

Induction Array Log

Company	O'Brien Energy Resources Corp.	Company	O'Brien Energy Resources Corp.
Well	Keystone #6-4	Well	Keystone #6-4
Field	Angell Southeast	Field	Angell Southeast
County	Meade	County	Meade
State	Kansas	State	Kansas
Location:	1320' FSL & 2100' FWL W2 E2 E2 SW Lat: 37.202561503, Long: 100.482112615 NAD83	API #: 15-119-21443	Other Services CNL, LDT, MEL
SEC 4	TWP 33S	RGE 29W	Elevation K.B. 2681 ft. D.F. 2680 ft. G.L. 2669 ft.
Permanent Datum	G.L.	Elevation 2669 ft.	
Log Measured From	K.B.	12 ft. above perm. datum	
Drilling Measured From	K.B.		
Date	17-May-2020		
Run Number	One		
Depth Driller	6298'		
Depth Logger	6298'		
Bottom Logged Interval	6290'		
Top Log Interval	1560'		
Casing Driller	8.625" @ 1573'	@	@
Casing Logger	1567'		
Bit Size	7.875"	@	@
Type Fluid in Hole	WBM		
Density / Viscosity	9.2 / 60		
pH / Fluid Loss	11 / 6.8		
Source of Sample	Flowline		
Rm @ Meas. Temp	0.74 @ 75°F	@	@
Rmf @ Meas. Temp	0.56 @ 75°F	@	@
Rmc @ Meas. Temp	0.42 @ 75°F	@	@
Source of Rmf / Rmc	Calculated		
Rm @ BHT	0.47 @ 125°F	@	@
Time Circulation Stopped	17-May-2020 @ 18:00		
Time Logger on Bottom	18-May-2020 @ 1:15		
Maximum Recorded Temperature	125°F		
Equipment Number	10002		
Location	OKC		
Recorded By	B. Oetting		
Witnessed By	D. Greathouse		

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Equipment and Log Data															
Service Order: T2_201705															
Gamma			Density			Neutron			Sonic			IAT/DLL			
Run No.		One	Run No.		One	Run No.		One	Run No.		One	Run No.		One	
Serial No.		49	Serial No.		63	Serial No.		71	Serial No.			Serial No.		64	
O.D.		3.375 in.	Source No.		50129B	Source No.		87624G	Centralizers			Standoffs		2 @ 0.5"	
			O.D.		4.5 in.	O.D.		3.375 in.	O.D.		3.375 in.	O.D		3.875 in.	
Logging Pass Data															
General			Gamma		Density			Neutron			Sonic			IAT/DLL	
			Scales		Scales			Scales			Scales			Scales	
Run	Depths		Left	Right	Left	Right	Matrix	Left	Right	Matrix	Left	Right	Matrix	Left	Right
One	CSG	TD	0	150	0.3	-0.1	2.71 g/cc	0.3	-0.1	Lime				0.2	2000
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

Toolstring ran as per diagram.
Density is presented on a 2.71g/cc Matrix, Neutron is presented on a Limestone Matrix, Chlorides 6300 mg/L.
Annular volume computed using 4.5" Casing.
Washouts and borehole rugosity affect data quality.

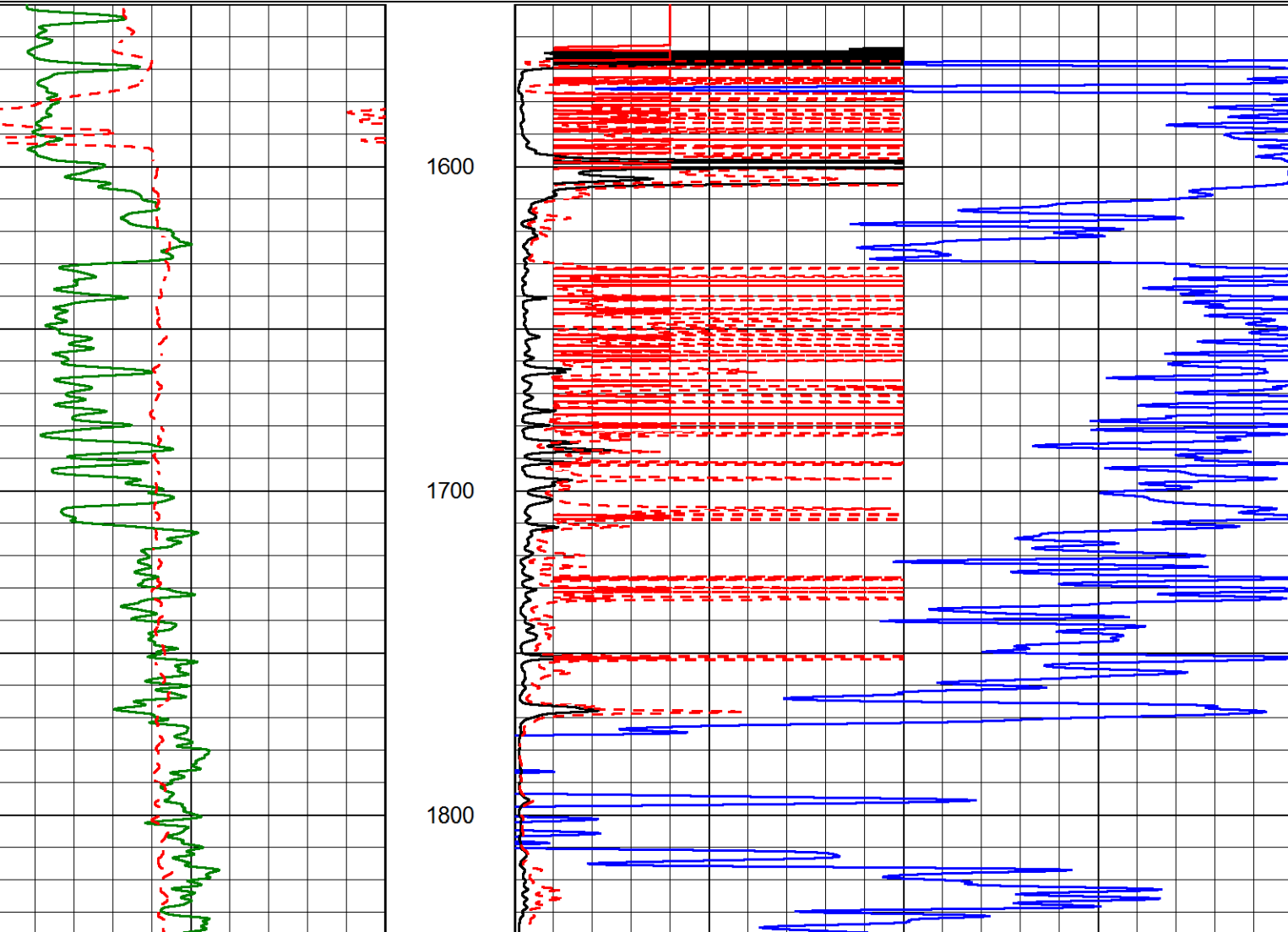
YOUR CREW TODAY: H. Garcia / J. Jones
THANK YOU FOR CHOOSING WIRELINE LOGGING SOLUTIONS. OKLAHOMA CITY. (405) 445-7135.

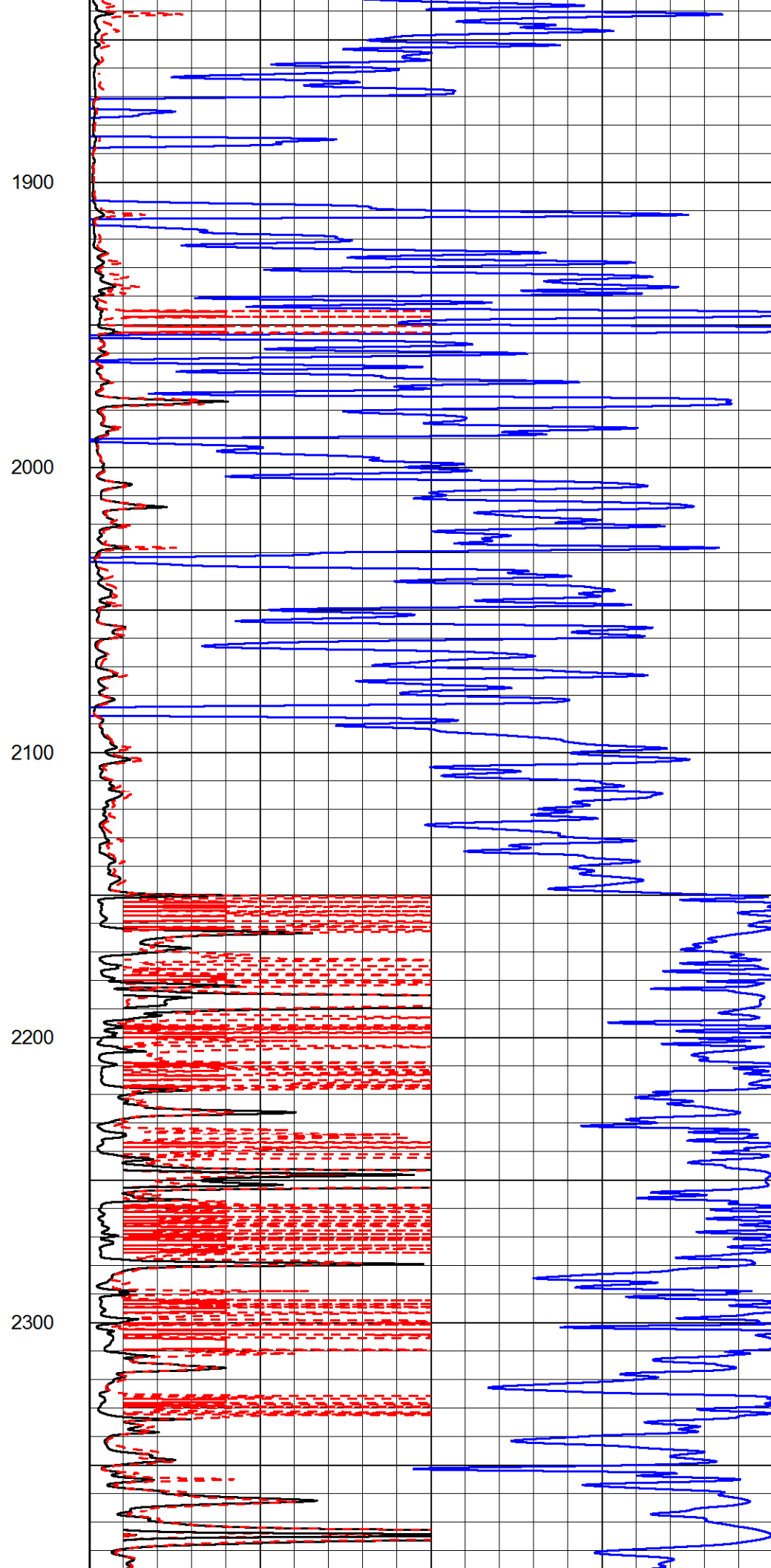
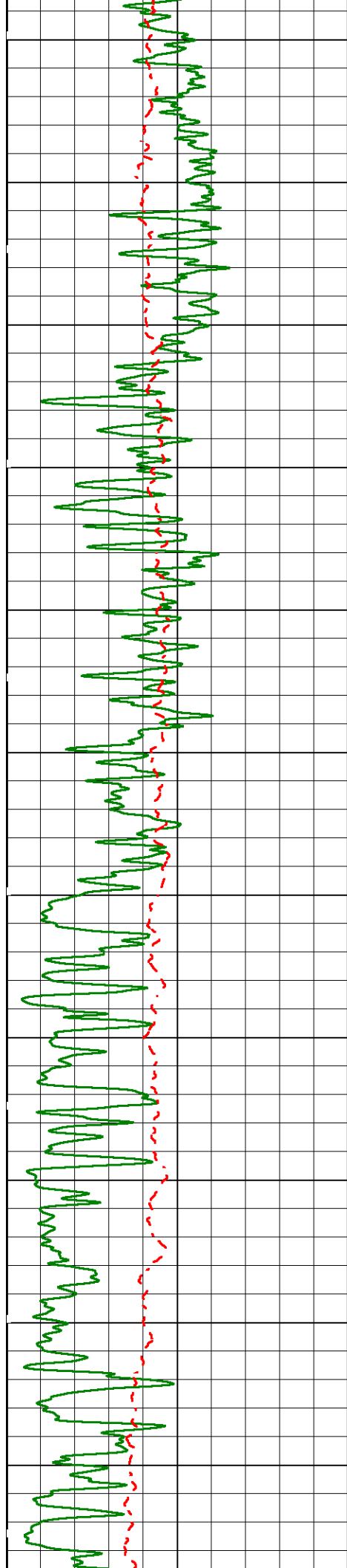


Main Pass

Database File obrien_keystone_6-4.db
Dataset Pathname MainPass
Presentation Format OKC-AC~1
Dataset Creation Mon May 18 03:39:43 2020
Charted by Depth in Feet scaled 1:600

0	Gamma Ray (GAPI)	150	1000	90" Conductivity (mmho/m)	0
SP [-20mV+]			0	Shallow Resistivity (Ohm-m)	50
			0	Deep Resistivity (Ohm-m)	50
			500	IA20_2 (Ohm-m)	5000
			500	IA90_2 (Ohm-m)	5000





