



Compensated Neutron  
Gamma Ray  
Casing Collar Log

Company	Noble Energy Inc.		
Well	70 Ranch State BB18-647		
Field	Wattenberg		
County	Weld	State	Colorado
Location:	API #: 05-123-41535		Other Services RCBL MIT
SEC 17	TWP 5N	RGE 63W	Elevation
Permanent Datum	Ground Level	Elevation	4667'
Log Measured From	Kelly Bushing	30 FT	K.B. 4697'
Drilling Measured From	Kelly Bushing		D.F. 4696'
			G.L. 4667'

Date	28-AUG-2015
Run Number	One
Depth Driller	16042 FT
Depth Logger	6769 FT
Bottom Logged Interval	6768 FT
Top Log Interval	Surface
Open Hole Size	8.750"
Type Fluid	Water
Density / Viscosity	8.34 lbm/gal
Max. Recorded Temp.	228.2 °F
Estimated Cement Top	260 FT
Time Well Ready	ROA
Time Logger on Bottom	10:00 AM
Equipment Number	HD-0340
Location	Fort Lupton, CO
Recorded By	R. Cameron
Witnessed By	Bill Mansfield
Sam Hopper	

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
Casing Record	Size (in)	Wgt (lbs/ft)	Grade	Top	Bottom		
Surface Casing	9 5/8	36	J-55	30 FT	767.4 FT		
Intermediate #1	7	26	P-110	30 FT	6892 FT		
Intermediate #2							
Liner	4 1/2	11.6	P-110IC	6798.5 FT	16042 FT		

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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

Log ran as per customer request  
Log ran from 10' above liner top to surface  
Recorded with 2500 PSI surface induced pressure  
Logging tools were clean and free of any debris upon completion of operations  
  
Thank you for choosing FMC Technologies Completion Services, Inc.!!



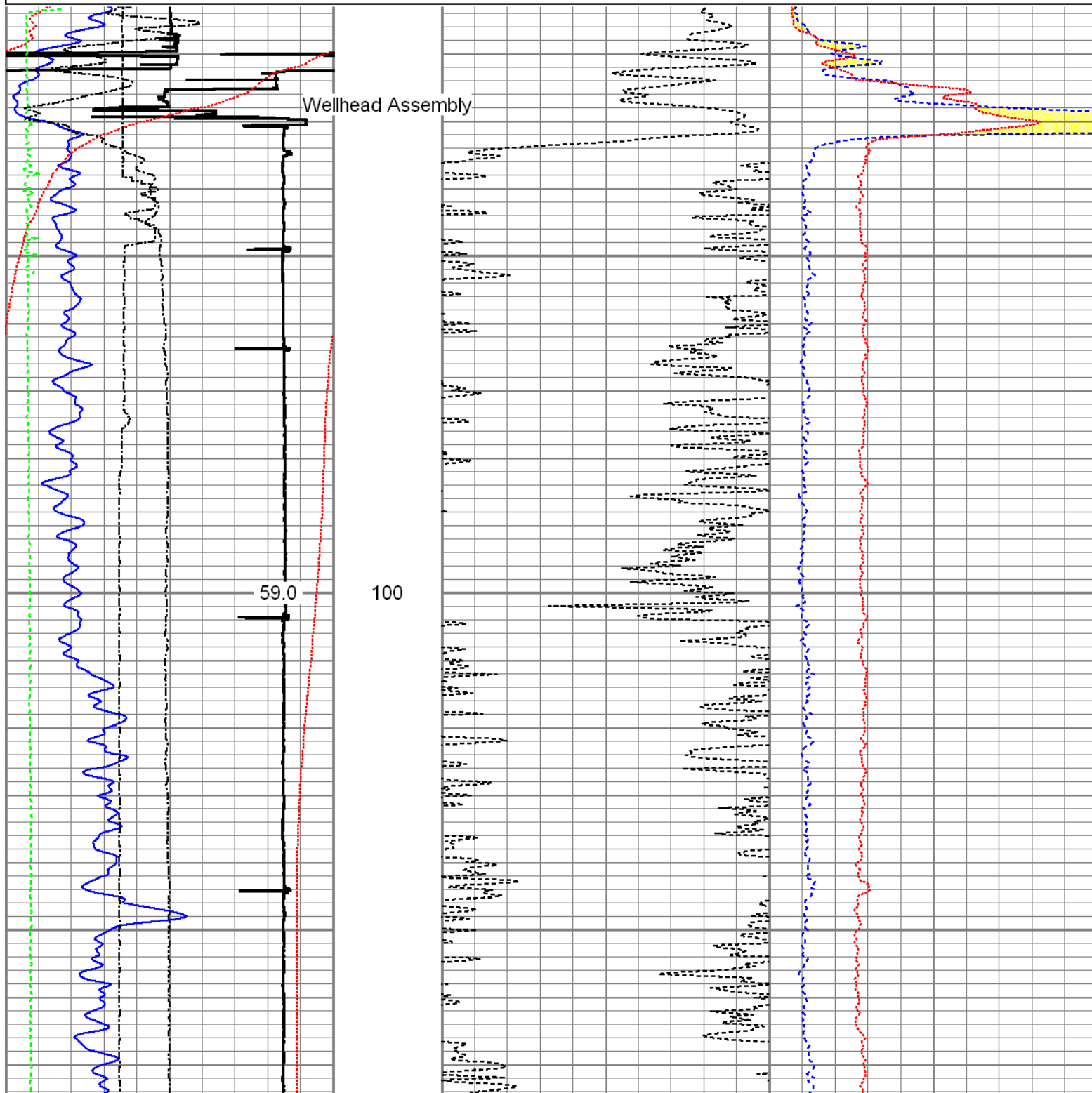
Main Pass

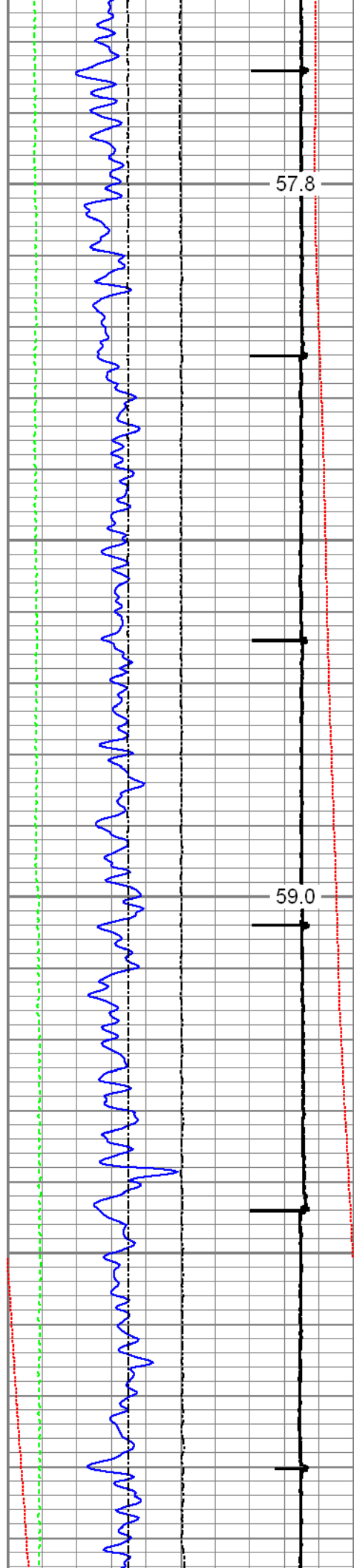
Recorded with 2500 PSI Surface Induced Pressure

Database File: 08-28-15\_noble energy\_70 ranch state bb18-647\_mit\_rbl\_cnl.db  
Dataset Pathname: pass7  
Presentation Format: cnl\_mit  
Dataset Creation: Fri Aug 28 09:59:19 2015 by Log 7.0 B1  
Charted by: Depth in Feet scaled 1:240

0	Gamma Ray (GAPI)	120
Casing Collar Locator		
0	Temperature (degF)	20
-100	Line Speed (ft/min)	100
0	Line Tension (lb)	2000
-2	Differential Temperature (degF)	2

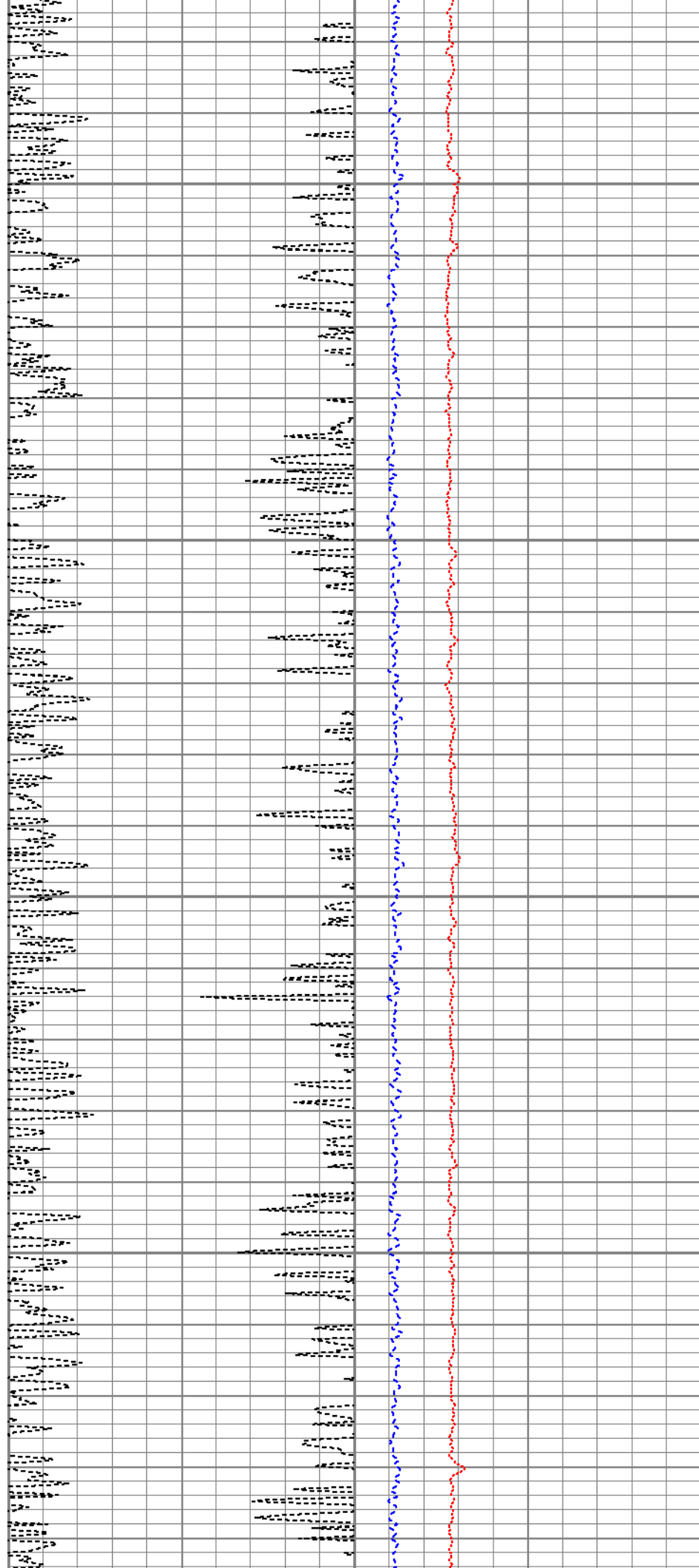
60	Neutron Porosity (pu)	0	0	Far Neutron (cps)	1000
			0	Near Neutron (cps)	10000

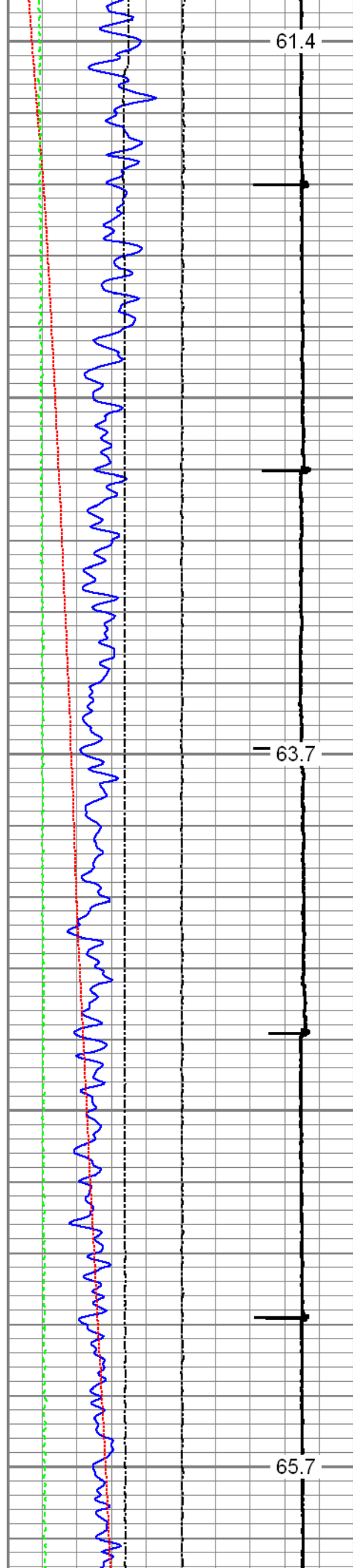




200

300

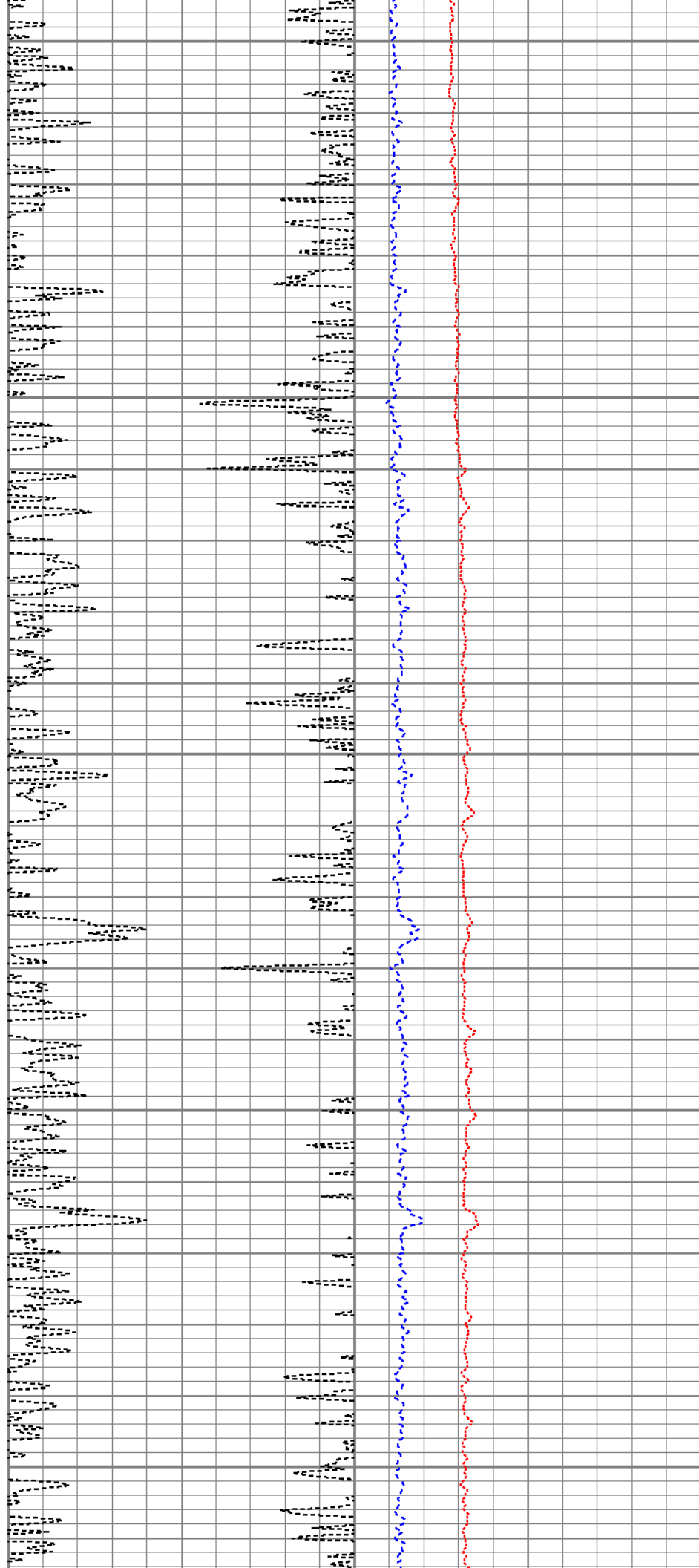


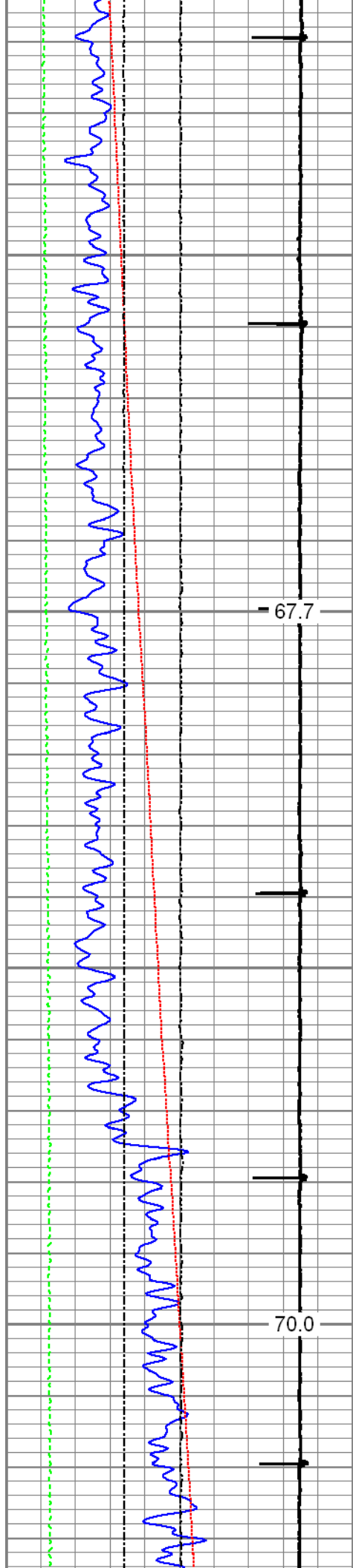


400

500

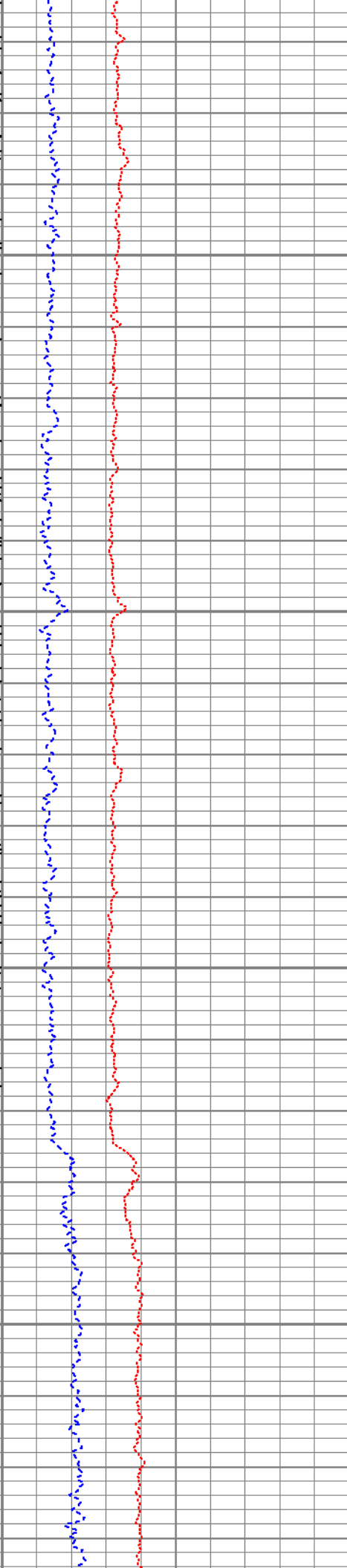
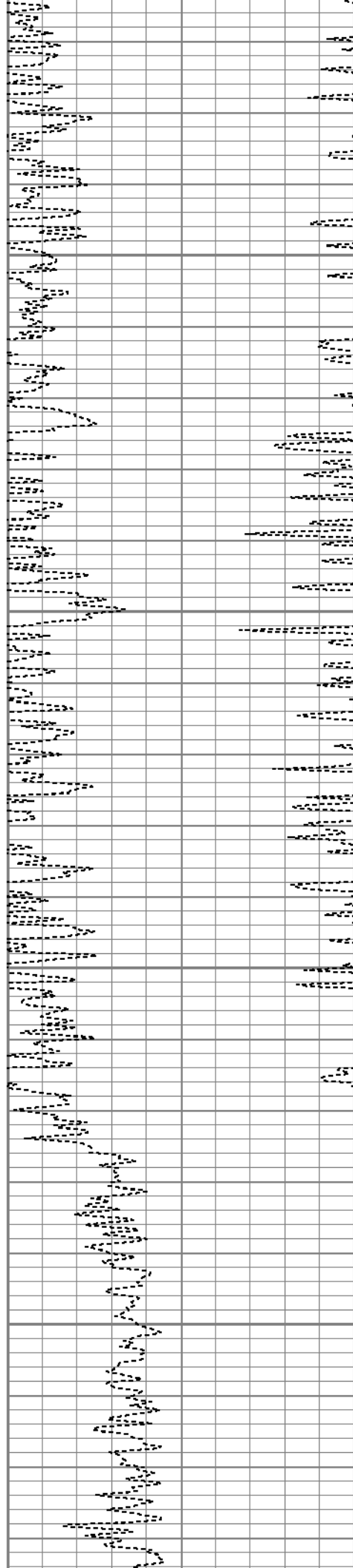
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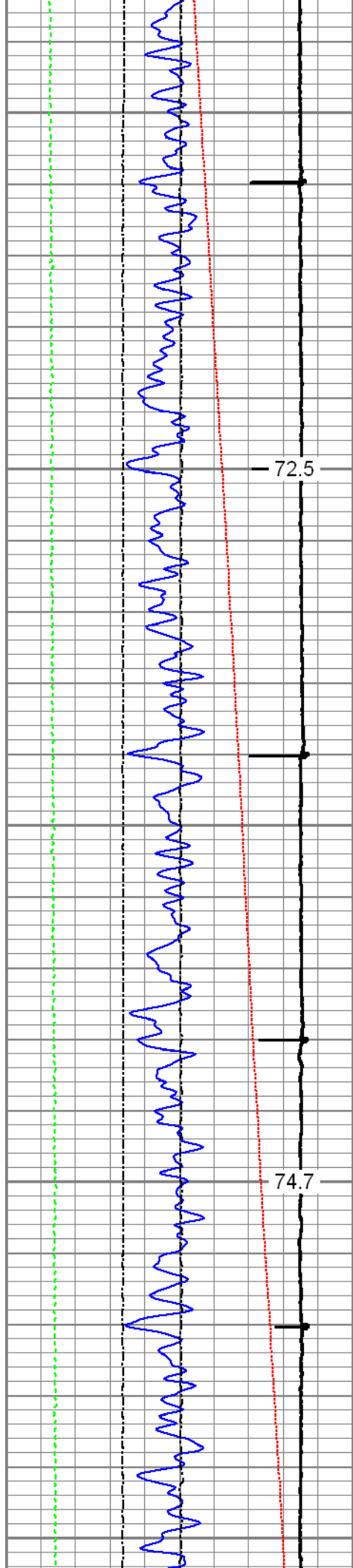




