Schlumberger

Company: Noble Energy Inc

Well: Hullabaloo State Y21-769

Field: Wattenberg

County: Weld State: Colorado

UltraSonic Summary Print

County: Weld
Field: Wattenberg
Location: NWNW Sec. 16, T2N, R64W
Well: Hullabaloo State Y21-769
Company: Noble Energy Inc

Location:				
NWNW Sec. 16, T2N, R64W		Elev.:	K.B.	4953.00 ft
SHL: 100' FSL & 1395' FWL			G.L.	4923.00 ft
Lat/Long: 40.14456 / -104.5626			D.F.	4953.00 ft
Permanent Datum:	Ground Level	Elev.:	4923.00 f	
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

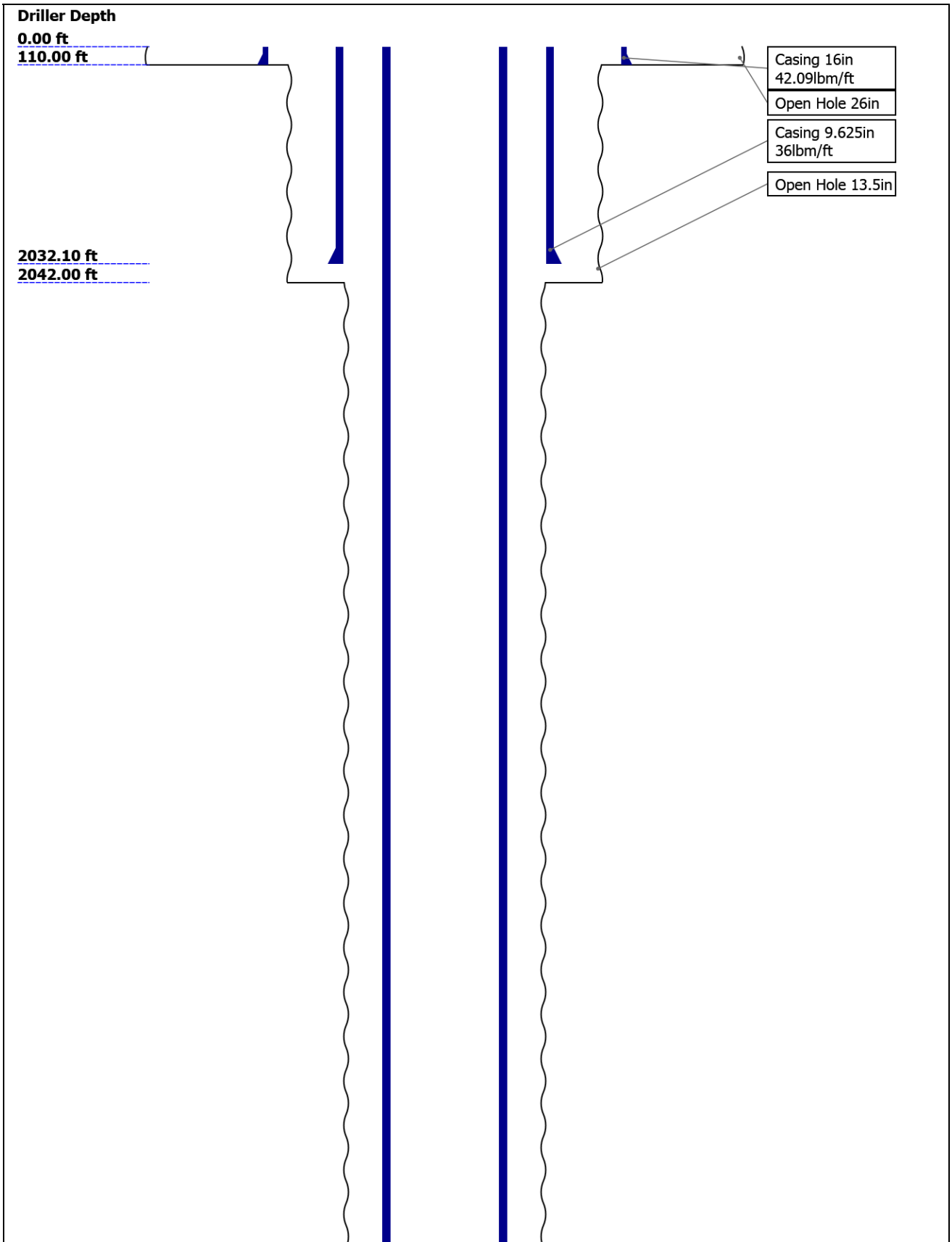
API Serial No.	Section:	Township:	Range:
05-123-45237	16	2N	64W

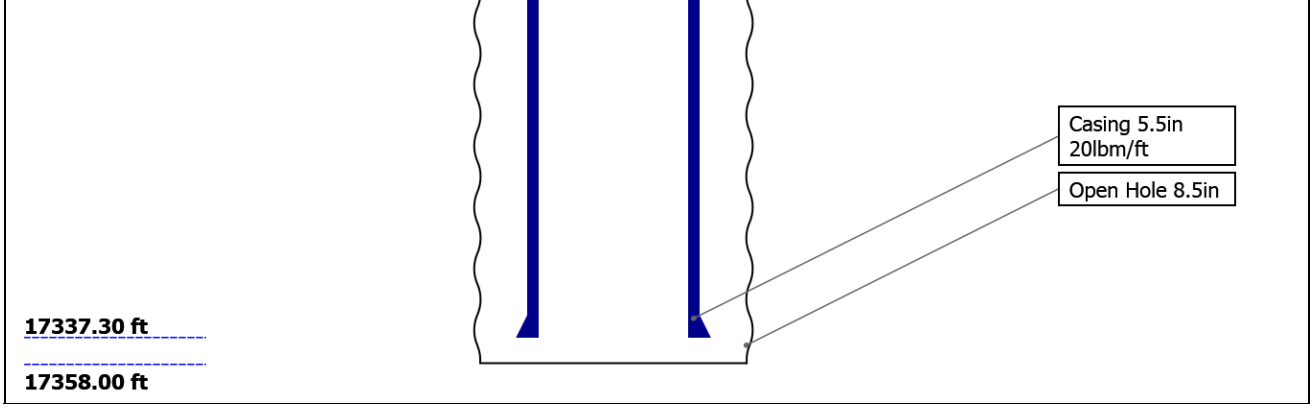
Logging Date	05-Oct-2017		
Run Number	ONE		
Depth Driller	17358.00 ft		
Schlumberger Depth	17358.00 ft		
Bottom Log Interval	6560.00 ft		
Top Log Interval	50.00 ft		
Casing Fluid Type	Brine		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	0.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.50 in		
From	2042.00 ft		
To	17358.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	P110		
From	0.00 ft		
To	17337.30 ft		
Max Recorded Temperatures	215 degF		
Logger on Bottom Time	05-Oct-2017	09:08:00	
Unit Number Location:	2161	Fort Morgan, CO	
Recorded By	A.BLOCHOWICZ		
Witnessed By	BILL MANSFIELD		

Disclaimer

Contents

Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	2042			
Top Logger (ft)	0	110	2042			
Bottom Driller (ft)	110	2042	17358			
Bottom Logger (ft)	110	2042	17358			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	42.09	36	20			
Inner Diameter (in)	15.511	8.921	4.778			
Grade	N/A	J55	P110			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	2032.1	17337.3			
Bottom Logger (ft)	110	2032.1	17337.3			

Operational Run Summary

Parameter (unit)	ONE					
Date Log Started	05-Oct-2017					
Time Log Started	08:27:35					
Date Log Finished	05-Oct-2017					
Time Log Finished	10:06:27					
Top Log Interval (ft)	50.00					
Bottom Log Interval (ft)	6560.00					
Total Depth (ft)	6560.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	8.500					
Logging Unit Number	2161					
Logging Unit Location	Fort Morgan, CO					
Recorded By	A.BLOCHOWICZ					

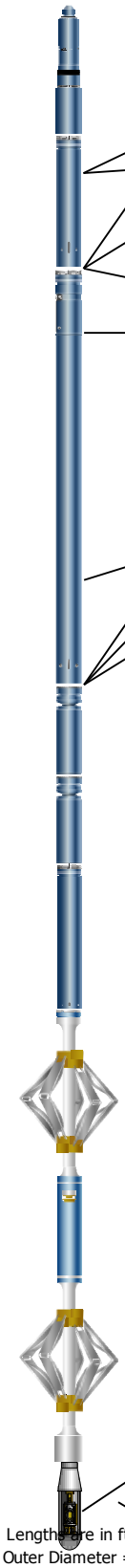
Witnessed By	BILL MANSFIELD					
Service Order Number	DXCR-00005					

Remarks and Equipment Summary

ONE: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	**34.88**		
LEH-QT			
DTC-H:8602	**31.97**	**CTEM**	**31.07**
		HV	**0.00**
		TelStatus	**28.97**
		ToolStatus	**28.97**
HGNS-H:4736	**28.97**	**Temperature**	**28.94**
		GR	**28.23**
		CNL Porosity	**21.89**
		HGNS	**19.56**
		HMCA	**19.56**
		Accelerometer	**0.00**
AH-184[2]	**19.56**		
AH-184[1]:5941	**17.56**		
USIT-E:930	**15.56**		
USI Sensor	**0.37**		
Head Tension			

ECH-KC:9680
DTC-H:8602
HGNH:2987
NPV-N
NSR-F:5068
HMCA-H
HACCZ-H:5118
HGNS-H:4736
2765
ECH-MFA:1924
USAC-A:930
USIS-A:1826
USSC-B:1778
USRS-AB:873
USI-SENSOR:1014
TOOL_ZERO



Length are in ft
Maximum Outer Diameter = 3.410 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

ONE: Remarks

Thank you for choosing Schlumberger!
Tool string run as per tool sketch.
This is the first log in well.
Main Pass logged at 2500 PSI. Repeat logged at 0 PSI
Lead Cement: 13.2#
BHT: 213.5 deg F

Depth Summary

	ONE		
Depth Measuring Device			

Type	IDW-B		
Serial Number	5836		
Calibration Date	12-SEP-2017		
Calibrator Serial Number			
Calibration Cable Type	7-39pxs		
Wheel Correction 1	-4		
Wheel Correction 2	-2		

Tension Device

Type	CMTD-B/A		
Serial Number	1109		
Calibration Date	12-SEP-2017		
Calibrator Serial Number	441345a		
Number of Calibration Points	10		
Calibration Root Mean Square Error	7		
Calibration Peak Error	11		

Logging Cable

Type	7-39PI-XS		
Serial Number	F713311		
Length	12800.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane USA		

ONE:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth control policies followed.
Rig Up Length At Surface		IDW used as primary depth reference.
Rig Up Length At Bottom		Z-chart used as secondary depth reference.
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[4]:Up	6562.05	42.72

Fluid Velocity = "Automatic".
CFVL equals DFSL channel

Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)

Mud Impedance = "FreePipe Norm.".
Free Pipe normalization zone is : 14.21m(46.63ft) to 20.24m(66.42ft)
MUD_N_FRP = 1.18
DFD = 1.01g/cm3(8.40lbm/gal)
CZMD median computed in free pipe normalization interval = 1.71 MRayl

Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)

ONE

2500 PSI Main Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP2	7.2.87778.3100

Pass Summary

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	42.72 ft	6562.05 ft	05-Oct-2017 9:08:36 AM	05-Oct-2017 10:06:08 AM	ON	3.38 ft	Yes

All depths are referenced to toolstring zero

Log

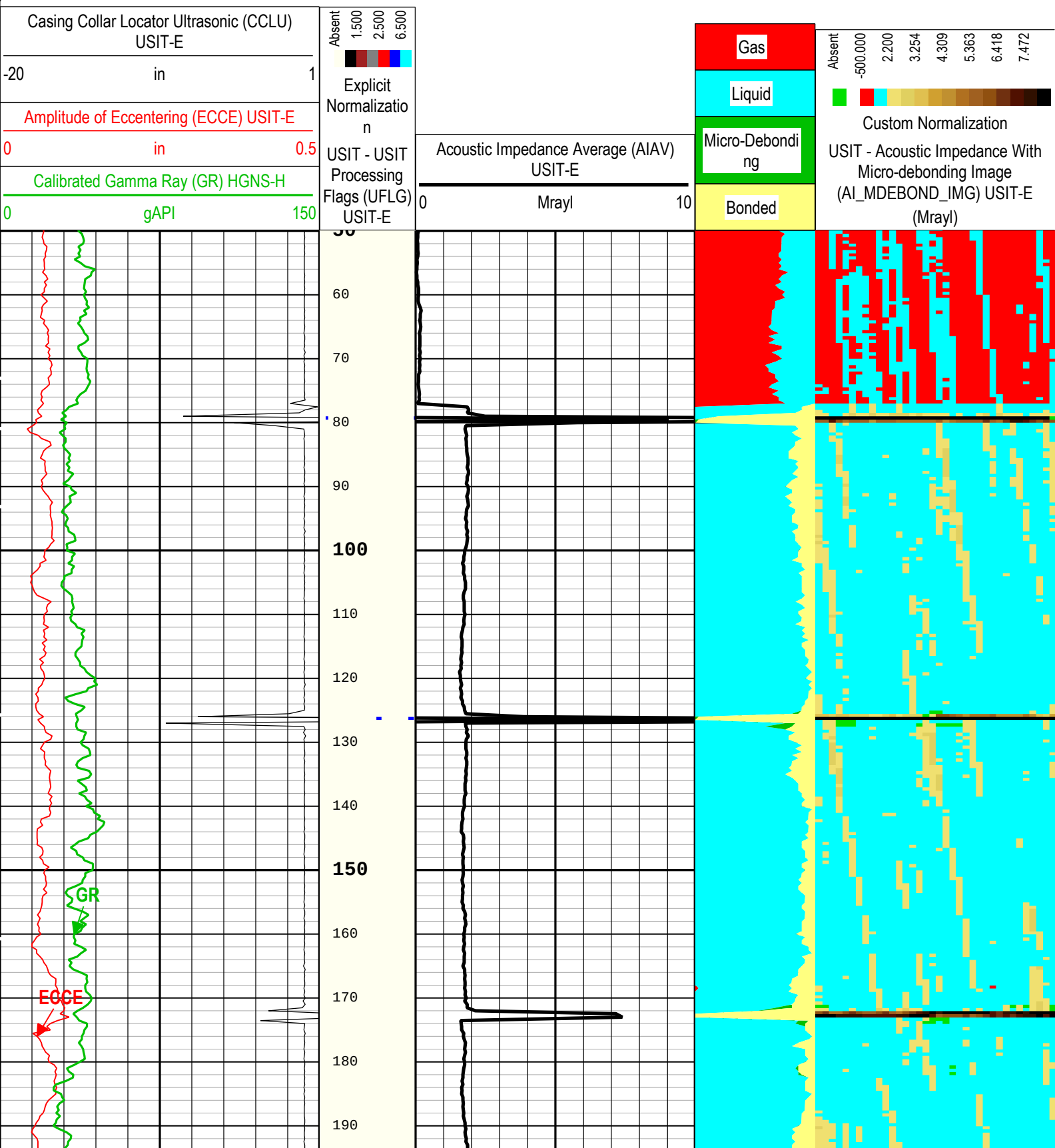
Company:Noble Energy Inc Well:Hullabaloo State Y21-769

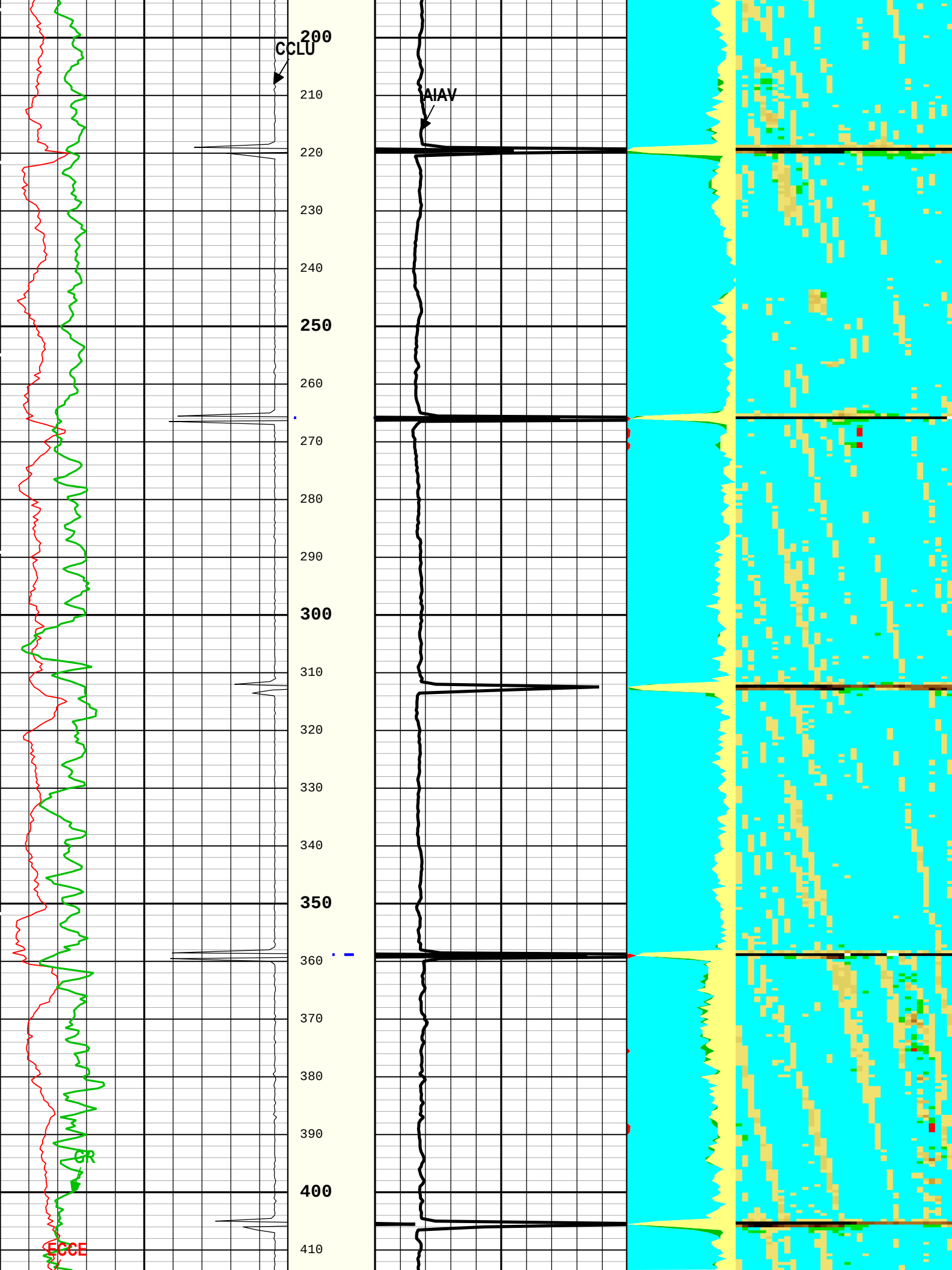
ONE: Log[4]:Up:S003

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 05-Oct-2017 10:50:17

TIME_1900 - Time Marked every 60.00 (s)

