LWD MEMORY LOG

Gamma Ray

Scale: 1:240 MD

Depth Reference: Driller's Depth

Company: SRC Energy
Well: AG 31N-31B-L
Field: Wattenburg
County: Weld **Country:** United States
State: Colorado

Status: Final Print

API No: 05-123-44875-00
Job ID: 8578655

Surface Location:
Latitude: 040° 26' 57.250" N
Longtitude: 104° 47' 39.703" W

Other Services: Directional

Permanent Datum (P.D.): Ground Level
Log Measured From: Rig Floor
Elevation: 4706.00 ft
Above P.D. 20.00 ft
Elev. KB: N/A
Elev. DF: 4726.00 ft
Elev. GL: 4706.00 ft

Dates		Interval Logged		Magnetic Field Reference		
Date From:	2017-09-12	Top: (ft)	0.00	Azi Reference North: True	Dip Angle: (deg)	66.81
Date To:	2017-09-13	Bottom: (ft)	18454.00	Total Magnetic Field Strength: (nT)		52714
Spud Date:	2017-06-25			Mag to Reference North Correction: (deg)		7.69 E

Borehole Record

Hole Size (in)	From (ft)	To (ft)
13.500	0.00	1759.00
8.500	1759.00	18454.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	20.00	1759.00

Mud Record

Type	From (ft)	To (ft)
Diesel-Oil Based Mud	0.00	18454.00

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
13.500	1759.00	0.24 | 355.78	0.24 | 355.78
8.500	16695.00	12.15 | 116.31	91.32 | 264.67

Acquisition System	Software Version
Baker Hughes Cadence	RT4.1
PlotStudio	4.1.7763.3

Other

Rig: Precision 462
Contractor: Precision Drilling
District: RMA Unit: D&E

Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Bit Depth Interval From (ft)	Bit Depth Interval To (ft)	Date / Time Start Logging	Date / Time End Logging	Circ. Hours (h)
1	1	13.500	PDC	8.00	Rotary	0.00	0.00	0.00	1759.00	2017-06-26 00:41	2017-06-26 15:09	14.68
2	2	8.500	PDC	3.00	Rotary Steerable	1759.00	18441.00	1759.00	18454.00	2017-09-13 12:50	2017-09-16 17:39	66.67

Crew

Name	Arrive Wellsite	Depart Wellsite
Garrett Gerdsen	2017-09-13	2017-09-15

Name	Arrive Wellsite	Depart Wellsite
Steve Bueghly	2017-09-15	2017-09-17

Name	Arrive Wellsite	Depart Wellsite

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+ (%)
2017-09-13 14:00	2	1916.00	Diesel-Oil Based Mud	9.5	61	N/A	0.0	78/22	Suction	26000	0.00
2017-09-14 14:00	2	7790.00	Diesel-Oil Based Mud	9.5	51	N/A	0.0	77/23	Suction	27000	0.00
2017-09-15 14:00	2	13457.00	Diesel-Oil Based Mud	9.6	58	N/A	0.0	76/24	Suction	29000	0.00
2017-09-16 14:00	2	17854.00	Diesel-Oil Based Mud	9.7	52	N/A	0.0	77/23	Suction	29000	0.00
2017-09-17 02:00	2	18454.00	Diesel-Oil Based Mud	9.8	56	N/A	0.0	78/22	Suction	26000	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	Sensor Sub	ZAPS230924	Directional (mag)	11.41	62.30	8.000	3.250
1	Sensor Sub	ZAPS230924	VSS	11.41	62.30	8.000	3.250
1	Sensor Sub	ZAPS230924	Pressure	31.99	82.88	8.000	3.250
2	ATC_SU	14236914	Near Bit VSS	5.93	6.73	7.000	4.330
2	ATC_SU	14236914	Near Bit Inclination	5.93	6.73	7.000	4.330
2	ATC_MWD	14146739	Gamma (single)	2.75	12.90	7.000	3.250
2	ATC_MWD	14146739	Directional (mag)	12.27	22.42	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
GAM	APS	APS EM Module
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 lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.

2 Baker Hughes LWD Run 1 utilized an 8 inch APS EM service (Directional only) behind an 13 1/2 inch bit and steerable assembly from surface to 1759 feet MD (1735 feet TVD). No logging data was acquired during this run.

3 Baker Hughes LWD Run 1 used the 6 3/4 inch NaviGamma service (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly to drill from 1759 to 18454 feet MD (1735 to 6848 feet TVD).

4 Gamma Ray Apparent (GRAM) is presented 0 to 300 API per customer request.

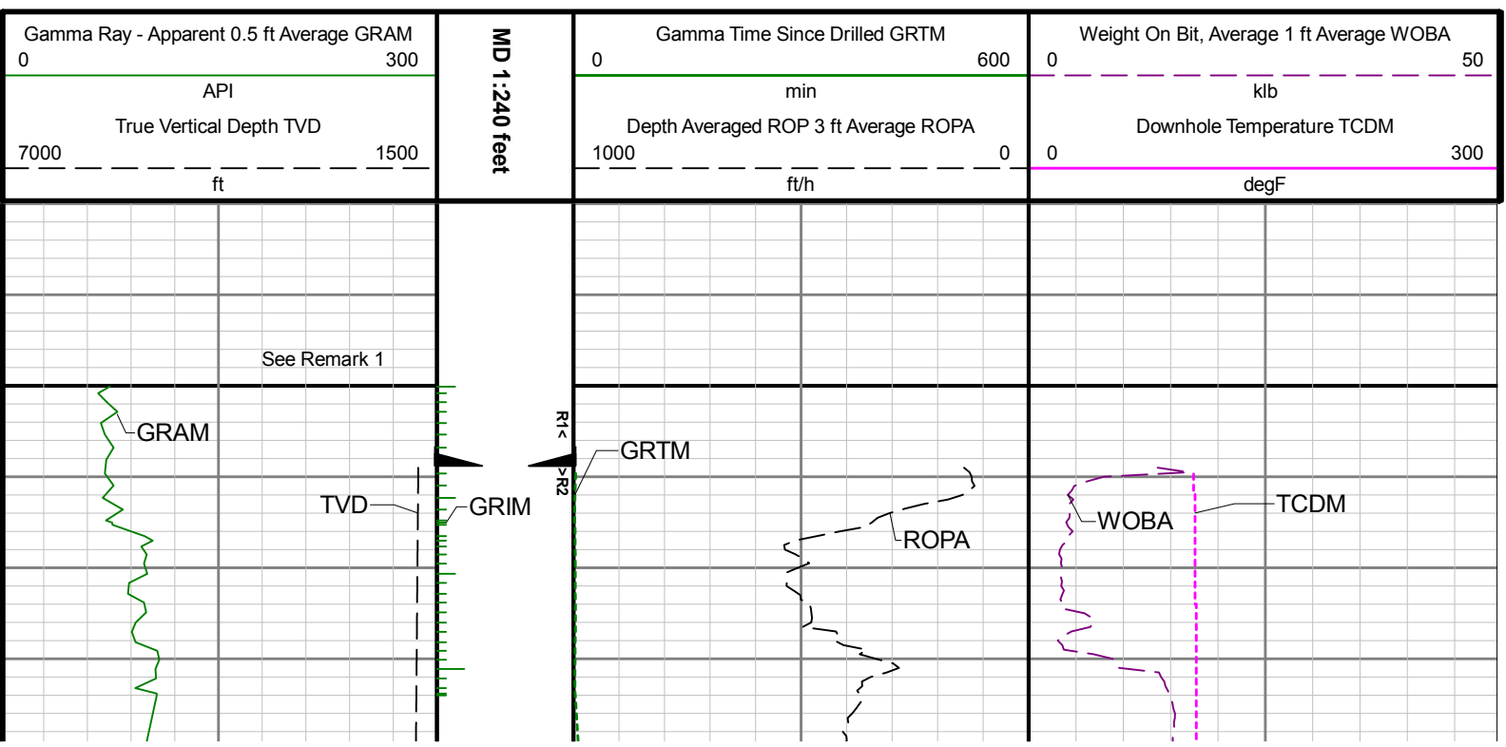
5 Multiple gaps in gamma log due to the tool powering off while drilling ahead.

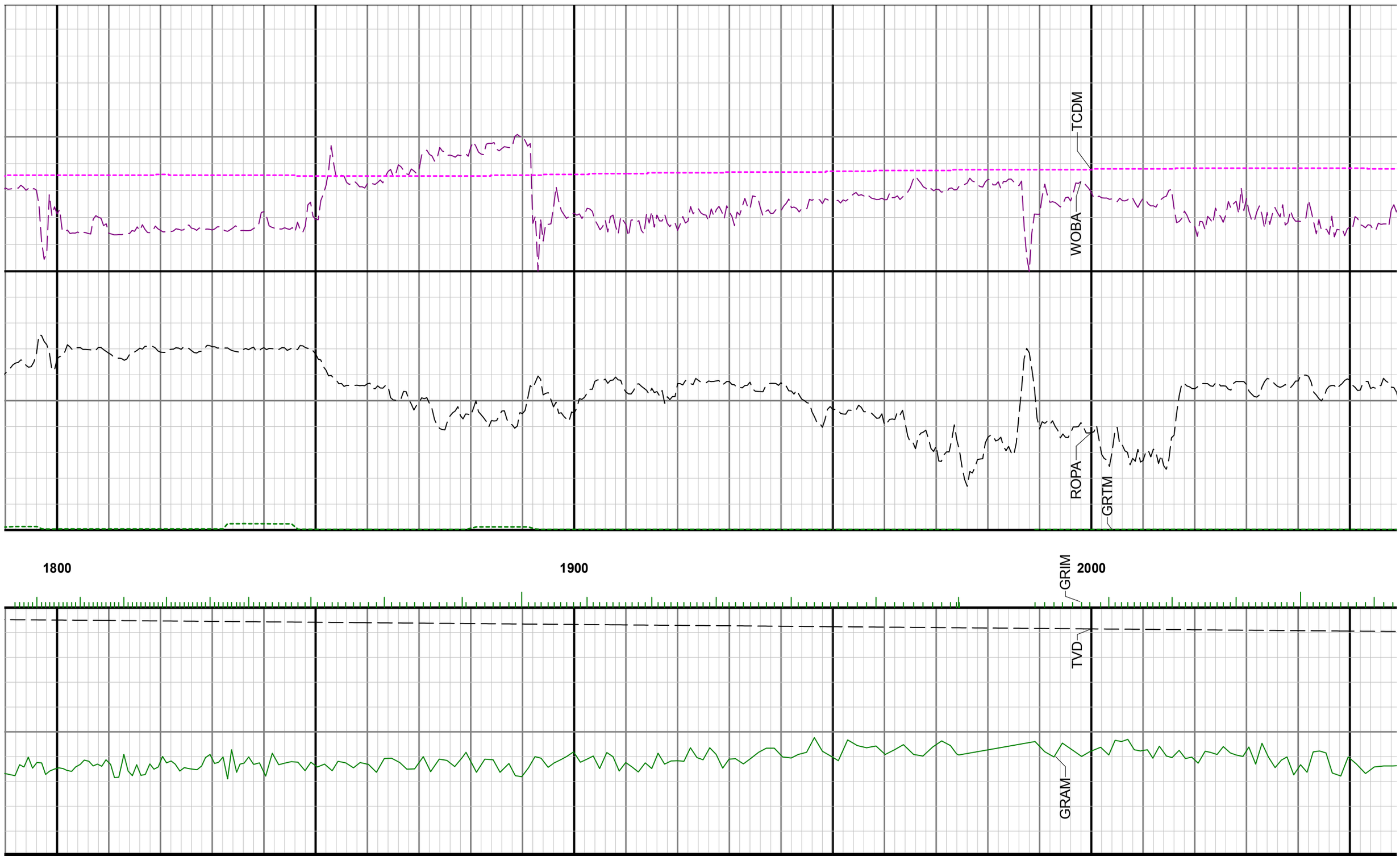
Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1750.00	8.500	2	The interval from 1746 to 1759 feet MD (1727 to 1735 feet TVD) has no gamma data due to sensor to bit offset at start of run.
2	18451.00	8.500	2	The interval from 18441 to 18454 feet MD (6848 feet TVD) has no gamma data due to sensor to bit offset at 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

