



Natural Formation Evaluation
Gamma Ray

Realtime Log

Scale:	Company: Kerr McGee Oil & Gas LP
1:240	Well: Howard 28C-33HZ
Measured Depth	Field: Weld County (Kerr-McGee)
	Region: RMD Country: United States

Status:	Final Print	Surface Location:	Other Services:
API Number:	051233693200	Latitude: 40° 1' 42.211" N Longitude: 104° 53' 24.104" W	Directional VSS
Permanent Datum (P.D.):	Ground Level	Elevation: 4999.00 ft.	Elevations:
Log Measured From:	Drill Floor	13.00 ft.	KB: N/A DF: 4999.00 ft. GL: 4986.00 ft.
Depth Reference:	Driller's Depth		

Interval Logged				Dates				Magnetic Field Reference			
Top:	7230 ft.	Date From:	30/Oct/13	Dip Angle:	66.64 °	Azi Reference North:					True
Bottom:	12989 ft.	Date To:	05/Nov/13	Total		Mag to Reference					
		Spud Date:	28/Oct/13	Field Strength:	52597.0 nT	North Correction:					8.62 °

Borehole Record				Casing Record			
Hole Size	From	To	Size	Weight	From	To	
13.500 in.	Surface	1037 ft.	9.625 in.	36.00 lb/ft	Surface	1027 ft.	
8.750 in.	1037 ft.	8244 ft.	7.000 in.	26.00 lb/ft	Surface	8218 ft.	
6.125 in.	8244 ft.	13042 ft.					

Mud Record				Deviation Record			
Type	From	To	Hole Size	Interval	Inc / Az (Start)	Inc / Az (End)	
Water Based - Fresh	1029 ft.	7660 ft.	13.500 in.	1037 ft.	0.3 ° / 243.9 °	0.4 ° / 262.6 °	
Water Based - Fresh	4076 ft.	11962 ft.	8.750 in.	7206 ft.	0.4 ° / 262.6 °	82.8 ° / 179.6 °	
			6.125 in.	5836 ft.	82.8 ° / 179.6 °	89.7 ° / 178.2 °	
					/	/	
					/	/	
					/	/	

Acquisition System				Software Version				Other			
Advantage	2.20U4	Rigi / Contractor:	Xtreme 20	/	Ensign Drilling						
PATS	6.4.1.34	Job No:	5769751								
		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	3	2	8.750	PDC	2.500	Steerable	N/A	N/A	1027	3644	28/Oct/2013 15:15	19/Oct/2013 17:20		44.1	
2	3	2	8.750	PDC	2.500	Steerable	7231	7606	7201	7659	29/Oct/2013 18:45	31/Oct/2013 16:00		33.6	
3	3	3	8.750	PDC	2.500	Steerable	7608	8193	7659	8243	01/Nov/2013 00:34	01/Nov/2013 15:32		18.03	
4	4	4	8.750	PDC	3.000	Steerable	8193	12989	8243	13042	01/Nov/2013 21:22	05/Nov/2013 07:22		42.93	

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
David Campbell	27 oct 2013	06 Nov 2013	Barry Combs	27 oct 2013	06 Nov 2013	Travis Wilcox	27 oct 2013	06 Nov 2013

Greg Dore	27 oct 2013	06 Nov 2013										

Mud Properties Record

Date / Time		LWD Run No.	Measured Depth (ft.)	Mud Type	Density (sg)	Viscosity (cp)	pH	Fluid Loss (cc)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
31/Oct/2013	06:07	2	4076	Water Based - Fresh	9.0	46	8.0	4.0	4 / 94	Active Mud Pit	1100	0.0
31/Oct/2013	06:07	2	7594	Water Based - Fresh	9.0	46	8.0	4.2	4 / 95	Active Mud Pit	1200	0.0
01/Nov/2013	00:22	3	1029	Water Based - Fresh	8.5	31	7.5	0.0	1 / 98	Active Mud Pit	1000	0.0
01/Nov/2013	00:23	3	2501	Water Based - Fresh	8.4	30	7.8	0.0	1 / 98	Active Mud Pit	1000	0.0
01/Nov/2013	00:28	3	5403	Water Based - Fresh	9.4	30	7.8	0.0	1 / 98	Active Mud Pit	1000	0.0
01/Nov/2013	00:28	3	7660	Water Based - Fresh	10.2	40	7.8	0.0	4 / 88	Active Mud Pit	1100	0.0
03/Nov/2013	05:59	4	8234	Water Based - Fresh	10.5	48	8.0	4.0	4 / 85	Active Mud Pit	1000	0.0
03/Nov/2013	21:00	4	8244	Water Based - Fresh	9.0	55	8.1	4.0	4 / 86	Active Mud Pit	1100	0.0
04/Nov/2013	07:32	4	10680	Water Based - Fresh	89.0	42	7.8	4.3	5 / 91	Active Mud Pit	1200	0.0

Mnemonics

Curve	Description	Units
GRAX	Gamma Ray Apparent, 0.5 ft. Avg.	API
GRIX	Gamma Ray Data Density	point
GRSI	Gamma Ray Sliding 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 (m.)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	12373456	Directional	56.67	6.750	0.000
1	SRIG	12600750	Gamma	53.29	6.750	0.000
2	DIR	12440860	Directional	55.95	6.750	0.000
2	SRIG	12606956	Gamma	52.58	6.750	0.000
3	DIR	12440860	Directional	53.26	6.750	0.000
3	SRIG	12606956	Gamma	49.89	6.750	0.000
4	DIR	12497607	Directional	53.48	4.750	0.000
4	SRIG	12600744	Gamma	50.10	4.750	0.000

Service and Tool Mnemonics

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

Comments

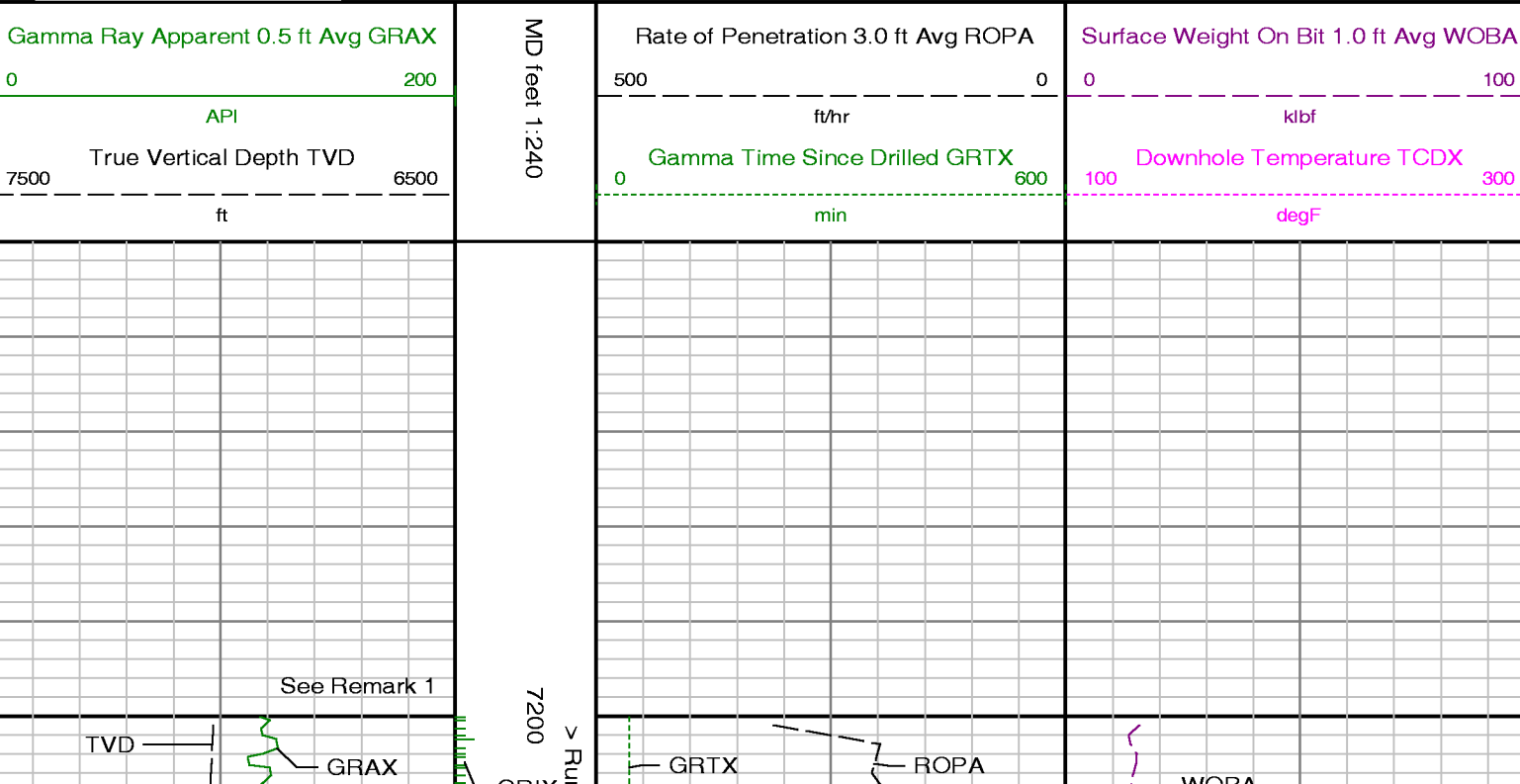
- 1.) Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
- 2.) Baker Hughes runs 1 thru 3 utilized 6 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 3/4 inch bit and steerable assembly from 1037 to 8244 feet MD (1037 to 7719 feet TVD).
- 3.) Baker Hughes run 4 utilized 4 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 6 1/8 inch bit and steerable assembly from 8244 to 13042 feet MD (7719 to 7726 feet TVD).
- 5.) The interval from 1037 to 7230 feet MD (1037 to 7046 feet TVD) was not logged due to directional only services being provided through the straight-hole and nudge section for Baker Hughes runs 1 and 2.

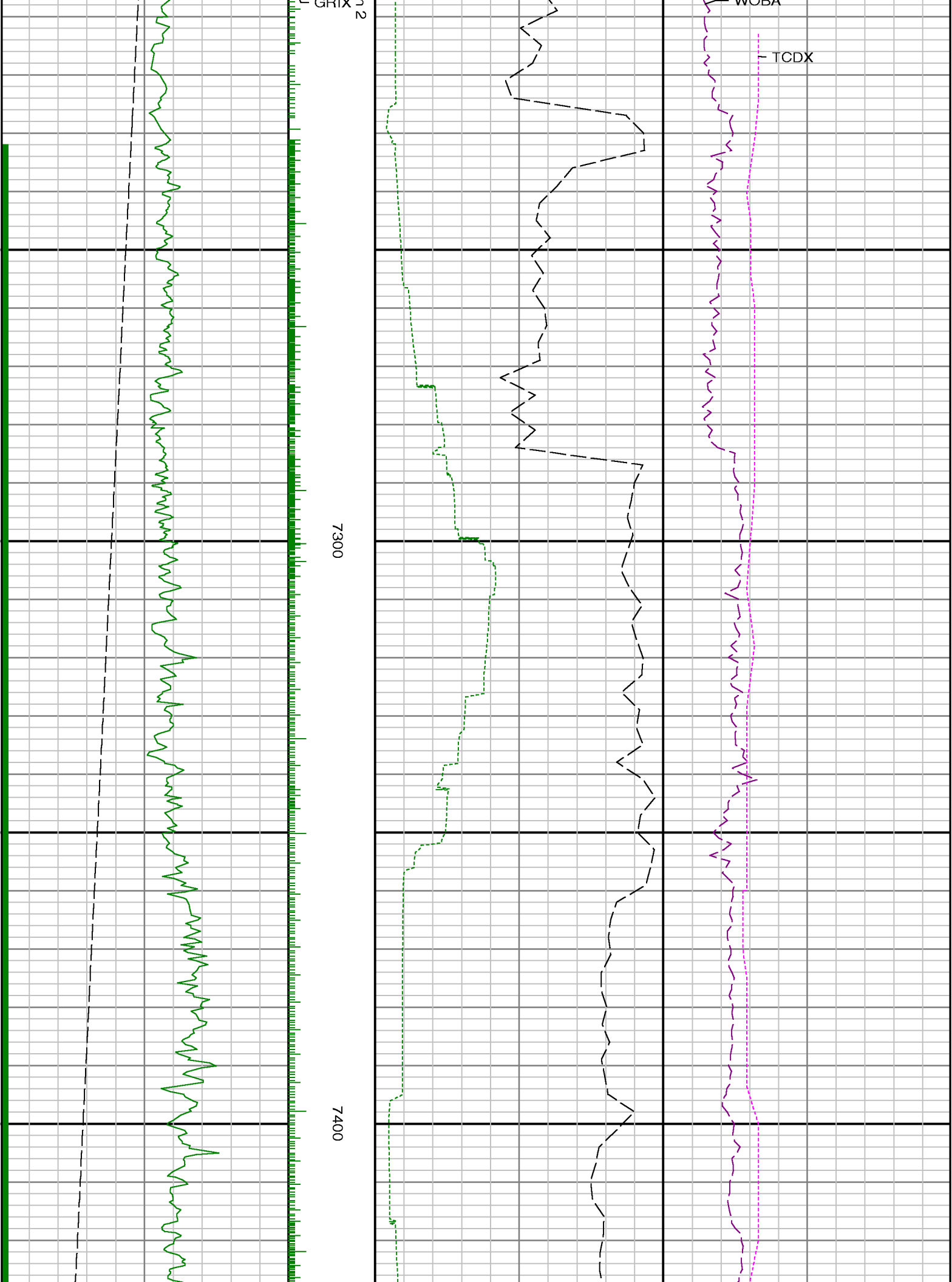
Remarks

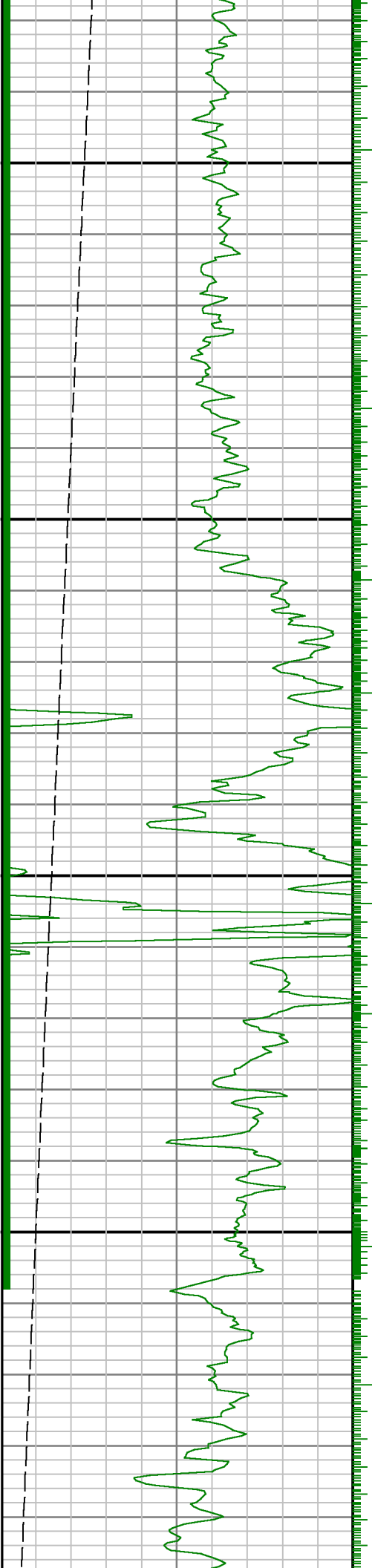
Number	Measured Depth (m.)	Hole Section (in.)	LWD Run No.	Remark
1	7230	8.750	1	Begin logging due to directional only service provided thru vertical section.
2	7606	8.750	1	The interval between 7606 ft and 7660ft MD (7408 and 7454 ft TVD) was relogged up to 16 hrs due to trip out for motor. The motor was not getting the required build rates.
3	8193	8.750	2	The interval between 8193 ft and 8244 ft MD (7713 and 7716 ft TVD) was relogged up to 26 hrs due to casing and cement ops.
4	12989	6.125	4	The interval between 12989 ft and 13042 ft MD (7726 and 7726 ft TVD) has no sensor data due to sensor to bit offset.



