



**BAKER  
HUGHES**

LWD REALTIME/MEMORY LOG - RUN 1

Gamma Ray

Scale: Company: Noble Energy

1:1200 MD Well: Wells Ranch BB11-650

Depth Reference: Field: Weld County(Noble NAD 83 Grid)

Driller's Depth County: Weld Country: United States

State: Colorado

Status: Surface Location: 040° 24' 45.648" N Other Services:

Final Print Latitude: 104° 24' 45.468" W

Drilling Dynamics

API No: 05-123-44961-00 Longitude:

Wellbore Survey

Job ID: 8645722 SEC: 11 TWN: 5N RGE: 63W

Permanent Datum (P.D.): Ground Level Elevation: 4668.00 ft Elev. KB: N/A

Log Measured From: Rig Floor Above P.D. 30.00 ft Elev. DF: 4698.00 ft

Dates Interval Logged Magnetic Field Reference

Date From: 2017-08-24 Top: (ft) 1931.00 Azi Reference North: Grid Dip Angle: (deg) 67.08

Date To: 2017-08-25 Bottom: (ft) 14088.00 Total Magnetic Field Strength: (nT) 52322

Spud Date: 2017-08-23 Mag to Reference North Correction: (deg) 7.29 E

Borehole Record

Casing Record

Hole Size (in) From (ft) To (ft) Size (in) Weight (lb/ft) From (ft) To (ft)

8.500 1907.00 14088.00 9.625 36.00 30.00 1921.00

Mud Record

Deviation Record

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

Oil Based Mud 1931.00 14088.00 8.500 14088.00 0.96 | 42.34 89.17 | 91.32

Acquisition System Software Version Other

Baker Hughes Cadence RT4.1 Rig: H&P 517

Plot Studio 4.1.7763.3 Contractor: Helmerich & Payne Drilling Co

District: RMA Unit: D&E

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Log Run Summary

Run	Bit	Bit	Bit	Bit	Assembly	Logged Interval	Bit Depth Interval	Date / Time	Circ.
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No	Run No.	Size  (in)	Type	Gauge  Length (in)	Type	Top  (ft)	Bottom  (ft)	From  (ft)	To  (ft)	Start Logging	End Logging	Hours  (h)
1	1	8.500	PDC	2.00	AutoTrak Curve	1911.00	14064.00	1935.00	14088.00	2017-08-24 11:56	2017-08-26 06:45	37.46

## Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Mark Herpin	2017-08-24	2017-08-26	Ty Jackson	2017-08-24	2017-08-26			

## Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2017-08-22 18:08	1	1900.00	Oil Based Mud	9.2	9	N/A	15.0	85/15	Active Pit	24000	0.00
2017-08-25 19:45	1	10962.64	Oil Based Mud	9.2	45	N/A	N/A	80/20	Active Pit	22500	0.00
2017-08-26 06:40	1	14088.00	Oil Based Mud	9.2	42	N/A	N/A	84.4/15.6	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	12194650	Near Bit Inclination	5.93	6.73	7.000	4.330
1	ATC_SU	12194650	Near Bit VSS	5.93	6.73	7.000	4.330
1	ATC_MWD	12284825	Gamma (single)	2.75	12.90	7.000	3.250
1	ATC_MWD	12284825	Directional (mag)	12.27	22.42	7.000	3.250

## Service and Tool Mnemonics

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

## Comments

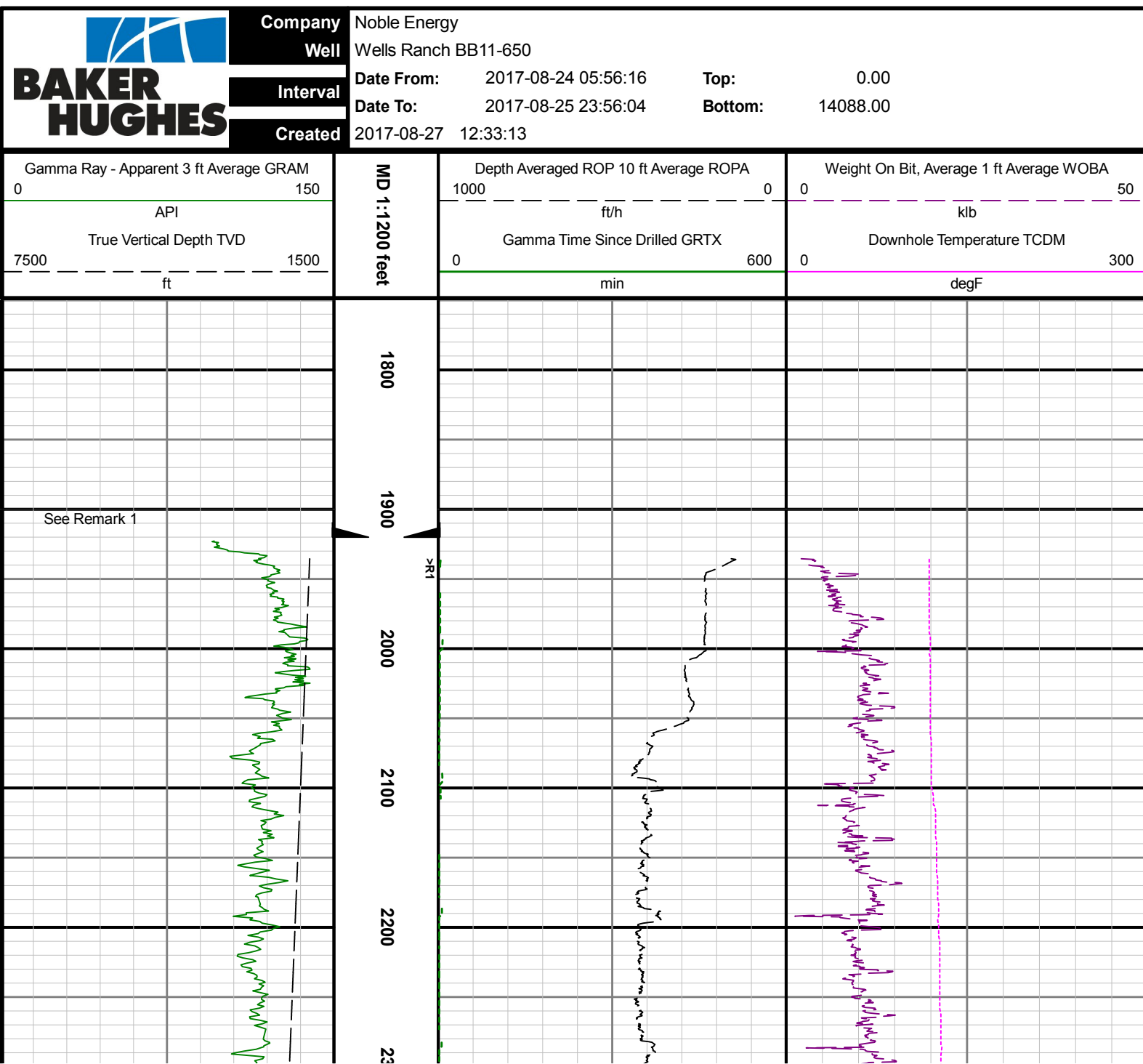
- 1 Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.
- 2 Baker Hughes LWD Run 1 utilized a 6.75 inch NaviGamma services (Gamma Ray and Directional) services behind a 8.5 inch bit and rotary steerable assembly from 1935 to 14088 feet MD (1935 to 6622 feet TVD).

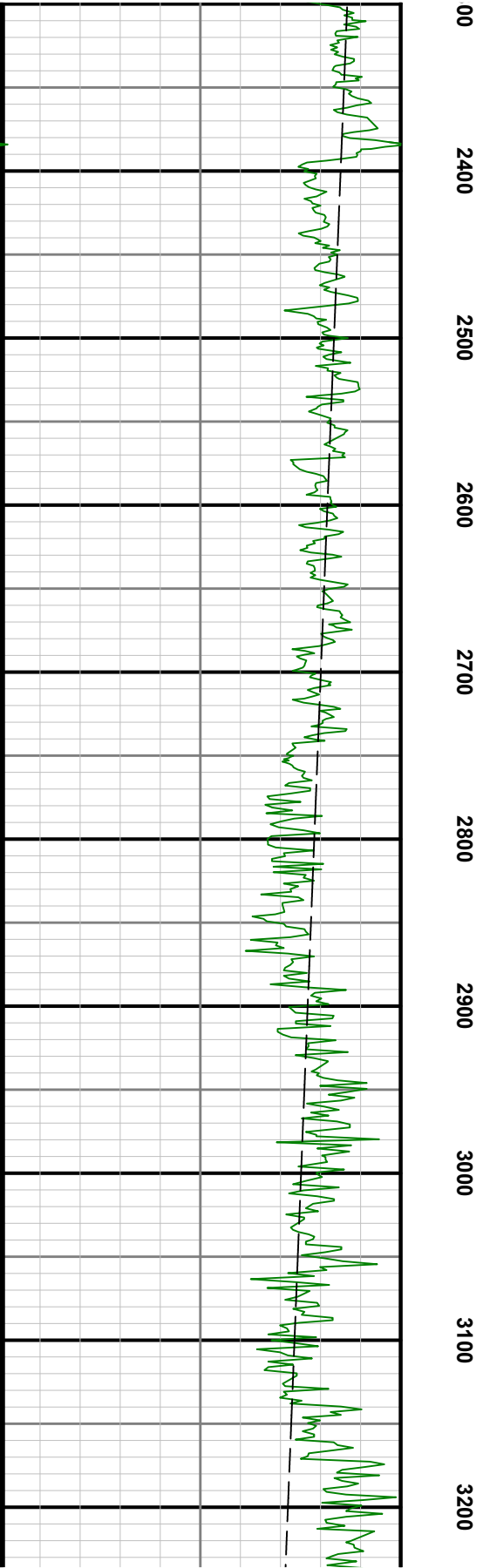
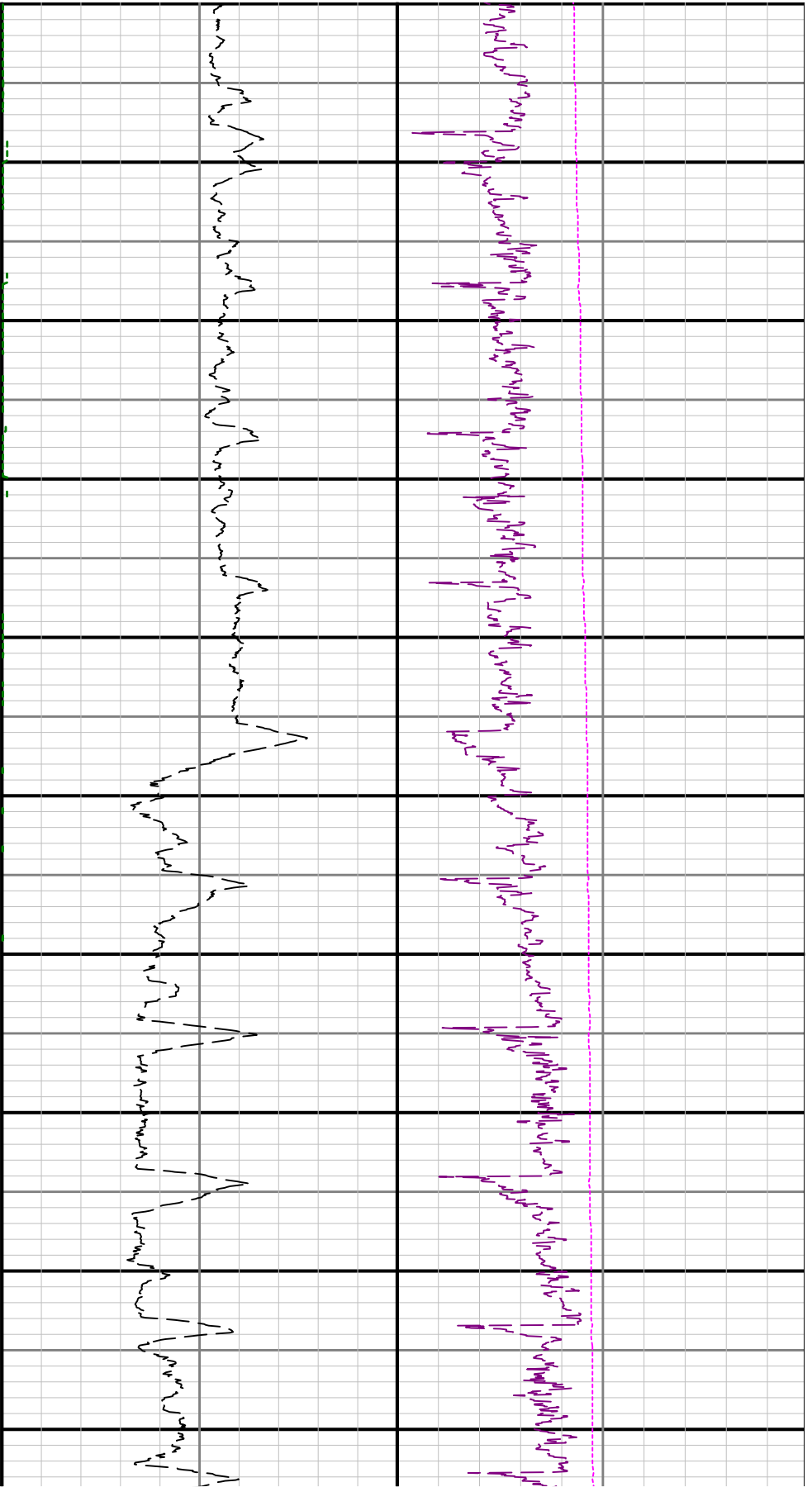
## Remarks

