



Natural Formation Evaluation
Gamma Ray

Realtime Log

Scale:

Company: Anadarko

Well: Howard 15C-33HZ

Field: Weld County (Kerr McGee)

County: Weld State: Colorado

Status:

Final Print

Surface Location:

Latitude: 40° 1' 9.685" N

Longitude: 104° 53' 28.381" W

Other Services:

SEC: 28 TWP: 1N RNG: 67W

Directional
VSS

API Number:
05-123-38033-00

Permanent Datum (P.D.): Ground Level

Elevation: 5021.00 ft.

Elevations: N/A

Log Measured From:

Rig Floor

5037.00 ft.

Above P.D.

KB: N/A
DF: 5037.00 ft.
GL: 5021.00 ft.

Depth Reference:

Drillers Depth

GL: 5021.00 ft.

Interval Logged

Dates

Magnetic Field Reference

Top: 7378.0 ft. Date From: 10/Dec/2013 Dip Angle: 66.28° Azi Reference North: True

Bottom: 12862.0 ft. Date To: 31/Dec/2013 Total Mag to Reference

Spud Date: 13/Dec/2013 Field Strength: 52648.0 nT North Correction: 8.47°

Borehole Record

Casing Record

Hole Size	From	To	Size	Weight	From	To
13.500 in.	Surface	1031.0 ft.	9.625 in.	36.00 lb/ft	Surface	1023.0 ft.
8.750 in.	1023.0 ft.	8425.0 ft.	7.000 in.	26.00 lb/ft	Surface	8415.0 ft.
6.125 in.	8415.0 ft.	12692.0 ft.				

Mud Record

Deviation Record

Type	From	To	Hole Size	Interval	Inc / Az (Start)	Inc / Az (End)
Water Based Mud	Surface	12692.0 ft.	13.500 in.	1031.0 ft.	0.0 ° / 0.0 °	0.1 ° / 339.8 °
			8.750 in.	7402.0 ft.	0.1 ° / 346.4 °	89.1 ° / 179.4 °
			6.125 in.	4277.6 ft.	88.2 ° / 179.8 °	87.9 ° / 180.2 °
					/	/
					/	/
					/	/

Acquisition System Software Version

Other

Advantage	2.20U4	Rig:	Xtreme 6	/ Xtreme Coil Drilling
PAIS	6.4.1.34	Job No:	5869402	
		District / Unit:	RMD	/ D & E

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Log Run Summary

LWD Run No.	BHA Run No.	Bit Run No.	Bit Size (in.)	Bit Type	Bit Gauge Length (in.)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Time (hrs.)
							Top (ft.)	Bottom (ft.)	From (ft.)	To (ft.)	Start	End	
1	1	2	8.750	PDC Core	3.000	Steerable	N/A	N/A	1031.0	1205.0	13/Dec/2013 21:33	14/Dec/2013 00:16	2.5
2	2	3	8.750	PDC Core	6.000	Steerable	N/A	N/A	1205.0	7378.0	14/Dec/2013 03:54	17/Dec/2013 07:09	41.2
3	3	4	8.750	PDC Core	6.000	Steerable	7339.0	8425.0	7378.0	8425.0	19/Dec/2013 08:05	20/Dec/2013 15:08	22.3
4	4	5	6.125	PDC Core	5.750	Steerable	8376.0	10364.0	8425.0	10364.0	22/Dec/2013 18:34	23/Dec/2013 22:27	15.4
5	5	6	6.125	PDC Core	5.750	Steerable	N/A	N/A	N/A	N/A	25/Dec/2013 05:56	26/Dec/2013 12:12	18.2
6	6	7	6.125	PDC Core	5.750	Steerable	10314.0	12692.0	10364.0	12692.0	28/Dec/2013 18:33	31/Dec/2013 03:00	37.4

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
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	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
Matthew Delmore	10/Dec/2013	31/Dec/2013	David Campbell	10/Dec/2013	15/Dec/2013	Stephen Gray	15/Dec/2013	31/Dec/2013
Tyler Wall	25/Dec/2013	25/Dec/2013						

Mud Properties Record

Date / Time	LWD Run No.	Measured Depth (ft.)	Mud Type	Density (ppg)	Viscosity (cp)	pH	Fluid Loss (cc)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
13/Dec/2013 07:00	1	1031.0	Water Based Mud	8.5	30	8.8	NC	0/100	Flow Line	700	N/A
14/Dec/2013 19:00	2	2761.0	Water Based Mud	8.6	29	8.8	NC	0/100	Flow Line	700	N/A
15/Dec/2013 19:00	2	3997.0	Water Based Mud	8.7	29	8.8	NC	0/100	Flow Line	700	N/A
16/Dec/2013 19:00	2	7300.0	Water Based Mud	10.0	41	8.8	7.0	0/92	Flow Line	1000	N/A
17/Dec/2013 19:00	2	7378.0	Water Based Mud	9.8	36	8.5	12.0	0/93	Flow Line	1000	N/A
18/Dec/2013 18:30	2	7378.0	Water Based Mud	9.8	36	8.5	12.0	1/92	Flow Line	1000	N/A
19/Dec/2013 19:00	3	7628.0	Water Based Mud	10.0	45	9.2	6.0	1/91	Flow Line	1000	N/A
20/Dec/2013 16:30	3	8425.0	Water Based Mud	10.0	45	9.0	5.4	2/89	Flow Line	1000	N/A
21/Dec/2013 09:30	3	8425.0	Water Based Mud	10.0	47	8.8	5.2	2/90	Flow Line	1000	N/A
22/Dec/2013 18:30	3	8425.0	Water Based Mud	9.0	35	8.5	6.4	2/93	Flow Line	1000	N/A
23/Dec/2013 20:30	4	10137.0	Water Based Mud	8.9	39	8.5	5.0	1/95	Flow Line	1000	N/A
24/Dec/2013 18:30	4	10361.0	Water Based Mud	9.3	40	9.3	4.6	1/95	Flow Line	1000	N/A
25/Dec/2013 19:00	5	10361.0	Water Based Mud	9.7	39	9.0	4.6	1/92	Flow Line	1000	N/A
27/Dec/2013 20:15	N/A	10361.0	Water Based Mud	9.7	54	9.8	4.0	3/90	Active Pit	1000	N/A
28/Dec/2013 21:30	6	10544.0	Water Based Mud	9.7	50	9.0	4.4	3/90	Active Pit	1000	N/A
29/Dec/2013 22:00	6	12160.0	Water Based Mud	9.7	44	9.5	3.8	4/90	Active Pit	1000	N/A
30/Dec/2013 17:30	6	12692.0	Water Based Mud	10.1	46	9.0	3.6	5/87	Active Pit	1000	N/A

Mnemonics

Curve	Description	Units
GRAX	Gamma Ray Apparent, 0.5 ft. Avg.	API
GRIX	Gamma Ray Density	points
GRSI	Gamma Ray Slide Indicator	unitless
GRTX	Gamma Ray Time Since Drilled	min.
ROPA	Rate of Penetration, 3.0 ft. Avg.	ft/hr
TCDX	Downhole Temperature	degF
TVD	True Vertical Depth	ft.
WOBA	Surface Weight on Bit, 1.0 ft. Avg.	klbs

Equipment and Service Data

LWD Run No.	Tool	Serial Number	Measurement	Bit Offset (ft)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	11832777	Directional	47.42	6.750	3.250
1	SRIG	12131401	Gamma	44.05	6.750	3.250

2	DIR	11832777	Directional	47.42	6.750	3.250
2	SRIG	12131401	Gamma	44.05	6.750	3.250
3	DIR	12011873	Directional	42.27	6.750	3.250
3	SRIG	12376064	Gamma	38.90	6.750	3.250
4	DIR	12497612	Directional	51.91	4.750	2.688
4	SRIG	12600745	Gamma	48.53	4.750	2.688
5	DIR	12373456	Directional	54.89	4.750	2.688
5	SRIG	12586753	Gamma	51.51	4.750	2.688
6	DIR	12042365	Directional	53.35	4.750	2.688
6	SRIG	5015	Gamma	49.97	4.750	2.688

Service and Tool Mnemonics

Mnemonic	Name	Description
DIR	Directional	Wellbore directional survey
SRIG	Inclination and Gamma	Probe based gamma ray and inclination module

Comments

<p>1.) Baker Hughes LWD run 1 utilized 6 3/4 inch NaviTrak Services (VSS, Directional) from 1031 to 1205 ft. MD (1030.99 to 1204.99 ft. TVD). Run 1 was a drill out run with a mill tooth/tricone bit.</p> <p>2.) Baker Hughes LWD run 2 utilized 6 3/4 inch NaviTrak Services (VSS, Directional) behind an 8 3/4 inch bit and steerable assembly from 1205 to 7378 ft. MD (1204.99 to 7188.46 ft. TVD).</p> <p>3.) Baker Hughes LWD run 3 utilized 6 3/4 inch NaviGamma Services (VSS, Directional, Gamma Ray) behind an 8 3/4 inch bit and steerable assembly from 7378 to 8425 ft. MD (7188.46 to 7771.54 ft. TVD).</p> <p>4.) Baker Hughes LWD run 4 utilized 4 3/4 inch NaviGamma Services (VSS, Directional, Gamma Ray) behind an 6 1/8 inch bit and steerable assembly from 8425 to 10364 ft. MD (7771.54 to 7786.82 ft. TVD).</p> <p>5.) Baker Hughes LWD run 5 utilized 4 3/4 inch NaviGamma Services (VSS, Directional, Gamma Ray) behind an 6 1/8 inch bit and steerable assembly which was used for tripping and reaming of the open hole.</p> <p>6.) Baker Hughes LWD run 6 utilized 4 3/4 inch NaviGamma Services (VSS, Directional, Gamma Ray) behind an 6 1/8 inch bit and steerable assembly from 10364 to 12692 ft. MD (7786.82 to 7800.94 ft. TVD).</p> <p>7.) A sliding indicator is shown to the left of track 1 as a heavy green line. The indicator has been depth-shifted to the gamma sensor offset to correspond with data acquired while sliding.</p> <p>8.) Depth measurements were obtained from a depth tracking system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes LWD 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.</p>

Remarks

Number	Measured Depth (ft)	Hole Section (in.)	LWD Run No.	Remark
1	7342	8.750	3	The interval from 7339 to 7378 ft. MD (7150.26 to 7188.18 ft. TVD) was not logged for up to 76 hours after drilling due to a trip to surface for a new BHA for run 3.
2	8378	6.125	4	The interval from 8376 to 8425 ft. MD (7769.00 to 7771.54 ft. TVD) was not logged for up to 65 hours after drilling due to a trip to surface for casing operations and a new BHA for run 4.
3	10316	6.125	6	The interval from 10314 to 10364 ft. MD (7786.73 to 7786.82 ft. TVD) was not logged for up to 115.88 hours after drilling due to a trip to surface for a new BHA for run 6.
4	12652	6.125	6	The interval from 12642 to 12692 ft. MD (7799.17 to 7800.94 ft. TVD) has no GRAX, GRIX or GRTX due to bit to sensor offset.

