



ThruBit
A Schlumberger Company

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

Company SANDRIDGE ENERGY
Well MURRAY 3406 1-5H
Field EASTHAM
County HARPER
State KANSAS

Company SANDRIDGE ENERGY
Well MURRAY 3406 1-5H
Field EASTHAM
County HARPER State KANSAS

Location: API #: 15-077-21921-0100
200' FSL & 660' FEL
SEC 5 TWP 34S RGE 6W
Permanent Datum G.L. Elevation 1254'
Log Measured From KB 15' ABOVE PERM DATUM
Drilling Measured From KB
Other Services
THRUBIT
PORTAL BIT
Elevation
K.B. 1269'
D.F. 1269'
G.L. 1254'

Date	22 APR 2013
Run Number	ONE
Depth Driller	8885'
Depth Logger	8833'
Bottom Logged Interval	8815'
Top Log Interval	2500'
Casing Driller	7.0" @ 5265'
Casing Logger	5254'
Bit Size	6.125"
Type Fluid in Hole	WBM
Density / Viscosity	8.4 / 27
PH / Fluid Loss	9.0 / 60
Source of Sample	PIT
Rm @ Meas. Temp	7.69 OHM@65DEGF
Rmf @ Meas. Temp	5.77 OHM@65DEGF
Rmc @ Meas. Temp	9.61 OHM@65DEGF
Source of Rmf / Rmc	CALCULATED
Rm @ BHT	3.82 OHM@138DEGF
Time Circulation Stopped	11:00 22 APR 2013
Time Logger on Bottom	12:30 22 APR 2013
Maximum Recorded Temperature	138 DEGF
Equipment Number	T005
Location	OKC, OK
Recorded By	S.JARSKI
Witnessed By	T.LELJA

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

SERVICE: HORIZONTAL PUMP DOWN MEMORY BIT DEPTH: 8781' LOGGED TO: 2500'
ALL SCALES AND PRESENTATIONS PER CLIENT REQUEST
LIMESTONE MATRIX, 2.71 g/cc. USED FOR POROSITY MEASUREMENTS
TOOLSTING RAN WITH SWIVEL AND SMALL DE-CENTRALIZER
TBHV REPRESENTS TOTAL BOREHOLE VOLUME, ft3
ABHV REPRESENTS ANNULAR HOLE VOLUME, CALCULATED FOR 4.5" CSG., ft3
RIGMINDER USED TO ACQUIRE LOG DEPTH
LOG CORRELATED TO MWD GR
RIG: UNIT #310

CREW: S.JARSKI R.WILSON R.CRESSWELL I.HERNANDEZ

Service Ticket No. 1862 API No. 15-077-21921-0100 PGM Ver WARRIOR 7.0

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

EQUIPMENT DATA

GAMMA	NEUTRON	DENSITY	INDUCTION
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Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	PS27T	Serial No.	PS14N	Serial No.	PS01D	Serial No.	PS38R
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	8833'	2500'	0 PSI	30 FPM	

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

DIRECTIONAL INFORMATION

Maximum Deviation	91.63	deg. @	7024'	KOP	3750'
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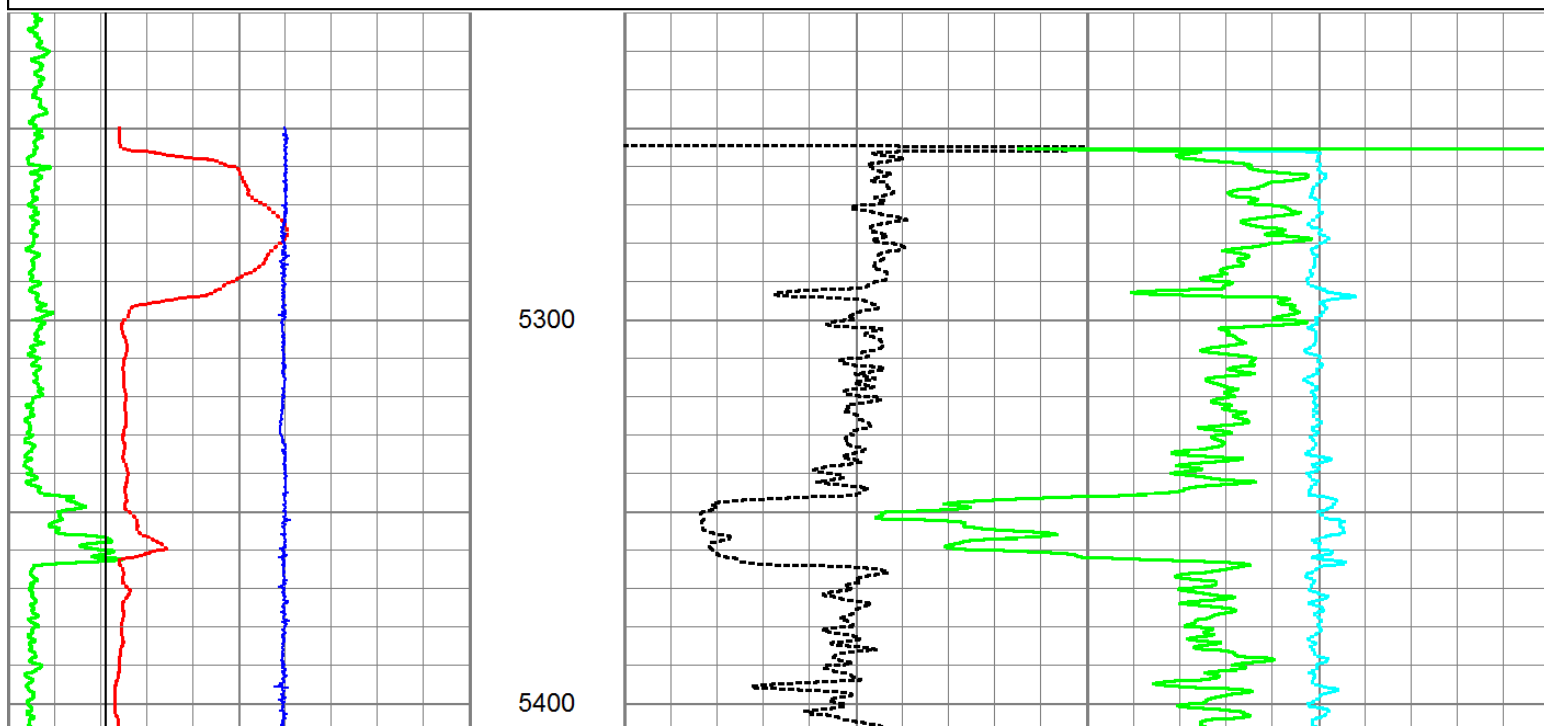


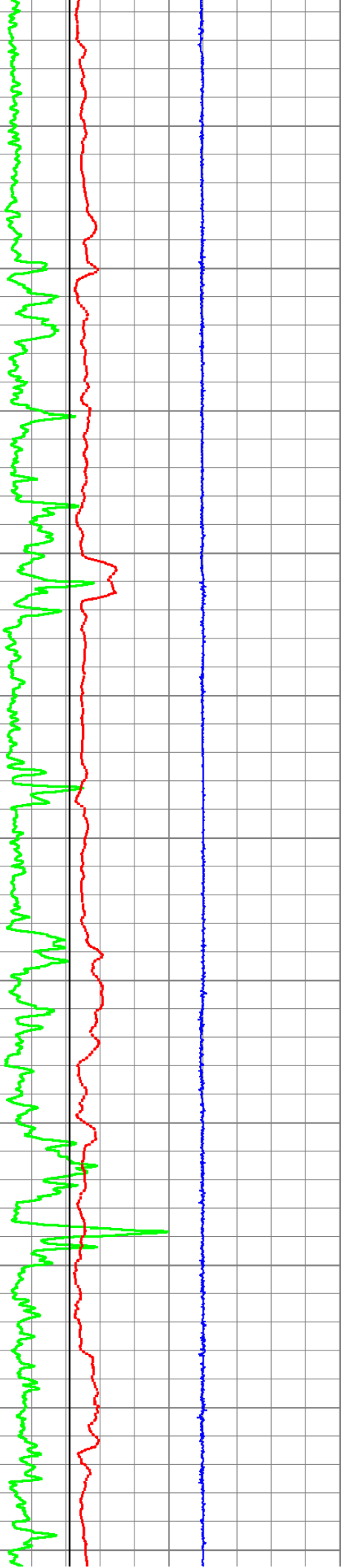
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 Dataset Pathname: proc1/pass1.4
 Presentation Format: 6_2n_chk
 Dataset Creation: Mon Apr 22 20:56:58 2013
 Charted by: Depth in Feet scaled 1:600

