

# Radial Cement Bond Gamma Ray Casing Collar Log

Company Noble Energy Inc.			
Well Wells Ranch AE32-640			
Field Wattenberg			
County Weld			
State Colorado			
Location: API # : 05-123-41727			
Other Services MIT			
SEC 32 TWP 6N RGE 62W			
Permanent Datum Ground Level Elevation 4722'			
Log Measured From Kelly Bushing 24 FT			
Drilling Measured From Kelly Bushing			
Date 12-OCT-2015			
Run Number One			
Depth Driller 16,038 FT			
Depth Logger 6754 FT			
Bottom Logged Interval 6739 FT			
Top Log Interval Surface			
Open Hole Size 8.750"			
Type Fluid Water			
Density / Viscosity 8.34 lbm/gal			
Max. Recorded Temp. 223 °F			
Estimated Cement Top 94 FT			
Time Well Ready ROA			
Time Logger on Bottom 08:32 AM			
Equipment Number HD-0119			
Location Fort Lupton, CO			
Recorded By A. Olmsted			
Witnessed By B. Mansfield			
Borehole Record			
Tubing Record			
Run Number Bit From To Size Weight From To			

<<< Fold Here >>>

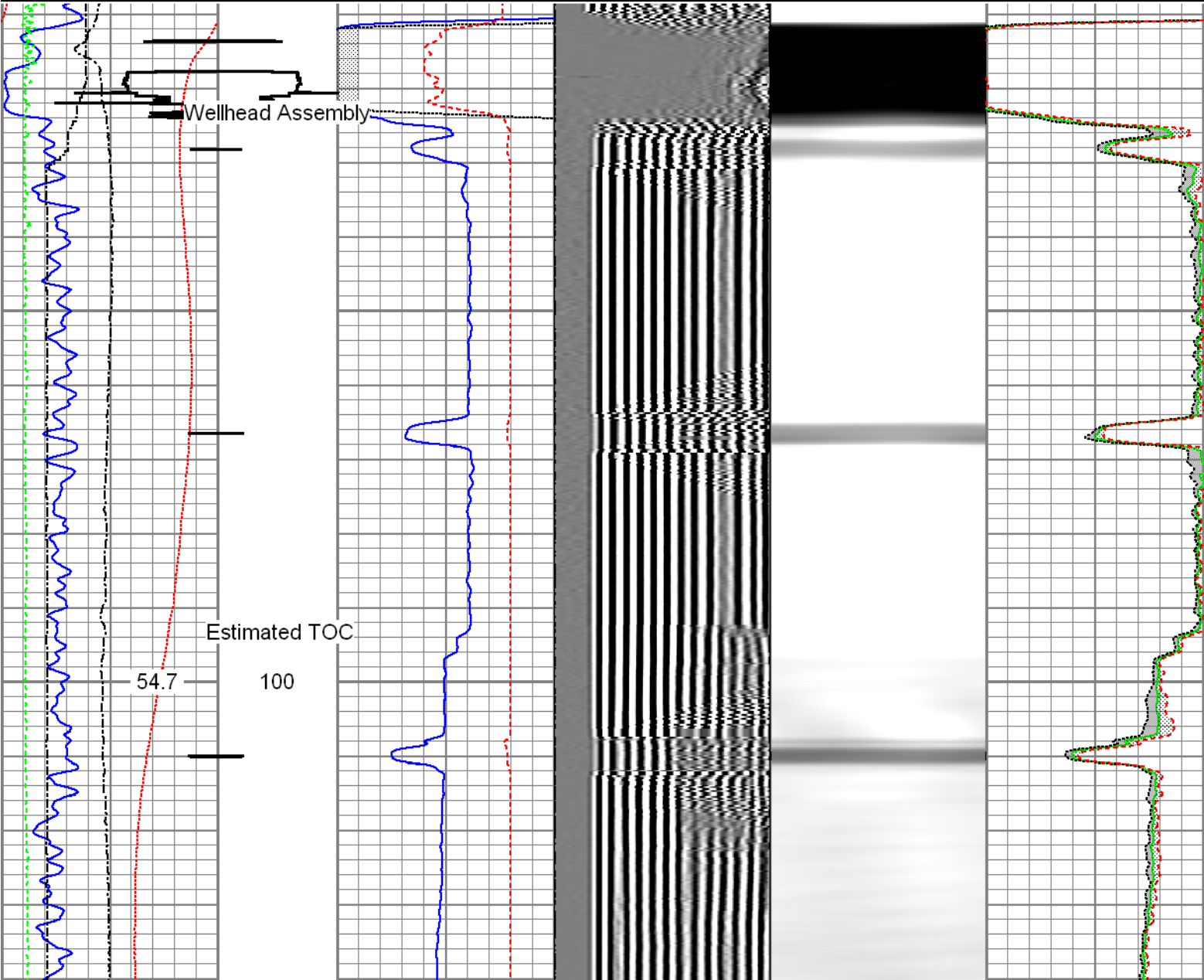
All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs,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

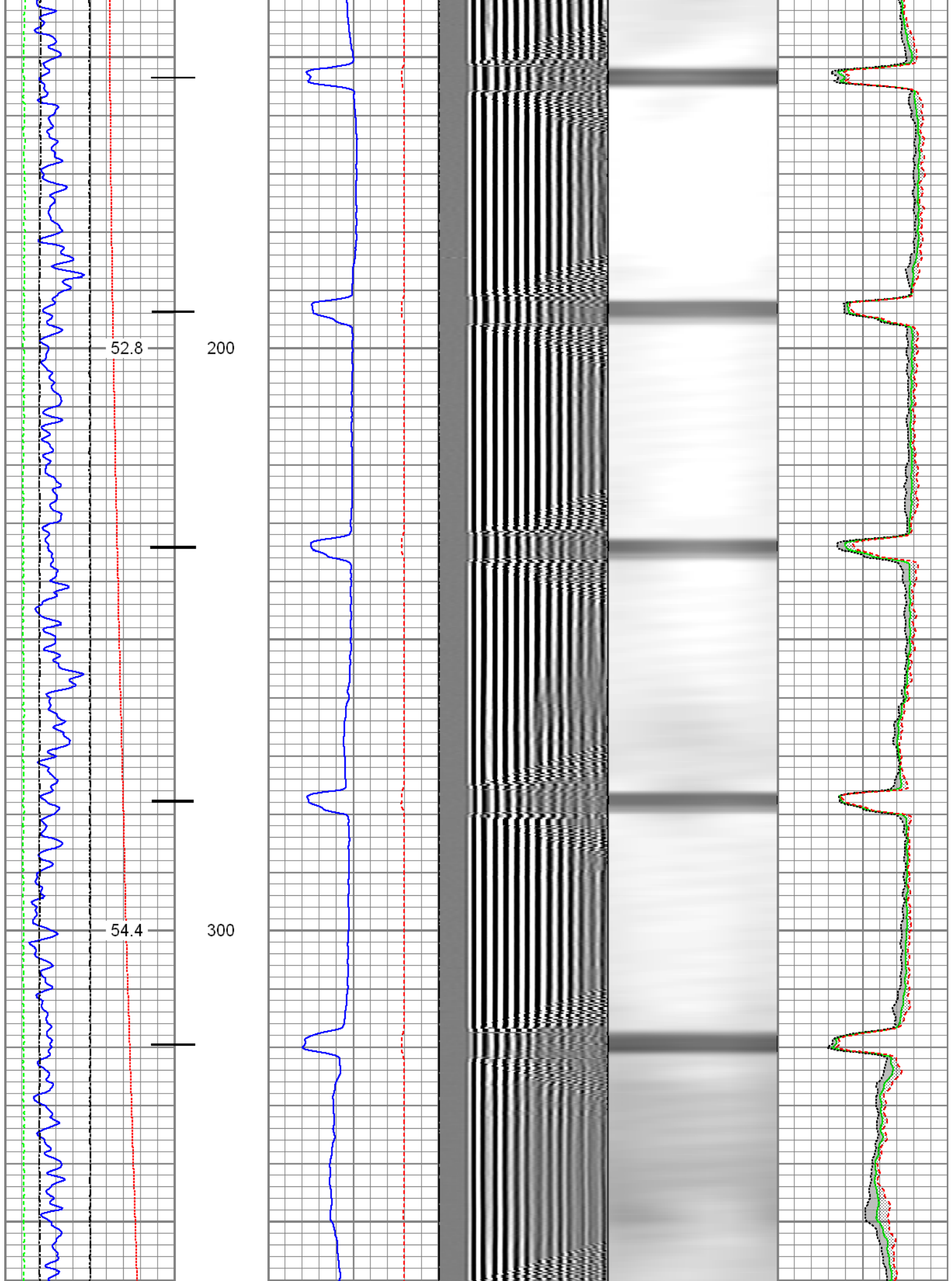
## Comments

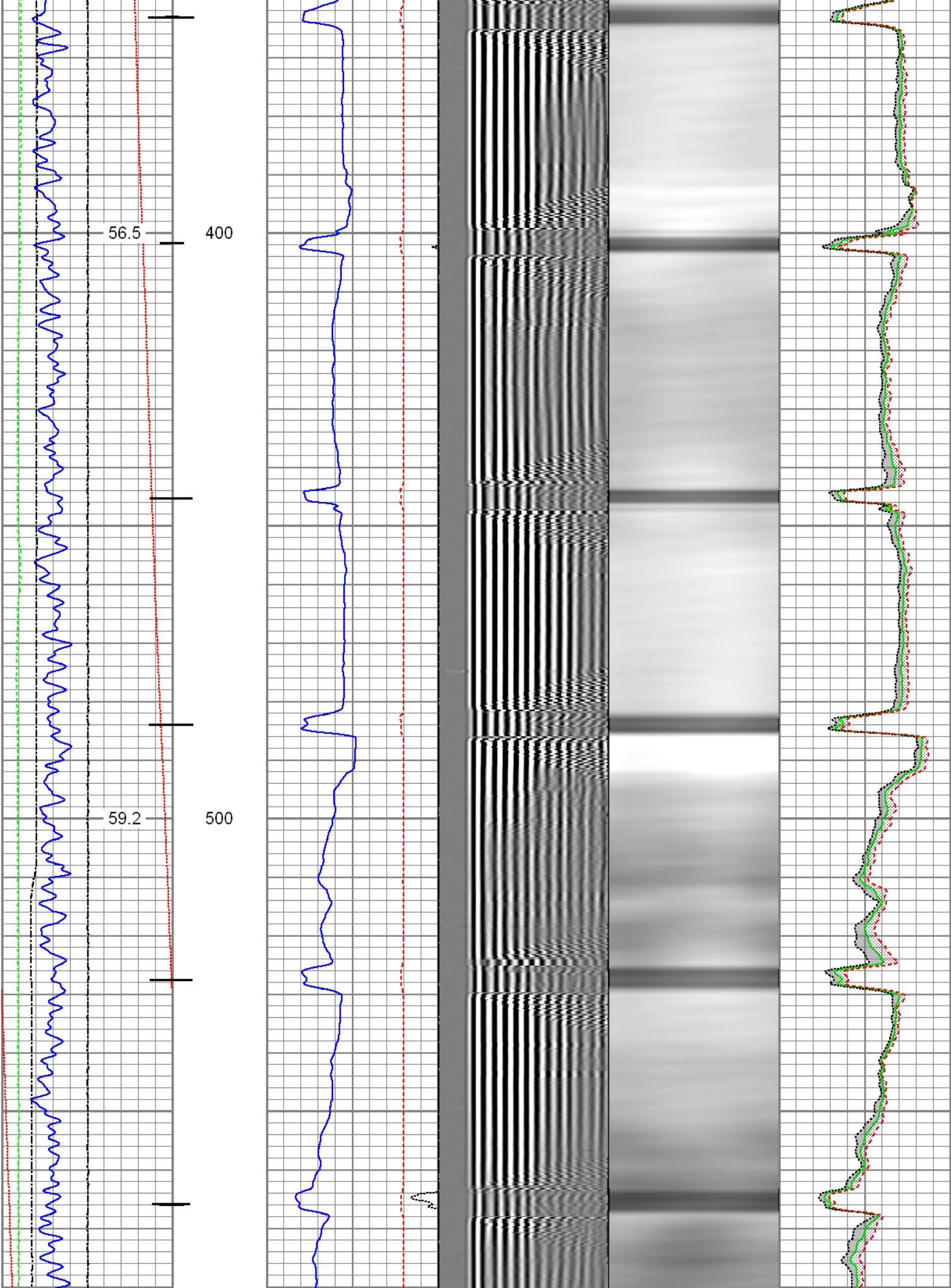
Log ran as per customer request  
Depth referenced to Kelly Bushing at 24 FT  
Adjusted -2 FT to correlate with Kelly Bushing  
Log ran from 6754 FT to surface  
Recorded with 2500 PSI surface induced pressure  
Logging tools were coated with debris upon completion of operations  
  
Thank you for choosing FMC Technologies Completion Services, Inc.!!

Database File: processed\_10-12-15\_noble energy\_wells ranch ae32-640\_rbl.db  
Dataset Pathname: 5.4  
Presentation Format: rbt4\_mit  
Dataset Creation: Mon Oct 12 15:21:46 2015 by Calc SCH 120430  
Charted by: Depth in Feet scaled 1:240

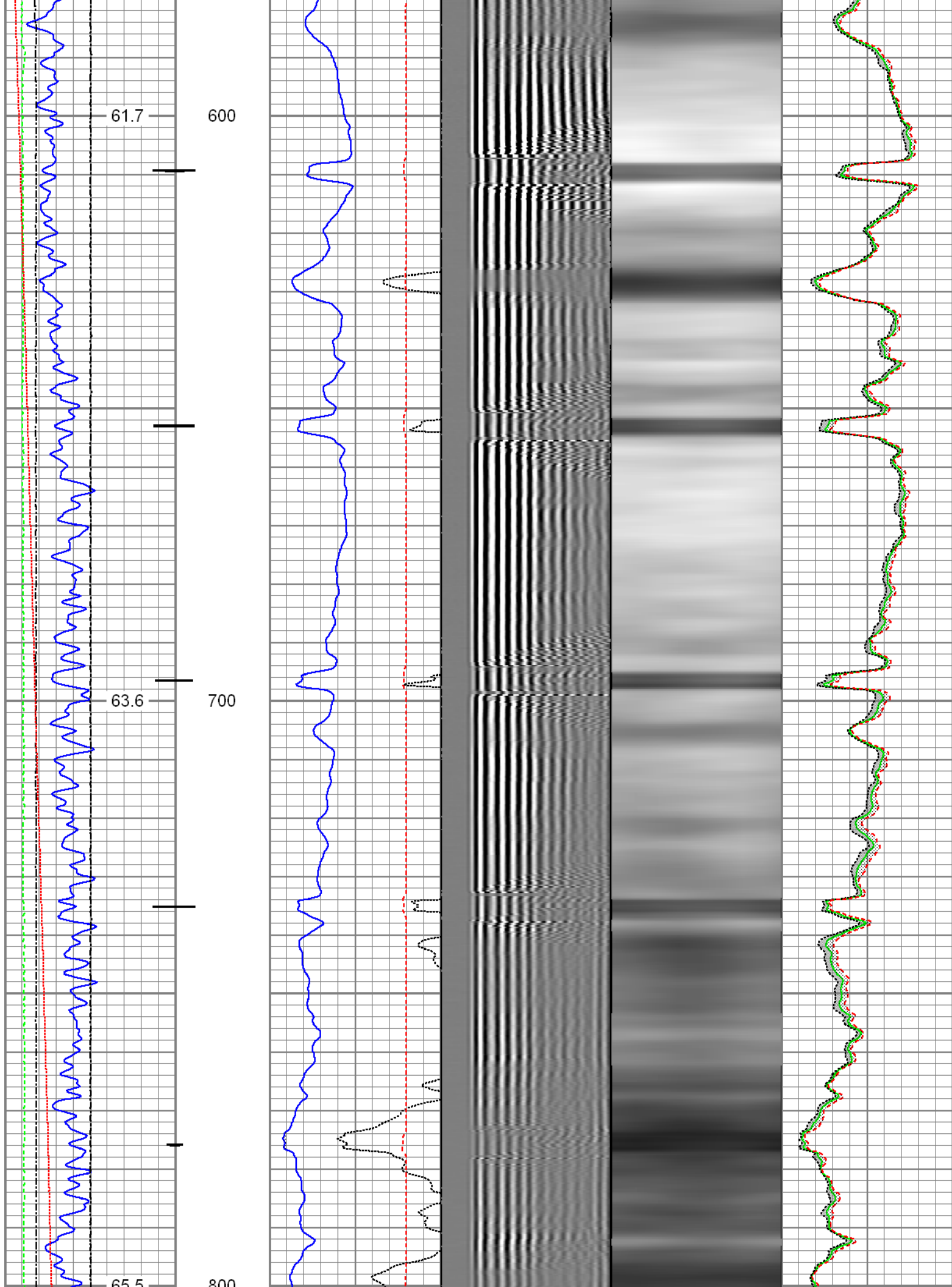
Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Line Speed	3' Amplitude x 5			Mimimum Amplitude
-100 (ft/min) 100	0 (mV) 20			0 100
Line Tension	3' Travel Time			Maximum Amplitude
0 (lb) 2000	650 (usec) 150			0 100
Differential Temperature				
-2 (degF) 2				
Temperature				
0 (degF) 20				
Casing Collar Locator				
8 (in) 6.4				

