

ThruBit

A Schlumberger Company

**SPECTRAL DENSITY
DUAL SPACED NEUTRON
GAMMA RAY
MEMORY LOG**

Company SANDRIDGE ENERGY
Well VORNAUF 2-18H
Field STRANATHAN
County HARPER
State KANSAS

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Well VORNAUF 2-18H
Field STRANATHAN
County HARPER State KANSAS

Location: API #: 15-077-21859-0100
300' FNL & 1980' FEL
SEC 7 TWP 35S RGE 7W
Permanent Datum G.L. Elevation 1323'
Log Measured From K.B. 15' ABOVE PERM DATUM
Drilling Measured From K.B.
Other Services
THRUBIT
PORTAL
BIT
Elevation
K.B. 1338'
D.F. 1338'
G.L. 1323'

Date	14 AUG 2012
Run Number	ONE
Depth Driller	11772'
Depth Logger	10181'
Bottom Logged Interval	10164'
Top Log Interval	3300'
Casing Driller	7" @ 5404'
Casing Logger	5395'
Bit Size	6.125"
Type Fluid in Hole	WBHM
Density / Viscosity	9.1 / 28
pH / Fluid Loss	8.0 / 60
Source of Sample	MUD SENSOR
Rm @ Meas. Temp	0.0930OHM @ 65DEGF
Rmf @ Meas. Temp	0.0890OHM @ 65DEGF
Rmc @ Meas. Temp	0.1070OHM @ 65DEGF
Source of Rmf / Rmc	CALCULATED
Rm @ BHT	6.050OHM @ 127DEGF
Time Circulation Stopped	16:00 13AUG2012
Time Logger on Bottom	5:58 14AUG2012
Maximum Recorded Temperature	127DEGF
Equipment Number	T005
Location	OKC,OK
Recorded By	C.PARKER
Witnessed By	A. LEIJA
	B. FRANTOM

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The use of and reliance upon this recorded-data by the herein named company (and any of its affiliates, partners, representatives, agents, consultants and employees) is subject to the terms and conditions agreed upon between ThruBit LLC and the company, including: (a) Restrictions on use of the recorded-data; (b) Disclaimers and waivers of warranties and representations regarding company's use of and reliance upon the recorded-data; and (c) Customer's full and sole responsibility for any inference drawn or decision made in connection with the use of this recorded-data.

Comments

SERVICE: HORIZONTAL PUMP DOWN MEMORY BIT DEPTH: 10117' LOG TO: 3300'
ALL SCALES AND PRESENTATIONS PER CLIENT REQUEST
LIMESTONE MATRIX, 2.71 g/cc, USED FOR POROSITY MEASUREMENTS
TOOLS RAN WITH DECENTRALIZER AND SWIVEL
TBHV REPRESENTS TOTAL BOREHOLE VOLUME, ft3
ABHV REPRESENTS ANNULAR BOREHOLE VOLUME, ft3, CALCULATED FOR 4.5" CASING
USED RIGMINDER WITH PASON TO ACQUIRE LOG DEPTH
CORRELATED TO MWD LOG PROVIDED BY CUSTOMER
BOTTOM INTERVAL NOT LOGGED DUE TO LOST BHA
RIG: UNIT 310
CREW: C.PARKER R.CRESSWELL B.FRANTOM I.HERNANDEZ

Service Ticket No. 1316 API No. 15-077-21859-0100 PGM Ver WARRIOR 7.0

The Well Name, Location, Borehole Description, and / or Cementing Data Furnished by Client

EQUIPMENT DATA

GAMMA RAY		NEUTRON		DENSITY		INDUCTION	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	PS27T	Serial No.	PS27N	Serial No.	PS1D	Serial No.	PS1R
Model No.	PS	Model No.	PS	Model No.	PS	Model No.	PS
Diameter	2.125"	Diameter	2.125"	Diameter	2.125"	Diameter	2.125"

LOGGING DATA

General Data

Pass	Depths		Well Head	Speed	Logging Run Comments
No.	From	To	Pressure	Ft/Min	
ONE	10170'	3300'	0	35 FPM	

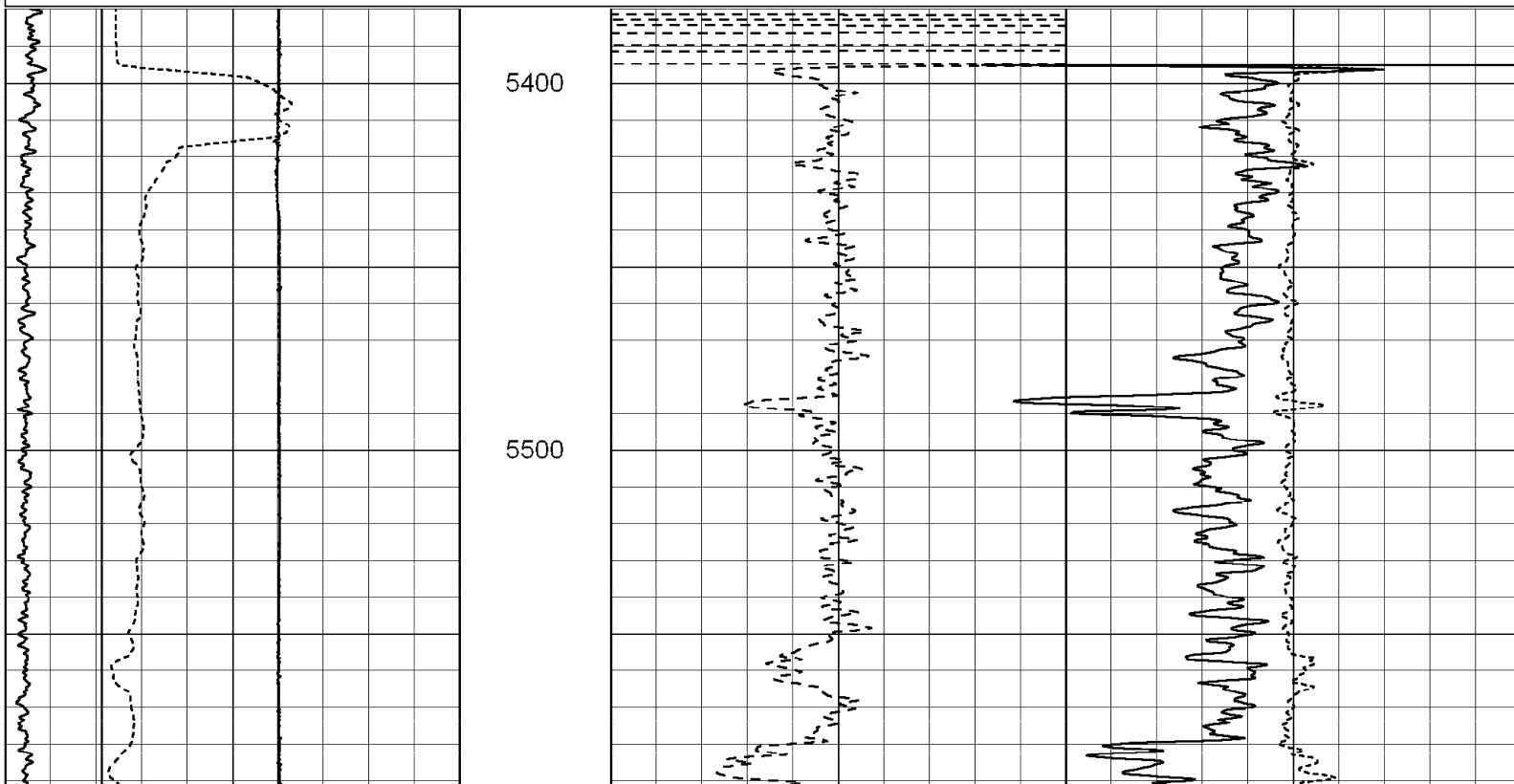
Pass	GAMMA RAY		NEUTRON		DENSITY		INDUCTION	
	Scale		Scale		Scale		Scale	
No.	L	R	L	R	L	R	L	L
ONE	0 API	150 API	30%	-10%	30%	-10%	0.2 OHMM	2000 OHMM

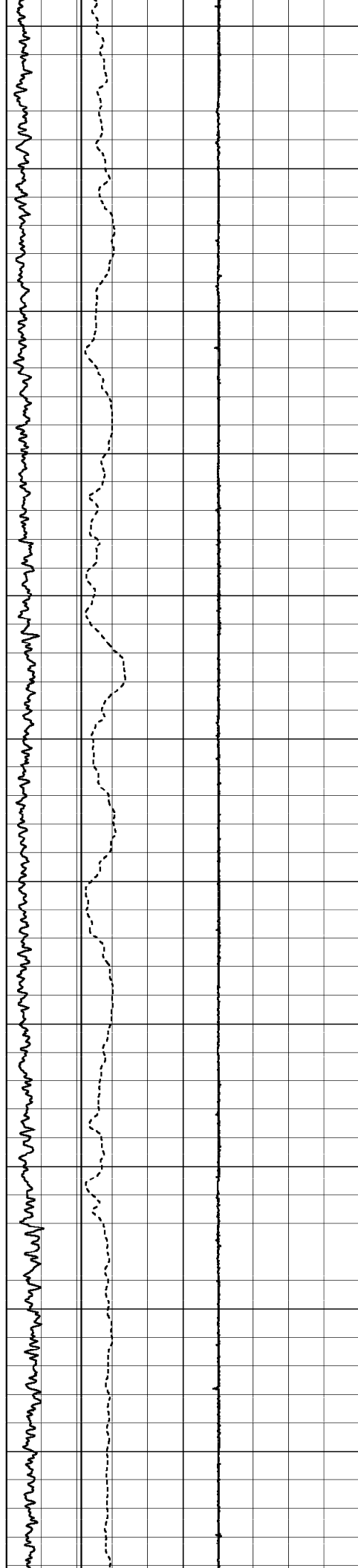
DIRECTIONAL INFORMATION

Maximum Deviation	93.04	deg. @	9538'	KOP	4010'	

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 Dataset Pathname: proc1/pass1.5
 Presentation Format: 6_2n_chk
 Dataset Creation: Tue Aug 14 13:46:30 2012 by Calc Thrubit 110523
 Charted by: Depth in Feet scaled 1:600

