

# Radial Cement Bond Gamma Ray Casing Collar Log

Company	Noble Energy Inc.	Company	Noble Energy Inc.
Well	70 Ranch BB18-622	Well	70 Ranch BB18-622
Field	Wattenberg	Field	Wattenberg
County	Weld	County	Weld
State	Colorado	State	Colorado
Location:	API #: 05-123-41539		
Permanent Datum	SEC 17 TWP 5N RGE 63W	Ground Level	Elevation 4647'
Log Measured From	Kelly Bushing	Drilling Measured From	Kelly Bushing
			Elevation K.B. 4671' D.F. 4670' G.L. 4647'

Date	01-AUG-2015
Run Number	One
Depth Driller	16476 FT
Depth Logger	6697 FT
Bottom Logged Interval	6692 FT
Top Log Interval	Surface
Open Hole Size	8.750"
Type Fluid	Water
Density / Viscosity	8.34 lbm/gal
Max. Recorded Temp.	226°F
Estimated Cement Top	132 FT
Time Well Ready	ROA
Time Logger on Bottom	16:12
Equipment Number	HD-0343
Location	Fort Lupton, CO
Recorded By	J. Houlin
Witnessed By	Bill Mansfield

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	748 FT		
Intermediate #1	7	26	HC-P110	24 FT	6860 FT		
Intermediate #2							
Liner	4 1/2	11.6	HCP-110	6715 FT	16476 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

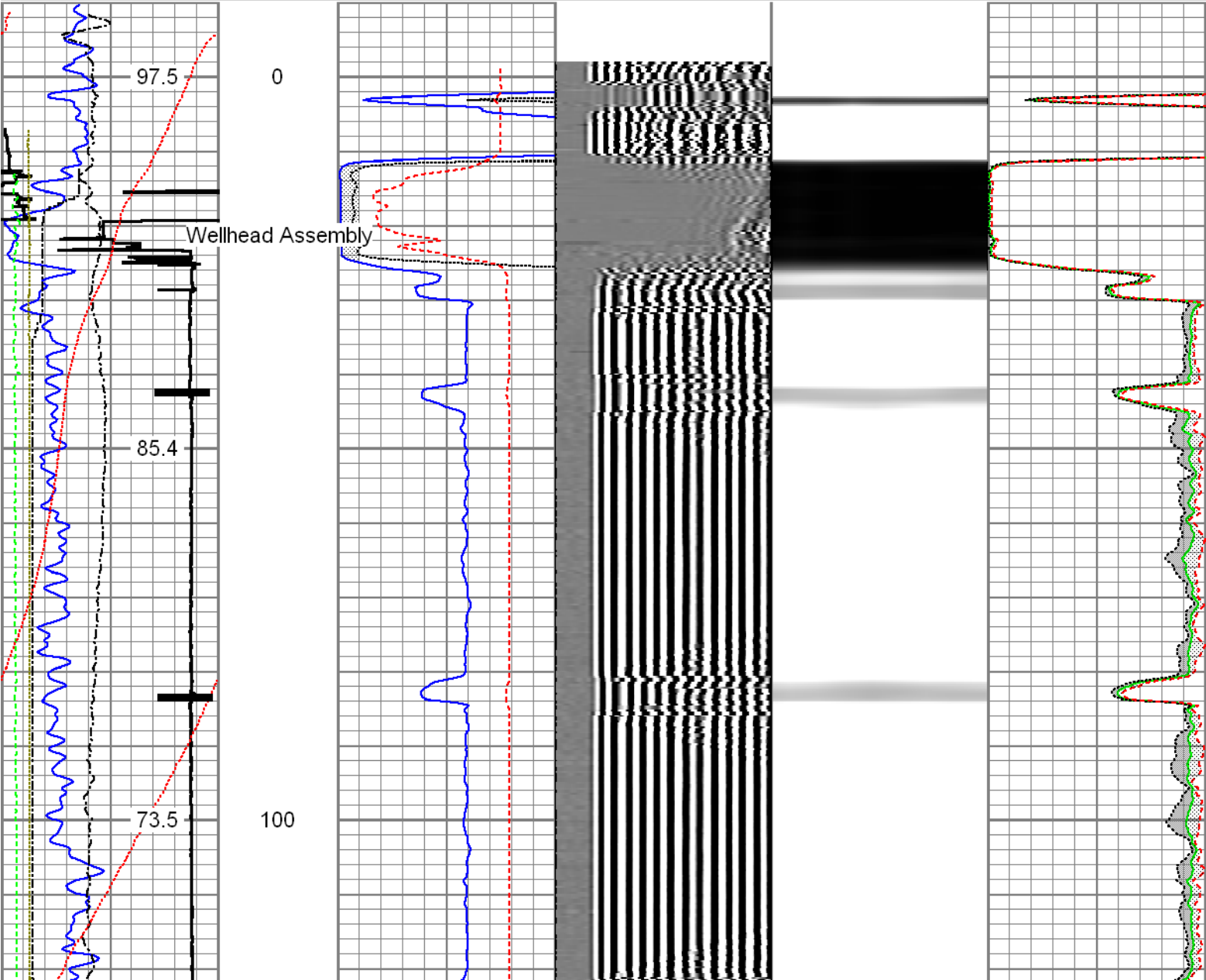
Log ran as per customer request

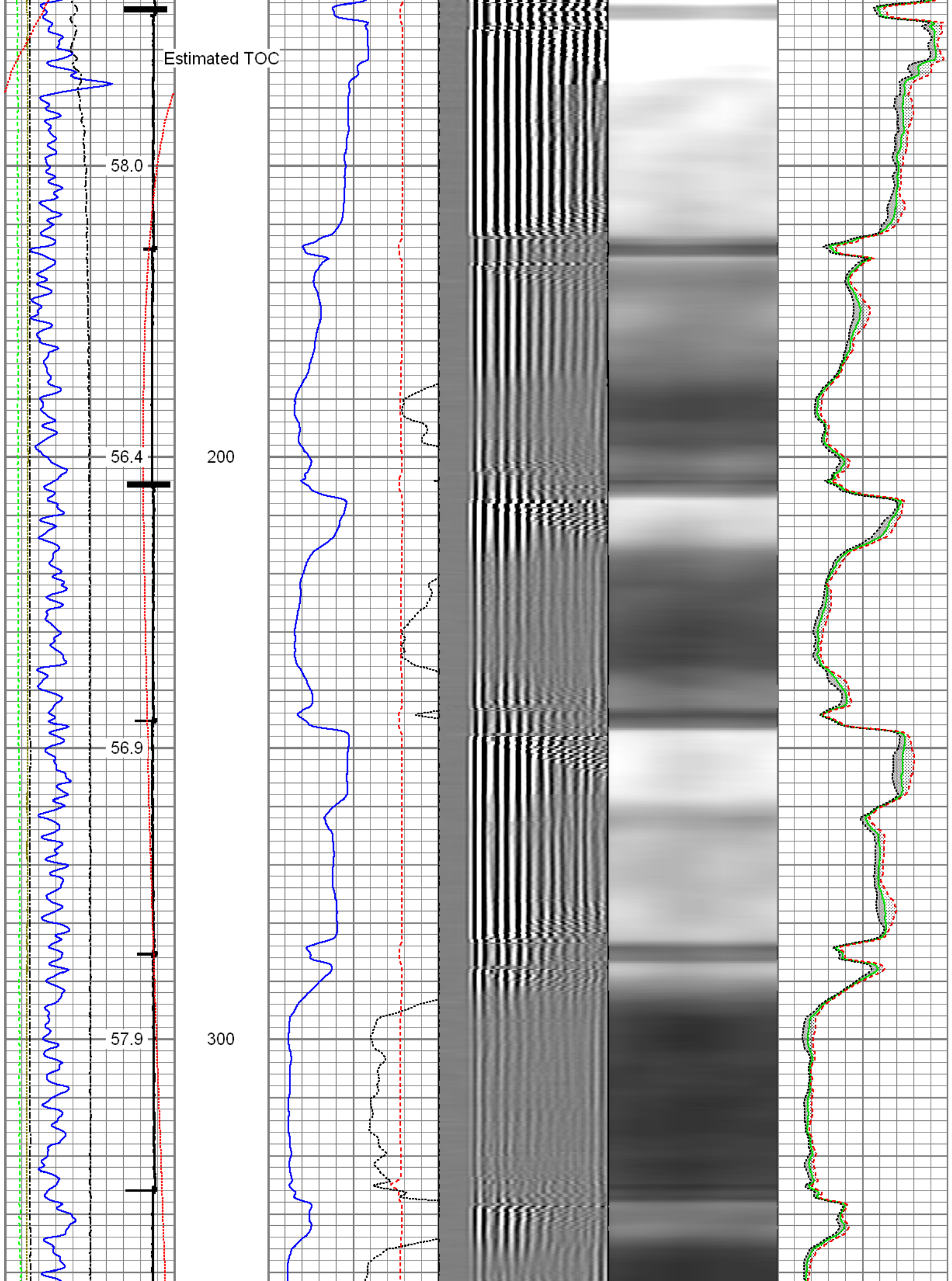
Log ran from just above liner top to surface  
Recorded with 2500 PSI surface induced pressure  
Large amounts of Drilling Mud/Cement debris on tolls upon completion of operations

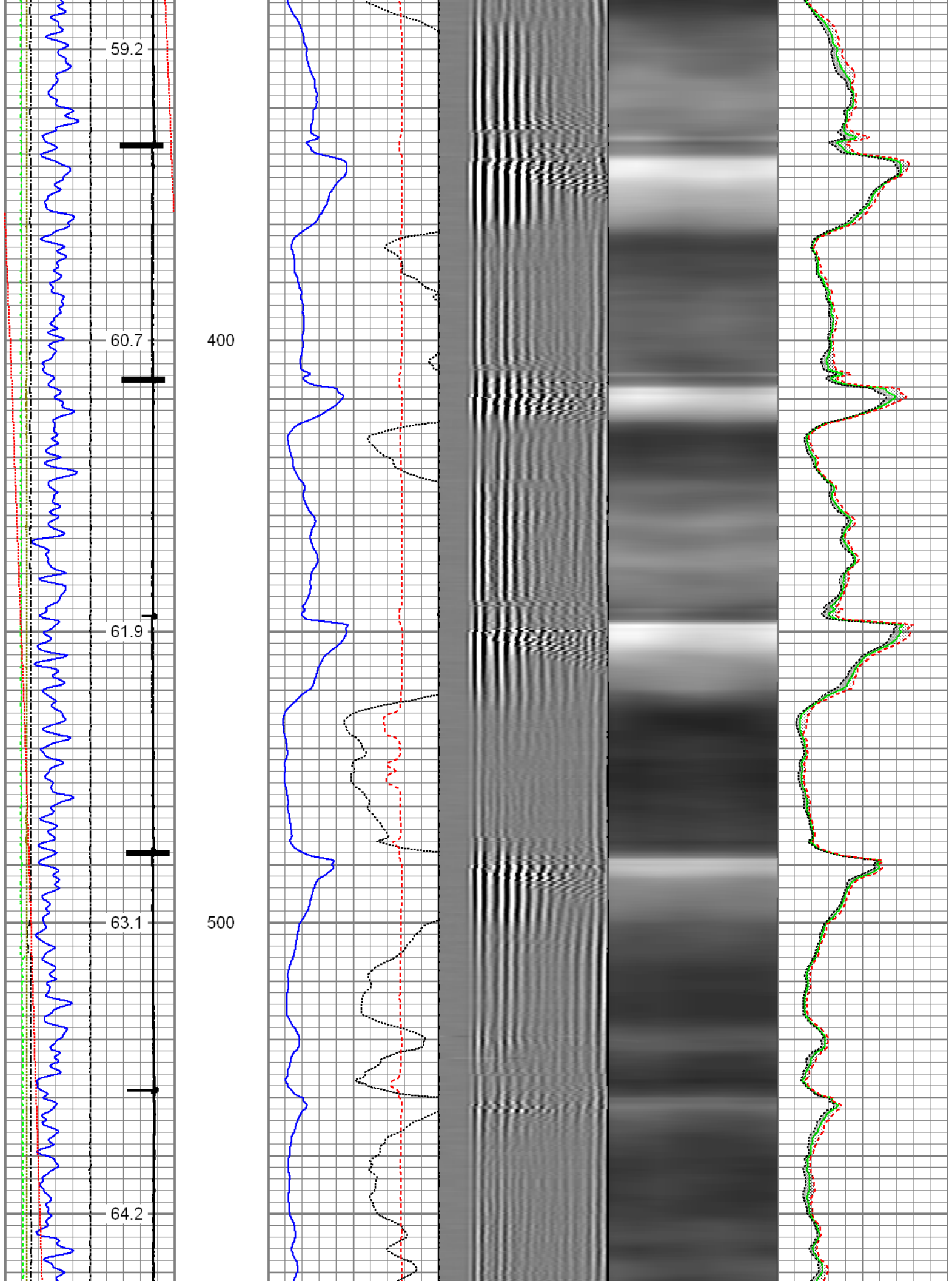
Thank you for choosing FMC Technologies Completion Services, Inc.!!

Database File: 08-01-15\_noble energy\_70 ranch bb18-622\_mit\_rbl.db  
Dataset Pathname: pass15.1  
Presentation Format: rbt4\_mit  
Dataset Creation: Sun Aug 02 08:34:08 2015 by Calc 7.0 B1  
Charted by: Depth in Feet scaled 1:240

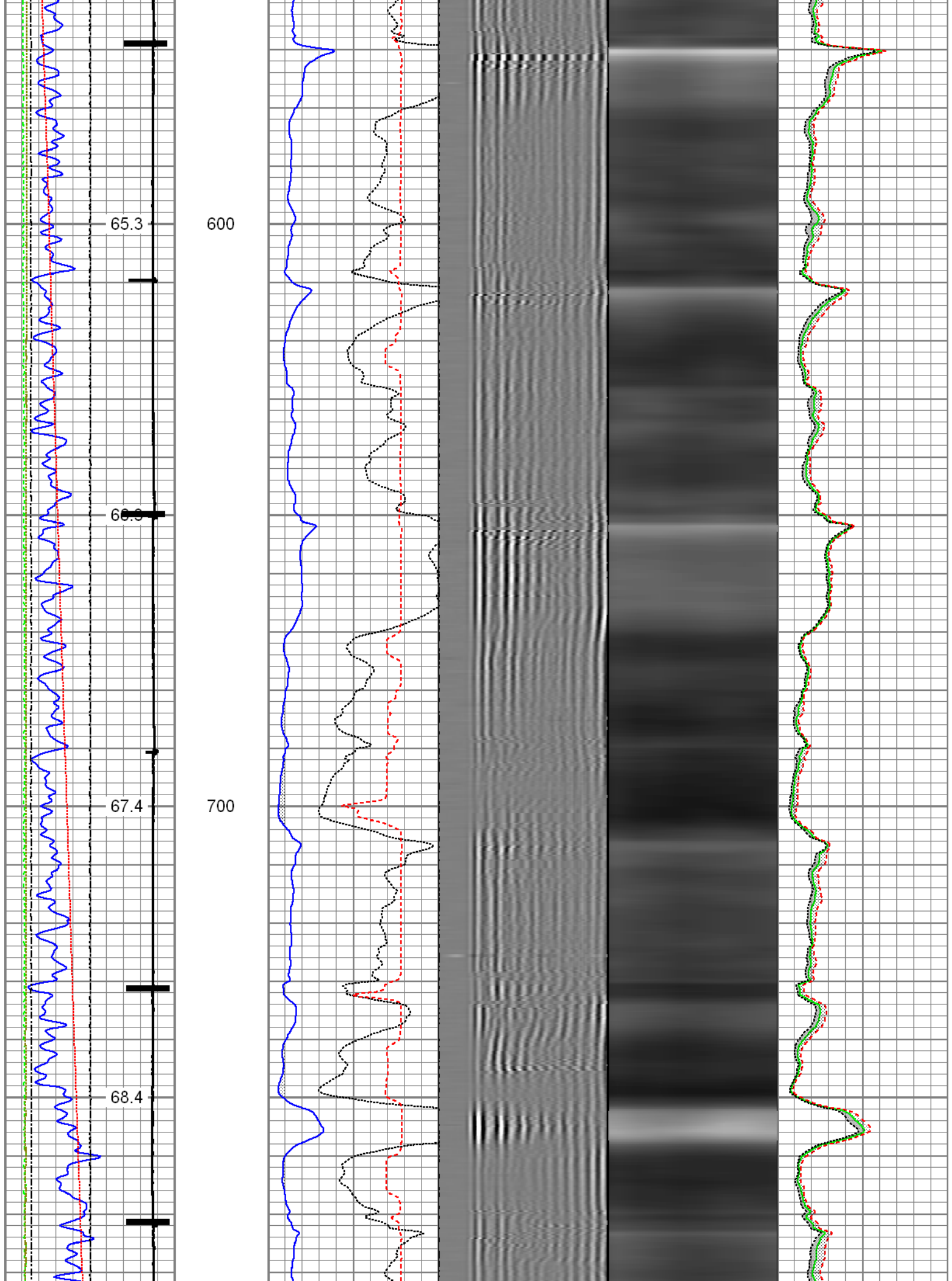
Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Casing Collar Locator	3' Amplitude x 5			Minimum Amplitude
Line Speed	0 (mV) 20			0 100
-100 (ft/min) 100	3' Travel Time			Maximum Amplitude
Line Tension	650 (usec) 150			0 100
0 (lb) 2000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