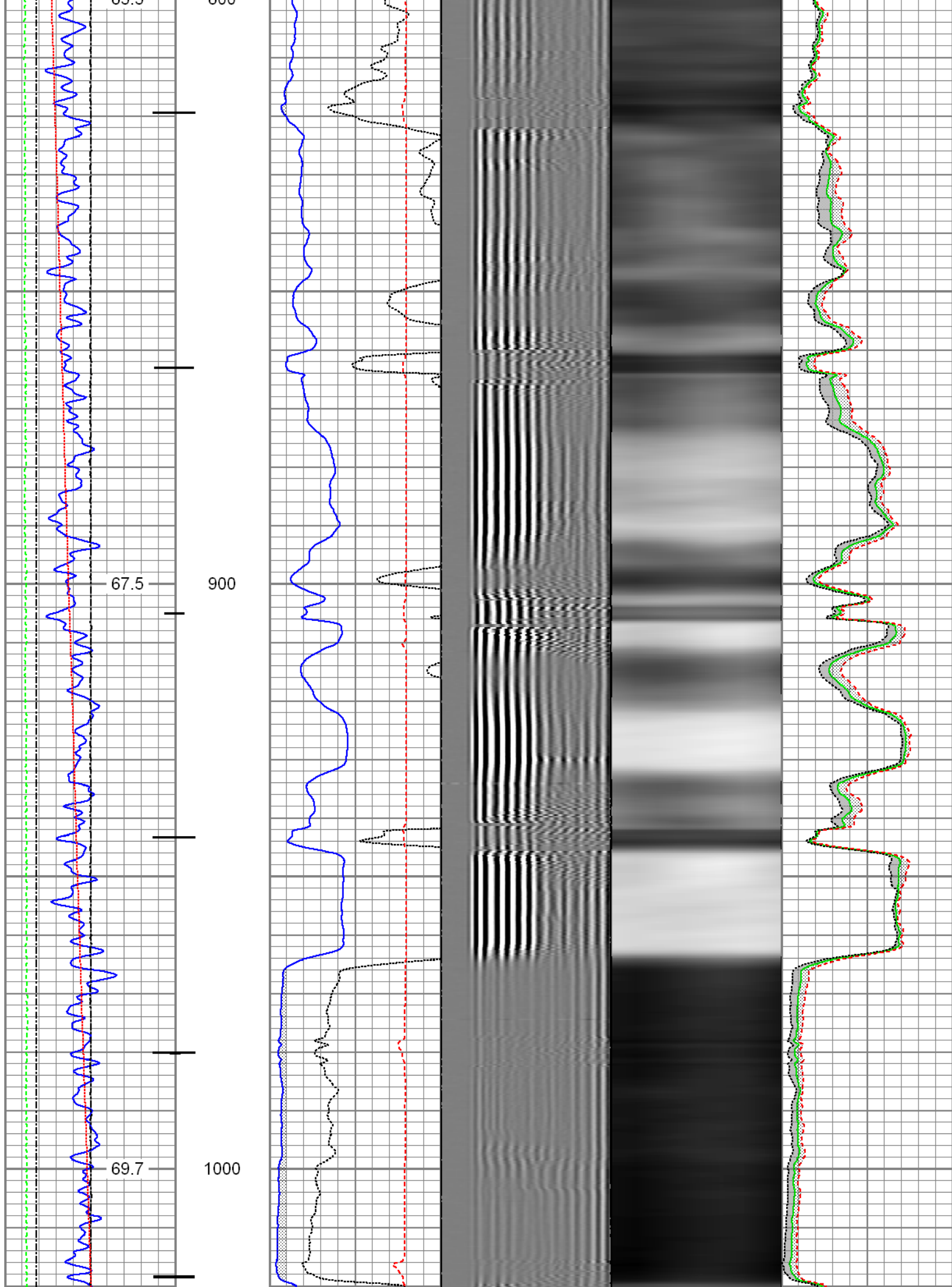


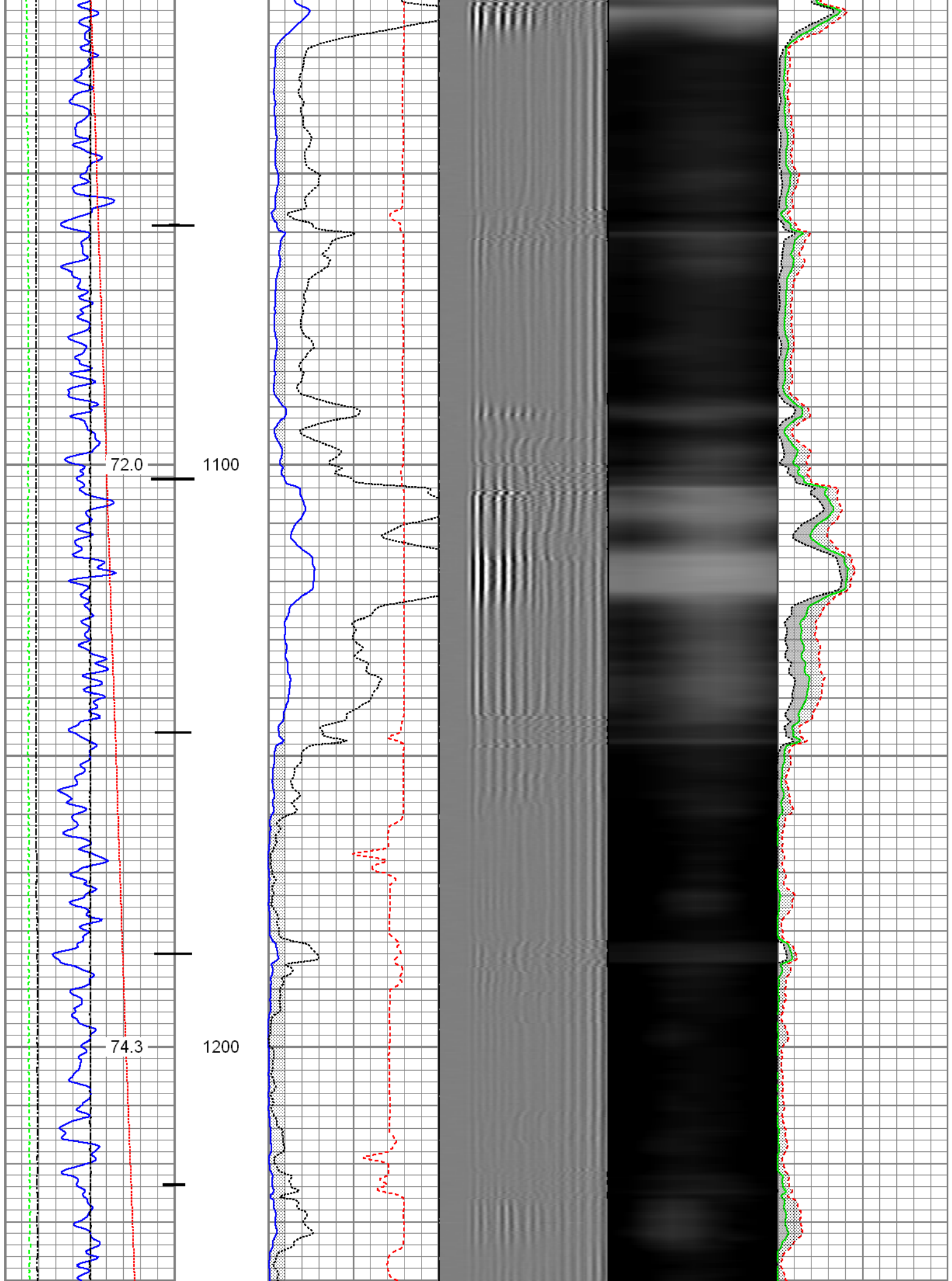


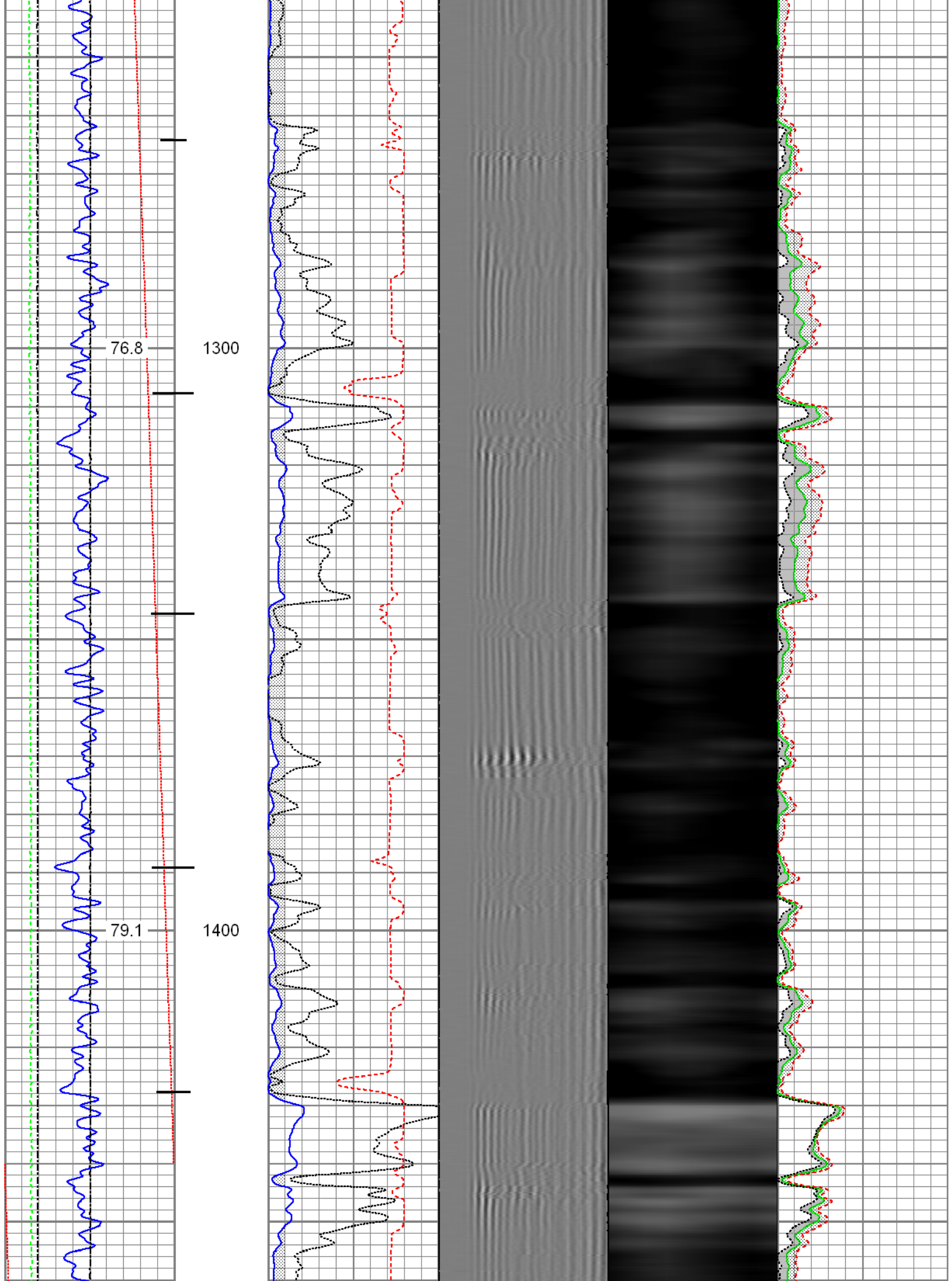




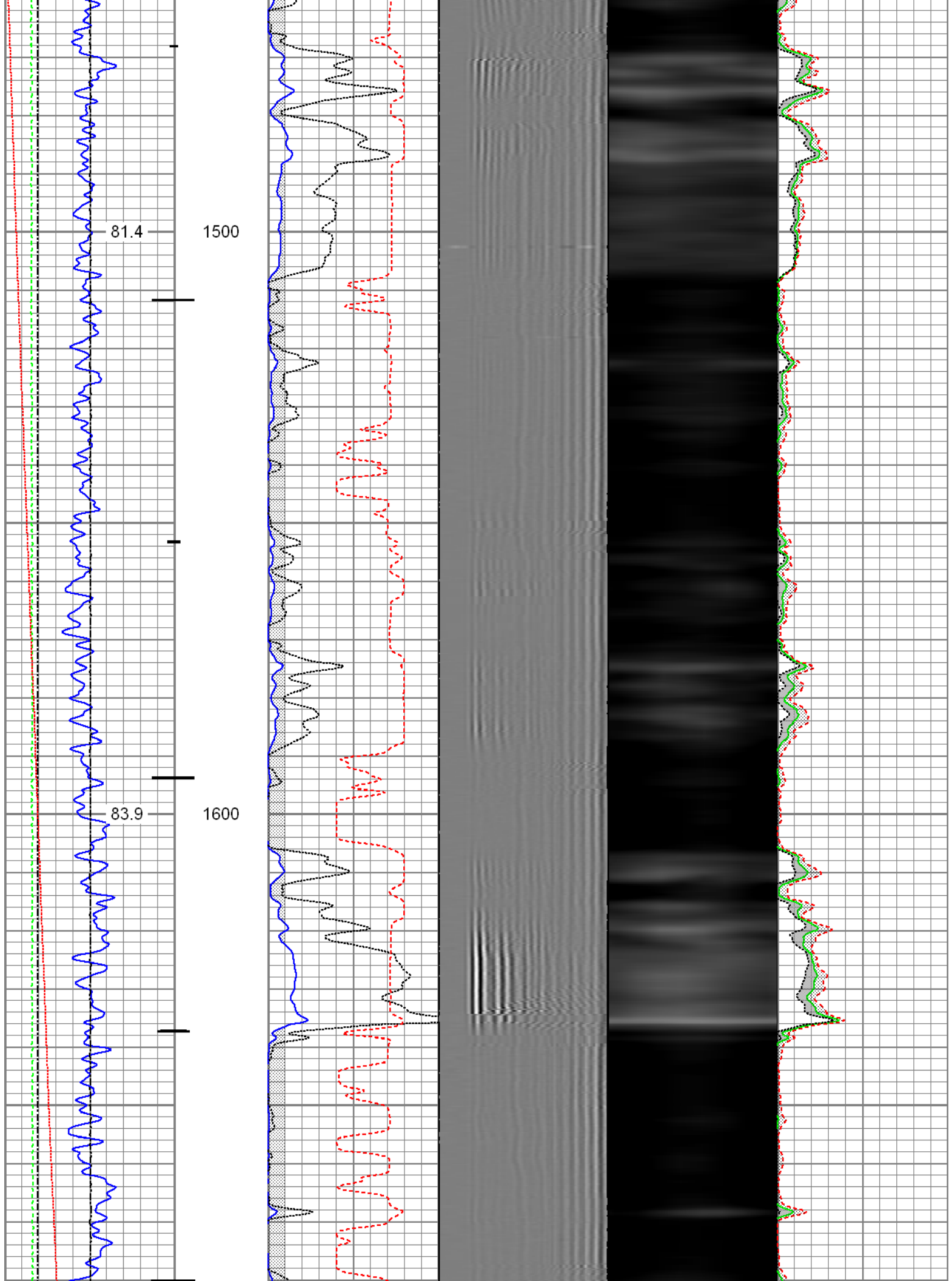




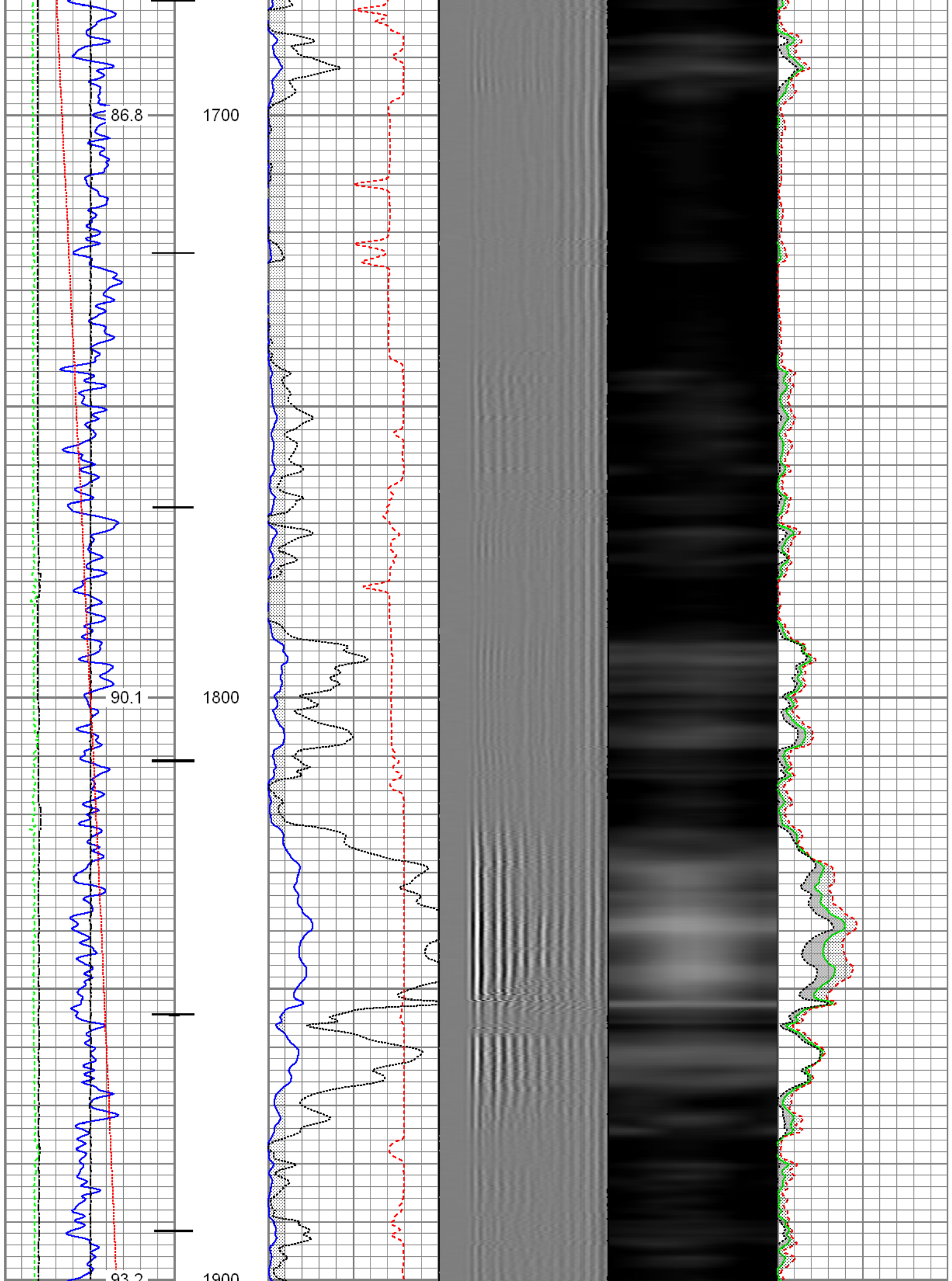


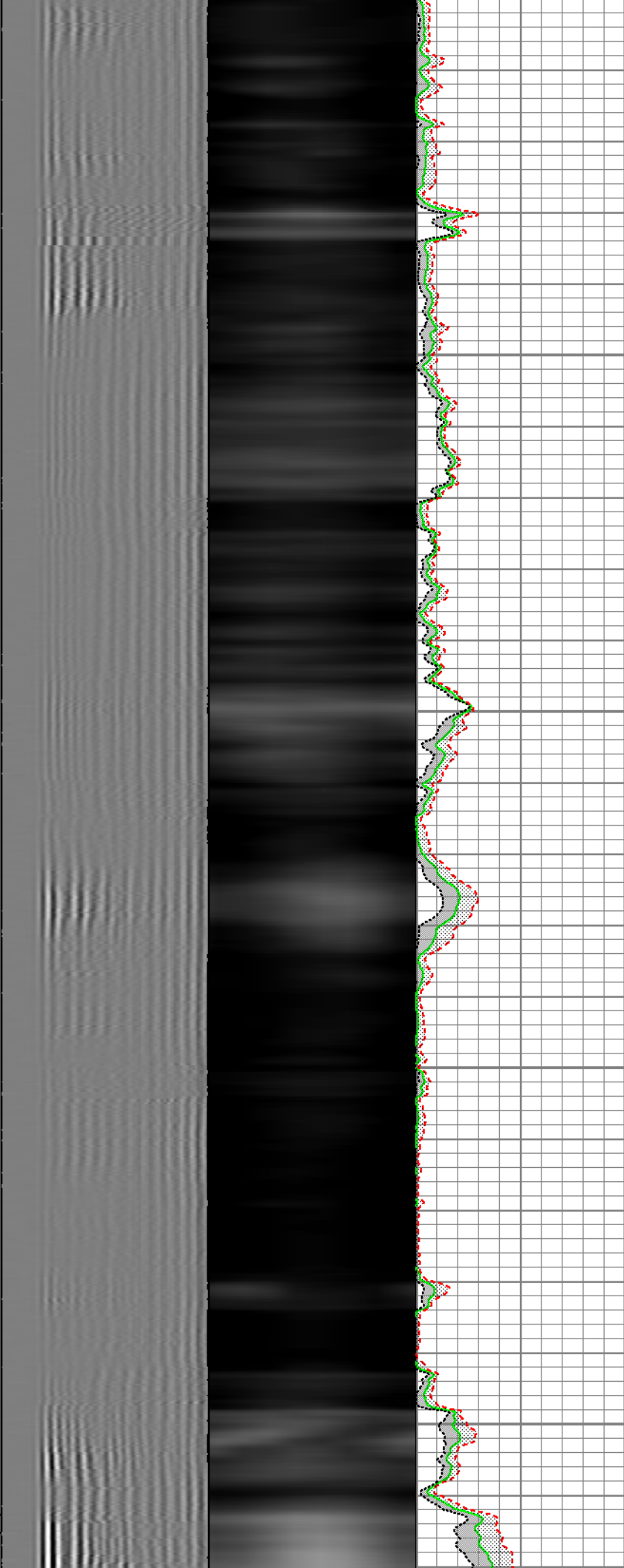
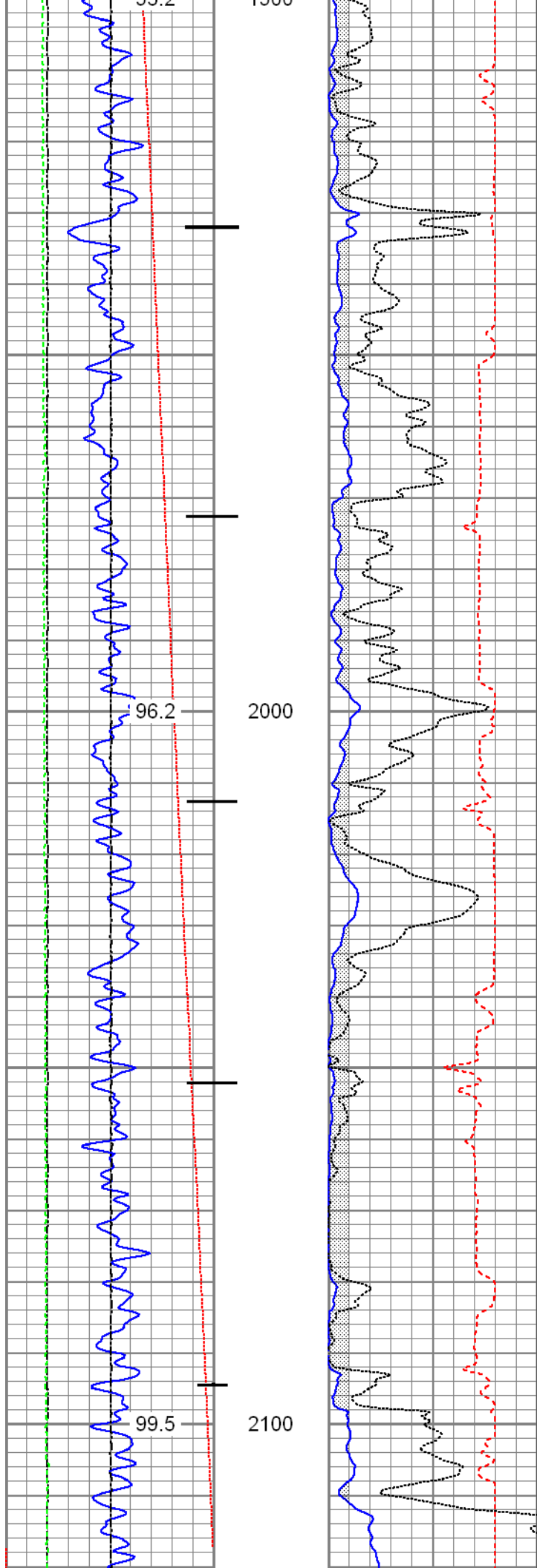