0	GR (GAPI)	150	0	PEF (barn)	10	-0.5	DRHO (g/cc)	0.5
4	DCAL (in)	14	2	RHOB (g/cc)				3
4	BOREID (in)	14						
-5	ACCY	5						





5600

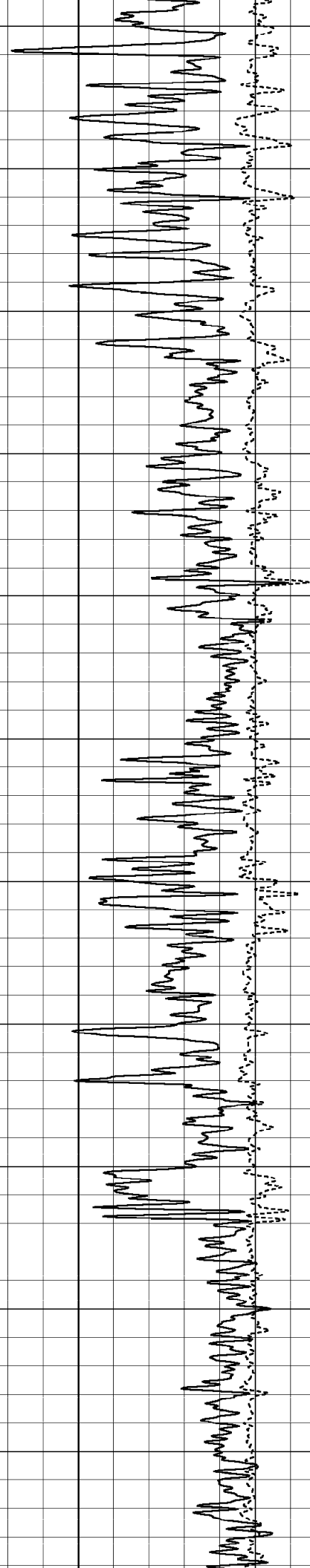
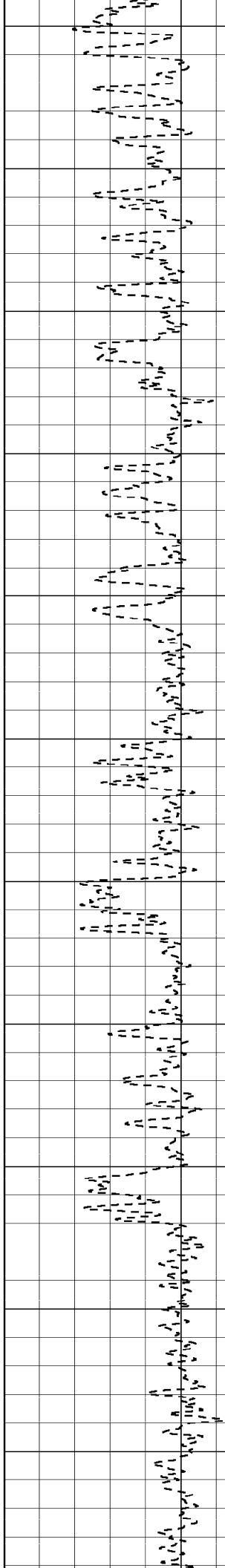
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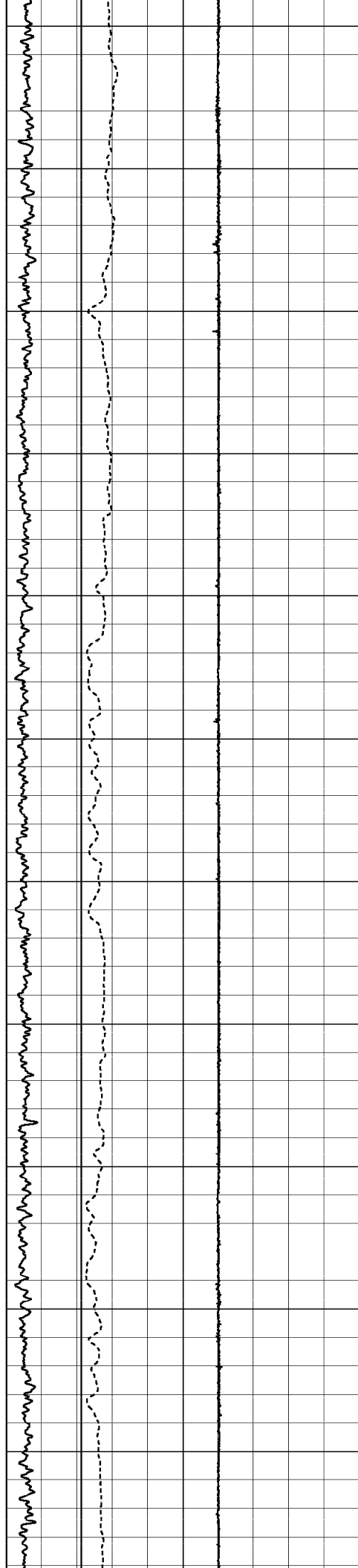
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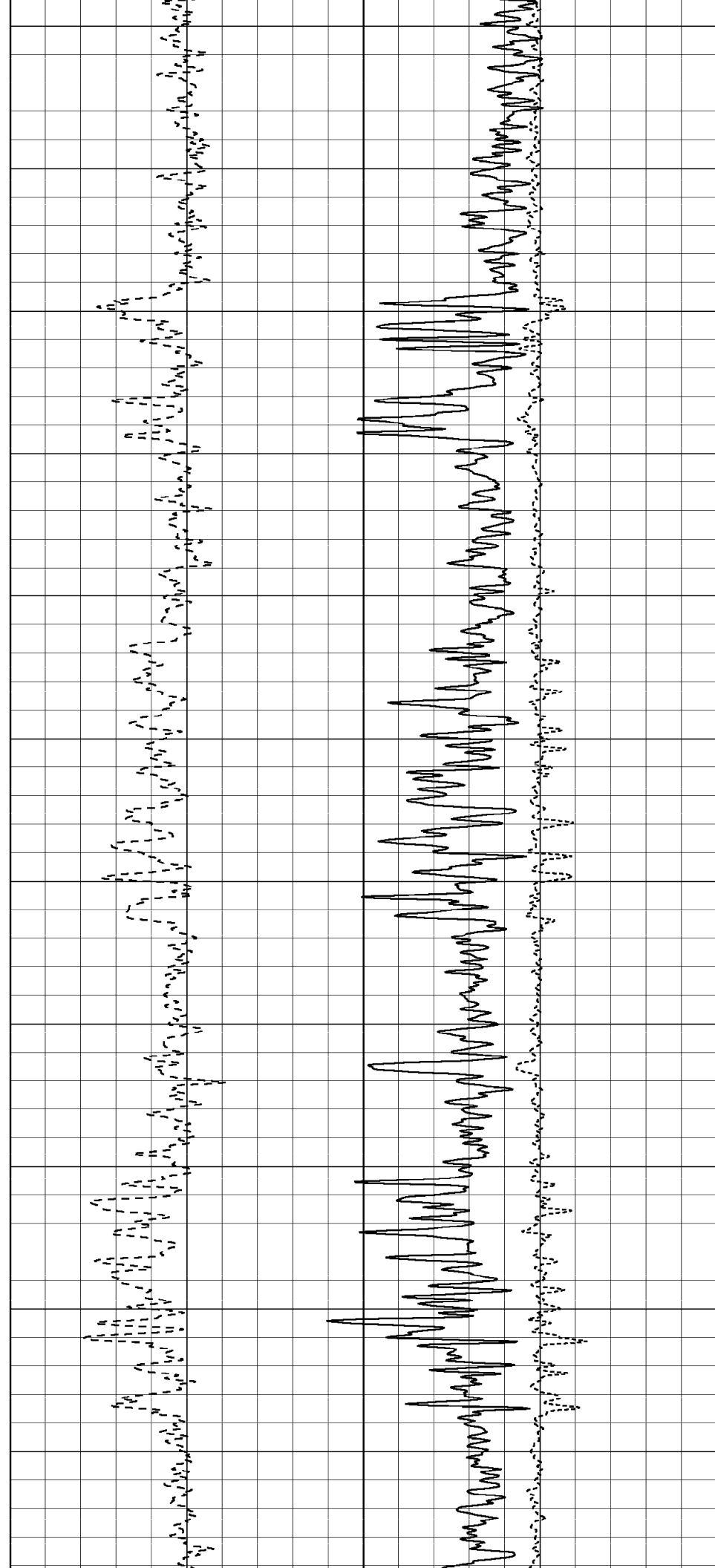
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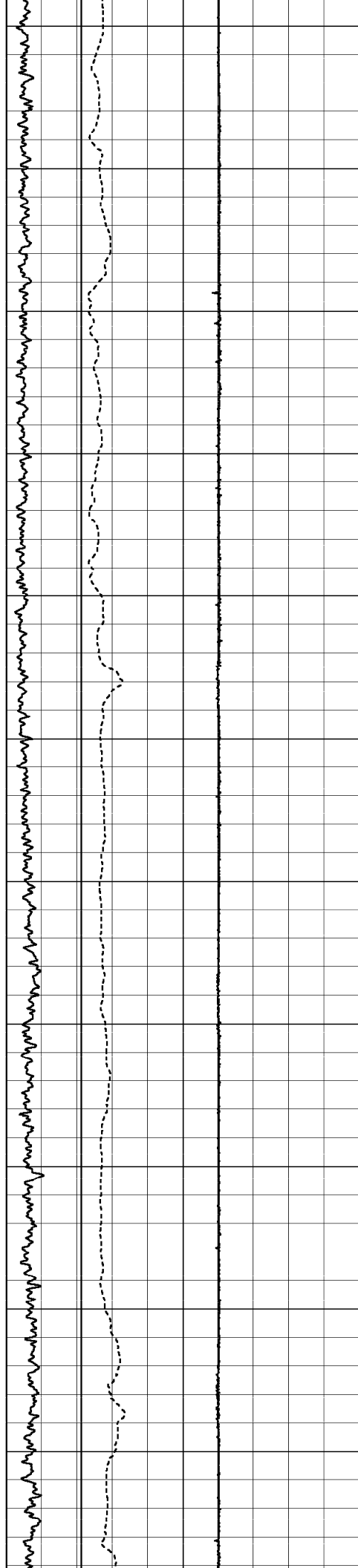
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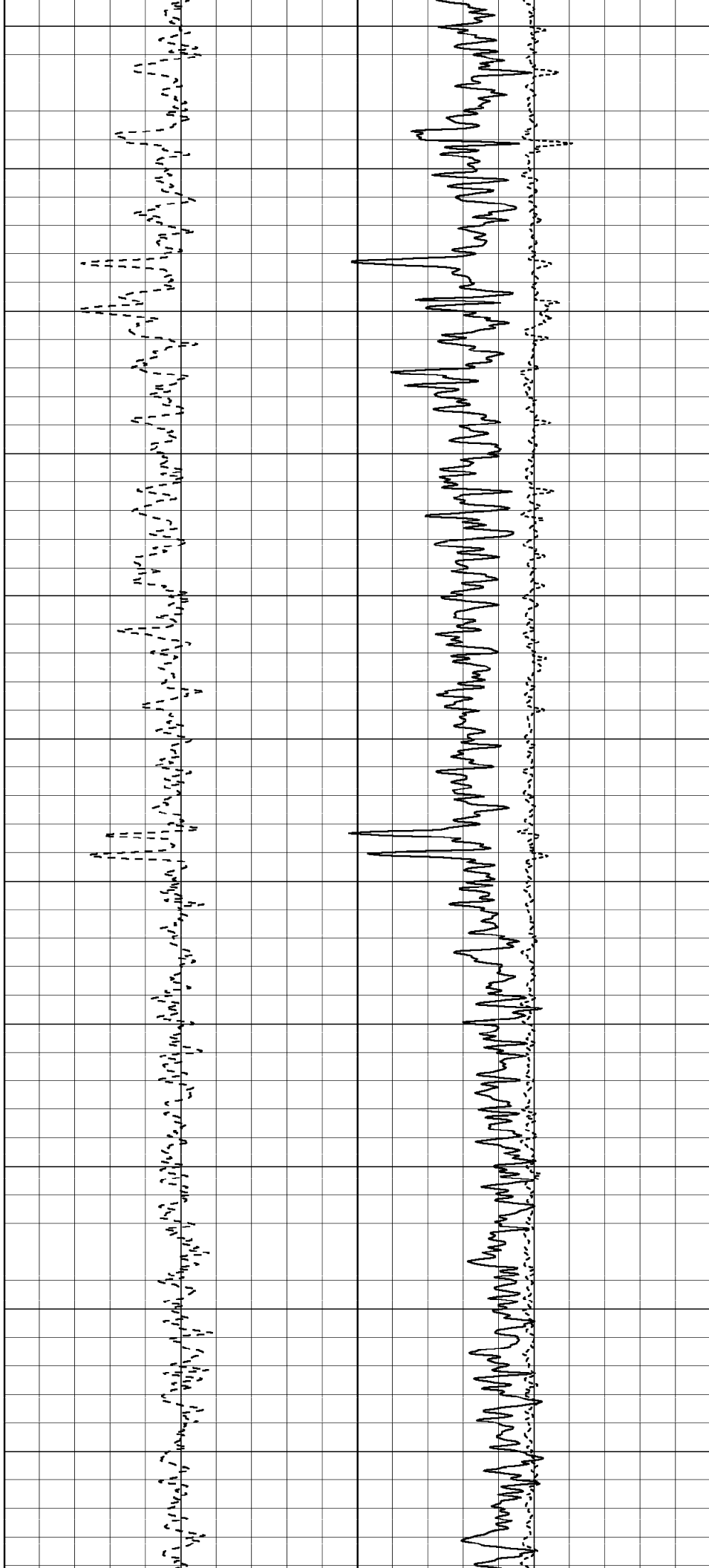
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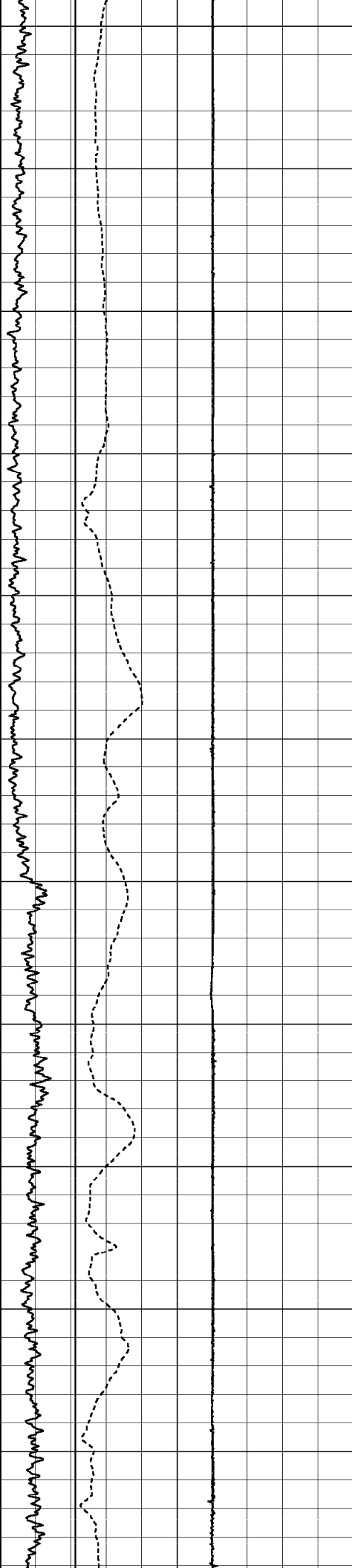
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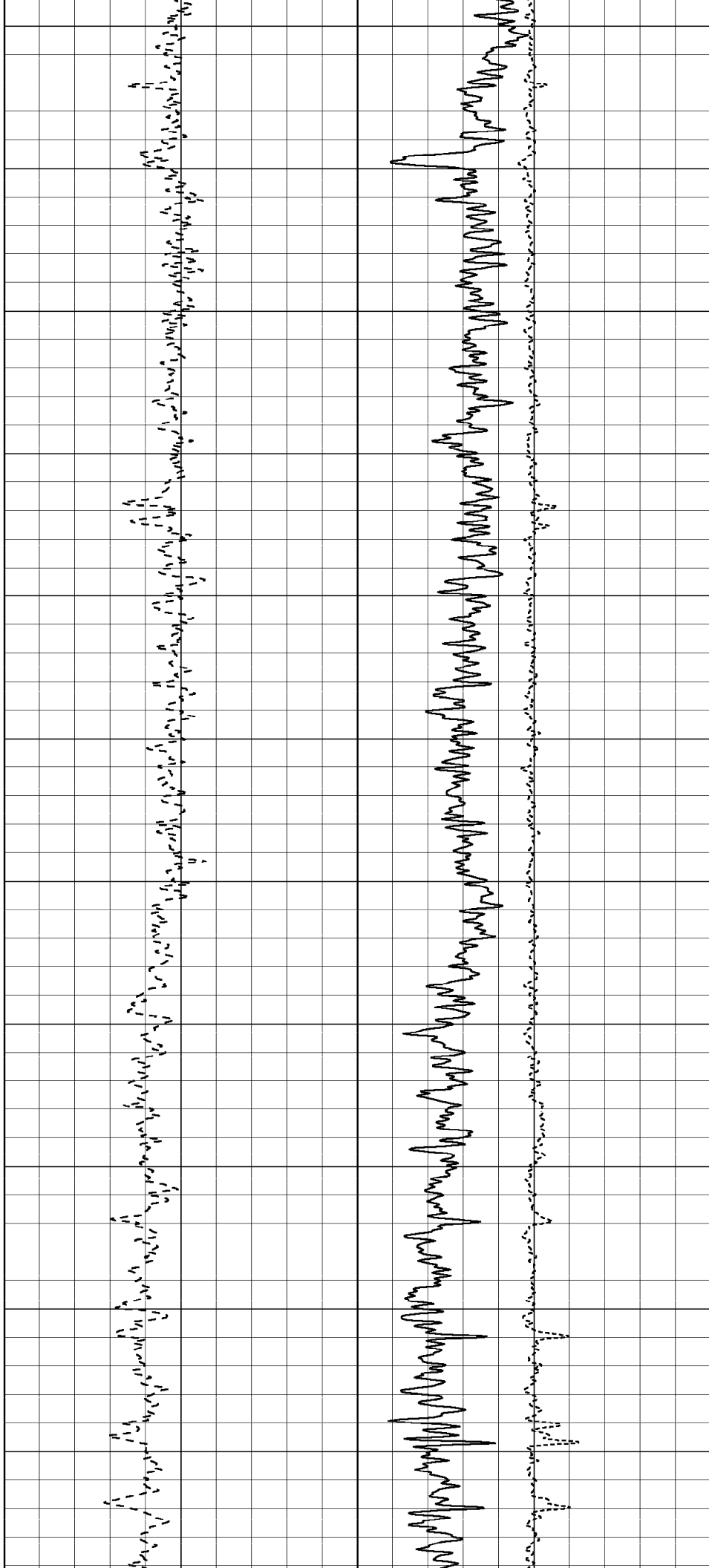
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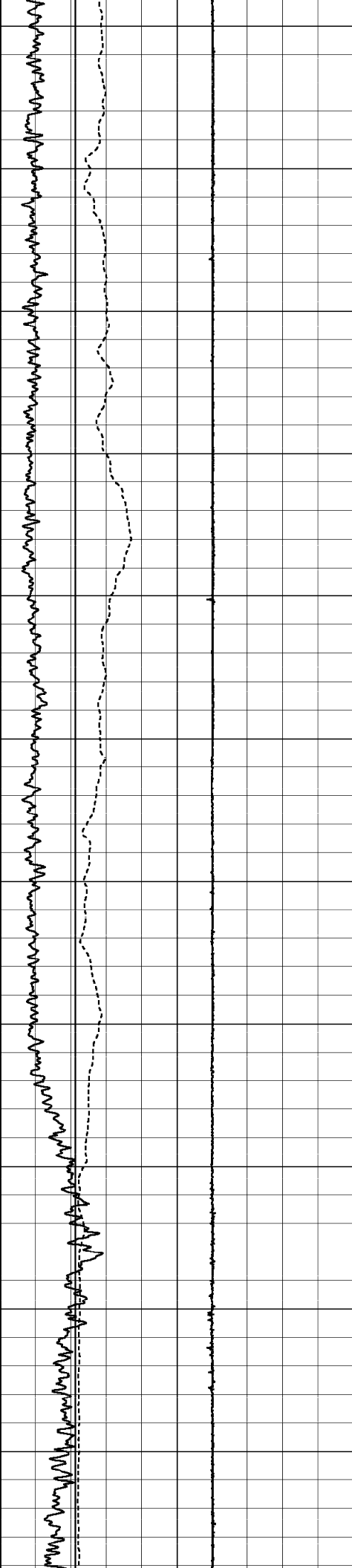
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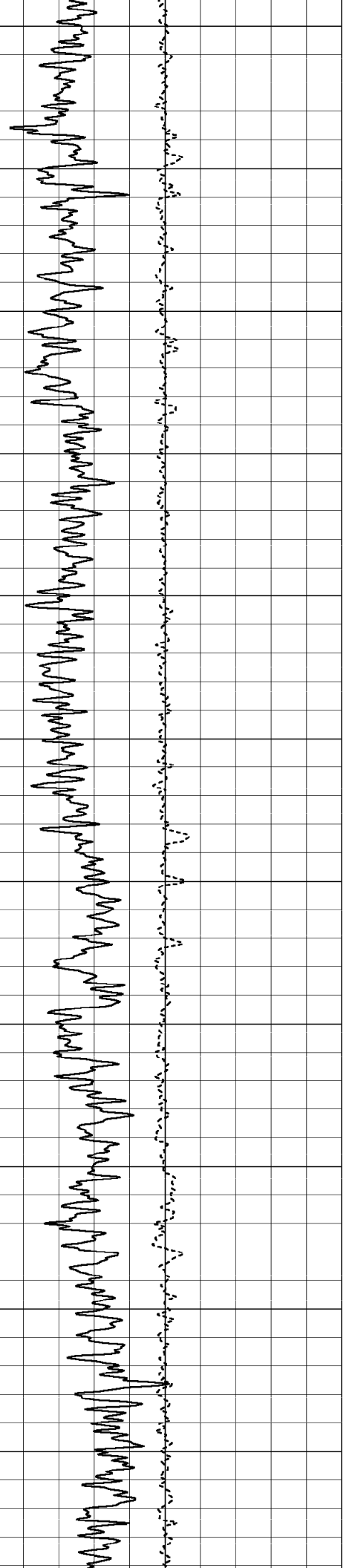
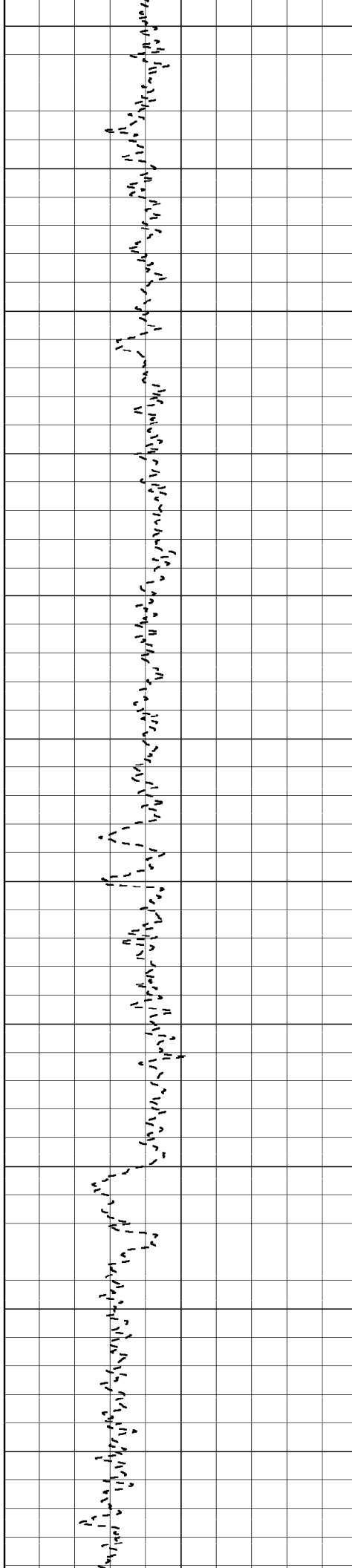
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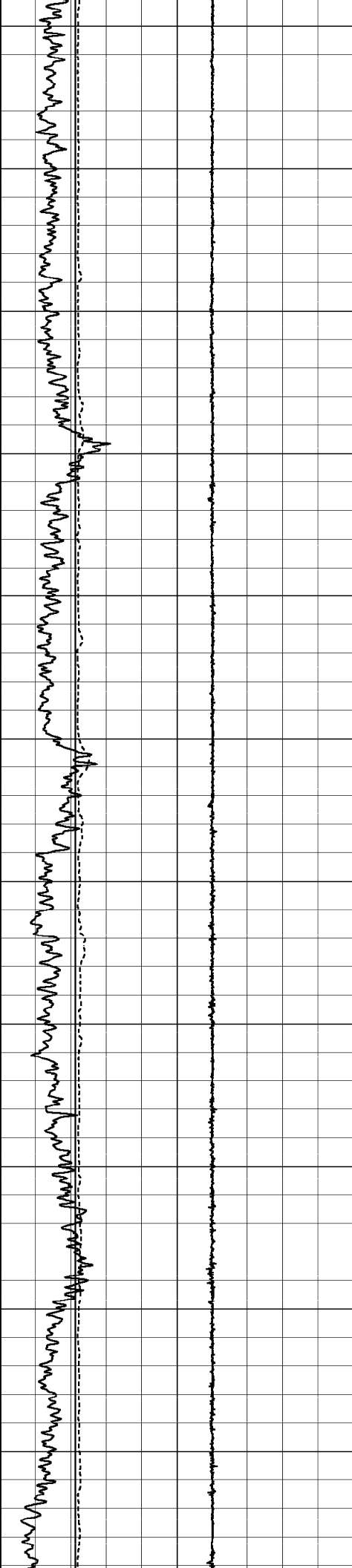
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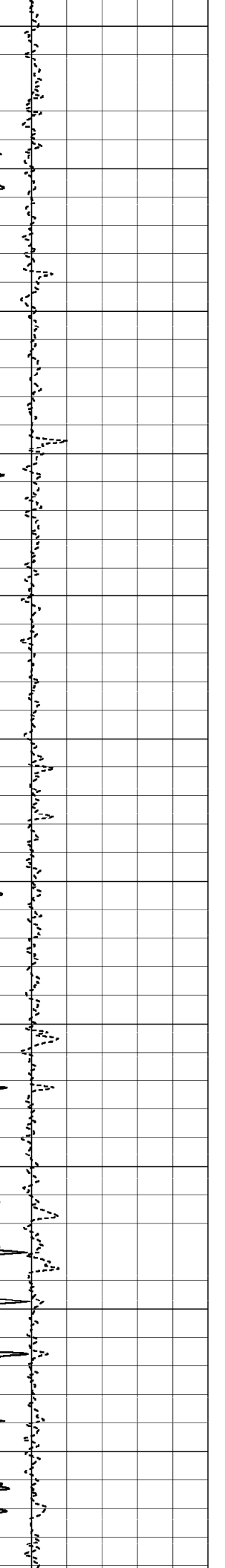
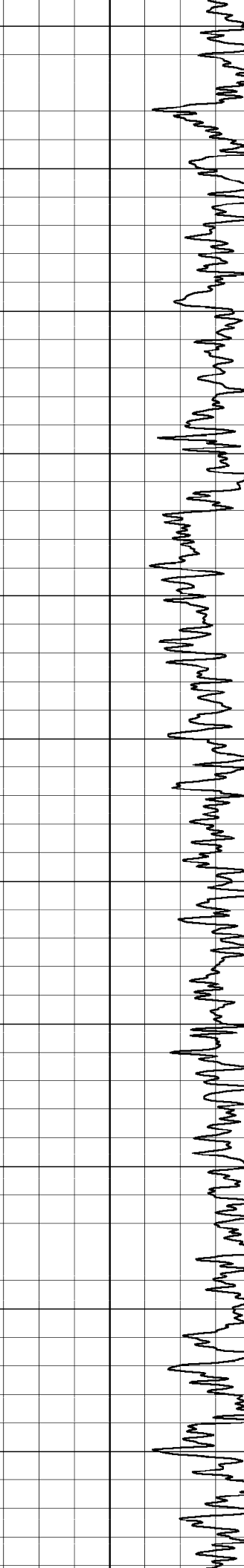
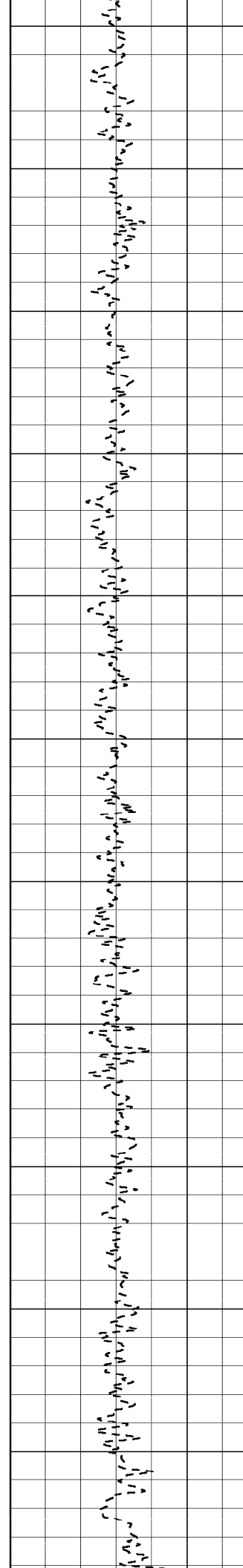
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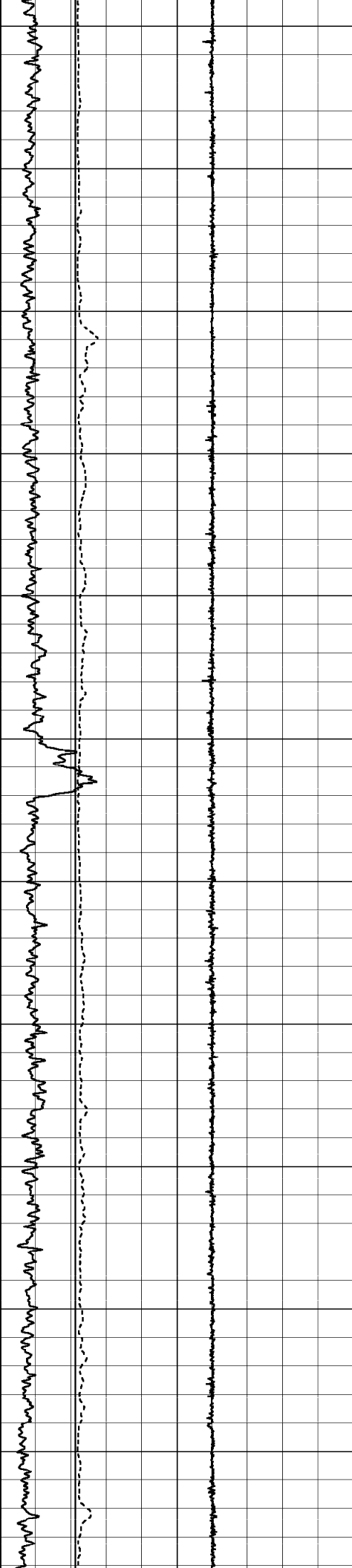
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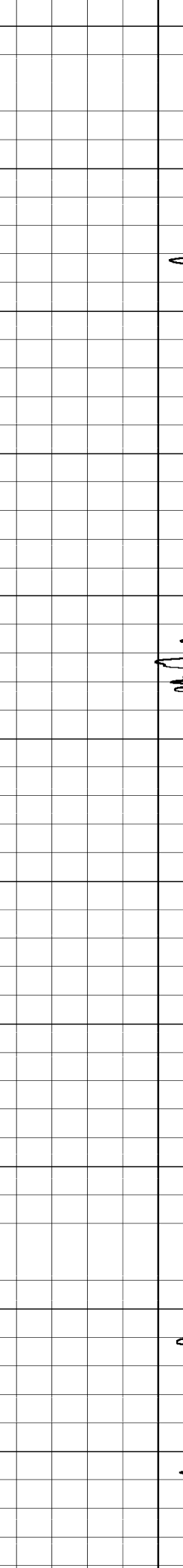
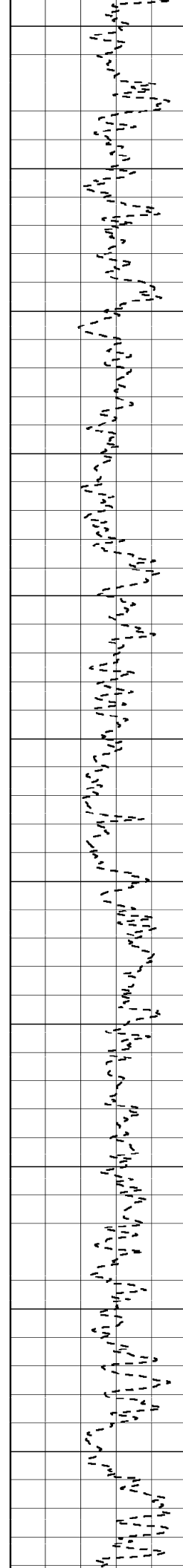
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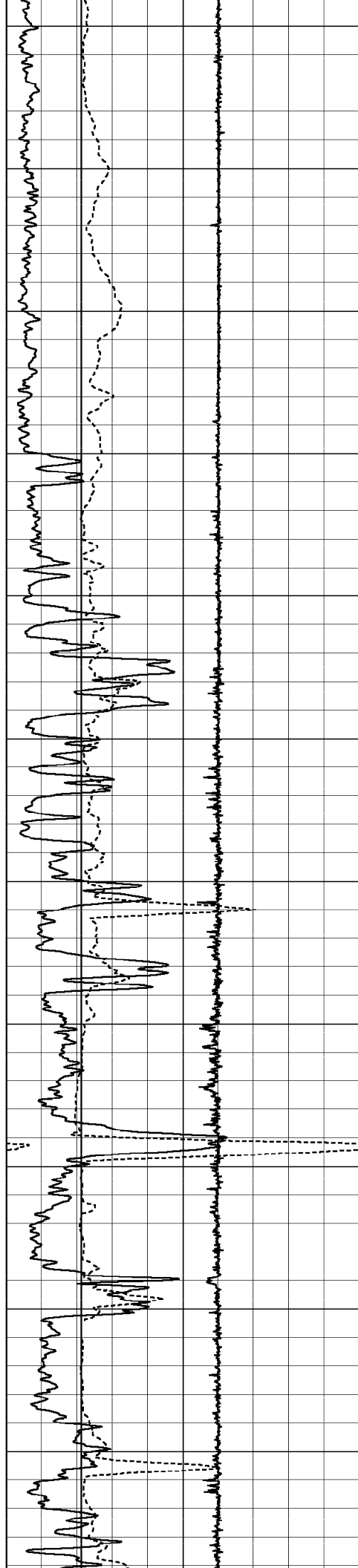
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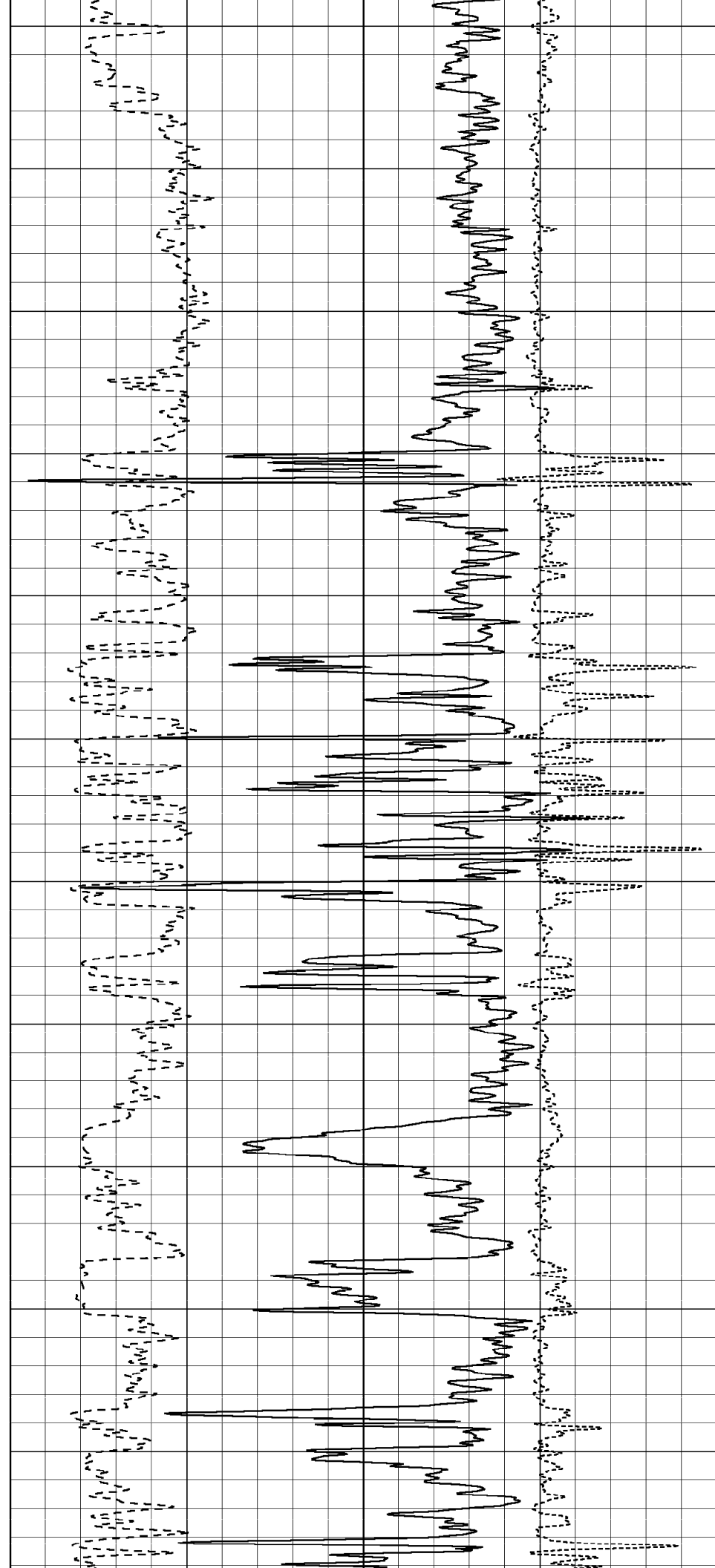
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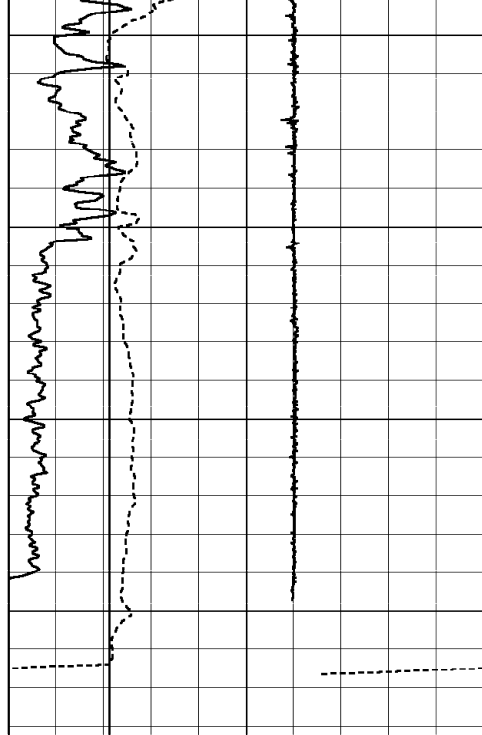
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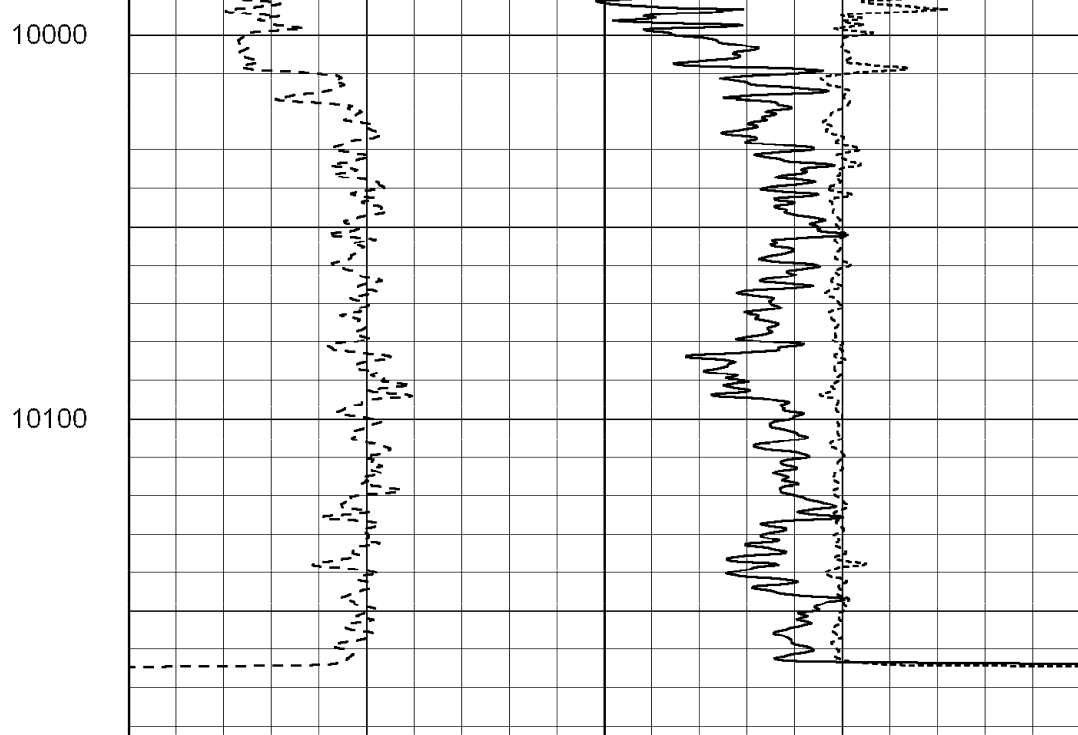
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0	GR (GAPI)	150
4	DCAL (in)	14
4	BOREID (in)	14
-5	ACCY	5



0	PEF (barn)	10	-0.5	DRHO (g/cc)	0.5
2	RHOB (g/cc)				3



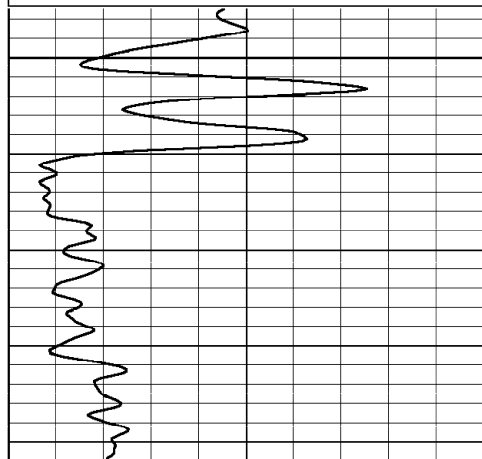
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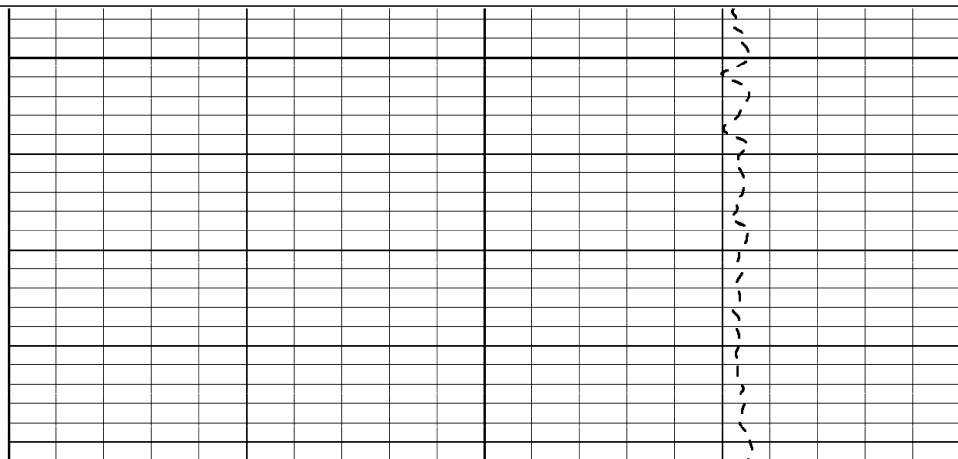
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4	BOREID (in)	14
0	GR (GAPI)	150
-5	ACCY	5

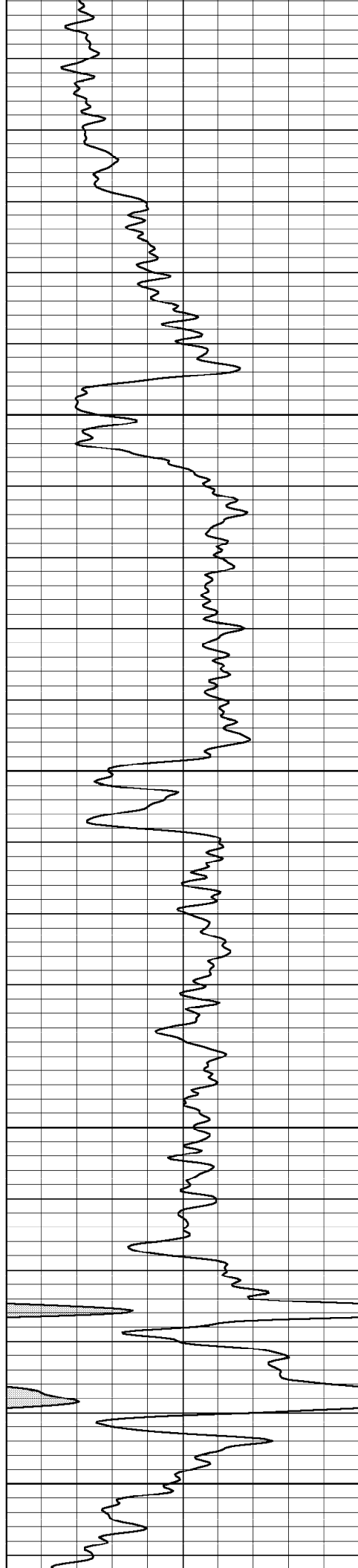
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30	DPHI (pu)		-10		
0	PEF (barn)	10	-0.5	DRHO (g/cc)	0.5
ABHV (ft3)					

TBHV (ft3)