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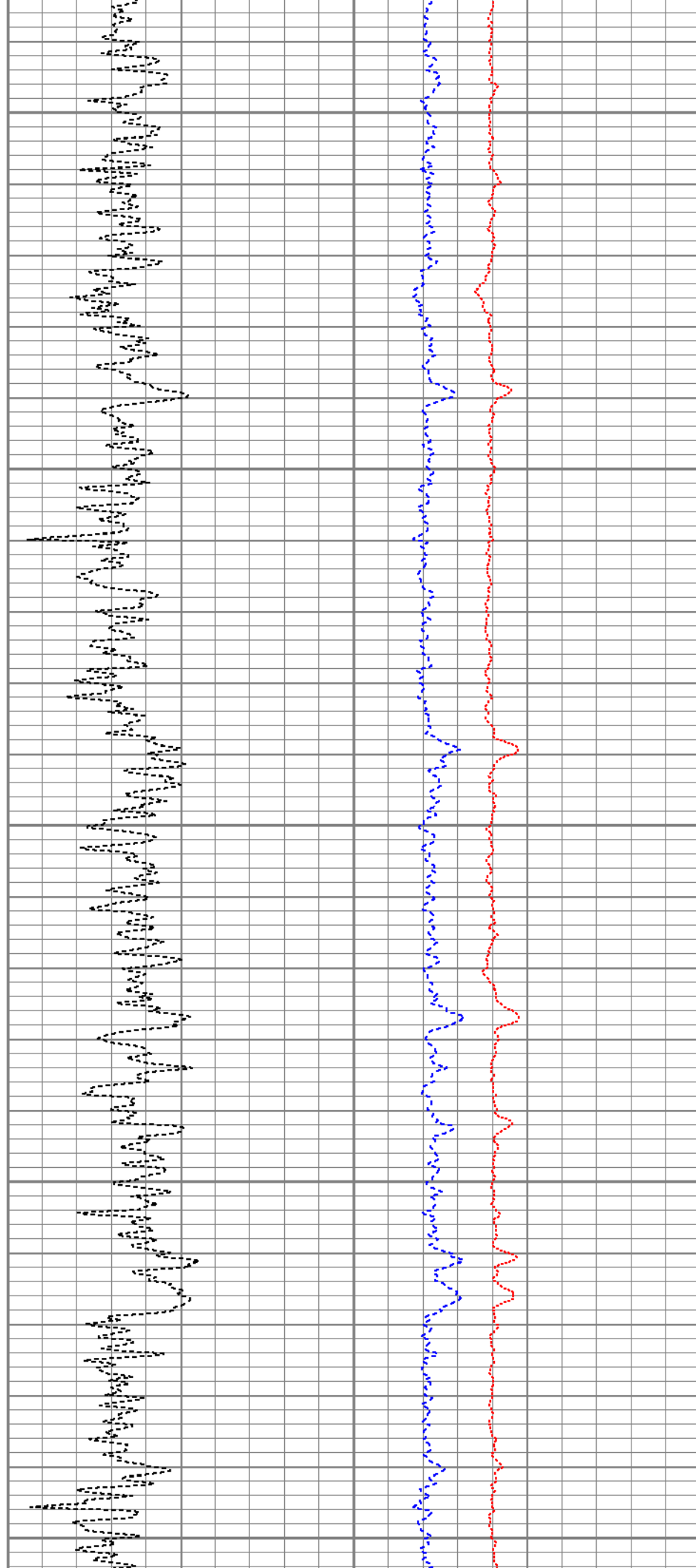
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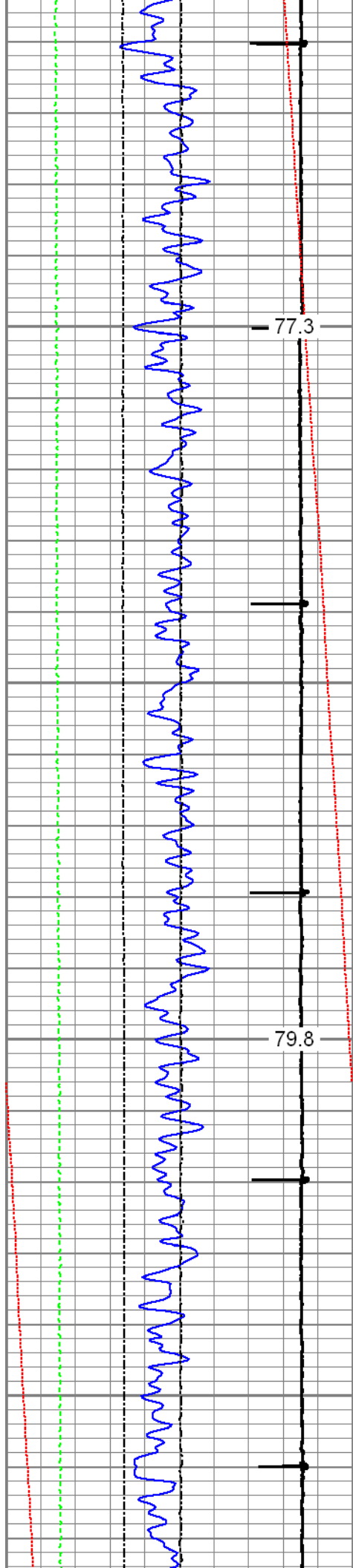




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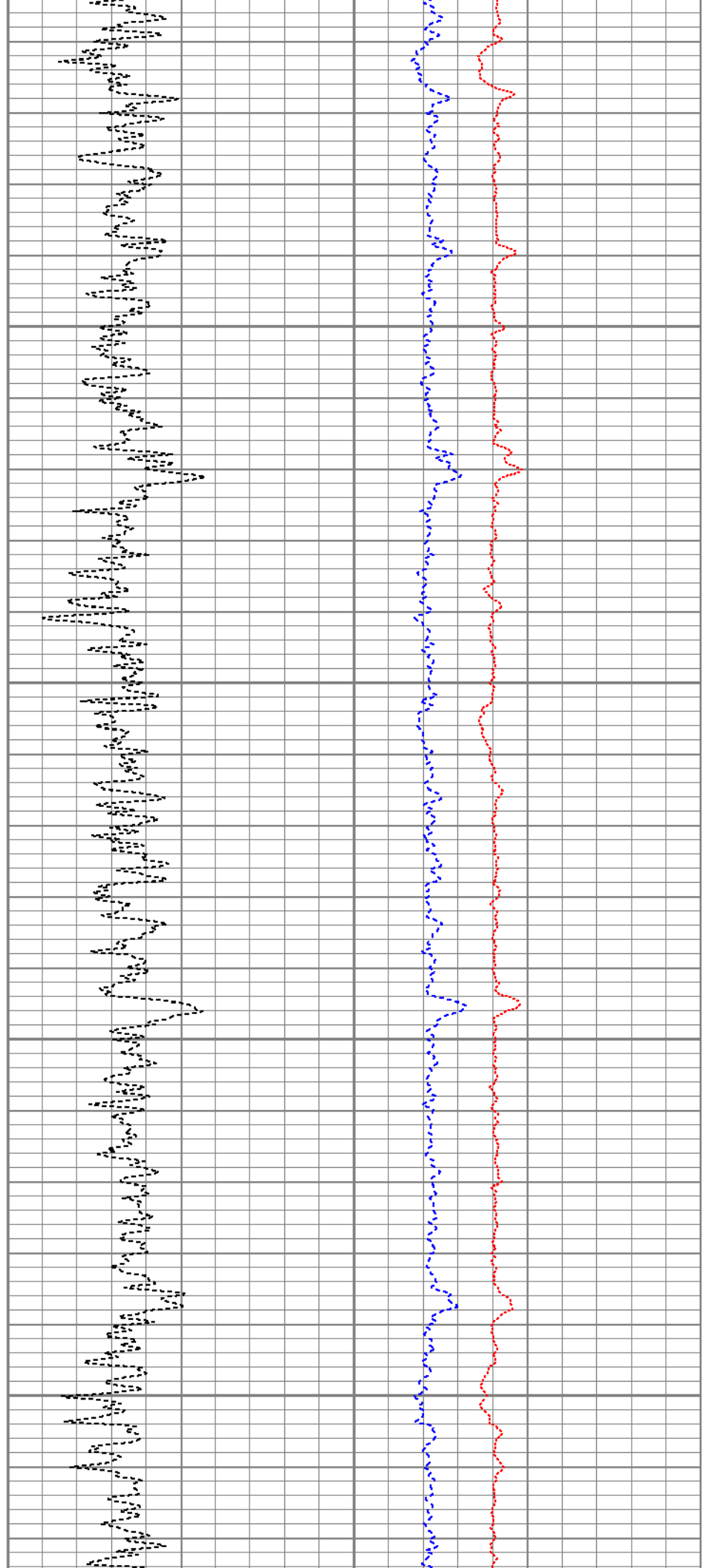


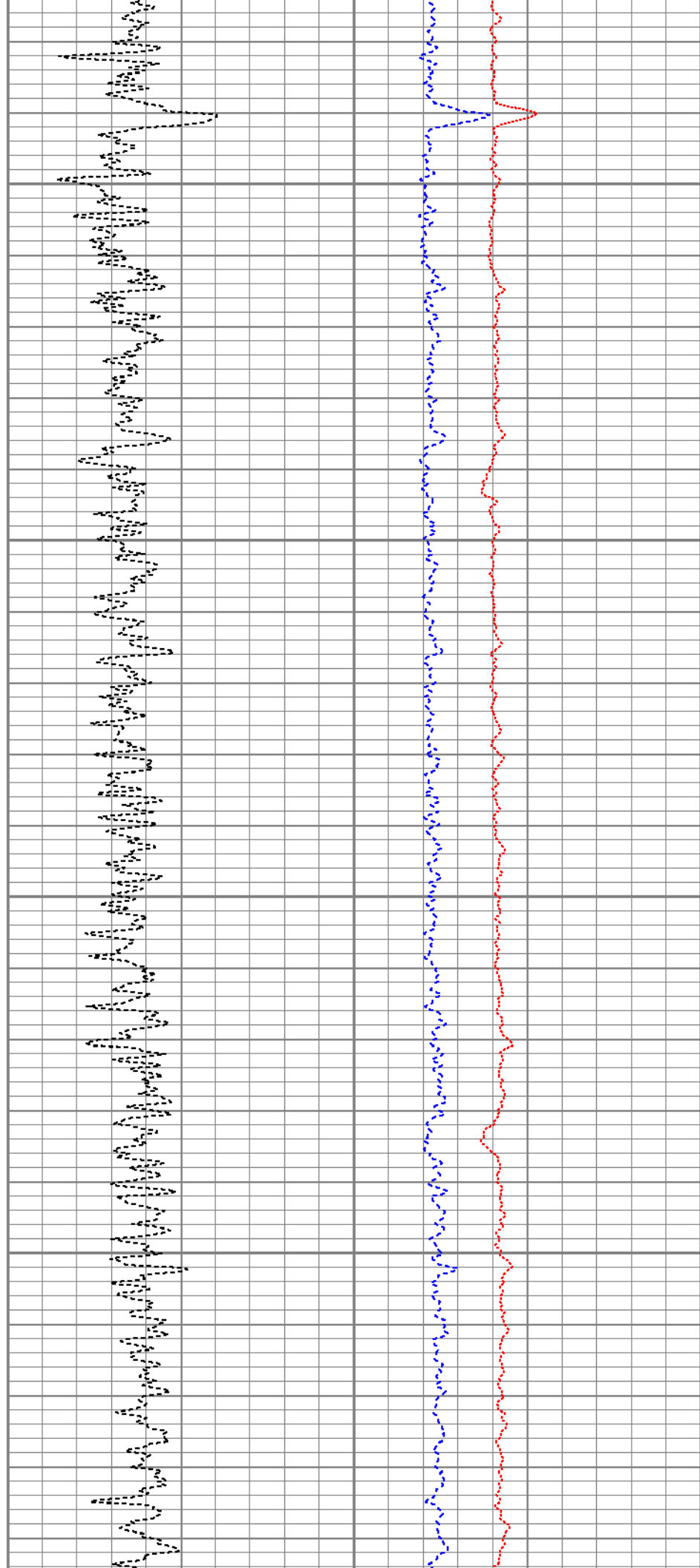
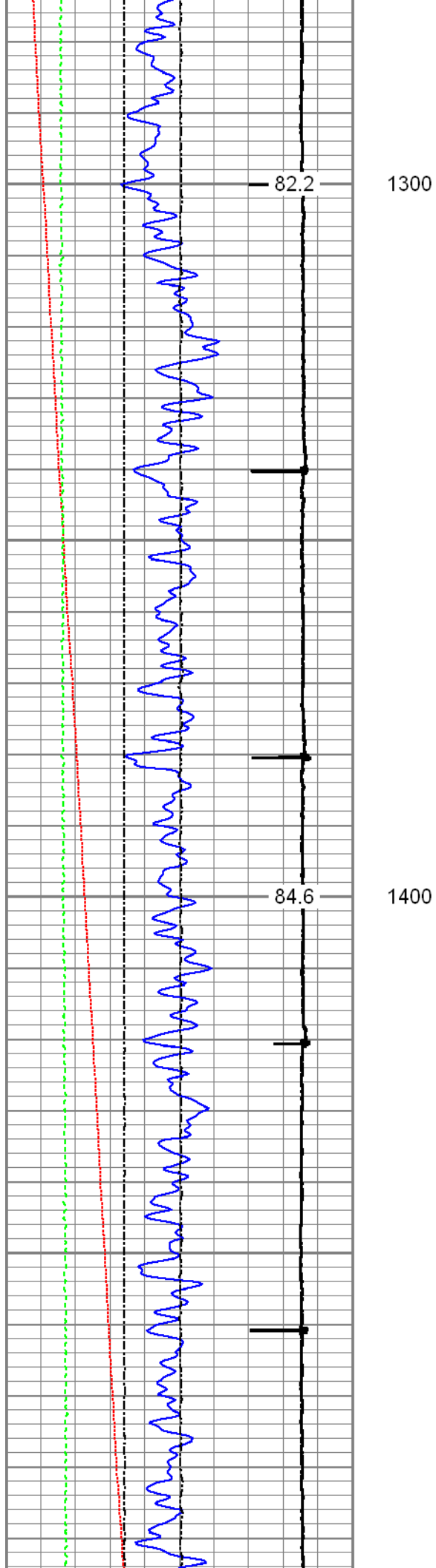
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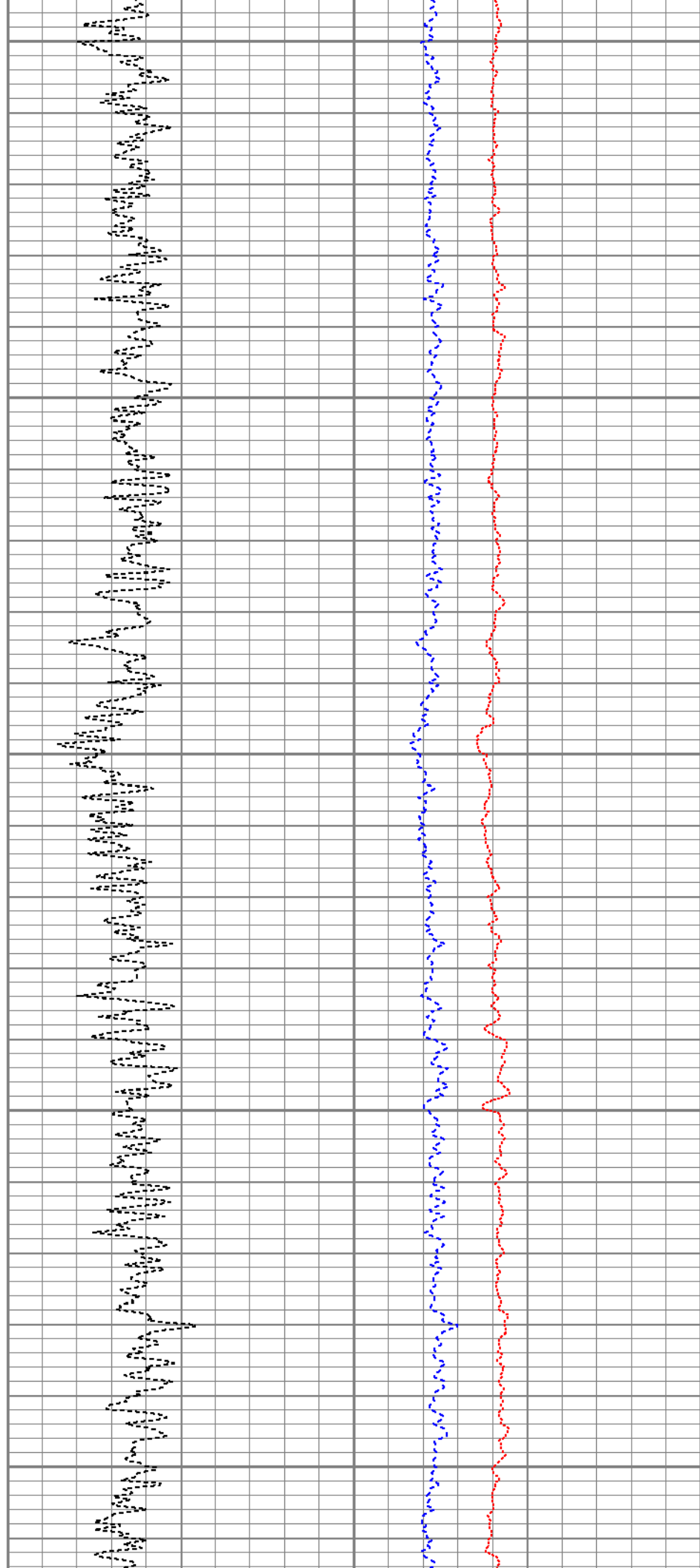
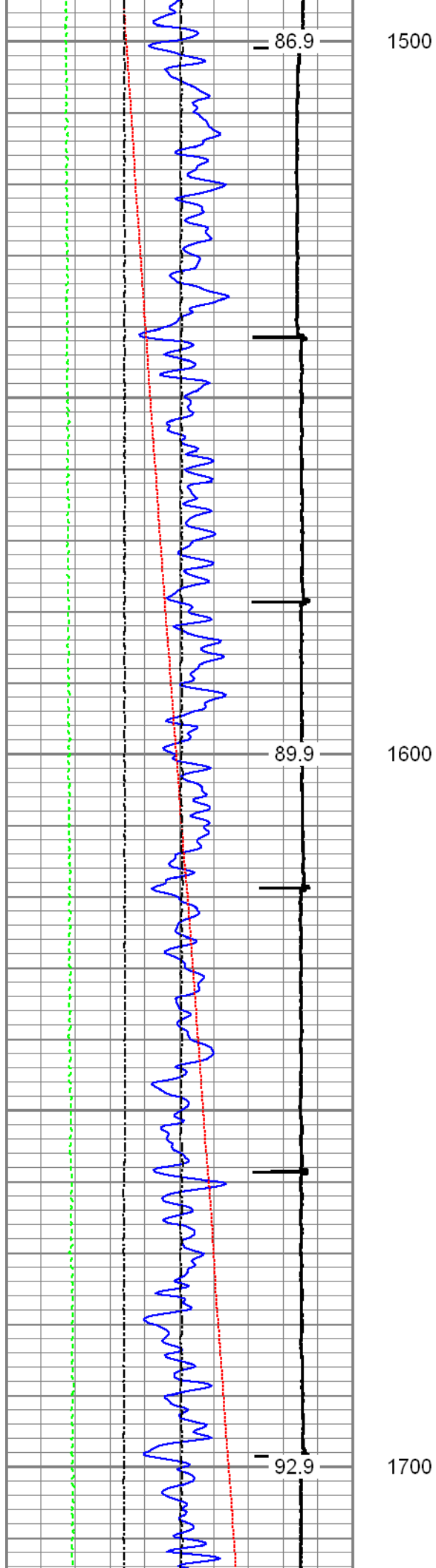
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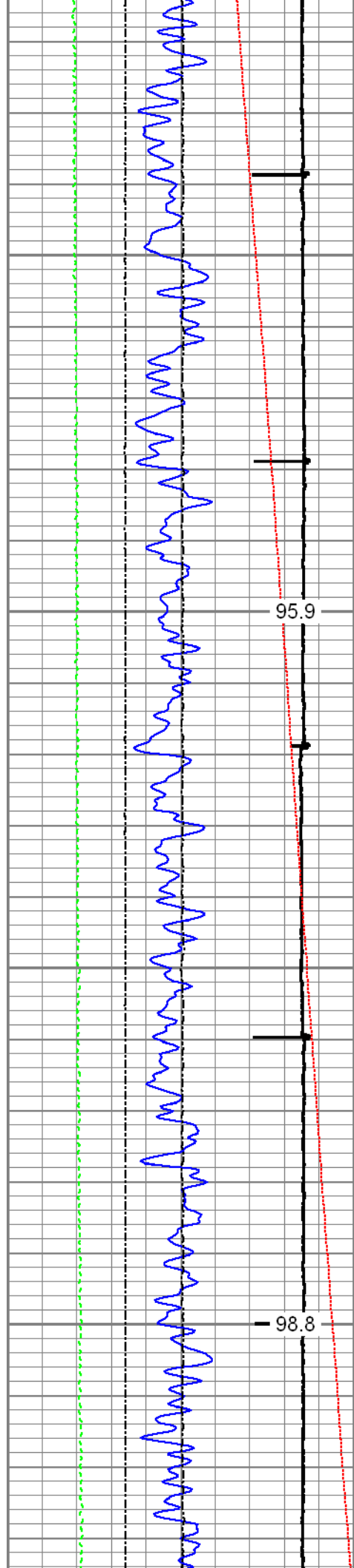
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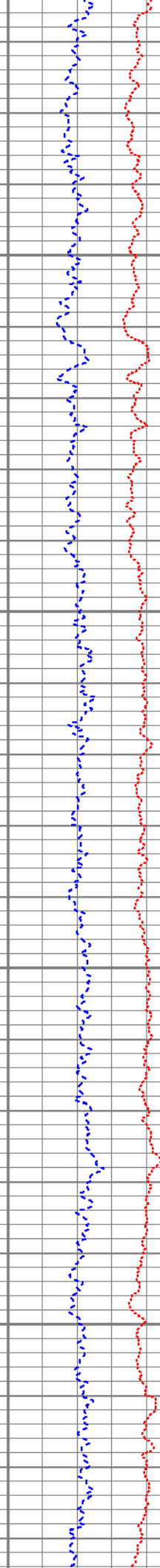
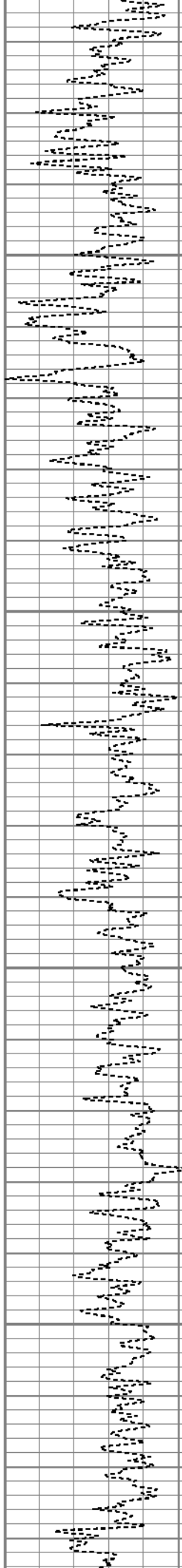


