

**Radial Cement Bond Log
Gamma Ray / CCL
Temperature**

Company Antero Resources
Well Jack 3H
Field Marcellus
County Tyler
State West Virginia

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Field Marcellus
County Tyler
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Location: API #: 4709502463
Latitude:
Longitude:
SEC TWP RGE
Permanent Datum Ground Level Elevation
Log Measured From Kelly Bushing
Drilling Measured From Kelly Bushing
Other Services
Elevation
K.B. -
D.F. -
G.L. -

Date	13 - December - 2018	
Run Number	One	
Depth Driller	18,158ft	
Depth Logger	6,400 ft	
Bottom Logged Interval	6,390 ft	
Top Log Interval	Surface	
Open Hole Size	N/A	
Type Fluid	Fresh Water	
Density / Viscosity	8.3 lbs/gal	
Max. Recorded Temp.	135 °F	
Estimated Cement Top	1,426 ft	
Time Well Ready	17:00	
Time Logger on Bottom	18:00	
Equipment Number	2612	
Location	Irwin, PA	
Recorded By	Z. Gregory	
Witnessed By	Curt Anderson	
Borehole Record		
Run Number	Bit	From To
Tubing Record		
Run Number	Size	Weight From To
Casing Record	Size	Wgt/Ft
Surface String	13-3/8"	-
Prot. String	9-5/8"	-
Production String	5 1/2 in	20#
Liner		18,158 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.

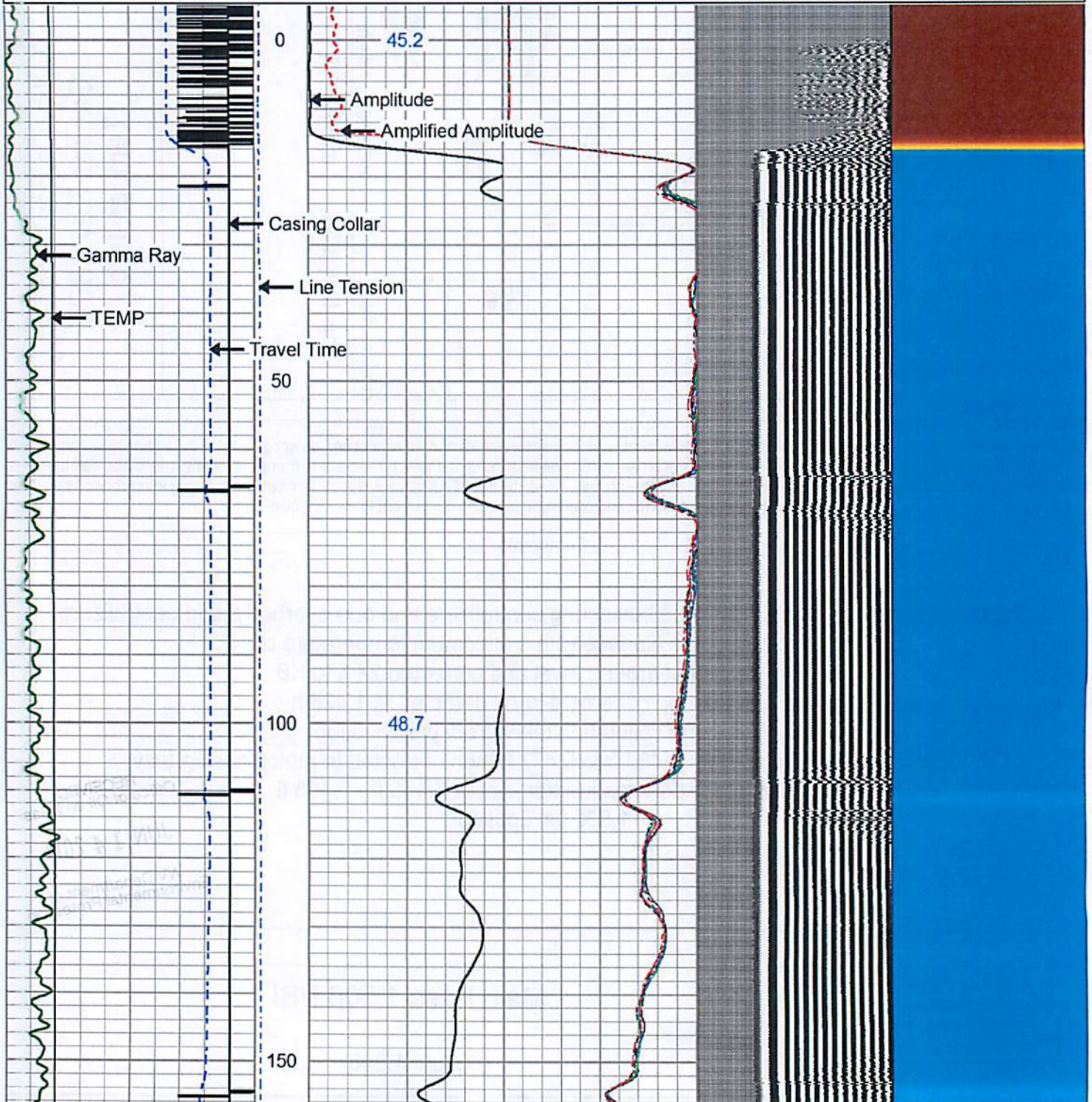
Comments

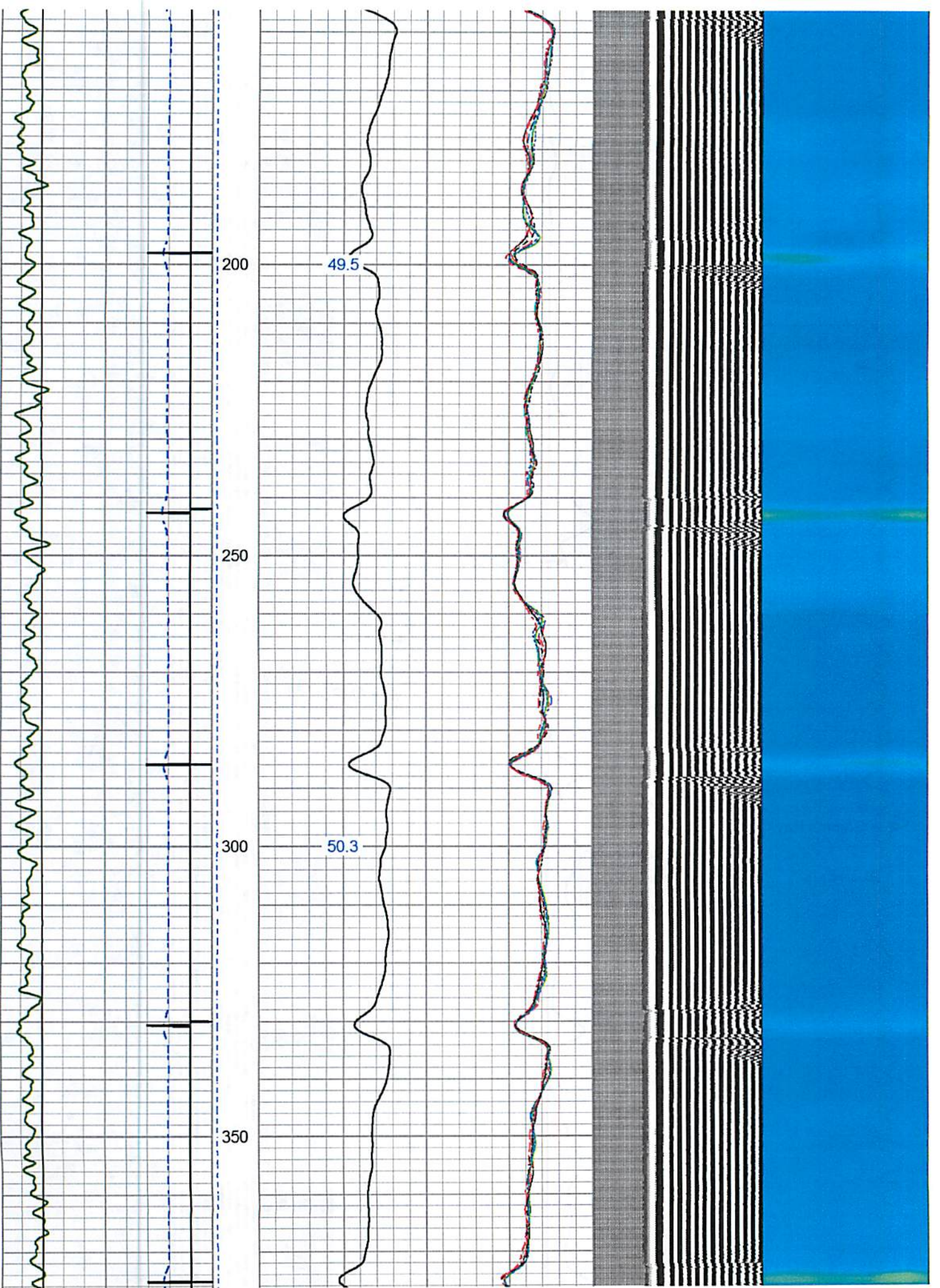
Bond tool centralized with two inline bowspring centralizers and one overbody rigid centralizers
 Logged from 6,390 ft to Surface with a maximum temperature of 135° F
 Tool zeroed at ground level and corrected 24 ft to KB
 Estimated top of cement bond detected at 1,426 ft
 Free pipe calibration taken from previous log
 Marker joint detected from 5,467 ft to 5,477 ft then corrected to match casing tally
 Casing tally denotes marker joint at 5,455 ft - 5,465 ft
 1,500 psi applied

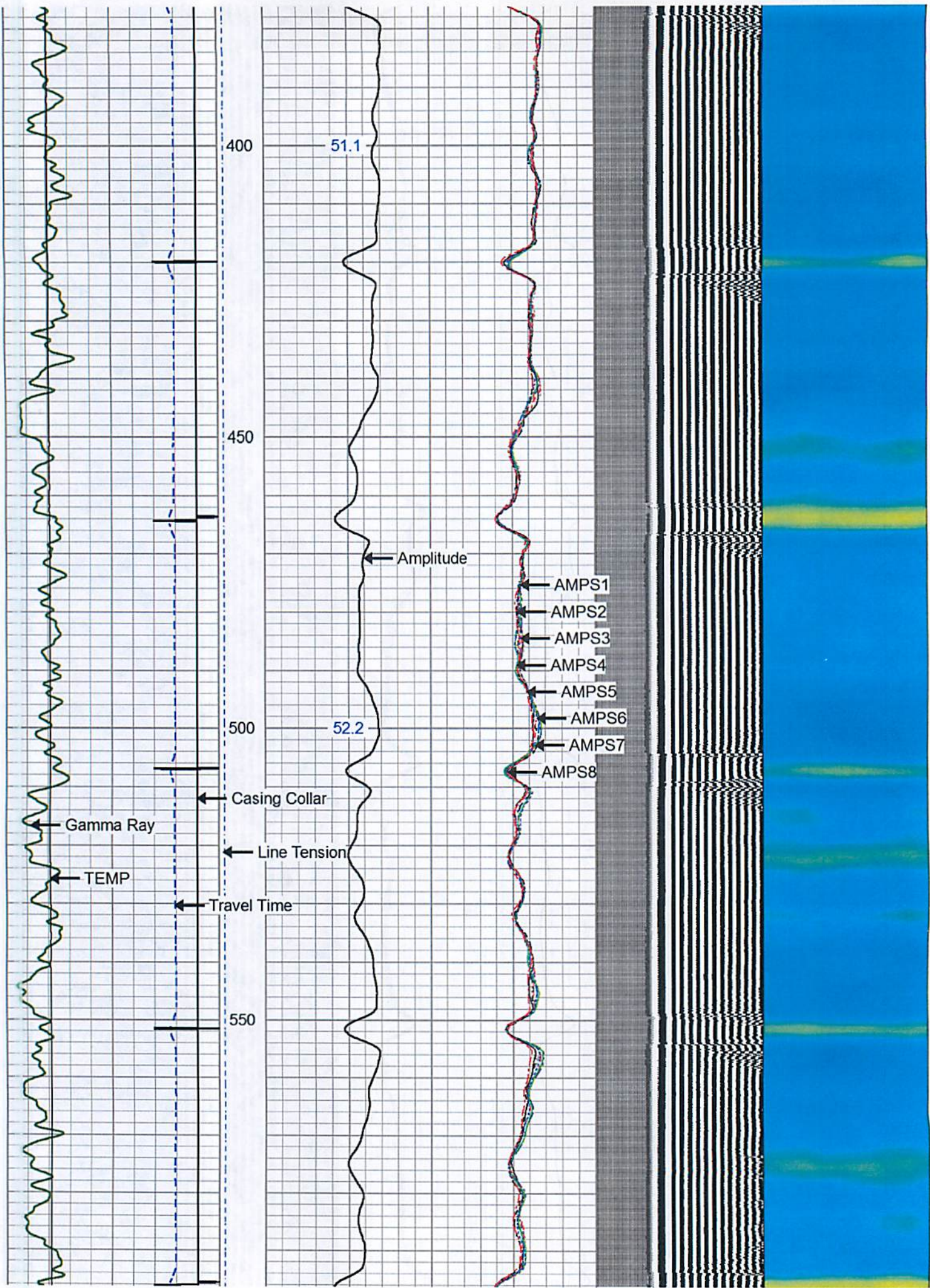
RECEIVED
Office of Oil and Gas
JUN 14 2019
WV Department of
Environmental Protection

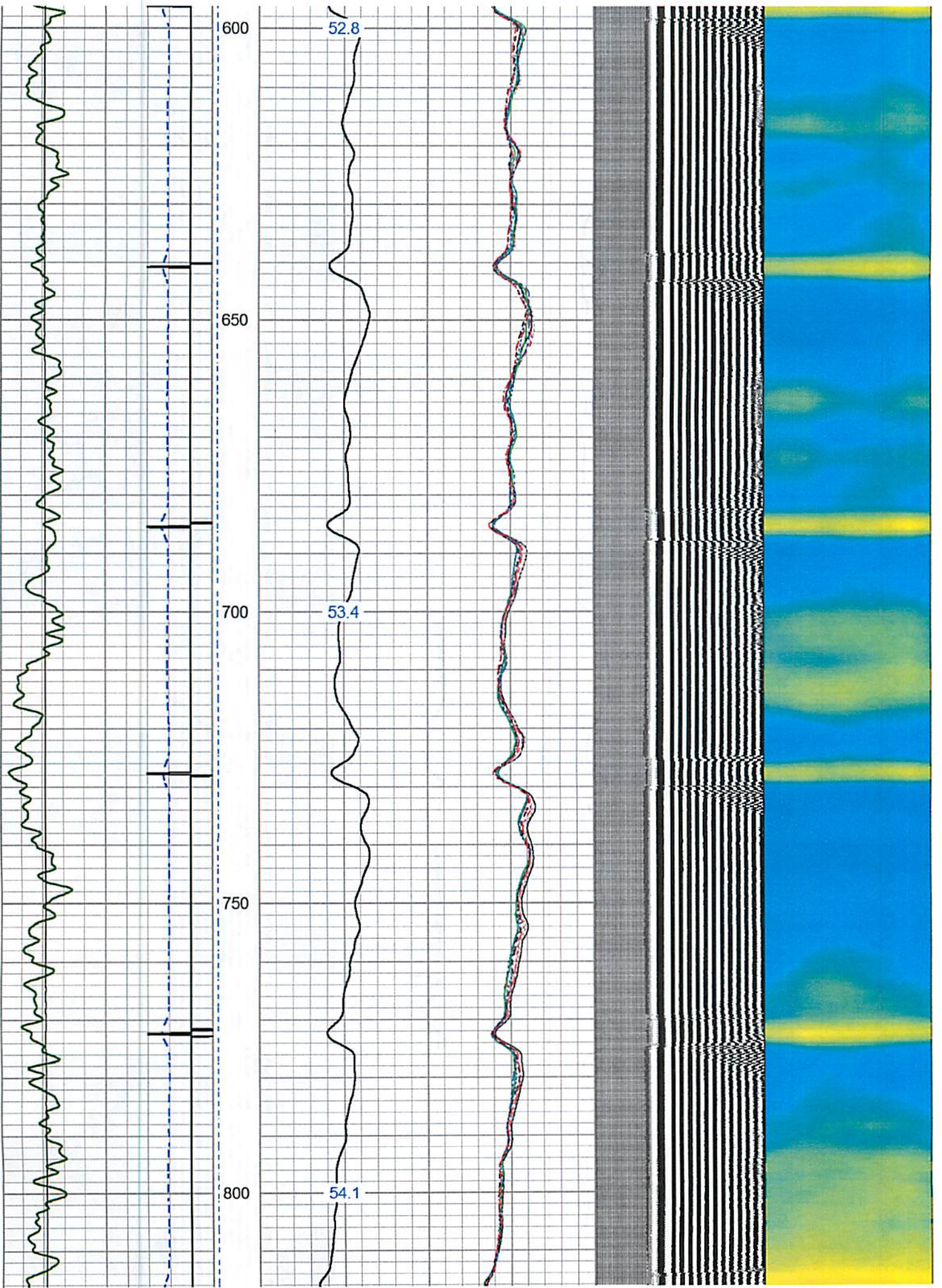
Database File c:\users\user\desktop\antero neat logs\antero_neat_jack_unit3h_rcbl_12132018.db
 Dataset Pathname Main
 Presentation Format ahws_rcbl_jc
 Dataset Creation Thu Dec 13 20:44:01 2018
 Charted by Depth in Feet scaled 1:240

