

# Radial Cement Bond Gamma Ray Casing Collar Log

Company	Noble Energy Inc.		
Well	Wells Ranch State A36-665		
Field	Wattenberg		
County	Weld		
State	Colorado		
Location:	API #: 05-123-41509		
SEC 31	TWP 6N	RGE 63W	Other Services MIT CNL
Permanent Datum	Ground Level	Elevation	4654'
Log Measured From	Kelly Bushing	30 FT	K.B. 4684' D.F. 4683' G.L. 4654'
Drilling Measured From	Kelly Bushing		

Date	25-JUL-2015
Run Number	One
Depth Driller	16736 FT
Depth Logger	6890.5 FT
Bottom Logged Interval	6889.5 FT
Top Log Interval	Surface
Open Hole Size	8.750"
Type Fluid	Water
Density / Viscosity	8.34 lbm/gal
Max. Recorded Temp.	233.6°F
Estimated Cement Top	122 FT
Time Well Ready	ROA
Time Logger on Bottom	12:01 PM
Equipment Number	HD-0340
Location	Fort Lupton, CO
Recorded By	R. Cameron
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	30 FT	802.8 FT		
Intermediate #1	7	26	P-110	30 FT	7048.5 FT		
Intermediate #2							
Liner	4 1/2	11.6	P-110 IC	6896.2 FT	16736 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 30 FT  
 Adjusted -2 FT to correlate with Kelly Bushing  
 Log ran from 3' 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:07-25-15\_noble energy\_wells ranch state a36-665\_mit\_rbl\_cnl.db

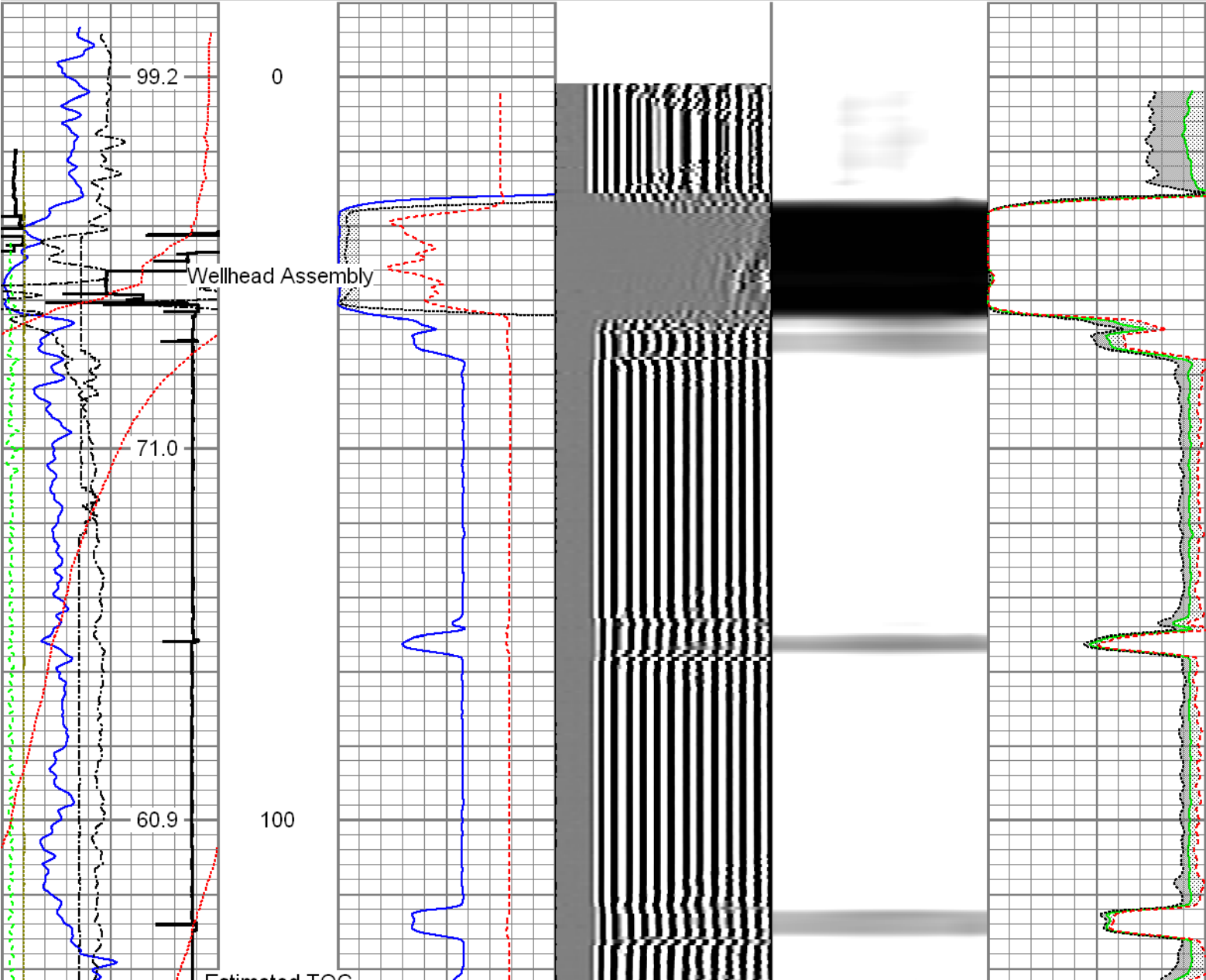
Dataset Pathname:pass11

Presentation Format:rbt4\_mit

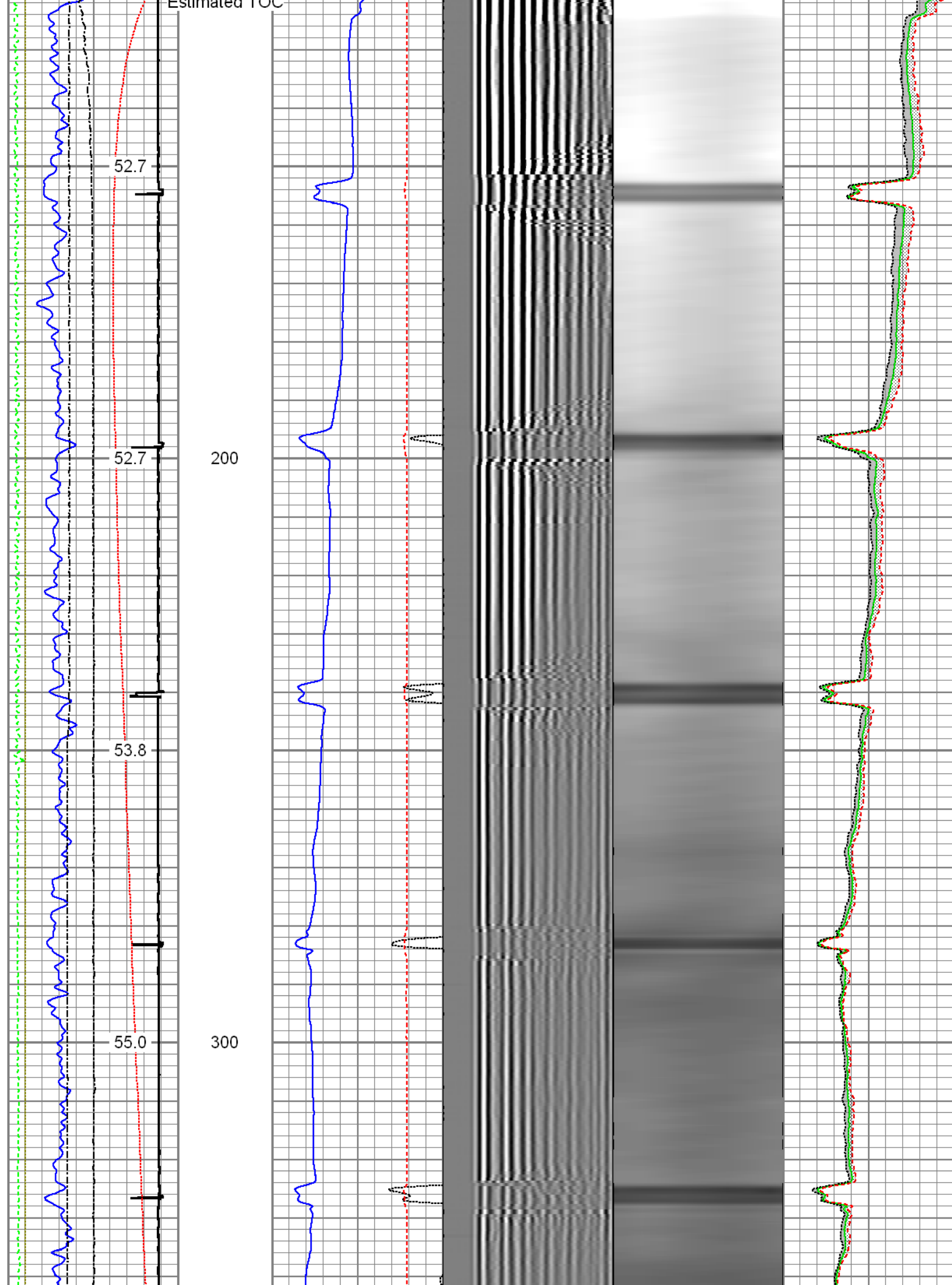
Dataset Creation:Sat Jul 25 11:57:19 2015 by Log 7.0 B1