2400

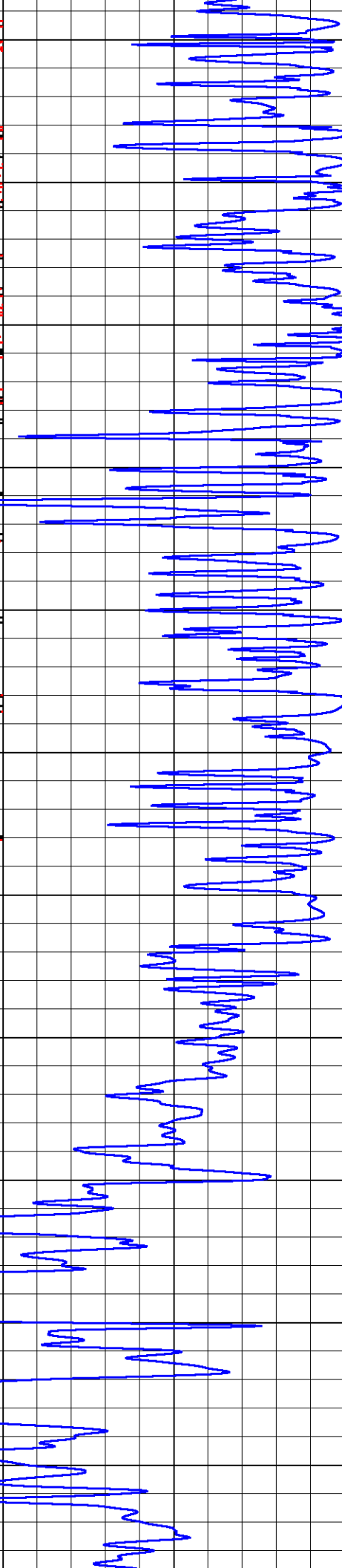
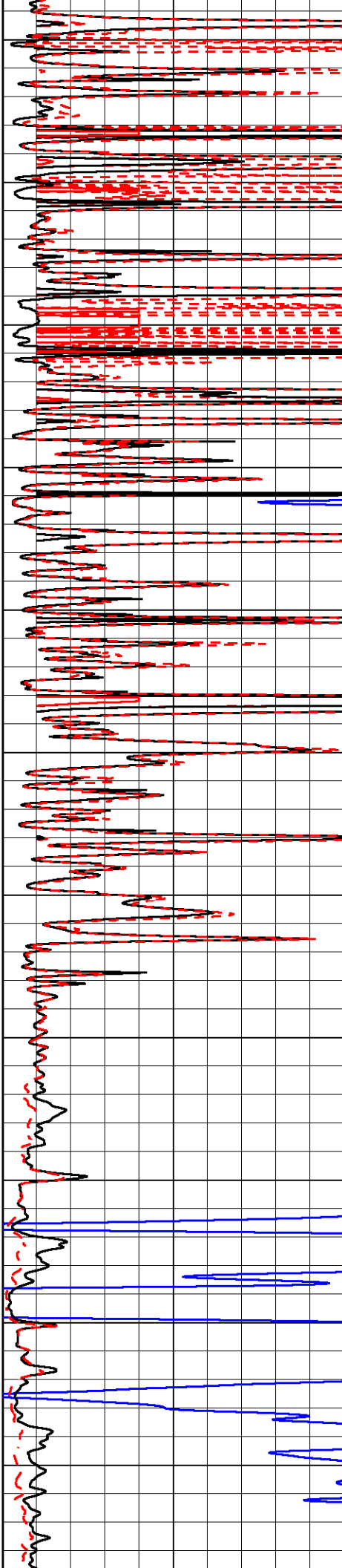
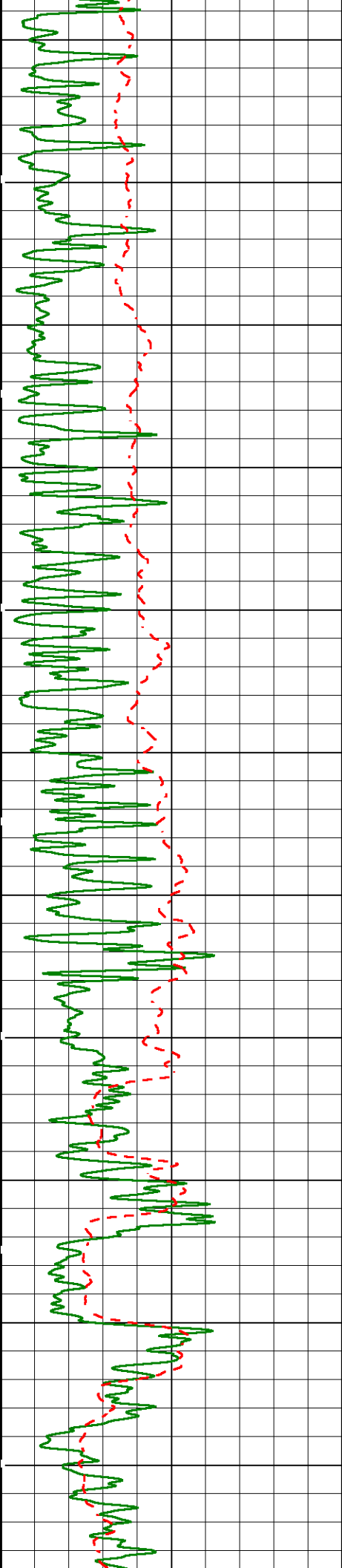
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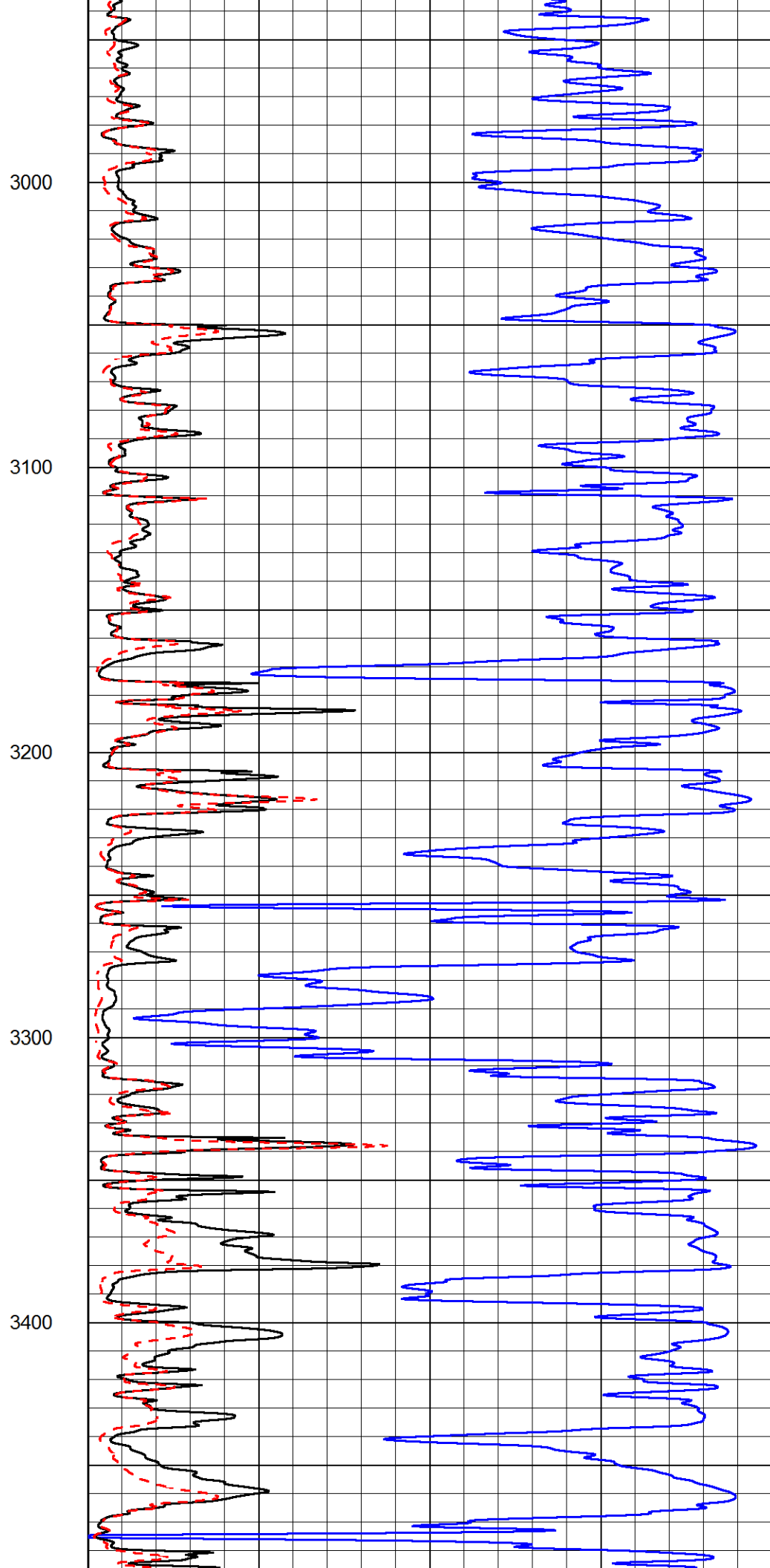
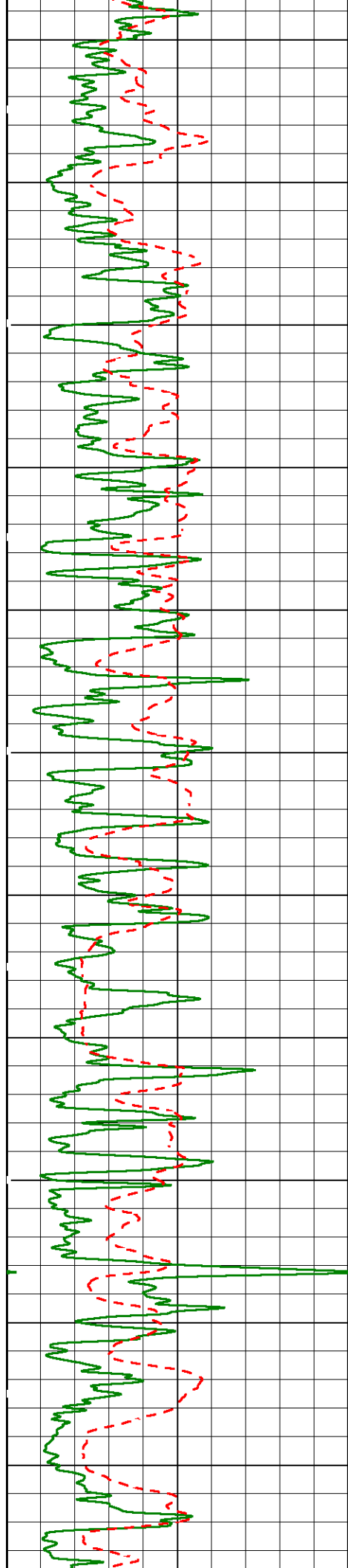
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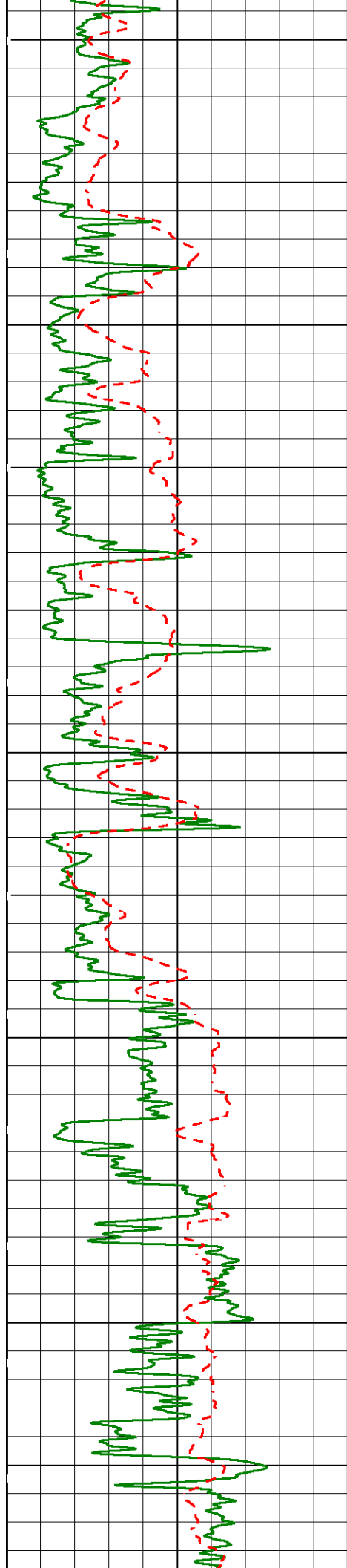
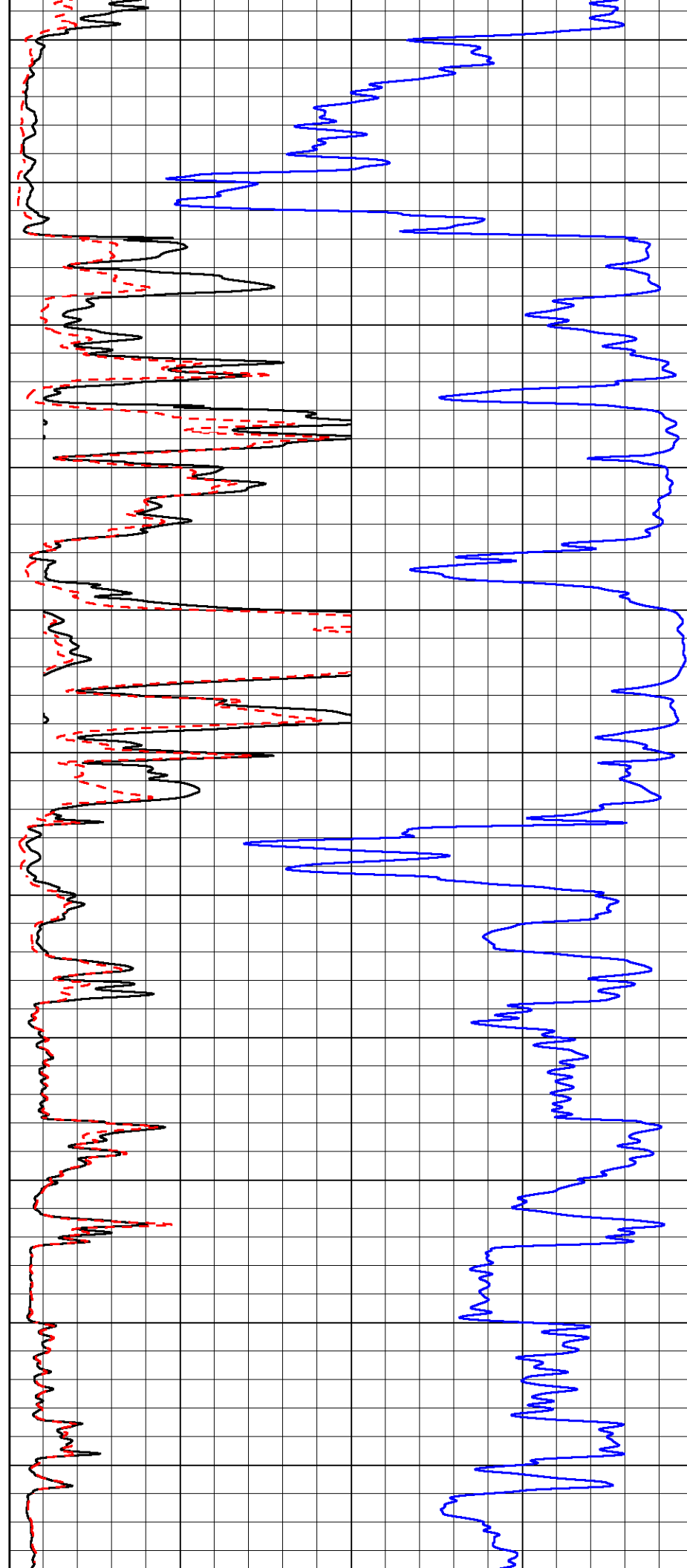
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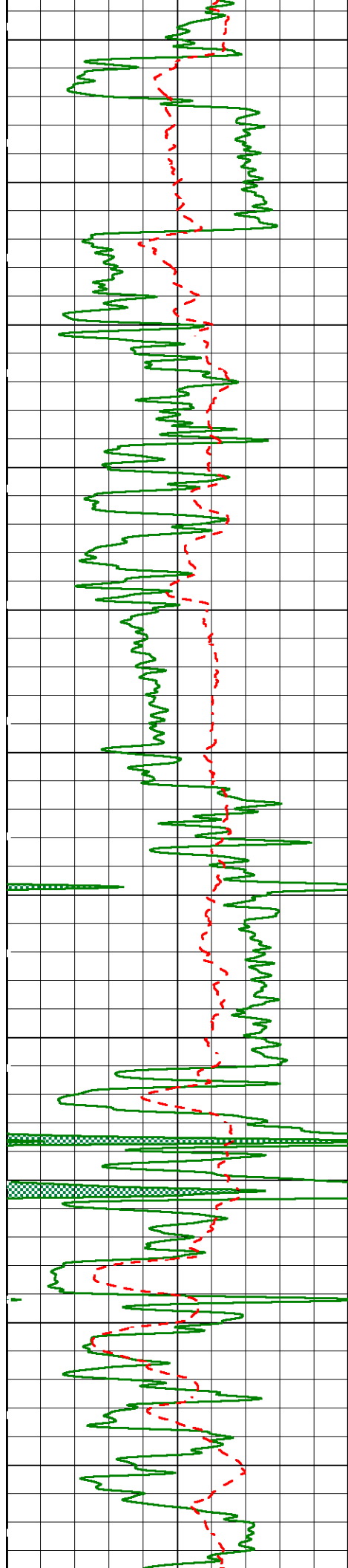
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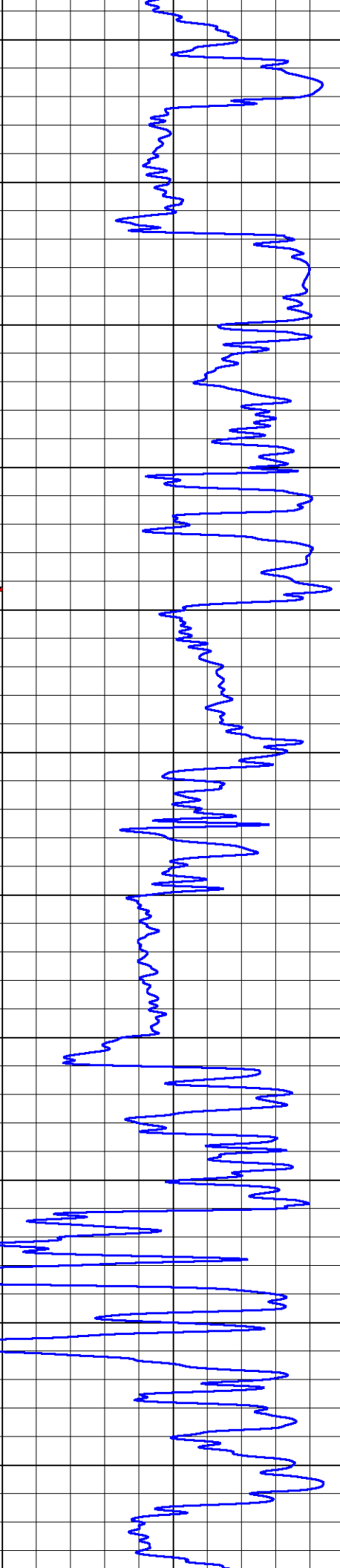
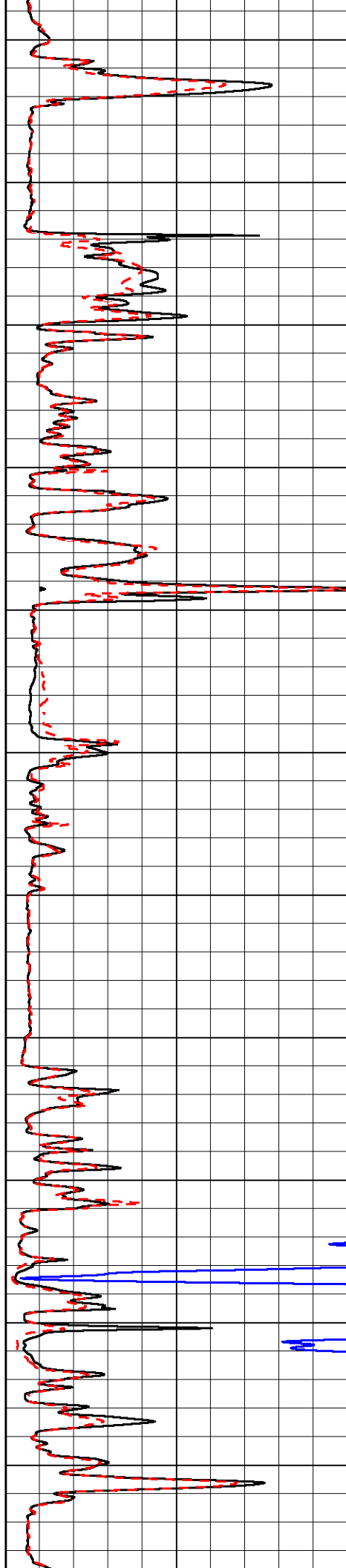
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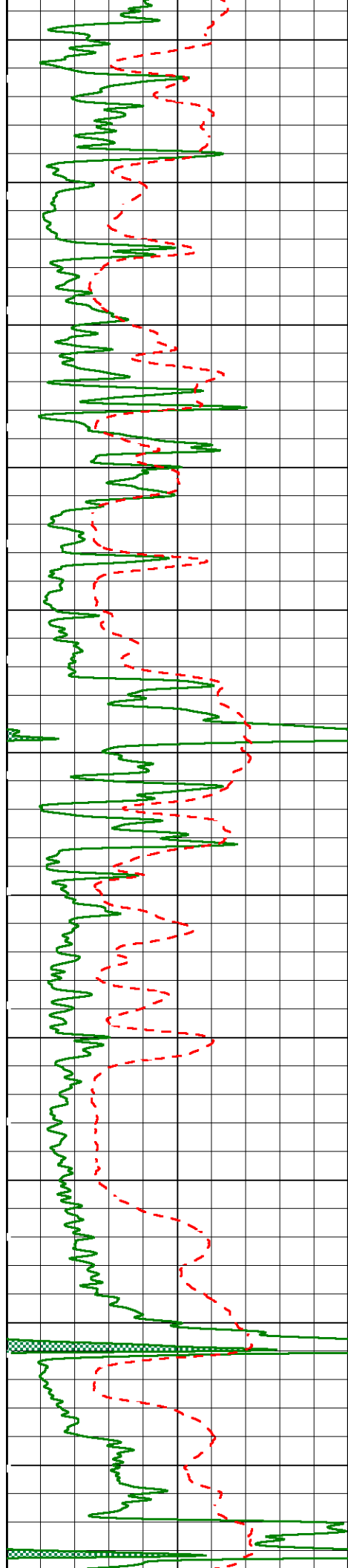
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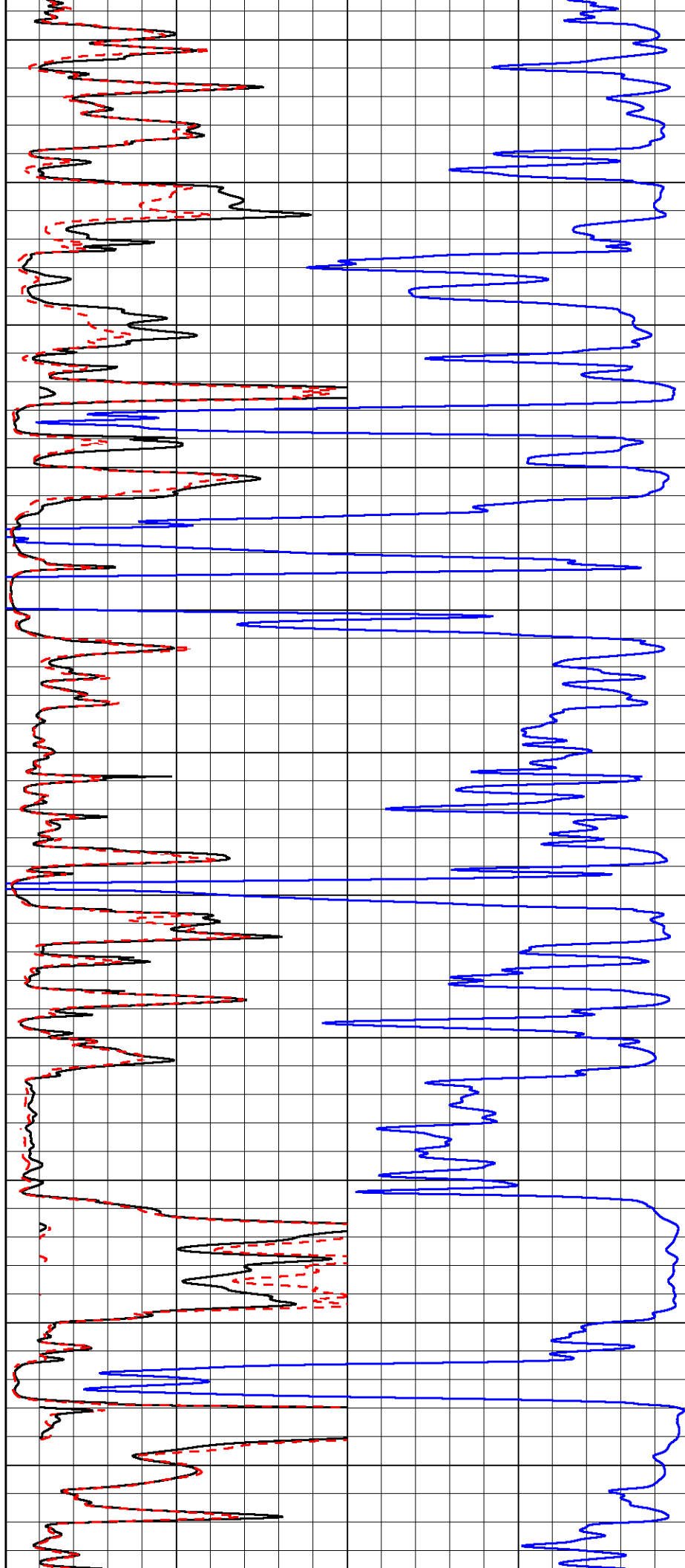
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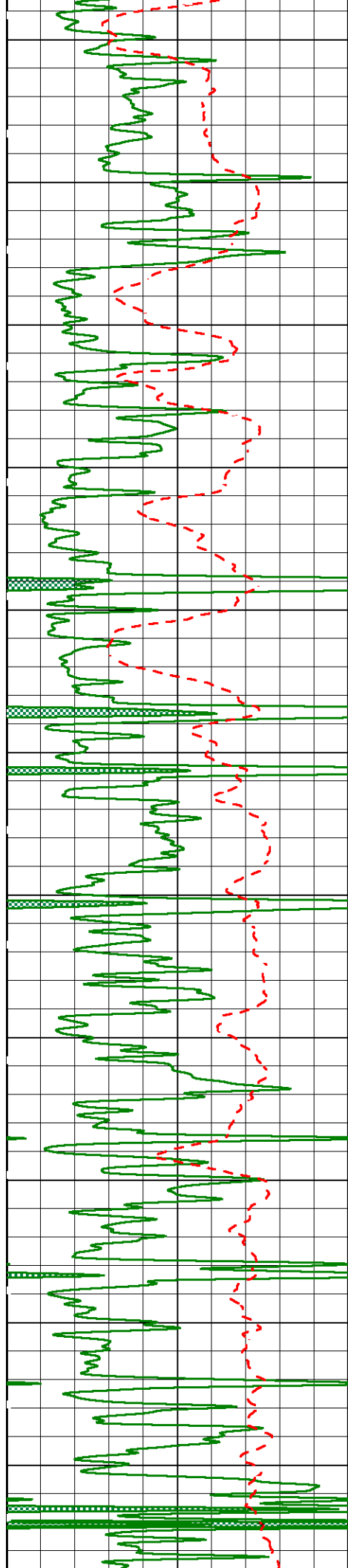
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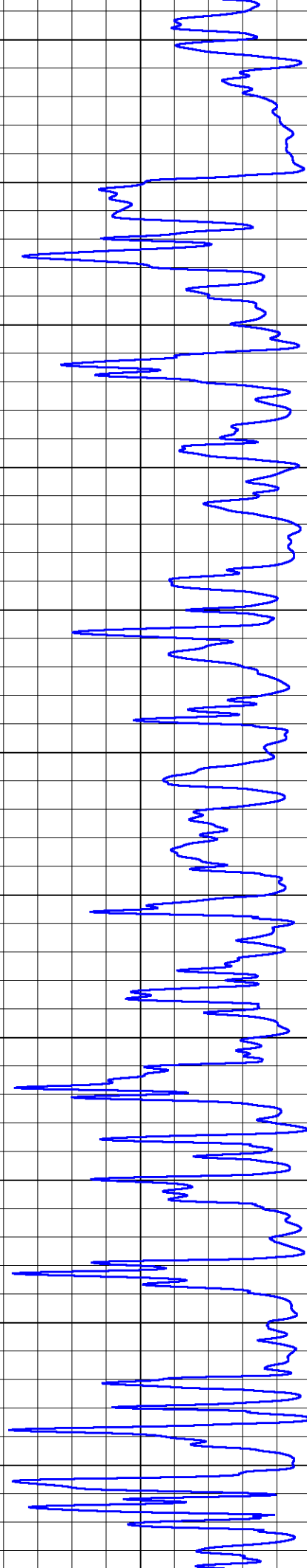
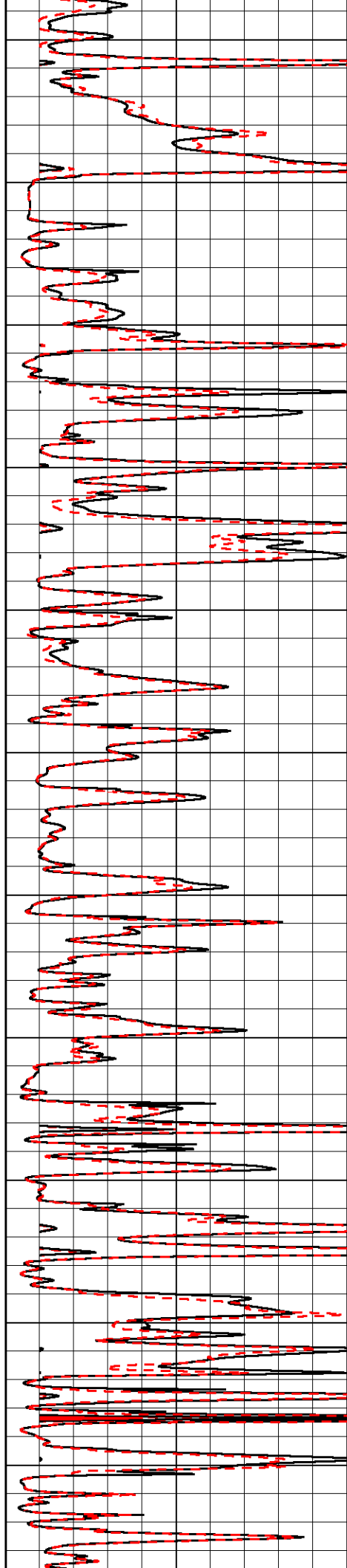
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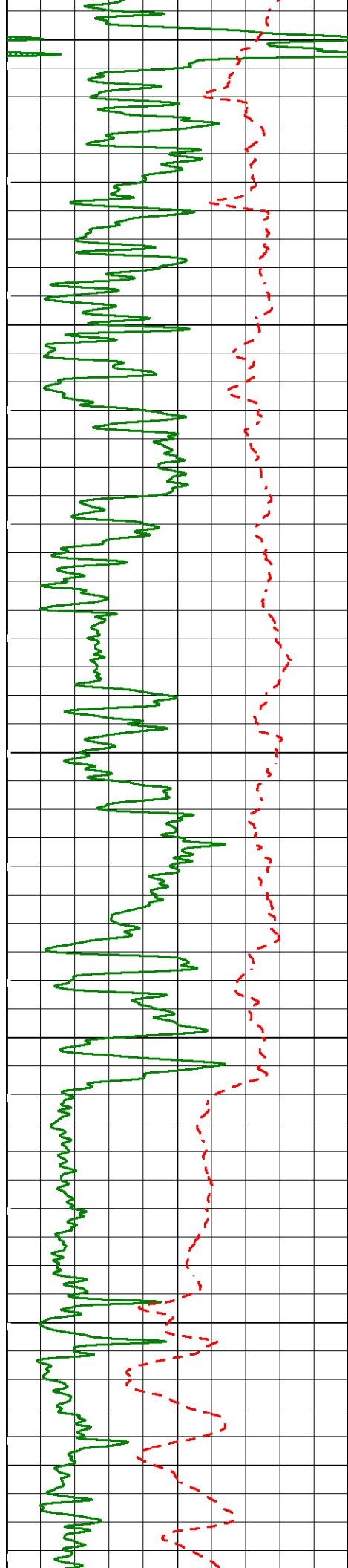
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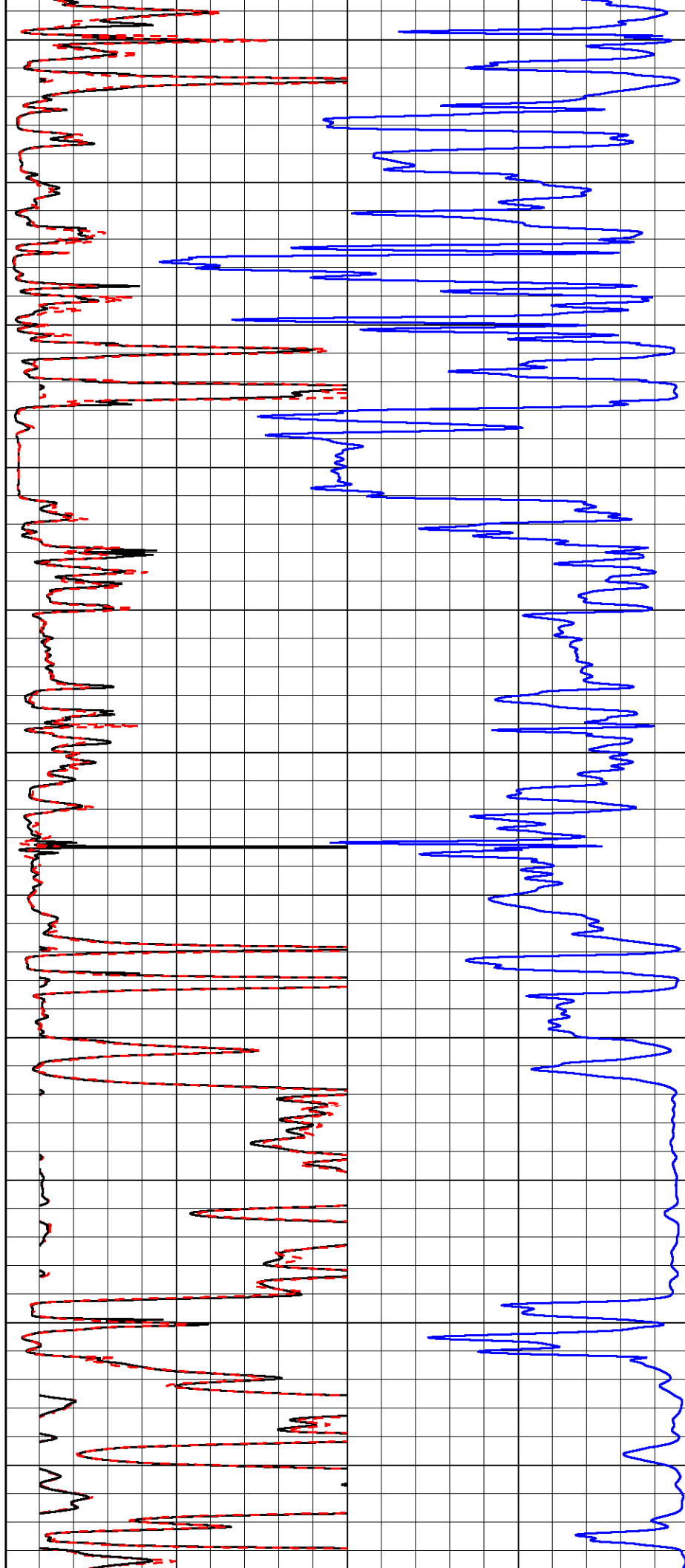
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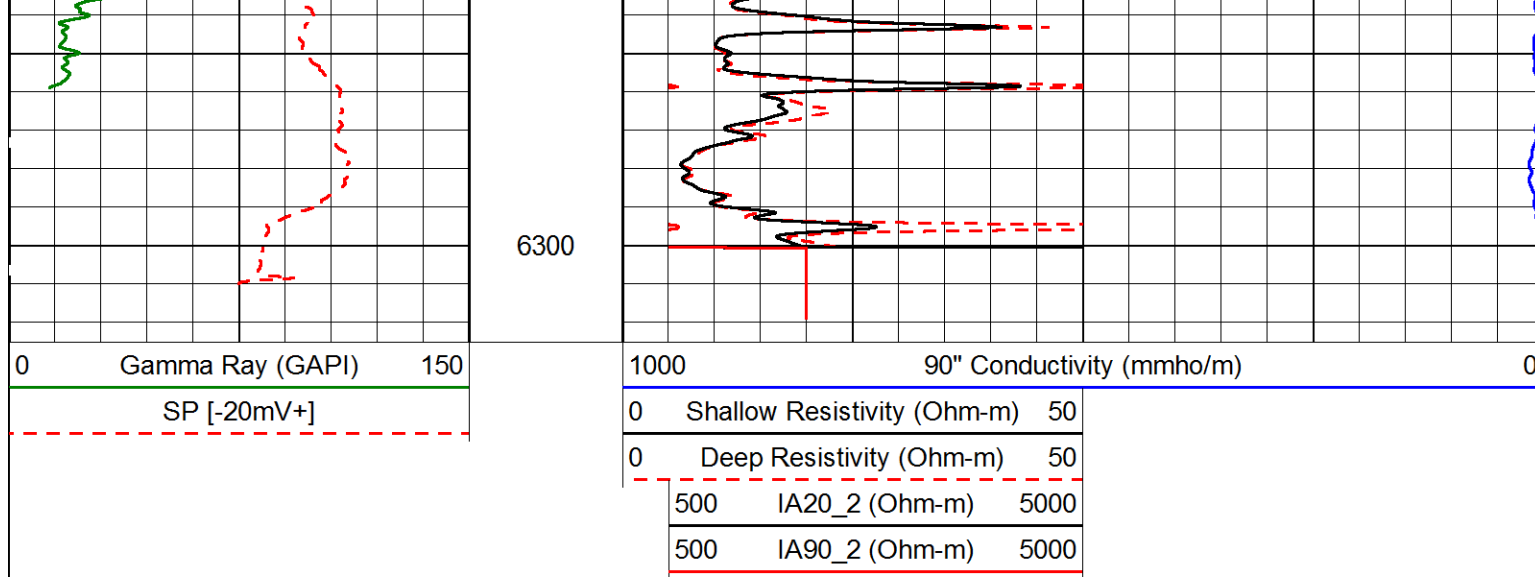
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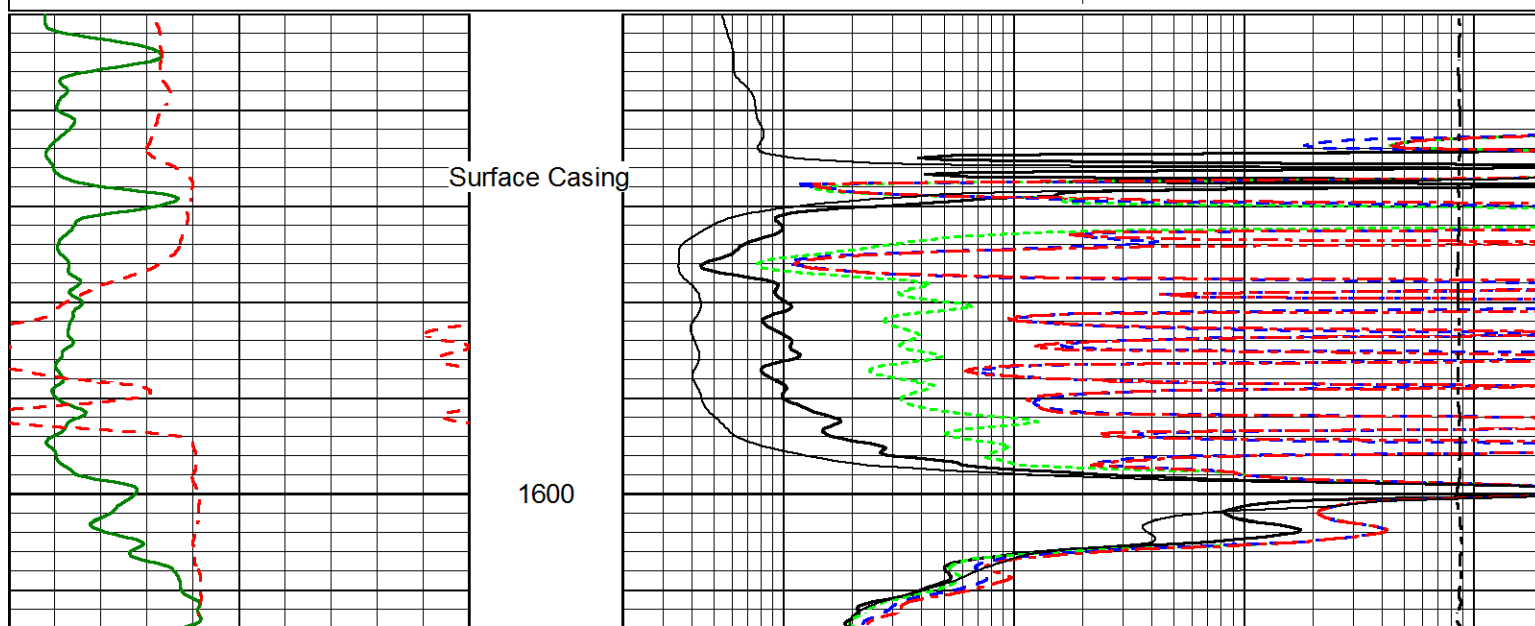
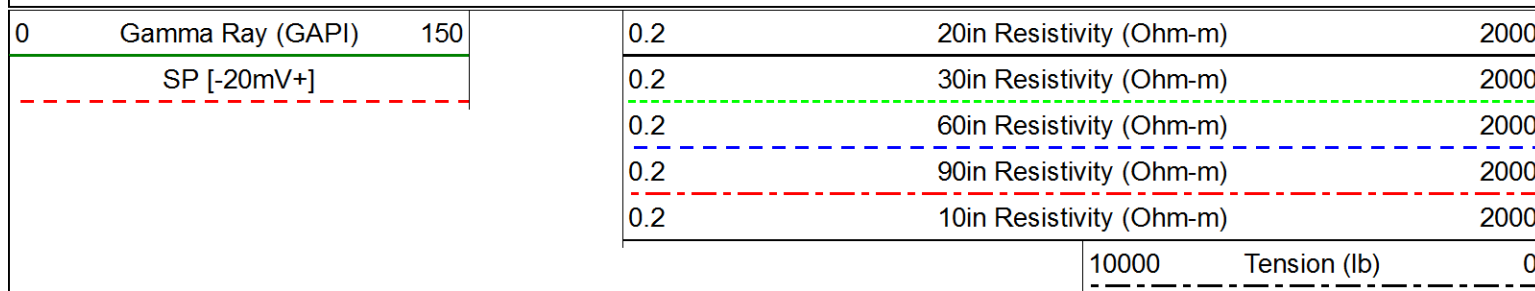
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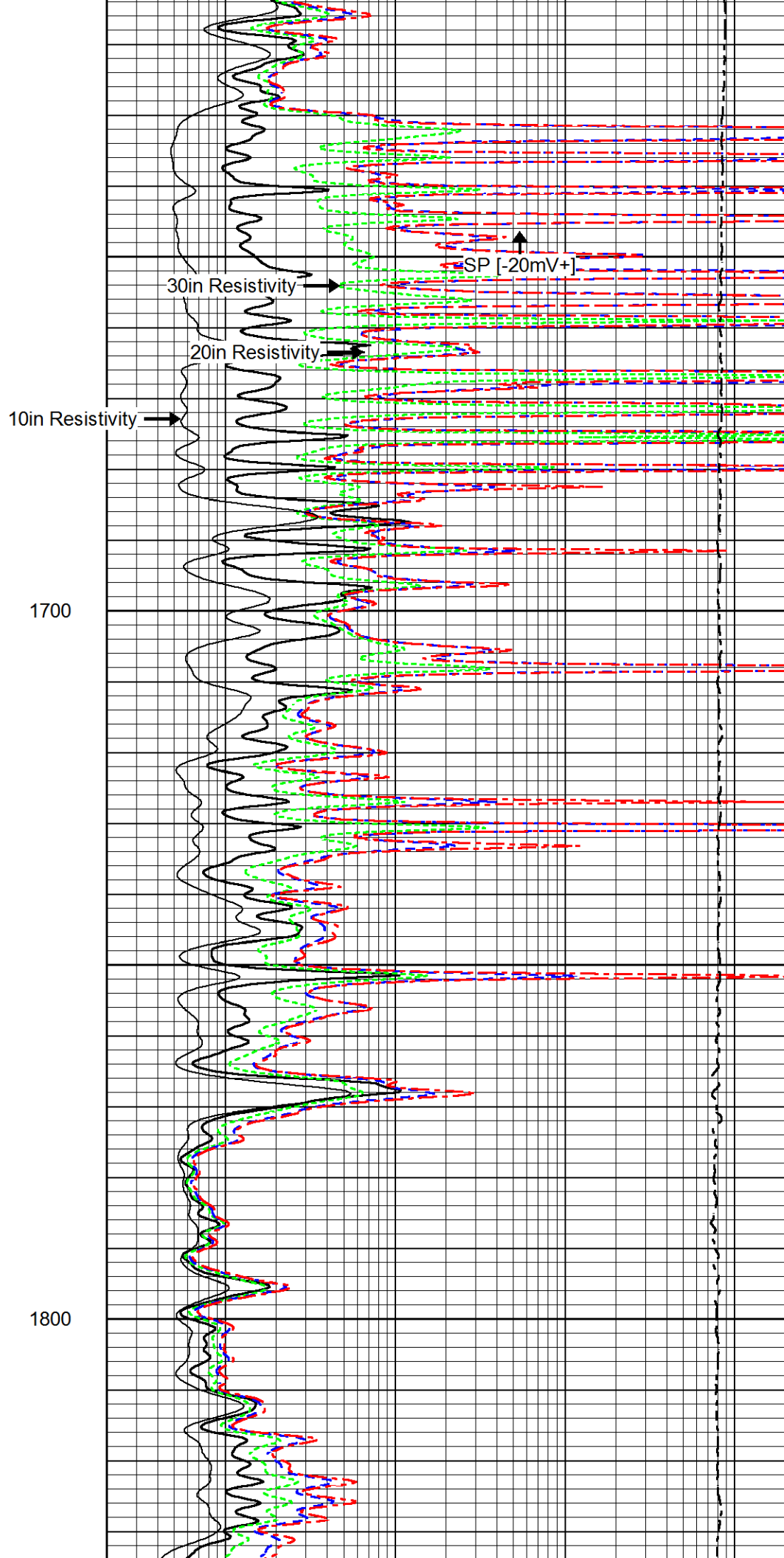
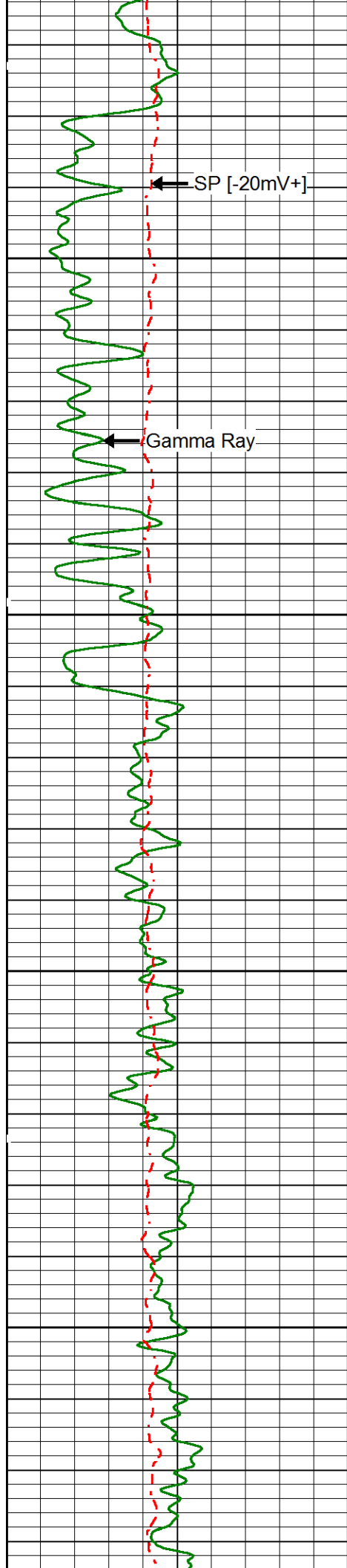
Main Pass

