LWD MEMORY LOG

Baker Hughes

Gamma Ray

Scale: **1:240 Measured Depth**

Depth Reference: **Driller's Depth**

Status: **Final Print**

API No: 05-123-49077-00

Job ID: 111272873

Company: Noble Energy

Well: Guttersen D12-755

Field: Wattenberg

County: WELD **Country:** United States

State: Colorado

Surface Location:

Latitude: 40° 15' 39.096" N

Longitude: 104° 30' 09.756" W

SEC: 1 TWN: 3N RGE: 64W

Other Services: Directional

Permanent Datum (P.D.): Mean Sea Level Elevation: 4745.00 ft

Log Measured From: Rig Floor Above P.D.: 4775.00 ft

Elev. KB: 4775.00 ft
Elev. DF: 4775.00 ft
Elev. GL: 4745.00 ft

Dates

From: 2022-05-04
To: 2022-05-08
Spud: 2022-05-04

Interval

Drilled (ft)		Logged (ft)	
Top:	1950.00	Top:	1950.00
Bottom:	17374.00	Bottom:	17361.00

Magnetic Field Reference

Azi Reference North: Grid Dip Angle: (deg) 66.58

Total Magnetic Field Strength: (nT) 51790

Mag to Reference North Correction: (deg) 7.27

Borehole Record

Hole Size (in)	From (ft)	To (ft)
13.500	30.00	1950.00
8.500	1950.00	17374.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	30.00	1940.00

Mud Record

Type	From (ft)	To (ft)
Oil Based Mud	1950.00	17374.20

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
8.500	15424.20	0.49 | 339.08	89.60 | 179.96

Acquisition System / Software Version

Cadence	RT 6.4
Plot Studio	6.9.9983.2

Other

Rig: H&P 517
Contractor: Helmerich & Payne Drilling Co
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	8.500	PDC	3.00	AutoTrak Curve	1950.00	14823.00	1950.00	14835.00	2022-05-04 20:22	2022-05-07 02:26	46.41
2	2	8.500	PDC	3.00	AutoTrak Curve	14823.00	17361.00	14835.00	17374.00	2022-05-07 18:15	2022-05-08 14:09	19.20

Crew

Name	Arrive Wellsite	Depart Wellsite
Tien Bui	2022-05-03	2022-05-09

Mud Properties Record

Date / Time	Run No.	Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2022-05-03 20:03	1	1950.00	Oil Based Mud	9.3	10	N/A	18.5	79.5/20.5	Active Pit	25000	N/A
2022-05-07 03:14	1	9565.00	Oil Based Mud	9.9	15	N/A	17.6	80.5/19.5	Active Pit	28500	N/A
2022-05-07 05:17	1	14835.00	Oil Based Mud	9.9	15	N/A	16.8	80.8/19.2	Active Pit	28500	N/A
2022-05-07 11:13	2	14835.00	Oil Based Mud	9.9	15	N/A	16.8	80.8/19.2	Active Pit	28500	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	AutoTrak Curve Steering Unit	12194649	Near Bit Inclination	5.93	6.74	7.000	4.330
1	AutoTrak Curve Steering Unit	12194649	Near Bit VSS	5.93	6.74	7.000	4.330
1	AutoTrak Curve MWD	14305965	Gamma (single)	2.79	12.91	7.000	3.250
1	AutoTrak Curve MWD	14305965	Directional (mag)	12.27	22.39	7.000	3.250
2	AutoTrak Curve Steering Unit	15082648	Near Bit Inclination	5.93	6.78	7.000	4.330

2	AutoTrak Curve Steering Unit	15082648	Near Bit Inclination	5.93	6.78	7.000	4.330
2	AutoTrak Curve MWD	14275758	Gamma (single)	2.84	12.95	7.000	3.250
2	AutoTrak Curve MWD	14275758	Directional (mag)	12.27	22.38	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC SU	AutoTrak Curve SU	Auto Trak Curve Steering Unit
ATC MWD	AutoTrak Curve MWD	Auto Trak Curve MWD
ATC LCPM	AutoTrak Curve LCPM	Auto Trak Curve LCPM

Comments

1 Baker Hughes Company runs 1 and 2 utilized 6 ¾ inch NaviGamma services (Gamma Ray and Directional) behind an 8 ½ inch PDC bit and rotary steerable assembly from 1949 to 17374 feet MD (1949 to 6645 feet TVD).

2 The Gamma Ray Apparent (GRAM) data is presented 0 to 300 API, per the customer's request.

3 Various gaps were not logged due to tool issue unable to power up.

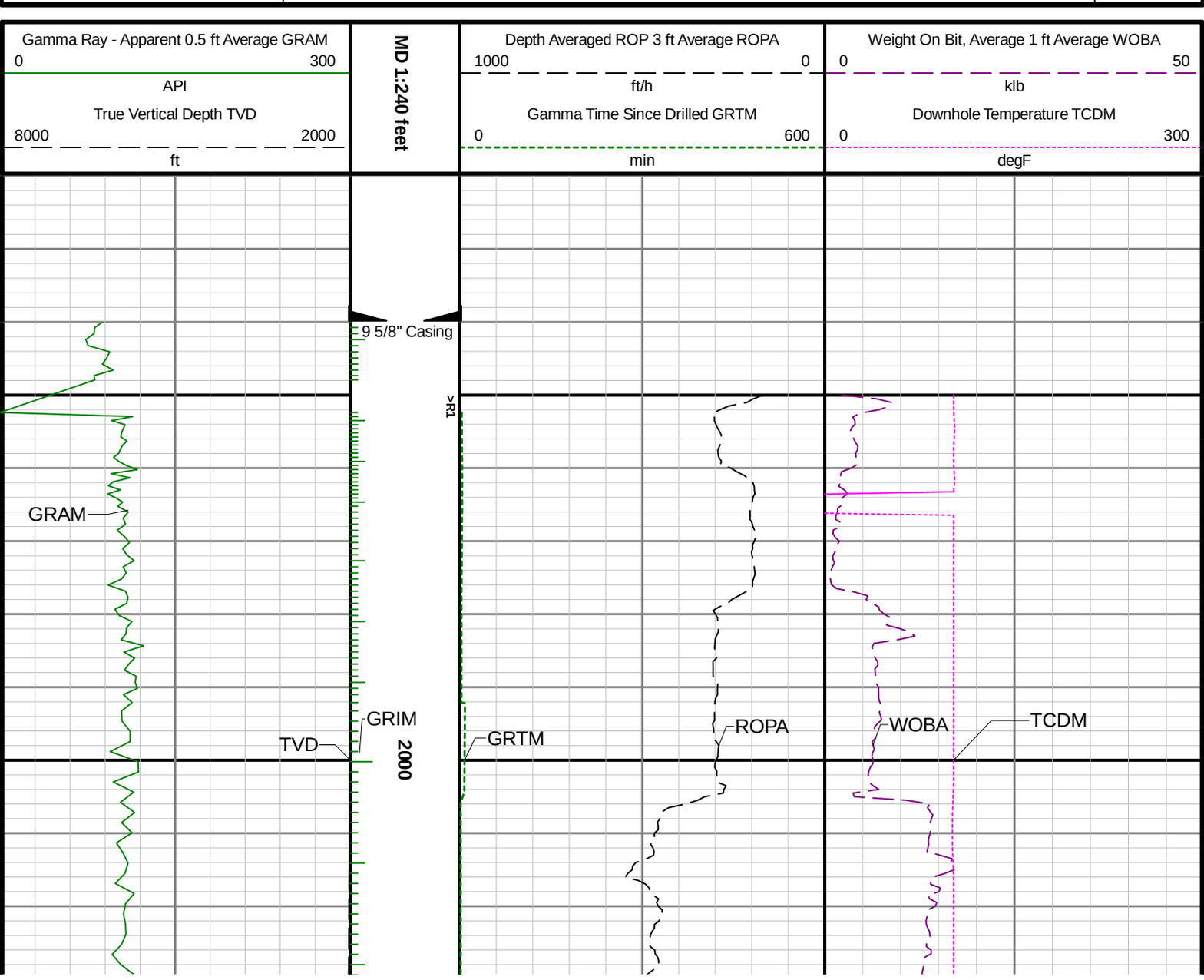
4 Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to a lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified and the unverified depths as supplied to Baker Hughes are being used to present logging data.

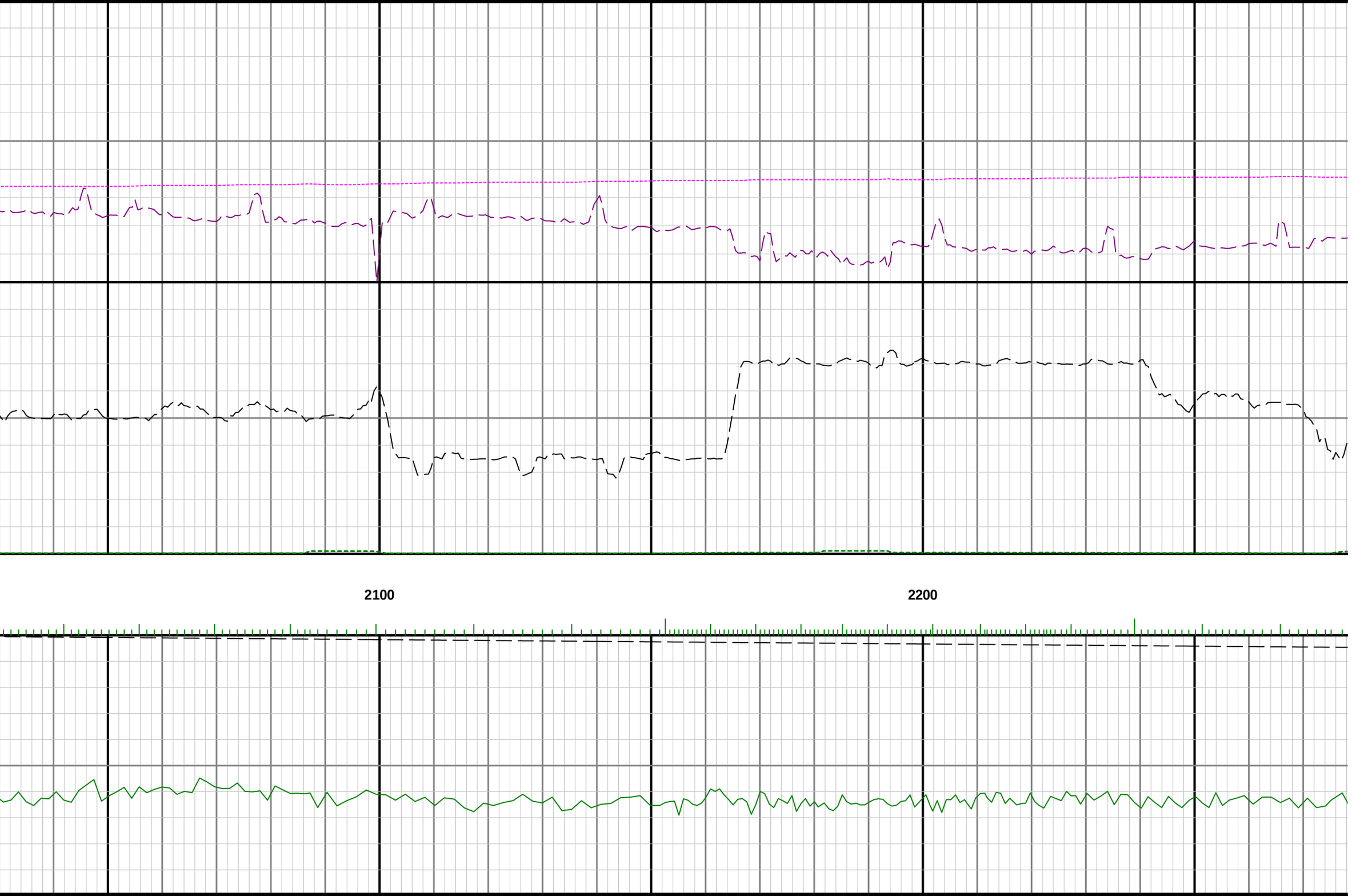
Remarks

Number	Depth (ft)	Hole Section (in)	Run No.	Remark
1	14823.00	8.500	2	The interval from 14823 to 14835 feet MD (6647 to 6647 feet TVD) was logged up to 16 hours after being drilled due to a trip out of the hole for MWD tool failure.
2	16824.00	8.500	2	The interval from 16824 to 16926 feet MD (6644 to 6644 feet TVD) was not logged due to tool issue unable to power up.
3	17020.00	8.500	2	The interval from 17020 to 17374 feet MD (6645 to 6645 feet TVD) was not logged due to tool issue unable to power up.

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
TCDM	Directional Real-Time Survey Temperature	degF