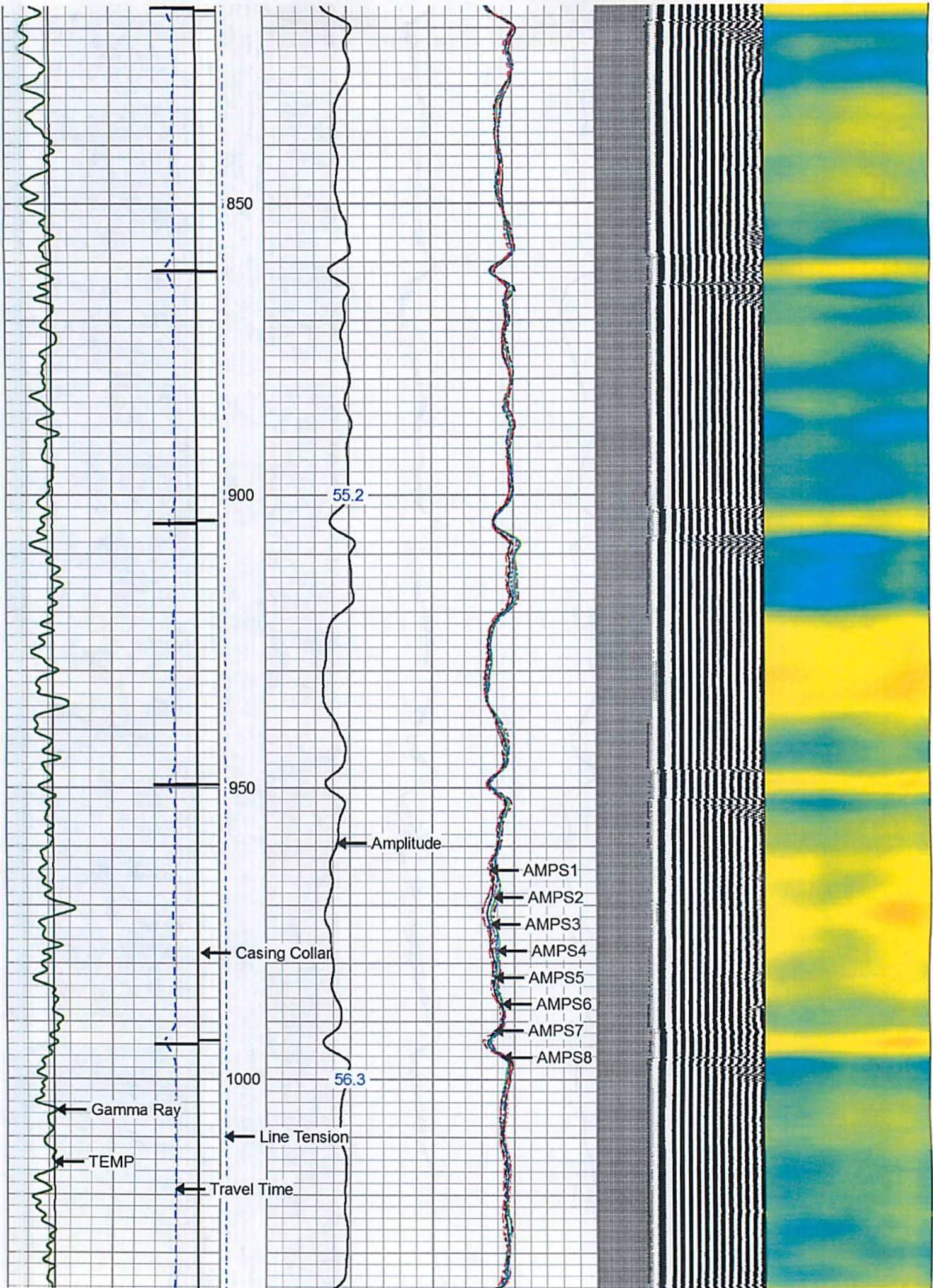
420	Travel Time (usec)	220	e Tens	0	Amplitude (mV)	100	-5	AMPS1	150	Variable Density	1	Cement Map	8
9	Casing Collar	-1	(lb)	0	Amplified Amplitude	-5	AMPS2	150	200	1200	0		100
0	Gamma Ray (GAPI)	300	(2500)	0	(mV)	10	-5	AMPS3	150				
0	TEMP (degF)	250			TEMP		-5	AMPS4	150				
					(degF)		-5	AMPS5	150				
							-5	AMPS6	150				
							-5	AMPS7	150				
							-5	AMPS8	150				