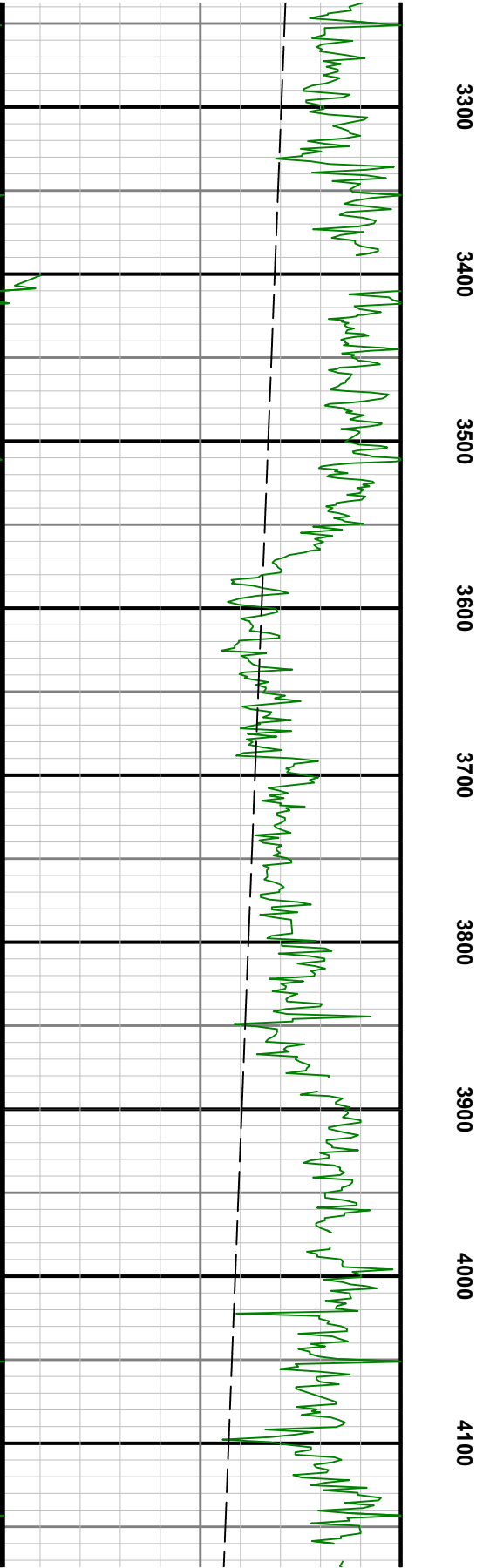
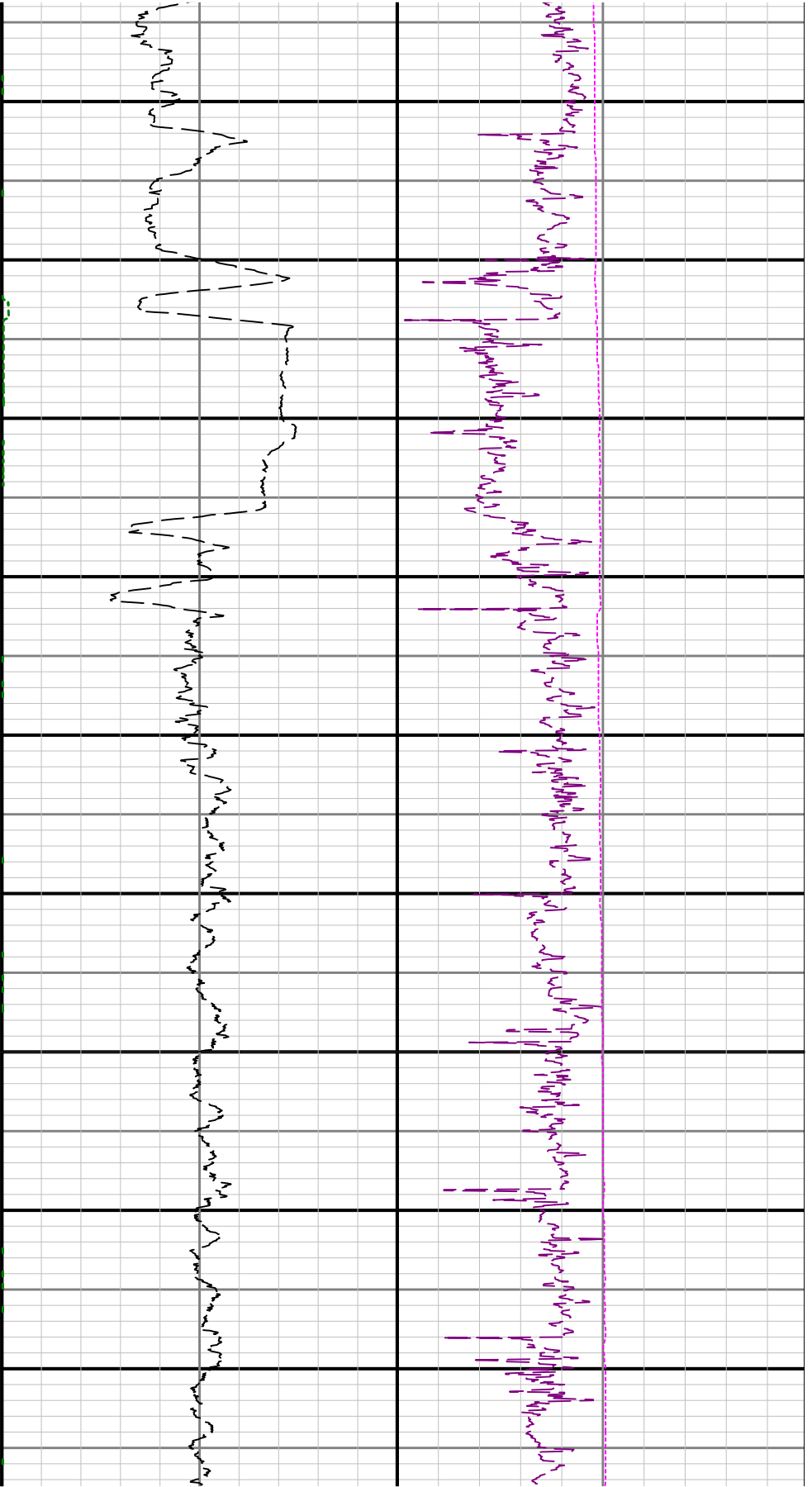
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1907.00	8.500	1	Gamma Ray logging operations began at 1911 feet MD (1911 feet TVD) per customer request.
2	14088.00	8.500	1	The interval from 14064 to 14088 feet MD (6622 feet TVD) was not logged after being drilled due to sensor to bit offset at well TD.

