

# Radial Cement Bond Gamma Ray Casing Collar Log

Company	Noble Energy Inc.	Company	Noble Energy Inc.
Well	Wells Ranch AA11-657	Well	Wells Ranch AA11-657
Field	Wattenberg	Field	Wattenberg
County	Weld	County	Weld
State	Colorado	State	Colorado
Location:	API #: 05-123-41255		
Permanent Datum	SEC 11 TWP 6N RGE 63W	Ground Level	Elevation 4869'
Log Measured From	Kelly Bushing	Drilling Measured From	Kelly Bushing
			Elevation K.B. 4893' D.F. 4892' G.L. 4869'
			MIT
			Other Services

Date	26-JUN-2015
Run Number	One
Depth Driller	13791 FT
Depth Logger	7042 FT
Bottom Logged Interval	7037 FT
Top Log Interval	Surface
Open Hole Size	8.750"
Type Fluid	Water
Density / Viscosity	8.34 lbm/gal
Max. Recorded Temp.	224°F
Estimated Cement Top	98 FT
Time Well Ready	ROA
Time Logger on Bottom	16:32
Equipment Number	HD-0324
Location	Ft. Lupton, CO
Recorded By	Rob 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	24 FT	645.5 FT		
Intermediate #1	7	26	P-110IC	24 FT	7101.4 FT		
Intermediate #2							
Liner	4 1/2	11.6	P-110IC	6997.8 FT	13781 FT		

>>> Fold Here >>>

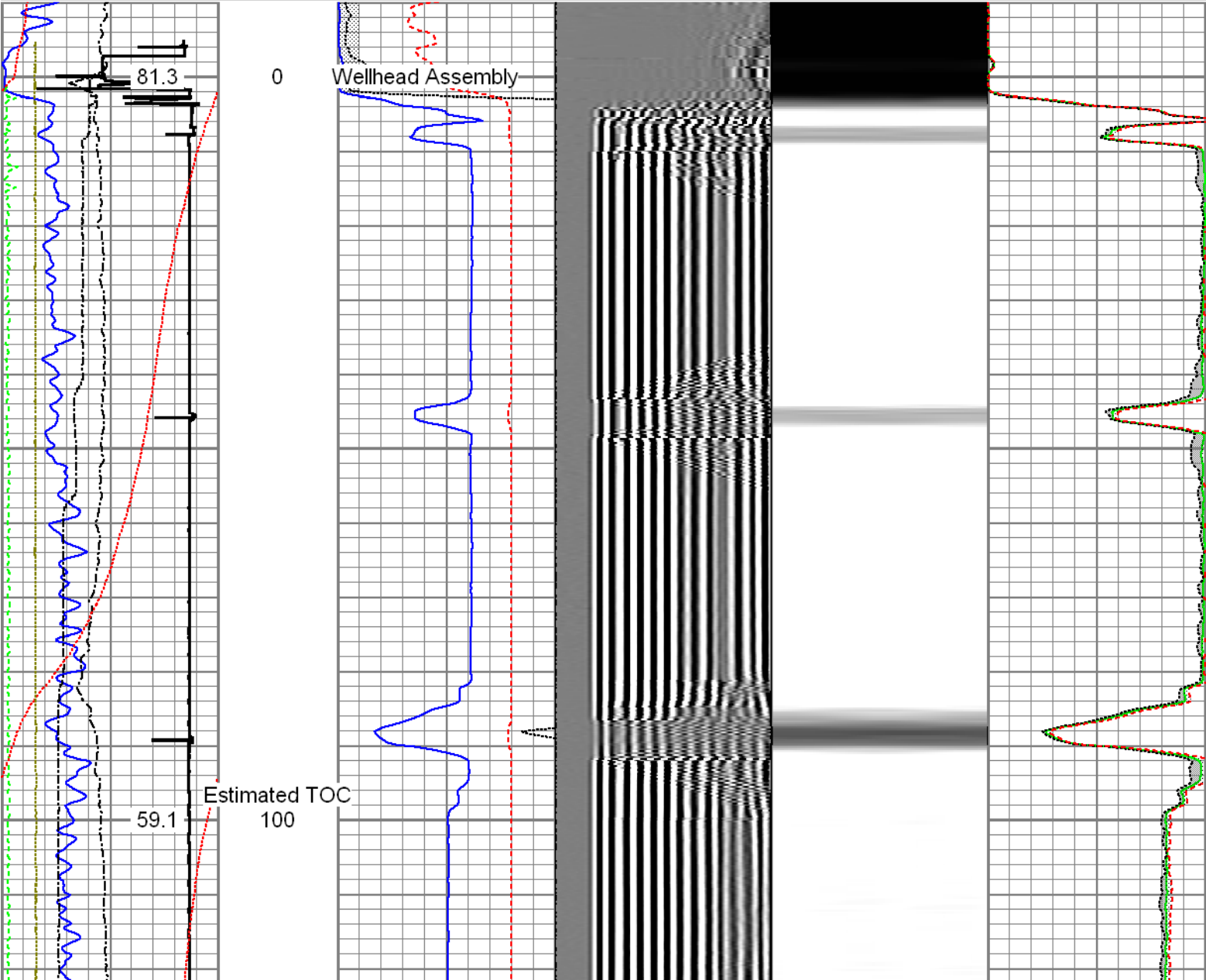
All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, 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.

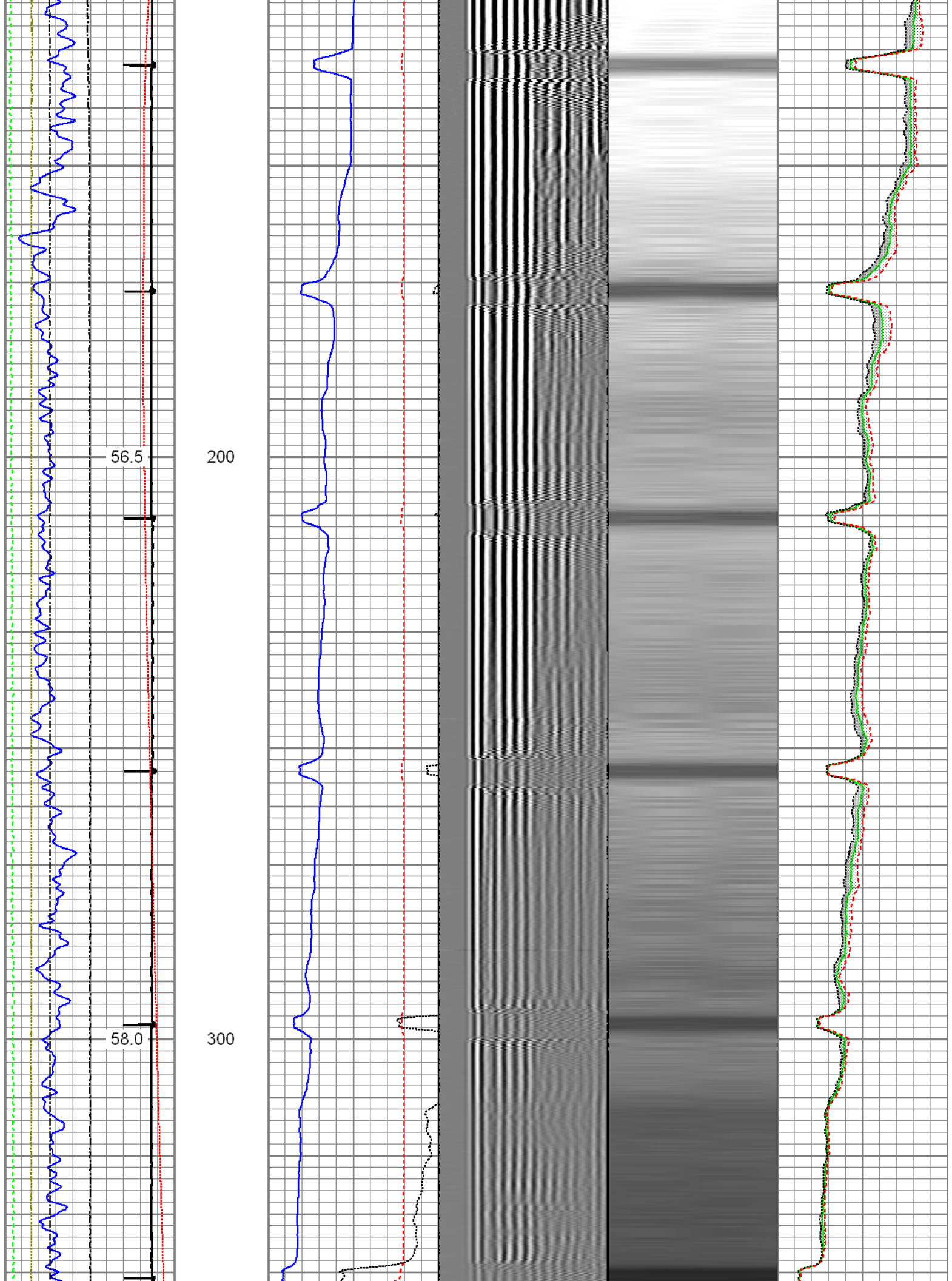
## Comments

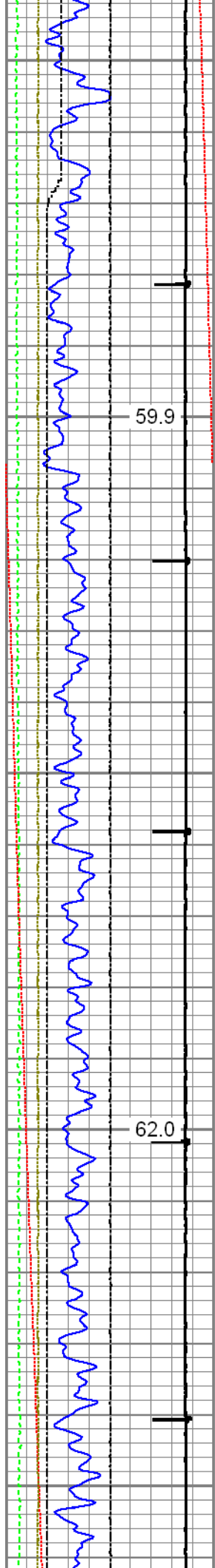
Log ran as per customer request  
 Depth referenced to casing tally reported liner top at 6997.8 FT  
 Adjusted log -23 FT to correlate with liner top  
 Log ran from just below liner top to surface  
 Logging tools were clean and free of any debris upon completion of operations  
 Thank you for choosing FMC Technologies Completion Services, Inc.!!

Database File: 06-26-15\_noble energy\_wells ranch aa11-657\_mit\_rbl.db  
Dataset Pathname: pass15.1  
Presentation Format: rbt4\_mit  
Dataset Creation: Fri Jun 26 19:54:46 2015 by Calc 7.0 B1  
Charted by: Depth in Feet scaled 1:240

Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Casing Collar Locator	3' Amplitude x 5			Minimum Amplitude
Line Speed	0 (mV) 20			0 100
-100 (ft/min) 100	3' Travel Time			Maximum Amplitude
Line Tension	650 (usec) 150			0 100
0 (lb) 2000				
Differential Temperature				
-2 (degF) 2				
Temperature				
0 (degF) 20				
-10 Deviation (°) 90				





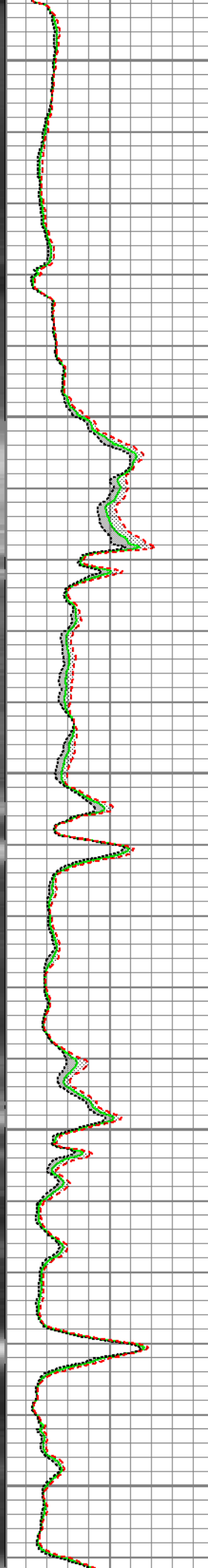
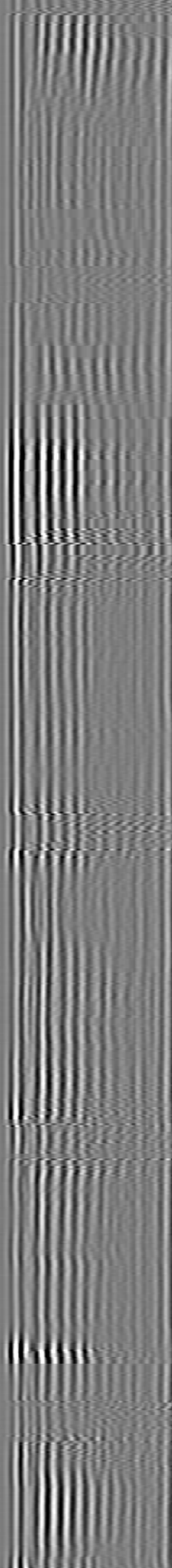
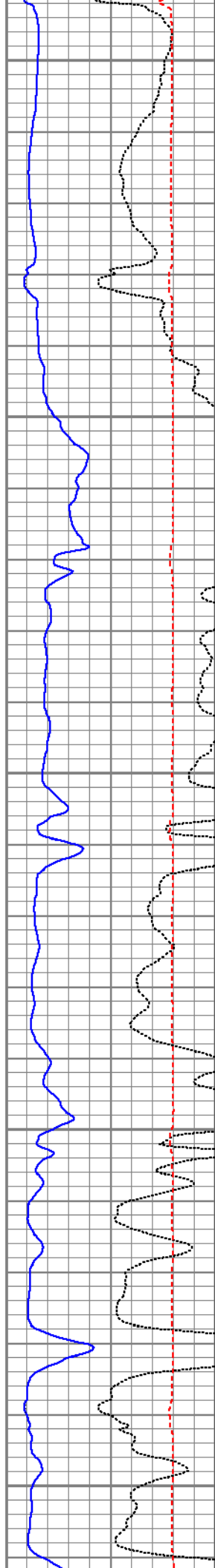