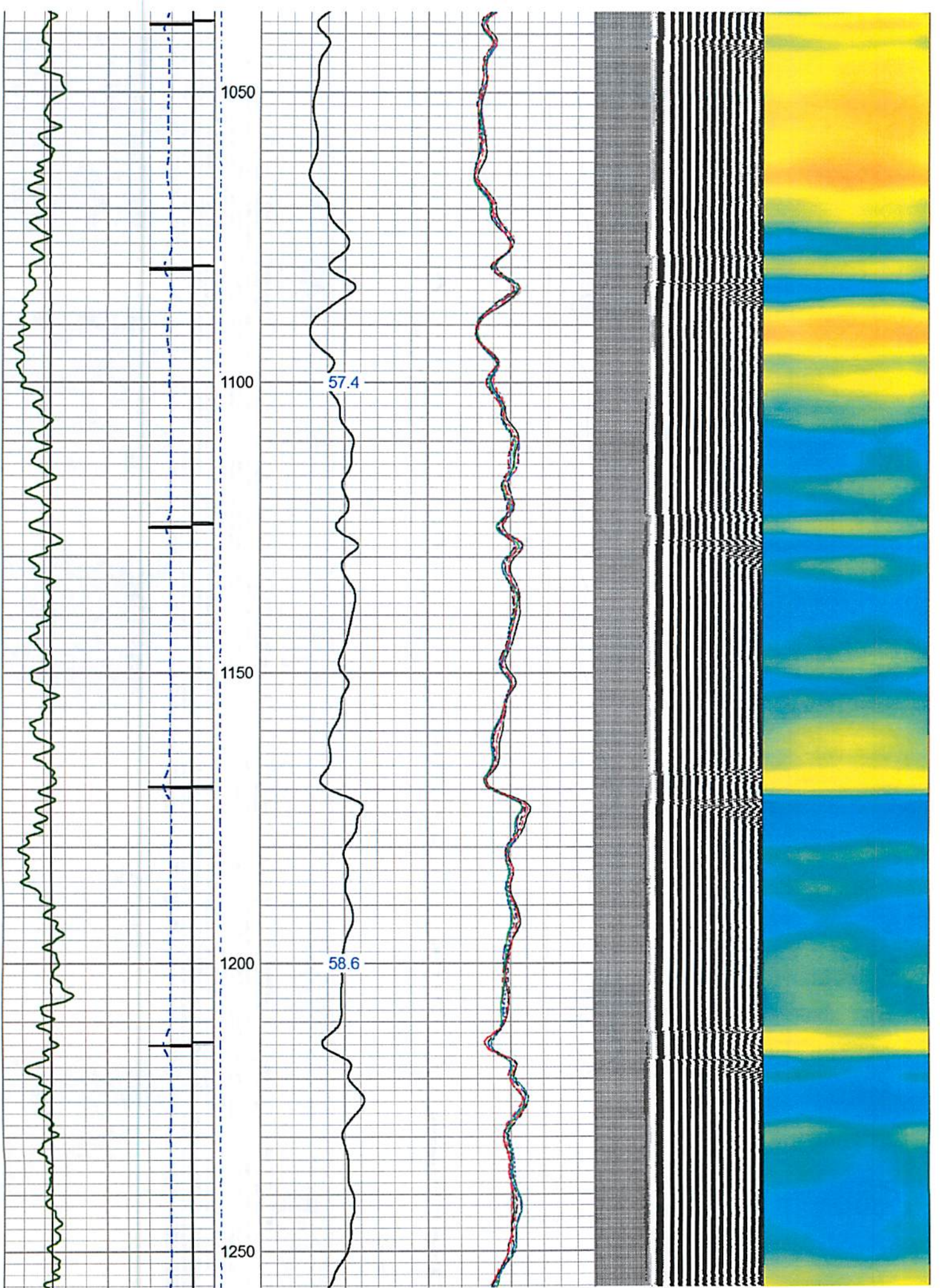


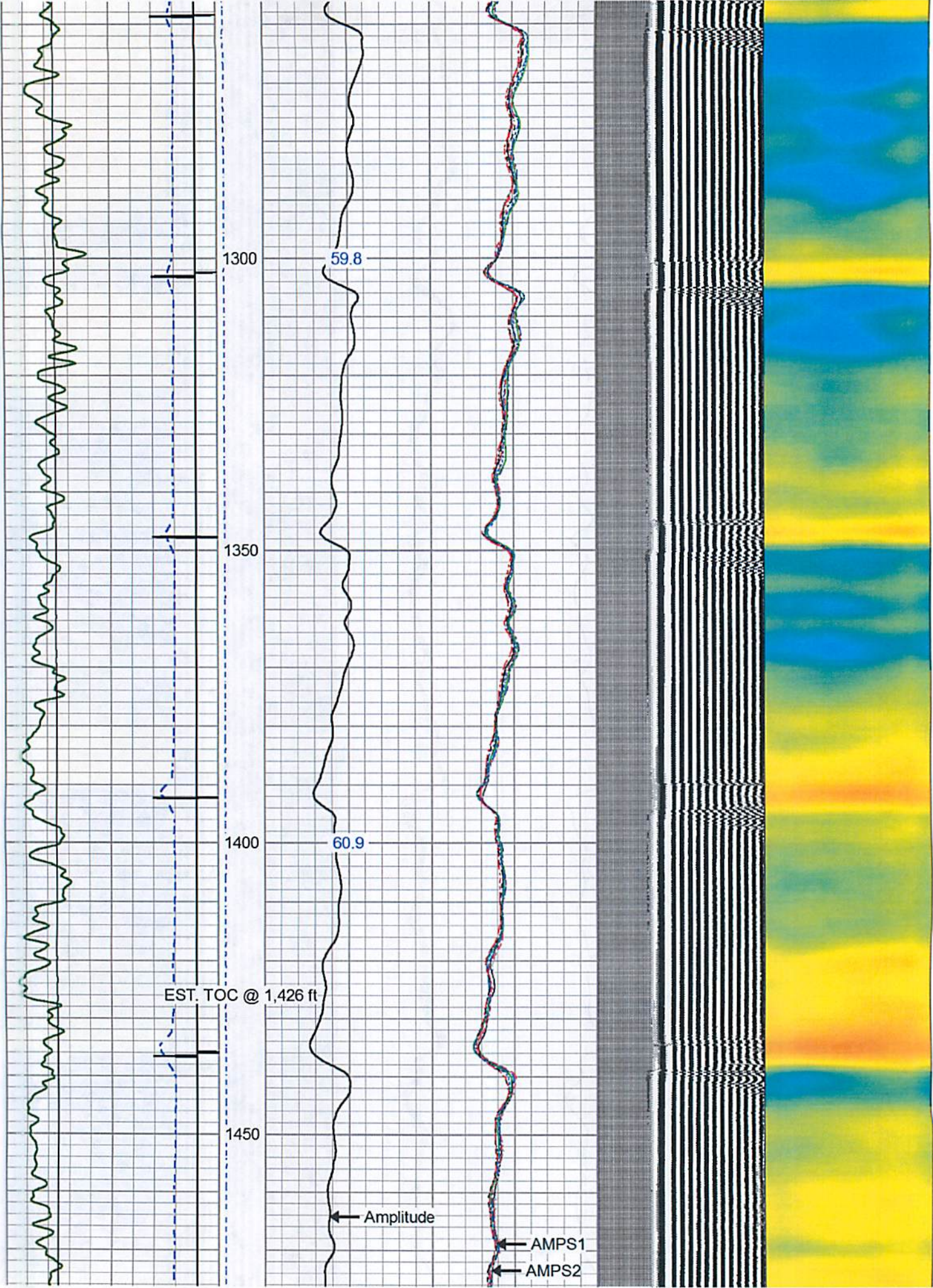


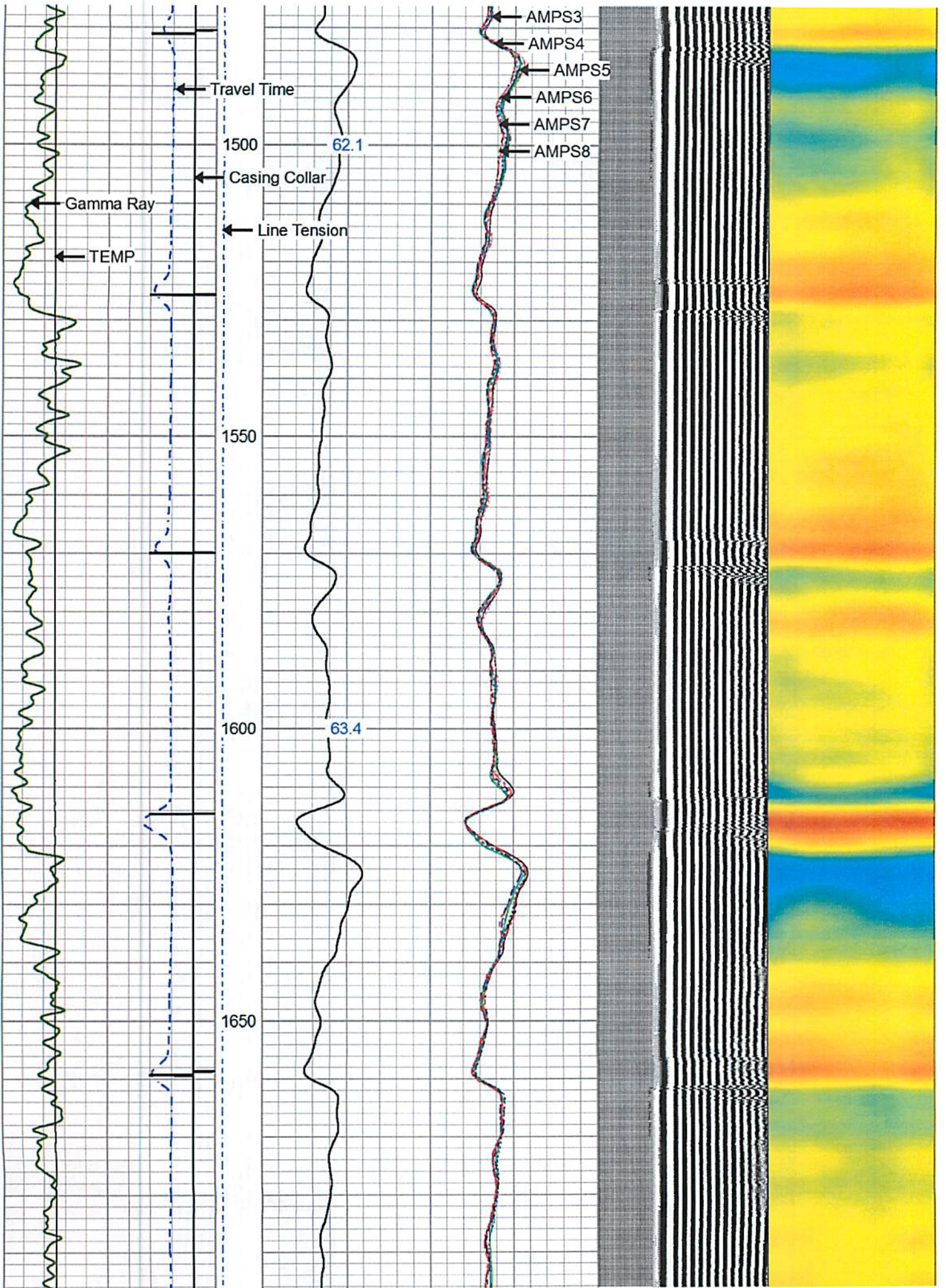


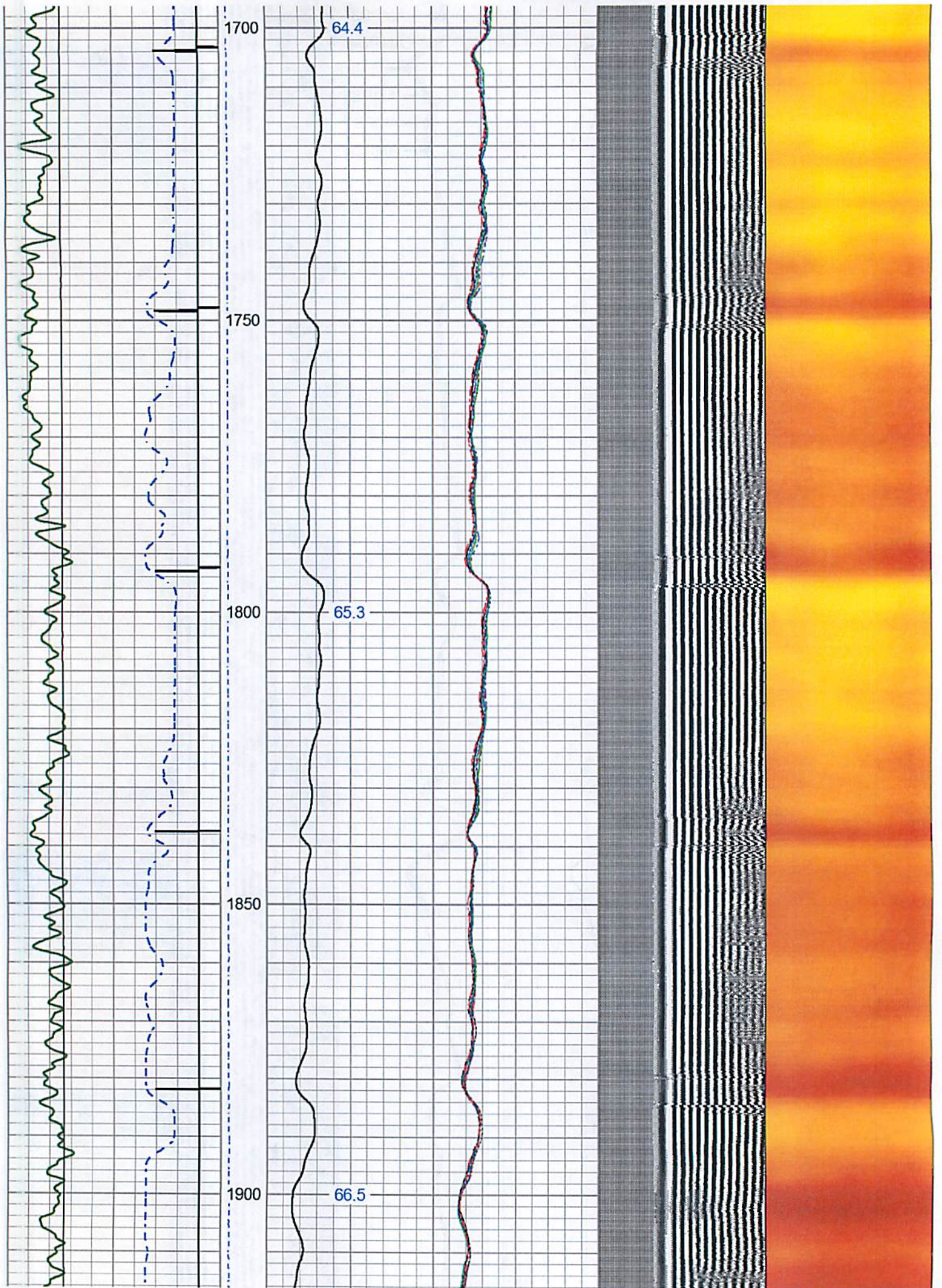


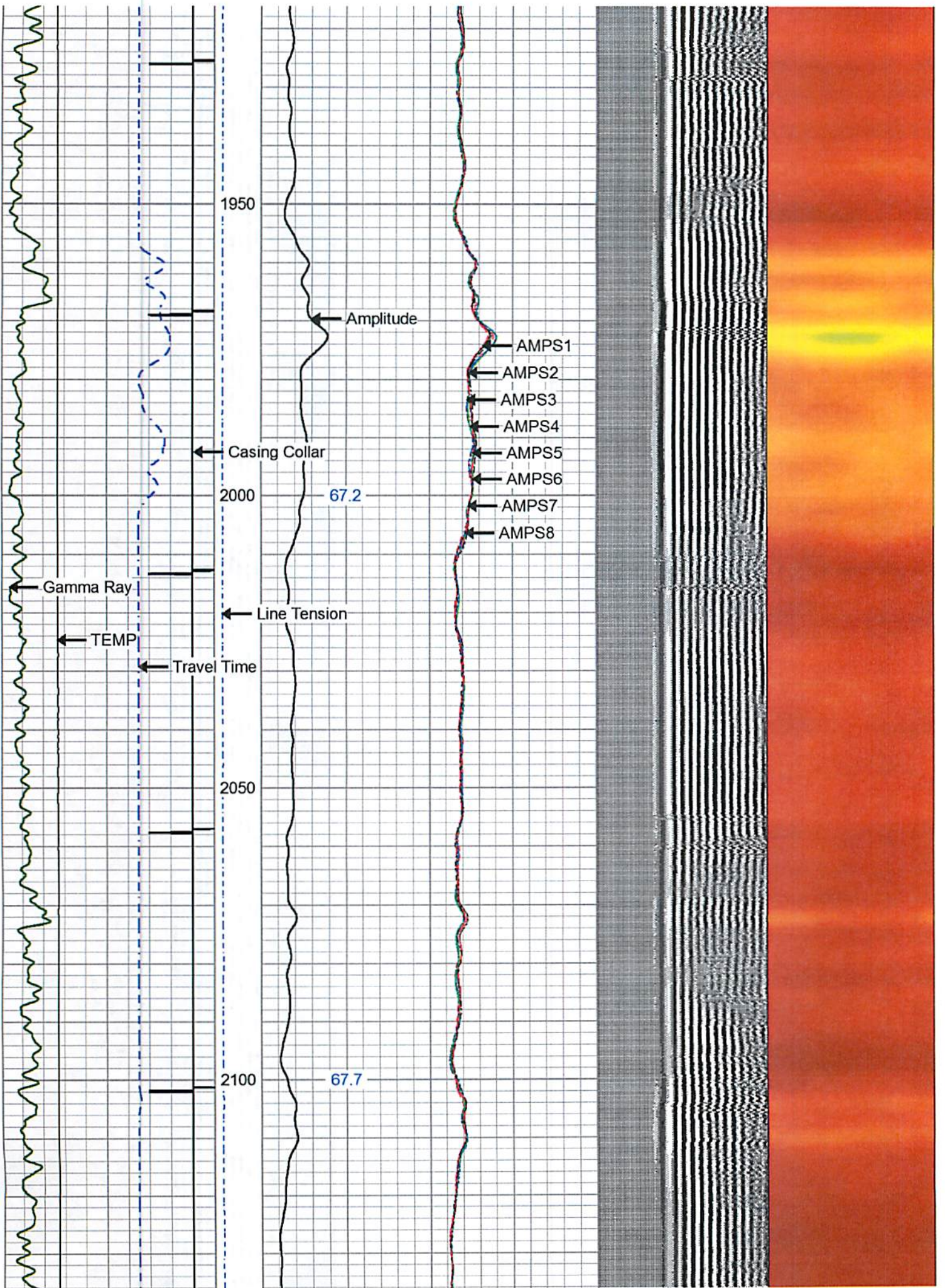


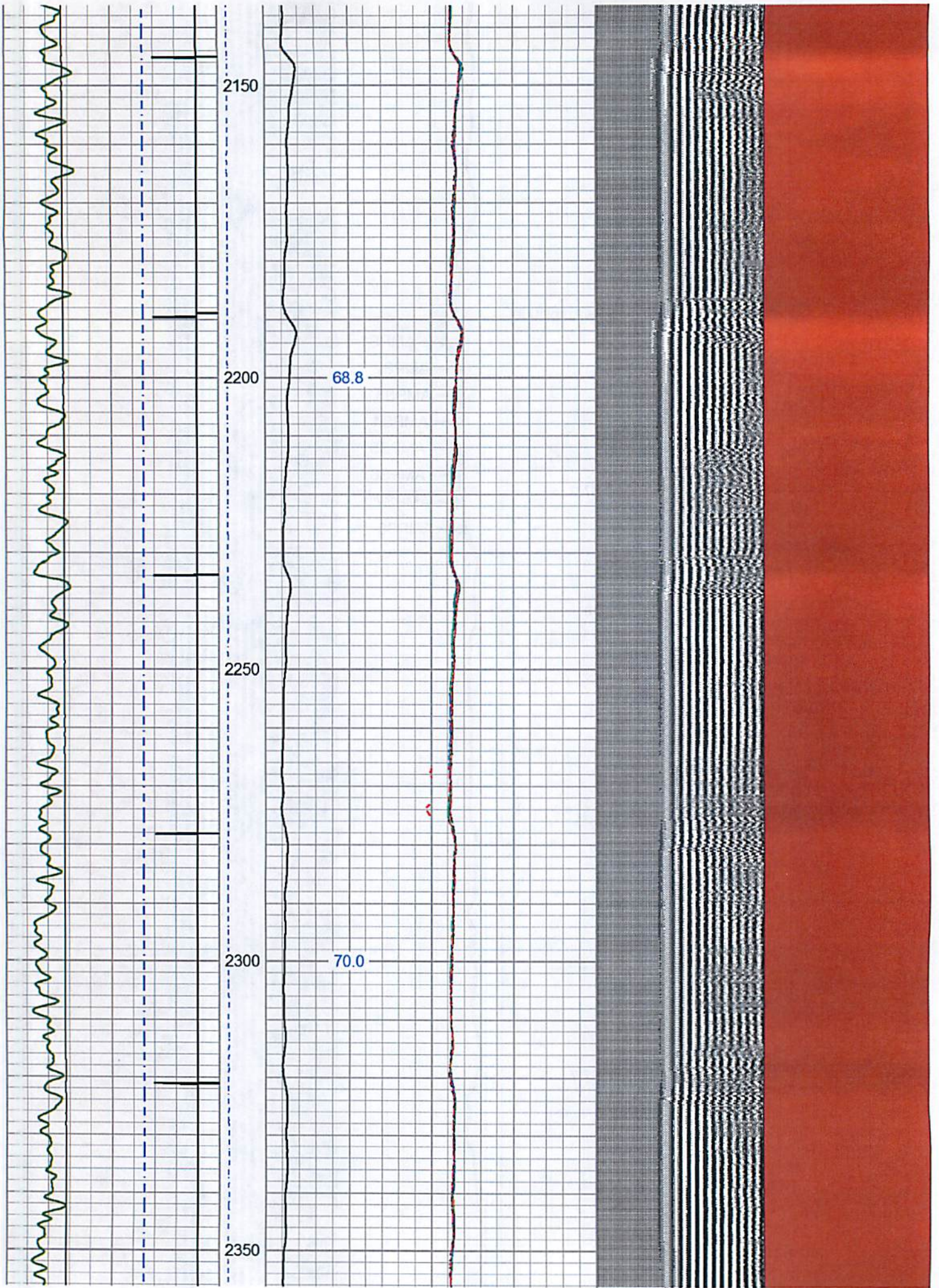


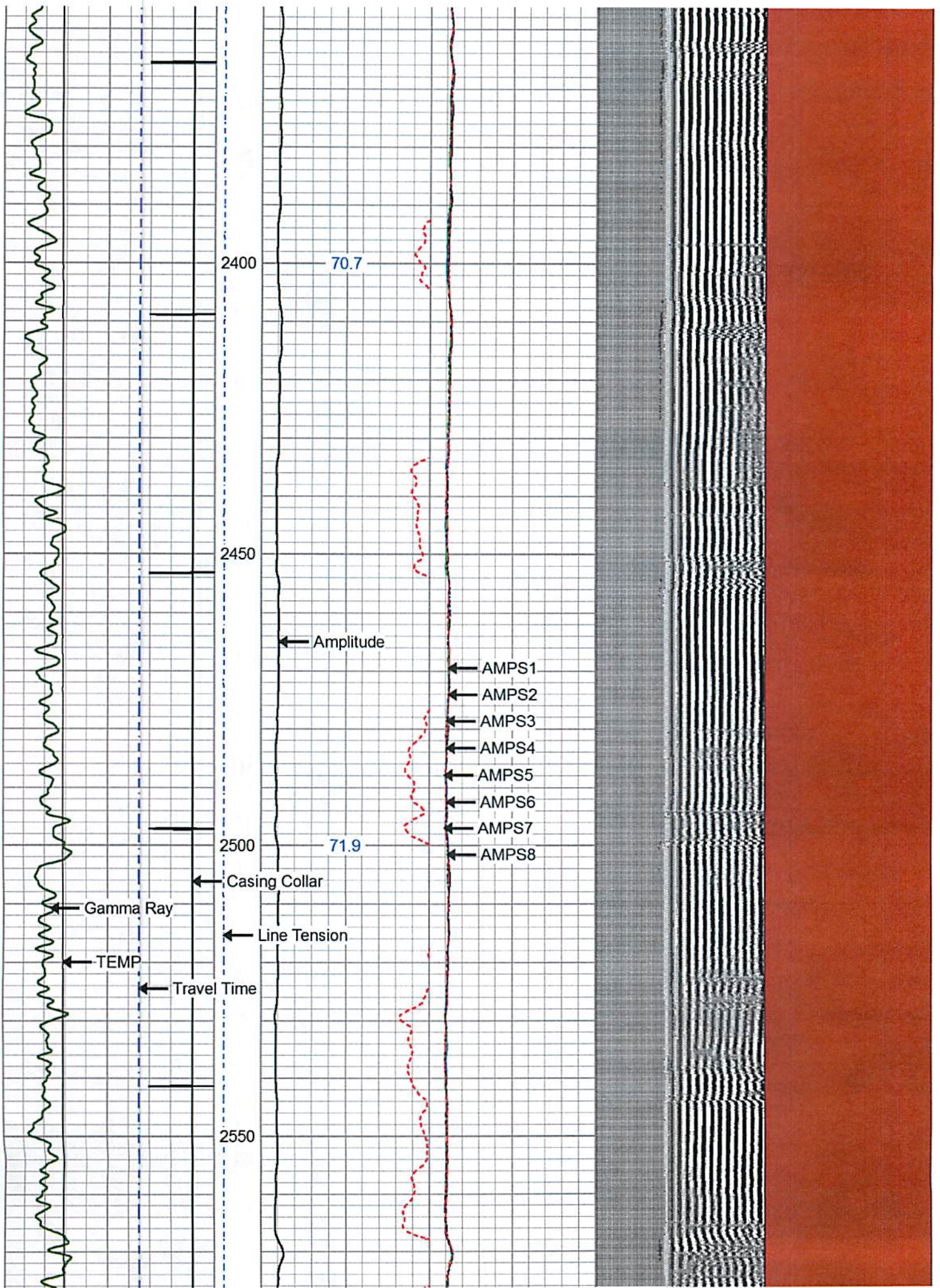


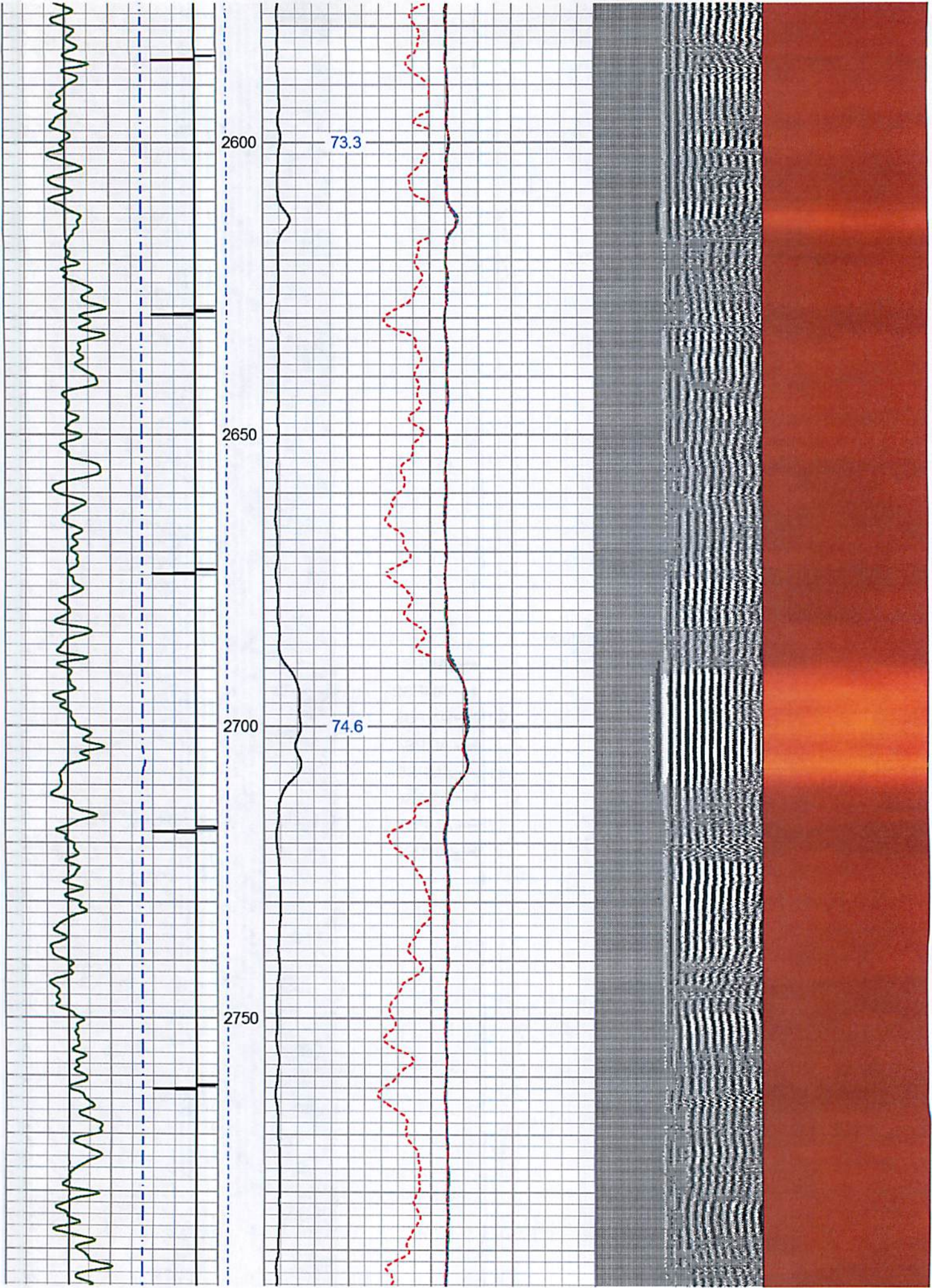


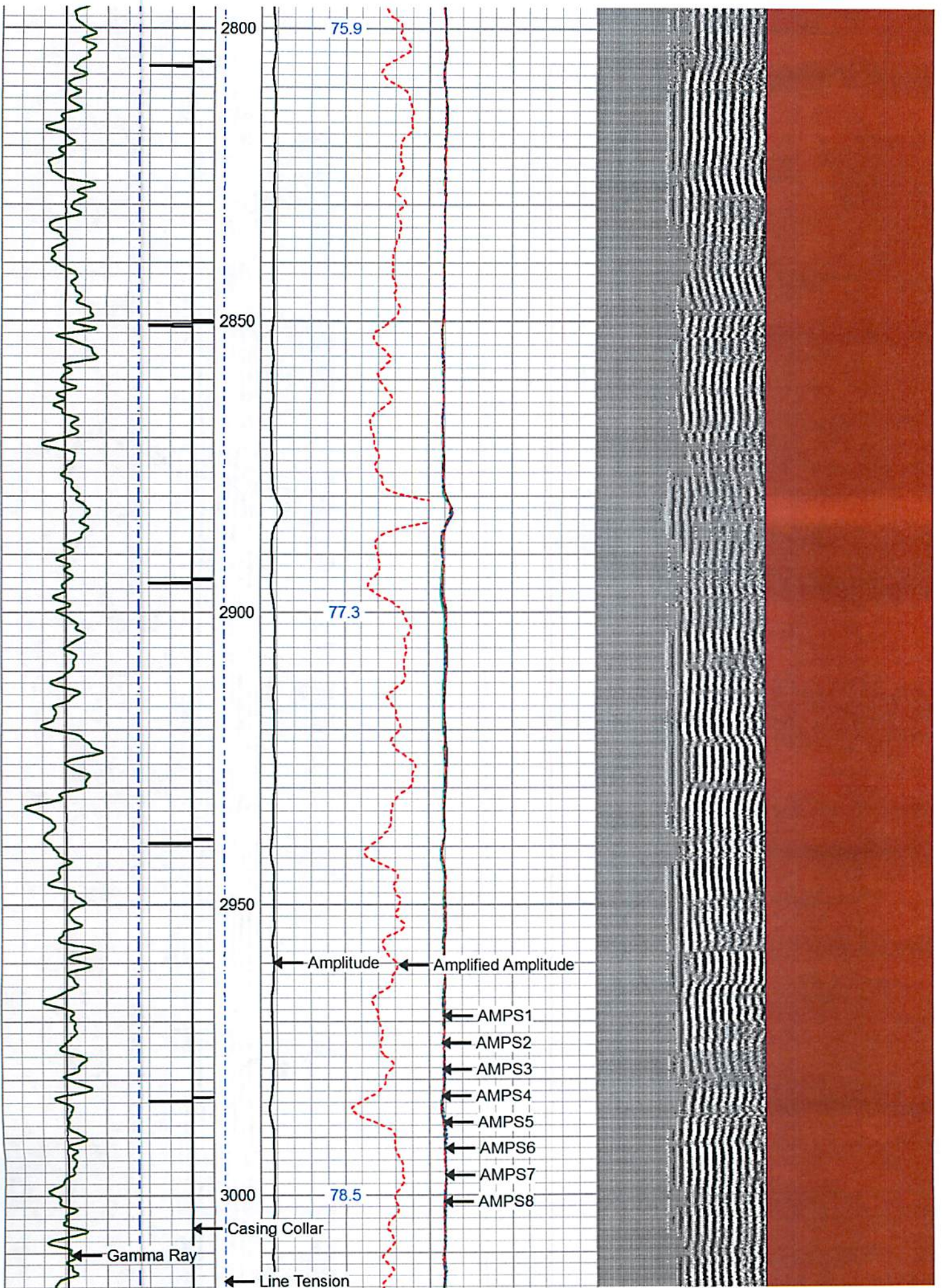


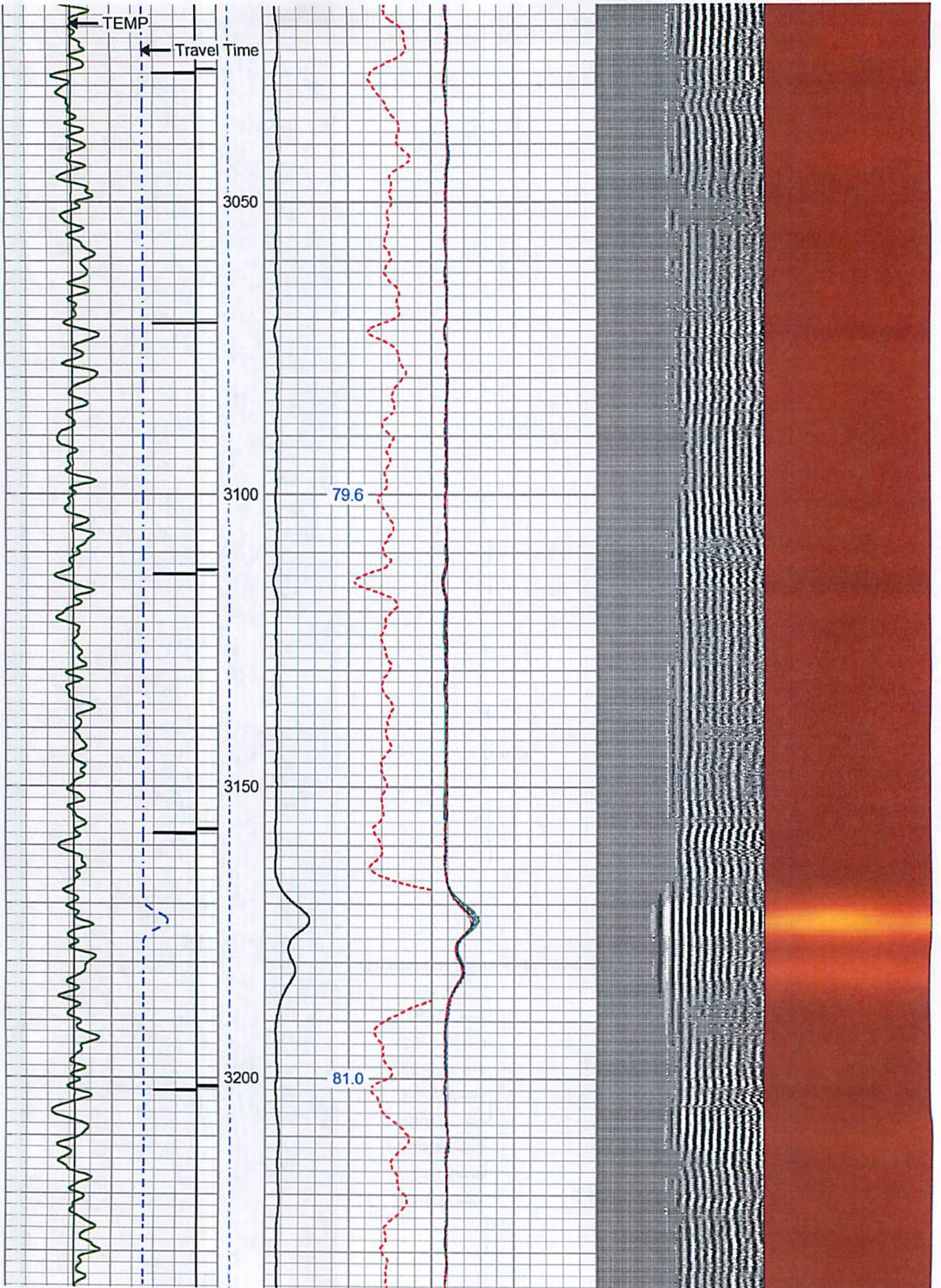


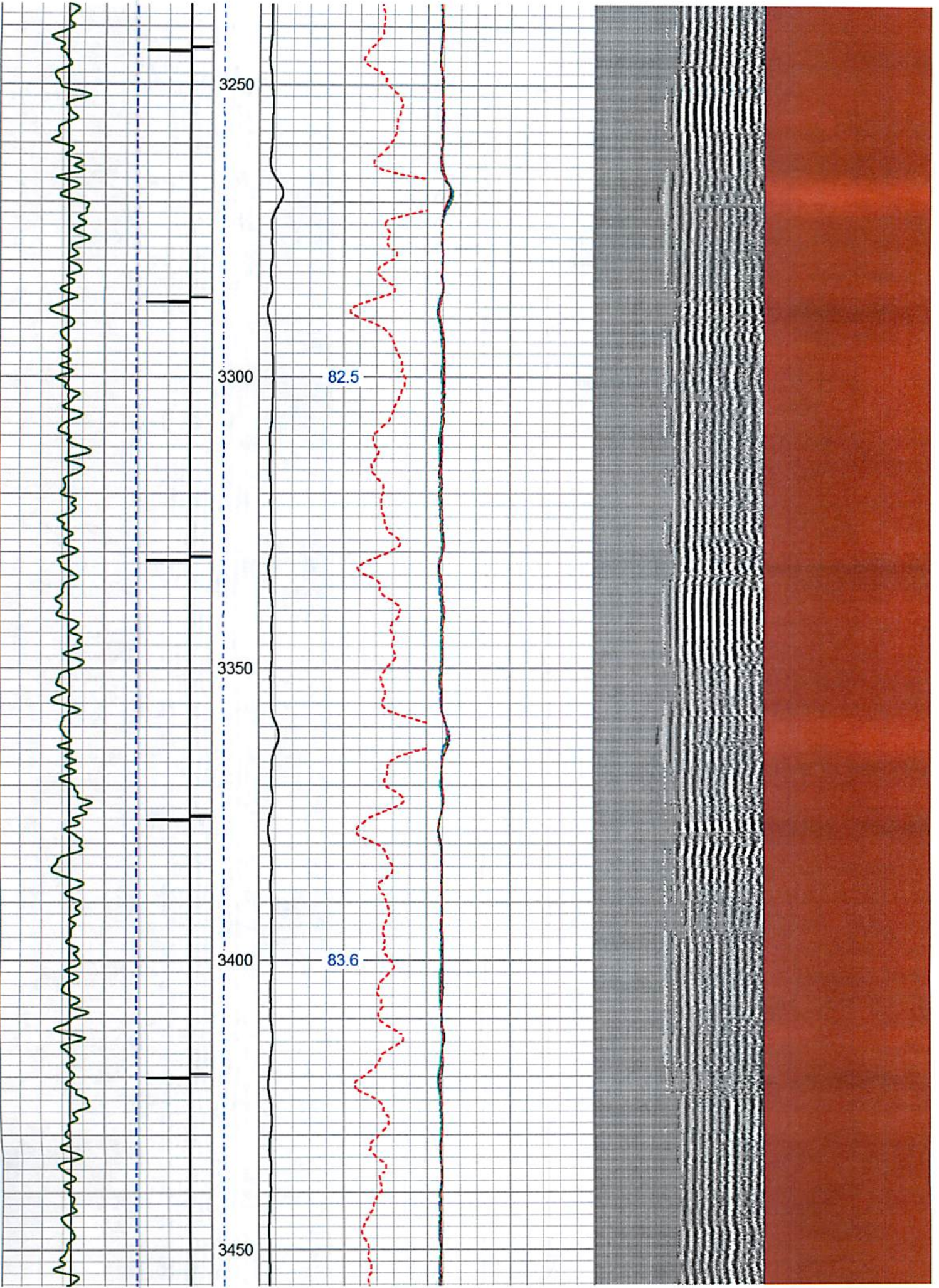


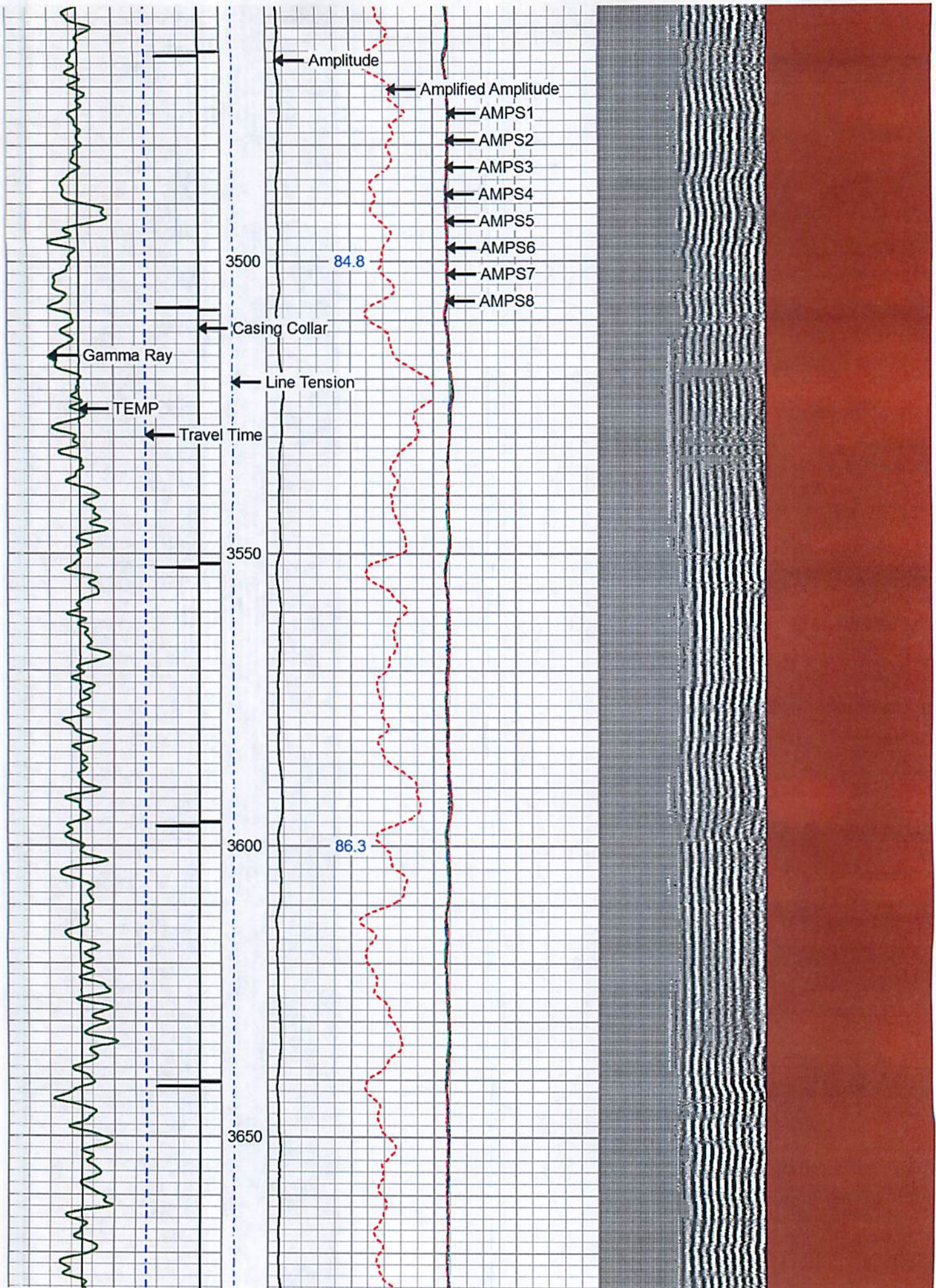


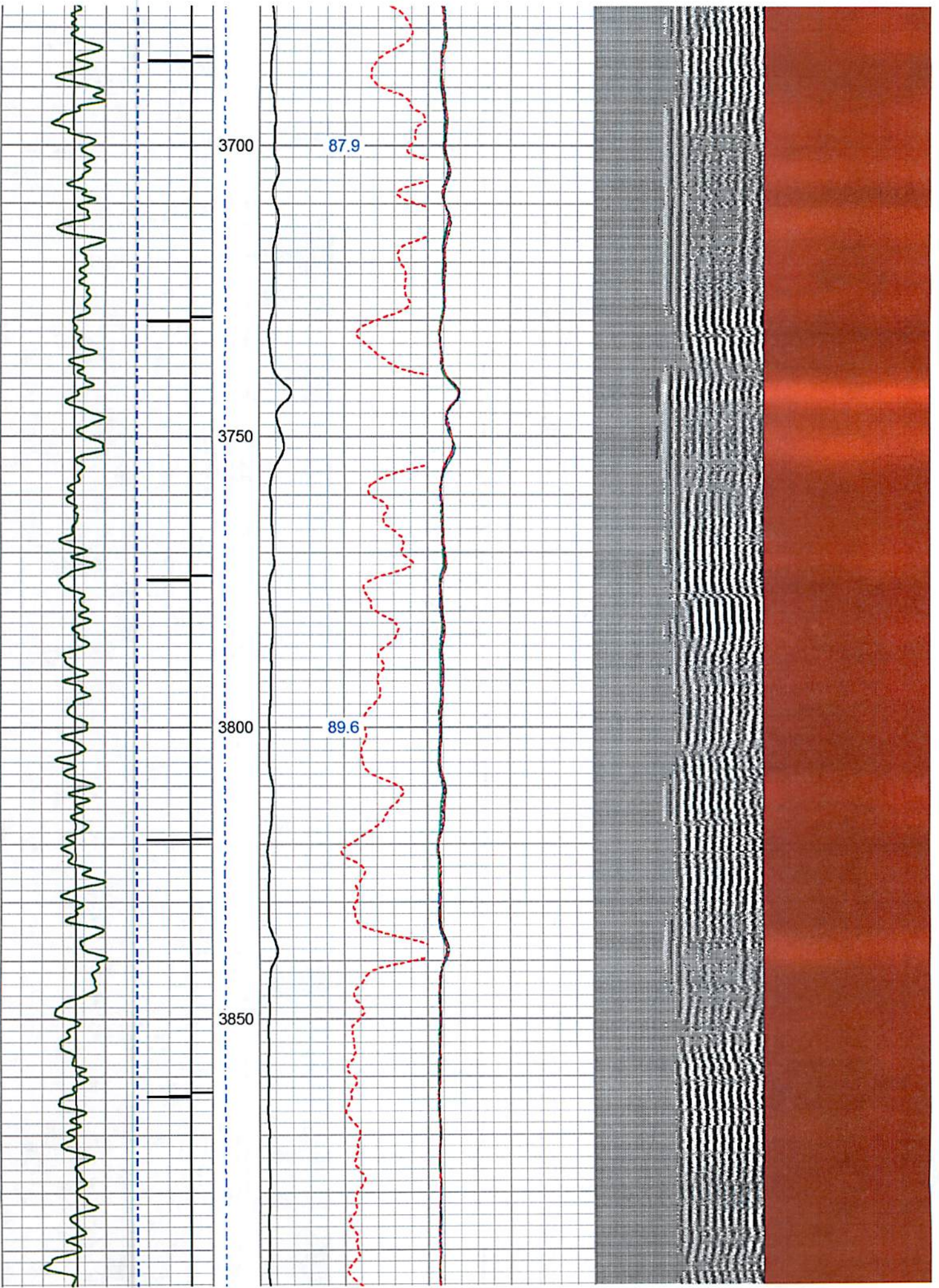


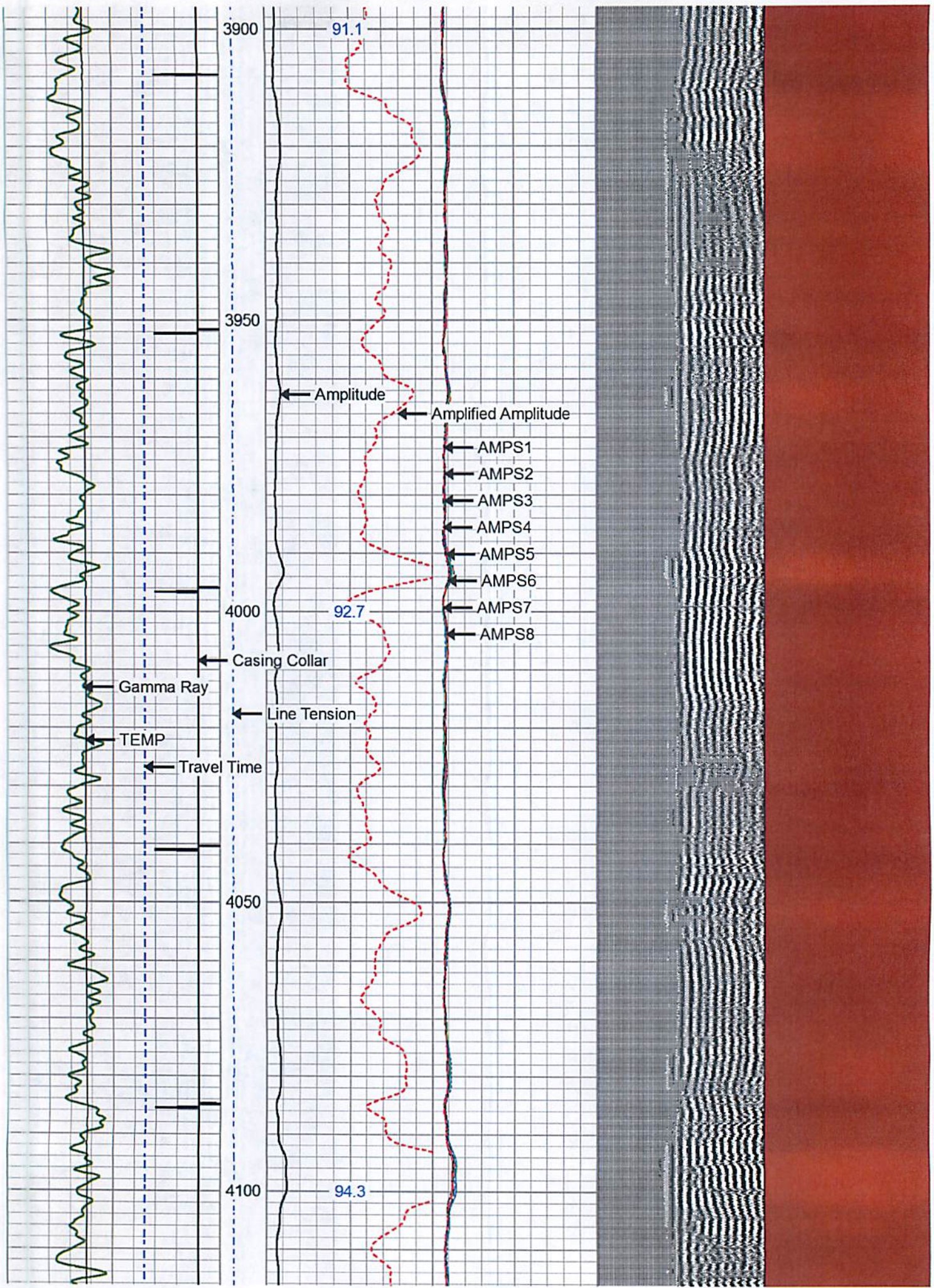


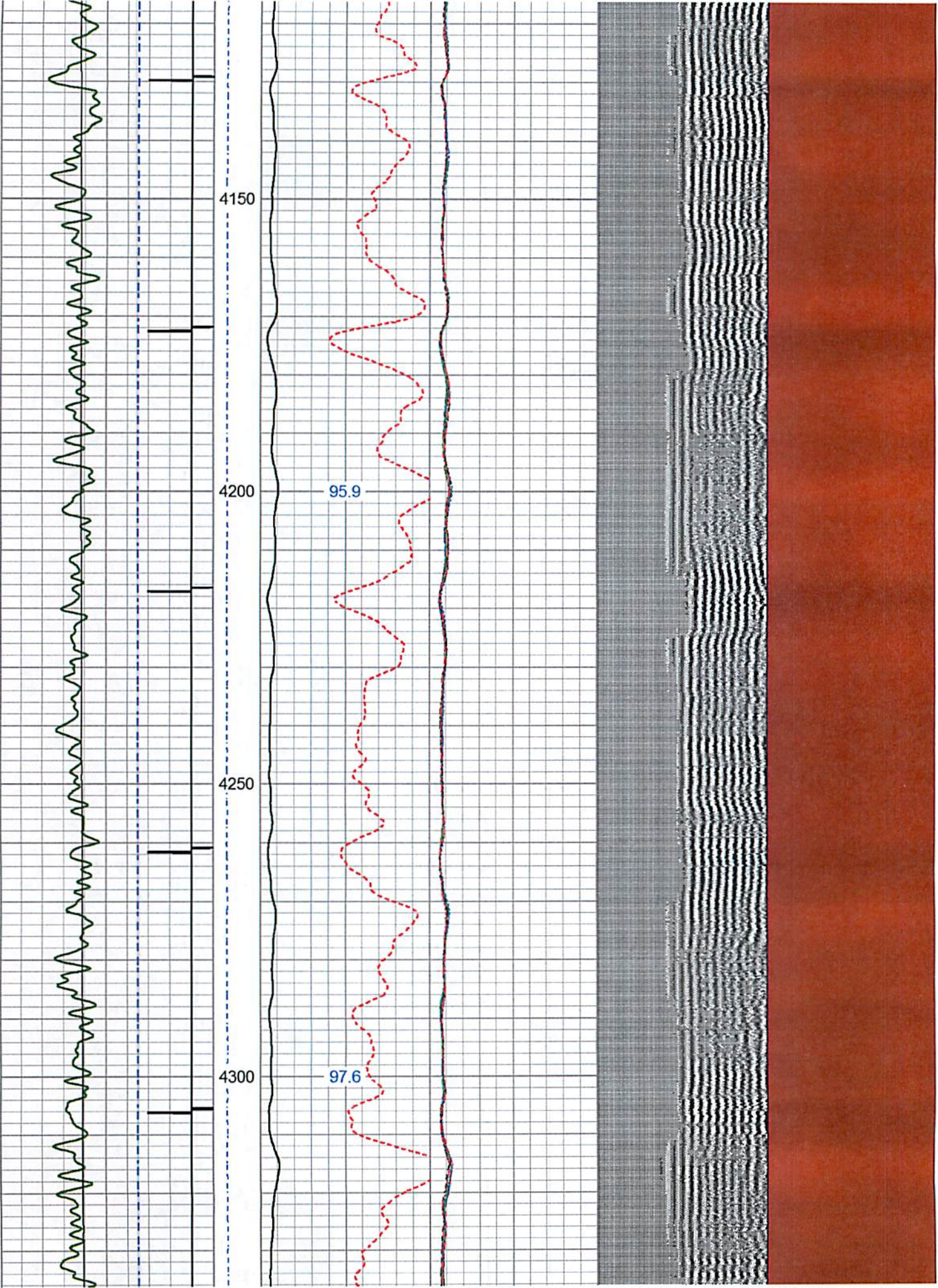


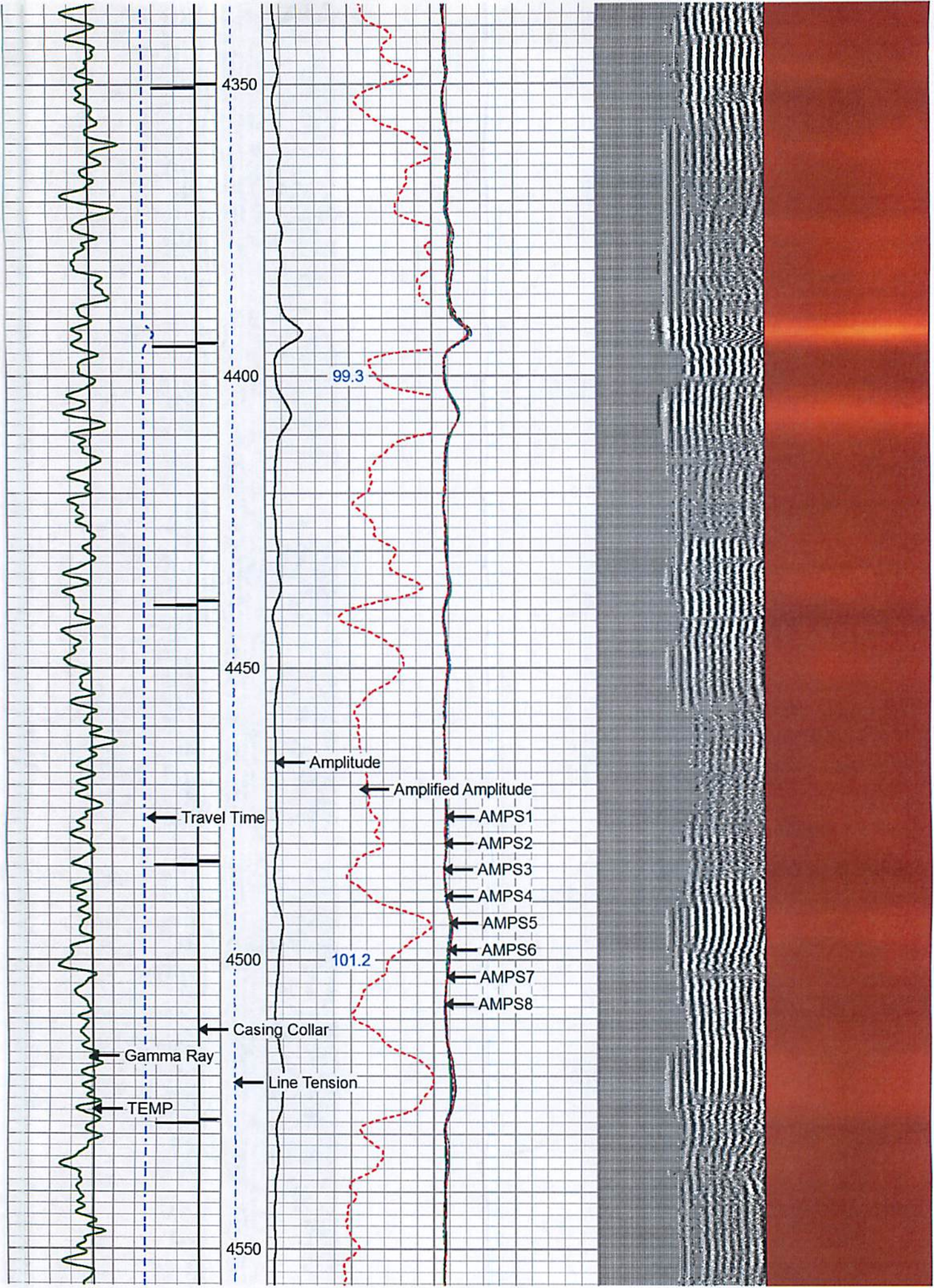


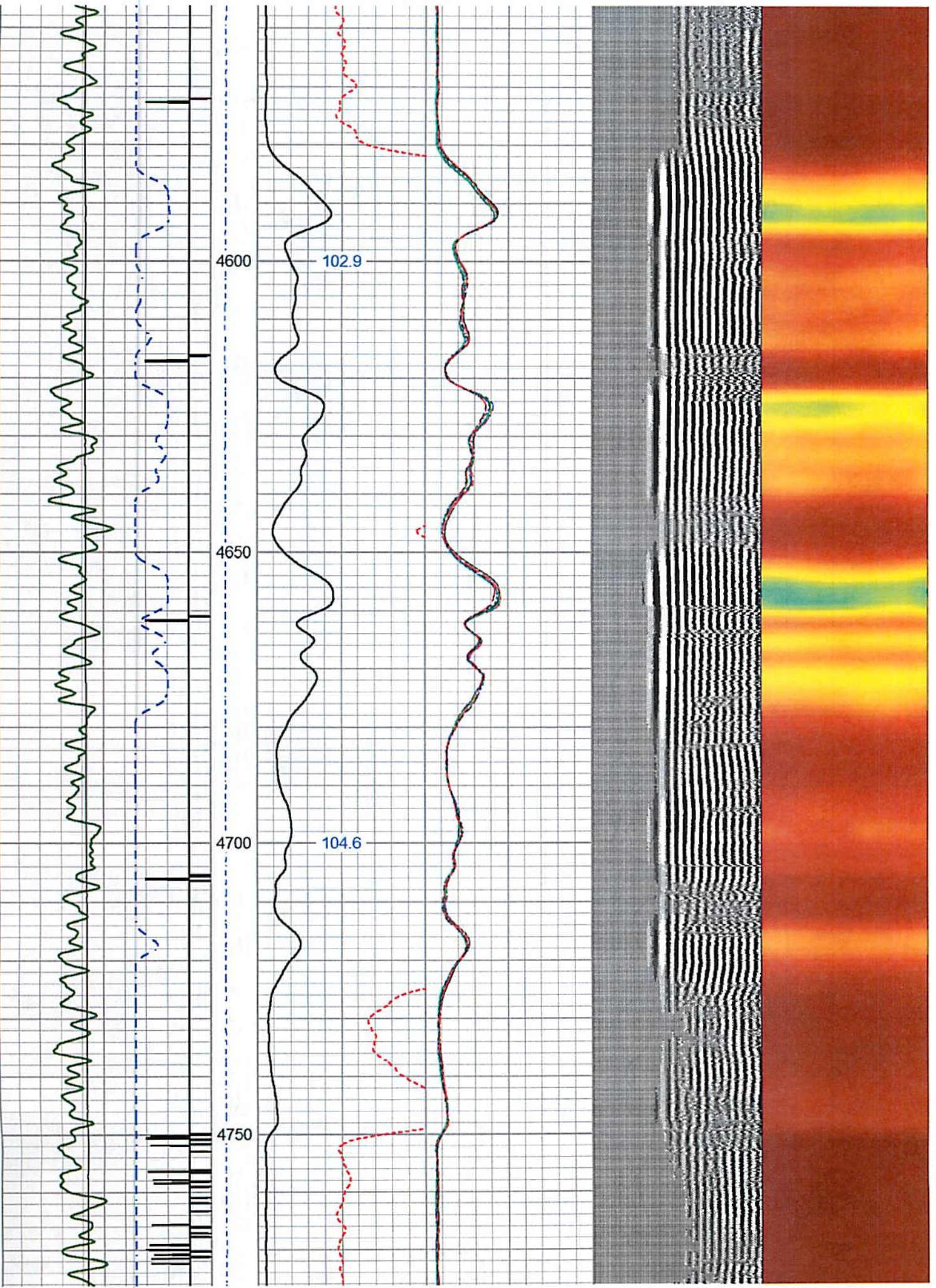


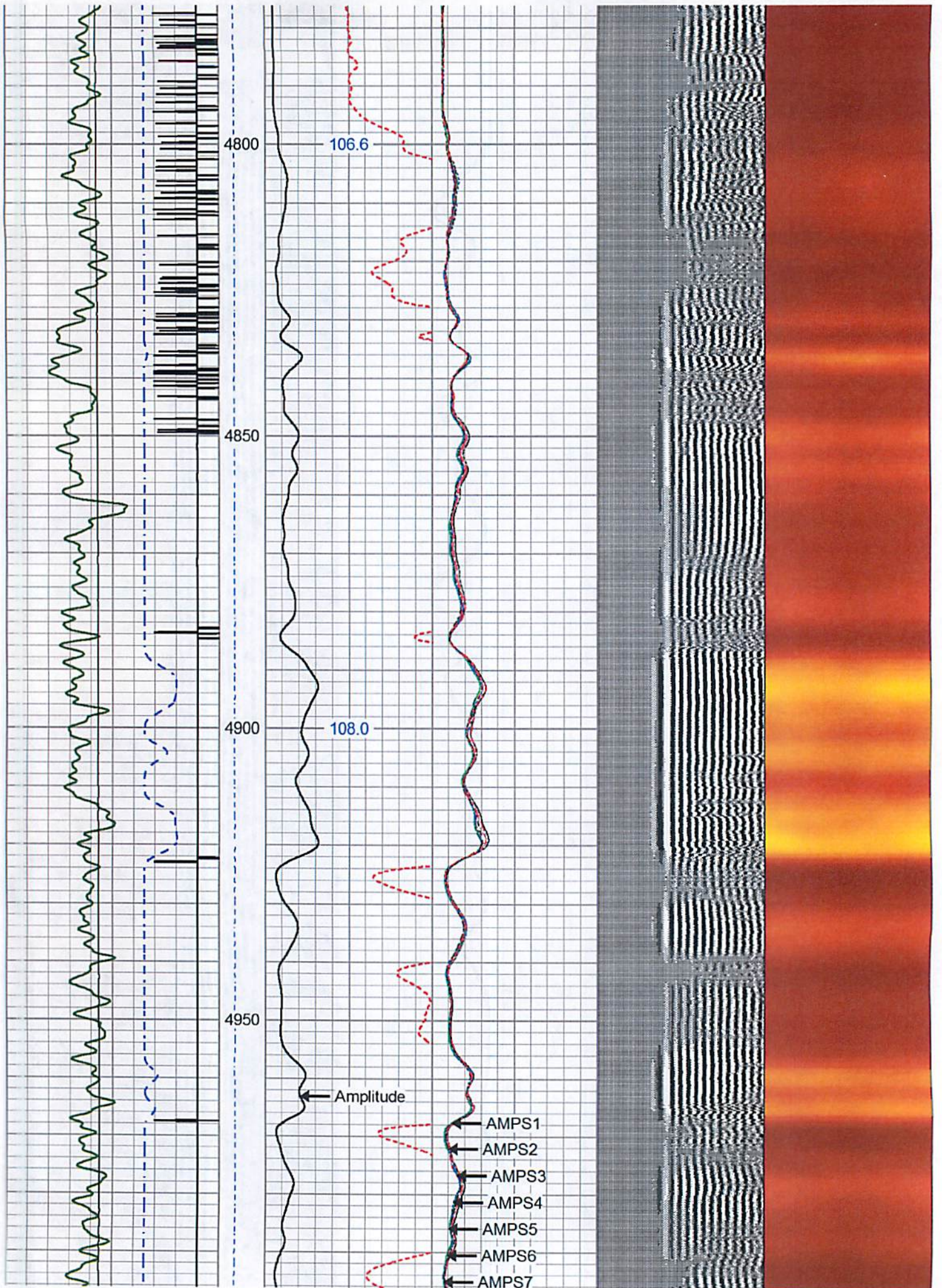


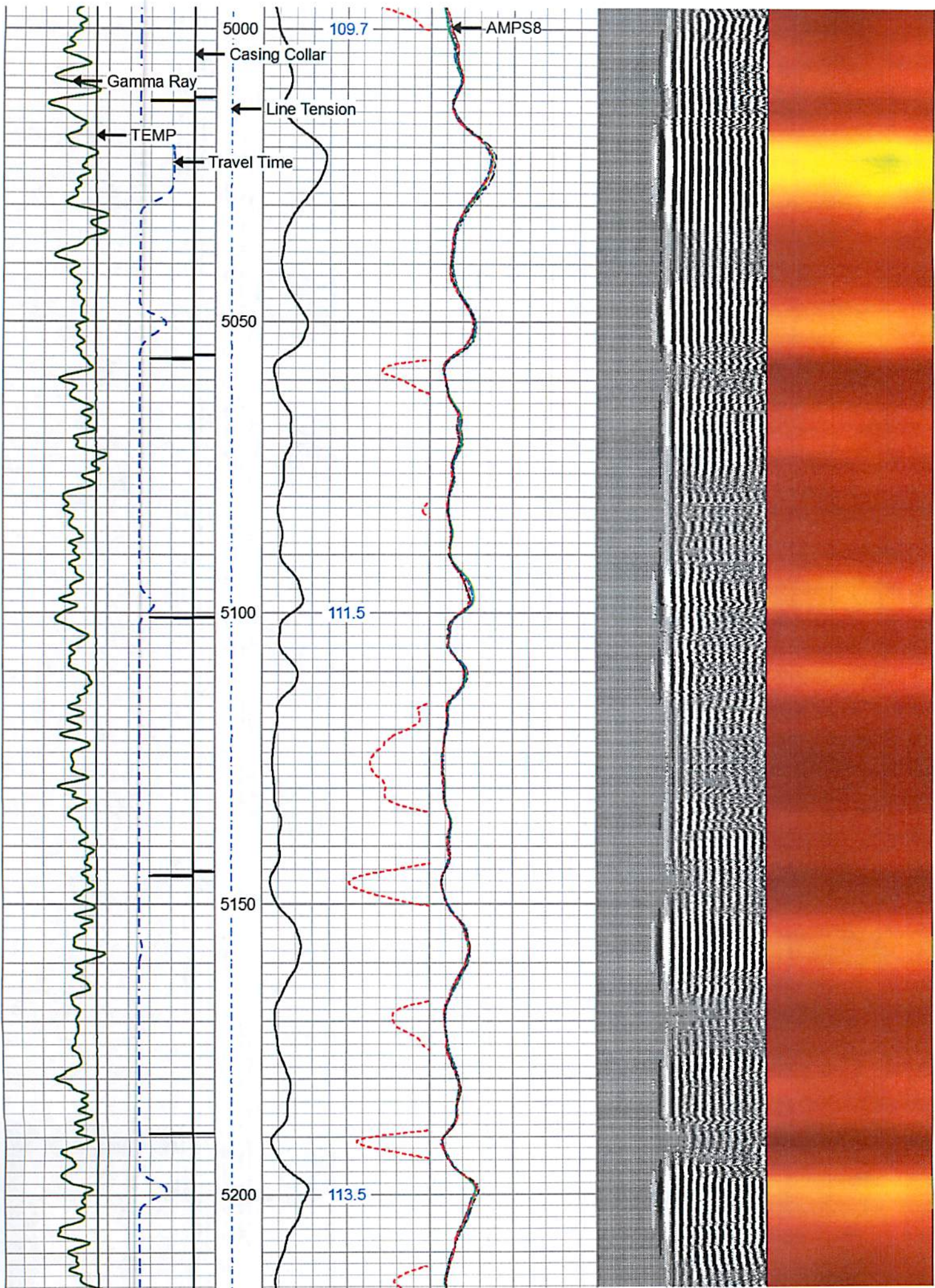


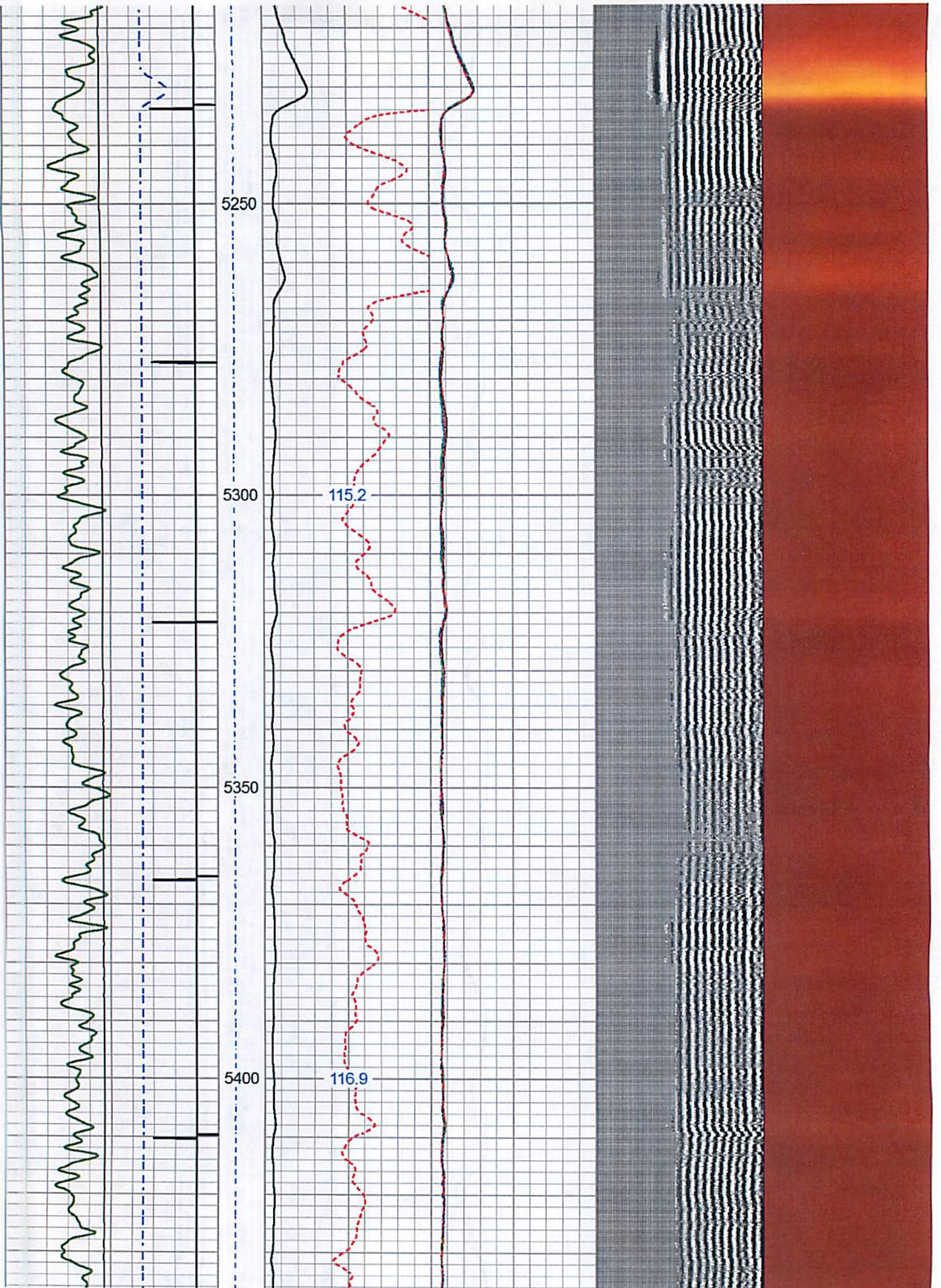


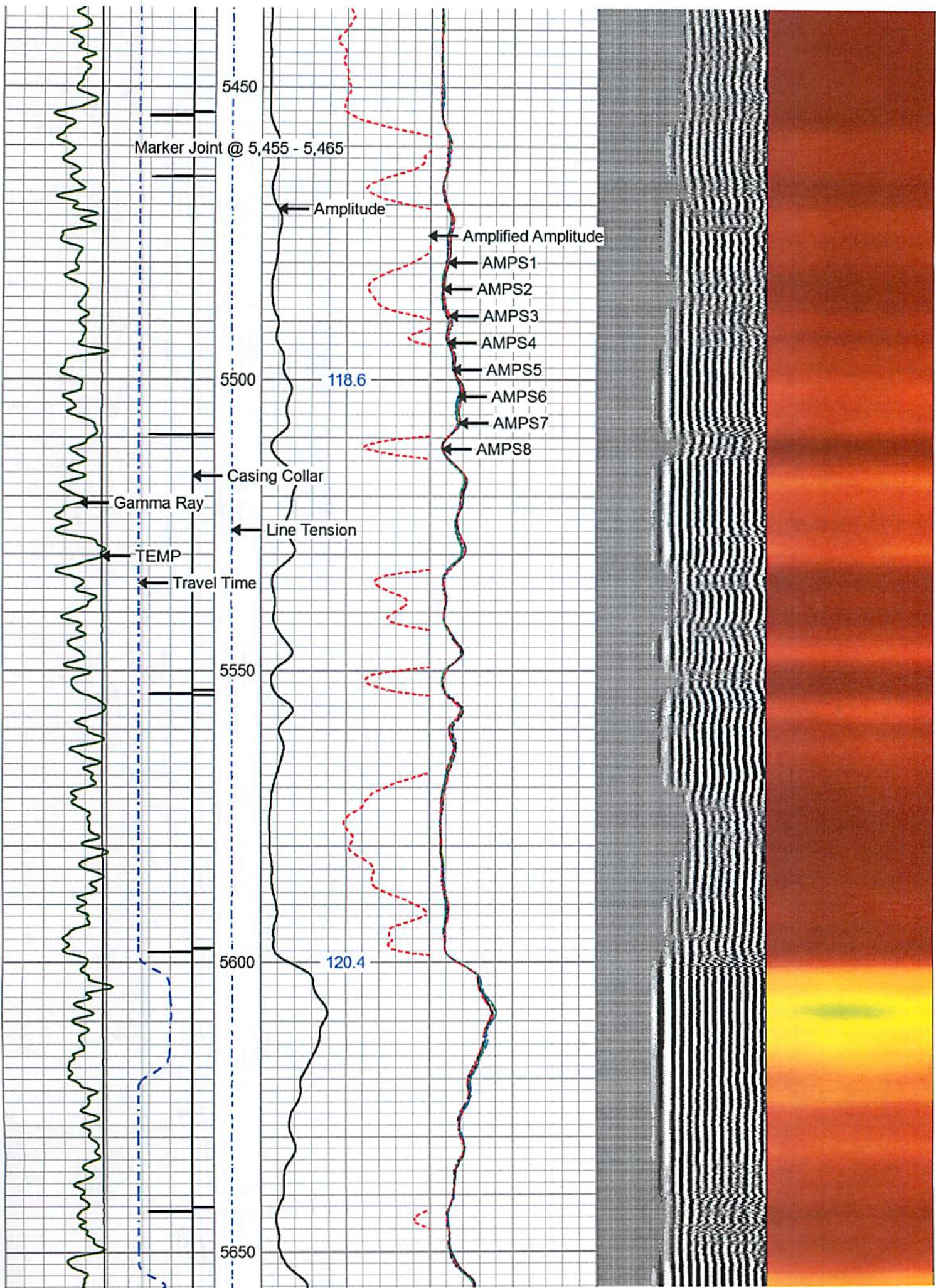


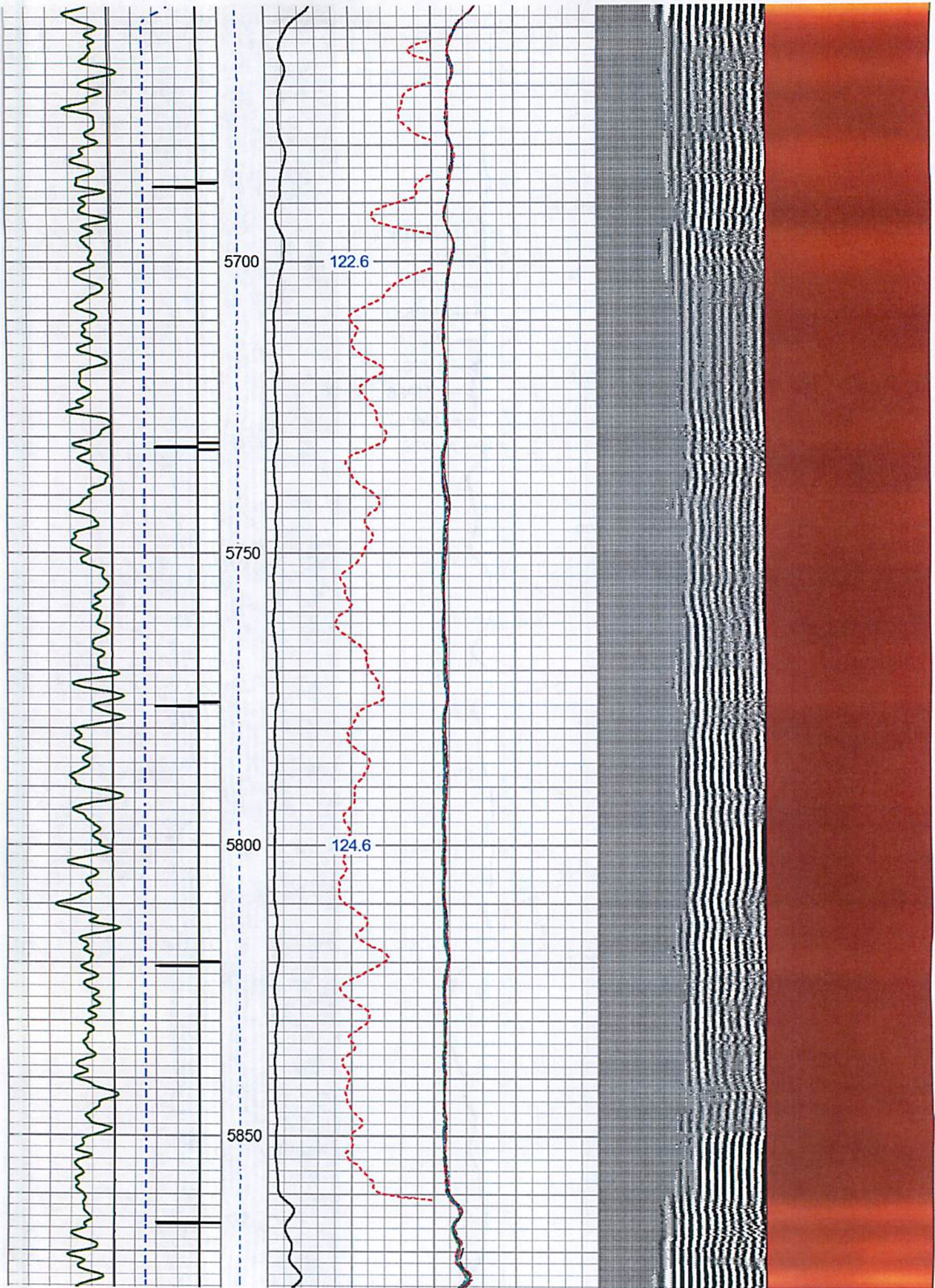


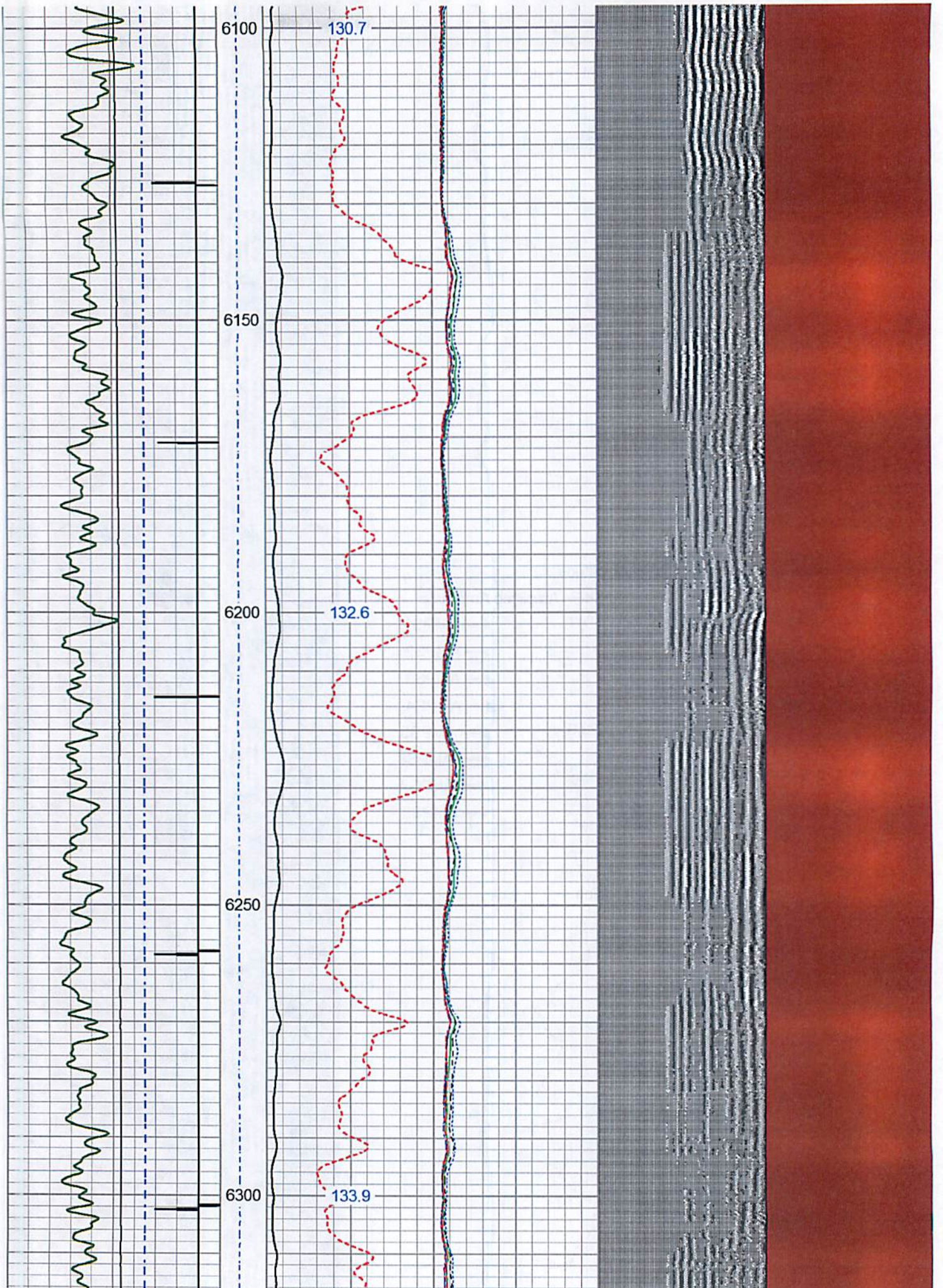