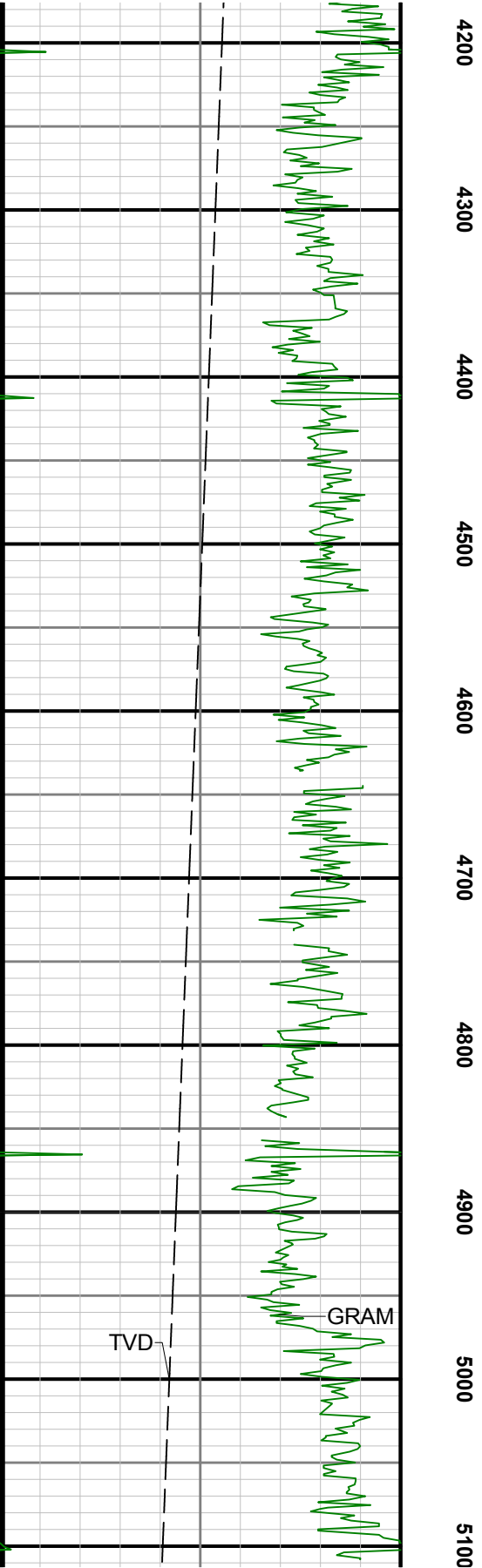
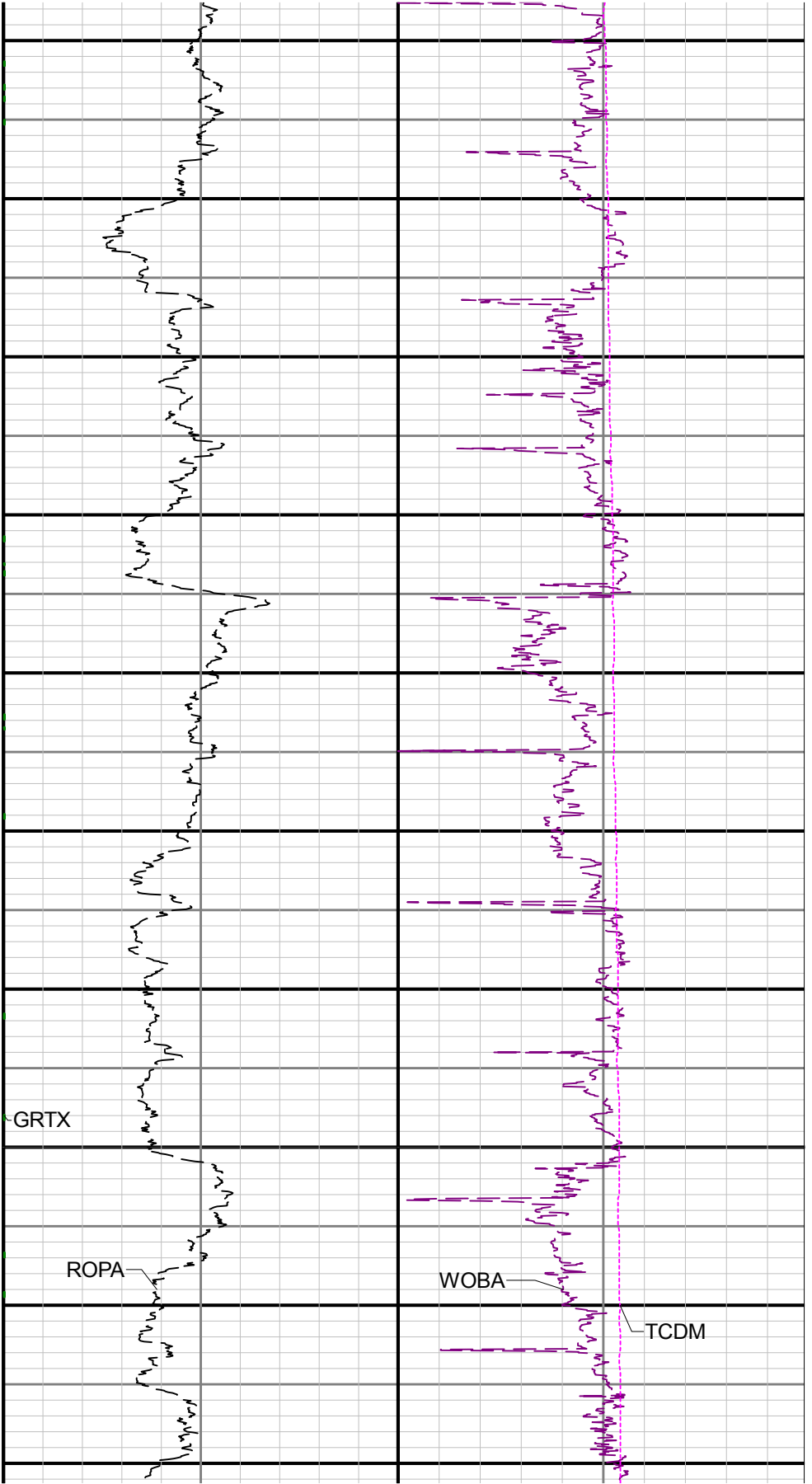
## Curve Mnemonics

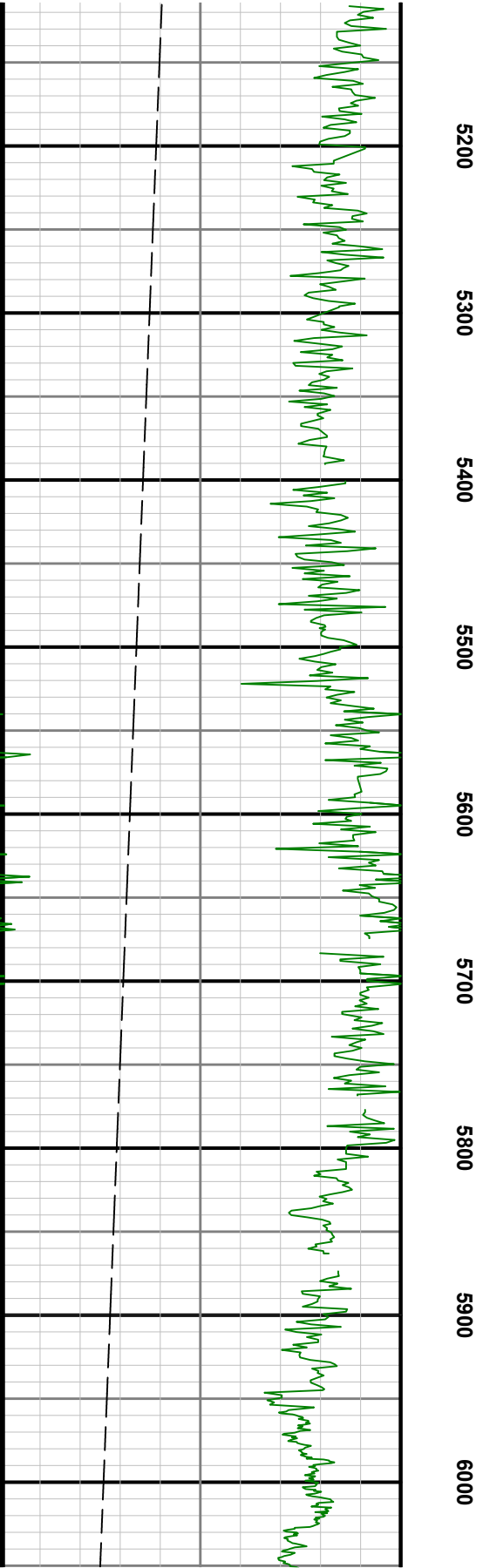
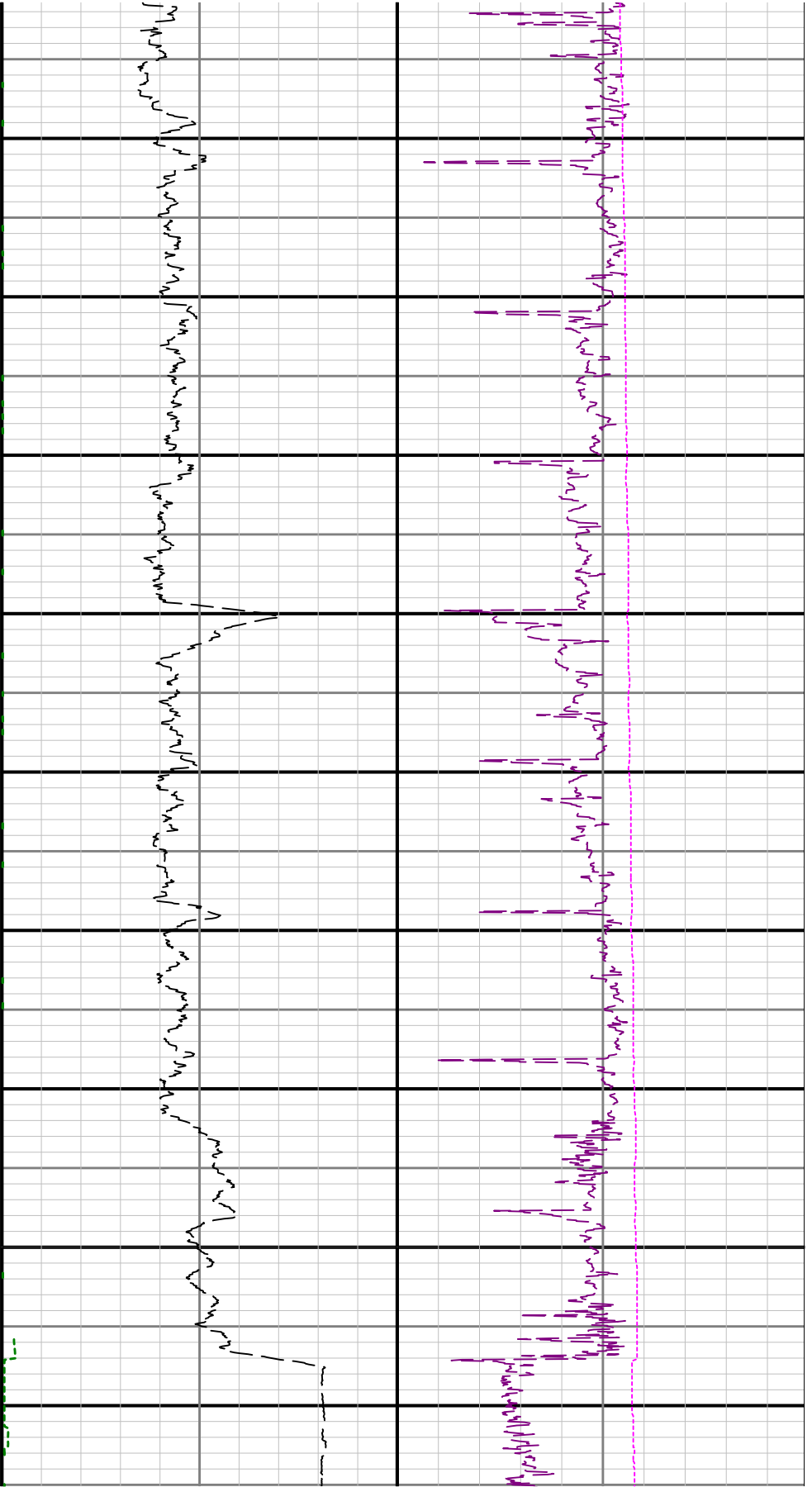
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 10 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	OnTrak - Gamma Ray - Apparent - Memory 3 ft Average	API
GRTX	OnTrak - Gamma Ray - Time Since Drilled - Real-Time	min
TCDM	Downhole Temperature	degF

