



Realtime and Memory Log

Multiple Propagation Resistivity
Gamma Ray

Scale: Company: Anadarko

1:240 Well: Griffiths 14N-20HZ

MEASURED DEPTH Field: Weld County

Status: Final Print Region: Continental US Country: United States

API Number: 0512336623 Surface Location: Latitude: 40° 3' 25.474" N Longitude: 104° 55' 2.914" W Other Services: Directional VSS

Permanent Datum (P.D.): Mean Sea Level Elevation: 5081.00 ft. Elevations: N/A
Log Measured From: Rig Floor 5081.00 ft. Above P.D. KB: 5081.00 ft.
Depth Reference: Driller's Depth GL: 5055.00 ft.

Interval Logged			Dates		Magnetic Field Reference		
Top:	5500 ft.	Date From:	23/Aug/13	Dip Angle:	66.44 °	Azi Reference North:	True
Bottom:	17328 ft.	Date To:	07/Sep/13	Total		Mag to Reference	
		Spud Date:	22/Aug/13	Field Strength:	52890.0 nT	North Correction:	8.49 °

Borehole Record				Casing Record			
Hole Size	From	To	Size	Weight	From	To	
8.750 in.	1098 ft.	8081 ft.	9.625 in.	55.00 lb/ft	Surface	1094 ft.	
6.125 in.	8081 ft.	17328 ft.	7.000 in.	26.00 lb/ft	Surface	8041 ft.	

Mud Record				Deviation Record			
Type	From	To	Hole Size	Interval	Inc / Az (Start)	Inc / Az (End)	
Water Based Mud	Surface	17328 ft.	8.750 in.	8081 ft.	0.9 / 170.8 °	84.2 ° / 181.3 °	
			6.125 in.	9247 ft.	84.2 ° / 181.3 °	85.9 ° / 176.3 °	
					/	/	
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Acquisition System Software Version Other							
Advantage	2.20U4	Rig / Contractor:	H&P 307	/ H&P			
PATS	6.4.1.34	Job No:	5587151	/ D & E			
		District / Unit:	RMD				

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Log Run Summary													
LWD	BHA	Bit	Bit	Bit	Bit	Assembly	Logged Interval		Bit Depth Interval		Date / Time		Circ.
Run	Run	Run	Size	Type	Gauge	Type	Top	Bottom	From	To	Start	End	Time
No.	No.	No.	(in.)		Length		(m.)	(m.)	(m.)	(m.)			(hrs.)
1	1	1	8.750	PDC		Steerable	5500	8037	1098	8081	23/Aug/2013 09:47	26/Aug/2013 01:12	50.5
2	2	2	6.125	PDC		Steerable	8047	12304	8081	12357	29/Aug/2013 01:42	31/Aug/2013 02:00	49
3	3	3	6.125	PDC		Steerable	12304	15415	12357	15468	01/Sep/2013 04:32	03/Sep/2013 02:46	49
4	4	4	6.125	PDC		Steerable	15415	17274	15468	17328	04/Sep/2013 03:44	07/Sep/2013 05:00	42

Crew								
Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
Andy King	21/Aug/2013	07/Sep/2013	David Belek	21/Aug/2013	07/Sep/2013			

Hans Cary	21/Aug/2013	07/Sep/2013	Bill Herbers	21/Aug/2013	07/Sep/2013					

Mud Resistivity Record					Surface				Downhole		
Date / Time		LWD Run No.	Measured Depth (m.)	Surface Temp (deg C)	Rm (ohm.m)	Rmf (ohm.m)	Rmc (ohm.m)	BHCT (deg C)	Rm @ BHCT (ohm.m)	Rmf @ BHCT (ohm.m)	Rmc @ BHCT (ohm.m)
29/Aug/2013	06:17	2	8521	76	1.70	N/A	N/A	185	0.72	N/A	N/A
29/Aug/2013	18:24	2	9743	80	0.61	N/A	N/A	198	0.26	N/A	N/A
30/Aug/2013	05:28	2	10856	77	0.71	N/A	N/A	204	0.28	N/A	N/A
30/Aug/2013	20:38	2	11961	78	0.69	N/A	N/A	214	0.26	N/A	N/A
01/Sep/2013	04:00	3	12362	77	0.72	N/A	N/A	200	0.29	N/A	N/A
01/Sep/2013	15:49	3	13281	77	0.66	N/A	N/A	226	0.24	N/A	N/A
02/Sep/2013	08:04	3	14510	72	1.41	N/A	N/A	234	0.45	N/A	N/A
02/Sep/2013	20:50	3	15327	75	1.40	N/A	N/A	244	0.45	N/A	N/A
04/Sep/2013	22:01	4	15468	72	0.73	N/A	N/A	212	0.26	N/A	N/A
05/Sep/2013	17:46	4	16187	78	0.67	N/A	N/A	253	0.22	N/A	N/A
06/Sep/2013	06:06	4	16707	73	0.75	N/A	N/A	255	0.23	N/A	N/A

Mnemonics		
Curve	Description	Units
ROPA	Rate of Penetration, 3.0 ft. Avg	ft/hr
GRIM	Gamma Ray Data Point Indicator	unitless
GRAM	Gamma Ray - Apparent, 0.5 ft. Avg	API
GRAUFM	Gamma Ray - Apparent, Up	API
GRADFM	Gamma Ray - Apparent, Down	API
RPCHM	Resistivity Phase - Corrected - 2MHz	ohm.m
RPCLM	Resistivity Phase - Corrected - 400kHz	ohm.m
RACHM	Resistivity Attenuation - Corrected - 2MHz	ohm.m
RACLM	Resistivity Attenuation - Corrected - 400kHz	ohm.m
RPTHM	Resistivity Time Since Drilled	min
RPSIHM	Resistivity Phase Short Space Sliding Indicator - 2MHz	unitless
CACLM	Conductivity Attenuation - Corrected - 400kHz	mmho/m
TCDM	Downhole Temperature	degF

Equipment and Service Data						
LWD Run No.	Tool	Serial Number	Measurement	Bit Offset (m.)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	11685175	Directional	46.72	6.750	3.250
1	SRIG	11703934	Gamma	43.35	6.750	3.250
2	CS	12114979	-	82.49	4.800	1.750
2	BCPM	10655410	Telemetry	65.26	5.240	1.750
2	STAB	11826084	-	62.28	5.630	1.750
2	OTK	12753448	Directional	57.25	5.170	1.750
2	OTK	12753448	Directional	57.25	5.170	1.750

2	OTK	12753448	Resistivity	44.07	5.170	1.750
2	OTK	12753448	Gamma	52.56	5.170	1.750
2	OTK	12753448	Pressure	48.51	5.170	1.750
2	CS	10369034	-	37.76	5.020	1.750
3	CS	12052199	-	76.55	4.940	1.750
3	BCPM	12415740	Telemetry	65.80	5.010	1.750
3	STAB	11698089	-	62.65	5.500	1.750
3	OTK	11843972	Directional	56.97	5.010	1.750
3	OTK	11843972	Resistivity	43.79	5.010	1.750
3	OTK	11843972	Gamma	52.28	5.010	1.750
3	OTK	11843972	Pressure	48.23	5.010	1.750
3	CS	10623947	-	37.04	5.010	1.750
4	CS	12052199	-	76.62	4.940	1.750
4	BCPM	12415740	Telemetry	65.87	5.010	1.750
4	STAB	11698089	-	62.72	5.500	1.750
4	OTK	11843972	Directional	57.04	5.010	1.750
4	OTK	11843972	Resistivity	43.86	5.010	1.750
4	OTK	11843972	Gamma	52.35	5.010	1.750
4	OTK	11843972	Pressure	48.30	5.010	1.750
4	CS	10623947	-	37.11	5.010	1.750

Service and Tool Mnemonics

Mnemonic	Name	Description
BCPM	BCPM	Mud pulse telemetry and downhole tool power module
DIR	Directional	Wellbore directional survey
OTK	OnTrak	Propagation resistivity, propagation conductivity, gamma ray, directional, annular pressure, system memory and VSS
SRIG	Inclination and Gamma	Probe based gamma ray and inclination module
STAB	Stabilizer	Stabilizer assembly
CS	Closure Sub	BHA power ring isolator allowing insertion of inert sub into electrically powered BHA

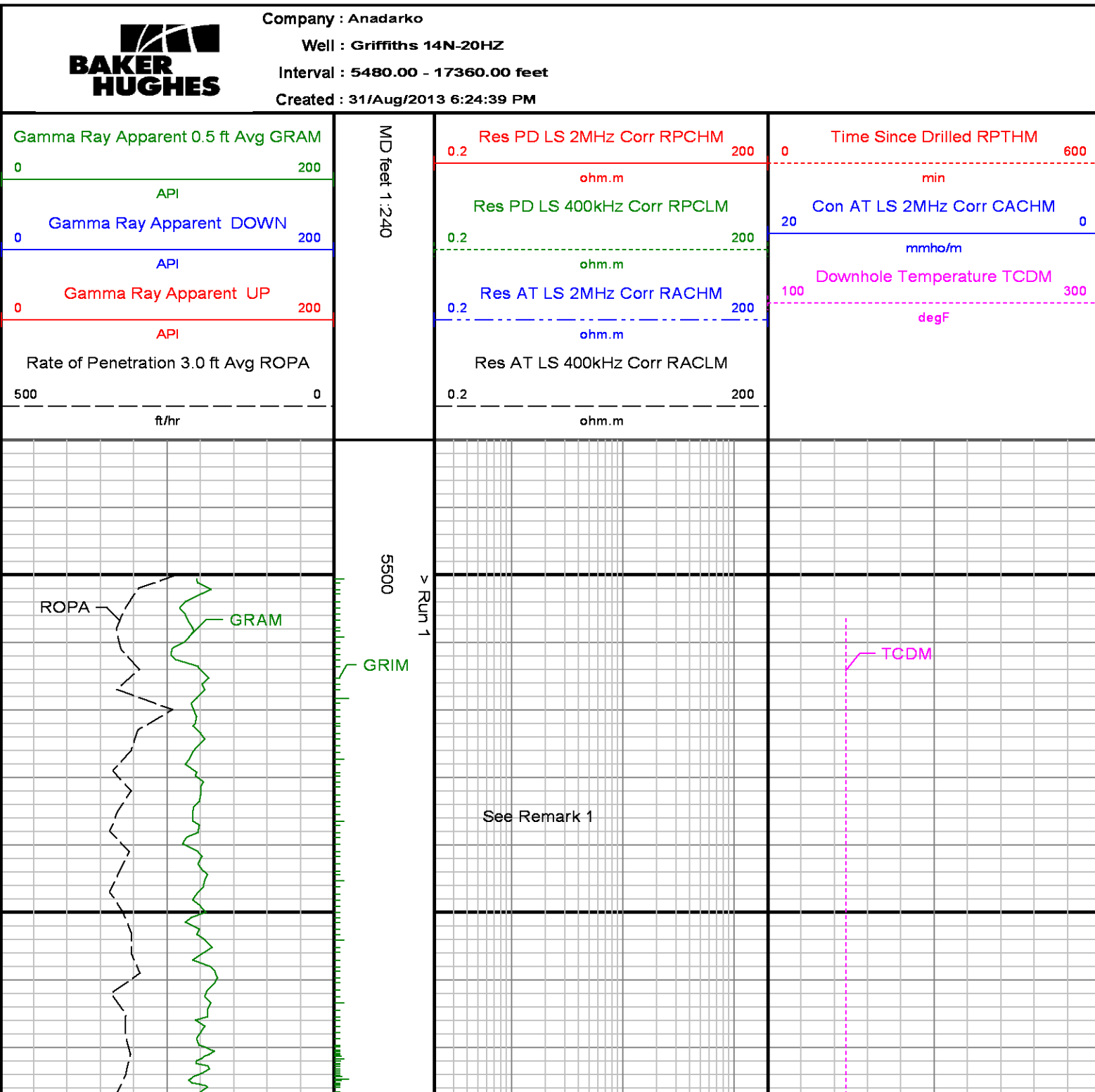
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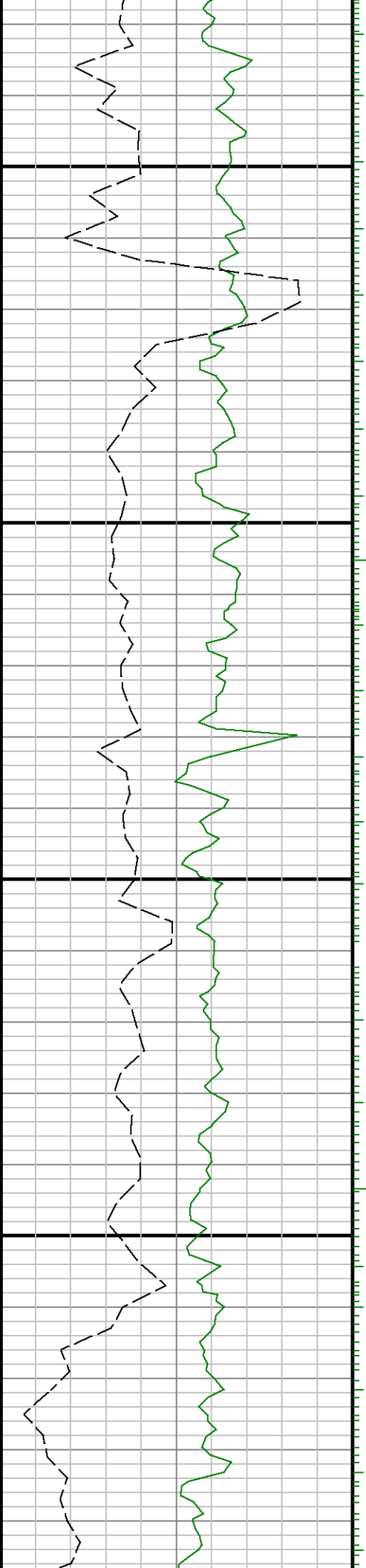
<p>(1) Baker Hughes INTEQ run 1 utilized 6 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 3/4 inch bit and steerable assembly from 1098 to 8081 feet MD (1098 to 7520 feet TVD).</p> <p>(2) Baker Hughes INTEQ runs 2 and 3 utilized 4 3/4 inch OnTrak services (Multiple Propagation Resistivity, Gamma Ray and Directional) behind a 6 1/8 inch bit and steerable assembly from 8081 to 15468 feet MD (7520 to 7571 feet TVD).</p> <p>(3) Baker Hughes INTEQ run 4 utilized 4 3/4 inch OnTrak services (Multiple Propagation Resistivity, Gamma Ray and Directional) behind a 6 1/8 inch bit and steerable assembly from 15468 to 17328 feet MD (7571 to 7616 feet TVD).</p> <p>(4) A sliding indicator is shown to the right edge of track 2 as a heavy line. The indicator has been depth-shifted to the resistivity sensor offset to correspond with resistivity data acquired while sliding.</p> <p>(5) Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes INTEQ. Due to lack of control by Baker Hughes INTEQ logging engineers, depth calibration and measurements could not be independently verified.</p>

Remarks

Number	Measured	Hole	LWD	Remark

	Depth (m.)	Section (in.)	Run No.	
1	5500	8.750	1	Began logging Gamma above the start of Build Section at 5500 ft MD.
2	12320	6.125	2	The interval from 12313 to 12357 ft MD was logged up to 26.5 hours after being drilled due to a trip out of the hole to pick up the Lateral Assembly at the end of Run 1.
3	15430	6.125	3	The interval from 15424 to 15468 ft MD was logged up to 43.0 hours after being drilled due to a trip out of the hole to repair the MI Swaco annular pressure control system and pick up a double agitator assembly along with a new mud motor and bit.
4	17300	6.125	4	The interval from 17284 to 17328 ft MD contains no logging data due to the sensor offset from the bit at the end of Run 4.

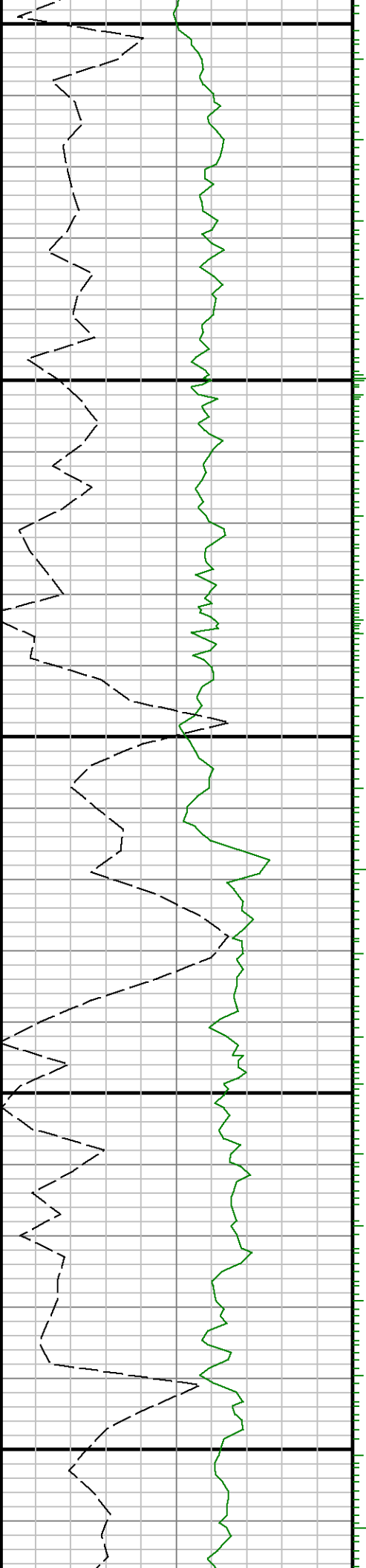




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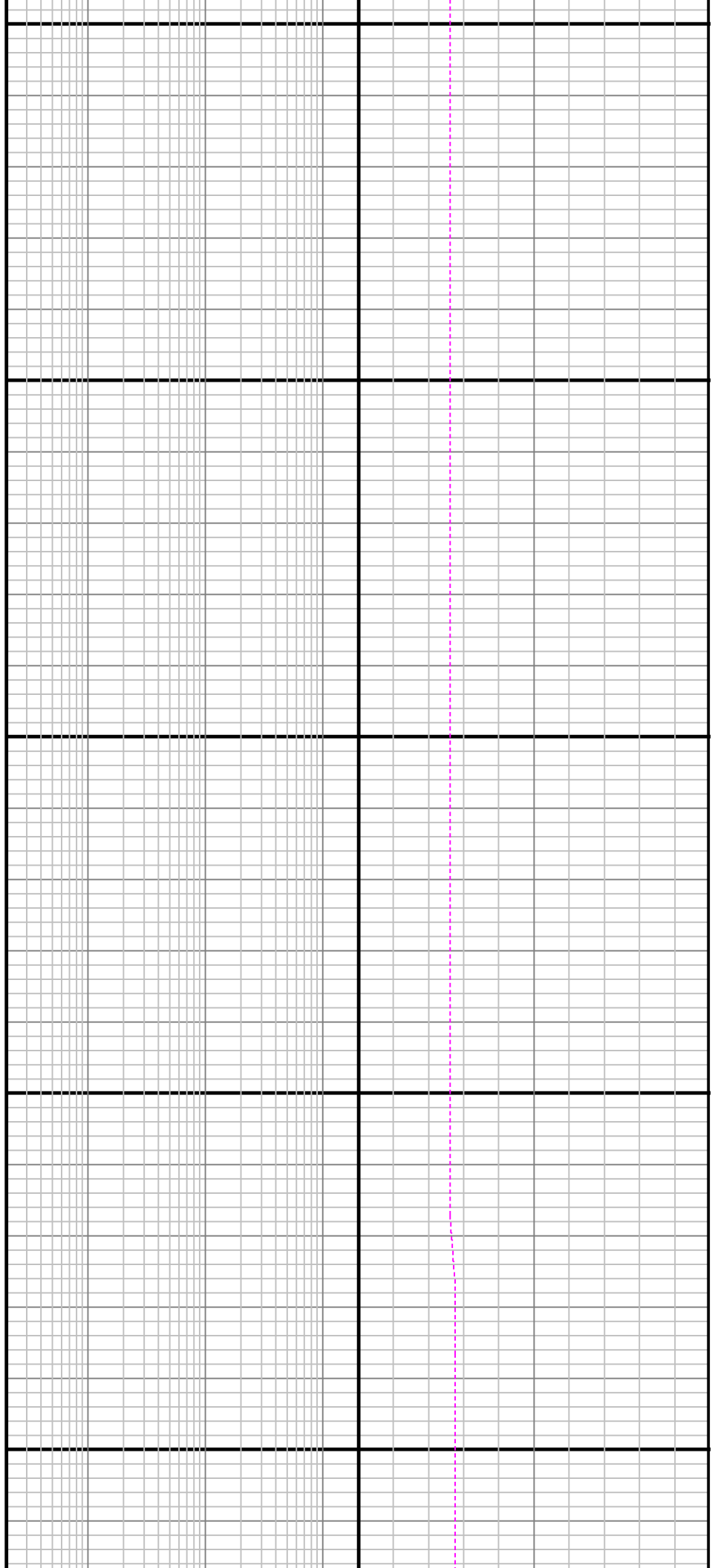


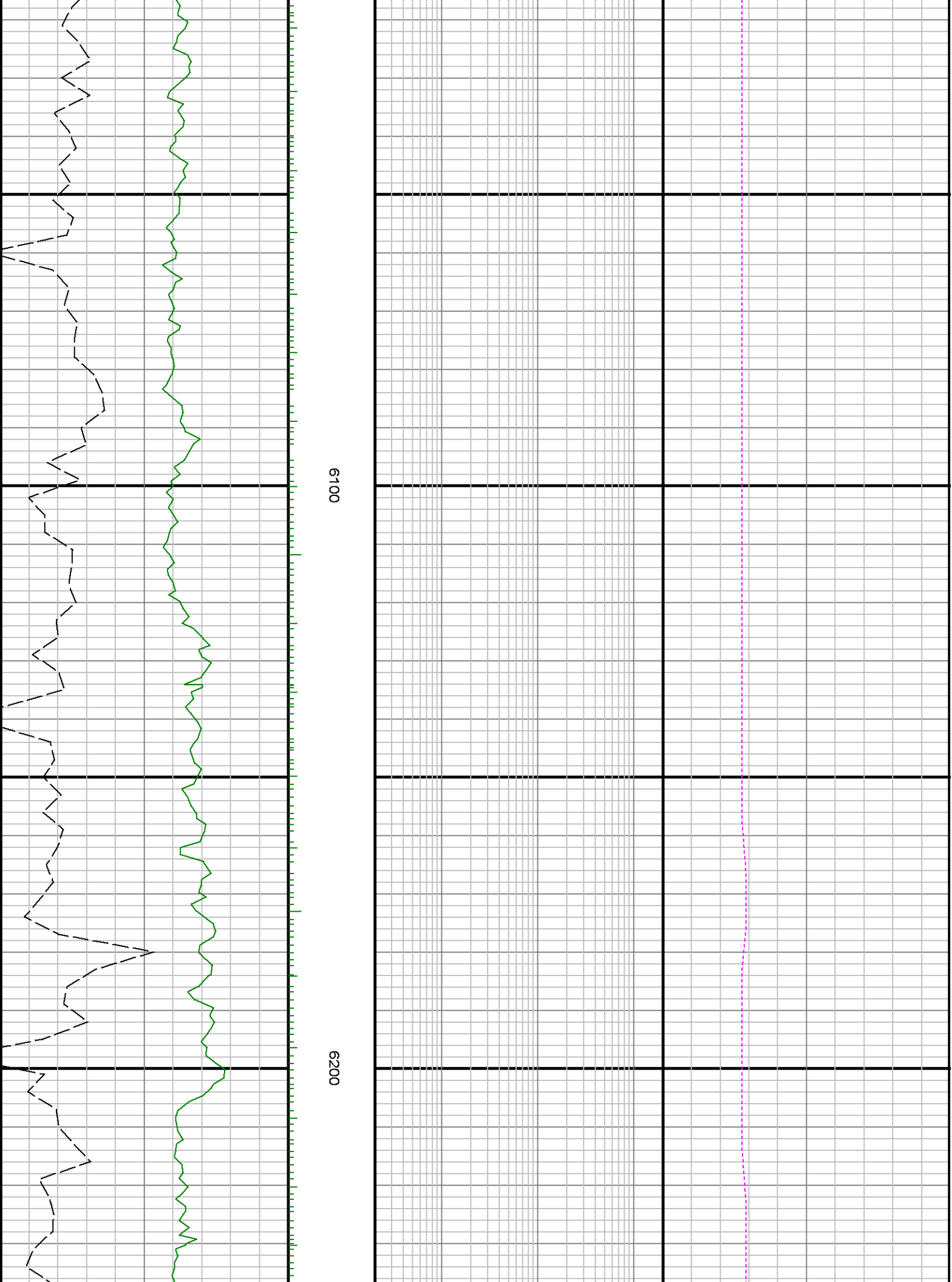


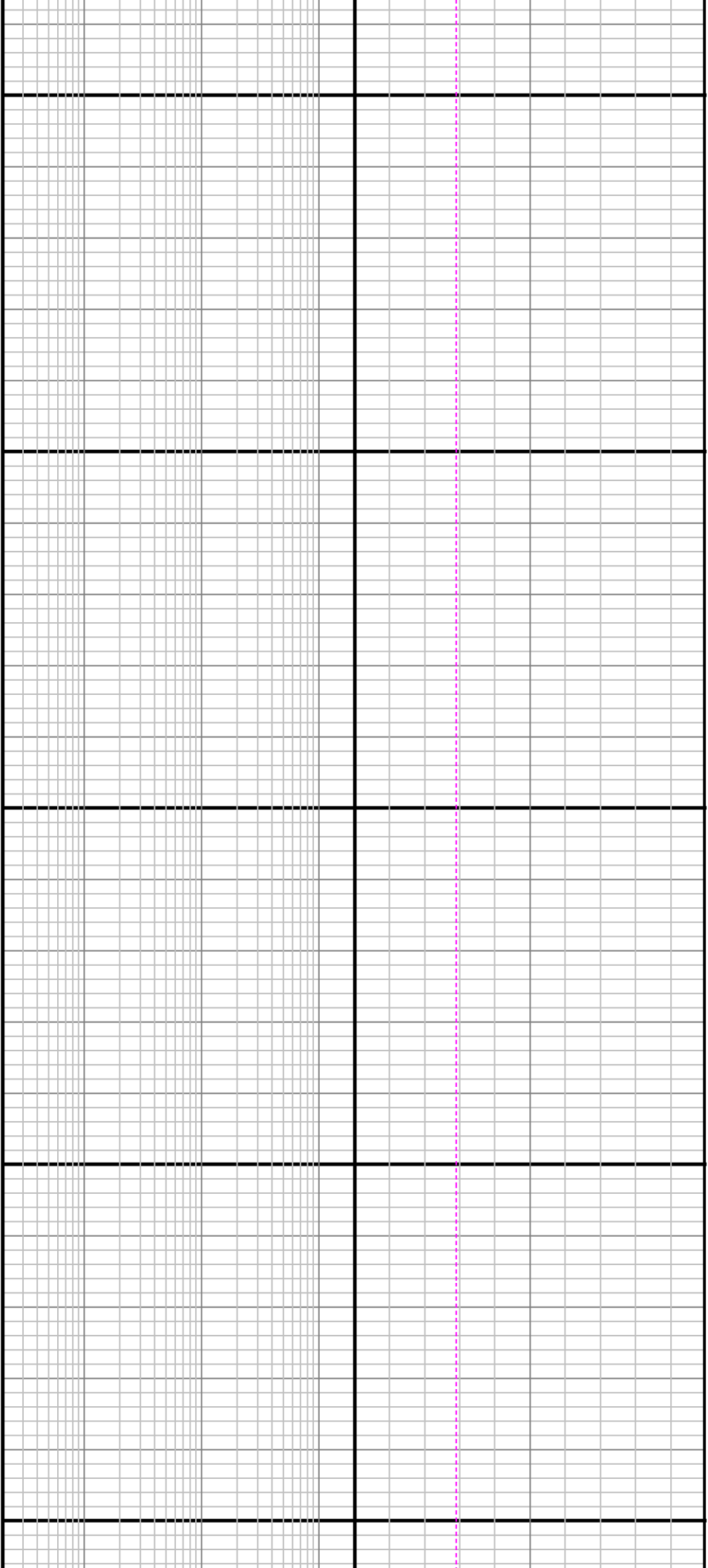
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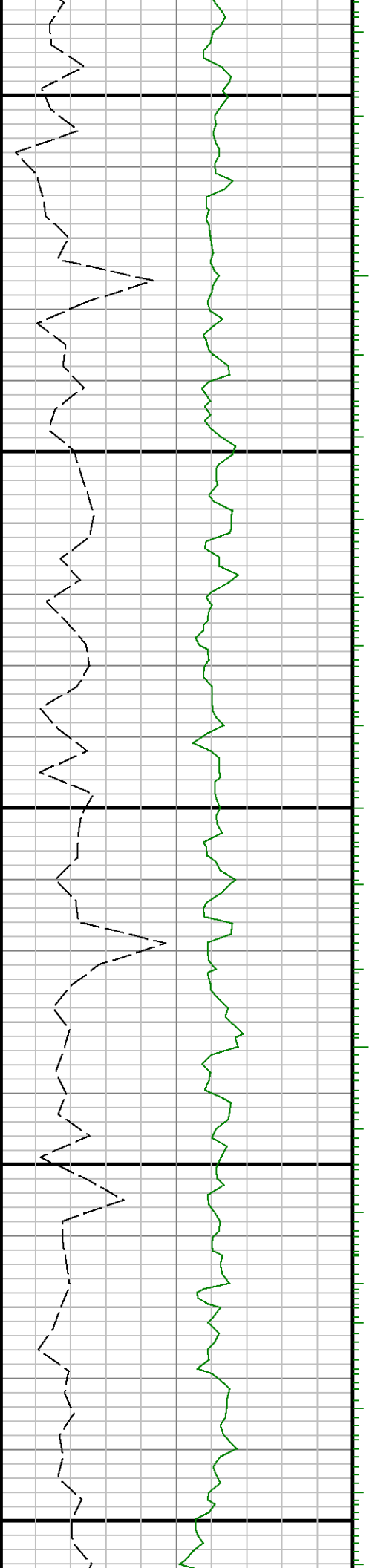


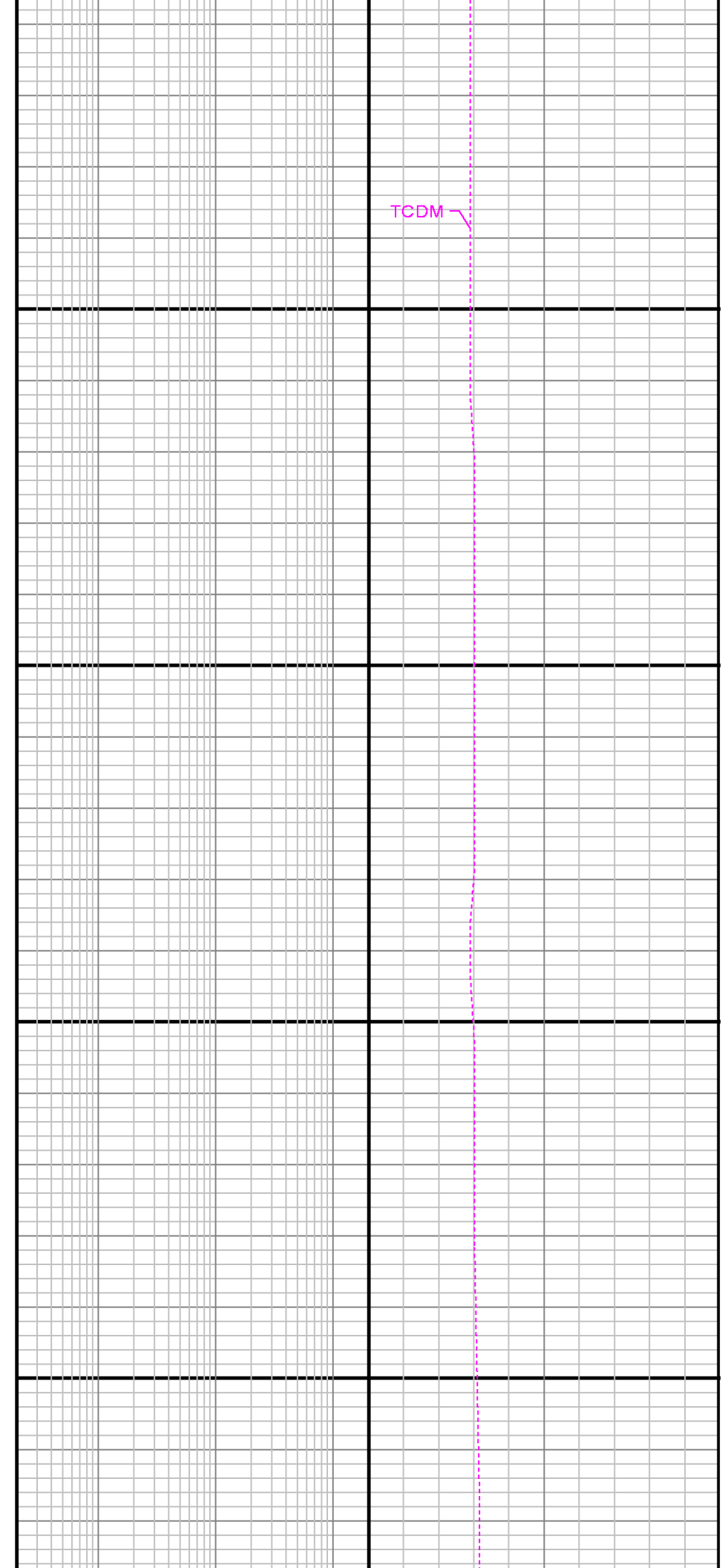
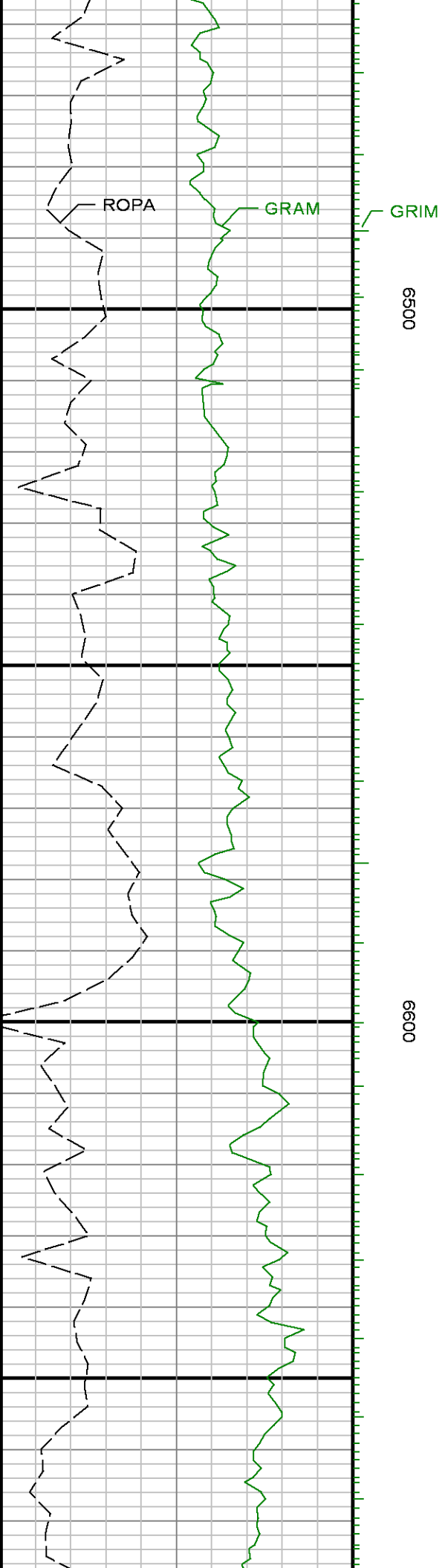


