



Radial Cement Bond  
Gamma Ray  
Casing Collar Log

Company Noble Energy Inc.		Company Noble Energy Inc.	
Well Wells Ranch AE32-650		Well Wells Ranch AE32-650	
Field Wattenberg		Field Wattenberg	
County Weld		County Weld	
State Colorado		State Colorado	
Location:		API #: 05-123-41729	
Permanent Datum		Ground Level	
Log Measured From		Kelly Bushing	
Drilling Measured From		Kelly Bushing	
SEC 32 TWP 6N RGE 62W		Elevation 4722'	
		MIT	
		Other Services	
Date		12-OCT-2015	
Run Number		One	
Depth Driller		16122 FT	
Depth Logger		6838 FT	
Bottom Logged Interval		6833 FT	
Top Log Interval		Surface	
Open Hole Size		8.750"	
Type Fluid		Water	
Density / Viscosity		8.34 lbm/gal	
Max. Recorded Temp.		222 °F	
Estimated Cement Top		148 FT	
Time Well Ready		ROA	
Time Logger on Bottom		15:12	
Equipment Number		HD-0119	
Location		Fort Lupton, CO	
Recorded By		A. Olmsted	
Witnessed By		Bill Mansfield	
Borehole Record			
Tubing Record			
Run Number		Bit	
From		To	
Size		Weight	
From		To	
Casing Record		Size (in)	
Surface Casing		Wgt (lbs/ft)	
Intermediate #1		Grade	
Intermediate #2		Top	
Liner		Bottom	
4 1/2		11.6	
P-110		6852 FT	
		16112 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  
Depth referenced to Kelly Bushing at 24 FT  
Adjusted +1 FT to correlate with Kelly Bushing  
Log ran from 6838 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.!!

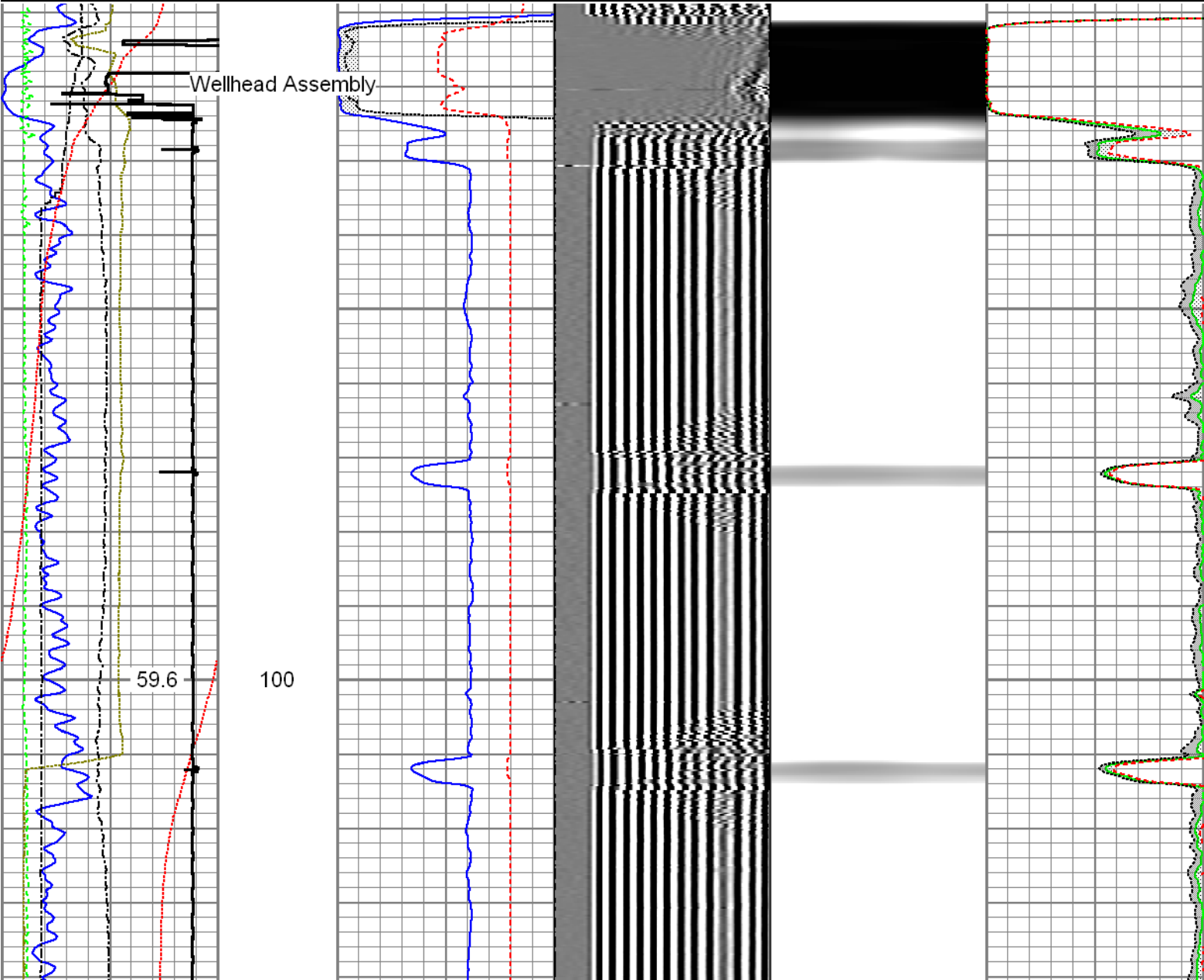


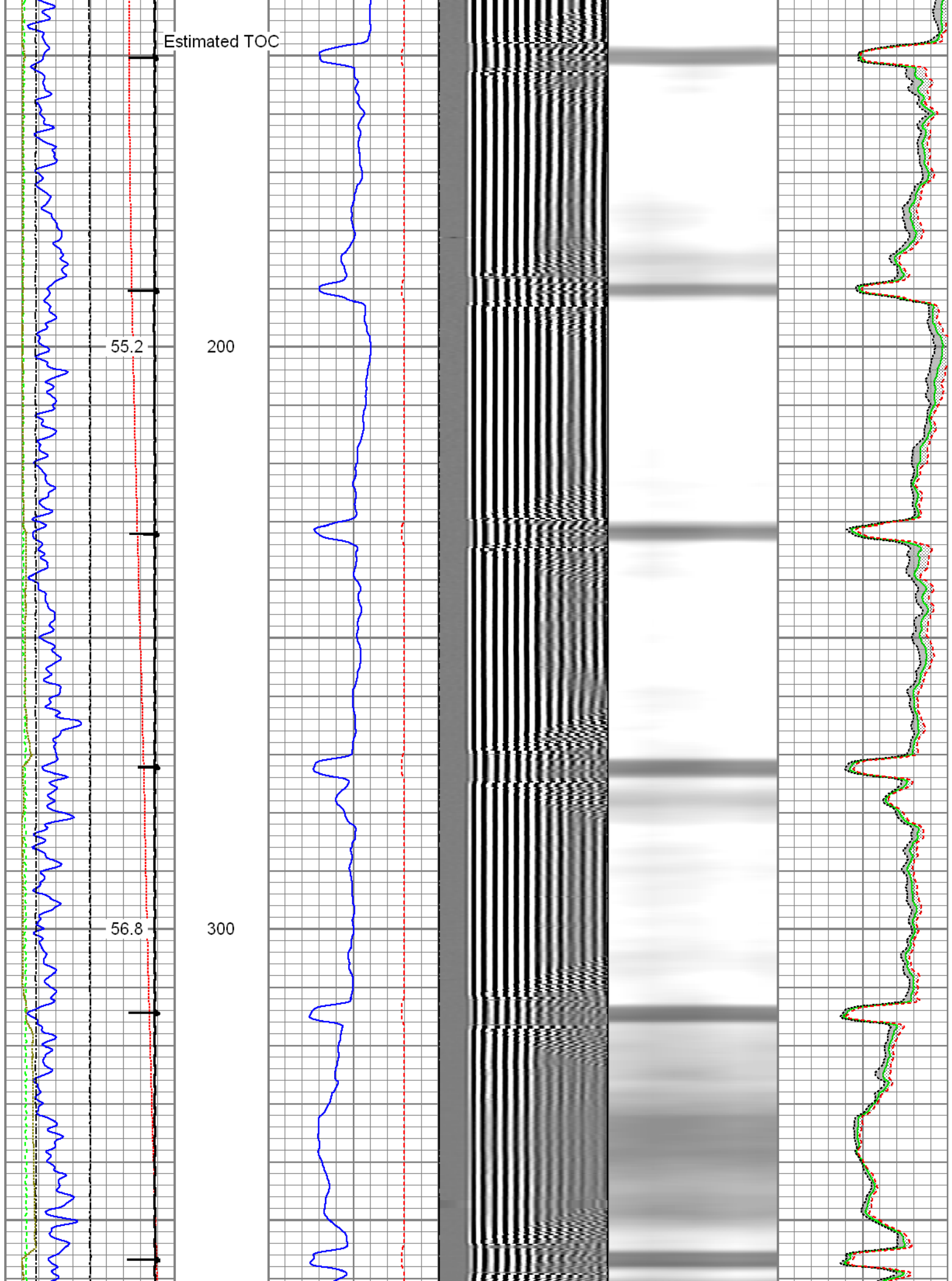
Main Pass

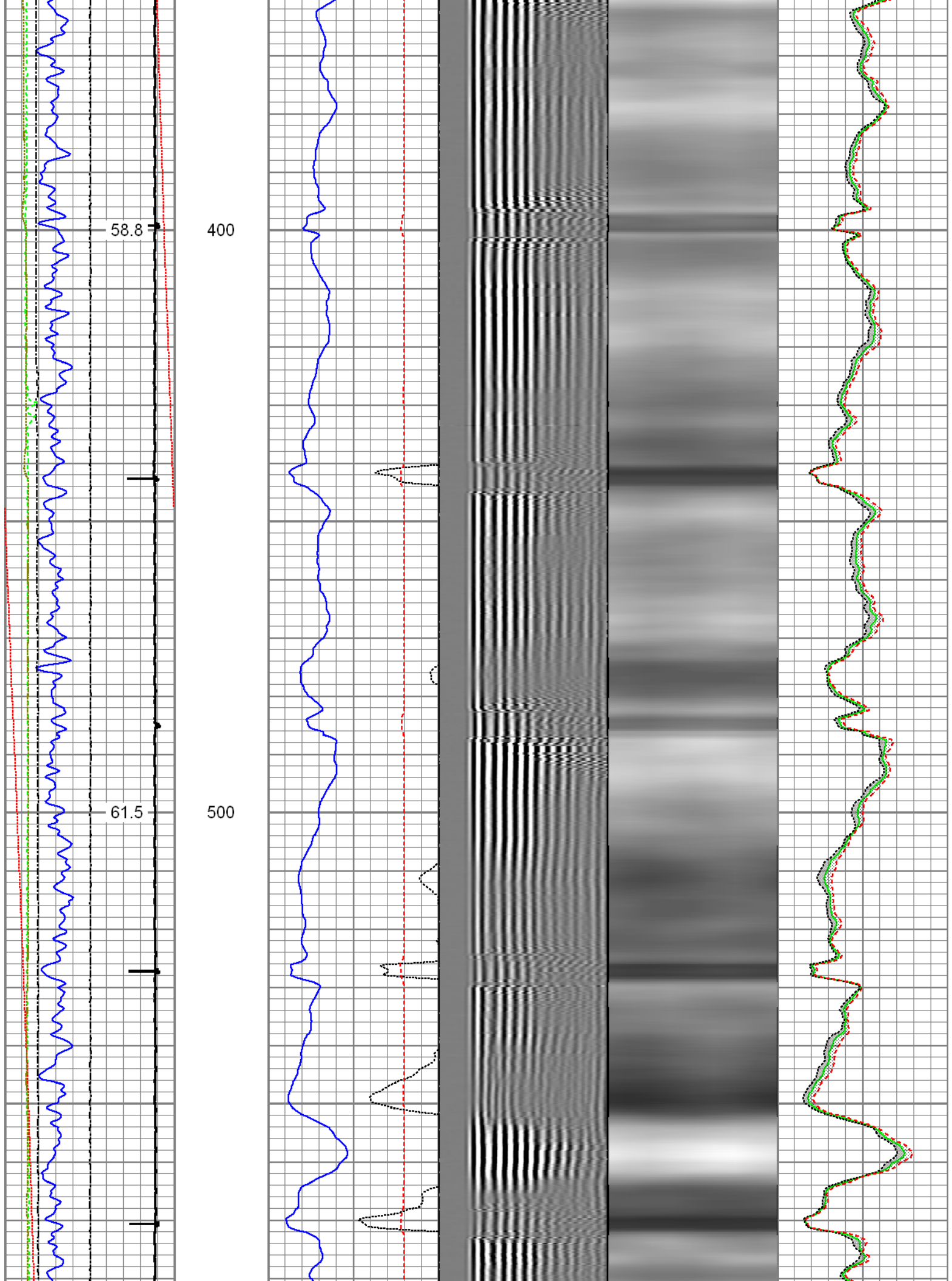
Recorded With 2500 PSI Surface Induced Pressure

Database File: processed\_revised\_noble\_wells\_ranch-ae32-650\_12-oct-2015\_rbl.db  
Dataset Pathname: pass3.2  
Presentation Format: rbt4\_mit  
Dataset Creation: Thu Oct 15 13:53:43 2015 by Calc 7.0 B1  
Charted by: Depth in Feet scaled 1:240

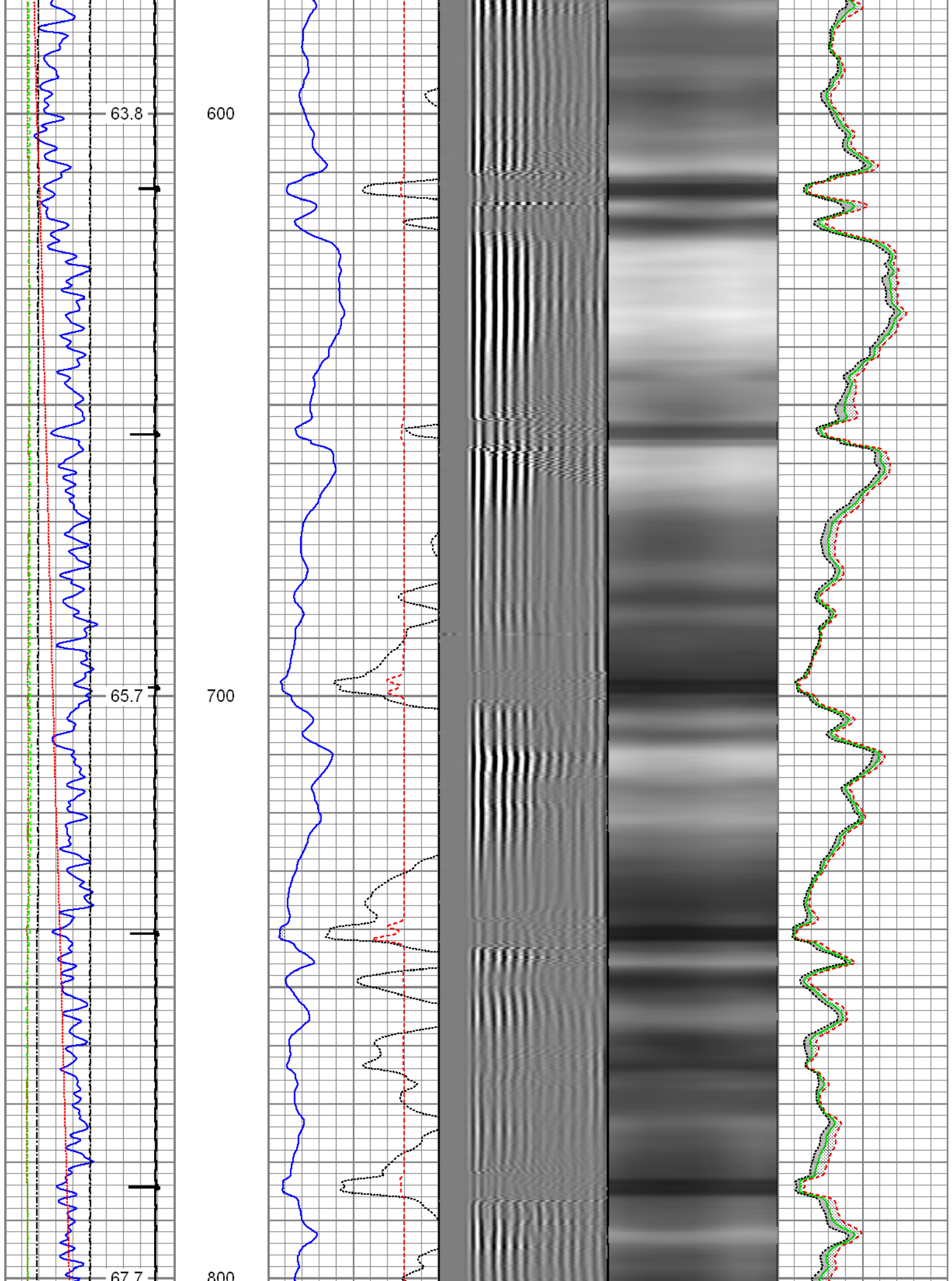
Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Line Speed	3' Amplitude x 5			Mimimum Amplitude
-100 (ft/min) 100	0 (mV) 20			0 100
Line Tension	3' Travel Time			Maximum Amplitude
0 (lb) 2000	650 (usec) 150			0 100
Differential Temperature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