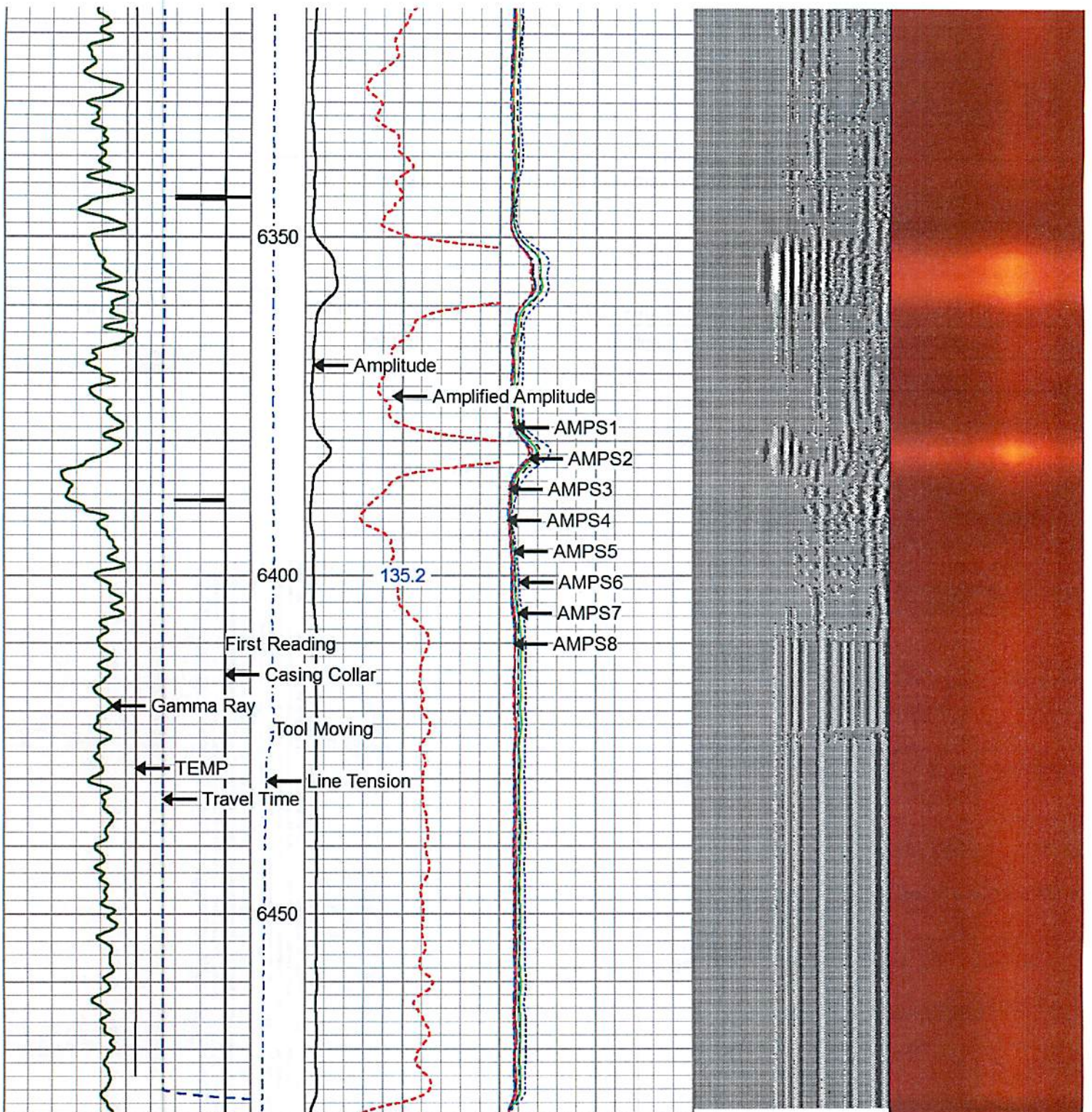












420	Travel Time (usec)	220
9	Casing Collar	-1
0	Gamma Ray (GAPI)	300
0	TEMP (degF)	250

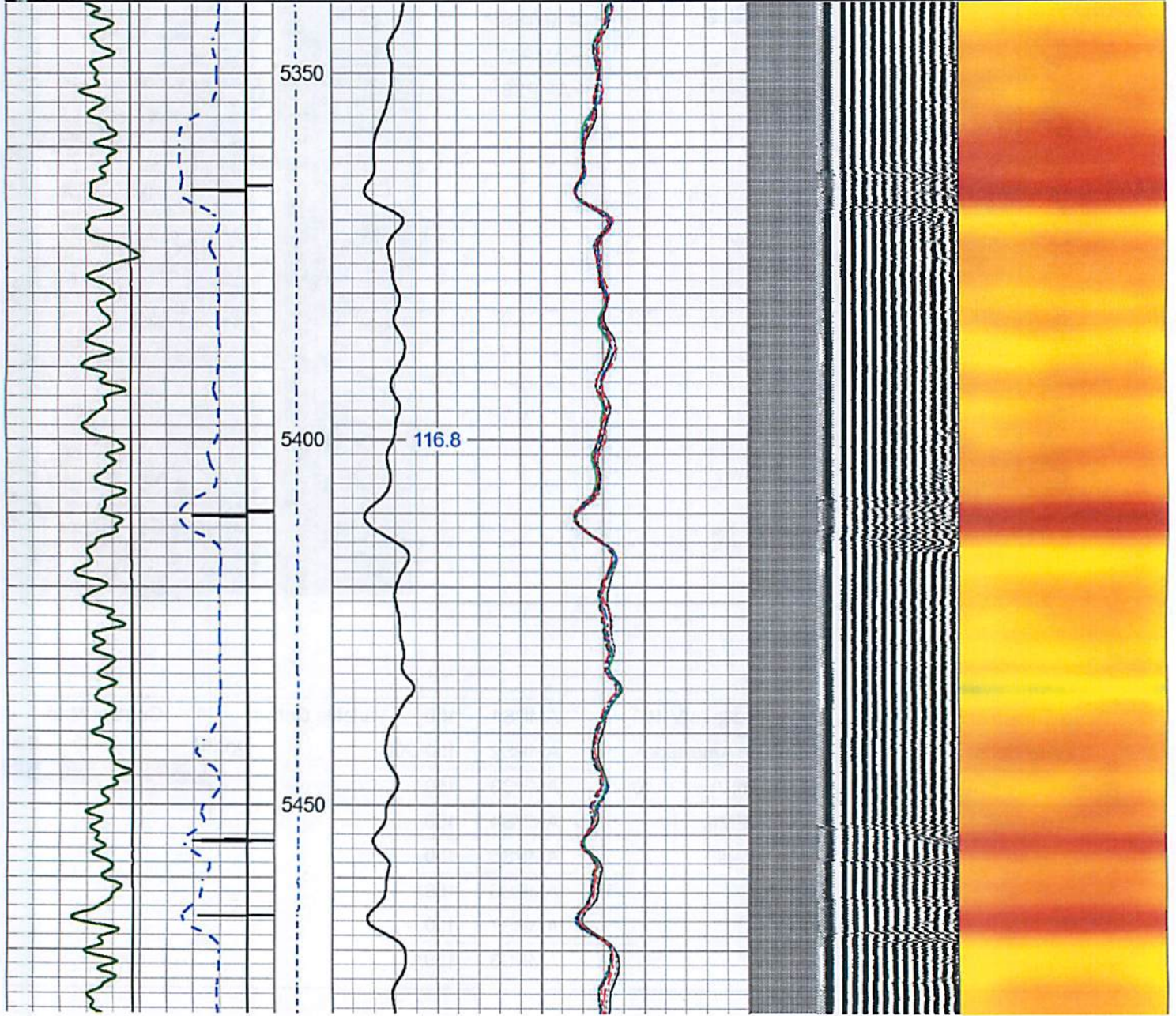
Line Tens	0	Amplitude (mV)	100	-5	AMPS1	150
(lb)	2500	Amplified Amplitude	(mV)	10	AMPS2	150
					AMPS3	150
		TEMP			AMPS4	150
		(degF)			AMPS5	150
					AMPS6	150
					AMPS7	150
					AMPS8	150

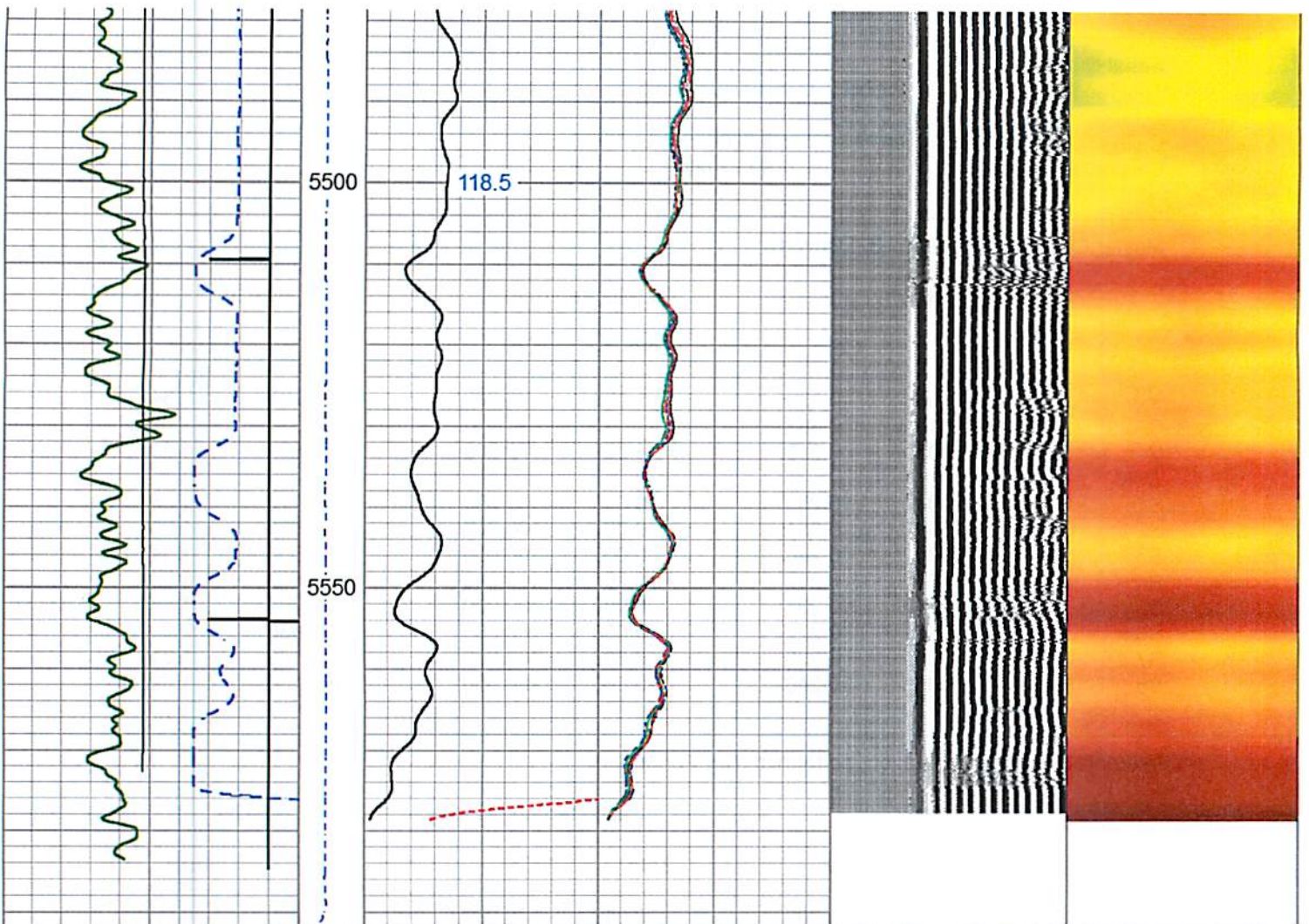
Variable Density	1	Cement Map	8
200	1200	0	100



Database File c:\users\user\desktop\antero neat logs\antero_neat_jack_unit3h_rcbl_12132018.db
 Dataset Pathname Repeat
 Presentation Format ahws_rcbl_jc
 Dataset Creation Thu Dec 13 20:45:07 2018
 Charted by Depth in Feet scaled 1:240

420	Travel Time (usec)	220	e Tens	0	Amplitude (mV)	100	-5	AMPS1	150	Variable Density	1	Cement Map	8
9	Casing Collar	-1	(lb)	0	Amplified Amplitude	10	-5	AMPS2	150	200	1200	0	100
0	Gamma Ray (GAPI)	300	(2500)	0	(mV)	10	-5	AMPS3	150				
0	TEMP (degF)	250			TEMP		-5	AMPS4	150				