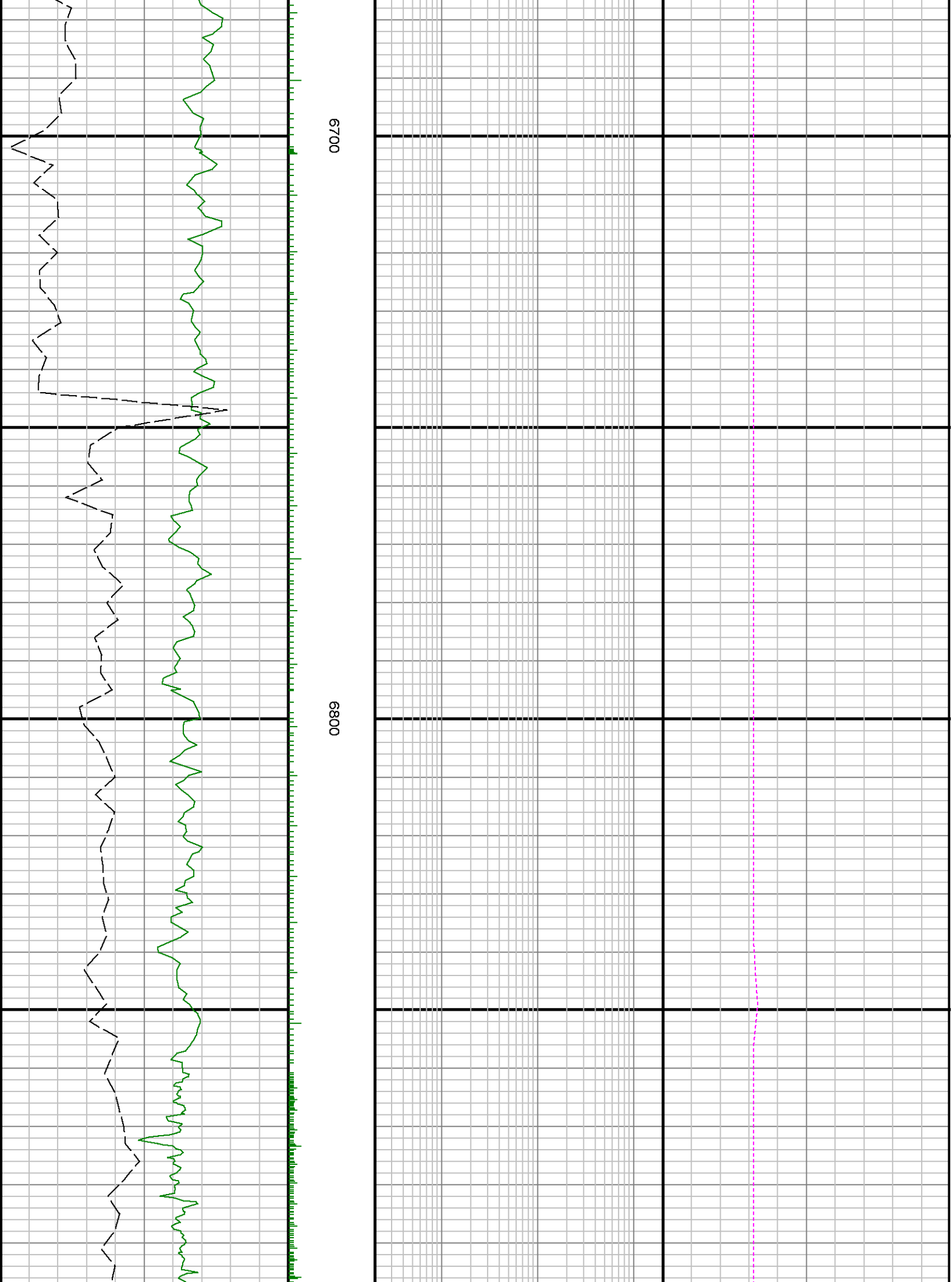


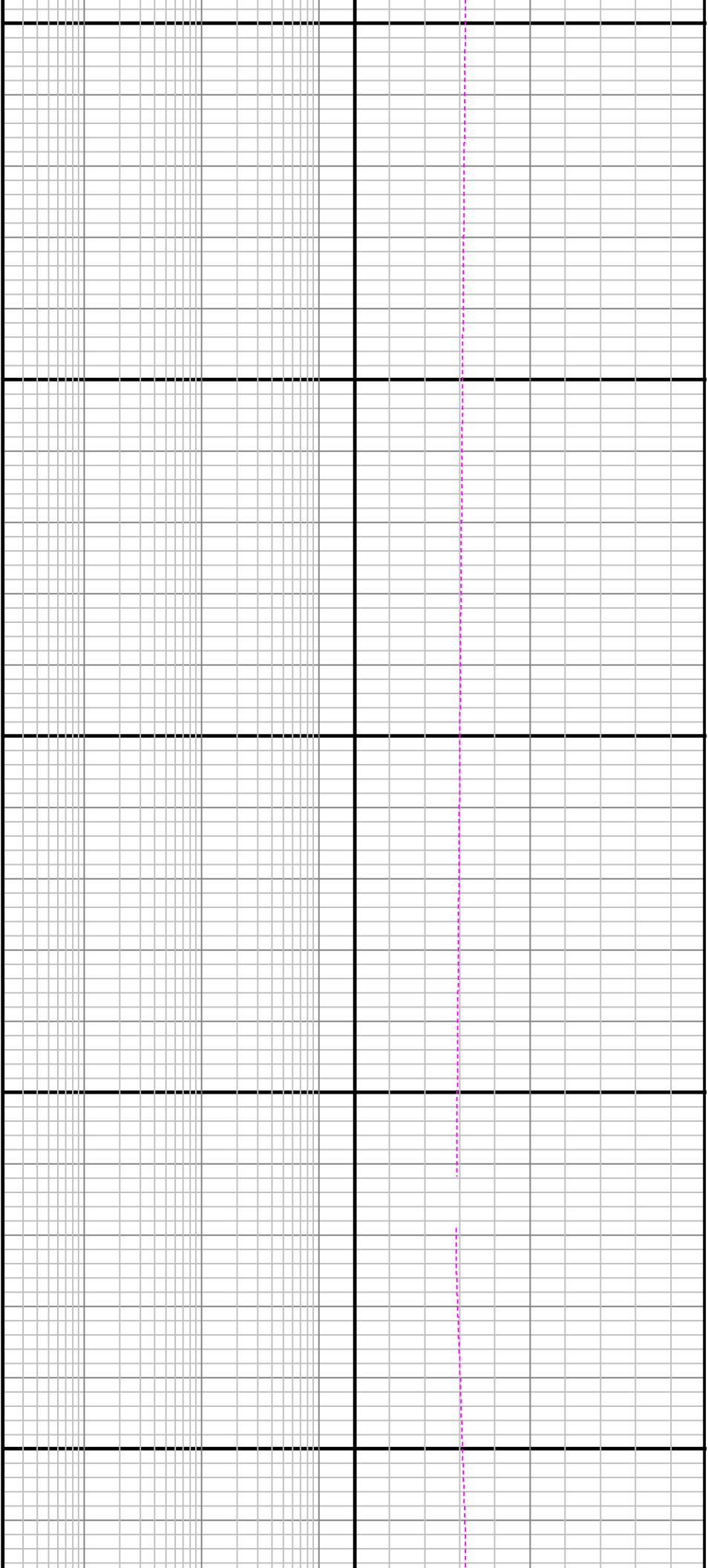
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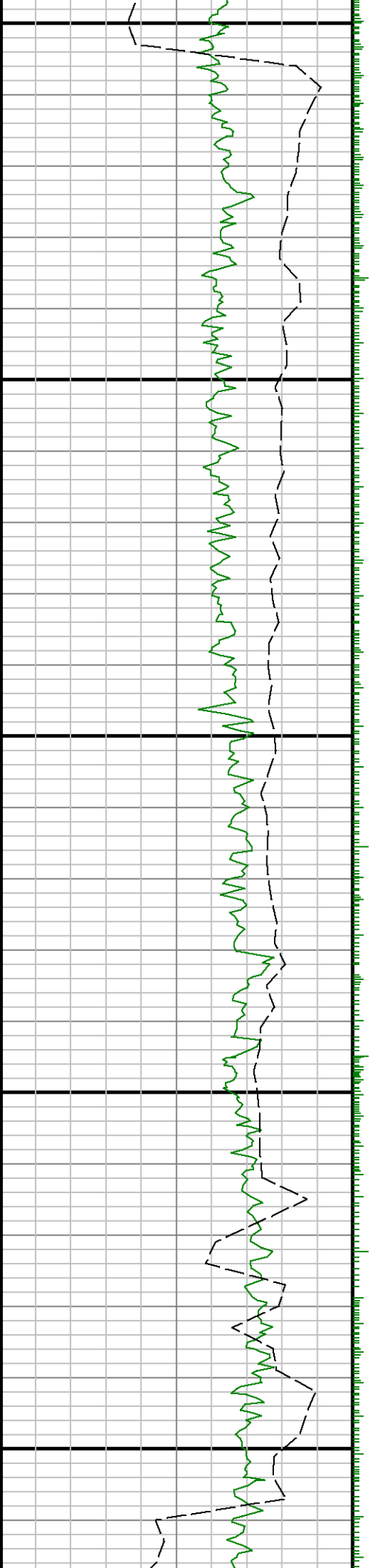


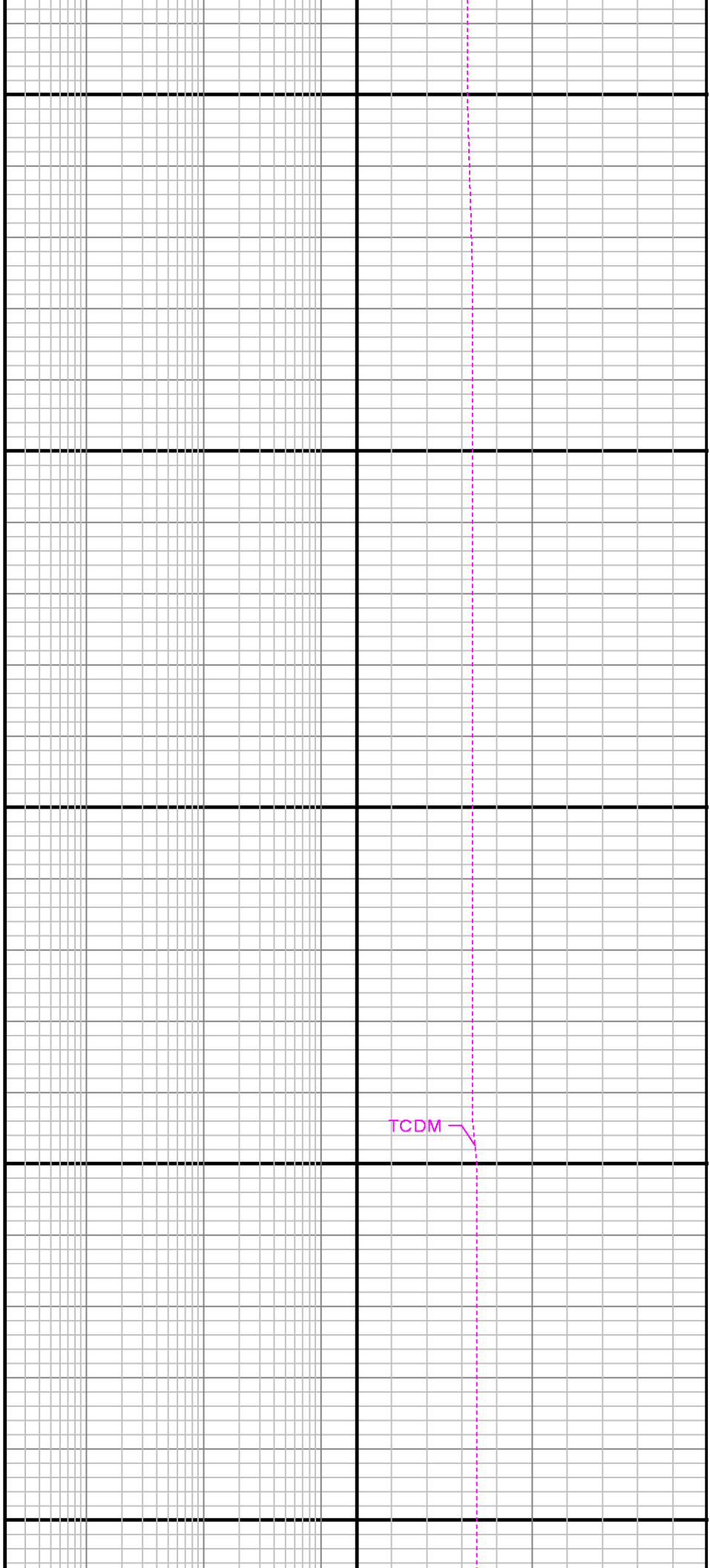
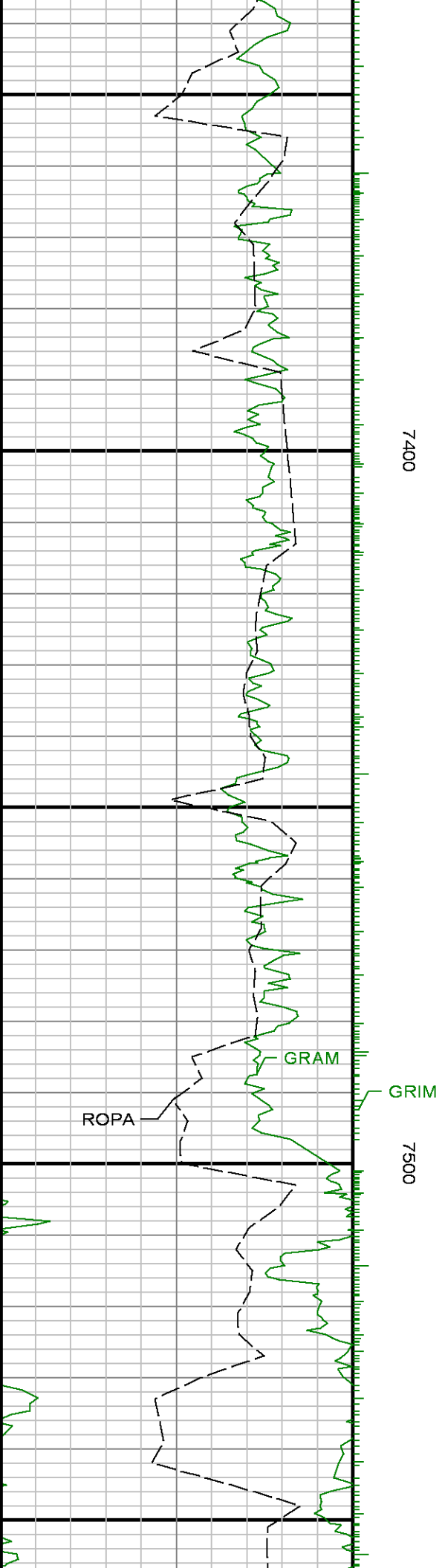


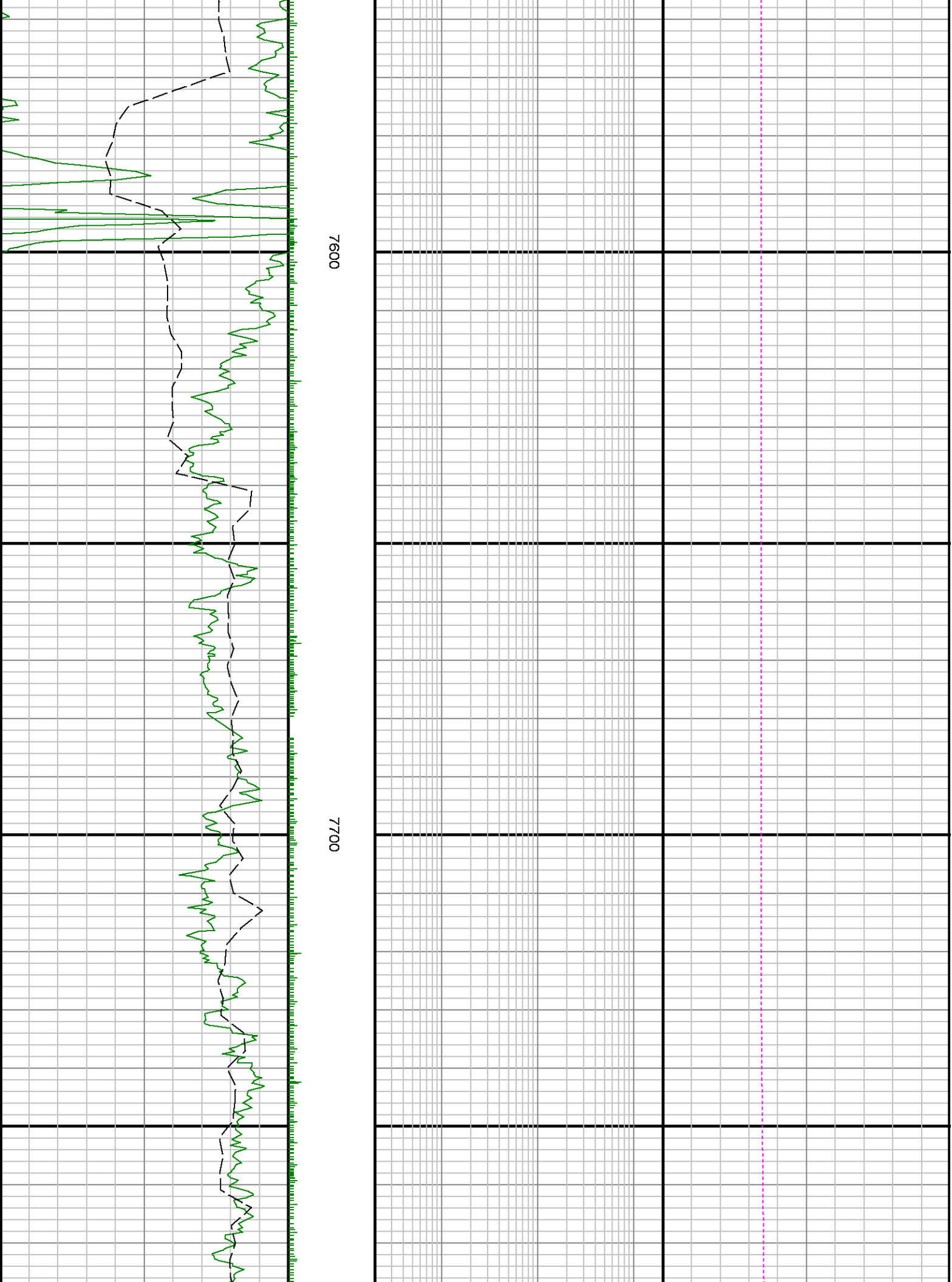
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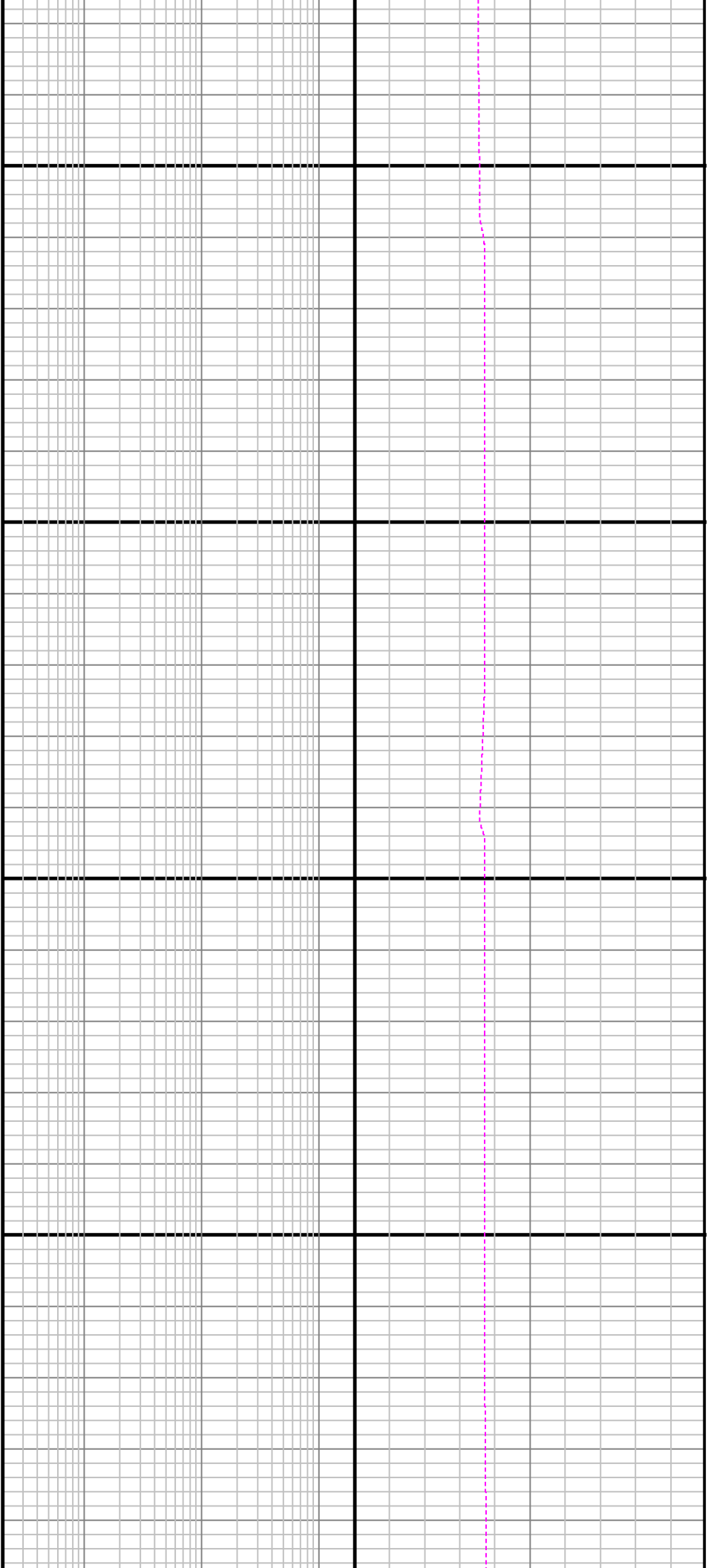
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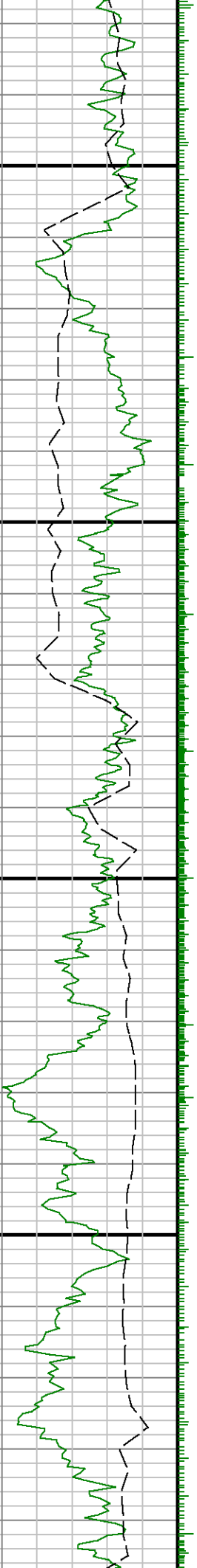


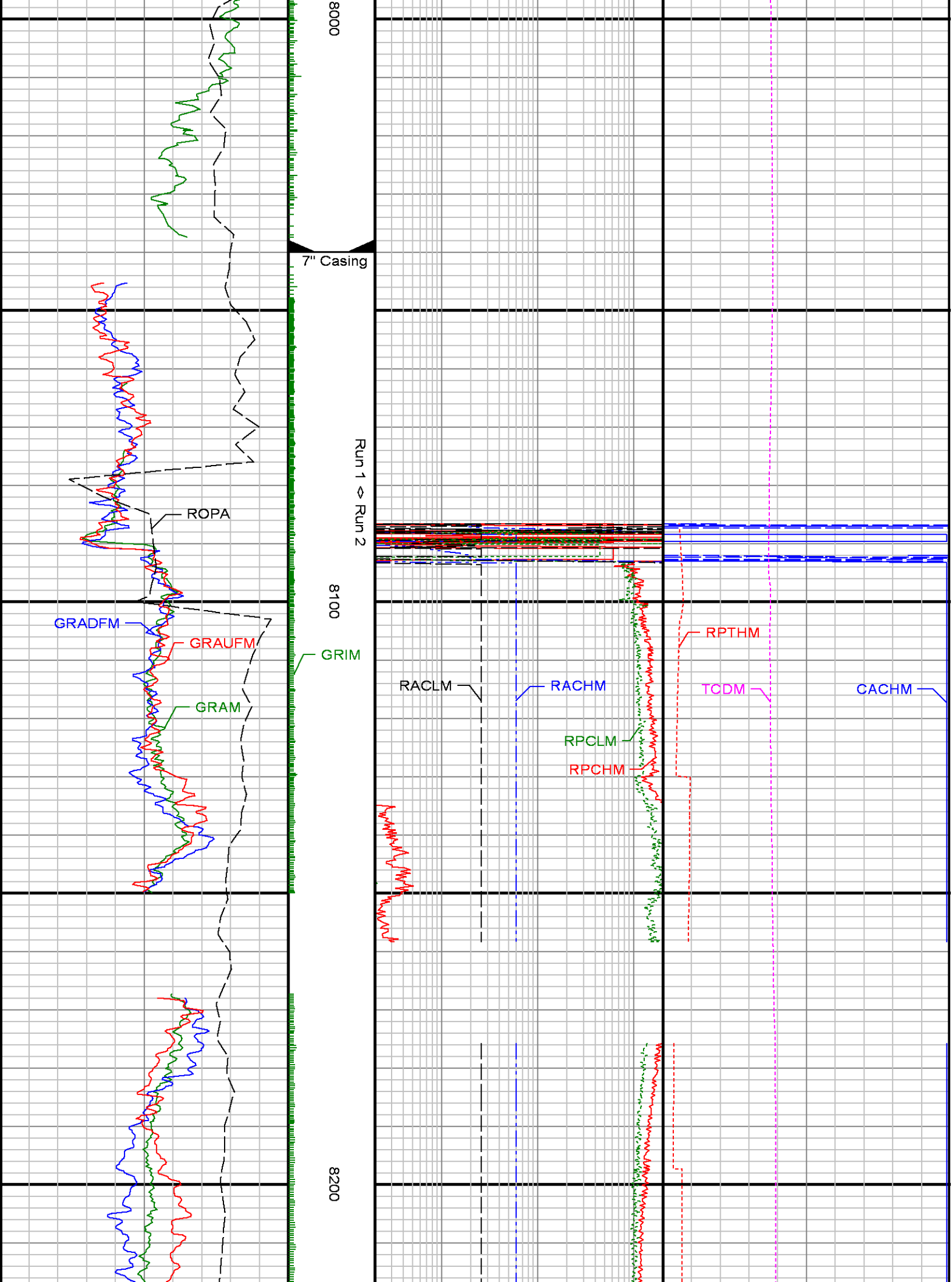


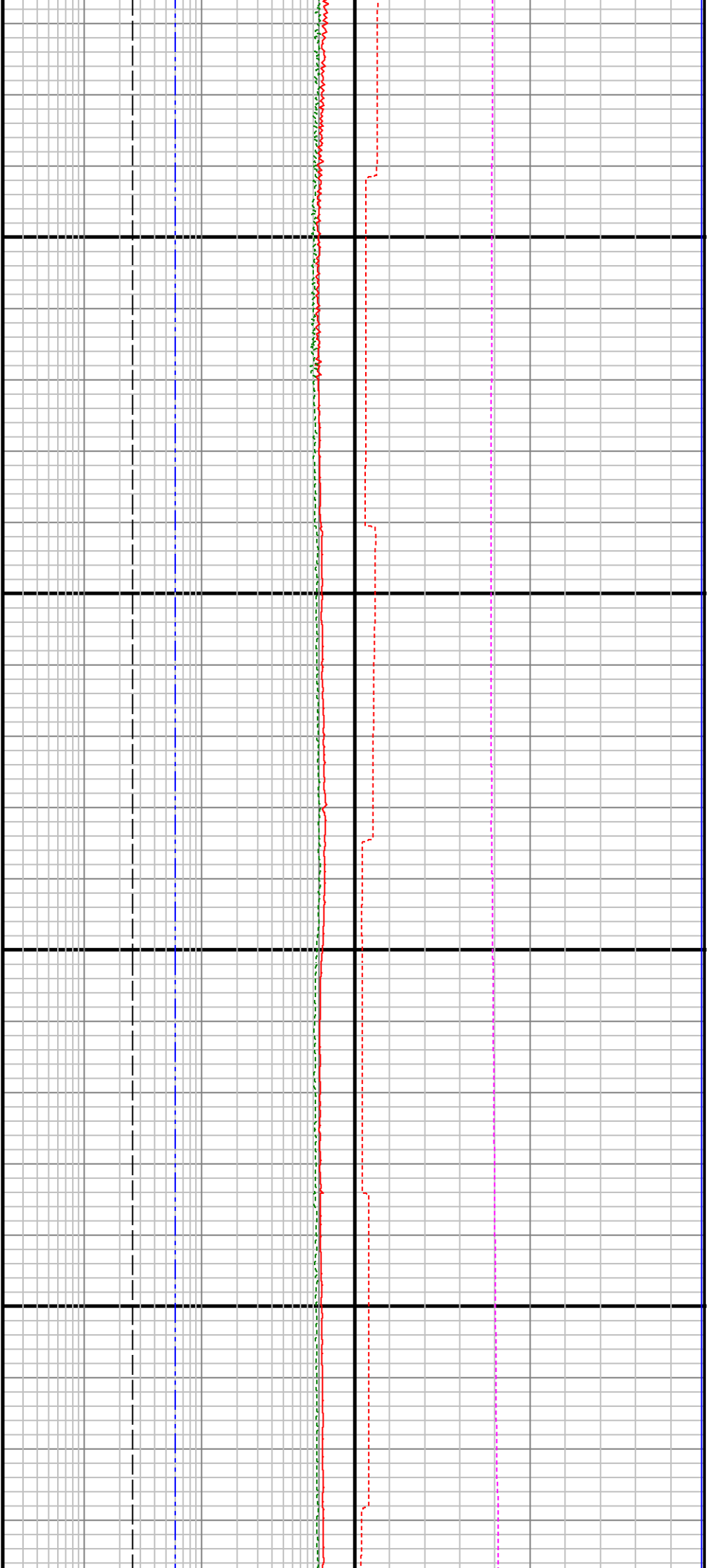


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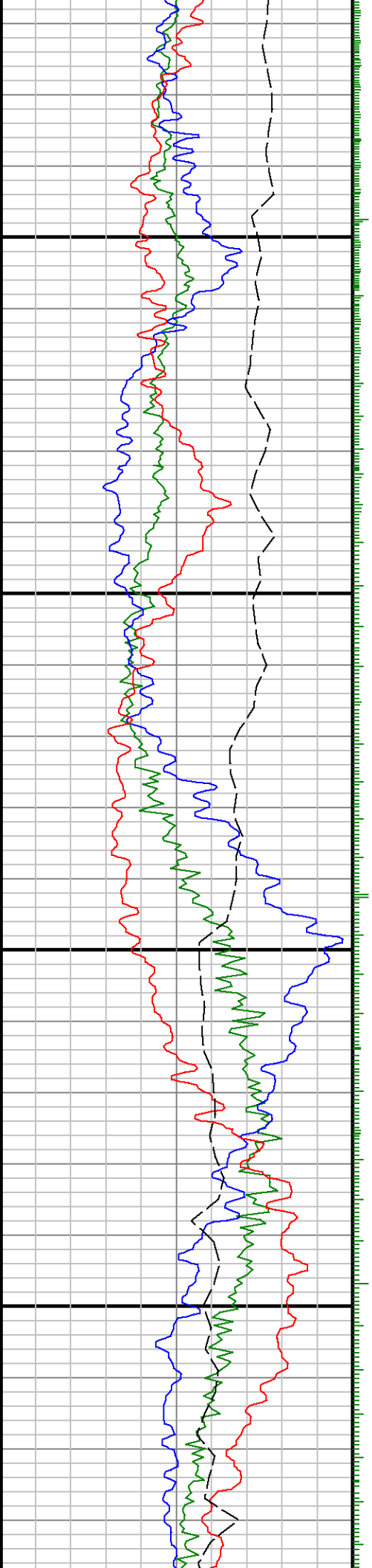