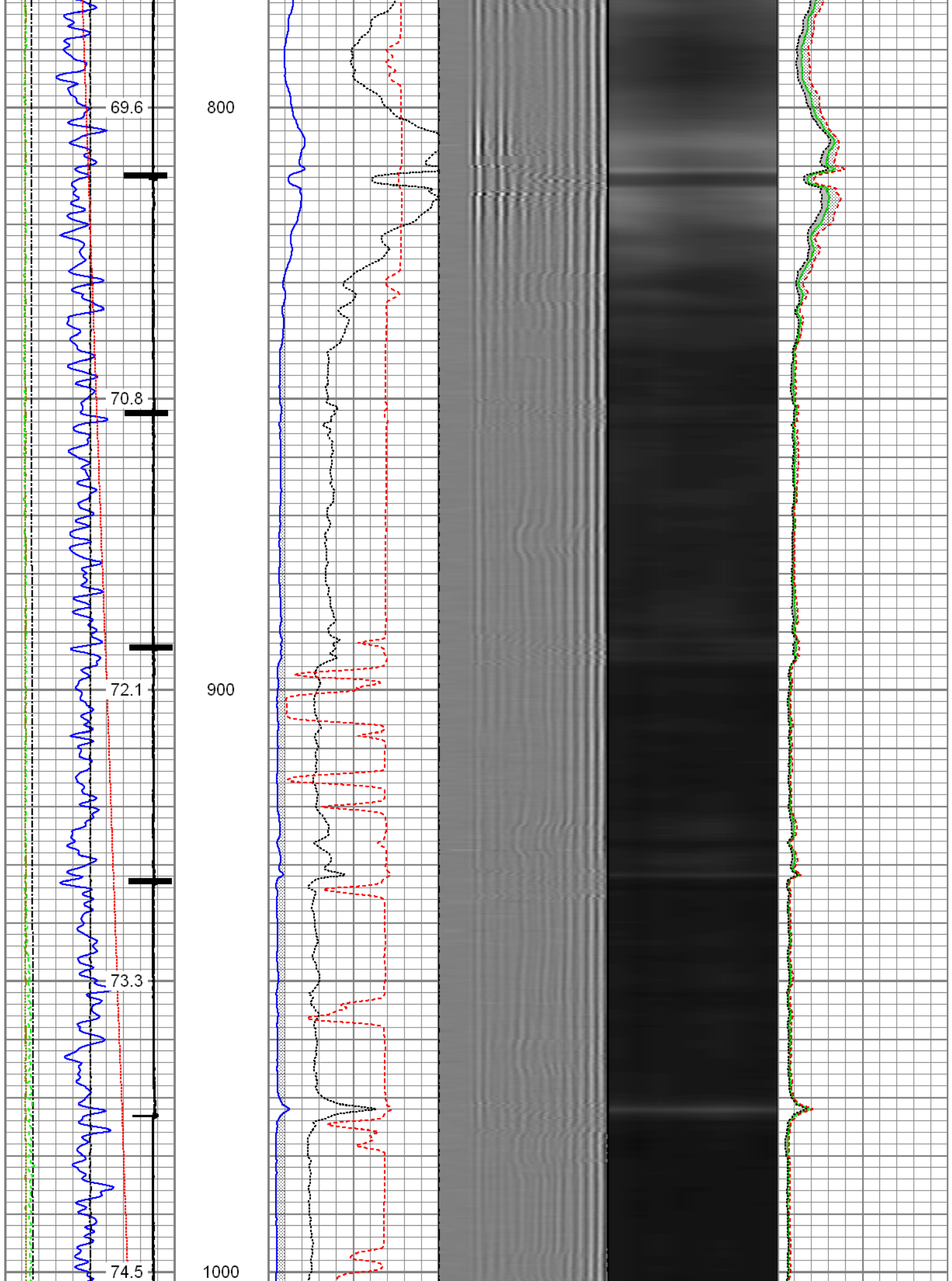


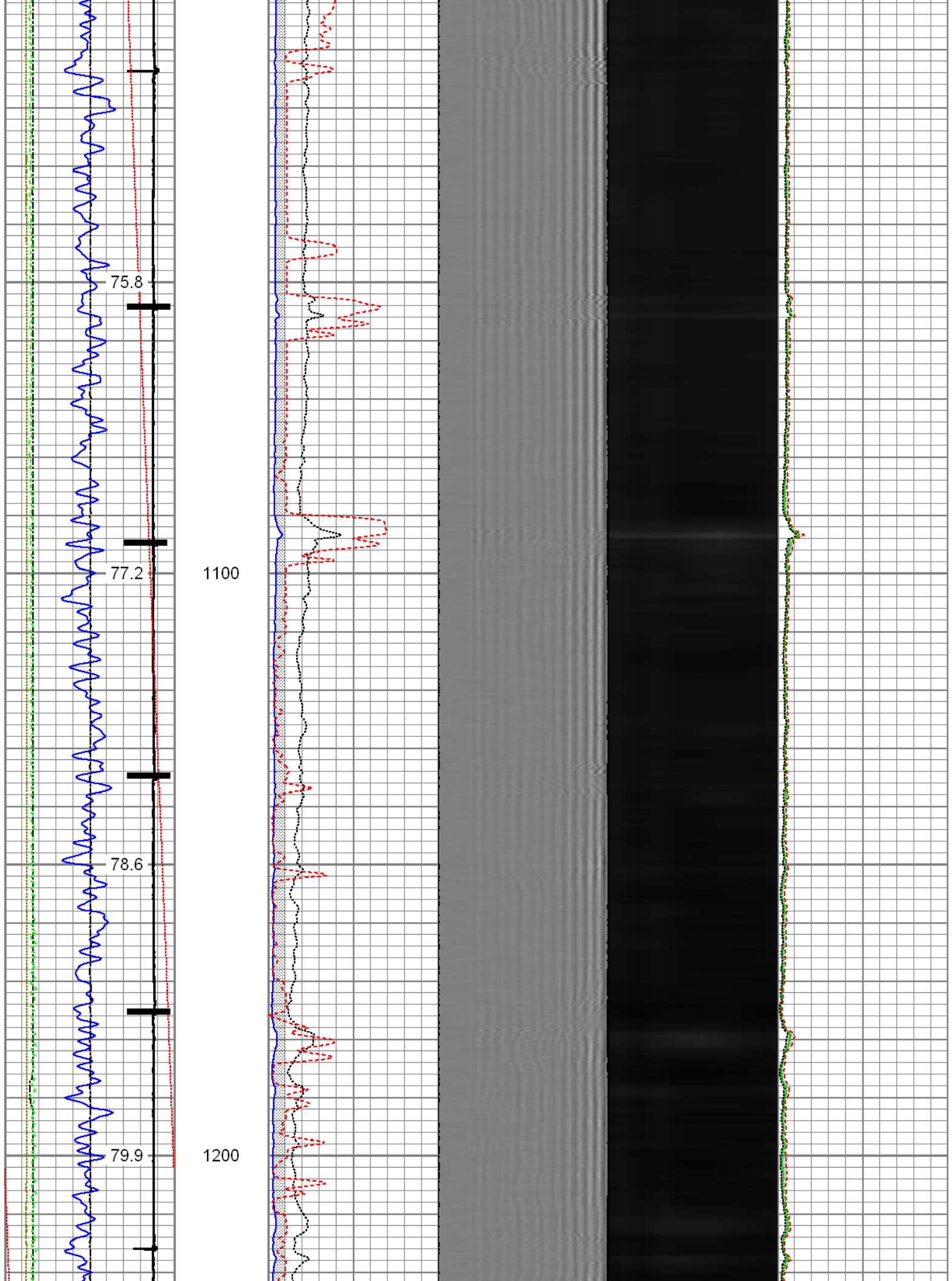


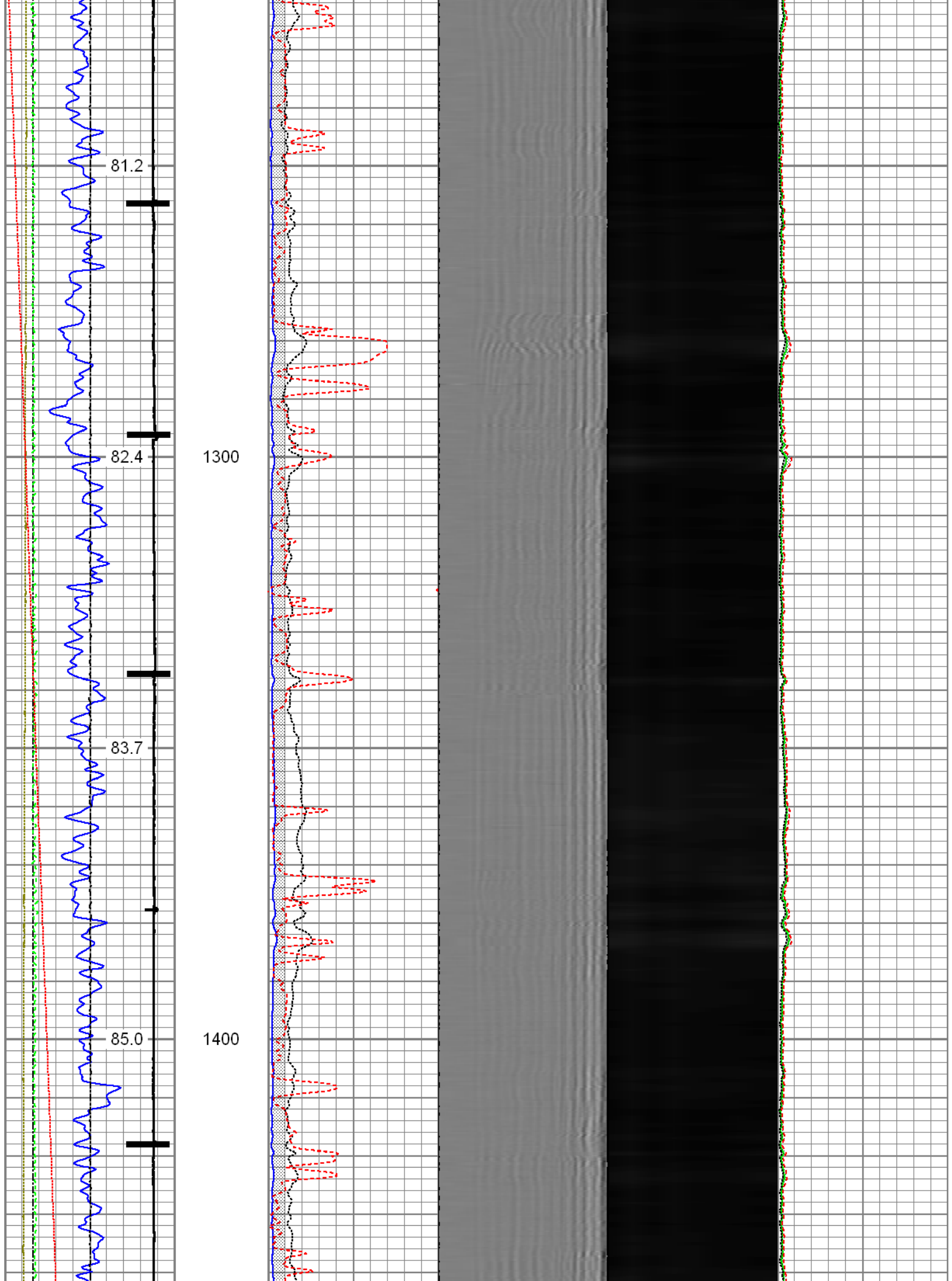


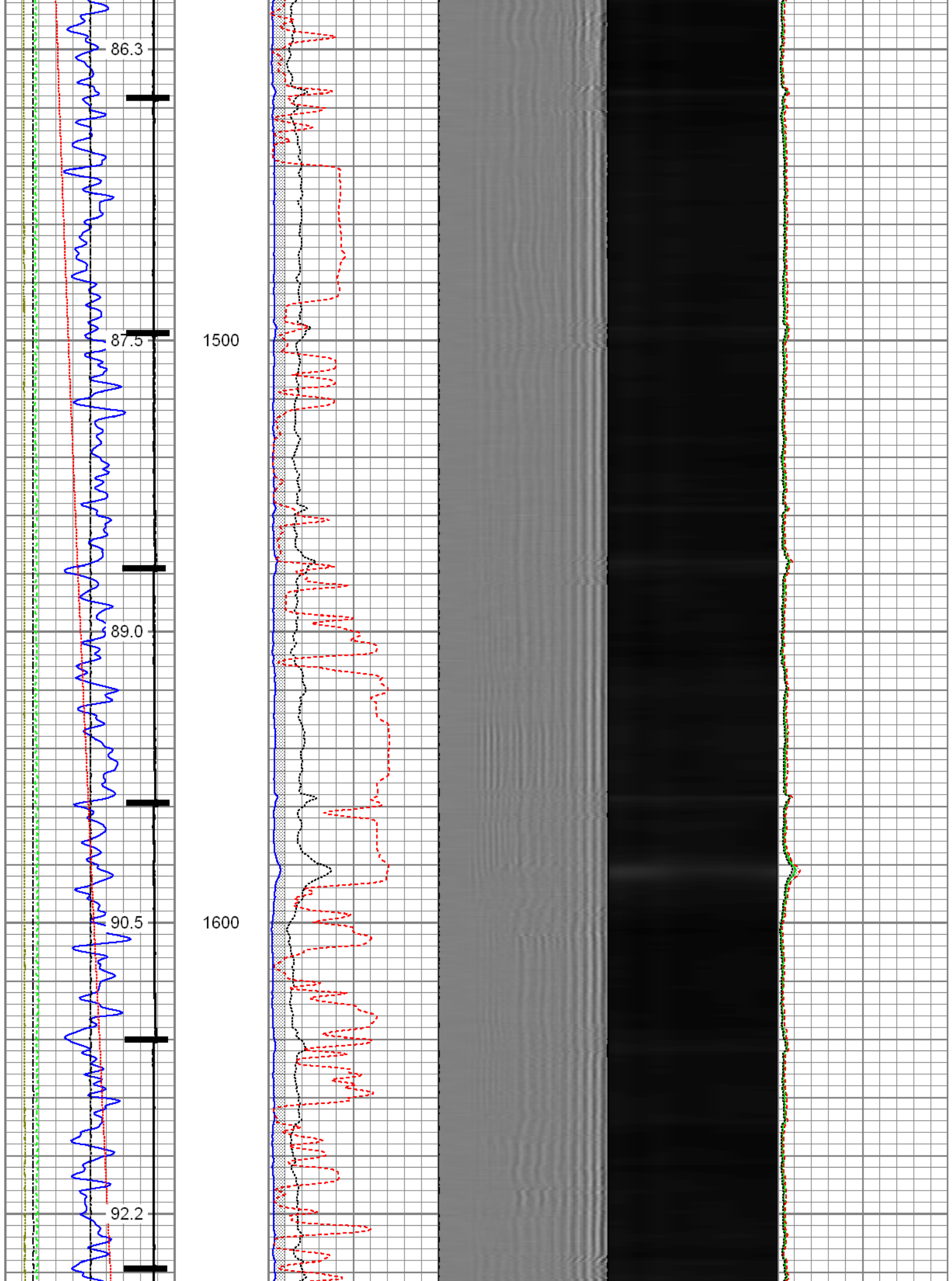




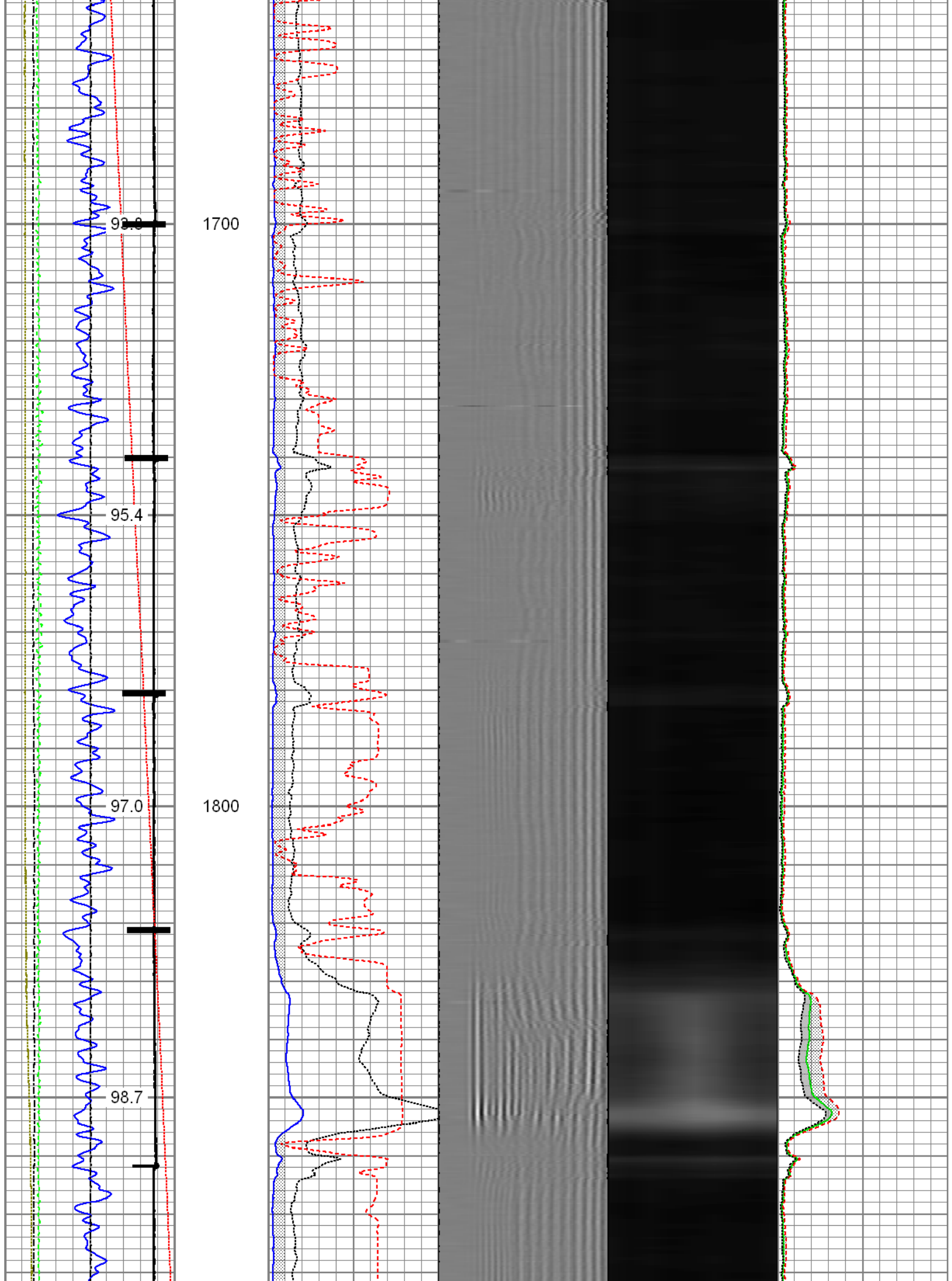


