

Company: Noble Energy Inc.

Well: Freedom Federal LC21-640

Field: Wildcat

County: Weld State: Colorado

DJ Basin UltraSonic Summary Print

County:	Weld		
Field:	Wildcat		
Location:	NWSW Sec. 22, T9N, R59W		
Well:	Freedom Federal LC21-640		
Company:	Noble Energy Inc.		
Location:		Elev.:	K.B. 4913.00 ft
NWSW Sec. 22, T9N, R59W			G.L. 4883.00 ft
SHL: 1663' FSL and 400' FWL			D.F. 4913.00 ft
Lat: 40.73343 Long:-103.97207			
Permanent Datum:	Ground Level	Elev.:	4883.00 f
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		
API Serial No.	Section:	Township:	Range:
05-123-42804	22	9N	59W

Logging Date	07-Aug-2017		
Run Number	One		
Depth Driller	11210.00 ft		
Schlumberger Depth	5899.00 ft		
Bottom Log Interval	5899.00 ft		
Top Log Interval	116.00 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	1941.00 ft		
To	6105.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	N/A		
From	30.00 ft		
To	5899.00 ft		
Max Recorded Temperatures	189 degF		
Logger on Bottom	07-Aug-2017	08:50:00	
Unit Number	Location:	Time	
Recorded By	2377	Fort Morgan	
Witnessed By	Camila Lang		
	Bill Mansfield		

Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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12.1 Integration Summary

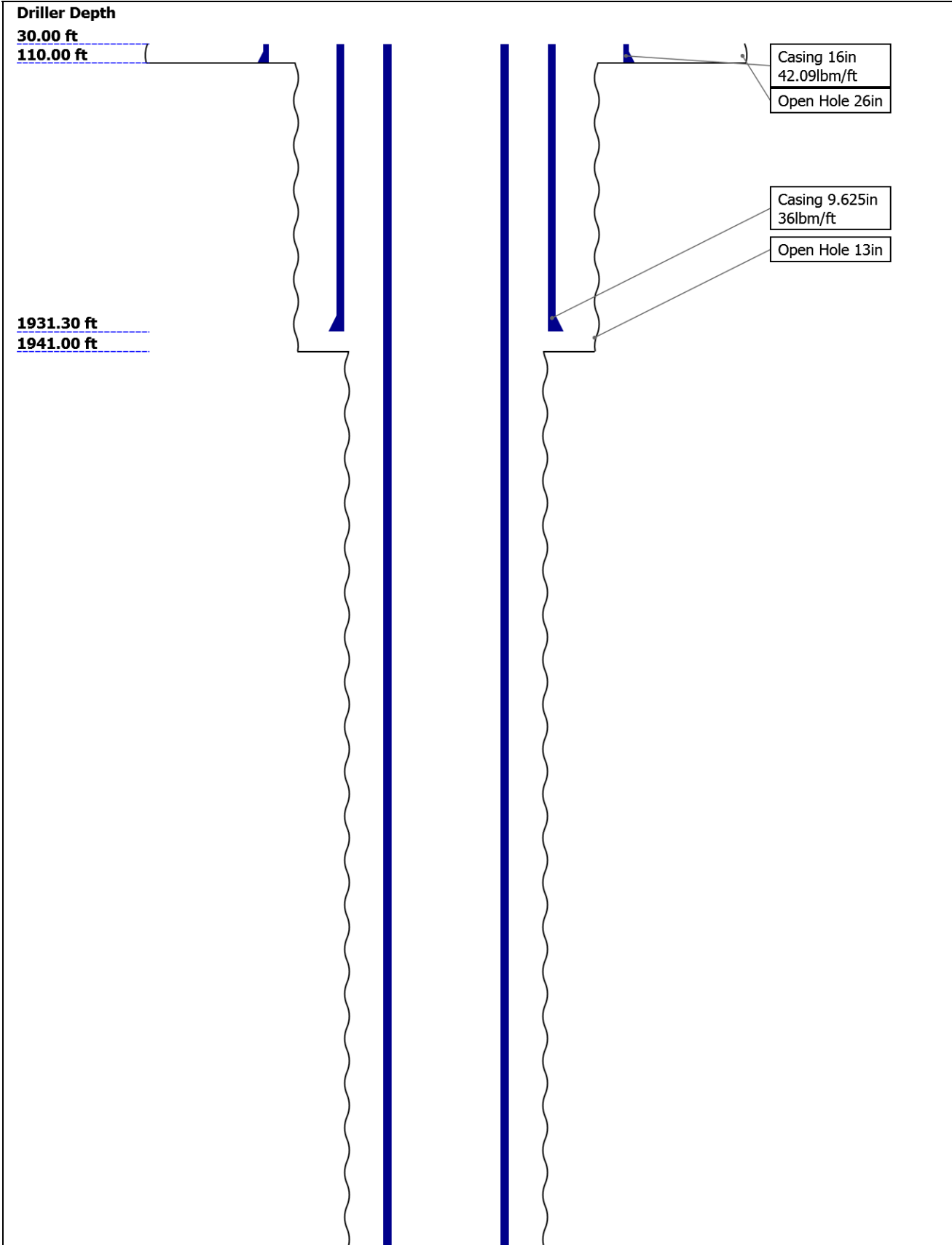
12.2 Software Version

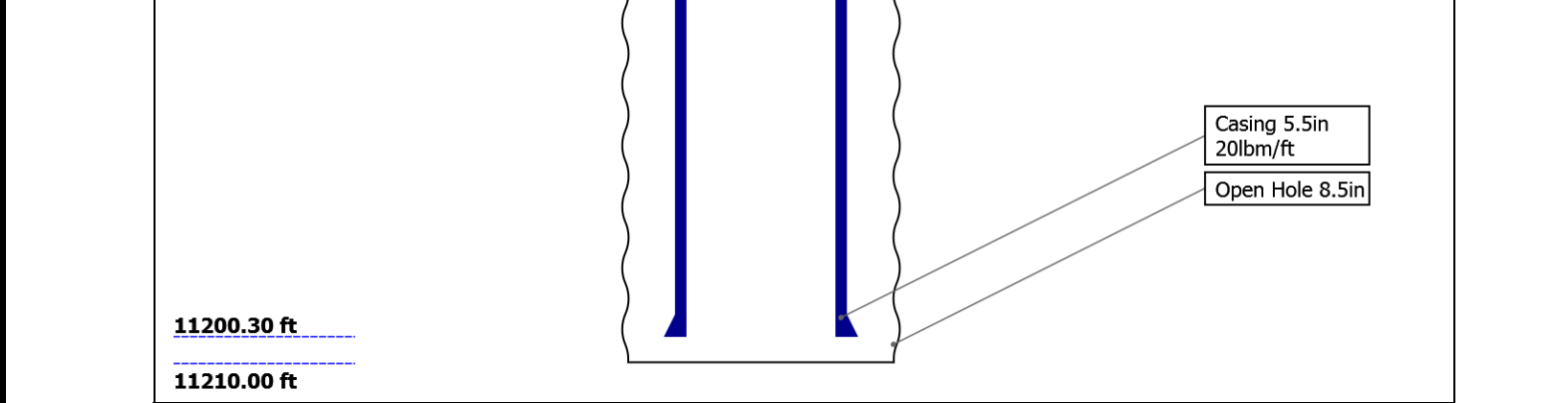
12.3 Composite Summary

12.4 Log ( DJ Basin Ultrasonic Cement Summary Report )

12.5 Parameter Listing

Well Sketch





## Borehole Size/Casing/Tubing Record

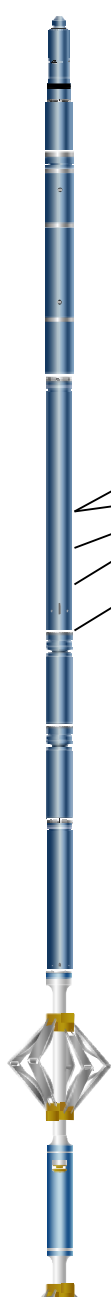
Bit						
Bit Size ( in )	26	13	8.5			
Top Driller ( ft )	30	110	1941			
Top Logger ( ft )	30	110	1941			
Bottom Driller ( ft )	110	1941	11210			
Bottom Logger ( ft )	110	1941	6105			
Casing						
Size ( in )	16	9.625	5.5			
Weight ( lbm/ft )	42.09	36	20			
Inner Diameter ( in )	15.511	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller ( ft )	30	30	30			
Top Logger ( ft )	30	30	30			
Bottom Driller ( ft )	110	1931.3	11200.3			
Bottom Logger ( ft )	110	1931.3	5899			


## Operational Run Summary

Parameter ( unit )	One					
Date Log Started	07-Aug-2017					
Time Log Started	08:15:35					
Date Log Finished	07-Aug-2017					
Time Log Finished	09:33:31					
Top Log Interval ( ft )	116.00					
Bottom Log Interval ( ft )	5899.00					
Total Depth ( ft )	5899.00					
Max Hole Deviation ( deg )	0.00					
Azimuth of Max Deviation ( deg )	0.00					
Bit Size ( in )	8.500					
Logging Unit Number	2377					
Logging Unit Location	Fort Morgan					
Recorded By	Camila Lang					

## Borehole Fluids

## Remarks and Equipment Summary

One: Toolstring			One: Remarks
<b>Equip name Length</b>		<b>MP name Offset</b>	This is the first run in the well.
<b>LEH-QT 33.83</b>			Tool ran as per tool sketch.
LEH-QT			CSG: 9.625" 36lb/ft @1930.4'
			5.5" 20 lb/ft @ 11210'
			Fluid: 8.4 ppg Brine
			Main pass recorded at 2500 psi, Repeat pass recorded at 0 psi.
			BHT: 189 degF
<b>SAH-F:18 30.91</b>			
<b>EDTC-B 26.06</b>			
EDTH-B:92 45 EDTG-A EDTC-B			
		CTEM 22.56 ACCZ 0.00 HV 0.00 Gamma Ray TelStatus 19.56	
<b>AH-184[2]:1951 19.56</b>			
<b>AH-184[1]:2826 17.56</b>			
<b>USIT-E:92 15.56</b>			
ECH-MFA: 1908 USAC-A:9 21 USIS-A:90 2 USSC-B:17 30 USRS-A:78 6 USI-SENS OR			

<div><div>USIT Sensor 0.37 Tool Joint Head Fe Lengths are in ft Maximum Outer Diameter = 3.875 in Line: Sensor Location, Value: Gating Offset All measurements are relative to TOOL_ZERO</div></div>			
Depth Summary			
One			
Depth Measuring Device			
Type	IDW-JA		
Serial Number	5845		
Calibration Date	07-Jul-2017		
Calibrator Serial Number	57		
Calibration Cable Type	7-46 PXS		
Wheel Correction 1	-4		
Wheel Correction 2	-5		
Tension Device			
Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		
Logging Cable			
Type	7-46A-XS		
Serial Number	710146		
Length	23000.00 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 were followed	
Rig Up Length At Surface		IDW used as a primary depth reference.	
Rig Up Length At Bottom		Z-chart used as a 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)
Fluid Velocity			
Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)
Mud Impedance			
Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
One			
2500 PSI Main Pass			
Software Version			
Acquisition System		Version	

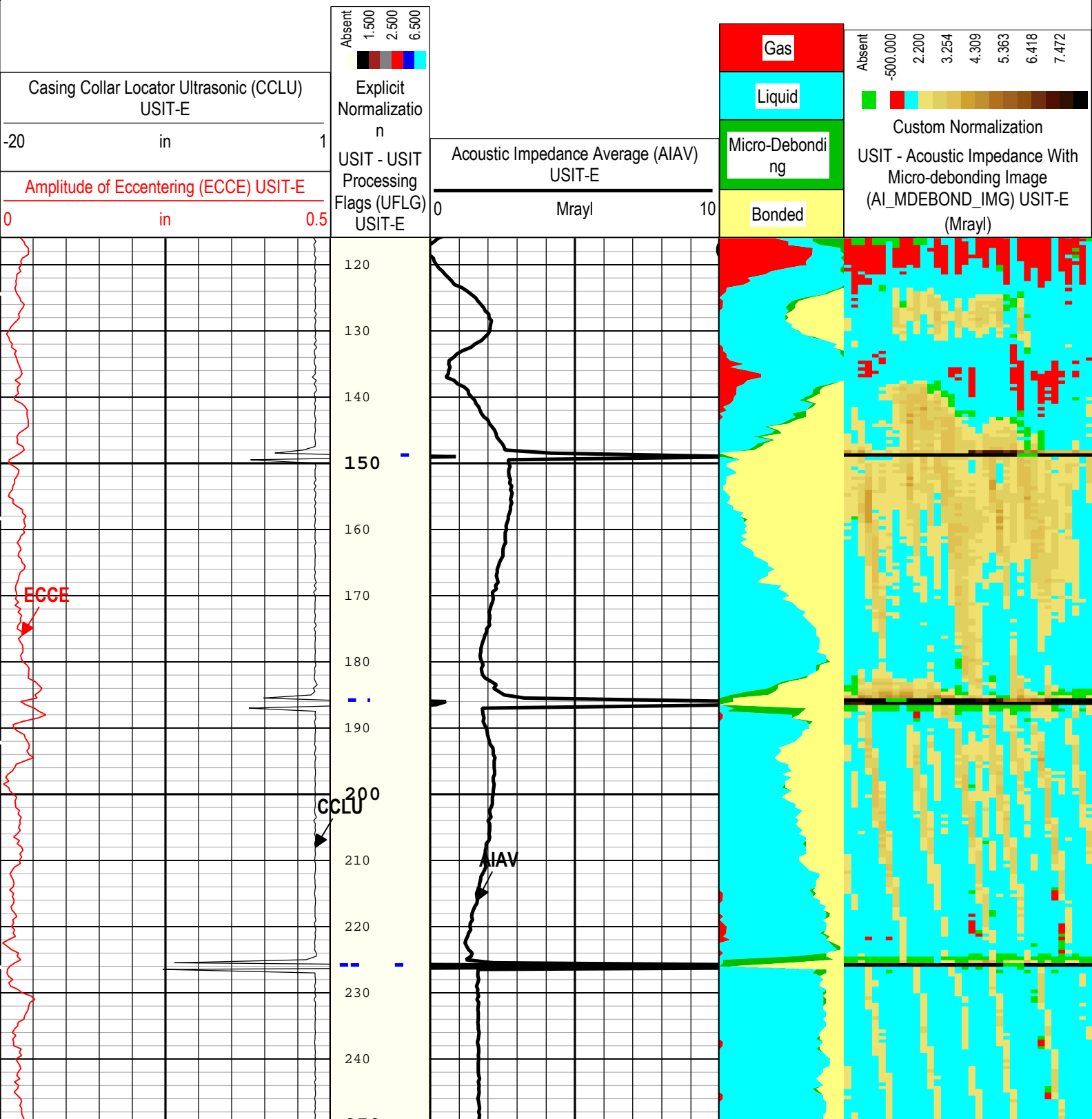
Pass Summary									
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[5]:Up	Up	64.47 ft	6106.32 ft	07-Aug-2017 8:52:54 AM	07-Aug-2017 9:32:49 AM	ON	6.24 ft	Yes

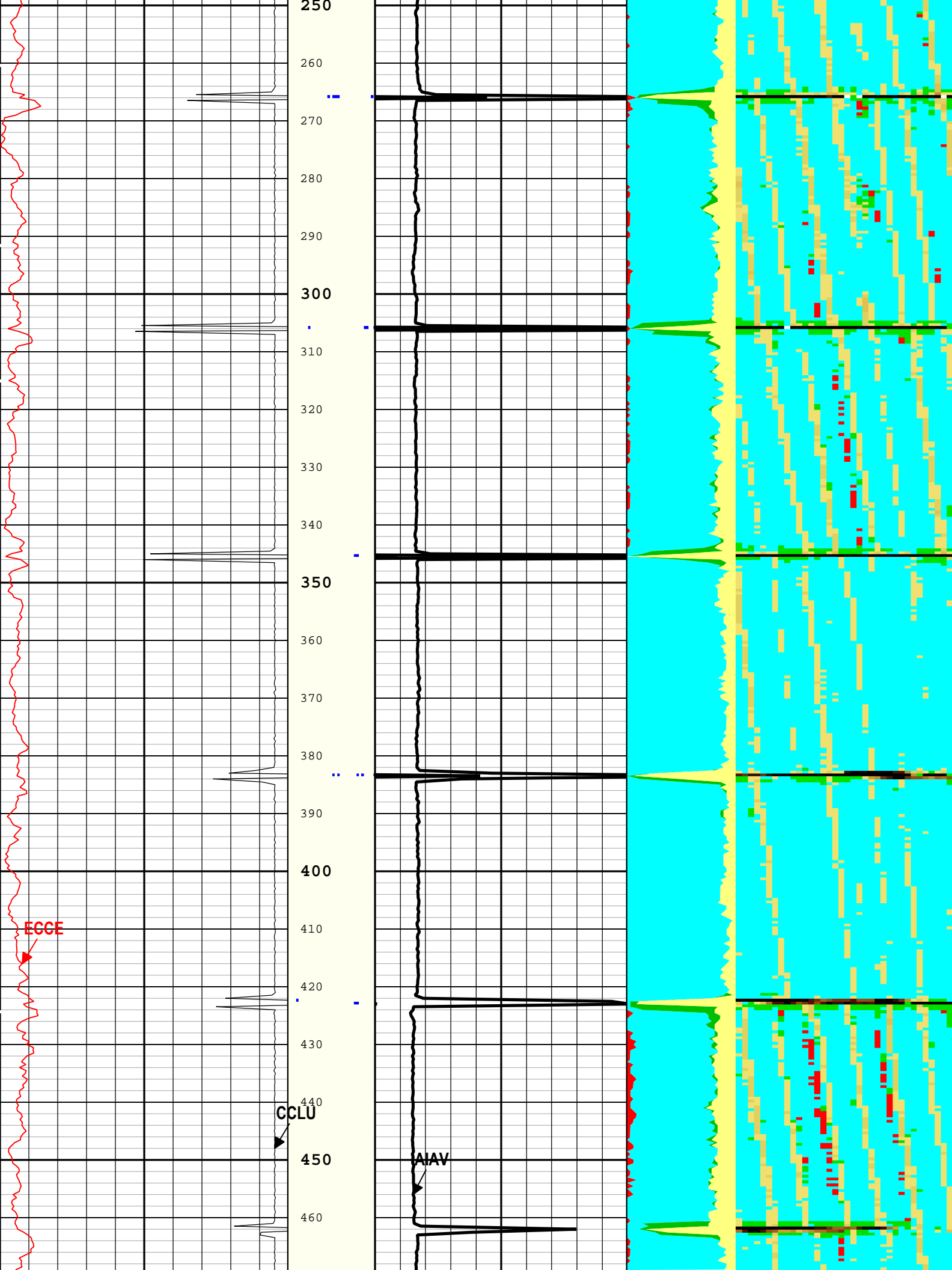
All depths are referenced to toolstring zero