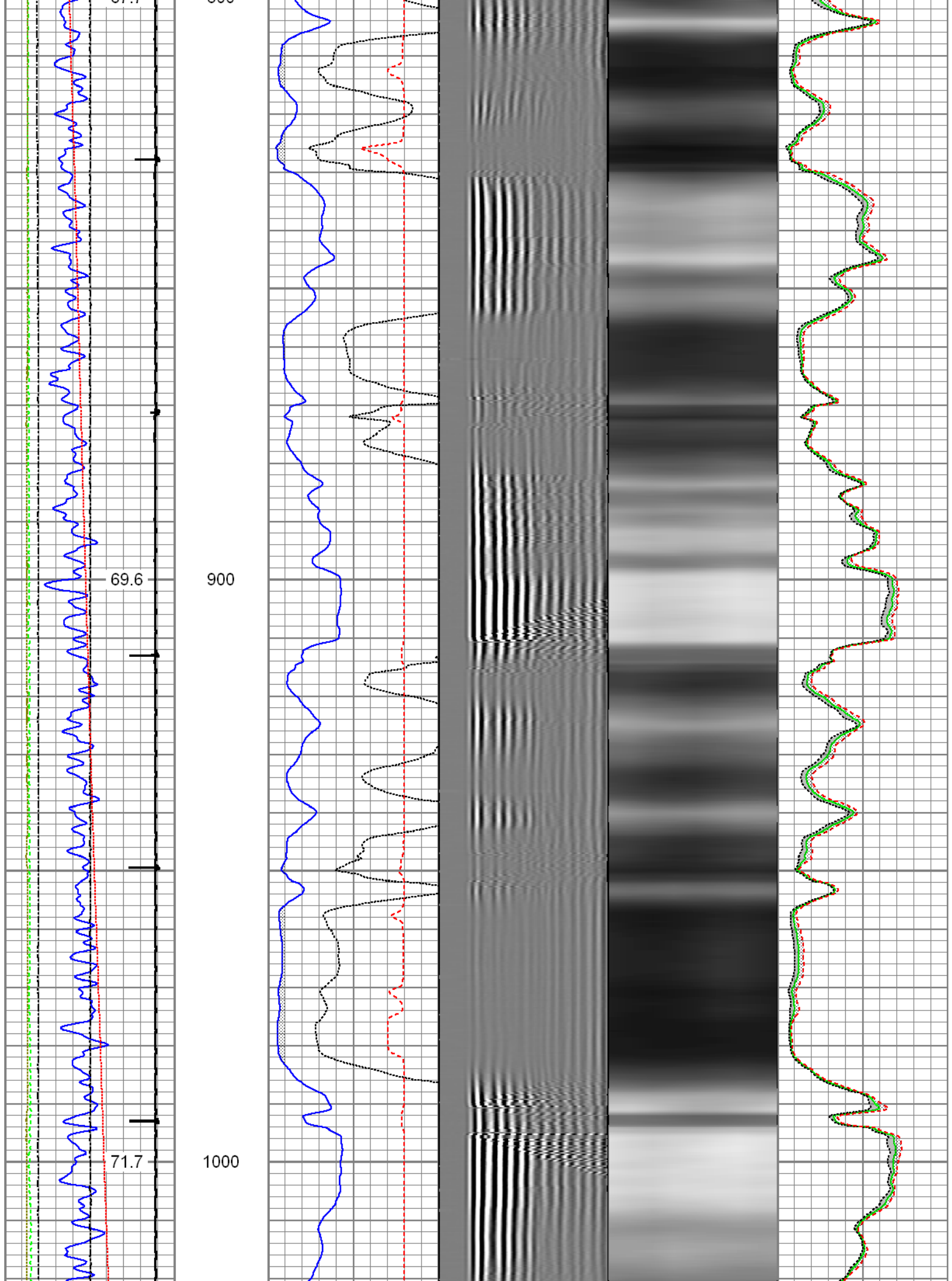


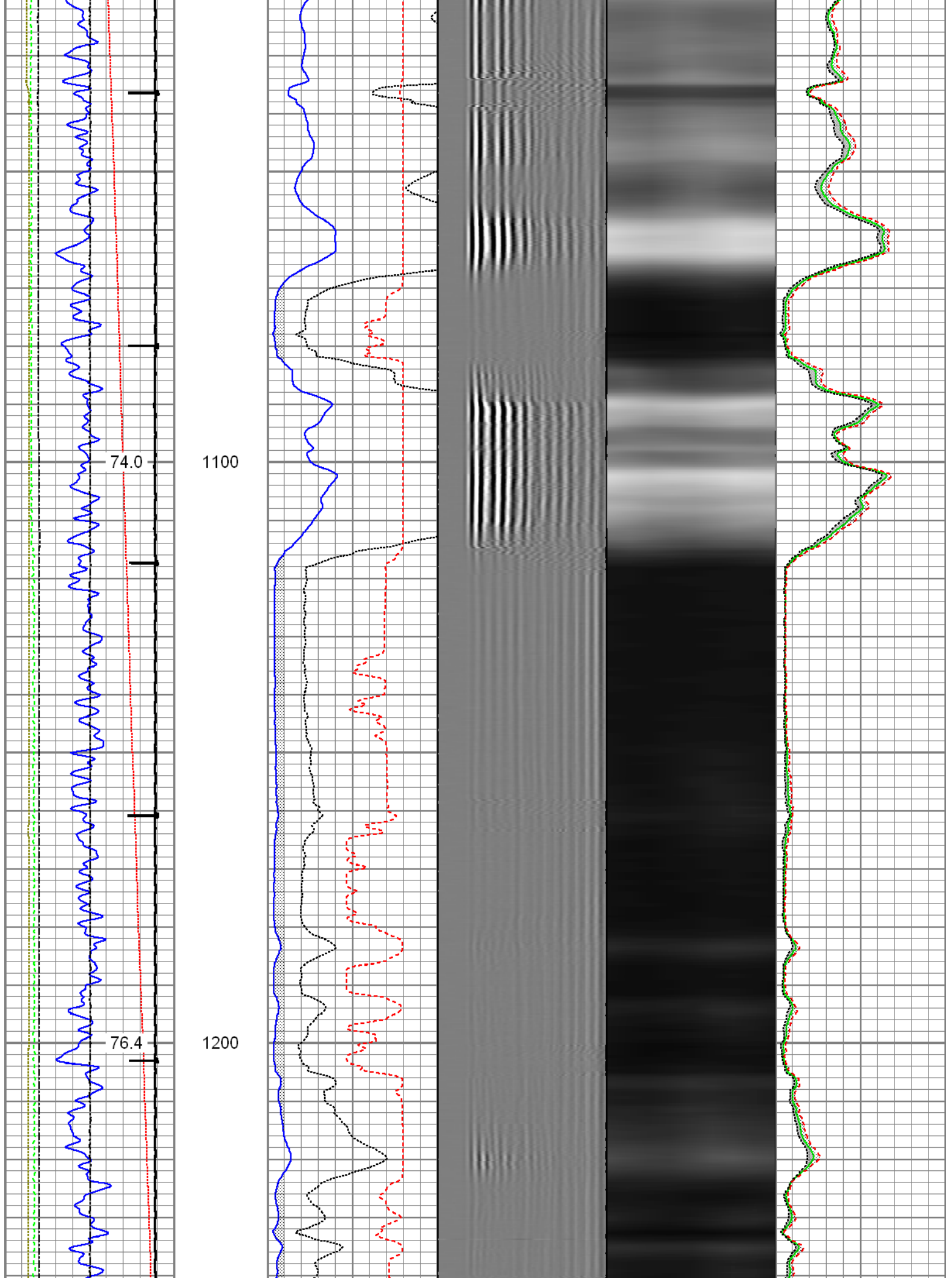


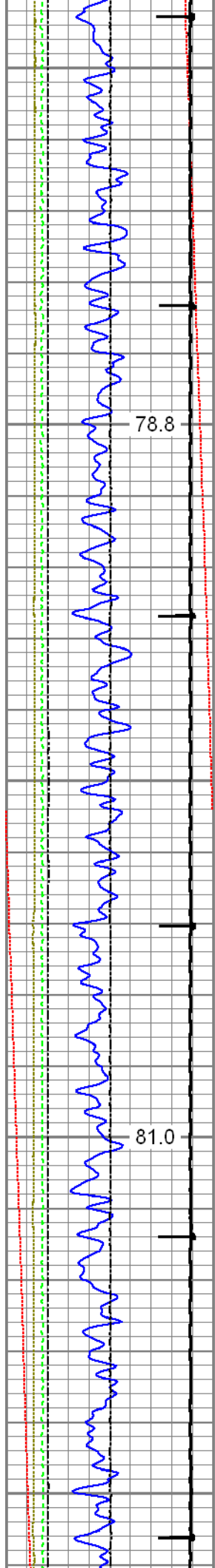






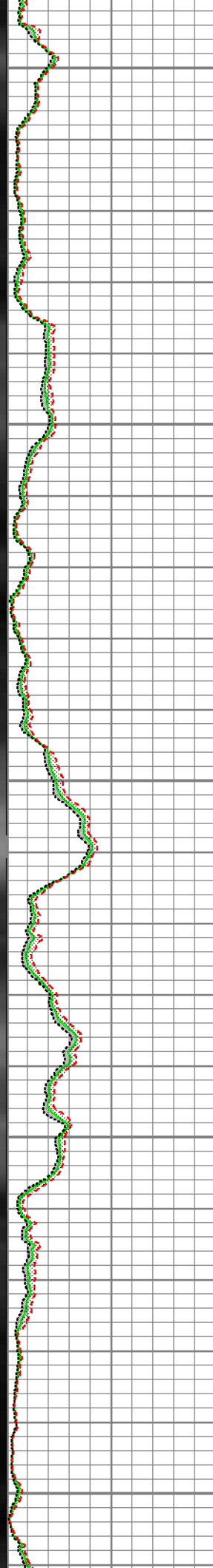
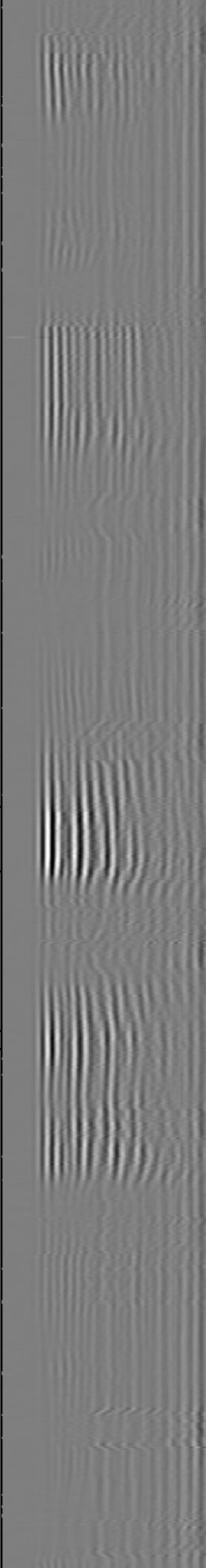
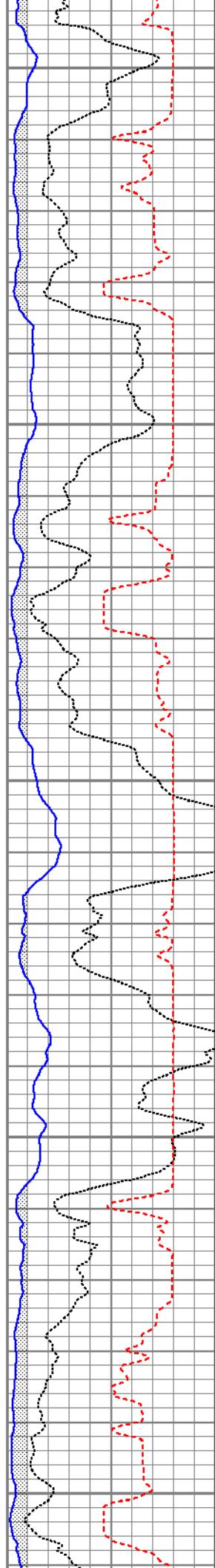