					(degF)		-5	AMPS5	150				
							-5	AMPS6	150				
							-5	AMPS7	150				
							-5	AMPS8	150				





420	Travel Time (usec)	220	0	Amplitude (mV)	100	-5	AMPS1	150	Variable Density	1	Cement Map	8
9	Casing Collar	-1	(lb)	Amplified Amplitude		-5	AMPS2	150	200	1200	0	100
0	Gamma Ray (GAPI)	300	(2500)	(mV)	10	-5	AMPS3	150				
0	TEMP (degF)	250		TEMP		-5	AMPS4	150				
				(degF)		-5	AMPS5	150				
						-5	AMPS6	150				
						-5	AMPS7	150				
						-5	AMPS8	150				

Calibration Report

Database File c:\users\user\desktop\antero neat logs\antero_neat_jack_unit3h_rcbl_12132018.db
 Dataset Pathname Main
 Dataset Creation Thu Dec 13 20:44:01 2018

Gamma Ray Calibration Report

Serial Number: FW1408-38 Corr
 Tool Model: GC_C3
 Performed: Thu May 25 15:00:07 2017

Calibrator Value: 1636.0 GAPI

Background Reading: 40.1 cps
 Calibrator Reading: 1964.2 cps

Sensitivity: 0.8503 GAPI/cps

Serial Number: FW1406-126
 Tool Model: RBTC3 Temp
 Calibration Casing Diameter: 5.500 in
