



**RADIAL CEMENT BOND LOG  
VARIABLE DENSITY LOG  
GAMMA/CCL/TEMP**

Company ANTERO RESOURCES  
Well Beech Run Crystal 1H  
Field Rabbit Ears  
County Tyler  
State WV

Company ANTERO RESOURCES  
Well Beech Run Crystal 1H  
Field Rabbit Ears  
County Tyler State WV

Location: API #: 47-095-02799

SEC	TWP	RGE	Other Services
Permanent Datum	GROUND LEVEL	Elevation	K.B.
Log Measured From	KELLY BUSHING 25.5'	Elevation	D.F.
Drilling Measured From	KELLY BUSHING	Elevation	G.L.

Date JANUARY 19, 2023

Run Number	ONE
Depth Driller	17,806'
Depth Logger	6,925'
Bottom Logged Interval	6,985'
Top Log Interval	SURFACE
Open Hole Size	NA
Type Fluid	FRESH WATER
Density / Viscosity	8.6 LB/GAL
Max. Recorded Temp.	141 DEG.F.
Estimated Cement Top	1,884'
Time Well Ready	10:30
Time Logger on Bottom	11:10
Equipment Number	116
Location	CHARLEROI, PA
Recorded By	M.MCNALLY
Witnessed By	Bob Reed

Borehole Record		Tubing Record					
Run Number	Bit	From	To	Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Conductor String	28"		SURFACE	125.5'
Surface String	17 1/2"		SURFACE	992'
Intermediate String	12 1/4"		SURFACE	3,368'
Intermediate String	8 3/4"		SURFACE	6,021'
Production String	5.5"	20#	SURFACE	17,806'

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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 CORRELATED TO MARKER JOINT  
DEPTH SHIFT -8'  
MARKER JOINT 5,825'-5,835'  
MAIN PASS LOGGED WITH 1500 PSI  
REPEAT PASS LOGGED WITH 0 PSI  
  
THANK YOU FOR USING NINE ENERGY SERVICES

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Environmental Protection

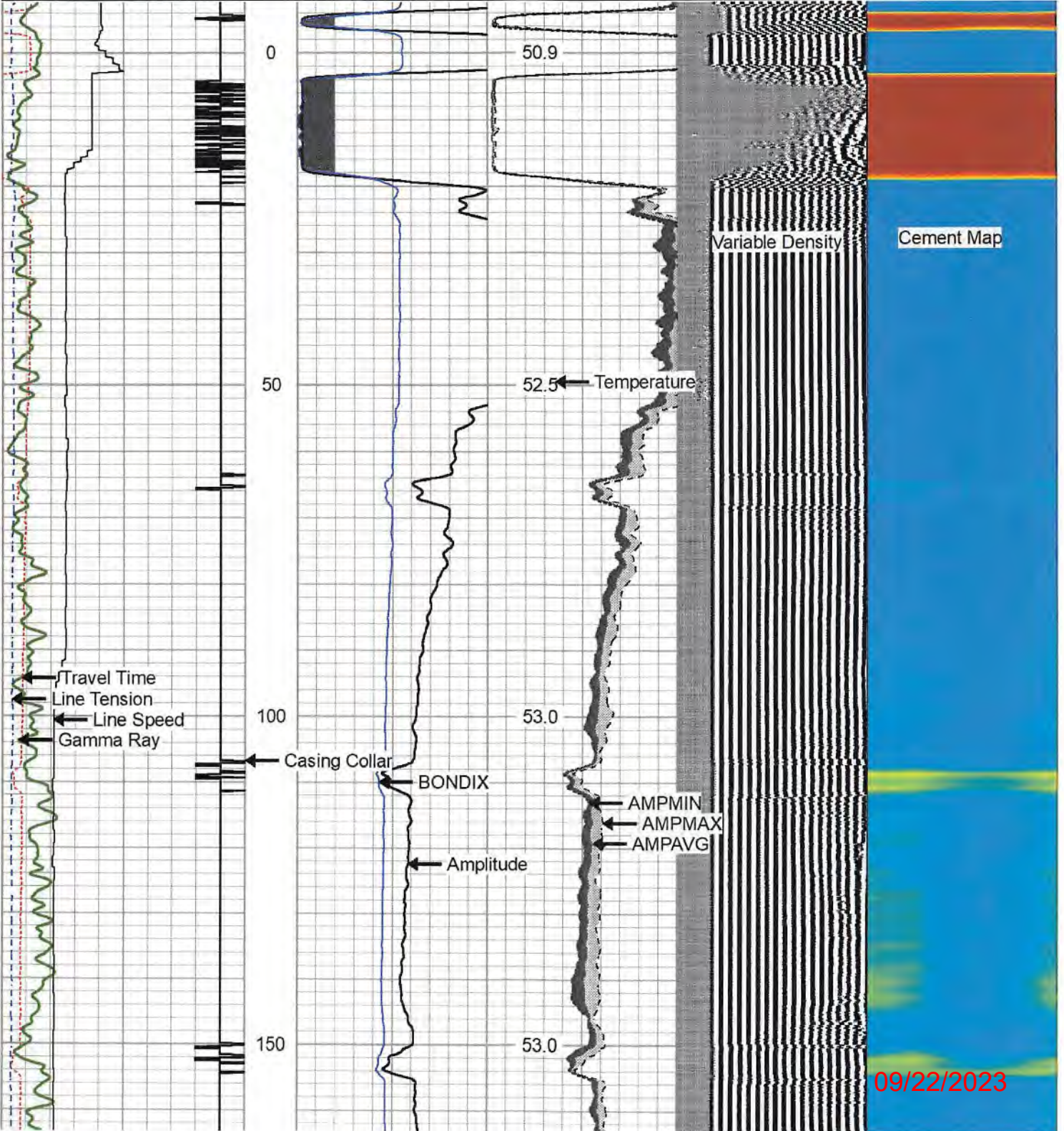


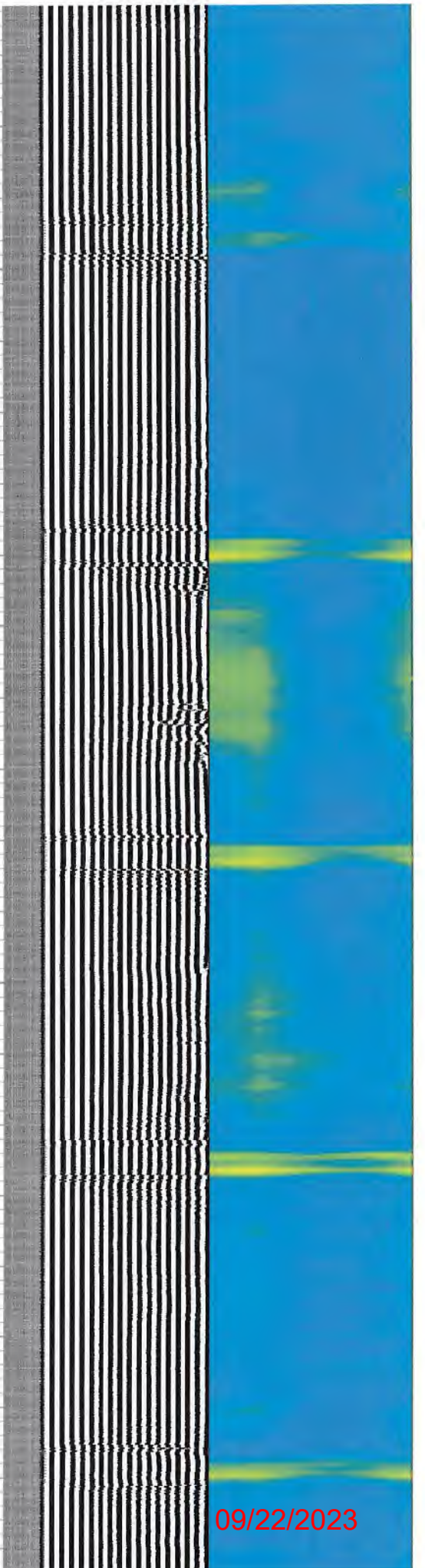
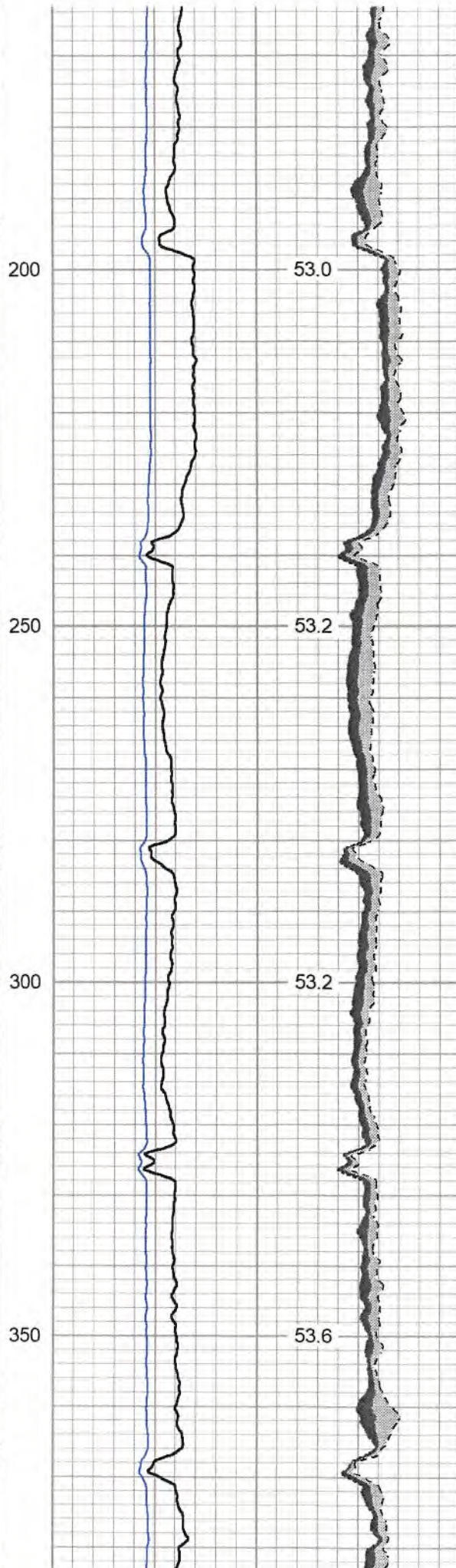
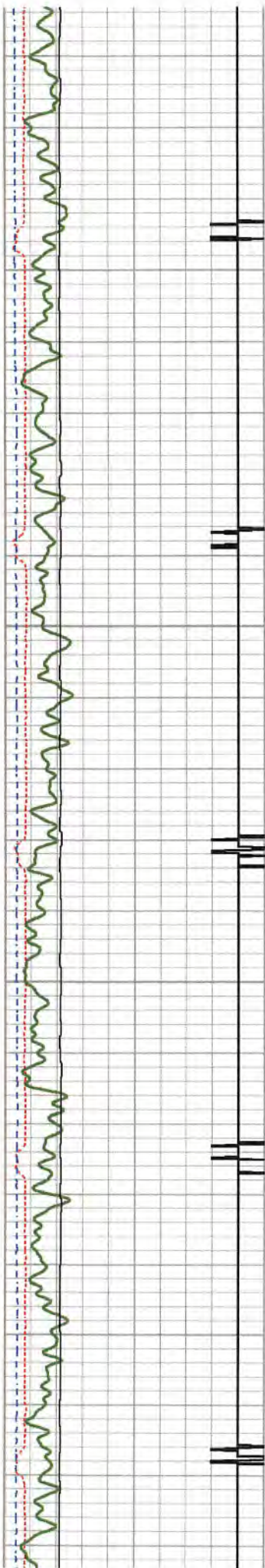
**Main Pass 1,500 PSI**

4

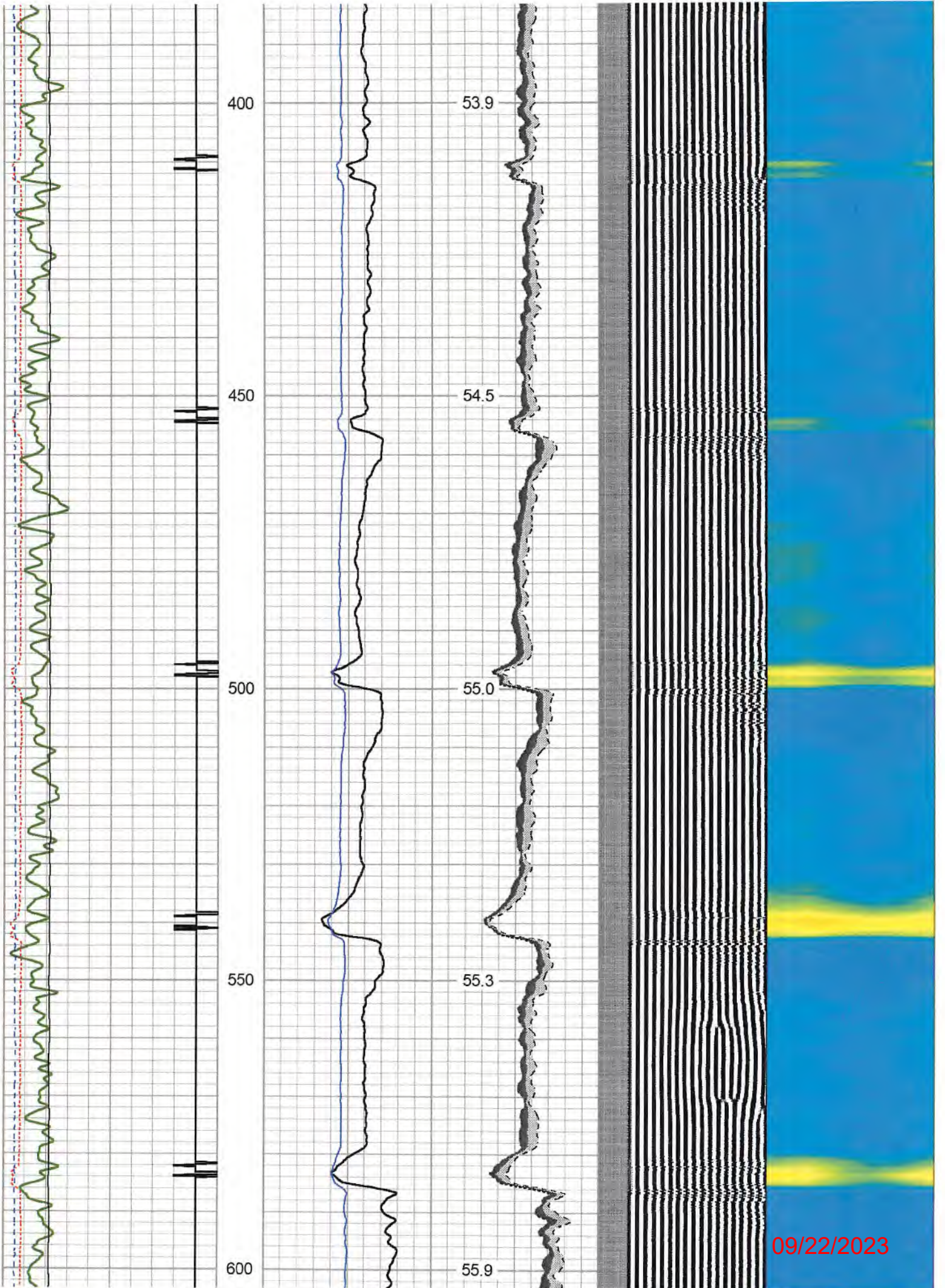
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 Dataset Pathname crystal1h/rcbl/pass6  
 Presentation Format rcbl 2  
 Dataset Creation Thu Jan 19 10:57:21 2023  
 Charted by Depth in Feet scaled 1:240

270	Travel Time (usec)	160	0	Amplitude (mV)	100	-5	AMPMIN	150	Variable Density	1	Cement Map	8
9	Casing Collar	-1	1	BONDIX	0	-5	AMPMAX	150	200	(usec)	1200	
0	Gamma Ray (GAPI)	150				-5	AMPAVG	150				
	Line Speed						TEMP					
-200	(ft/min)	200					(degF)					
0	Line Tension (lb)	5000										