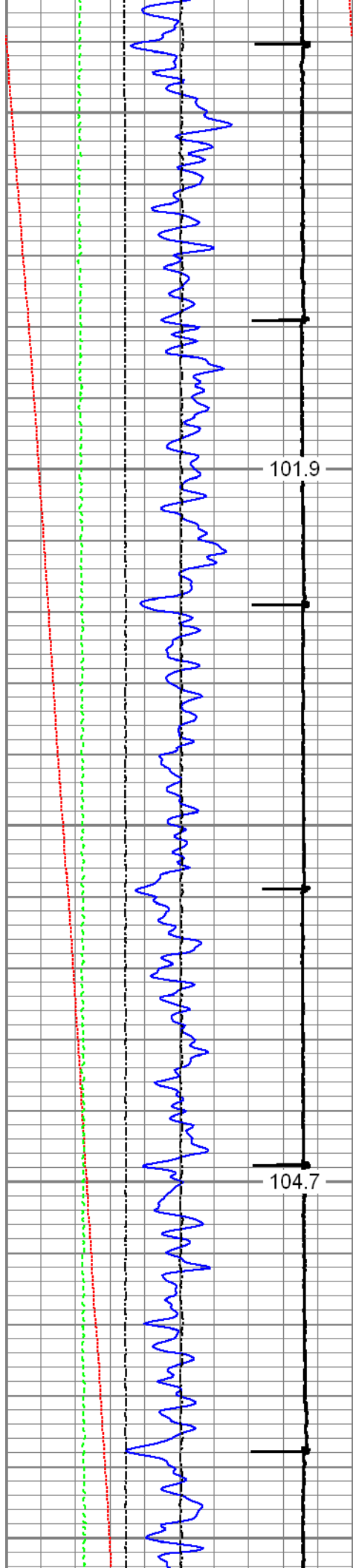




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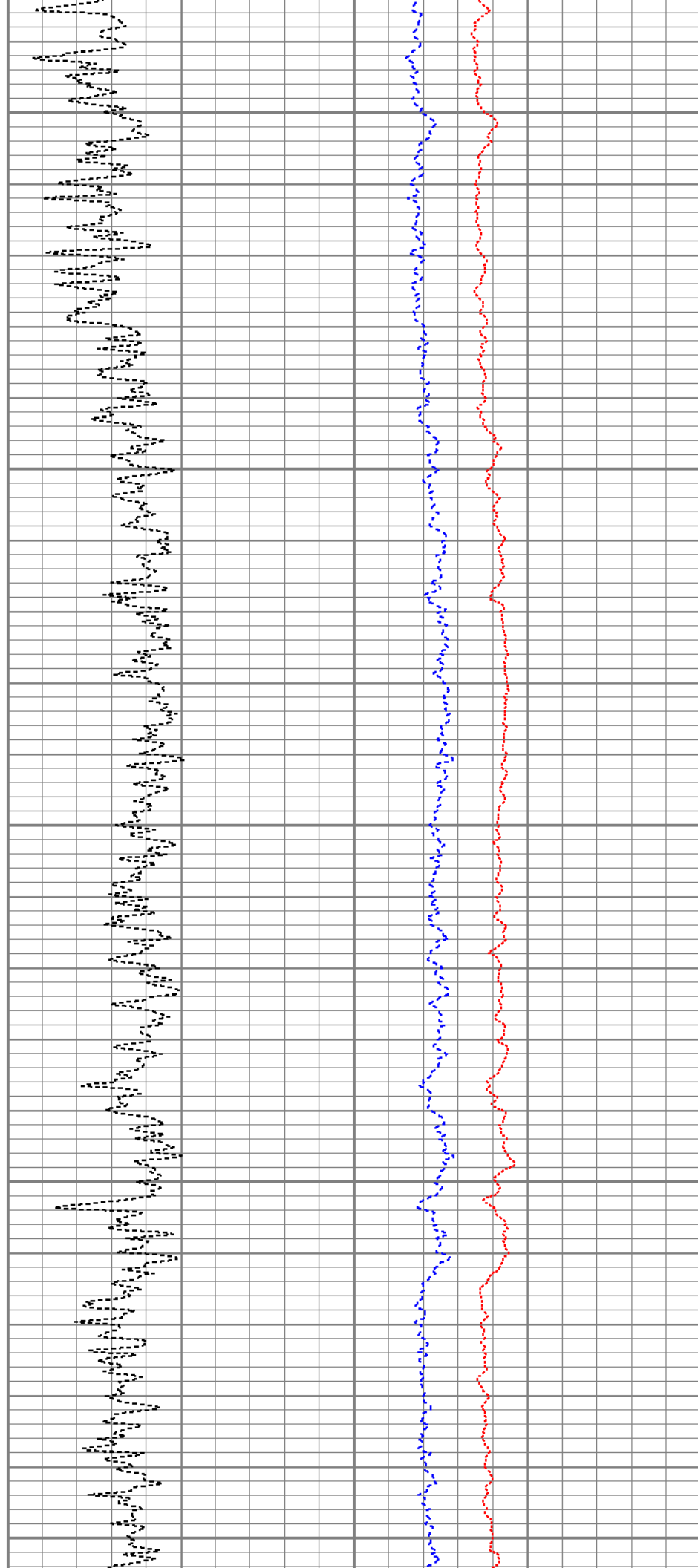


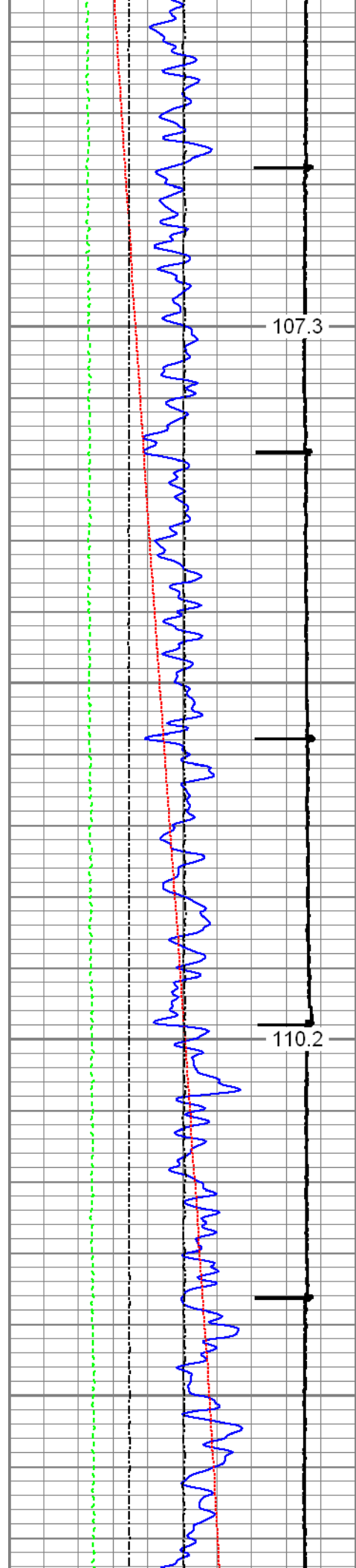
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2100



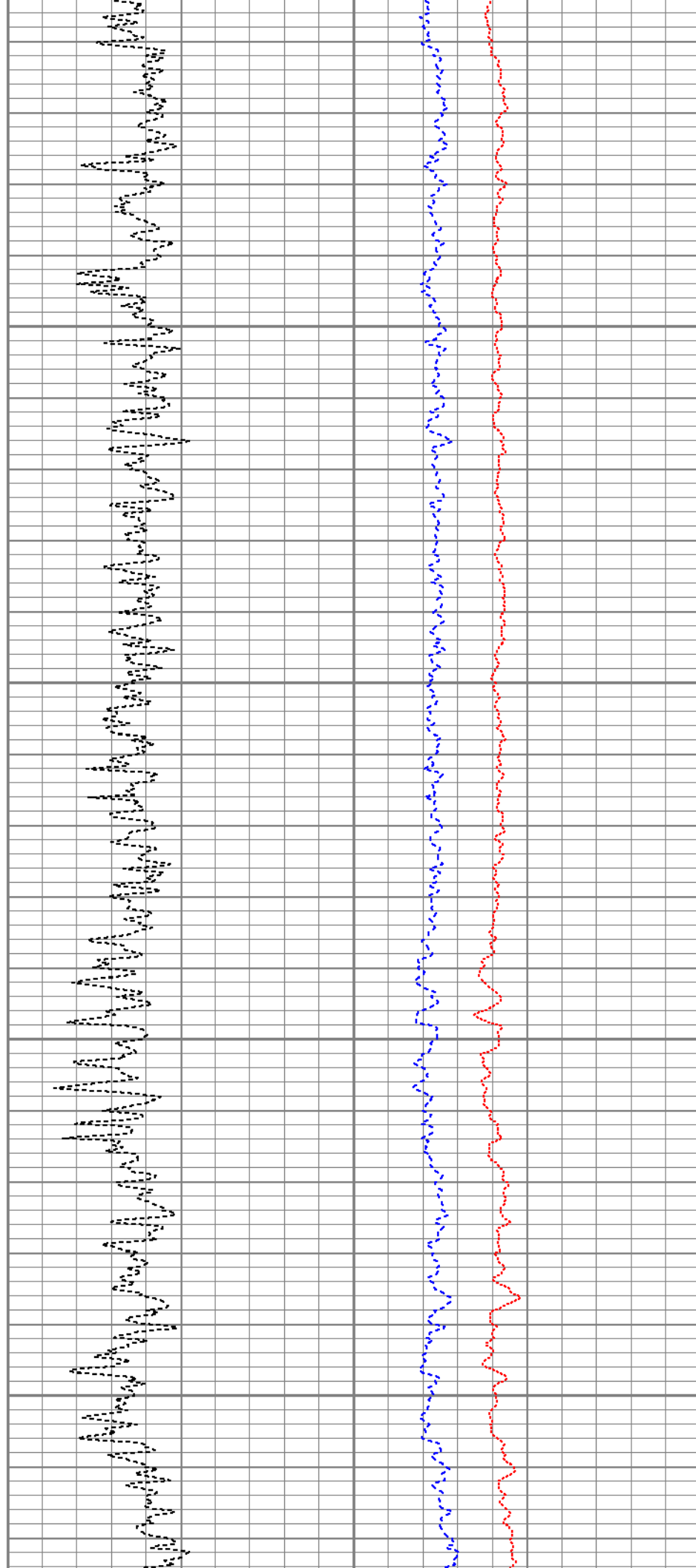


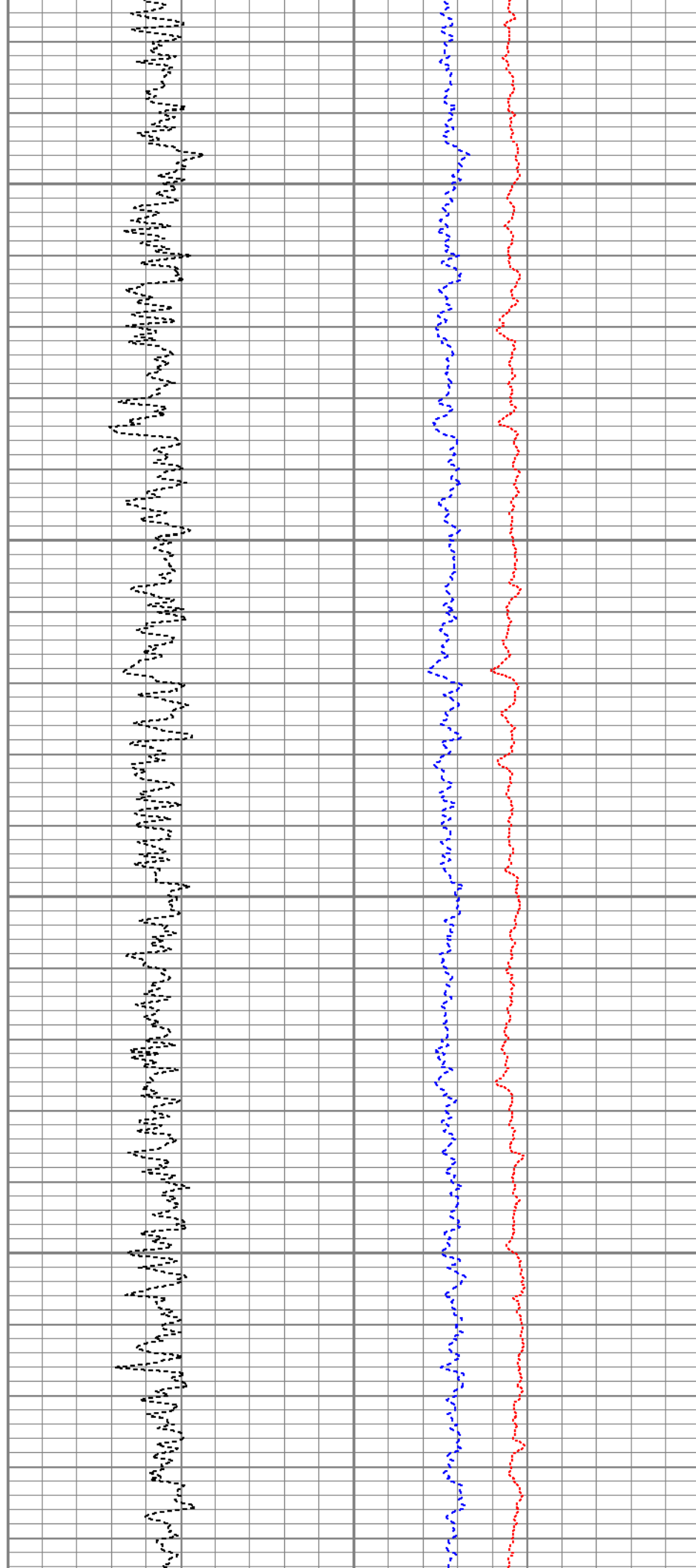
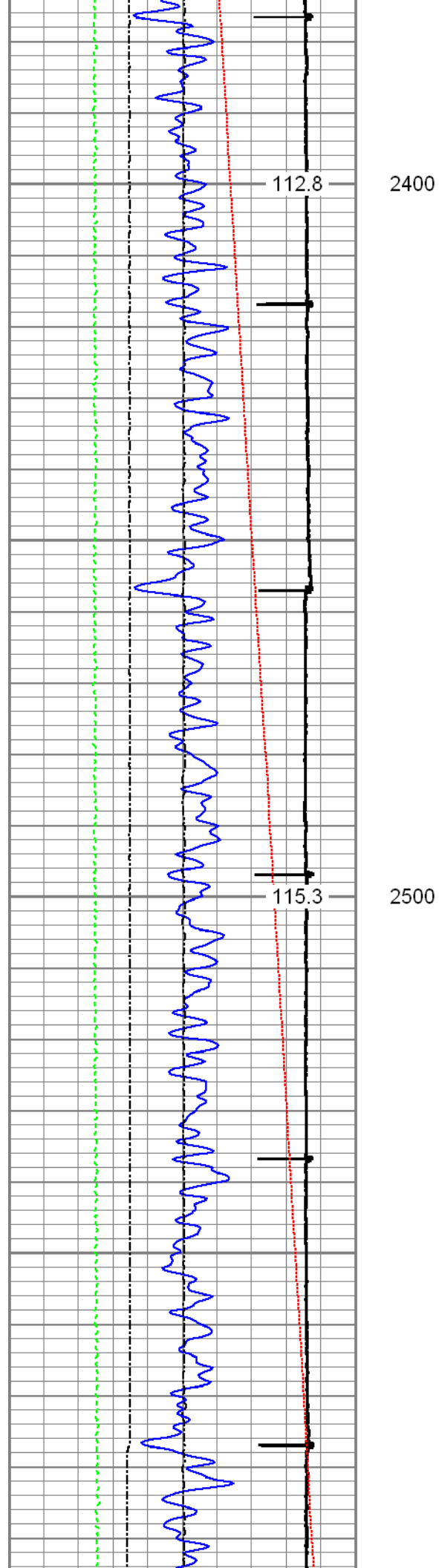
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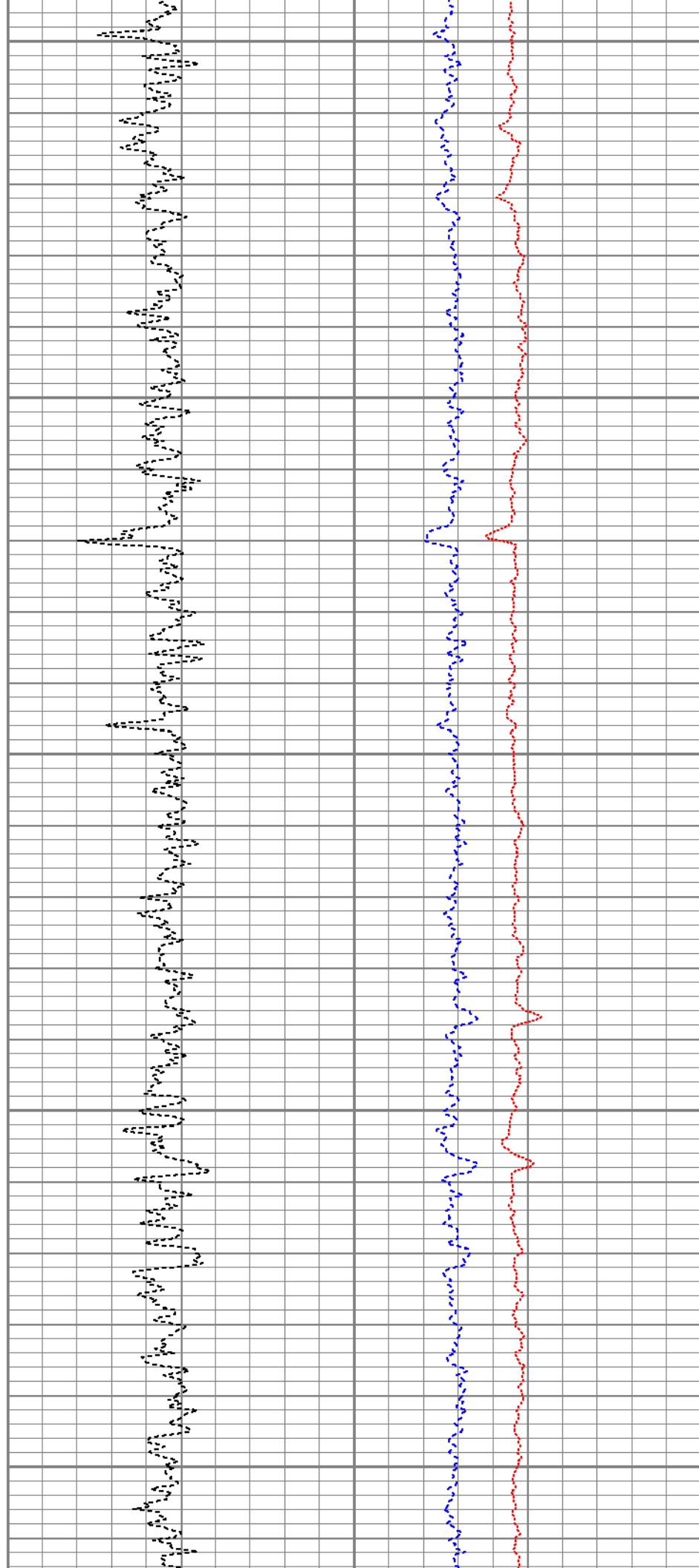
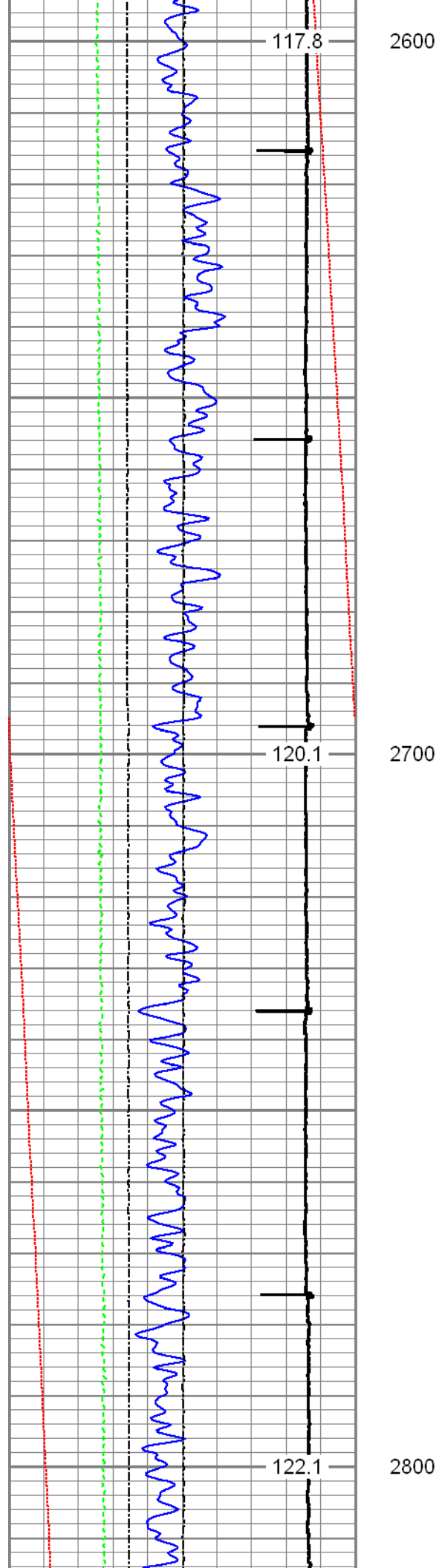
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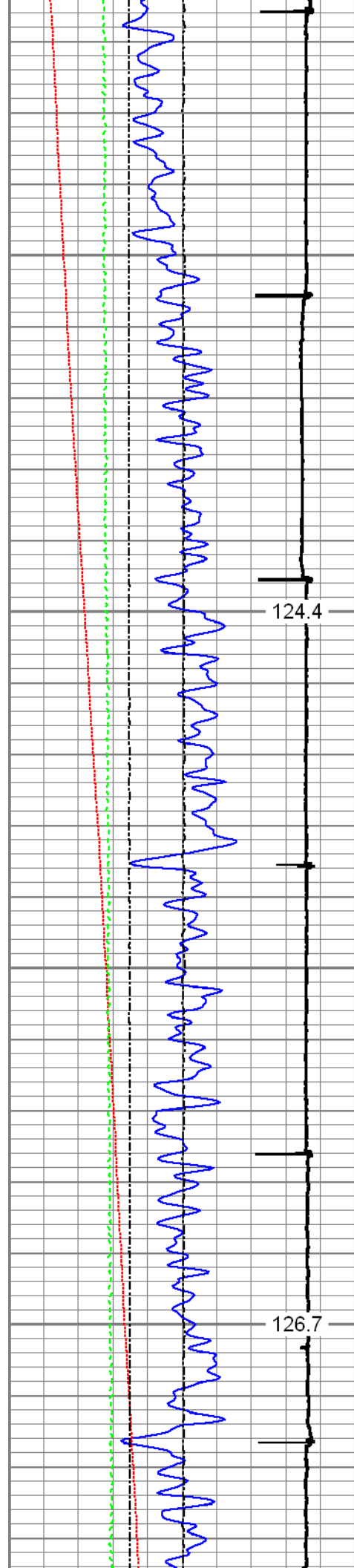
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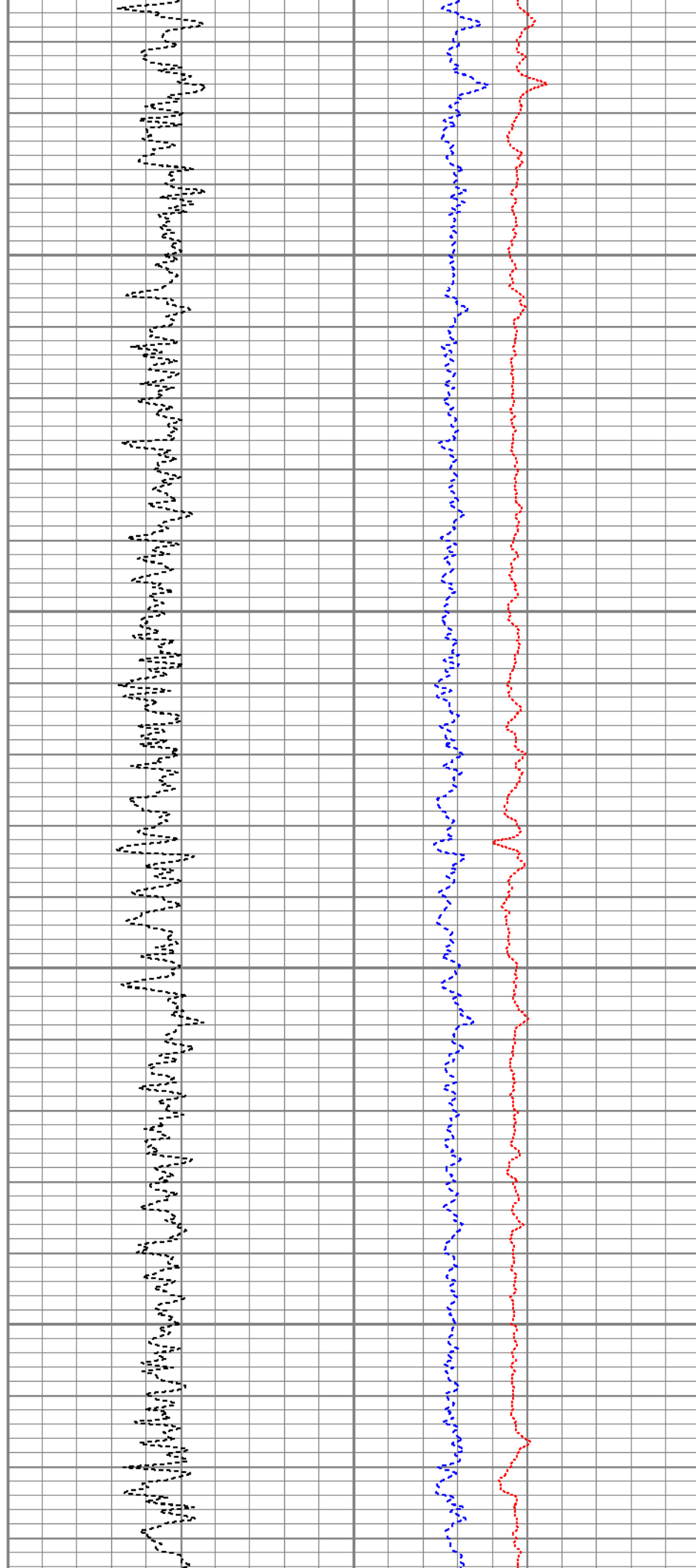