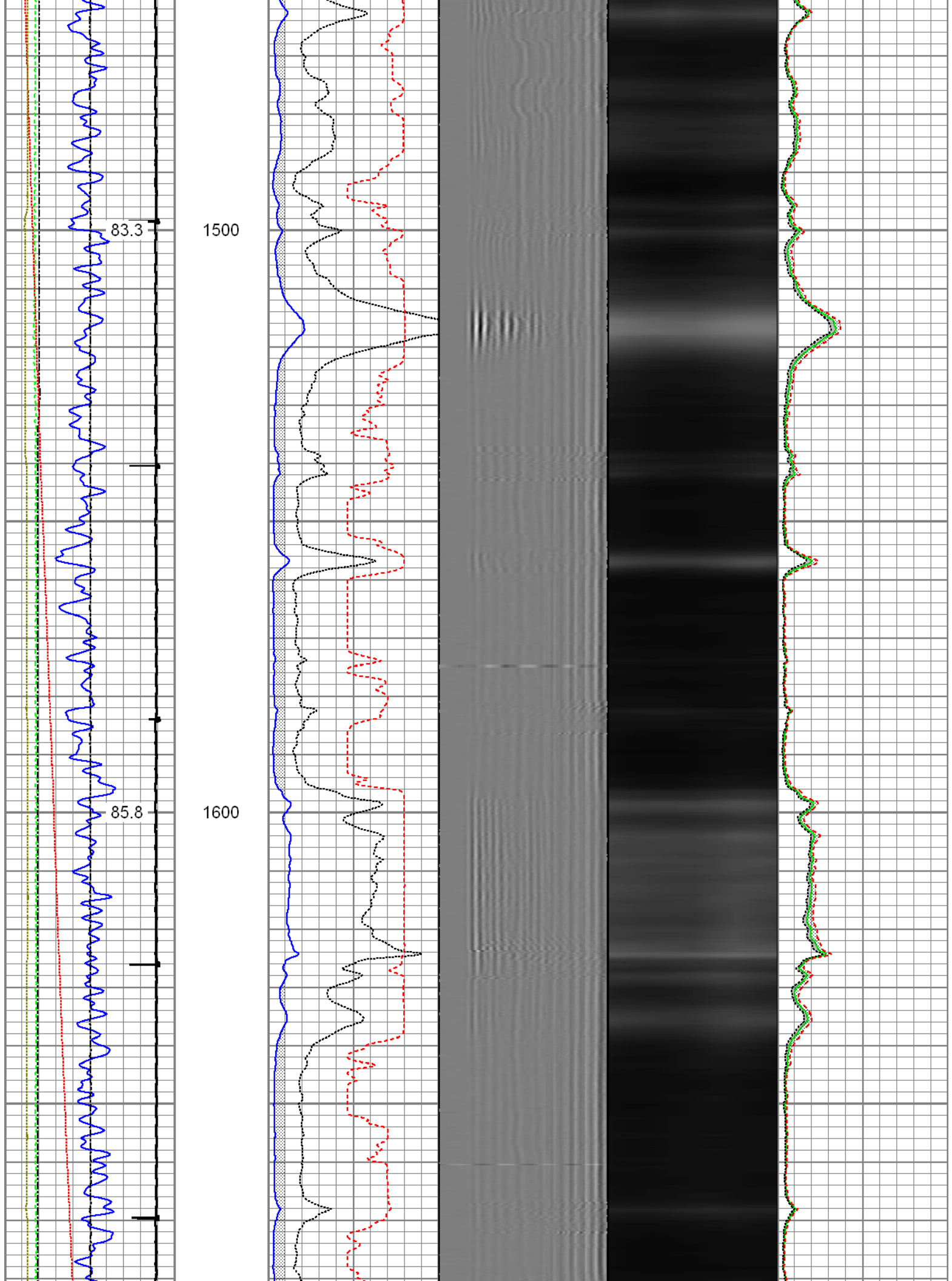




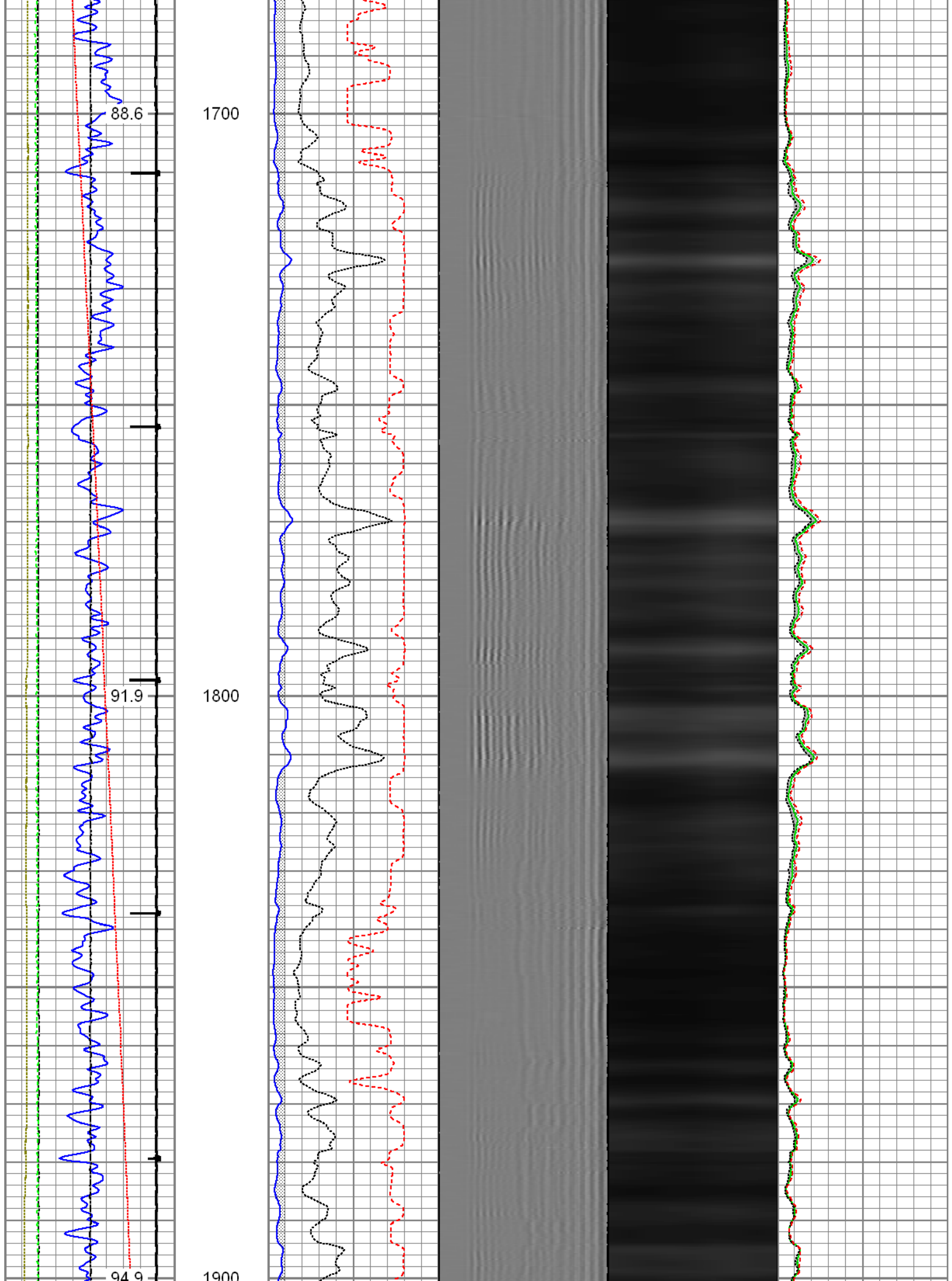
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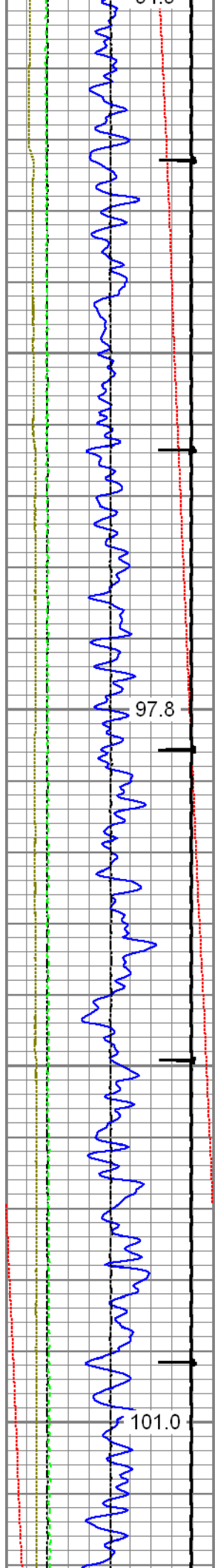
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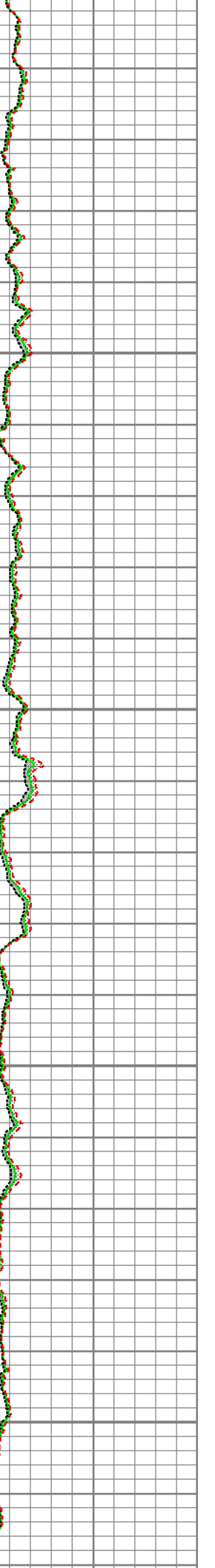
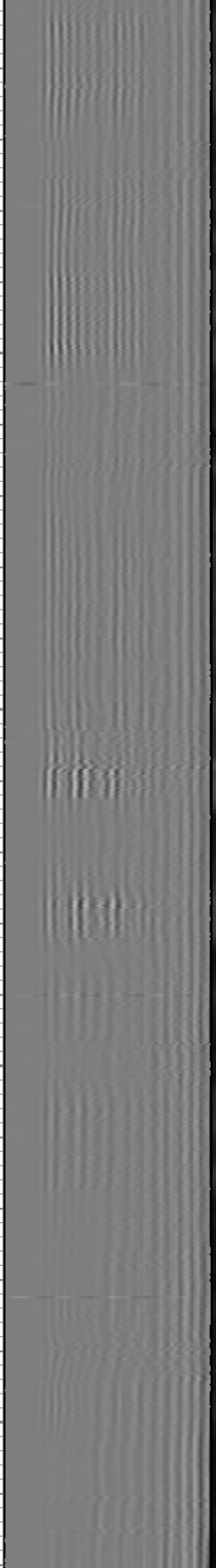
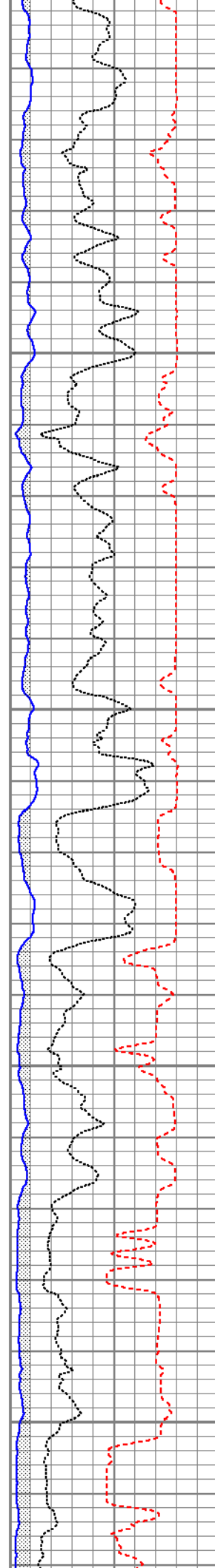


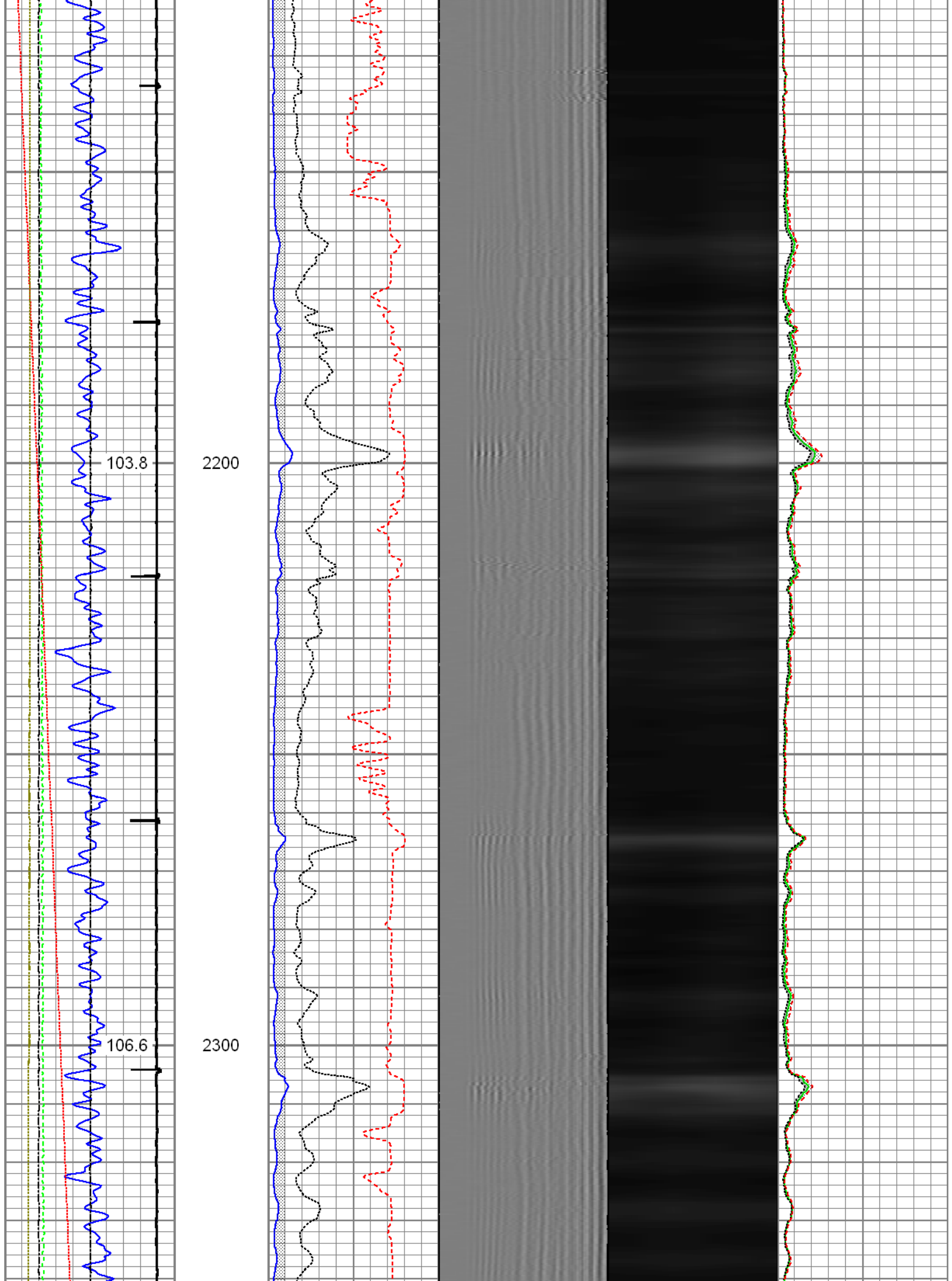


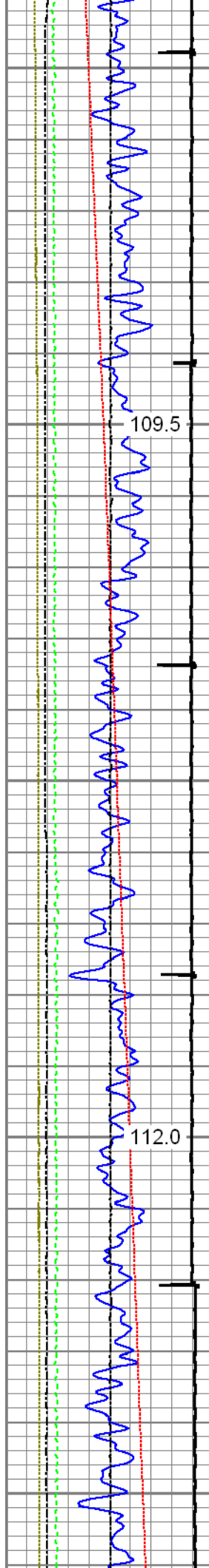




1000  
2000  
2100





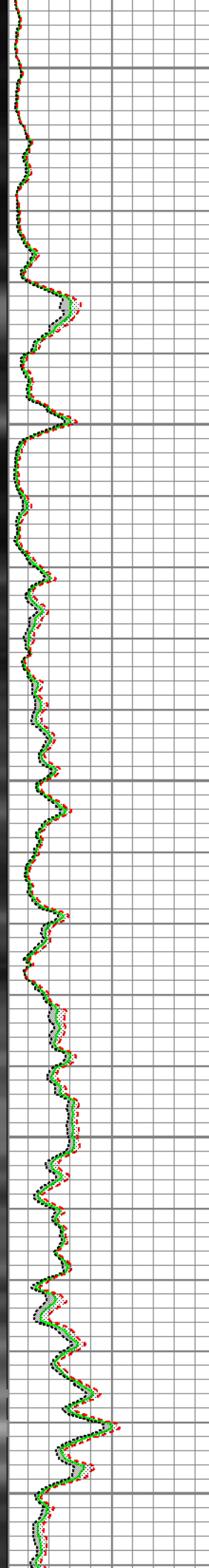
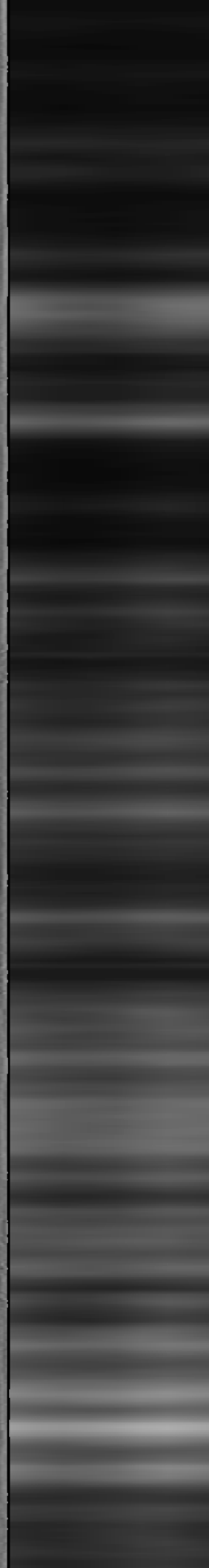
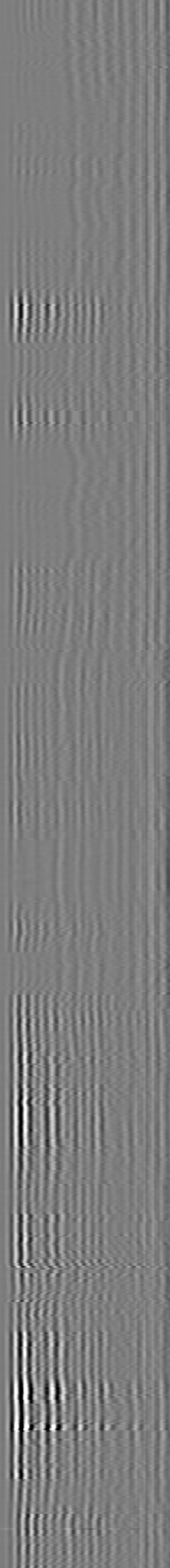
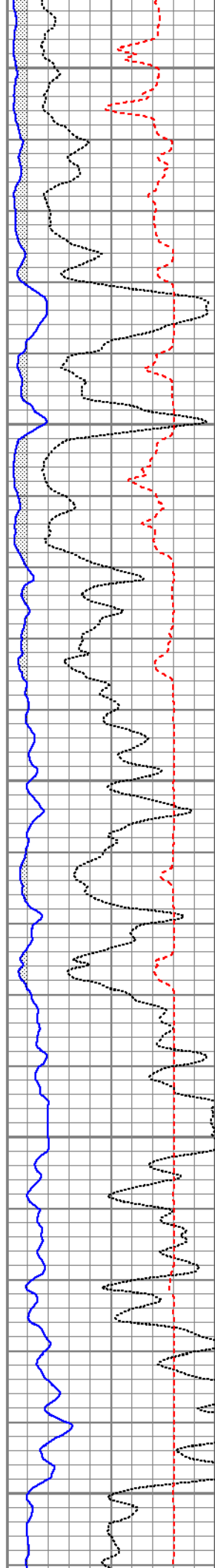