3300





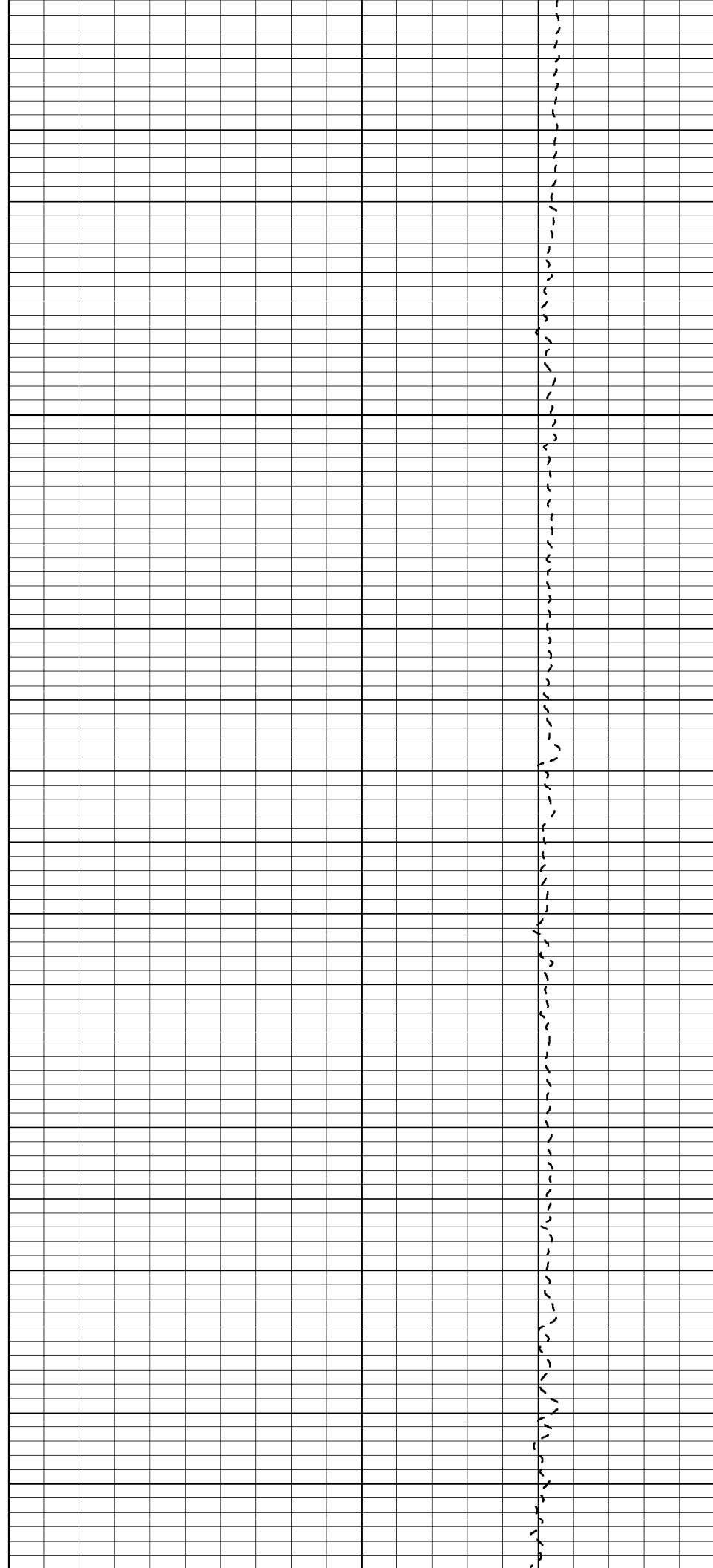
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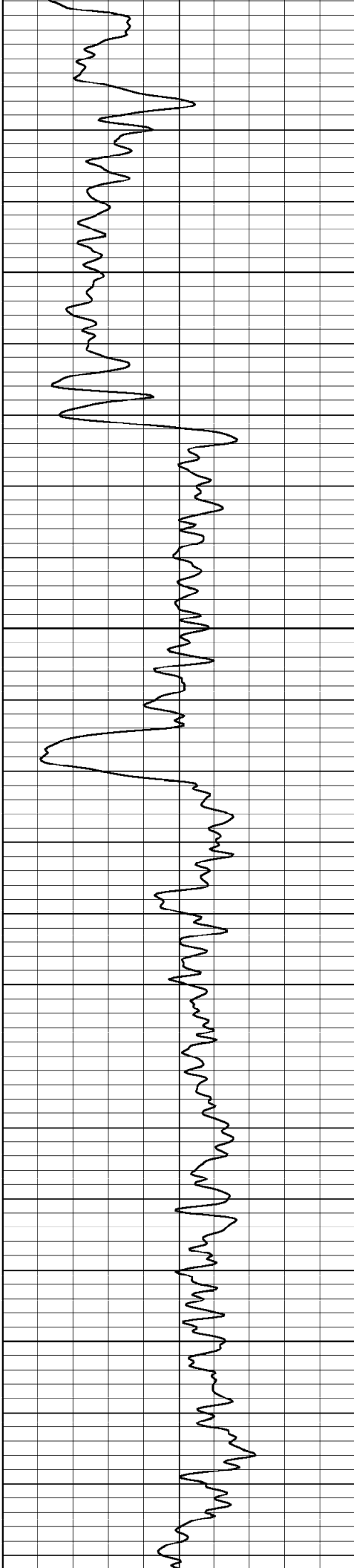
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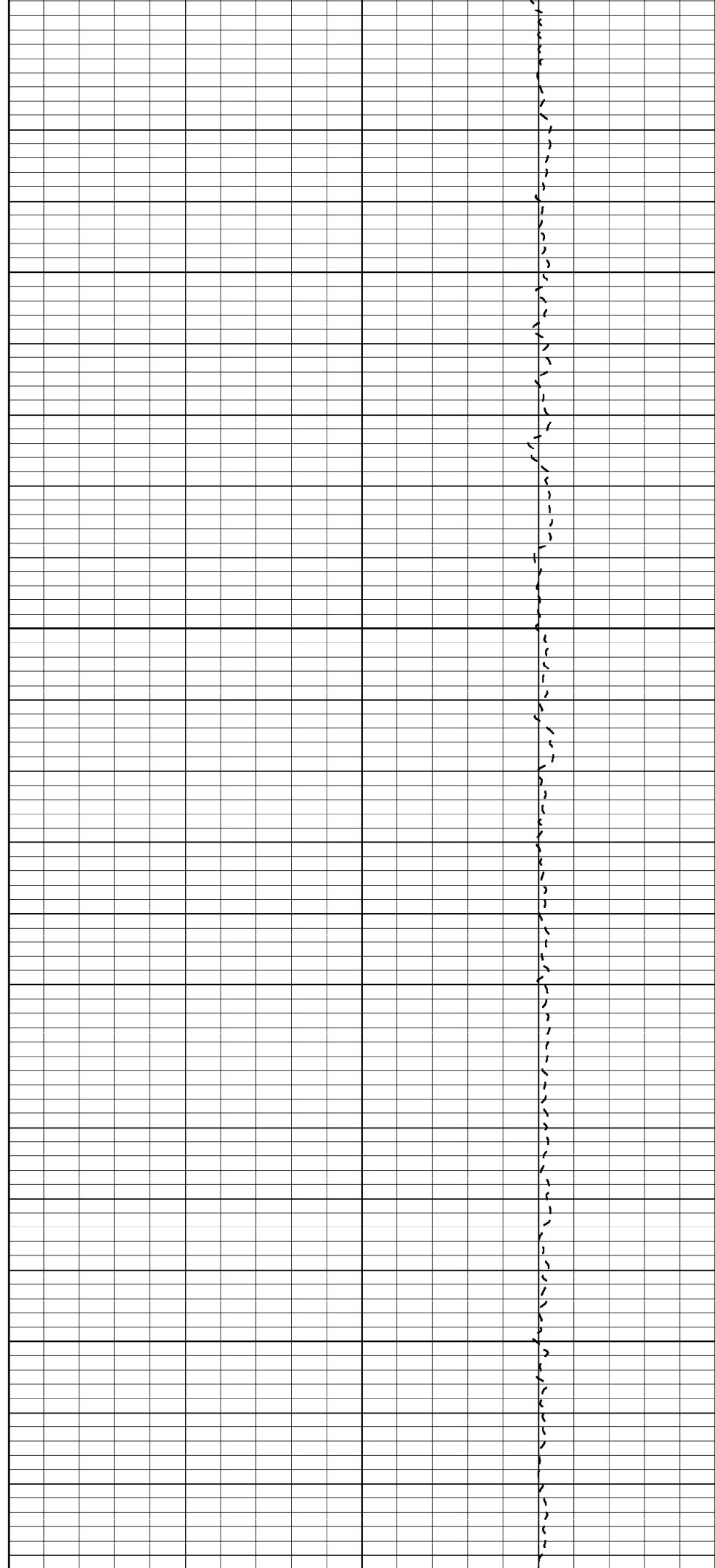


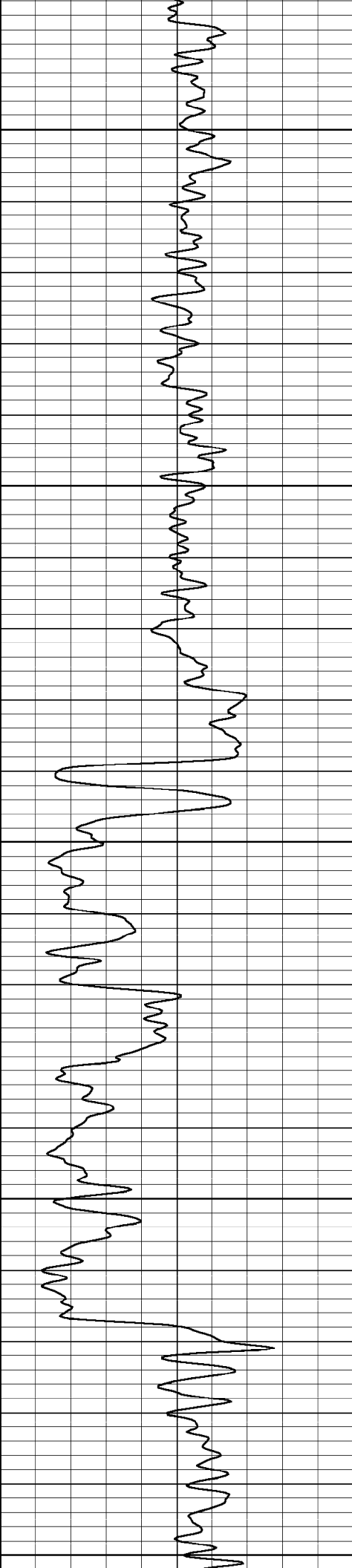
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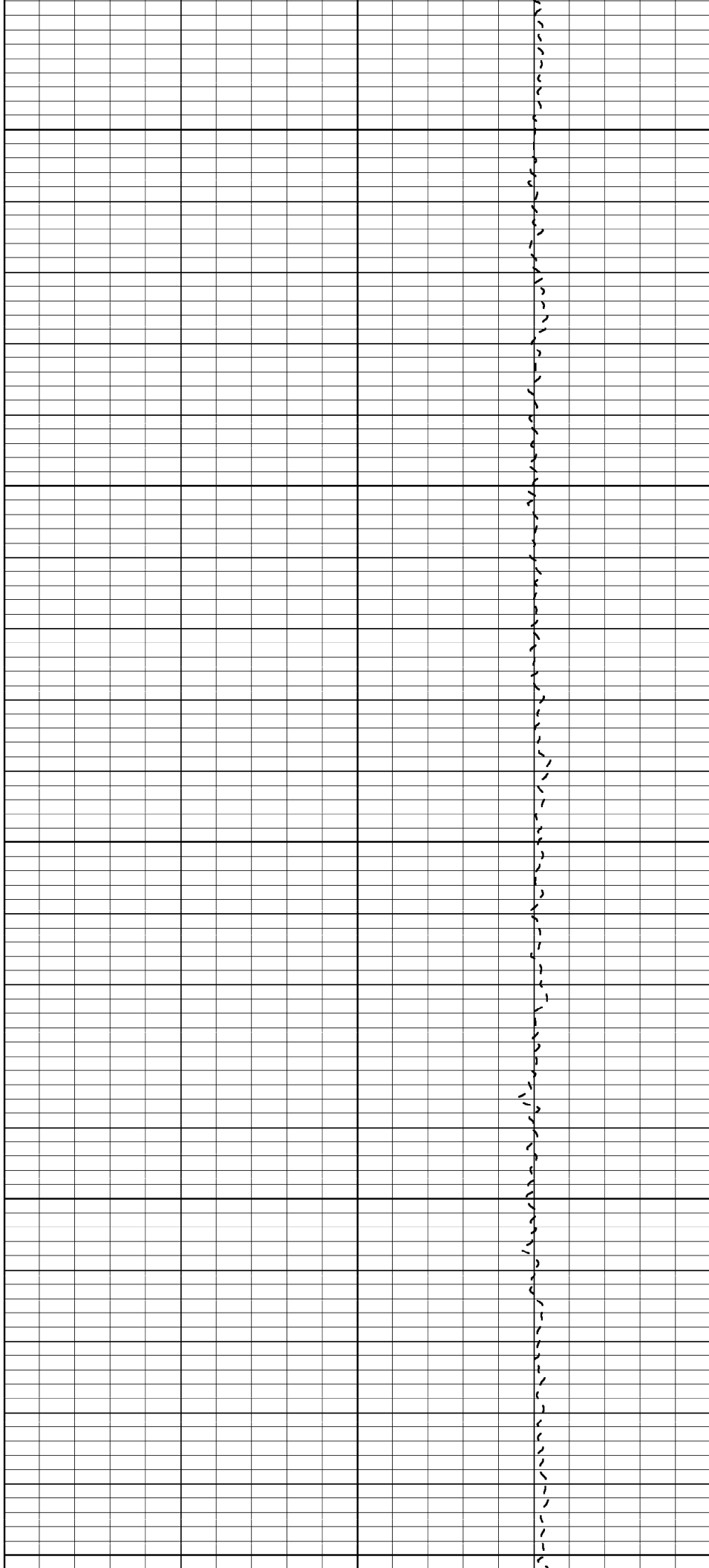
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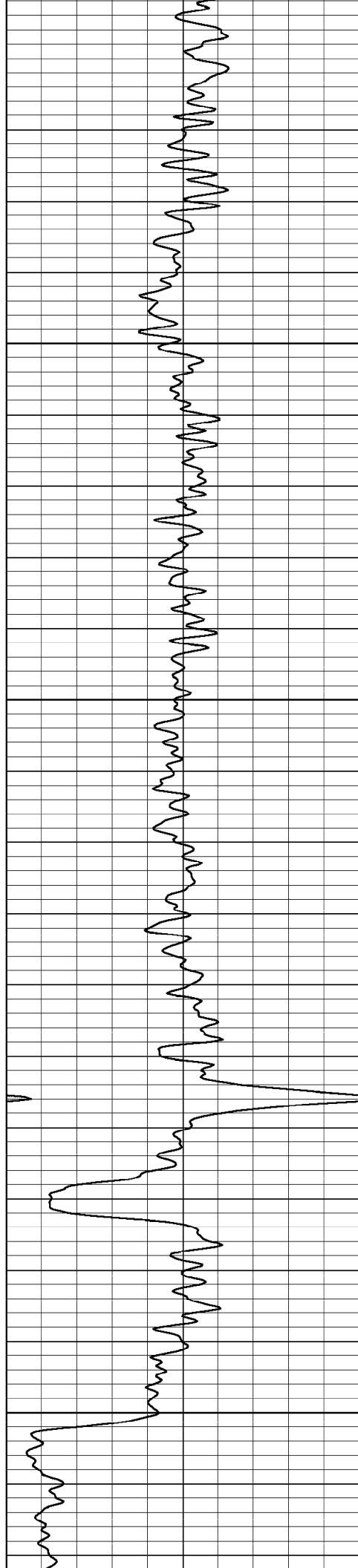
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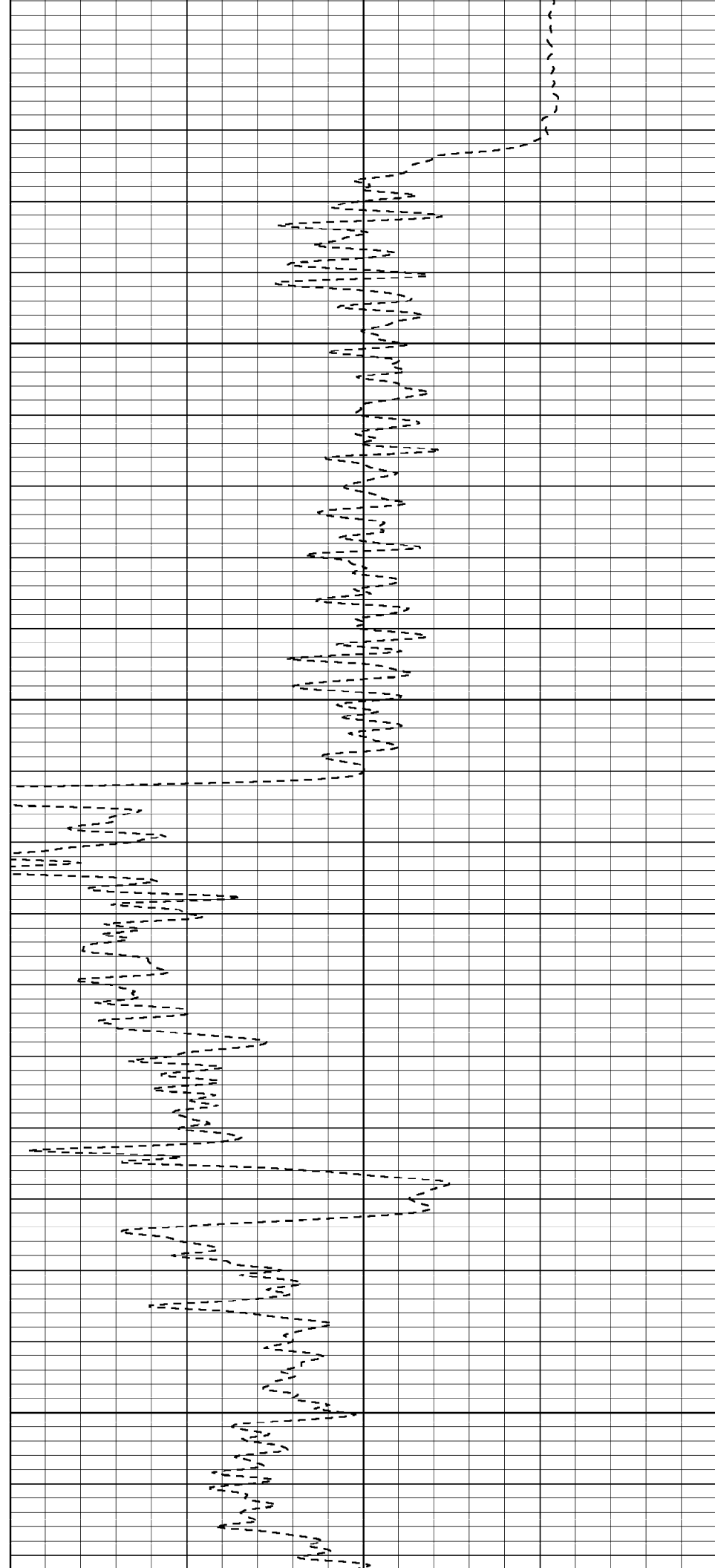


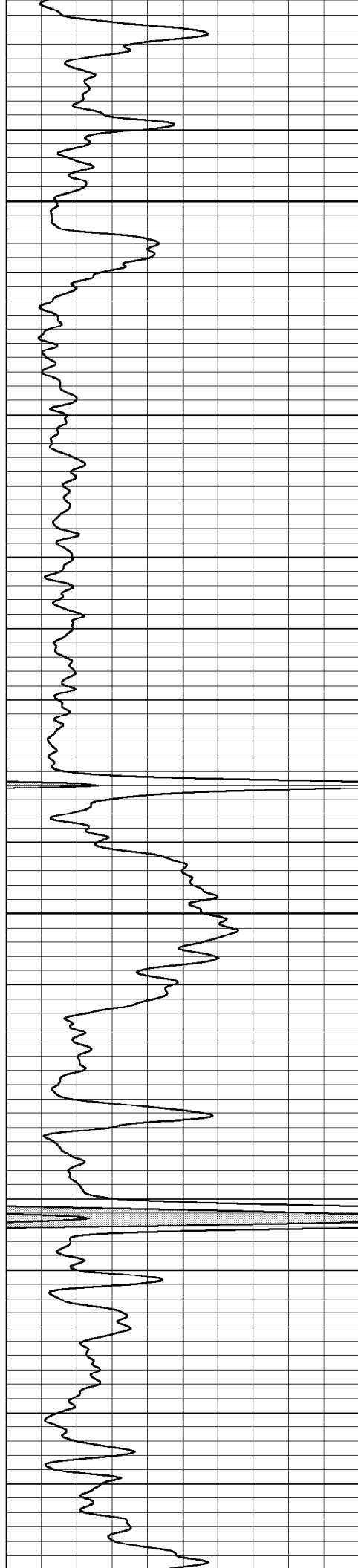
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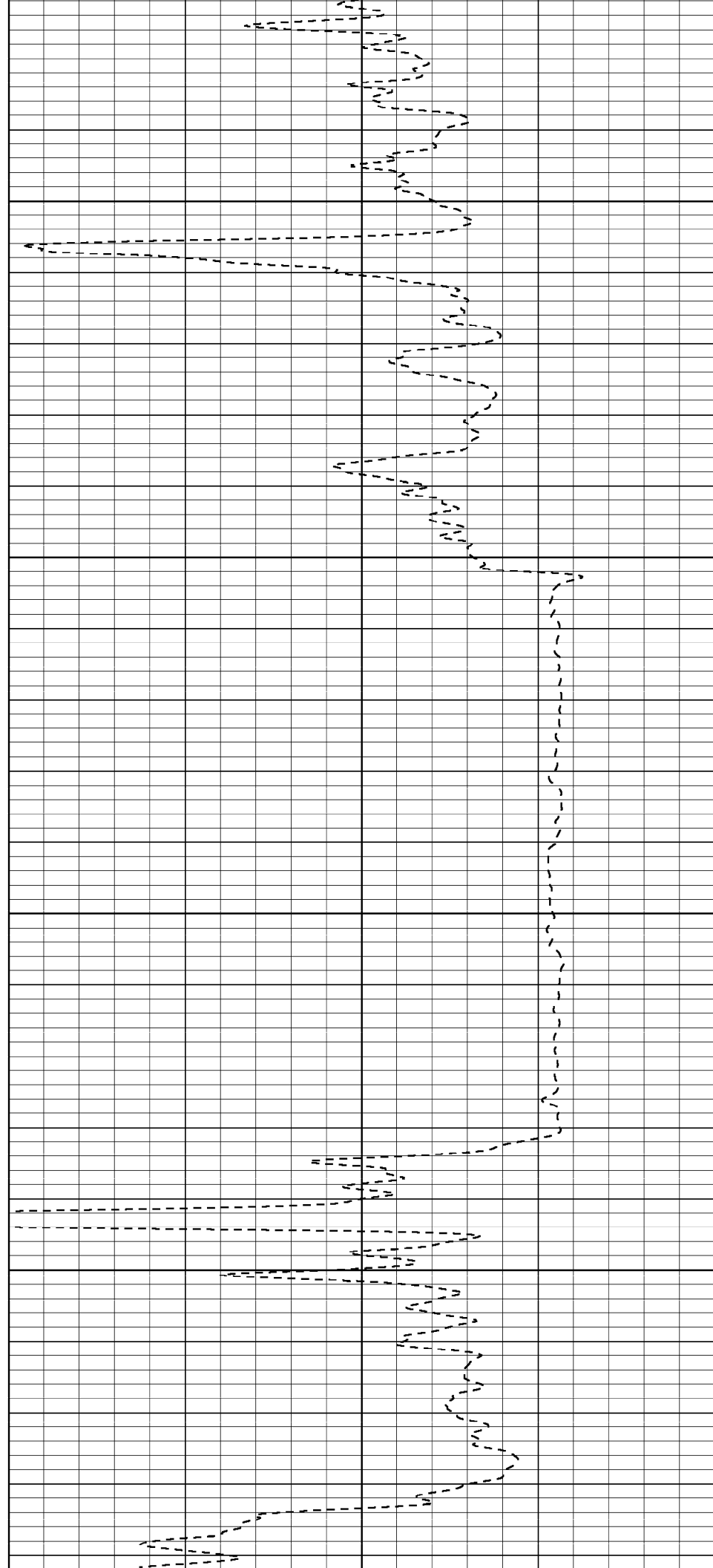