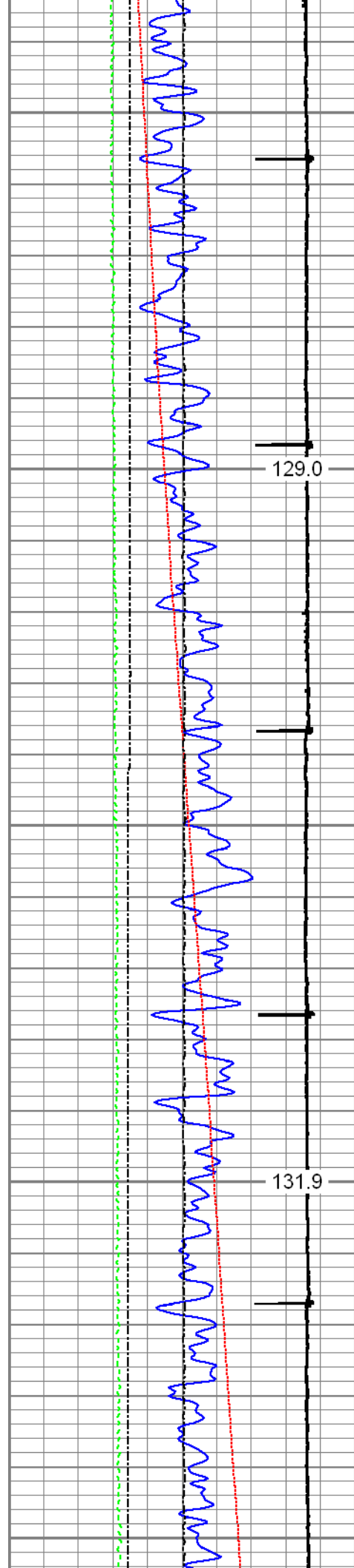
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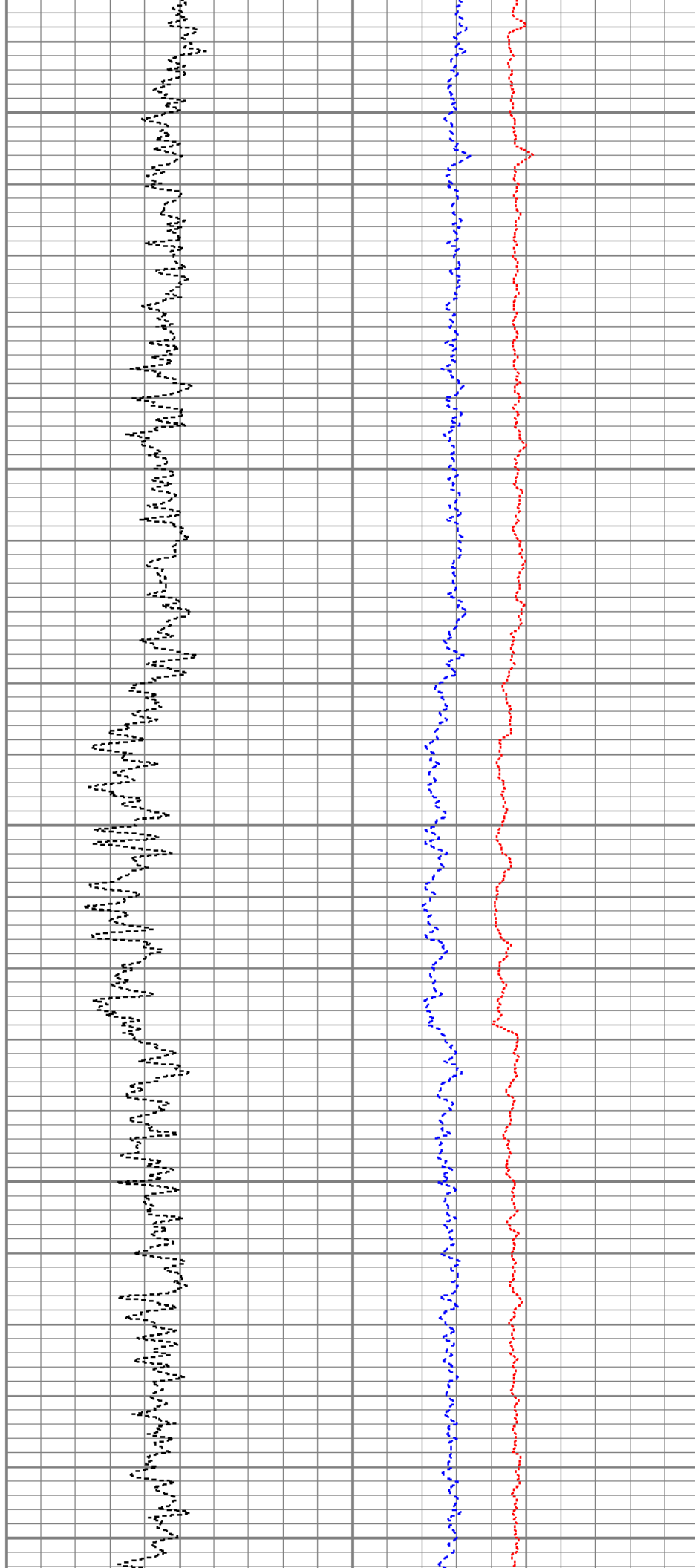


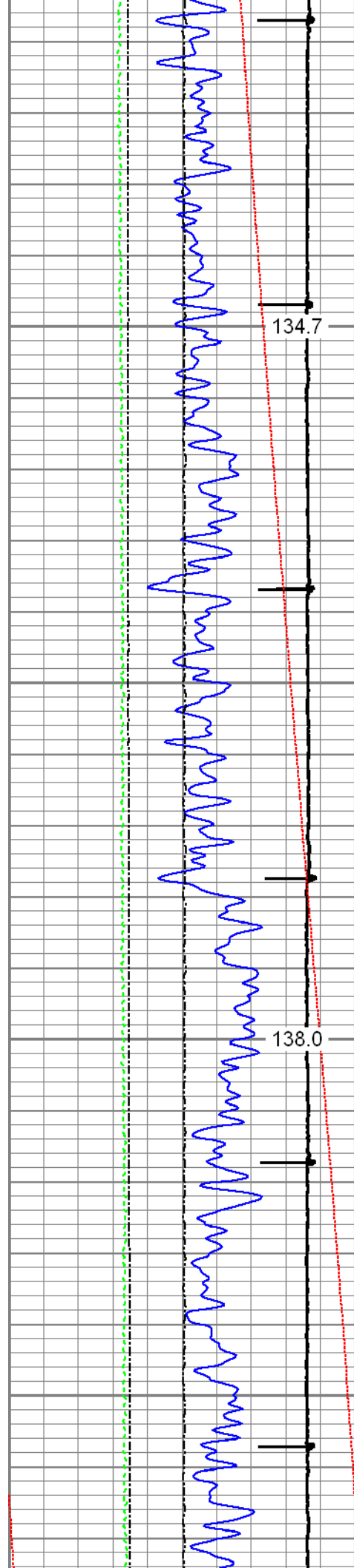
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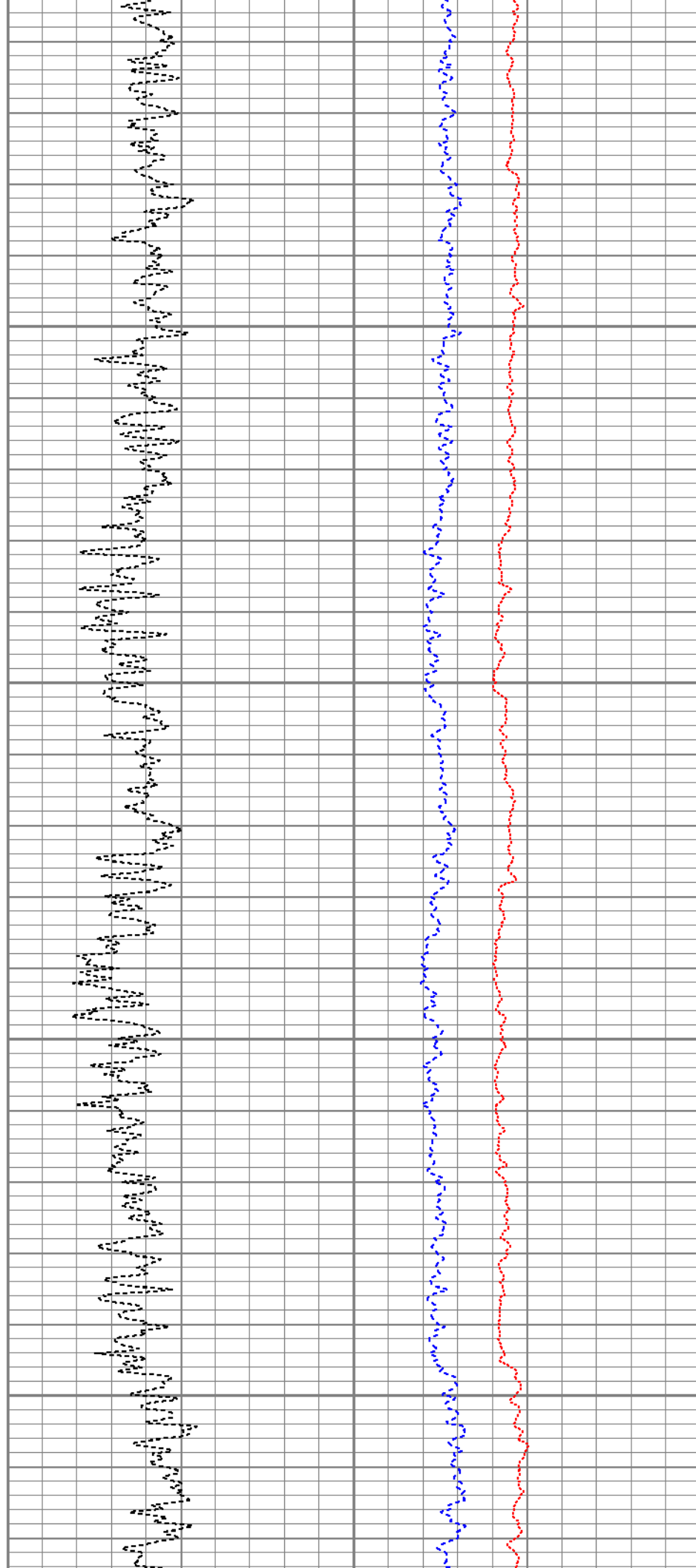


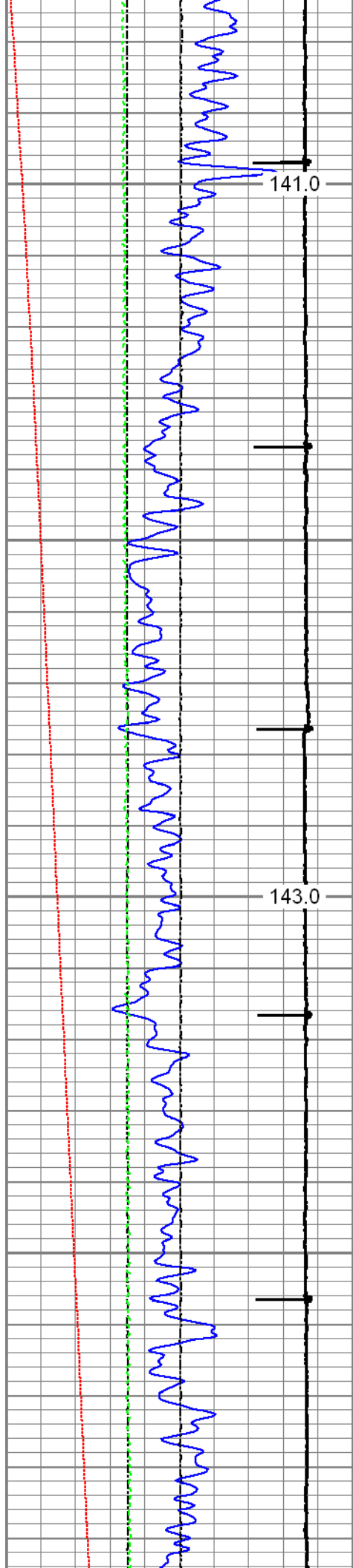
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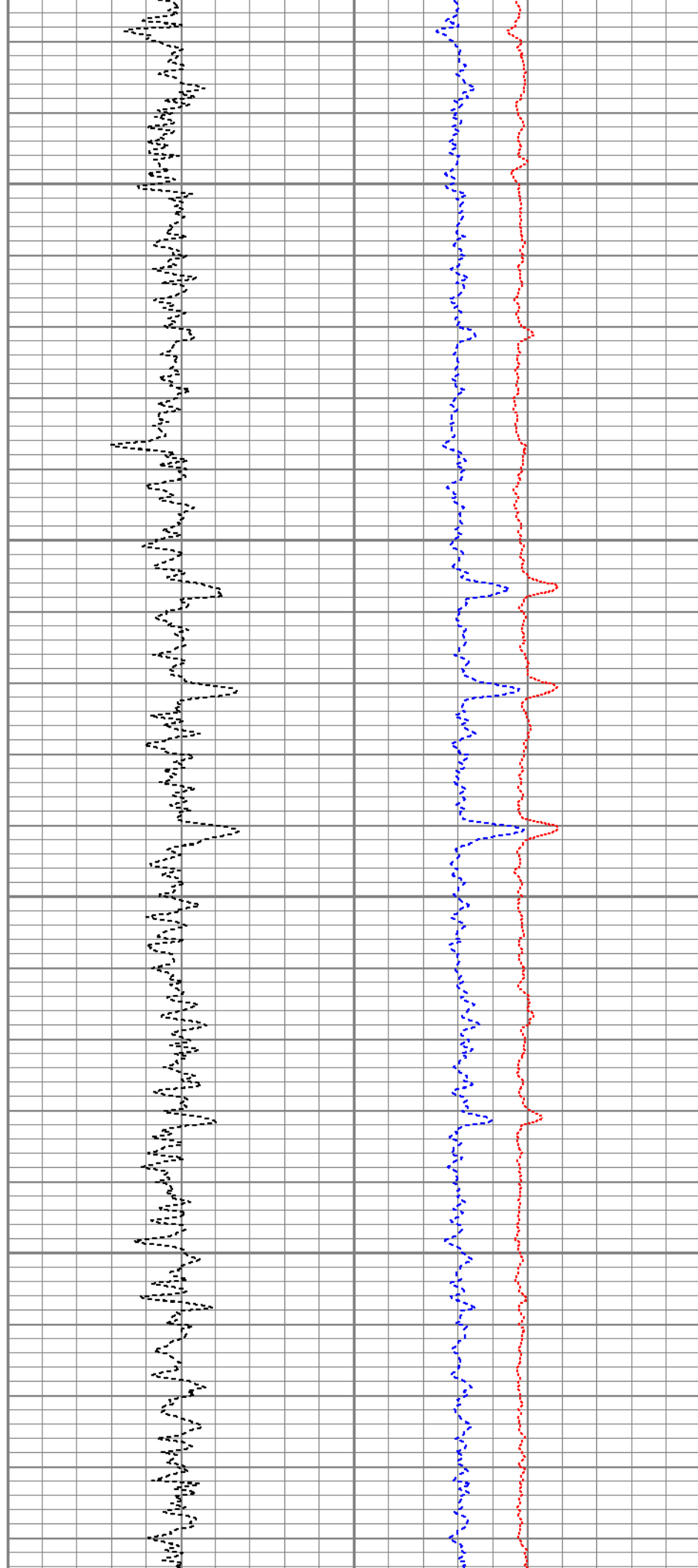


