

# Radial Cement Bond Gamma Ray Casing Collar Log

Company	Noble Energy Inc.		
Well	Wells Ranch State A36-649		
Field	Wattenberg		
County	Weld		
State	Colorado		
Location:	Company	Noble Energy Inc.	
	Well	Wells Ranch State A36-649	
	Field	Wattenberg	
	County	Weld	
Other Services	State	Colorado	
	API #	05-123-41514	
	MIT		
	Elevation		
Permanent Datum	Ground Level	Elevation 4657'	
Log Measured From	Kelly Bushing	24 FT	
Drilling Measured From	Kelly Bushing		

Date	17-JUL-2015
Run Number	One
Depth Driller	15520 FT
Depth Logger	5707 FT
Bottom Logged Interval	5701 FT
Top Log Interval	Surface
Open Hole Size	8.750"
Type Fluid	Water
Density / Viscosity	8.34 lbm/gal
Max. Recorded Temp.	200°F
Estimated Cement Top	160 FT
Time Well Ready	ROA
Time Logger on Bottom	8:58 AM
Equipment Number	HD-0119
Location	Fort Lupton, CO
Recorded By	Andrew Olmsted
Witnessed By	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	846 FT		
Intermediate #1	7	26	P-110	24 FT	7061 FT		
Intermediate #2							
Liner	4 1/2	11.6	P-110 IC	5722.2 FT	15520 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 -4 FT to correlate with Kelly Bushing  
 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.!!

Database File:07-17-15\_noble energy\_wells ranch state a36-649\_mit\_rbl.db

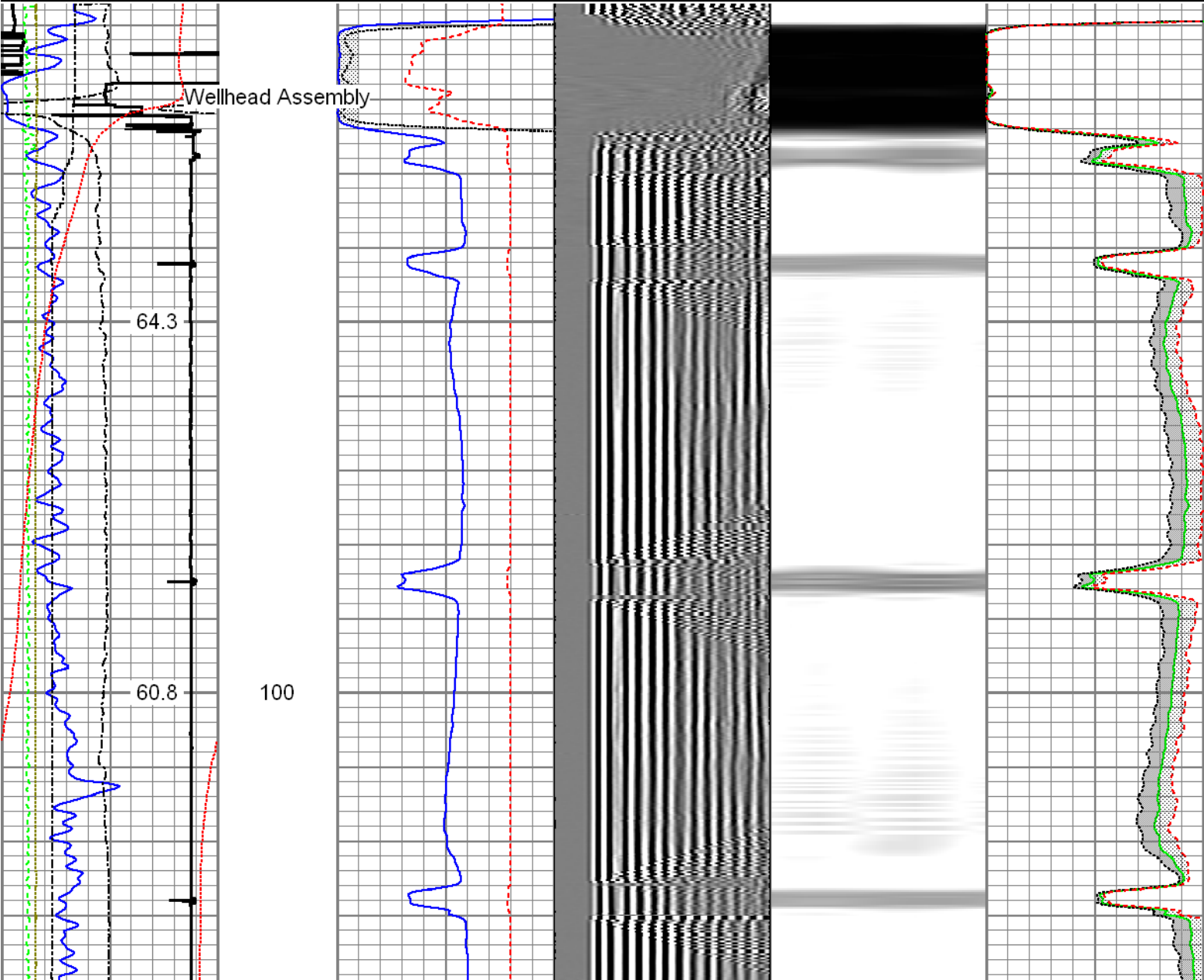
Dataset Pathname:pass4

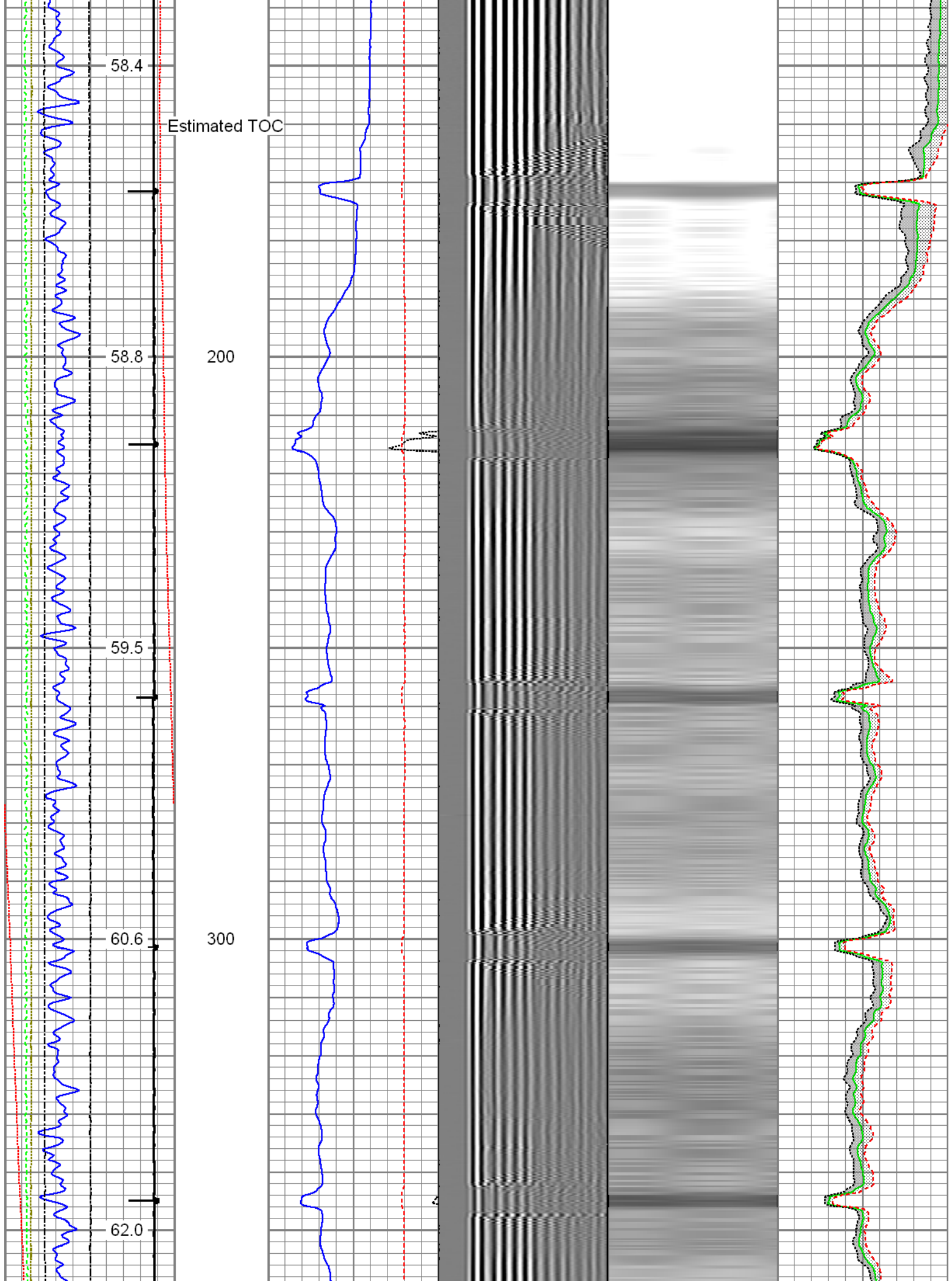
Presentation Format:rbt4\_mit

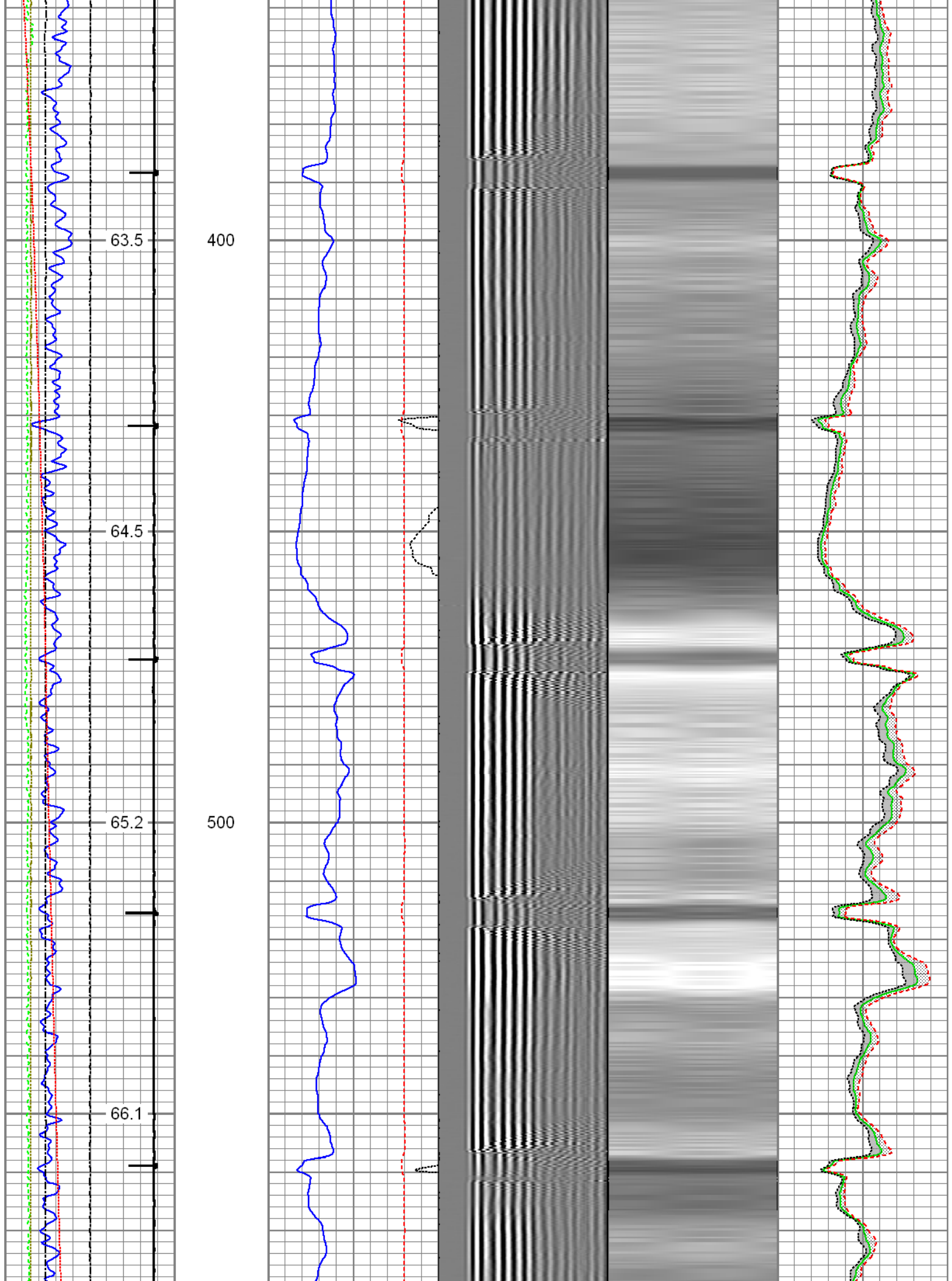
Dataset Creation:Fri Jul 17 09:06:20 2015 by Log 7.0 B1

Charted by:Depth in Feet scaled 1:240

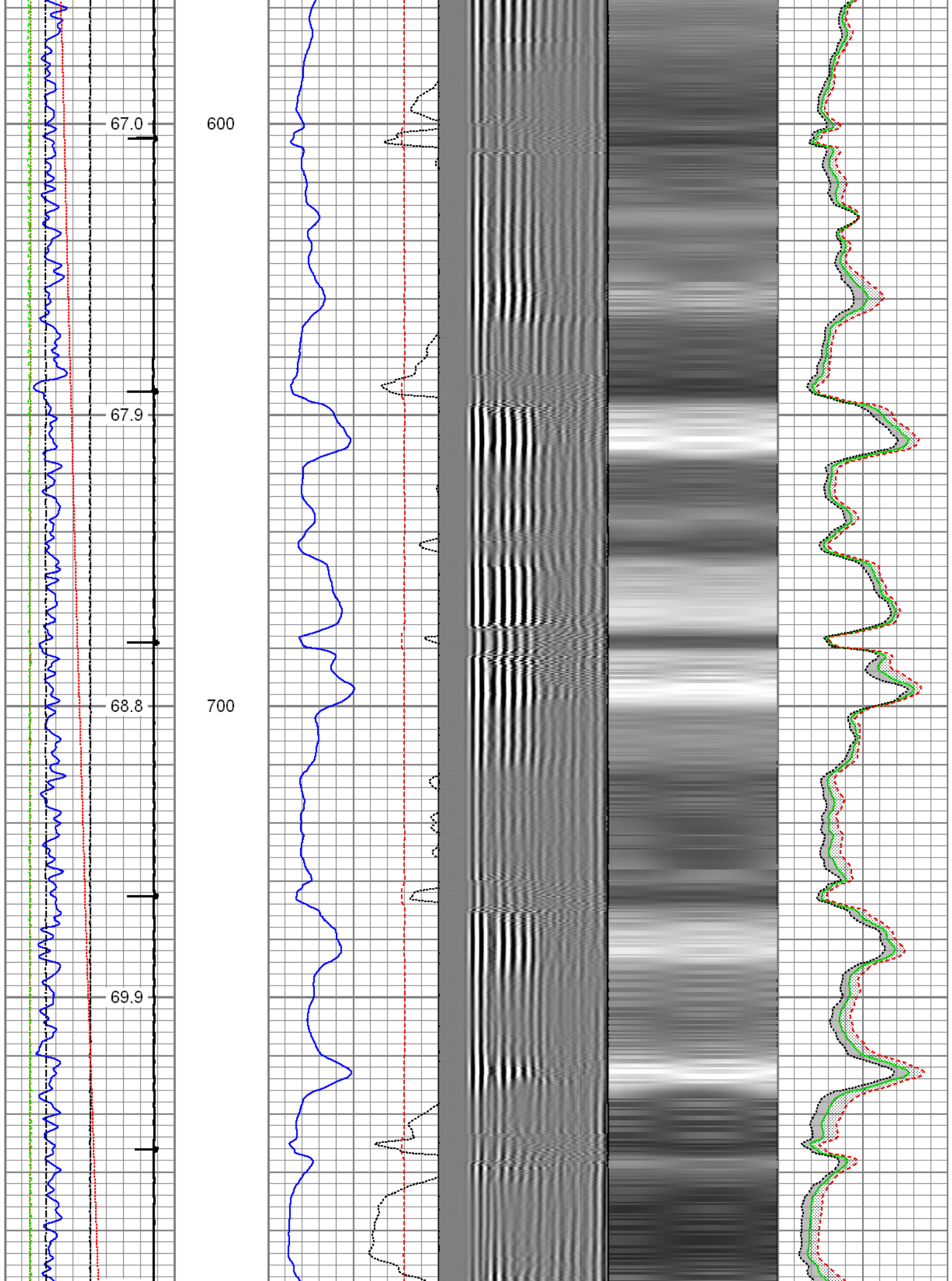
Gamma Ray	3' Amplitude	5' Variable Density Log	Sector Map	Average Amplitude
0 (GAPI) 120	0 (mV) 100	200 1200		0 100
Casing Collar Locator	3' Amplitude x 5			Mimimum Amplitude
Line Speed	0 (mV) 20			0 100
-100 (ft/min) 100	3' Travel Time			Maximum Amplitude
Line Tension	650 (usec) 150			0 100
0 (lb) 2000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