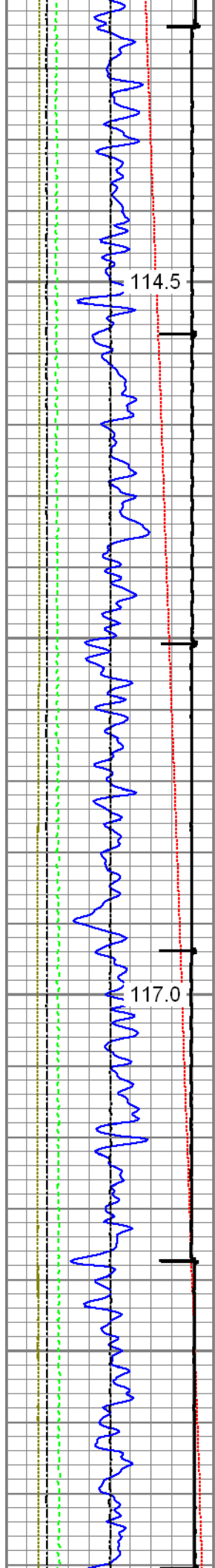
109.5

112.0

2400

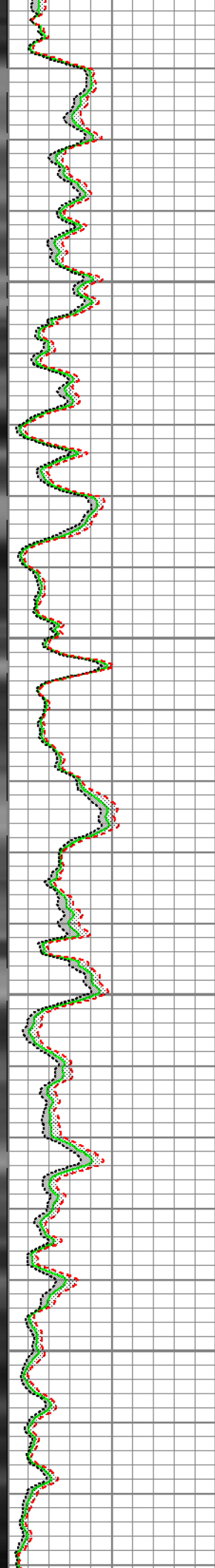
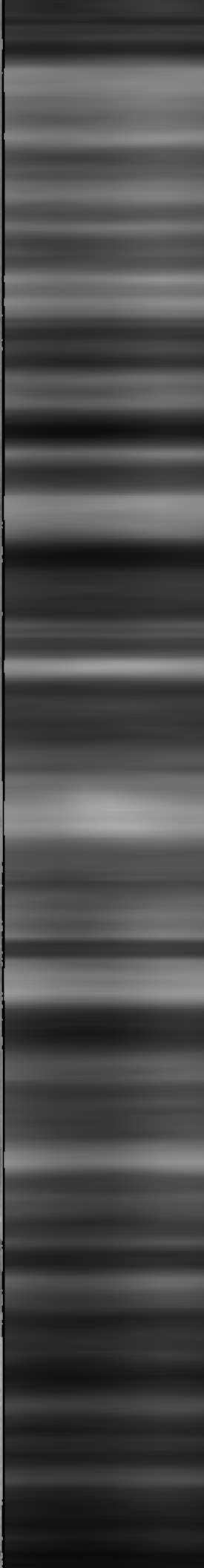
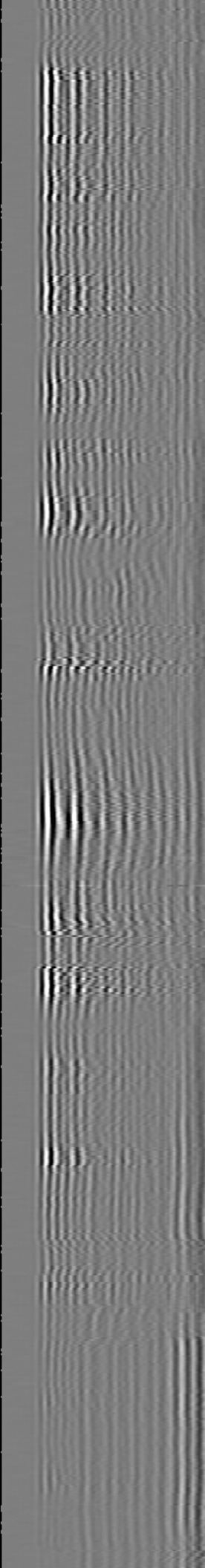
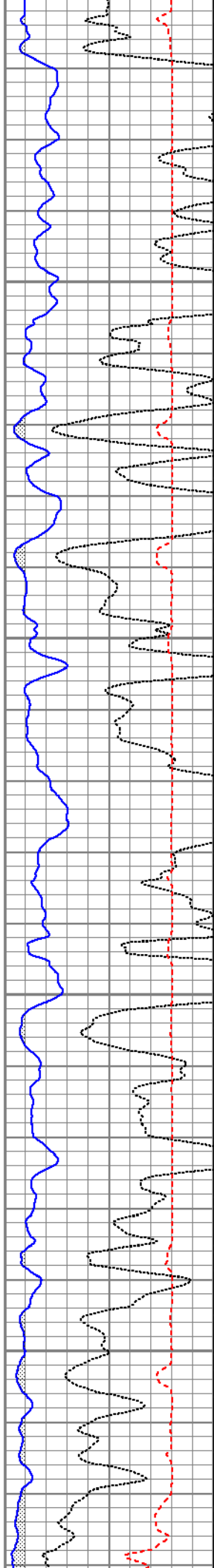
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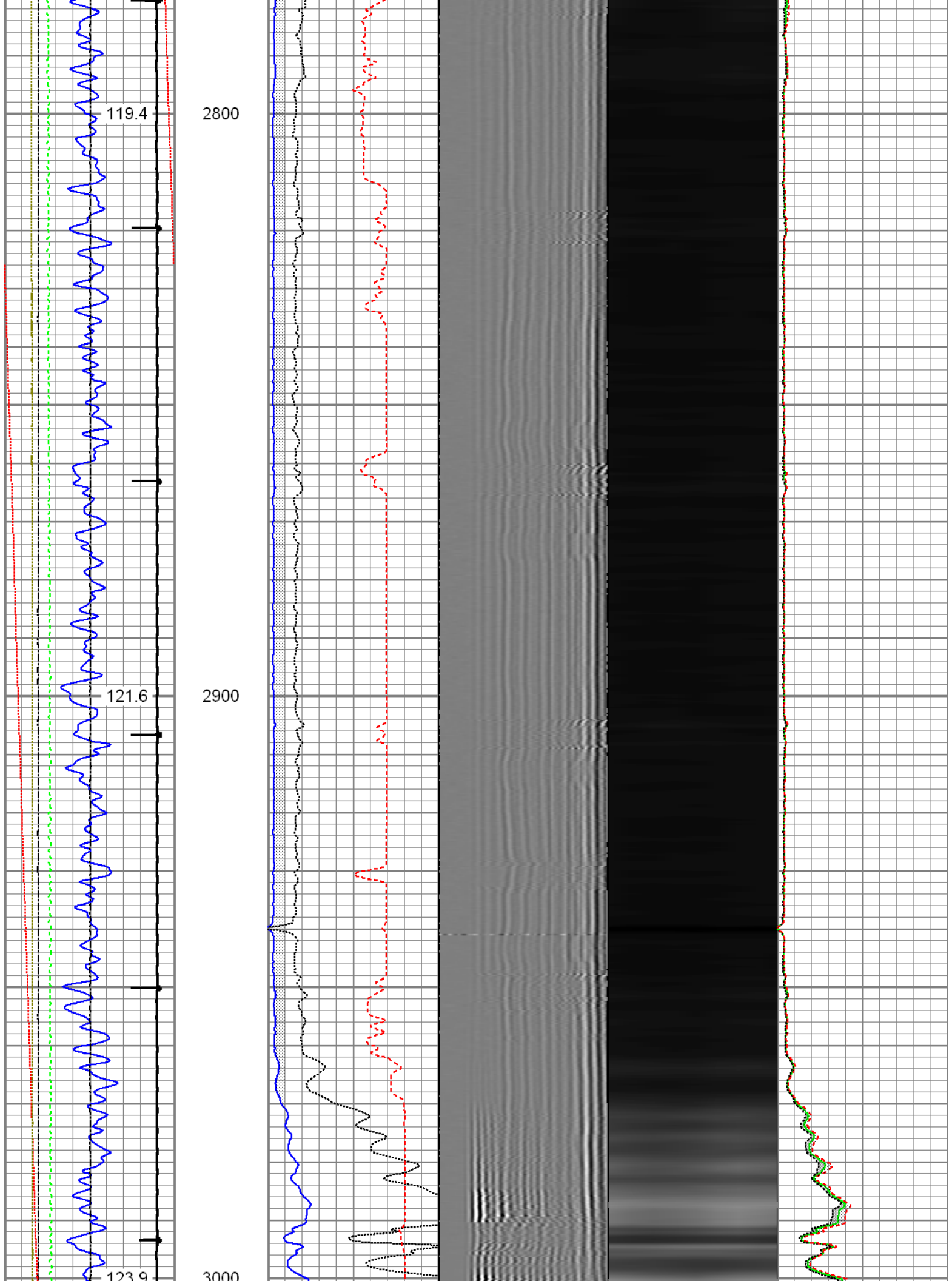


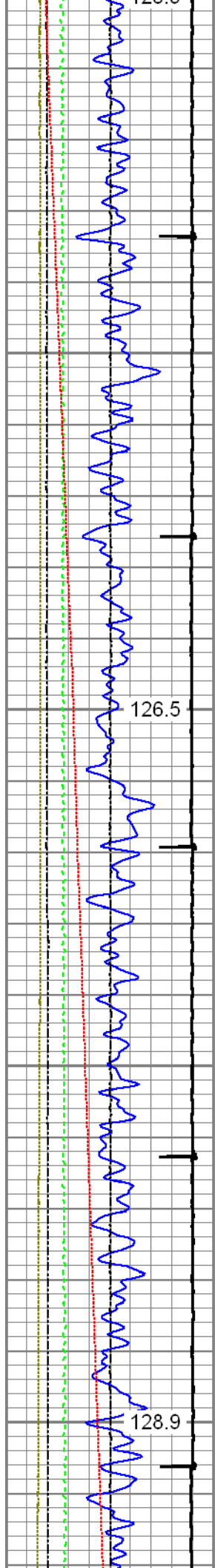
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2700

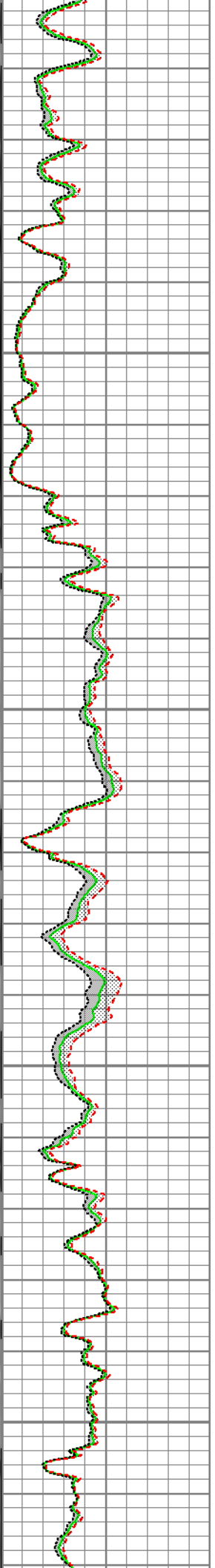
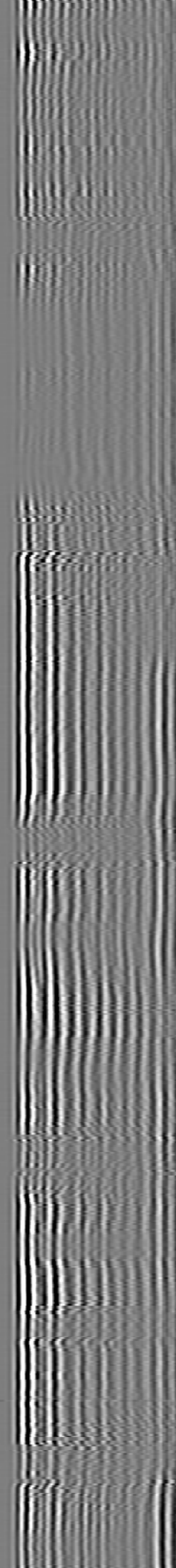
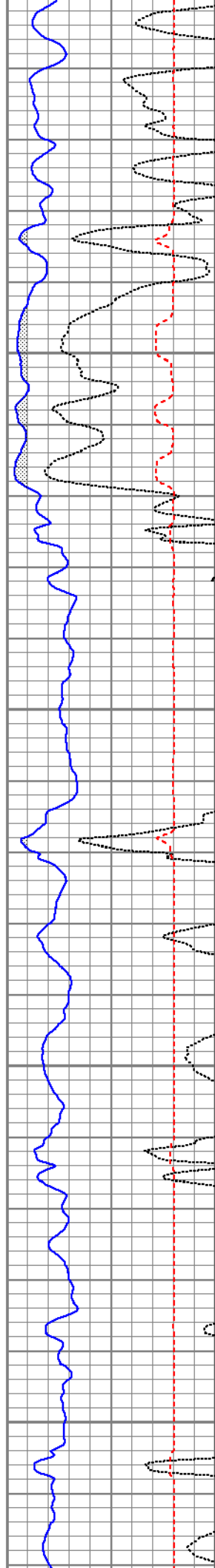


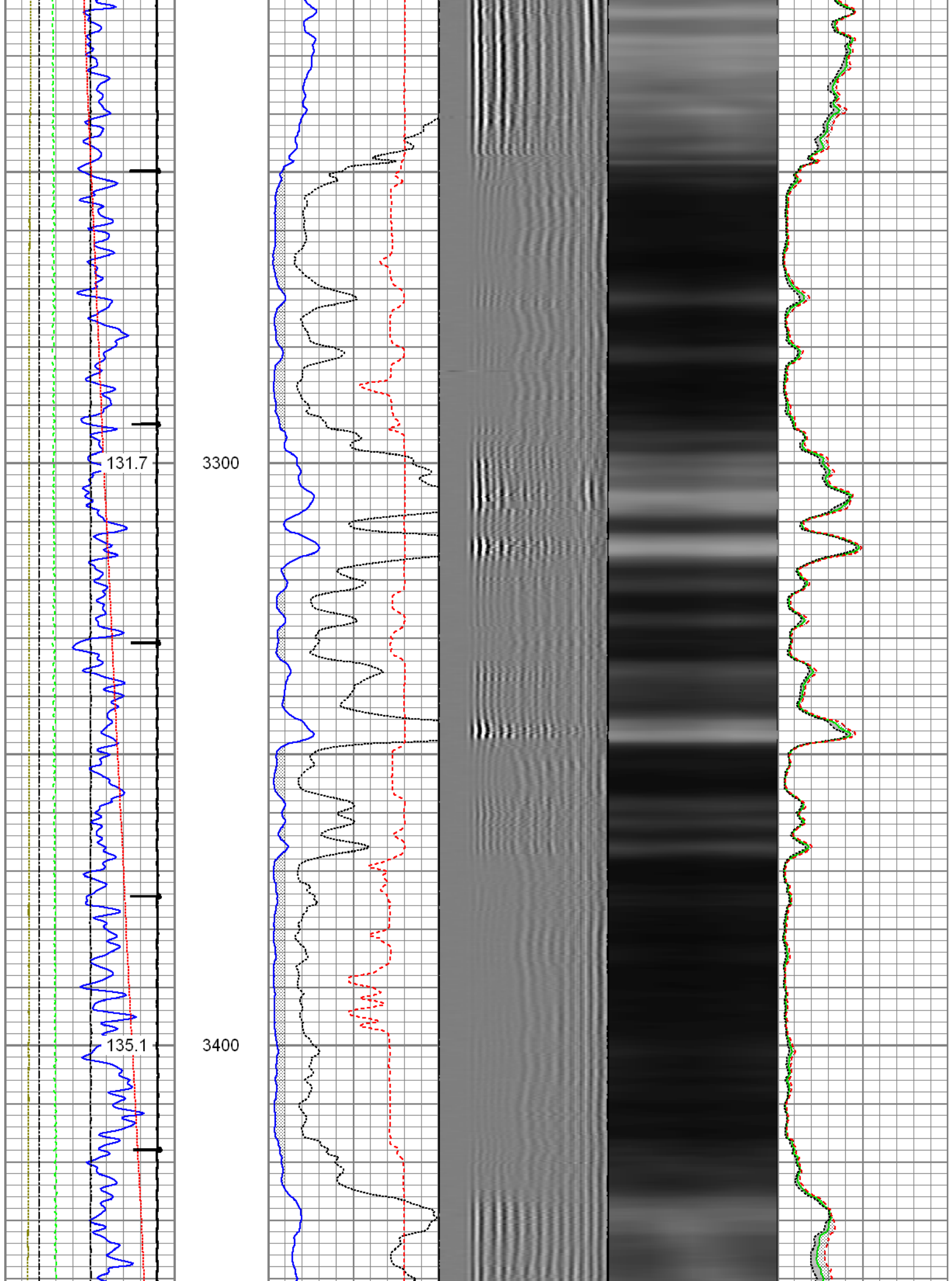


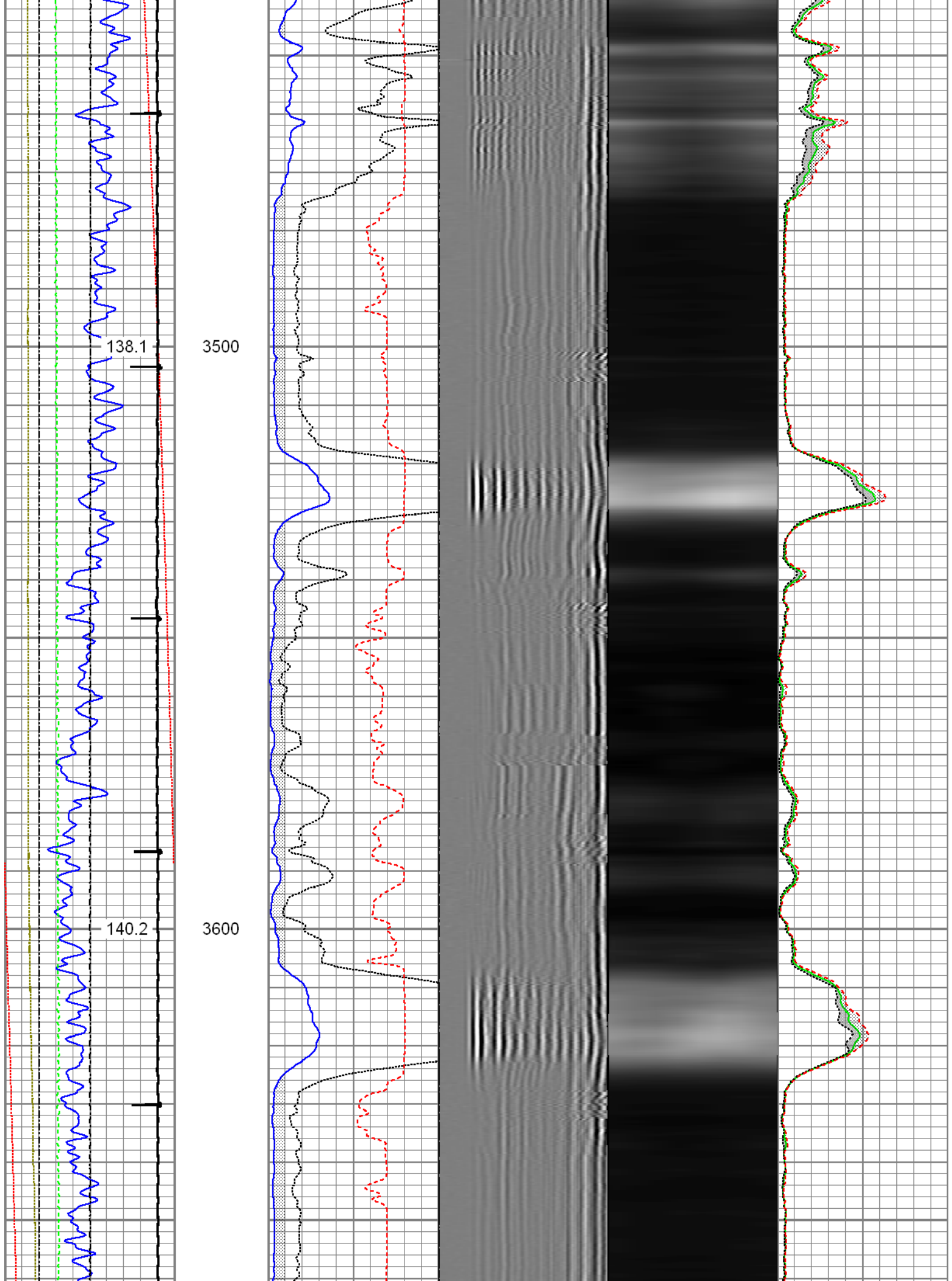




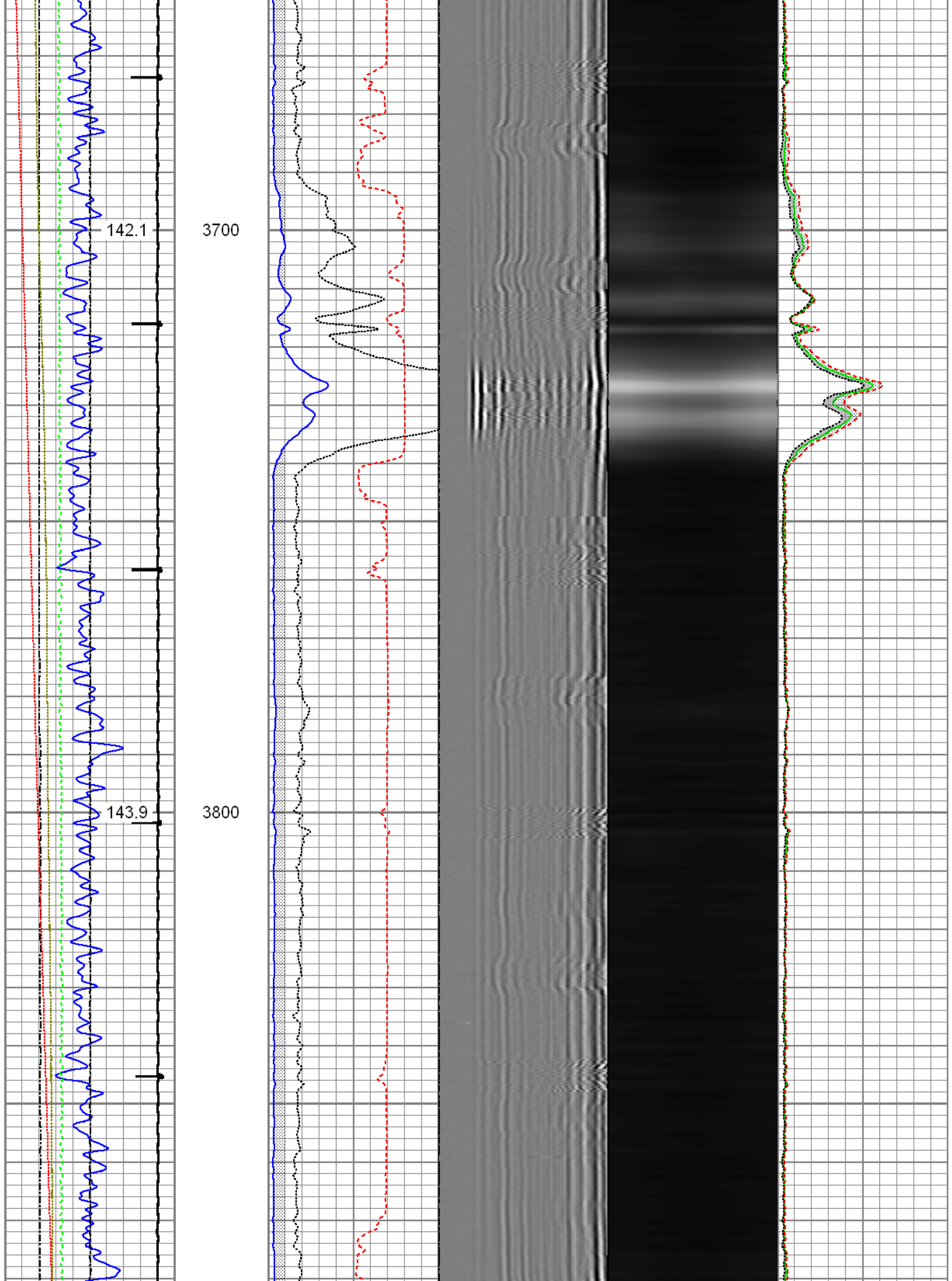
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3100  
3200