Company : Kerr McGee Oil & Gas LP
Well : Howard 28C-33HZ
Interval : 7150.00 - 13075.00 feet
Created : 05/Nov/2013 6:07:58 AM

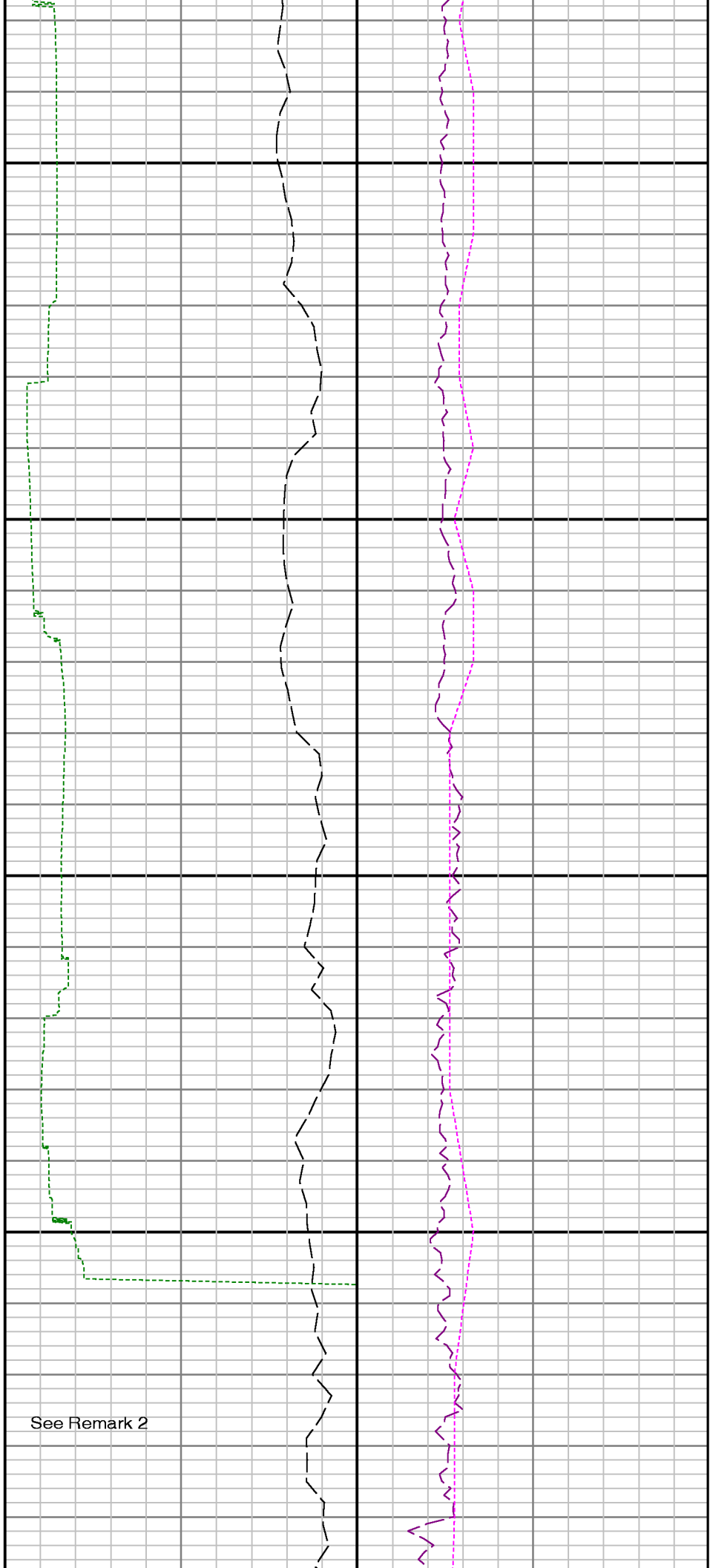




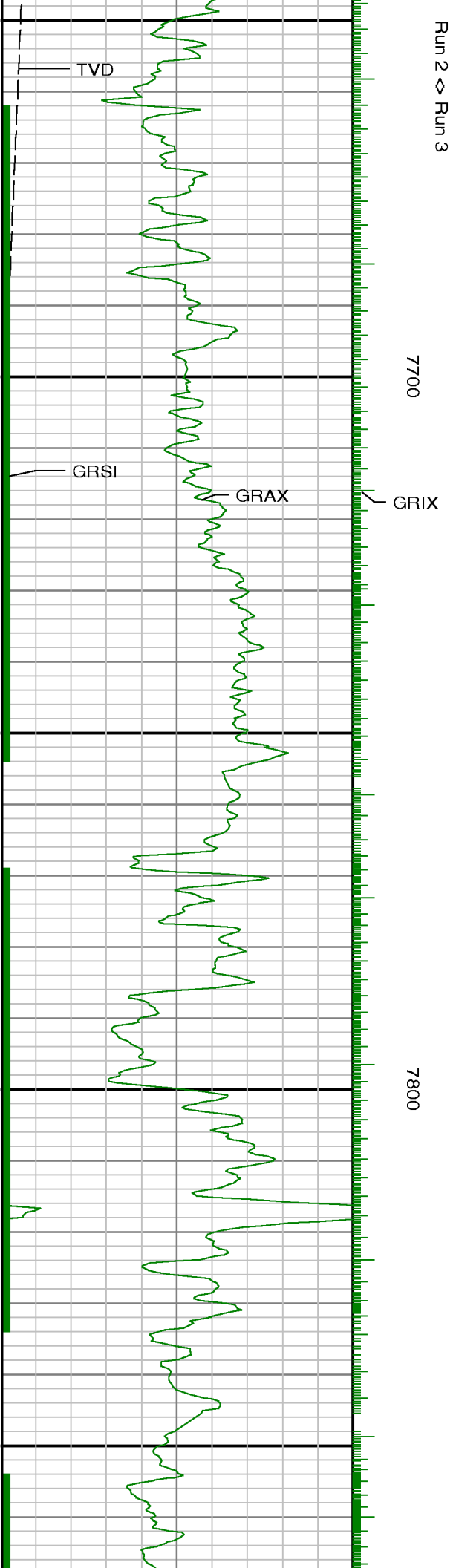
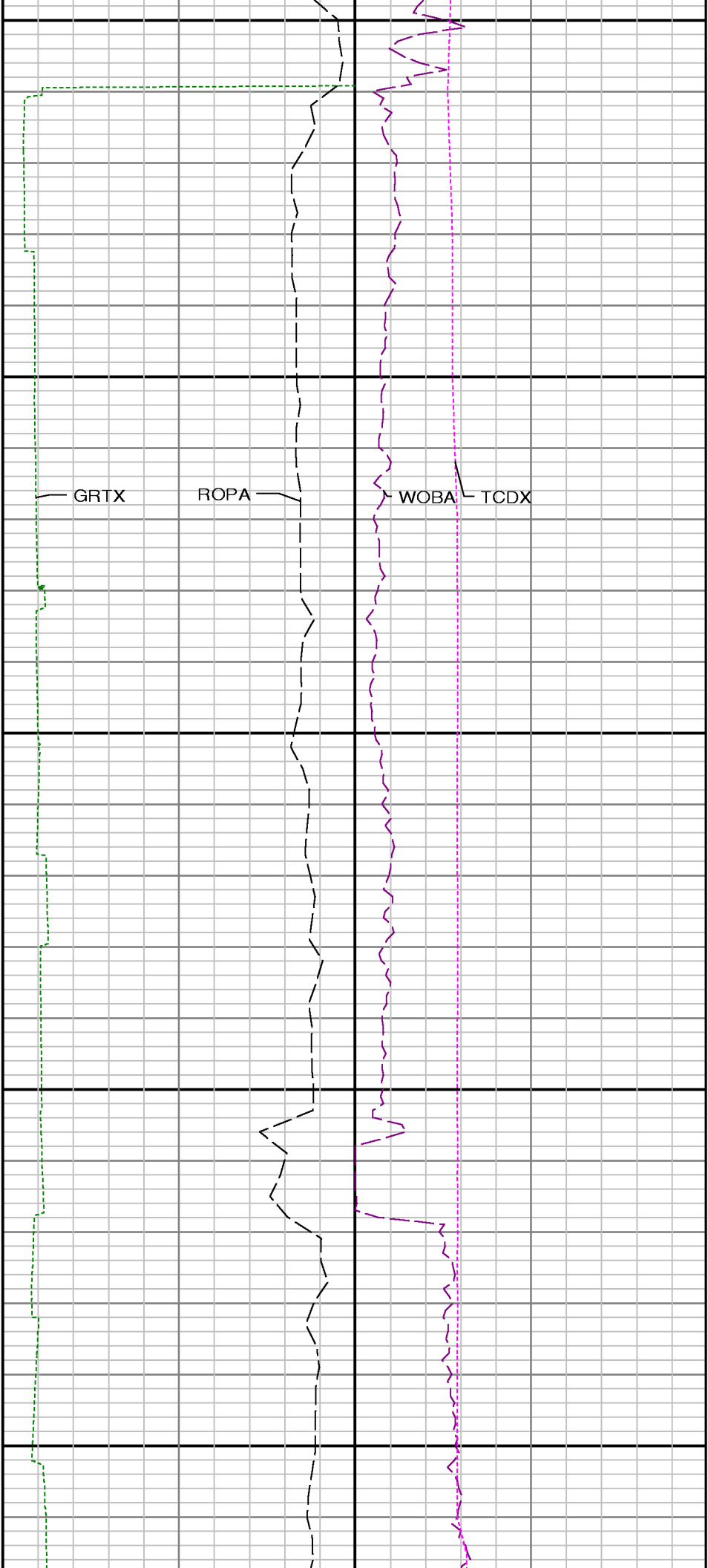