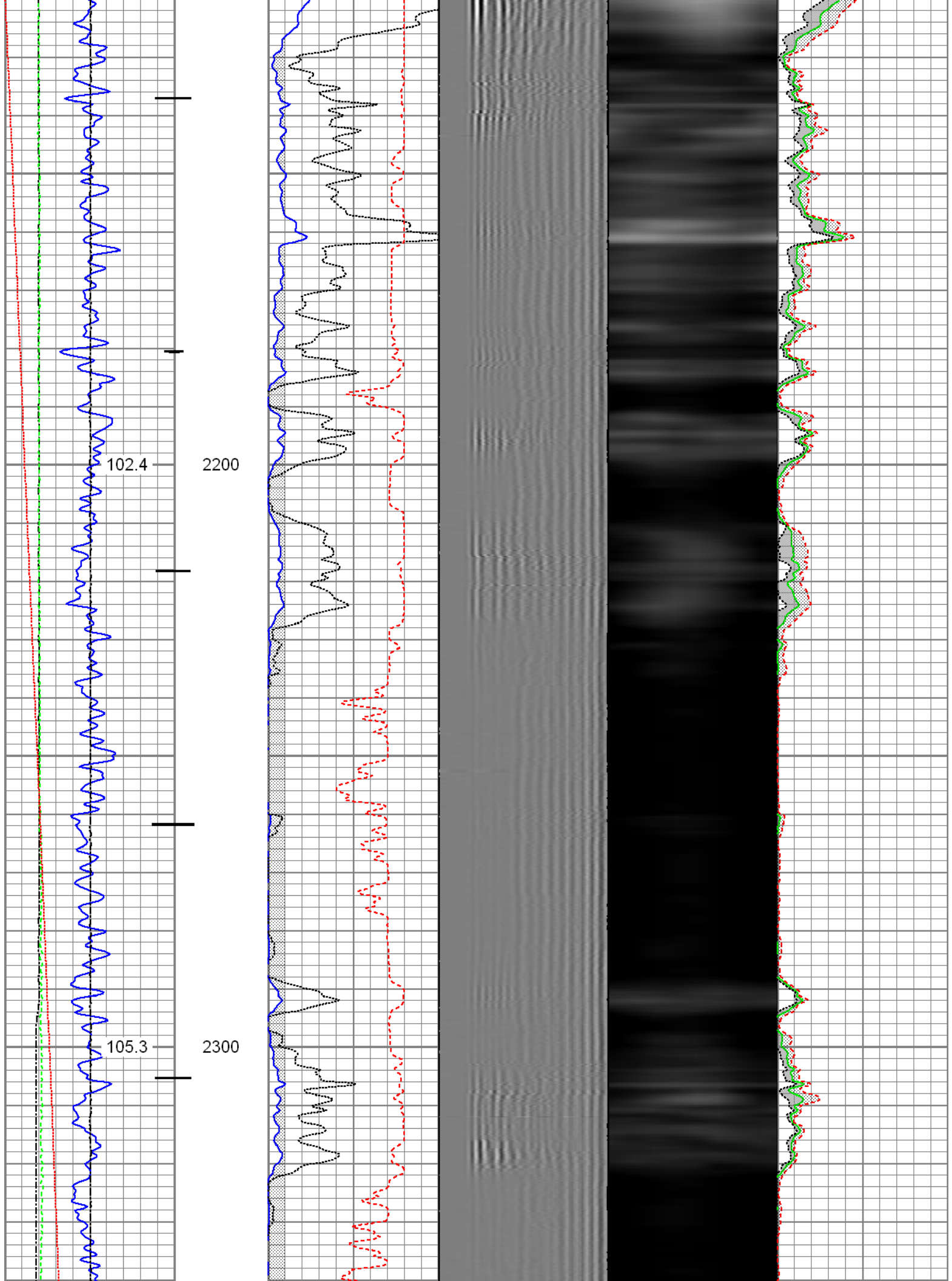


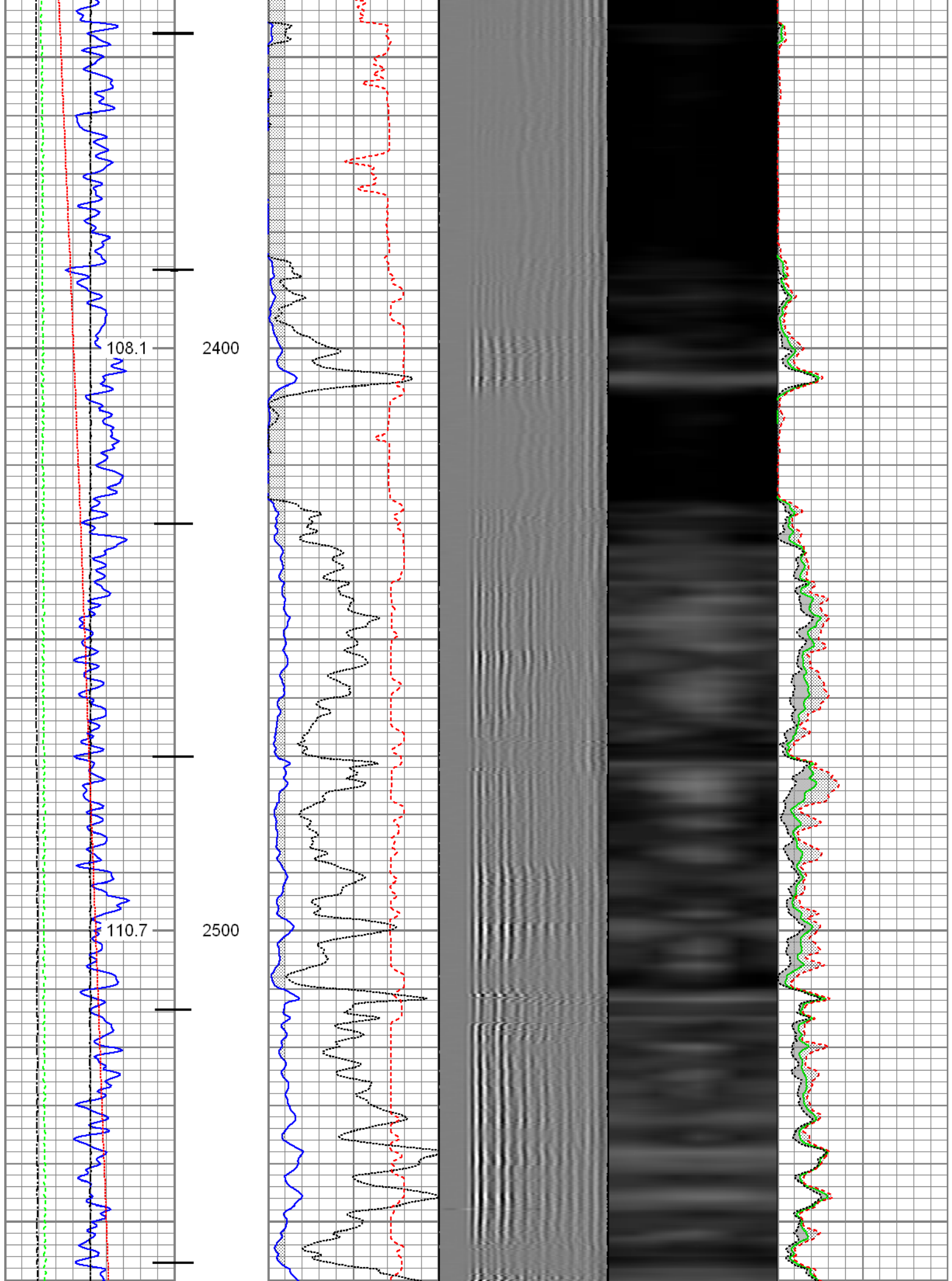




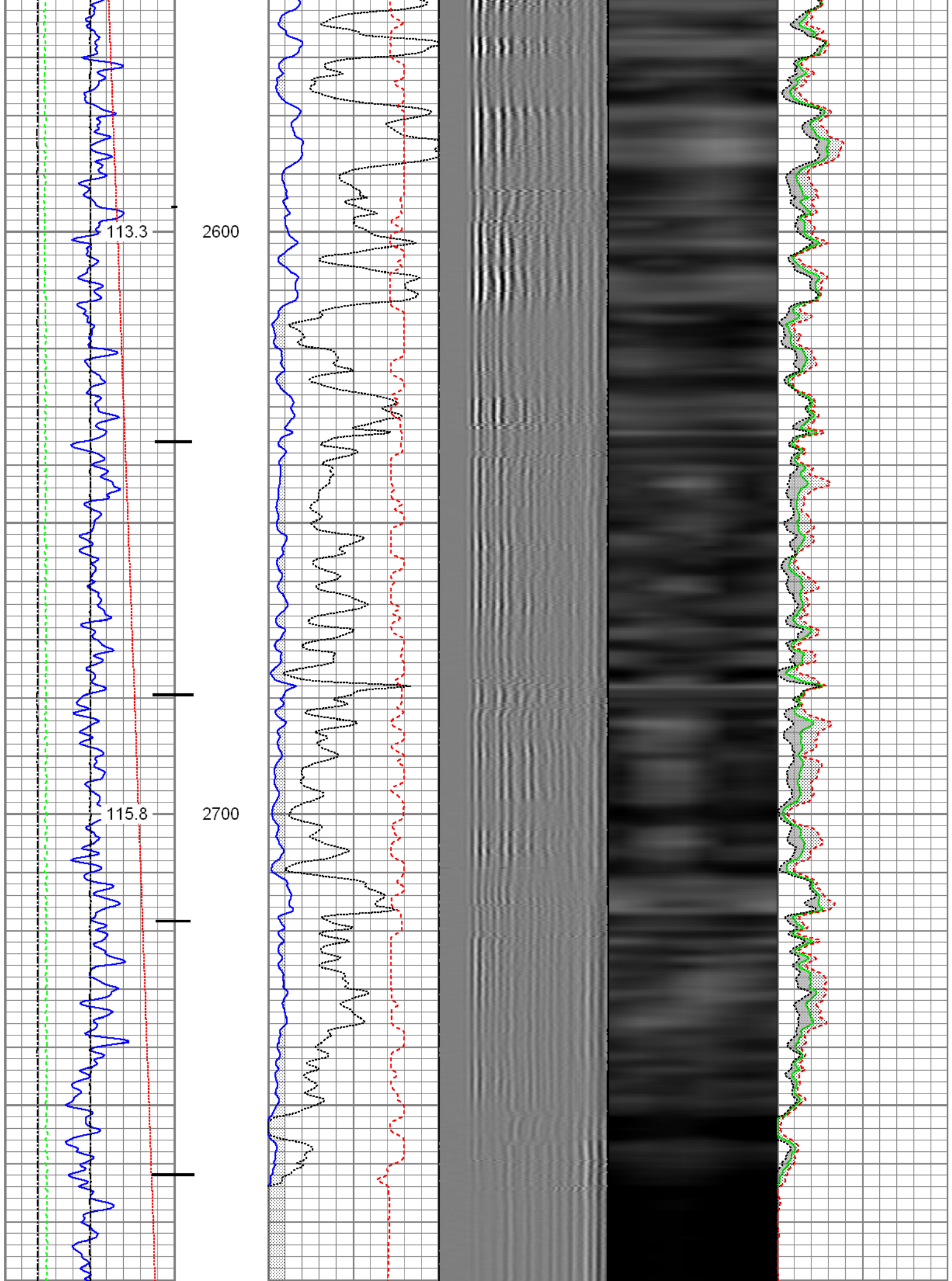




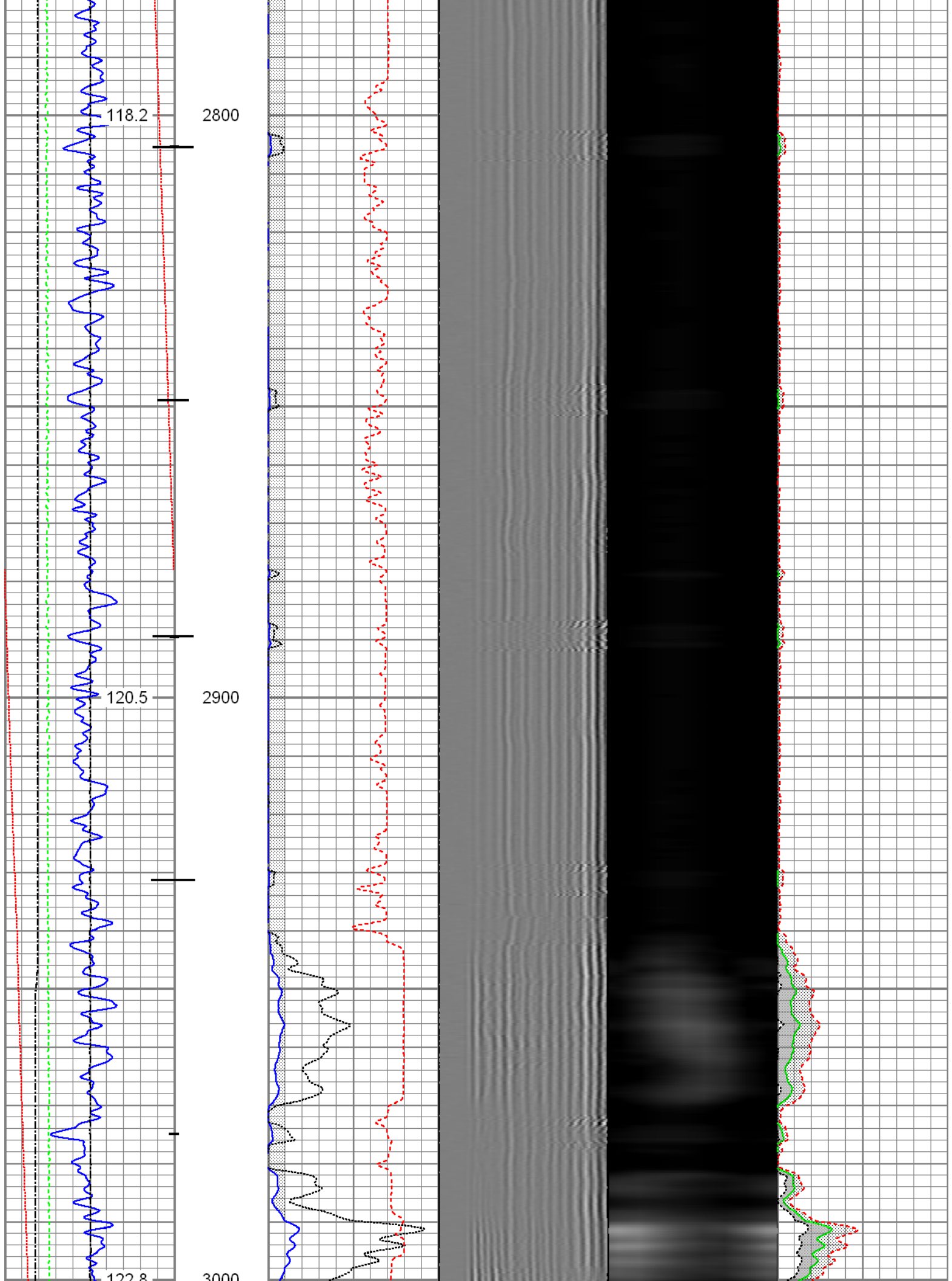


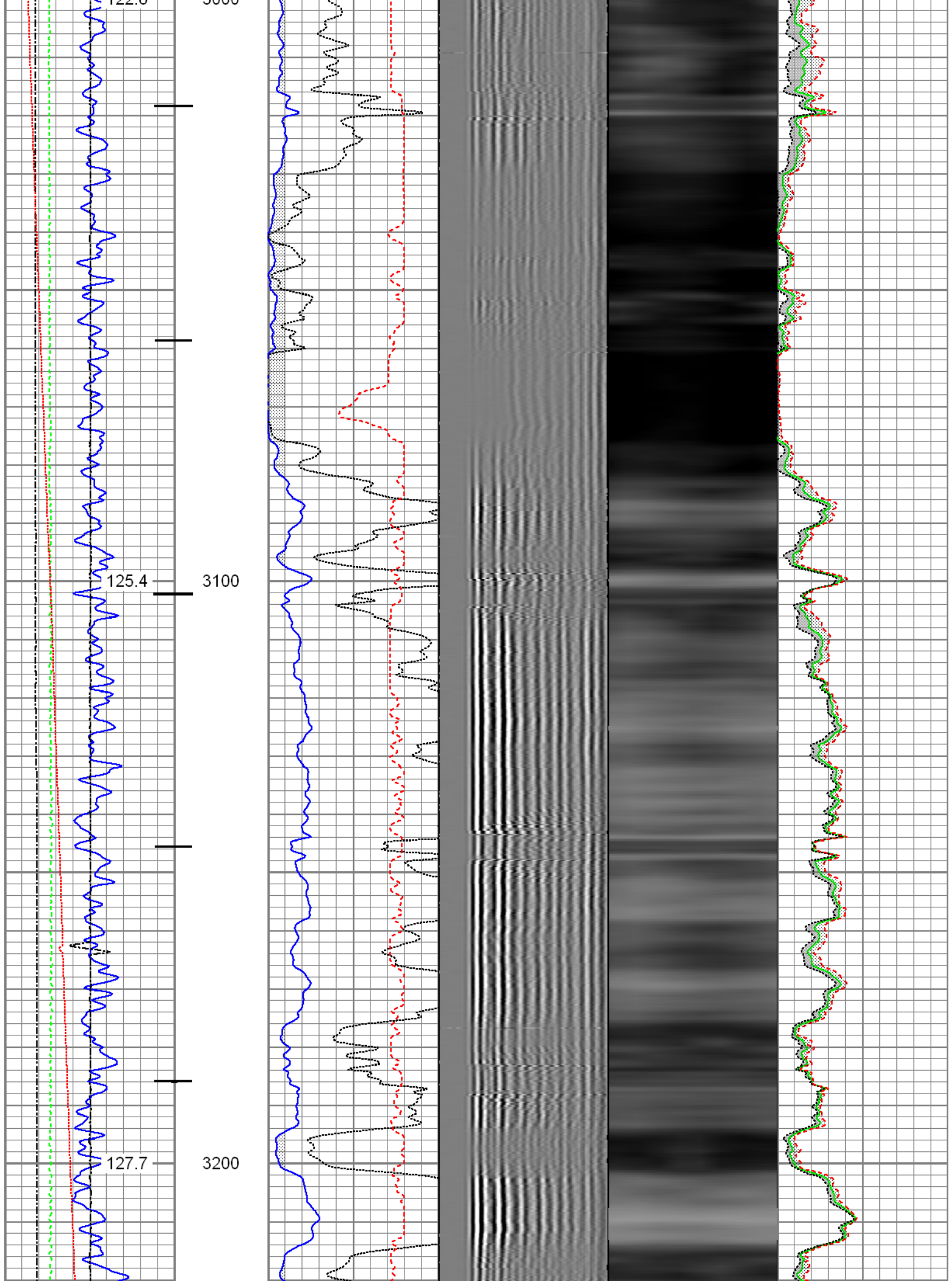


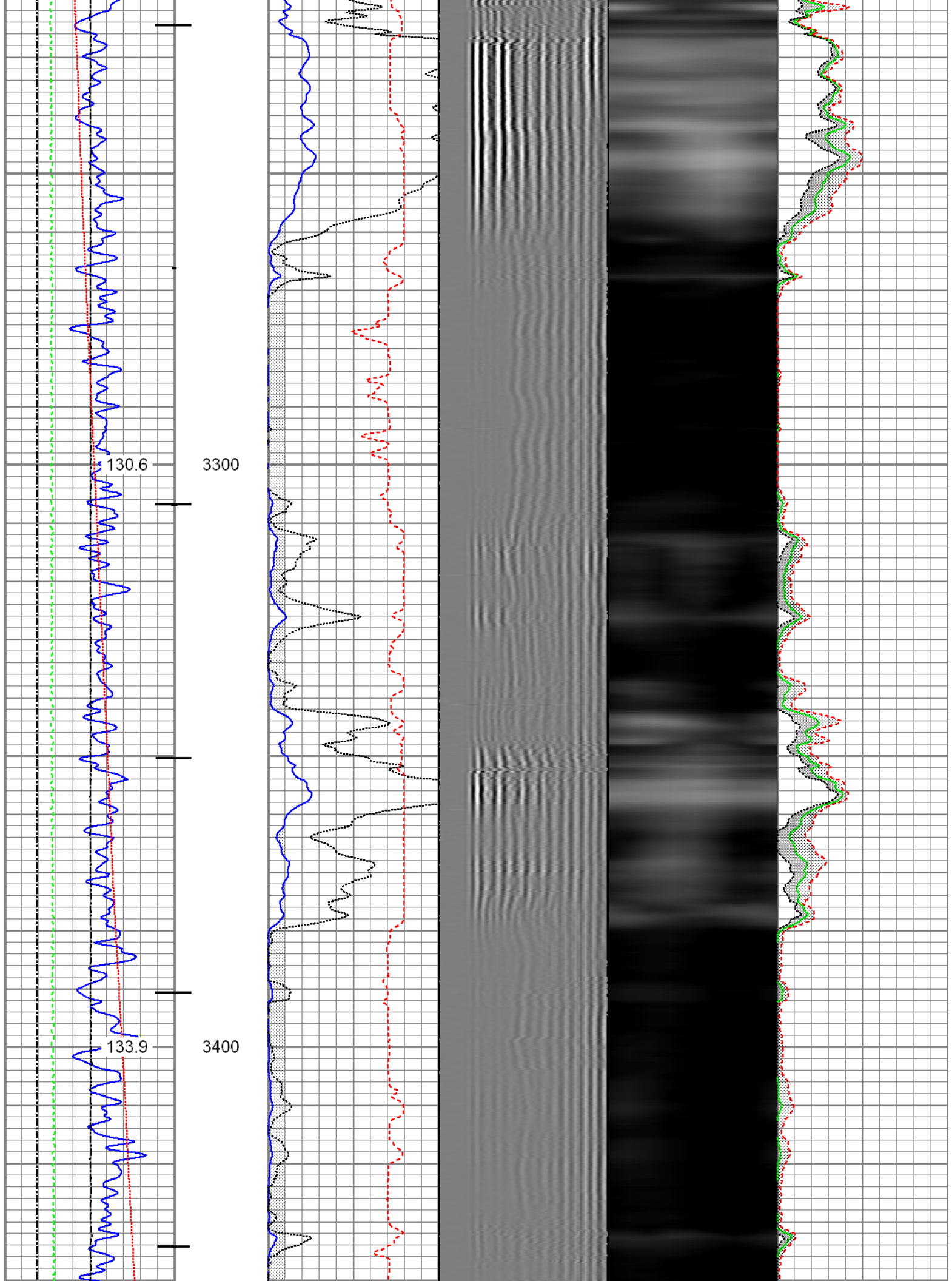


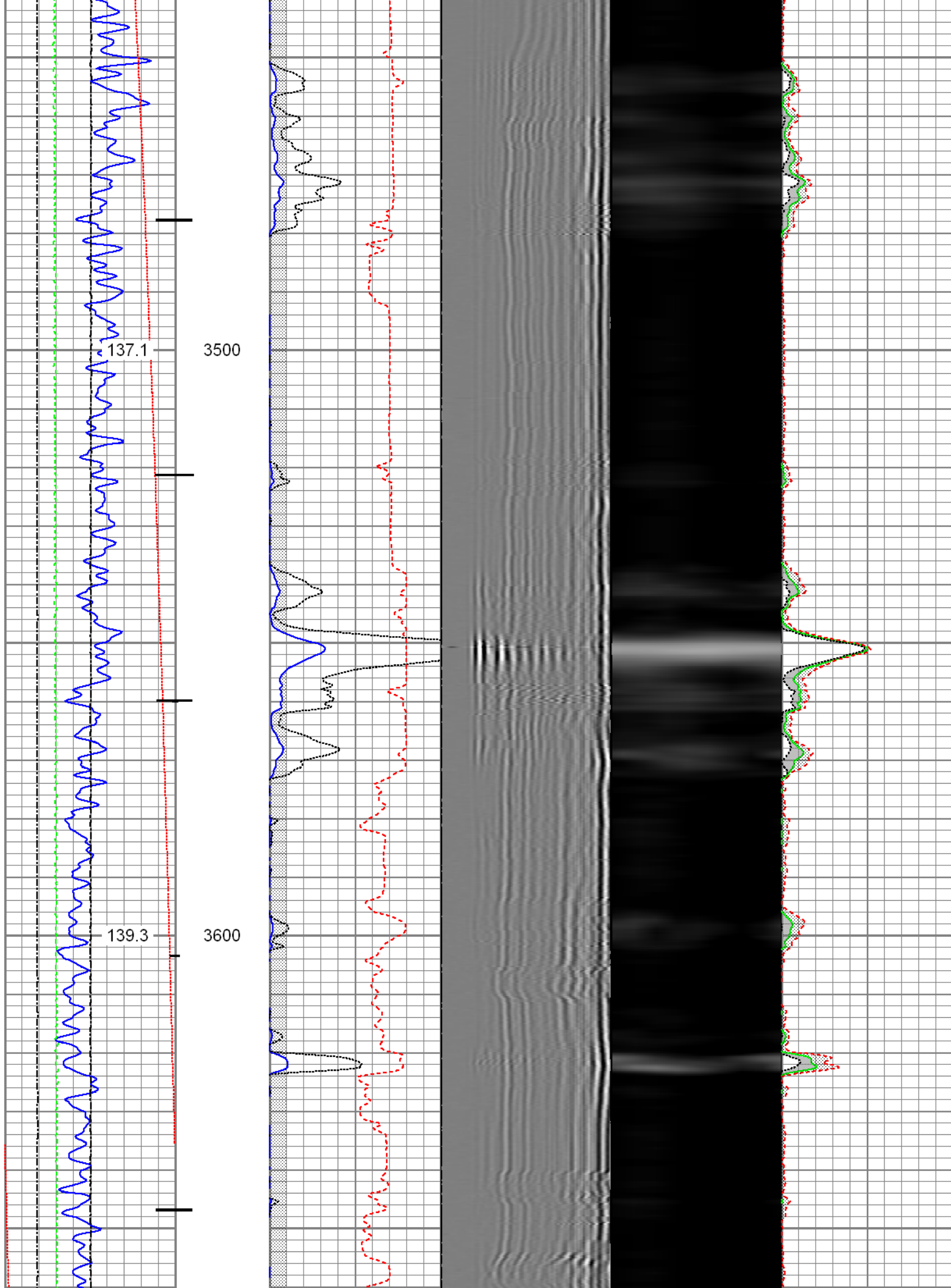




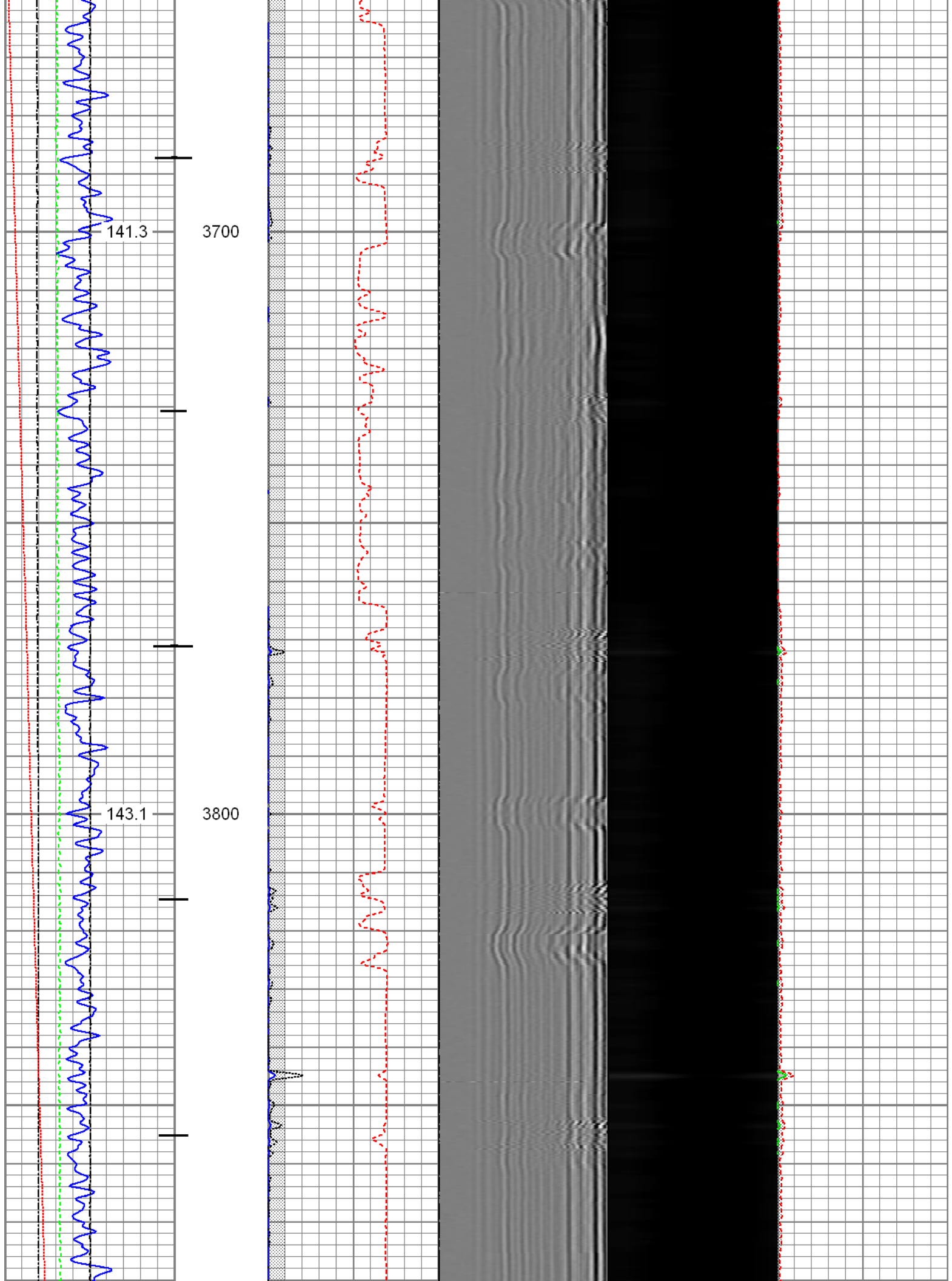




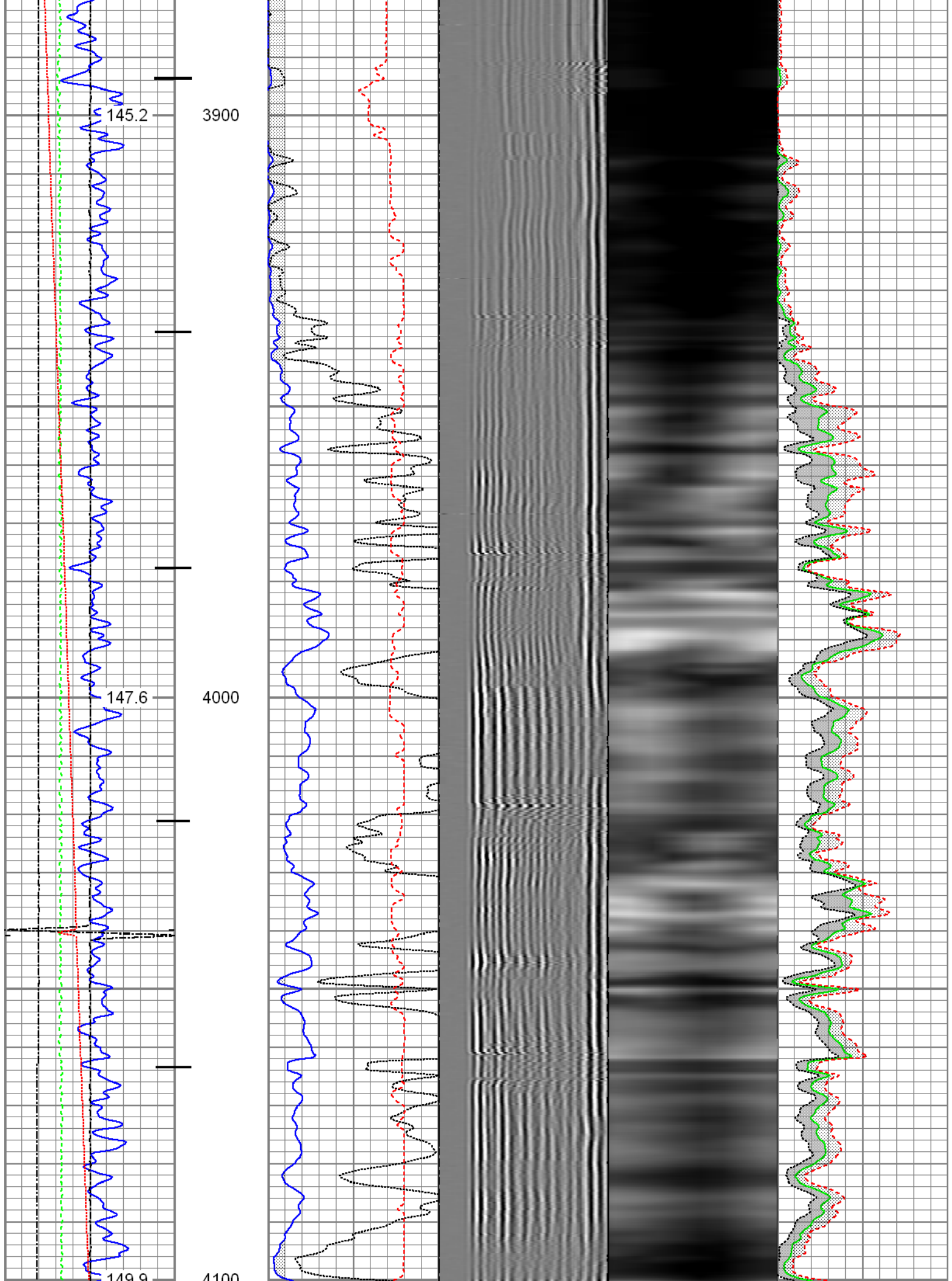


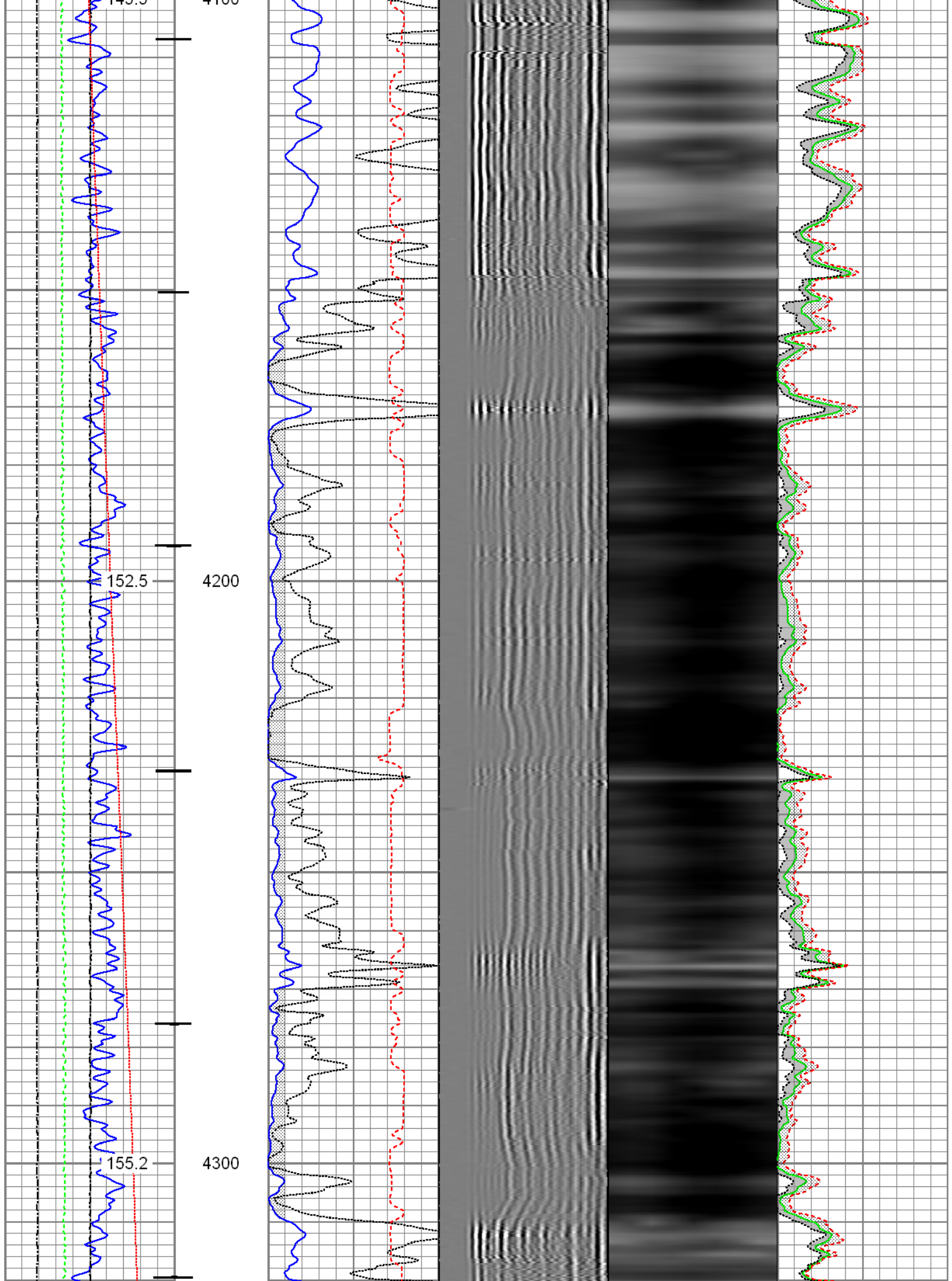


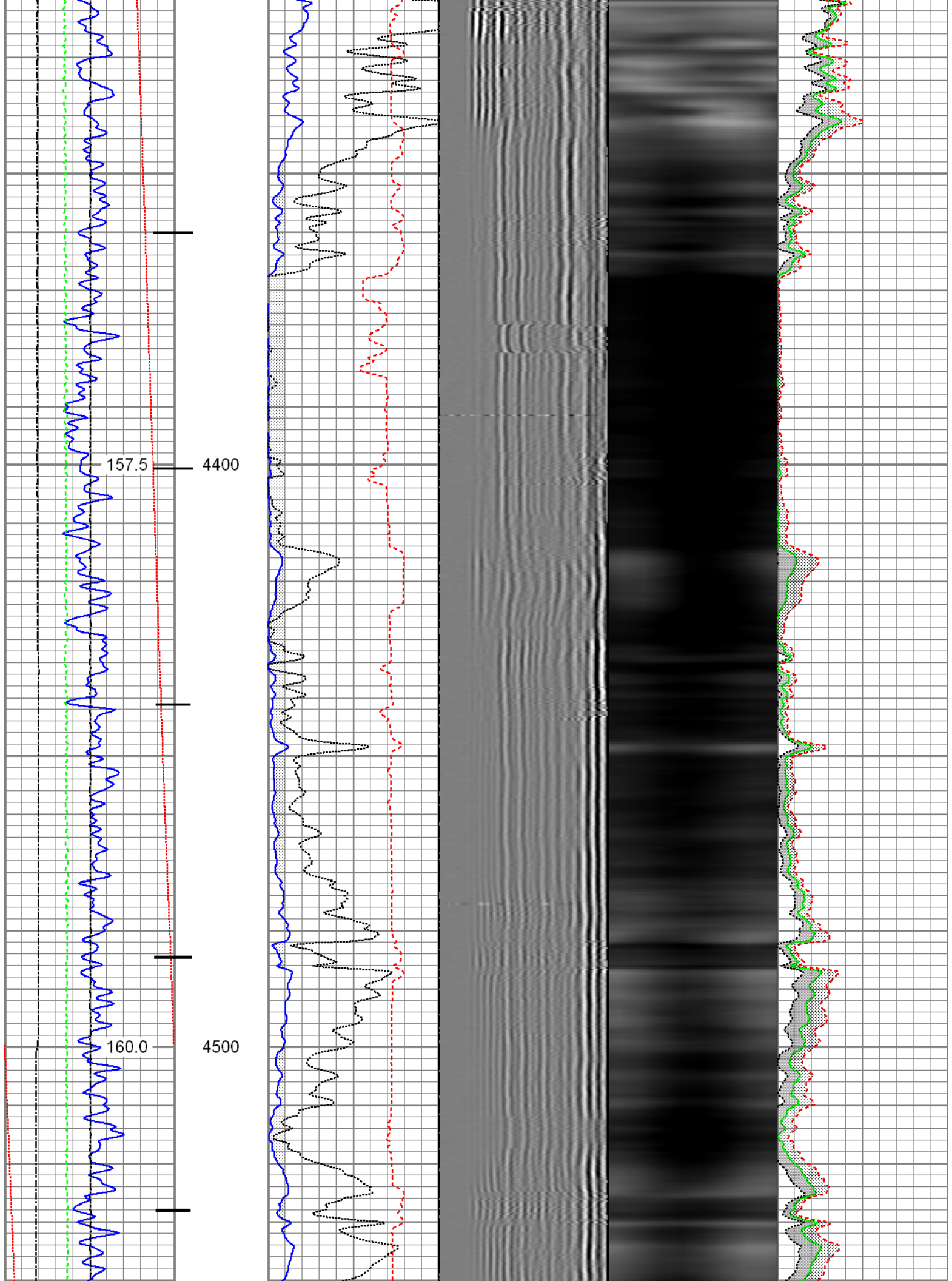




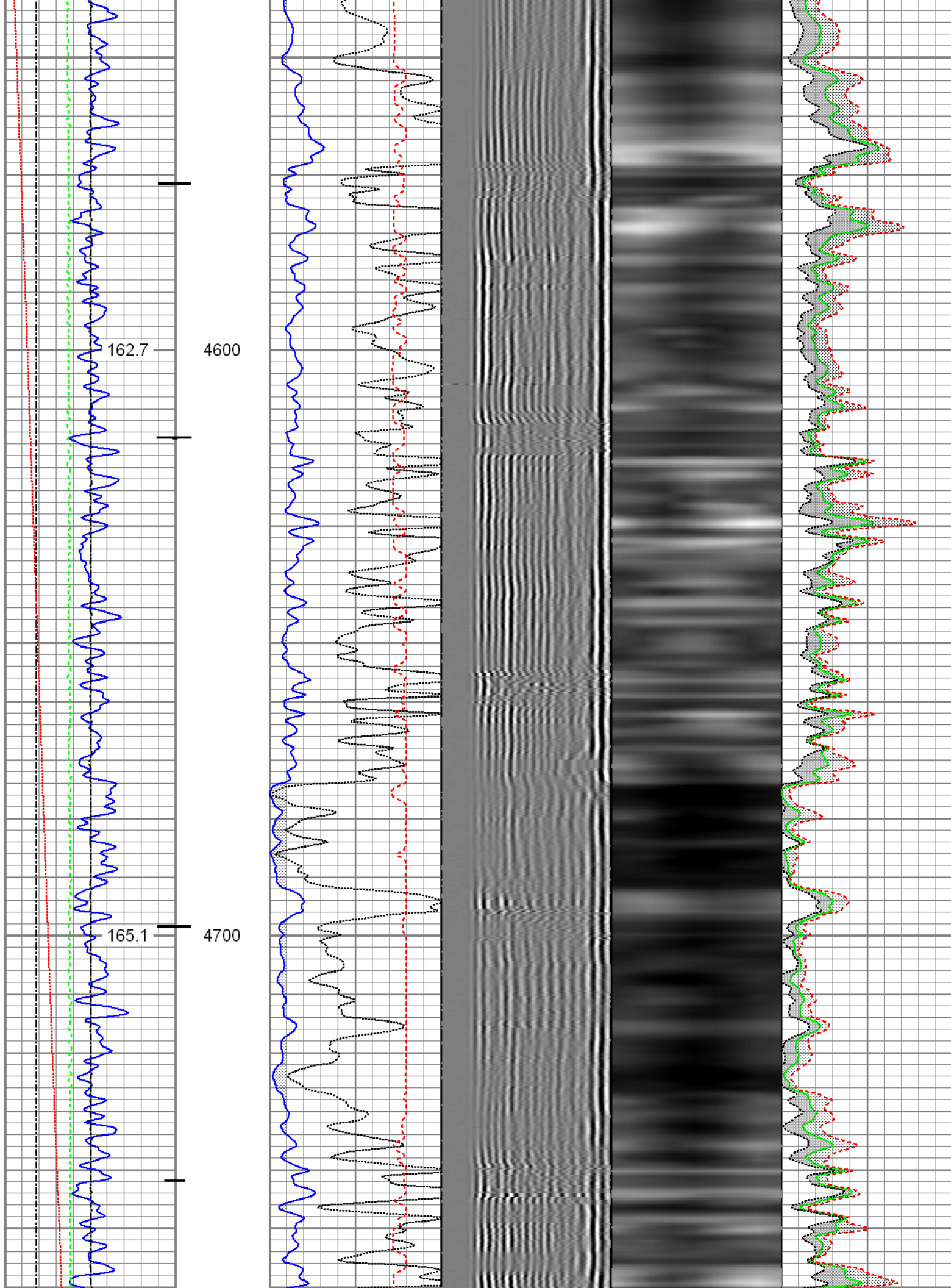


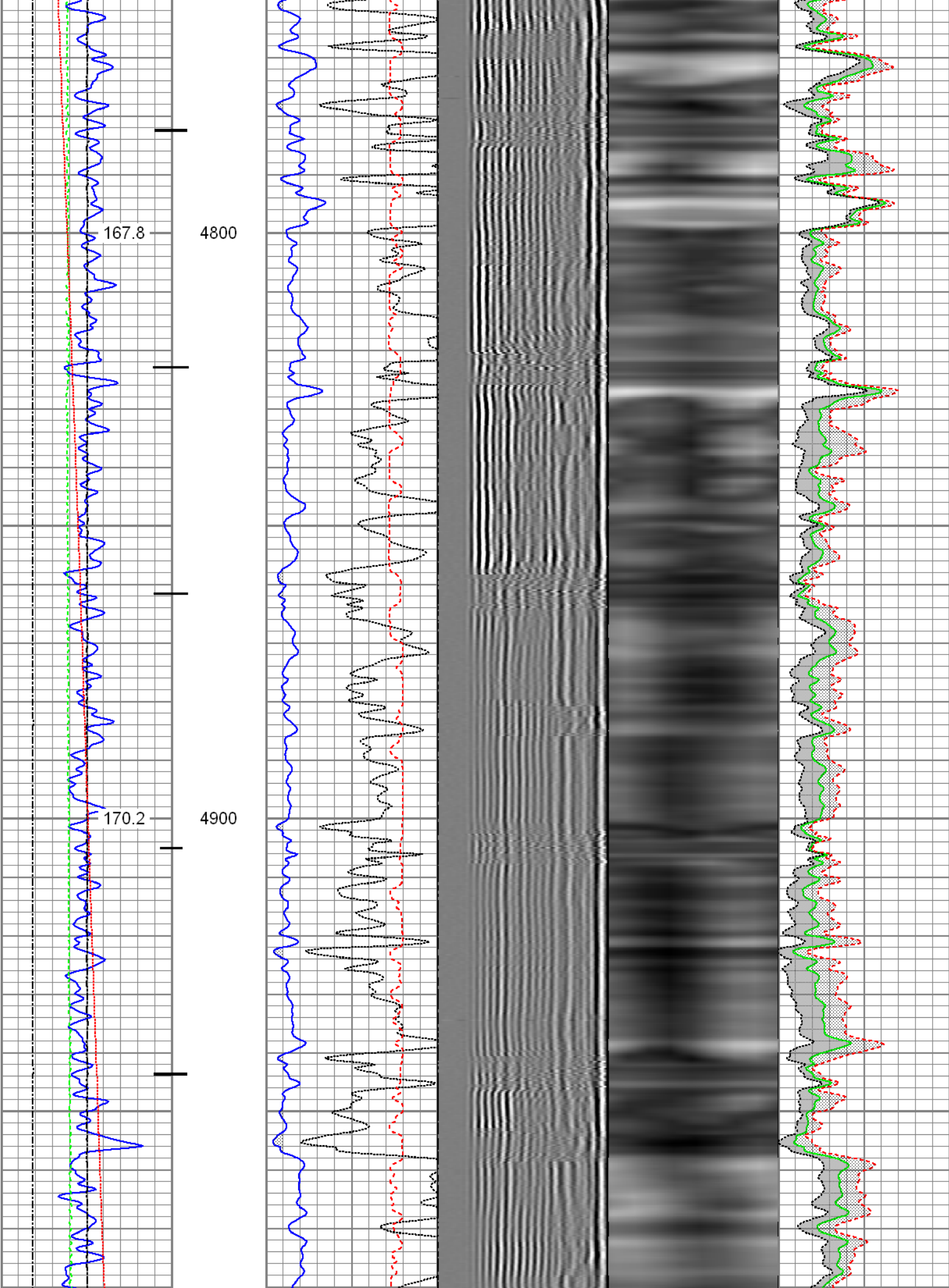




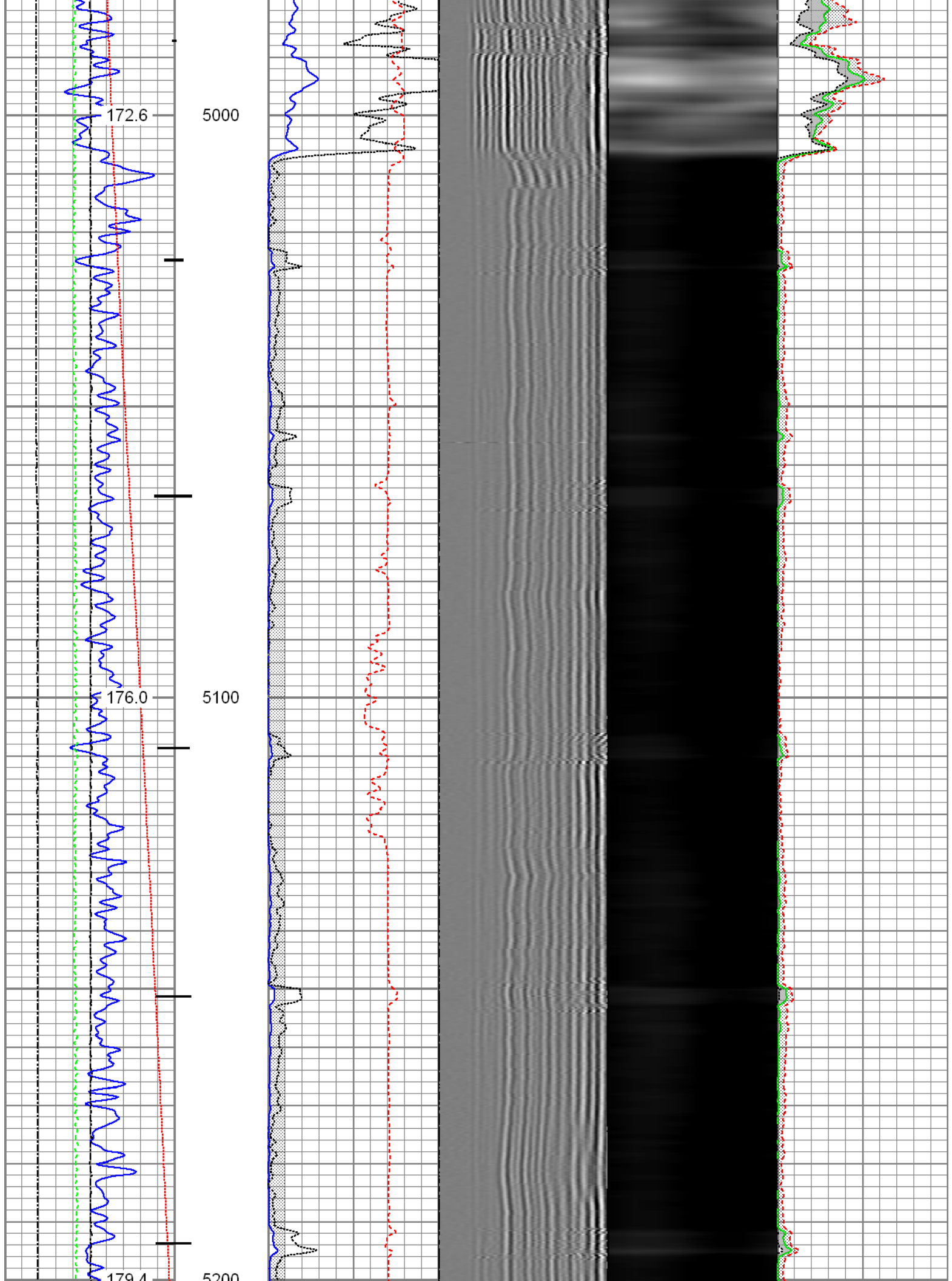


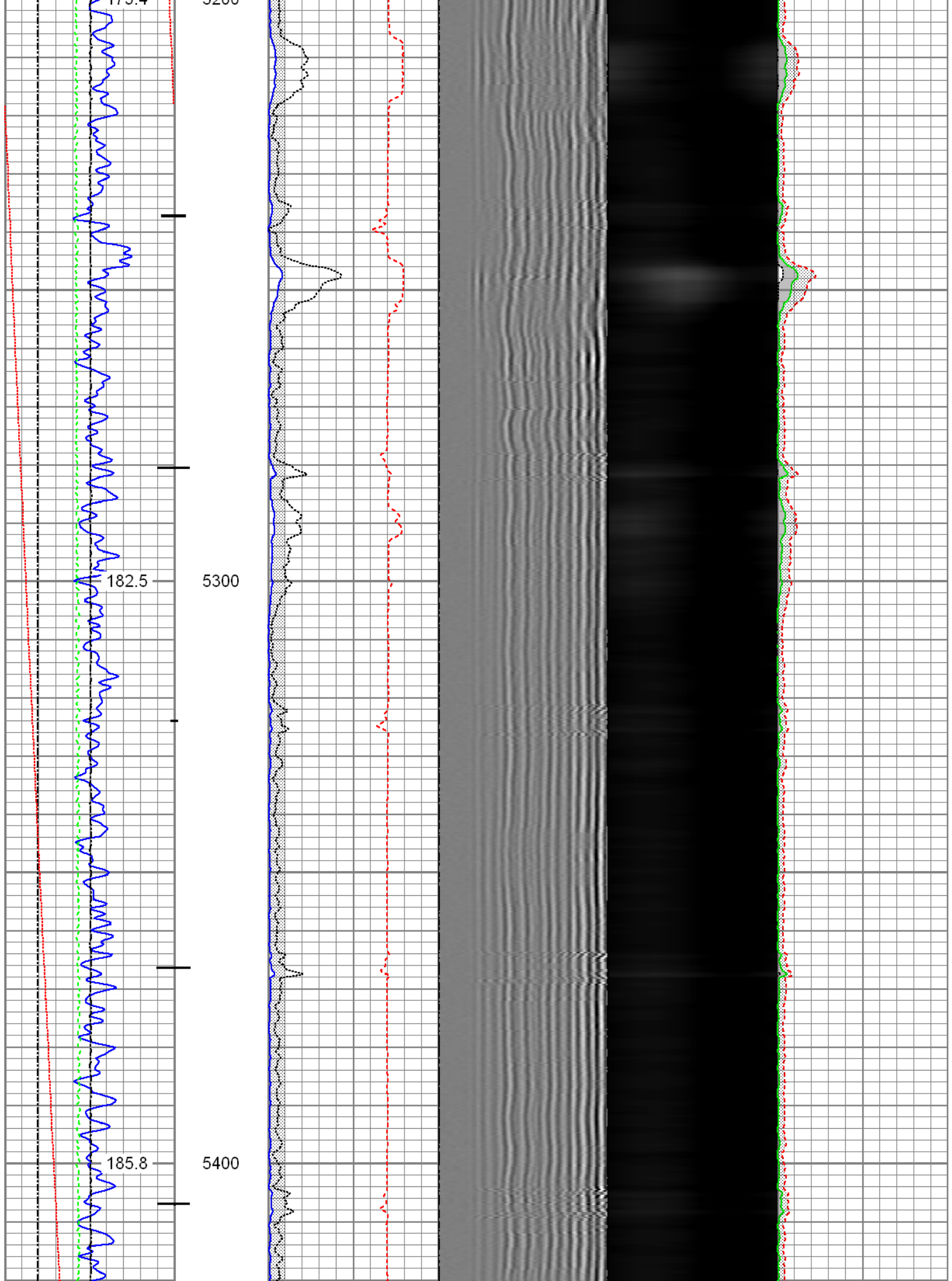


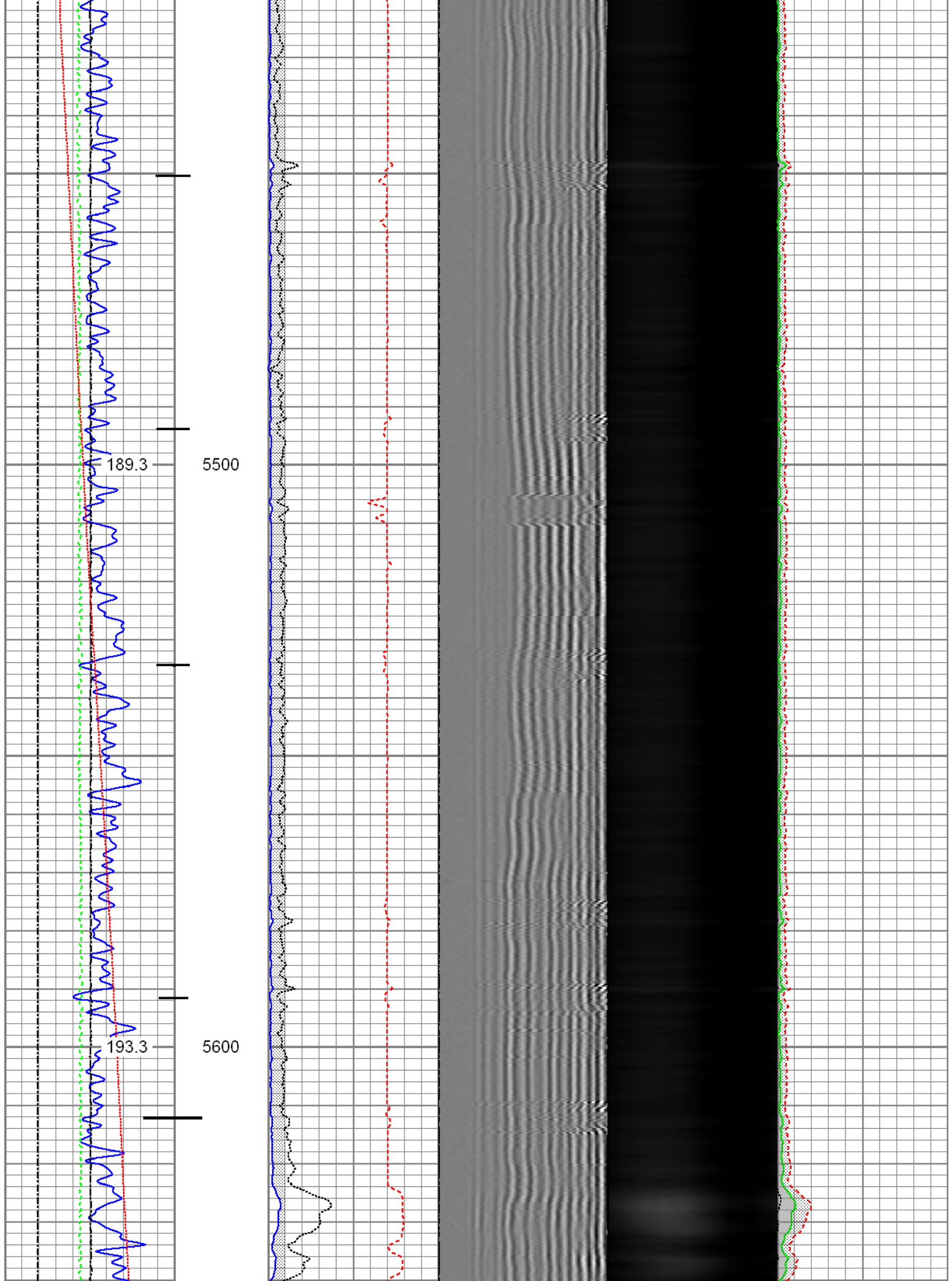


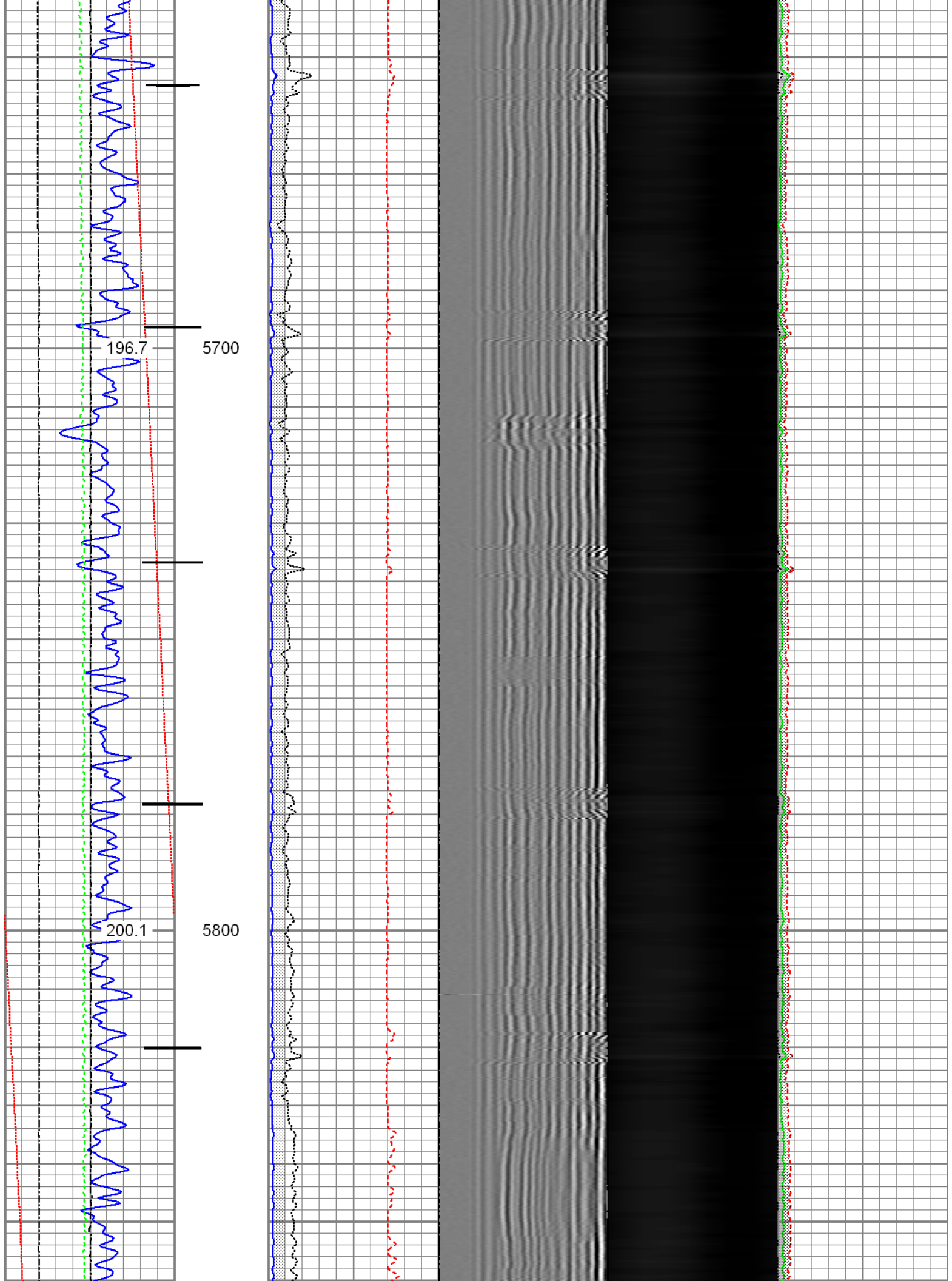




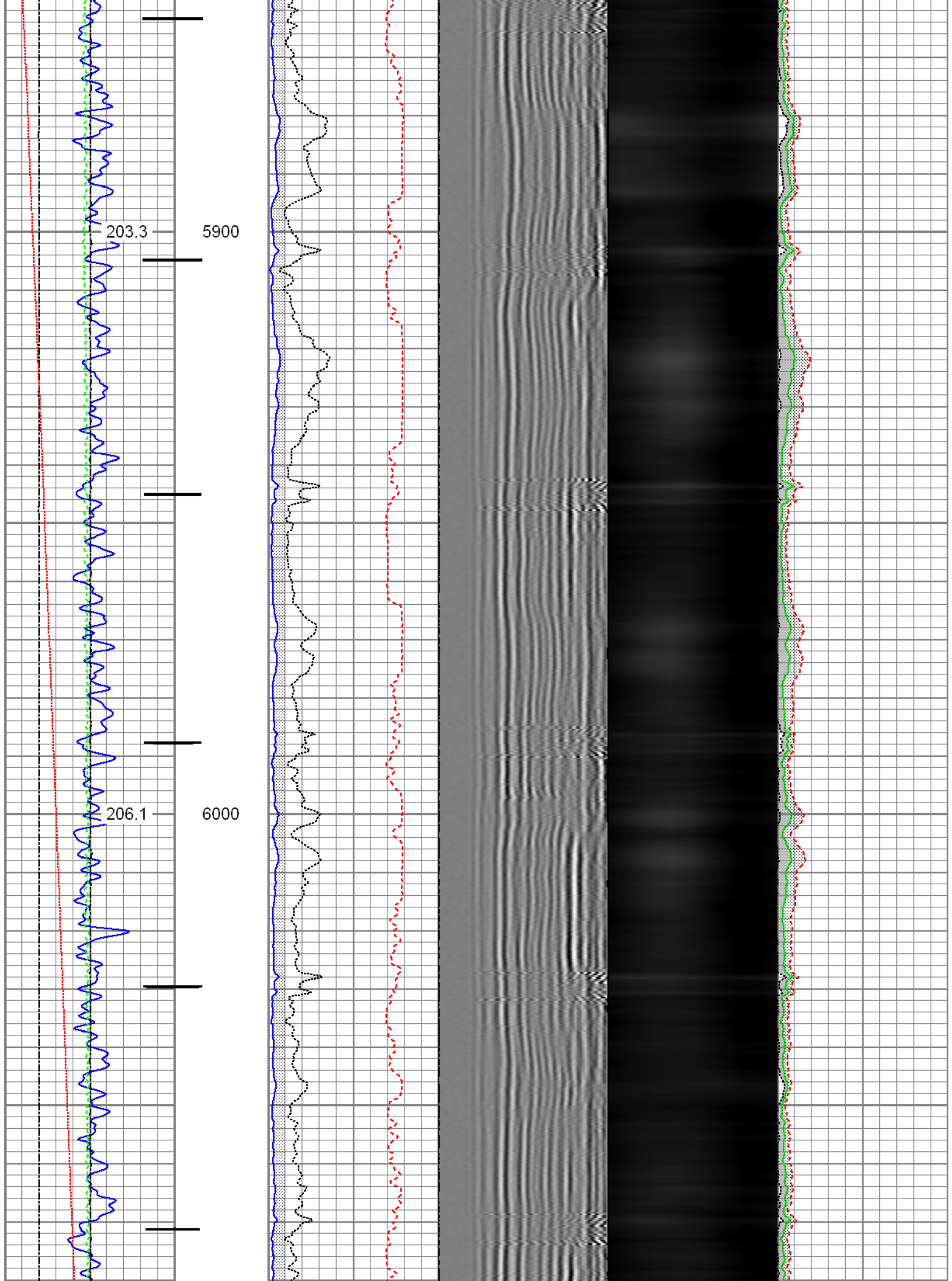


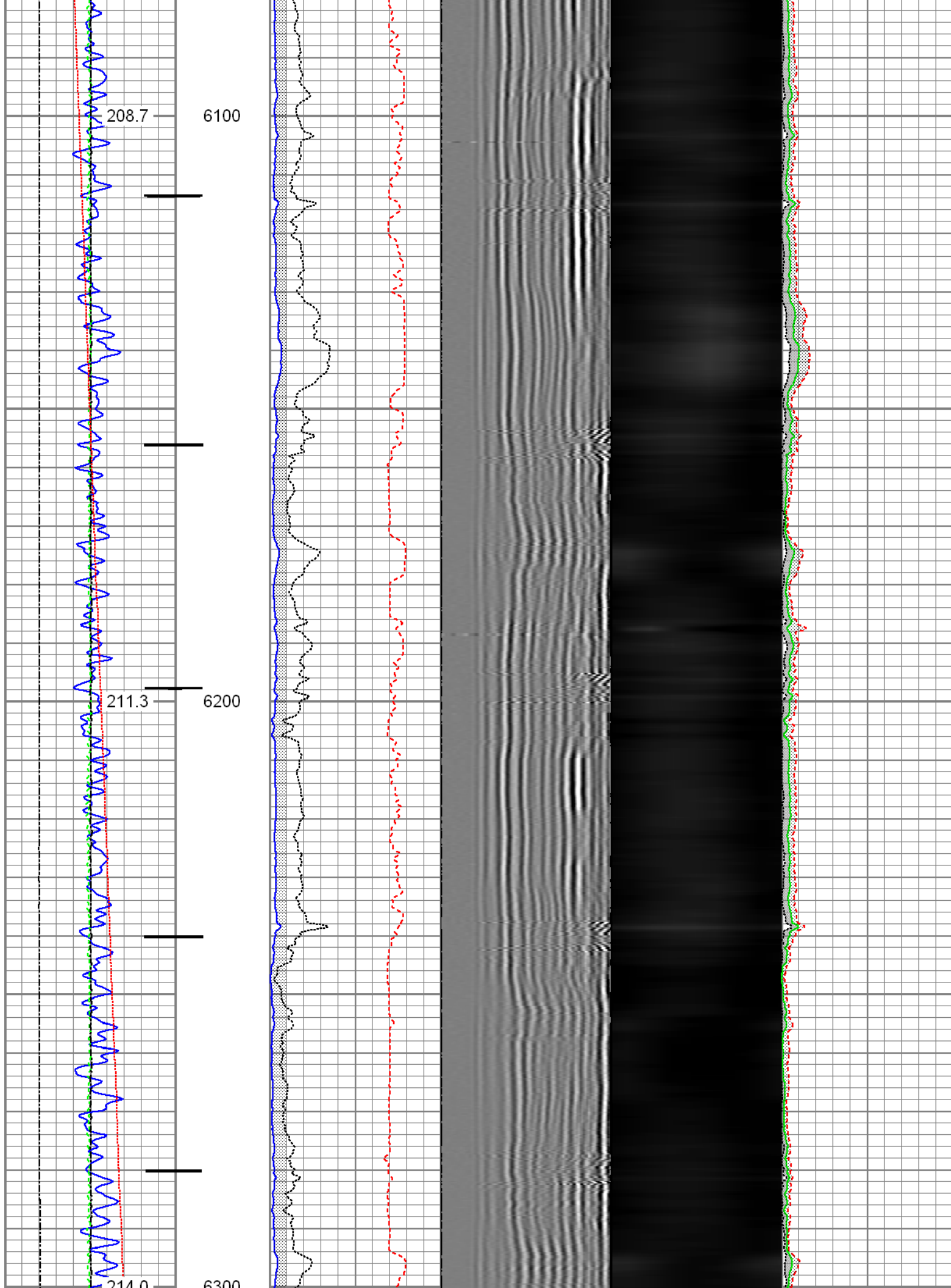


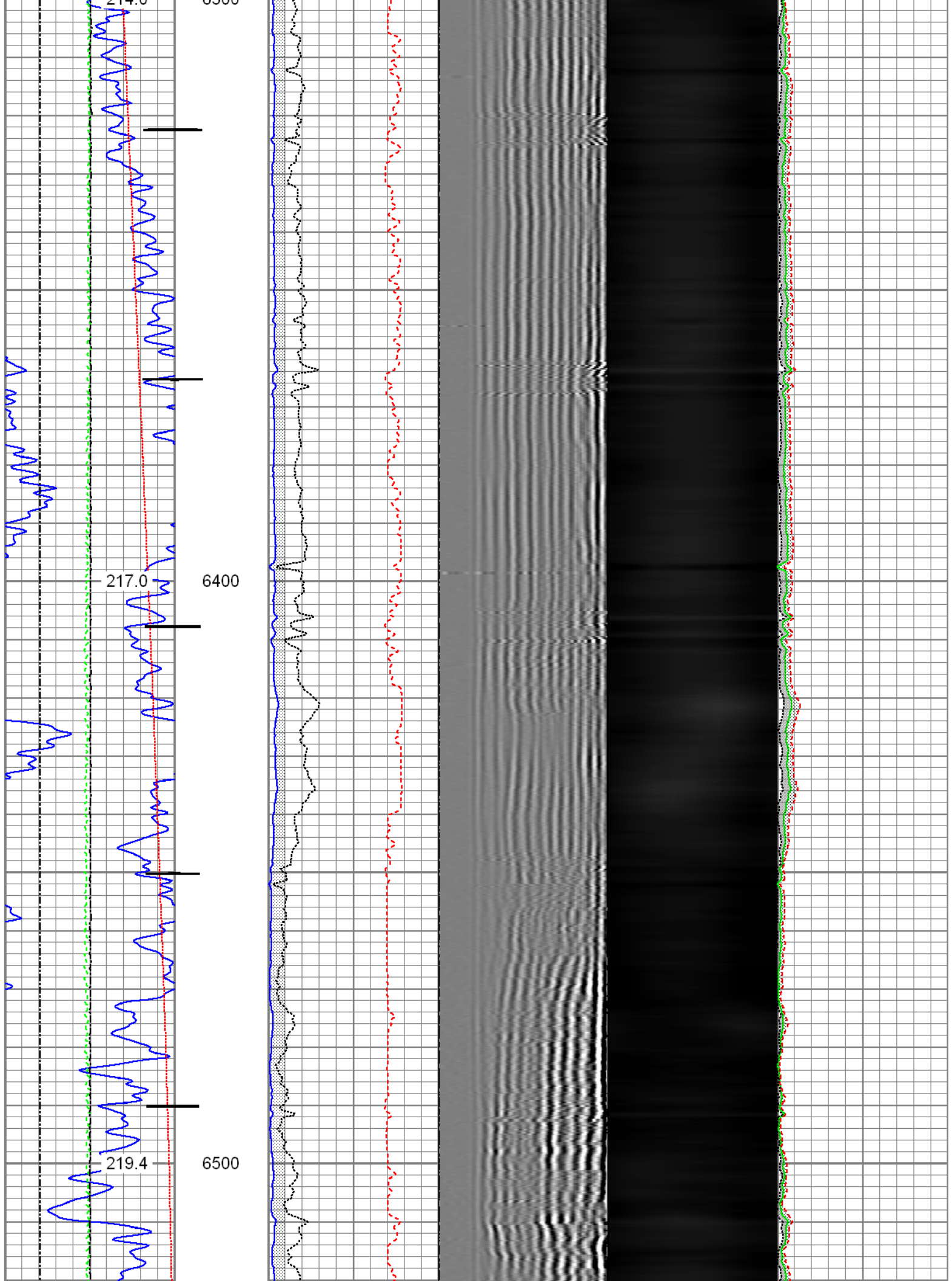


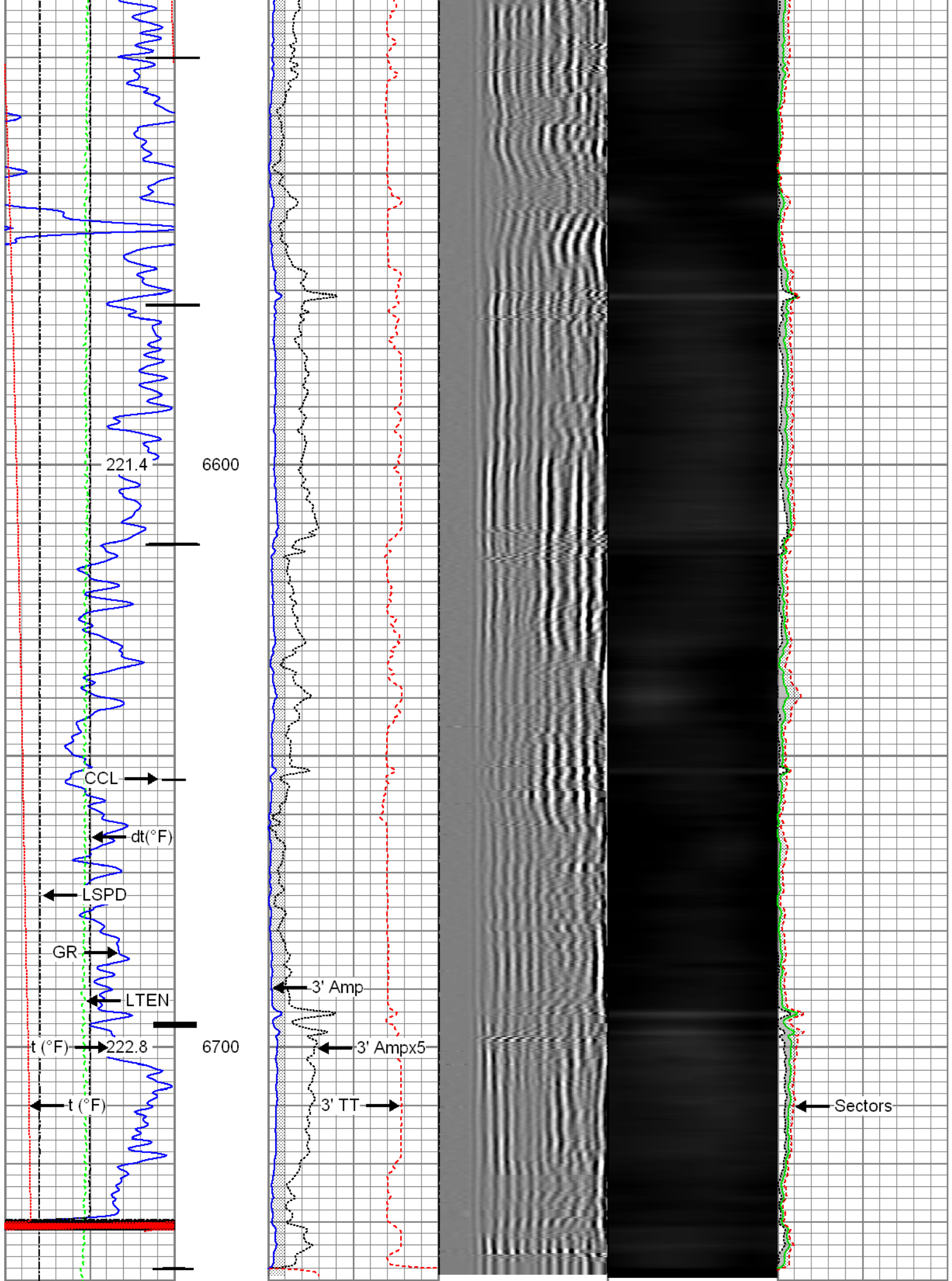




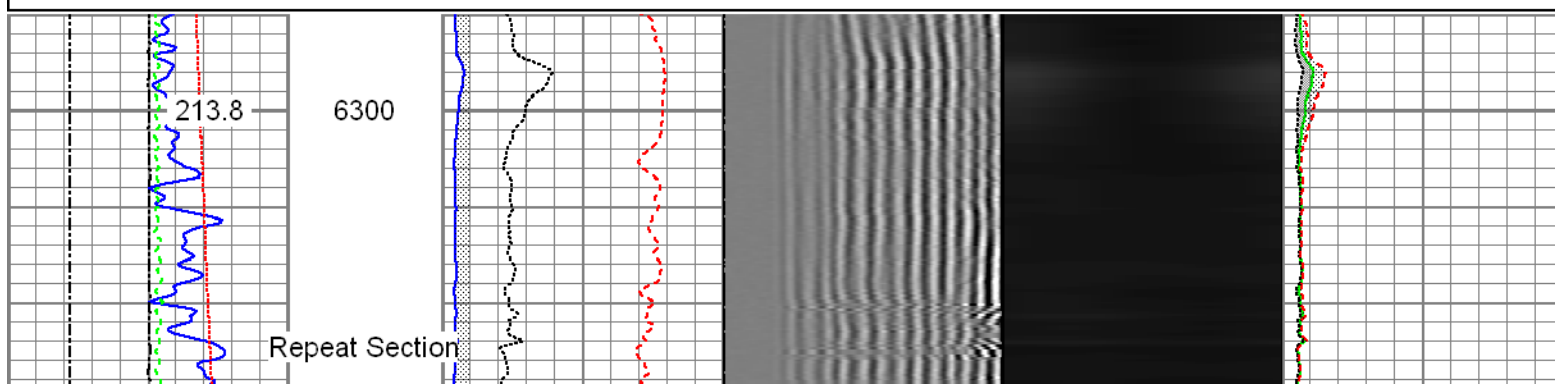
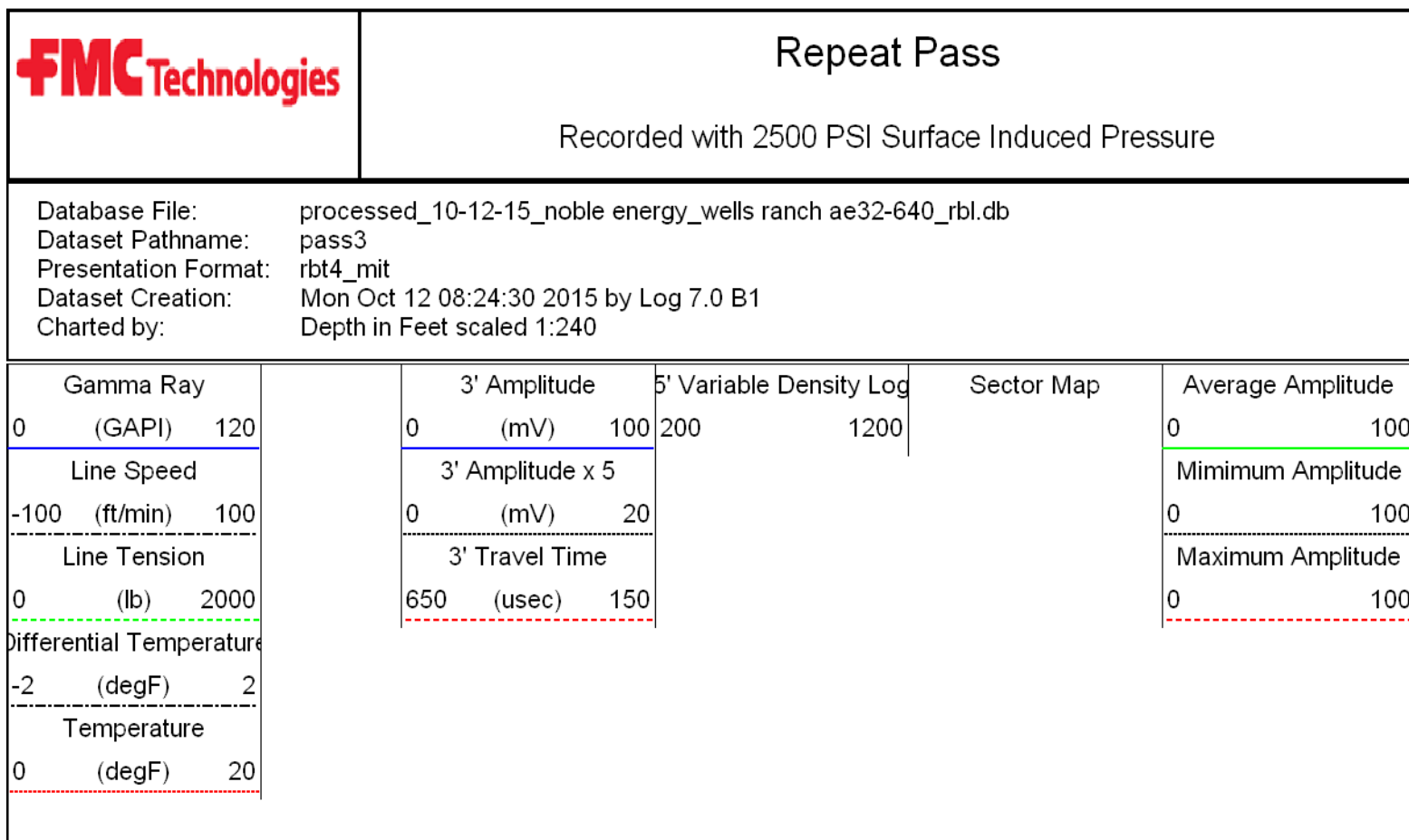
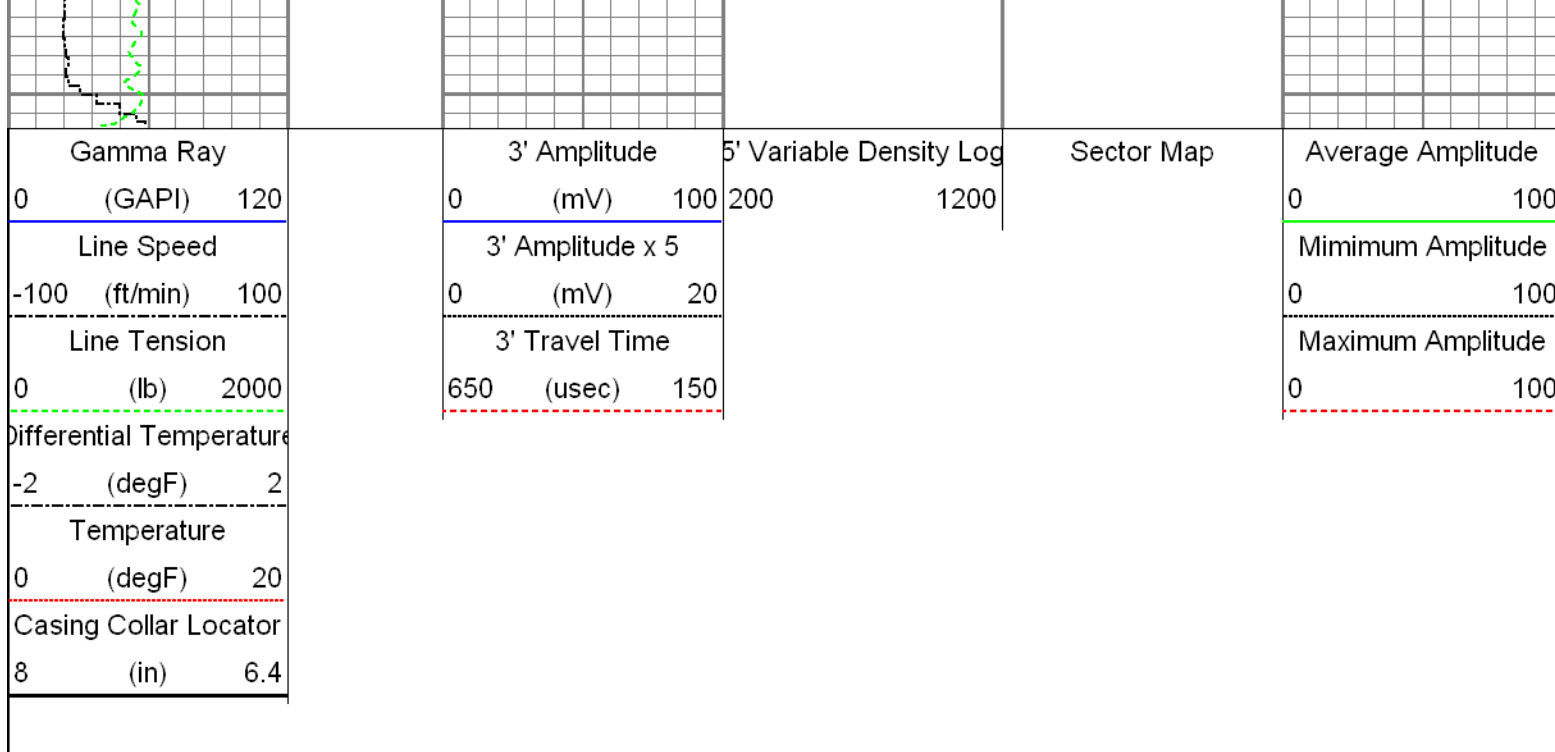




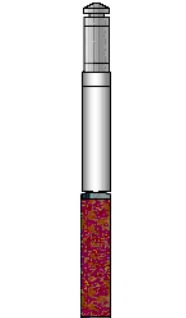
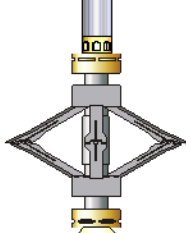
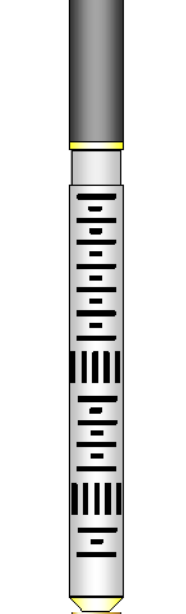
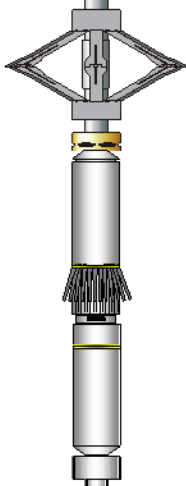
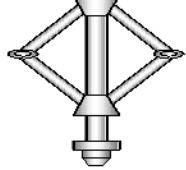










Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	23.85		T_CH14375_1_GO Titan 1-7/16" Assembled Electric Cable Head with 1" Fishing Neck	1.03	1.44	4.00