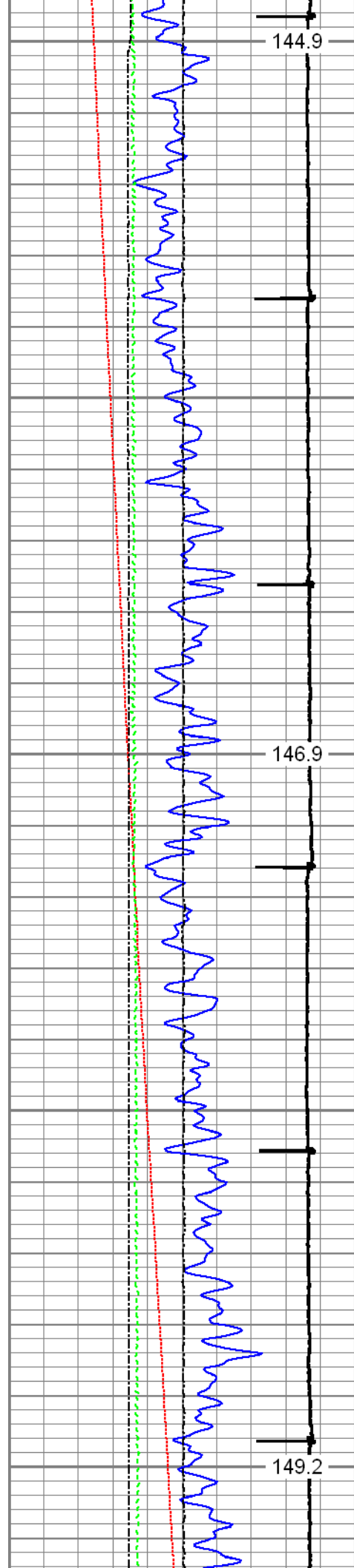
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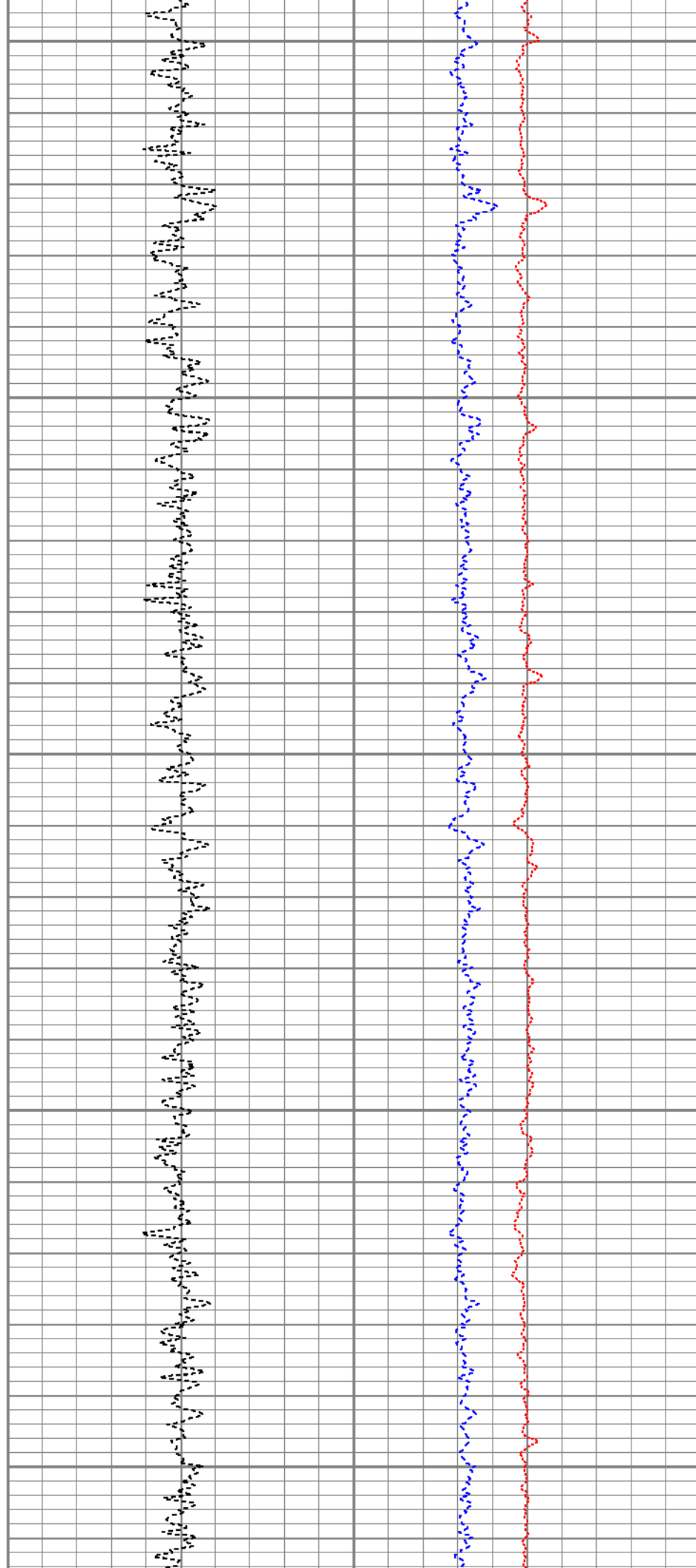


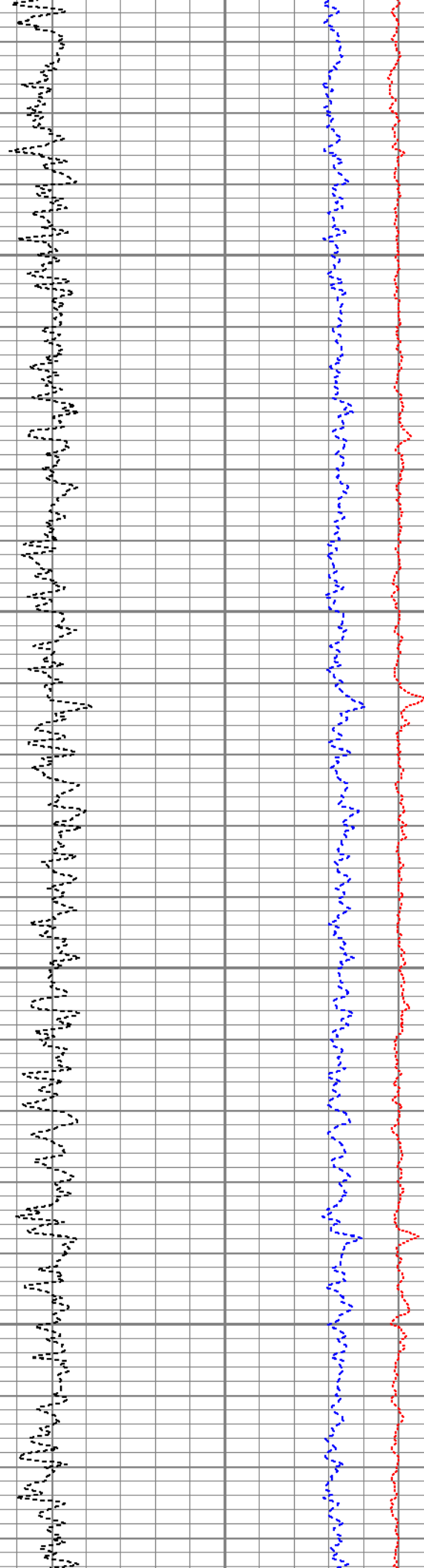
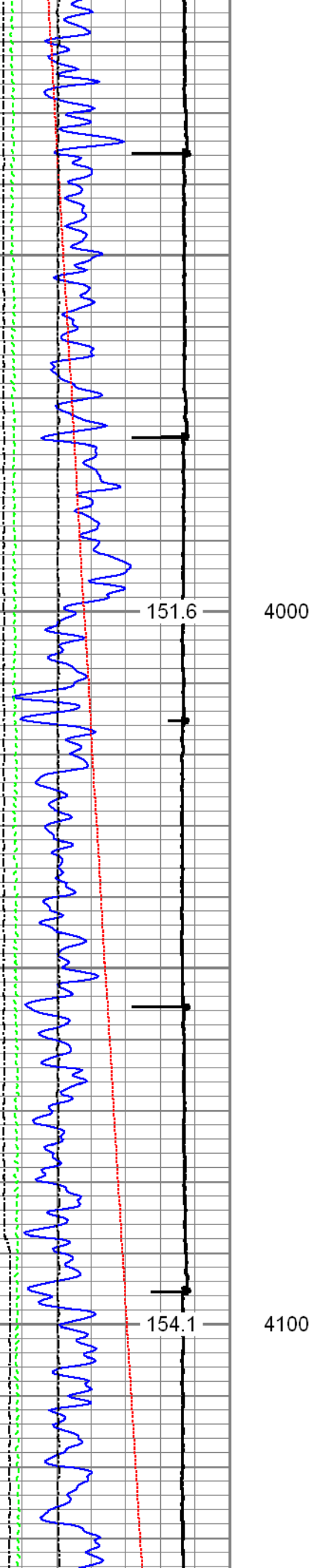


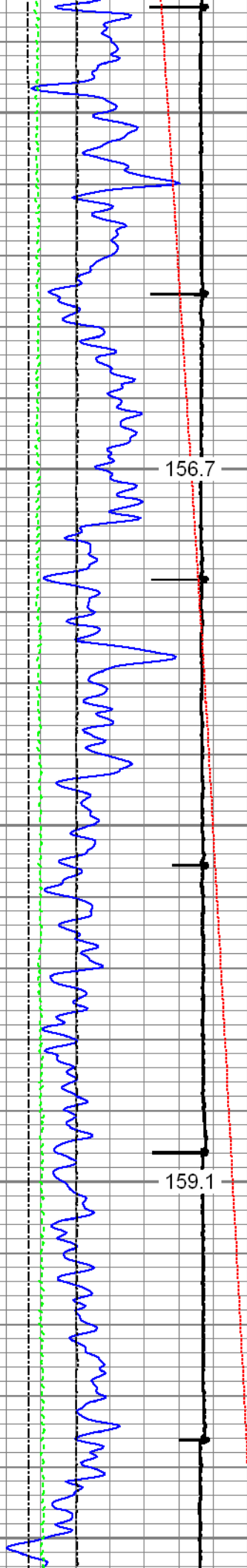
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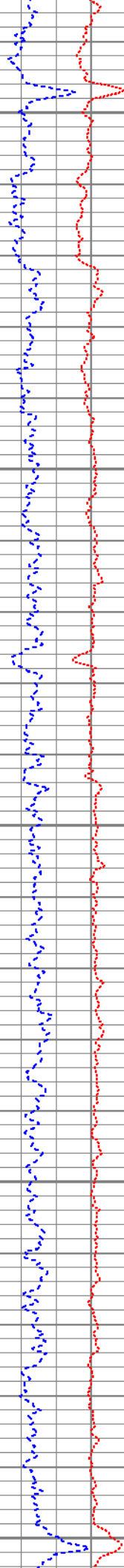
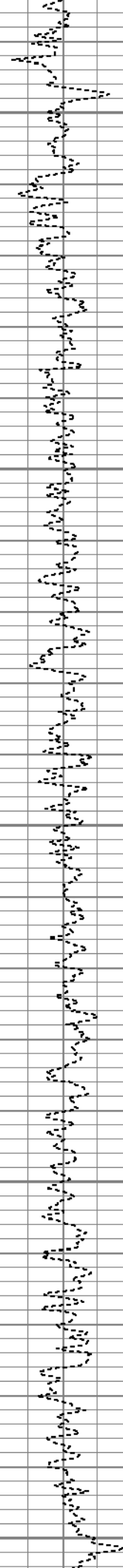


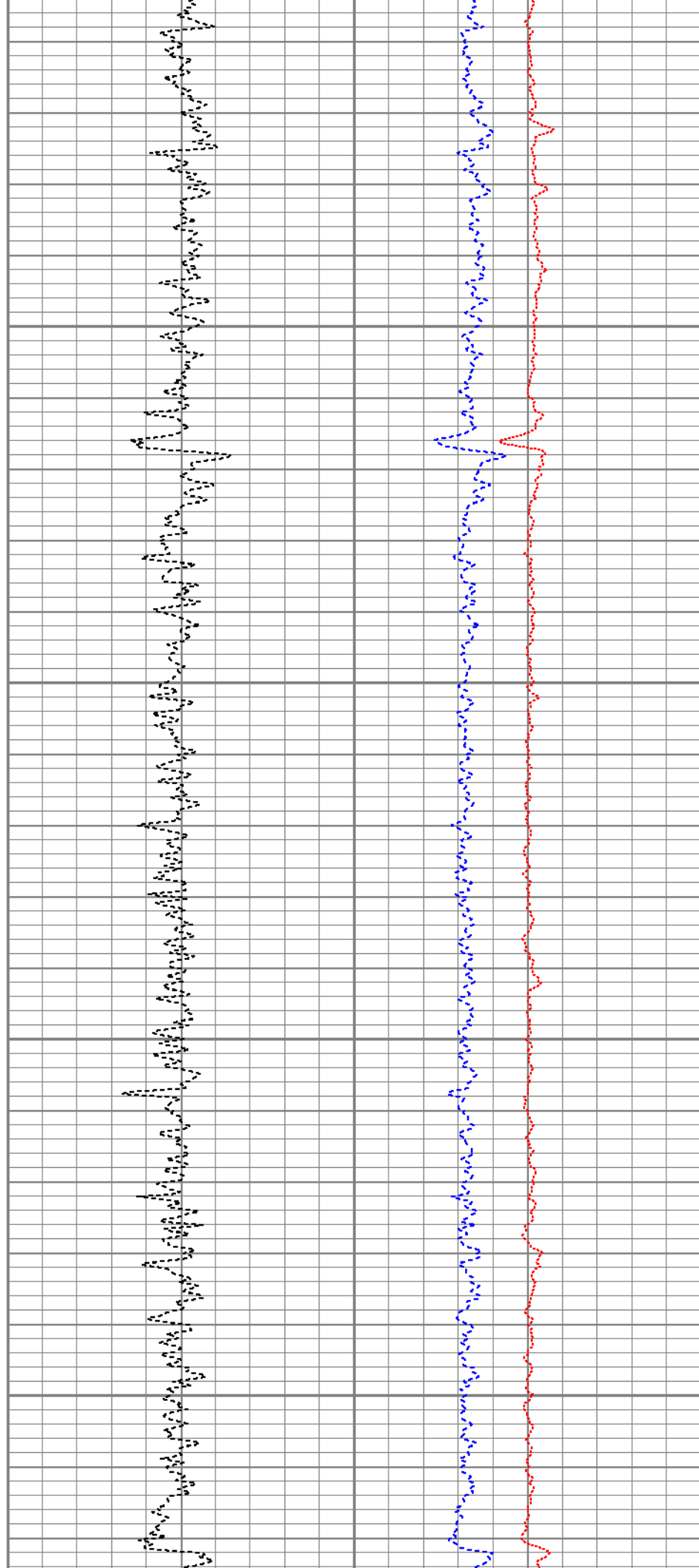
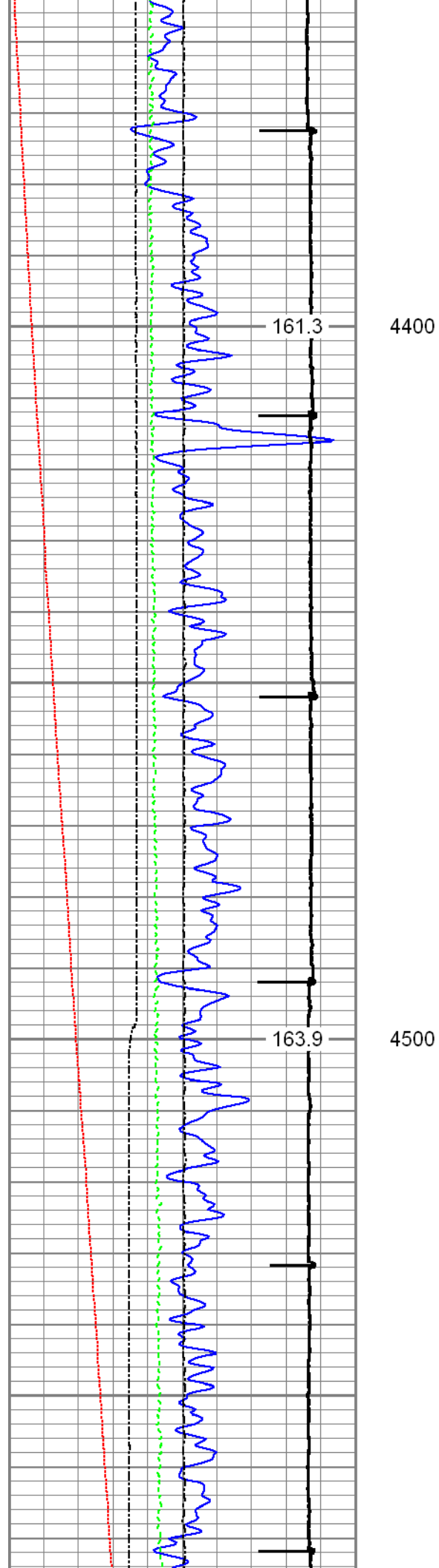
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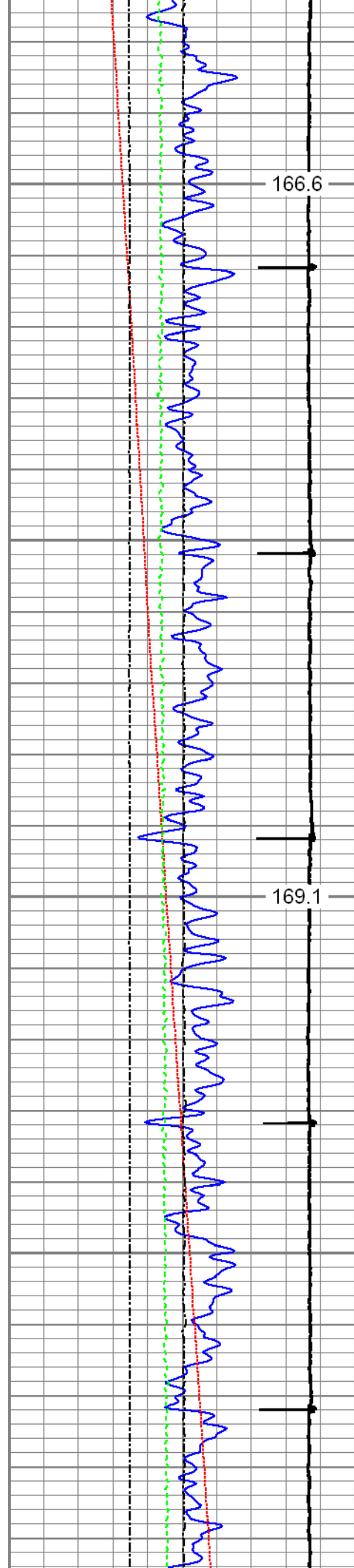
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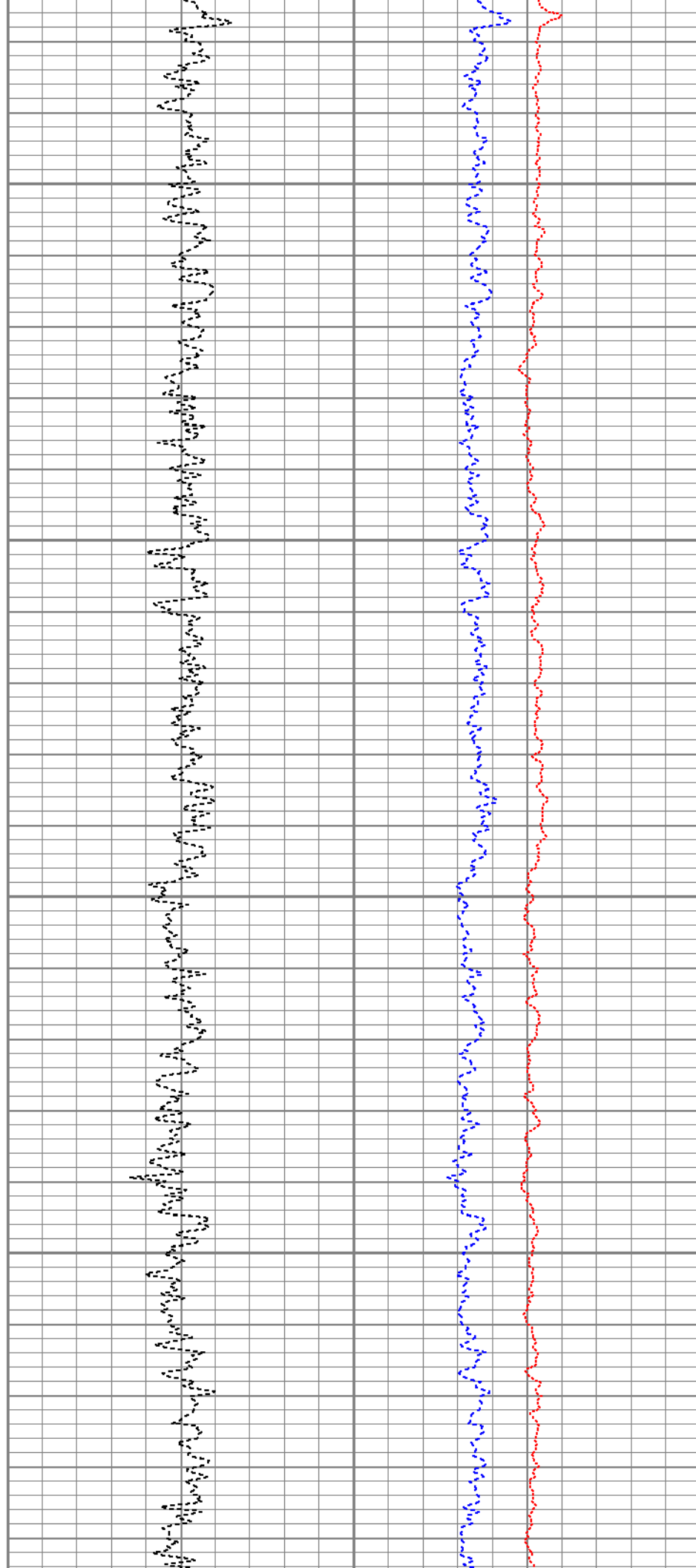