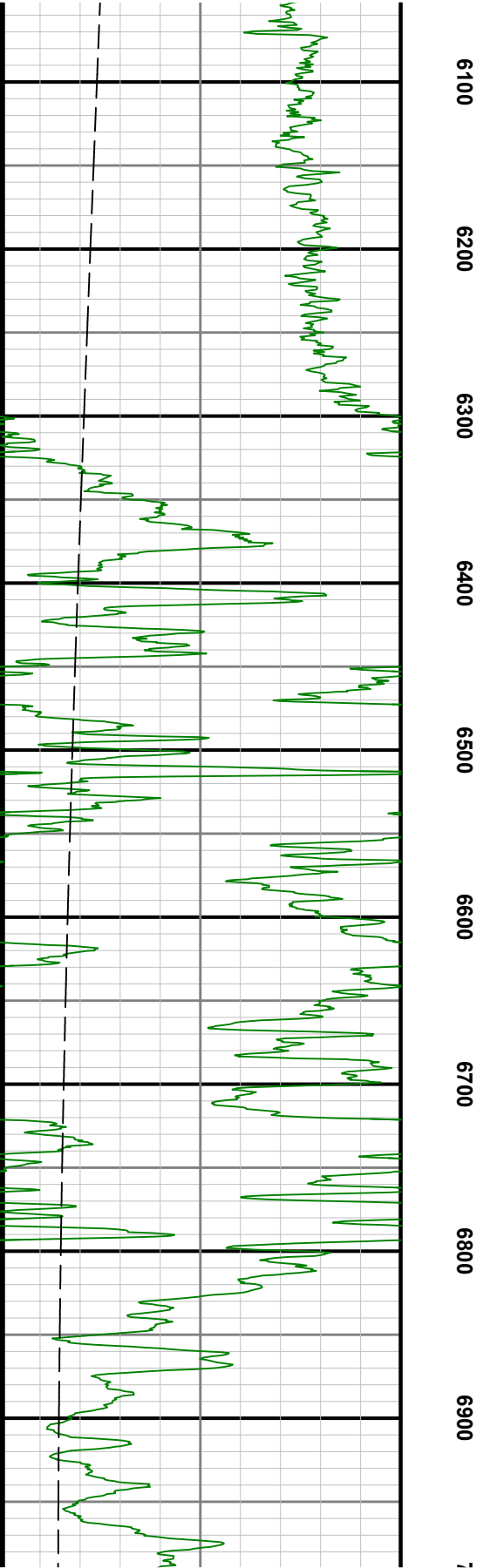
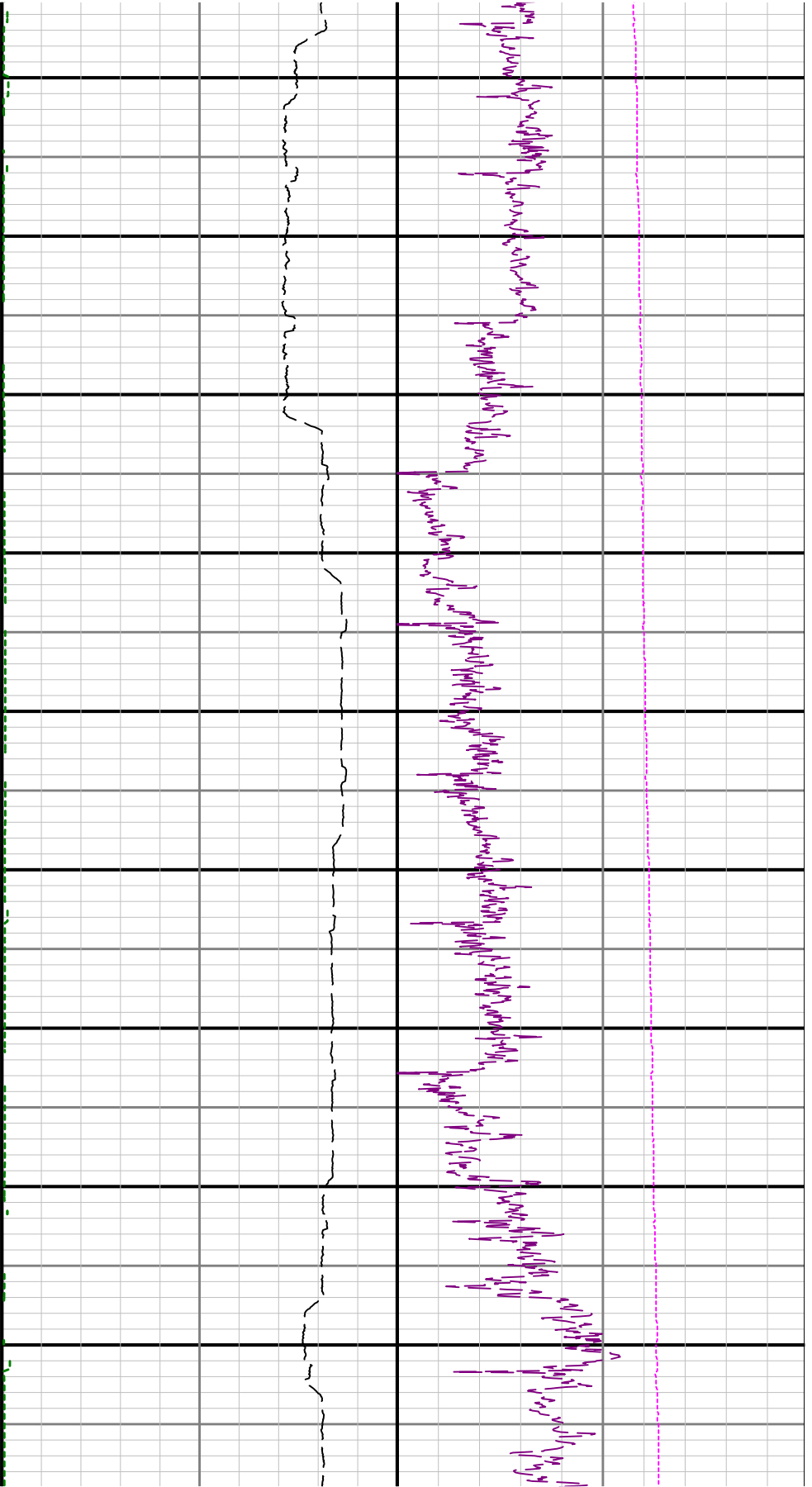


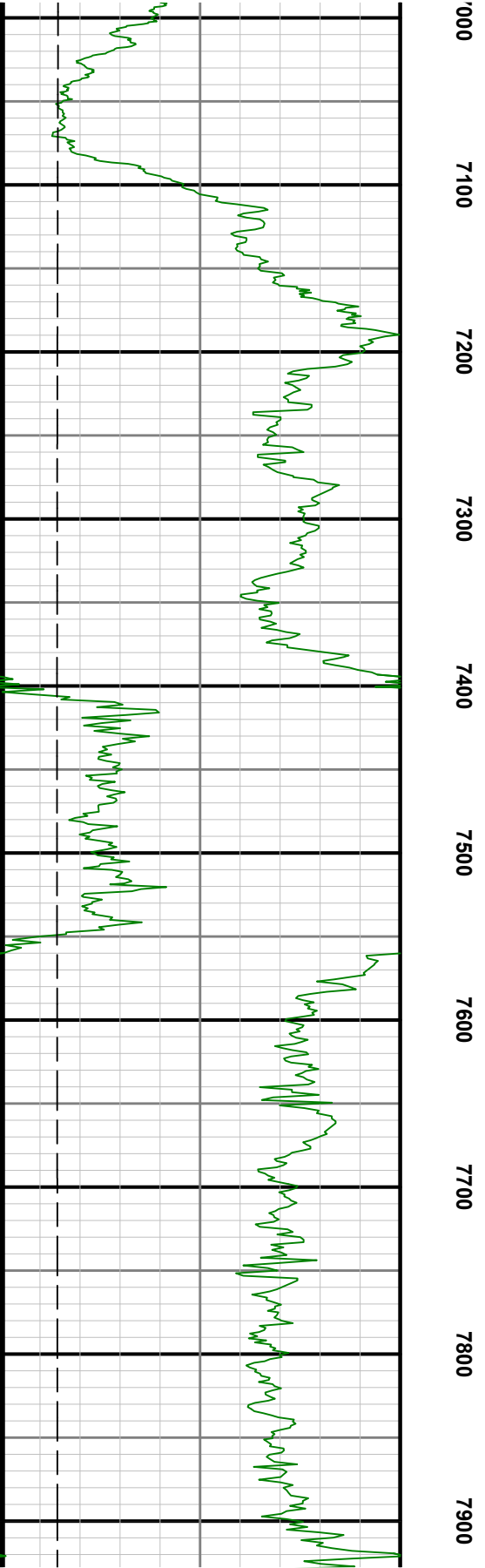
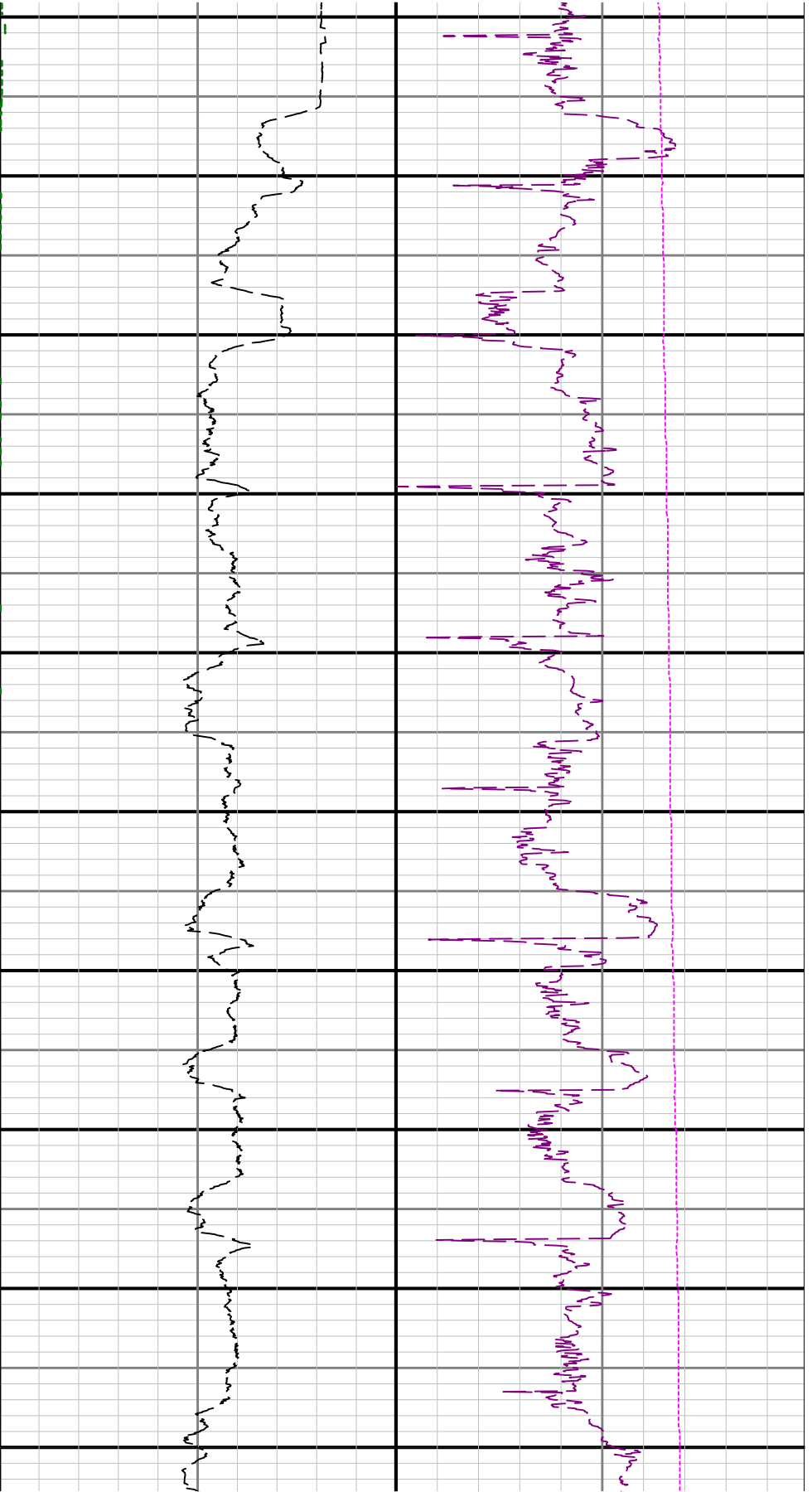


