



ThruBit
A Schlumberger Company

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

Company	SANDRIDGE ENERGY	Location:	API #: 15-077-21950-01-00	Other Services
Well	BRYANT 3508 3-10H	SHL: 350' FNL & 660' FWL		THRUBIT
Field	WALDRON	SEC 10 TWP 35S RGE 8W		PORTAL BIT
County	HARPER			Elevation
State	KANSAS			K.B. 1300'
				D.F. 1300'
				G.L. 1280'

Date	18 AUG 2013
Run Number	ONE
Depth Driller	9010'
Depth Logger	8963'
Bottom Logged Interval	8945'
Top Log Interval	3000'
Casing Driller	7" @ 5737'
Casing Logger	7" @ 5731'
Bit Size	6.125
Type Fluid in Hole	WBM
Density / Viscosity	8.6 / 27
pH / Fluid Loss	8.0 / NA
Source of Sample	ACTIVE PIT
Rm @ Meas. Temp	2.63 OHM @ 92 DEGF
Rmf @ Meas. Temp	1.97 OHM @ 92 DEGF
Rmc @ Meas. Temp	3.28 OHM @ 92 DEGF
Source of Rmf / Rmc	CALCULATED
Rm @ BHT	1.82 OHM @ 136 DEGF
Time Circulation Stopped	1017 18 AUG 2013
Time Logger on Bottom	1125 18 AUG 2013
Maximum Recorded Temperature	136 DEGF
Equipment Number	T011
Location	OKLAHOMA CITY, OK
Recorded By	R. BROOMFIELD
Witnessed By	CODY DAVIS

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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: LEVEL 4- HORIZONTAL MEMORY PUMPDOWN - BIT DEPTH 8914' LOG TO 3000'
ALL SCALES AND PRESENTATION PER CLIENT REQUEST
LIMESTONE POROSITY , 2.71 G/CC, USED FOR POROSITY CALCULATIONS
LOG RAN WITH SWIVEL, SMALL DECENTRALIZER AND NO STANDOFFS
TBHV REPRESENTS TOTAL BOREHOLE VOLUME, FT3
ABHV REPRESENTS ANNULAR BOREHOLE VOLUME, FT3, CALCULATED FOR 4.50" CASING
RIGMINDER LITE AND PASON USED TO CREATE DEPTH LOG
LOG DEPTH CORRELATED TO MWD GR PROVIDED BY CUSTOMER**

**RIG: HORIZON 15
CREW: R. BROOMFIELD, Z. HOWARD, J. HIRSCHLER**

Service Ticket No.	2111	API No.	15-077-21950-01-00	PGM Ver	WARRIOR 7.0
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The Well Name, Location, Borehole Description, and / or Cementing Data Furnished by Client

EQUIPMENT DATA

GAMMA RAY	NEUTRON	DENSITY	INDUCTION
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Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	PS10T	Serial No.	PS30N	Serial No.	PS52D	Serial No.	PS35R
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	8963'	3000'	0	30 FPM	

	GAMMA RAY		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 OHM-M	2000 OHM-M

DIRECTIONAL INFORMATION

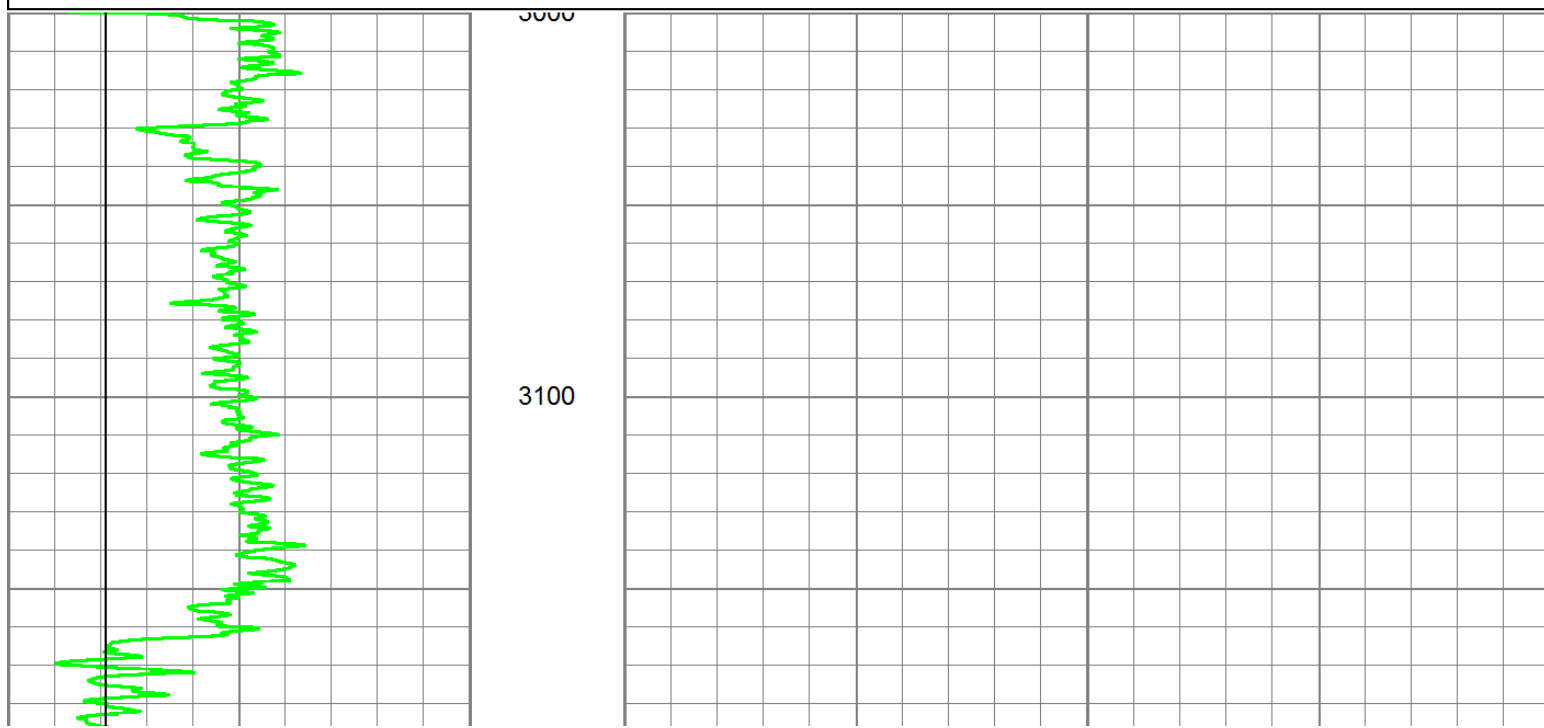
Maximum Deviation	98.4	deg. @	8951'	KOP	3950'
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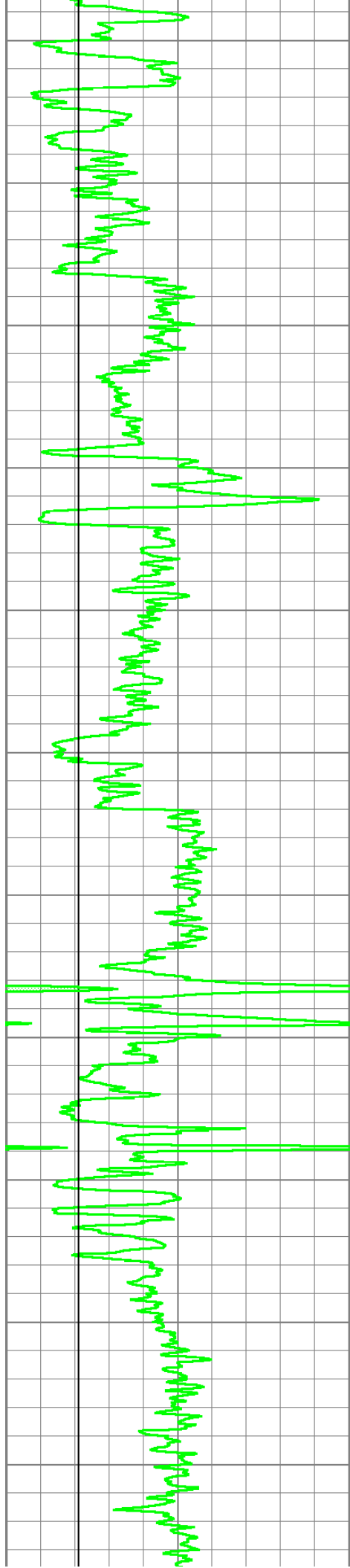


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 Dataset Pathname: proc1/pass1.3
 Presentation Format: 6_2n_chk
 Dataset Creation: Sun Aug 18 20:59:13 2013
 Charted by: Depth in Feet scaled 1:600