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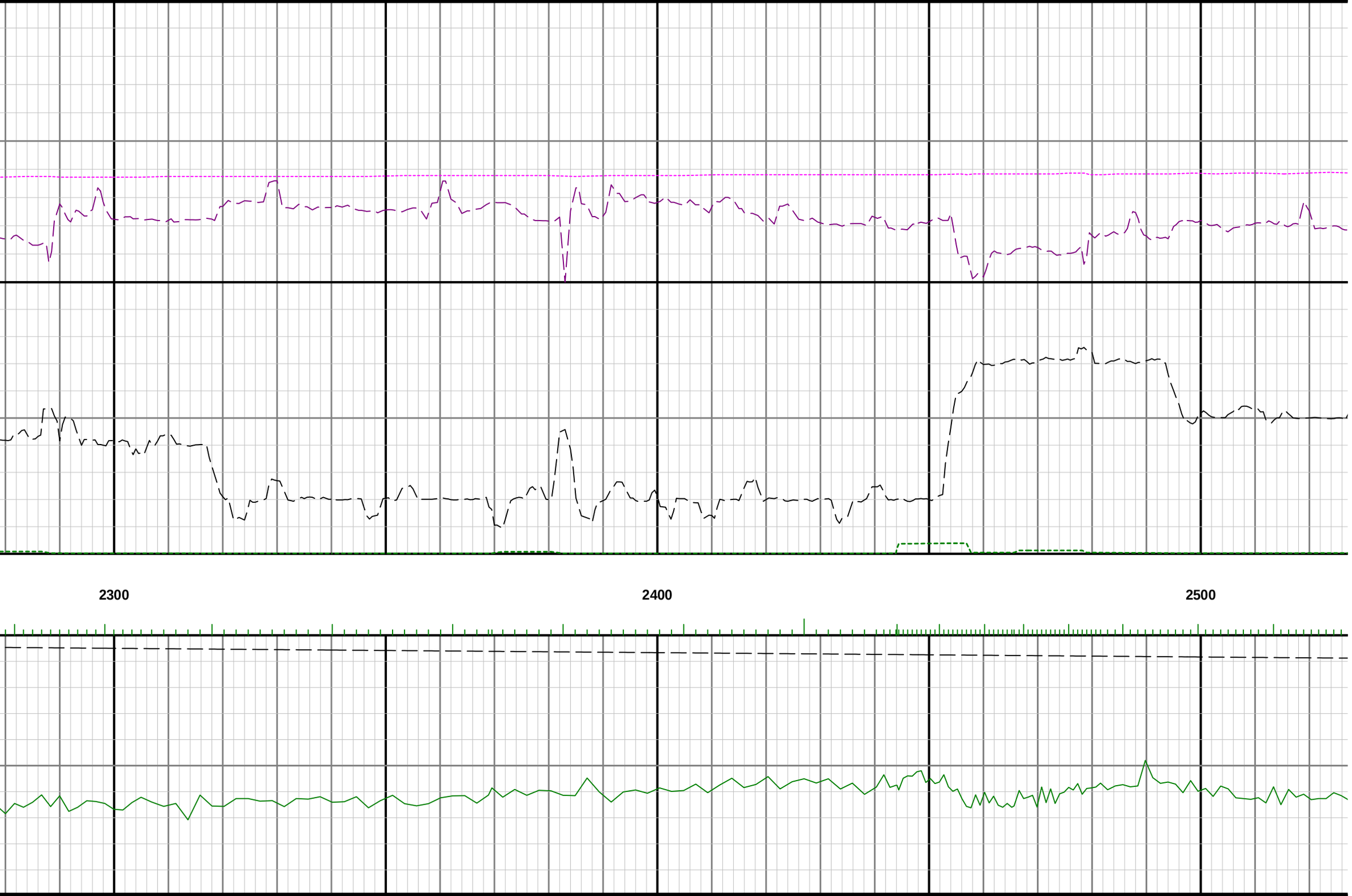
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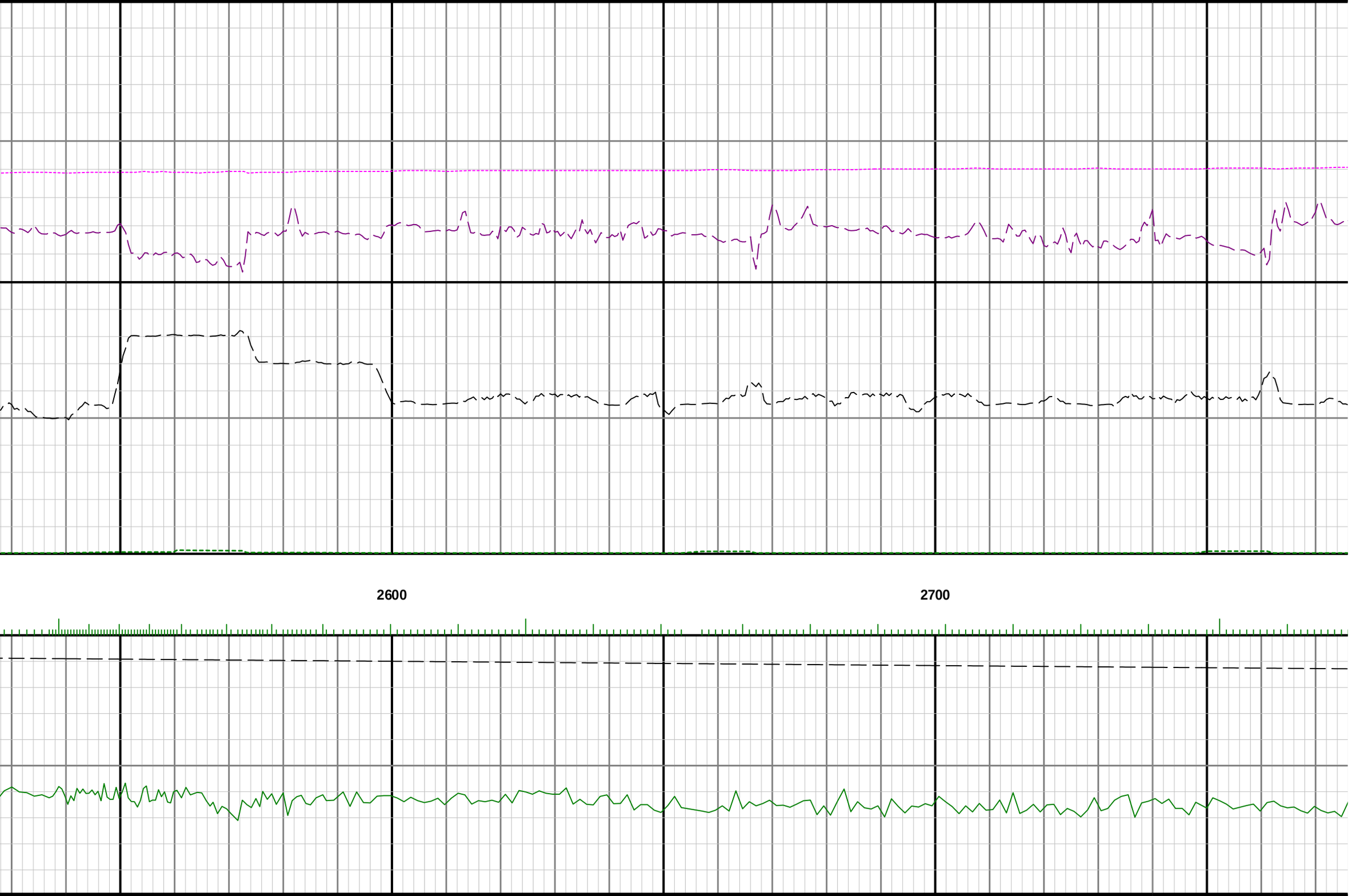
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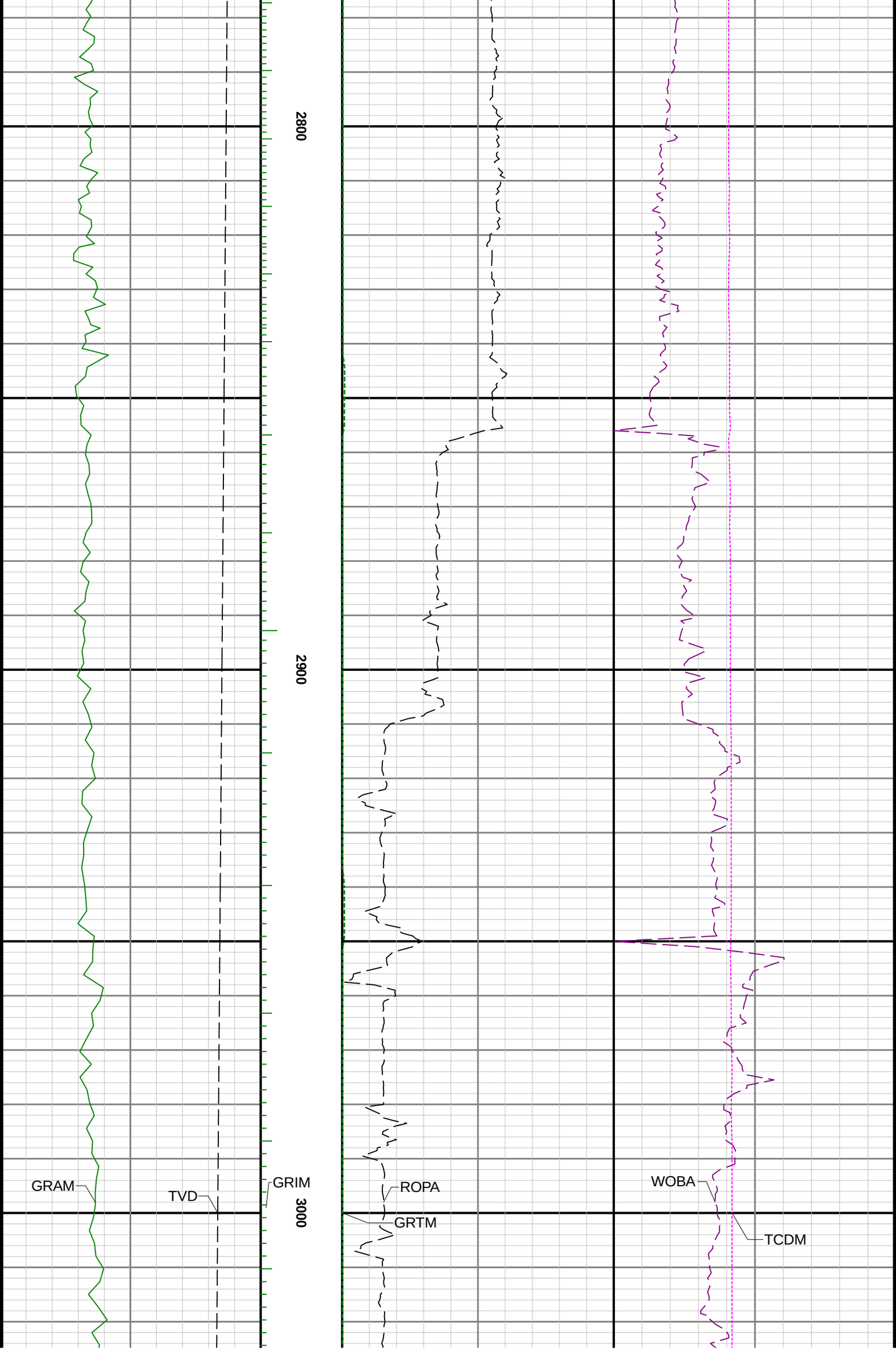
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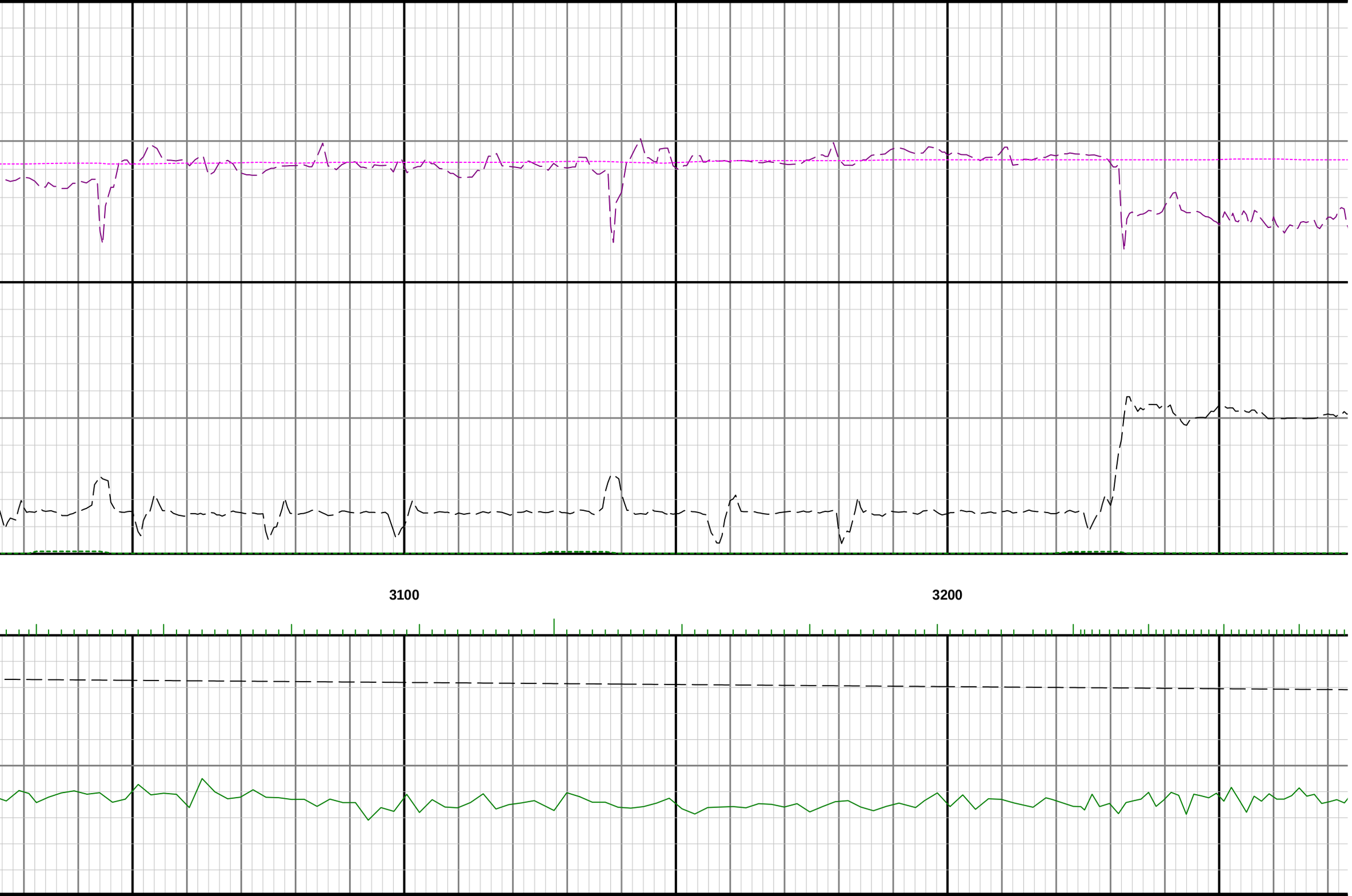
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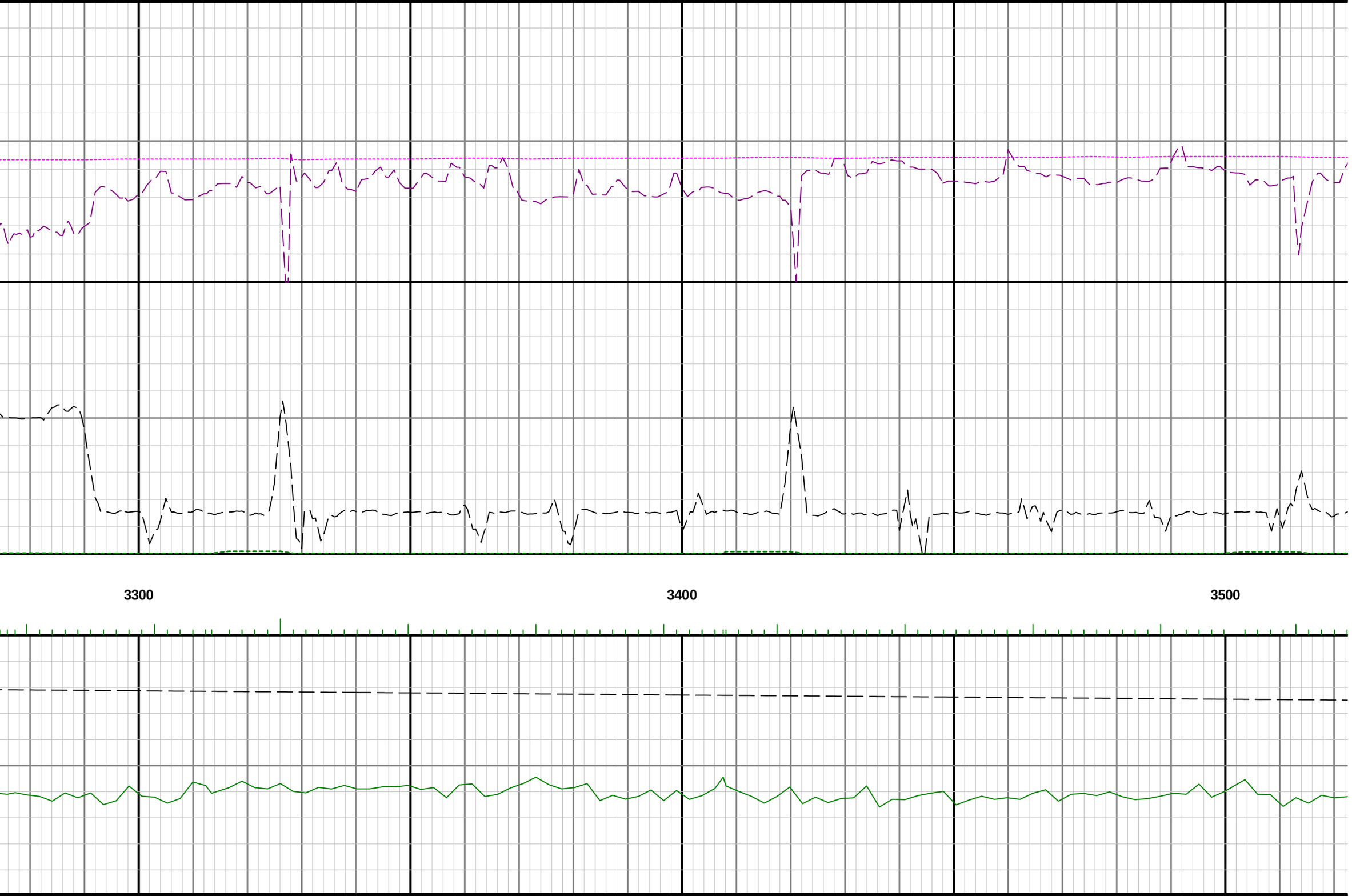
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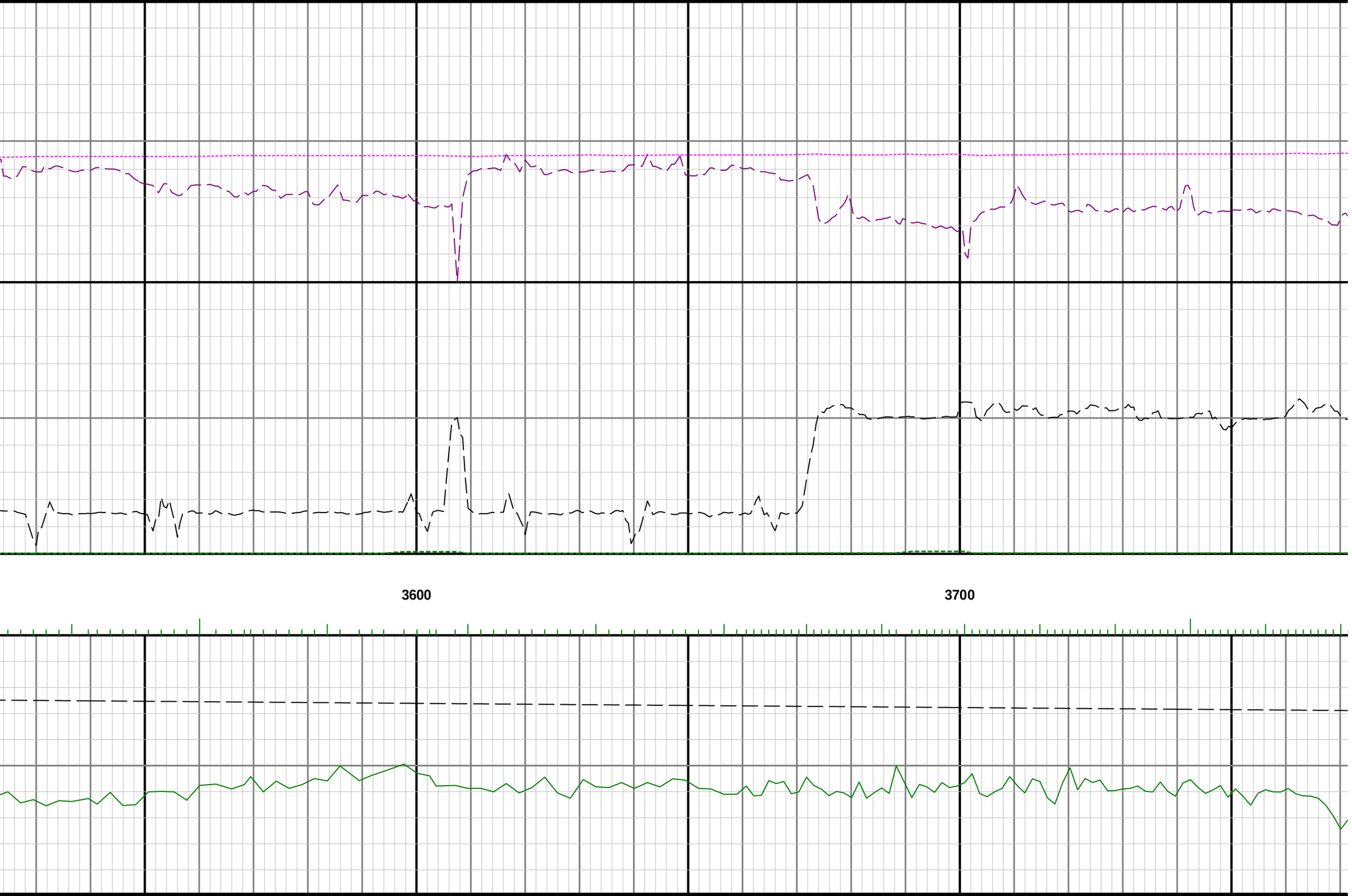
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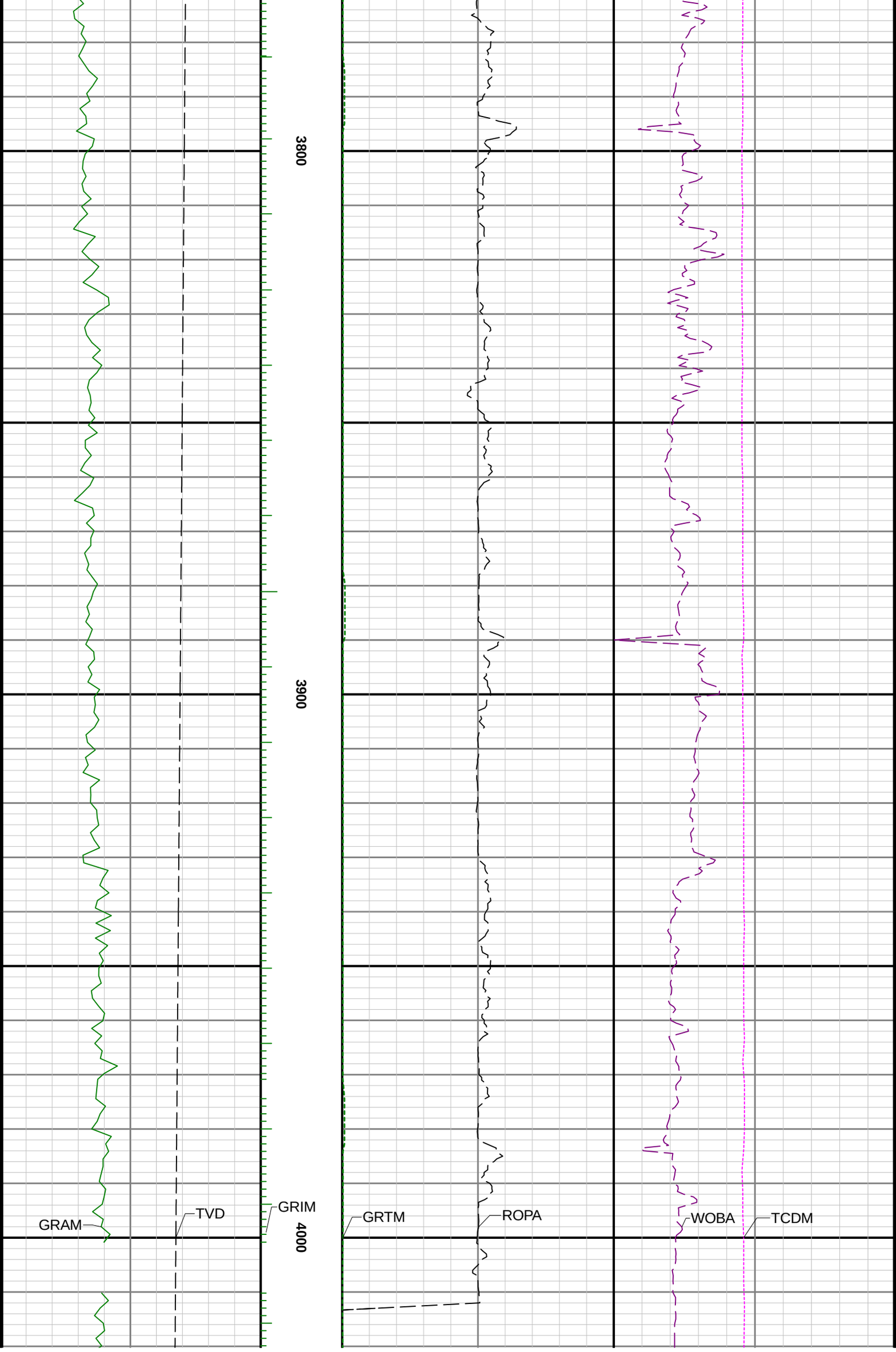
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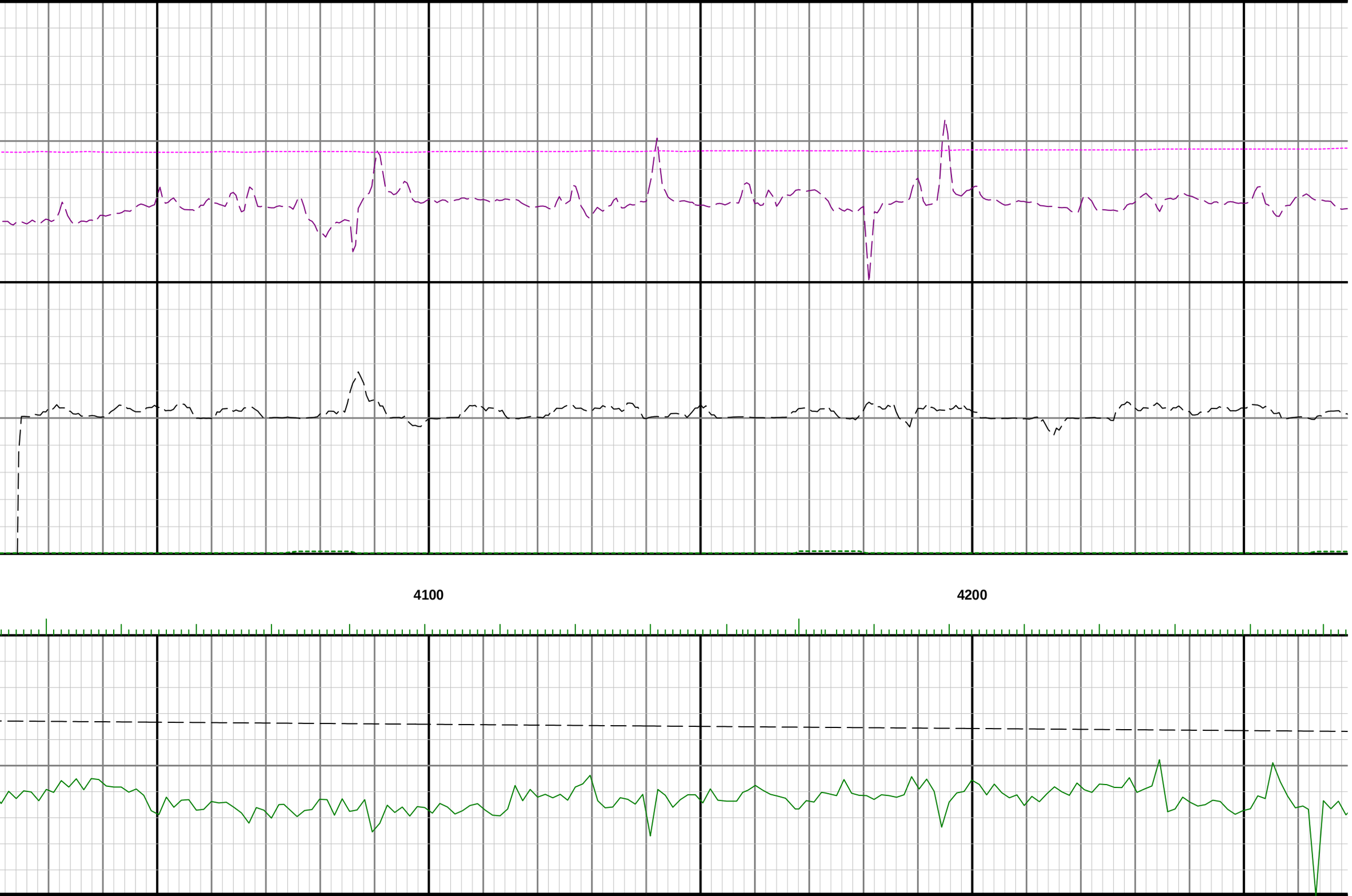