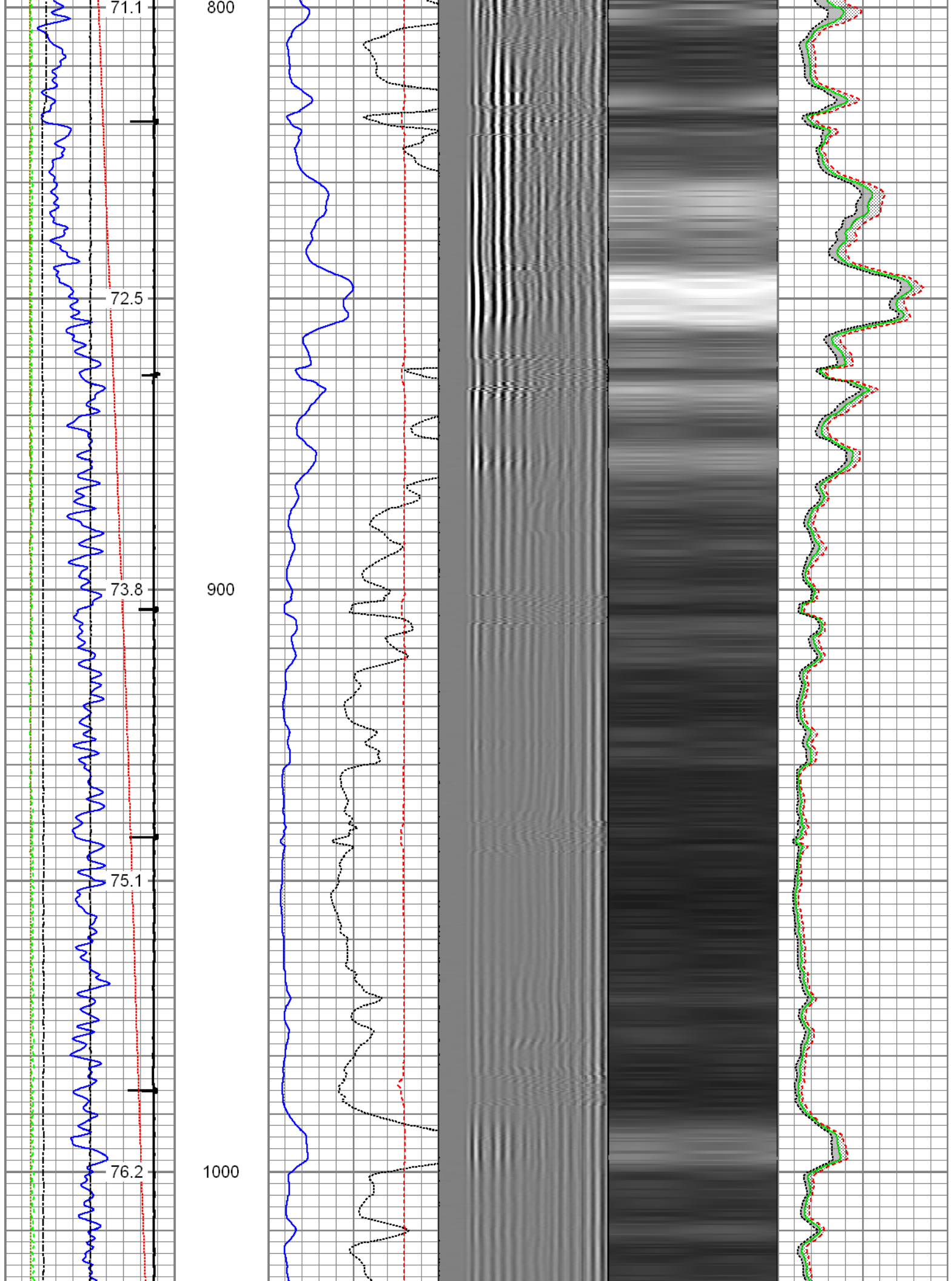


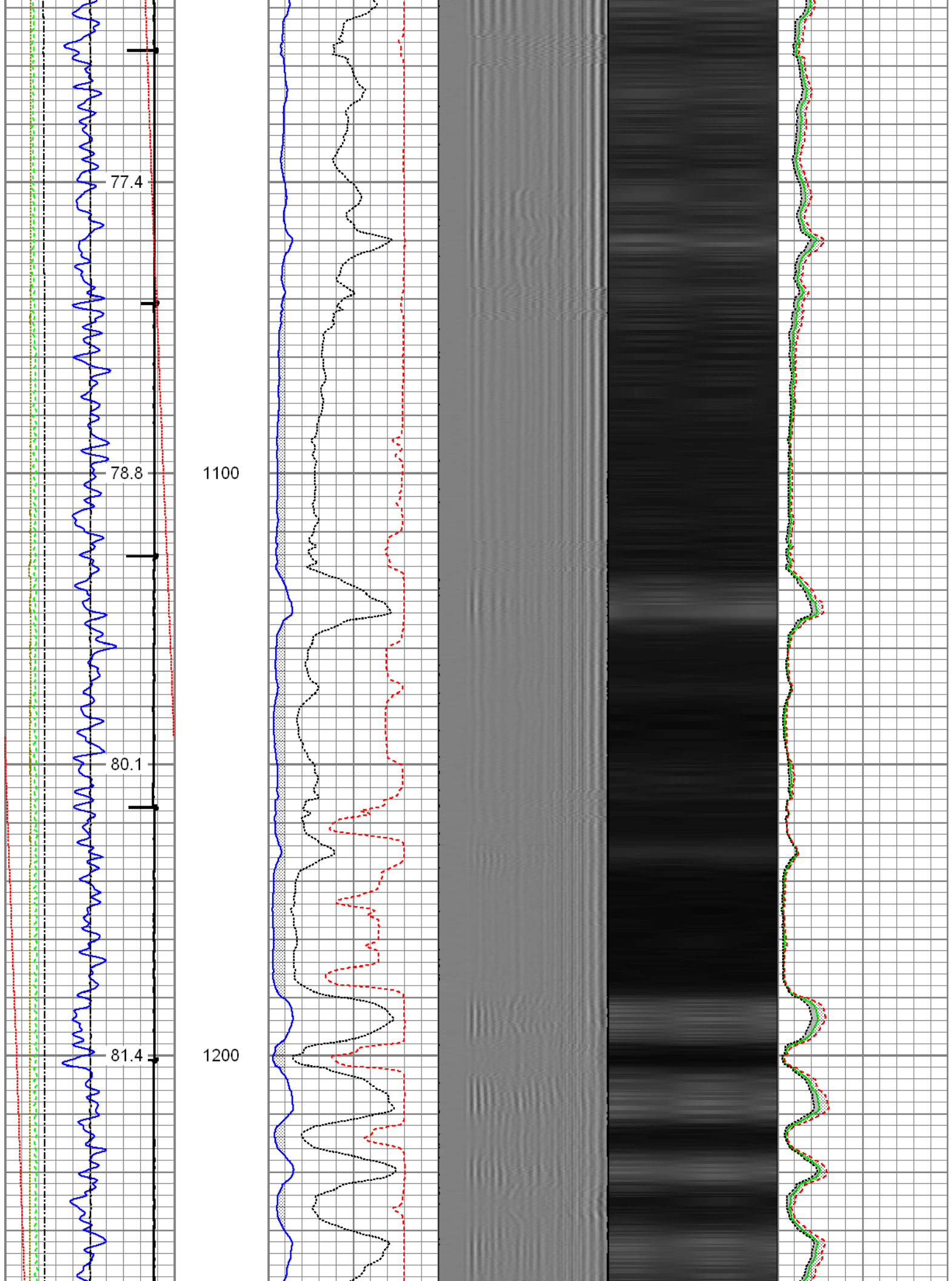


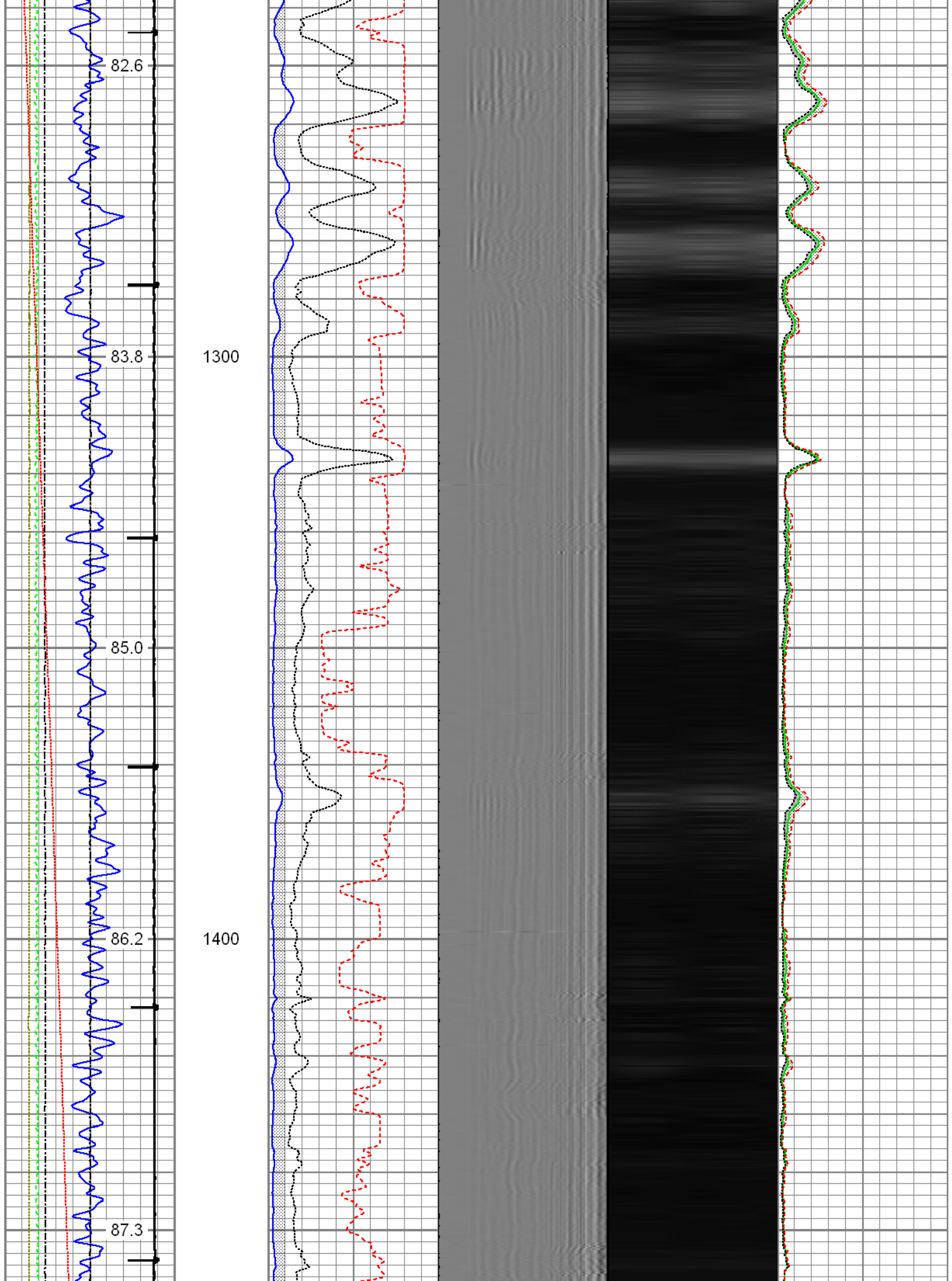




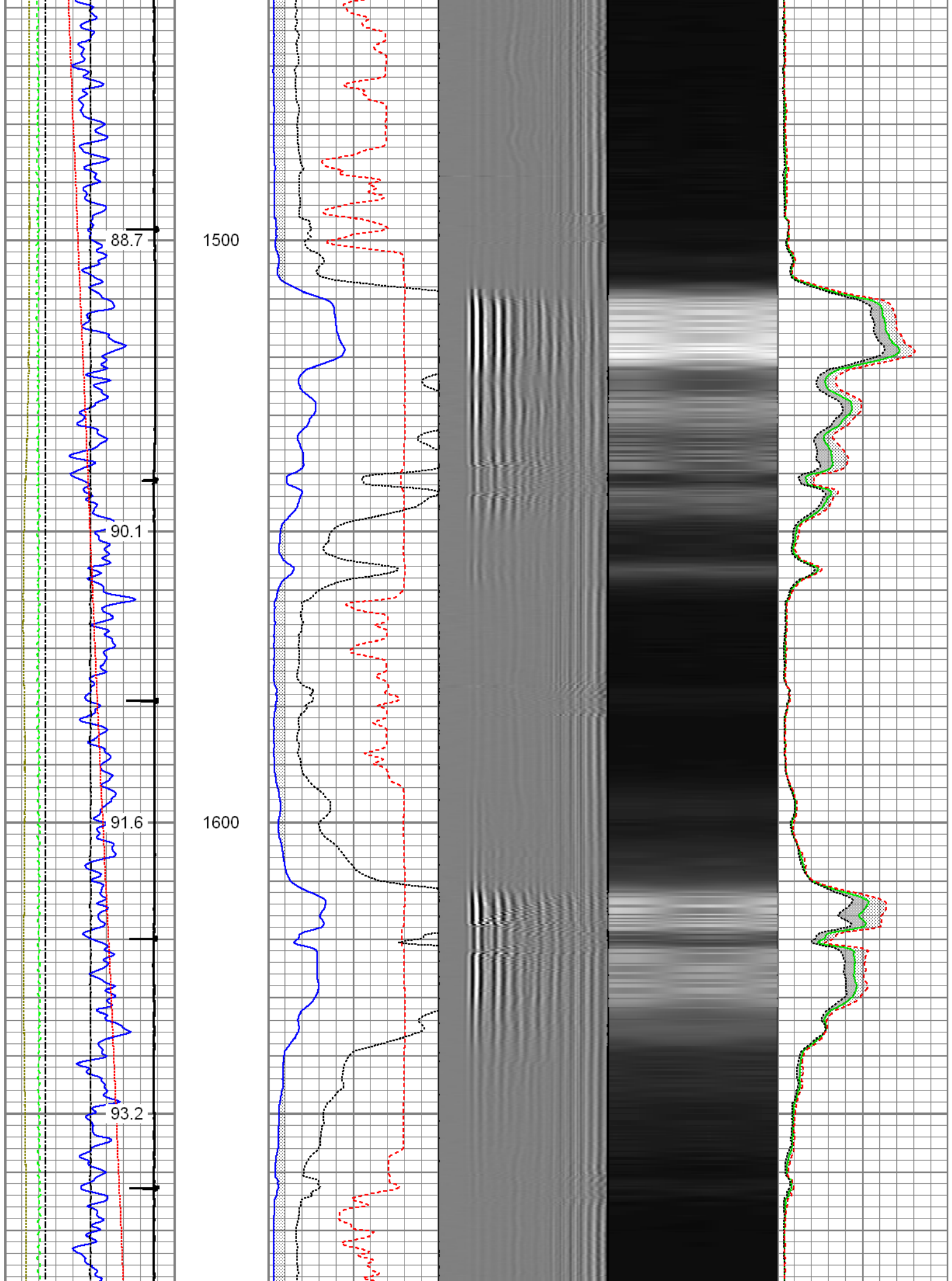


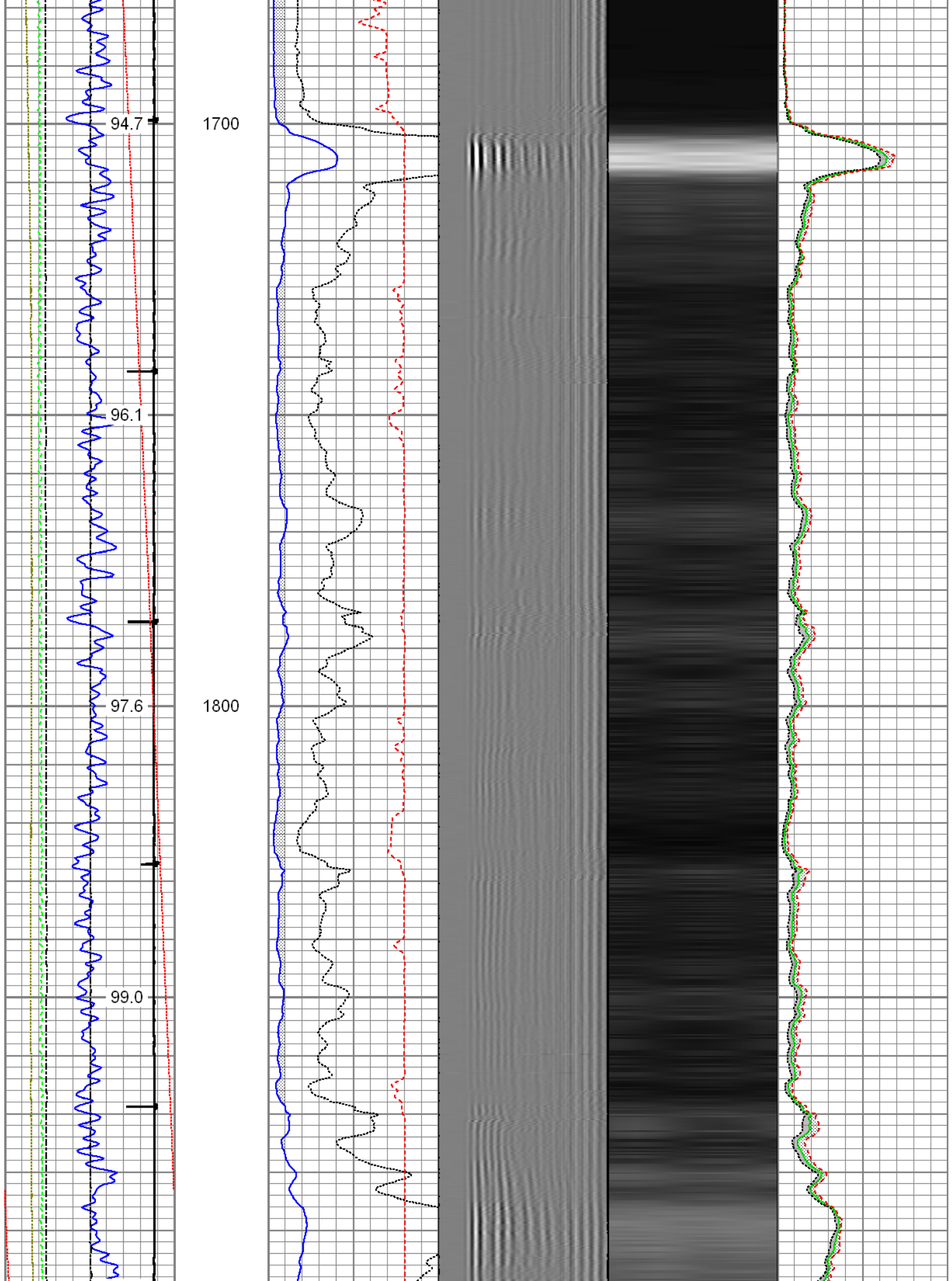


