



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

Company Antero Resources Corporation  
 Well Hopper Unit 1H  
 Field Mountain  
 County Tyler  
 State West Virginia Country USA

Company Antero Resources Corporation  
 Well Hopper Unit 1H  
 Field Mountain  
 County Tyler  
 State West Virginia Country USA

Location: API #: 47-095-02388  
 Latitude: 39.35898  
 Longitude: -80.97551  
 SEC TWP RGE

Permanent Datum Ground Level Elevation 1,178 ft  
 Log Measured From Kelly Bushing  
 Drilling Measured From Kelly Bushing

Other Services  
 Elevation  
 K.B. 1,210 ft  
 D.F. 1,210 ft  
 G.L. 1,178 ft

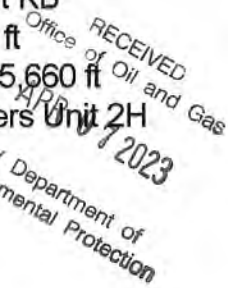
Date	1 - Mar - 2018	
Run Number	One	
Depth Driller	14,406 ft	
Depth Logger	6,879 ft	
Bottom Logged Interval	6,865 ft	
Top Log Interval	Surface	
Open Hole Size	-	
Type Fluid	Fresh Water	
Density / Viscosity	8.3 lb/gal	
Max. Recorded Temp.	136° F	
Estimated Cement Top	972 ft	
Time Well Ready	10:00	
Time Logger on Bottom	10:30	
Equipment Number	2611	
Location	Inwin	
Recorded By	Blake Fenton	
Witnessed By	Beau Carroll	
Borehole Record		
Run Number	Bit	From
		To
		Size
		Weight
		From
		To
Tubing Record		
Casing Record	Size	Wgt/Ft
Surface String	13 3/8 in	54.5 lbs/ft
Intermed. String	-	-
Intermed. 2 String	9 5/8 in	36 lbs/ft
Production String	5 1/2"	23 lbs/ft
		Top
		Bottom

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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 three inline bowspring centralizers  
 Logged from 6,865 ft to surface with a maximum temperature of 136° F  
 Tool zeroed at ground level and corrected 32 ft KB  
 Marker joint detected from 5,648 ft to 5,658 ft  
 Casing tally denotes marker joint from 5,650 ft to 5,660 ft  
 Free pipe calibration taken from previous well, Packers Unit 2H  
 Estimated top of cement bond at 972 ft  
 Kick-off point 5,822 ft  
 1,500 psi applied



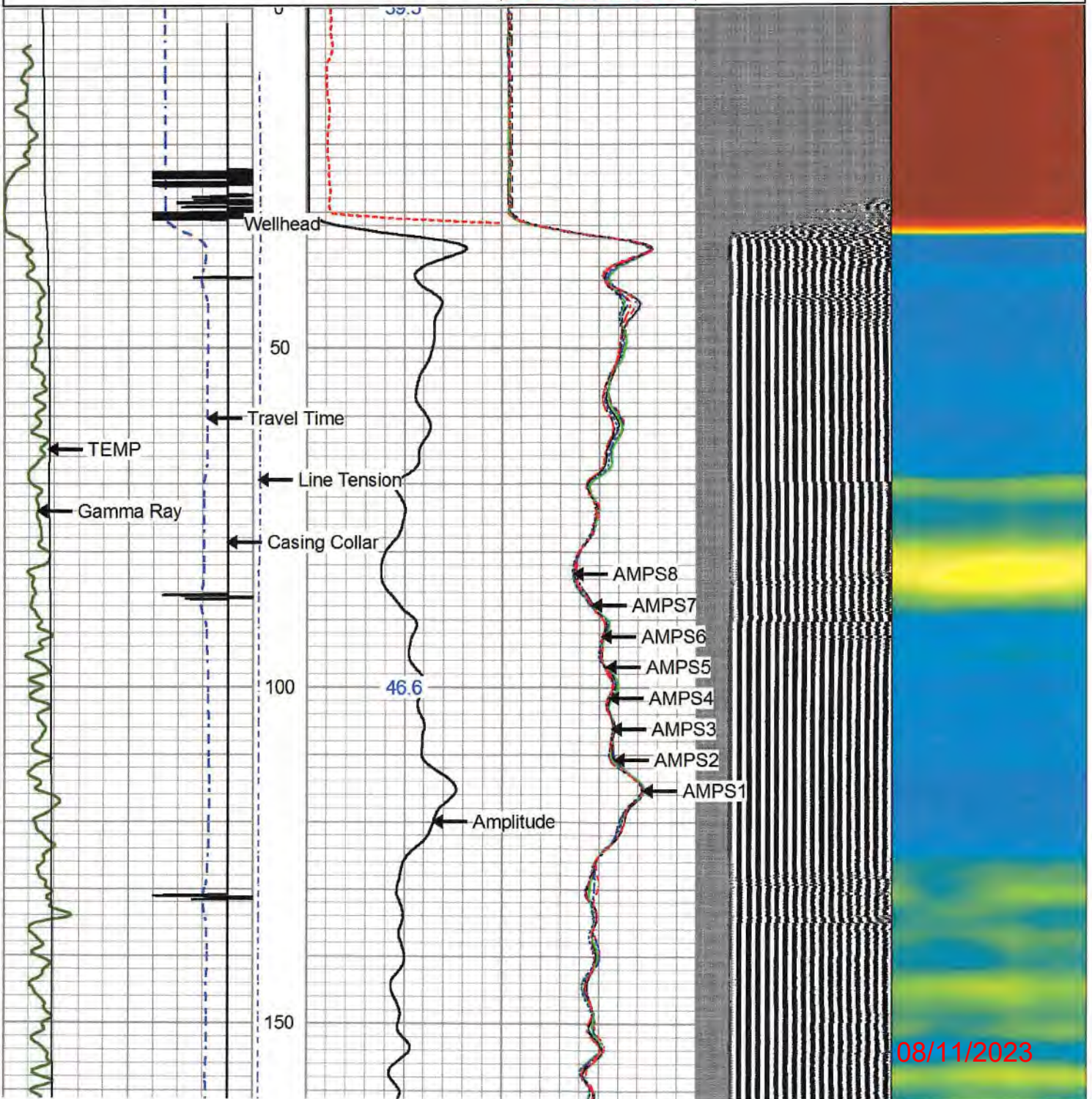
**1,500 PSI MAIN PASS**

Scale 1:240



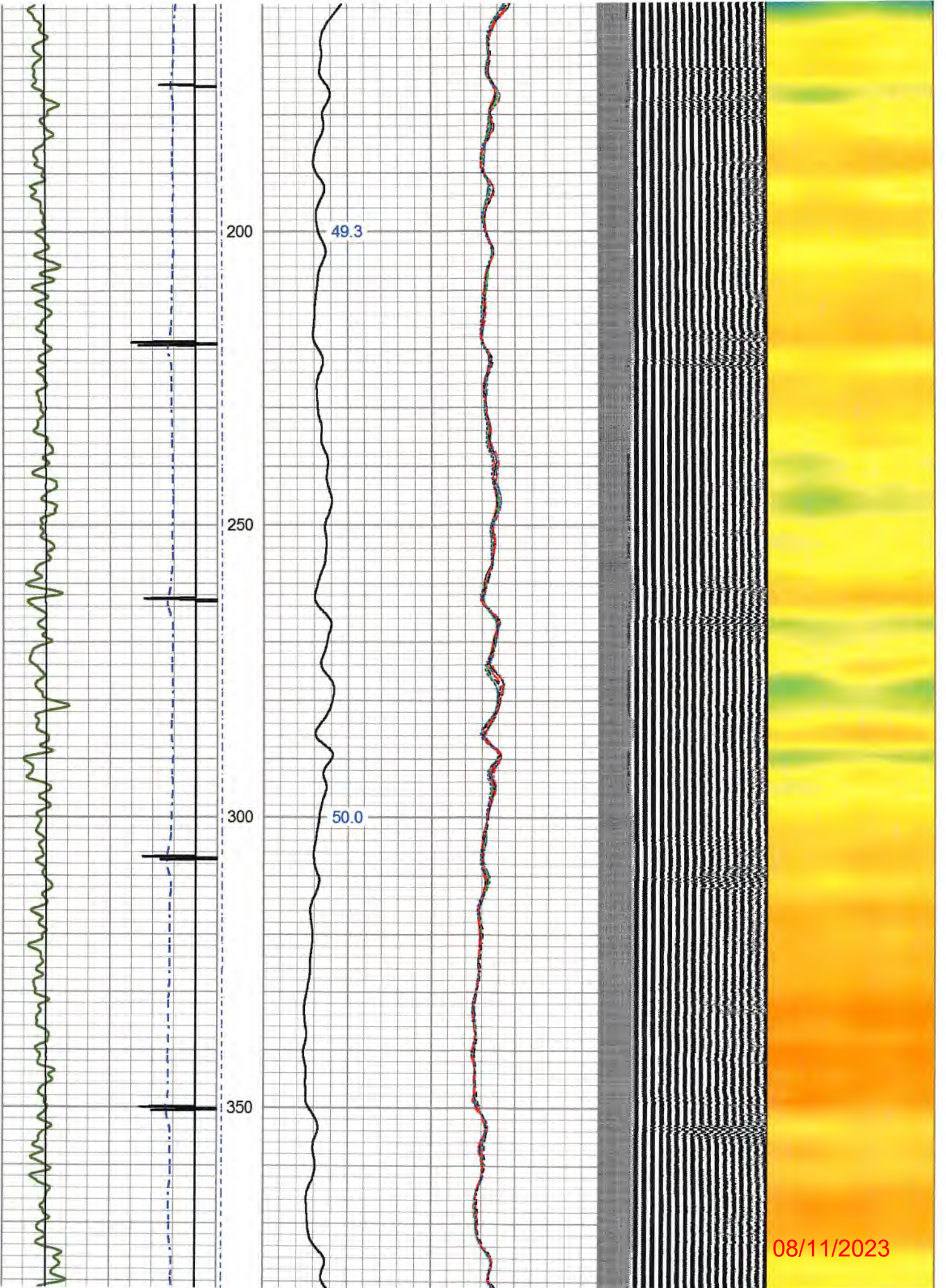
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 Dataset Pathname passMain  
 Presentation Format ahws\_rcbl\_jc  
 Dataset Creation Fri Mar 02 12:23:35 2018  
 Charted by Depth in Feet scaled 1:240

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	(V)	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				



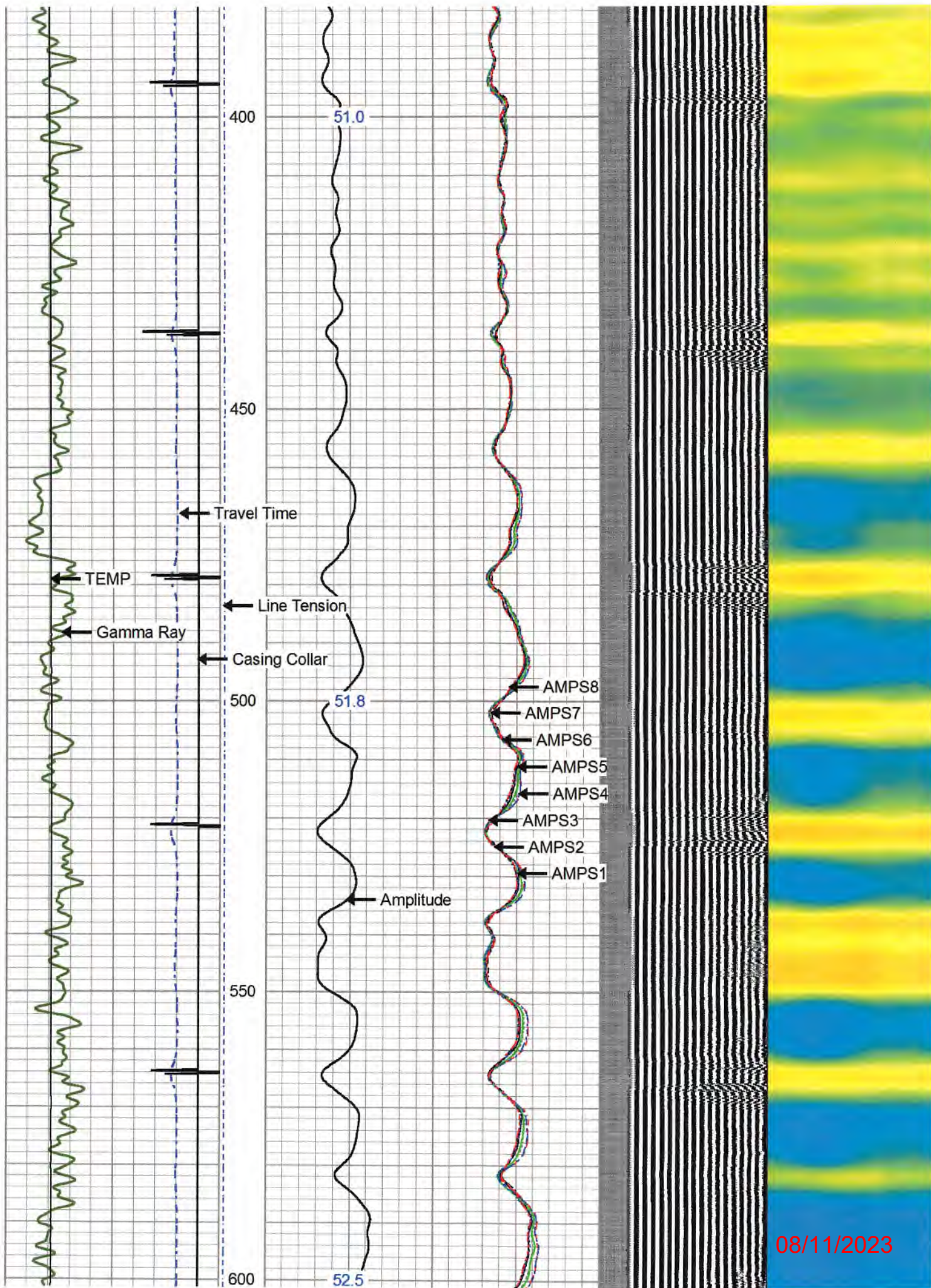
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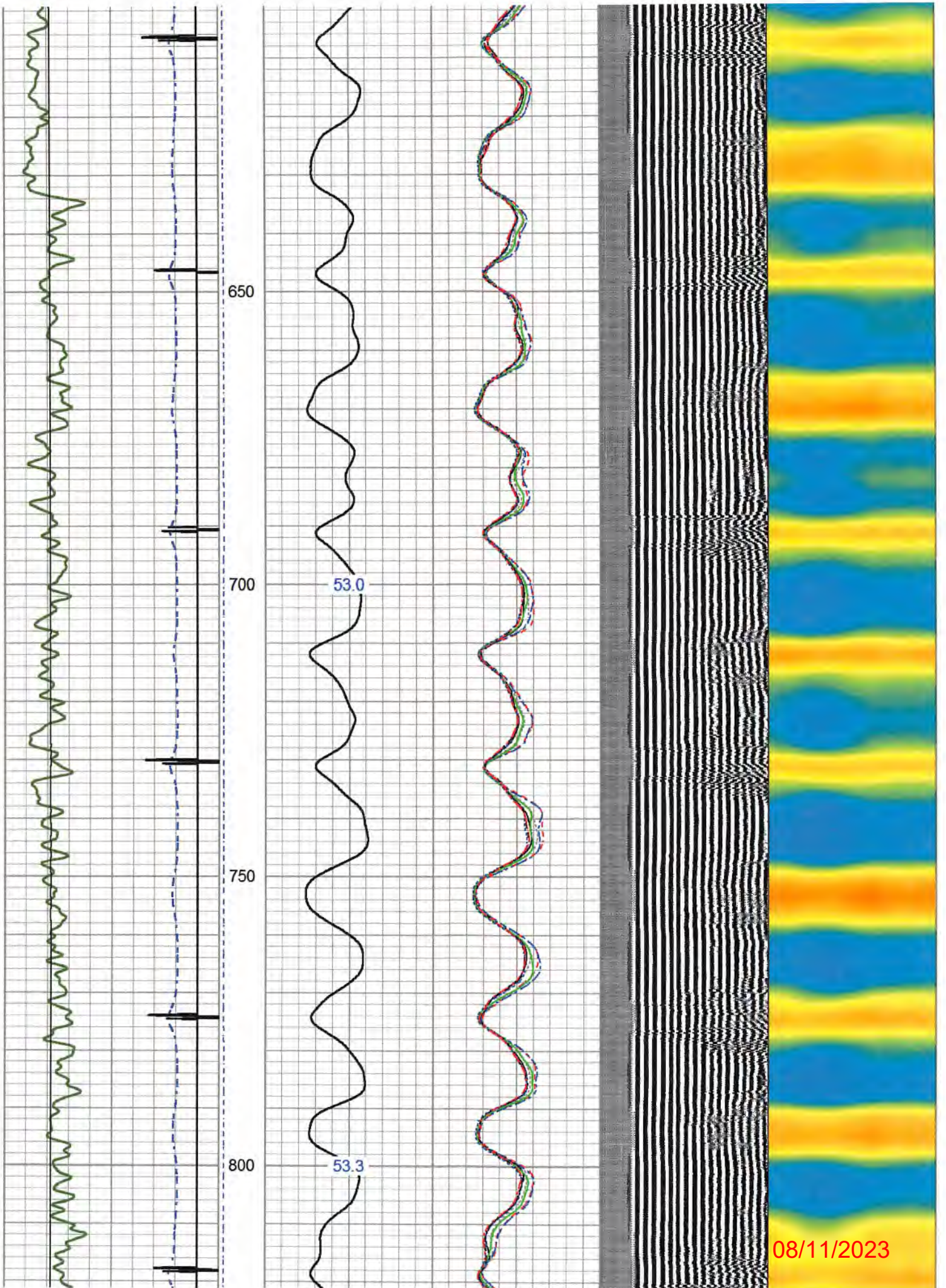