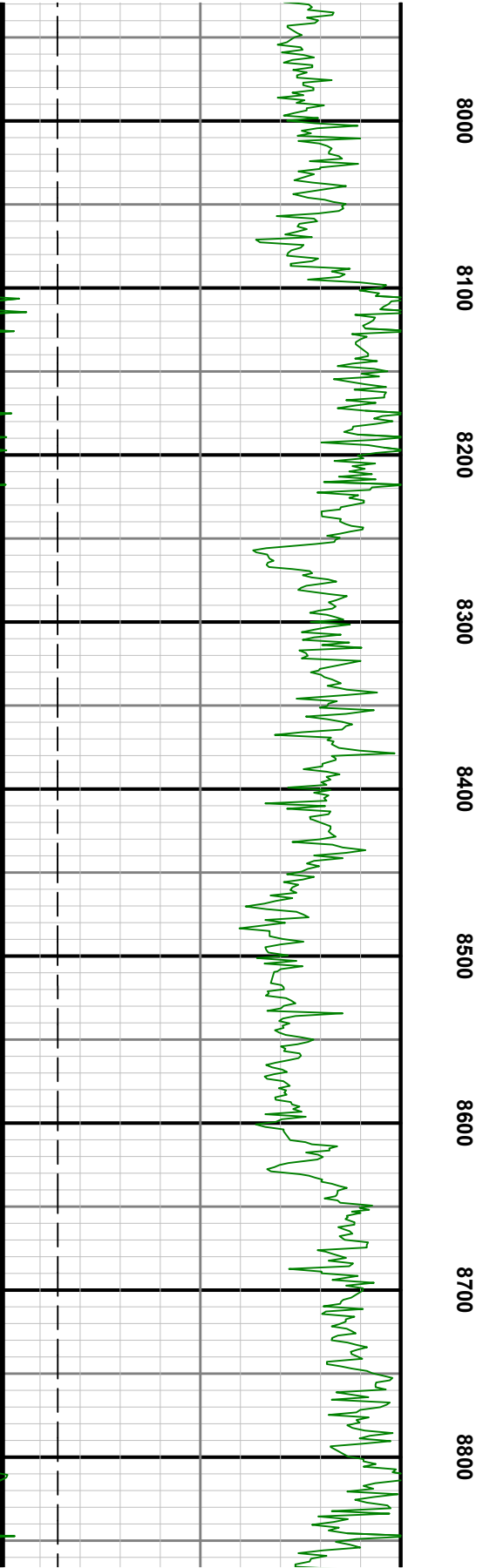
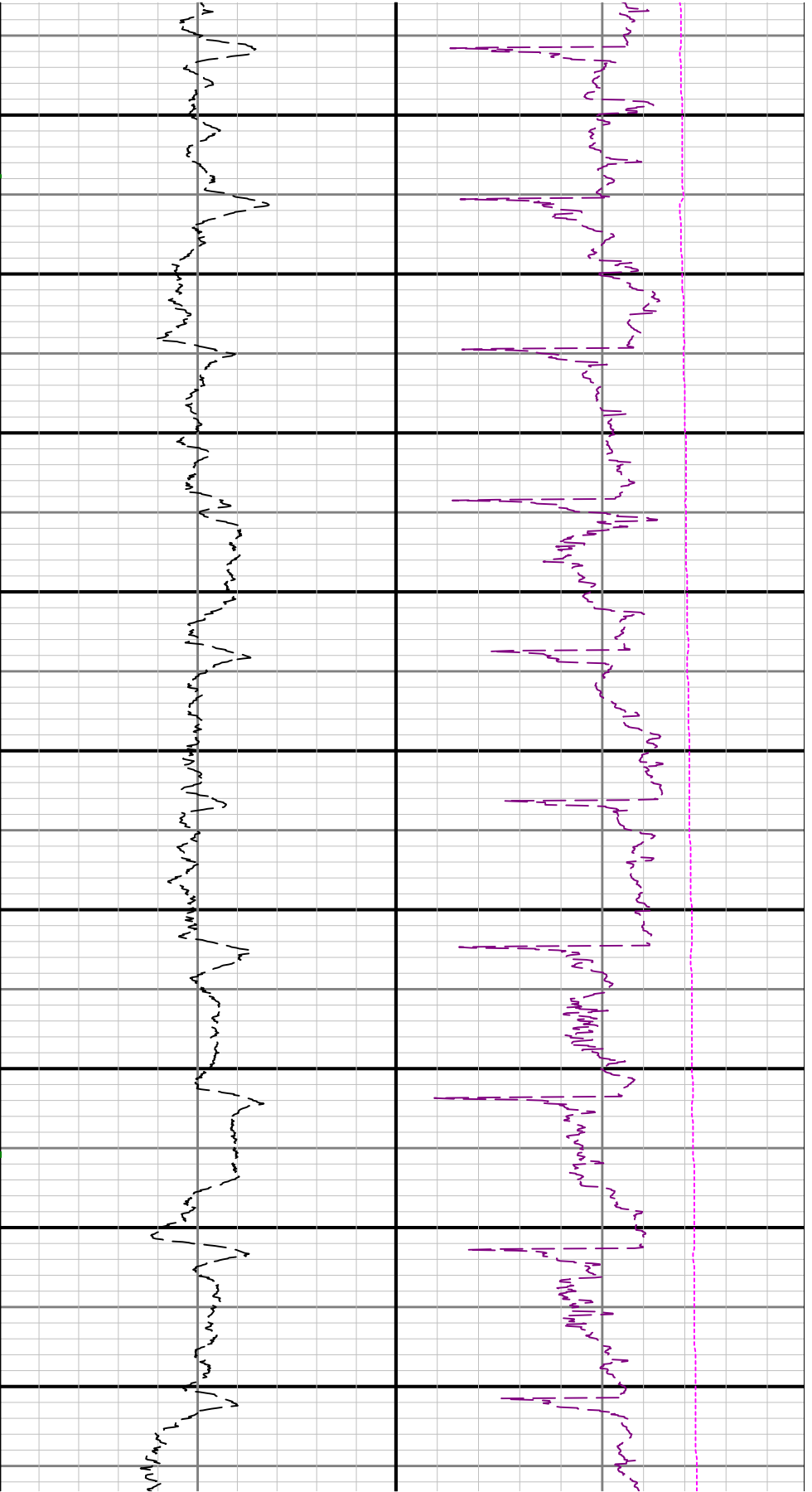