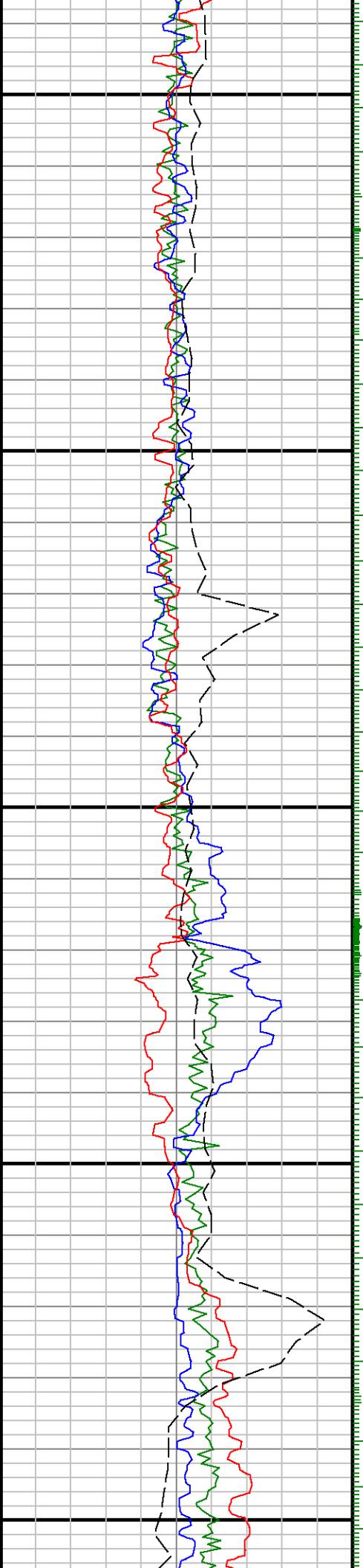




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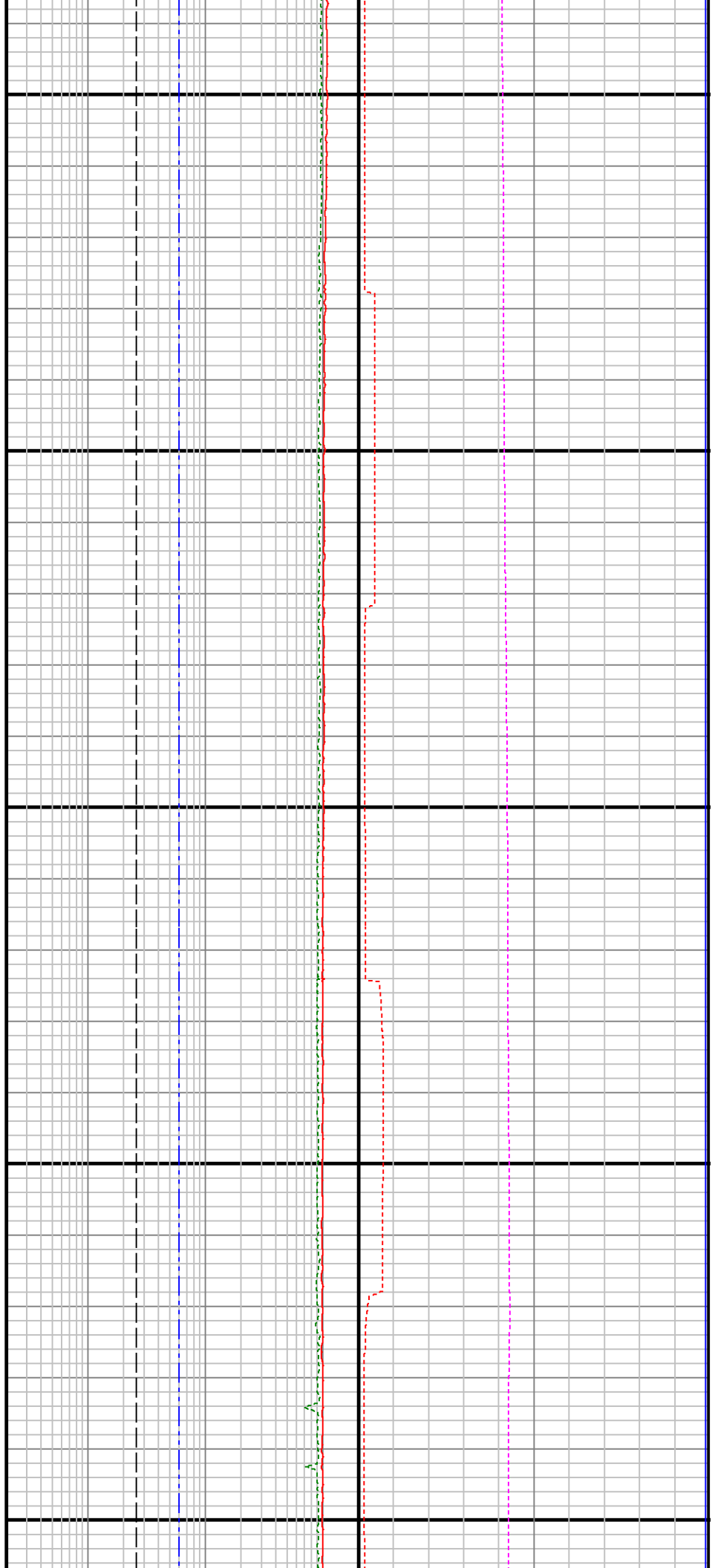
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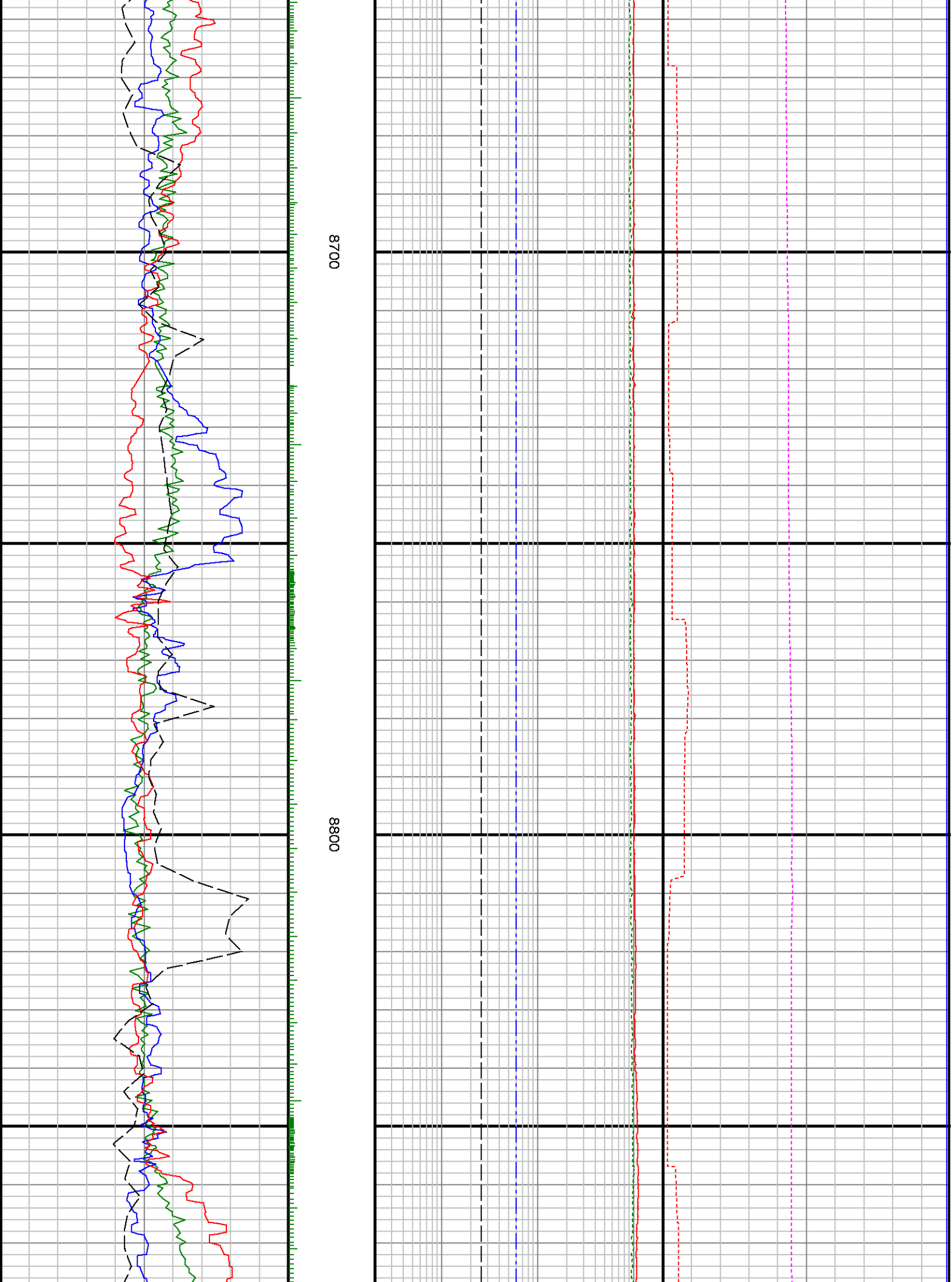


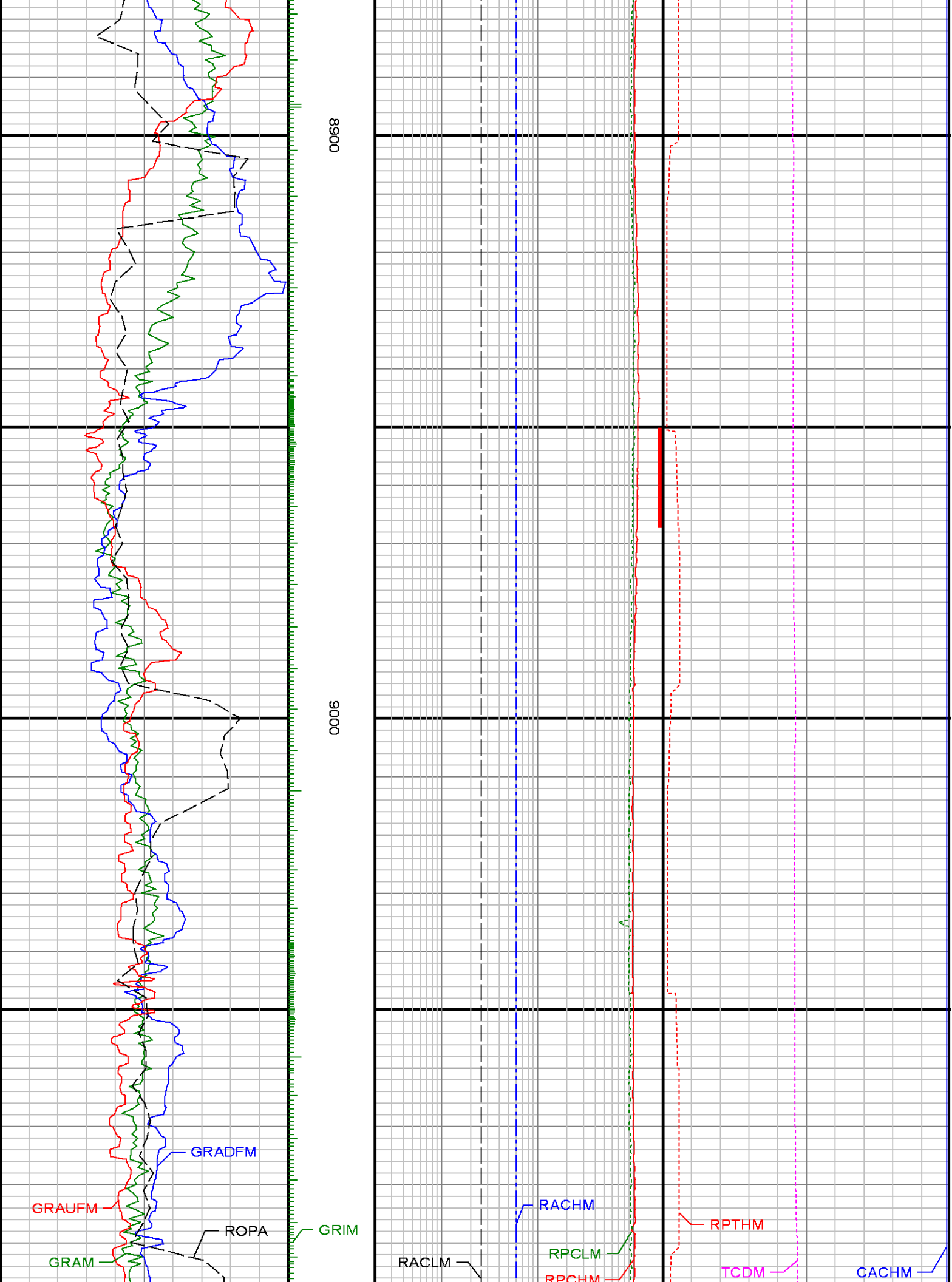


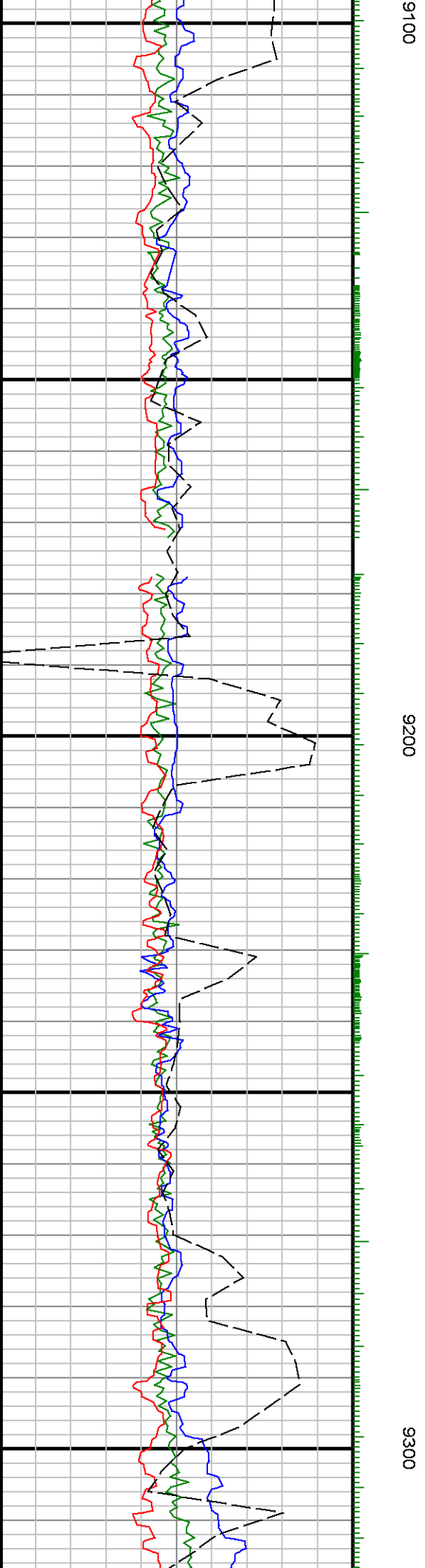
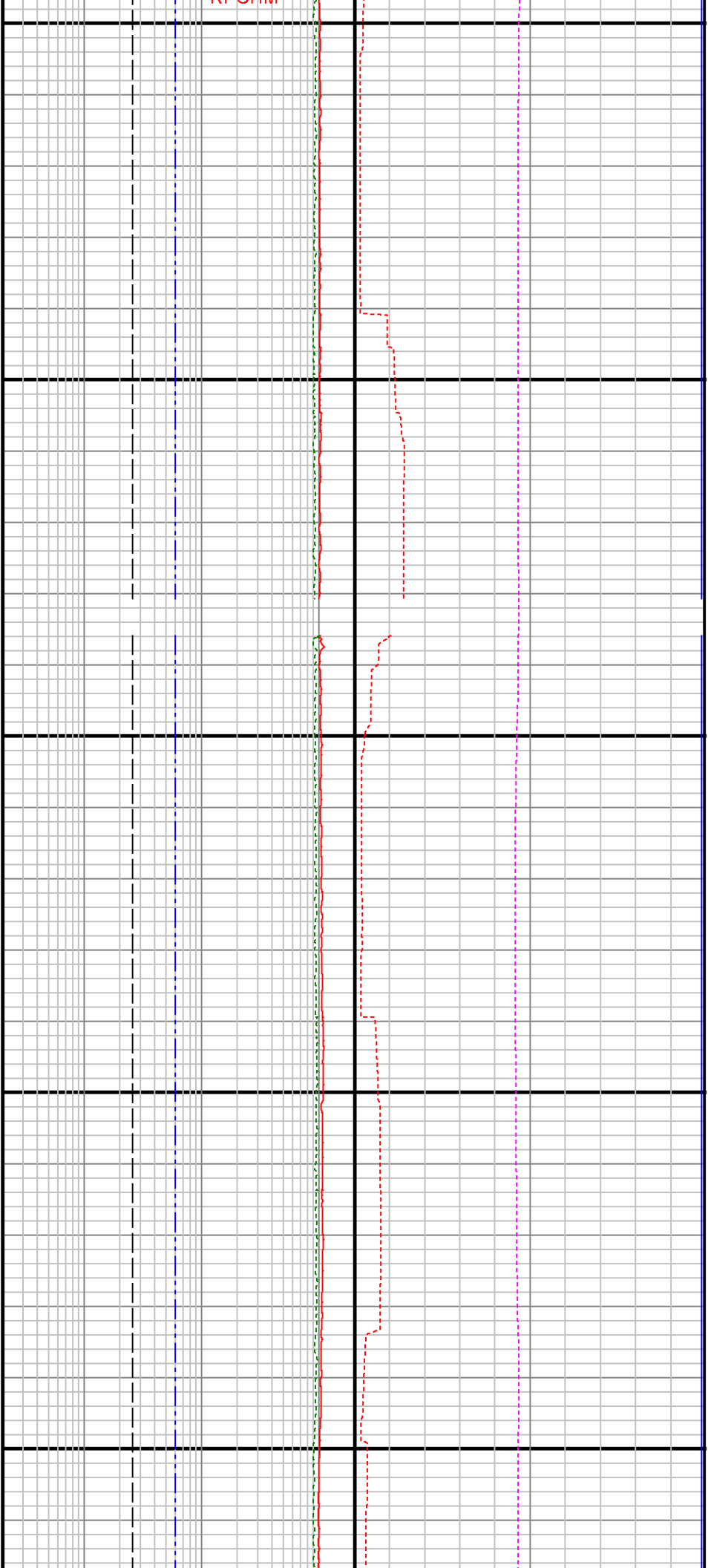
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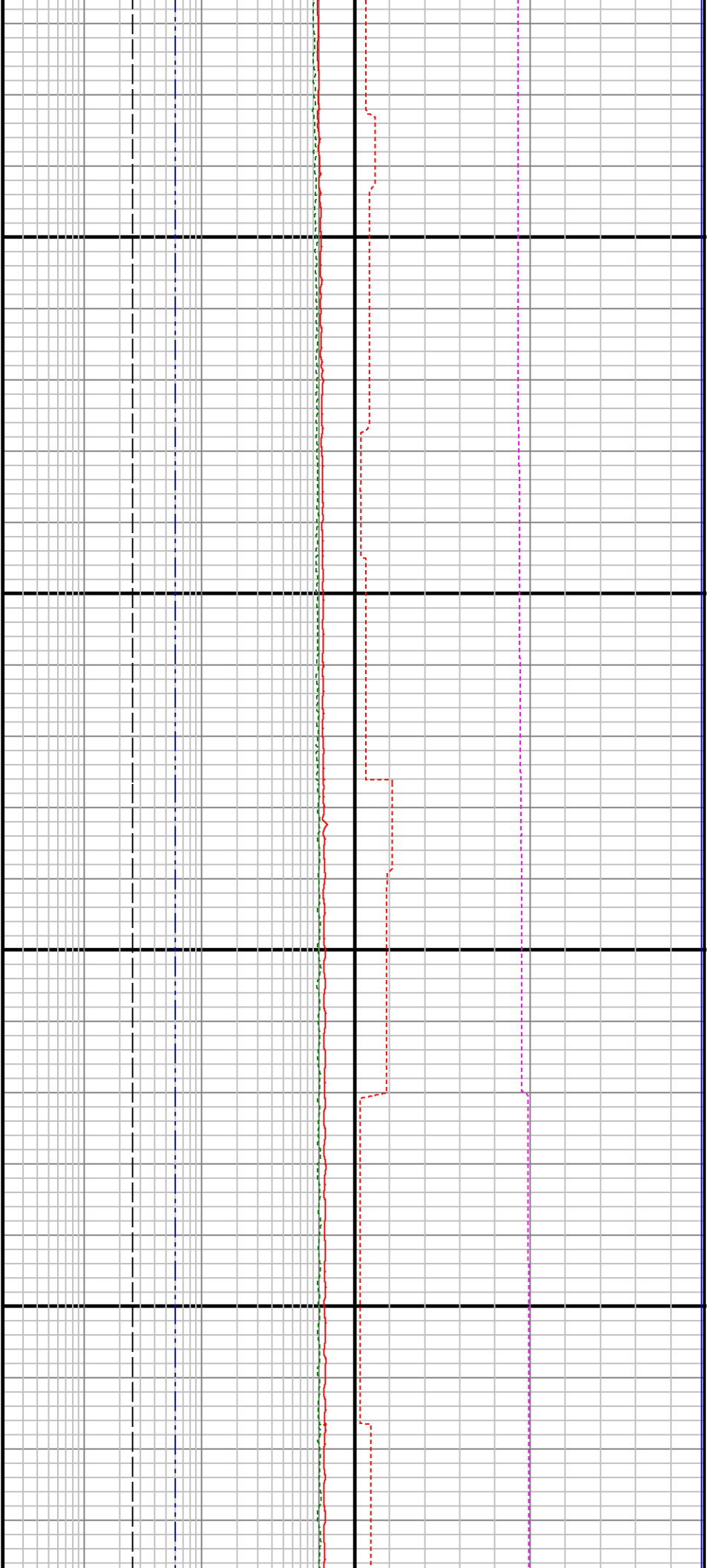
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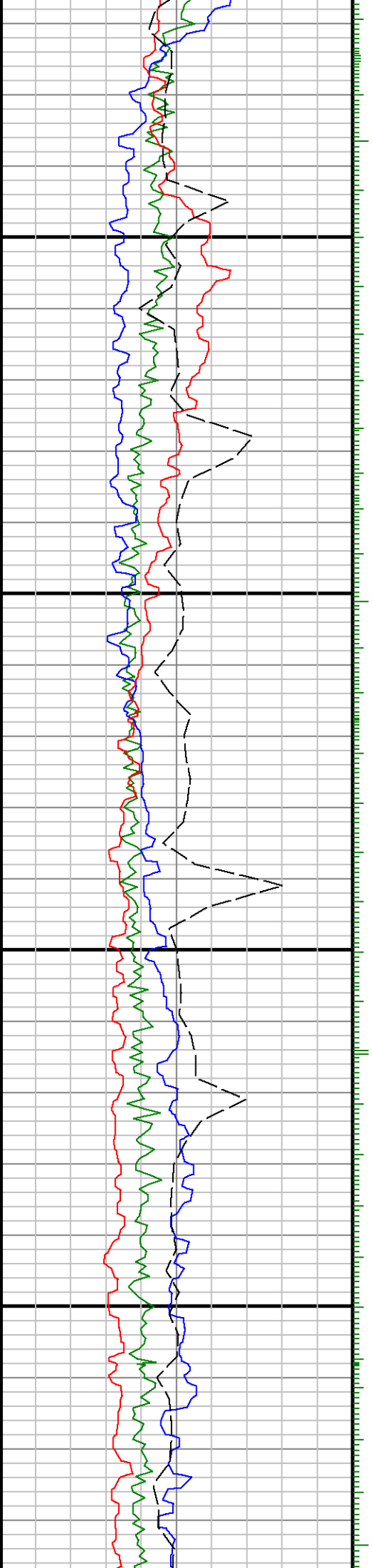


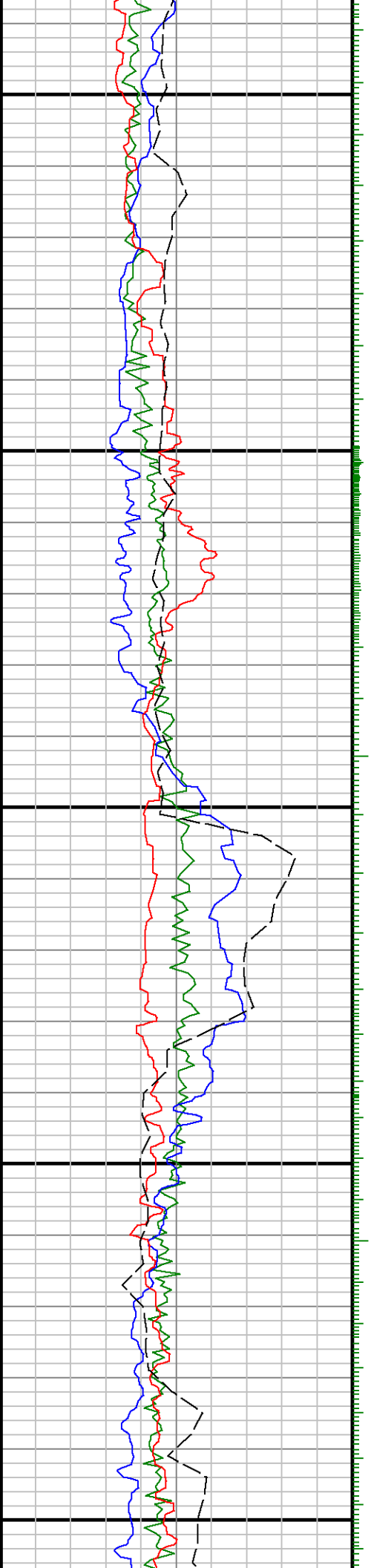




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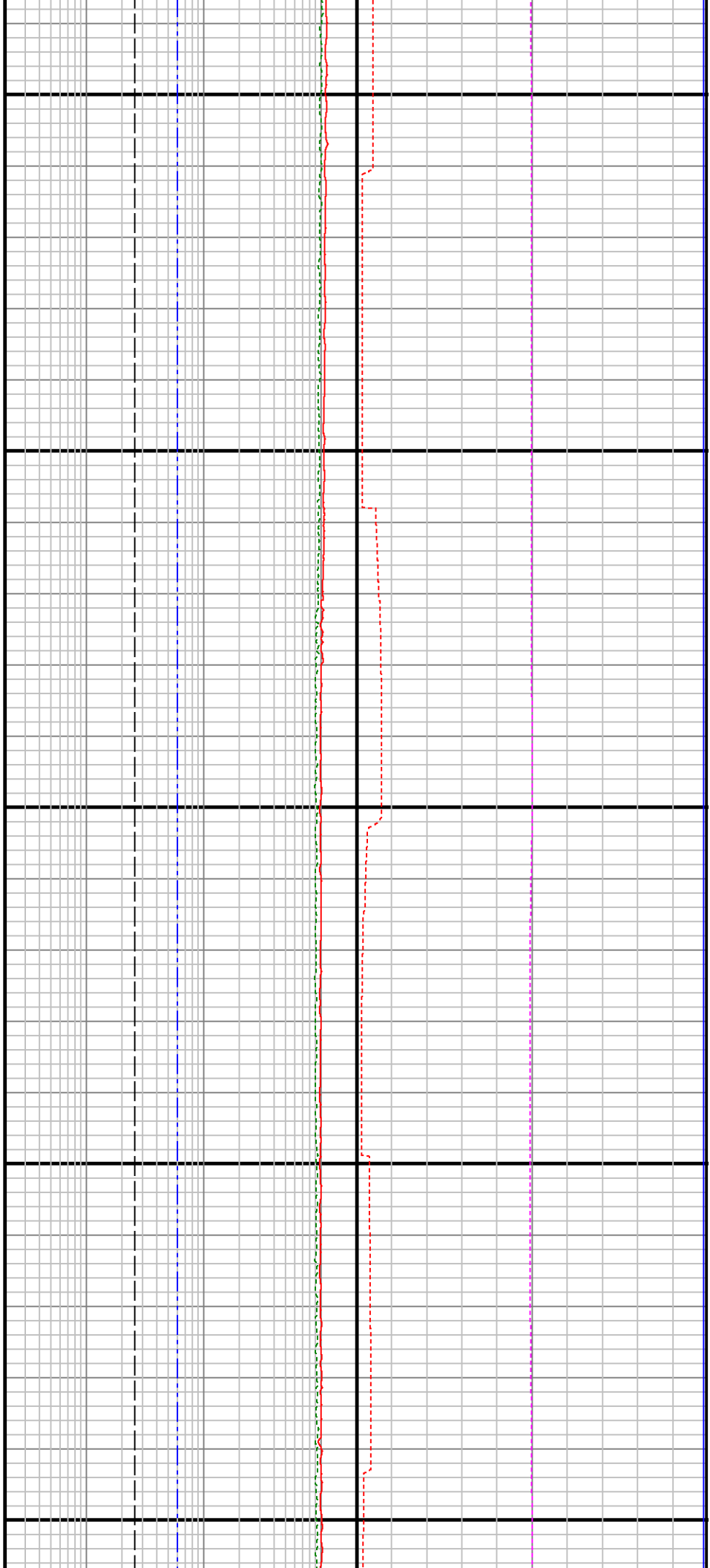
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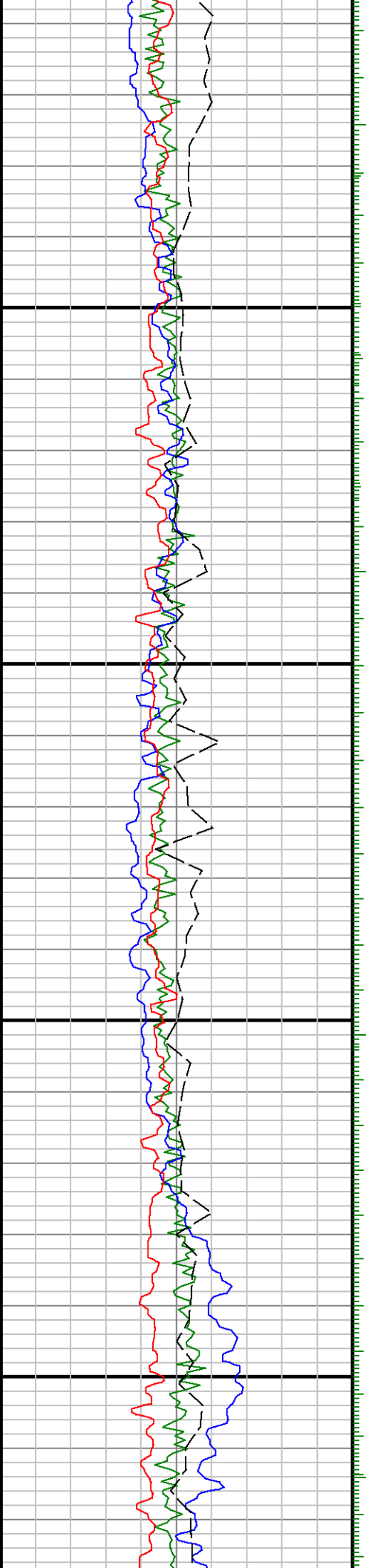