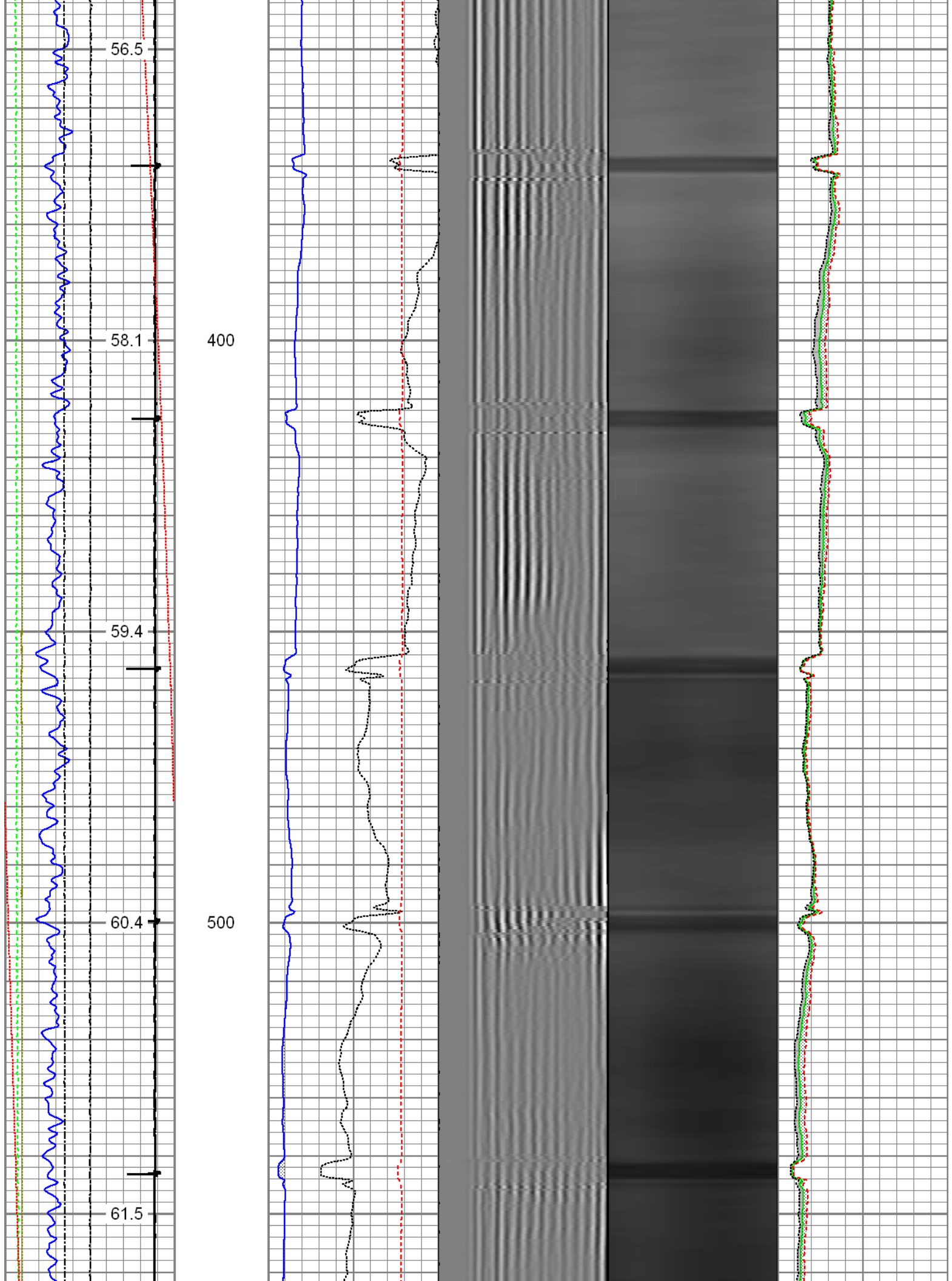
Charted by:Depth in Feet scaled 1:240

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				

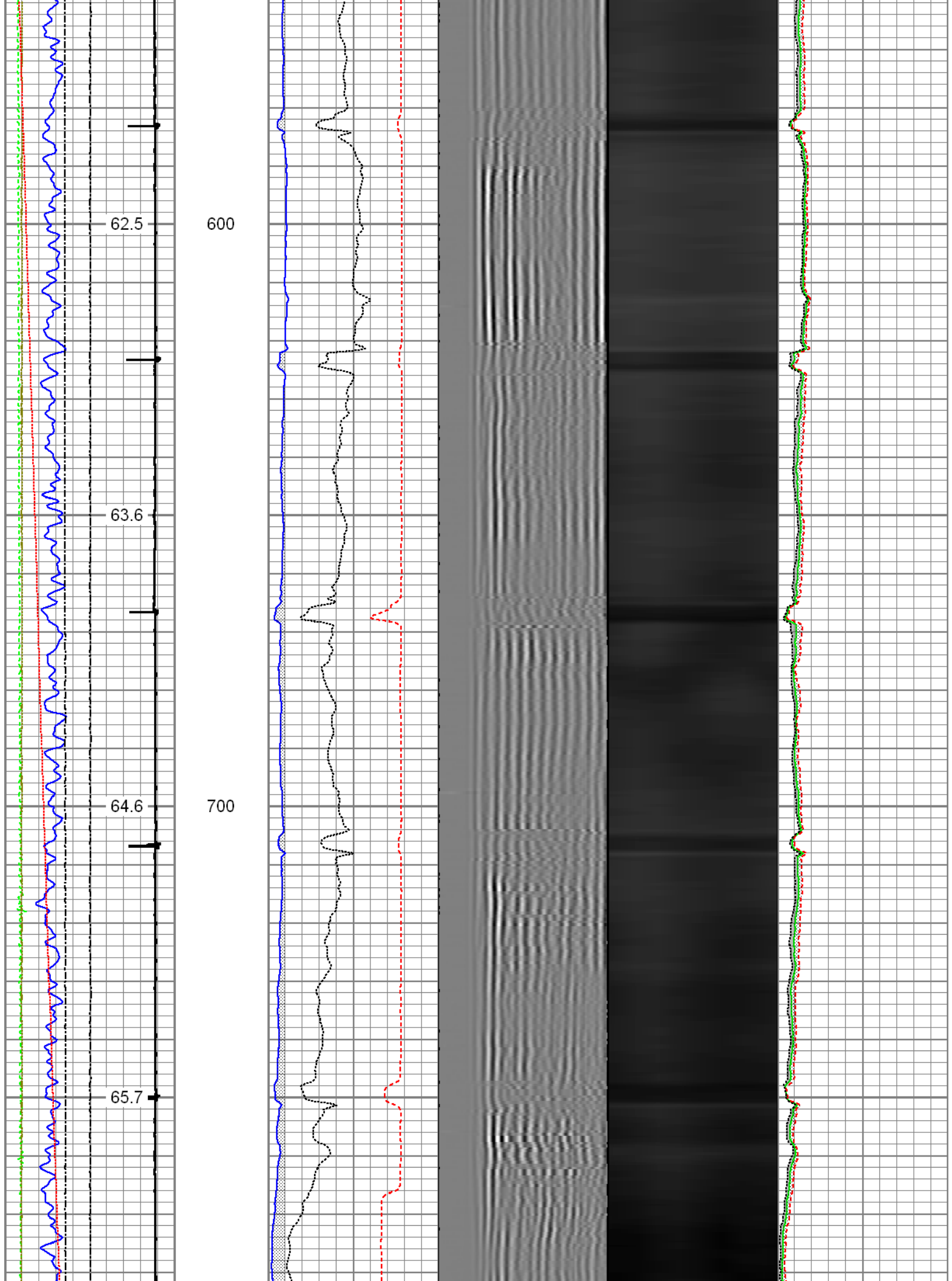


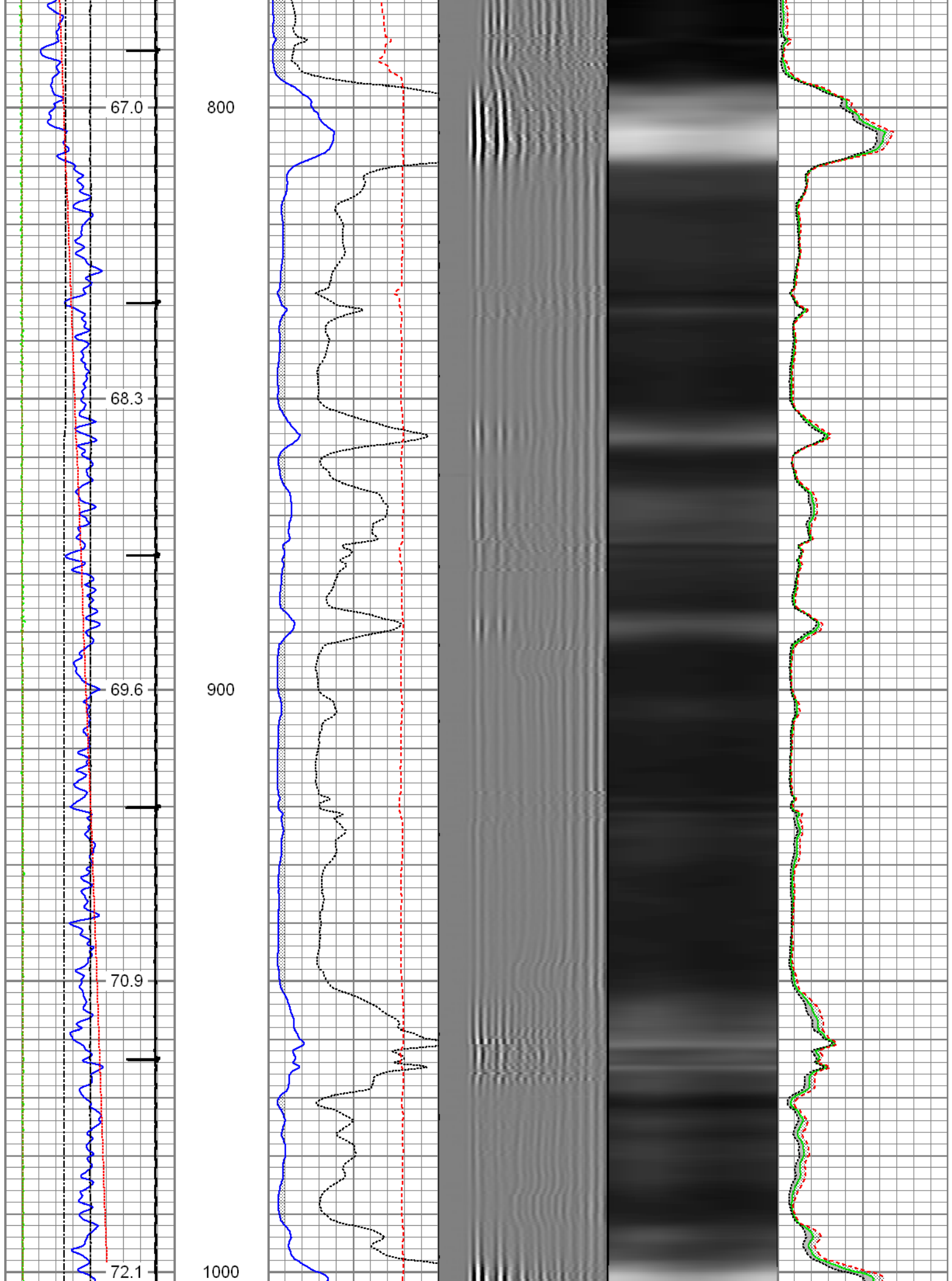
Estimated TOC

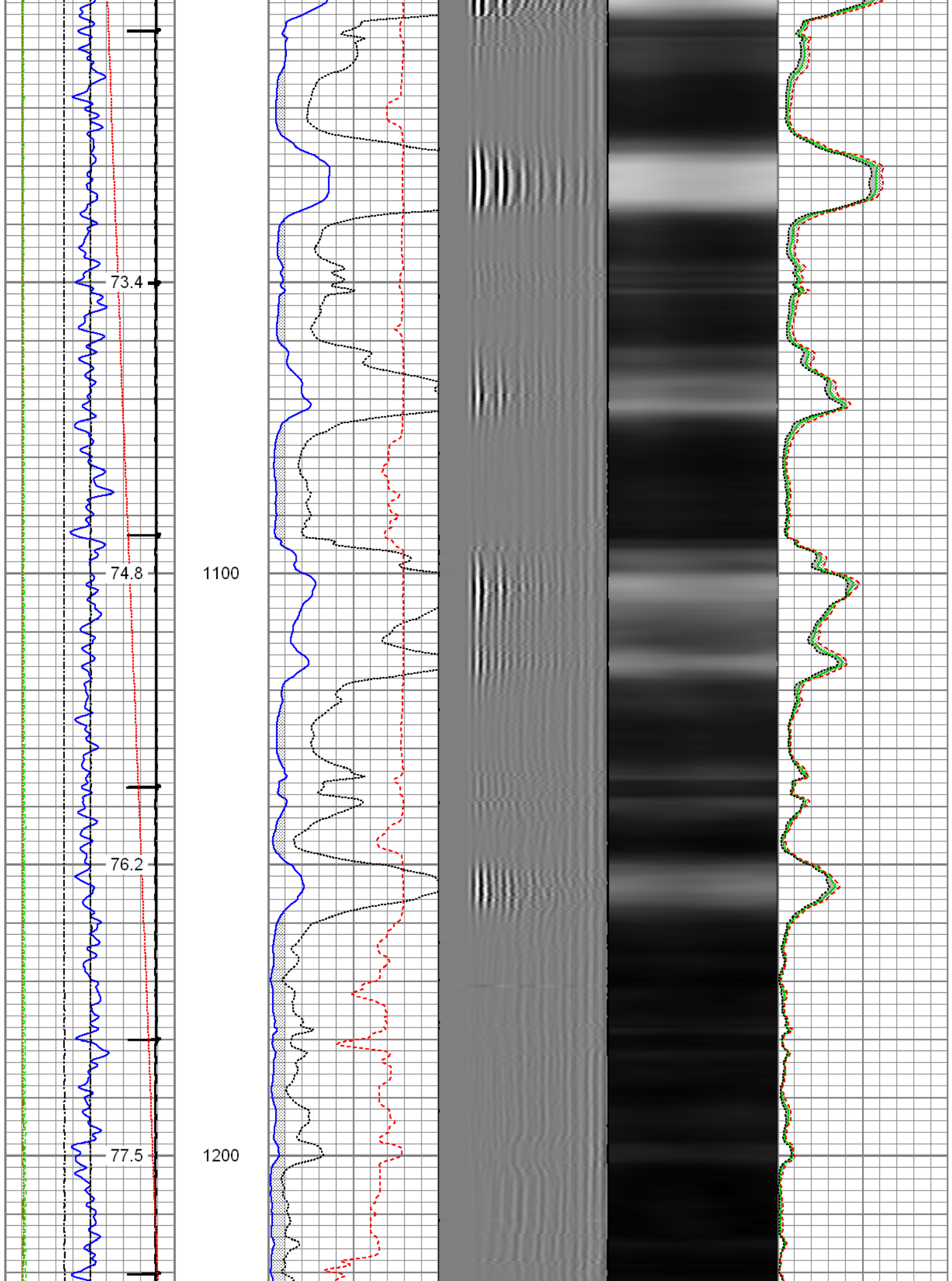


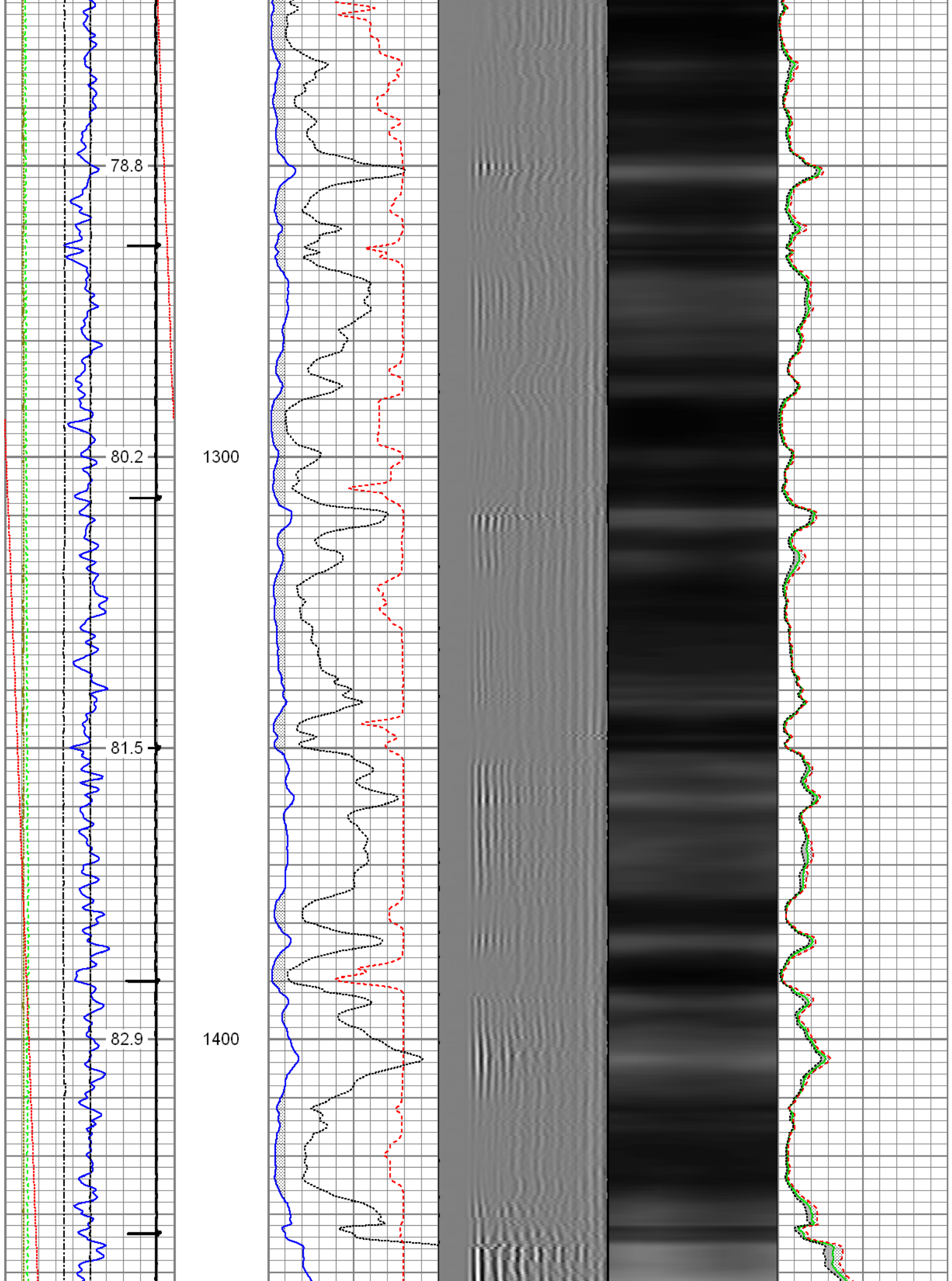


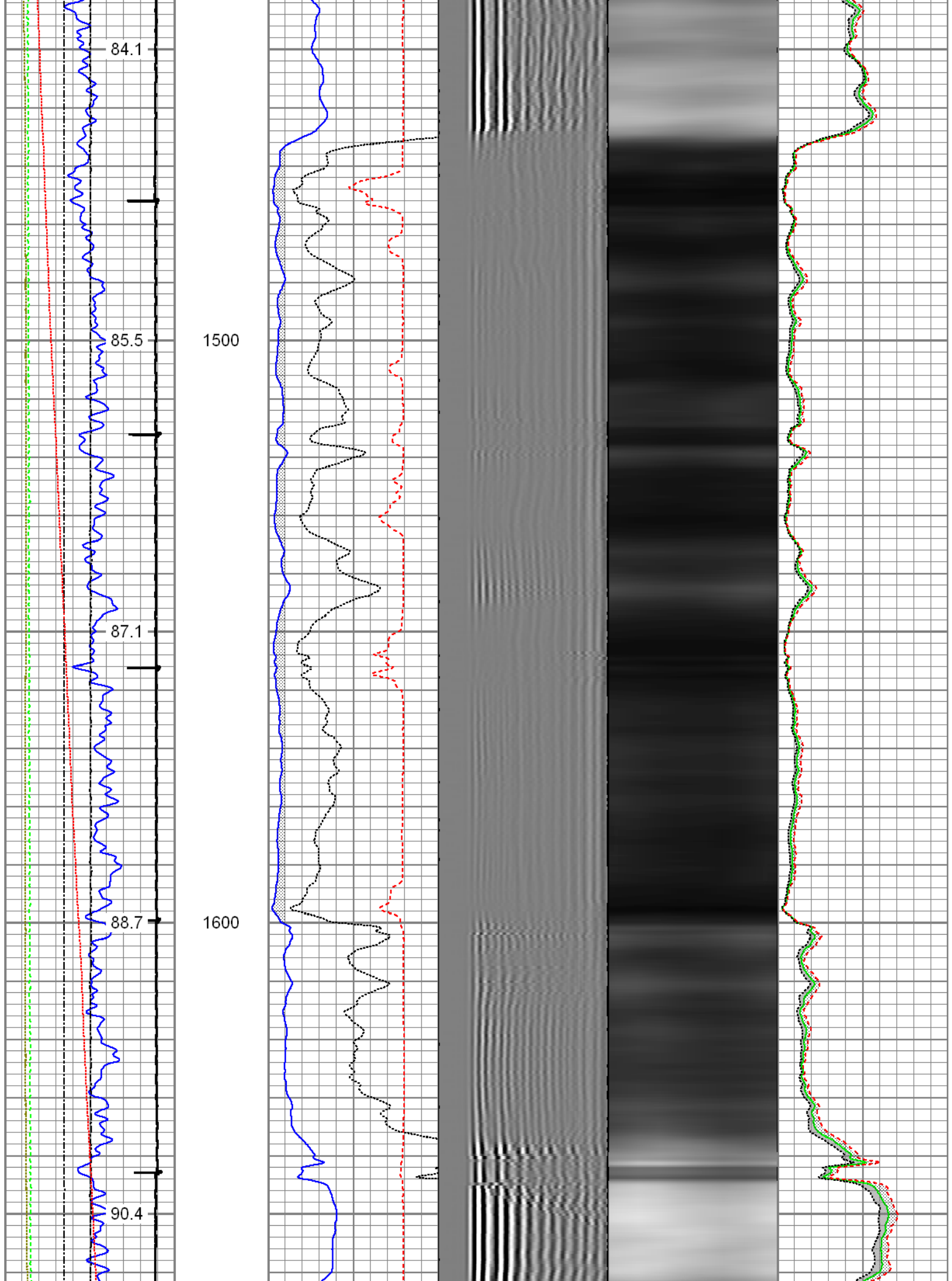