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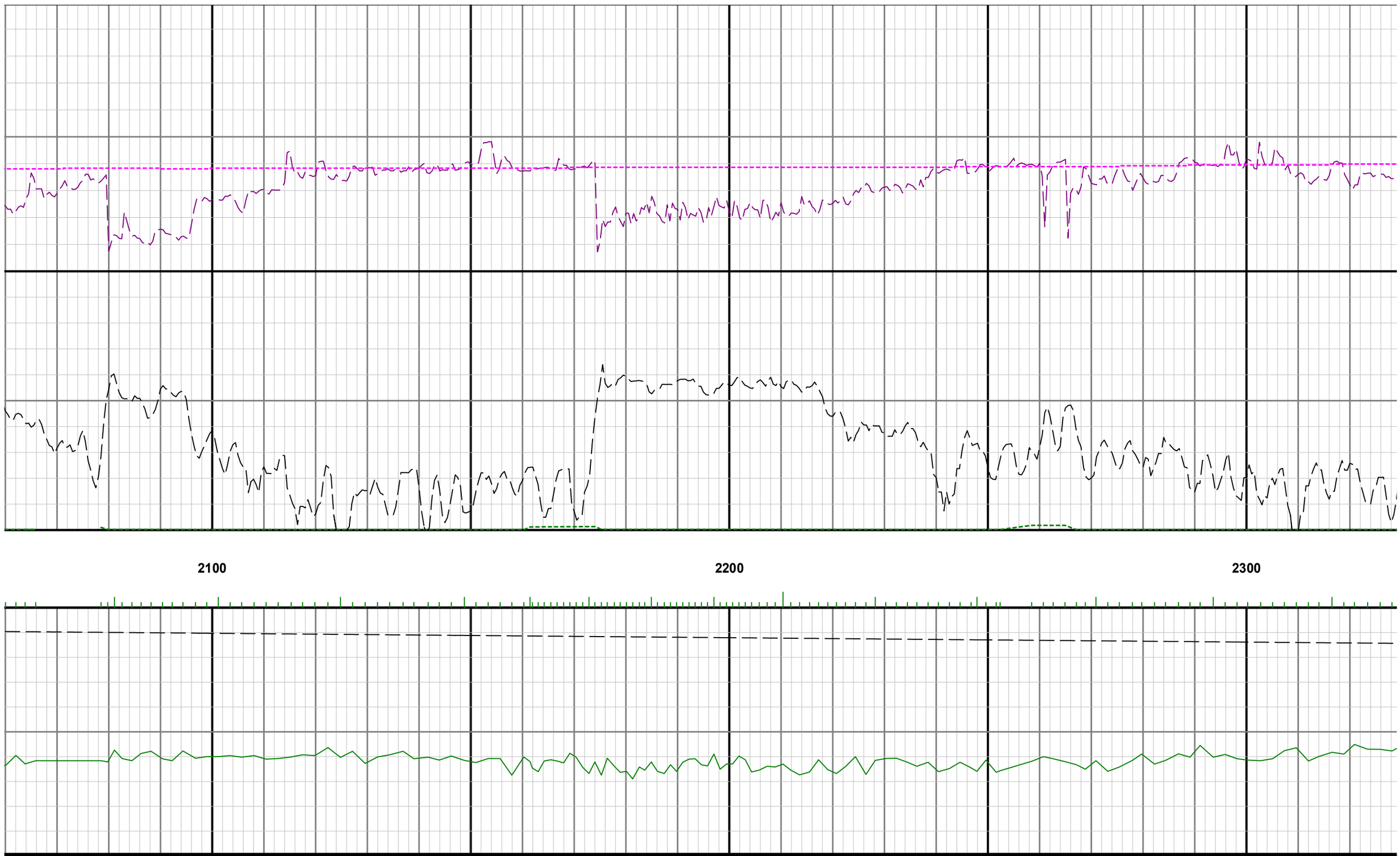
GRAM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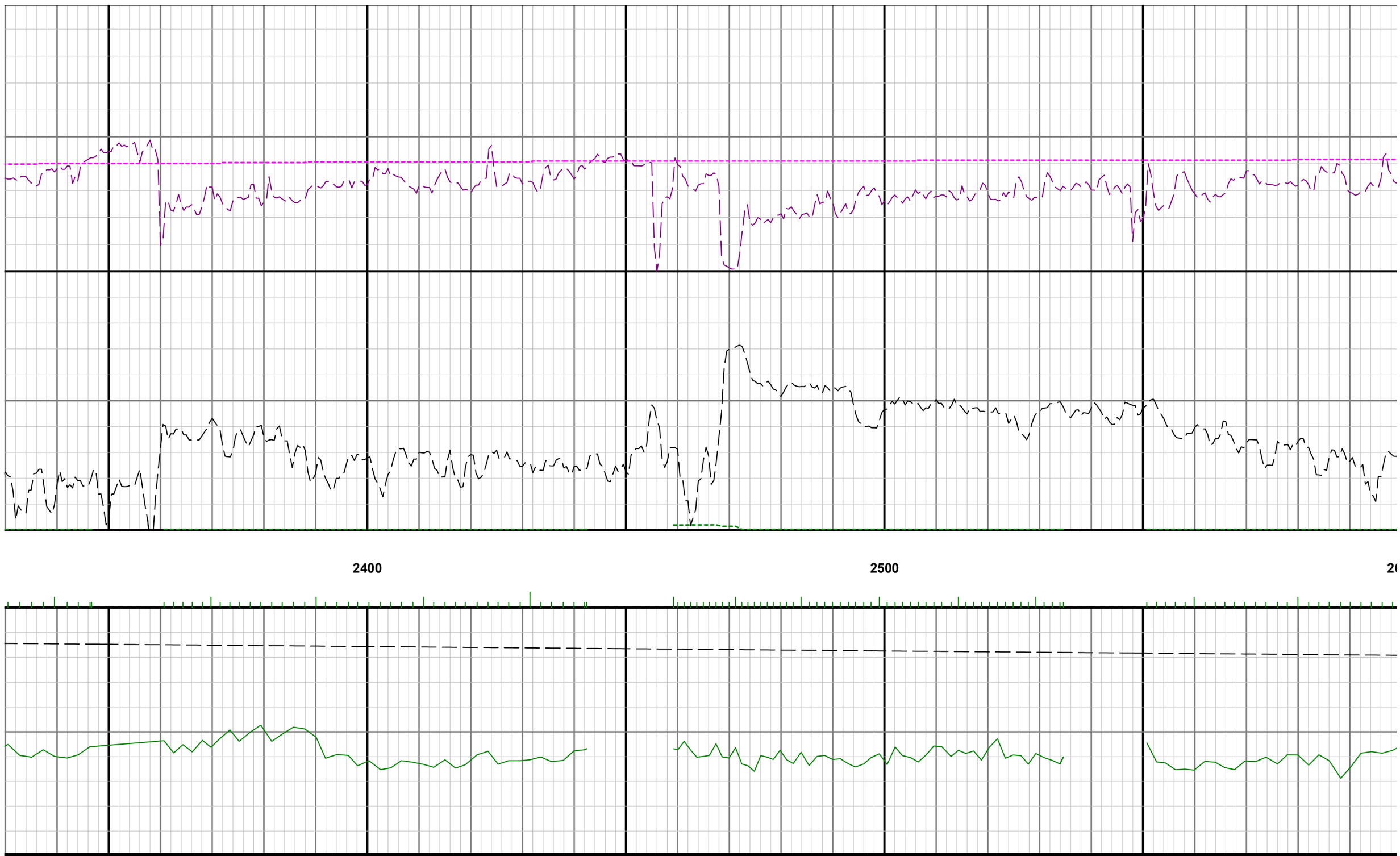
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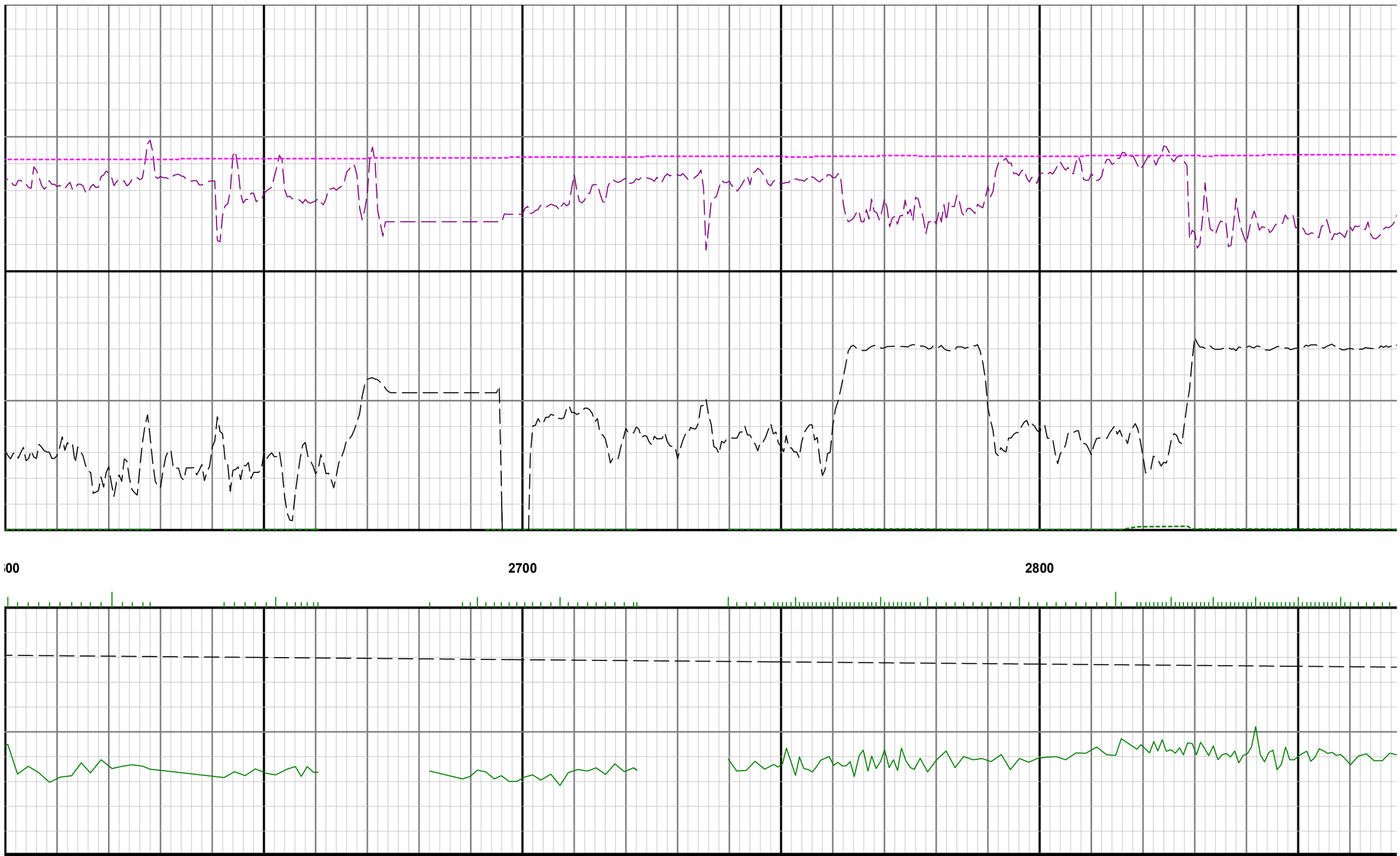
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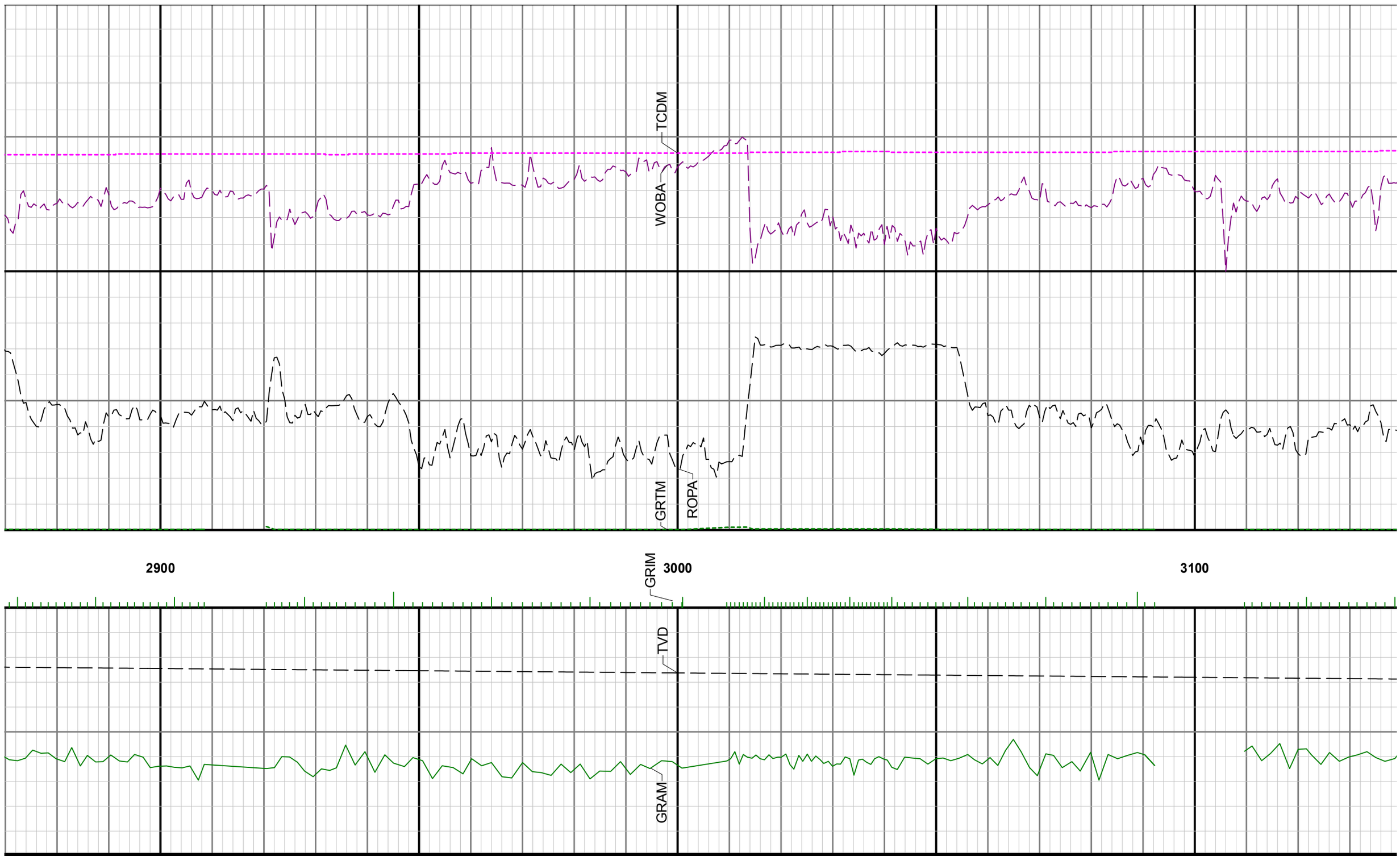
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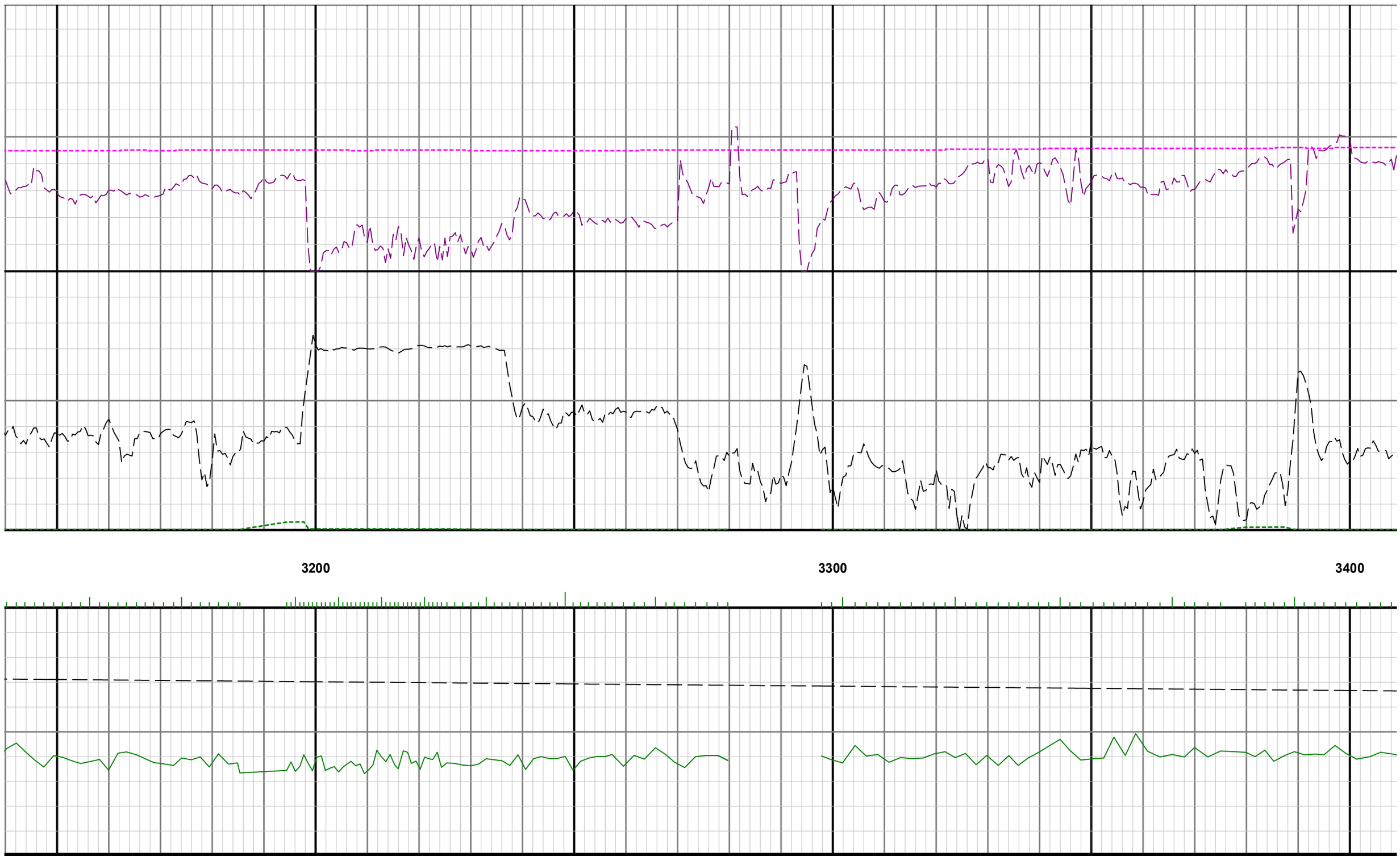
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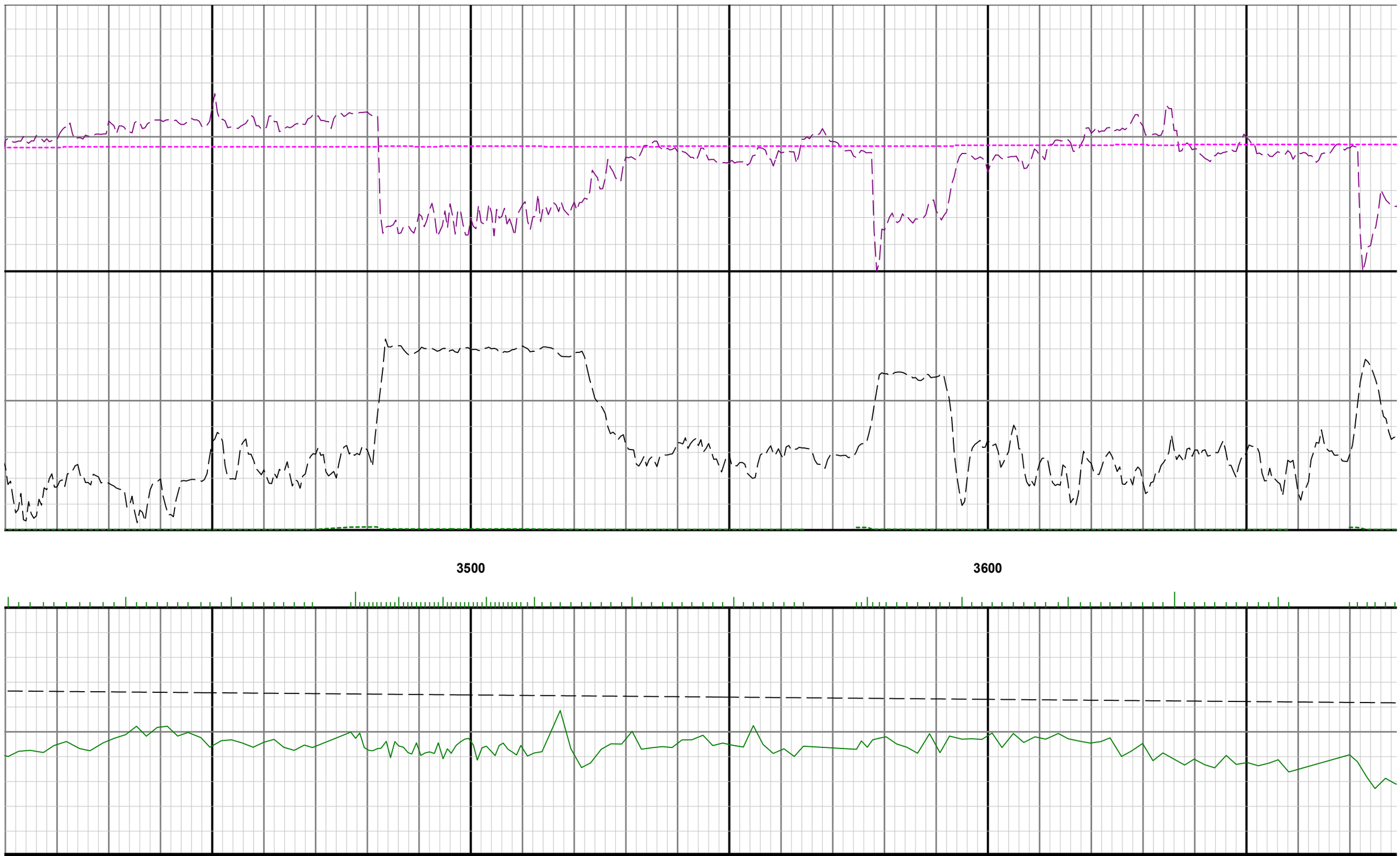
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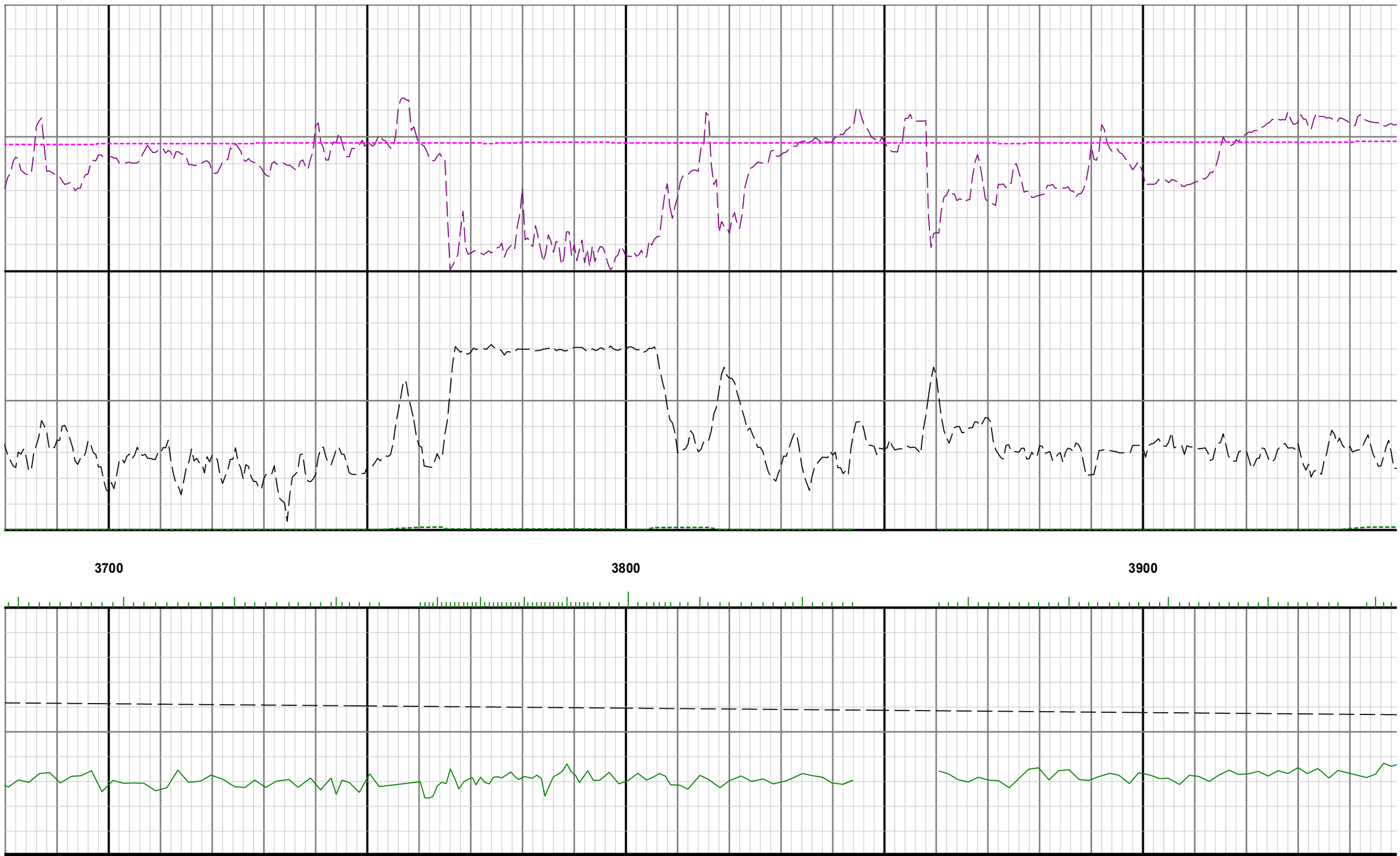
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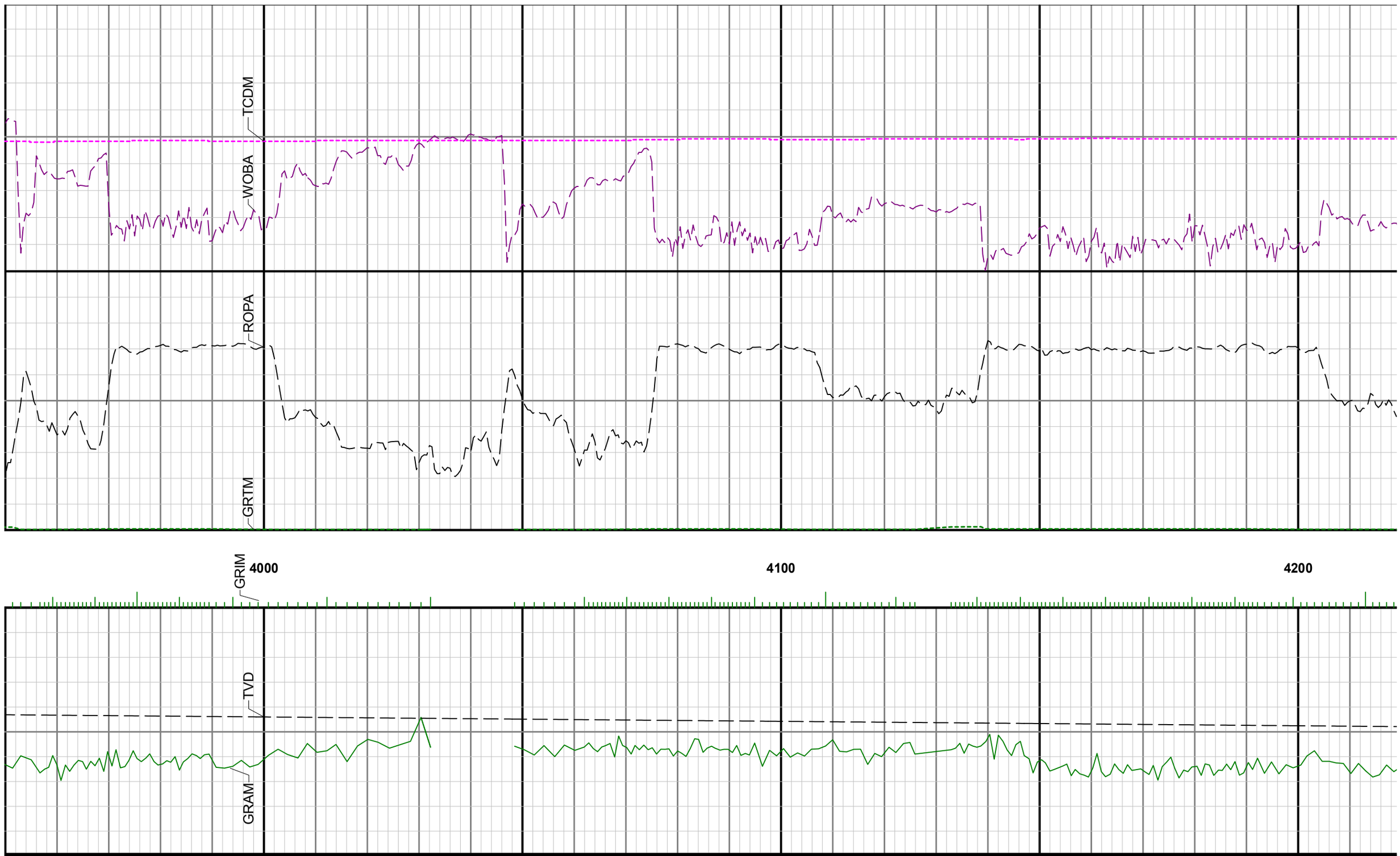
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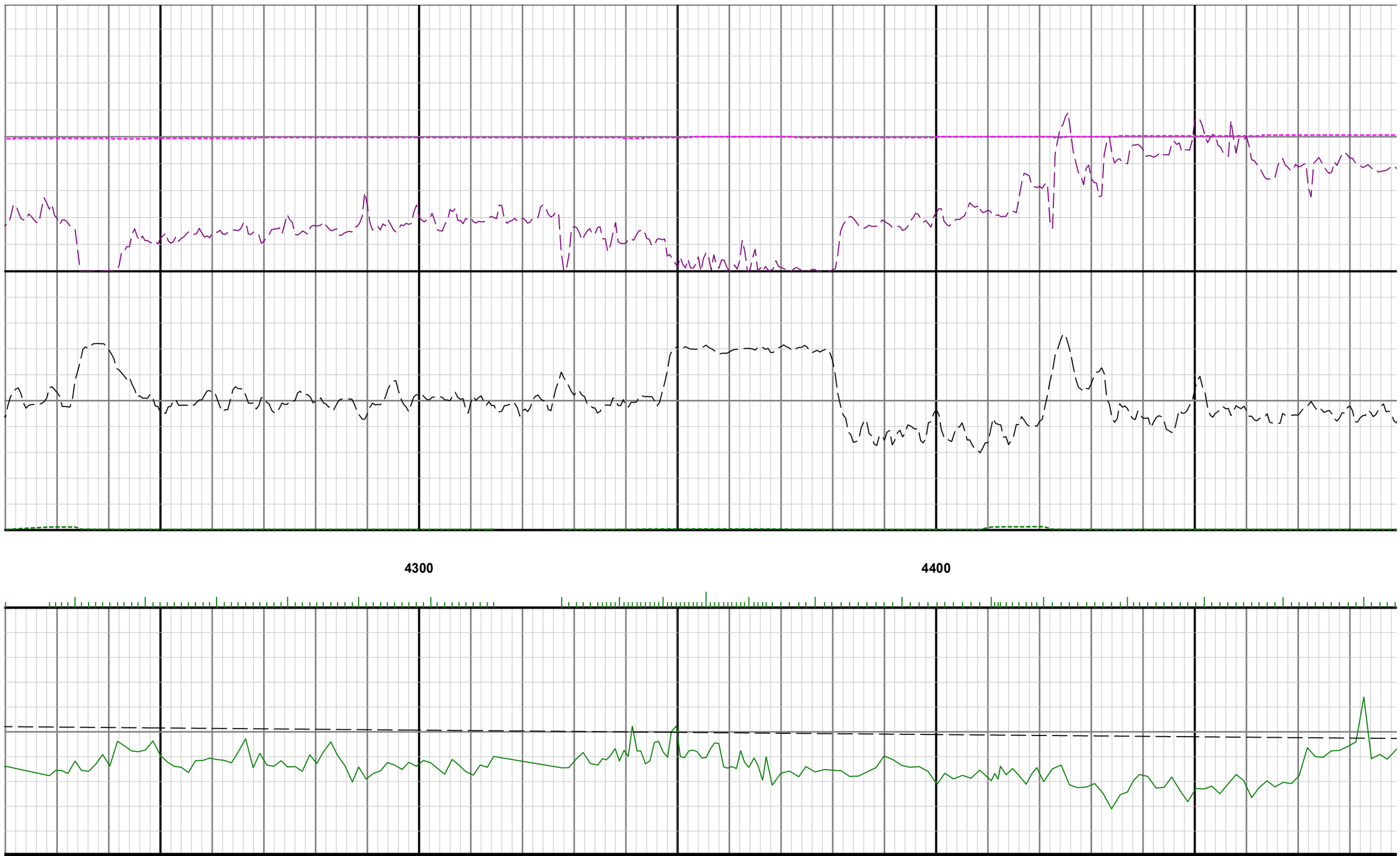