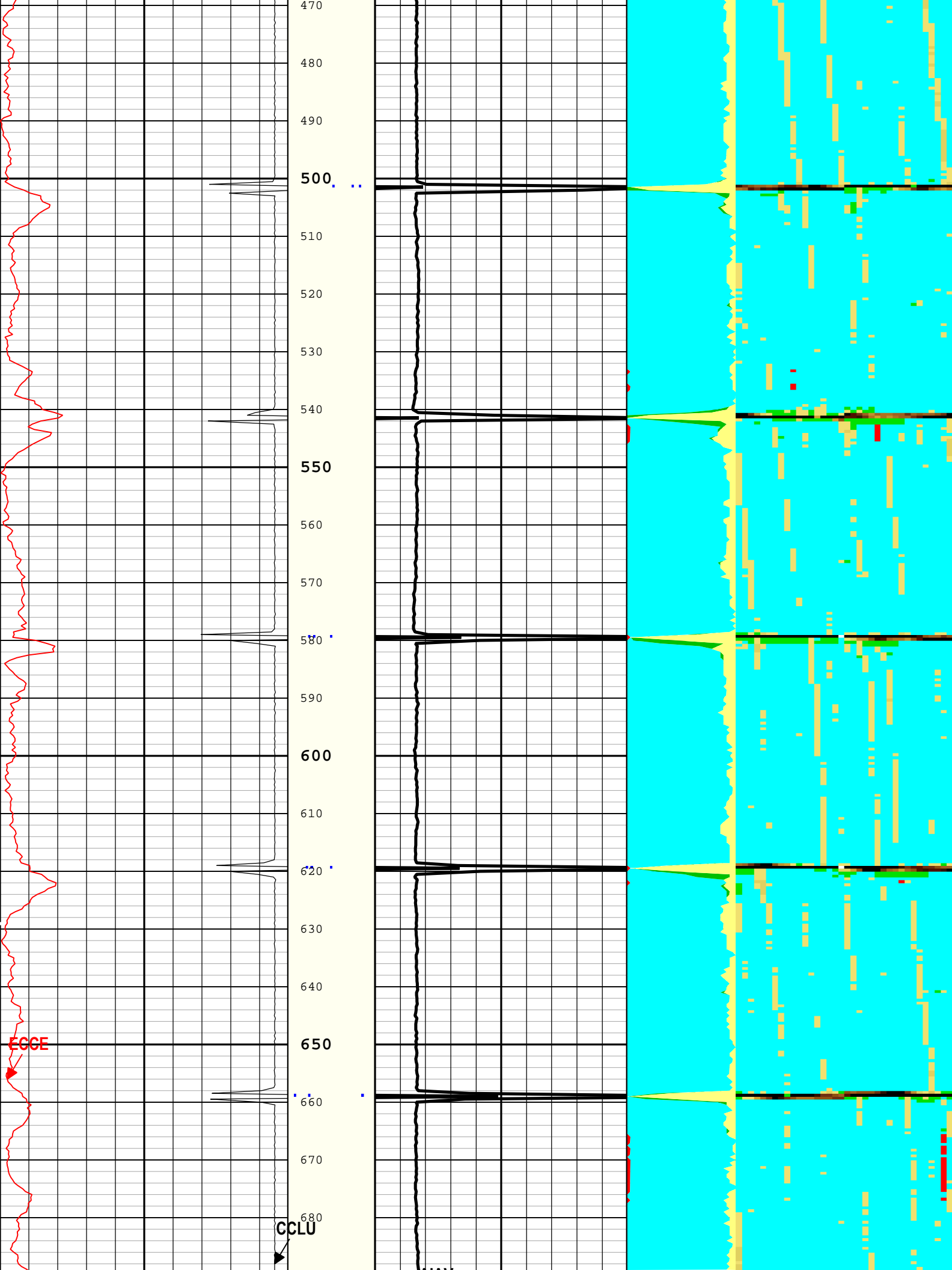
Log	Company:Noble Energy Inc.	Well:Freedom Federal LC21-640
One: Log[5]:Up:S024		

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: 09-Aug-2017 18:39:07

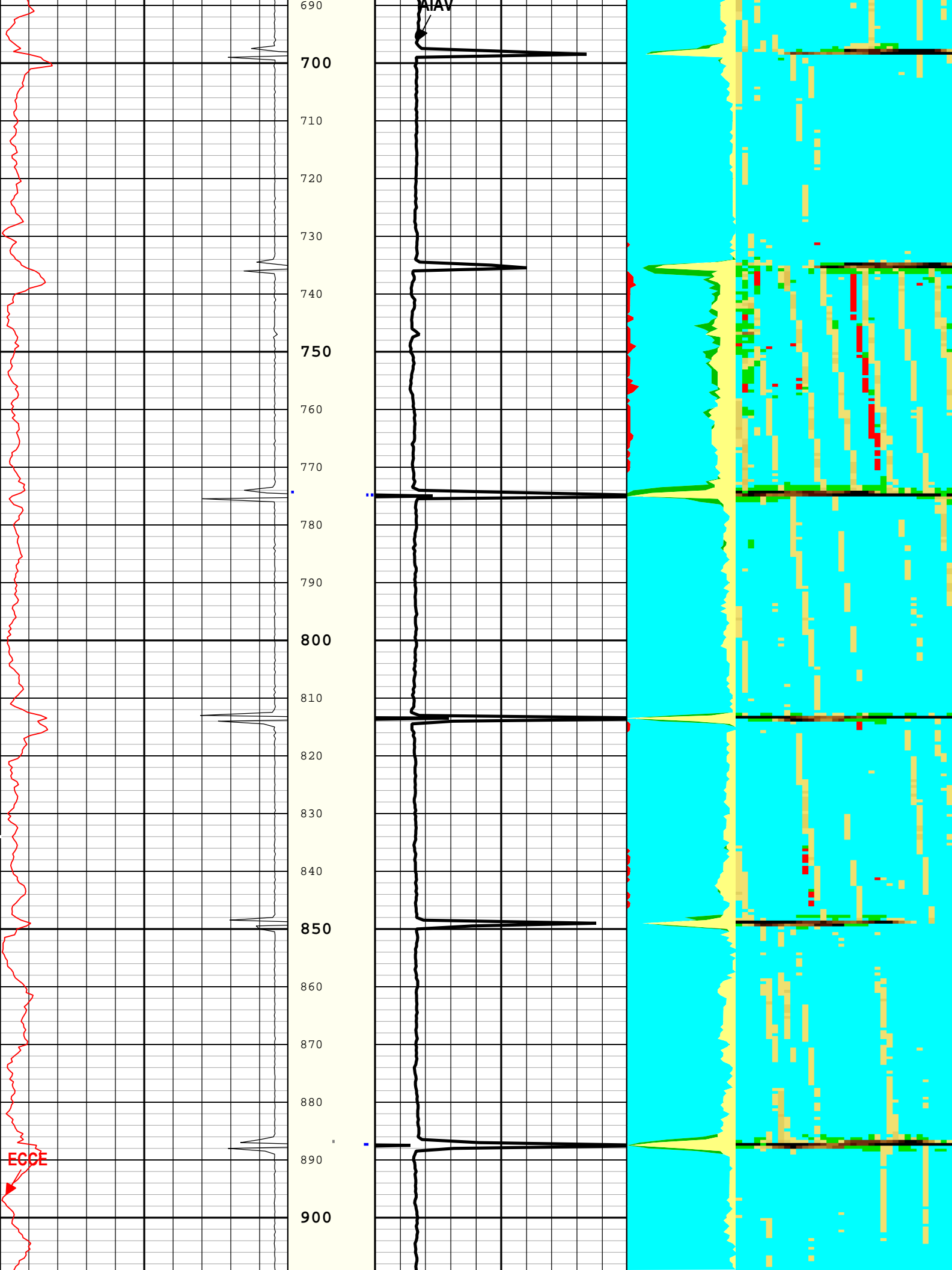
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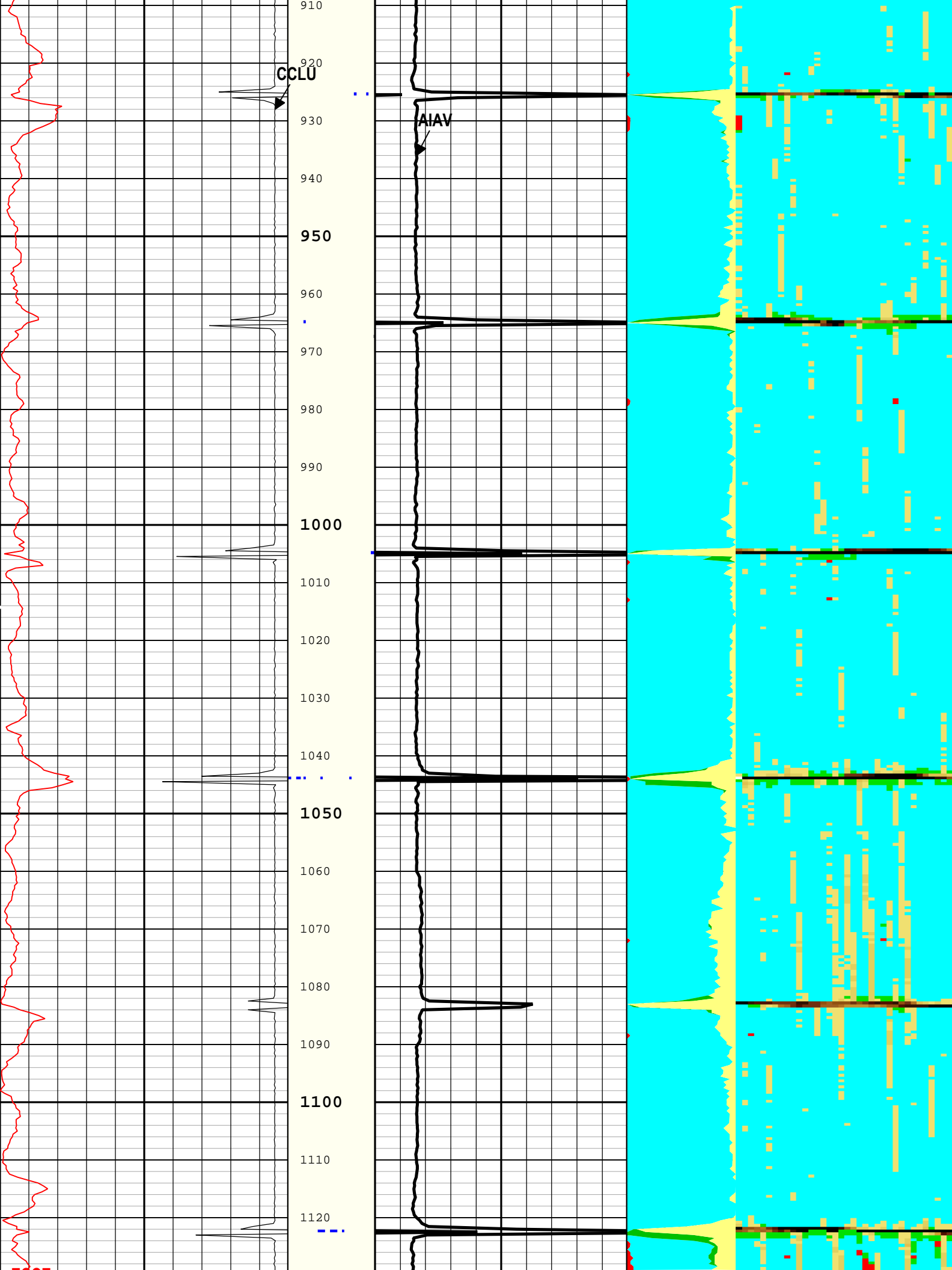