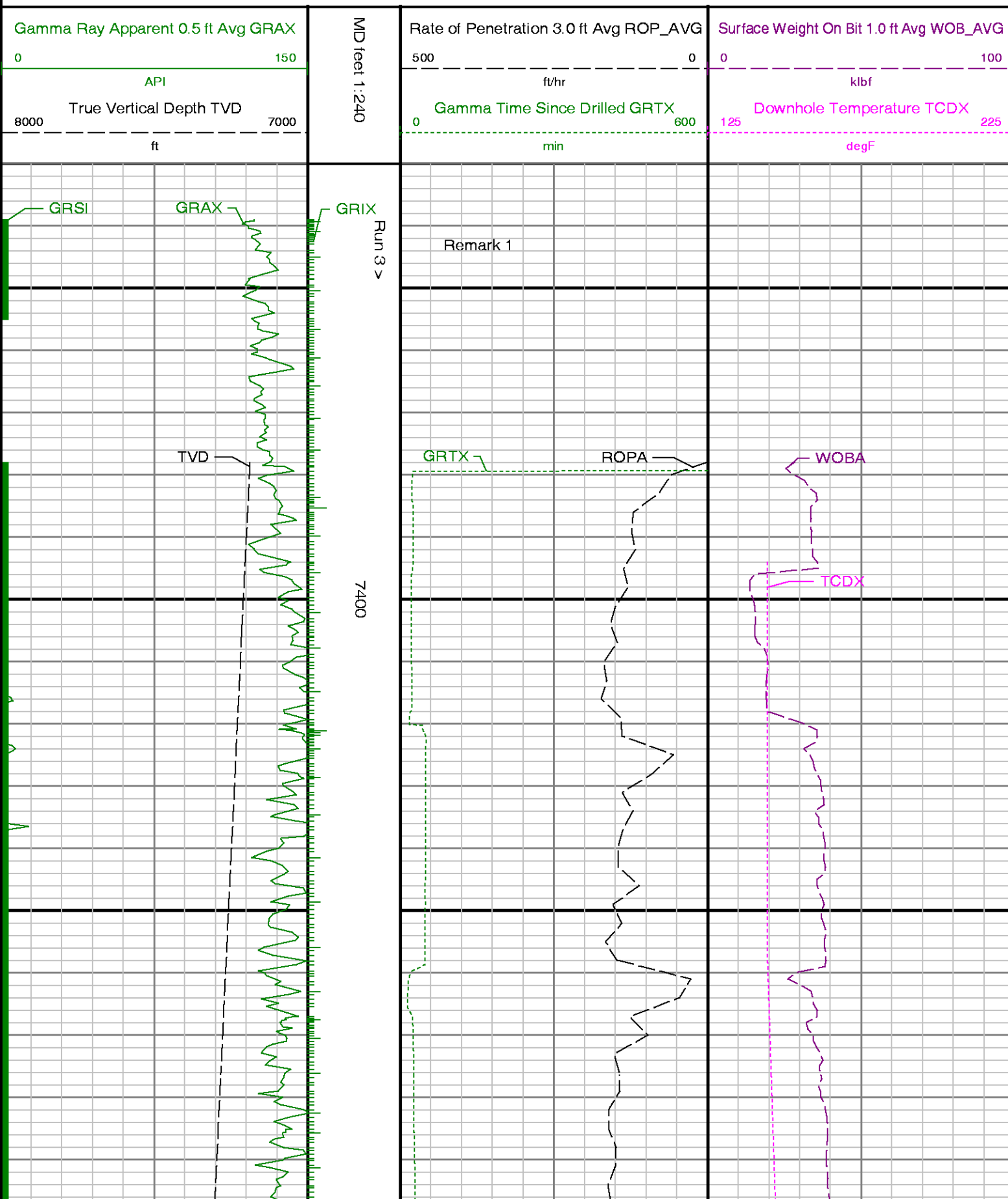


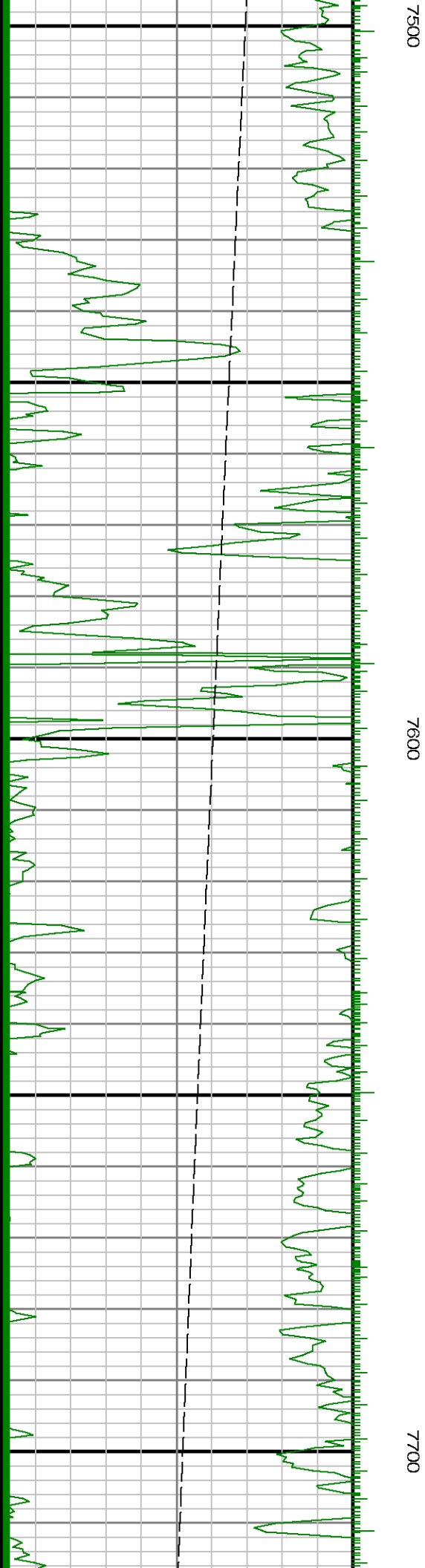
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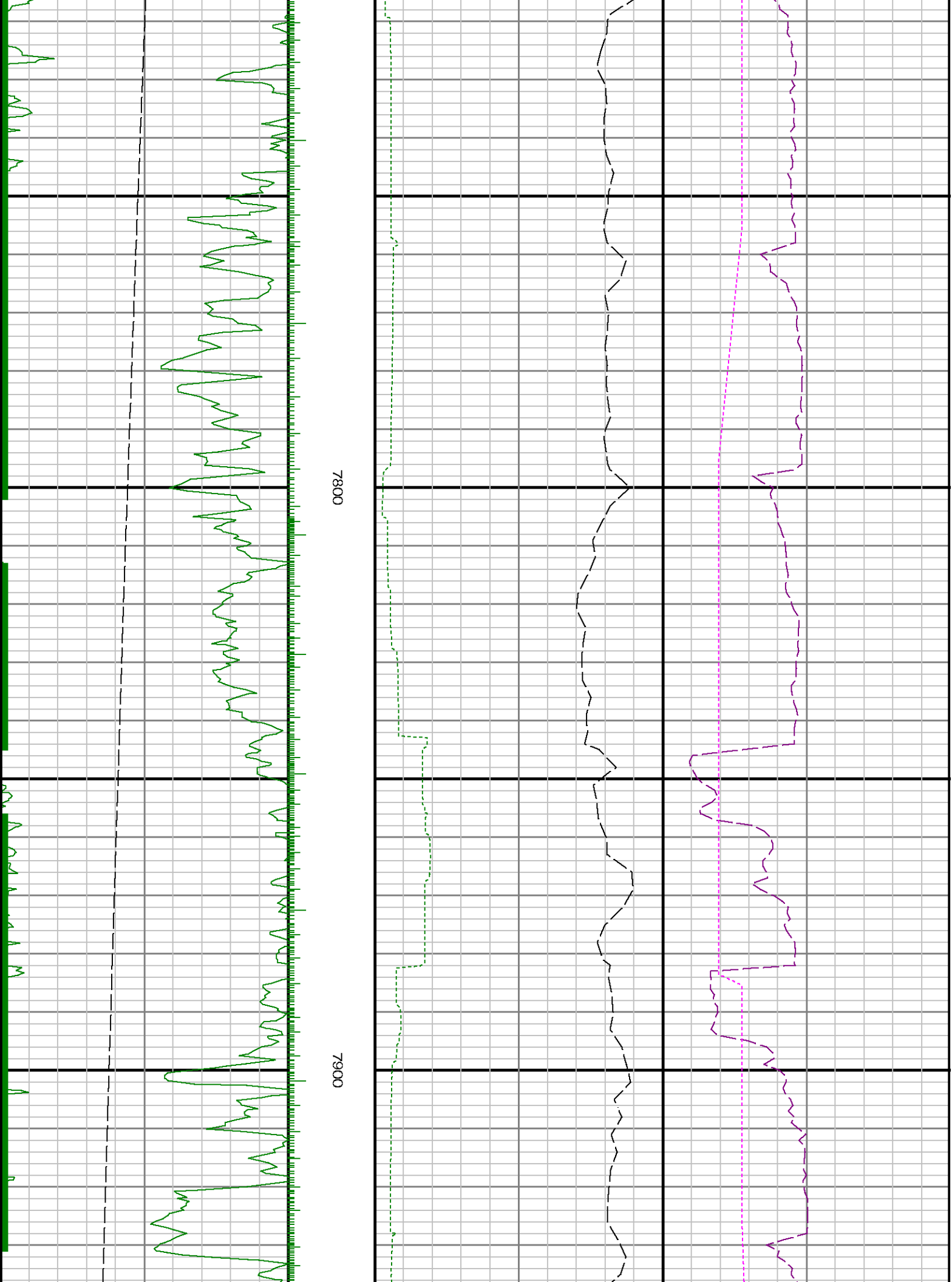
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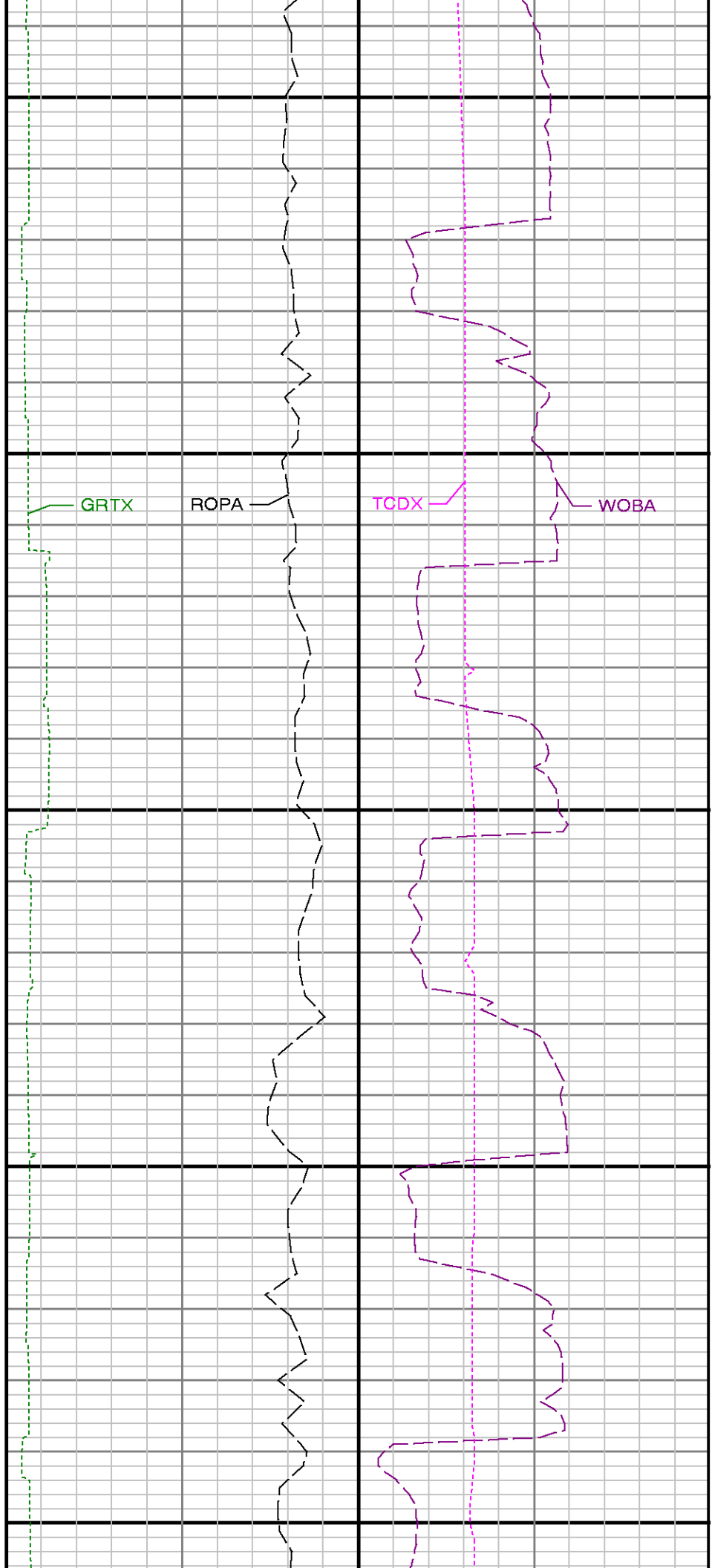