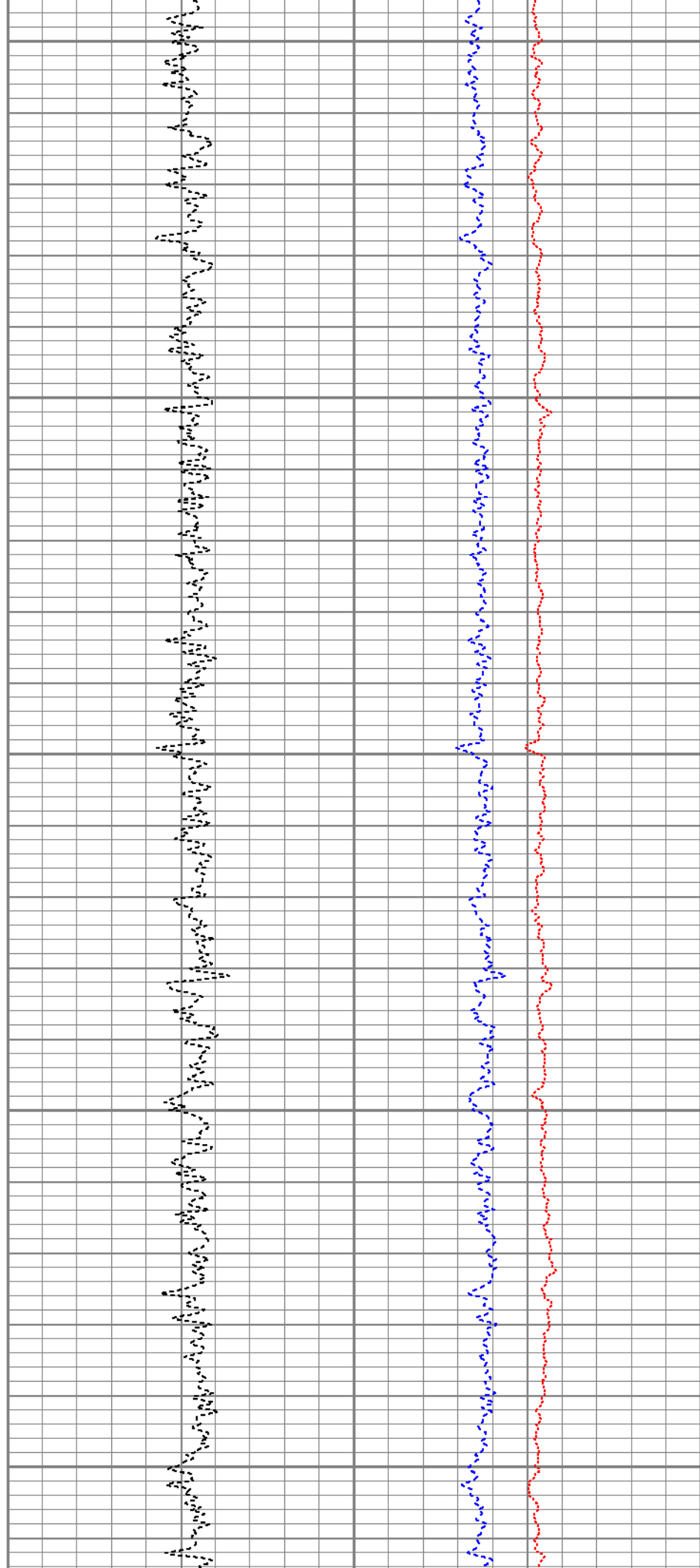
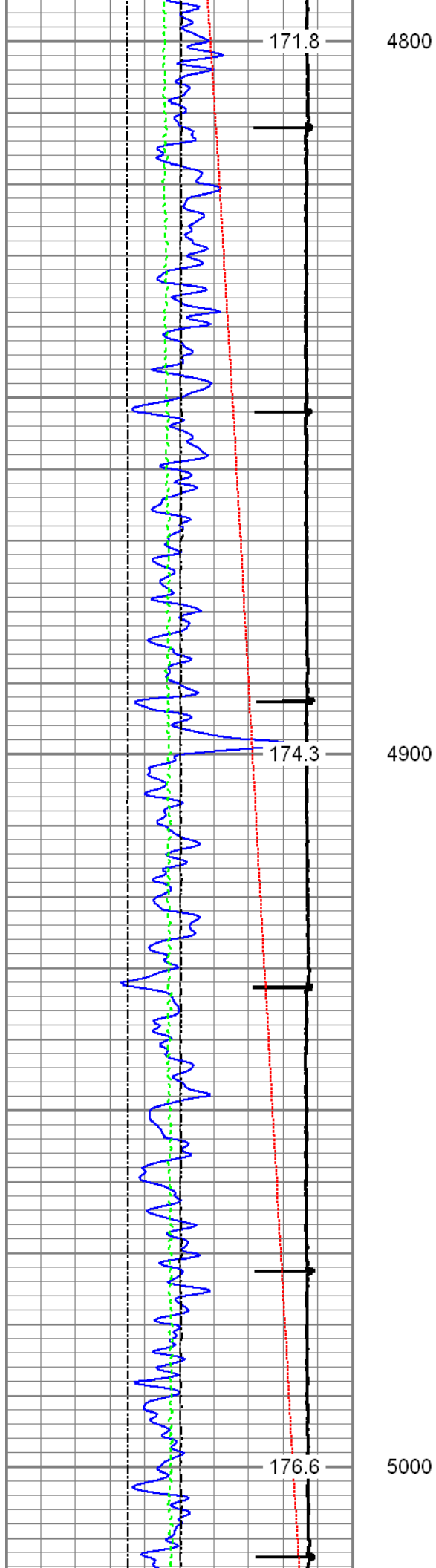


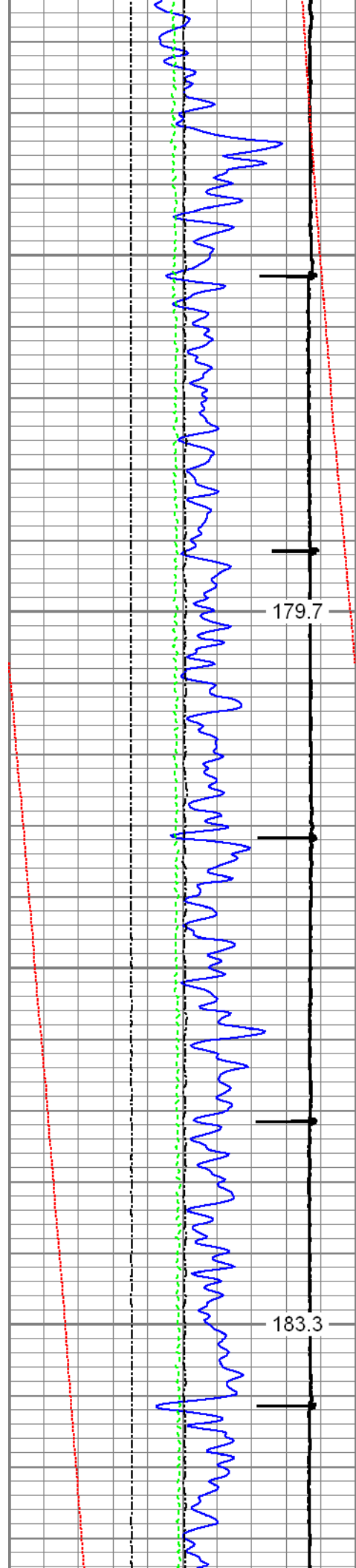


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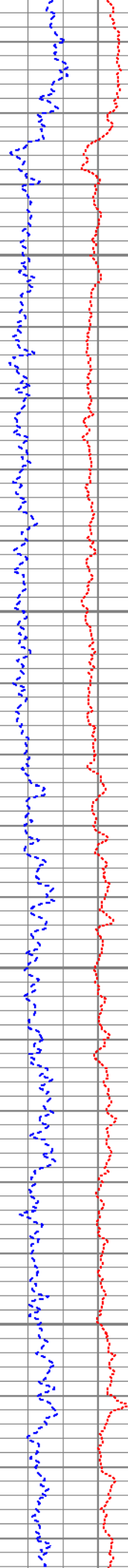
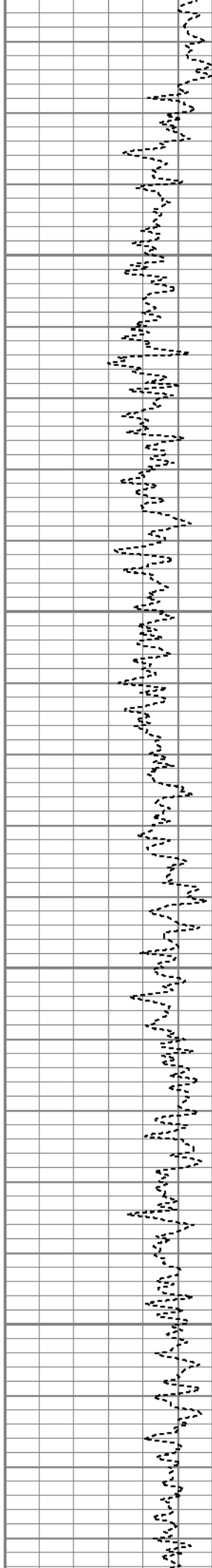


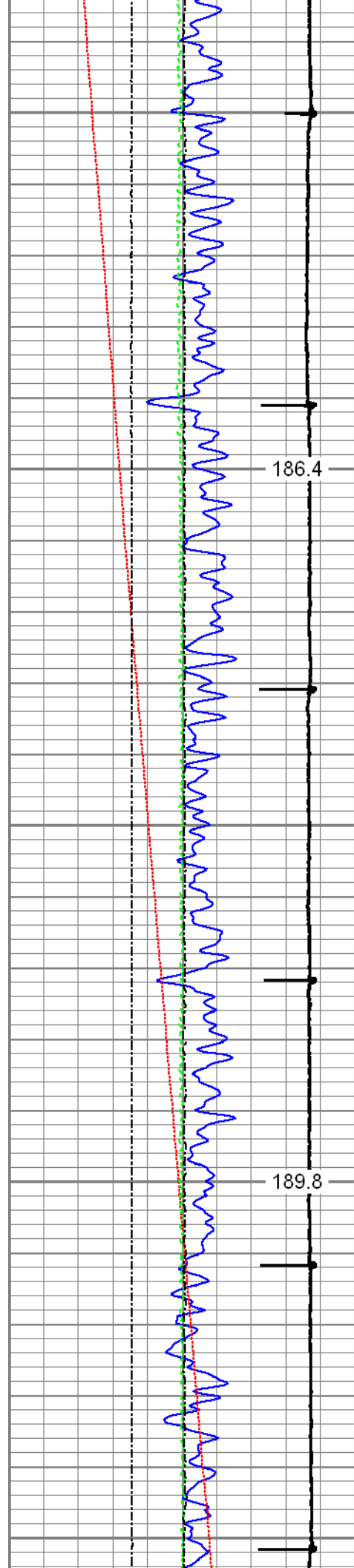




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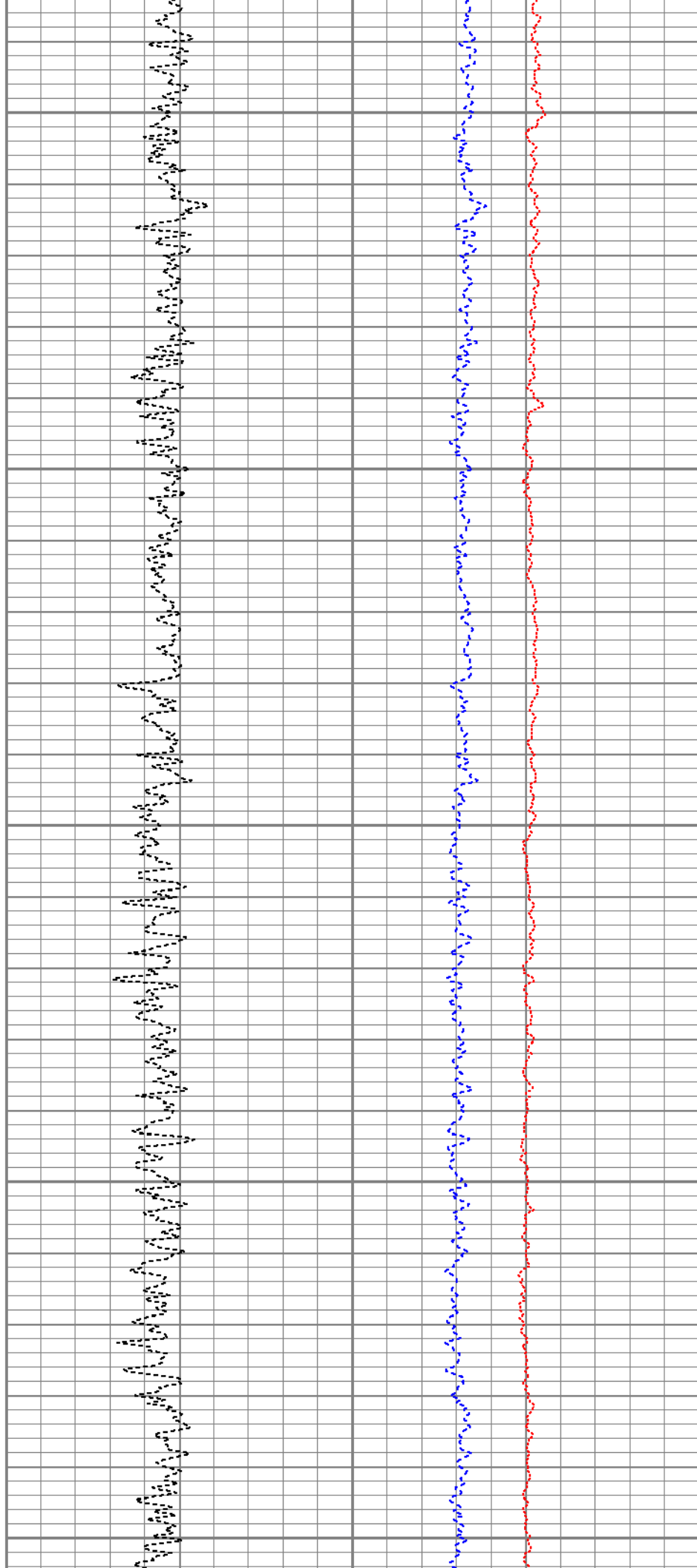
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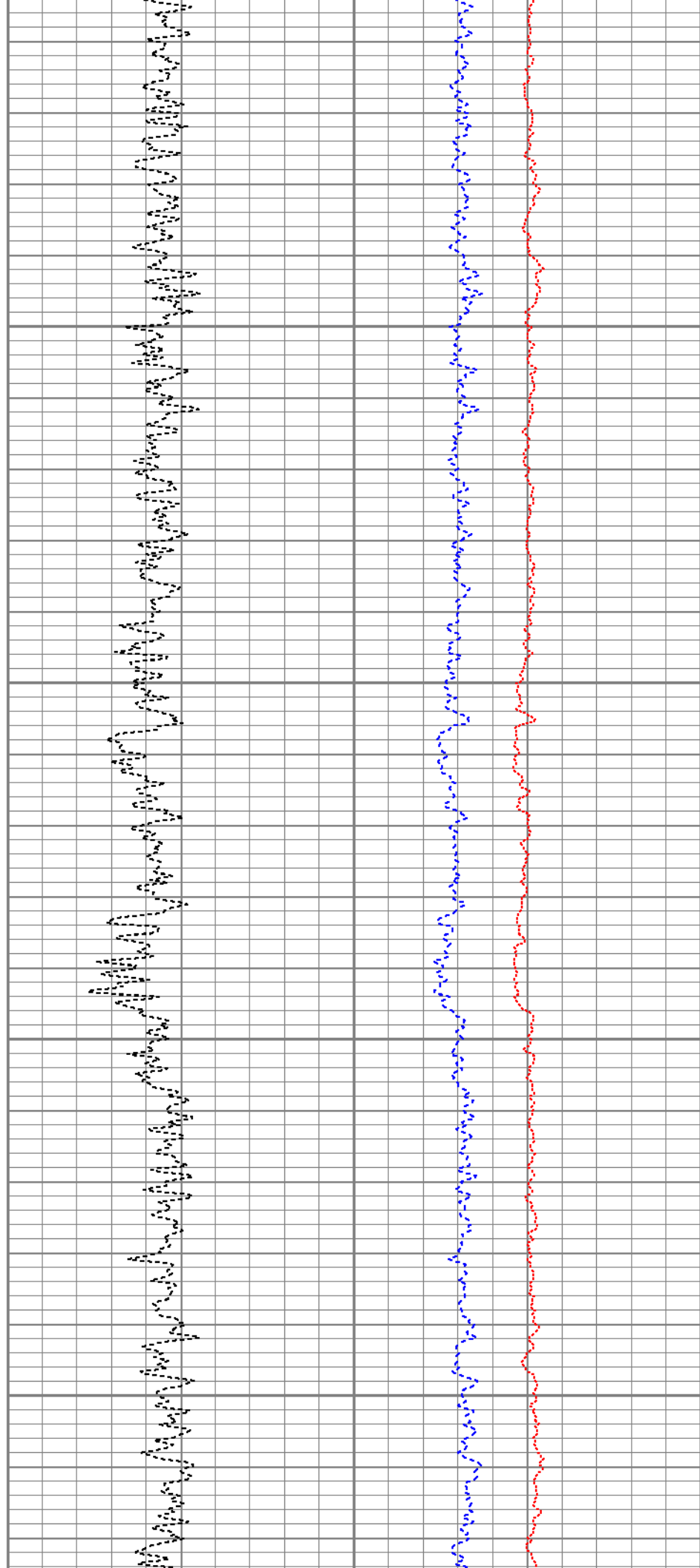
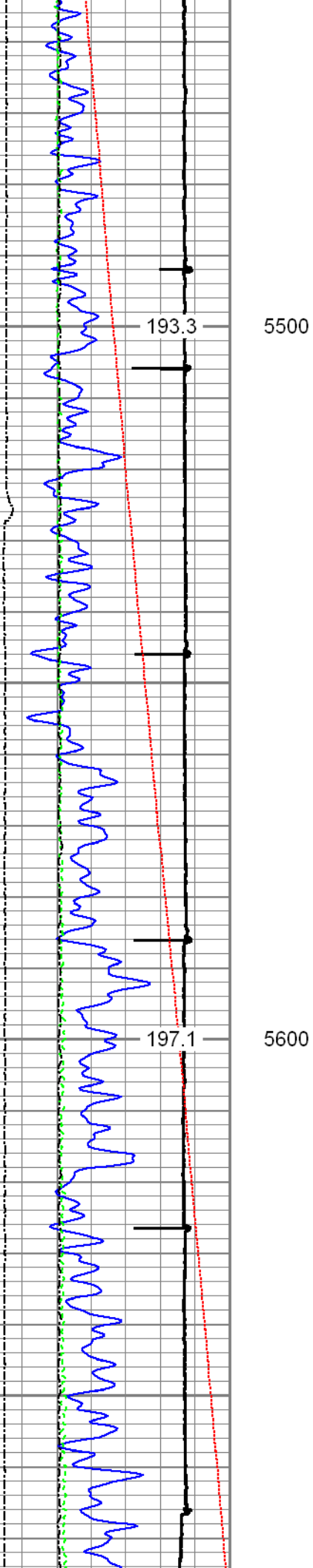