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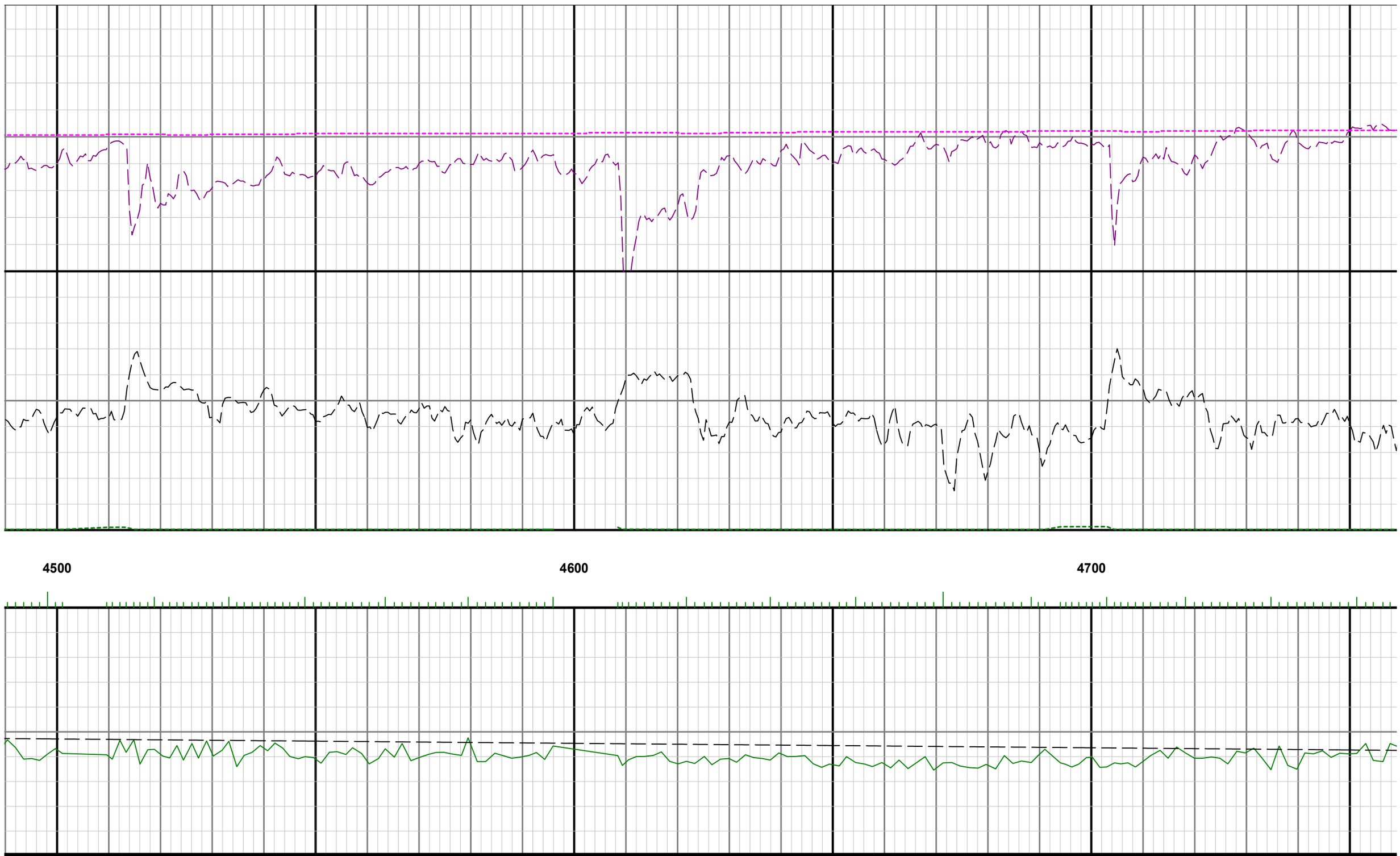
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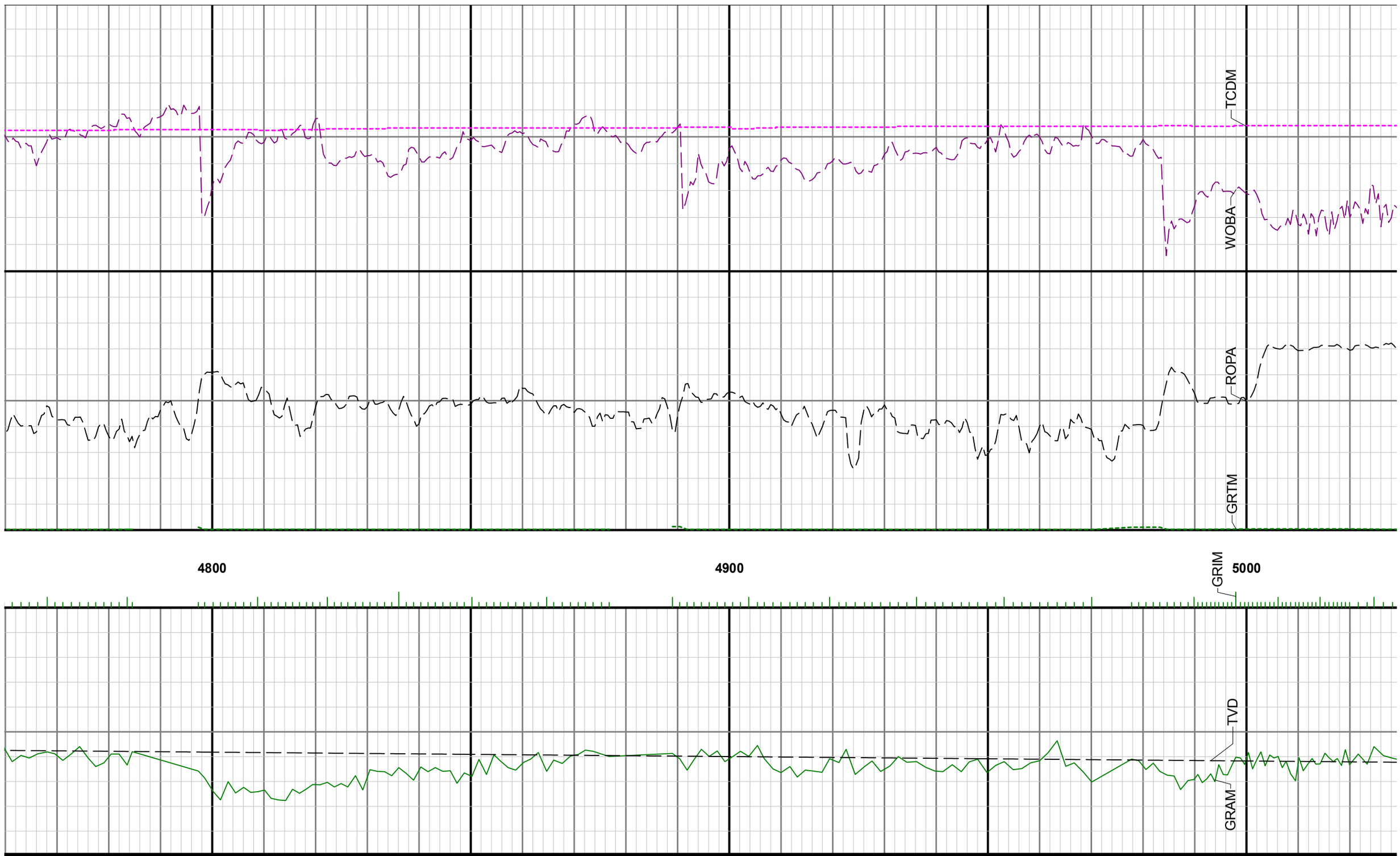
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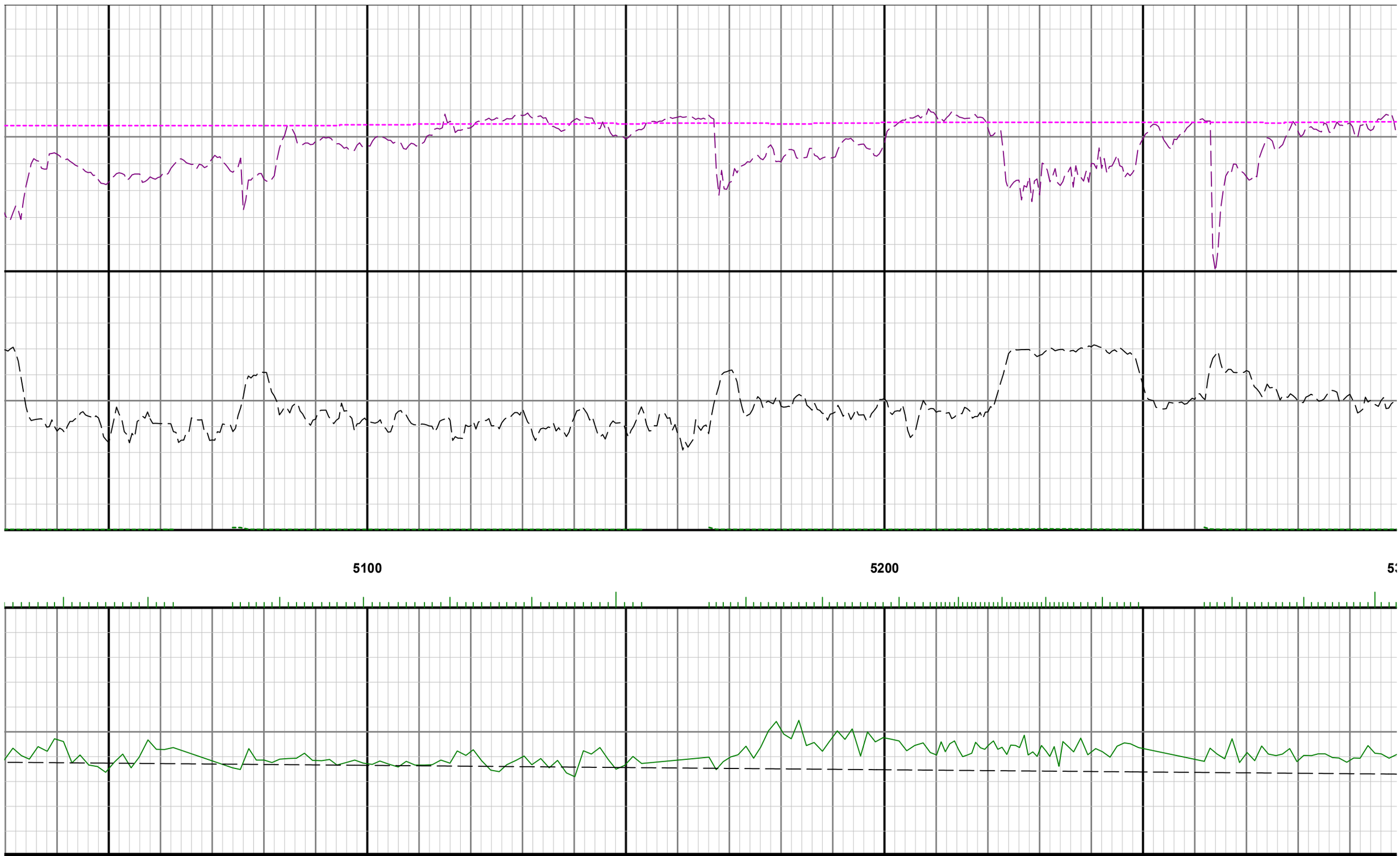
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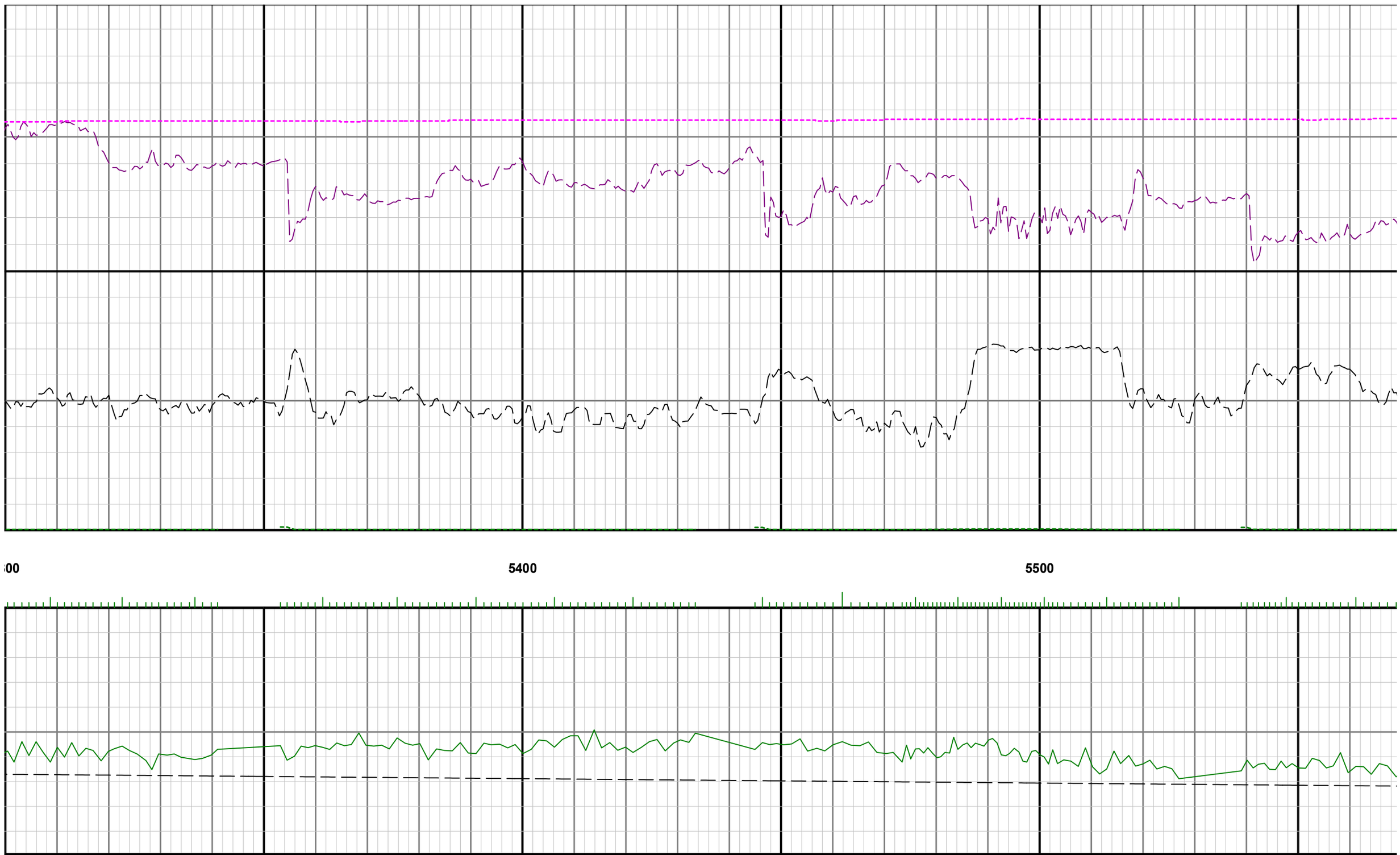
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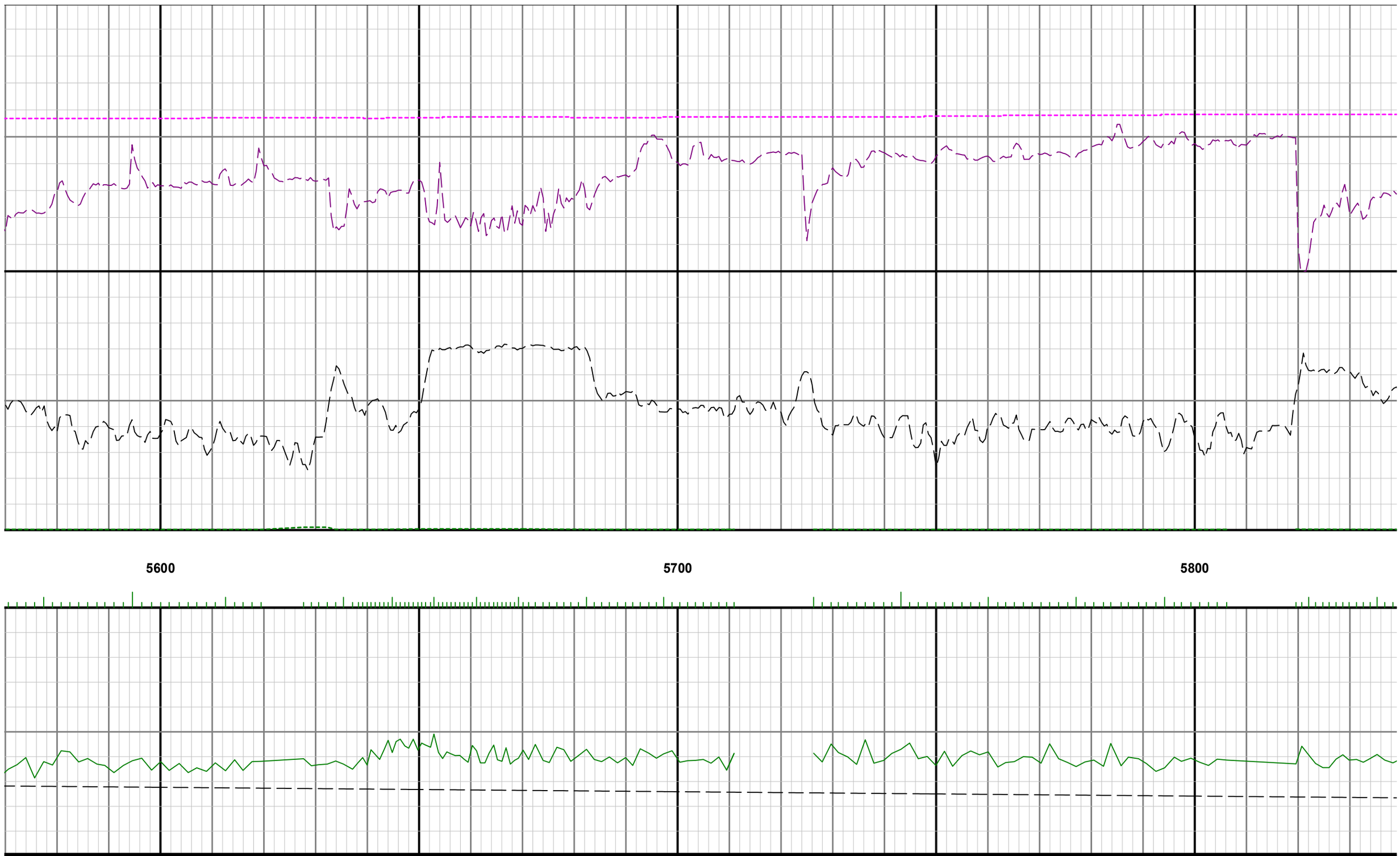
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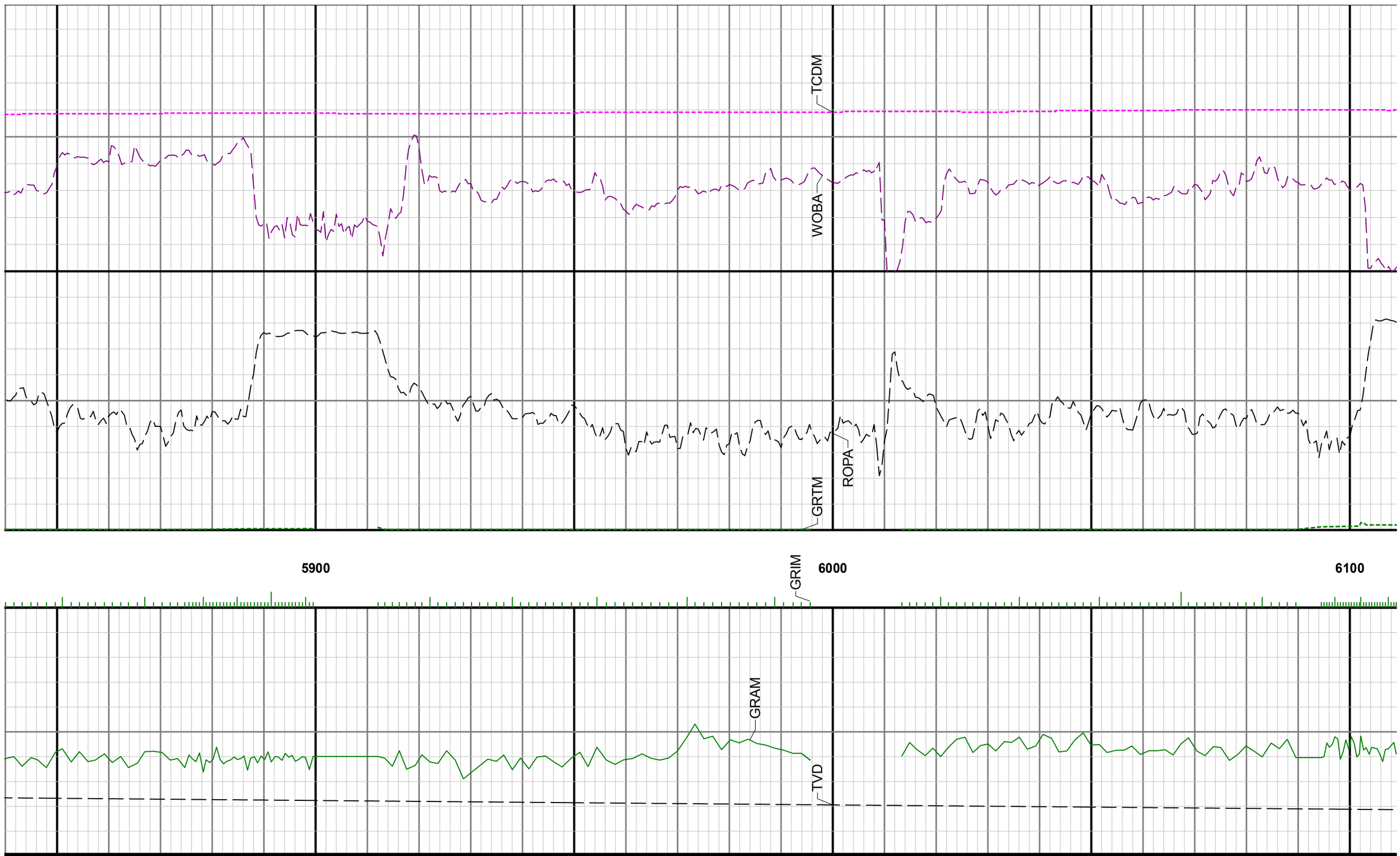
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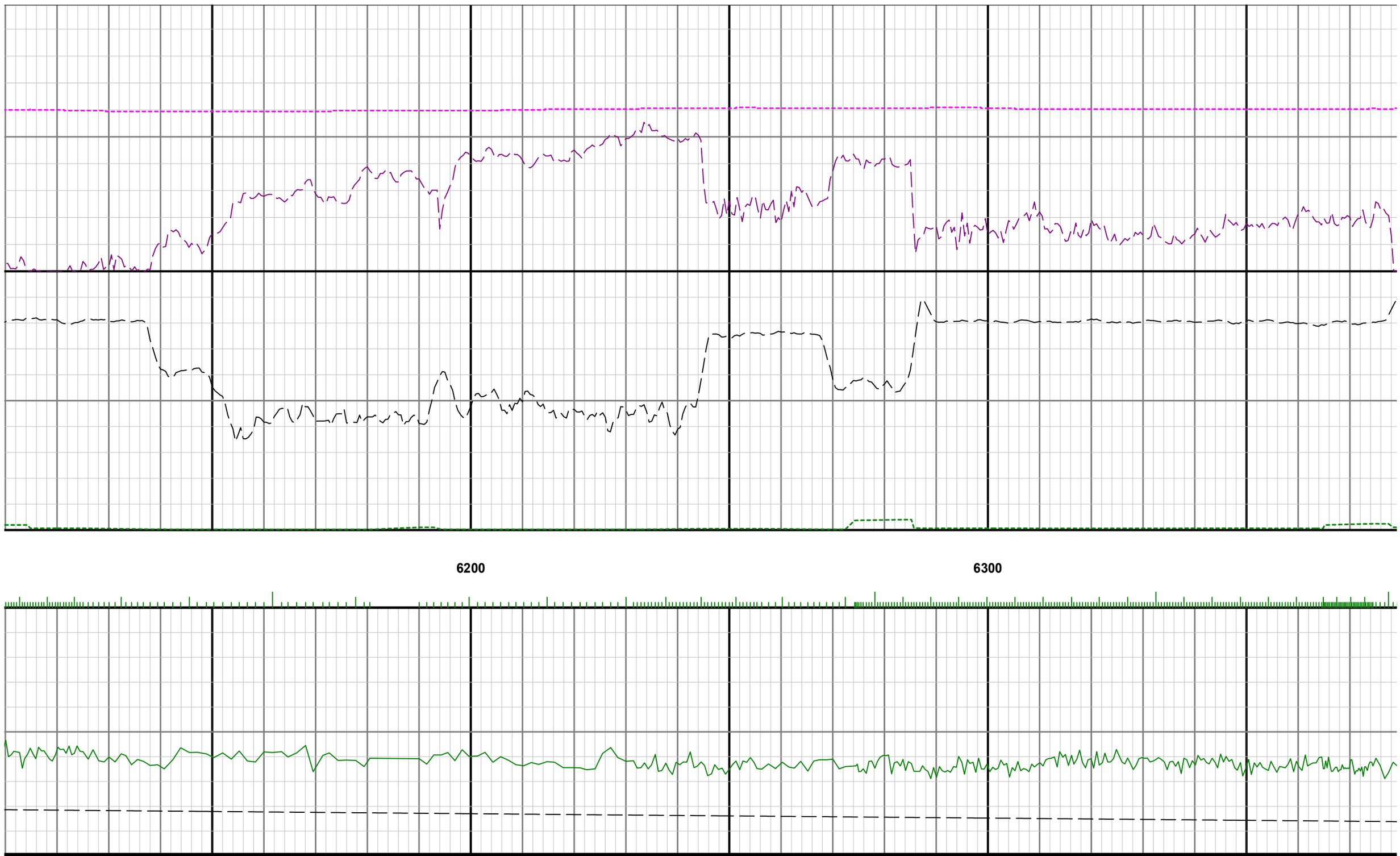
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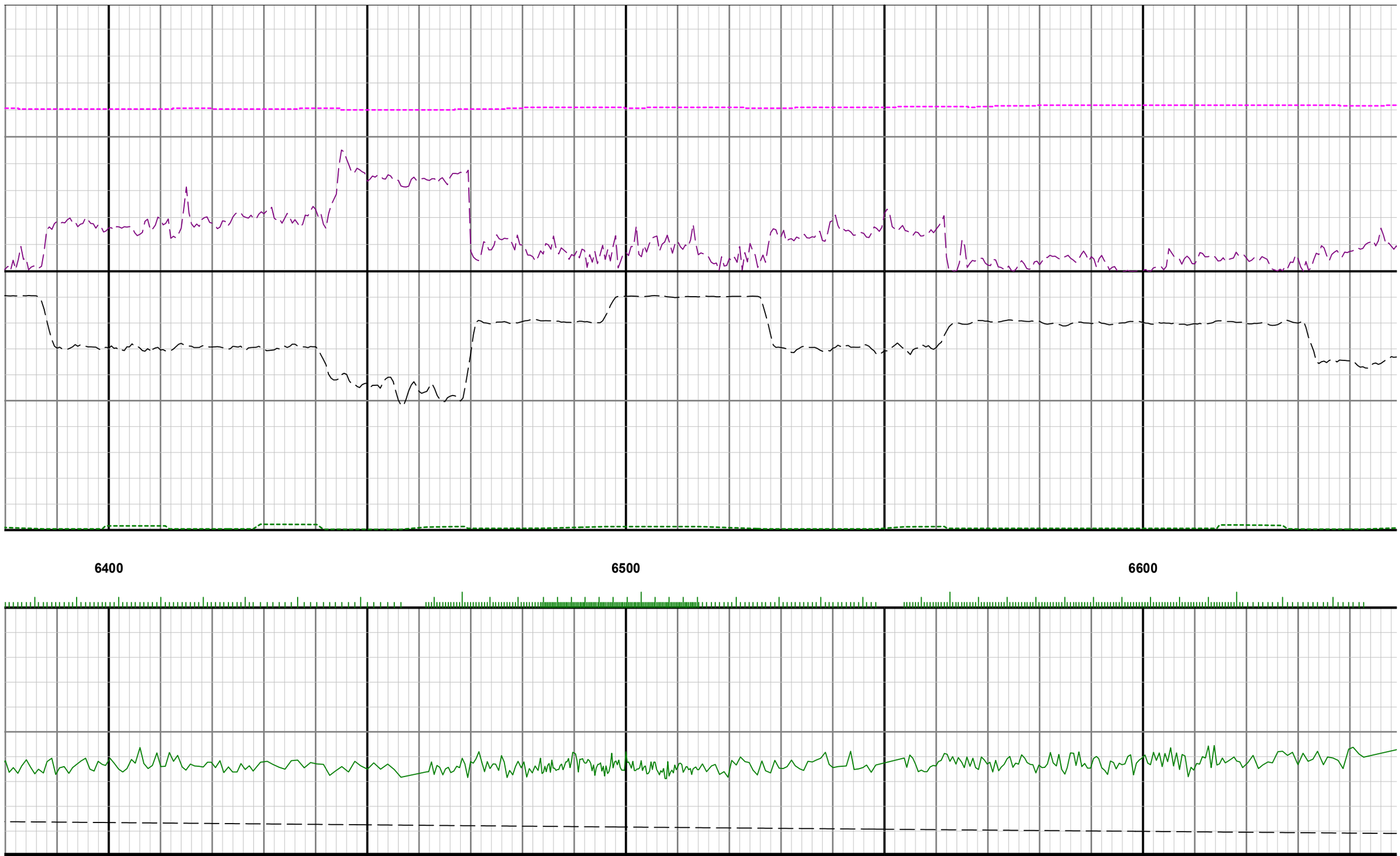
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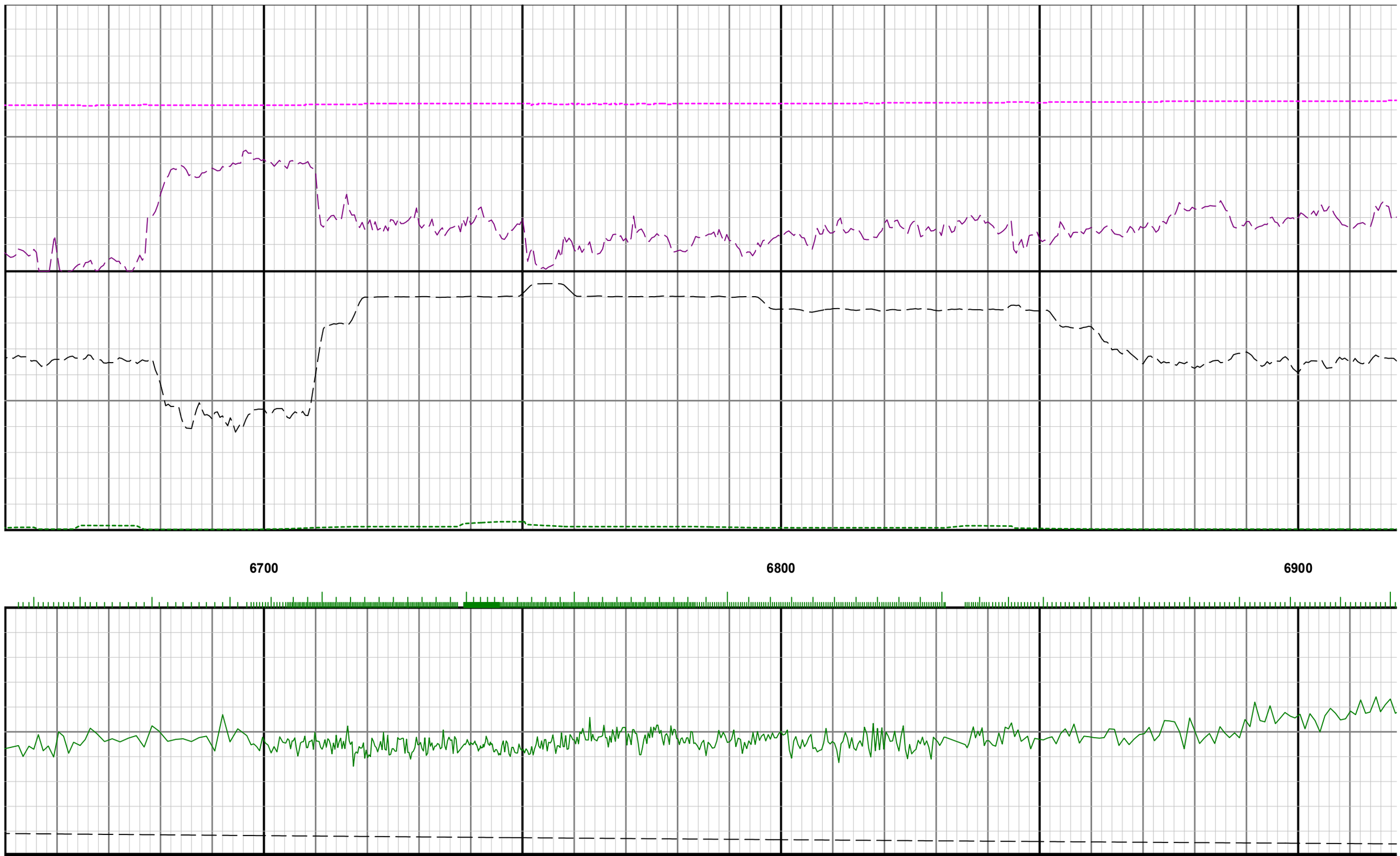
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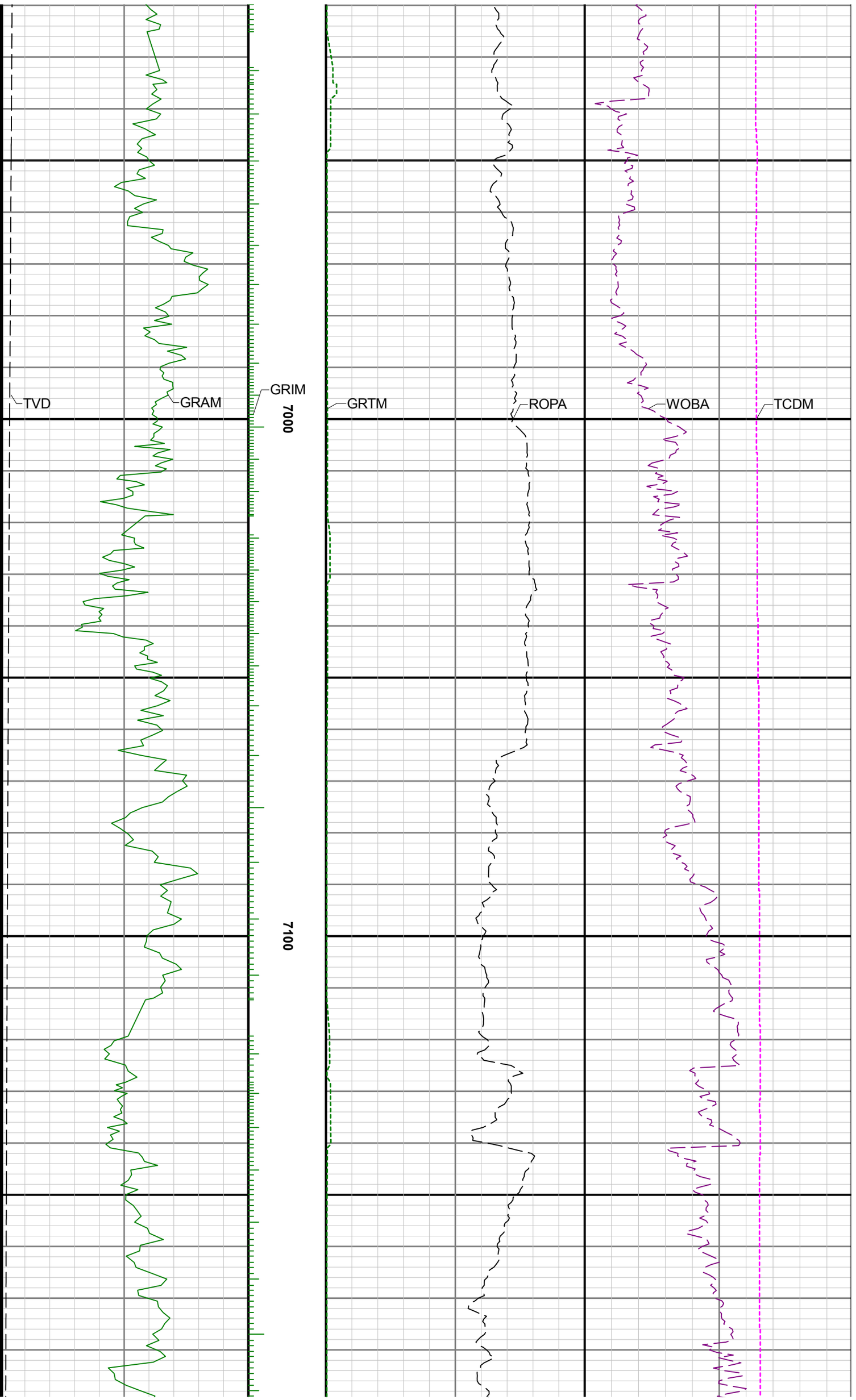