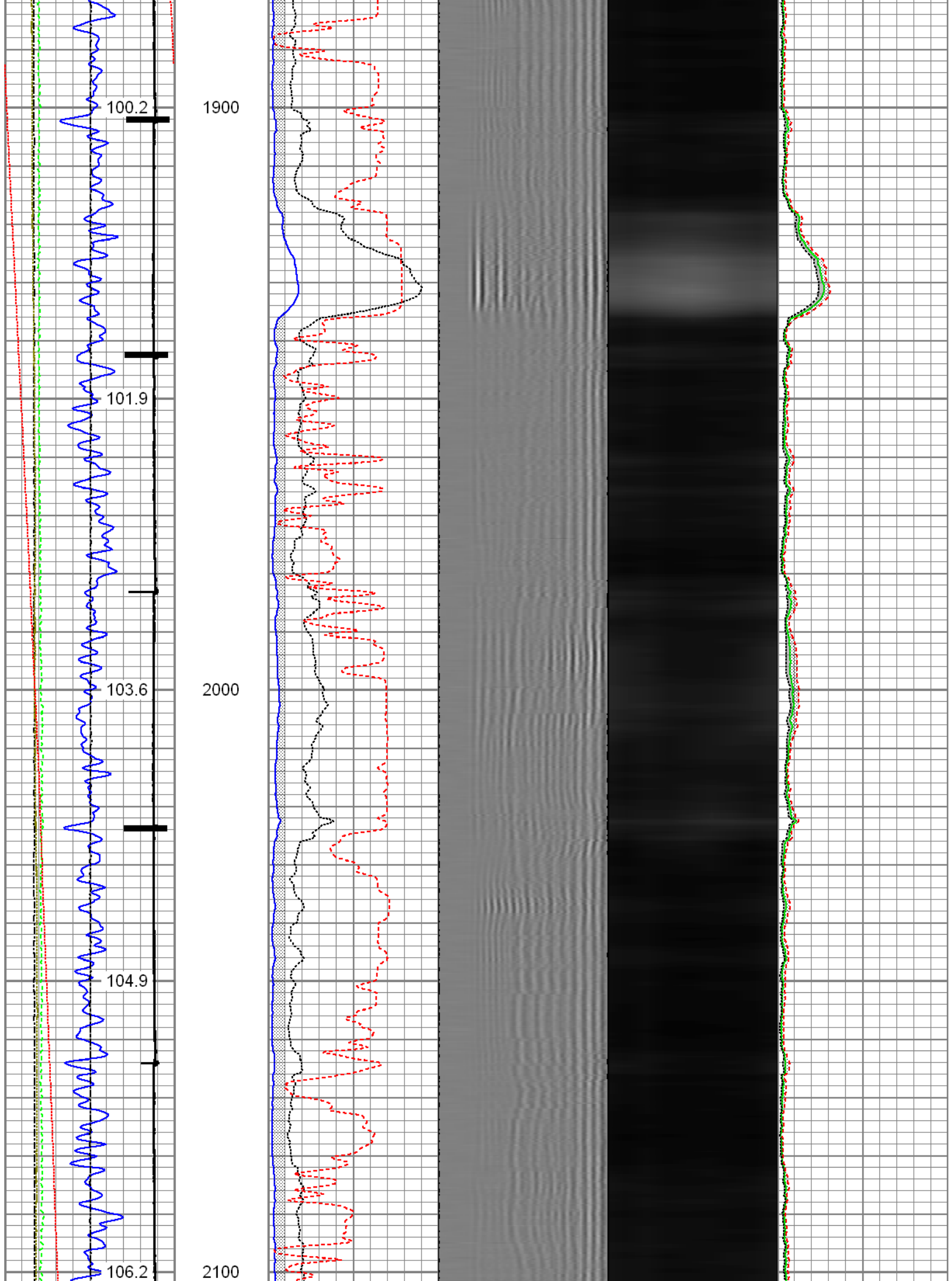


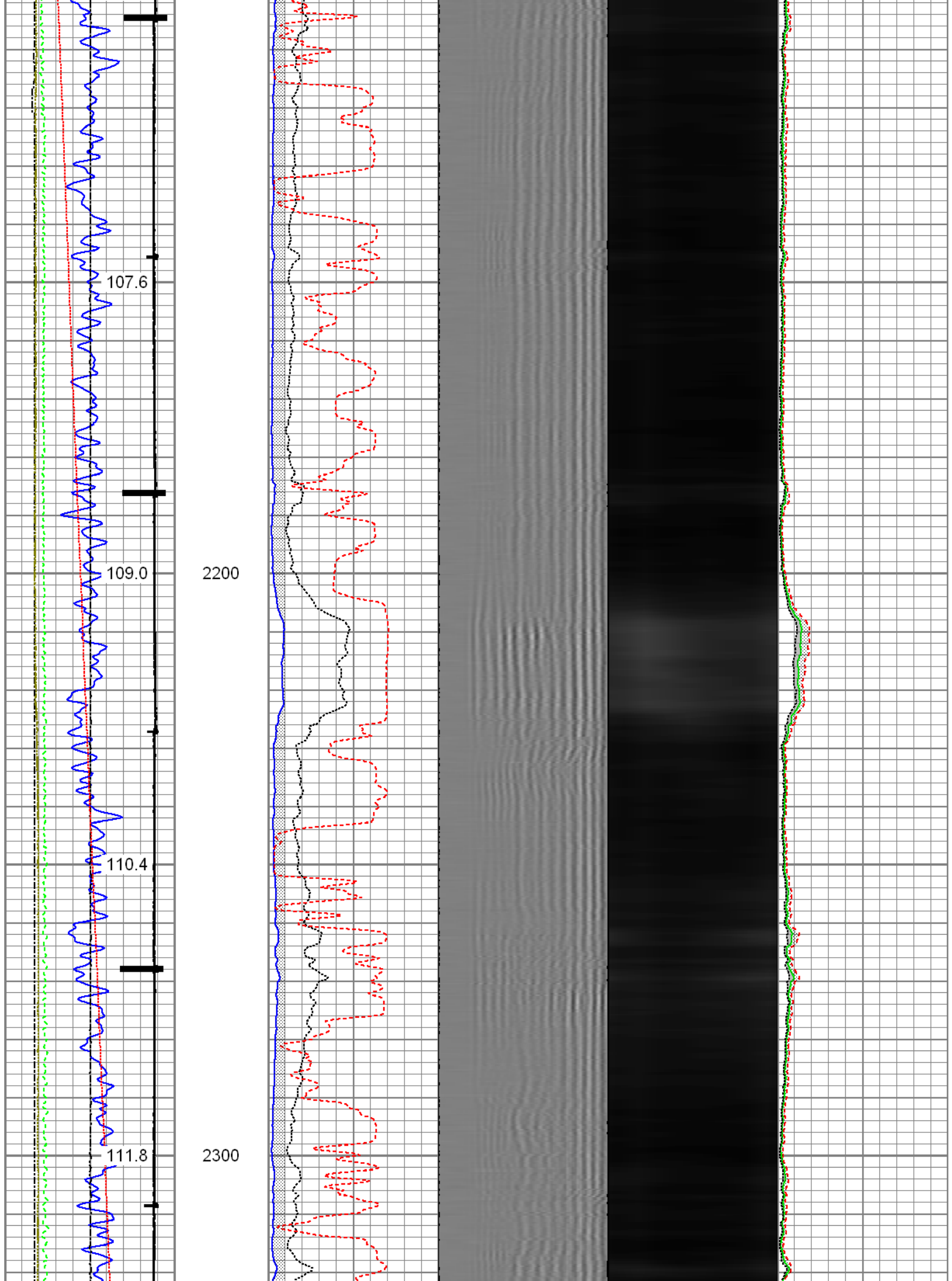


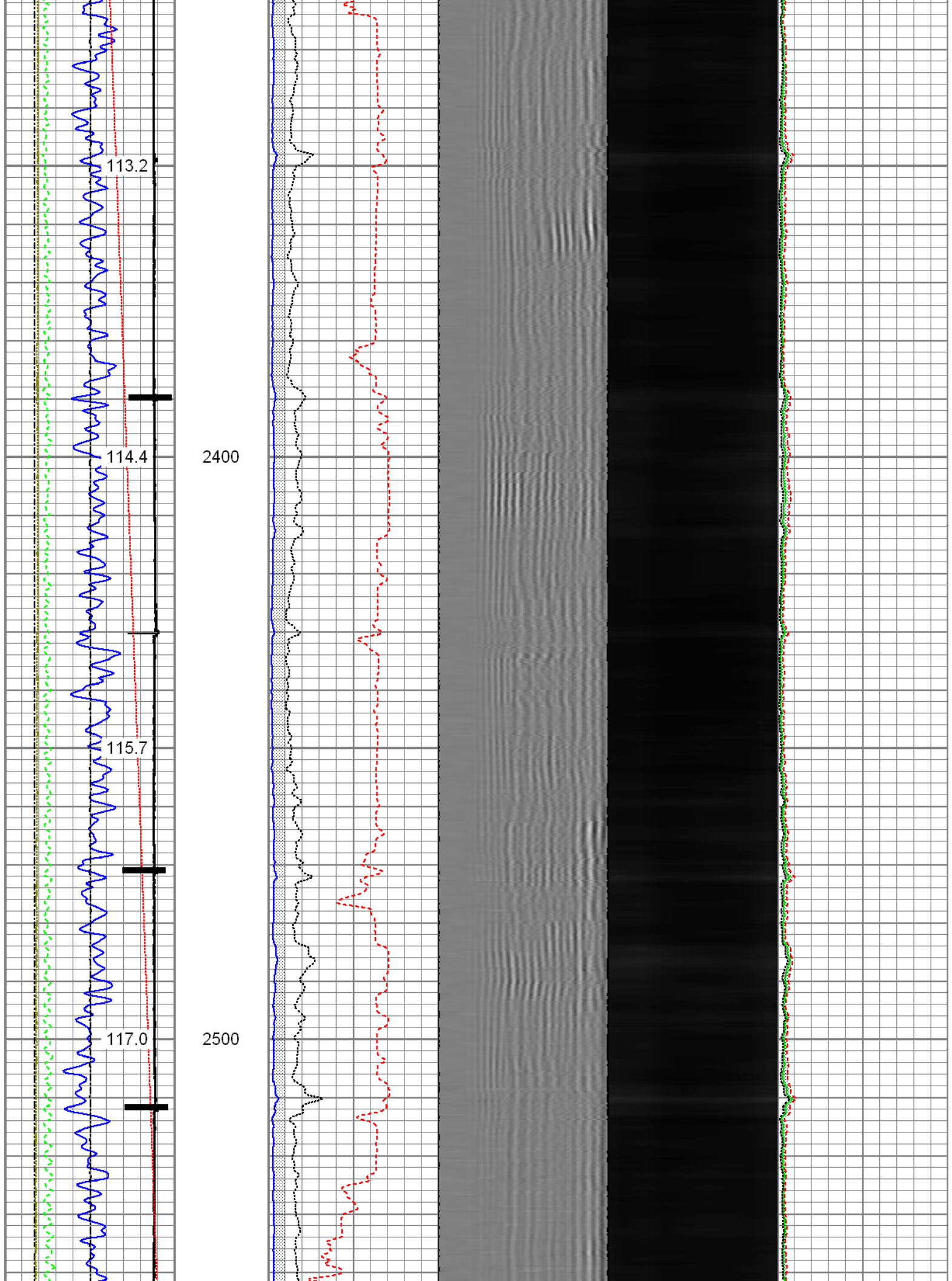


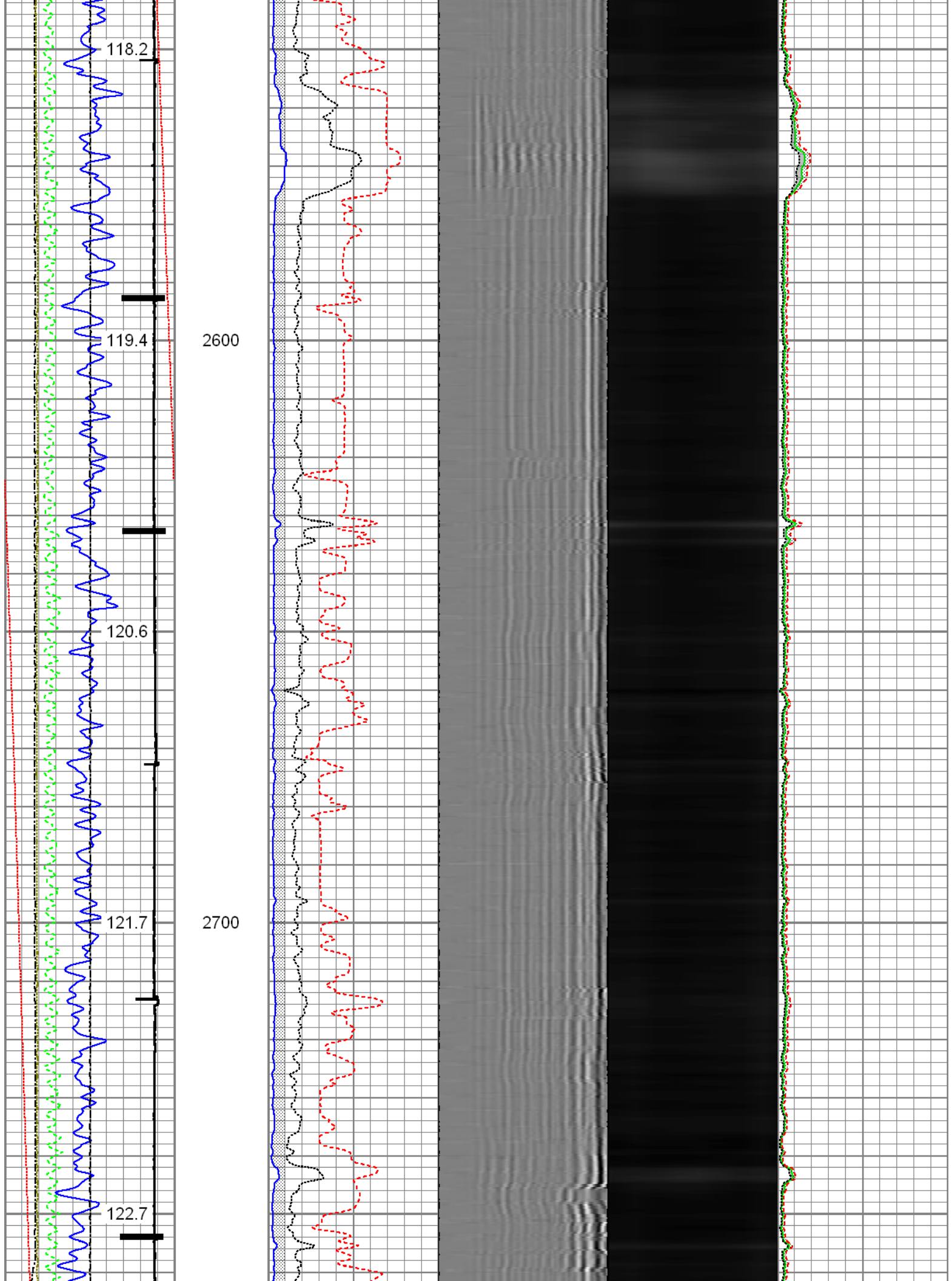




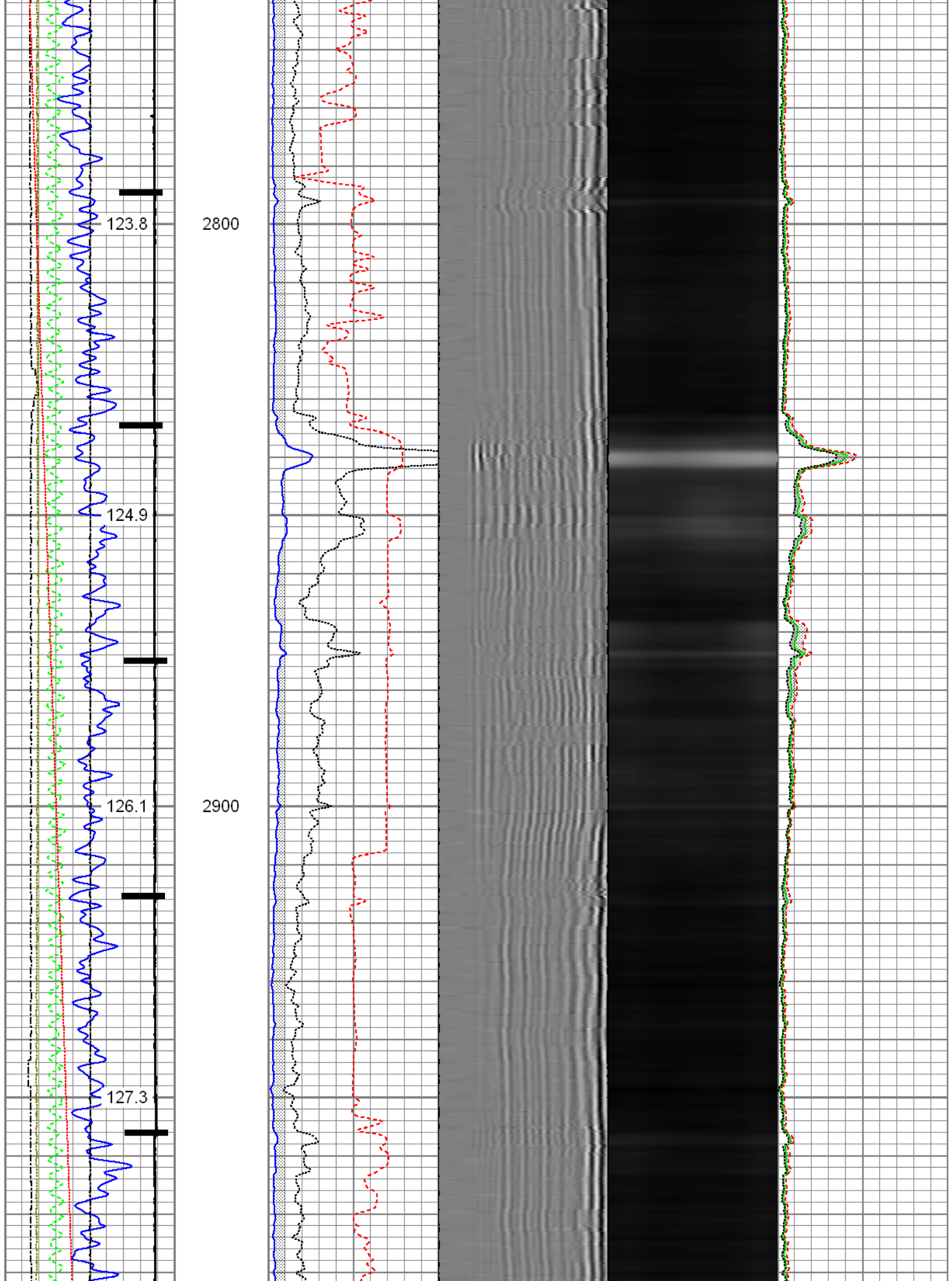