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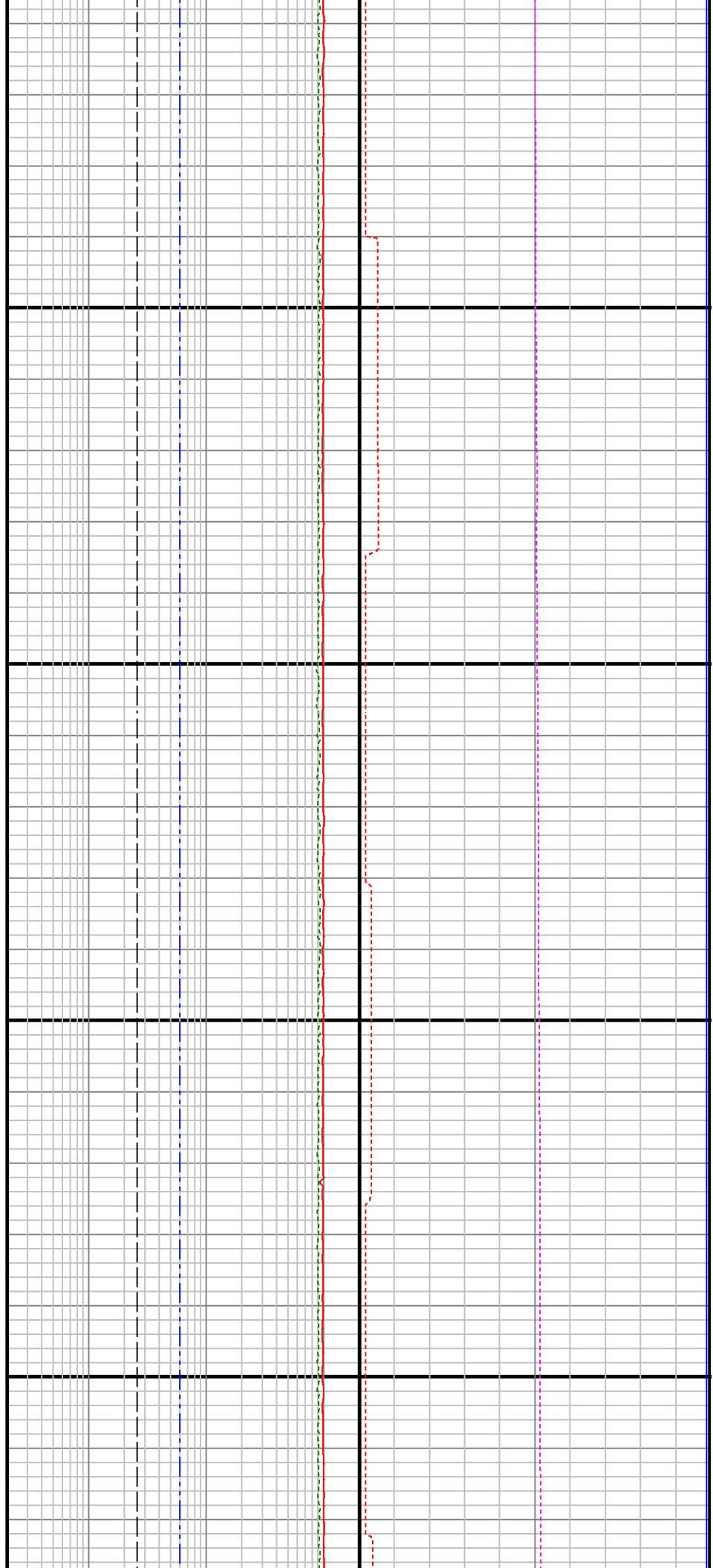
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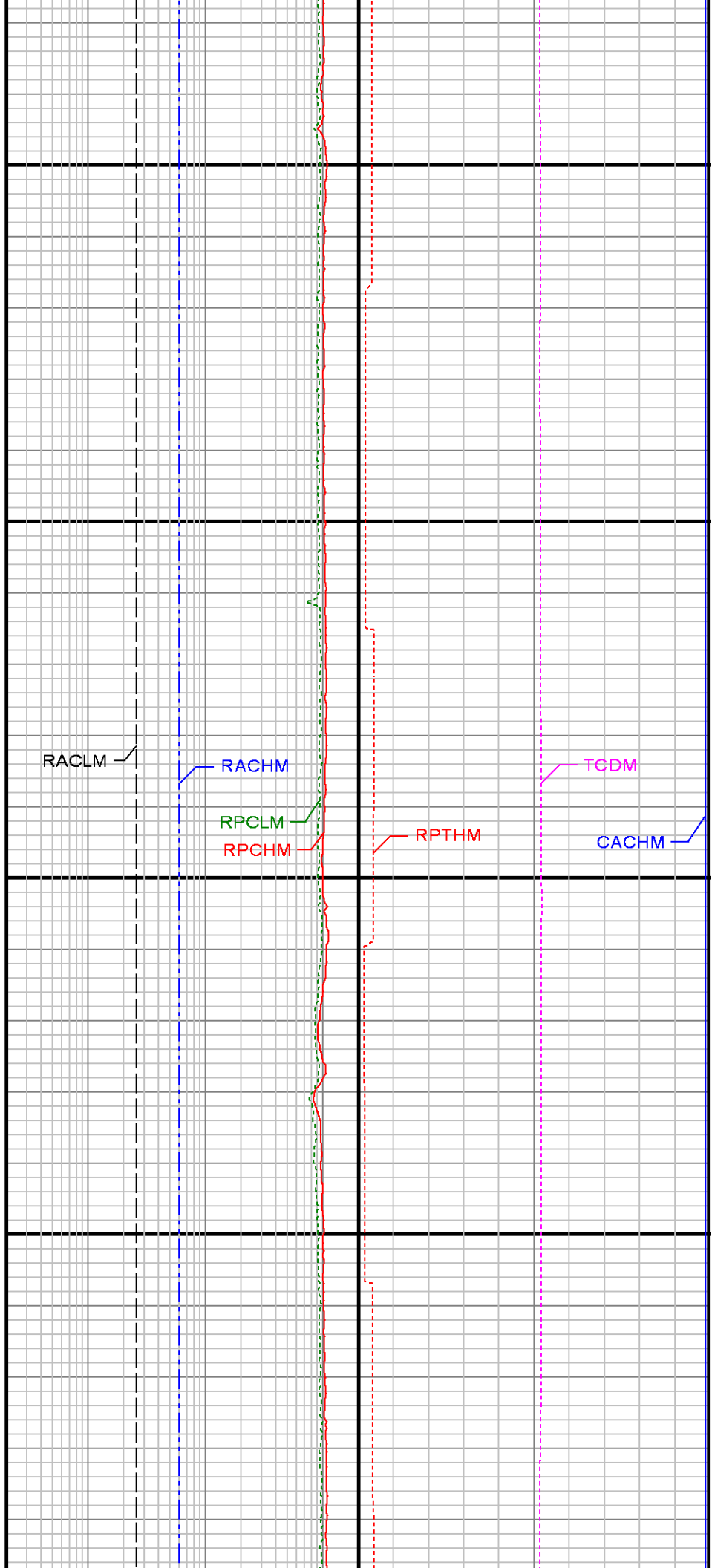
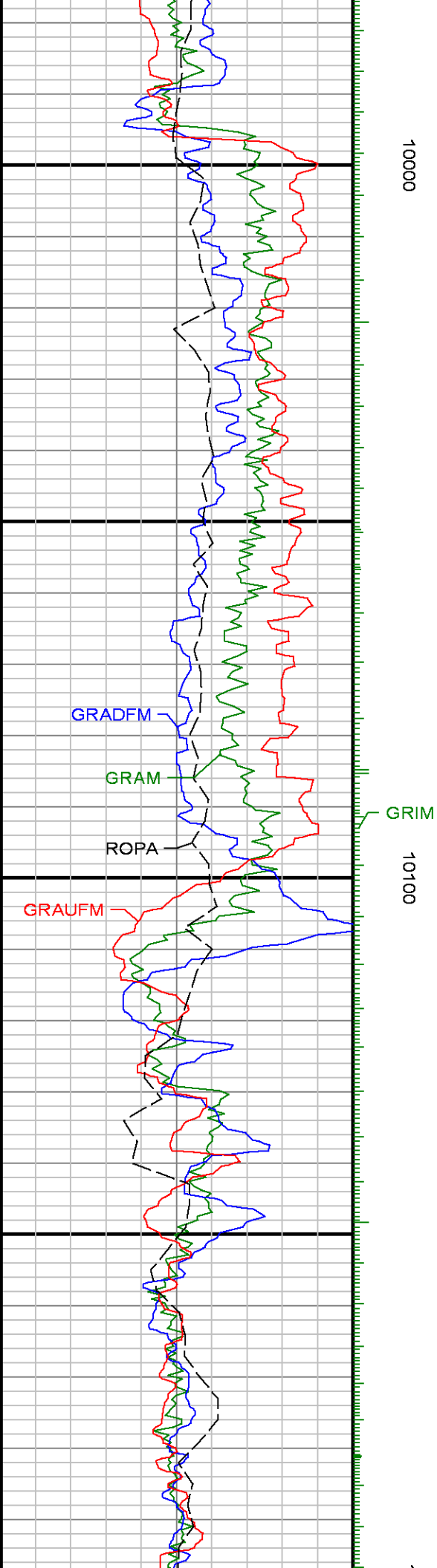


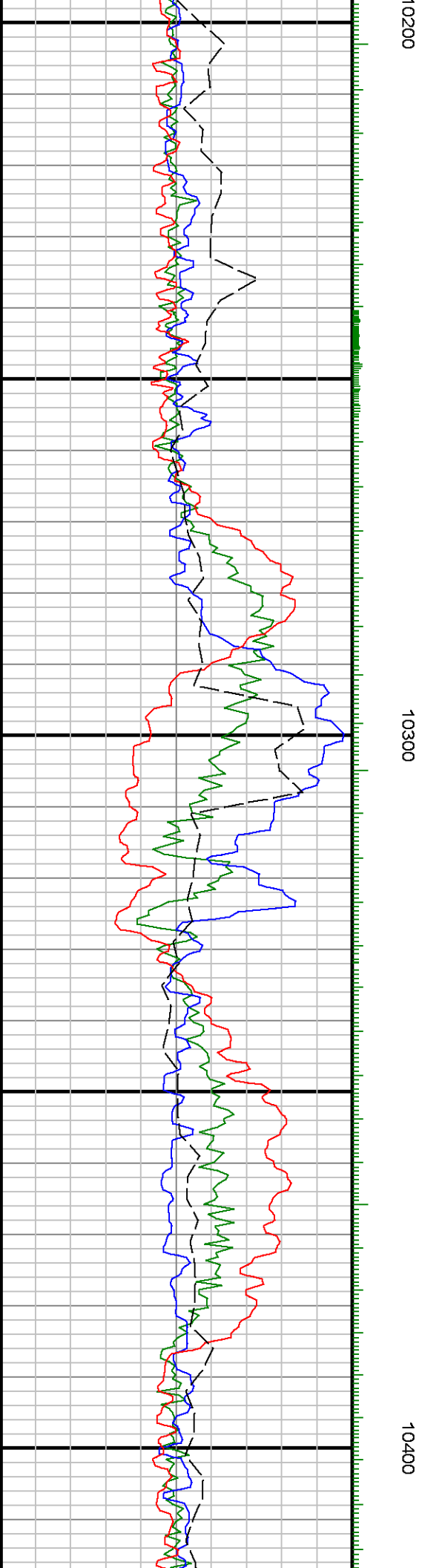
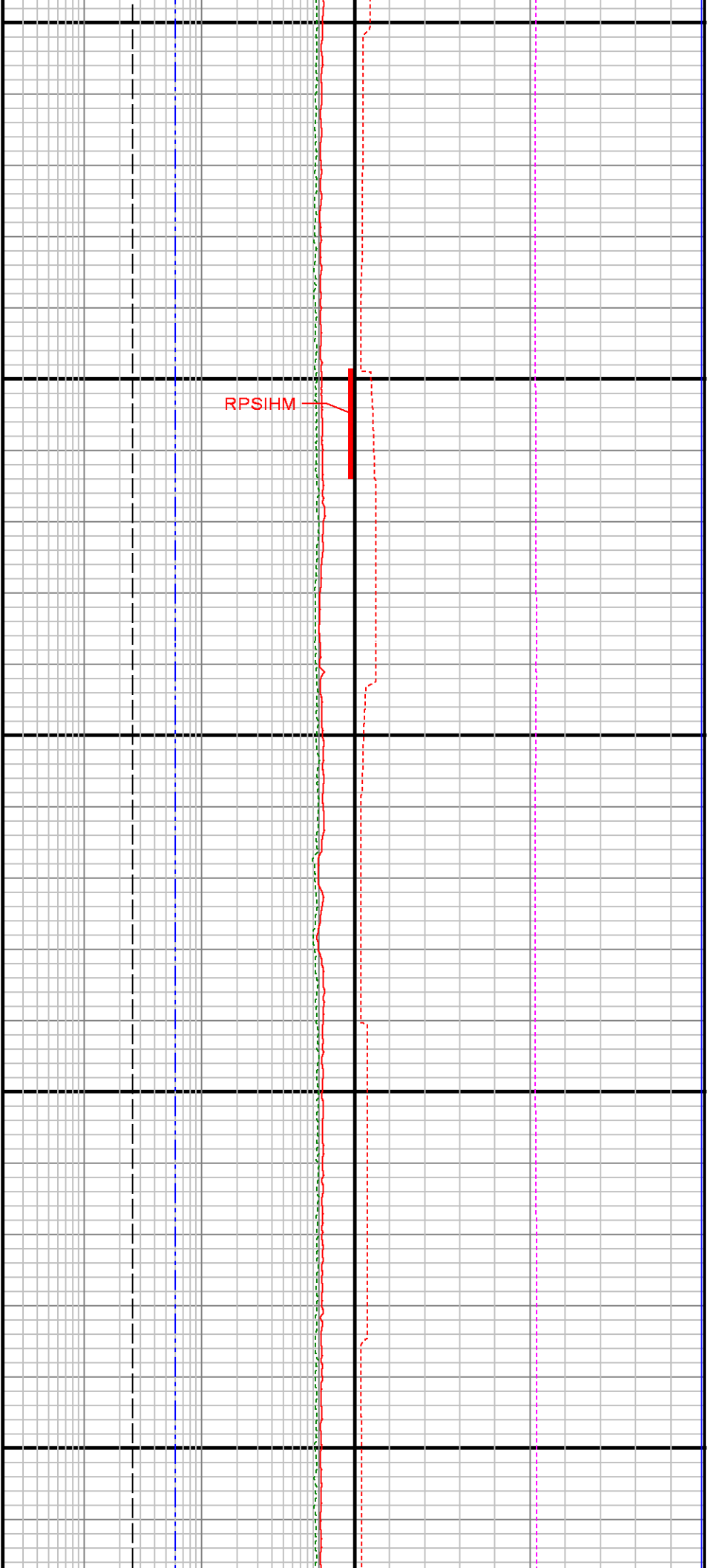


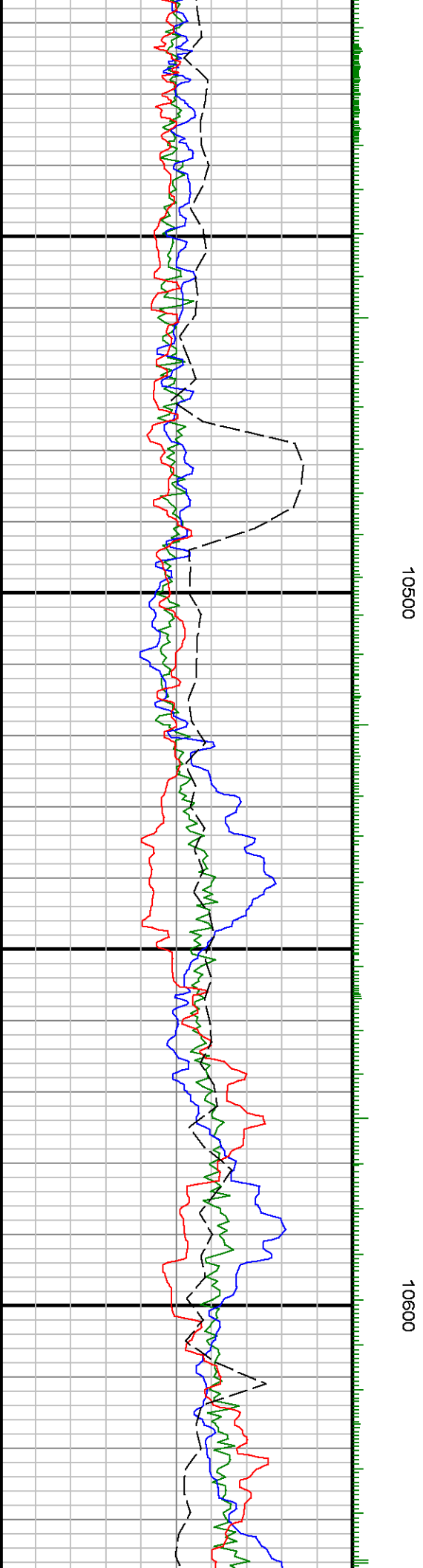
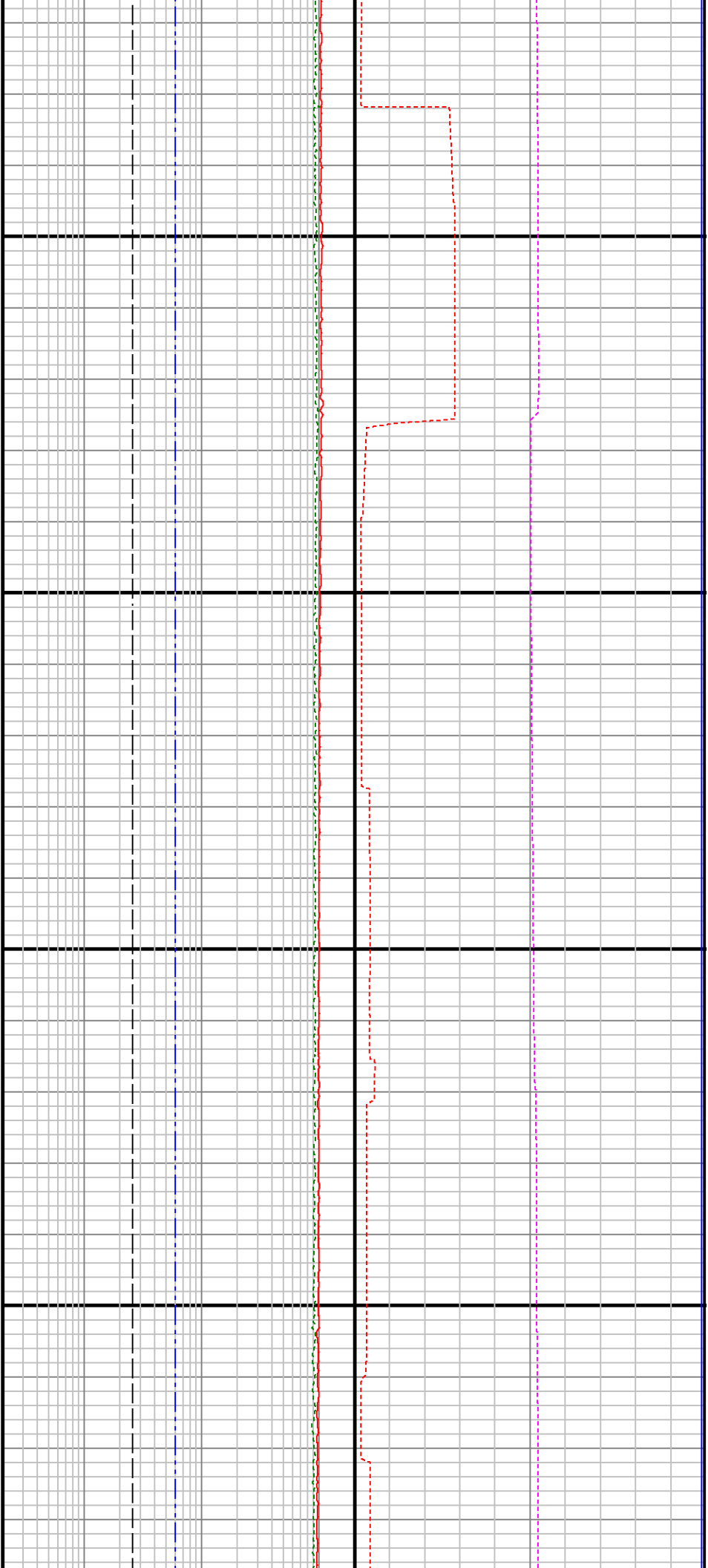
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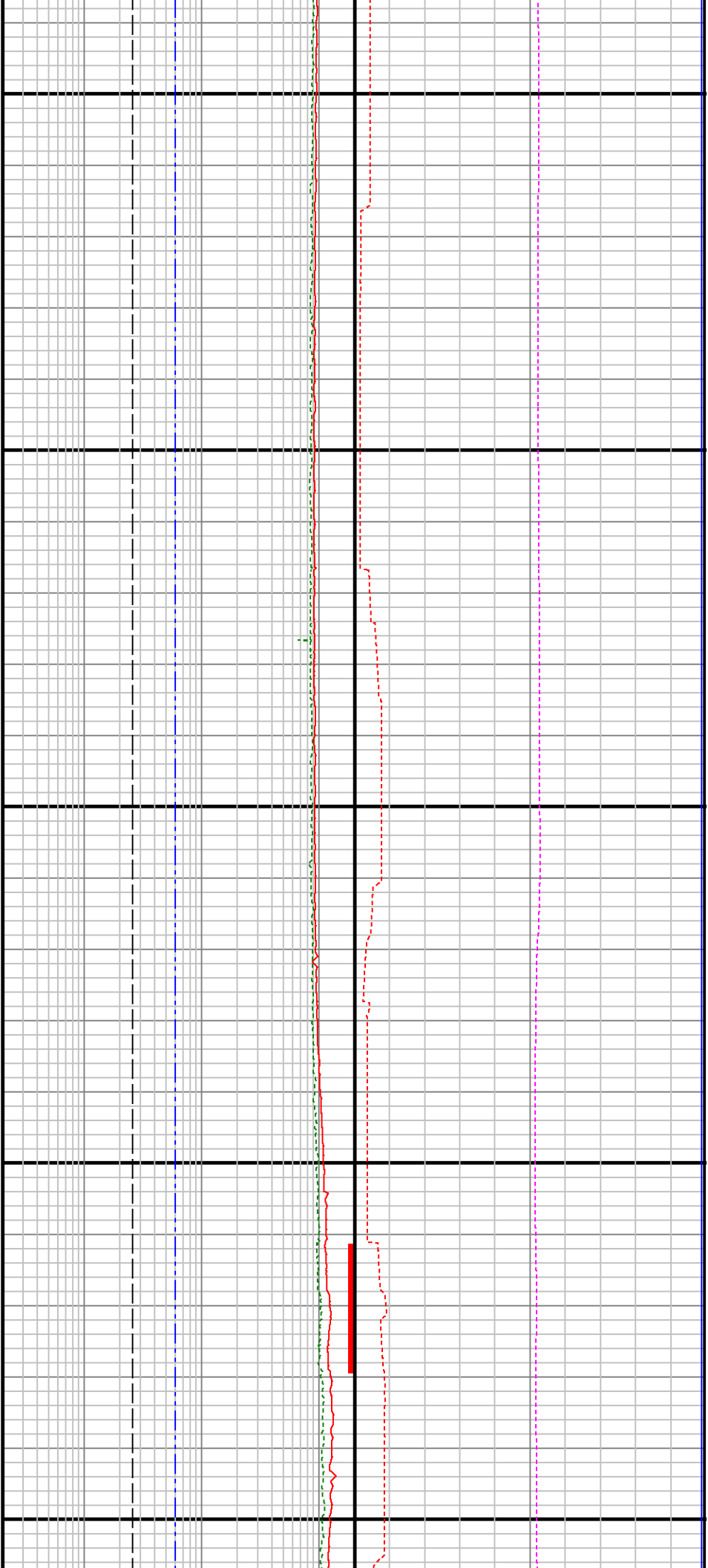
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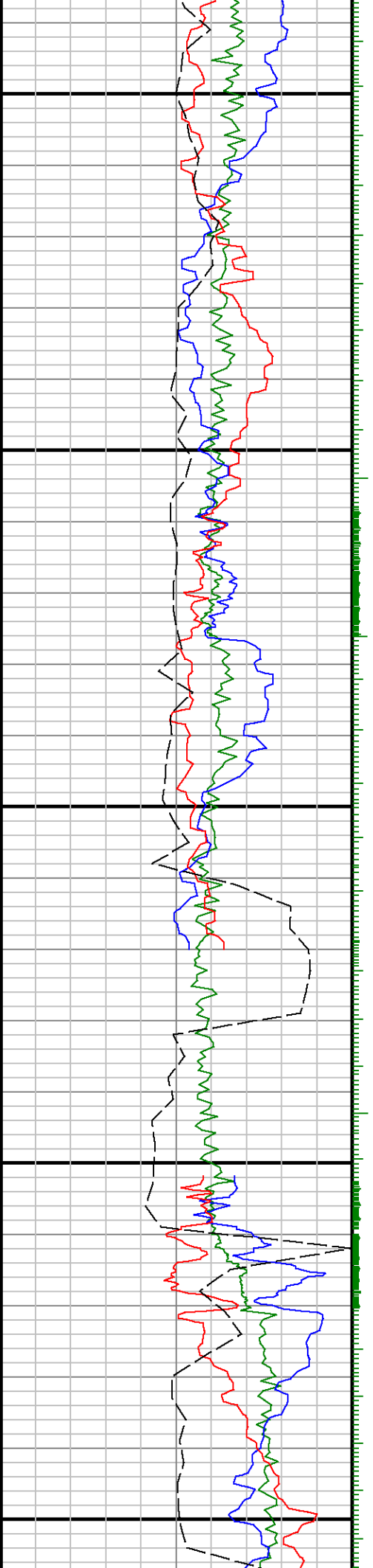


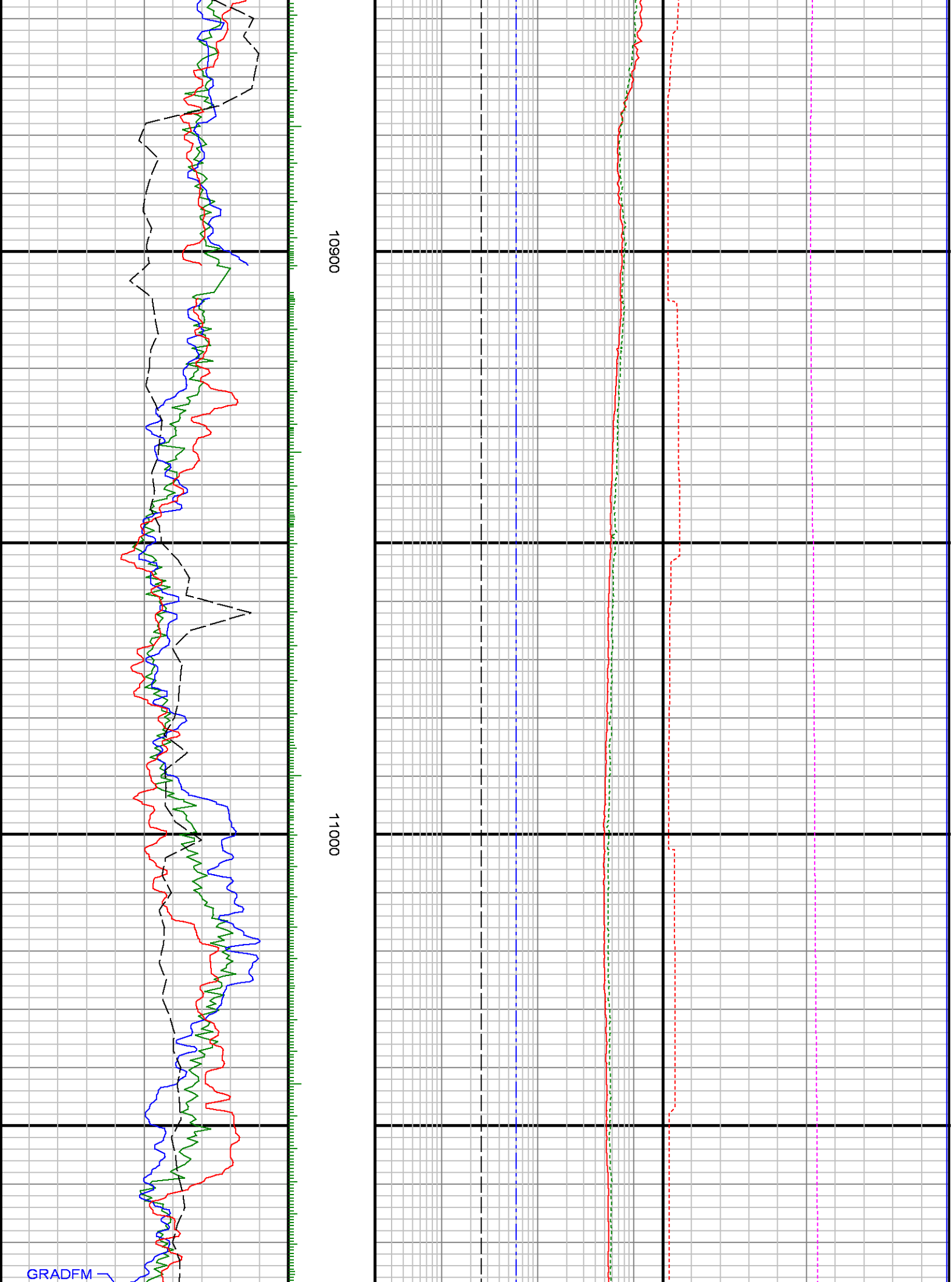


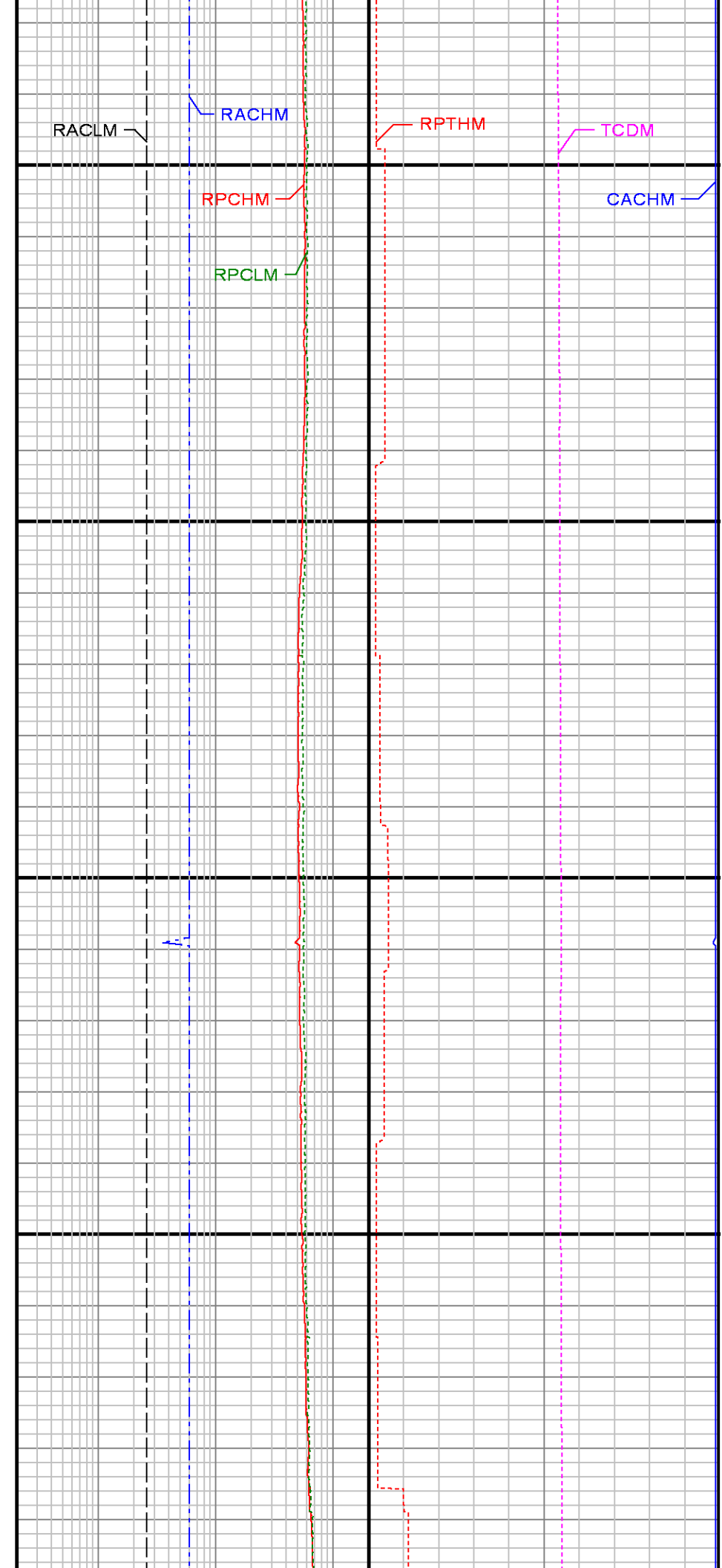
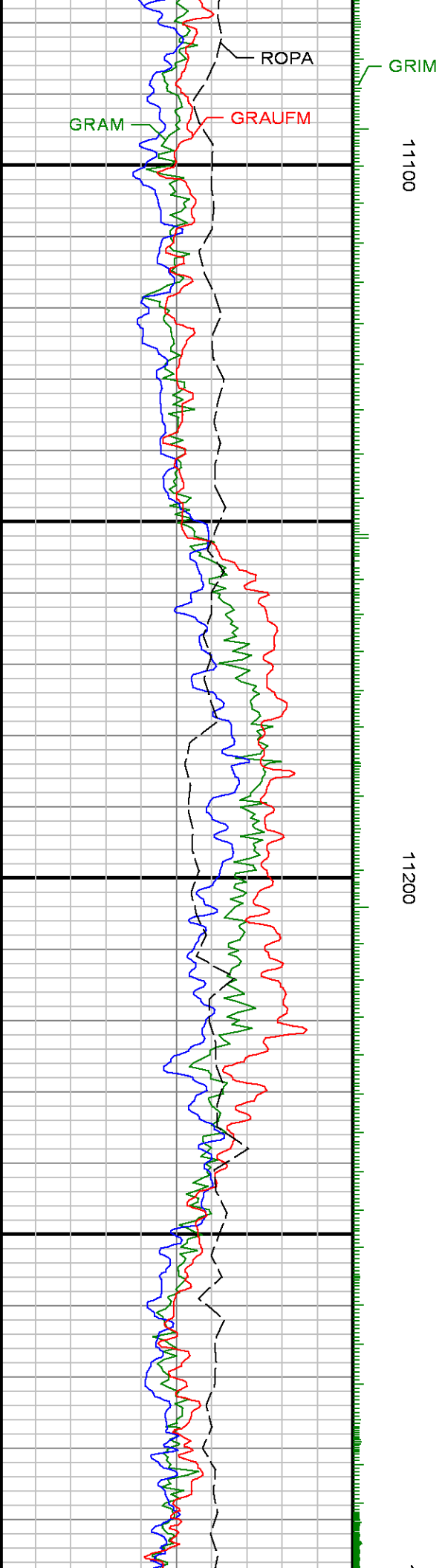