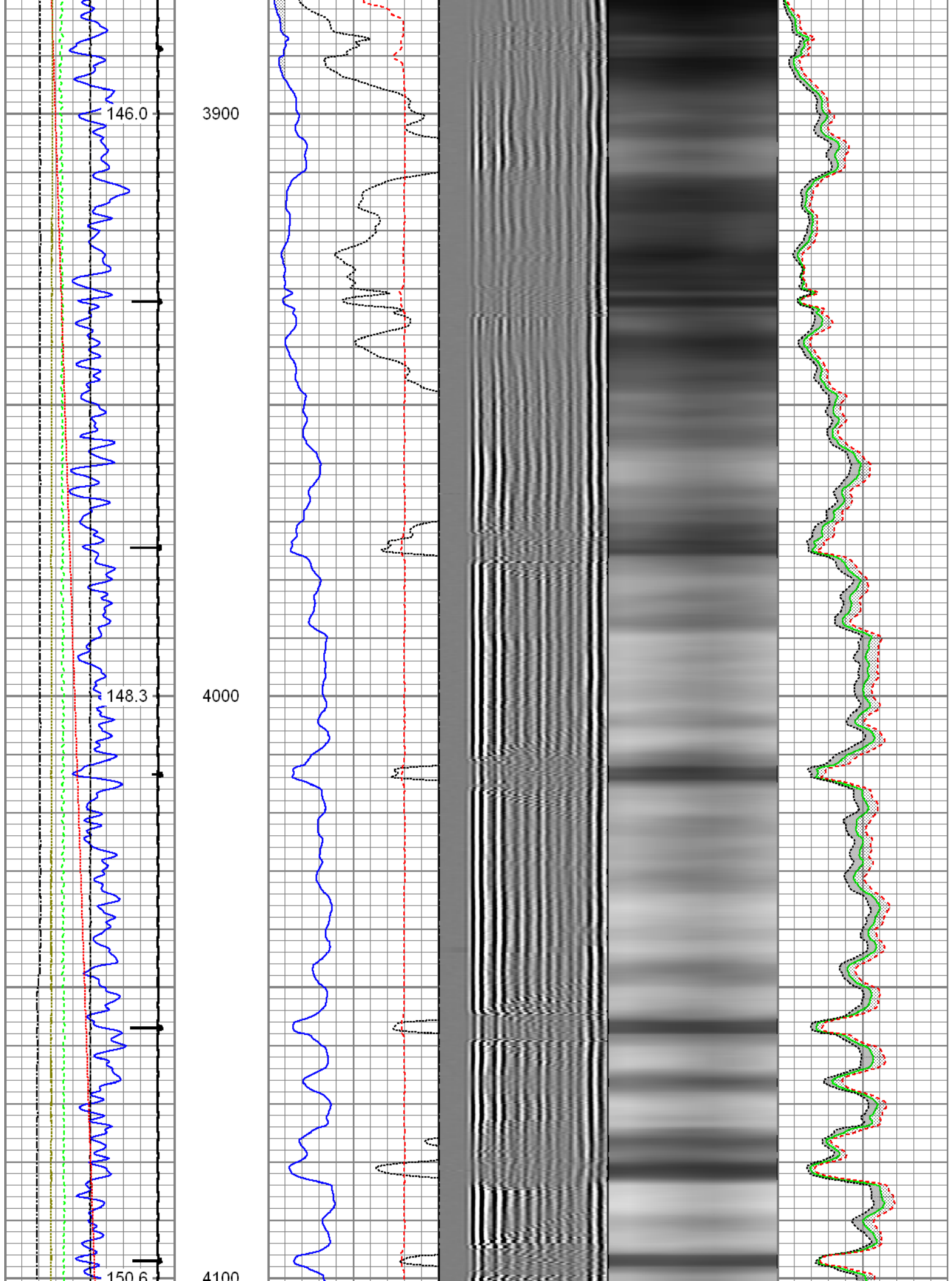


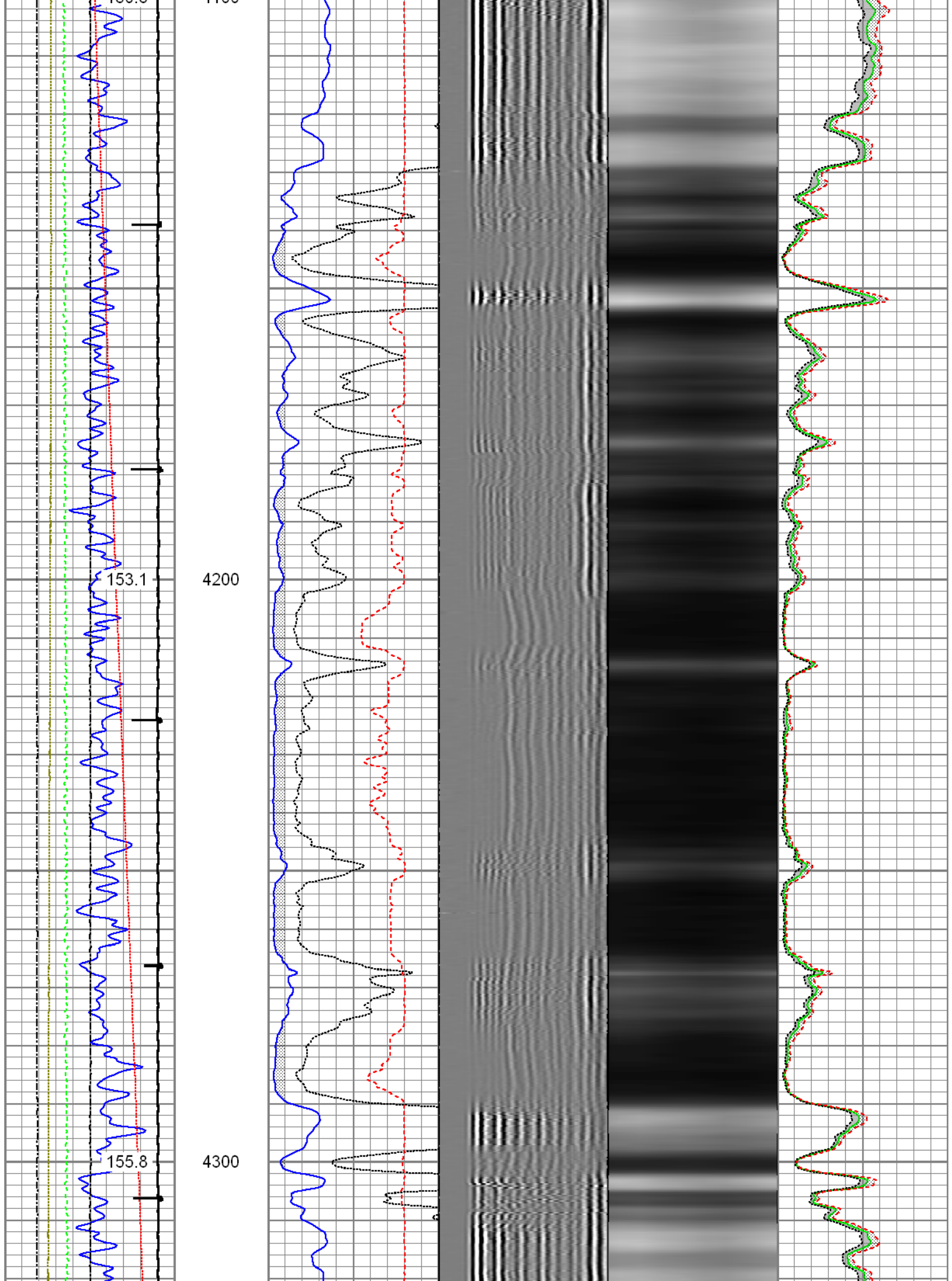


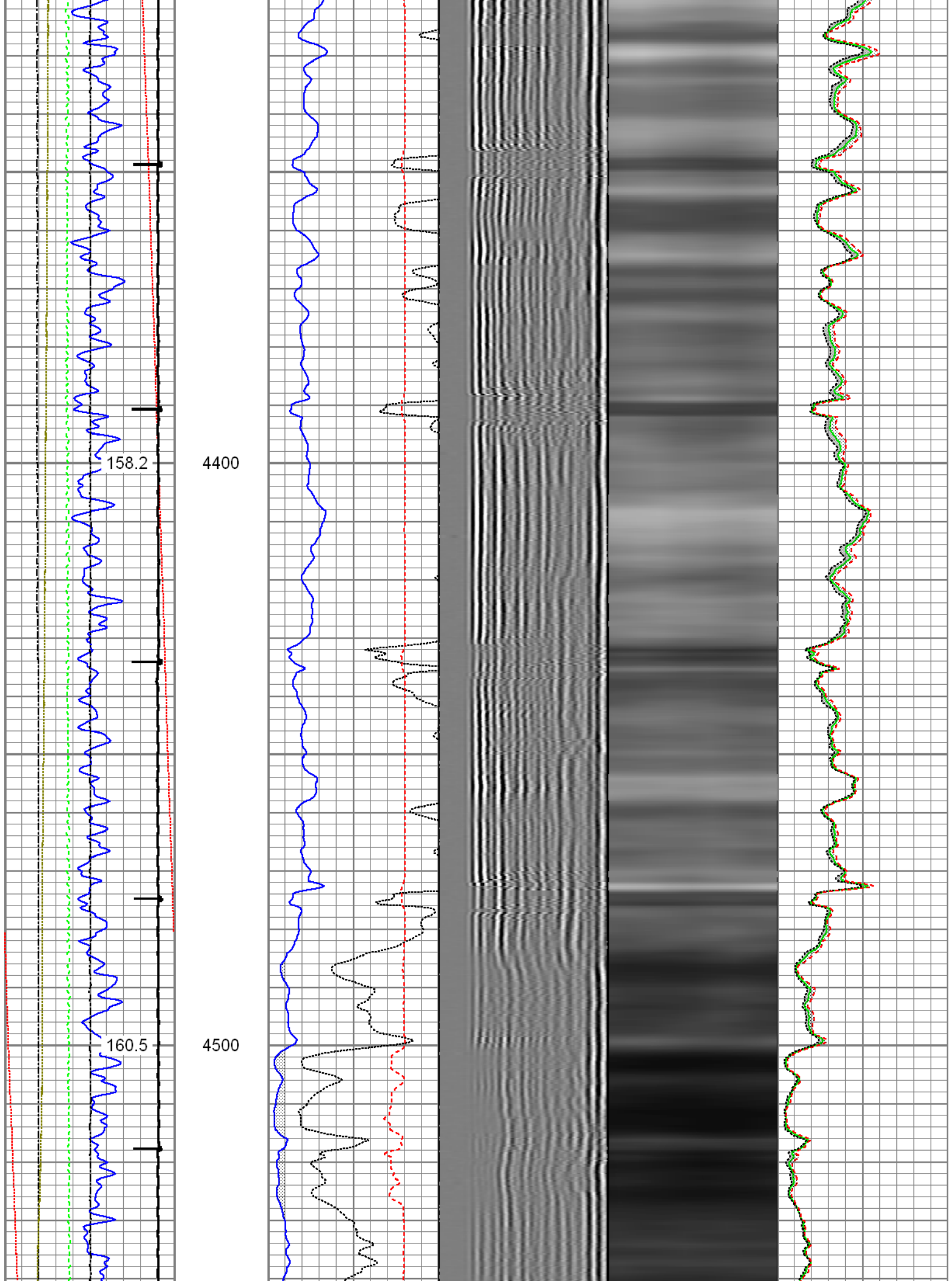


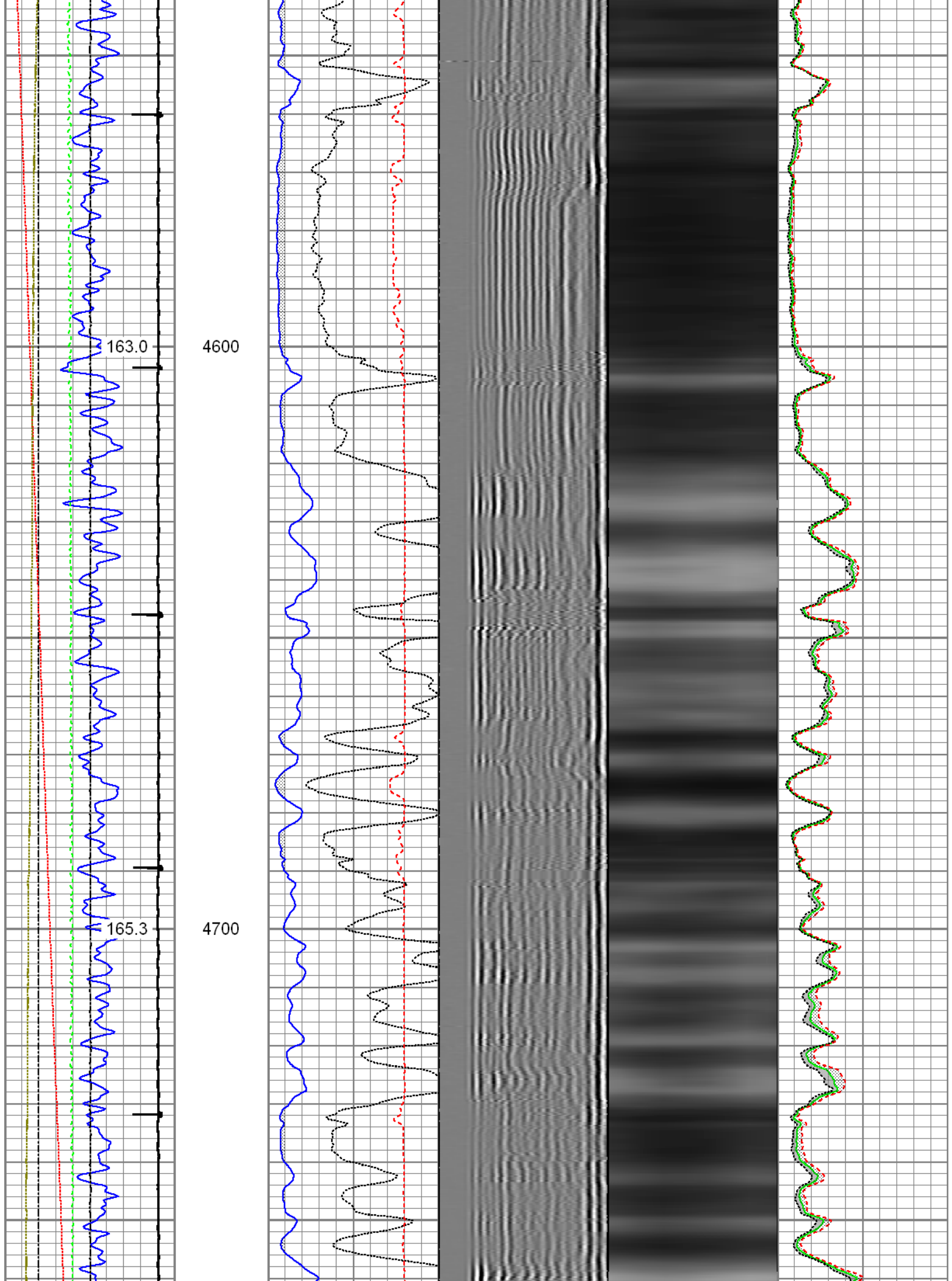




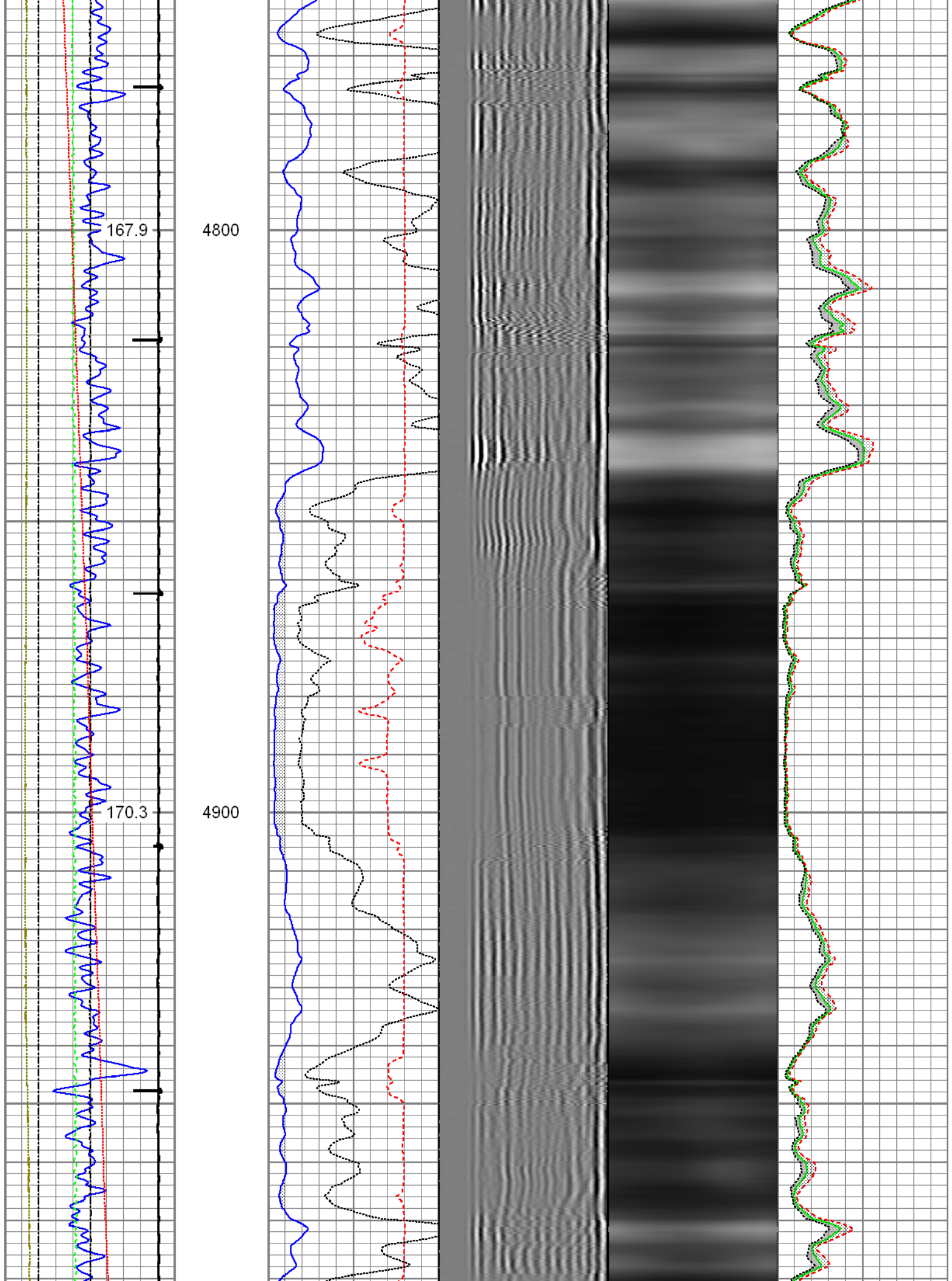