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		





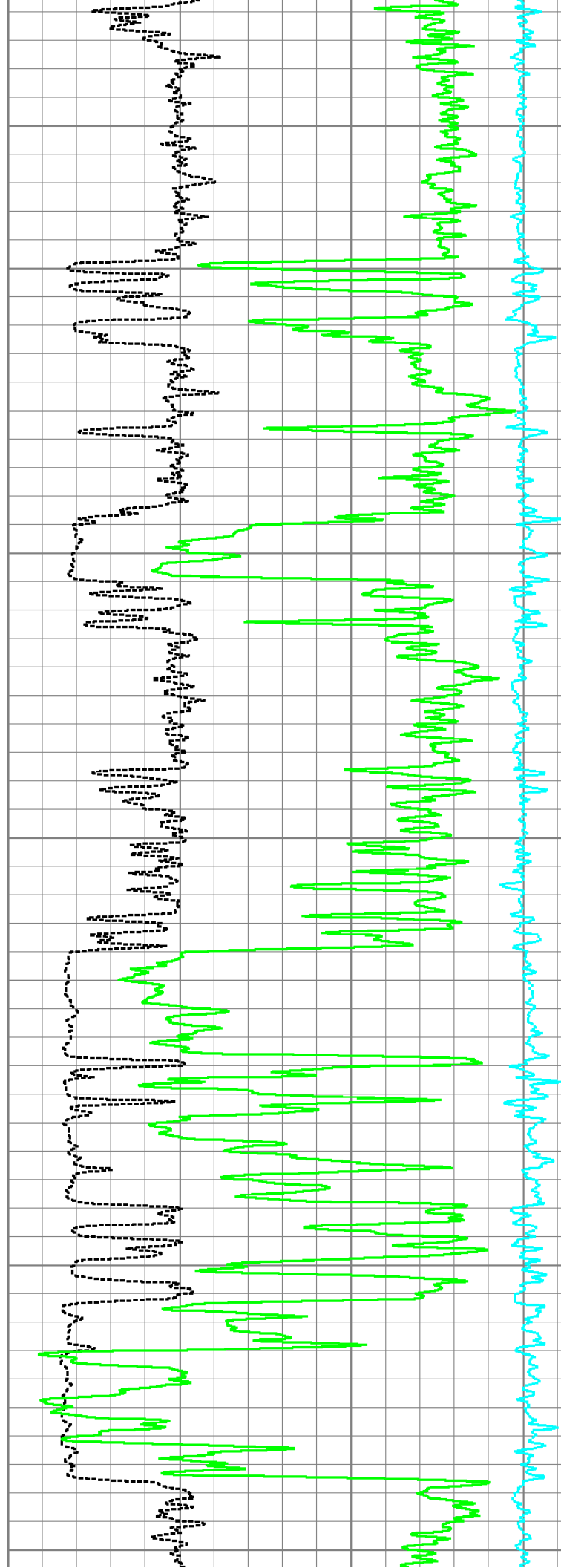
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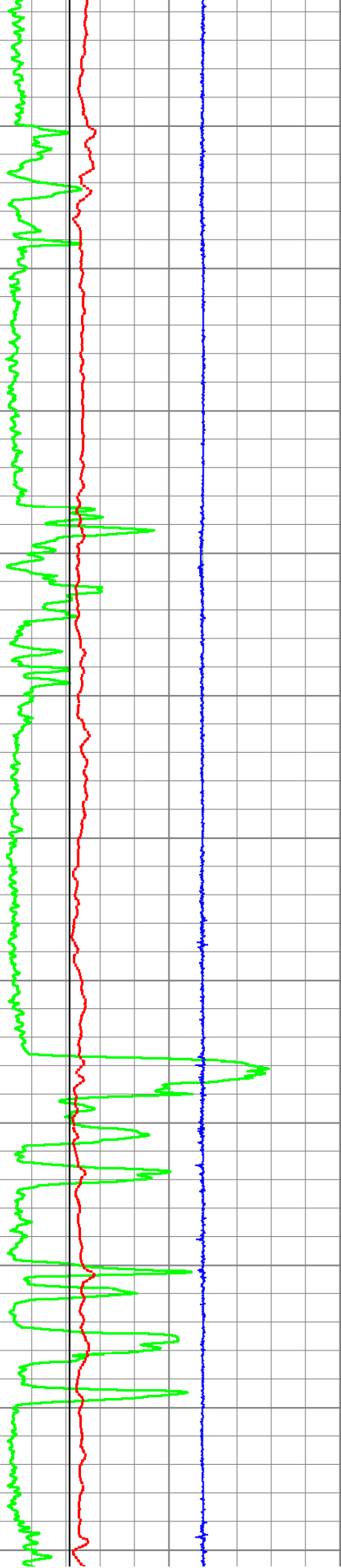
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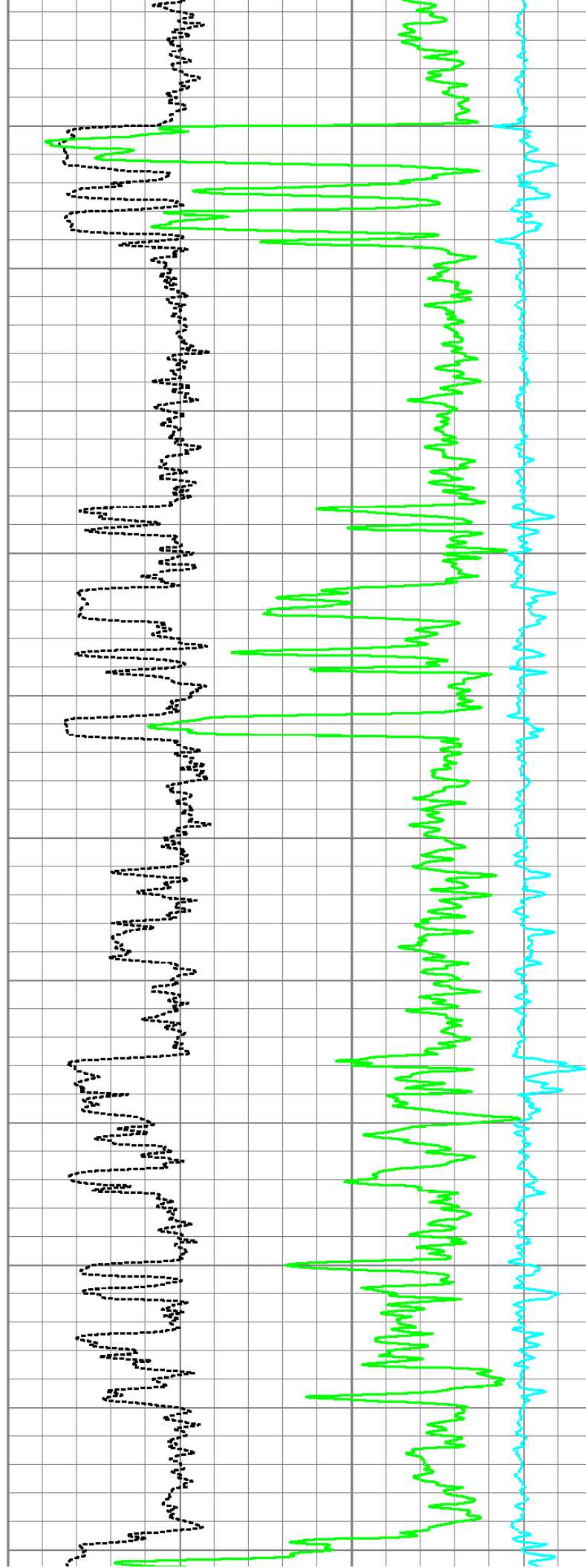
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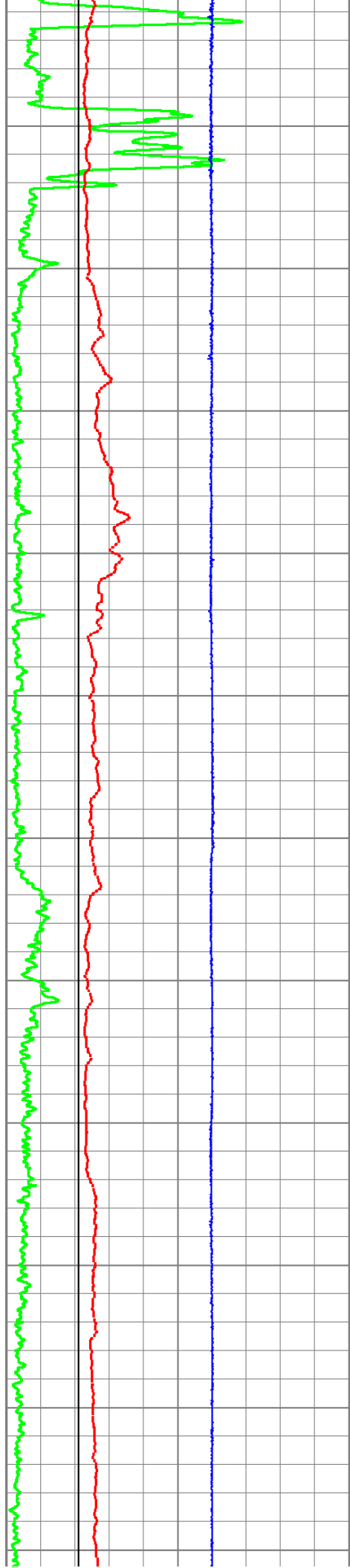
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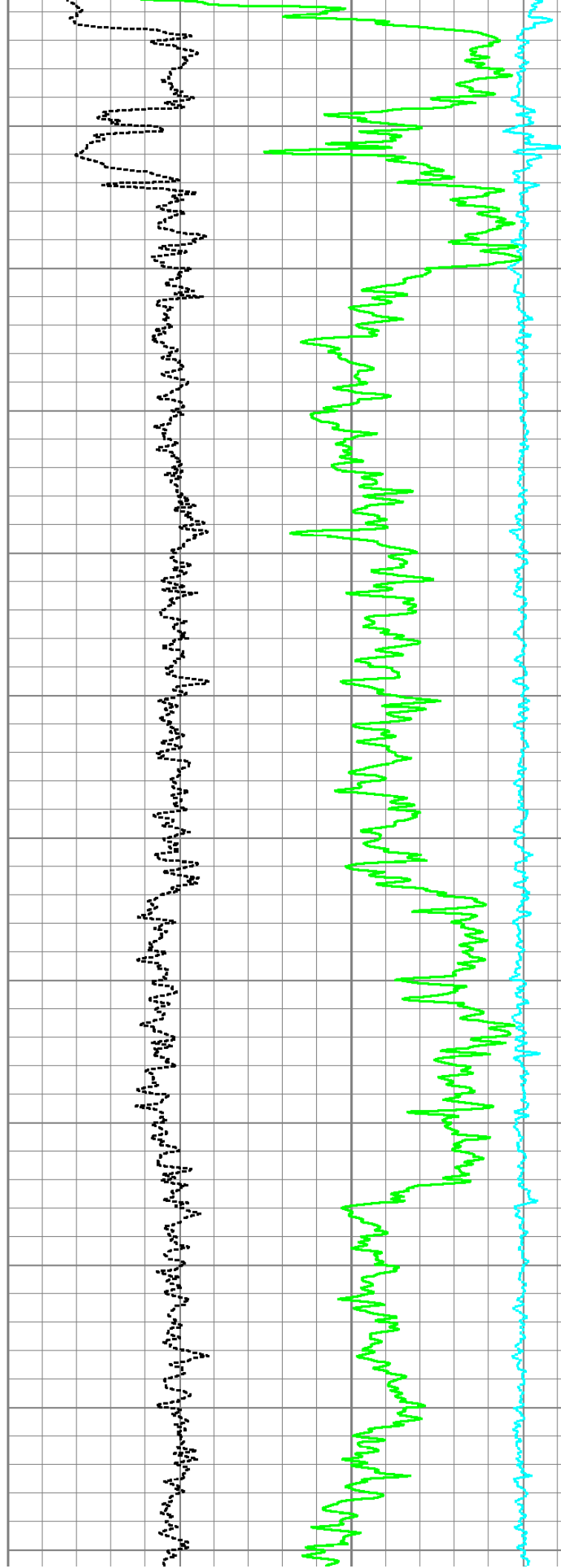
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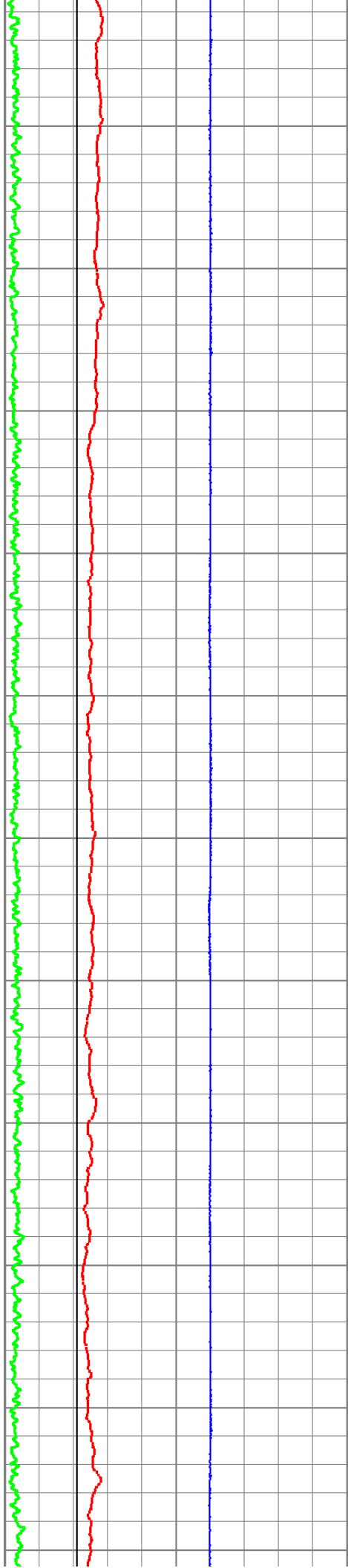
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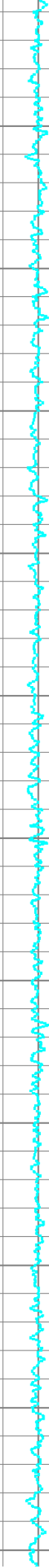
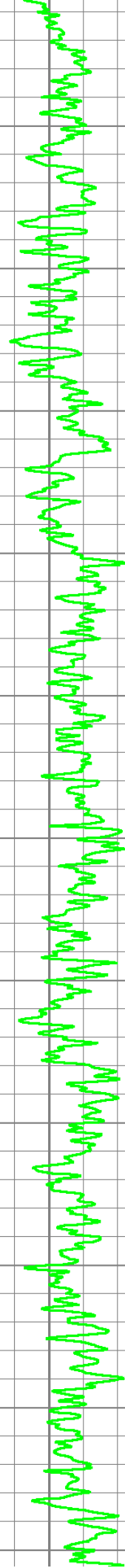
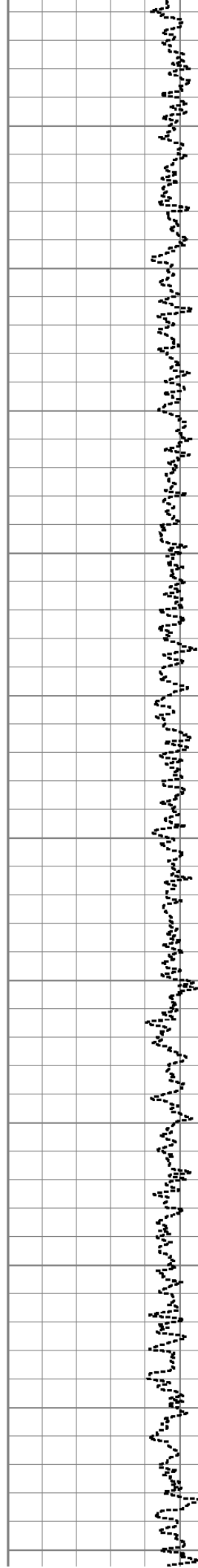
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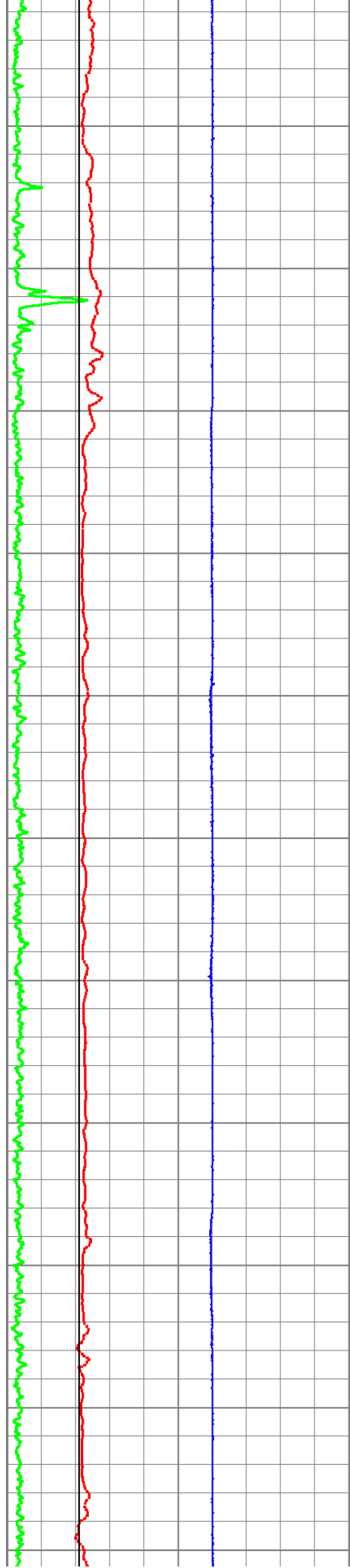
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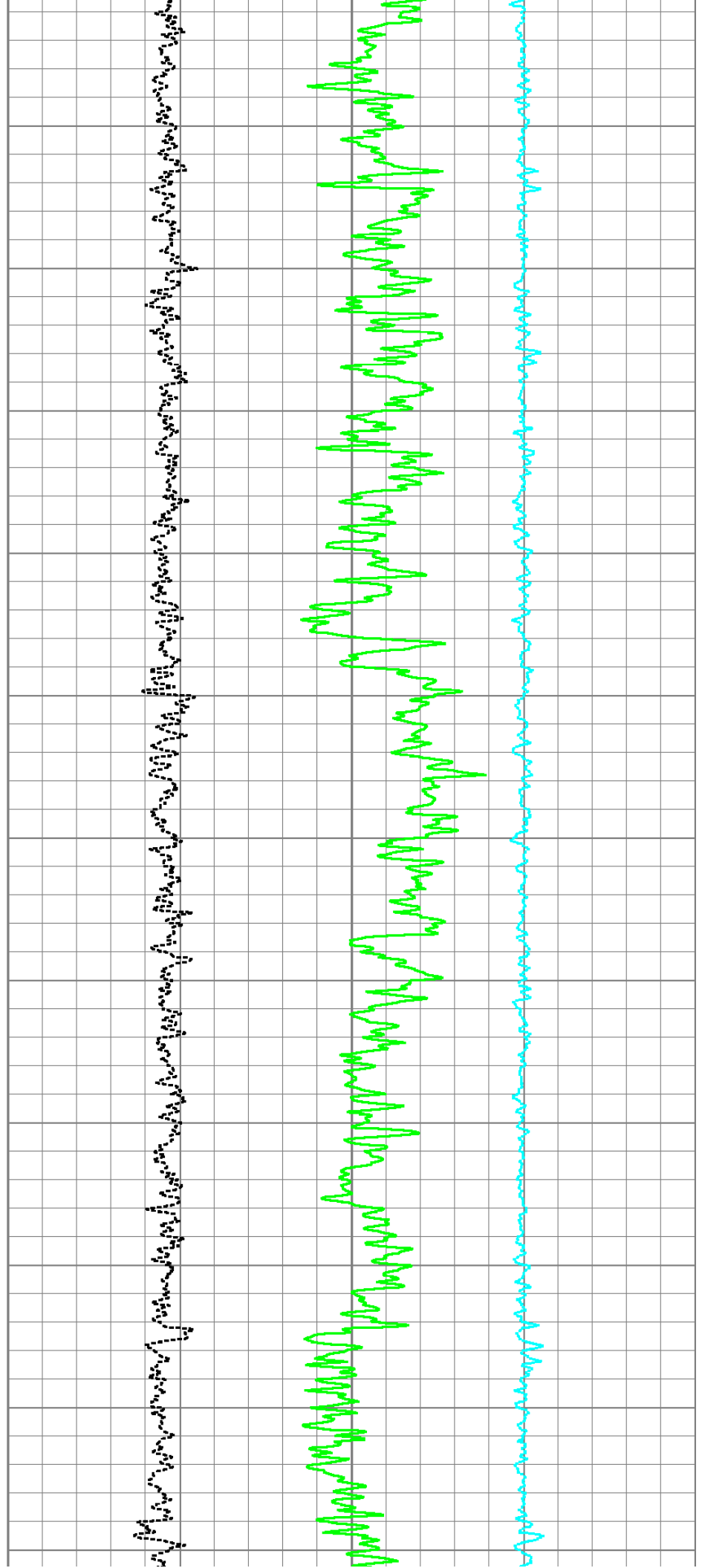
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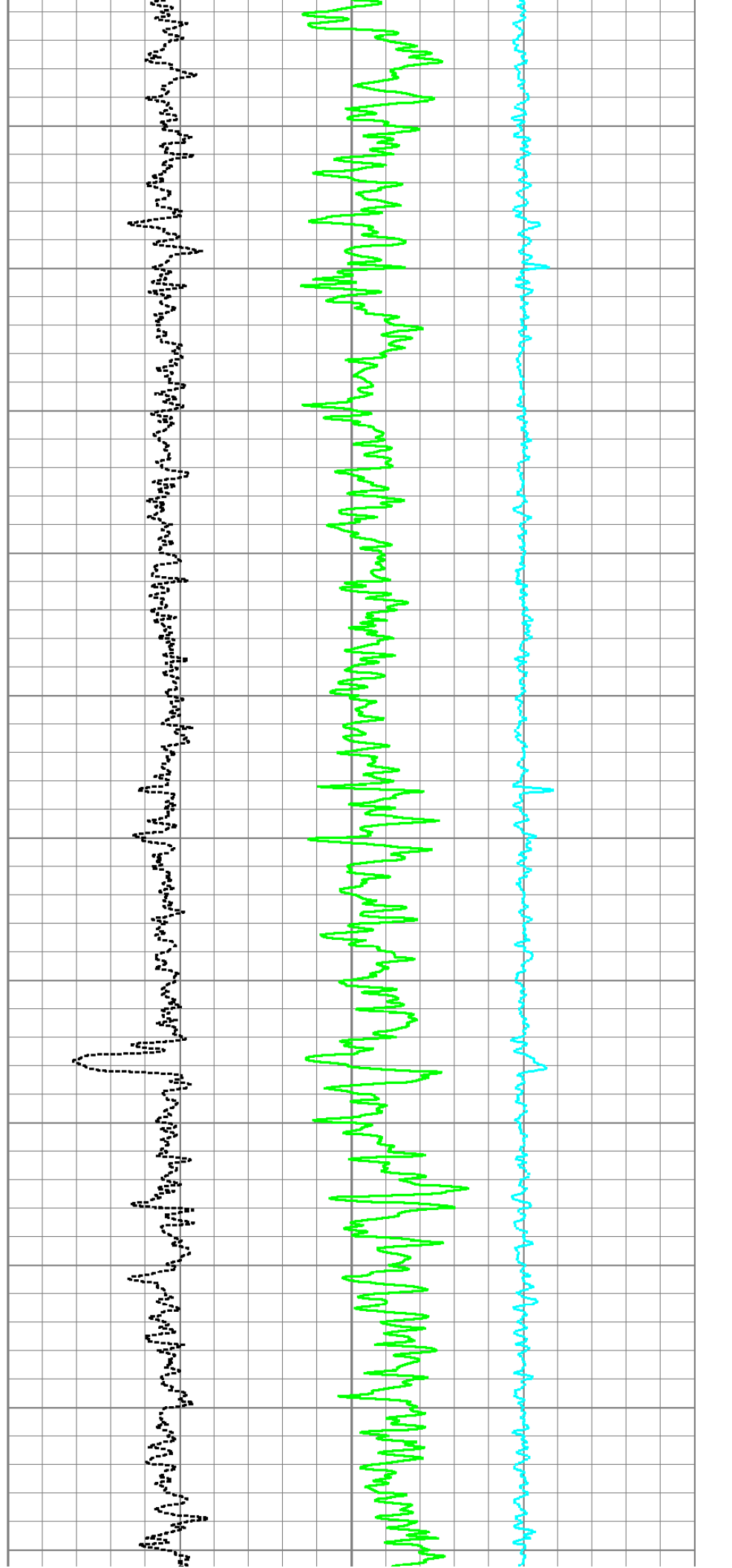
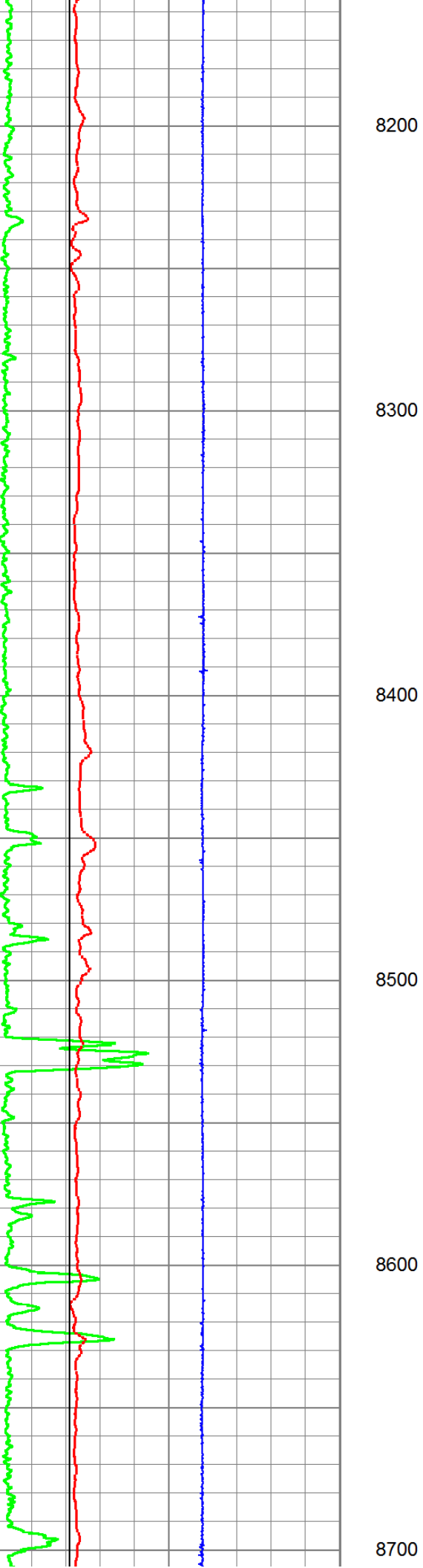
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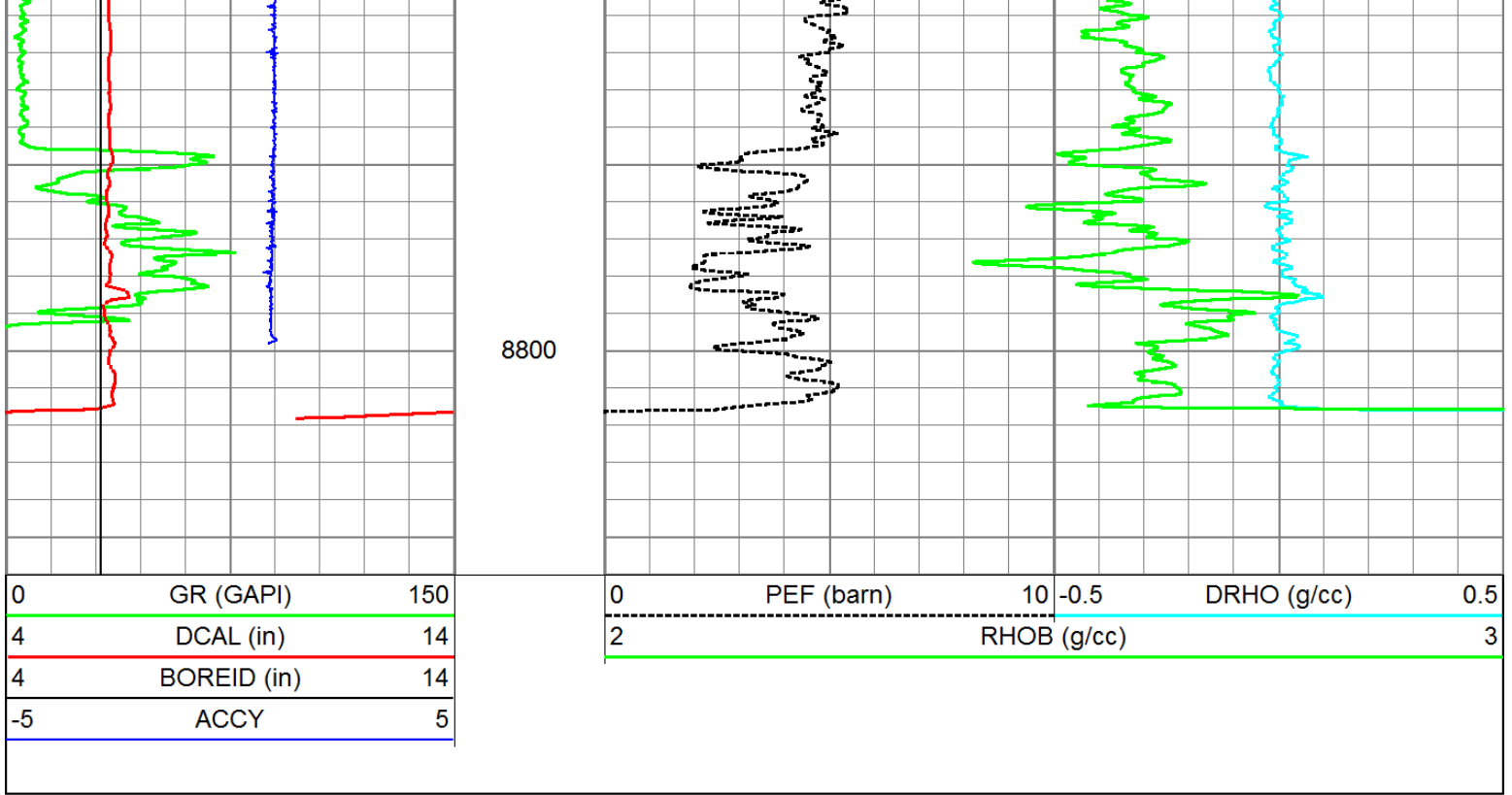
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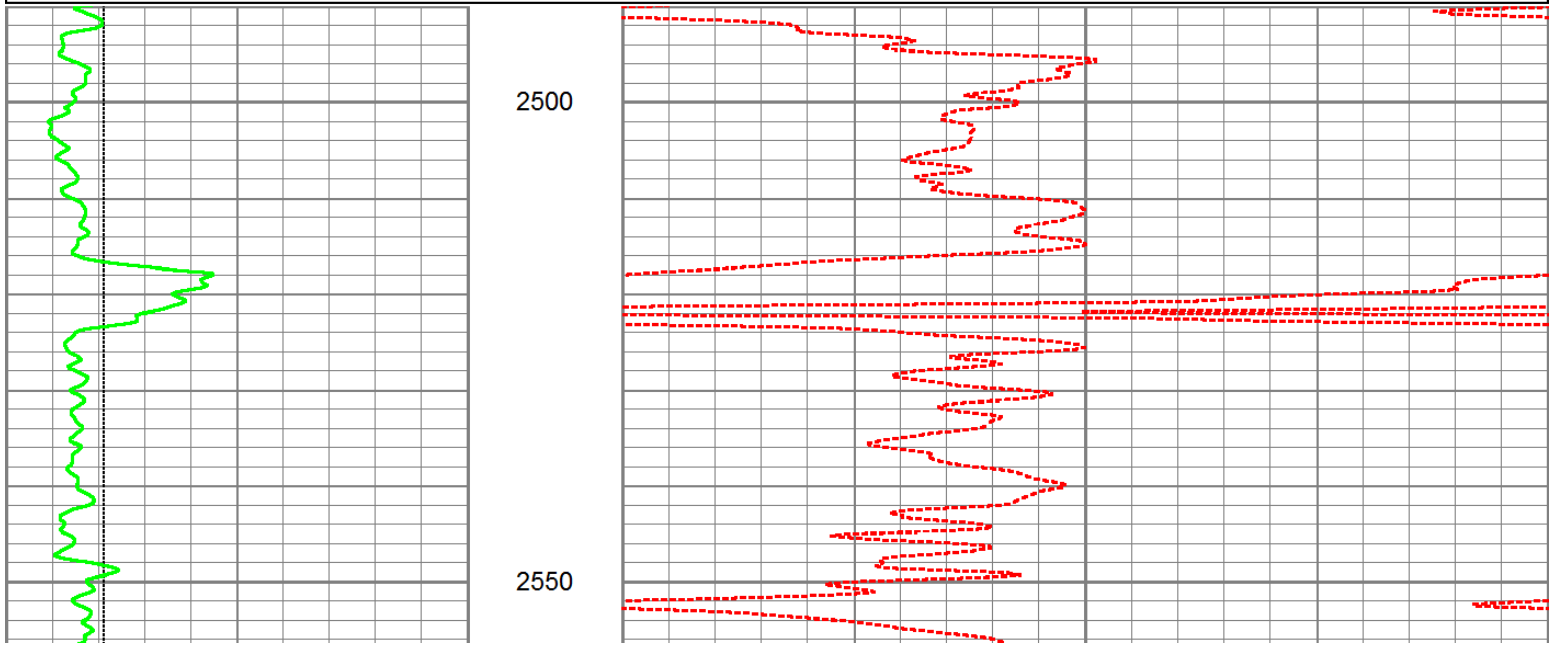


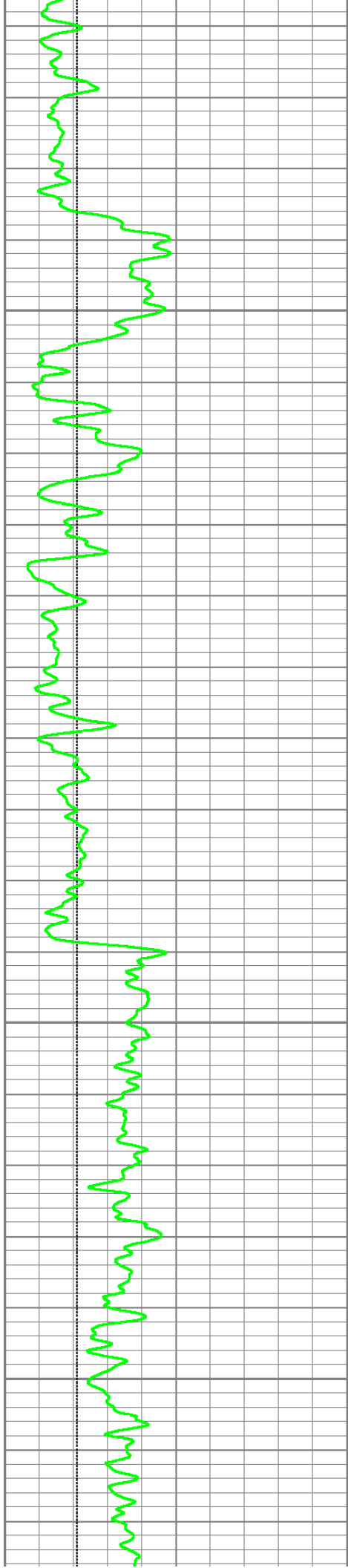


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 Dataset Pathname: proc1/pass1.4
 Presentation Format: 6_5n_chk
 Dataset Creation: Mon Apr 22 20:56:58 2013
 Charted by: Depth in Feet scaled 1:240

4	DCAL (in)	14	30	CNPOR (pu)	-10			
4	BOREID (in)	14	30	DPHI (pu)	-10			
0	GR (GAPI)	150	0	PEF (barn)	10	-0.5	DRHO (g/cc)	0.5
-5	ACCY	5	ABHV (ft3)					
	TBHV (ft3)							