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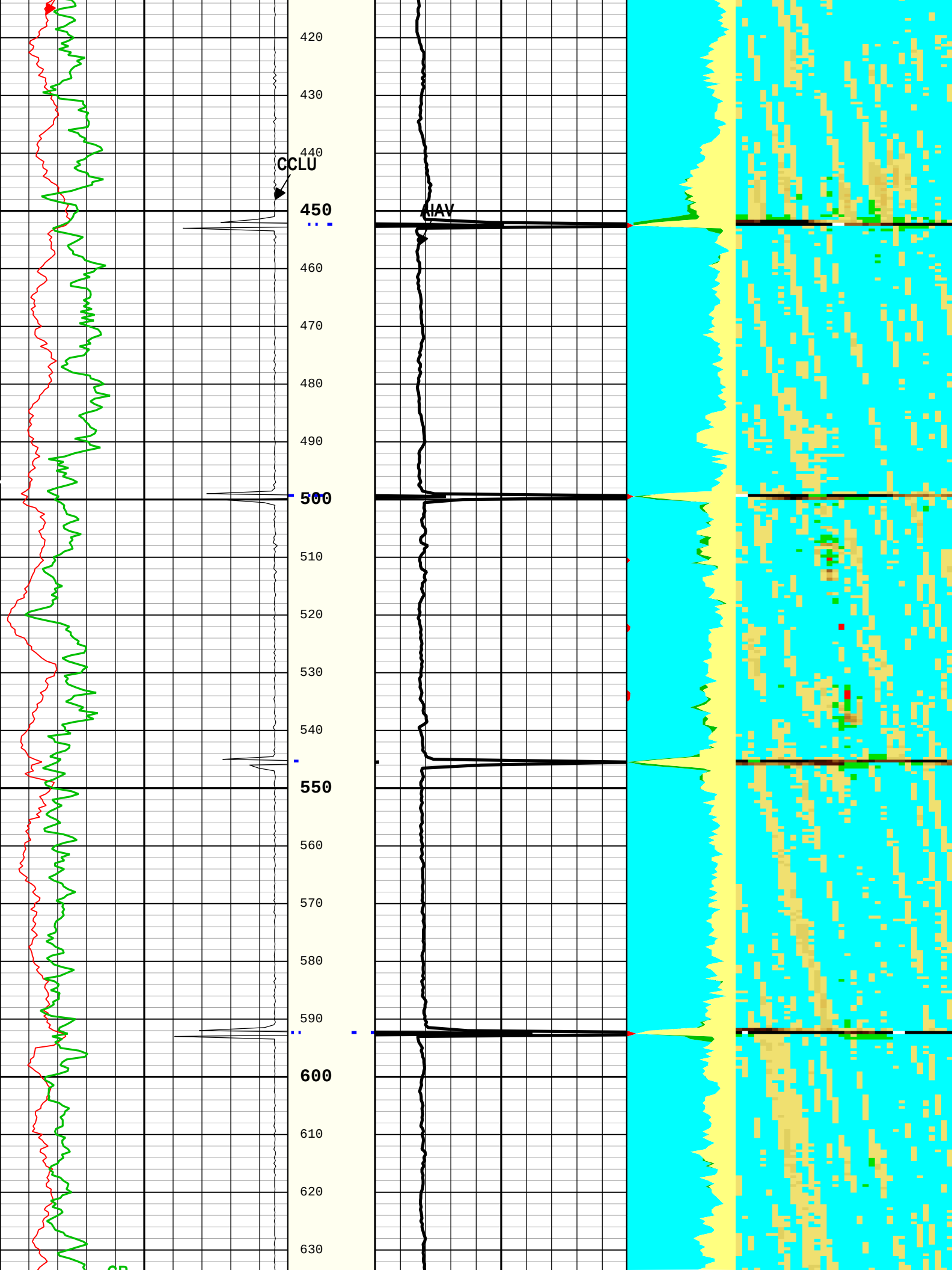
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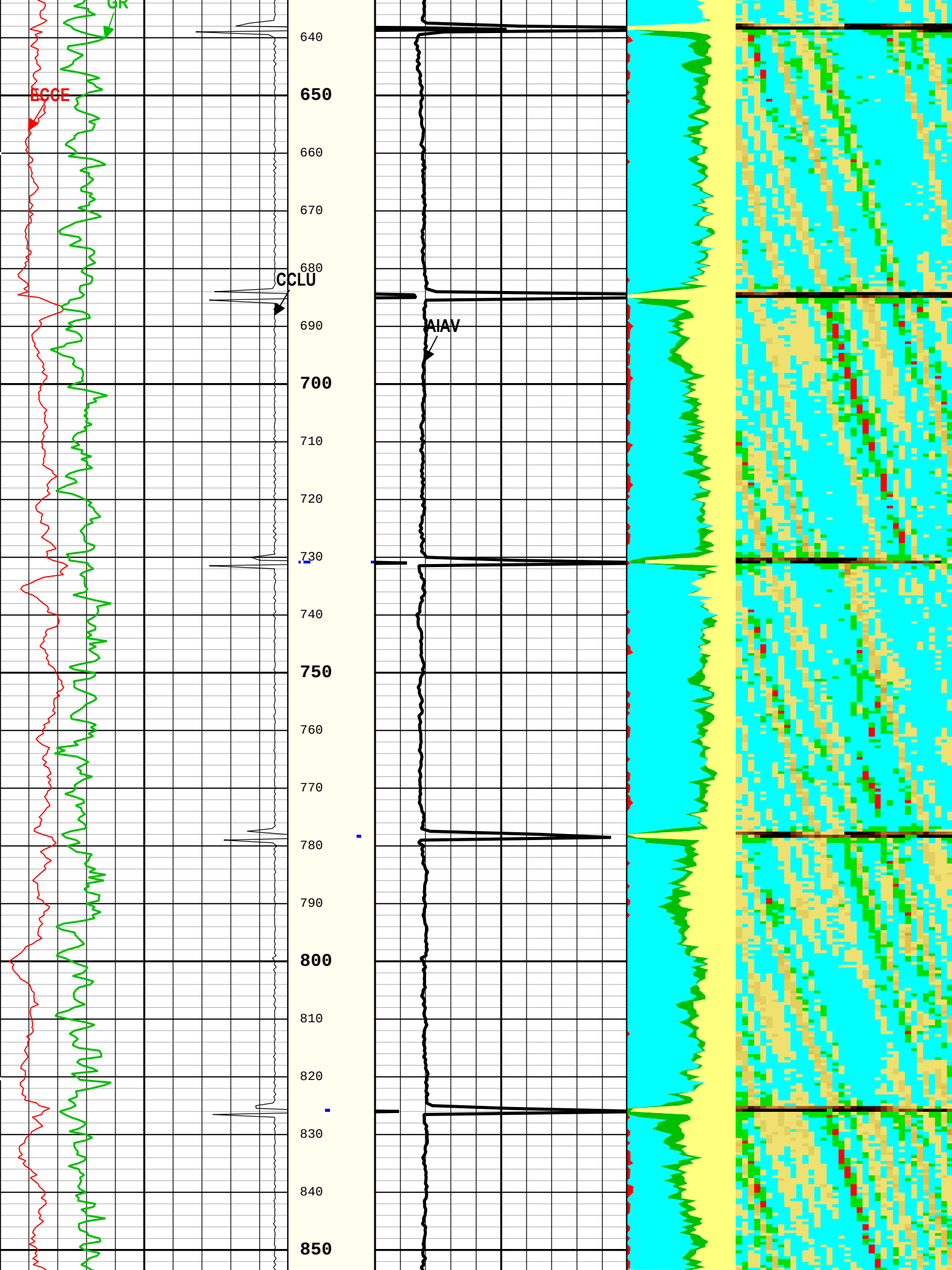
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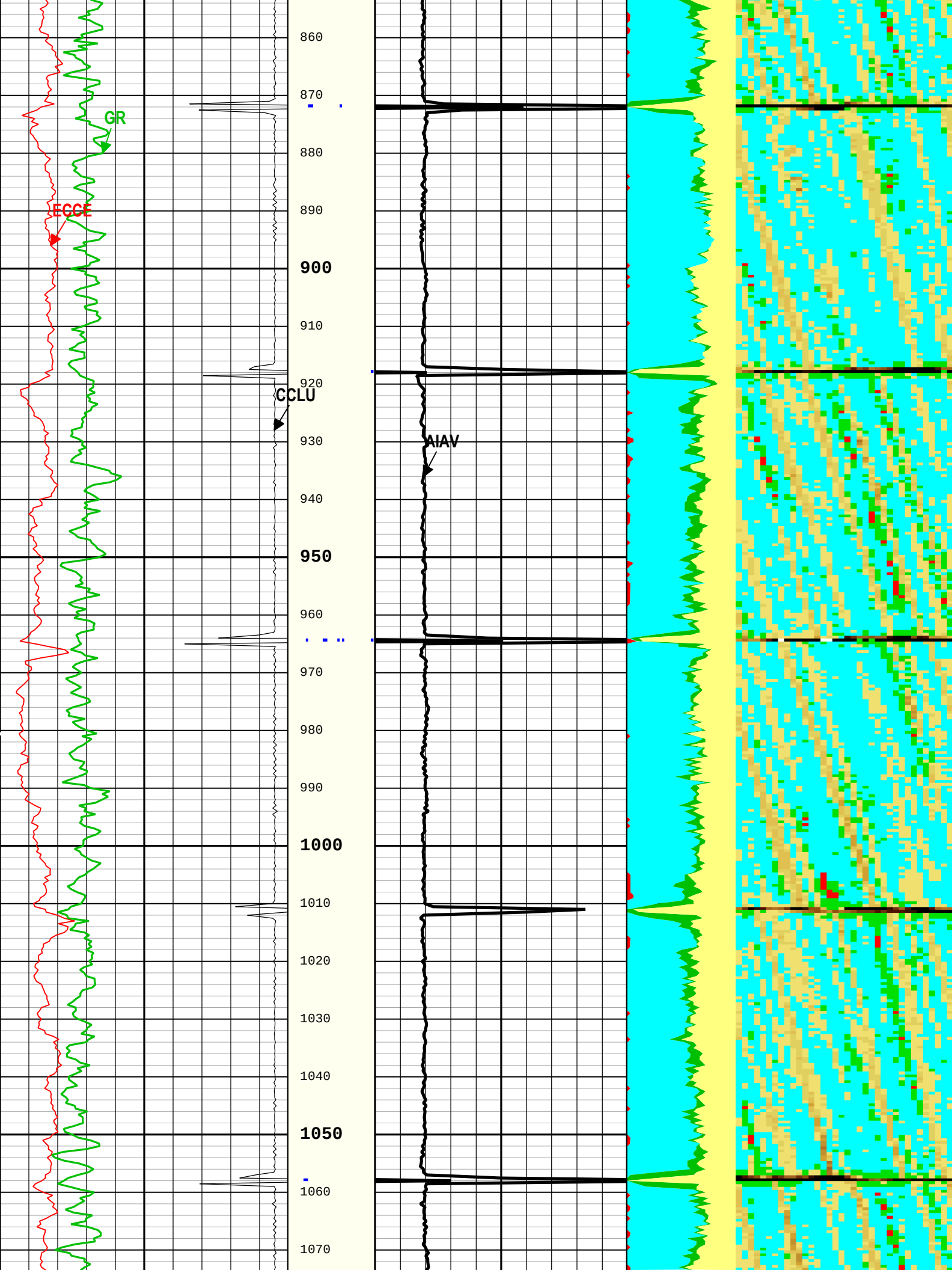
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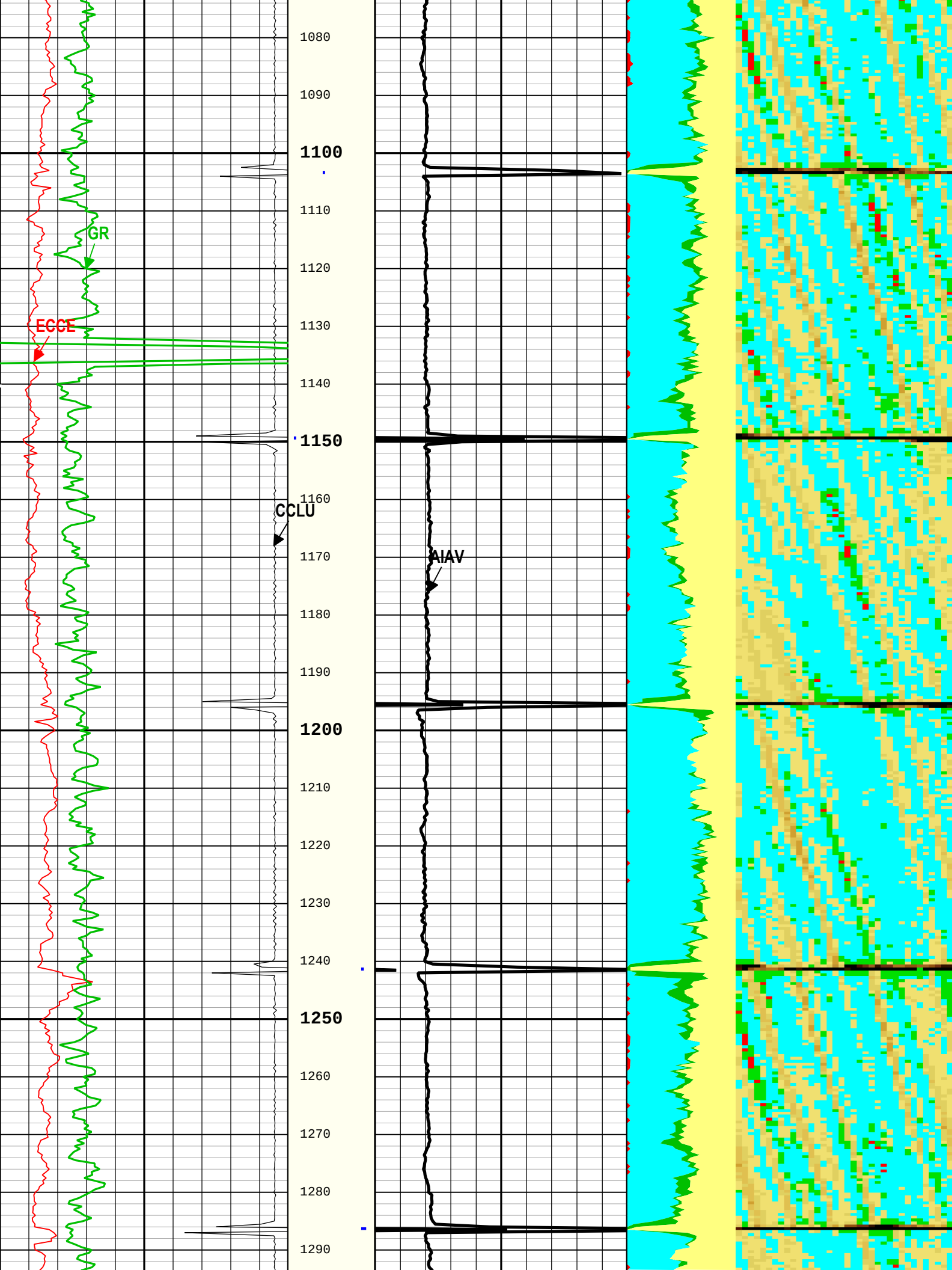
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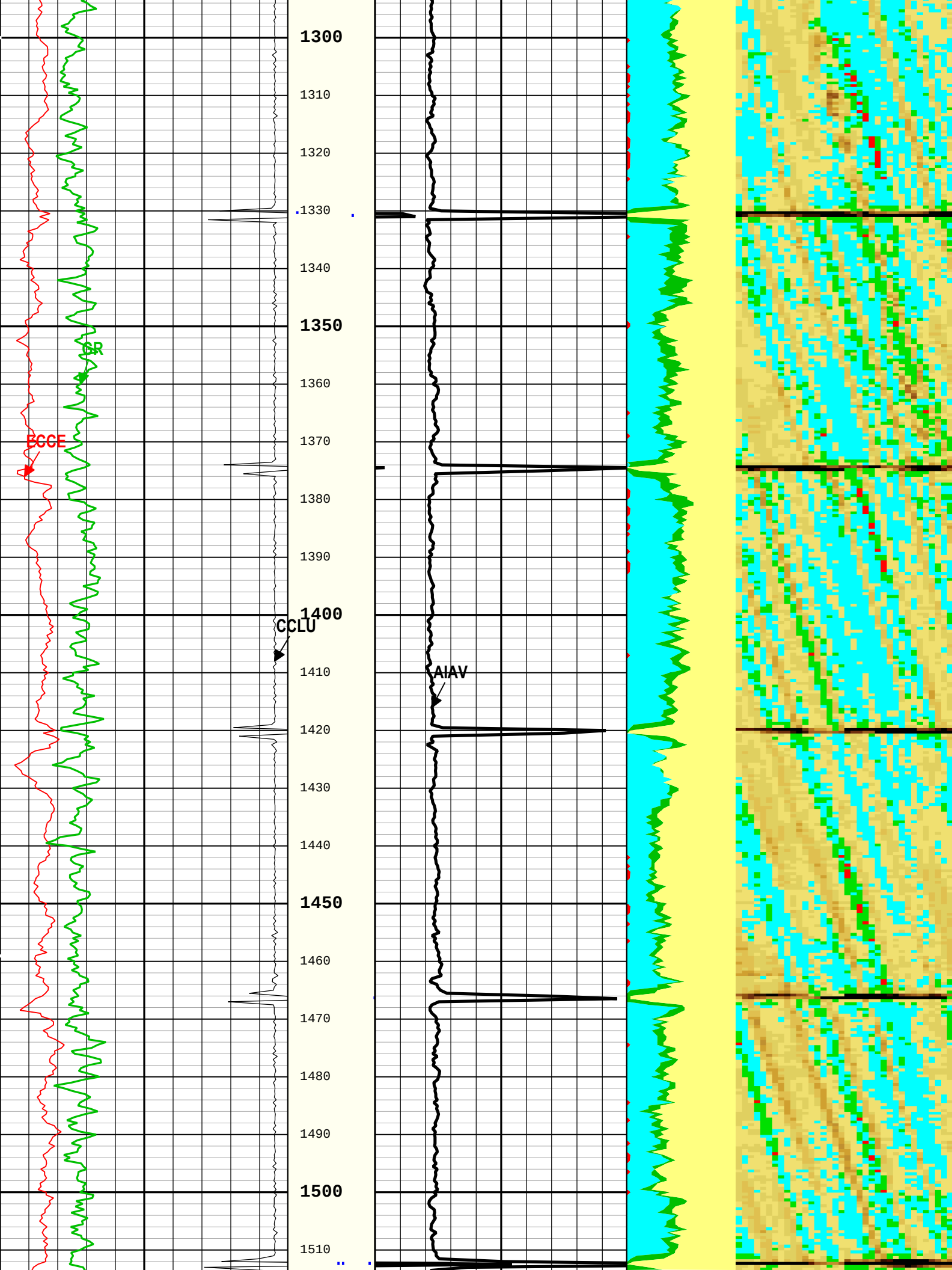
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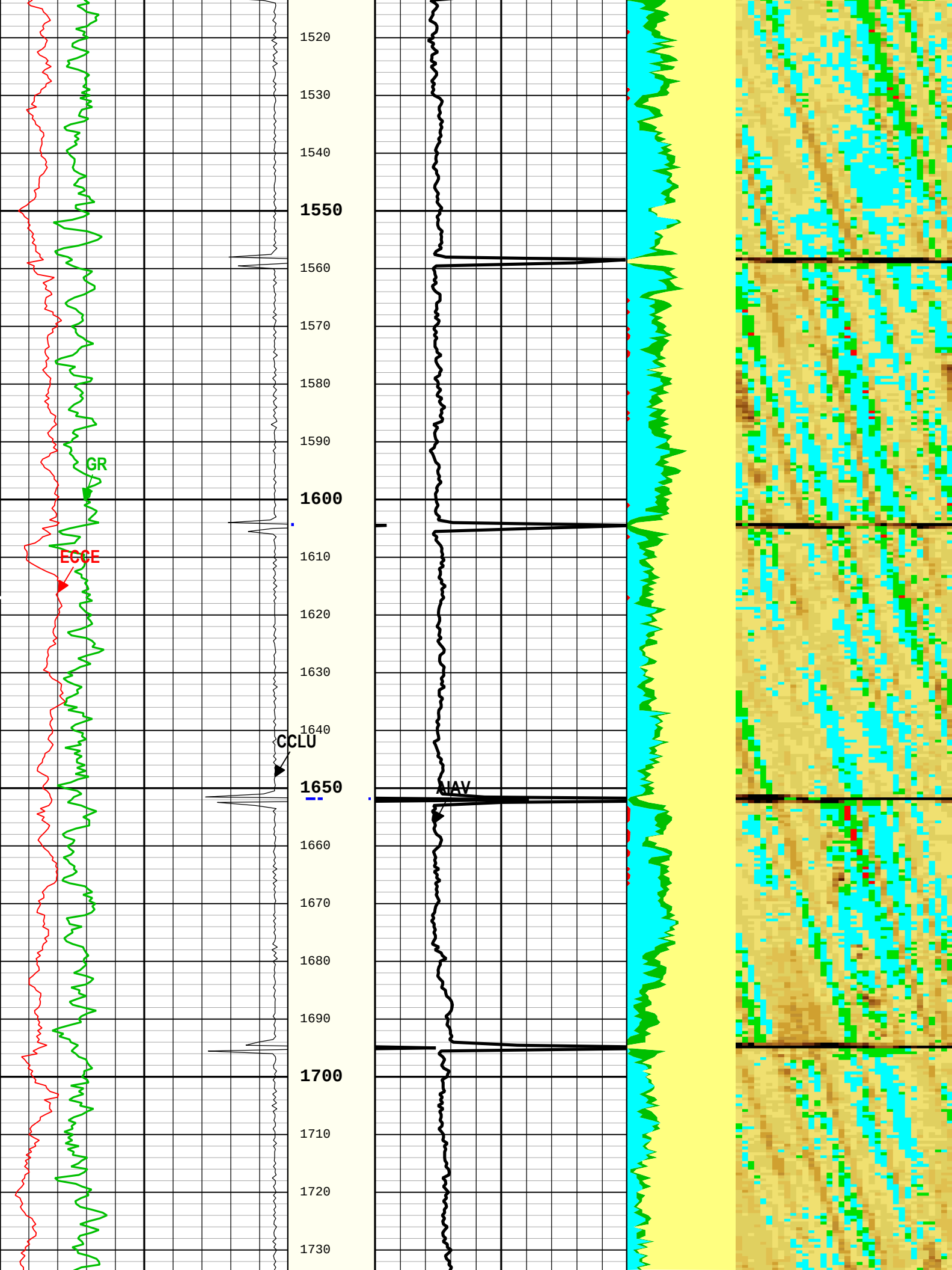
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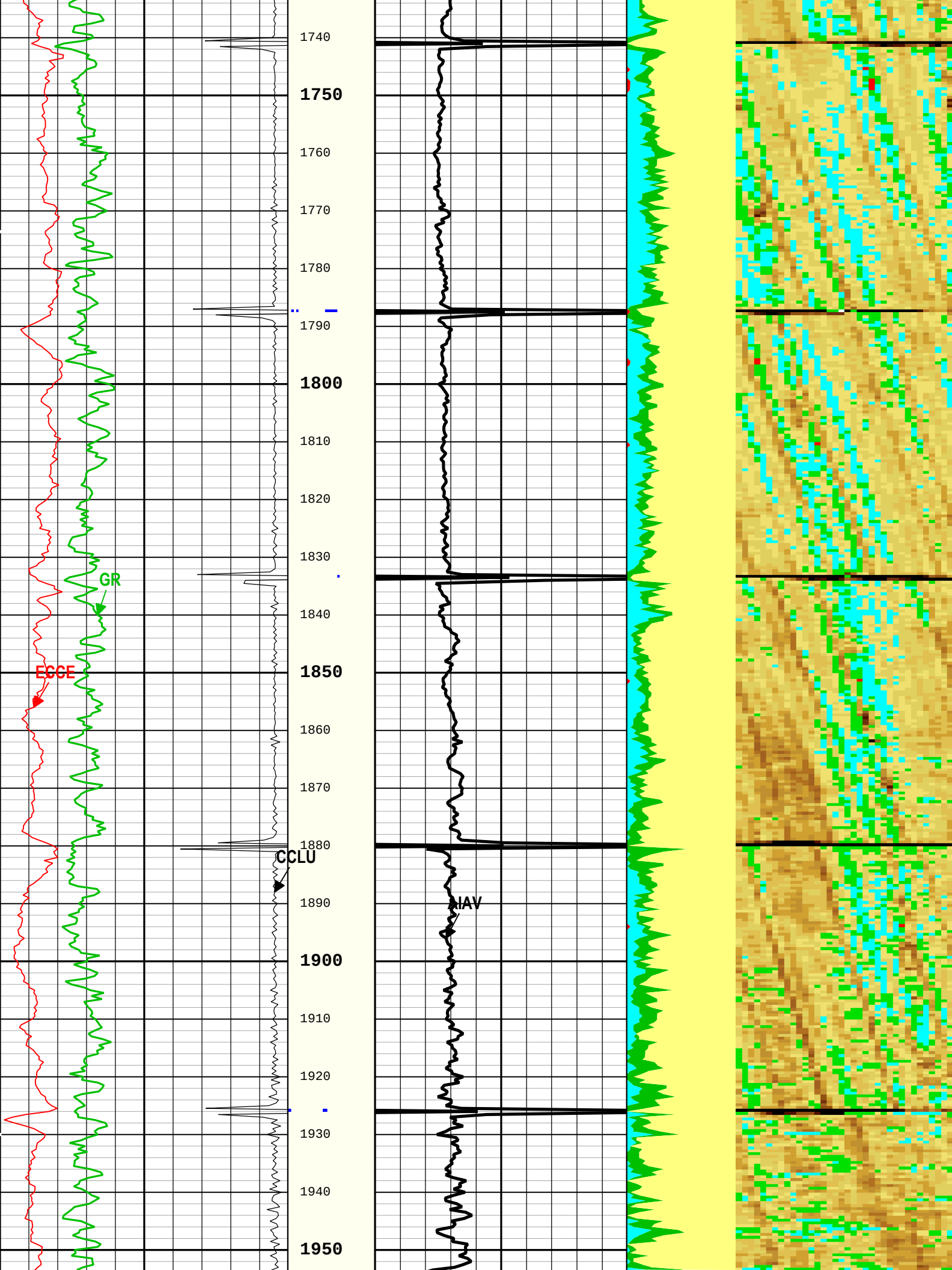
