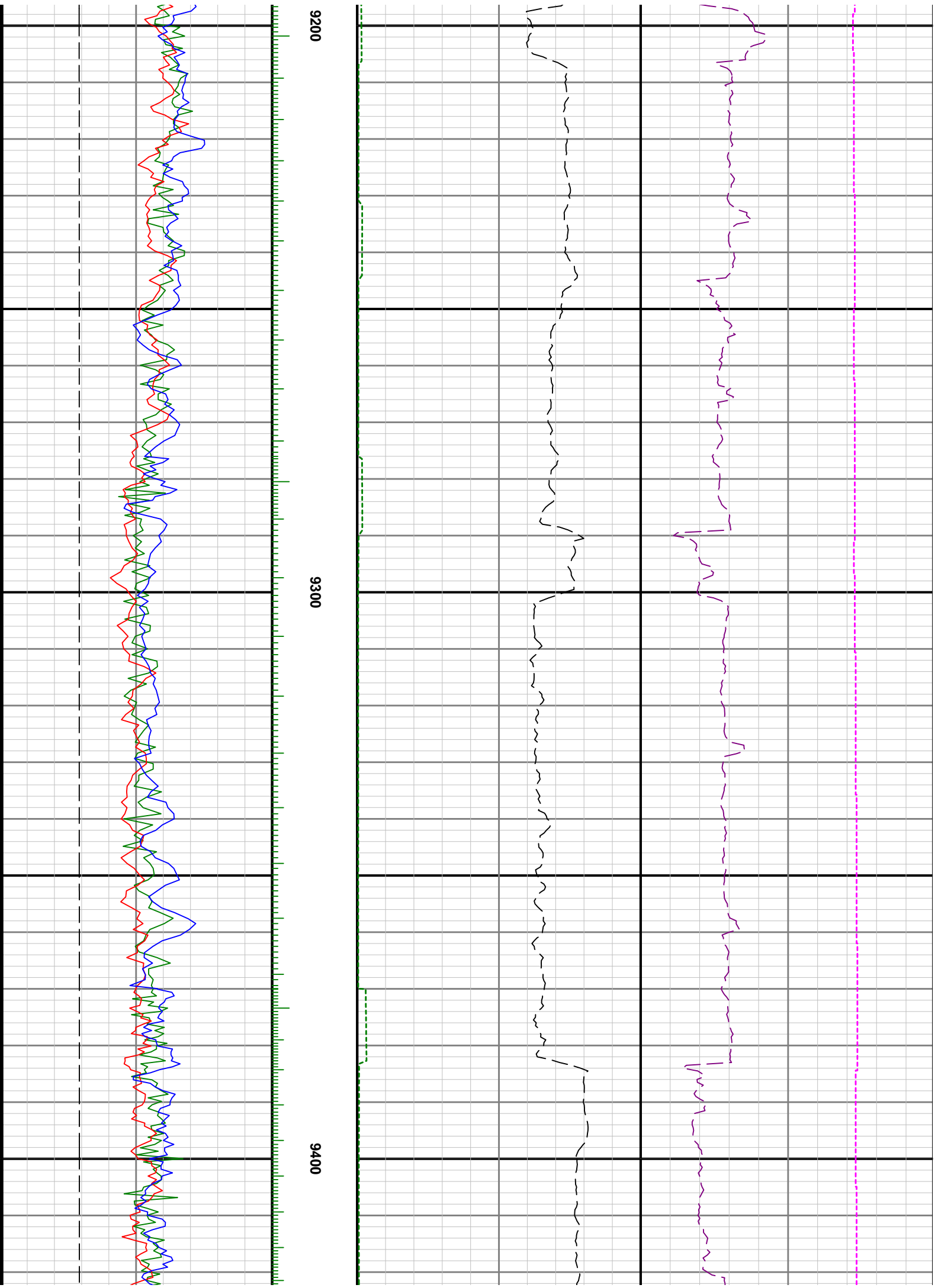


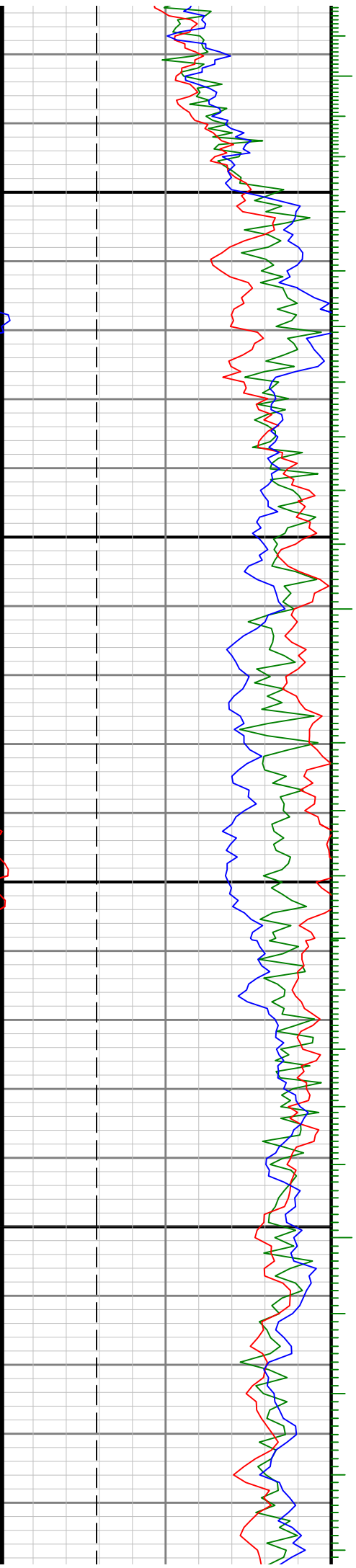
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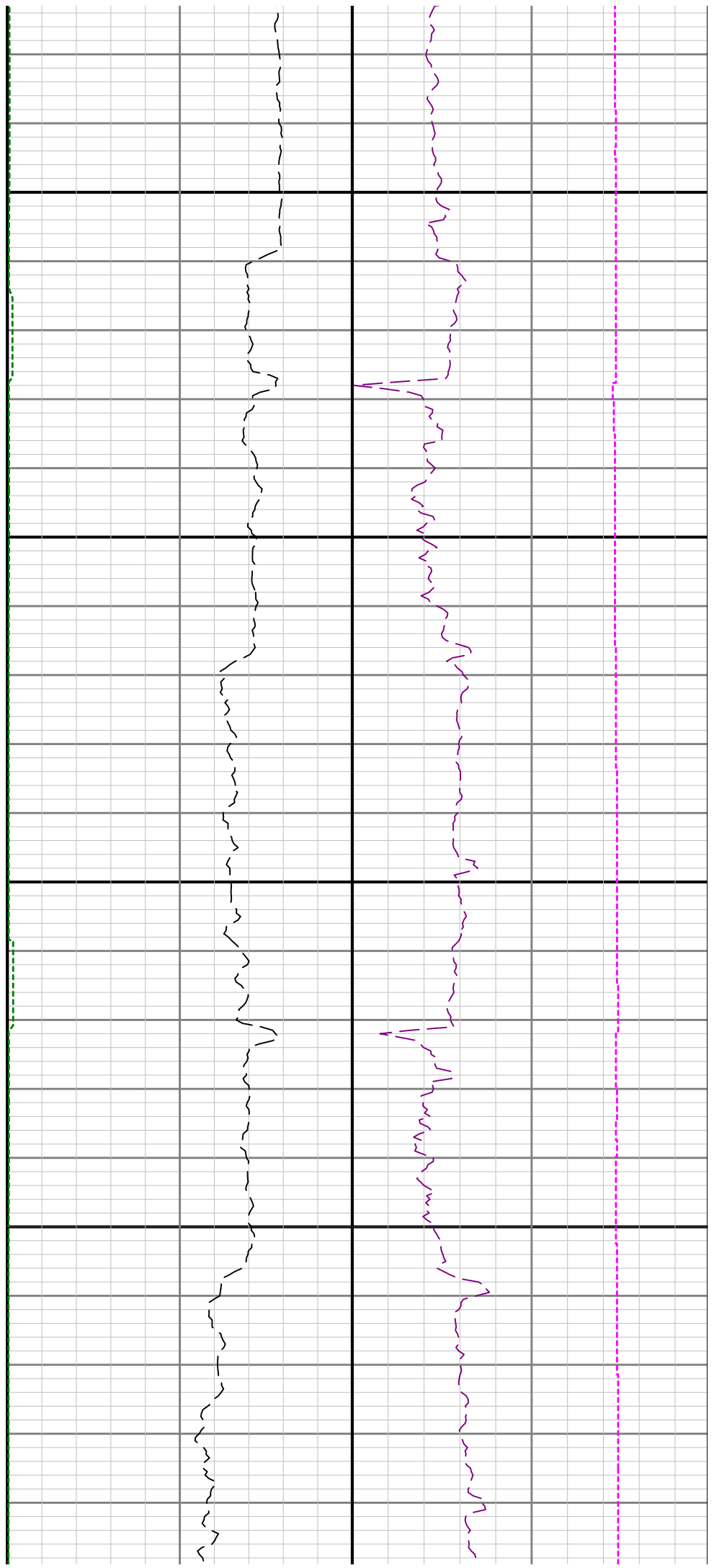