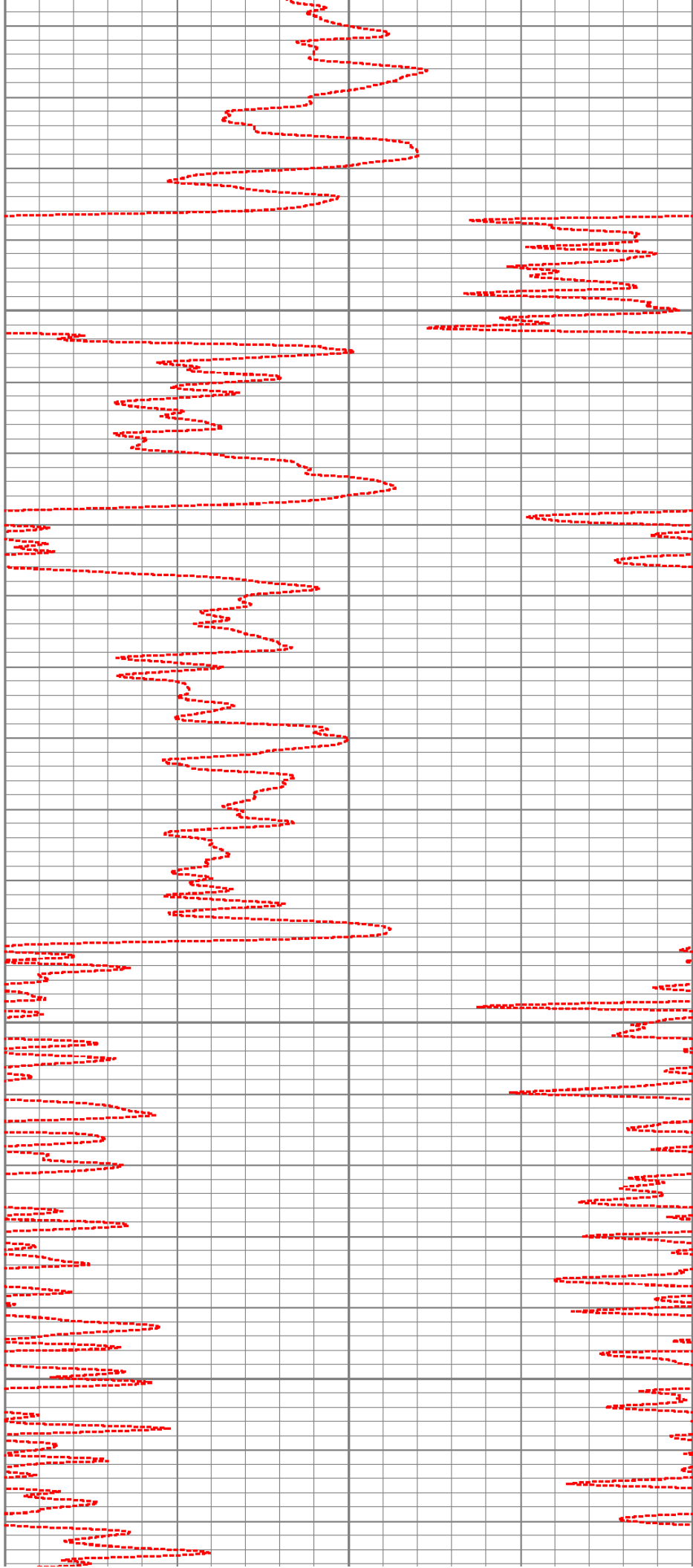


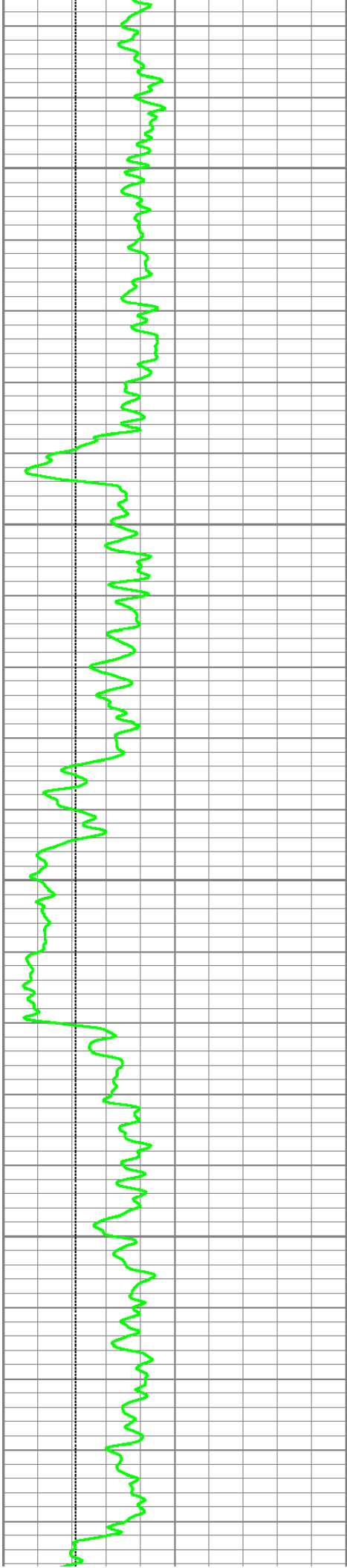
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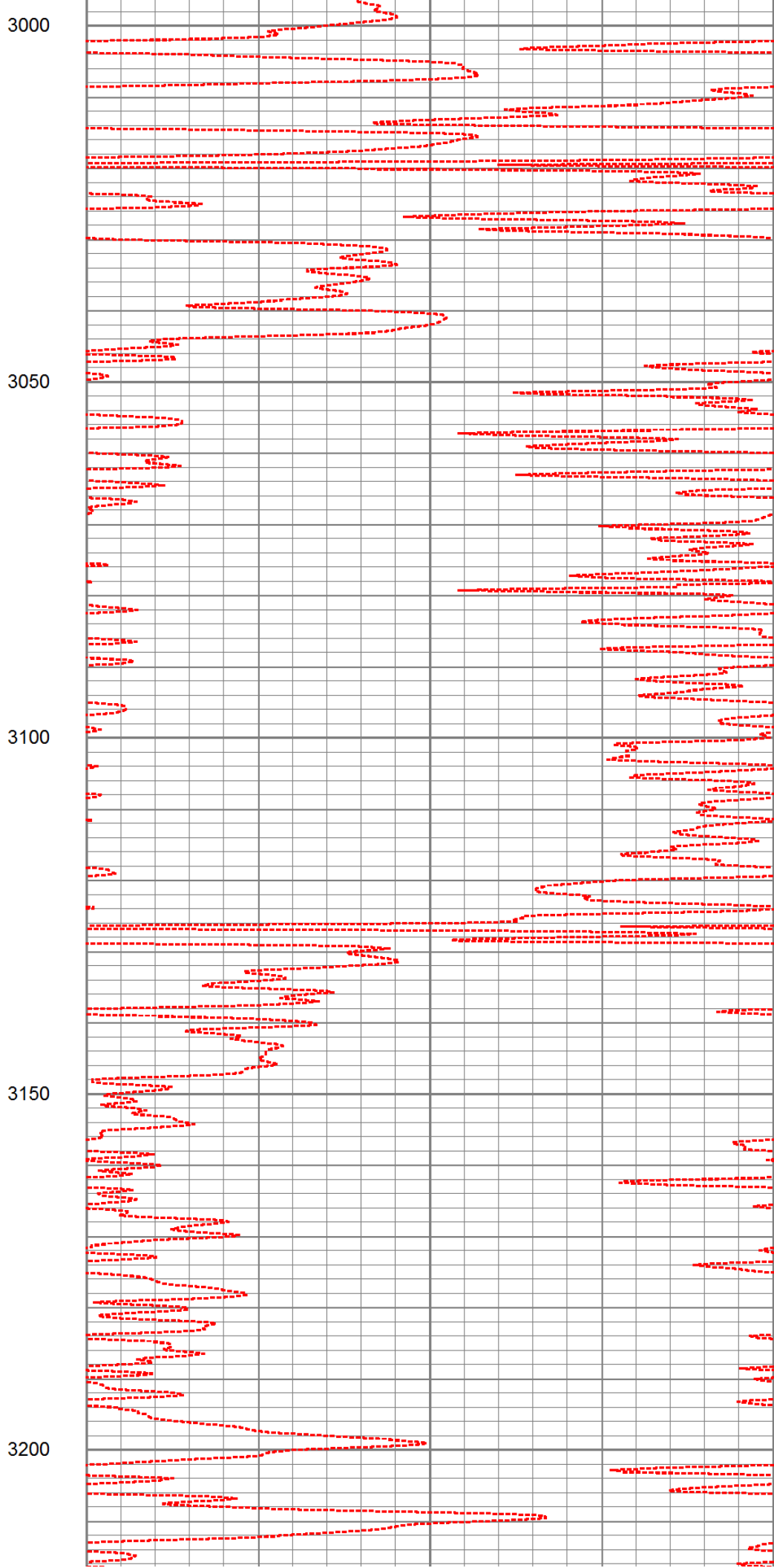
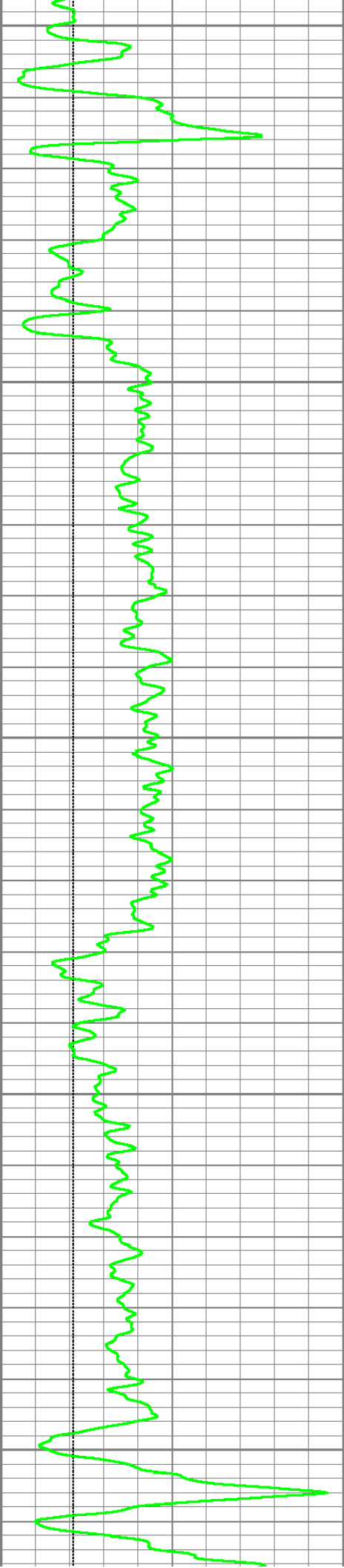
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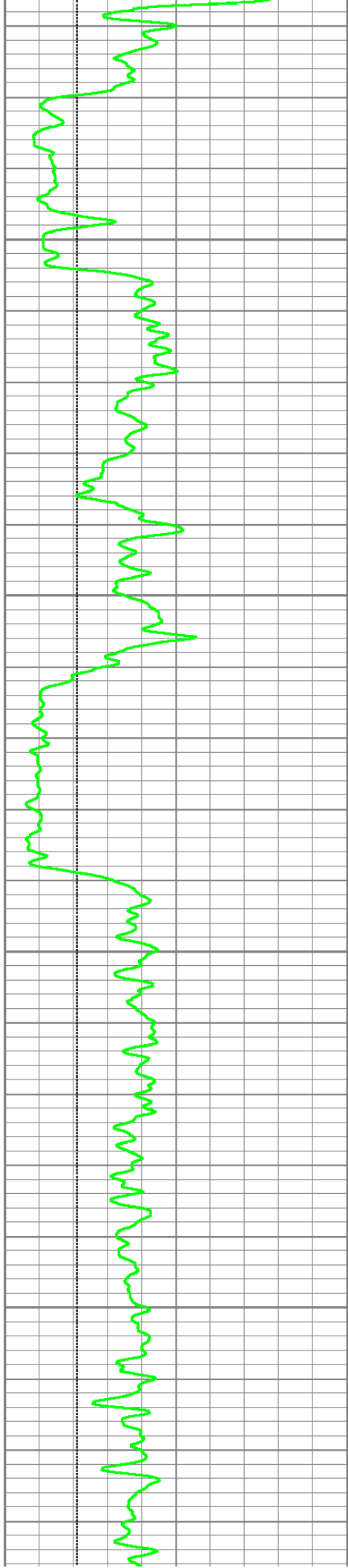
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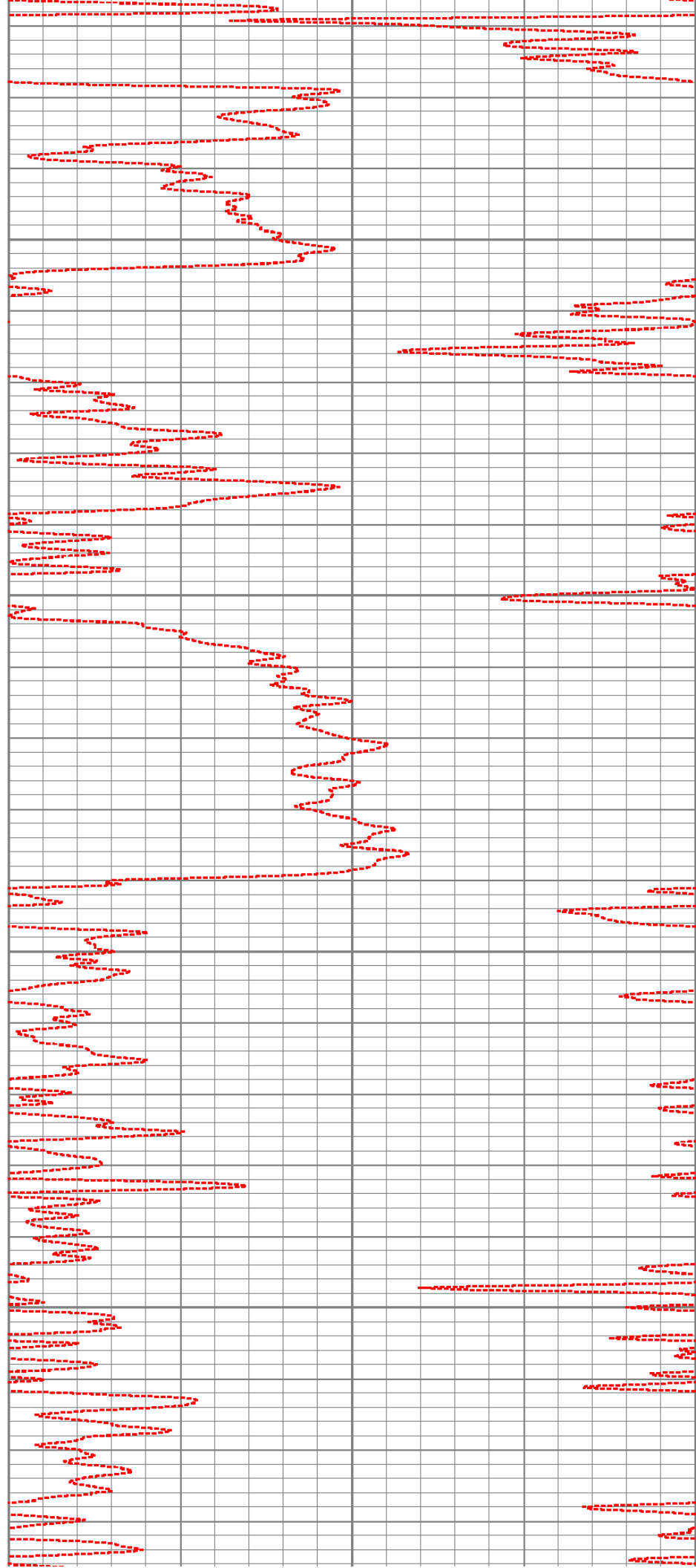


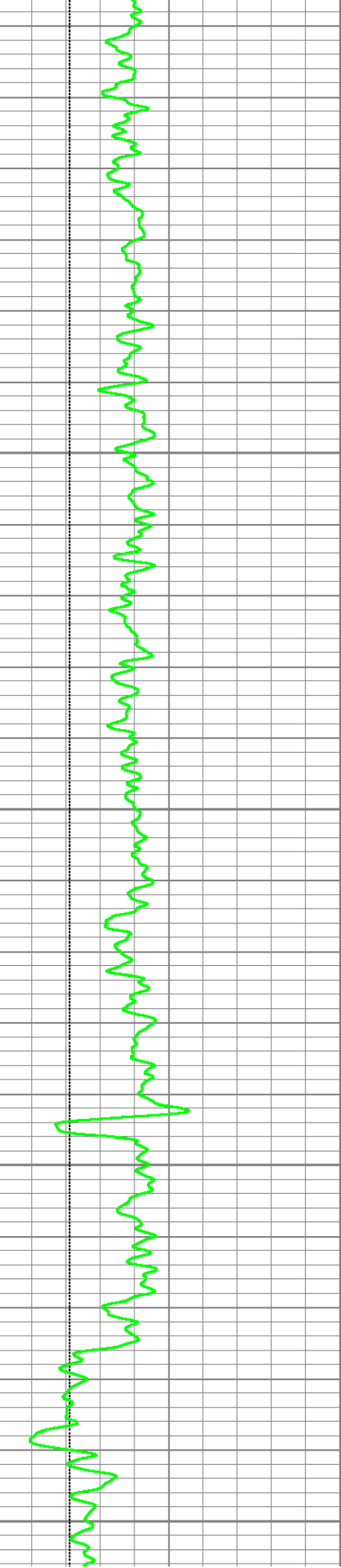
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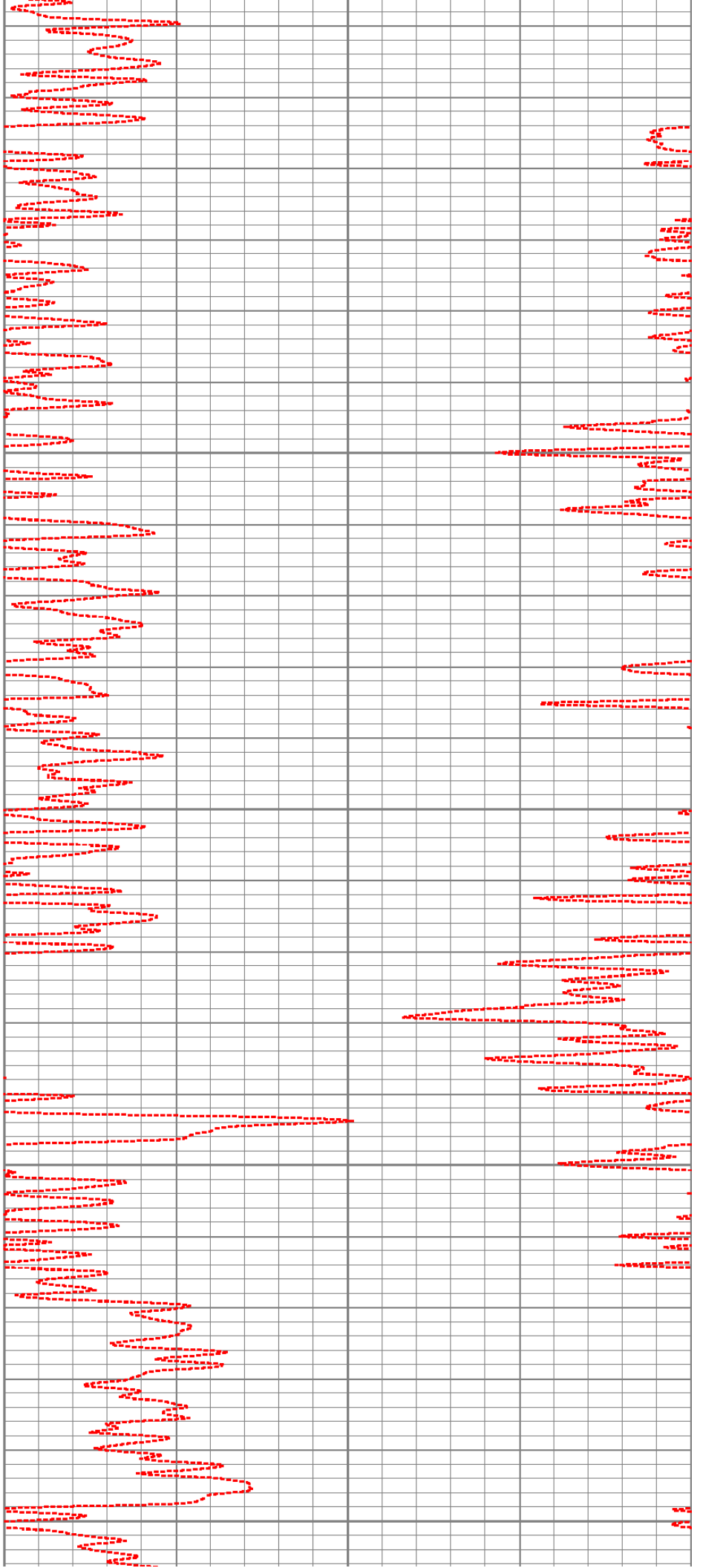
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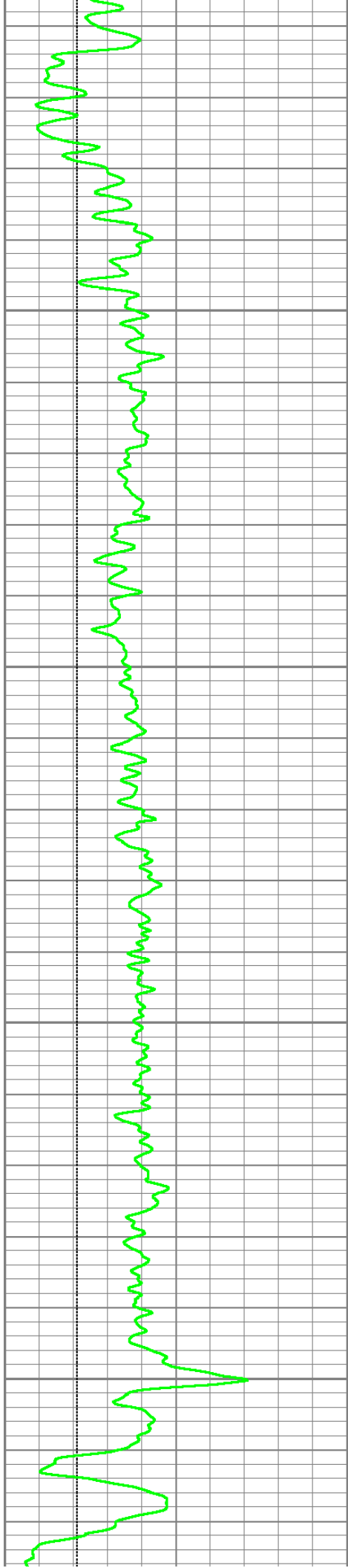
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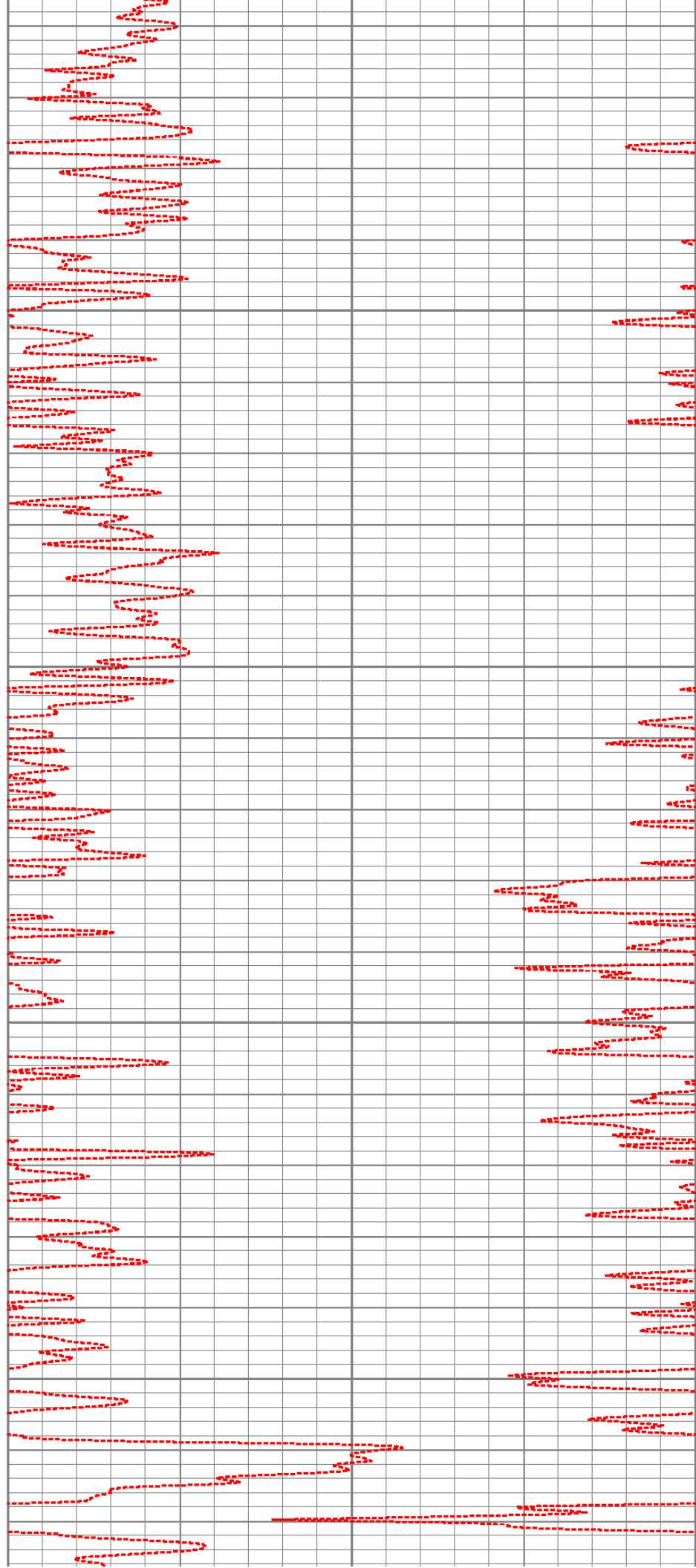