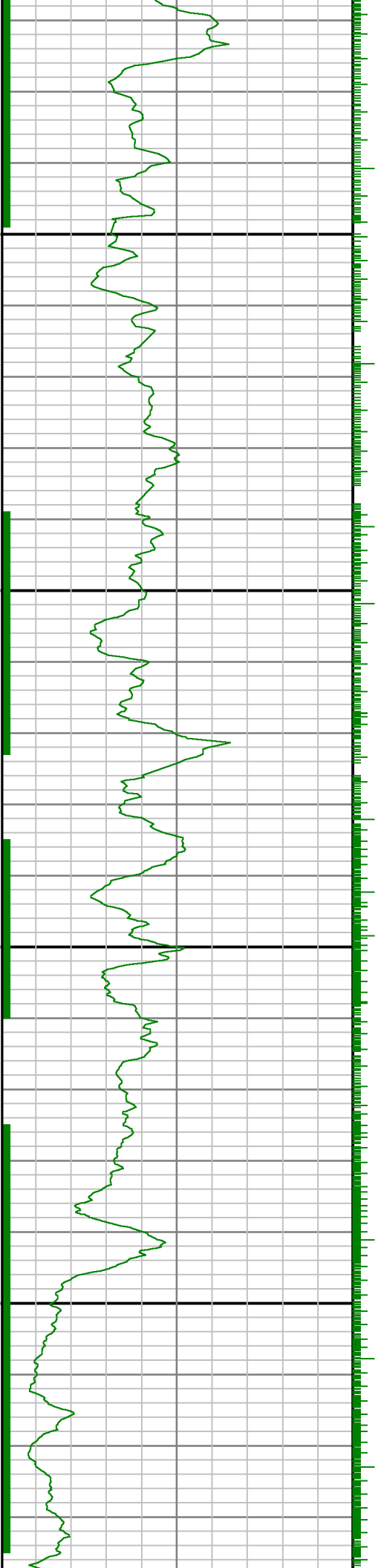
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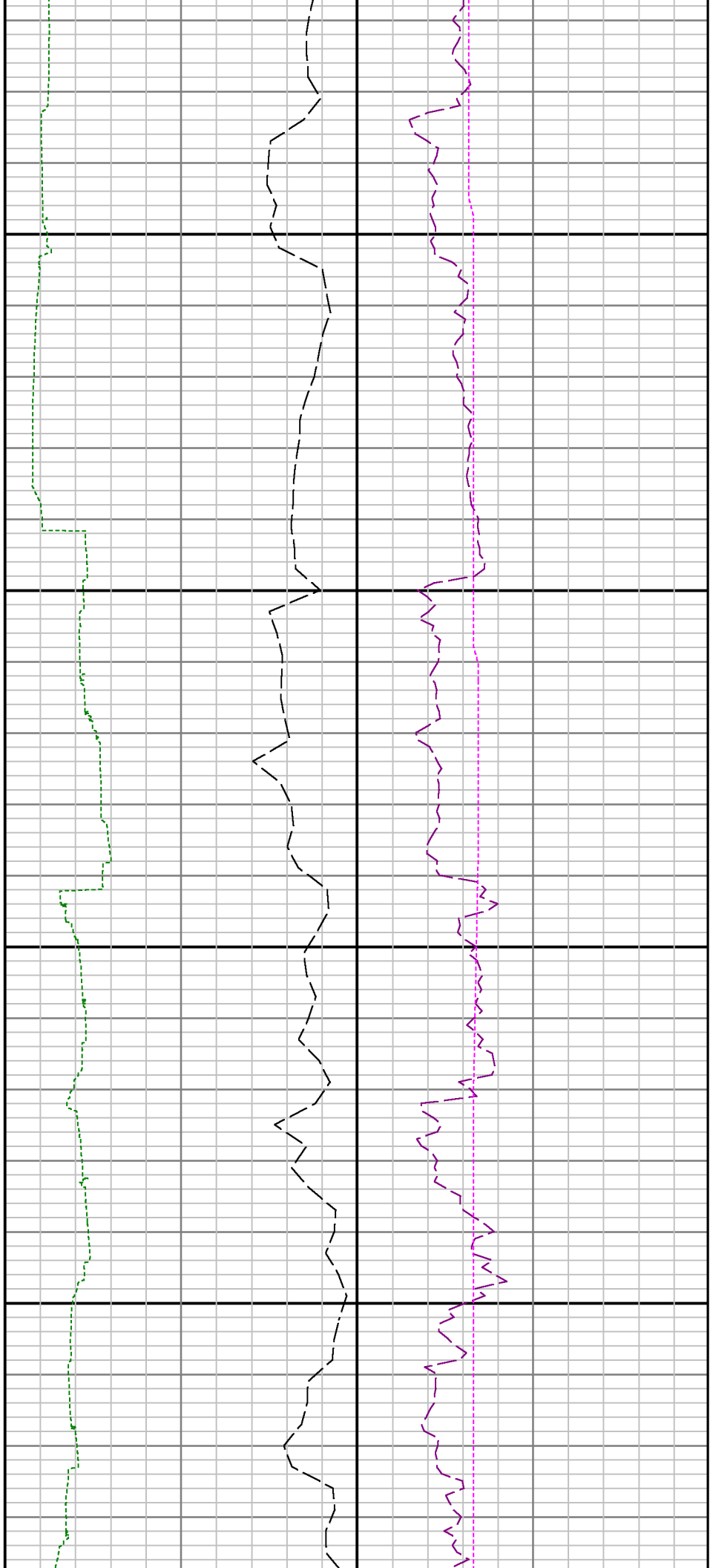
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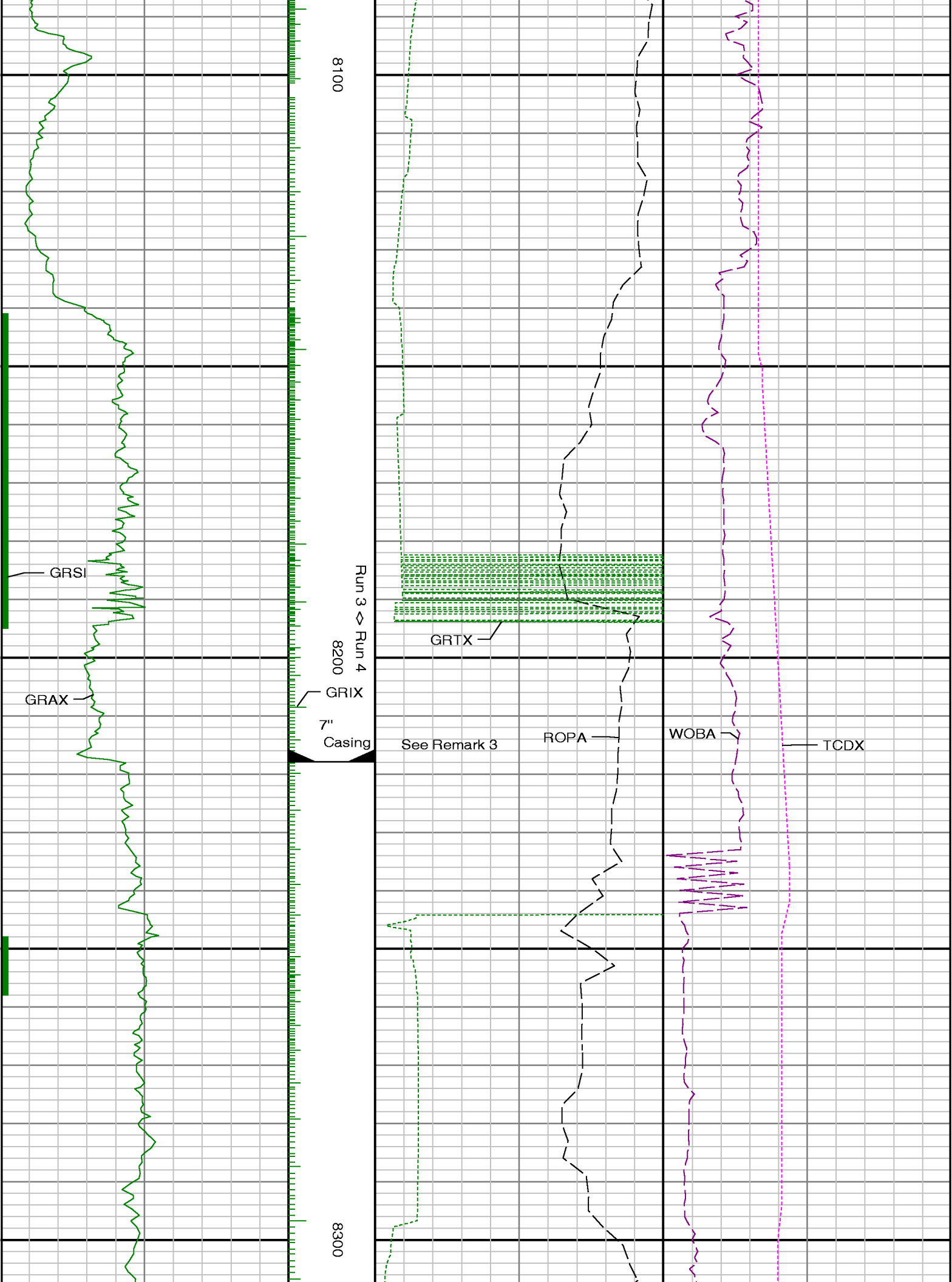