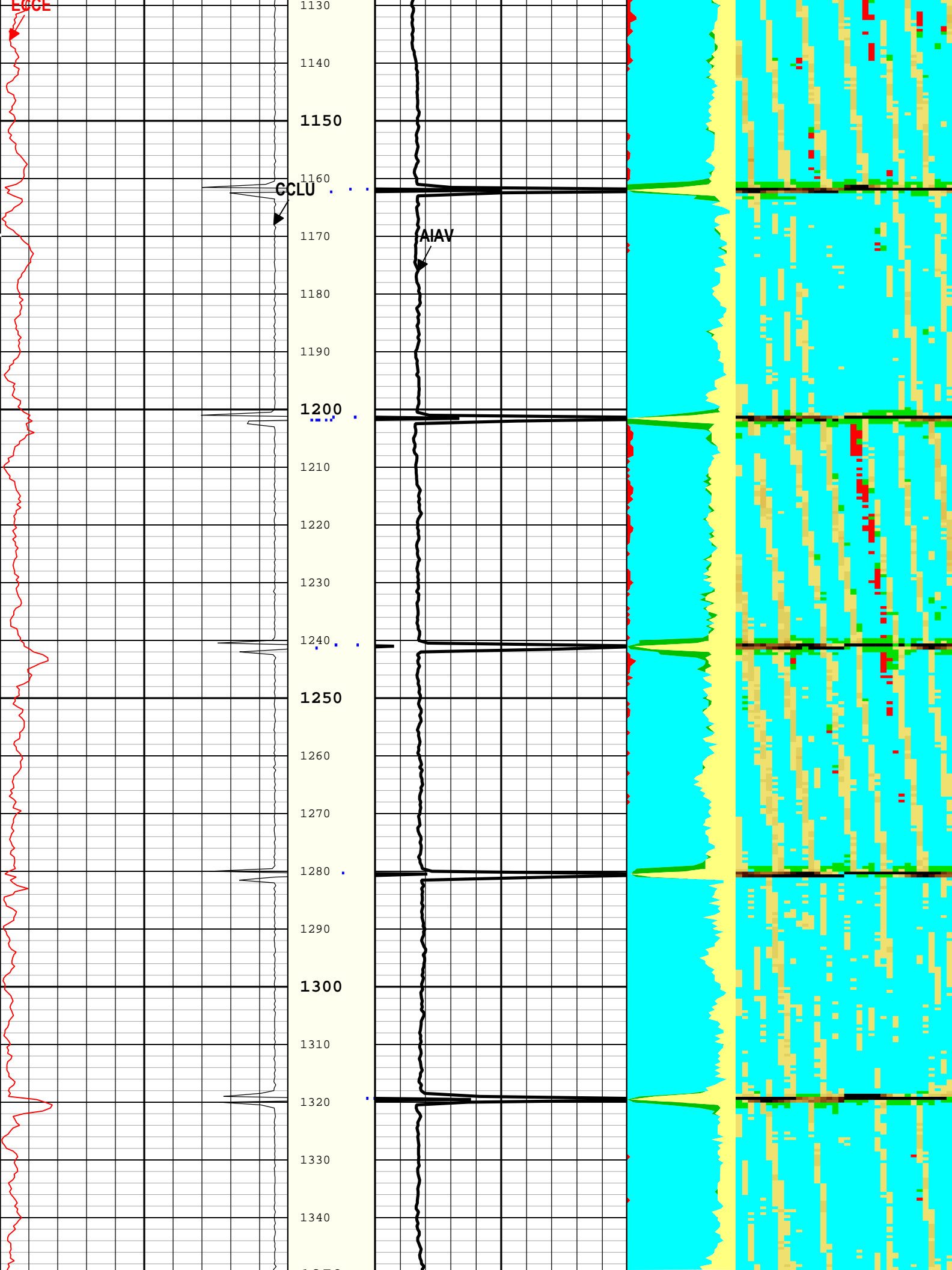


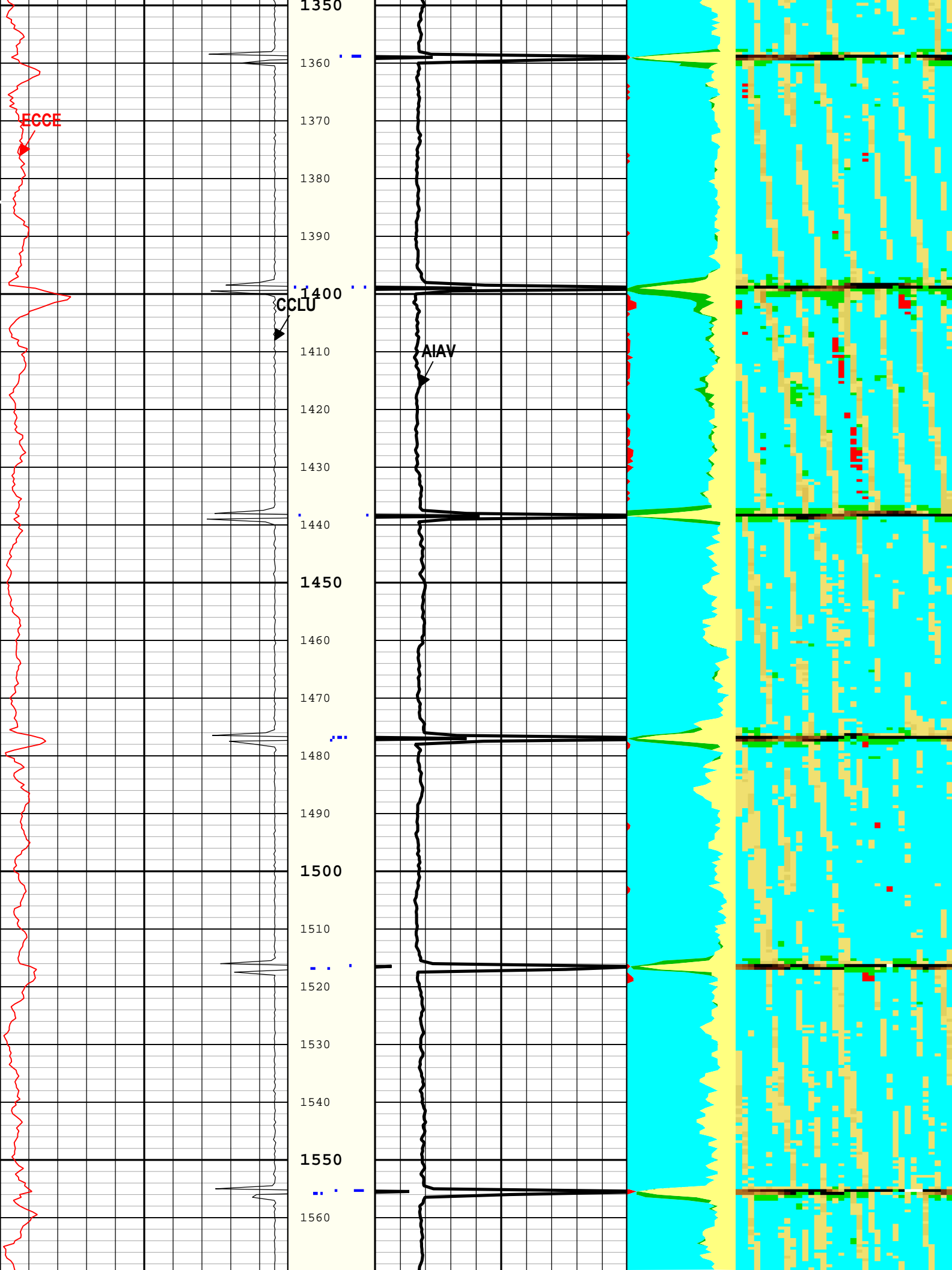


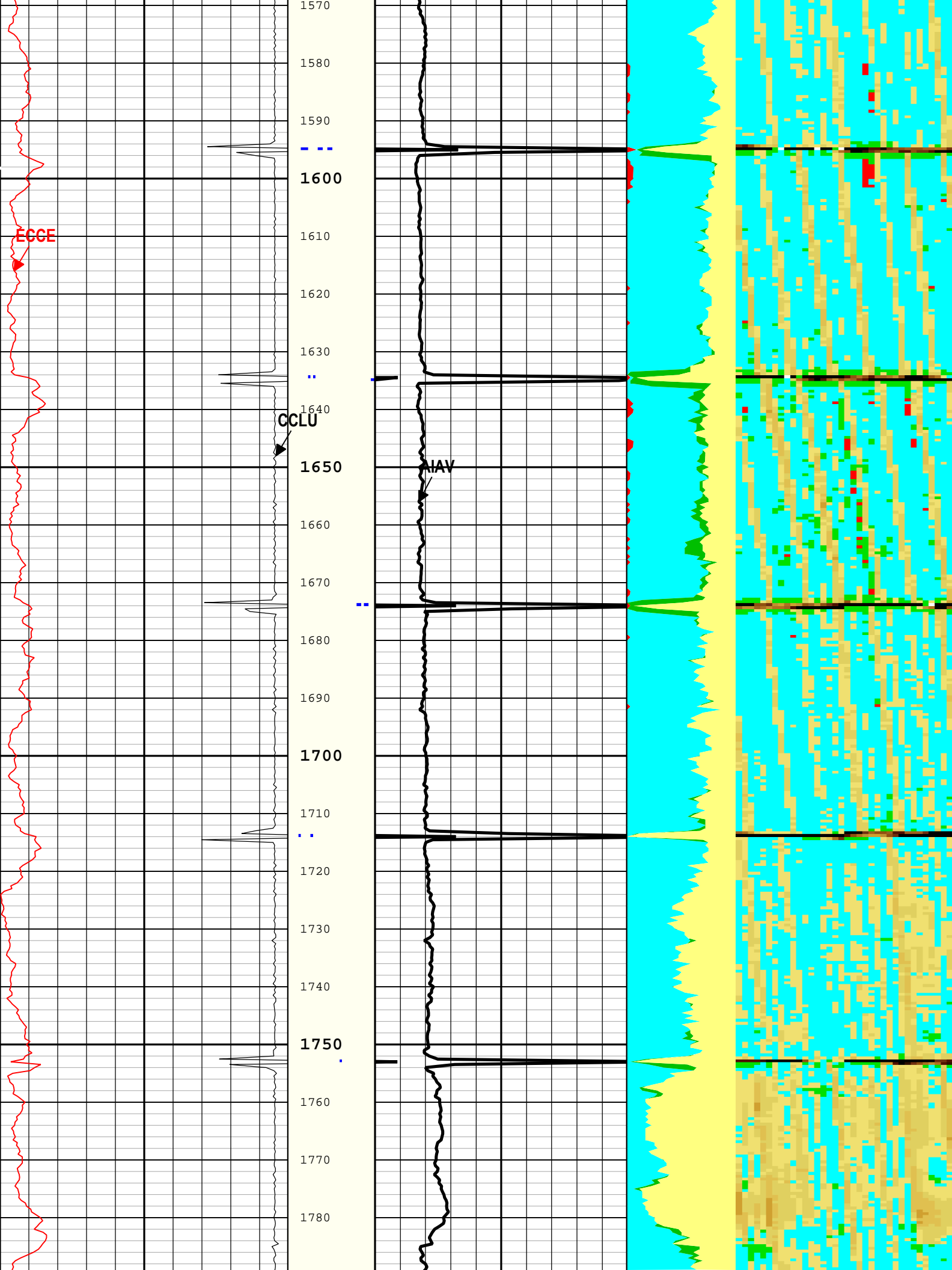


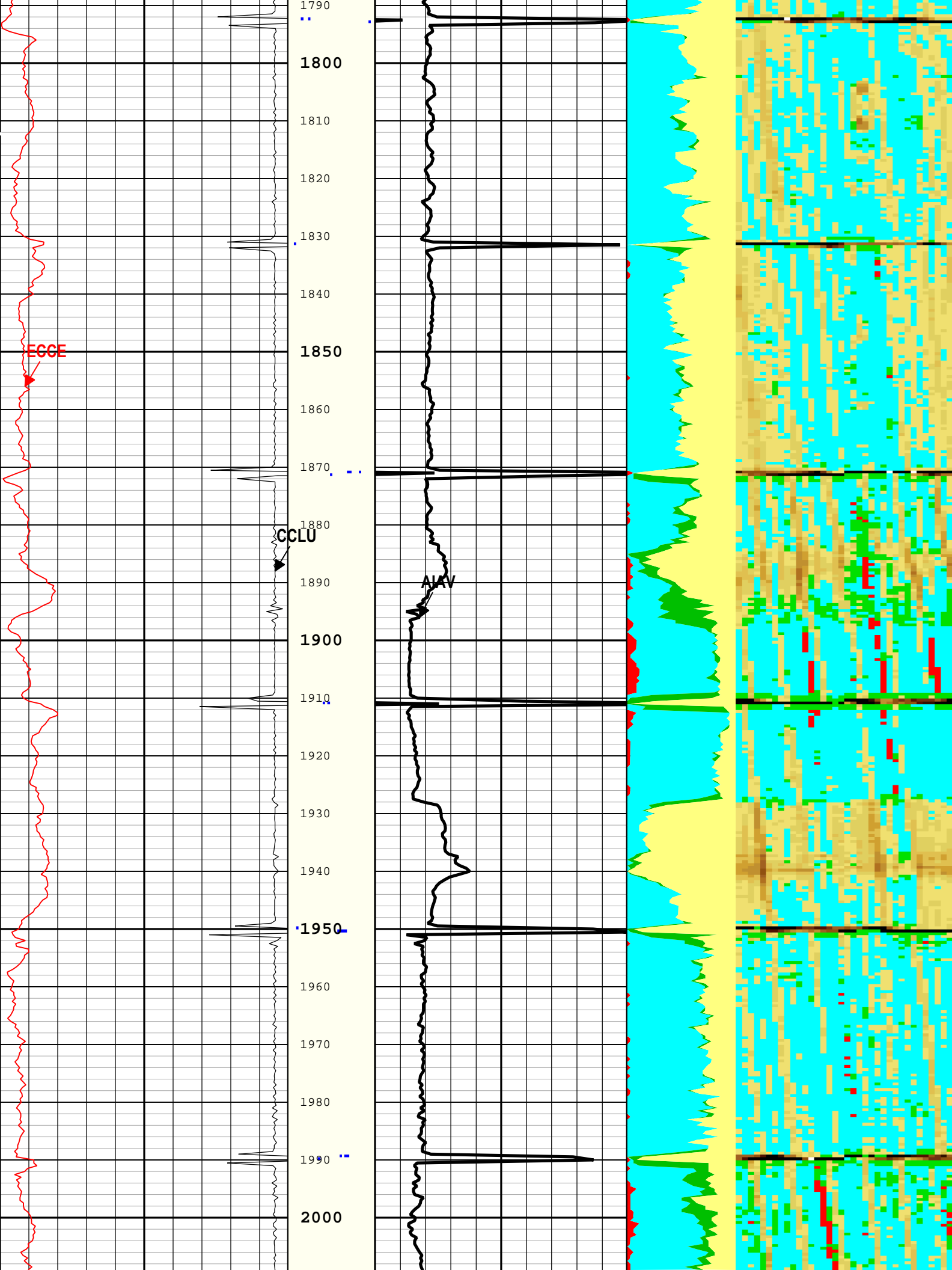


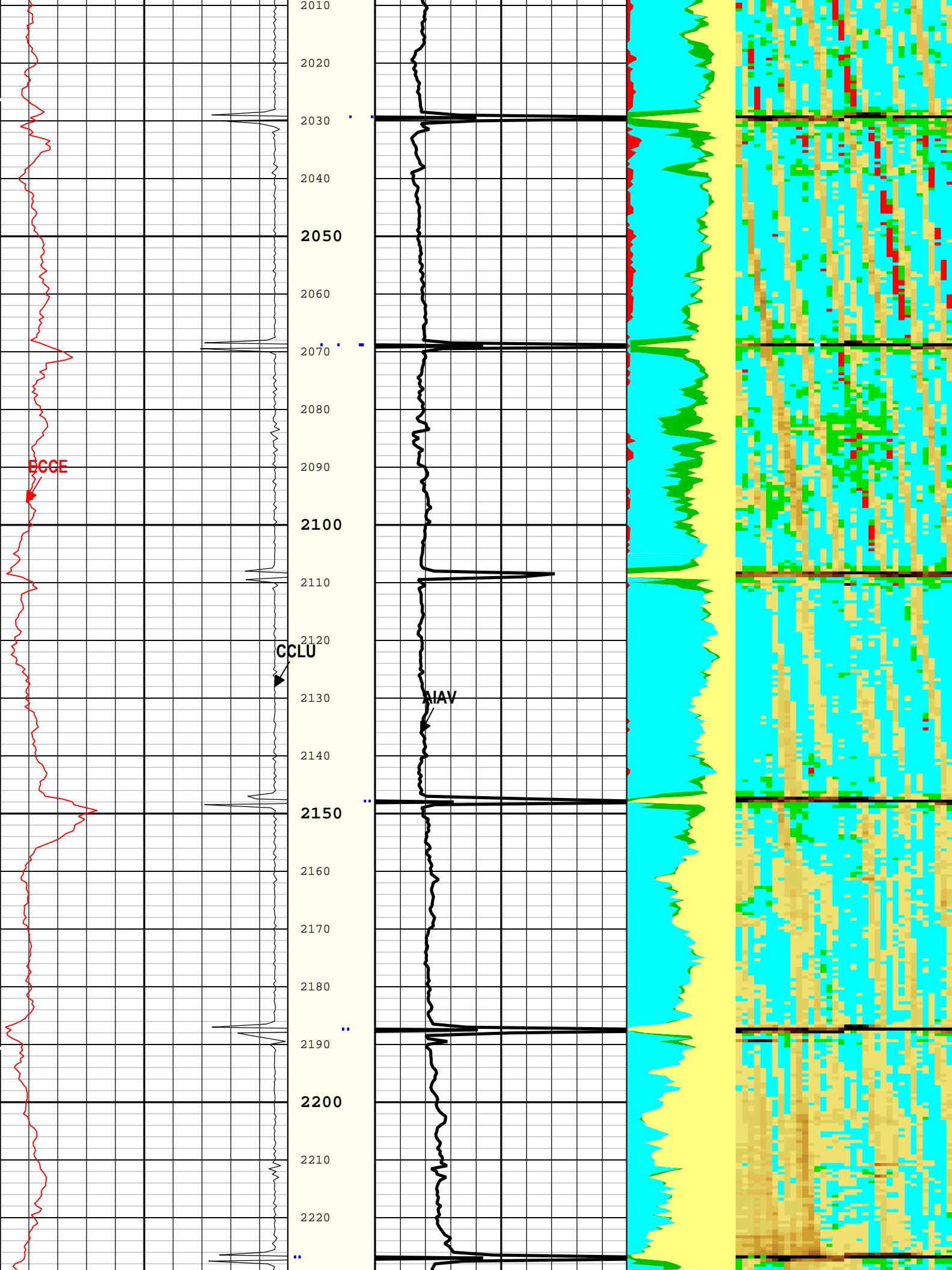


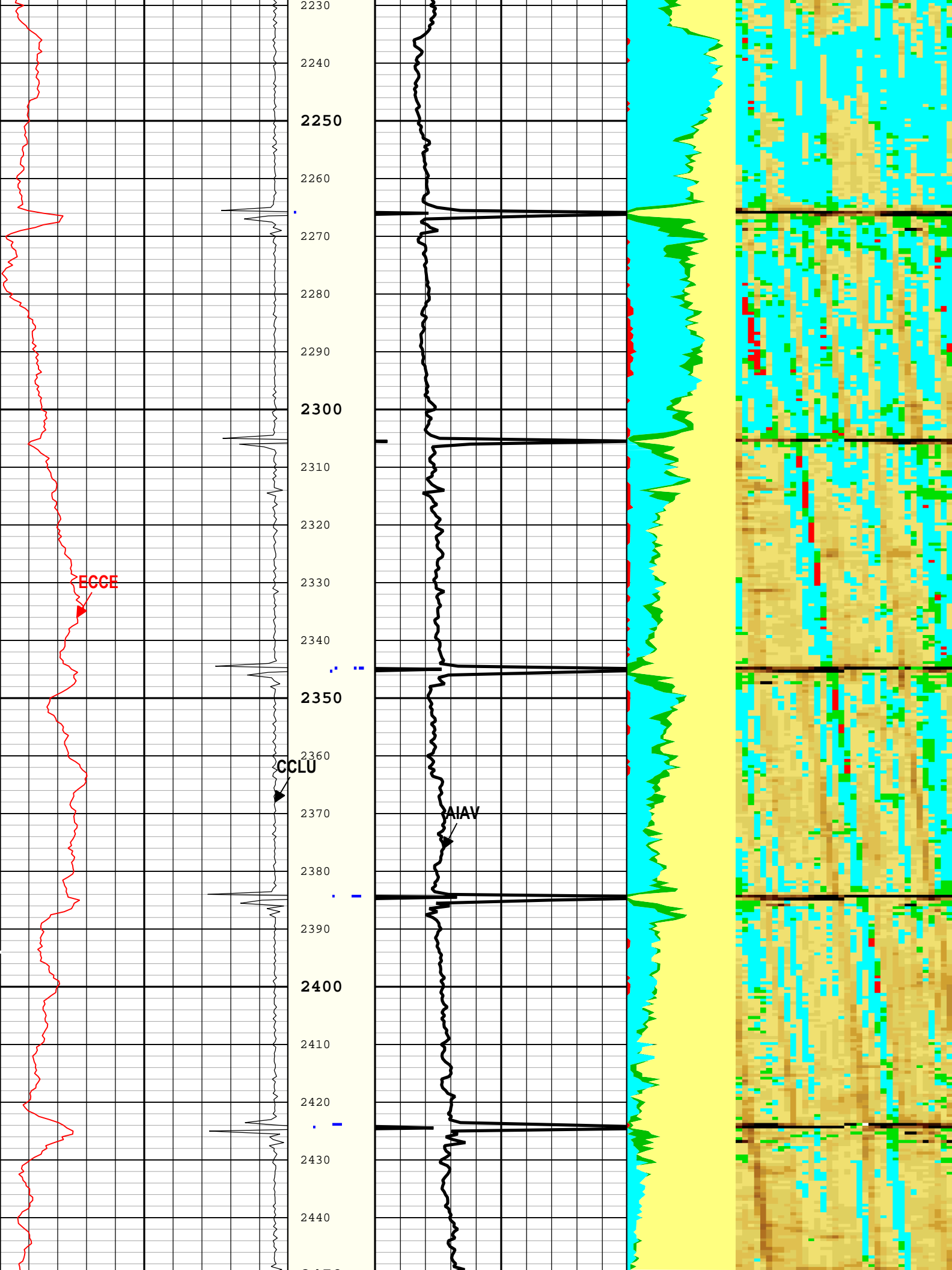




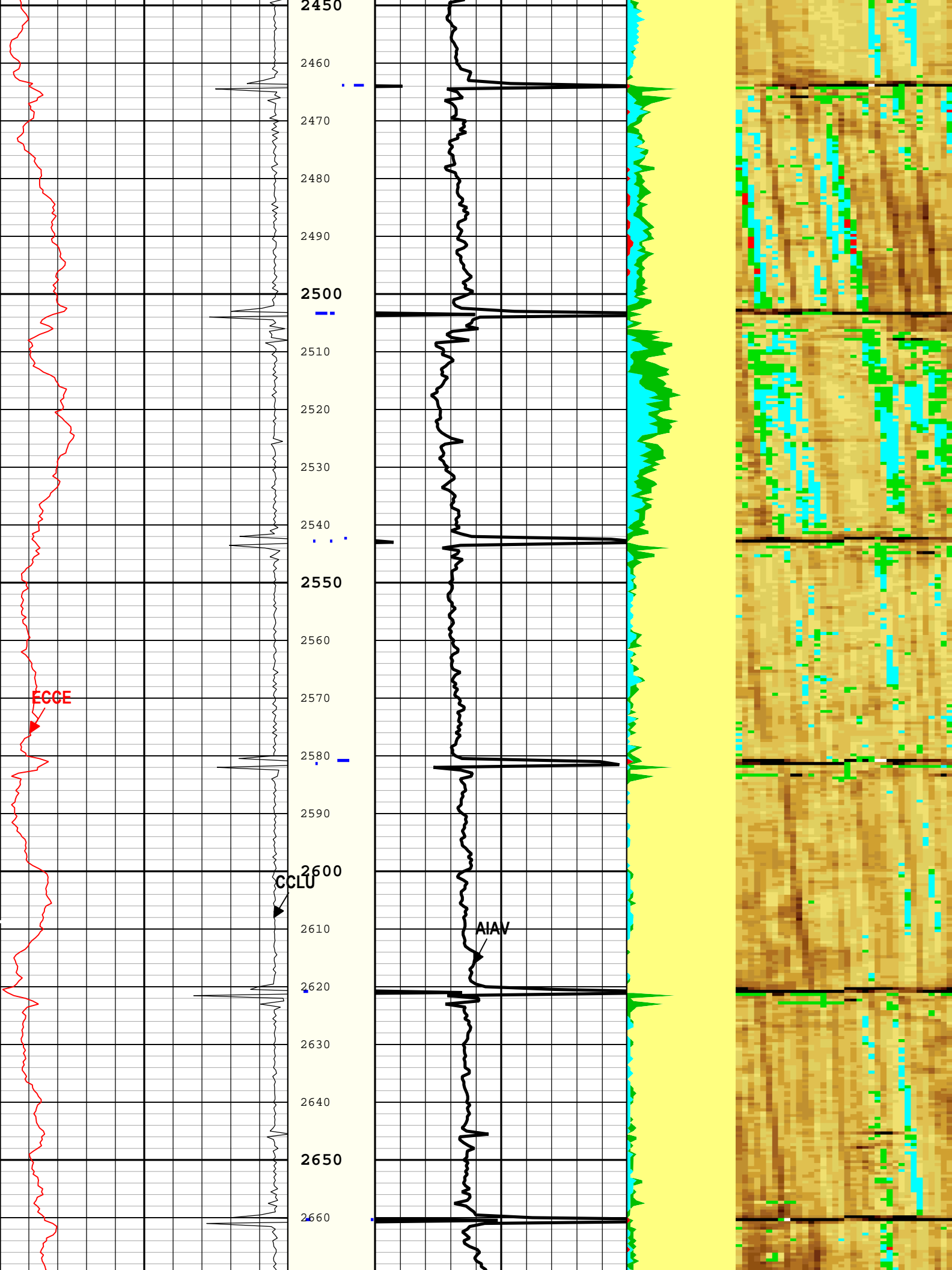


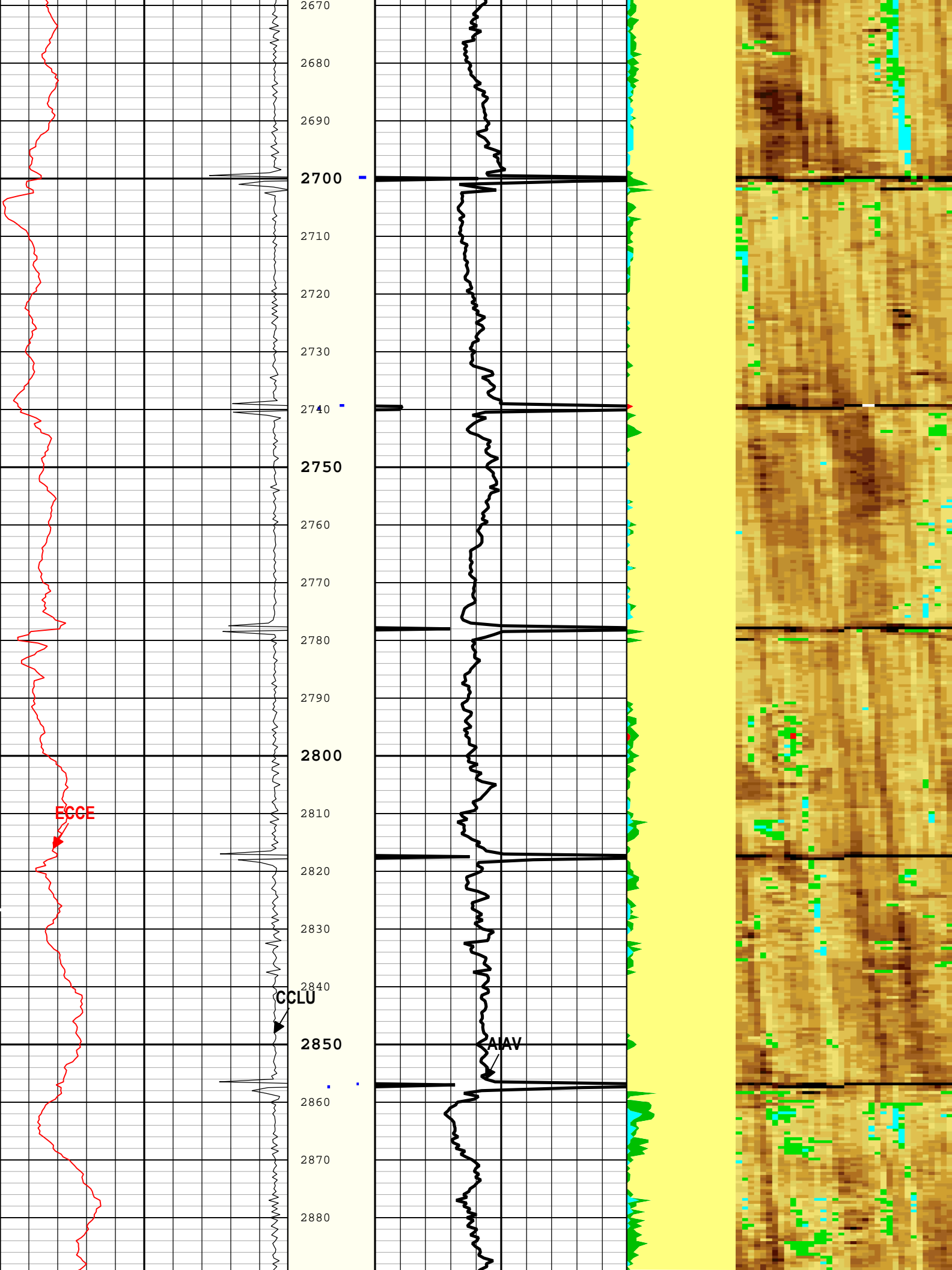


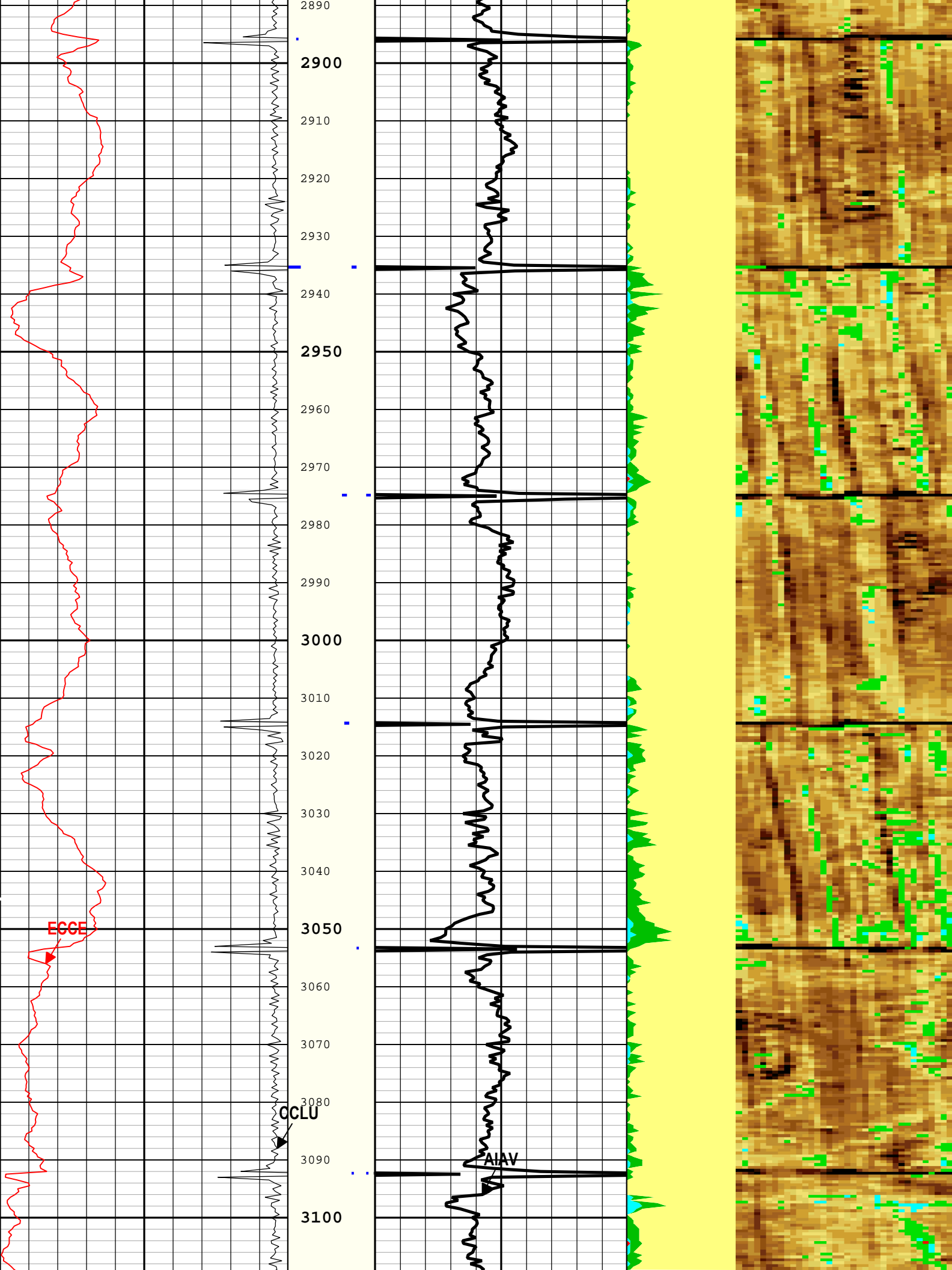


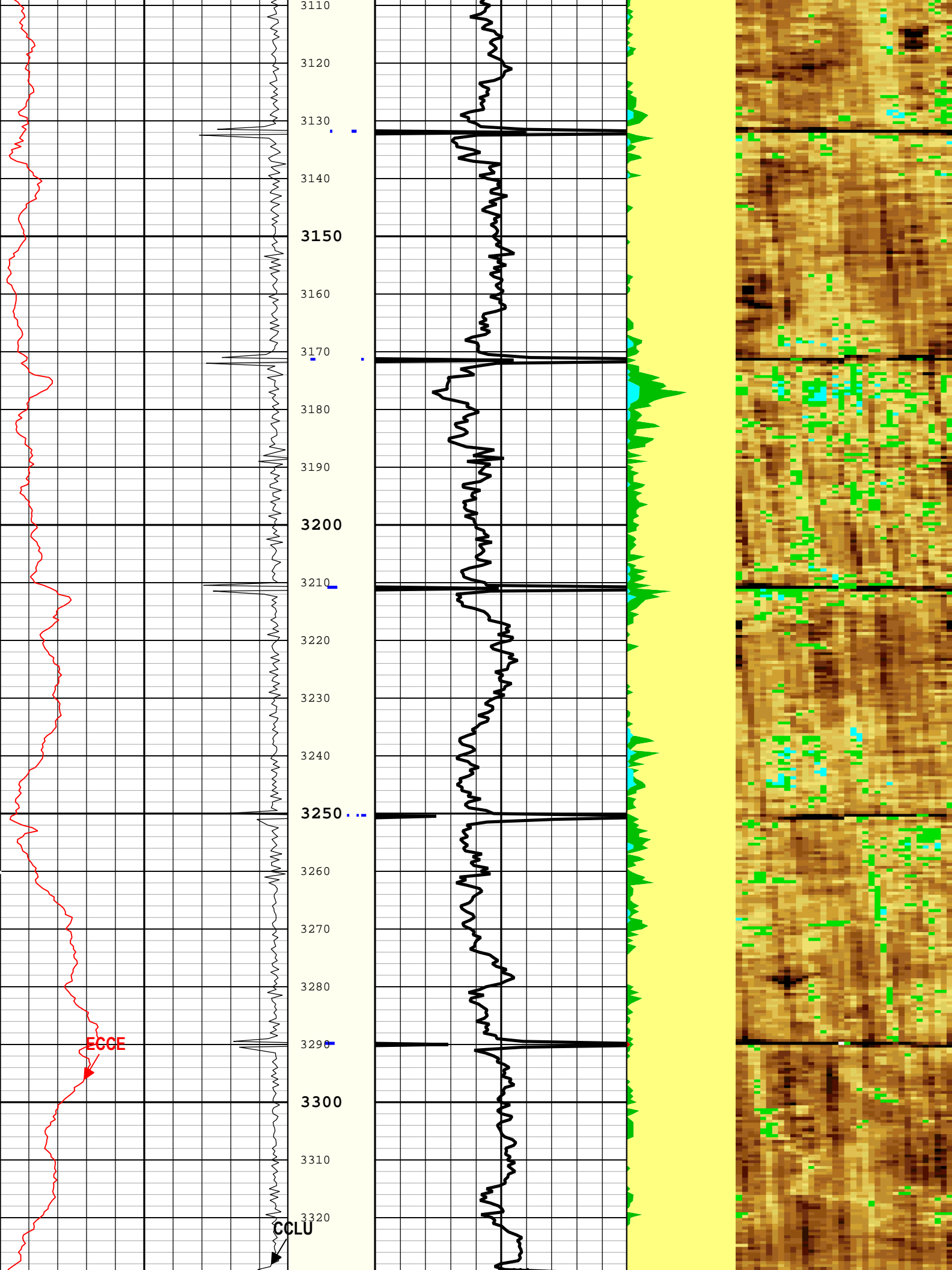


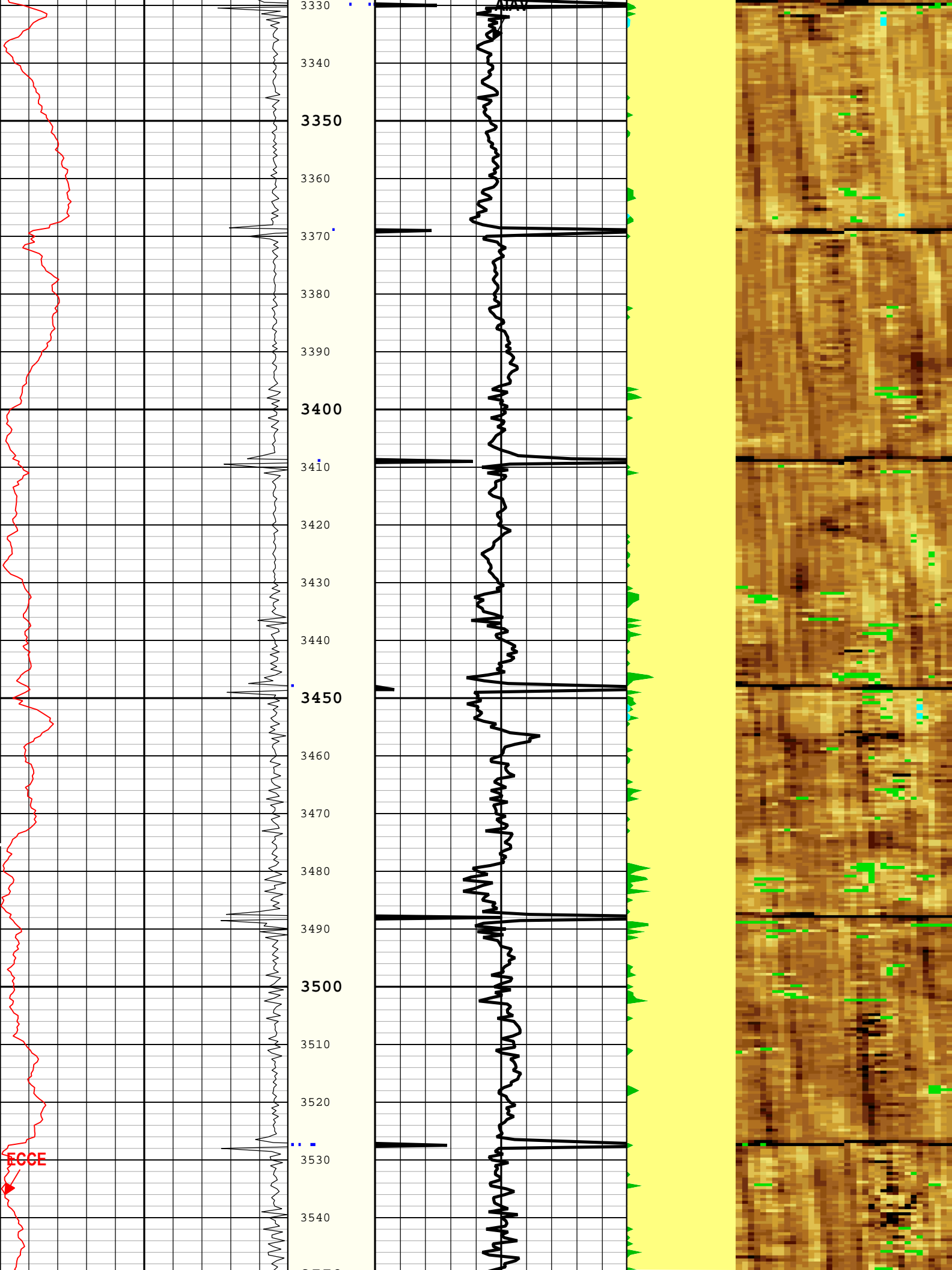


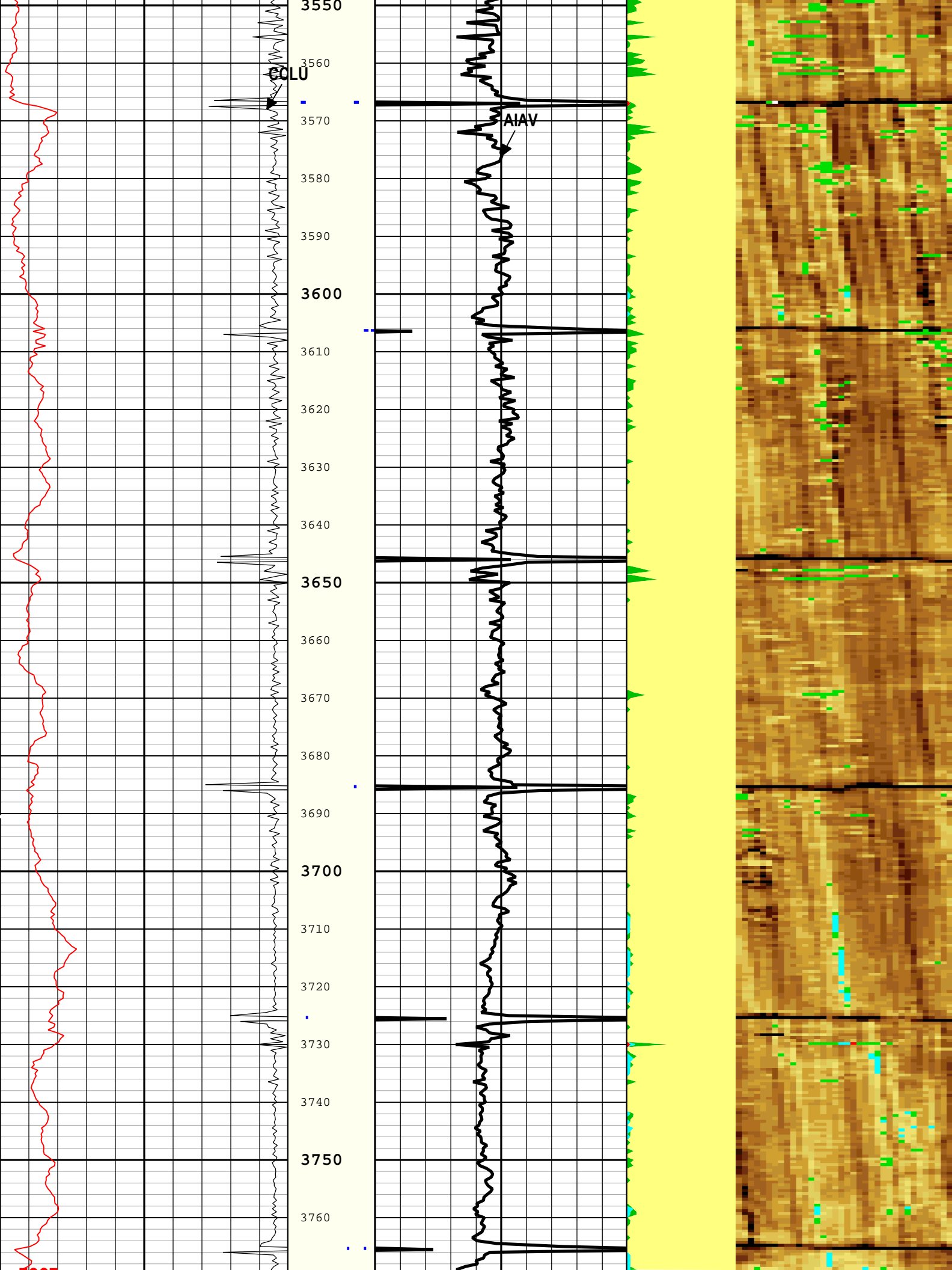


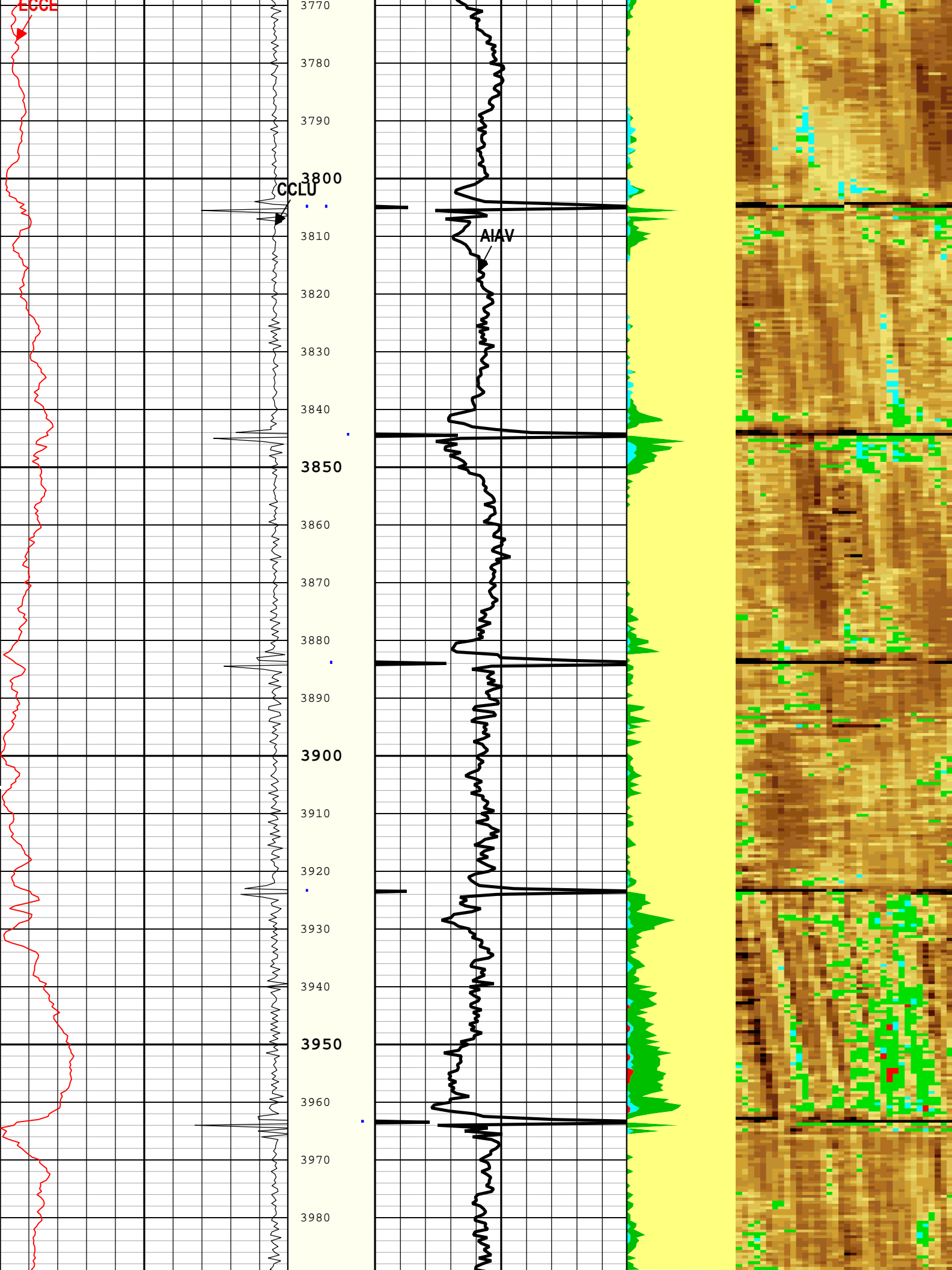


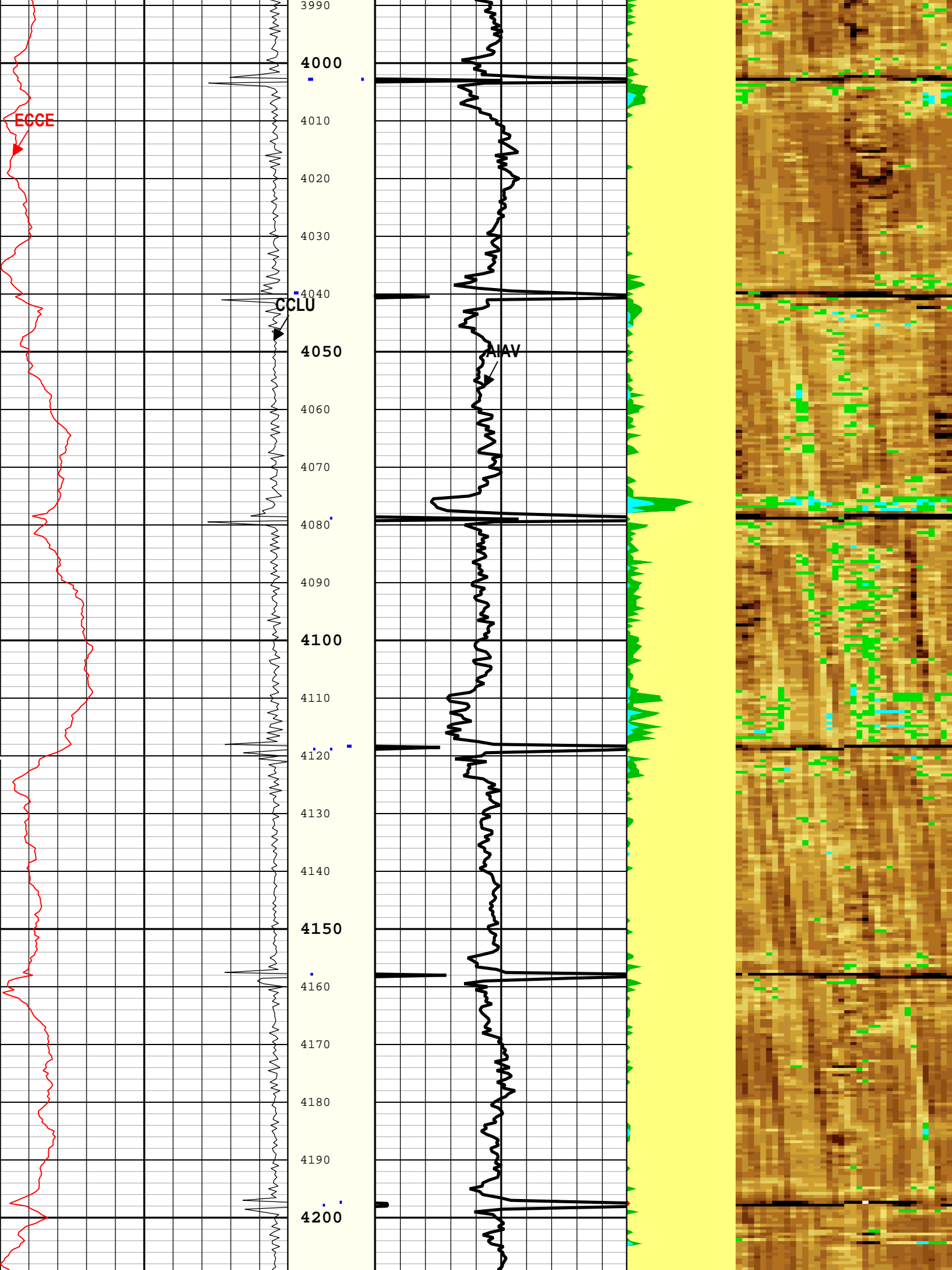