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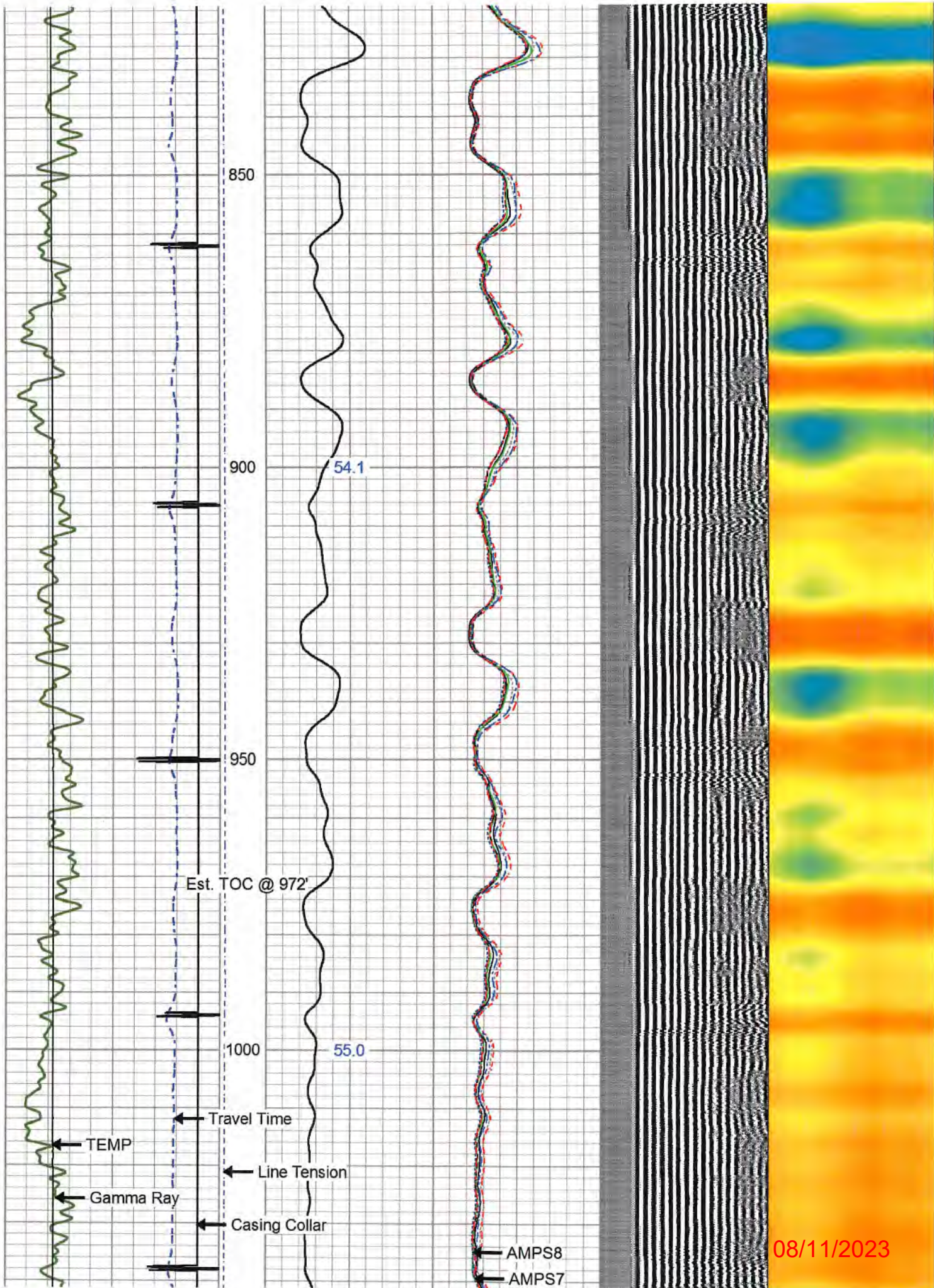




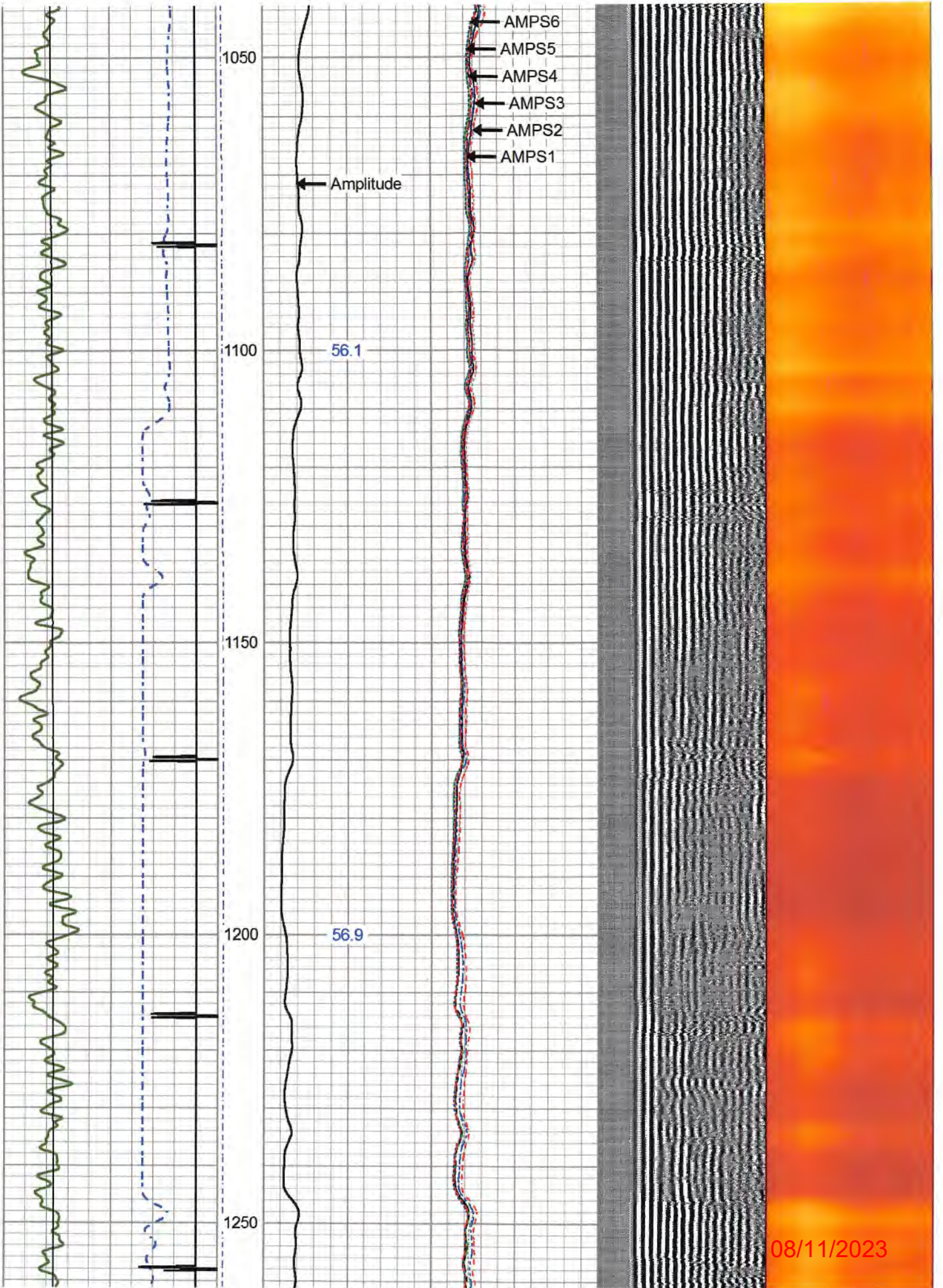




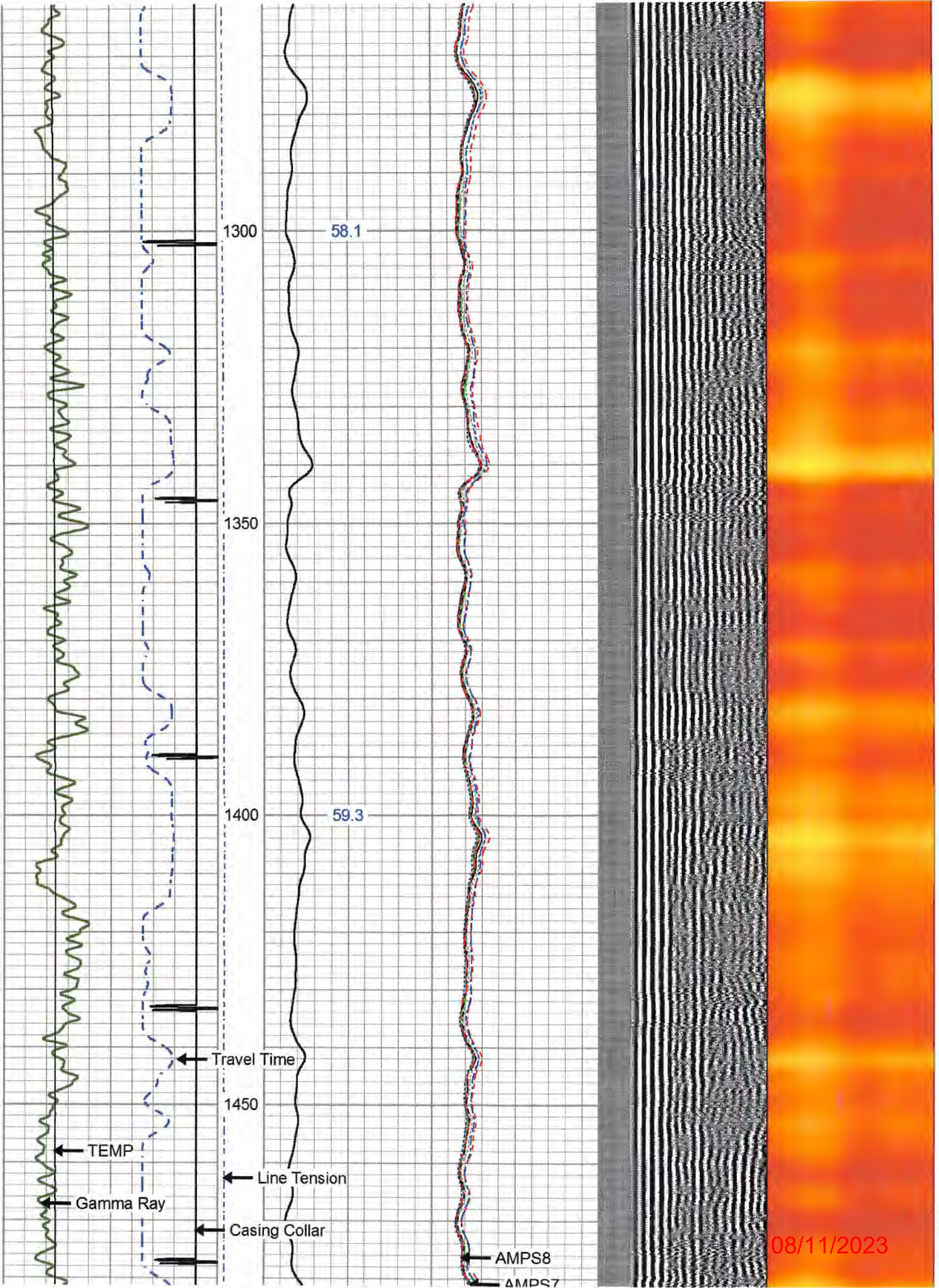




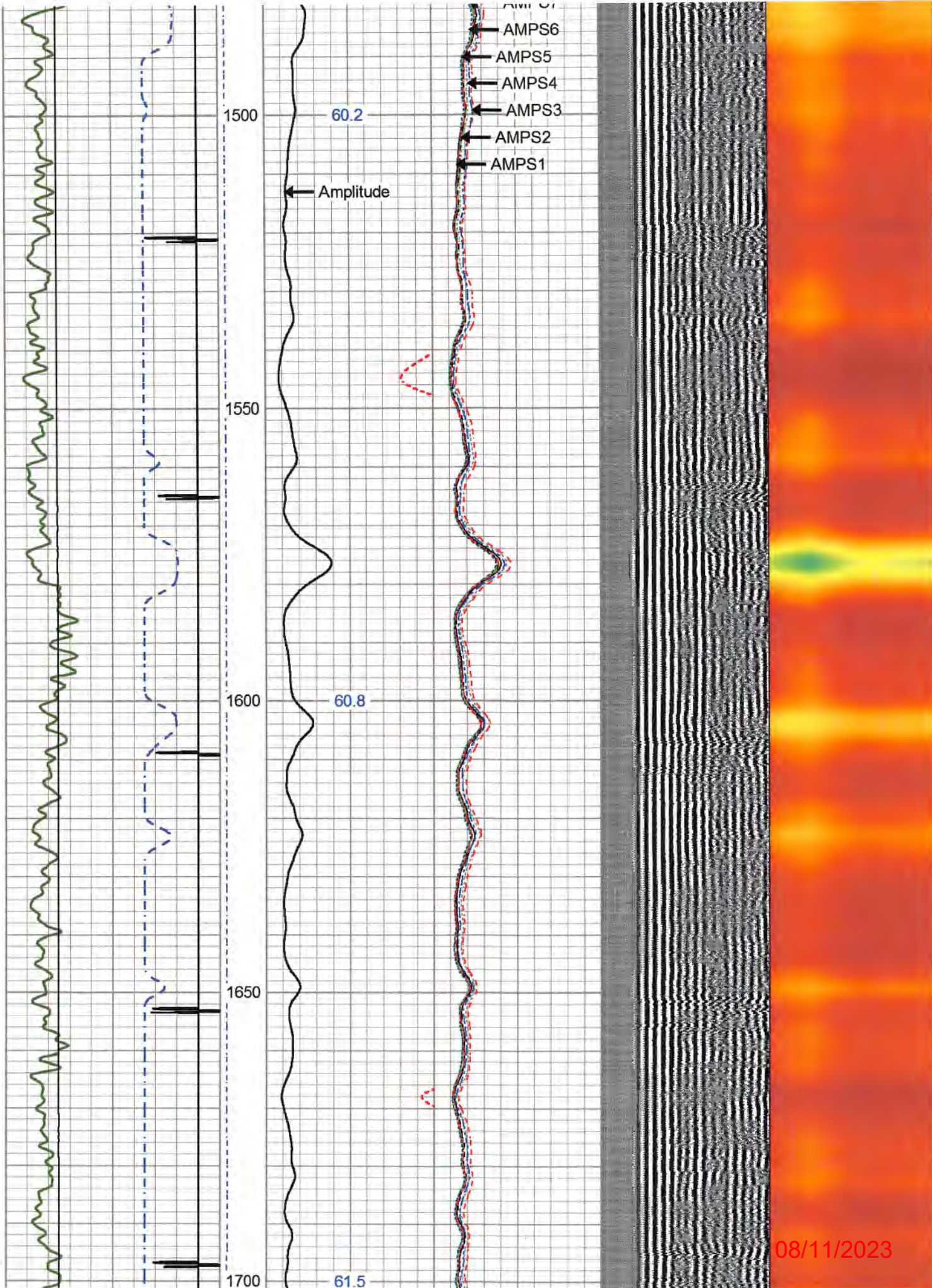






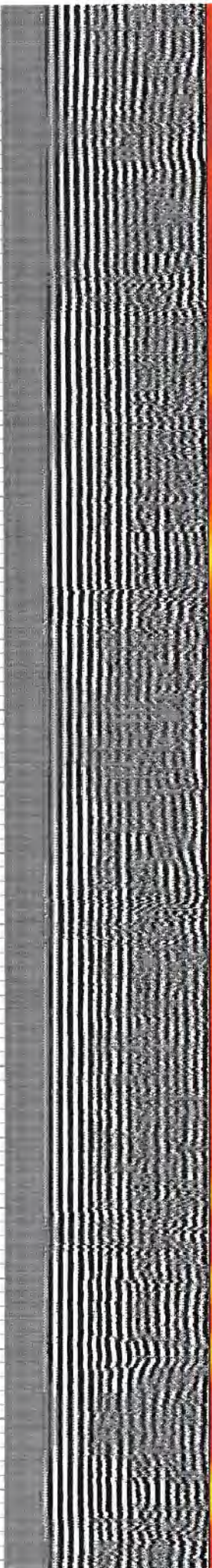
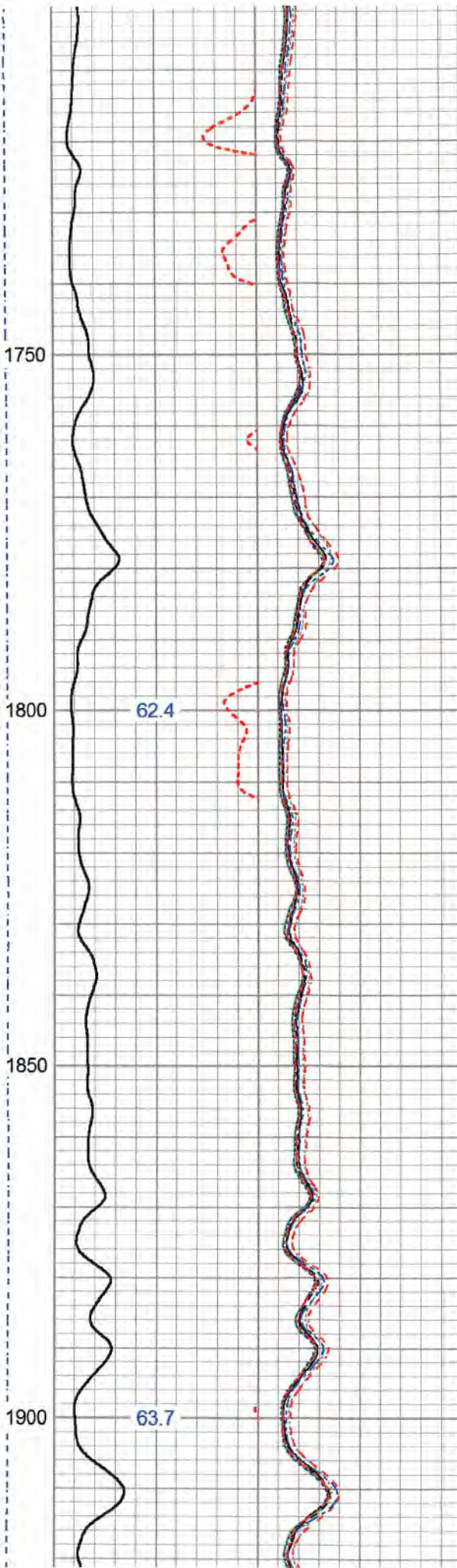
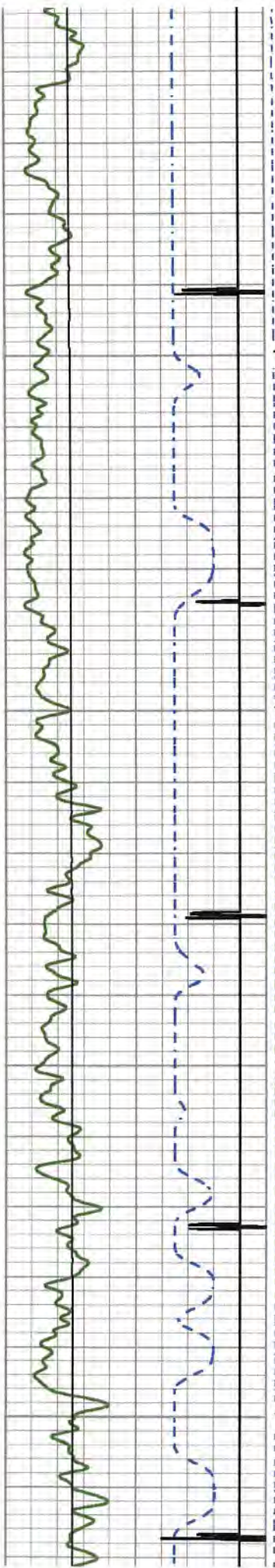