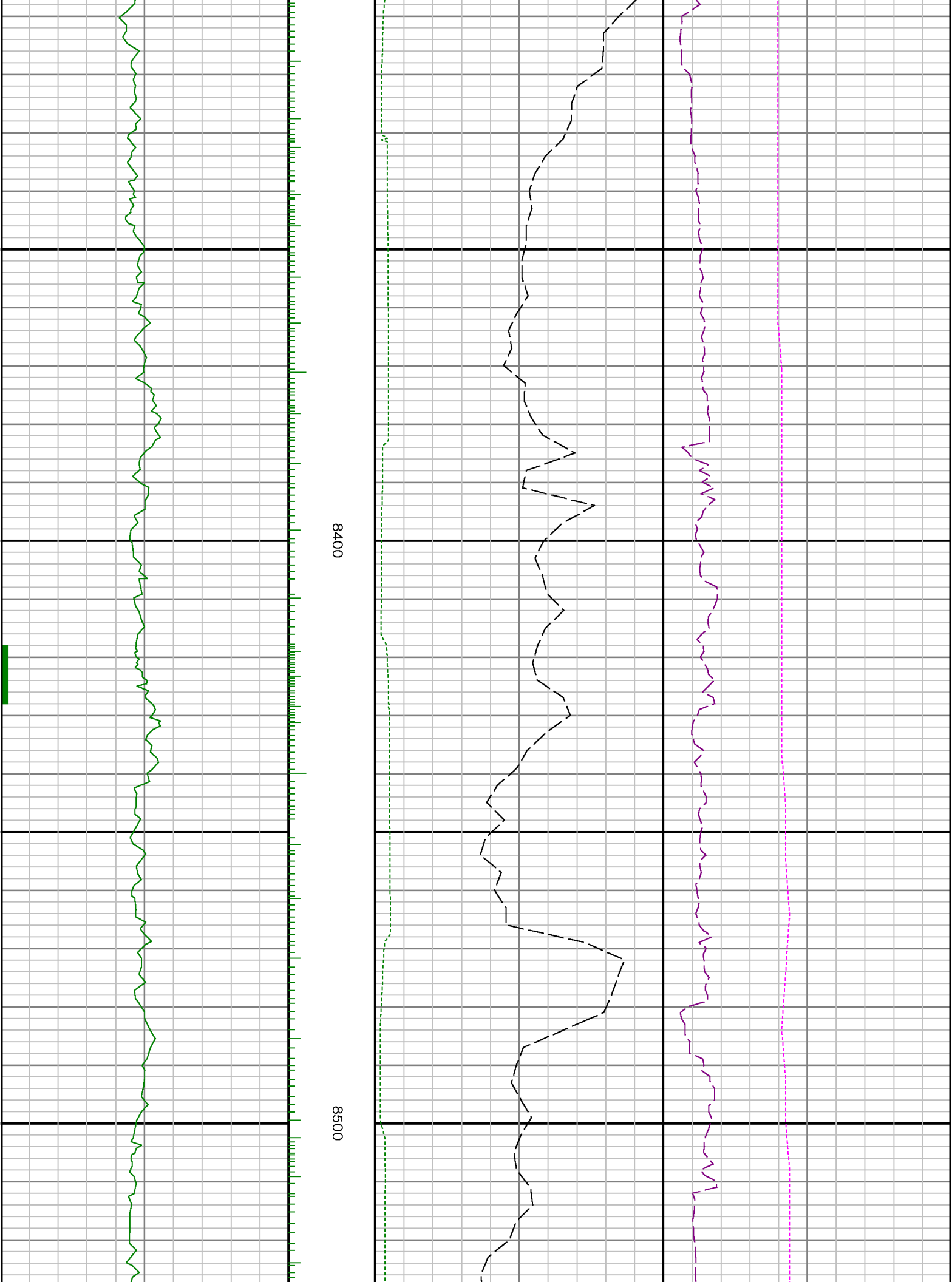


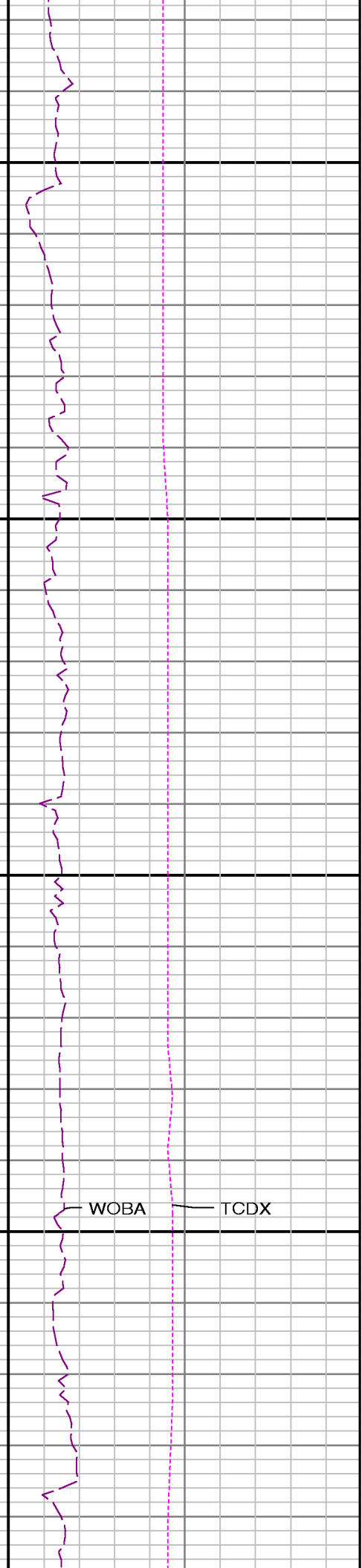
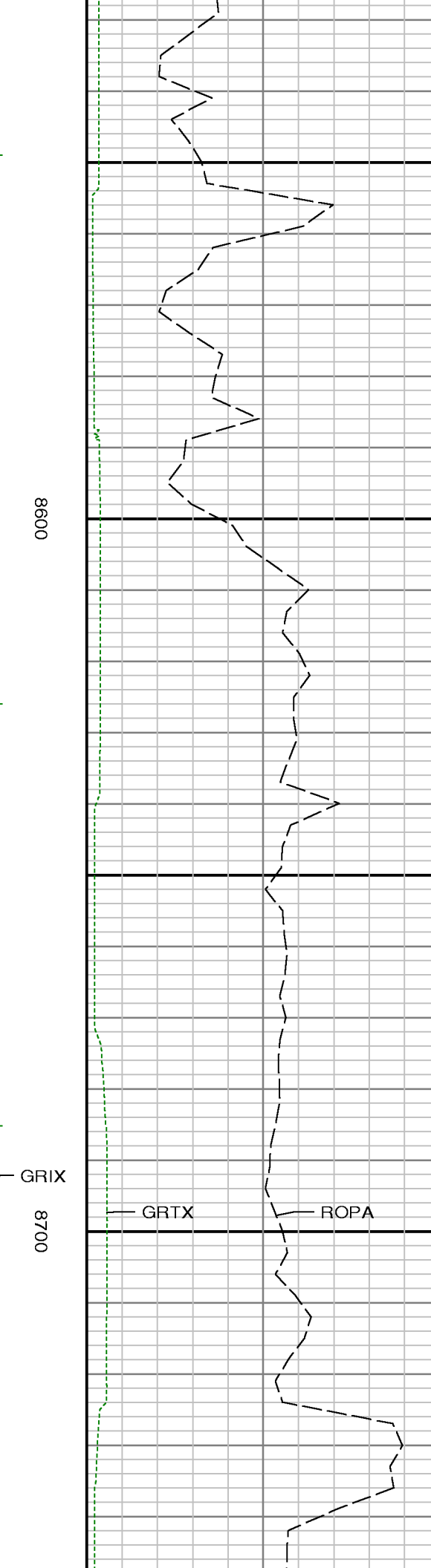
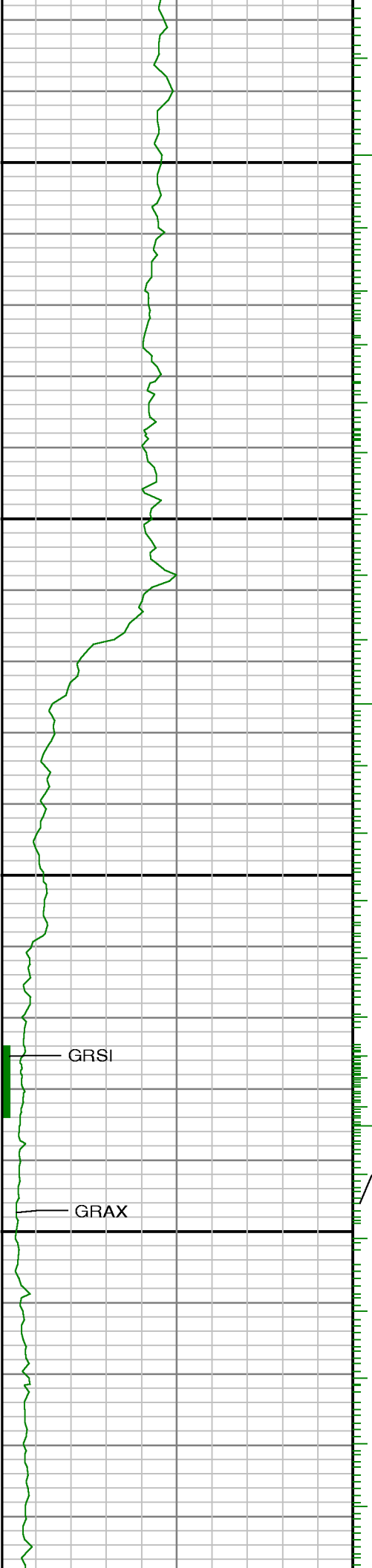
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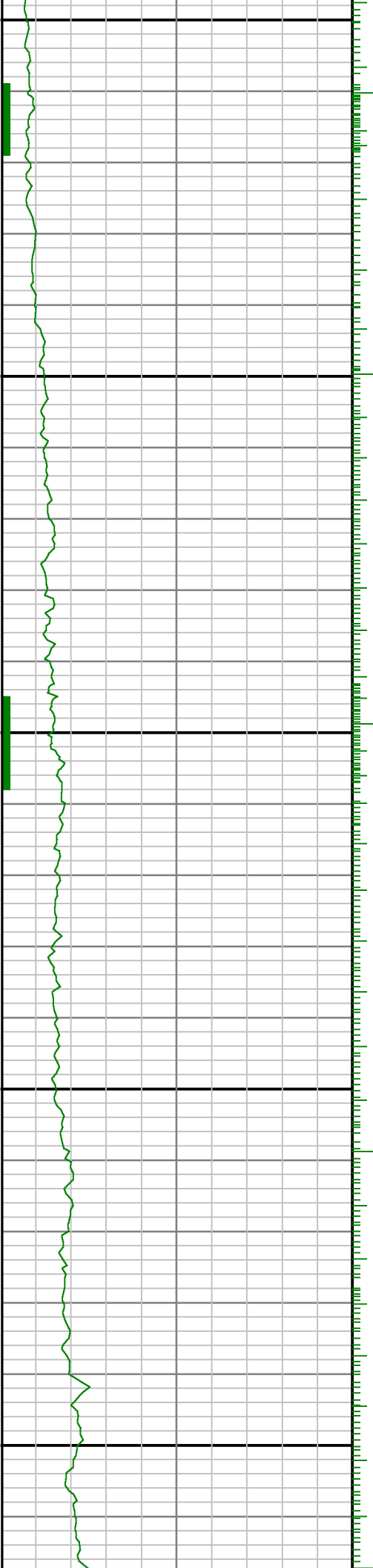
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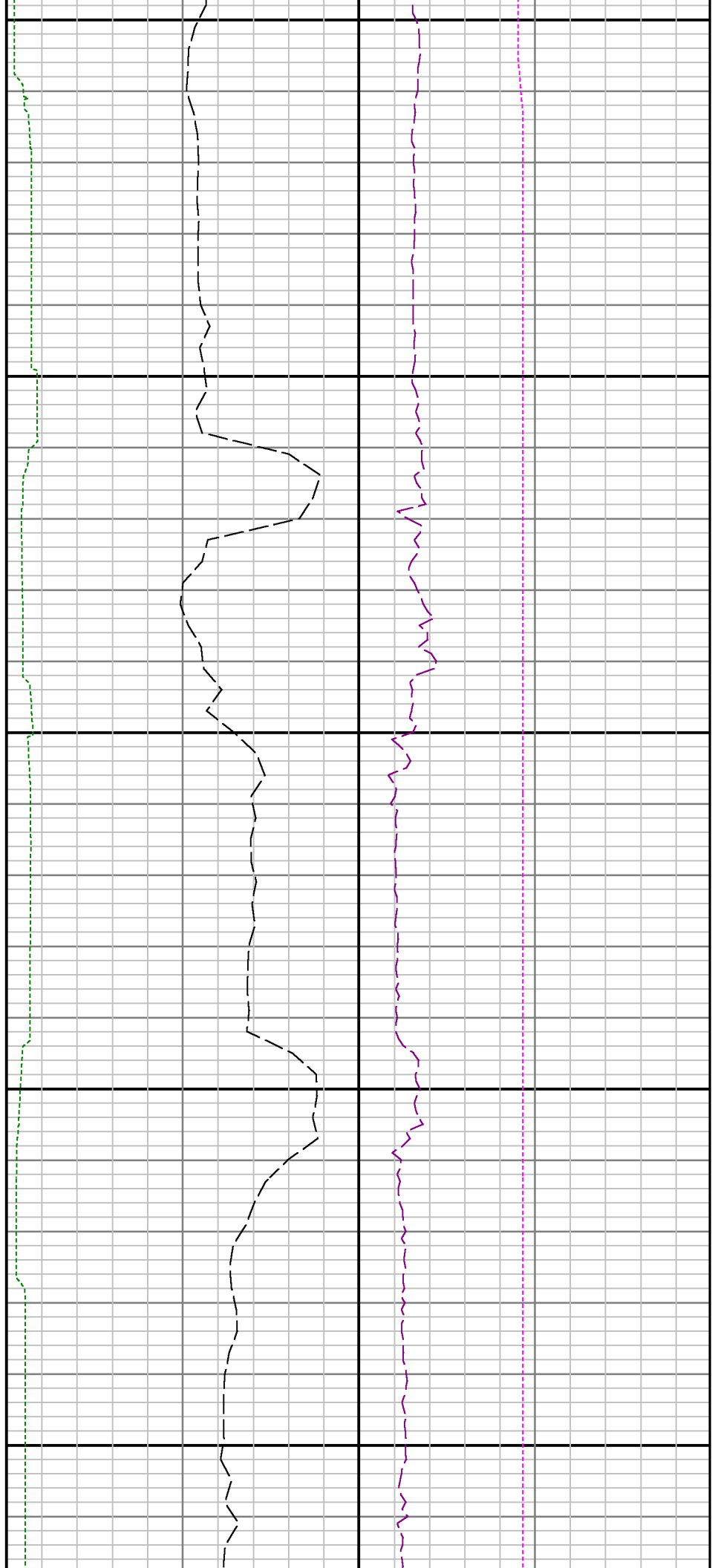


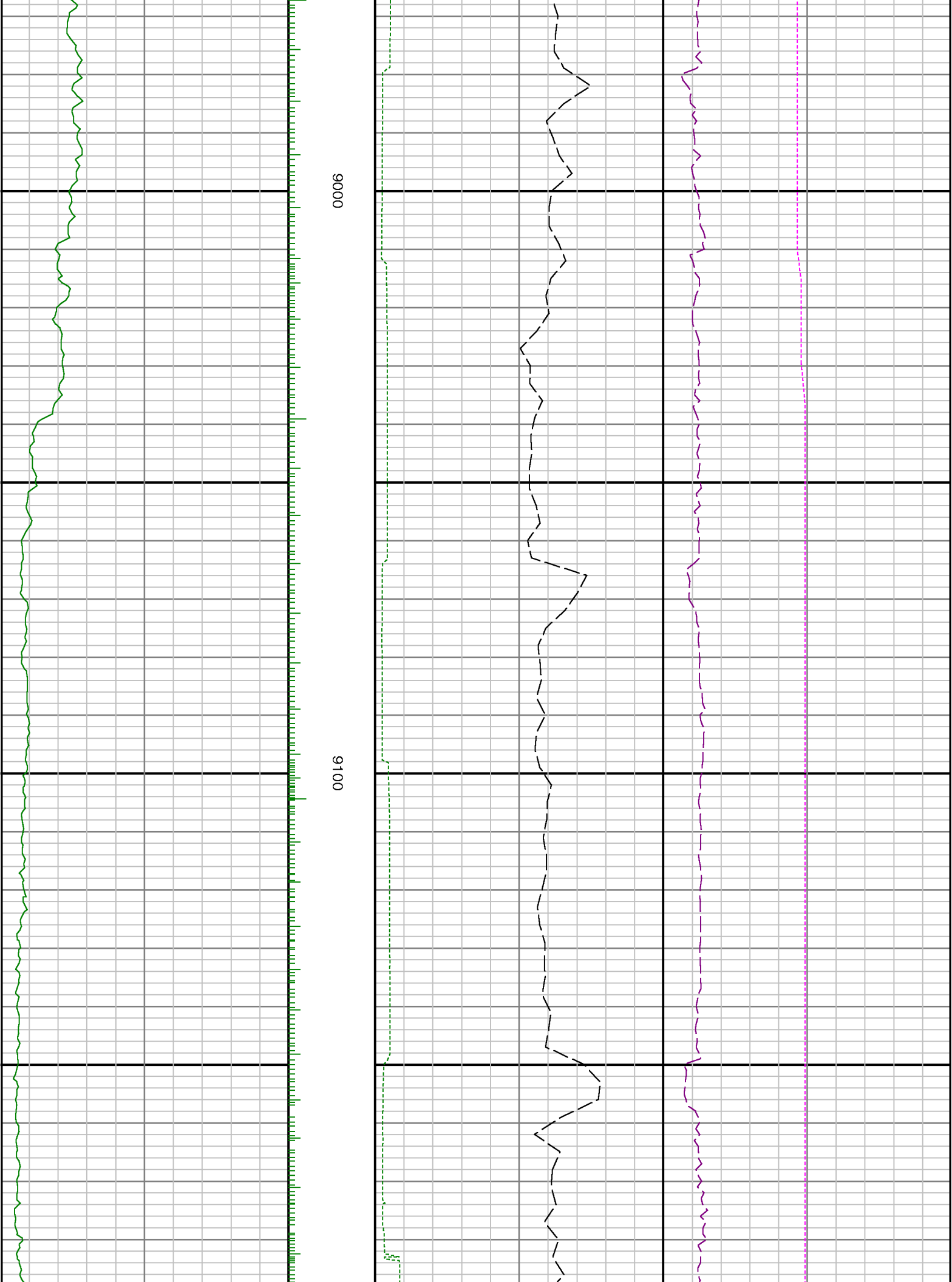


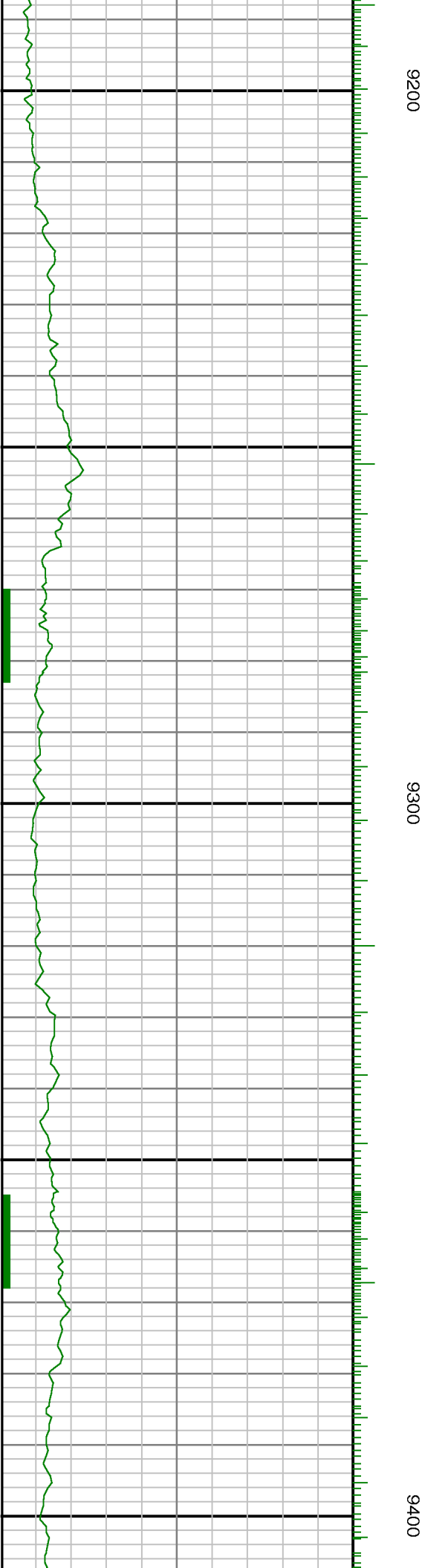
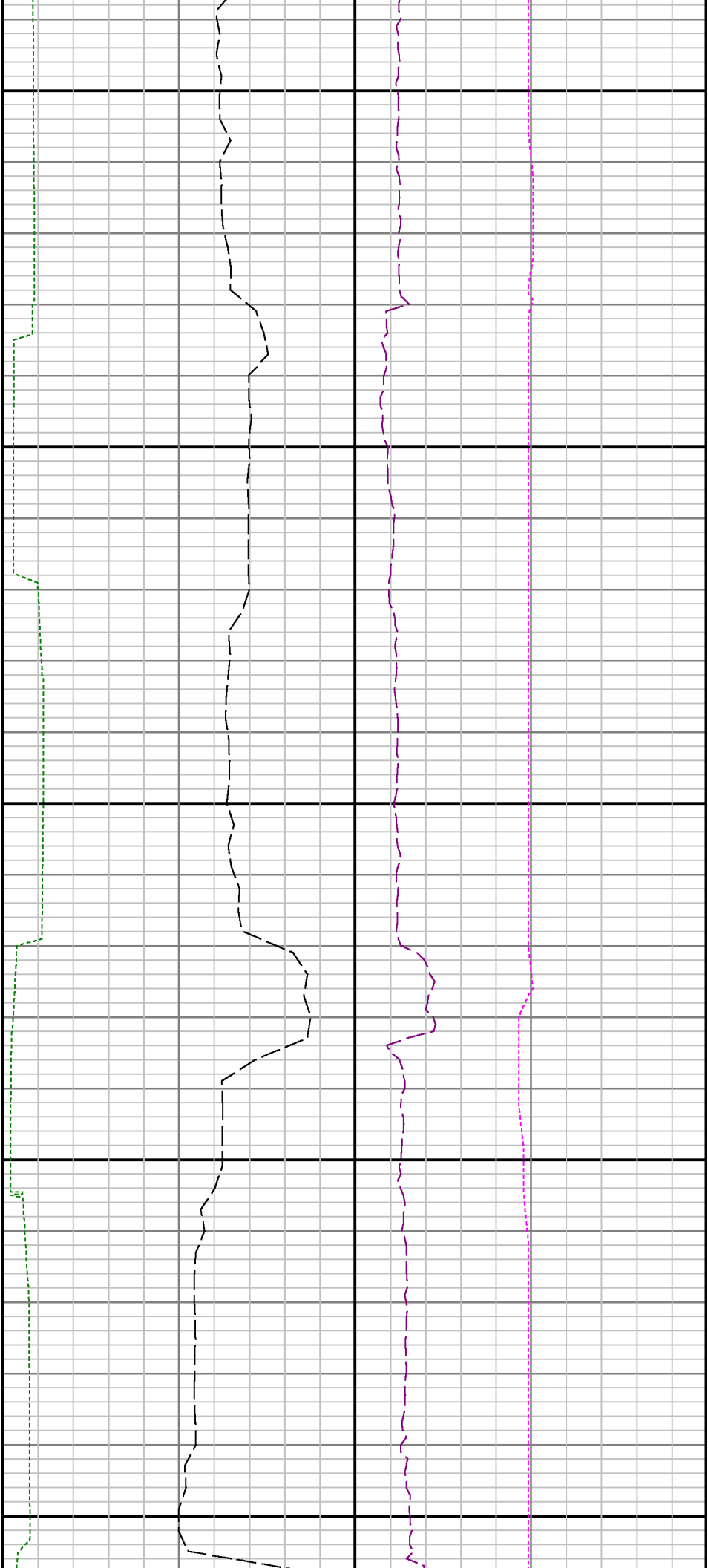