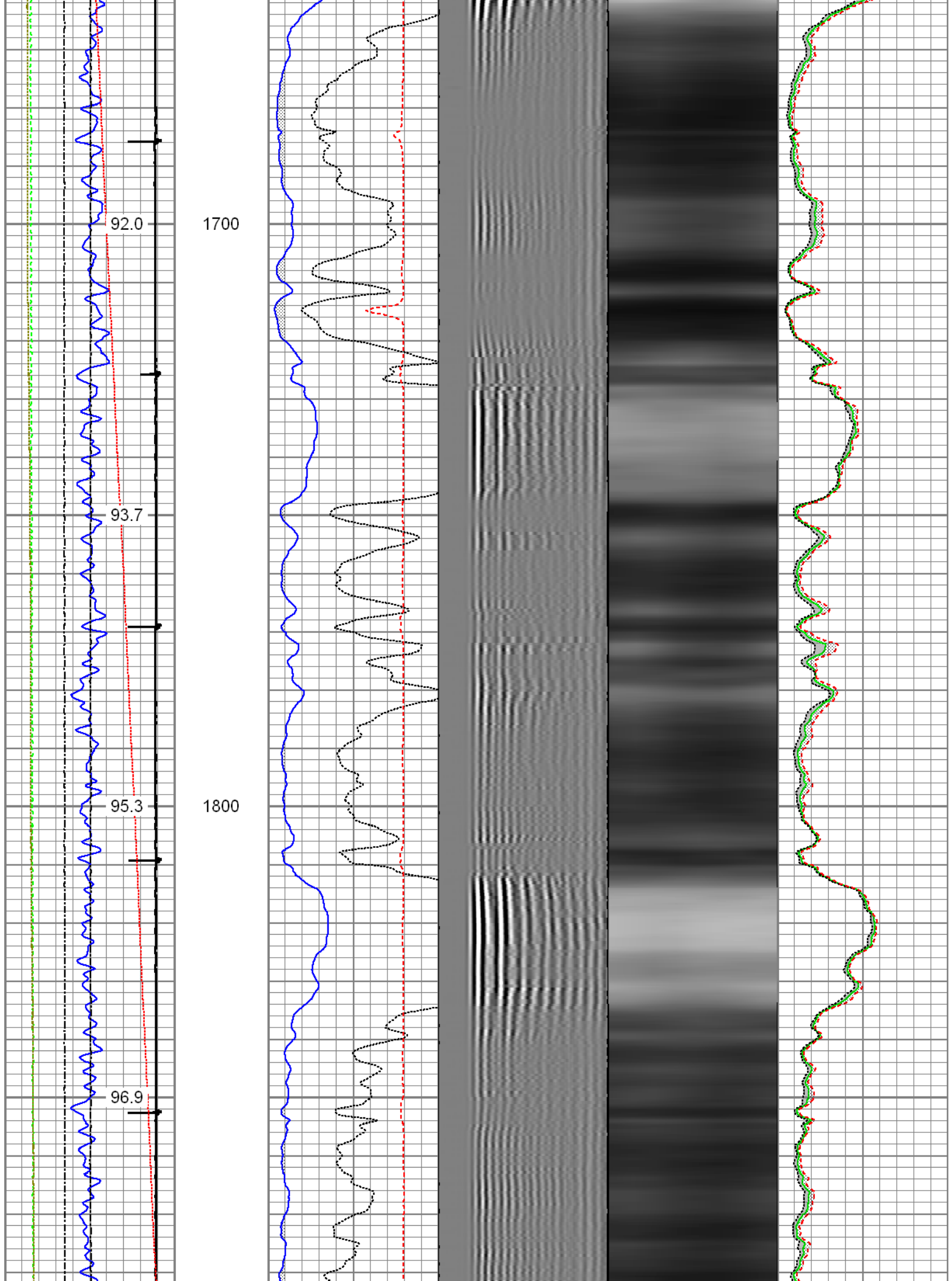


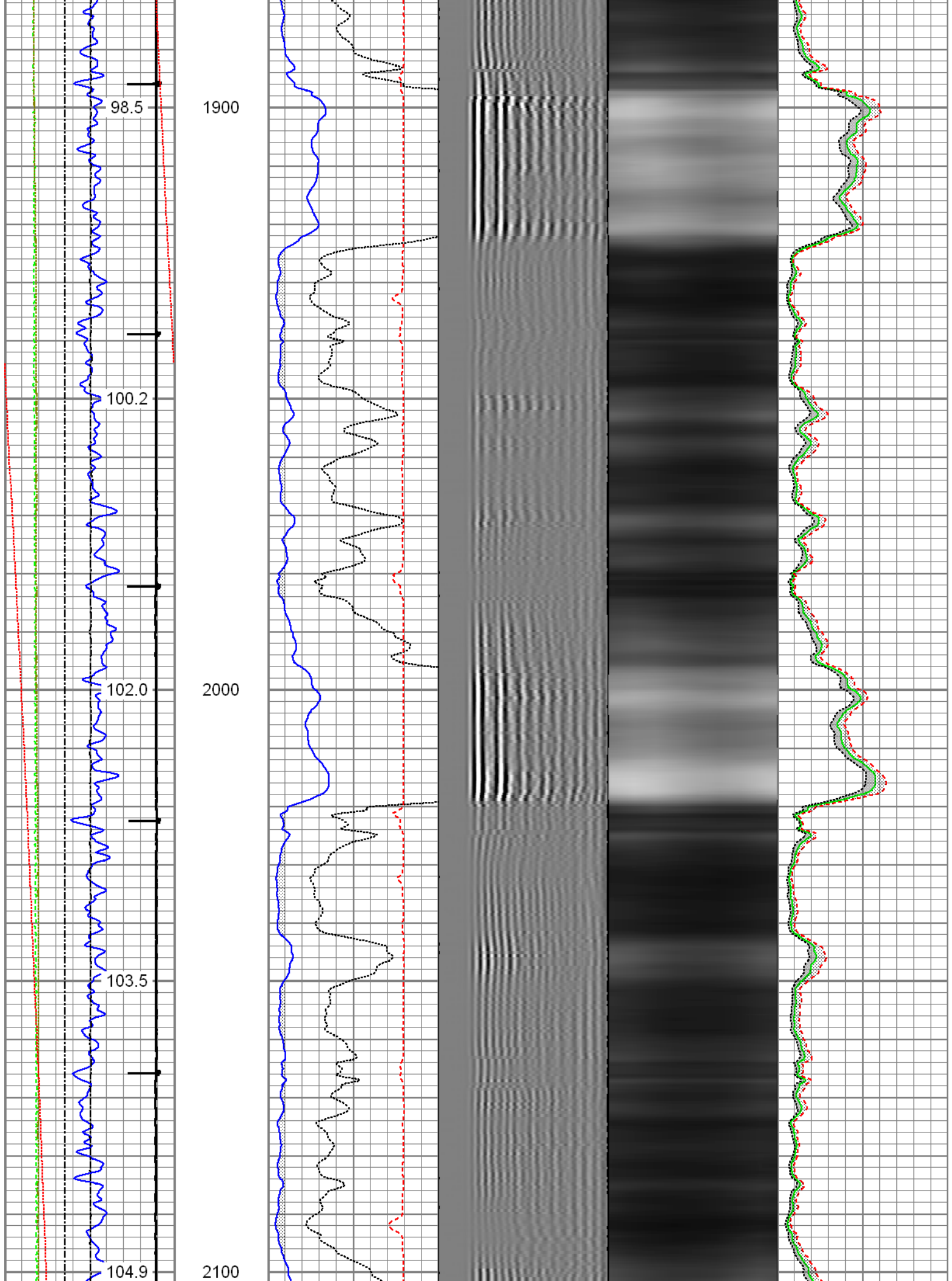


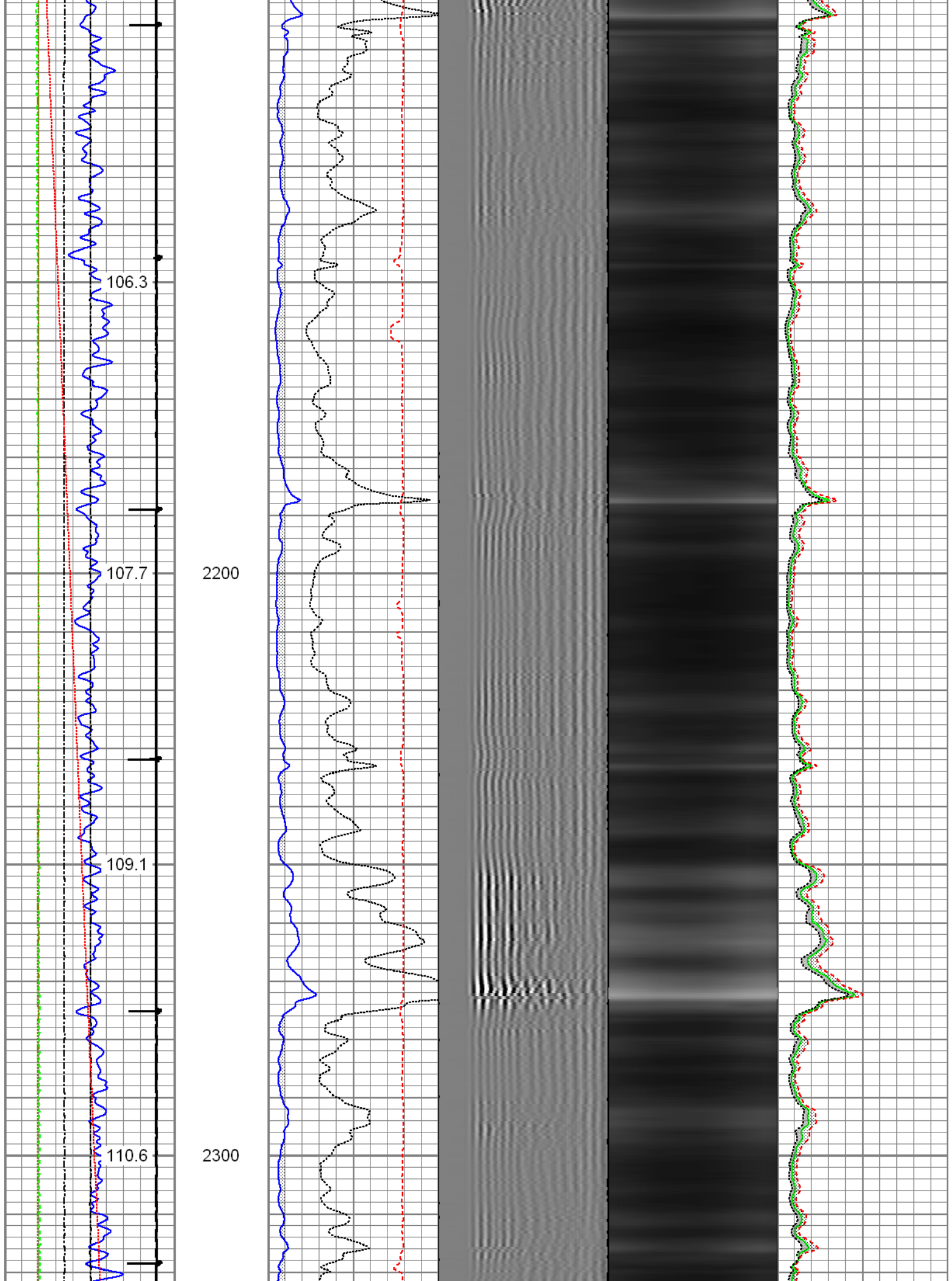


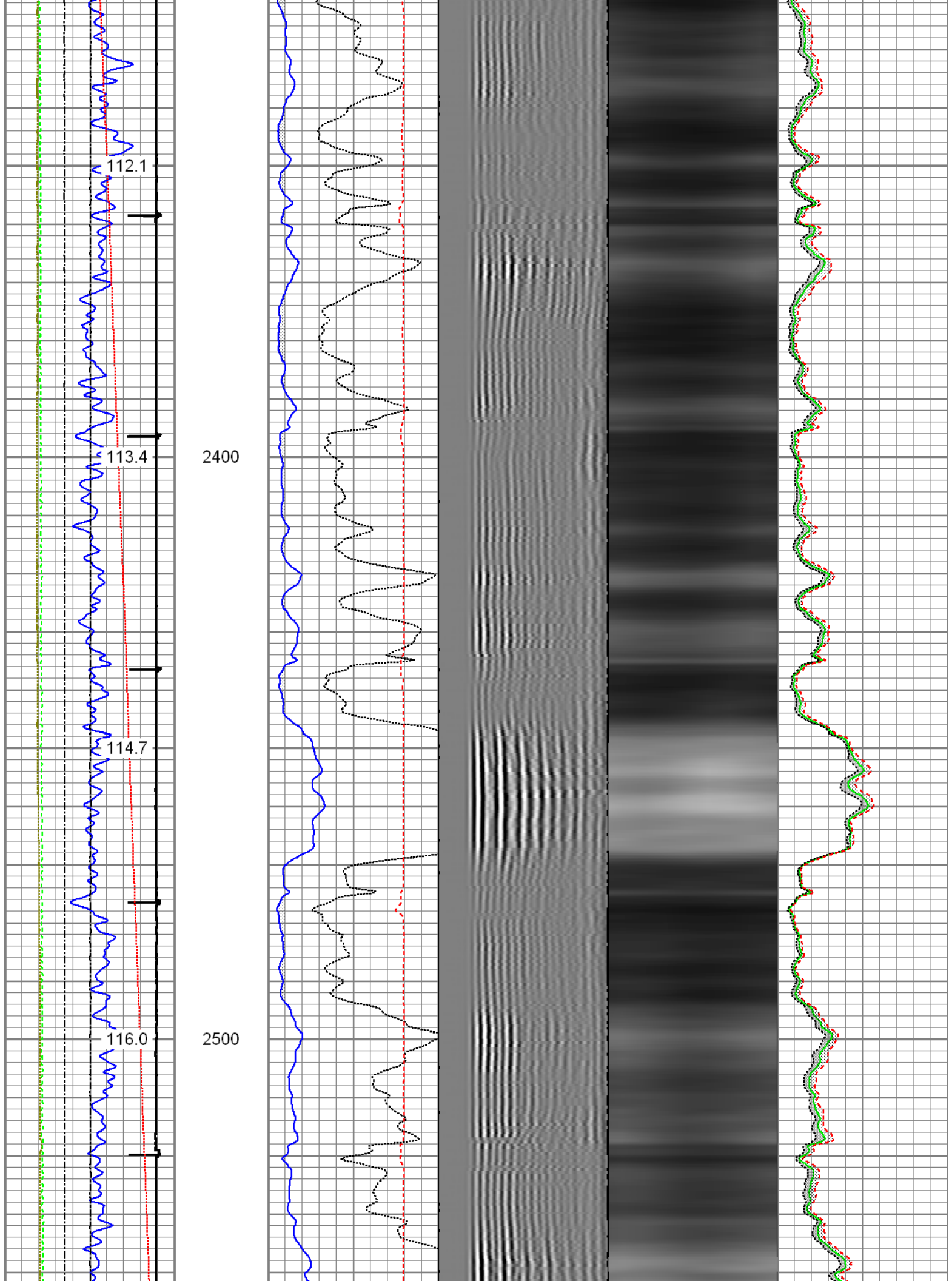


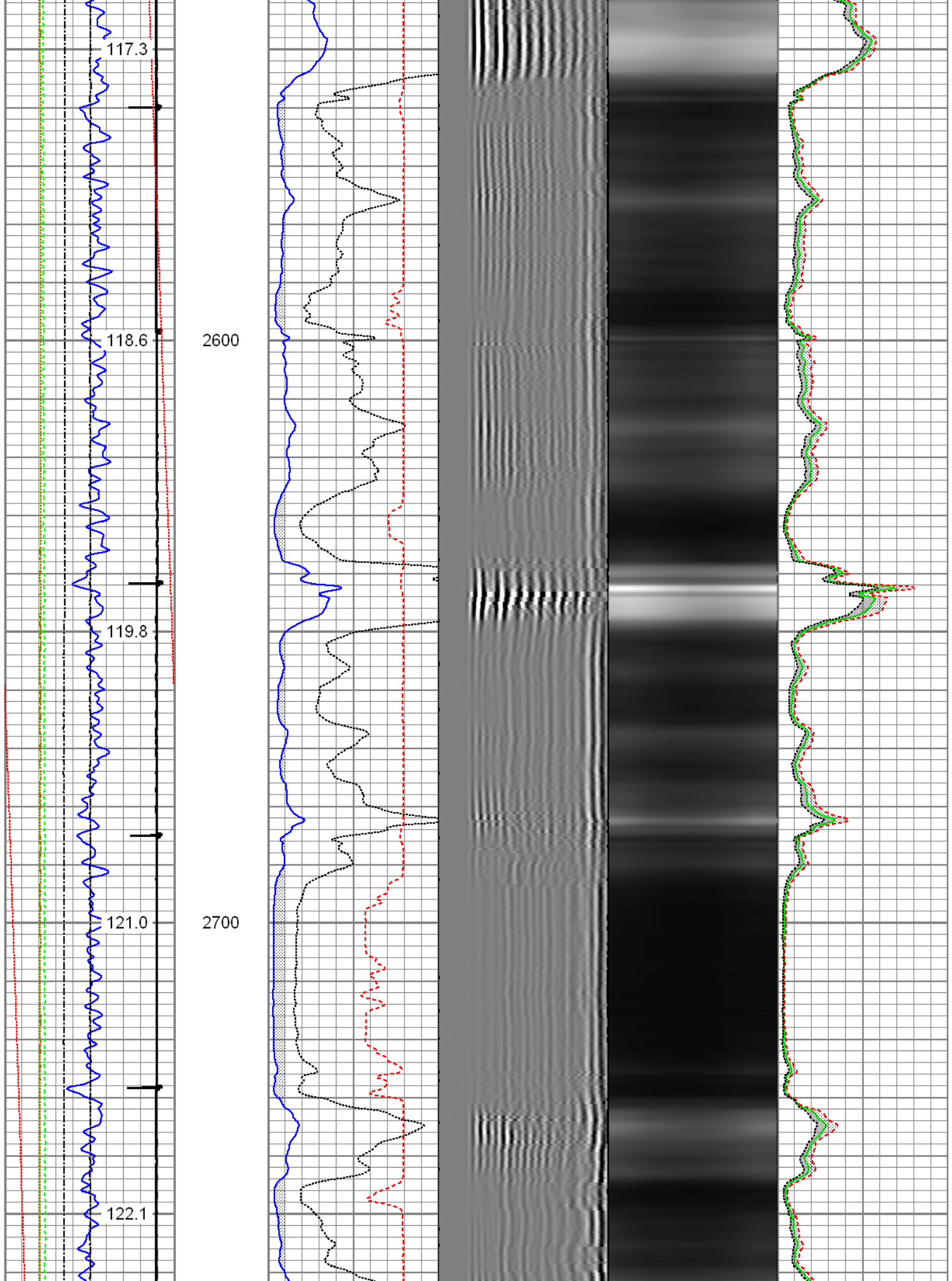




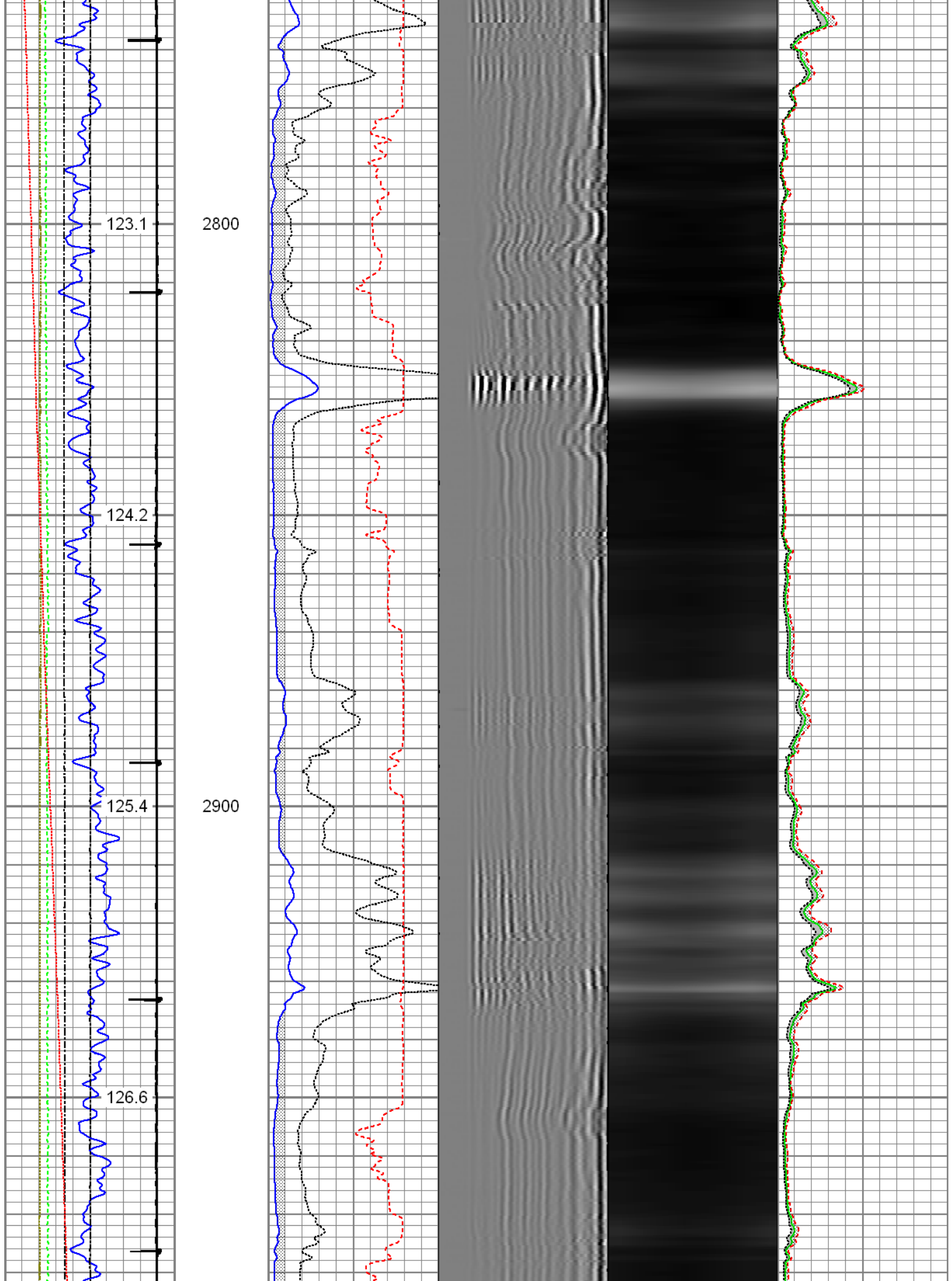


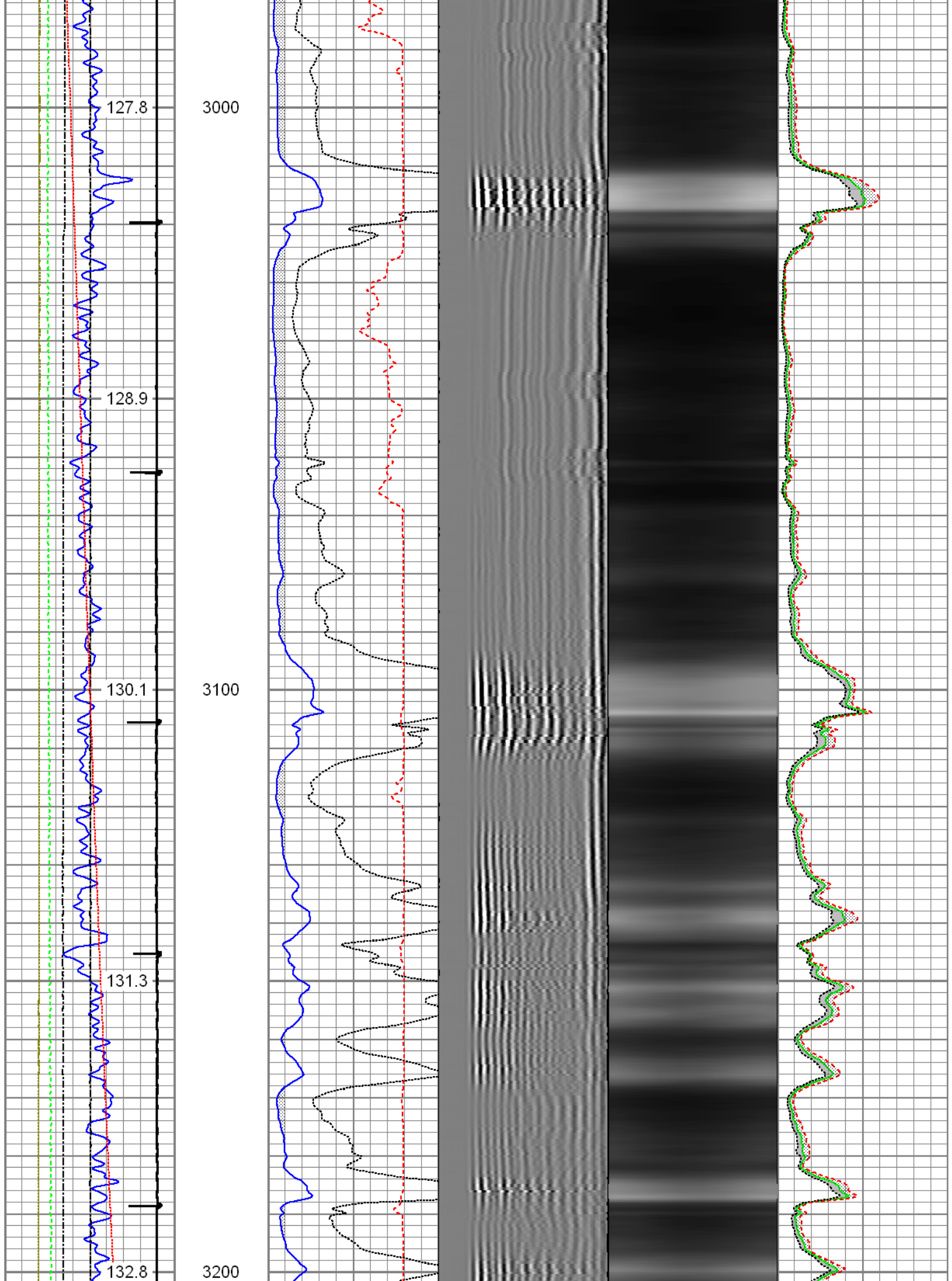


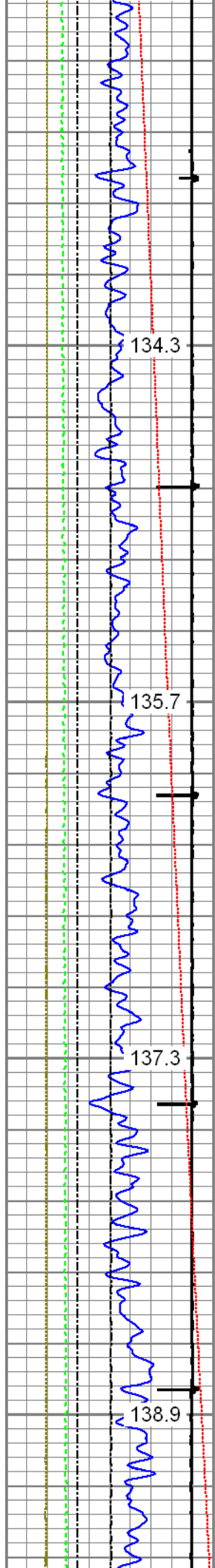






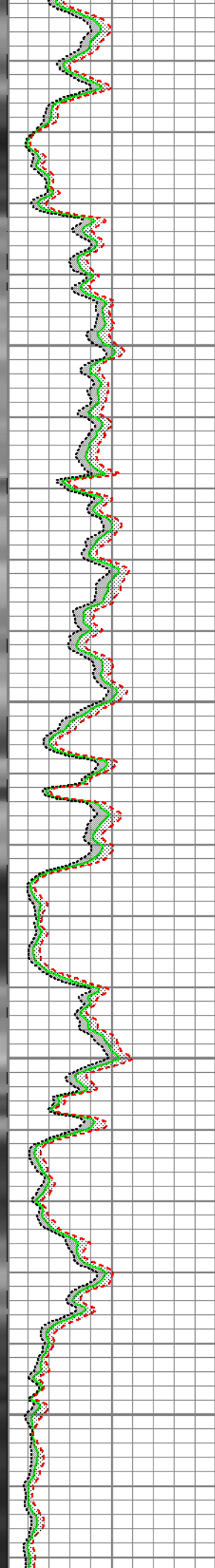