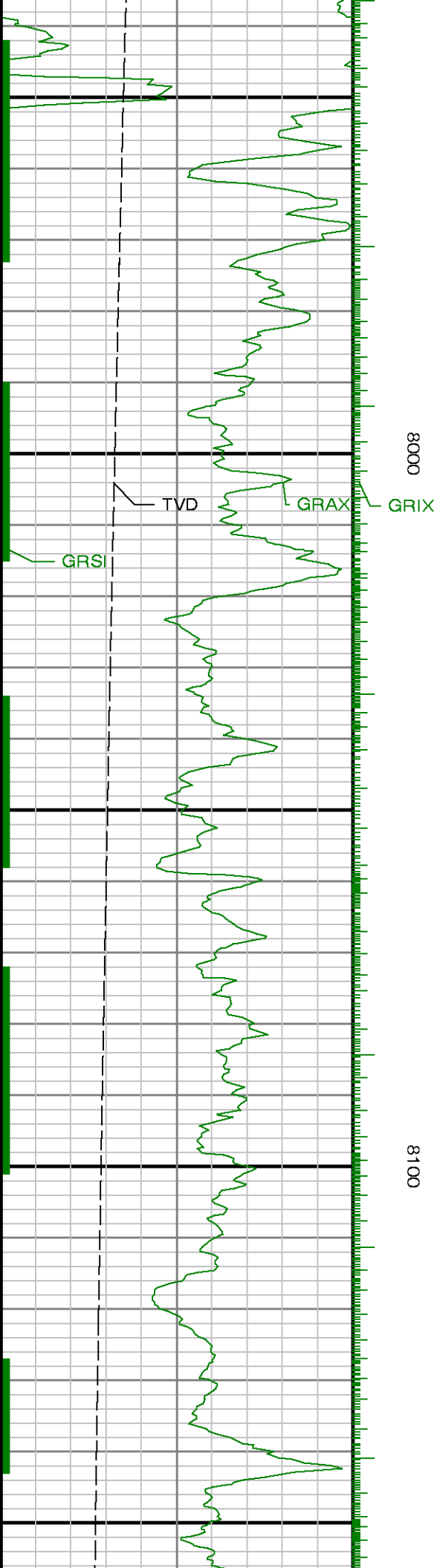
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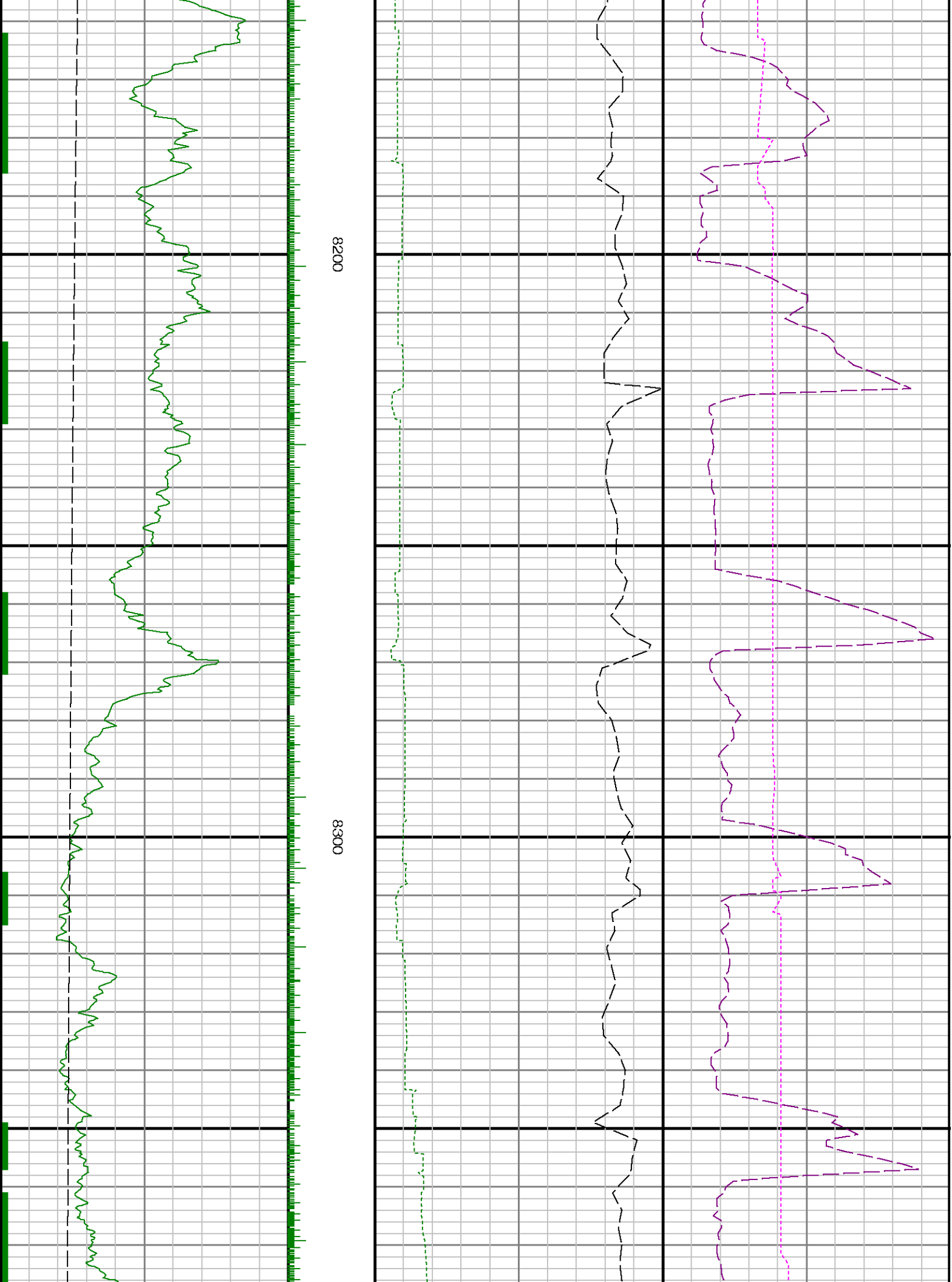
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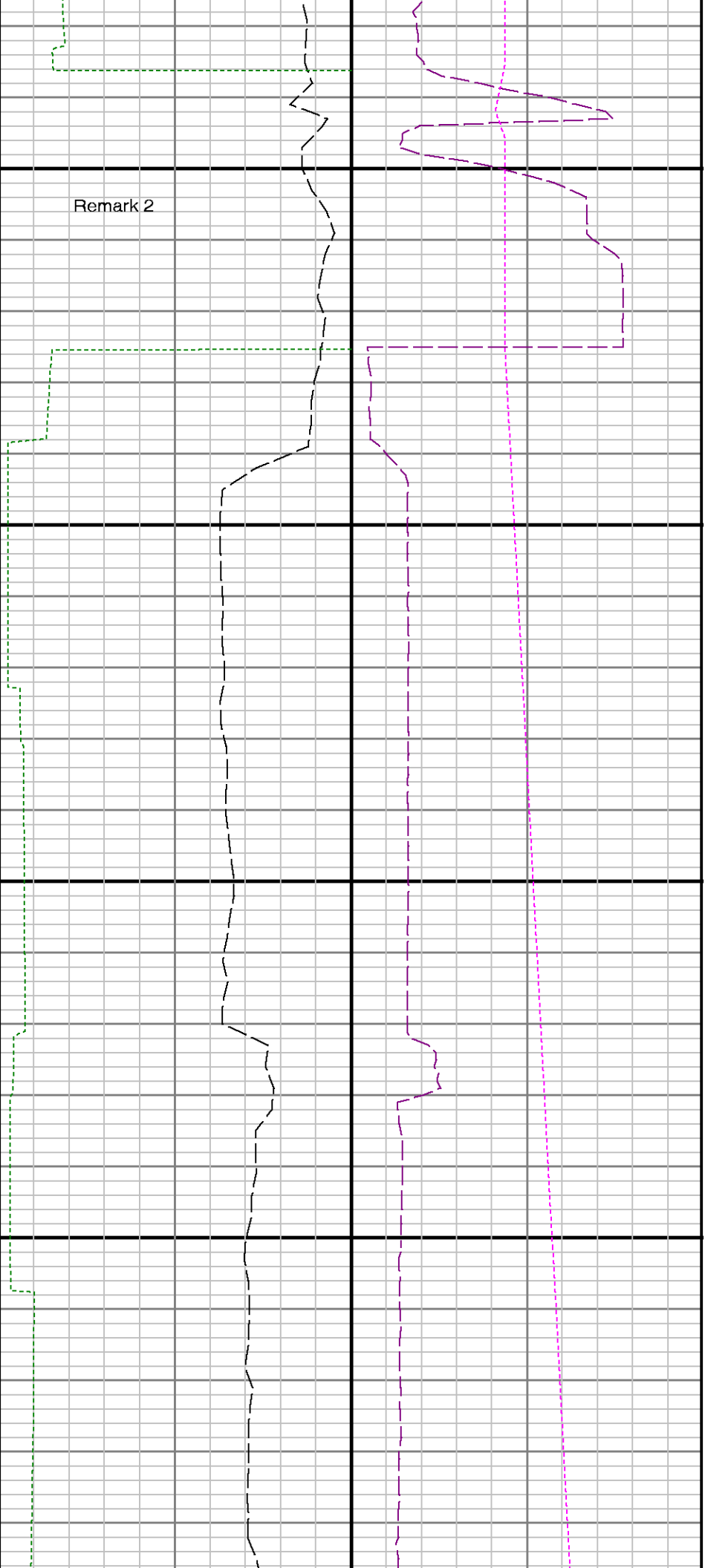
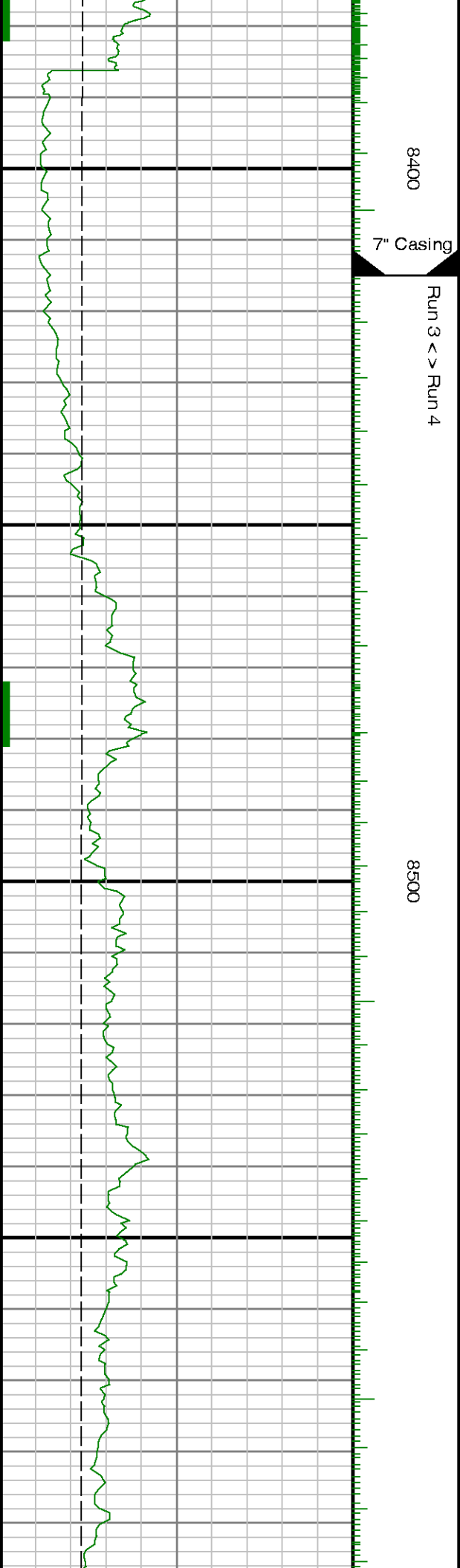