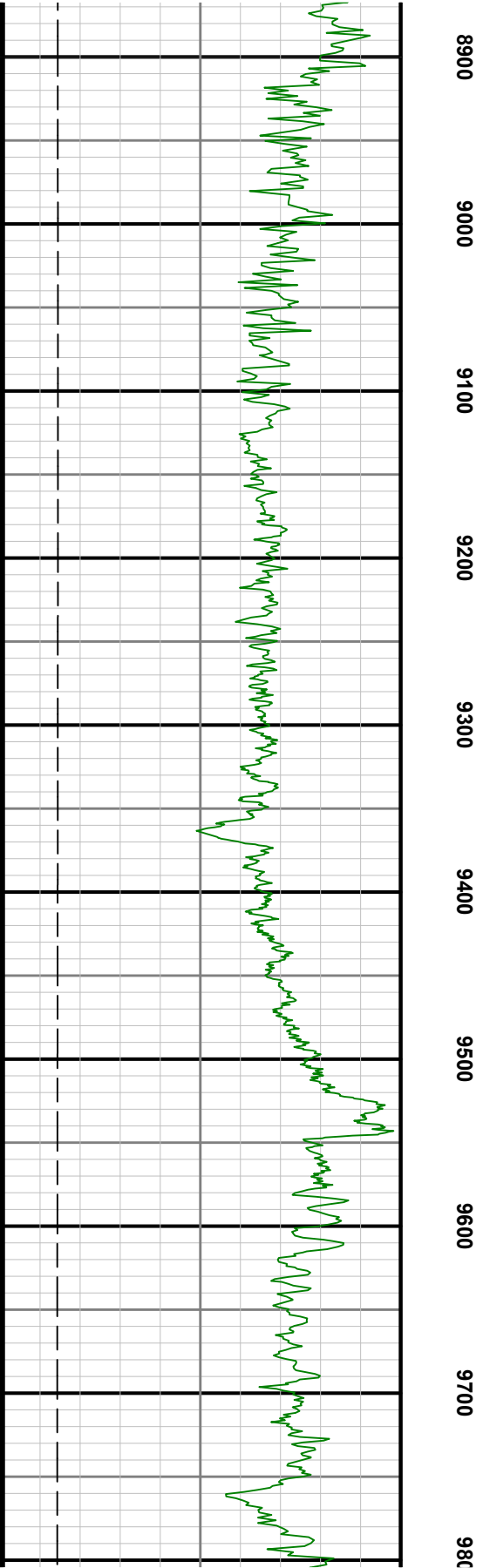
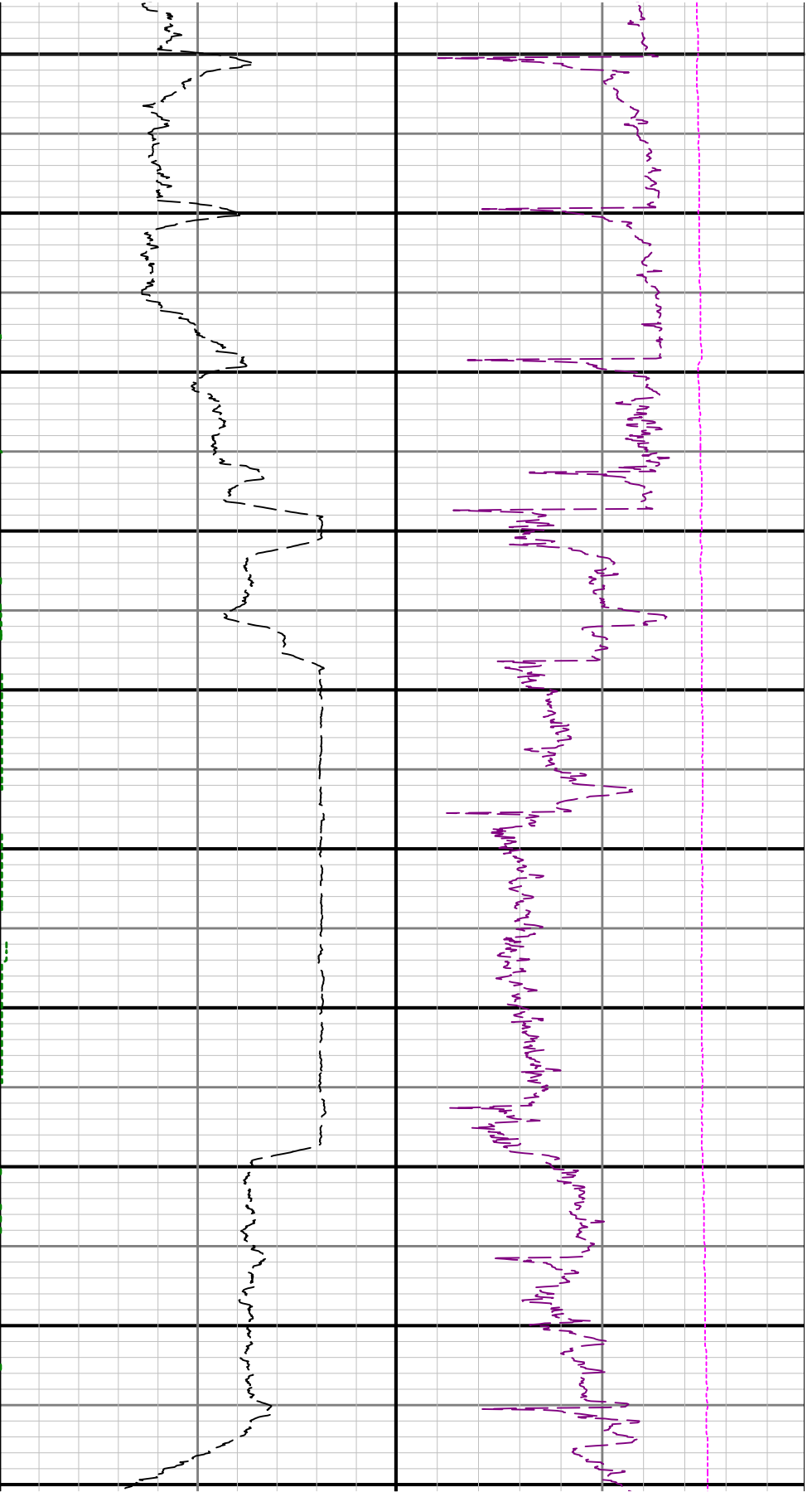


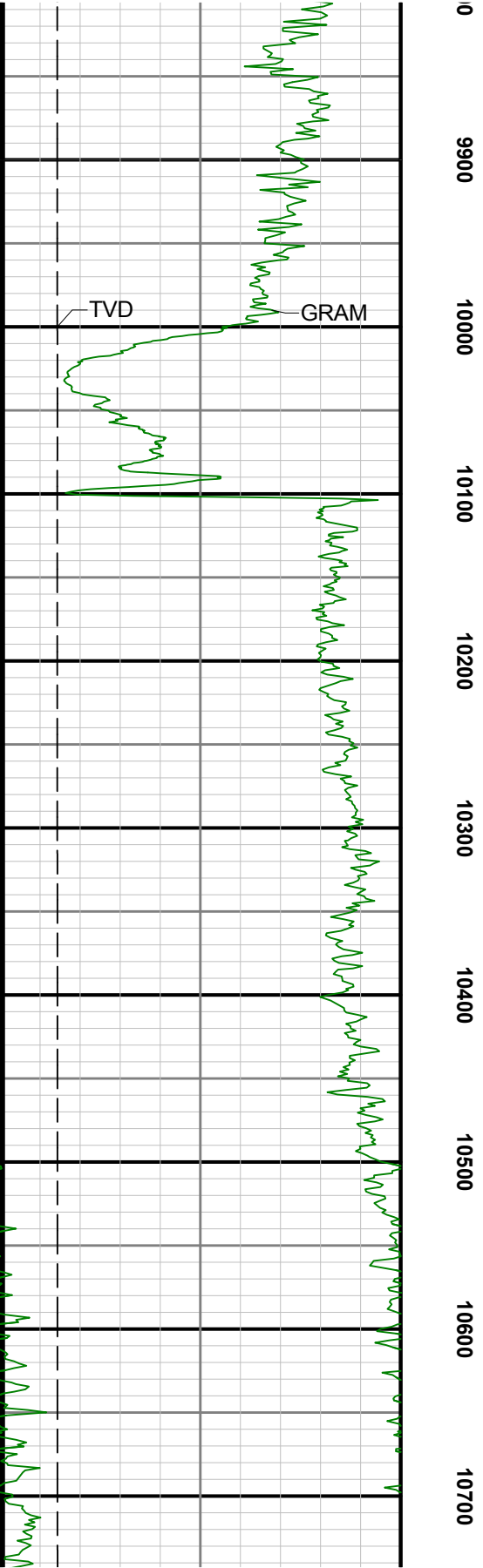
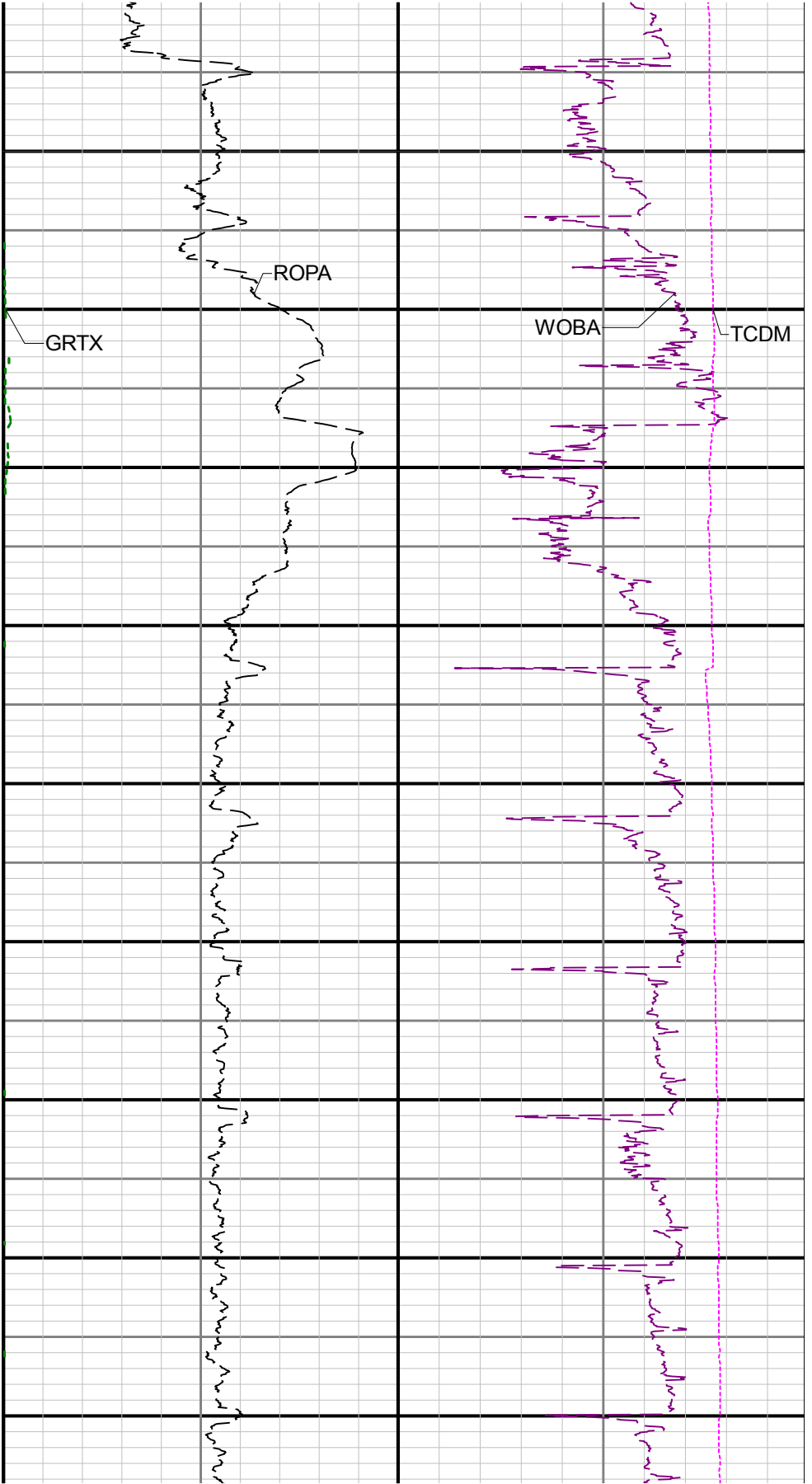