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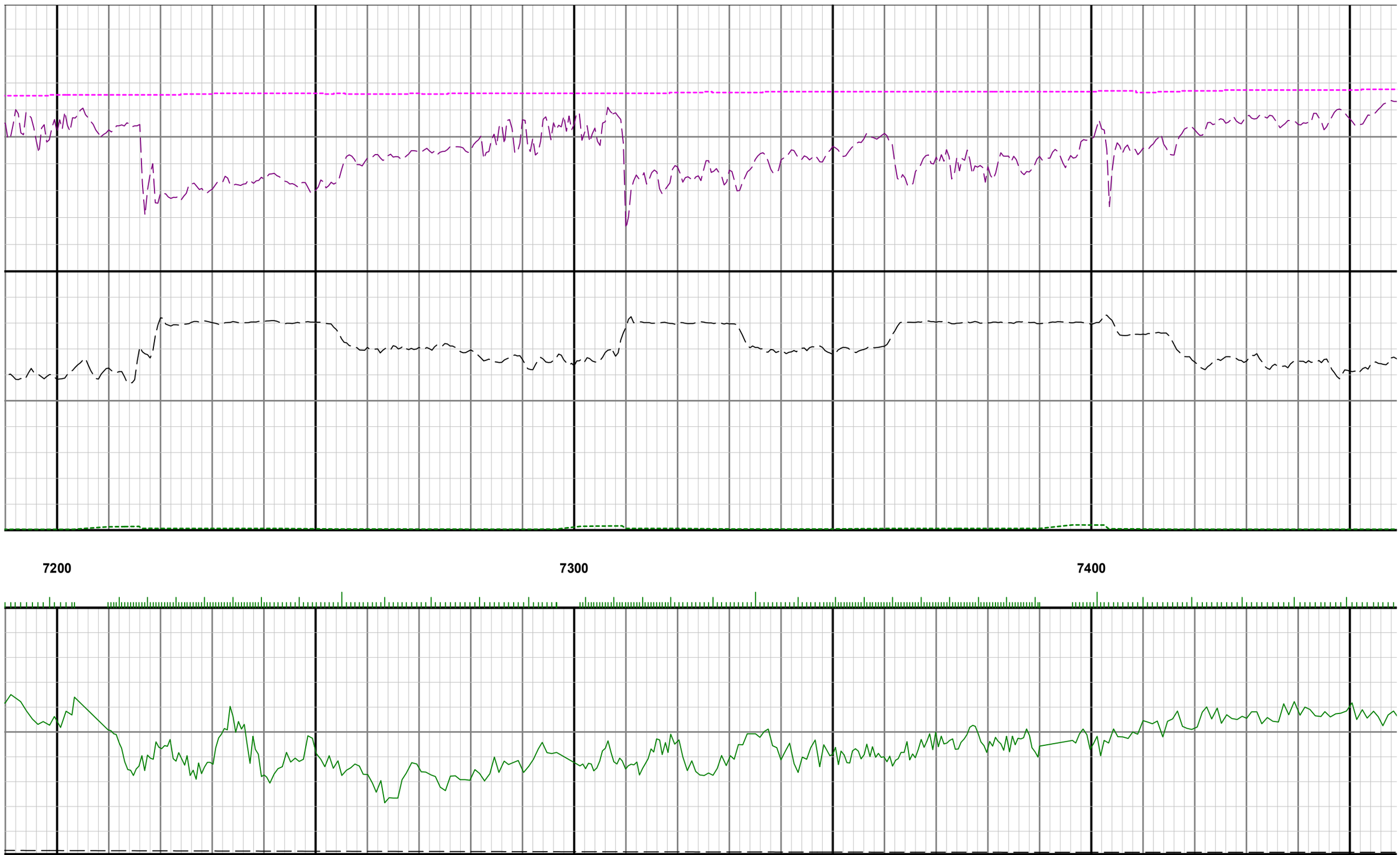
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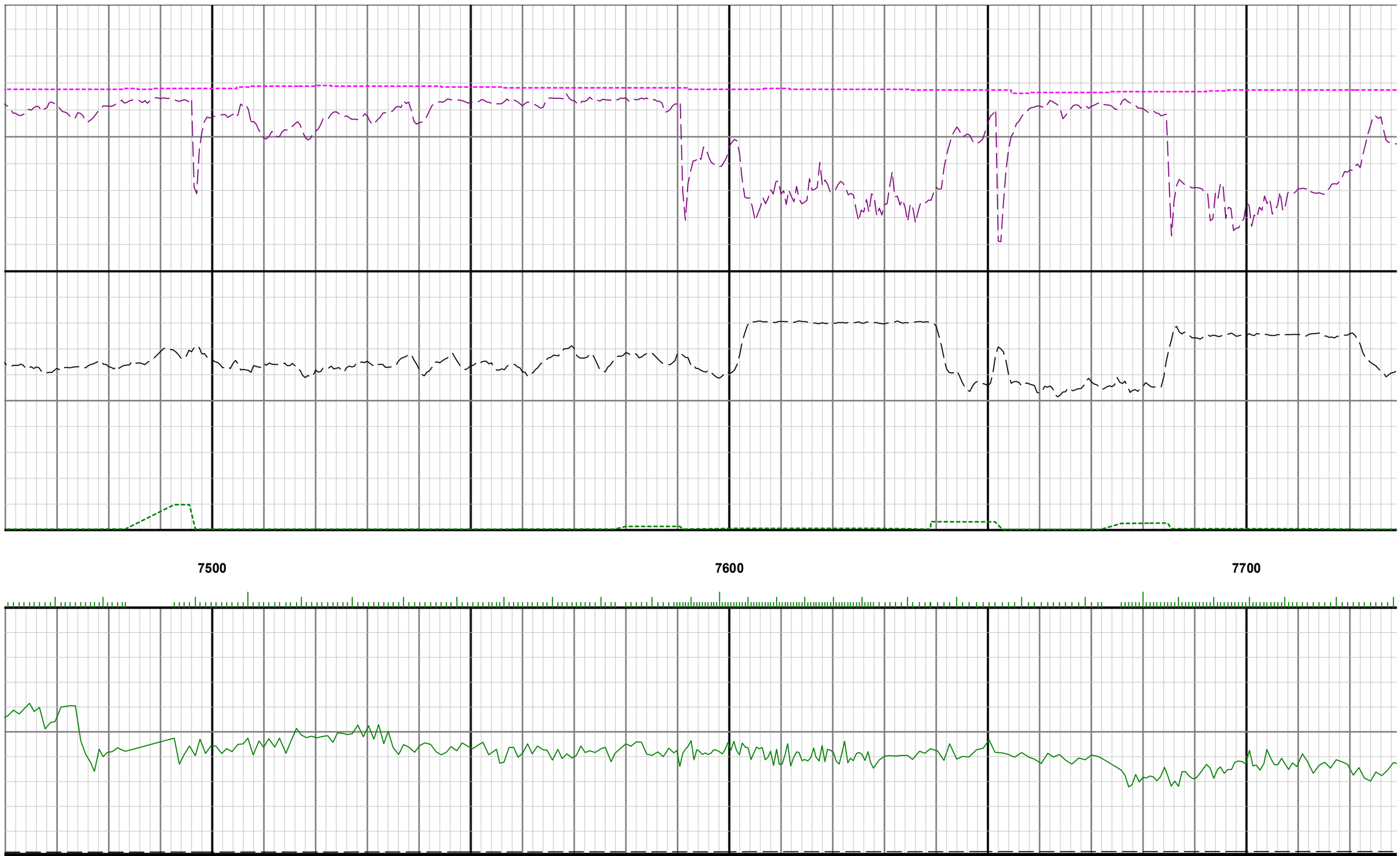
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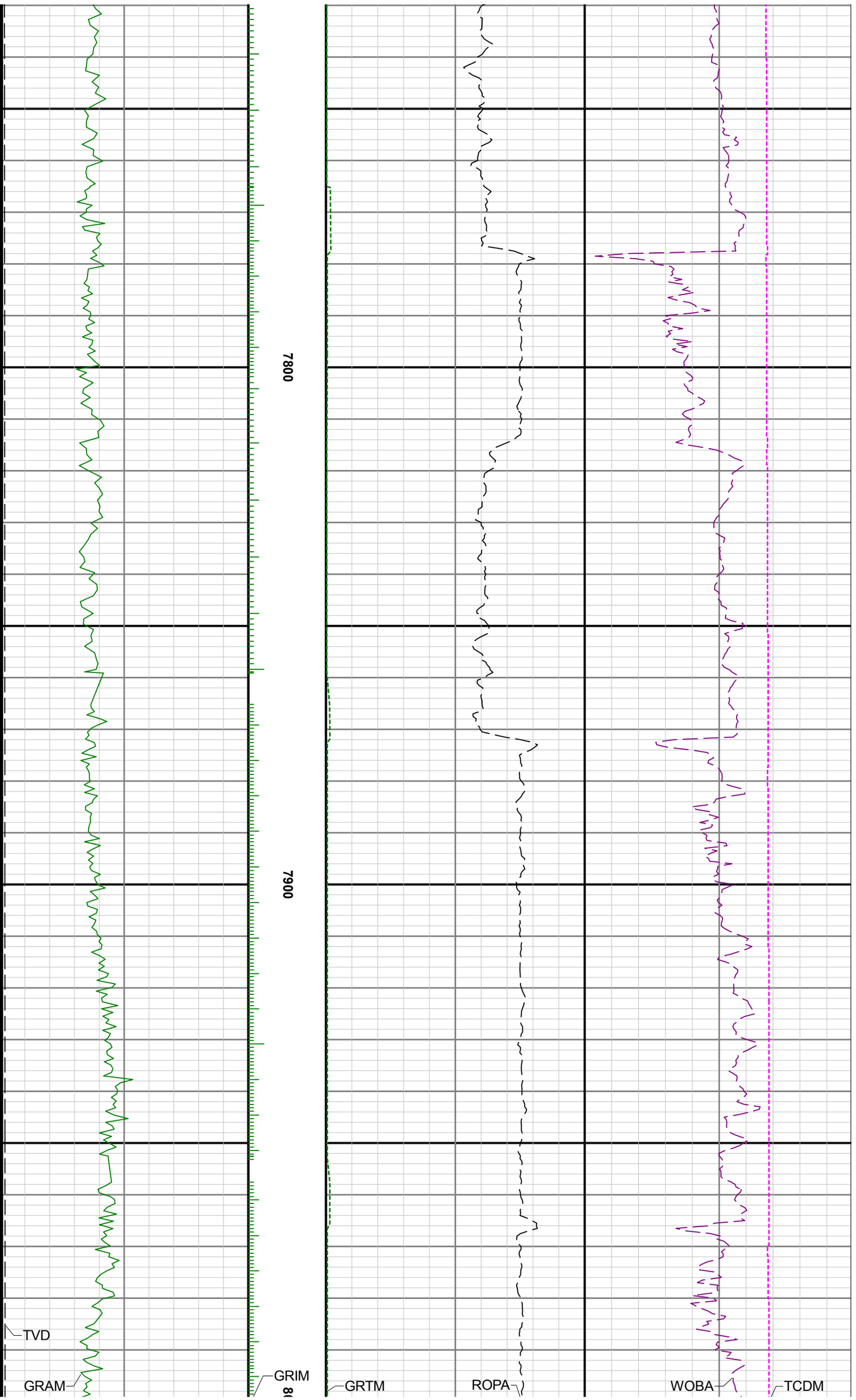
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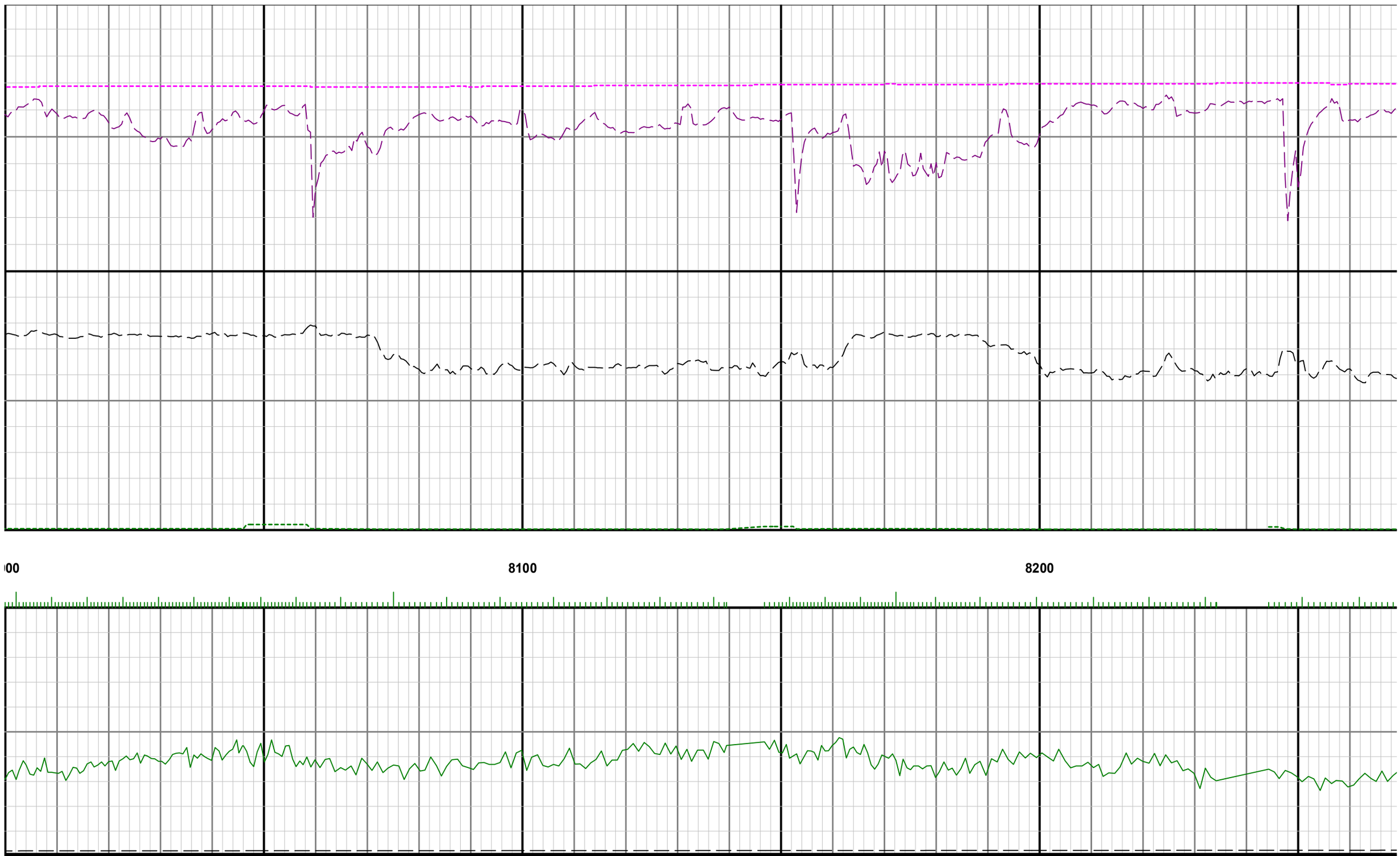
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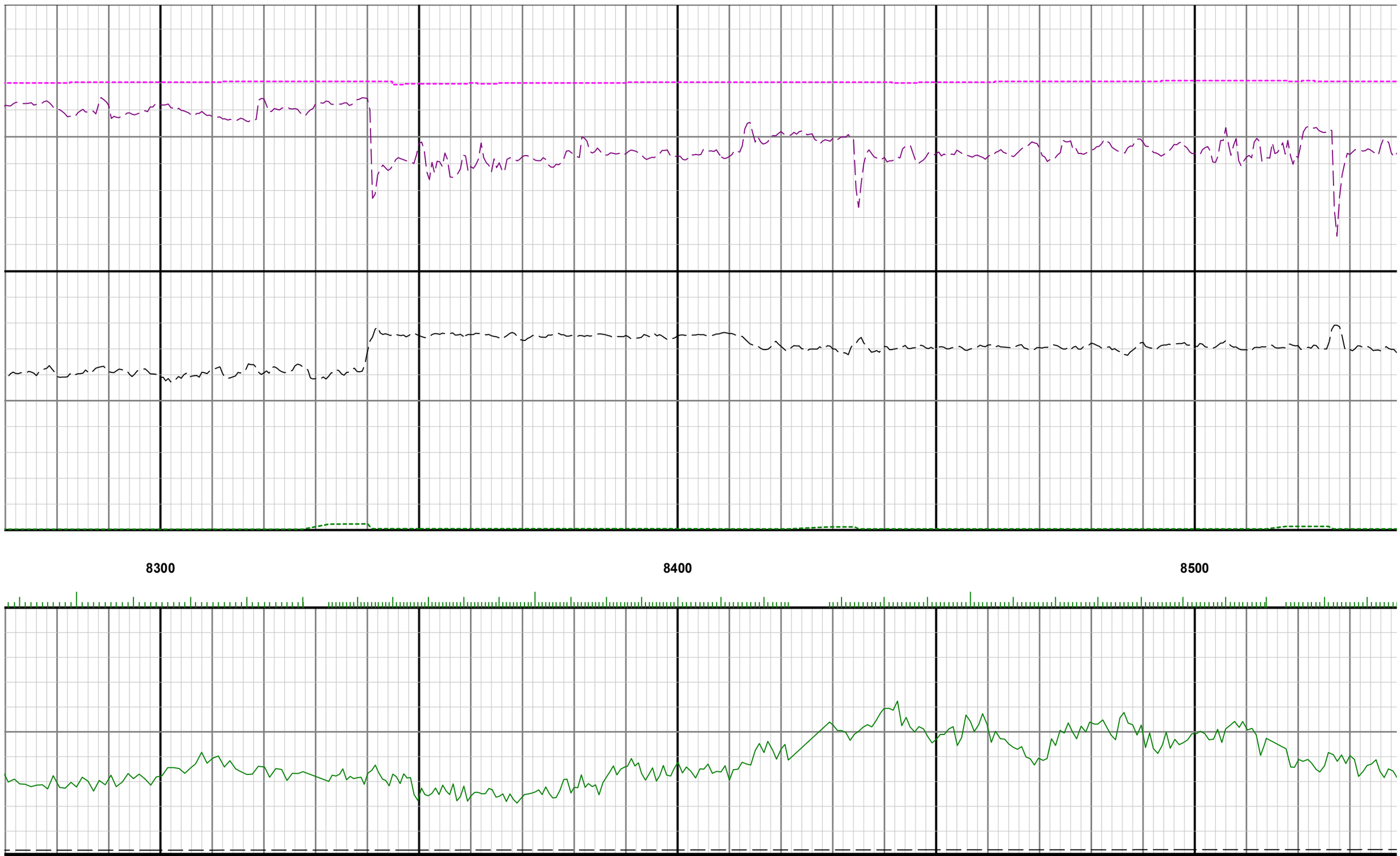
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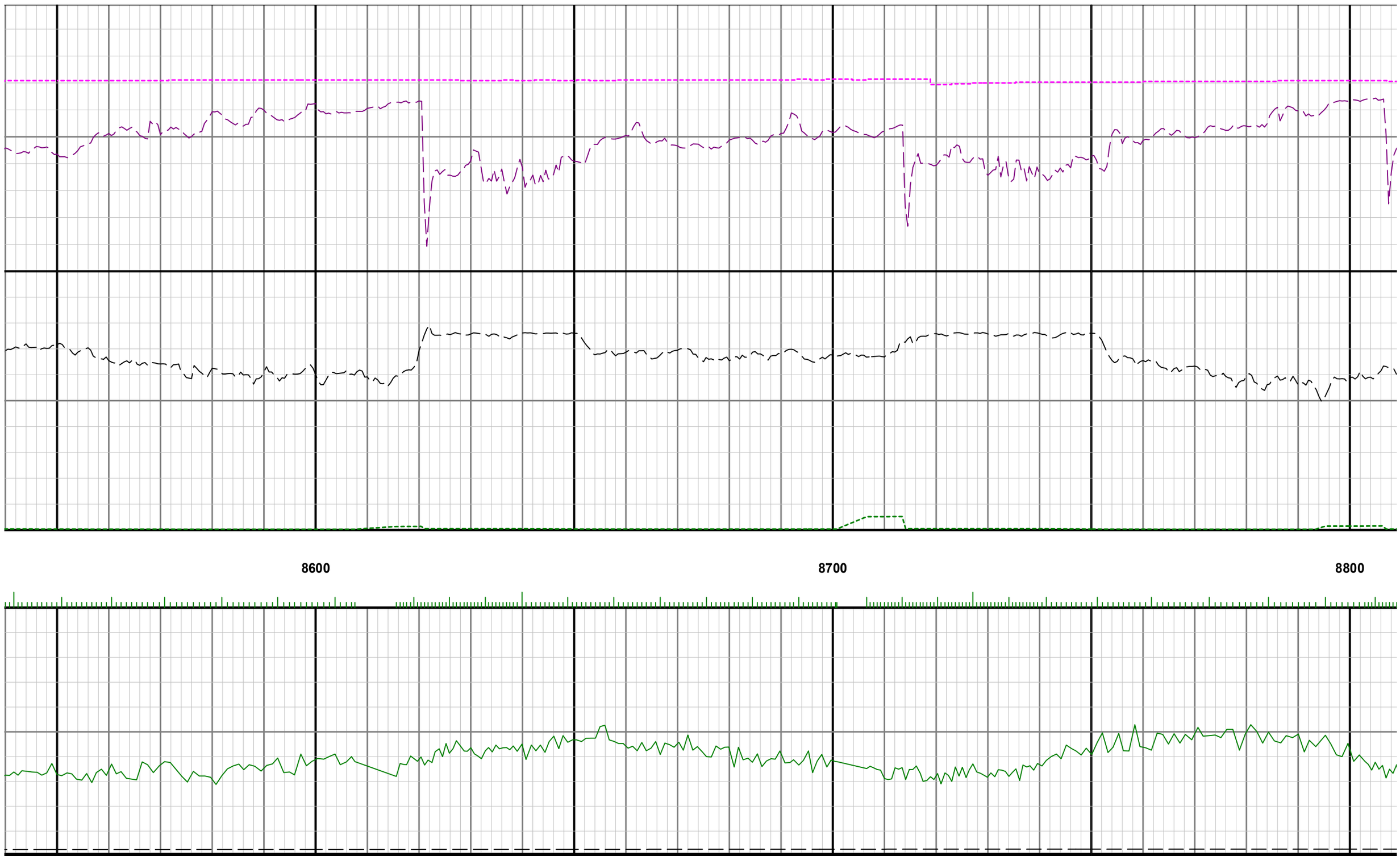
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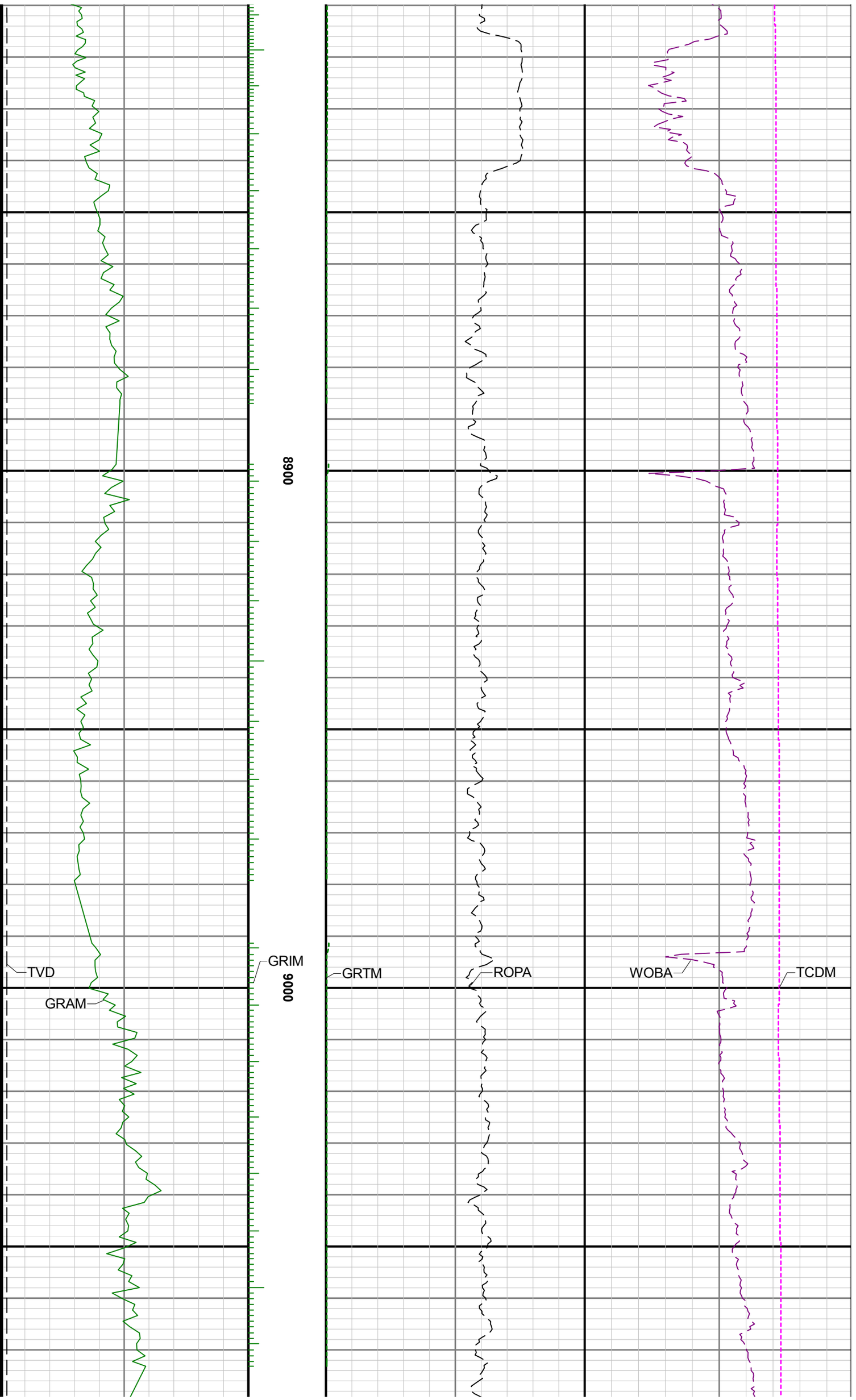
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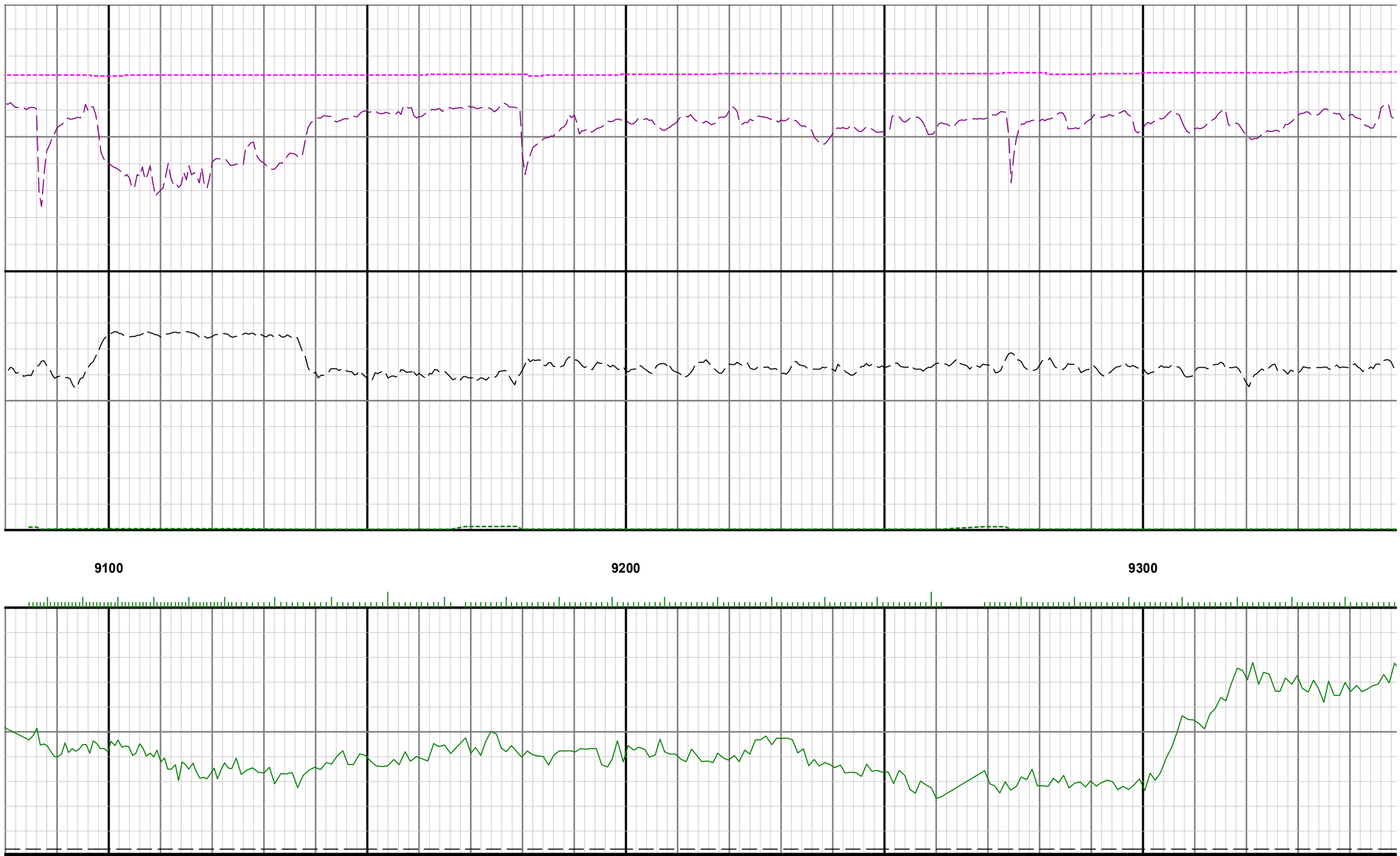
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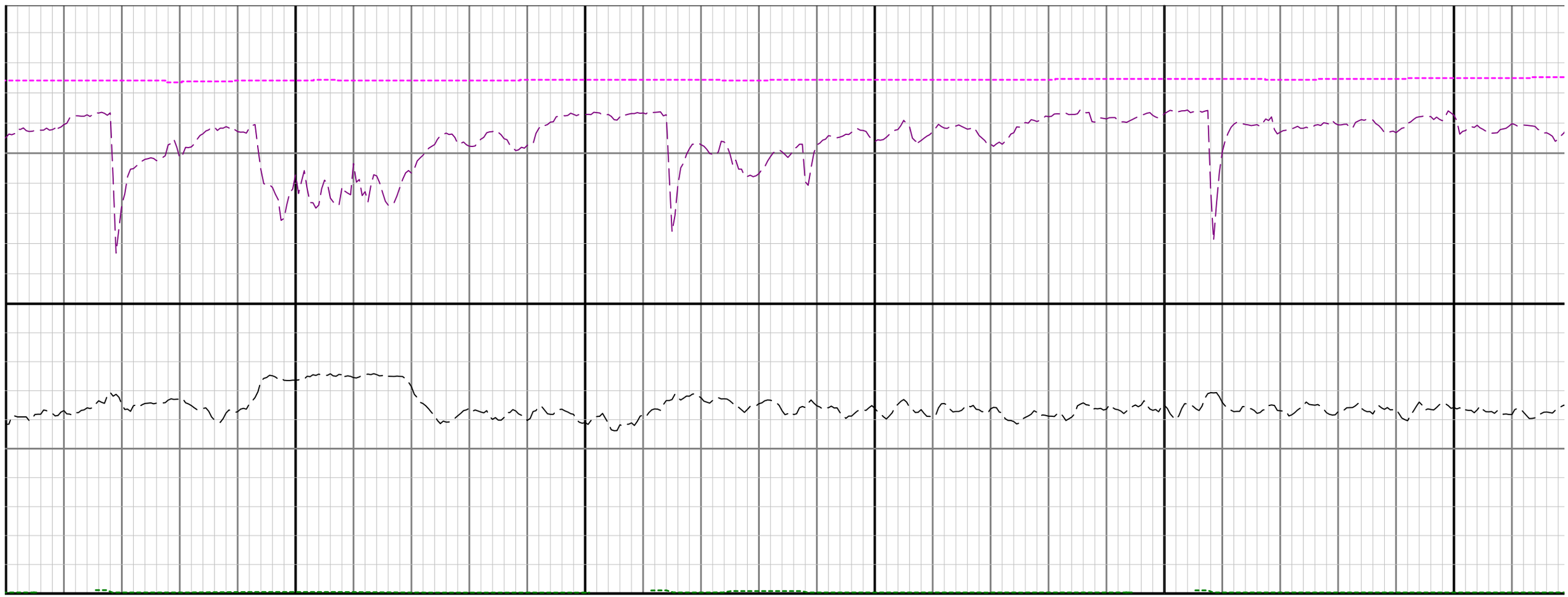