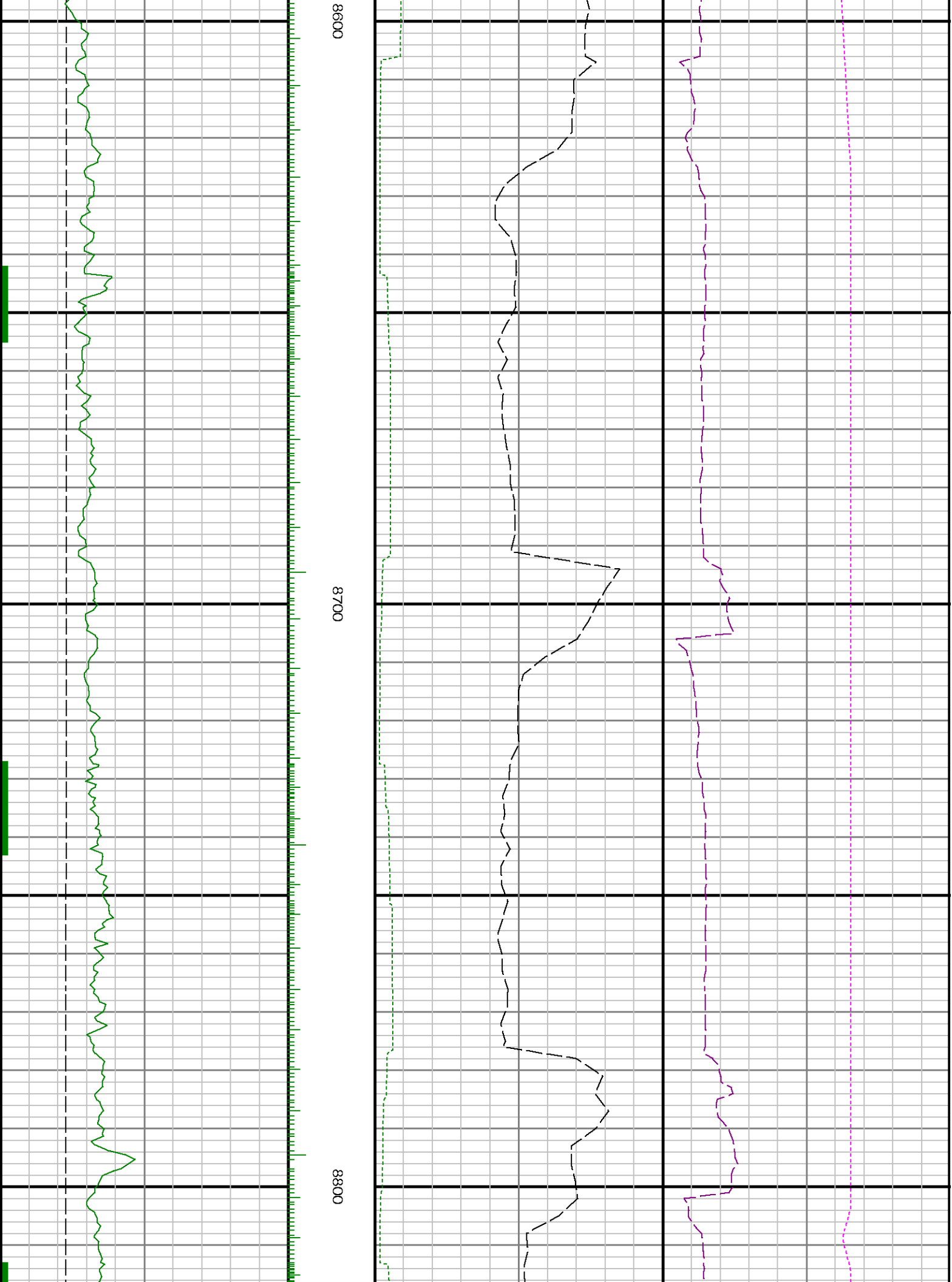


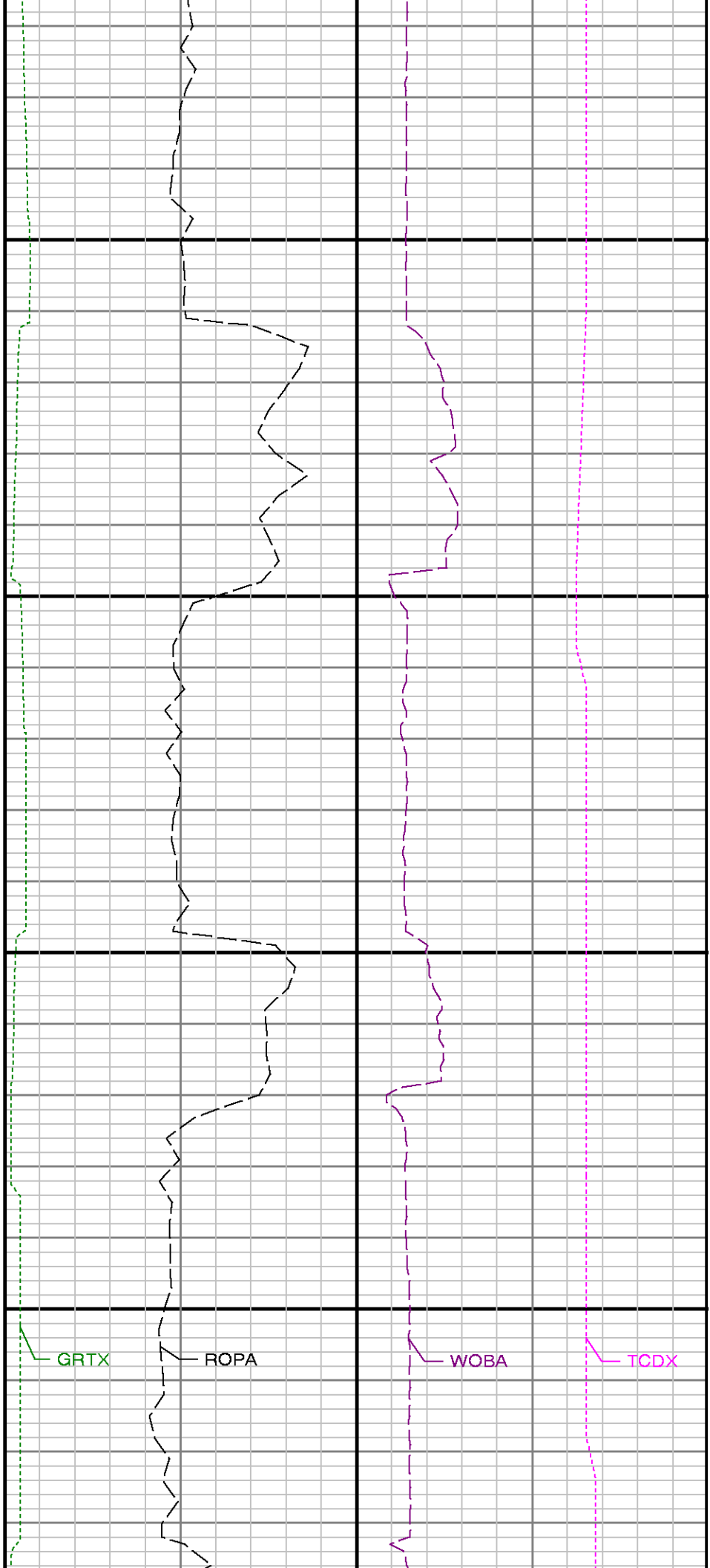
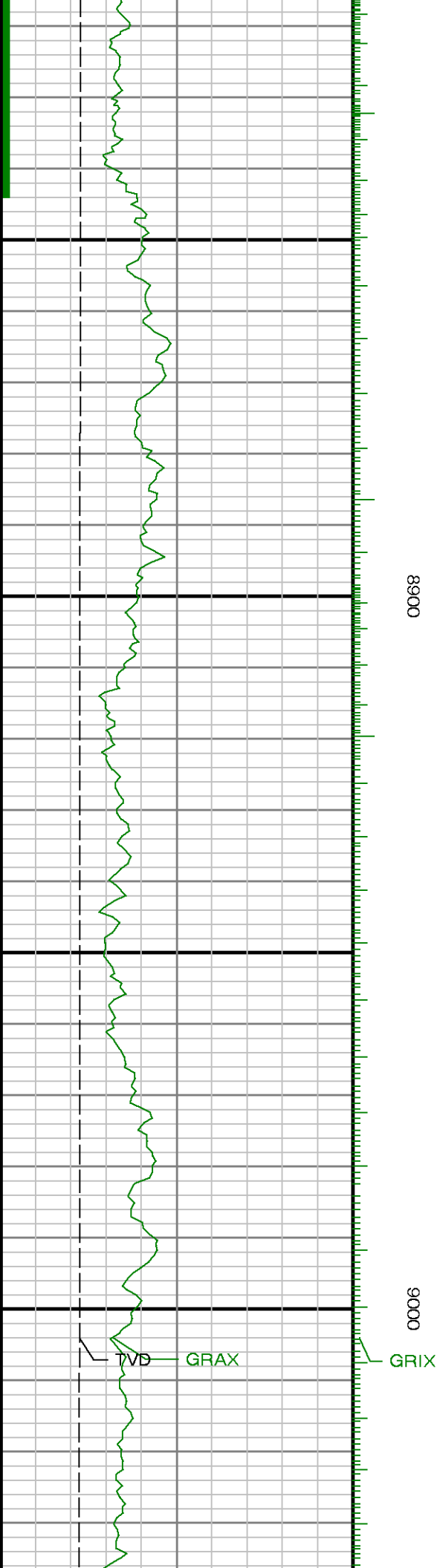