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						





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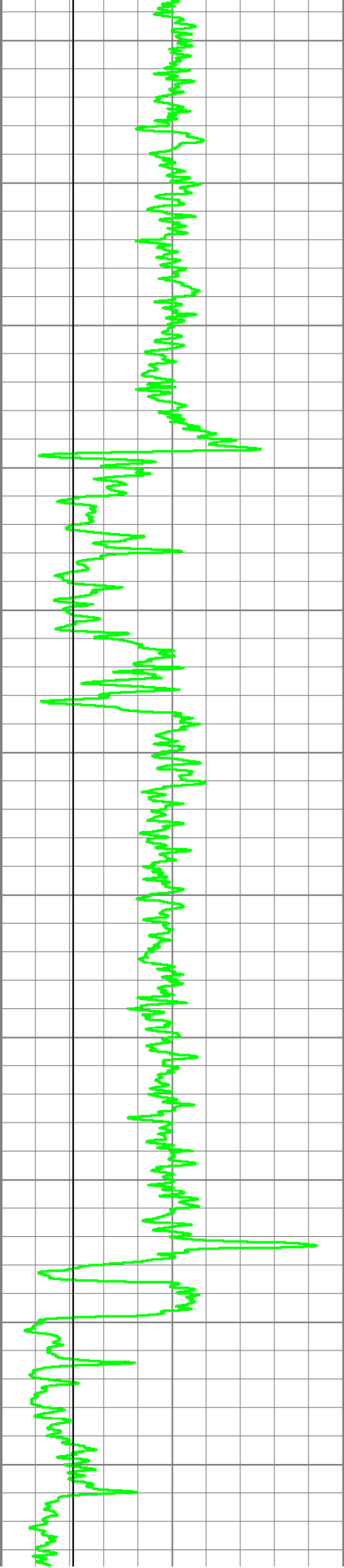
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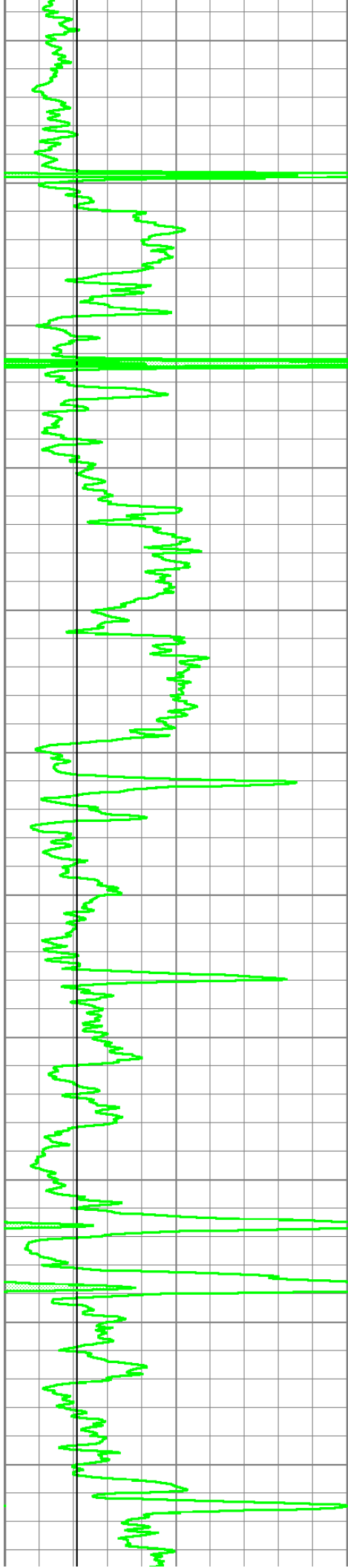
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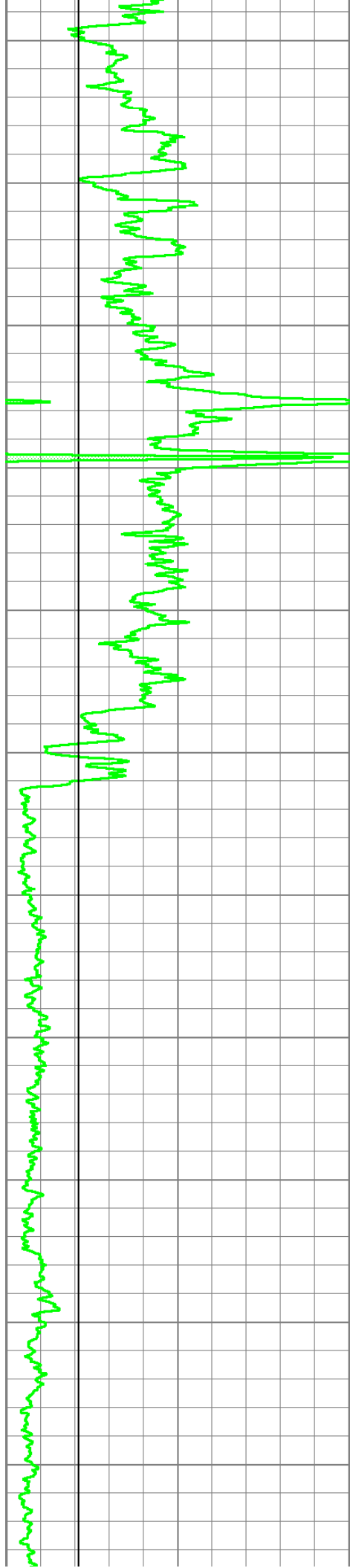
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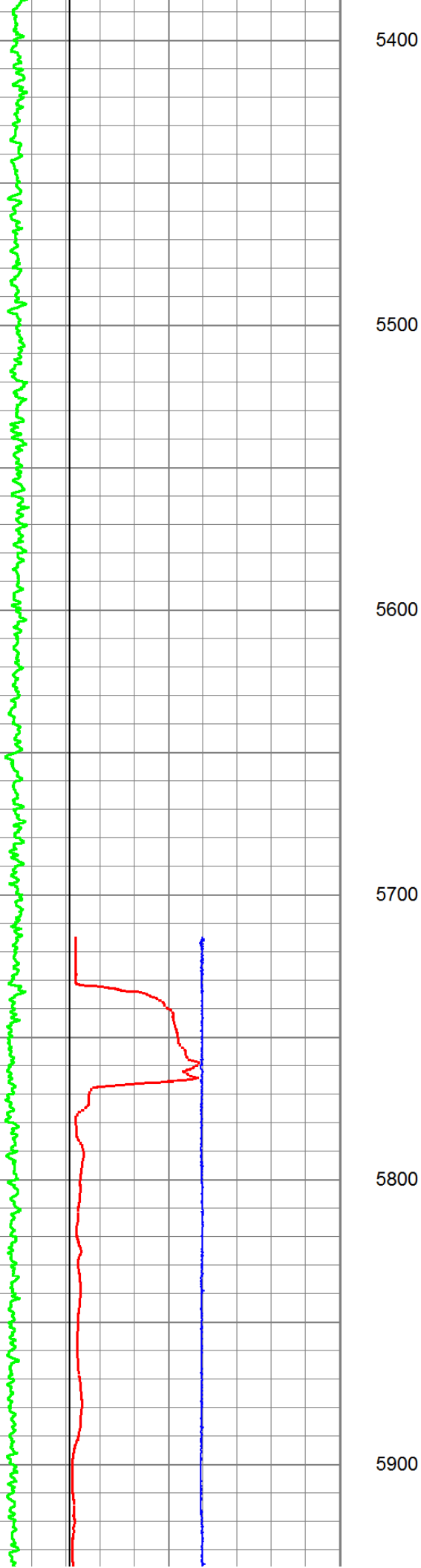
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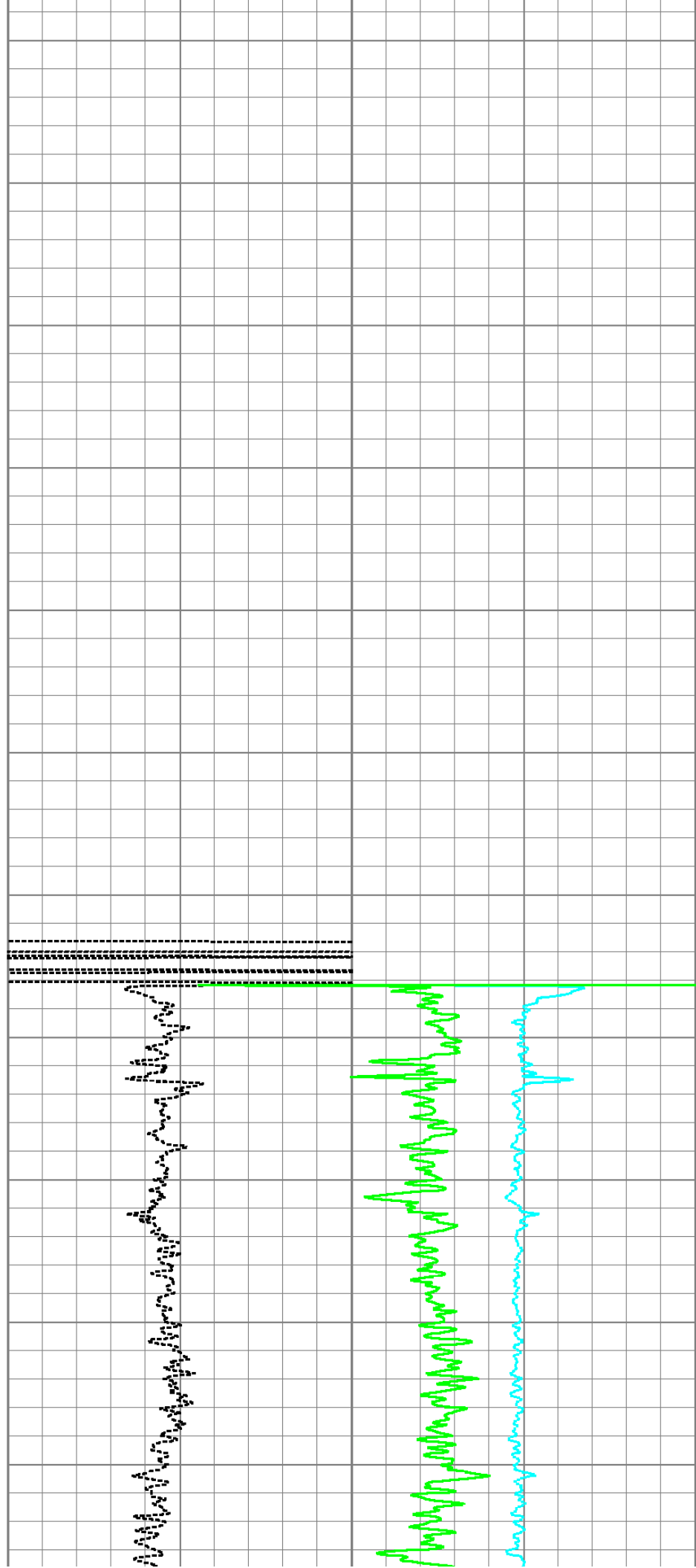
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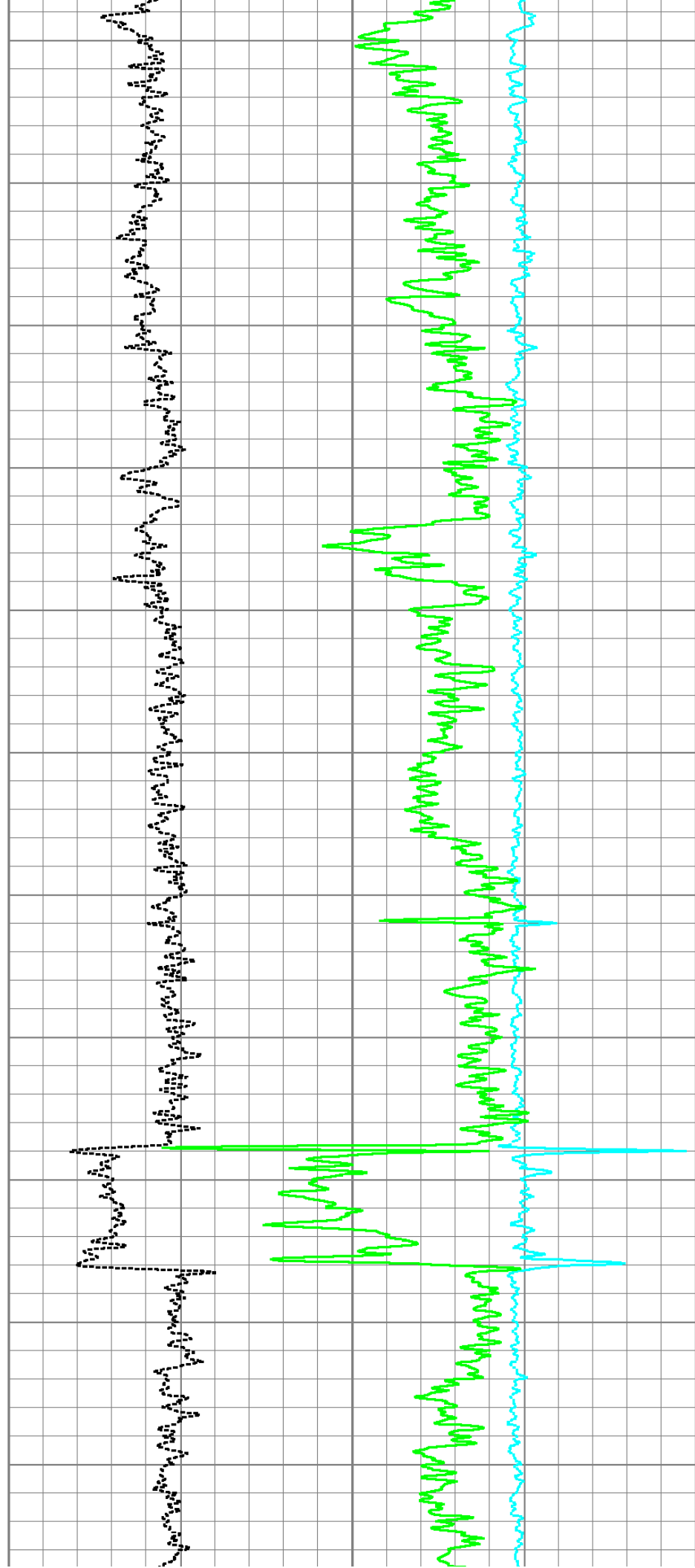
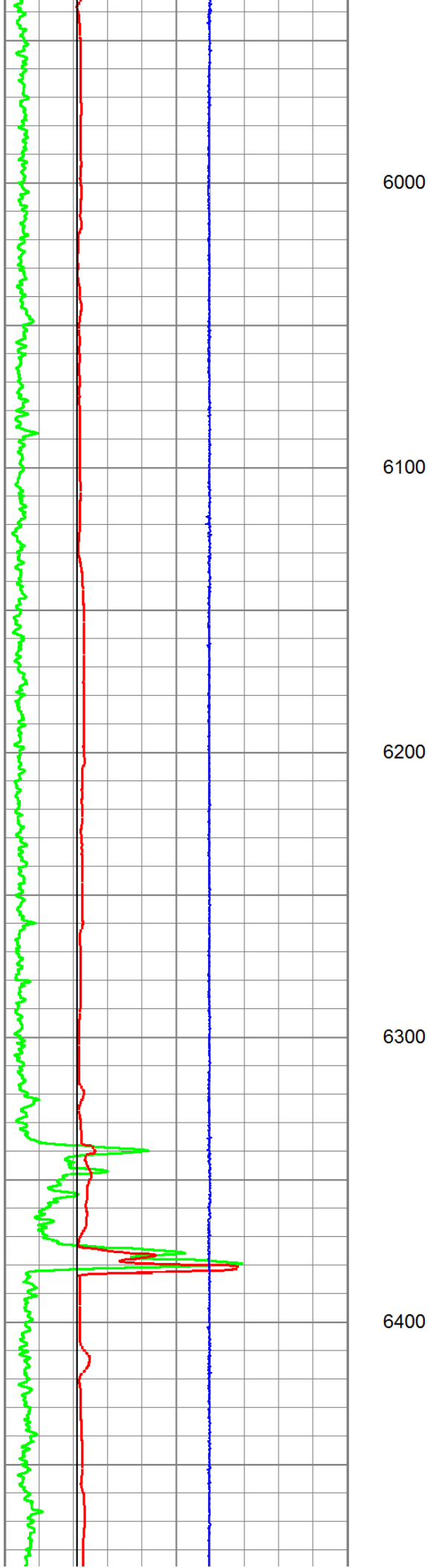
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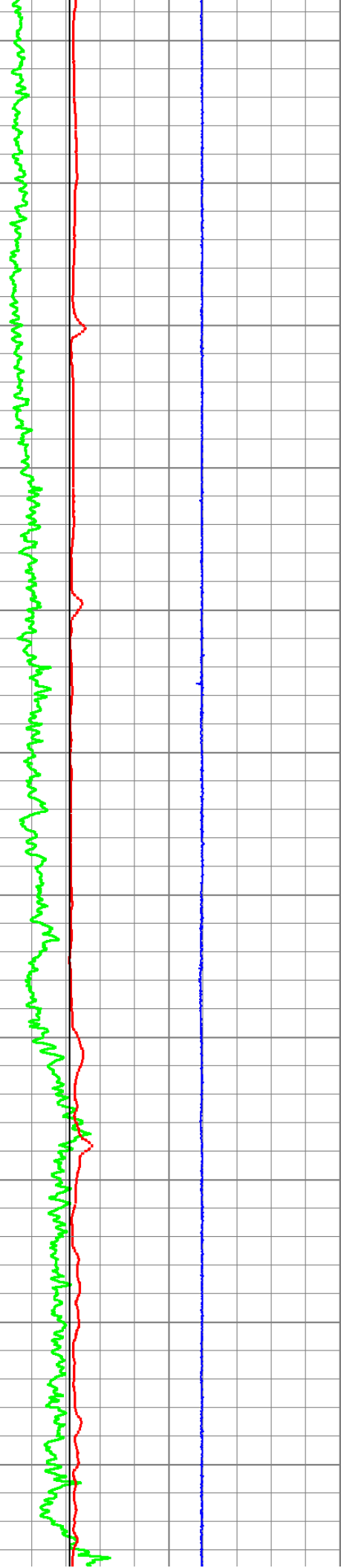
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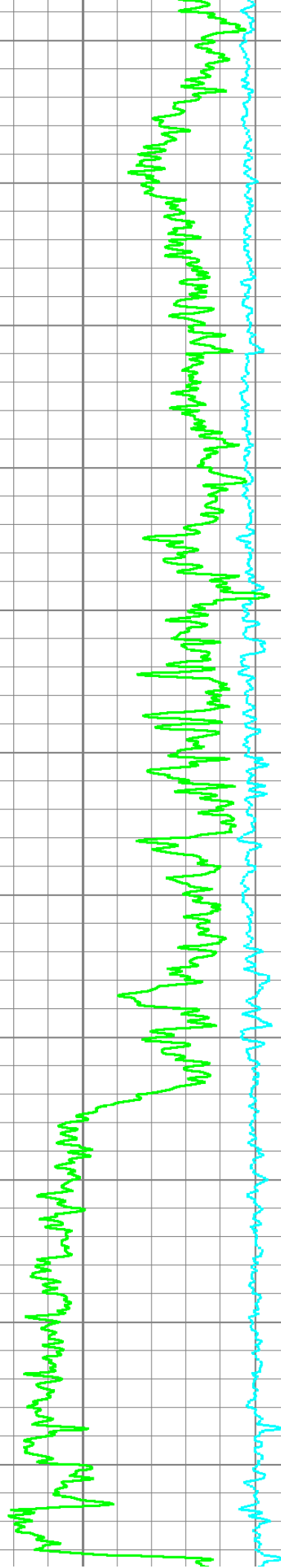
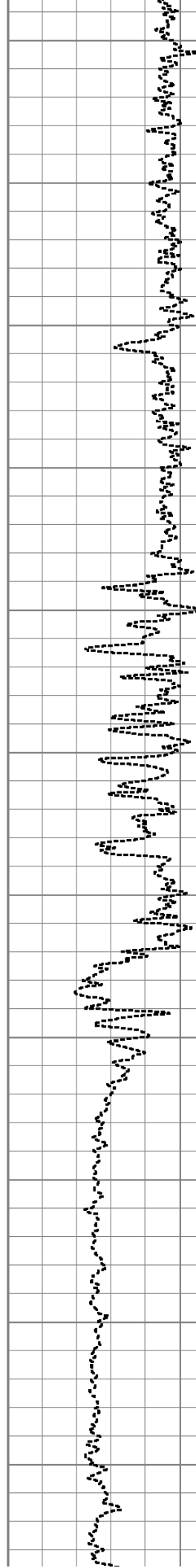
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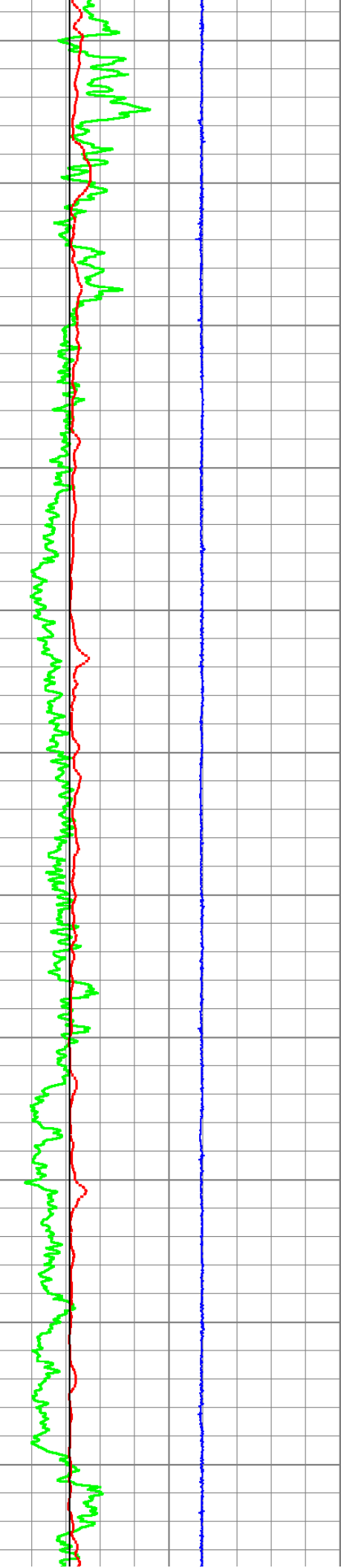
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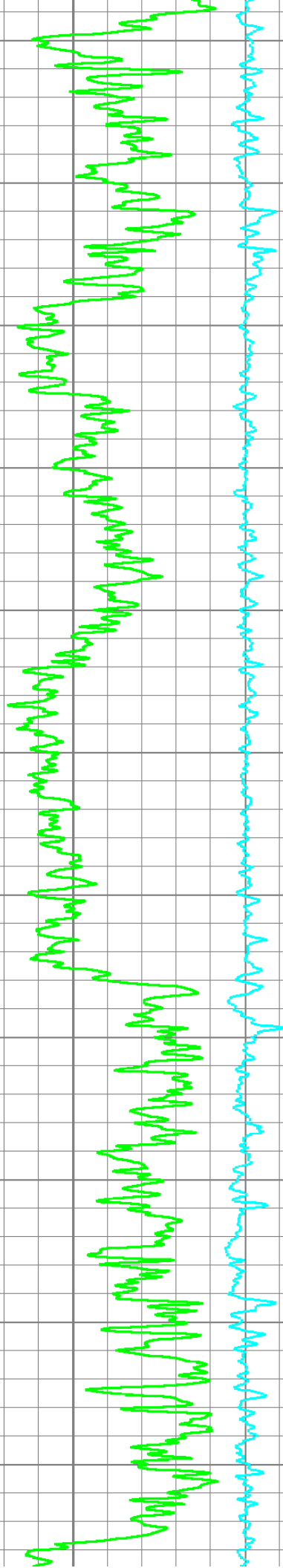
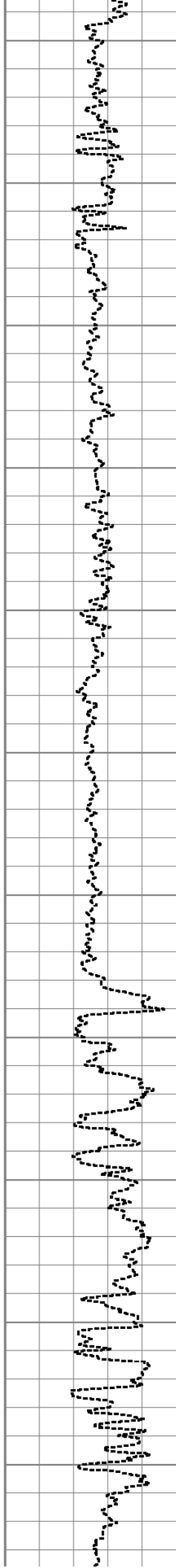
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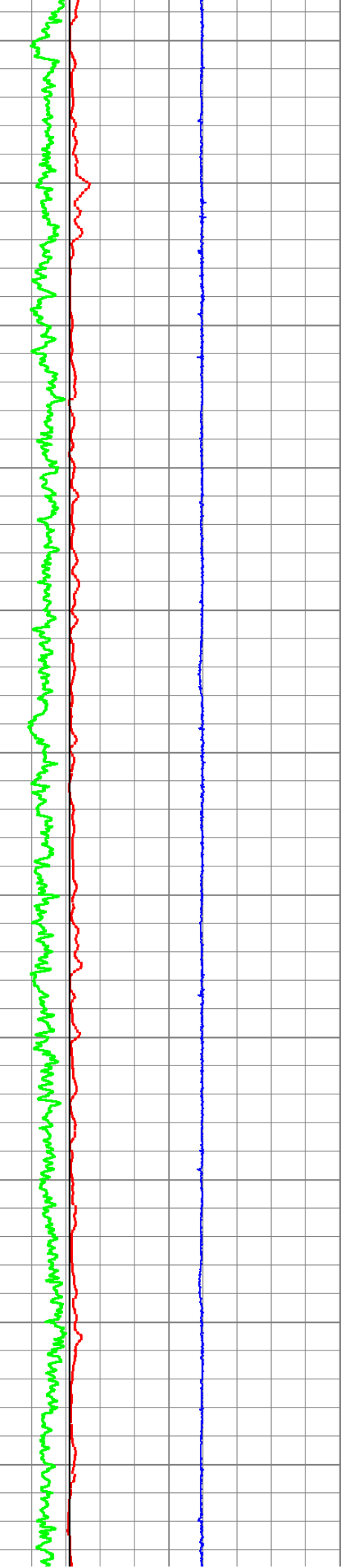
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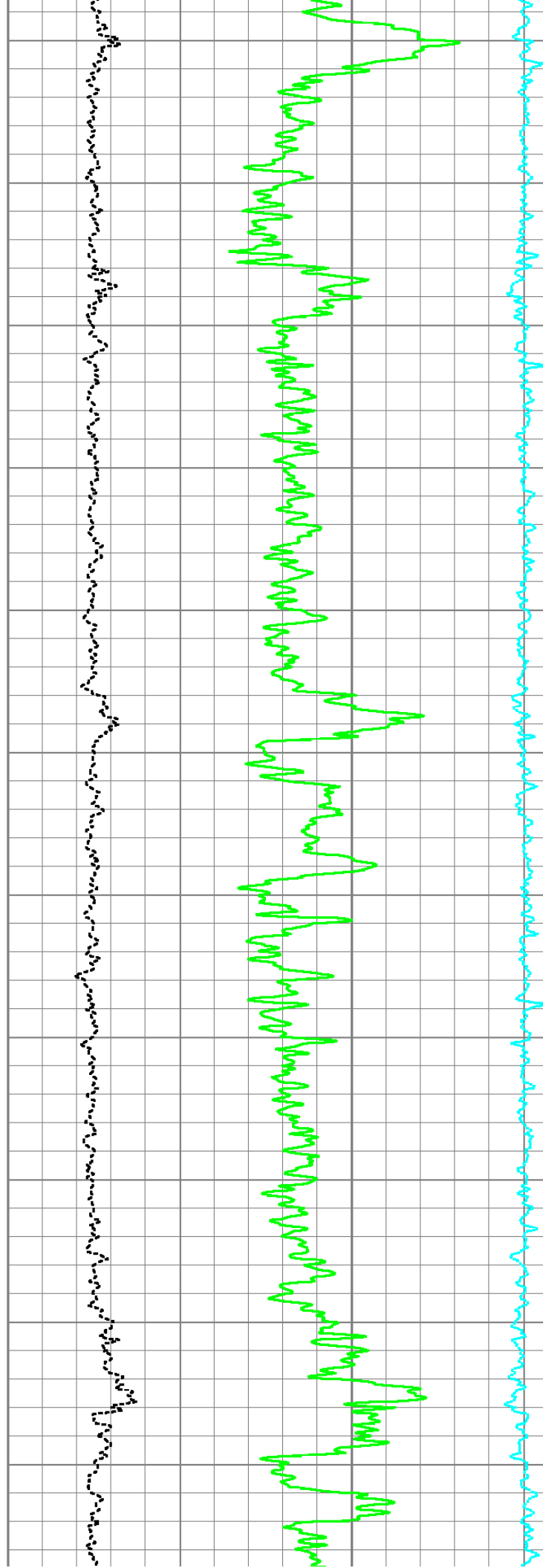
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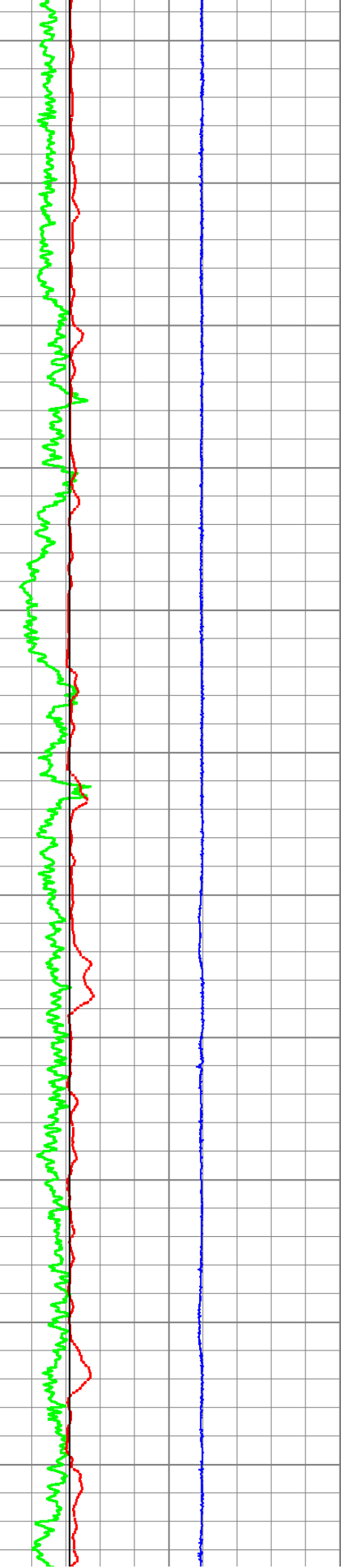
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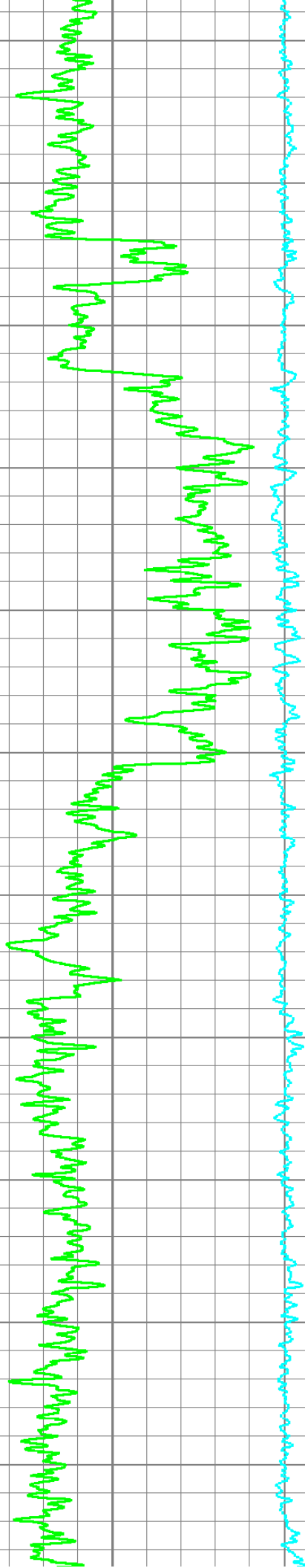
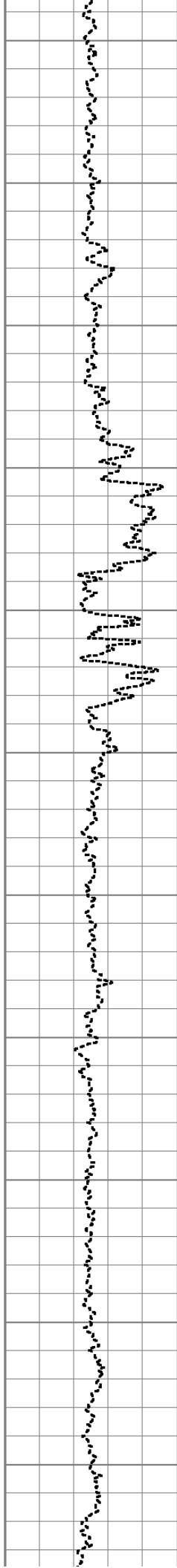
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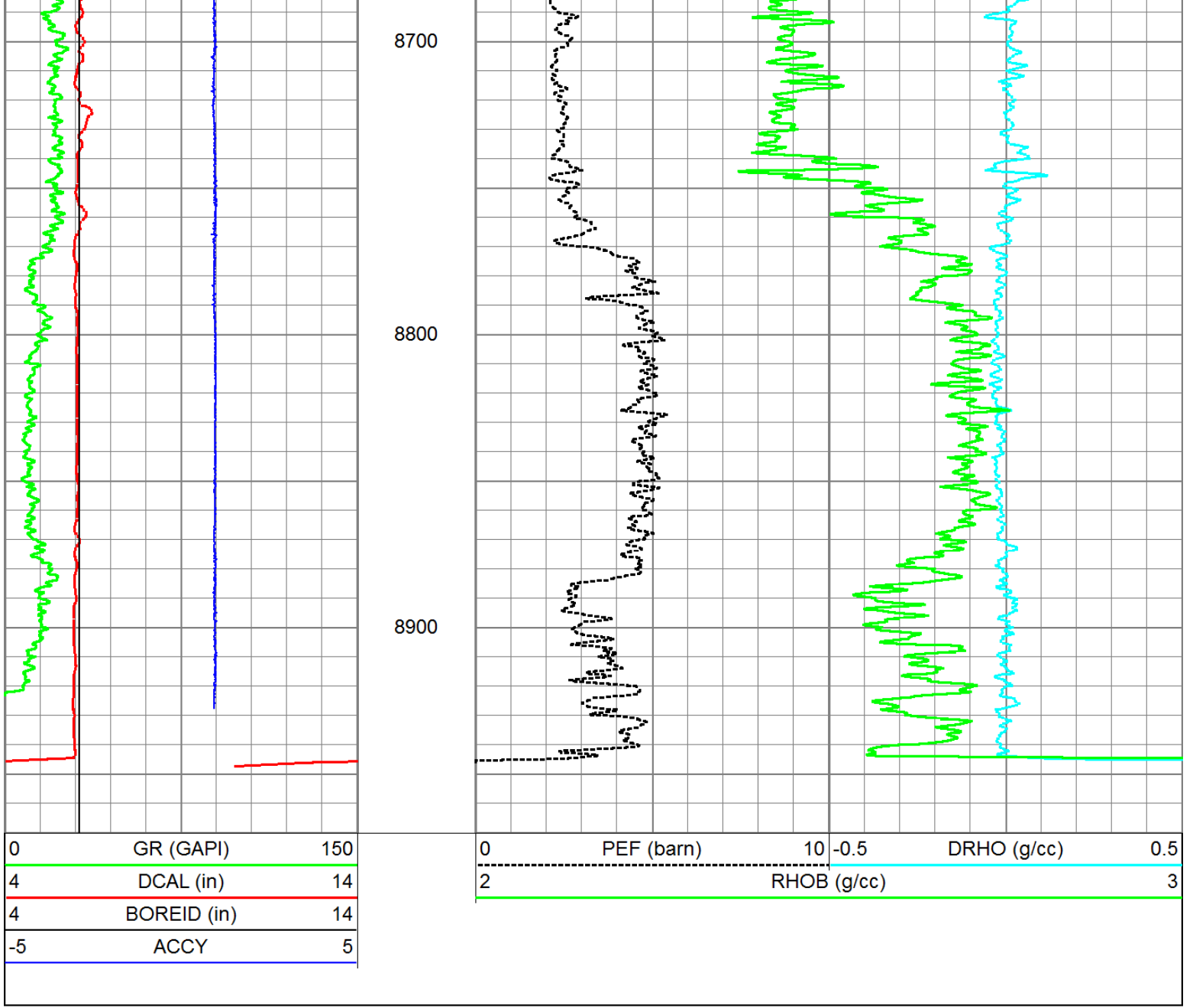
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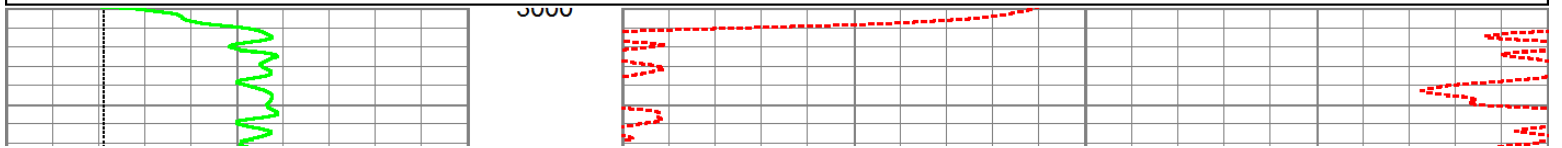


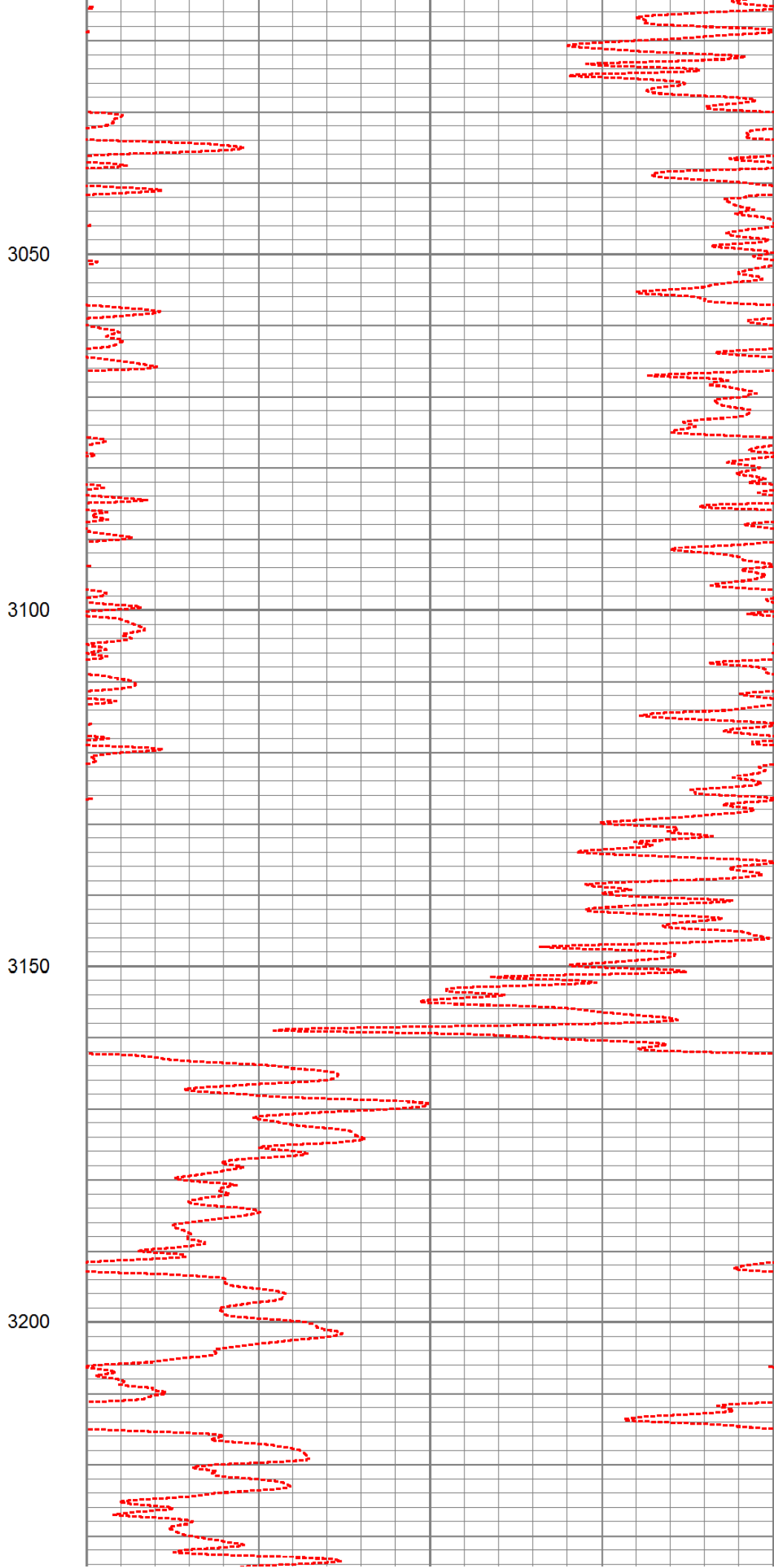
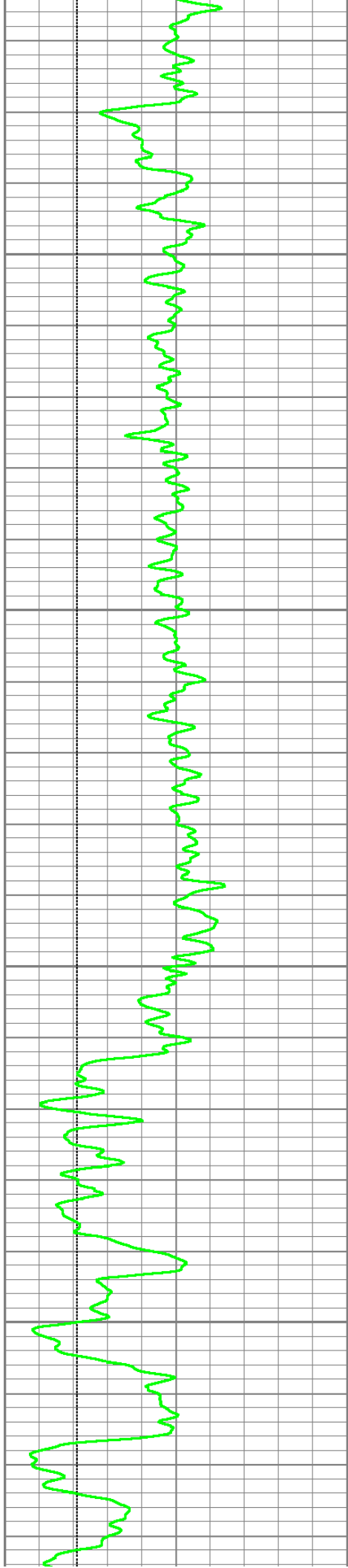