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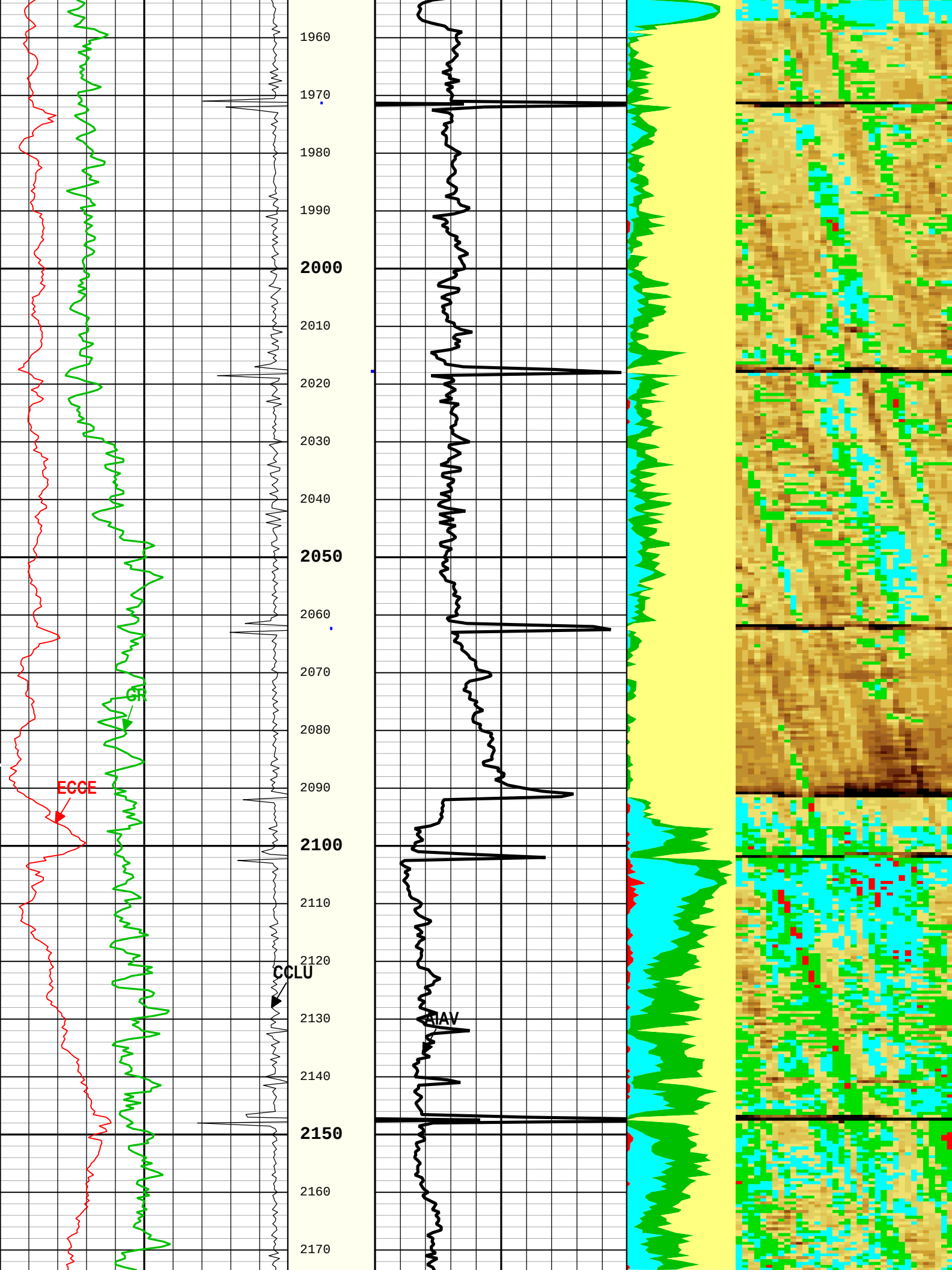
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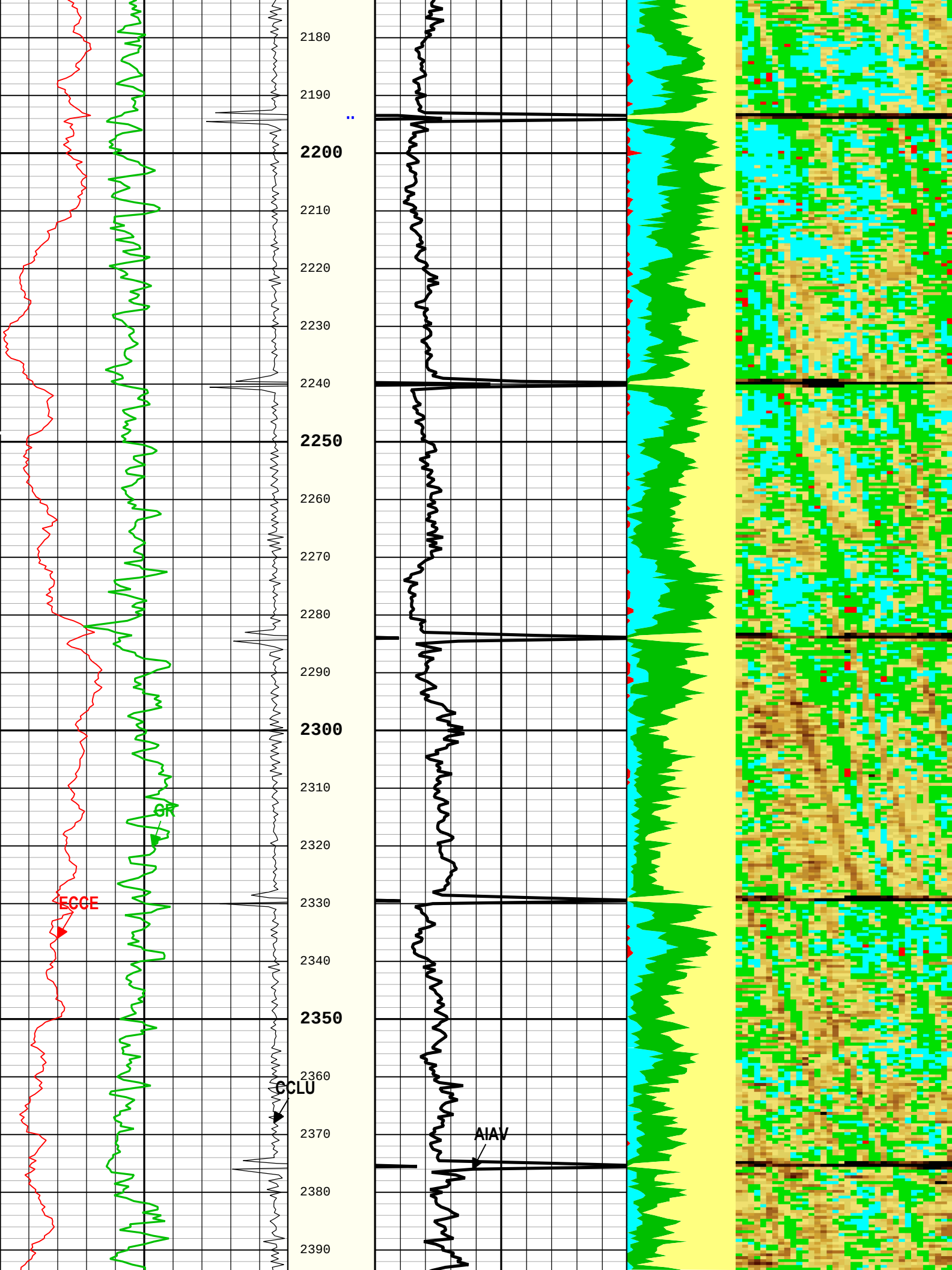
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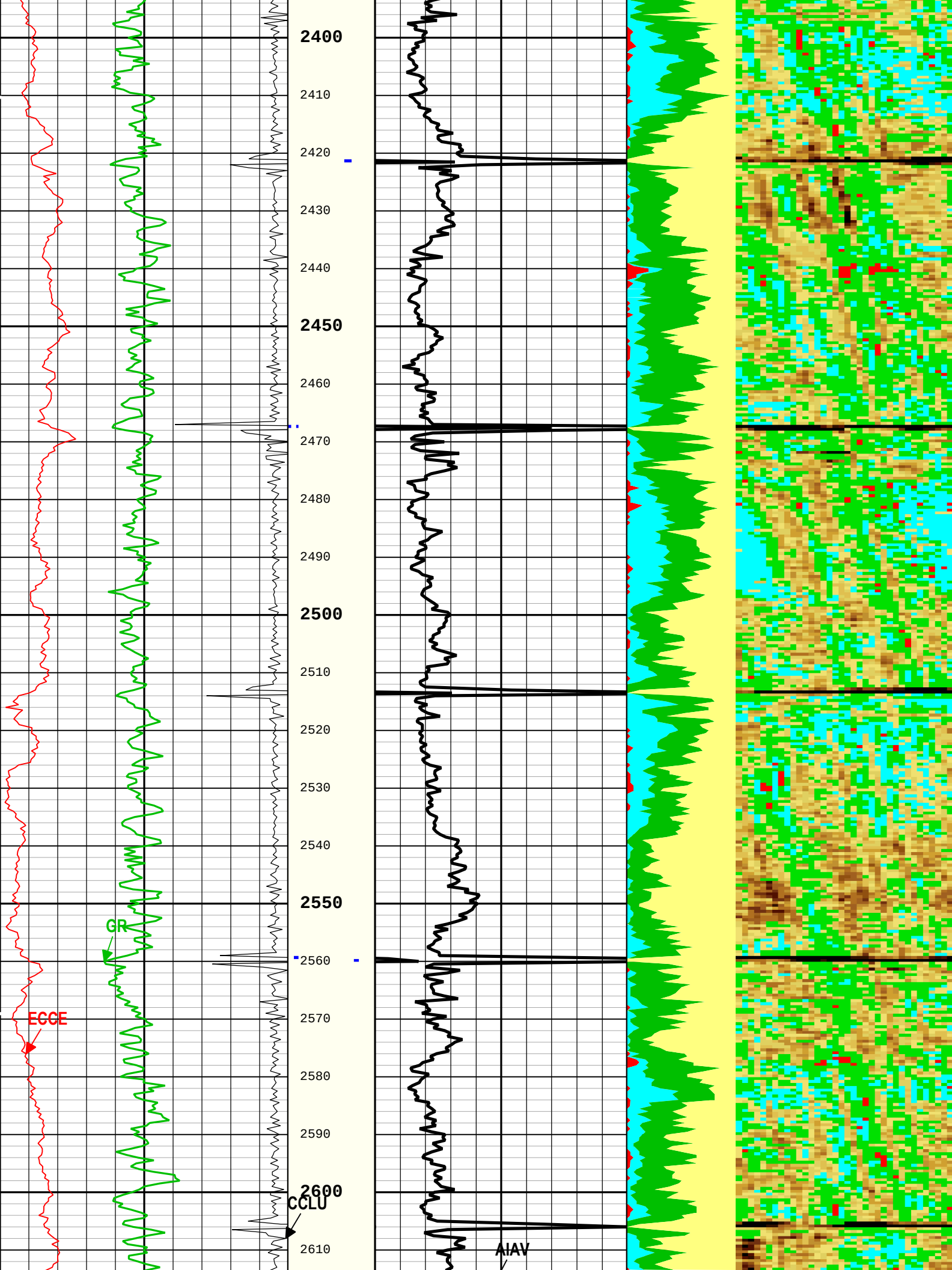
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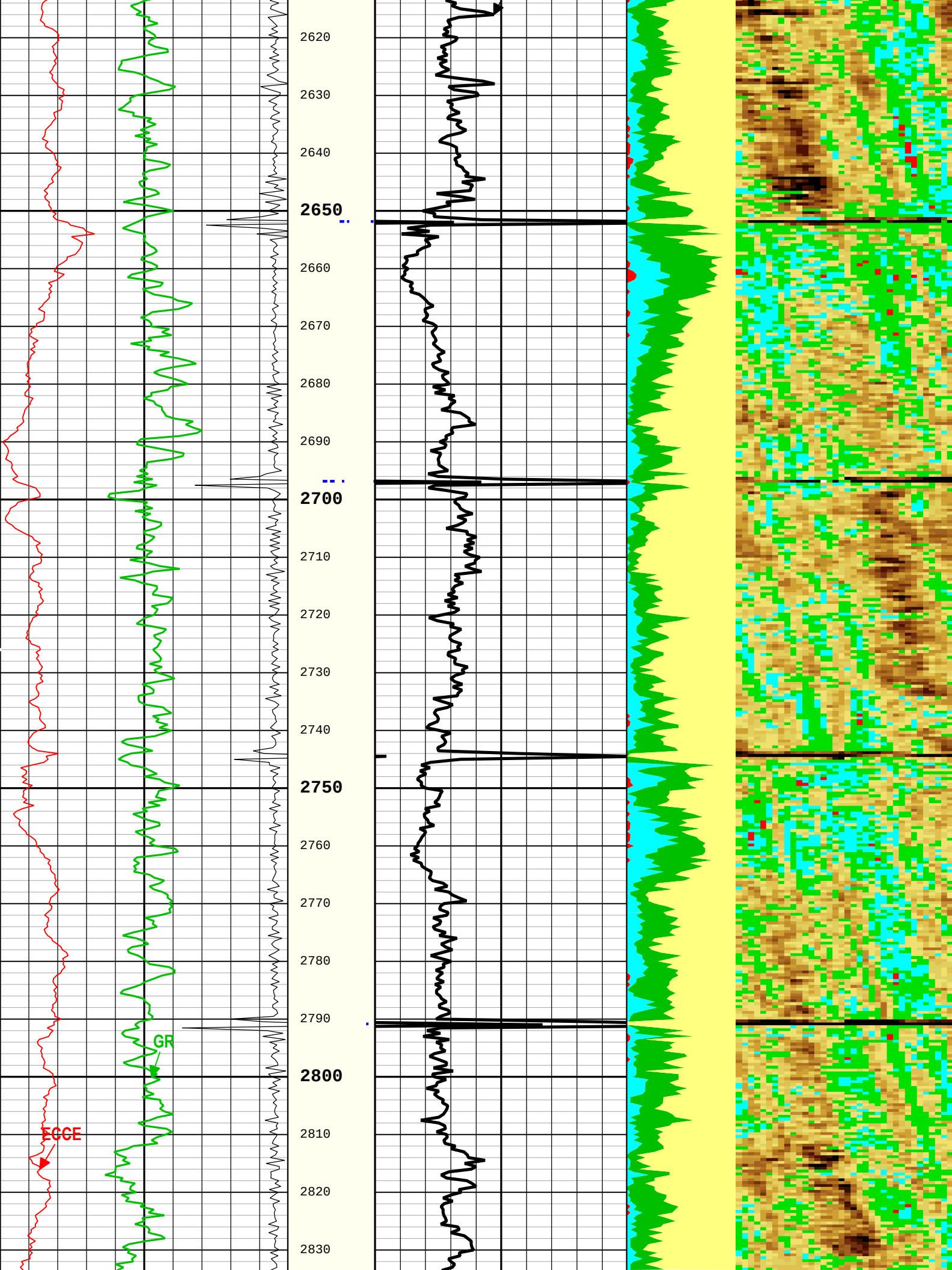
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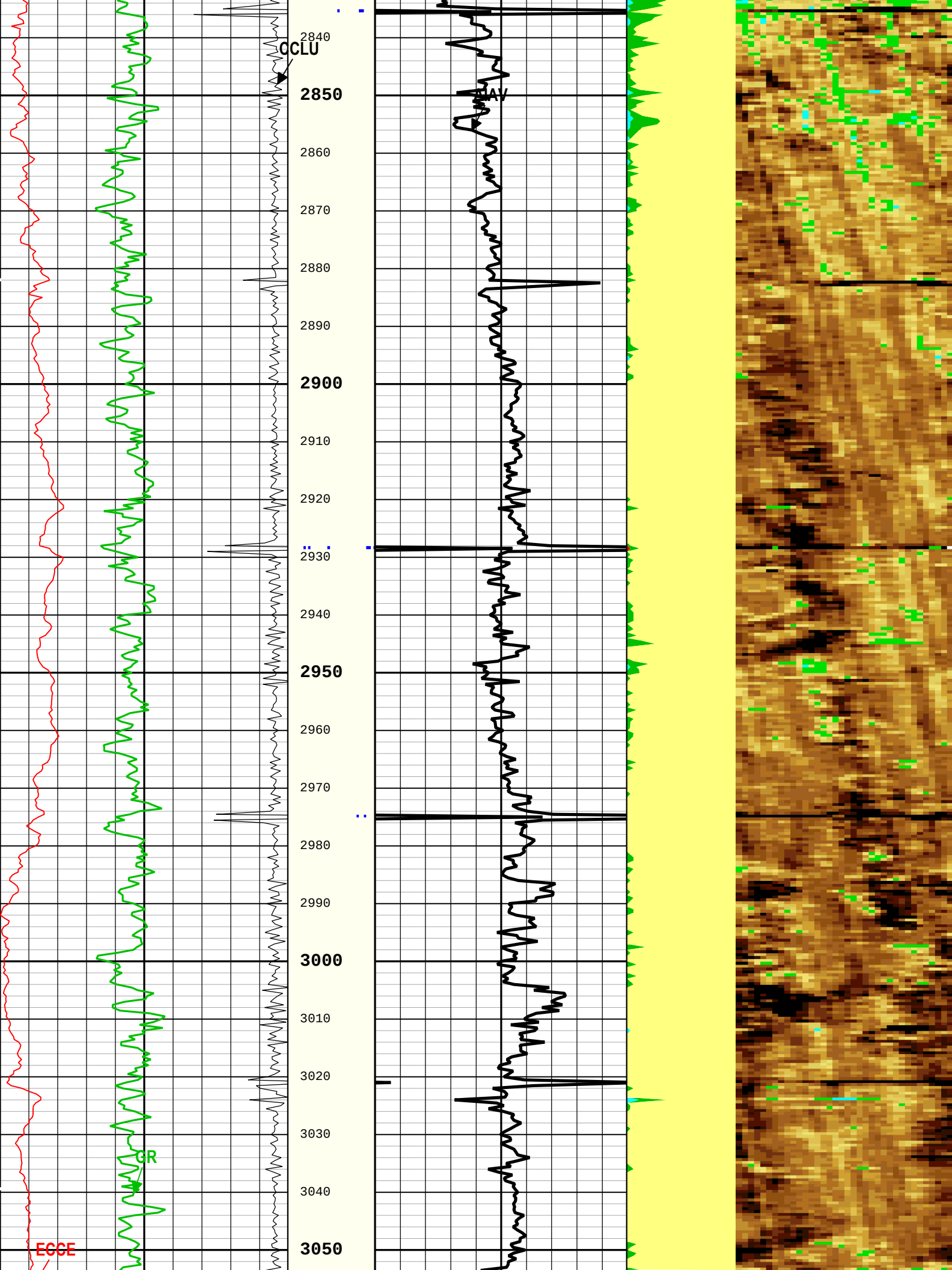
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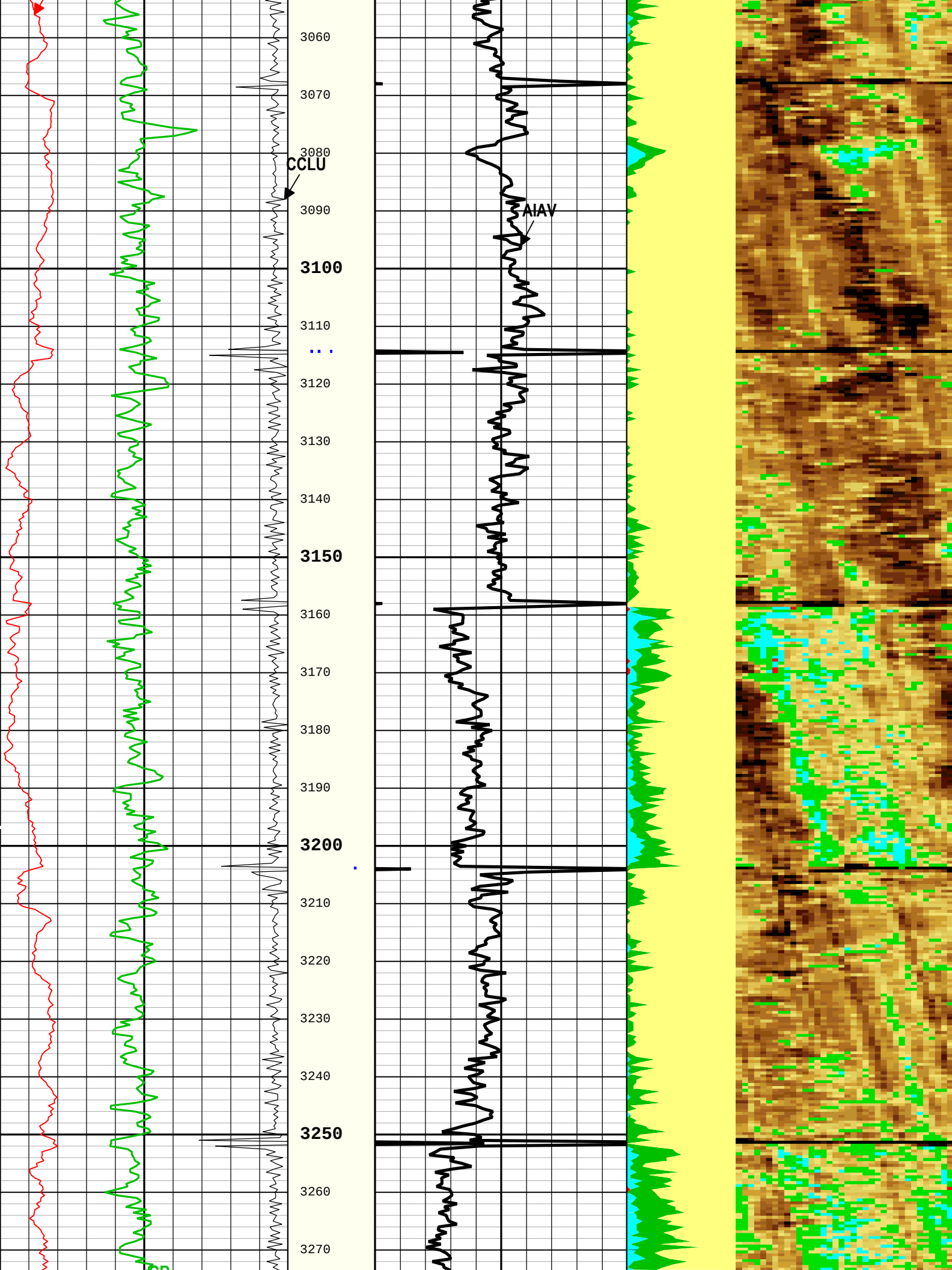
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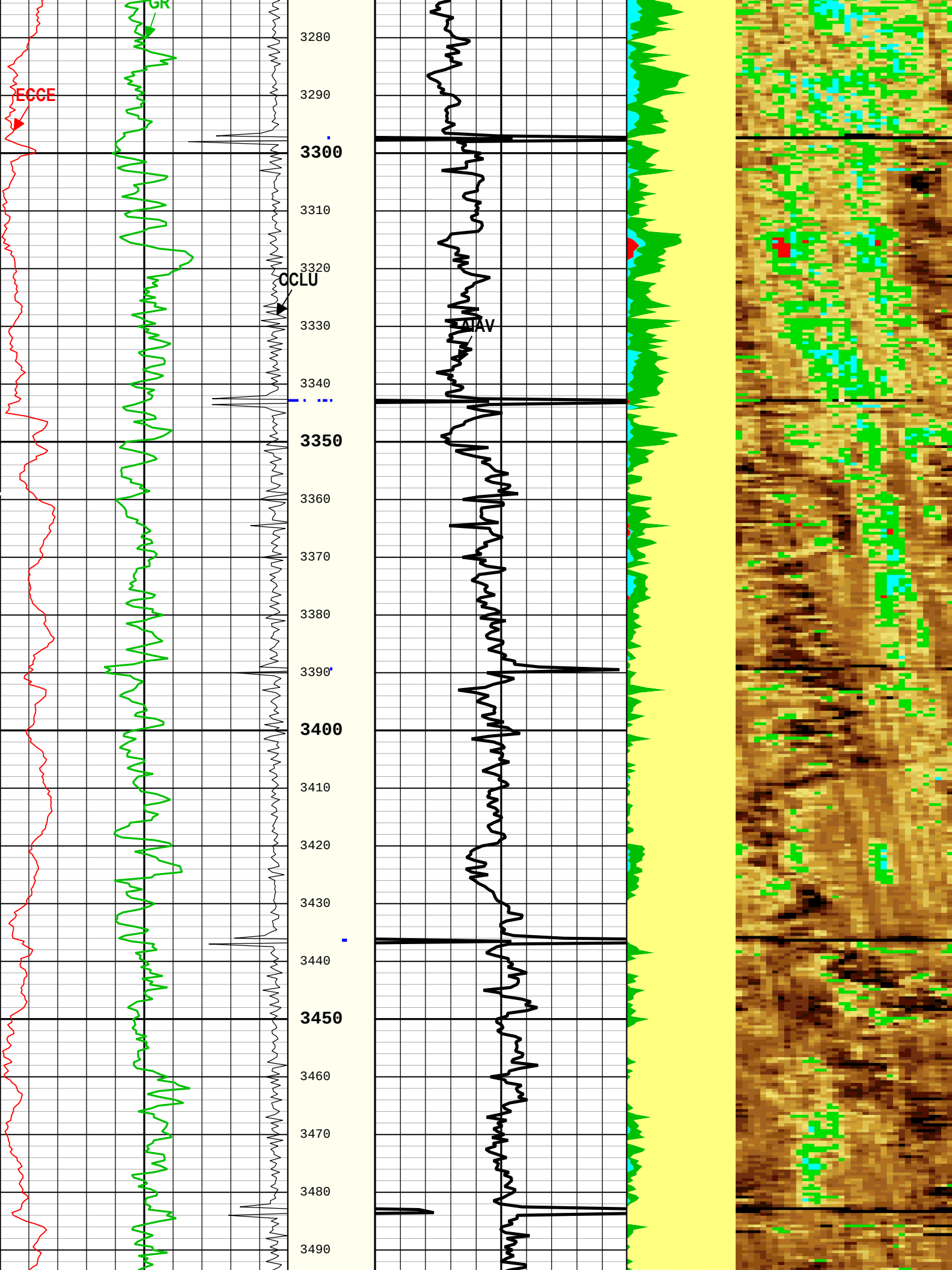