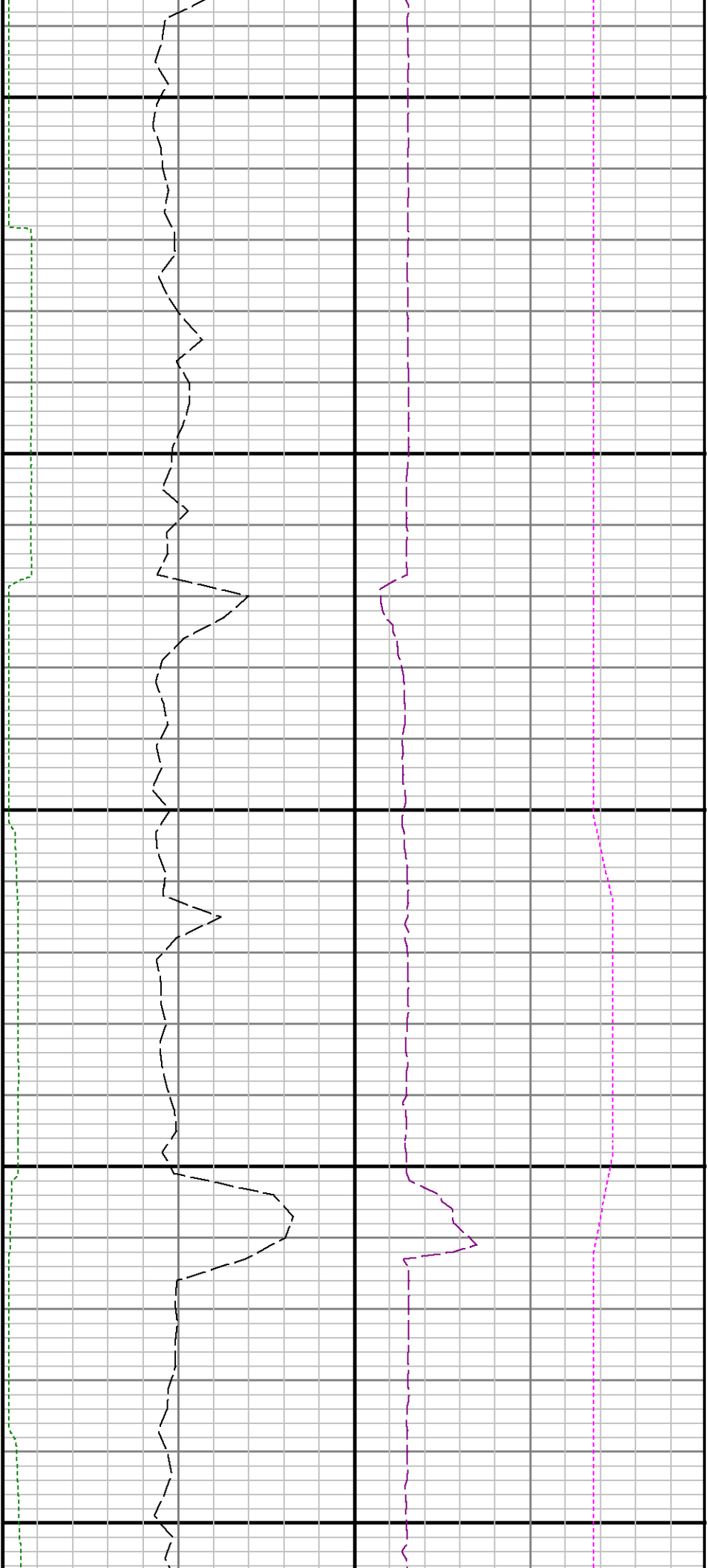






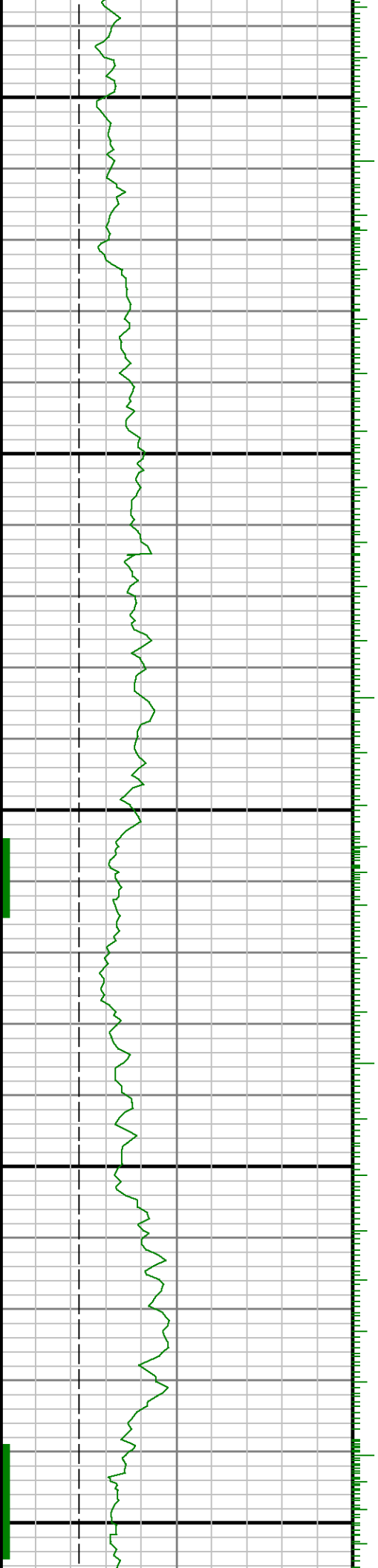






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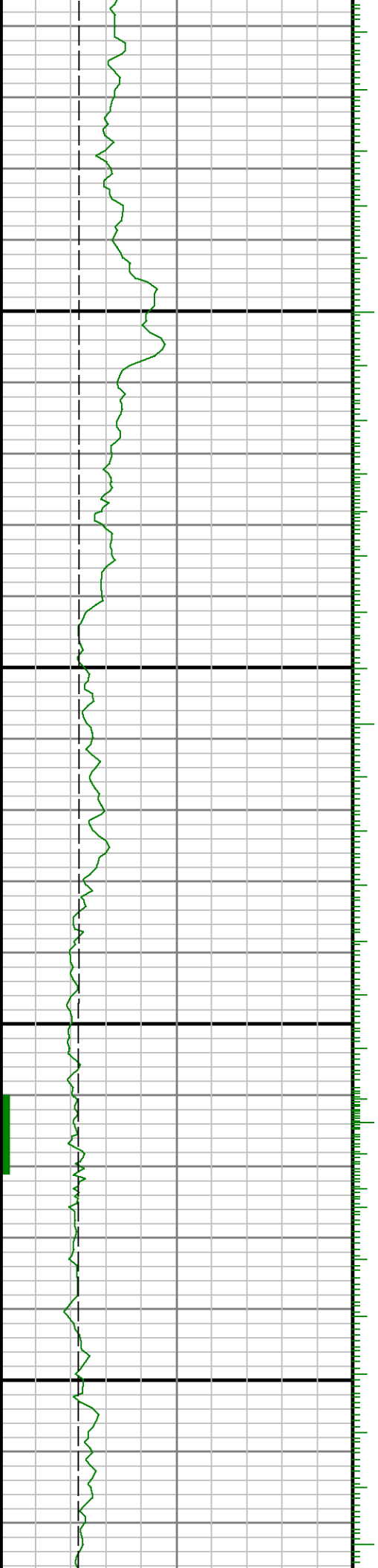
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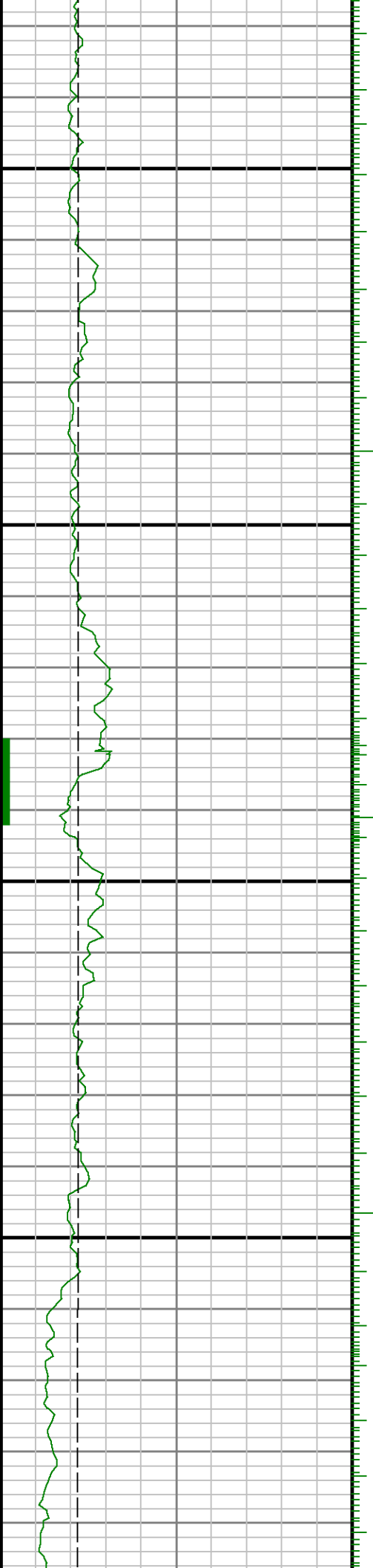




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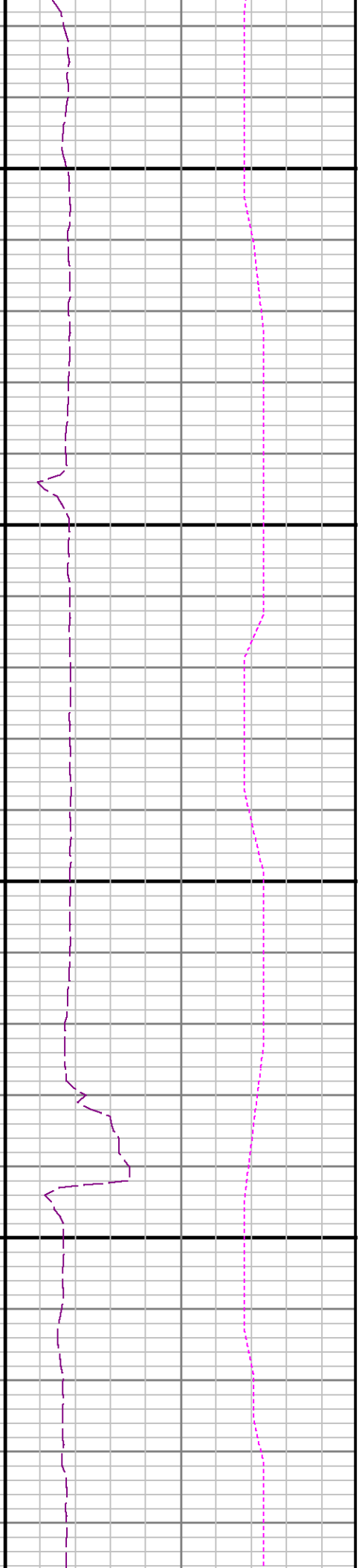
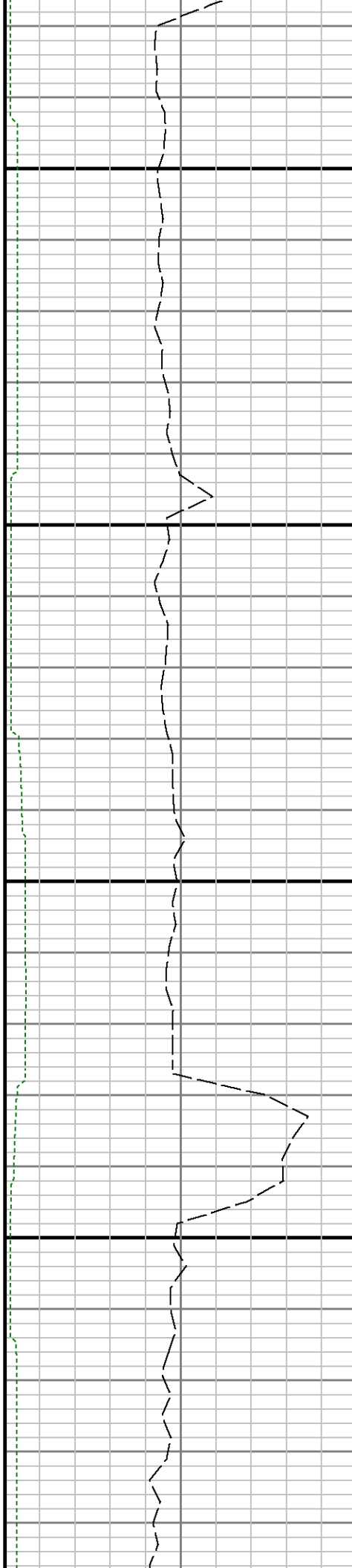
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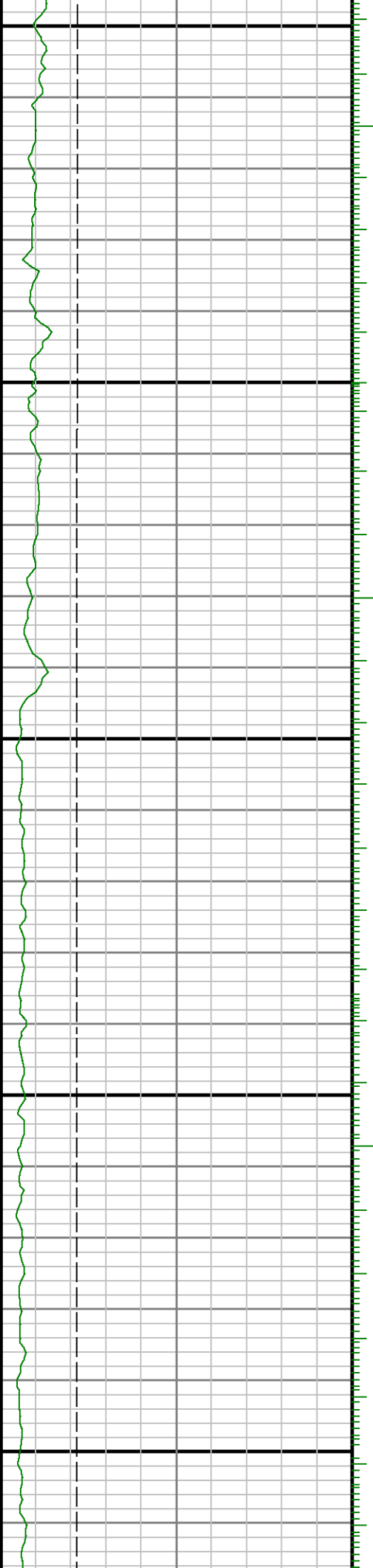