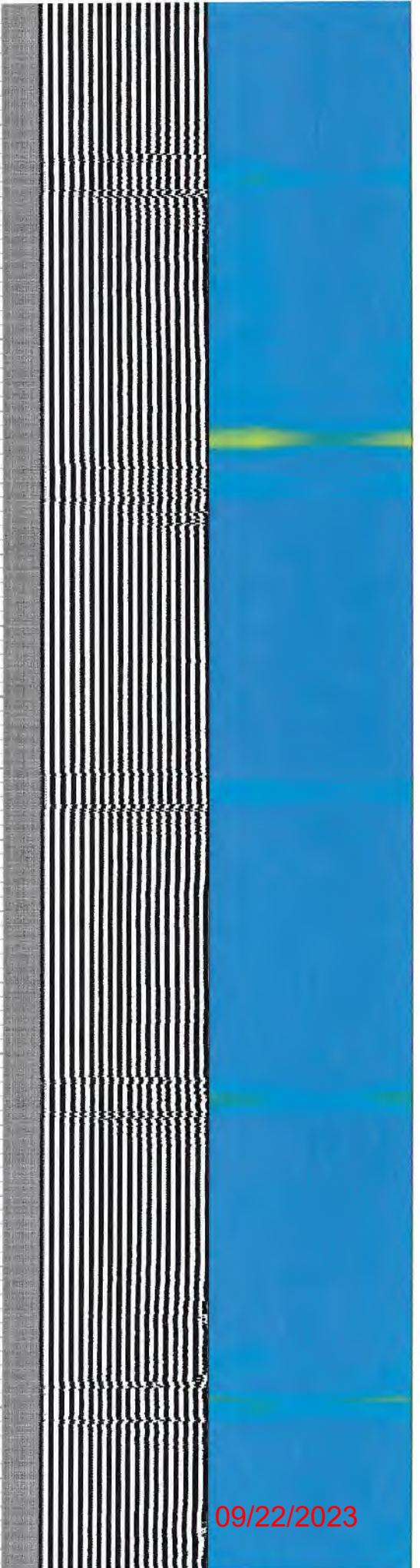
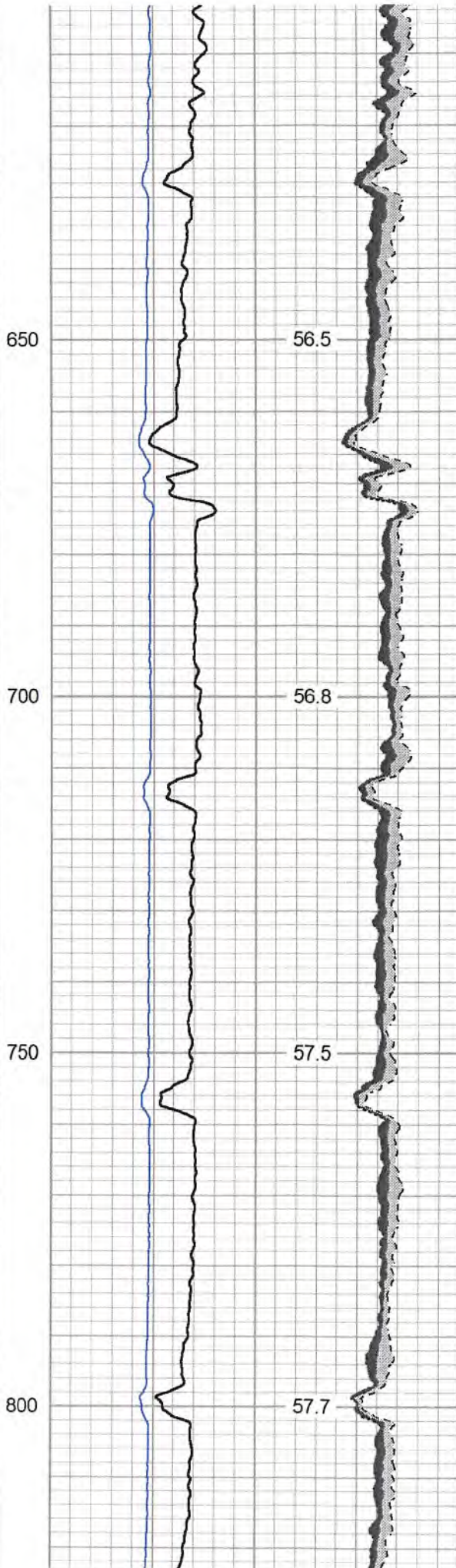
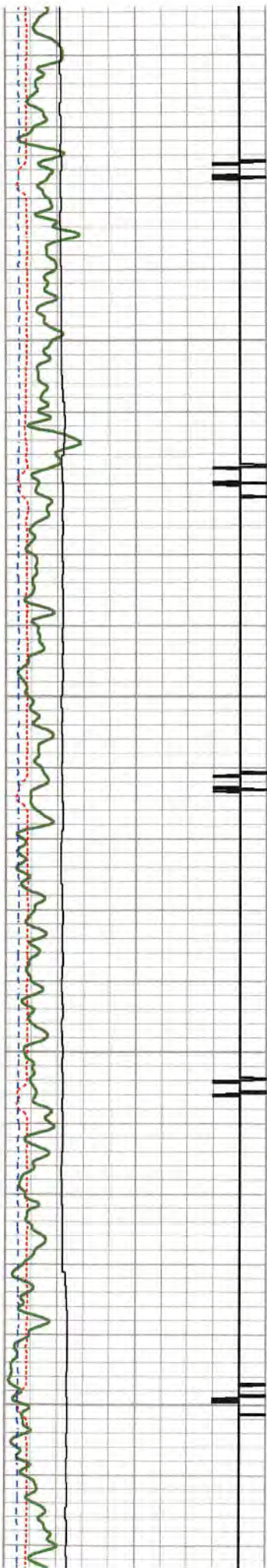


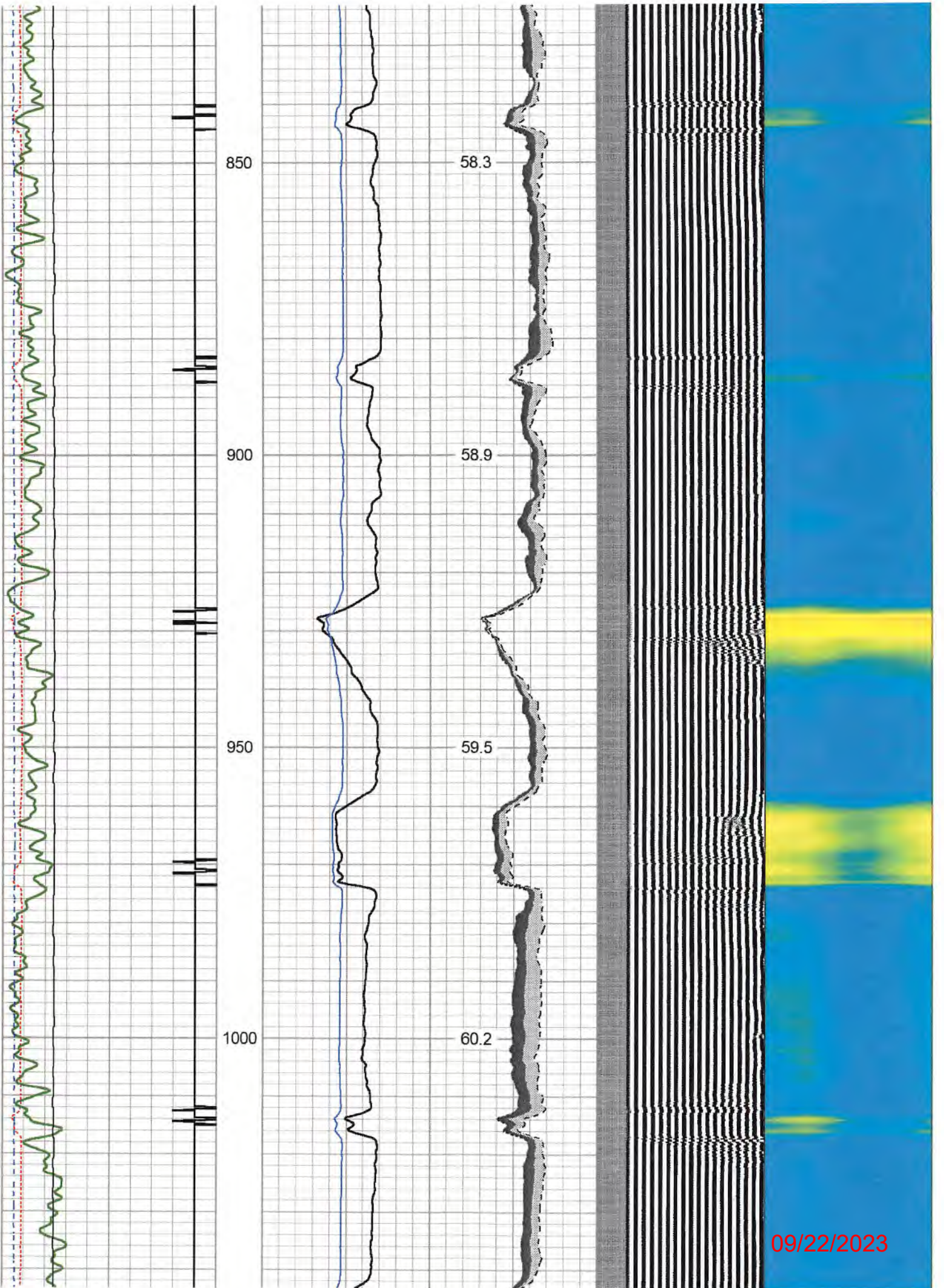


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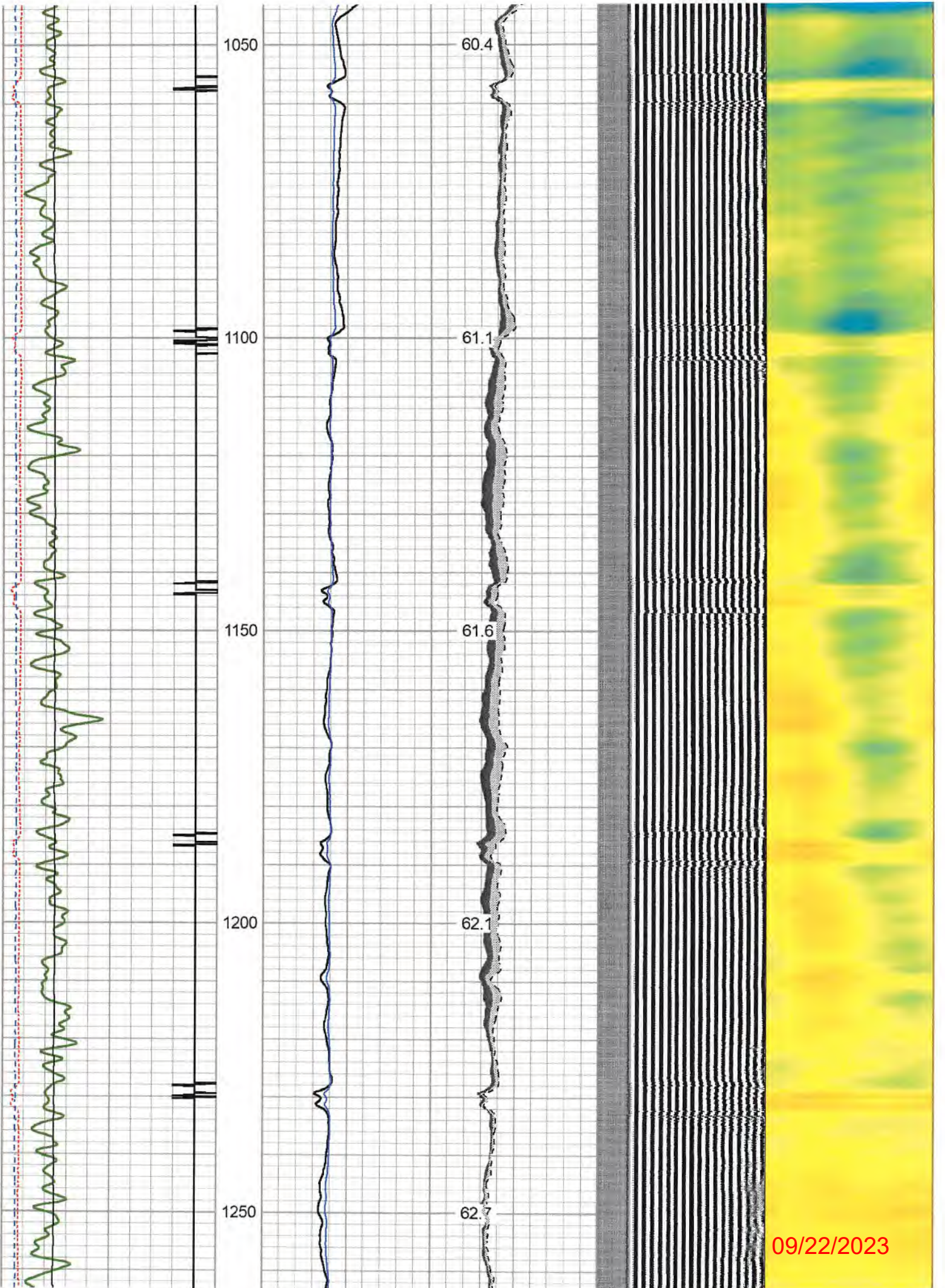


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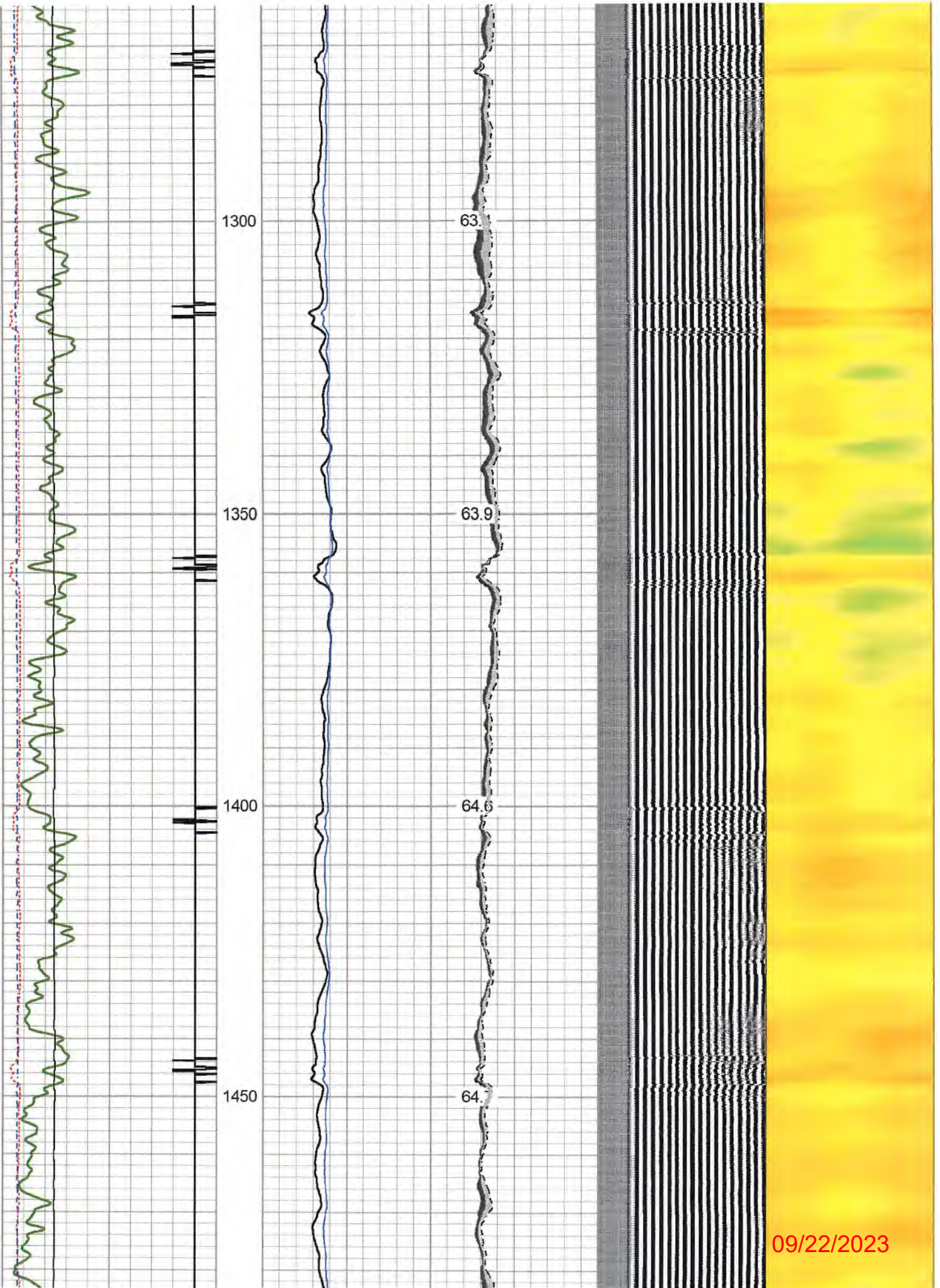