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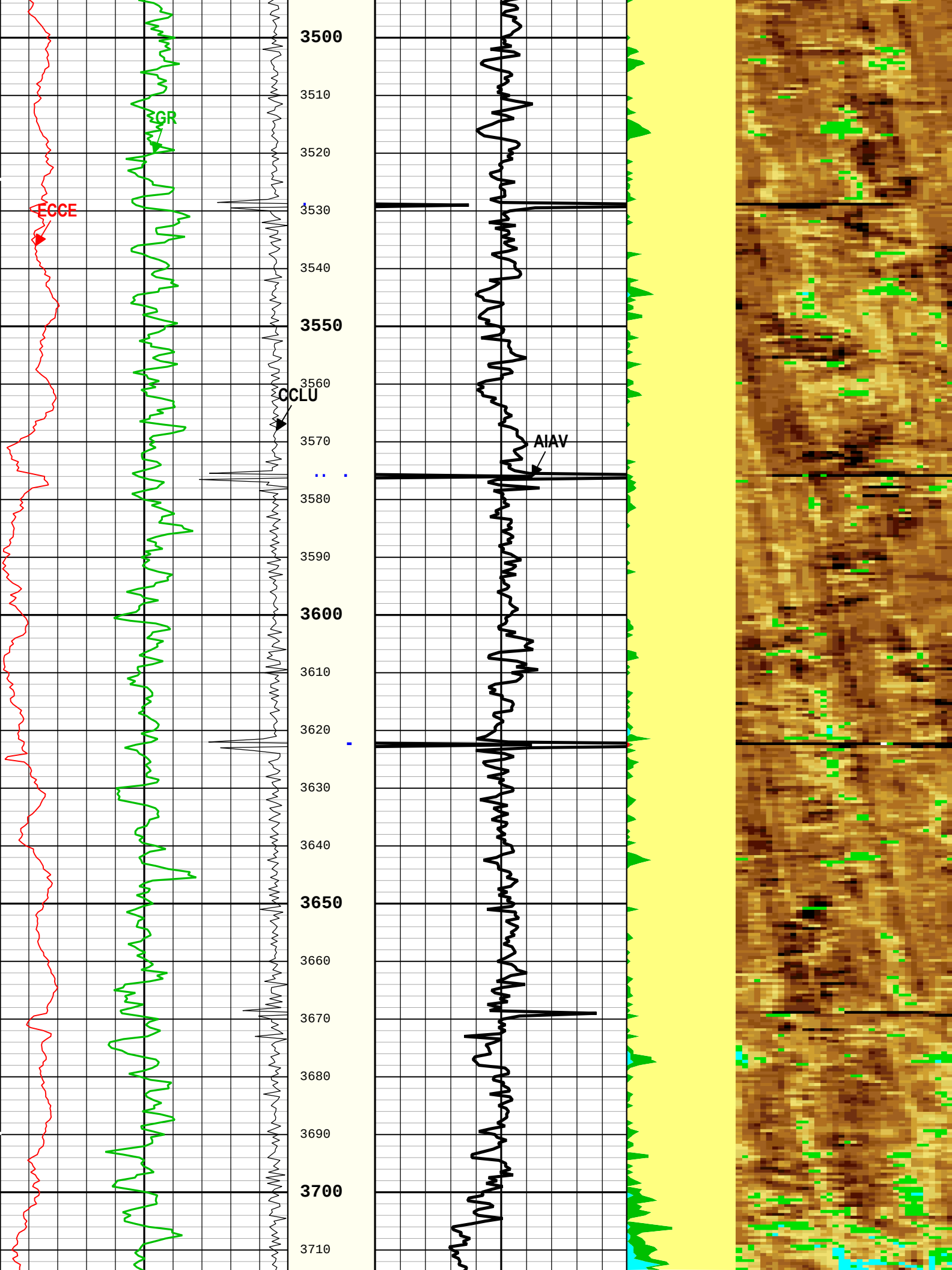
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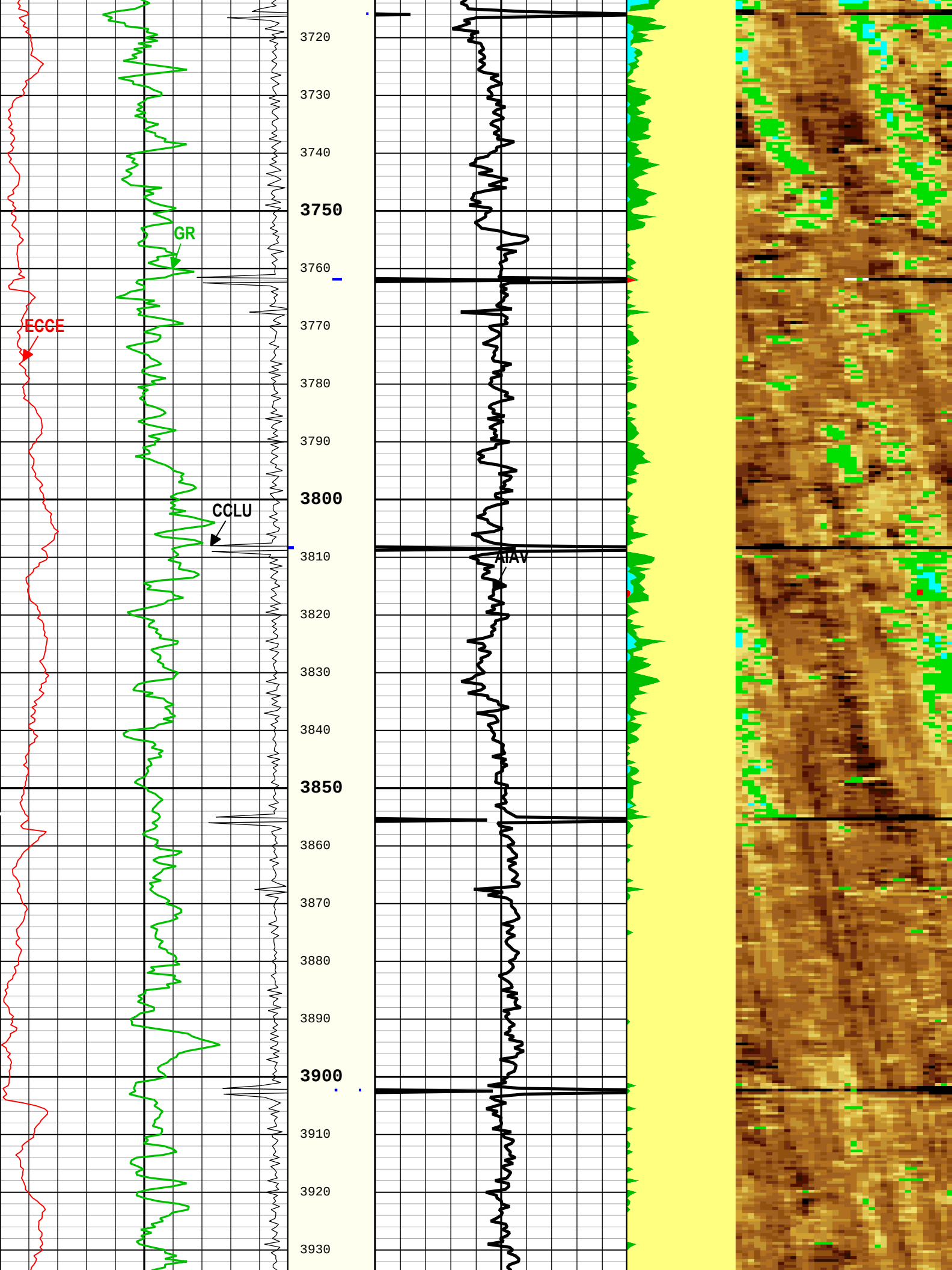
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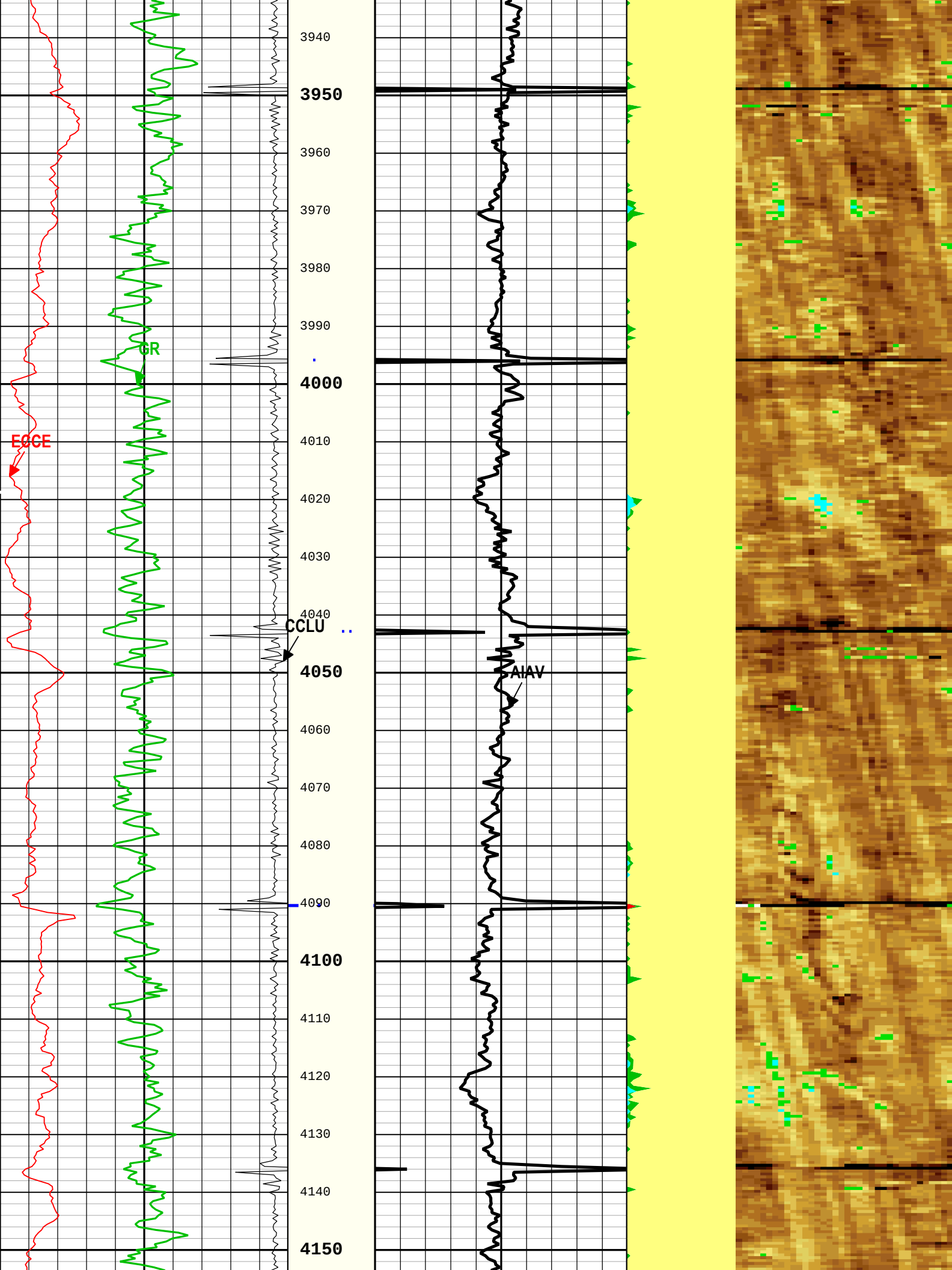
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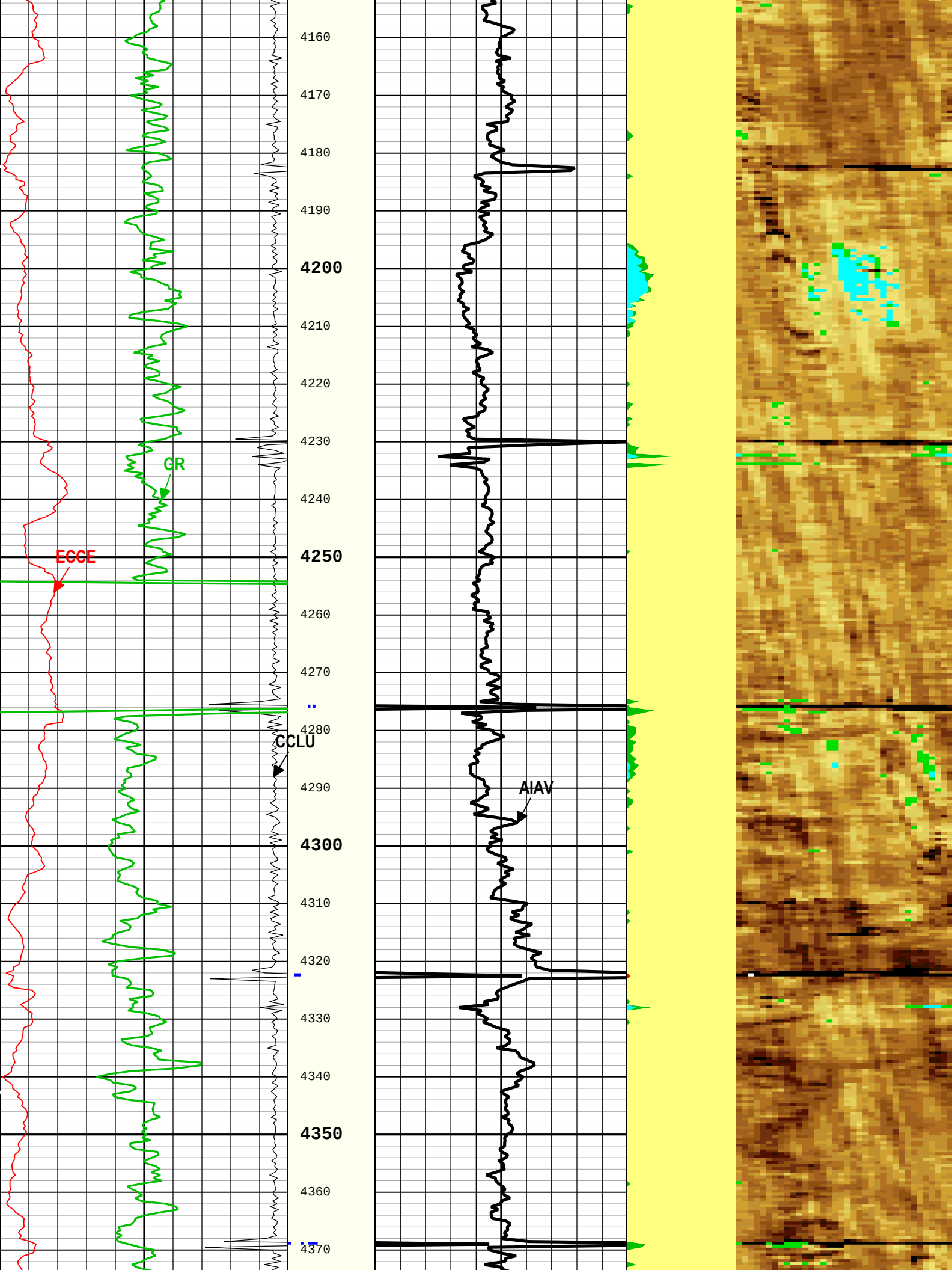
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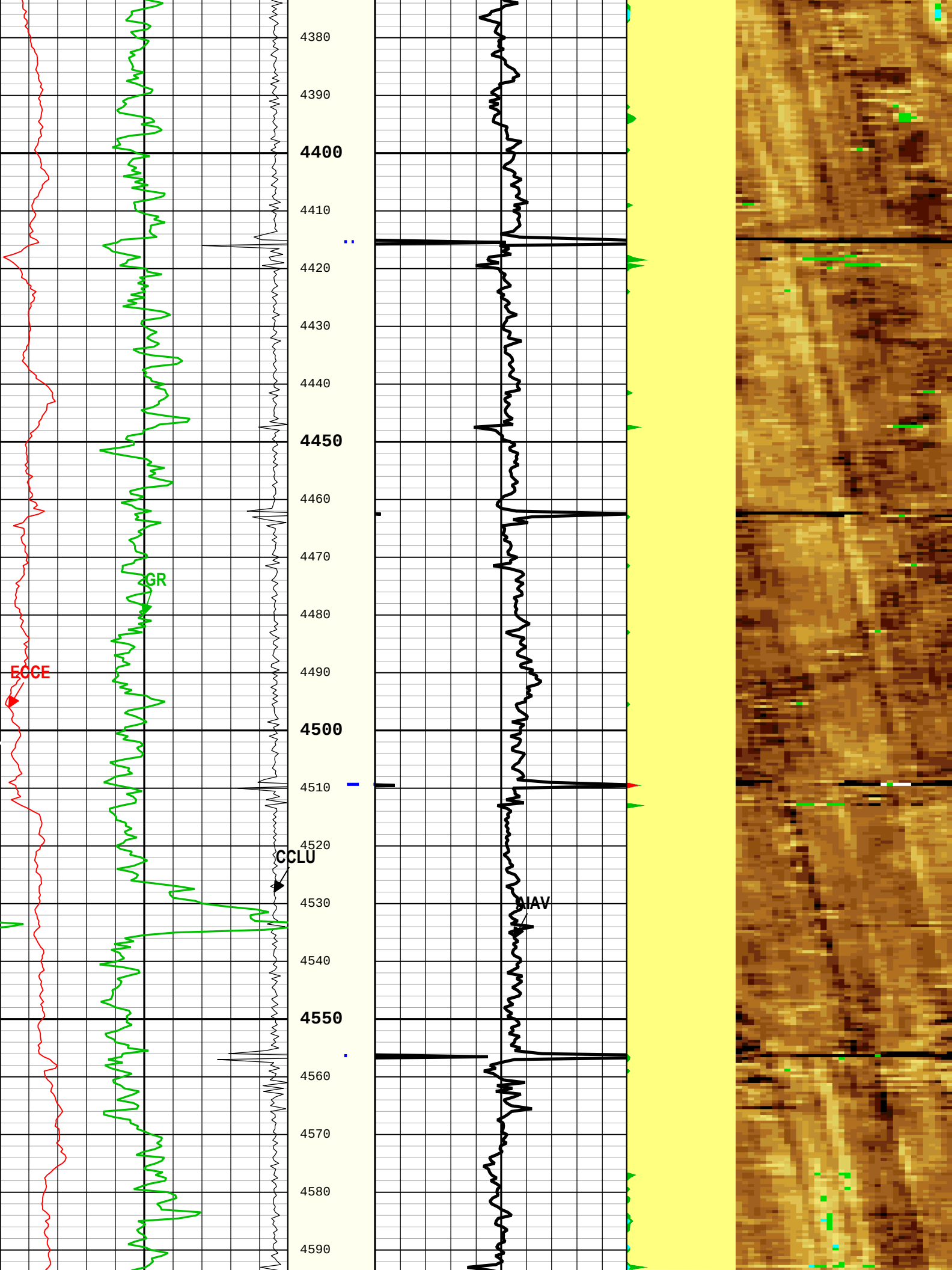
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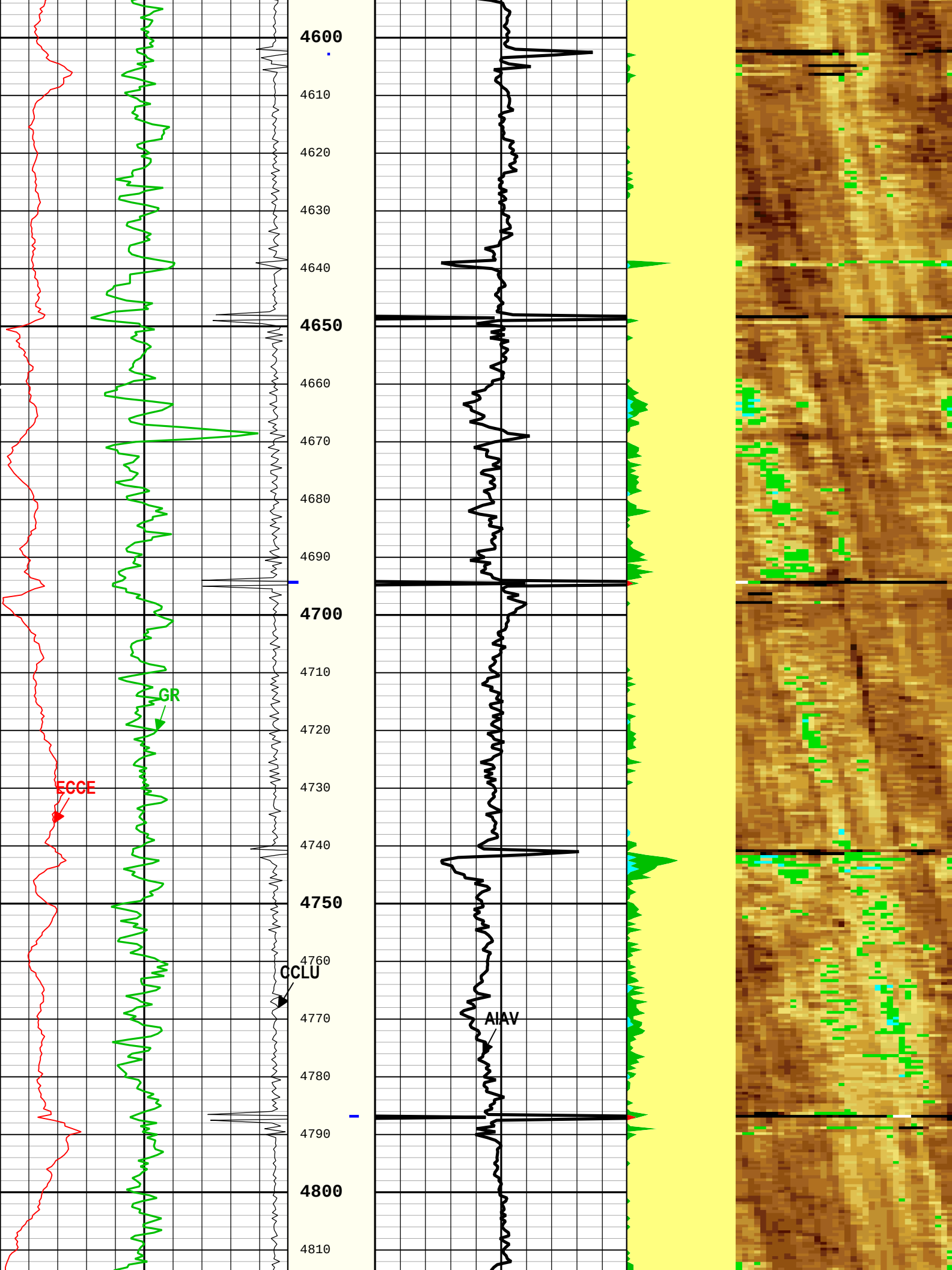
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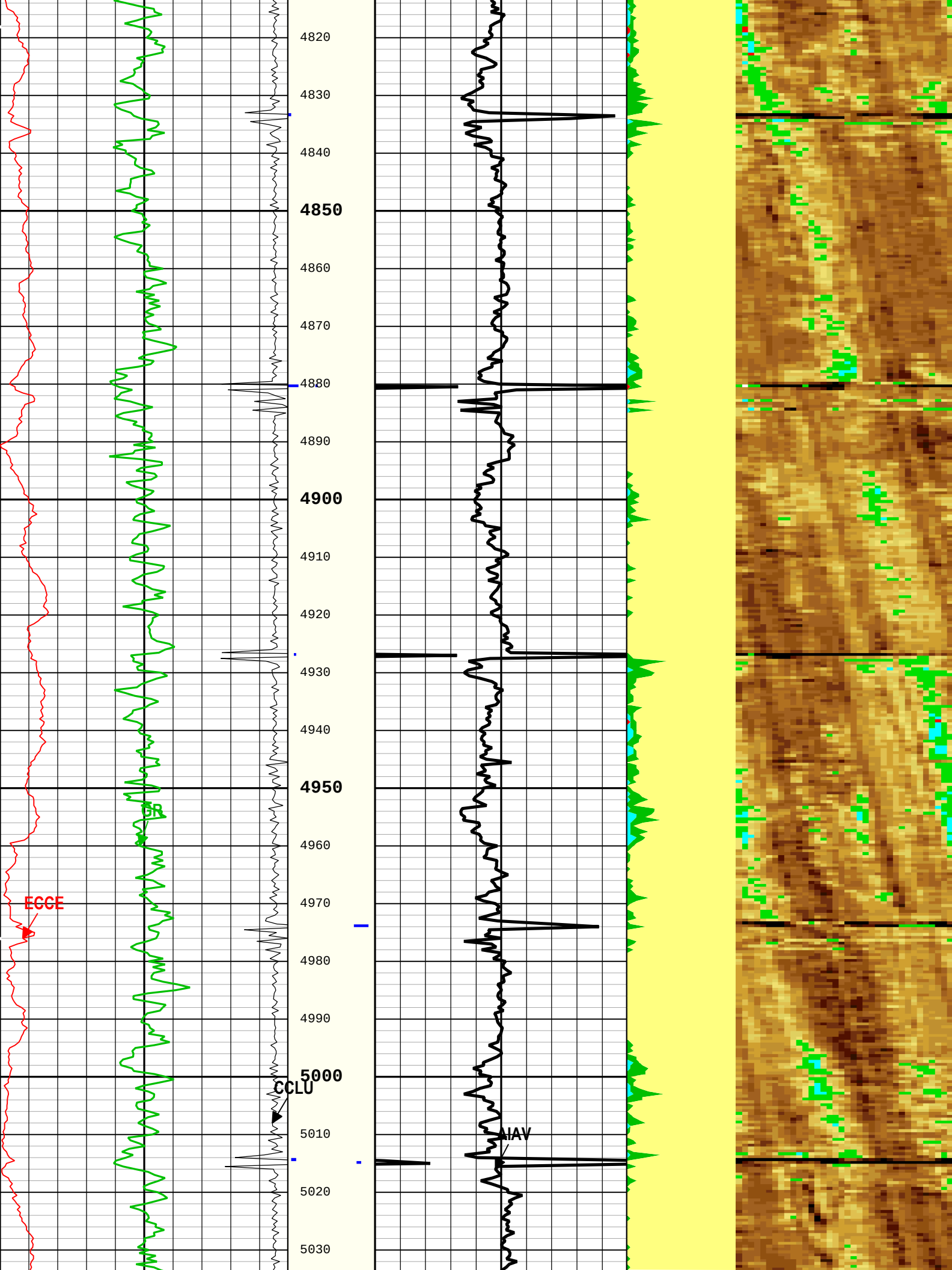