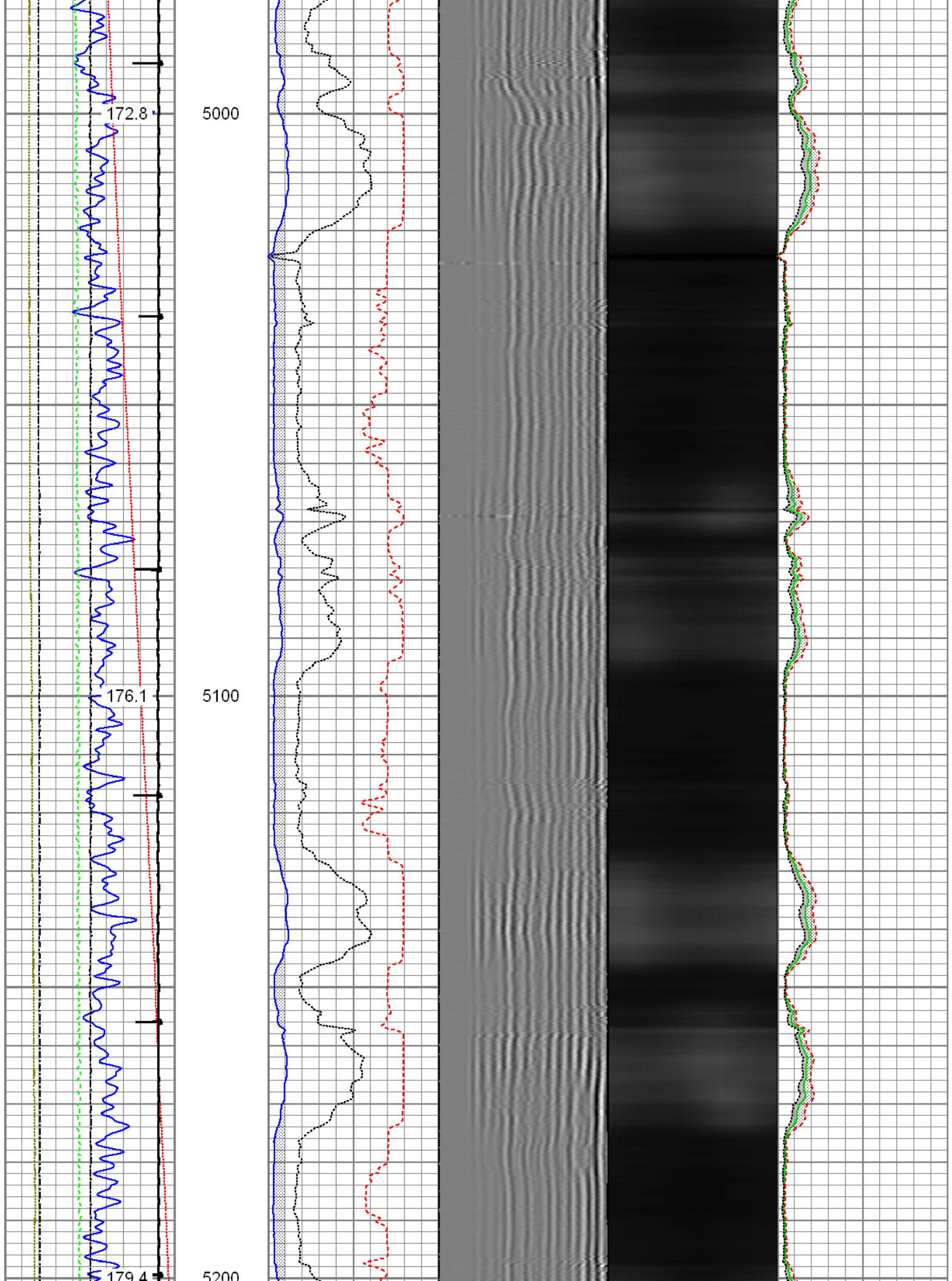


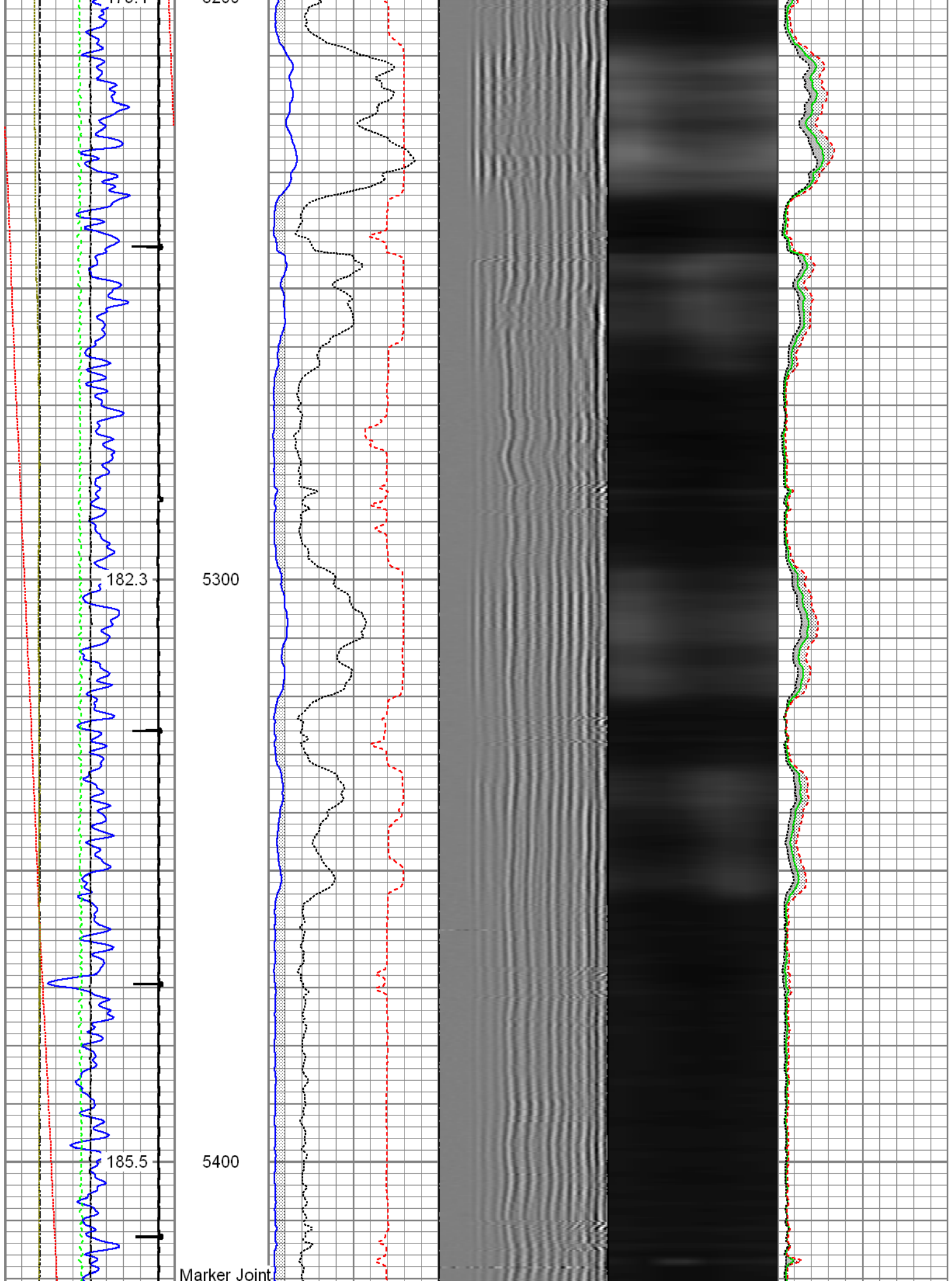


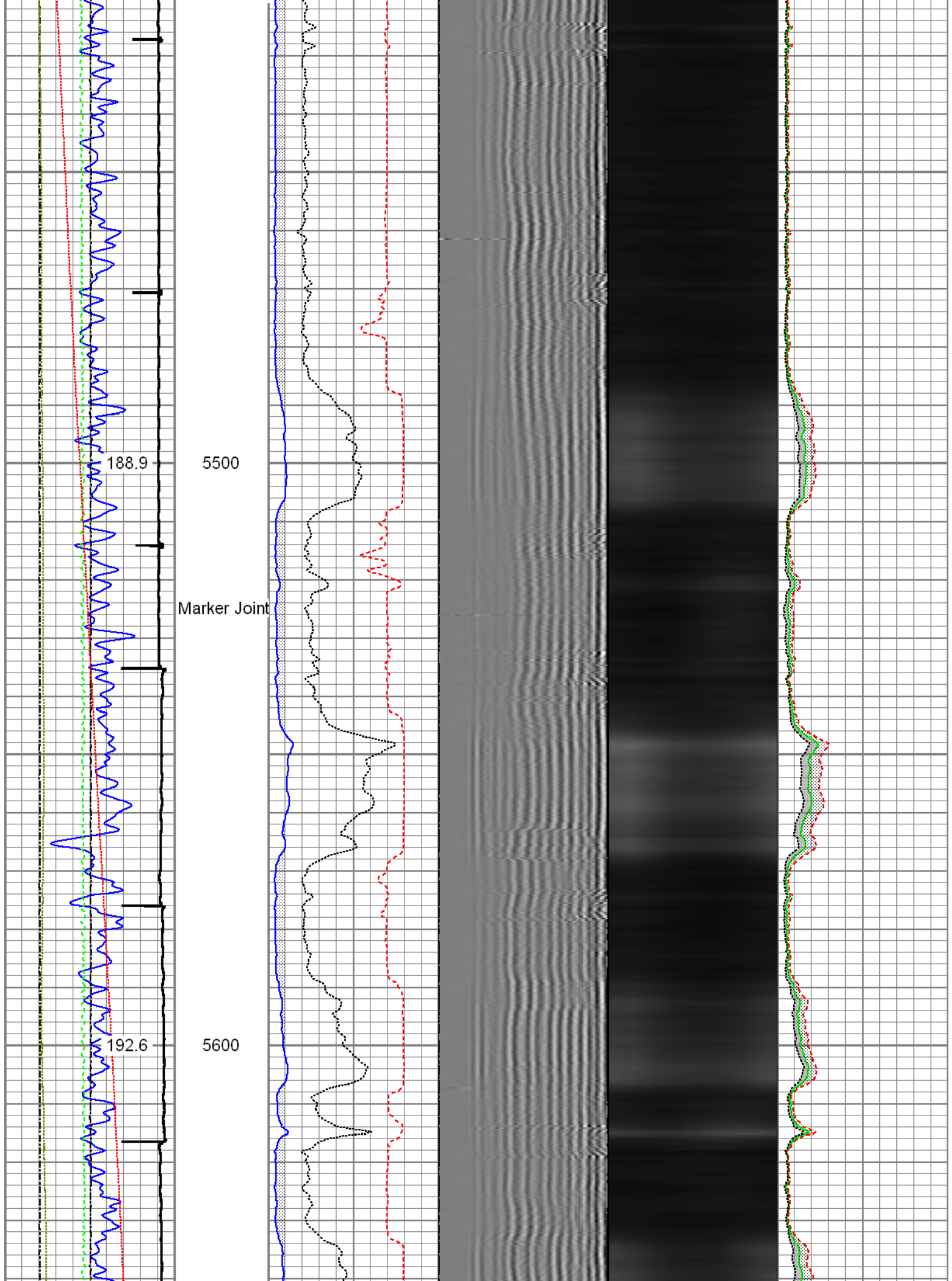


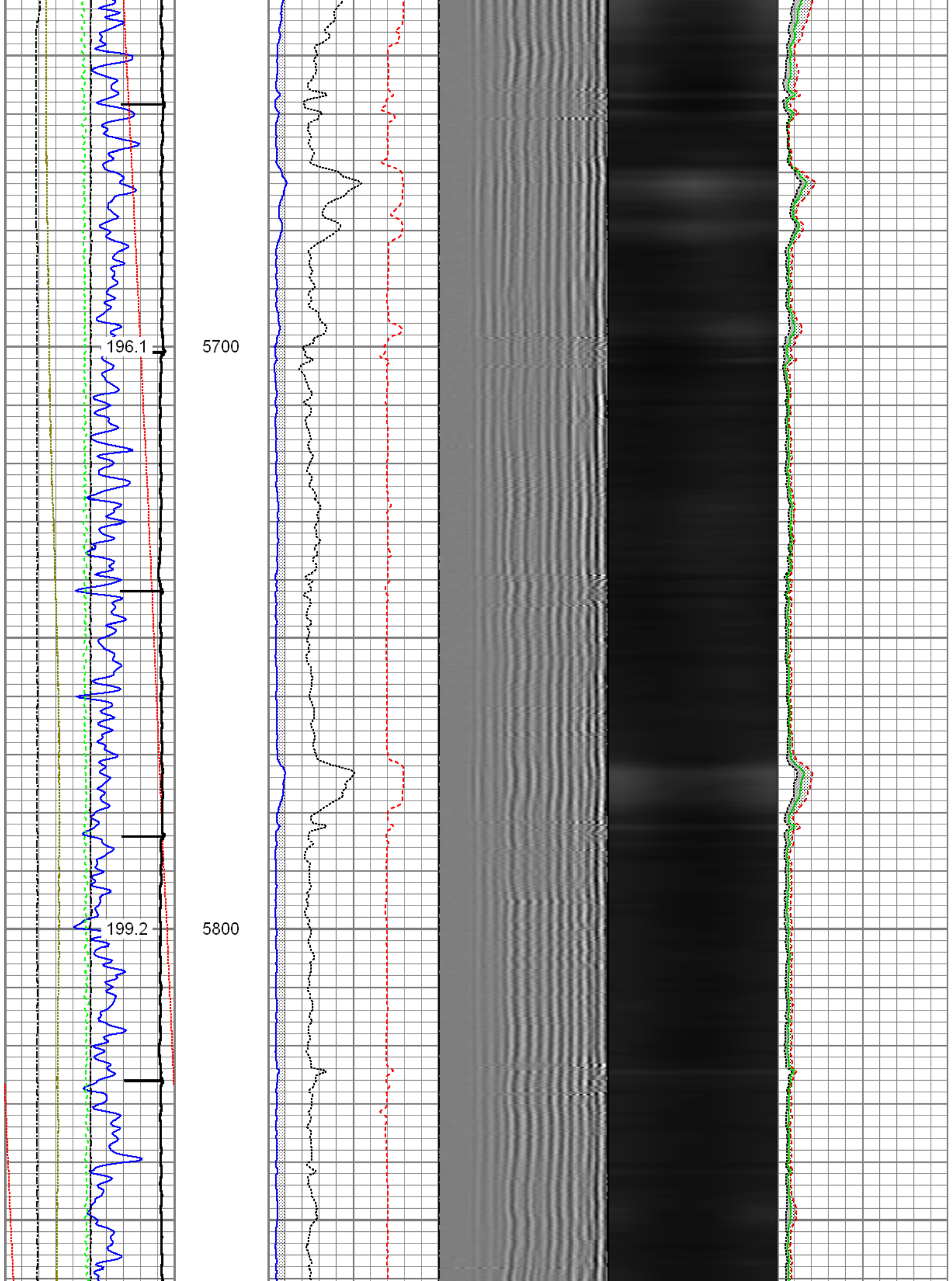




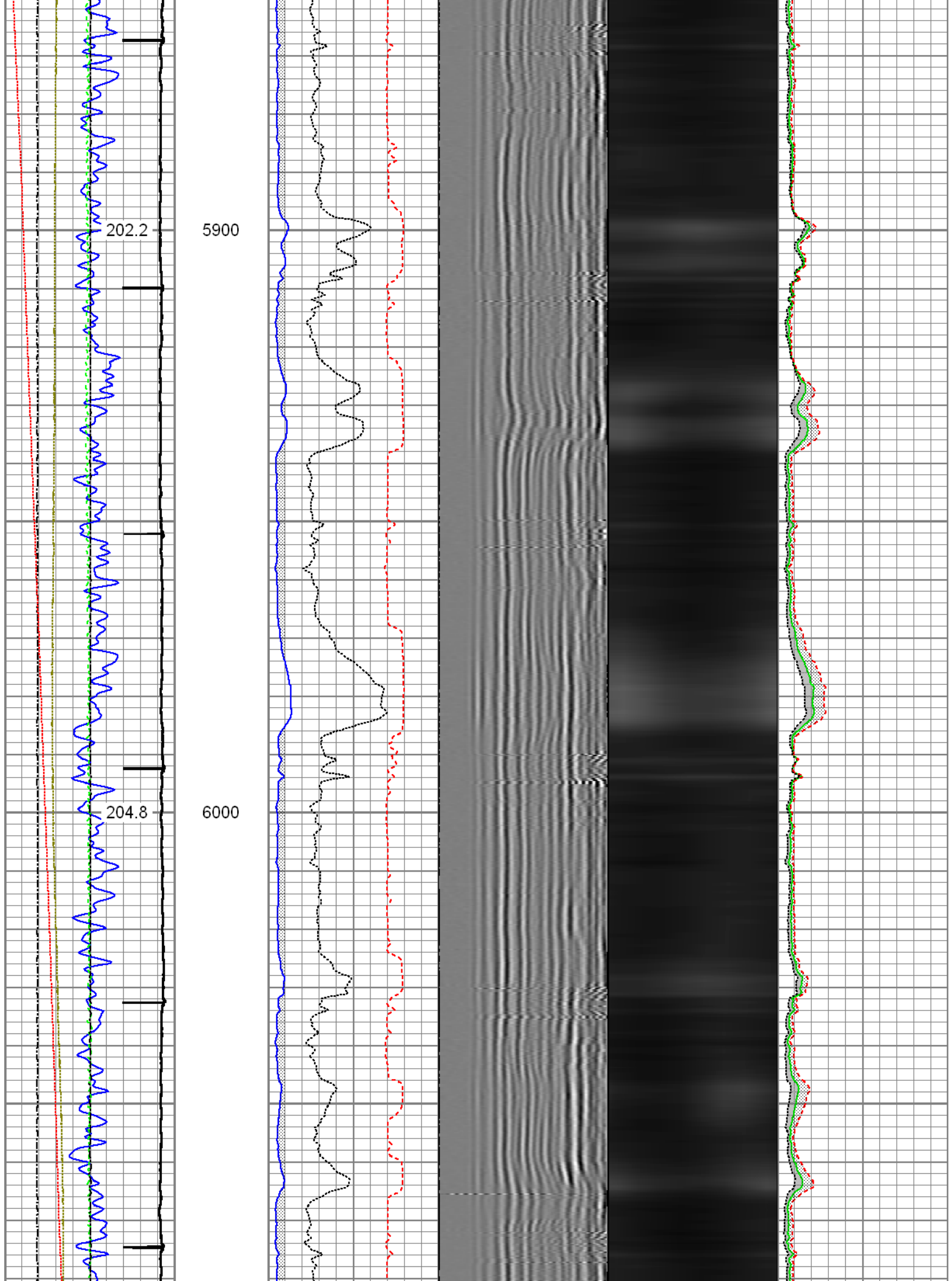




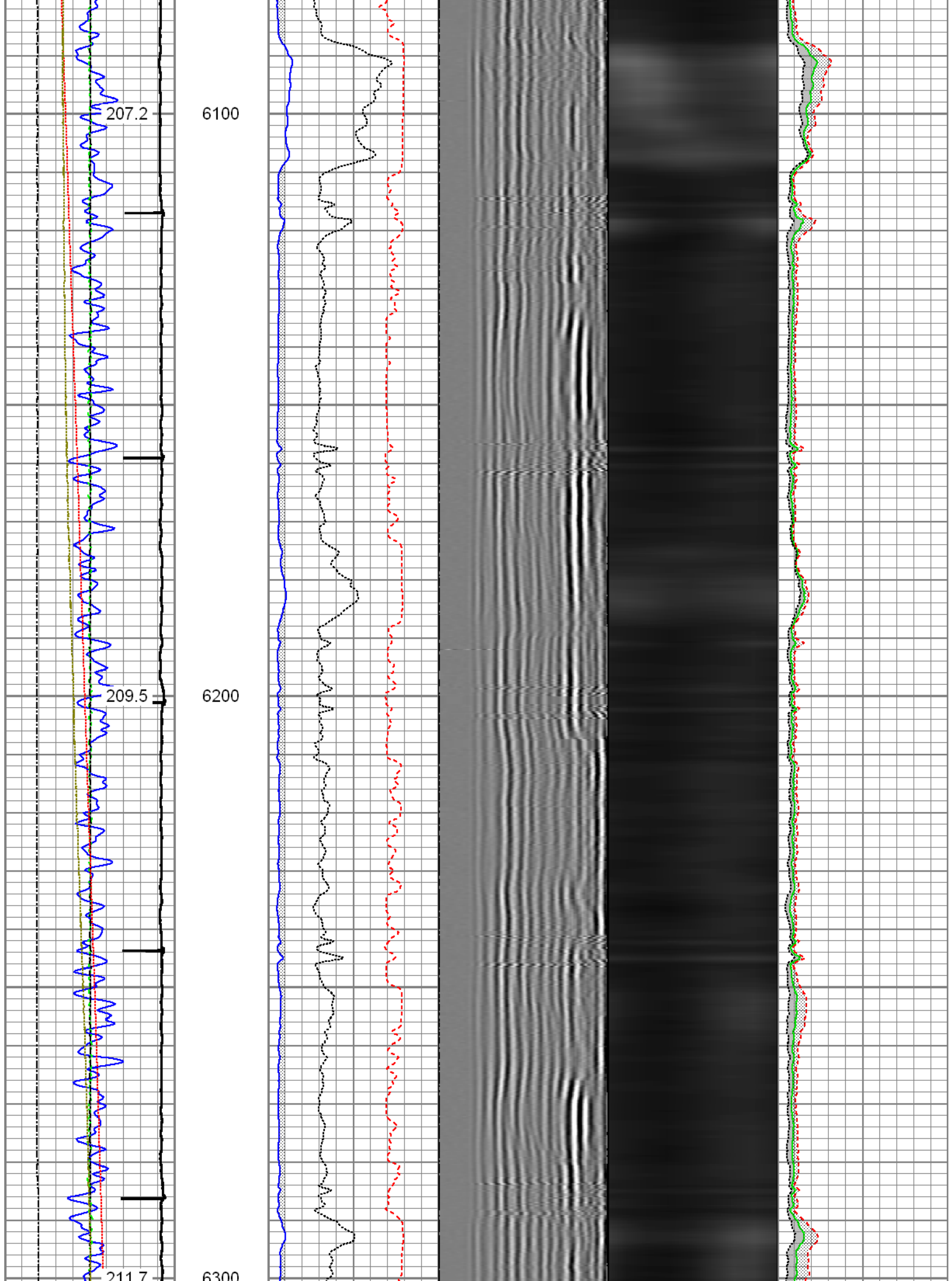