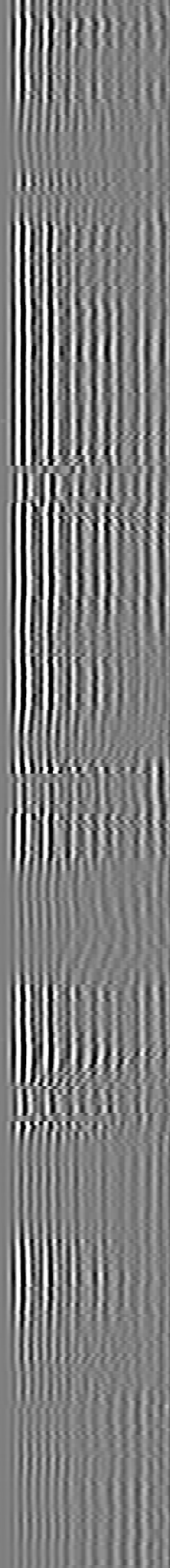
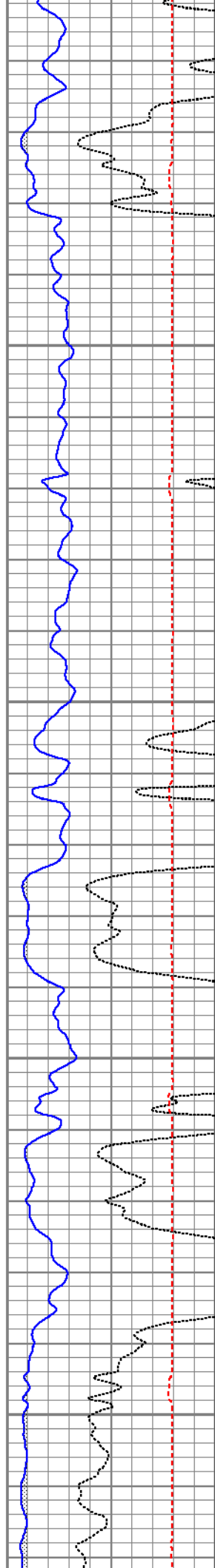


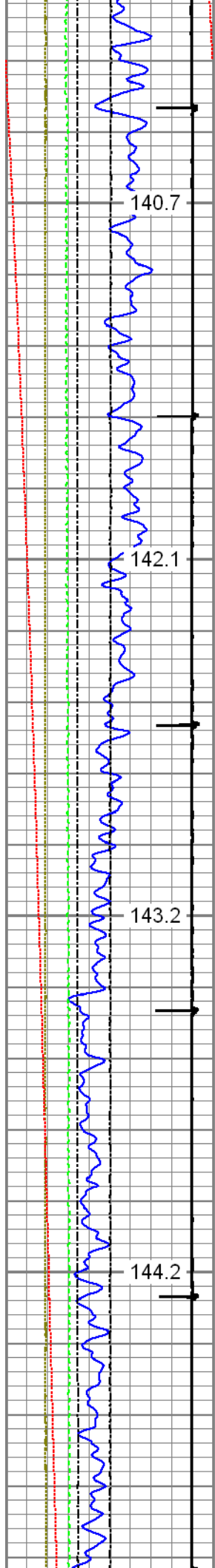




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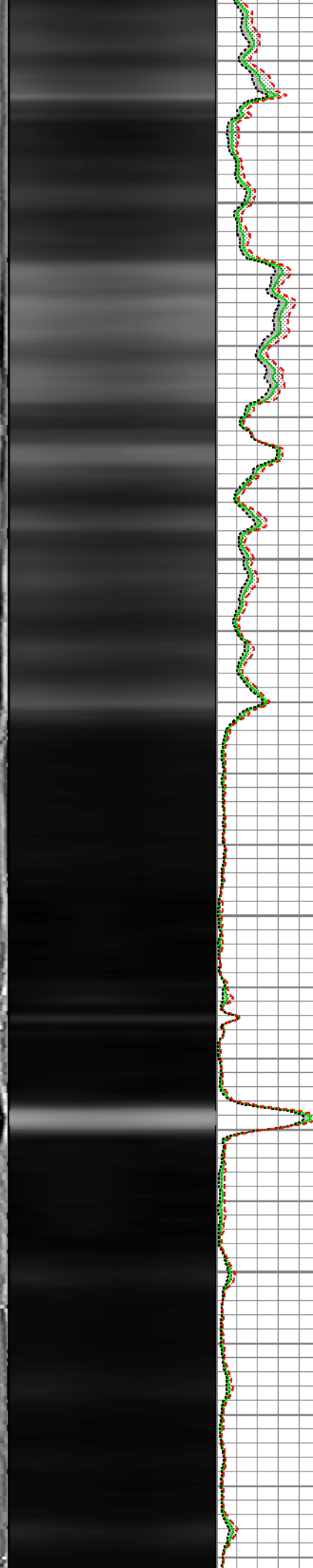
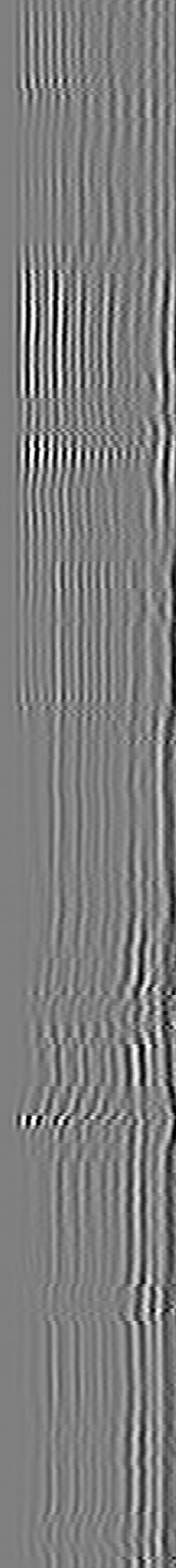
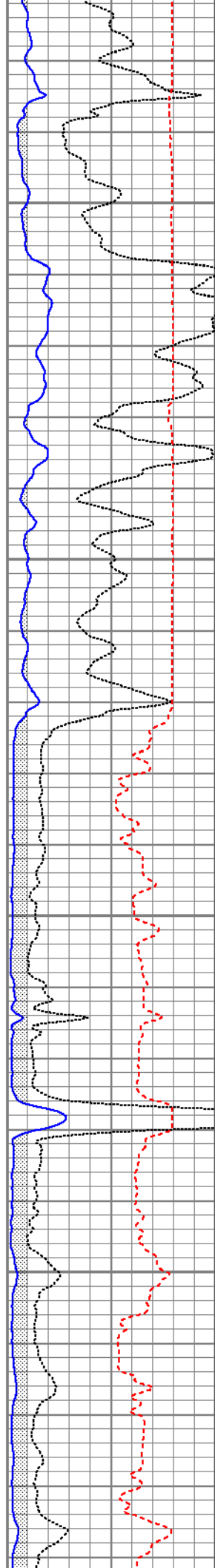
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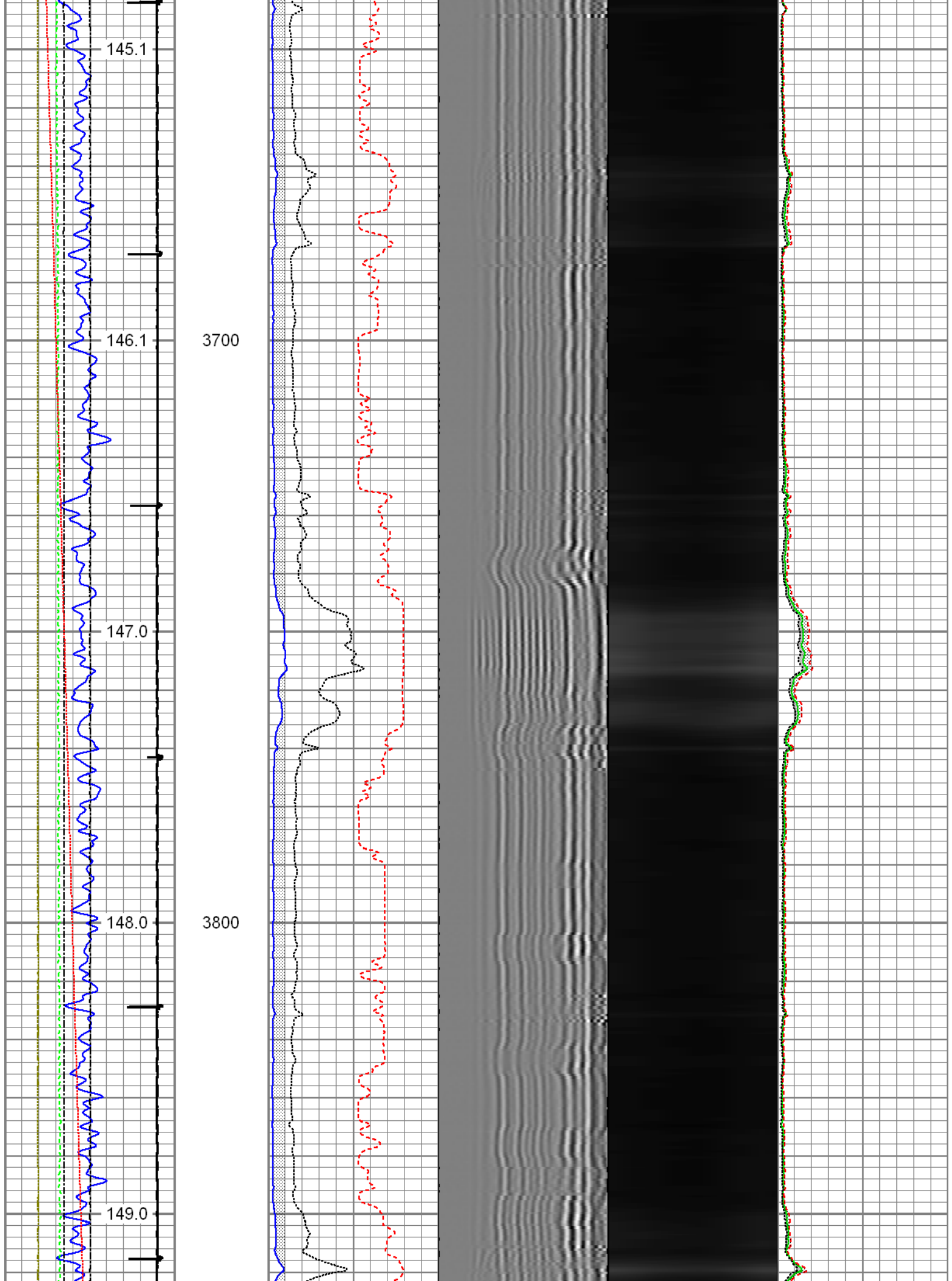