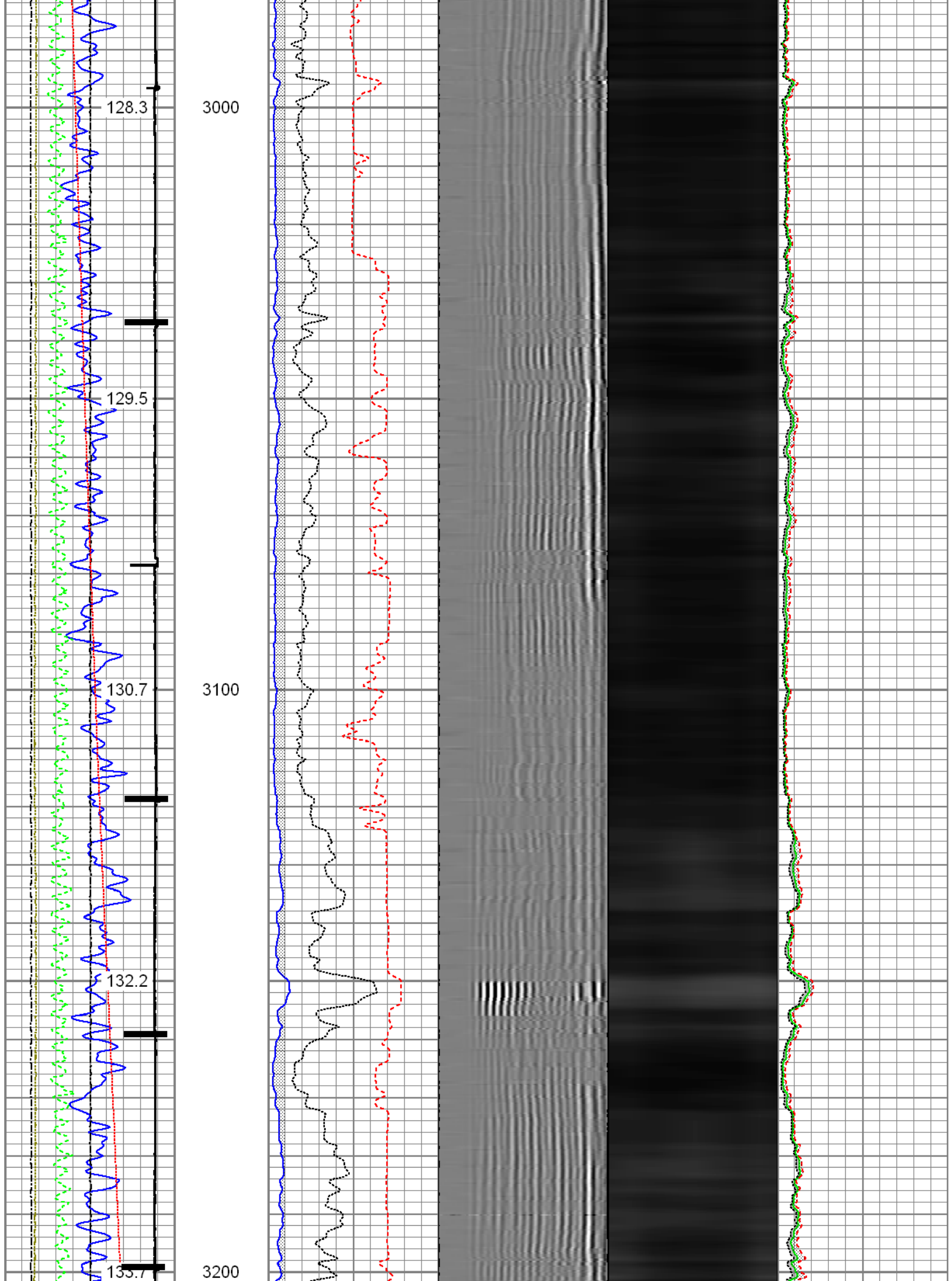


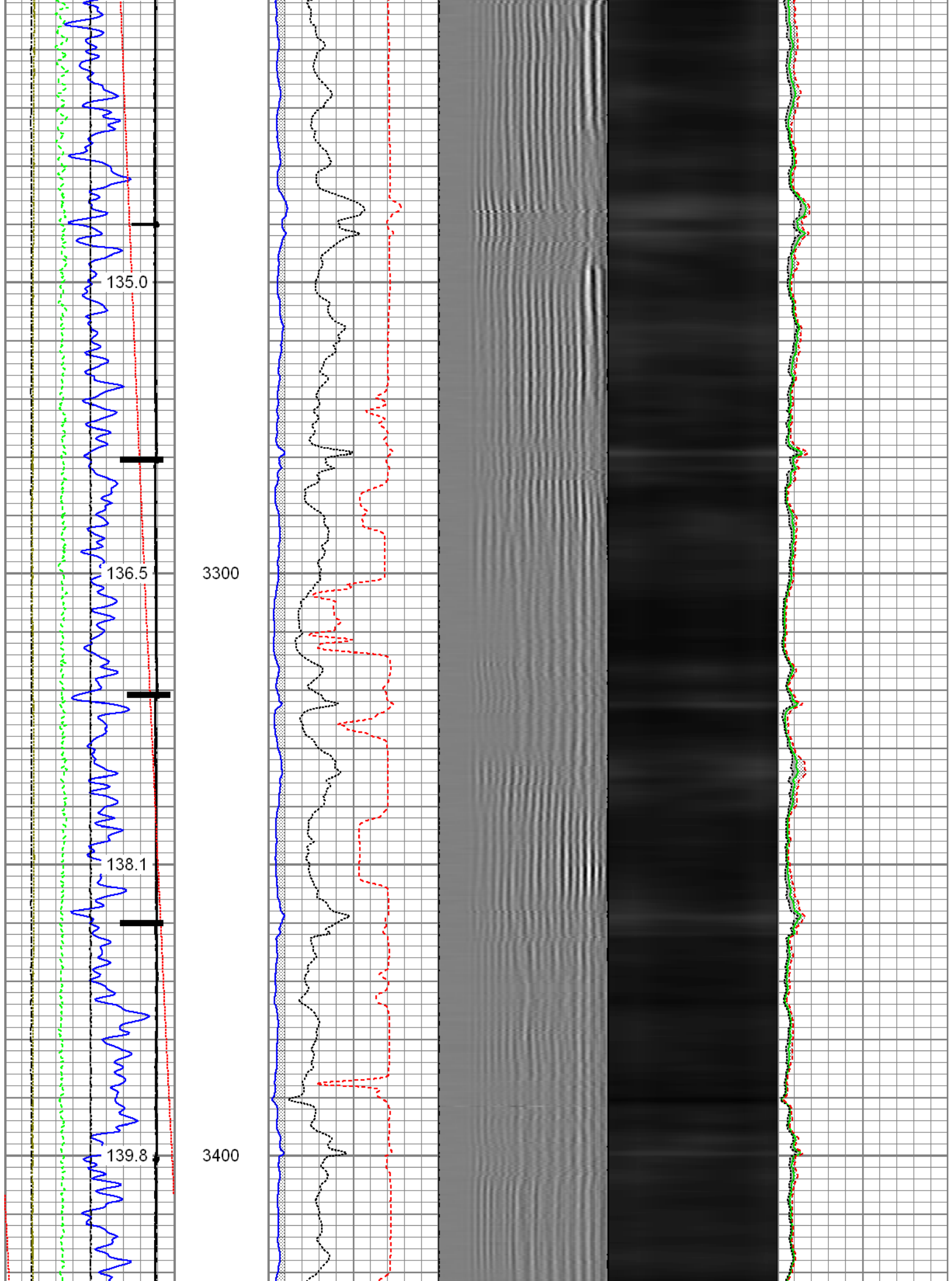


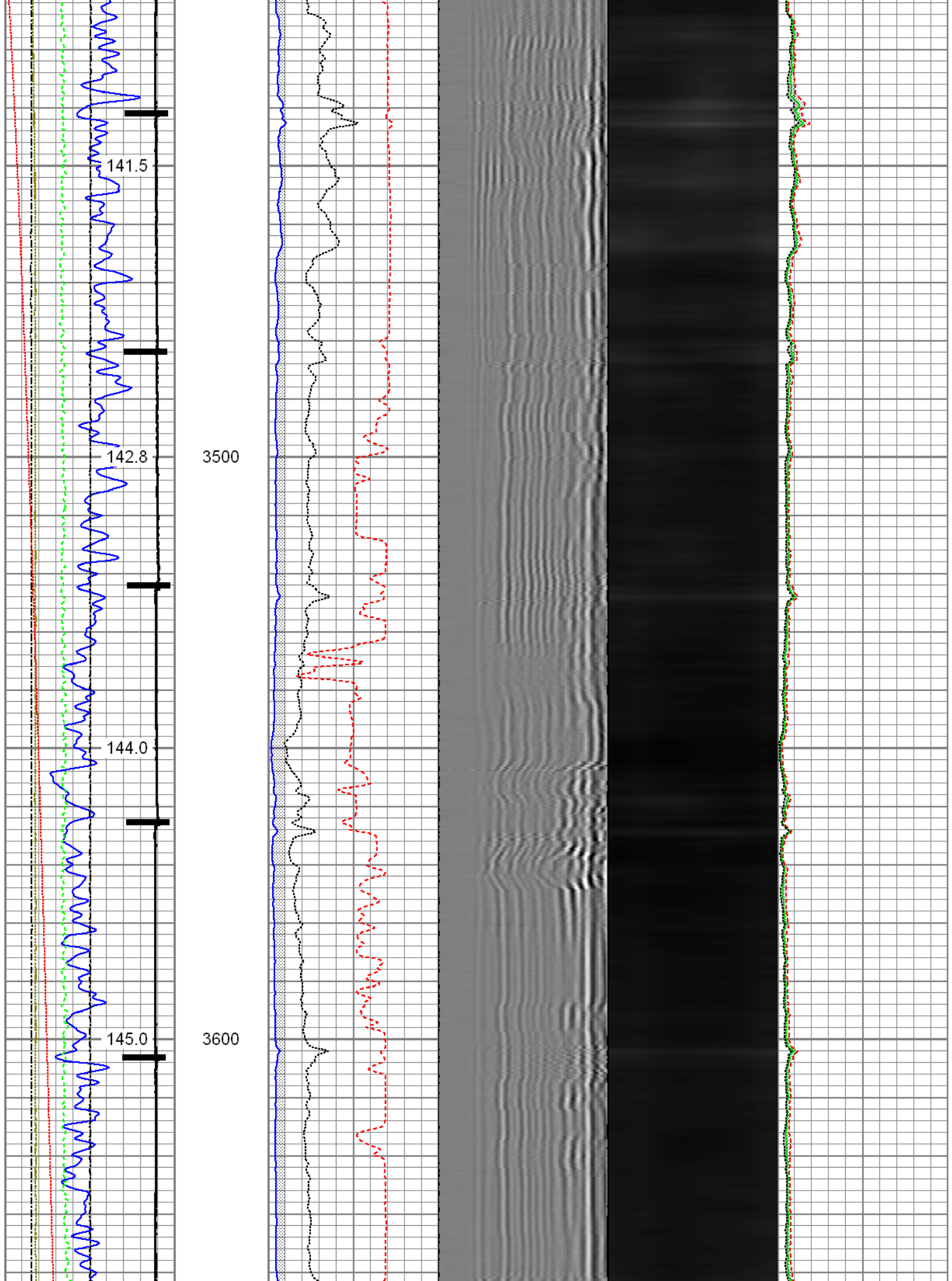


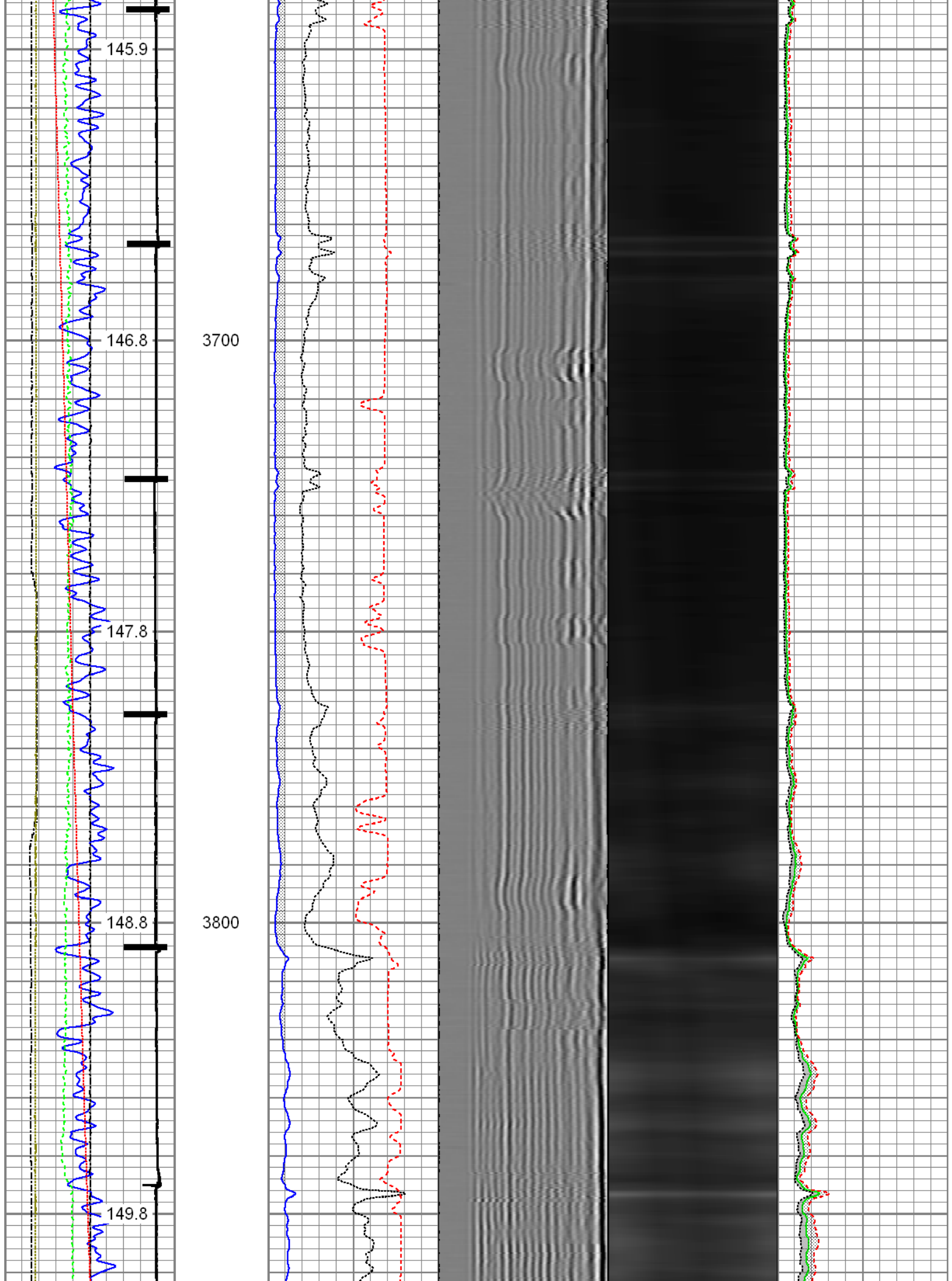




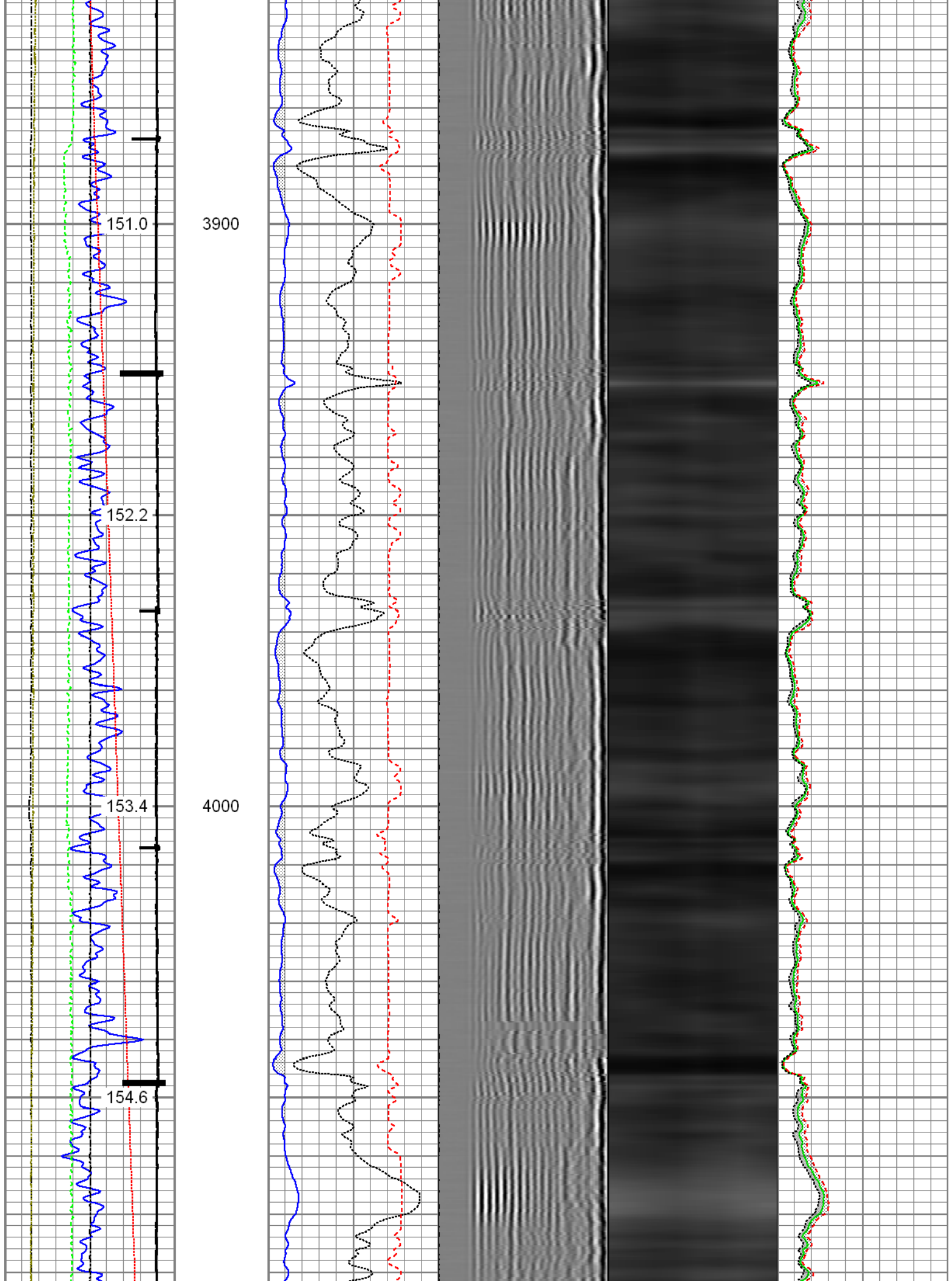