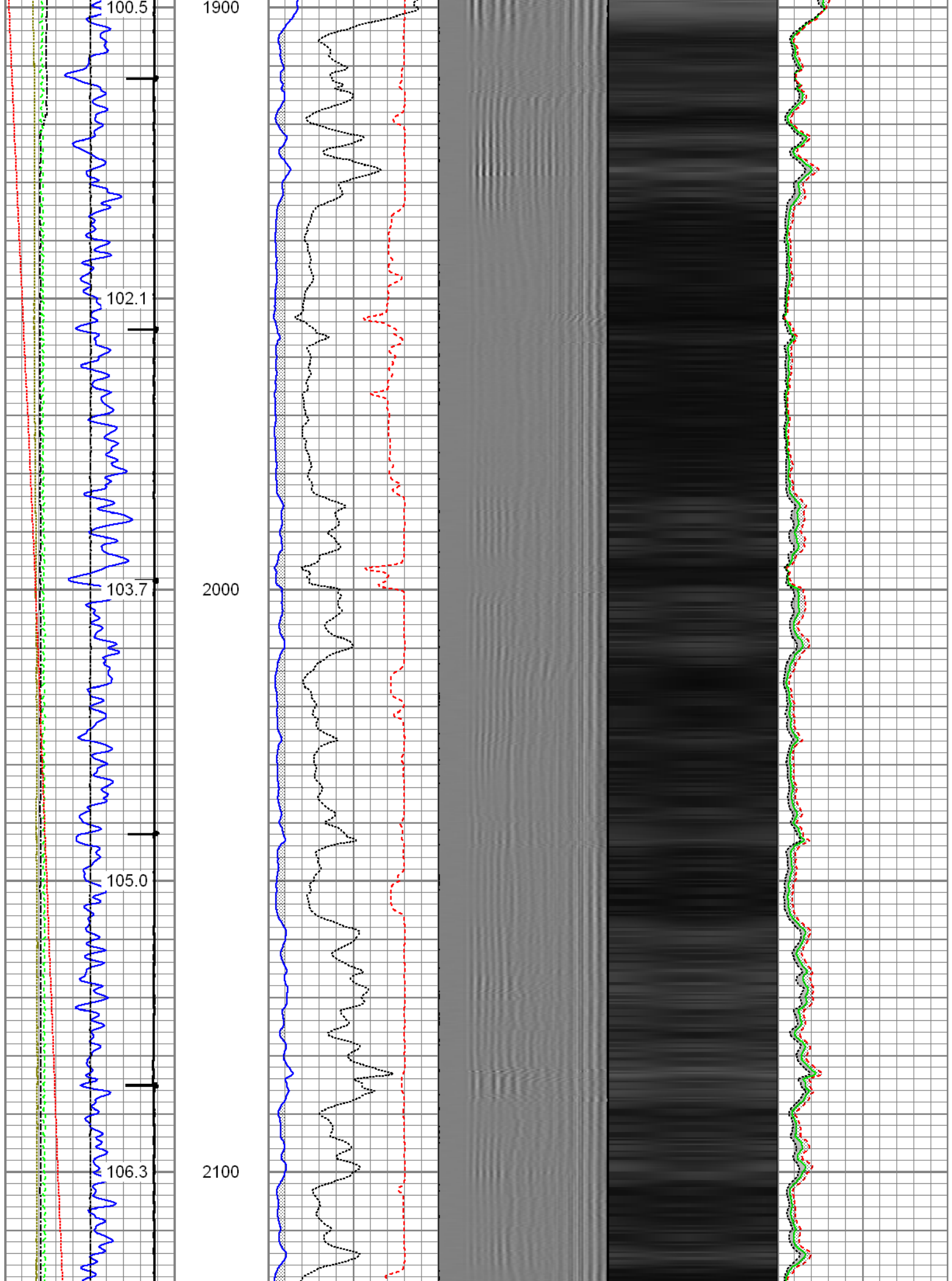


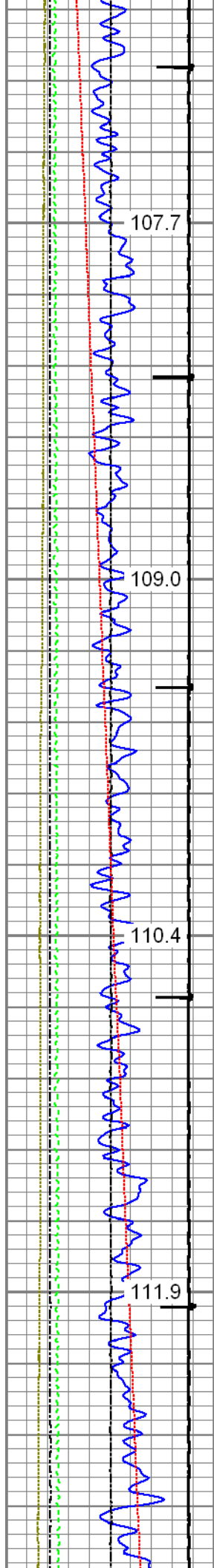






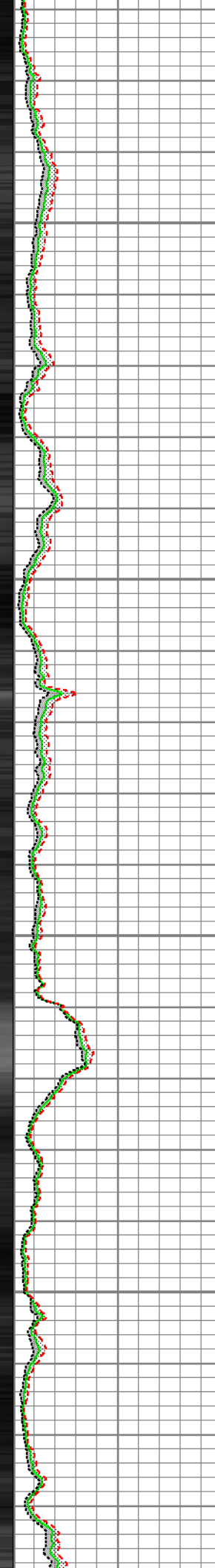
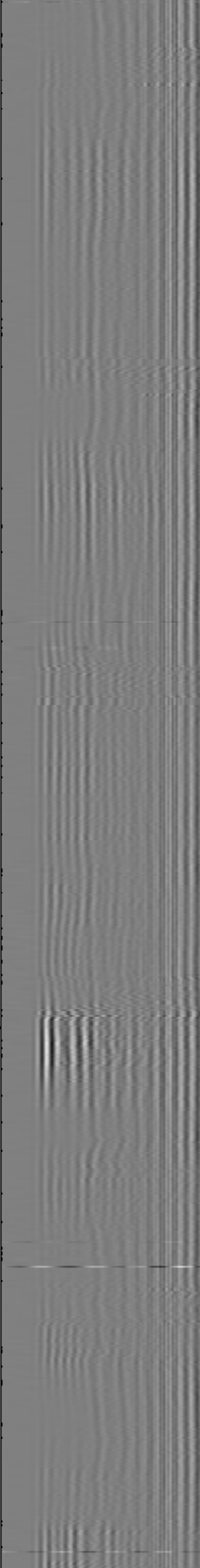
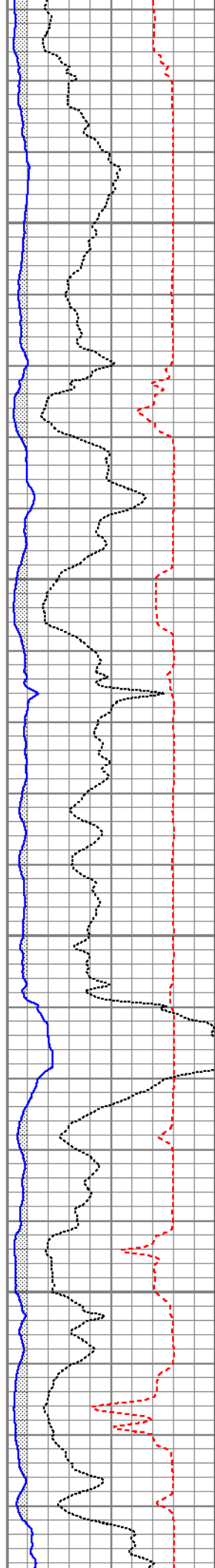