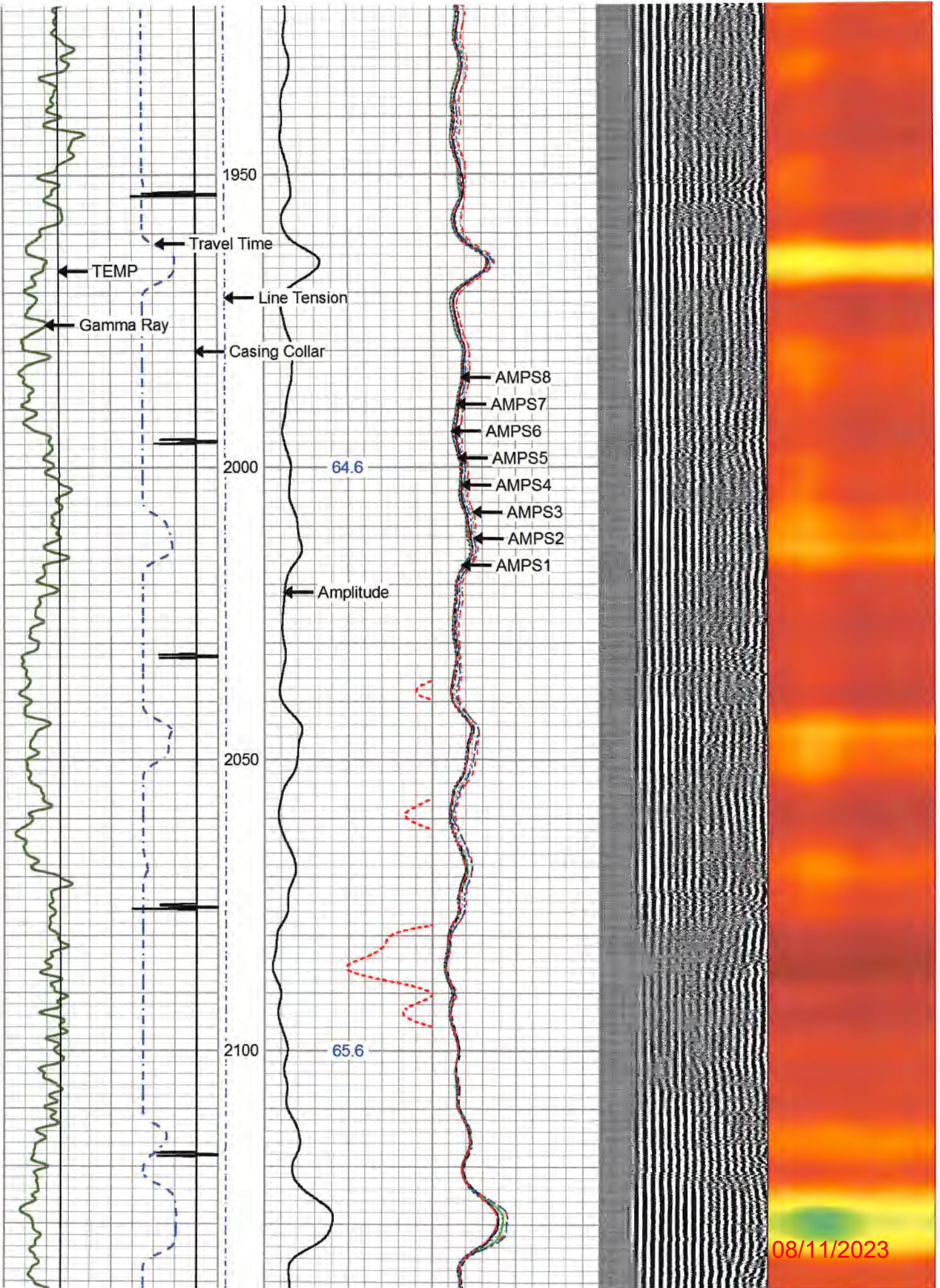
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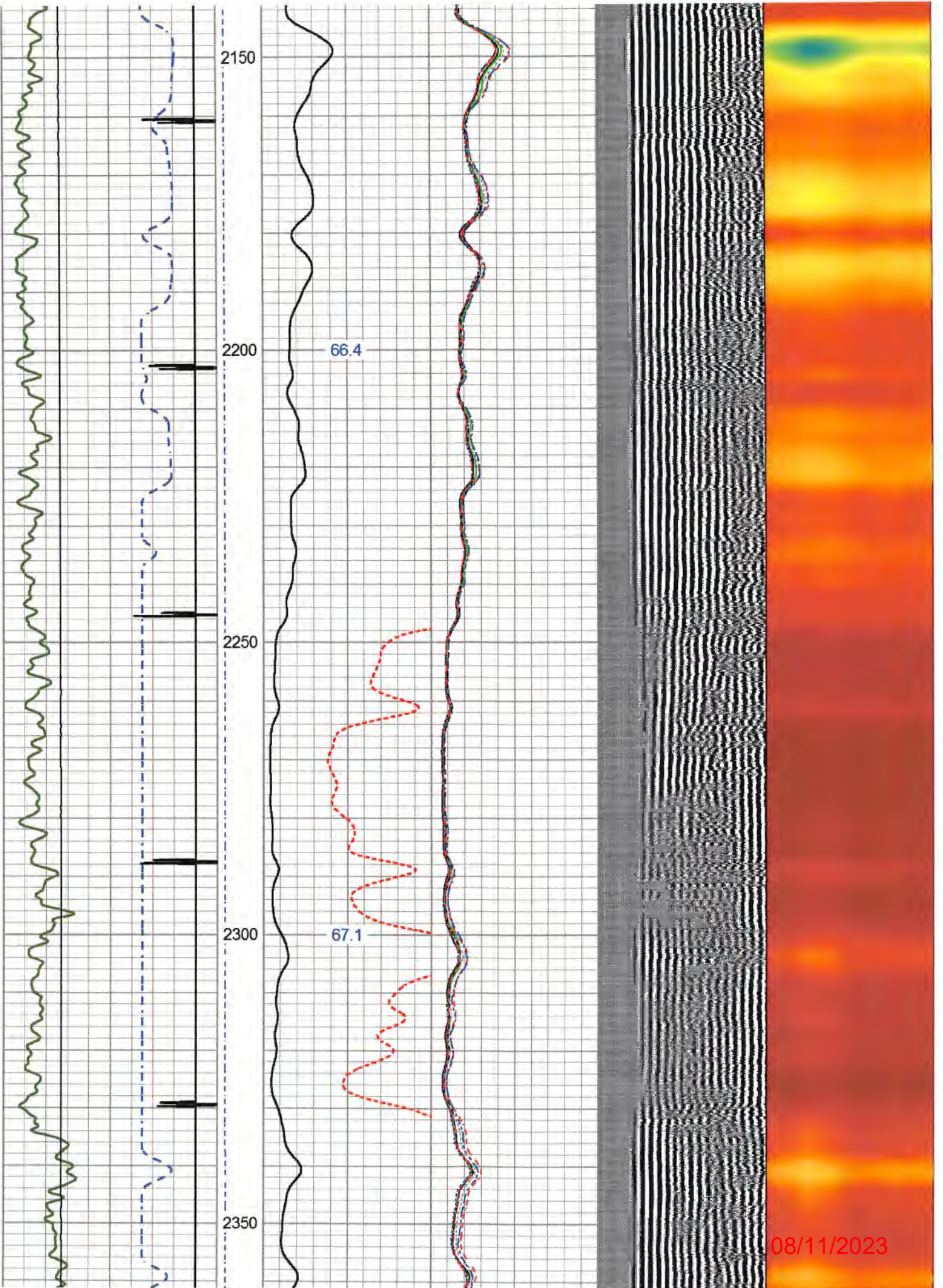


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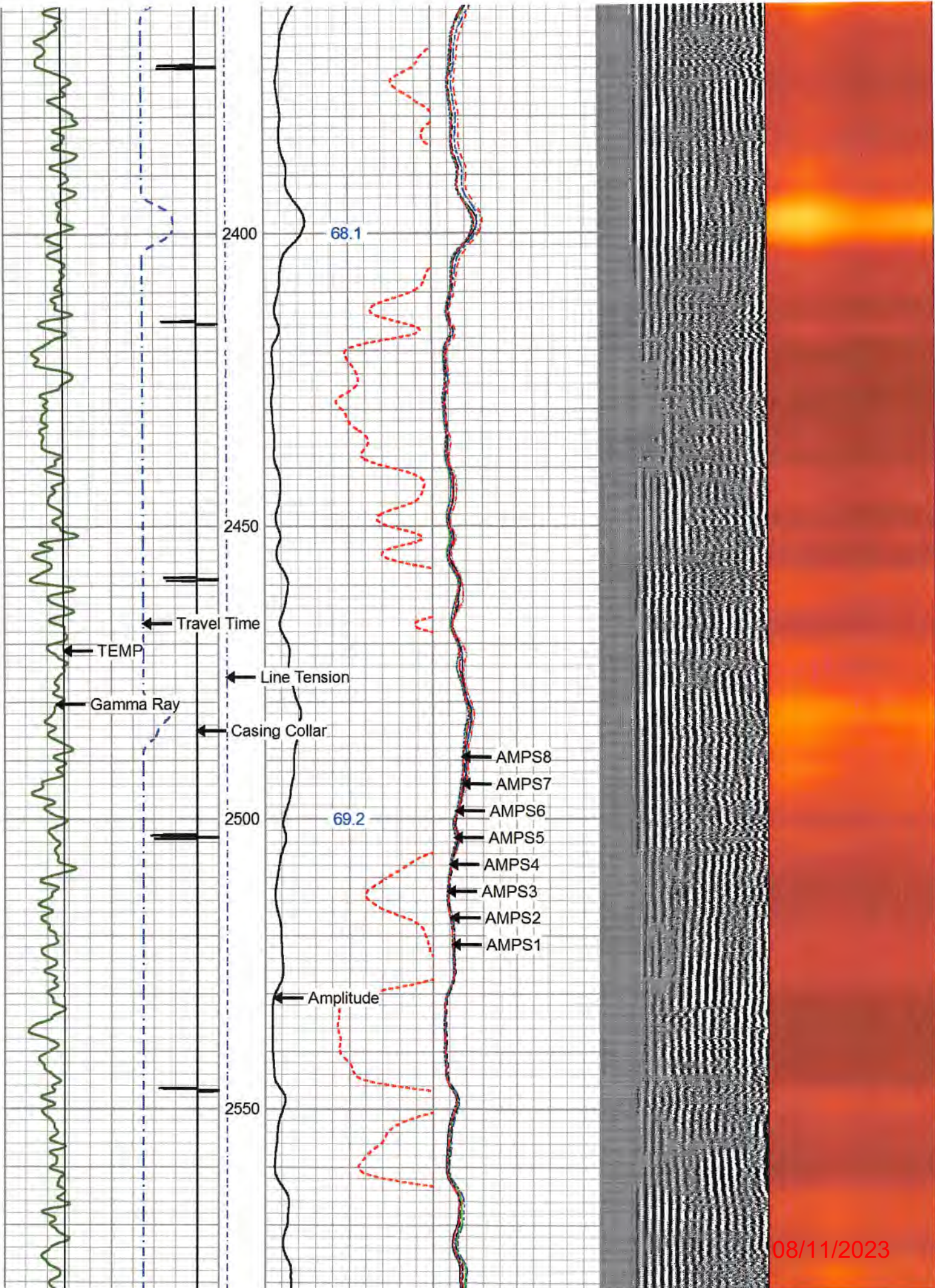