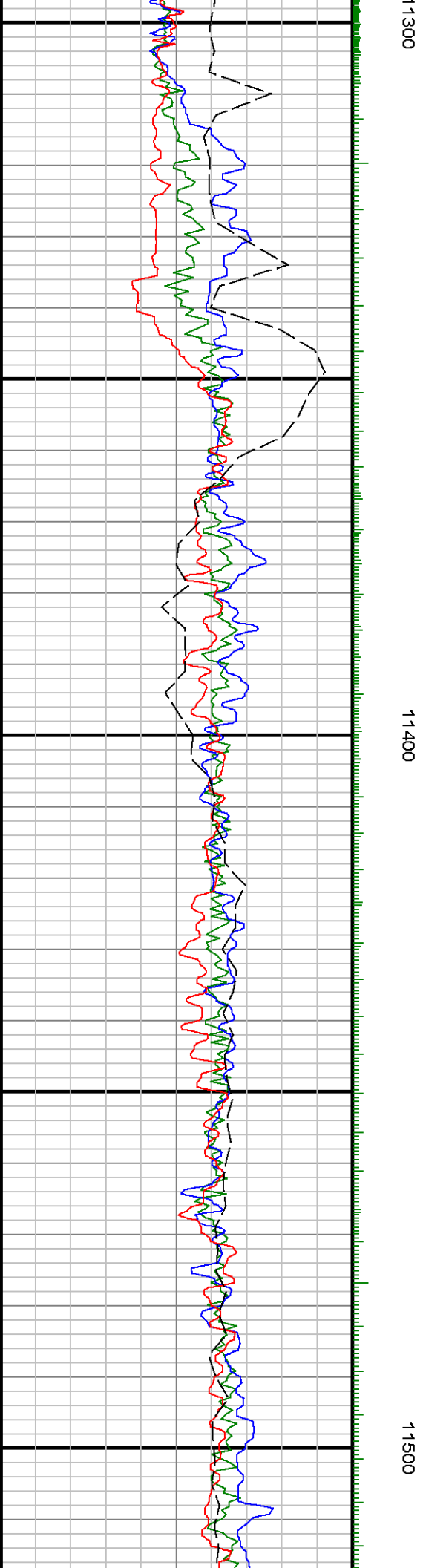
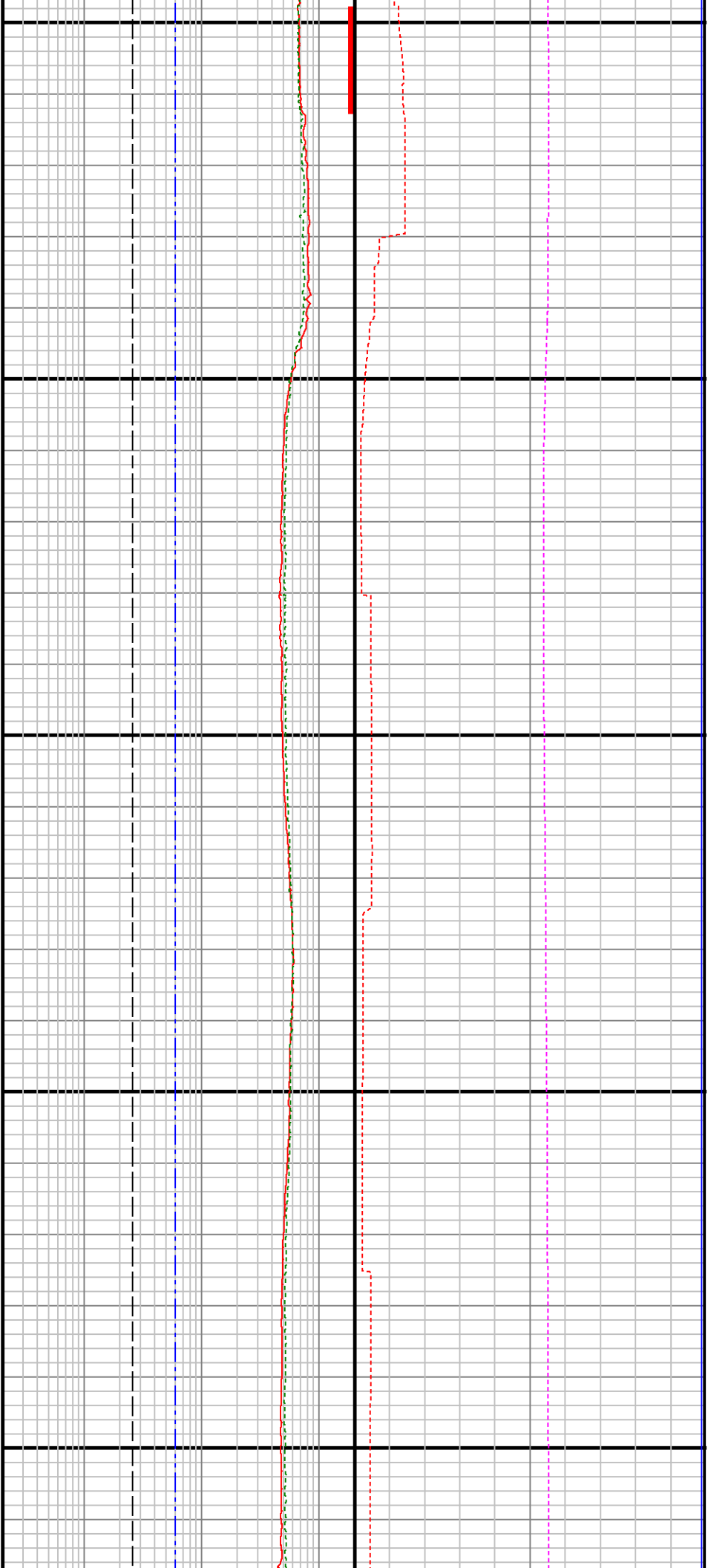
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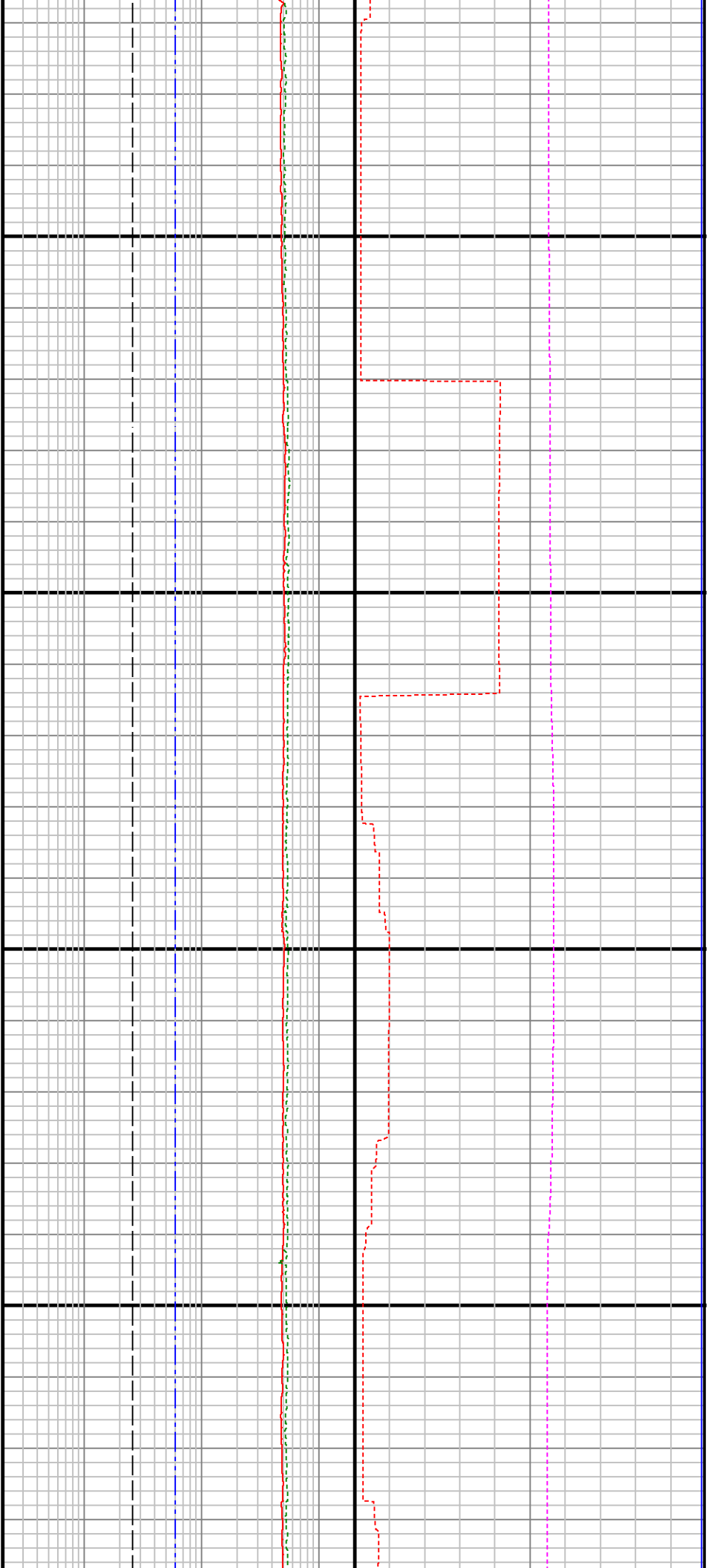
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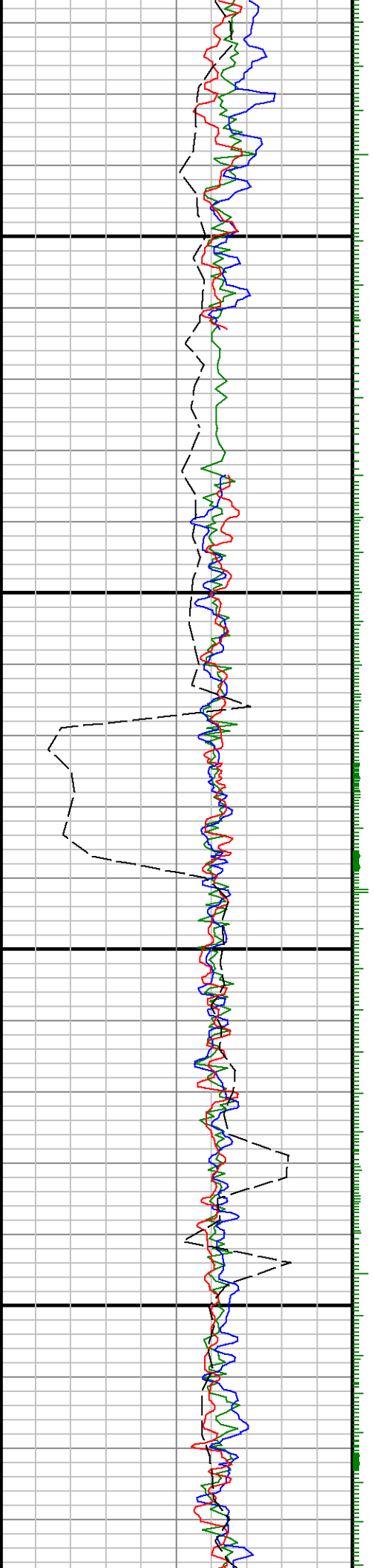


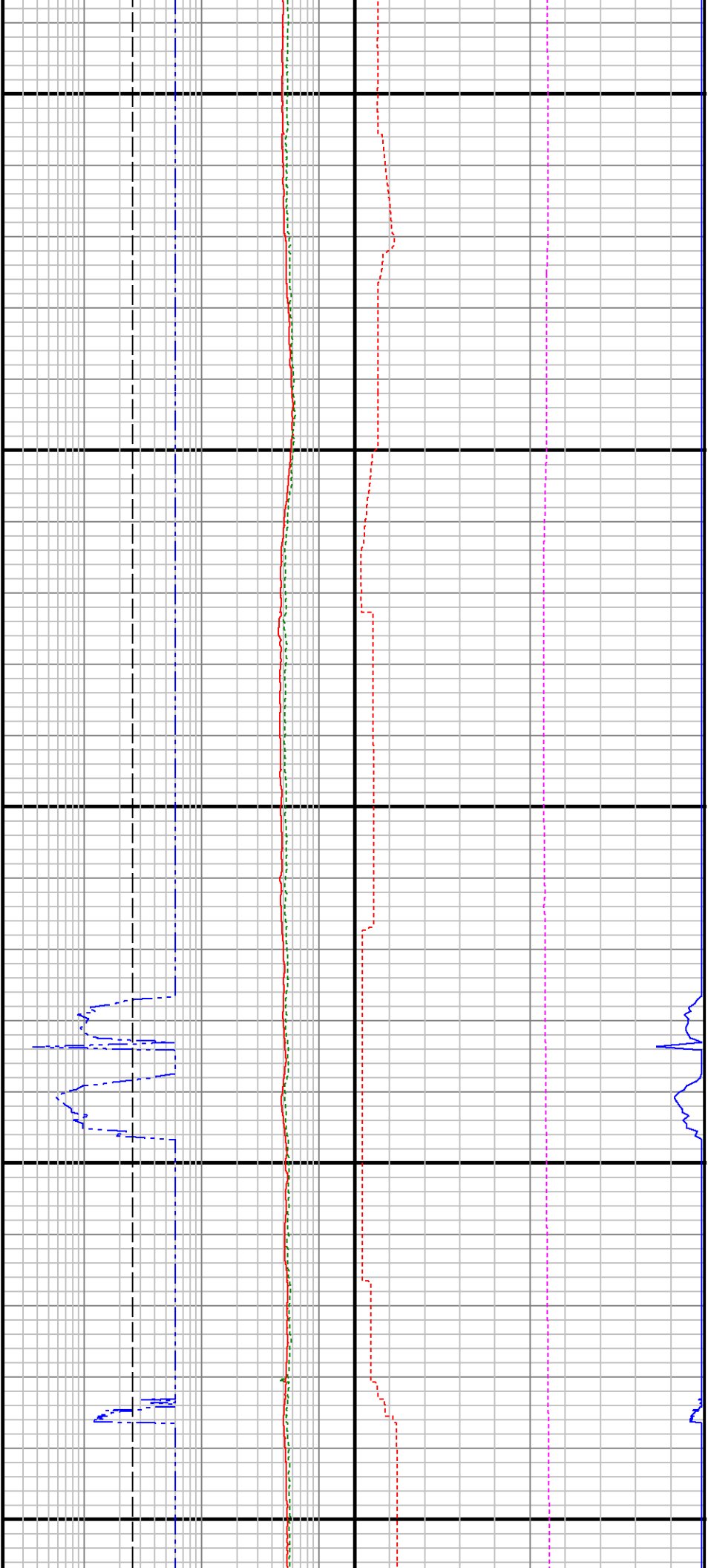




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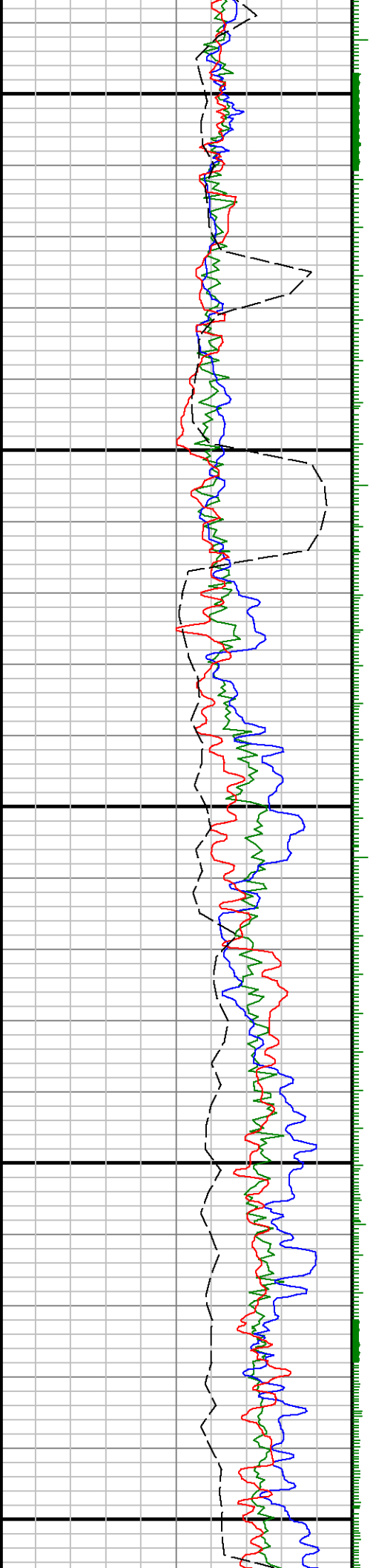
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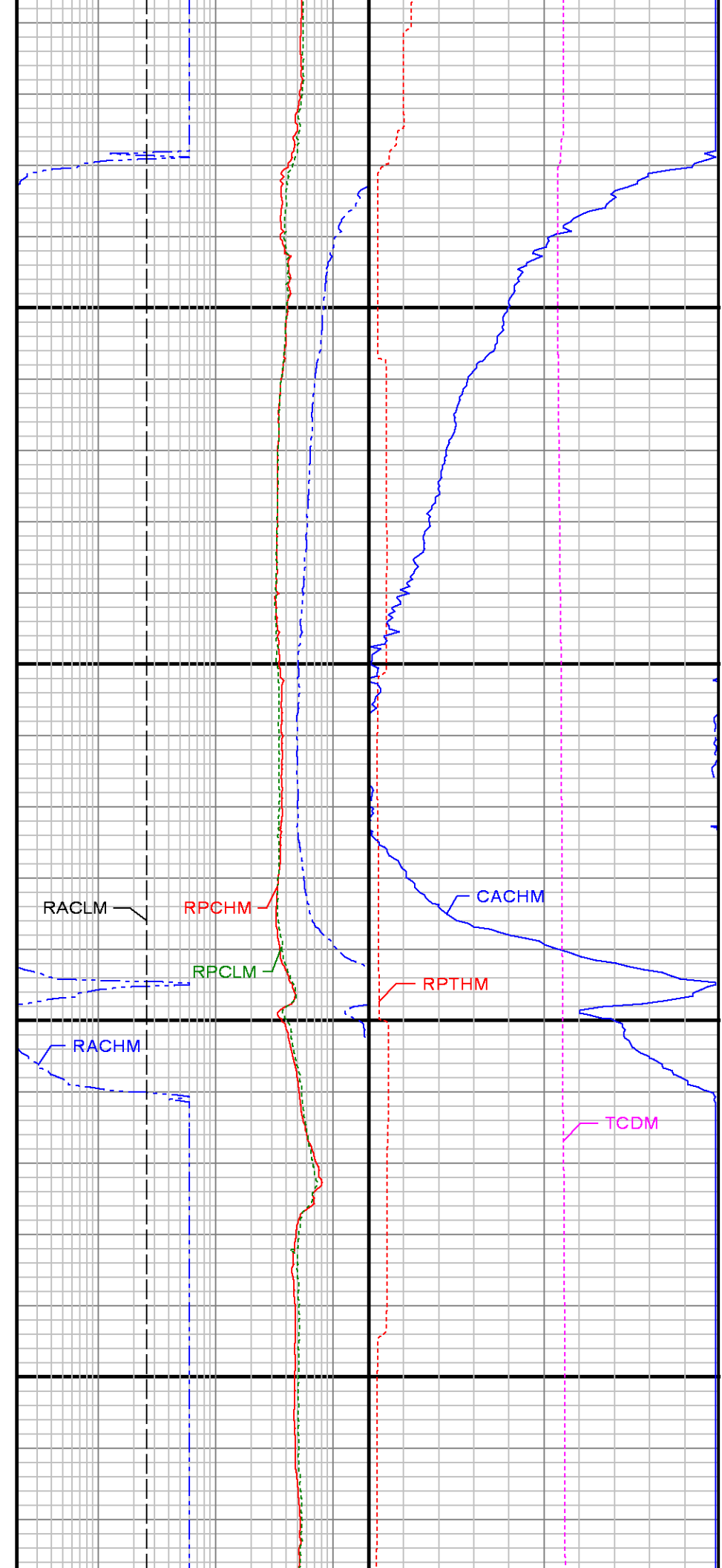
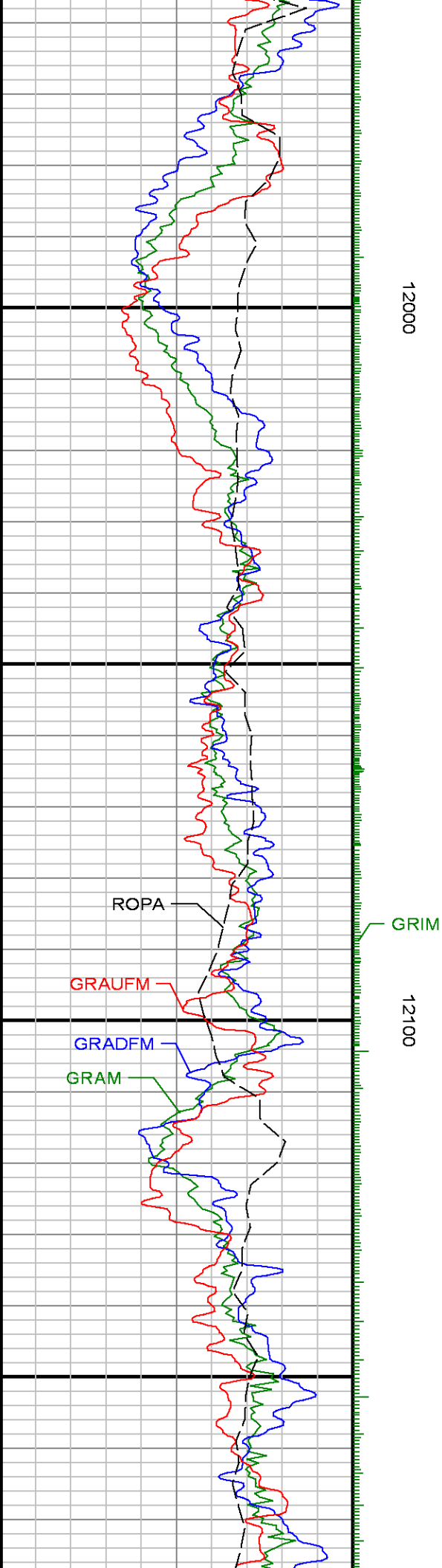


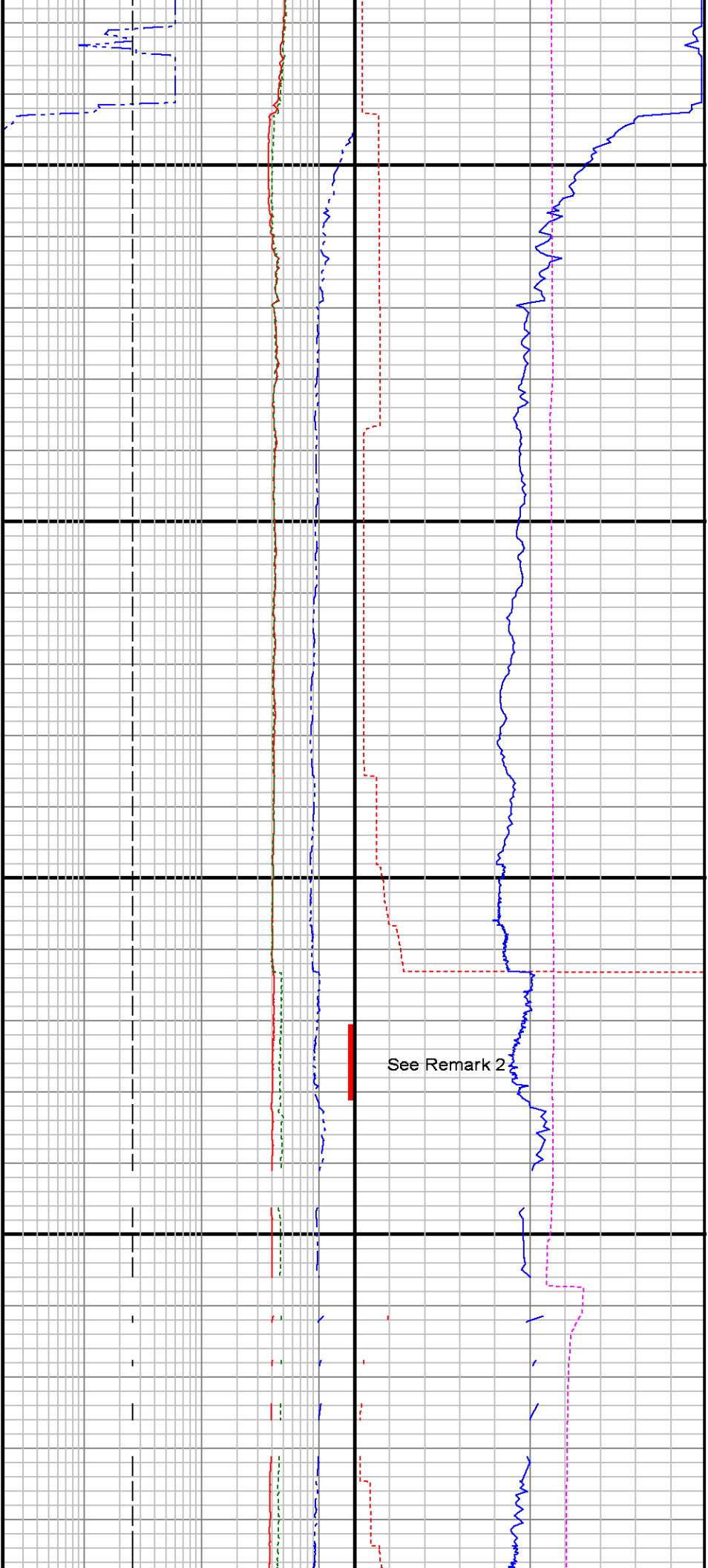


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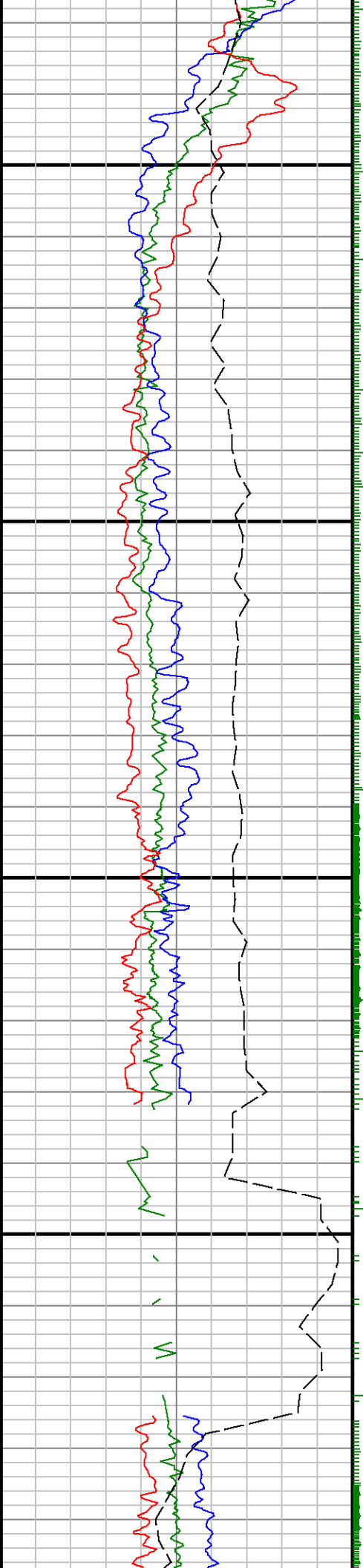


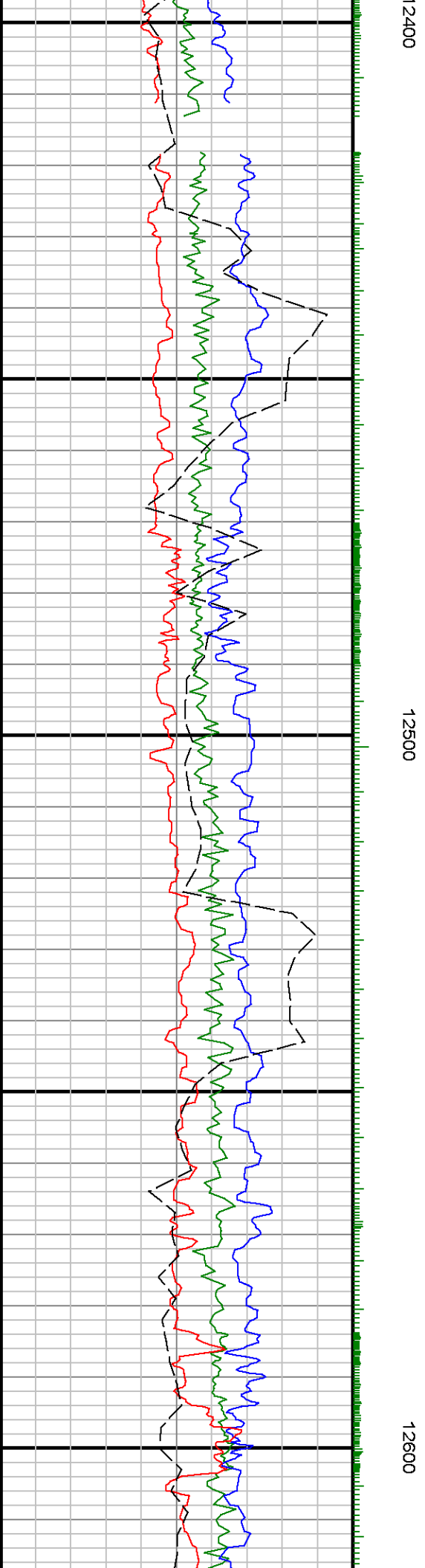
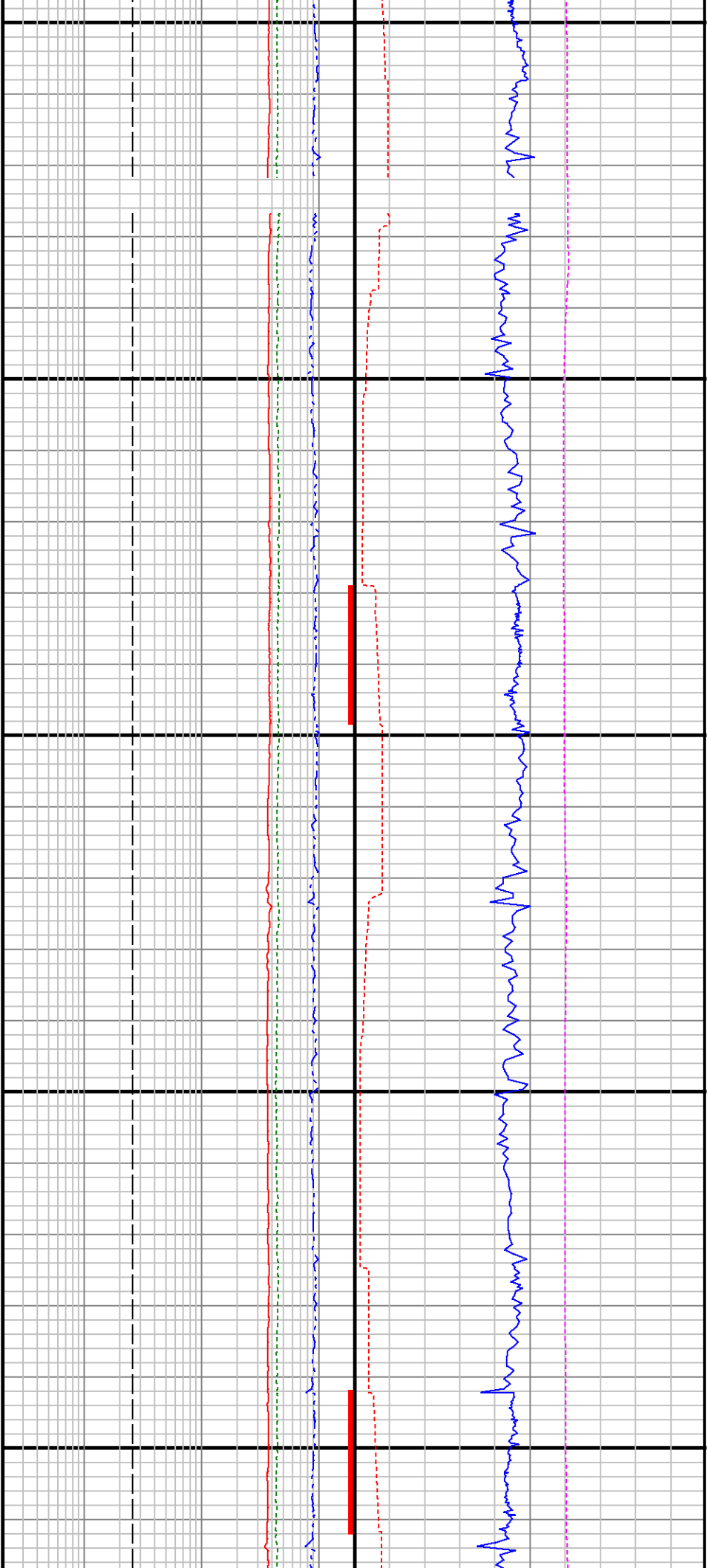