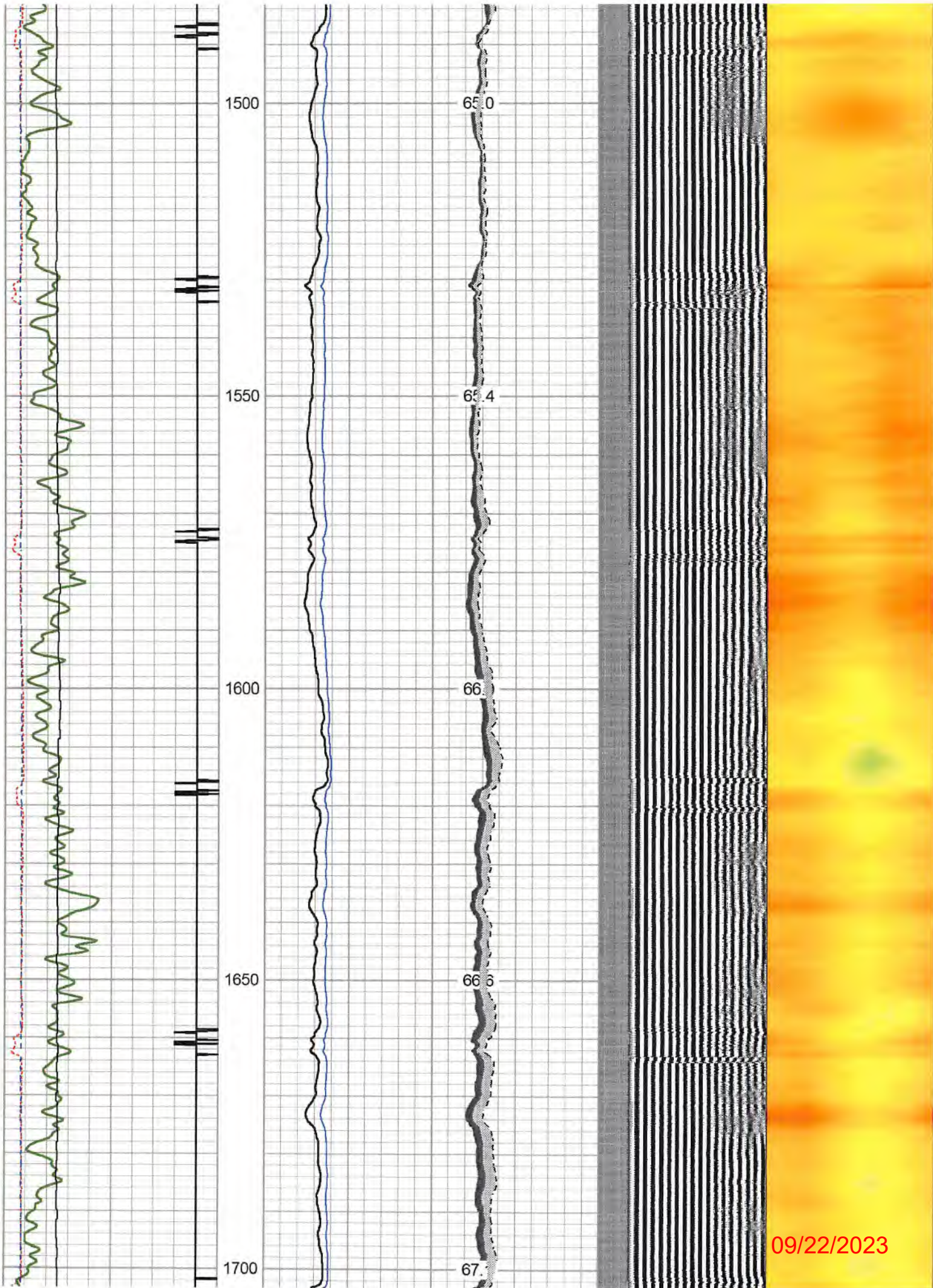
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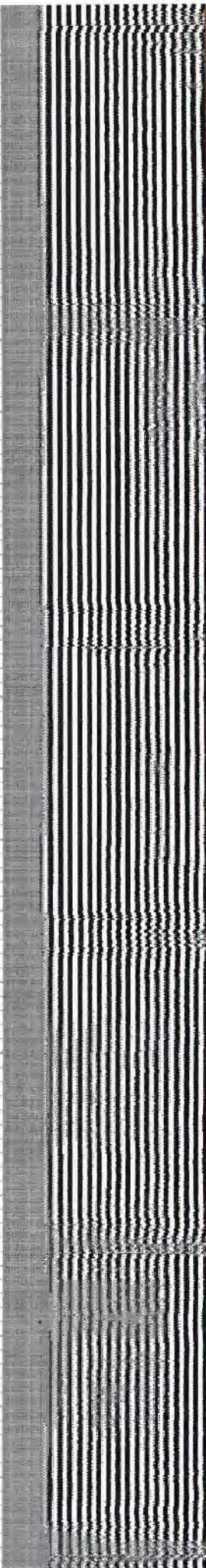
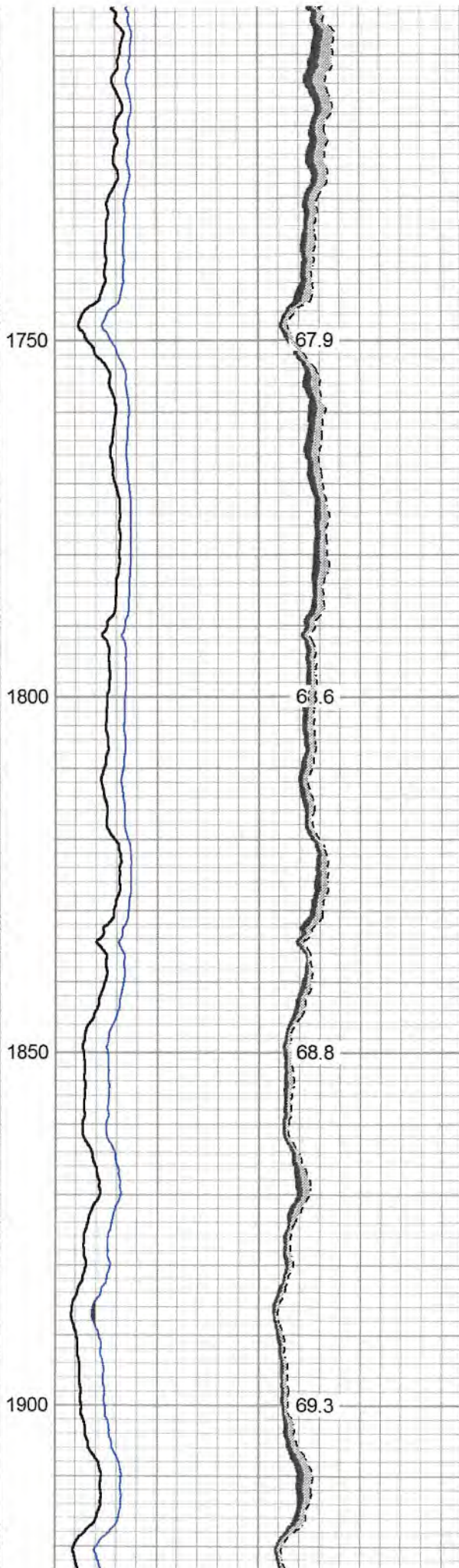
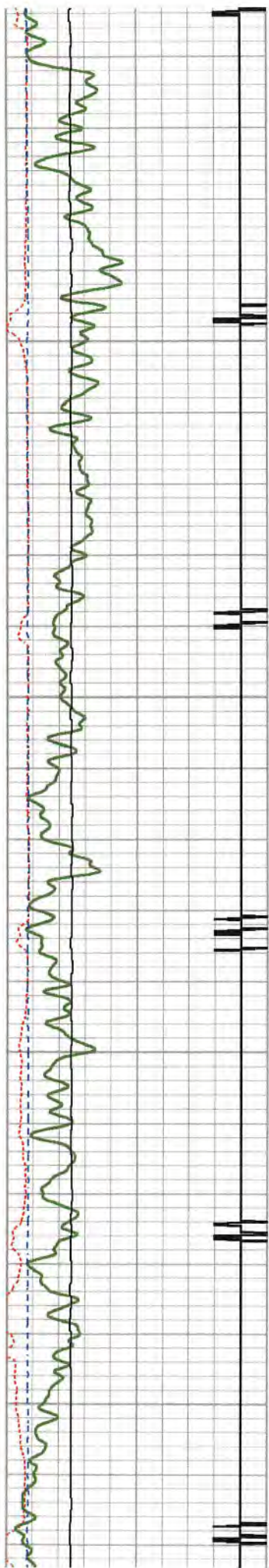


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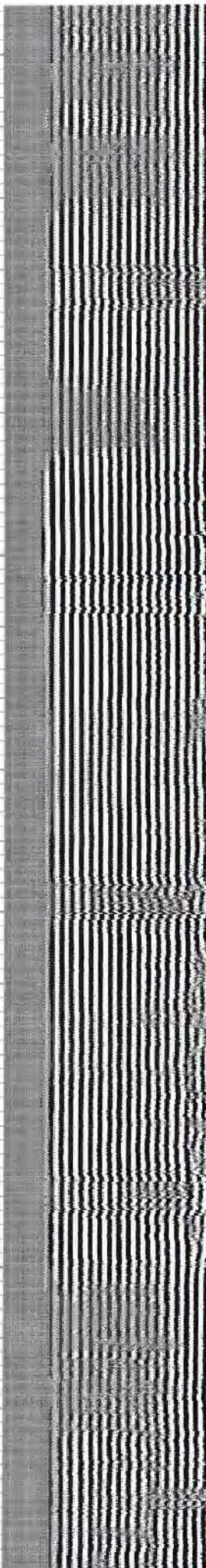
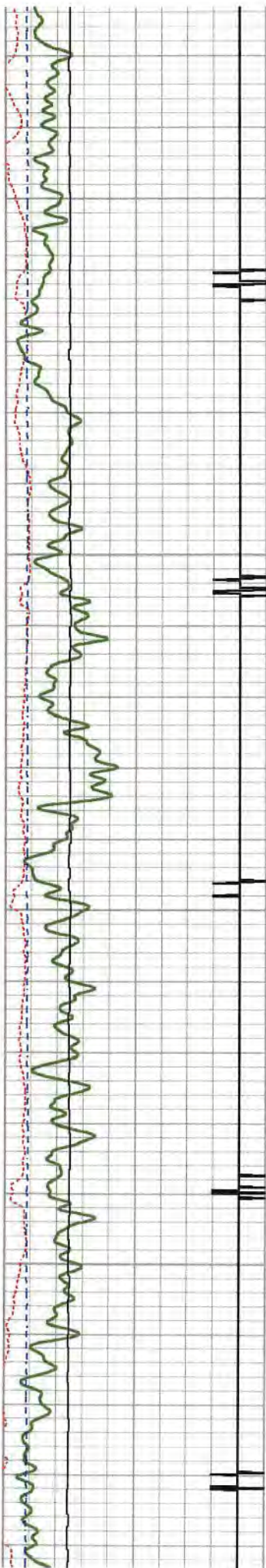




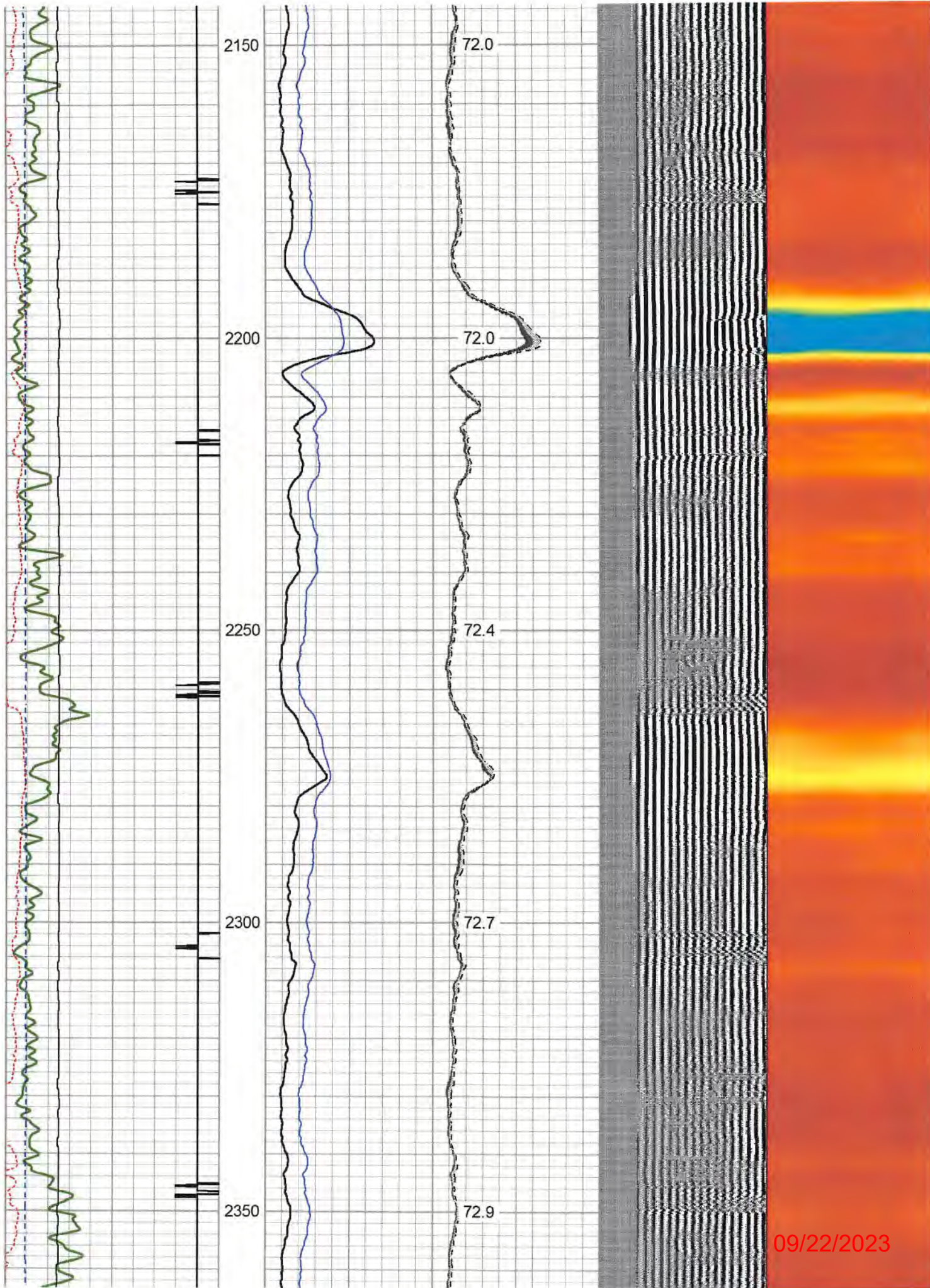




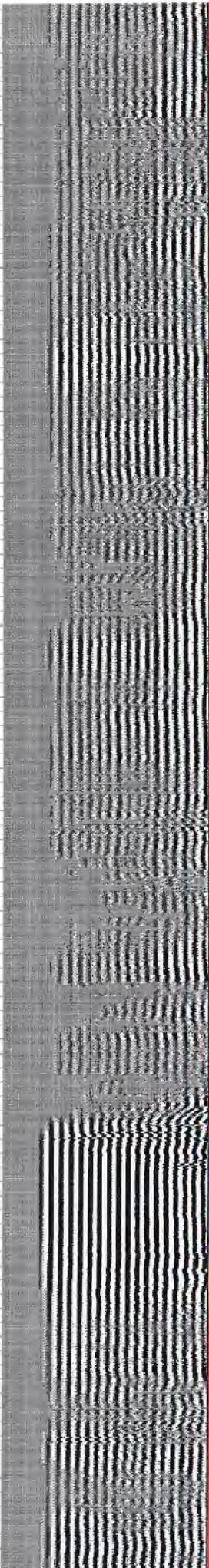
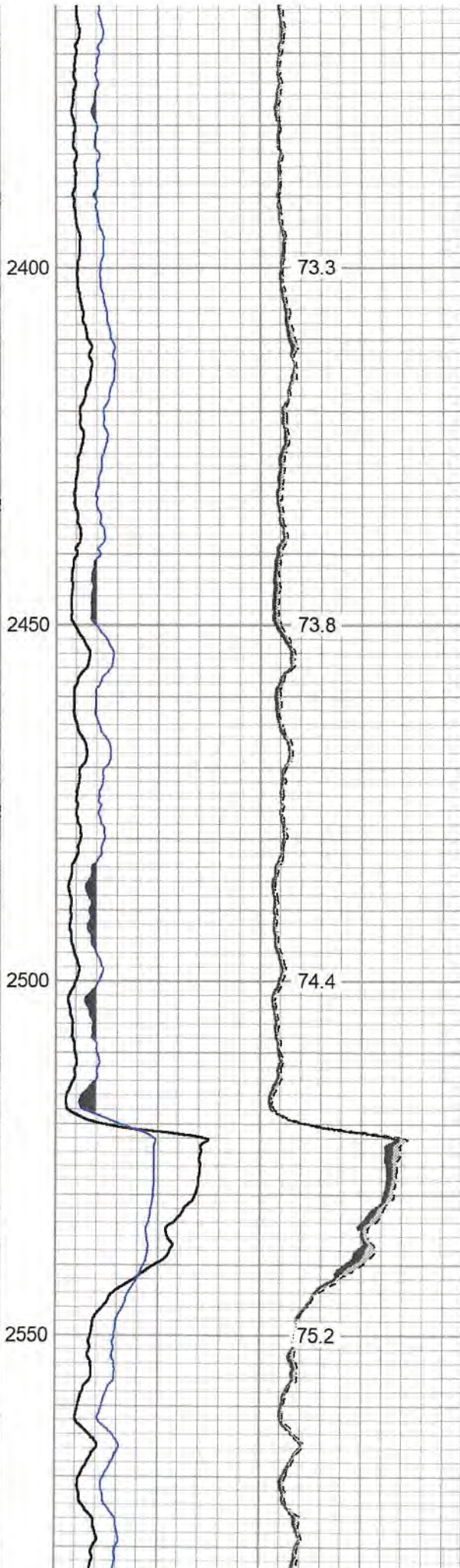
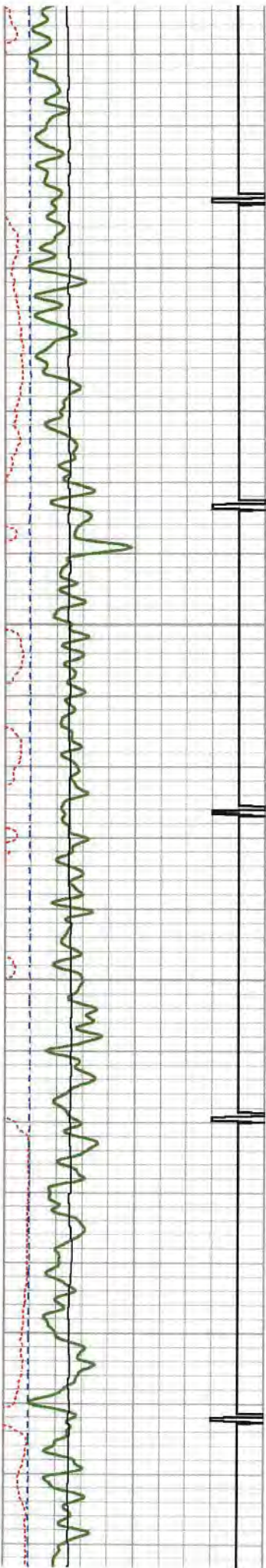
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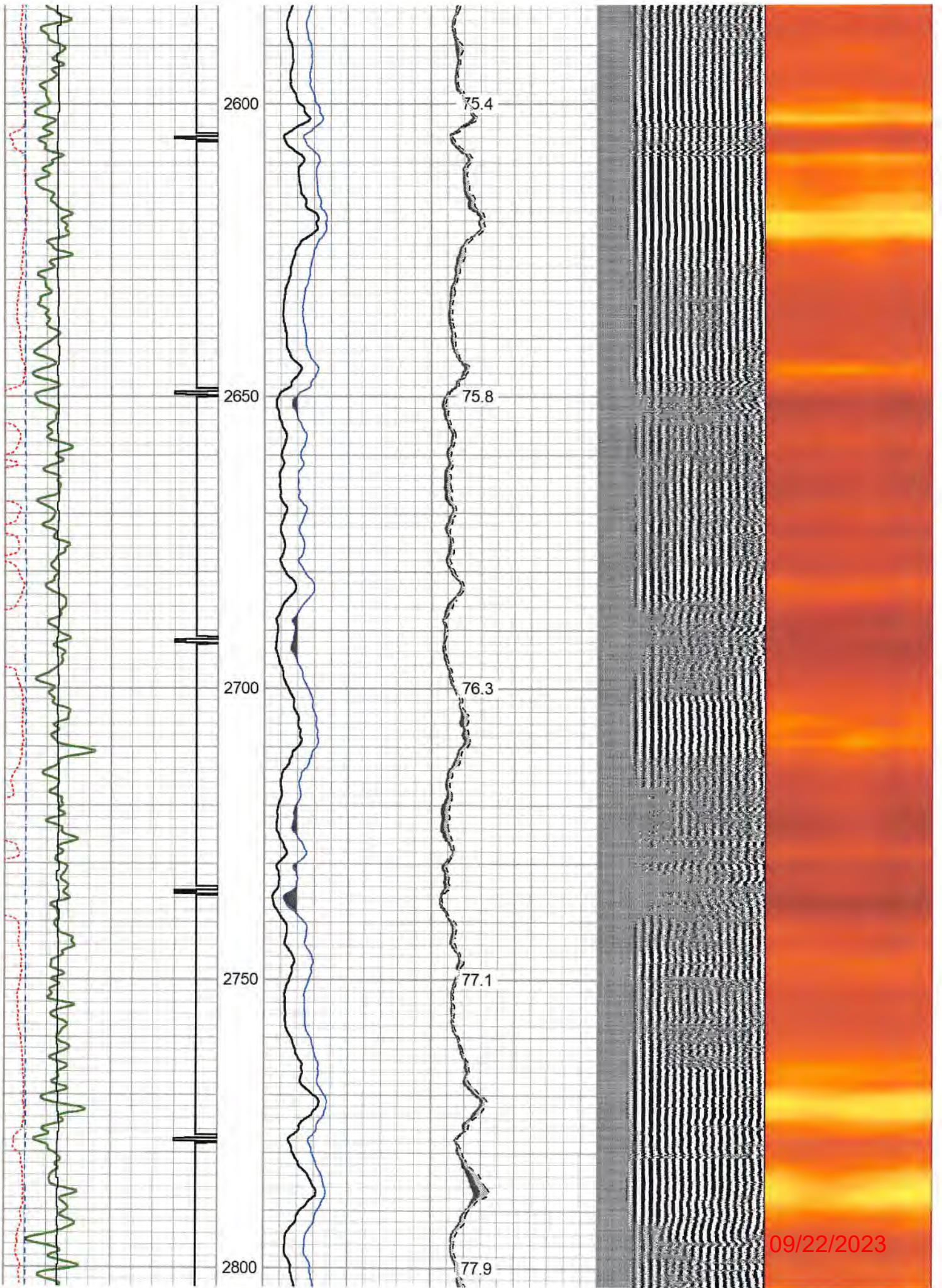
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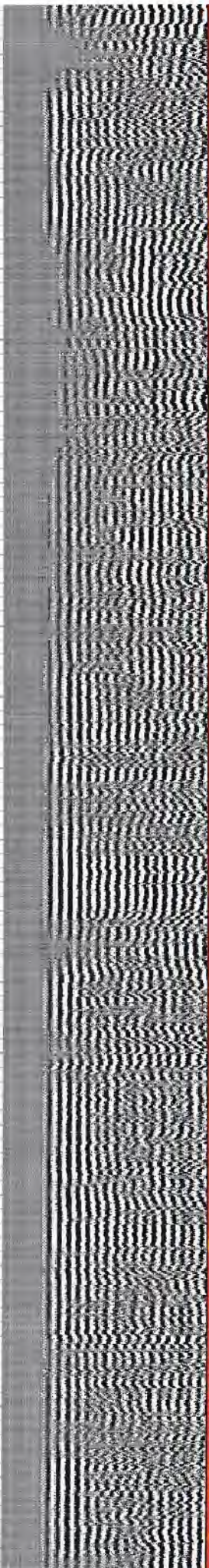
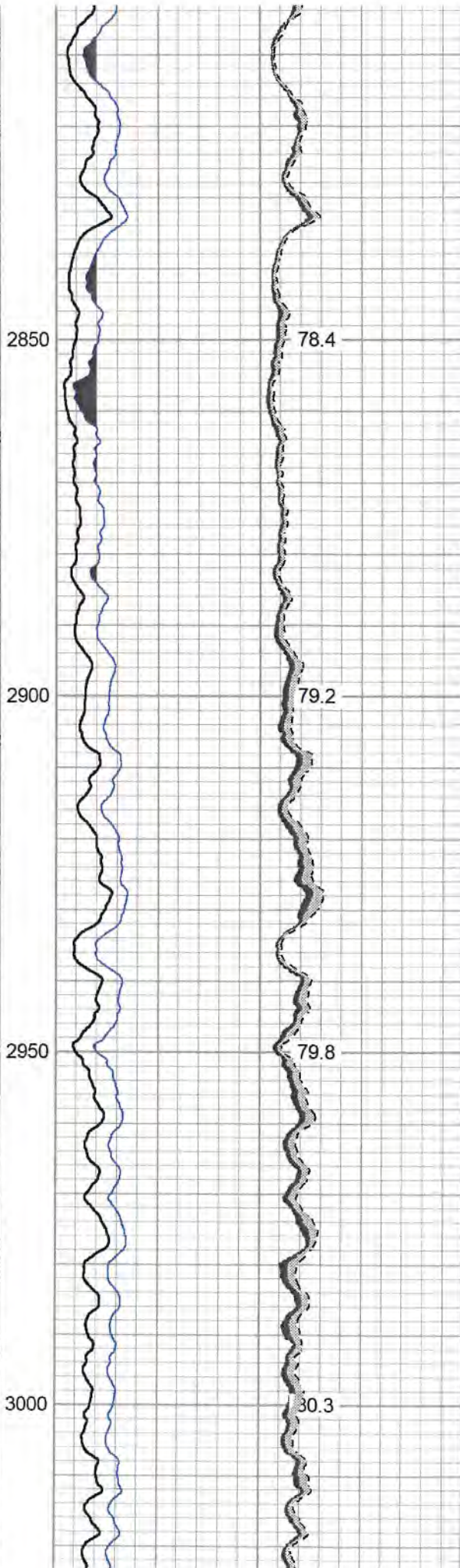
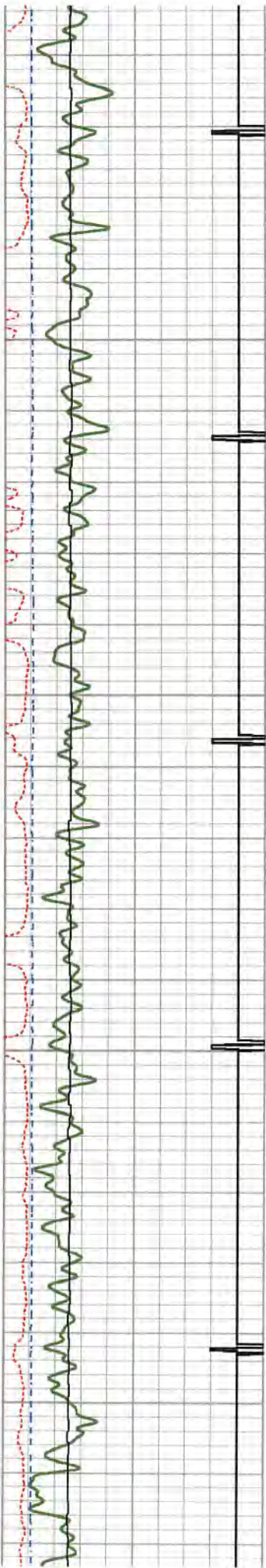