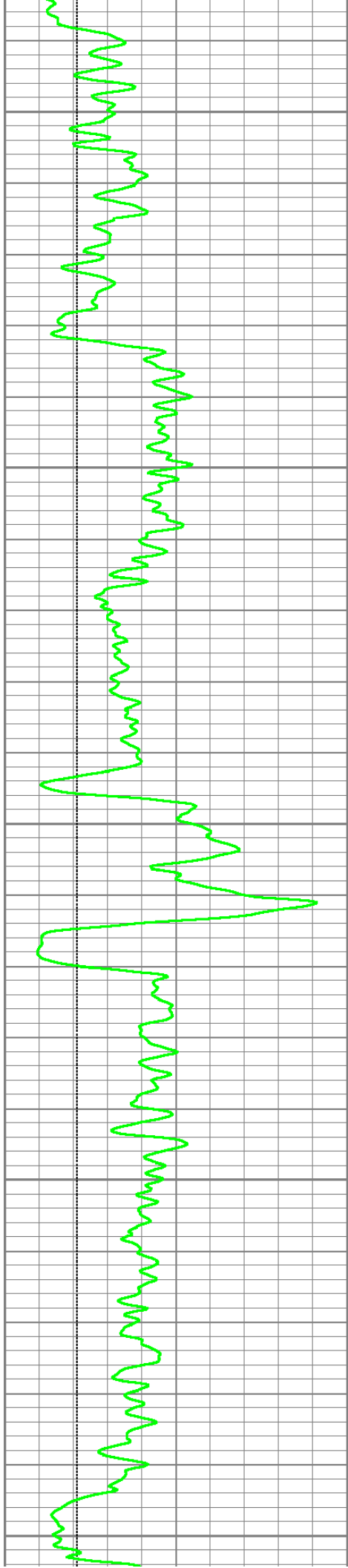
MAIN PASS

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 Dataset Pathname: proc1/pass1.3
 Presentation Format: 6_5n_chk
 Dataset Creation: Sun Aug 18 20:59:13 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)						







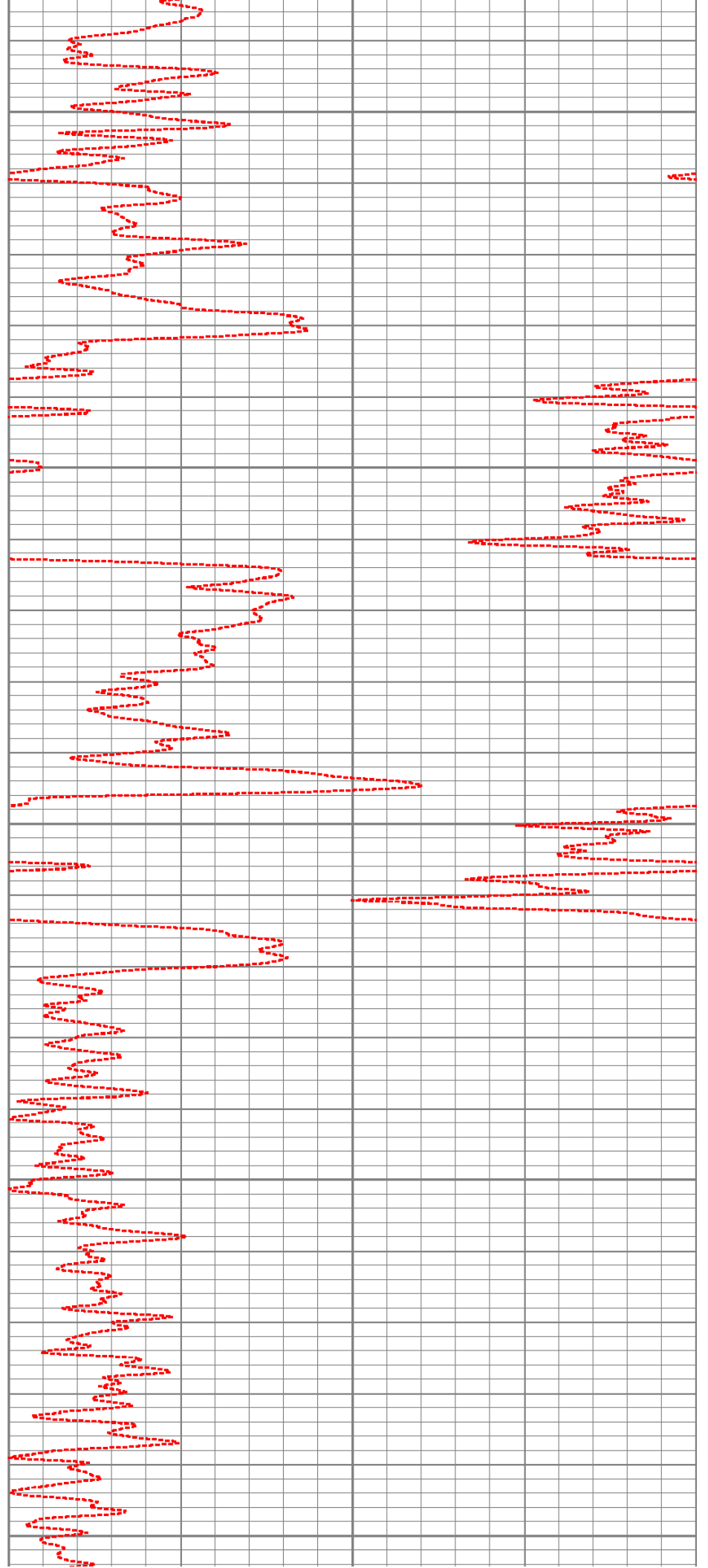
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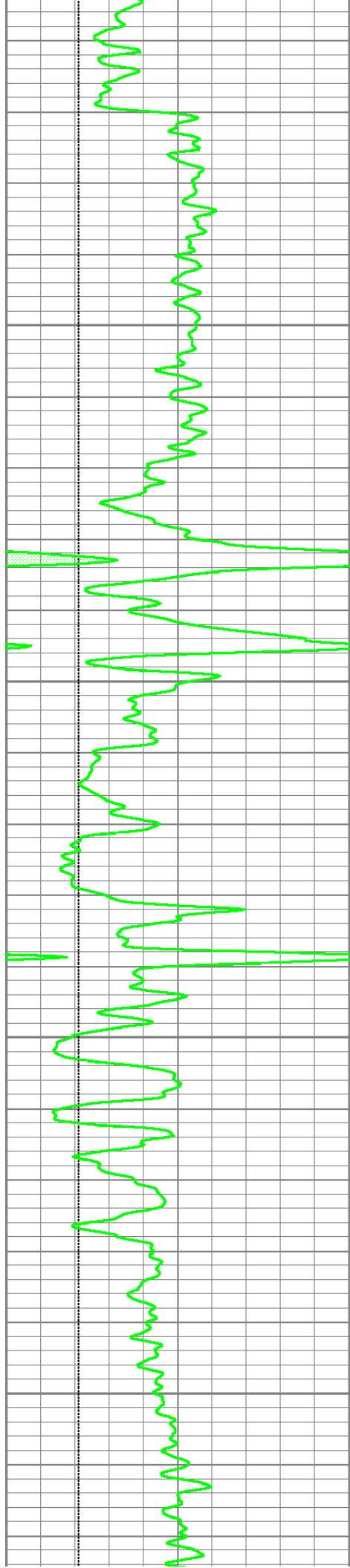
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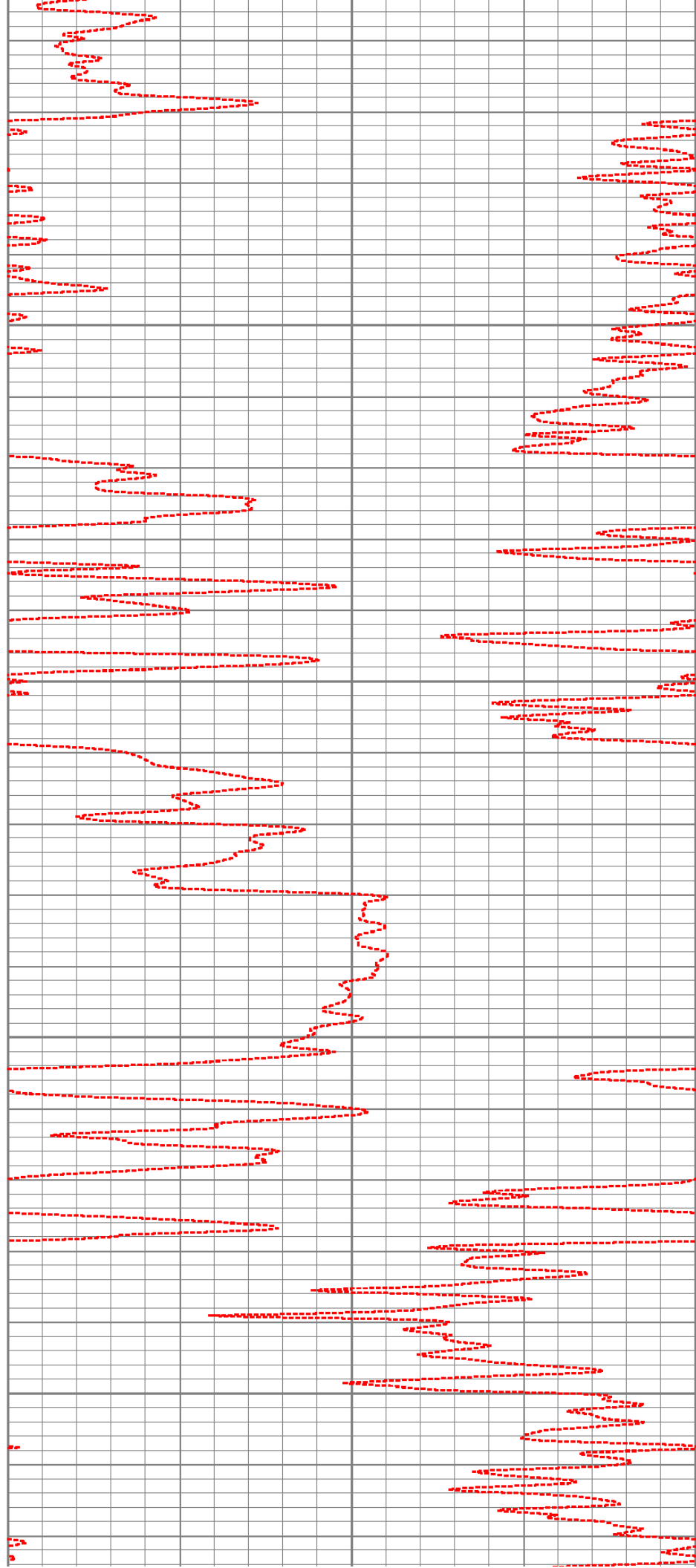


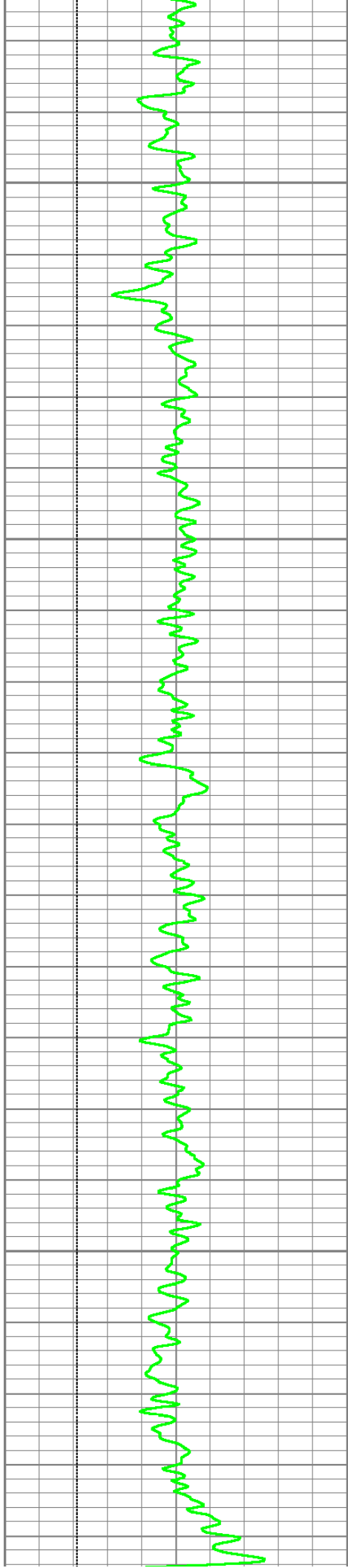
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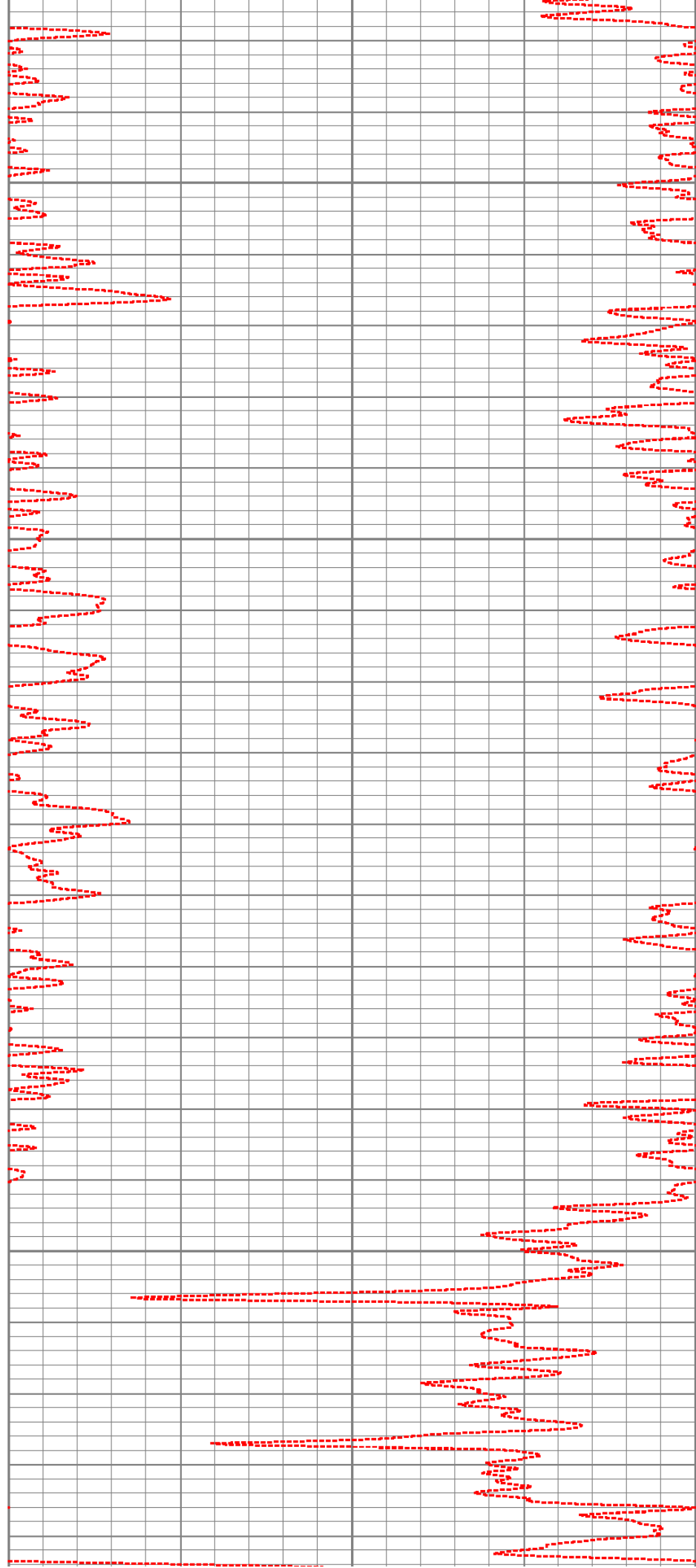


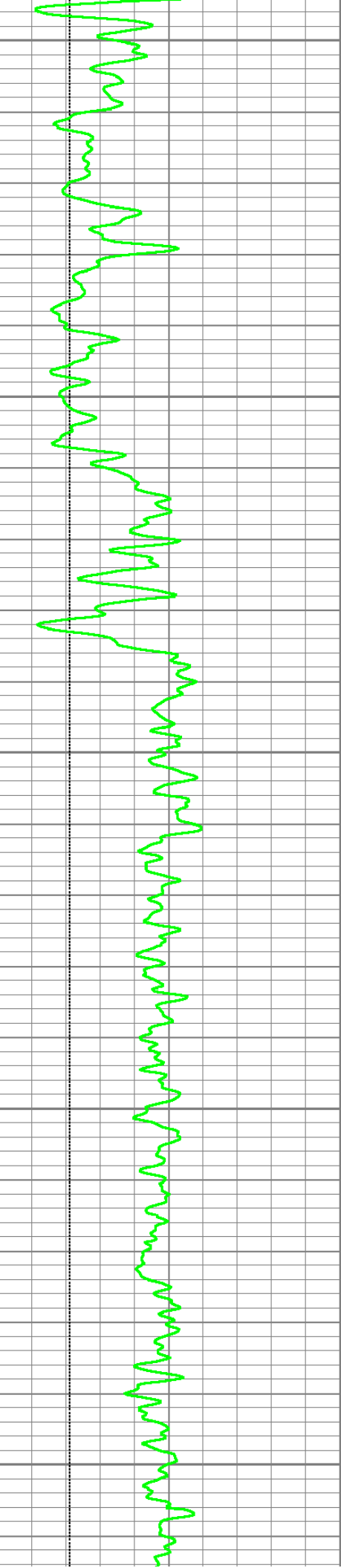
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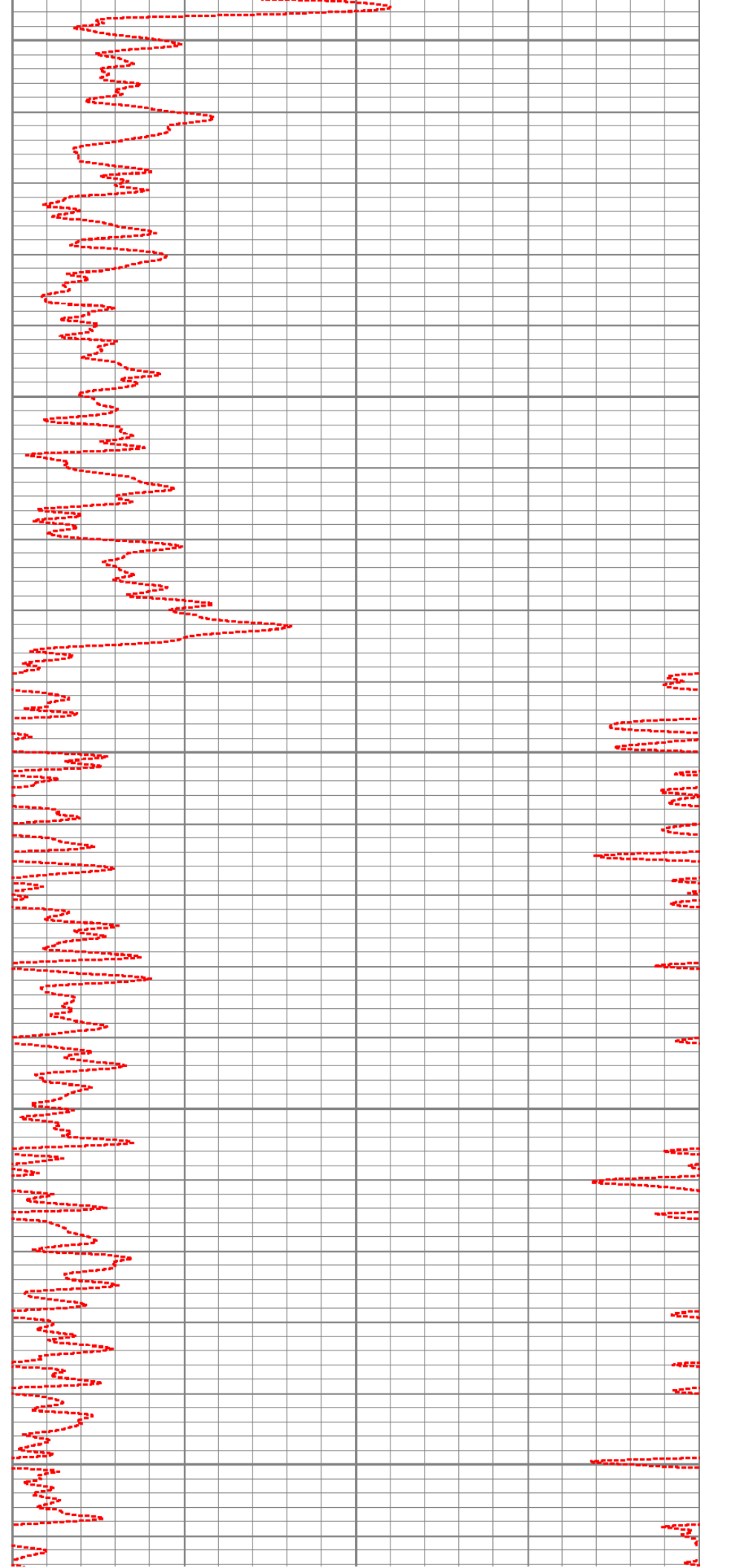
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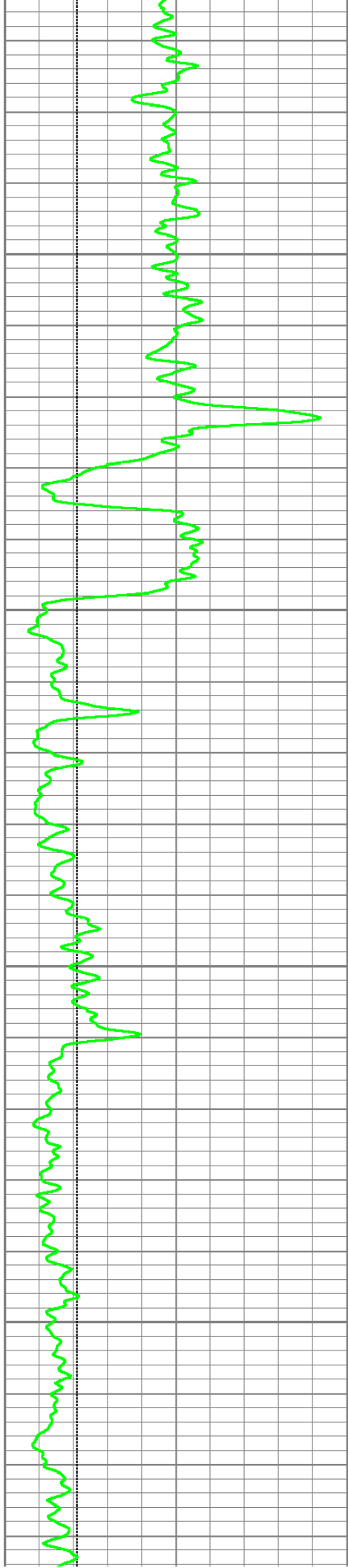
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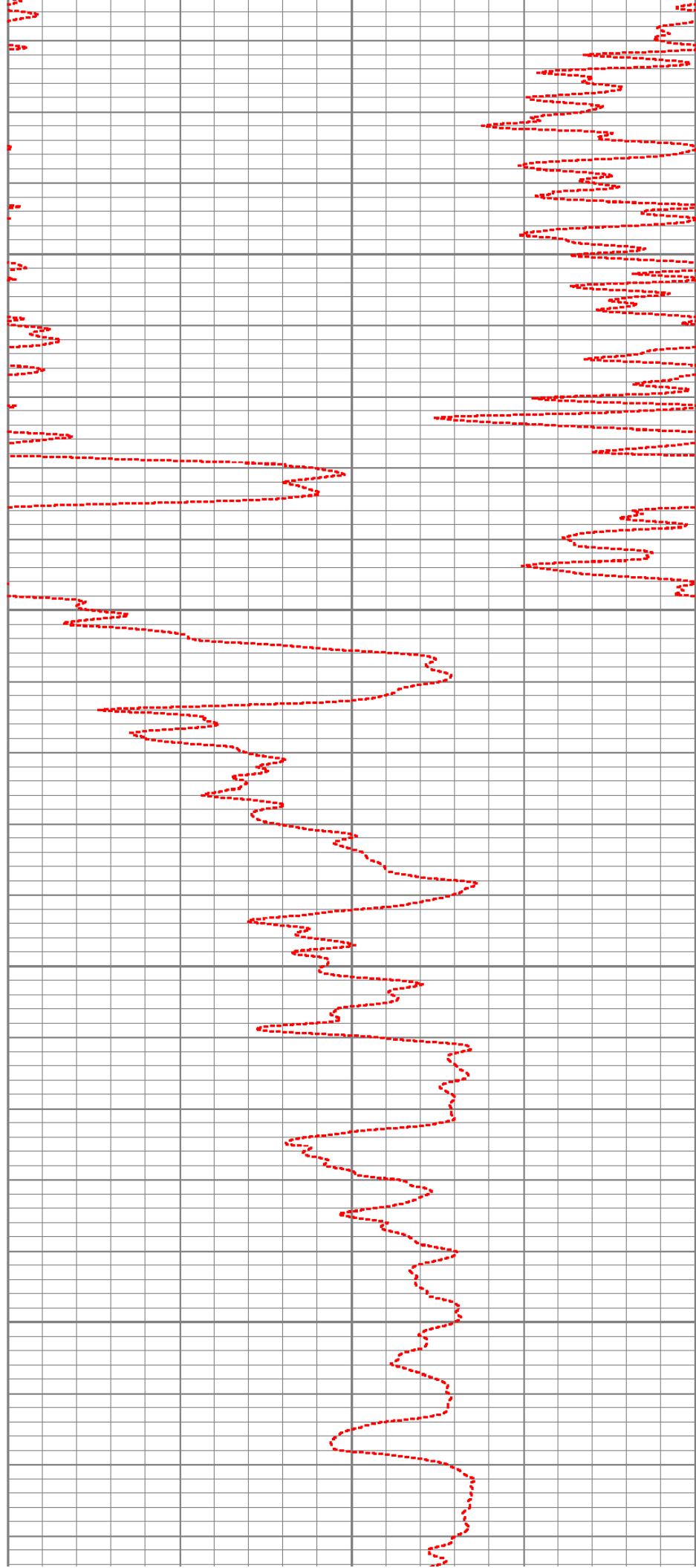