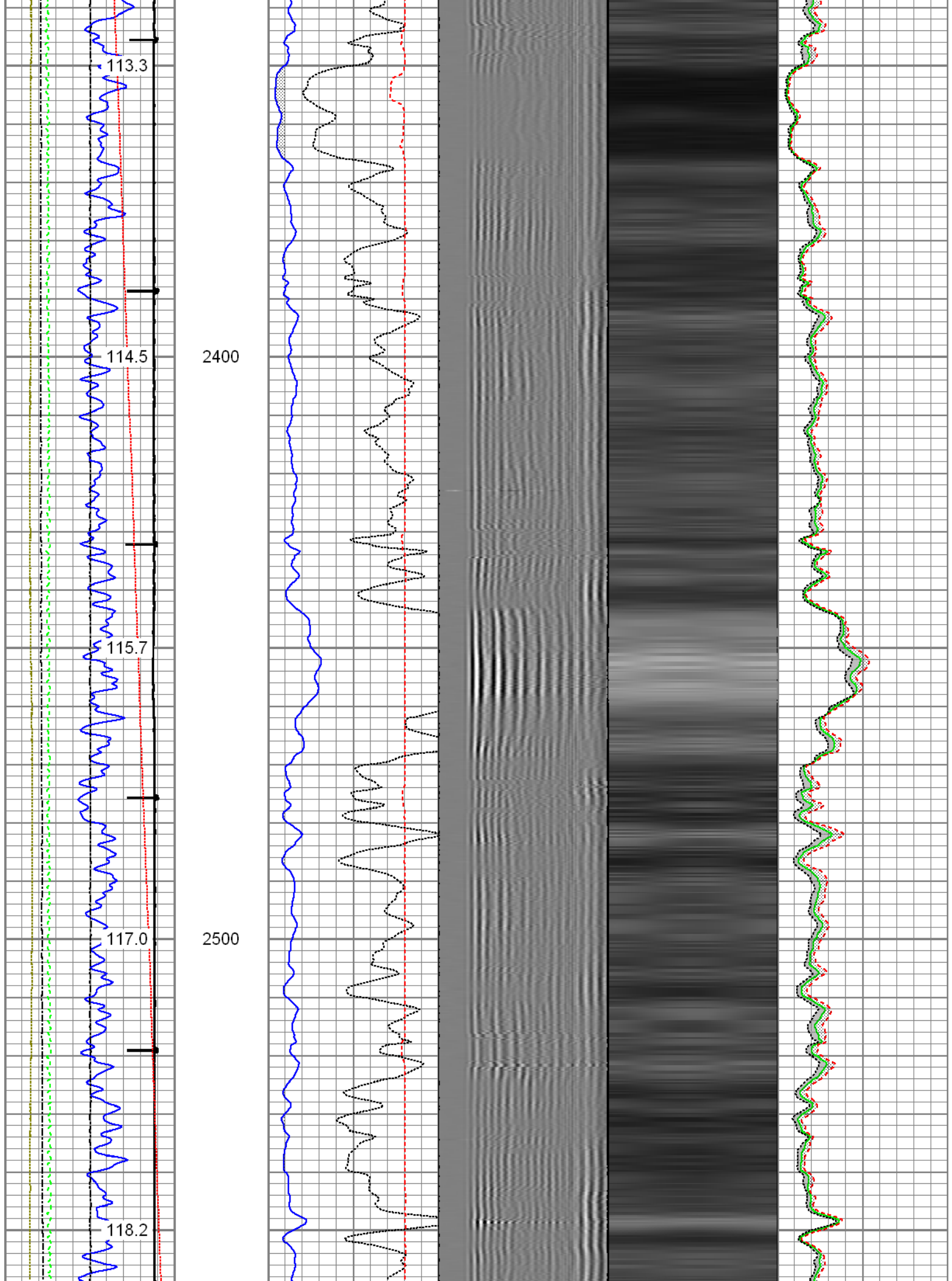


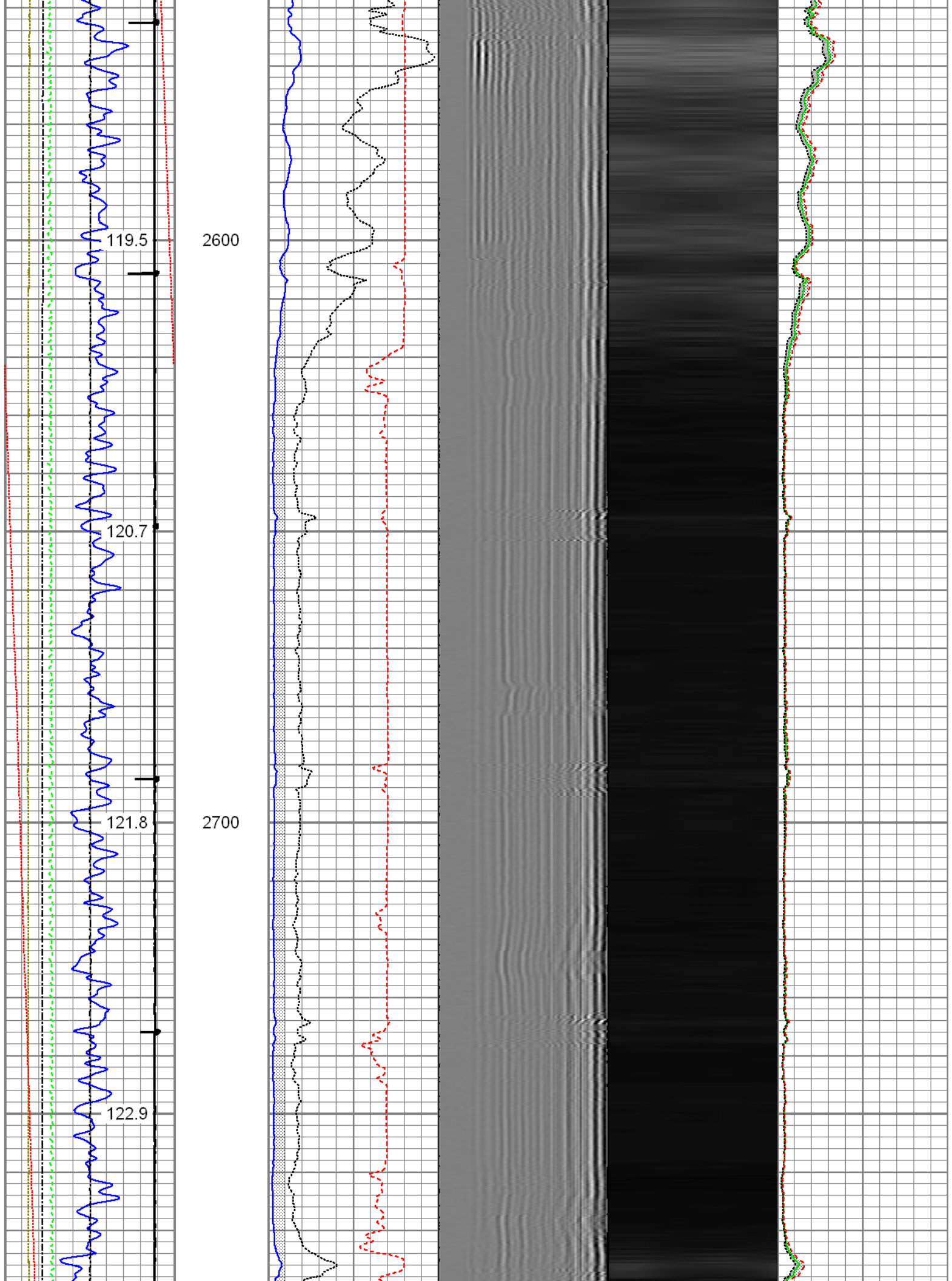
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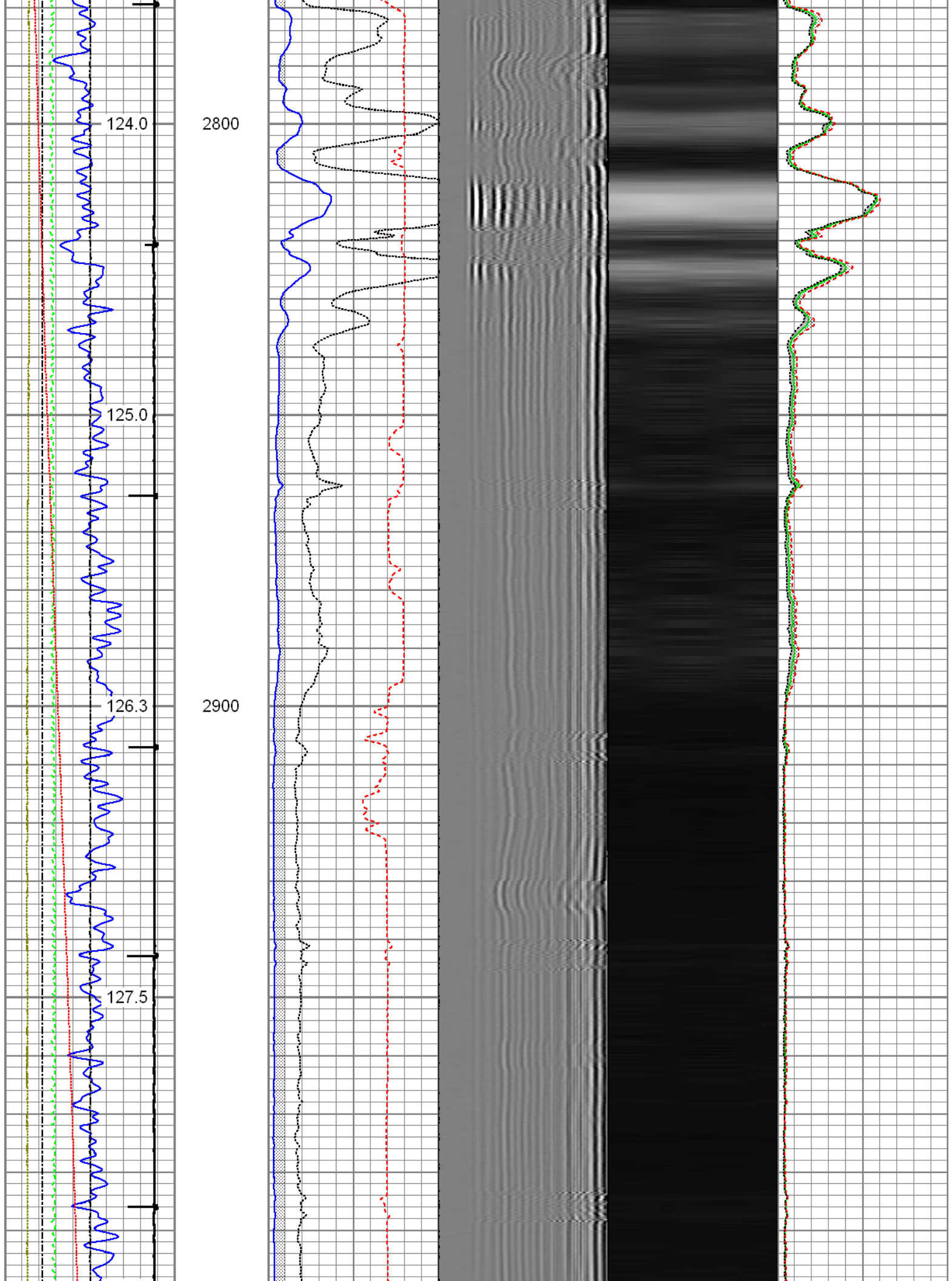
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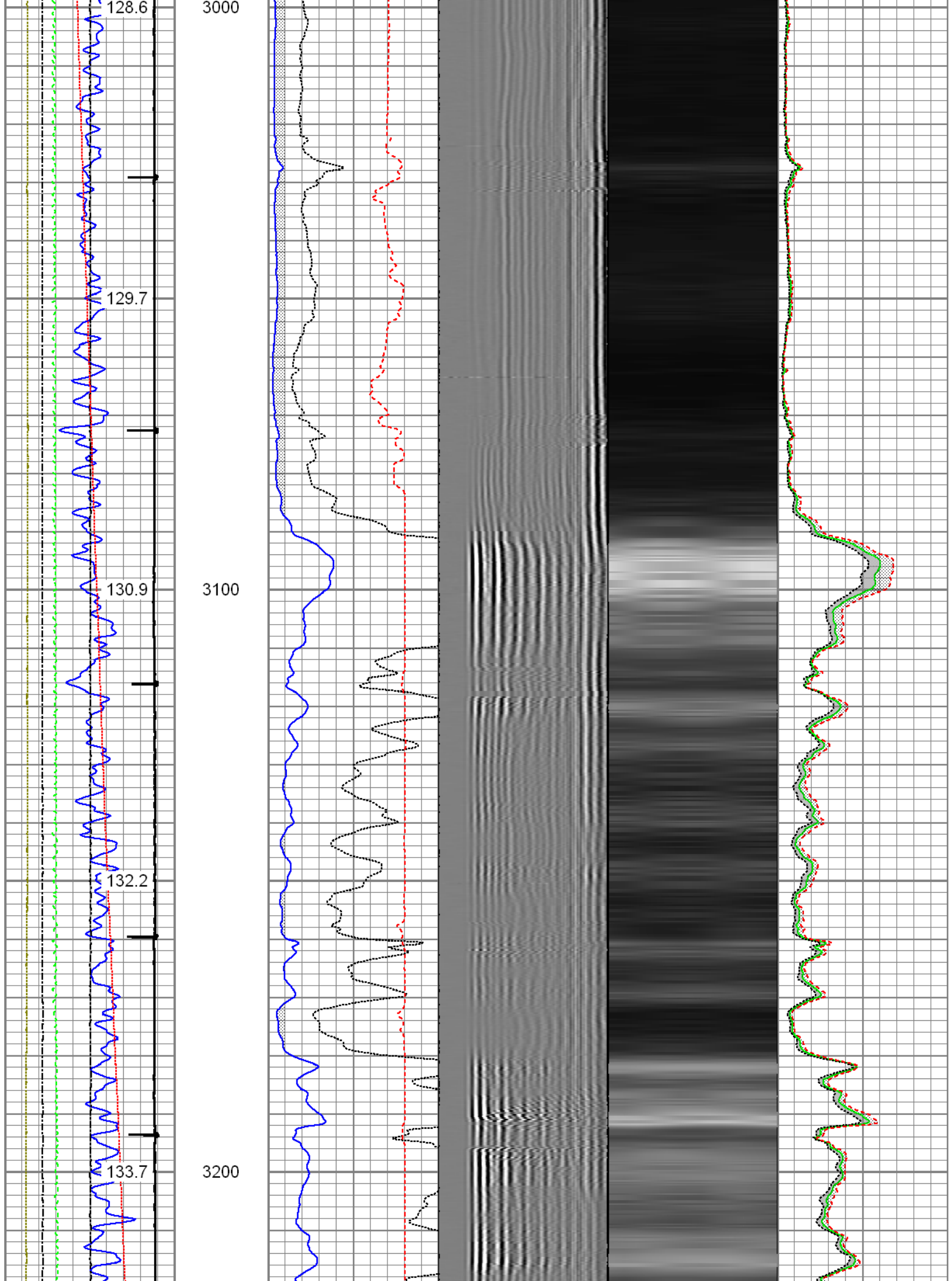