			UW_AGS-UW_AGS_001 (215017) Sondex Adapter - GO Box to Sondex Pin	0.21	1.69	1.00
			UW_XTU-UW_XTU_002 (219135) Crossover Ultrawire Toolbus to Ultralink	1.58	1.69	6.50
			UW_PGR-UW_PGR_020 (10013902) Production Gamma Ray	1.93	1.69	9.50
TEMP	22.45		UW_PRT-UW_PRT_016 (10025100) Platinum Resistance Thermometer	1.04	1.69	5.20
			UW_PRC-DSSRAC (081) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WV3FT	15.42		UW_RBT-UW_RBT_004 (1063) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
WVFS1	15.42					
WVFS2	15.42					
WVFS3	15.42					
WVFS4	15.42					
WVFS5	15.42					
WVFS6	15.42					
WVFS7	15.42					
WVFS8	15.42					
CBLTEMP	15.42					
CBLROT	15.42					
WV5FT	14.42					
MIT	5.41		UW_PRC-DSSRAC (082) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
			UW_MIT-UW_MIT40_027 (218949) 40 Multifinger Imaging Tool	4.54	2.75	61.10
			UW_PRC #4 -UW_PRC_057 (1038) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
TSTAMP	0.00		UW_BUL-UW_BUL_006 (031422) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20

## Calibration Report

Database File: PROCESSED\_10-12-15\_Noble Energy\_Wells Ranch AE32-640\_RBL.db  
 Dataset Pathname: pass11  
 Dataset Creation: Mon Oct 12 11:25:31 2015 by Log 7.0 B1

## 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: Mon Oct 12 07:54:33 2015

Ring size:	4		5		6		7
(in)		Sens		Sens		Sens	
Finger 01:	1372	286.0	1658	301.0	1959	314.0	2273
Finger 02:	1437	282.0	1719	297.0	2016	308.0	2324
Finger 03:	1651	285.0	1936	291.0	2227	293.0	2520