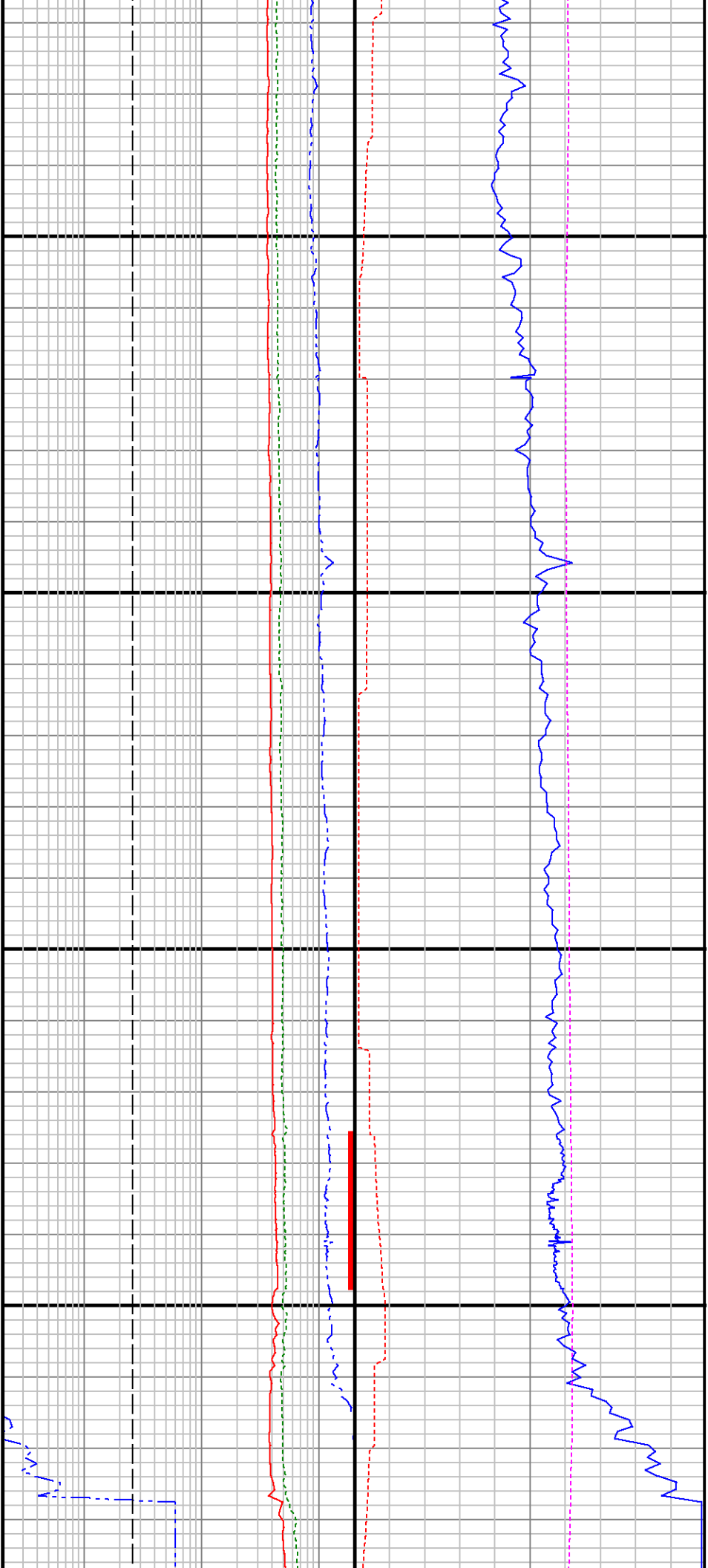
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Run 2 <> Run 3

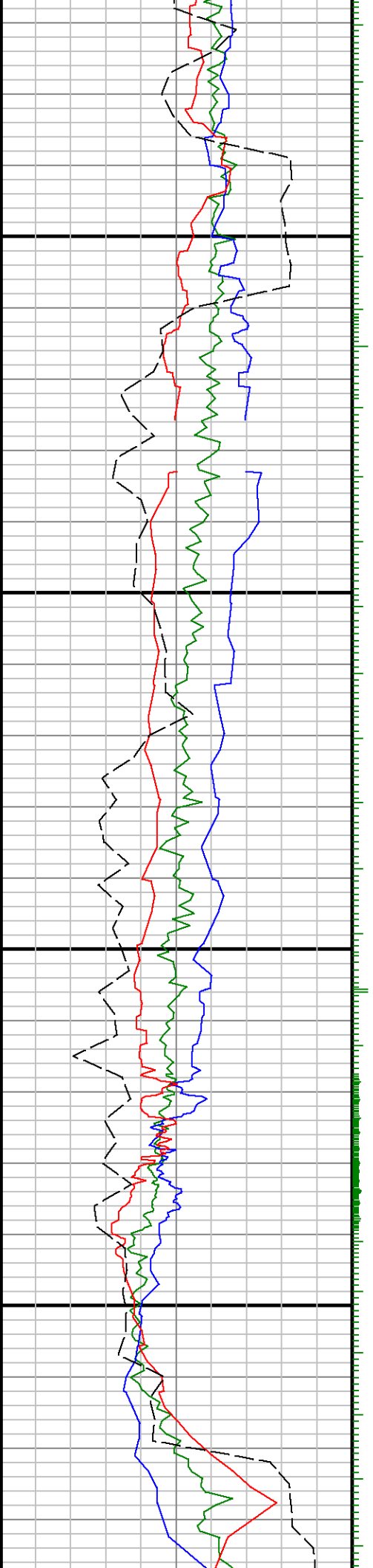


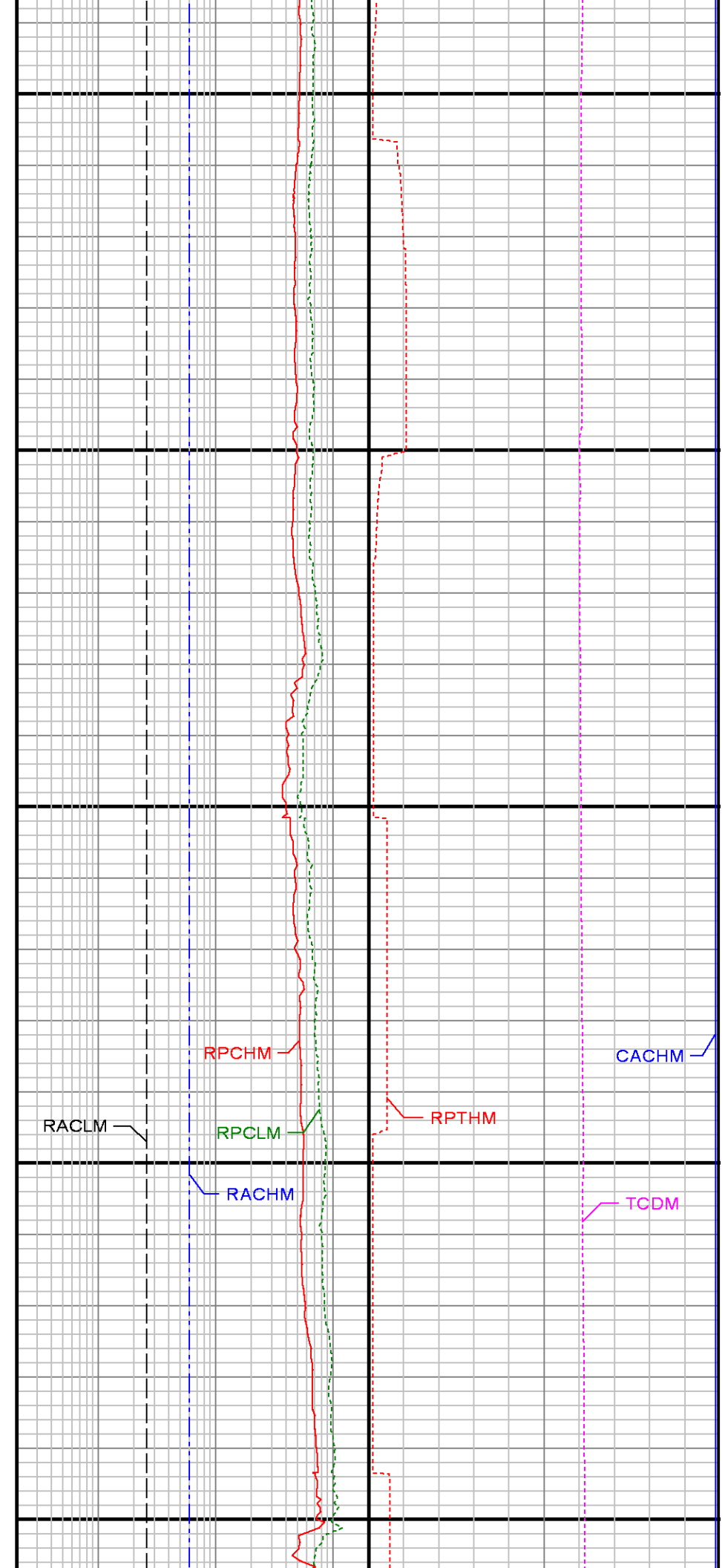
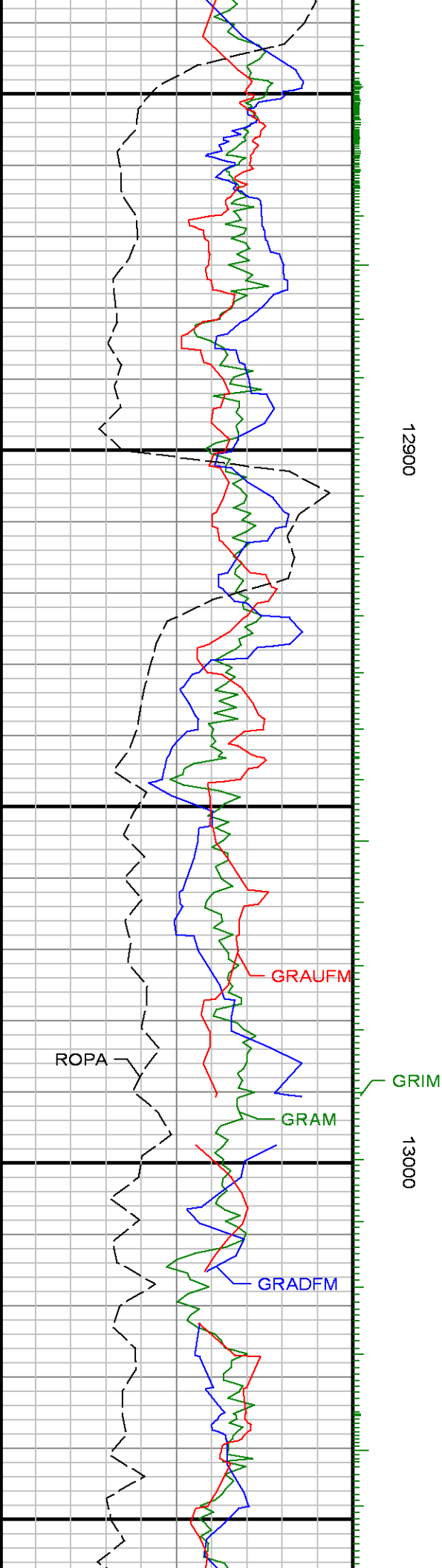


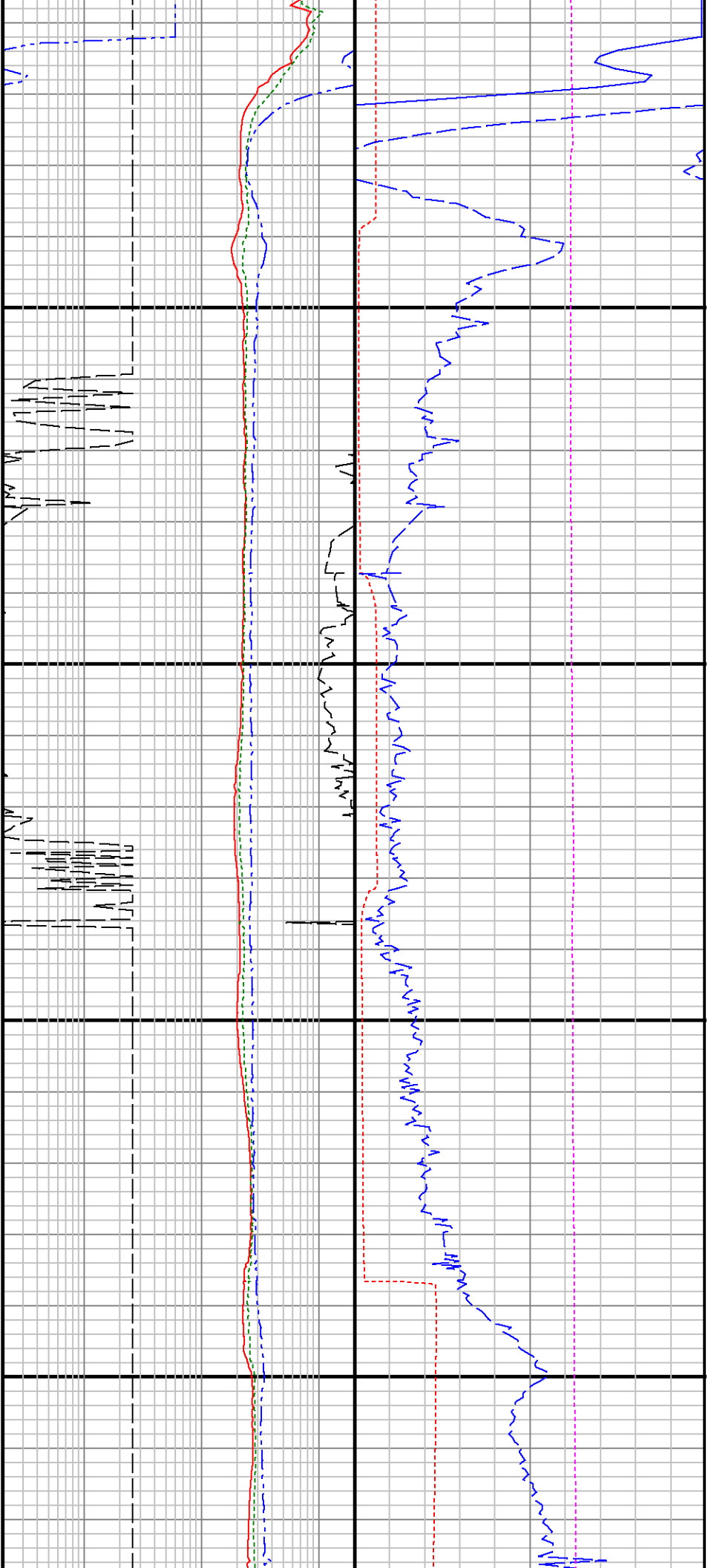


12700

12800

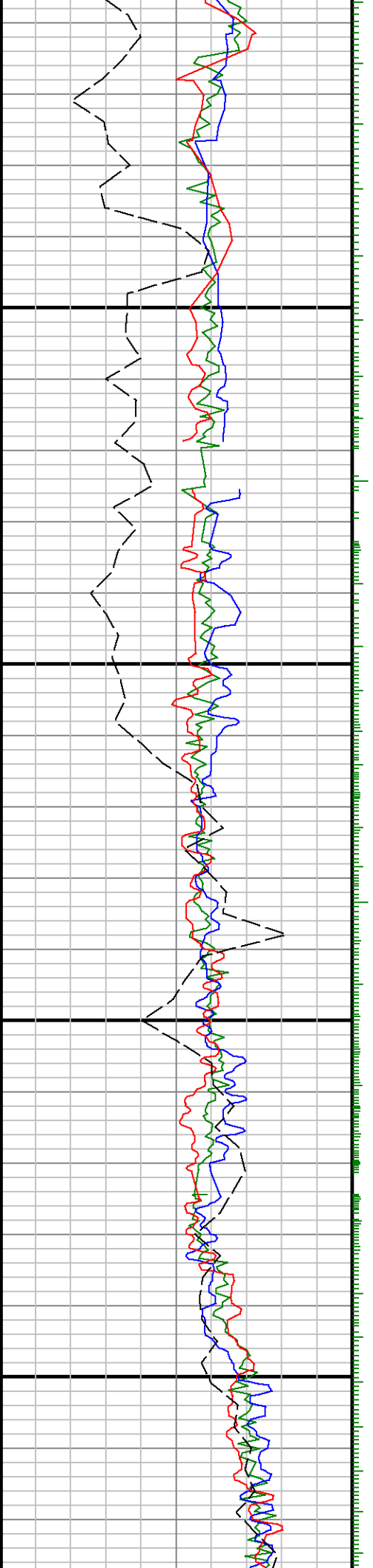


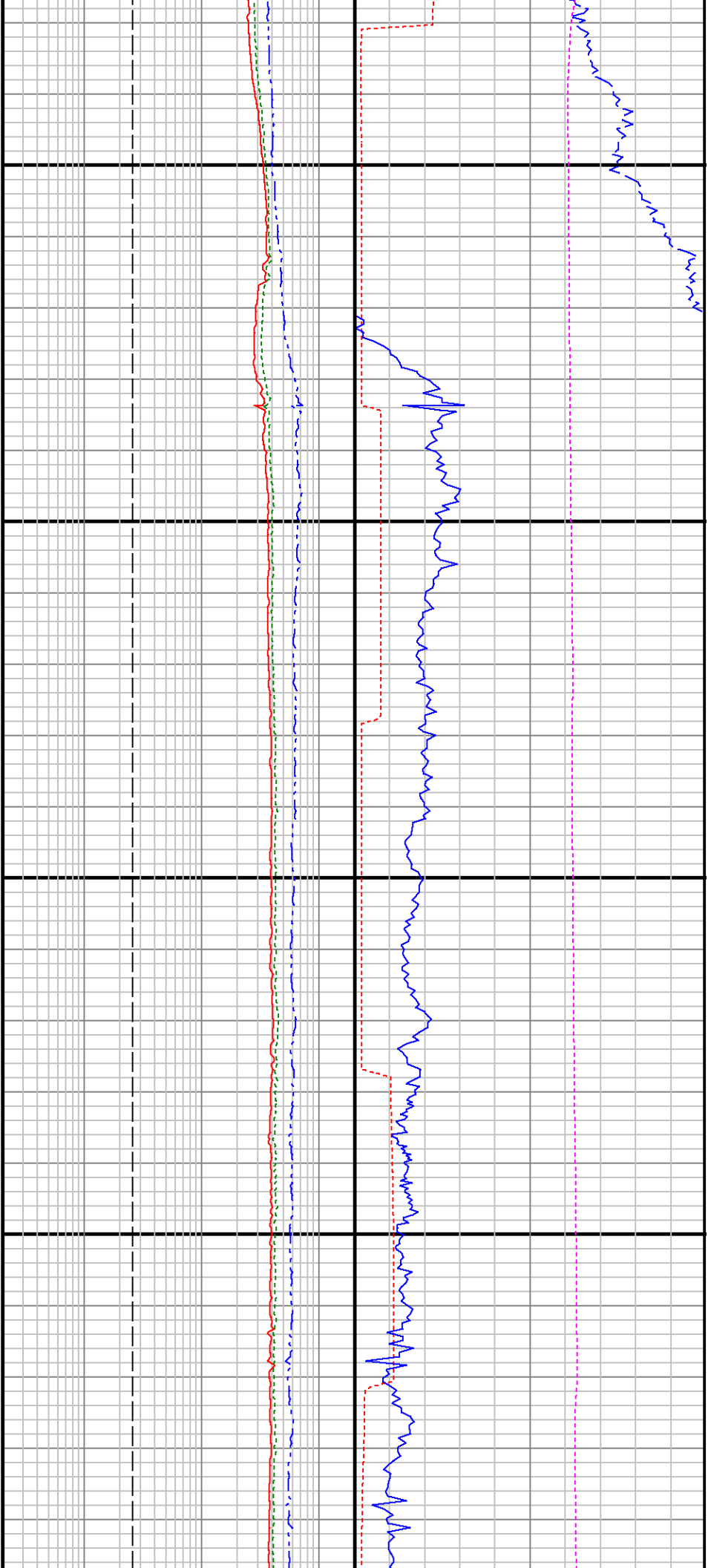




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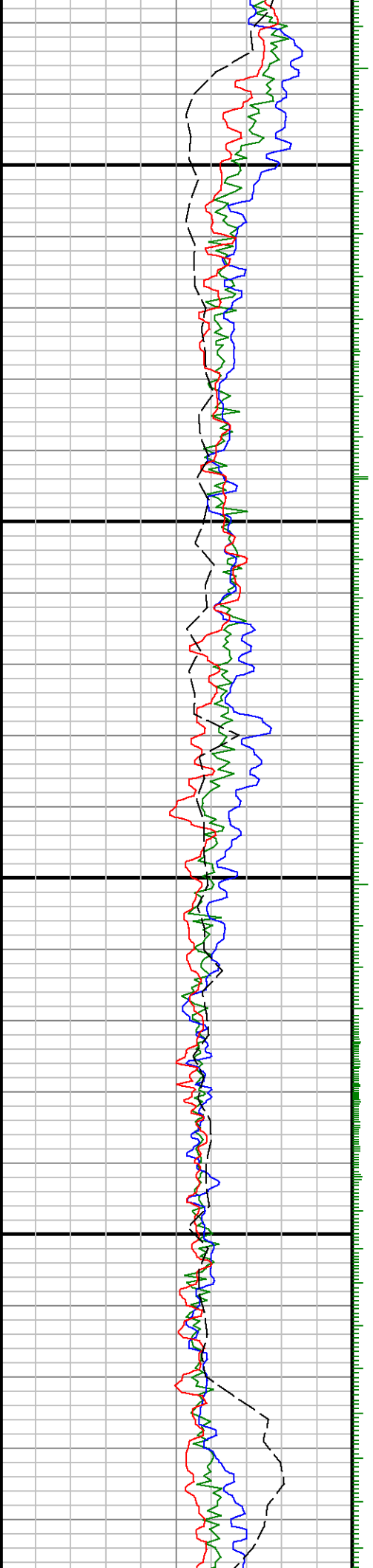
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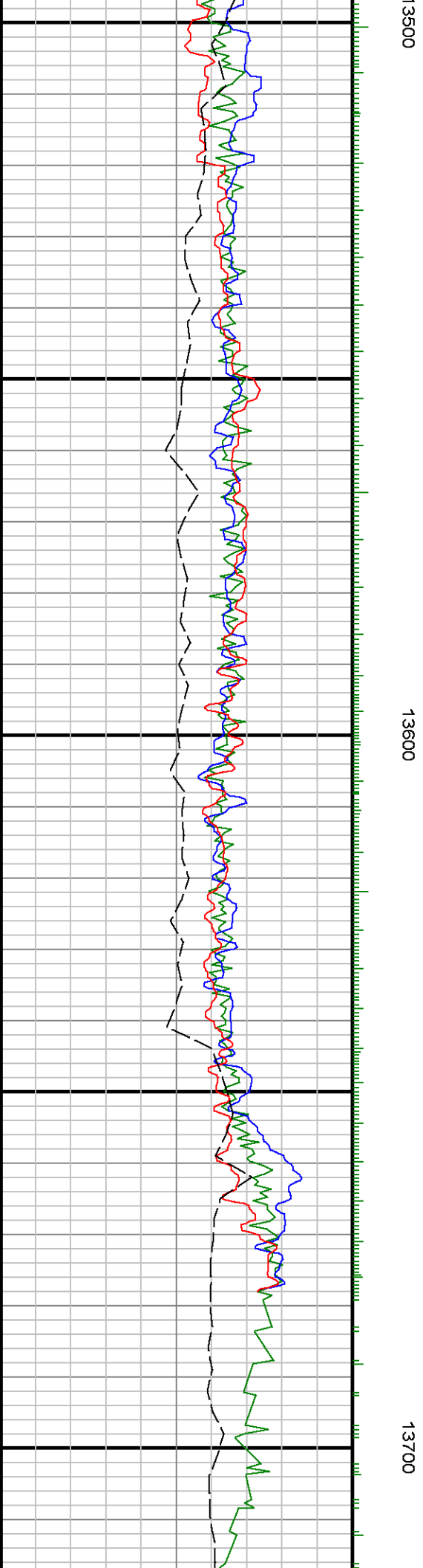
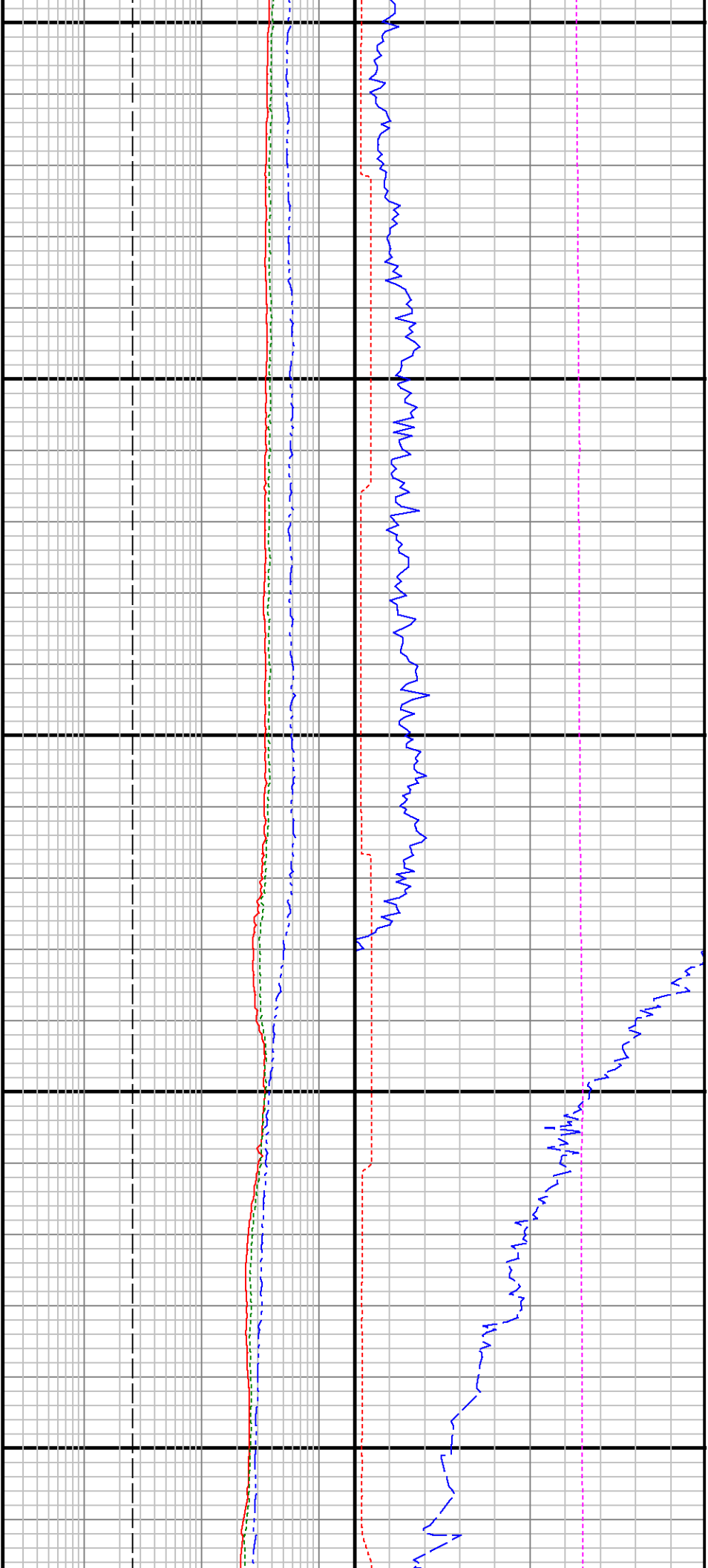


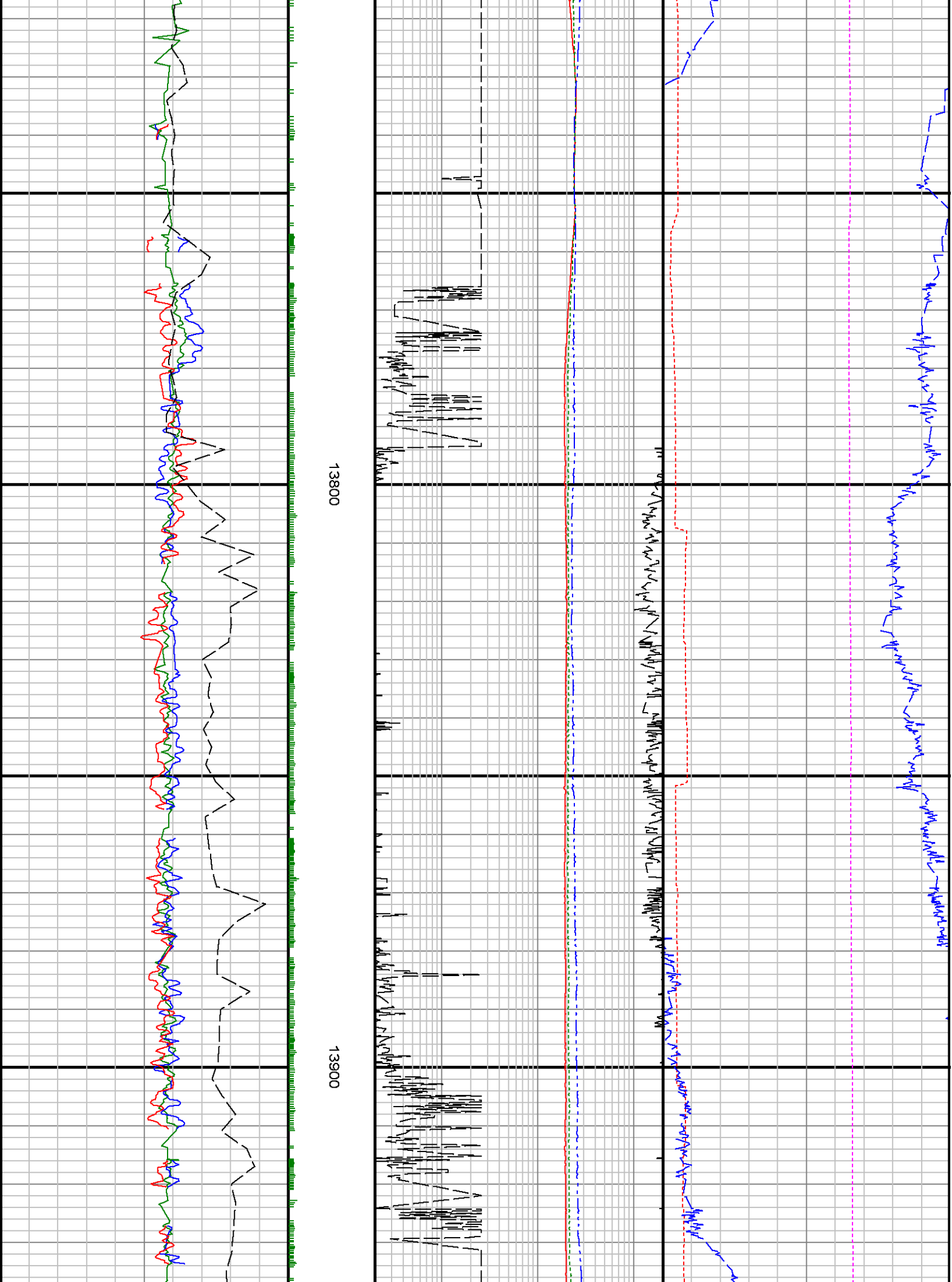


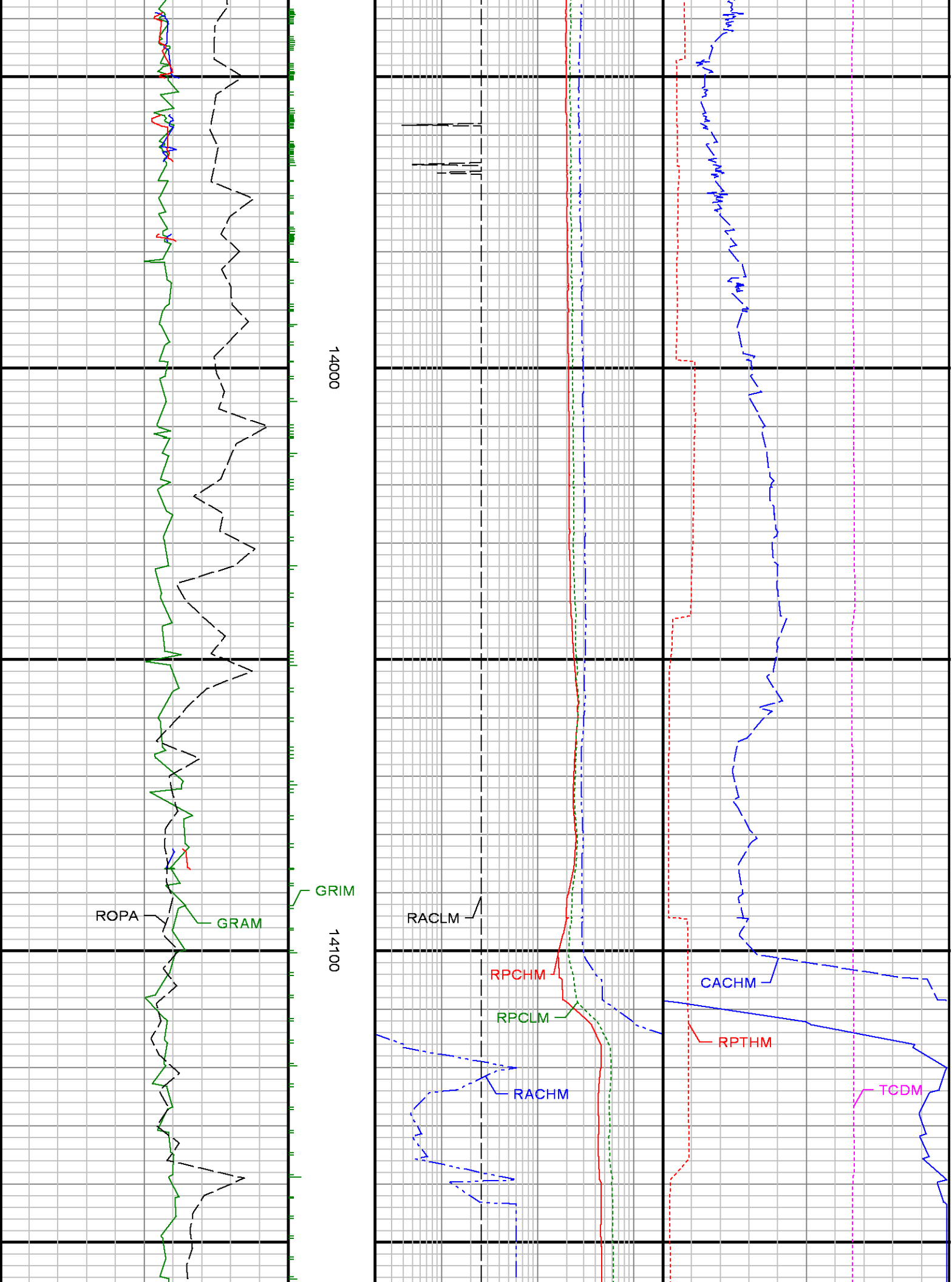
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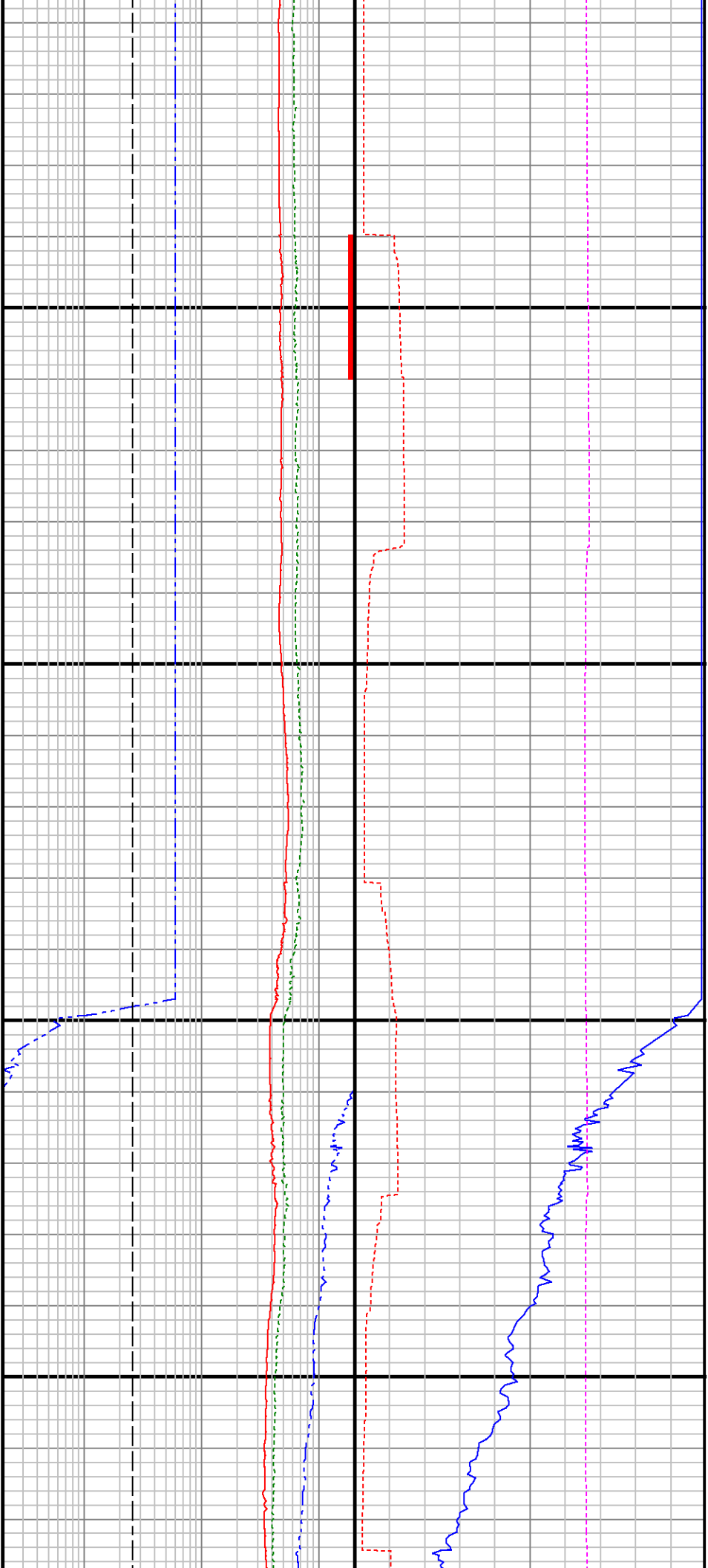
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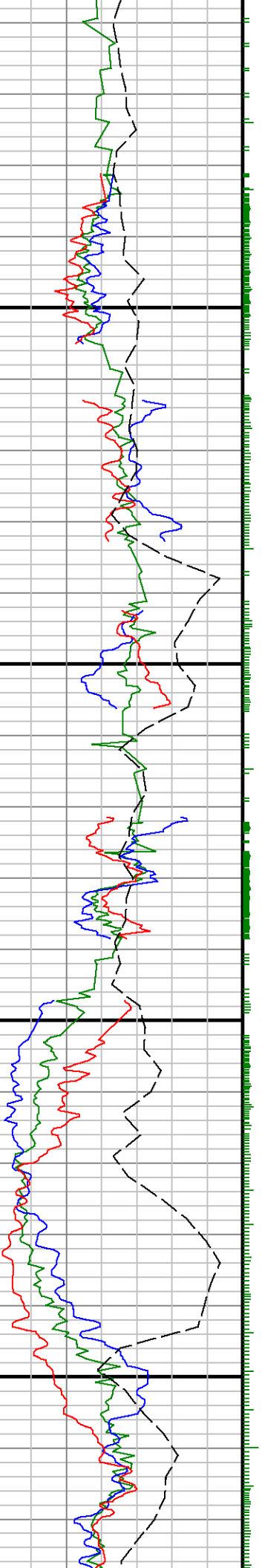