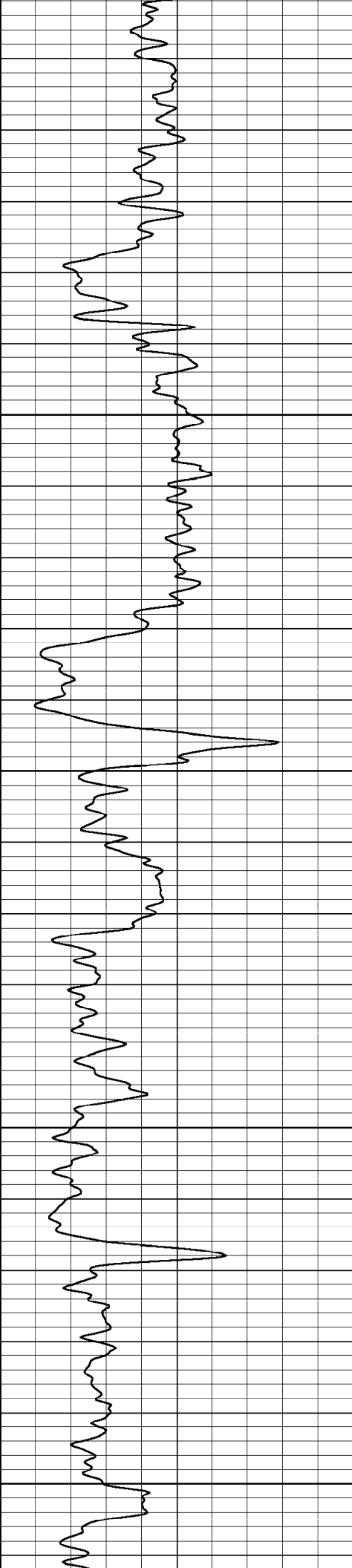
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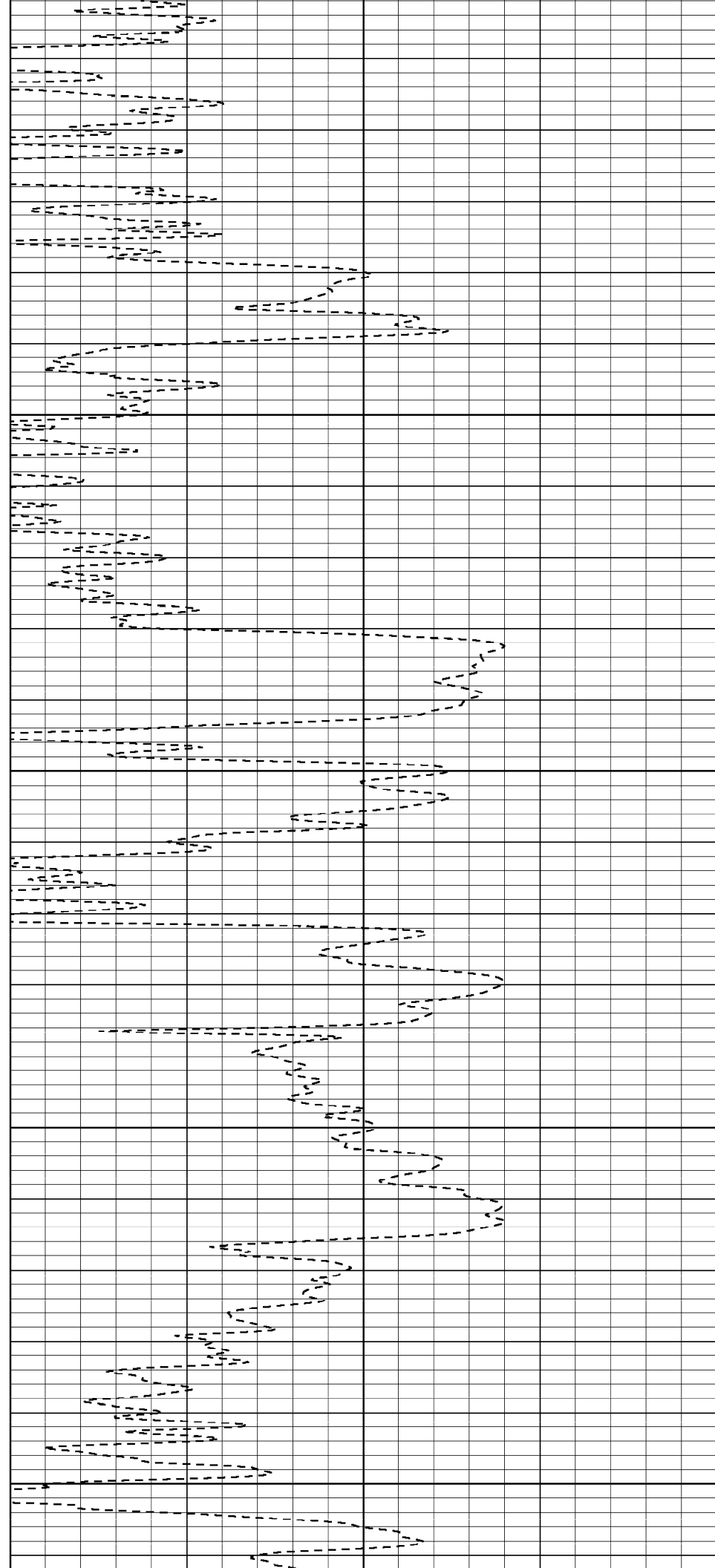
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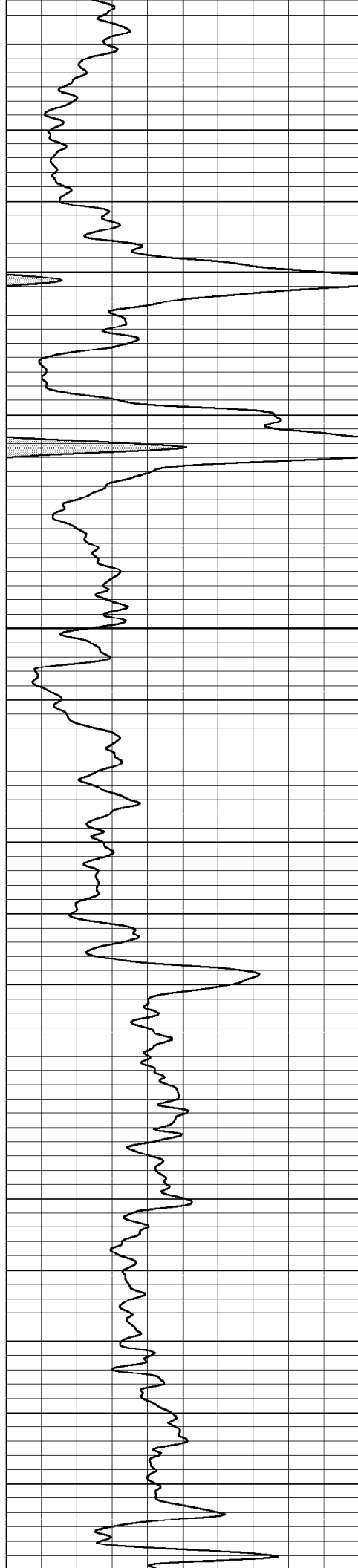
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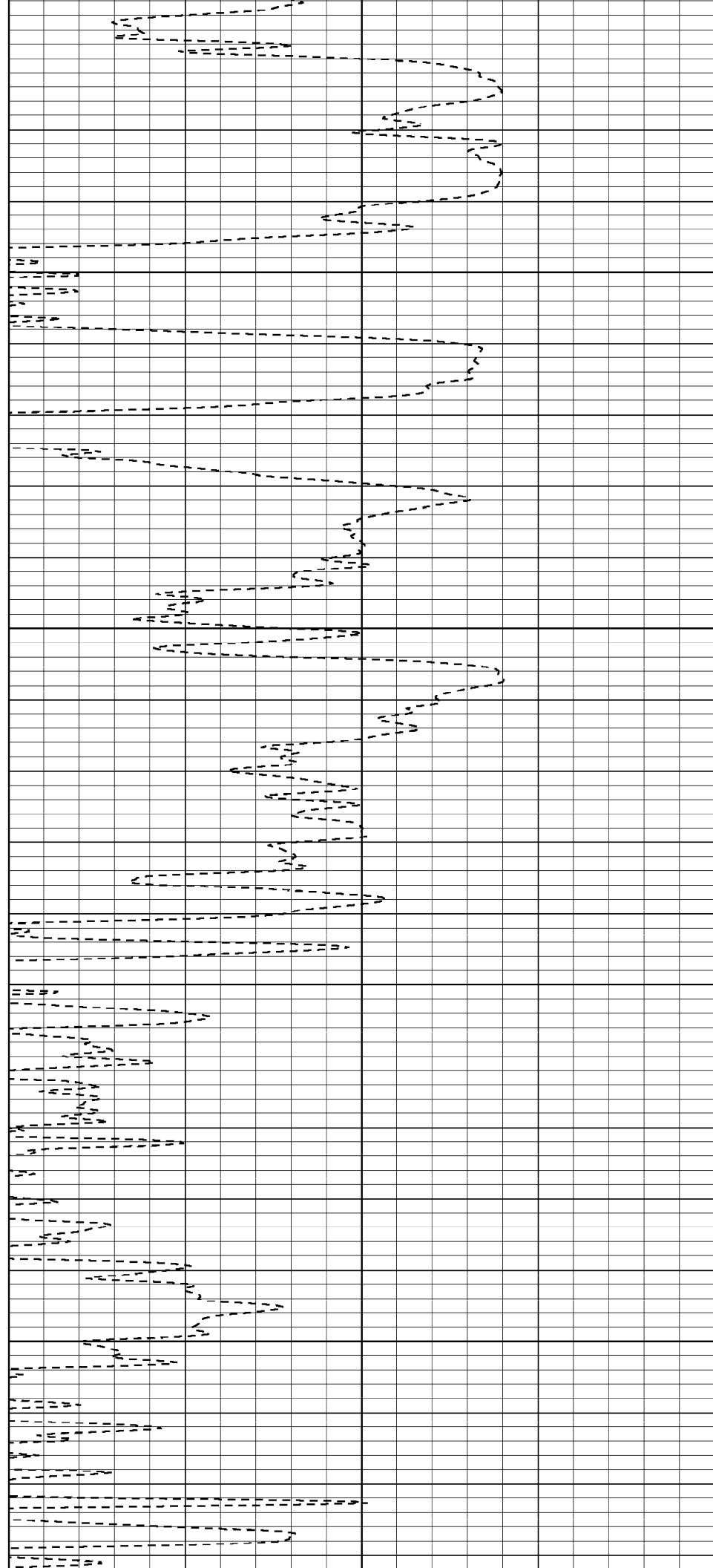


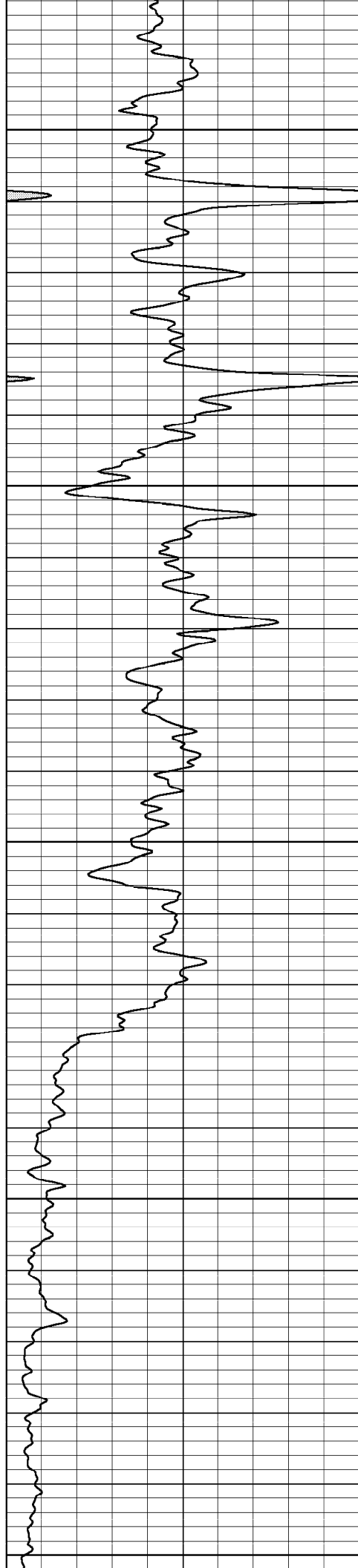
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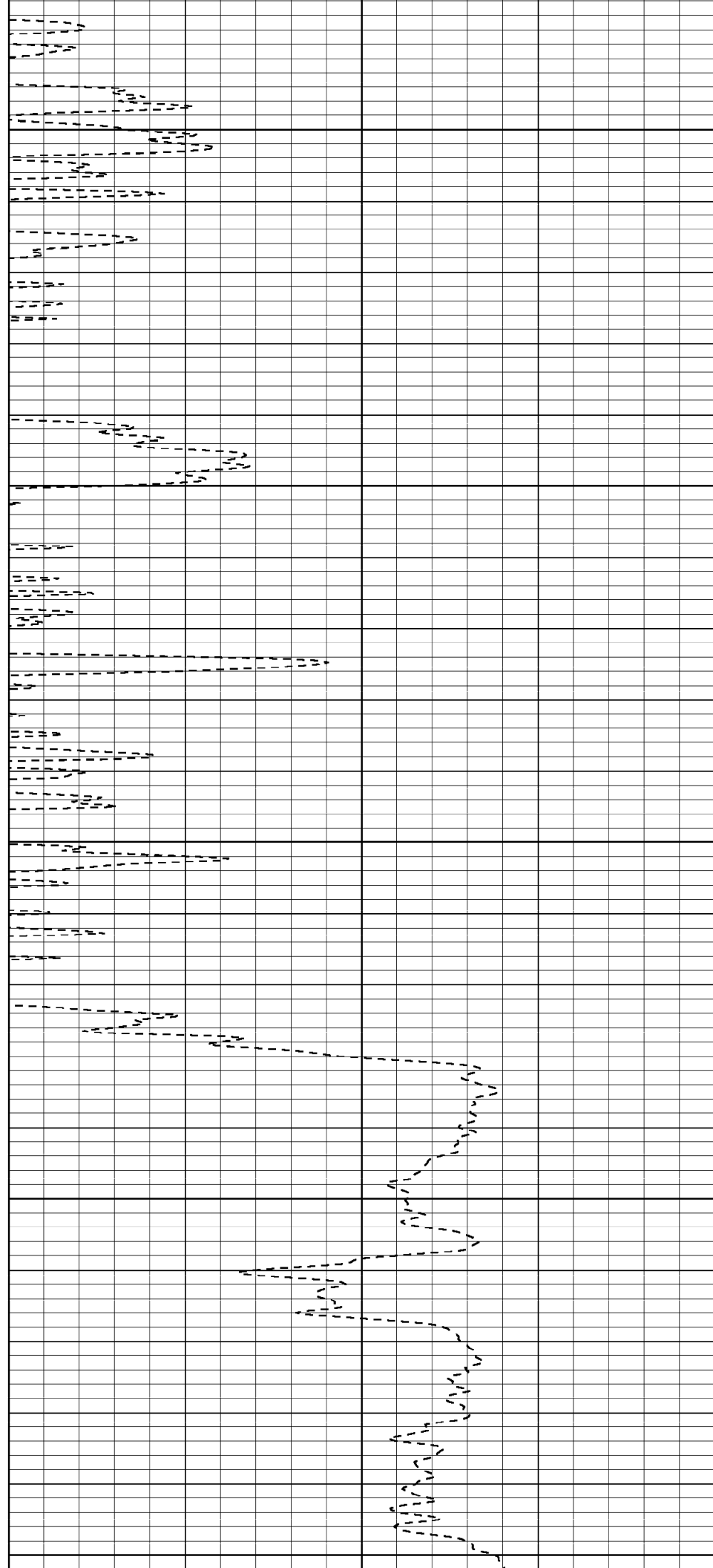
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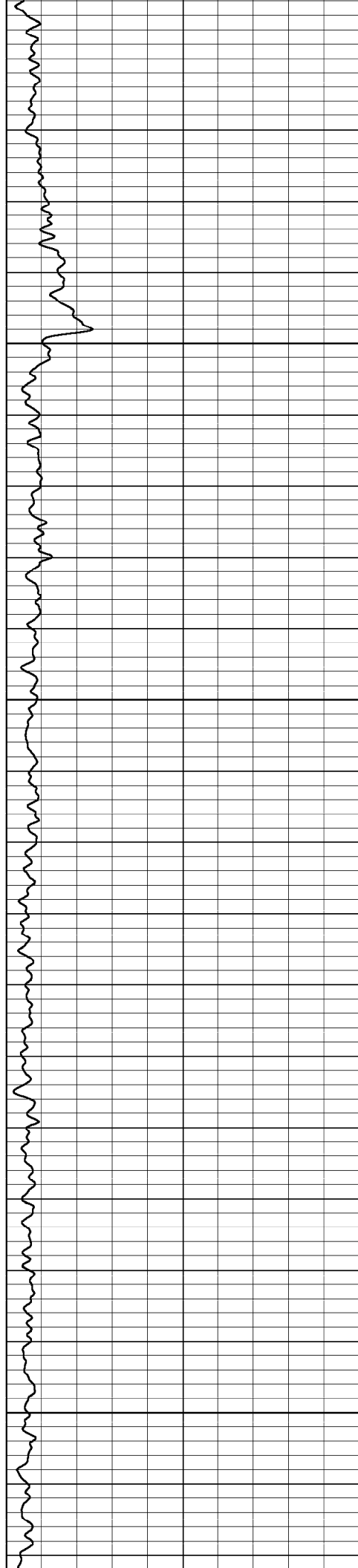
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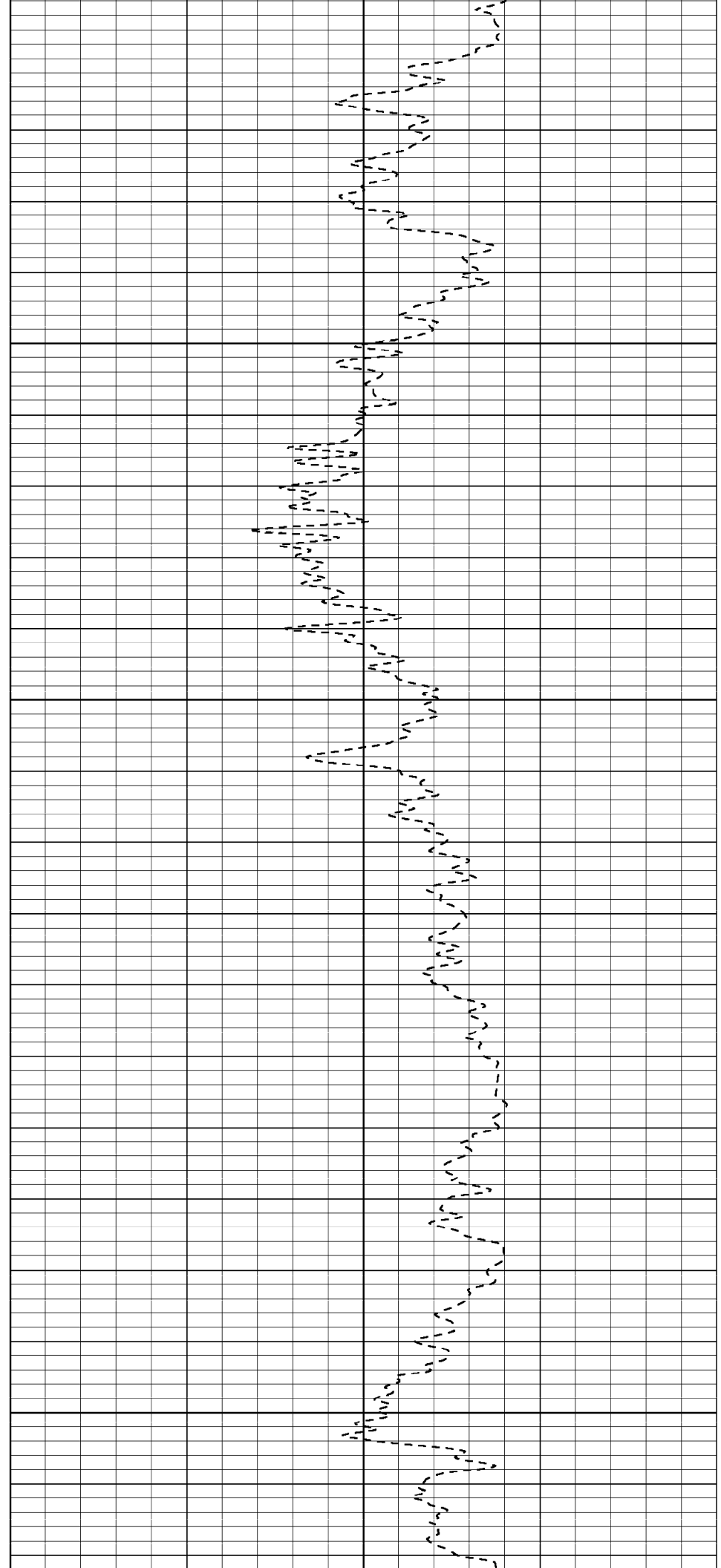


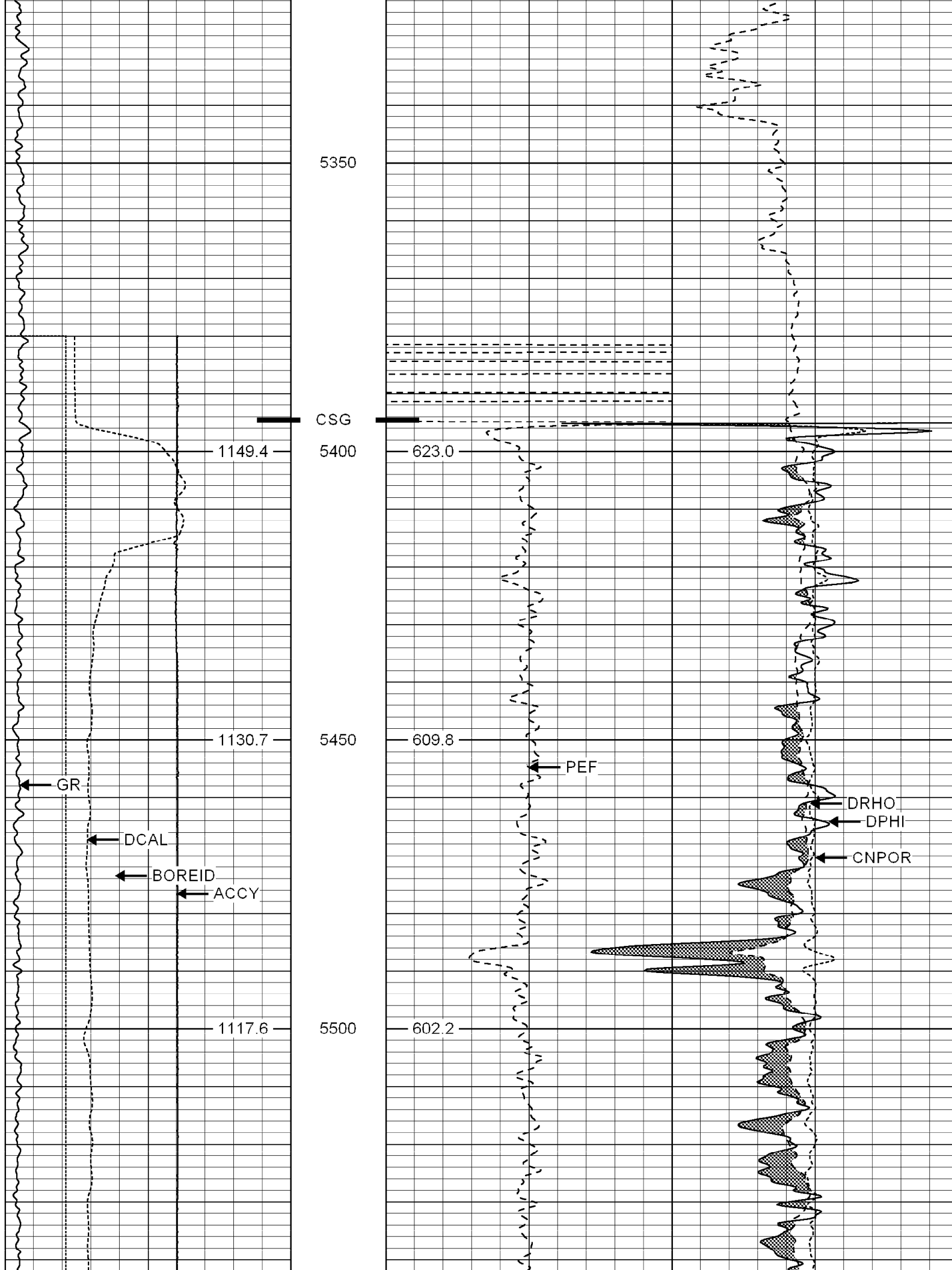
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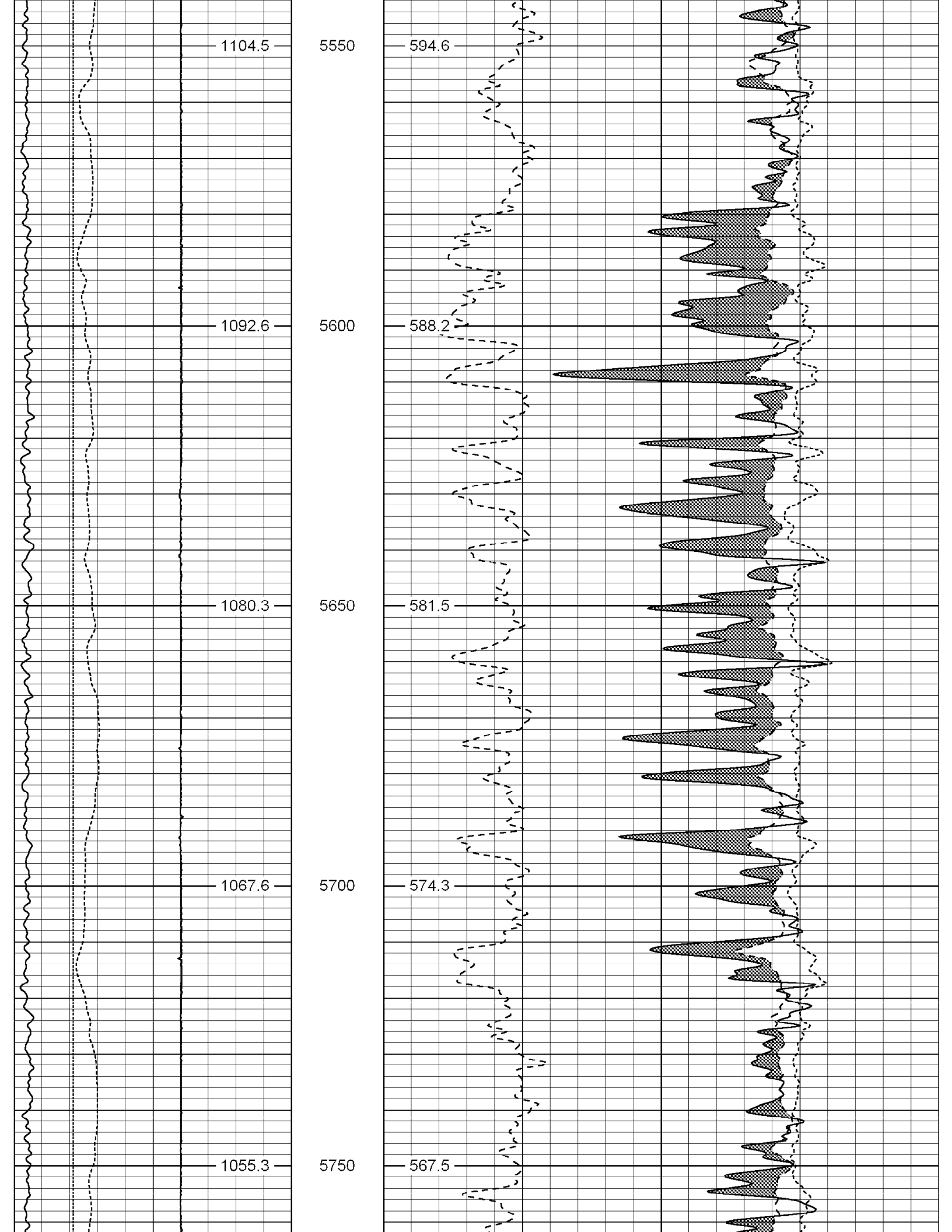
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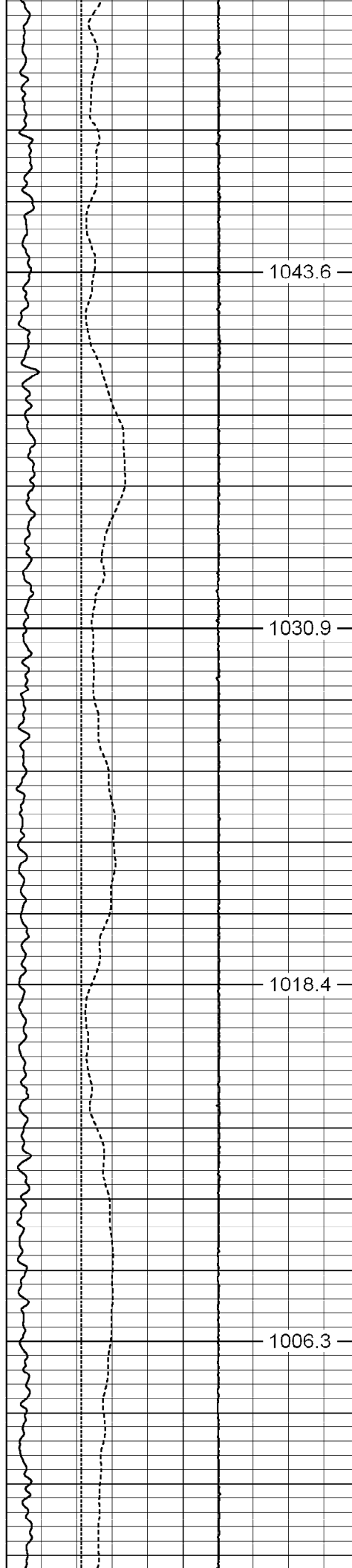
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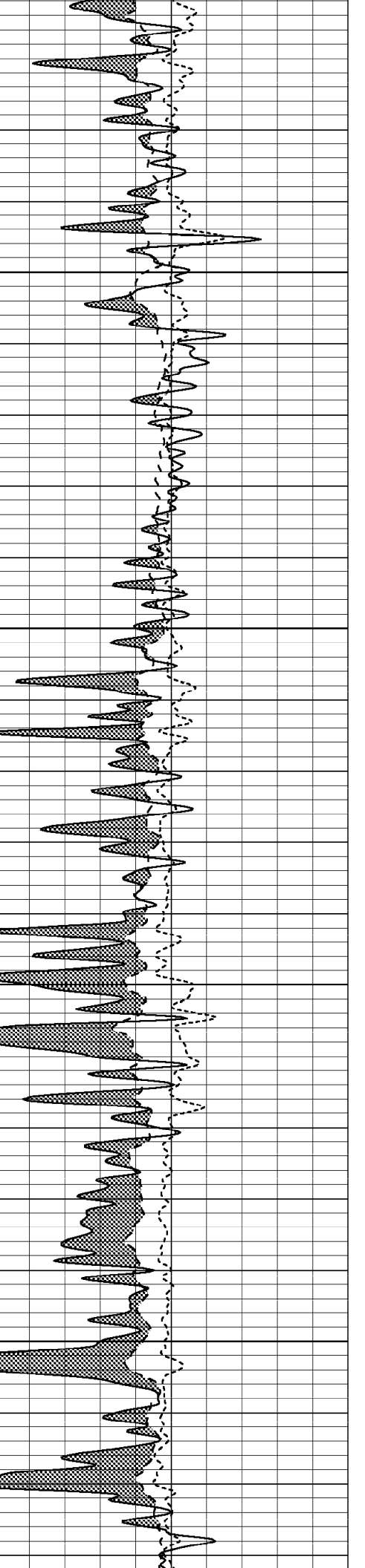
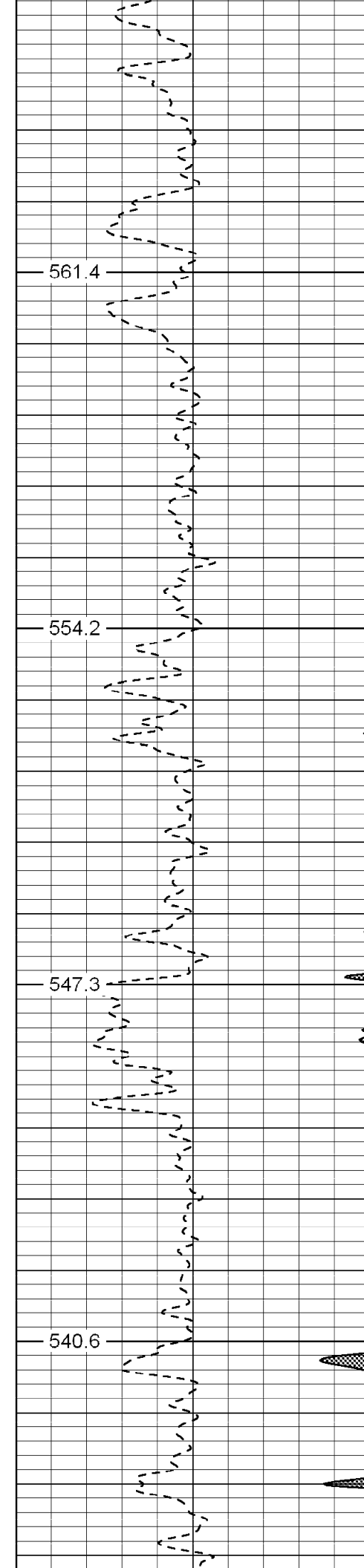
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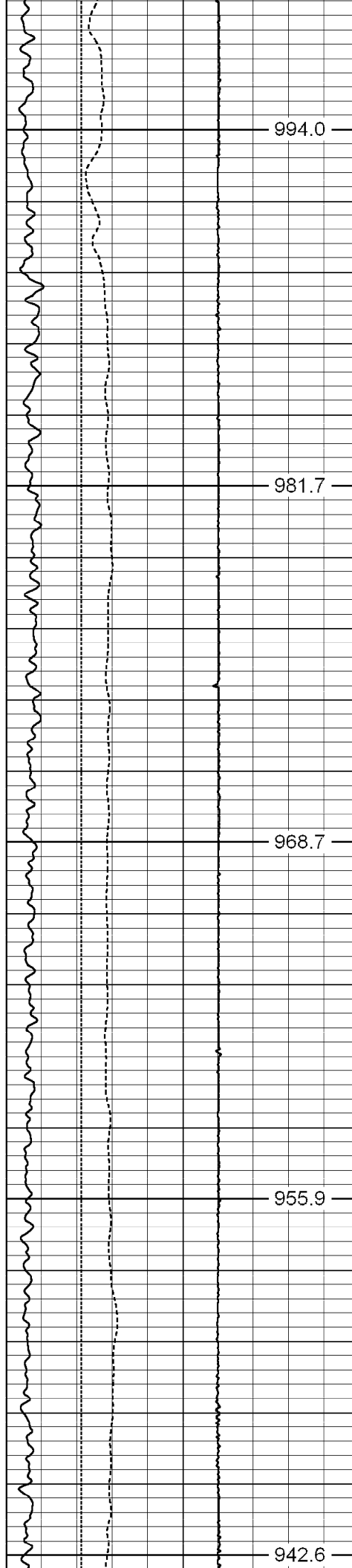
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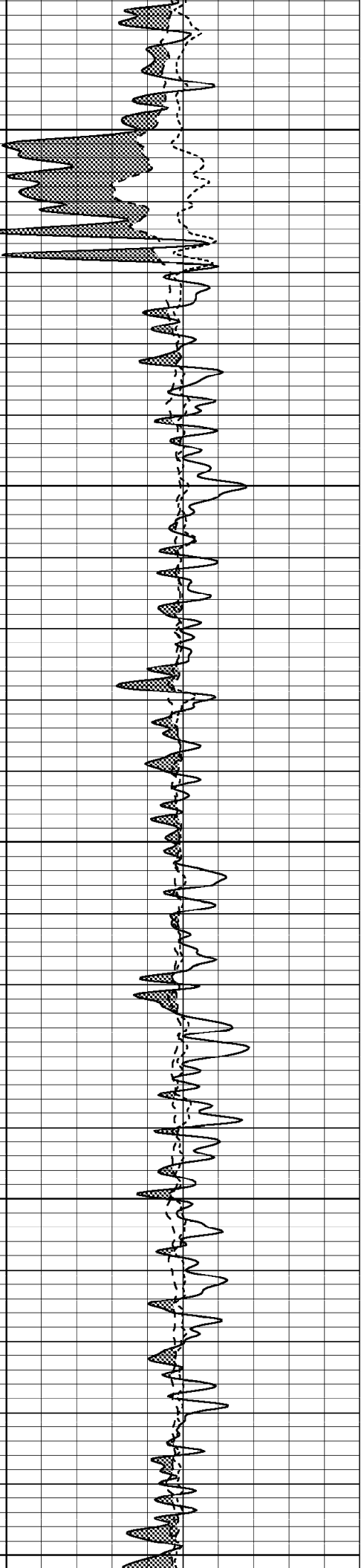
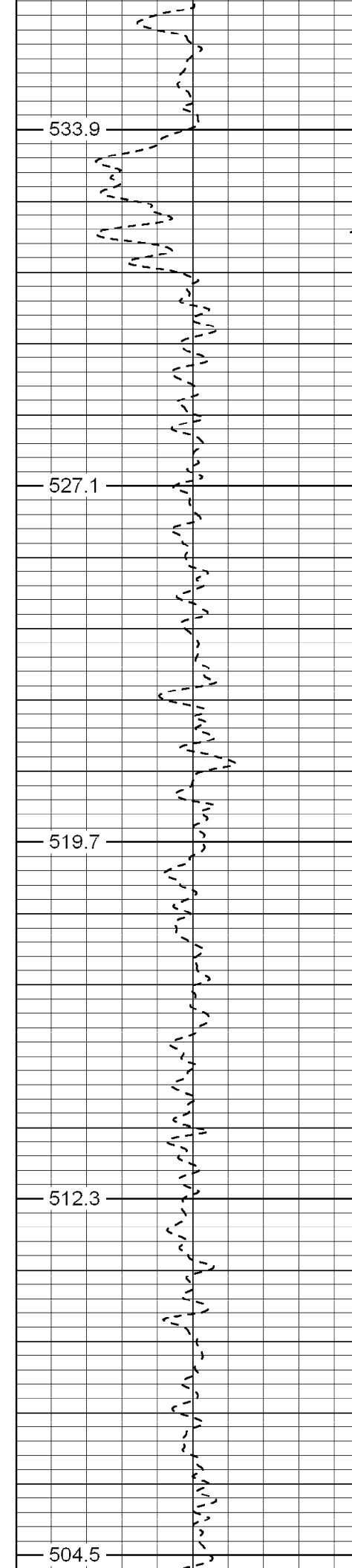