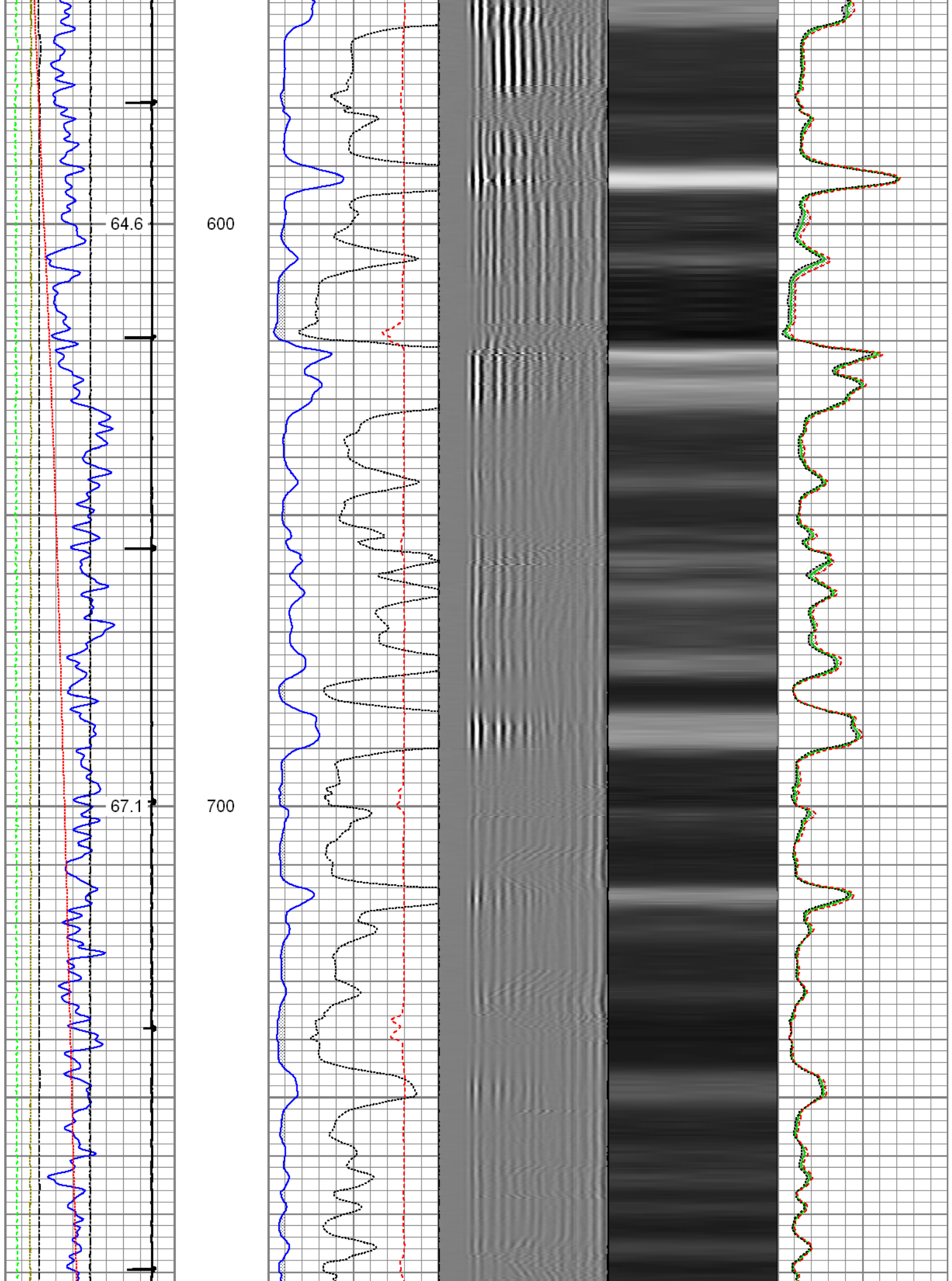
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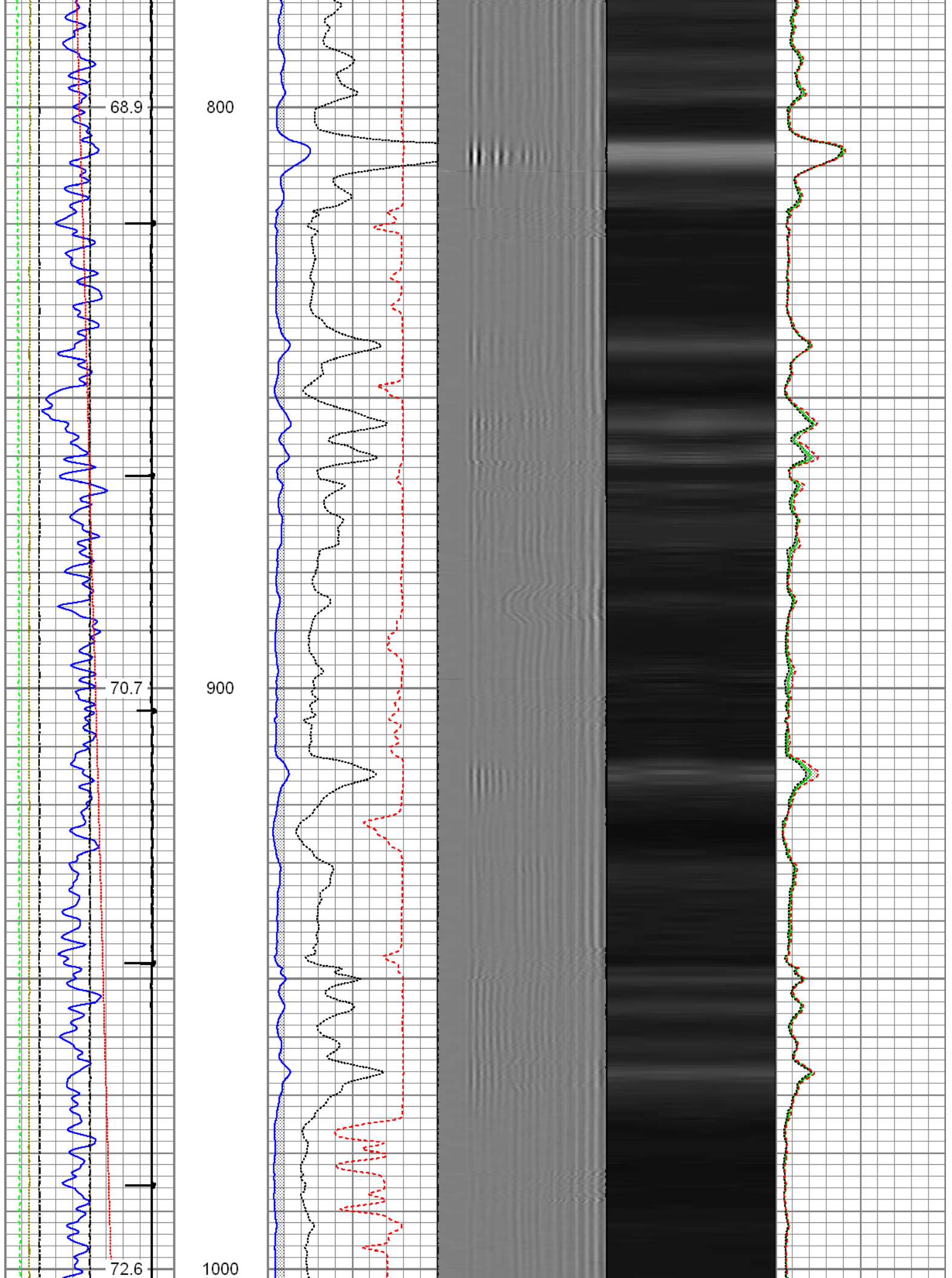
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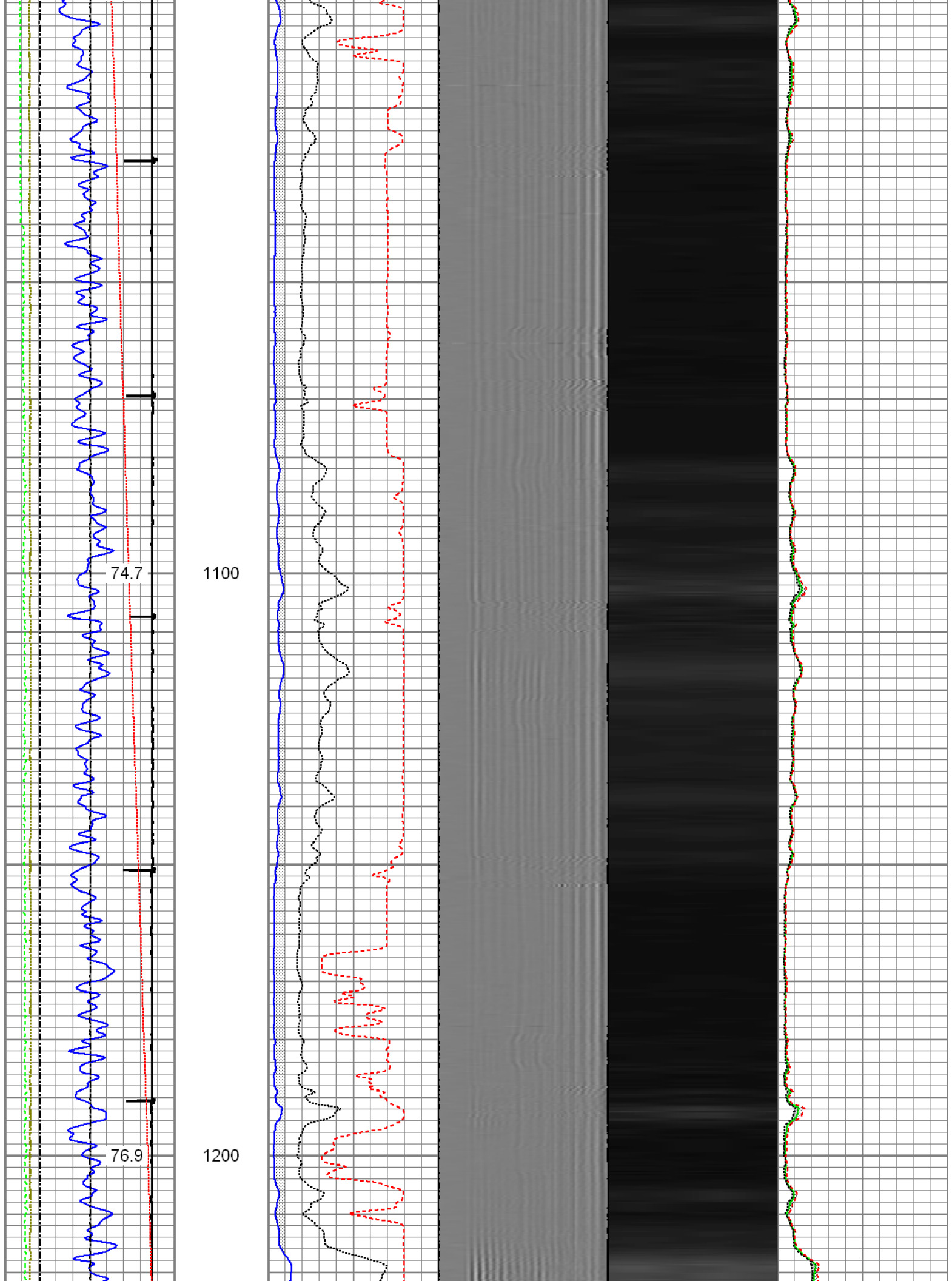
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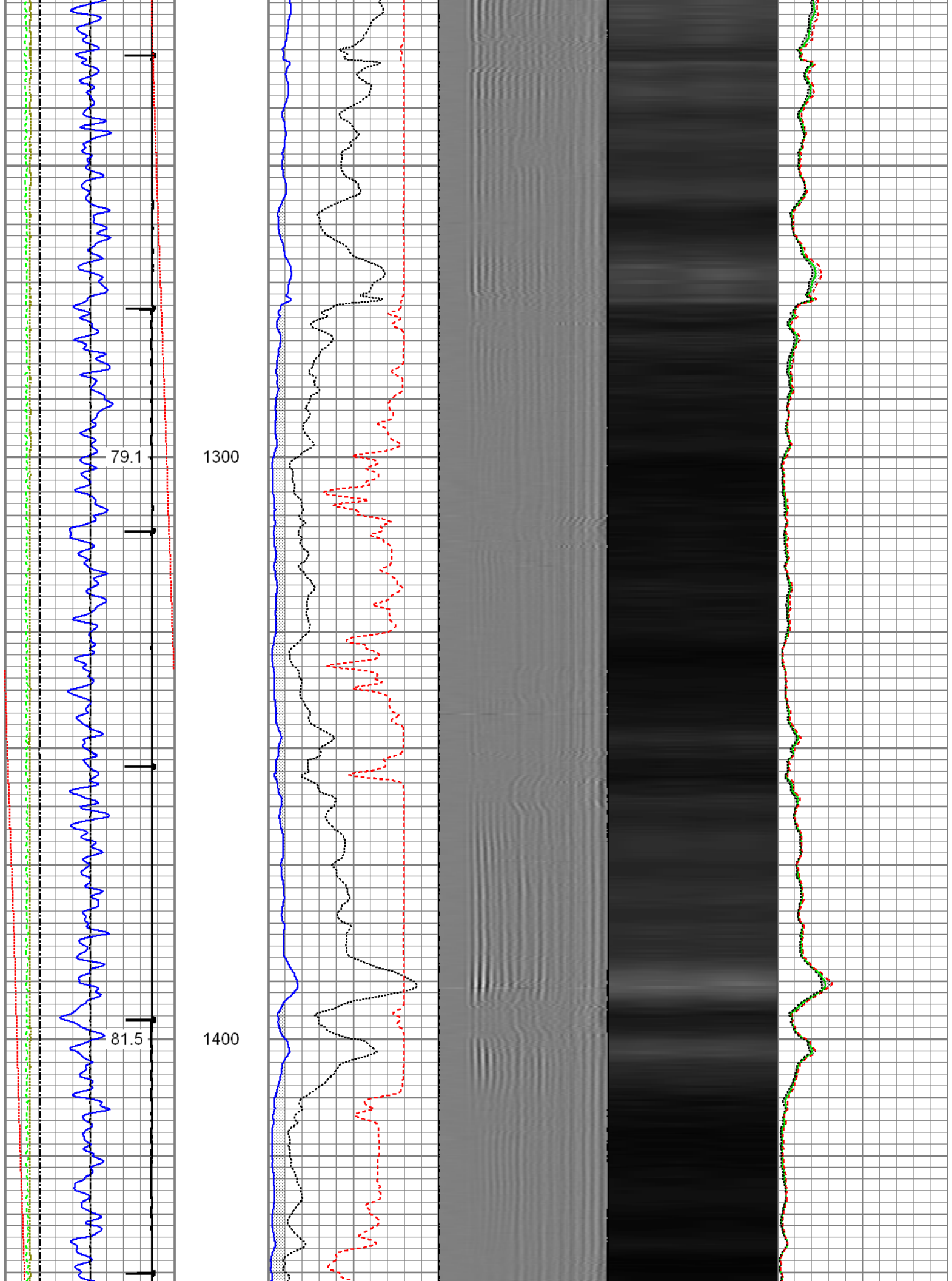
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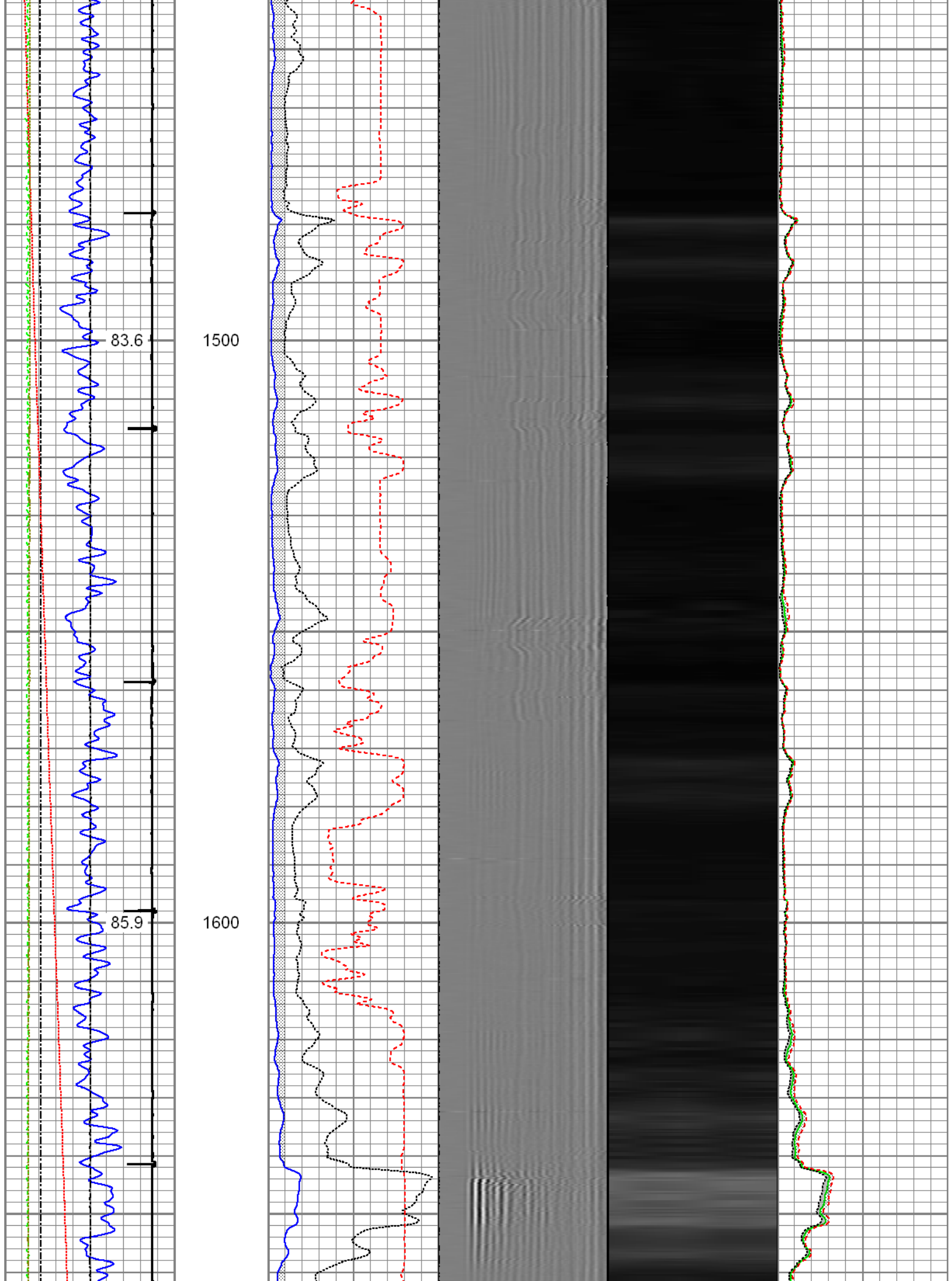