Finger 04:	1661	283.0	1944	288.0	2232	287.0	2519
Finger 05:	1529	264.0	1793	278.0	2071	289.0	2360
Finger 06:	1523	260.0	1783	272.0	2055	276.0	2331
Finger 07:	1340	276.0	1616	293.0	1909	305.0	2214
Finger 08:	1535	257.0	1792	272.0	2064	278.0	2342
Finger 09:	1409	270.0	1679	289.0	1968	303.0	2271
Finger 10:	1480	265.0	1745	283.0	2028	288.0	2316
Finger 11:	1467	261.0	1728	278.0	2006	283.0	2289
Finger 12:	1312	278.0	1590	298.0	1888	312.0	2200
Finger 13:	1565	284.0	1849	291.0	2140	296.0	2436
Finger 14:	1409	283.0	1692	296.0	1988	310.0	2298
Finger 15:	1527	260.0	1787	275.0	2062	287.0	2349
Finger 16:	1391	279.0	1670	297.0	1967	309.0	2276
Finger 17:	1627	270.0	1897	278.0	2175	287.0	2462
Finger 18:	1367	284.0	1651	308.0	1959	321.0	2280
Finger 19:	1626	258.0	1884	262.0	2146	265.0	2411
Finger 20:	1496	262.0	1758	277.0	2035	291.0	2326
Finger 21:	1581	251.0	1832	259.0	2091	266.0	2357
Finger 22:	1447	272.0	1719	312.0	2031	289.0	2320
Finger 23:	1338	273.0	1611	286.0	1897	302.0	2199
Finger 24:	1668	261.0	1929	270.0	2199	279.0	2478
Finger 25:	1351	289.0	1640	305.0	1945	324.0	2269
Finger 26:	1521	292.0	1813	293.0	2106	309.0	2415
Finger 27:	1458	265.0	1723	266.0	1989	284.0	2273
Finger 28:	1620	281.0	1901	279.0	2180	295.0	2475
Finger 29:	1460	277.0	1737	279.0	2016	303.0	2319
Finger 30:	1412	281.0	1693	288.0	1981	306.0	2287
Finger 31:	1517	274.0	1791	270.0	2061	295.0	2356
Finger 32:	1336	272.0	1608	277.0	1885	301.0	2186