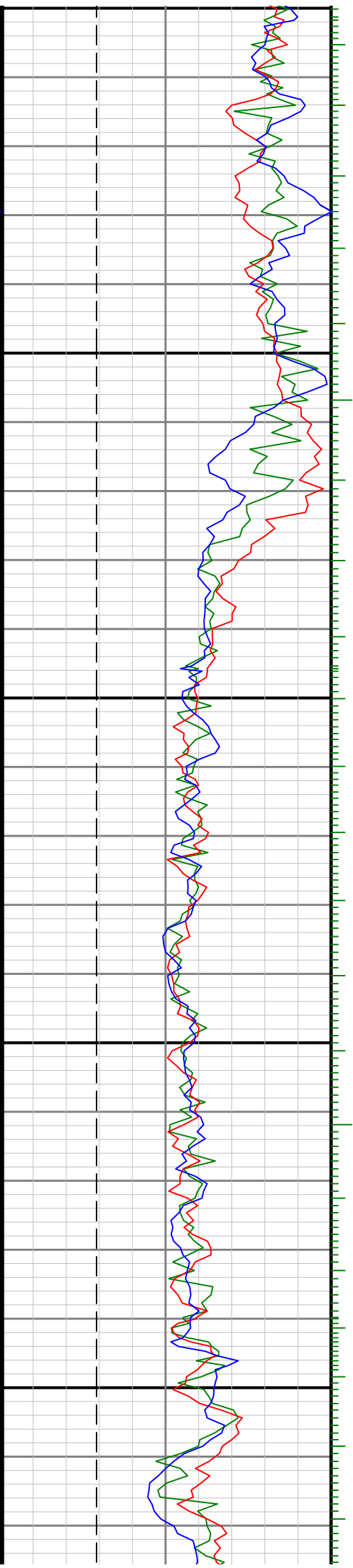




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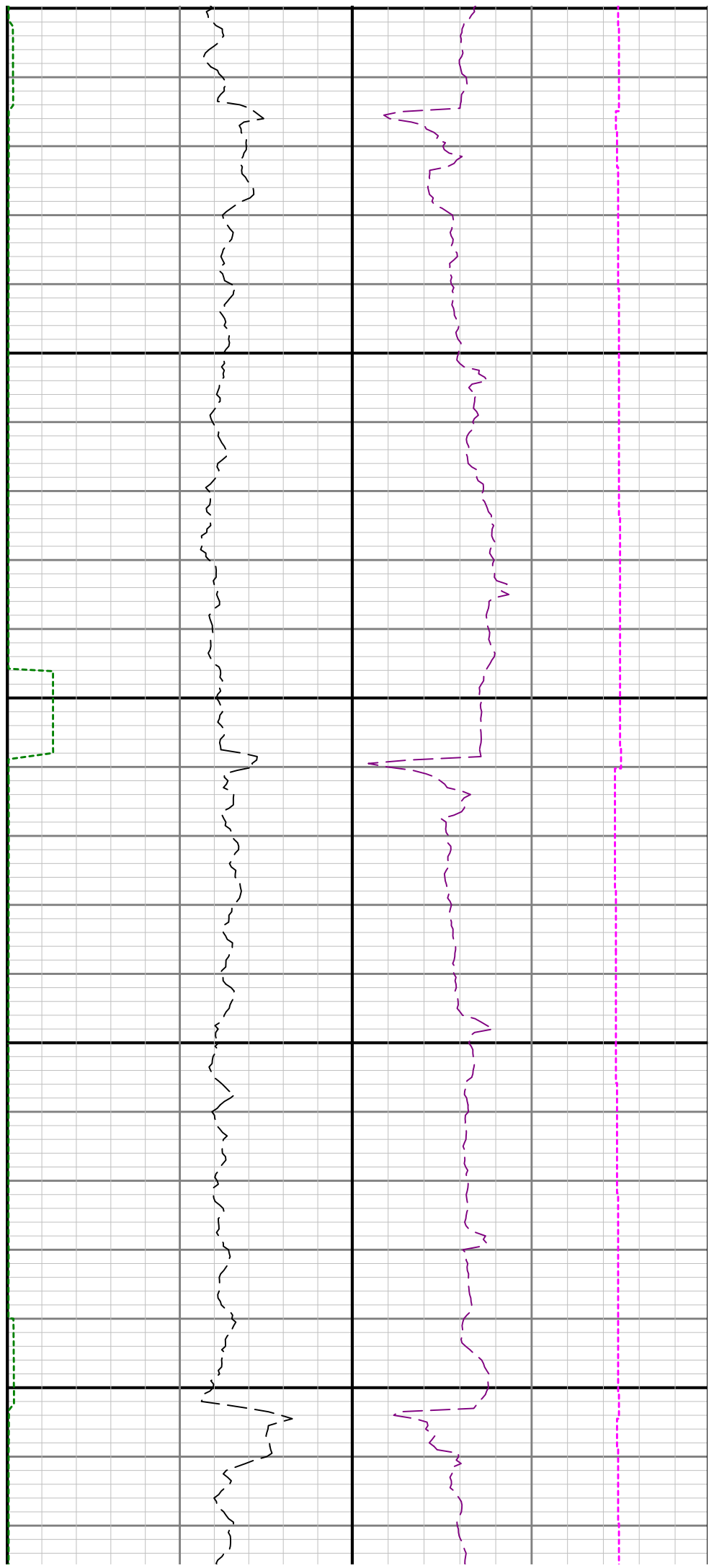
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