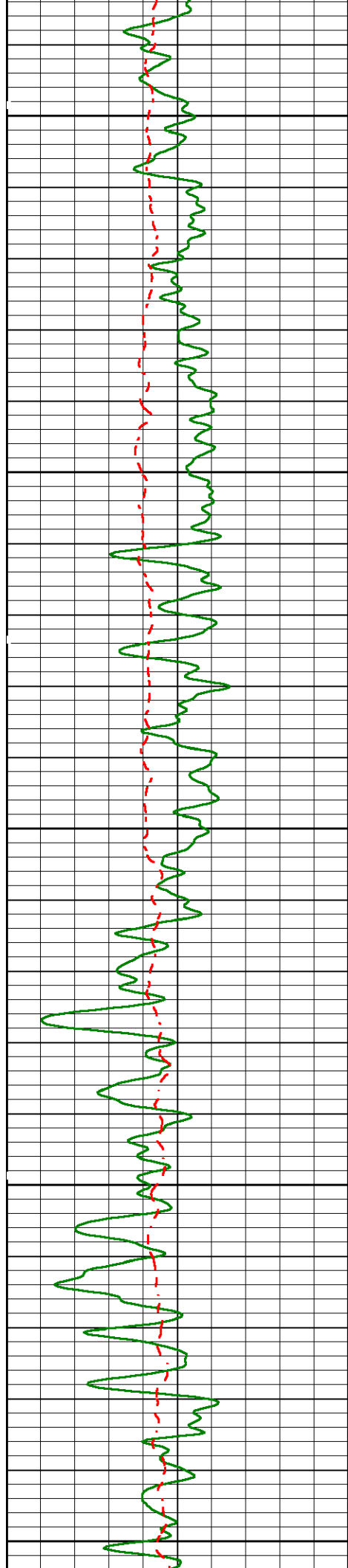
WIRELINE LOGGING SOLUTIONS

Main Pass

Database File	obrien_keystone_6-4.db
Dataset Pathname	MainPass
Presentation Format	OKC-AI~1
Dataset Creation	Mon May 18 03:39:43 2020
Charted by	Depth in Feet scaled 1:240

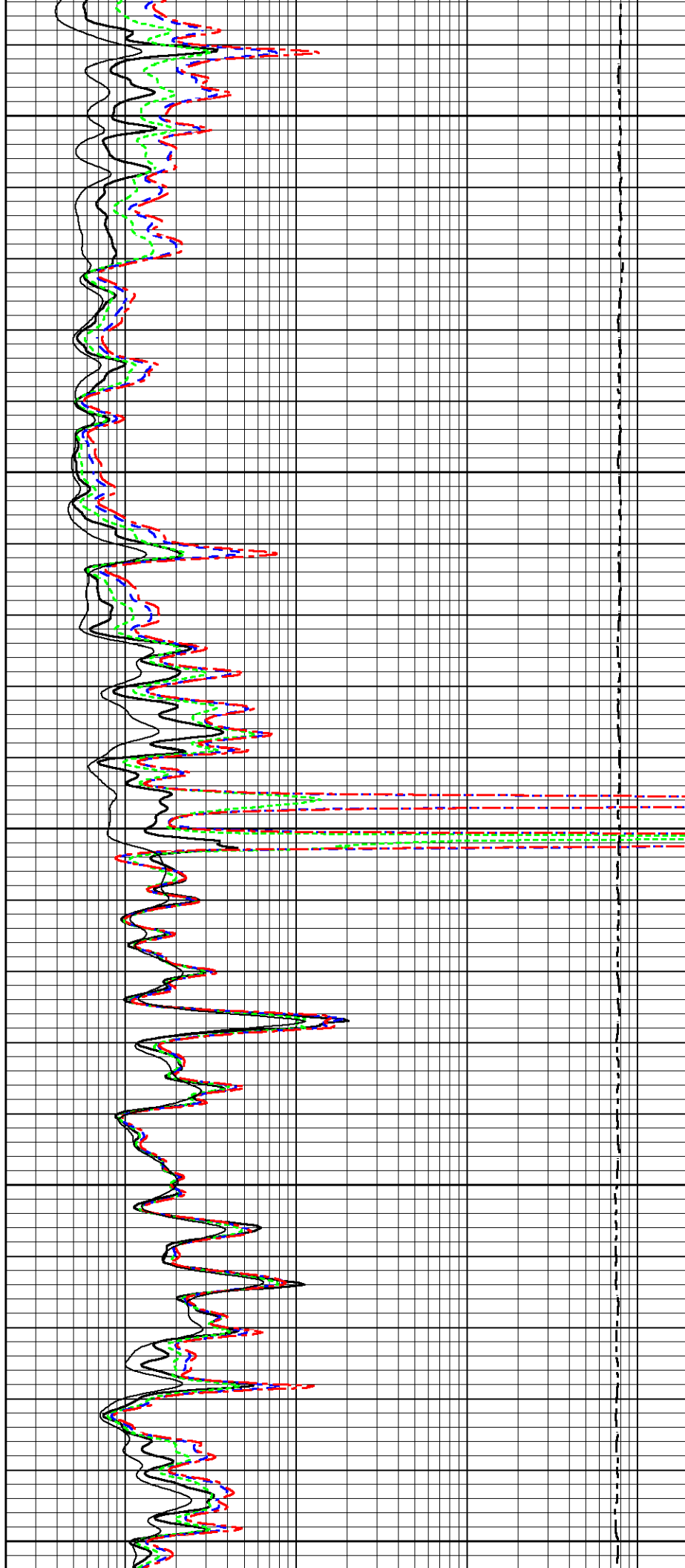


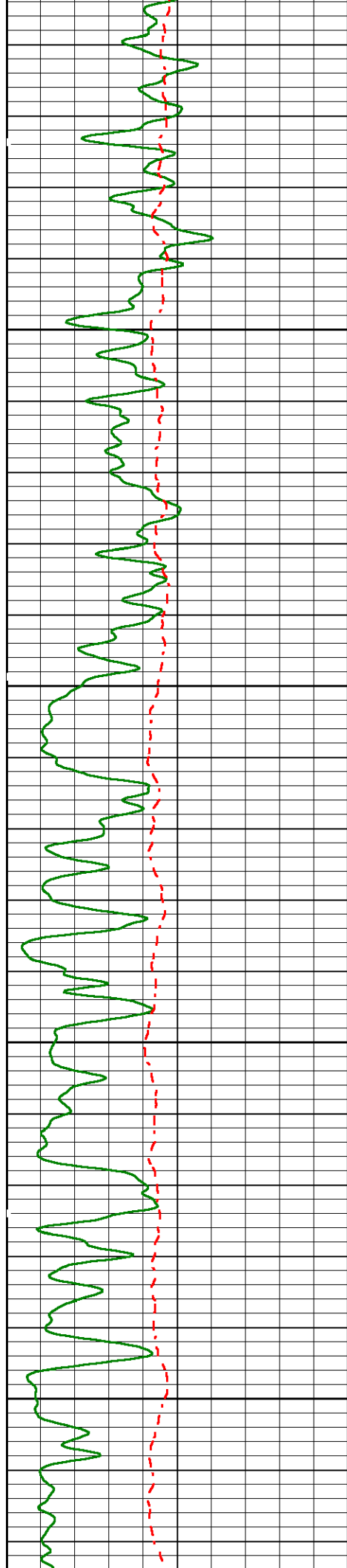




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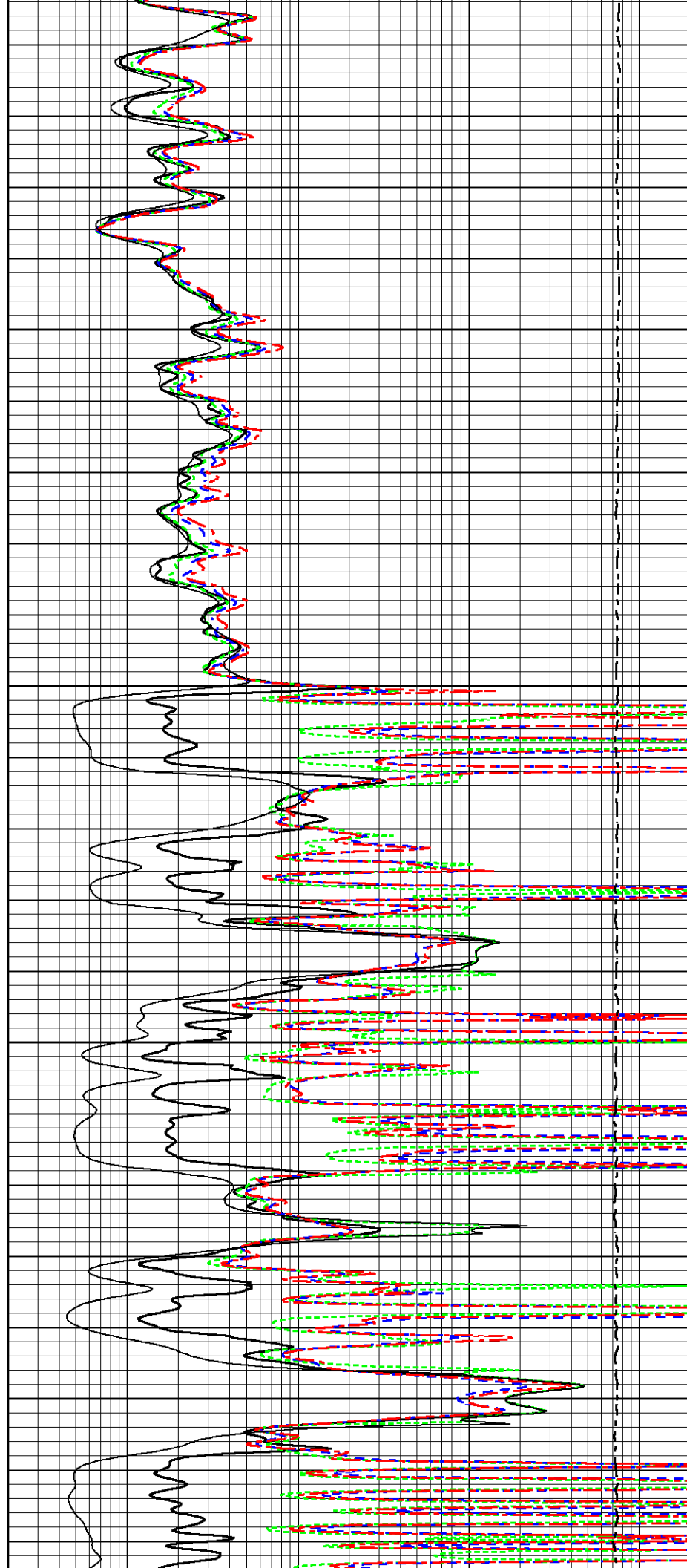
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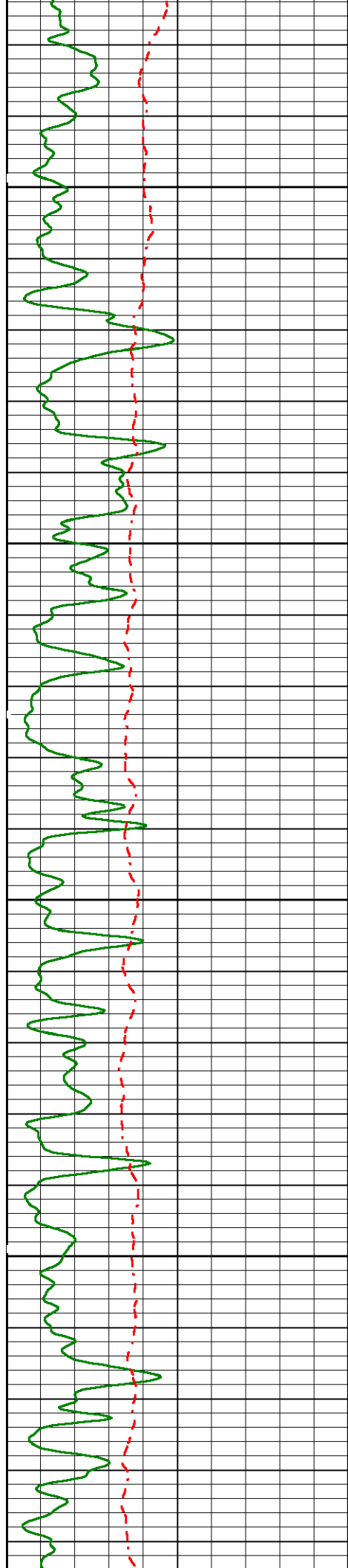




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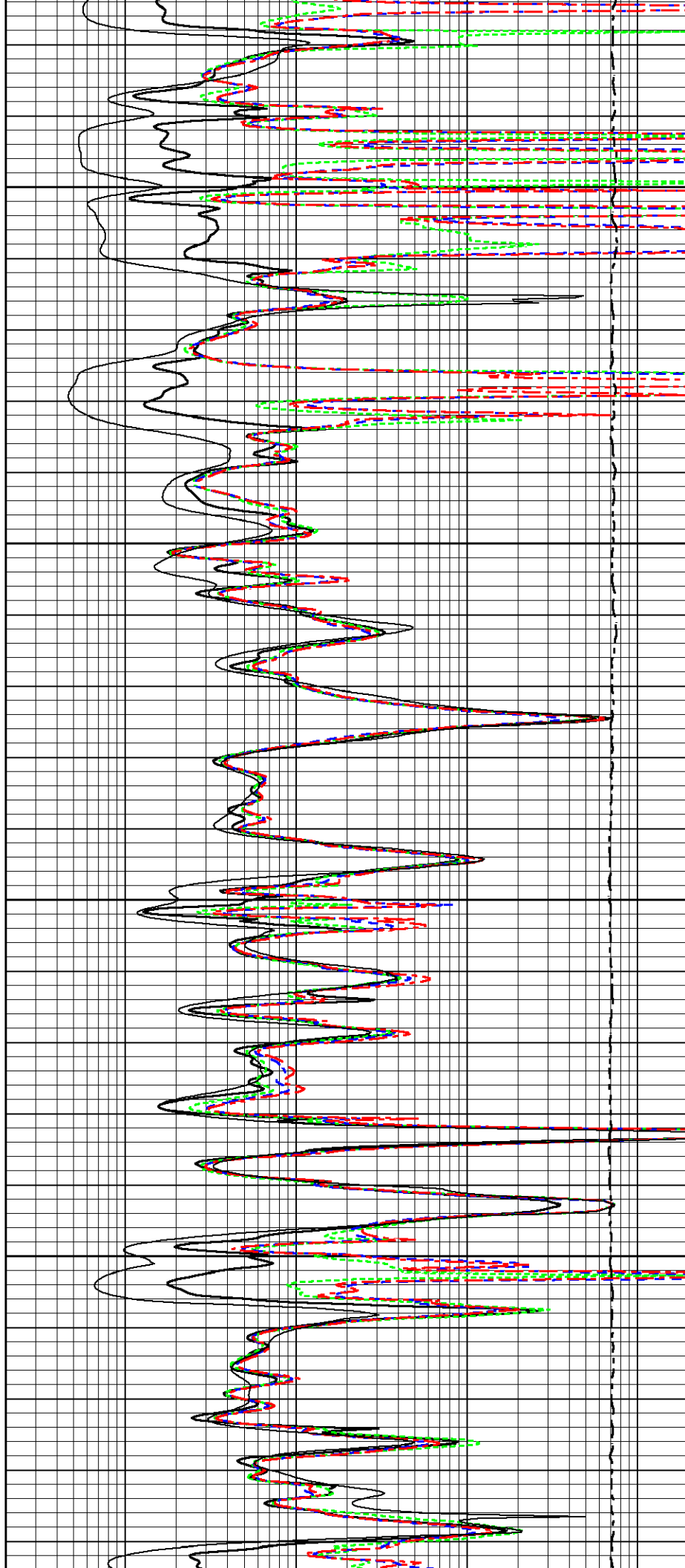
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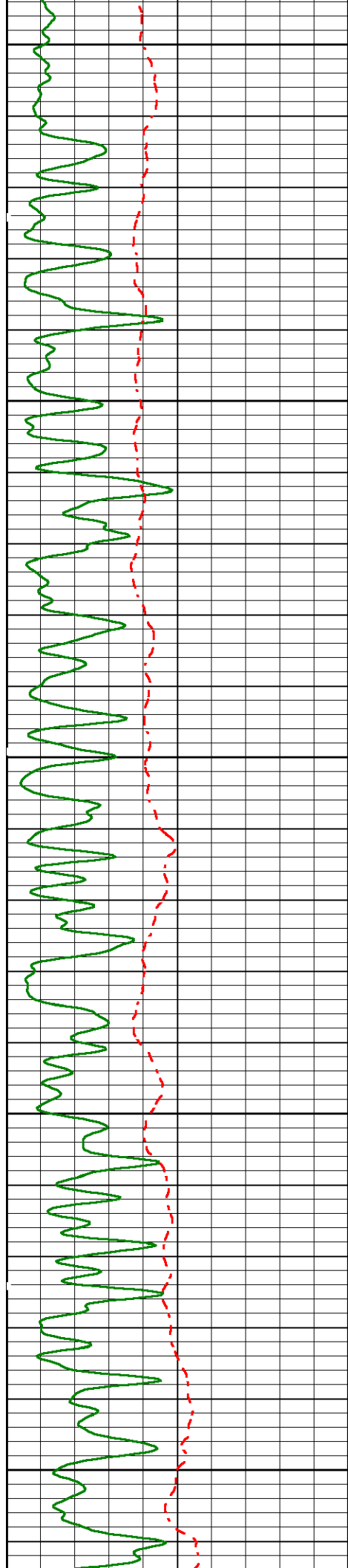




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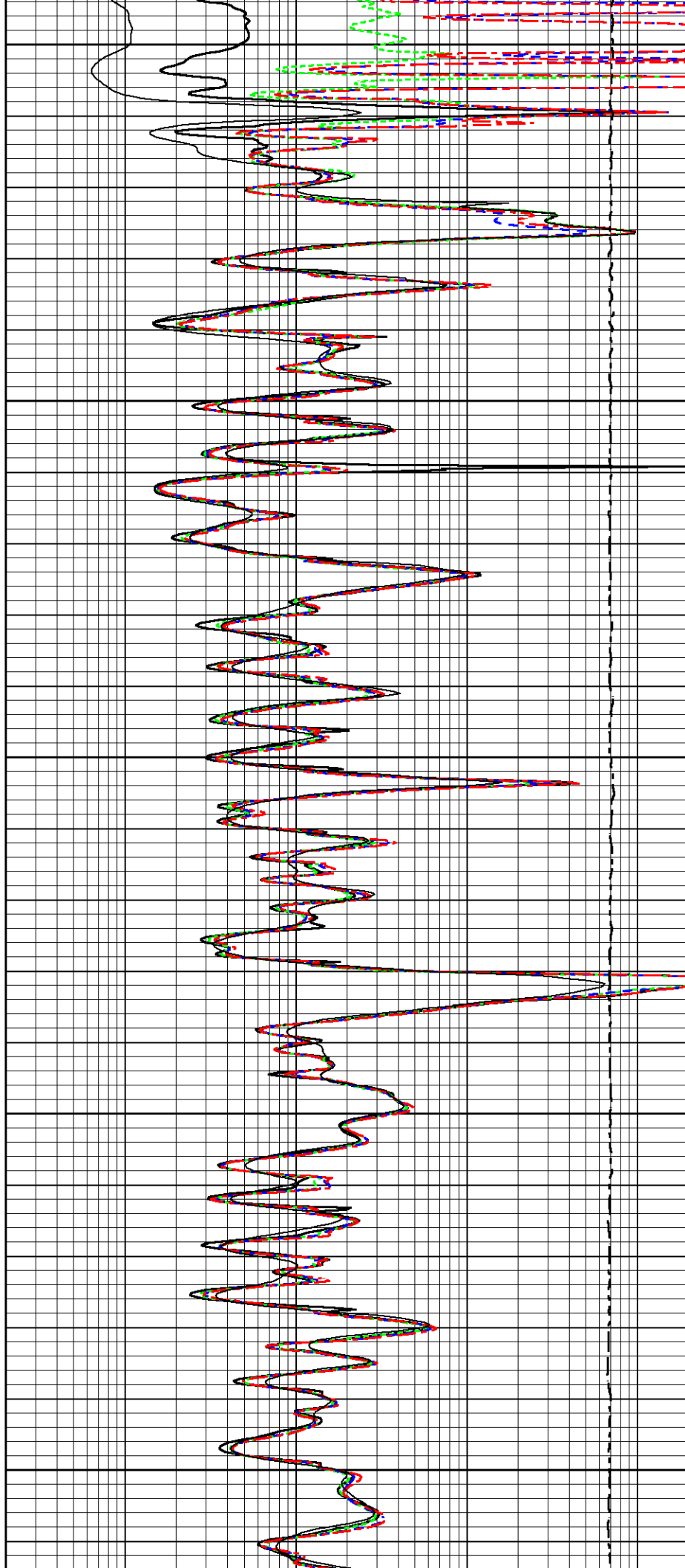