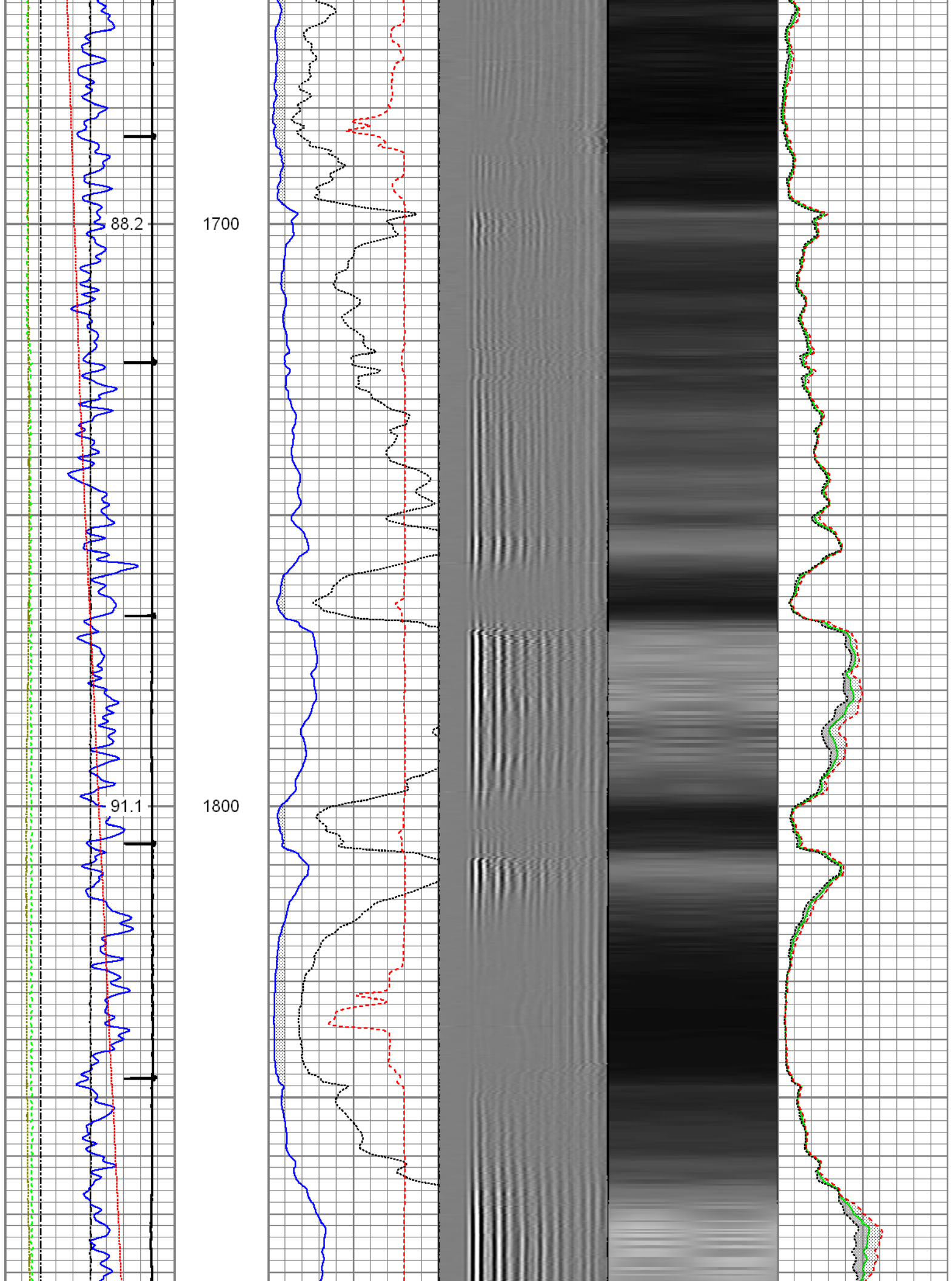


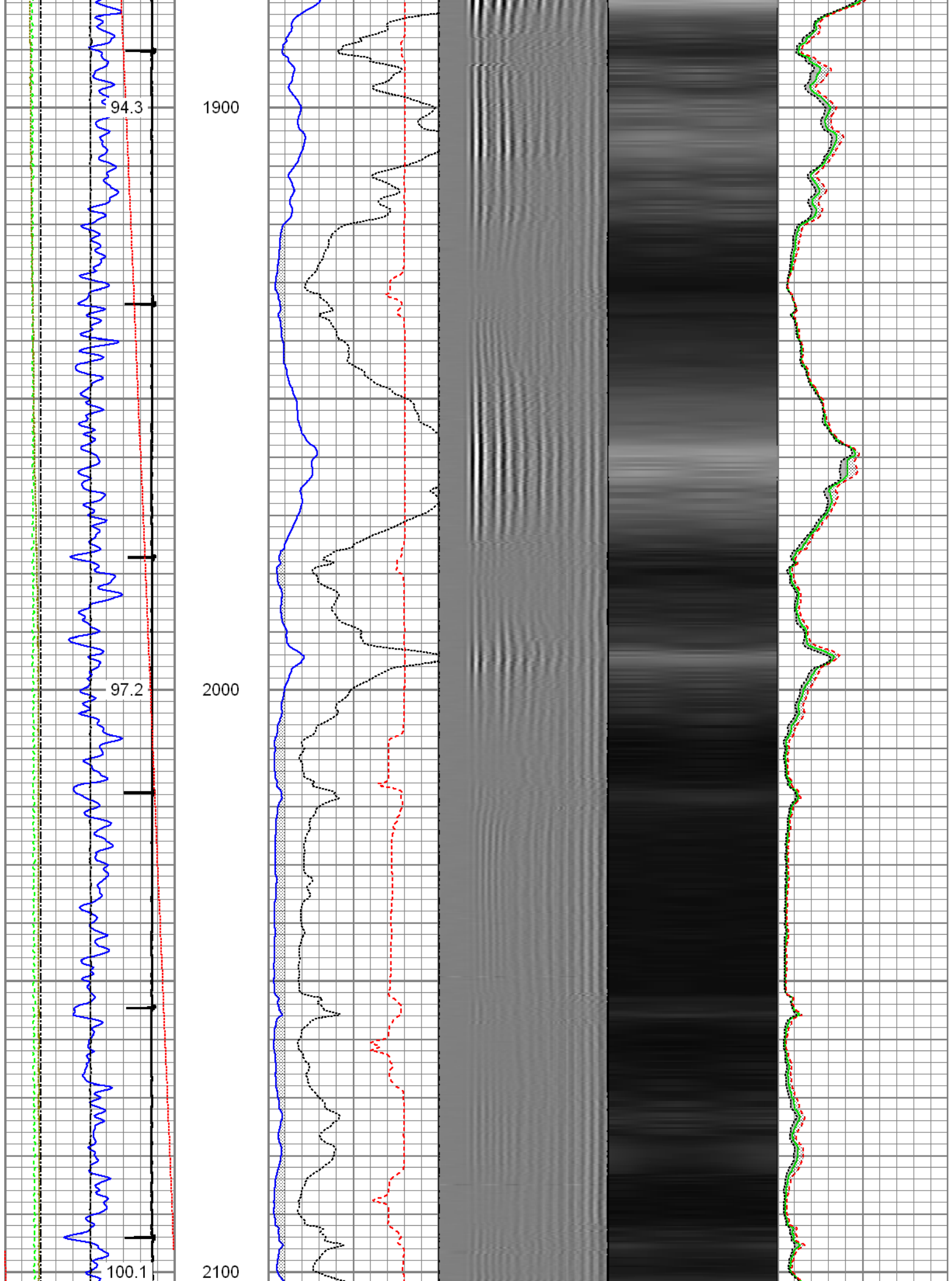


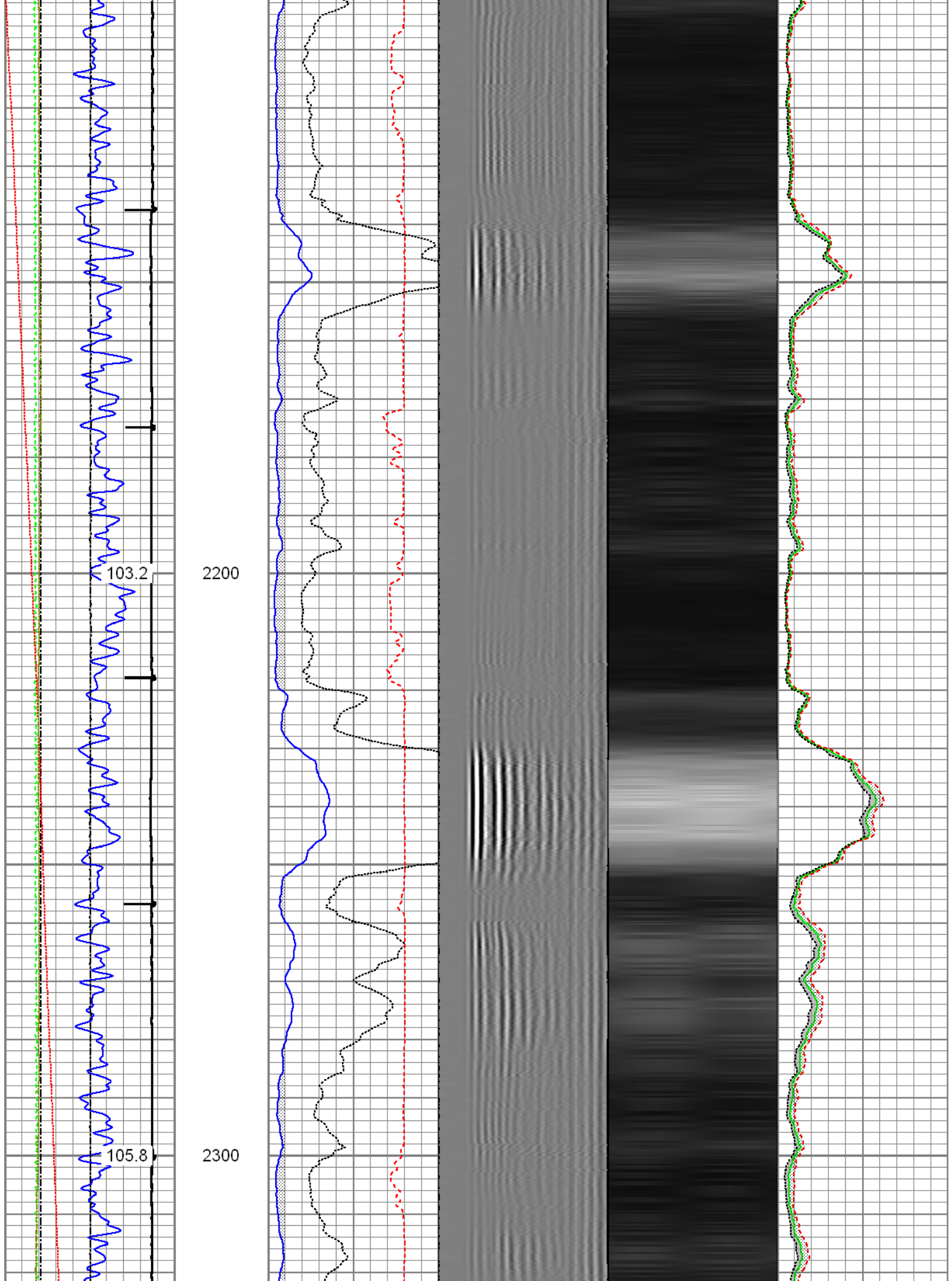


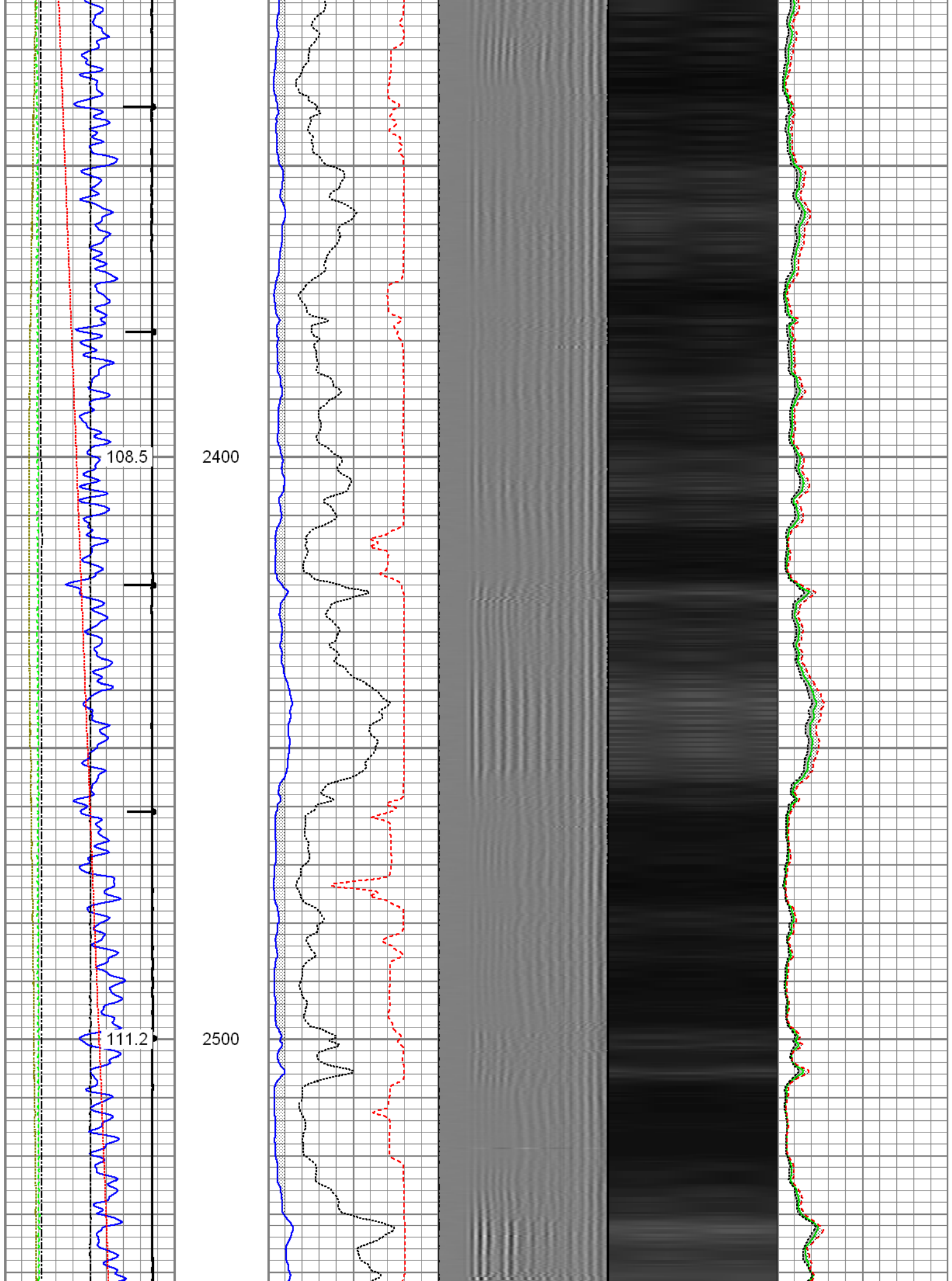


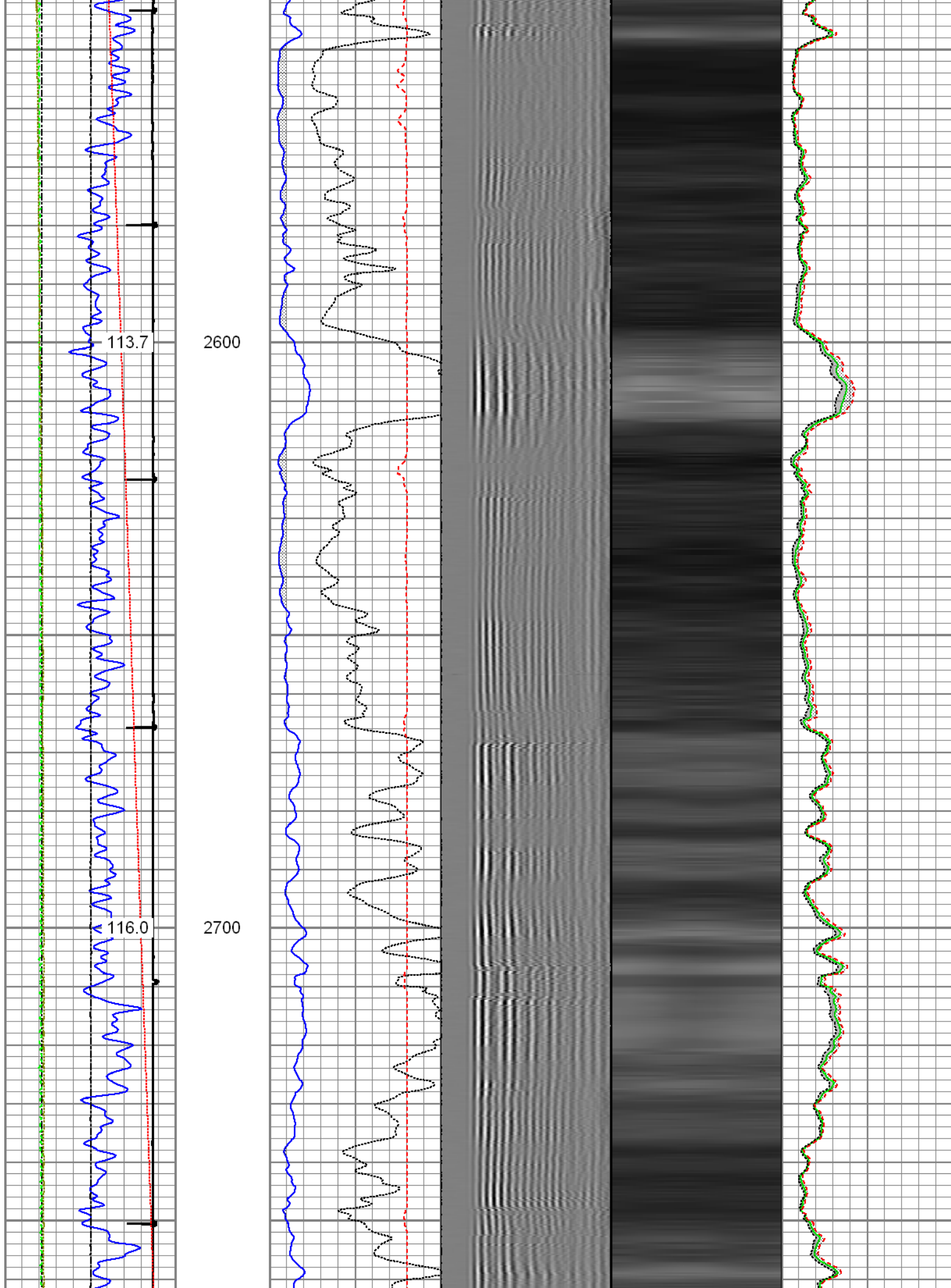


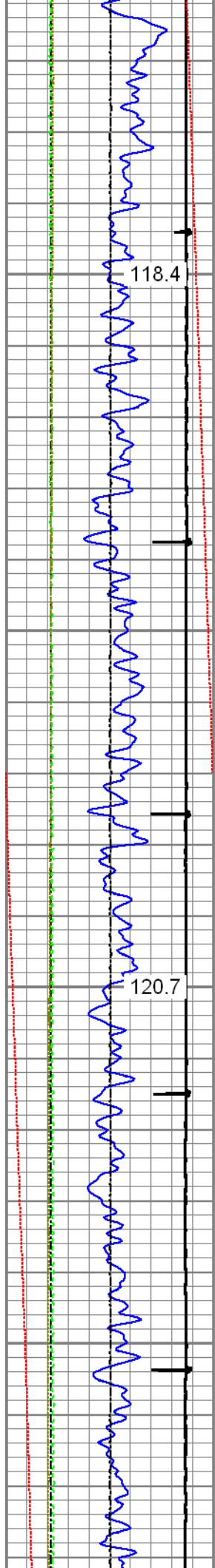










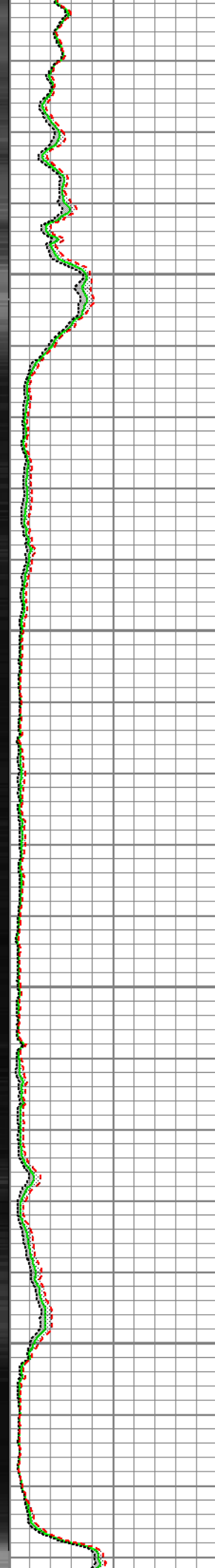
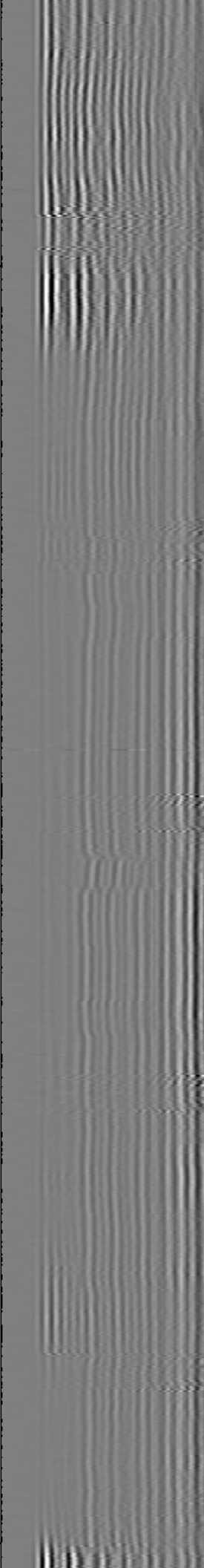
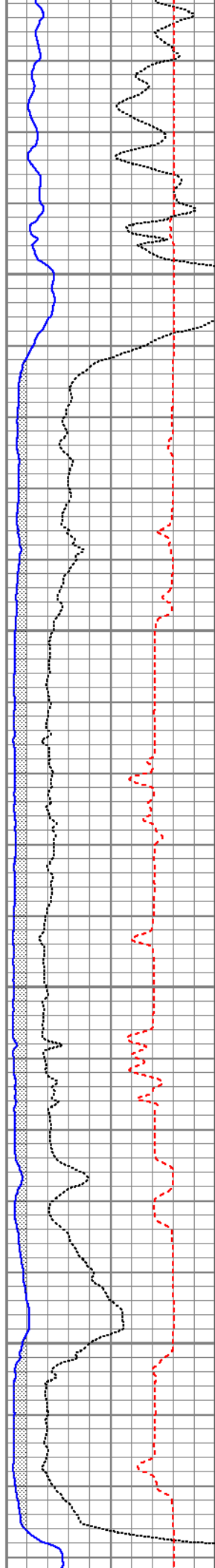