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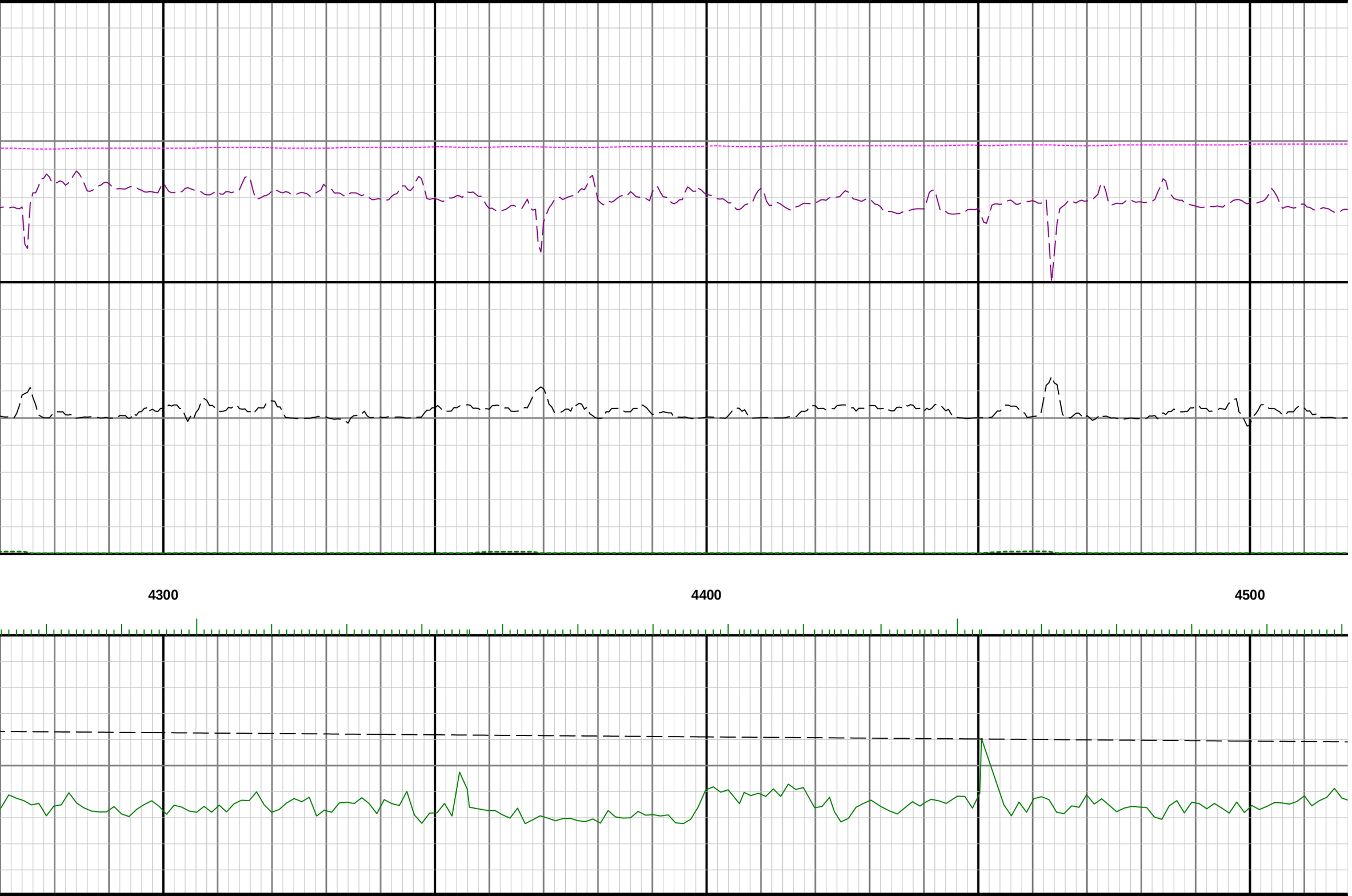
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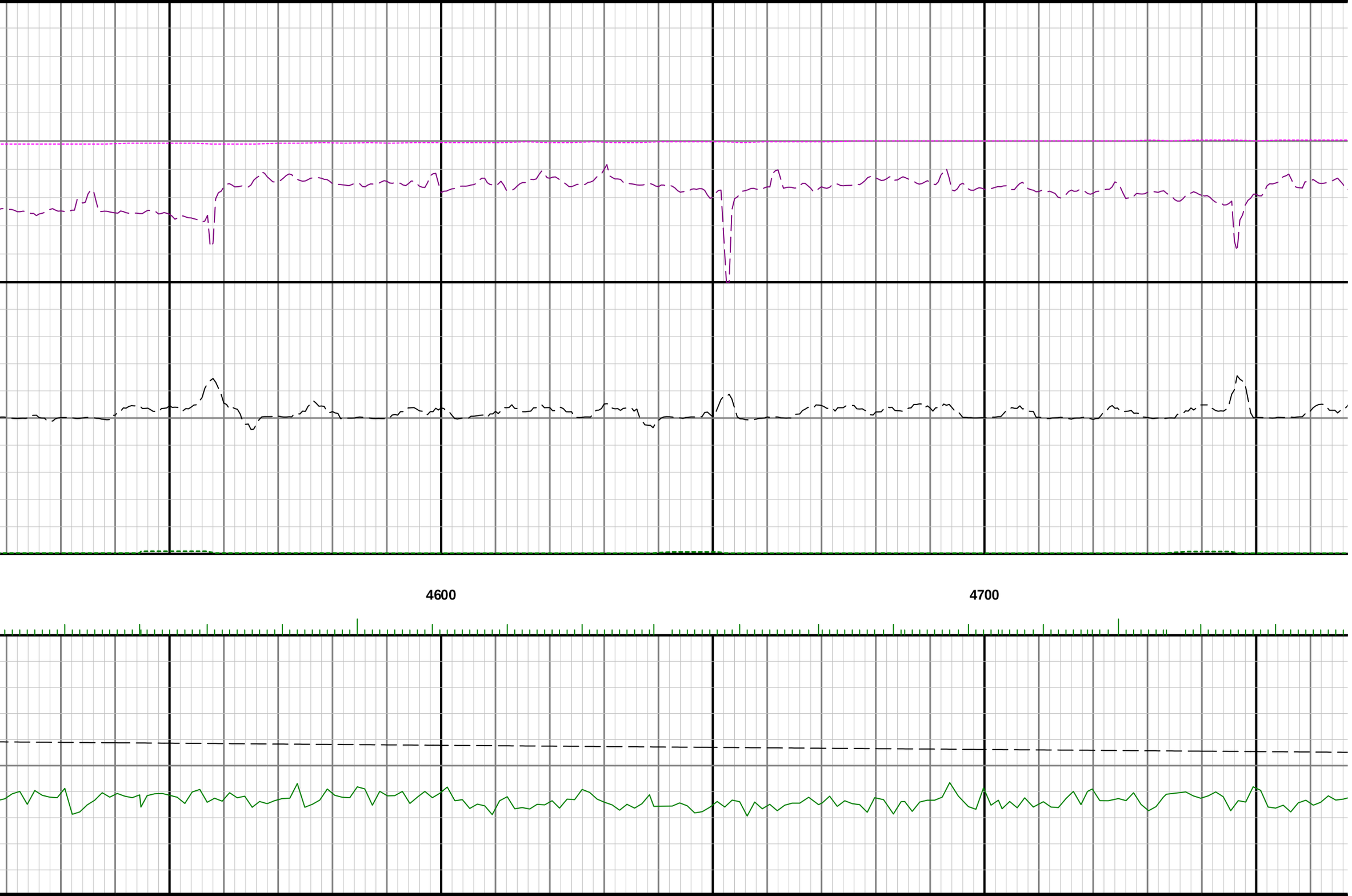
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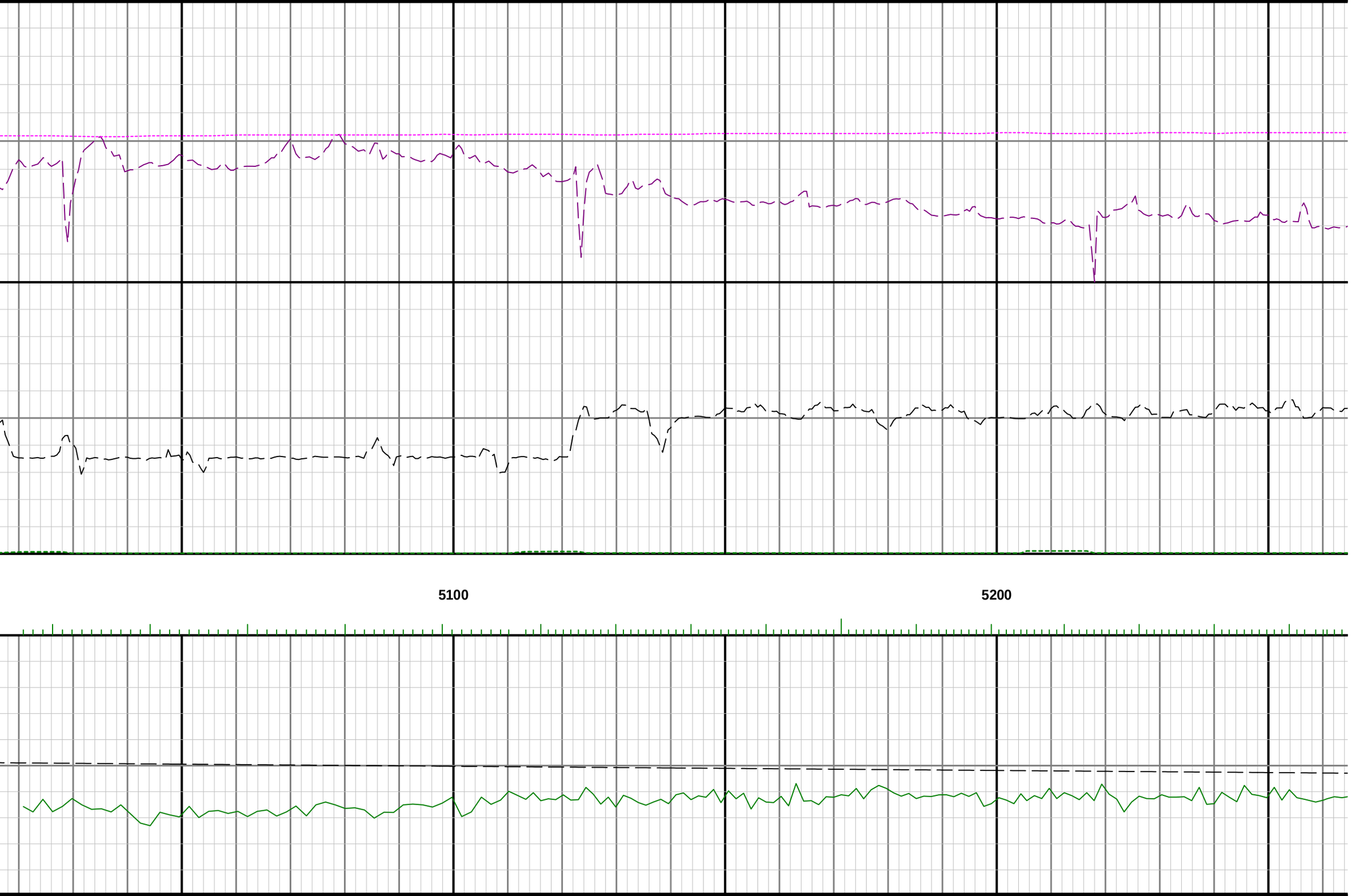
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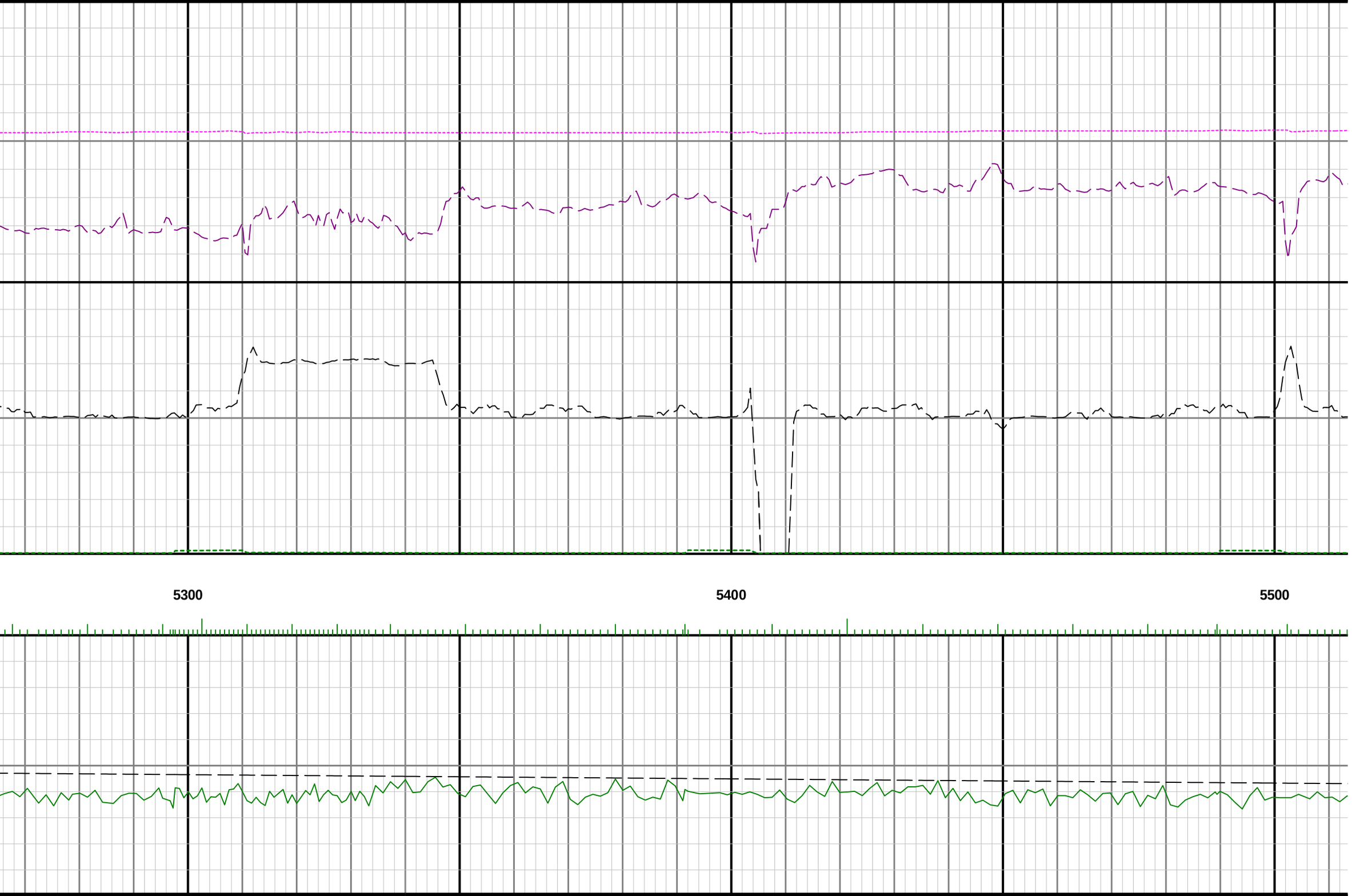
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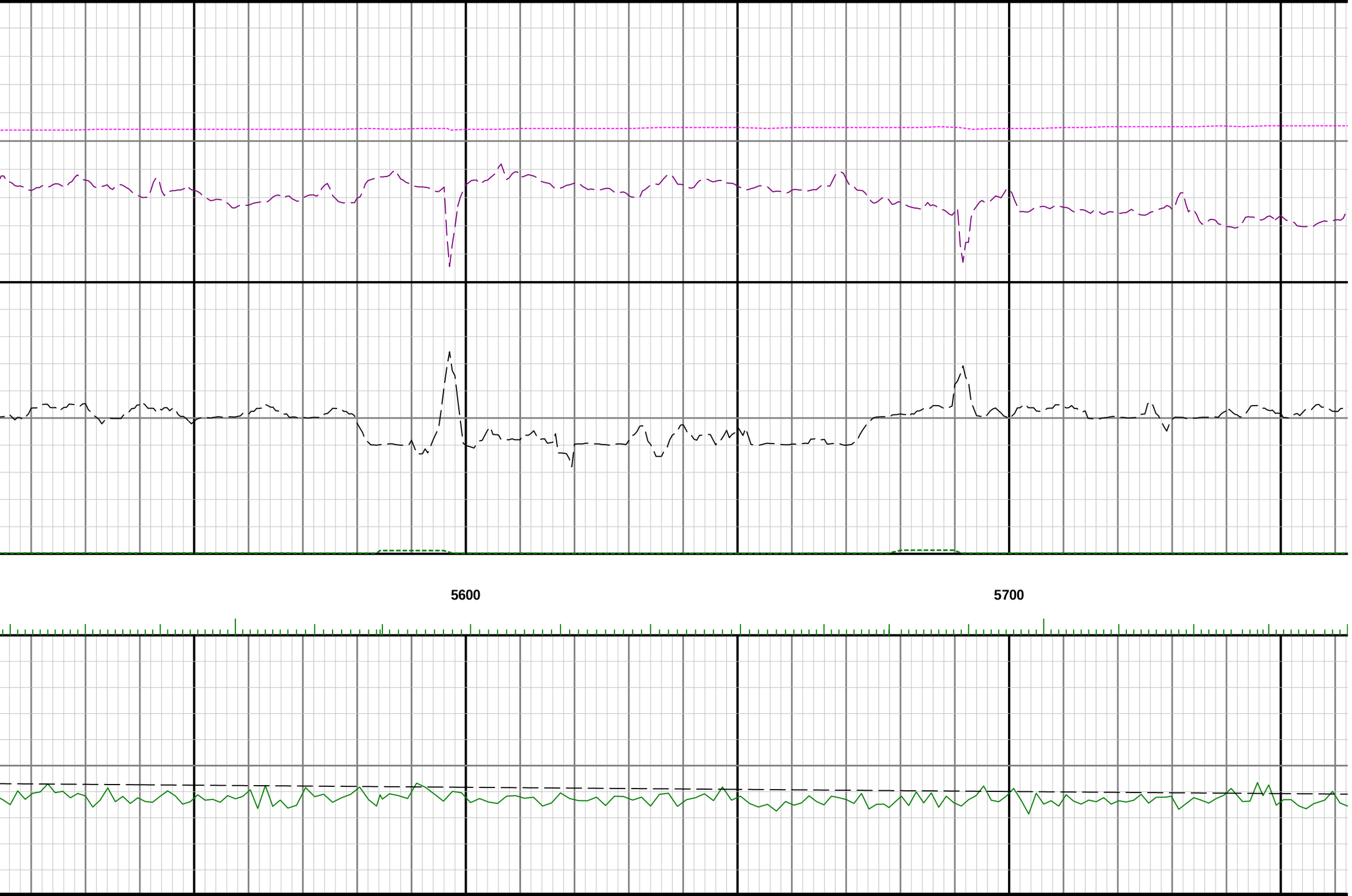
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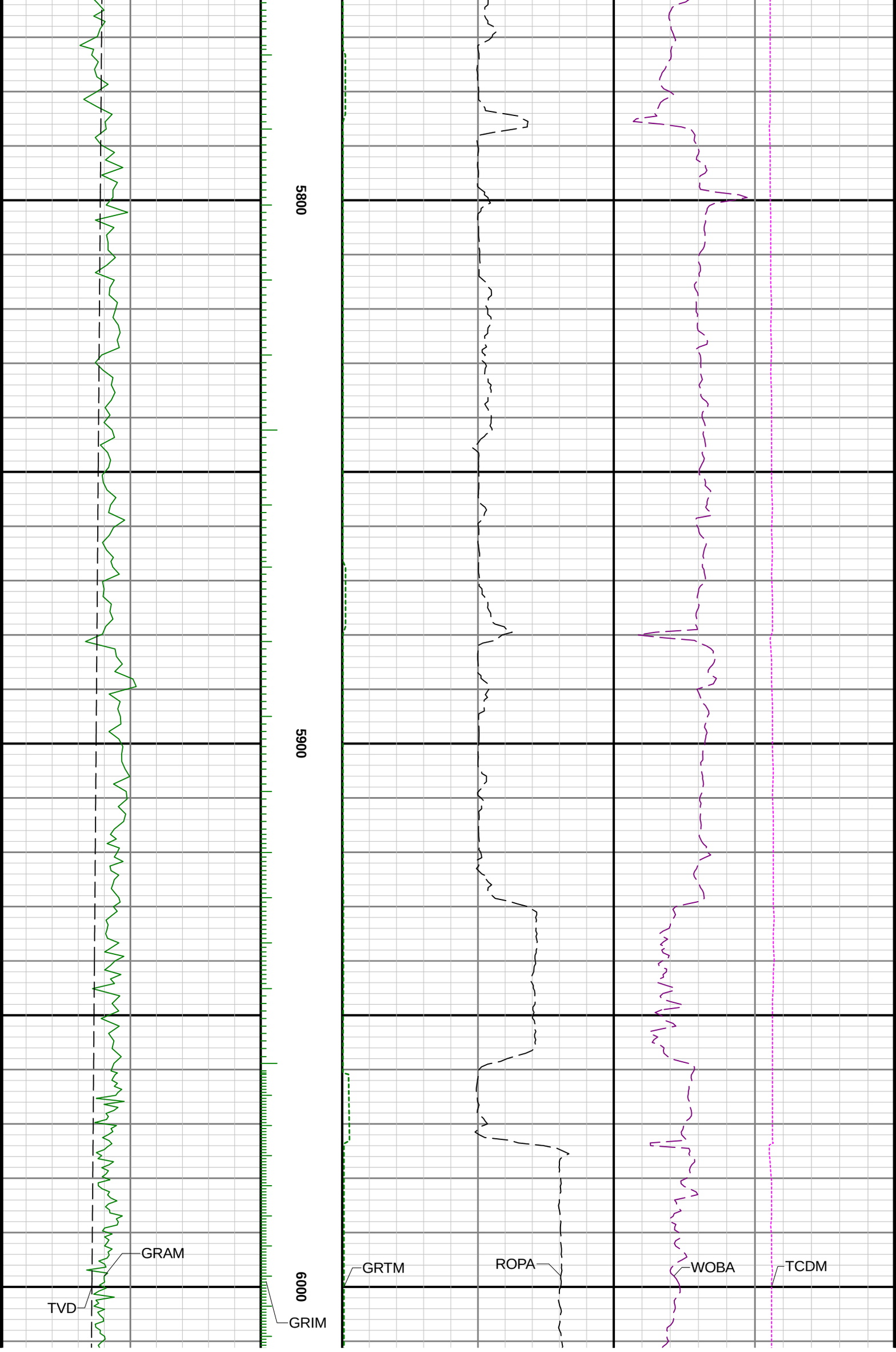
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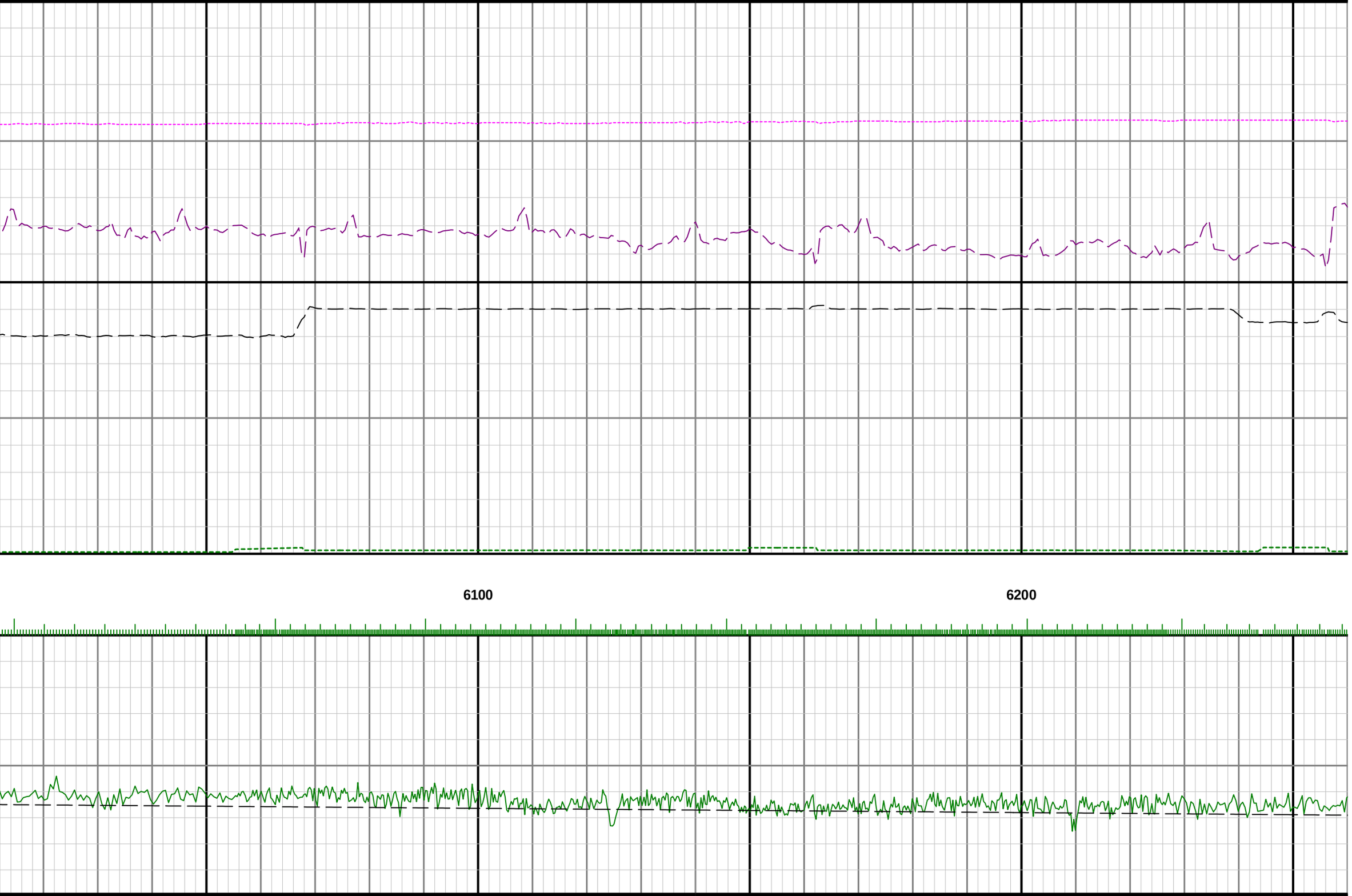
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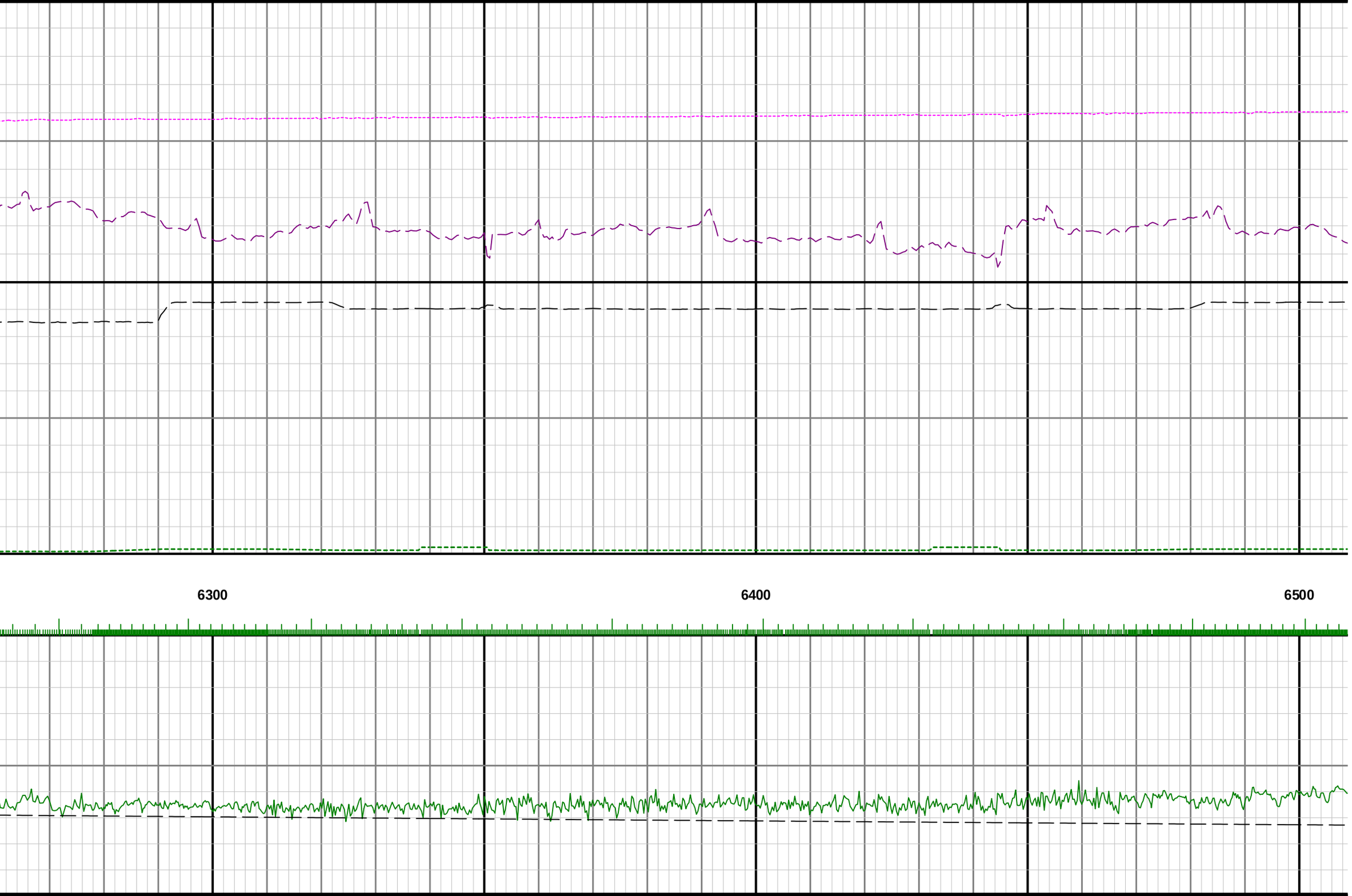