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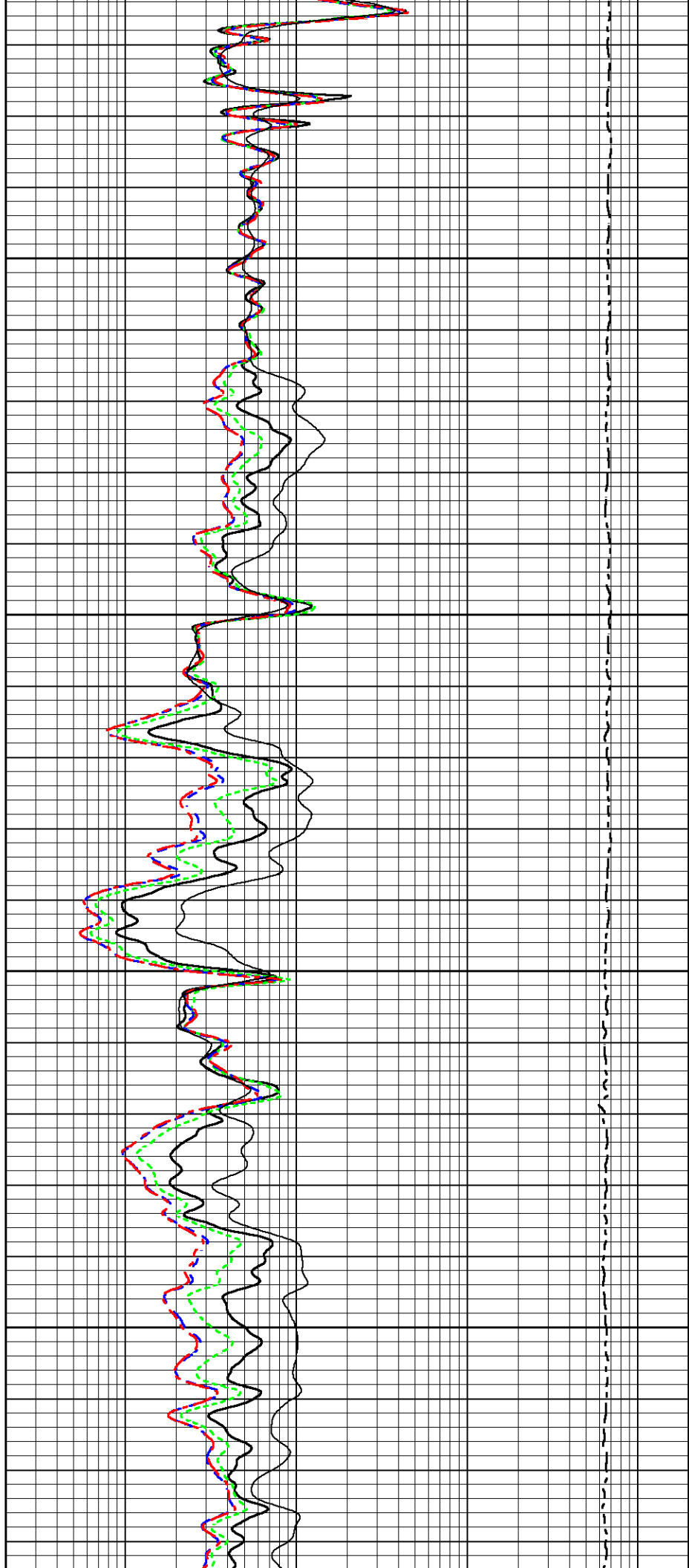
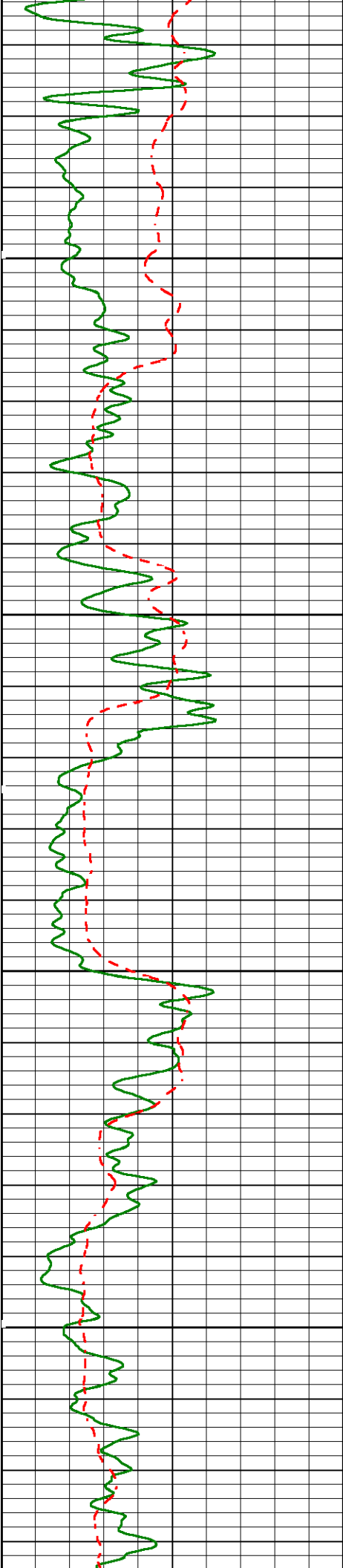
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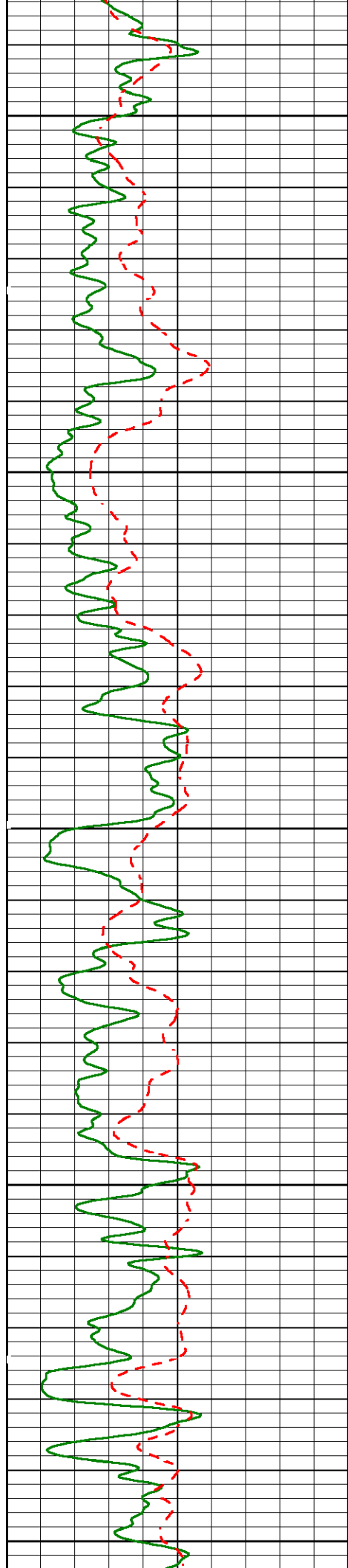
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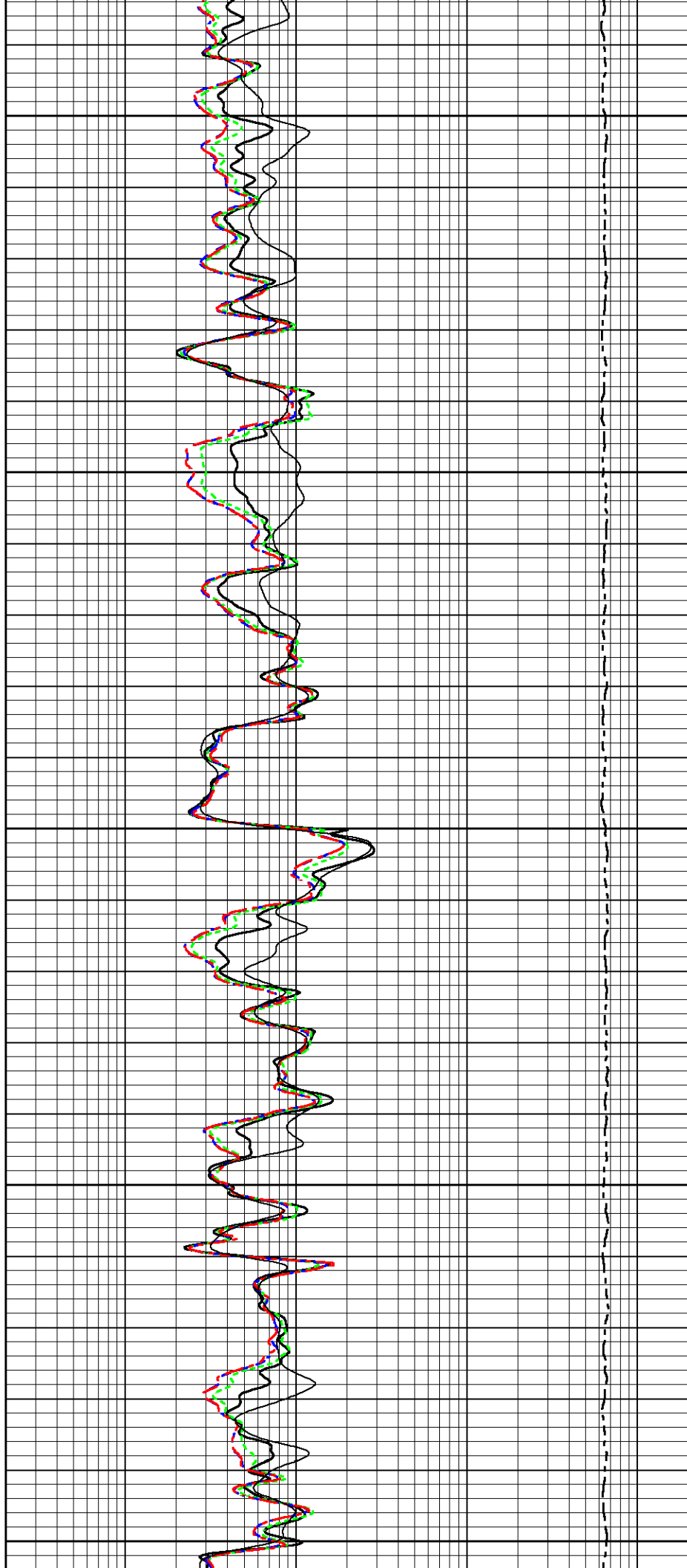
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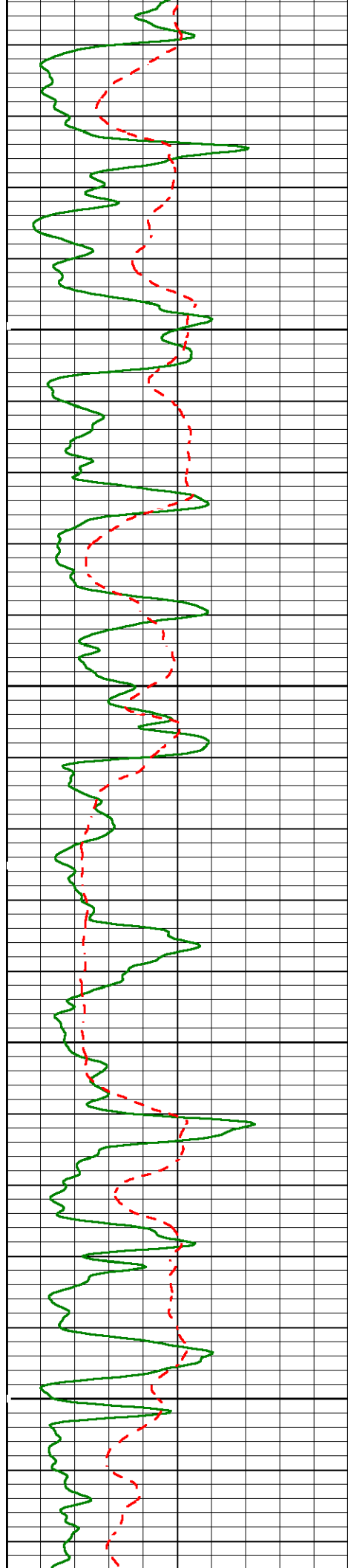




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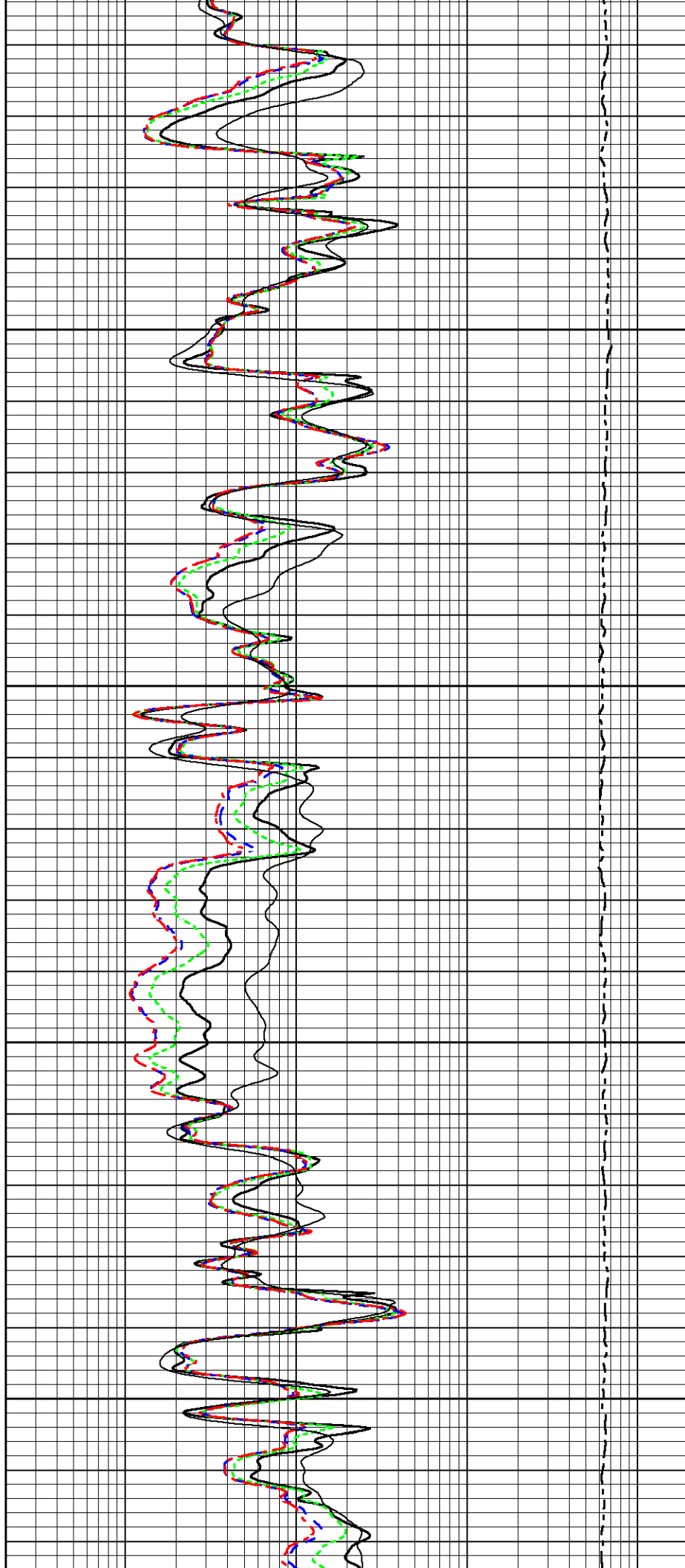
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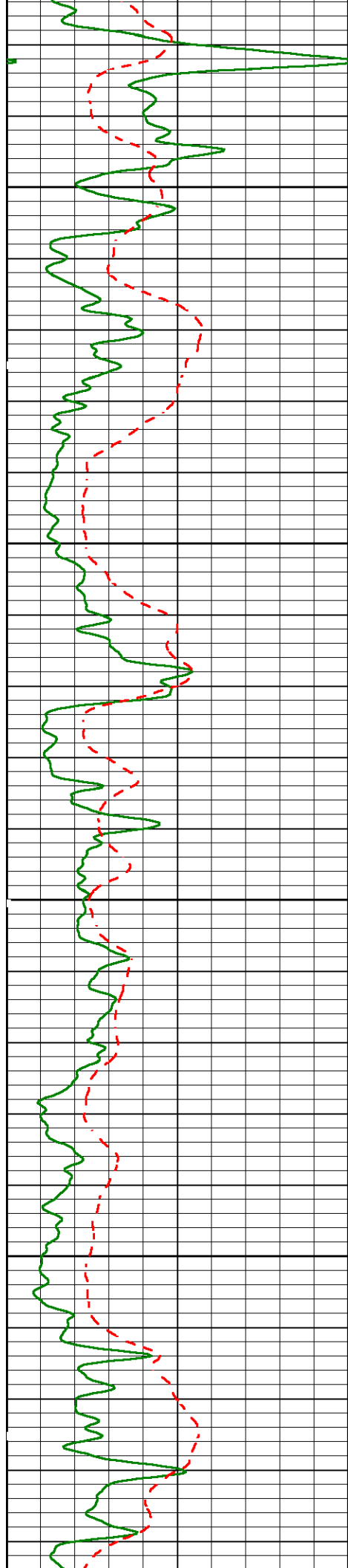




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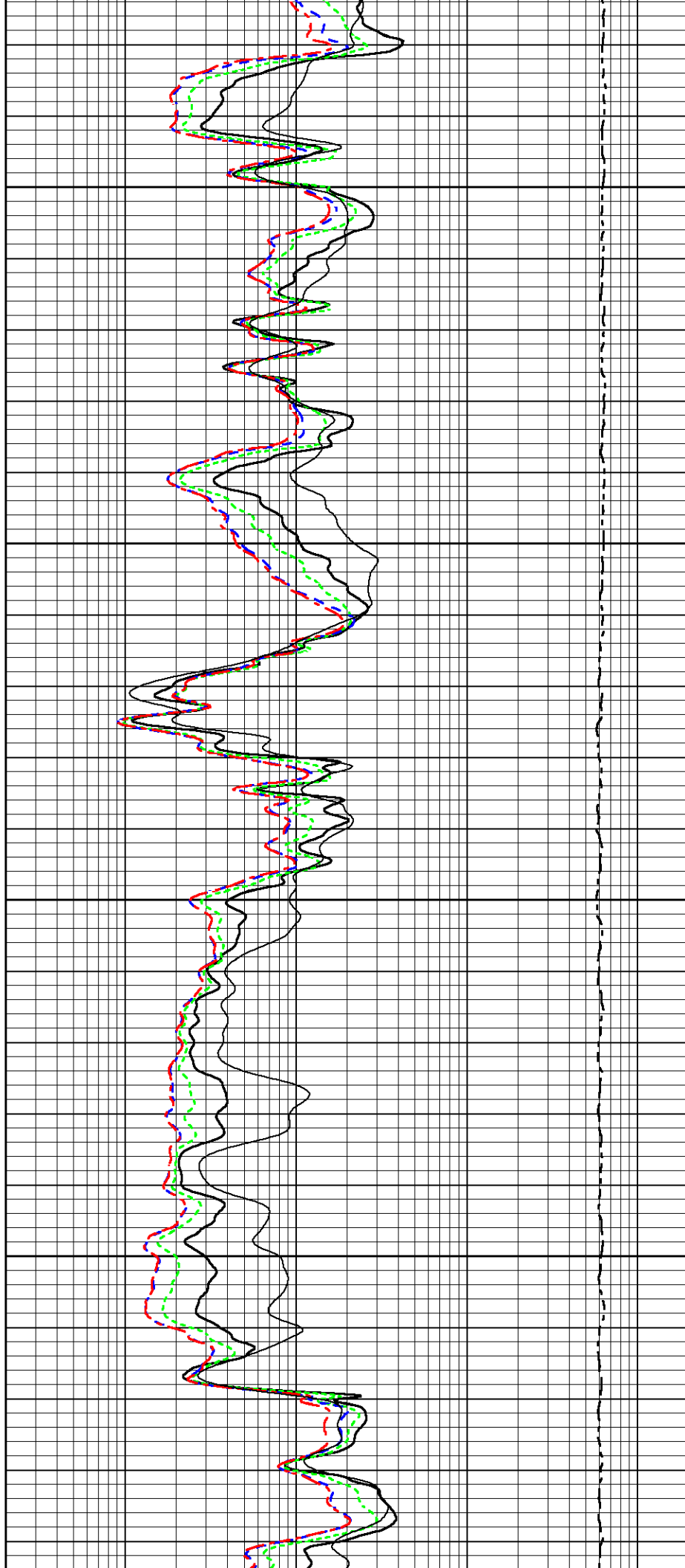
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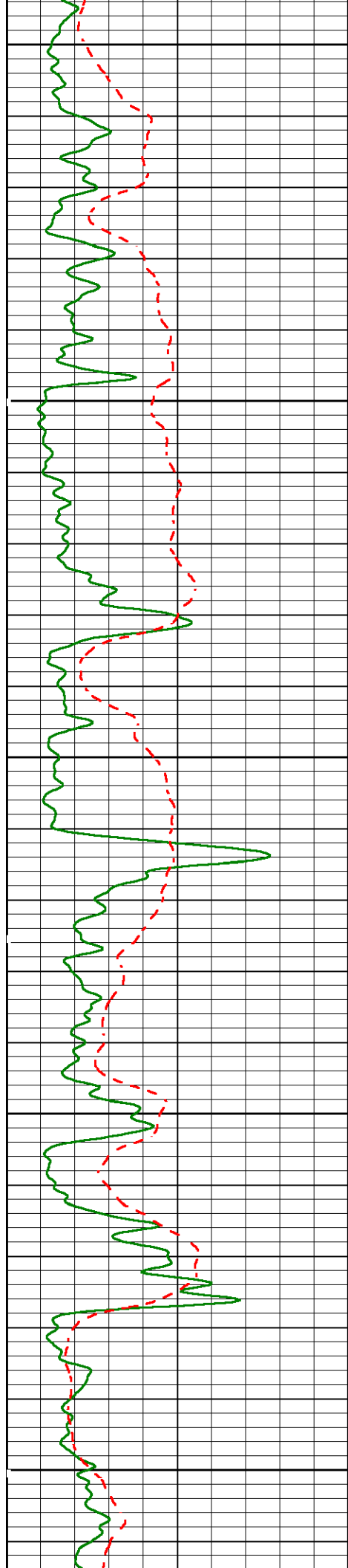




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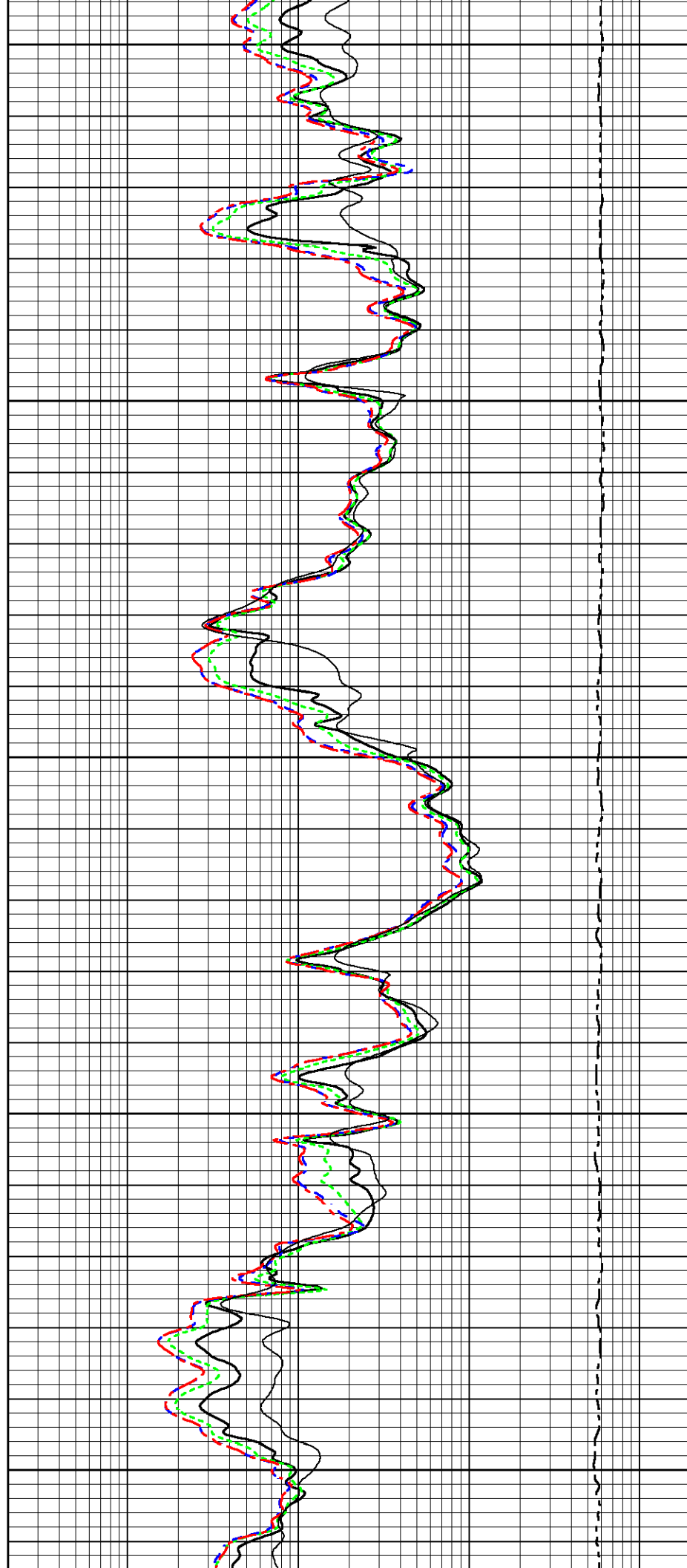


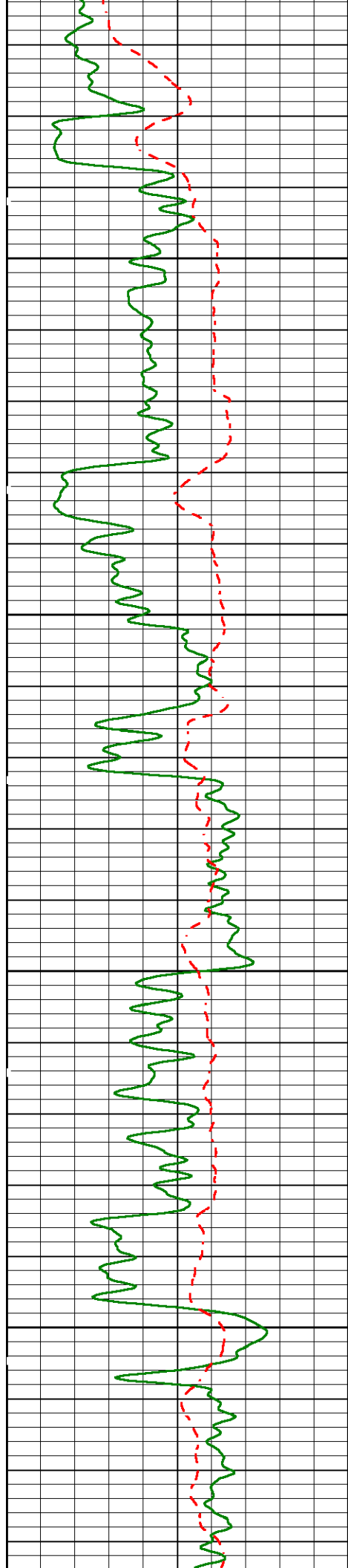


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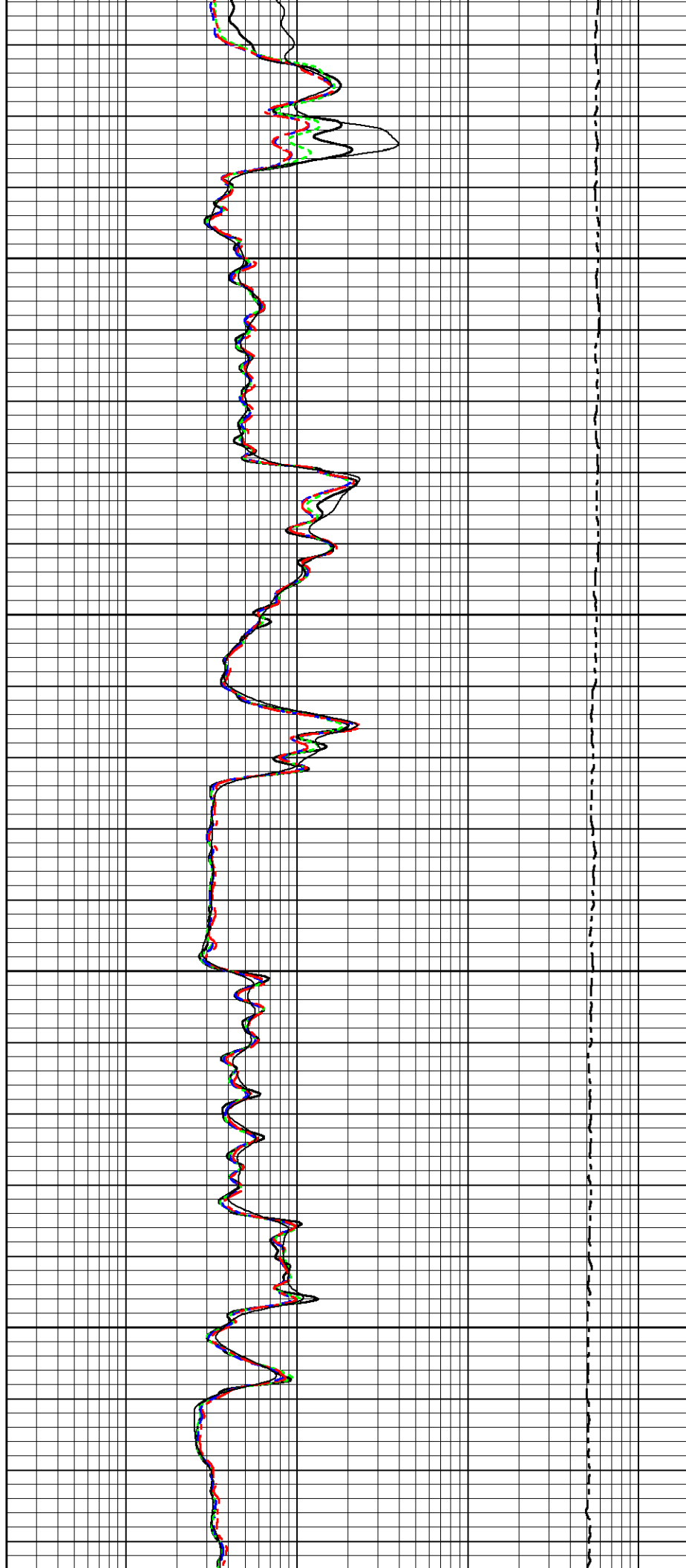
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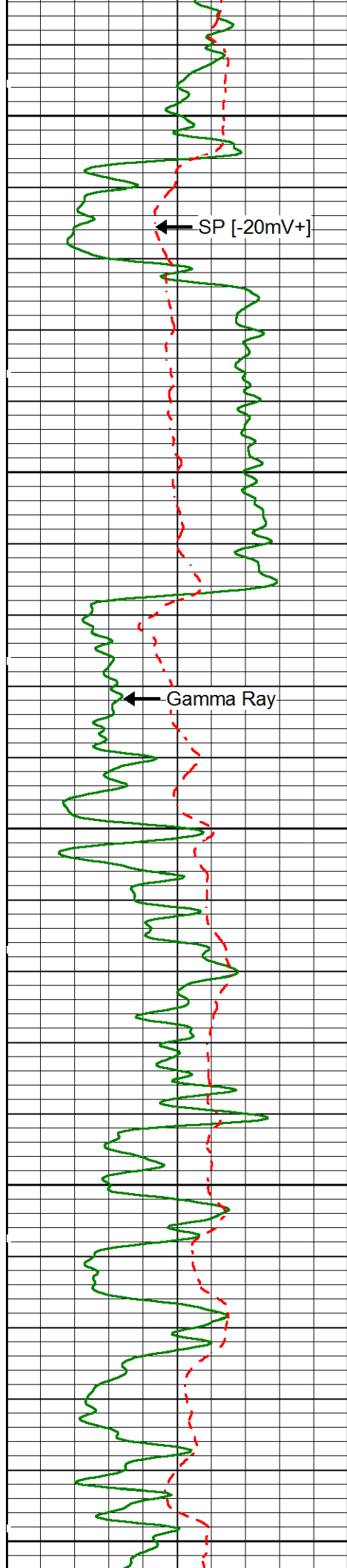