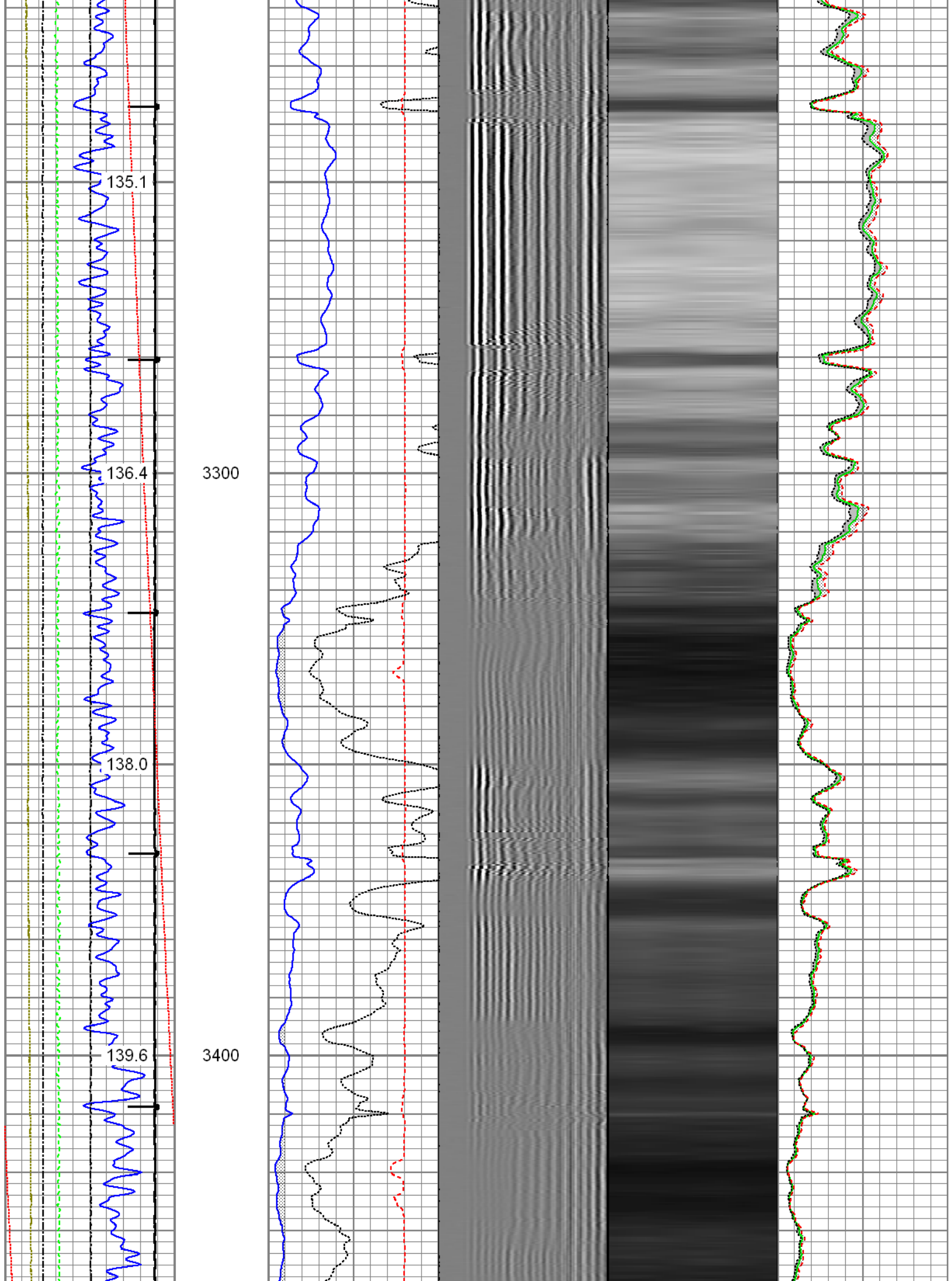


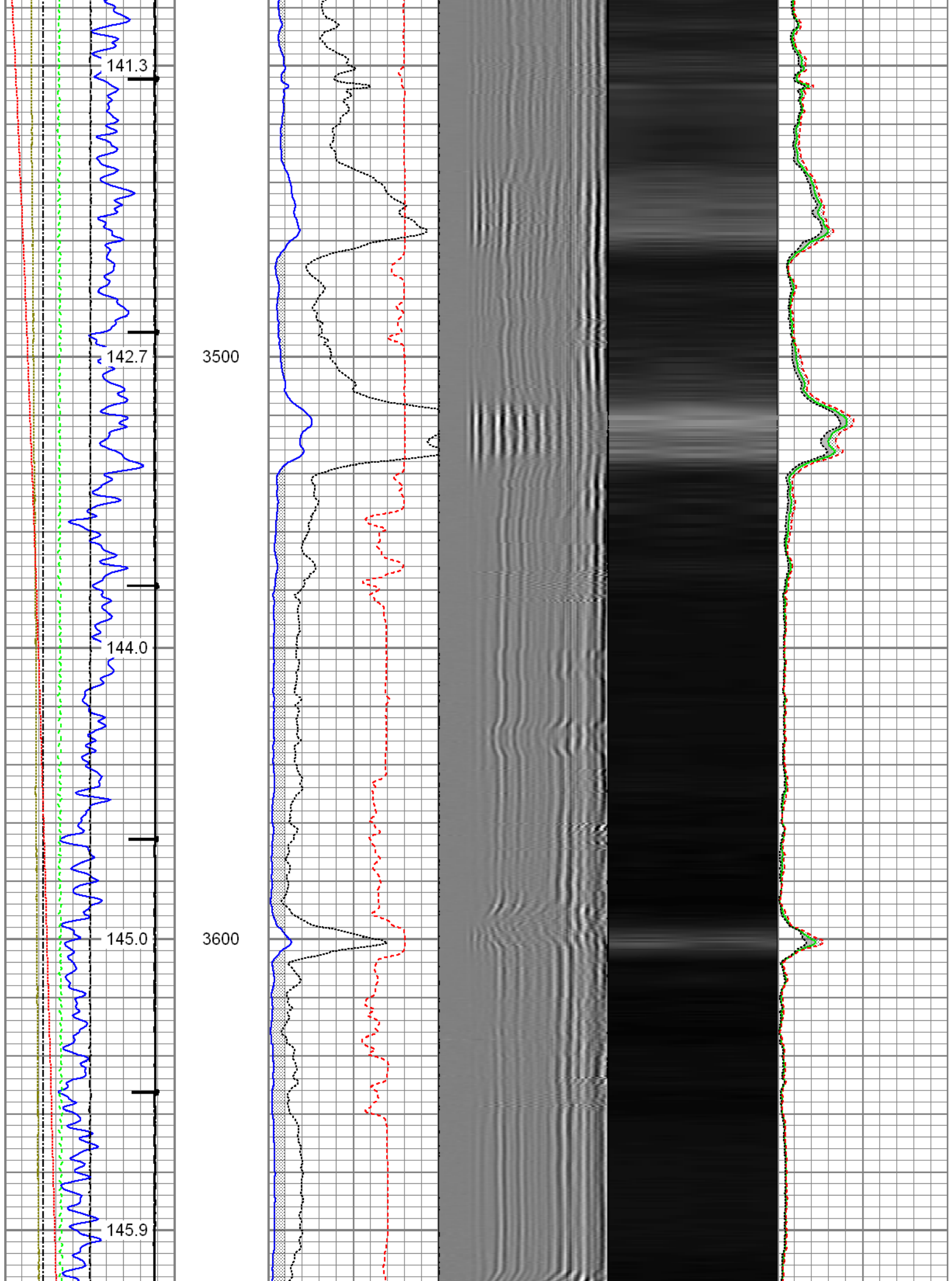


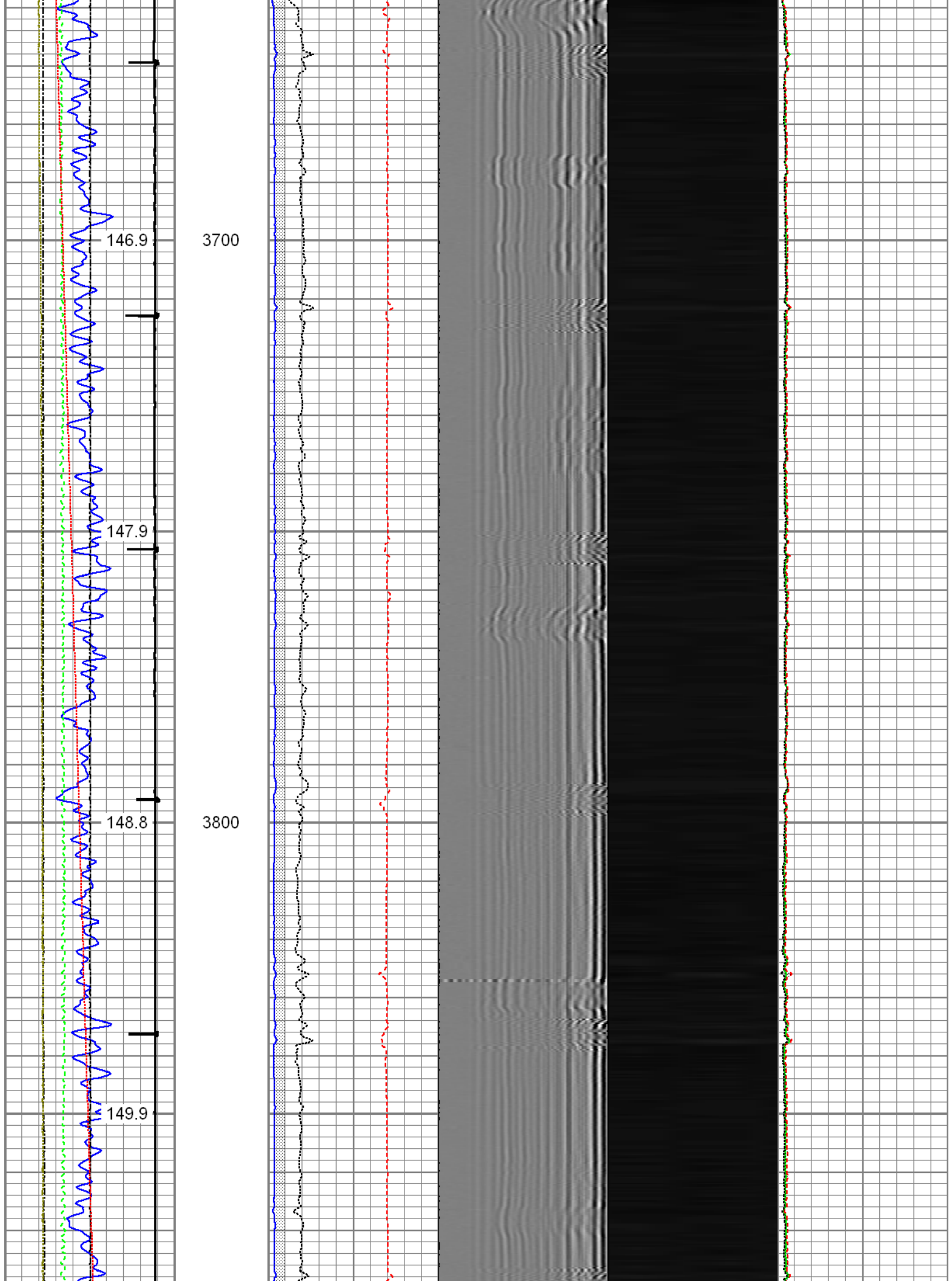


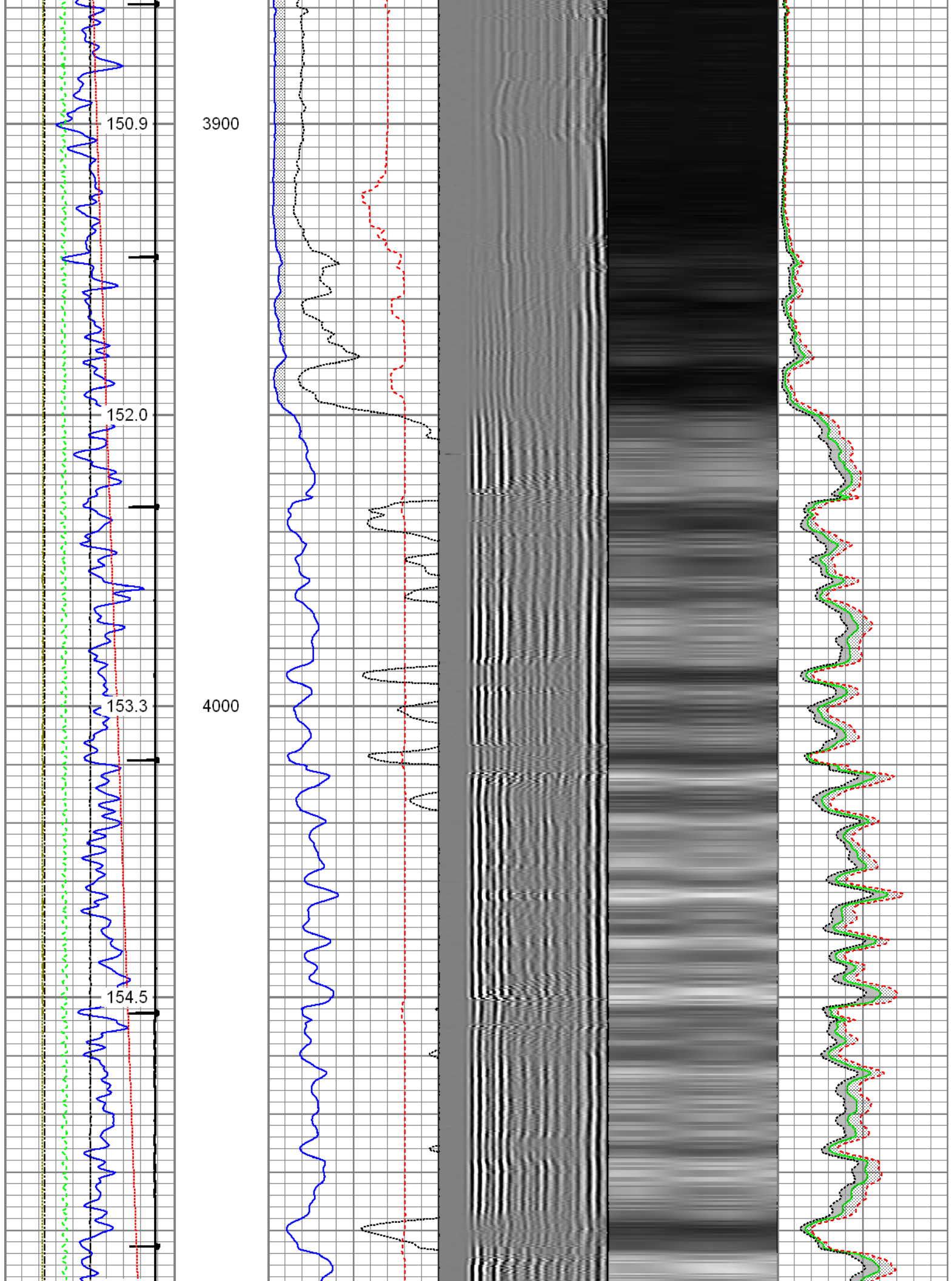




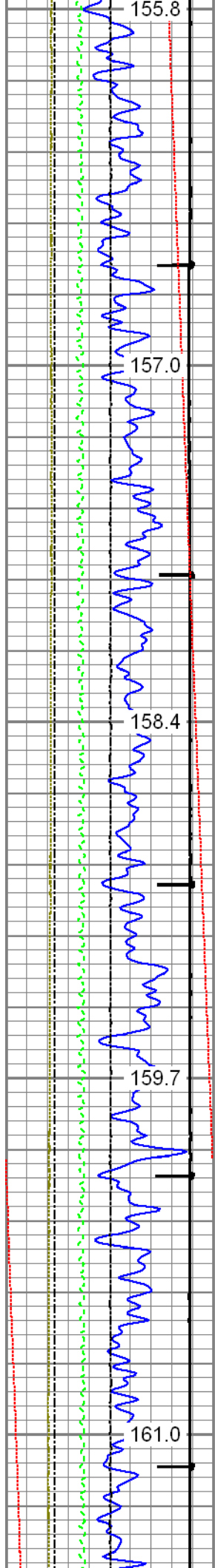












4100

157.0

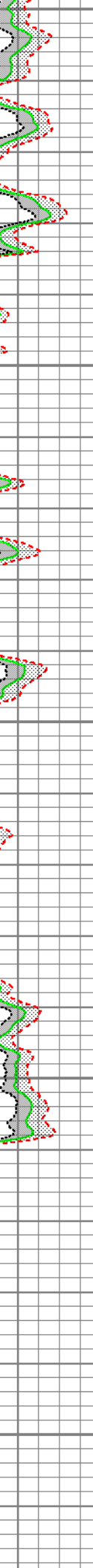
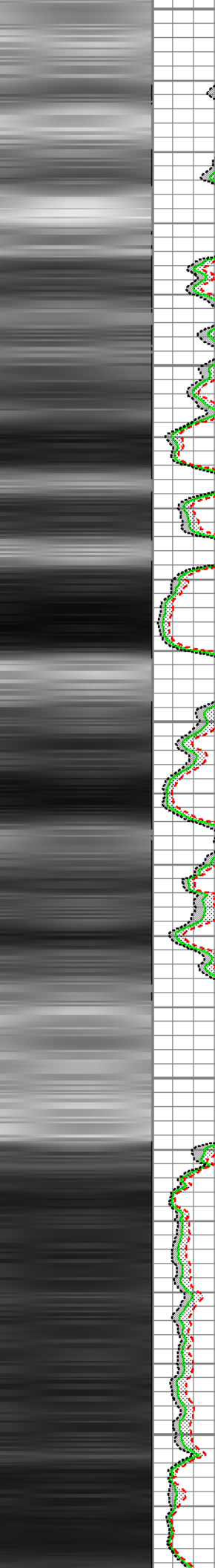
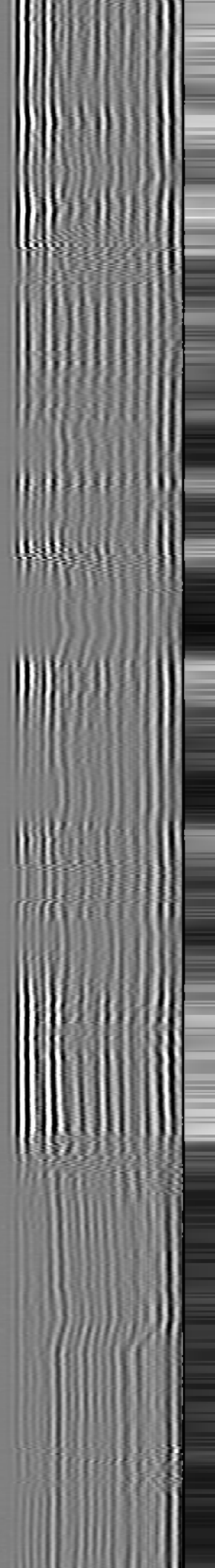
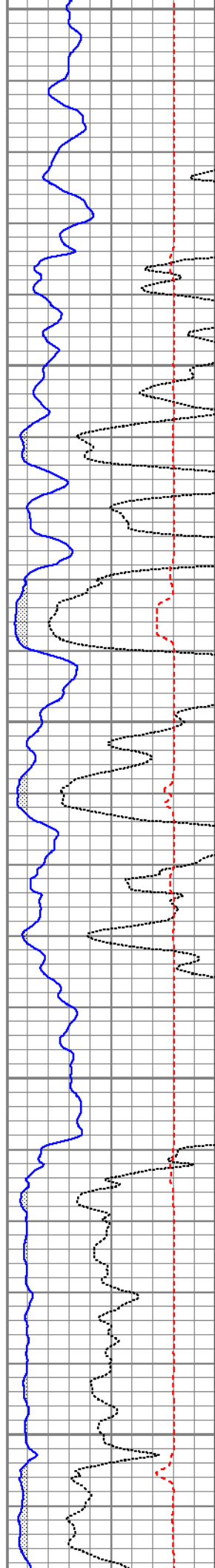