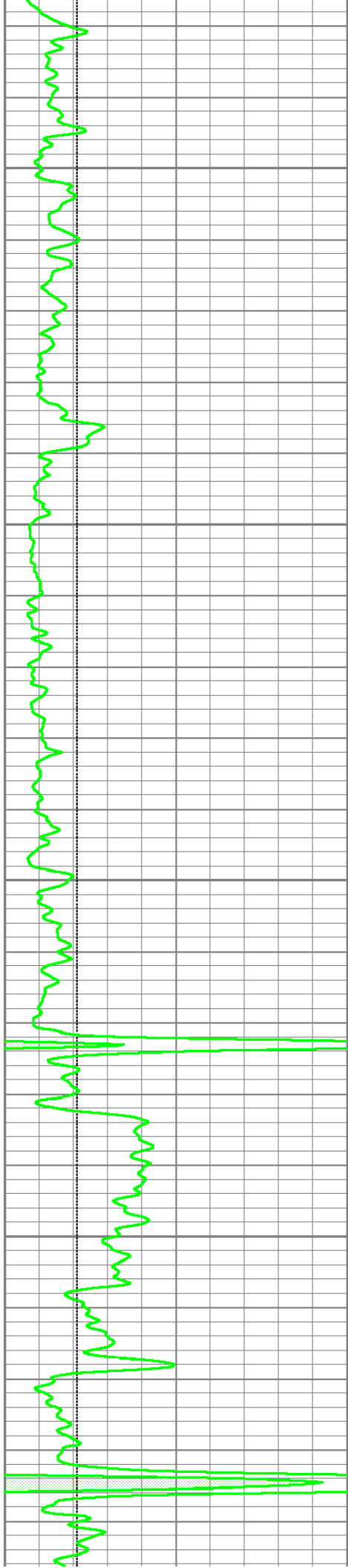
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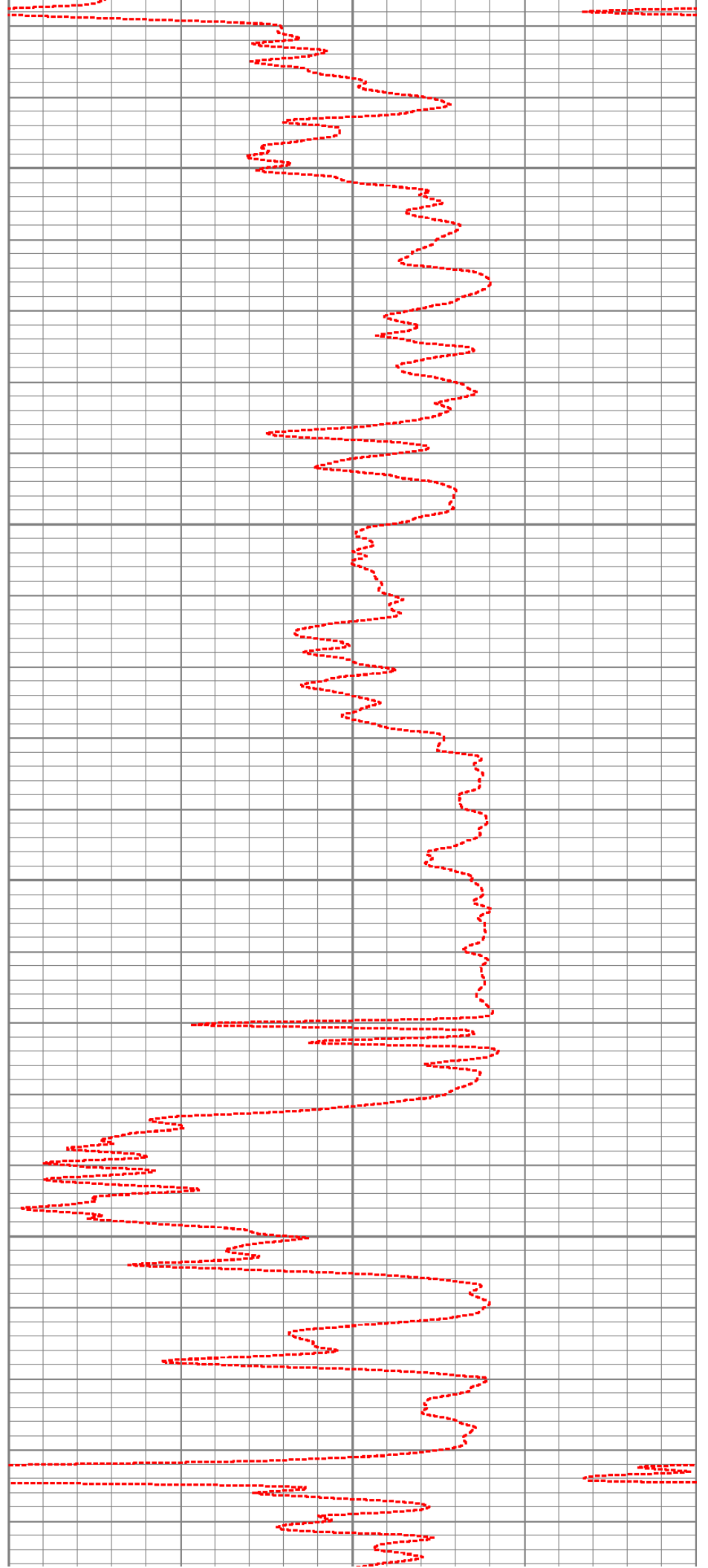


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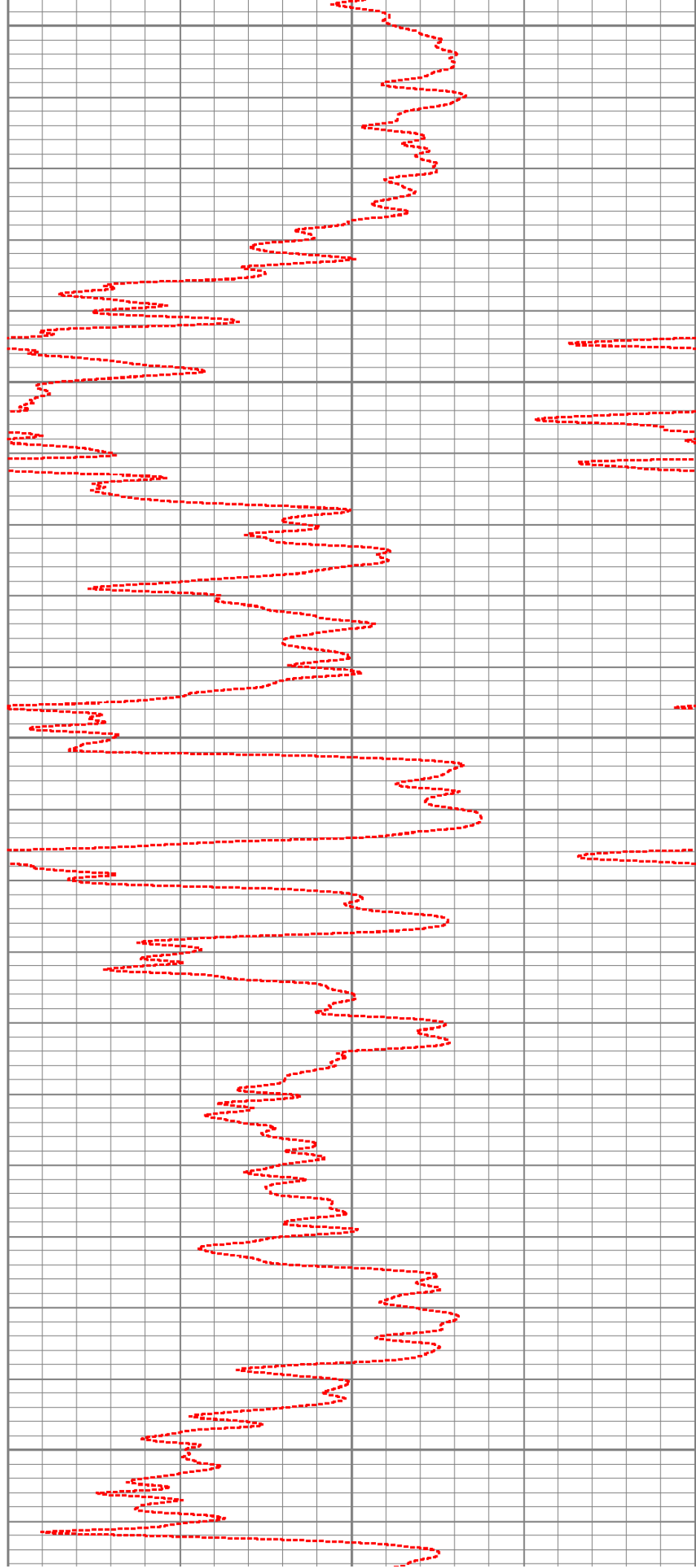
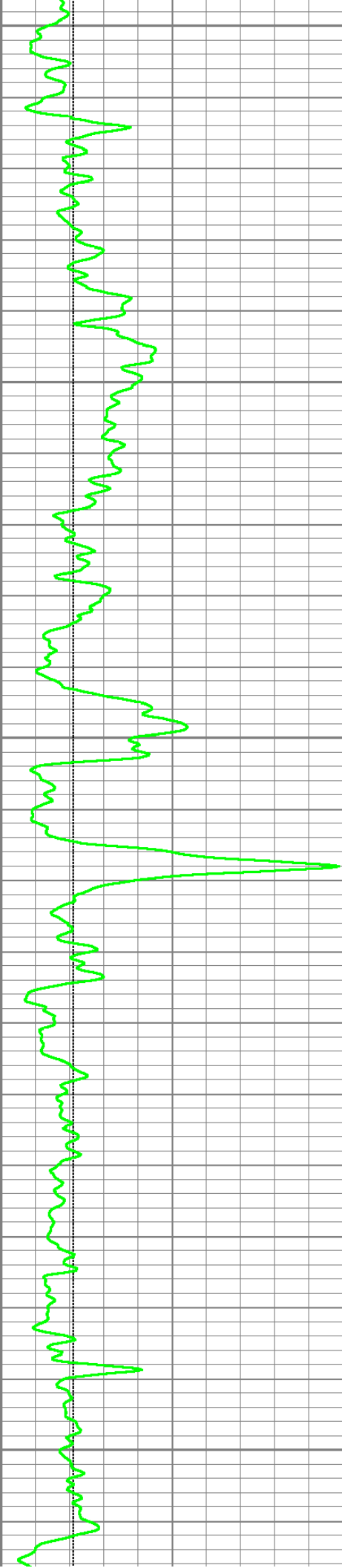
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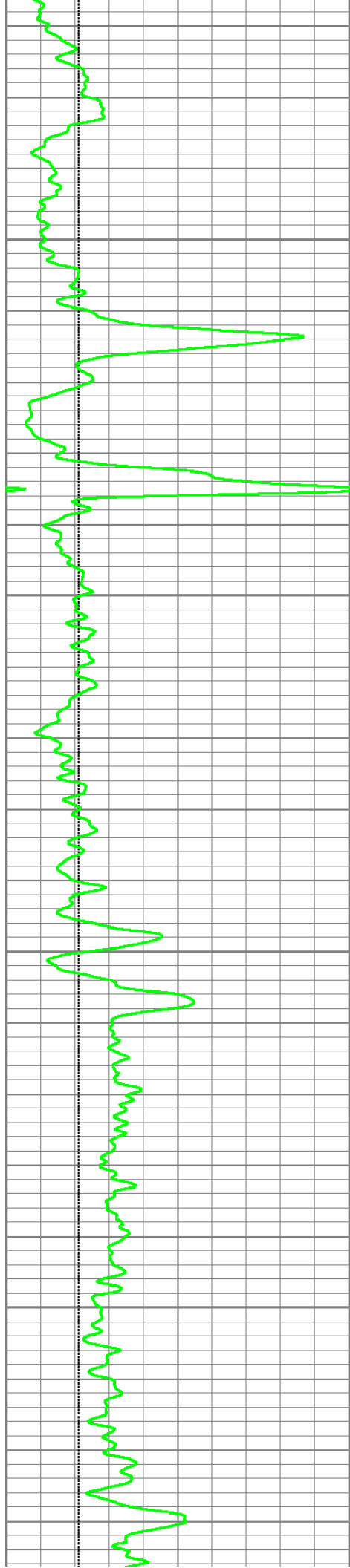
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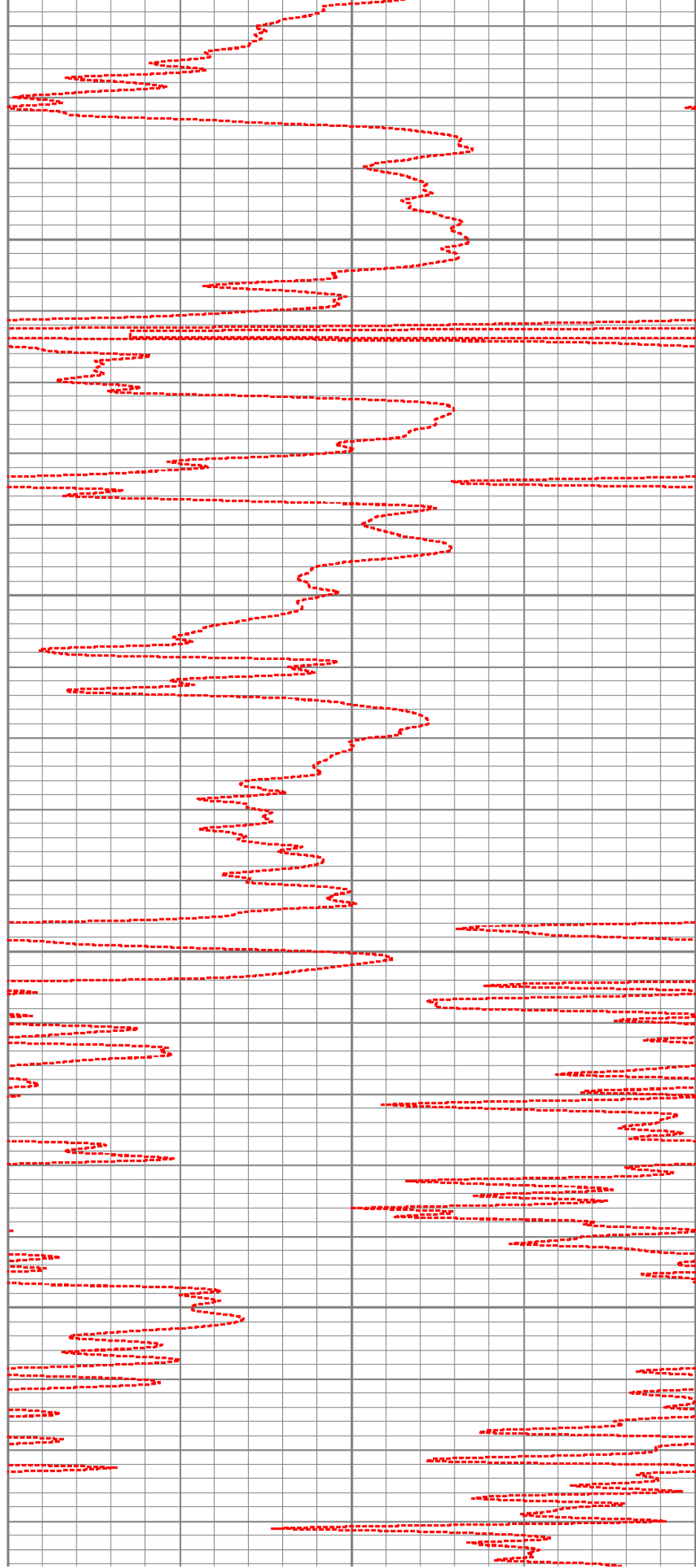


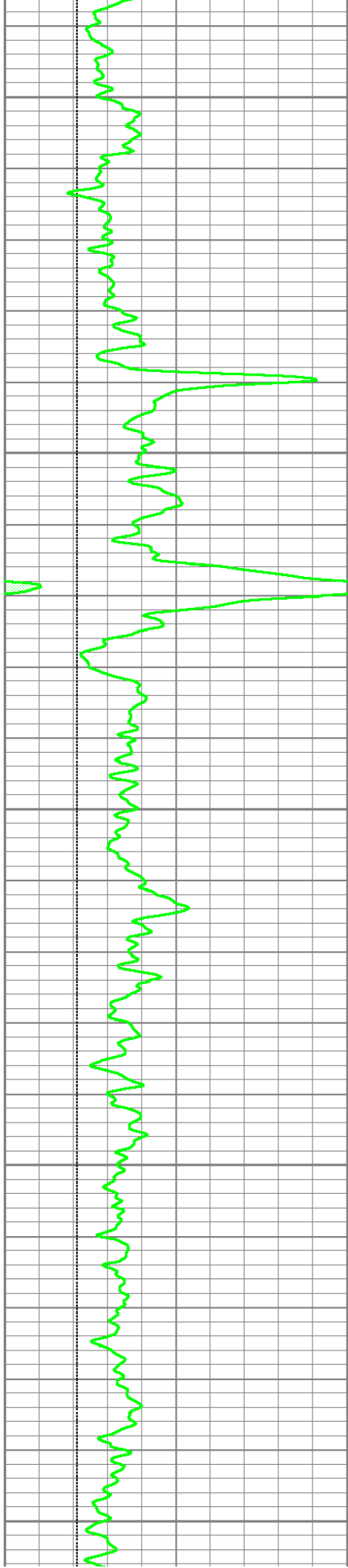
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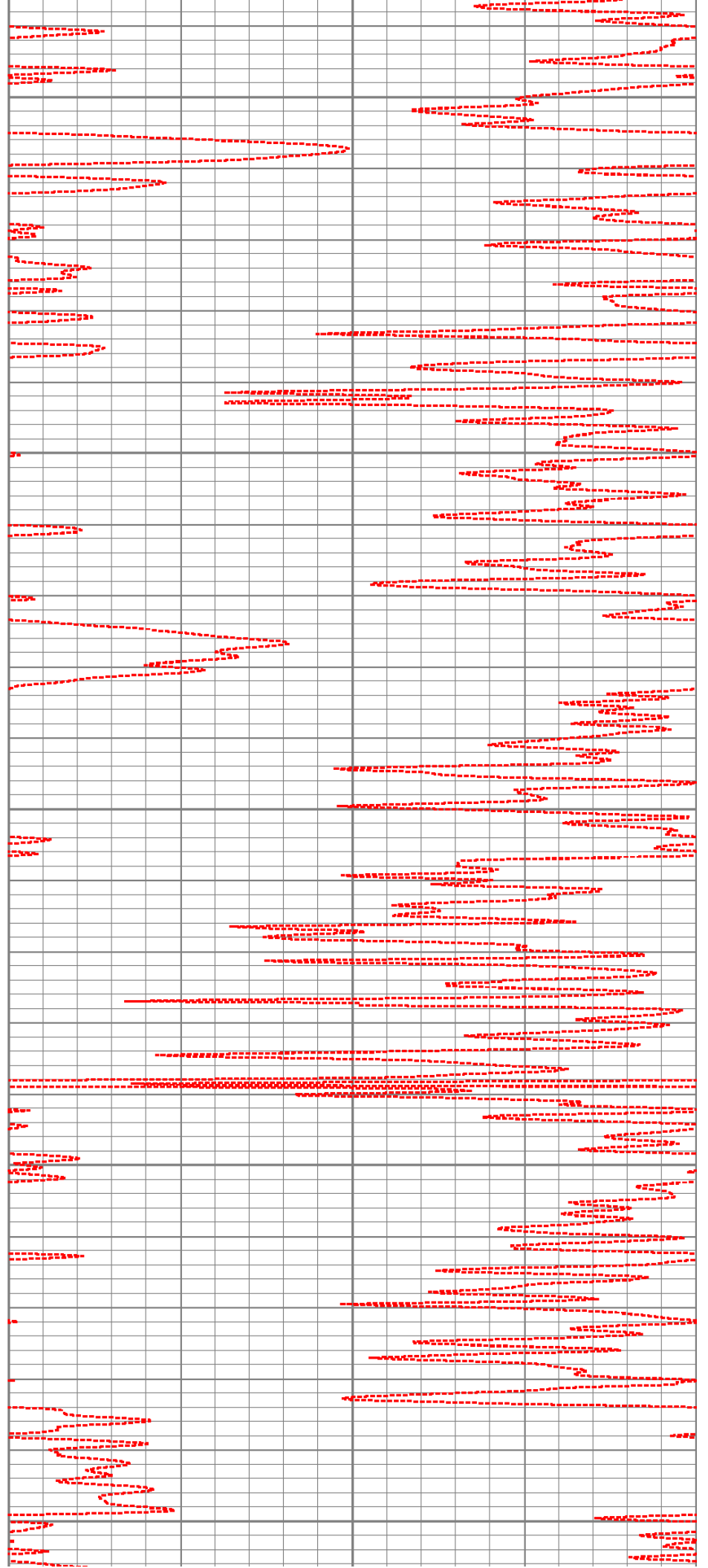
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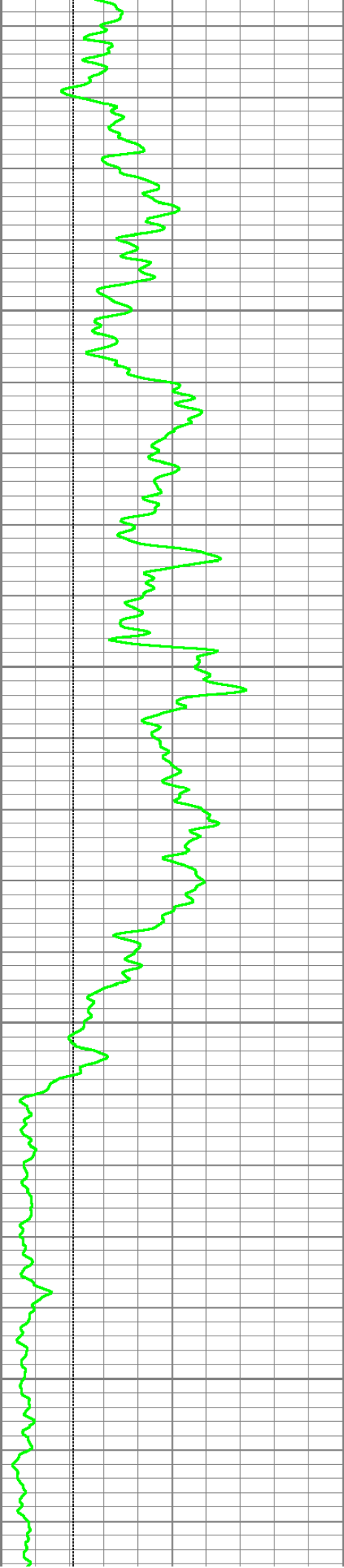
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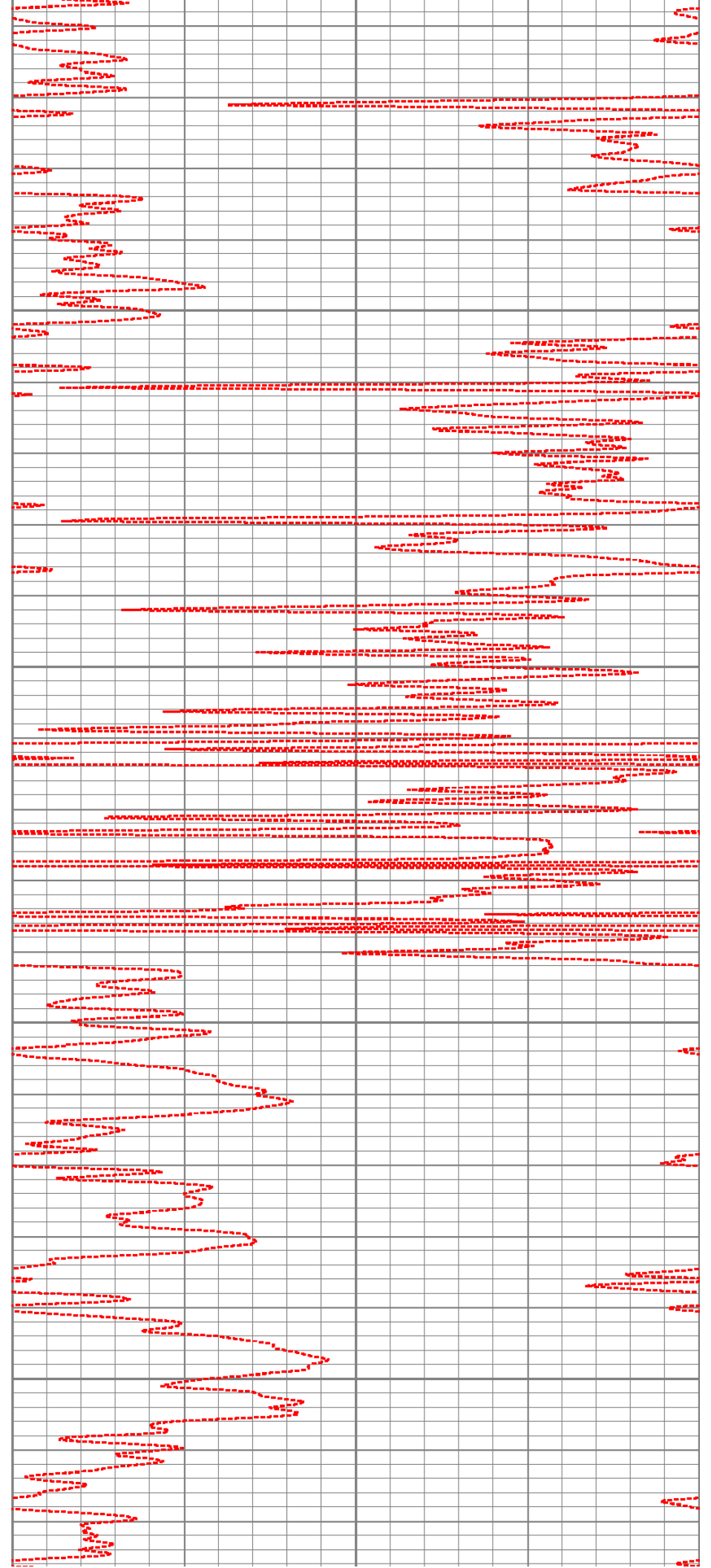