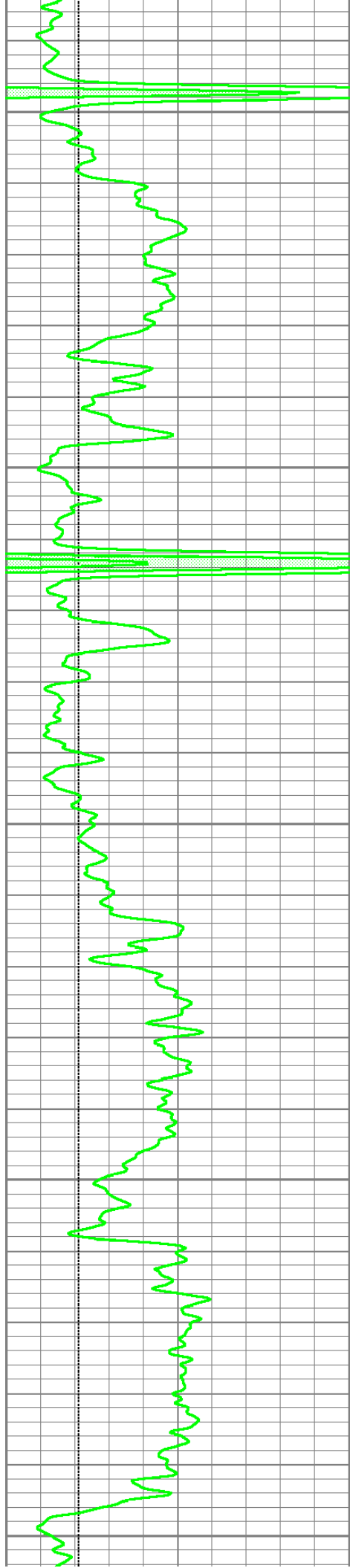
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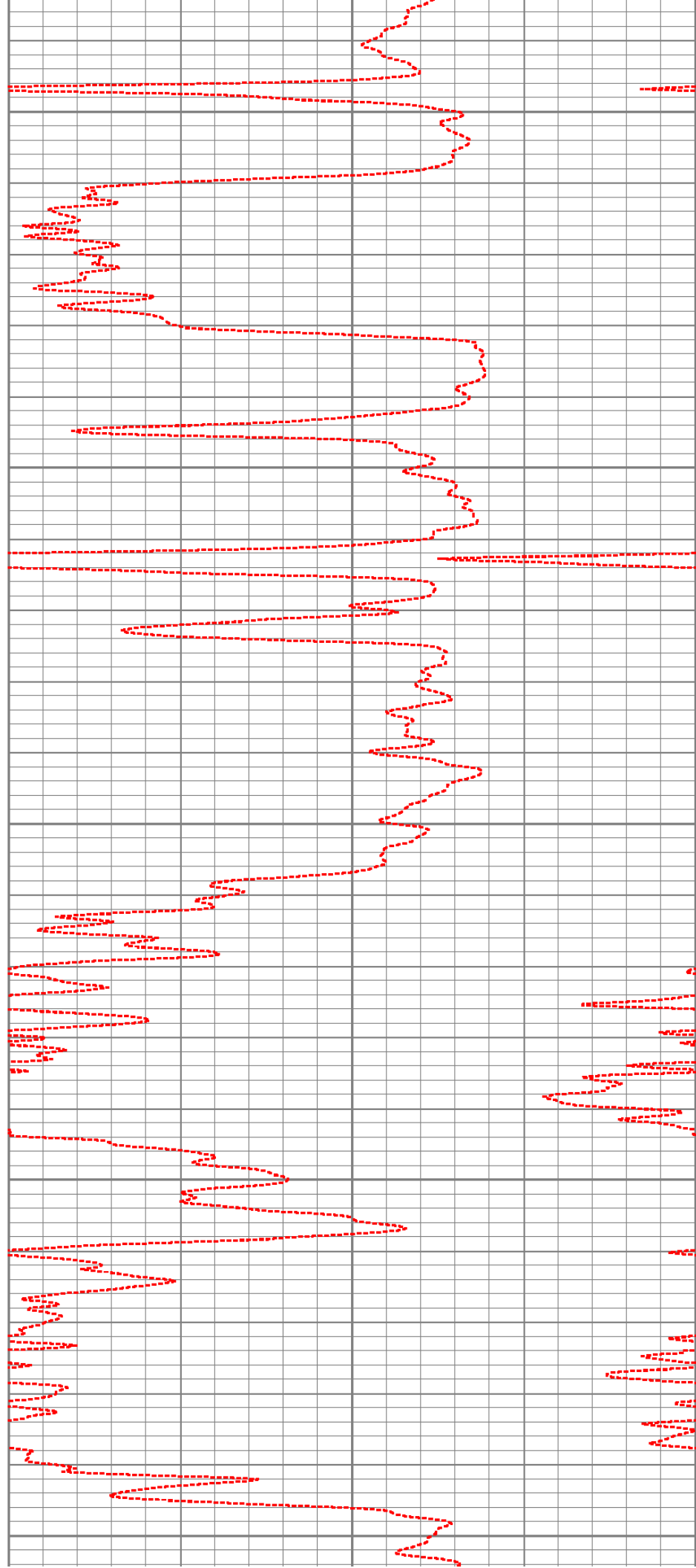
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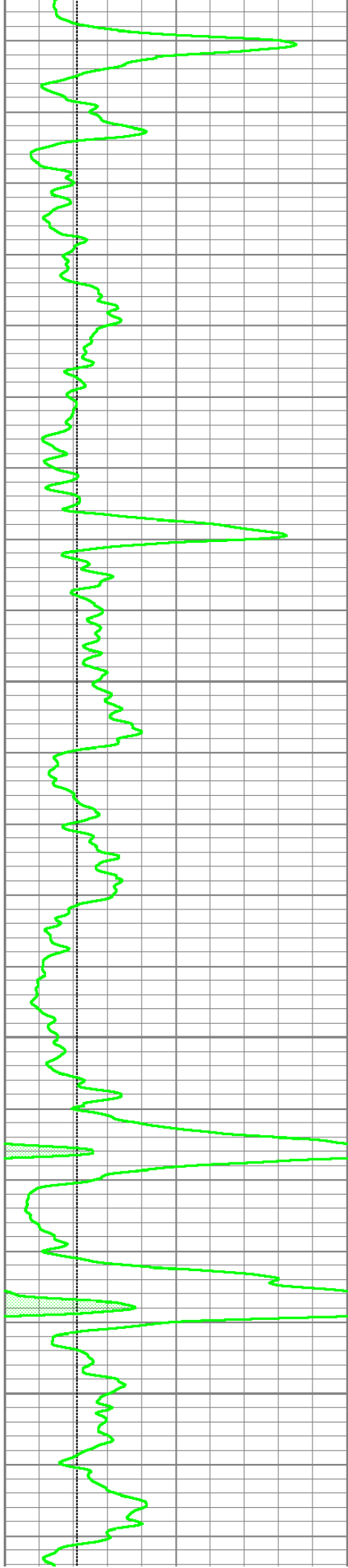
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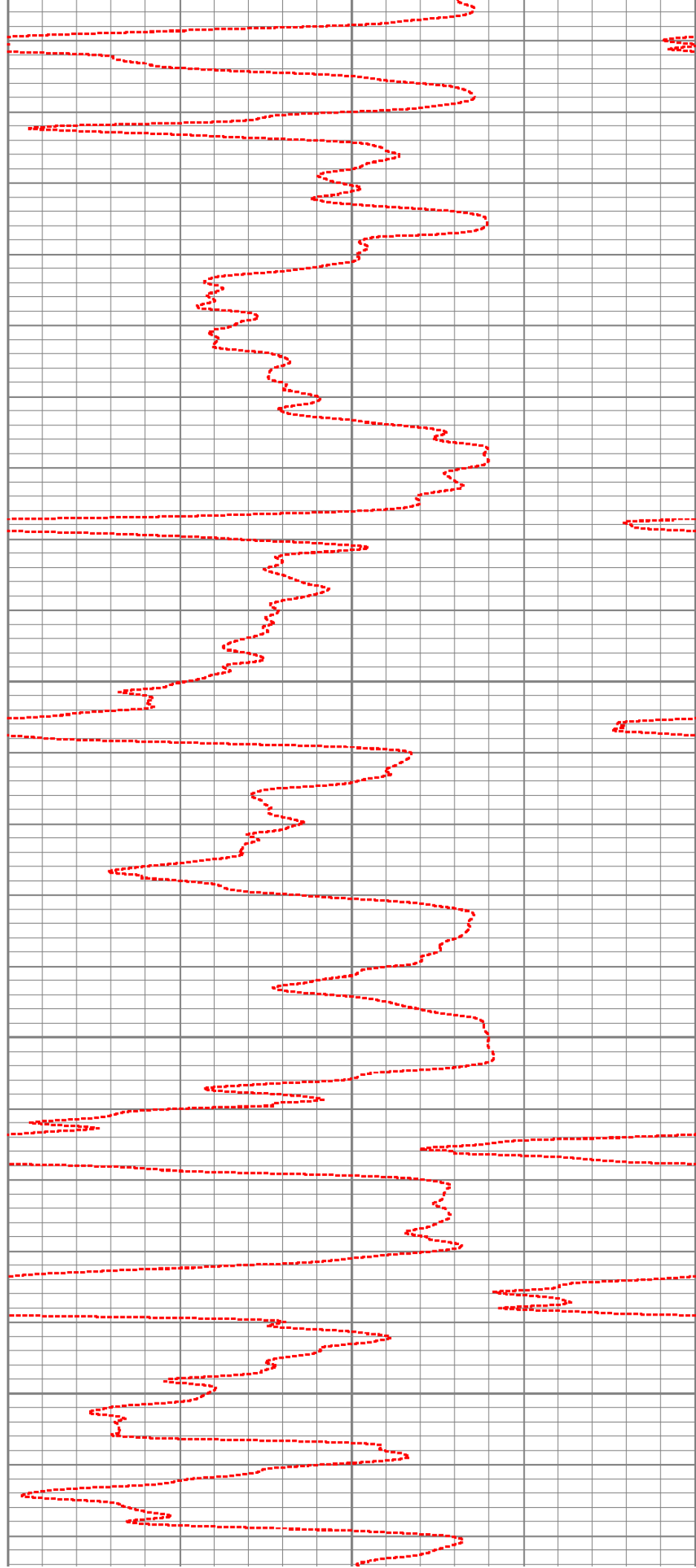


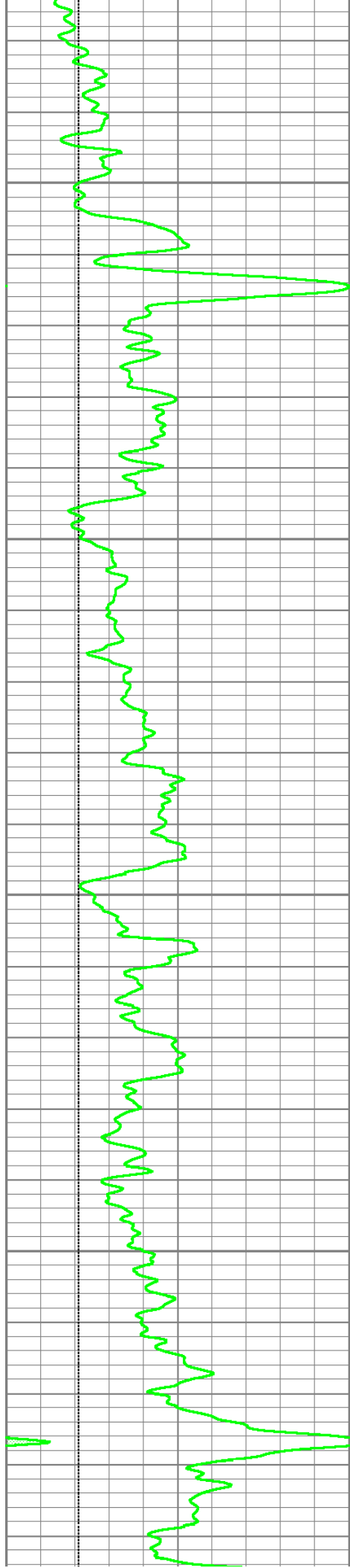
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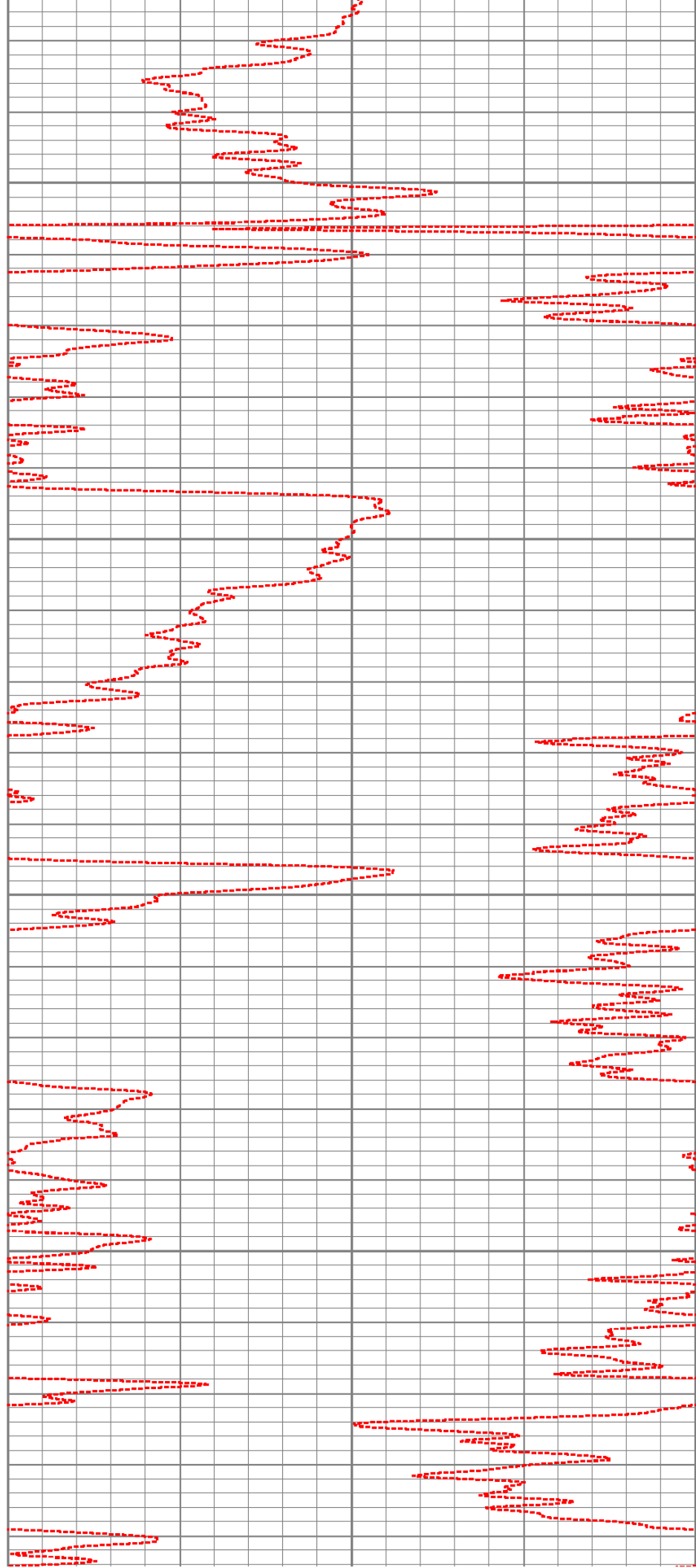