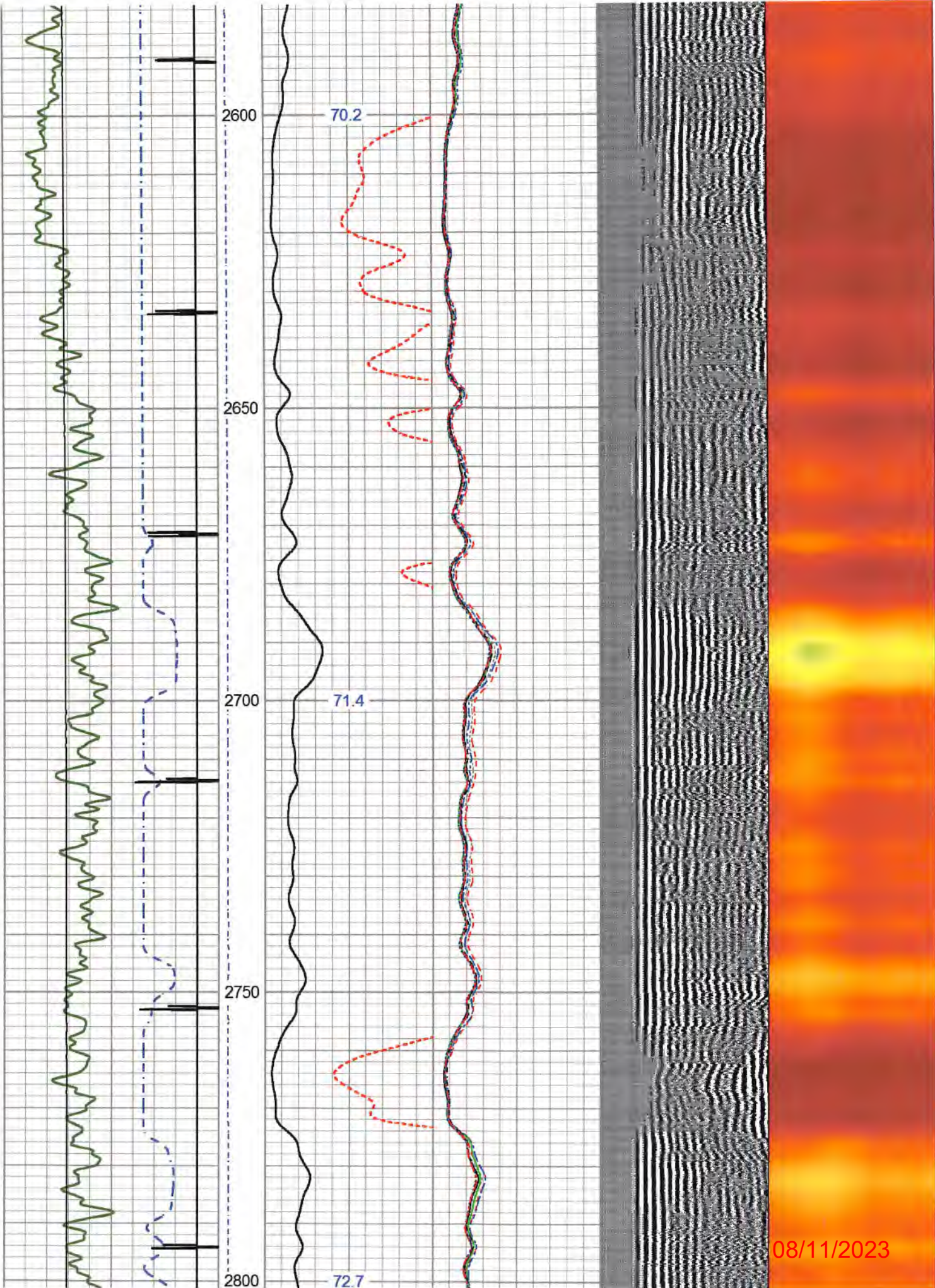


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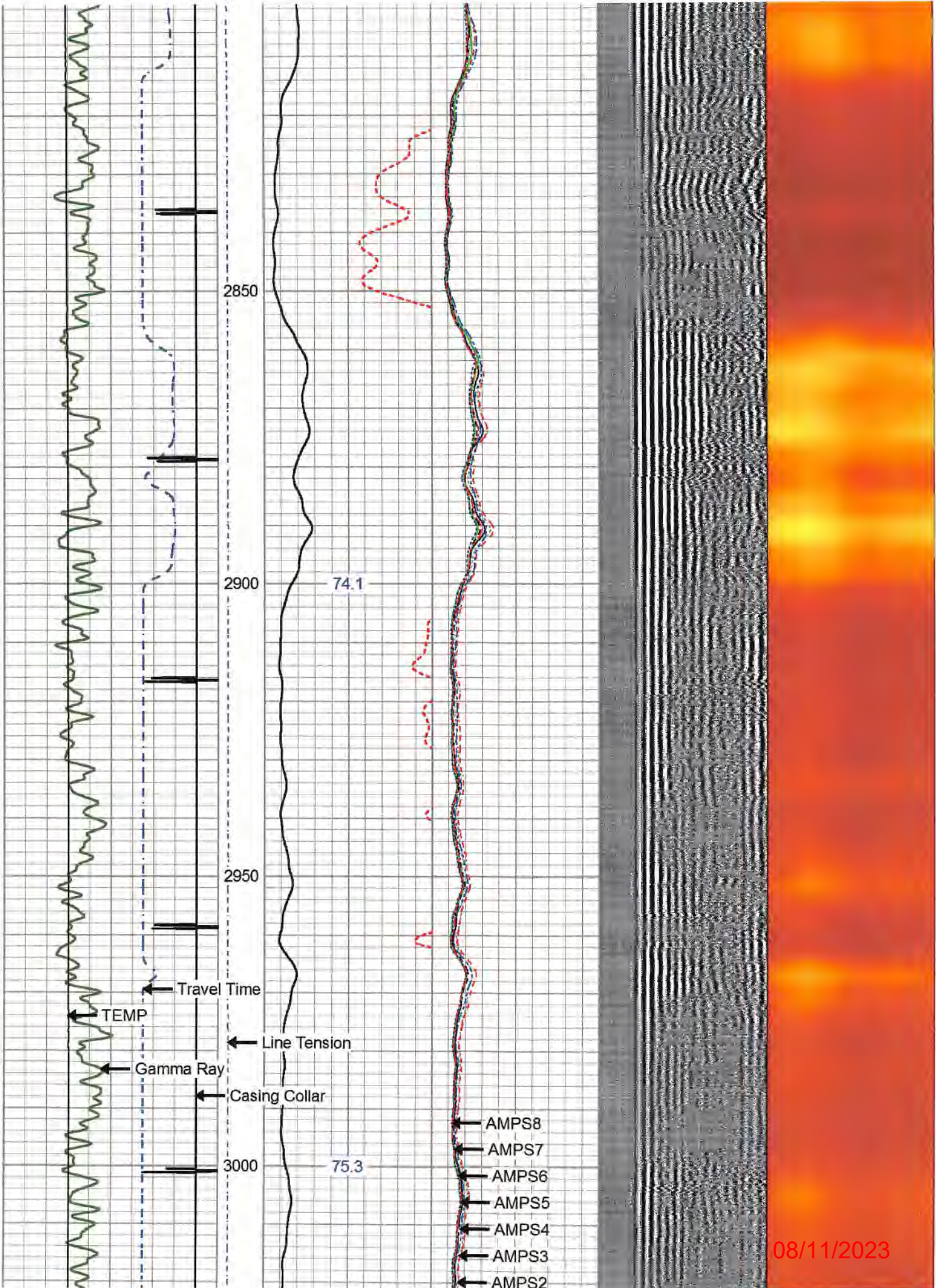






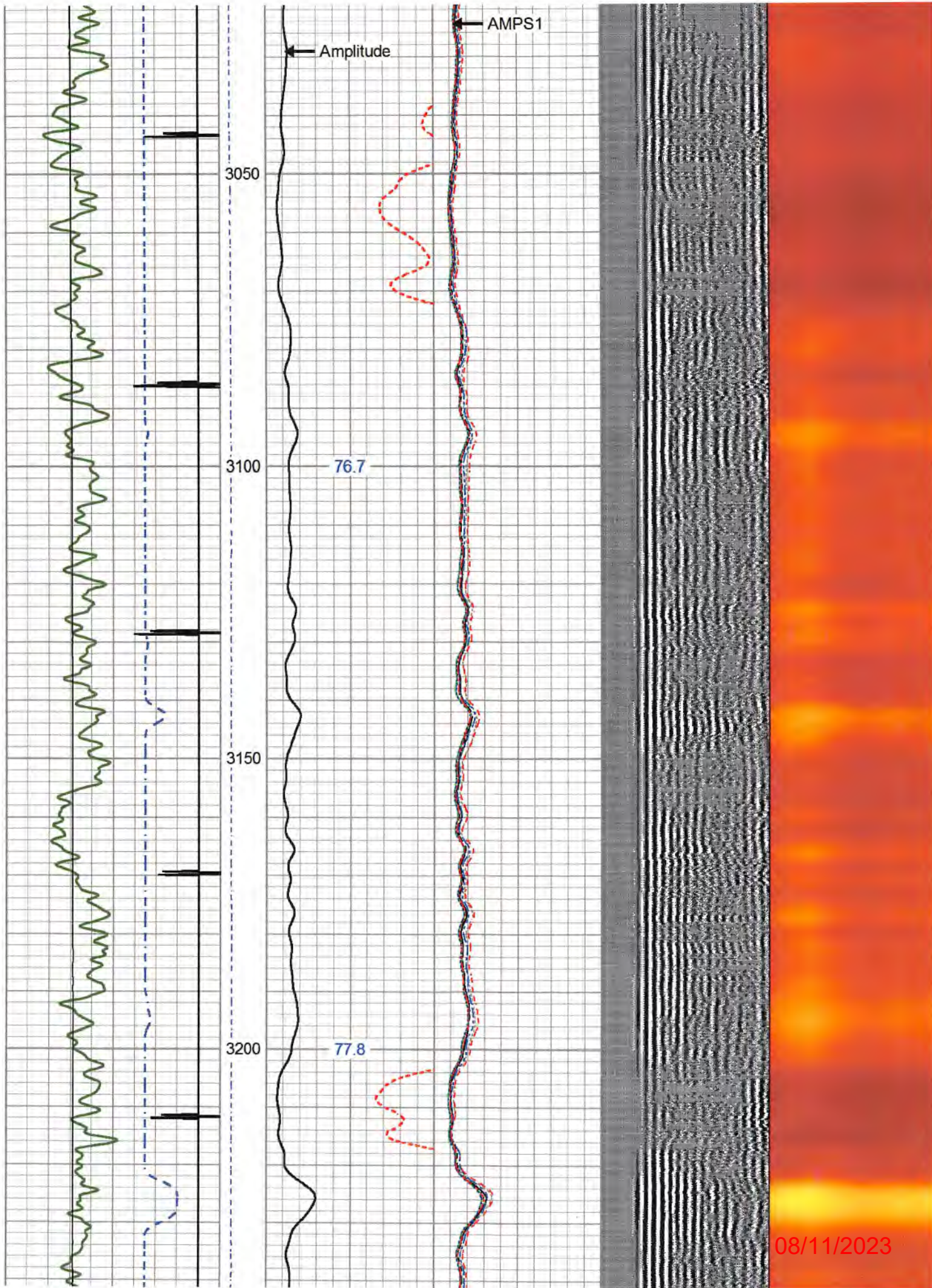
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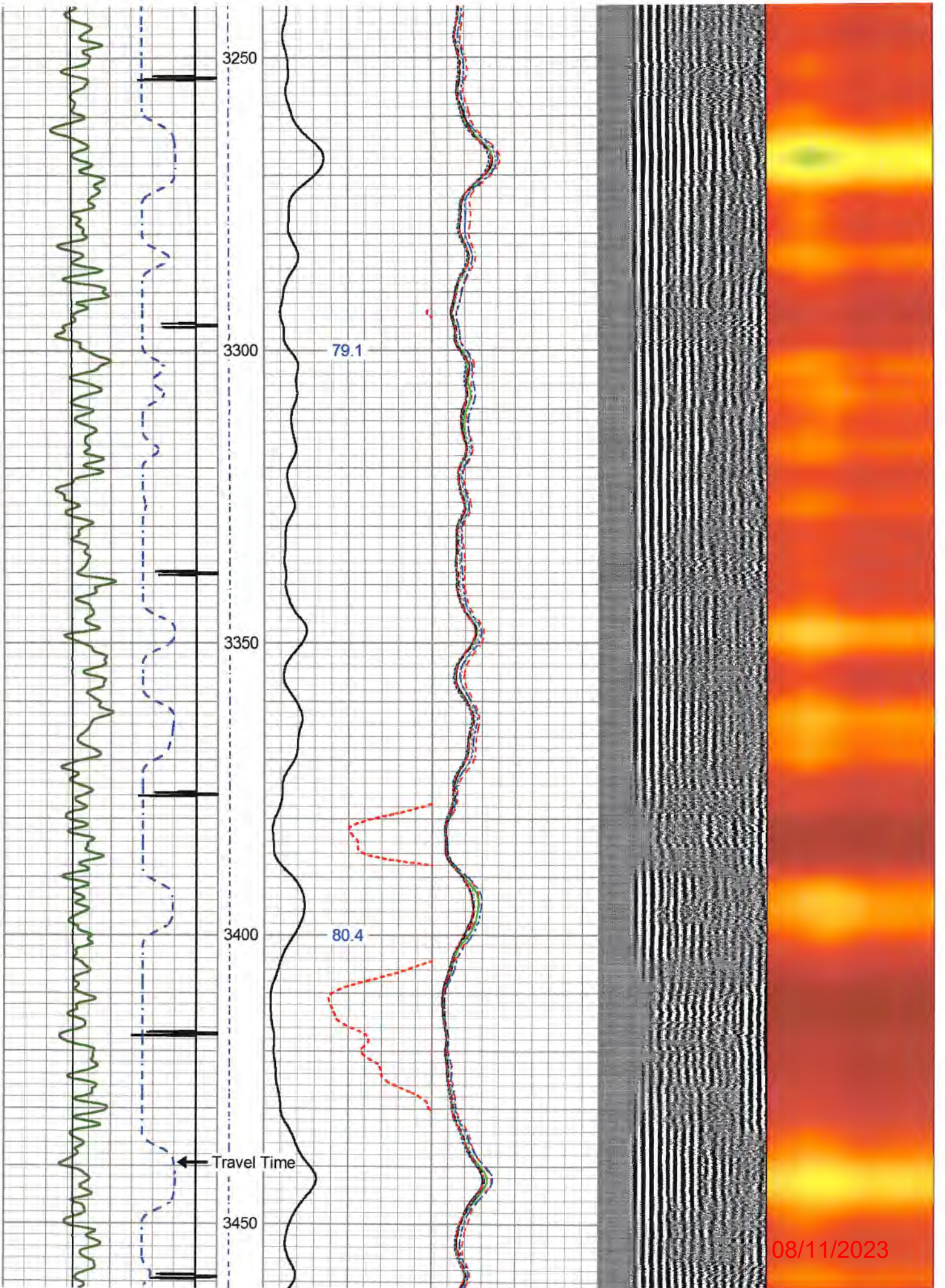


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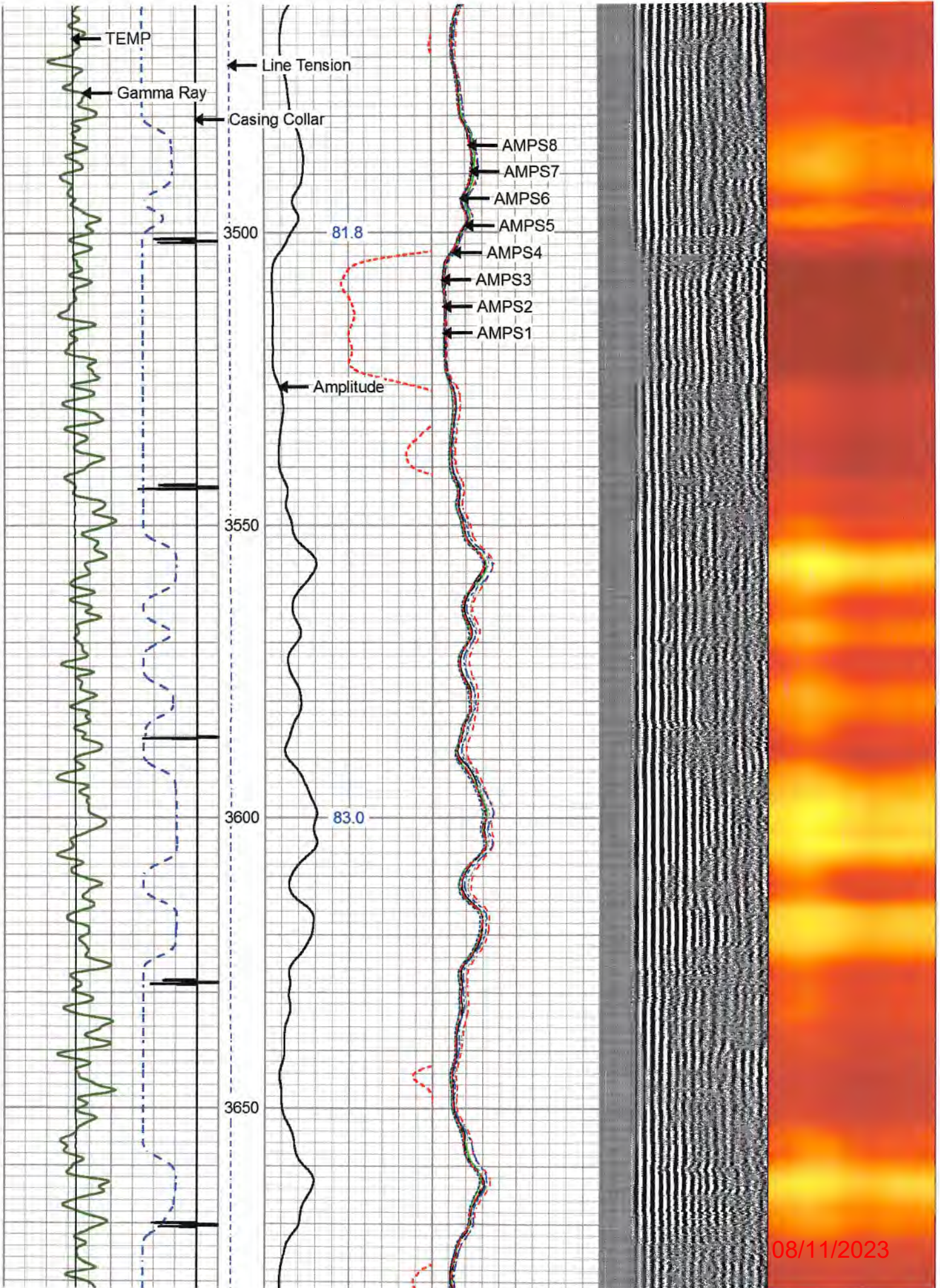