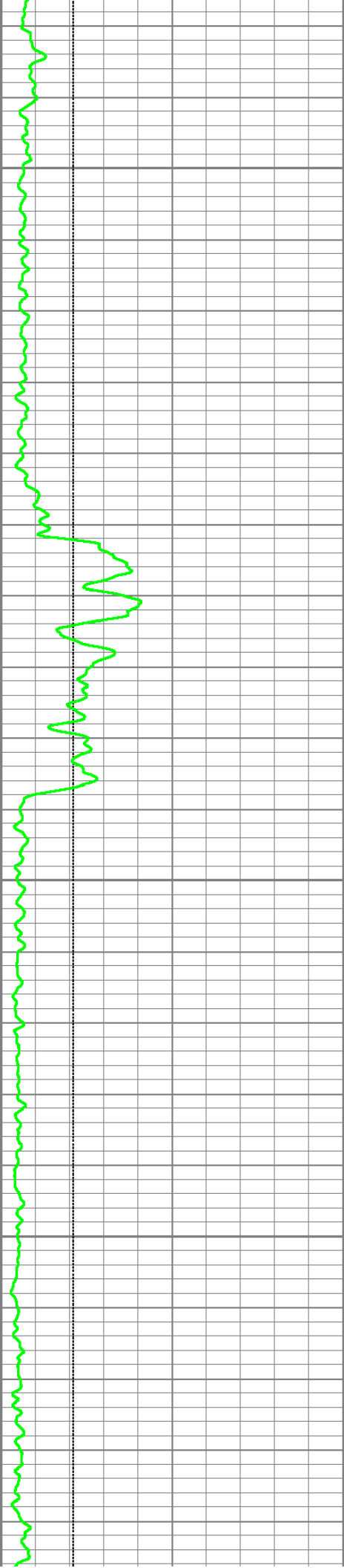
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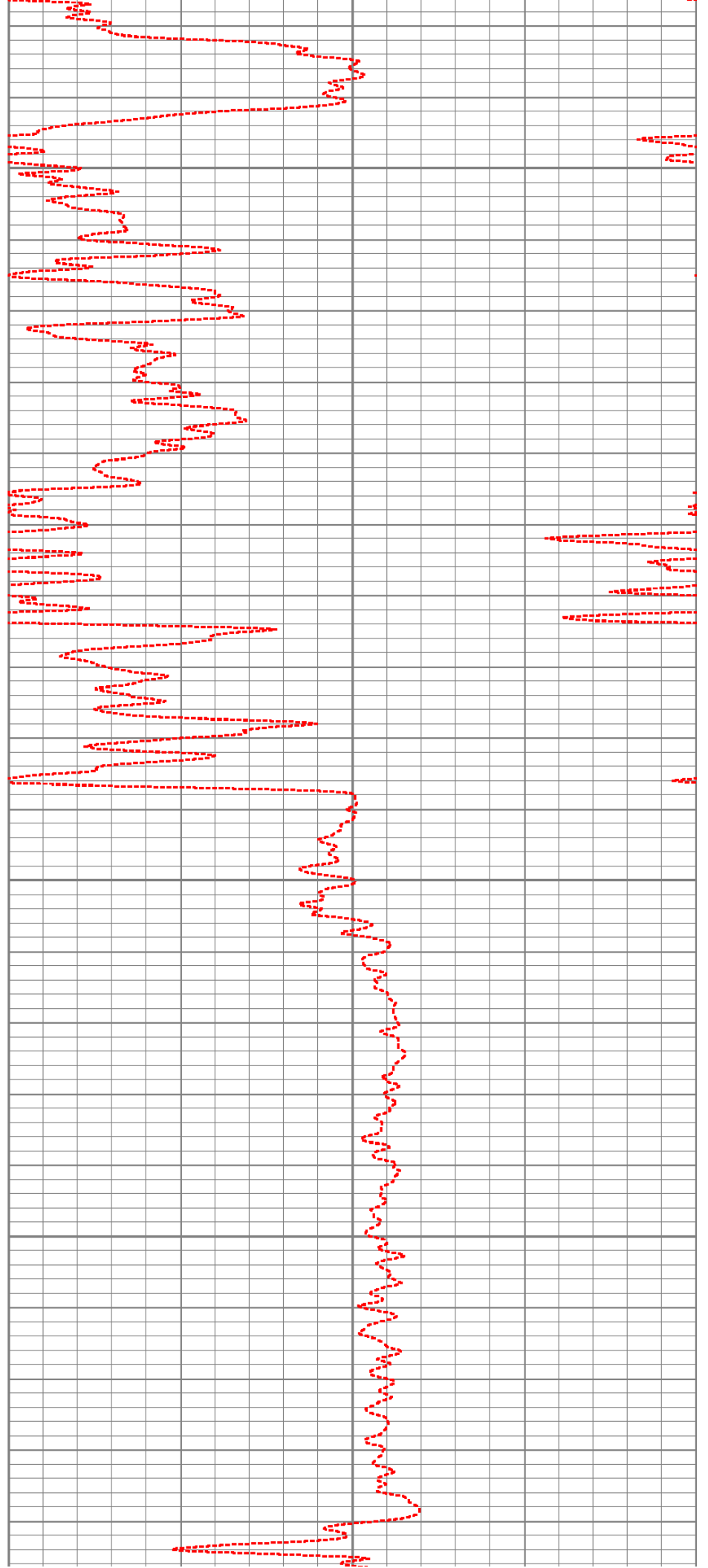


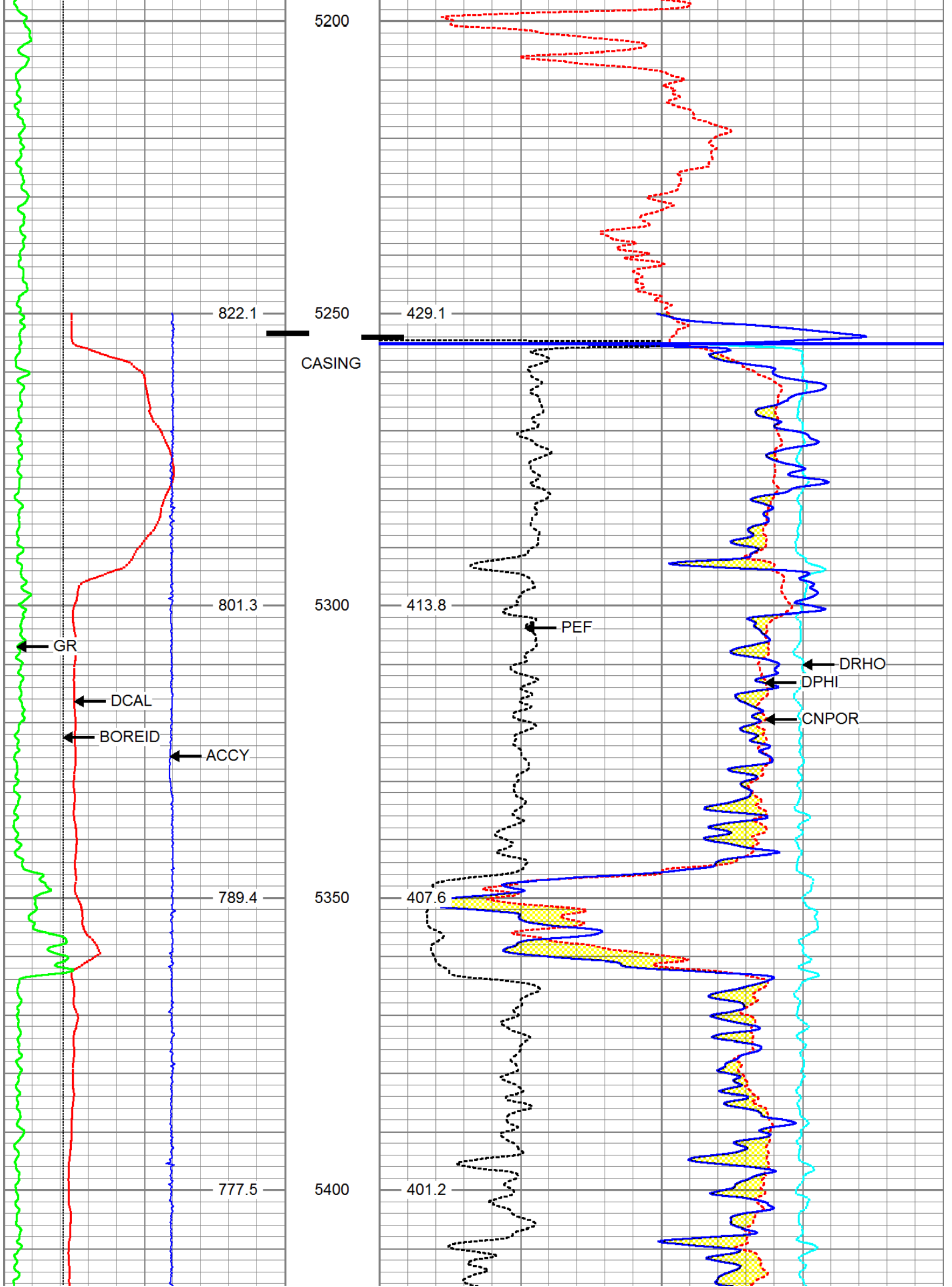
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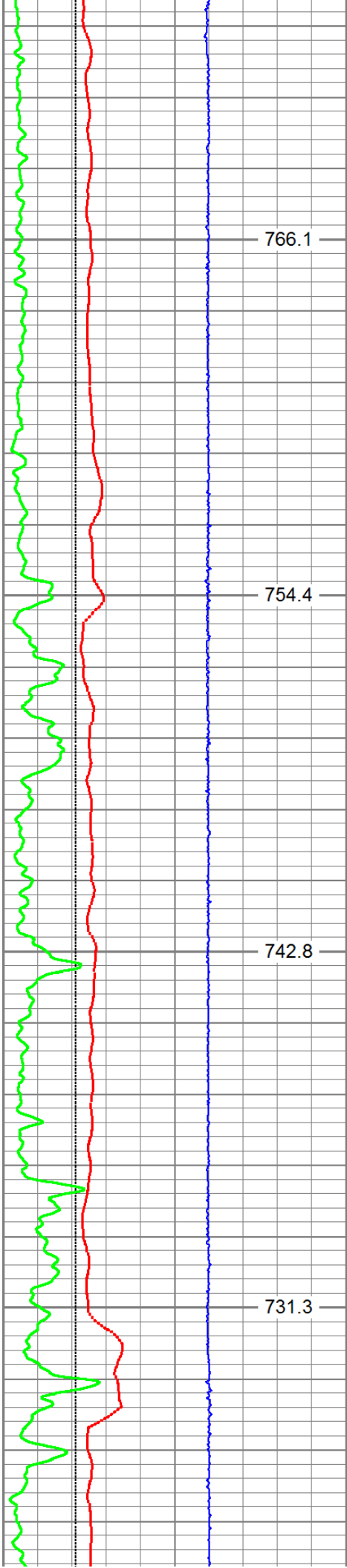
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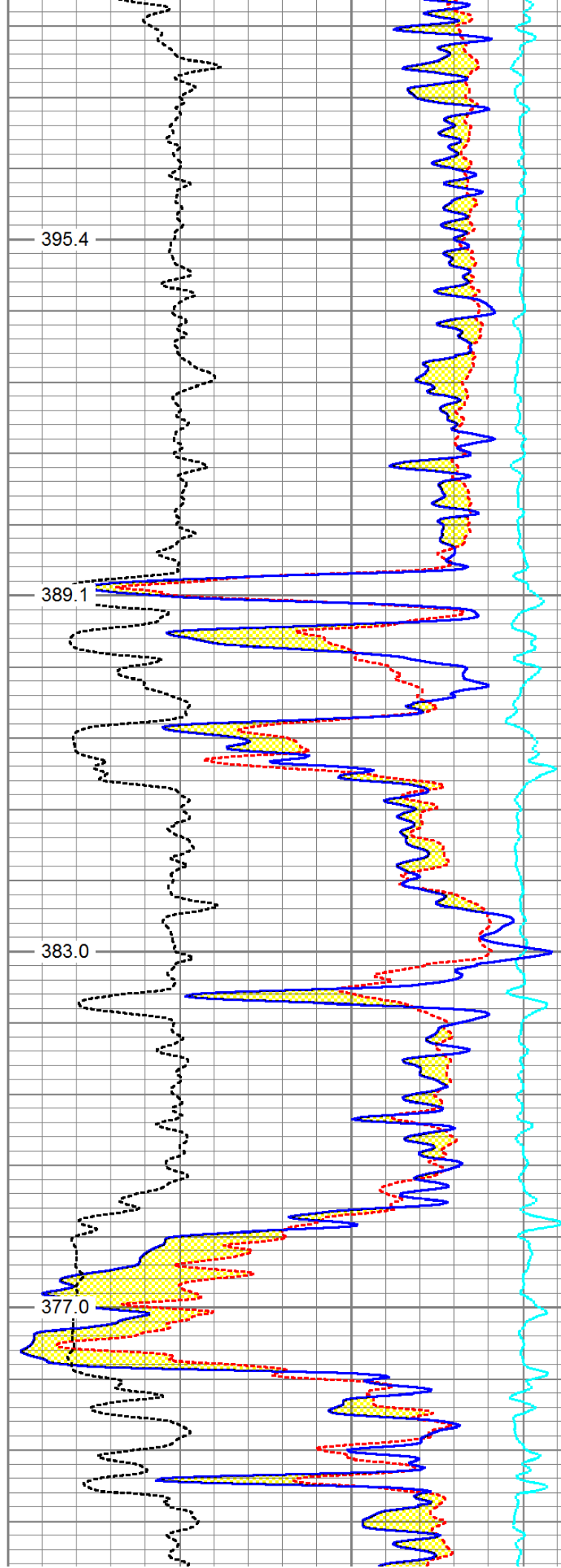