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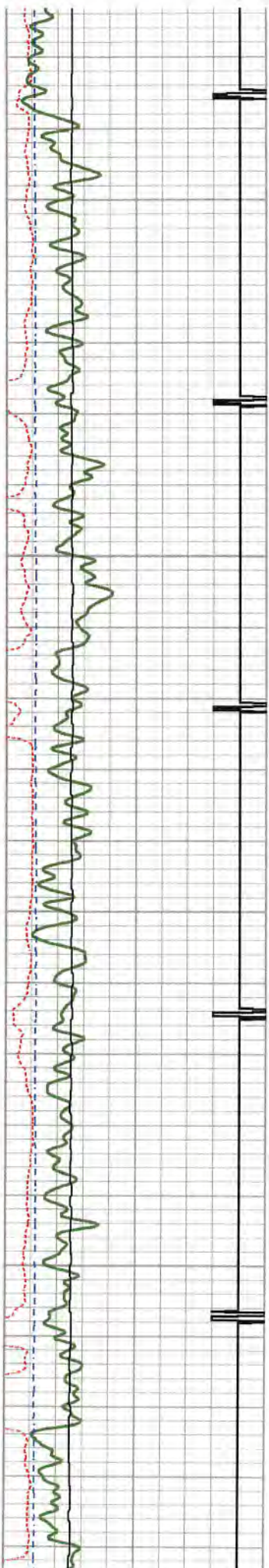


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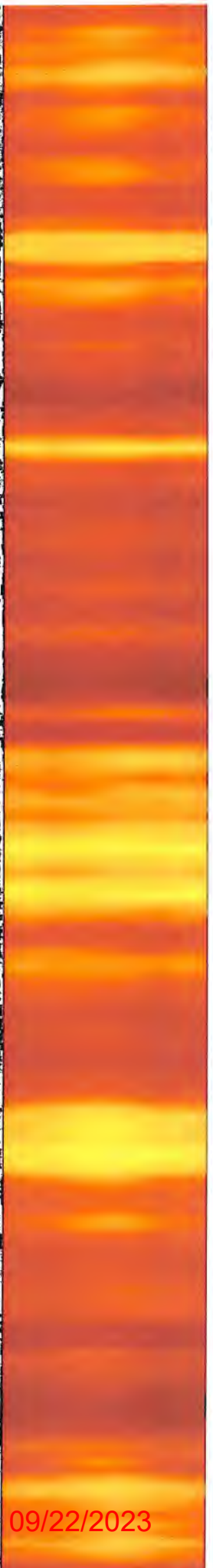
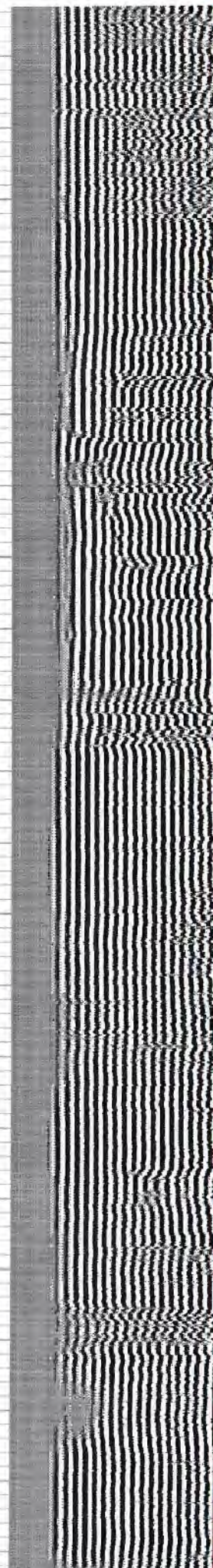
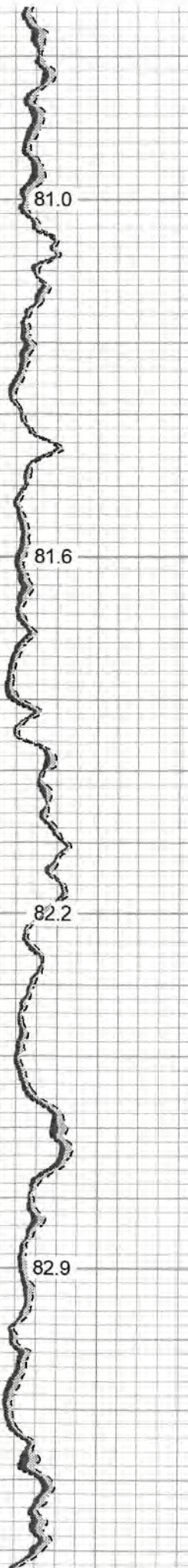
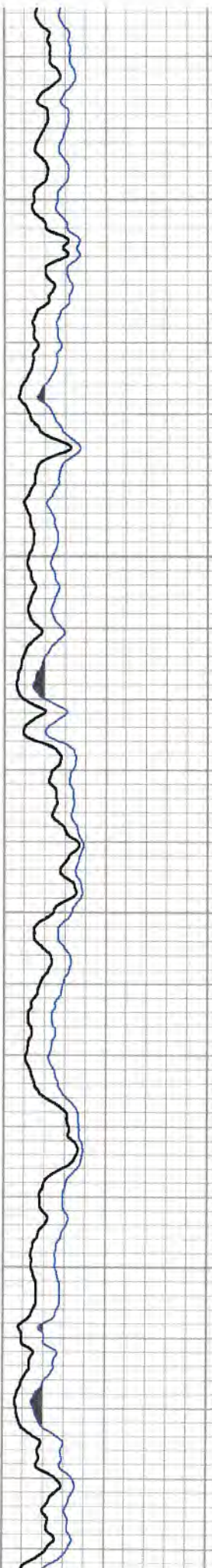




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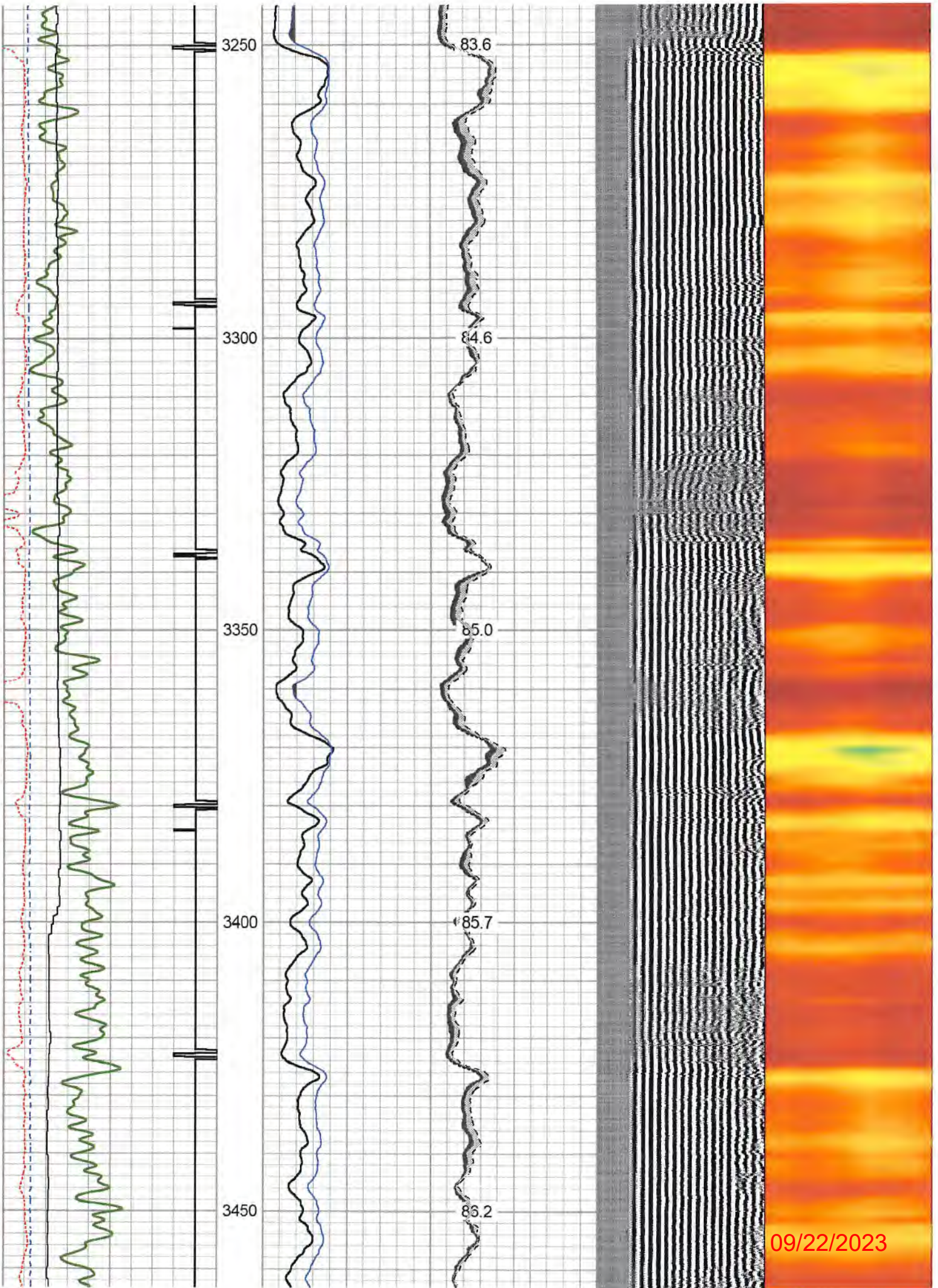


3050  
3100  
3150  
3200

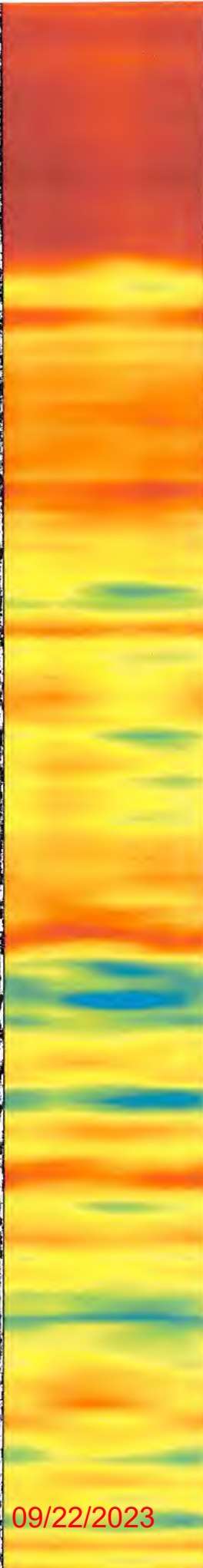
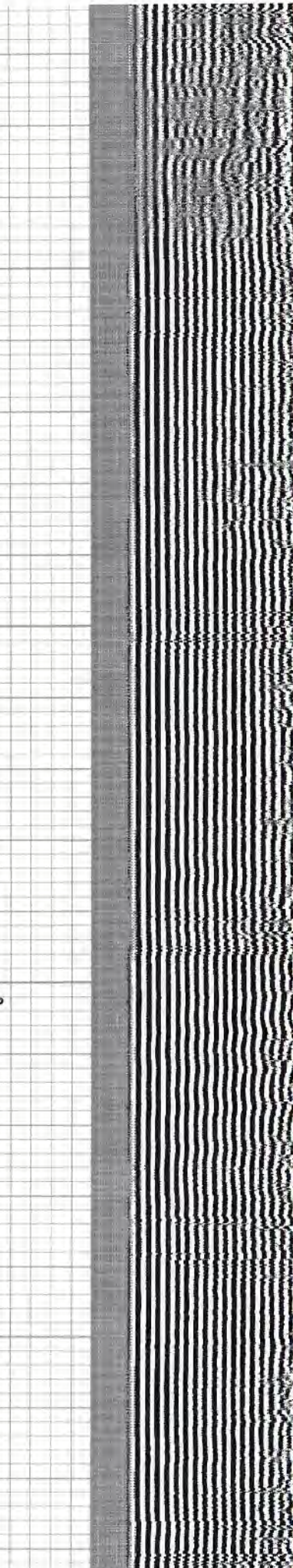
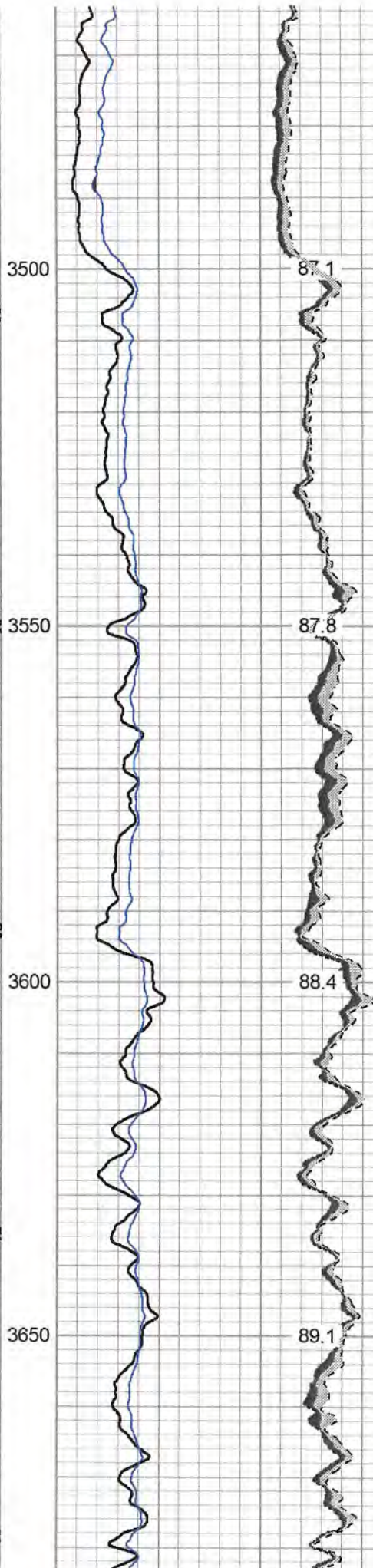
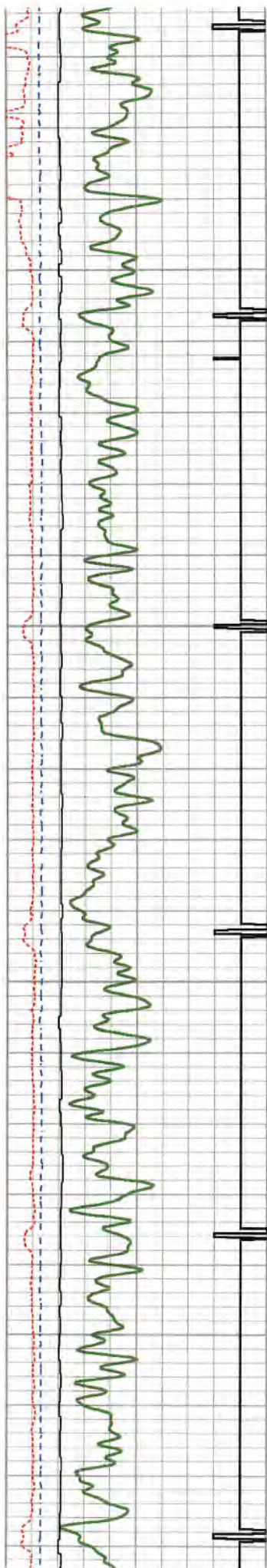