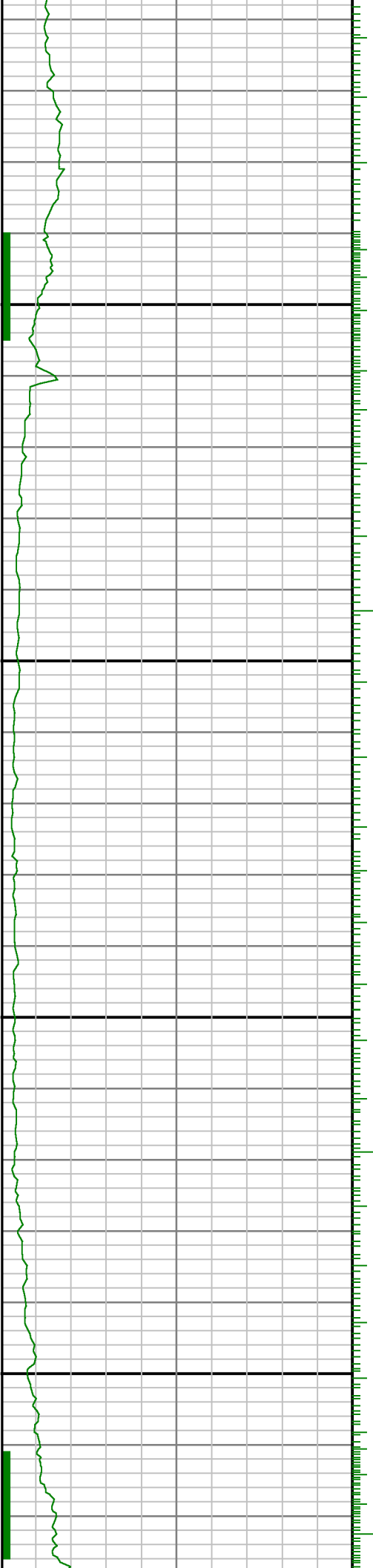
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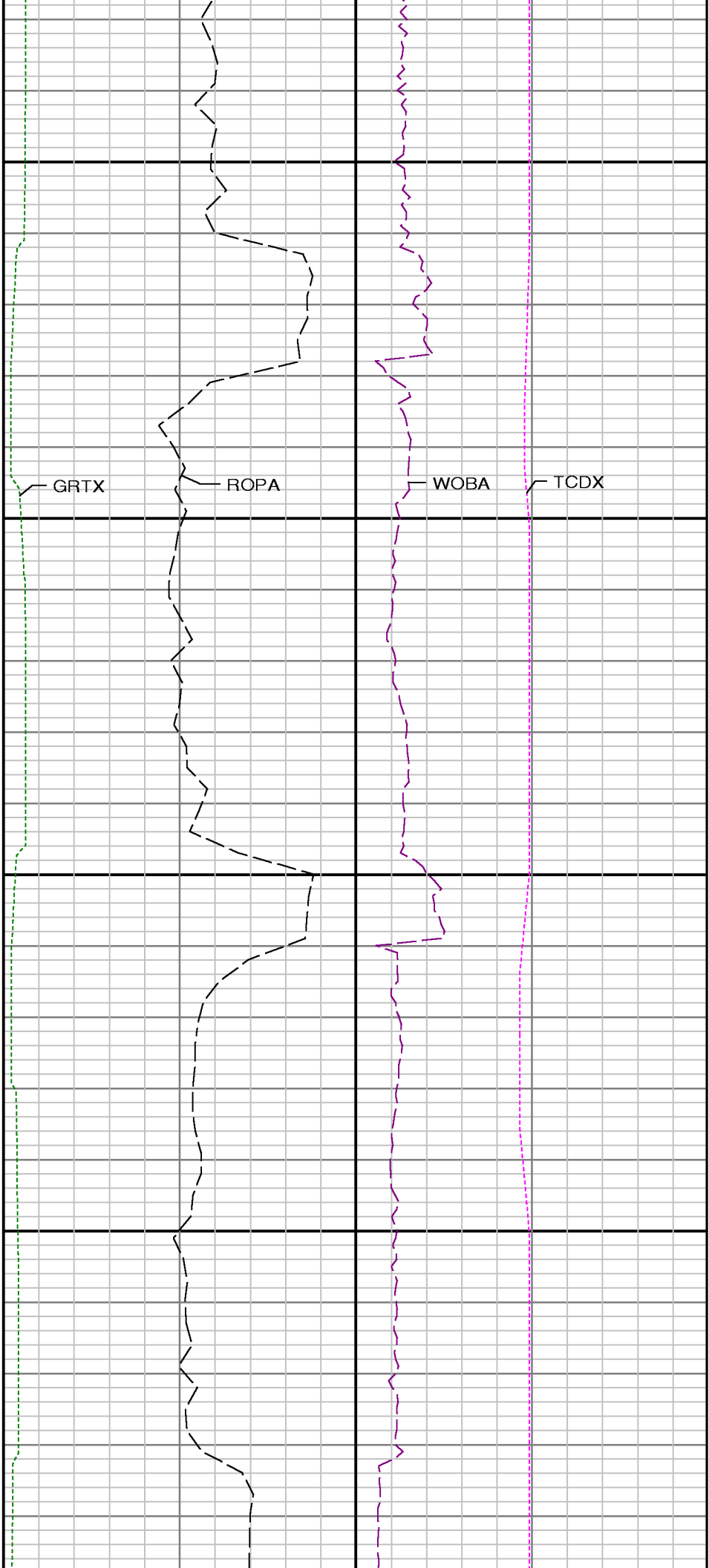
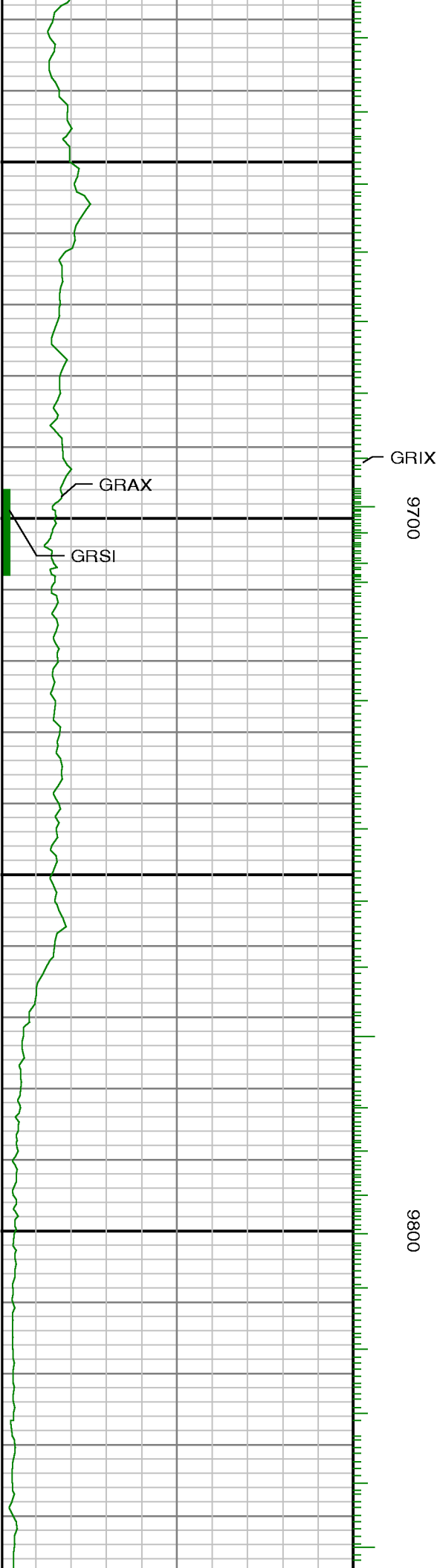