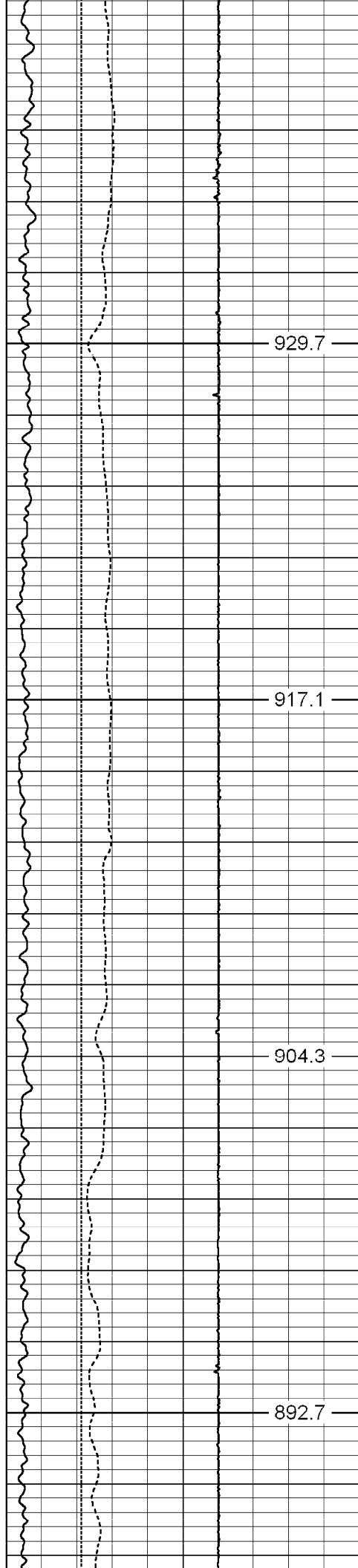
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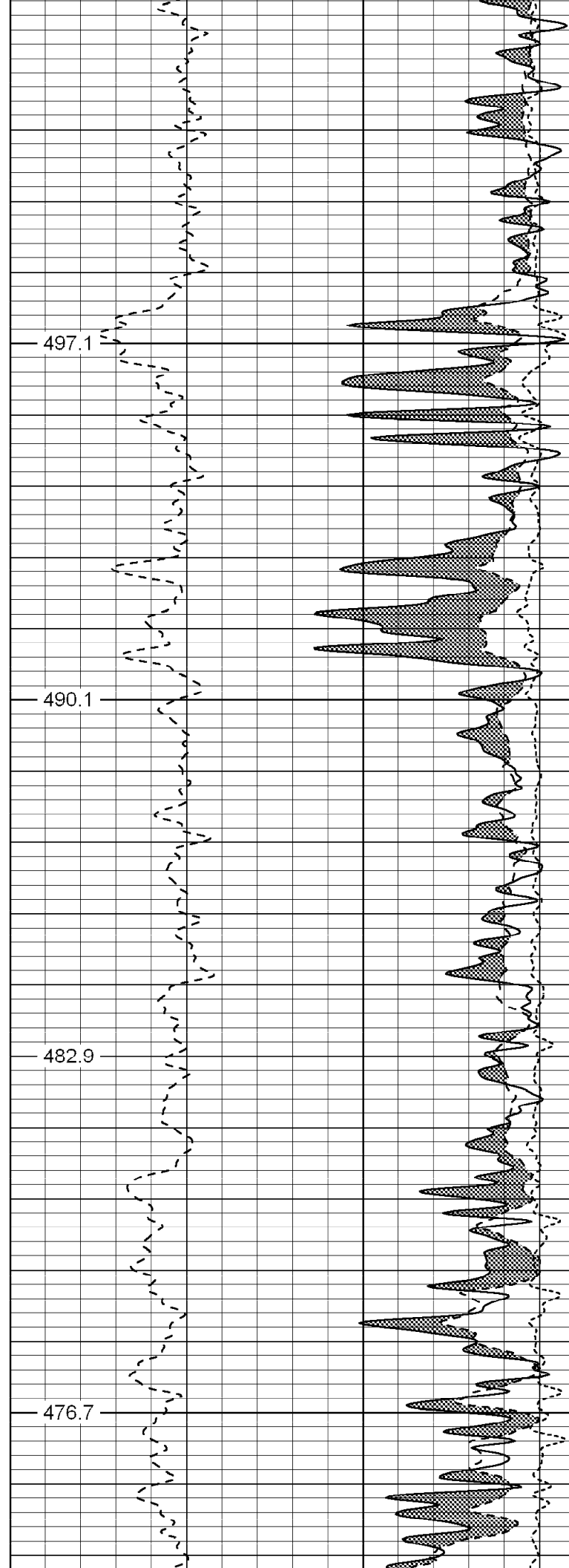


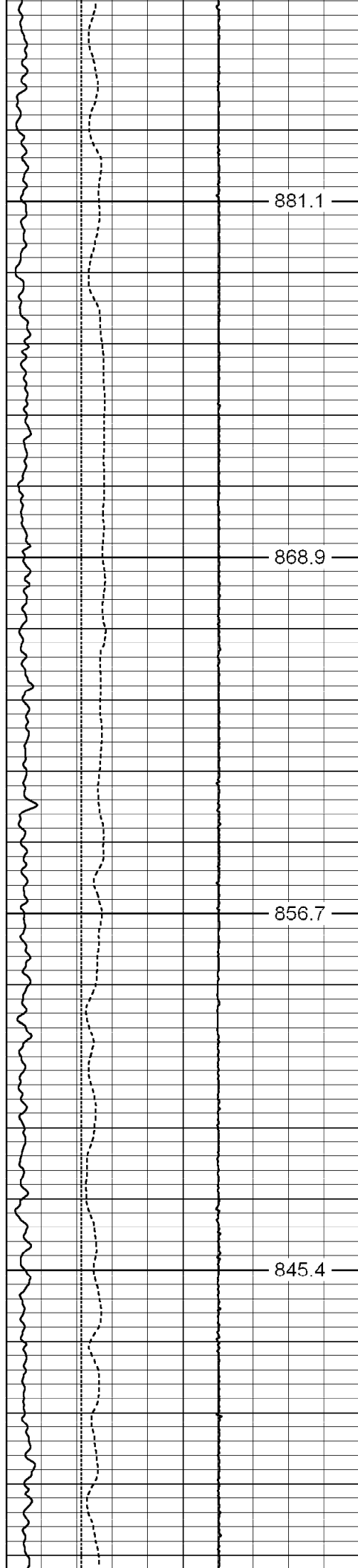
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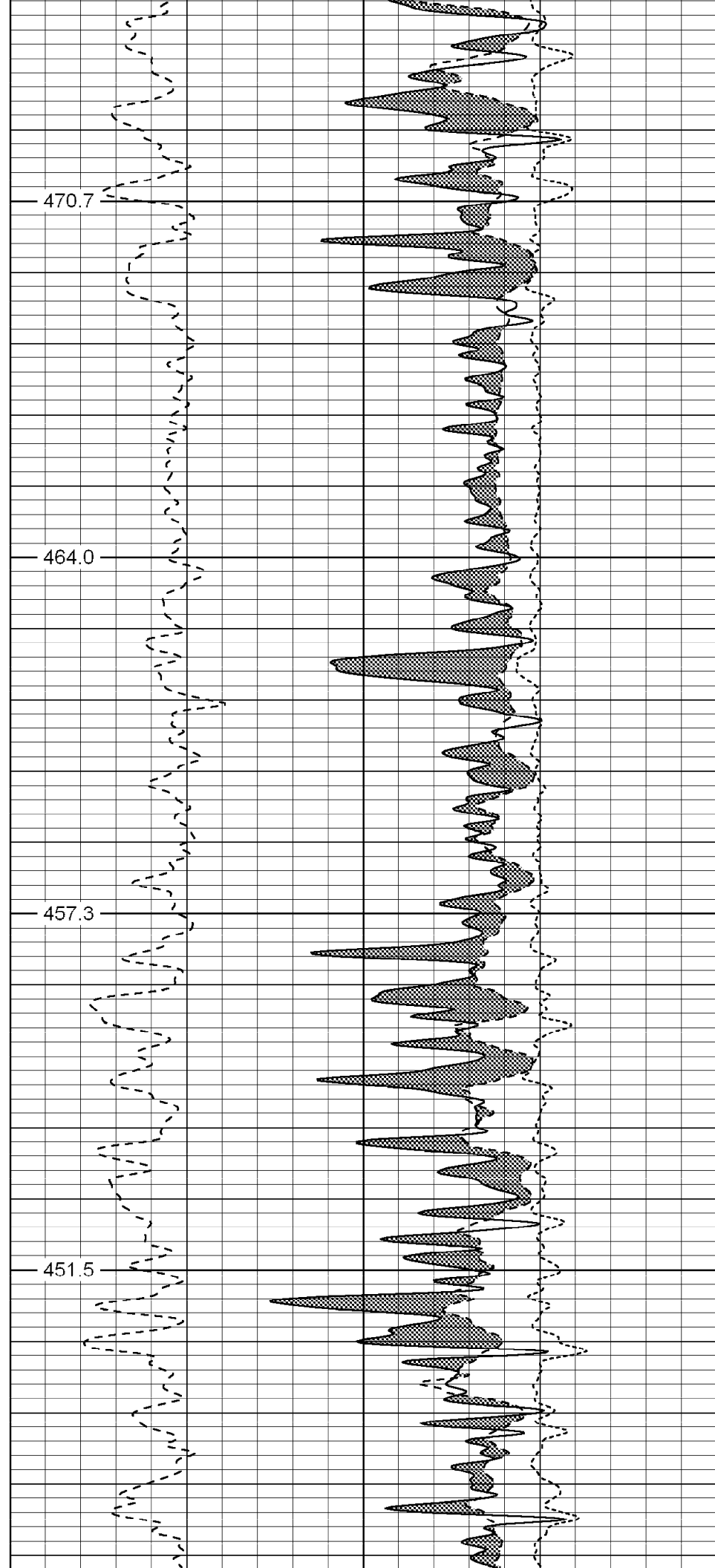


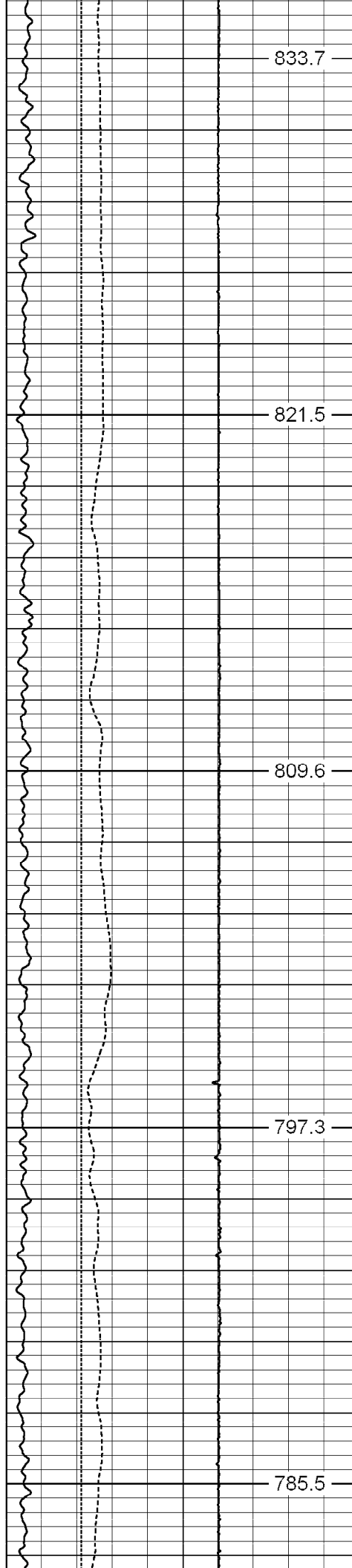
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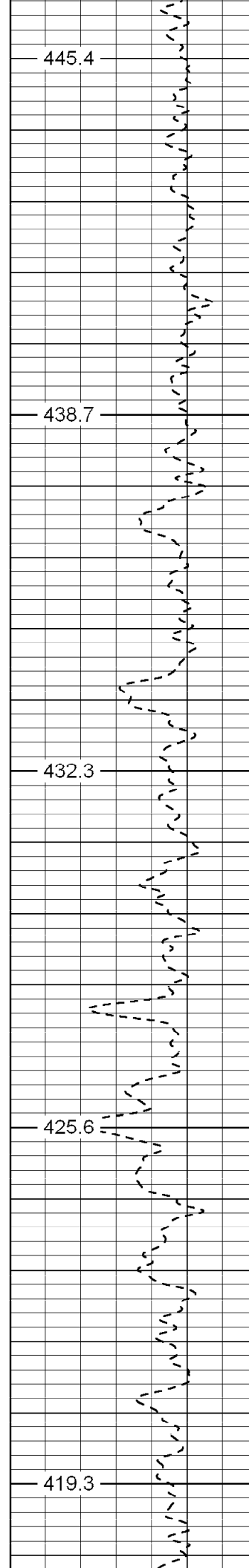
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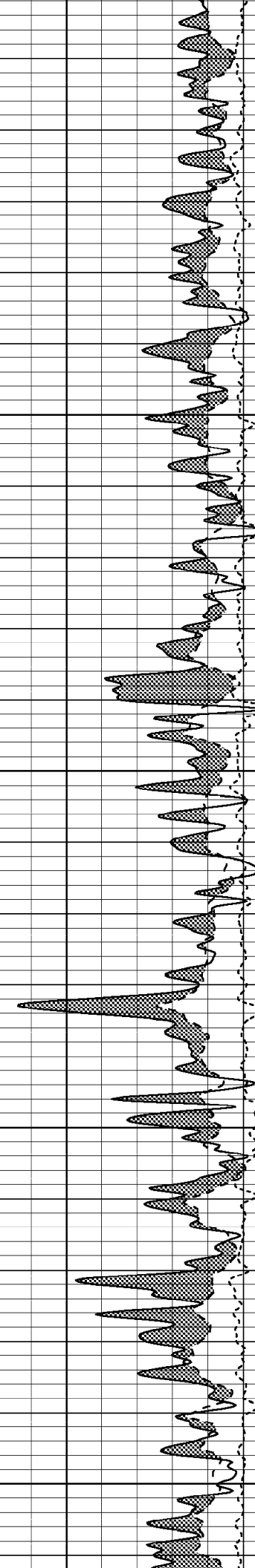
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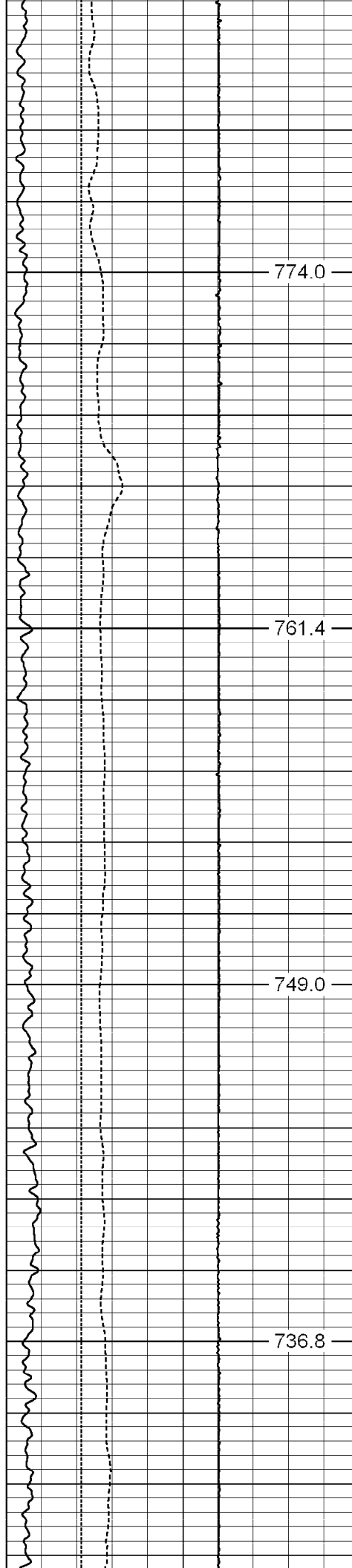
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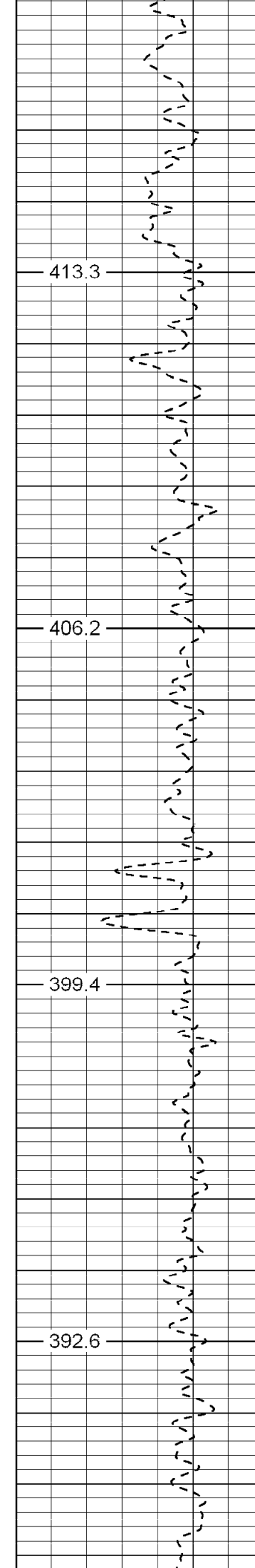
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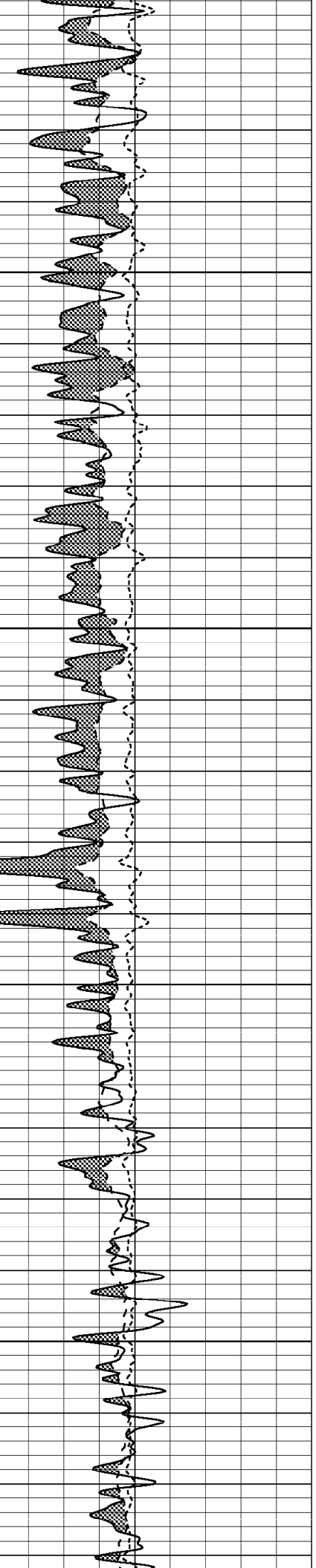
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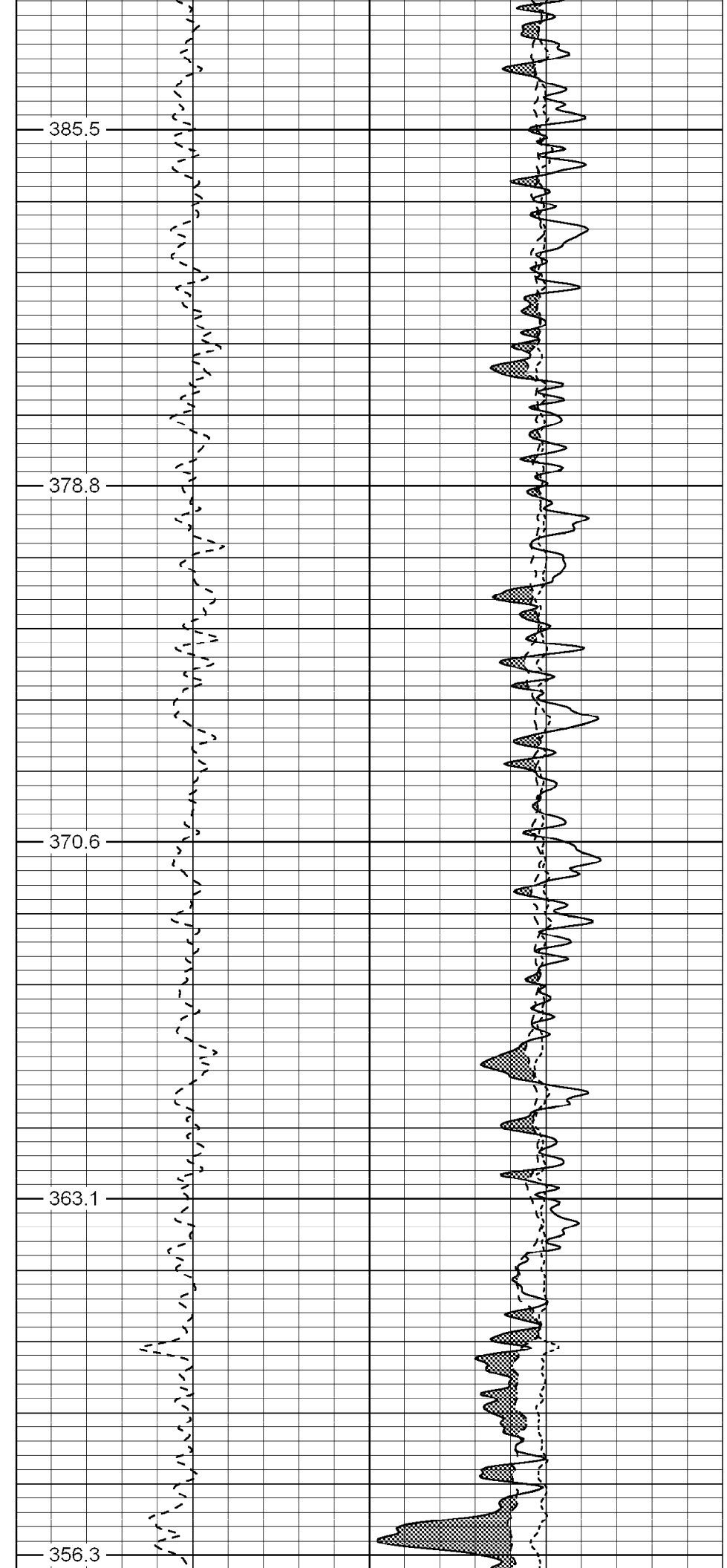
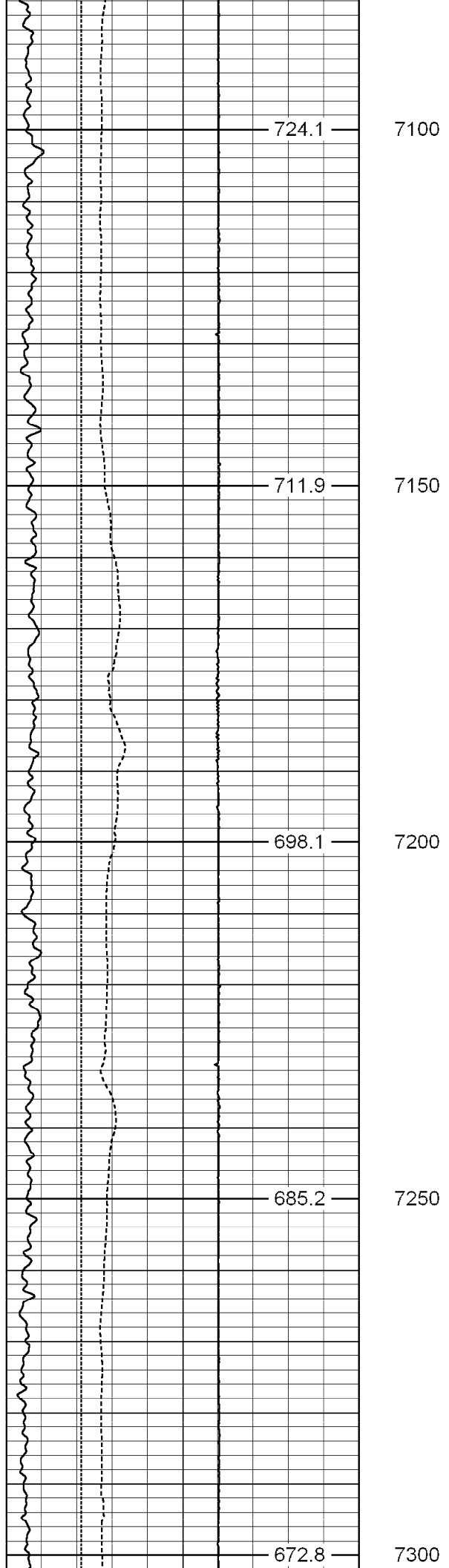