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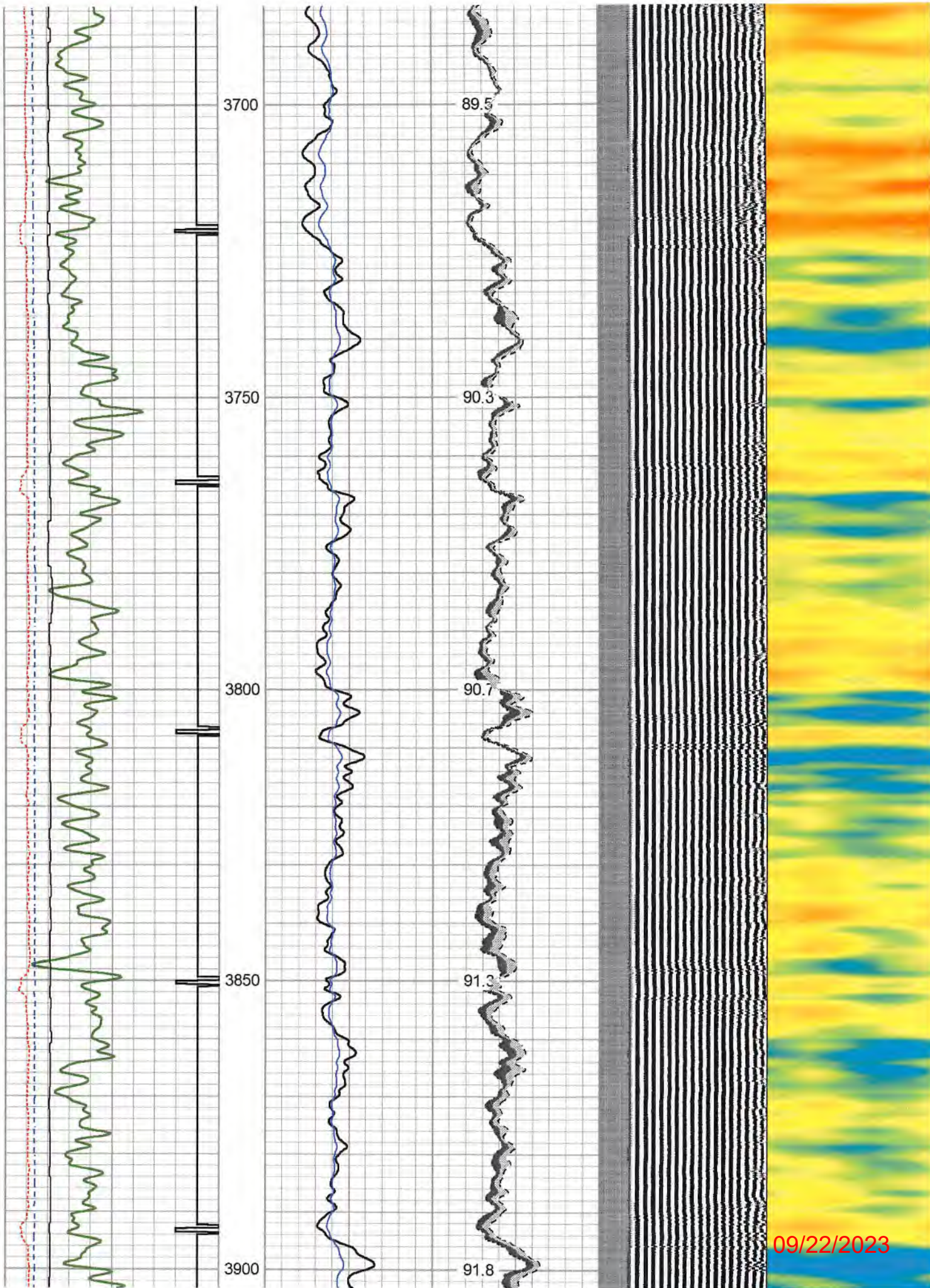


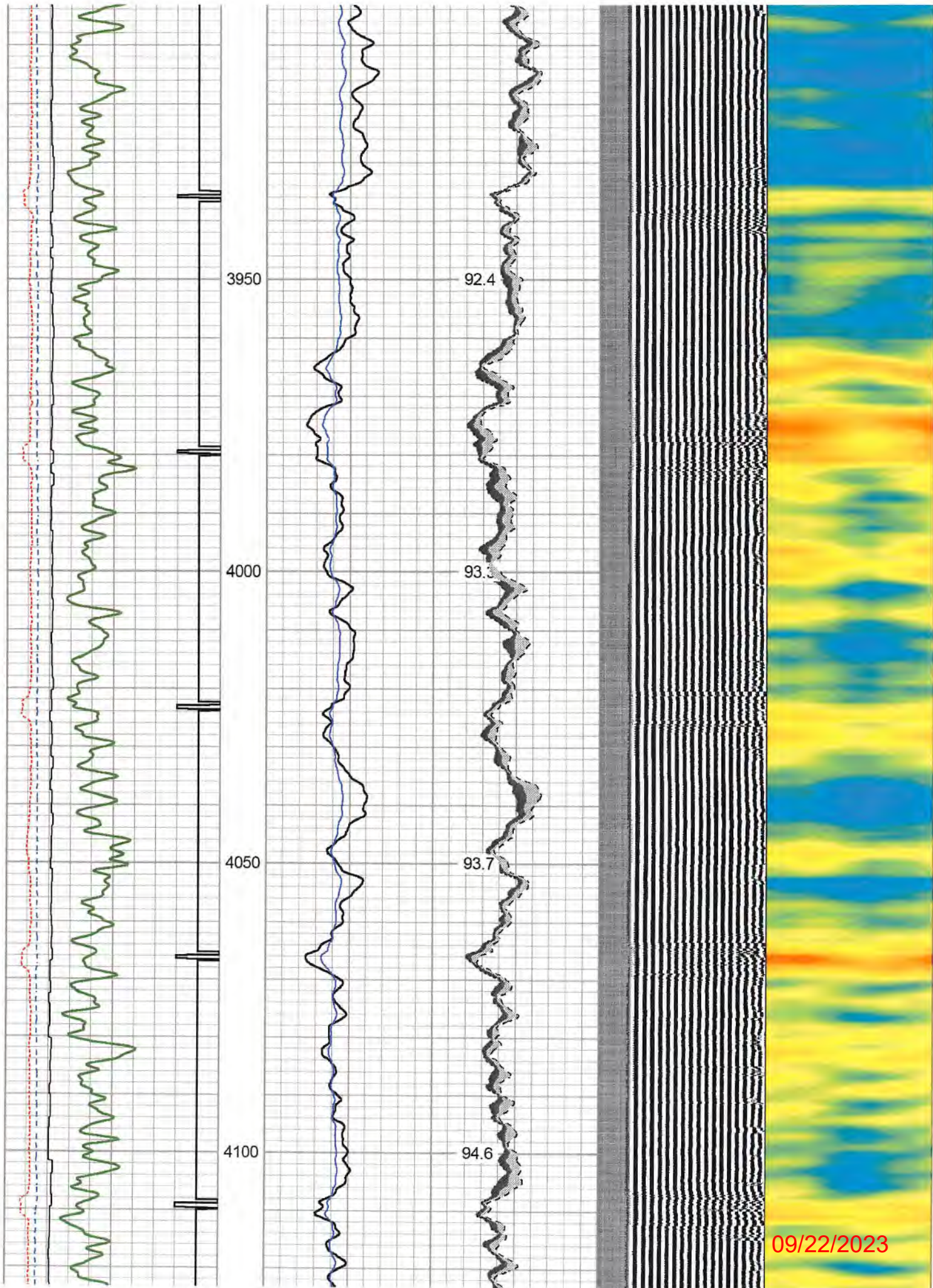


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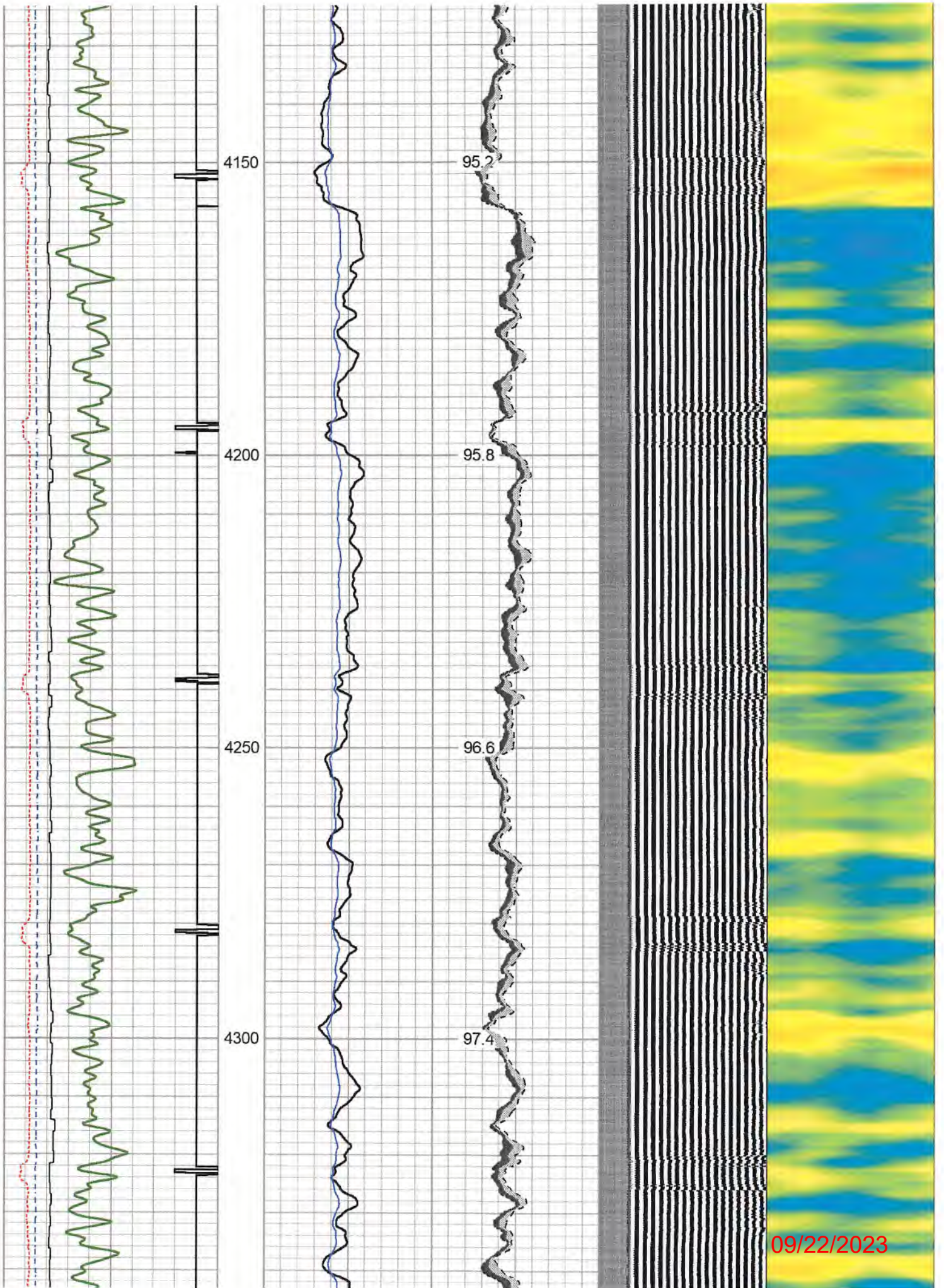


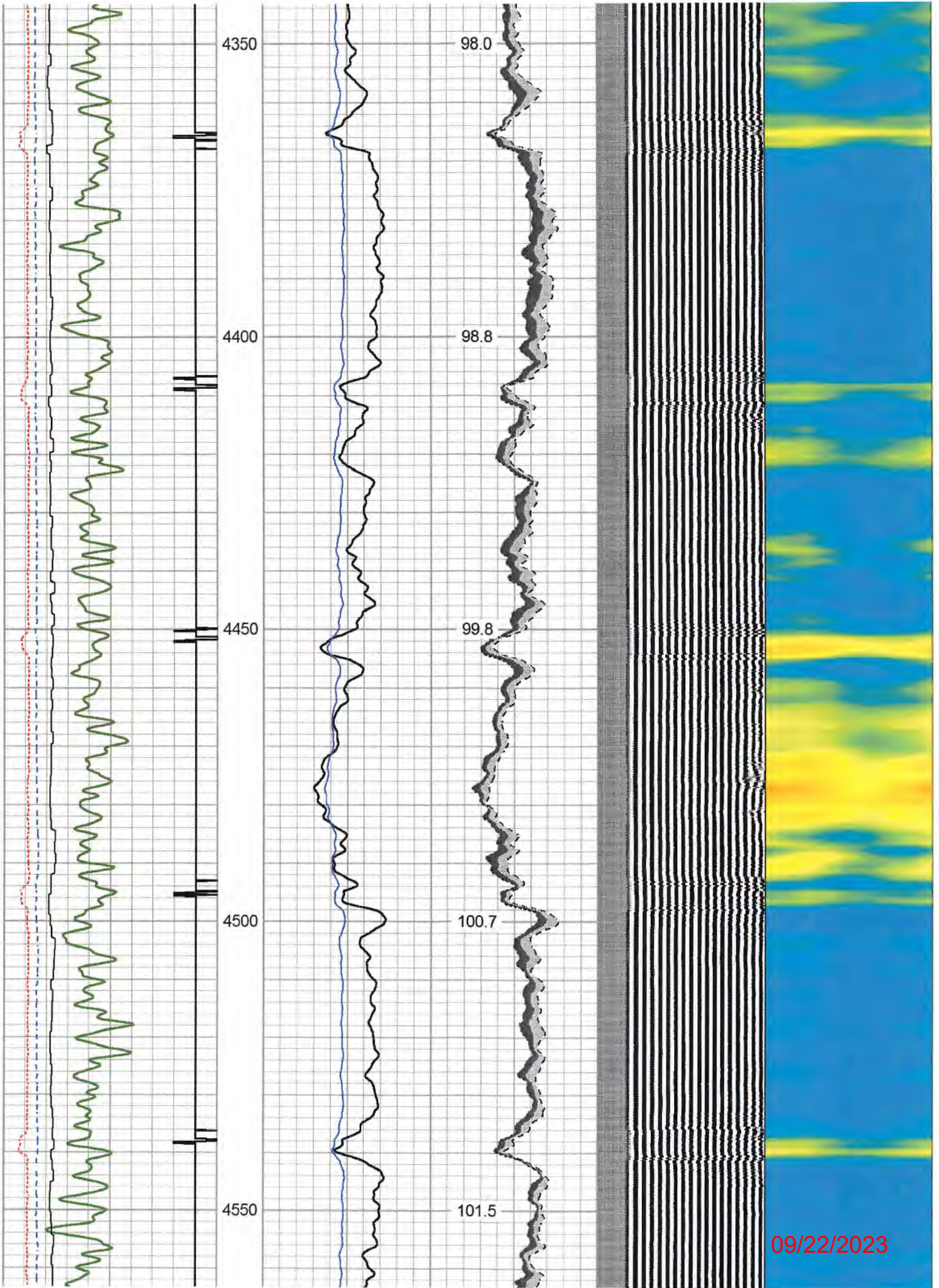
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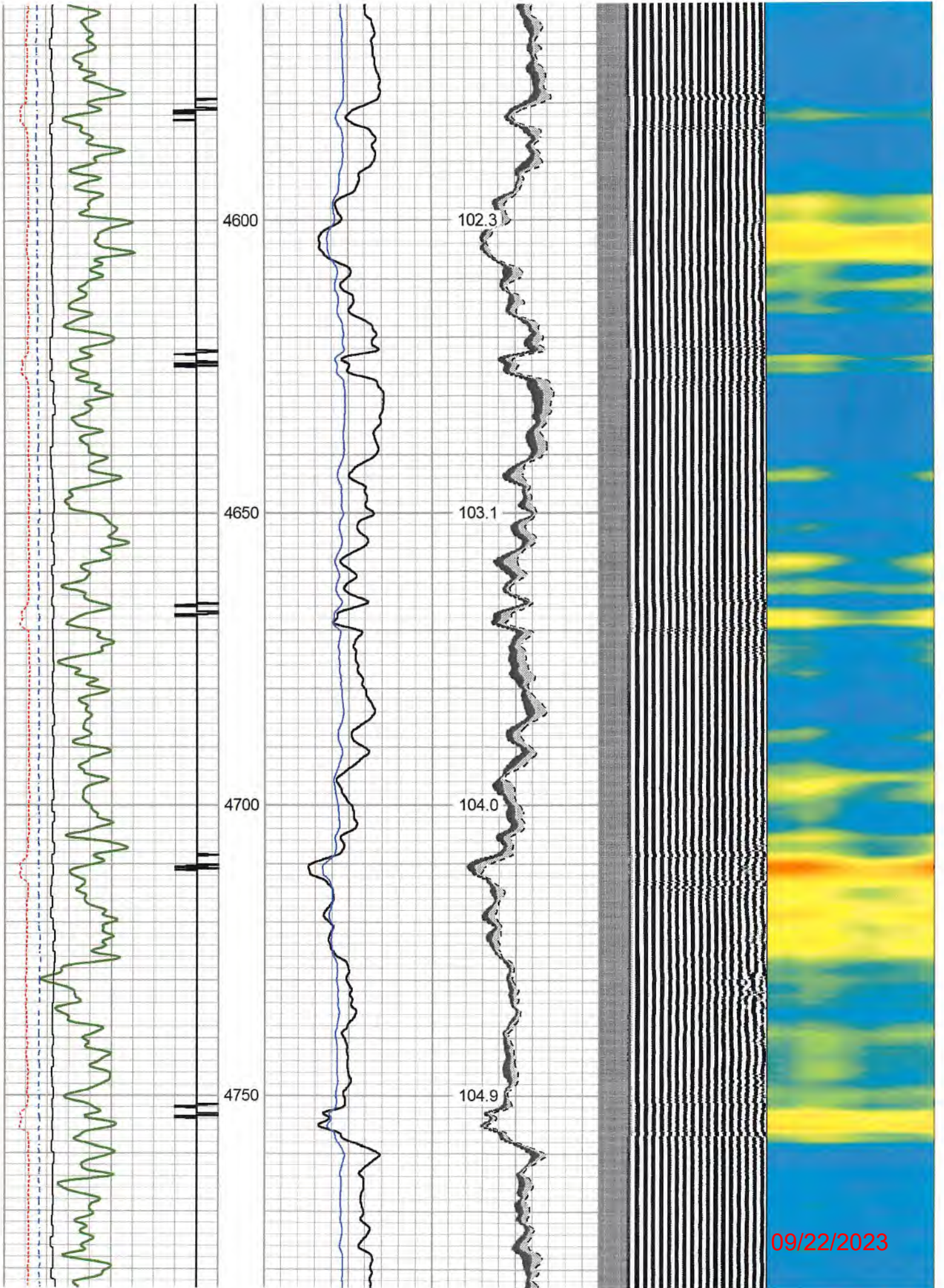