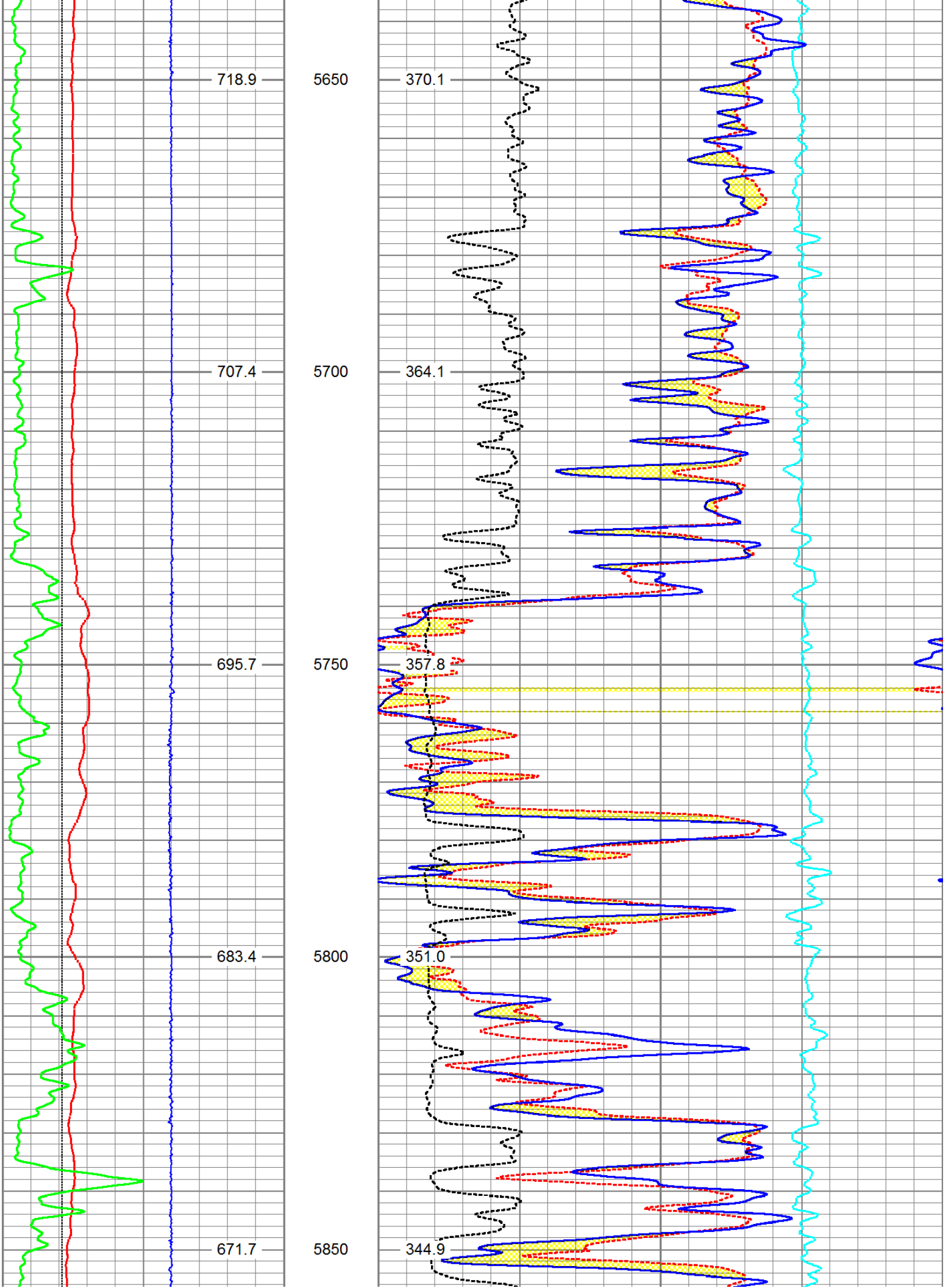
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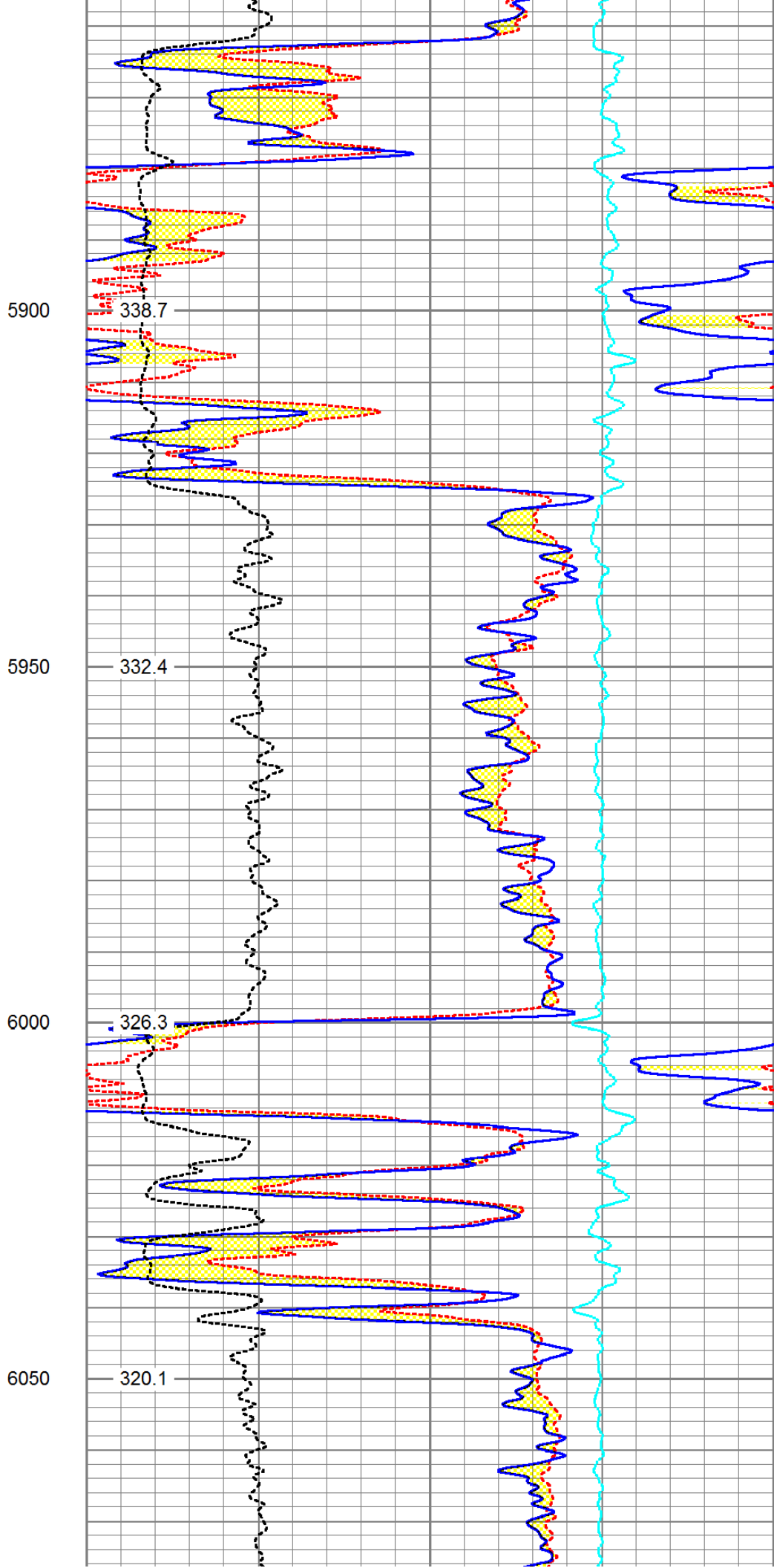
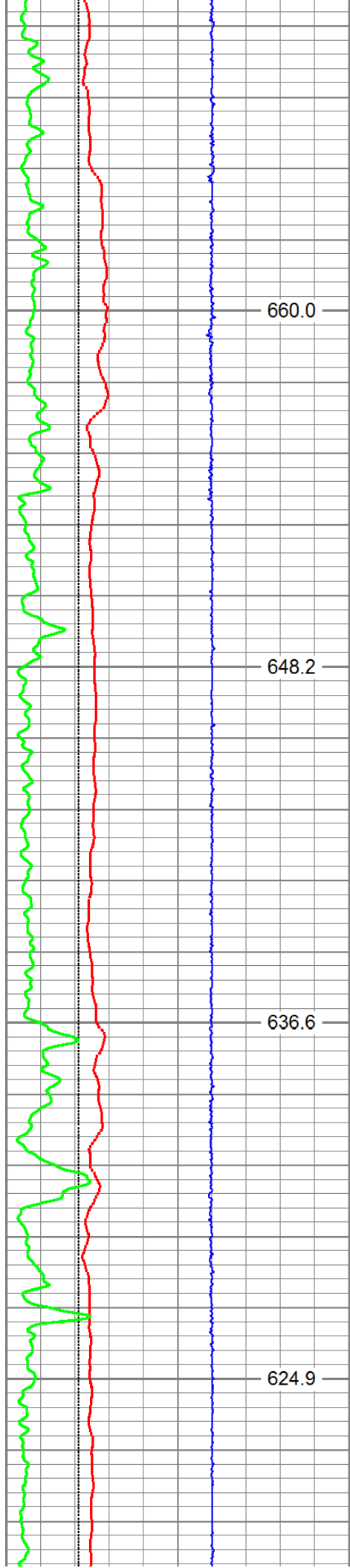
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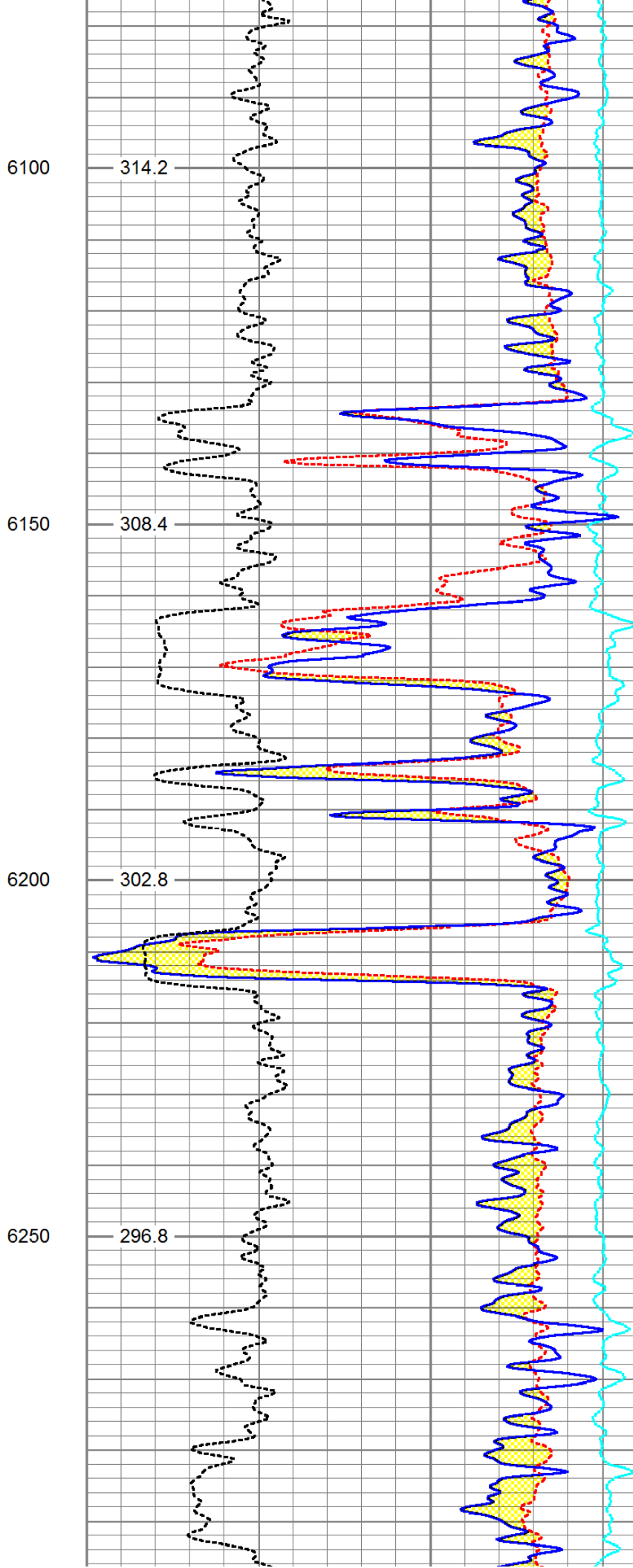
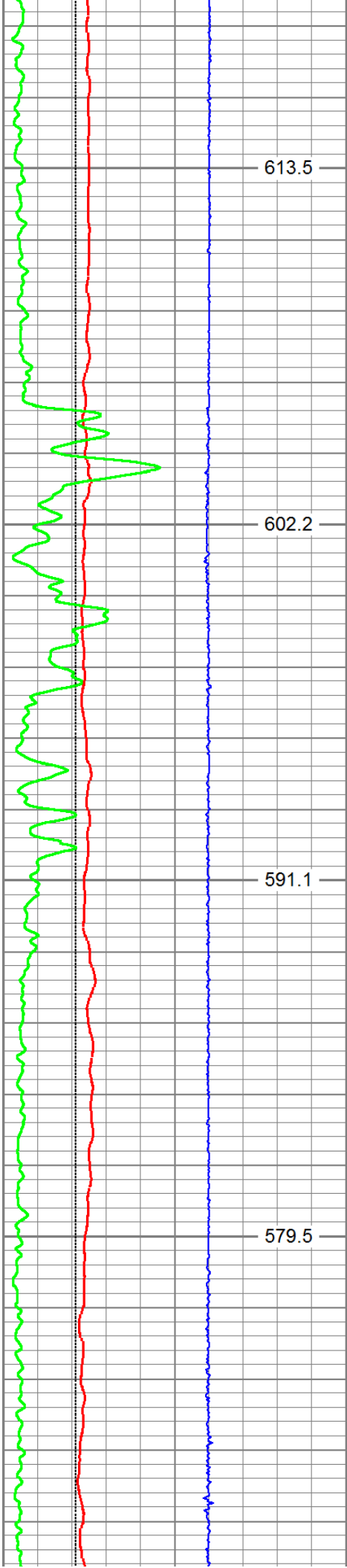
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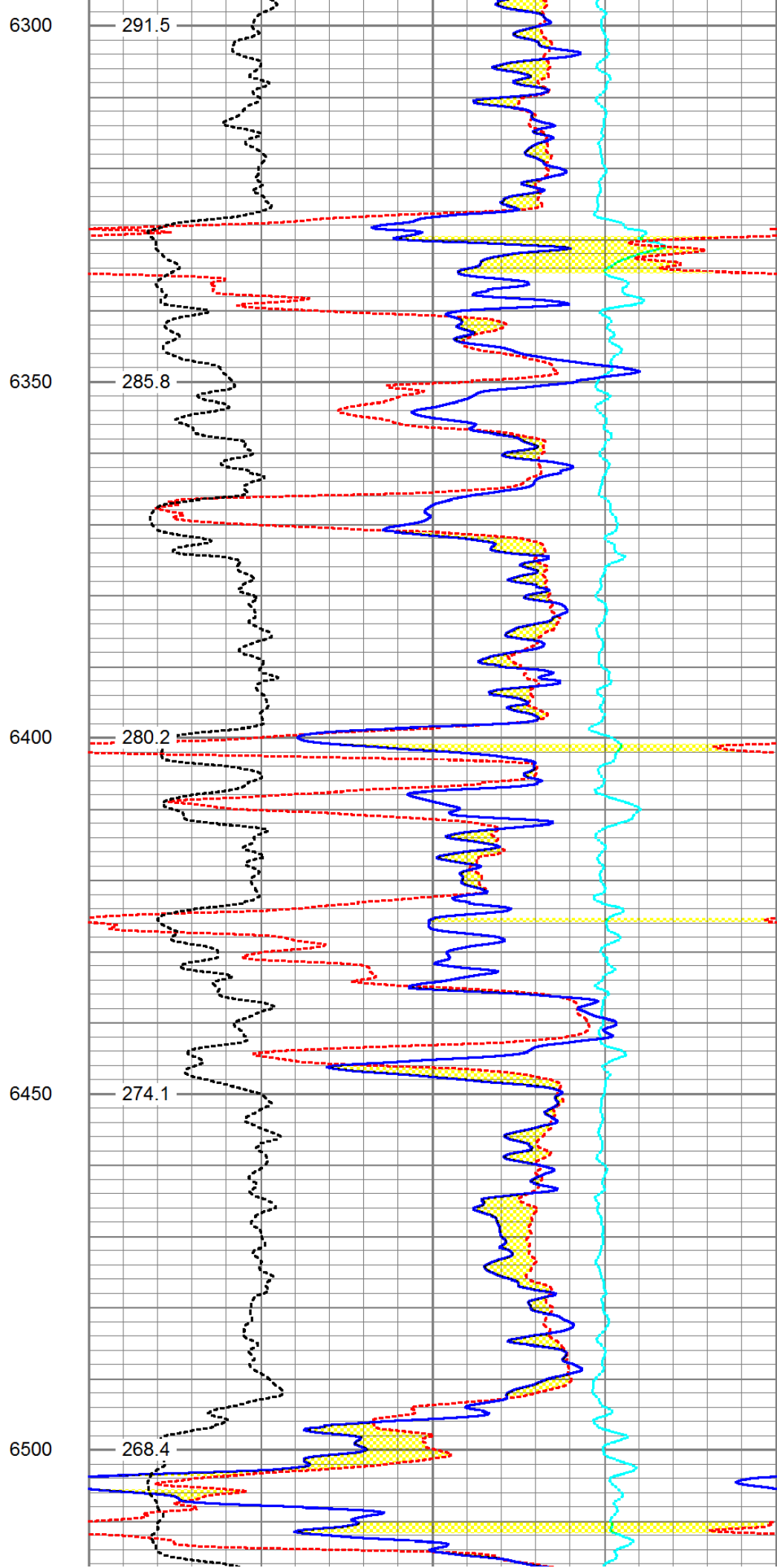
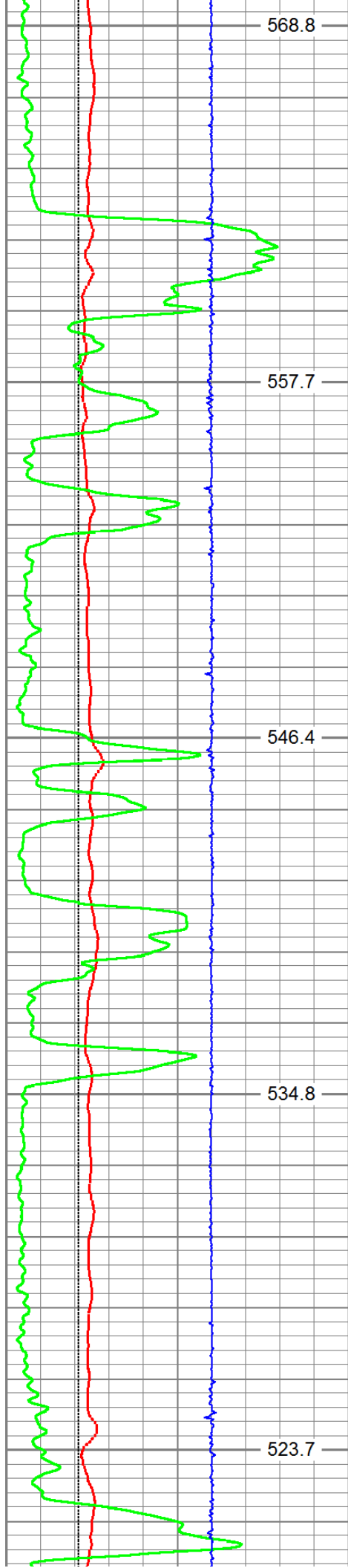
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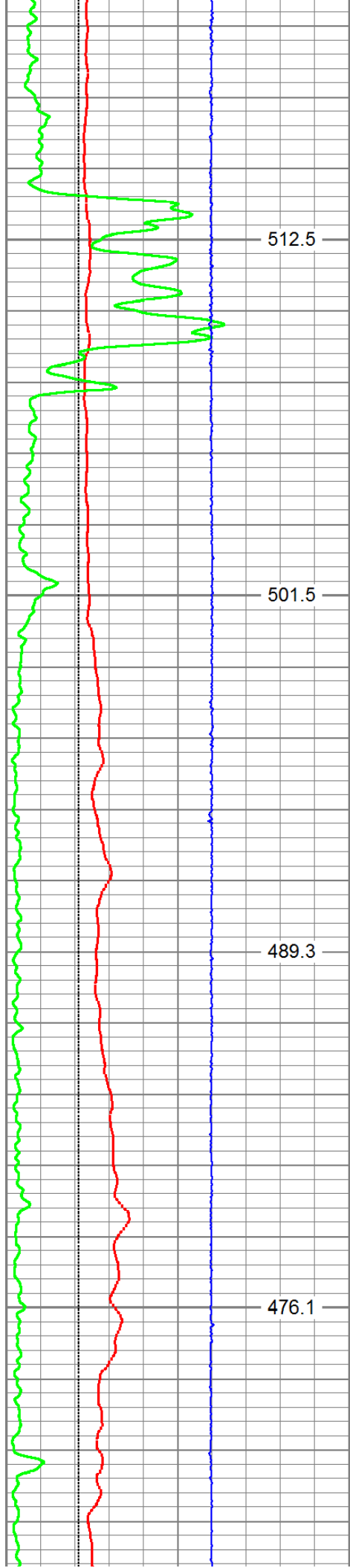










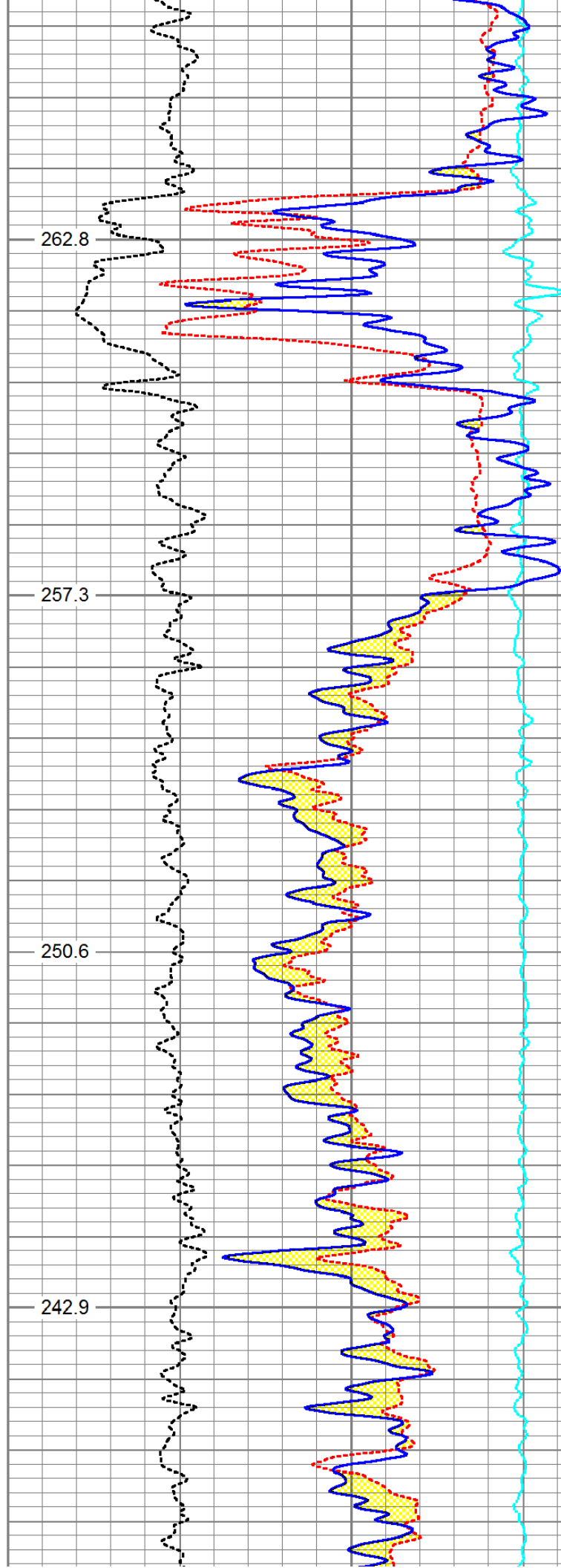


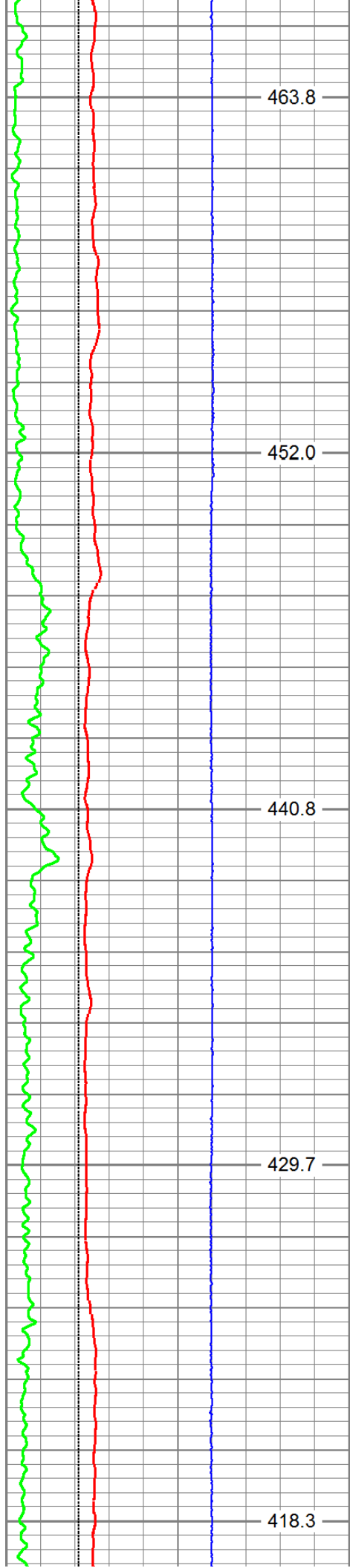
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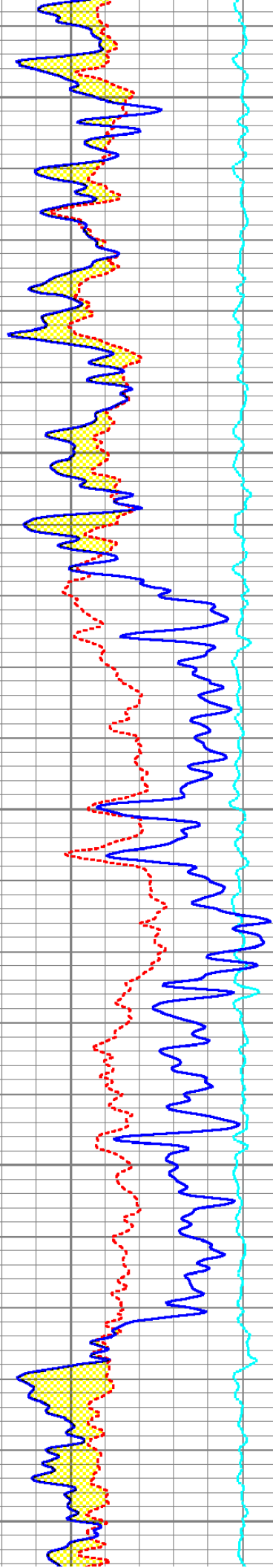
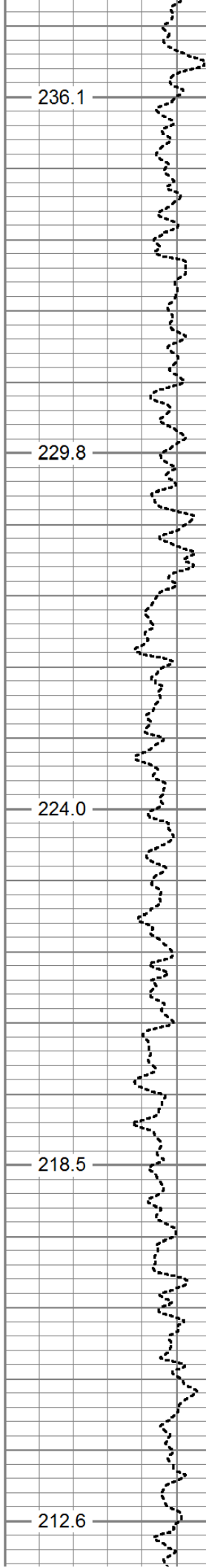
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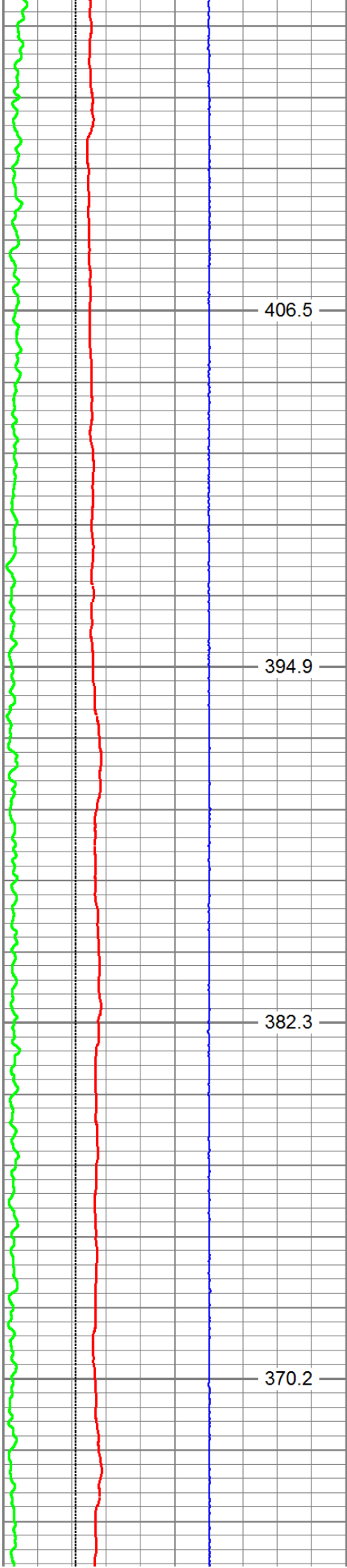
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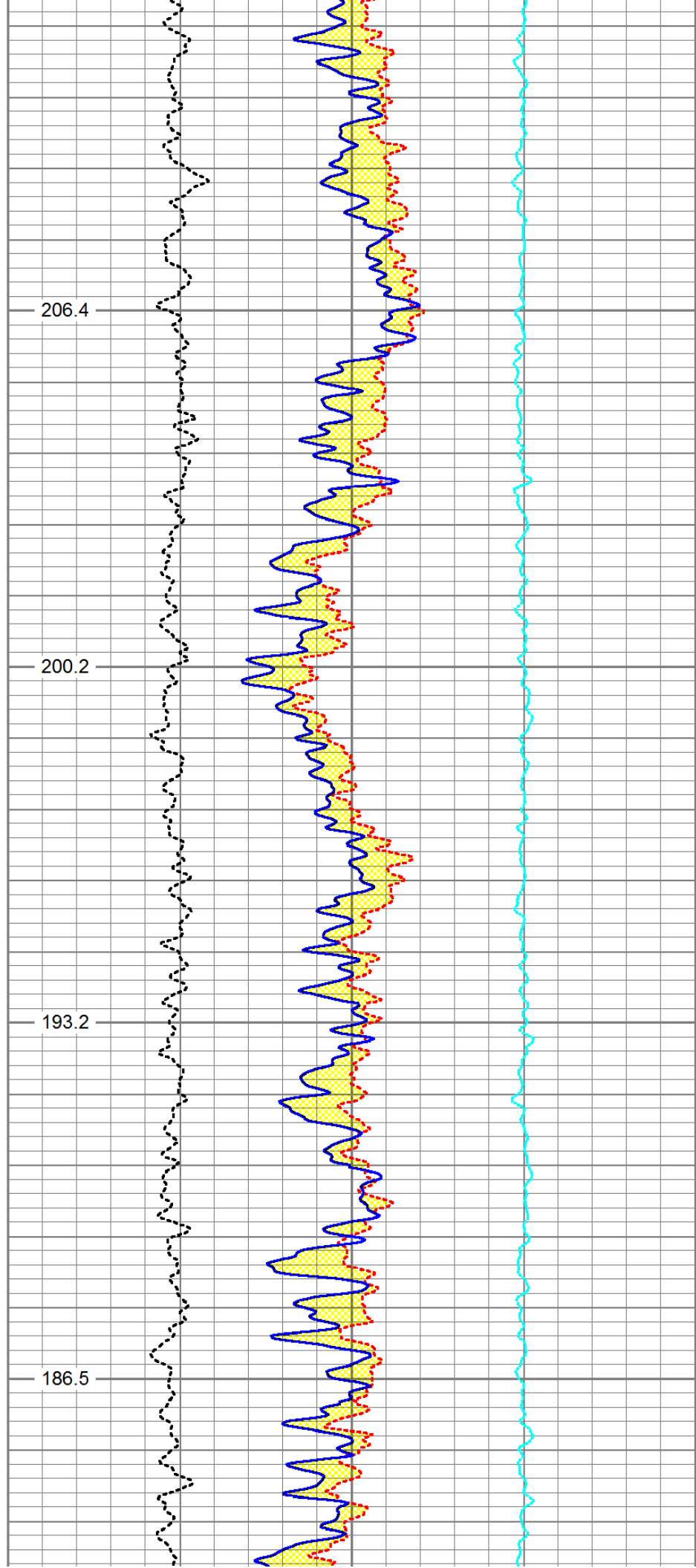
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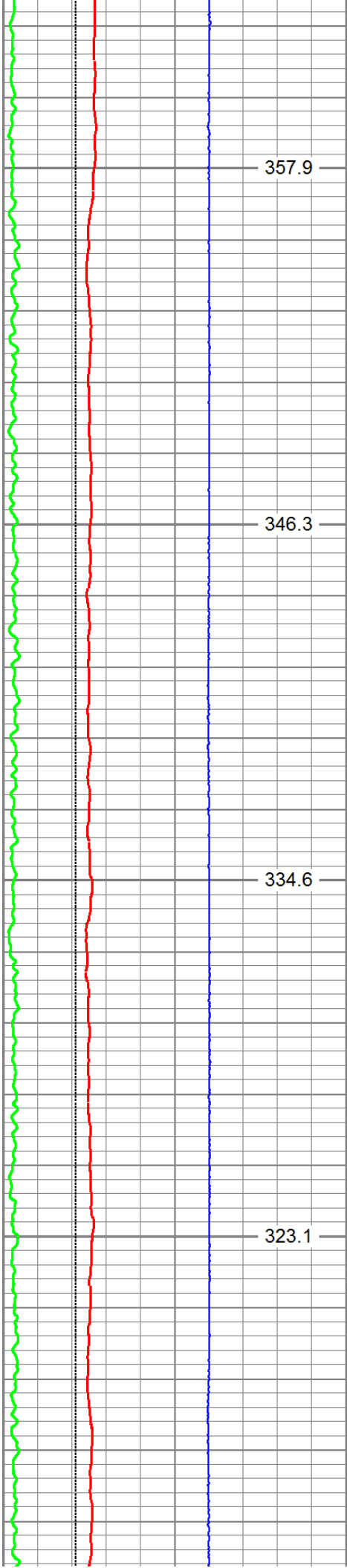
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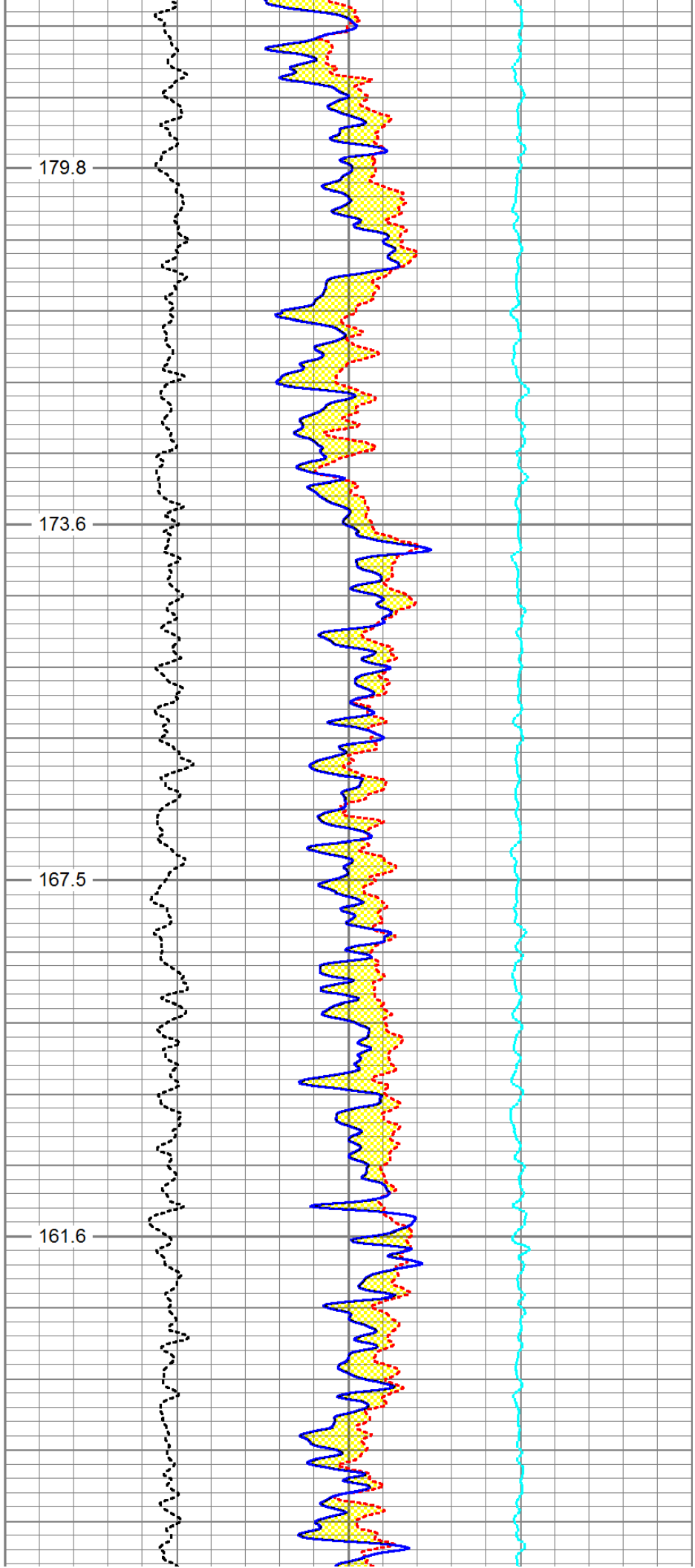