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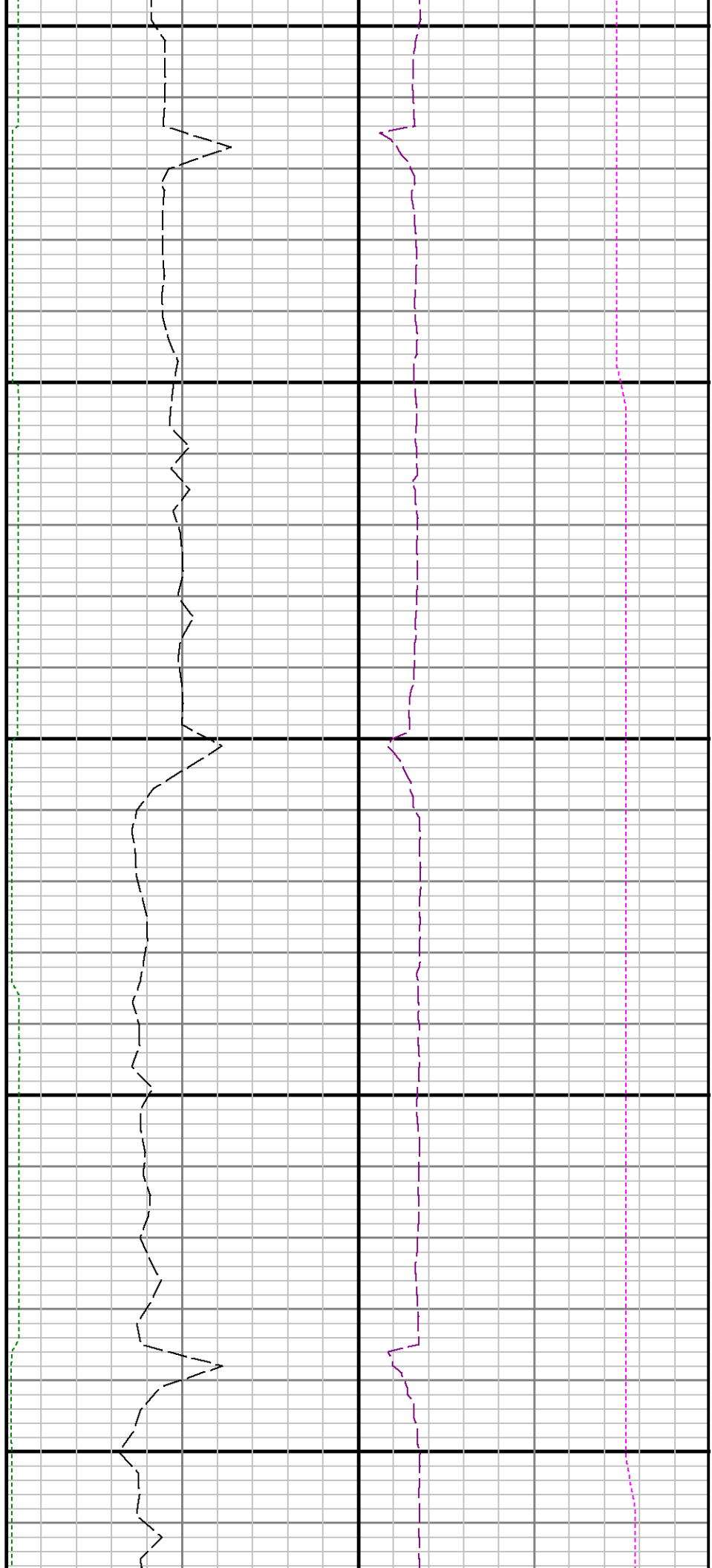


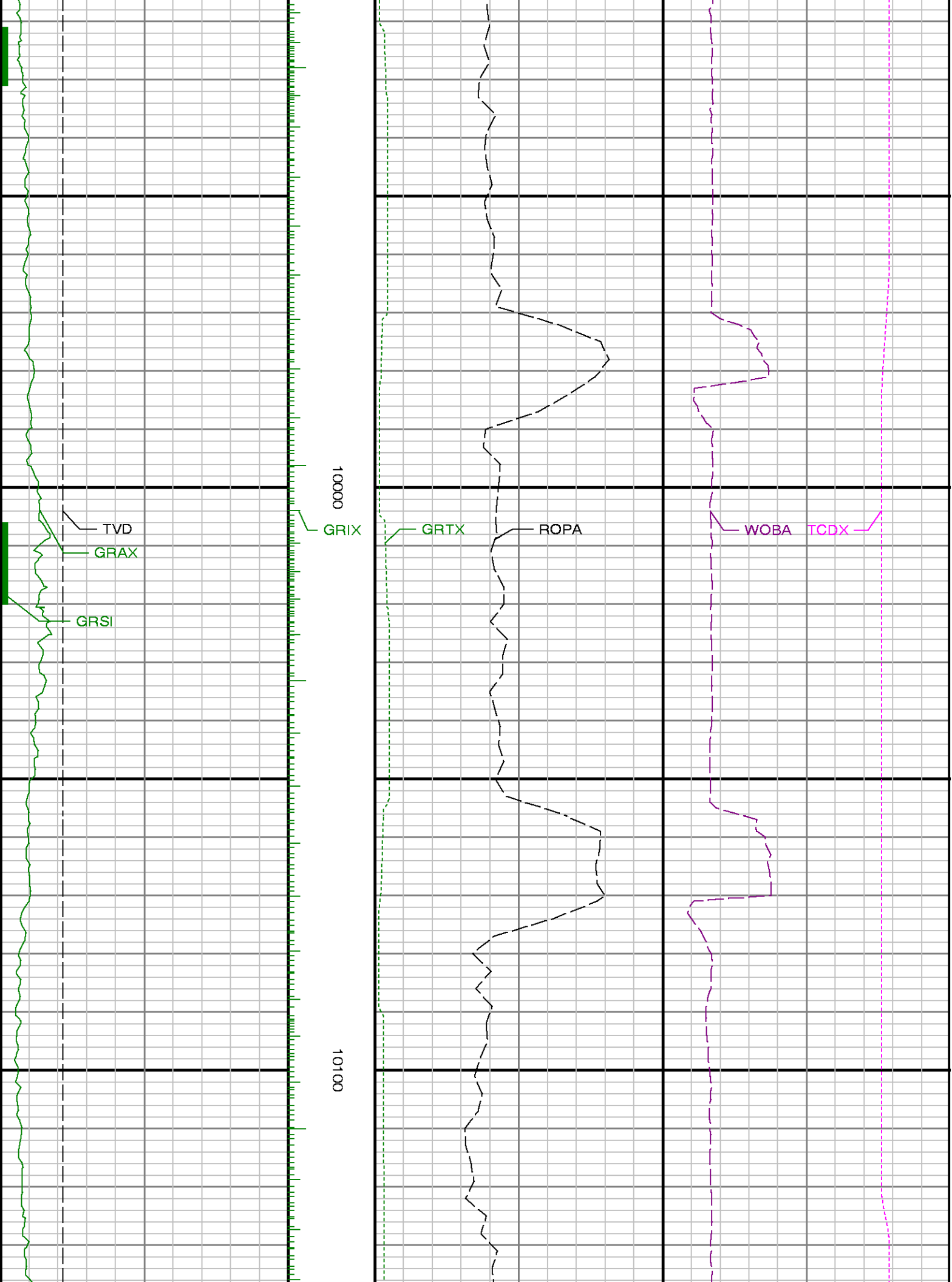


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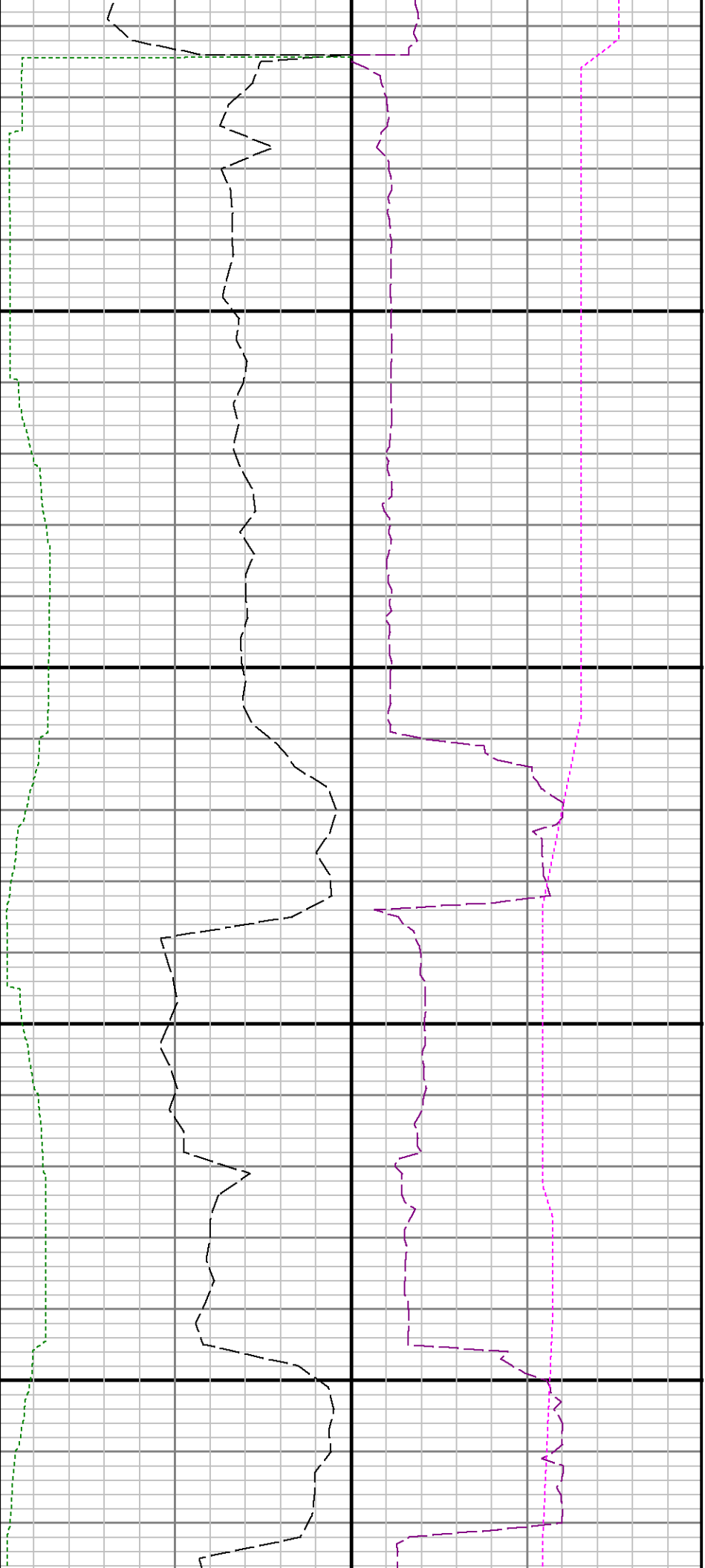
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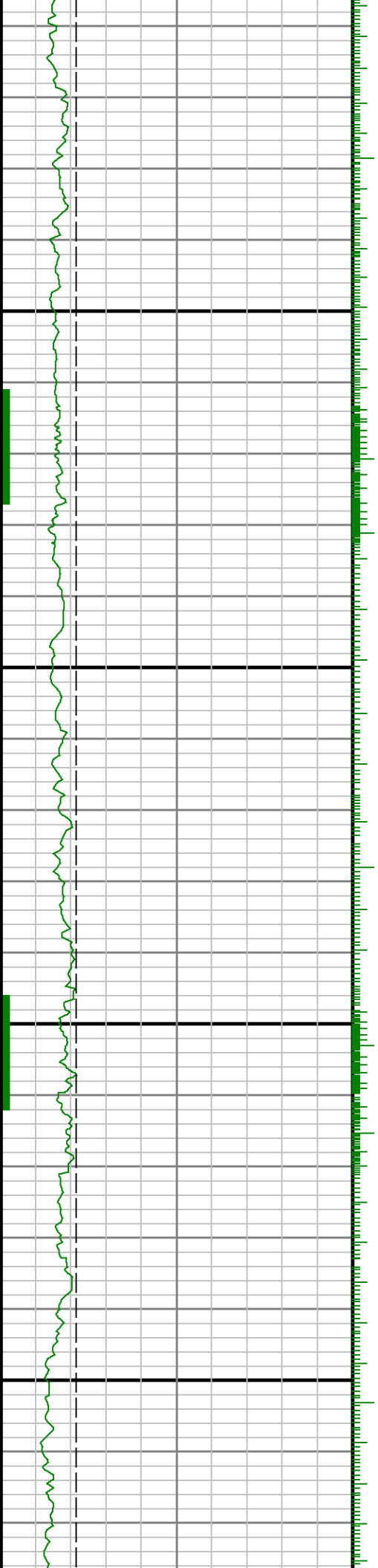