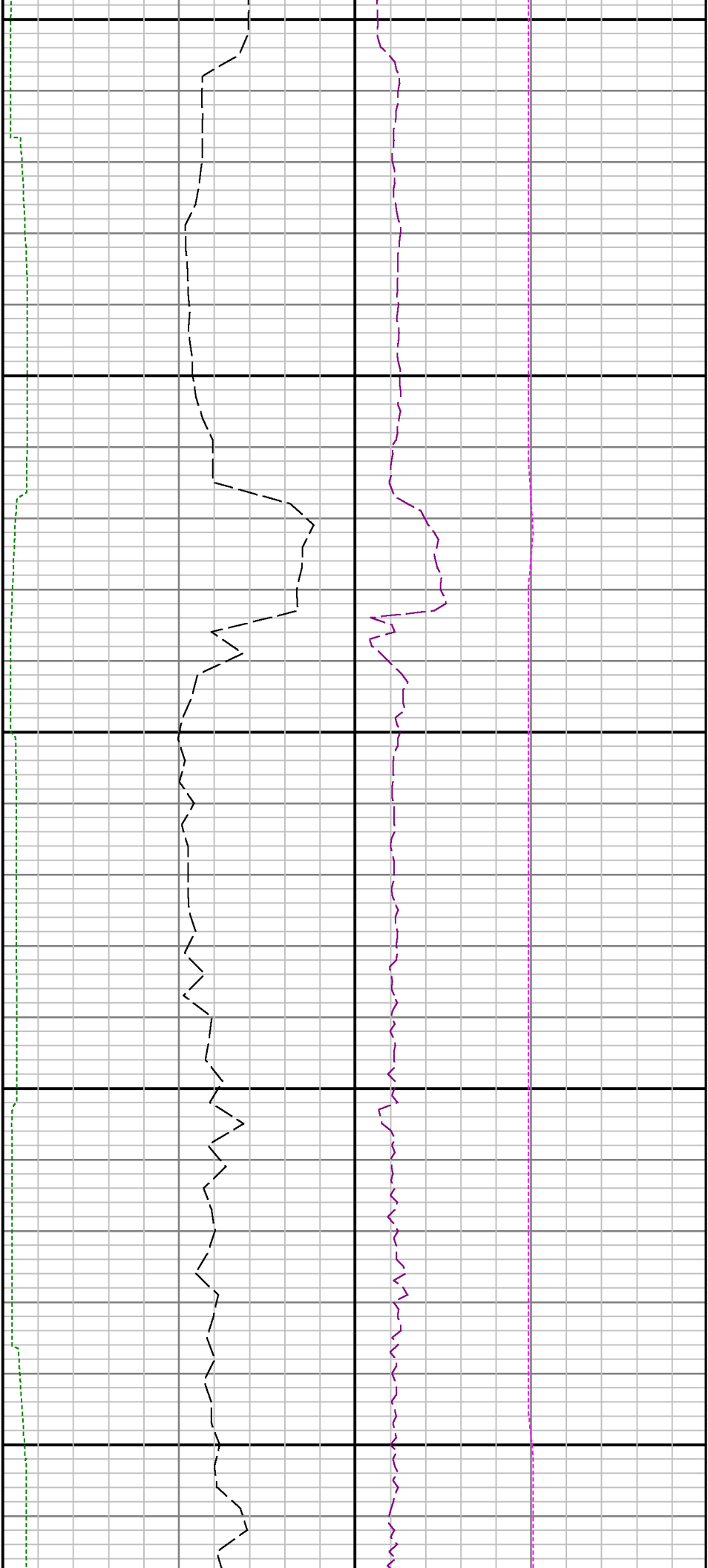


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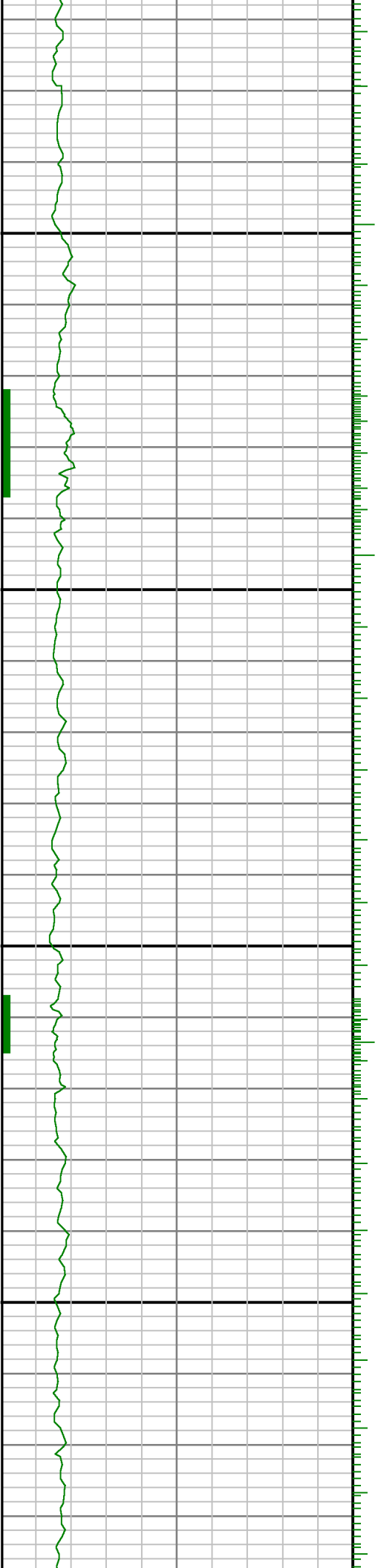
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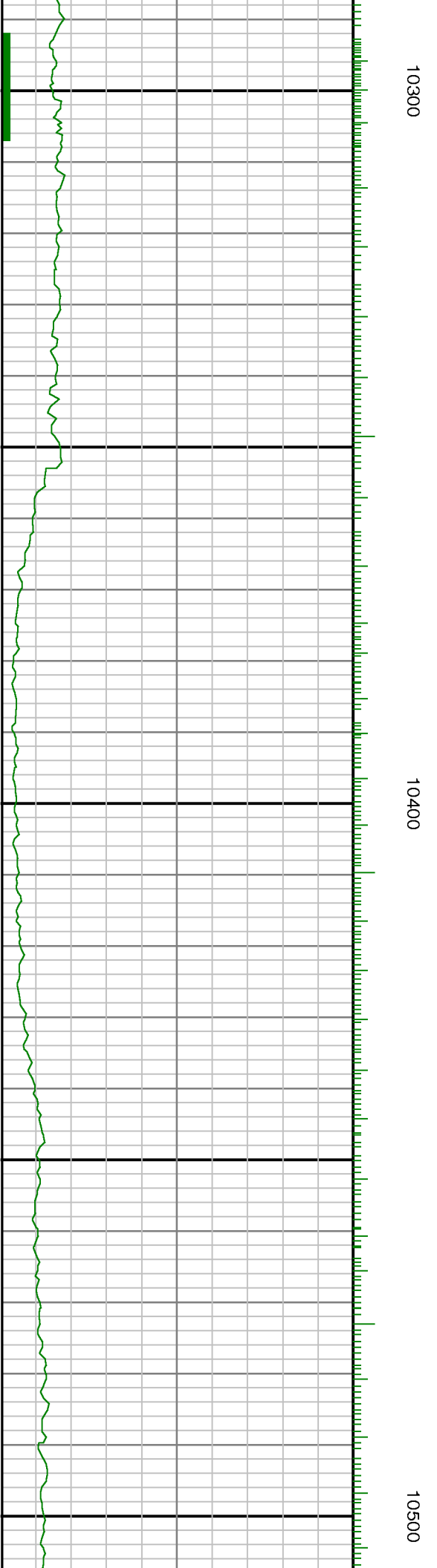
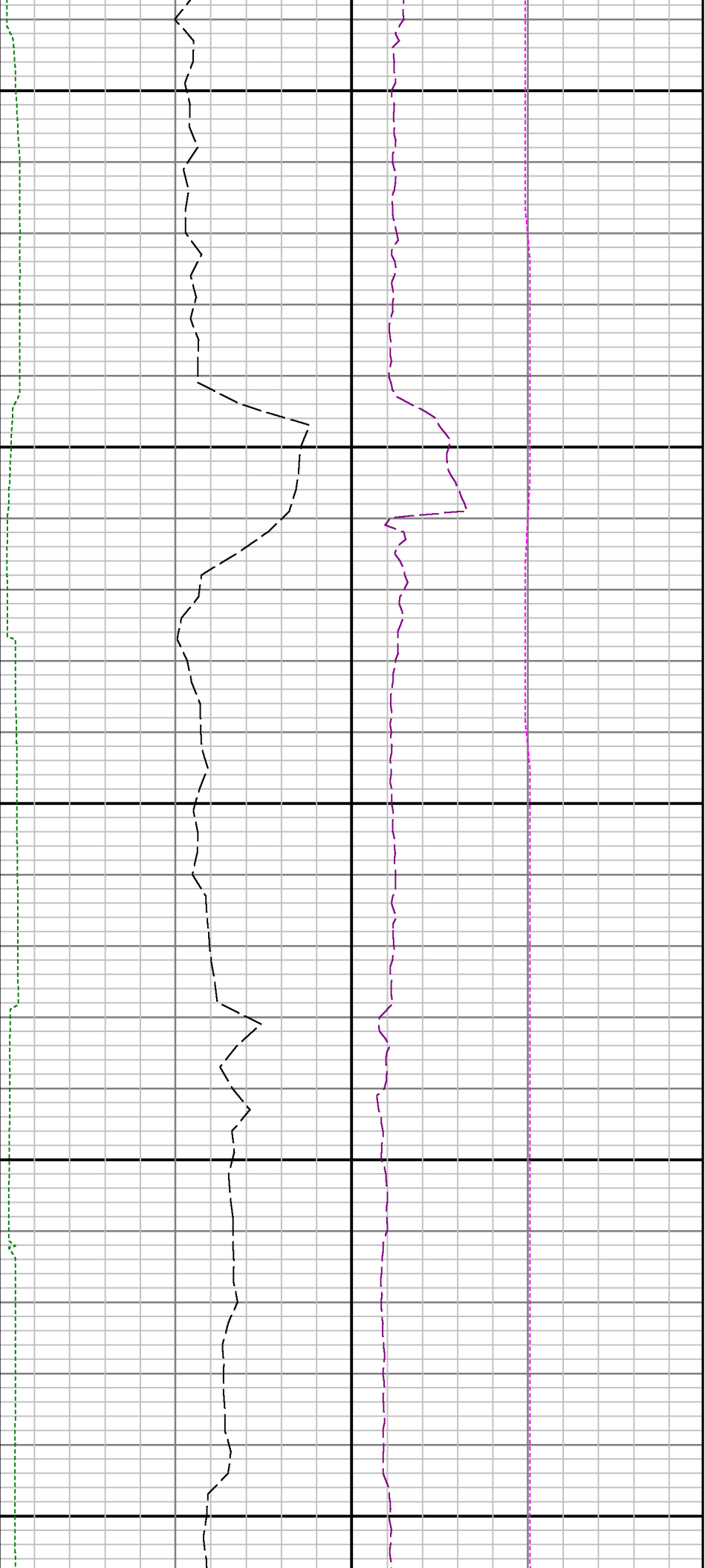
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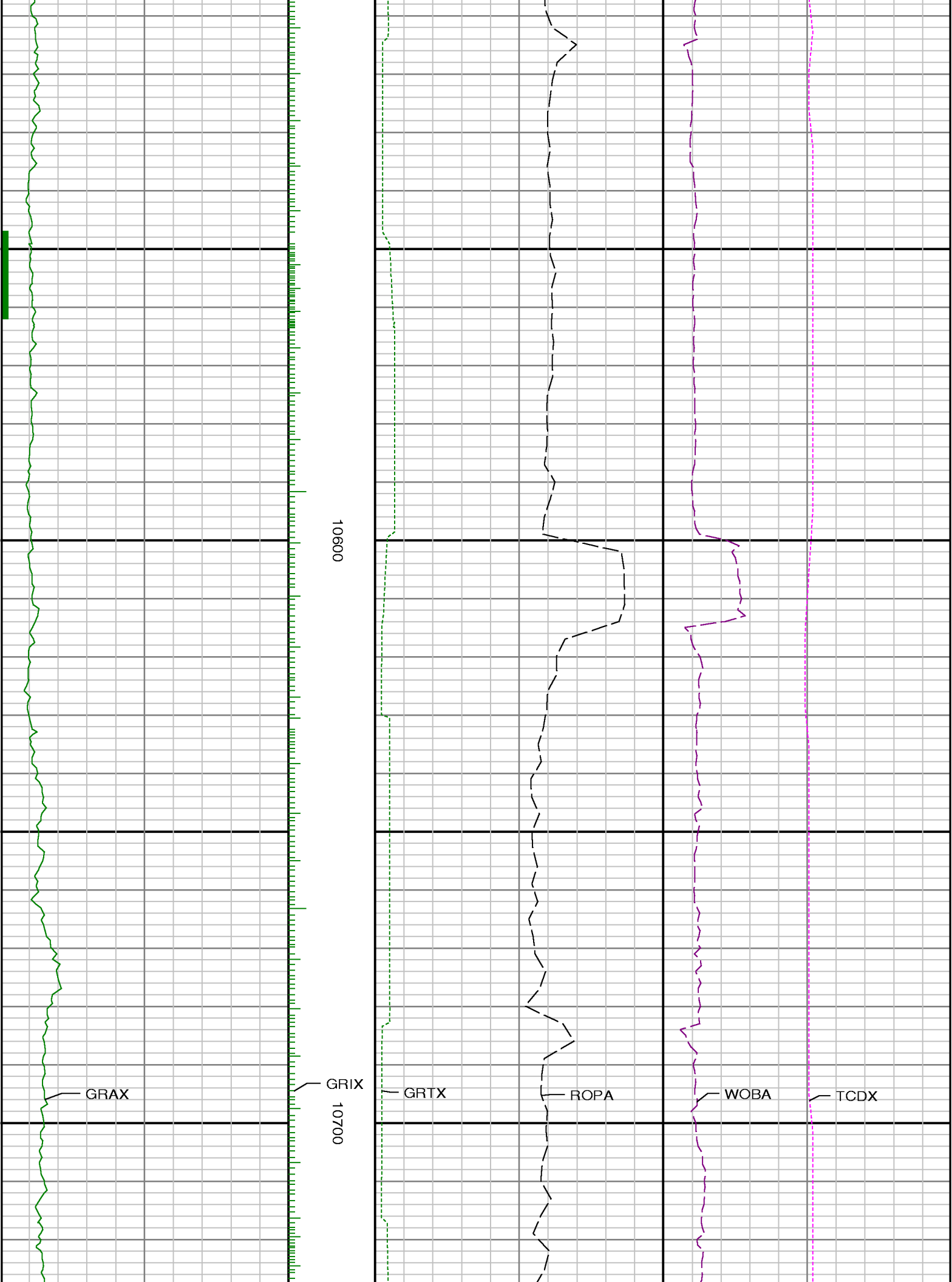


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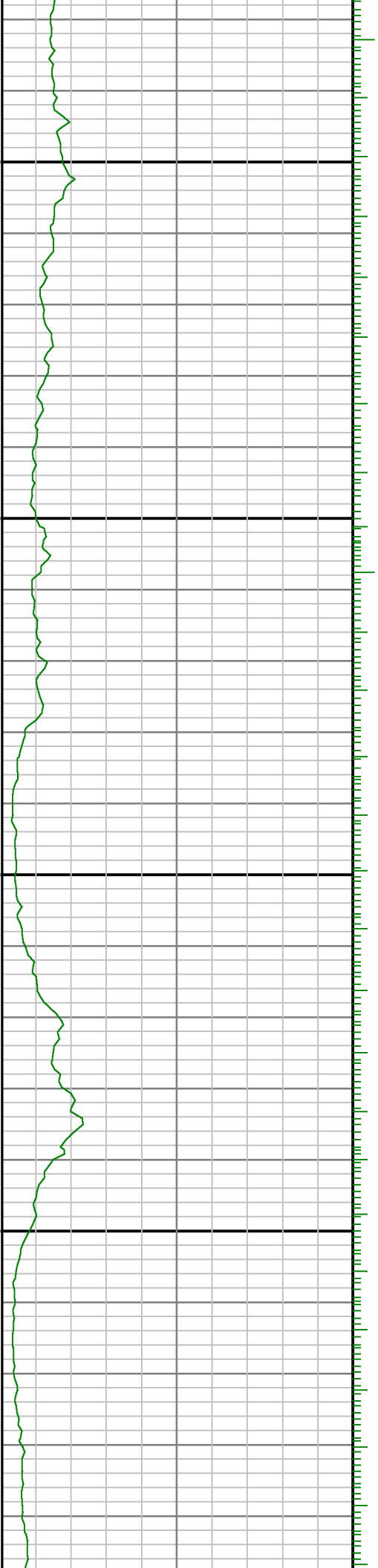