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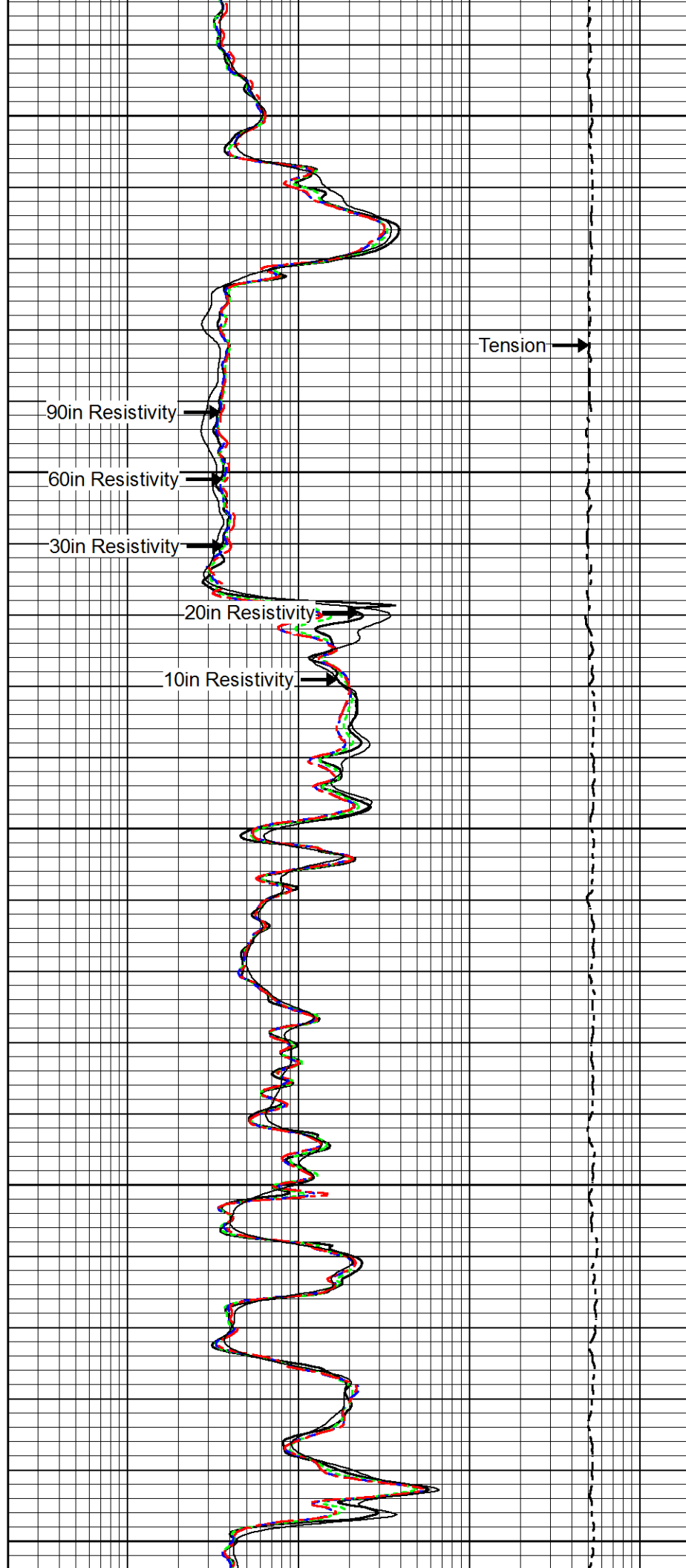
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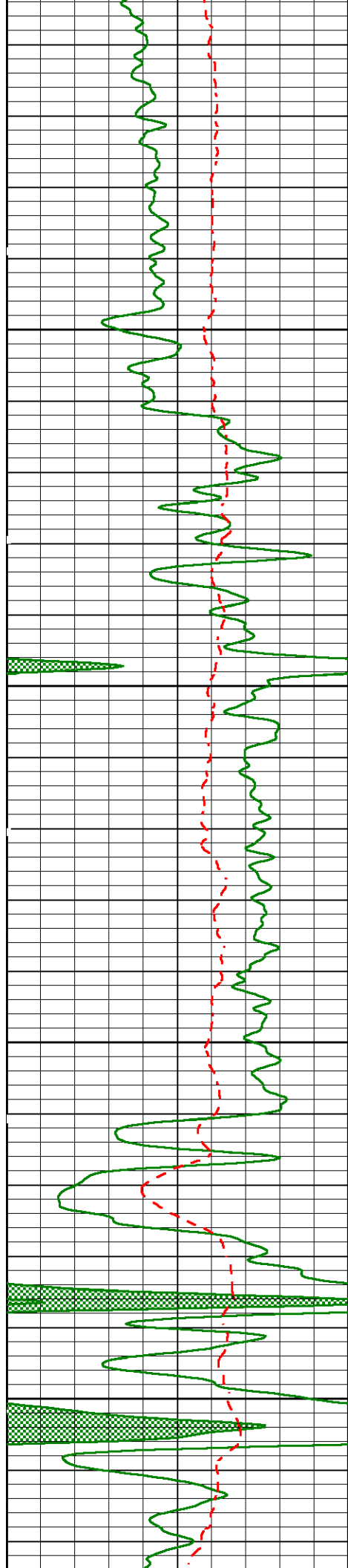




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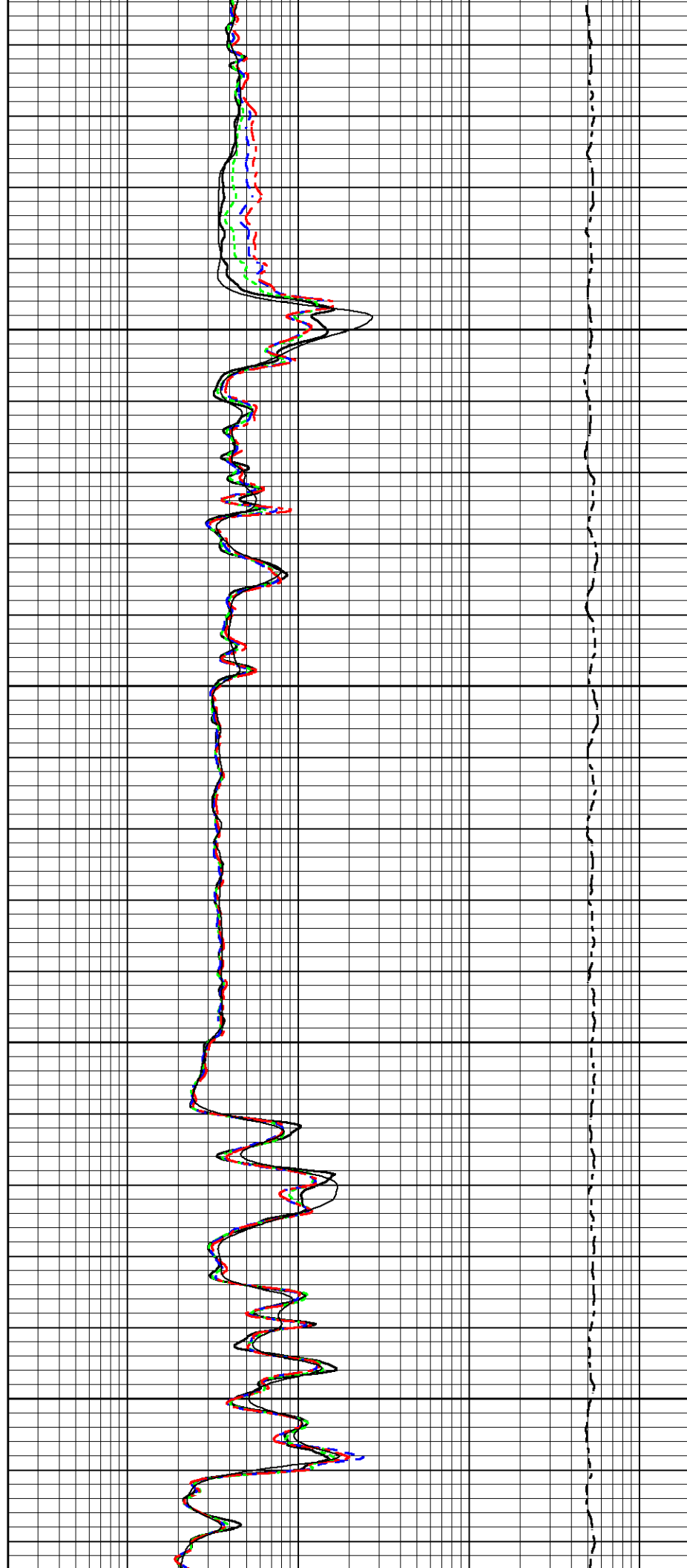
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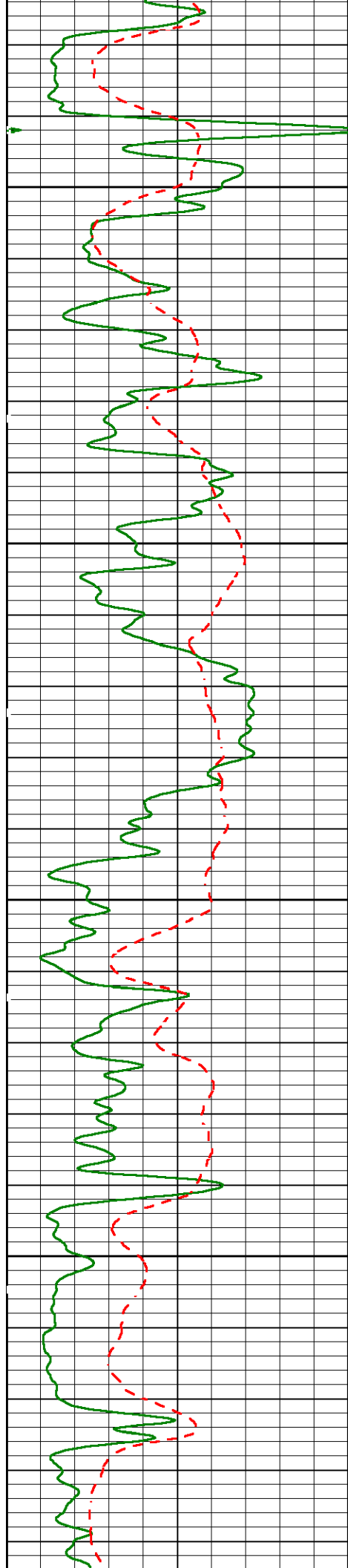




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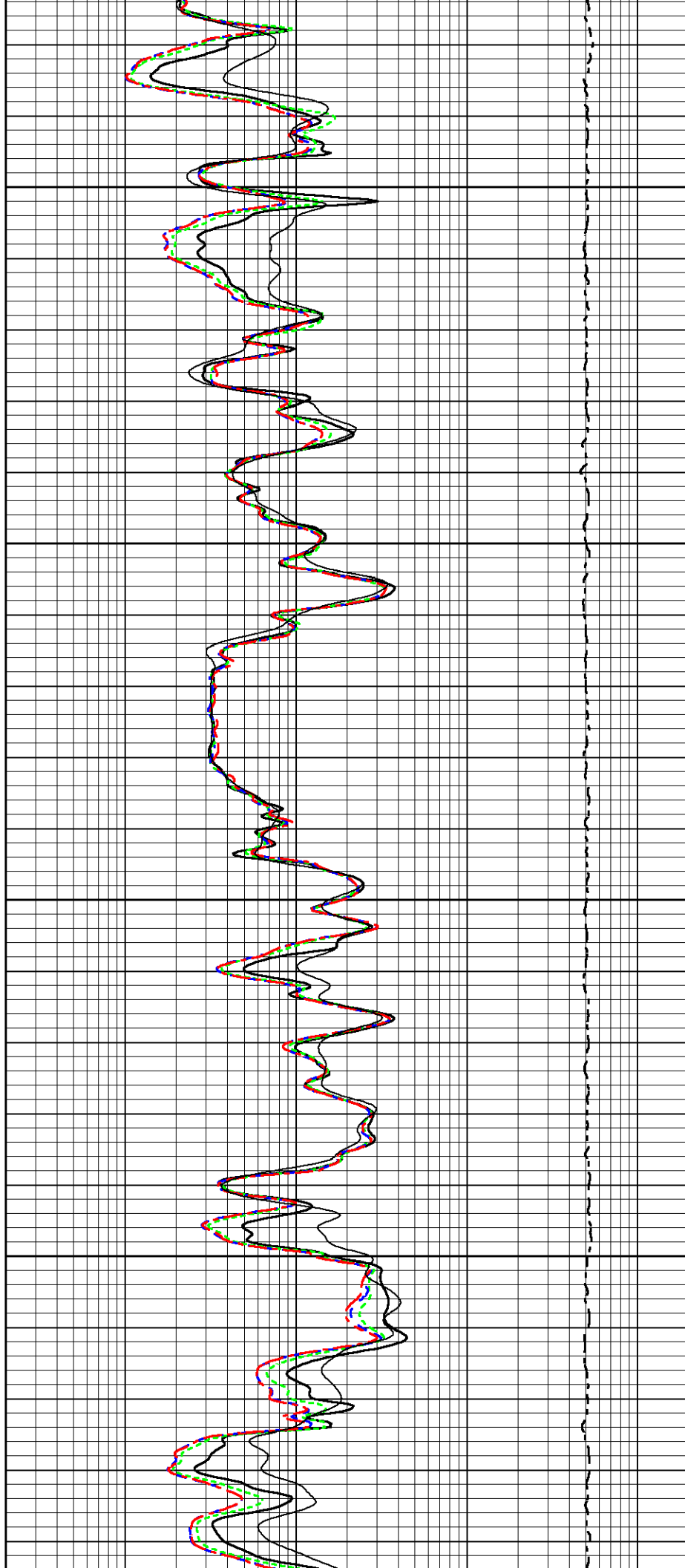
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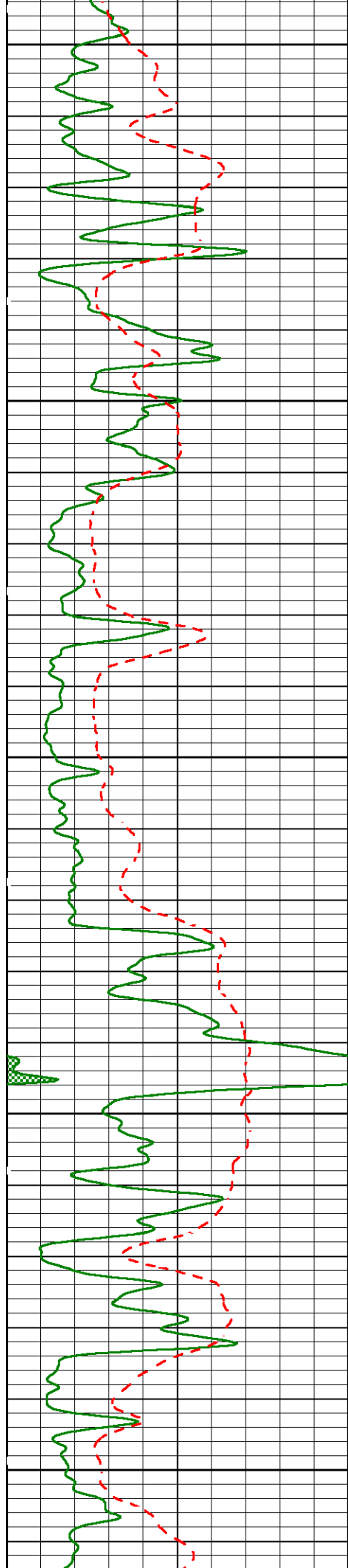




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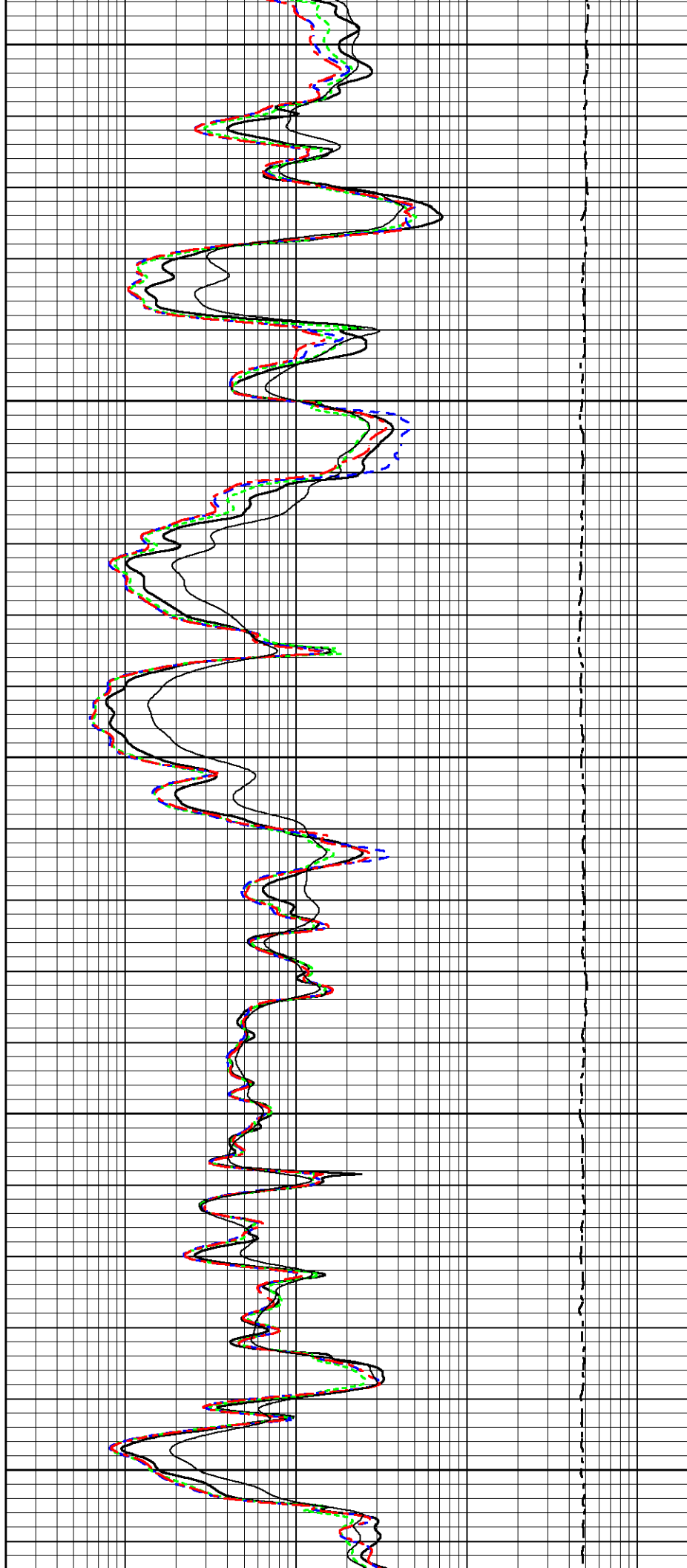


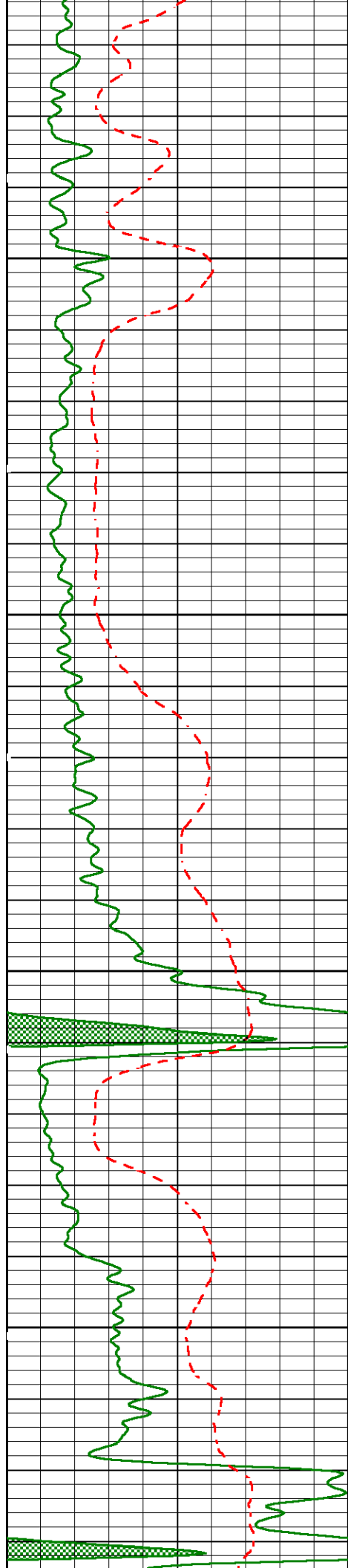


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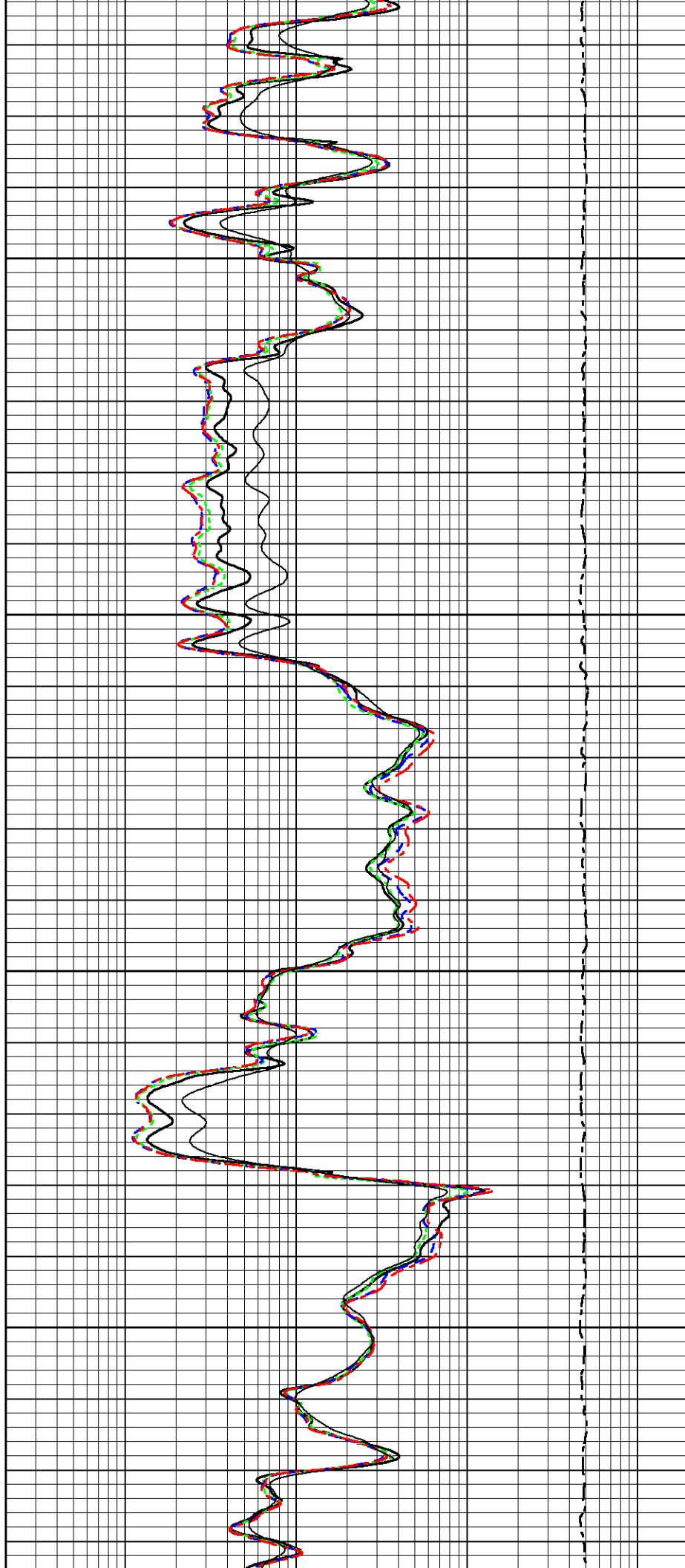
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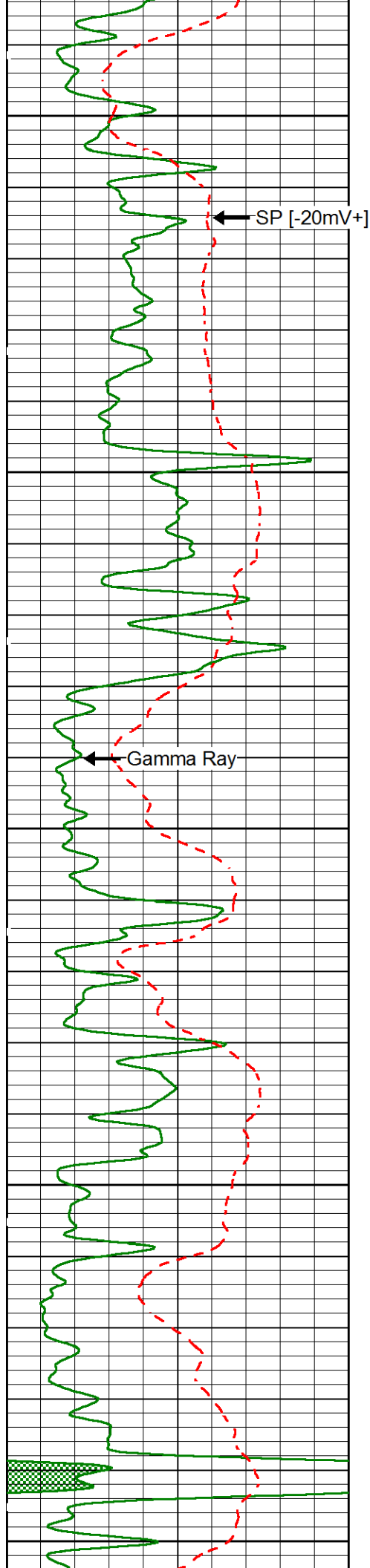




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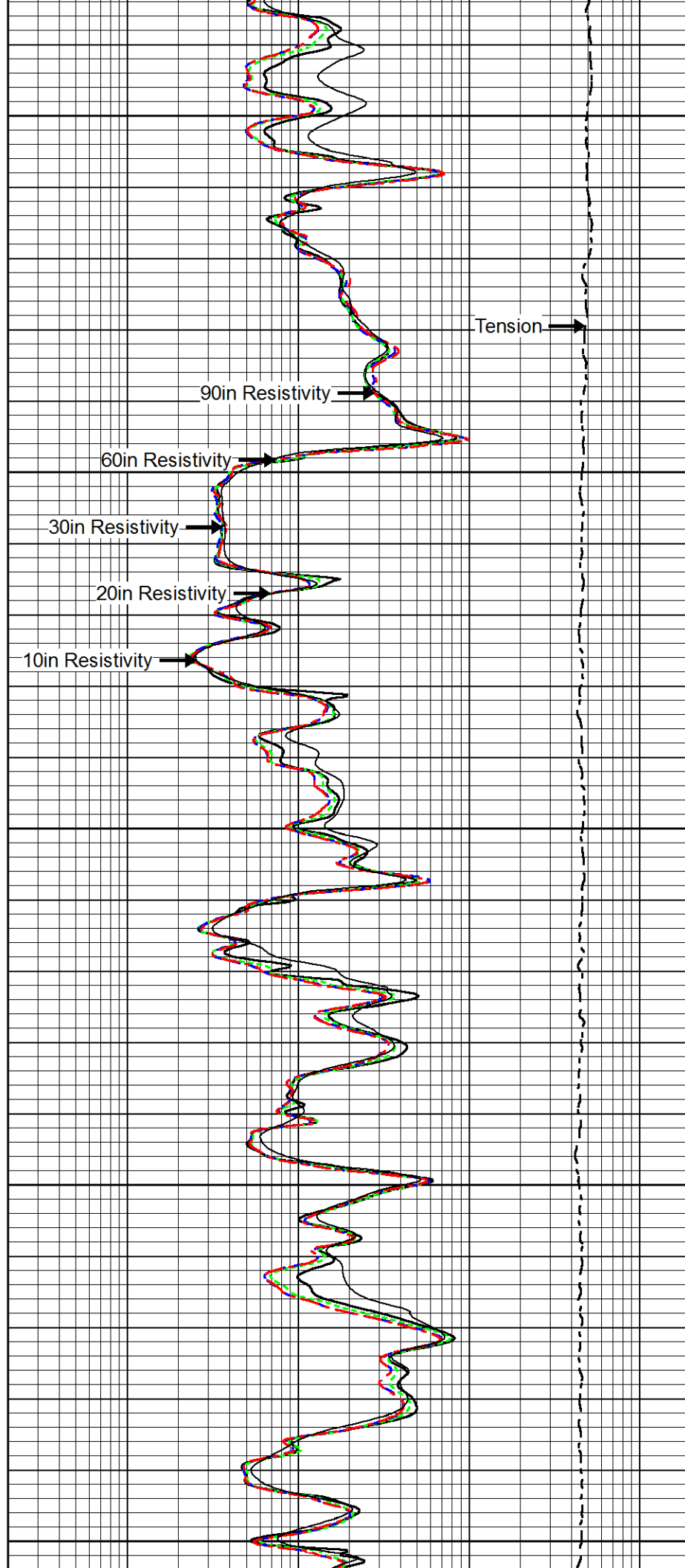
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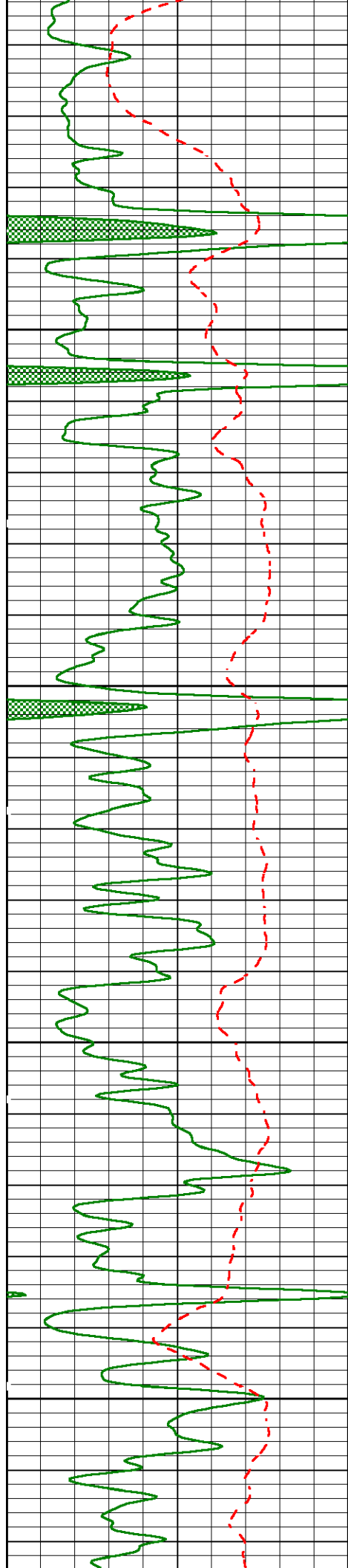