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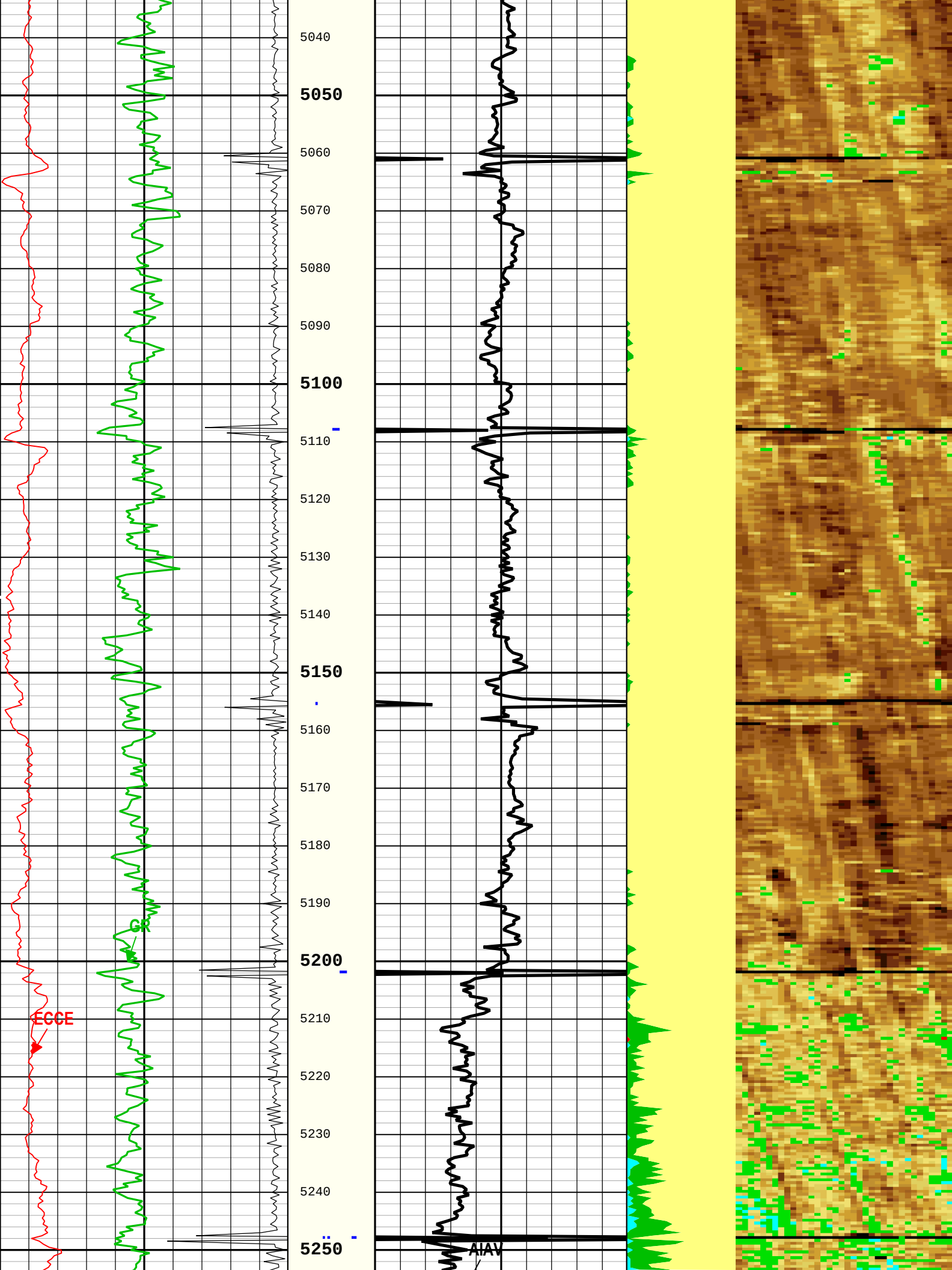
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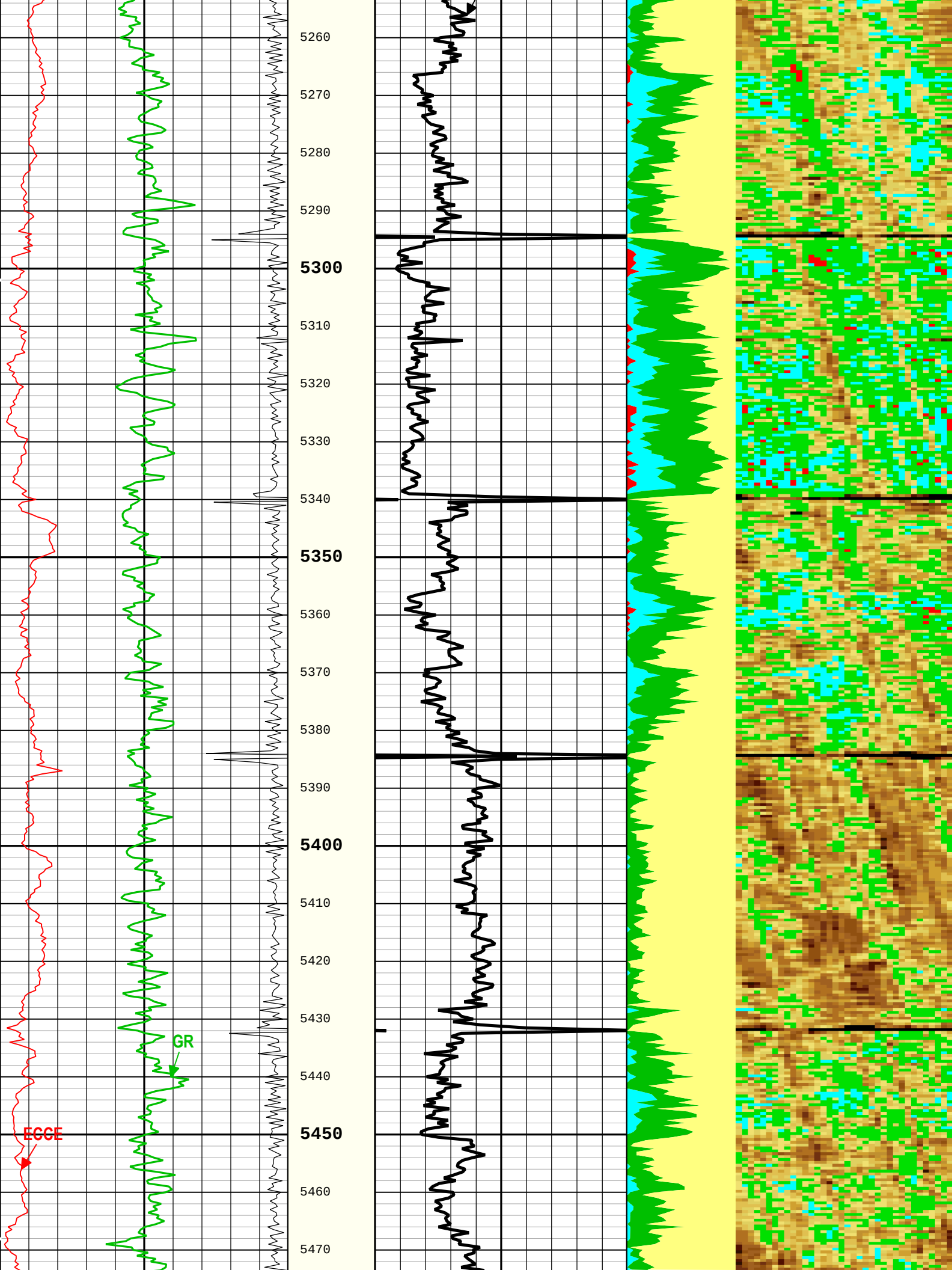
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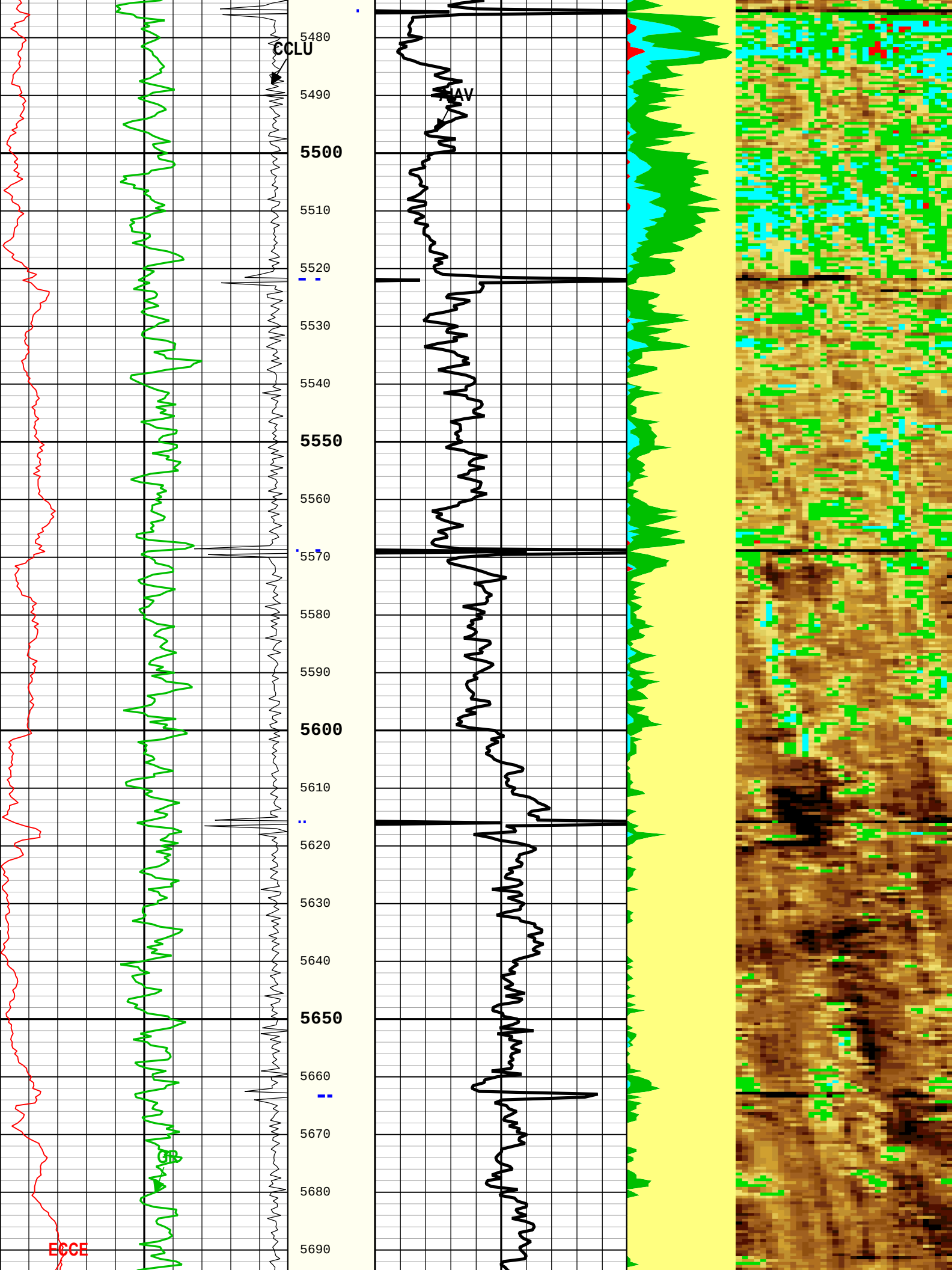
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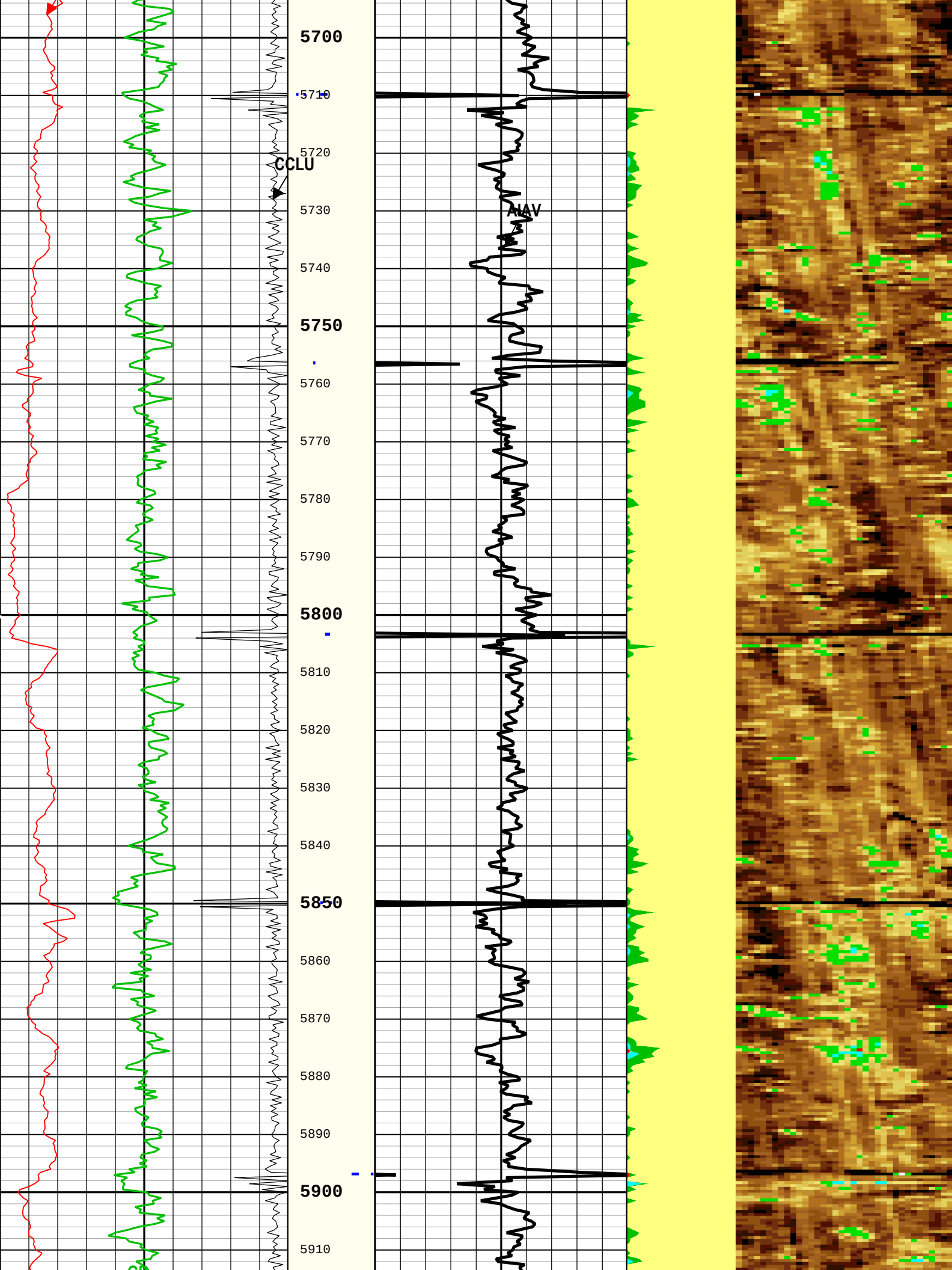
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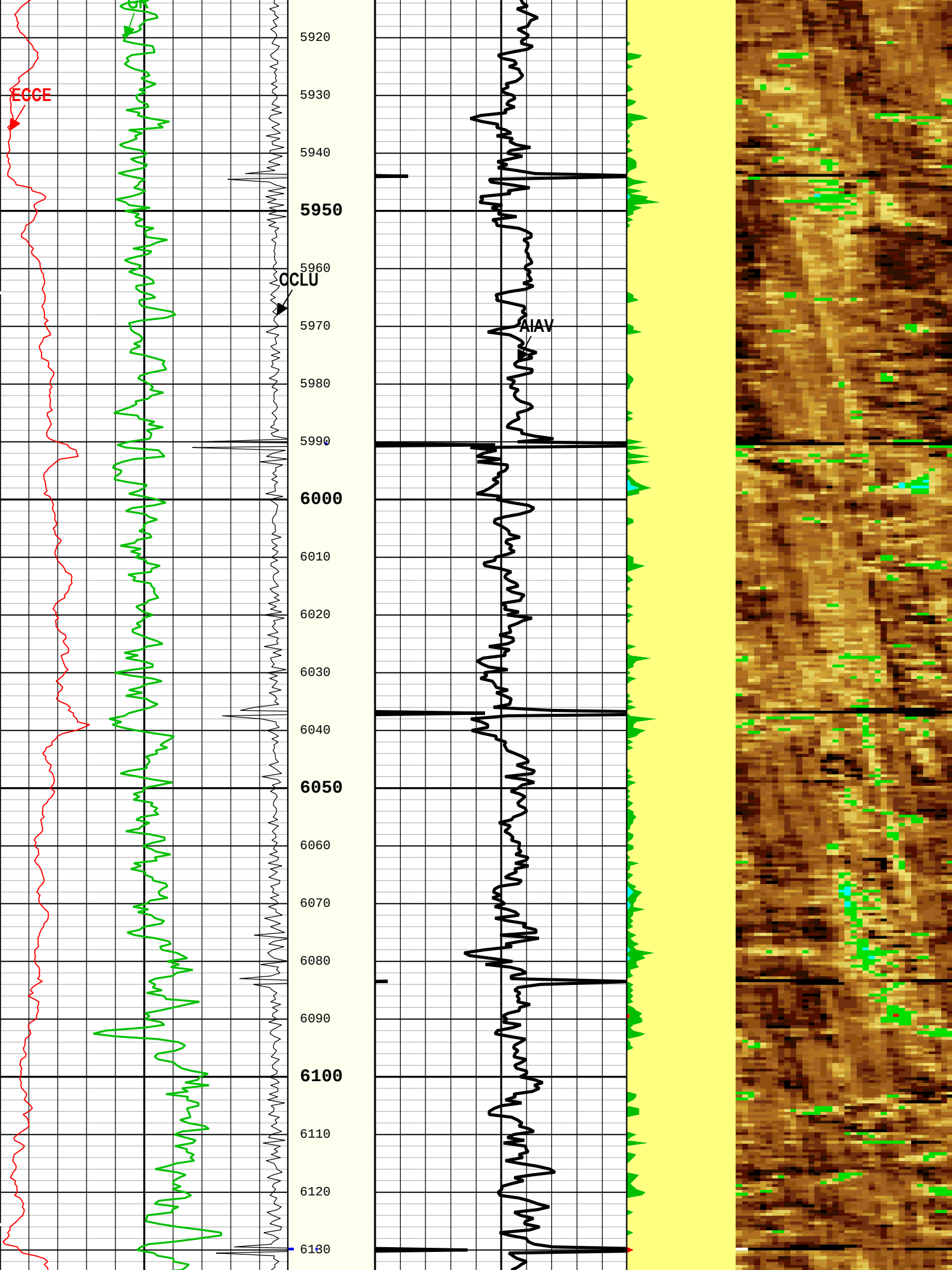
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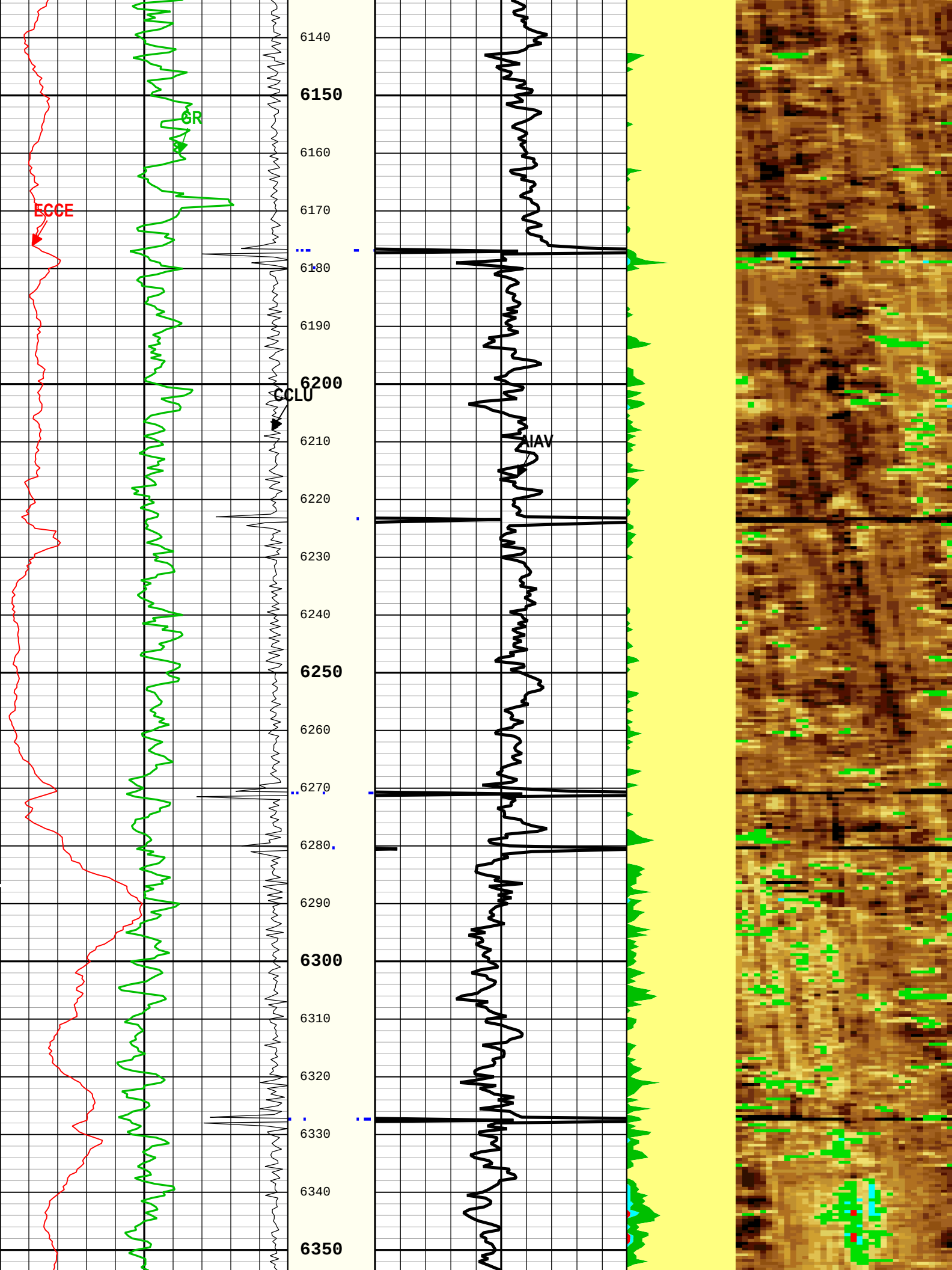
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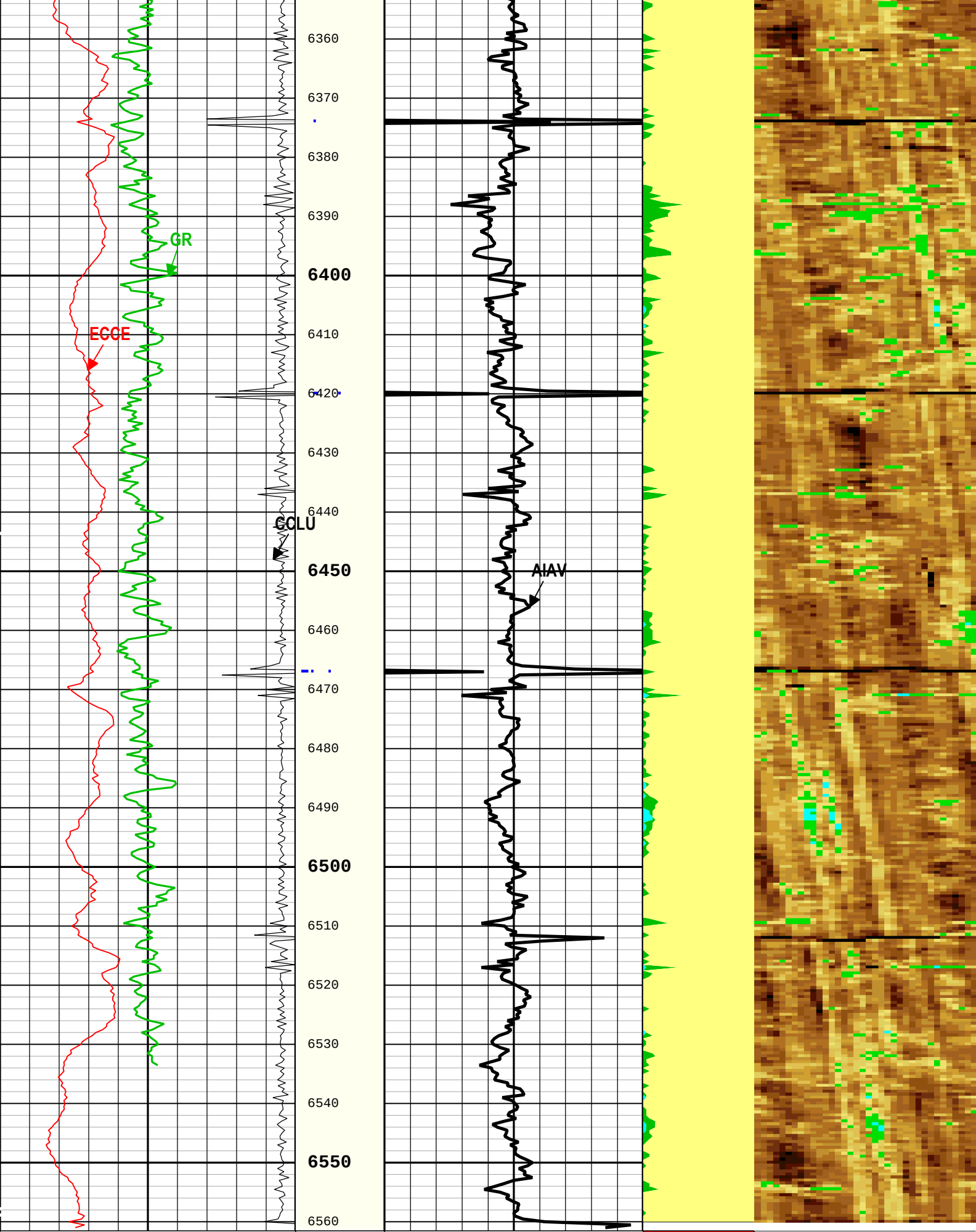