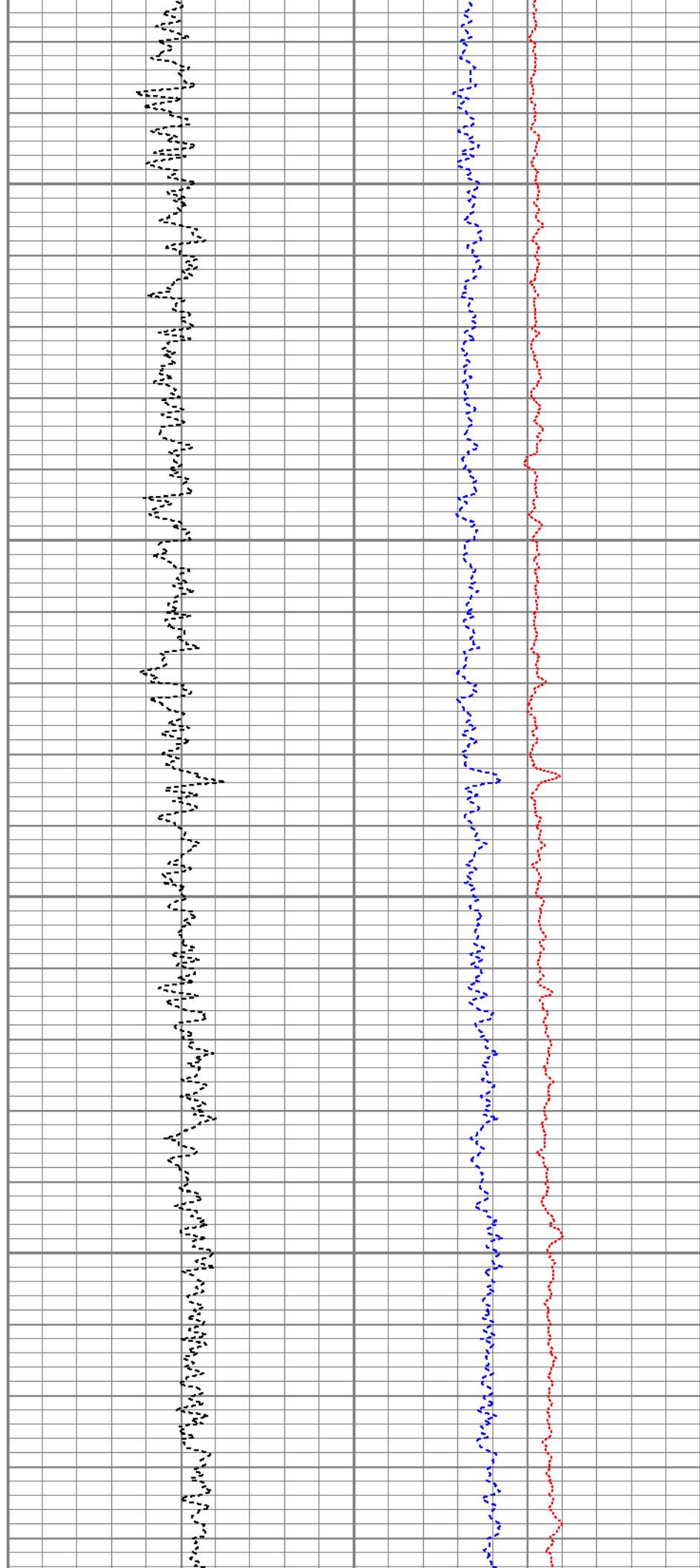
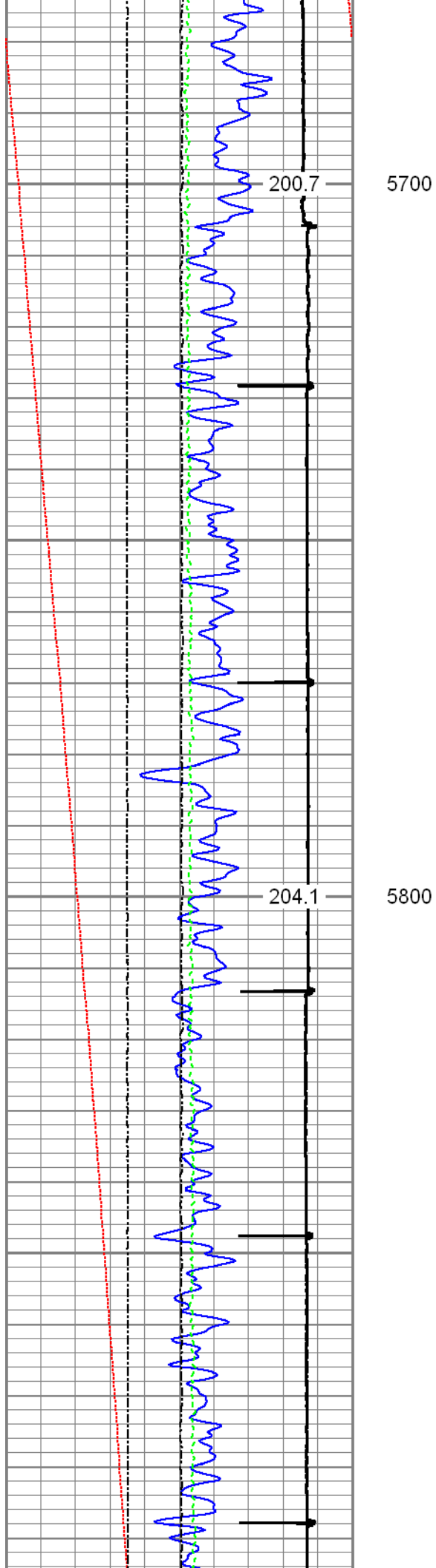


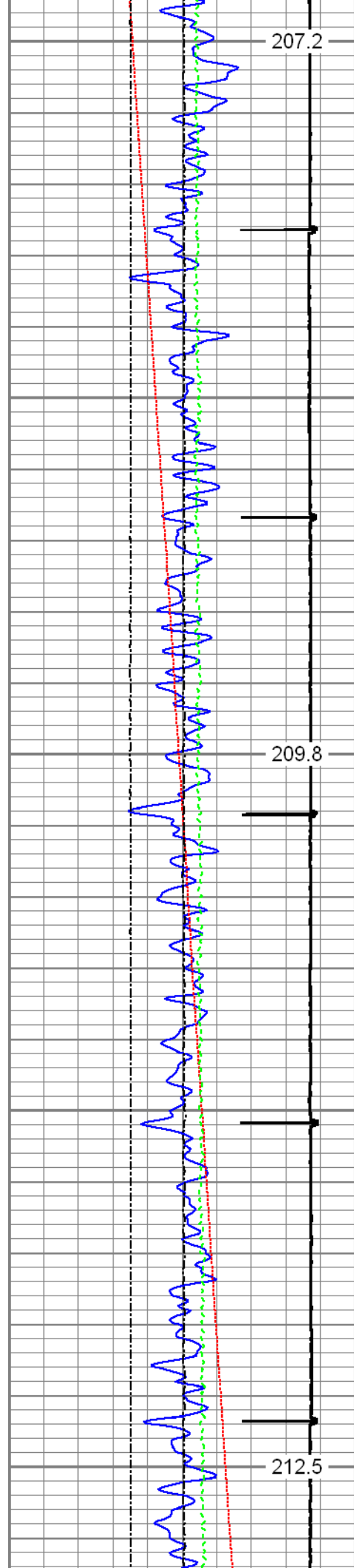
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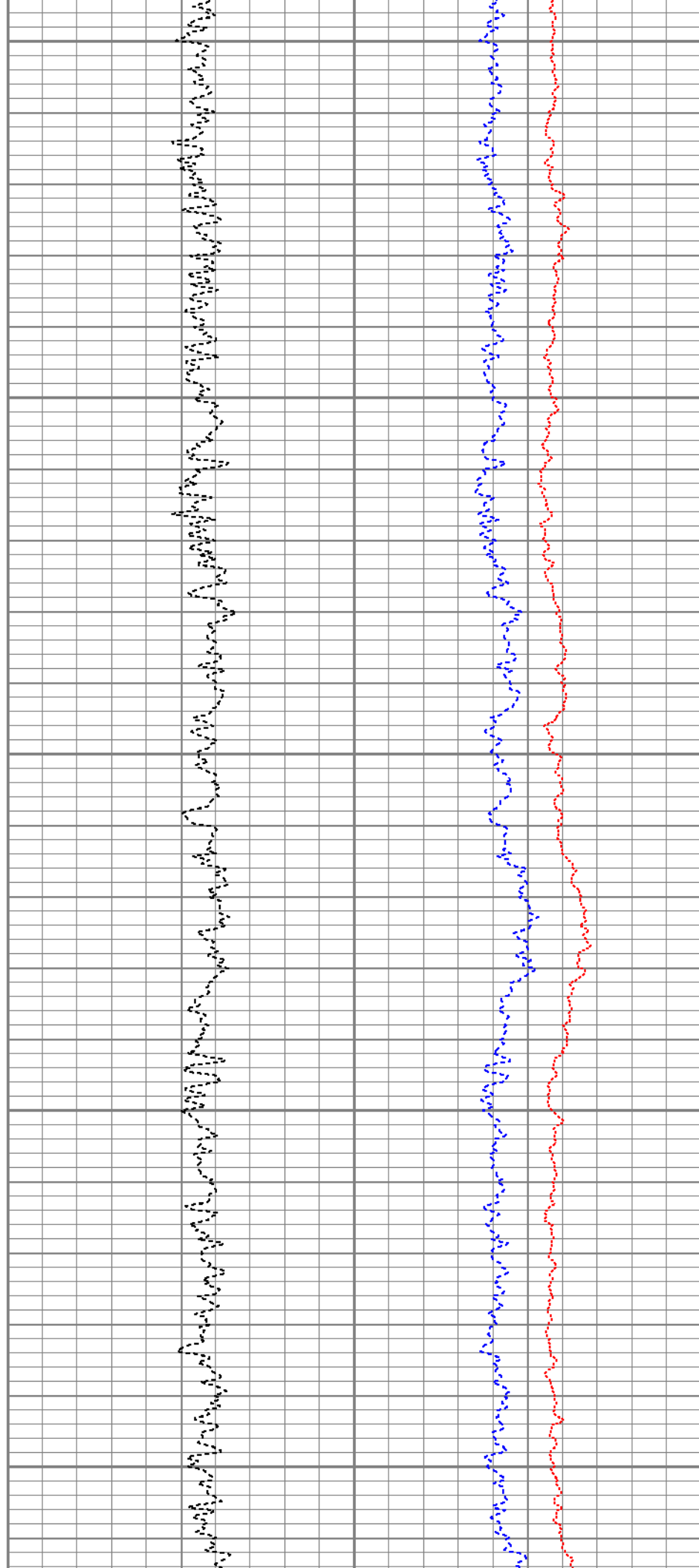


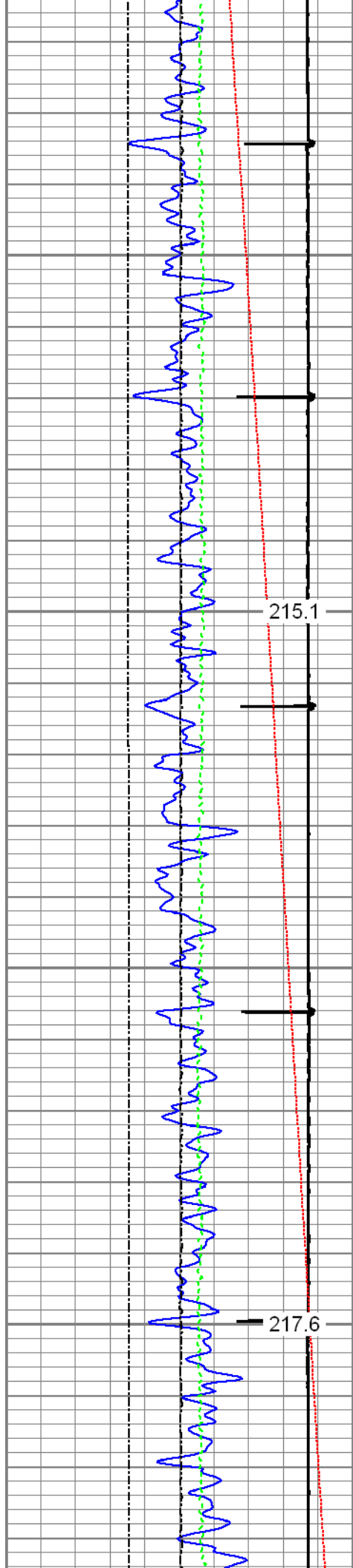


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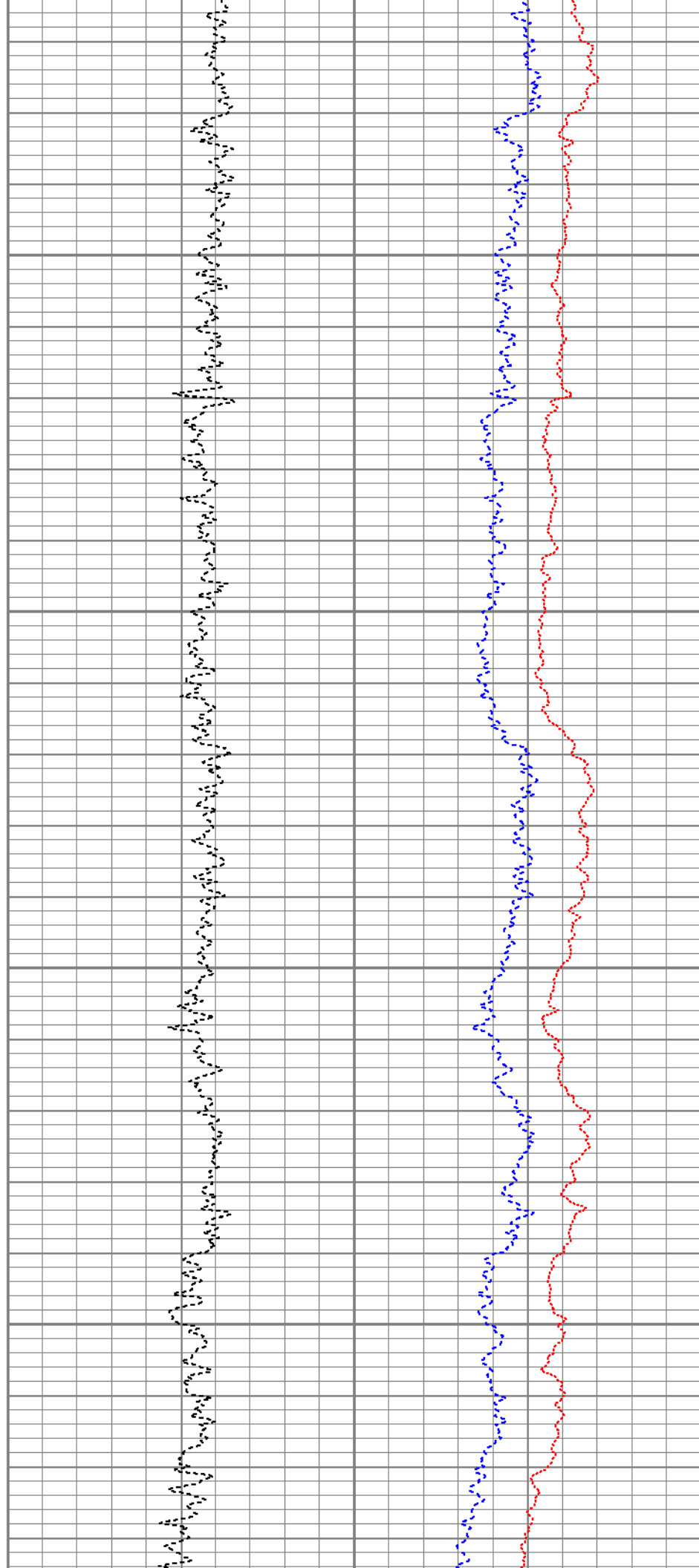
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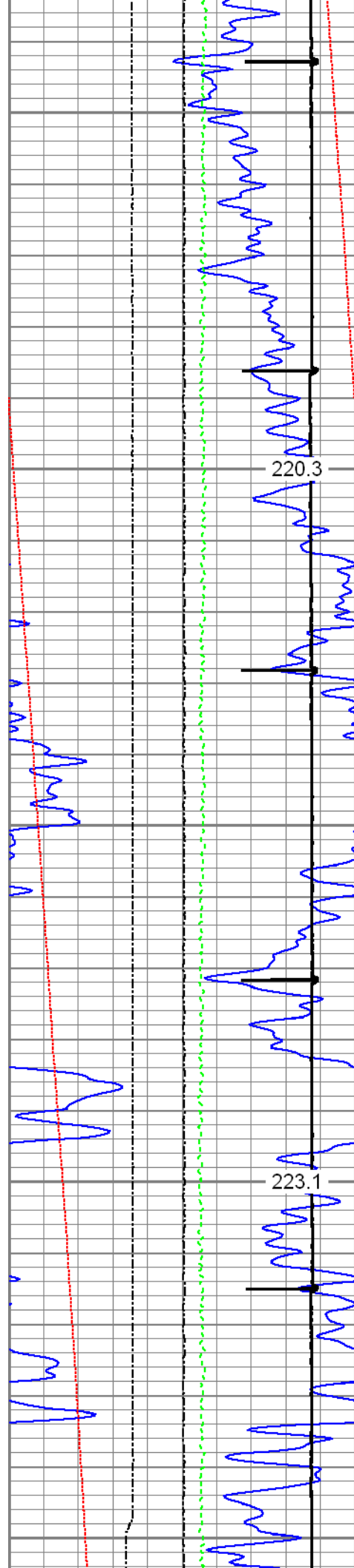




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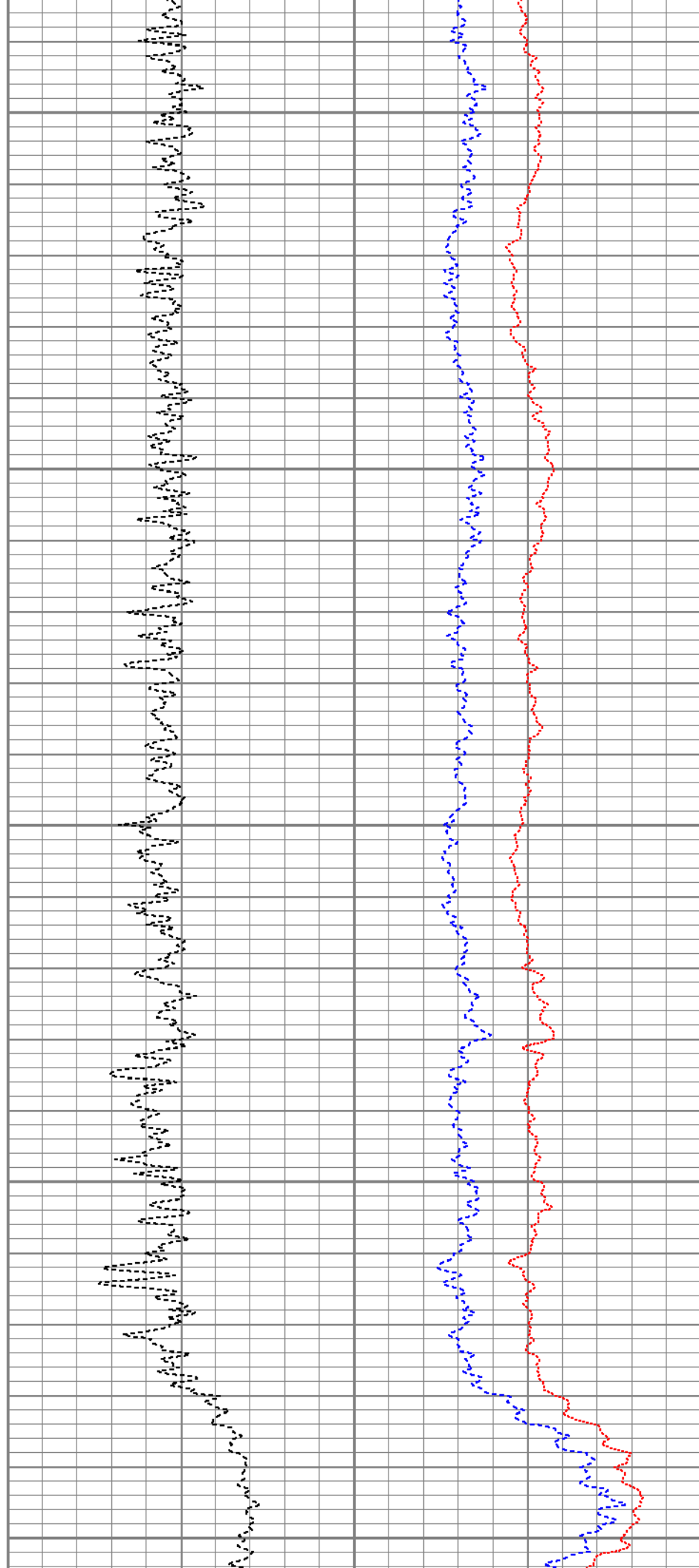