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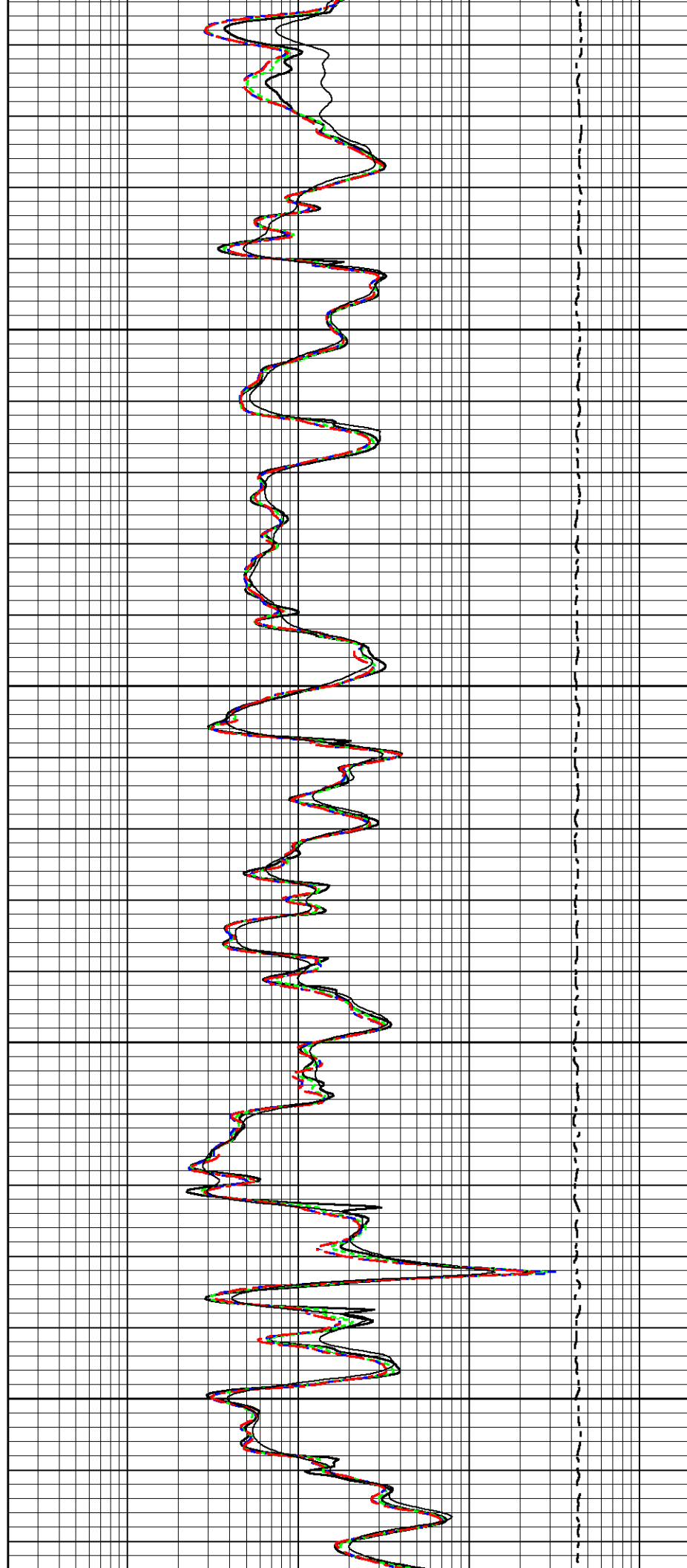
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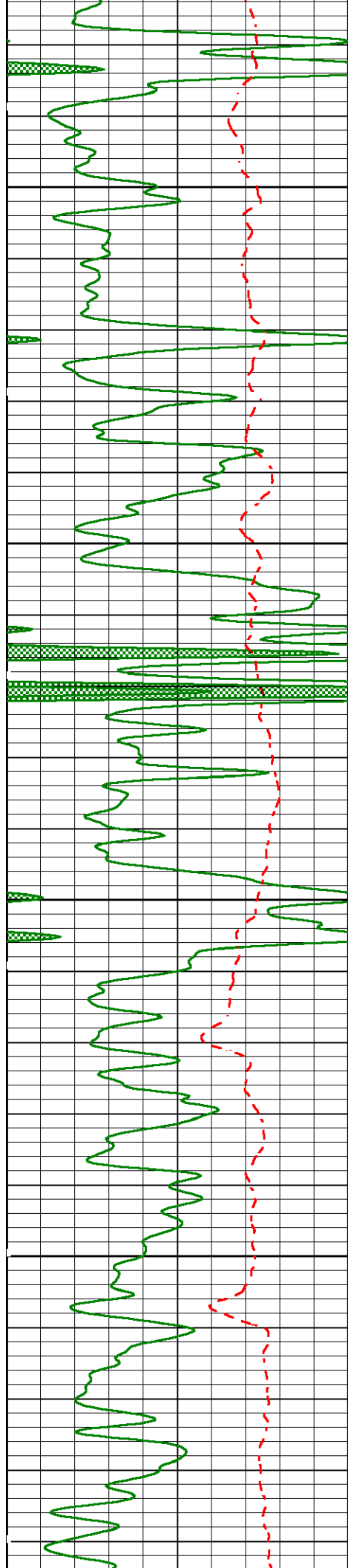




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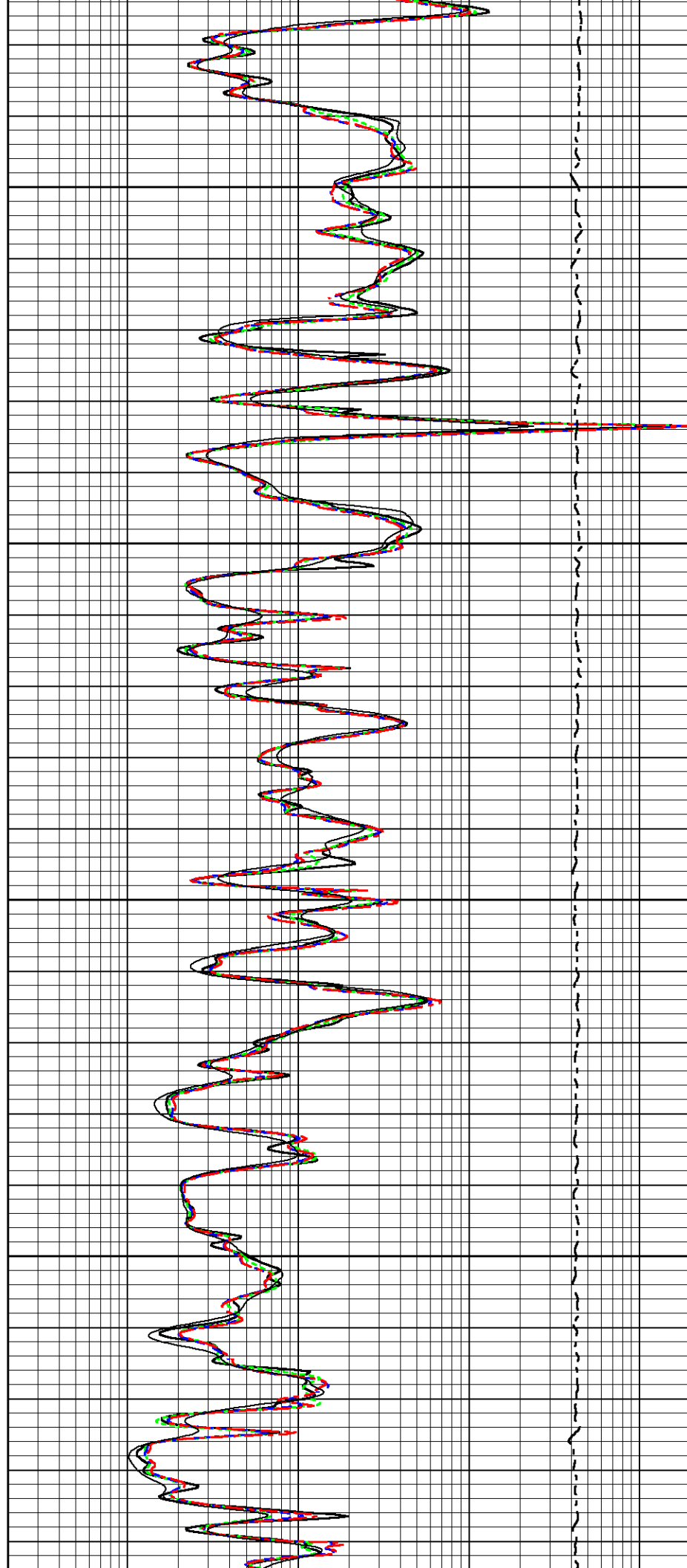
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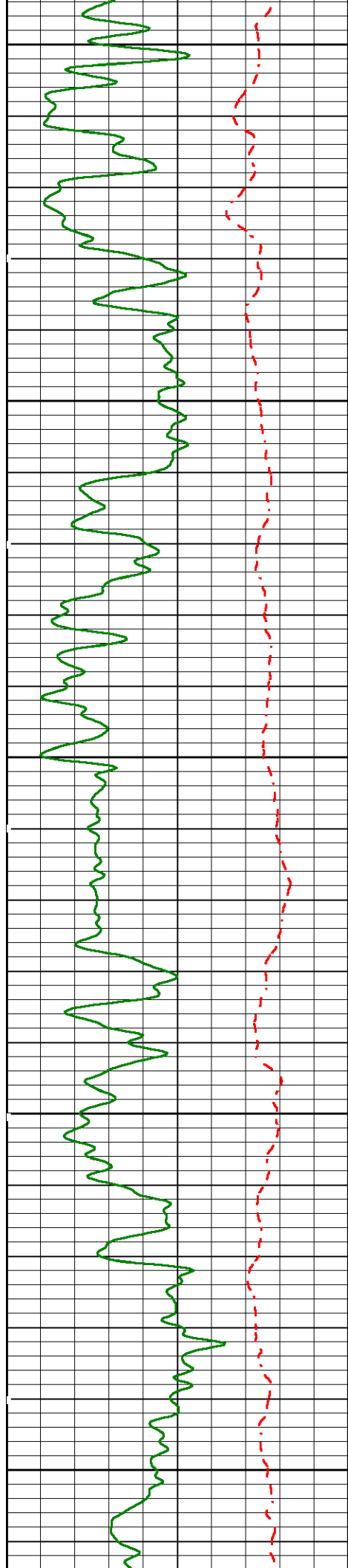




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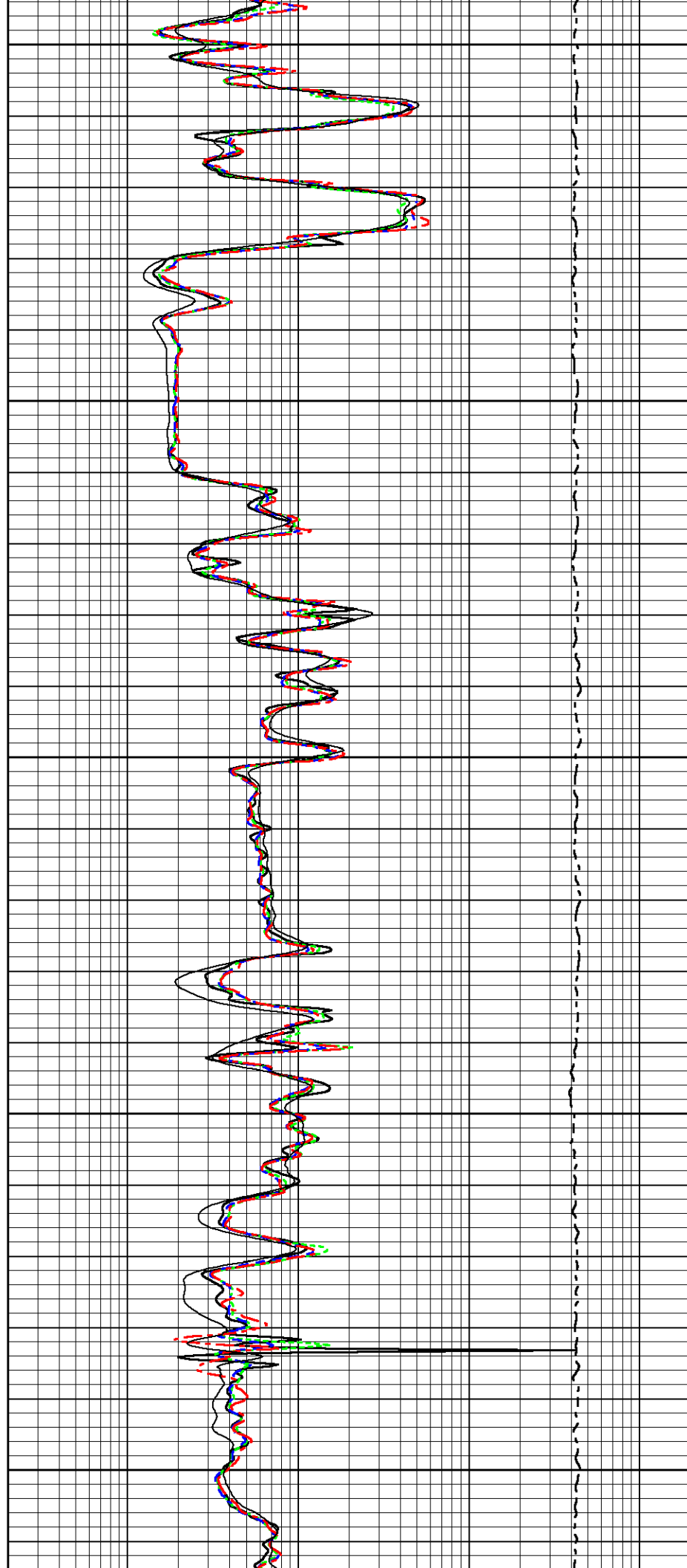


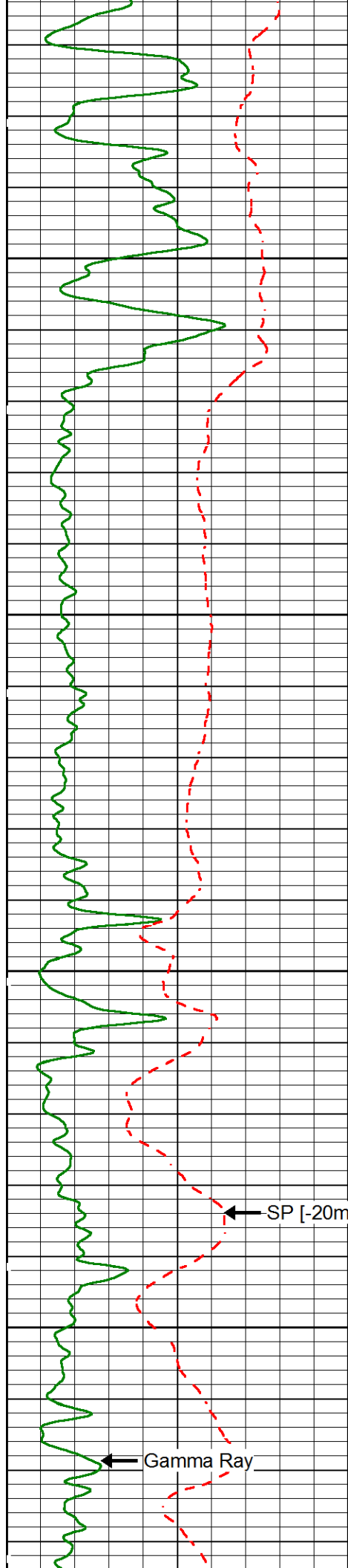


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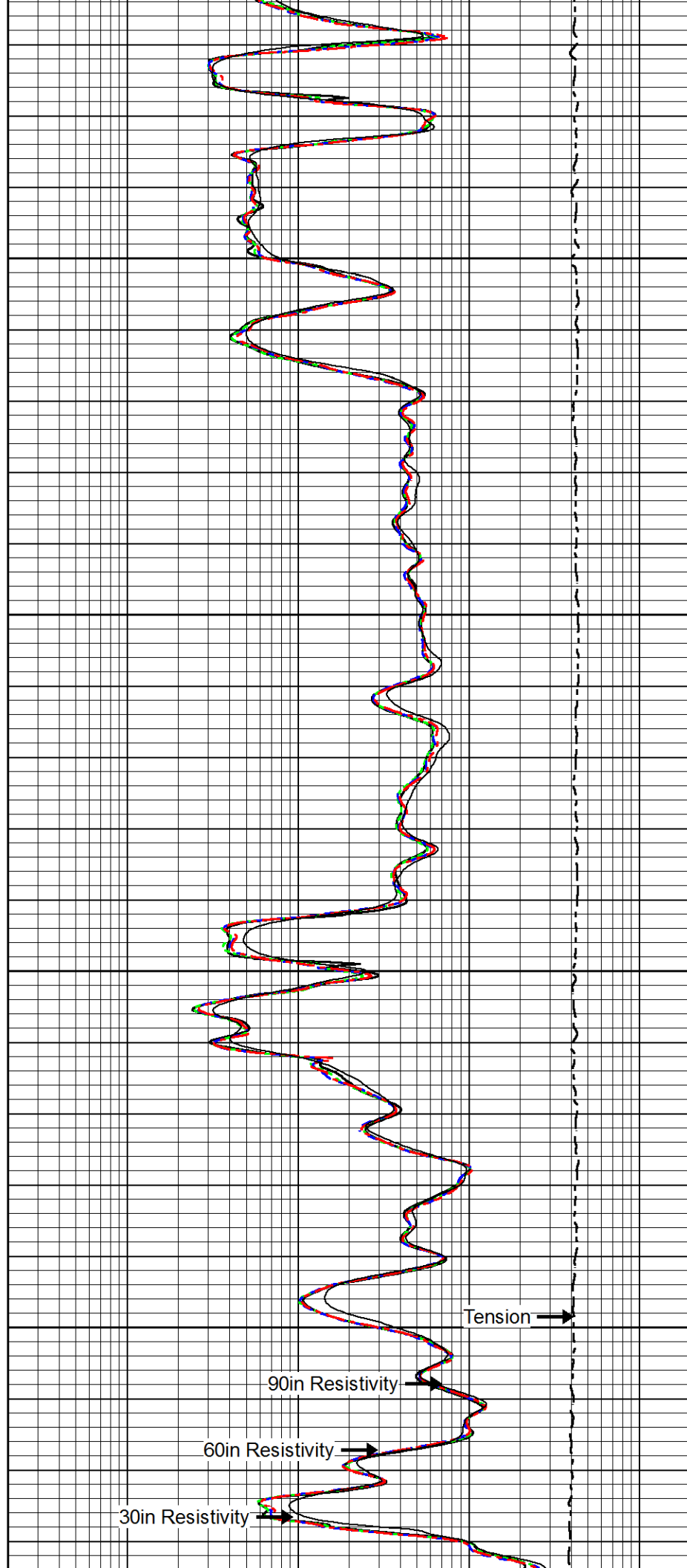


6100

6200

← SP [-20mV+]

← Gamma Ray

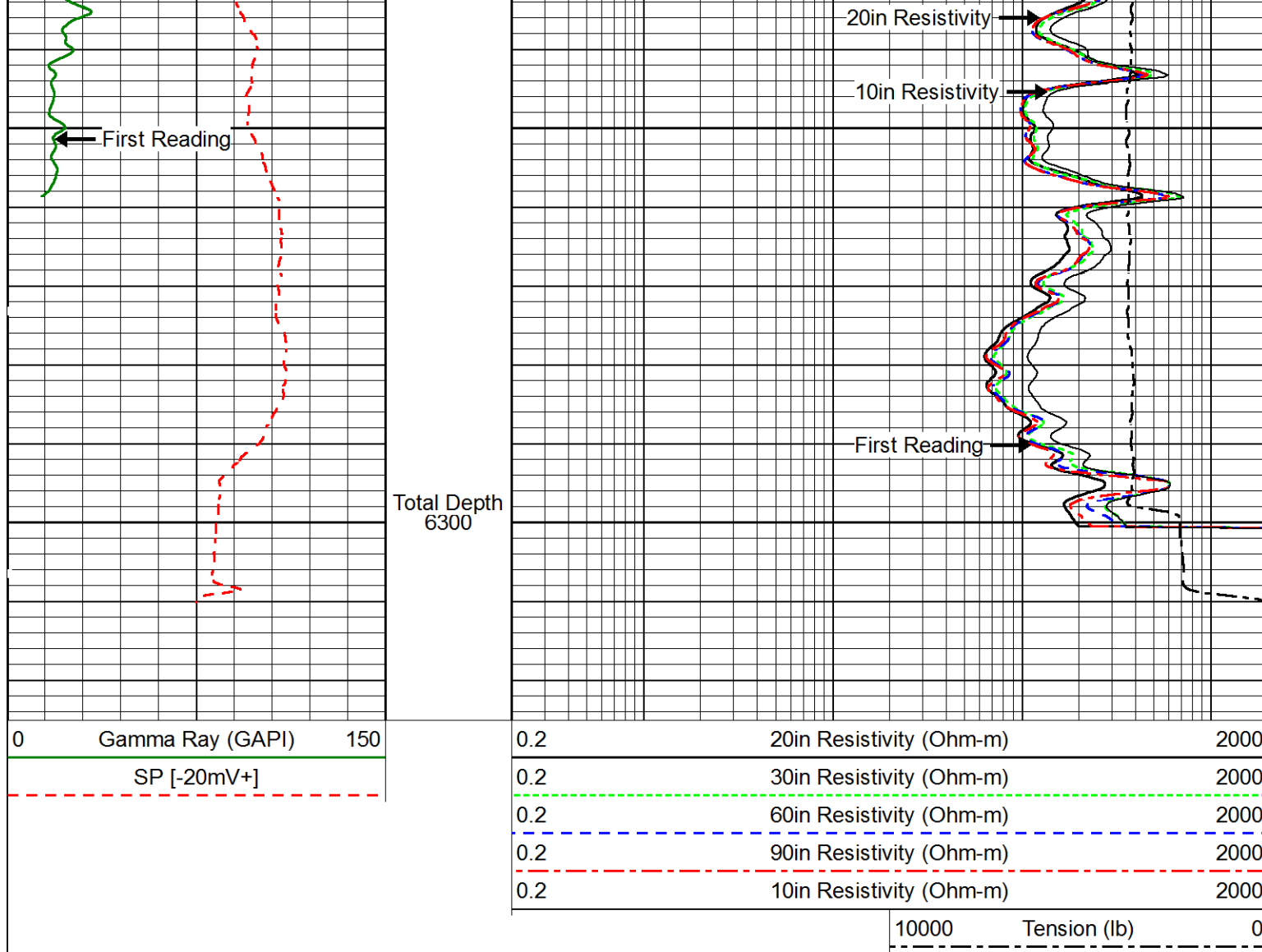


90in Resistivity

60in Resistivity

30in Resistivity

Tension →



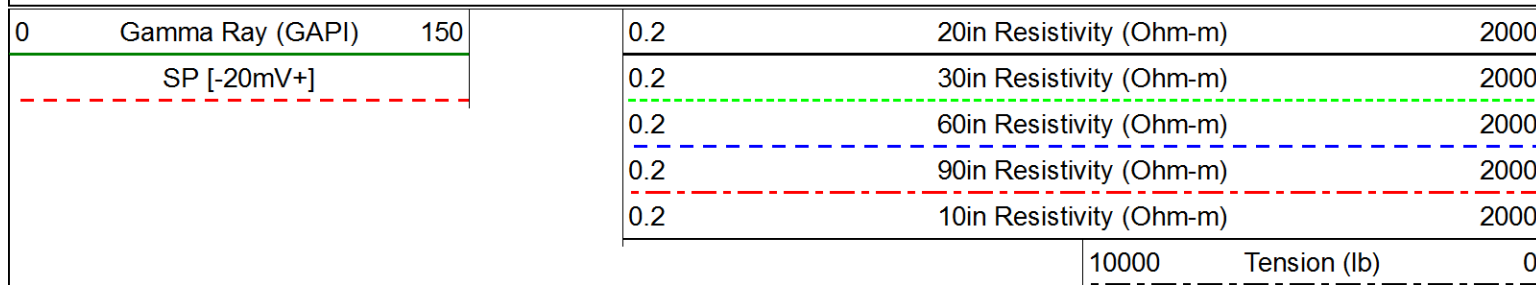
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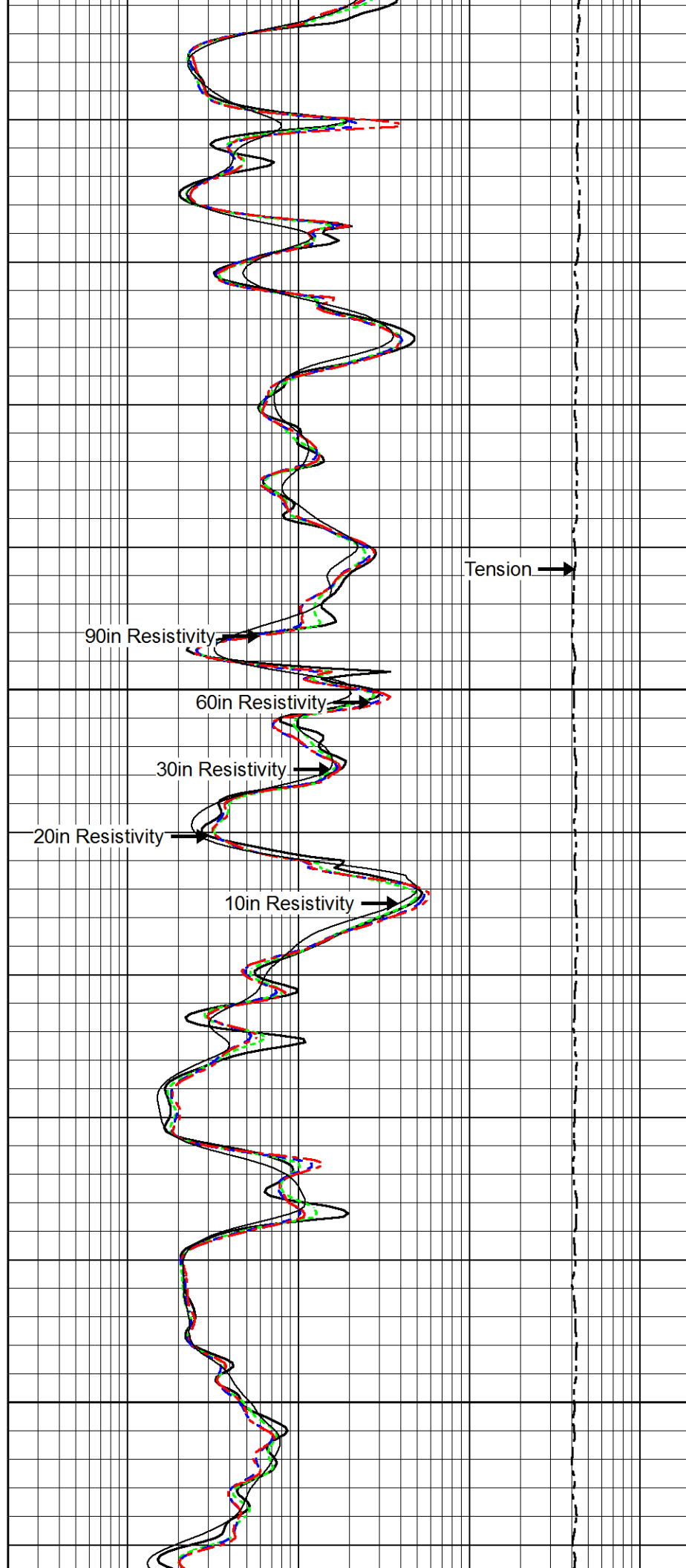
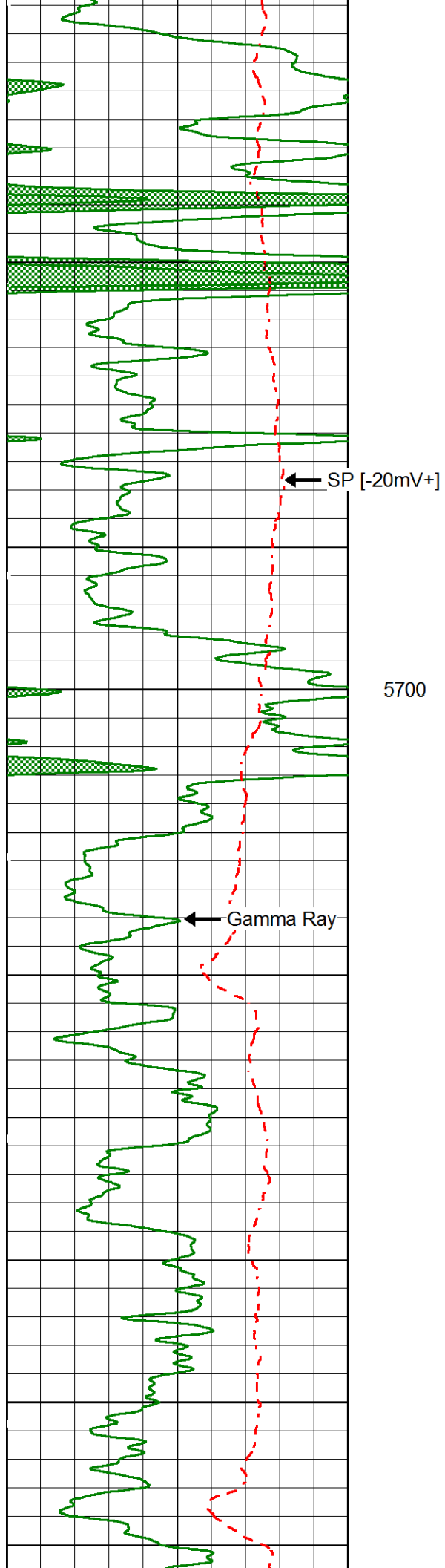
Main Pass