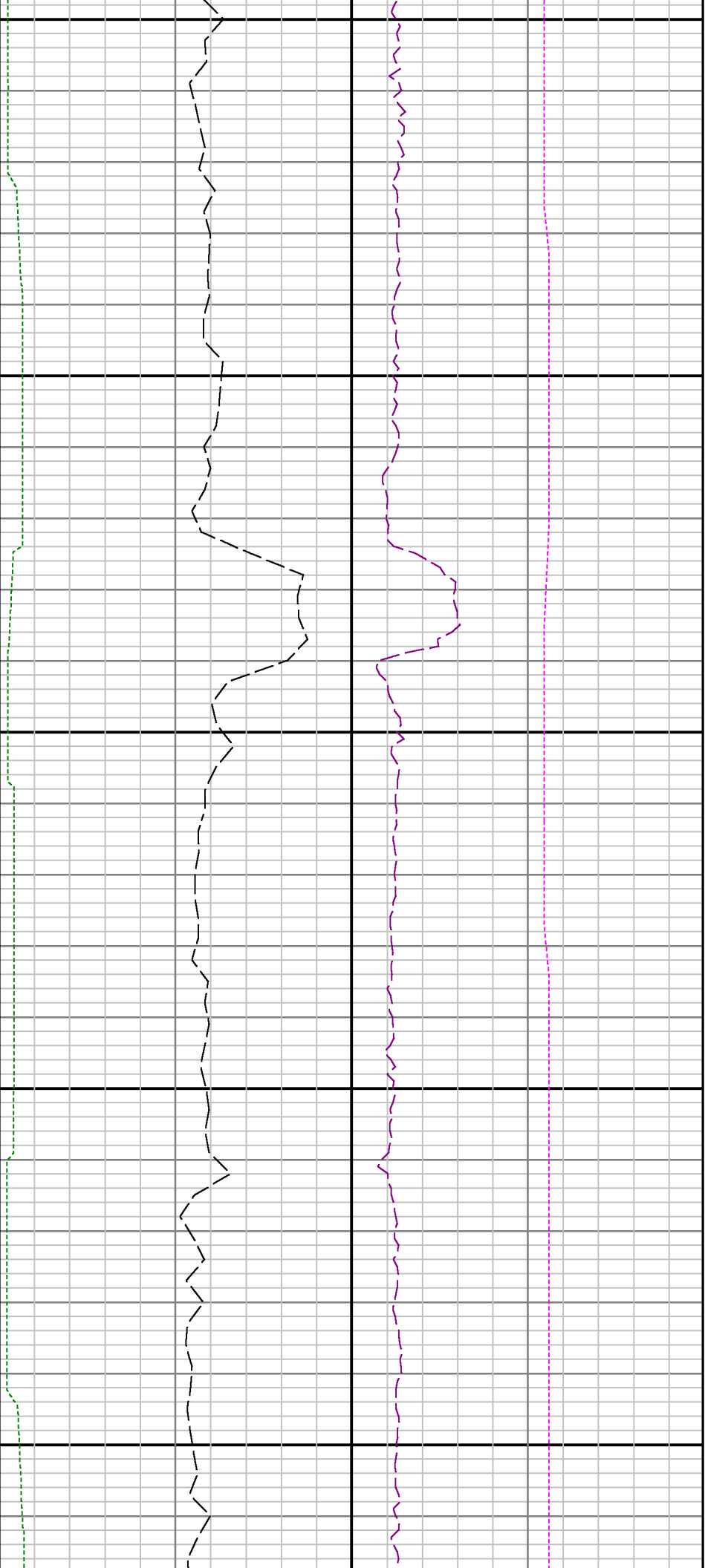




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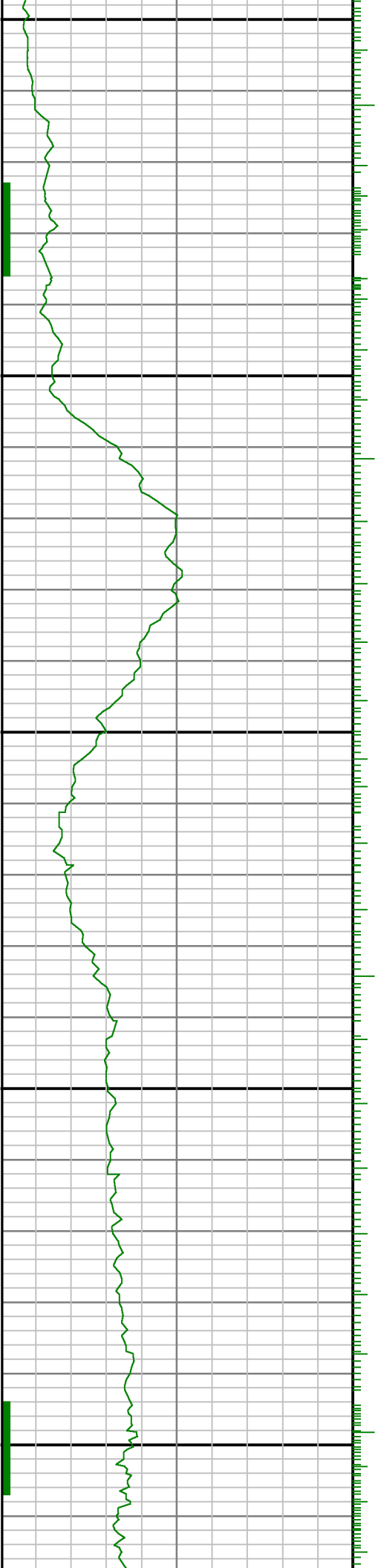
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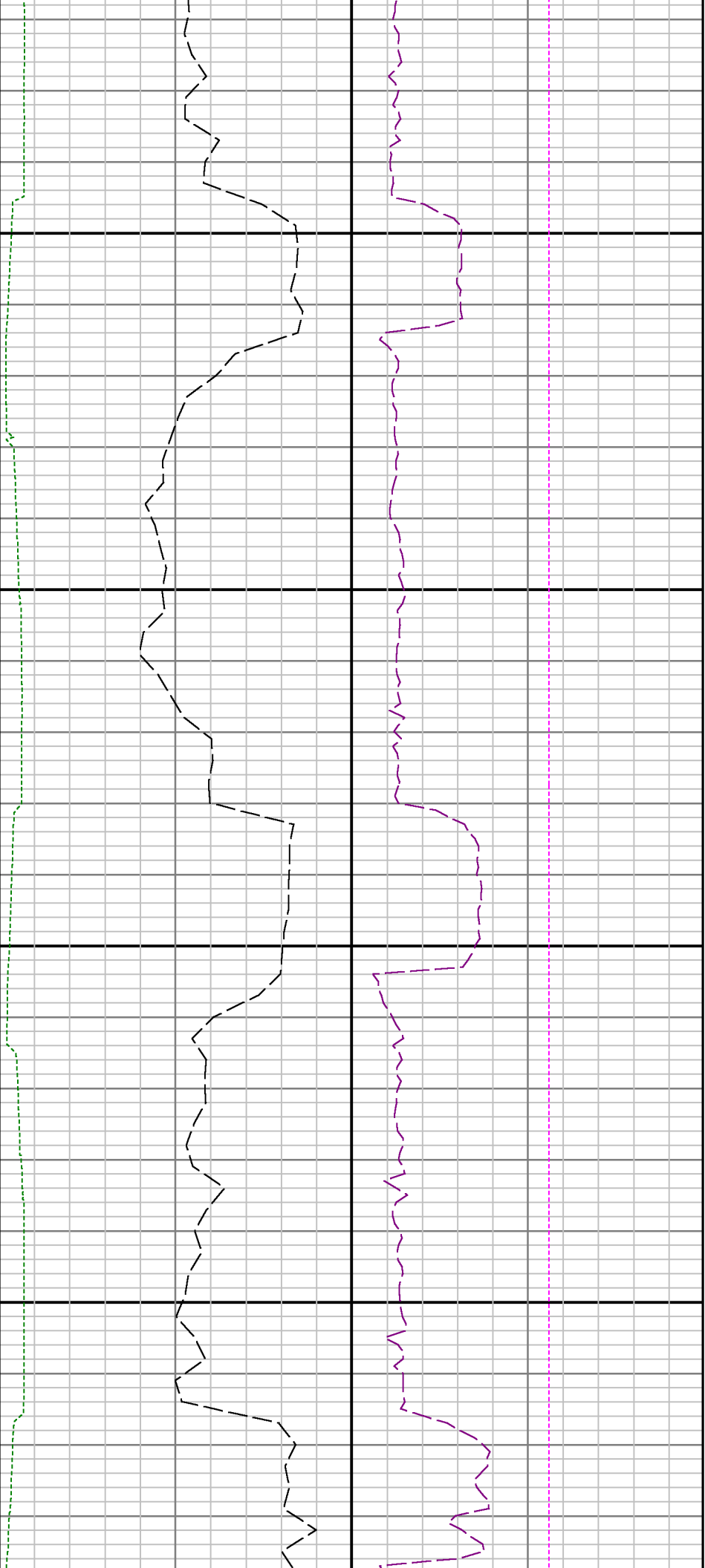




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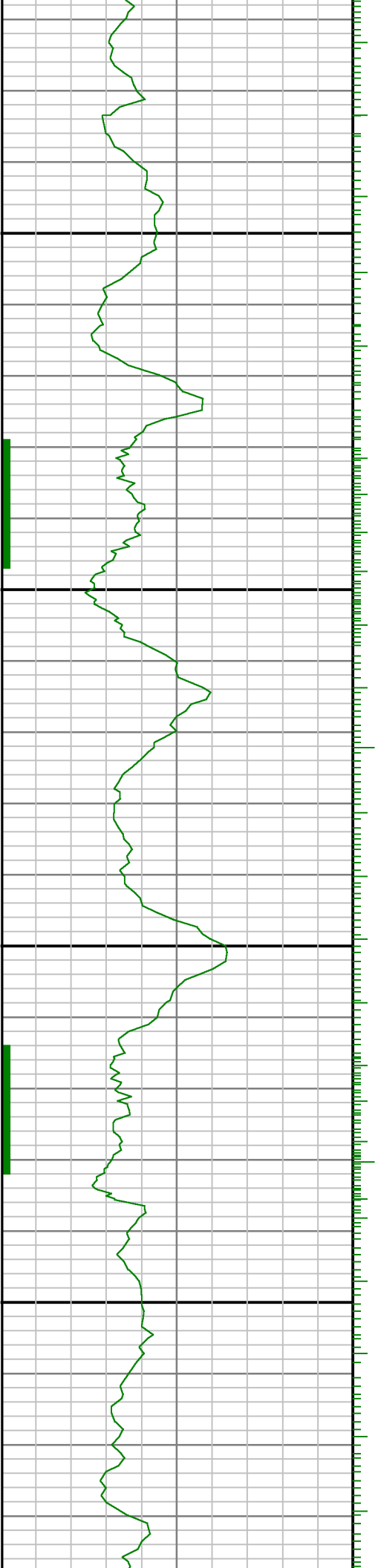
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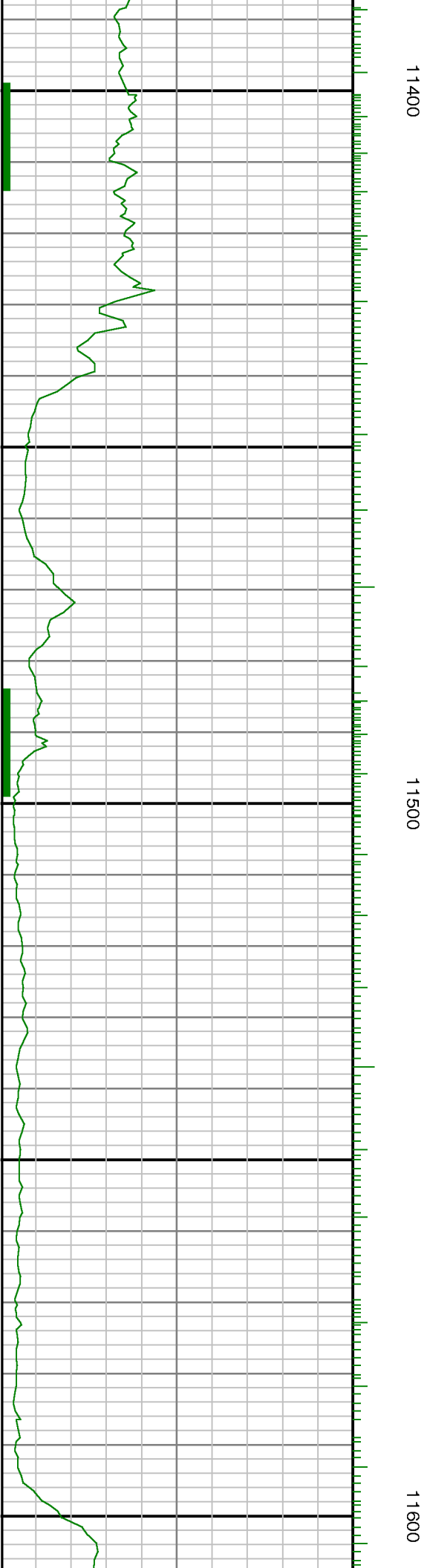
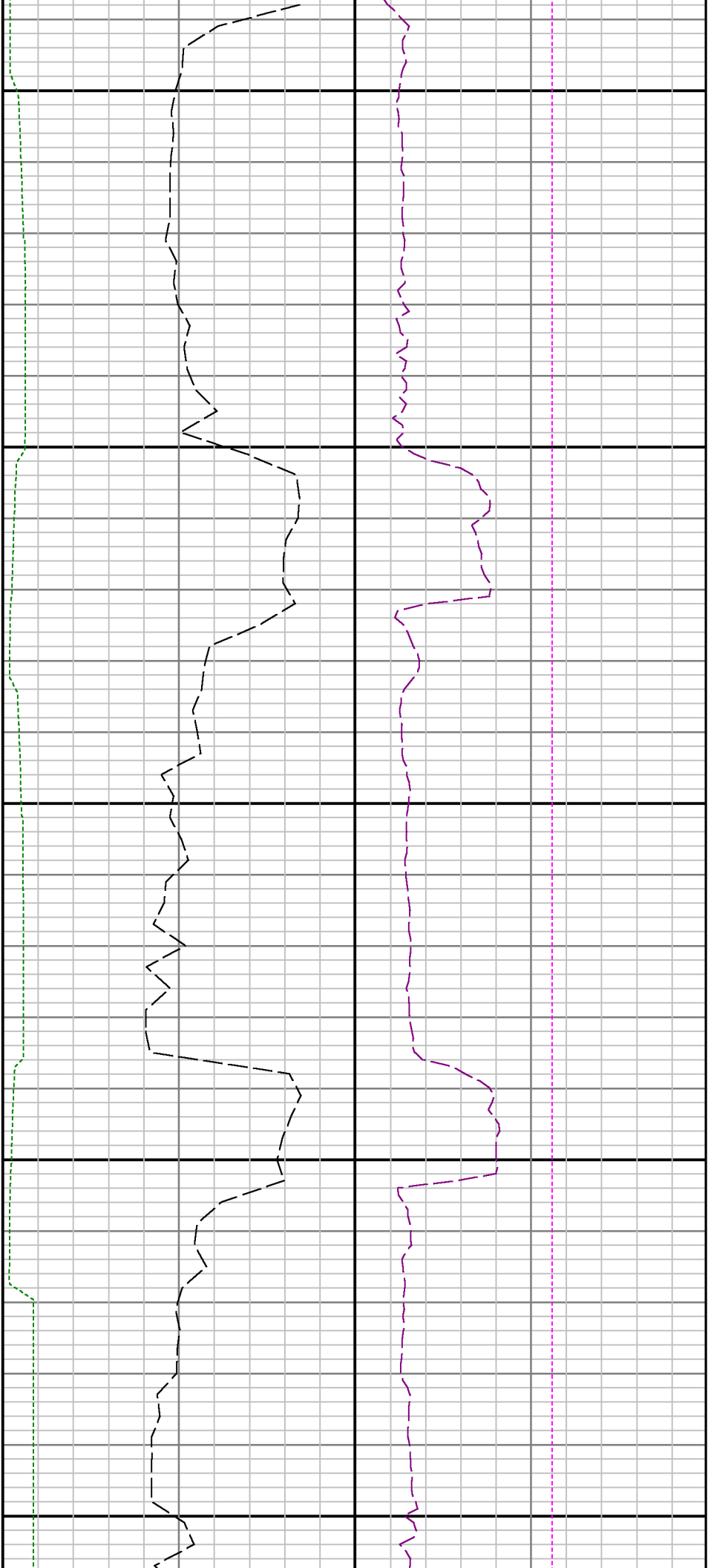