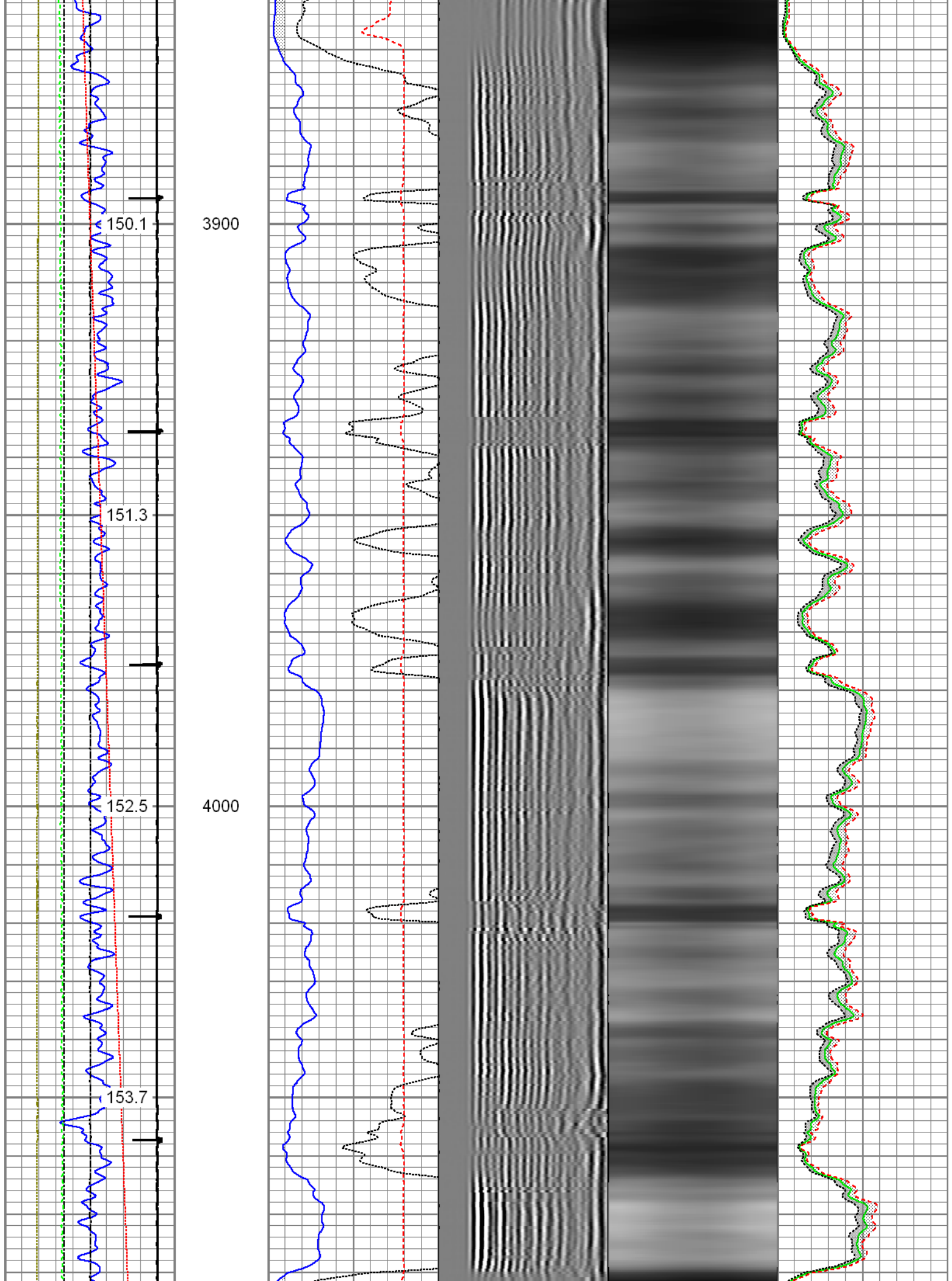
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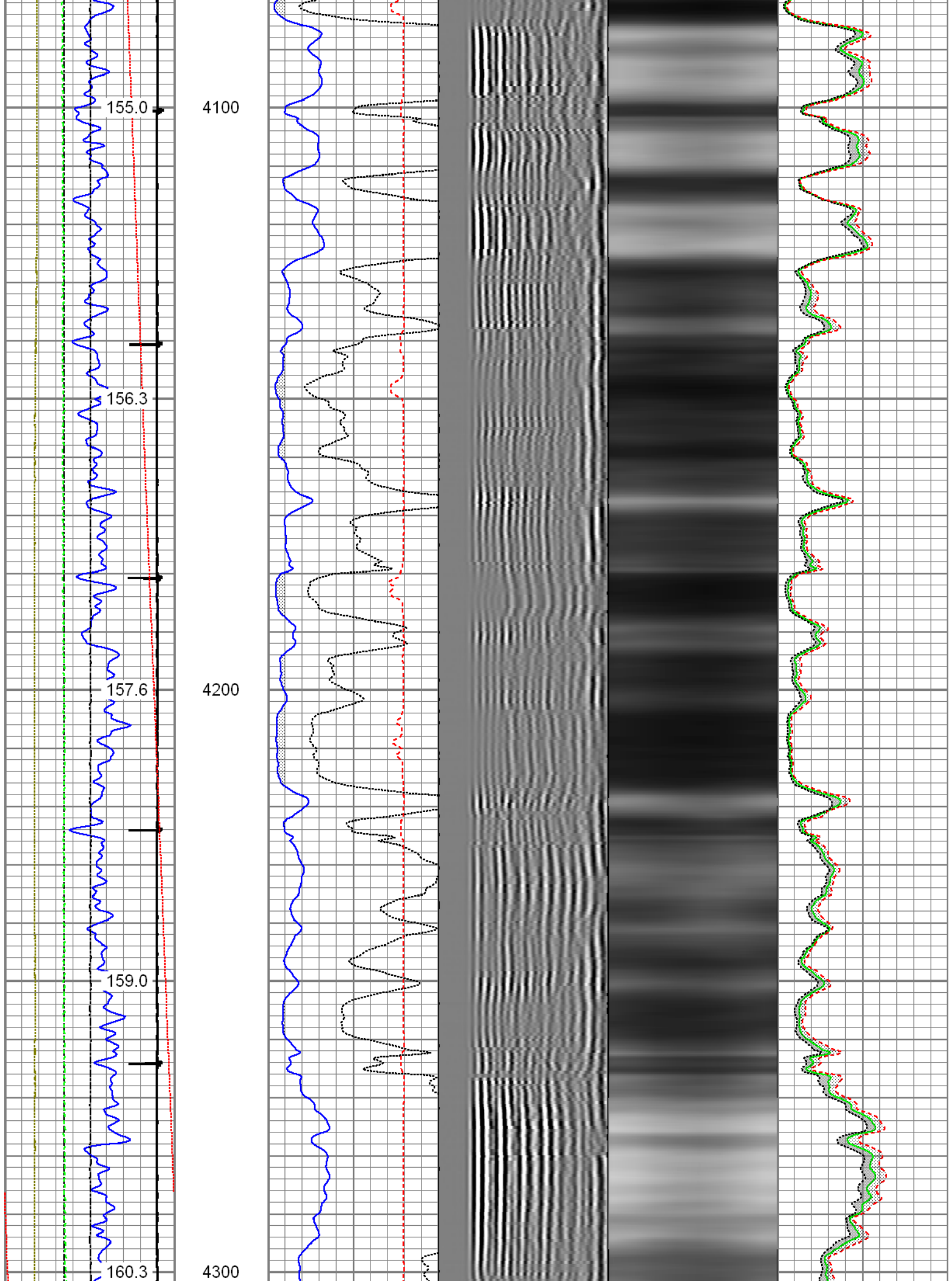
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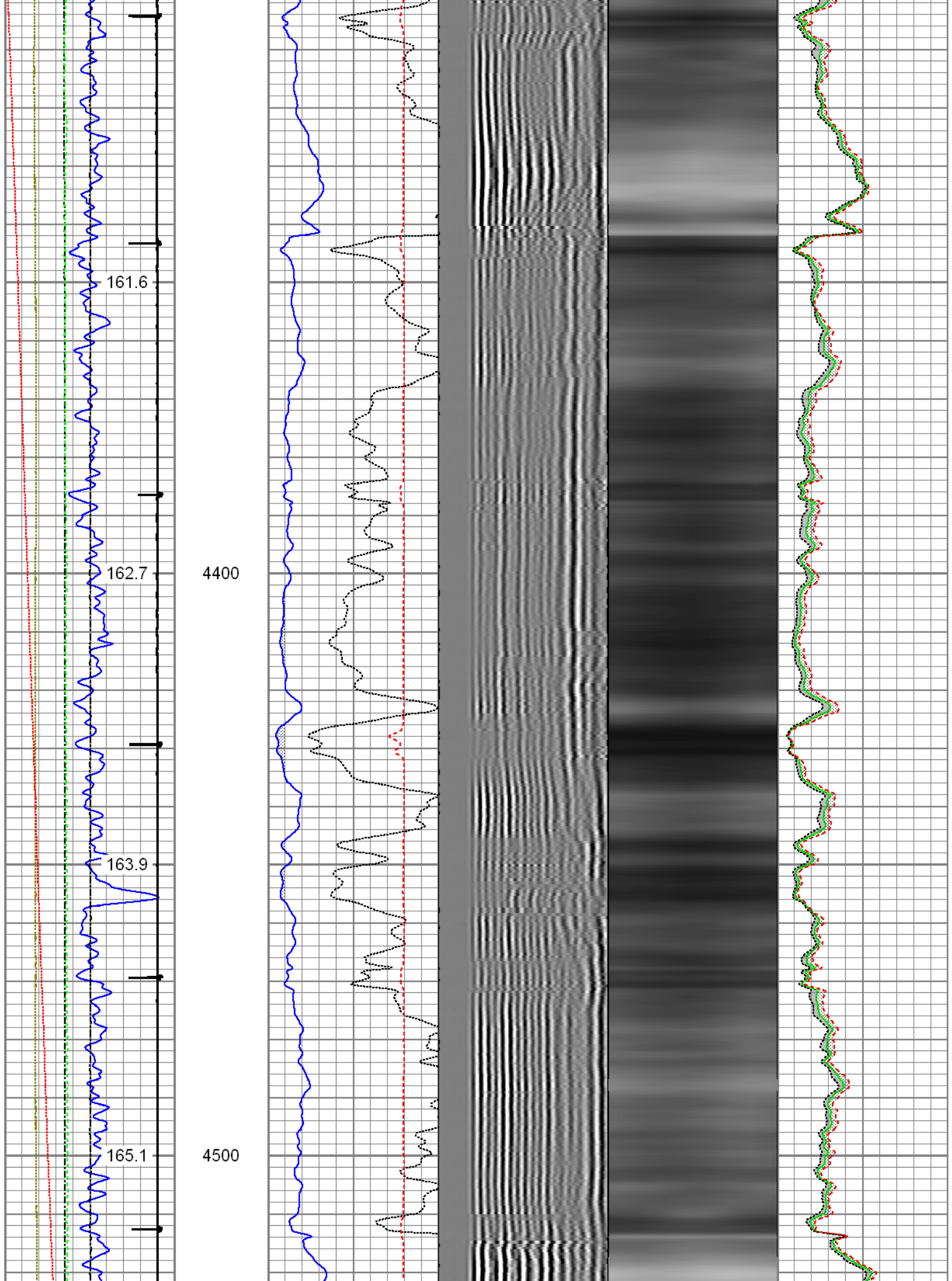