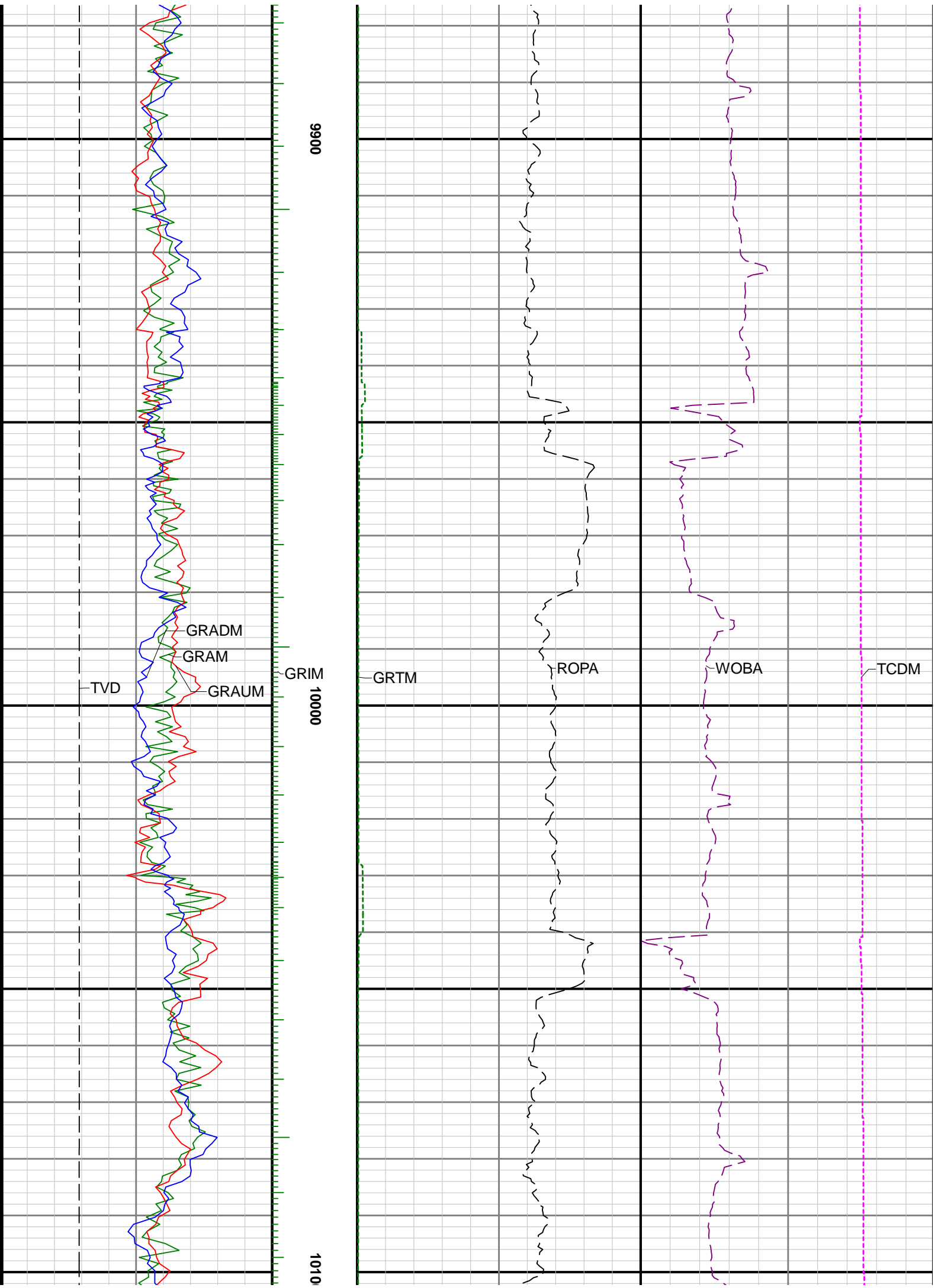


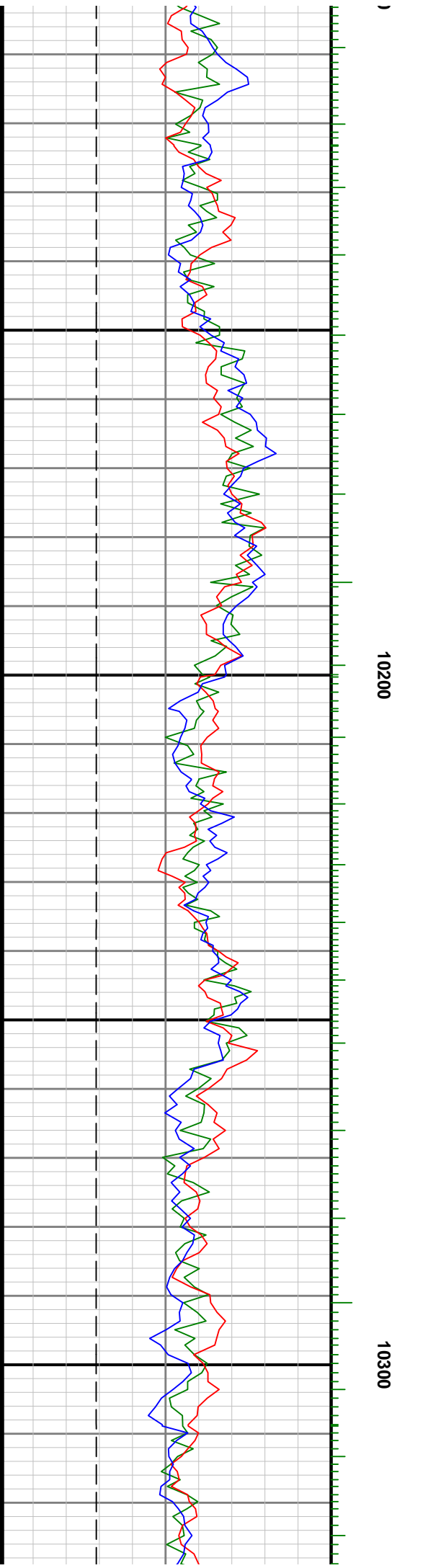
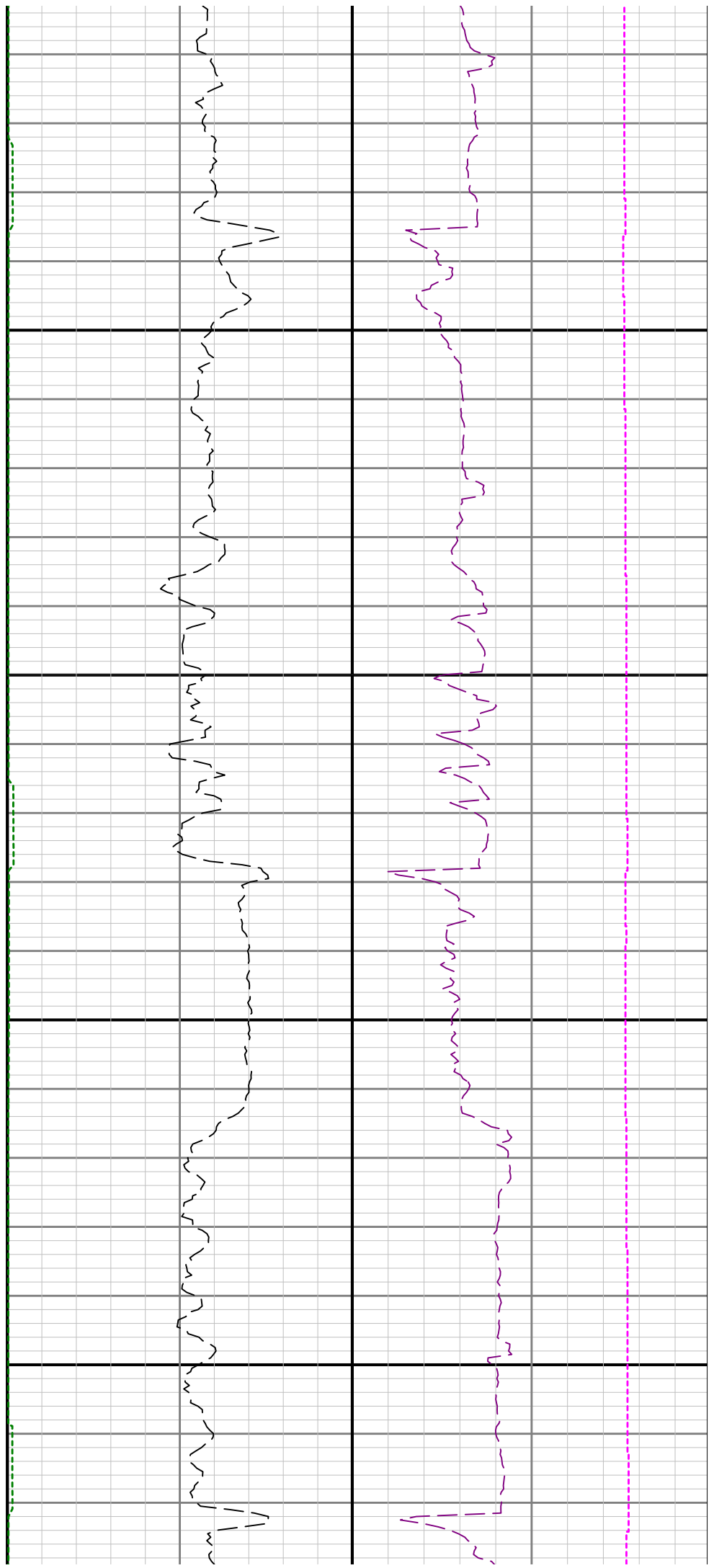


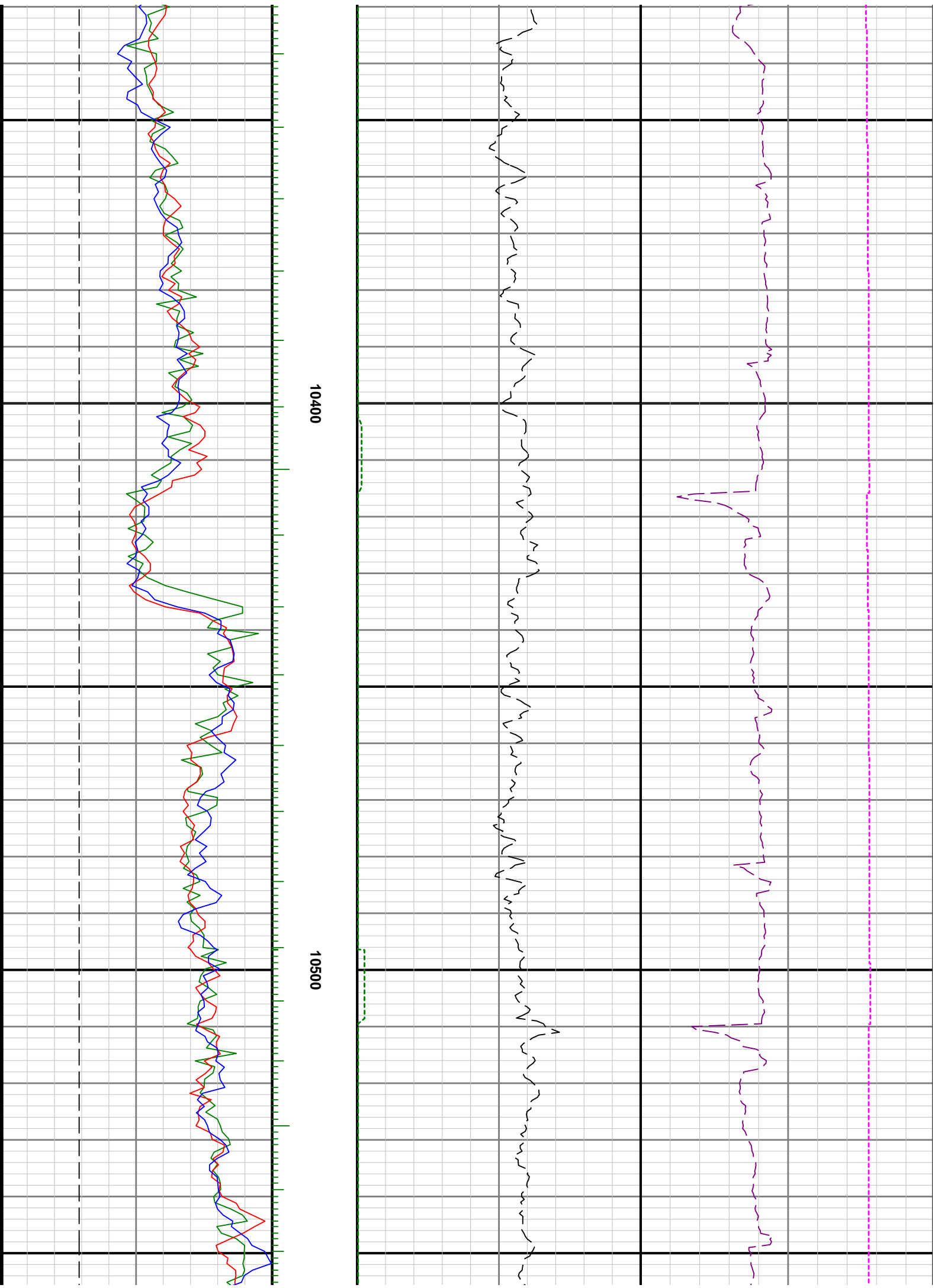
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