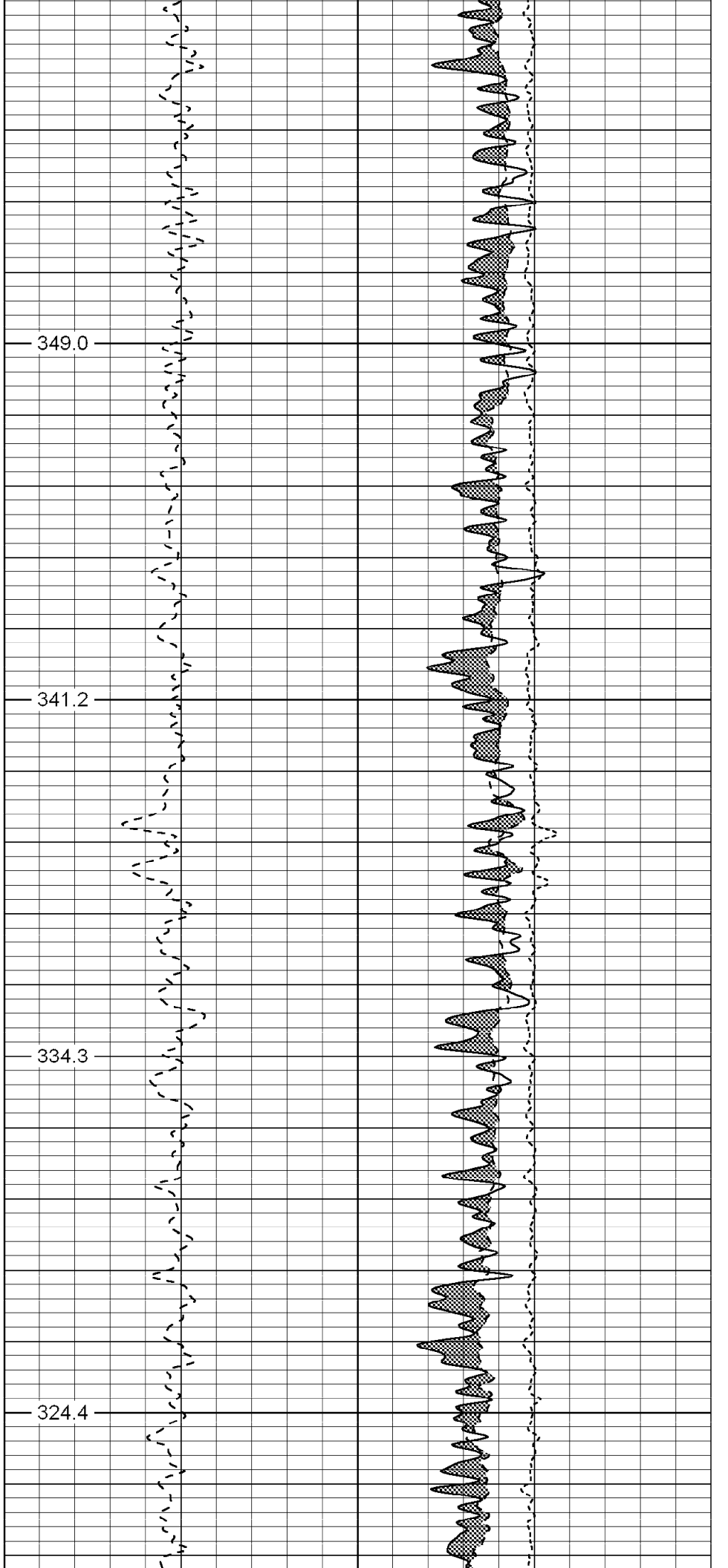
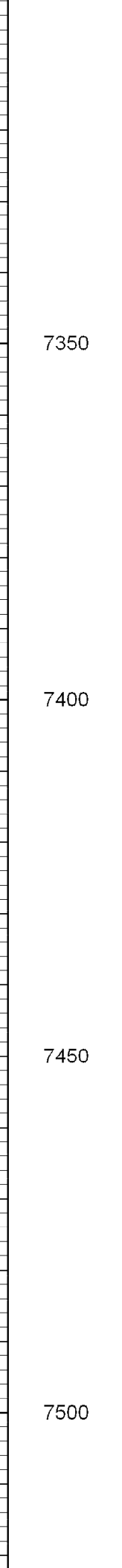
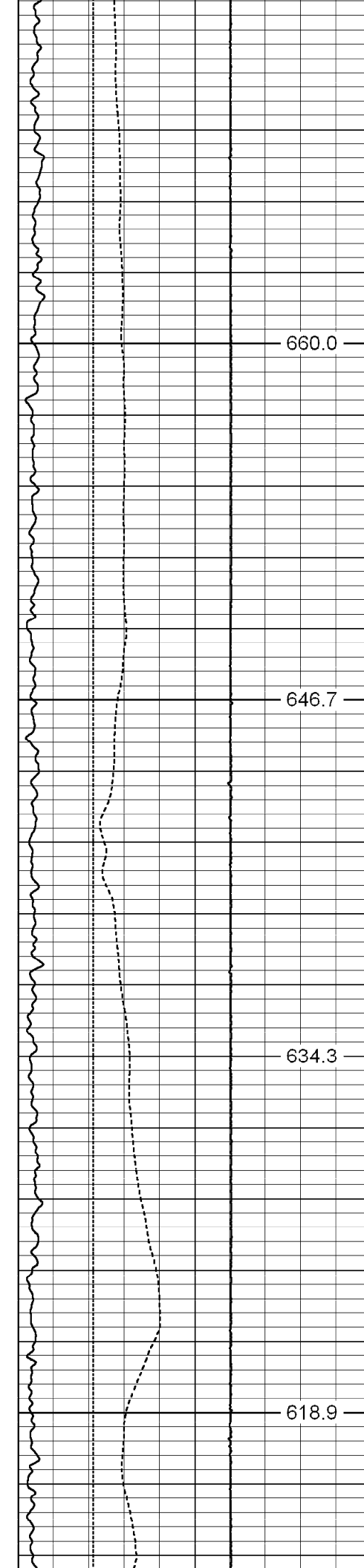
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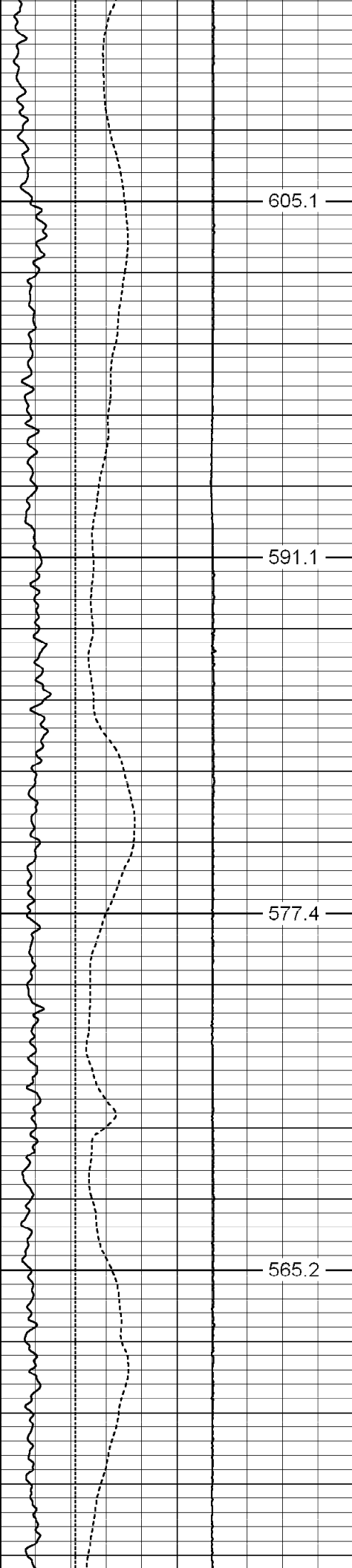


413.3
406.2
399.4
392.6









605.1

591.1

577.4

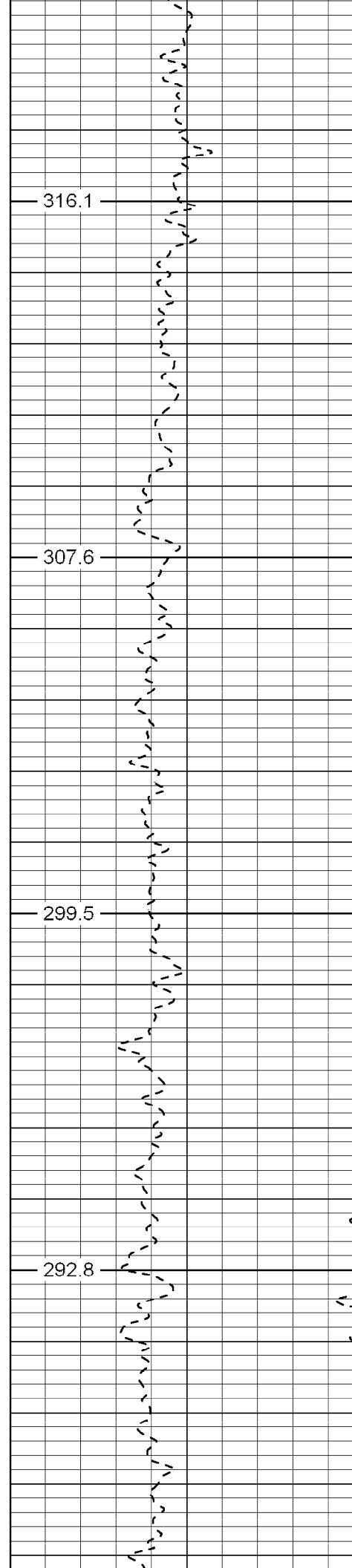
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7550

7600

7650

7700

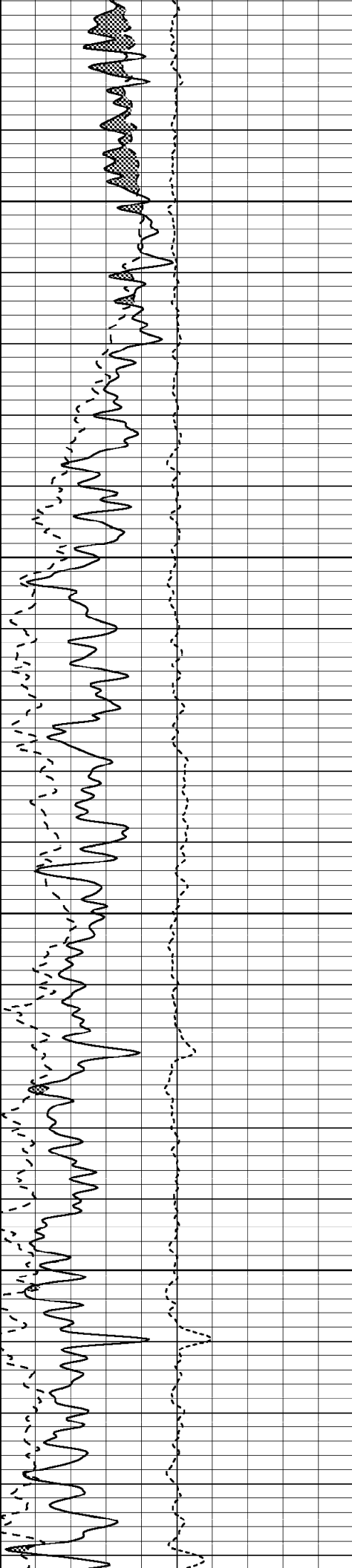


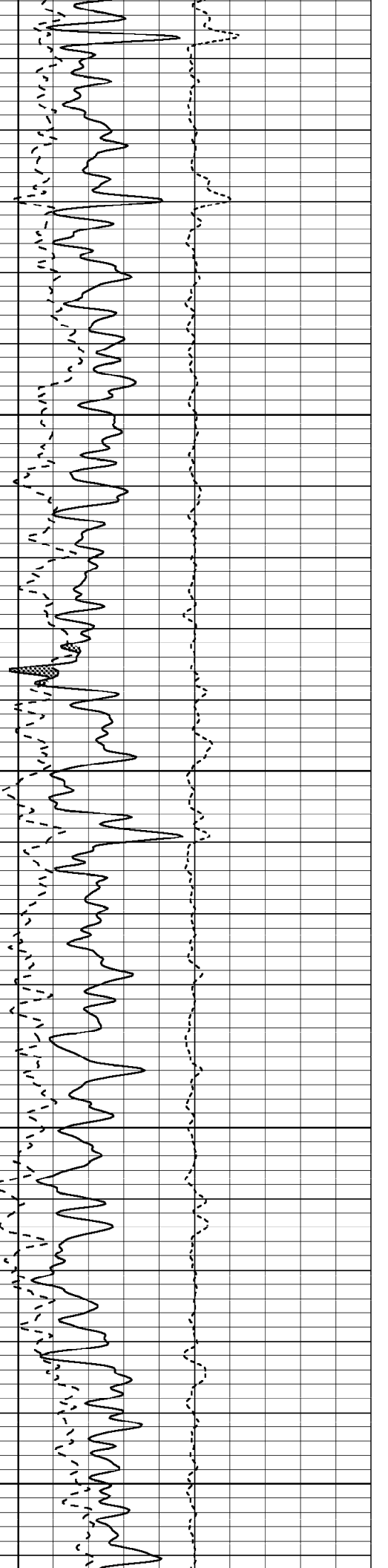
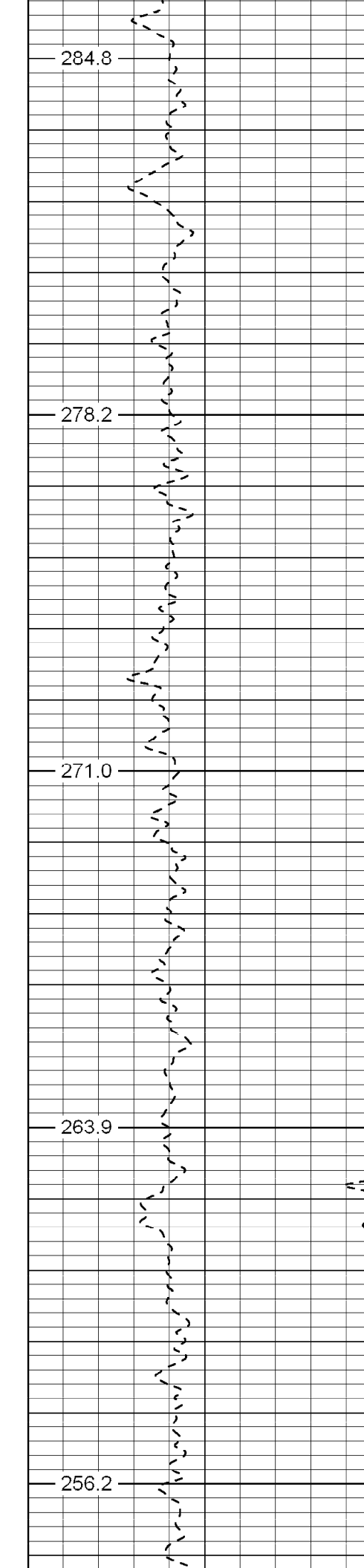
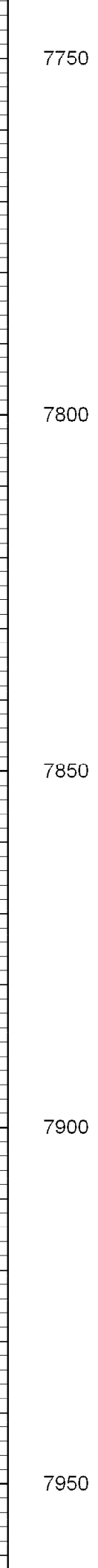
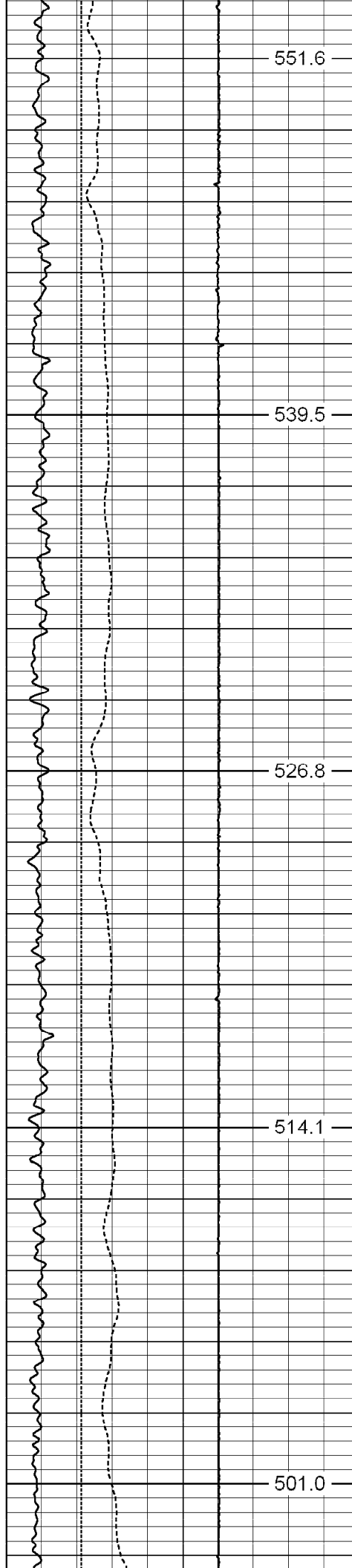
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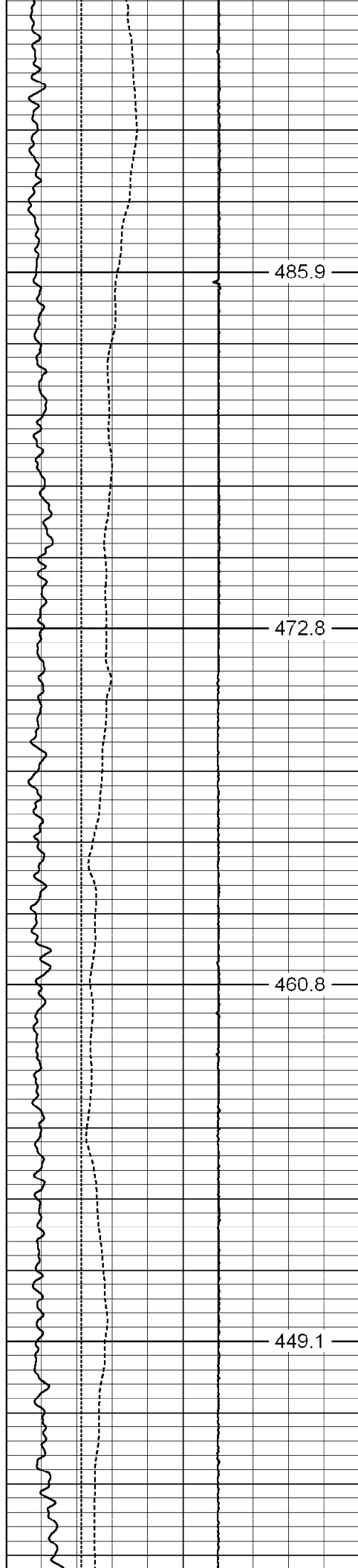
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299.5

292.8





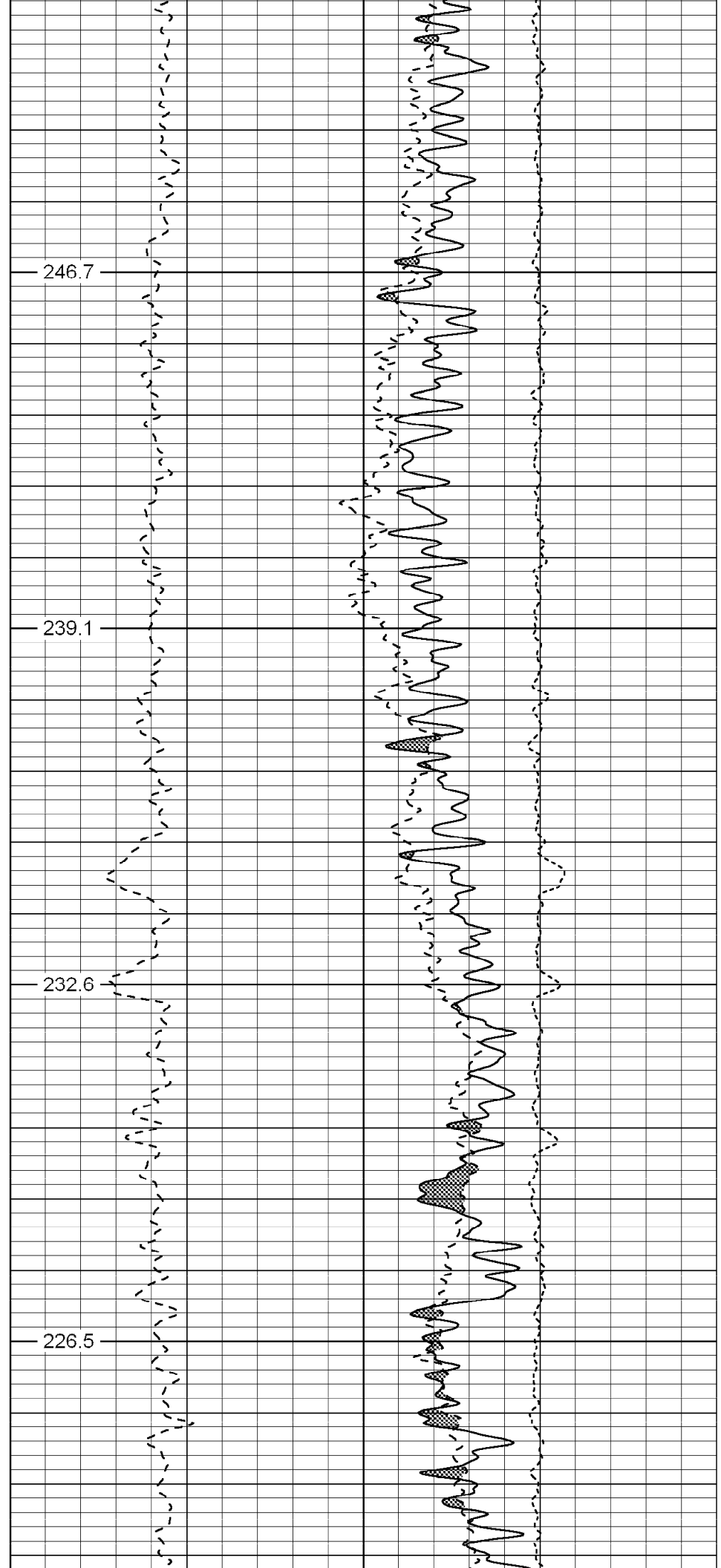


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8150

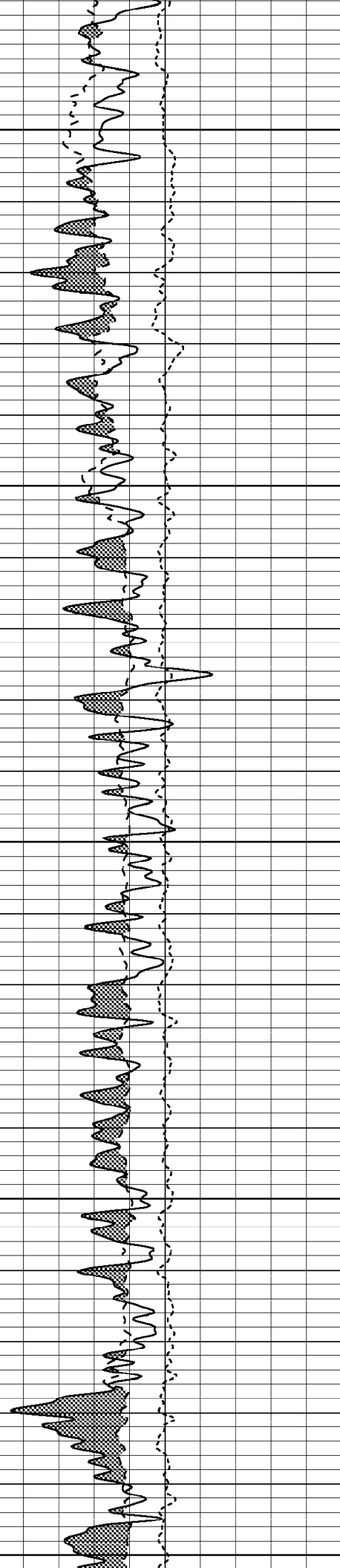
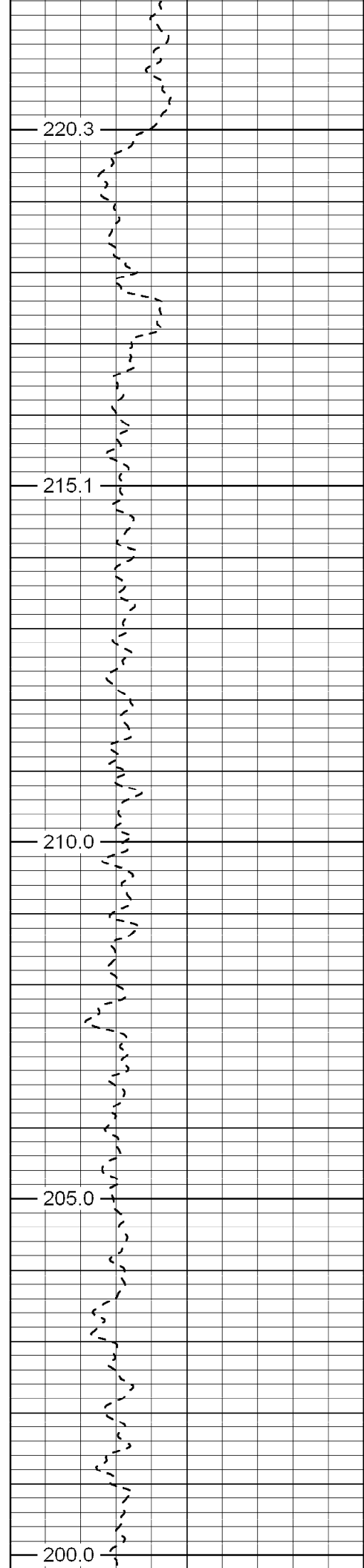
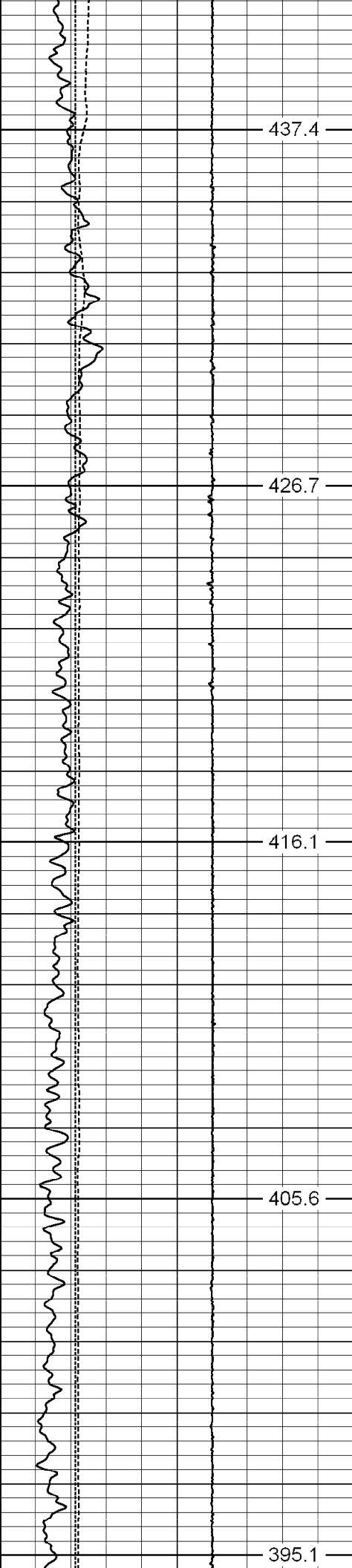