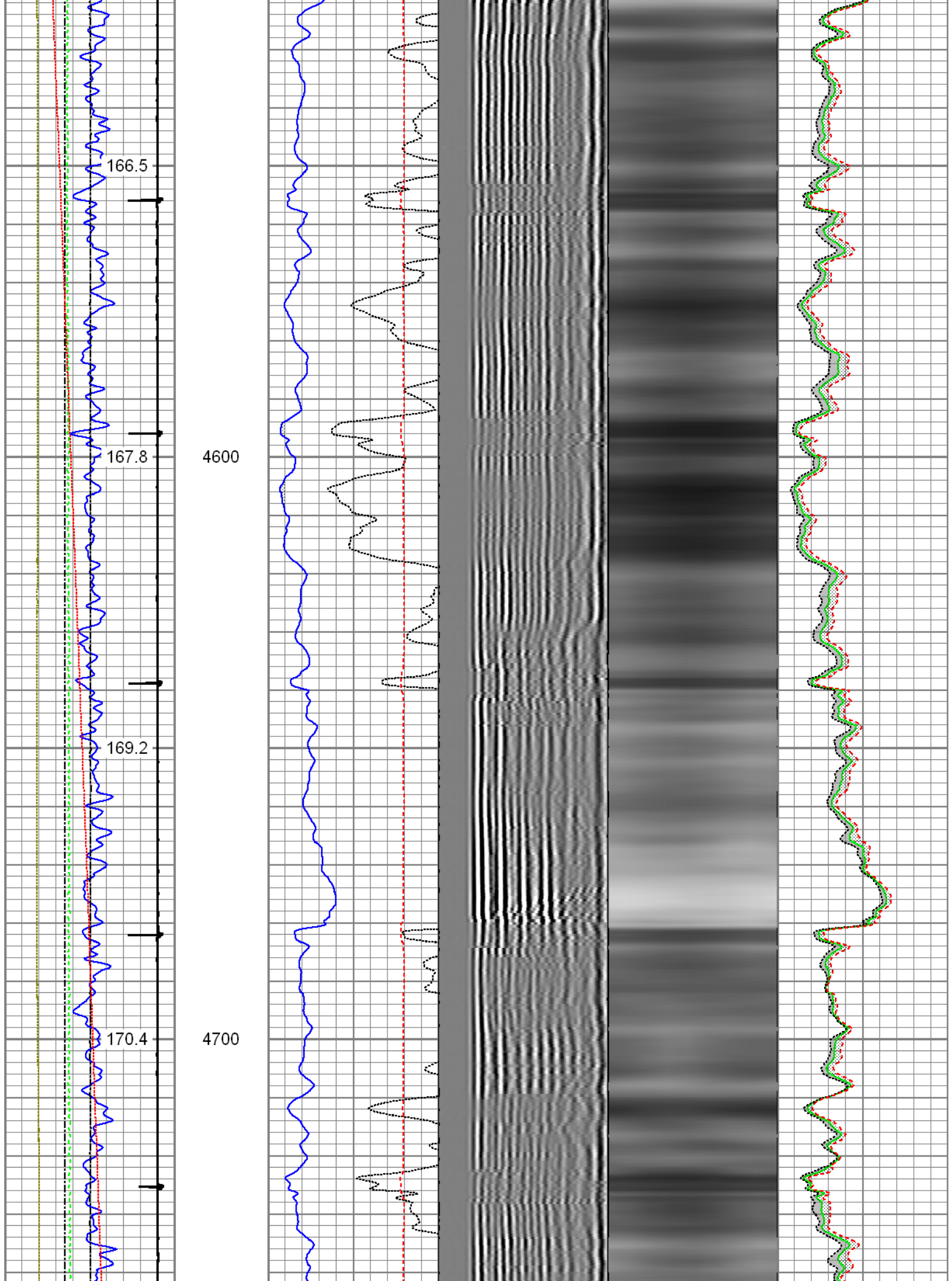




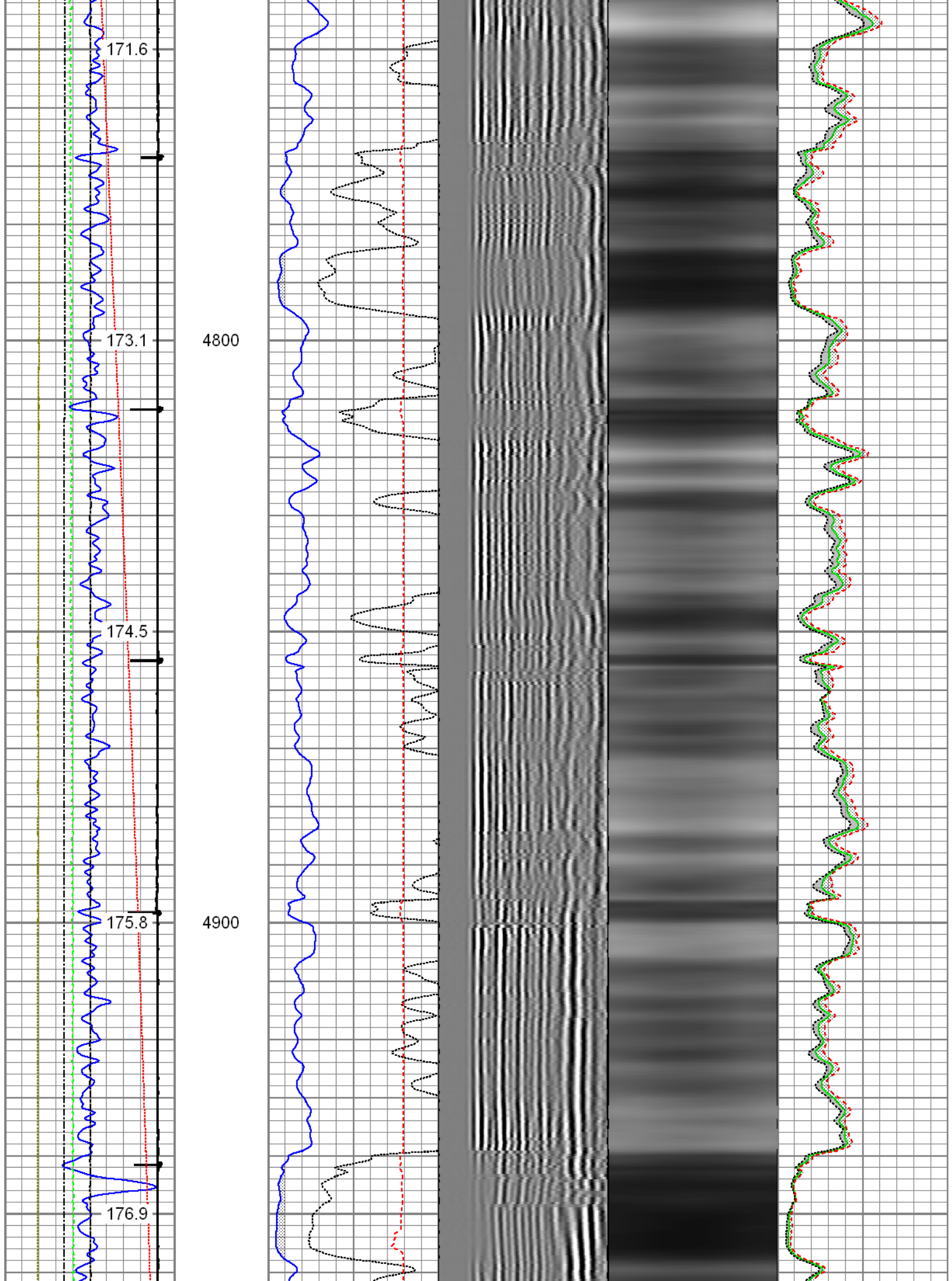




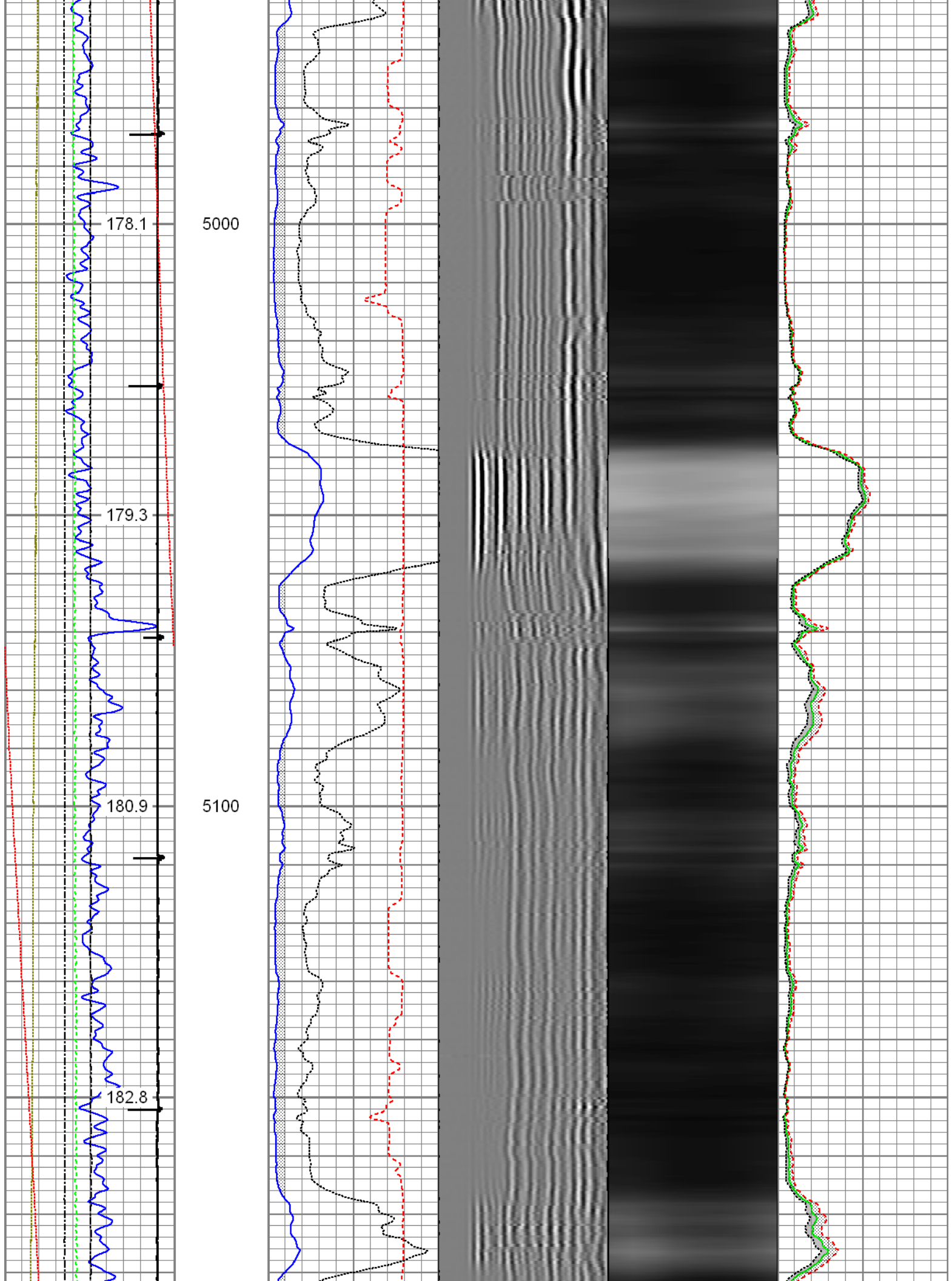


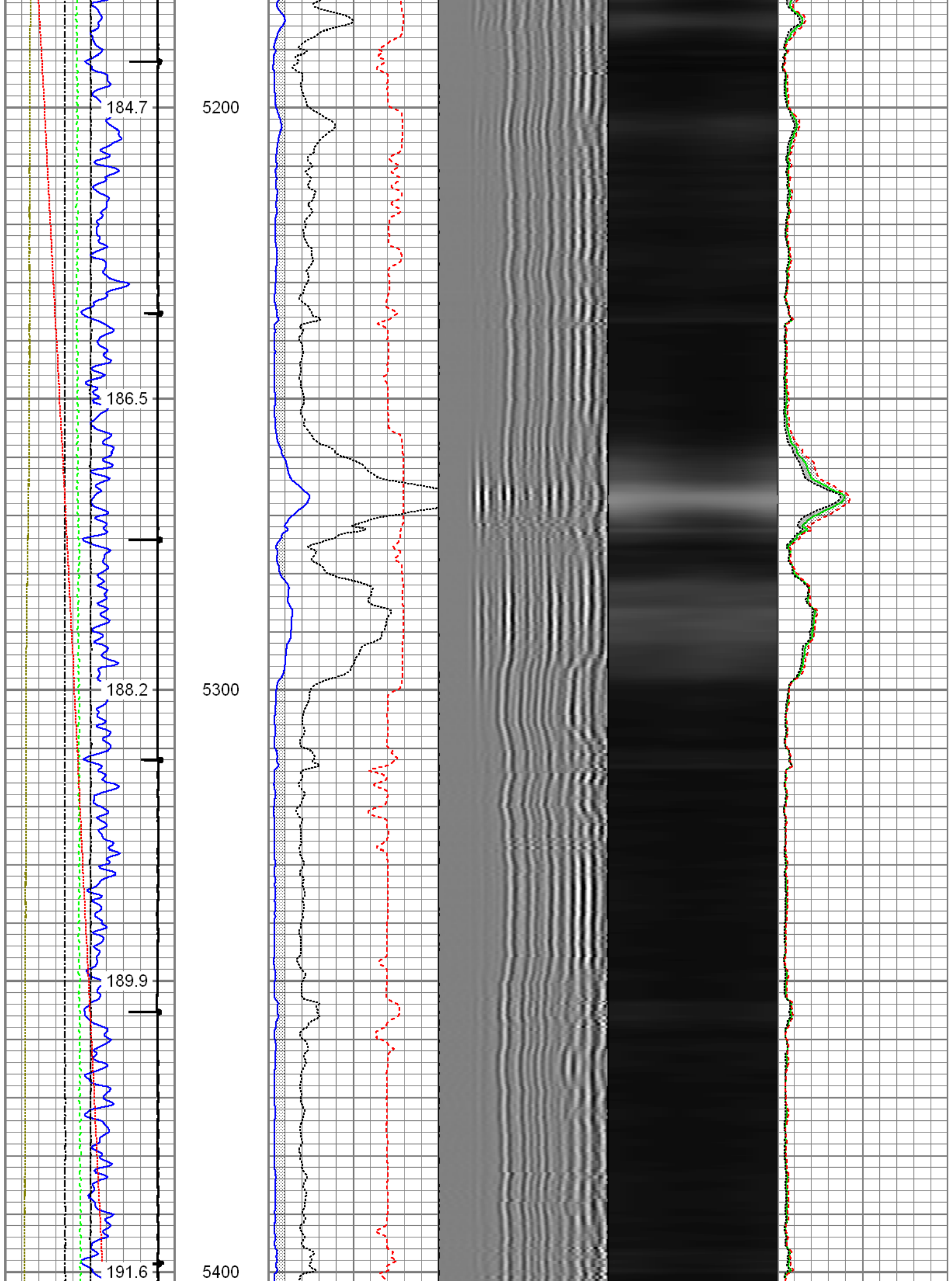


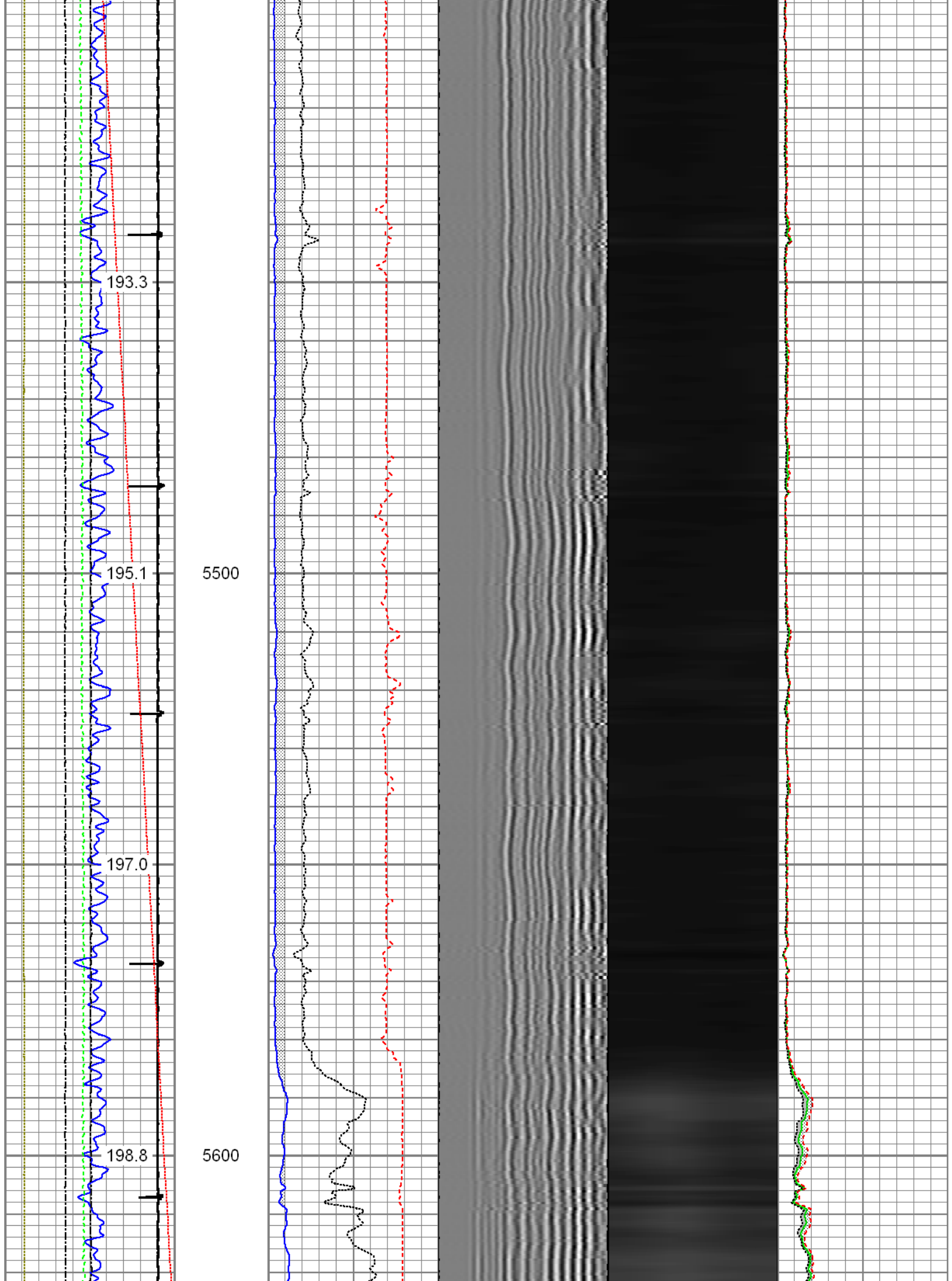


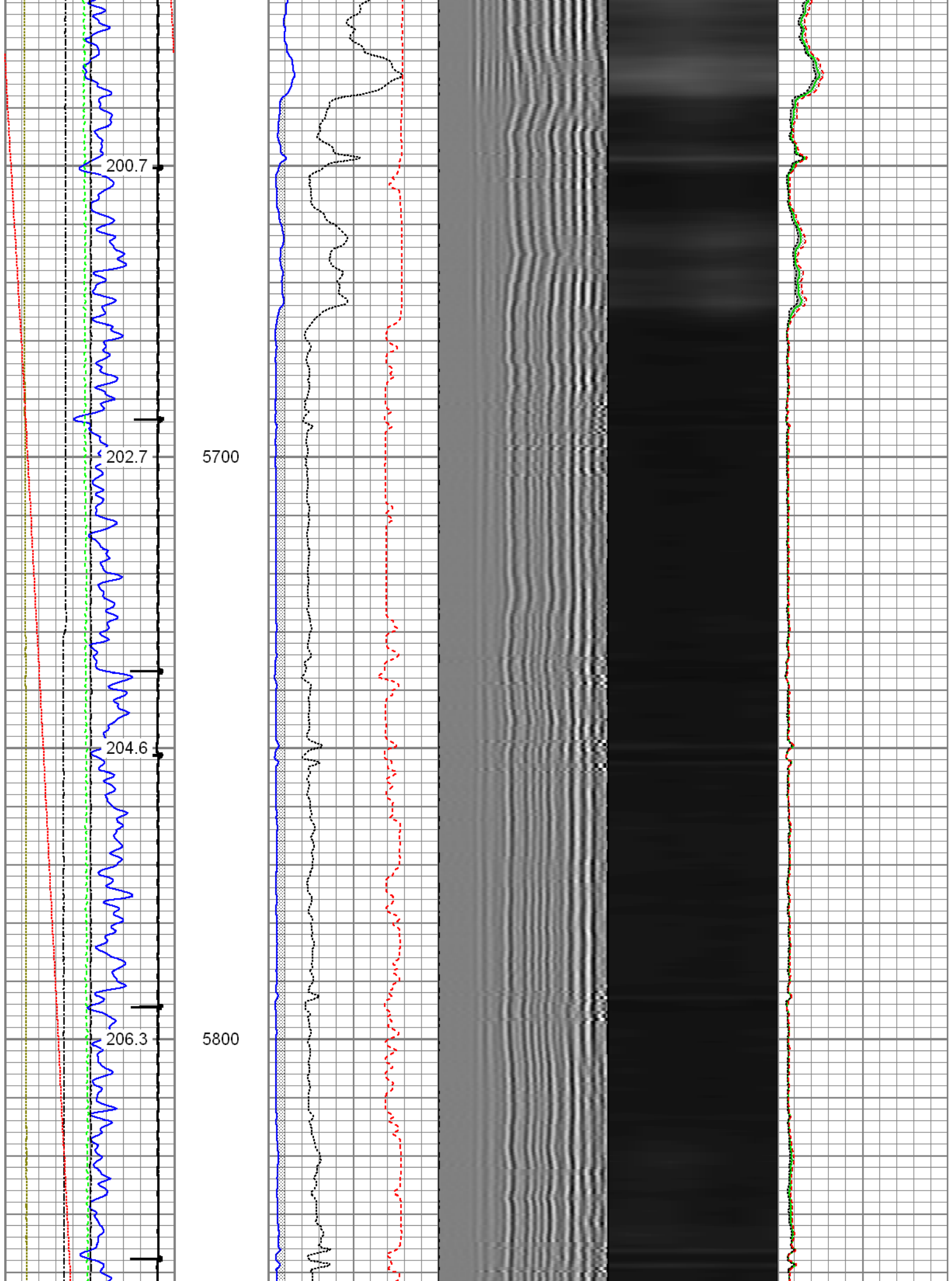


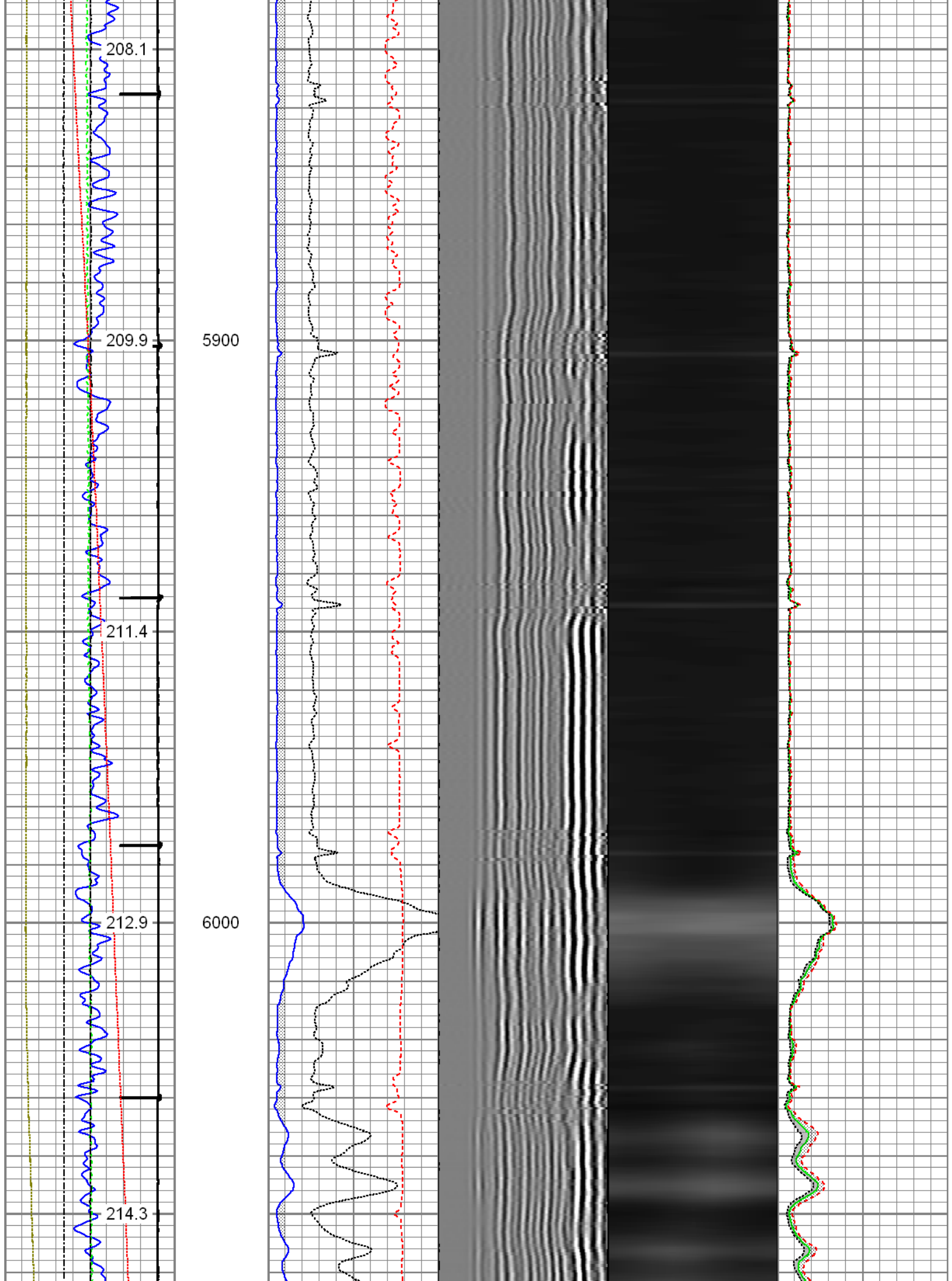




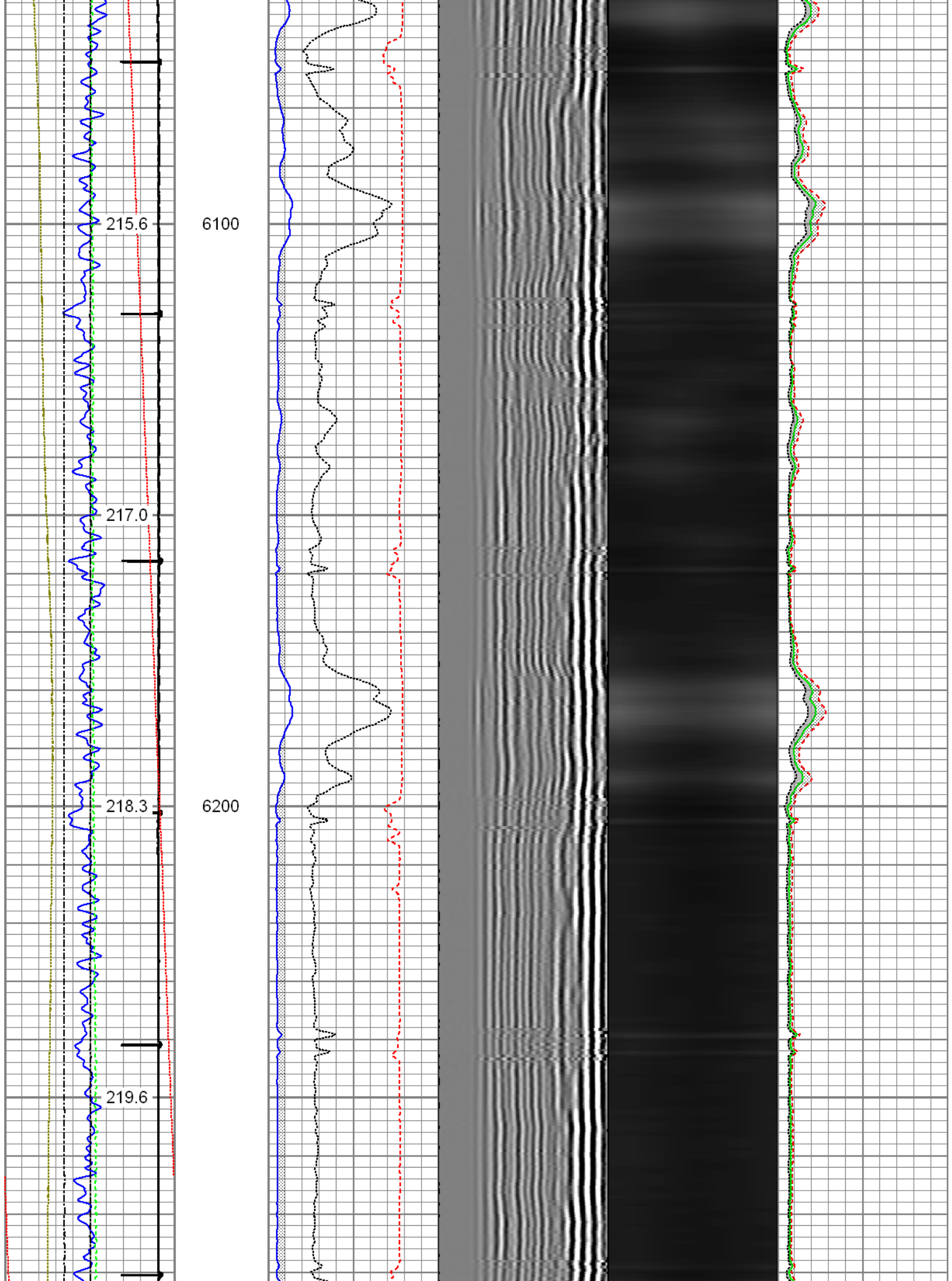