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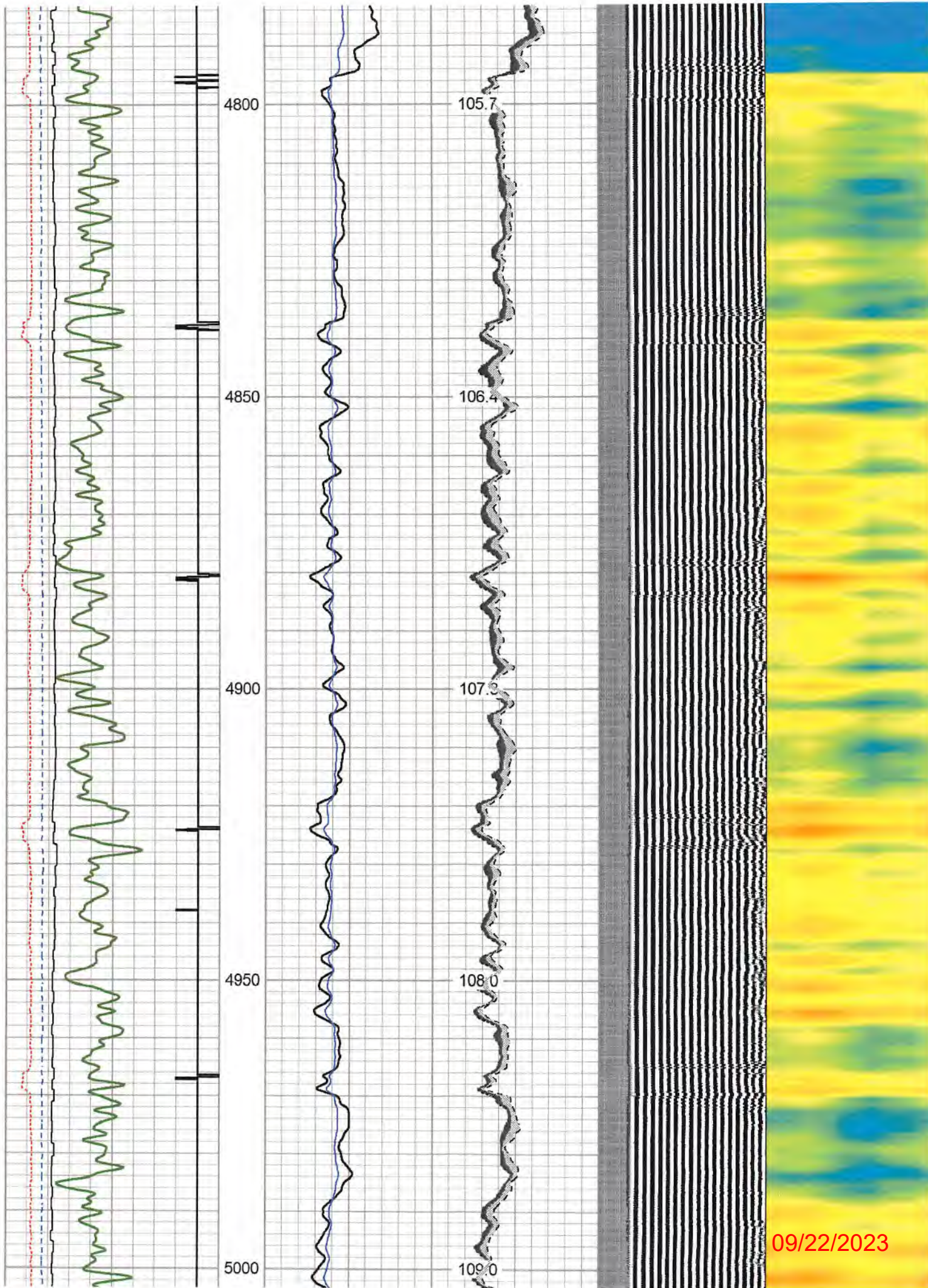




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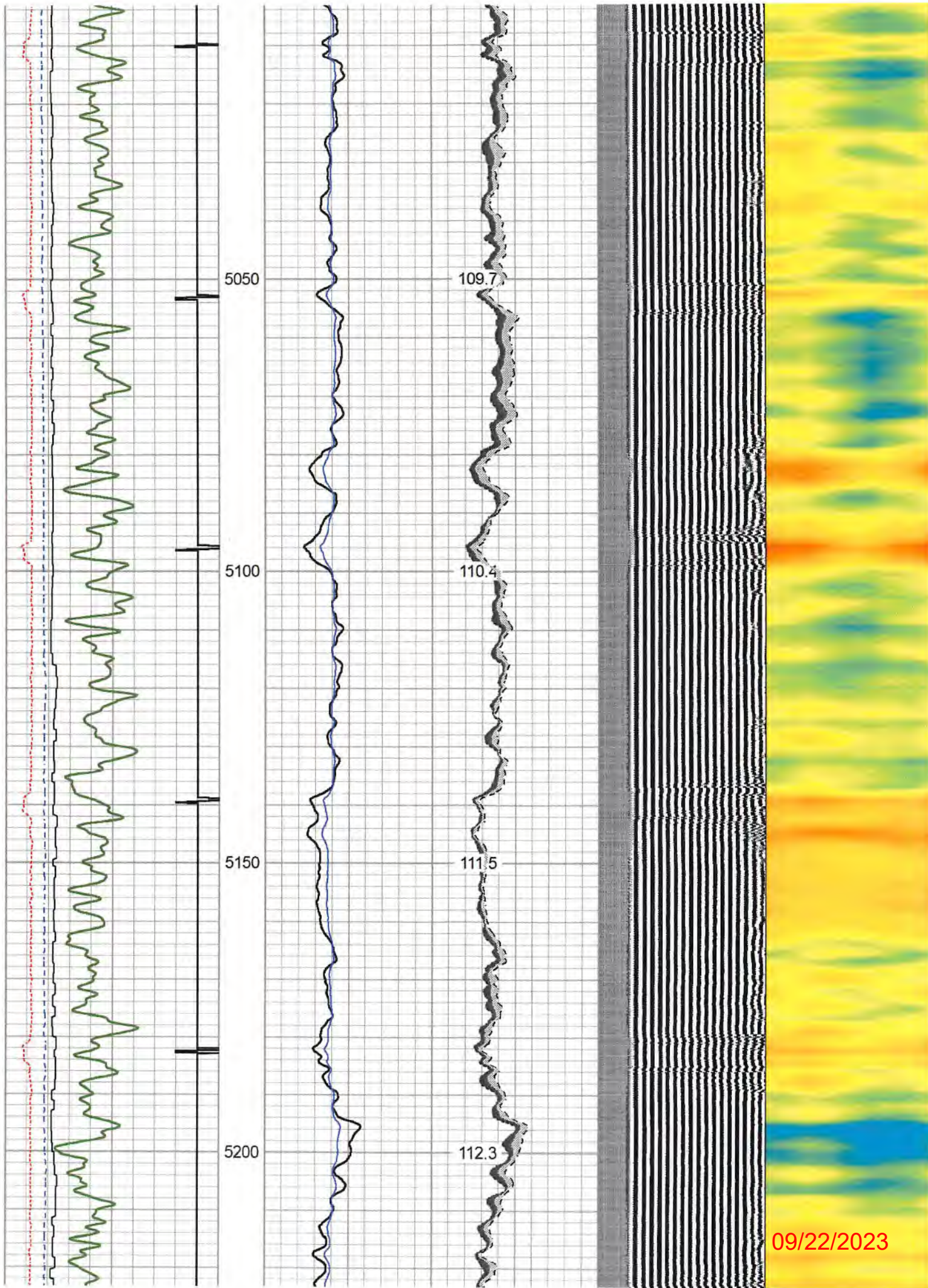


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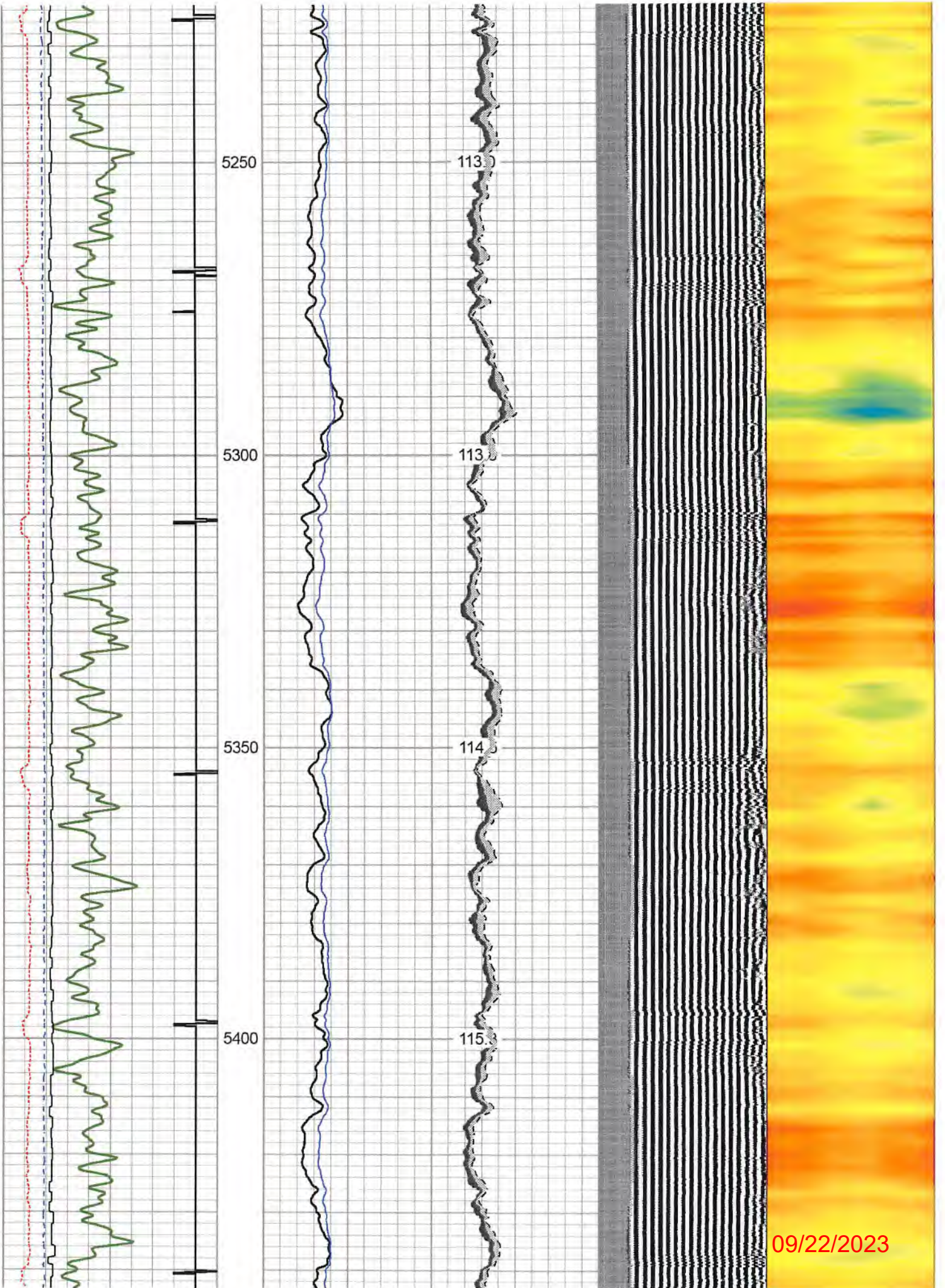


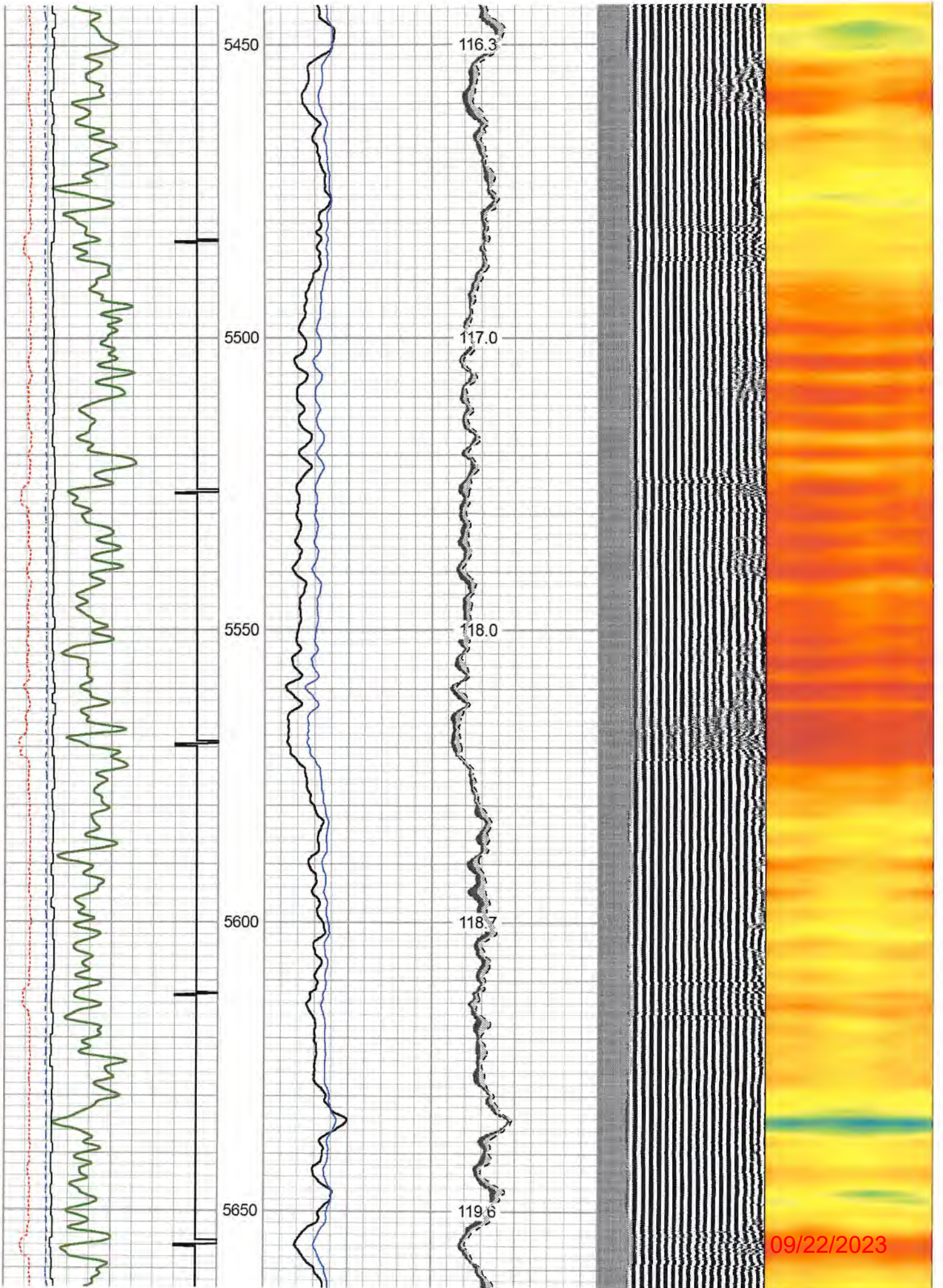
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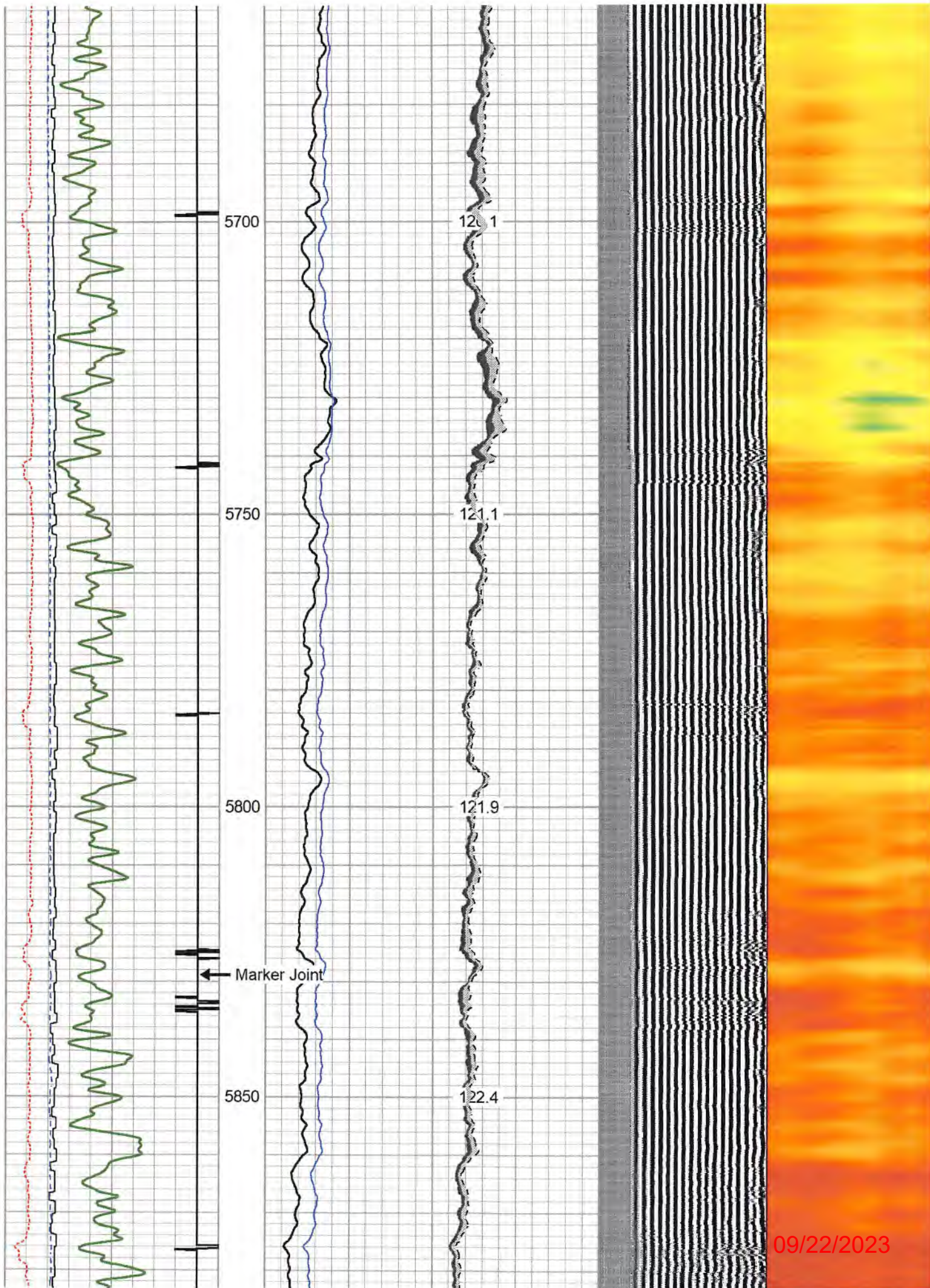