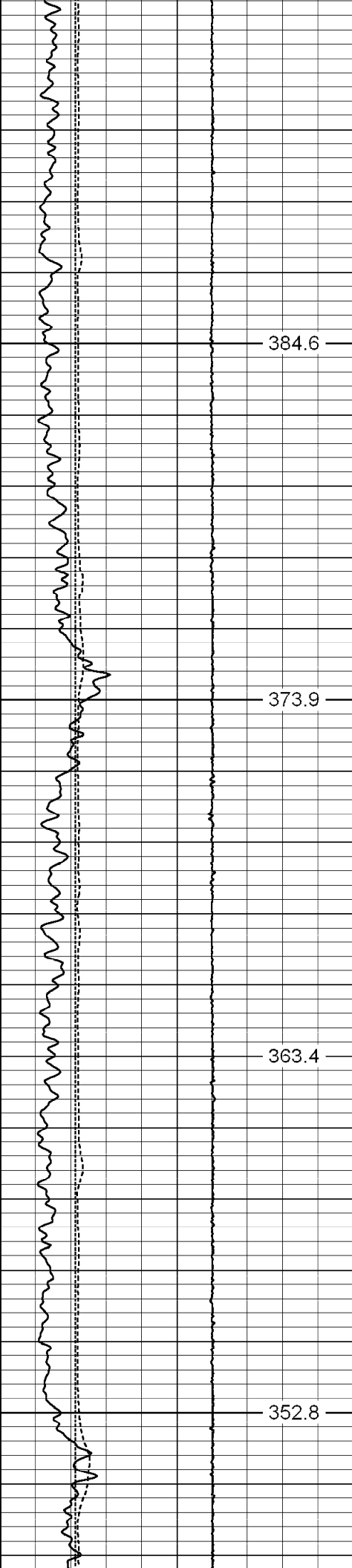
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239.1

232.6

226.5



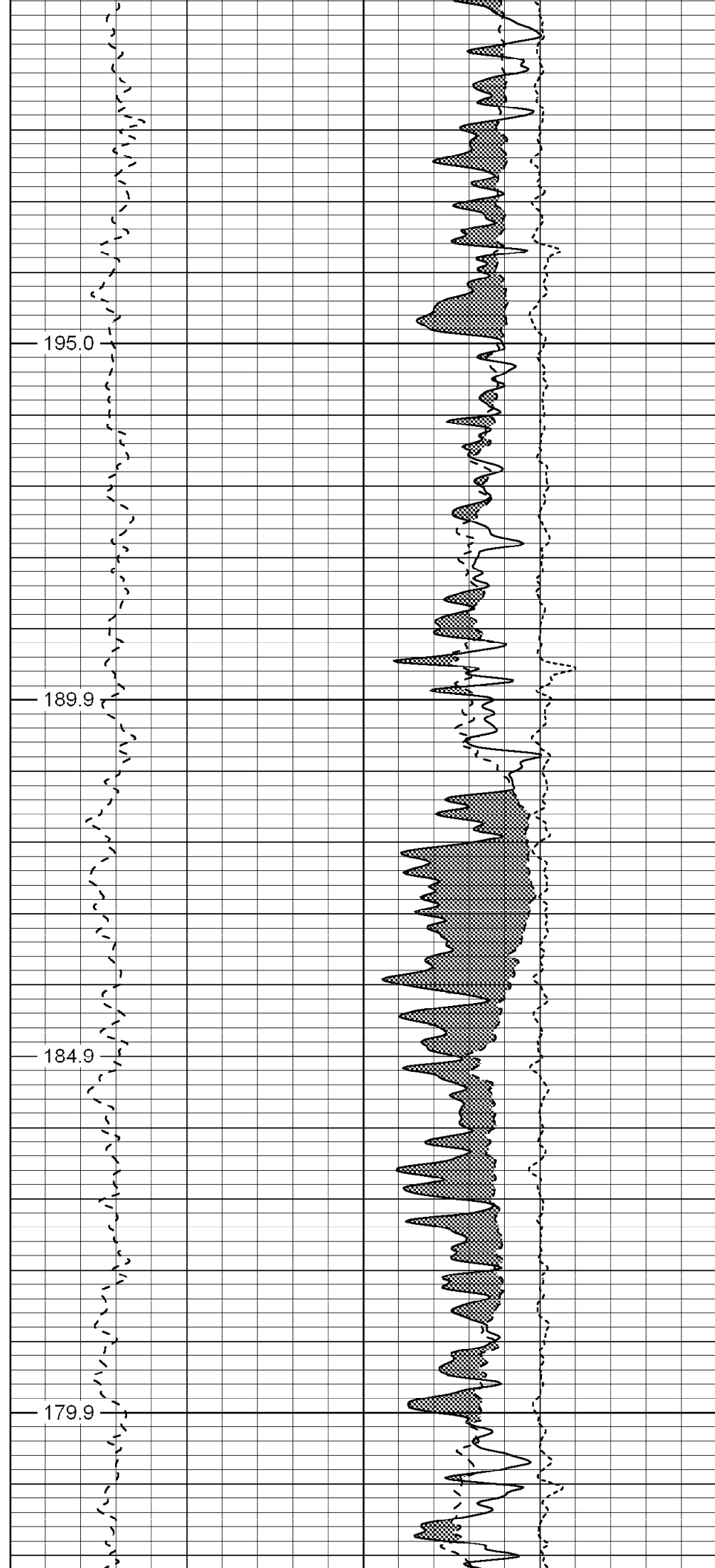


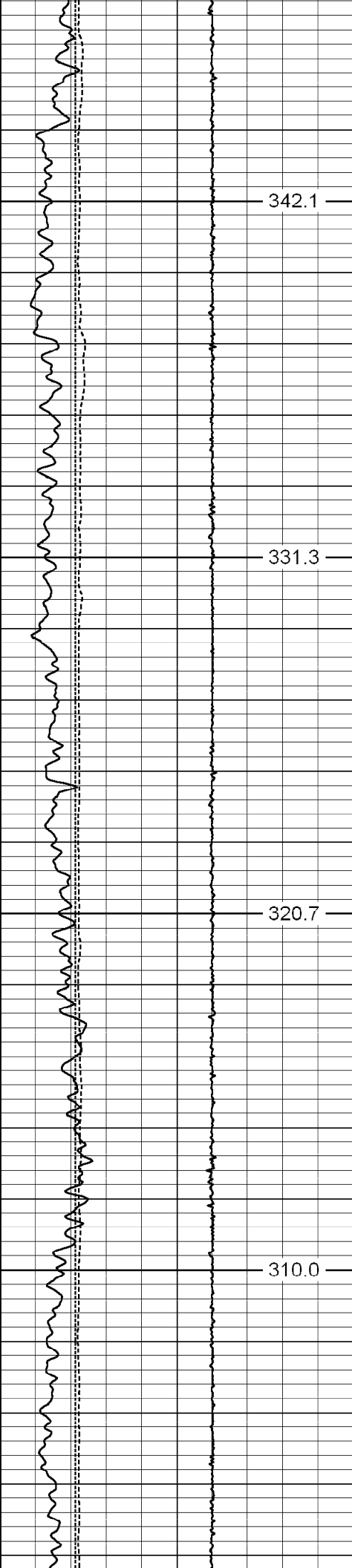
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8500

8550

8600



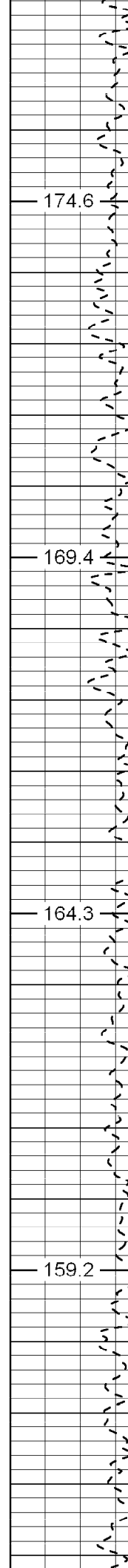


8650

8700

8750

8800

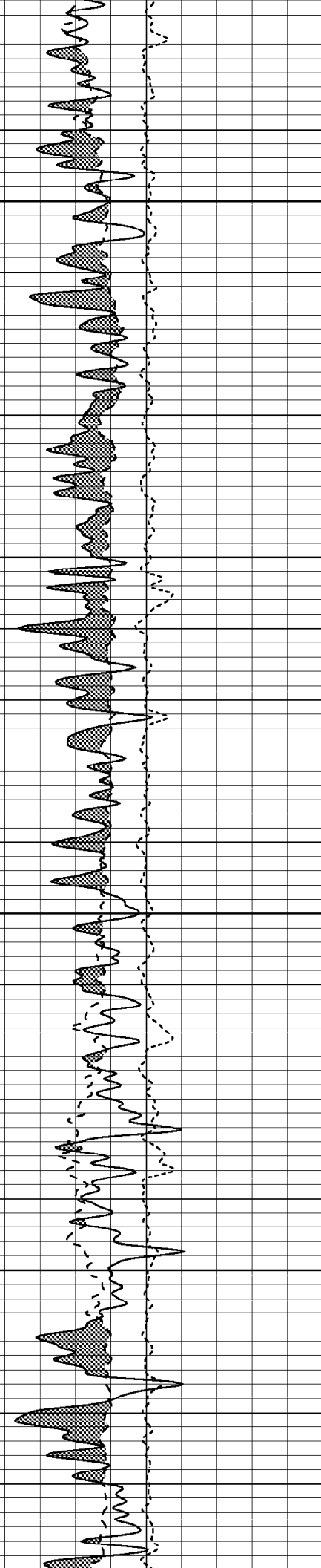


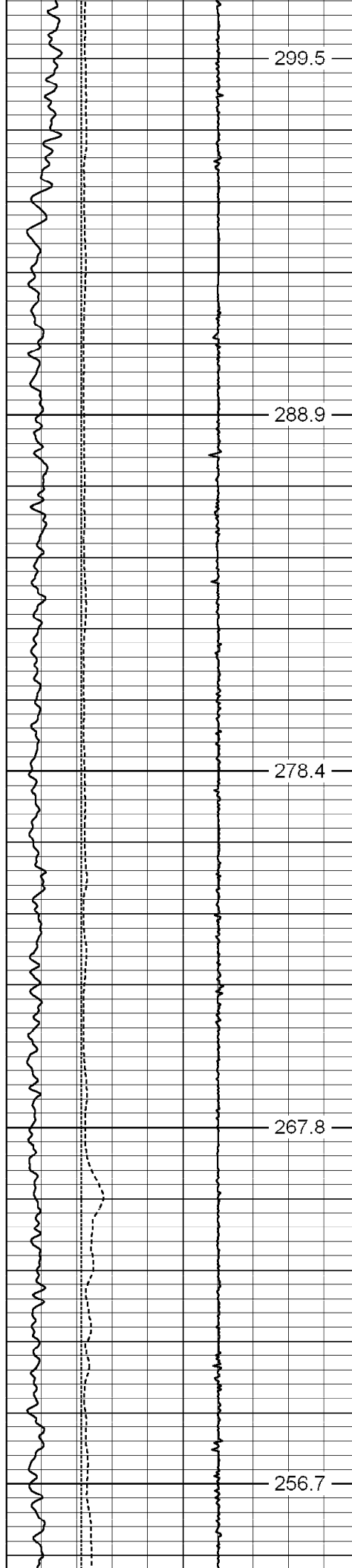
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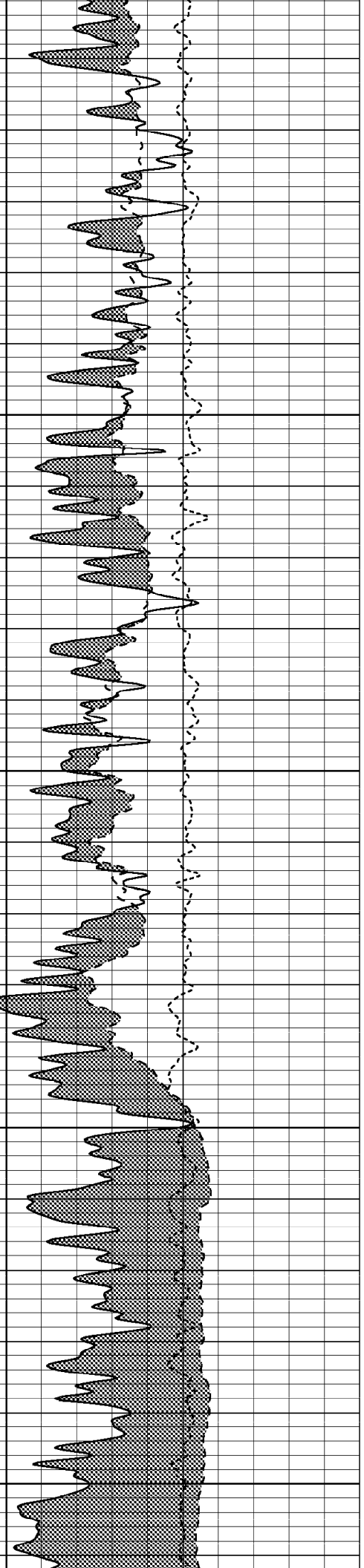
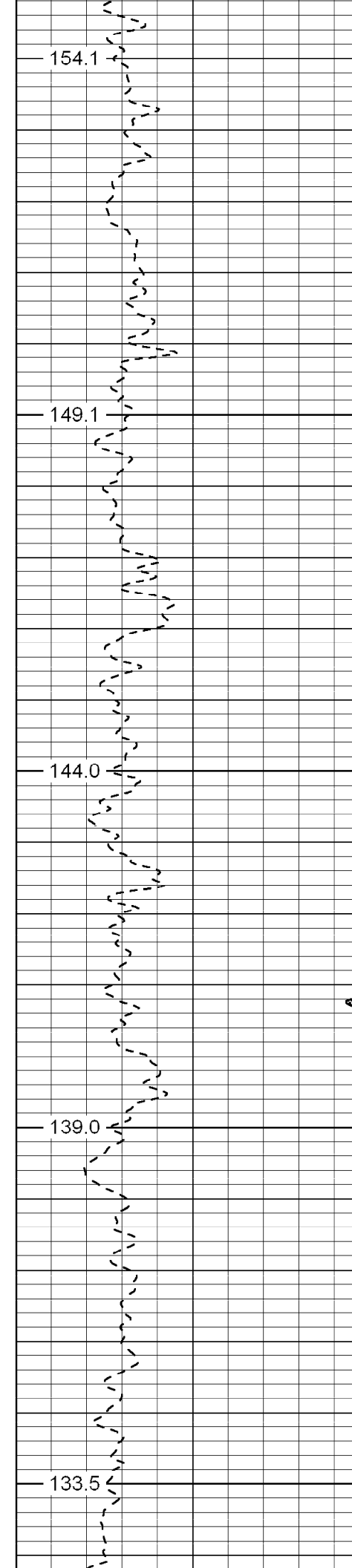
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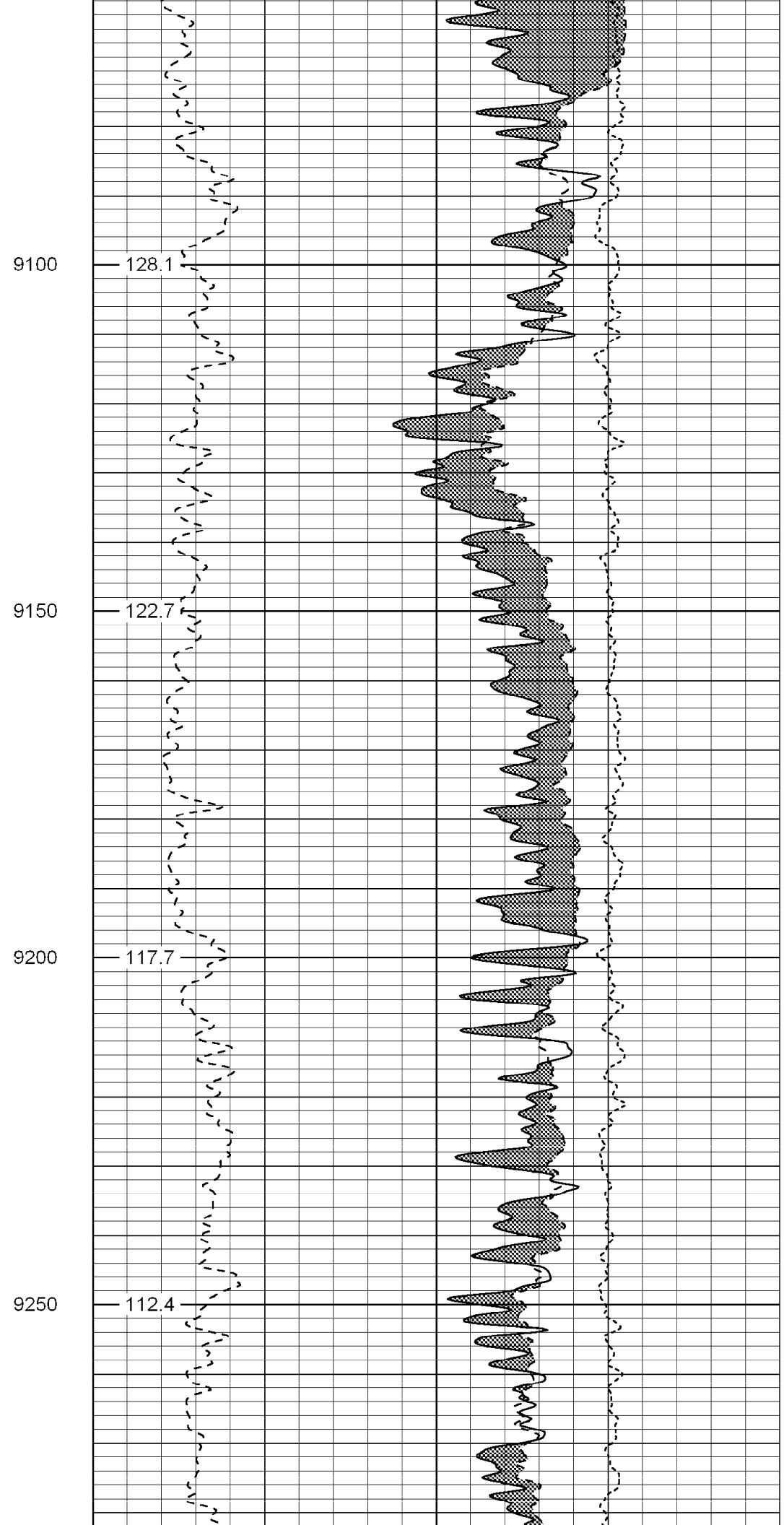
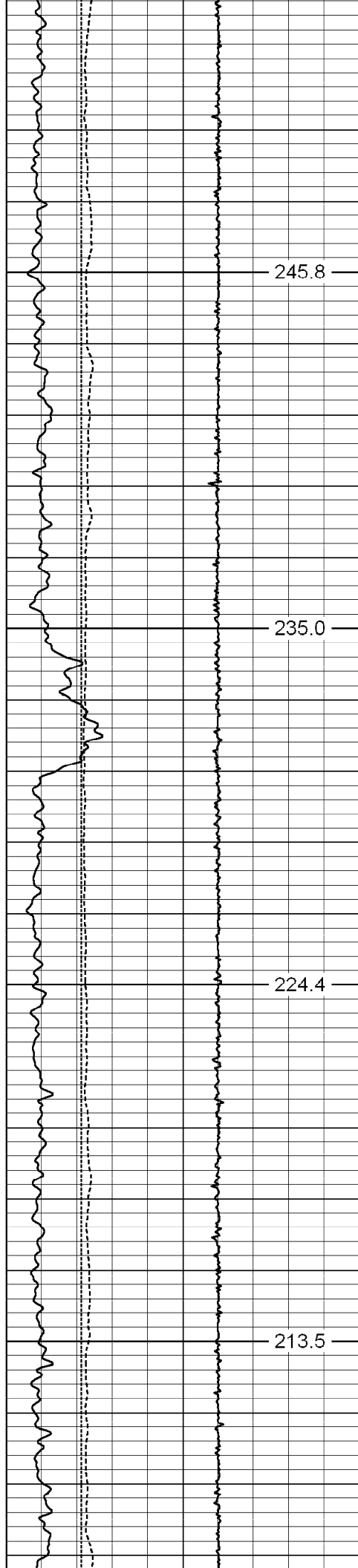
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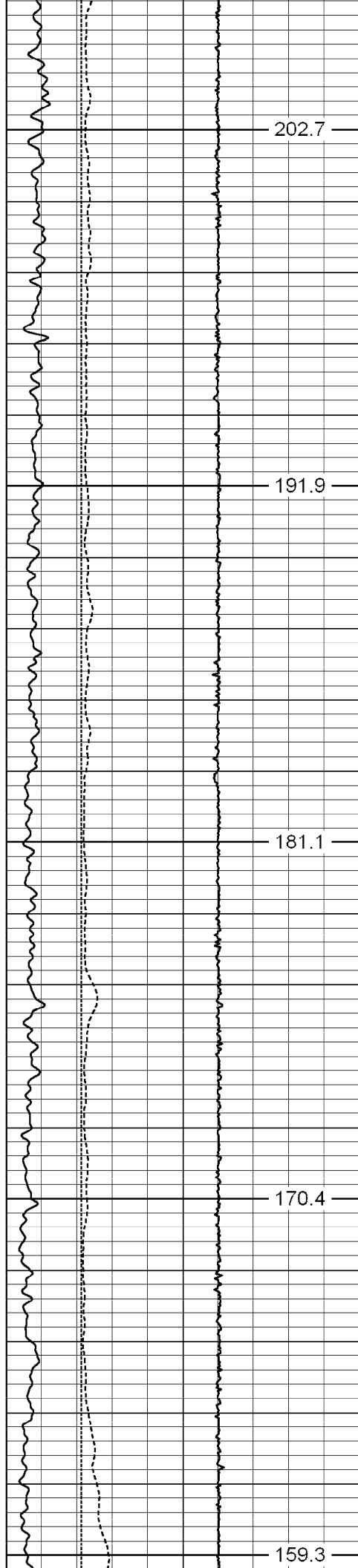




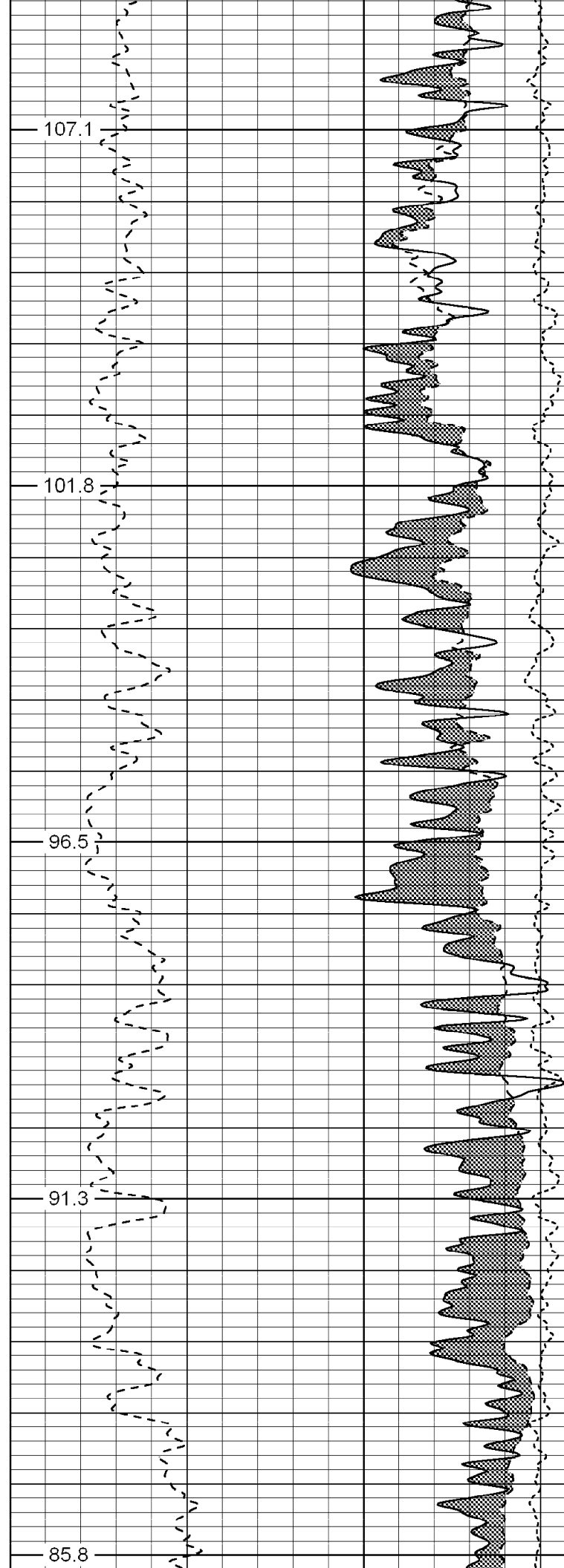
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9050