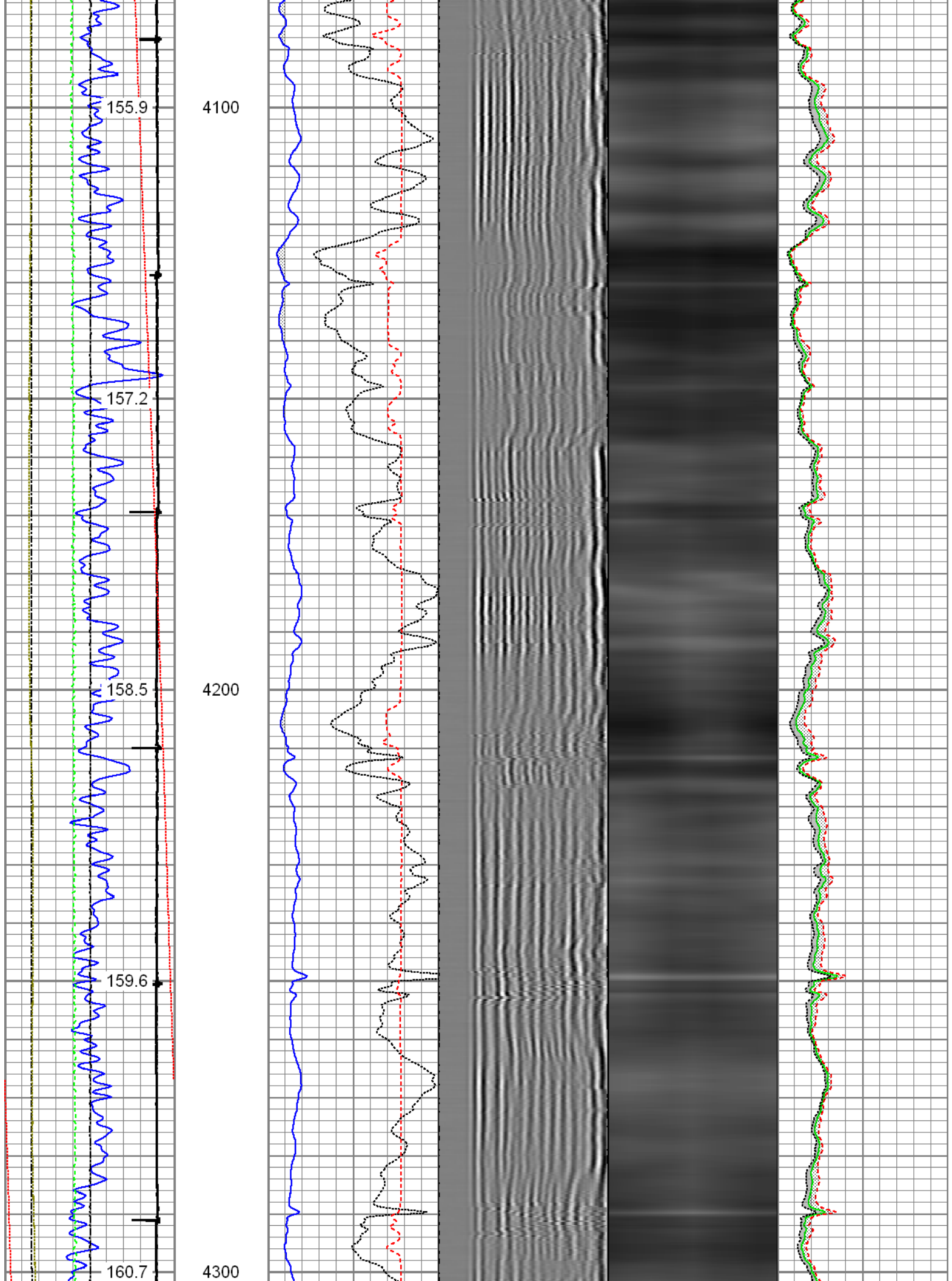


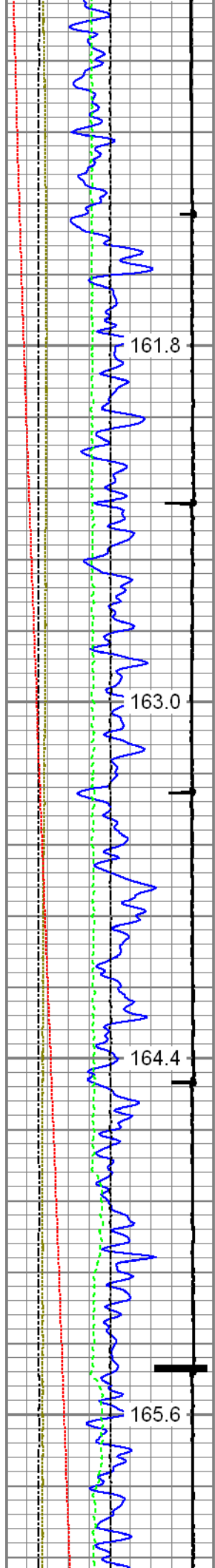






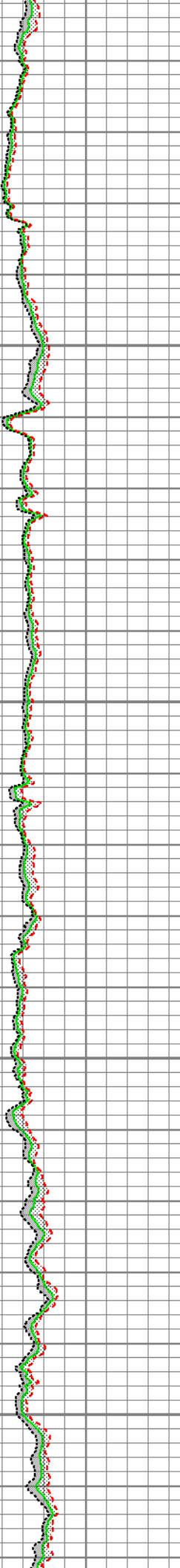
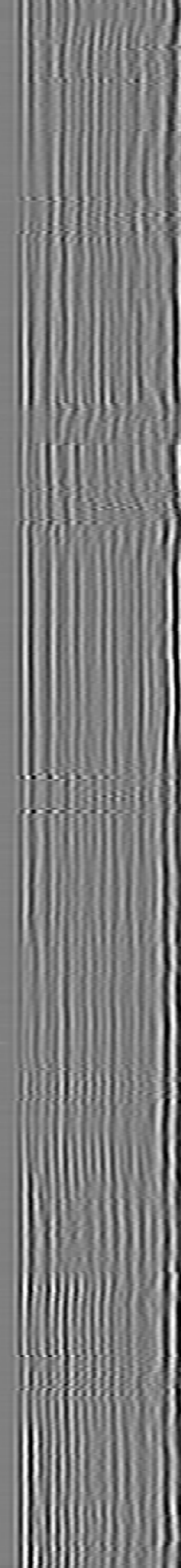
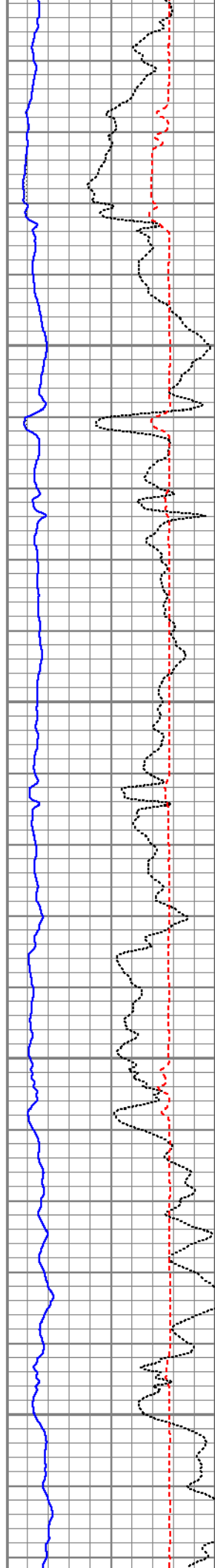