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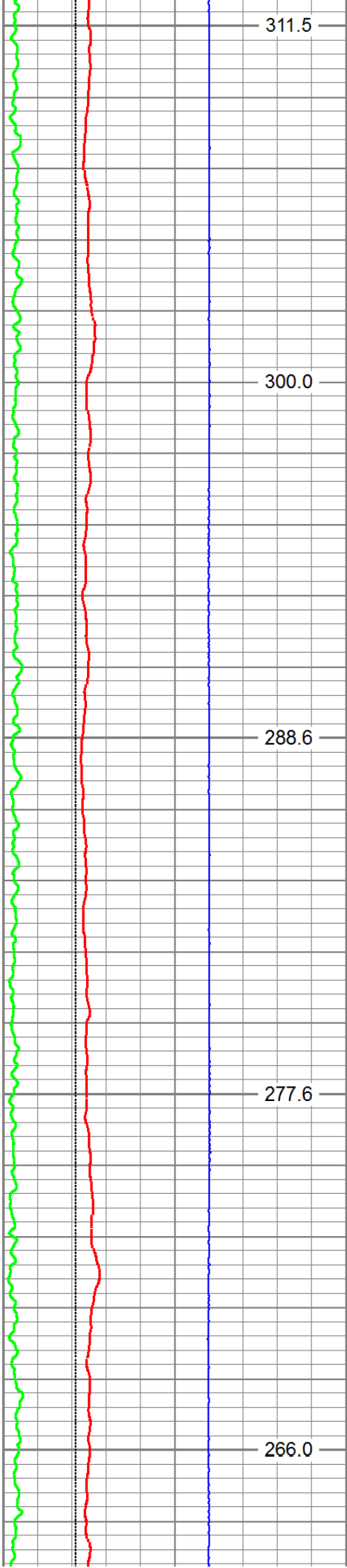


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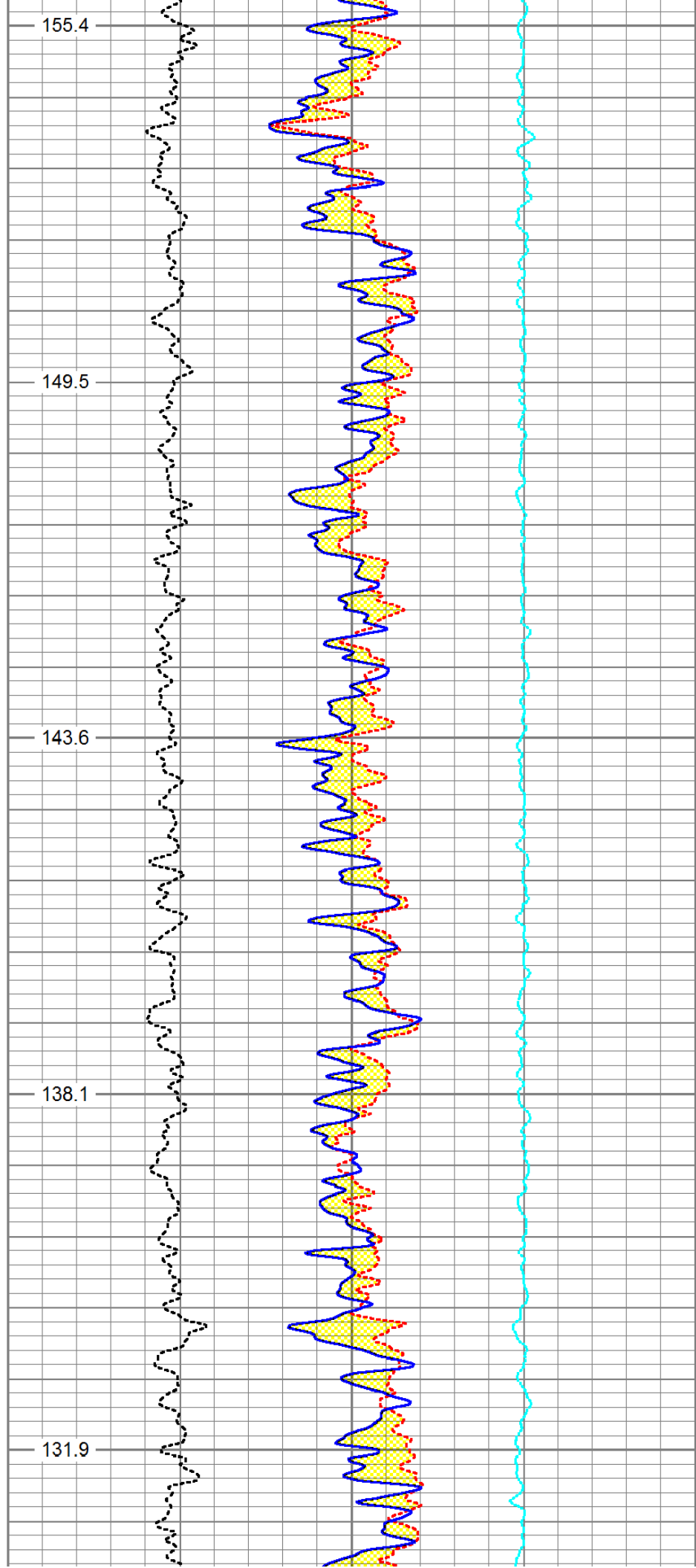
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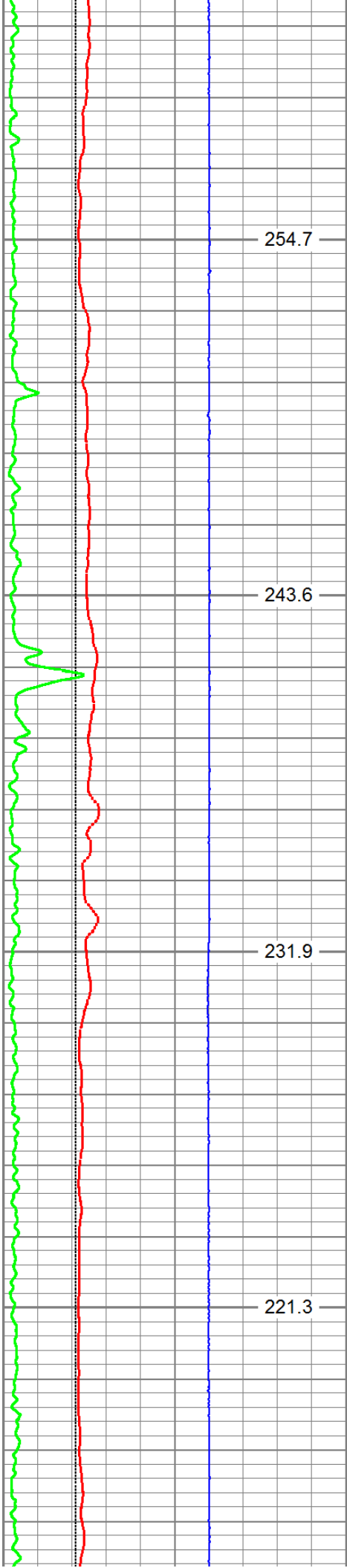
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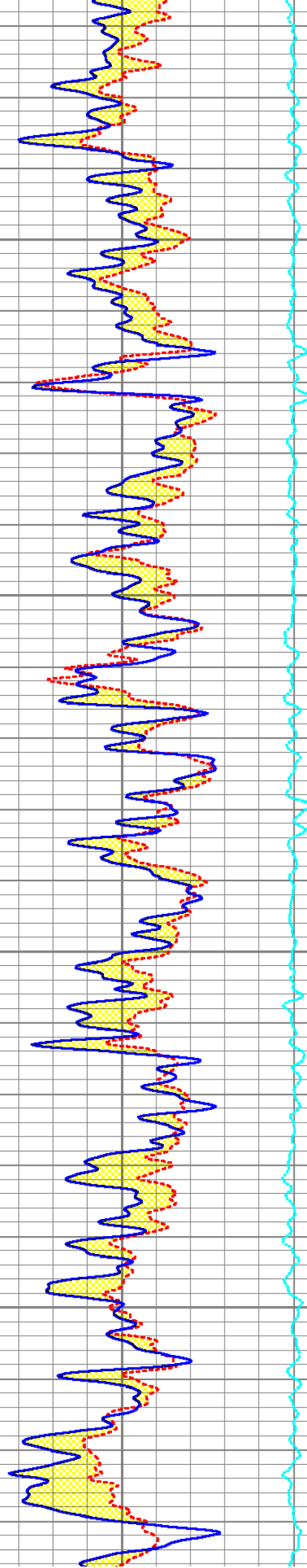
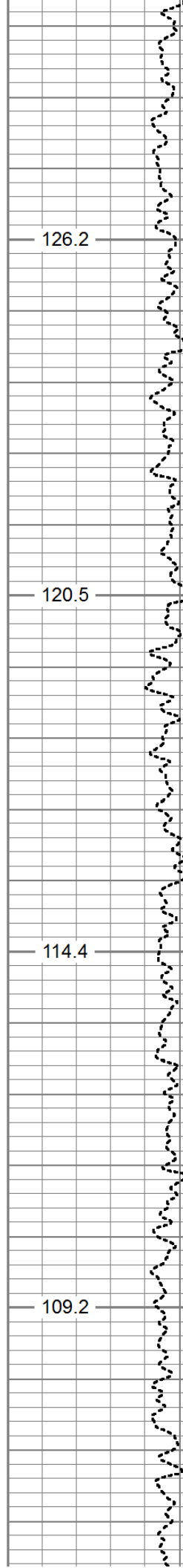


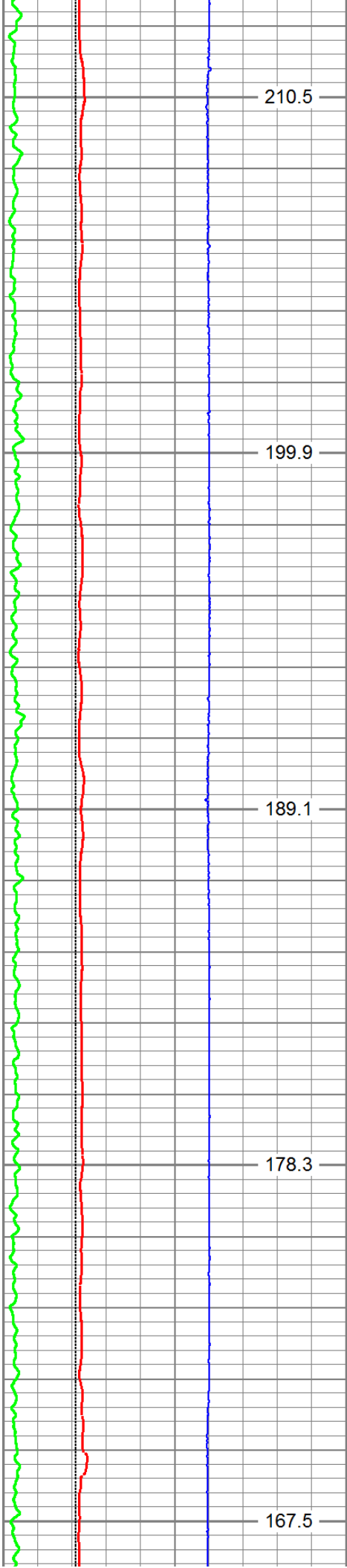
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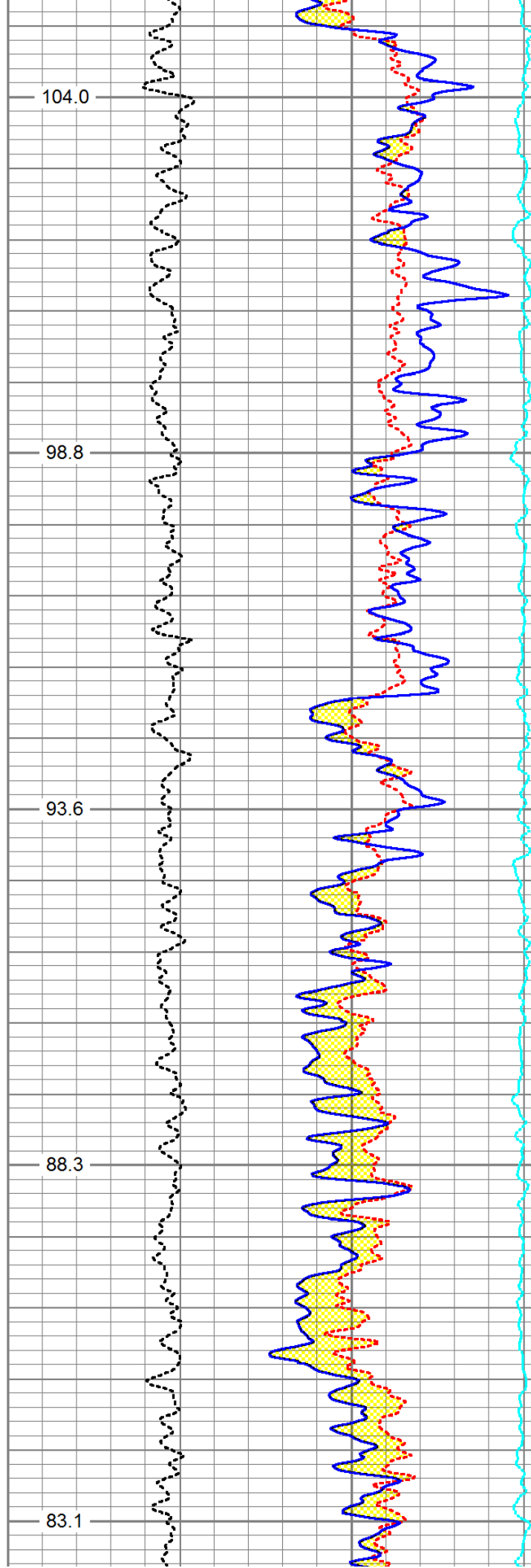
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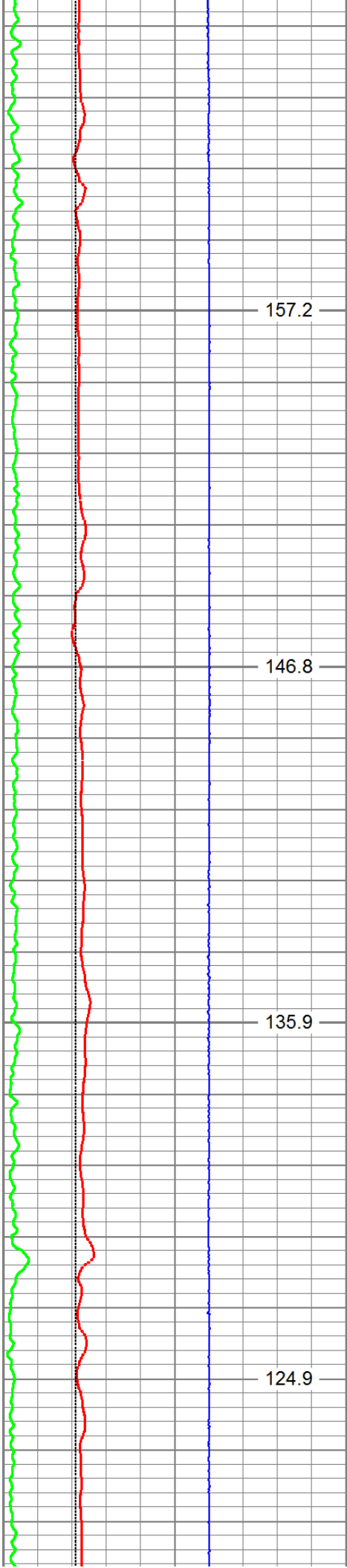
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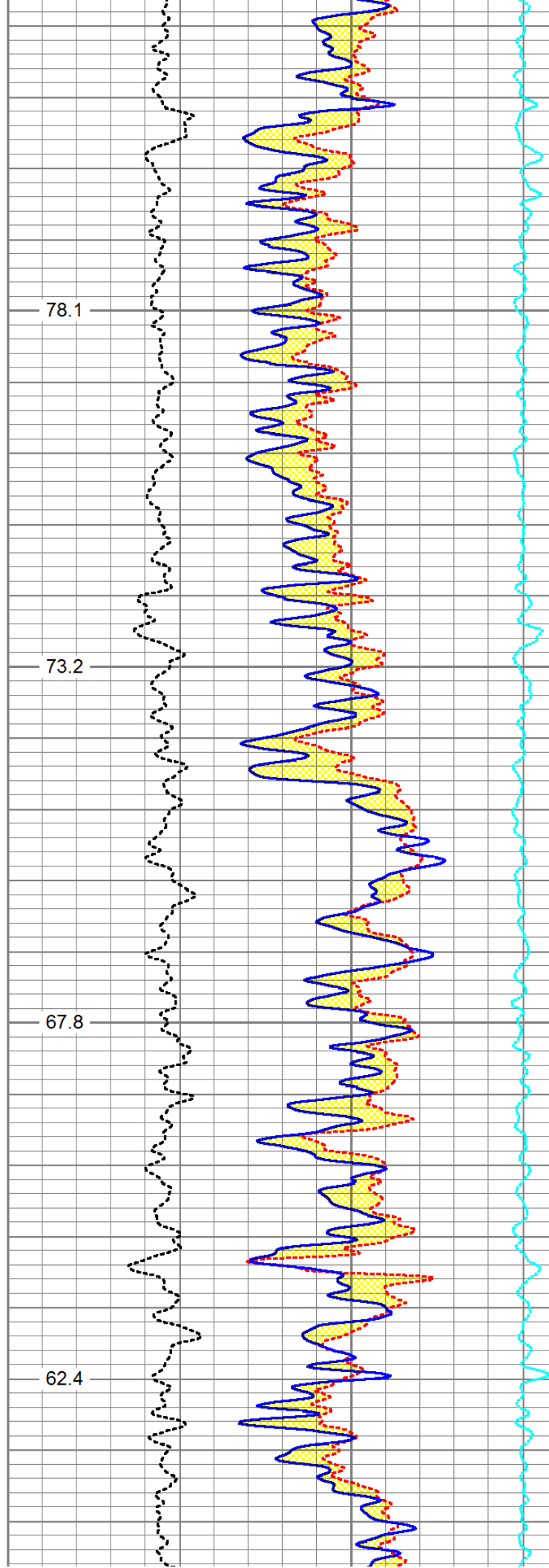