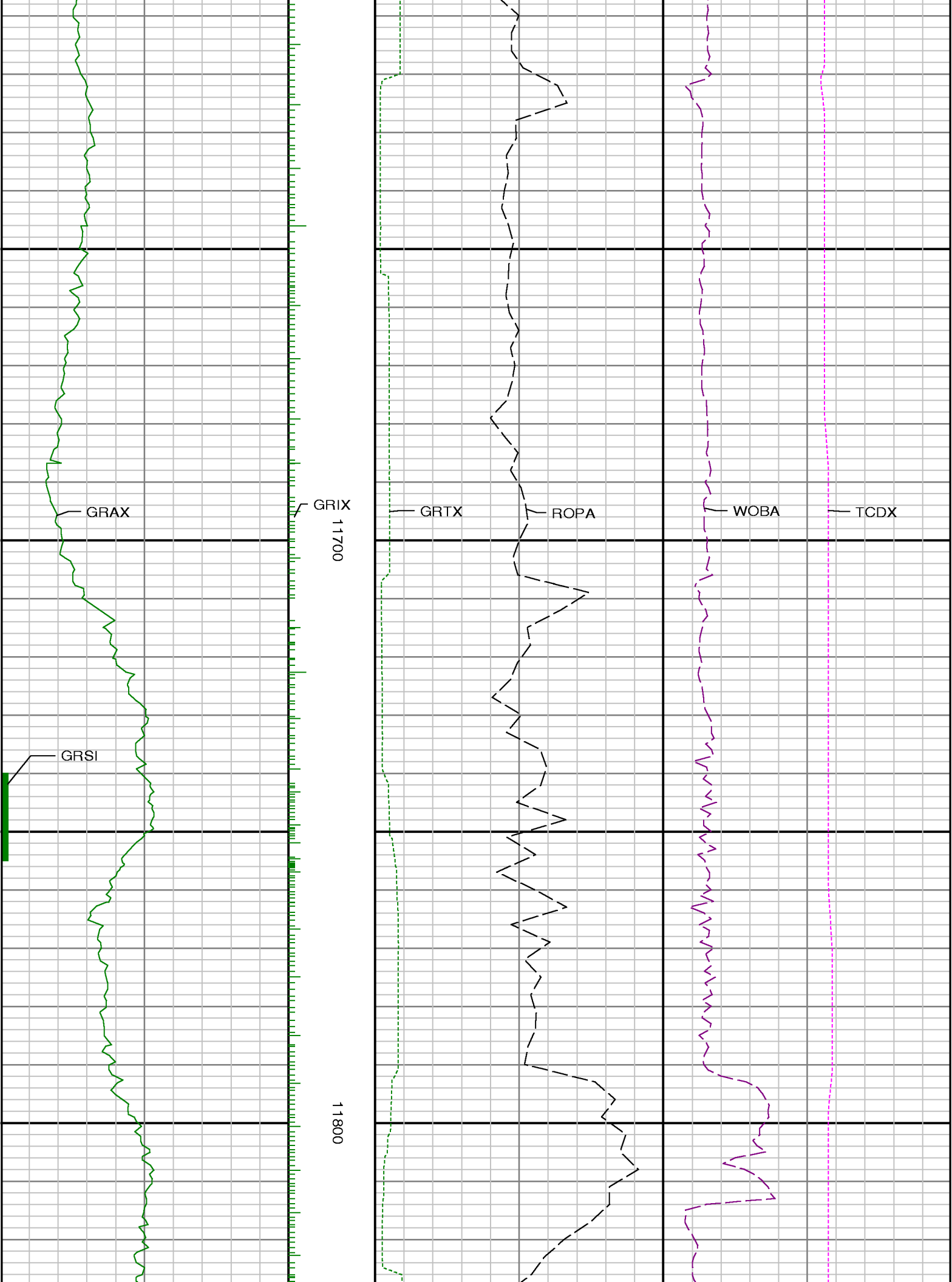


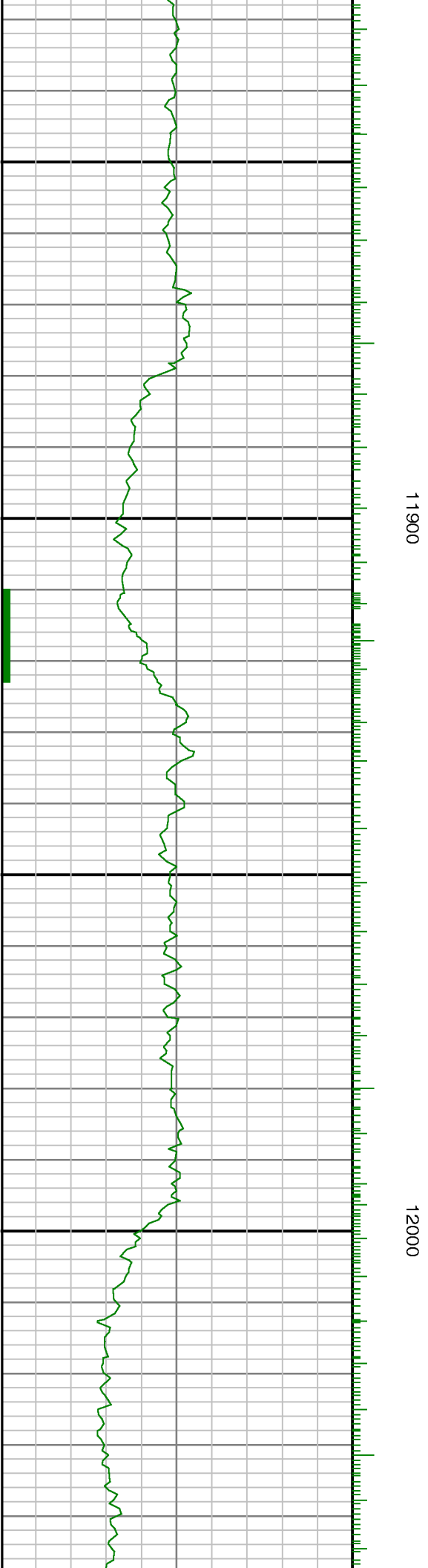
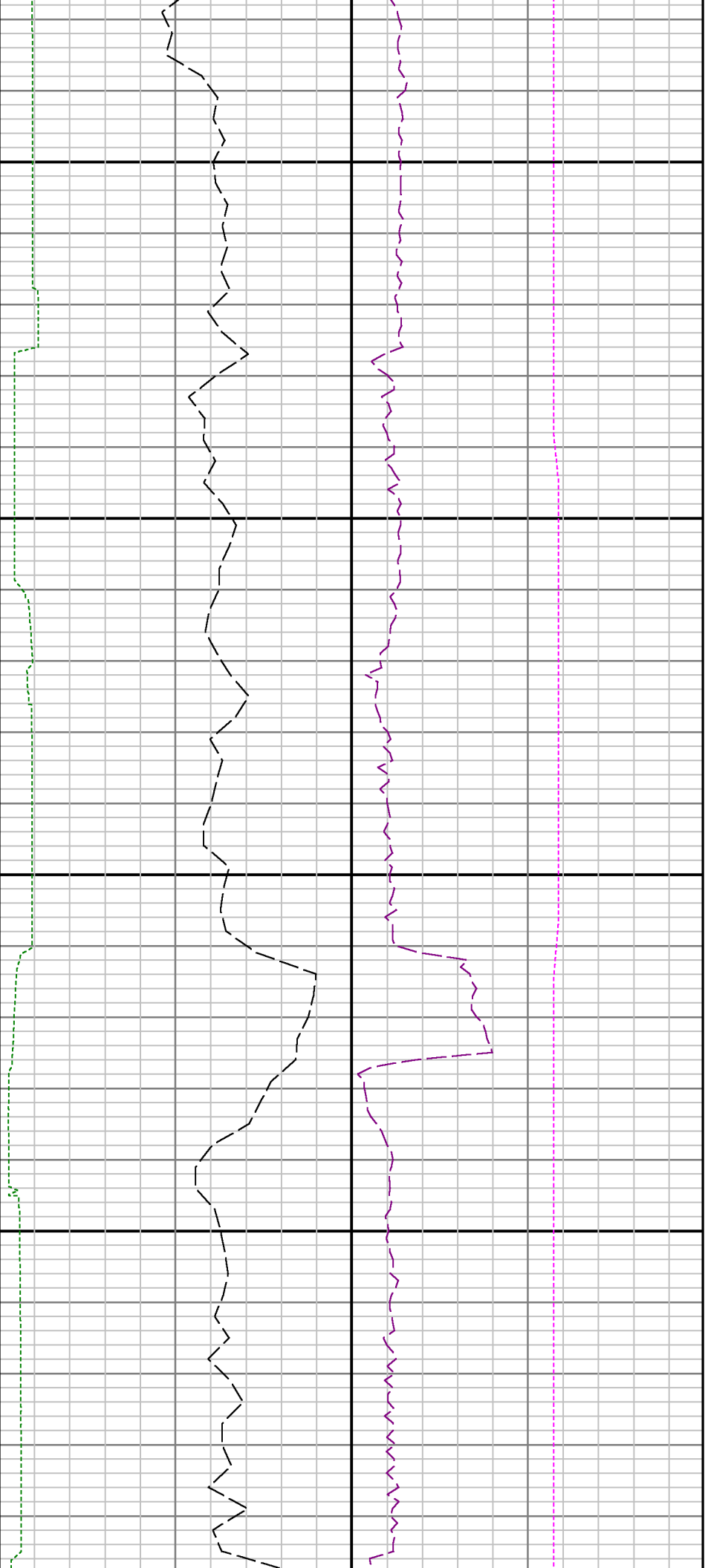
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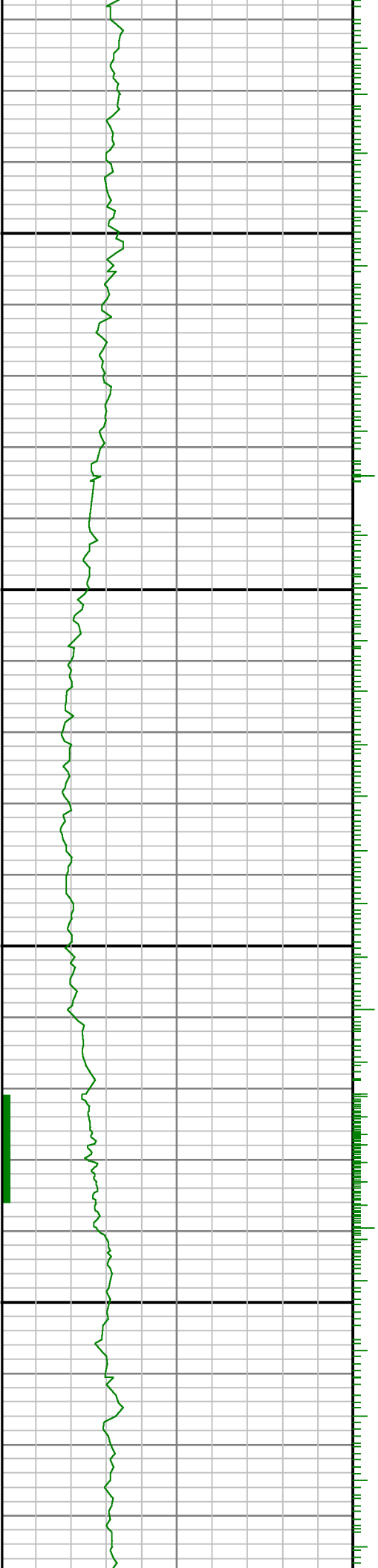




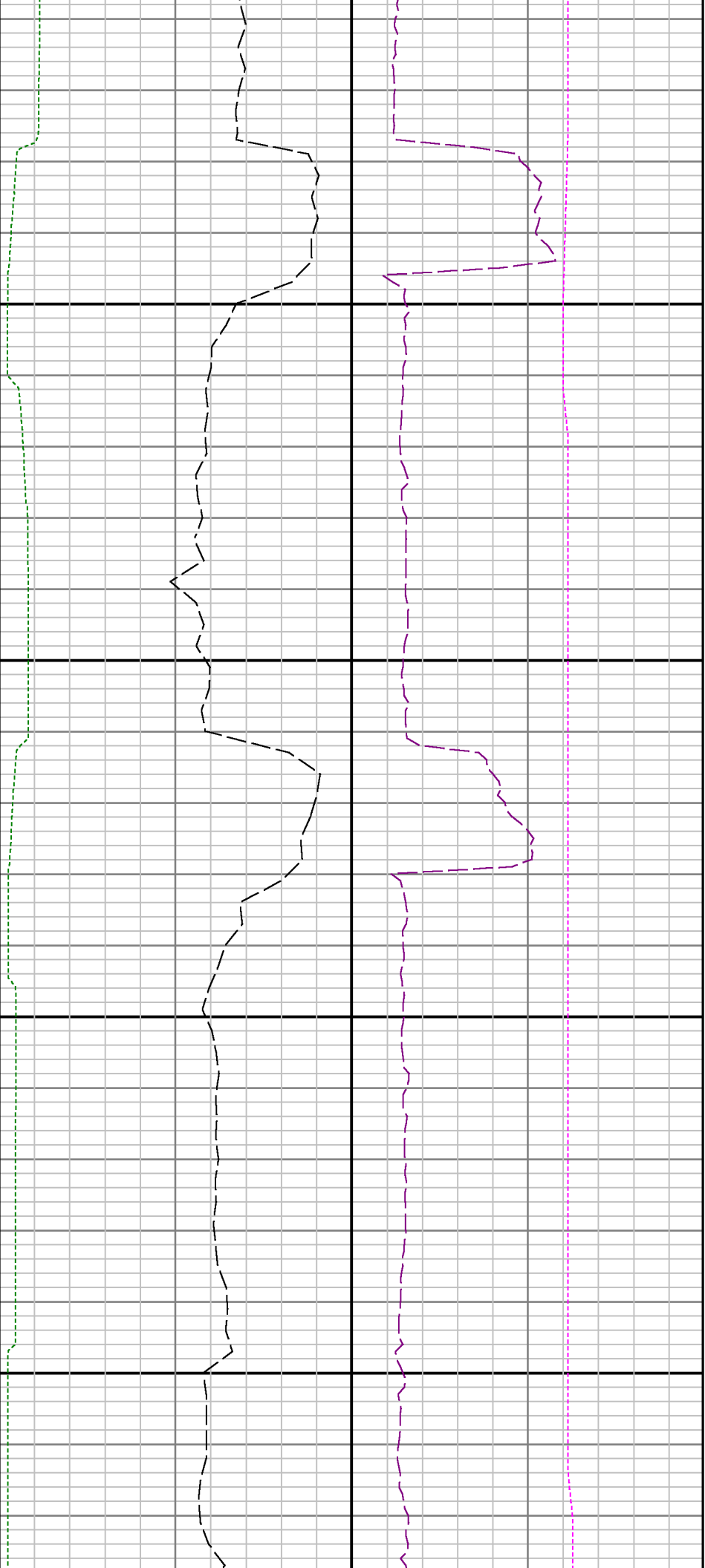


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