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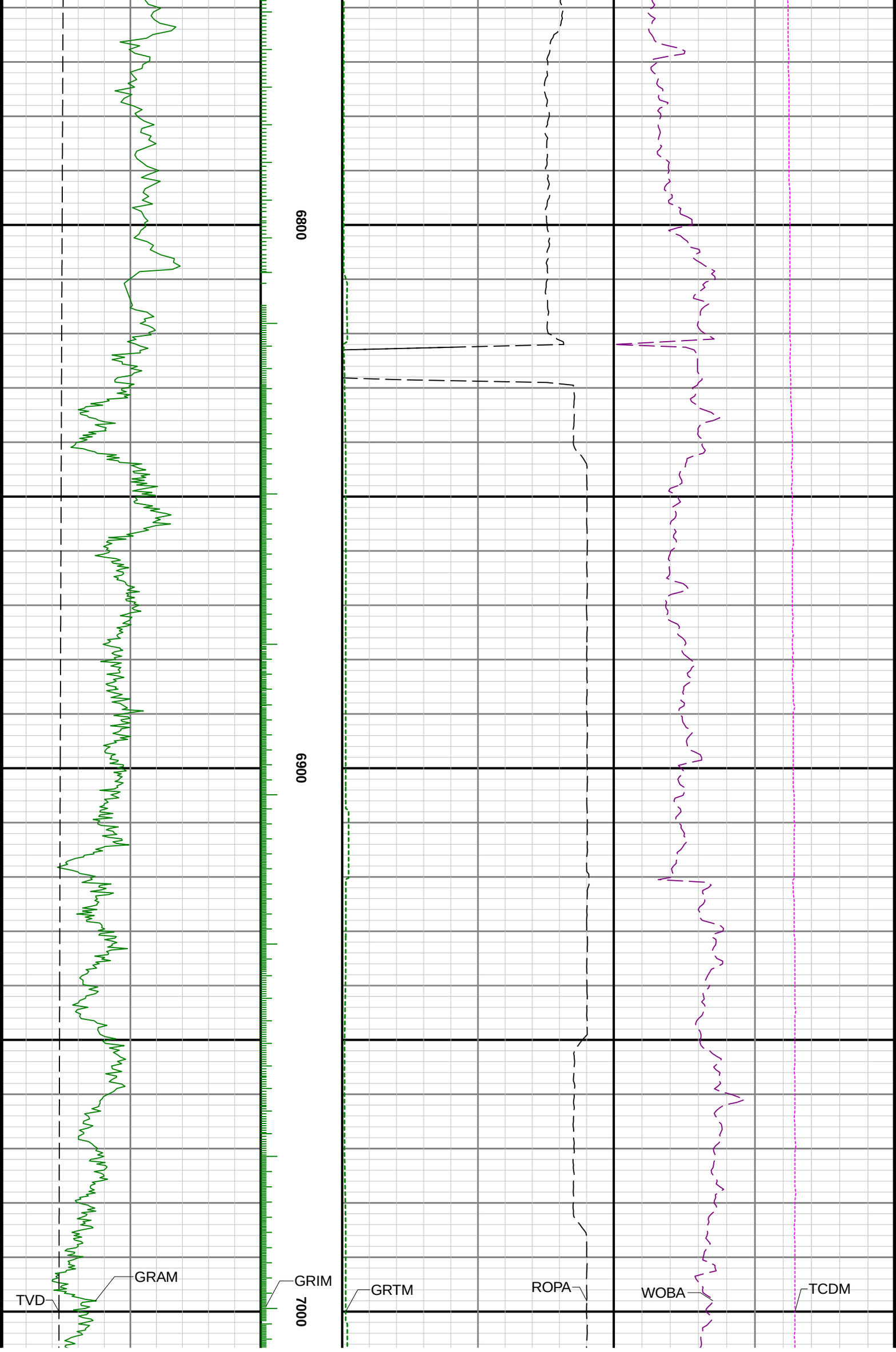
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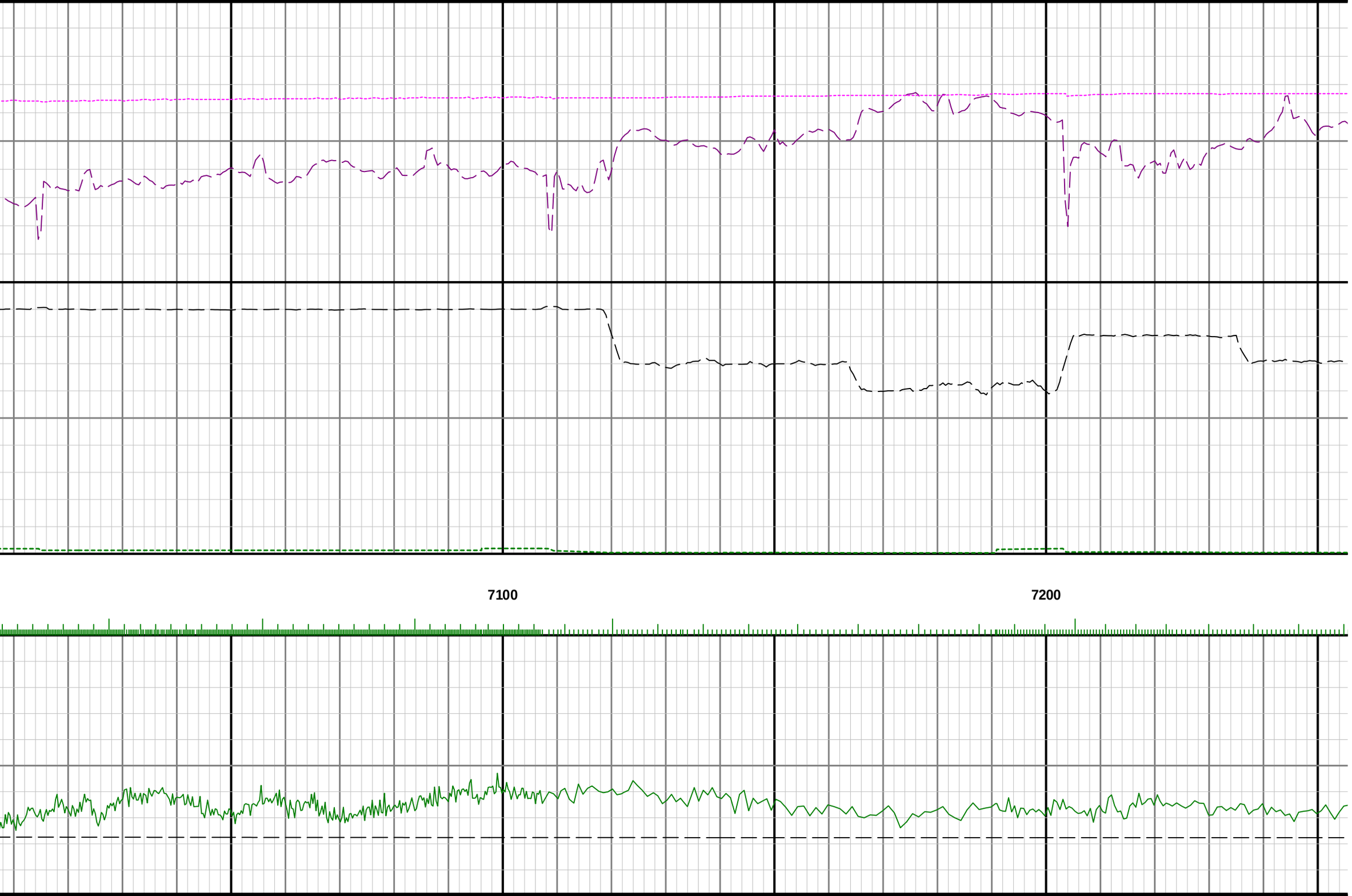
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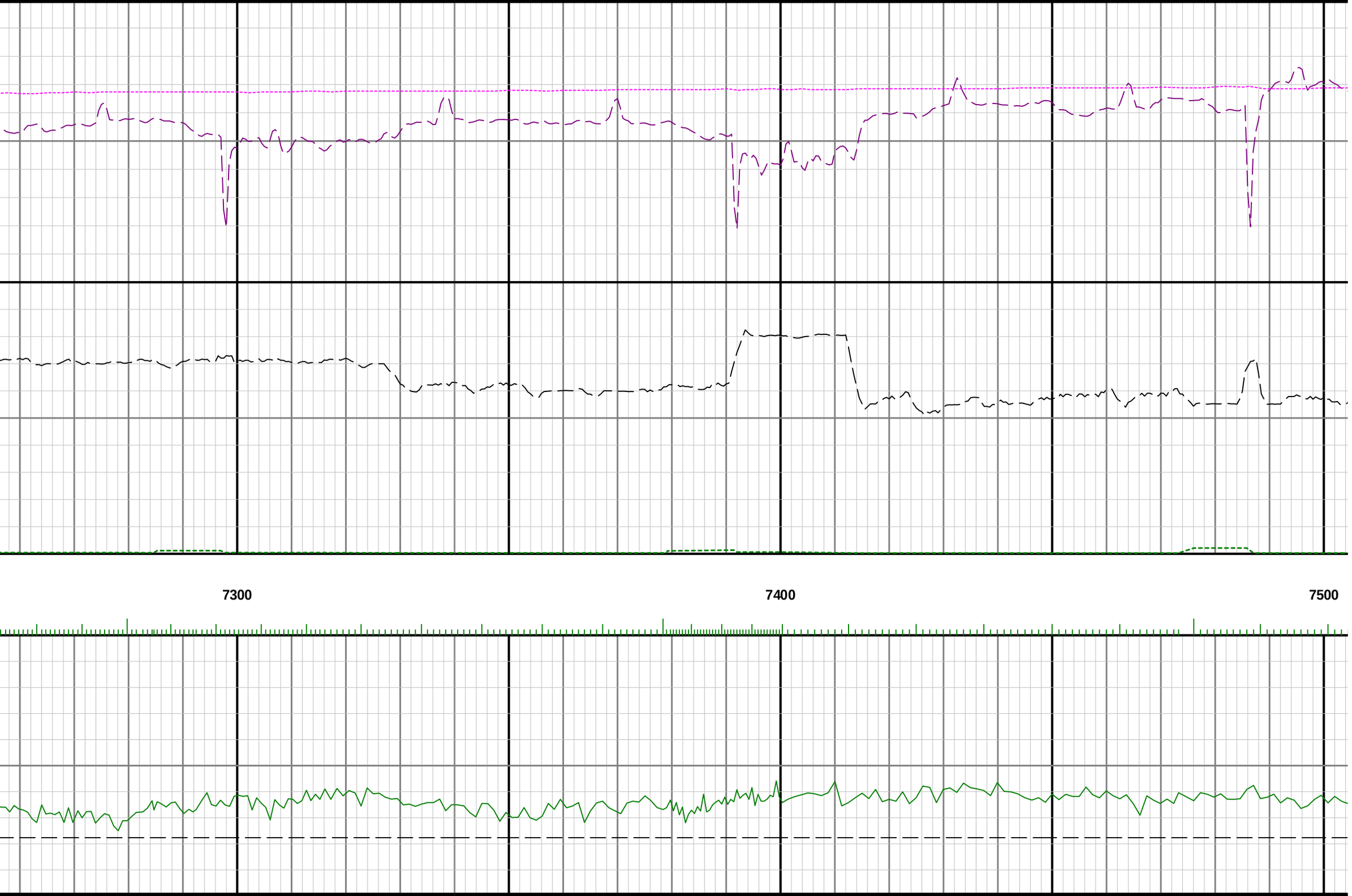
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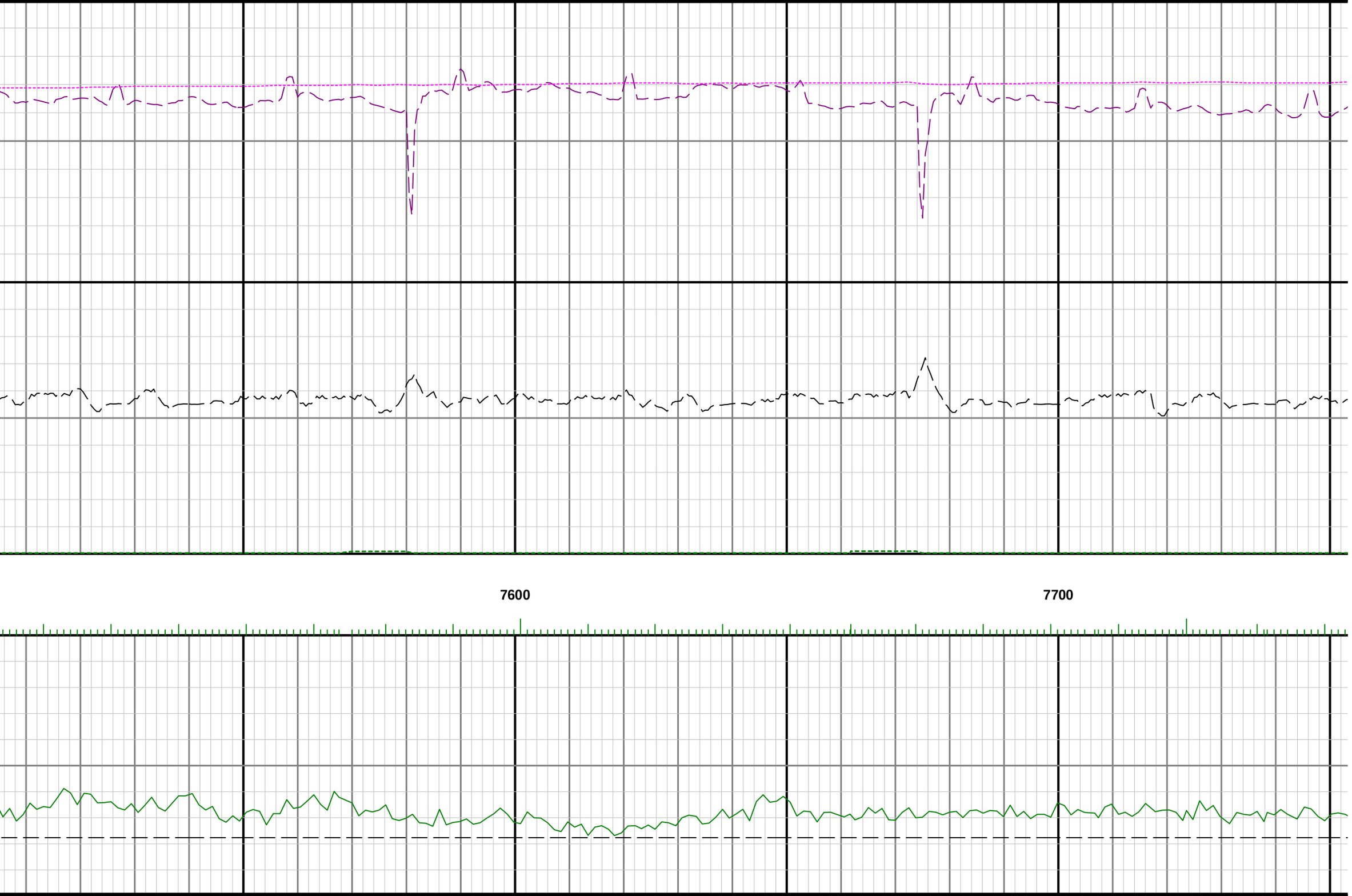
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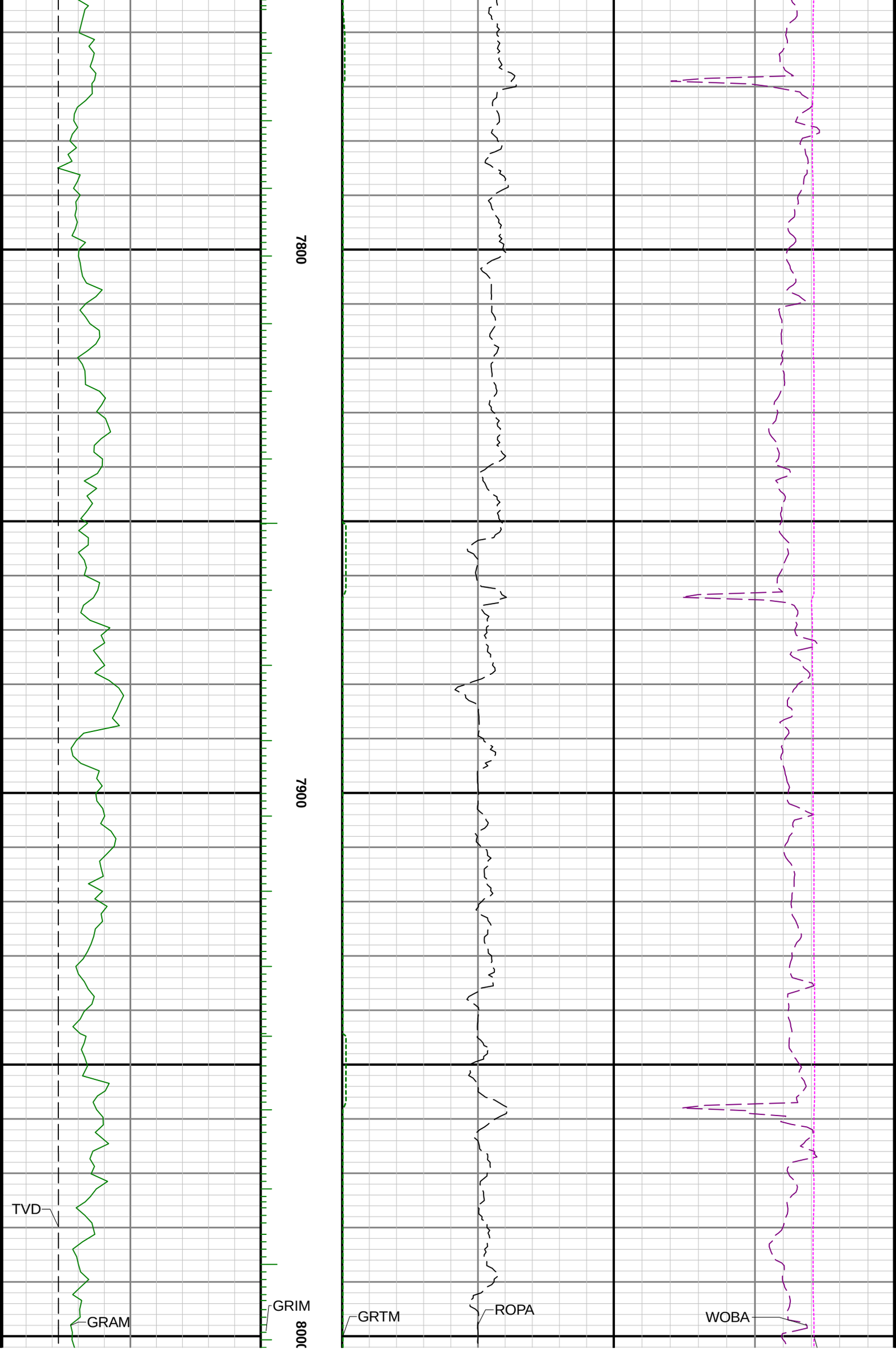
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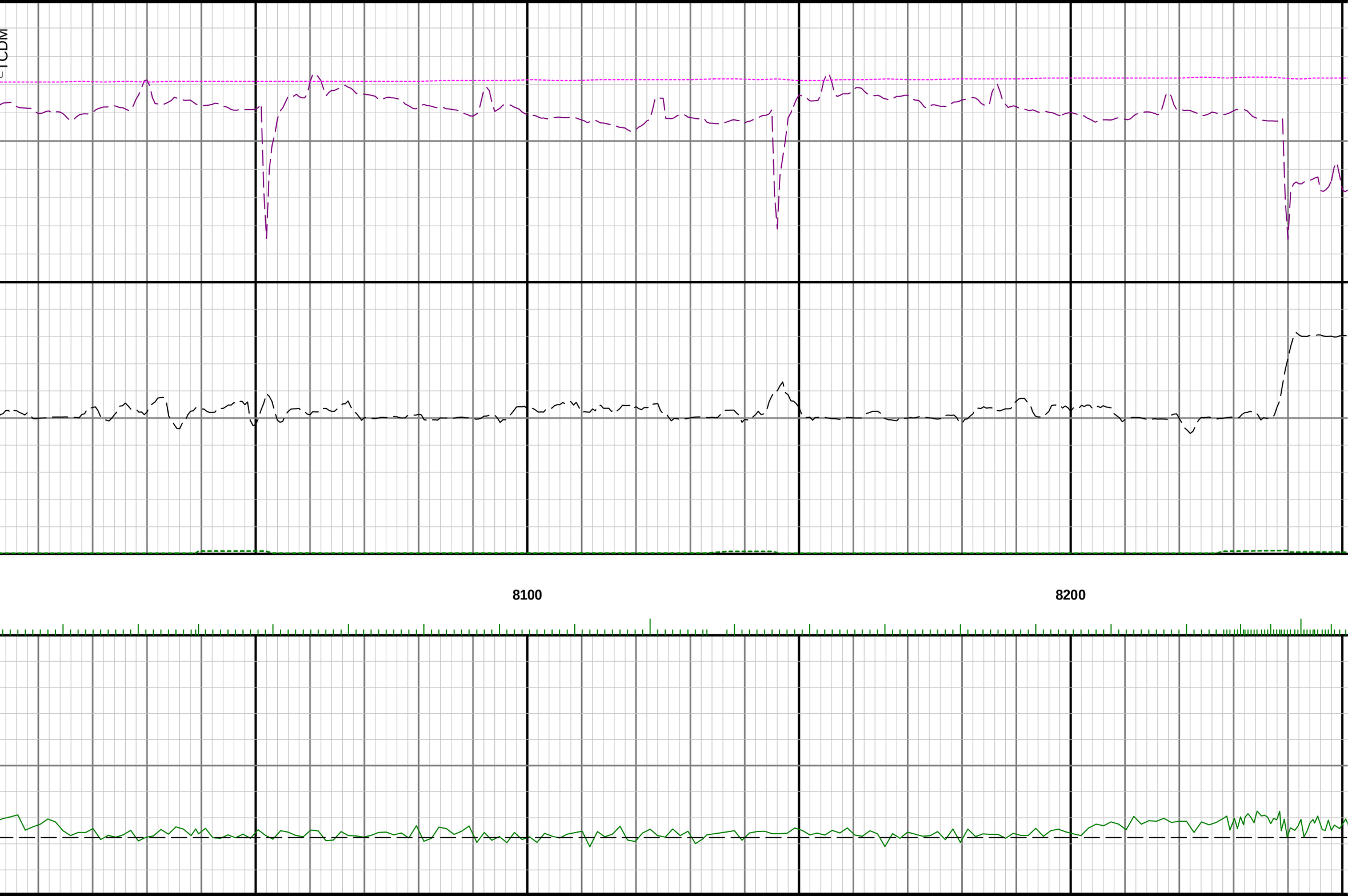
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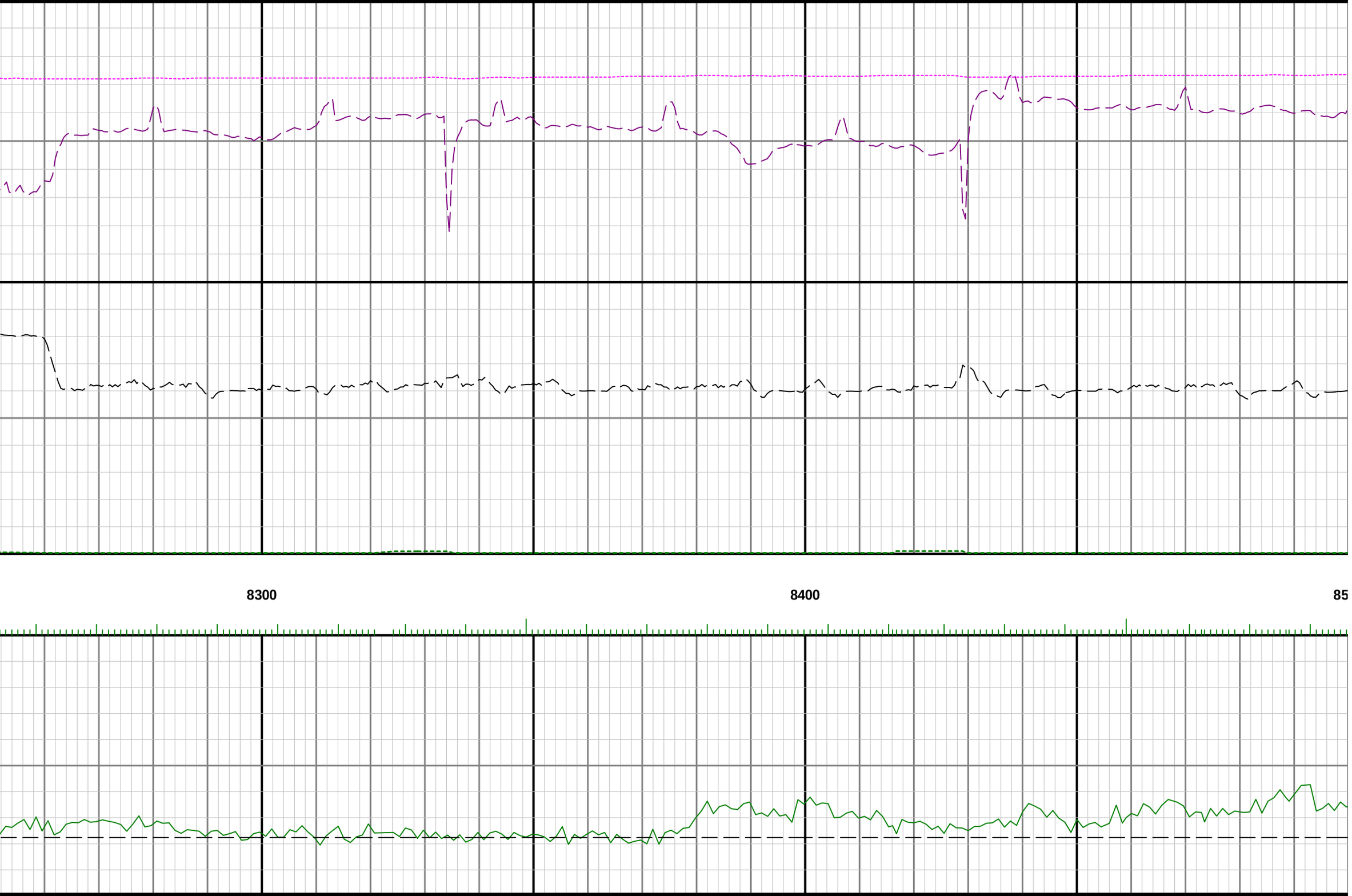
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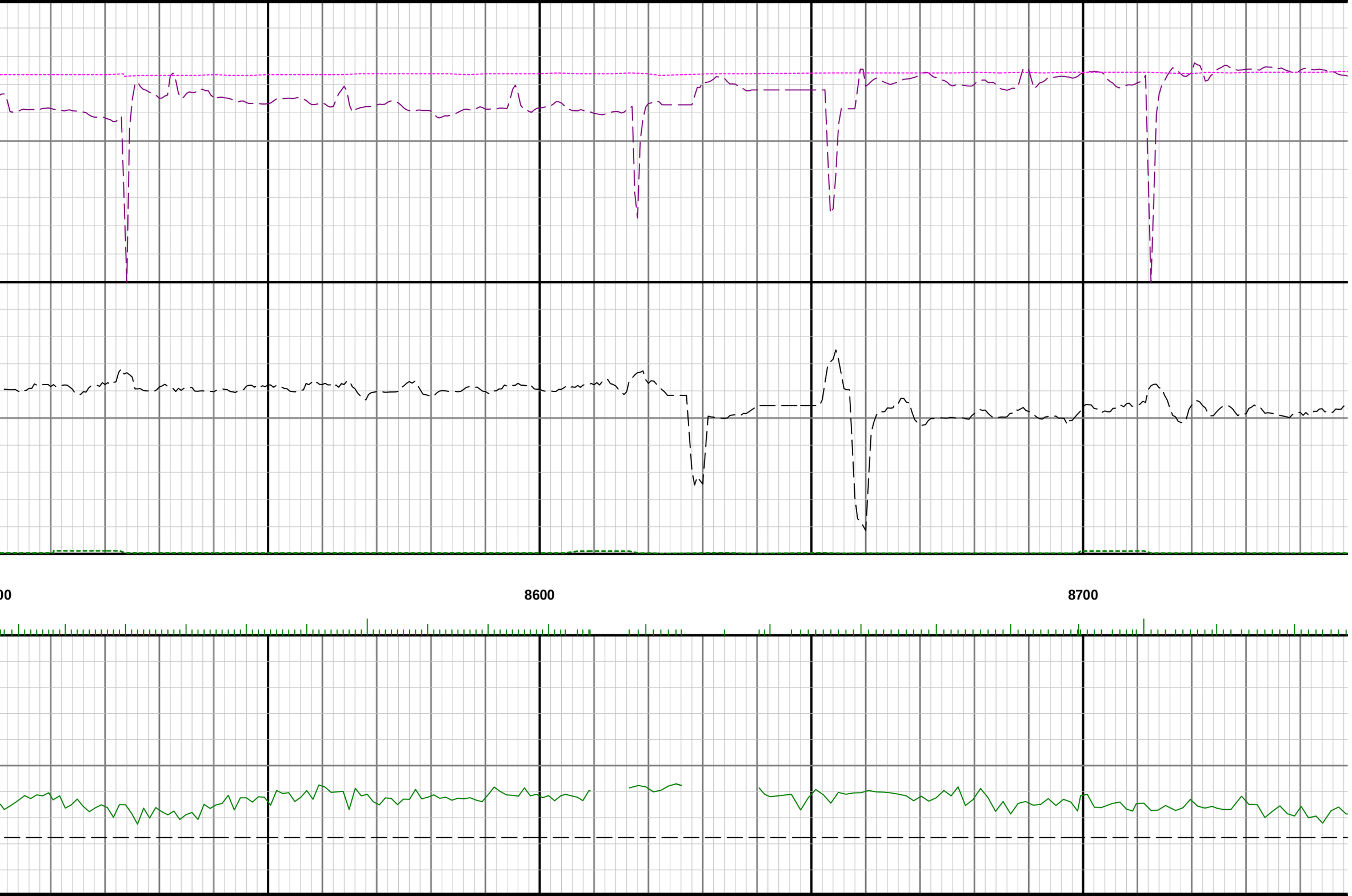