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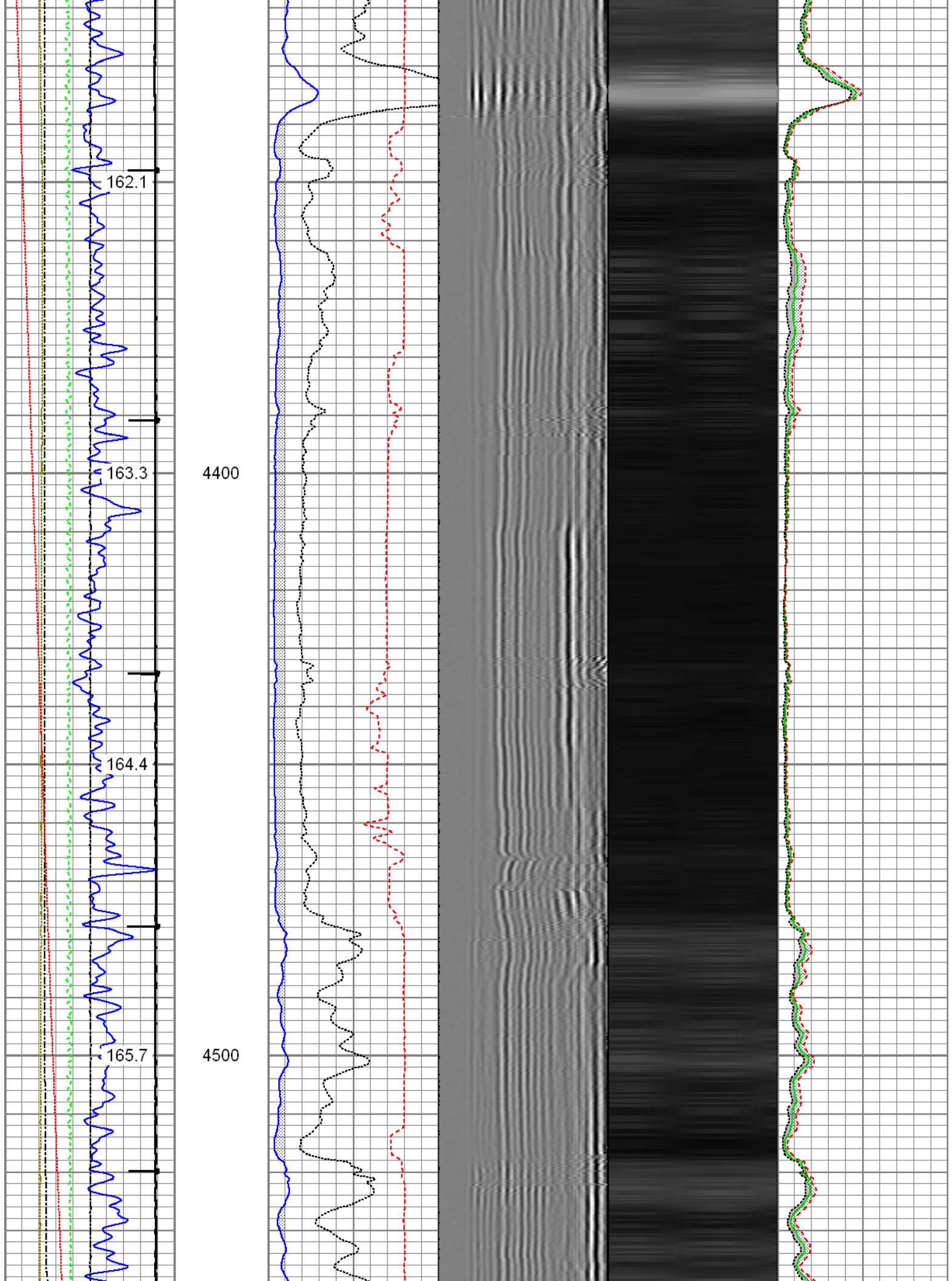
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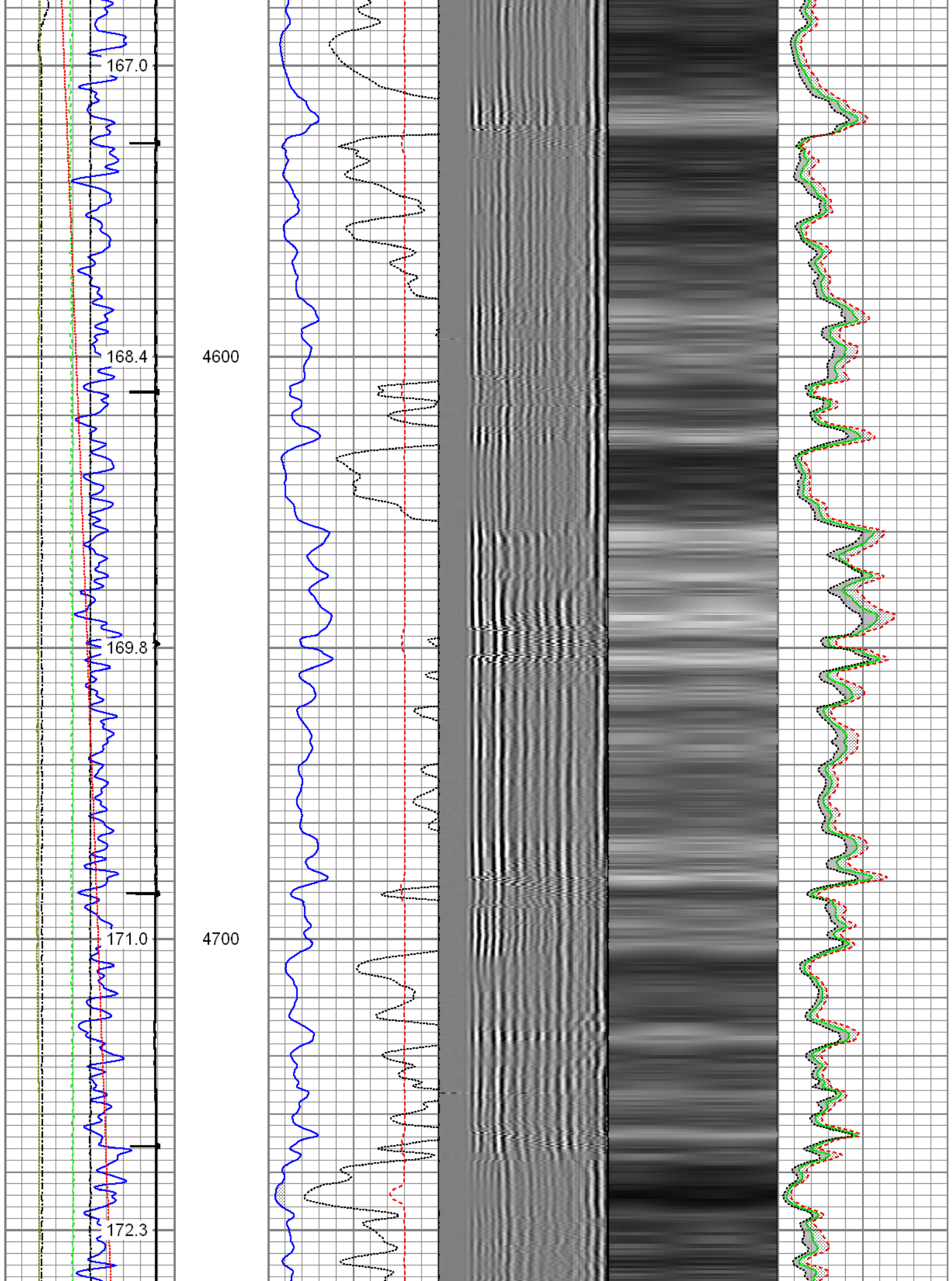
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4200

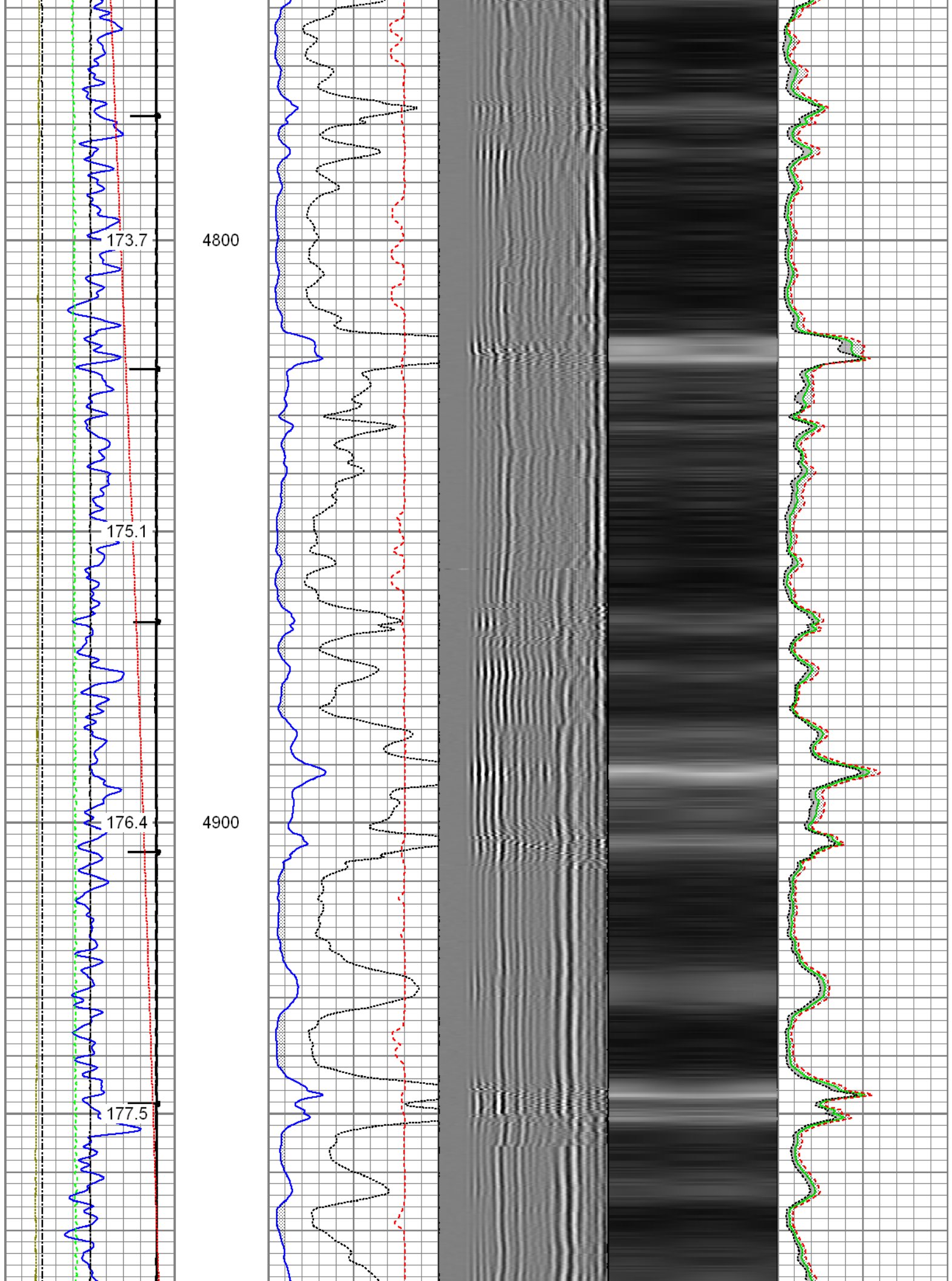
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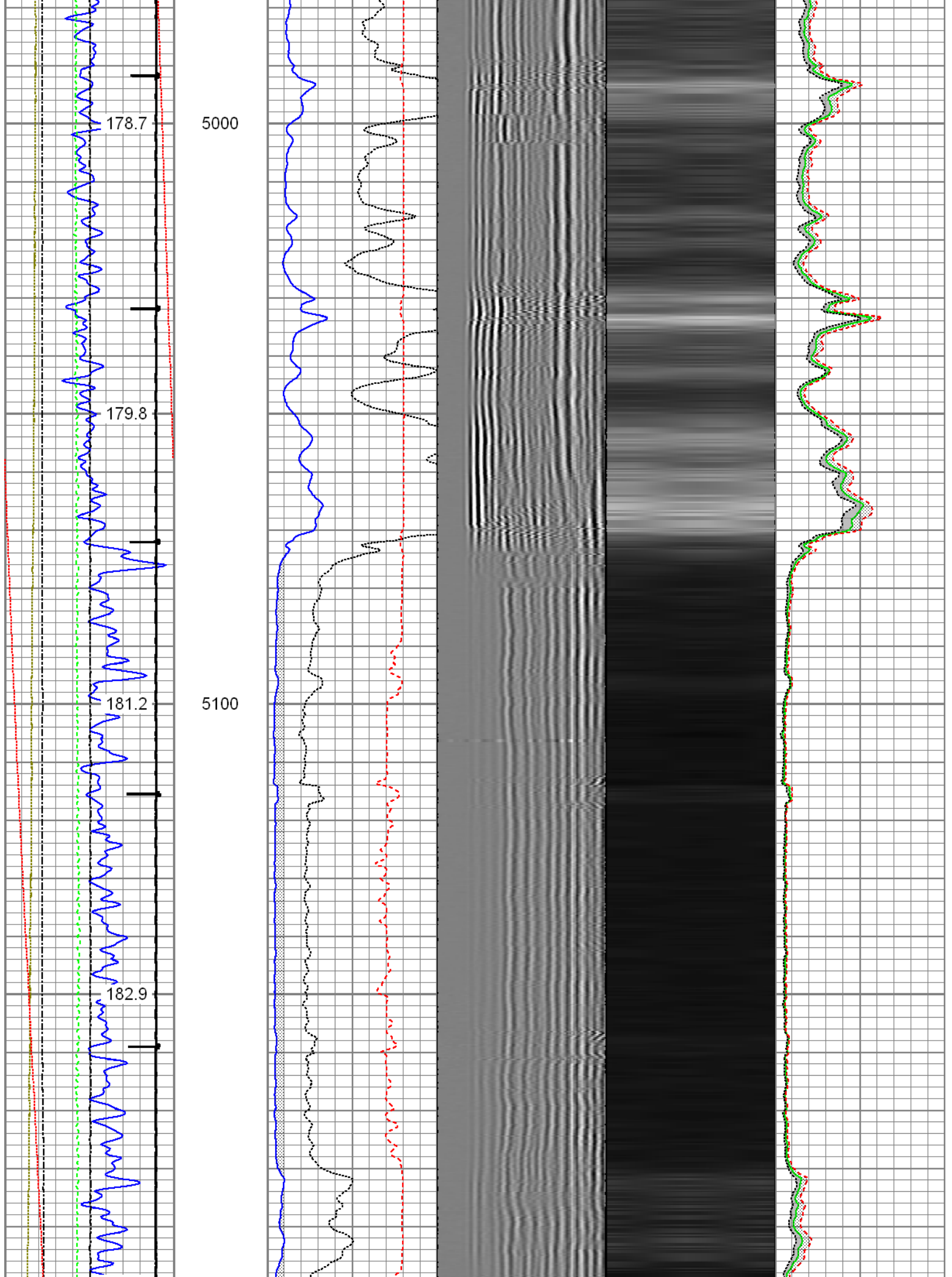