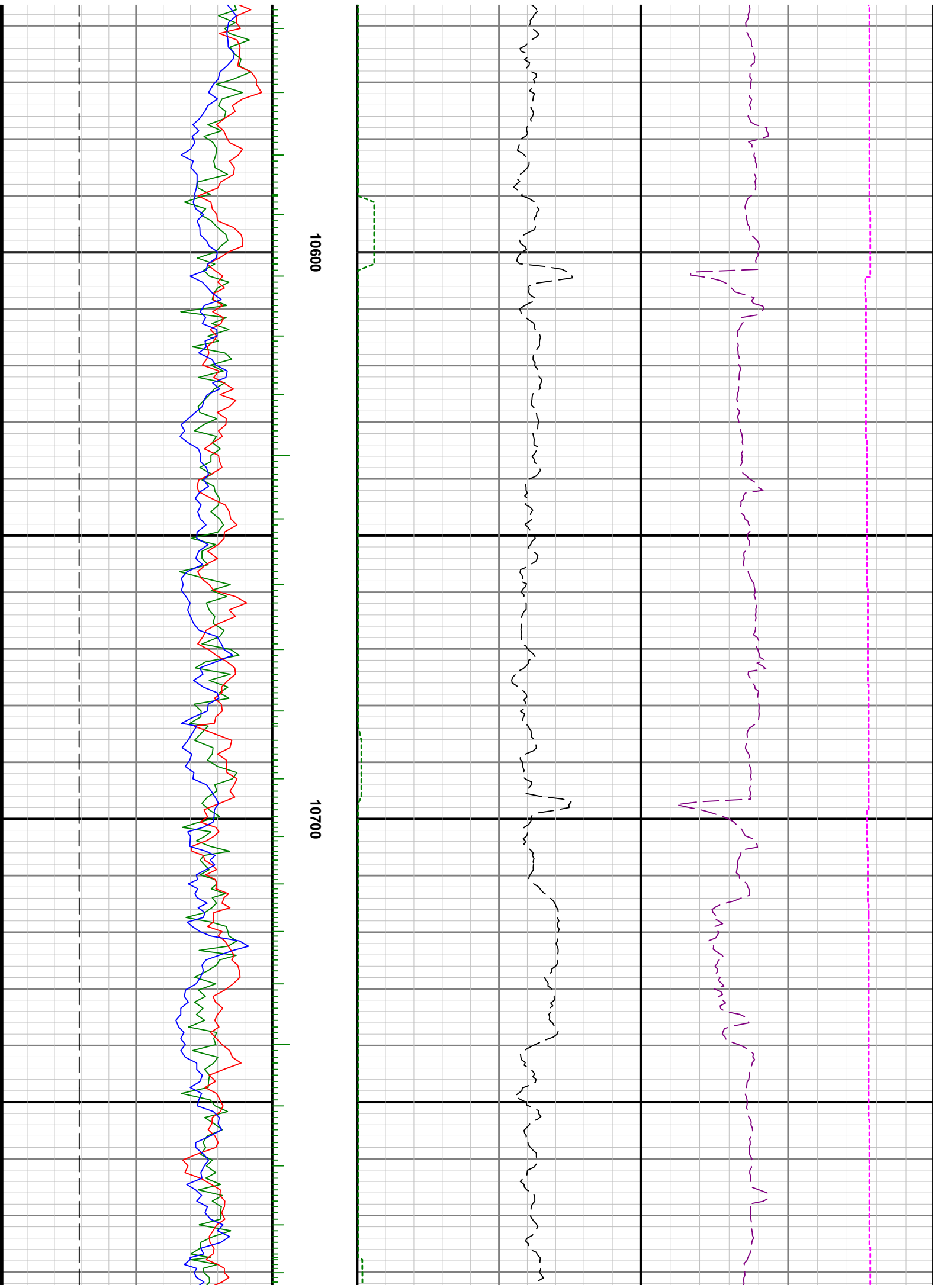
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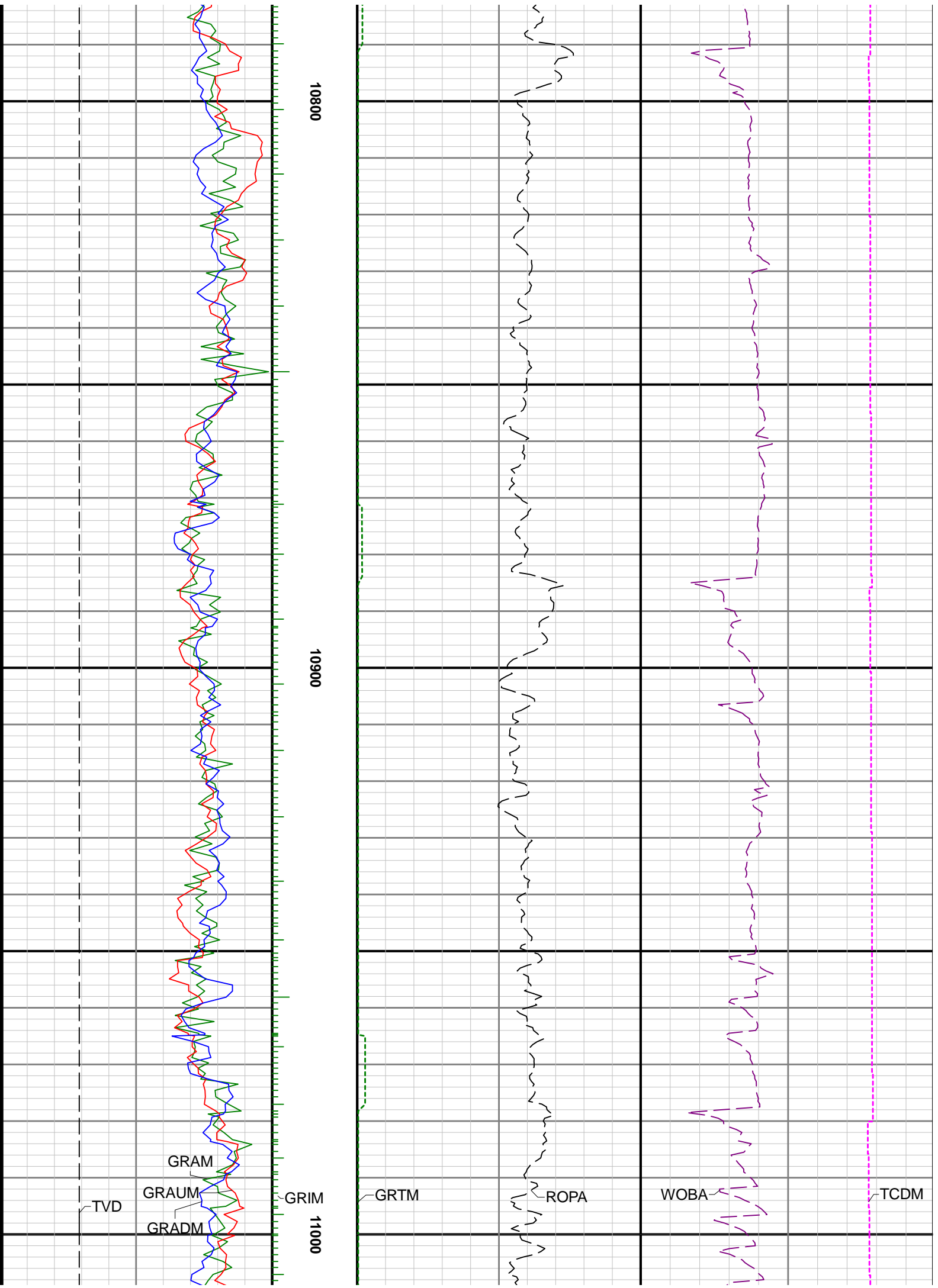


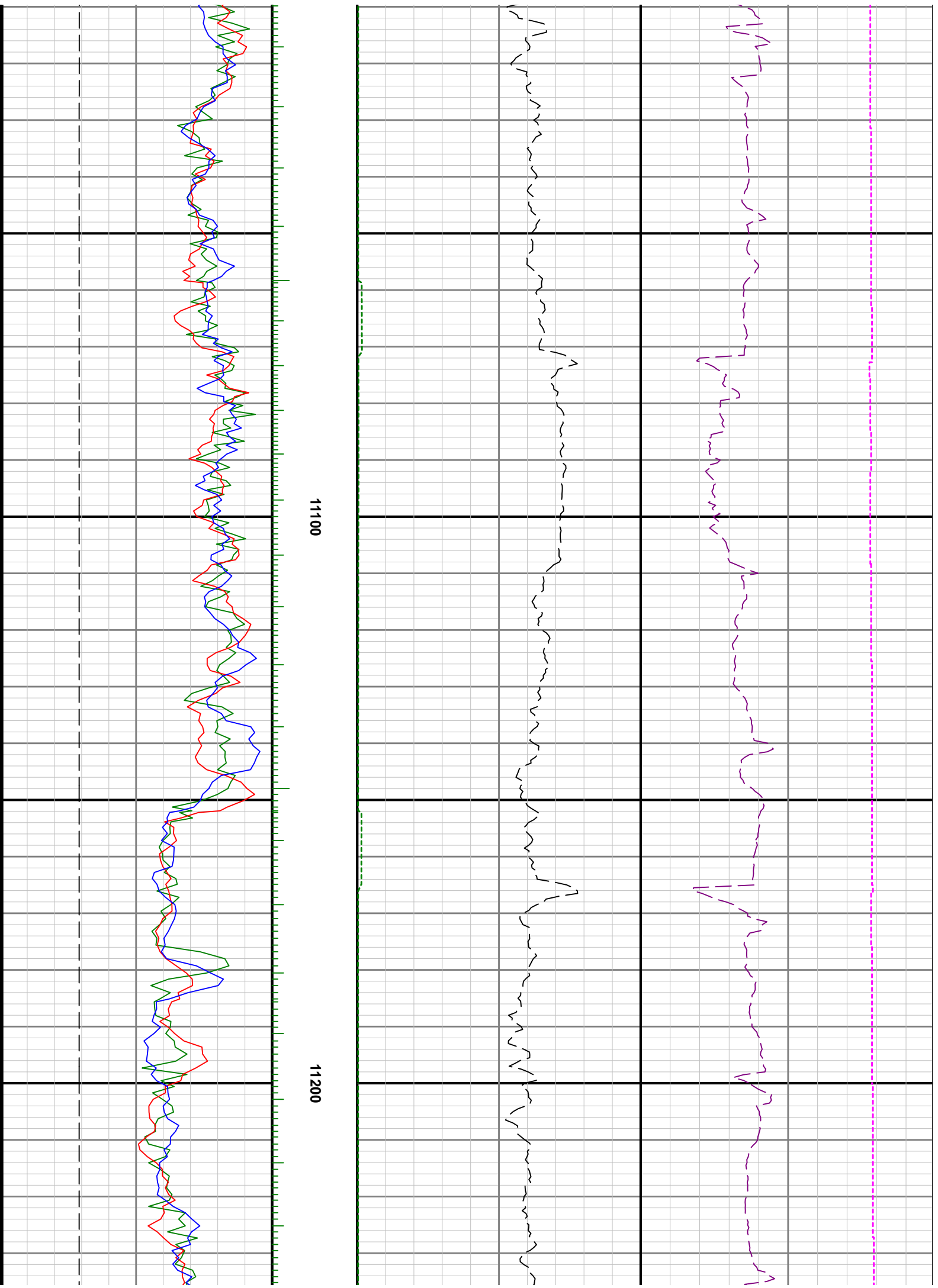