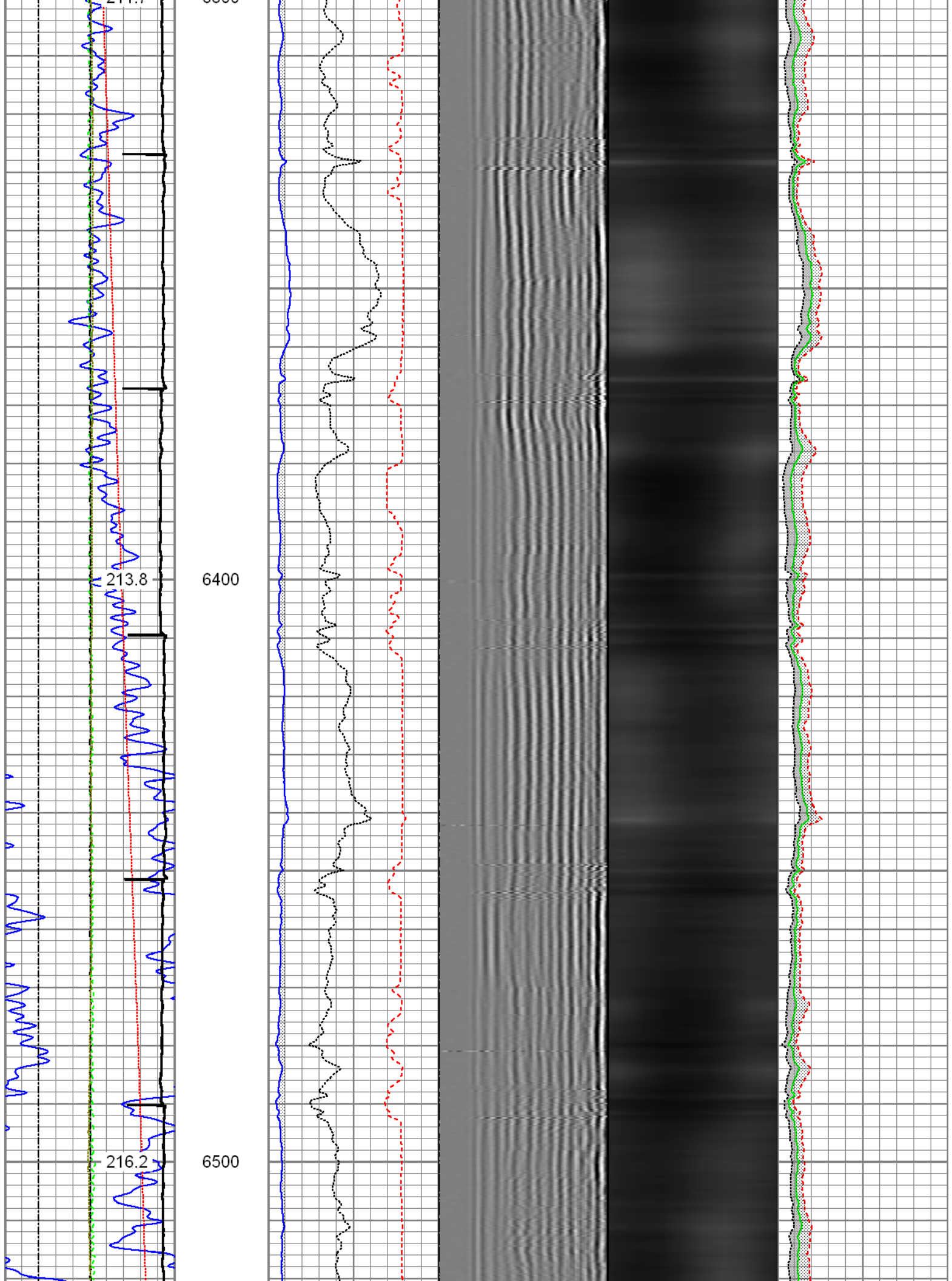


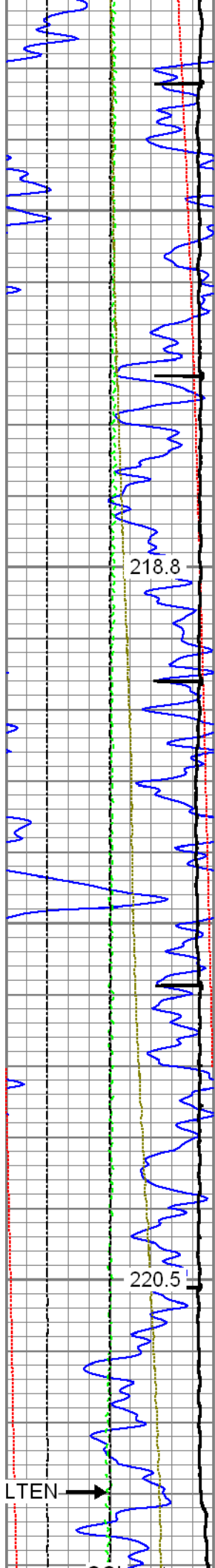










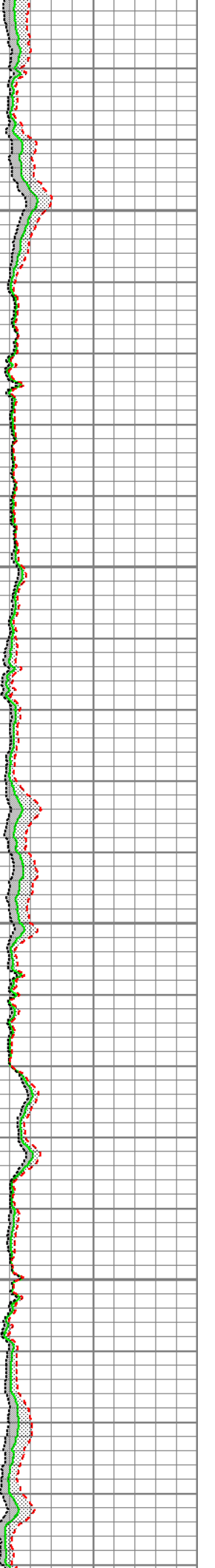
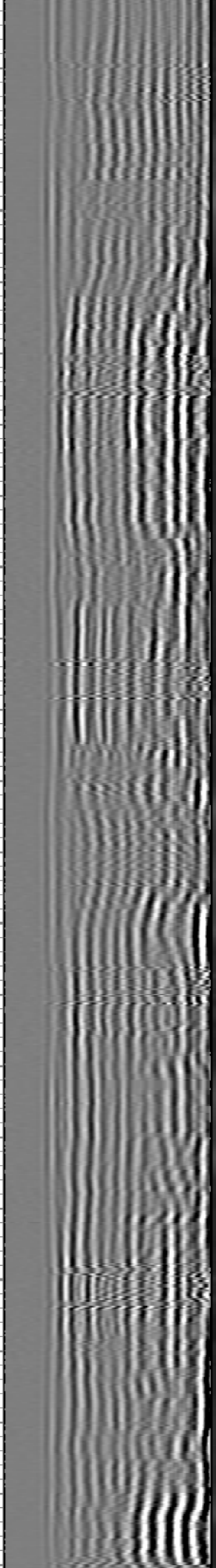
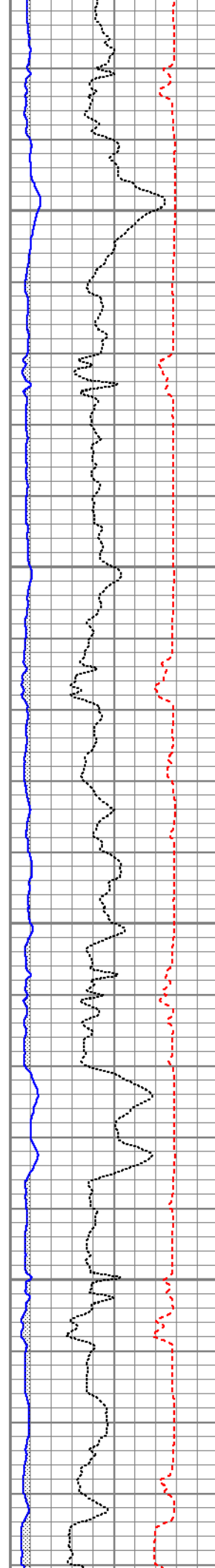