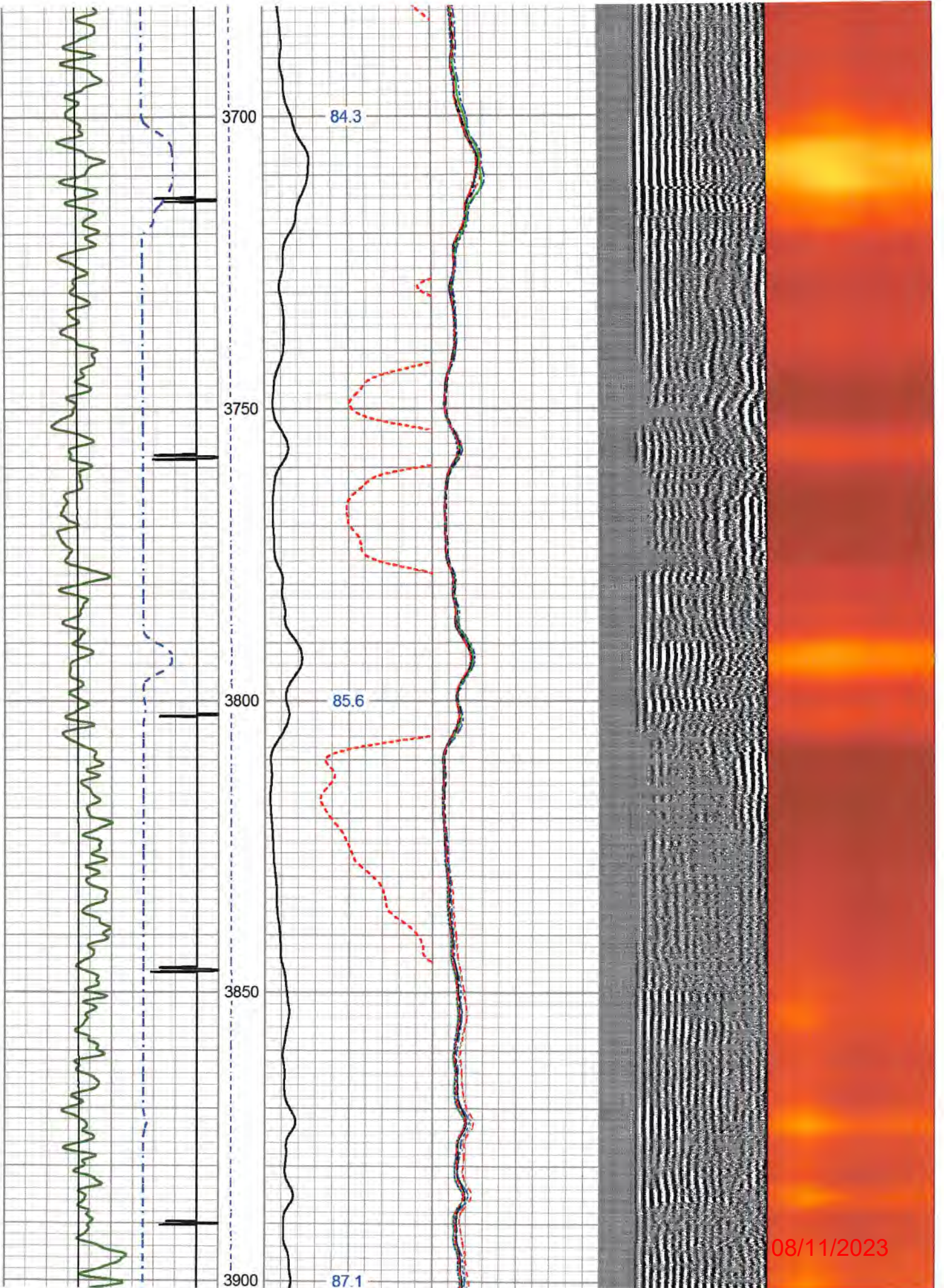






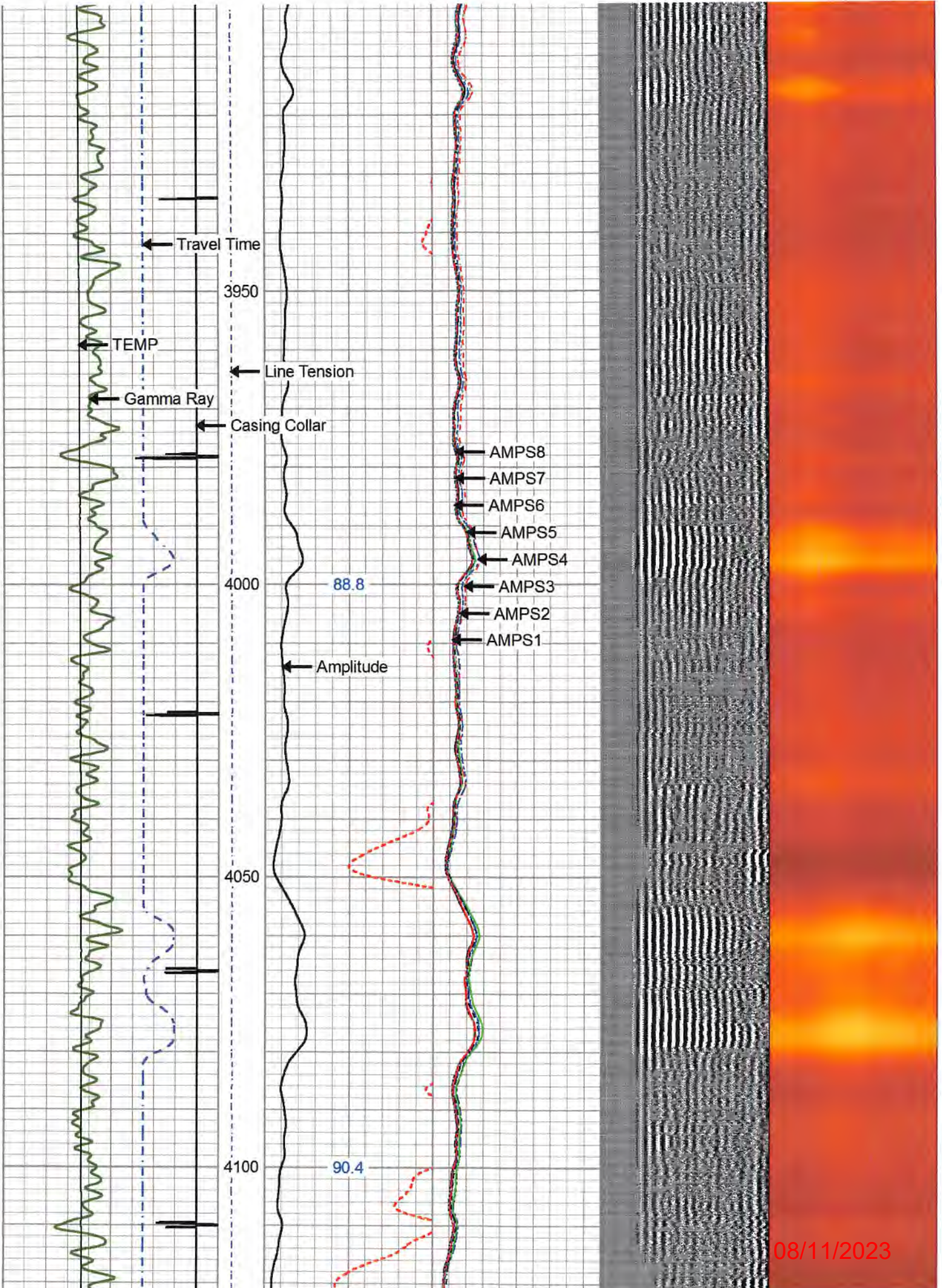




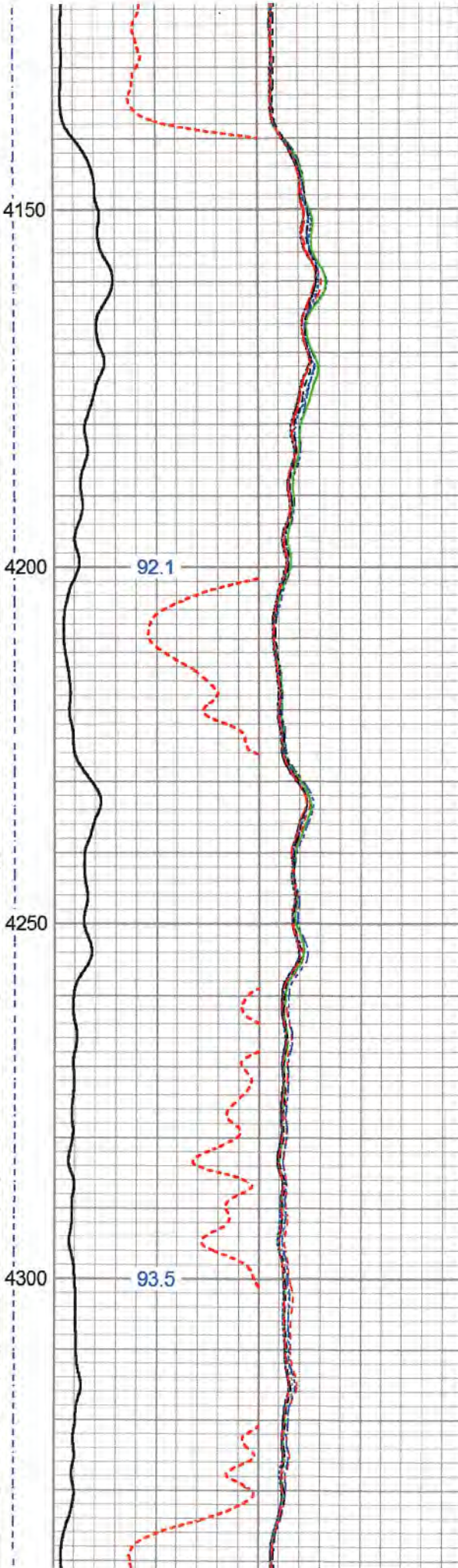
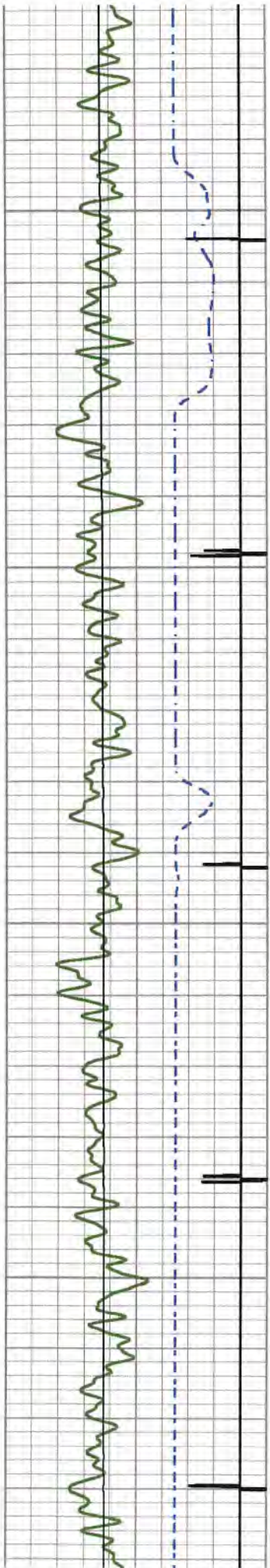


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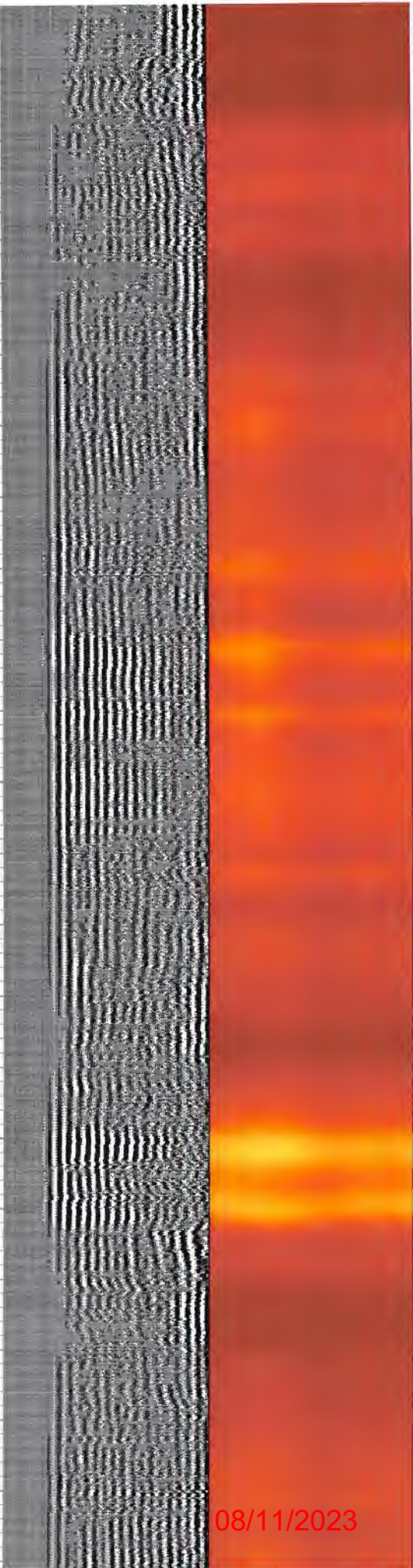
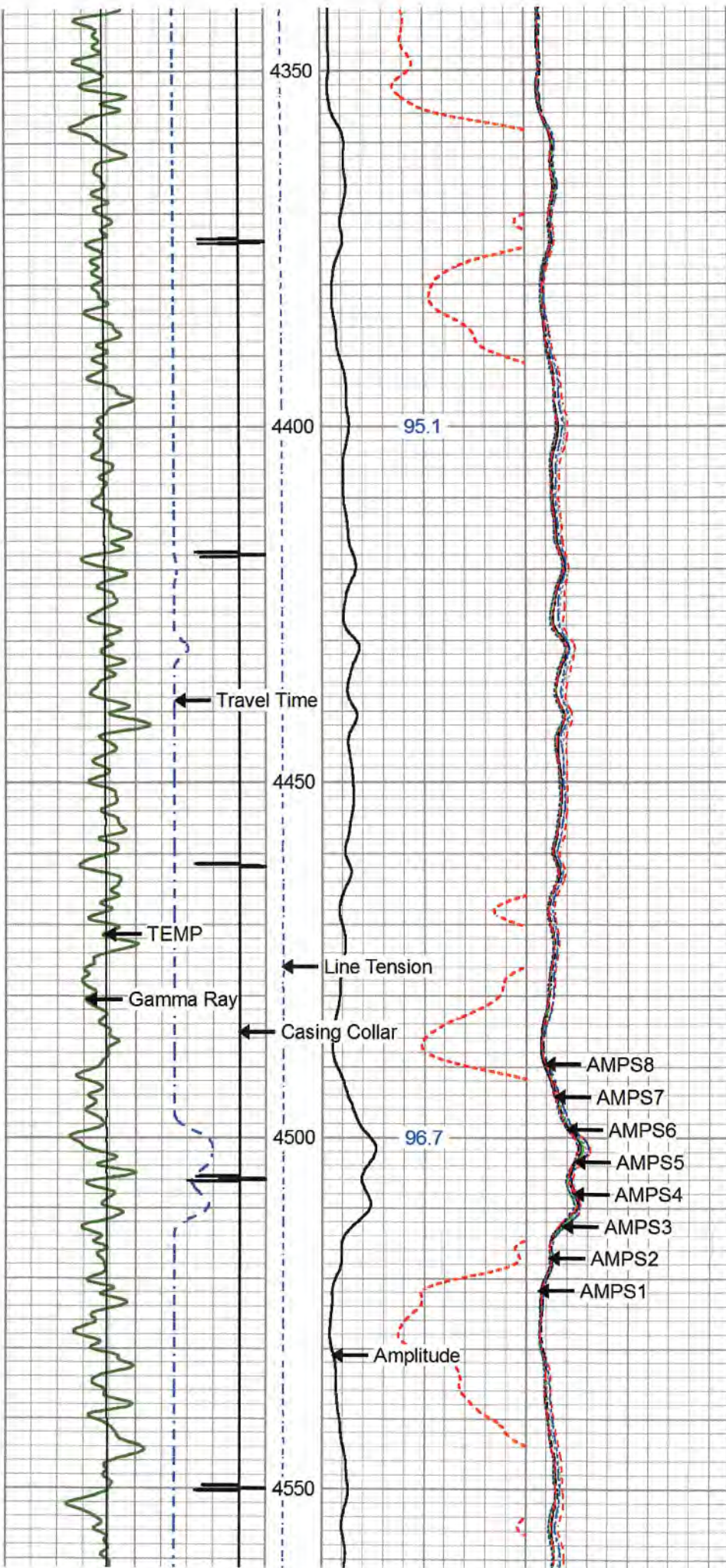