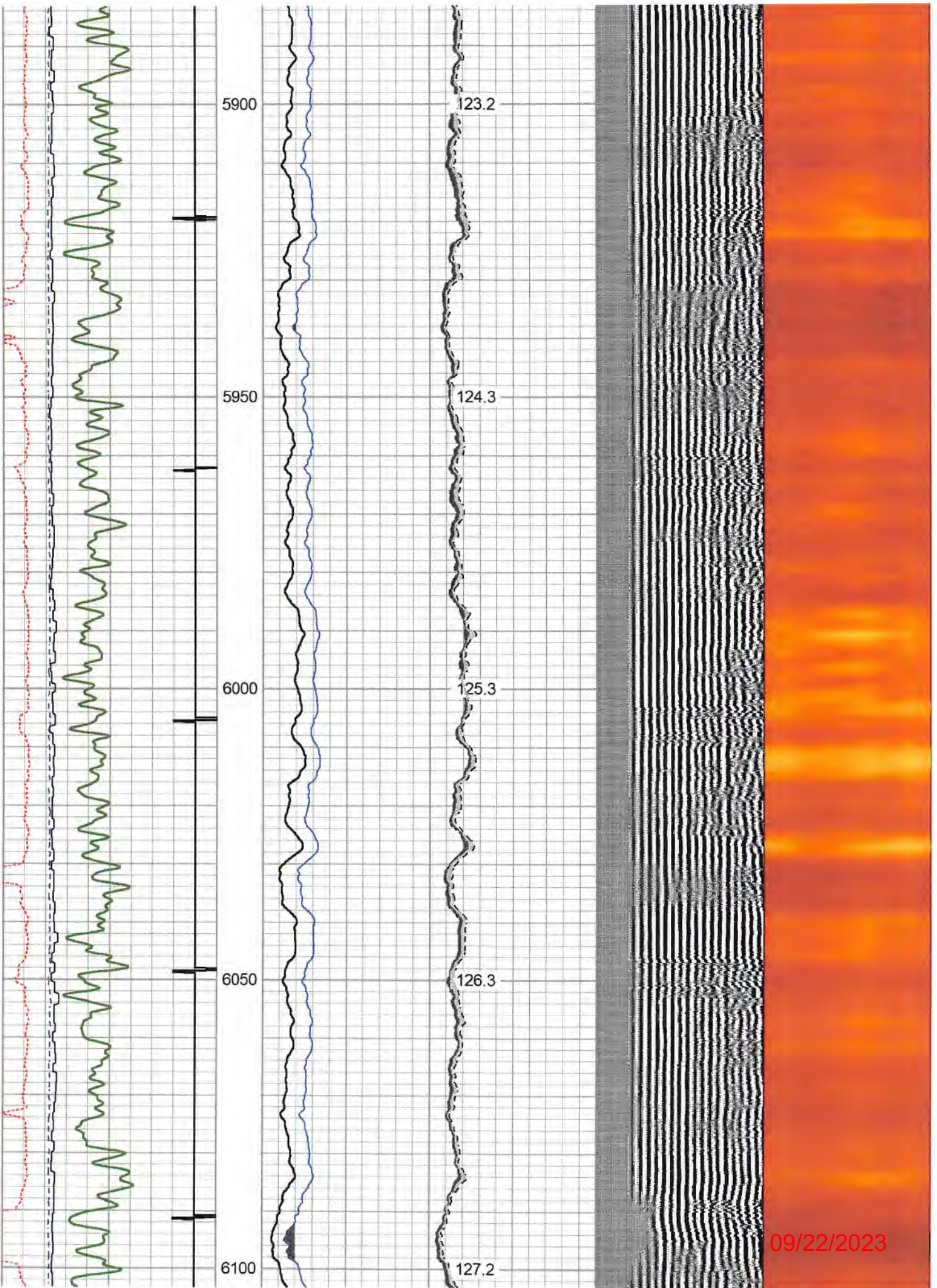


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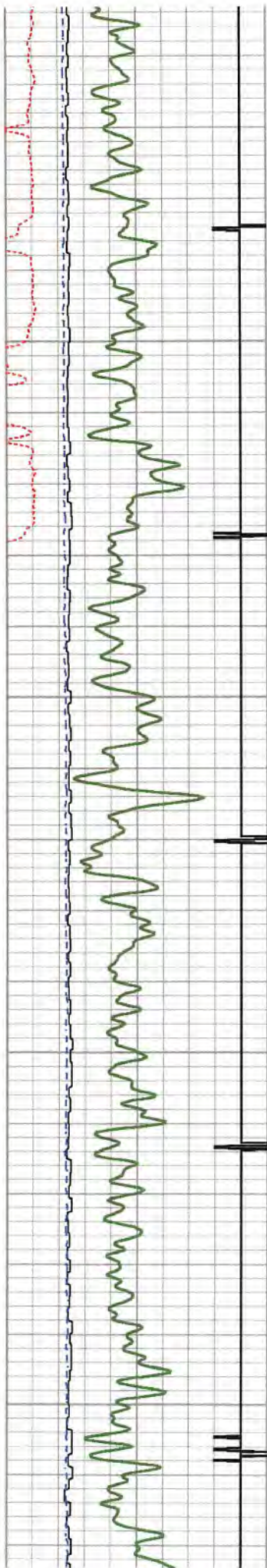








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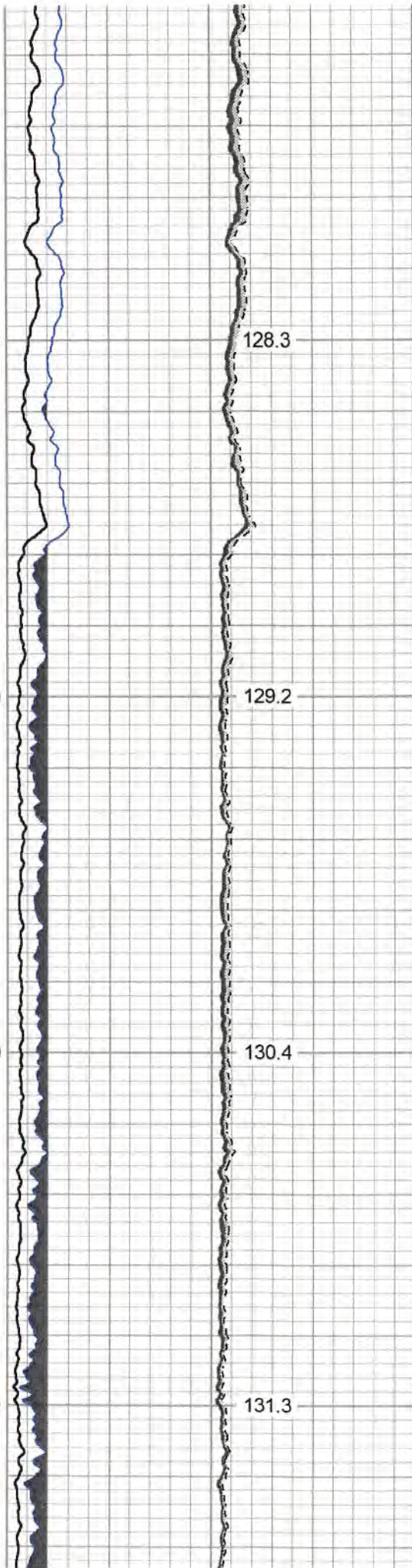


6150

6200

6250

6300

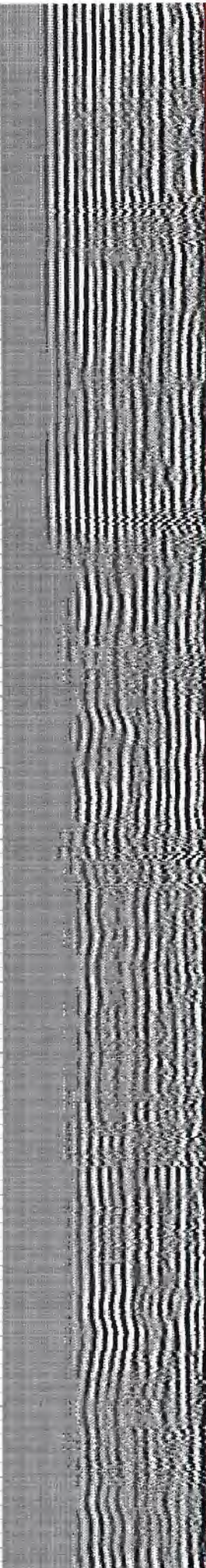


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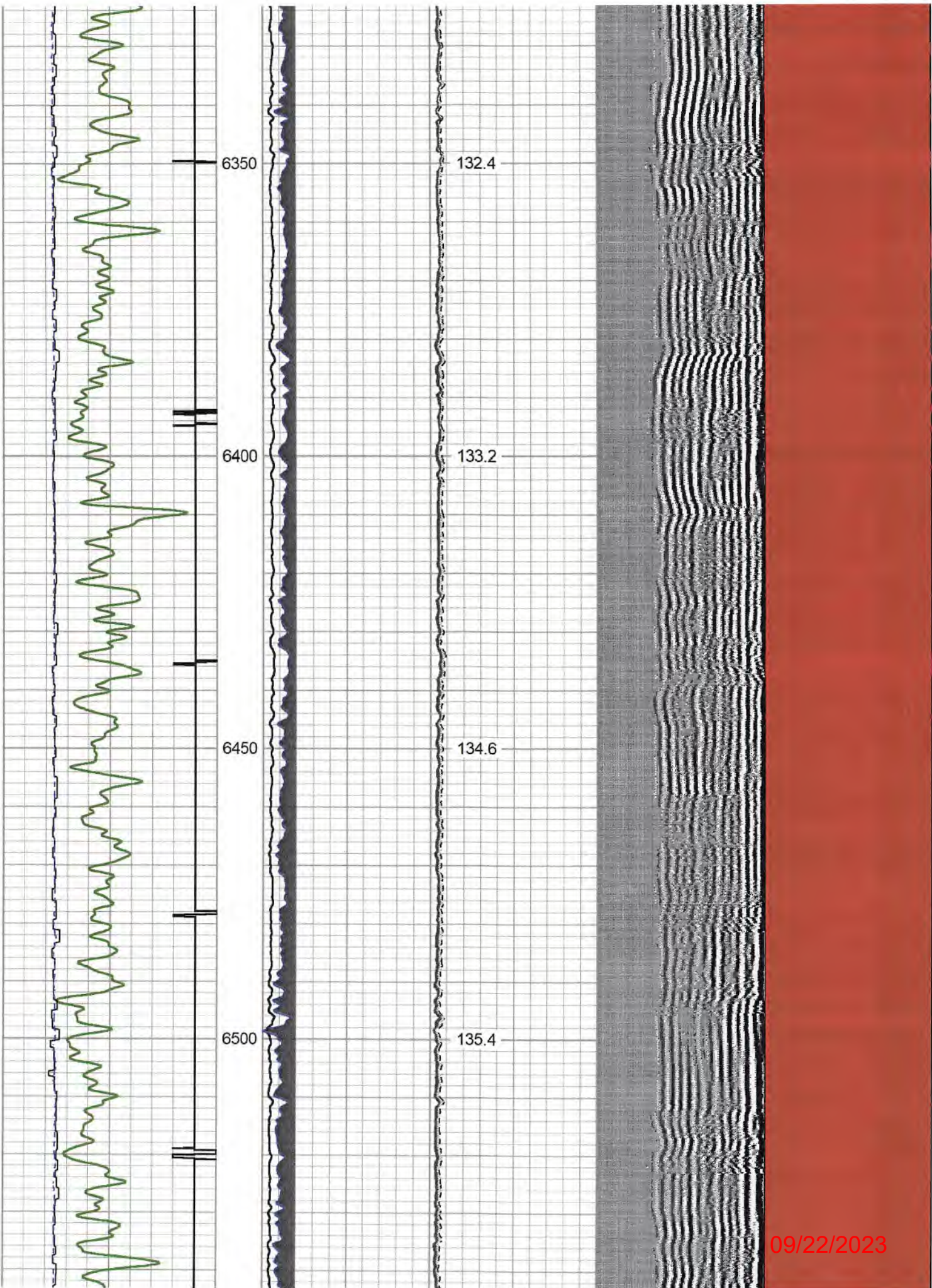
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130.4

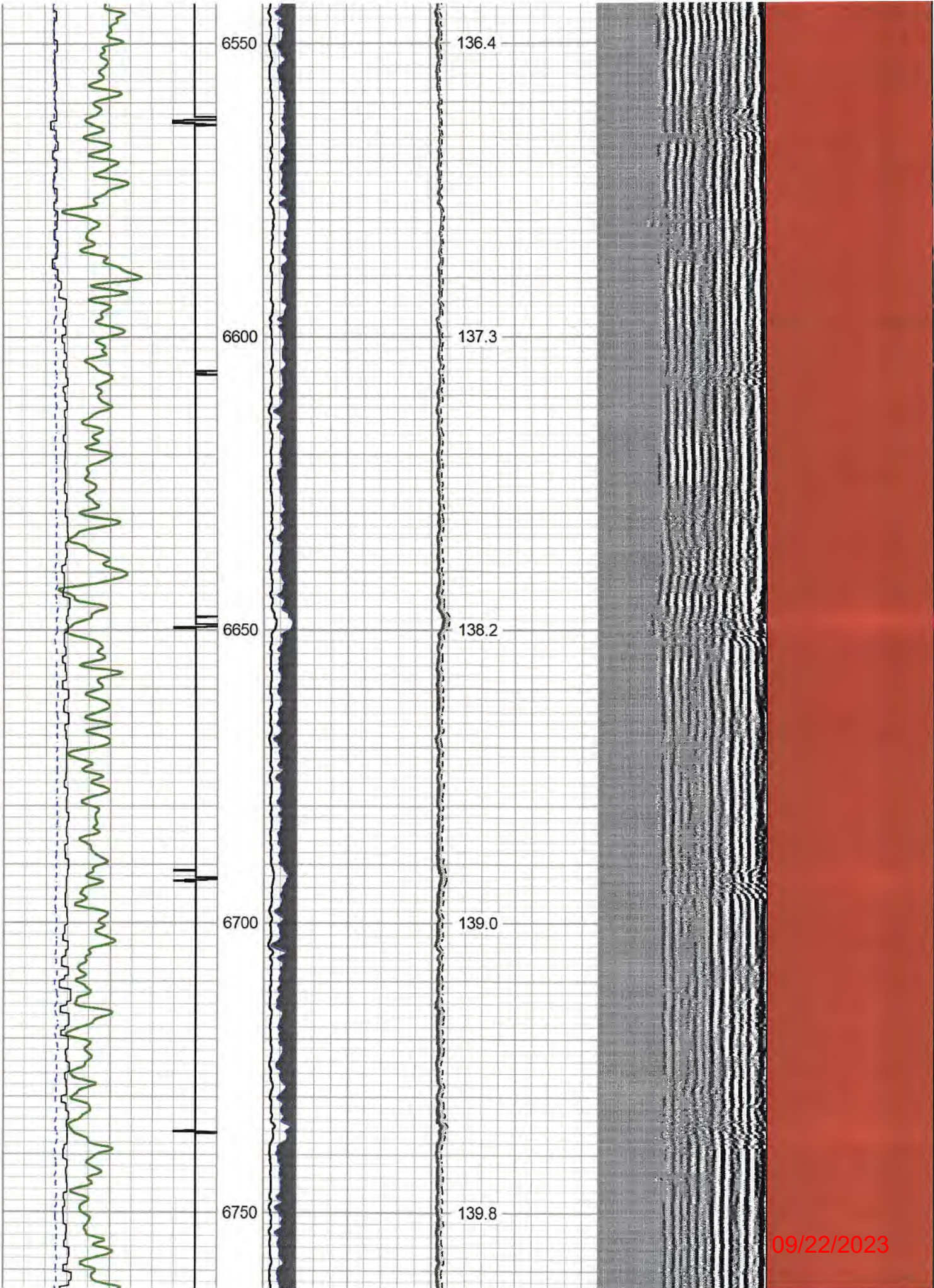
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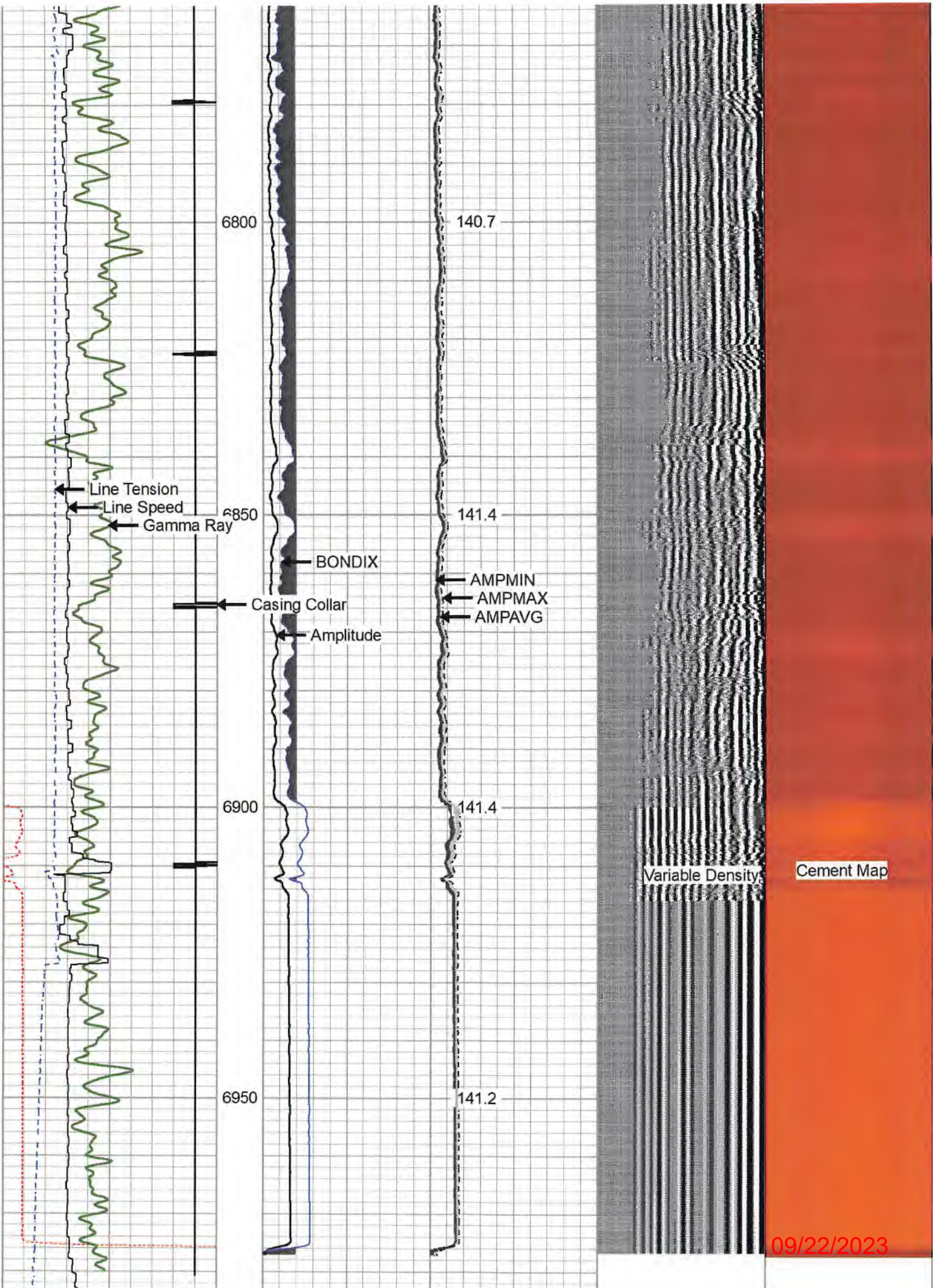