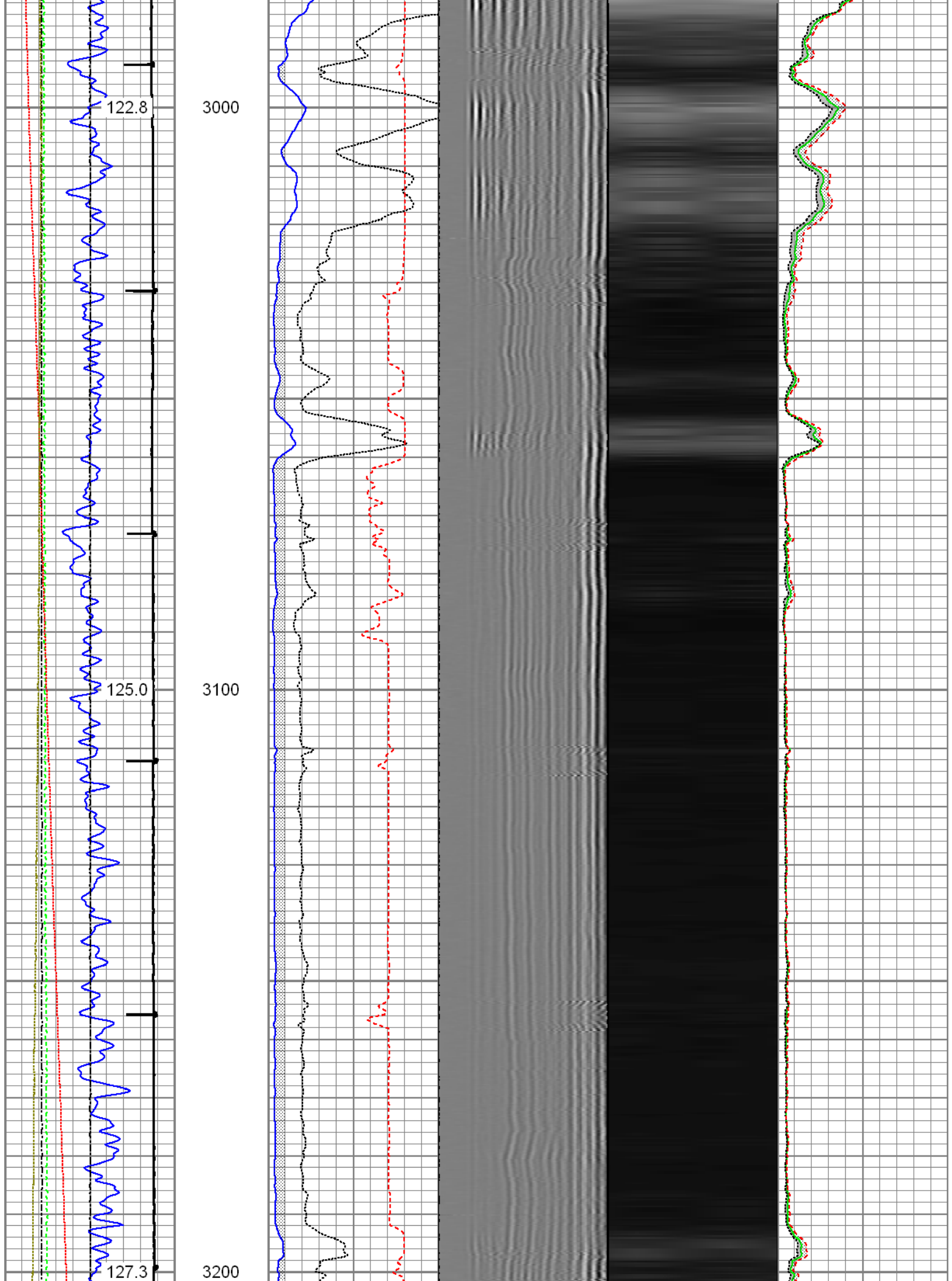
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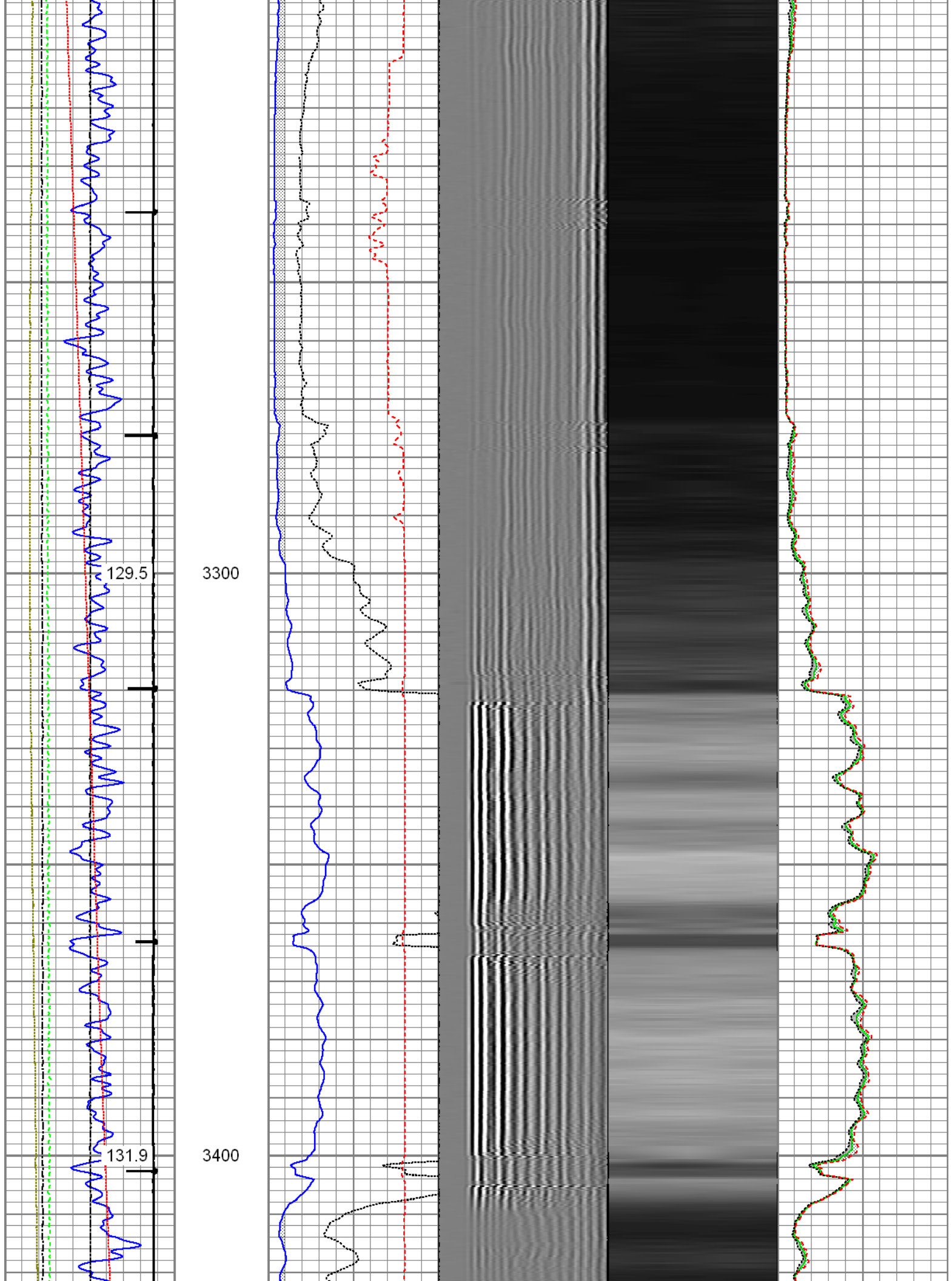
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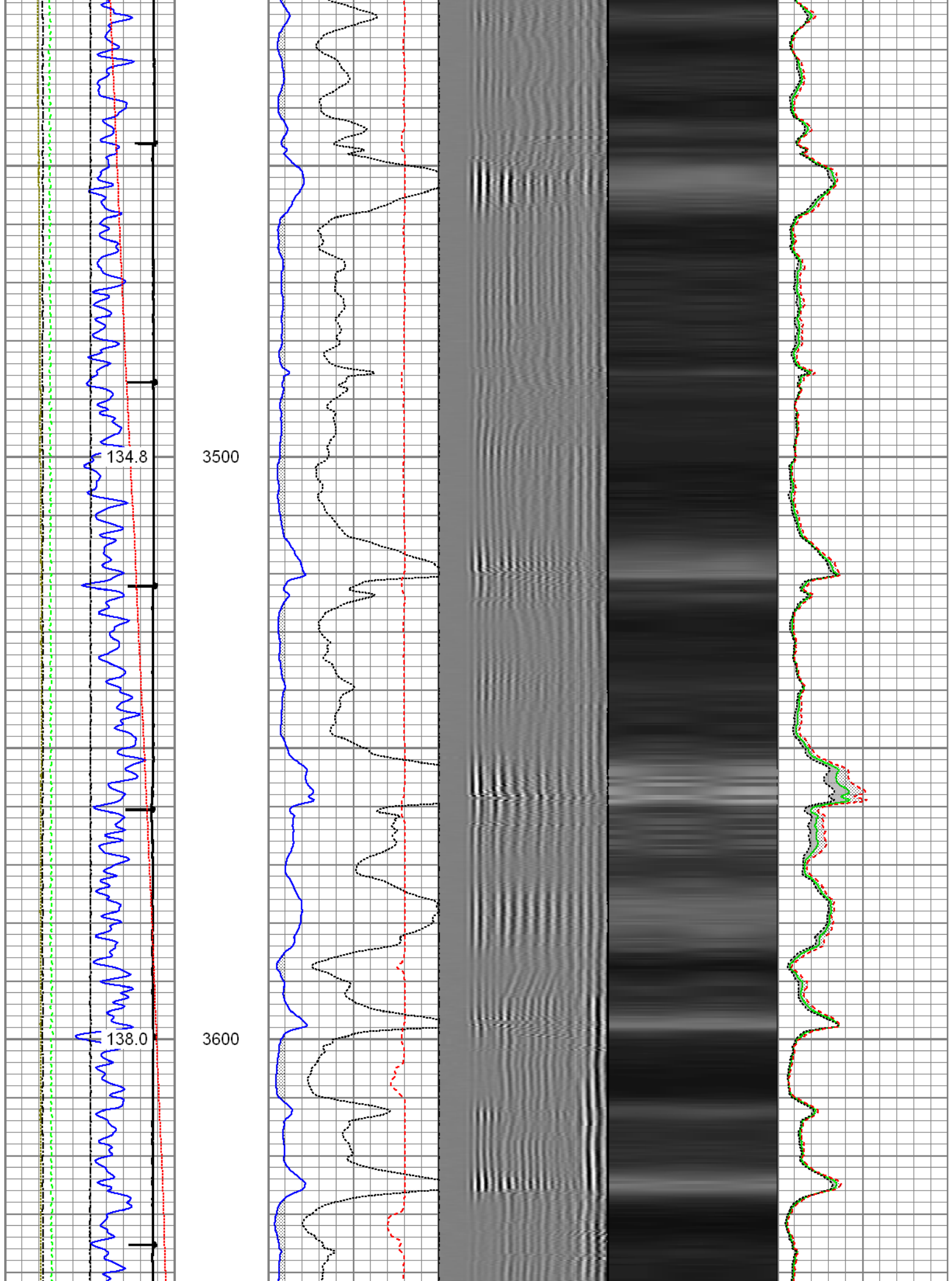
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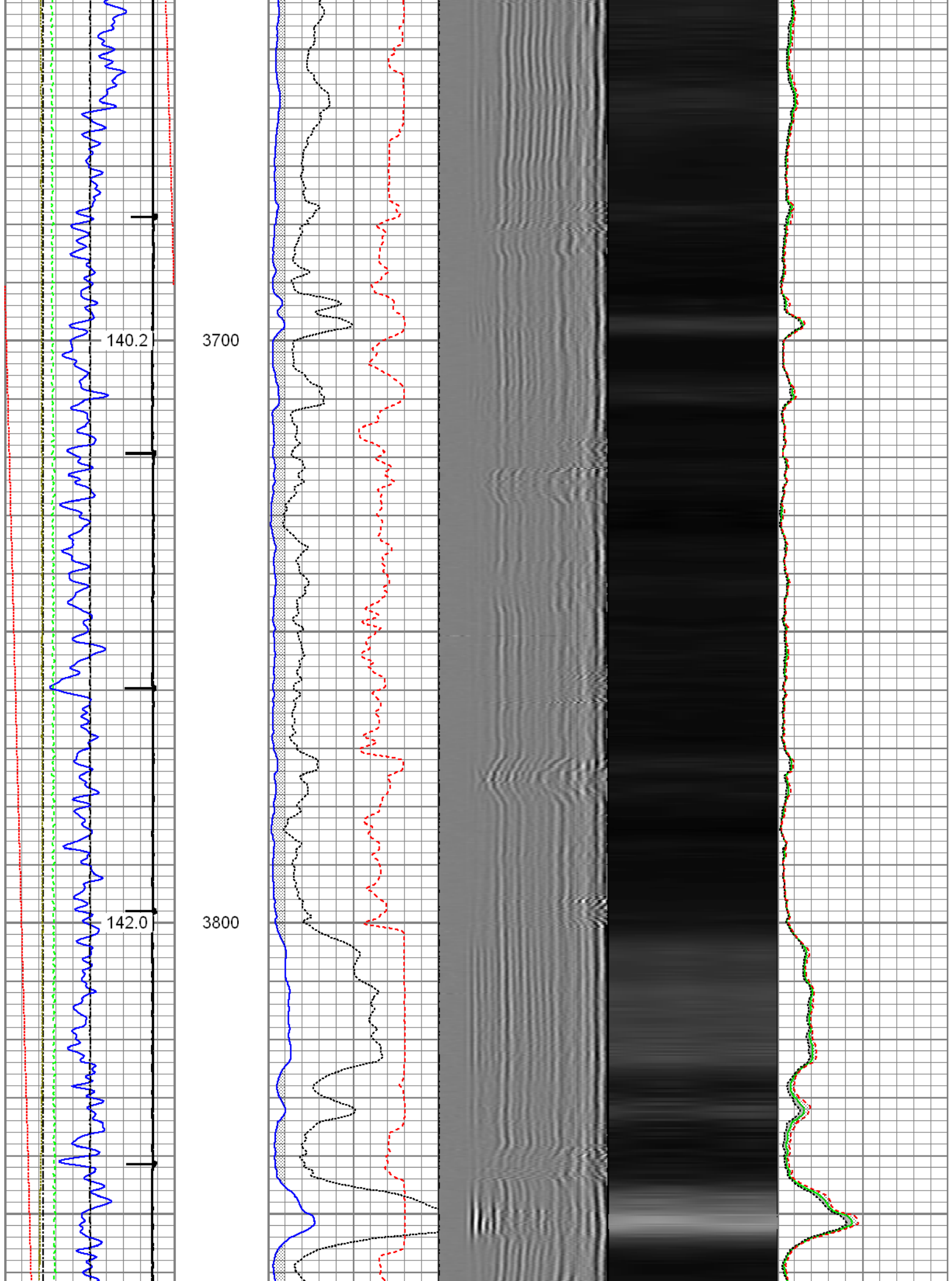
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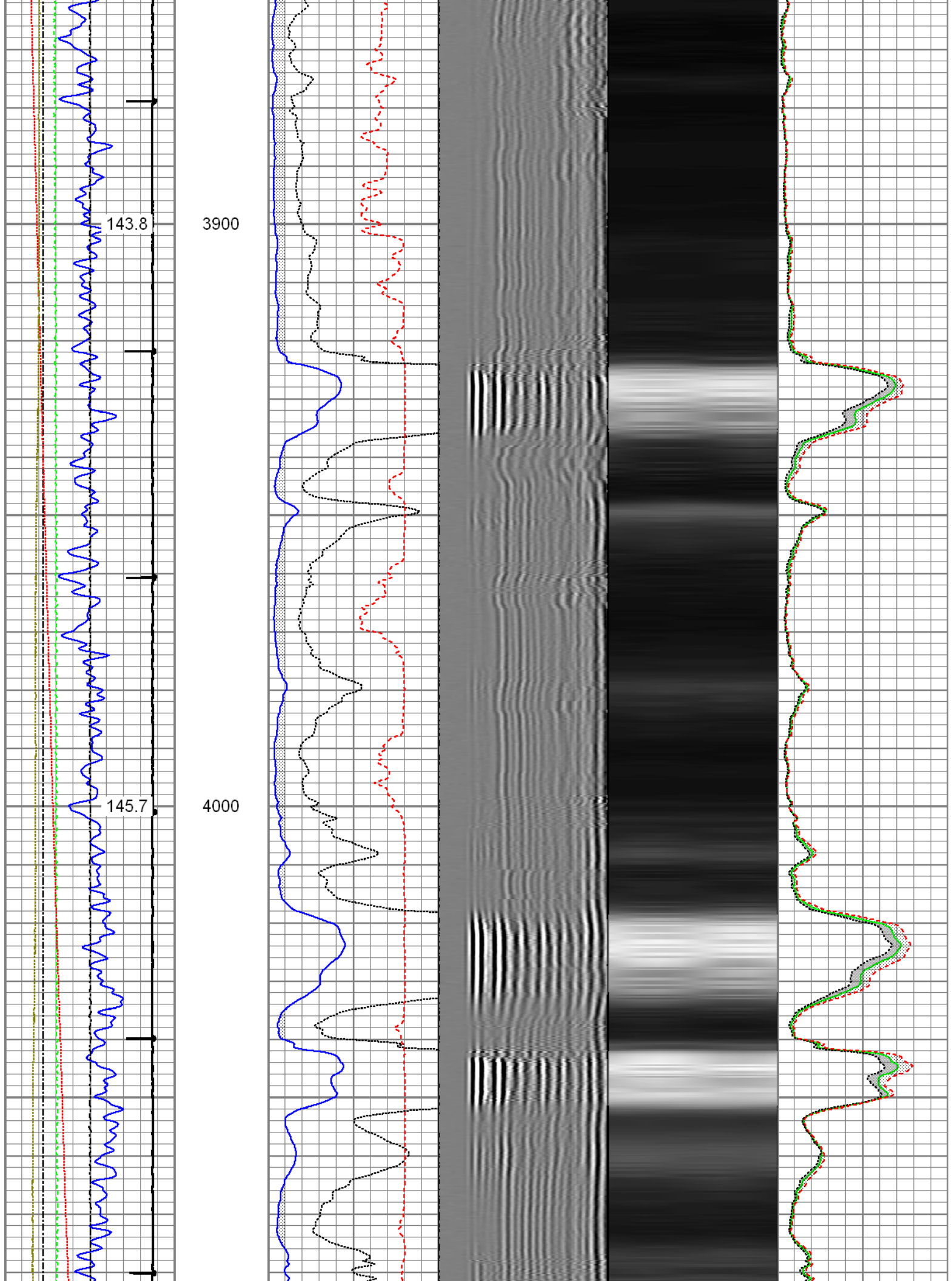