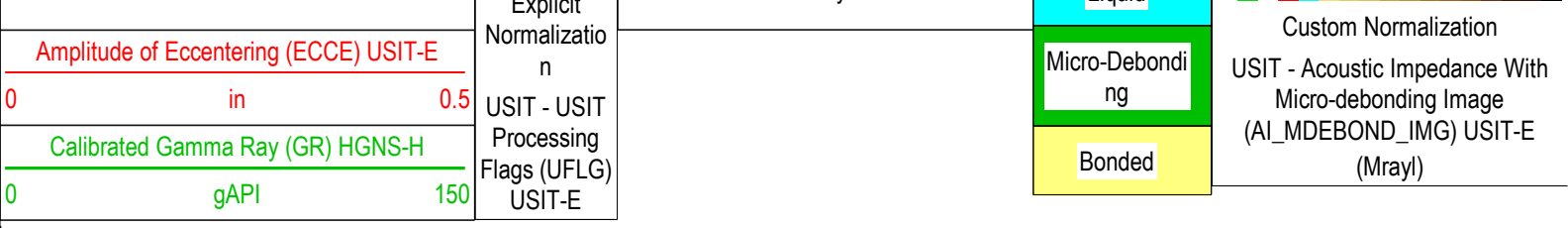
Casing Collar Locator Ultrasonic (CCLU)
USIT-E
-20 in 1