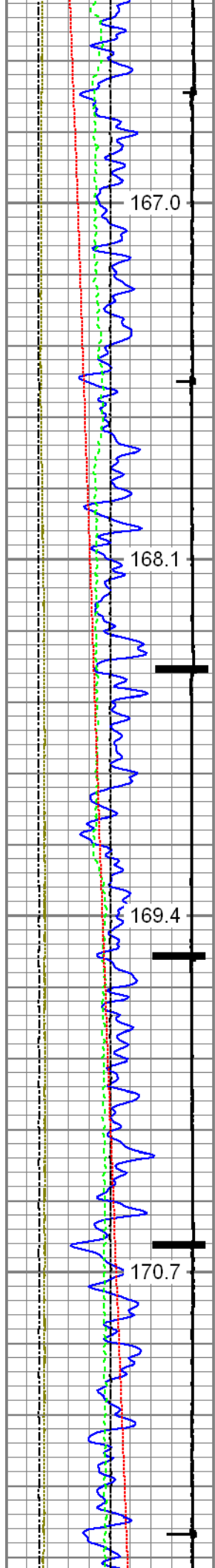




4400

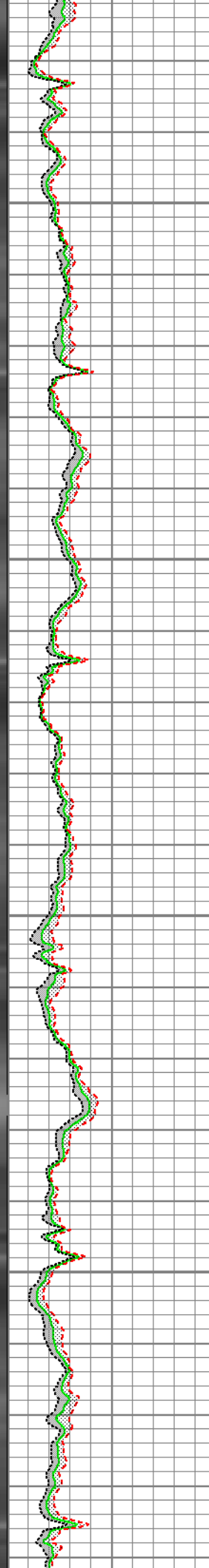
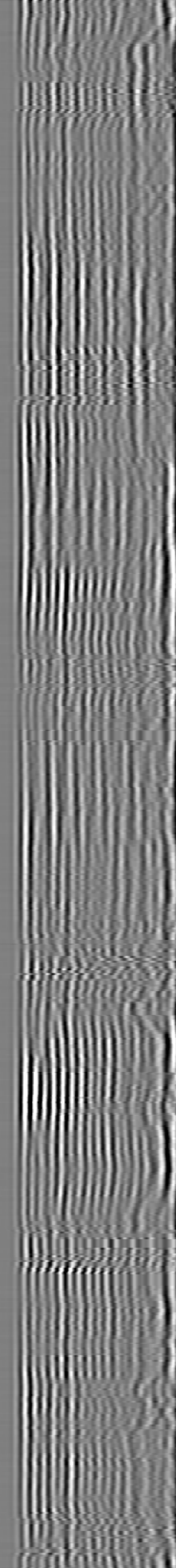
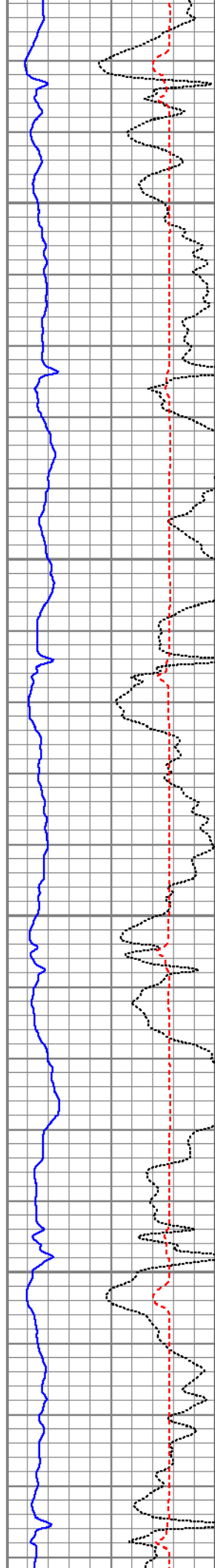
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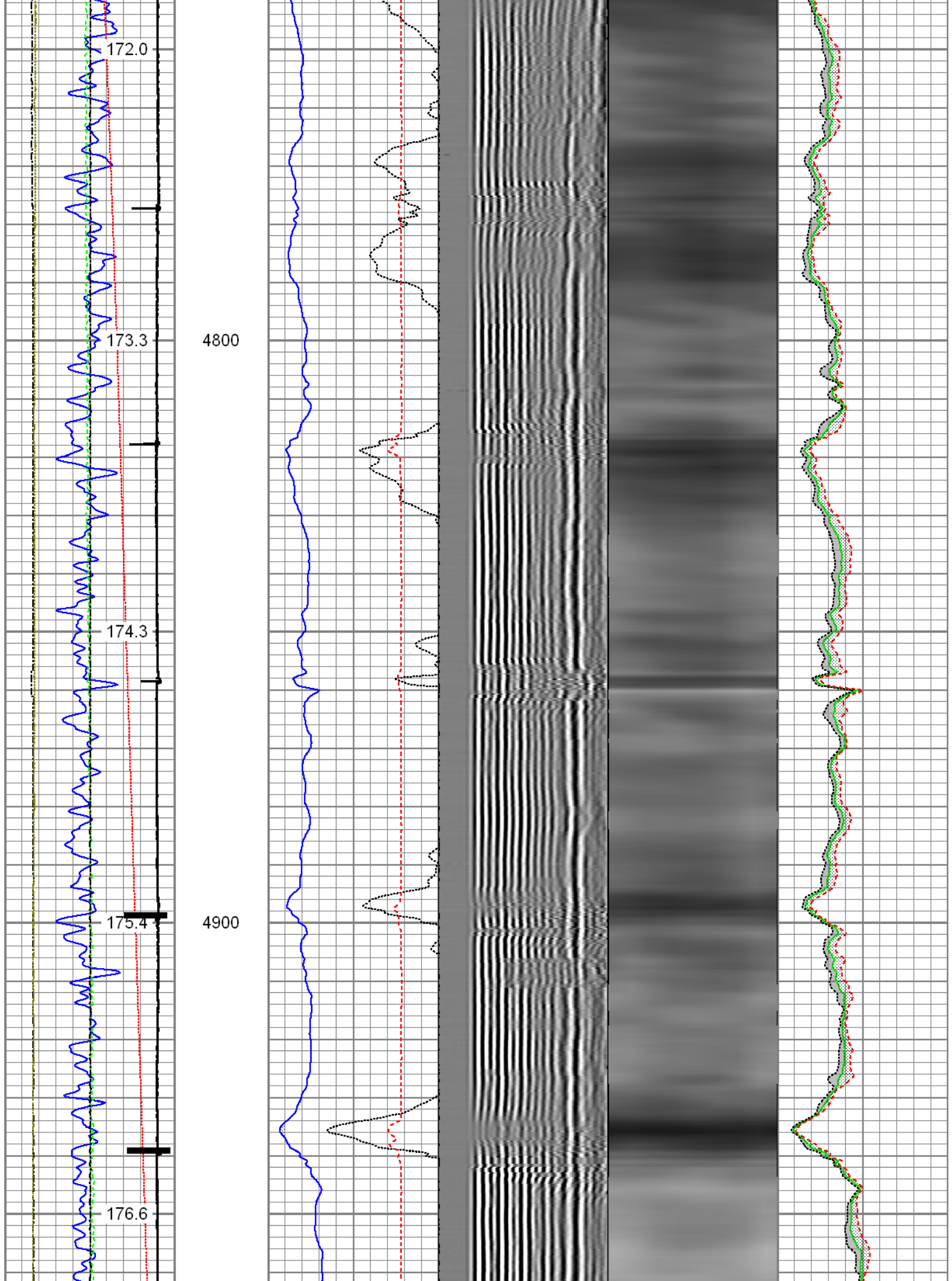


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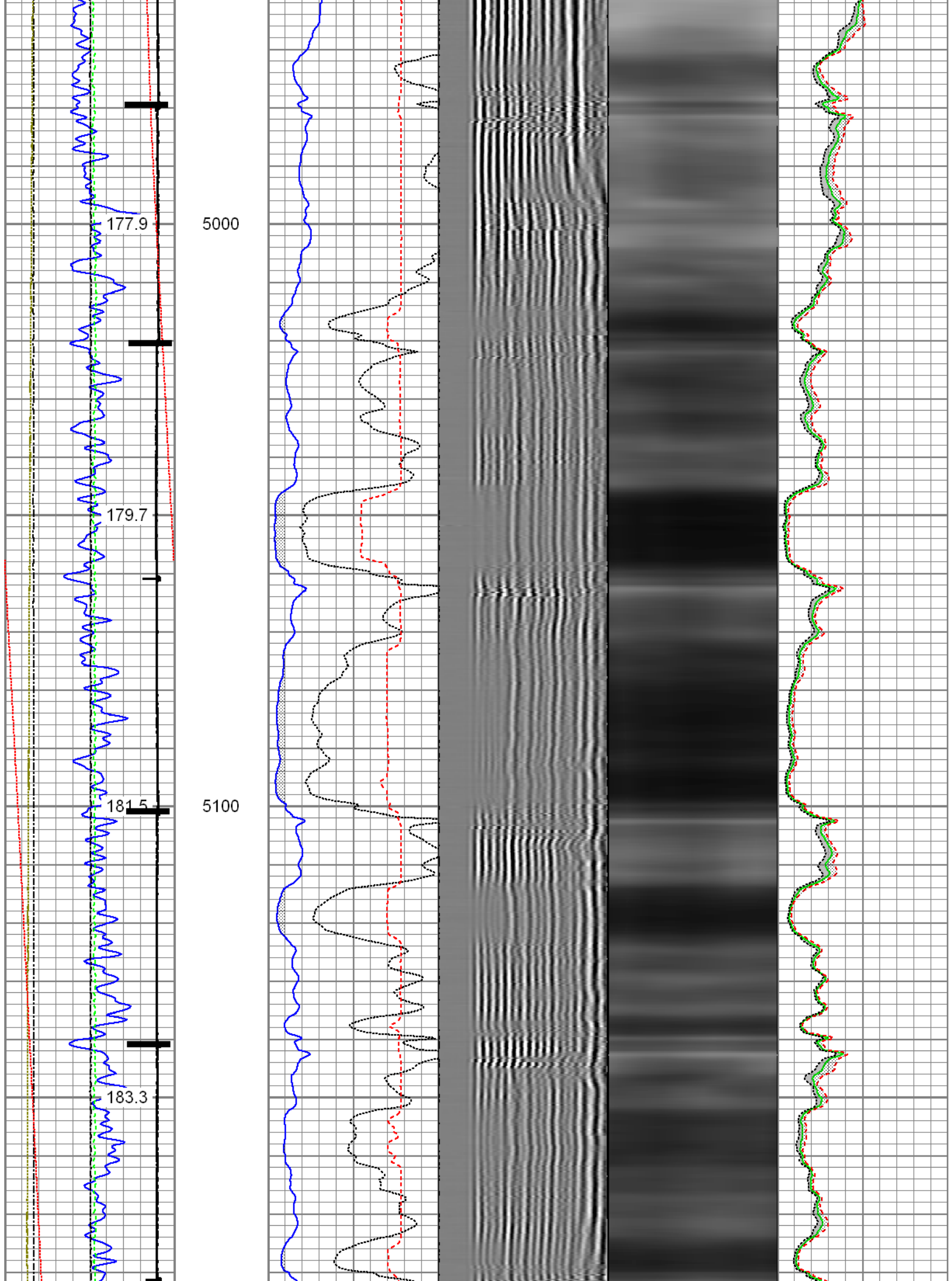
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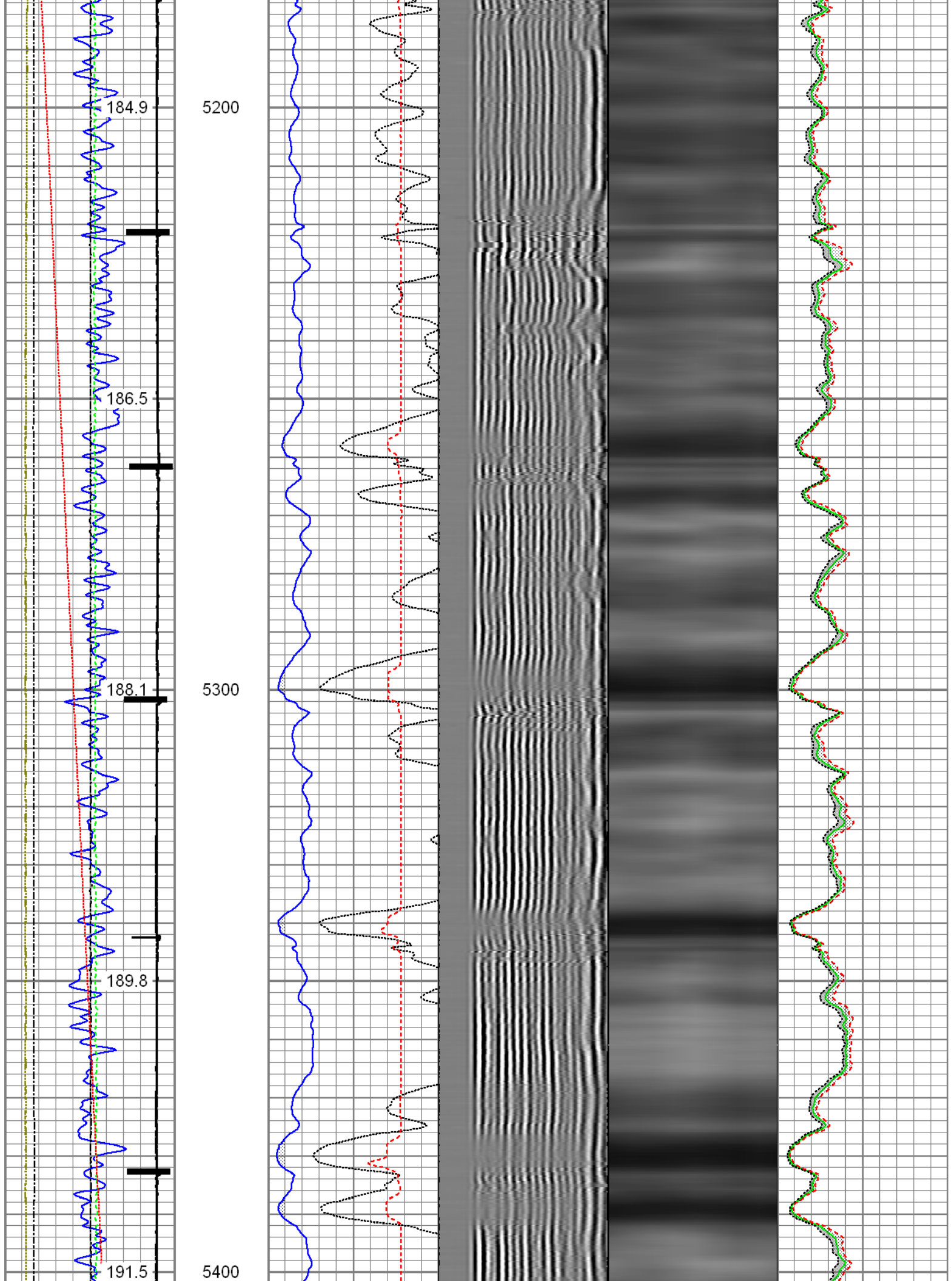