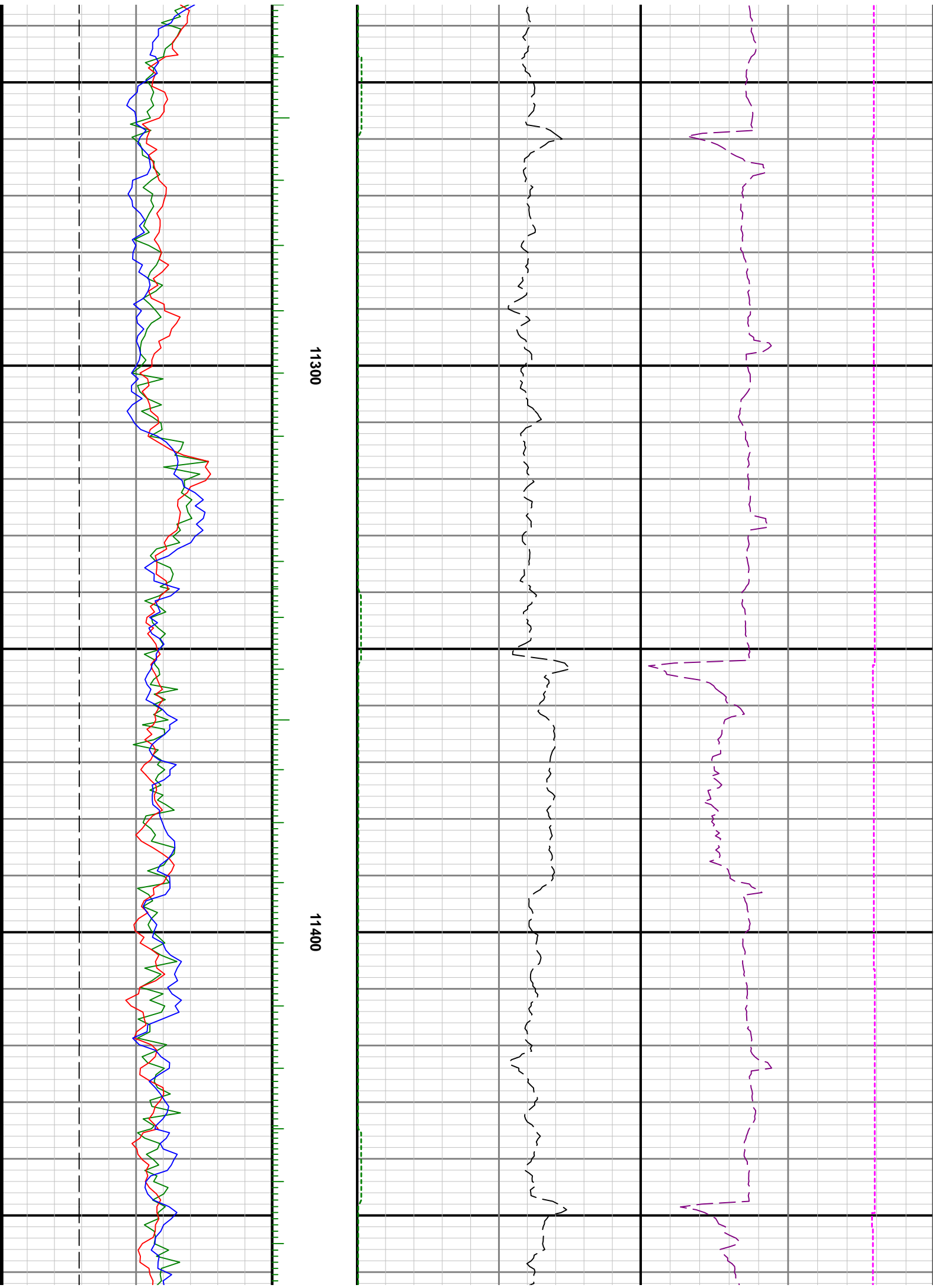


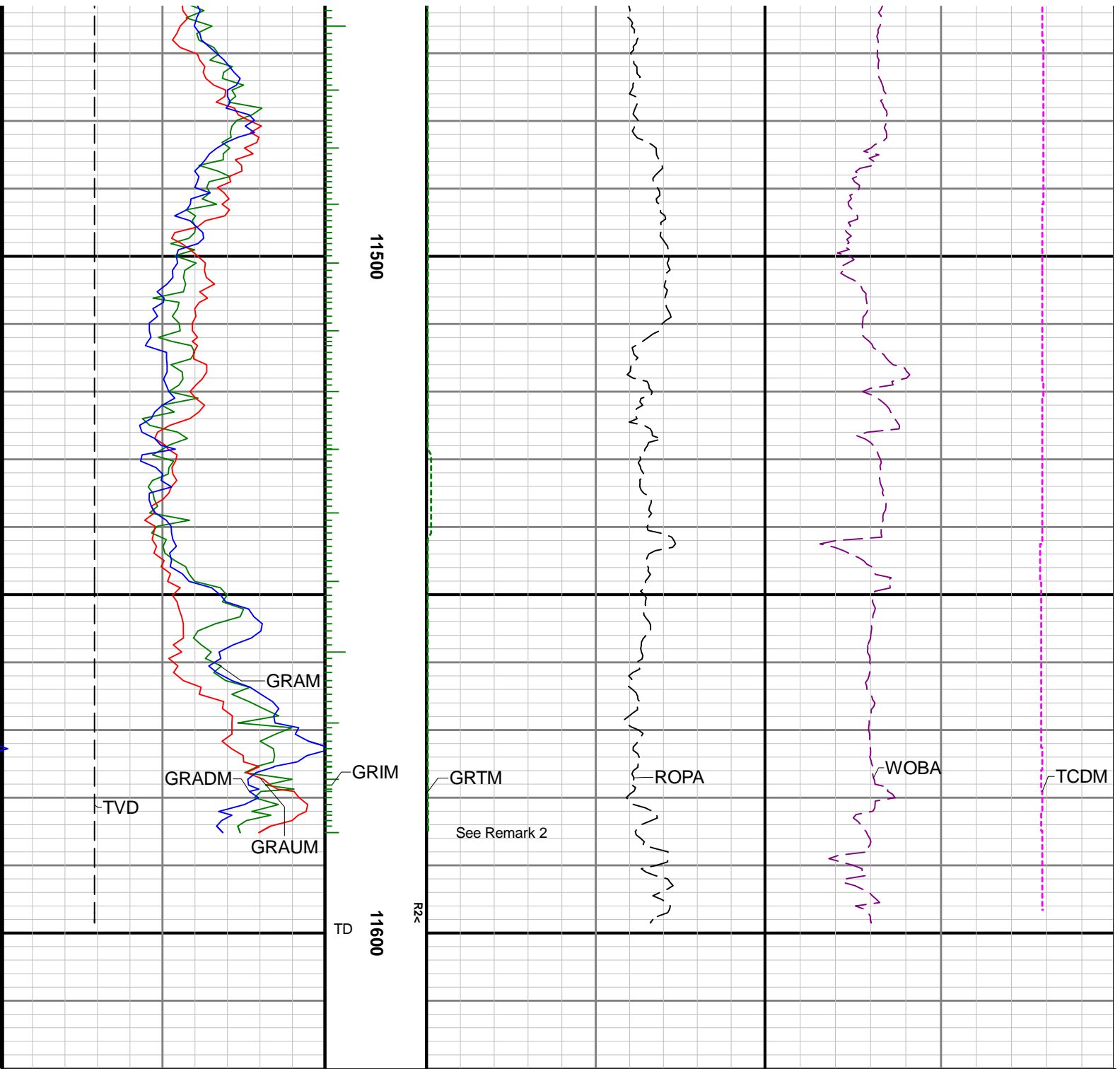












| | | |
|---|------|------|
| Gamma Ray - Apparent 0.5 ft Average GRAM | 0 | 200 |
| API | | |
| Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM | 0 | 200 |
| API | | |
| Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM | 0 | 200 |
| API | | |
| True Vertical Depth TVD | 7000 | 4850 |
| ft | | |

MID 1:240 feet

| | | |
|--------------------------------------|------|-----|
| Depth Averaged ROP 3 ft Average ROPA | 1000 | 0 |
| ft/h | | |
| Gamma Time Since Drilled GRTM | 0 | 600 |
| min | | |

| | | |
|--|---|-----|
| Weight On Bit, Average 1 ft Average WOBA | 0 | 100 |
| klb | | |
| Downhole Temperature TCDM | 0 | 300 |
| degF | | |