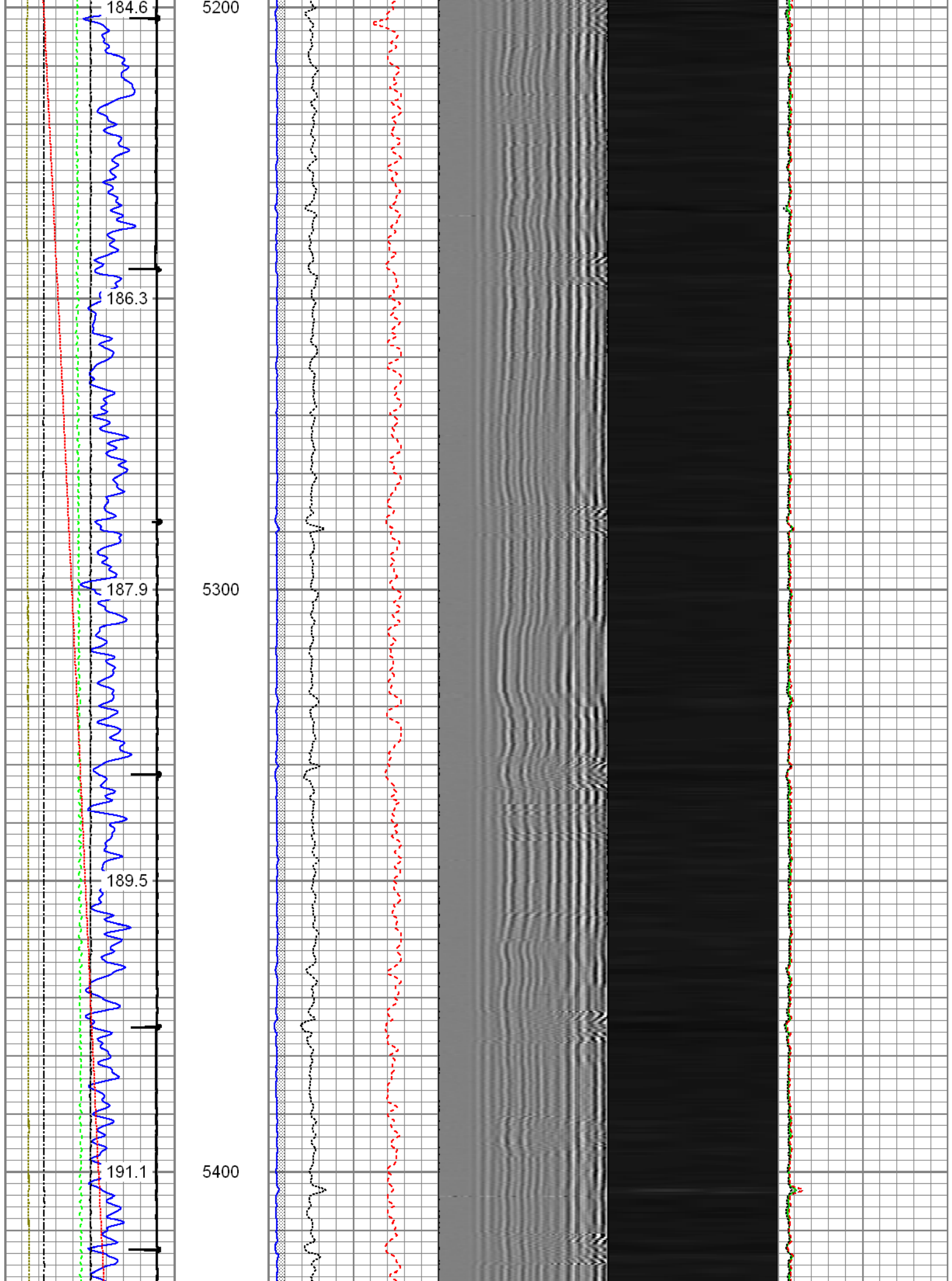


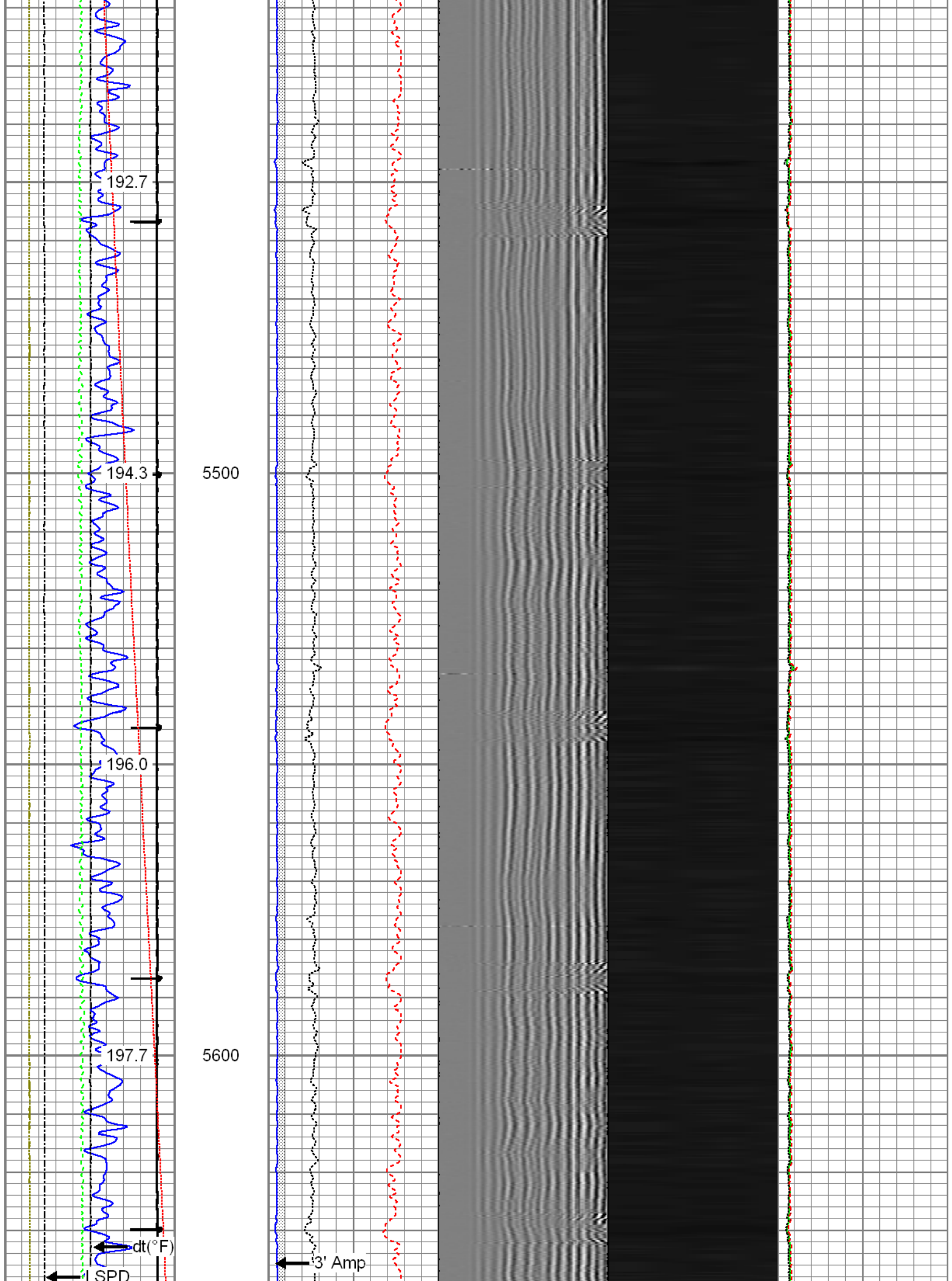


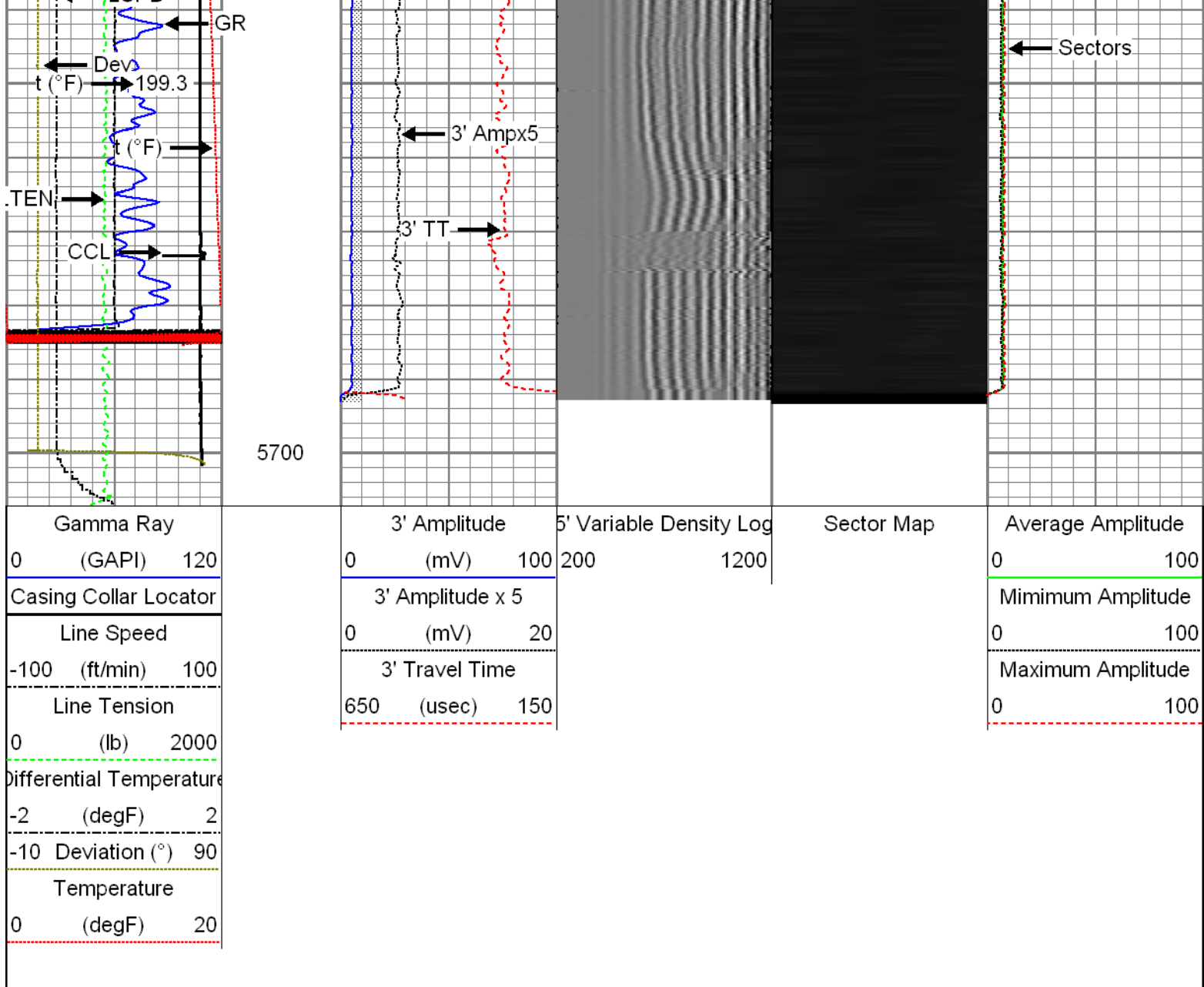








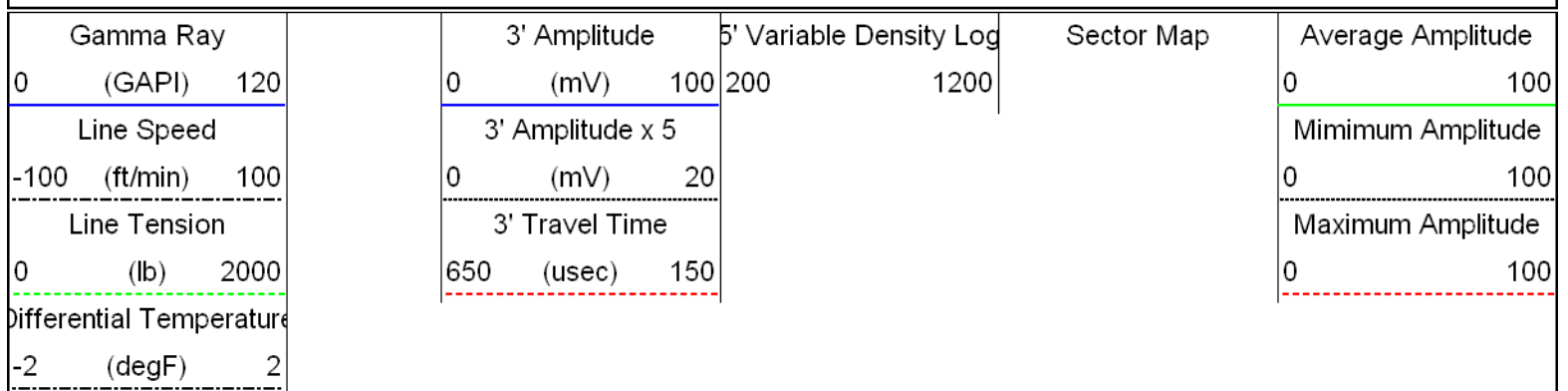




## Repeat Pass

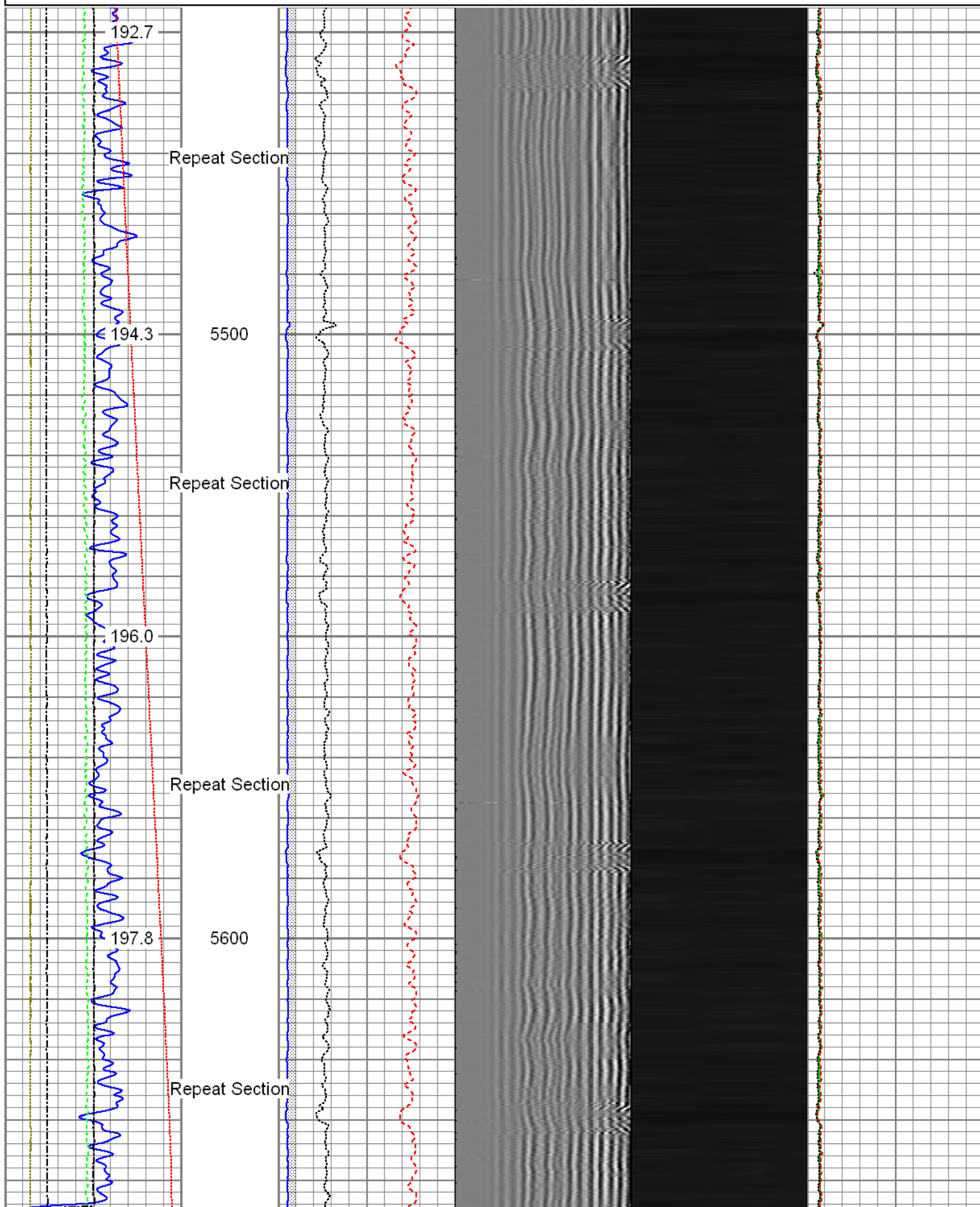
Recorded with 2500 PSI Surface Induced Pressure

Database File: 07-17-15\_noble energy\_wells ranch state a36-649\_mit\_rbl.db  
 Dataset Pathname: pass2  
 Presentation Format: rbt4\_mit  
 Dataset Creation: Fri Jul 17 08:58:00 2015 by Log 7.0 B1  
 Charted by: Depth in Feet scaled 1:240

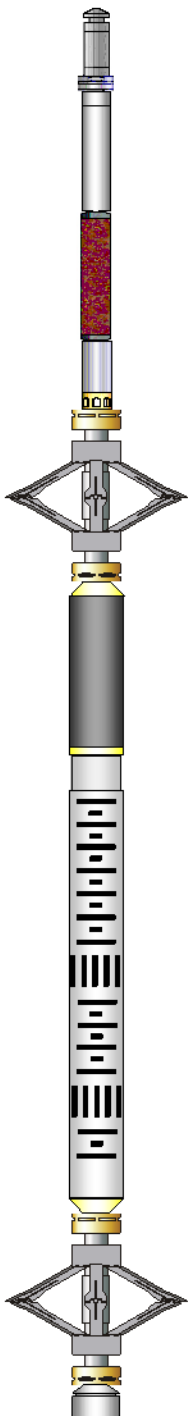
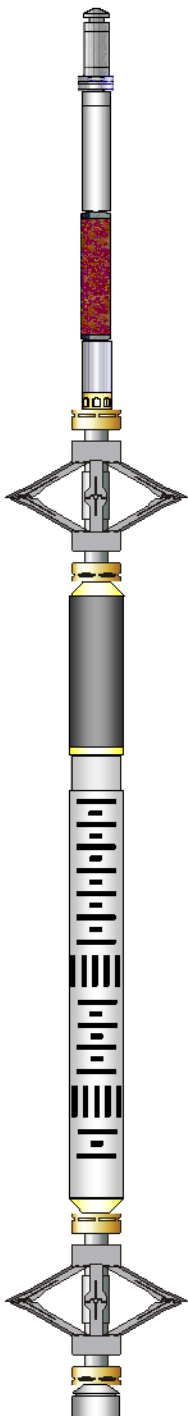
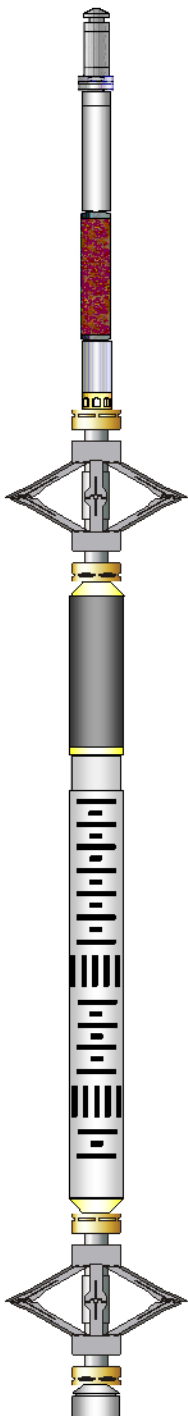


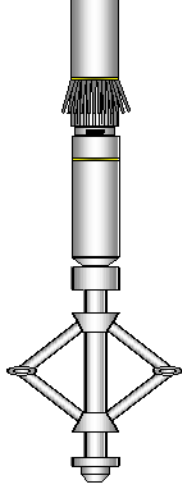


-10	Deviation (°)	90
Temperature		
0	(degF)	20



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)
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
			GOpin-GOpin 2" GO Pin to GO Pin Connection	0.23	2.00	5.00
			UW_AGS-UW_AGS_001 (218874) 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 (10019072) 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 (083) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WV3FT	15.42					
WVFS1	15.42		UW_RBT-UW_RBT_004 (1066) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
WVFS2	15.42					
WVFS3	15.42					
WVFS4	15.42					
WVFS5	15.42					
WVFS6	15.42					
WVFS7	15.42					
WVFS8	15.42					
CBLTEMP	15.42					
CBLROT	15.42					
WV5FT	14.42		UW_PRC-DSSRAC (084) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00

MIT	5.41		UW_MIT-UW_MIT40_042 (10020664) 40 Multifinger Imaging Tool	4.54	2.75	61.10
			UW_PRC #4 -UW_PRC_057 (1101) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
TSTAMP	0.00		UW_BUL-UW_BUL_006 (218707) Sondex Ultrawire Bullnose Terminator	0.22	1.69	1.20
Dataset: 07-17-15_Noble Energy_Wells Ranch State A36-649_MIT_RBL.db: field/well/run1/pass4 Total Length: 28.32 ft Total Weight: 329.50 lb O.D. 3.13 in						

Calibration Report Database File: 07-17-15_Noble Energy_Wells Ranch State A36-649_MIT_RBL.db Dataset Pathname: pass4 Dataset Creation: Fri Jul 17 09:06:20 2015 by Log 7.0 B1		
Multi-finger Imaging Tool Calibration Report		
Serial Number: 10020664 Number of Fingers: 40 Tool Model: UW_MIT40_042		
Inclinometer Calibration Report Performed: Wed Nov 26 12:28:41 2014 Calibration Angle: 45		
Vertical:	Inc X	Inc Y
Finger 1 up:	1946	1932
Finger 31 up:	1712	1699
Finger 21 up:	2180	1700
Finger 11 up:	2165	2167
	1708	2156
Sensitivity ratio:	1.00121	
X-axis angle:	134.04	
Deviation const.:	327.106	

Finger Calibration Report Performed: Fri Jul 17 08:20:17 2015						
Ring size:	4	5	6	7		
(in)						
	Sens	Sens	Sens			
Finger 01:	1170 346.0	1516 374.0	1890 391.0	2281		
Finger 02:	1185 351.0	1536 379.0	1915 396.0	2311		
Finger 03:	1129 339.0	1468 379.0	1847 397.0	2244		
Finger 04:	1141 356.0	1497 396.0	1893 414.0	2307		