Finger 33:	1601	308.0	1909	305.0	2214	326.0	2540



Finger 34:	1532	276.0	1808	276.0	2084	289.0	2373
Finger 35:	1432	272.0	1704	279.0	1983	298.0	2281
Finger 36:	1579	292.0	1871	286.0	2157	303.0	2460
Finger 37:	1594	283.0	1877	285.0	2162	295.0	2457
Finger 38:	1487	278.0	1765	289.0	2054	303.0	2357
Finger 39:	1455	287.0	1742	296.0	2038	313.0	2351
Finger 40:	1578	289.0	1867	301.0	2168	310.0	2478

Post Survey Calibration Check								
Performed: Mon Oct 12 11:25:25 2015								
Ring size: (in)	4	Nom. wear	5	Nom. wear	6	Nom. wear	7	Nom. wear
Finger 01:	4.004	0.002	4.999	-0.001	5.986	-0.007	6.997	-0.002
Finger 02:	4.013	0.007	5.000	-0.000	5.993	-0.004	6.996	-0.002
Finger 03:	4.015	0.008	5.005	0.002	5.995	-0.003	6.997	-0.002
Finger 04:	4.020	0.010	5.006	0.003	5.993	-0.003	6.994	-0.003
Finger 05:	4.003	0.001	5.008	0.004	6.002	0.001	6.995	-0.002
Finger 06:	4.004	0.002	5.006	0.003	5.998	-0.001	7.004	0.002
Finger 07:	4.005	0.002	4.993	-0.004	5.995	-0.002	6.993	-0.003
Finger 08:	4.004	0.002	4.998	-0.001	5.994	-0.003	6.994	-0.003
Finger 09:	4.008	0.004	4.992	-0.004	6.015	0.008	7.005	0.002
Finger 10:	4.011	0.006	5.001	0.001	6.001	0.001	7.000	-0.000
Finger 11:	3.987	-0.006	4.989	-0.005	6.015	0.007	7.013	0.006
Finger 12:	3.998	-0.001	4.988	-0.006	6.003	0.001	7.003	0.001
Finger 13:	4.022	0.011	4.991	-0.005	6.007	0.003	7.003	0.002
Finger 14:	4.027	0.013	5.000	0.000	6.018	0.009	7.011	0.006
Finger 15:	4.003	0.002	4.997	-0.001	6.020	0.010	7.006	0.003