 Calibration Depth: 593.242 ft

Master Calibration, performed (Derived):

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3'	-0.006	0.239	1.000	72.000	290.237	2.645
CAL	-0.010	0.383				
5'	-0.003	0.213	1.000	72.000	329.981	1.843
SUM						
S1	-0.004	0.253	0.000	100.000	390.415	1.387
S2	-0.003	0.251	0.000	100.000	393.835	1.200
S3	-0.004	0.246	0.000	100.000	399.863	1.447
S4	-0.004	0.237	0.000	100.000	414.882	1.541
S5	-0.004	0.231	0.000	100.000	426.707	1.581
S6	-0.005	0.227	0.000	100.000	431.030	2.030
S7	-0.004	0.235	0.000	100.000	418.149	1.816
S8	-0.005	0.246	0.000	100.000	398.436	1.895

Internal Reference Calibration, performed (Not Performed):

	Raw (v)		Calibrated (v)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
CAL	0.000	0.000	-0.010	0.383	1.000	0.000

Air Zero Calibration, performed Thu Feb 15 08:40:59 2018:

	Raw (v)		Calibrated (v)		Results	
	Zero		Zero		Gain	Offset
3'	0.000		0.000			0.000
5'	0.000		0.000			0.000
SUM						
S1	0.000		0.000			0.000