Finger 05:	1123 349.0	1472 388.0	1860 408.0	2268		
Finger 06:	1156 347.0	1503 382.0	1885 391.0	2276		
Finger 07:	1066 357.0	1423 406.0	1829 428.0	2257		
Finger 08:	1121 345.0	1466 388.0	1854 408.0	2262		
Finger 09:	1088 348.0	1436 394.0	1830 420.0	2250		
Finger 10:	1010 351.0	1361 407.0	1768 442.0	2210		
Finger 11:	1096 344.0	1440 374.0	1814 397.0	2211		
Finger 12:	1071 349.0	1420 389.0	1809 413.0	2222		
Finger 13:	1051 340.0	1391 383.0	1774 406.0	2180		
Finger 14:	1028 346.0	1374 387.0	1761 401.0	2162		

Finger 14:	1028	348.0	1374	367.0	1781	401.0	2182
Finger 15:	1099	345.0	1444	367.0	1811	389.0	2200
Finger 16:	1046	342.0	1388	379.0	1767	400.0	2167
Finger 17:	1048	348.0	1396	384.0	1780	401.0	2181
Finger 18:	1008	341.0	1349	394.0	1743	413.0	2156
Finger 19:	1007	346.0	1353	386.0	1739	408.0	2147
Finger 20:	1044	349.0	1393	389.0	1782	407.0	2189
Finger 21:	1064	343.0	1407	374.0	1781	398.0	2179
Finger 22:	1063	355.0	1418	384.0	1802	401.0	2203
Finger 23:	1177	339.0	1516	349.0	1865	367.0	2232
Finger 24:	1025	354.0	1379	386.0	1765	410.0	2175
Finger 25:	1016	354.0	1370	386.0	1756	415.0	2171
Finger 26:	1088	349.0	1437	376.0	1813	411.0	2224
Finger 27:	1123	358.0	1481	384.0	1865	404.0	2269
Finger 28:	1108	357.0	1465	383.0	1848	407.0	2255
Finger 29:	1104	368.0	1472	397.0	1869	415.0	2284
Finger 30:	1154	356.0	1510	377.0	1887	394.0	2281
Finger 31:	1154	356.0	1510	379.0	1889	396.0	2285
Finger 32:	1185	353.0	1538	367.0	1905	386.0	2291
Finger 33:	1204	358.0	1562	375.0	1937	389.0	2326
Finger 34:	1157	361.0	1518	387.0	1905	407.0	2312
Finger 35:	1181	359.0	1540	387.0	1927	407.0	2334
Finger 36:	1222	349.0	1571	374.0	1945	393.0	2338
Finger 37:	1147	361.0	1508	394.0	1902	416.0	2318
Finger 38:	1110	368.0	1478	406.0	1884	428.0	2312
Finger 39:	1136	354.0	1490	392.0	1882	413.0	2295
Finger 40:	1164	353.0	1517	385.0	1902	404.0	2306

#### Segmented Cement Bond Log Calibration Report

Serial Number: 1066  
Tool Model: UW\_RBT\_004

Calibration Casing Diameter: 7.000 in  
Calibration Depth: -128.457 ft

Master Calibration, performed Fri Jul 17 08:21:22 2015:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	0.005	0.693	0.800	62.165	89.194	0.395
5FT	-0.001	0.653	0.800	62.165	93.804	0.915
S1	0.004	0.666	0.000	100.000	151.231	-0.655
S2	0.004	0.677	0.000	100.000	148.538	-0.526
S3	0.004	0.686	0.000	100.000	146.498	-0.558
S4	0.004	0.701	0.000	100.000	143.317	-0.513
S5	0.004	0.705	0.000	100.000	142.703	-0.589
S6	0.004	0.712	0.000	100.000	141.108	-0.522
S7	0.004	0.715	0.000	100.000	140.737	-0.600
S8	0.005	0.688	0.000	100.000	146.487	-0.722

#### 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



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:	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	Wells Ranch State A36-649		
	Field	Wattenberg		
	County	Weld		
	State	Colorado		