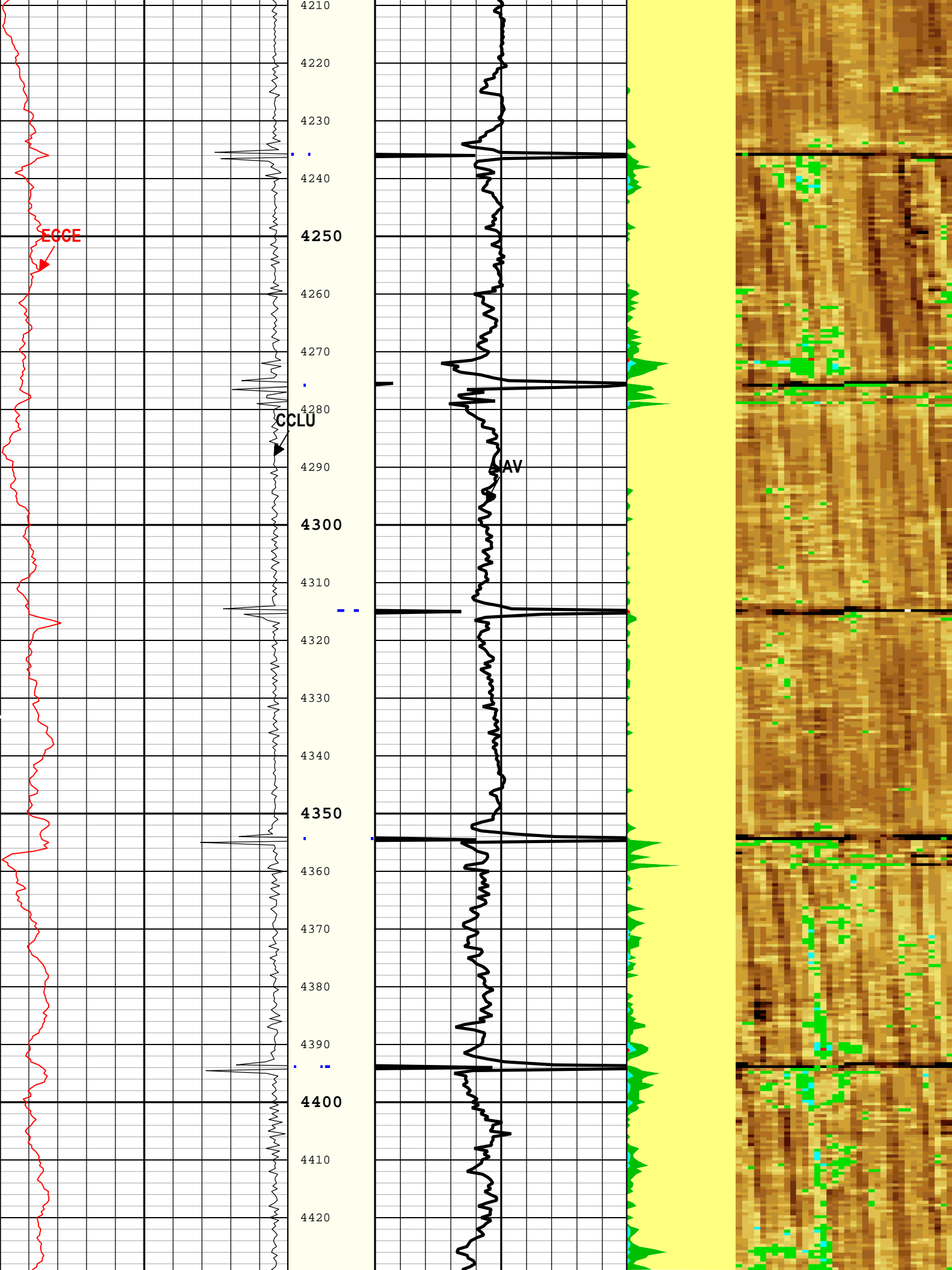


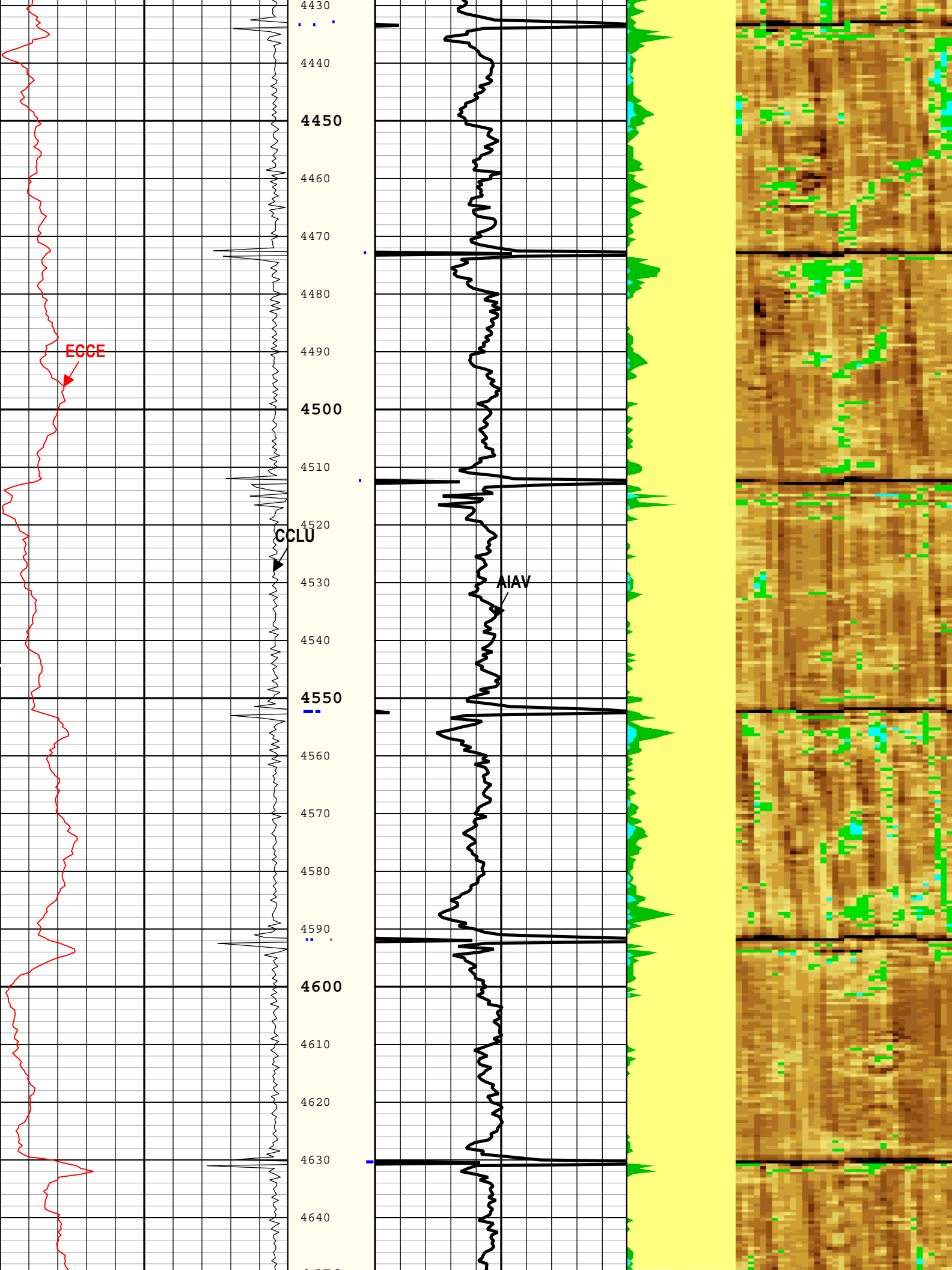


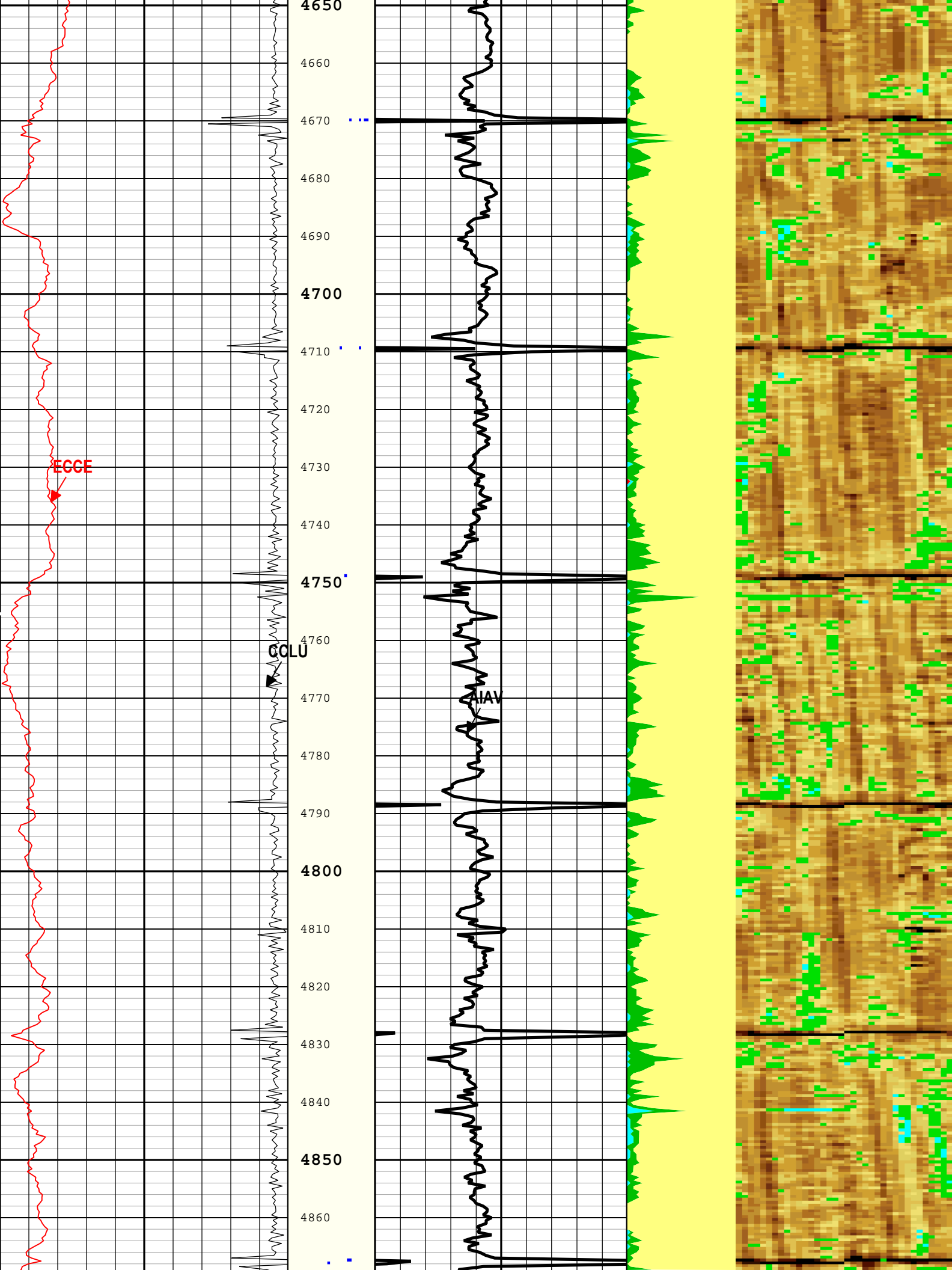


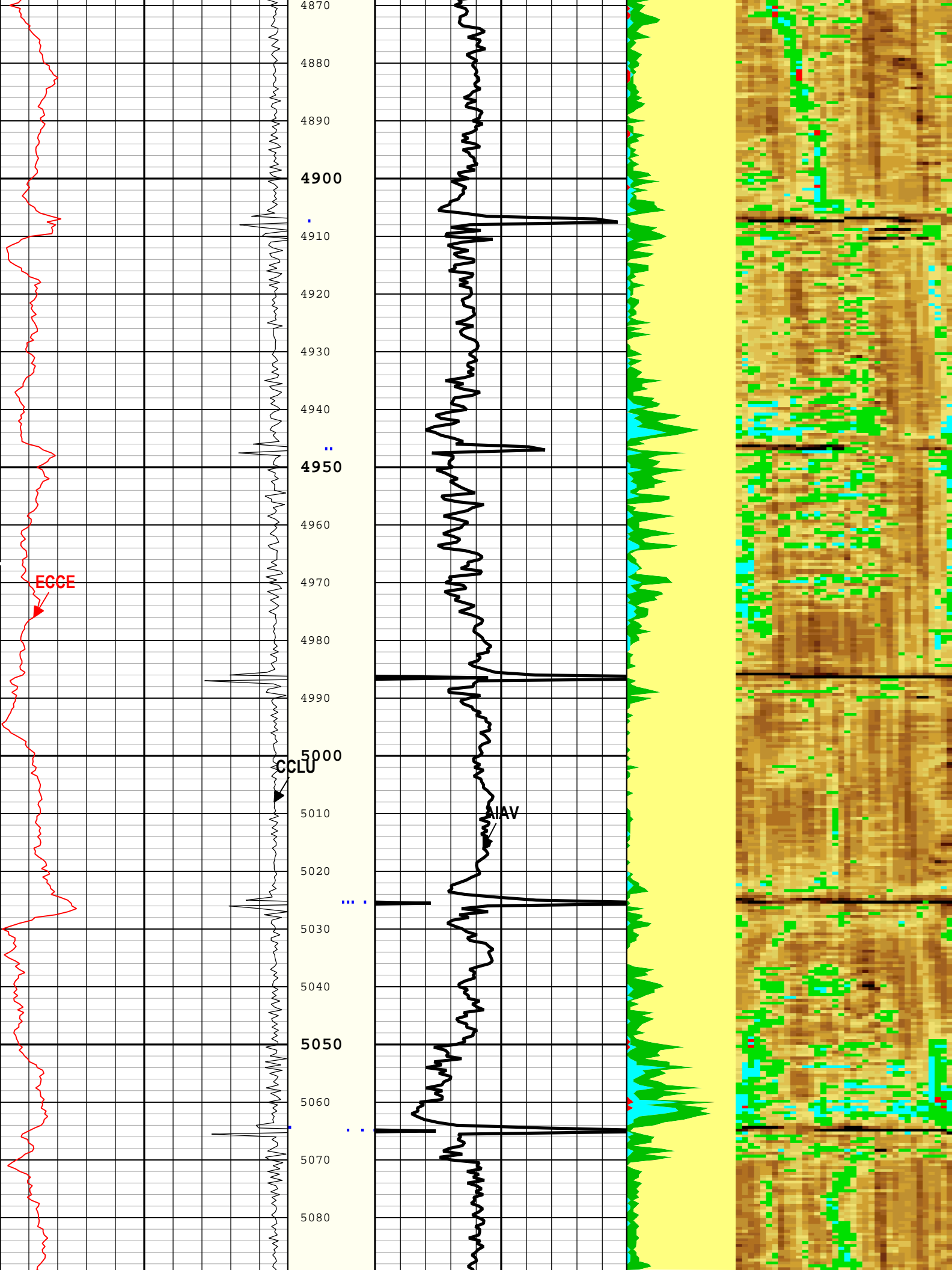


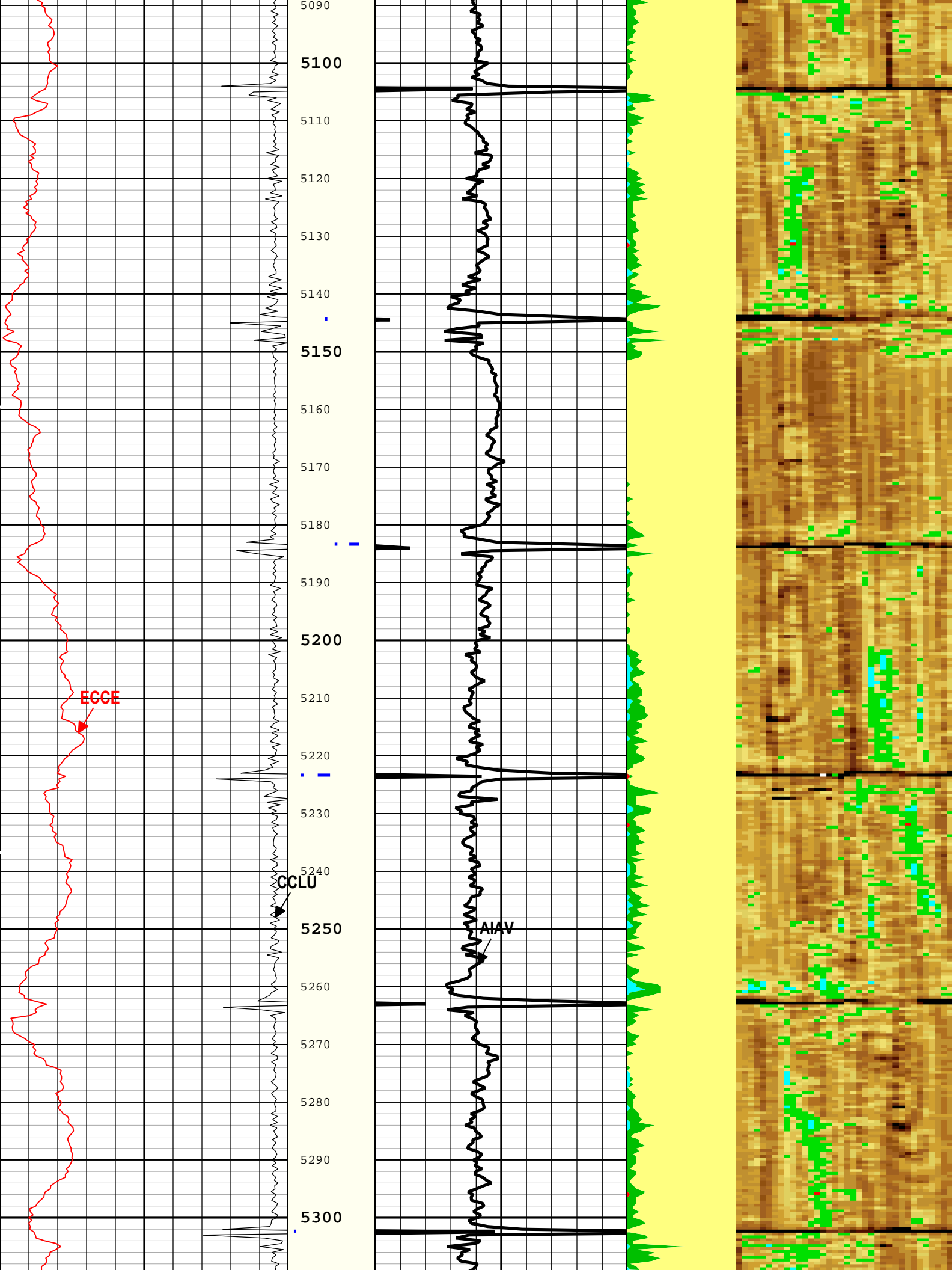


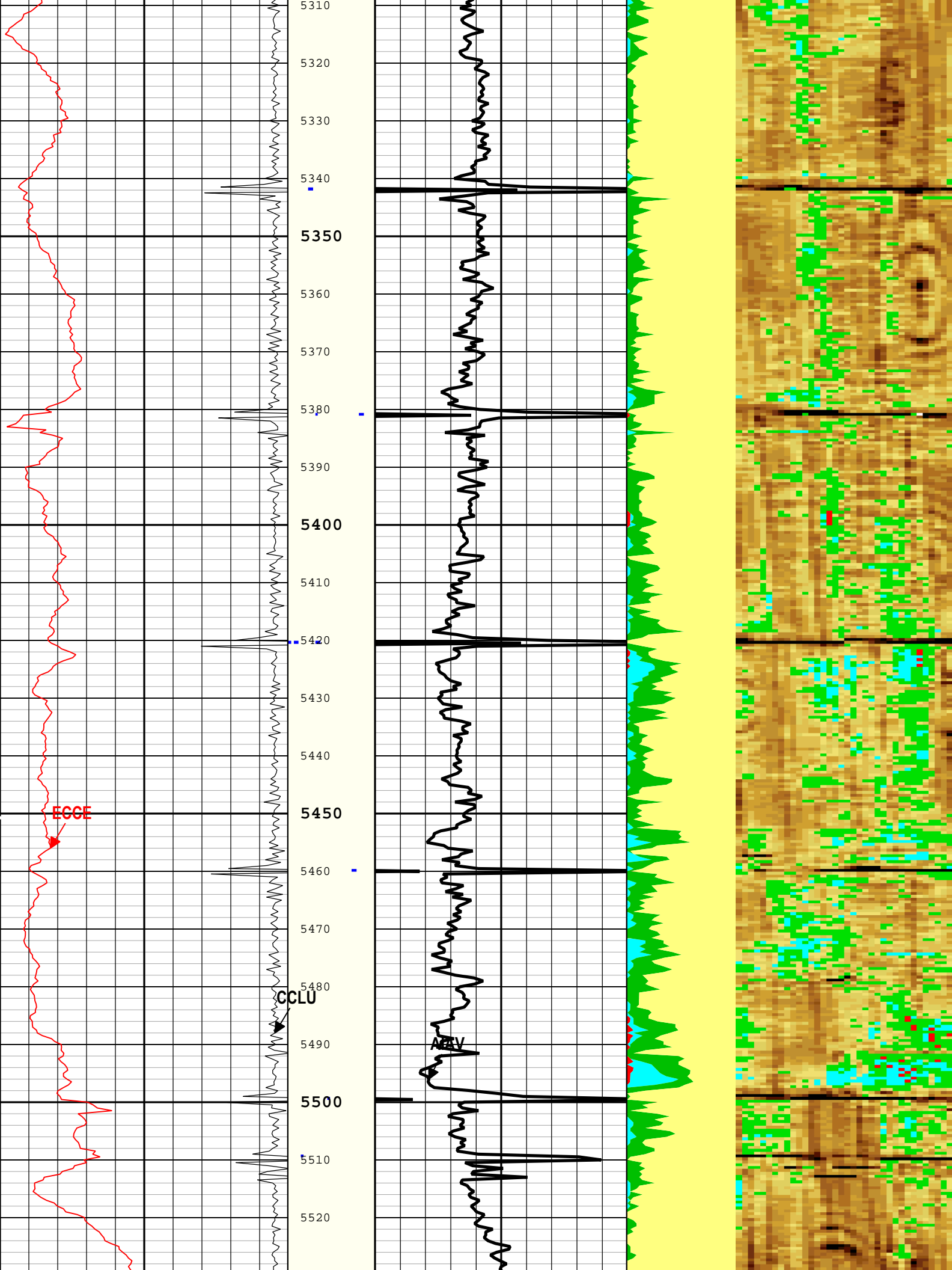


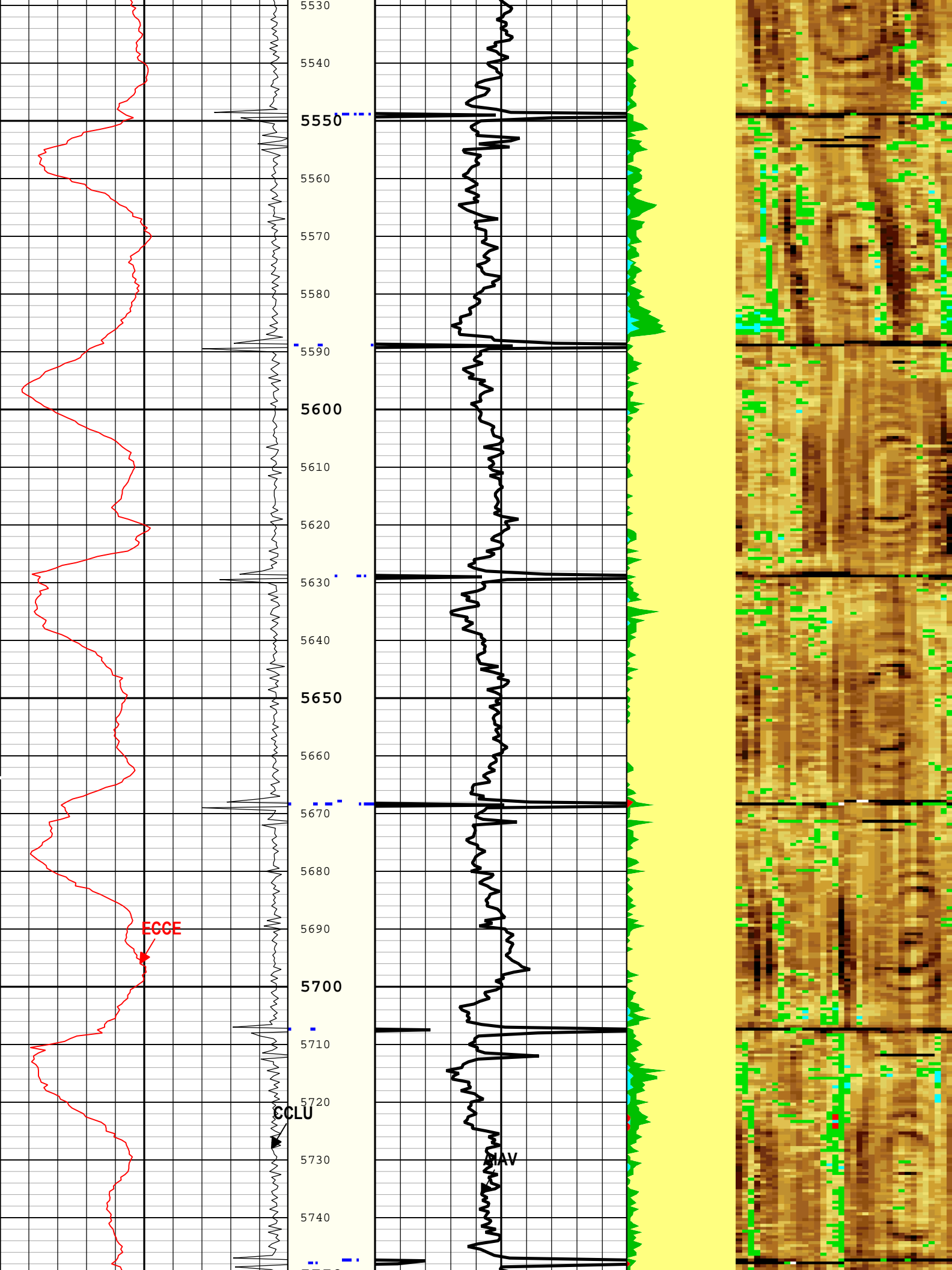


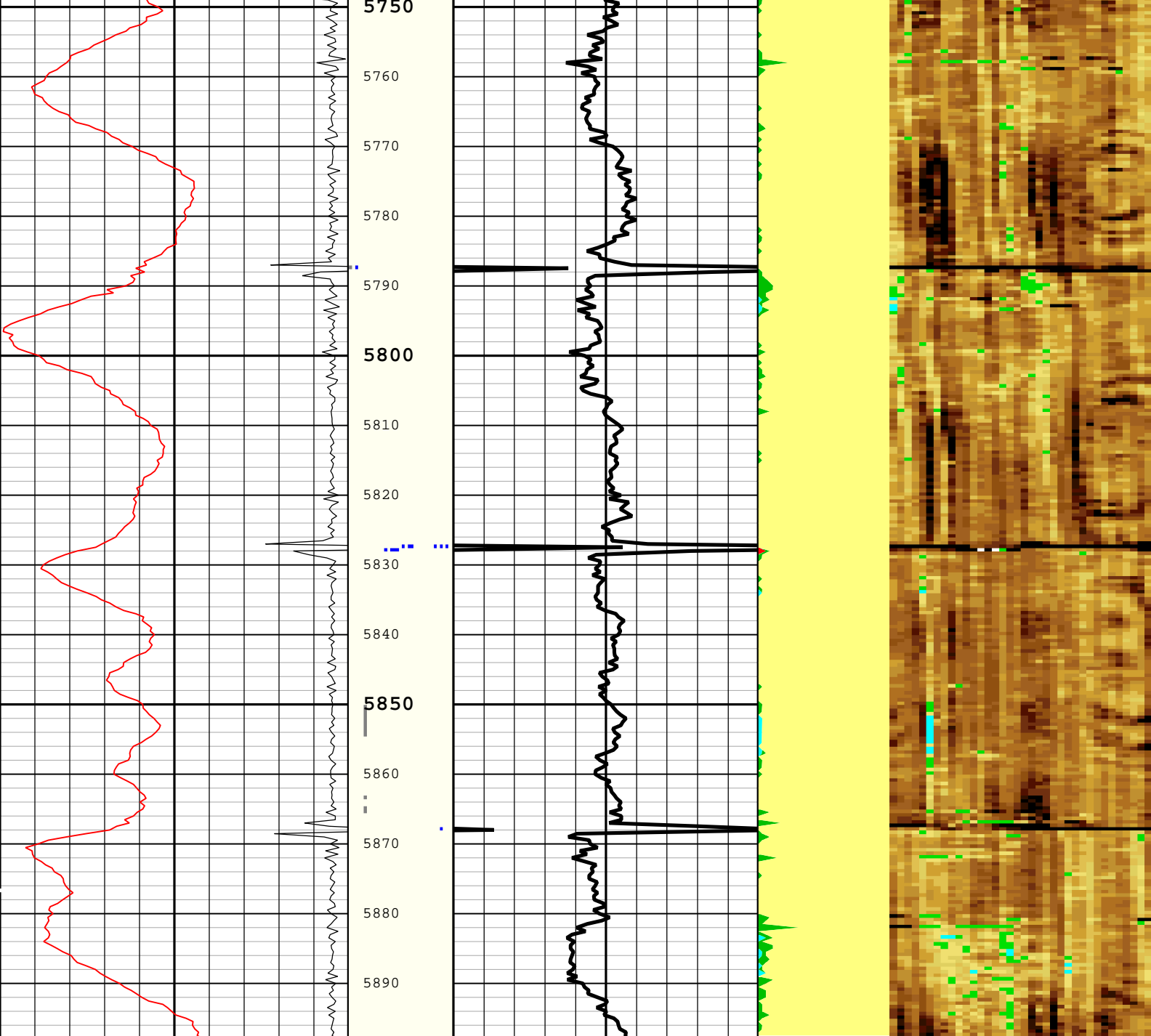












Casing Collar Locator Ultrasonic (CCLU) USIT-E			<div><div>Absent</div><div>1.5002.5006.500</div><div><div></div><div></div><div></div><div></div><div></div></div></div>	Acoustic Impedance Average (AIAV) USIT-E			<div><div>Gas</div><div>Liquid</div><div>Micro-Debonding</div><div>Bonded</div></div>	