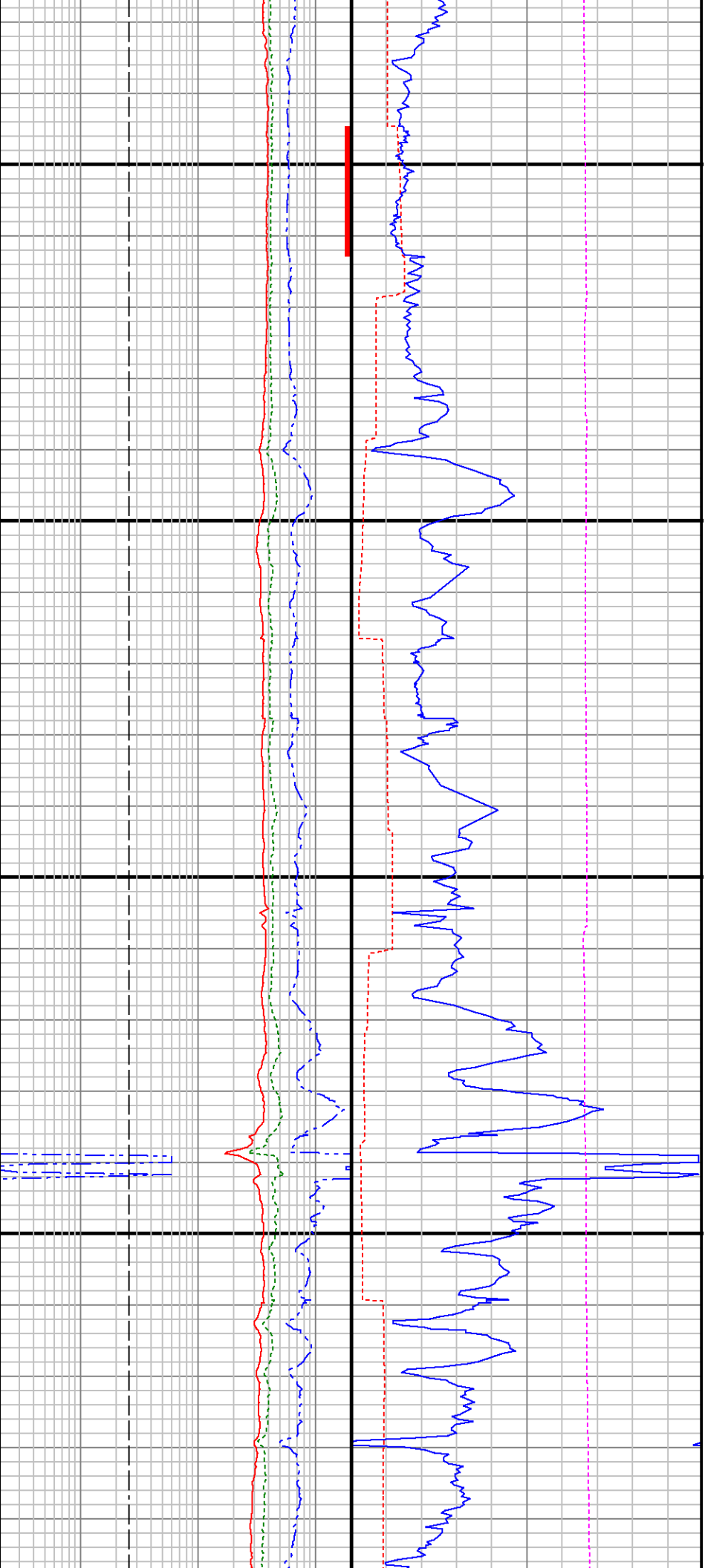




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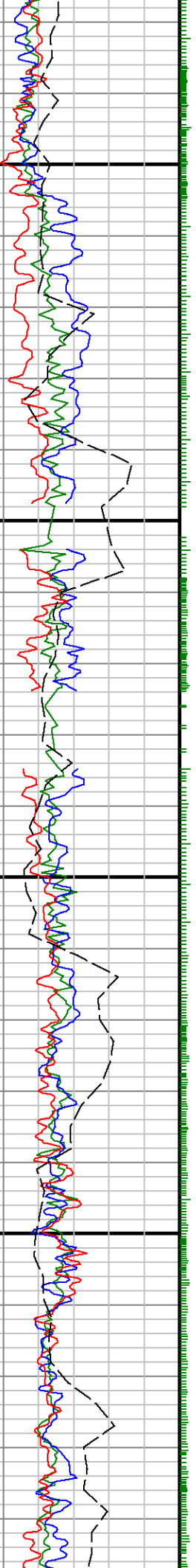
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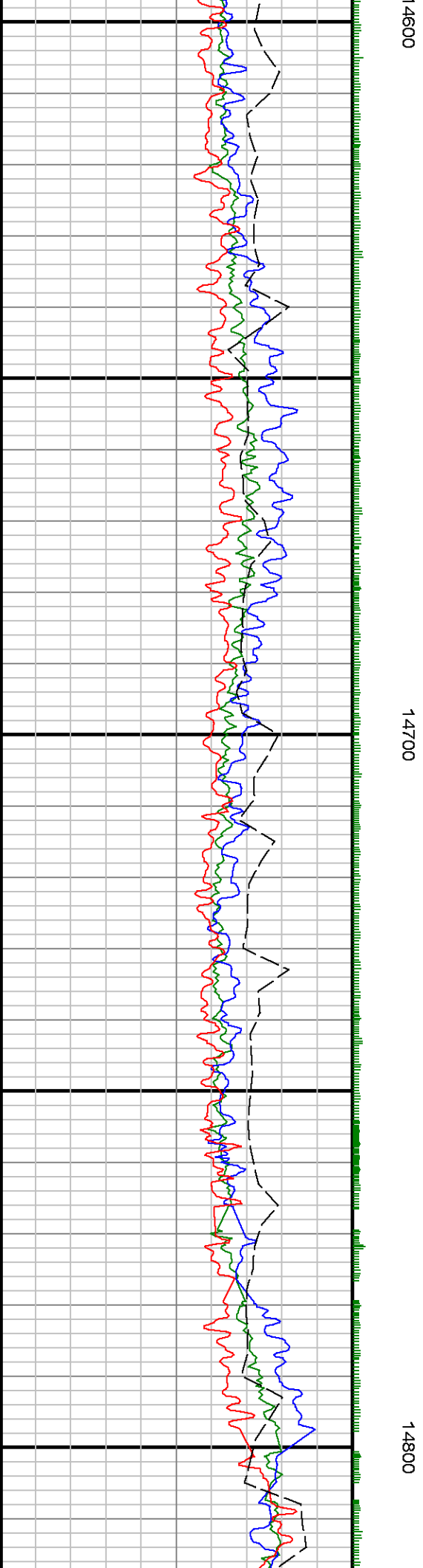
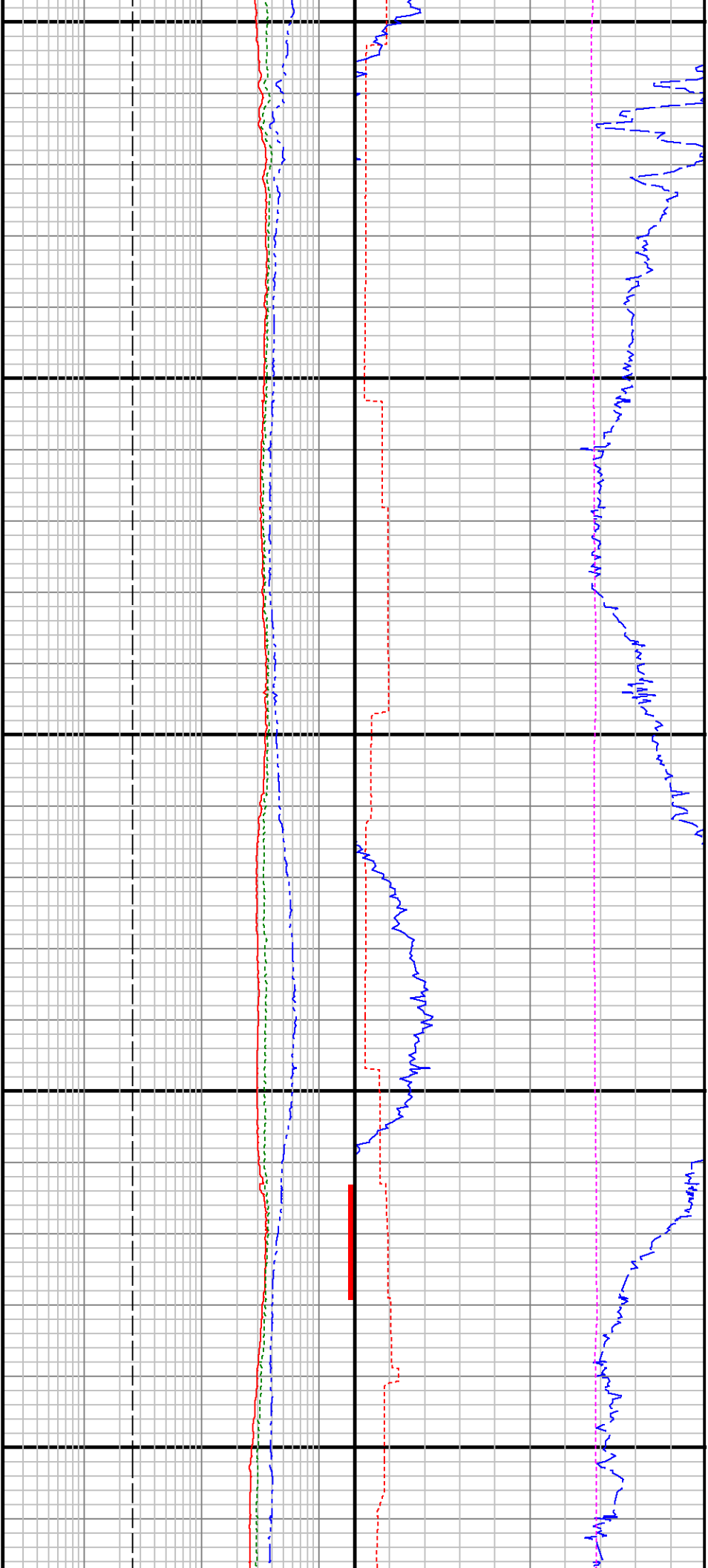


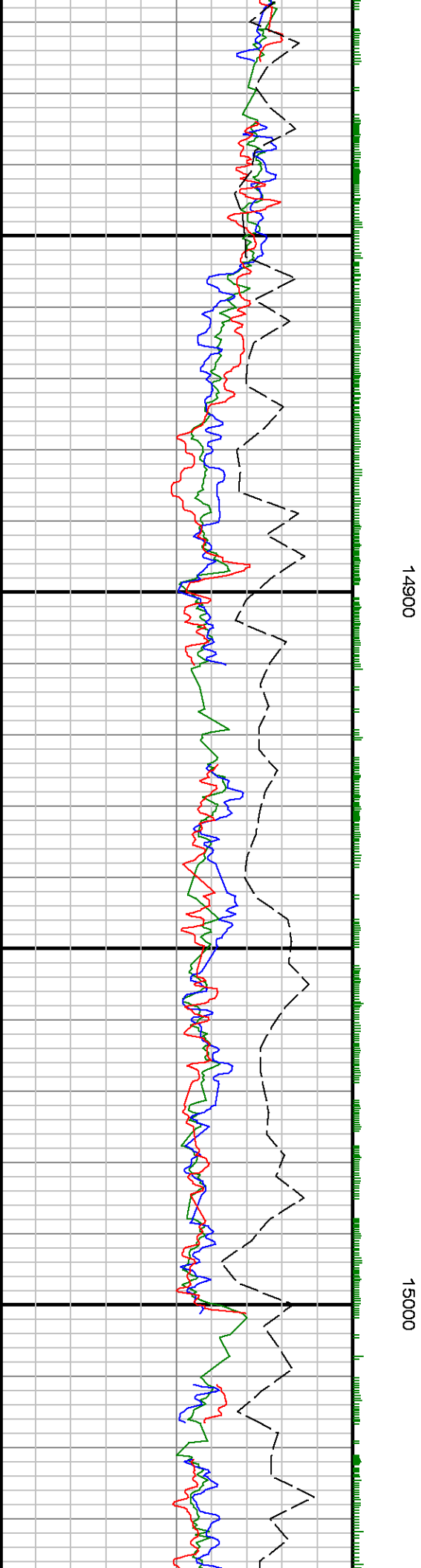
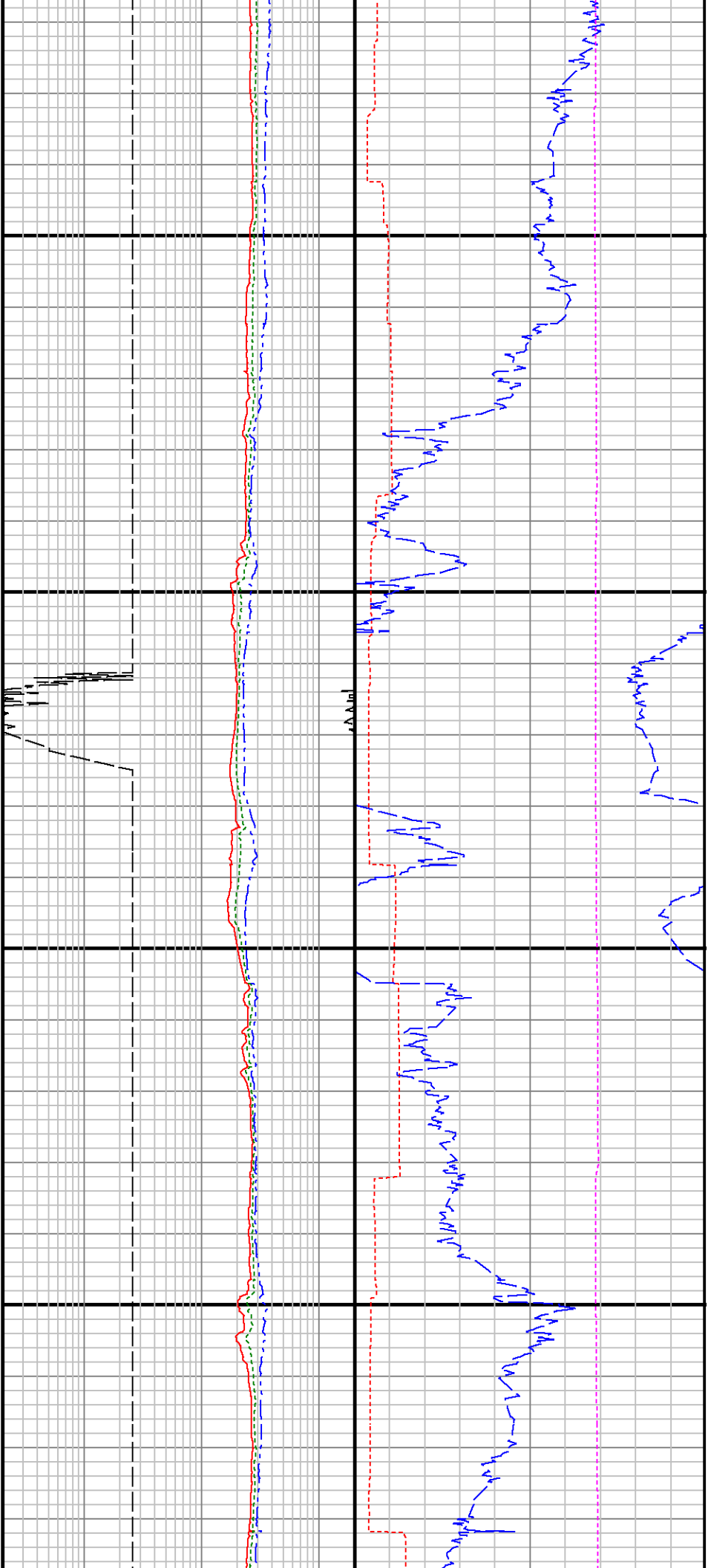


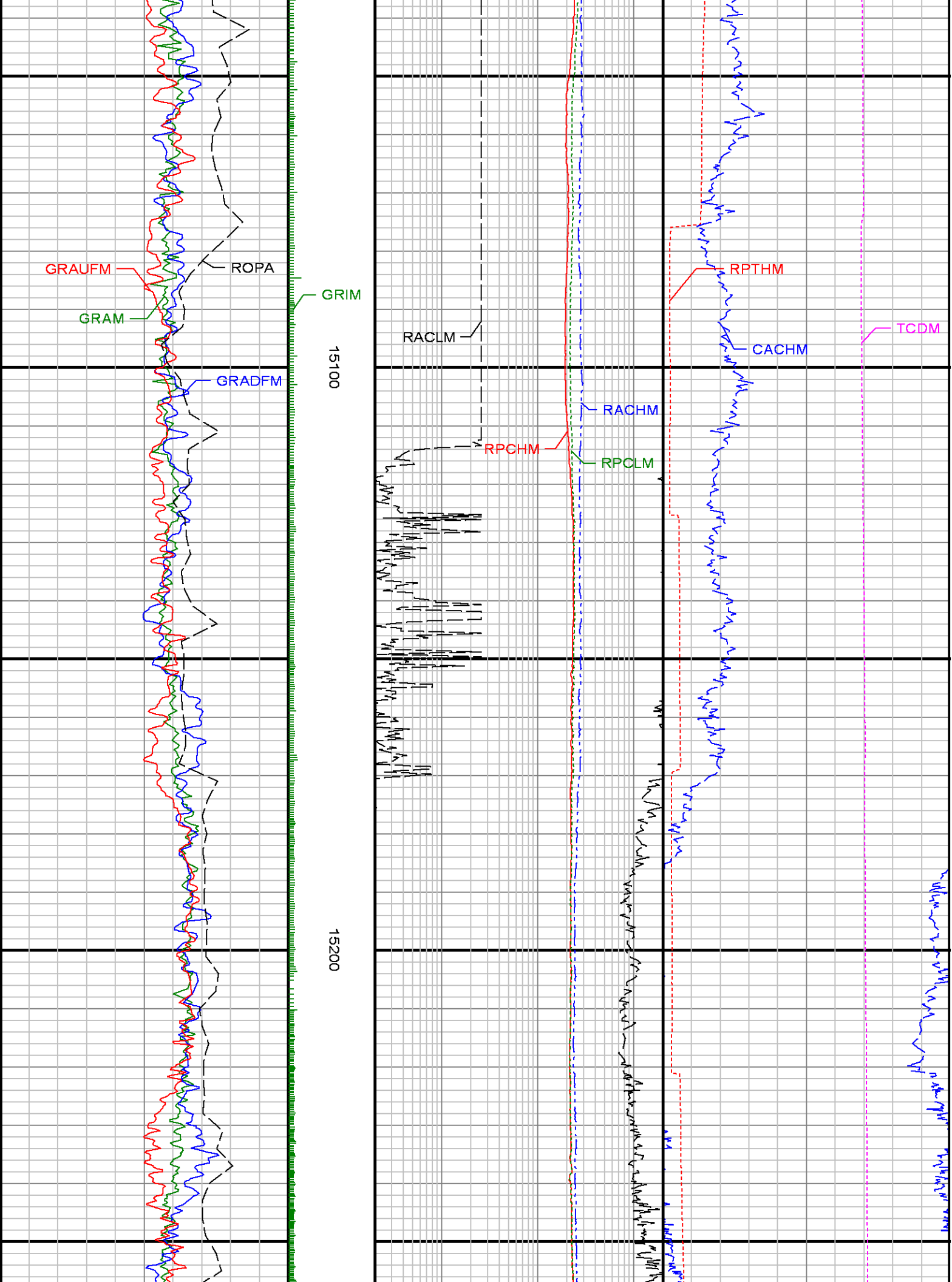
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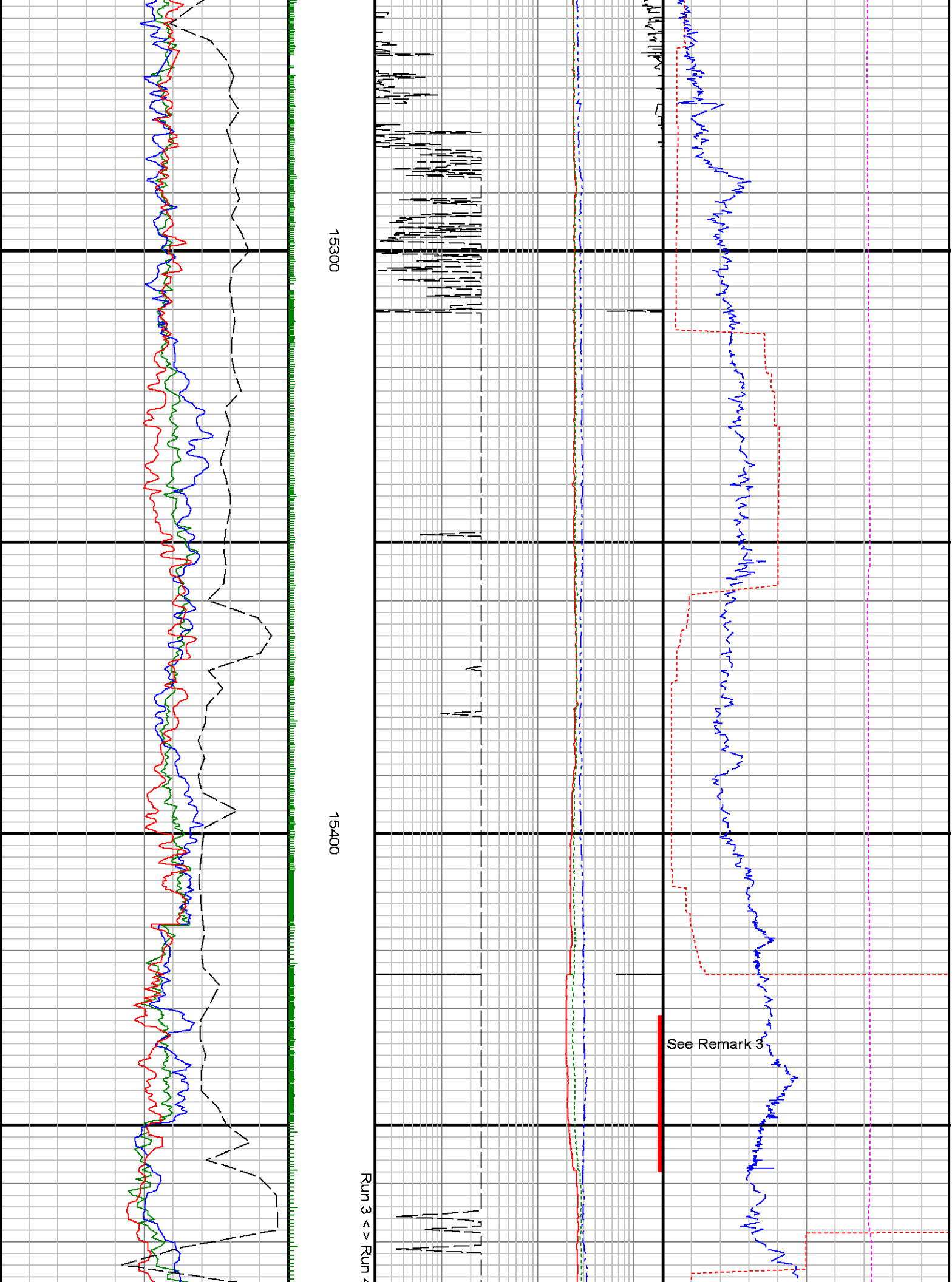
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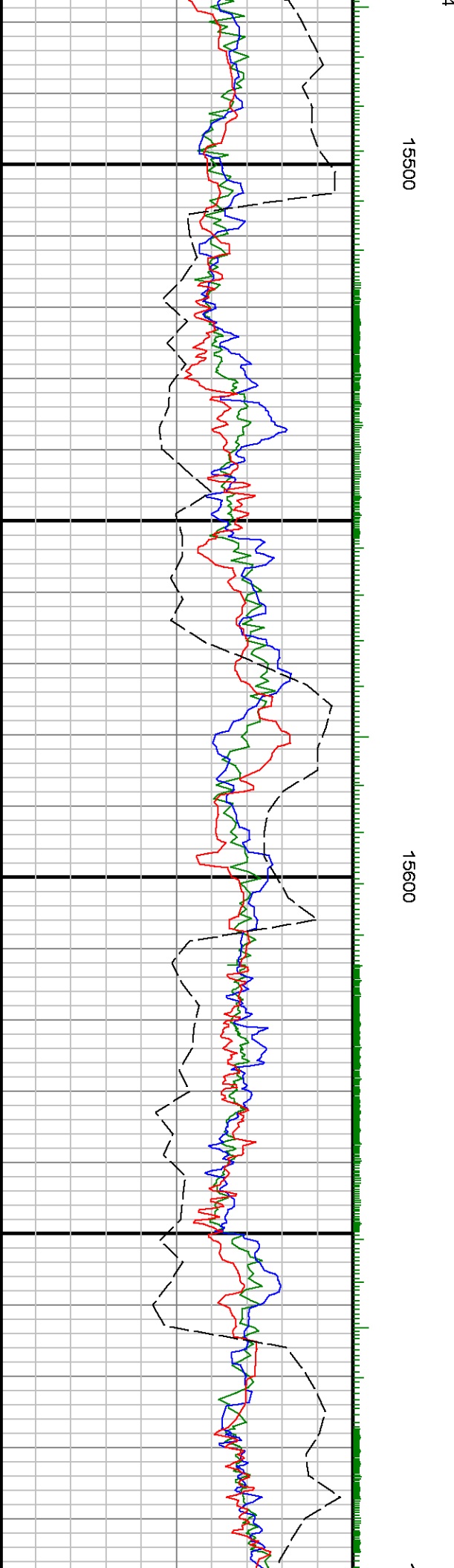
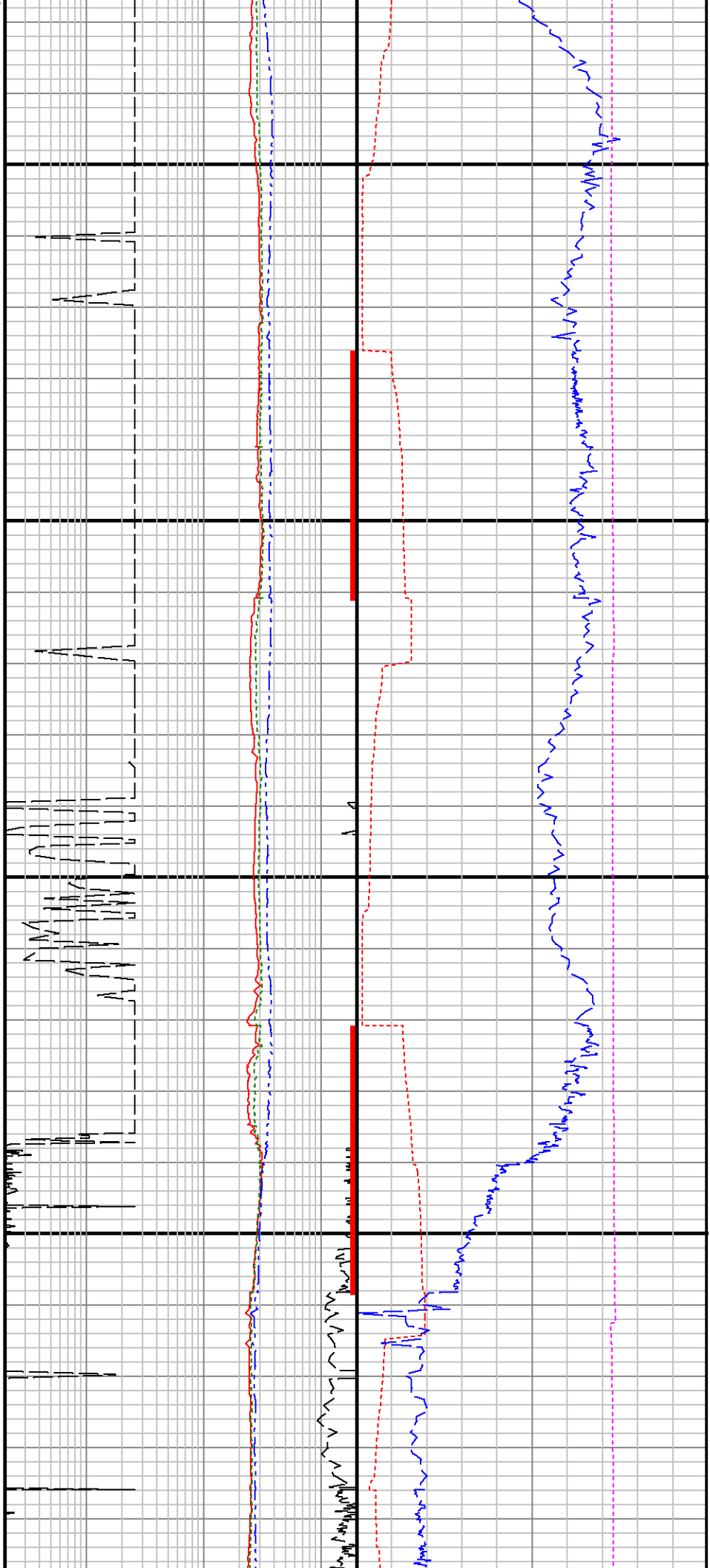