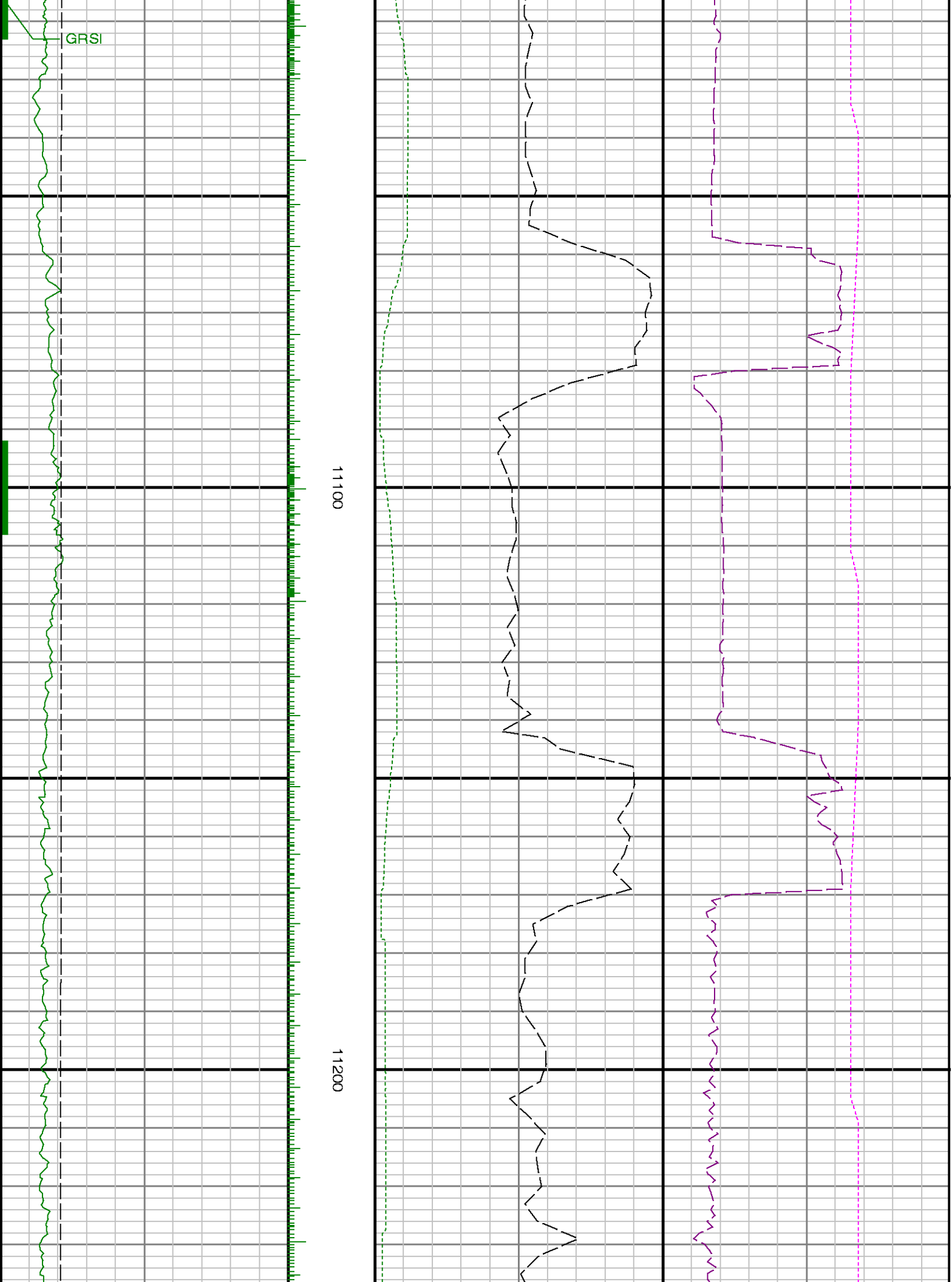
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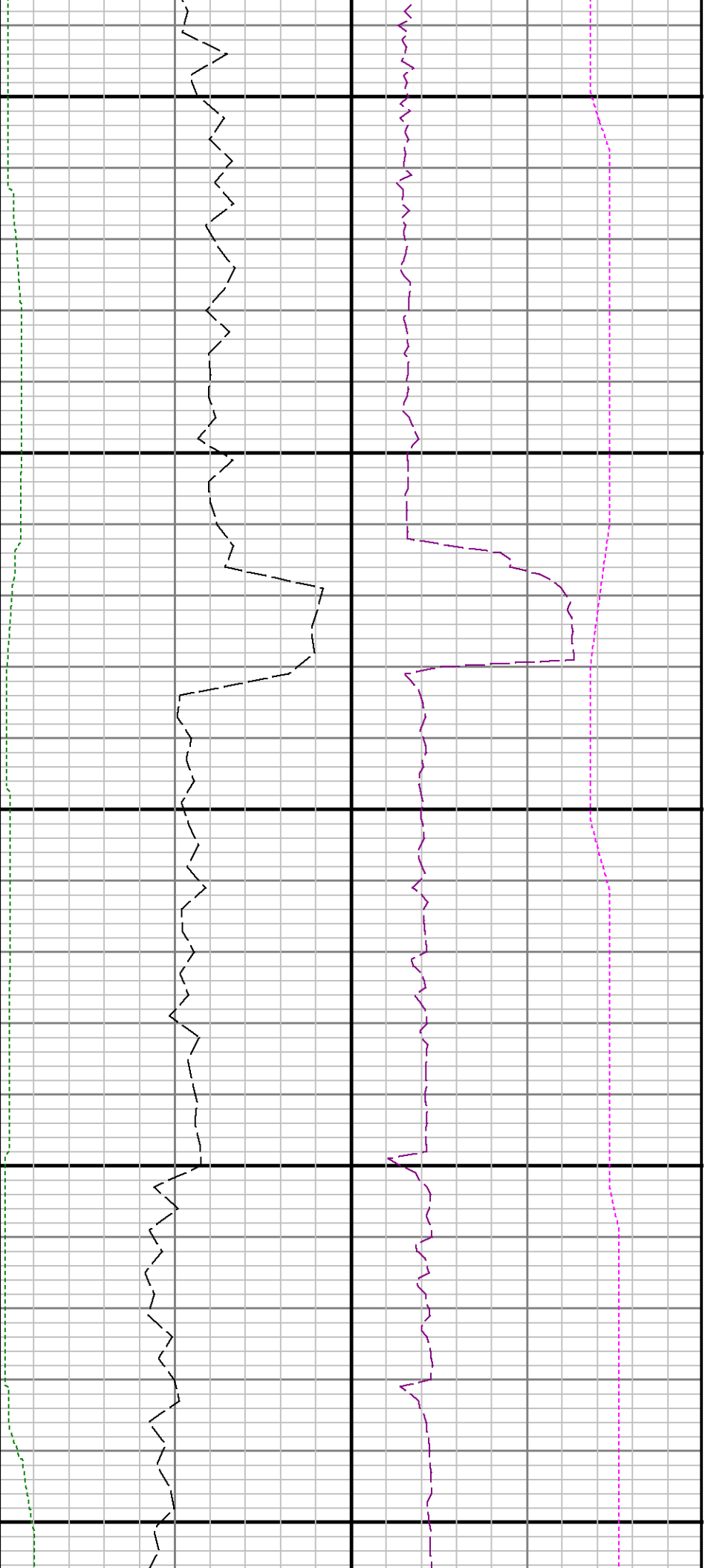
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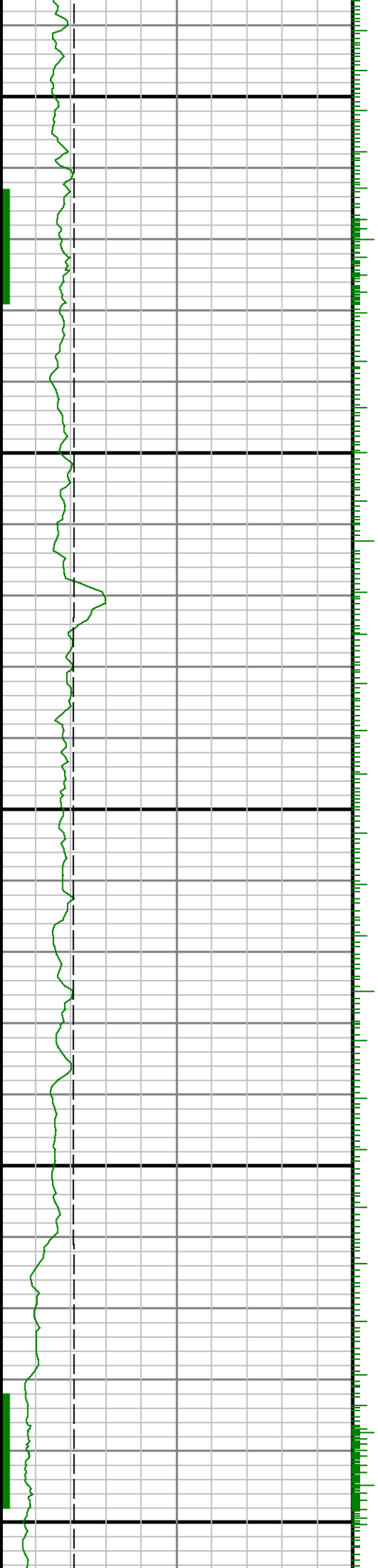