Finger 16:	4.015	0.008	5.000	-0.000	6.010	0.005	7.006	0.003
Finger 17:	4.013	0.007	4.994	-0.003	6.015	0.007	7.018	0.009
Finger 18:	4.010	0.005	5.001	0.000	6.007	0.004	7.013	0.007
Finger 19:	4.017	0.008	5.004	0.002	6.016	0.008	7.006	0.003
Finger 20:	4.006	0.003	4.990	-0.005	6.001	0.001	6.999	-0.000
Finger 21:	4.004	0.002	4.992	-0.004	5.994	-0.003	7.009	0.004
Finger 22:	4.009	0.004	5.029	0.014	5.916	-0.042	6.940	-0.030
Finger 23:	3.970	-0.015	5.006	0.003	6.008	0.004	7.009	0.004
Finger 24:	4.006	0.003	5.001	0.001	6.004	0.002	7.003	0.002
Finger 25:	4.006	0.003	4.996	-0.002	6.003	0.002	7.000	0.000
Finger 26:	4.019	0.009	4.991	-0.004	5.998	-0.001	6.996	-0.002
Finger 27:	4.018	0.009	5.008	0.004	6.022	0.011	7.010	0.005
Finger 28:	4.016	0.008	5.006	0.003	6.017	0.009	7.007	0.003
Finger 29:	4.013	0.007	4.993	-0.003	6.011	0.006	7.022	0.011
Finger 30:	4.006	0.003	4.992	-0.004	6.000	0.000	6.999	-0.001
Finger 31:	4.011	0.006	4.992	-0.004	6.015	0.008	7.000	0.000
Finger 32:	3.998	-0.001	4.994	-0.003	5.998	-0.001	6.998	-0.001
Finger 33:	4.008	0.004	4.990	-0.005	6.011	0.005	6.996	-0.002
Finger 34:	4.005	0.003	4.995	-0.002	6.003	0.001	6.999	-0.000
Finger 35:	4.008	0.004	4.999	-0.000	6.001	0.001	7.005	0.002
Finger 36:	4.016	0.008	4.989	-0.005	6.020	0.010	7.020	0.010
Finger 37:	4.008	0.004	4.999	-0.000	5.993	-0.004	6.999	-0.000
Finger 38:	4.000	0.000	4.999	-0.001	5.999	-0.001	7.002	0.001
Finger 39:	4.017	0.008	5.011	0.006	6.027	0.014	7.017	0.008