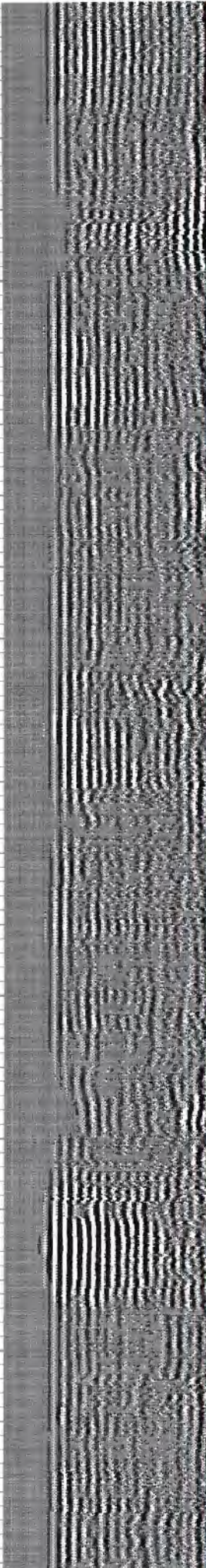
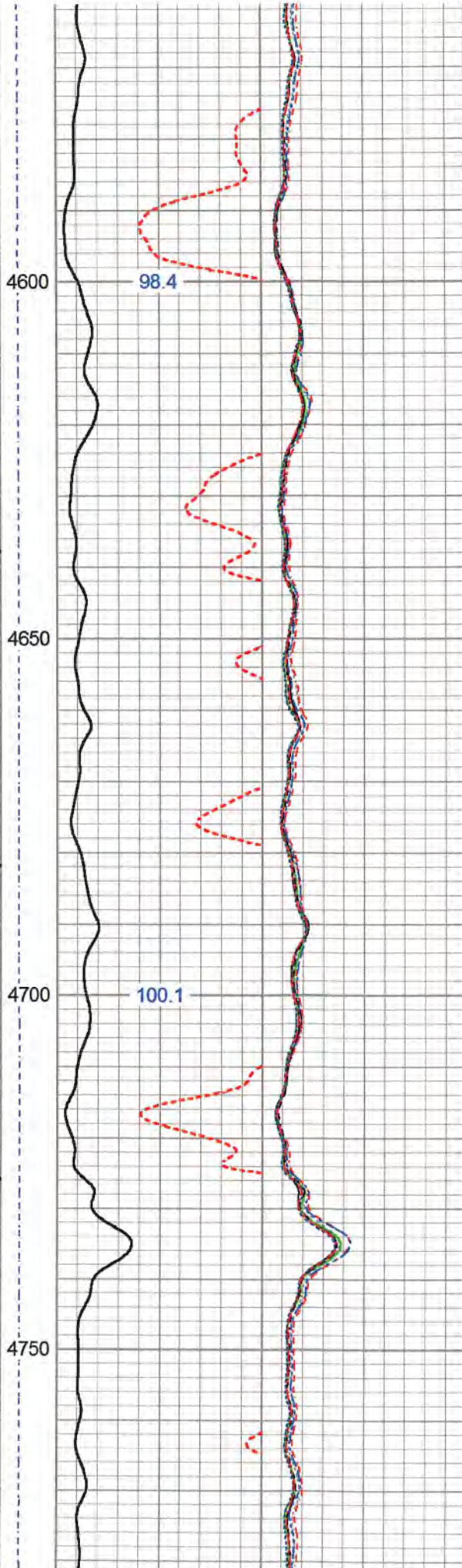
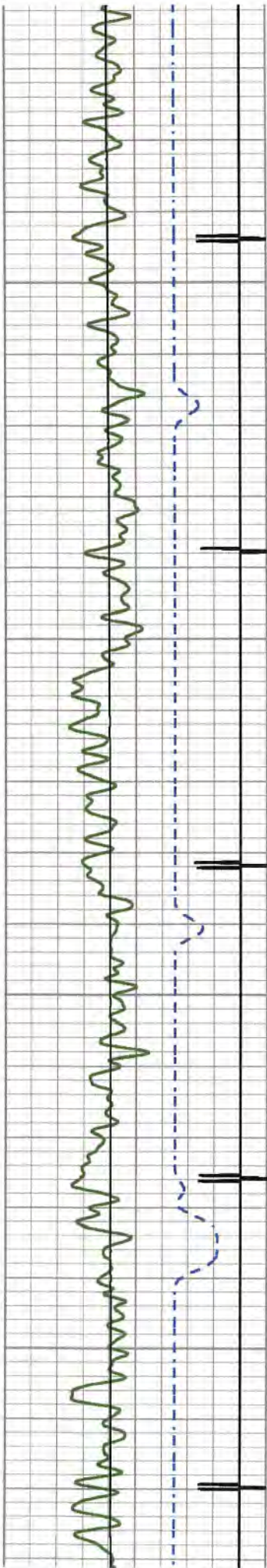
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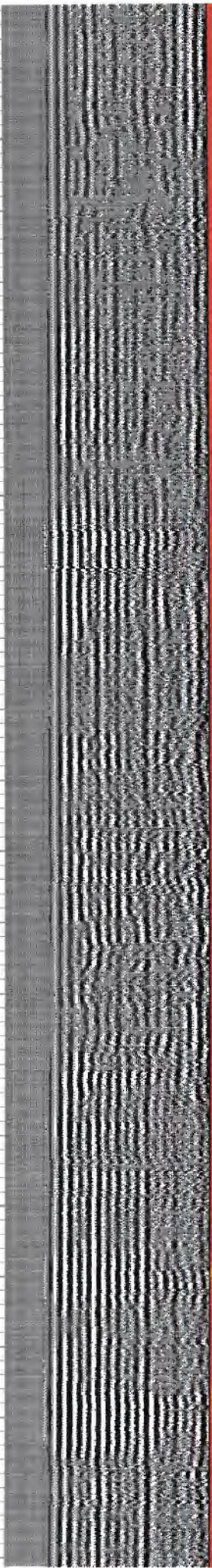
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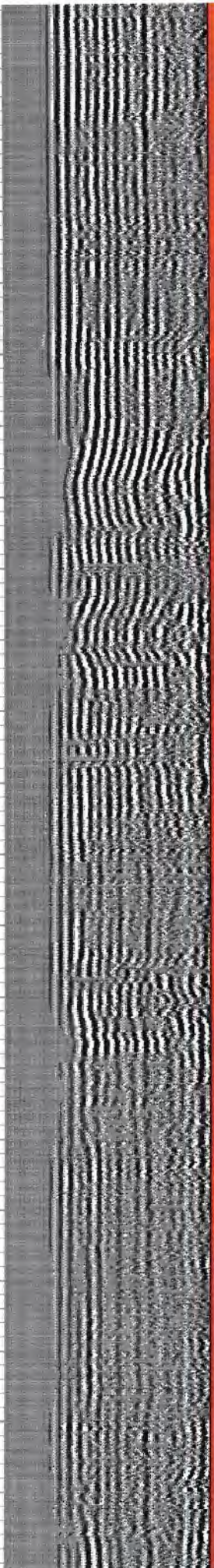
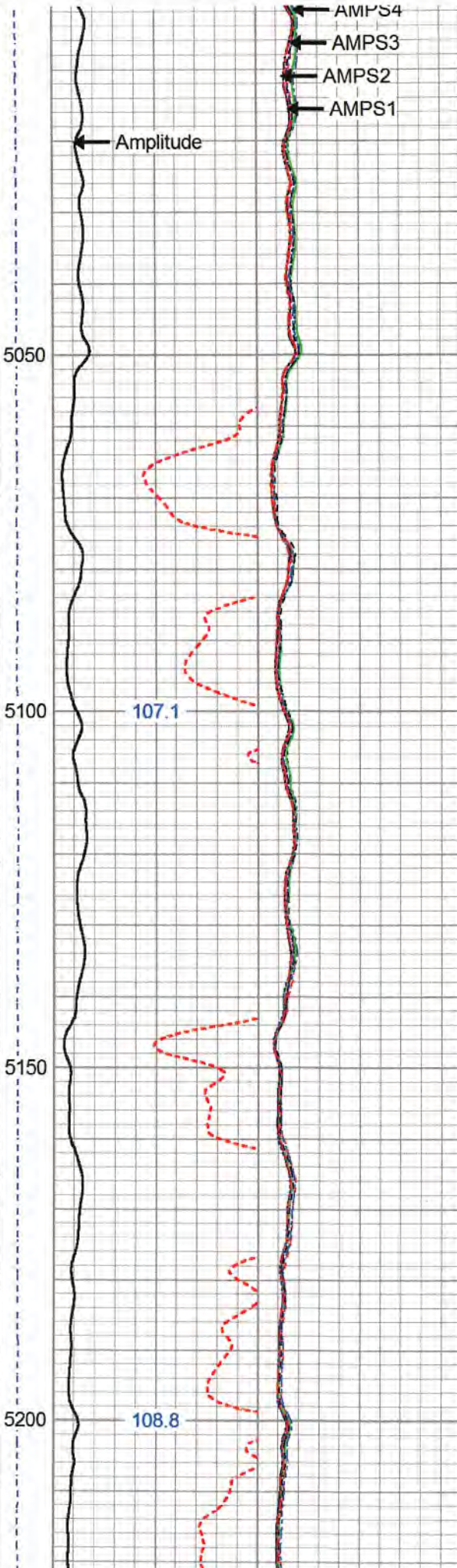
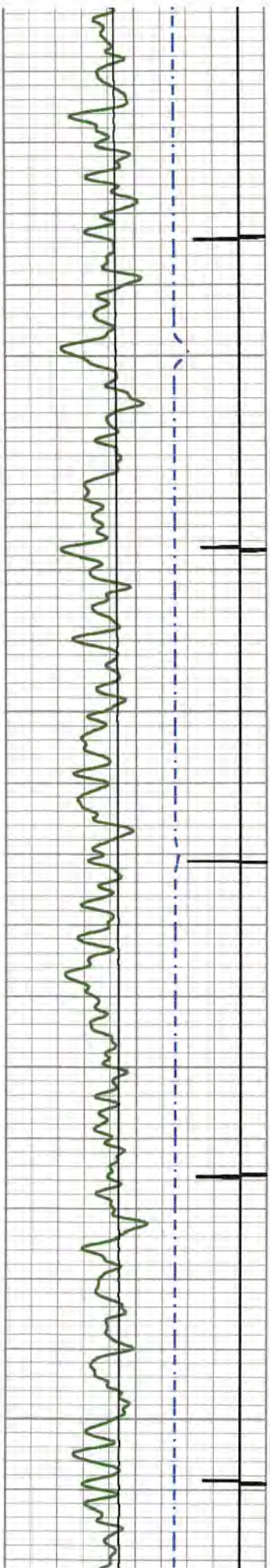
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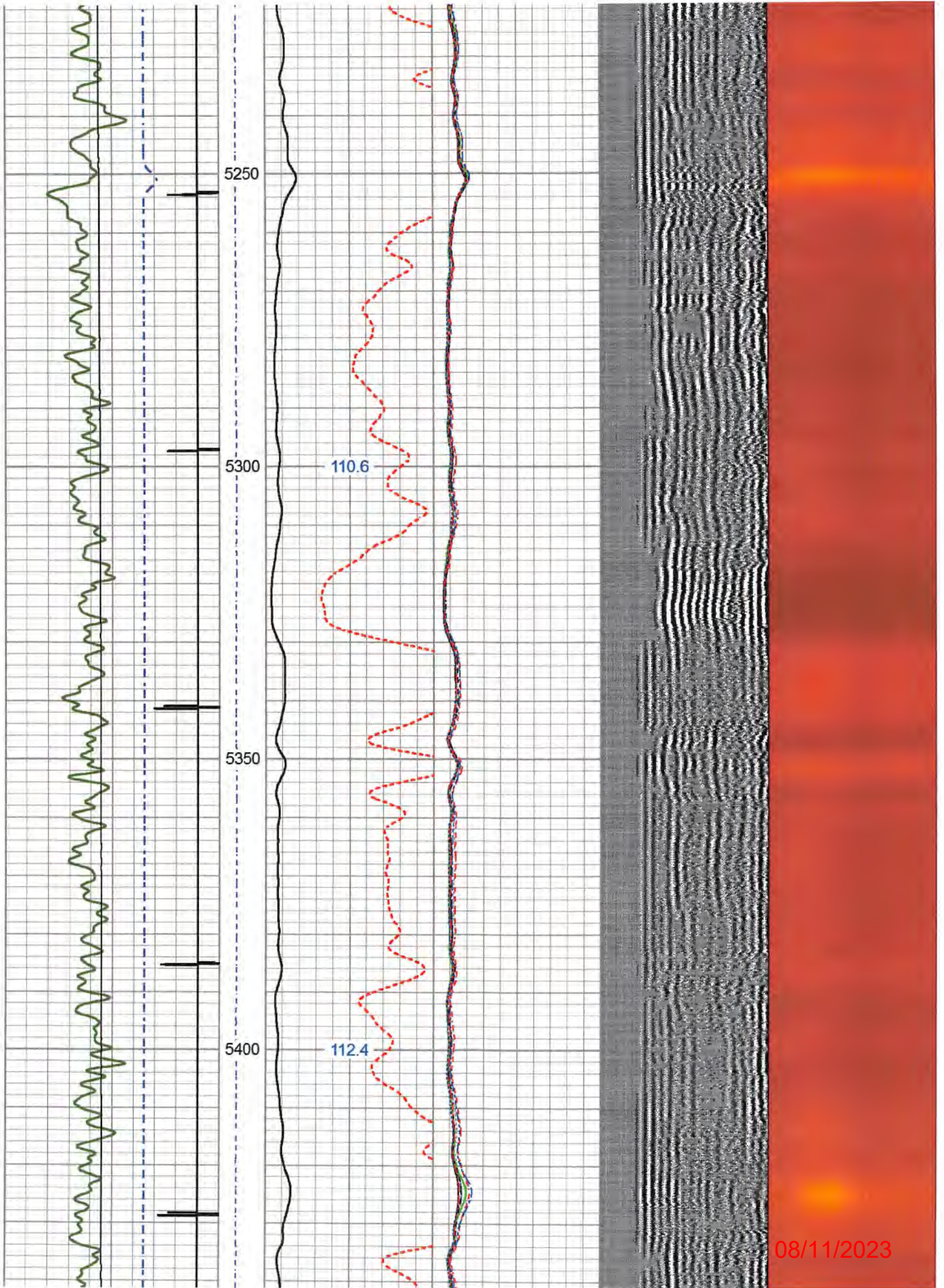
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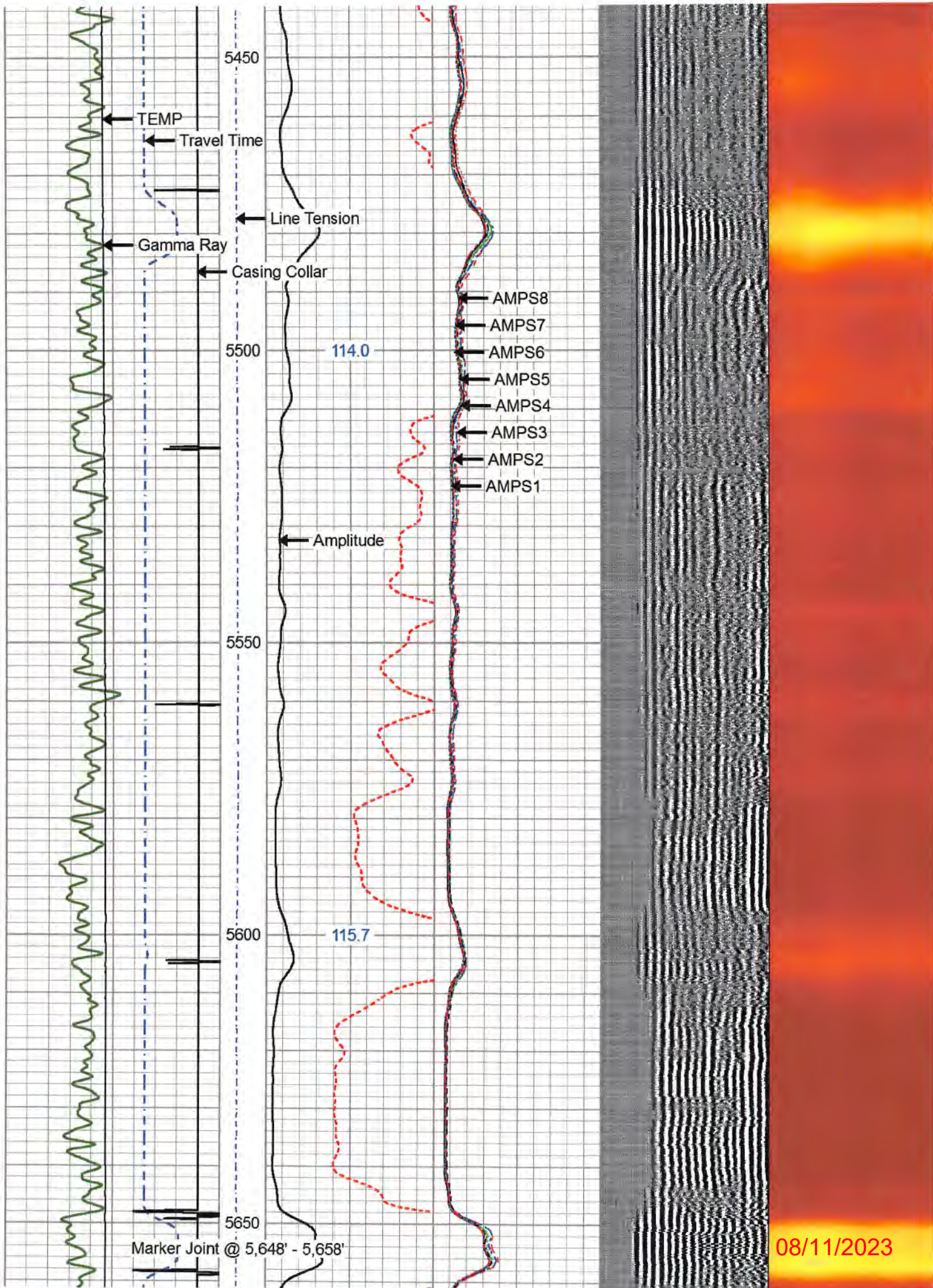


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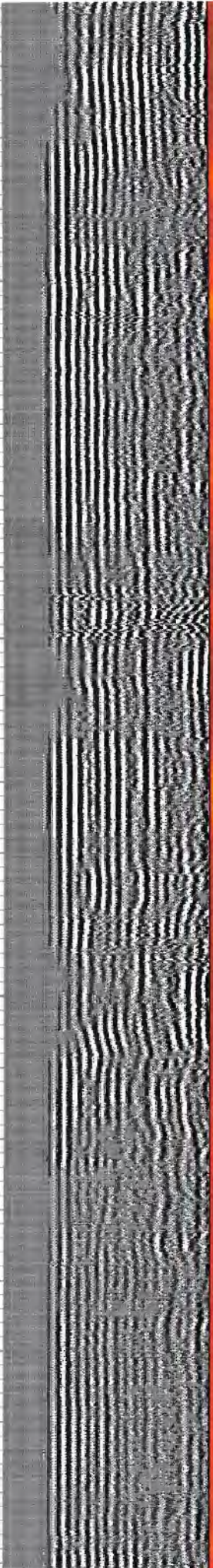
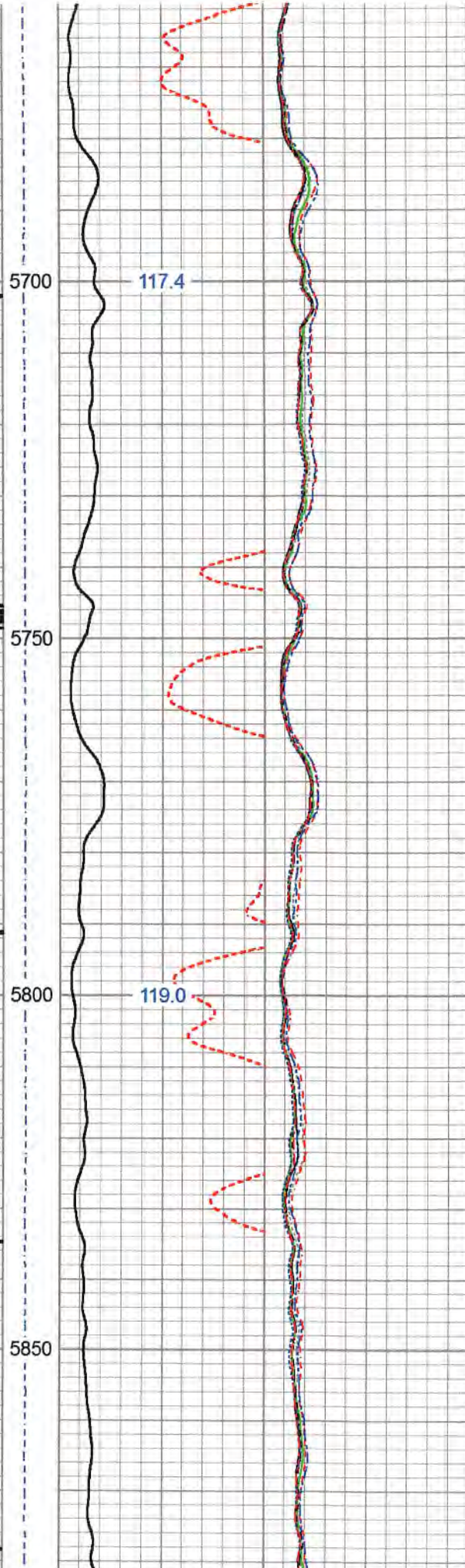
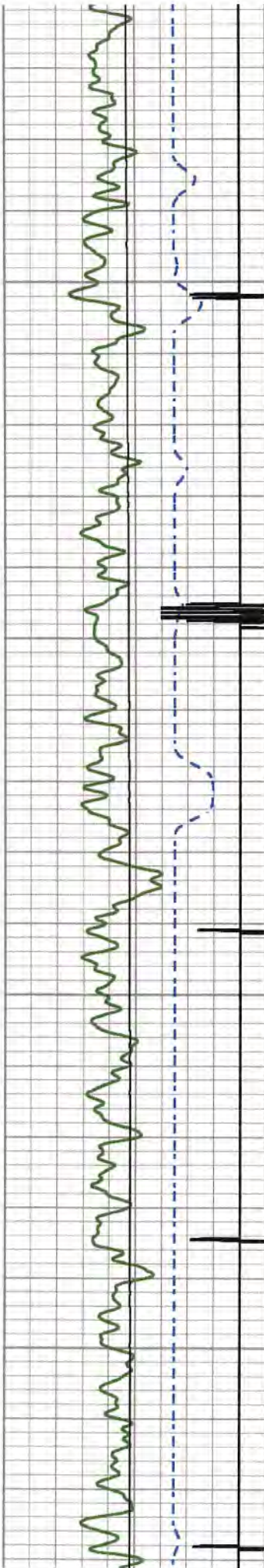