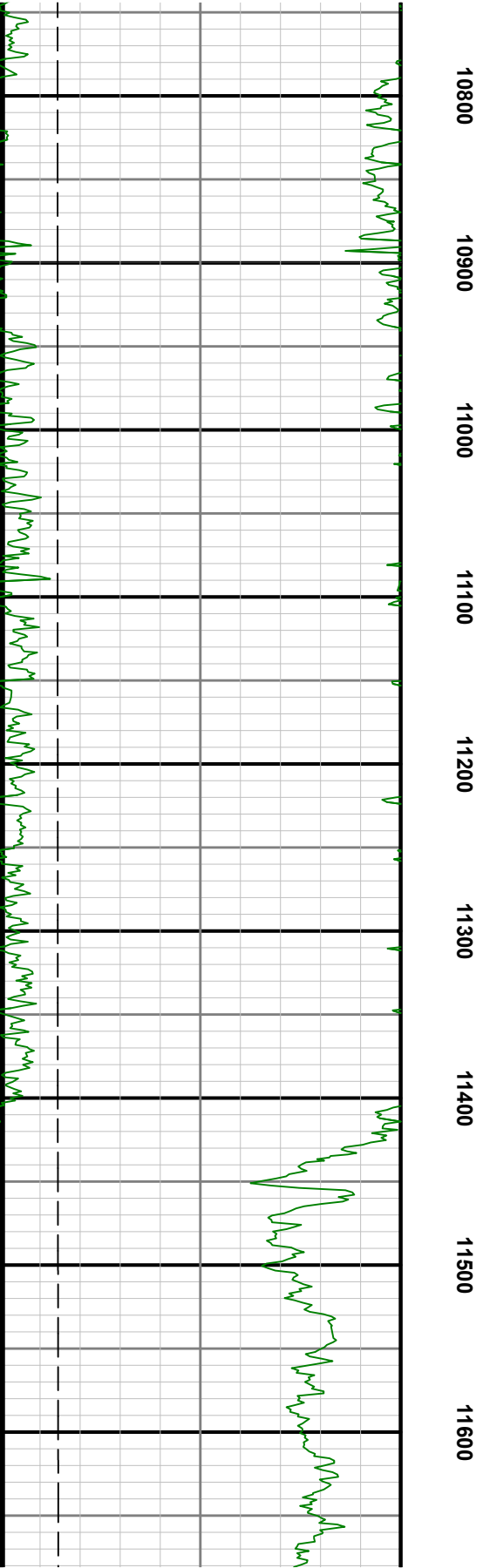
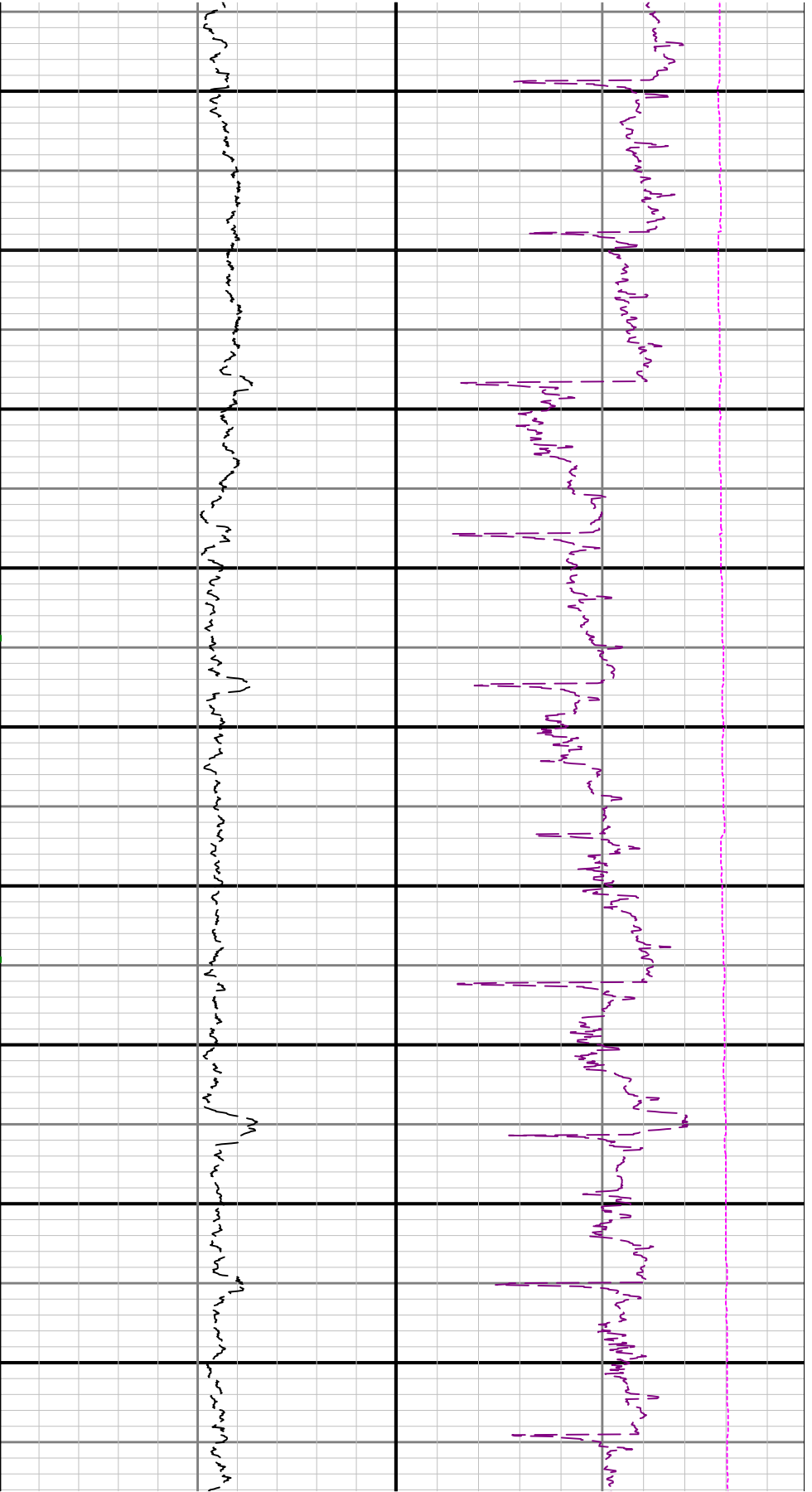


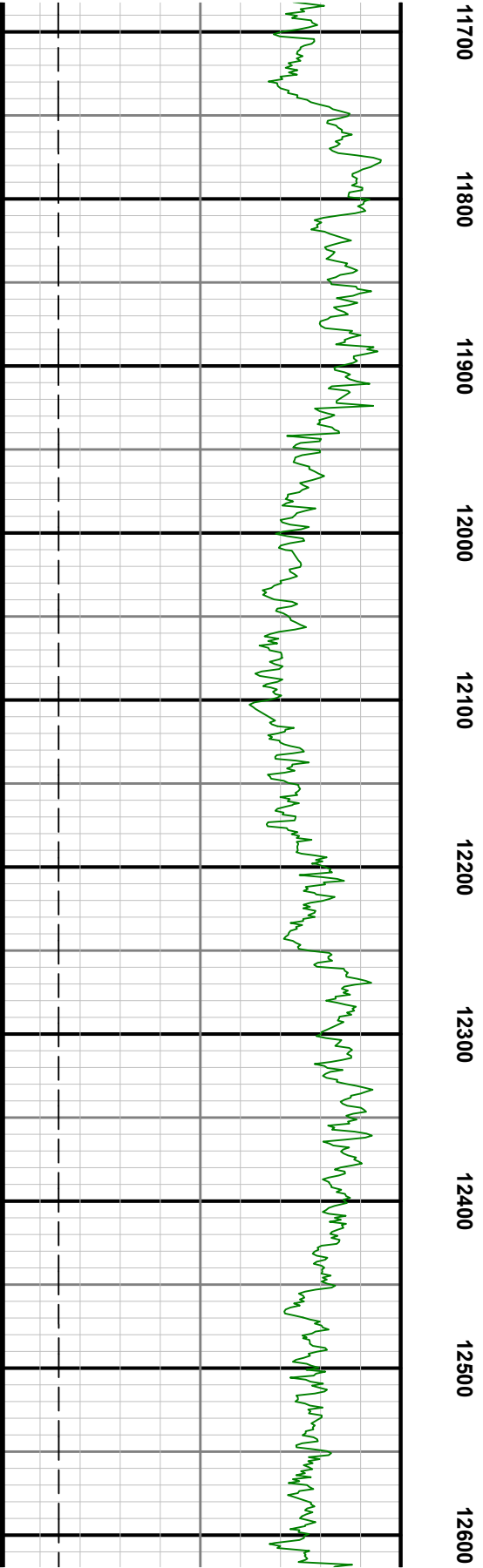
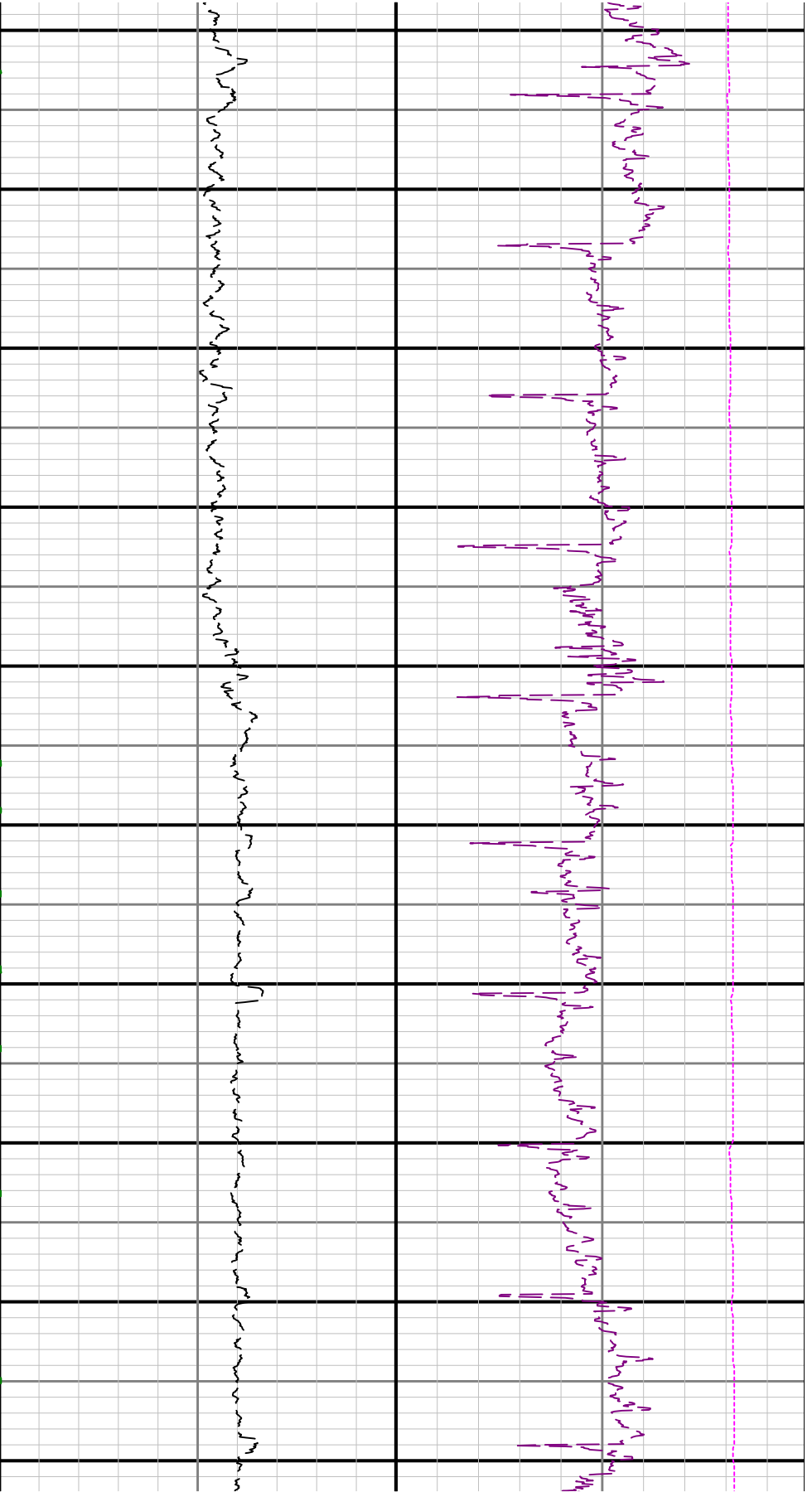