Finger 40:	3.998	-0.001	4.997	-0.002	6.007	0.003	7.009	0.004
Average:	4.008	0.004	4.998	-0.001	6.003	0.002	7.002	0.001

Segmented Cement Bond Log Calibration Report								
			Serial Number:		1063			
			Tool Model:		UW_RBT_004			
			Calibration Casing Diameter:		7.000	in		
			Calibration Depth:		-61.567	ft		

Master Calibration, performed Mon Oct 12 07:51:35 2015:


	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	-0.003	1.000	0.800	62.165	61.197	0.968
5FT	-0.006	1.000	0.800	62.165	60.993	1.172
S1	-0.004	1.000	0.000	100.000	99.635	0.365
S2	-0.003	1.000	0.000	100.000	99.665	0.335
S3	-0.004	1.000	0.000	100.000	99.635	0.365
S4	-0.004	1.000	0.000	100.000	99.635	0.365
S5	-0.003	1.000	0.000	100.000	99.714	0.286
S6	-0.004	1.000	0.000	100.000	99.641	0.359
S7	-0.003	1.000	0.000	100.000	99.652	0.348
S8	-0.003	1.000	0.000	100.000	99.675	0.325

### Temperature Calibration Report

Serial Number:		10025100			
Tool Model:		UW_PRT_016			
Performed:		Wed Feb 11 13:47:59 2015			
Point #	Reading	Reference			
1	13249.00 cps	68.00	degF		
2	18454.00 cps	104.00	degF		
3	29735.00 cps	176.00	degF		
4	41457.00 cps	248.00	degF		
5	52851.00 cps	320.00	degF		
6	59128.00 cps	356.00	degF		
7	cps		degF		
8	cps		degF		
9	cps		degF		
10	cps		degF		

### Gamma Ray Calibration Report

Serial Number:		10013902			
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	Wells Ranch AE32-640
	Field	Wattenberg
	County	Weld
	State	Colorado