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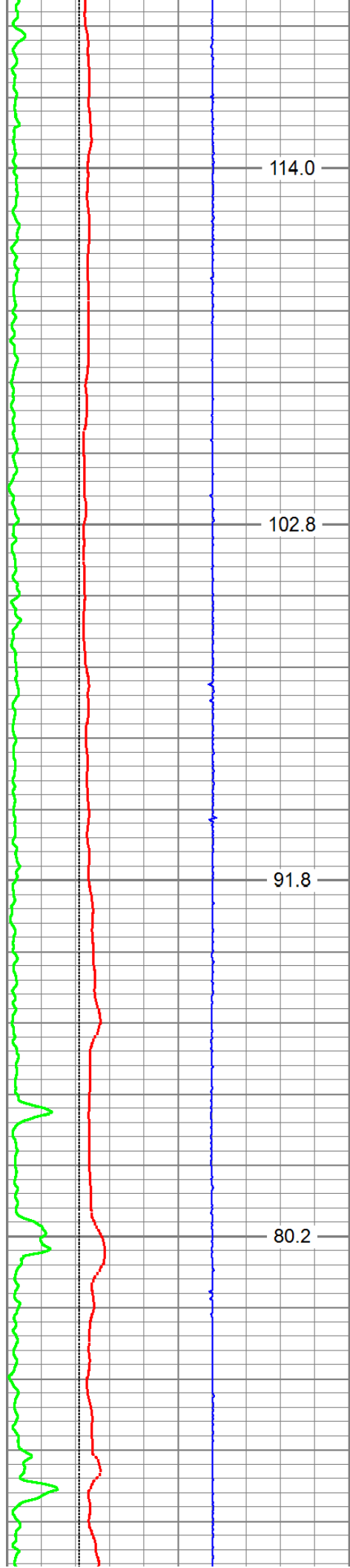


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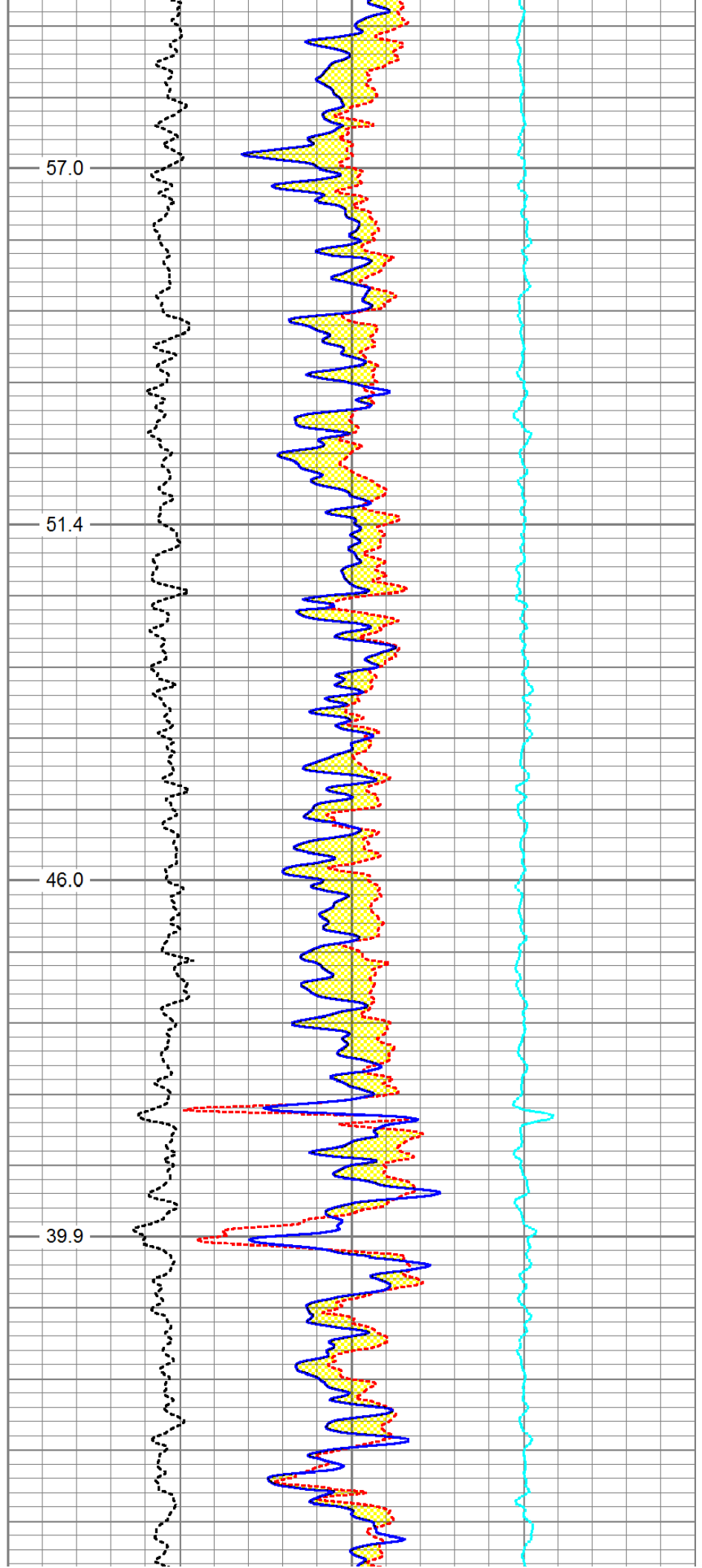
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8450

80.2

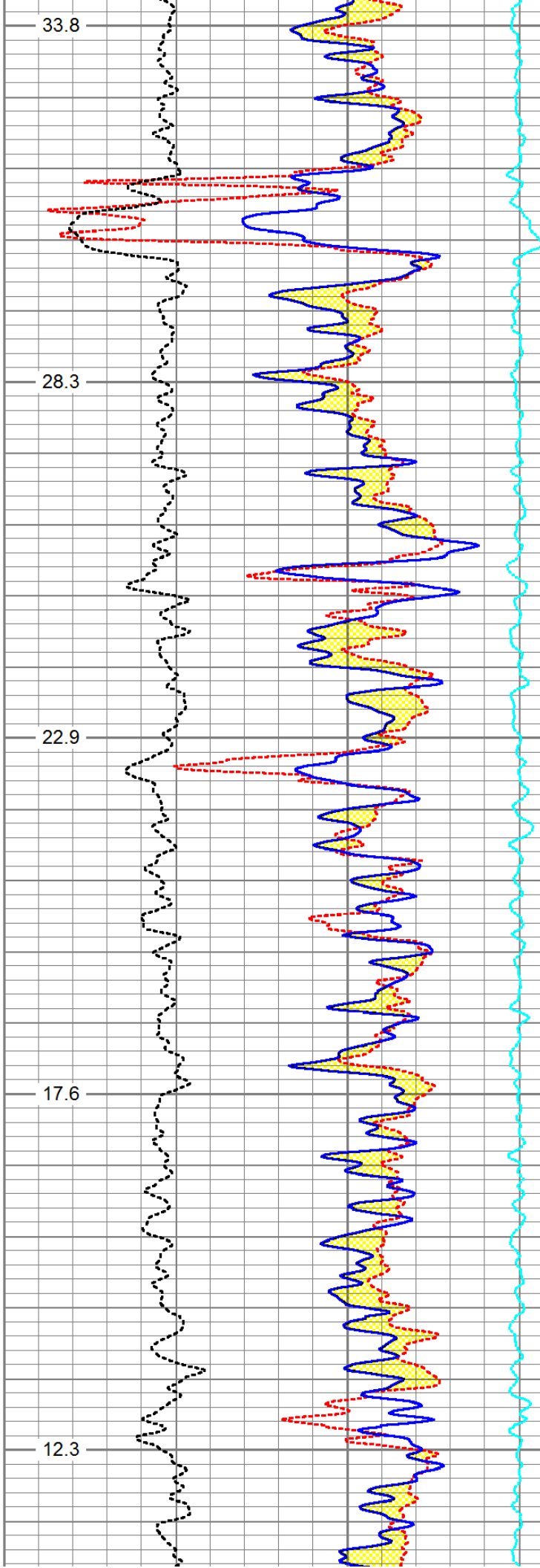
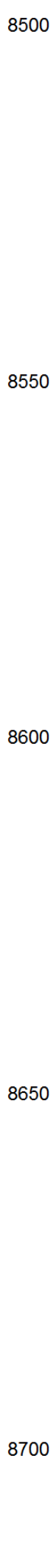
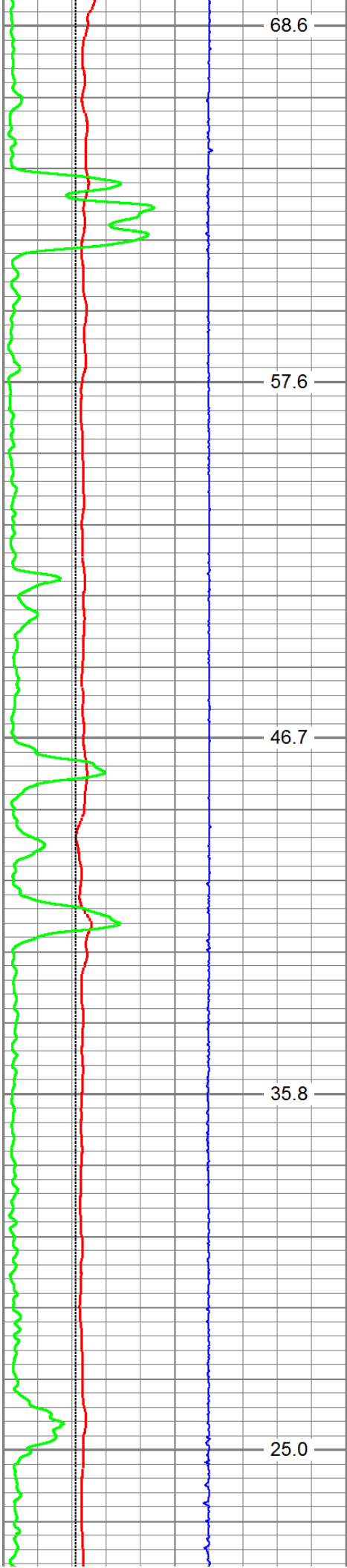


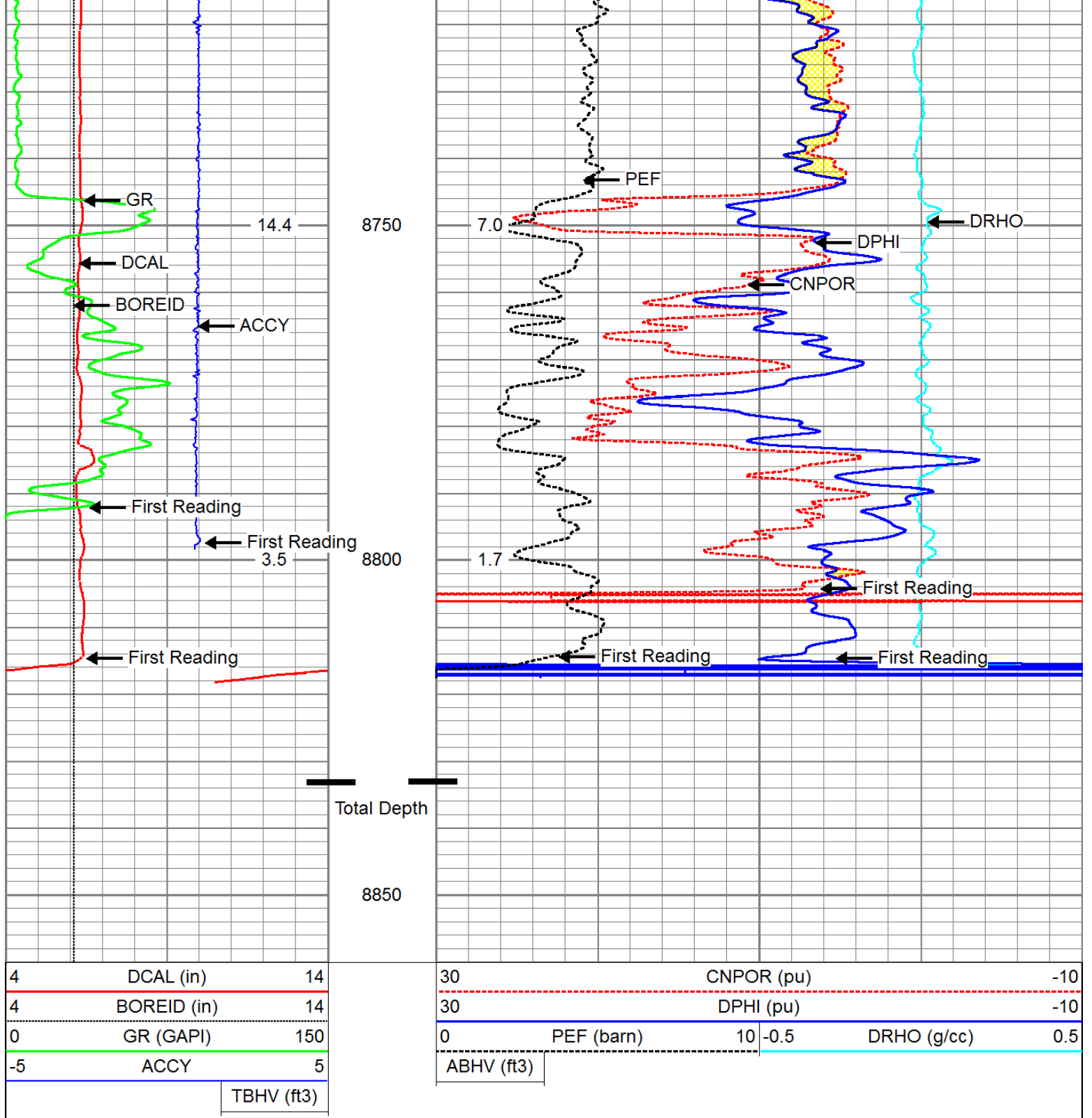
57.0

51.4

46.0

39.9





Log Variables

Database: C:\Warrior\Data\murray_mem.db
 Dataset: field/well/proc1/pass1.4

Top - Bottom

A	BHCOR	BHFL_TYPE	BHFLRES Ohm-m	BHFLRESSRC	BHIDSRC	BOREID in
1	On	WBM	1	MUDCELL	CURVE	6.125
BOTTEMP degF	CASED?	CASEOD in	CASETHCK in	CEMWATERSA kppm	CMNTHCK in	DNBHC?
138	No	4.5	0	0	0	NO
DPORSEL	FLUIDDEN g/cc	FRMSALIN kppm	LATNOR	M	MATRXDEN g/cc	MUDSALIN kppm

RHOB	g/cc 1	kgppm 0	Off	2	g/cc 2.71	kgppm 0.8
MudWgt lb/gal 8.4	NPORSEL Limestone	PEBHC? YES	PERFS 0	RESTMPSRC INTERNAL	SO in 0.5	SRFTEMP degF 65
SZCOR On	TDEPTH ft 8885	TMPCOR On	TOOLPOS Ec-centered			

Calibration Report

Database File: murray_mem.db
Dataset Pathname: proc1/pass1.4
Dataset Creation: Mon Apr 22 20:56:58 2013

ThruBit Induction Calibration Report

Tool Model-Serial Number: PS-PS38R
Shop Calibration Performed: Fri Mar 01 12:30:29 2013

BASELINE

	R	Expected	X	Expected
Freq 1				
A1	-478.4900	[-500.00, -400.00]	175.3190	[-500.00, 500.00]
A2	-135.7360	[-180.00, -100.00]	302.3650	[-500.00, 500.00]
A3	-26.2781	[-50.00, -10.00]	-65.5454	[-500.00, 500.00]
A4	-16.7549	[-30.00, -10.00]	254.1780	[-500.00, 500.00]
A5	-14.3211	[-30.00, -10.00]	151.4720	[-500.00, 500.00]
Freq 2				
A1	-252.3300	[-280.00, -180.00]	90.6894	[-500.00, 500.00]
A2	-86.4805	[-130.00, -50.00]	170.3340	[-500.00, 500.00]
A3	-19.2593	[-50.00, -10.00]	-94.3423	[-500.00, 500.00]
A4	-19.7630	[-30.00, -10.00]	78.5474	[-500.00, 500.00]
A5	-19.2330	[-30.00, -10.00]	2.2441	[-500.00, 500.00]
Freq 3				
A1	-162.5760	[-180.00, -80.00]	-2.4436	[-500.00, 500.00]
A2	-65.8174	[-130.00, -30.00]	84.6667	[-500.00, 500.00]
A3	-15.1583	[-50.00, -10.00]	-126.5820	[-500.00, 500.00]
A4	-21.2009	[-30.00, -10.00]	-38.0339	[-500.00, 500.00]
A5	-21.8735	[-30.00, -10.00]	-105.2590	[-500.00, 500.00]
Freq 4				
A1	-89.4241	[-120.00, -40.00]	-152.8680	[-500.00, 500.00]
A2	-46.8994	[-110.00, -10.00]	-29.1757	[-500.00, 500.00]
A3	-12.3098	[-50.00, -10.00]	-189.9740	[-500.00, 500.00]
A4	-23.7794	[-30.00, -10.00]	-211.1800	[-500.00, 500.00]
A5	-26.9272	[-30.00, -10.00]	-283.6760	[-500.00, 500.00]

CALIBRATION COEFFICIENTS

	R	Expected	X	Expected
Freq 1				
A1	0.9910	[0.95, 1.05]	0.0019	[-0.05, 0.05]
A2	0.9910	[0.95, 1.05]	0.0018	[-0.05, 0.05]
A3	1.0009	[0.95, 1.05]	-0.0054	[-0.05, 0.05]
A4	0.9885	[0.95, 1.05]	0.0047	[-0.05, 0.05]
A5	0.9939	[0.95, 1.05]	0.0015	[-0.05, 0.05]

Freq 2				
A1	0.9860	[0.95, 1.05]	-0.0059	[-0.05, 0.05]
A2	0.9858	[0.95, 1.05]	-0.0055	[-0.05, 0.05]
A3	0.9901	[0.95, 1.05]	-0.0051	[-0.05, 0.05]
A4	0.9836	[0.95, 1.05]	-0.0030	[-0.05, 0.05]
A5	0.9887	[0.95, 1.05]	-0.0069	[-0.05, 0.05]

Freq 3				
A1	0.9930	[0.95, 1.05]	-0.0045	[-0.05, 0.05]
A2	0.9931	[0.95, 1.05]	-0.0041	[-0.05, 0.05]
A3	0.9966	[0.95, 1.05]	-0.0041	[-0.05, 0.05]
A4	0.9891	[0.95, 1.05]	-0.0015	[-0.05, 0.05]
A5	0.9978	[0.95, 1.05]	-0.0052	[-0.05, 0.05]

Freq 4				
A1	0.9848	[0.95, 1.05]	-0.0070	[-0.05, 0.05]
A2	0.9844	[0.95, 1.05]	-0.0066	[-0.05, 0.05]
A3	0.9901	[0.95, 1.05]	-0.0084	[-0.05, 0.05]
A4	0.9809	[0.95, 1.05]	-0.0036	[-0.05, 0.05]
A5	0.9965	[0.95, 1.05]	-0.0100	[-0.05, 0.05]

Temperature 34.5229 degC

ThruBit Density Calibration Report

Tool Model-Serial Number: PS-PS01D
 Source Number:
 Shop Calibration Performed: Tue Apr 16 14:16:56 2013

REFERENCE

	Density	Units
Aluminium	2.607	g/cc
Magnesium	1.752	g/cc

READINGS

Outputs	Counts	Units	Expected
SS1 Background	134.71	cps	[130.00, 170.00]
LS1 Background	144.11	cps	[130.00, 170.00]
LS4 Background	30.89	cps	[27.00, 35.00]
SS1 Aluminium	4829.85	cps	[4500.00, 5500.00]
LS1 Aluminium	888.69	cps	[750.00, 950.00]
LS4 Aluminium	1022.63	cps	[843.00, 1068.00]
SS1 Magnesium	7979.36	cps	[7000.00, 9000.00]
LS1 Magnesium	5766.10	cps	[5250.00, 6250.00]
LS1 Al + Fe	765.36	cps	[650.00, 800.00]
LS4 Al + Fe	479.51	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	4.926	[3.510, 6.170]
PEF B Factor	-0.639	[-0.700, -0.410]

Caliper Shop Calibration performed: Tue Apr 16 14:16:56 2013

RESULTS

Reference	Reading	Units	
12.00	1835.24	in	
9.00	1997.22	in	
6.00	2157.79	in	
DENSITY PRE-SURVEY CHECK Performed:		Fri Apr 19 12:10:09 2013	
Outputs	Counts	Units	Expected
SS1 Background	133.35	cps	[130.67, 138.76]
LS1 Background	142.37	cps	[139.79, 148.43]
LS4 Background	30.68	cps	[29.03, 32.74]
CALIPER PRE-SURVEY CHECK Performed:		Fri Apr 19 12:07:48 2013	
Reference	Readings	Units	Expected
6.00	6.02	in	[5.80, 6.20]

Compensated Neutron Calibration Report

Tool Model-Serial Number:	PS-PS14N
Source Number:	
Calibration Tank Temperature:	63.7 degF
Shop Calibration Performed:	Mon Mar 18 10:54:09 2013

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	786.5	cps	
LS Counts	26.1	cps	
Tank Ratio Ref	30.9580	SS/LS	
Tank Ratio	30.1063	SS/LS	
Tank Ratio Gain	1.0283		[0.85, 1.15]

ALUMINUM SLEEVE REFERENCE			
Outputs	Measured	Units	Expected
SS Counts	8812.9	cps	
LS Counts	832.9	cps	
Al Ratio Ref	10.797	SS/LS	
Al Ratio	10.880	SS/LS	
Al Ratio Gain	0.99		[0.90, 1.10]
Sleeve Porosity	14.46	pu	

PRE-SURVEY BACKGROUND CHECK Performed:

Fri Apr 19 12:07:16 2013

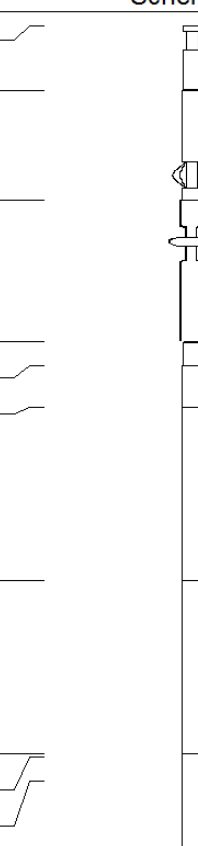
Outputs	Measured	Units	Expected
SS Counts	0.1	cps	<10
LS Counts	0.1	cps	<4

Gamma Ray Calibration Report

Tool Model-Serial Number:	PS-PS27T		
Performed:	Mon Apr 08 09:54:28 2013		
Calibrator Value:	165.0	GAPI	
Background Reading:	47.8	cps	
Calibrator Reading:	359.6	cps	
Sensitivity:	0.3750	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	66.92		Cablehead-S	2.31	2.13	5.00
Thrubit	64.61		Solid Weakpoint			
			PSBDOT	3.87	2.25	35.00
Thrubit	60.75		HangOff_Tool	5.00	2.38	60.00
Thrubit	55.75		10-1	0.88	2.13	3.95
Thrubit	54.87		Universal Joint	1.46	2.06	15.00
TBBAT	53.41		TBBAT-A (PS13B) Thrubit Battery	6.13	2.13	38.20
TBBAT2	47.29		TBBAT2-A (PS33B) Thrubit Battery	6.13	2.13	40.00
TMG	41.16		TMG-PS (PS27T)	6.13	2.13	45.00
GR	41.04					
GRTEMP	40.20					

ThruBit	35.04					
			Decentralizer Decentralizer (Small)	4.50	2.13	70.00
CNLSC	28.60		TBN-PS (PS14N) ThruBit Neutron	4.77	2.13	63.00
			TBD-PS (PS01D) ThruBit Density	10.48	2.13	91.00
LSW1	18.04					
DCAL	17.13					
A1_P	10.60					
A2_P	10.10					
A3_P	9.35					
A4_P	8.35		TBI-PS (PS38R) ThruBit Induction	15.29	2.13	94.00
A5_P	6.60					

Dataset: murray_mem.db: field/well/proc1/pass1.4
 Total Length: 66.92 ft
 Total Weight: 560.15 lb
 O.D. 2.38 in



Company SANDRIDGE ENERGY
 Well MURRAY 3406 1-5H
 Field EASTHAM
 County HARPER
 State KANSAS