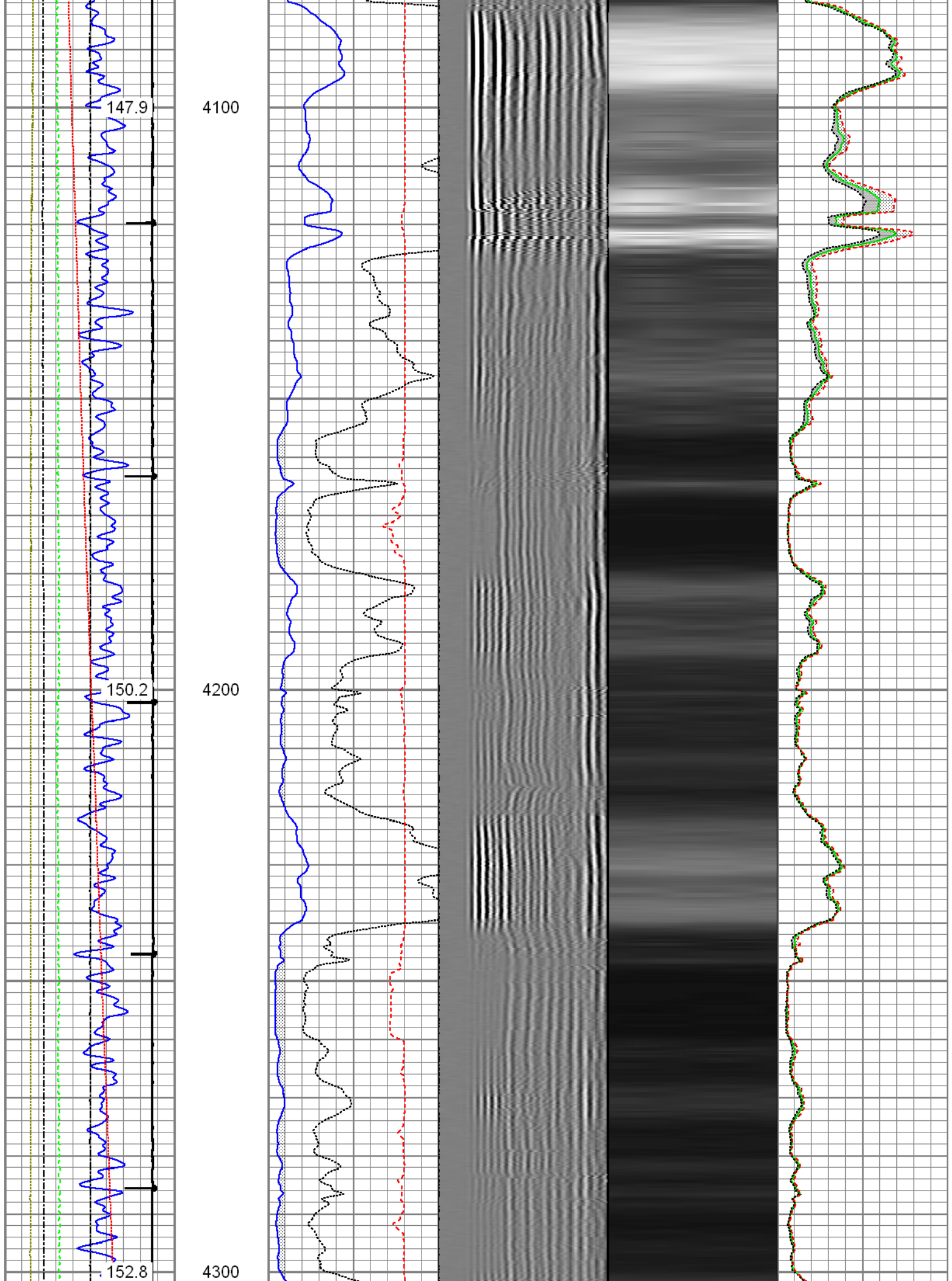


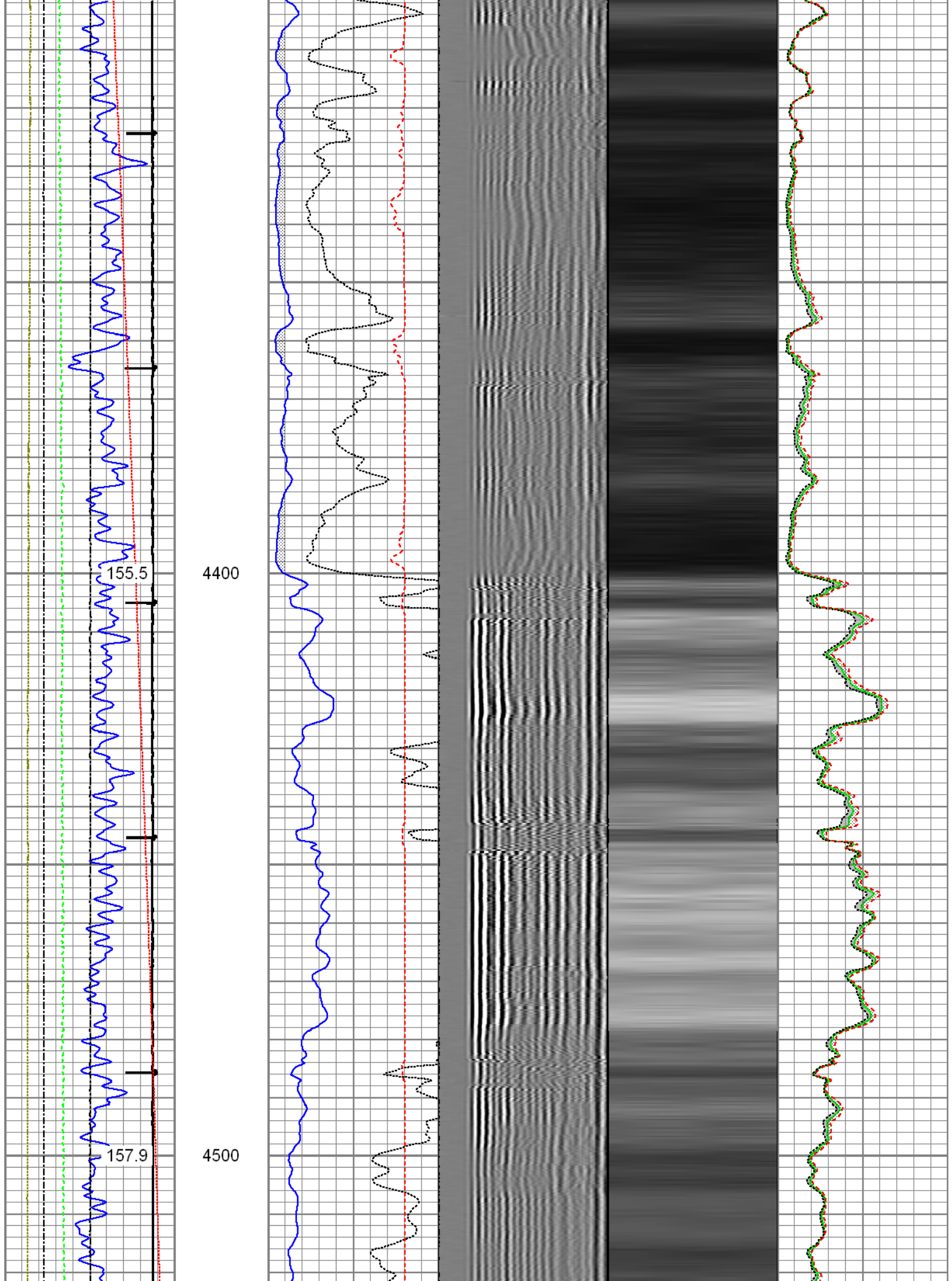


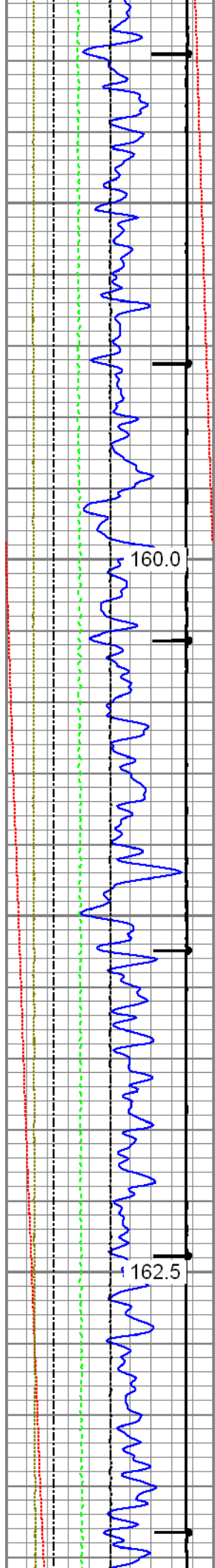










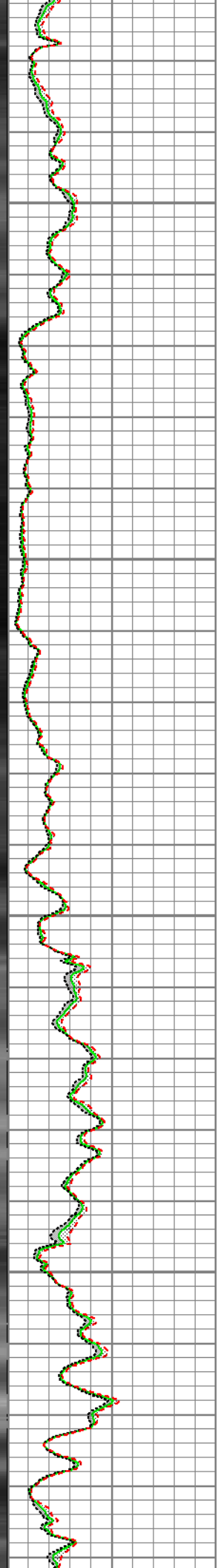
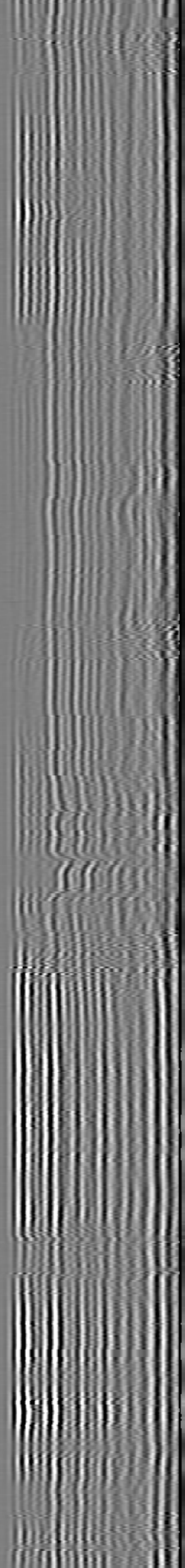
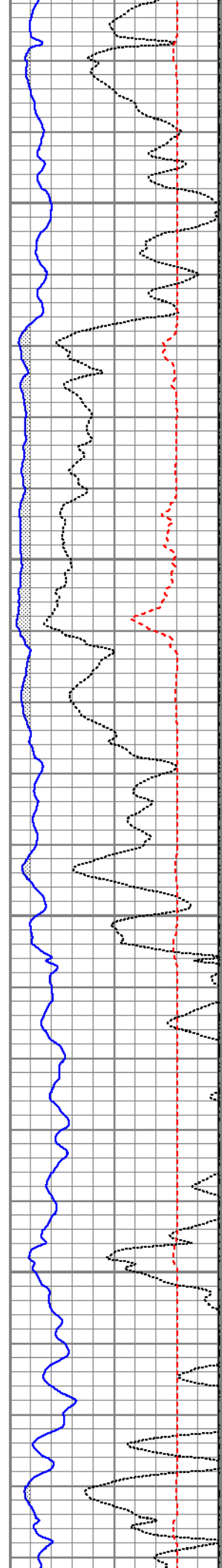