<div><div>Absent</div><div>-500,0002,2003,2544,3095,3636,4187,472</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div> <div>Custom Normalization USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)</div>
-20	in	1		0	Mrayl	10		
Amplitude of Eccentering (ECCE) USIT-E			Explicit Normalization				<div>Micro-Debonding</div>	
0	in	0.5		USIT - USIT Processing Flags (UFLG) USIT-E				
			USIT - USIT Processing Flags (UFLG) USIT-E				<div>Bonded</div>	

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: 09-Aug-2017 18:39:07

## Channel Processing Parameters

### One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
PS	Bit Size	WL SESSION	Depth Zoned	in



	Bit Size	WELSESSION	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	1.15	
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	116	1941	
BS	8.5	1941	5899	
All depth are actual.				

Tool Control Parameters				
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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	55	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	6500	ft
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	Time Zoned	us

Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
WINB	31.88	07-Aug-2017 08:52:54	07-Aug-2017 09:32:42	6106.32	68.06
WINB	25.15	07-Aug-2017 09:32:42	07-Aug-2017 09:32:49	68.06	64.47
WINE	71.88	07-Aug-2017 08:52:54	07-Aug-2017 08:53:08	6106.32	6104.01

WINE	75.98	07-Aug-2017 08:53:08	07-Aug-2017 09:32:49	6104.01	64.47
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All depth are at tool zero.

One

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP1	7.1.82245.3100

Pass Summary

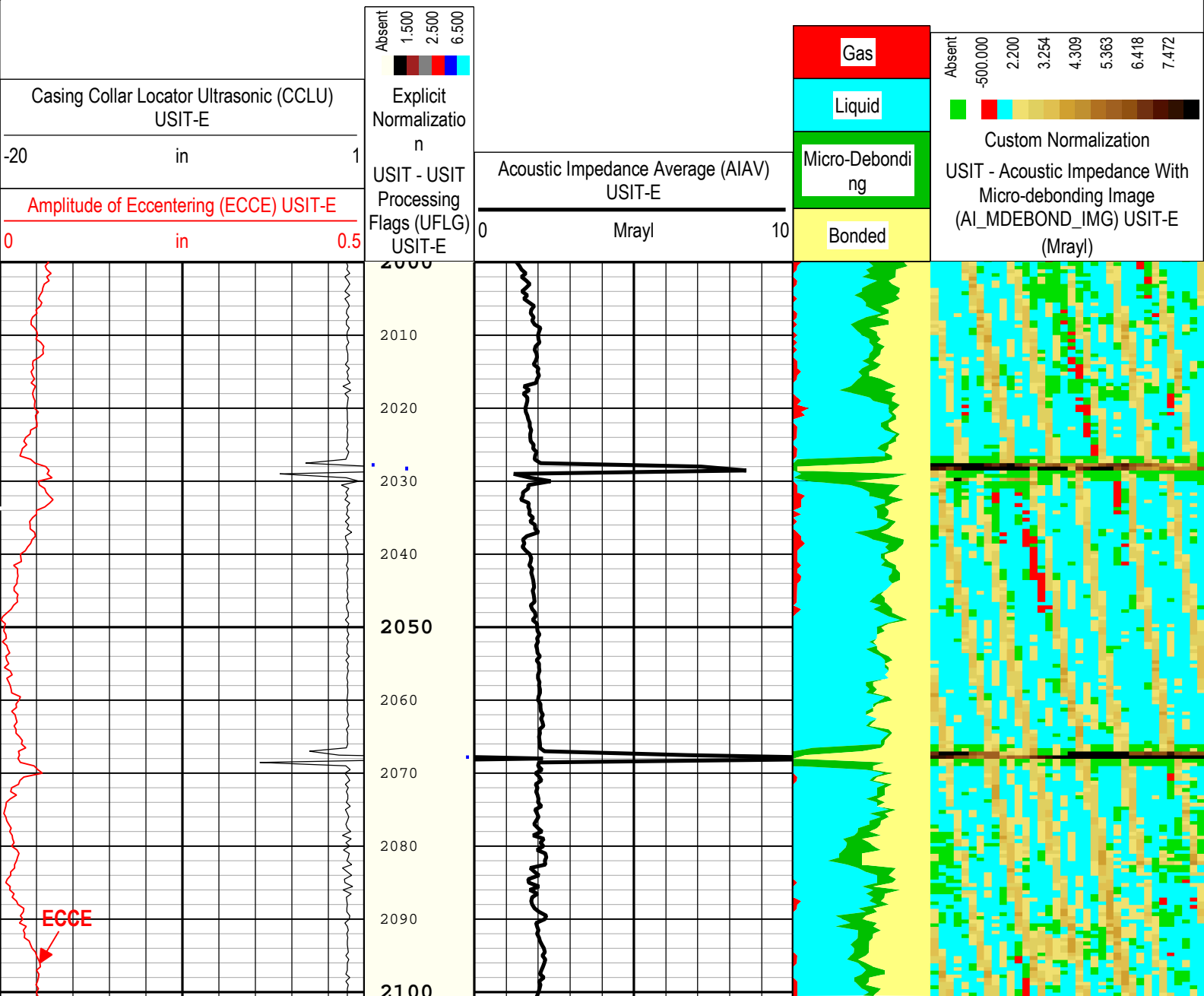
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[2]:Up	Up	1961.81 ft	2535.88 ft	07-Aug-2017 8:26:21 AM	07-Aug-2017 8:30:35 AM	ON	3.84 ft	Yes