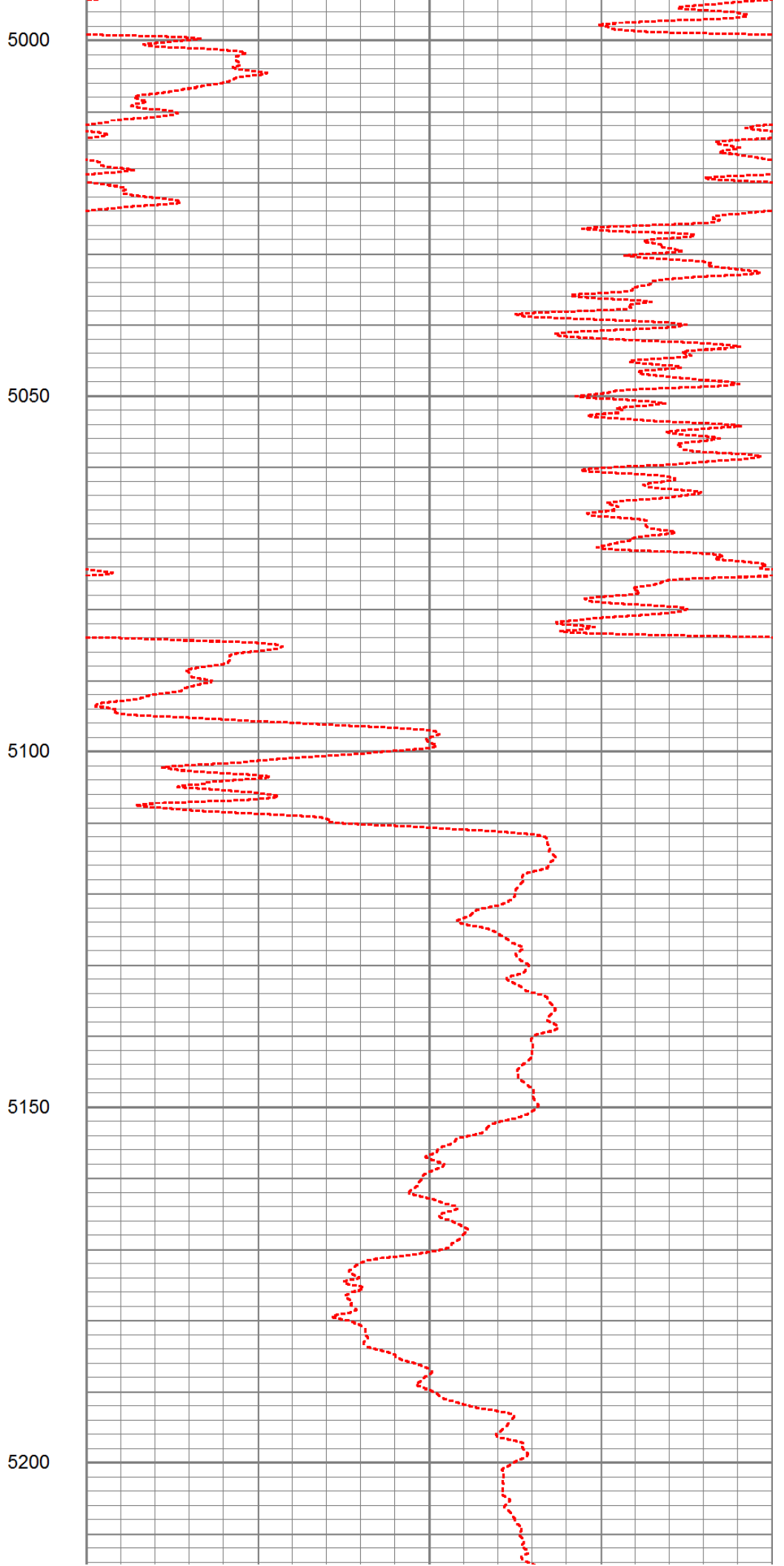
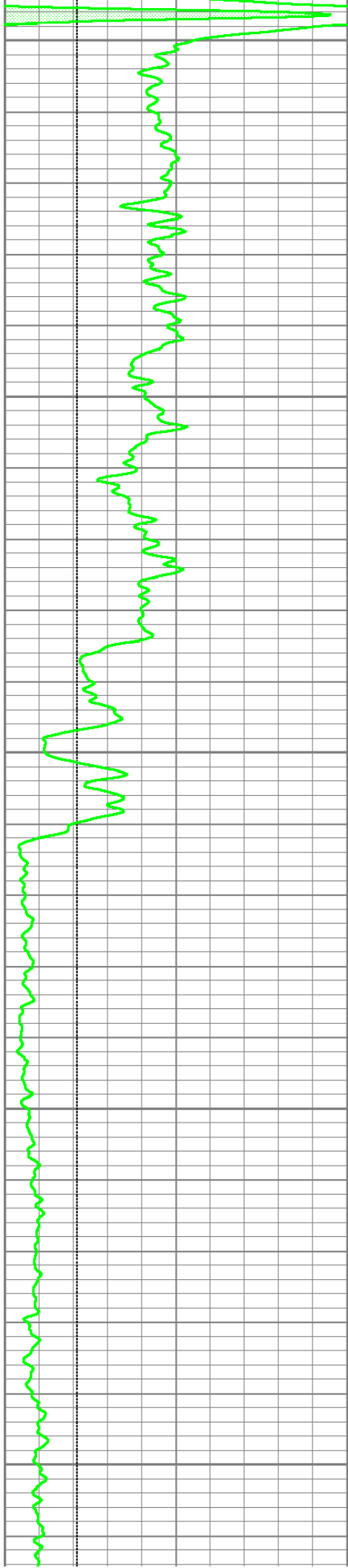
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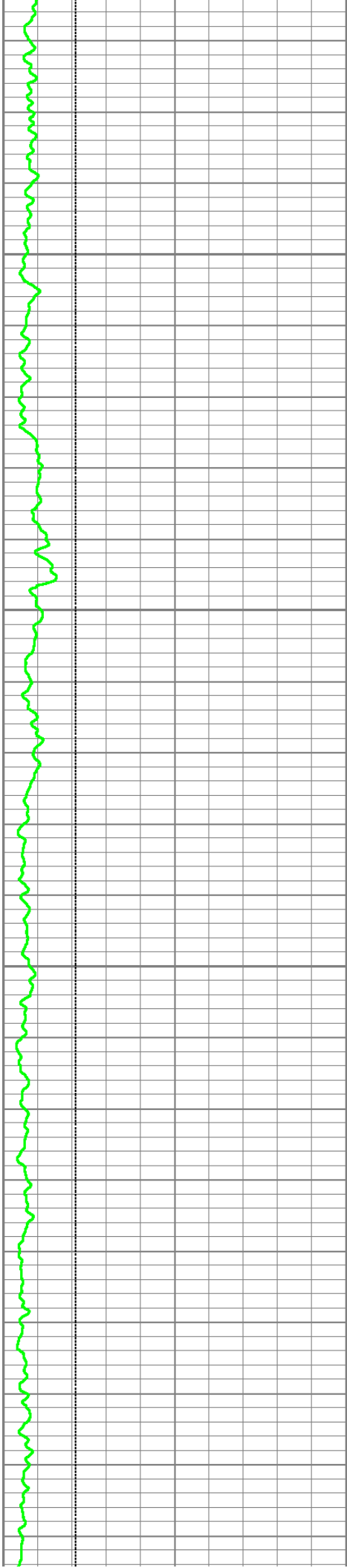
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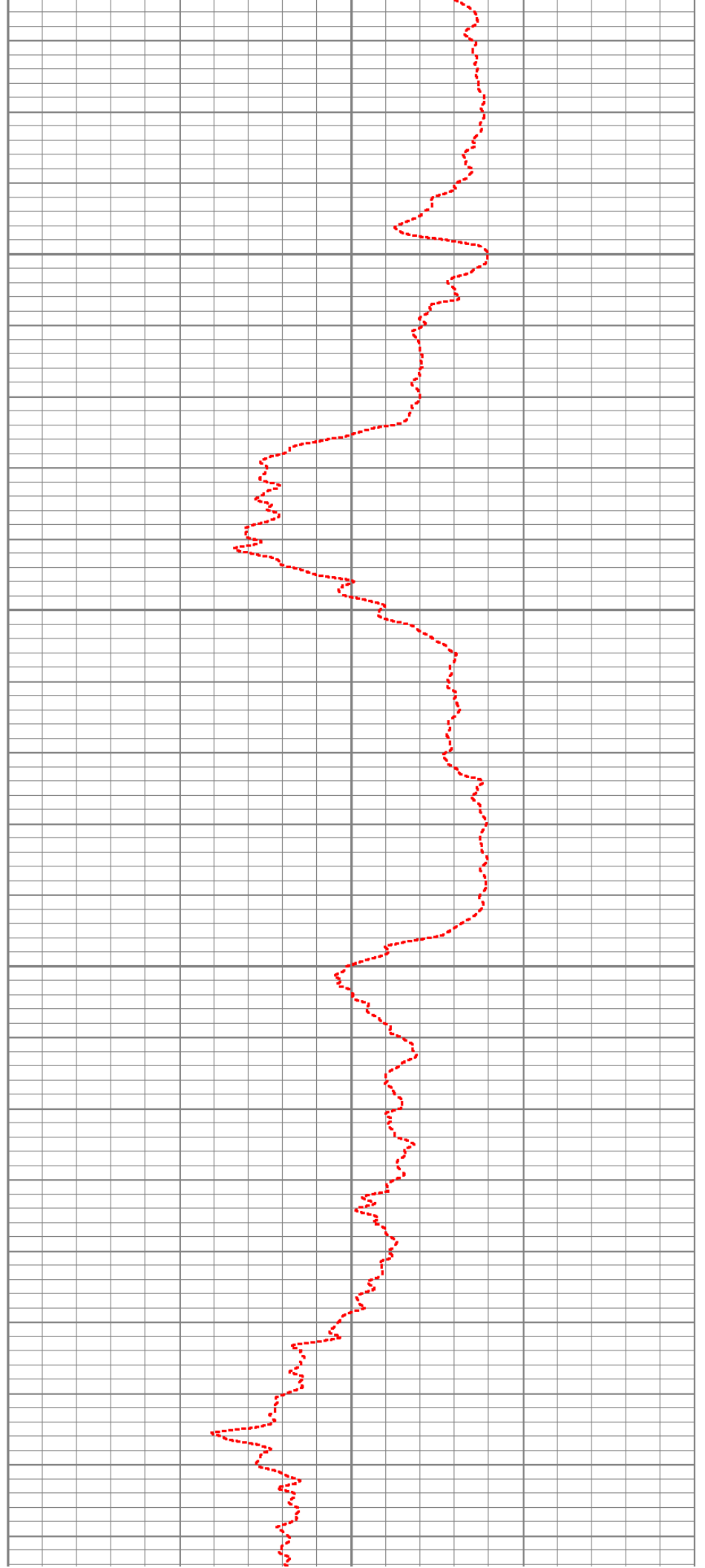


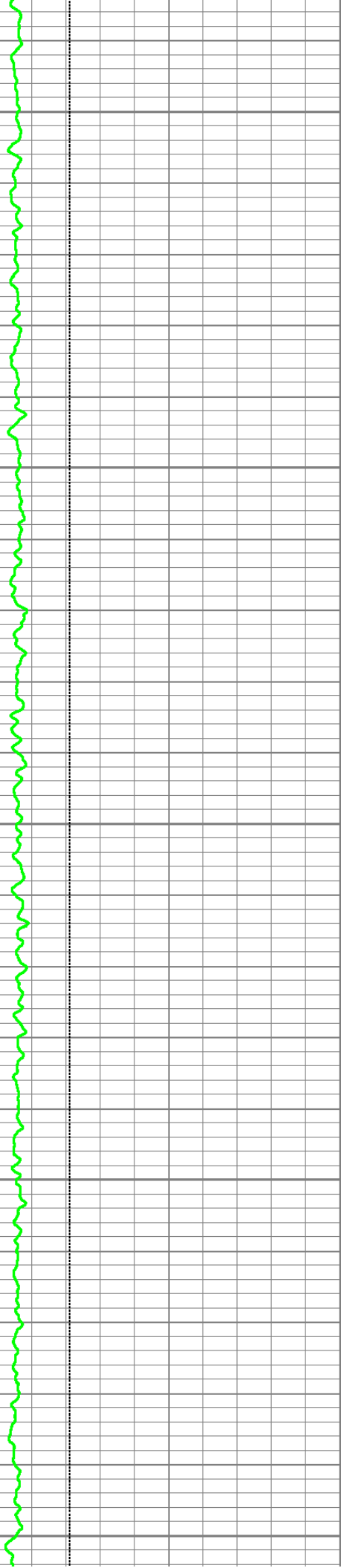
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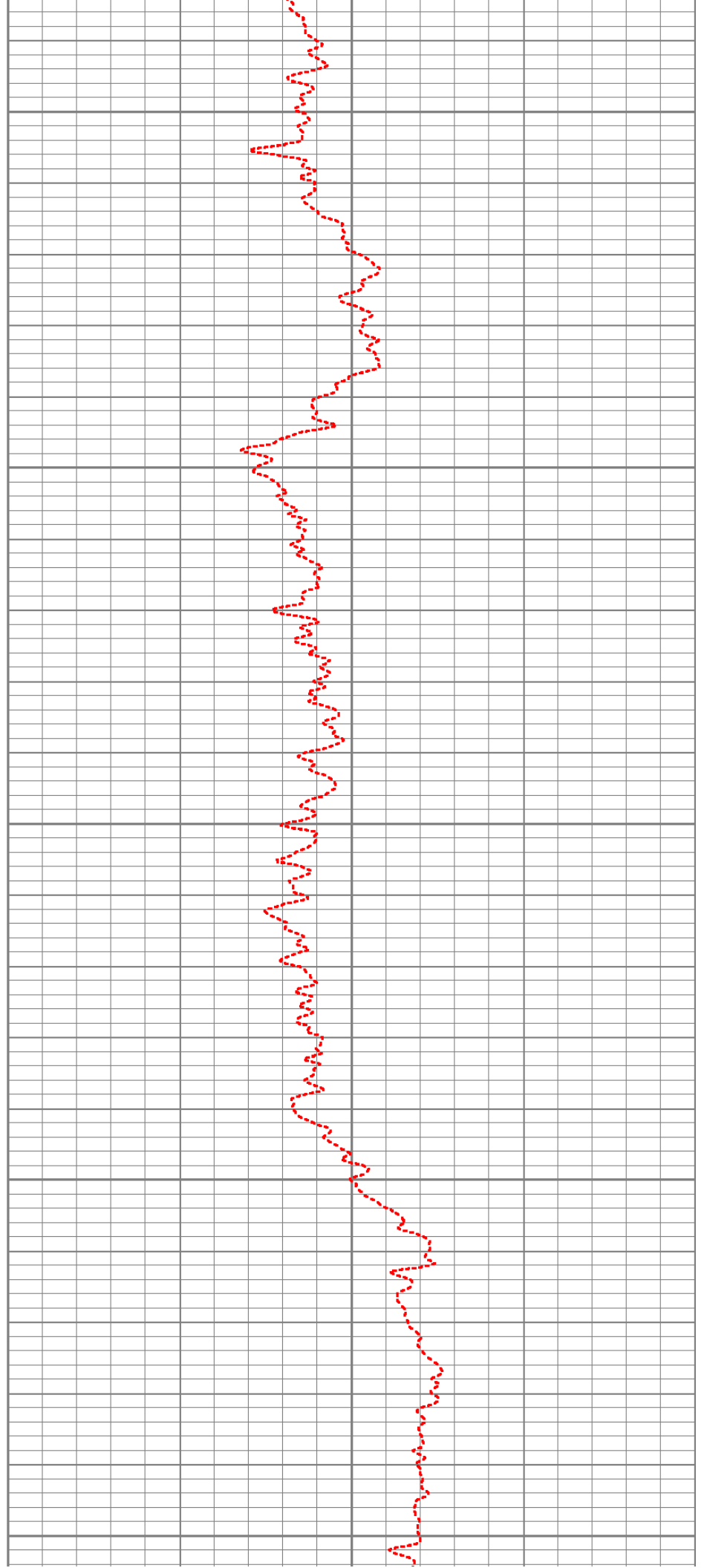
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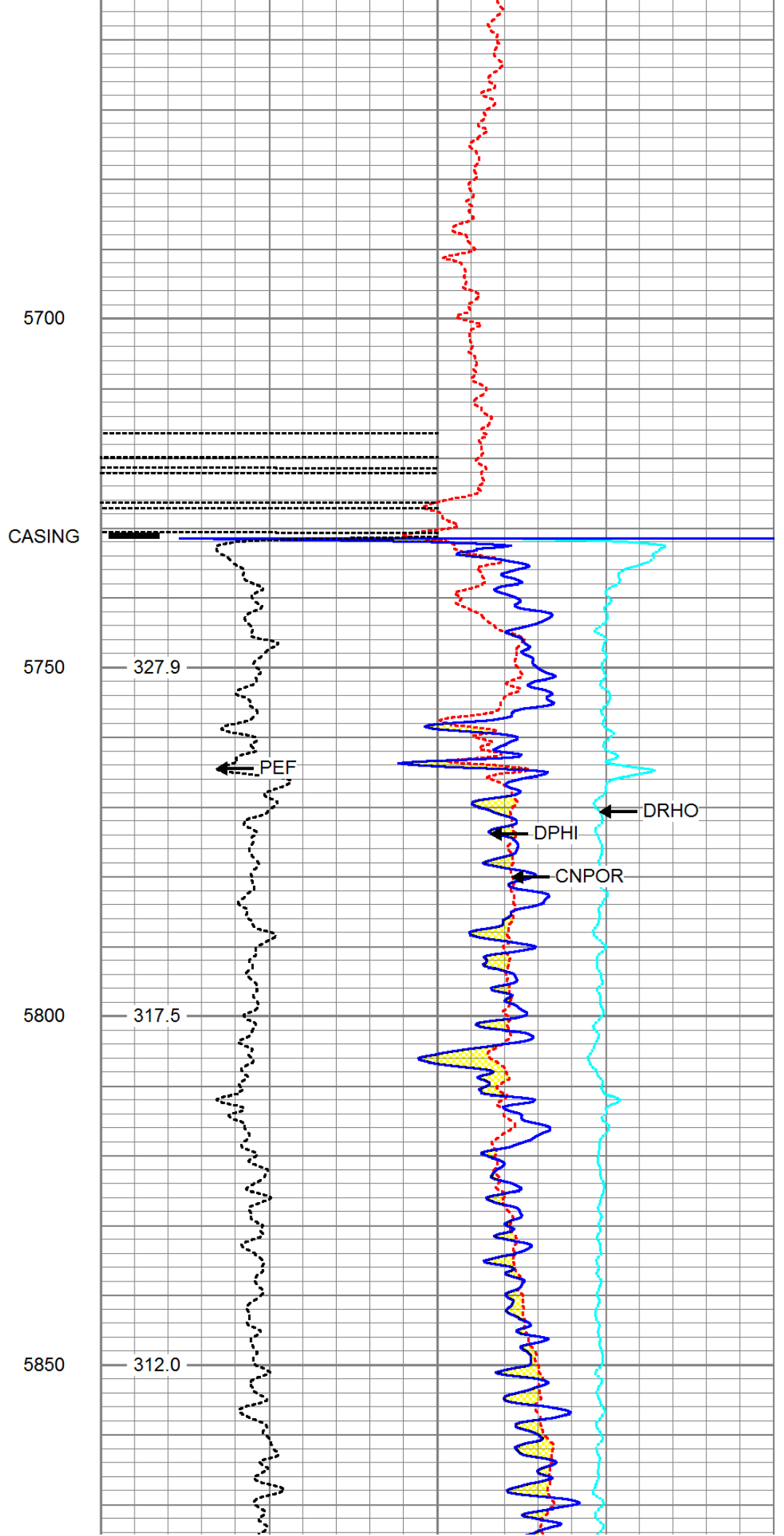
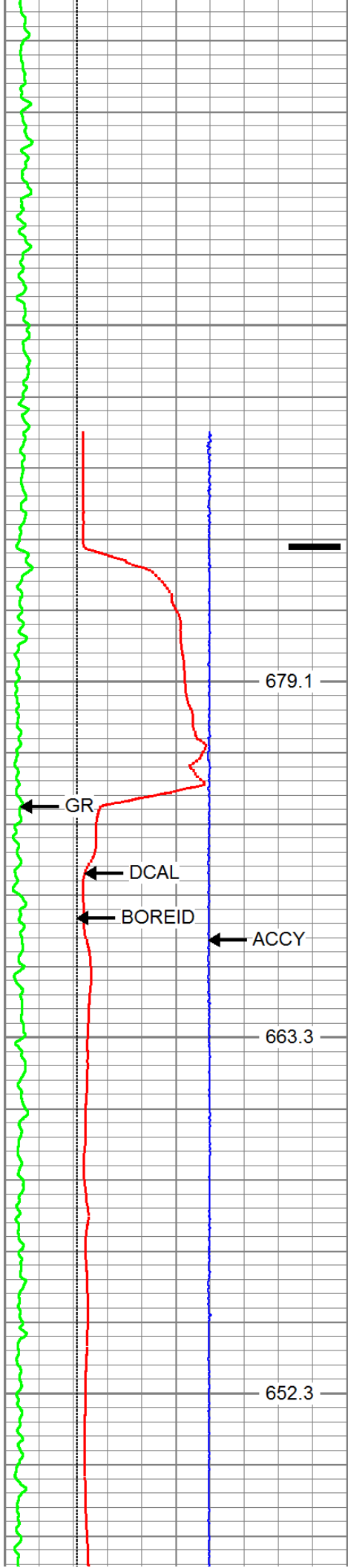
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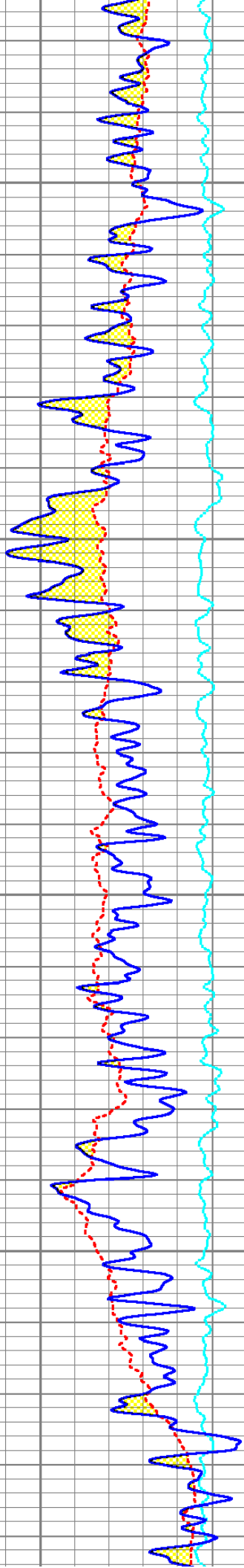
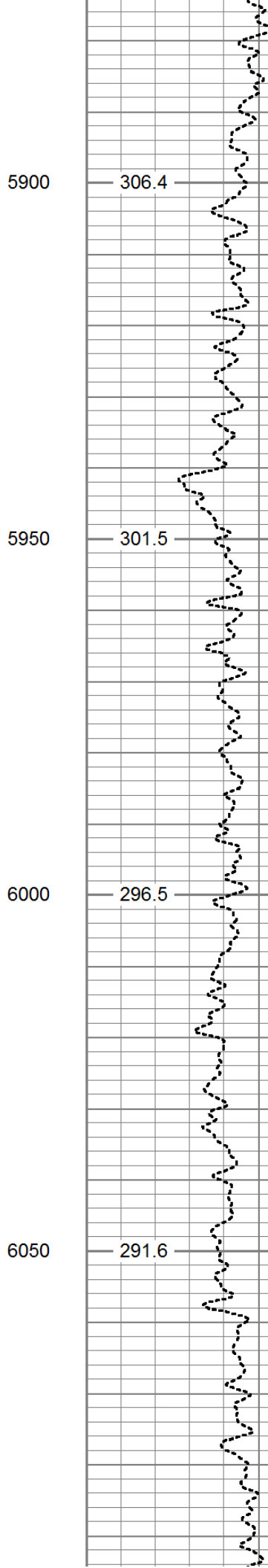
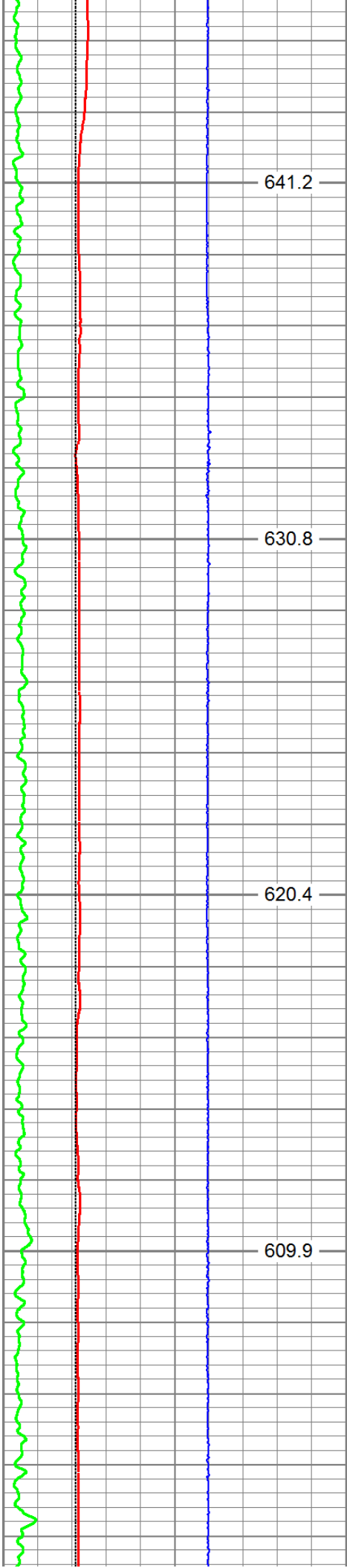
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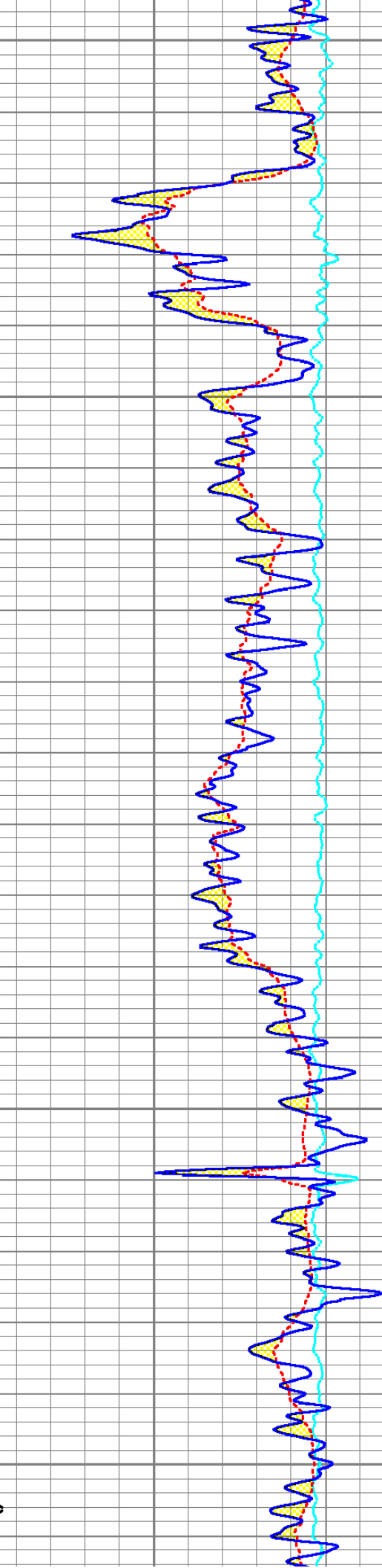
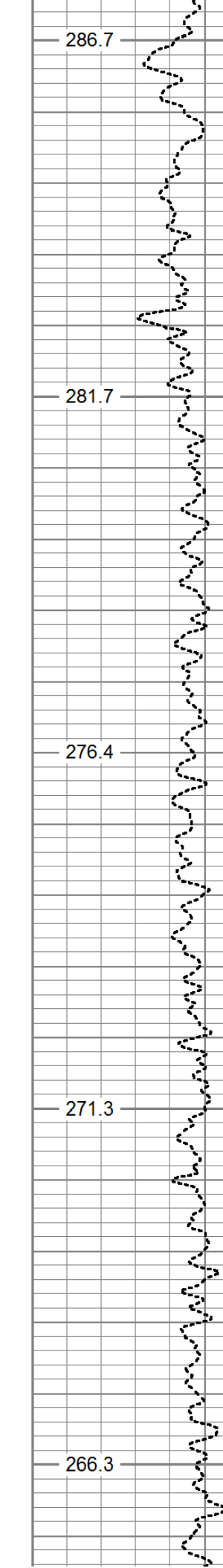
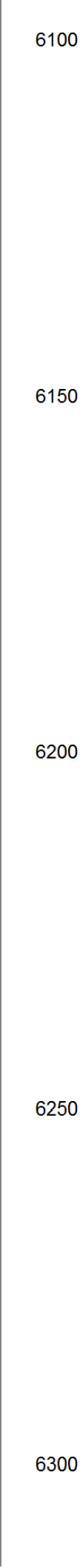
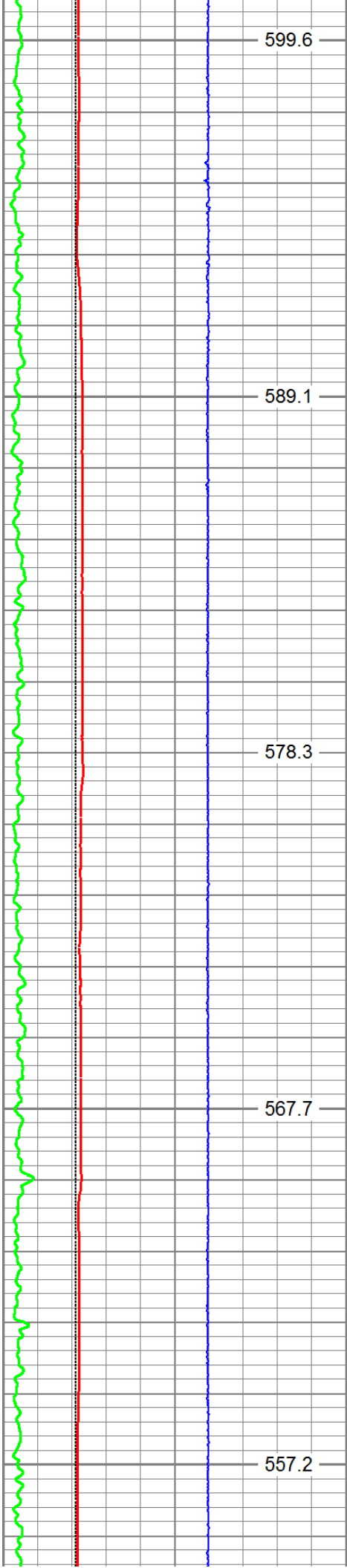
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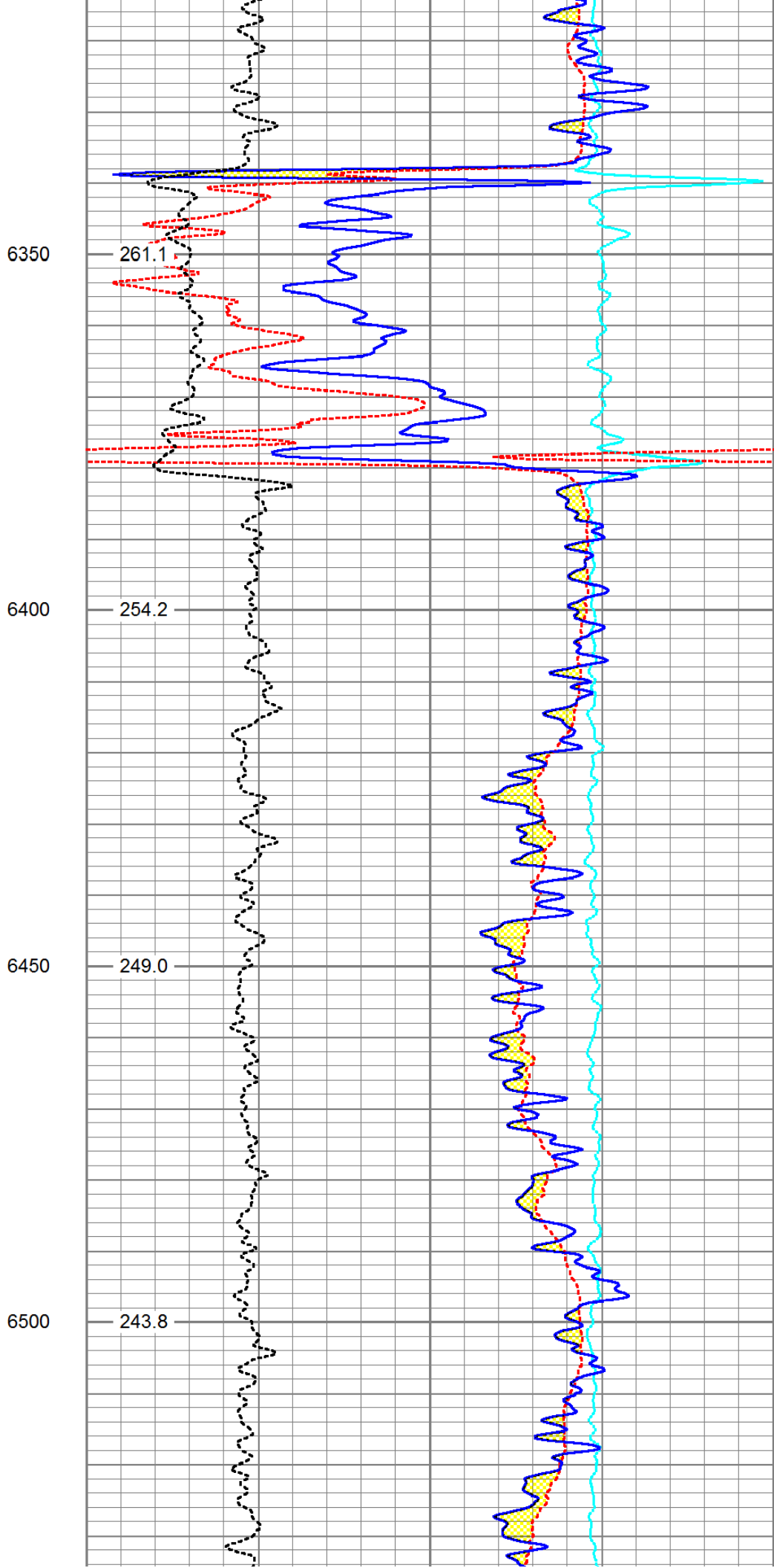
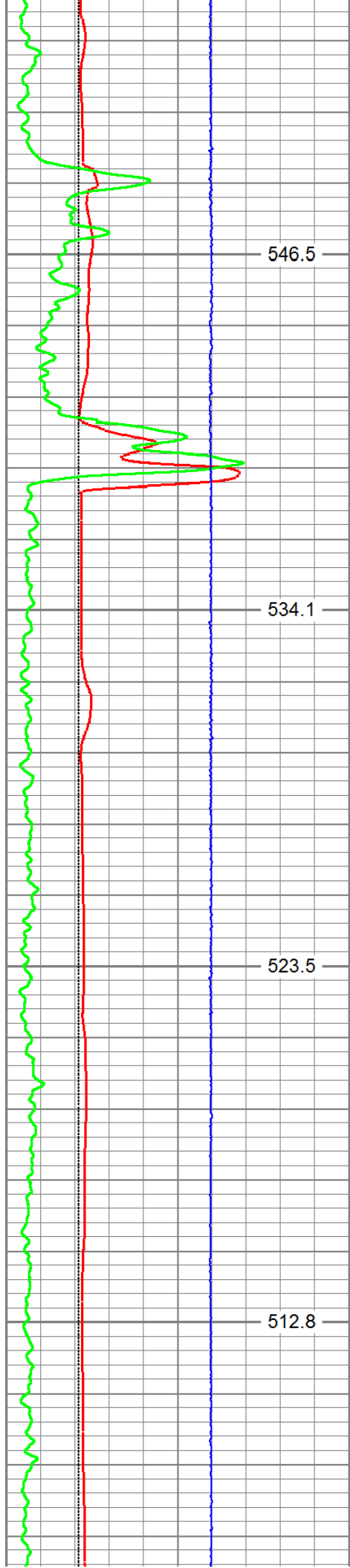
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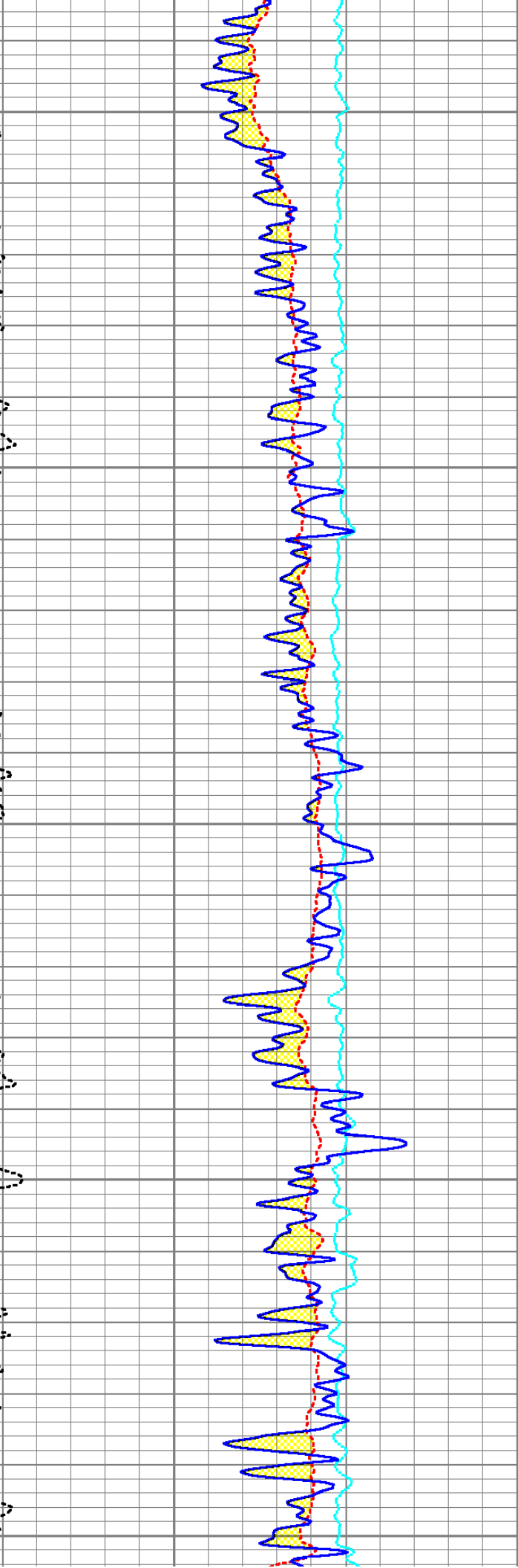
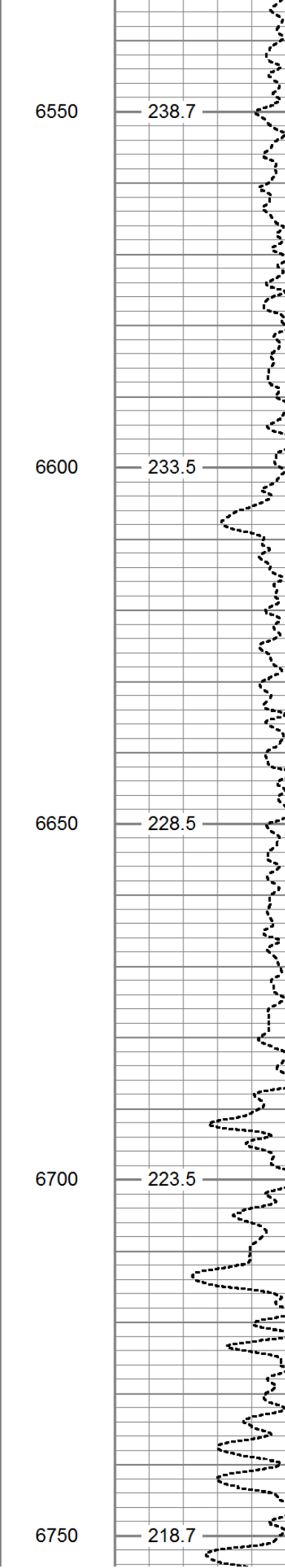
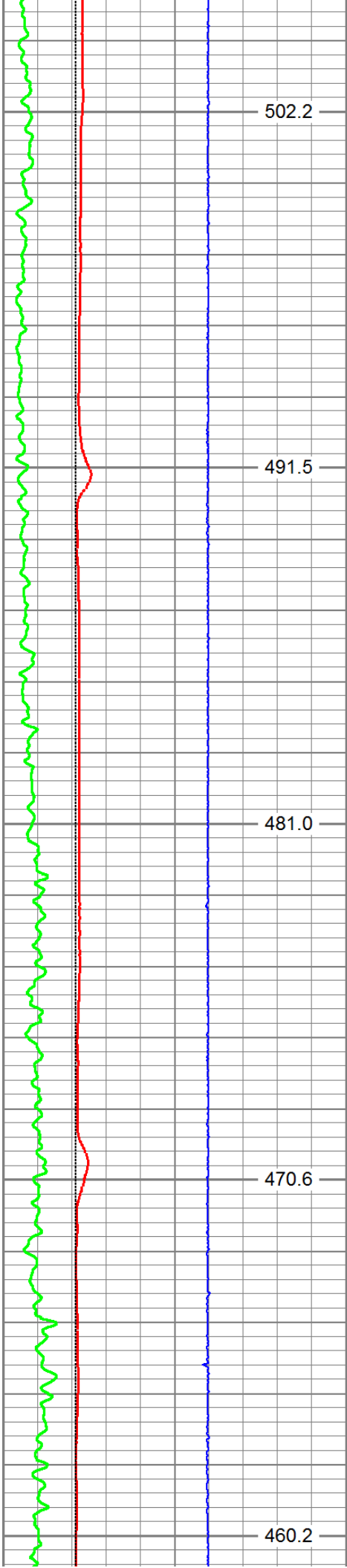
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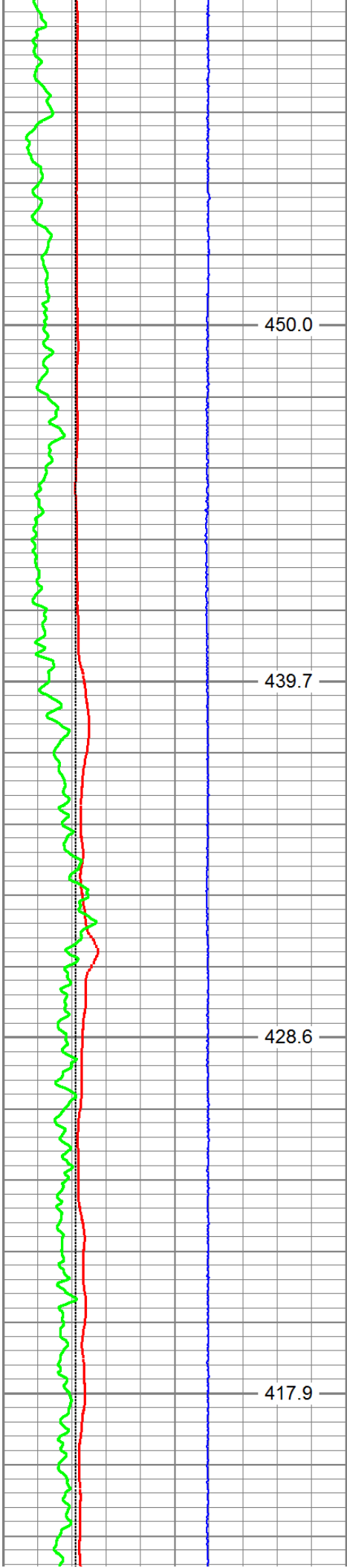
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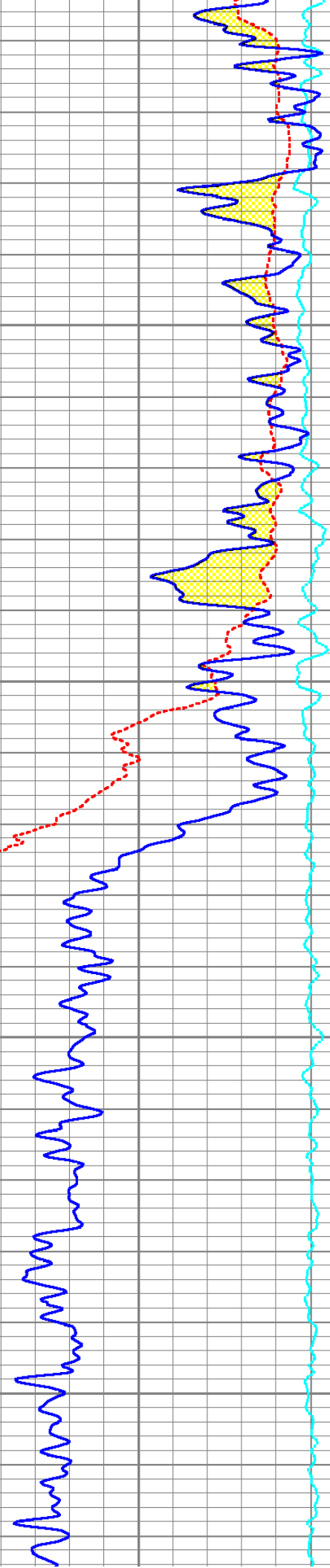
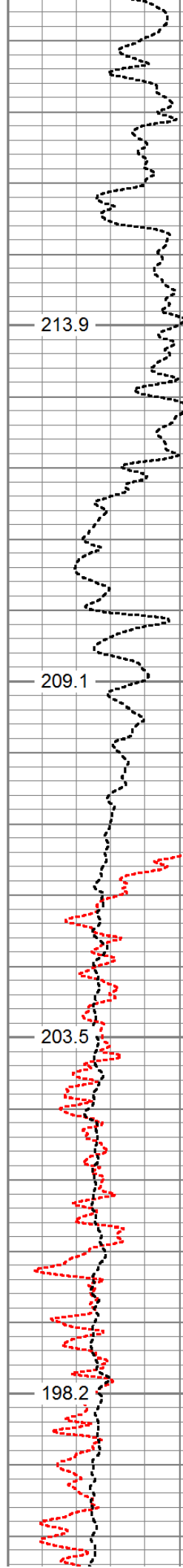