Absent 1.500 2.500 6.500
Explicit

Acoustic Impedance Average (AIAV)
USIT-E
0 Mrayl 10

Gas
Liquid

Absent -500.000 2.200 3.254 4.309 5.363 6.418 7.472



TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 05-Oct-2017 10:50:17

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	Depth Zoned	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
FDII	FPM Data Interpolation Interval	USIT-E	0	ft
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.18	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	26	50	110
BS	13.5	110	2042
BS	8.5	2042	6561.5

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
U-USIT_DDT5	USIC Downhole Decimation for T5 only	USIT-E	0_NONE	
EMXV	EMEX Voltage	USIT-E	Time Zoned	V
HRES	Horizontal Resolution	USIT-E	10 deg	
TMUC	Type of Mud	USIT-E	BRI	

ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
USFR	Ultrasonic Sampling Frequency	USIT-E	500000	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	7000	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	71.88	us

Time Zone Parameters

Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
EMXV	80	05-Oct-2017 09:08:36	05-Oct-2017 09:22:03	6562.05	5790.39
EMXV	100	05-Oct-2017 09:22:03	05-Oct-2017 10:06:08	5790.39	42.72

All depth are at tool zero.

ONE

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP2	7.2.87778.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[2]:Up	Up	1990.83 ft	2512.02 ft	05-Oct-2017 8:44:00 AM	05-Oct-2017 8:48:01 AM	ON	1.44 ft	Yes

All depths are referenced to toolstring zero

Log

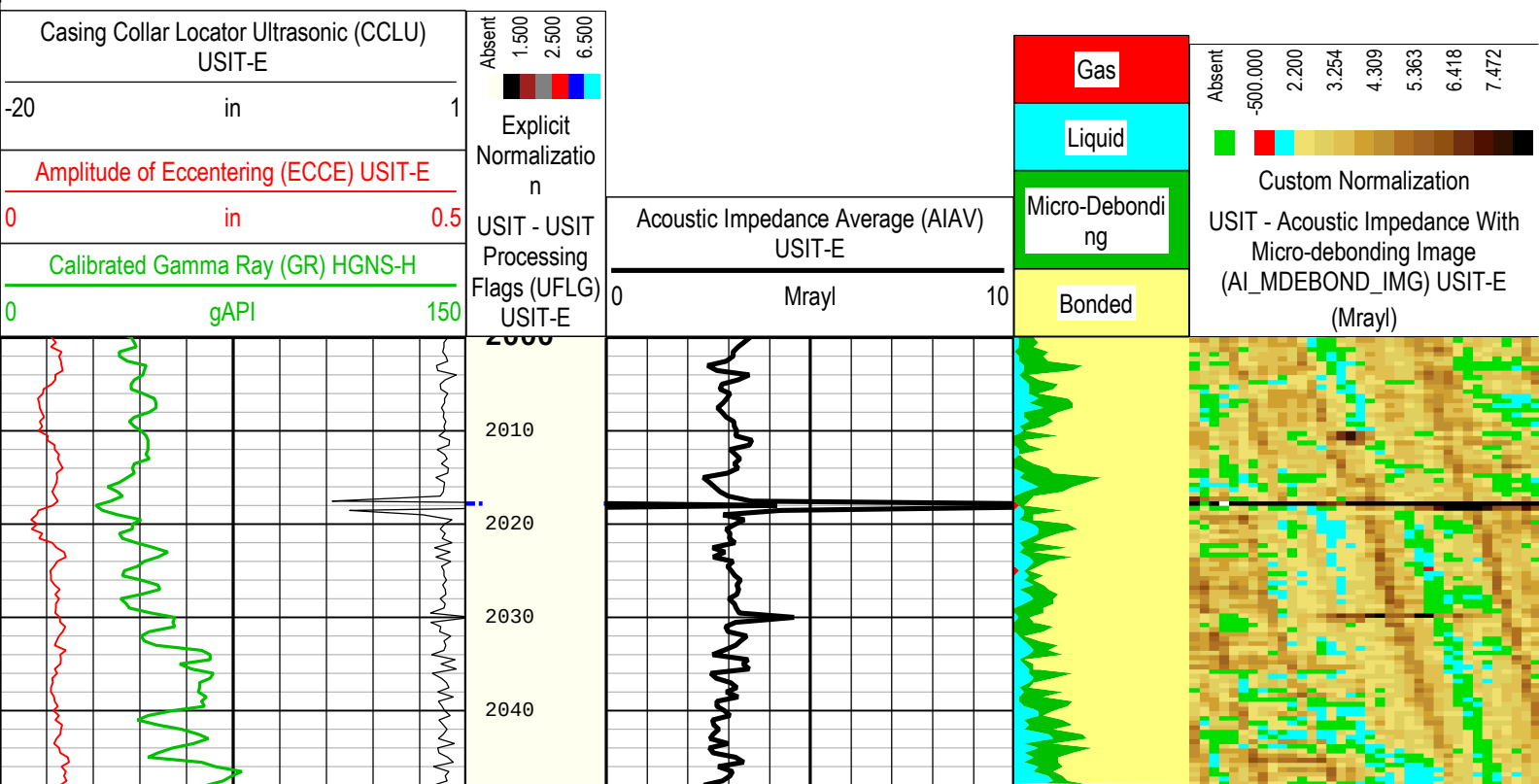
Company:Noble Energy Inc Well:Hullabaloo State Y21-769