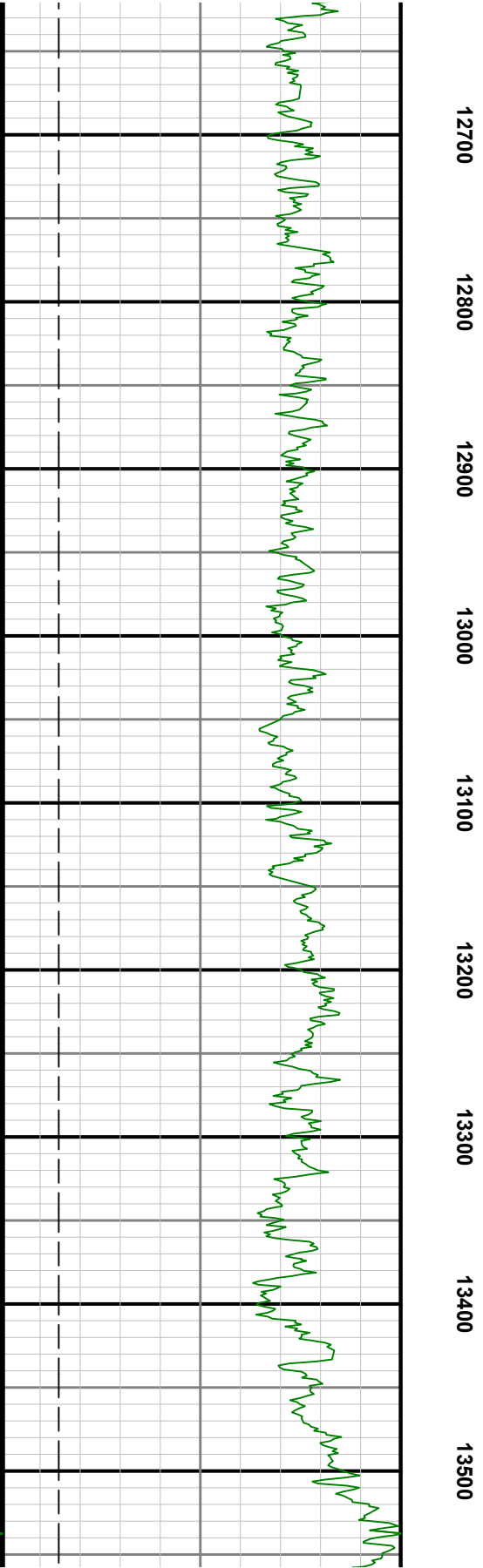
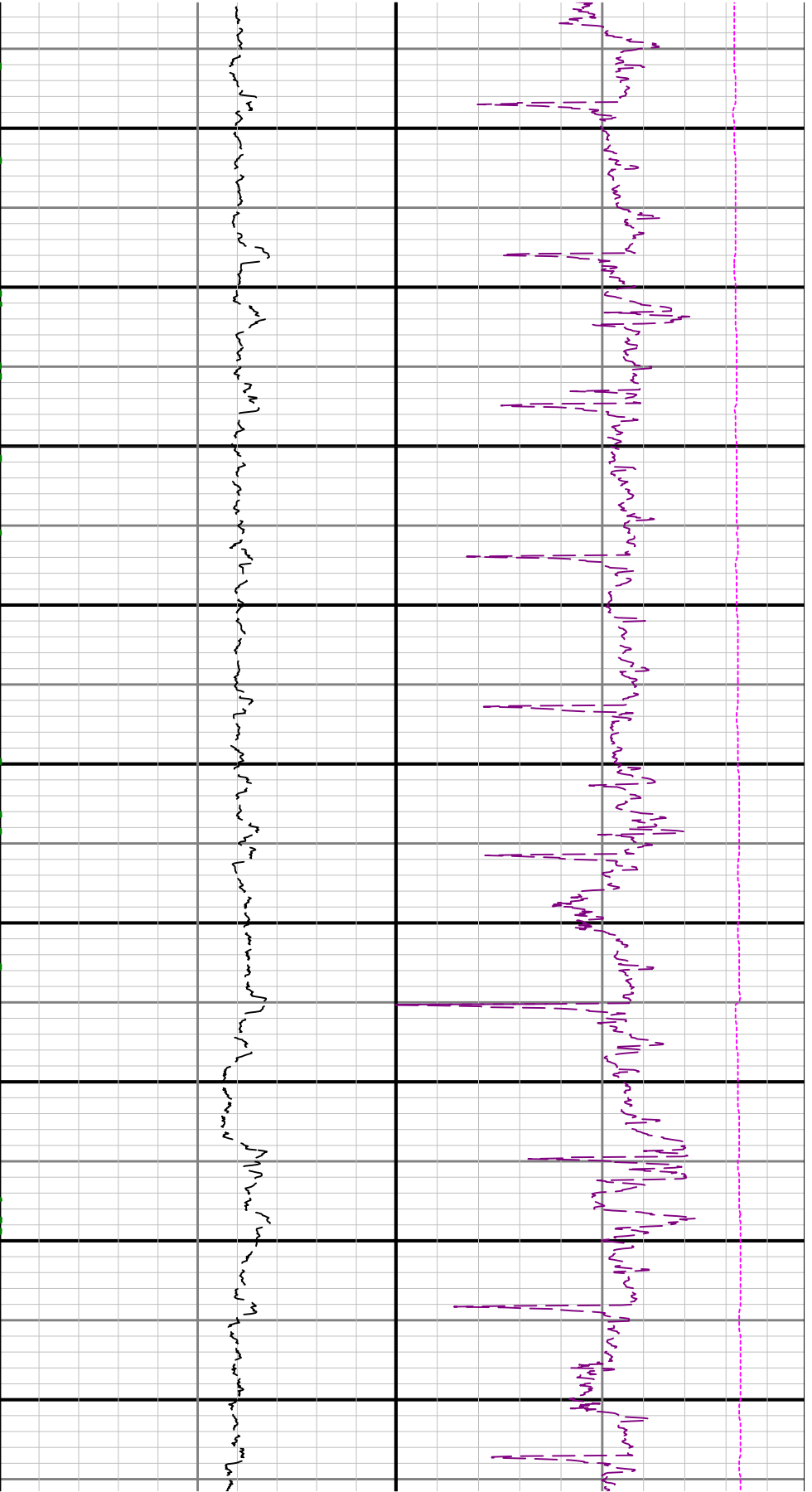


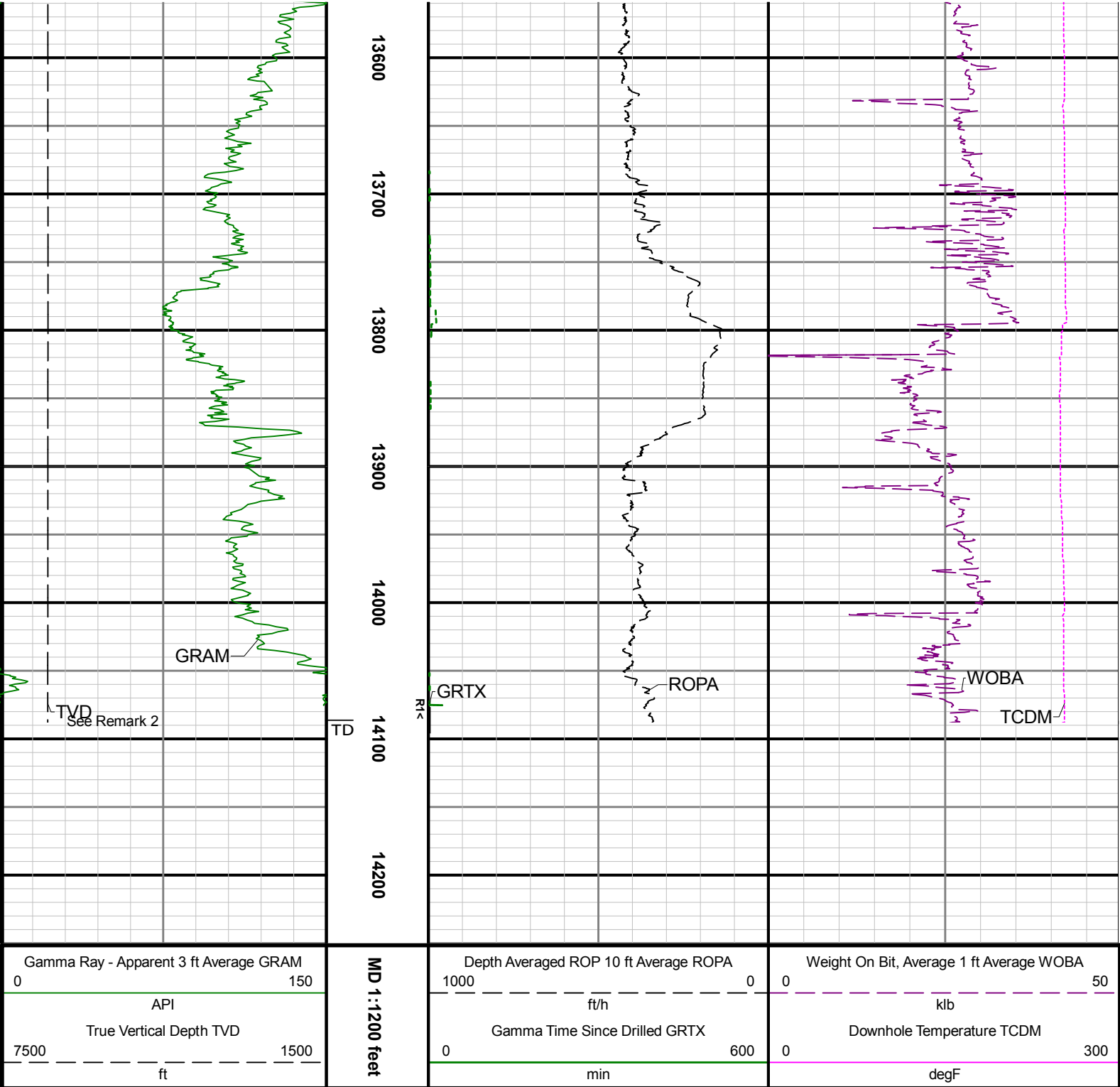












TVD  
See Remark 2

MD 1:1200 feet