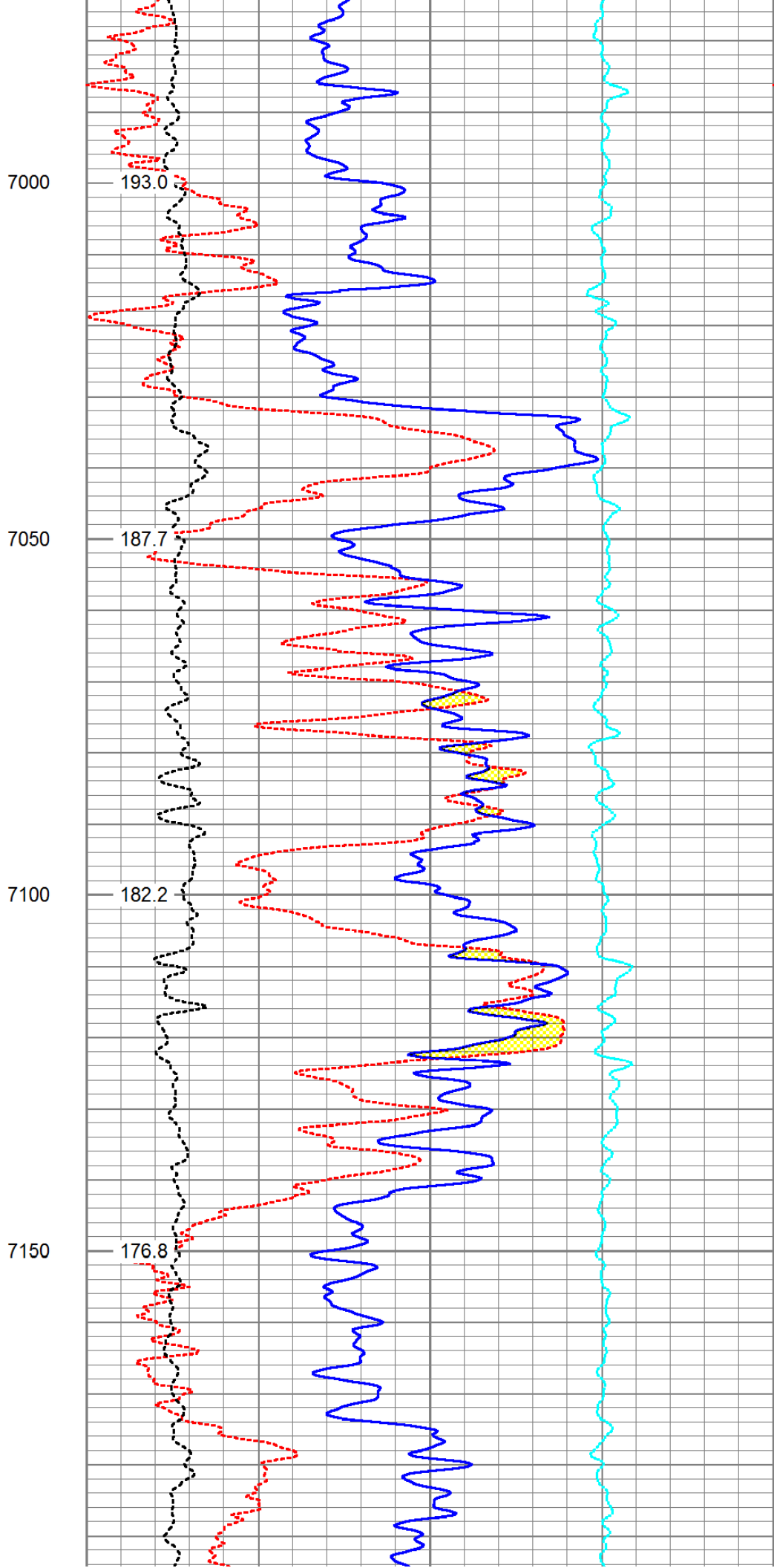
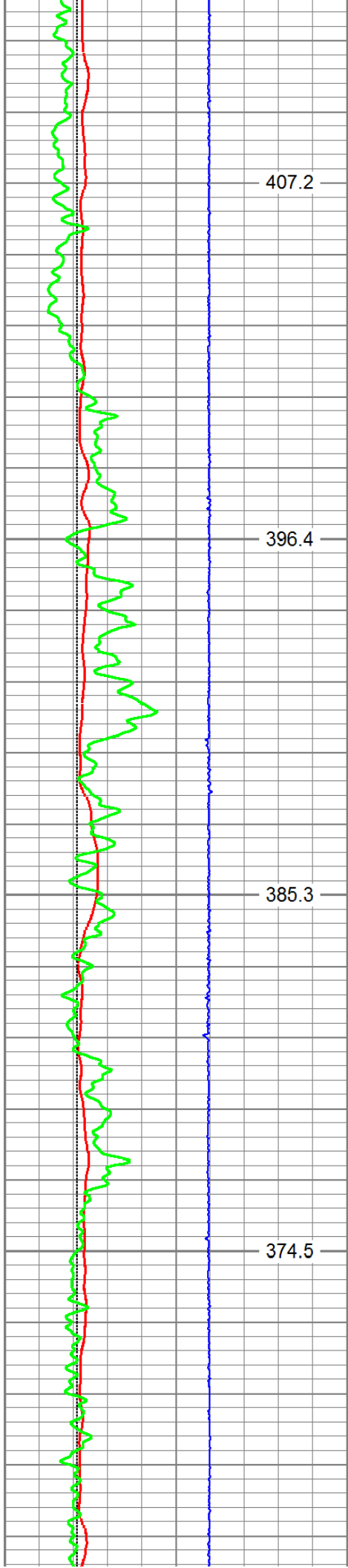