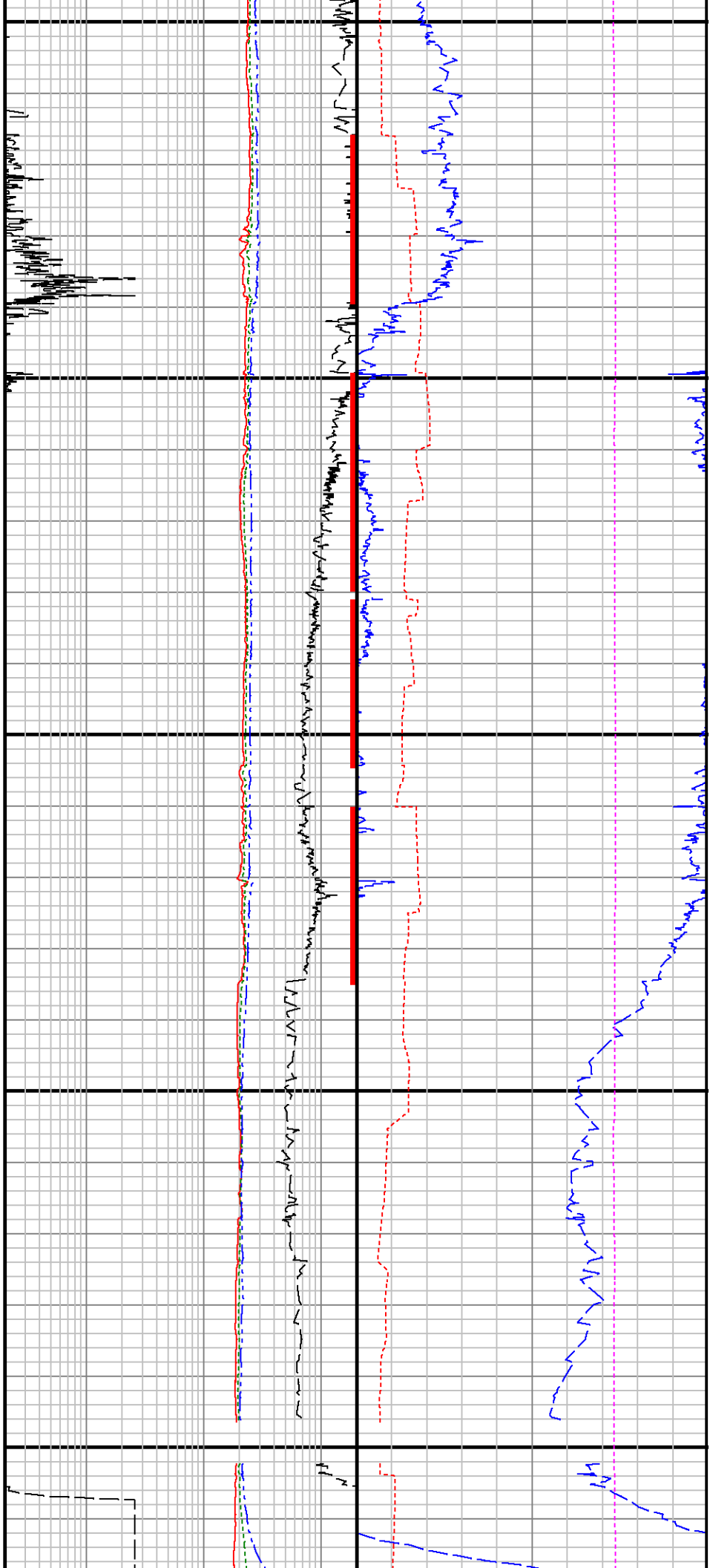








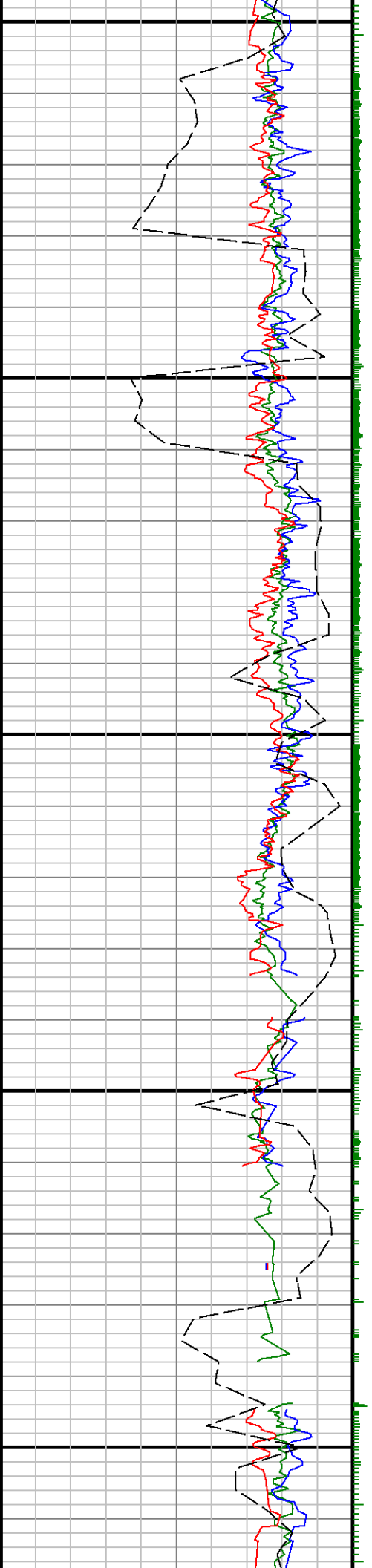


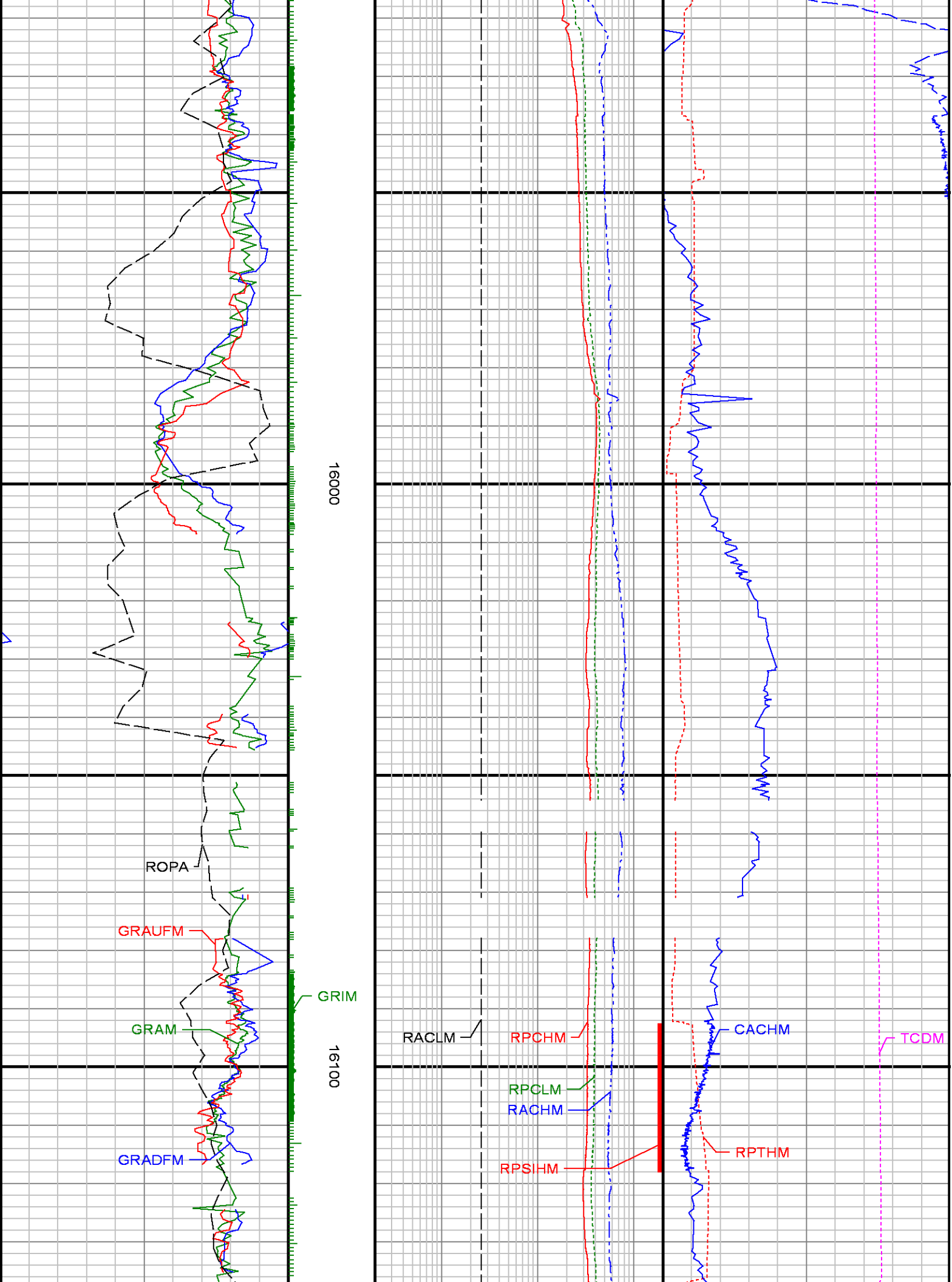


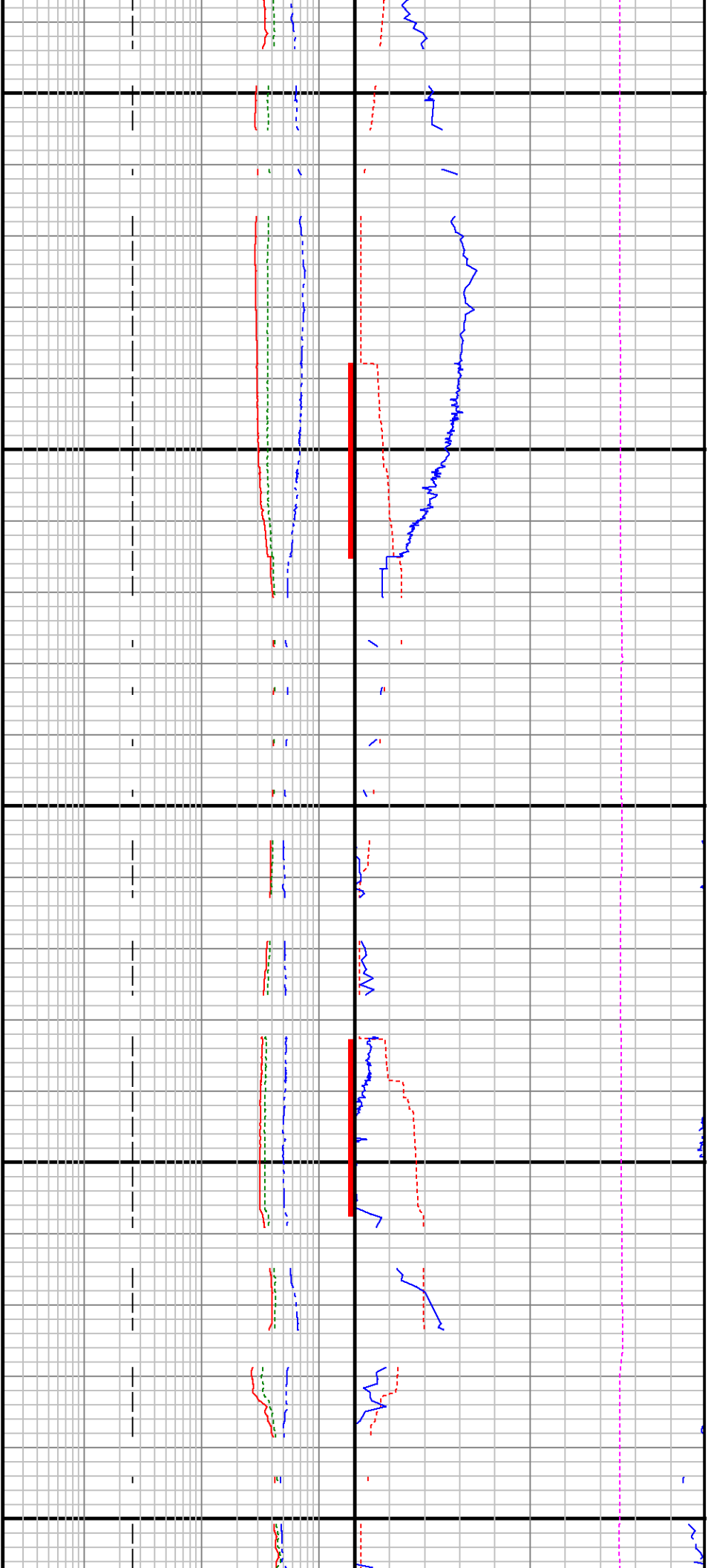
5700

15800

15900

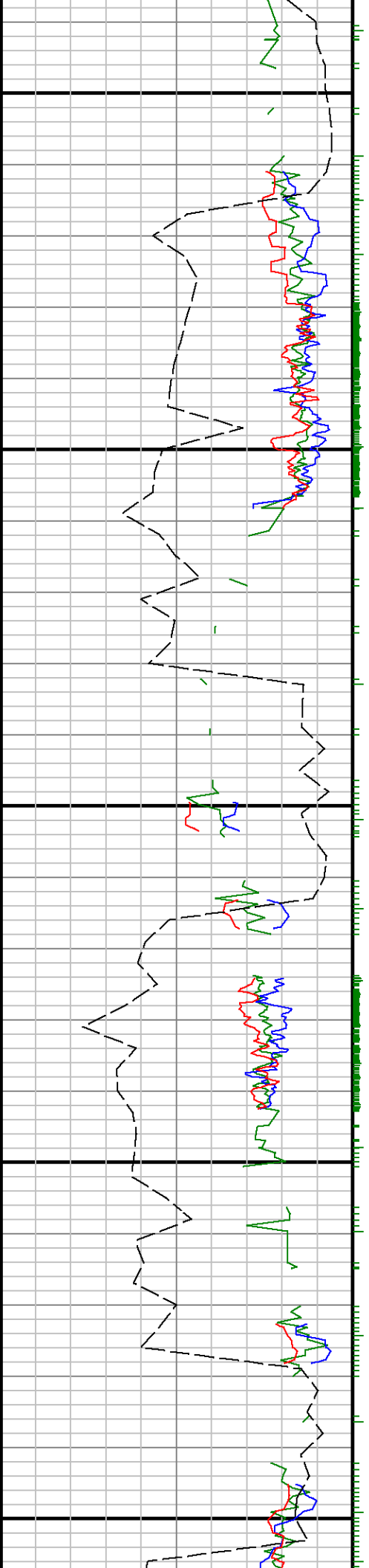


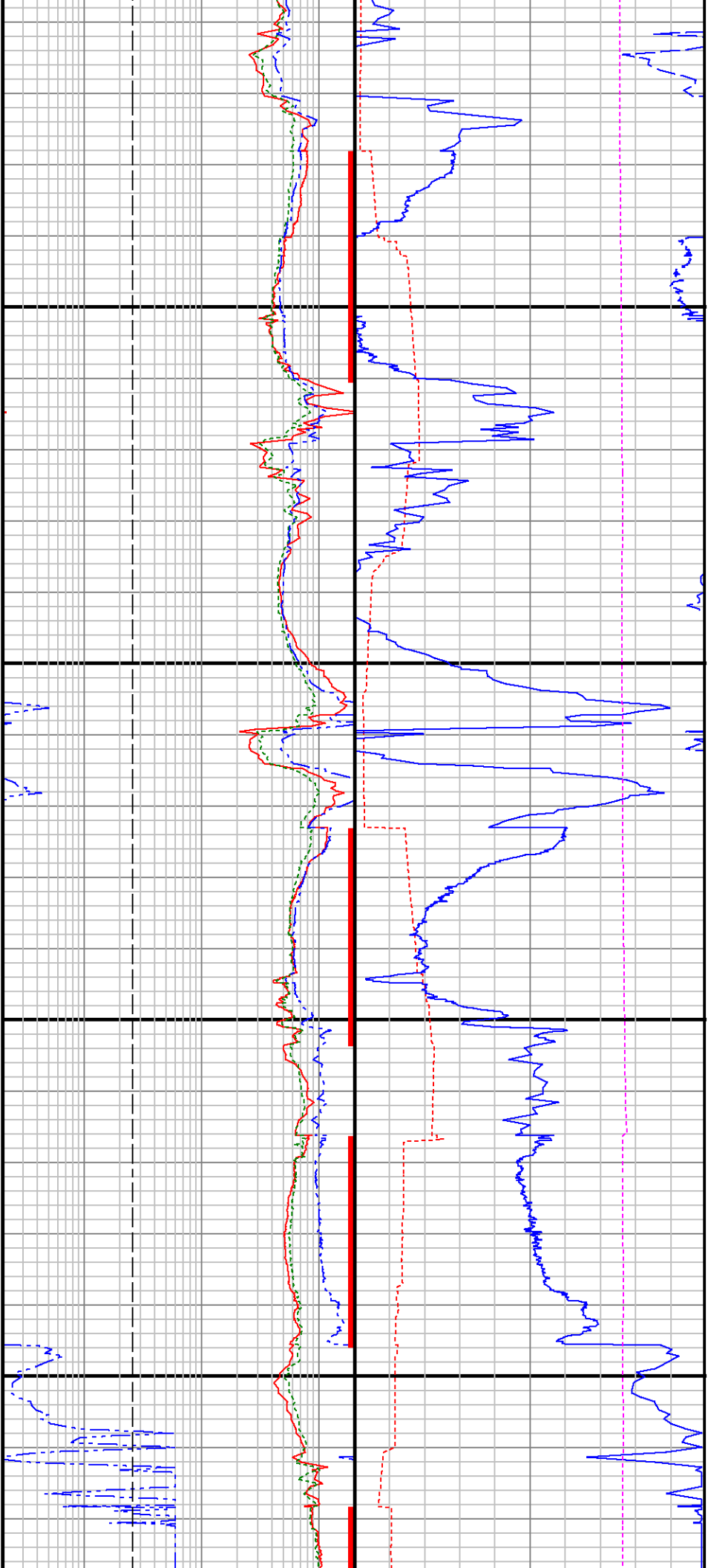




16200

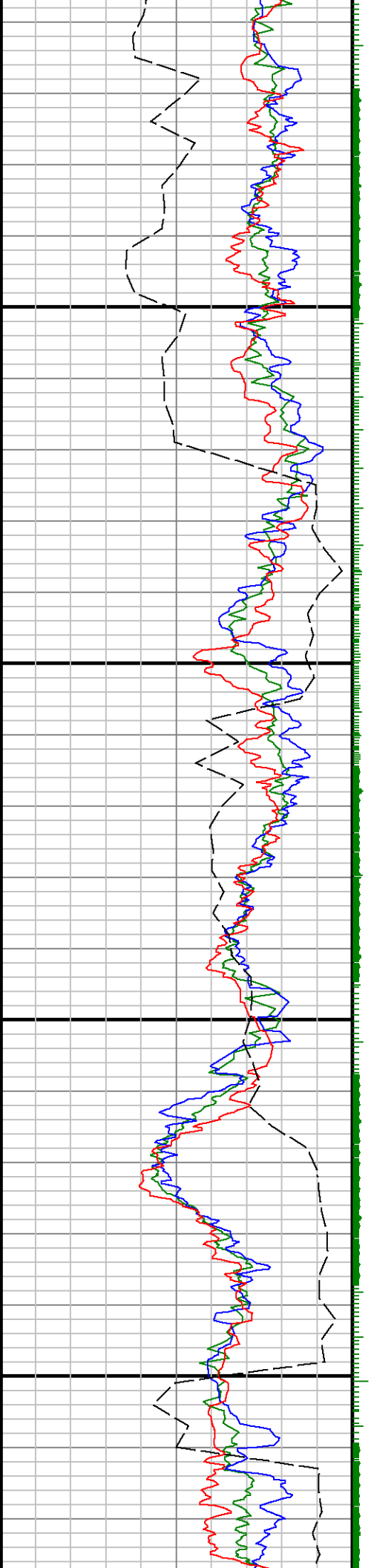
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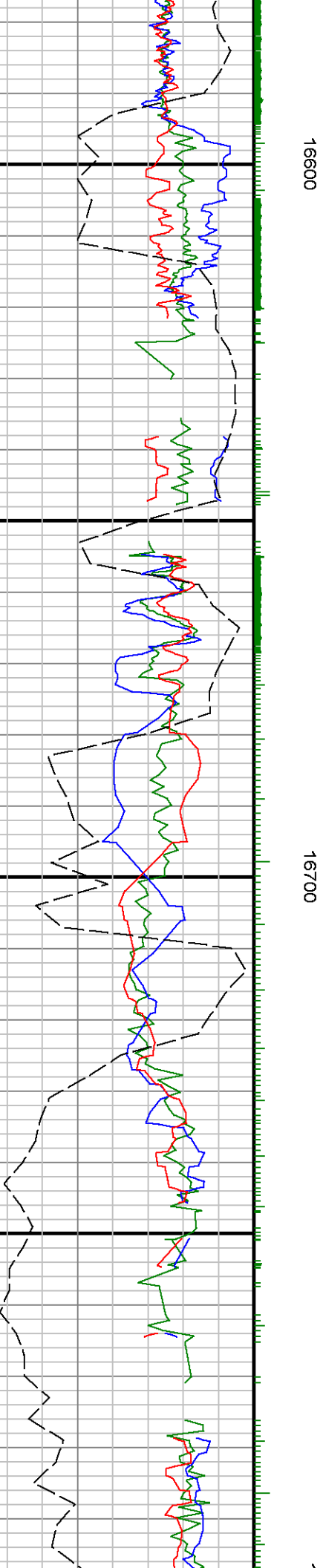
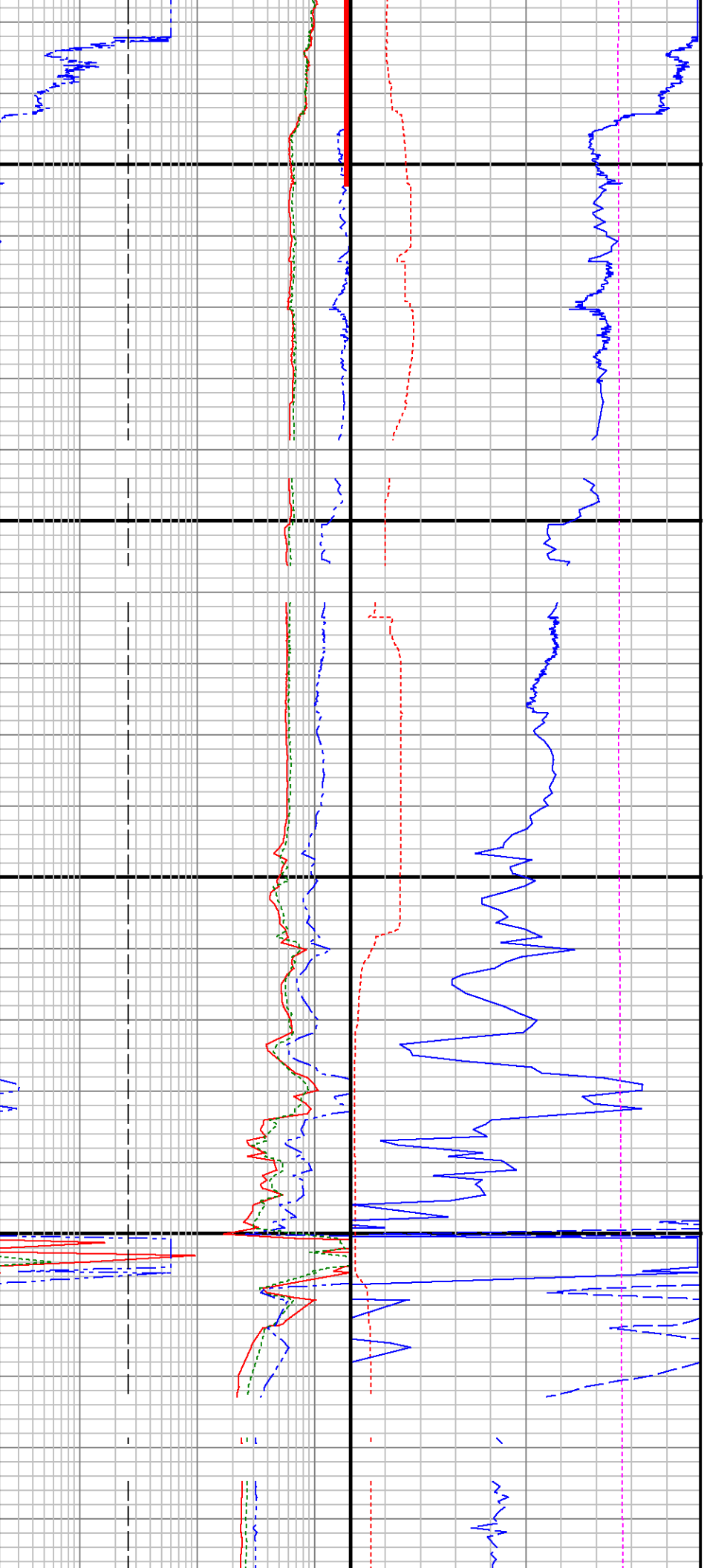


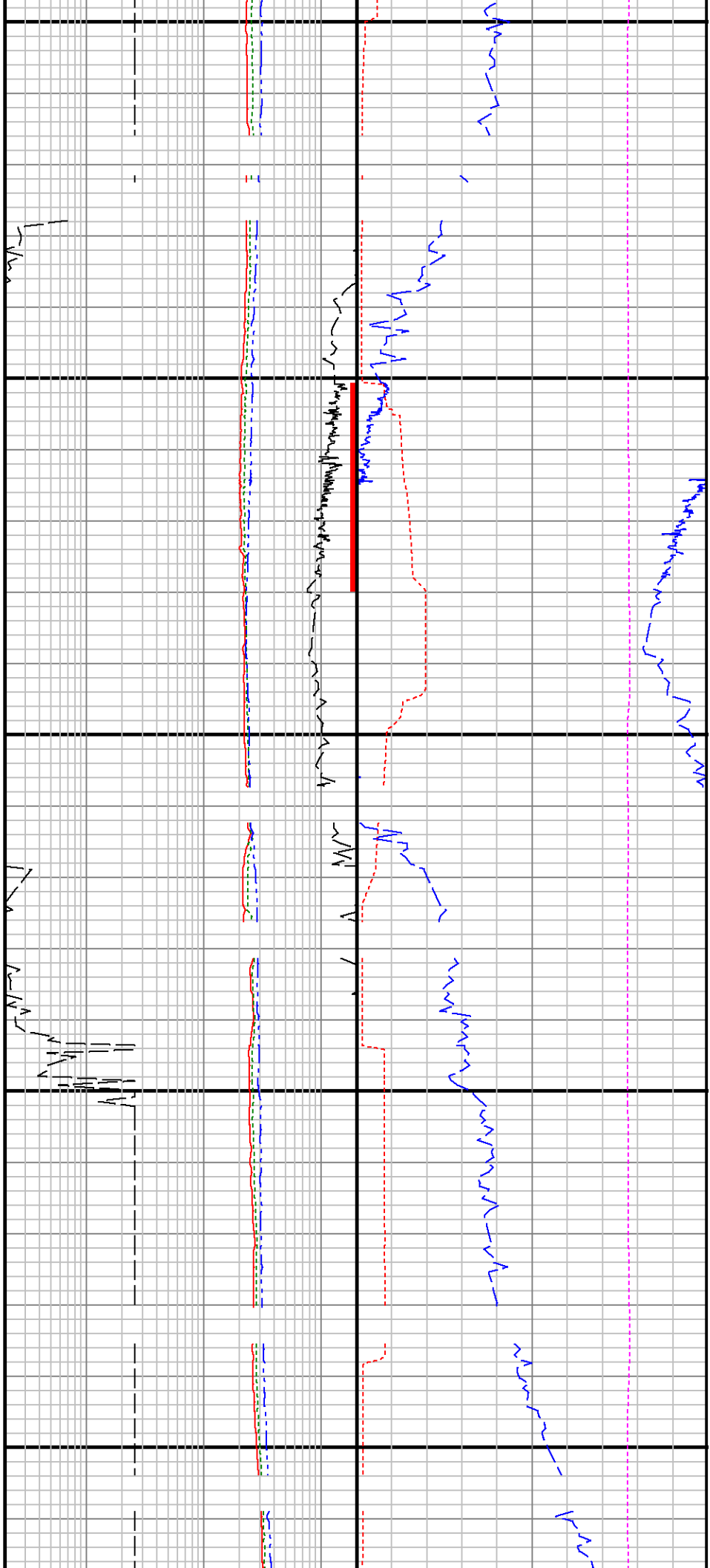


16400

16500



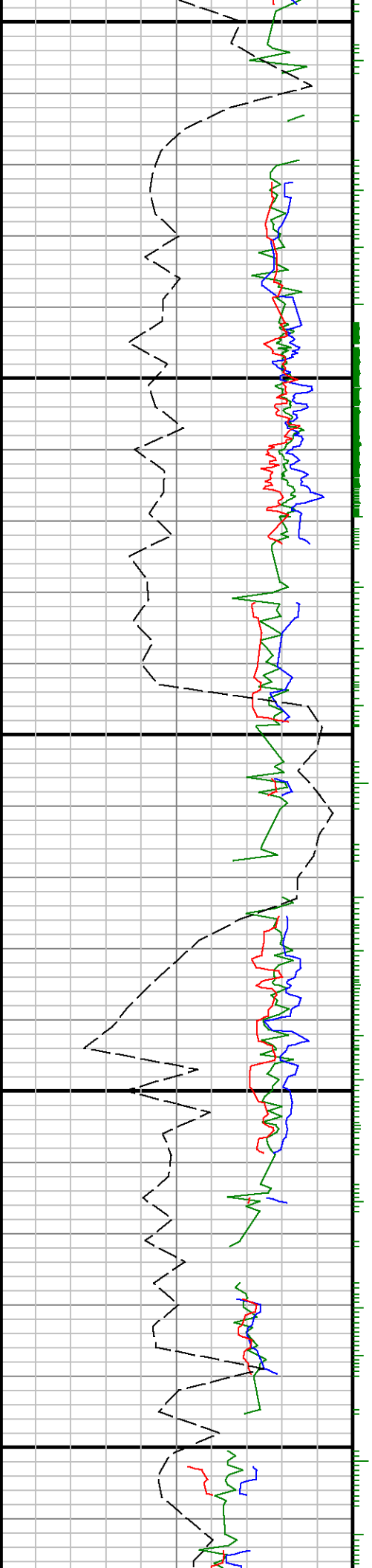


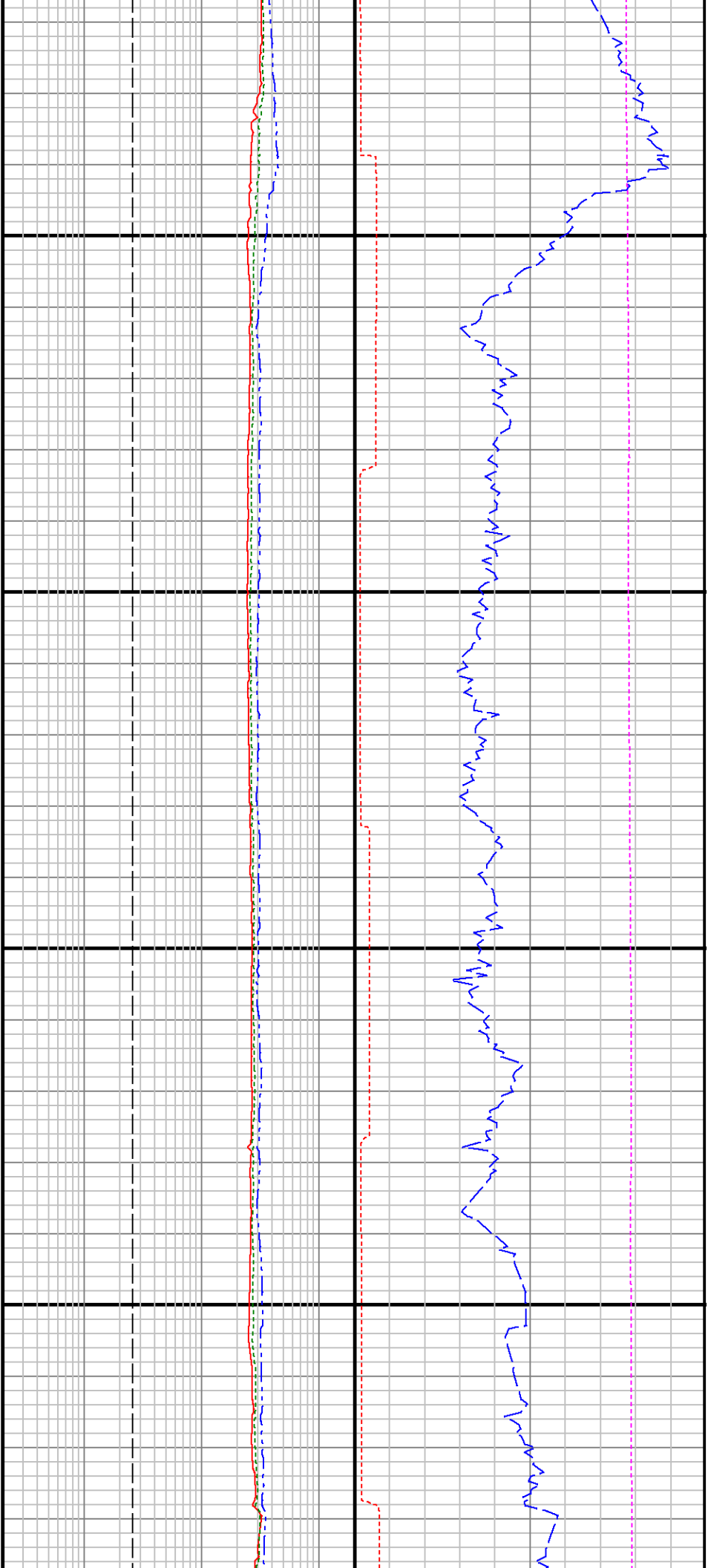


6800

16900

17000





17100

17200