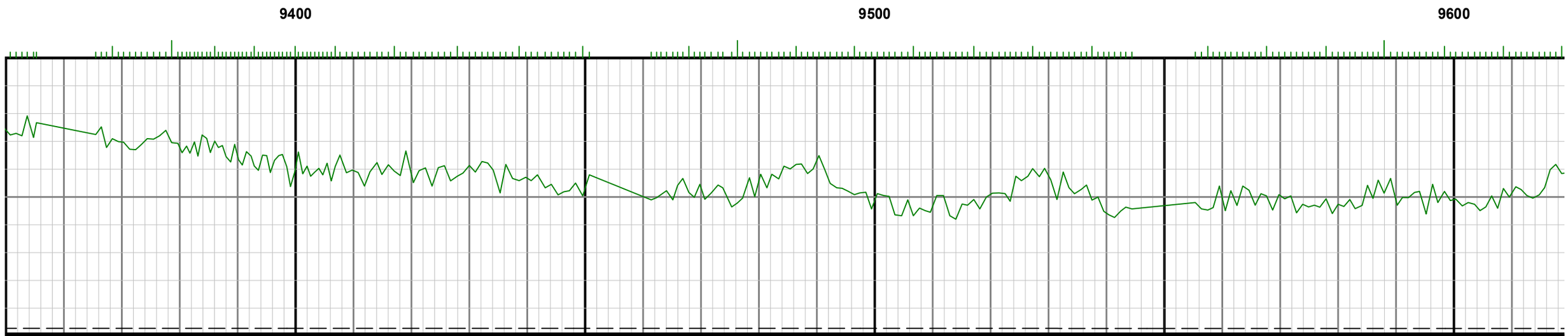
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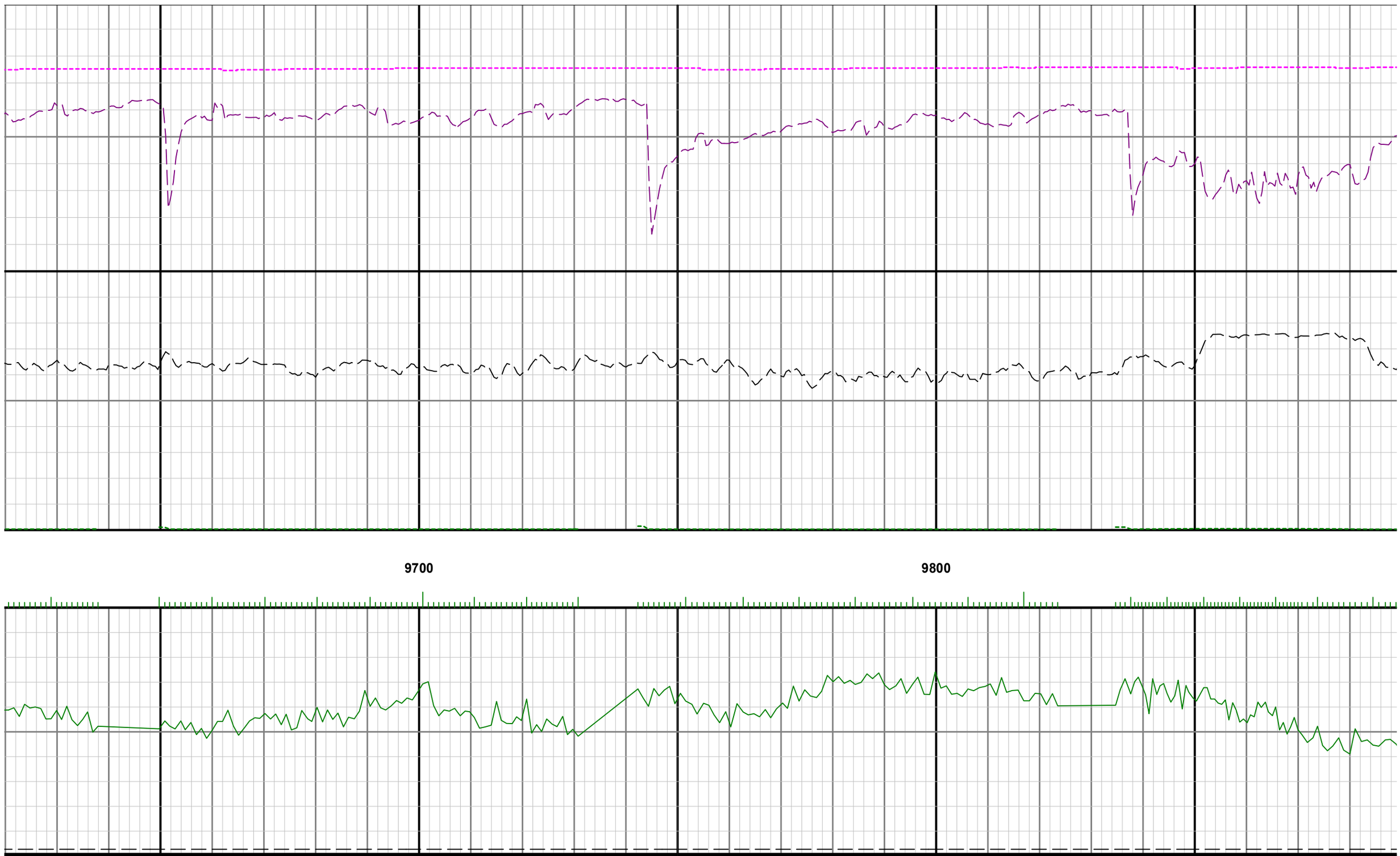
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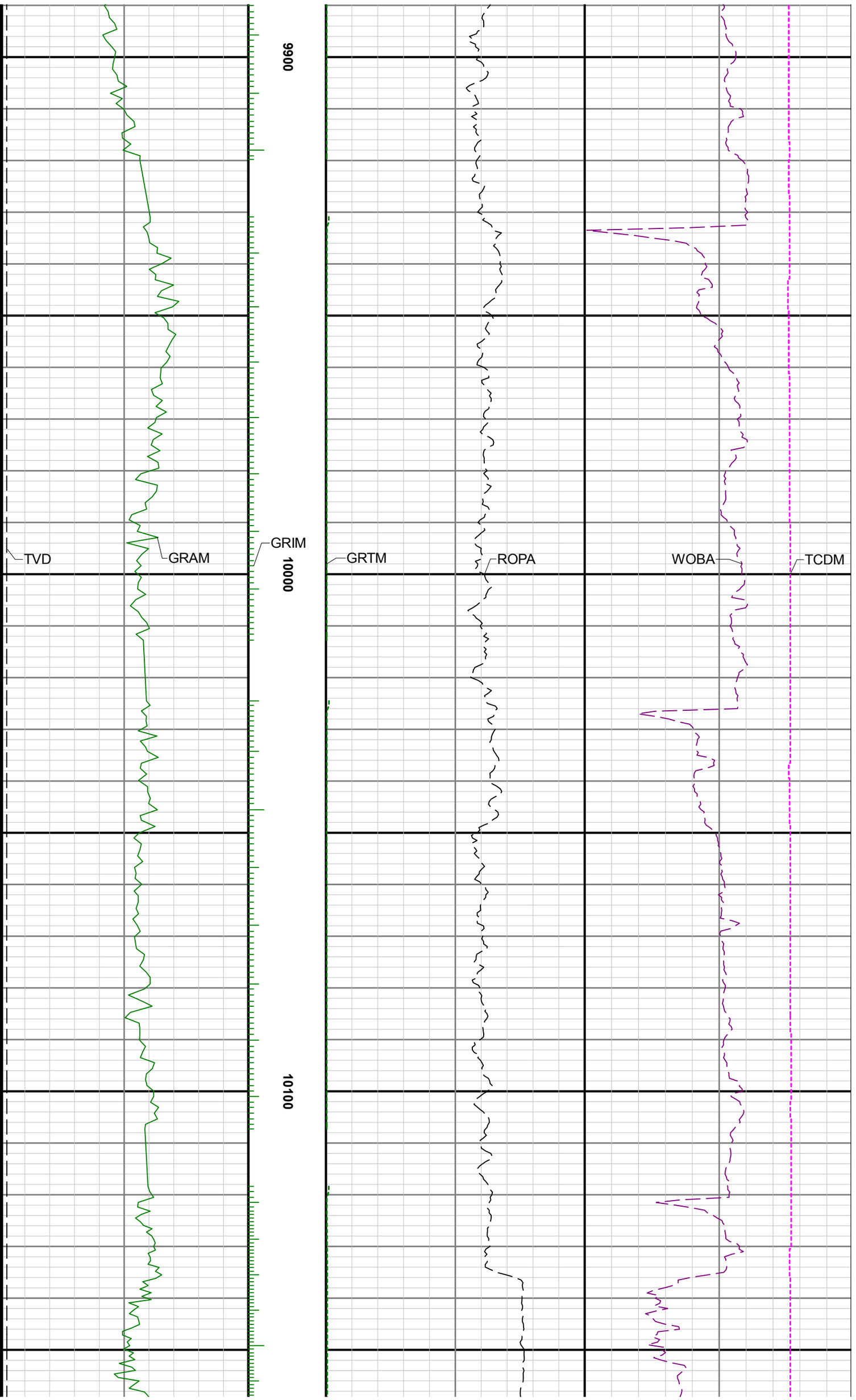
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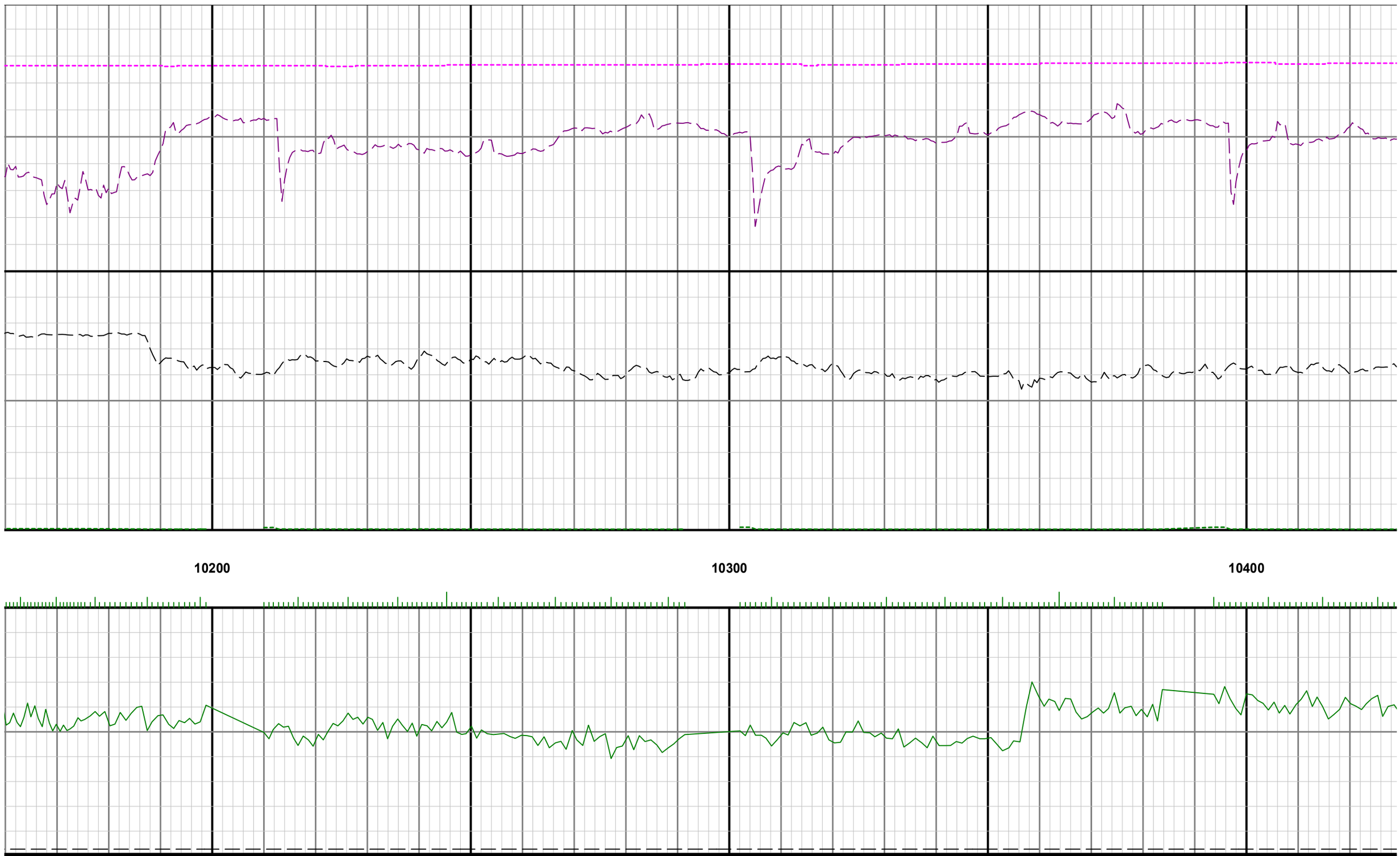
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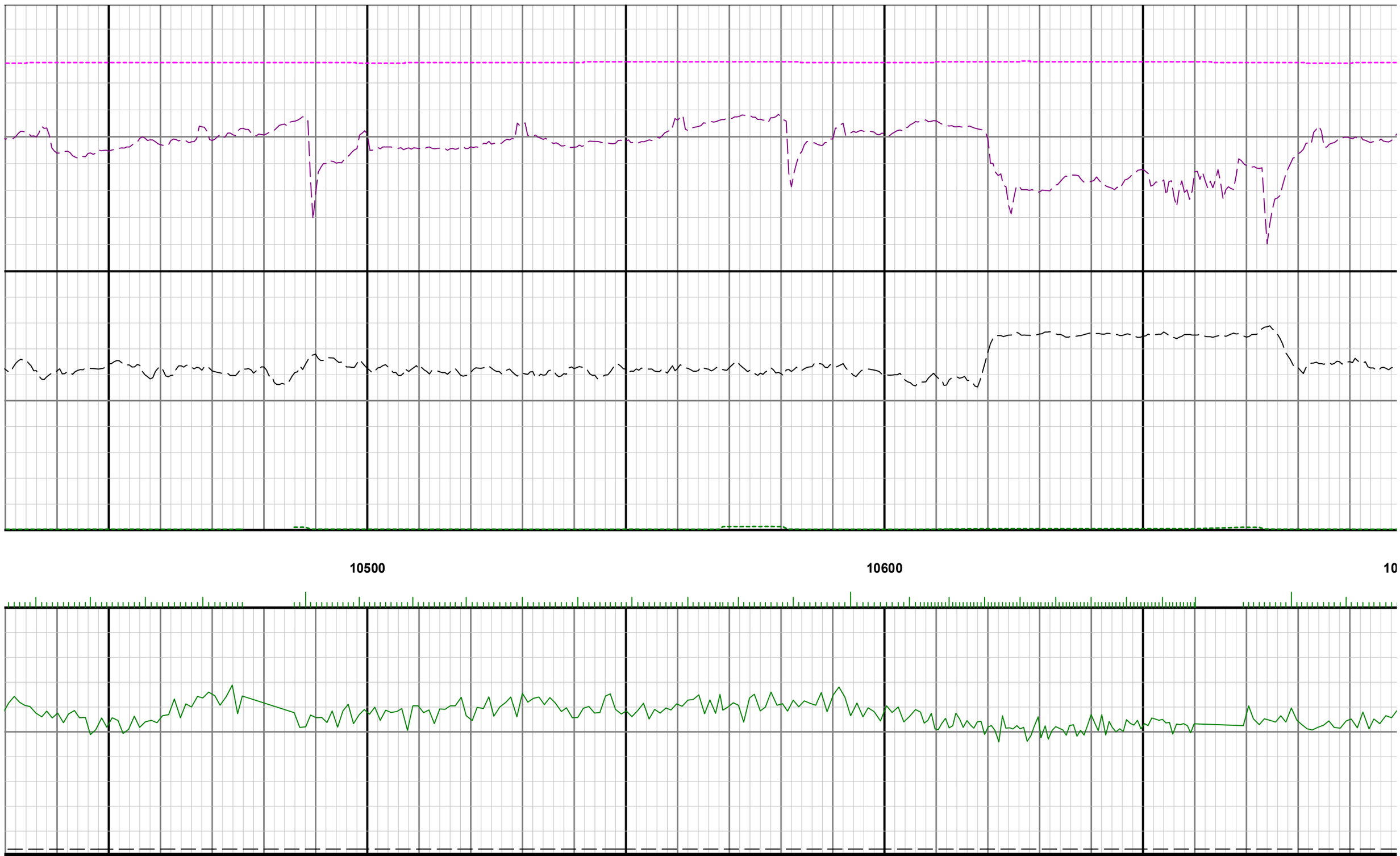
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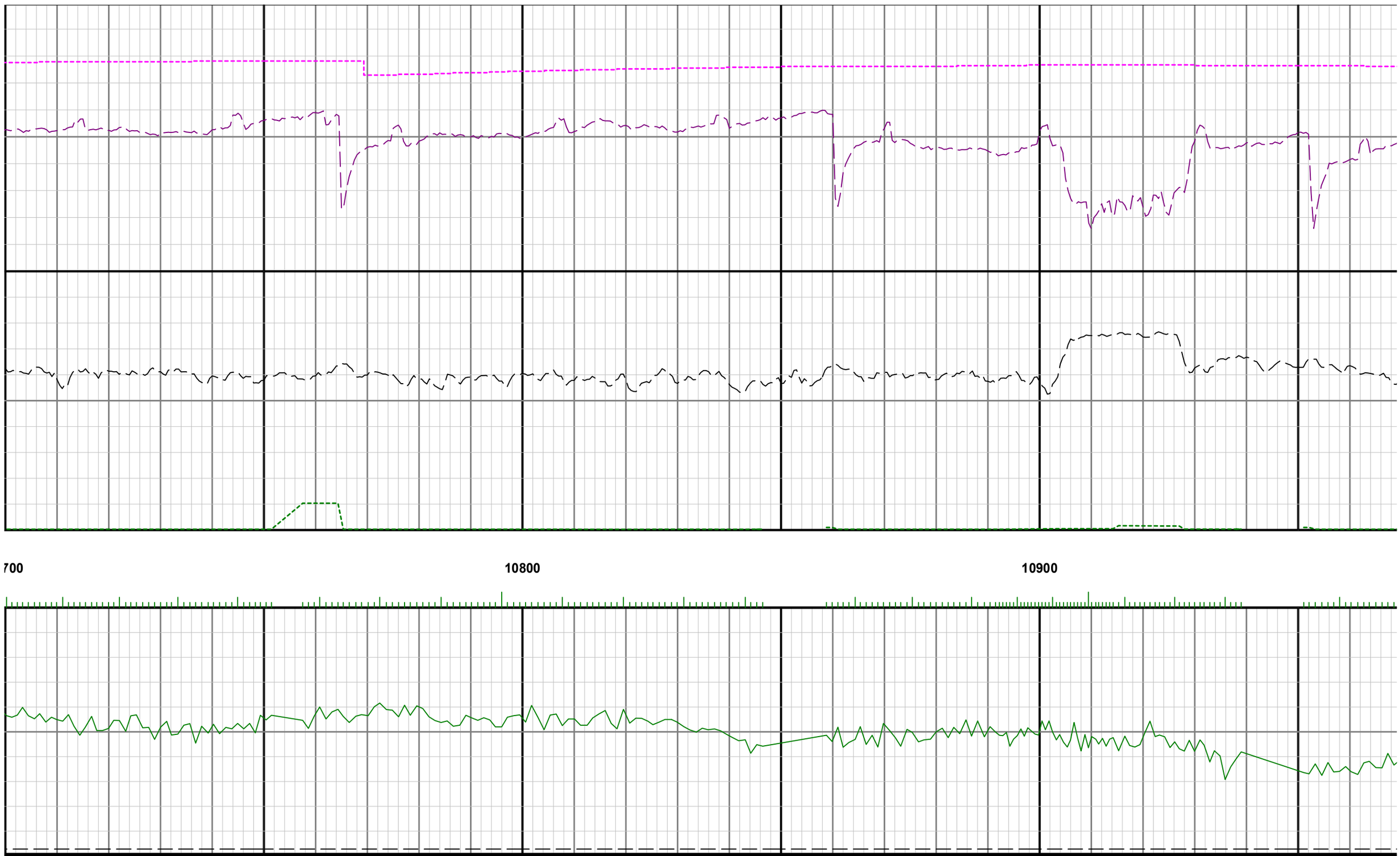
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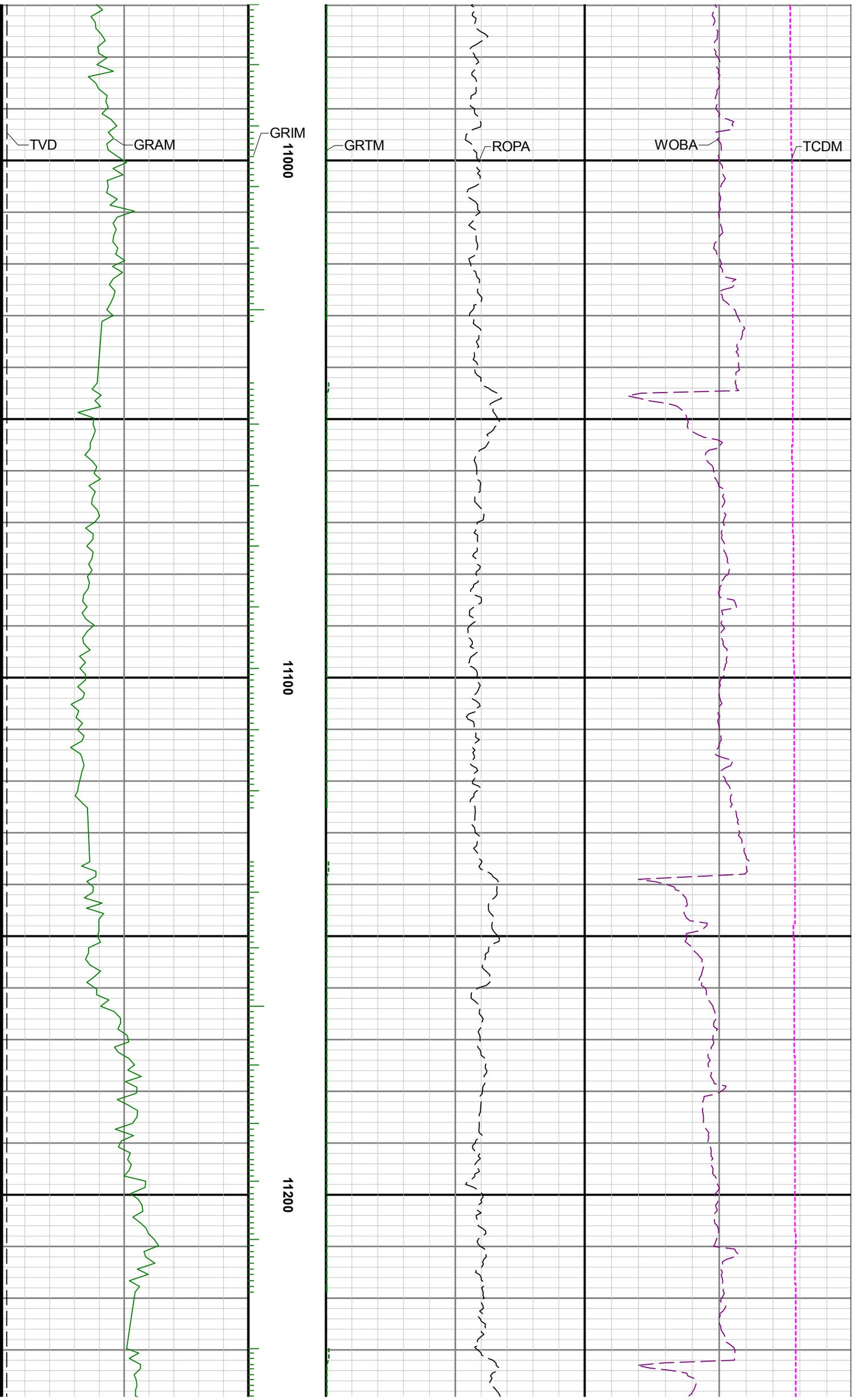
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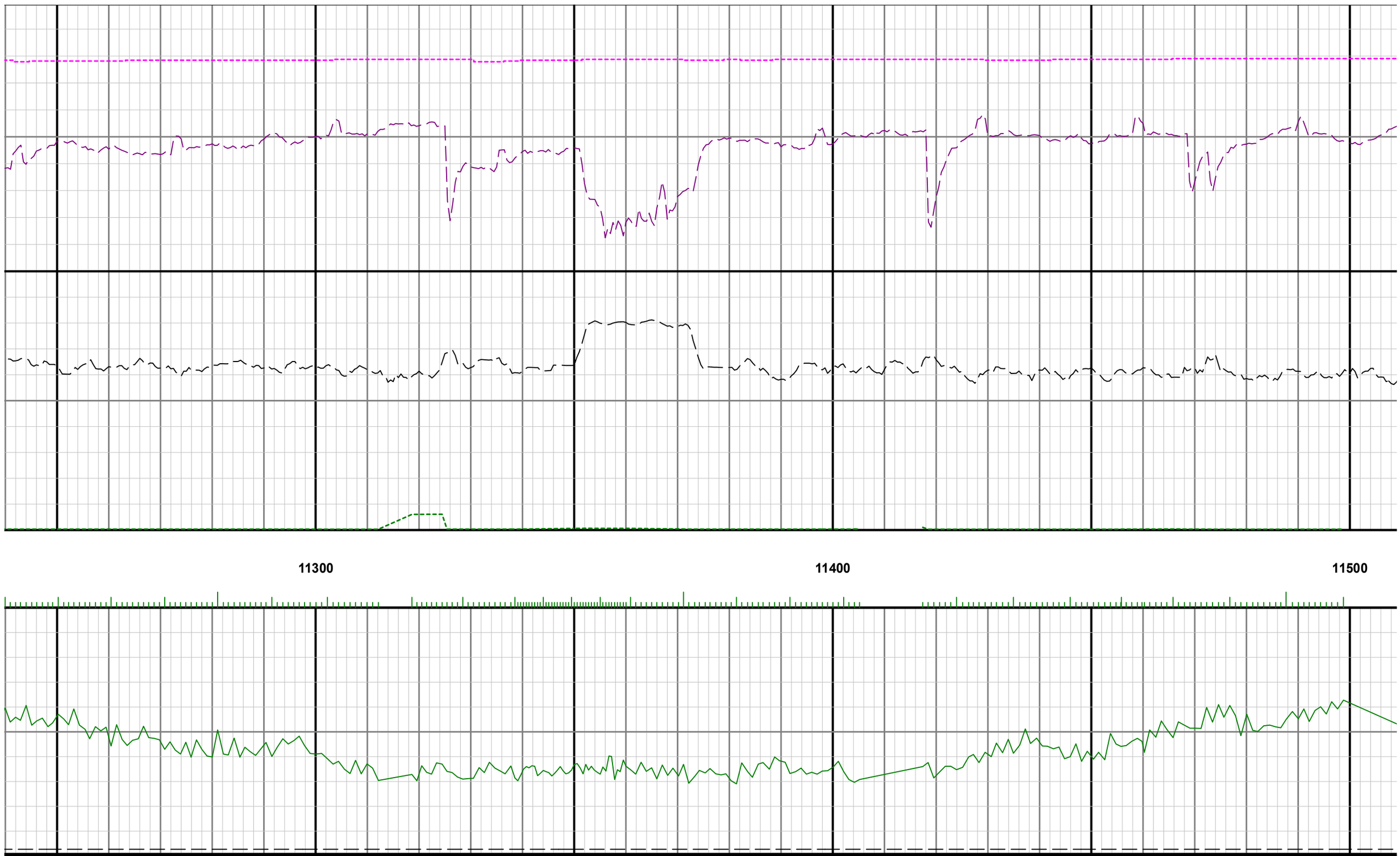
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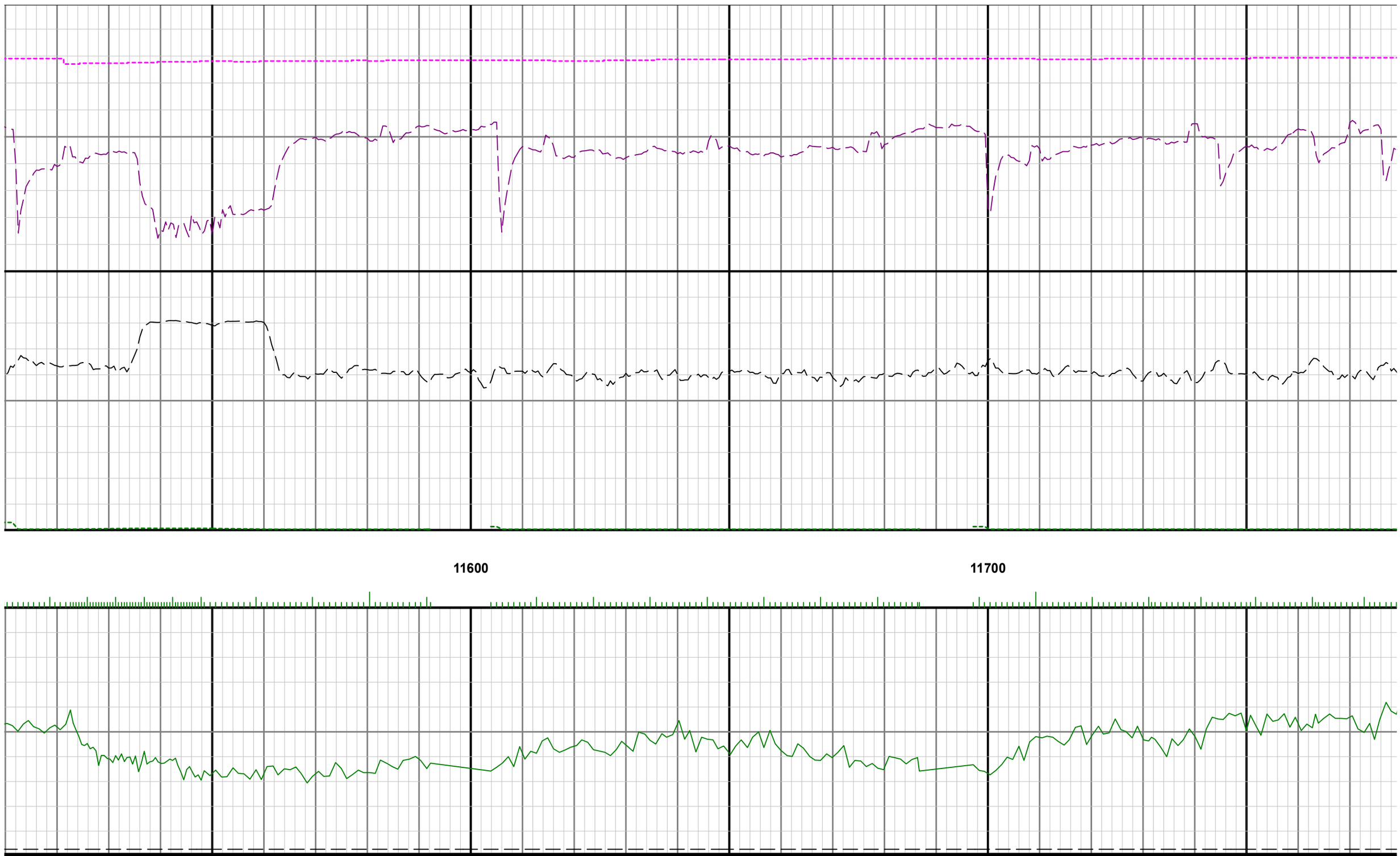
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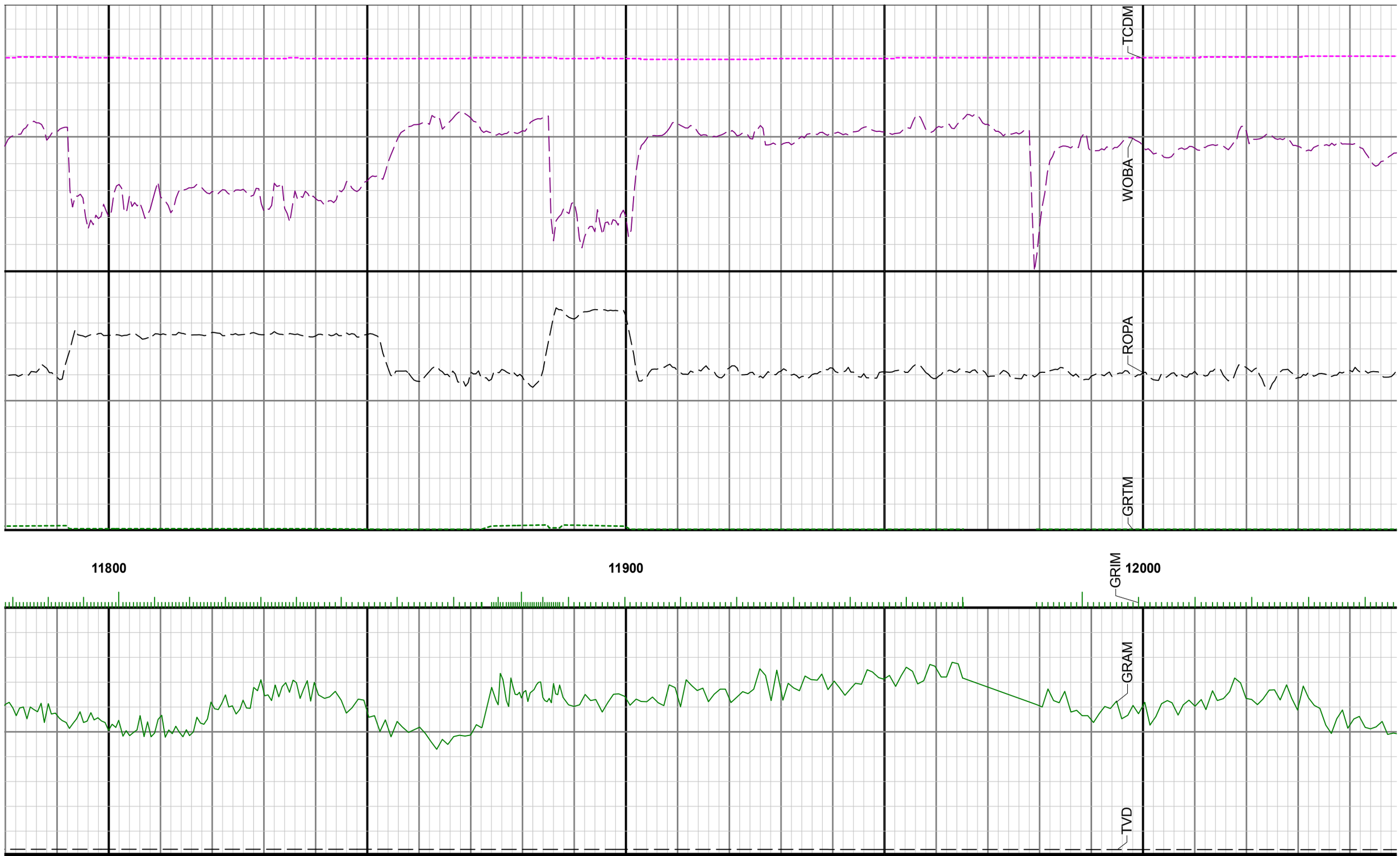
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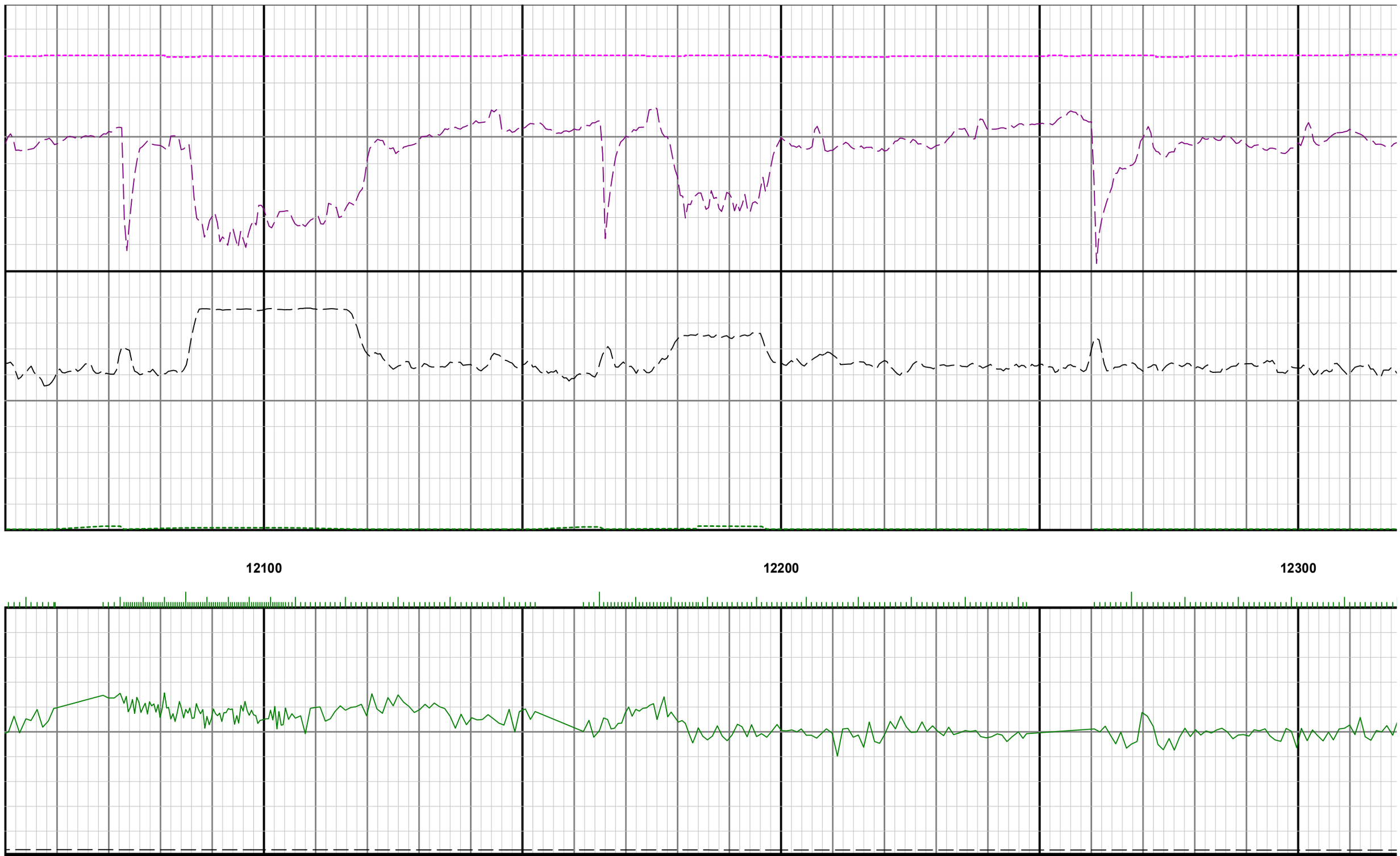
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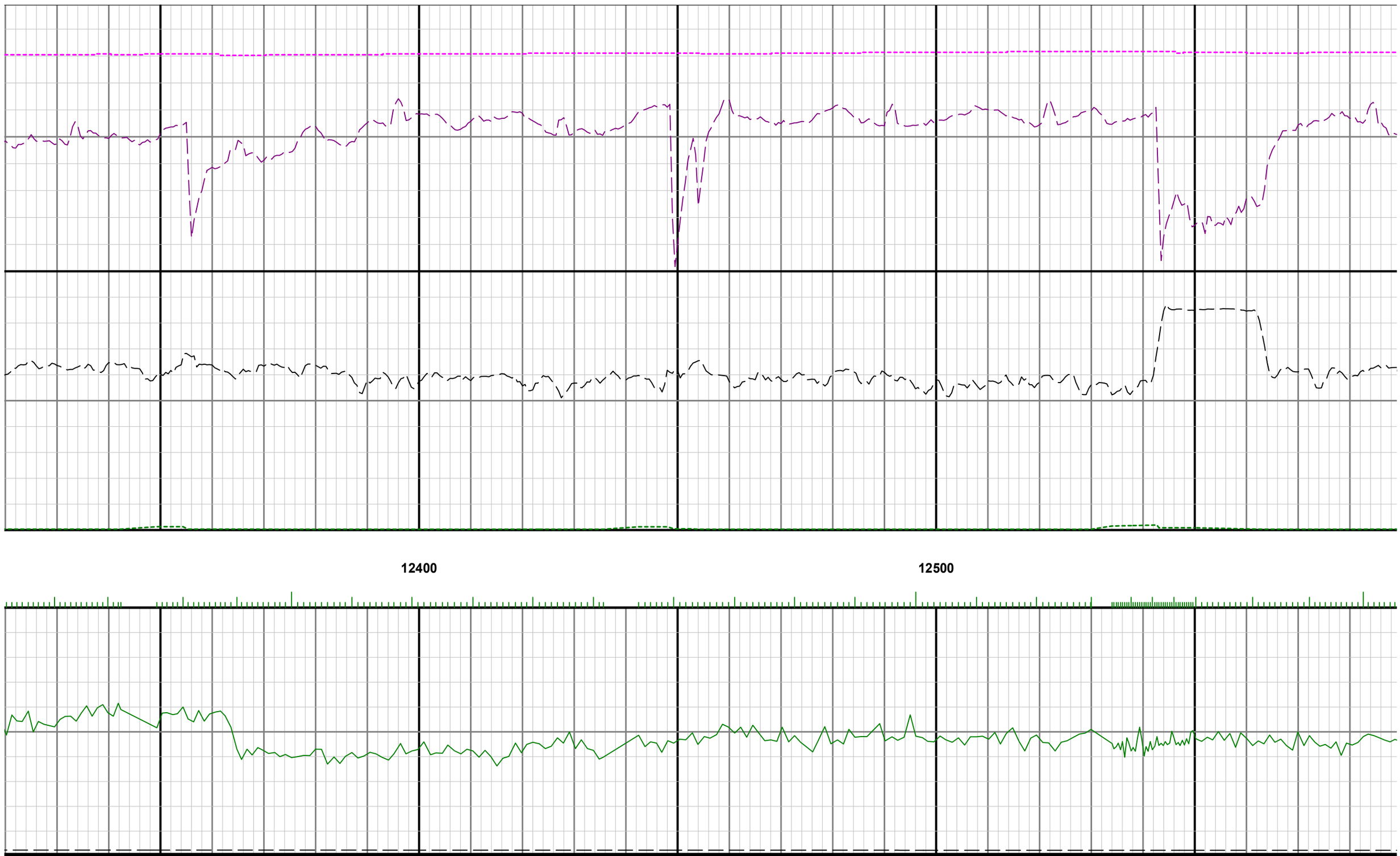