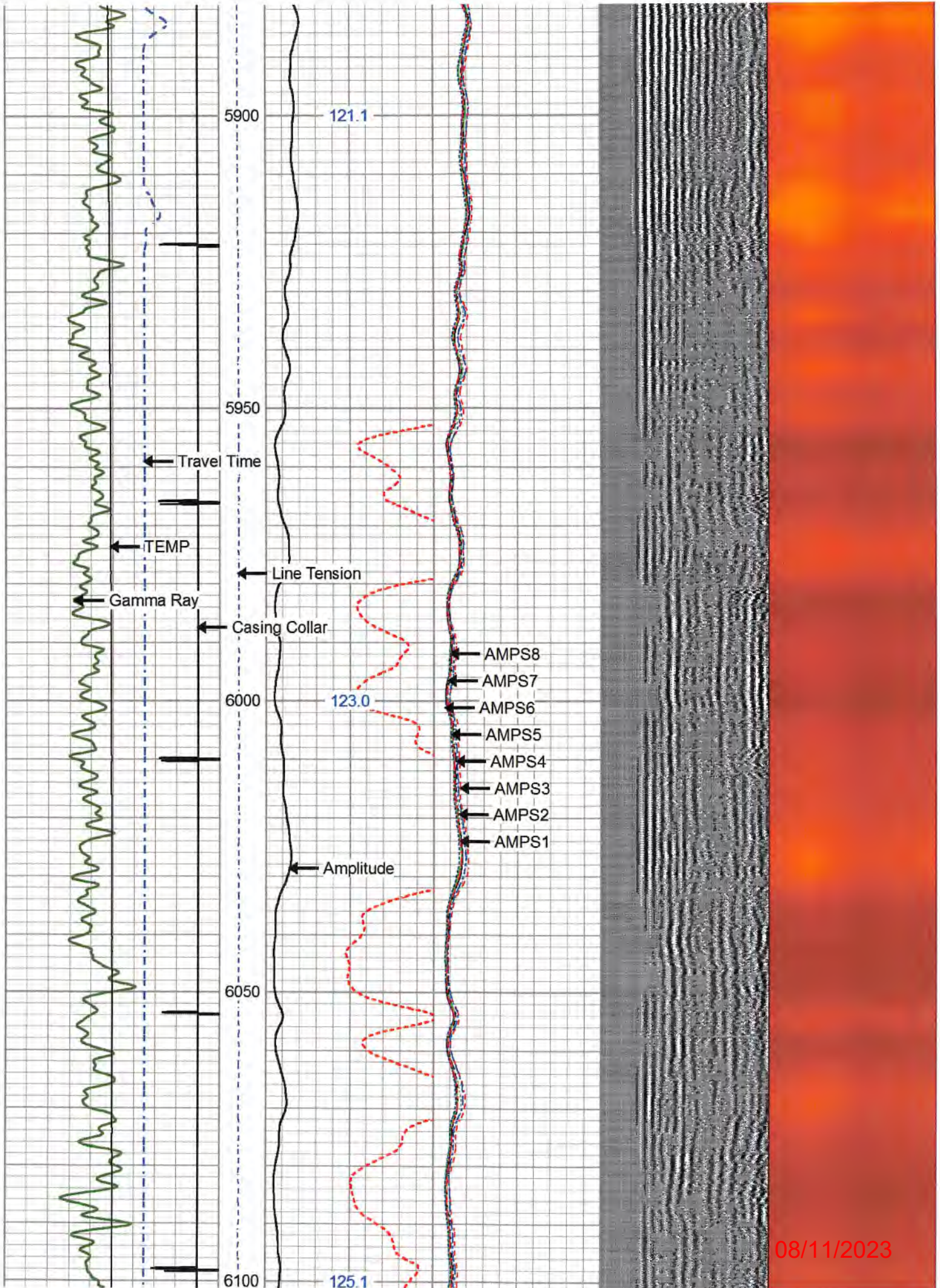




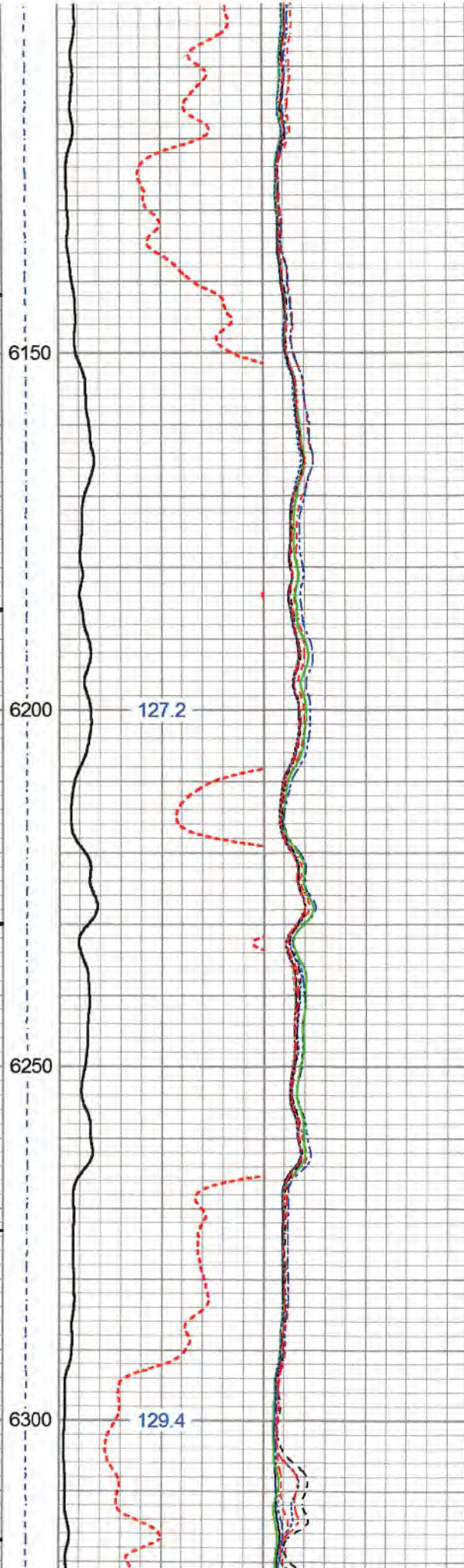
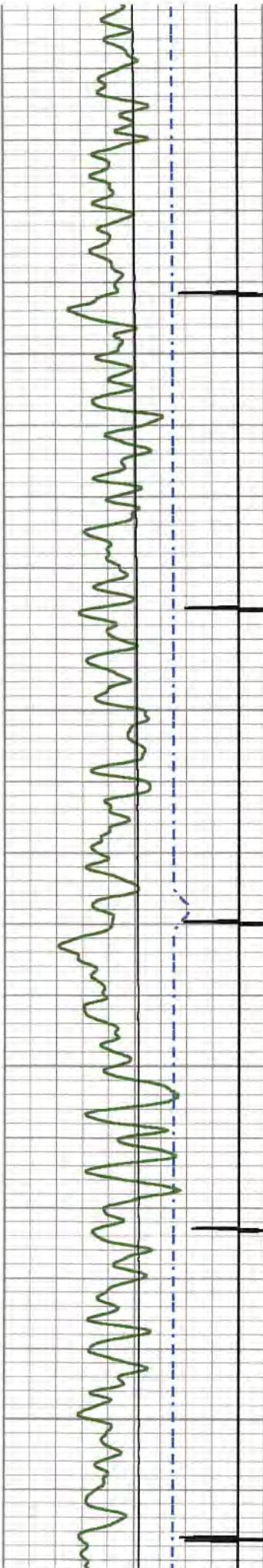


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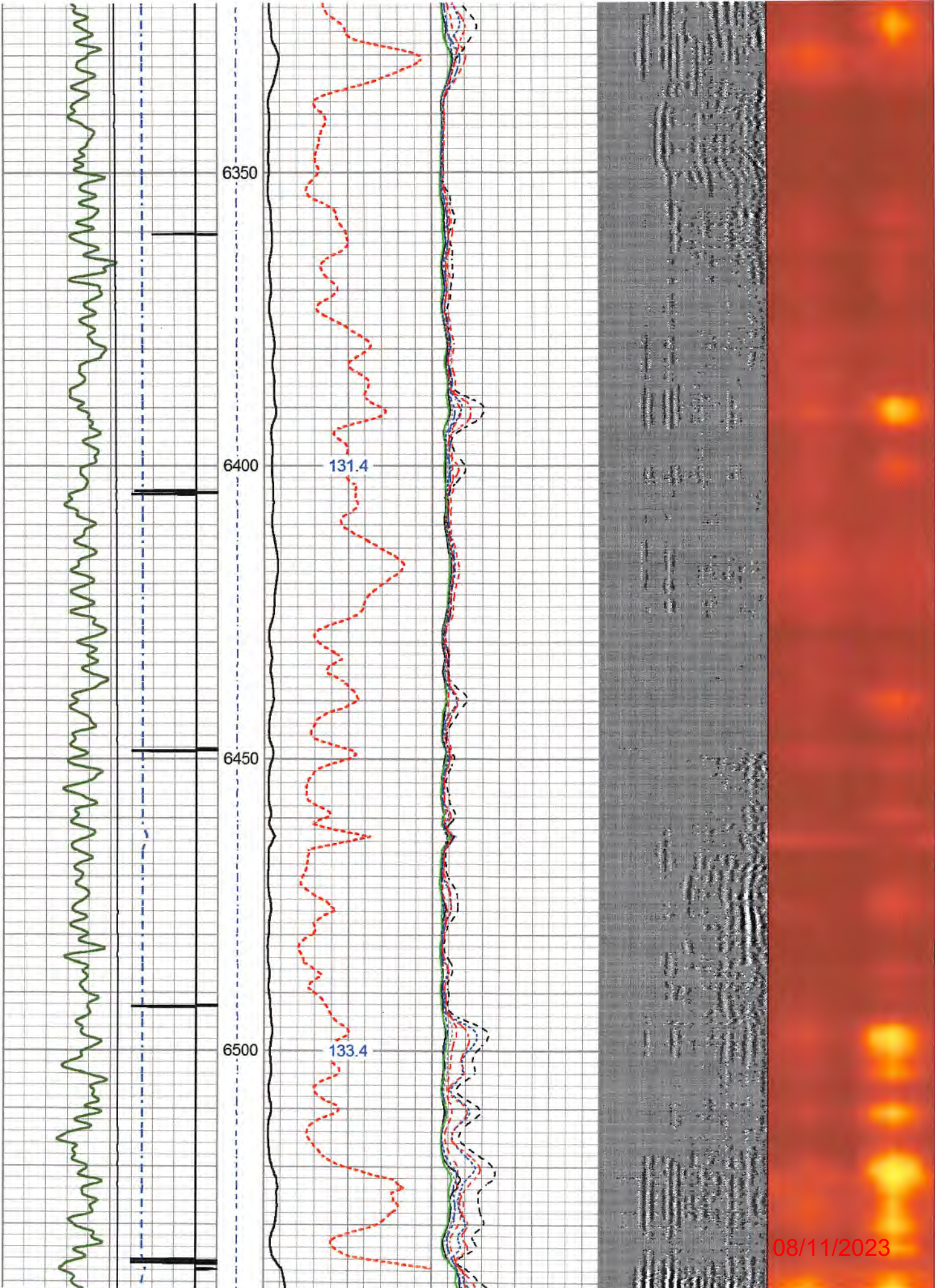