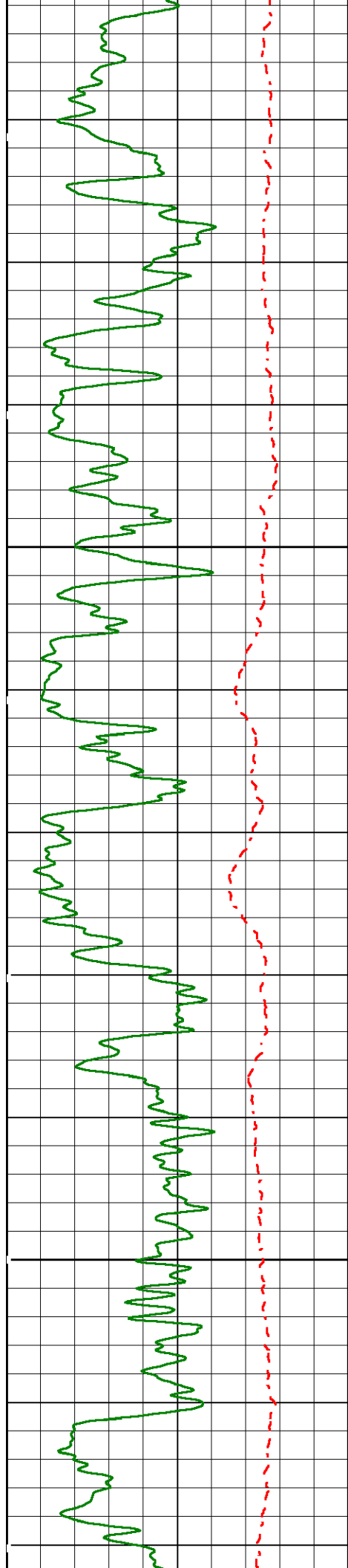
WIRELIN
LOGGING
SOLUTIONS

High Resolution Pass

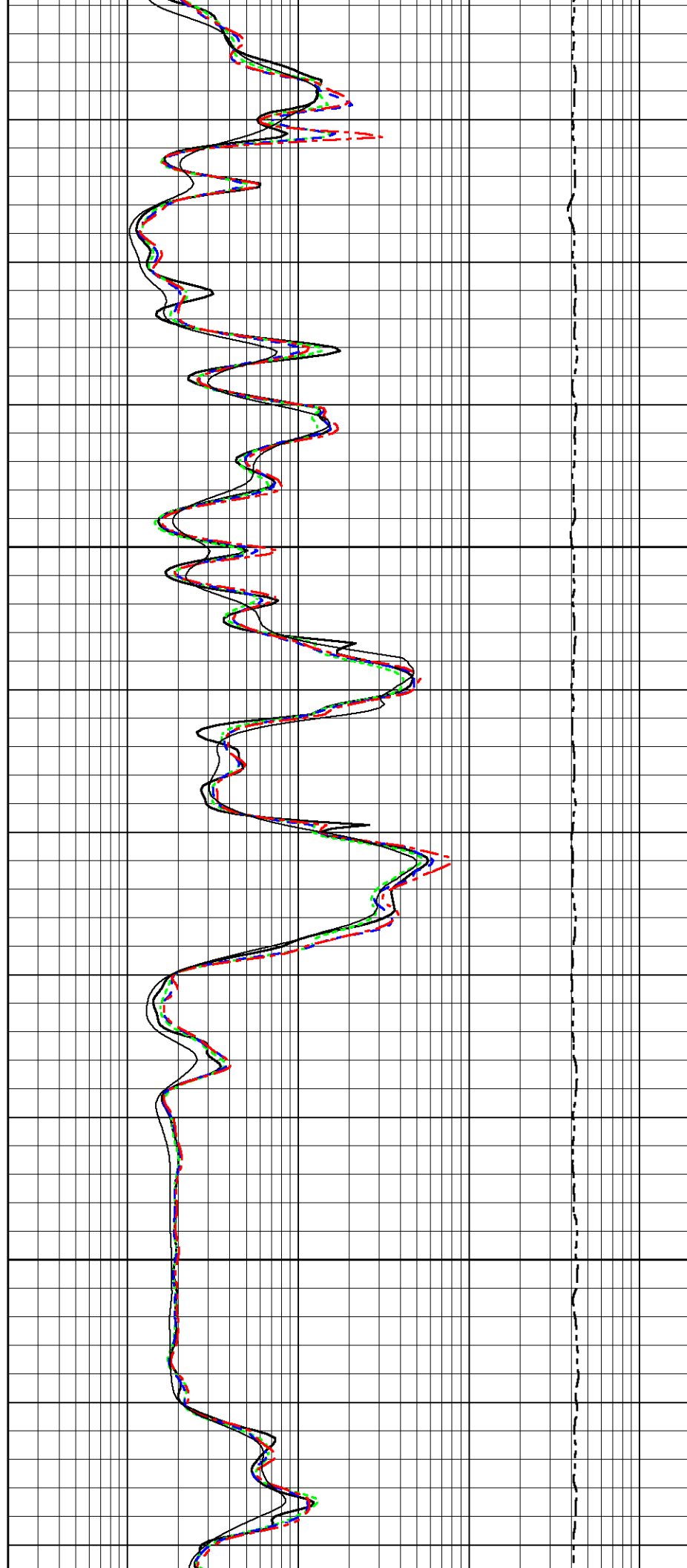
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Dataset Pathname HiRes
Presentation Format OKC-AI~1
Dataset Creation Mon May 18 01:52:50 2020 by Calc Sondex
Charted by Depth in Feet scaled 1:120



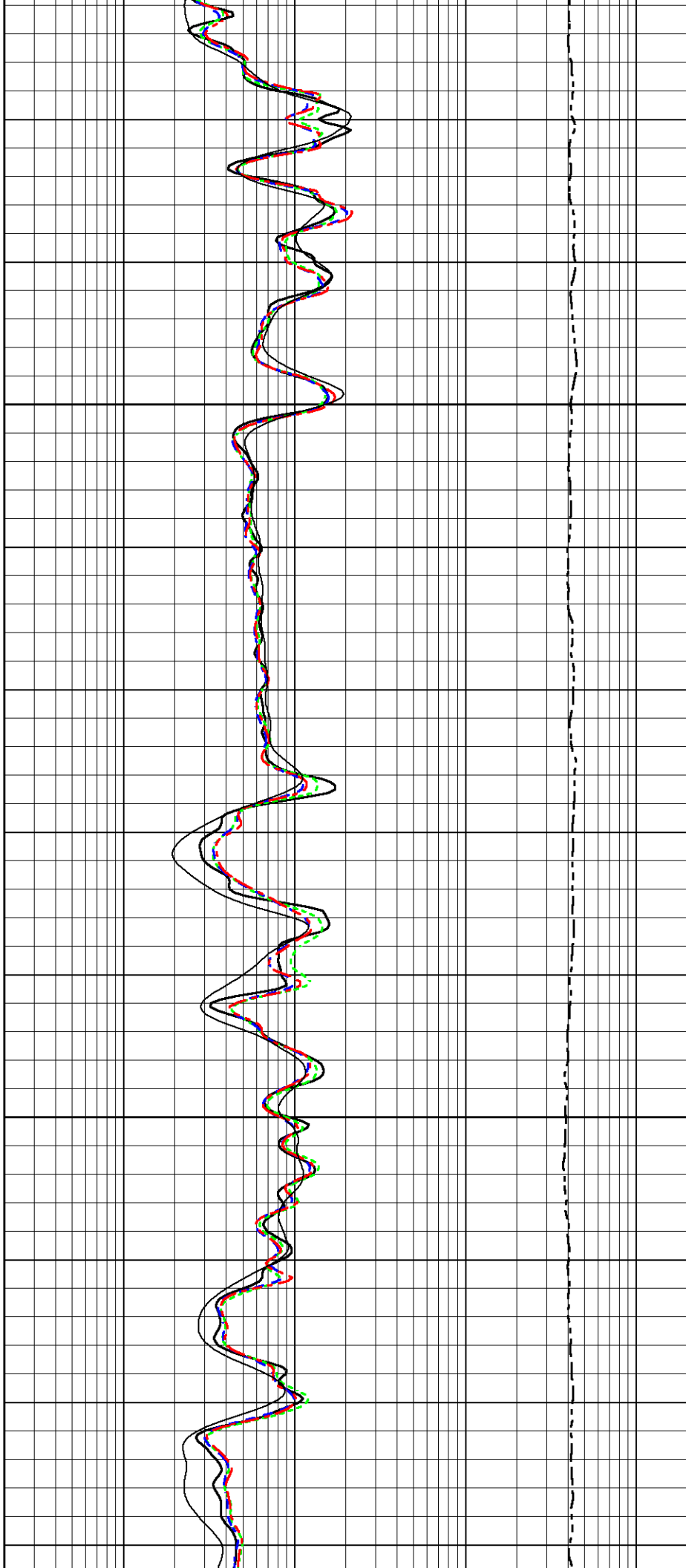
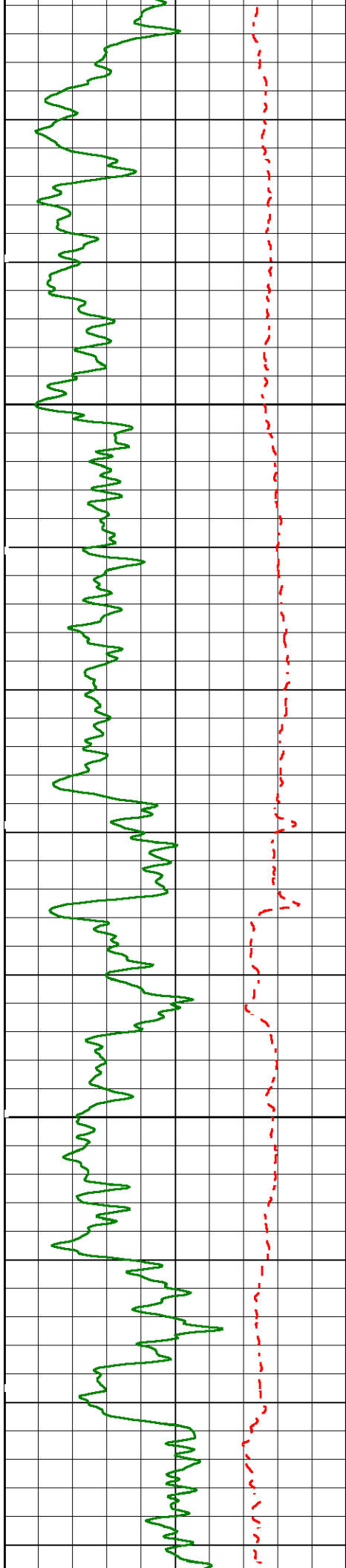




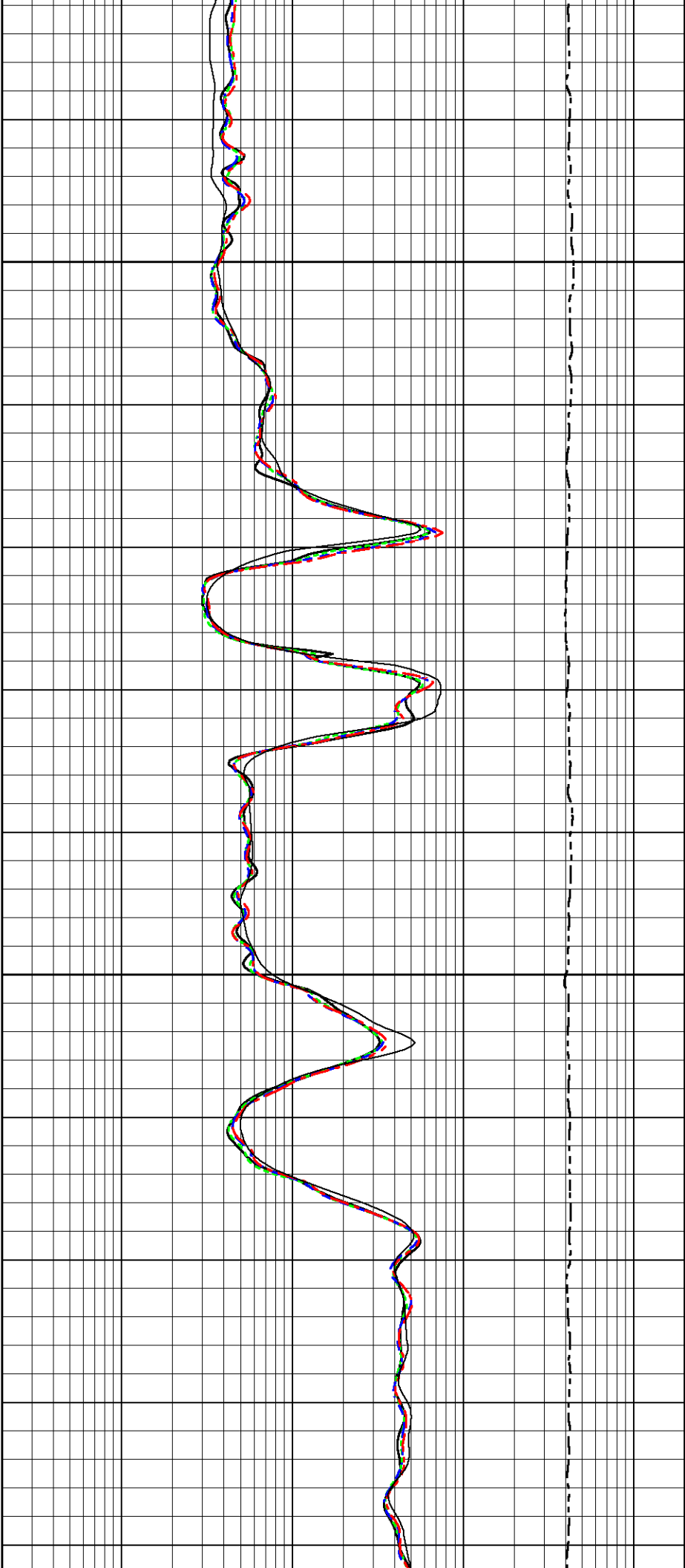
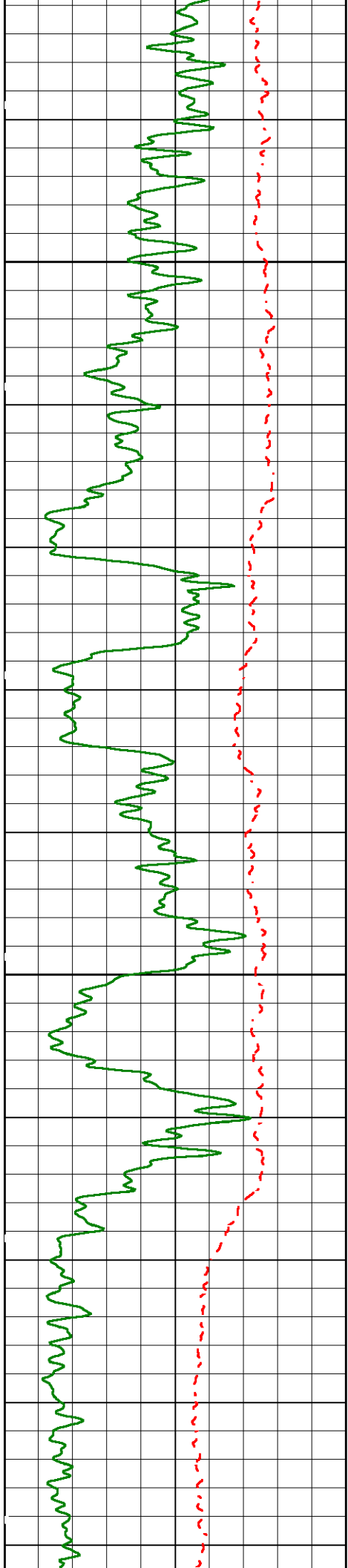
5800

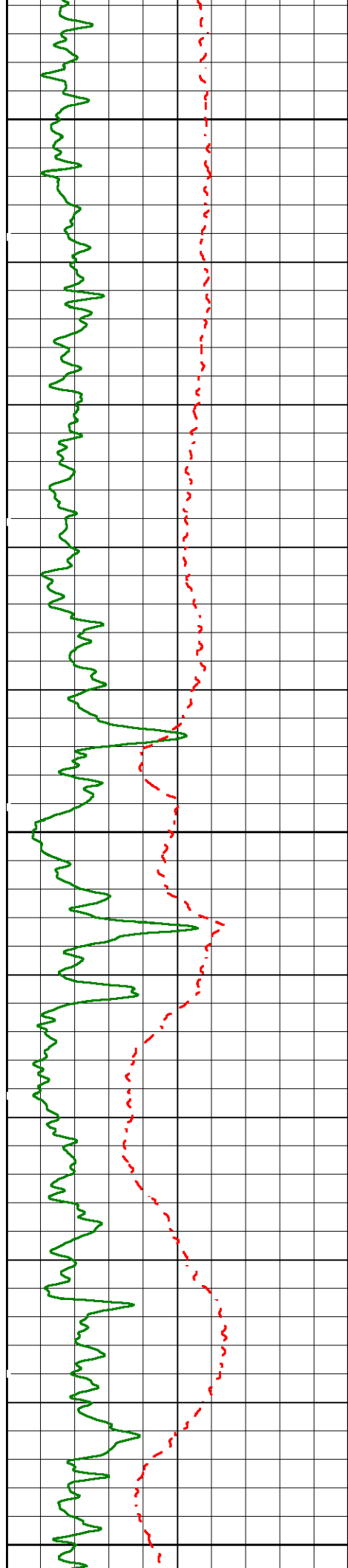


5900



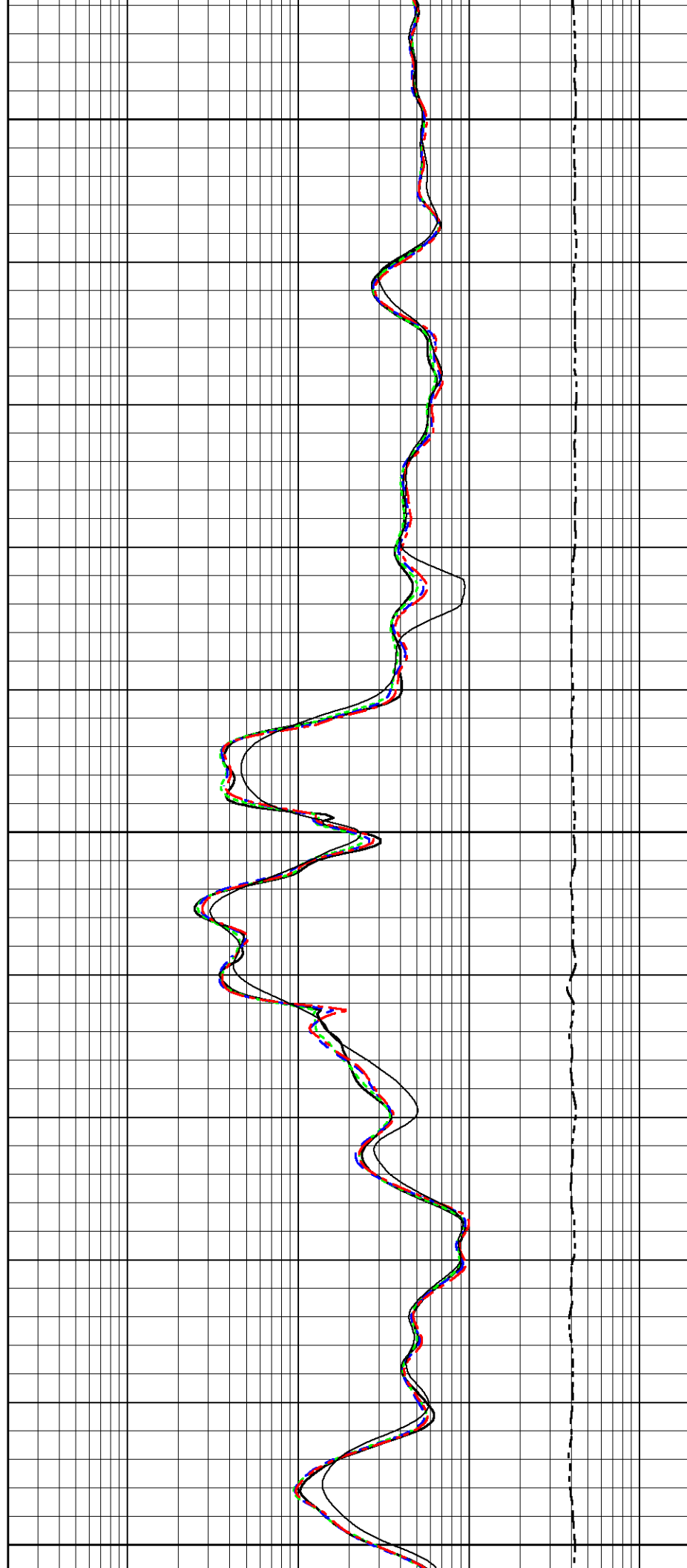
6000

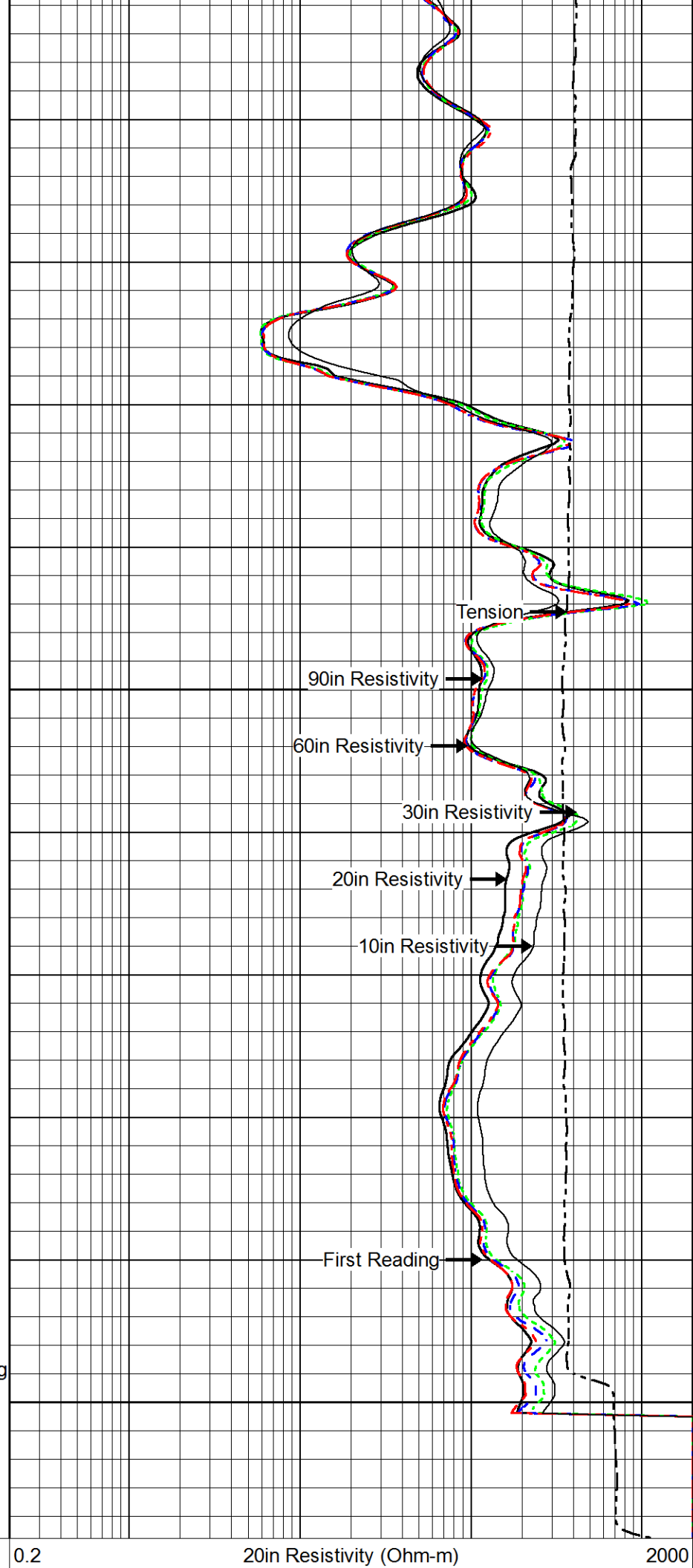
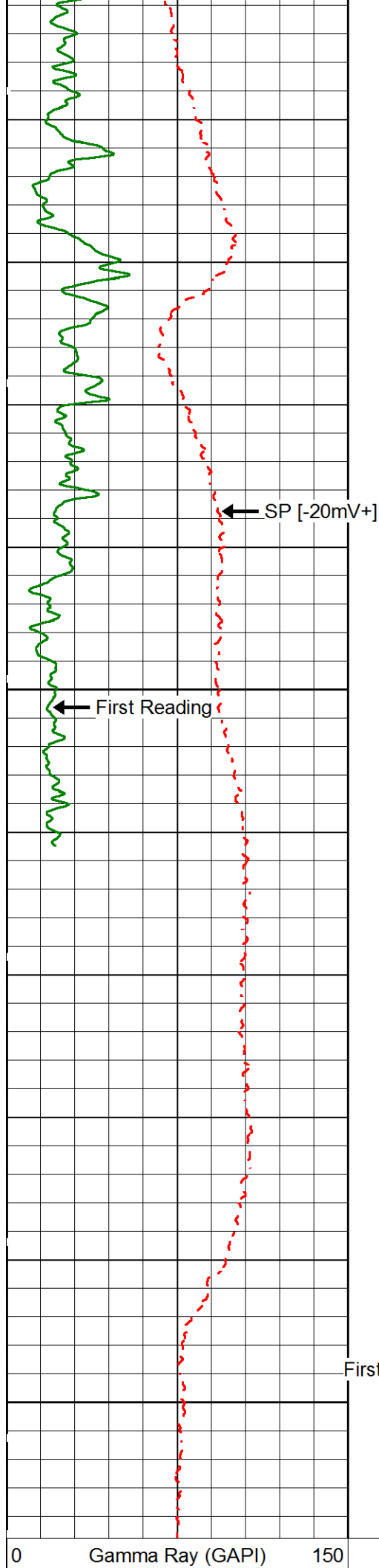




6100

6200





SP [-20mV+]

0.2	30in Resistivity (Ohm-m)	2000
0.2	60in Resistivity (Ohm-m)	2000
0.2	90in Resistivity (Ohm-m)	2000
0.2	10in Resistivity (Ohm-m)	2000
	10000	Tension (lb)
		0