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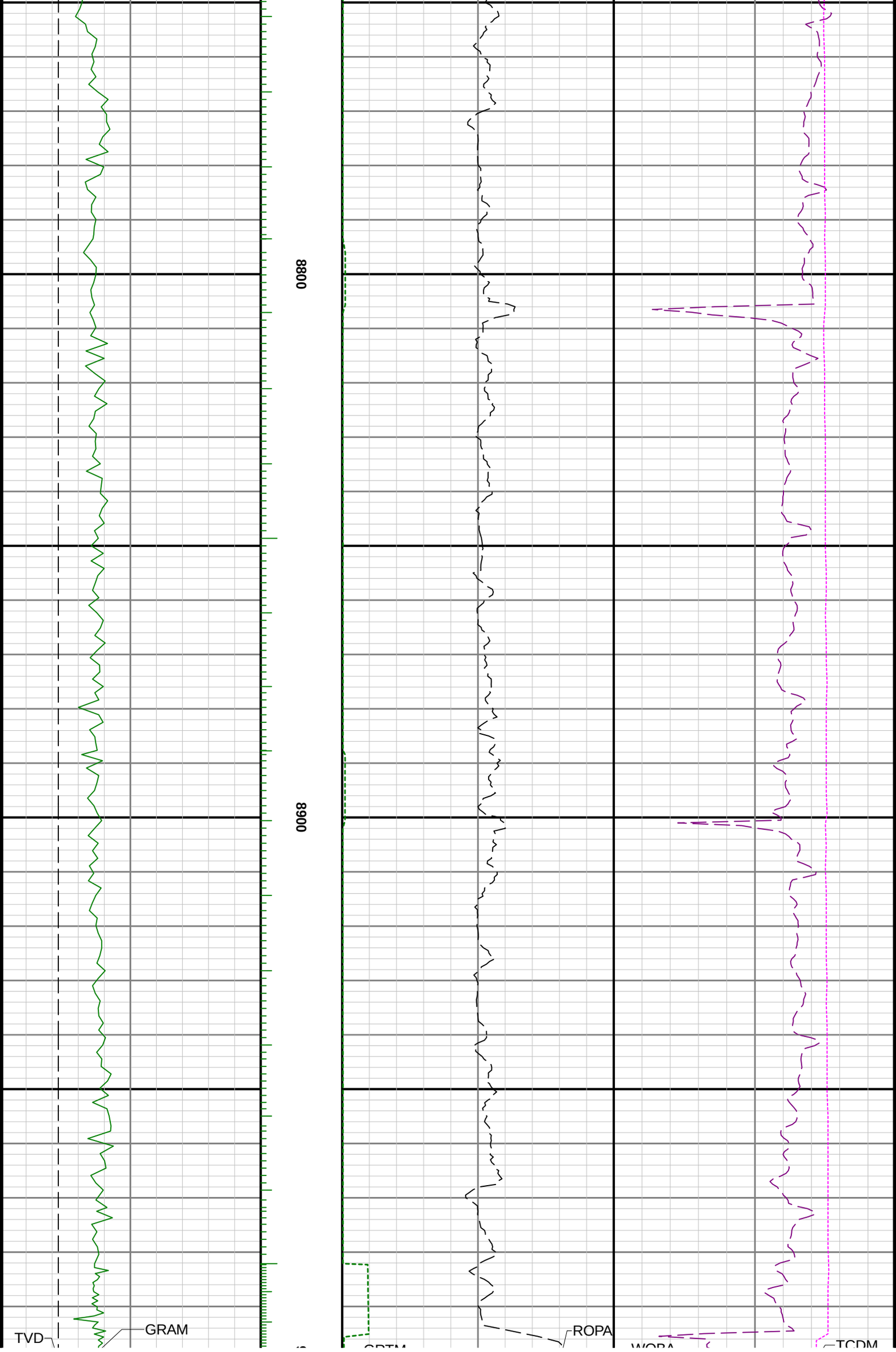
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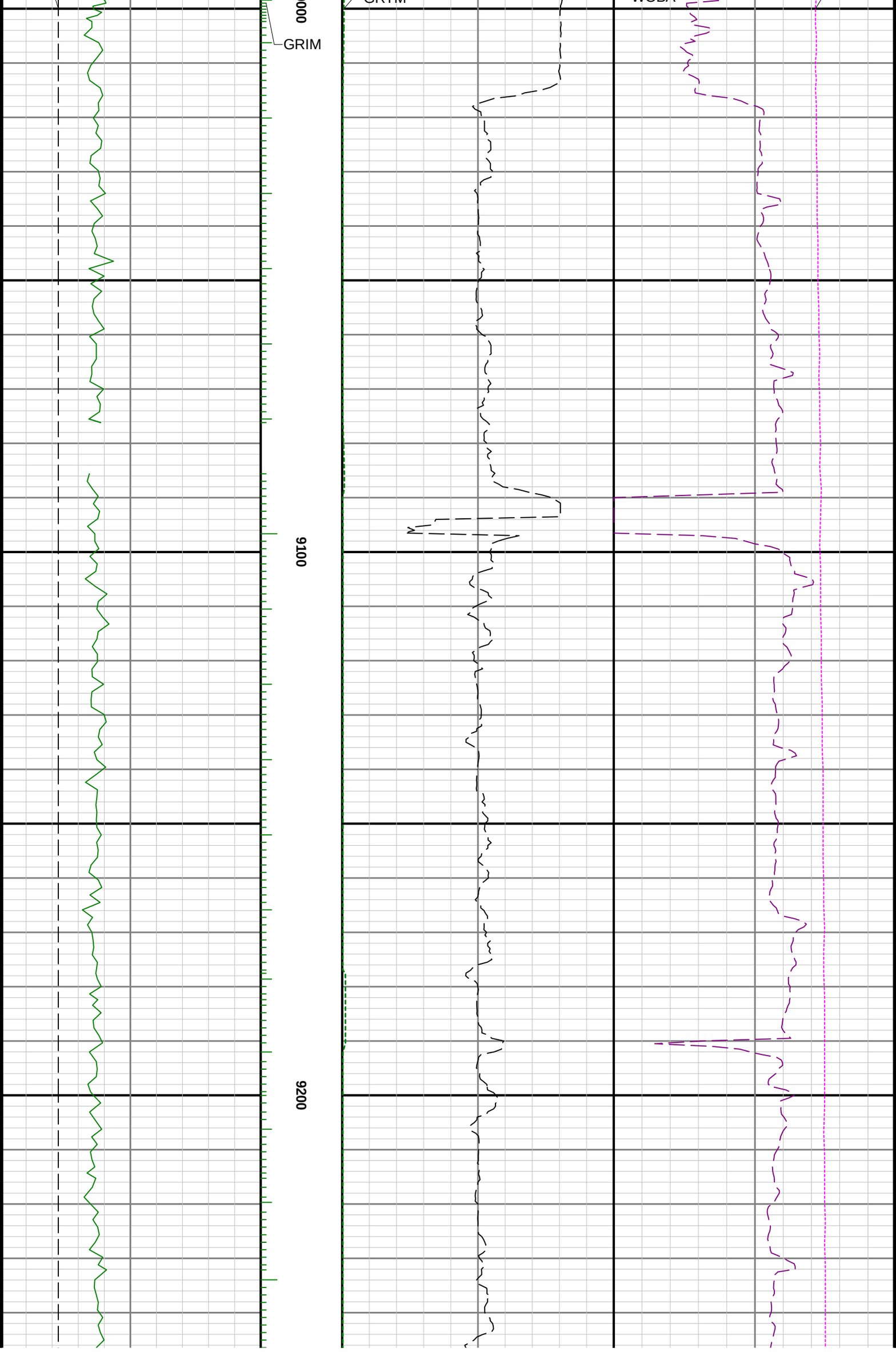
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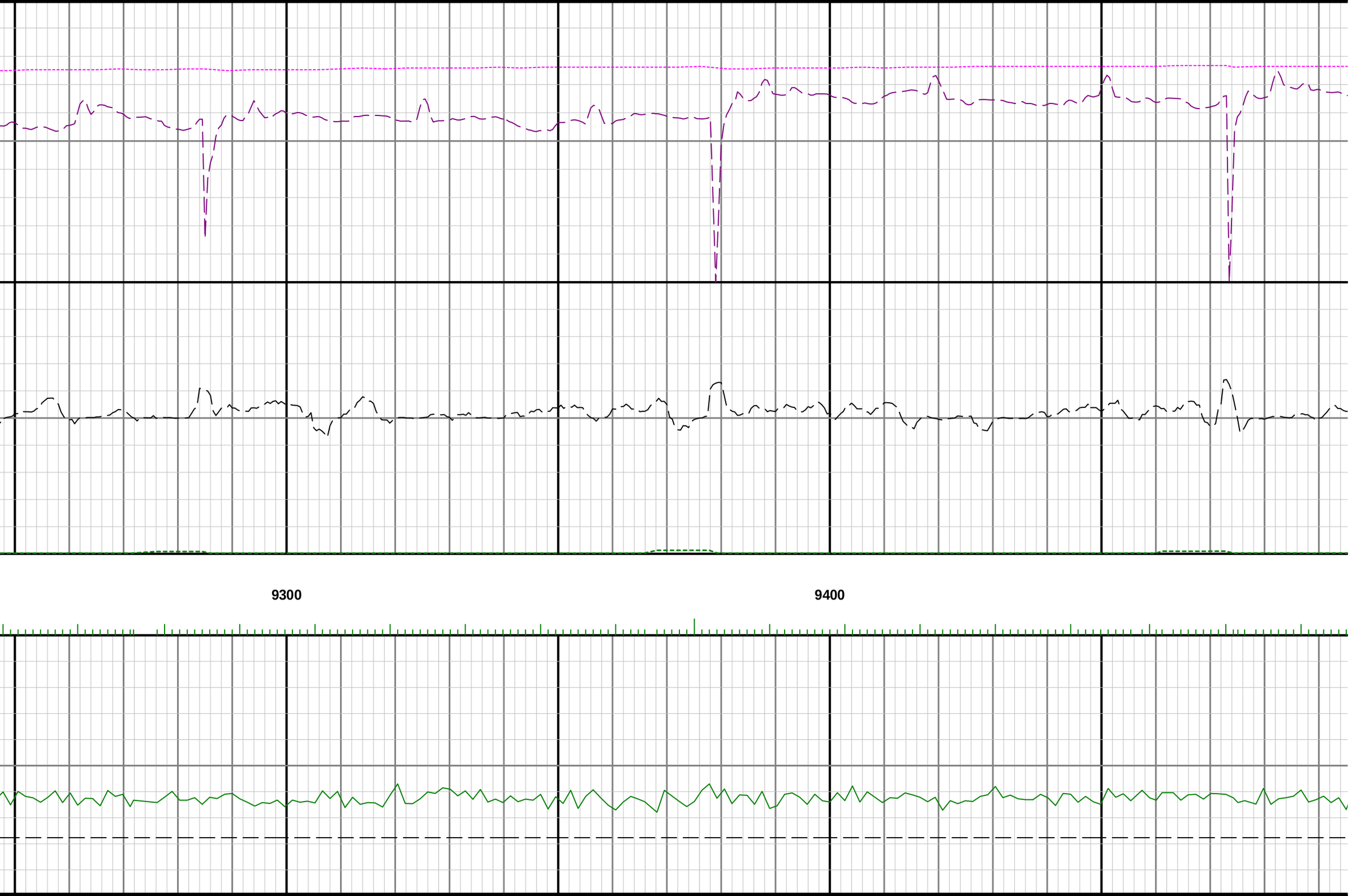
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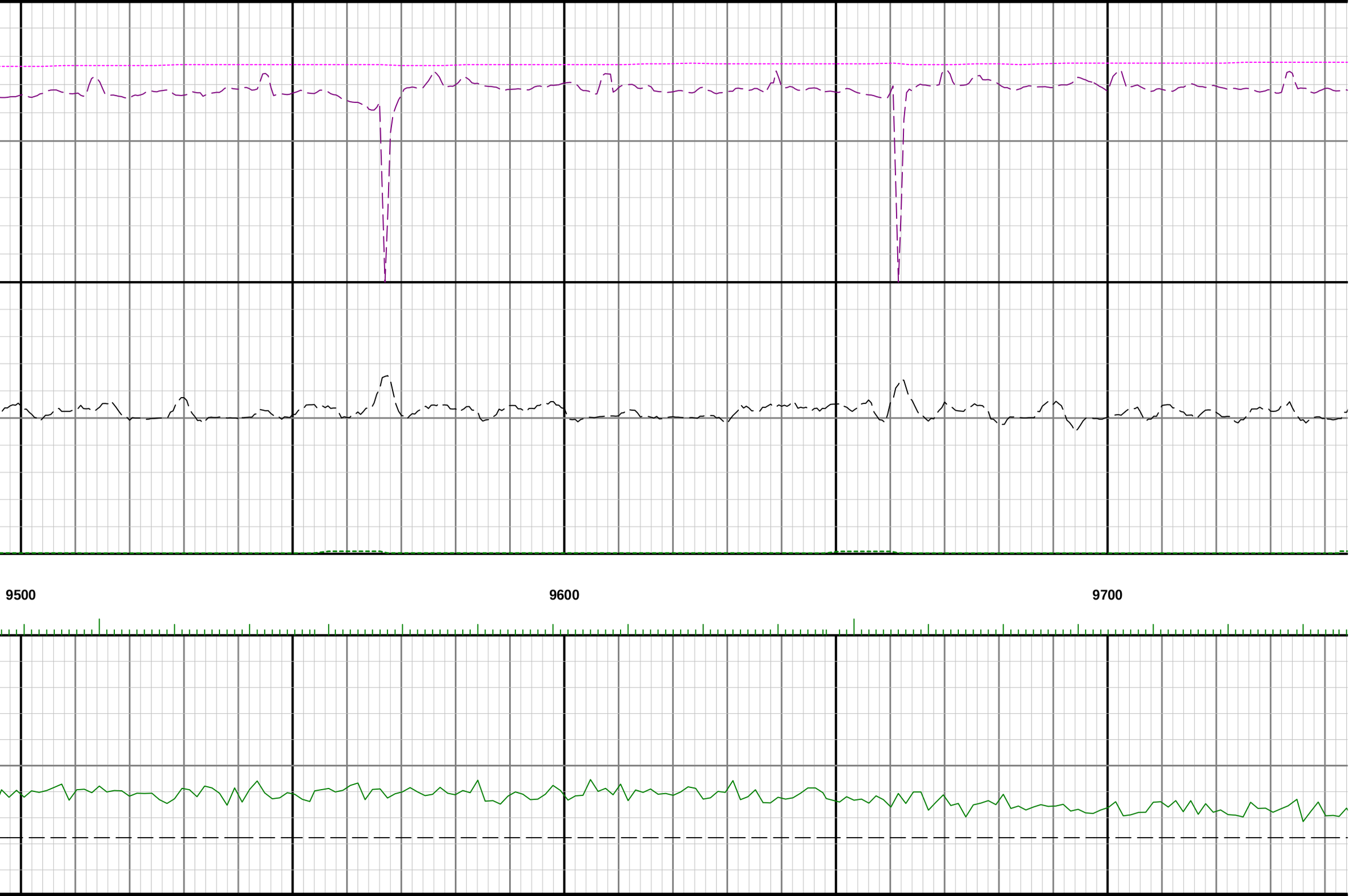
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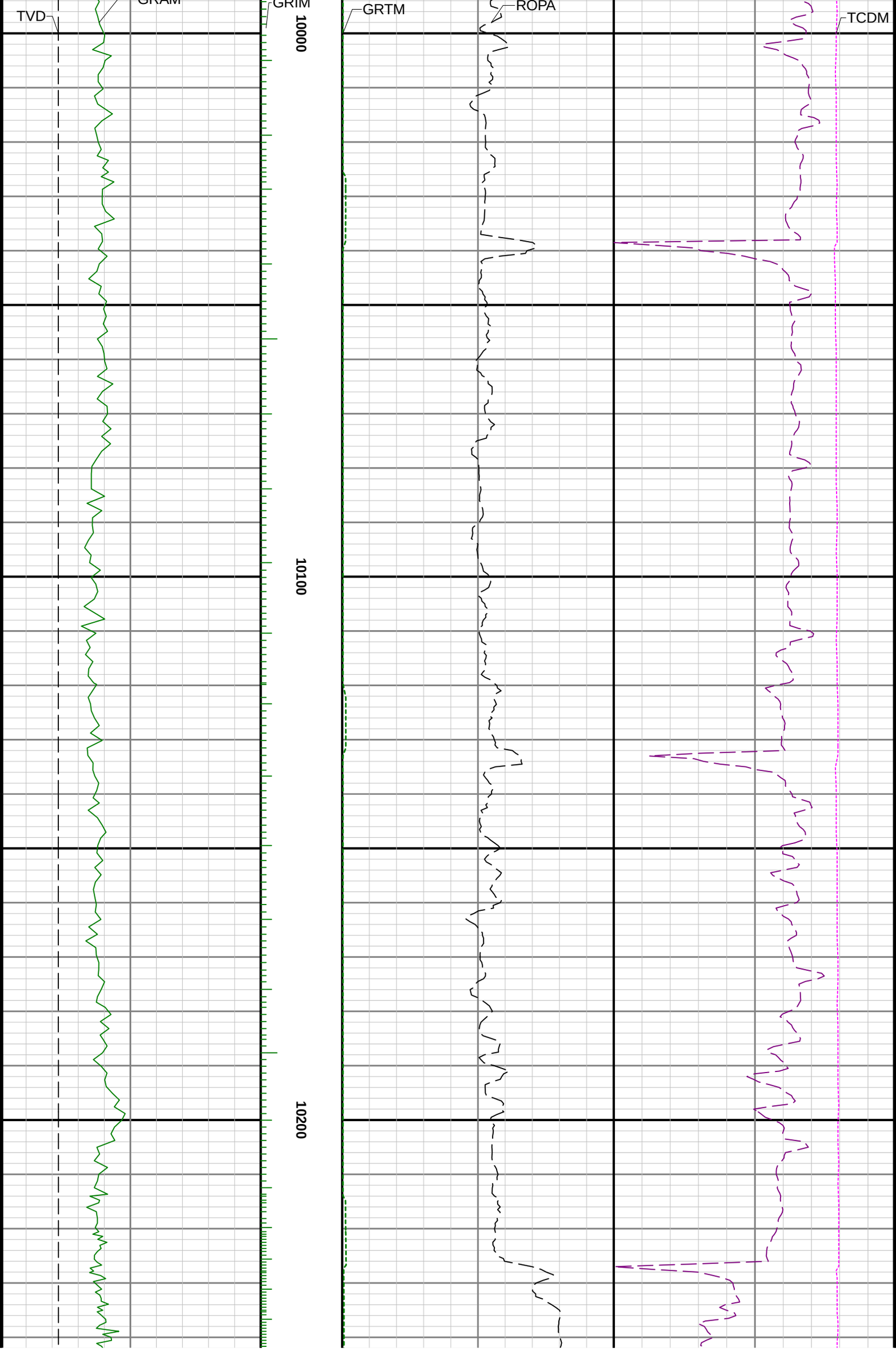
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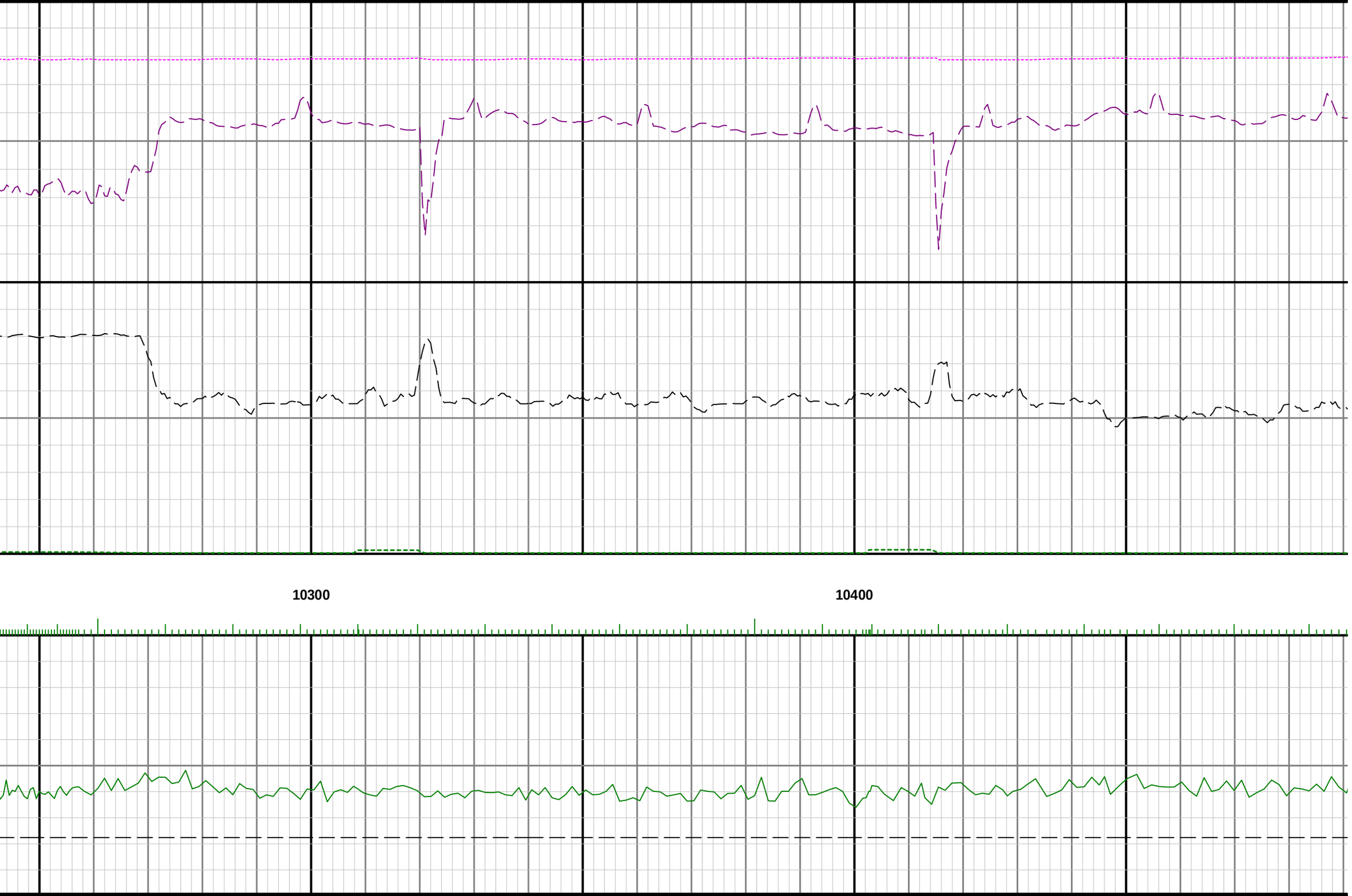
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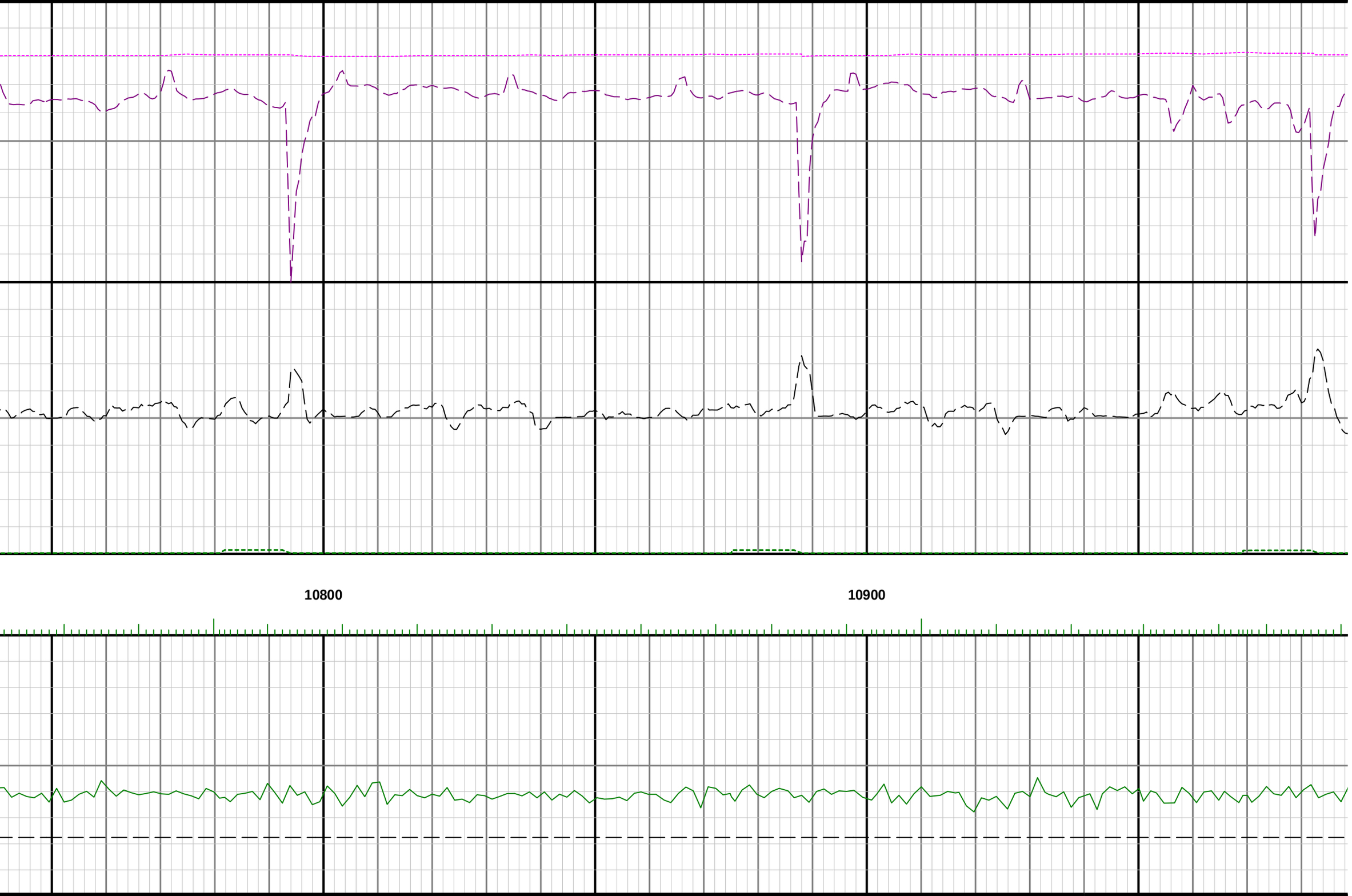
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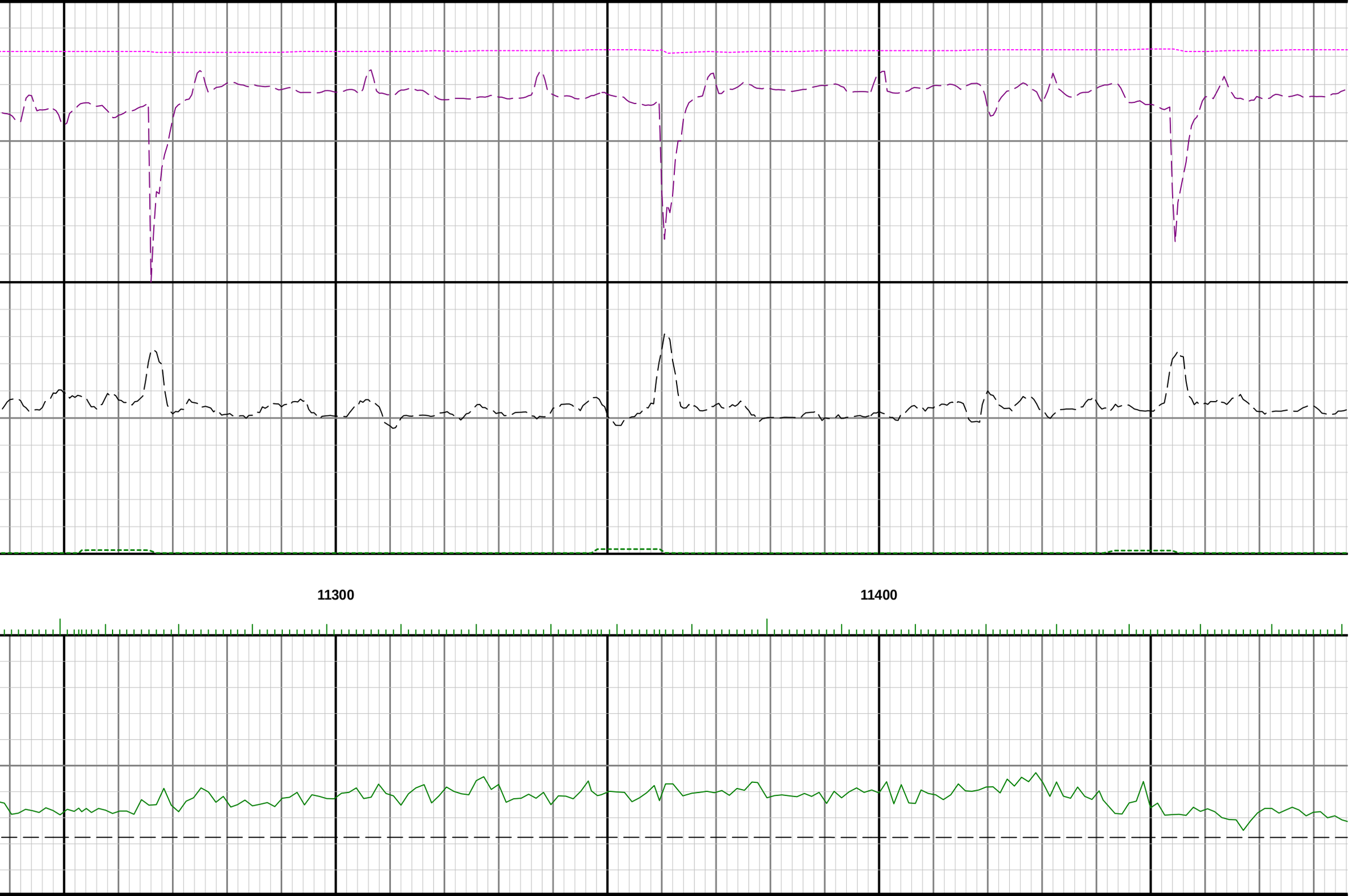