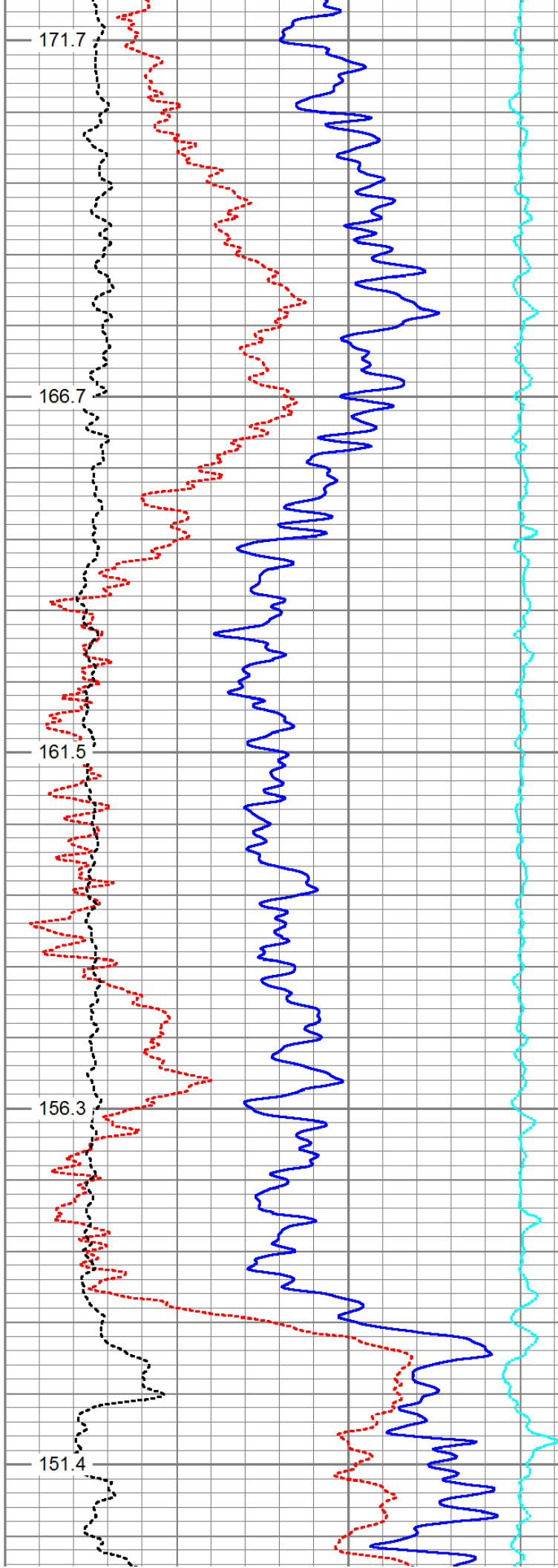
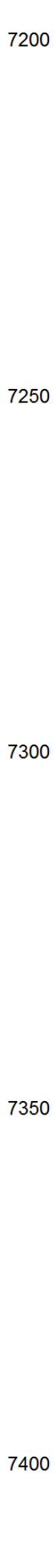
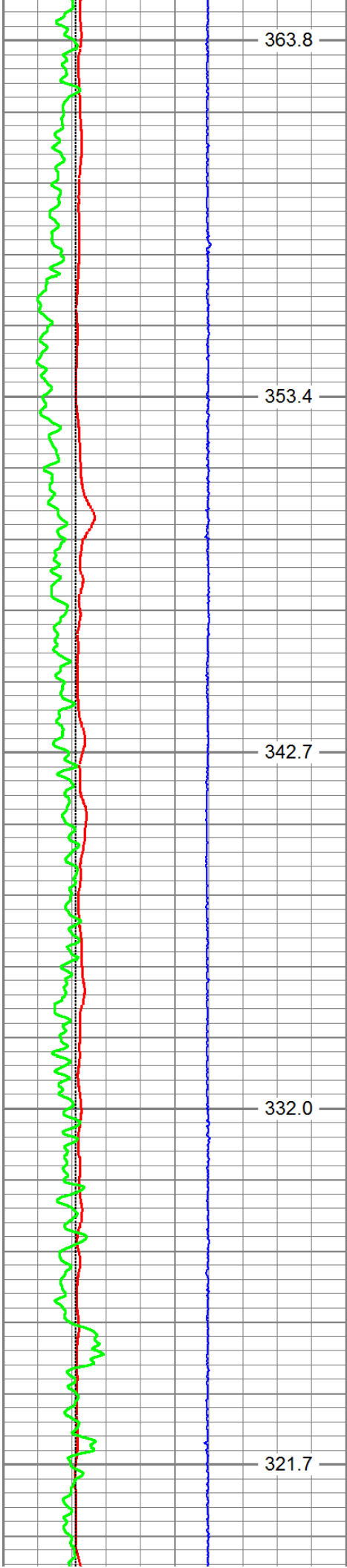


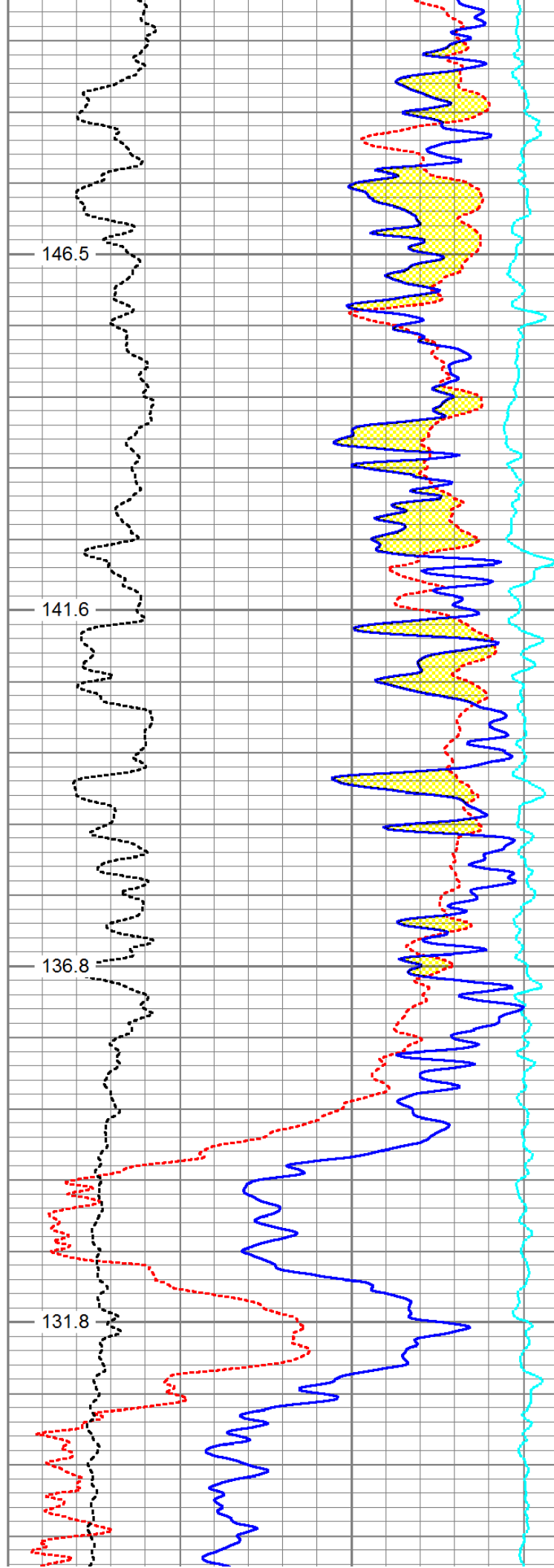
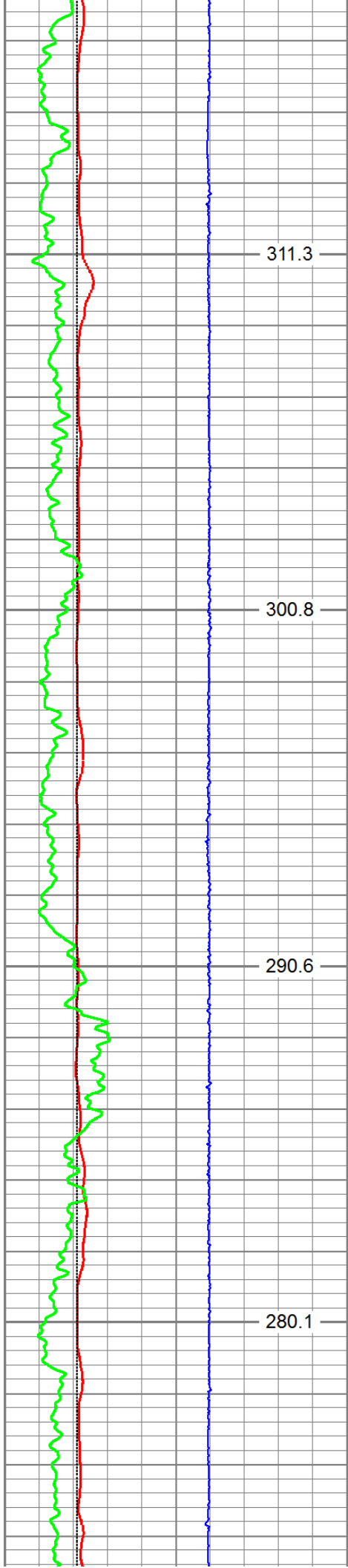


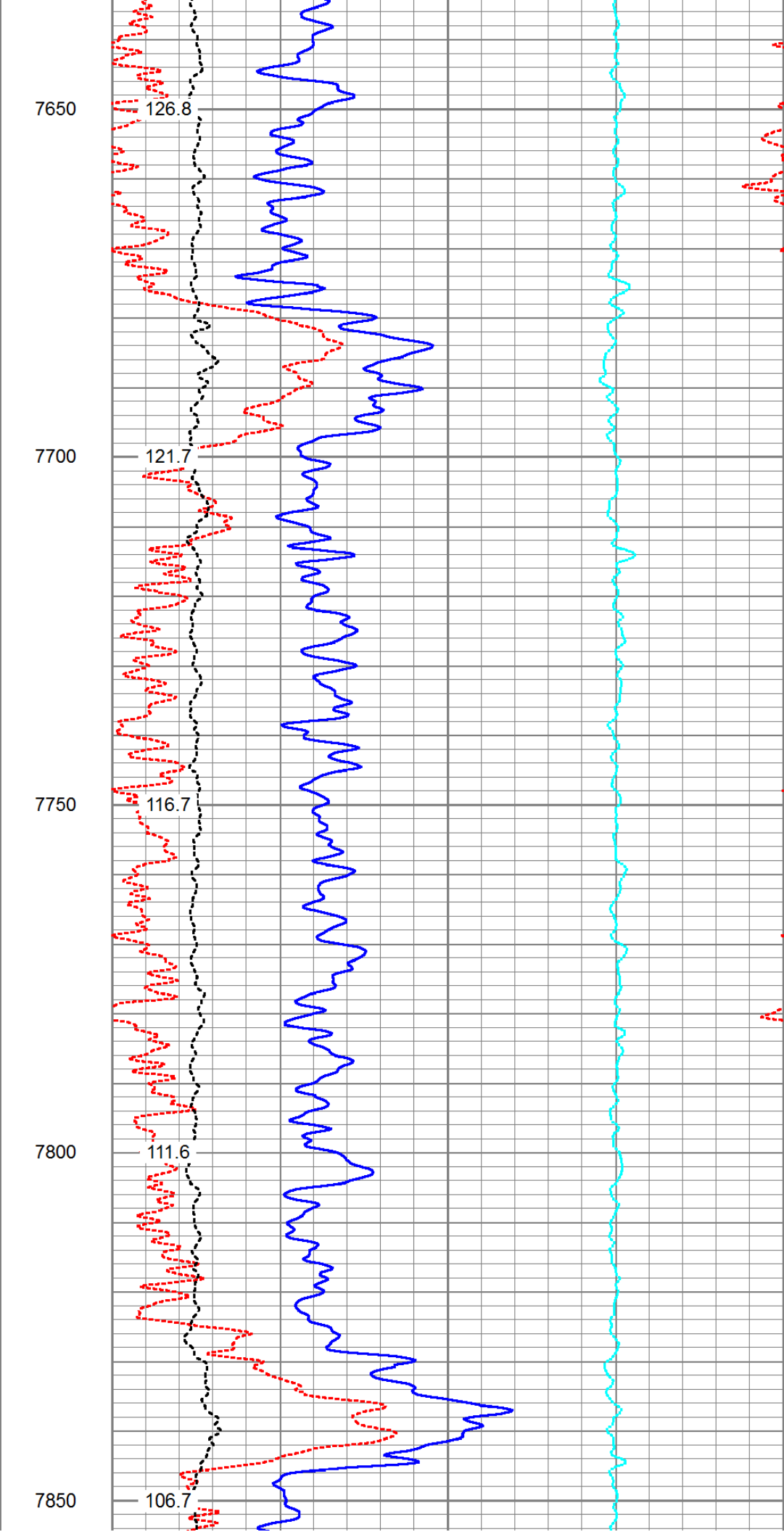
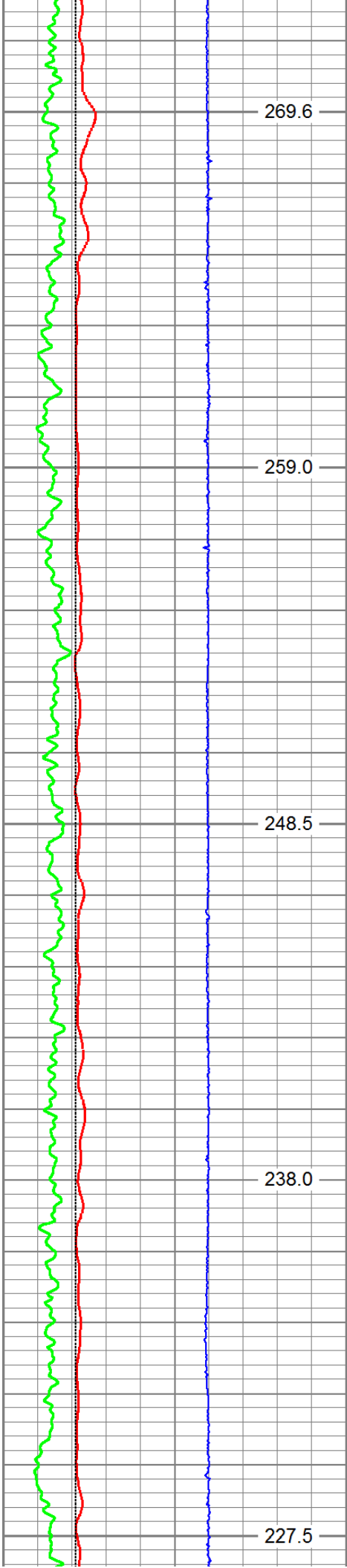
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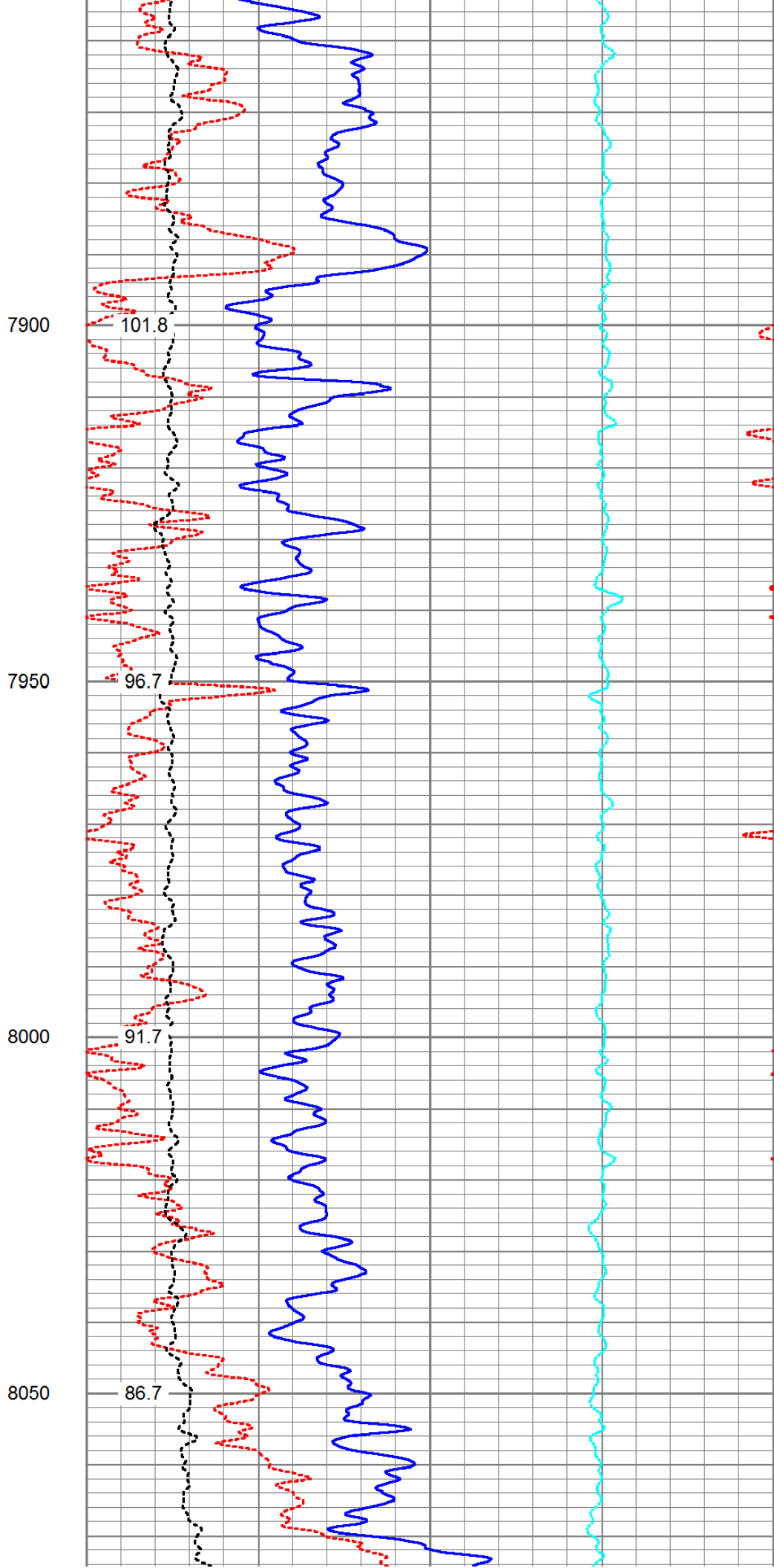
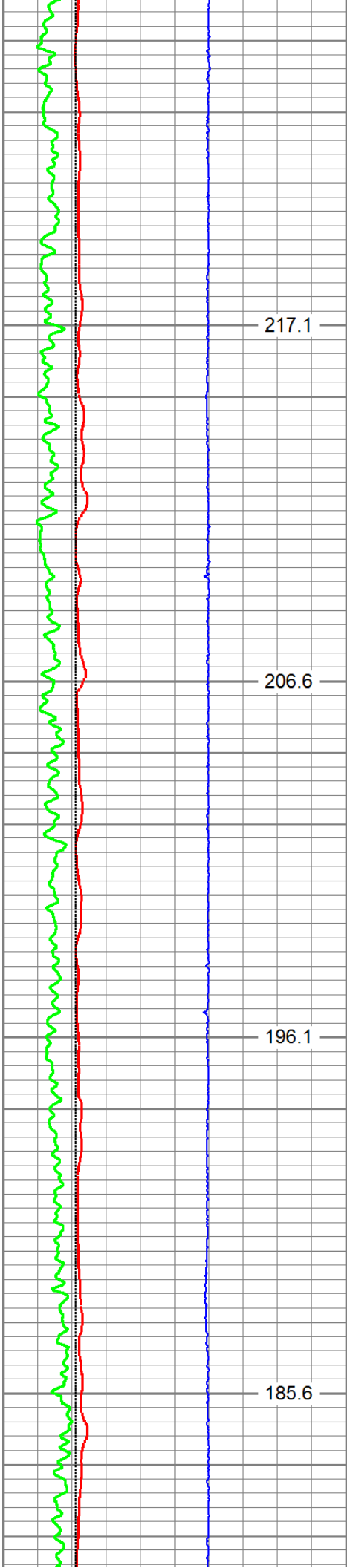


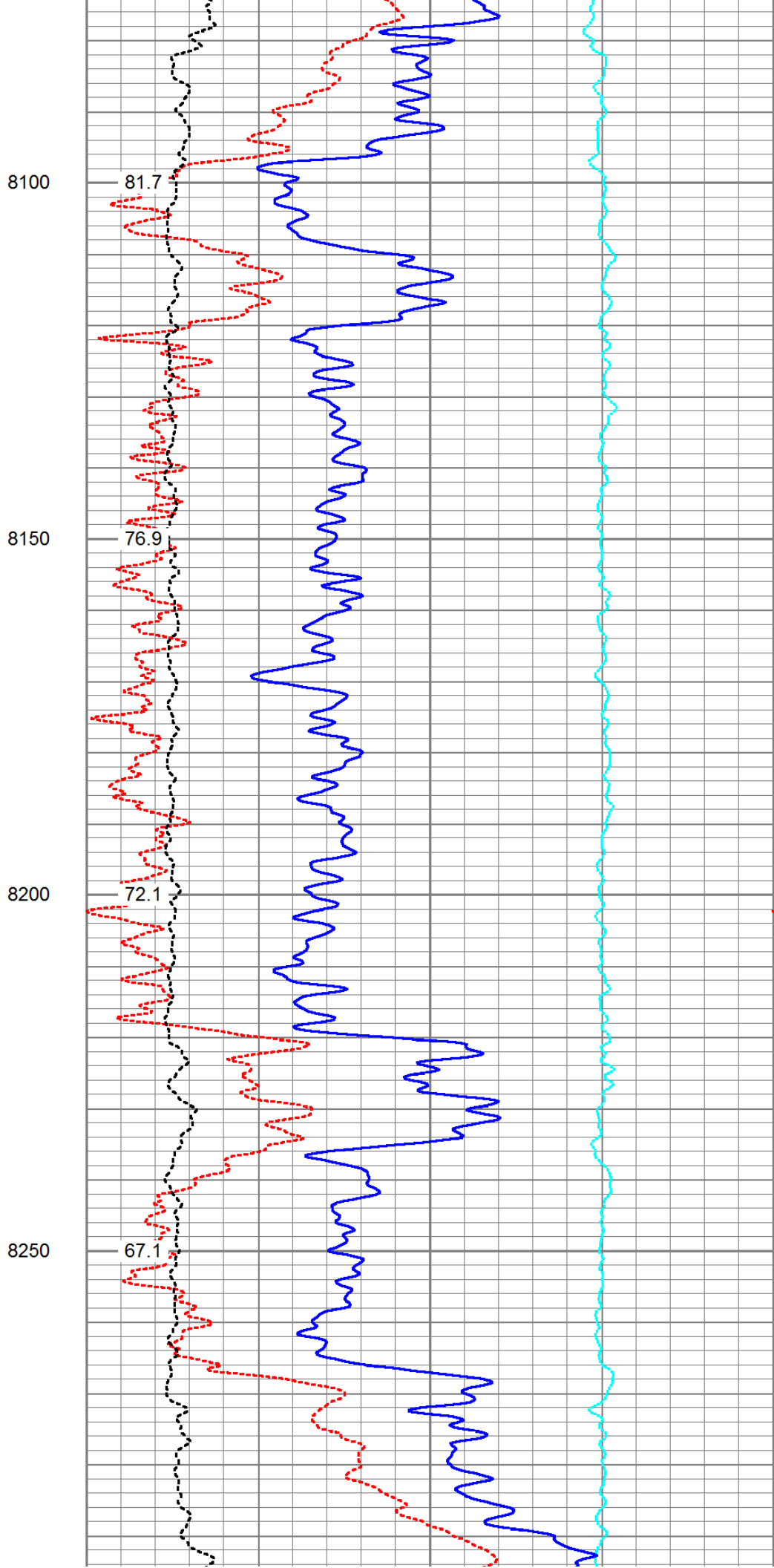
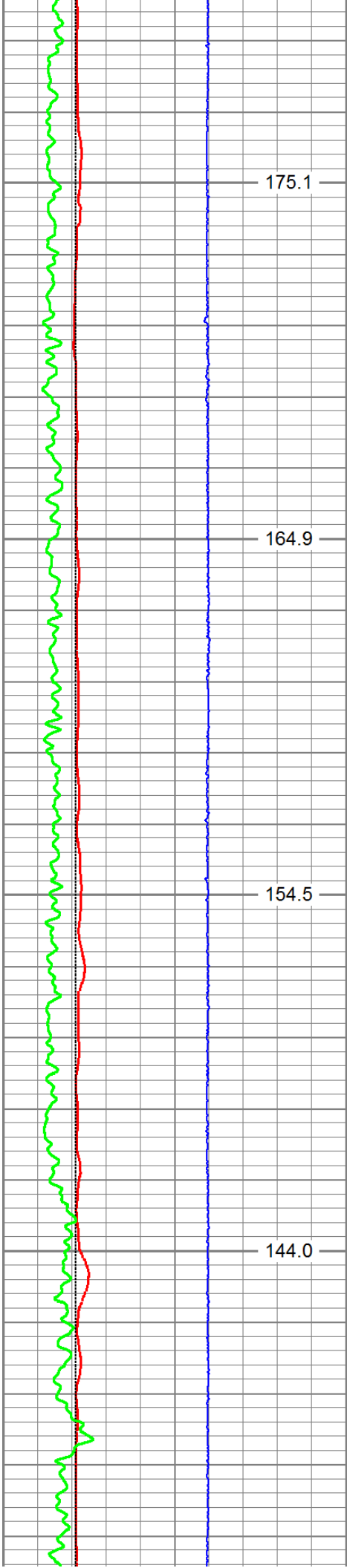