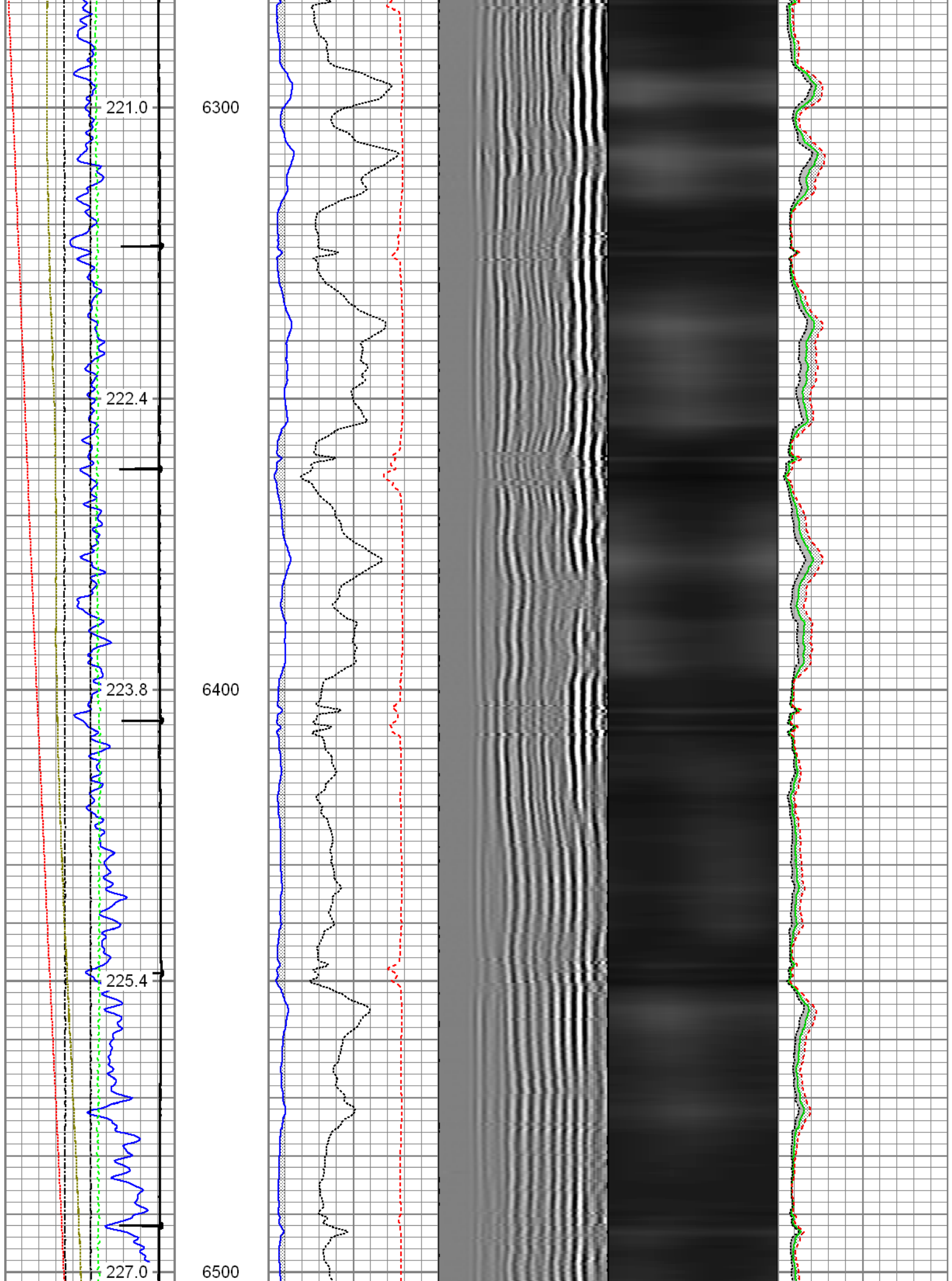


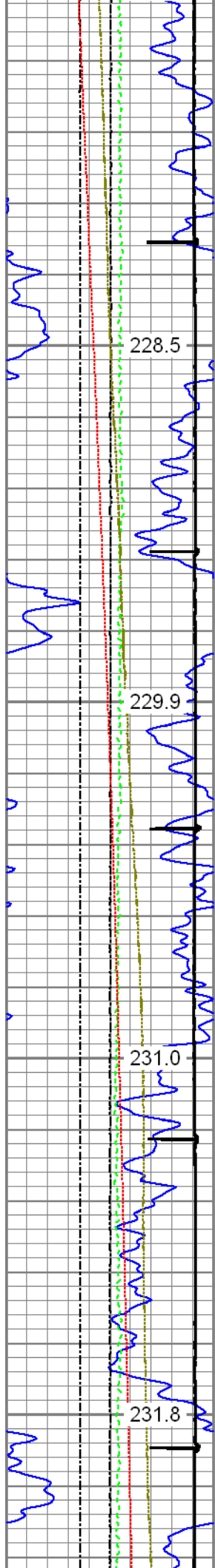












228.5

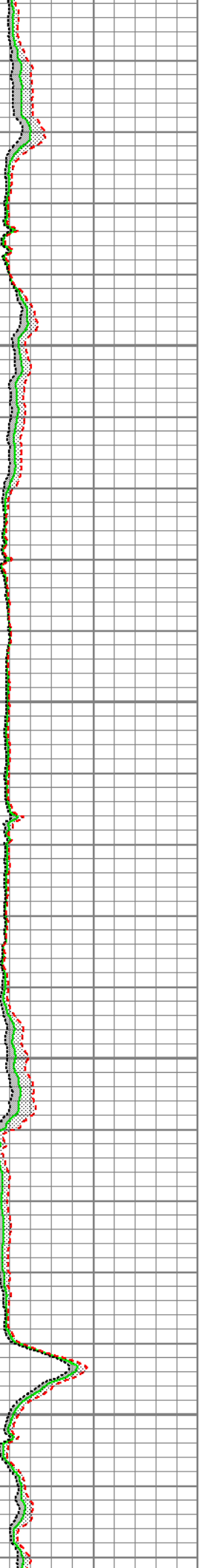
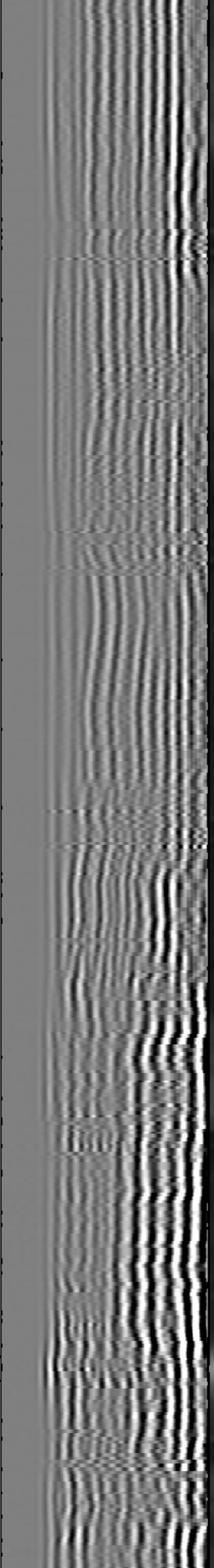
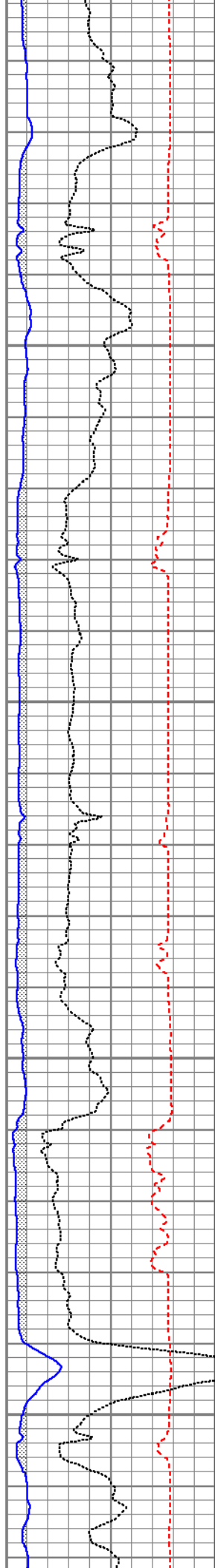
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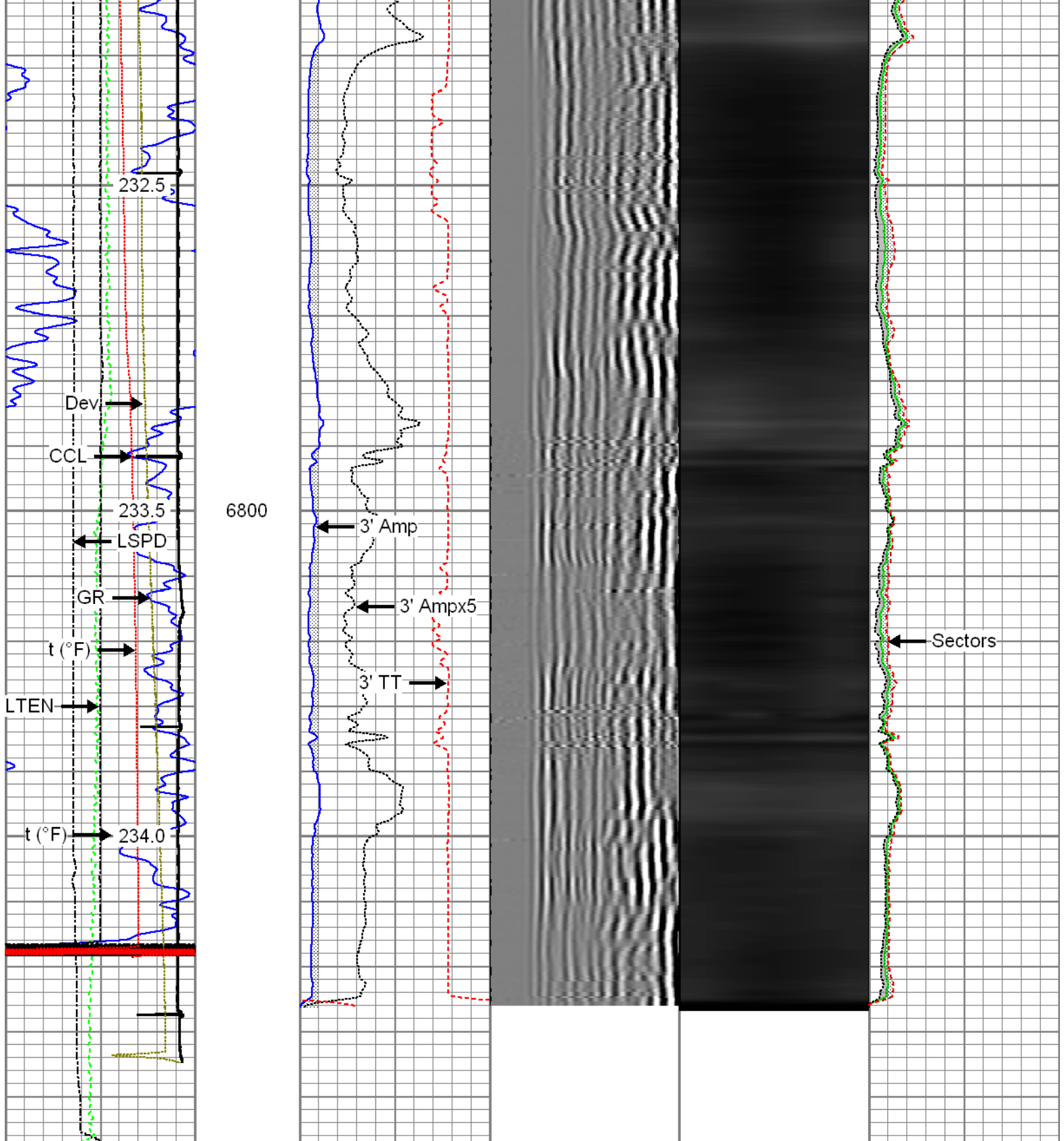
231.0