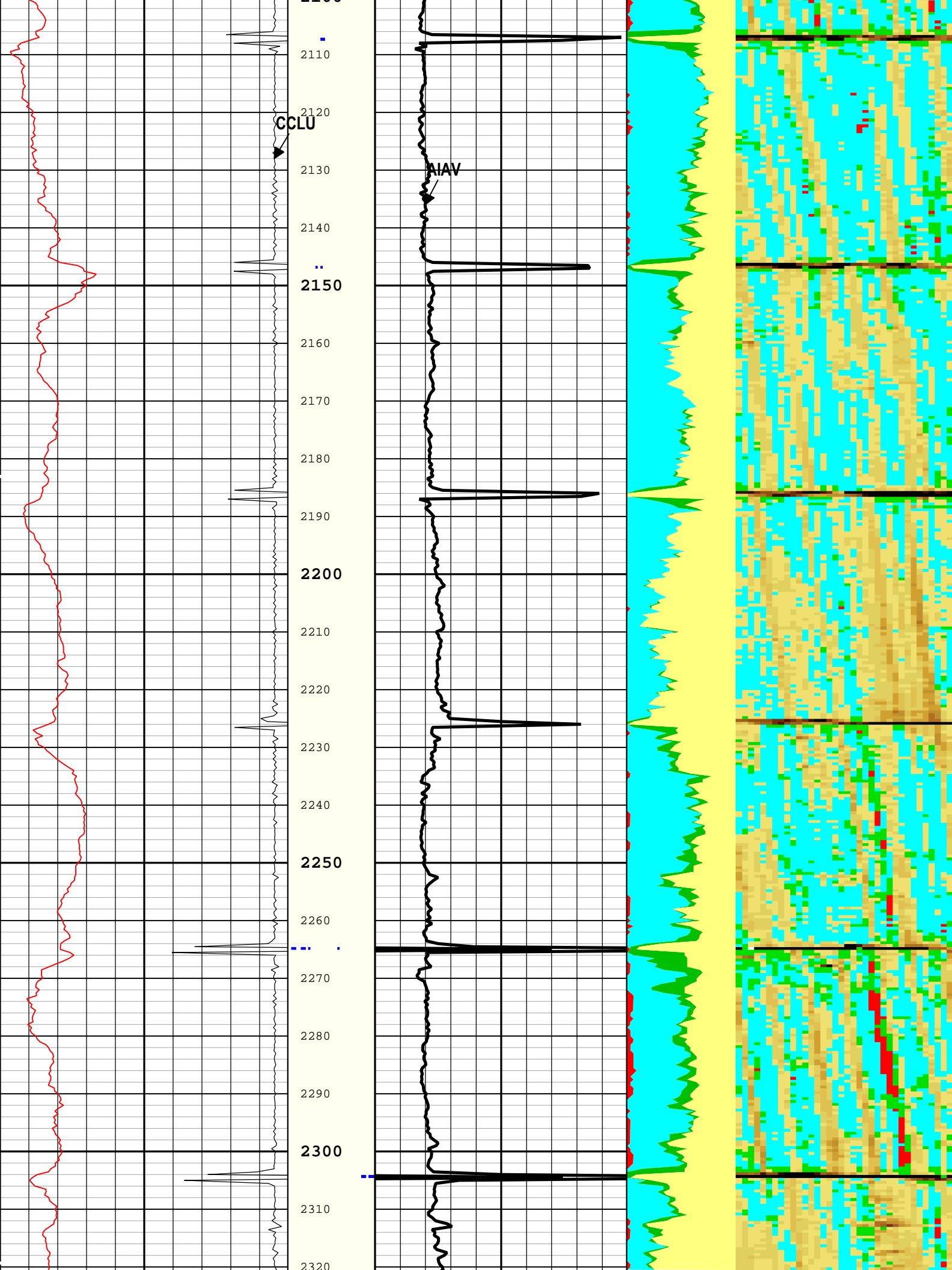
All depths are referenced to toolstring zero

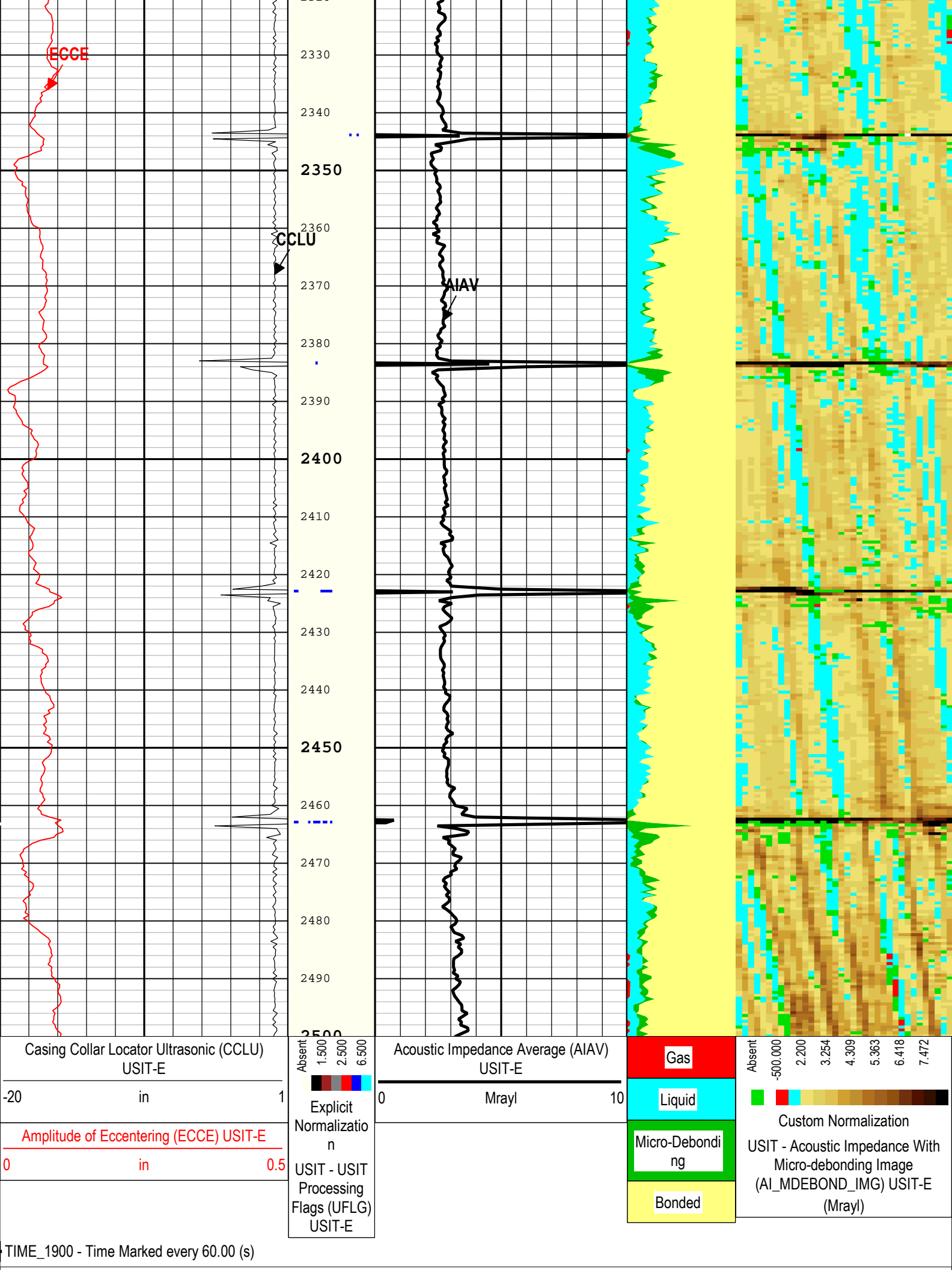
Log	Company:Noble Energy Inc.      Well:Freedom Federal LC21-640 One: Log[2]:Up:S024
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Description:    Format: Log ( DJ Basin Ultrasonic Cement Summary Report )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth  
Creation Date: 09-Aug-2017 18:39:13

TIME\_1900 - Time Marked every 60.00 (s)







Channel Processing Parameters	
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One: Parameters				
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	8.5	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	1.15	
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

Tool Control Parameters	
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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	55	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

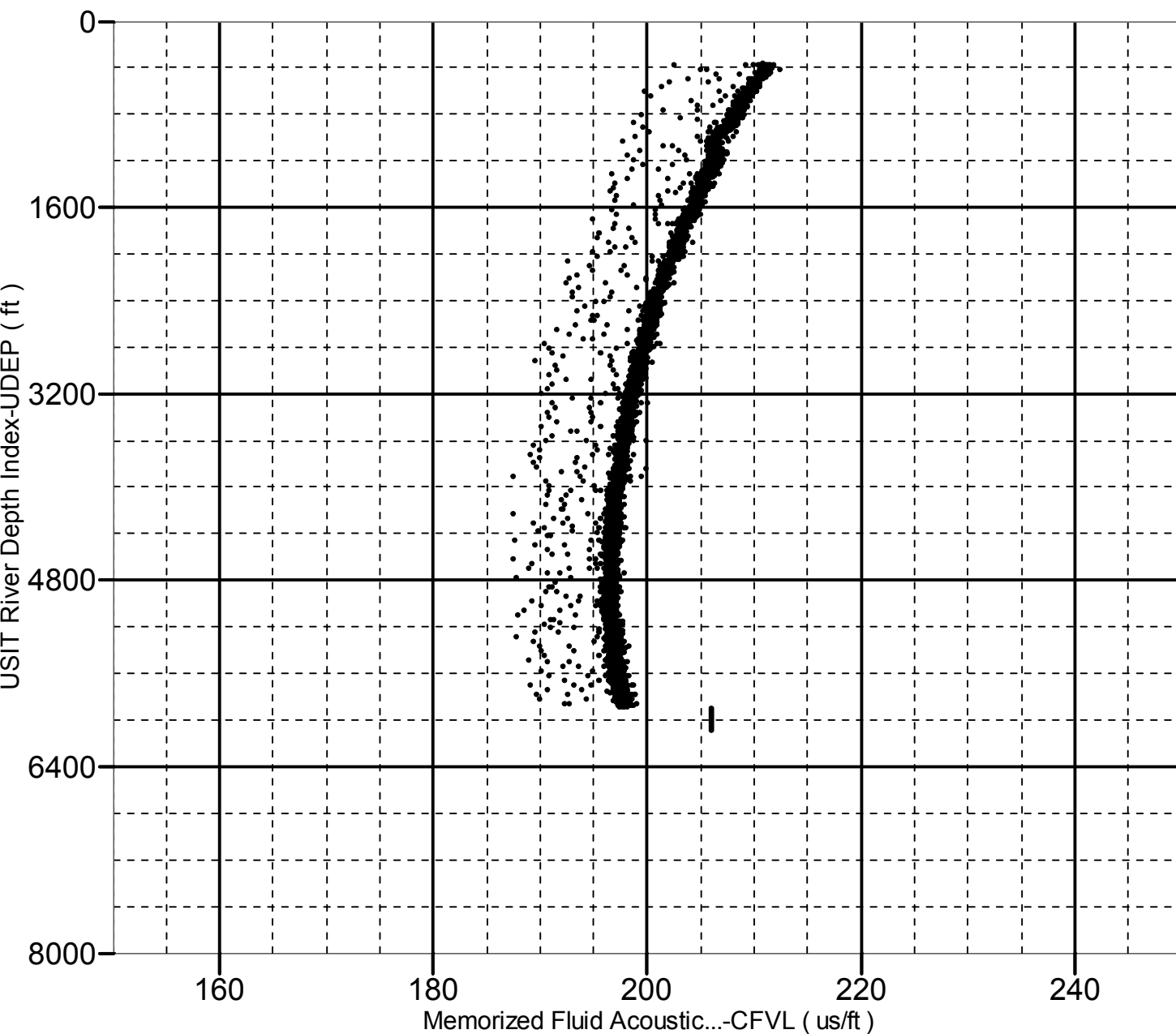
# Fluid Acoustic Slowness vs Depth

3D Cross Plot

## 2D Cross Plot

Index Range: From 5899.00 to 116.00 ft

● CFVL-UDEP



XYZ

Company:Noble Energy Inc. Well:Freedom Federal LC21-640

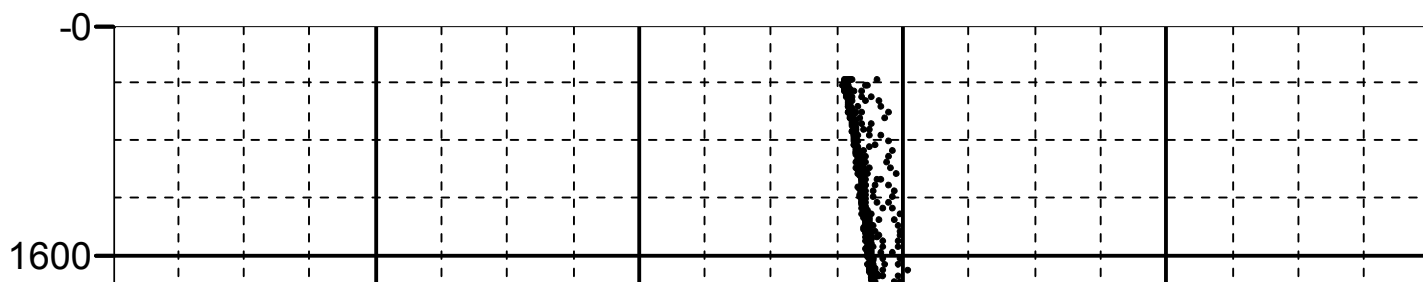
One: Log[5]:Up:S024

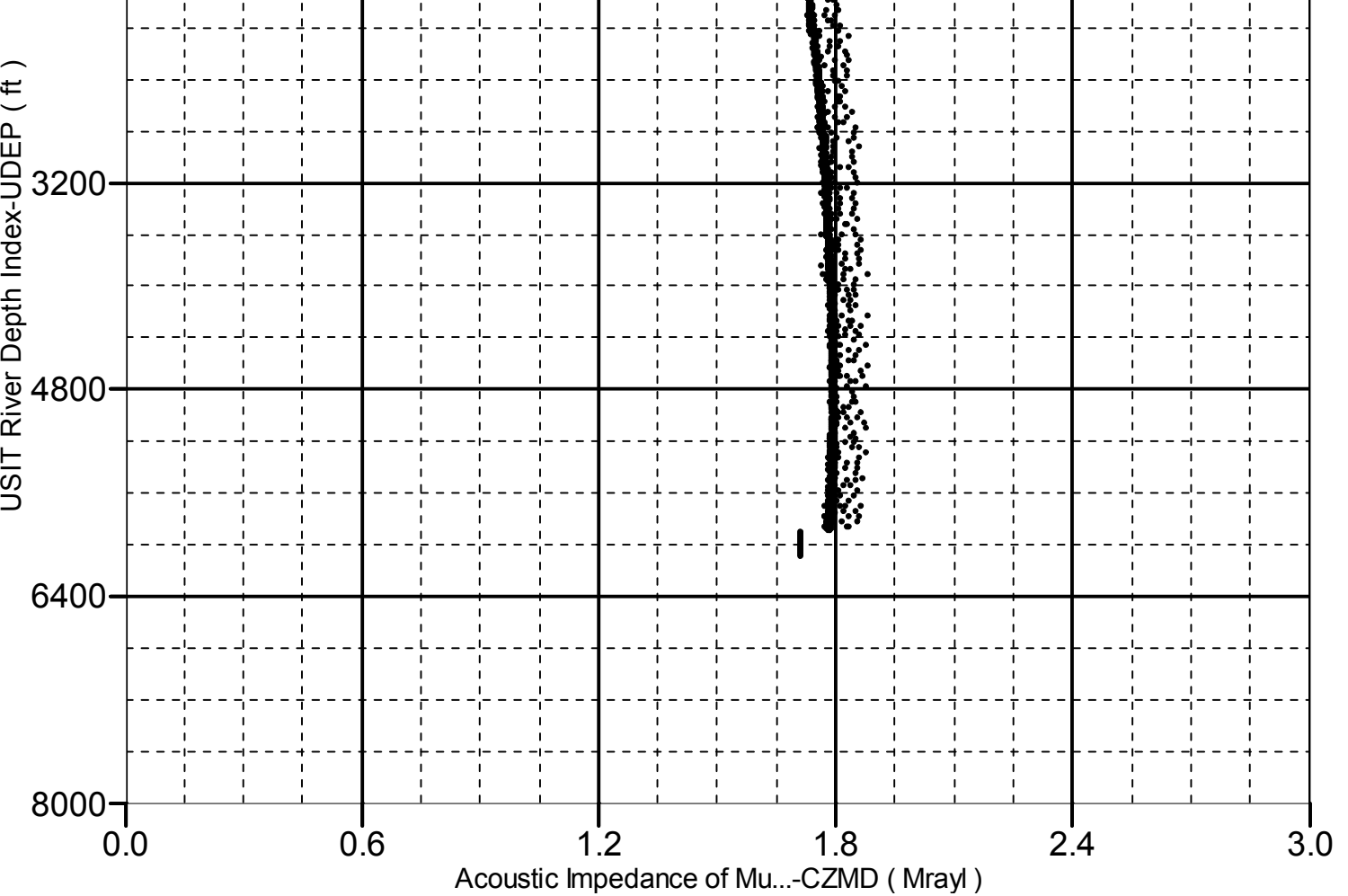
## Acoustic Impedance of Mud vs Depth

### 2D Cross Plot

Index Range: From 5899.00 to 116.00 ft

● CZMD-UDEP





Calibration Report

EDTC-B (Enhanced Digital Telemetry Cartridge - Version B) Calibration - Run One

Primary Equipment :

EDTC-BEDTC-B

Calibration Parameter :

Plus Reference (Jig minus background reference)165

EDTC-B Accelerometer Calibration - EDTC-B Accelerometer Calibration

Before (Measured):08:18:17 07-Aug-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.19	31.53	32.14	32.84	

EDTC-B Gamma-Ray Calibration - Gamma Ray Coefficients

Before (Measured):14:28:50 06-Aug-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Gain		Before	1.000	0.900	1.065	1.100	

EDTC-B Gamma-Ray Calibration - Gamma Ray Accumulations

Before (Measured):14:28:50 06-Aug-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before		0	74.927	120.000	
RGR Plus Measurement	gAPI	Before	165.000	150.000	154.970	180.000	

Company:	Noble Energy Inc.	<b>Schlumberger</b>
Well:	Freedom Federal LC21-640	
Field:	Wildcat	
County:	Weld	
State:	Colorado	

DJ Basin UltraSonic Summary Print