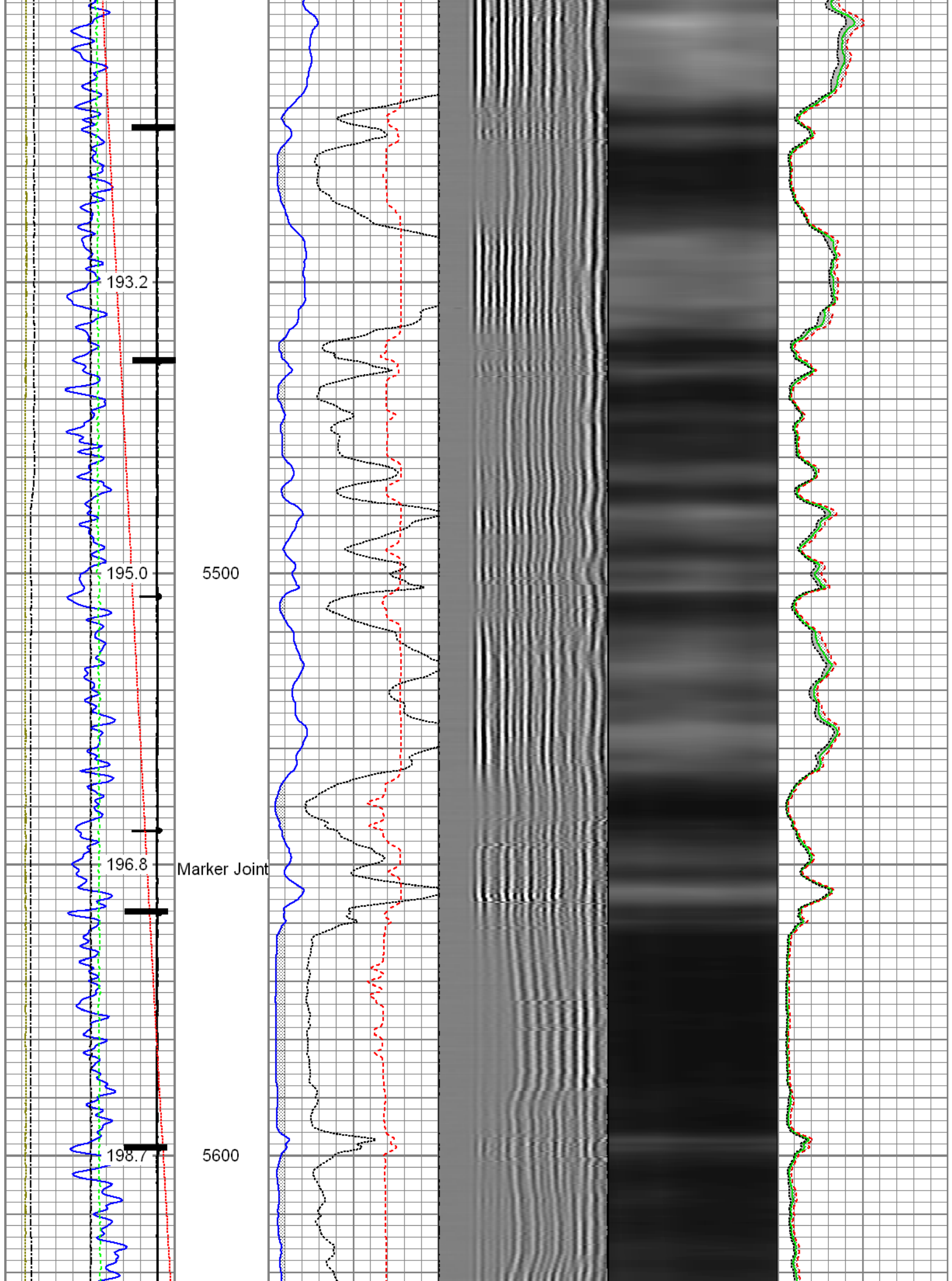


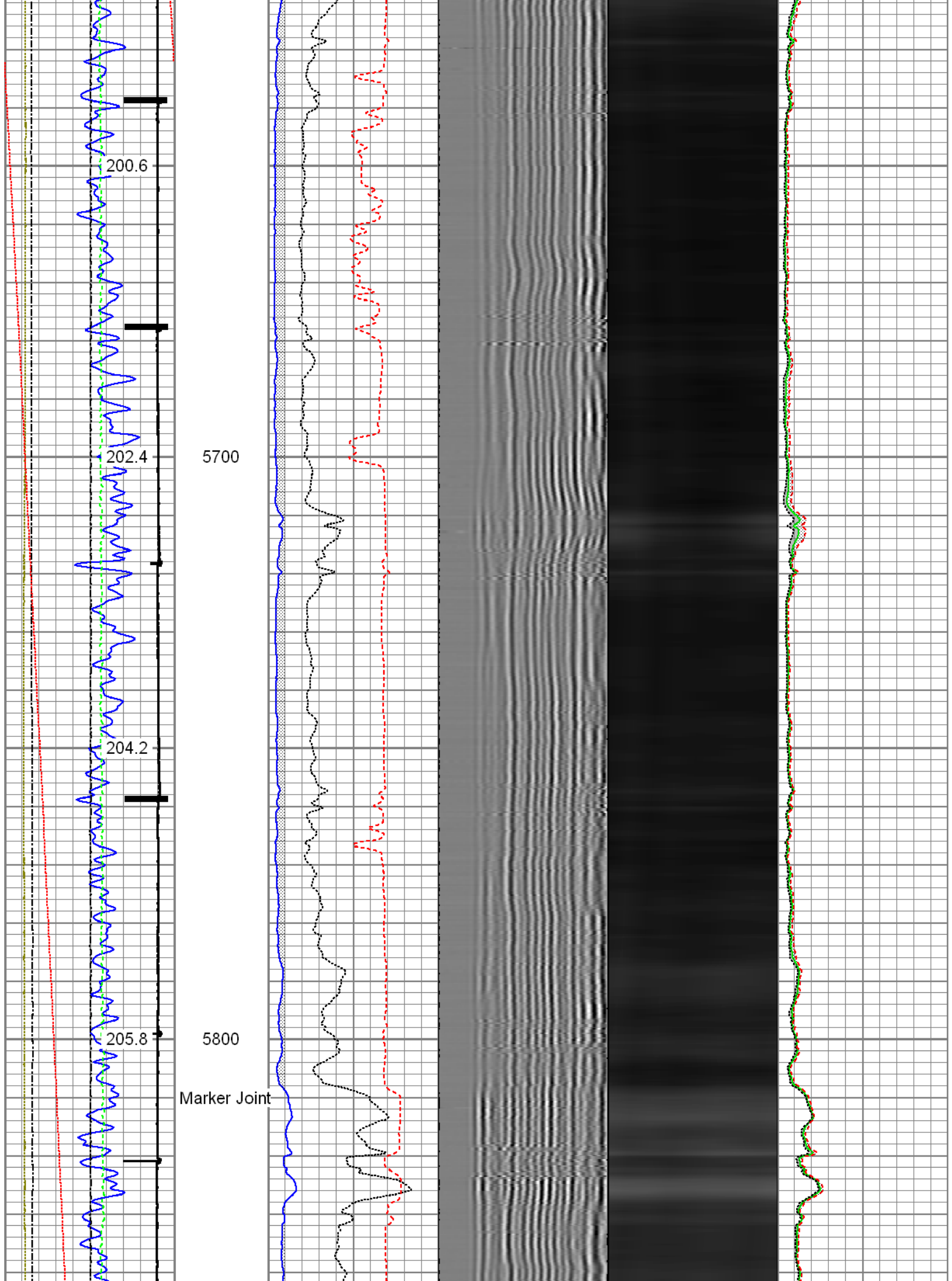




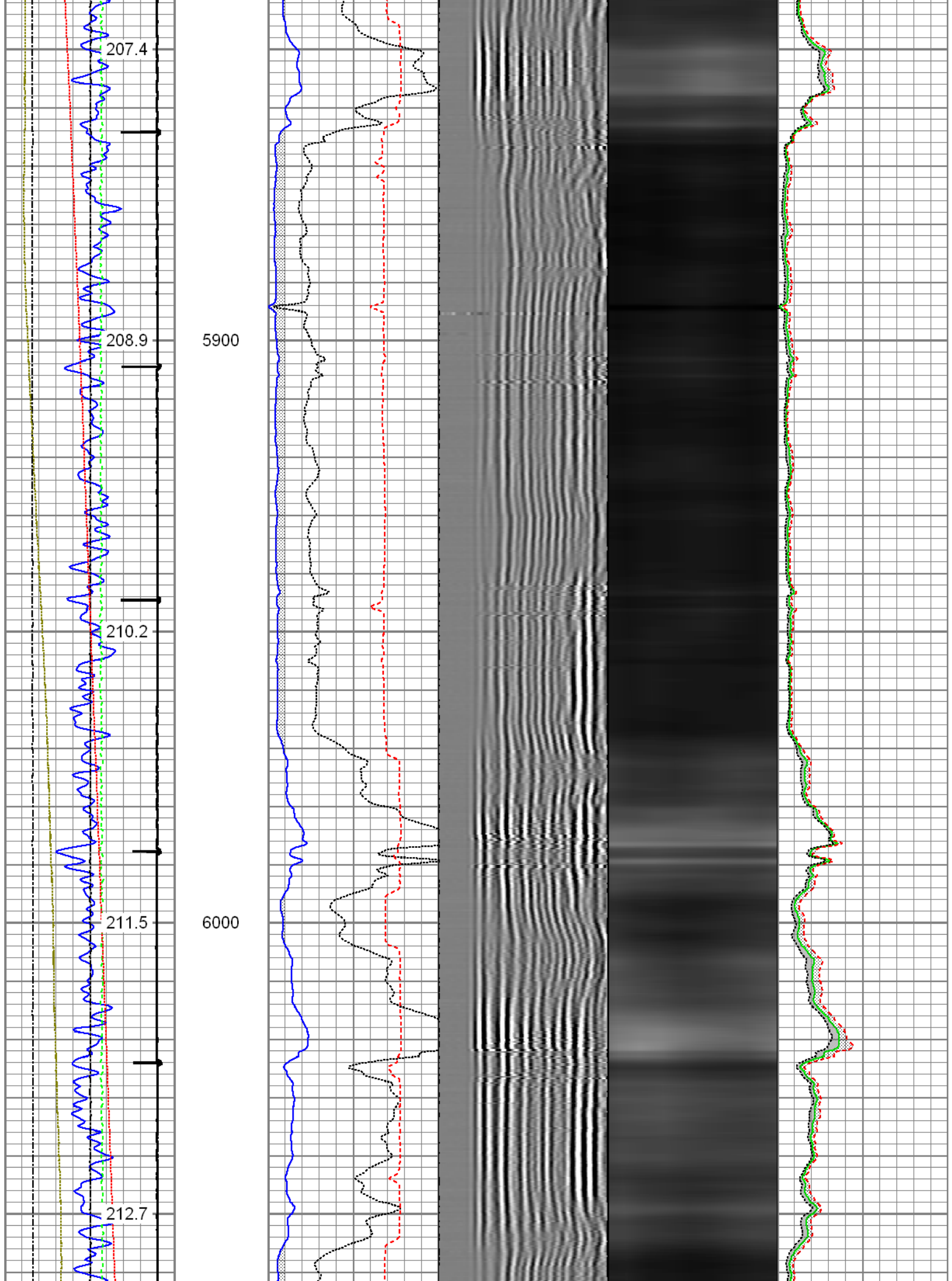




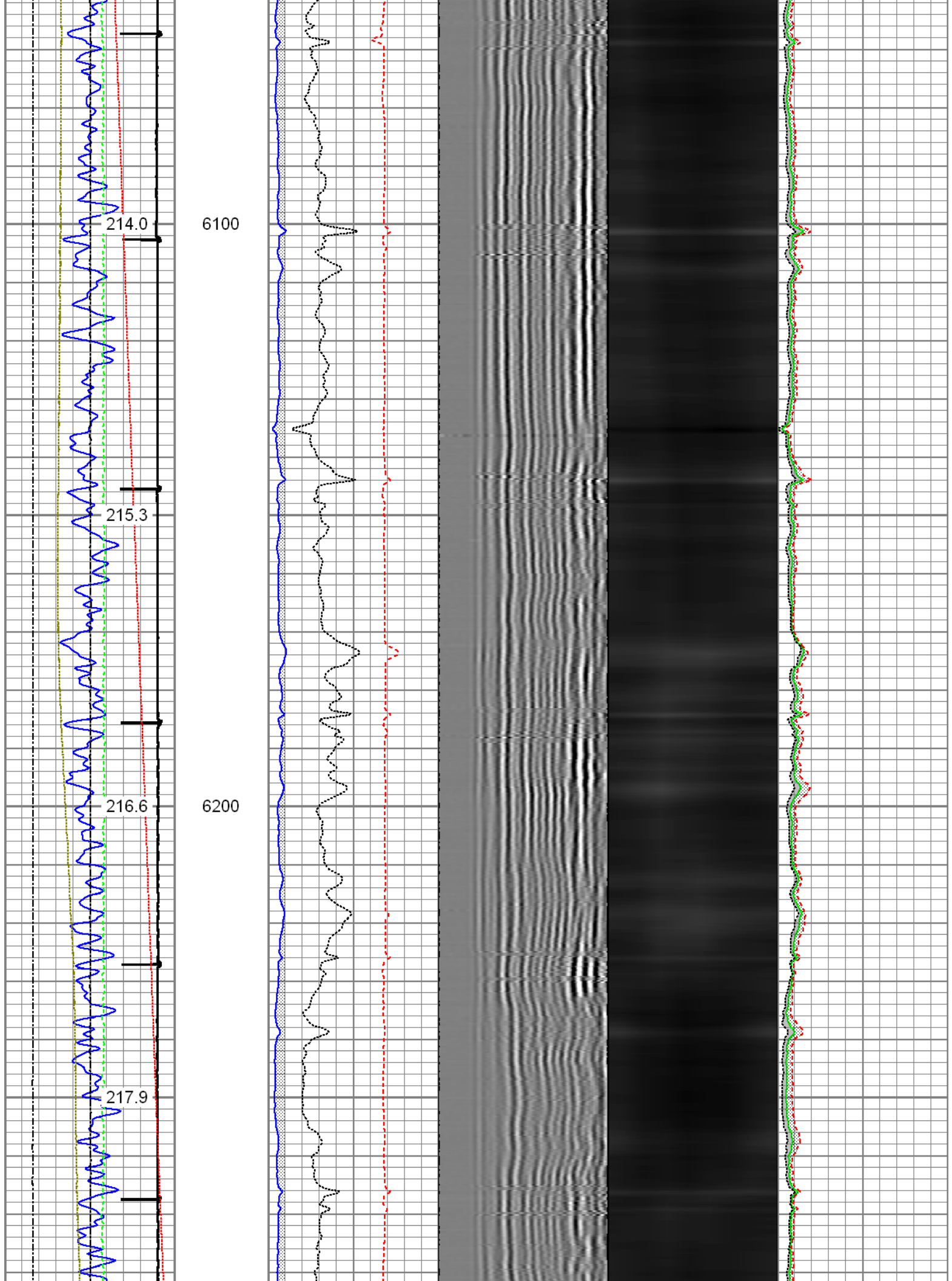


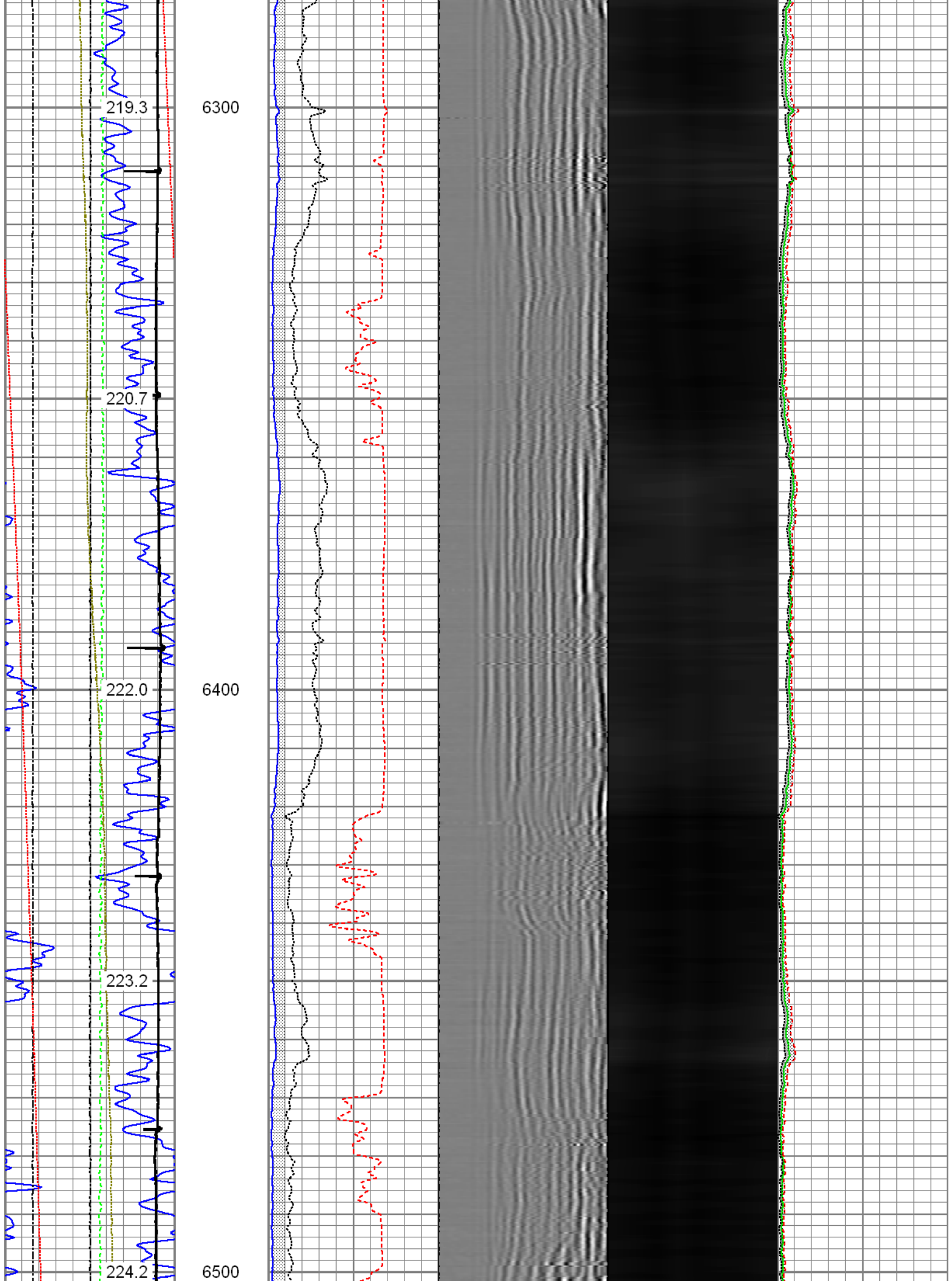


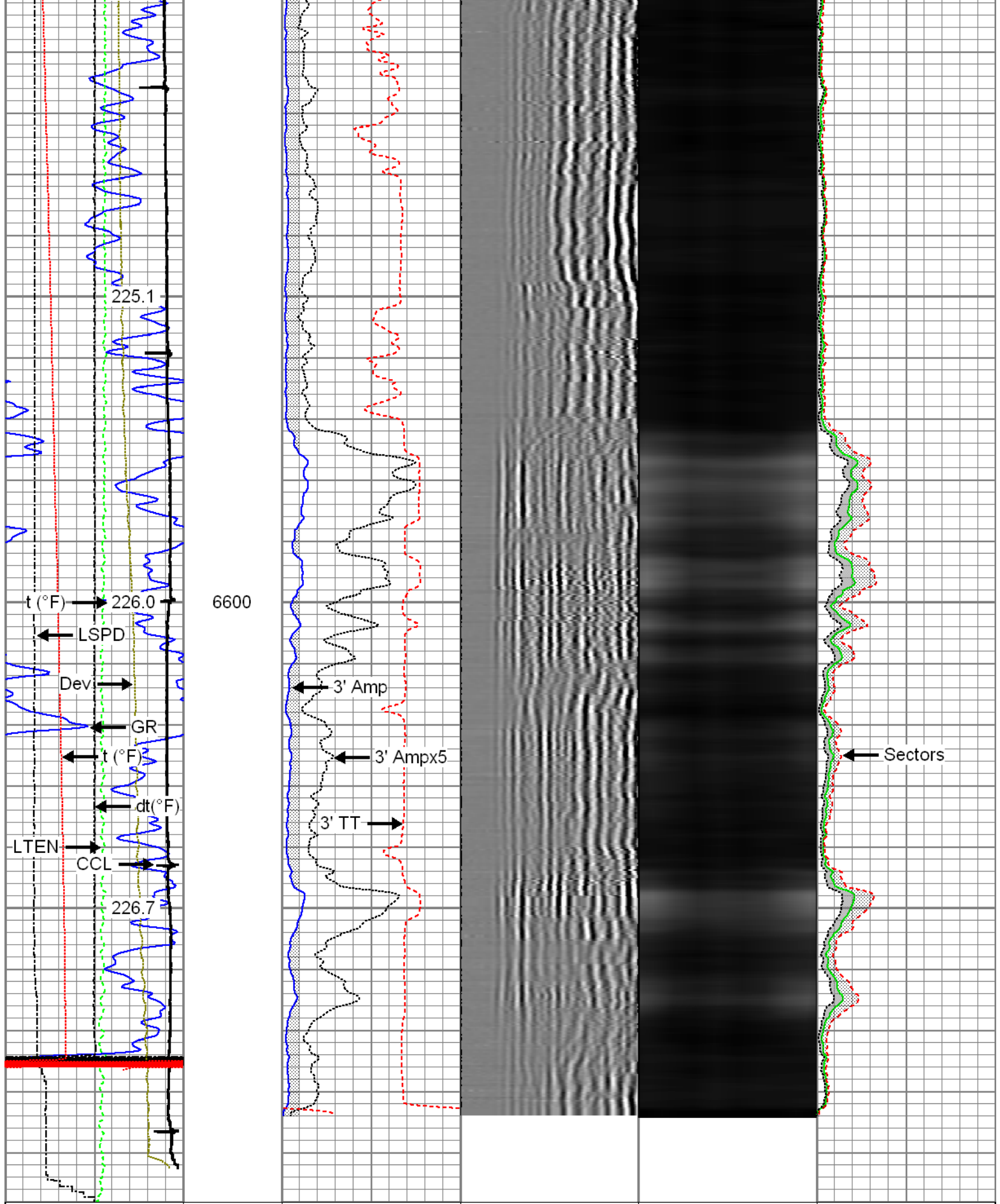













Gamma Ray 0 (GAPI) 120	3' Amplitude 0 (mV) 100	5' Variable Density Log 200 1200	Sector Map	Average Amplitude 0 100
Casing Collar Locator	3' Amplitude x 5 0 (mV) 20			Minimum Amplitude 0 100
Line Speed -100 (ft/min) 100	3' Travel Time			Maximum Amplitude