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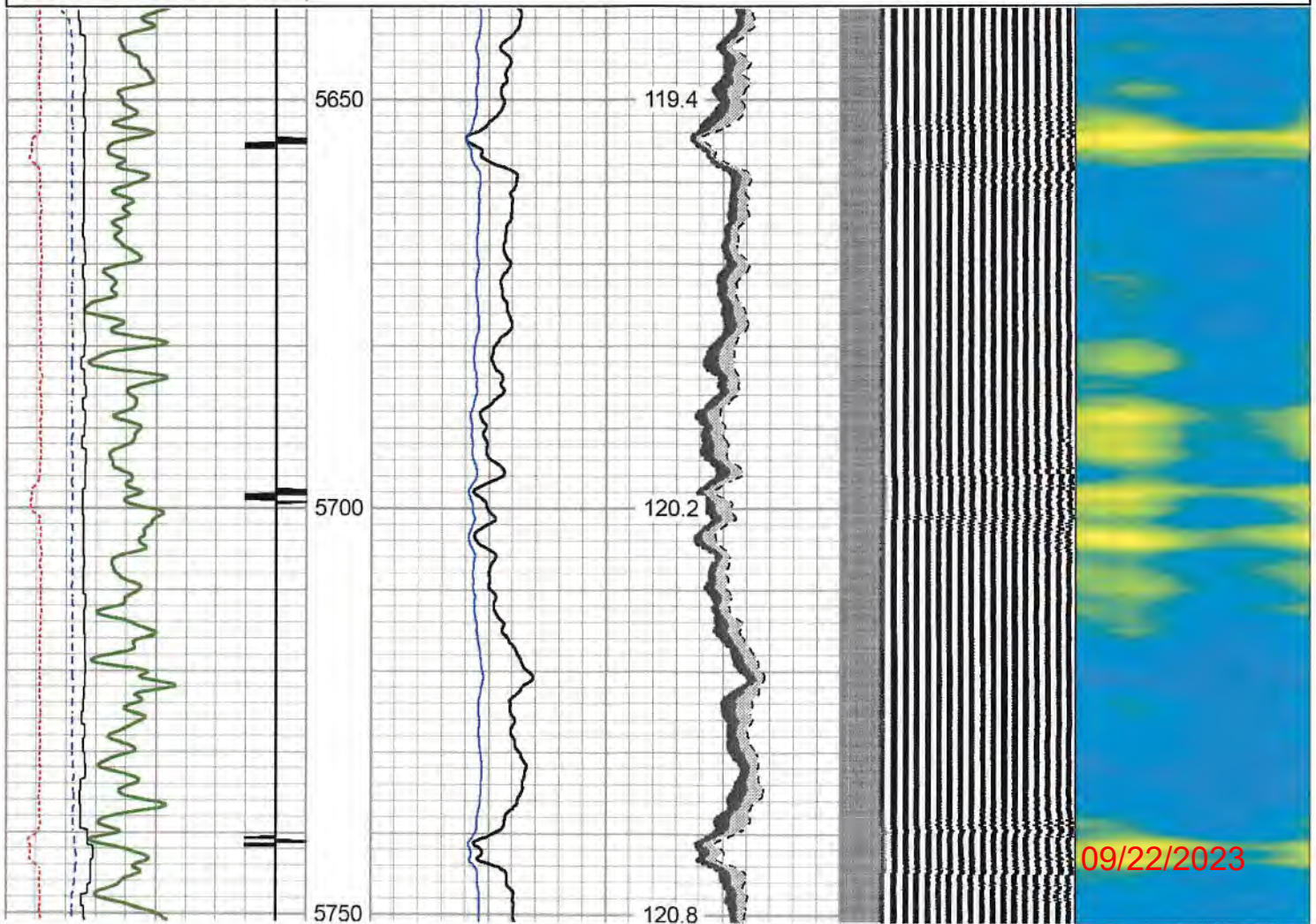
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9	Casing Collar	-1	1	BONDIX	0	-5	AMPMAX	150	200 (usec)	1200		
0	Gamma Ray (GAPI)	150				-5	AMPAVG	150				
	Line Speed			TEMP			(degF)					
-200	(ft/min)	200										
0	Line Tension (lb)	5000										

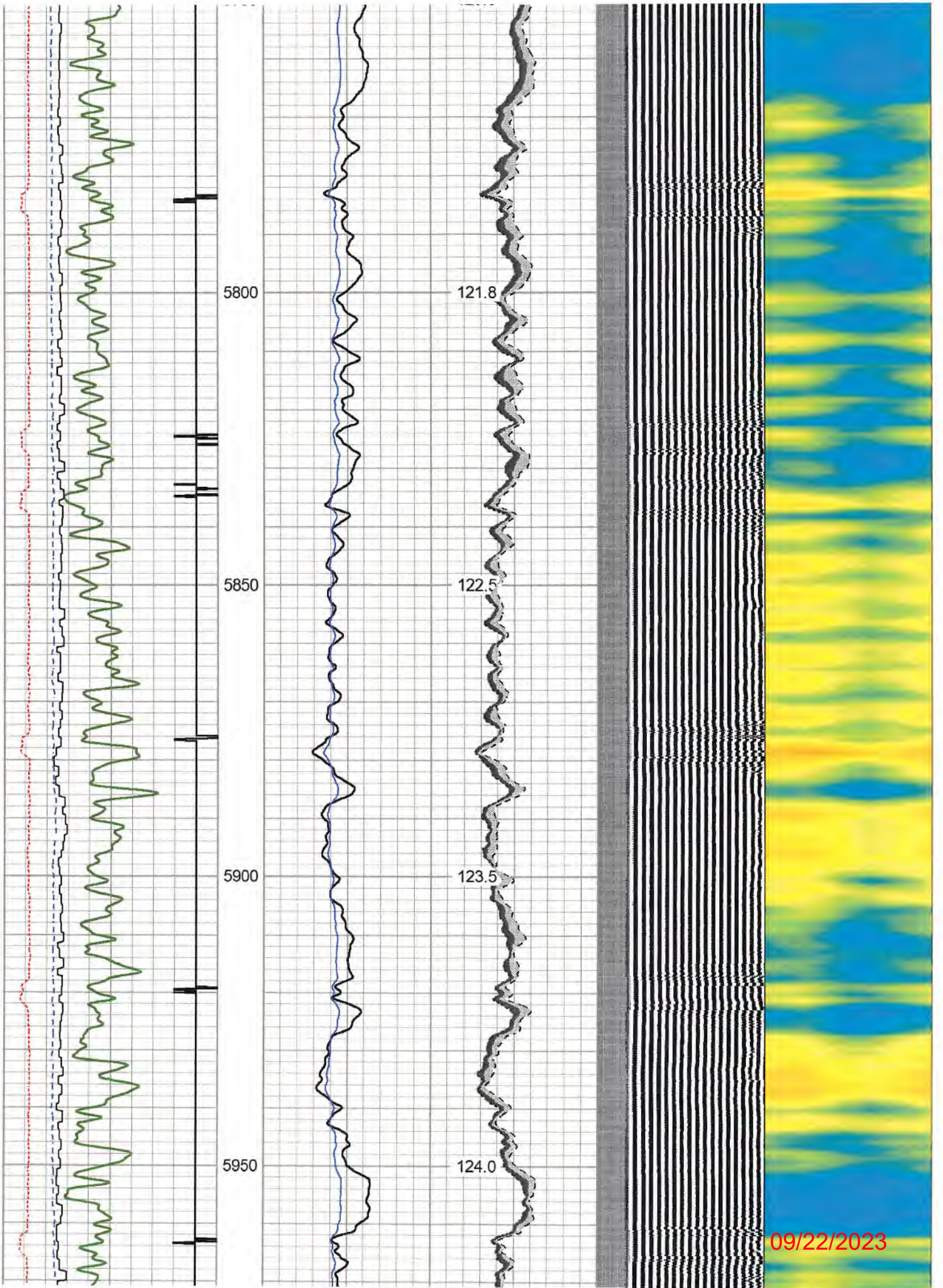


# Repeat Pass 0 PSI

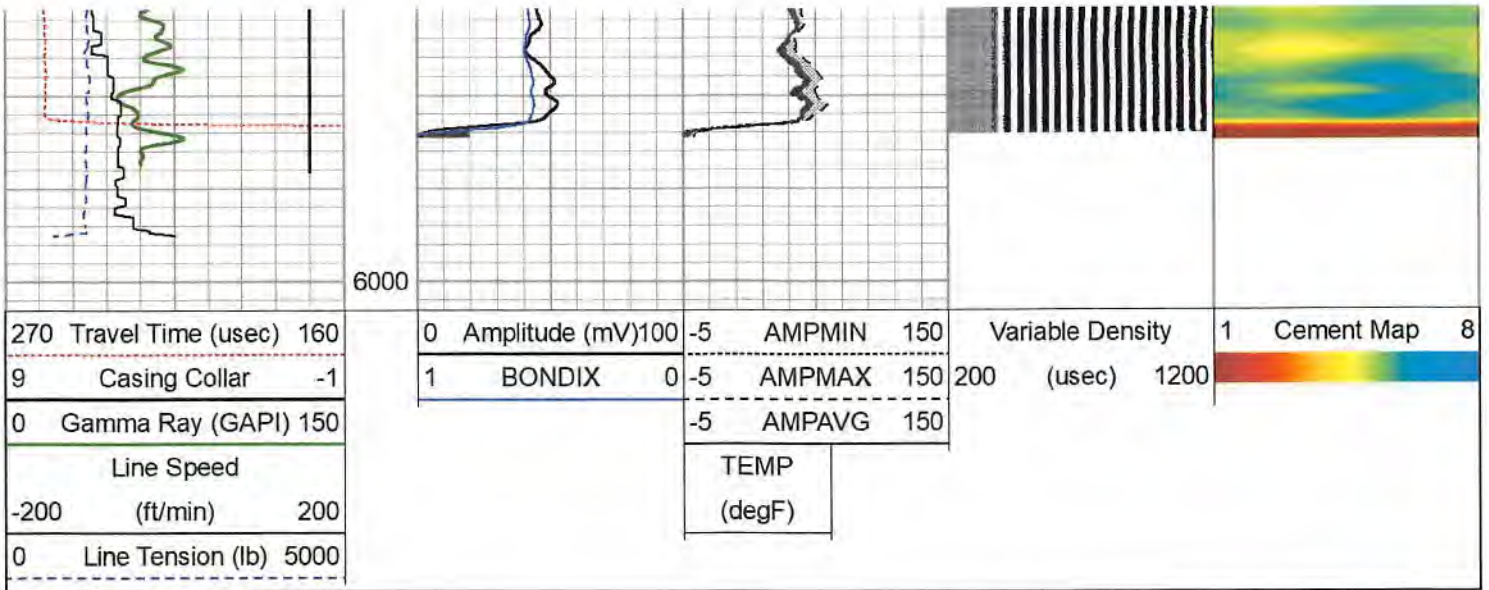
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 Presentation Format: rcbl 2  
 Dataset Creation: Thu Jan 19 10:48:51 2023  
 Charted by: Depth in Feet scaled 1:240

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9	Casing Collar	-1	1	BONDIX	0	-5	AMPMAX	150	200 (usec)	1200		
0	Gamma Ray (GAPI)	150				-5	AMPAVG	150				
	Line Speed			TEMP			(degF)					
-200	(ft/min)	200										
0	Line Tension (lb)	5000										





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### Log Variables

Database C:\ProgramData\Warrior\Data\antero\_crystal\_1h\_rcbl\_19\_jan\_2022.db  
 Dataset field/crystal1h/rcbl/pass6/\_vars\_

**Top - Bottom**

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	CASEWGHT	MAXAMPL	MINAMPL
TEMP	in 7.875	degF 141	in 5.5	in 0.361	lb/ft 20	mV 71.9	mV 2.2
MINATTN	PERFS	PPT	SRFTEMP	TDEPTH			
db/ft 10.8	No	usec 261	degF 50	ft 6925			

**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 antero\_crystal\_1h\_rcbl\_19\_jan\_2022.db  
 Dataset Pathname crystal1h/rcbl/pass6  
 Dataset Creation Thu Jan 19 10:57:21 2023

**Gamma Ray Calibration Report**

Serial Number:	FW1211-86
Tool Model:	Probe
Performed:	Sun Nov 13 11:04:25 2022
Calibrator Value:	1.0 GAPI
Background Reading:	0.0 cps
Calibrator Reading:	1.0 cps
Sensitivity:	0.5000 GAPI/cps

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**Segmented Cement Bond Log Calibration Report**

**09/22/2023**

Serial Number:	2.75"
Tool Model:	Probe 275T

1001 Model:

Probe/CSI

Calibration Casing Diameter: 5.500 in  
 Calibration Depth: 720.117 ft

Master Calibration, performed Thu Jan 19 10:32:37 2023:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3'	0.007	0.928	2.200	71.921	75.763	1.645
CAL	0.993	1.490				
5'	-0.005	0.956	2.200	71.921	72.595	2.554
SUM						
S1	0.089	0.975	0.000	100.000	112.910	-10.064
S2	0.006	0.903	0.000	100.000	111.477	-0.659
S3	-0.001	0.963	0.000	100.000	103.779	0.077
S4	-0.005	0.966	0.000	100.000	102.977	0.518
S5	-0.009	0.951	0.000	100.000	104.175	0.929
S6	-0.013	0.945	0.000	100.000	104.462	1.320
S7	0.000	0.933	0.000	100.000	107.173	-0.041
S8	0.004	0.918	0.000	100.000	109.335	-0.402


Internal Reference Calibration, performed Wed Nov 23 14:17:52 2011:

	Raw (v)		Calibrated (v)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
CAL	0.000	0.000	0.993	1.490	1.000	0.000

Air Zero Calibration, performed Wed Jan 11 18:02:46 2023:

	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

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 WV Department of  
 Environmental Protection

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
HeadVolt	16.95		CHD-Titan Standard 1 7/16" Cable Head	1.02	1.44	1.00
			CENT-Overbody Antelope (SP-919-0233)	1.67	4.88	5.00
Temp	14.10					

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temp	14.10					
WVFS8	11.86		RBT-Probe275T (2.75") Probe 2.75" Radial with Integral Temperature Sub	9.39	2.75	90.00
WVFS7	11.86					
WVFS6	11.86					
WVFS5	11.86					
WVFS4	11.86					
WVFS3	11.86					
WVFS2	11.86					
WVFS1	11.86					
WVF3FT	11.86					
WVF5FT	10.86					
WVFCAL	7.61					
HEADVOLT	7.61					
CCL	6.71					
GR	5.38		GR-Probe (FW1211-86) Probe 2 3/4" Logging Gamma Ray	4.78	2.75	57.00
			CENT-Overbody Antelope (SP-919-0233)	1.67	4.88	5.00
			Centralizer-Probe_2.75 Bowspring Centralizer	2.83	2.75	24.00

Dataset: antero\_crystal\_1h\_rcbl\_19\_jan\_2022.db: field/crystal1h/rcbl/pass6  
 Total length: 18.03 ft  
 Total weight: 182.00 lb  
 O.D.: 4.88 in

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Company ANTERO RESOURCES  
 Well Beech Run Crystal 1H  
 Field Rabbit Ears  
 County Tyler  
 State WV

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