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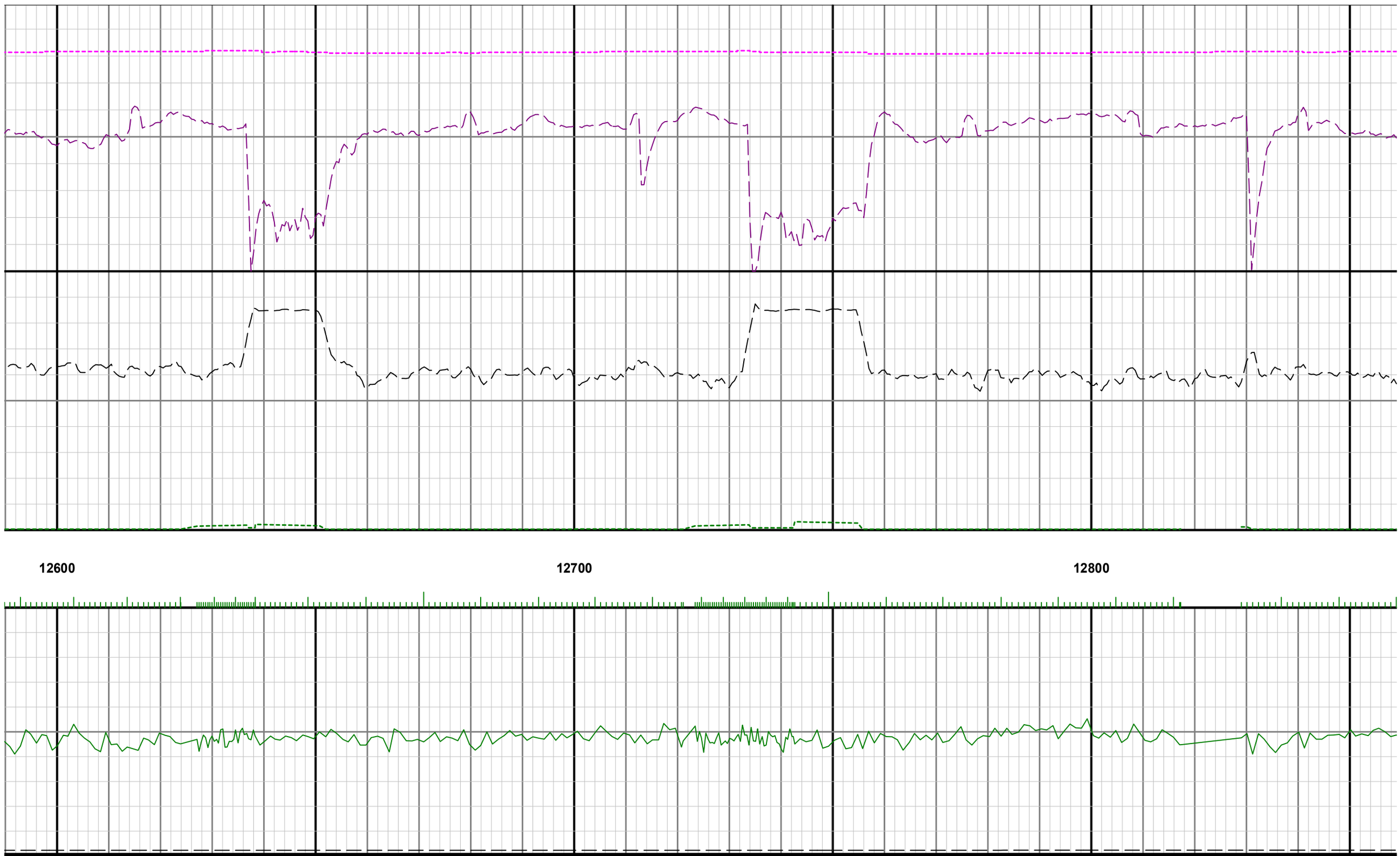
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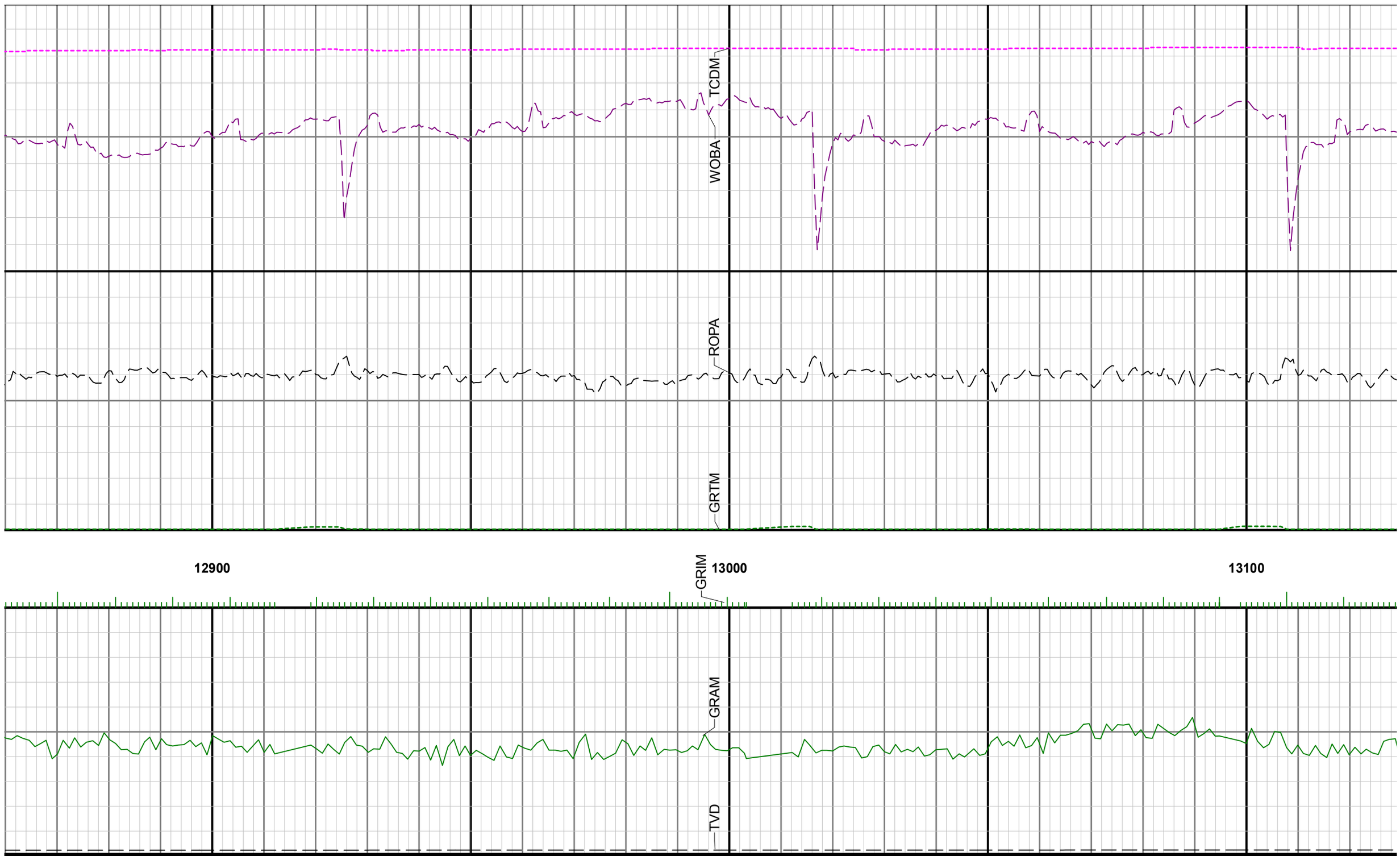
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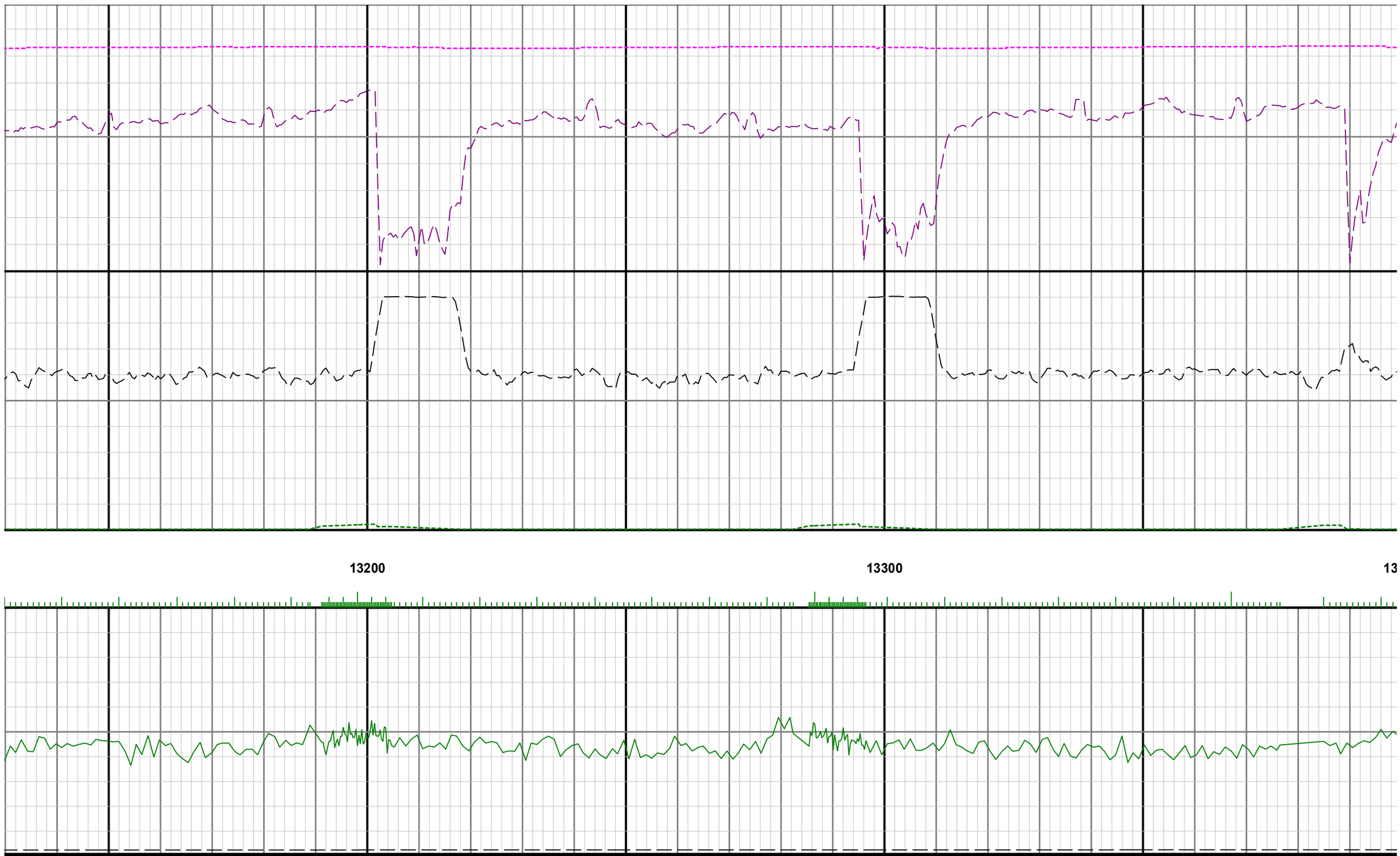
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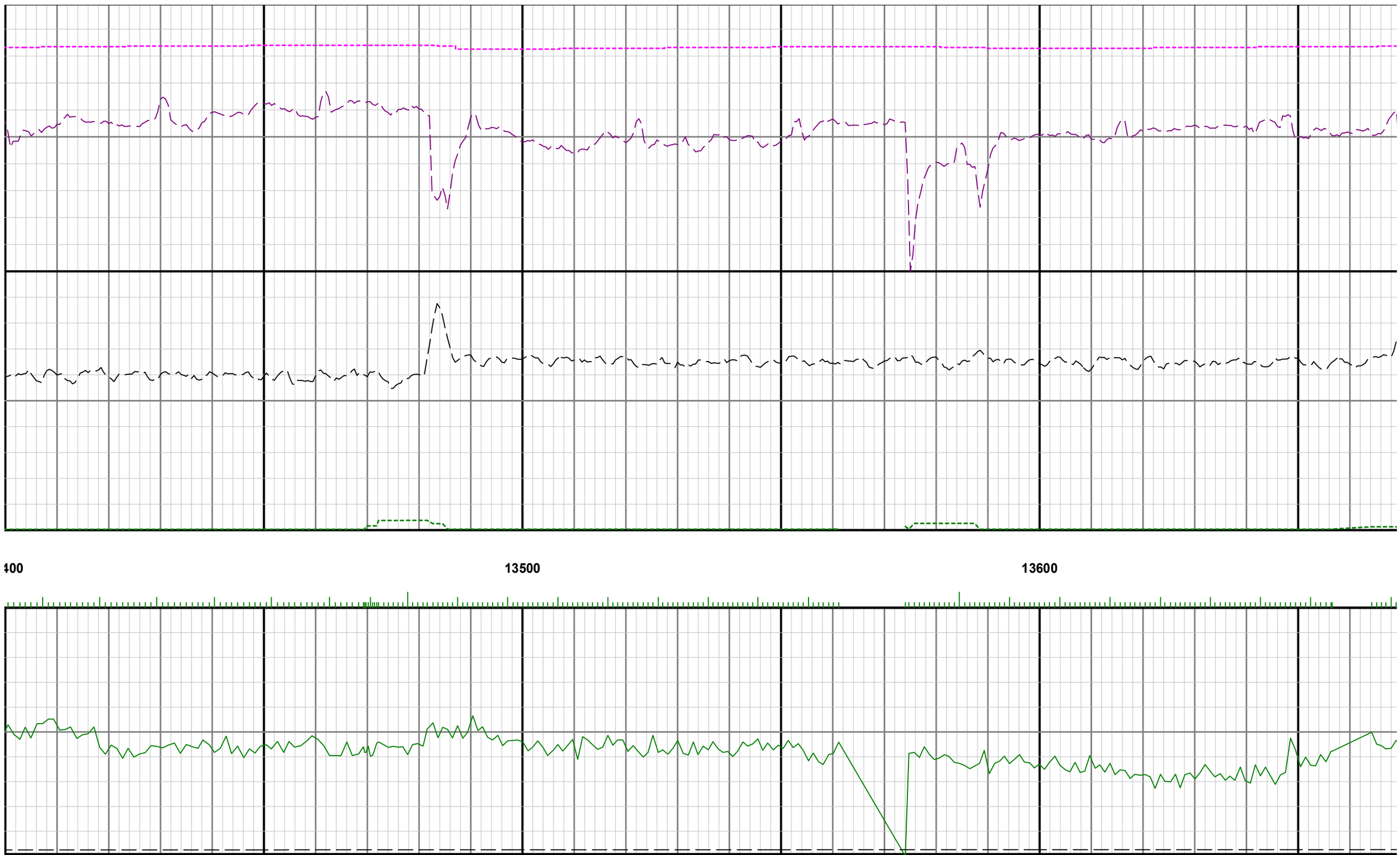
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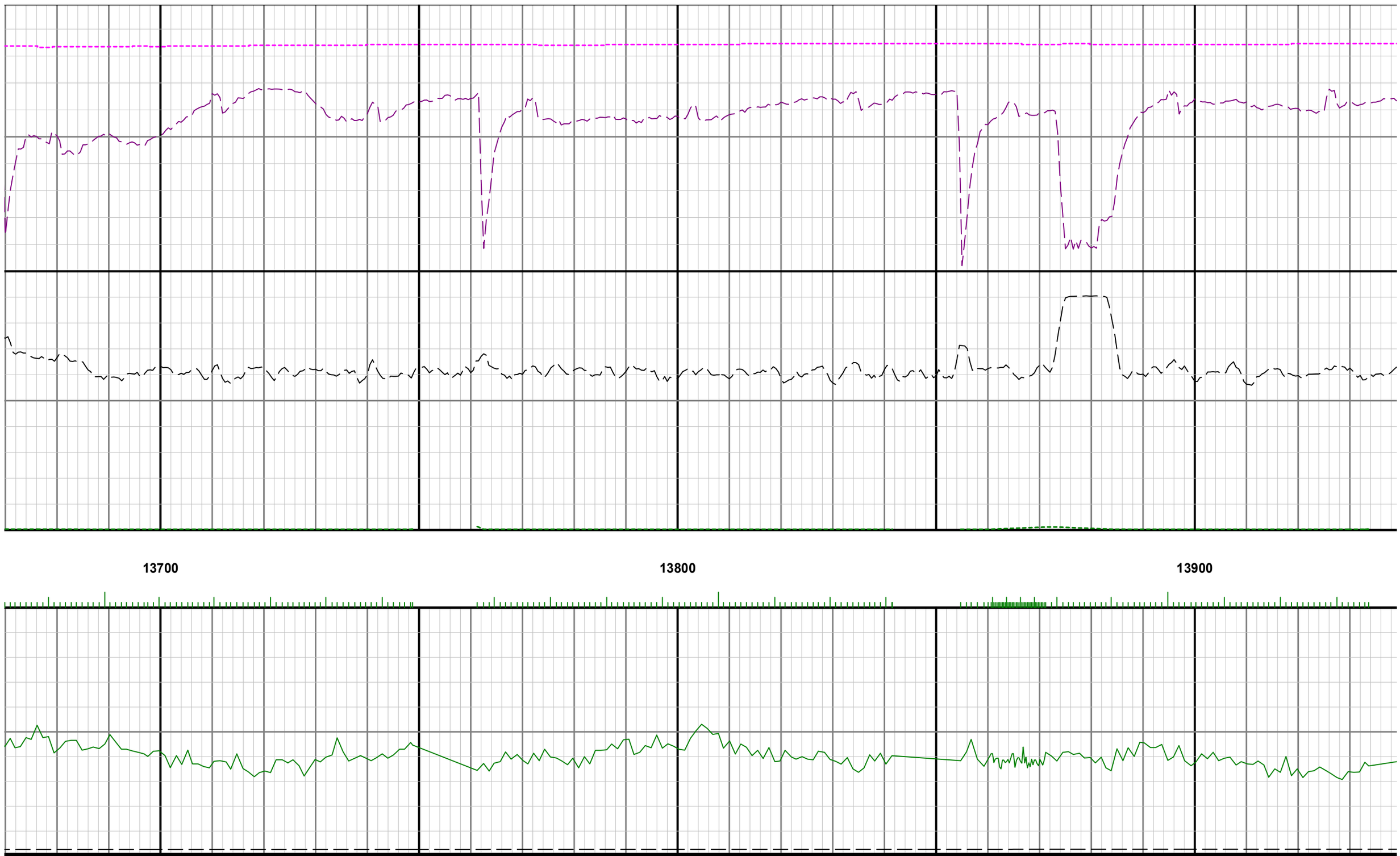
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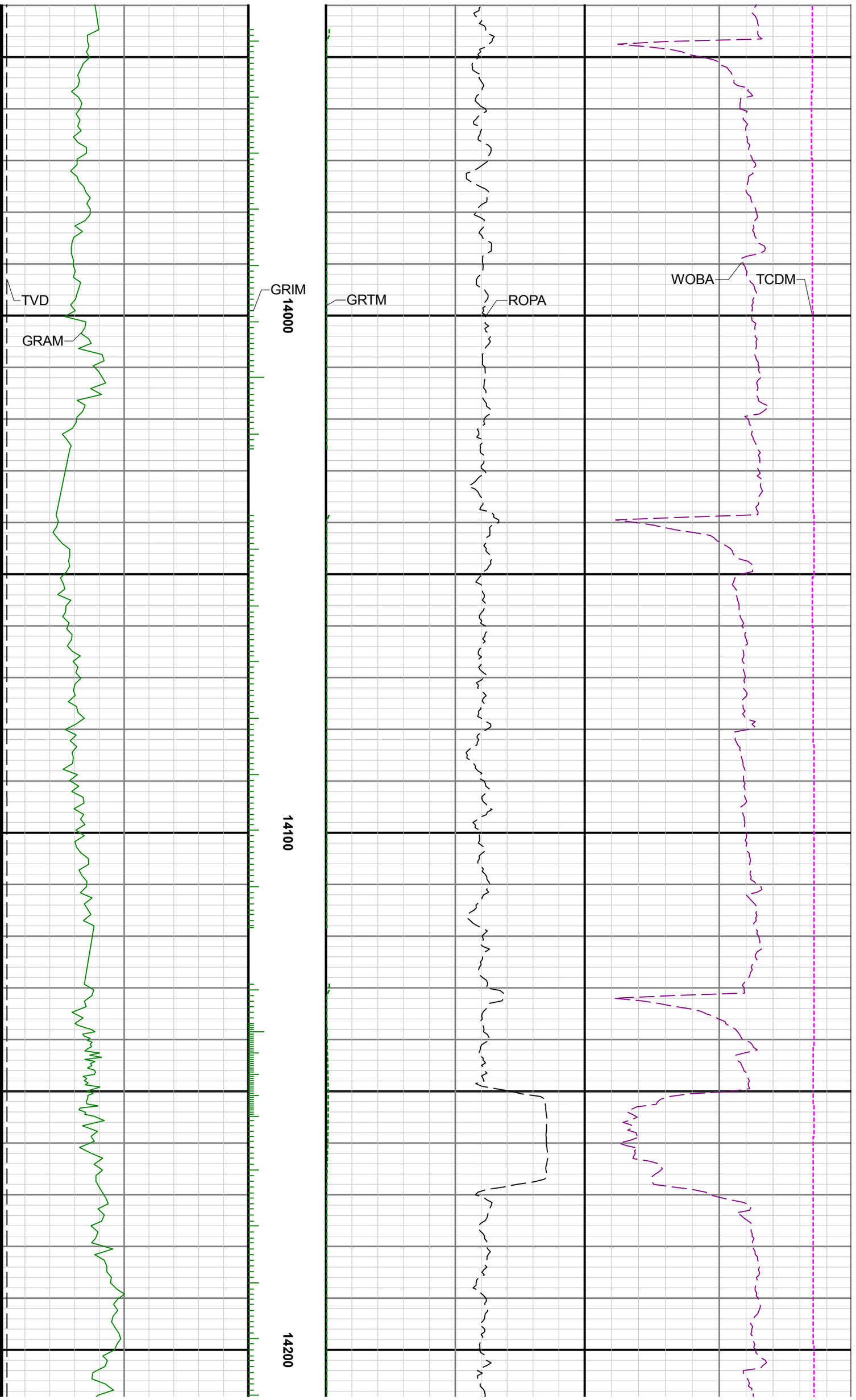
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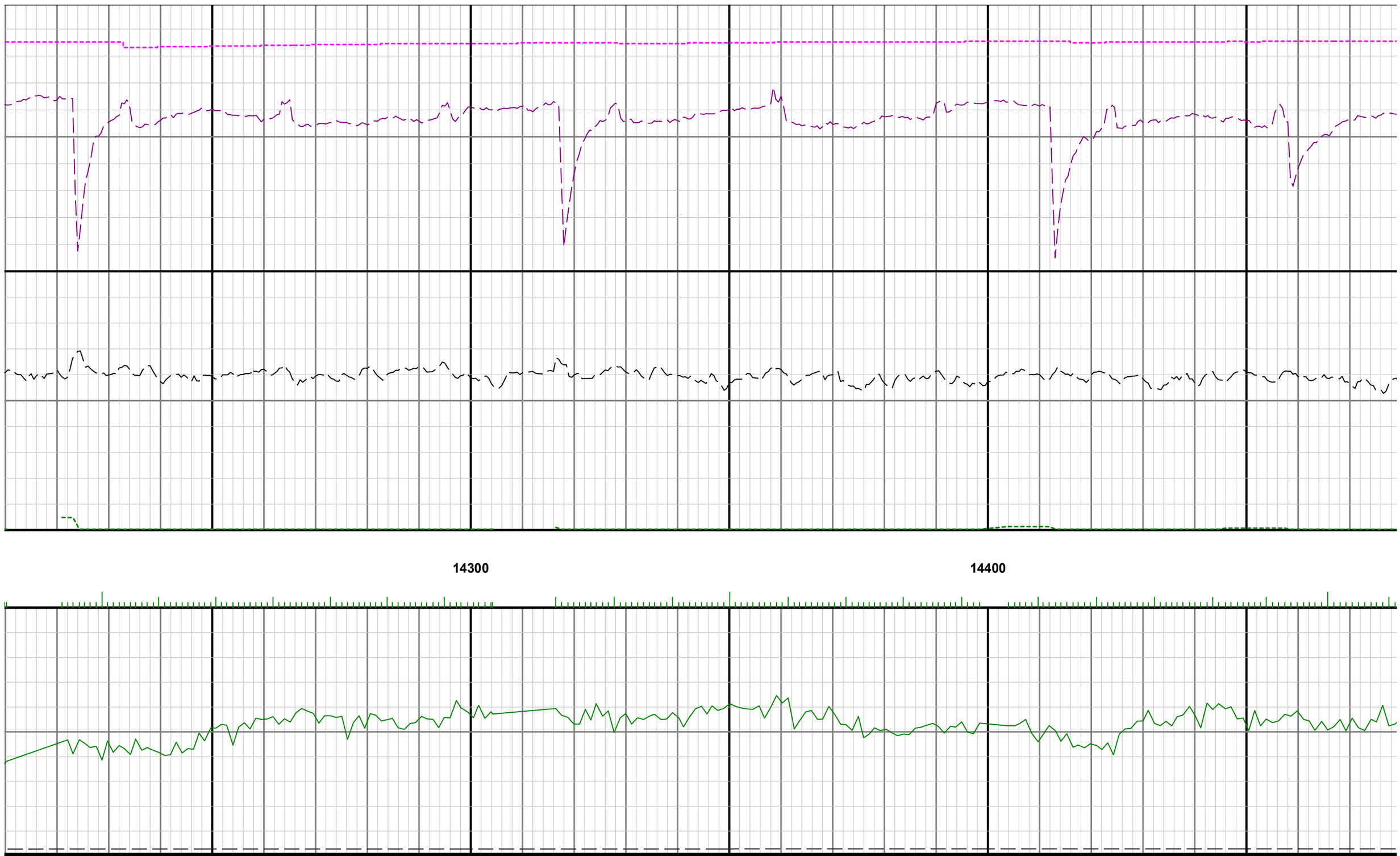
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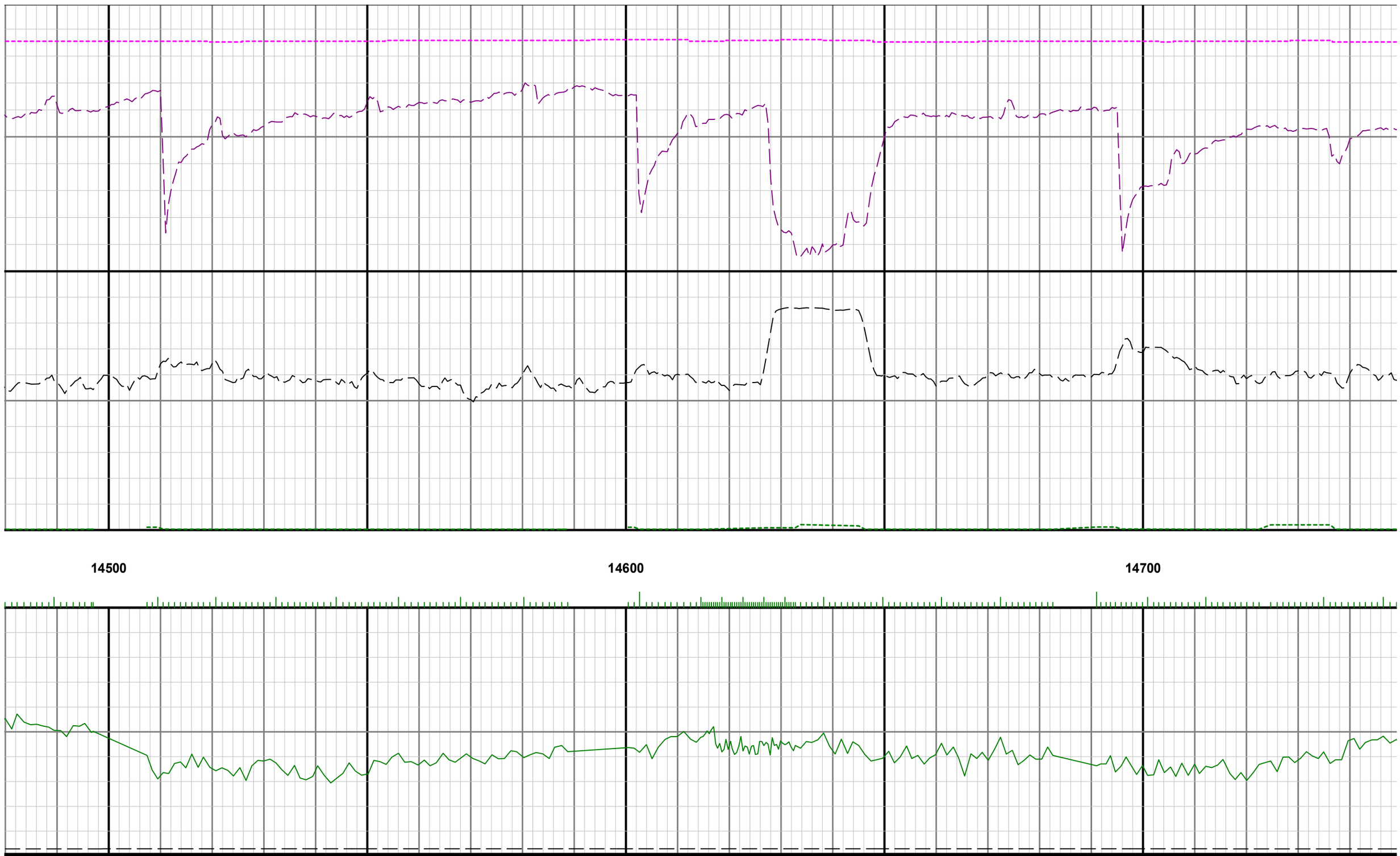
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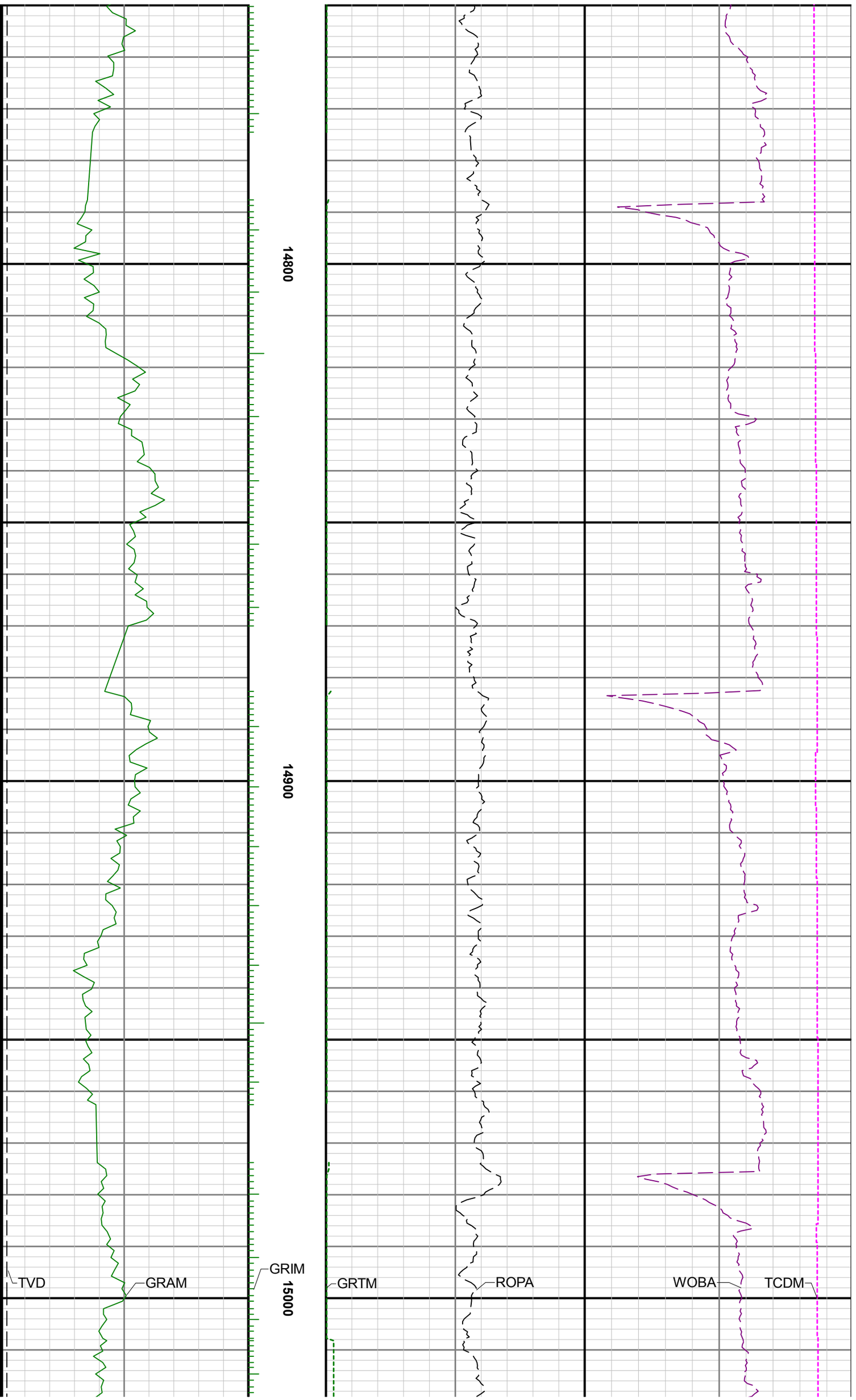
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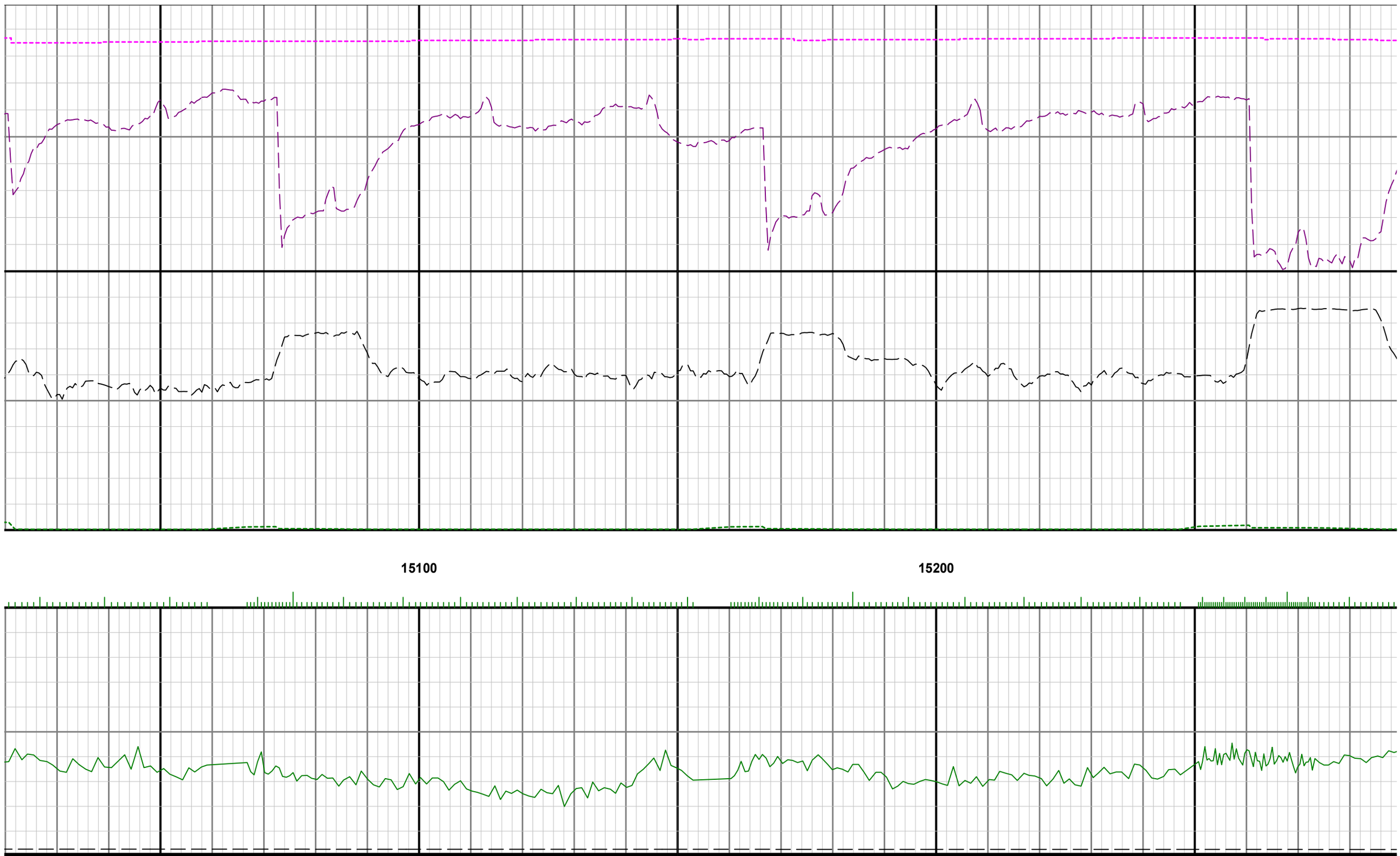
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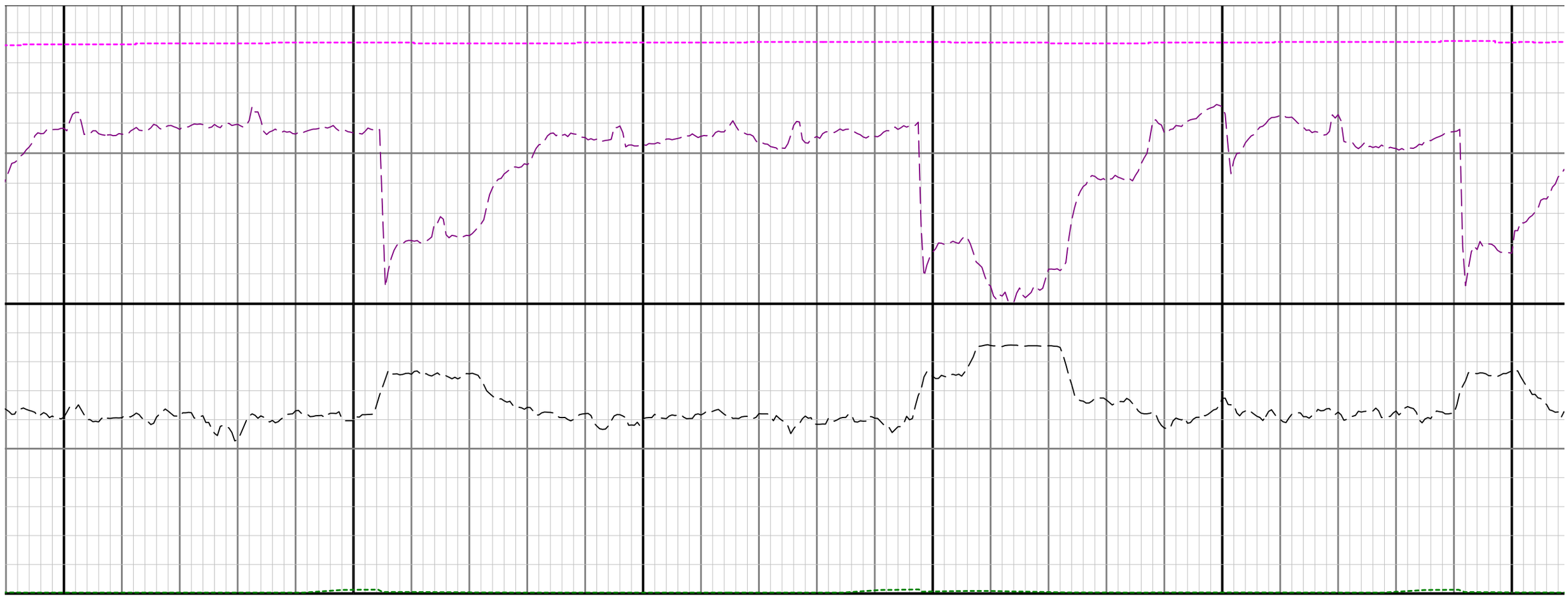