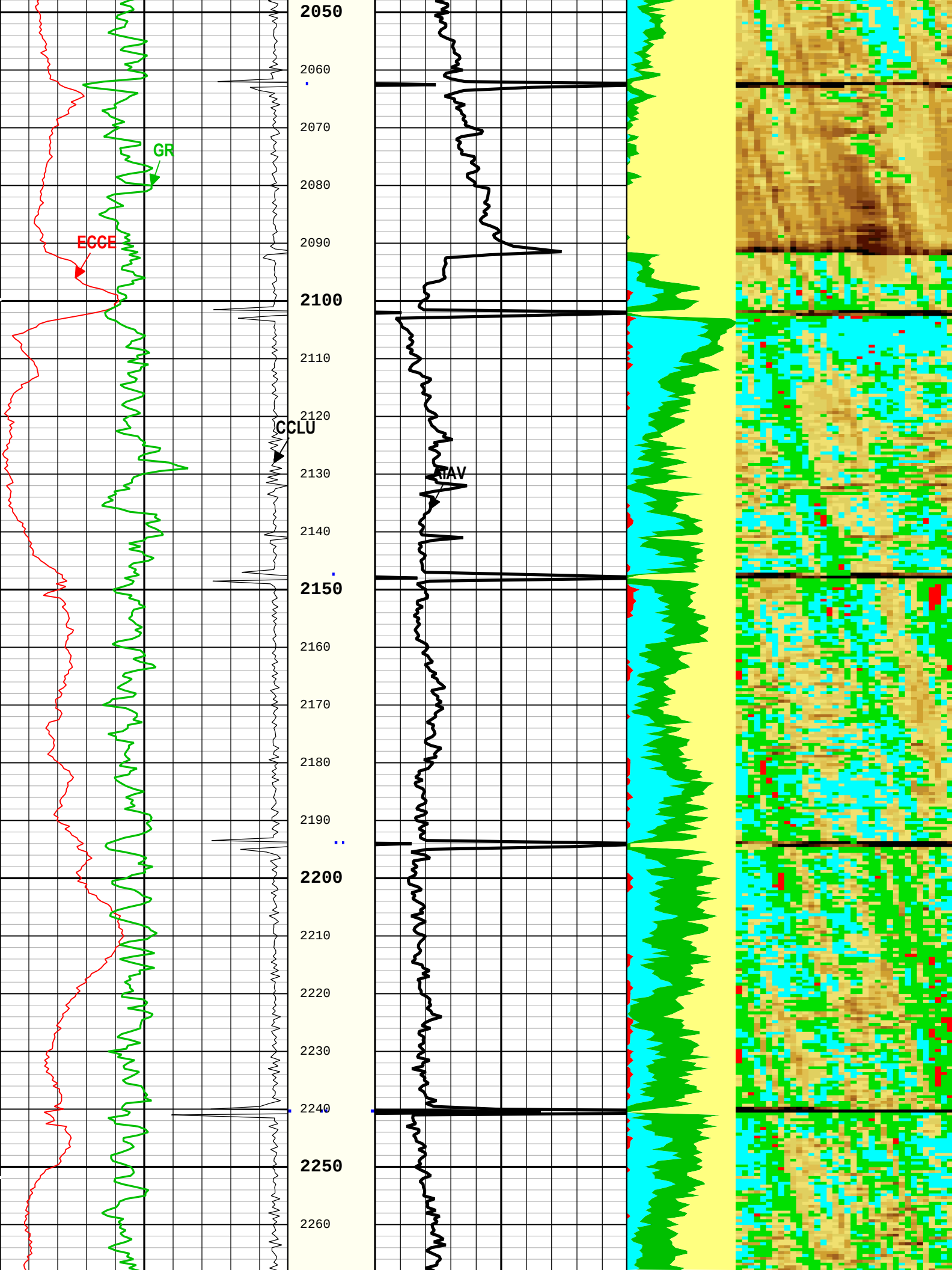
ONE: Log[2]:Up:S003

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 05-Oct-2017 10:50:24

TIME_1900 - Time Marked every 60.00 (s)

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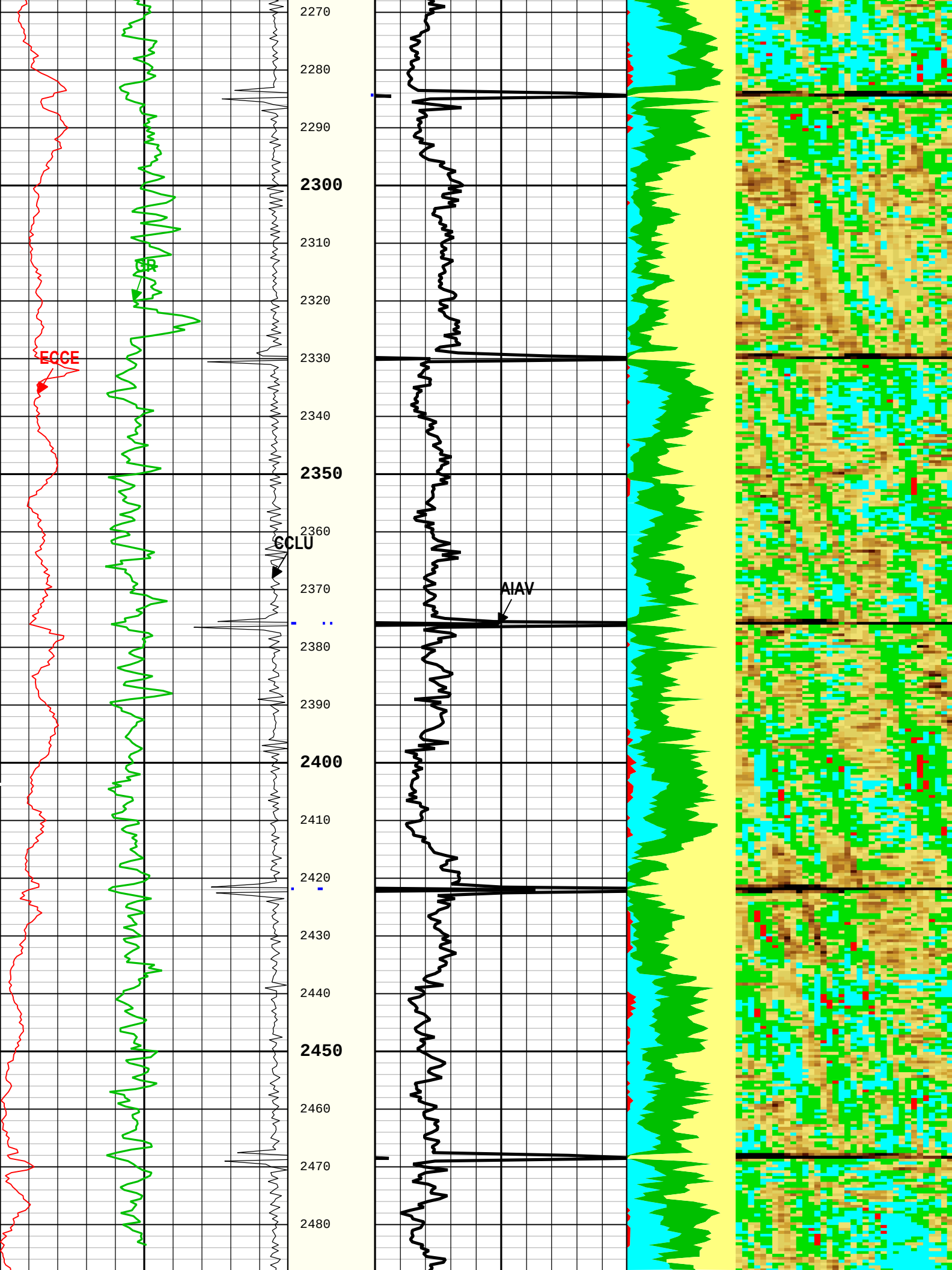
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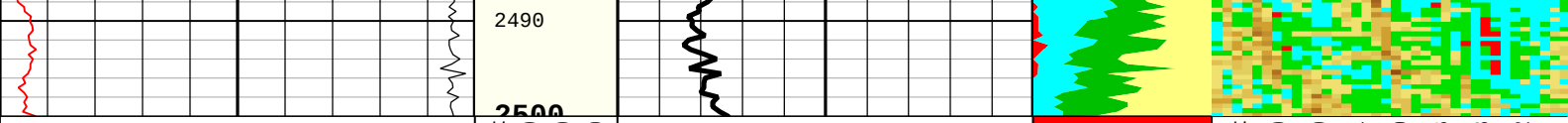


Casing Collar Locator Ultrasonic (CCLU) USIT-E

-20 in 1

Amplitude of Eccentering (ECCE) USIT-E

0 in 0.5

Calibrated Gamma Ray (GR) HGNS-H

0 gAPI 150

Absent 1.500 2.500 6.500

Explicit Normalization

USIT - USIT Processing Flags (UFLG) USIT-E

Acoustic Impedance Average (AIAV) USIT-E

0 Mrayl 10

Gas

Liquid

Micro-Debonding

Bonded

Absent -500.000 2.200 3.254 4.309 5.363 6.418 7.472

Custom Normalization

USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)

TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 05-Oct-2017 10:50:24

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	Depth Zoned	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
FDII	FPM Data Interpolation Interval	USIT-E	0	ft
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.18	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	13.5	2000	2042
BS	8.5	2042	2500

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB

AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
U-USIT_DDT5	USIC Downhole Decimation for T5 only	USIT-E	0_NONE	
EMXV	EMEX Voltage	USIT-E	80	V
HRES	Horizontal Resolution	USIT-E	10 deg	
TMUC	Type of Mud	USIT-E	BRI	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
USFR	Ultrasonic Sampling Frequency	USIT-E	500000	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	3000	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	71.88	us

XYZ

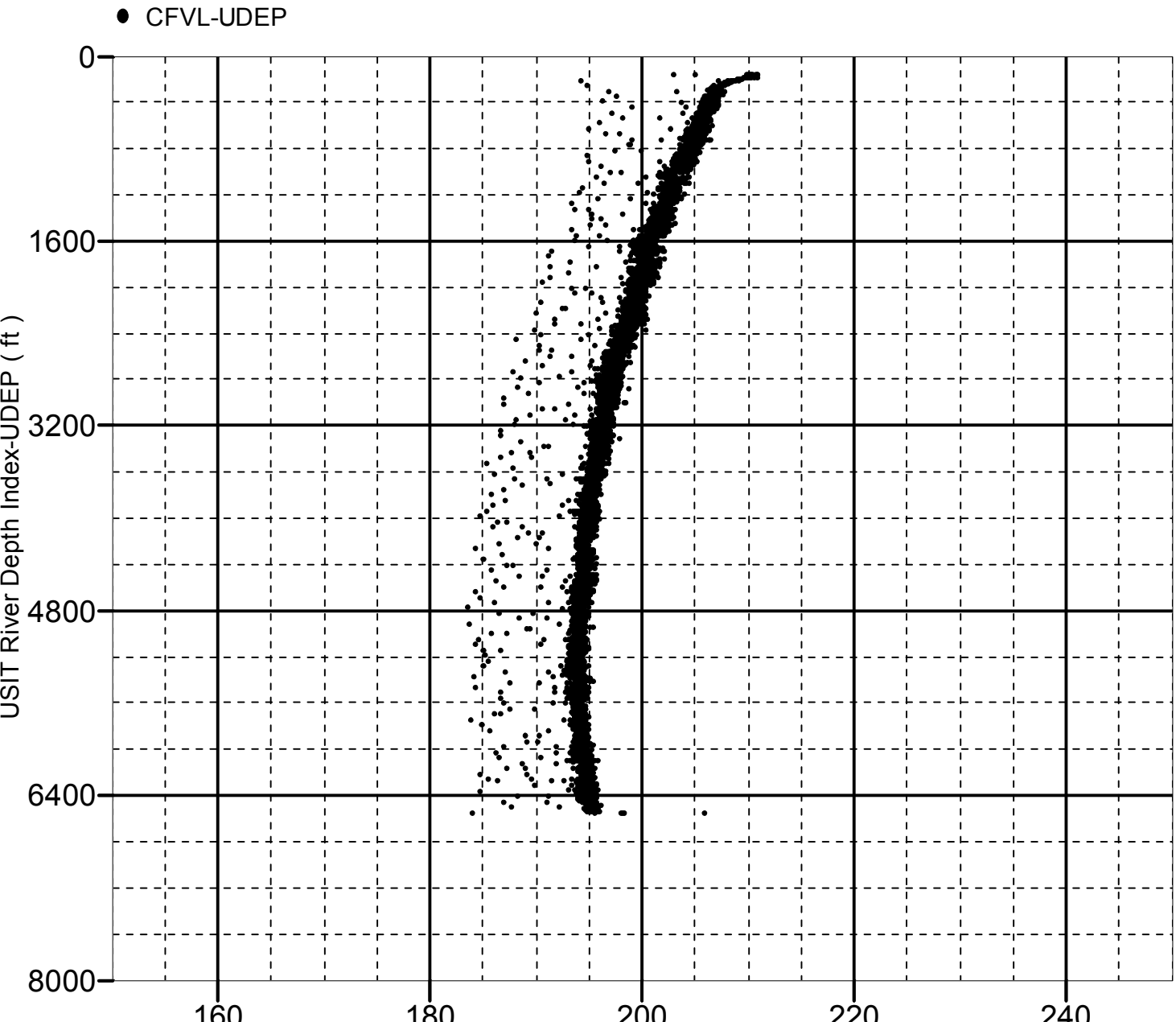
Company:Noble Energy Inc Well:Hullabaloo State Y21-769

ONE: Log[4]:Up:S003

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6561.50 to 50.00 ft



Memorized Fluid Acoustic...-CFVL (us/ft)

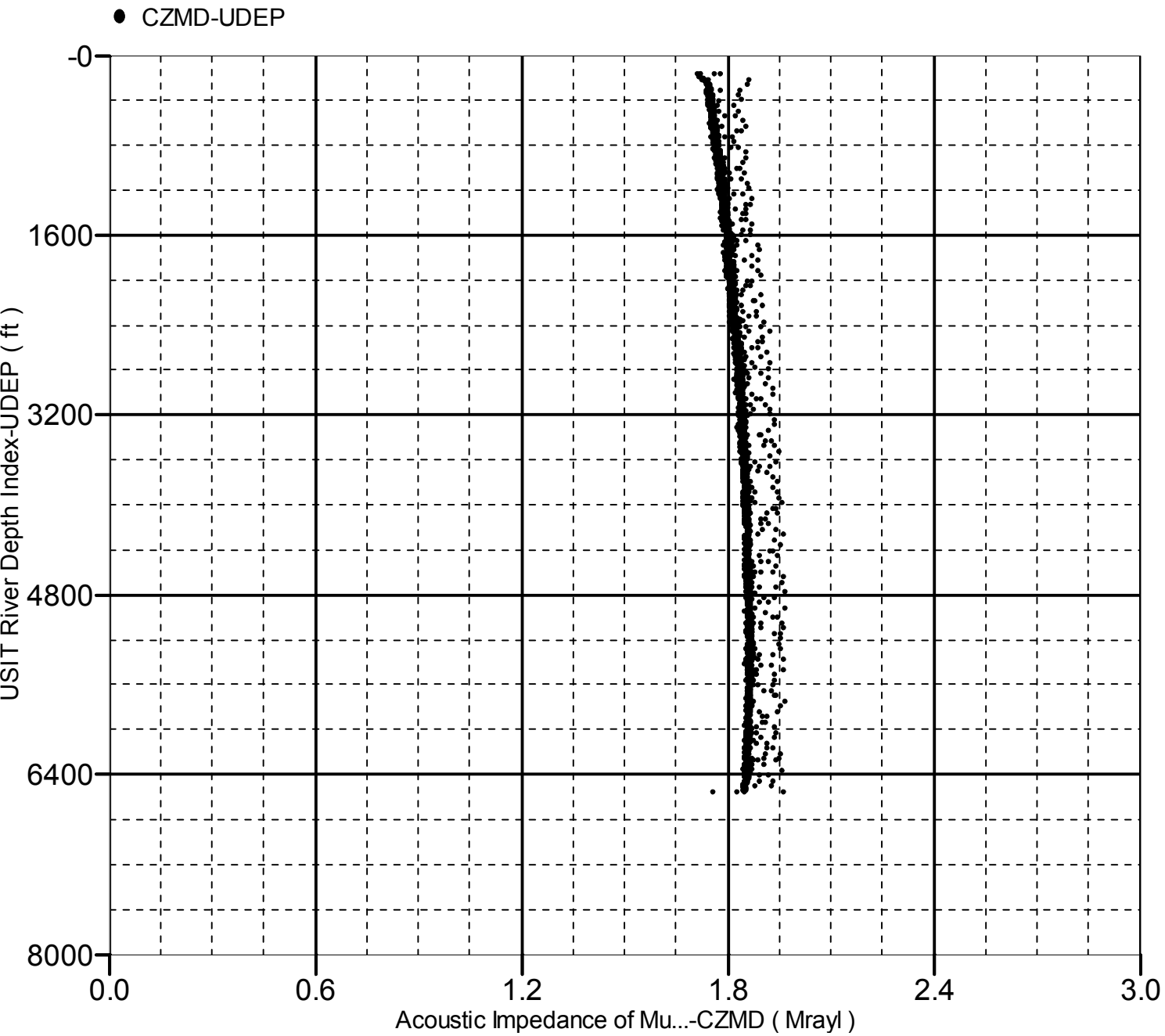
XYZ

Company:Noble Energy Inc Well:Hullabaloo State Y21-769
ONE: Log[4]:Up:S003

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6561.50 to 50.00 ft



Company:	Noble Energy Inc
Well:	Hullabaloo State Y21-769
Field:	Wattenberg

Schlumberger

County: Weld

State: Colorado

UltraSonic Summary Print