WIRELINE
LOGGING
SOLUTIONS

High Resolution Pass

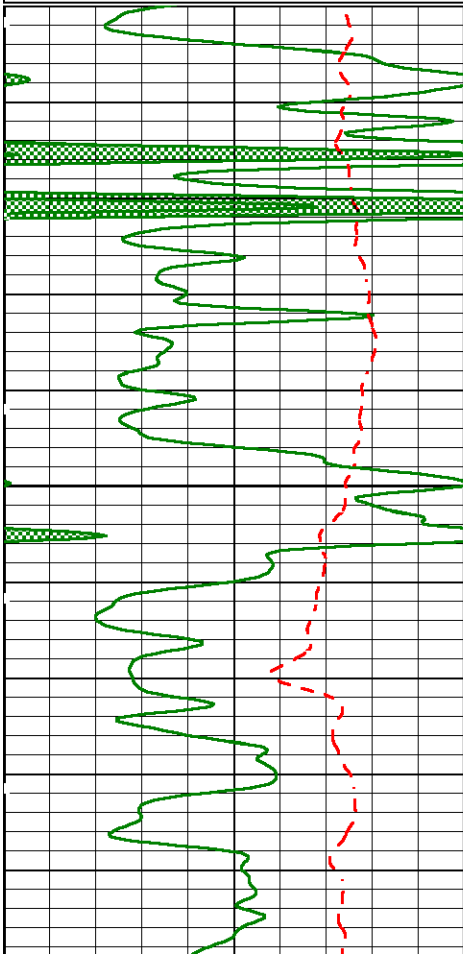
WIRELINE
LOGGING
SOLUTIONS

Repeat Pass

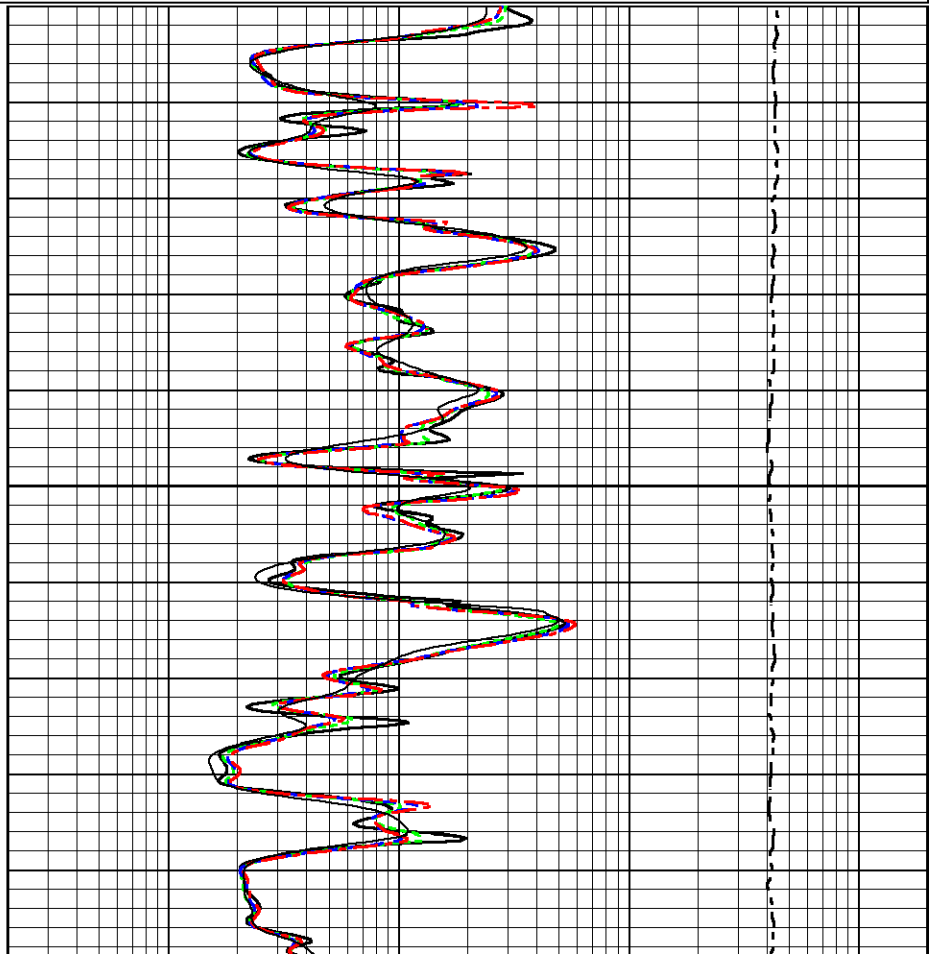
Database File obrien_keystone_6-4.db
Dataset Pathname RepeatPass
Presentation Format OKC-AI~1
Dataset Creation Mon May 18 01:56:32 2020 by Calc Sondex
Charted by Depth in Feet scaled 1:240

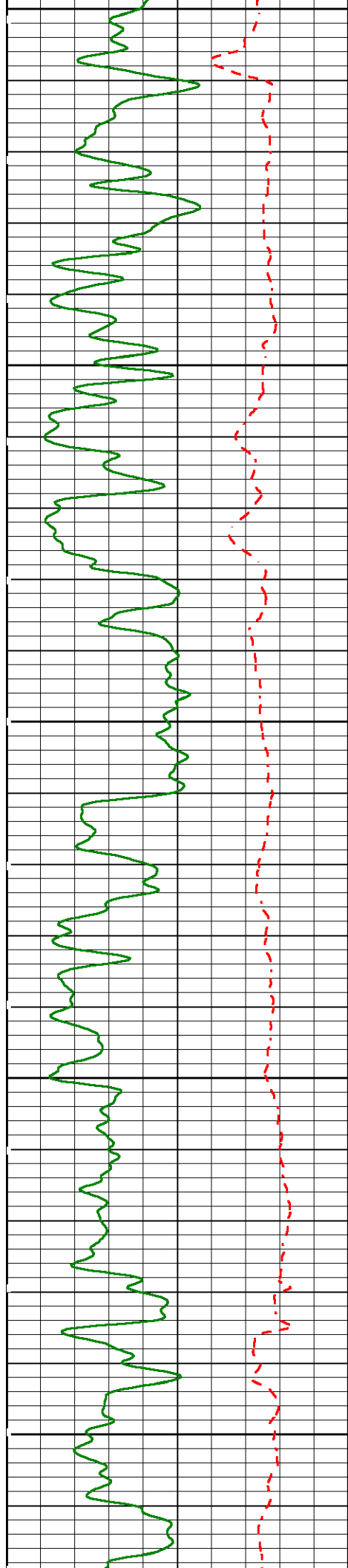
0 Gamma Ray (GAPI) 150
SP [-20mV+]

0.2	20in Resistivity (Ohm-m)	2000
0.2	30in Resistivity (Ohm-m)	2000
0.2	60in Resistivity (Ohm-m)	2000
0.2	90in Resistivity (Ohm-m)	2000
0.2	10in Resistivity (Ohm-m)	2000
	10000	Tension (lb)
		0



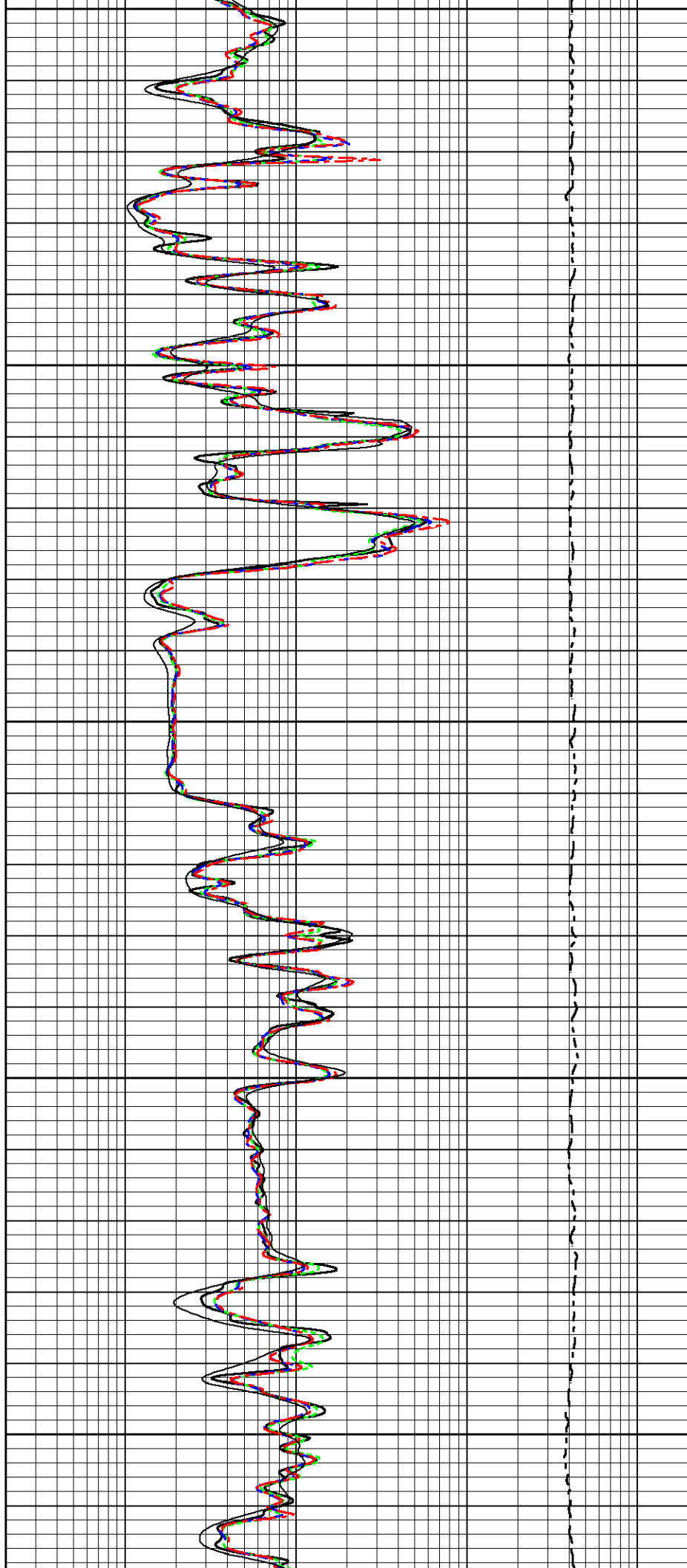
5700

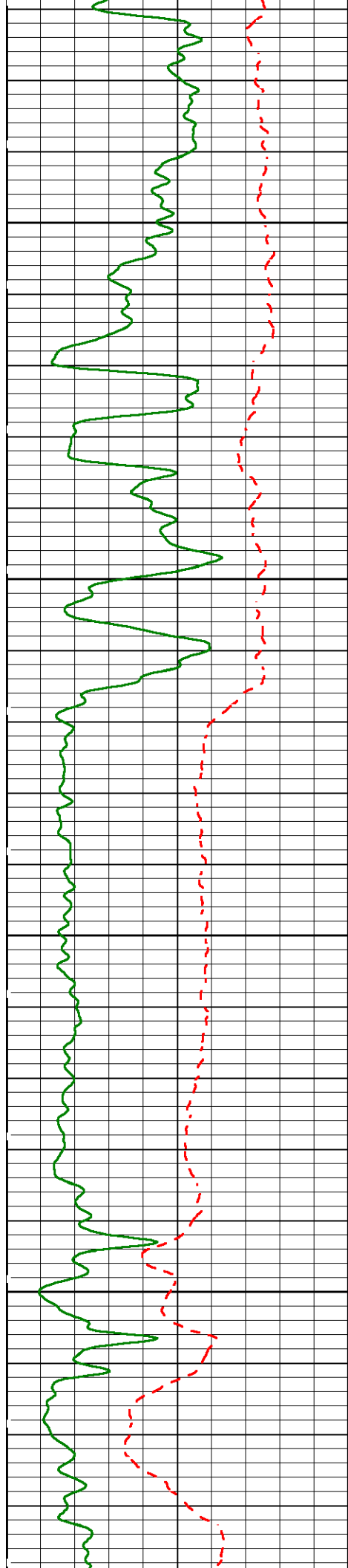




5800

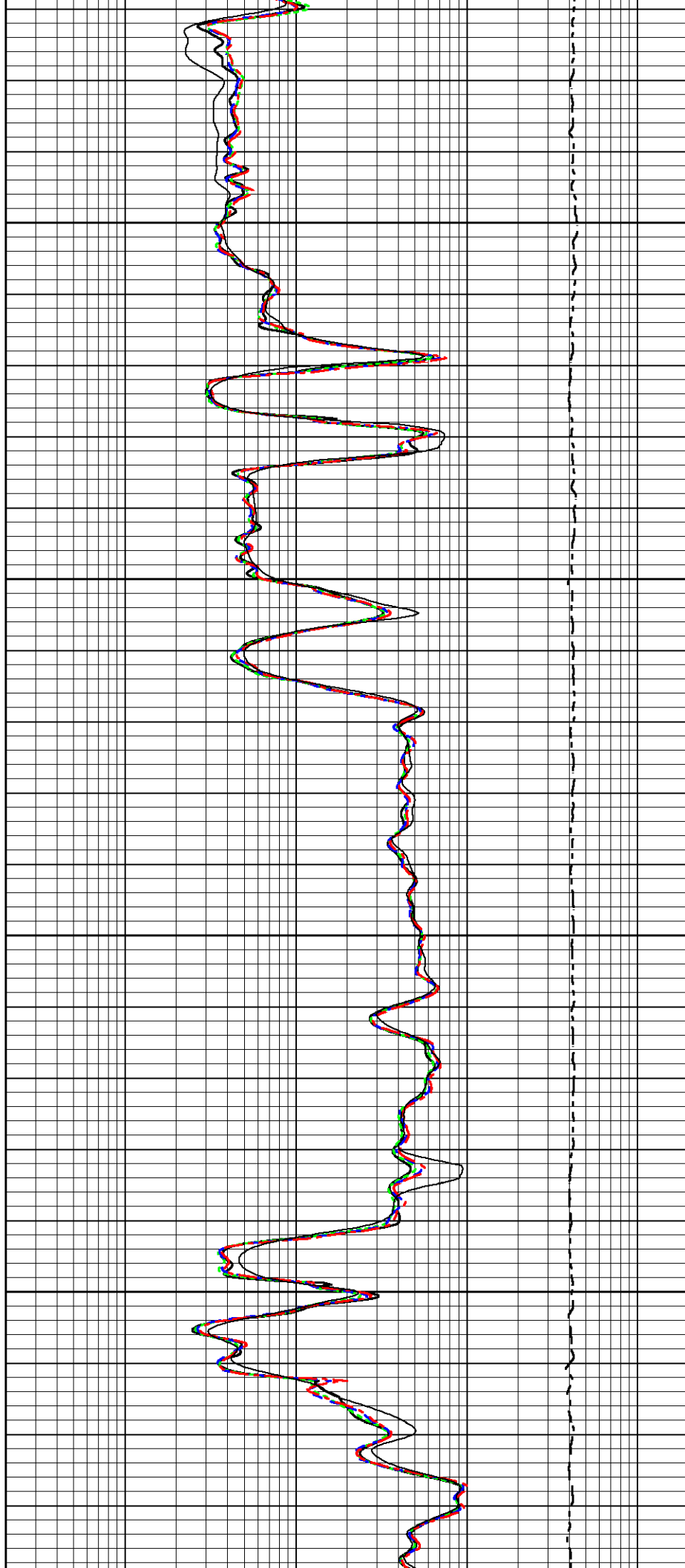
5900

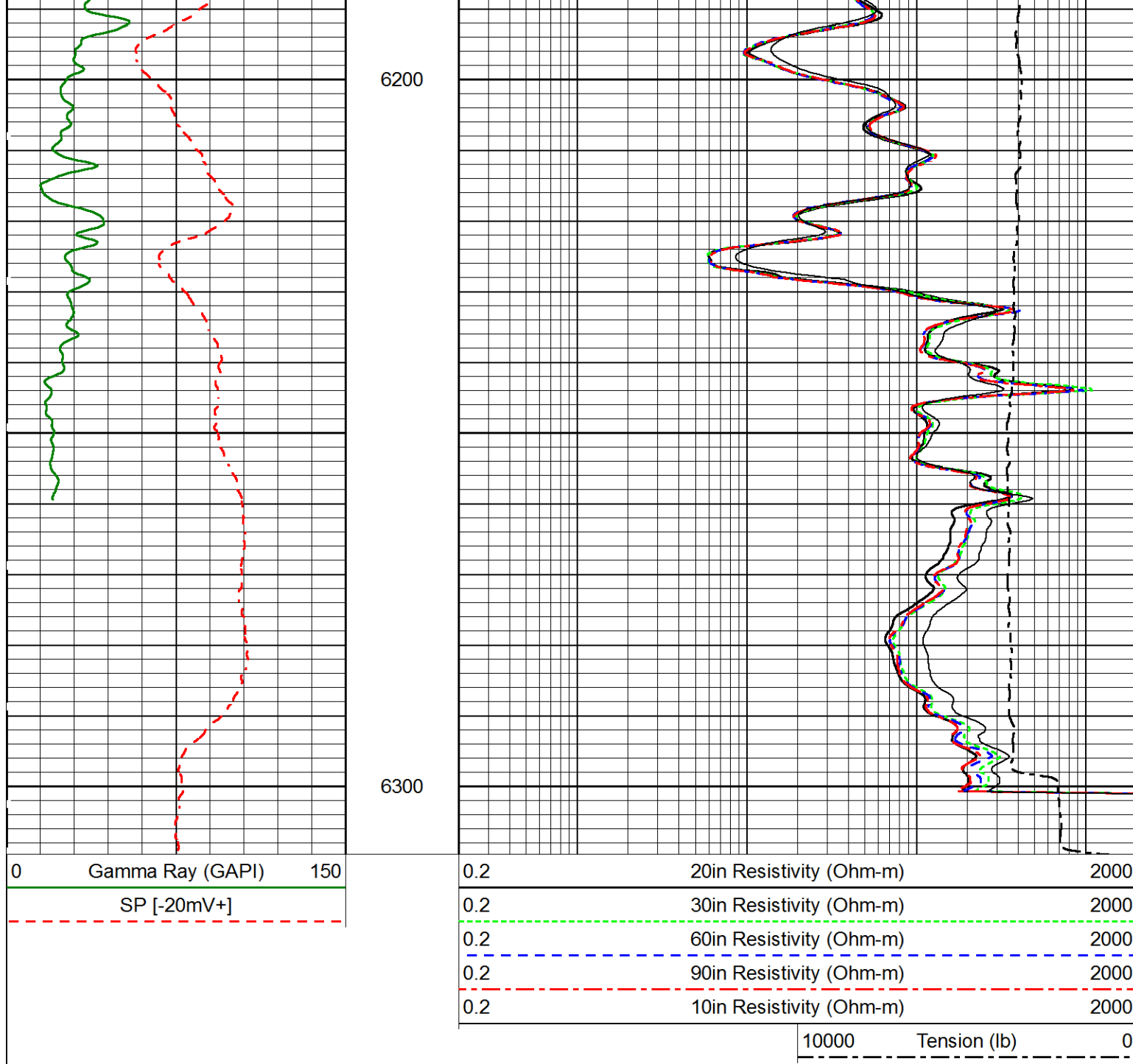




6000

6100





WIRESLINE
LOGGING
SOLUTIONS

Repeat Pass

Log Variables DatabaseC:\Sondex\Sondex Warrior\Data\obrien_keystone_6-4.db
Dataset field/well/run1/HiRes/_vars_

Top - 1573.00 ft

FRMSALIN kppm 0	MUDSALIN kppm 0	DEVI deg 0	SRFTEMP degF 68	SO in 0.25	DE-CENT Yes	CASED? Yes	CASEWGHT lb/ft 24
NPORSEL Limestone	AIR_HOLE? No	MudWgt lb/gal 9.2	FLUIDDEN g/cc 1	MATRXDEN g/cc 2.71	SPSHIFT mV 0	CASETHCK in 0	CASEOD in 8.625

PERFS	TDEPTH ft	BOTTEMP degF	BOREID in
0	6298	130	12.25

1573.00 ft - Bottom

FRMSALIN kppm 0	MUDSALIN kppm 0	DEVI deg 0	SRFTEMP degF 68	SO in 0.25	DE-CENT Yes	CASED? No	CASEWGHT lb/ft 11.5
NPORSEL Limestone	AIR_HOLE? No	MudWgt lb/gal 9.2	FLUIDDEN g/cc 1	MATRXDEN g/cc 2.71	SPSHIFT mV 0	CASETHCK in 0	CASEOD in 4.5
PERFS 0	TDEPTH ft 6298	BOTTEMP degF 130	BOREID in 7.875				

Calibration Report

Database File obrien_keystone_6-4.db
Dataset Pathname RepeatPass
Dataset Creation Mon May 18 01:56:32 2020 by Calc Sondex

Induction Array Tool Calibration Report

Serial Number: B12164
Tool Model: 002

Master Calibration Performed: Fri Mar 08 11:08:02 2019
Temperature: 62.3 degF

Sonde Error:

Array	1	2	3	4	5	6	7	
Real	209.1	-13.0	-59.4	-11.7	-2.8	1.0	4.3	mmho/m
Imaginary	-50.9	5.8	0.9	4.1	7.1	-13.1	-0.1	mmho/m

Loop Gain:

Array	1	2	3	4	5	6	7	
Loop (real)	537.7	678.5	1295.3	1394.1	1144.8	712.8	404.8	mmho/m
Loop (imaginary)	73.3	92.5	389.8	419.5	344.5	214.5	121.8	mmho/m
Real	825.1	793.4	1253.6	1409.7	1181.6	755.7	430.9	mmho/m
Imaginary	27.1	111.6	391.7	430.4	358.8	213.6	128.4	mmho/m
Gain (real)	0.873	0.841	0.987	0.981	0.967	0.945	0.949	
Gain (imaginary)	0.939	0.874	0.998	0.984	0.979	0.946	0.948	

Before Survey Verification Performed:

Sonde 1 Temperature: degF
Sonde 2 Temperature: degF
Array 1 Temperature: degF

Array	1	2	3	4	5	6	7
TxIR							
TxIX							
Tx Magnitude							

Gain

RxCR
RxCX
RxC Magnitude

Tool Module Parameters

Software Version: 8.0.0.4

Borehole Size Source:	CALI
Mud Resistivity Source:	MUDRES
Mud Resistivity At Surface:	N/A
Mud Resistivity Surface Temperature:	N/A
Borehole Corrections:	Automatic
Minimum Standoff:	0.4 in

Litho Density Tool Calibration Report

Serial Number:	B0063S50129B
Tool Model:	B10063

Caliper Calibration Performed:	Fri May 15 11:18:11 2020
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	Diameter		Reading	
Small Ring:	9.000	in	1891.800	cps
Large Ring:	13.000	in	2244.100	cps
Gain:	0.0114			
Offset:	-12.4794			

Master Calibration Performed:	Fri May 15 10:52:09 2020
-------------------------------	--------------------------

Source Number:	50129B
Medium:	Water
Al Block Density:	2.6014 g/cc

	Background	Al Block	Al Block + Fe	
SS1	662.1	3915.5	3603.1	cps
SS2	1866.7	26468.7	24190.6	cps
SSTOTAL	4364.1	42048.0	38112.2	cps
LITH	73.2	438.7	283.6	cps
LL	144.4	725.5	691.6	cps
LU	411.6	901.7	880.6	cps
LS	556.0	1627.2	1572.2	cps
LSTOTAL	1047.9	4025.8	3505.5	cps
SSHV	1462.5	1464.4	1465.3	V
LSHV	1468.7	1467.1	1468.2	V
SSFF	0.006	0.009	0.004	
LSFF	0.007	0.005	0.005	

Before Survey Verification Performed:	Mon Feb 24 10:39:31 2020
After Survey Verification Performed:	Mon Feb 24 10:45:14 2020

	Master Background	Before Survey Background	After Survey Background	
SS1	662.1	662.3	666.4	cps
SS2	1866.7	1872.6	1878.1	cps
SSTOTAL	4364.1	4372.7	4388.1	cps
LITH	73.2	74.5	73.9	cps
LL	144.4	144.8	142.6	cps
LU	411.6	410.2	414.9	cps
LS	556.0	555.0	557.5	cps
LSTOTAL	1047.9	1049.2	1050.2	cps
SSHV	1462.5	1467.0	1467.2	V
LSHV	1468.7	1471.5	1471.5	V
SSFF	0.006	0.003	0.009	
LSFF	0.007	0.006	0.004	

Tool Module Parameters

Software Version:	8.0.0.6
Borehole Size Source:	BOPEID

Borehole Size Source:
Pad Type:

BOREHOLE
2

Compensated Neutron Tool Calibration Report

Serial Number: C10071
Tool Model: 009

Master Calibration Performed: Fri May 15 08:32:16 2020
Source Number: 87624G
Short Spacing Counts: 4685.07 cps
Long Spacing Counts: 170.48 cps
High Voltage: 1364.05 V
Target Ratio: 27.2000
Ratio: 27.4816
K-Factor: 0.9898

Before Survey Verification Performed: Fri May 15 08:39:23 2020
After Survey Verification Performed: Fri May 15 08:40:36 2020
Verifier Number: 6489

Verifier Values	Master Cal	Before Survey	After Survey	
Short Spacing Counts:	264.29	267.98	268.28	cps
Long Spacing Counts:	260.11	261.87	263.74	cps
High Voltage:	1364.02	1364.01	1364.01	V
Ratio:	1.0161	1.0233	1.0172	

Tool Module Parameters

Software Version: 8.0.0.5
Borehole Size Source: CALI
Clip Crossplot Porosity: YES
Lithology Identification Parameters:
Calcite Quartz Dolomite
Uma: 13.77 4.79 9.03 barns/cc
RHOMA: 2.71 2.65 2.88 g/cc

Micro Electric Log Calibration Report

Serial Number: 10021240
Tool Model: 003

Caliper Calibration Performed: Mon Nov 13 12:40:50 2017

	Pad Arm			Backup Arm		
	Radius		Reading	Radius		Reading
Small Jig:	9.000	in	1847.200	9.000	in	1677.000
Large Jig:	13.000	in	2371.600	13.000	in	2315.300
Gain:			0.0076			0.0063
Offset:			-5.0900			-1.5092

Pad Calibration

	Inverse	Normal
Gain:	1.0000	1.0000
Offset:	0.0000	0.0000

Tool Module Parameters

Software Version: 8.0.0.4

Gamma Ray Calibration Report

Serial Number:	C10049	
Tool Model:	001	
Performed:	Thu Apr 16 17:15:15 2020	
Calibrator Value:	156.0	GAPI
Background Reading:	63.7	cps
Calibrator Reading:	494.2	cps
Sensitivity:	0.3624	GAPI/cps

Borehole Fluid Resistivity Calibration Report

Serial Number:	P004
Tool Model:	002
Master Calibration Performed:	Wed May 25 15:17:37 2016
Resistivity Polynomial Equation:	
0.1429x^3 - 0.4495x^2 + 1.2097x - 0.2854	
Temperature Calibration:	
Reference	Reading
71.60 degF	559.80 bits
167.00 degF	659.50 bits

Head Tension Unit Calibration Report

Serial Number:			00001		
Tool Model:			011		
Performed:			Mon Mar 04 10:52:43 2013		
Point #	Reference		Reading		
1	-19894.000	lb	8957.860	cps	
2	-15010.000	lb	13965.100	cps	
3	-9998.000	lb	19079.100	cps	
4	-5007.000	lb	24133.000	cps	
5	-1009.000	lb	28232.100	cps	
6	1017.000	lb	30185.400	cps	
7	5040.000	lb	34439.700	cps	
8	9970.000	lb	39346.900	cps	
9	14955.000	lb	44466.000	cps	
10	19770.000	lb	49397.800	cps	

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)	
HTEN	55.67		CHD-WFT (WFT01) Weatherford Cable Head	2.67	2.25	15.00	
			X-Over-WFT (0001) Weatherford X-Over	1.13	3.38	5.00	
CCL	53.15		XTU-008 (C10067) Crossover Ultrawire Toolbus to Ultralink	2.08	3.38	47.00	
			HTU-011 (00001) Head Tension Unit	2.18	3.38	55.00	
BFR	50.41		CCL-028 (252350) Casing Collar Locator	1.61	3.13	36.00	
			BFR-002 (P004) Borehole Fluid Resistivity Tool	4.39	3.38	94.00	
GR	47.64		GRT-001 (C10049) Gamma Ray Tool	3.22	3.38	69.00	
			Overbody-Over-cen	3.00	3.38	10.00	

			Overbody Centralizer	9.27	3.38	209.00
MEL	37.67		MEL-003 (10021240) Micro Electric Log	9.27	3.38	209.00
			CEN-001 (000028) Inline OH Springbow Centraliser	4.27	3.38	66.00
			KJT-001 (10010514) Knuckle Joint	2.86	3.38	72.00
CNLSC CNSSC	25.59 25.09		CNL-009 (C10071) Compensated Neutron Logging Tool	5.28	3.38	100.00
			LDT-B10063 (B0063S50129B) Litho Density Tool	9.75	4.50	310.00
LDT	15.44		Overbody-Standoff Standoff (Rubber)	1.00	4.50	4.00
IAT	8.44		IAT-002 (B12164) Induction Array Tool	13.22	3.88	196.00
SP	0.42		Shorty-Short Short Hole Finder	0.38	3.88	6.00
Dataset: obrien_keystone_6-4.db: field/well/run1/RepeatPass Total length: 62.30 ft Total weight: 1294.00 lb O.D.: 4.50 in						

WIRELINE LOGGING SOLUTIONS	Company	O'Brien Energy Resources Corp.
	Well	Keystone #6-4
	Field	Angell Southeast
	County	Meade
	State	Kansas

WIRELINE LOGGING SOLUTIONS	Main Pass
Database File Dataset Pathname Presentation Format Dataset Creation Charted by	obrien_keystone_6-4.db MainPass OKC-AC~1 Mon May 18 03:39:43 2020 Depth in Feet scaled 1:1200