S2	0.000		0.000			0.000
S3	0.000		0.000			0.000
S4	0.000		0.000			0.000
S5	0.000		0.000			0.000
S6	0.000		0.000			0.000
S7	0.000		0.000			0.000
S8	0.000		0.000			0.000

Log Variables

Database: \users\user\desktop\antero neat logs\antero_neat_jack_unit3h_rcbl_12132018.db
 Dataset field/well/run1/Main/_vars_

Top - Bottom

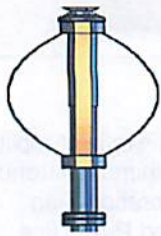
BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	CASEWGHT	MAXAMPL	MINAMPL
TEMP	in 8.625	degF 135	in 5.5	in 0.415	lb/ft 23	mV 72	mV 1
MINATTN	PERFS	PPT	SRFTEMP	TDEPTH			
db/ft 0.8		usec 260	degF 0	ft 0			

Variable Description

BHTEMP_Src : BHTEMP Input Source Selector
 BOREID : Borehole I.D.
 BOTTEMP : Bottom Hole Temperature
 CASEOD : Casing O.D.
 CASETHCK : Casing Thickness
 CASEWGHT : Casing Weight
 MAXAMPL : Maximum Amplitude

MINAMPL : Minimum Amplitude
 MINATTN : Minimum Attenuation
 PERFS : Perforation Flag
 PPT : Predicted Pipe Time
 SRFTEMP : Surface Temperature
 TDEPTH : Total Depth