Line Tension	650	(usec)	150	0	100
0	(lb)	2000			
Differential Temperature					
-2	(degF)	2			
-10	Deviation (°)	90			
Temperature					
0	(degF)	20			

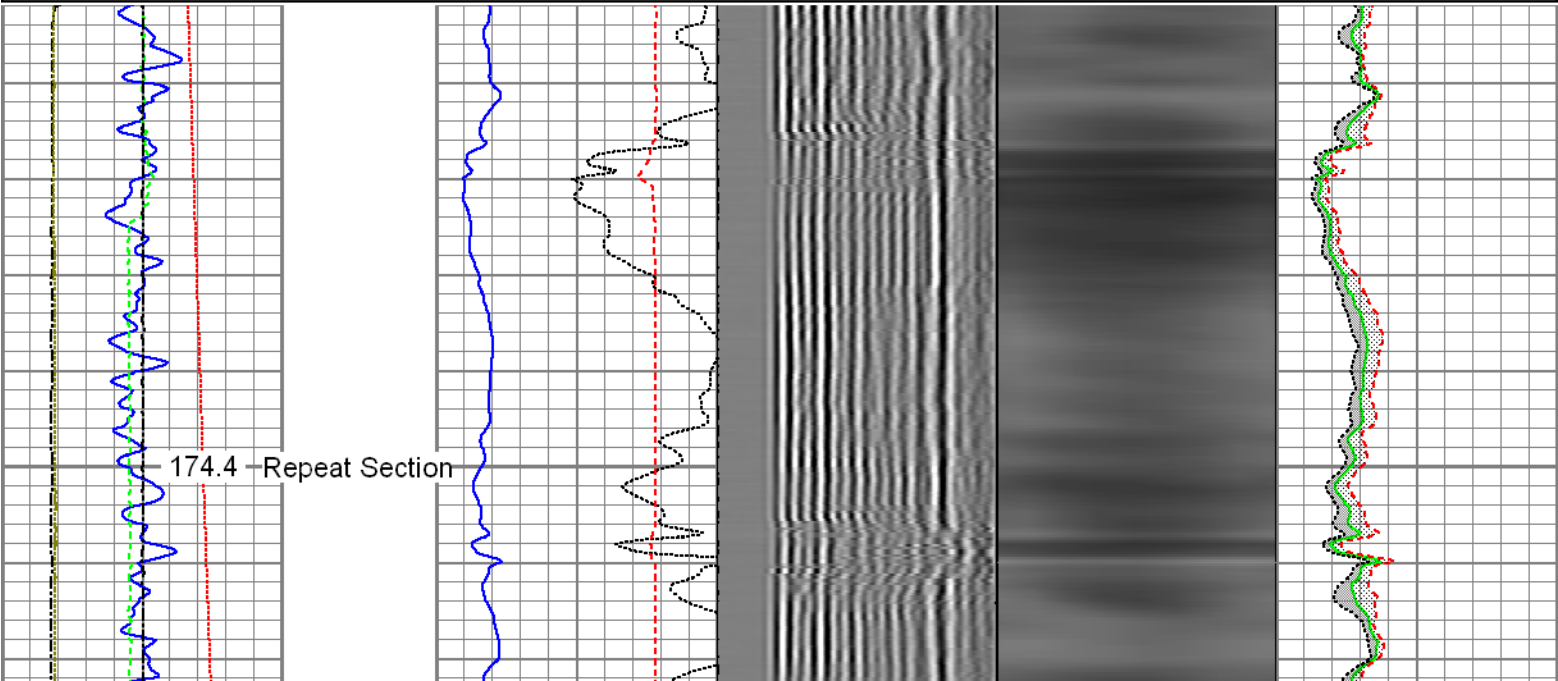


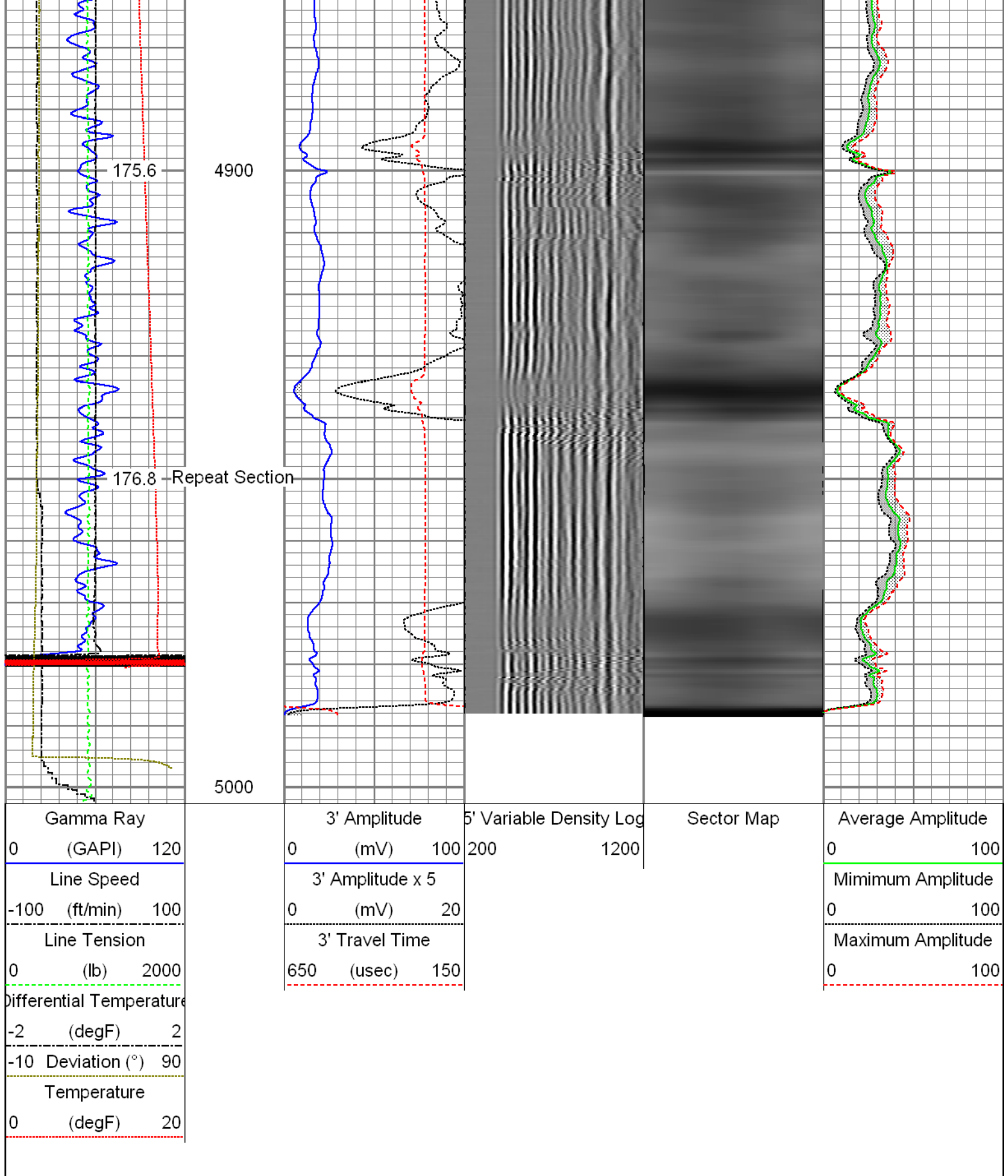
## Repeat Section



Recorded with 2500 PSI Surface Induced Pressure

Database File: 08-01-15\_noble energy\_70 ranch bb18-622\_mit\_rbl.db  
Dataset Pathname: pass14  
Presentation Format: rbt4\_mit  
Dataset Creation: Sat Aug 01 16:00:50 2015 by Log 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
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				
-10 Deviation (°) 90				
Temperature				
0 (degF) 20				





Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			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



GR	23.85		UW_XTU-UW_XTU_002 (10010522) Crossover Ultrawire Toolbus to Ultralink	1.58	1.69	6.50
			UW_PGR-UW_PGR_020 (10019072) Production Gamma Ray	1.93	1.69	9.50
			UW_PRT-UW_PRT_016 (10025097) Platinum Resistance Thermometer	1.04	1.69	5.20
TEMP	22.45		UW_PRC #4 -DSSRAC (081) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
			UW_RBT-UW_RBT_004 (10022773) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
			UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WVFS3FT	15.42		UW_MIT-UW_MIT40_042 (10012912) 40 Multifinger Imaging Tool	4.54	2.75	61.10
			UW_PRC-UW_PRC_057 (1101) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
			UW_BUL-UW_BUL_006 (218707) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20
			UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
			UW_RBT-UW_RBT_004 (10022773) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
			UW_PRT-UW_PRT_016 (10025097) Platinum Resistance Thermometer	1.04	1.69	5.20
			UW_PGR-UW_PGR_020 (10019072) Production Gamma Ray	1.93	1.69	9.50
			UW_XTU-UW_XTU_002 (10010522) Crossover Ultrawire Toolbus to Ultralink	1.58	1.69	6.50
WVFS1	15.42		UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WVFS2	15.42					
WVFS3	15.42					
WVFS4	15.42					
WVFS5	15.42					
WVFS6	15.42					
WVFS7	15.42					
WVFS8	15.42					
CBLTEMP	15.42		UW_MIT-UW_MIT40_042 (10012912) 40 Multifinger Imaging Tool	4.54	2.75	61.10
CBLROT	15.42					
WVFS5FT	14.42					
MIT	5.41		UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
			UW_RBT-UW_RBT_004 (10022773) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
			UW_PRT-UW_PRT_016 (10025097) Platinum Resistance Thermometer	1.04	1.69	5.20
TSTAMP	0.00		UW_PRC-UW_PRC_057 (1101) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
			UW_BUL-UW_BUL_006 (218707) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20
		UW_MIT-UW_MIT40_042 (10012912) 40 Multifinger Imaging Tool	4.54	2.75	61.10	
Dataset: 08-01-15_Noble Energy_70 Ranch BB18-622_MIT_RBL.db: field/well/run1/pass15.1						
Total Length: 28.09 ft						
Total Weight: 324.50 lb						
O.D. 3.13 in						

Calibration Report	
Database File:	08-01-15_noble energy_70 ranch bb18-622_mit_rbl.db
Dataset Pathname:	pass15.1
Dataset Creation:	Sun Aug 02 08:34:08 2015 by Calc 7.0 B1

## Multi-finger Imaging Tool Calibration Report

Serial Number: 10012912  
Number of Fingers: 40  
Tool Model: UW\_MIT40\_042

## Inclinometer Calibration Report

Performed: Mon Jul 15 09:39:36 2013  
Calibration Angle: 45

		Inc X	Inc Y
Vertical:		1968	1974
Finger 1 up:		1740	1744
Finger 31 up:		2215	1741
Finger 21 up:		2205	2224
Finger 11 up:		1731	2217
Sensitivity ratio:	0.992868		
X-axis angle:	134.307		
Deviation const.:	335.589		

## Finger Calibration Report

Performed: Sat Aug 01 15:39:45 2015

Ring size:	4		5		6		7
(in)		Sens		Sens		Sens	
Finger 01:	1058	358.0	1416	378.0	1794	407.0	2201
Finger 02:	1201	370.0	1571	377.0	1948	401.0	2349
Finger 03:	1110	382.0	1492	396.0	1888	429.0	2317
Finger 04:	1102	368.0	1470	385.0	1855	418.0	2273
Finger 05:	1094	380.0	1474	389.0	1863	418.0	2281
Finger 06:	1101	383.0	1484	389.0	1873	416.0	2289
Finger 07:	1078	388.0	1466	391.0	1857	419.0	2276
Finger 08:	1099	385.0	1484	386.0	1870	416.0	2286
Finger 09:	1083	390.0	1473	386.0	1859	415.0	2274
Finger 10:	1081	394.0	1475	387.0	1862	413.0	2275
Finger 11:	1075	397.0	1472	387.0	1859	408.0	2267
Finger 12:	1070	402.0	1472	391.0	1863	414.0	2277
Finger 13:	1067	400.0	1467	385.0	1852	404.0	2256
Finger 14:	1047	410.0	1457	398.0	1855	415.0	2270
Finger 15:	989	414.0	1403	411.0	1814	426.0	2240
Finger 16:	997	418.0	1415	411.0	1826	427.0	2253
Finger 17:	907	395.0	1302	399.0	1701	424.0	2125
Finger 18:	1045	411.0	1456	397.0	1853	407.0	2260
Finger 19:	999	409.0	1408	402.0	1810	416.0	2226
Finger 20:	987	413.0	1400	418.0	1818	427.0	2245
Finger 21:	997	422.0	1419	415.0	1834	414.0	2248
Finger 22:	964	413.0	1377	418.0	1795	427.0	2222
Finger 23:	927	409.0	1336	426.0	1762	439.0	2201
Finger 24:	996	404.0	1400	406.0	1806	403.0	2209
Finger 25:	940	401.0	1341	421.0	1762	432.0	2194
Finger 26:	1080	393.0	1473	399.0	1872	396.0	2268
Finger 27:	1019	398.0	1417	412.0	1829	413.0	2242
Finger 28:	1036	383.0	1419	398.0	1817	402.0	2219
Finger 29:	978	387.0	1365	415.0	1780	425.0	2205
Finger 30:	1039	385.0	1424	411.0	1835	414.0	2249
Finger 31:	1054	377.0	1431	399.0	1830	409.0	2239
Finger 32:	1030	380.0	1410	412.0	1822	423.0	2245
Finger 33:	1125	373.0	1498	384.0	1882	390.0	2272
Finger 34:	1092	363.0	1455	394.0	1849	411.0	2260
Finger 35:	1034	377.0	1411	418.0	1829	436.0	2265
Finger 36:	1056	370.0	1426	401.0	1827	424.0	2251
Finger 37:	1122	366.0	1488	389.0	1877	409.0	2286
Finger 38:	1148	366.0	1514	382.0	1896	398.0	2294
Finger 39:	1145	362.0	1507	383.0	1890	395.0	2285
Finger 40:	1094	371.0	1465	391.0	1856	414.0	2270

## Segmented Cement Bond Log Calibration Report

Serial Number: 10022773  
Tool Model: UW\_RBT\_004

Calibration Casing Diameter: 7.000 in  
Calibration Depth: 24.013 ft

Master Calibration, performed Sun Aug 02 08:33:56 2015:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	-0.003	0.830	0.800	62.165	73.649	1.049
5FT	-0.021	0.850	0.800	62.165	70.437	2.295
S1	0.000	0.813	0.000	100.000	122.946	-0.000
S2	-0.009	0.852	0.000	100.000	116.182	1.010
S3	0.000	0.839	0.000	100.000	119.239	-0.001
S4	0.000	0.812	0.000	100.000	123.203	-0.001
S5	0.000	0.820	0.000	100.000	121.982	-0.001
S6	0.000	0.832	0.000	100.000	120.240	-0.000
S7	0.000	0.842	0.000	100.000	118.709	-0.000
S8	-0.012	0.822	0.000	100.000	119.892	1.393

## Temperature Calibration Report

Serial Number: 10025097  
Tool Model: UW\_PRT\_016  
Performed: Wed Feb 11 13:44:44 2015

Point #	Reading	Reference
1	13053.00 cps	68.00 degF
2	18014.00 cps	104.00 degF
3	29668.00 cps	176.00 degF
4	41181.00 cps	248.00 degF
5	52983.00 cps	320.00 degF
6	58931.00 cps	356.00 degF
7	cps	degF
8	cps	degF
9	cps	degF
10	cps	degF

## Gamma Ray Calibration Report

Serial Number: 10019072  
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 BB18-622  
Field Wattenberg  
County Weld

	State	Colorado
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