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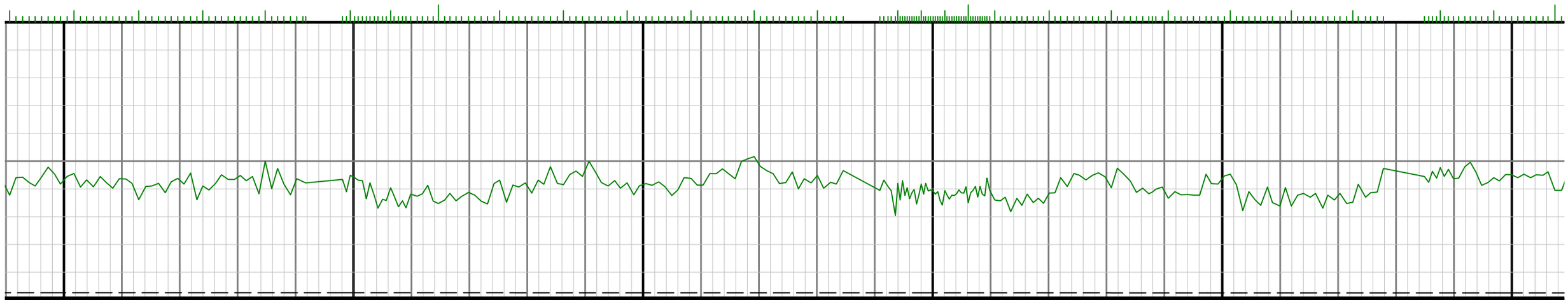