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			CHD-STNDRD (GOI) Standard Cable Head	1.00	1.69	10.00
			CENT-Probe275 Probe 2.75" 4 Arm Bow Spring Centralizer	2.88	1.69	36.00
Temp	17.35		RBT-RBTC3 Temp (FW1406-126) Probe 2.75" Corrosion RCBL With Integral Temp Sub	9.39	2.75	90.00
WVFS8	15.12					
WVFS7	15.12					
WVFS6	15.12					
WVFS5	15.12					
WVFS4	15.12					
WVFS3	15.12					
WVFS2	15.12					
WVFS1	15.12					
WVFCAL	15.12					
WVF3FT	15.12					
WVF5FT	14.12					
		CENT-Probe275 Probe 2.75" 4 Arm Bow Spring Centralizer	2.88	1.69	36.00	
CCL	7.09					
GR	6.01	GR-GC_C3 (FW1408-38 Corr) Probe 2.75" Gamma Ray-CCL Corrosion Modified	5.10	2.75	55.00	



CENT-Probe275
Probe 2.75\" 4 Arm Bow Spring Centralizer

2.88

1.69

36.00

Dataset: antero_neat_jack_unit3h_rcbl_12132018.db: field/well/run1/Main
Total length: 24.15 ft
Total weight: 263.00 lb
O.D.: 2.75 in

ALLIED
HORIZONTAL
WIRELINE SERVICES

Company Antero Resources
Well Jack 3H
Field Marcellus
County Tyler
State West Virginia

Country