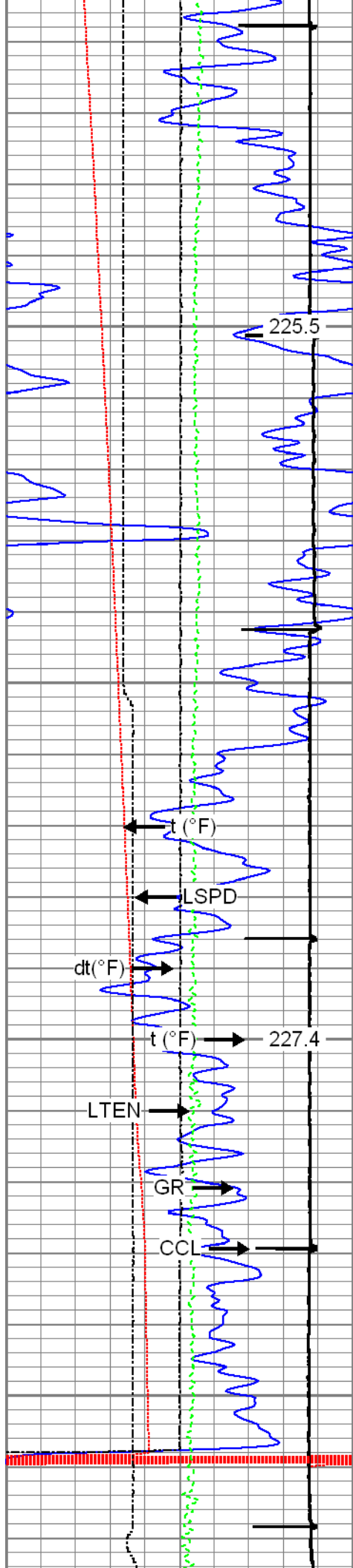
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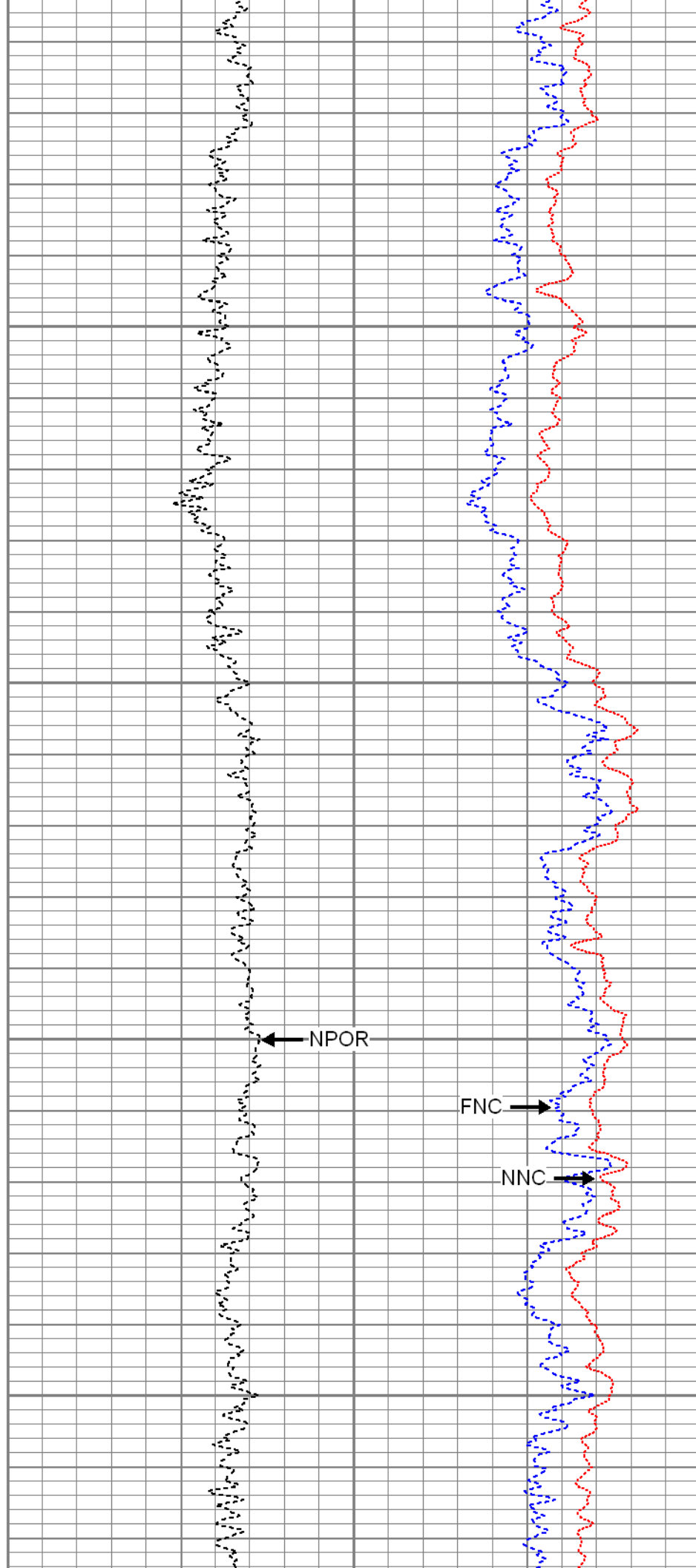
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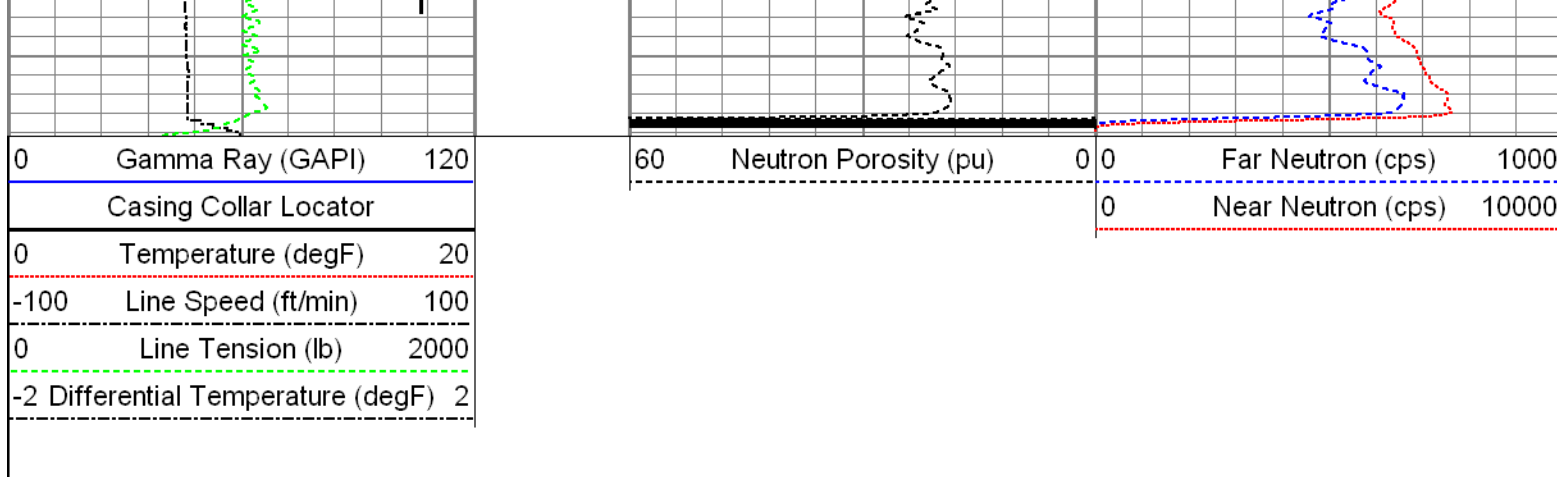




6600

6700





## Repeat Pass

Recorded with 2500 PSI Surface Induced Pressure

Database File: 08-28-15\_noble energy\_70 ranch state bb18-647\_mit\_rbl\_cnl.db

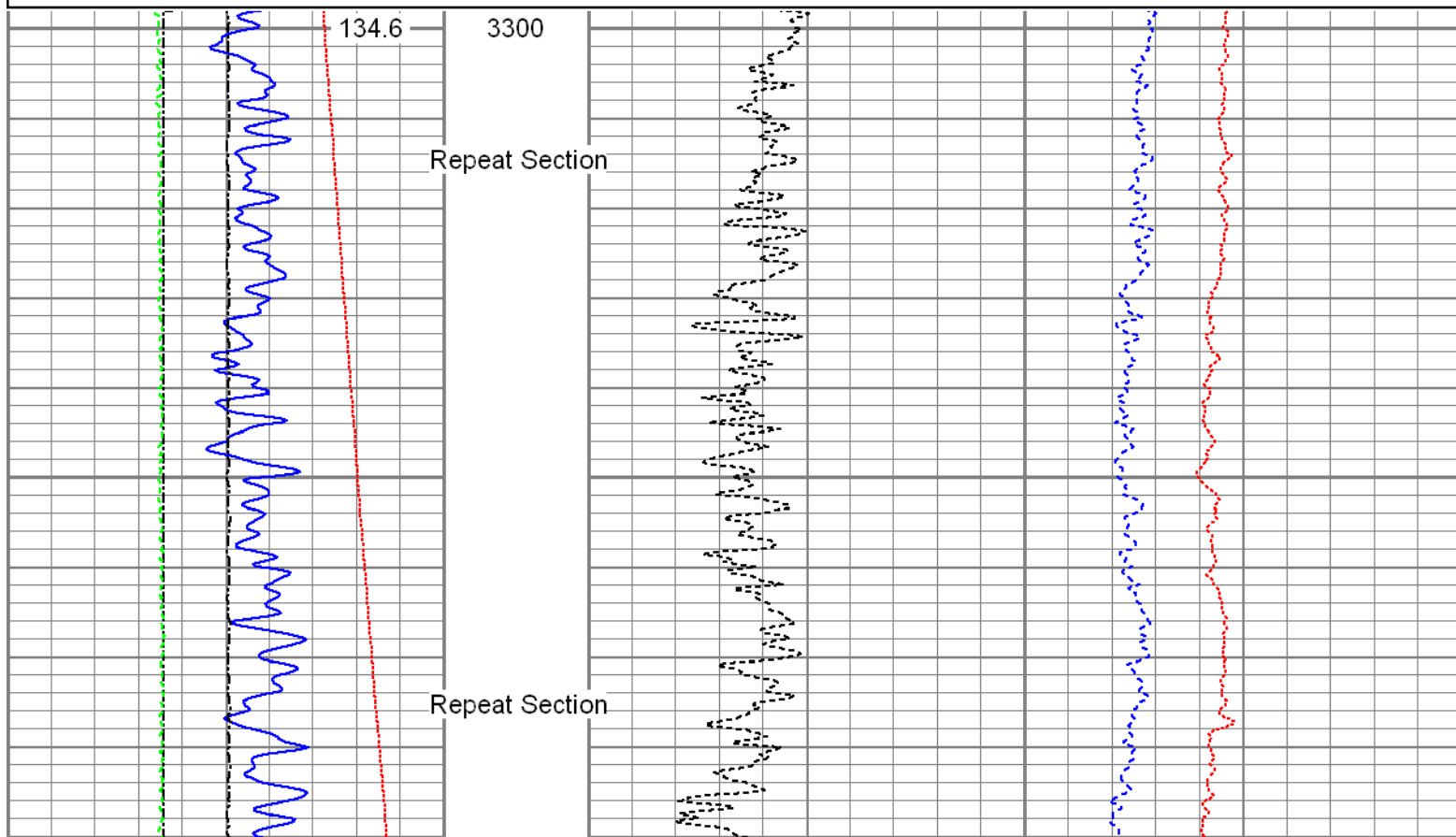
Dataset Pathname: pass5

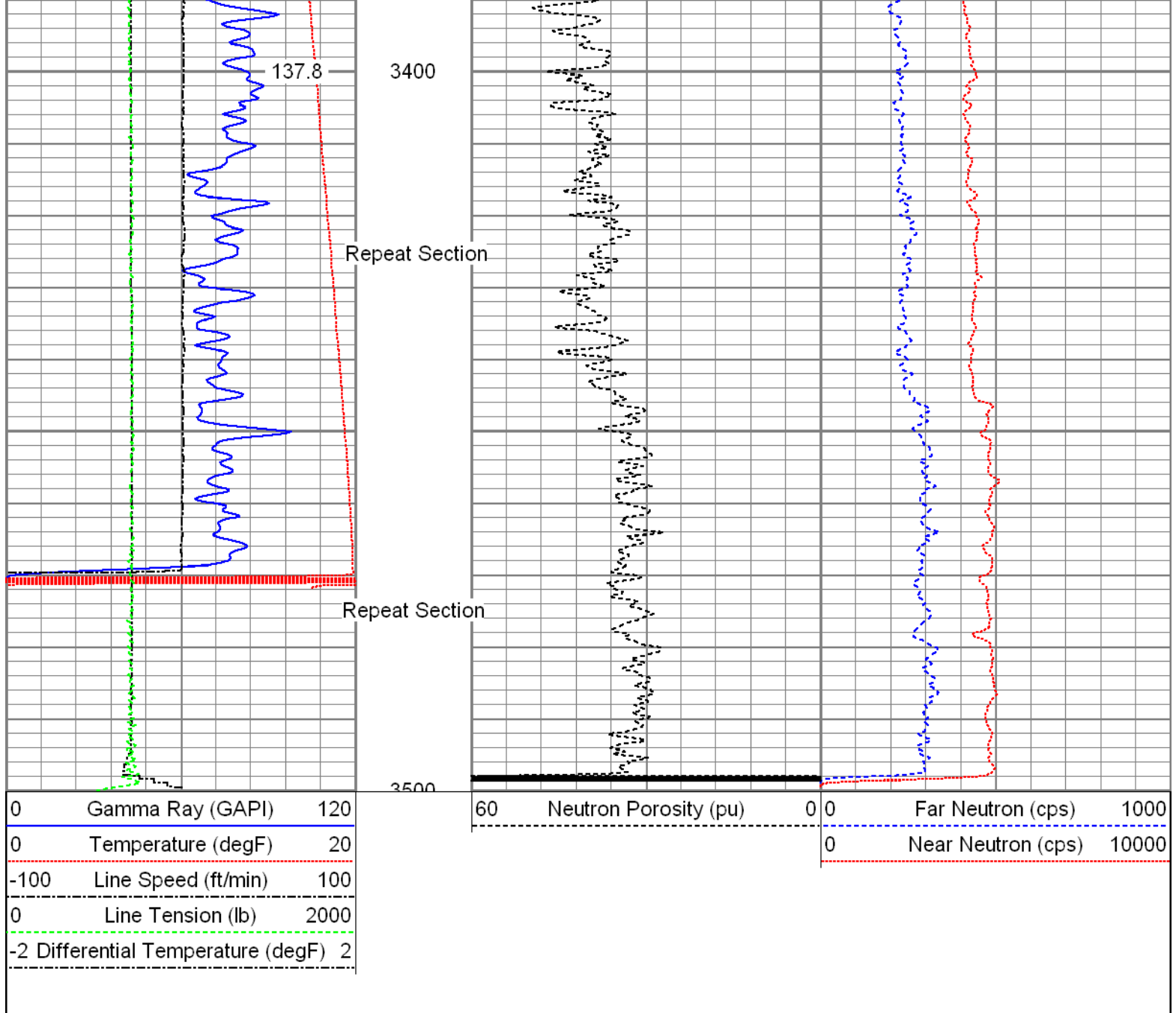
Presentation Format: cnl\_mit

Dataset Creation: Fri Aug 28 09:33:32 2015 by Log 7.0 B1

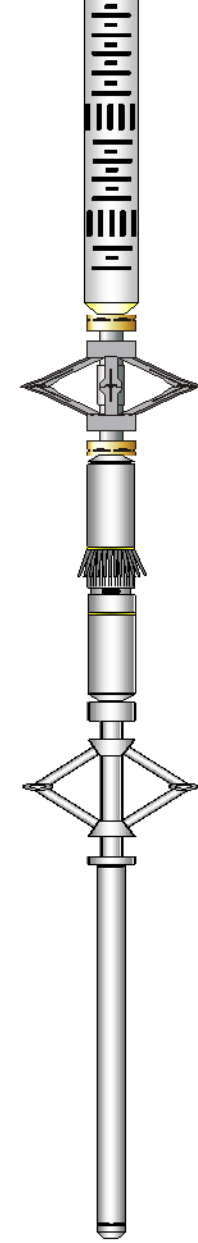
Charted by: Depth in Feet scaled 1:240

0	Gamma Ray (GAPI)	120	60	Neutron Porosity (pu)	0	0	Far Neutron (cps)	1000
0	Temperature (degF)	20						
-100	Line Speed (ft/min)	100						
0	Line Tension (lb)	2000						
-2	Differential Temperature (degF)	2						





Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR TEMP	30.46 29.06		T_CH14375_1_GO Titan 1-7/16" Assembled Electric Cable Head with 1" Fishing Neck	1.03	1.44	4.00
			UW_AGS-UW_AGS_001 (215017) Sondex Adapter - GO Box to Sondex Pin	0.21	1.69	1.00
			UW_XTU-UW_XTU_002 (218874) Crossover Ultrawire Toolbus to Ultralink	1.58	1.69	6.50
			UW_PGR-UW_PGR_020 (10013899) Production Gamma Ray	1.93	1.69	9.50
			UW_PRT-UW_PRT_016 (10025093) Platinum Resistance Thermometer	1.04	1.69	5.20
			UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00

WVF3FT	22.03		UW_RBT-UW_RBT_004 (10013454) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
WVFS1	22.03					
WVFS2	22.03					
WVFS3	22.03					
WVFS4	22.03					
WVFS5	22.03					
WVFS6	22.03					
WVFS7	22.03					
WVFS8	22.03					
CBLTEMP	22.03					
CBLROT	22.03		UW_PRC-DSSRAC (081) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WVF5FT	21.03					
MIT	12.02		UW_MIT-UW_MIT40_027 (218949) 40 Multifinger Imaging Tool	4.54	2.75	61.10
			UW_PRC #4 -UW_PRC_057 (1037) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
			CNL-007 (1005) Compensated Neutron Logging Tool	6.61	1.69	30.00
CNLSC	1.75					
CNSSC	1.34					
TSTAMP	0.00		UW_BUL-UW_BUL_006 (10019616) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20
Dataset: 08-28-15_noble energy_70 ranch state bb18-647_mit_rbl_cnl.db: field/well/run1/pass7						
Total Length: 34.70 ft						
Total Weight: 354.50 lb						
O.D. 3.13 in						

Calibration Report			
Database File:	08-28-15_noble energy_70 ranch state bb18-647_mit_rbl_cnl.db		
Dataset Pathname:	pass7		
Dataset Creation:	Fri Aug 28 09:59:19 2015 by Log 7.0 B1		
Compensated Neutron Calibration Report			
Serial Number:	1005		
Tool Model:	007		
Master Calibration	Tue Jun 03 09:29:29 2014		
Detector	Readings		
Short Space	240.87	cps	
Long Space	303.55	cps	
	Measured	Reference	
Ratio	0.8150	Sleeve: 1.0000	
CNRAT Gain K	1.0271		

Before Survey			
Detector		Readings	
Short Space		cps	
Long Space		cps	
Ratio		Measured	Reference

After Survey			
Detector		Readings	
Short Space		cps	
Long Space		cps	
Ratio		Measured	Reference

Multi-finger Imaging Tool Calibration Report

Serial Number:		218949
Number of Fingers:		40
Tool Model:		UW_MIT40_027

Inclinometer Calibration Report			
Performed:		Mon, Oct, 06 14:03:04 2008	
Calibration Angle:		45	
		Inc X	Inc Y
Vertical:		1996	1984
Finger 1 up:		1780	1738
Finger 31 up:		2235	1756
Finger 21 up:		2216	2228
Finger 11 up:		1736	2196
Sensitivity ratio:	1.0062		
X-axis angle:	131.534		
Deviation const.:	331.322		

Finger Calibration Report							
				Performed:			
				Fri Aug 28 08:31:44 2015			
Ring size:	4	5	6	7			
(in)							
	Sens	Sens	Sens				
Finger 01:	1376	287.0	1663	293.0	1956	314.0	2270
Finger 02:	1445	281.0	1726	292.0	2018	305.0	2323
Finger 03:	1657	284.0	1941	285.0	2226	291.0	2517
Finger 04:	1671	282.0	1953	279.0	2232	287.0	2519
Finger 05:	1534	268.0	1802	273.0	2075	283.0	2358
Finger 06:	1531	264.0	1795	264.0	2059	275.0	2334
Finger 07:	1347	279.0	1626	287.0	1913	301.0	2214
Finger 08:	1539	264.0	1803	266.0	2069	276.0	2345
Finger 09:	1414	275.0	1689	285.0	1974	299.0	2273
Finger 10:	1482	270.0	1752	277.0	2029	289.0	2318
Finger 11:	1469	267.0	1736	273.0	2009	284.0	2293
Finger 12:	1312	282.0	1594	297.0	1891	312.0	2203
Finger 13:	1567	285.0	1852	293.0	2145	292.0	2437
Finger 14:	1410	284.0	1694	298.0	1992	307.0	2299
Finger 15:	1525	266.0	1791	276.0	2067	284.0	2351
Finger 16:	1391	281.0	1672	297.0	1969	308.0	2277
Finger 17:	1623	273.0	1896	282.0	2178	286.0	2464
Finger 18:	1361	288.0	1649	310.0	1959	323.0	2282
Finger 19:	1622	259.0	1881	265.0	2146	266.0	2412
Finger 20:	1492	263.0	1755	286.0	2041	284.0	2325


Finger 21:	1575	250.0	1825	266.0	2091	265.0	2356
Finger 22:	1511	271.0	1782	290.0	2072	296.0	2368
Finger 23:	1331	271.0	1602	292.0	1894	301.0	2195
Finger 24:	1662	258.0	1920	274.0	2194	281.0	2475
Finger 25:	1344	284.0	1628	312.0	1940	323.0	2263
Finger 26:	1518	281.0	1799	301.0	2100	309.0	2409
Finger 27:	1450	255.0	1705	276.0	1981	285.0	2266
Finger 28:	1618	270.0	1888	289.0	2177	294.0	2471
Finger 29:	1457	266.0	1723	288.0	2011	302.0	2313
Finger 30:	1412	267.0	1679	298.0	1977	306.0	2283
Finger 31:	1518	261.0	1779	280.0	2059	291.0	2350
Finger 32:	1338	259.0	1597	282.0	1879	300.0	2179
Finger 33:	1601	297.0	1898	314.0	2212	323.0	2535
Finger 34:	1533	266.0	1799	279.0	2078	291.0	2369
Finger 35:	1432	263.0	1695	282.0	1977	299.0	2276
Finger 36:	1584	282.0	1866	291.0	2157	299.0	2456
Finger 37:	1598	275.0	1873	283.0	2156	299.0	2455
Finger 38:	1487	277.0	1764	289.0	2053	300.0	2353
Finger 39:	1463	281.0	1744	296.0	2040	309.0	2349
Finger 40:	1582	289.0	1871	295.0	2166	306.0	2472

Segmented Cement Bond Log Calibration Report						
Serial Number:		10013454				
Tool Model:		UW_RBT_004				
Calibration Casing Diameter:		7.000	in			
Calibration Depth:		169.811	ft			
Master Calibration, performed Fri Aug 28 08:51:46 2015:						
	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	-0.001	0.577	0.800	62.165	106.062	0.919
5FT	-0.003	0.641	0.800	62.165	95.159	1.131
S1	-0.000	0.590	0.000	100.000	169.446	0.041
S2	-0.002	0.595	0.000	100.000	167.464	0.417
S3	-0.002	0.577	0.000	100.000	172.693	0.320
S4	-0.003	0.575	0.000	100.000	173.046	0.469
S5	-0.001	0.570	0.000	100.000	175.122	0.214
S6	-0.003	0.567	0.000	100.000	175.538	0.480
S7	-0.002	0.565	0.000	100.000	176.476	0.377
S8	-0.002	0.578	0.000	100.000	172.485	0.337

Temperature Calibration Report					
		Serial Number:		10025093	
		Tool Model:		UW_PRT_016	
		Performed:		Wed Feb 11 13:40:46 2015	
Point #		Reading		Reference	
1		13006.00	cps	68.00	degF
2		18181.00	cps	104.00	degF
3		29634.00	cps	176.00	degF
4		41077.00	cps	248.00	degF
5		52560.00	cps	320.00	degF
6		58409.00	cps	356.00	degF
7			cps		degF
8			cps		degF
9			cps		degF
10			cps		degF

Gamma Ray Calibration Report

Serial Number:	10013899	
Tool Model:	UW_PGR_020	
Performed:	Sun Jun 13 13:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	cps
Calibrator Reading:	1.0	cps
Sensitivity:	1.0000	GAPI/cps

	Company	Noble Energy Inc.
	Well	70 Ranch State BB18-647
	Field	Wattenberg
	County	Weld
	State	Colorado