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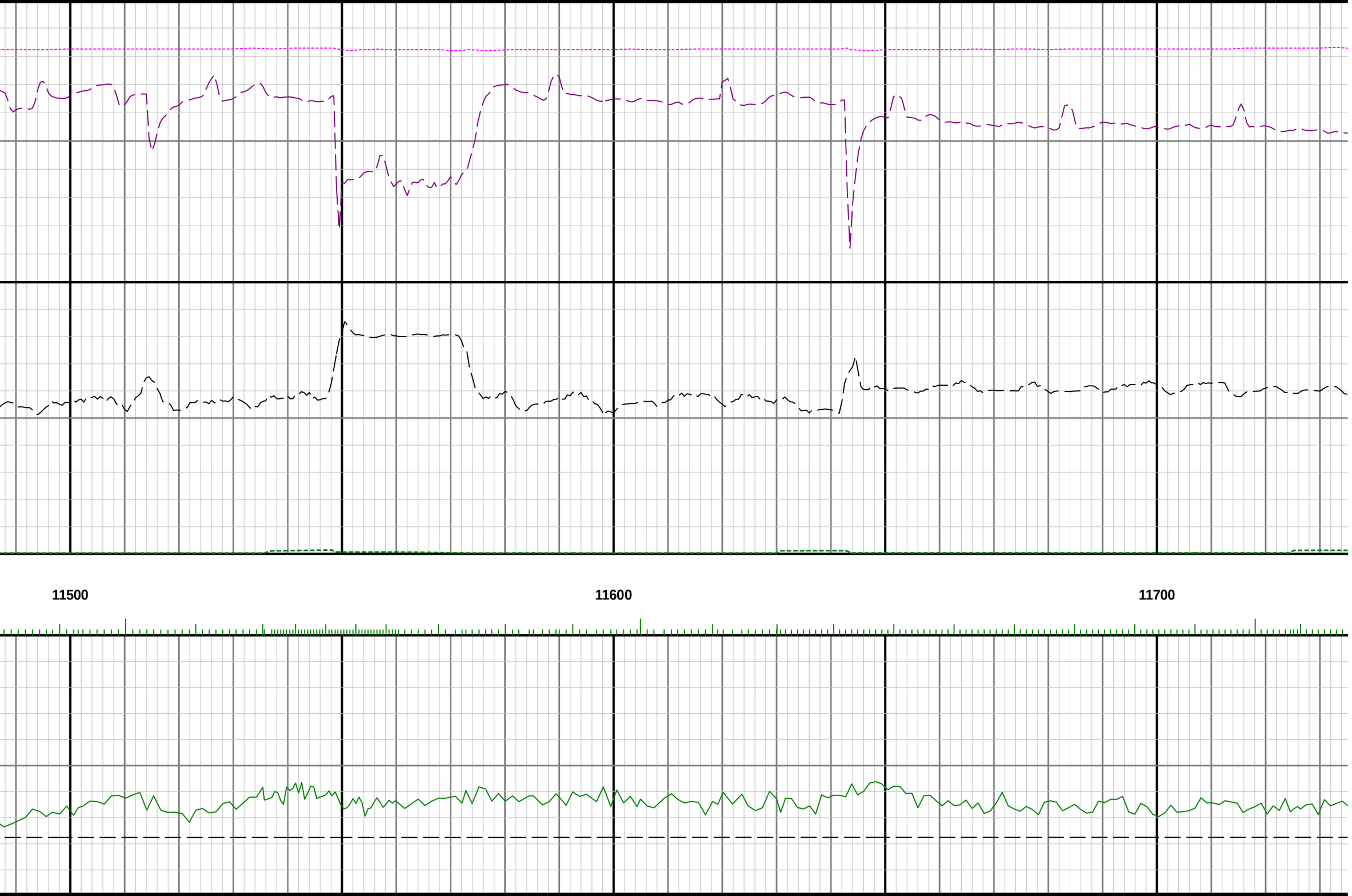
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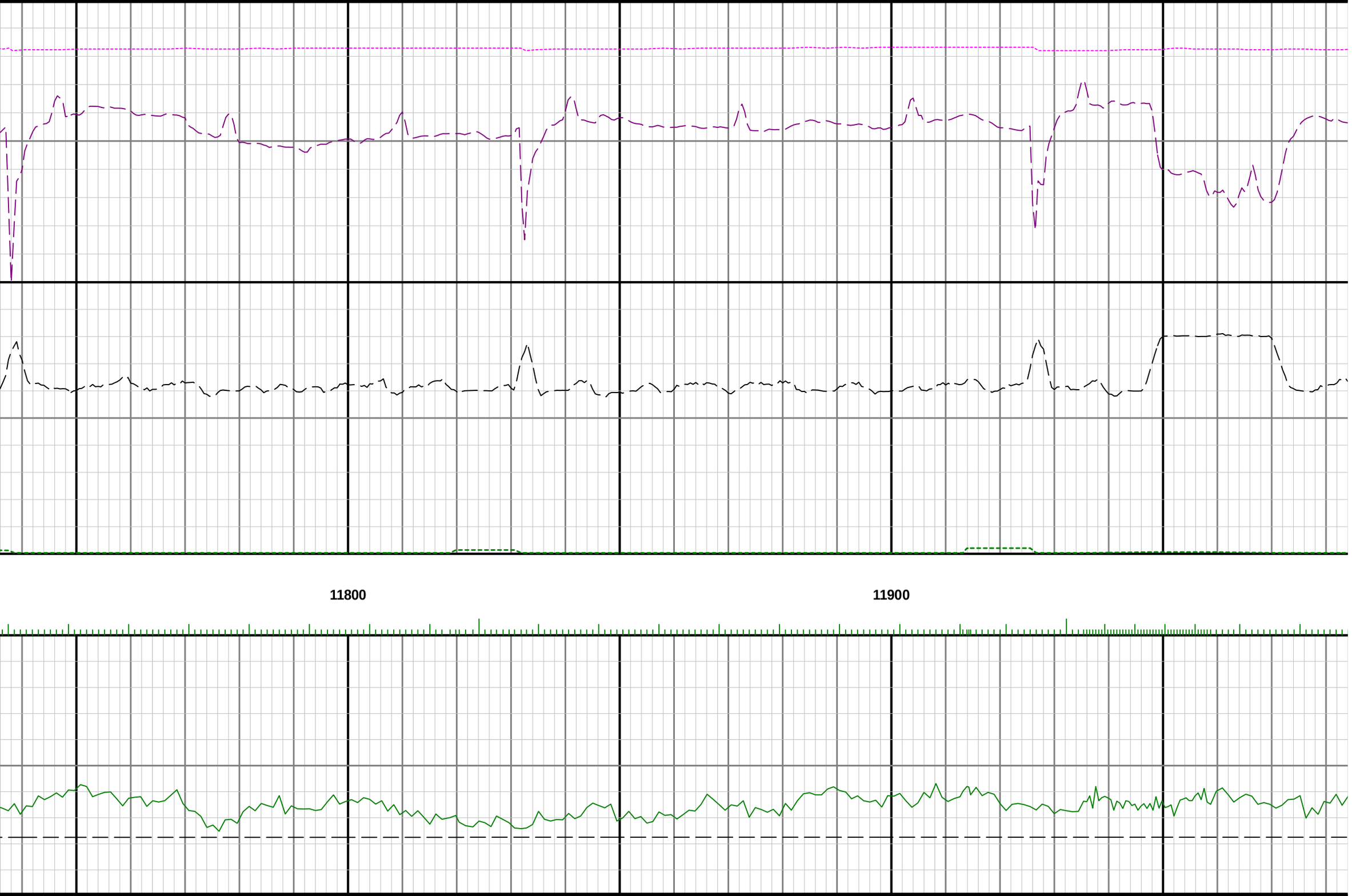
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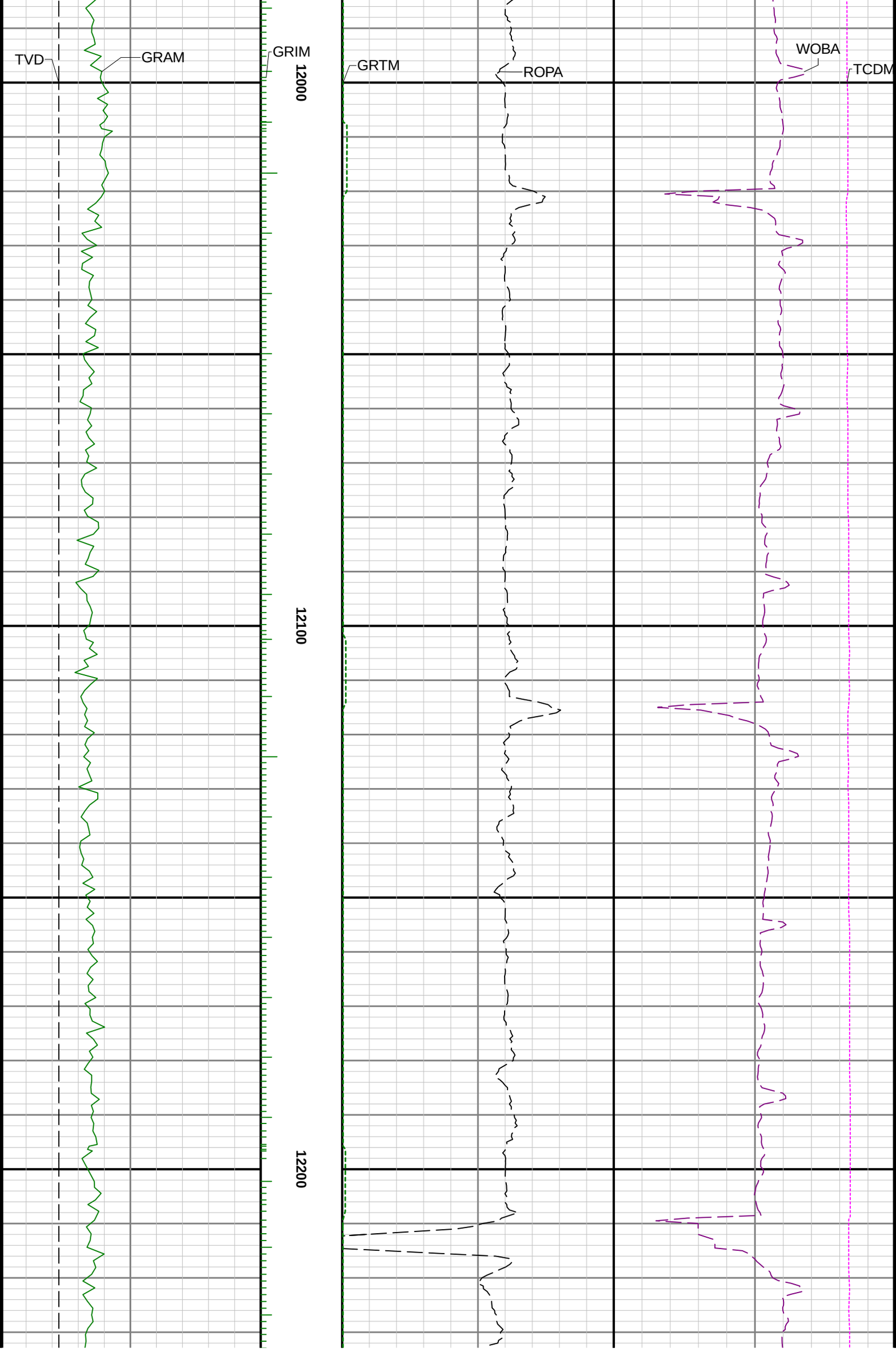
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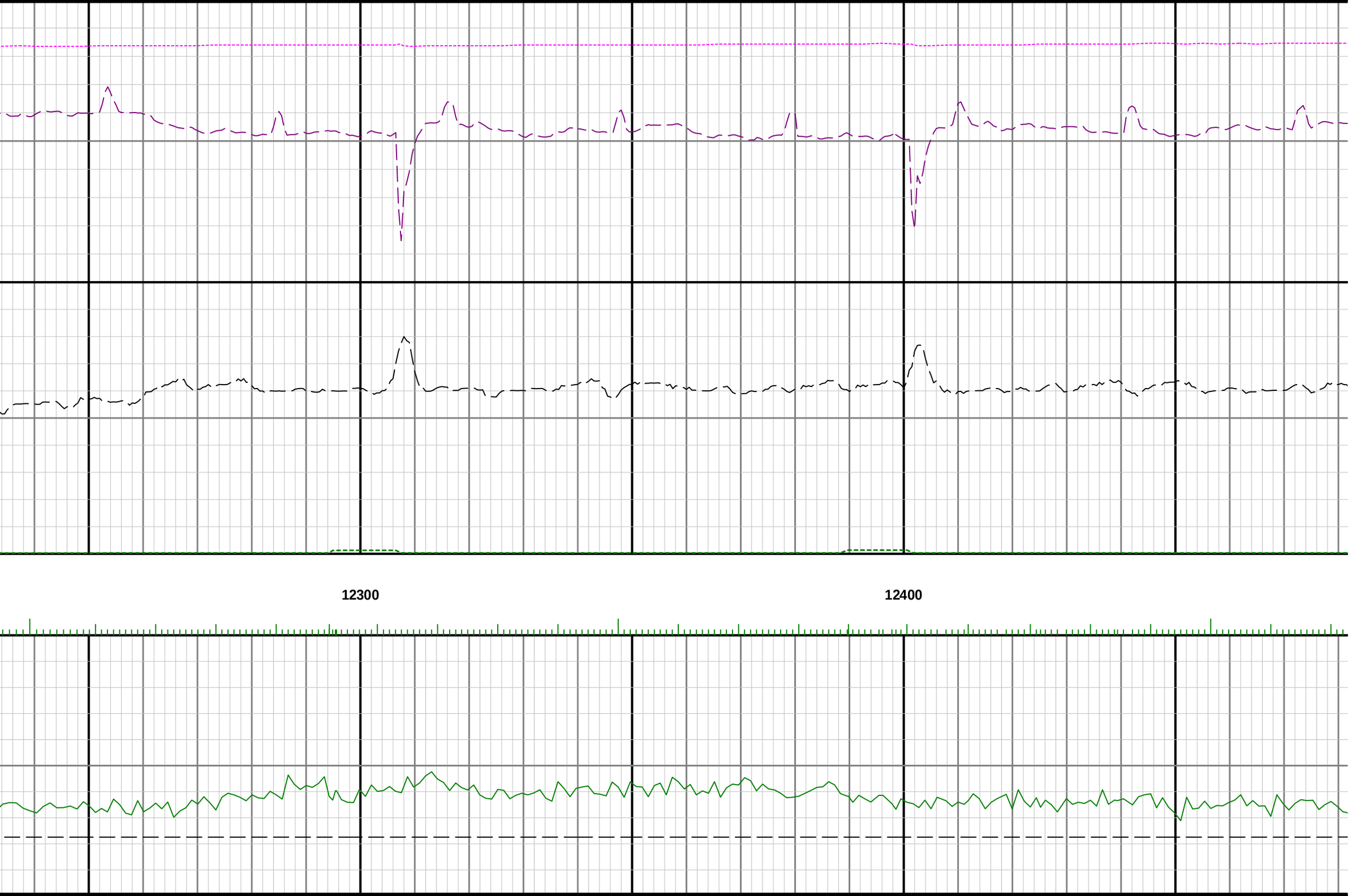
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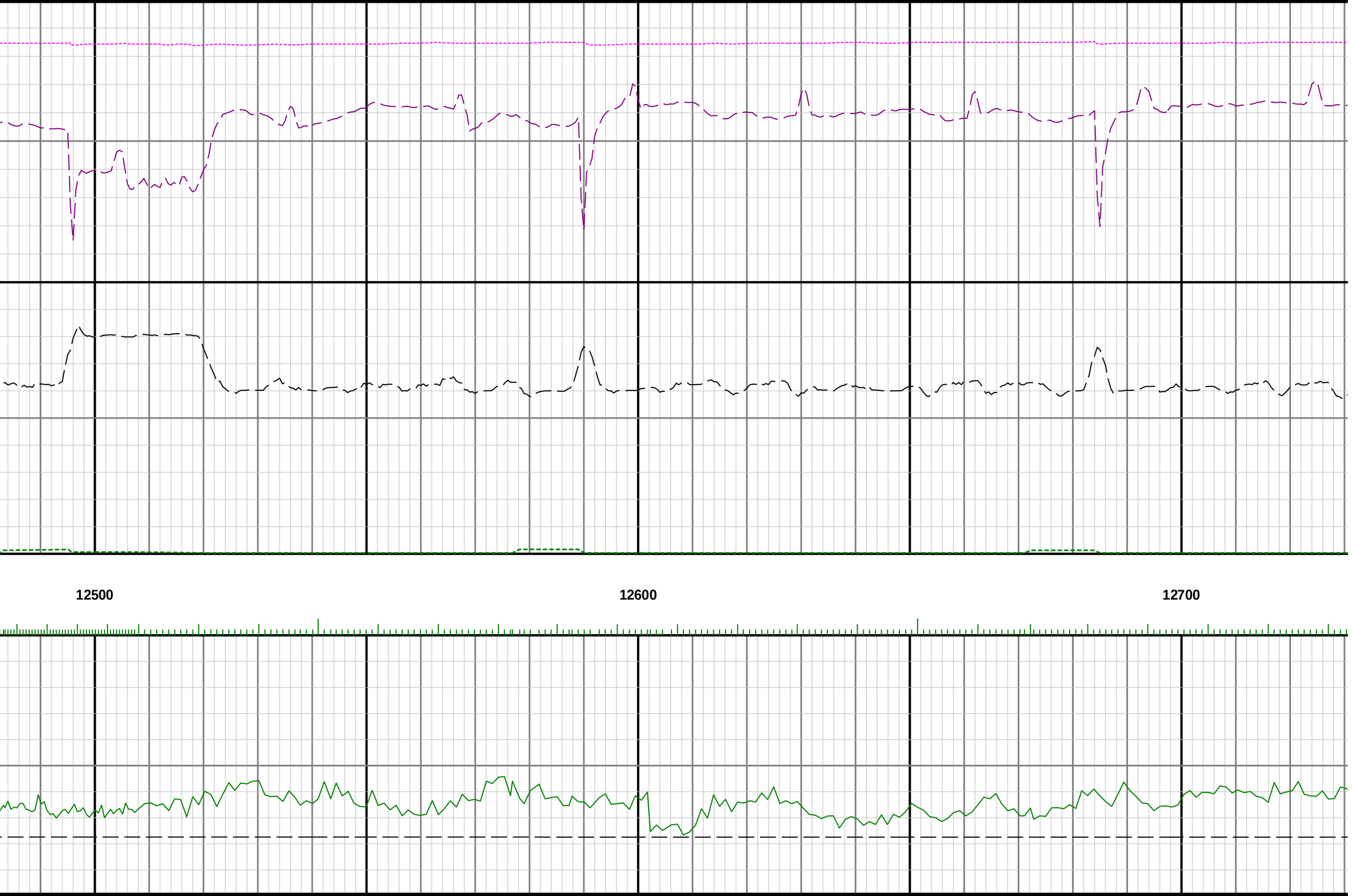
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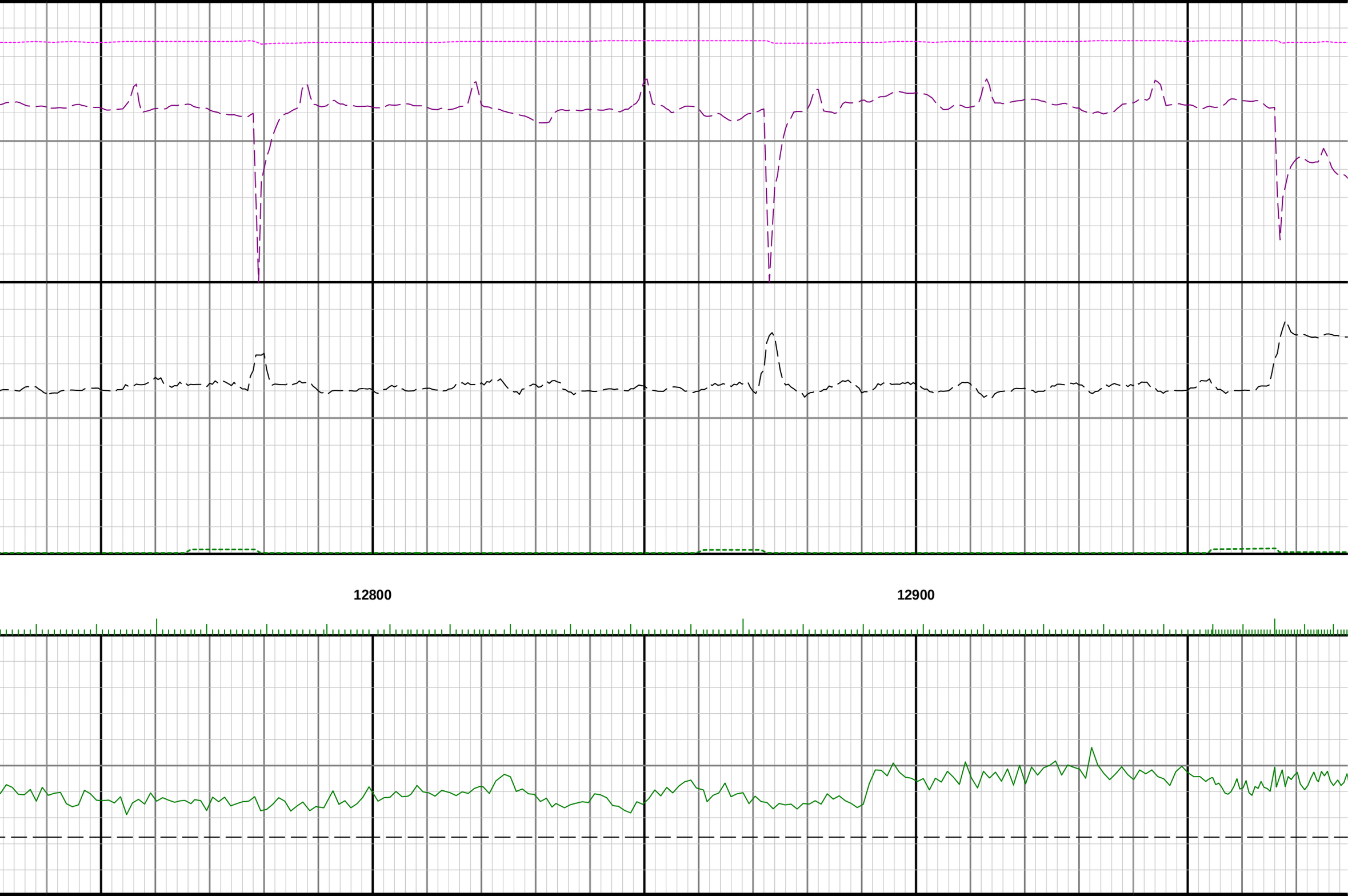
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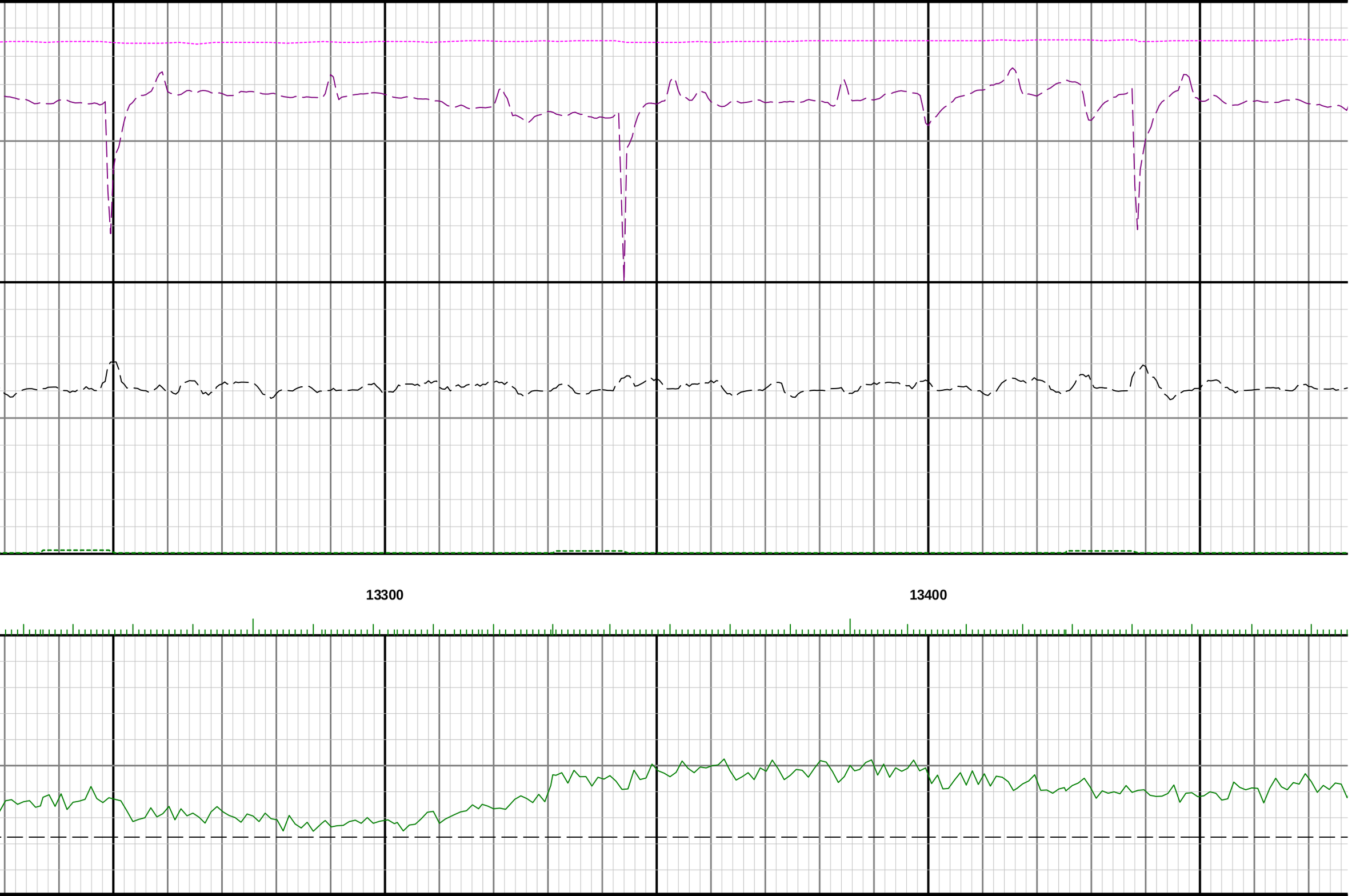
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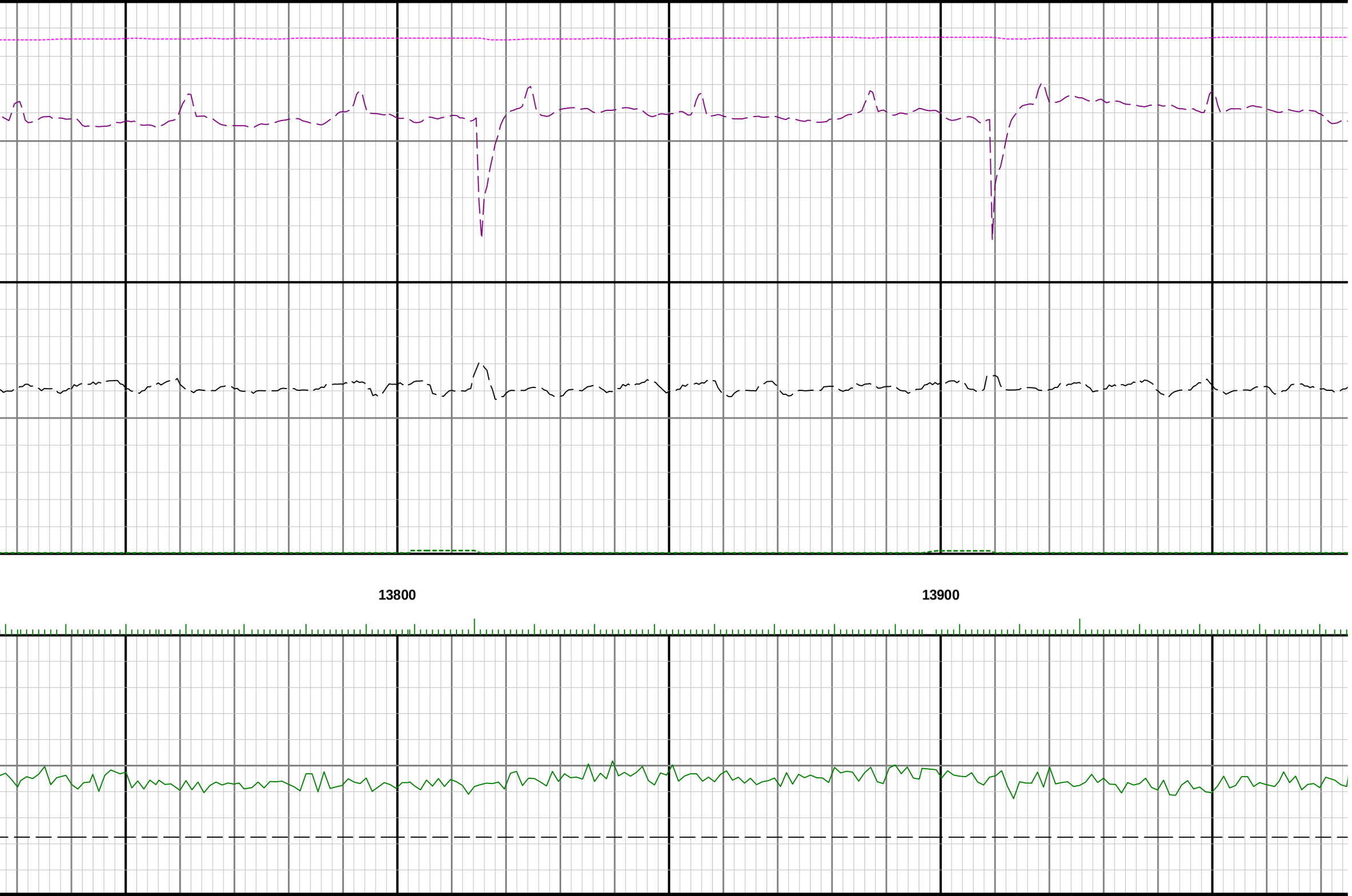
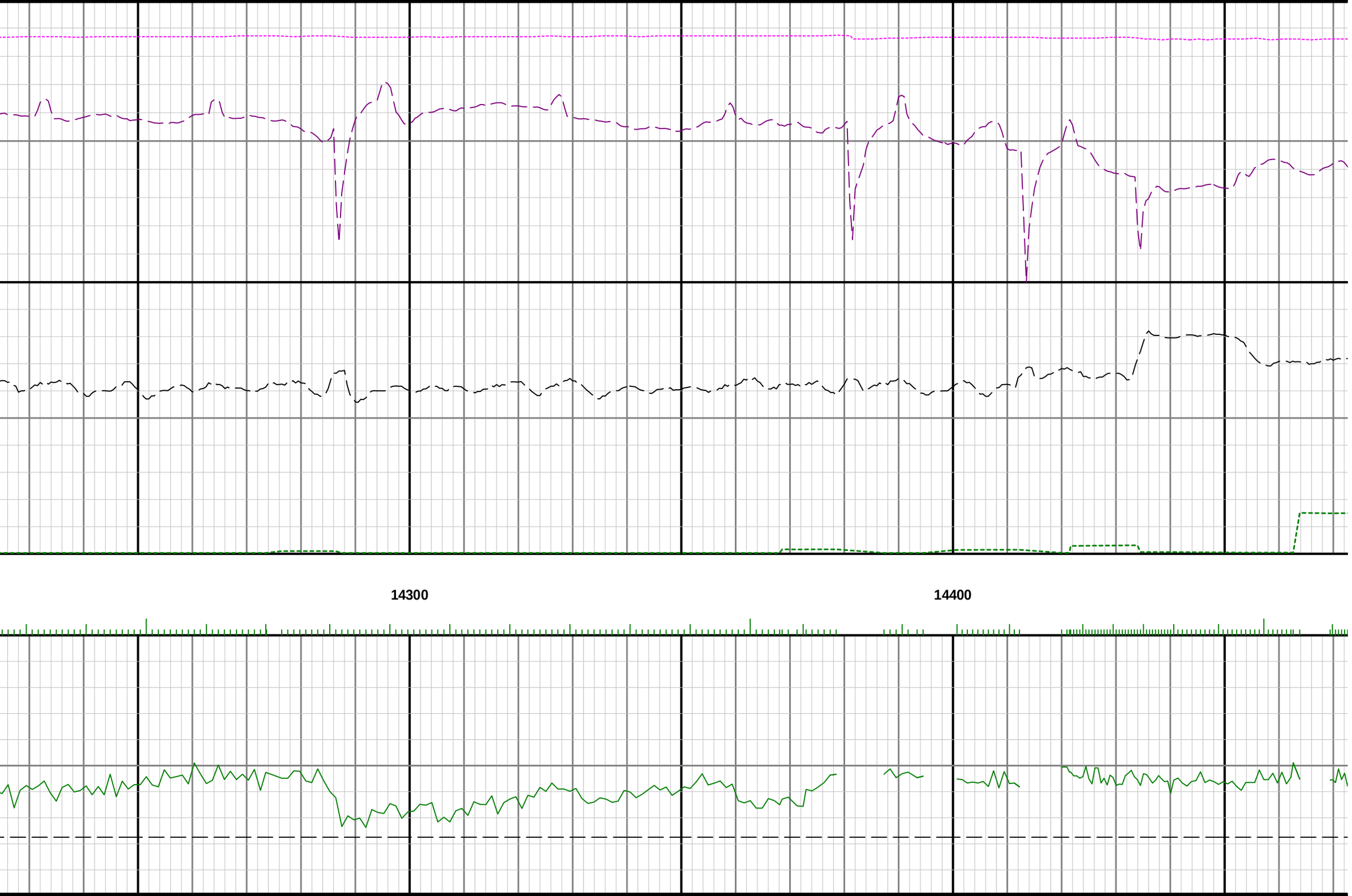