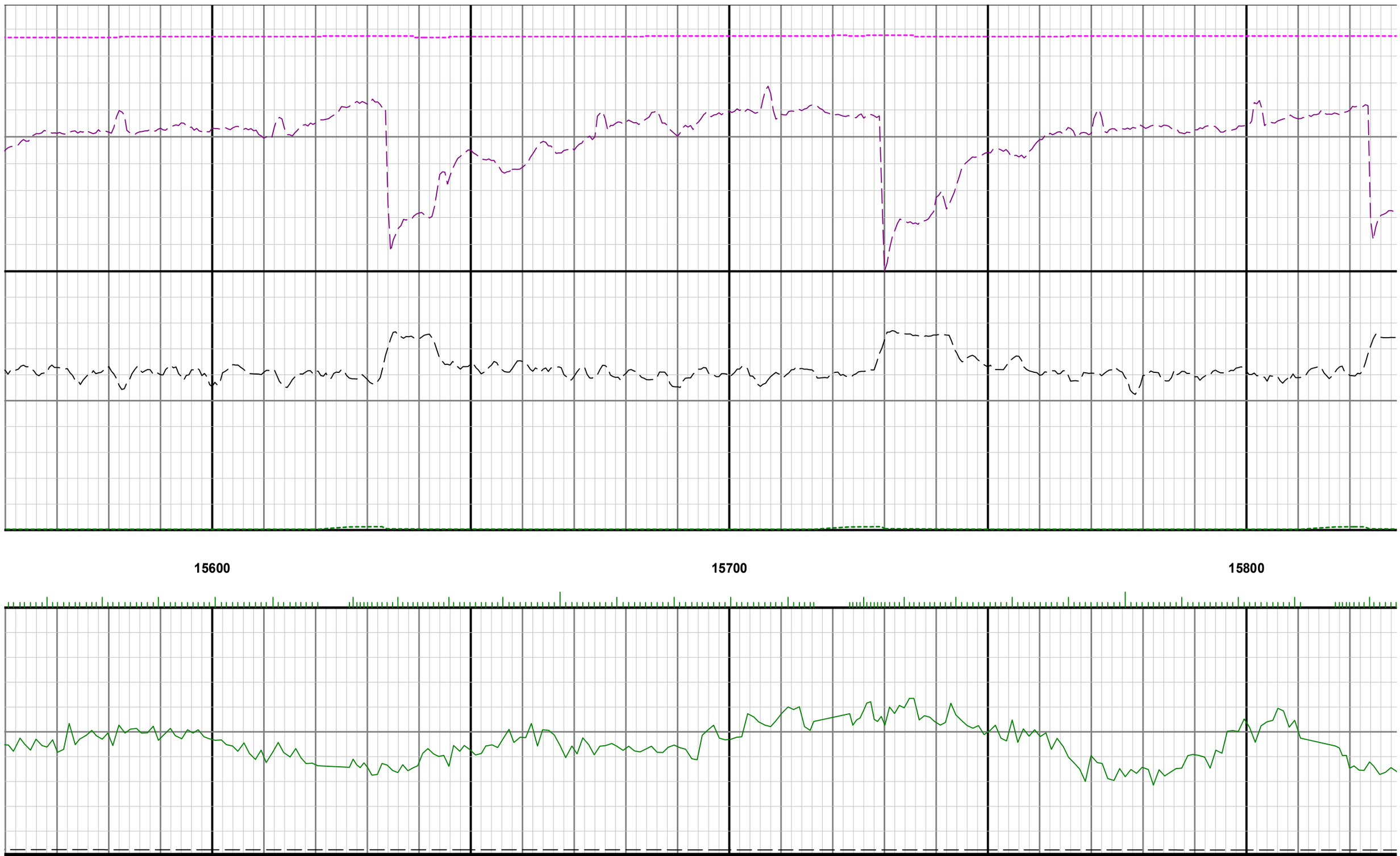
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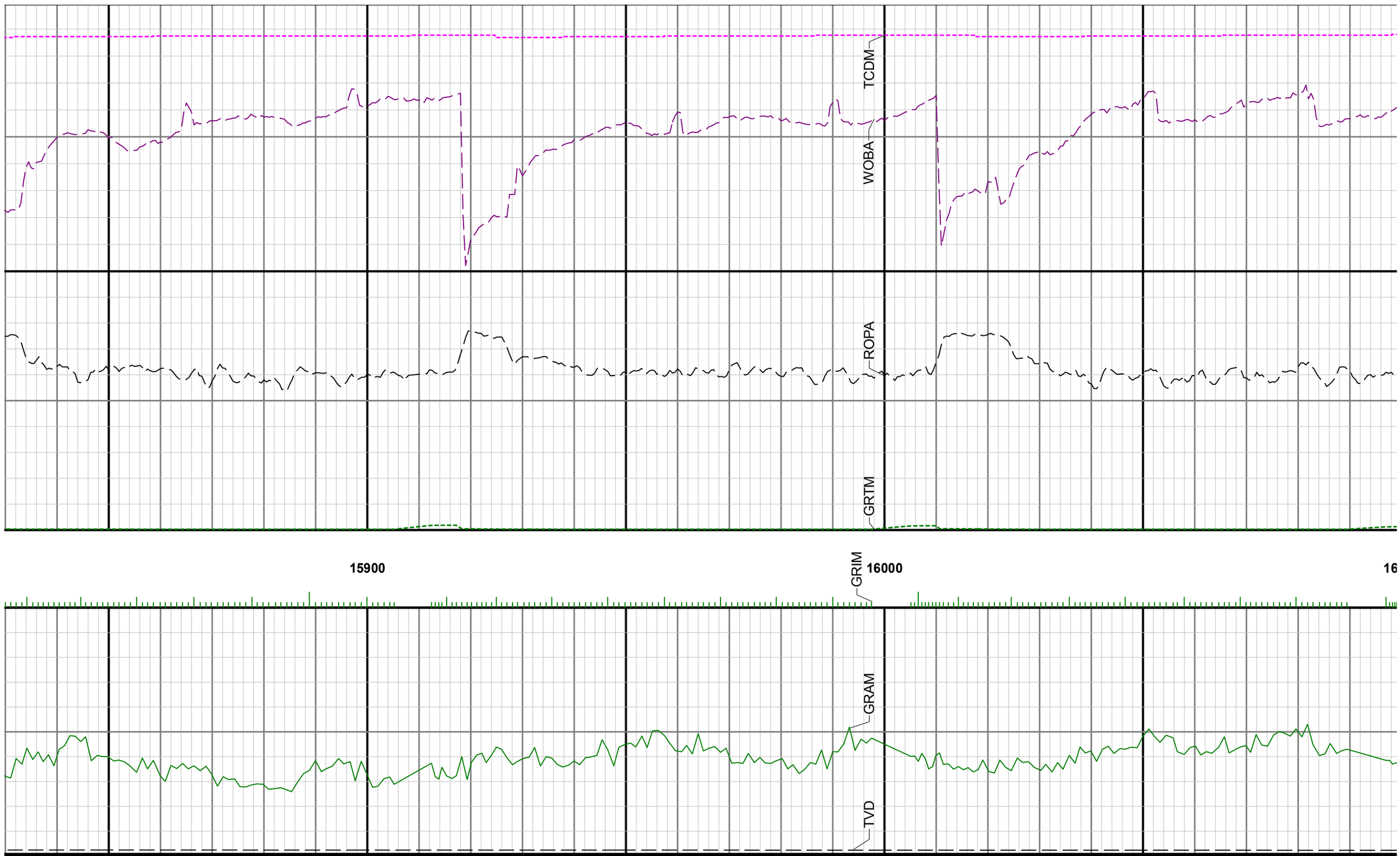
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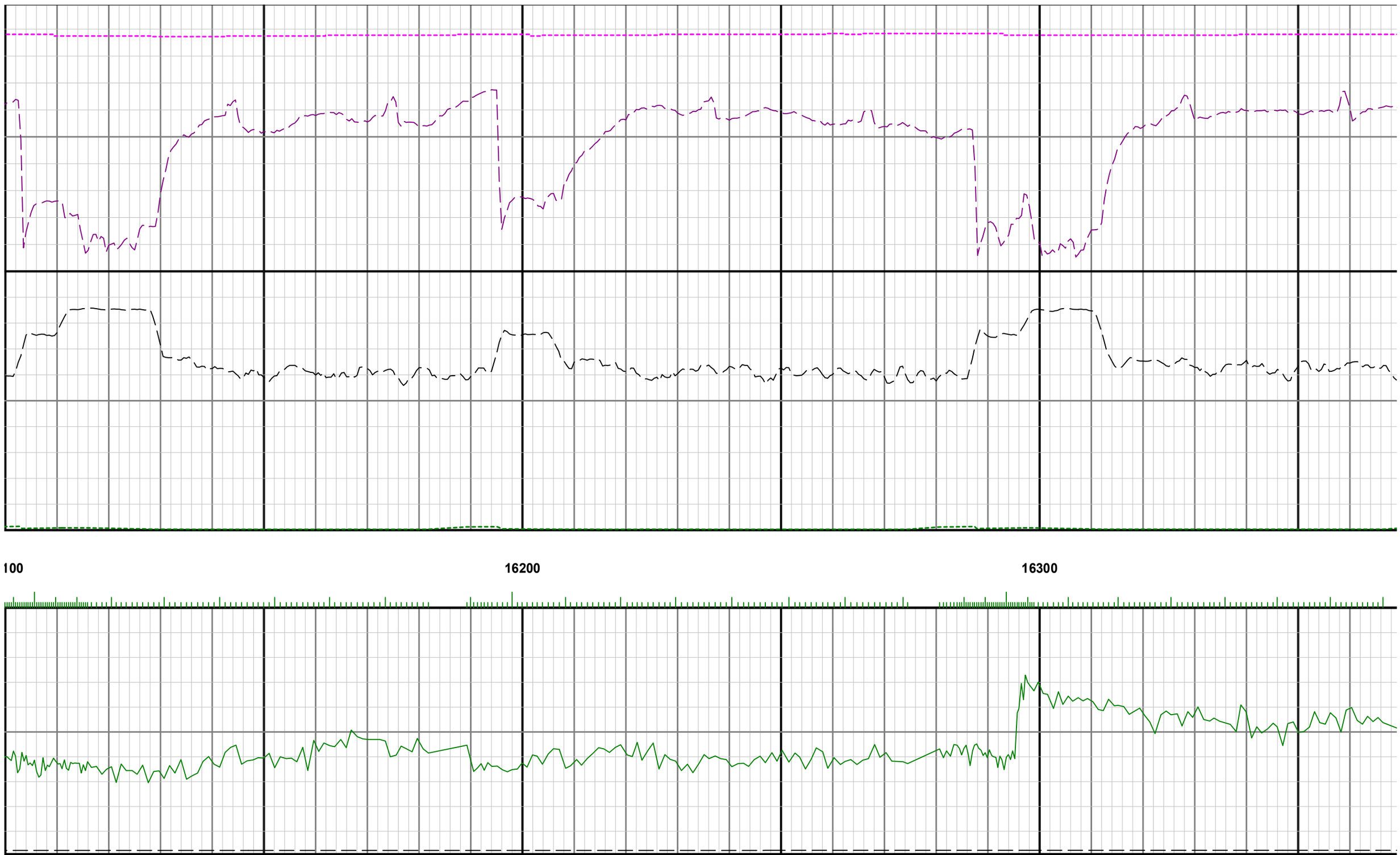
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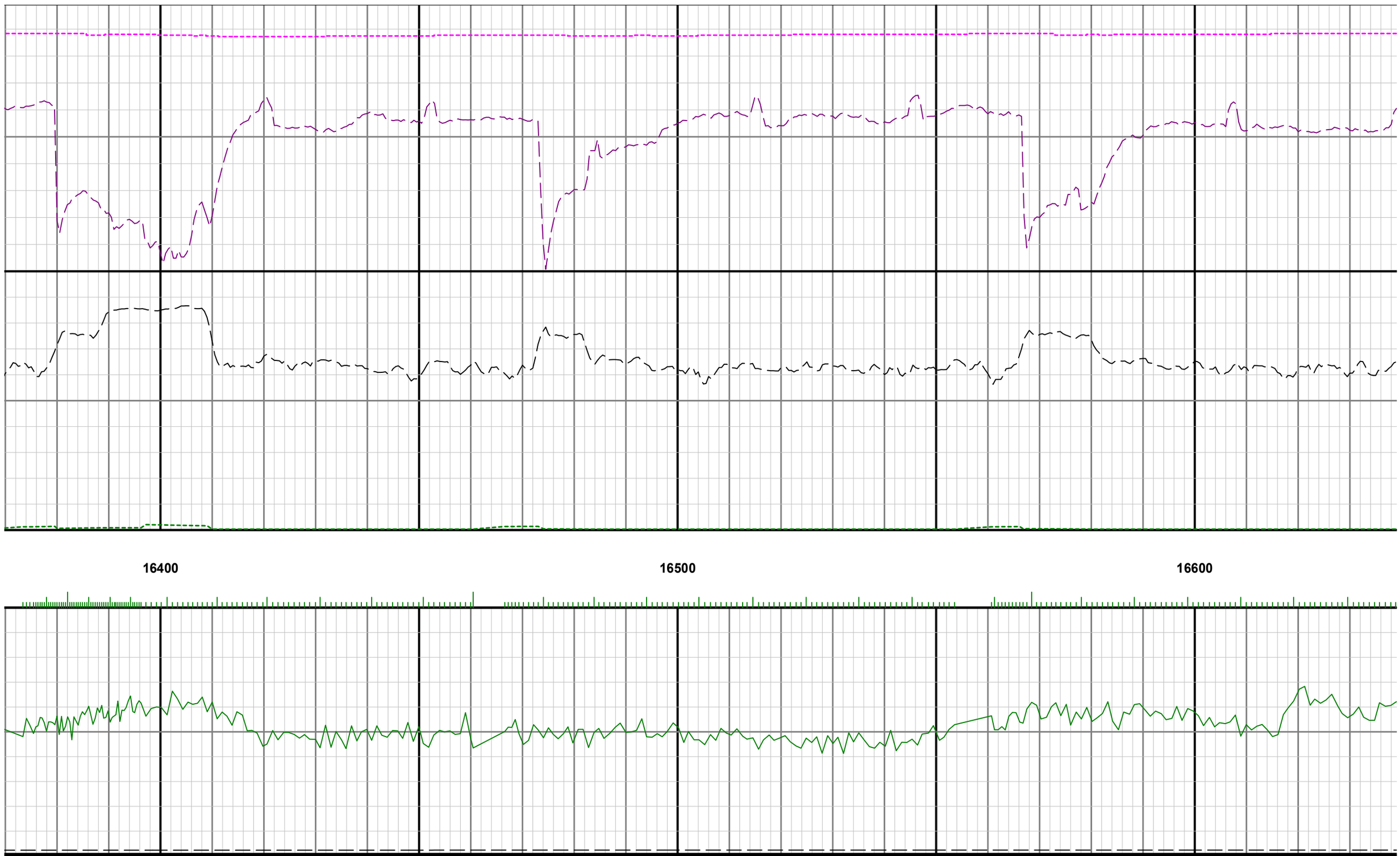
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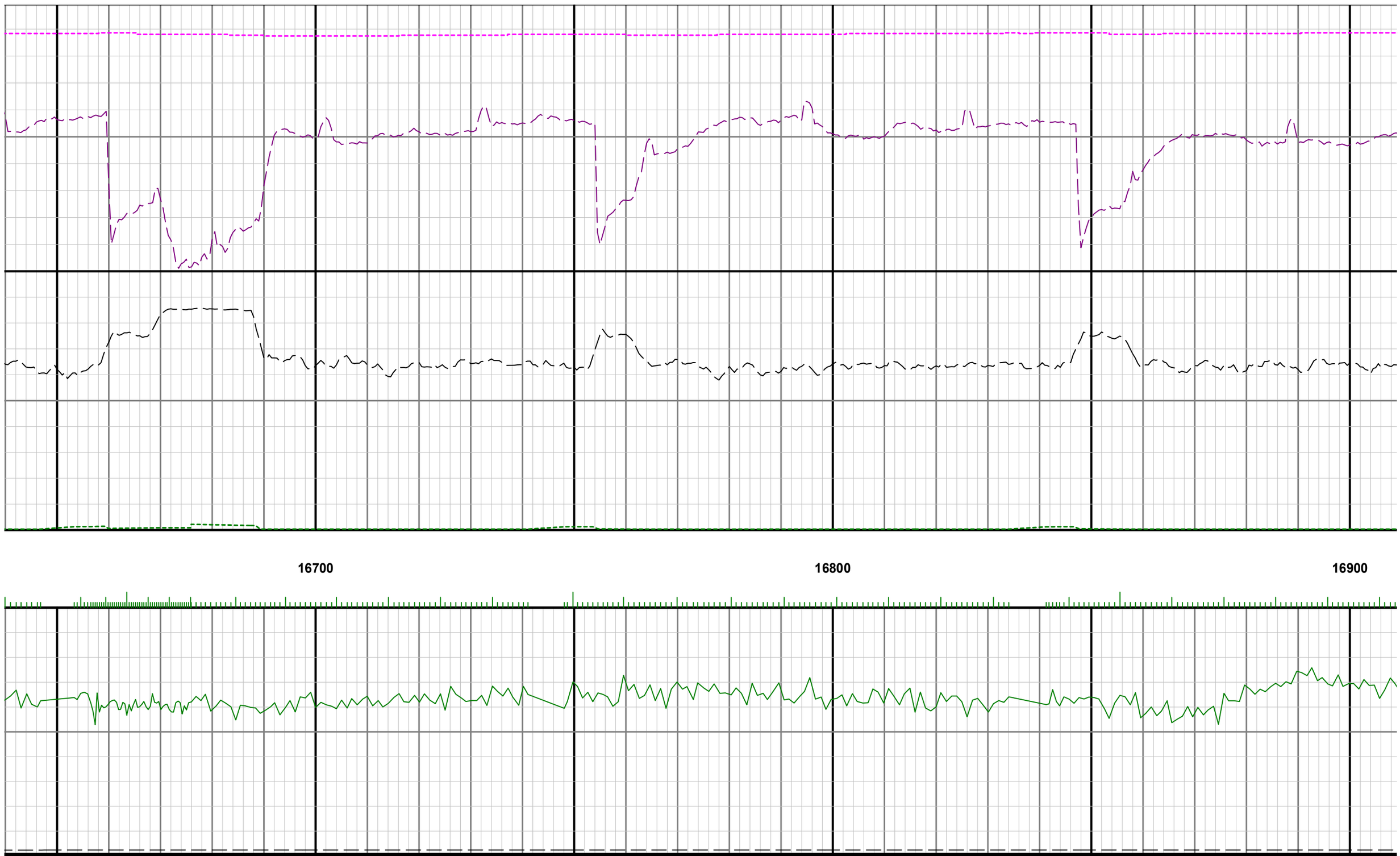
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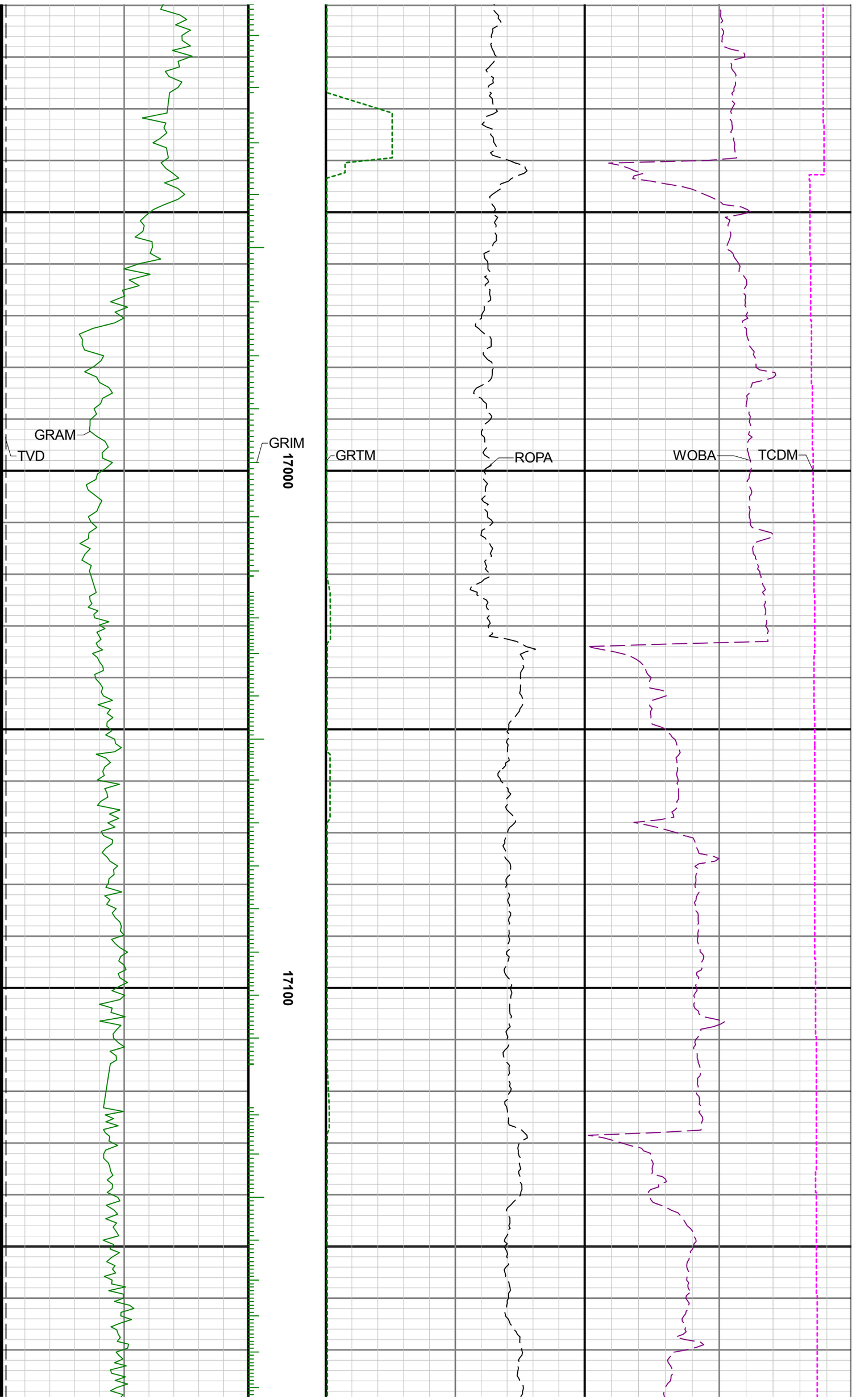
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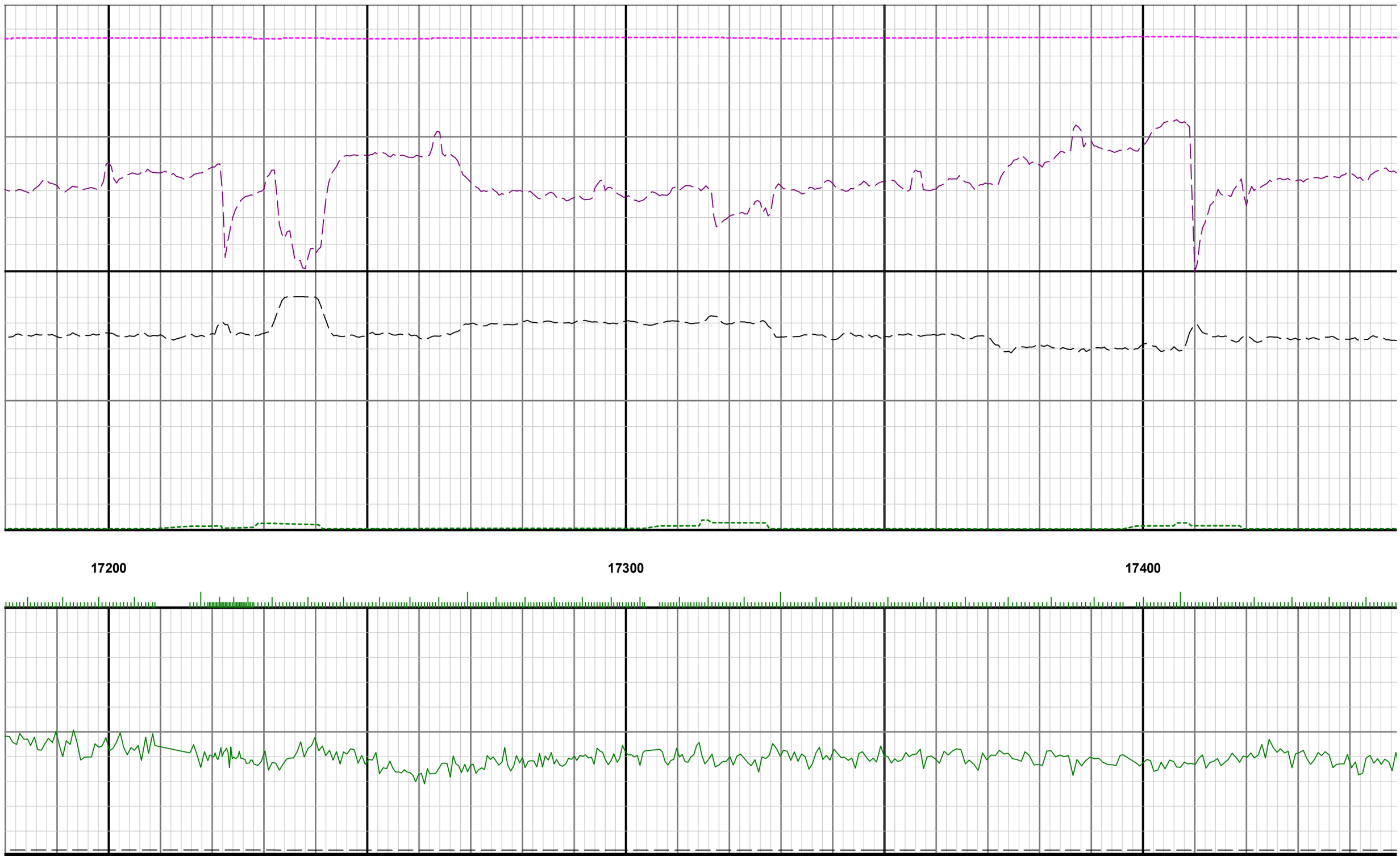
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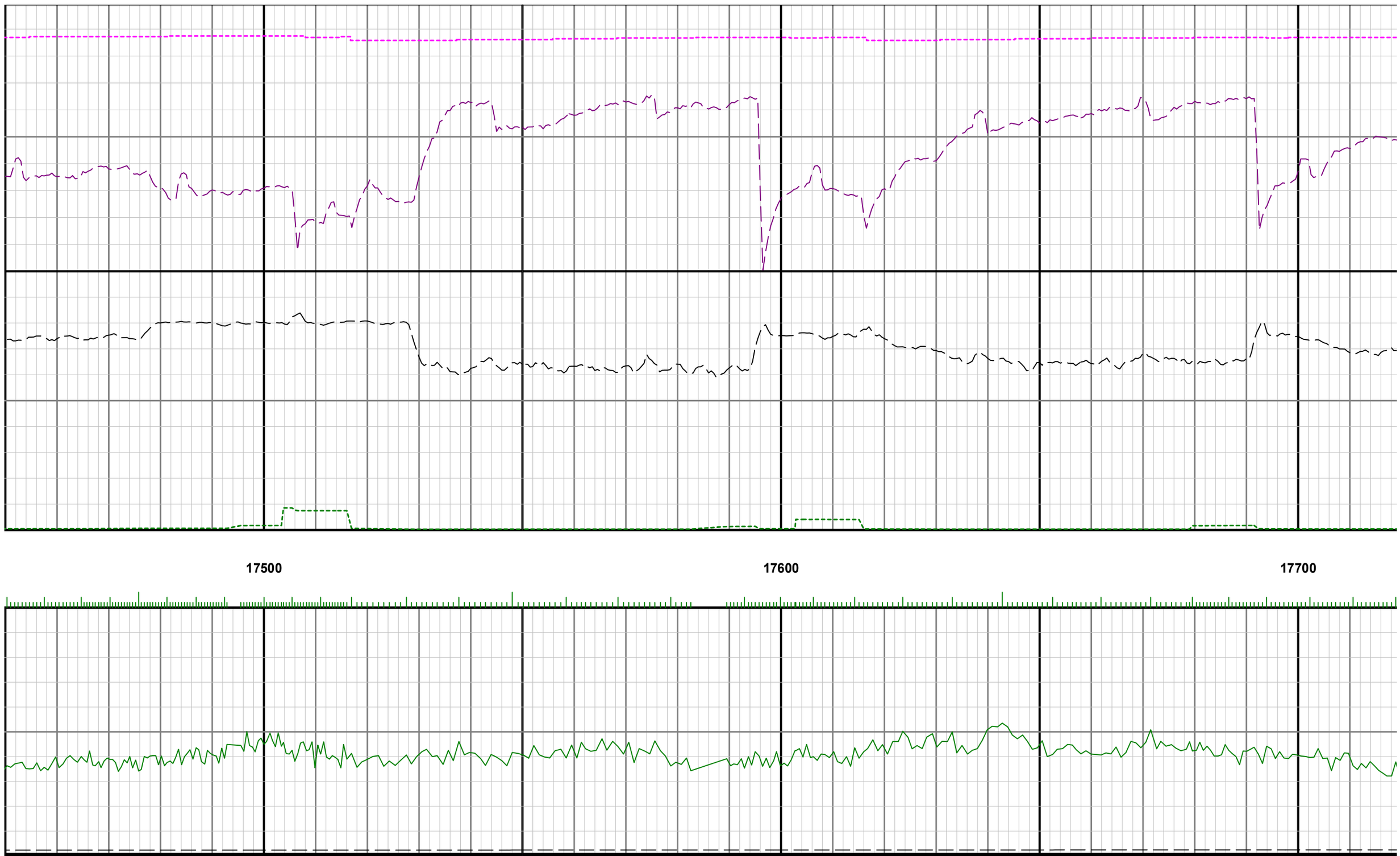
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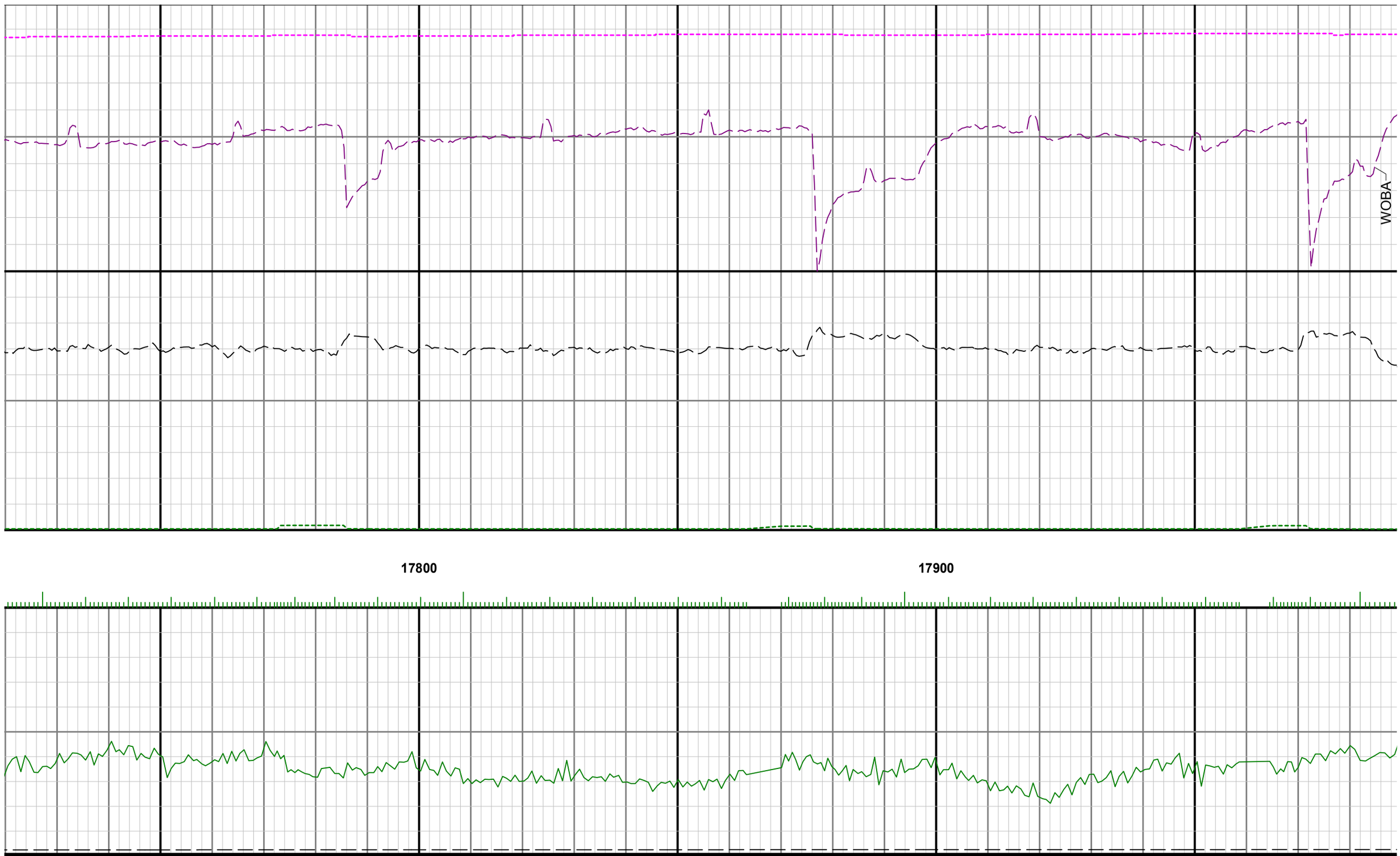
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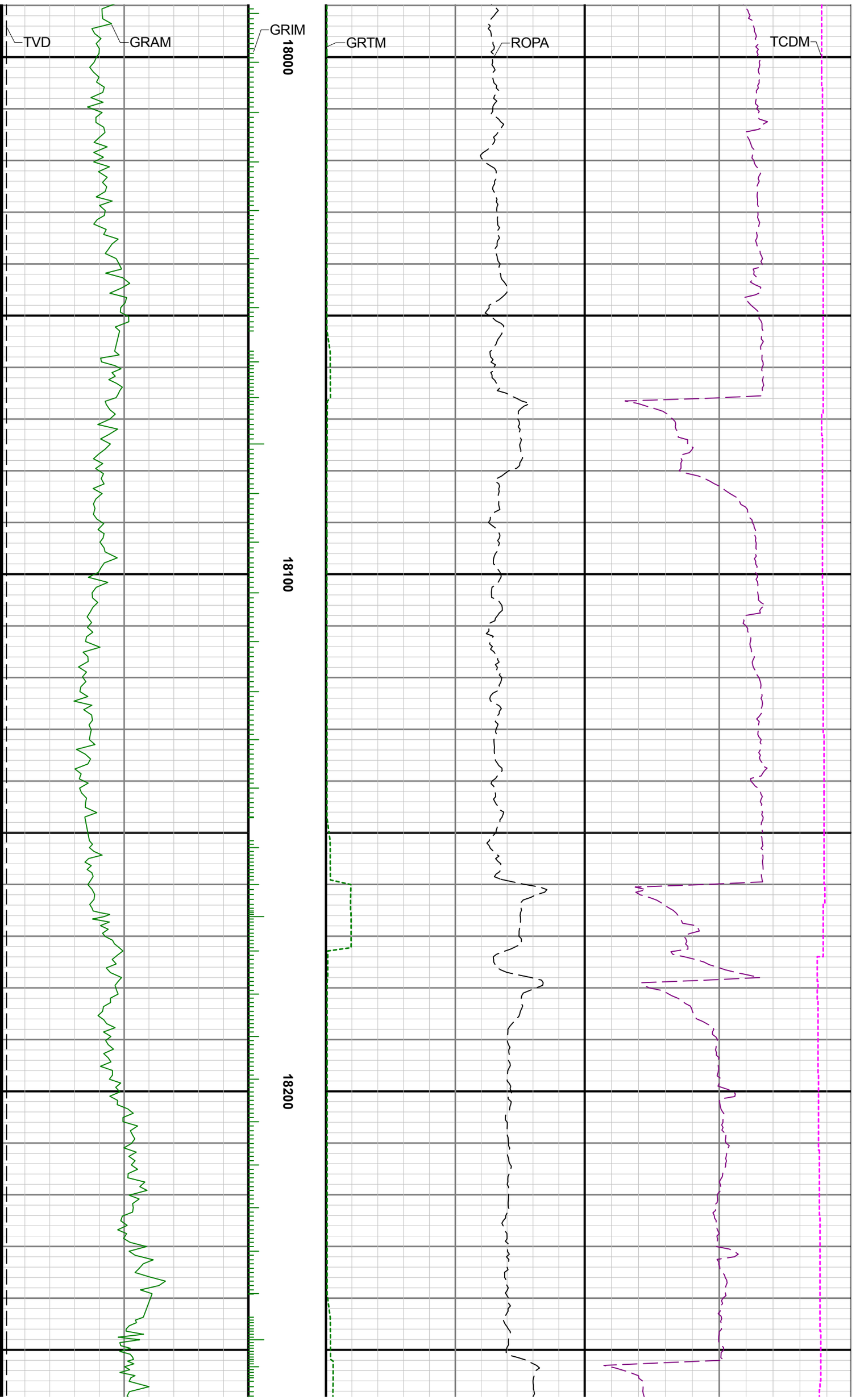
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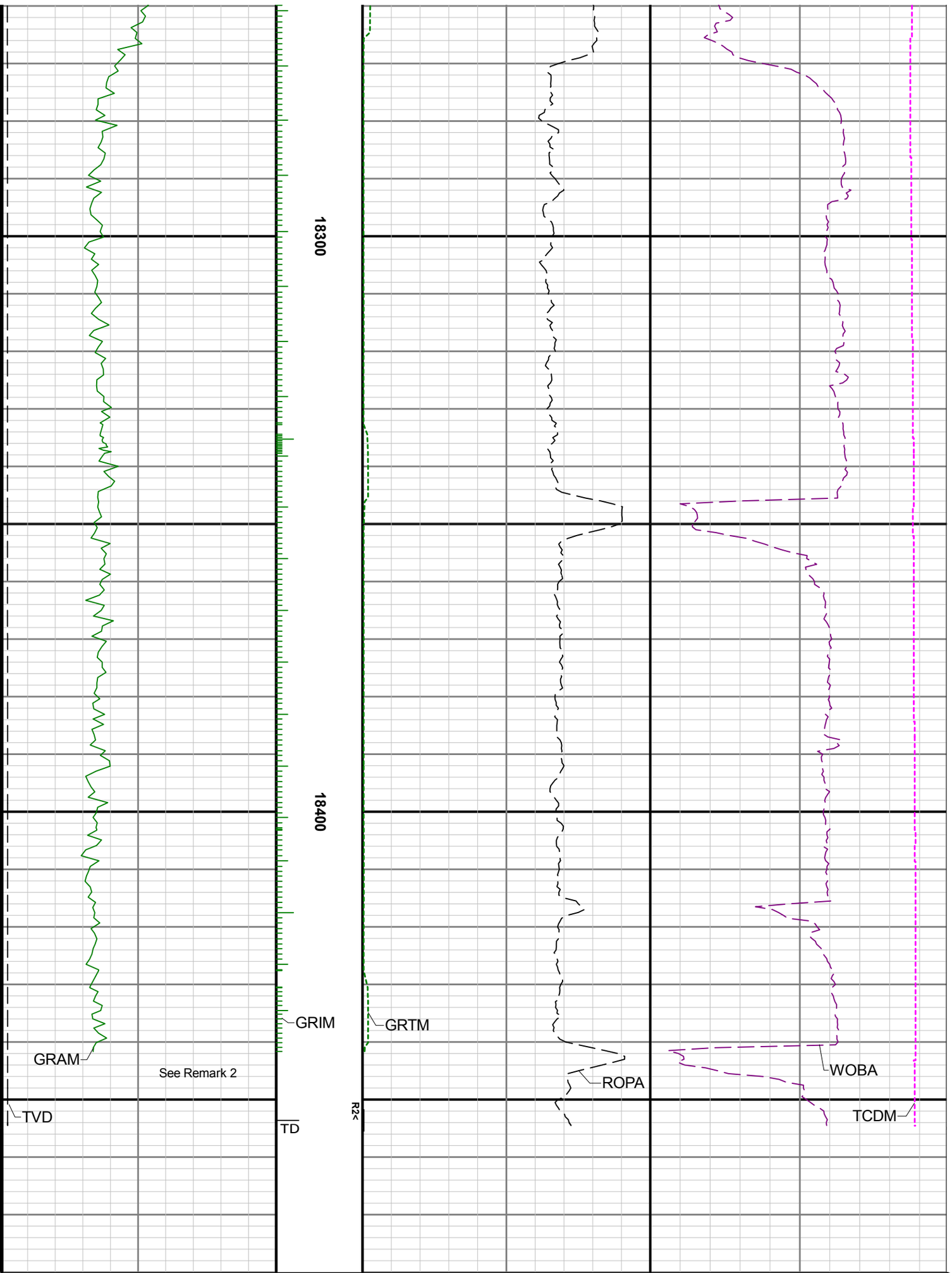

Gamma Ray - Apparent 0.5 ft Average GRAM		Gamma Time Since Drilled GRTM	Weight On Bit, Average 1 ft Average WOBA
0 — 300		0 — 600	0 — 50
API		min	klb
True Vertical Depth TVD	MD 1:240 feet	Depth Averaged ROP 3 ft Average ROPA	Downhole Temperature TCDM
7000 — 1500		1000 — 0	0 — 300
ft		ft/h	degF