231.8

6600

6700





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

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

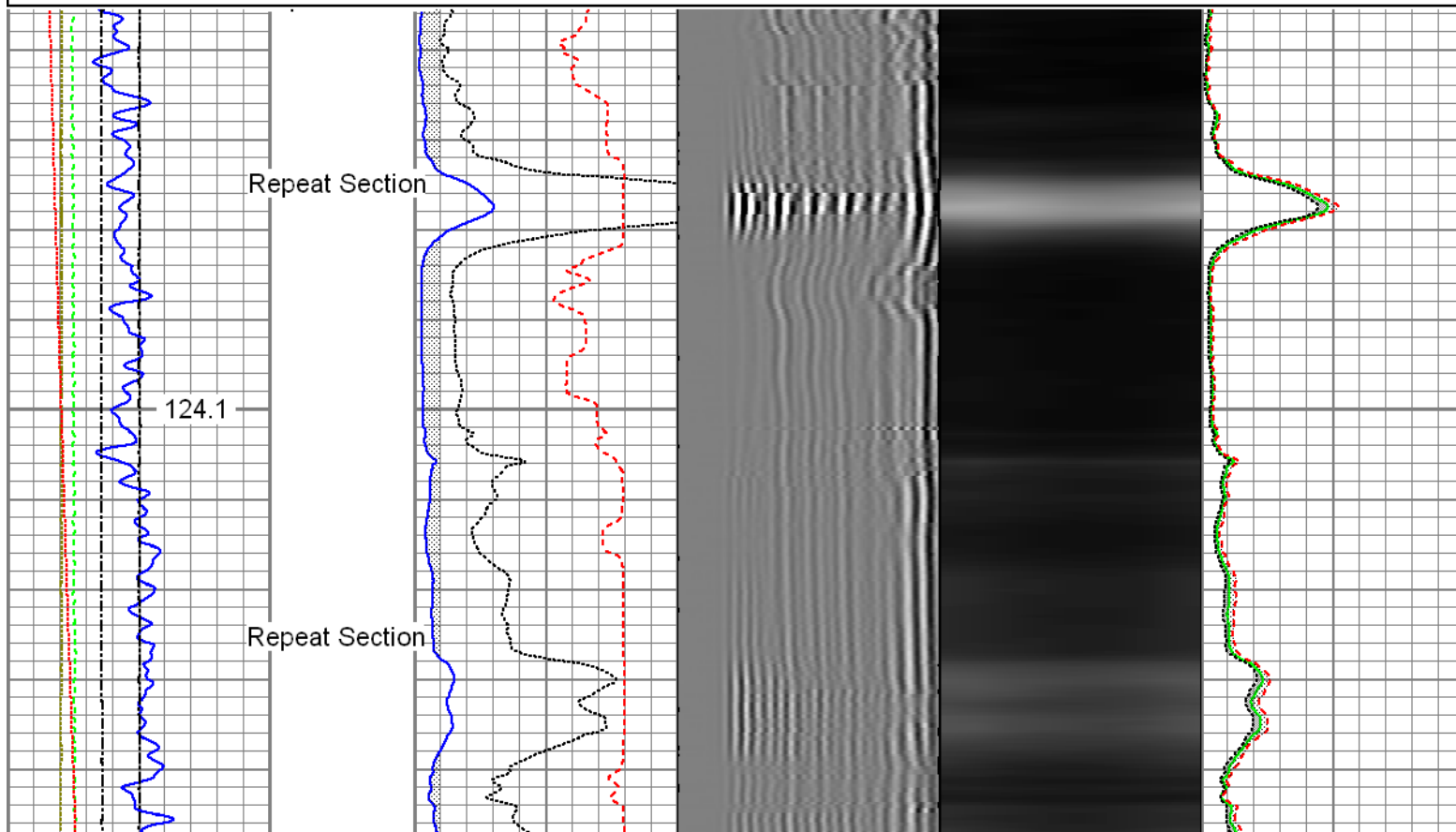


## Repeat Pass

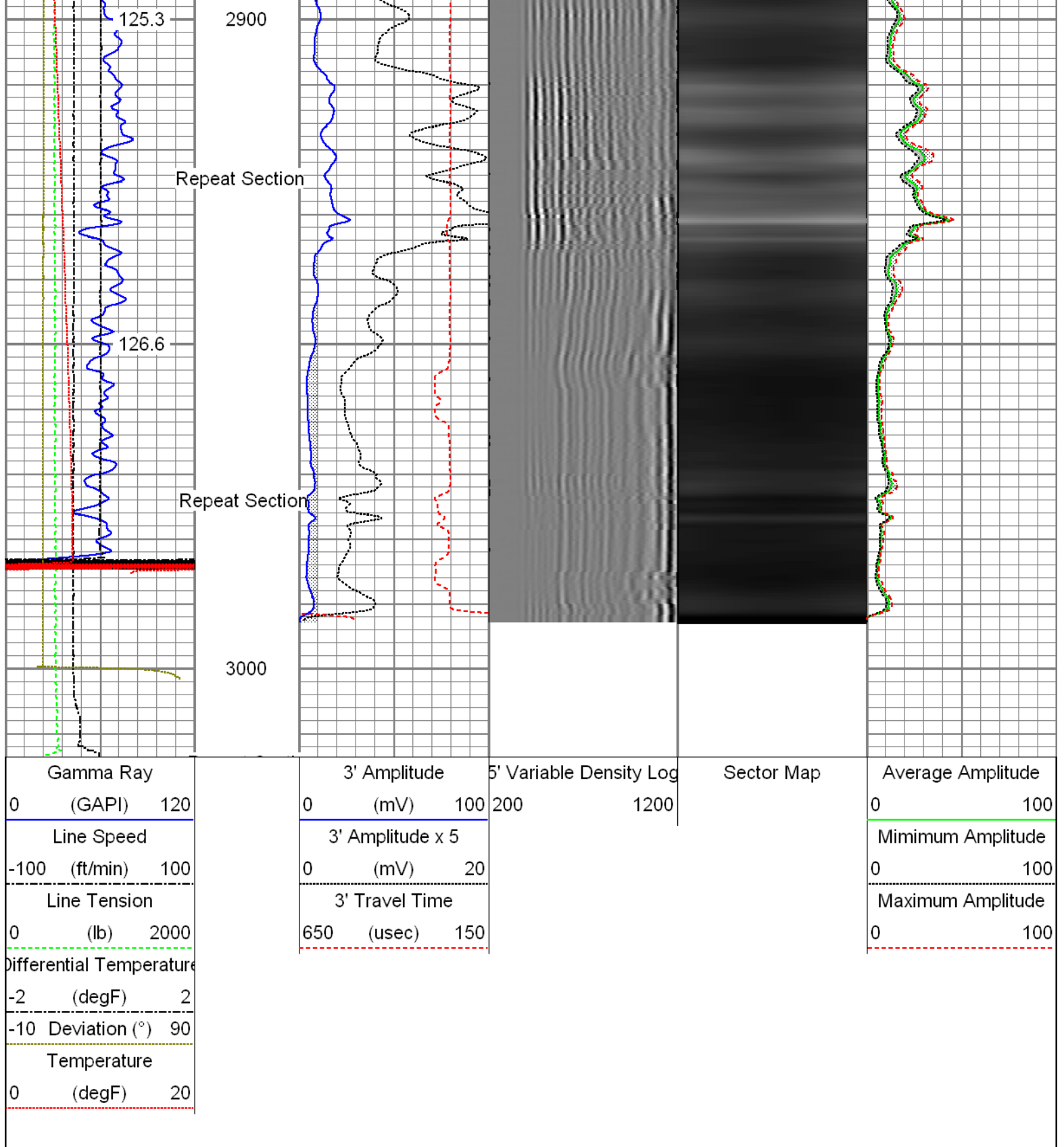
Recorded with 2500 PSI Surface Induced Pressure


Database File: 07-25-15\_noble energy\_wells ranch state a36-665\_mit\_rbl\_cnl.db  
Dataset Pathname: pass8  
Presentation Format: rbt4\_mit  
Dataset Creation: Sat Jul 25 11:18:53 2015 by Log 7.0 B1  
Charted by: Depth in Feet scaled 1:240

Gamma Ray 0 (GAPI) 120	3' Amplitude 0 (mV) 100	5' Variable Density Log 200 1200	Sector Map	Average Amplitude 0 100
Line Speed -100 (ft/min) 100	3' Amplitude x 5 0 (mV) 20			Minimum Amplitude 0 100
Line Tension 0 (lb) 2000	3' Travel Time 650 (usec) 150			Maximum Amplitude 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	30.24		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 (10010522) 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
TEMP	28.84					

TEMP	20.84		UW_PRT-UW_PRT_016 (10025097) Platinum Resistance Thermometer	1.04	1.69	5.20
			UW_PRC #3 -DSSRAC (082) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
WVF3FT	21.81					
WVFS1	21.81		UW_RBT-UW_RBT_004 (10022773) Sondex Ultrawire 3-1/8" Radial Bond Tool	9.47	3.13	140.00
WVFS2	21.81					
WVFS3	21.81					
WVFS4	21.81					
WVFS5	21.81					
WVFS6	21.81					
WVFS7	21.81					
WVFS8	21.81					
CBLTEMP	21.81		UW_PRC-DSSRAC (080) 2-3/4" DSS 5 Arm Roller Centralizer	2.55	2.75	32.00
CBLROT	21.81					
WVF5FT	20.81					
MIT	11.80		UW_MIT-UW_MIT40_027 (218950) 40 Multifinger Imaging Tool	4.54	2.75	61.10
			UW_PRC #4 -UW_PRC_057 (1037) Sondex 2-3/4" 4-Arm Production Roller Centraliser	2.98	2.75	32.00
			CNL-007 (1005) Compensated Neutron Logging Tool	6.61	1.69	30.00
CNLSC	1.53					
CNSSC	1.12					
TSTAMP	0.00					
Dataset: 07-25-15_noble energy_wells ranch state a36-665_mit_rbl_cnl.db: field/well/run1/pass11 Total Length: 34.48 ft Total Weight: 353.30 lb O.D. 3.13 in						

Calibration Report	
Database File:	07-25-15_noble energy_wells ranch state a36-665_mit_rbl_cnl.db
Dataset Pathname:	pass11
Dataset Creation:	Sat Jul 25 11:57:19 2015 by Log 7.0 B1
Compensated Neutron Calibration Report	
Serial Number:	1005
Tool Model:	007

Master Calibration		Tue Jun 03 09:29:29 2014	
Detector		Readings	
Short Space		240.87	cps
Long Space		303.55	cps
Ratio		Measured	Reference
CNRAT Gain K		0.8150	Sleeve: 1.0000
		1.0271	

Before Survey			
Detector		Readings	
Short Space			cps
Long Space			cps
Ratio		Measured	Reference

After Survey			
Detector		Readings	
Short Space			cps
Long Space			cps
Ratio		Measured	Reference

Multi-finger Imaging Tool Calibration Report

Serial Number:		218950
Number of Fingers:		40
Tool Model:		UW_MIT40_027

Inclinometer Calibration Report			
Performed:		Fri, Oct, 10 10:41:51 2008	
Calibration Angle:		45	
		Inc X	Inc Y
Vertical:		1996	1975
Finger 1 up:		2238	2226
Finger 31 up:		1760	2216
Finger 21 up:		1769	1745
Finger 11 up:		2250	1738
Sensitivity ratio:		1.00023	
X-axis angle:		314.283	
Deviation const.:		339.139	

Finger Calibration Report							
Performed:				Sat Jul 25 07:59:17 2015			
Ring size:	4	5	6	7			
(in)							
	Sens	Sens	Sens				
Finger 01:	1444	275.0	1719	289.0	2008	304.0	2312
Finger 02:	1514	254.0	1768	256.0	2024	265.0	2289
Finger 03:	1430	281.0	1711	288.0	1999	303.0	2302
Finger 04:	1456	280.0	1736	285.0	2021	296.0	2317
Finger 05:	1494	272.0	1766	272.0	2038	284.0	2322
Finger 06:	1423	286.0	1709	290.0	1999	305.0	2304
Finger 07:	1446	283.0	1729	287.0	2016	302.0	2318
Finger 08:	1436	278.0	1714	280.0	1994	296.0	2290
Finger 09:	1433	285.0	1718	288.0	2006	301.0	2307


Finger 10:	1449	274.0	1723	279.0	2002	290.0	2292
Finger 11:	1433	281.0	1714	289.0	2003	301.0	2304
Finger 12:	1385	287.0	1672	292.0	1964	306.0	2270
Finger 13:	1483	263.0	1746	270.0	2016	277.0	2293
Finger 14:	1421	268.0	1689	282.0	1971	294.0	2265
Finger 15:	1413	282.0	1695	292.0	1987	306.0	2293
Finger 16:	1416	274.0	1690	290.0	1980	299.0	2279
Finger 17:	1421	284.0	1705	299.0	2004	308.0	2312
Finger 18:	1362	270.0	1632	286.0	1918	299.0	2217
Finger 19:	1414	276.0	1690	293.0	1983	299.0	2282
Finger 20:	1420	278.0	1698	295.0	1993	302.0	2295
Finger 21:	1367	284.0	1651	309.0	1960	317.0	2277
Finger 22:	1389	267.0	1656	287.0	1943	292.0	2235
Finger 23:	1387	273.0	1660	294.0	1954	300.0	2254
Finger 24:	1424	274.0	1698	293.0	1991	294.0	2285
Finger 25:	1348	271.0	1619	292.0	1911	309.0	2220
Finger 26:	1333	277.0	1610	298.0	1908	306.0	2214
Finger 27:	1421	271.0	1692	291.0	1983	294.0	2277
Finger 28:	1406	280.0	1686	299.0	1985	303.0	2288
Finger 29:	1460	264.0	1724	281.0	2005	283.0	2288
Finger 30:	1370	277.0	1647	299.0	1946	307.0	2253
Finger 31:	1400	284.0	1684	303.0	1987	308.0	2295
Finger 32:	1463	267.0	1730	283.0	2013	285.0	2298
Finger 33:	1418	281.0	1699	304.0	2003	310.0	2313
Finger 34:	1432	275.0	1707	296.0	2003	306.0	2309
Finger 35:	1481	256.0	1737	270.0	2007	276.0	2283
Finger 36:	1468	266.0	1734	282.0	2016	294.0	2310
Finger 37:	1446	278.0	1724	295.0	2019	303.0	2322
Finger 38:	1519	250.0	1769	258.0	2027	274.0	2301
Finger 39:	1451	269.0	1720	282.0	2002	291.0	2293
Finger 40:	1416	285.0	1701	296.0	1997	309.0	2306

Segmented Cement Bond Log Calibration Report						
Serial Number:		10022773				
Tool Model:		UW_RBT_004				
Calibration Casing Diameter:		7.000	in			
Calibration Depth:		124.782	ft			
Master Calibration, performed Sat Jul 25 08:22:20 2015:						
	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3FT	0.002	0.781	0.800	62.165	78.835	0.604
5FT	-0.001	0.802	0.800	62.165	76.399	0.893
S1	0.002	0.730	0.000	100.000	137.512	-0.336
S2	0.000	0.744	0.000	100.000	134.516	-0.054
S3	0.003	0.743	0.000	100.000	135.010	-0.340
S4	0.001	0.754	0.000	100.000	132.959	-0.198
S5	0.002	0.791	0.000	100.000	126.819	-0.310
S6	0.001	0.788	0.000	100.000	127.034	-0.164
S7	0.002	0.778	0.000	100.000	128.905	-0.315
S8	0.002	0.756	0.000	100.000	132.658	-0.283
Temperature Calibration Report						

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:	211727			
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 A36-665
	Field	Wattenberg
	County	Weld
	State	Colorado