13800
13900


TVD
GRAM
GRIM
GRTM
ROPA
WOBA
TCDM
14000
14100
14200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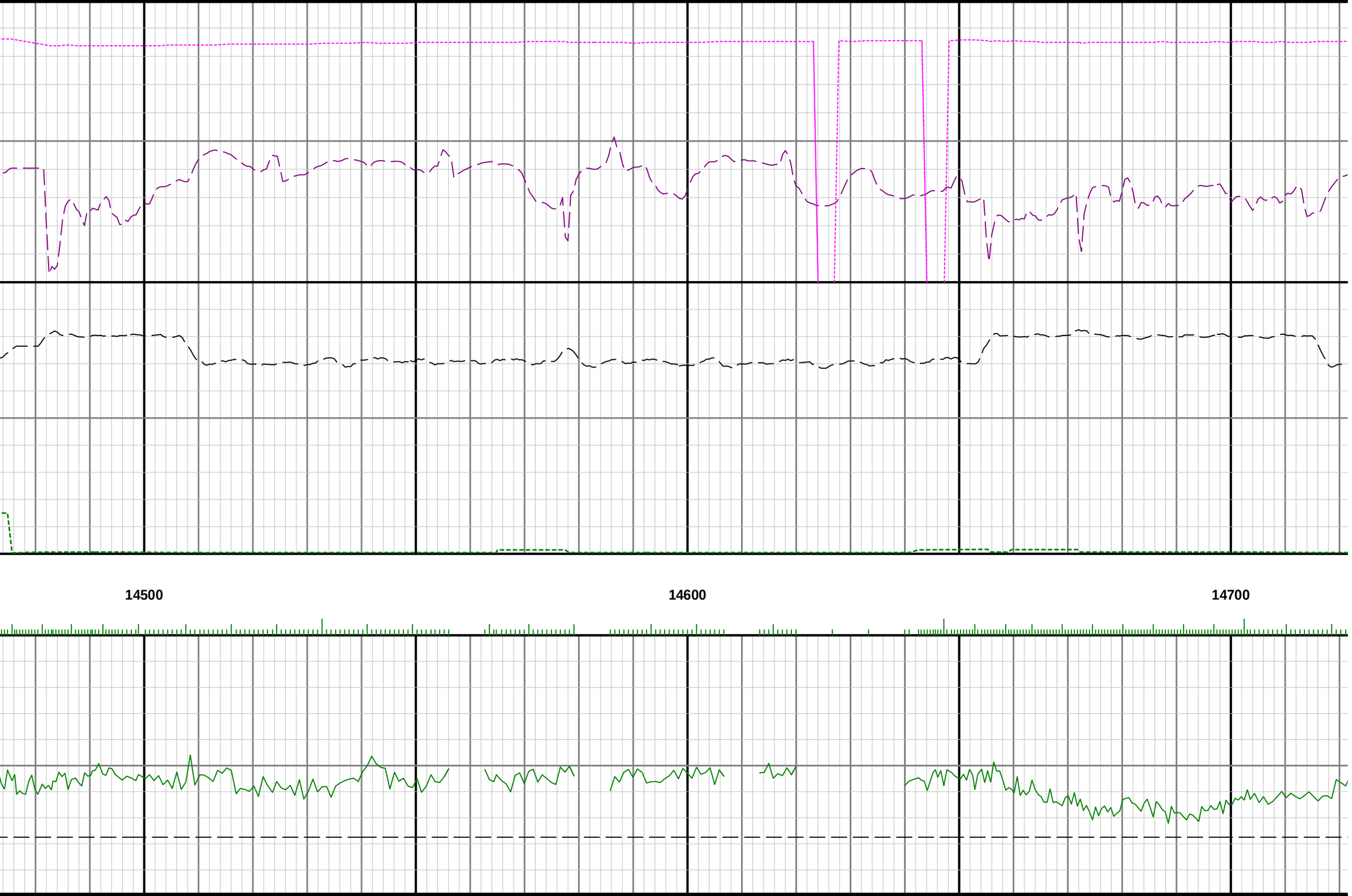
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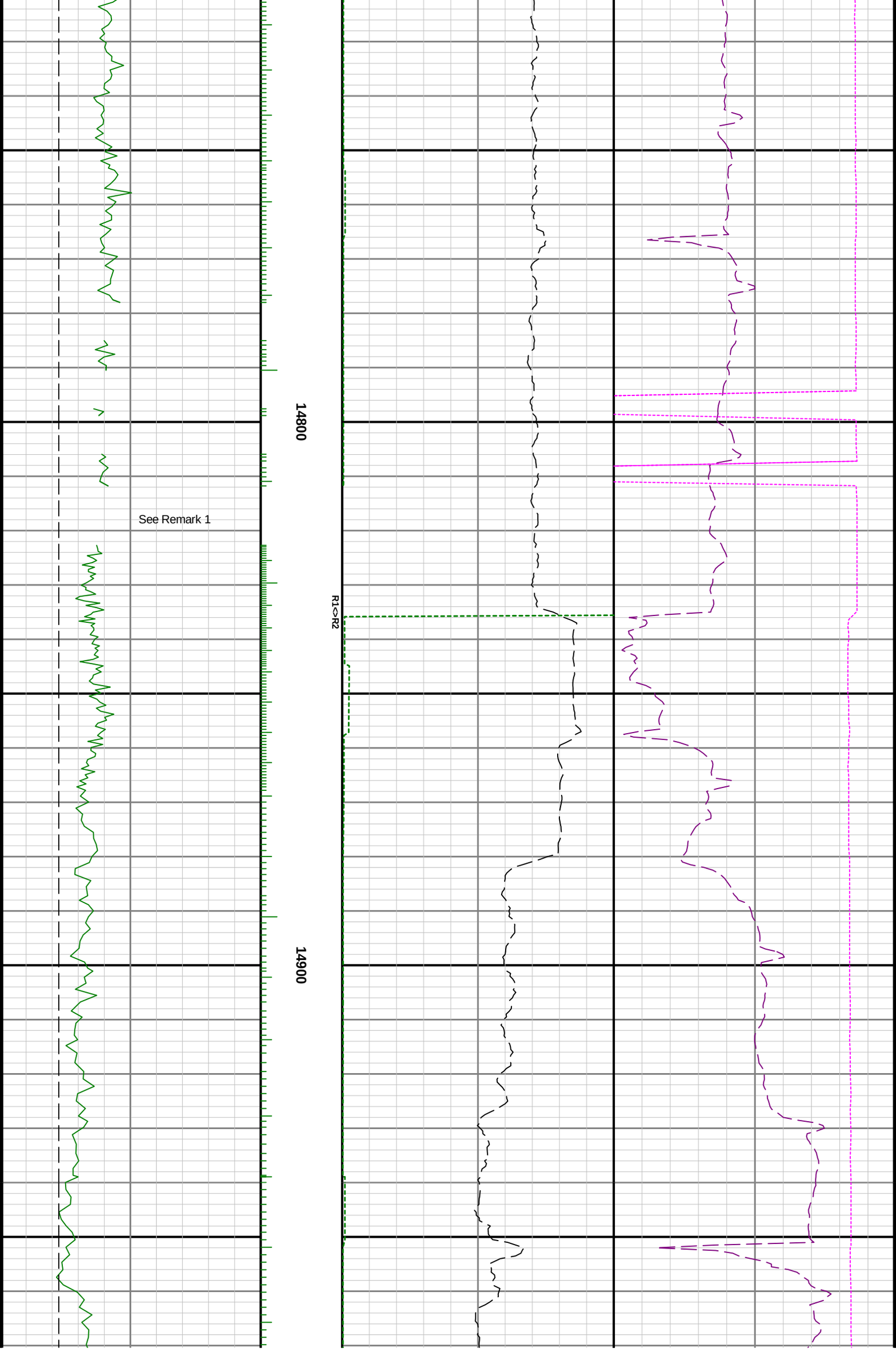
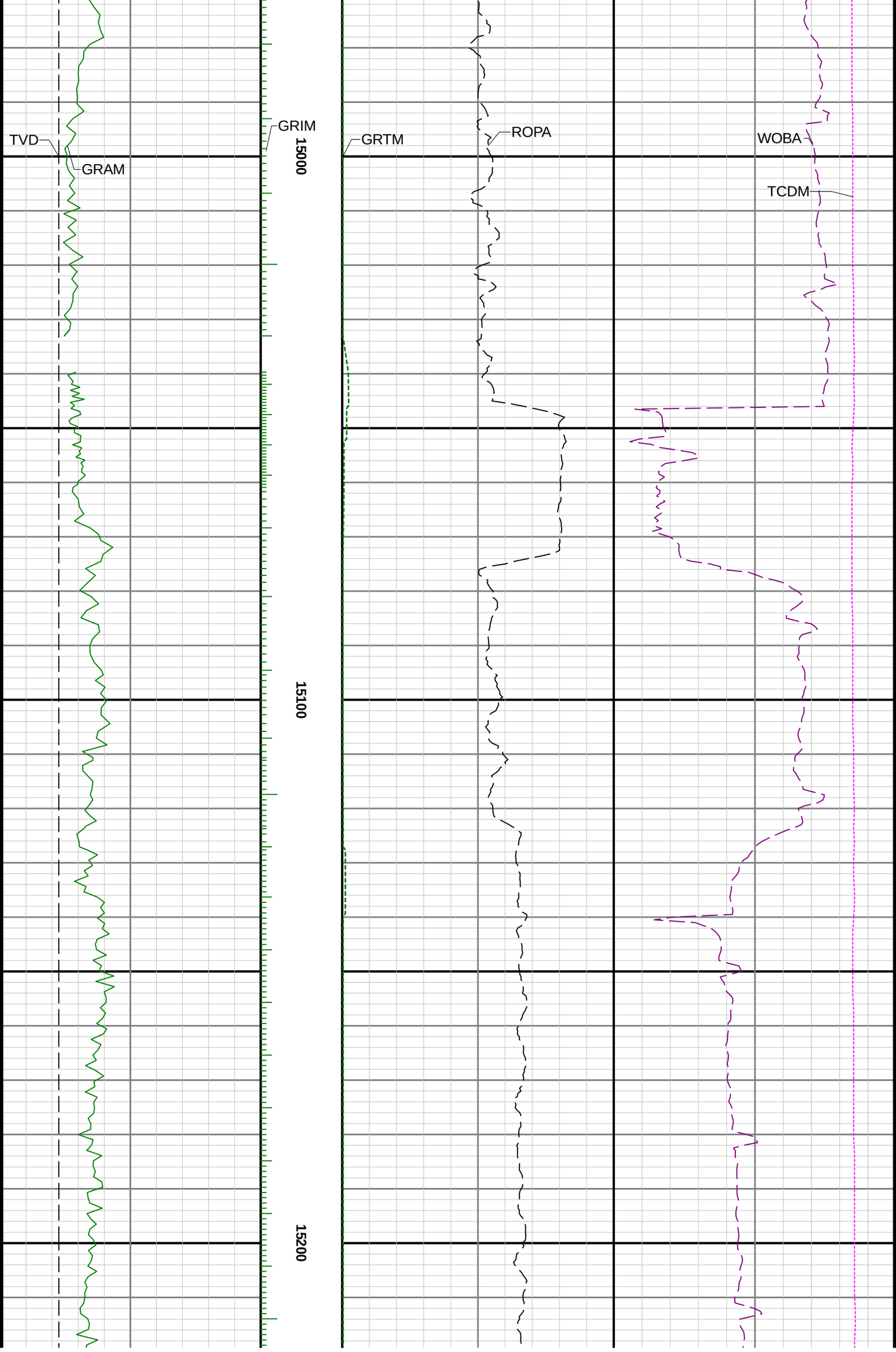
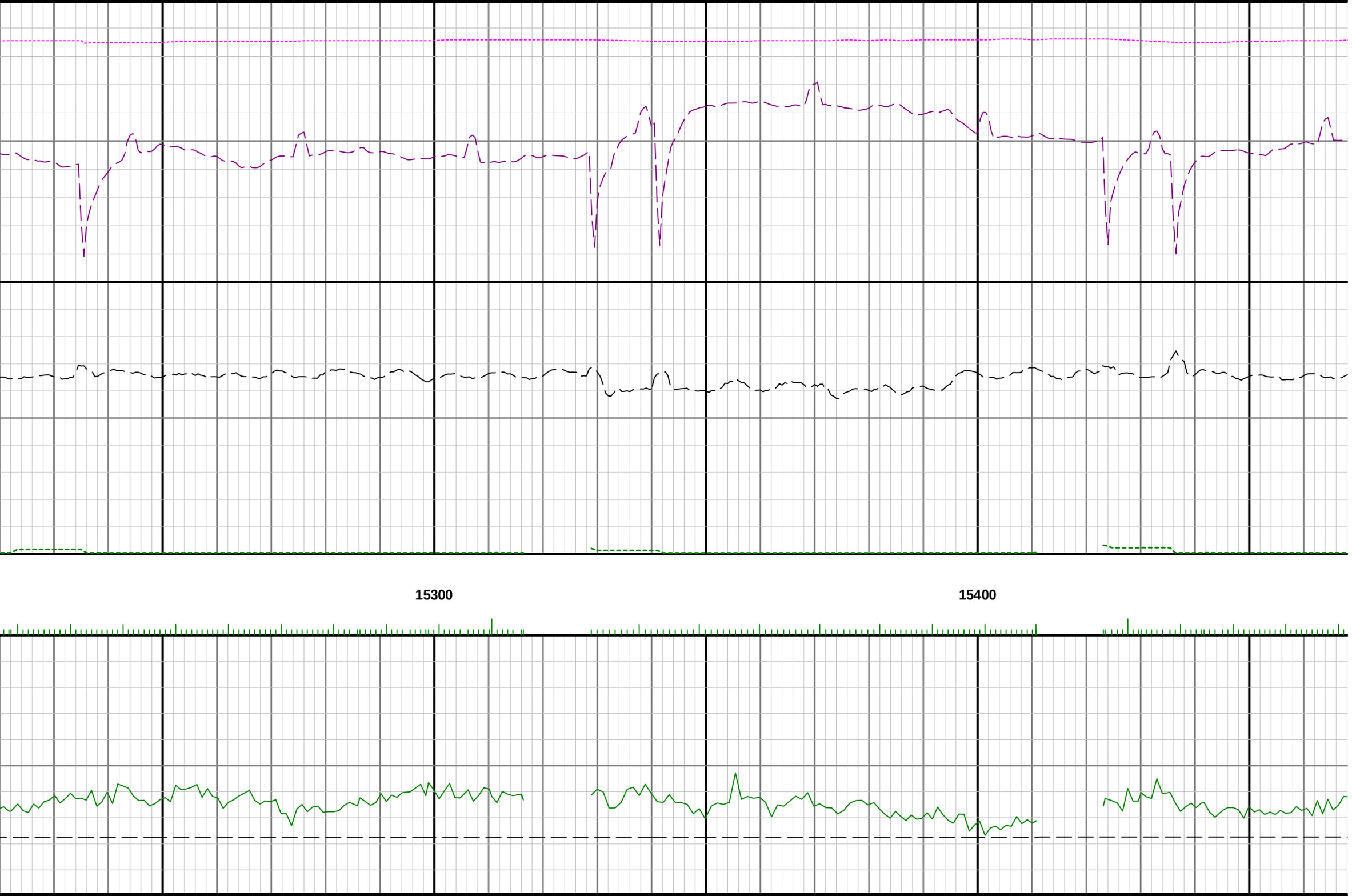