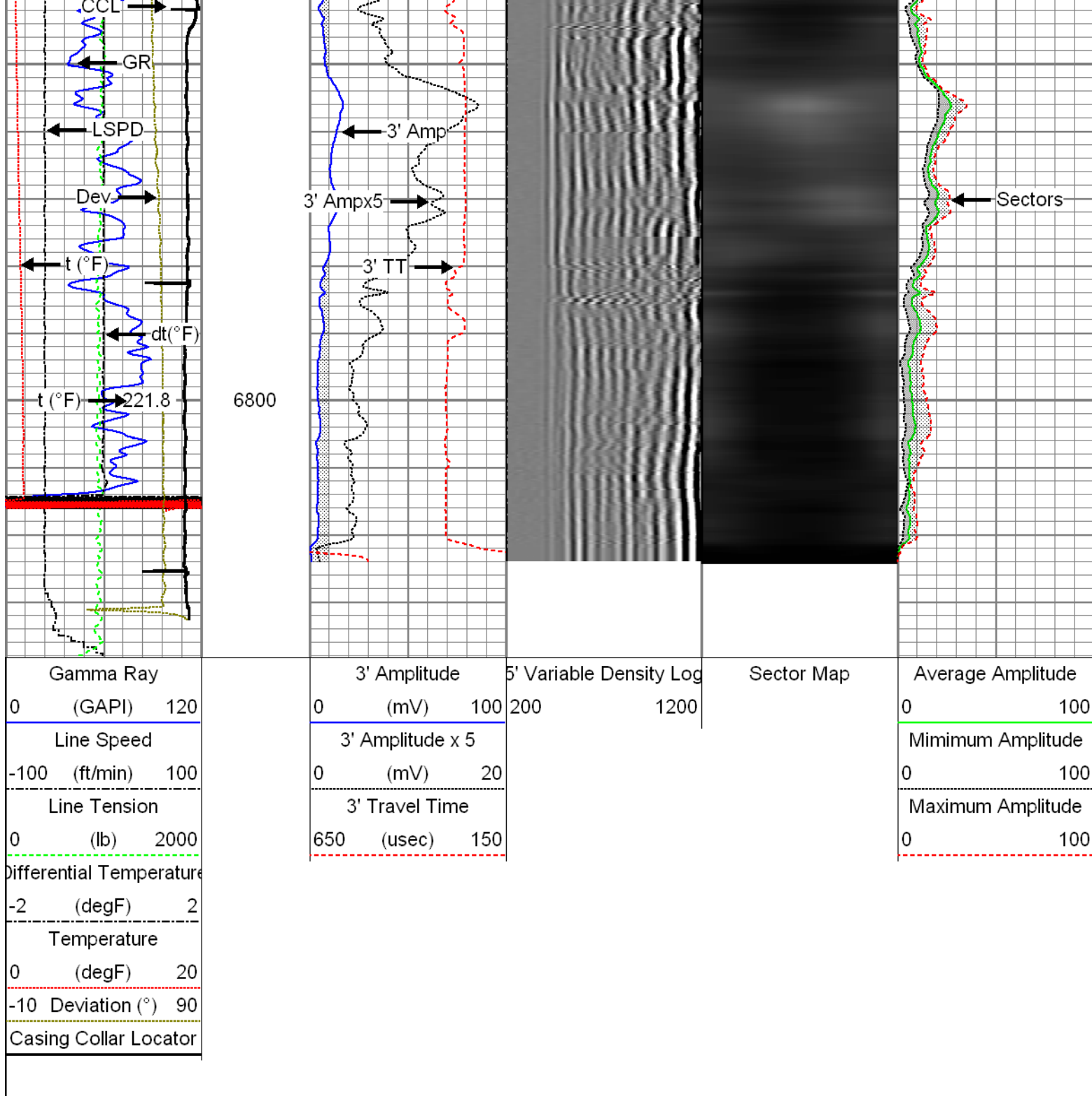
218.8

220.5

6600

6700

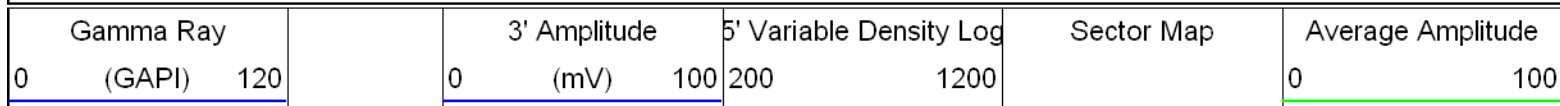




## Repeat Section

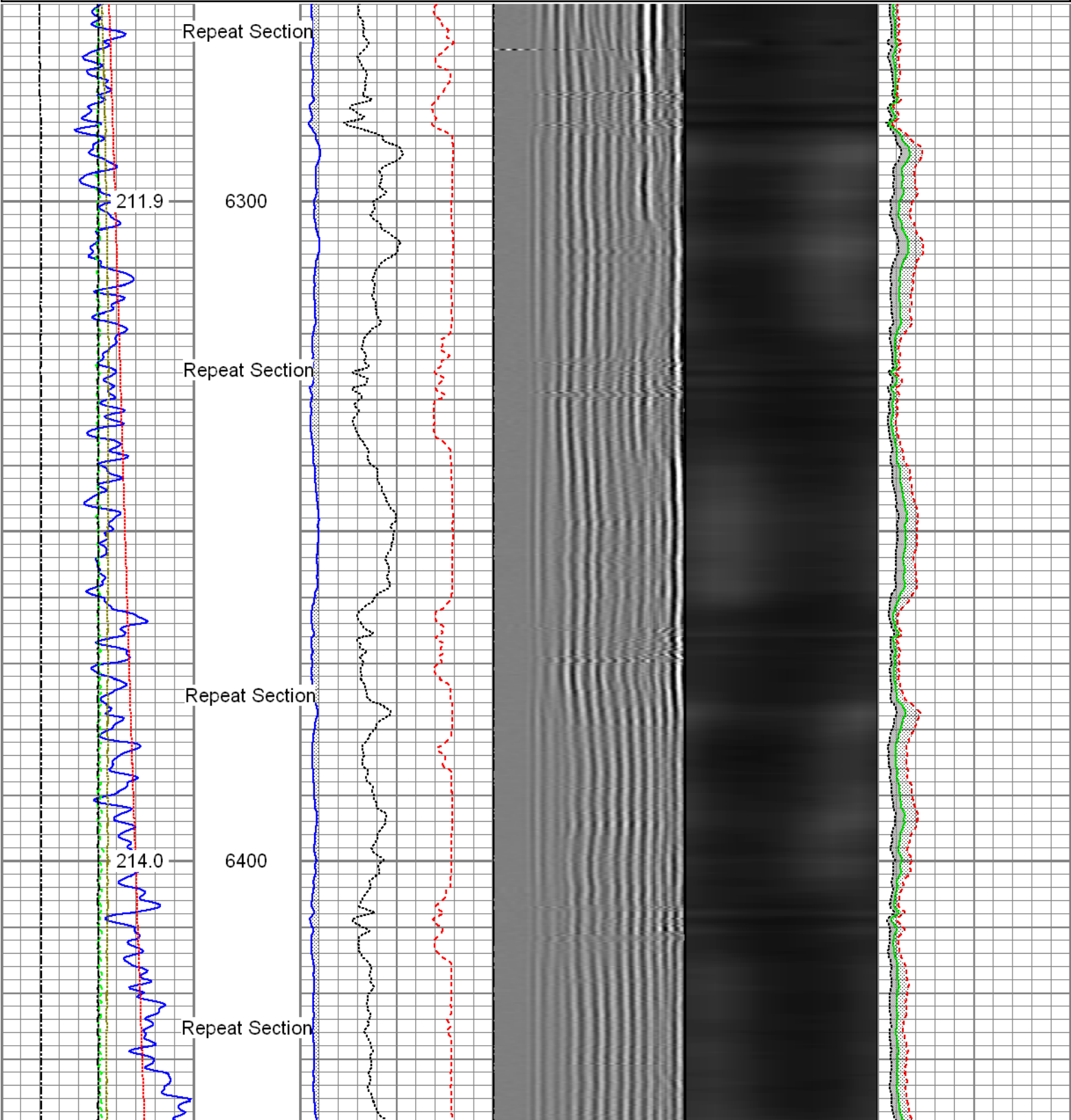
Recorded With 2500 PSI Surface Induced Pressure

Database File: processed\_revised\_noble\_wells\_ranch\_ae32-650\_12-oct-2015\_rbl.db  
 Dataset Pathname: pass2.2  
 Presentation Format: rbt4\_mit  
 Dataset Creation: Thu Oct 15 14:01:11 2015 by Calc 7.0 B1  
 Charted by: Depth in Feet scaled 1:240

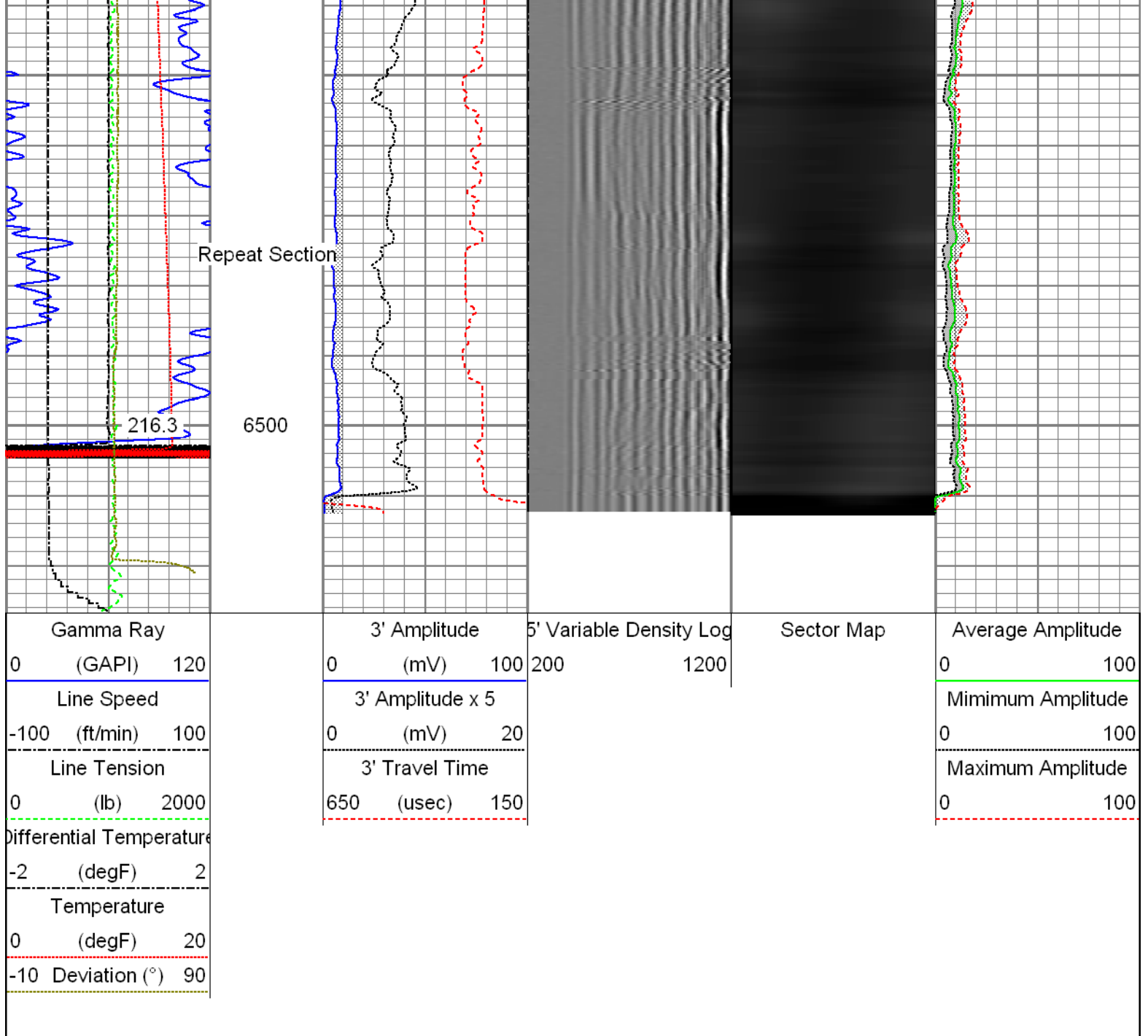




Line Speed			3' Amplitude x 5			Minimum Amplitude		
-100	(ft/min)	100	0	(mV)	20	0		100
Line Tension			3' Travel Time			Maximum Amplitude		
0	(lb)	2000	650	(usec)	150	0		100
Differential Temperature								
-2	(degF)	2						
Temperature								
0	(degF)	20						
-10	Deviation (°)	90						







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 (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

WVF3FT	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					
WVF5FT	14.42					
			UW_PRC-DSSRAC (082) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
MIT	5.41		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
			UW_BUL-UW_BUL_006 (031422) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20
TSTAMP	0.00					
Dataset: PROCESSED_revised_noble_wells_ranch_ae32-650_12-oct-2015_RBL.db: field/well/run1/pass3.2 Total Length: 28.09 ft Total Weight: 324.50 lb O.D. 3.13 in						

Calibration Report			
Database File:	PROCESSED_revised_noble_wells_ranch_ae32-650_12-oct-2015_RBL.db		
Dataset Pathname:	pass4		
Dataset Creation:	Mon Oct 12 17:38:54 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 14:52:55 2015

Ring size: (in)	4	Sens	5	Sens	6	Sens	7
Finger 01:	1368	287.0	1655	288.0	1943	312.0	2255
Finger 02:	1433	283.0	1716	285.0	2001	306.0	2307
Finger 03:	1651	284.0	1935	277.0	2212	299.0	2511
Finger 04:	1660	284.0	1944	275.0	2219	288.0	2507
Finger 05:	1526	267.0	1793	266.0	2059	289.0	2348
Finger 06:	1521	263.0	1784	261.0	2045	278.0	2323
Finger 07:	1339	276.0	1615	282.0	1897	306.0	2203
Finger 08:	1533	261.0	1794	261.0	2055	280.0	2335
Finger 09:	1407	270.0	1677	286.0	1963	303.0	2266
Finger 10:	1480	267.0	1747	277.0	2024	290.0	2314
Finger 11:	1468	261.0	1729	275.0	2004	286.0	2290
Finger 12:	1314	275.0	1589	298.0	1887	315.0	2202
Finger 13:	1573	275.0	1848	294.0	2142	299.0	2441
Finger 14:	1443	279.0	1722	302.0	2024	310.0	2334
Finger 15:	1534	257.0	1791	288.0	2079	282.0	2361
Finger 16:	1401	273.0	1674	304.0	1978	311.0	2289
Finger 17:	1635	265.0	1900	296.0	2196	282.0	2478
Finger 18:	1376	280.0	1656	317.0	1973	325.0	2298
Finger 19:	1635	253.0	1888	275.0	2163	262.0	2425
Finger 20:	1504	256.0	1760	285.0	2045	292.0	2337
Finger 21:	1589	244.0	1833	288.0	2121	263.0	2384
Finger 22:	1458	272.0	1730	287.0	2017	284.0	2301
Finger 23:	1347	265.0	1612	299.0	1911	302.0	2213
Finger 24:	1676	260.0	1936	280.0	2216	278.0	2494
Finger 25:	1360	283.0	1643	331.0	1974	312.0	2286
Finger 26:	1530	283.0	1813	309.0	2122	309.0	2431
Finger 27:	1469	257.0	1726	278.0	2004	281.0	2285
Finger 28:	1628	270.0	1898	302.0	2200	295.0	2495
Finger 29:	1464	270.0	1734	295.0	2029	299.0	2328
Finger 30:	1416	274.0	1690	303.0	1993	301.0	2294
Finger 31:	1522	265.0	1787	283.0	2070	285.0	2355
Finger 32:	1338	267.0	1605	284.0	1889	295.0	2184
Finger 33:	1602	302.0	1904	314.0	2218	316.0	2534
Finger 34:	1533	271.0	1804	279.0	2083	284.0	2367
Finger 35:	1432	267.0	1699	294.0	1993	295.0	2288
Finger 36:	1578	286.0	1864	291.0	2155	296.0	2451
Finger 37:	1593	280.0	1873	281.0	2154	294.0	2448
Finger 38:	1483	279.0	1762	283.0	2045	300.0	2345
Finger 39:	1455	281.0	1736	292.0	2028	324.0	2352
Finger 40:	1573	291.0	1864	290.0	2154	310.0	2464

### Post Survey Calibration Check

Performed: Mon Oct 12 17:38:50 2015

Ring size: (in)	4	Nom. wear	5	Nom. wear	6	Nom. wear	7	Nom. wear
Finger 01:	3.992	-0.004	4.998	-0.001	5.986	-0.007	7.000	0.000
Finger 02:	3.994	-0.003	4.995	-0.003	5.981	-0.009	6.998	-0.001
Finger 03:	3.988	-0.006	4.997	-0.001	5.986	-0.007	6.975	-0.013
Finger 04:	3.983	-0.009	4.996	-0.002	5.985	-0.008	6.995	-0.003
Finger 05:	3.997	-0.001	5.001	0.001	5.991	-0.005	6.985	-0.008
Finger 06:	4.006	0.003	5.006	0.003	5.990	-0.005	6.994	-0.003
Finger 07:	3.999	-0.000	4.998	-0.001	5.986	-0.007	6.986	-0.007
Finger 08:	3.999	-0.000	5.000	0.000	5.984	-0.008	6.994	-0.003

Finger 09:	3.985	-0.008	5.005	0.003	5.988	-0.006	7.007	0.004
Finger 10:	4.003	0.002	5.008	0.004	5.991	-0.005	6.993	-0.004
Finger 11:	3.999	-0.000	5.004	0.002	6.004	0.002	7.006	0.003
Finger 12:	4.003	0.001	5.004	0.002	5.991	-0.005	6.989	-0.006
Finger 13:	3.998	-0.001	5.010	0.005	5.992	-0.004	6.987	-0.007
Finger 14:	4.012	0.006	5.015	0.008	6.014	0.007	7.008	0.004
Finger 15:	3.991	-0.004	4.998	-0.001	5.962	-0.019	6.976	-0.012
Finger 16:	4.002	0.001	5.004	0.002	5.994	-0.003	6.986	-0.007
Finger 17:	3.989	-0.006	4.998	-0.001	5.968	-0.016	6.984	-0.008
Finger 18:	3.988	-0.006	4.994	-0.003	5.997	-0.002	6.990	-0.005
Finger 19:	3.989	-0.006	4.998	-0.001	5.980	-0.010	6.991	-0.004
Finger 20:	3.991	-0.004	4.999	-0.000	6.011	0.005	6.994	-0.003
Finger 21:	3.997	-0.001	5.005	0.003	5.933	-0.033	6.944	-0.028
Finger 22:	3.988	-0.006	5.012	0.006	5.994	-0.003	7.045	0.023
Finger 23:	3.983	-0.009	5.007	0.004	6.004	0.002	7.002	0.001
Finger 24:	3.993	-0.004	4.989	-0.005	6.001	0.000	6.999	-0.001
Finger 25:	3.995	-0.002	4.997	-0.001	5.958	-0.021	6.982	-0.009
Finger 26:	4.005	0.002	4.998	-0.001	5.991	-0.005	6.972	-0.014
Finger 27:	4.009	0.005	5.003	0.001	6.015	0.007	7.006	0.003
Finger 28:	3.993	-0.003	5.008	0.004	5.974	-0.013	6.961	-0.019
Finger 29:	4.008	0.004	5.001	0.001	5.998	-0.001	6.993	-0.004
Finger 30:	4.000	0.000	4.998	-0.001	5.976	-0.012	6.993	-0.003
Finger 31:	3.986	-0.007	5.010	0.005	6.003	0.002	7.008	0.004
Finger 32:	4.005	0.003	5.003	0.002	6.001	0.000	7.002	0.001
Finger 33:	3.994	-0.003	5.001	0.000	5.998	-0.001	7.003	0.002
Finger 34:	3.992	-0.004	5.001	0.001	5.993	-0.003	7.002	0.001
Finger 35:	4.001	0.000	5.019	0.009	5.961	-0.020	6.959	-0.021
Finger 36:	3.998	-0.001	5.005	0.003	5.980	-0.010	7.008	0.004
Finger 37:	4.000	-0.000	5.005	0.002	5.992	-0.004	6.999	-0.001
Finger 38:	3.980	-0.010	4.997	-0.002	5.995	-0.002	6.997	-0.002
Finger 39:	3.996	-0.002	5.000	-0.000	5.979	-0.011	6.946	-0.027
Finger 40:	4.001	0.001	5.008	0.004	5.989	-0.006	7.003	0.001
Average:	3.996	-0.002	5.002	0.001	5.988	-0.006	6.991	-0.004

Segmented Cement Bond Log Calibration Report						
Serial Number:		1063				
Tool Model:		UW_RBT_004				
Calibration Casing Diameter:		7.000	in			
Calibration Depth:		24.000	ft			
Master Calibration, performed Mon Oct 12 14:50:34 2015:						
	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	-0.003	1.000	0.800	62.165	61.157	1.008
5FT	-0.006	1.000	0.800	62.165	60.993	1.172
S1	-0.003	1.000	0.000	100.000	99.657	0.343
S2	-0.003	1.000	0.000	100.000	99.707	0.293
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	-0.002	1.000	0.000	100.000	99.752	0.248
S6	-0.004	1.000	0.000	100.000	99.644	0.356
S7	-0.004	1.000	0.000	100.000	99.635	0.365
S8	-0.003	1.000	0.000	100.000	99.673	0.327

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 AE32-650
Field	Wattenberg
County	Weld
State	Colorado