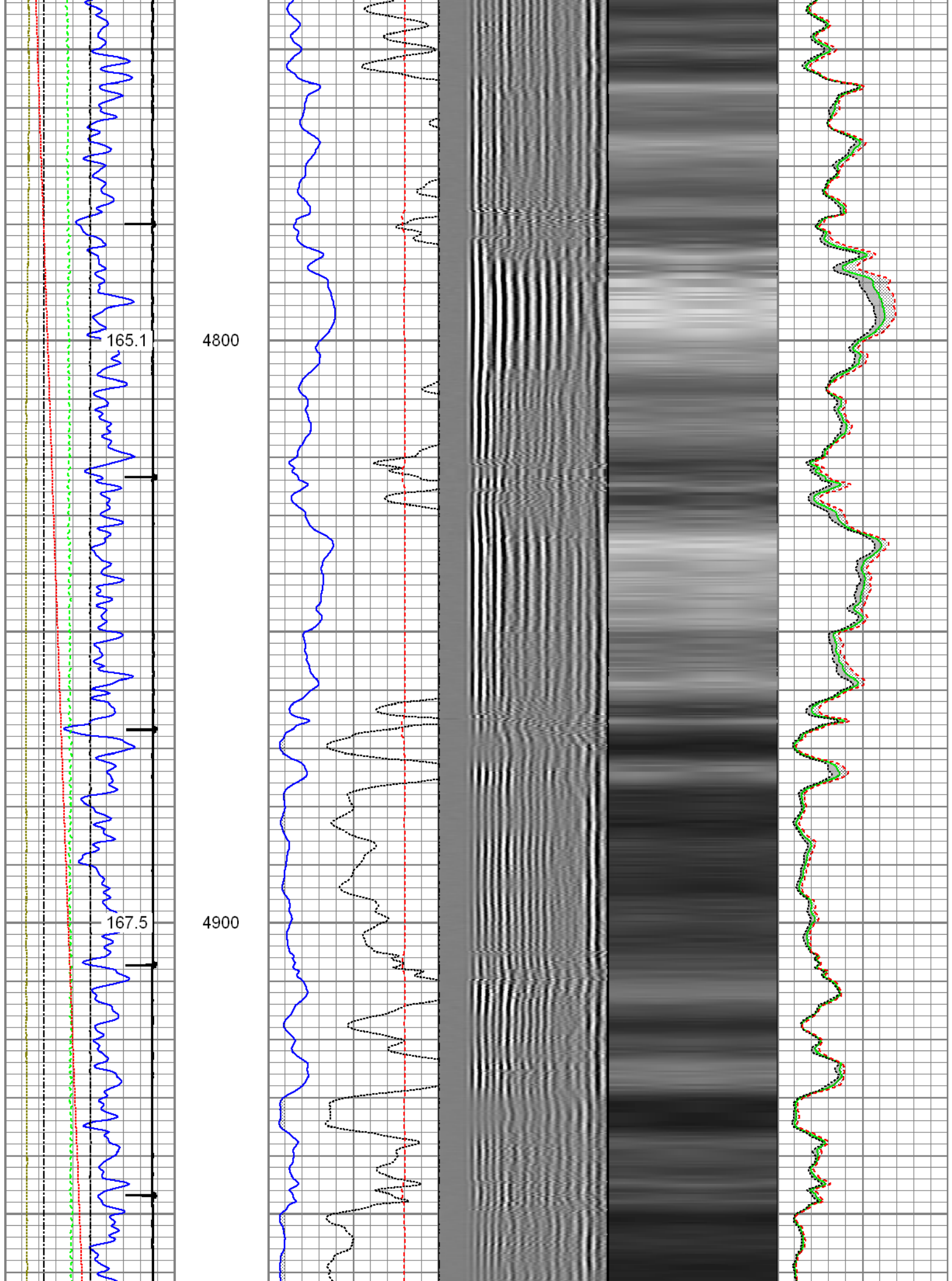
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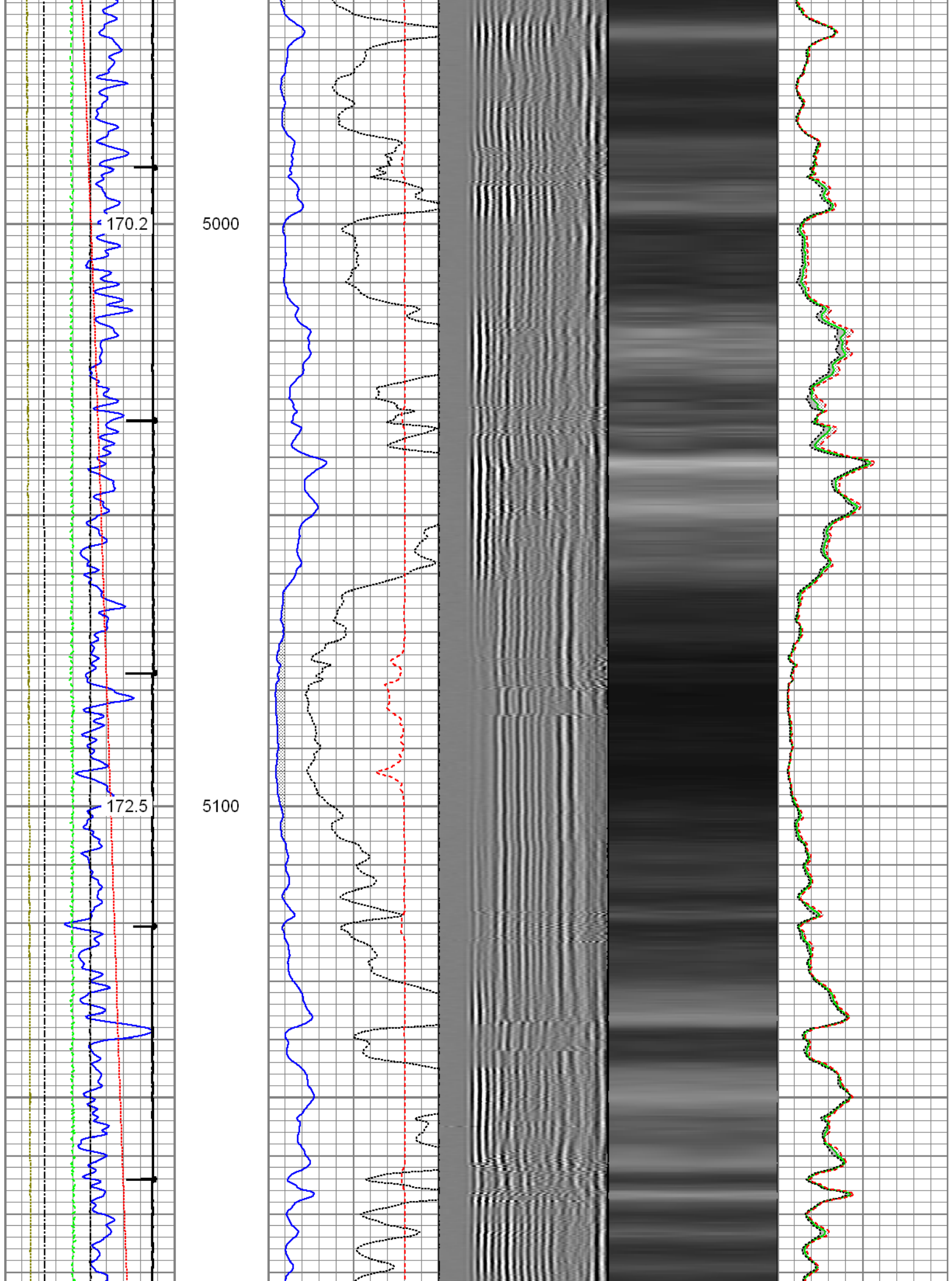
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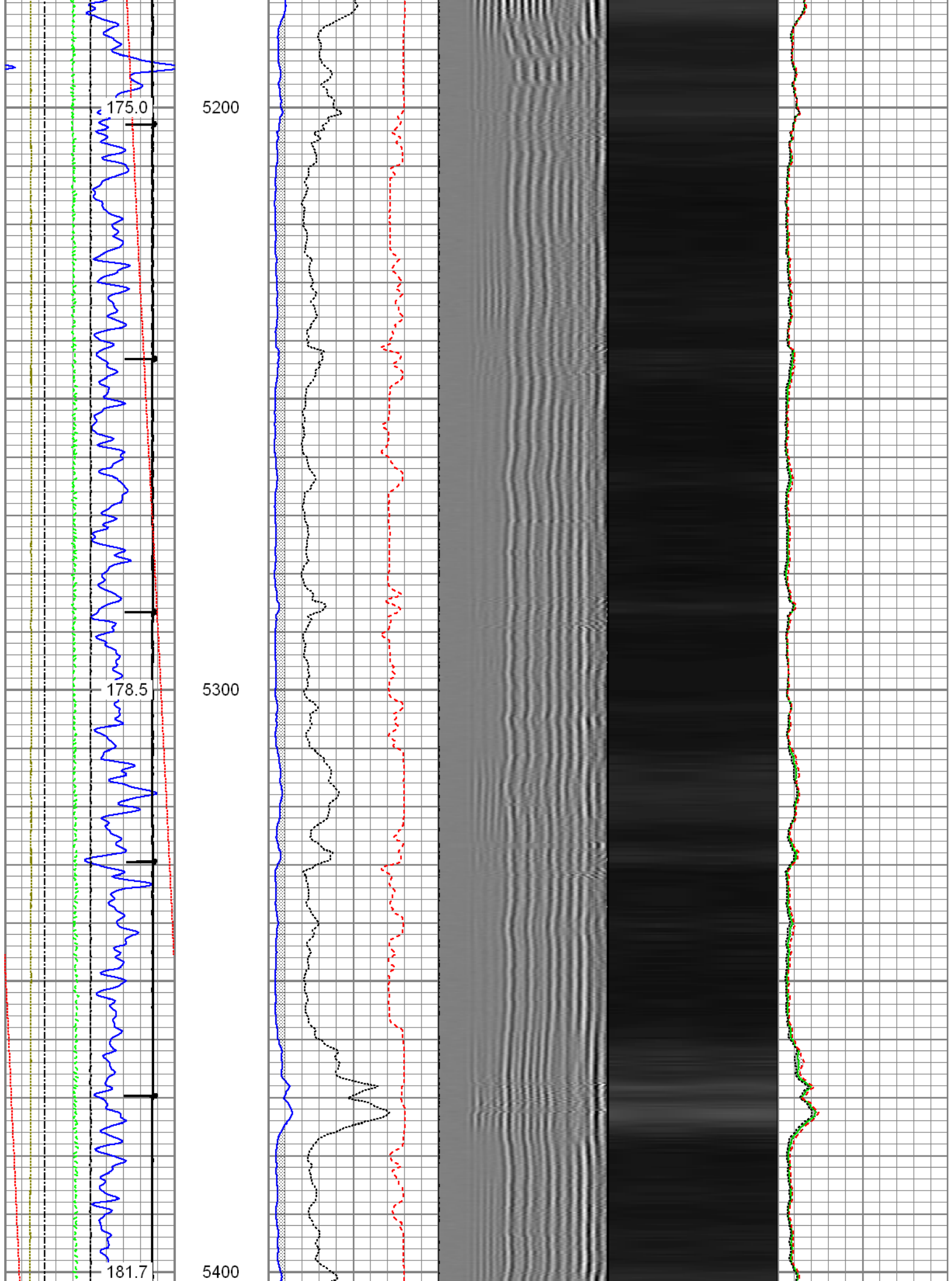
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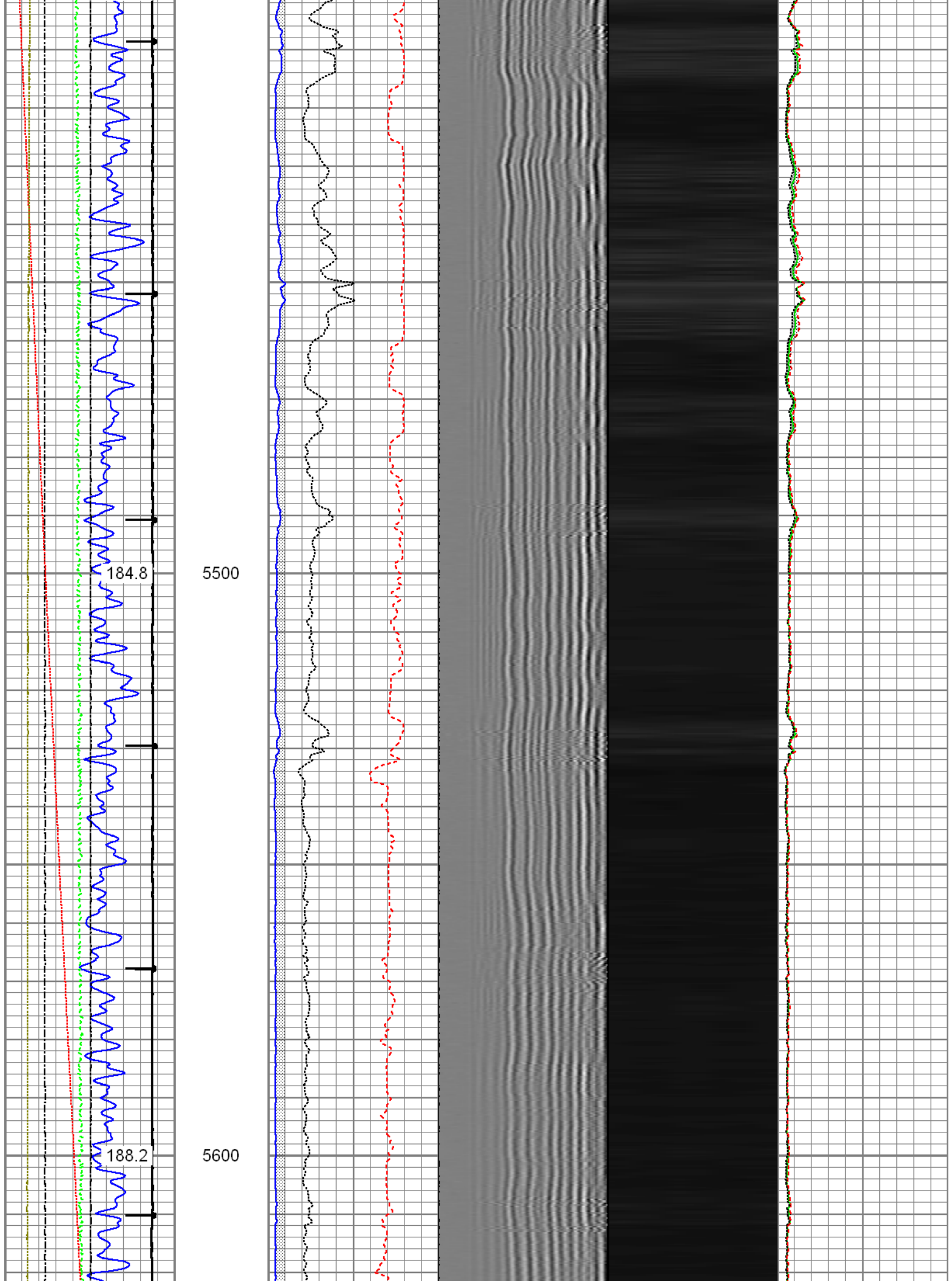
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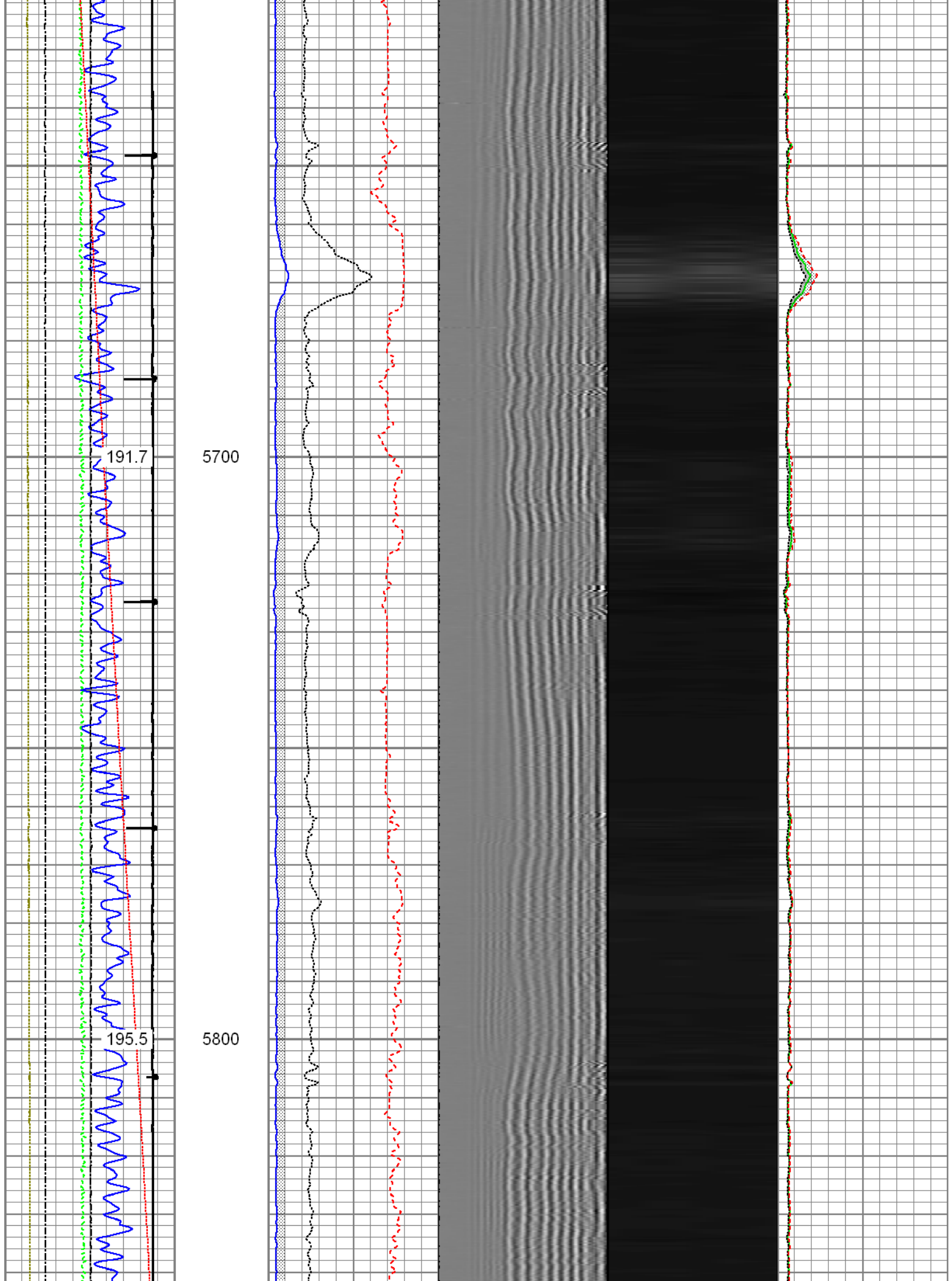