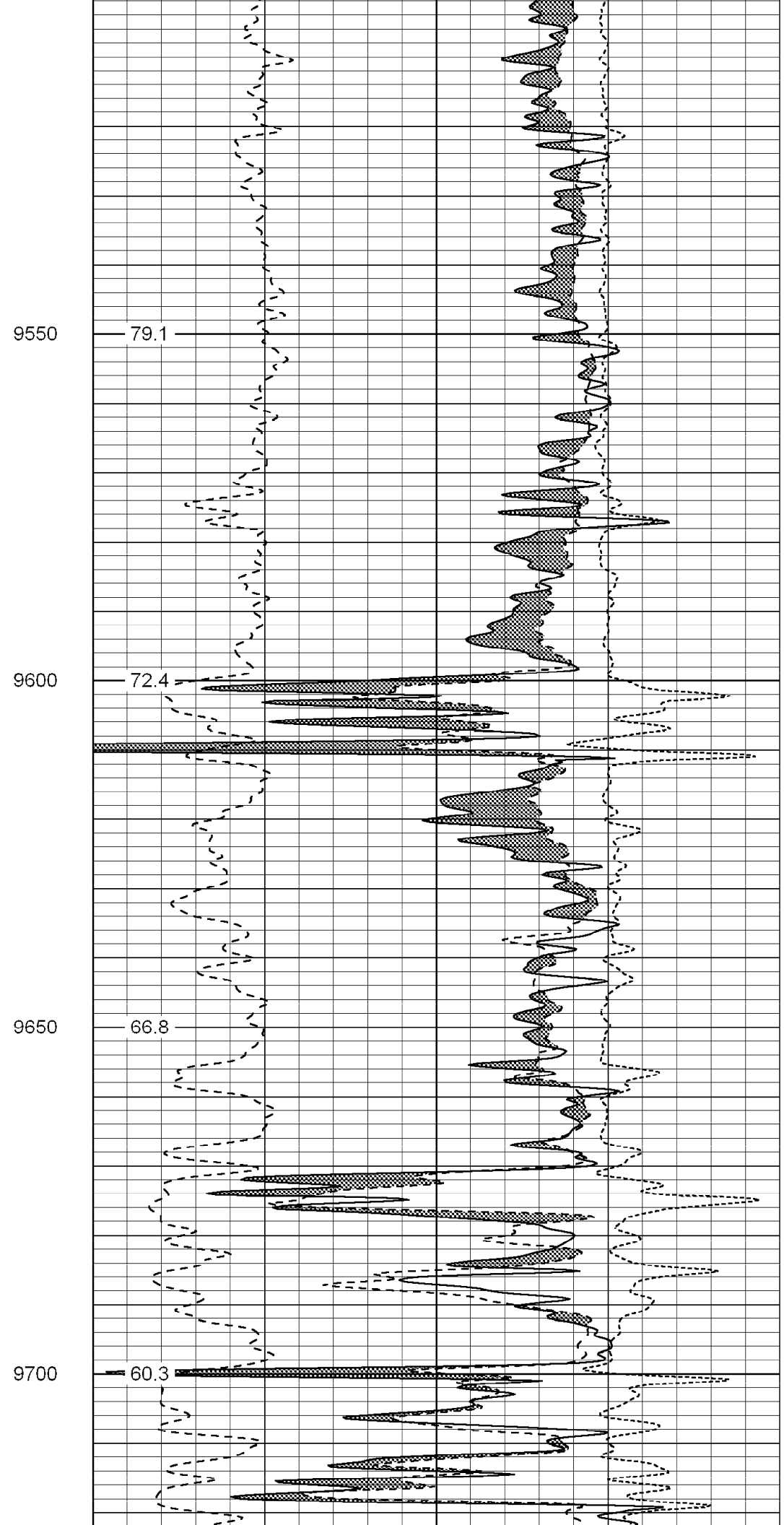
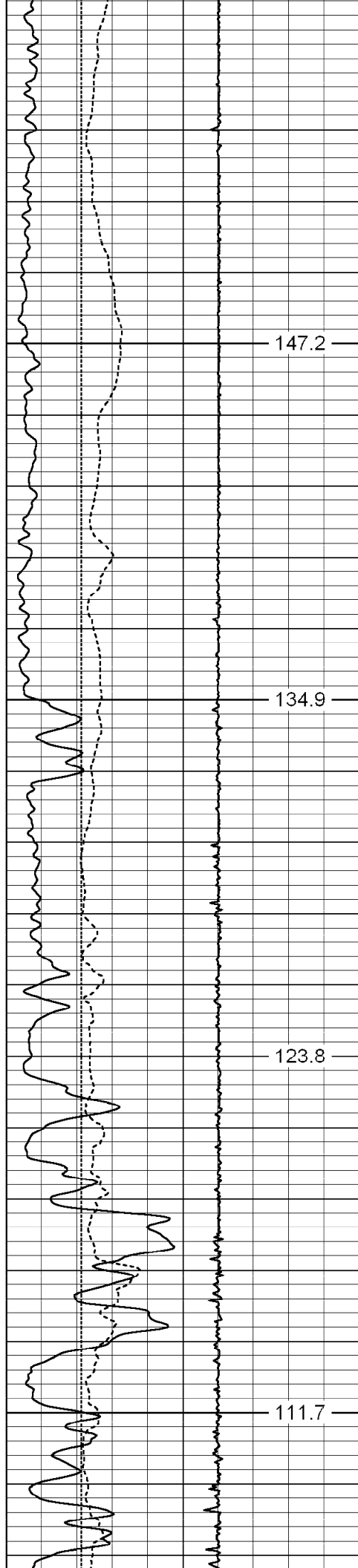


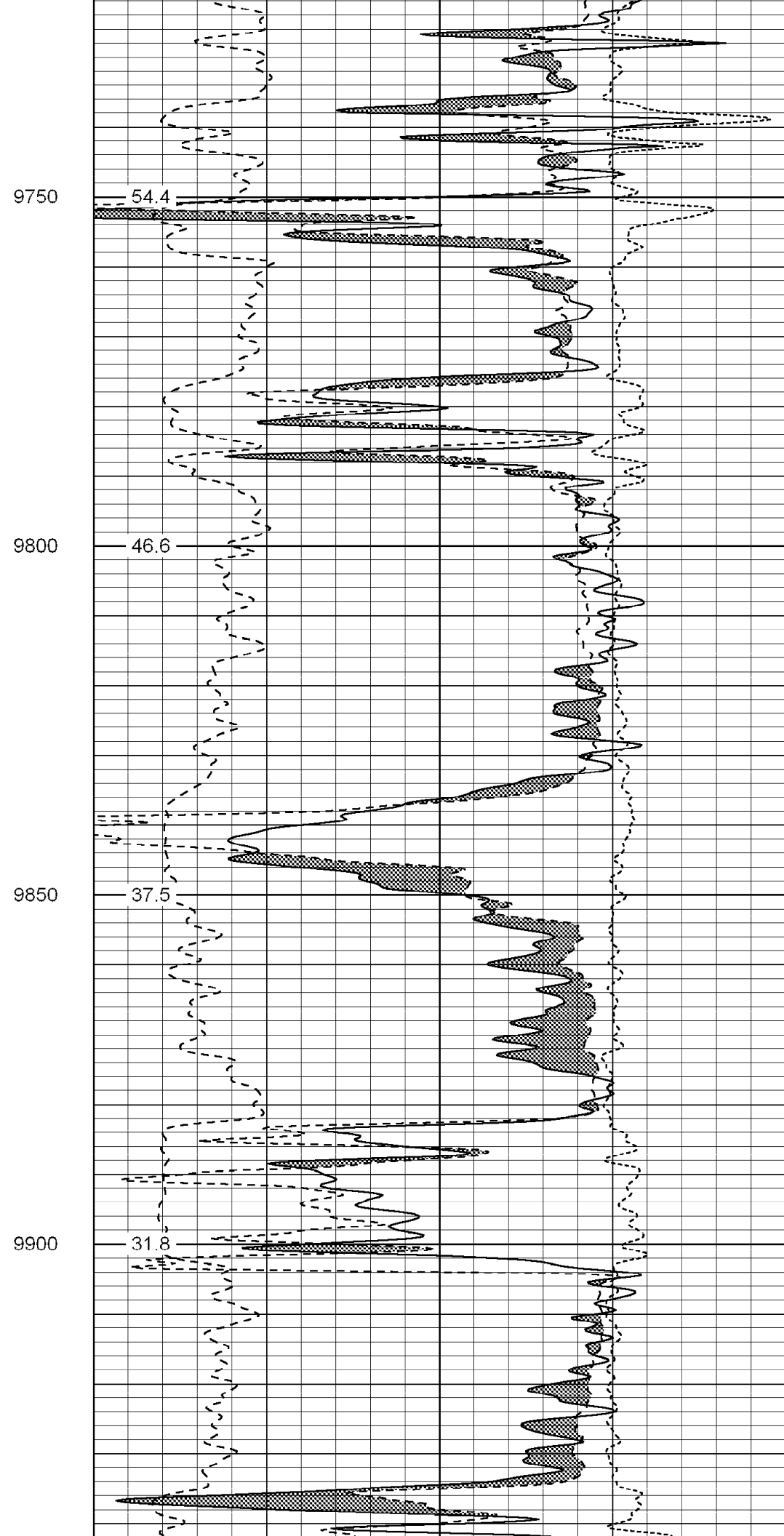
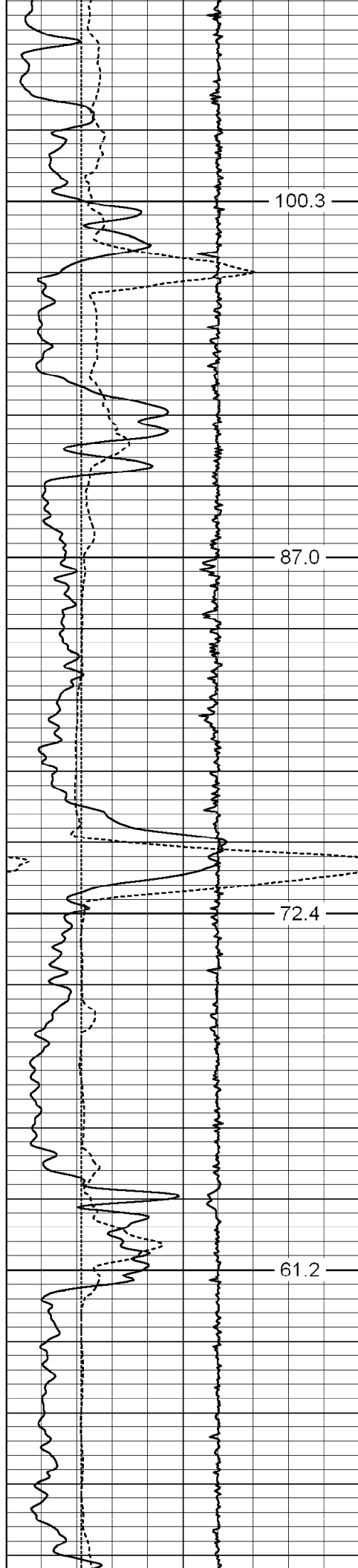


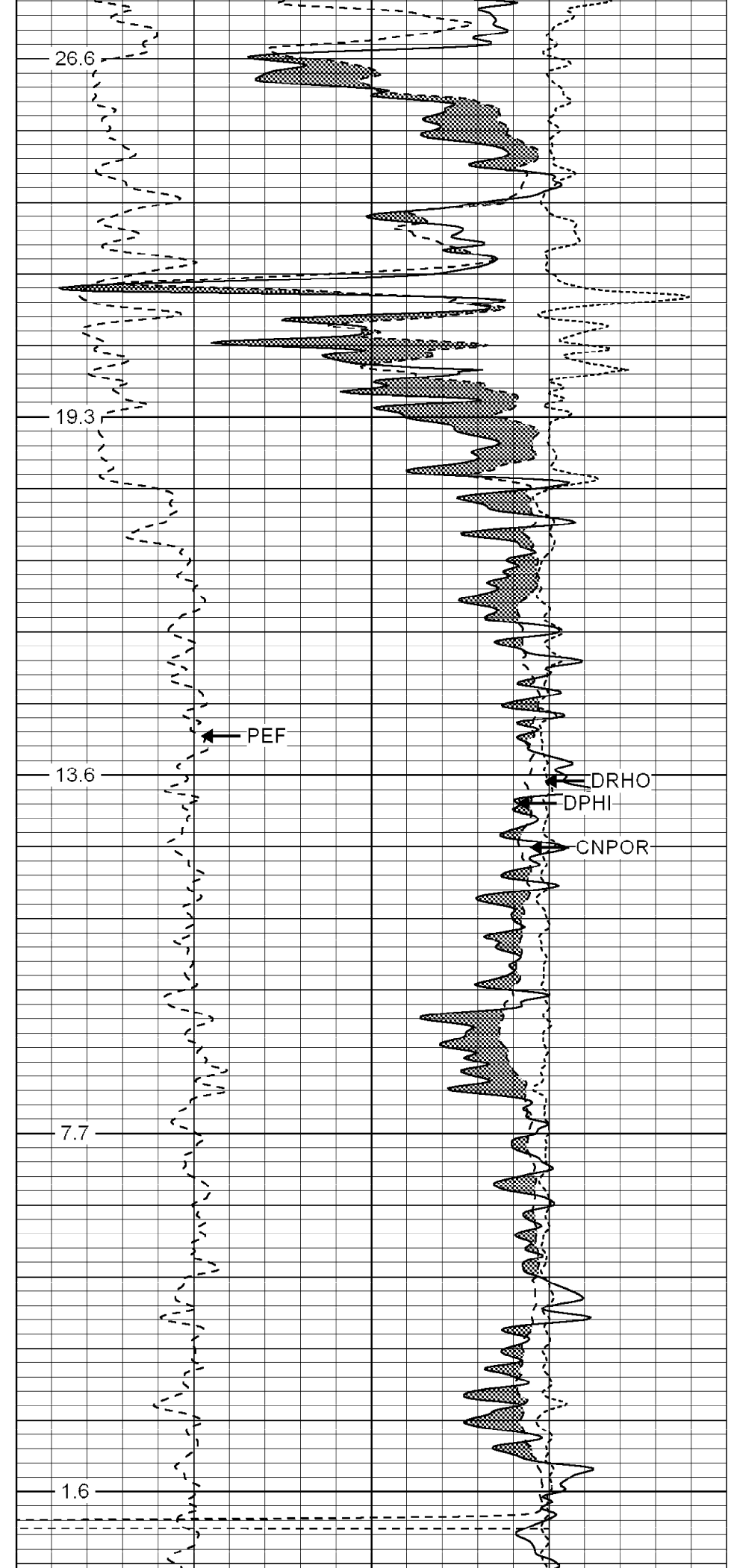
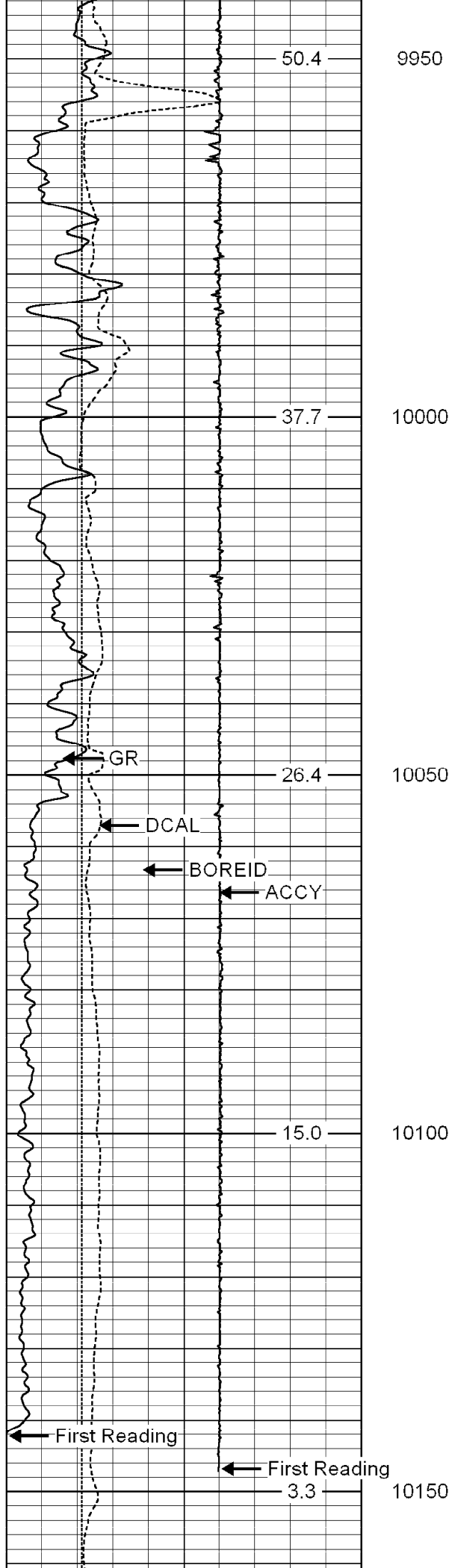


9300
9350
9400
9450
9500









← First Reading	
4	DCAL (in) 14
4	BOREID (in) 14
0	GR (GAPI) 150
-5	ACCY 5
	TBHV (ft3)

← First Reading		First Reading →	
Total Depth			
30	CNPOR (pu)	-10	
30	DPHI (pu)	-10	
0	PEF (barn)	10	-0.5
	DRHO (g/cc)	0.5	
	ABHV (ft3)		

Log Variables

Database: c:\documents and settings\t006\desktop\vornauf2-18h\sandridege_vornauf_mem.db
 Dataset: field/well/proc1/pass1.5

Top - Bottom

BHCOR	BHFL_TYPE	BHFLRES Ohm-m	BHFLRESSRC	BHIDSRC	BOREID in	BOTTEMP degF
On	WBM	1	MUDCELL	CURVE	6.125	128
CASED?	CASEOD in	CASETHCK in	CEMWATERSA kppm	CMNTTHCK in	DPORSEL	FLUIDDEN g/cc
No	4.5	0	0	0	RHOB	1
FRMSALIN kppm	LATNOR	MATRXDEN g/cc	MUDSALIN kppm	MudWgt lb/gal	NPORSEL	PERFS
0	Off	2.71	70	9.1	Limestone	0
RESTMP SRC	SO in	SRFTEMP degF	SZCOR	TDEPTH ft	TMPCOR	TOOLPOS
INTERNAL	0.5	65	On	11772	On	Ec-centered
XXXX						
0						

Calibration Report

Database File: c:\documents and settings\t006\desktop\vornauf2-18h\sandridege_vornauf_mem.db
 Dataset Pathname: proc1/pass1.5
 Dataset Creation: Tue Aug 14 13:46:30 2012 by Calc ThruBit 110523

ThruBit Induction Calibration Report

Tool Model-Serial Number: PS-PS01R
 Shop Calibration Performed: Wed Jul 25 10:03:01 2012

BASELINE

	R	Expected	X	Expected
Freq 1				
A1	-410.8880	[-500.00, -400.00]	427.5210	[-500.00, 500.00]
A2	-130.1030	[-180.00, -100.00]	121.8940	[-500.00, 500.00]
A3	-28.5086	[-50.00, -10.00]	-62.5202	[-500.00, 500.00]
A4	-16.1229	[-30.00, -10.00]	171.2620	[-500.00, 500.00]
A5	-14.8500	[-30.00, -10.00]	102.5790	[-500.00, 500.00]

Freq 2				
A1	-205.7230	[-280.00, -180.00]	242.9590	[-500.00, 500.00]
A2	-83.9072	[-130.00, -50.00]	45.6050	[-500.00, 500.00]
A3	-19.9393	[-50.00, -10.00]	-93.6120	[-500.00, 500.00]
A4	-20.0838	[-30.00, -10.00]	20.4881	[-500.00, 500.00]
A5	-20.2638	[-30.00, -10.00]	-32.8815	[-500.00, 500.00]
Freq 3				
A1	-126.0990	[-180.00, -80.00]	102.5720	[-500.00, 500.00]
A2	-63.1959	[-130.00, -30.00]	-12.7774	[-500.00, 500.00]
A3	-14.8126	[-50.00, -10.00]	-127.4750	[-500.00, 500.00]
A4	-21.8112	[-30.00, -10.00]	-83.7303	[-500.00, 500.00]
A5	-22.9647	[-30.00, -10.00]	-132.8210	[-500.00, 500.00]
Freq 4				
A1	-65.2680	[-120.00, -40.00]	-97.3914	[-500.00, 500.00]
A2	-44.8152	[-110.00, -10.00]	-101.5830	[-500.00, 500.00]
A3	-10.6991	[-50.00, -10.00]	-193.8100	[-500.00, 500.00]
A4	-26.0315	[-30.00, -10.00]	-245.1770	[-500.00, 500.00]
A5	-29.6423	[-30.00, -10.00]	-304.2350	[-500.00, 500.00]

CALIBRATION COEFFICIENTS

	R	Expected	X	Expected
Freq 1				
A1	0.9925	[0.95, 1.05]	0.0012	[-0.05, 0.05]
A2	0.9946	[0.95, 1.05]	0.0024	[-0.05, 0.05]
A3	0.9940	[0.95, 1.05]	-0.0045	[-0.05, 0.05]
A4	0.9898	[0.95, 1.05]	0.0041	[-0.05, 0.05]
A5	0.9963	[0.95, 1.05]	0.0019	[-0.05, 0.05]
Freq 2				
A1	0.9874	[0.95, 1.05]	-0.0076	[-0.05, 0.05]
A2	0.9889	[0.95, 1.05]	-0.0066	[-0.05, 0.05]
A3	0.9827	[0.95, 1.05]	-0.0062	[-0.05, 0.05]
A4	0.9848	[0.95, 1.05]	-0.0047	[-0.05, 0.05]
A5	0.9918	[0.95, 1.05]	-0.0073	[-0.05, 0.05]
Freq 3				
A1	0.9869	[0.95, 1.05]	-0.0092	[-0.05, 0.05]
A2	0.9884	[0.95, 1.05]	-0.0081	[-0.05, 0.05]
A3	0.9821	[0.95, 1.05]	-0.0082	[-0.05, 0.05]
A4	0.9827	[0.95, 1.05]	-0.0062	[-0.05, 0.05]
A5	0.9919	[0.95, 1.05]	-0.0084	[-0.05, 0.05]
Freq 4				
A1	0.9903	[0.95, 1.05]	0.0015	[-0.05, 0.05]
A2	0.9917	[0.95, 1.05]	0.0027	[-0.05, 0.05]
A3	0.9873	[0.95, 1.05]	0.0003	[-0.05, 0.05]
A4	0.9845	[0.95, 1.05]	0.0043	[-0.05, 0.05]
A5	1.0005	[0.95, 1.05]	0.0015	[-0.05, 0.05]
Temperature	37.6770 degC			

ThruBit Density Calibration Report

Tool Model-Serial Number: PS-PS01D

Source Number:

Shop Calibration Performed: Thu Jul 19 10:47:37 2012

REFERENCE

REFERENCE

Density Units

Aluminium 2.607 g/cc
 Magnesium 1.752 g/cc

READINGS

Outputs	Counts	Units	Expected
SS1 Background	123.66	cps	[130.00, 170.00]
LS1 Background	132.03	cps	[130.00, 170.00]
LS4 Background	27.54	cps	[27.00, 35.00]
SS1 Aluminium	4782.00	cps	[4500.00, 5500.00]
LS1 Aluminium	908.63	cps	[750.00, 950.00]
LS4 Aluminium	1016.34	cps	[843.00, 1068.00]
SS1 Magnesium	7901.76	cps	[7000.00, 9000.00]
LS1 Magnesium	6002.95	cps	[5250.00, 6250.00]
LS1 Al + Fe	771.31	cps	[650.00, 800.00]
LS4 Al + Fe	449.12	cps	[382.00, 471.00]

RESULTS

SS Slope	1.67	[1.52, 1.77]
LS Slope	0.42	[0.38, 0.45]
PEF K Factor	4.977	[3.510, 6.170]
PEF B Factor	-0.515	[-0.700, -0.410]

Caliper Shop Calibration performed: Thu Jul 19 10:47:37 2012

RESULTS

Reference	Reading	Units
12.00	1867.53	in
9.00	2024.30	in
6.00	2185.88	in

DENSITY PRE-SURVEY CHECK Performed: Wed Aug 08 08:21:53 2012

Outputs	Counts	Units	Expected
SS1 Background	124.79	cps	[119.95, 127.37]
LS1 Background	132.72	cps	[128.07, 135.99]
LS4 Background	41.33	cps	[25.89, 29.20]

DENSITY POST-SURVEY CHECK Performed: Wed Dec 31 18:00:00 1969

Outputs	Counts	Units	Expected
SS1 Background	0.00	cps	[119.95, 127.37]
LS1 Background	0.00	cps	[128.07, 135.99]
LS4 Background	0.00	cps	[25.89, 29.20]

CALIPER PRE-SURVEY CHECK Performed: Wed Aug 08 08:22:20 2012

Reference	Readings	Units	Expected
6.00	5.88	in	[5.80, 6.20]

CALIPER POST-SURVEY CHECK Performed: Wed Aug 08 08:22:20 2012

Reference	Readings	Units	Expected
0.00	0.00	in	[-0.20, 0.20]

Compensated Neutron Calibration Report

Tool Model-Serial Number: Source Number:	PS-PS27N
Calibration Tank Temperature: Shop Calibration Performed:	88.0 degF Wed Jul 18 12:12:40 2012

BACKGROUND MEASUREMENT

Outputs	Measured	Units	Expected
SS Counts	0.1	cps	<10
LS Counts	0.1	cps	<4

WATER TANK REFERENCE

Outputs	Measured	Units	Expected
SS Counts	914.6	cps	
LS Counts	31.1	cps	
Tank Ratio Ref	30.9580	SS/LS	
Tank Ratio	29.4457	SS/LS	
Tank Ratio Gain	1.0514		[0.85, 1.15]

ALUMINUM SLEEVE REFERENCE

Outputs	Measured	Units	Expected
SS Counts	10175.5	cps	
LS Counts	1006.0	cps	
Al Ratio Ref	10.797	SS/LS	
Al Ratio	10.634	SS/LS	
Al Ratio Gain	1.02		[0.90, 1.10]
Sleeve Porosity	14.46	pu	

PRE-SURVEY BACKGROUND CHECK Performed:	Thu Aug 09 07:44:56 2012
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Outputs	Measured	Units	Expected
SS Counts	0.1	cps	<10
LS Counts	0.1	cps	<4

POST-SURVEY BACKGROUND CHECK Performed:	
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Outputs	Measured	Units	Expected
SS Counts	0.0	cps	<10

LS Counts

0.0

cps

<4

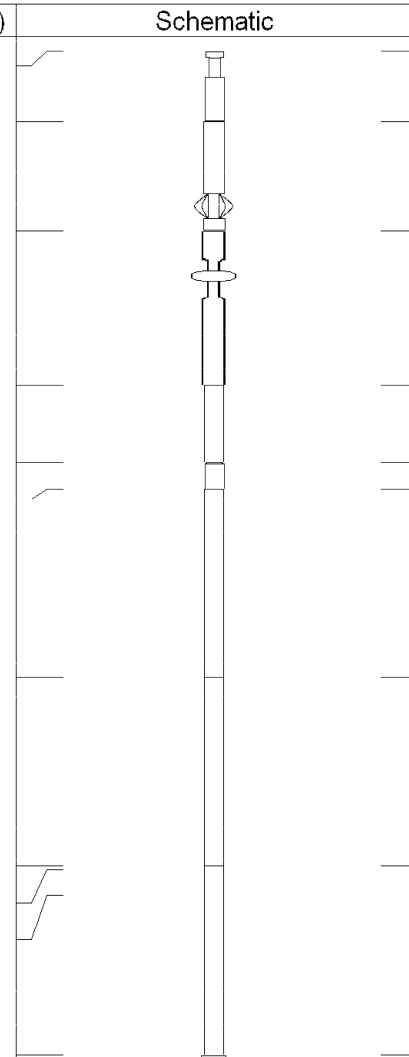
Gamma Ray Calibration Report

Tool Model-Serial Number: PS-PS27T
 Performed: Sat Jul 21 08:30:09 2012
 Calibrator Value: 162.7 GAPI
 Background Reading: 73.2 cps
 Calibrator Reading: 454.7 cps
 Sensitivity: 0.3850 GAPI/cps

Inclinometer Calibration Report

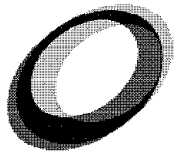
Performed: Sun Jun 13 14:33:21 1993

	Low Read.	High Read.	Low Ref.	High Ref.	
X Accelerometer	0.00	1.00	0.00	1.00	gee
Y Accelerometer	0.00	1.00	0.00	1.00	gee
Z Accelerometer	0.00	1.00	0.00	1.00	gee

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)	
Thrubit	67.64		Cablehead-S Solid Weakpoint	2.31	2.13	5.00	
Thrubit	65.33		BDOT	3.54	2.25	35.00	
Thrubit	61.79		HangOff_Tool	5.00	2.38	60.00	
Thrubit	56.79		Swivel	2.50	2.06	25.00	
Thrubit	54.29		10-1	0.88	2.13	3.95	
TBBAT2	53.41		TBBAT2-A (PS29B) Thrubit Battery	6.13	2.13	40.00	
TBBAT	47.29		TBBAT-A (PS30B) Thrubit Battery	6.13	2.13	38.20	
TMG	41.16		TMG-PS (PS27T) ThruBit Telemetry Gamma Ray		6.13	2.13	45.00
GR	41.04						
GRTEMP	40.20						
Thrubit	35.04						

ThruBit	33.04			Decentralizer Decentralizer (Small)	4.50	2.13	70.00
CNLSC	28.60			TBN-PS (PS27N) ThruBit Neutron	4.77	2.13	63.00
LSW1	18.04			TBD-PS (PS01D) ThruBit Density	10.48	2.13	91.00
DCAL	17.13						
A1_P	10.60						
A2_P	10.10						
A3_P	9.35						
A4_P	8.35			TBI-PS (PS01R) ThruBit Induction	15.29	2.13	94.00
A5_P	6.60						

Dataset: sandridge_vornauf_mem.db: field/well/proc1/pass1.5
 Total Length: 67.64 ft
 Total Weight: 570.15 lb
 O.D.: 2.38 in



ThruBit
 A Schlumberger Company

Company SANDRIDGE ENERGY
 Well VORNAUF 2-18H
 Field STRANATHAN
 County HARPER
 State KANSAS