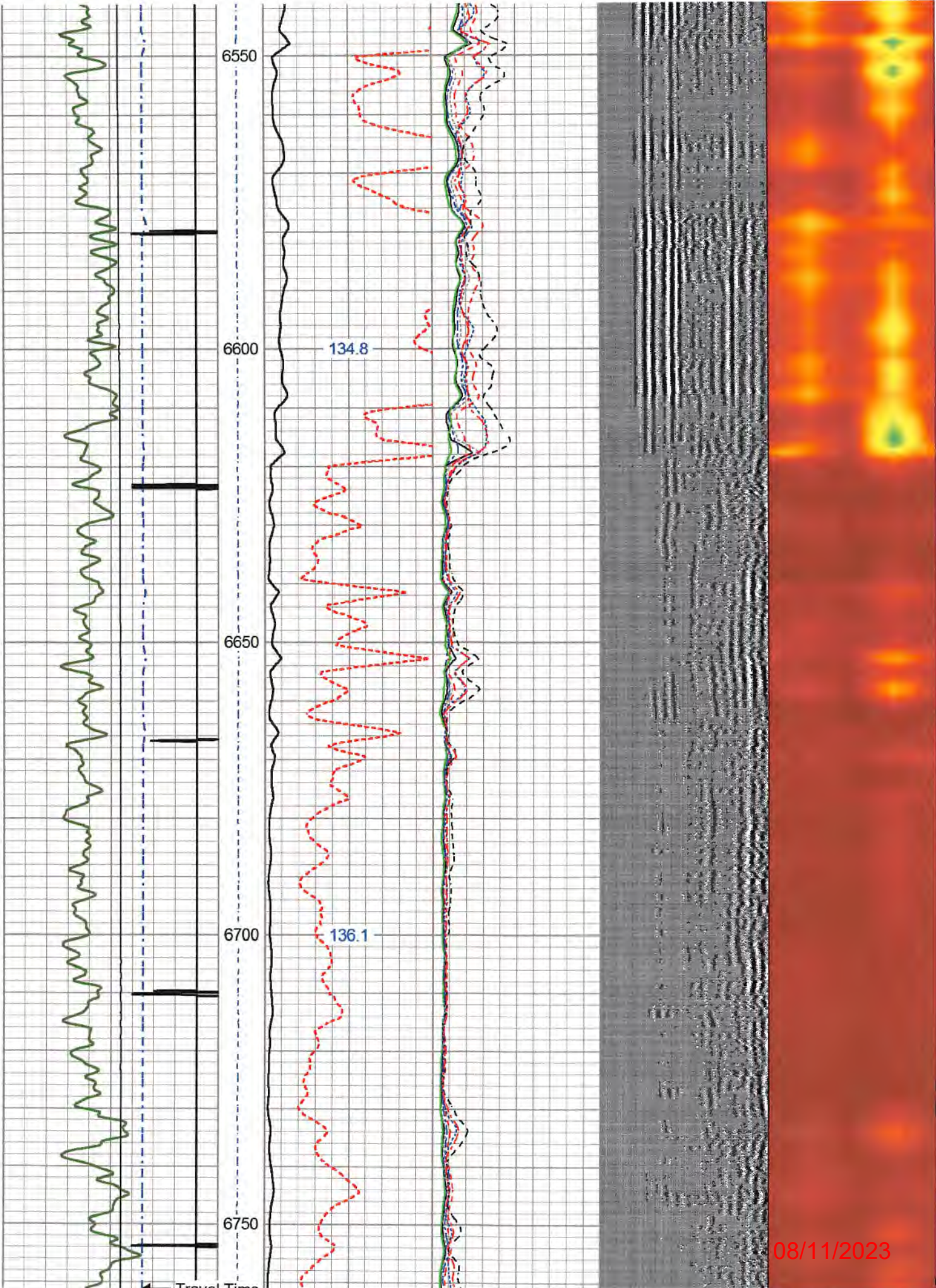
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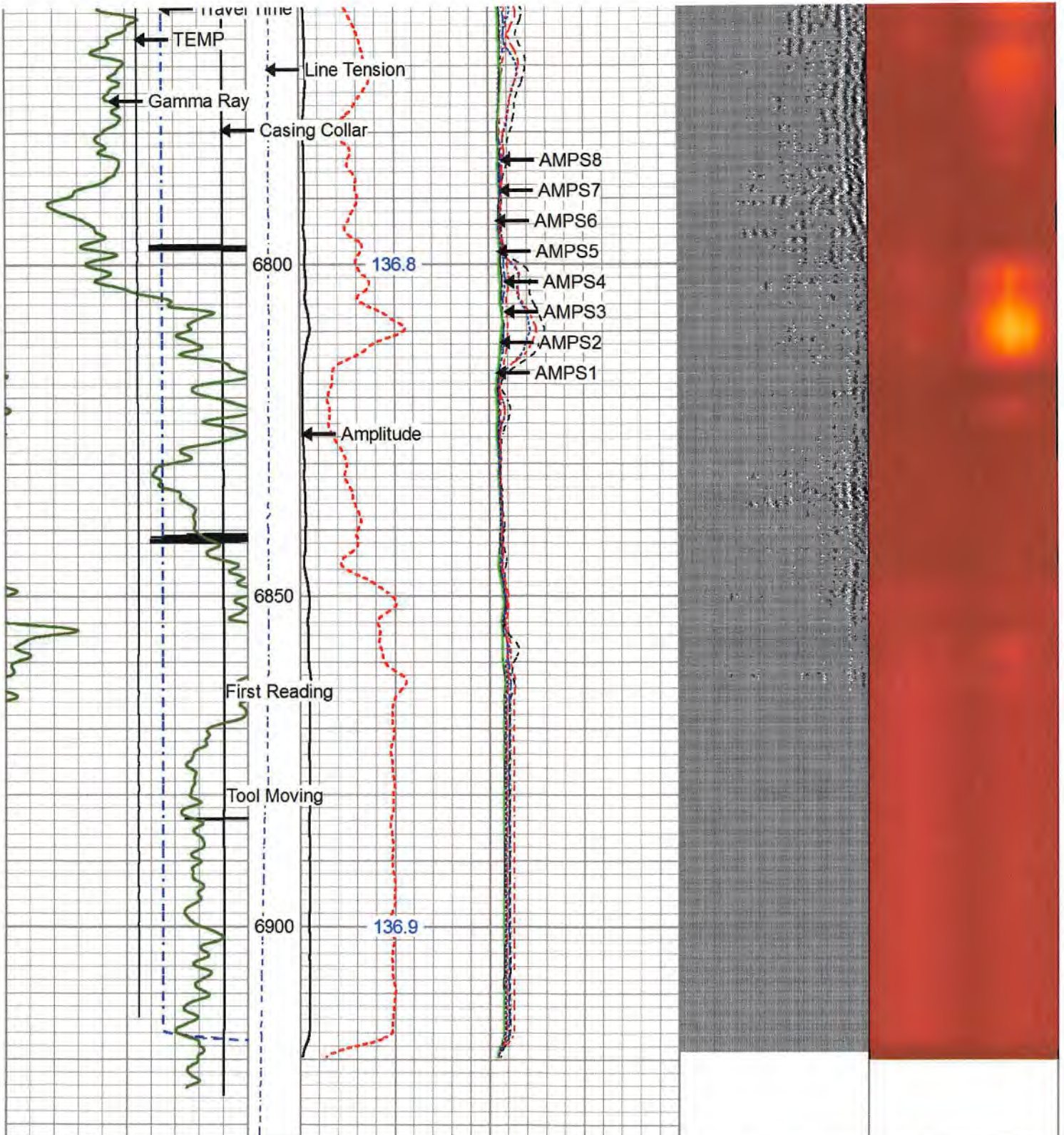
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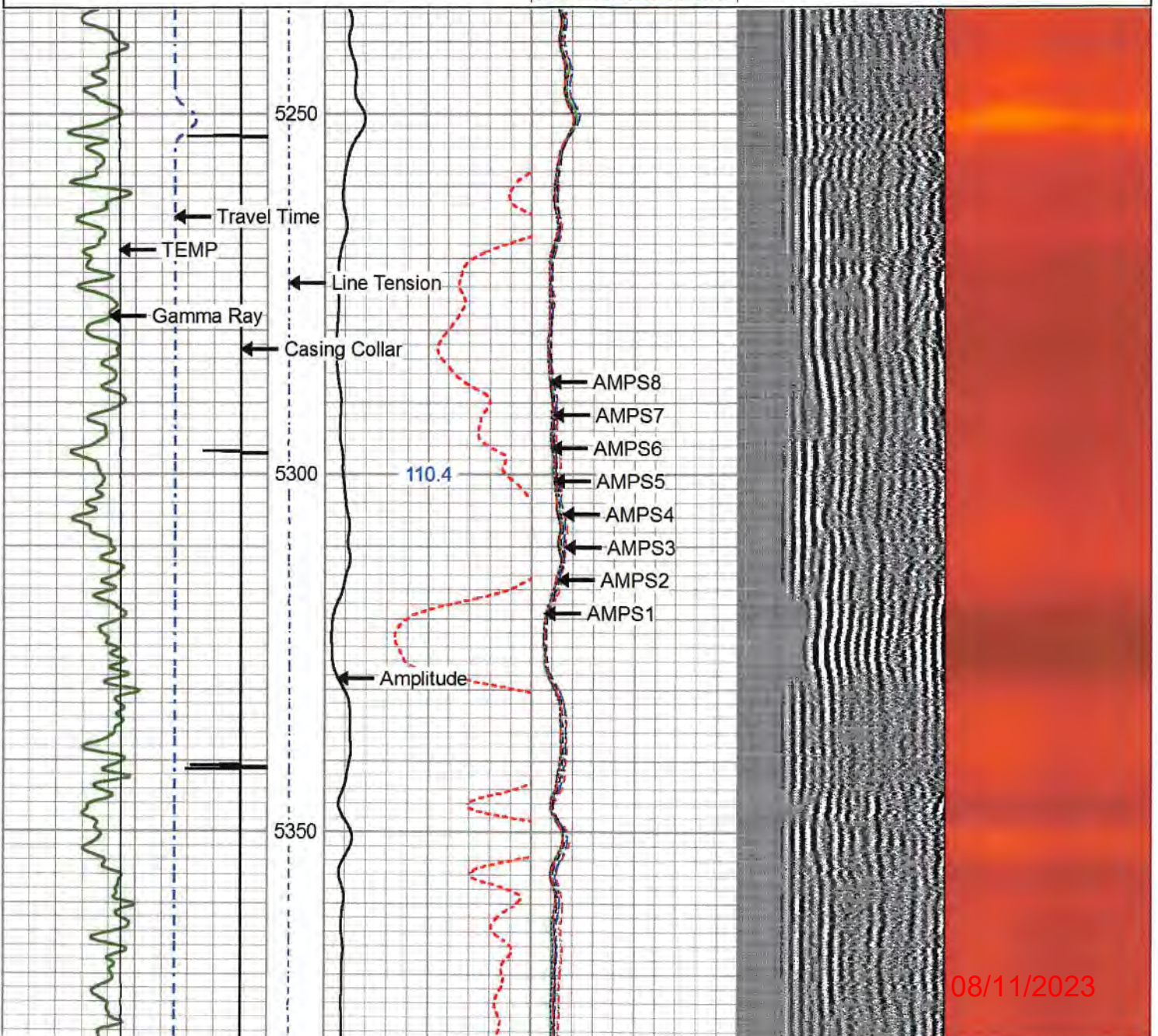
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9	Casing Collar	-1	Amplified Amplitude	0	(mV)	10	-5	AMPS2	150					200
0	Gamma Ray (GAPI)	300	TEMP	0			-5	AMPS3	150					
0	TEMP (degF)	250	TEMP				-5	AMPS4	150					
			(degF)				-5	AMPS5	150					
							-5	AMPS6	150					
							-5	AMPS7	150					
							-5	AMPS8	150					

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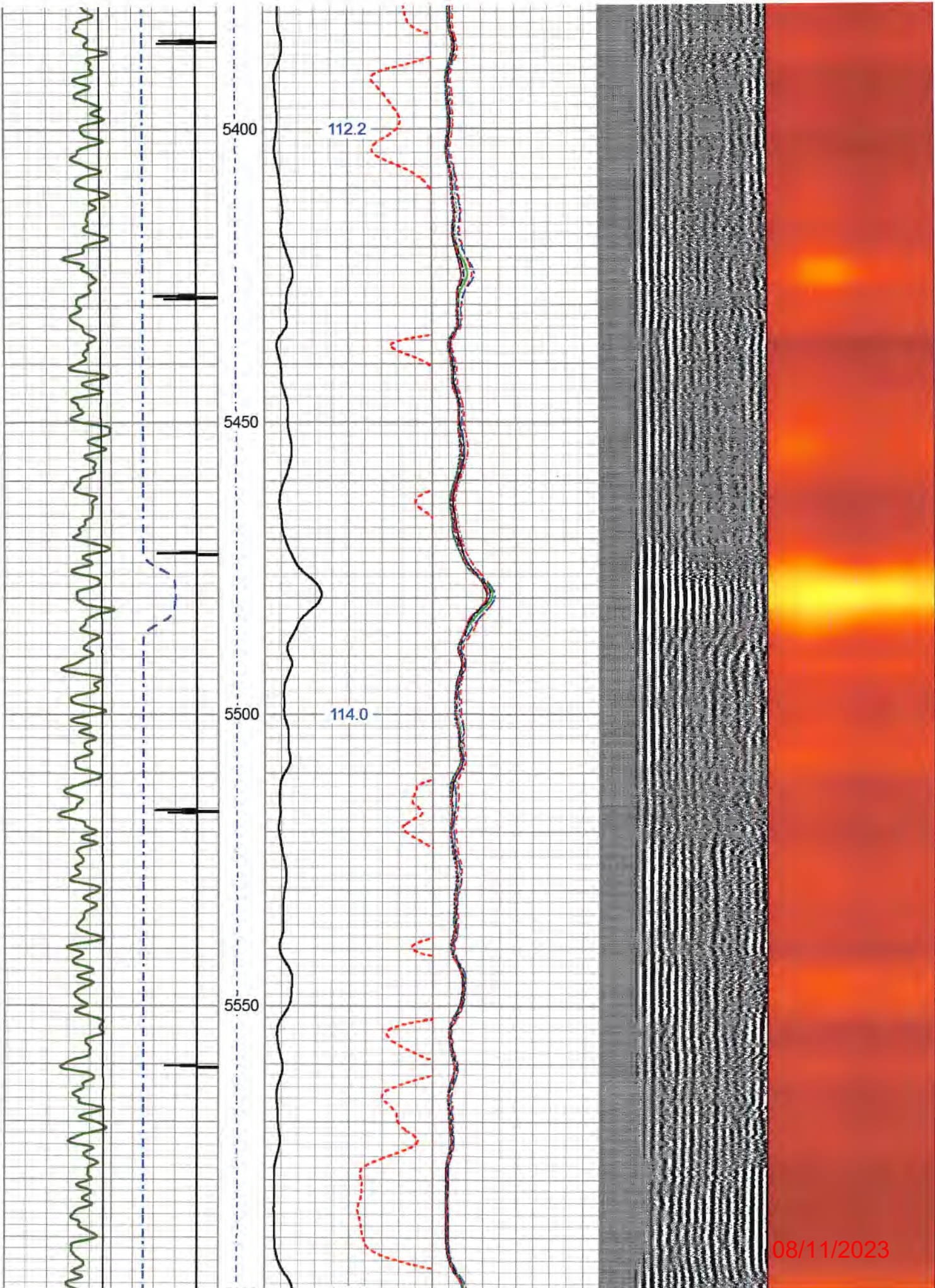


Database File 47-095-02388\_hopper\_unit1h\_rrcbl\_03022018.db  
 Dataset Pathname pass2  
 Presentation Format ahws\_rcbl\_jc  
 Dataset Creation Fri Mar 02 10:25:50 2018  
 Charted by Depth in Feet scaled 1:240

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9	Casing Collar	-1	(lb)	0	Amplified Amplitude		-5	AMPS2	150	200 (V)	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				

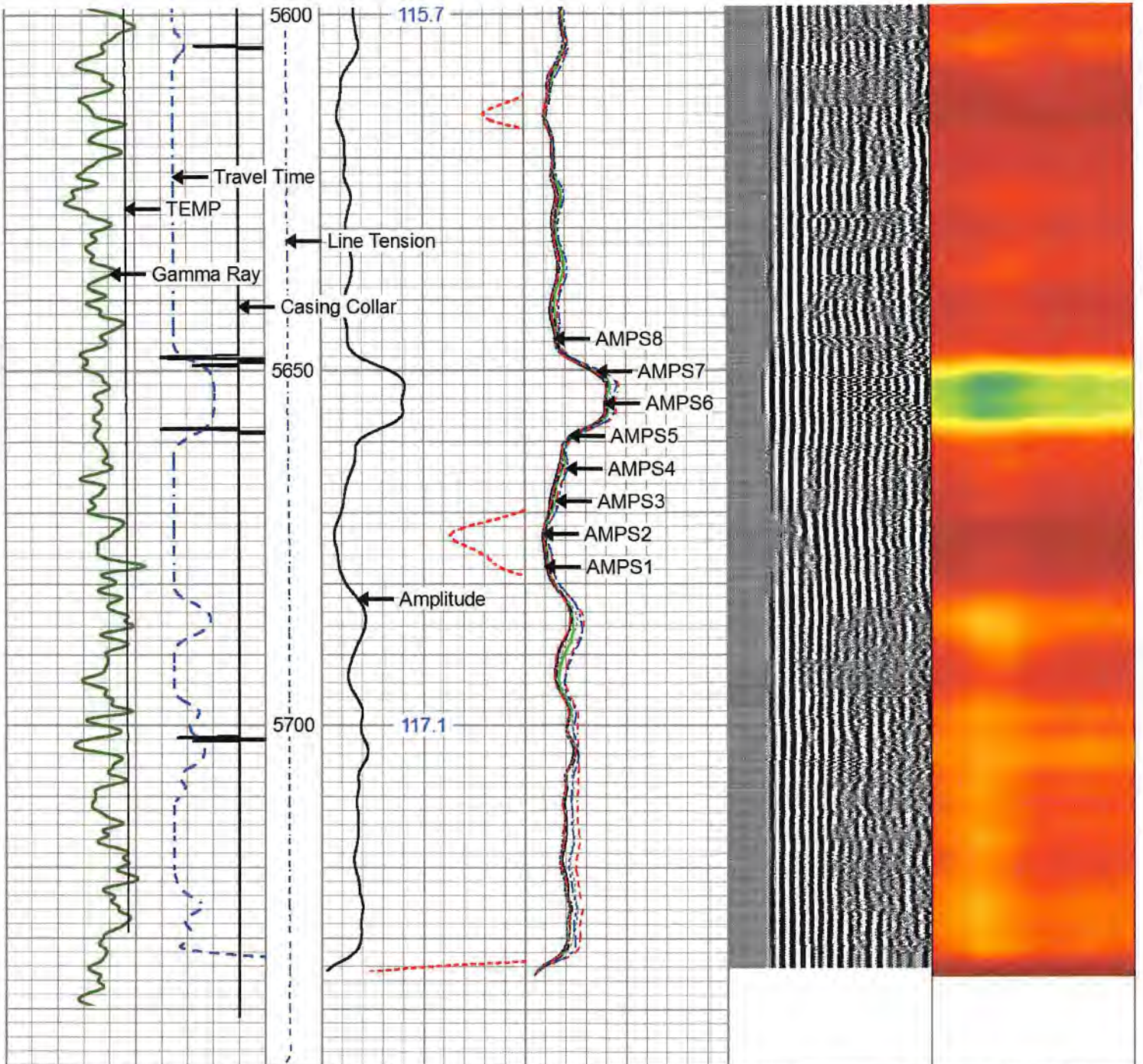






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420	Travel Time (usec)	220	Line Tension (lb)	0	Amplitude (mV)	100	-5	AMPS1	150	Variable Density (V)	1	Cement Map	8
9	Casing Collar	-1	(2500)	0	Amplified Amplitude (mV)	10	-5	AMPS2	150	200	1200	0	100
0	Gamma Ray (GAPI)	300		0	TEMP (degF)		-5	AMPS3	150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

**Log Variables** DatabaseC:\ProgramData\Warrior\Data\47-095-02388\_hopper\_unit1h\_rrcbl\_03022018.db  
 Dataset field/well/run1/passMain/\_vars\_

**Top - Bottom**

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	CASEWGHT	MAXAMPL	MINAMPL
TEMP	7.875	136	5.5	0.415	23	72	1

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MINATTN db/ft 0.8	PERFS 0	PPT usec 260	SRFTEMP degF 30	TDEPTH ft 6865
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**Variable Description**

BHTEMP_Src : BHTEMP Input Source Selector	MINAMPL : Minimum Amplitude
BOREID : Borehole I.D.	MINATTN : Minimum Attenuation
BOTTEMP : Bottom Hole Temperature	PERFS : Perforation Flag
CASEOD : Casing O.D.	PPT : Predicted Pipe Time
CASETHCK : Casing Thickness	SRFTEMP : Surface Temperature
CASEWGHT : Casing Weight	TDEPTH : Total Depth
MAXAMPL : Maximum Amplitude	

**Calibration Report**

Database File 47-095-02388\_hopper\_unit1h\_rrcbl\_03022018.db  
Dataset Pathname passMain  
Dataset Creation Fri Mar 02 12:23:35 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

**Segmented Cement Bond Log Calibration Report**

Serial Number: FW1406-126  
Tool Model: RBTC3 Temp

Calibration Casing Diameter: 5.500 in  
Calibration Depth: 329.767 ft

Master Calibration, performed Wed Feb 28 15:10:44 2018:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3'	-0.001	0.303	1.000	71.921	233.037	1.296
CAL	-0.001	0.459				
5'	-0.002	0.261	1.000	71.921	269.474	1.658
SUM						
S1	-0.004	0.304	0.000	100.000	325.015	1.226
S2	-0.002	0.324	0.000	100.000	306.140	0.751
S3	-0.002	0.332	0.000	100.000	299.196	0.628
S4	-0.005	0.326	0.000	100.000	301.776	1.507
S5	-0.003	0.303	0.000	100.000	326.050	1.130
S6	-0.005	0.285	0.000	100.000	344.317	1.732
S7	-0.010	0.278	0.000	100.000	346.517	3.562
S8	-0.006	0.285	0.000	100.000	342.747	2.222

Internal Reference Calibration, performed (Not Performed):

08/11/2023

Raw (v)	Calibrated (v)	Results
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	Zero	Cal	Zero	Cal	Gain	Offset
CAL	0.000	0.000	-0.001	0.459	1.000	0.000

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

	Raw (v)	Calibrated (v)	Results
	Zero	Zero	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

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						
WVFS8	15.12			RBT-RBTC3 Temp (FW1406-126) Probe 2.75" Corrosion RCBL With Integral Temp Sub	9.39	2.75	90.00
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	

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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: 47-095-02388\_hopper\_unit1h\_rrcbl\_03022018.db: field/well/run1/passMain  
 Total length: 24.15 ft  
 Total weight: 263.00 lb  
 O.D.: 2.75 in

	Company	Antero Resources Corporation	
	Well	Hopper Unit 1H	
	Field	Mountain	
	County	Tyler	
	State	West Virginia	Country

Gas  
 07 2023  
 Department of Environmental Protection