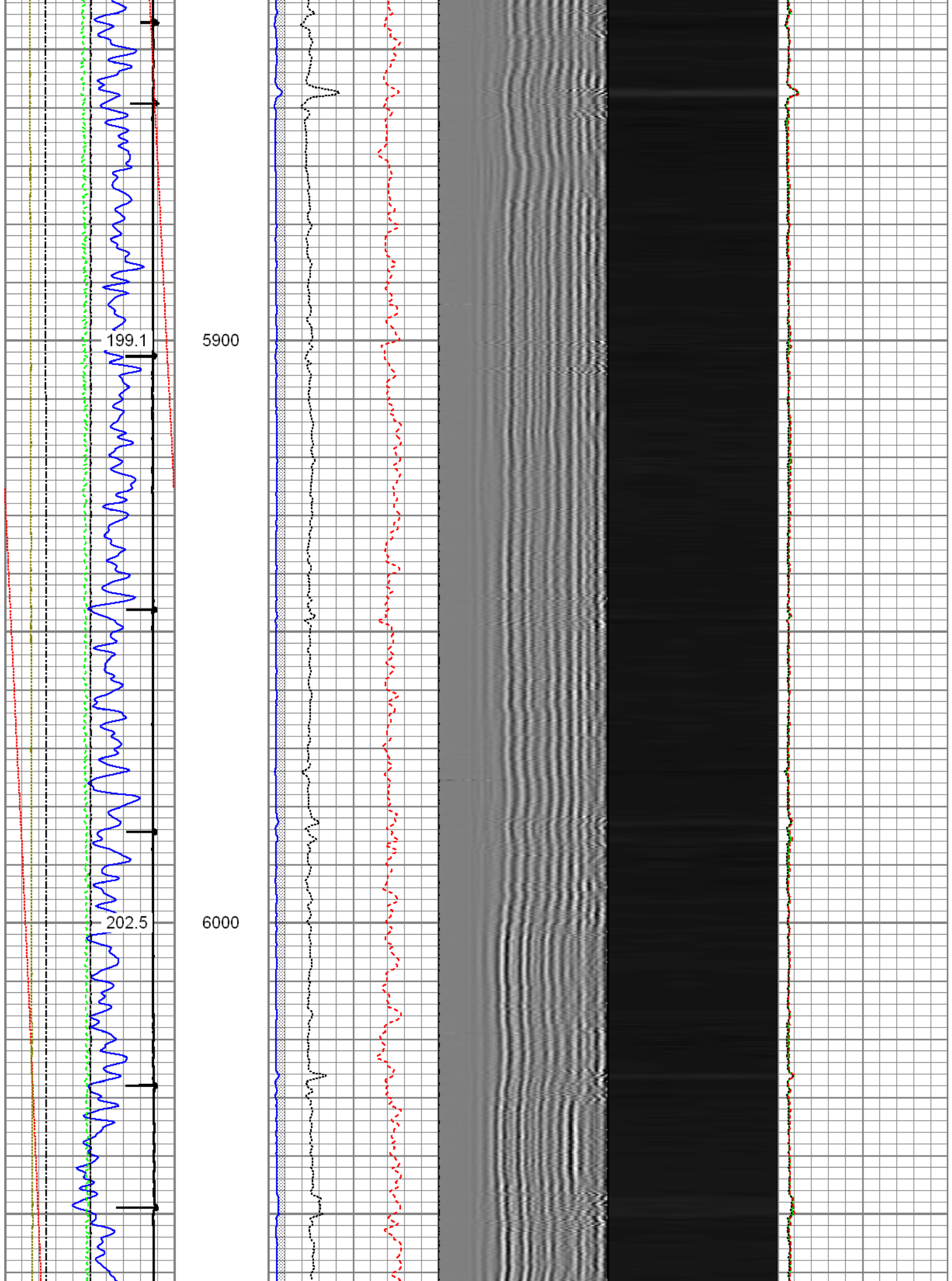


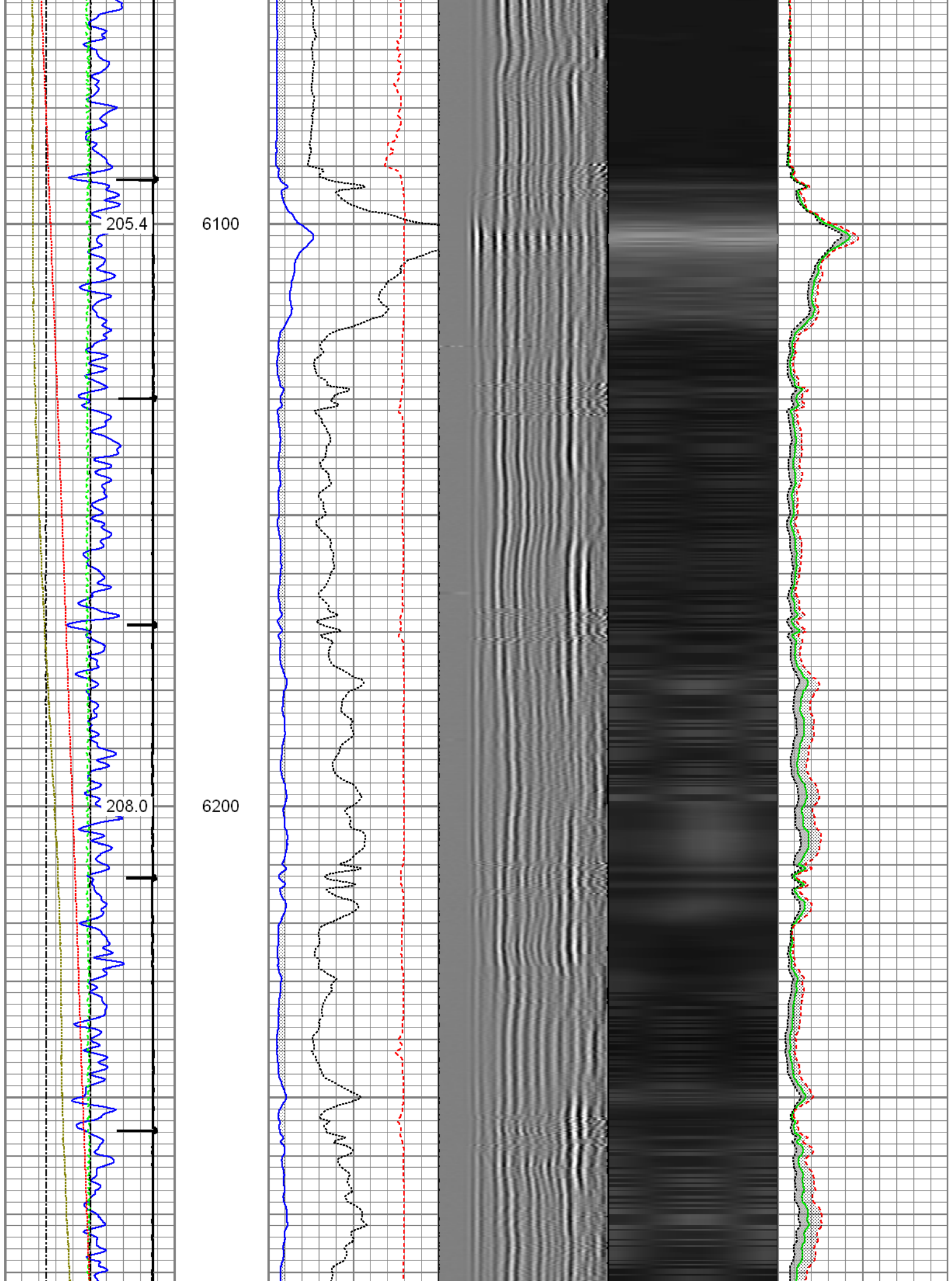


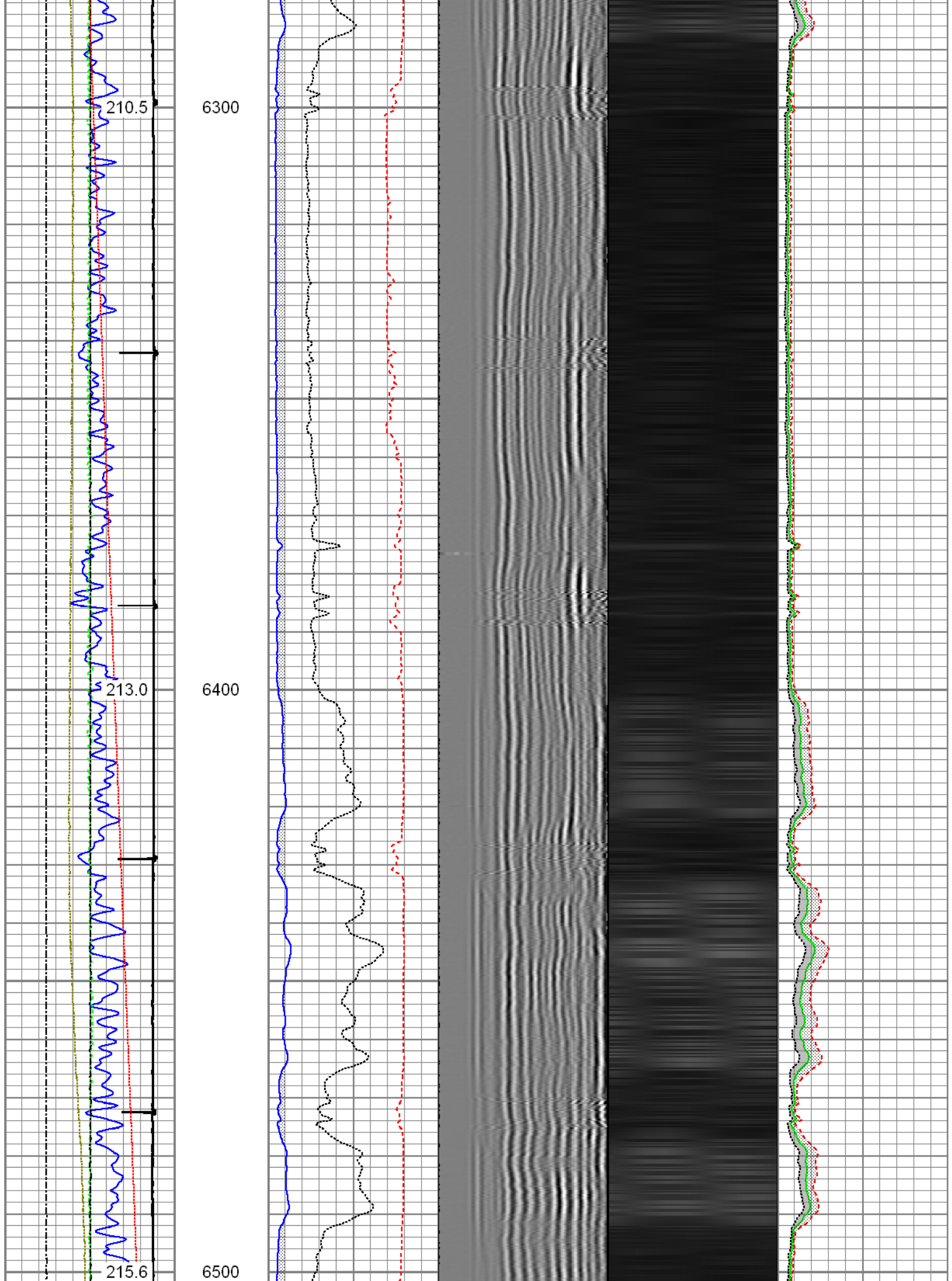


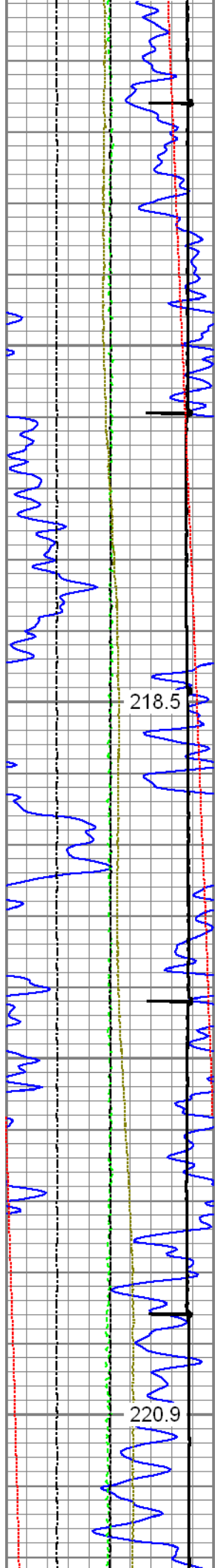






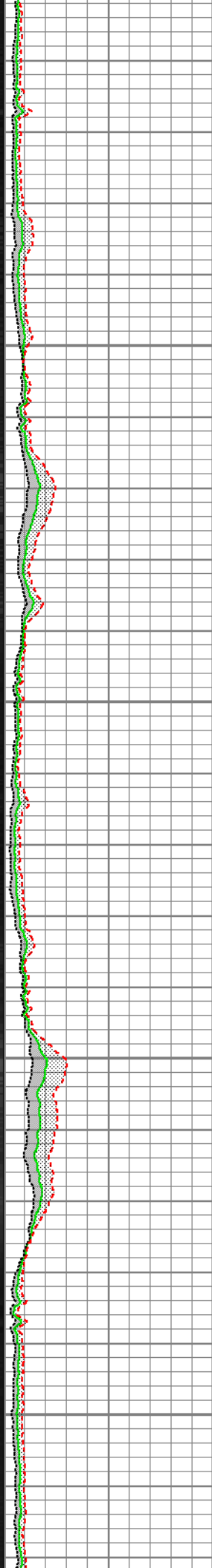
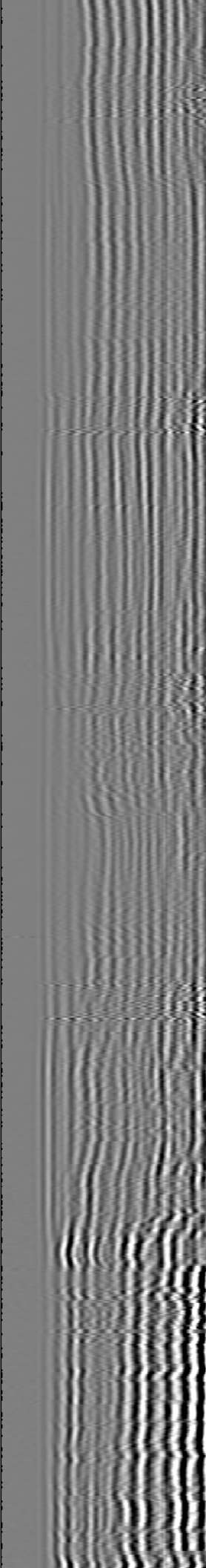
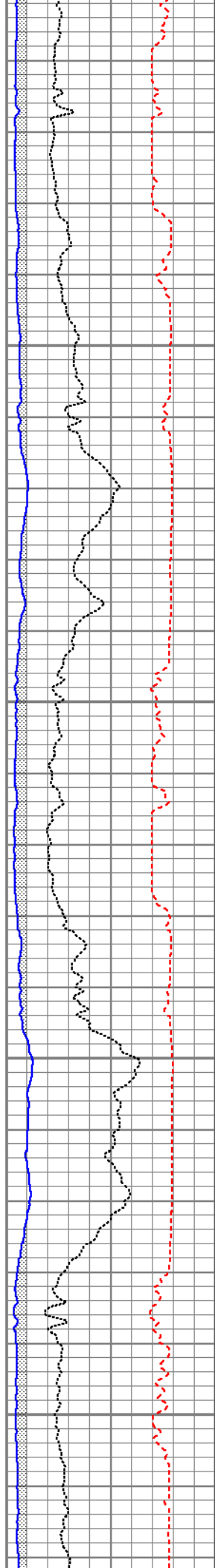