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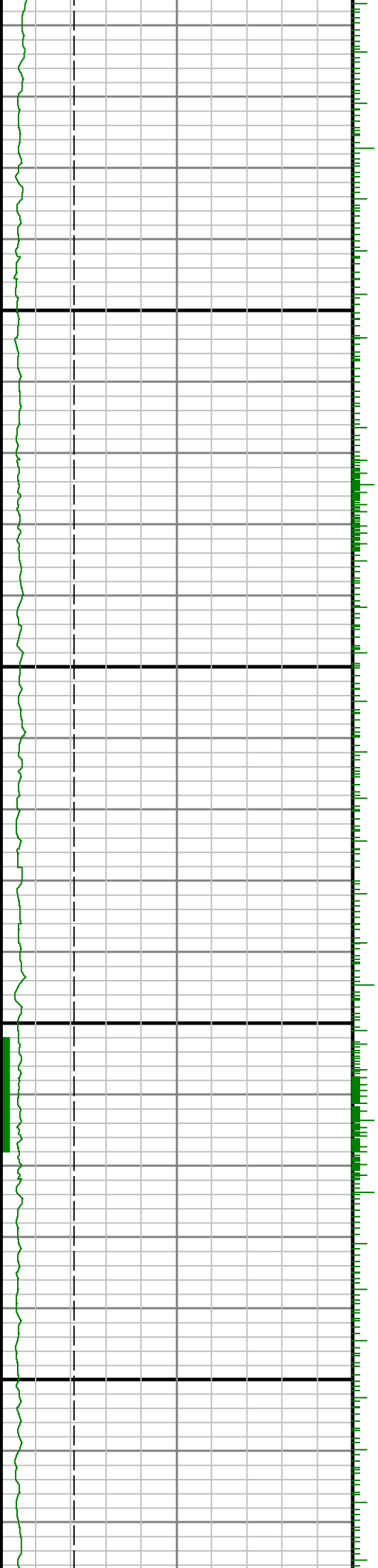
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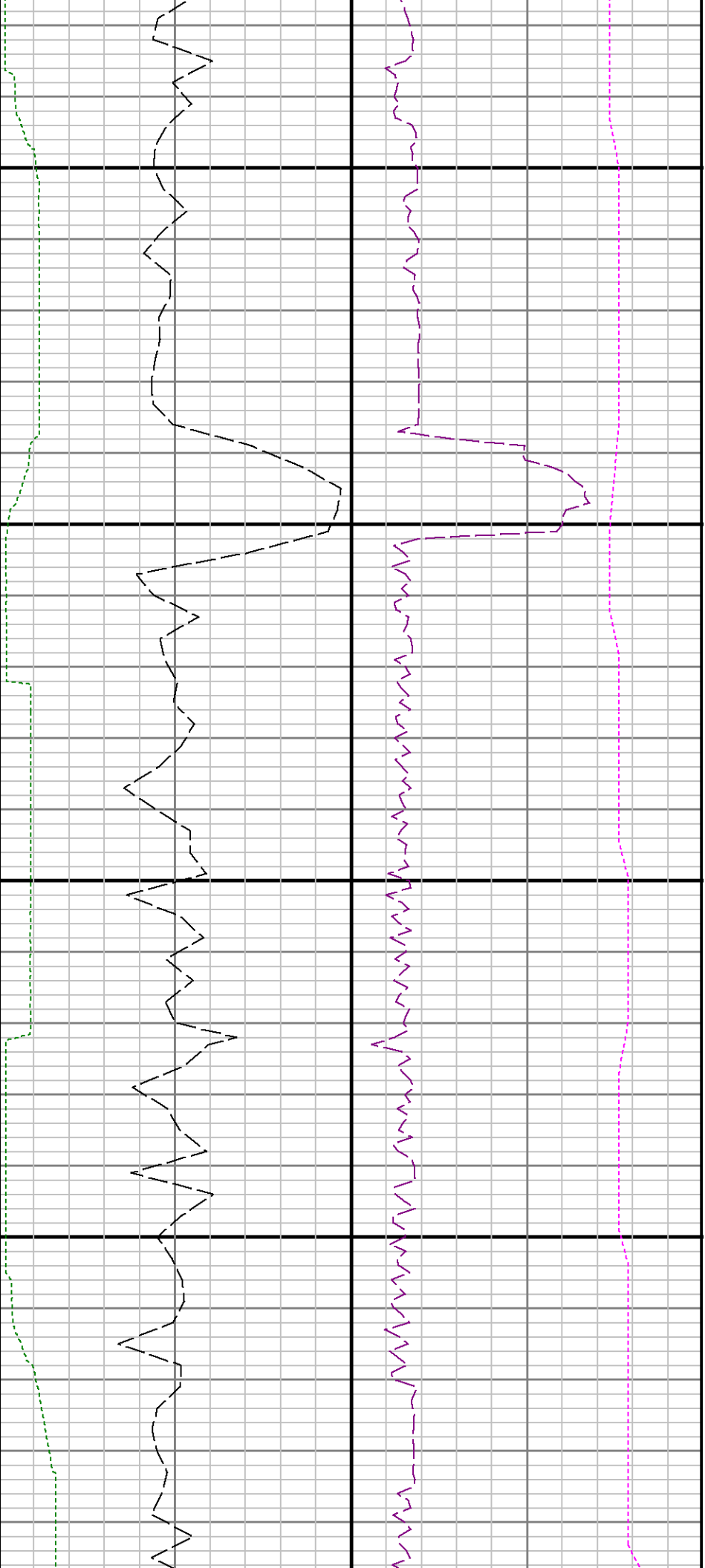




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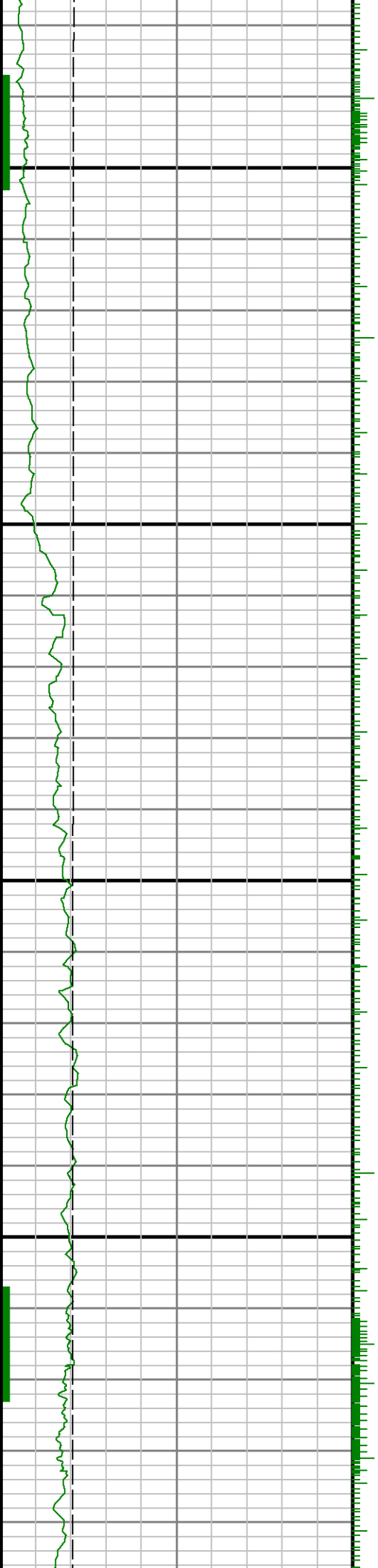
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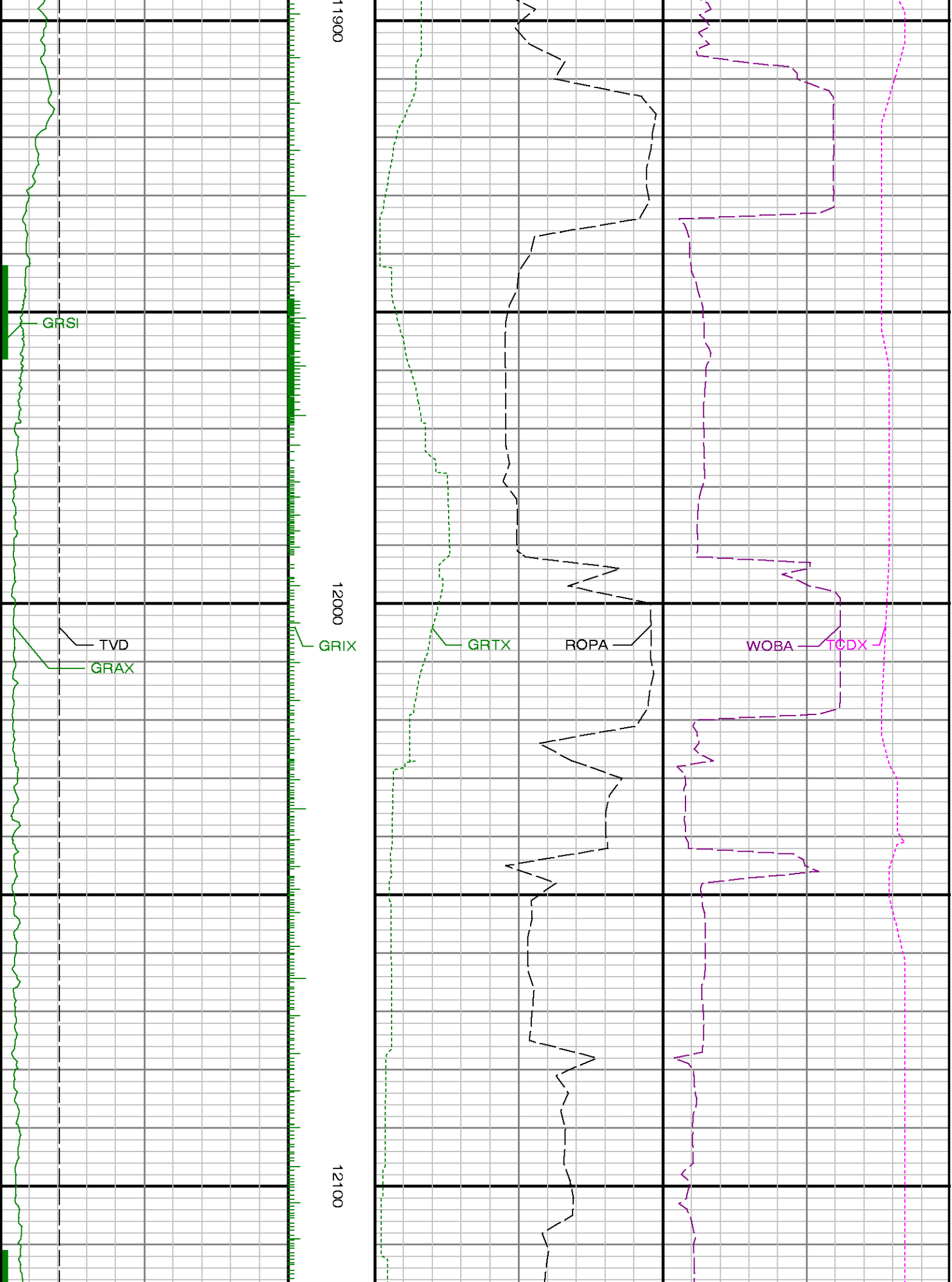


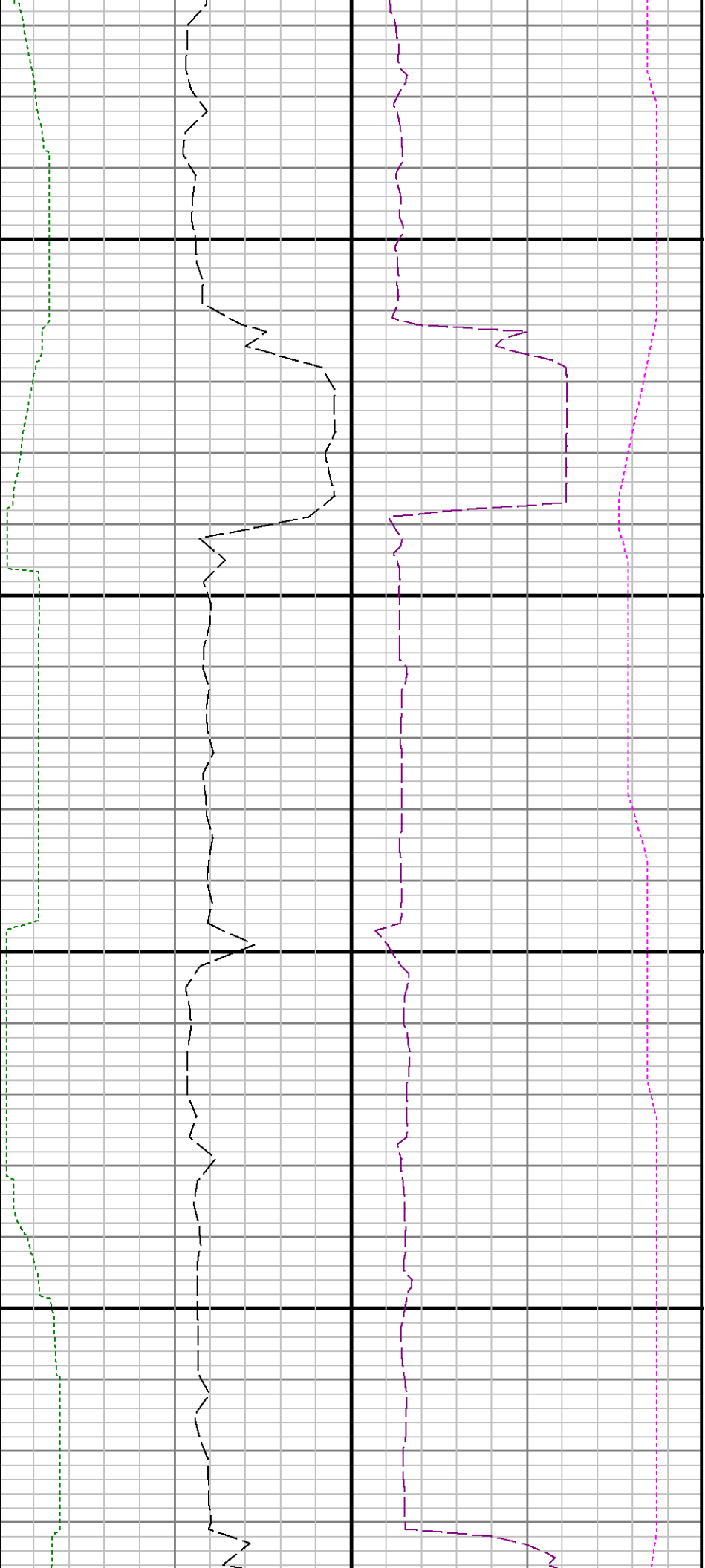


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