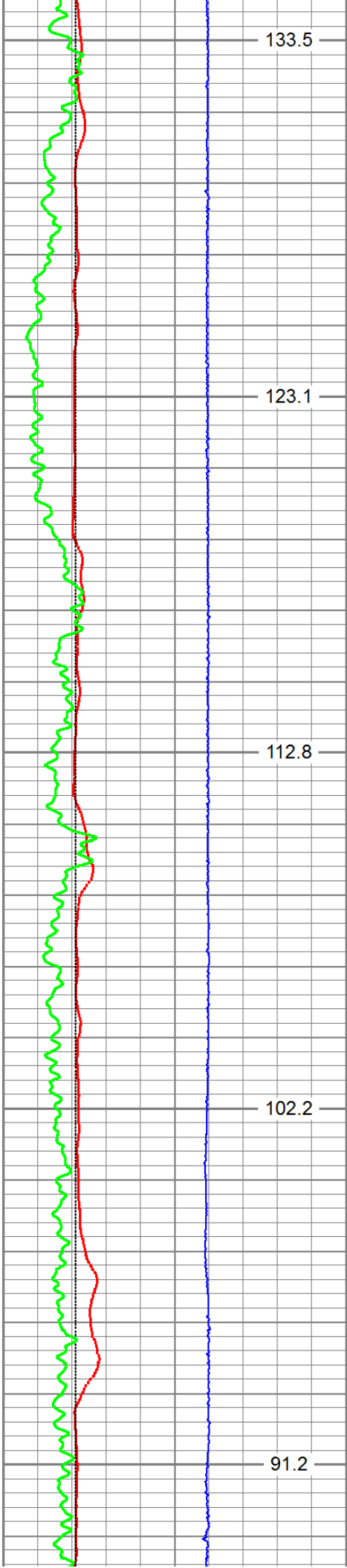




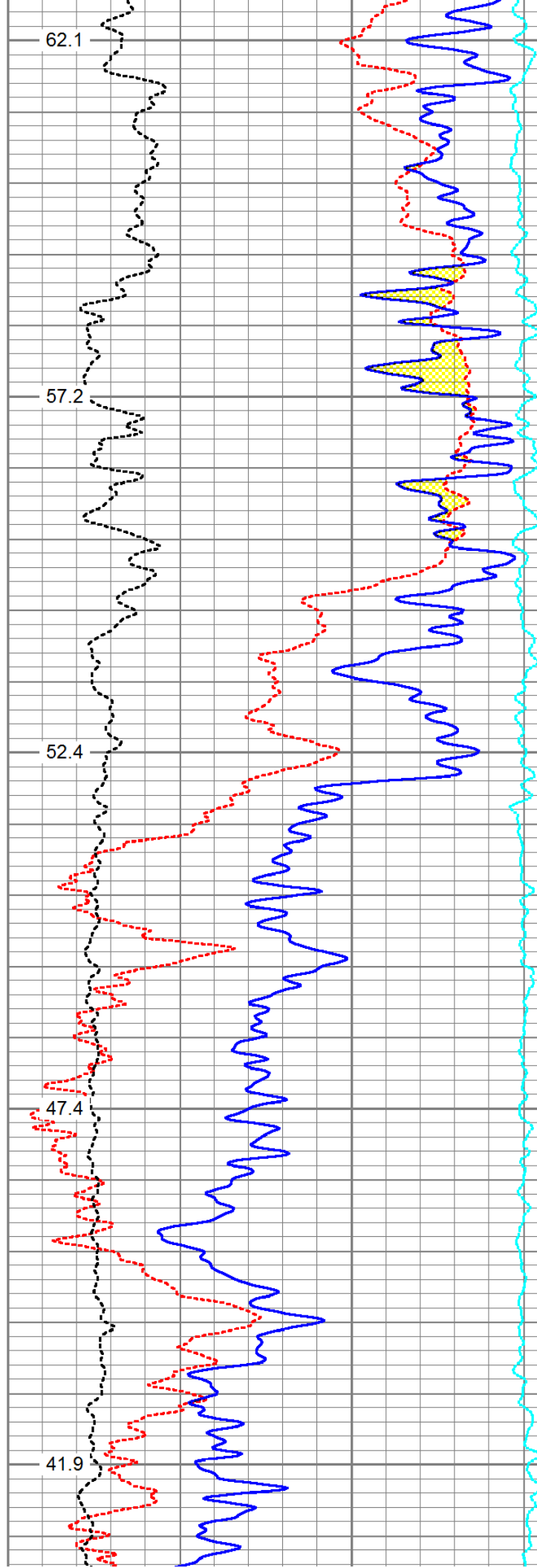


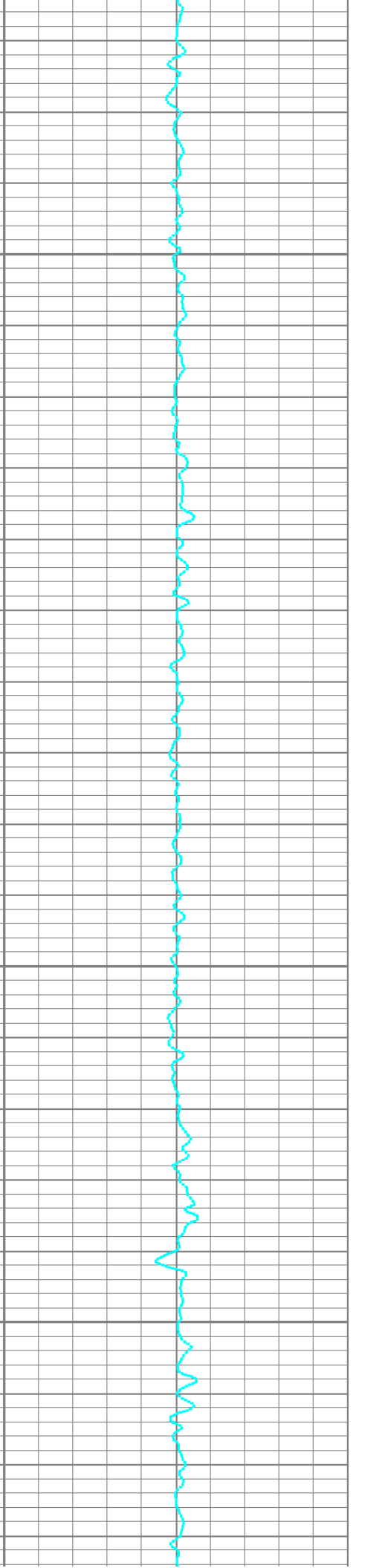
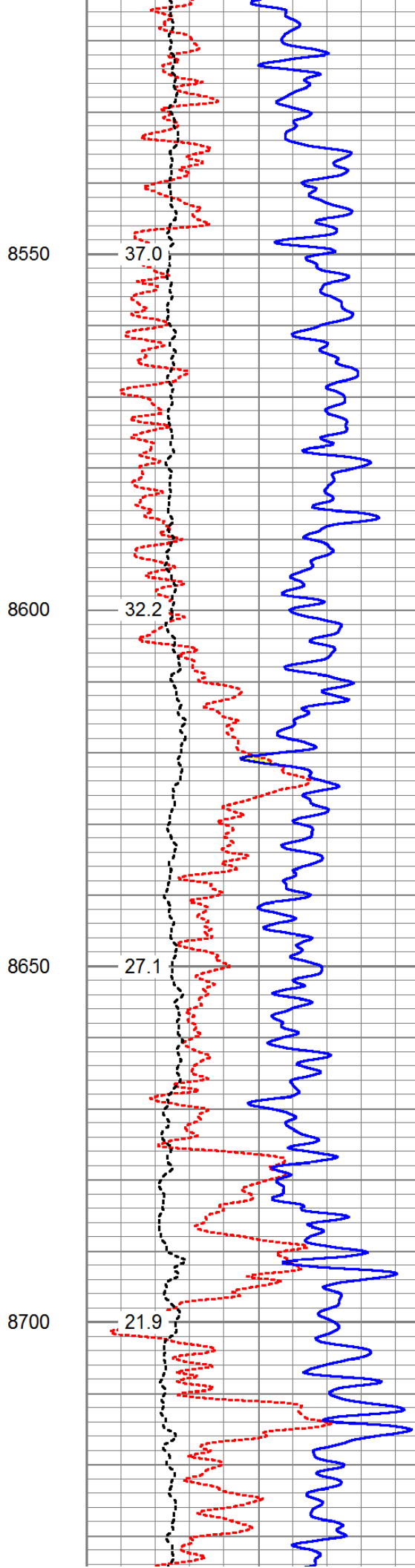
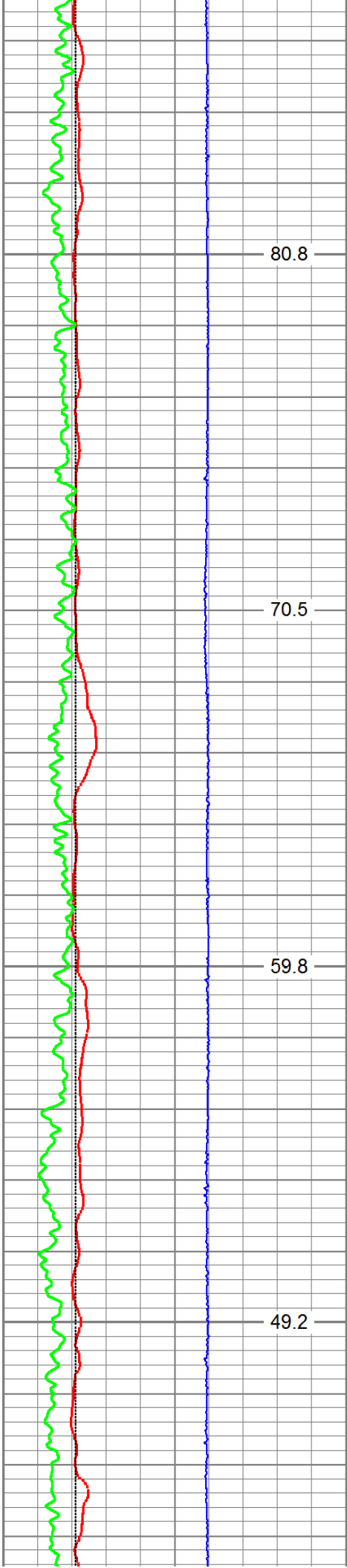


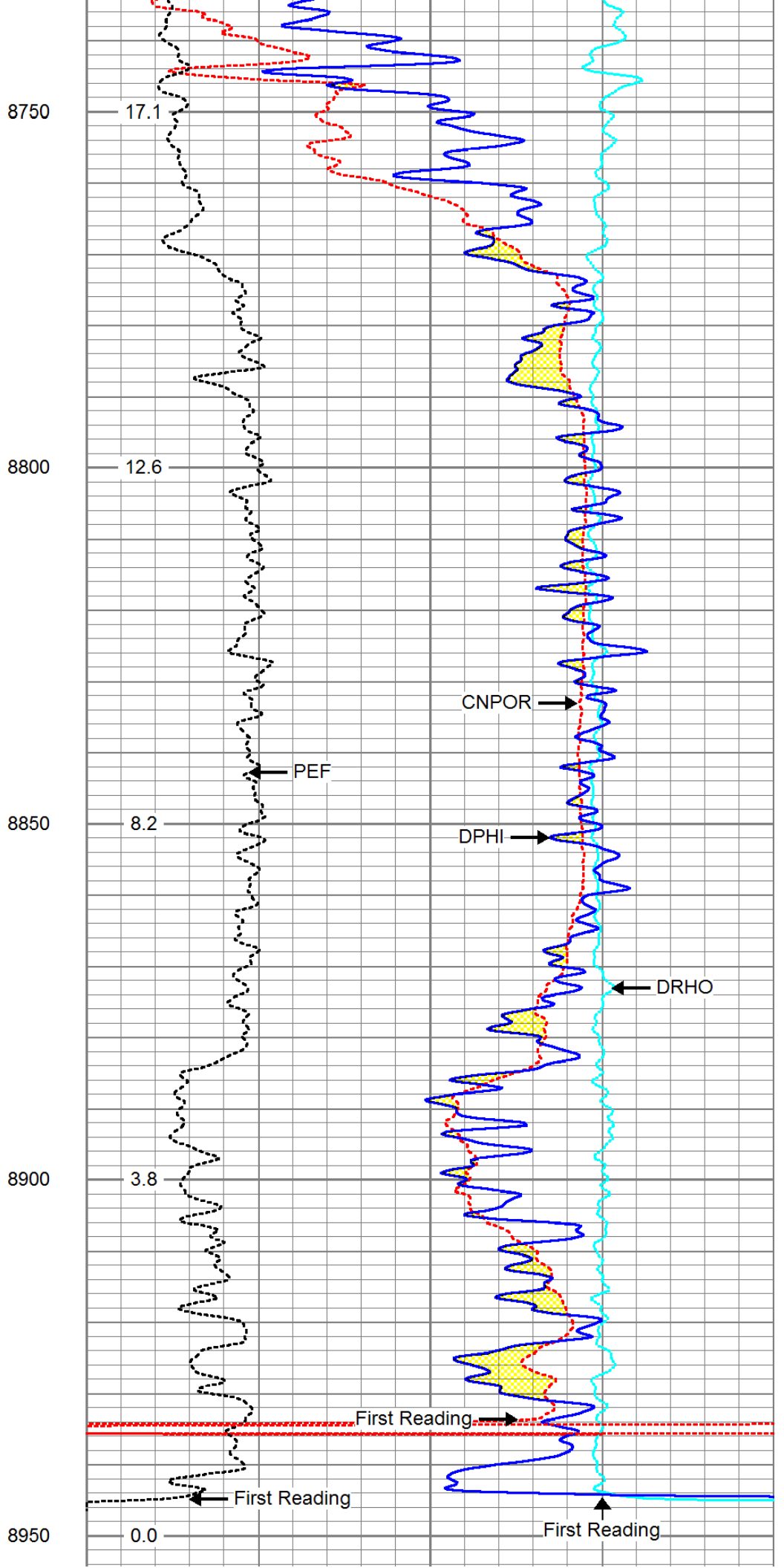
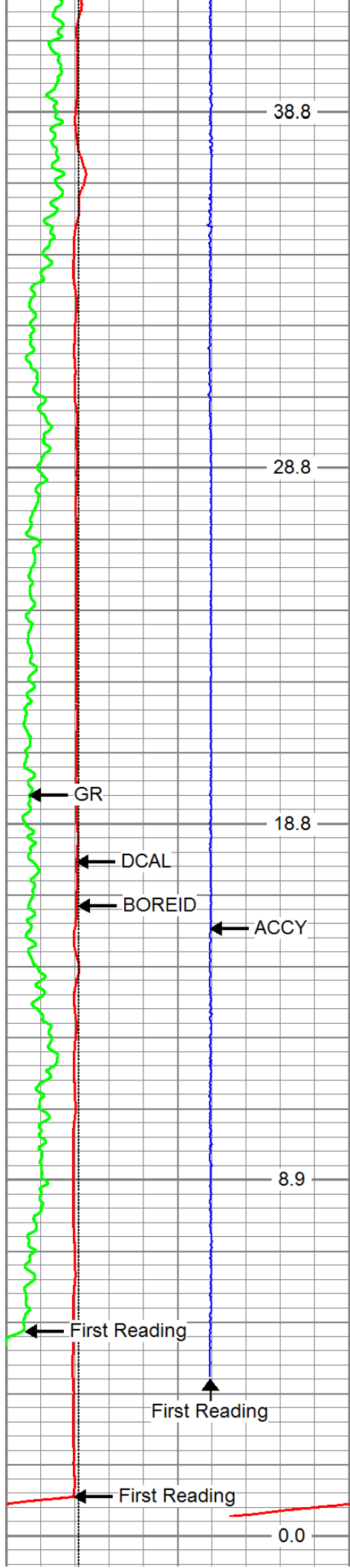




8300
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8400
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8500







			Total Depth					
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)						

Log Variables

Database: c:\users\t010\desktop\bryant 3508 3-10h\sr_bryant_mem.db
 Dataset: field/well/proc1/pass1.3

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	CMNTTHCK in	DNBHC?
136	No	4.5	0	0	0	NO
DPORSEL	FLUIDDEN g/cc	FRMSALIN kppm	LATNOR	M	MATRXDEN g/cc	MUDSALIN kppm
RHOB	1	0	Off	2	2.71	1.3
MudWgt lb/gal	NPORSEL	PEBHC?	PERFS	RESTMPSRC	SO in	SRFTEMP degF
8.6	Limestone	YES	0	INTERNAL	0.5	65
SZCOR	TDEPTH ft	TMPCOR	TOOLPOS			
On	9010	On	Free			

Calibration Report

Database File: c:\users\t010\desktop\bryant 3508 3-10h\sr_bryant_mem.db
 Dataset Pathname: proc1/pass1.3
 Dataset Creation: Sun Aug 18 20:59:13 2013

ThruBit Induction Calibration Report

Tool Model-Serial Number: PS-PS35R
 Shop Calibration Performed: Wed Jun 19 10:02:12 2013

BASELINE

	R	Expected	X	Expected
Freq 1				
A1	-479.9100	[-500.00, -400.00]	119.4580	[-500.00, 500.00]
A2	-137.7900	[-180.00, -100.00]	150.0270	[-500.00, 500.00]
A3	-29.4802	[-50.00, -10.00]	119.0240	[-500.00, 500.00]
A4	-14.2599	[-30.00, -10.00]	258.1220	[-500.00, 500.00]
A5	-13.4581	[-30.00, -10.00]	113.5880	[-500.00, 500.00]
Freq 2				
A1	-256.3120	[-280.00, -180.00]	53.7816	[-500.00, 500.00]
A2	-89.4811	[-130.00, -50.00]	70.6919	[-500.00, 500.00]
A3	-22.0319	[-50.00, -10.00]	30.8680	[-500.00, 500.00]

A4	-17.6043	[-30.00, -10.00]	90.4875	[-500.00, 500.00]
A5	-17.9337	[-30.00, -10.00]	-15.0062	[-500.00, 500.00]
Freq 3				
A1	-166.2200	[-180.00, -80.00]	-23.9880	[-500.00, 500.00]
A2	-68.7841	[-130.00, -30.00]	11.8295	[-500.00, 500.00]
A3	-18.0099	[-50.00, -10.00]	-30.7491	[-500.00, 500.00]
A4	-19.3053	[-30.00, -10.00]	-19.2834	[-500.00, 500.00]
A5	-20.2649	[-30.00, -10.00]	-109.4330	[-500.00, 500.00]
Freq 4				
A1	-91.9189	[-120.00, -40.00]	-164.6820	[-500.00, 500.00]
A2	-49.9209	[-110.00, -10.00]	-74.6679	[-500.00, 500.00]
A3	-13.7535	[-50.00, -10.00]	-121.6340	[-500.00, 500.00]
A4	-21.4034	[-30.00, -10.00]	-178.5610	[-500.00, 500.00]
A5	-24.5493	[-30.00, -10.00]	-267.7700	[-500.00, 500.00]

CALIBRATION COEFFICIENTS

	R	Expected	X	Expected
Freq 1				
A1	0.9867	[0.95, 1.05]	-0.0010	[-0.05, 0.05]
A2	0.9895	[0.95, 1.05]	0.0018	[-0.05, 0.05]
A3	0.9936	[0.95, 1.05]	-0.0055	[-0.05, 0.05]
A4	0.9825	[0.95, 1.05]	0.0044	[-0.05, 0.05]
A5	0.9928	[0.95, 1.05]	0.0037	[-0.05, 0.05]
Freq 2				
A1	0.9821	[0.95, 1.05]	-0.0086	[-0.05, 0.05]
A2	0.9841	[0.95, 1.05]	-0.0058	[-0.05, 0.05]
A3	0.9827	[0.95, 1.05]	-0.0059	[-0.05, 0.05]
A4	0.9785	[0.95, 1.05]	-0.0038	[-0.05, 0.05]
A5	0.9906	[0.95, 1.05]	-0.0038	[-0.05, 0.05]
Freq 3				
A1	0.9891	[0.95, 1.05]	-0.0058	[-0.05, 0.05]
A2	0.9911	[0.95, 1.05]	-0.0034	[-0.05, 0.05]
A3	0.9895	[0.95, 1.05]	-0.0037	[-0.05, 0.05]
A4	0.9849	[0.95, 1.05]	-0.0019	[-0.05, 0.05]
A5	0.9997	[0.95, 1.05]	0.0001	[-0.05, 0.05]
Freq 4				
A1	0.9873	[0.95, 1.05]	-0.0192	[-0.05, 0.05]
A2	0.9889	[0.95, 1.05]	-0.0175	[-0.05, 0.05]
A3	0.9895	[0.95, 1.05]	-0.0198	[-0.05, 0.05]
A4	0.9842	[0.95, 1.05]	-0.0165	[-0.05, 0.05]
A5	1.0115	[0.95, 1.05]	-0.0146	[-0.05, 0.05]
Temperature	33.0782 degC			

ThruBit Density Calibration Report

Tool Model-Serial Number: PS-PS52D
Source Number:
Shop Calibration Performed: Tue Aug 13 11:53:59 2013

REFERENCE

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

READINGS

Outputs	Counts	Units	Expected
SS1 Background	133.93	cps	[130.00, 170.00]
LS1 Background	132.40	cps	[130.00, 170.00]
LS4 Background	28.71	cps	[27.00, 35.00]
SS1 Aluminium	4701.37	cps	[4500.00, 5500.00]
LS1 Aluminium	852.08	cps	[750.00, 950.00]
LS4 Aluminium	986.60	cps	[843.00, 1068.00]
SS1 Magnesium	7742.59	cps	[7000.00, 9000.00]
LS1 Magnesium	5607.17	cps	[5250.00, 6250.00]
LS1 Al + Fe	728.77	cps	[650.00, 800.00]
LS4 Al + Fe	441.37	cps	[382.00, 471.00]

RESULTS

SS Slope	1.68	[1.52, 1.77]
LS Slope	0.42	[0.38, 0.45]
PEF K Factor	5.139	[3.510, 6.170]
PEF B Factor	-0.544	[-0.700, -0.410]

RESULTS

Caliper Shop Calibration performed: Tue Aug 13 11:53:59 2013

Reference	Reading	Units
12.00	1908.41	in
9.00	2075.14	in
6.00	2215.61	in

DENSITY PRE-SURVEY CHECK Performed: Fri Aug 16 13:28:50 2013

Outputs	Counts	Units	Expected
SS1 Background	134.39	cps	[129.91, 137.95]
LS1 Background	131.14	cps	[128.43, 136.37]
LS4 Background	28.67	cps	[26.99, 30.43]

CALIPER PRE-SURVEY CHECK Performed: Fri Aug 16 13:25:48 2013

Reference	Readings	Units	Expected
6.00	5.91	in	[5.80, 6.20]

Compensated Neutron Calibration Report

Tool Model-Serial Number: PS-PS30N
 Source Number:
 Calibration Tank Temperature: 79.9 degF
 Shop Calibration Performed: Tue Aug 13 10:11:35 2013

BACKGROUND MEASUREMENT

Outputs	Measured	Units	Expected
SS Counts	0.0	cps	<10
LS Counts	0.0	cps	<4

WATER TANK REFERENCE

Outputs	Measured	Units	Expected
SS Counts	2599.3	cps	
LS Counts	86.7	cps	
Tank Ratio Ref	30.9580	SS/LS	
Tank Ratio	29.9782	SS/LS	
Tank Ratio Gain	1.0327		[0.85, 1.15]

ALUMINUM SLEEVE REFERENCE

Outputs	Measured	Units	Expected
SS Counts	30057.0	cps	
LS Counts	2845.0	cps	
Al Ratio Ref	10.797	SS/LS	
Al Ratio	10.910	SS/LS	
Al Ratio Gain	0.99		[0.90, 1.10]
Sleeve Porosity	14.46	pu	

PRE-SURVEY BACKGROUND CHECK Performed: Fri Aug 16 13:33:57 2013


Outputs	Measured	Units	Expected
SS Counts	0.1	cps	<10
LS Counts	0.0	cps	<4

Gamma Ray Calibration Report

Tool Model-Serial Number:	PS-PS10T		
Performed:	Fri Aug 16 14:10:28 2013		
Calibrator Value:	162.7	GAPI	
Background Reading:	60.8	cps	
Calibrator Reading:	465.5	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)
Thru-bit	67.59		Cablehead-S	2.31	2.13	5.00

Thrubit	65.28		Solid Weakpoint			
			PSBDOT	3.87	2.25	35.00
Thrubit	61.41		HangOff_Tool	5.00	2.38	60.00
Thrubit	56.41		Swivel	2.25	2.06	25.00
Thrubit	54.16		10-1	0.75	2.13	3.95
TBBAT	53.41		TBBAT-A (PS30B) Thrubit Battery	6.13	2.13	38.20
TBBAT2	47.29		TBBAT2-A (PS29B) Thrubit Battery	6.13	2.13	40.00
TMG	41.16		TMG-PS (PS10T) ThruBit Telemetry Gamma Ray	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 (PS30N) ThruBit Neutron	4.77	2.13	63.00
			TBD-PS (PS52D) Thrubit Density	10.48	2.13	91.00
LSW1	18.04					
DCAL	17.13					
A1_P	10.60		TBI-PS (PS35R) Thrubit Induction	15.29	2.13	94.00
A2_P	10.10					
A3_P	9.35					
A4_P	8.35					
A5_P	6.60					

Dataset: sr_bryant_mem.db: field/well/proc1/pass1.3
 Total Length: 67.59 ft
 Total Weight: 570.15 lb
 O.D.: 2.38 in



ThruBit

A Schlumberger Company

Company
Well
Field
County
State

SANDRIDGE ENERGY
BRYANT 3508 3-10H
WALDRON
HARPER
KANSAS