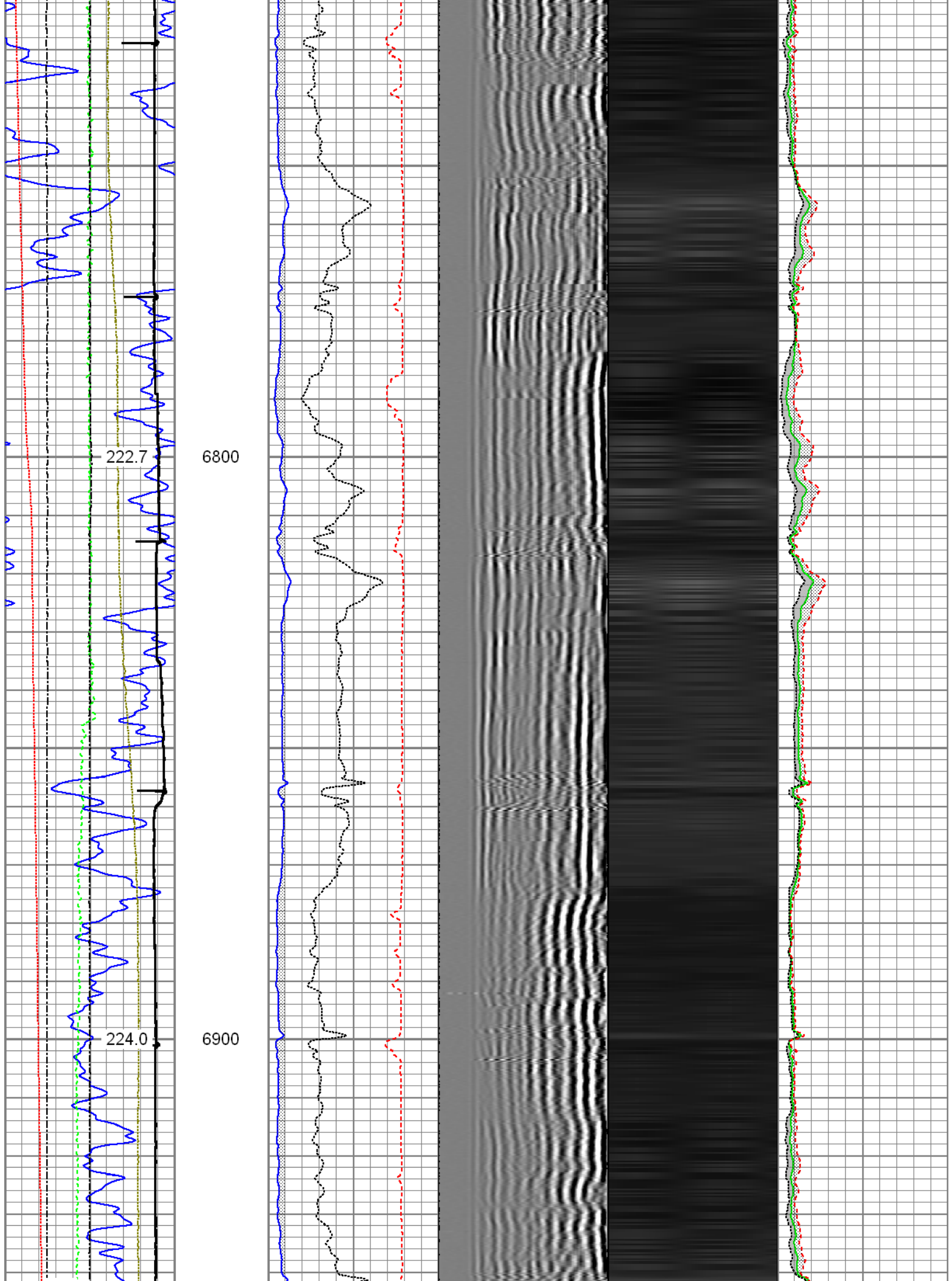


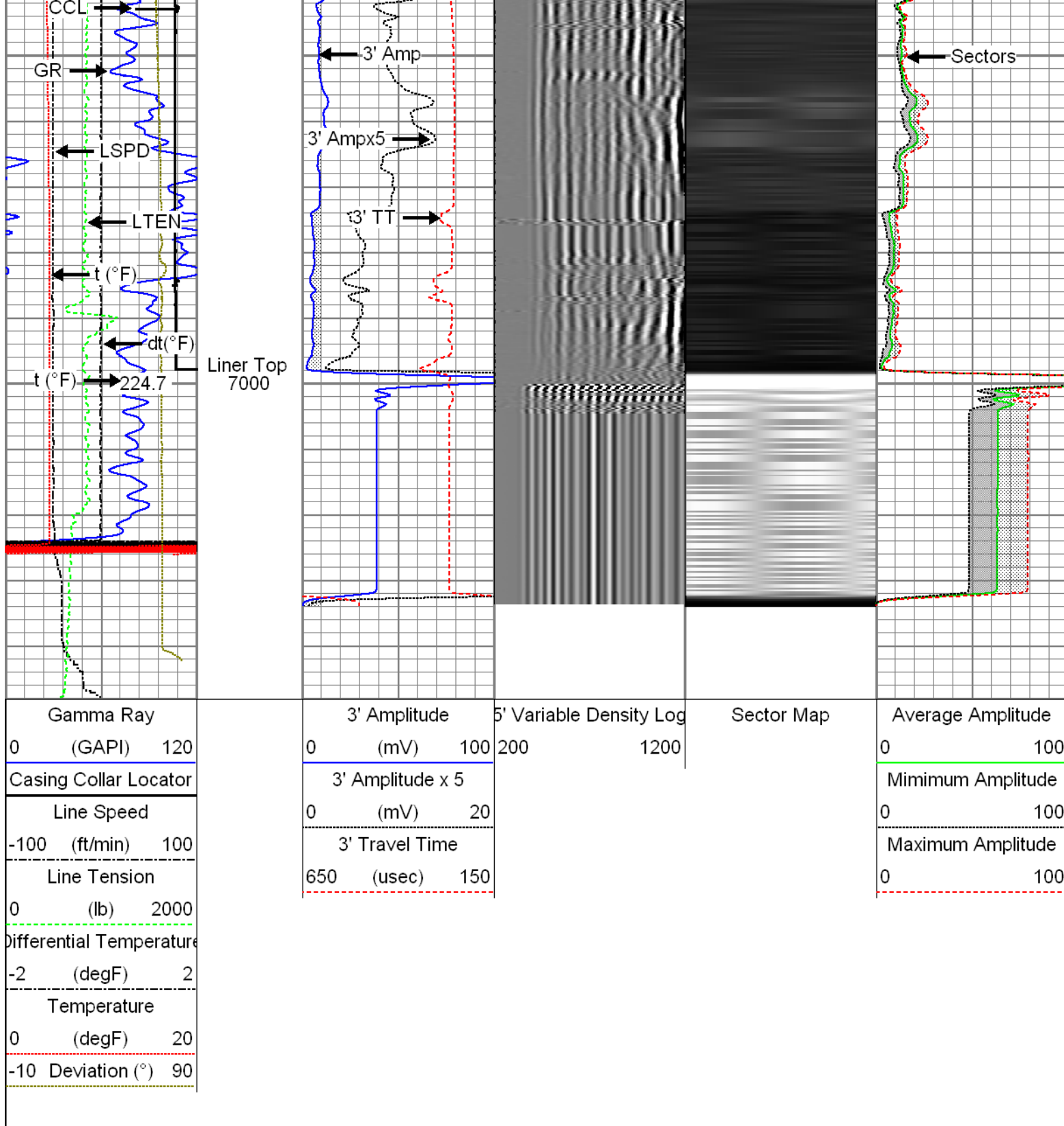



6600

6700

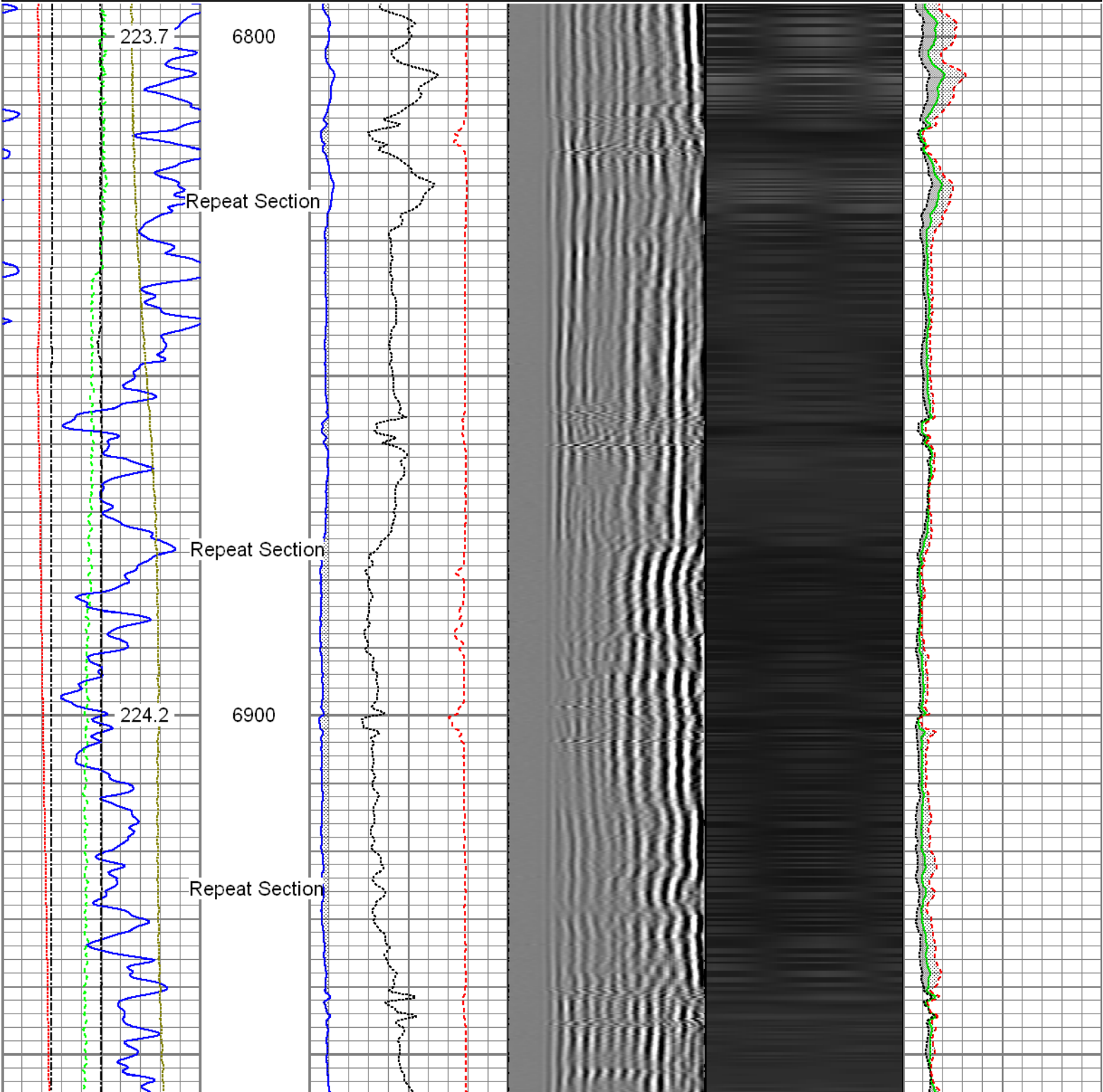


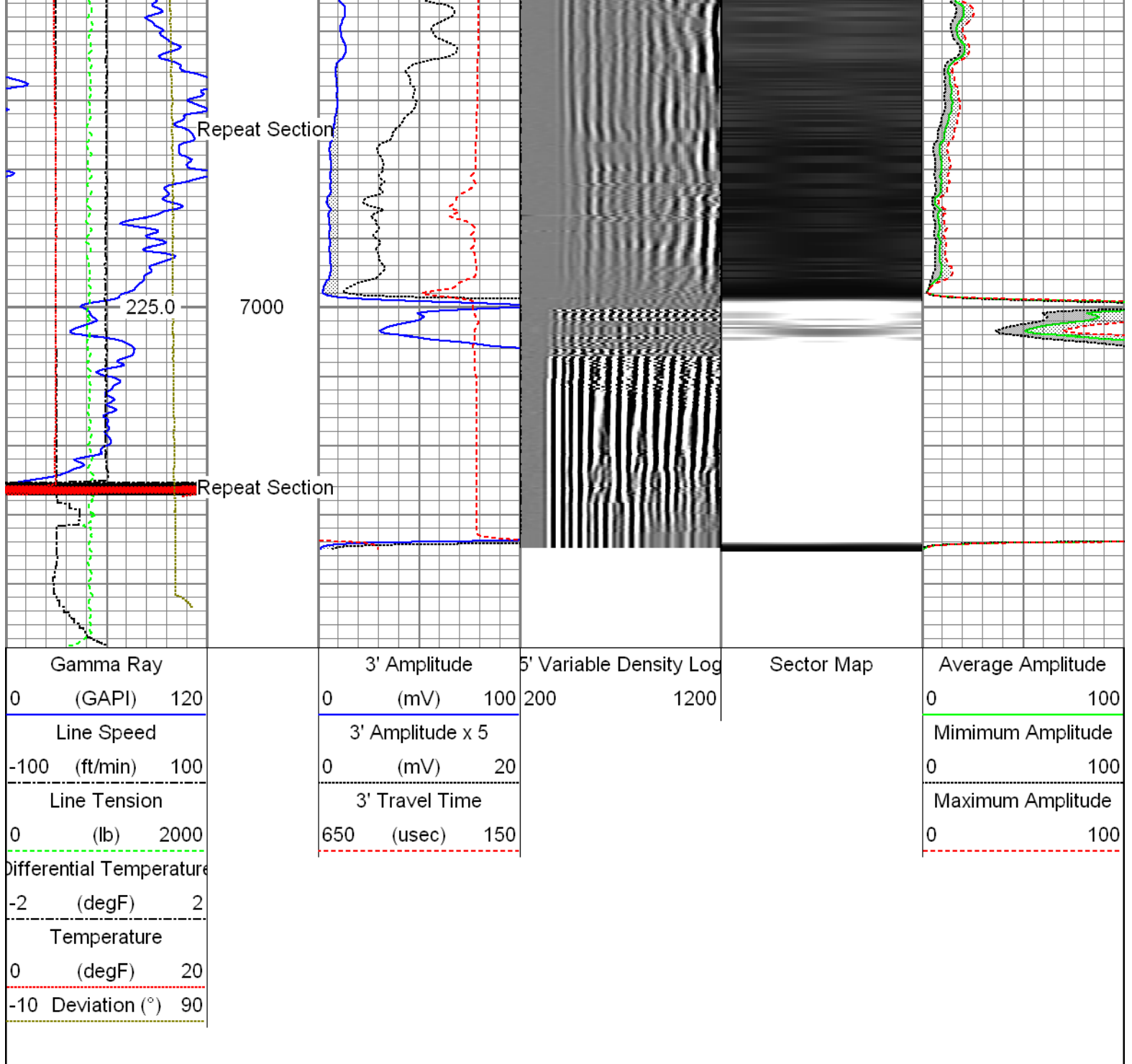




	<div>Repeat Section</div> <div>Recorded with 2500 PSI Surface Induced Pressure</div>
<div>Database File:</div> <div>Dataset Pathname:</div> <div>Presentation Format:</div> <div>Dataset Creation:</div> <div>Charted by:</div>	<div>06-26-15_noble energy_wells ranch aa11-657_mit_rbl.db</div> <div>pass13.3</div> <div>rbt4_mit</div> <div>Sat Jun 27 10:37:26 2015 by Calc 7.0 B1</div> <div>Depth in Feet scaled 1:240</div>

Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Line Speed	3' Amplitude x 5			Minimum Amplitude
-100 (ft/min) 100	0 (mV) 20			0 100
Line Tension	3' Travel Time			Maximum Amplitude
0 (lb) 2000	650 (usec) 150			0 100
Differential Temperature				
-2 (degF) 2				
Temperature				
0 (degF) 20				
-10 Deviation (°) 90				





Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	23.85		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 (10017430) Crossover Ultrawire Toolbus to Ultralink	1.58	1.69	6.50
			UW_PGR-UW_PGR_020 (211727) Production Gamma Ray	1.93	1.69	9.50
			UW_PRT-UW_PRT_016 (10025093) Platinum Resistance Thermometer	1.04	1.69	5.20
TEMP	22.45		UW_PRC #3 -DSSRAC (081) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00



Vertical:		1946	1932
Finger 1 up:		1712	1699
Finger 31 up:		2180	1700
Finger 21 up:		2165	2167
Finger 11 up:		1708	2156
Sensitivity ratio:	1.00121		
X-axis angle:	134.04		
Deviation const.:	327.106		

### Finger Calibration Report

Performed: Fri Jun 26 16:19:28 2015

Ring size: (in)	4	Sens	5	Sens	6	Sens	7
Finger 01:	1168	350.0	1518	373.0	1891	407.0	2298
Finger 02:	1182	354.0	1536	379.0	1915	409.0	2324
Finger 03:	1130	343.0	1473	375.0	1848	410.0	2258
Finger 04:	1140	361.0	1501	393.0	1894	423.0	2317
Finger 05:	1127	352.0	1479	388.0	1867	415.0	2282
Finger 06:	1159	349.0	1508	380.0	1888	395.0	2283
Finger 07:	1071	364.0	1435	407.0	1842	429.0	2271
Finger 08:	1128	348.0	1476	387.0	1863	407.0	2270
Finger 09:	1092	357.0	1449	392.0	1841	410.0	2251
Finger 10:	1013	354.0	1367	409.0	1776	430.0	2206
Finger 11:	1101	342.0	1443	377.0	1820	385.0	2205
Finger 12:	1077	349.0	1426	391.0	1817	398.0	2215
Finger 13:	1054	340.0	1394	385.0	1779	390.0	2169
Finger 14:	1029	340.0	1369	388.0	1757	390.0	2147
Finger 15:	1094	339.0	1433	370.0	1803	363.0	2166
Finger 16:	1045	340.0	1385	380.0	1765	378.0	2143
Finger 17:	1047	342.0	1389	384.0	1773	382.0	2155
Finger 18:	989	346.0	1335	395.0	1730	391.0	2121
Finger 19:	1001	342.0	1343	388.0	1731	386.0	2117
Finger 20:	1034	347.0	1381	388.0	1769	385.0	2154
Finger 21:	1052	340.0	1392	379.0	1771	379.0	2150
Finger 22:	1050	348.0	1398	385.0	1783	383.0	2166
Finger 23:	1162	336.0	1498	352.0	1850	353.0	2203
Finger 24:	1021	349.0	1370	389.0	1759	395.0	2154
Finger 25:	1001	346.0	1347	387.0	1734	403.0	2137
Finger 26:	1072	349.0	1421	382.0	1803	392.0	2195
Finger 27:	1099	357.0	1456	387.0	1843	401.0	2244
Finger 28:	1088	356.0	1444	386.0	1830	404.0	2234
Finger 29:	1081	366.0	1447	400.0	1847	418.0	2265
Finger 30:	1134	353.0	1487	380.0	1867	399.0	2266
Finger 31:	1131	356.0	1487	382.0	1869	405.0	2274
Finger 32:	1167	354.0	1521	368.0	1889	394.0	2283
Finger 33:	1183	359.0	1542	378.0	1920	400.0	2320
Finger 34:	1137	361.0	1498	388.0	1886	421.0	2307
Finger 35:	1163	365.0	1528	390.0	1918	418.0	2336
Finger 36:	1204	356.0	1560	374.0	1934	408.0	2342
Finger 37:	1130	369.0	1499	394.0	1893	432.0	2325
Finger 38:	1097	371.0	1468	405.0	1873	446.0	2319
Finger 39:	1127	364.0	1491	391.0	1882	425.0	2307
Finger 40:	1159	363.0	1522	381.0	1903	418.0	2321

### Segmented Cement Bond Log Calibration Report


Serial Number:	1066
Tool Model:	UW_RBT_004
Calibration Casing Diameter:	7.000 in
Calibration Depth:	452.967 ft

Master Calibration, performed Fri Jun 26 19:54:10 2015:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	-0.000	0.784	0.800	62.165	78.250	0.812
5FT	-0.005	0.757	0.800	62.165	80.488	1.214
S1	-0.000	0.745	0.000	100.000	134.140	0.020
S2	-0.002	0.746	0.000	100.000	133.716	0.221
S3	-0.001	0.753	0.000	100.000	132.601	0.099
S4	-0.002	0.774	0.000	100.000	128.777	0.294
S5	-0.001	0.793	0.000	100.000	126.025	0.107
S6	-0.001	0.813	0.000	100.000	122.839	0.118
S7	-0.001	0.820	0.000	100.000	121.811	0.162
S8	-0.001	0.784	0.000	100.000	127.332	0.122

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:		211727		
Tool Model:		UW_PGR_020		
Performed:		Fri Jun 26 16:09:02 2015		
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	Wells Ranch AA11-657
	Field	Wattenberg
	County	Weld
	State	Colorado