14800
14900
See Remark 1
R1<R2


TVD
GRAM
GRIM
15000
15100
15200
GRTM
ROPA
WOBA
TCDM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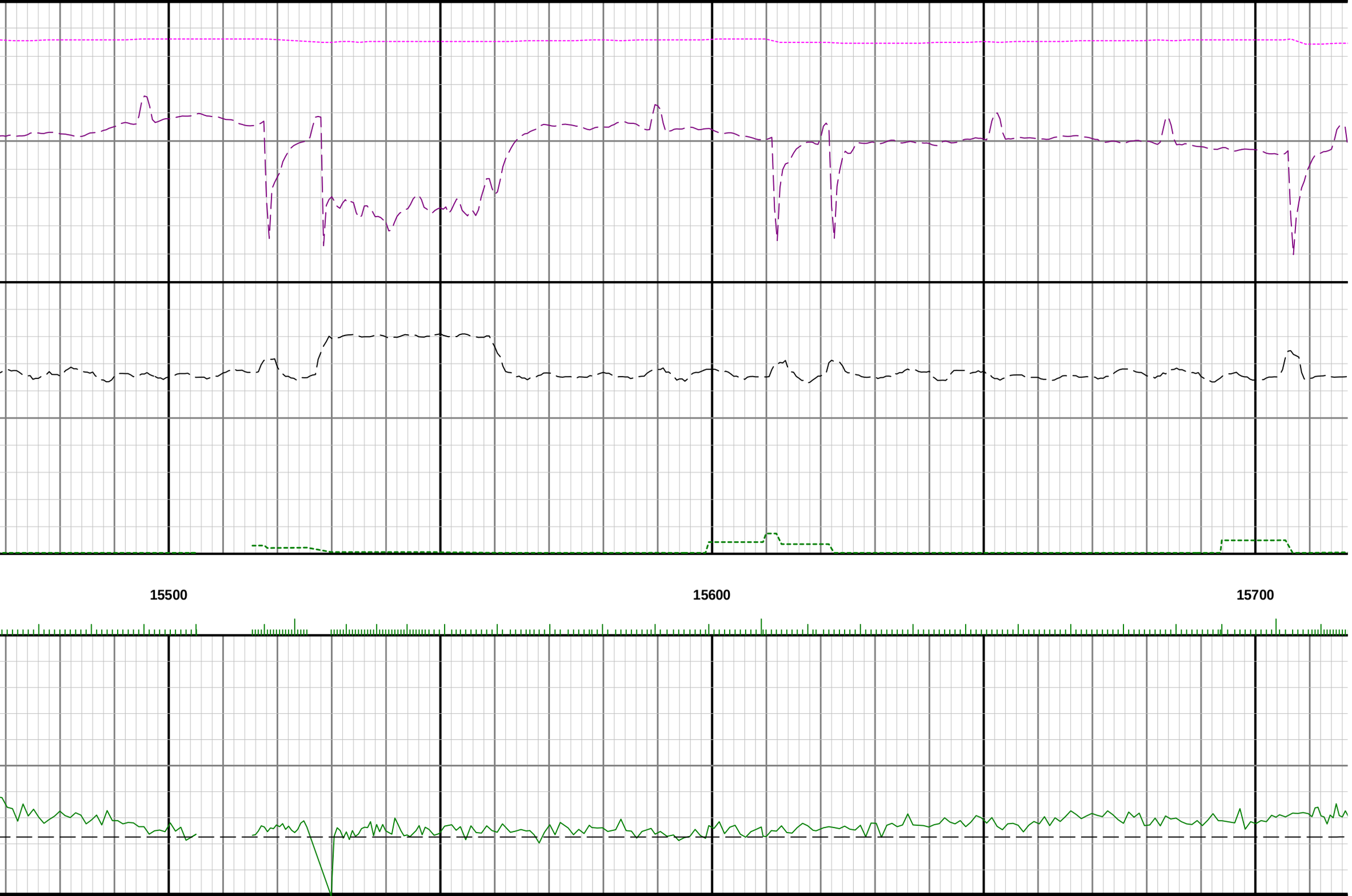
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15600
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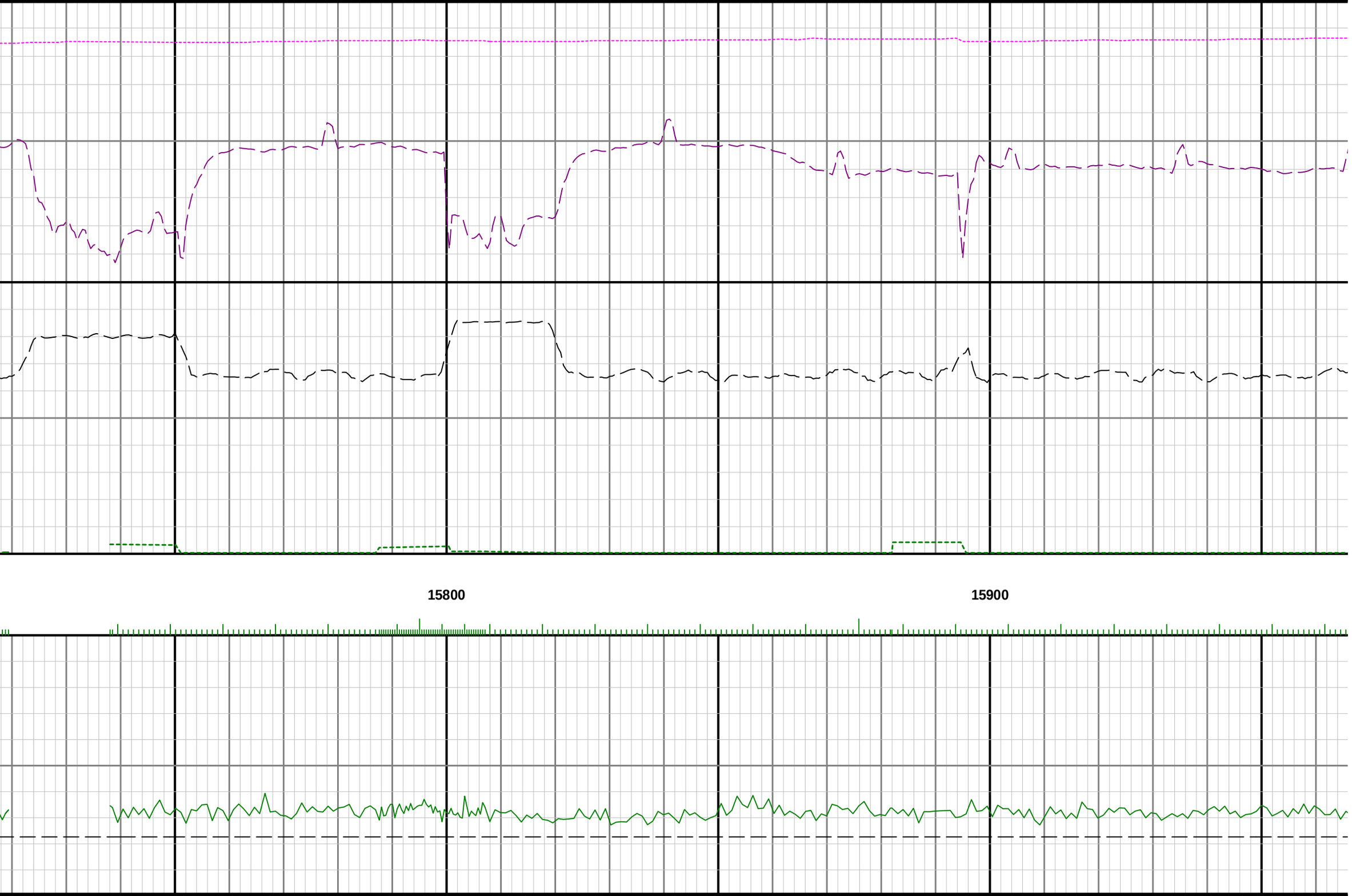
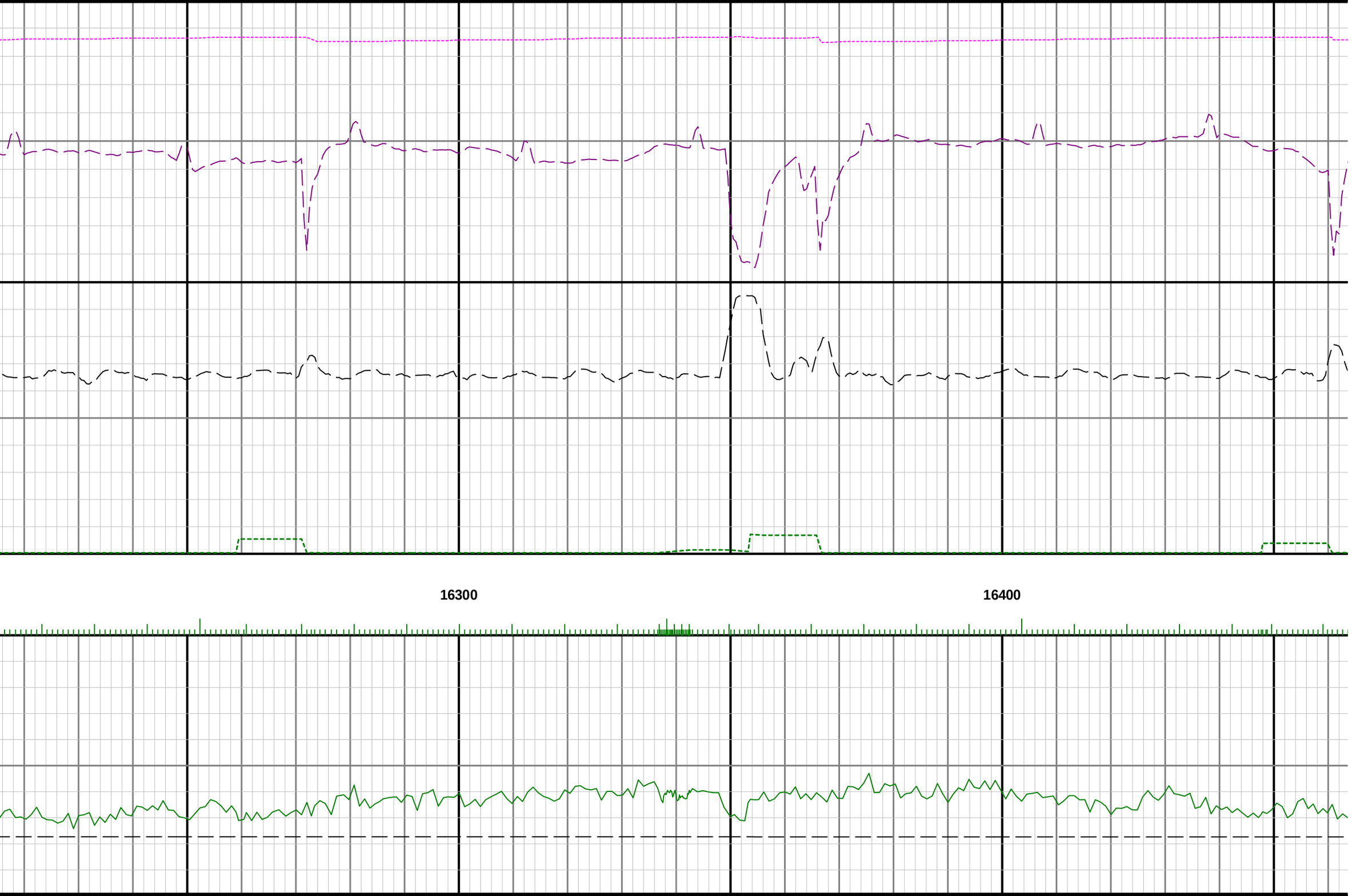

15800
15900


TVD
GRAM
GRIM
16000
16100
16200
GRTM
ROPA
WOBA
TCDM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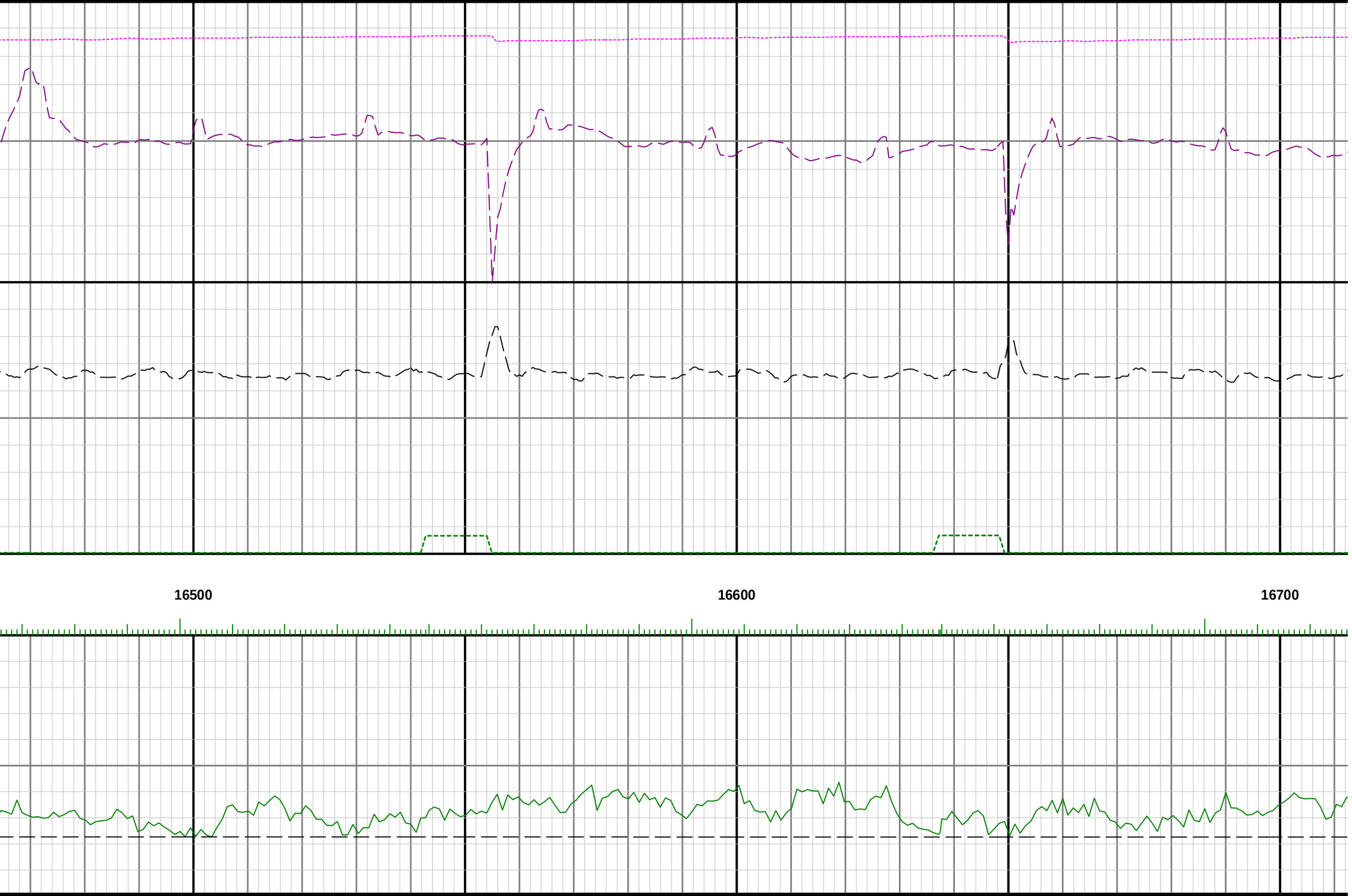
16400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16600
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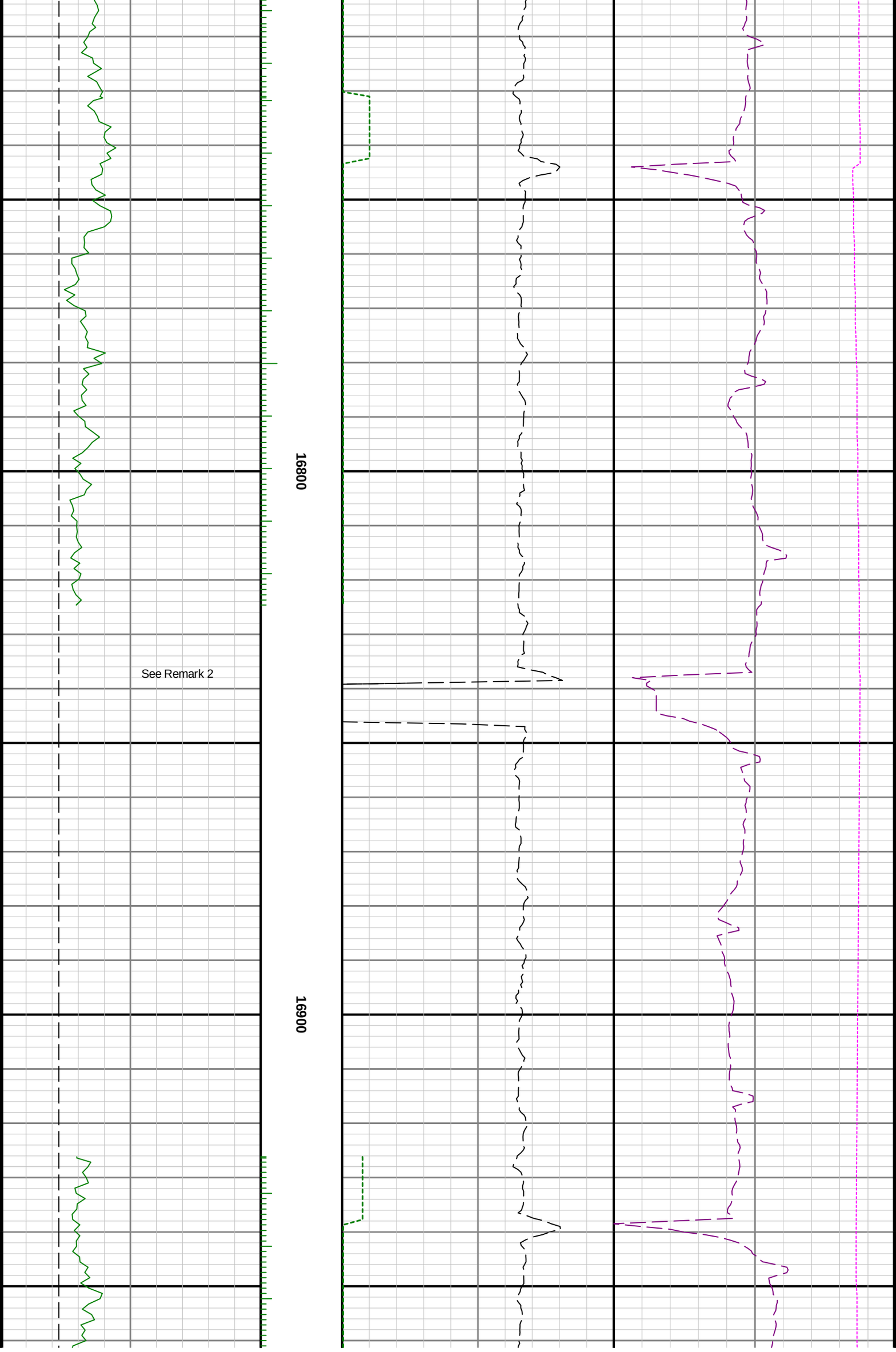
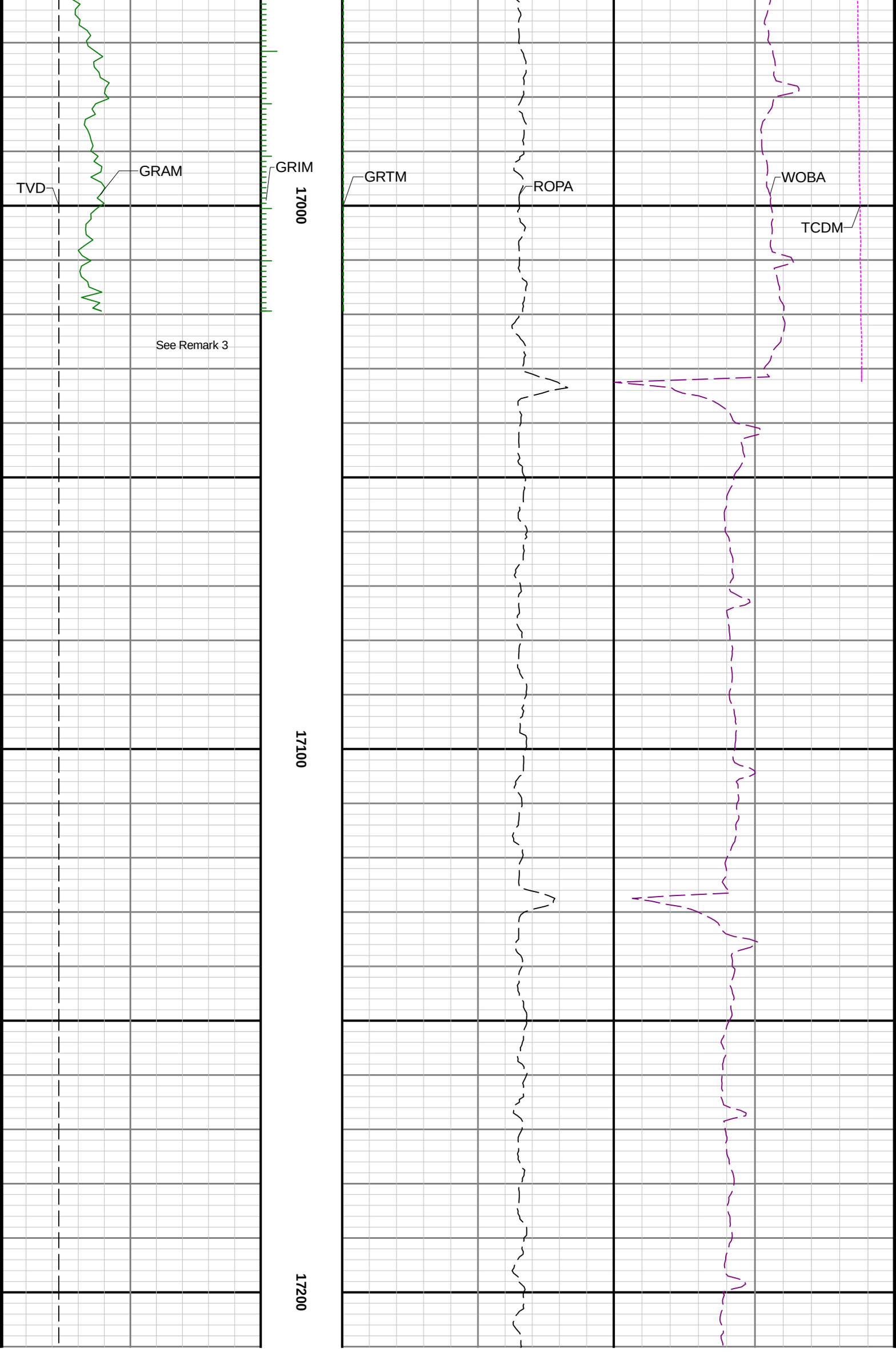
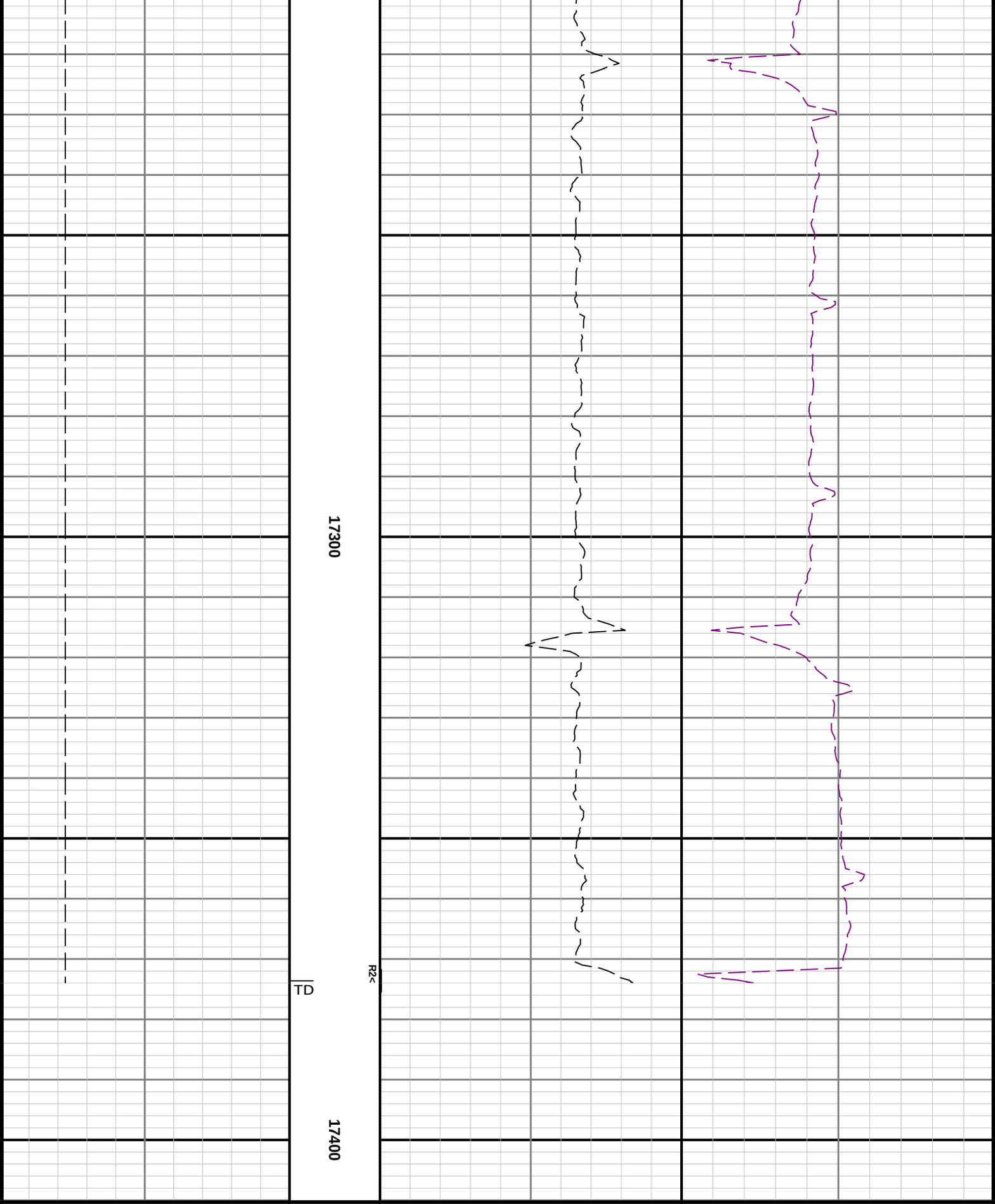

16800
See Remark 2
16900


TVD
GRAM
GRIM
GRTM
ROPA
WOBA
TCDM
See Remark 3
17000
17100
17200



Gamma Ray - Apparent 0.5 ft Average GRAM
0 300
API
True Vertical Depth TVD
8000 2000
ft

MD 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 50
klb
Downhole Temperature TCDM
0 300
degF