

Company: Noble Energy Inc.

Well: Wells Ranch AF07-651

Field: Wattenberg

County: Weld State: Colorado

DJ Basin UltraSonic Summary Print

County:	Weld
Field:	Wattenberg
Location:	SENE Sec 8, T5N, R62W
Well:	Wells Ranch AF07-651
Company:	Noble Energy Inc.
Location:	
SENE Sec 8, T5N, R62W	Elev.: K.B. 4734.00 ft
SHL: 2350' FNL & 175' FEL	G.L. 4704.00 ft
Lat: 40.41507, Long: -104.33836	D.F. 4734.00 ft
Permanent Datum:	Ground Level
Log Measured From:	Kelly Bushing
Drilling Measured From:	Kelly Bushing
API Serial No.	Section: 8
05-123-44248	Township: 5N
	Range: 62W

Logging Date	07-Aug-2017
Run Number	ONE
Depth Driller	15940.00 ft
Schlumberger Depth	6544.00 ft
Bottom Log Interval	6544.00 ft
Top Log Interval	58.00 ft
Casing Fluid Type	Water
Salinity	
Density	8.4 lbm/gal
Fluid Level	0.00 ft
BIT/CASING/TUBING STRING	
Bit Size	8.50 in
From	1948.00 ft
To	6544.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	N/A
From	30.00 ft
To	6544.00 ft
Max Recorded Temperatures	192 degF
Logger on Bottom	07-Aug-2017 18:30:00
Unit Number	2377
Recorded By	Camila Lang
Witnessed By	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.

Contents

1. Header

2. Disclaimer

3. Contents

4. Well Sketch

5. Borehole Size/Casing/Tubing Record

6. Operational Run Summary

7. Borehole Fluids

8. Remarks and Equipment Summary

9. Depth Summary

10. USI Fluid Properties Measurement_1

11. ONE 2500 PSI Main Pass

11.1 Integration Summary

11.2 Software Version

11.3 Composite Summary

11.4 Log (DJ Basin Ultrasonic Cement Summary Report)

11.5 Parameter Listing
13. XYZ (USI Fluid Acoustic Slowness vs Depth 3.0 in)

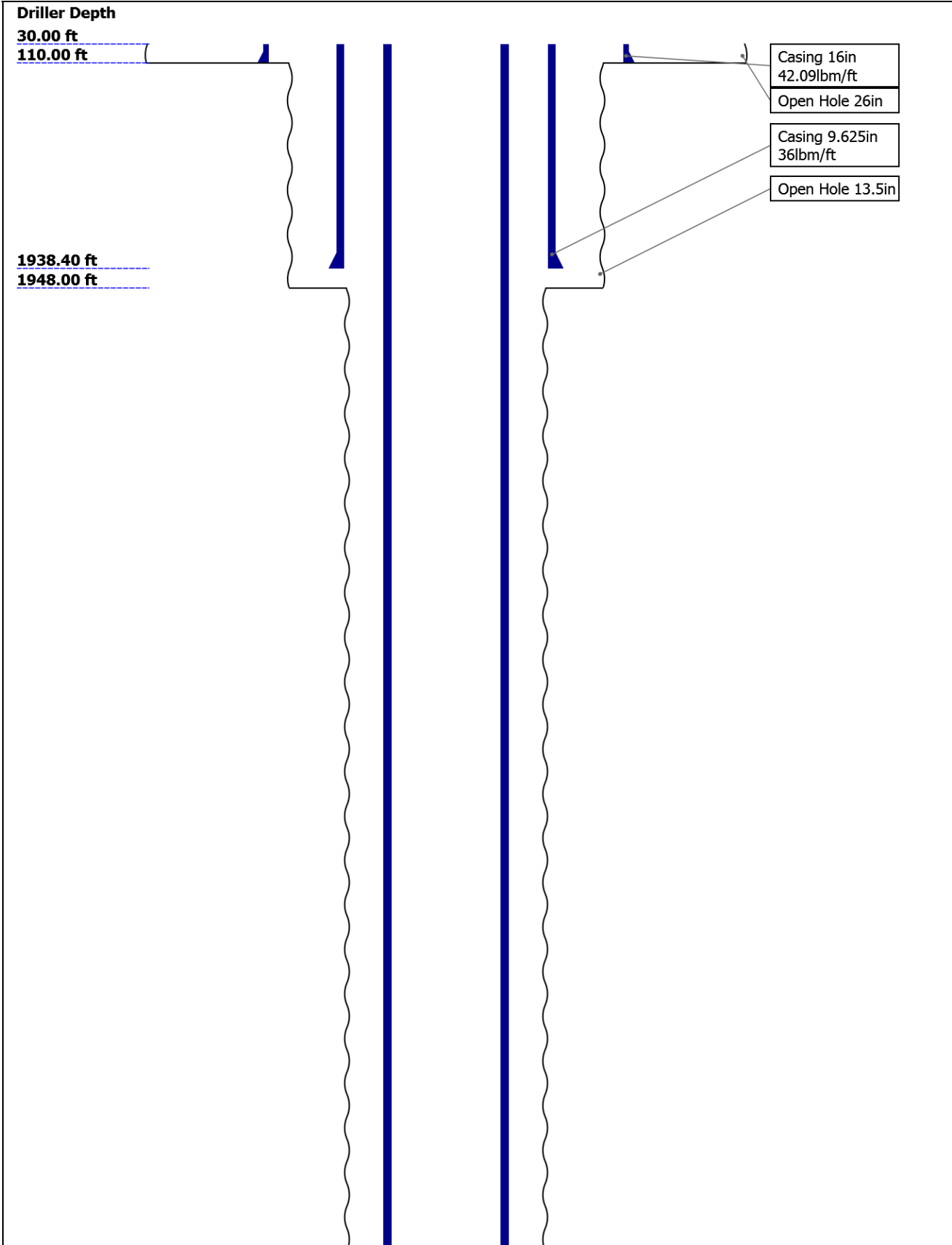
14. XYZ (USI Acoustic Impedance of Mud vs Depth 3.0 in)

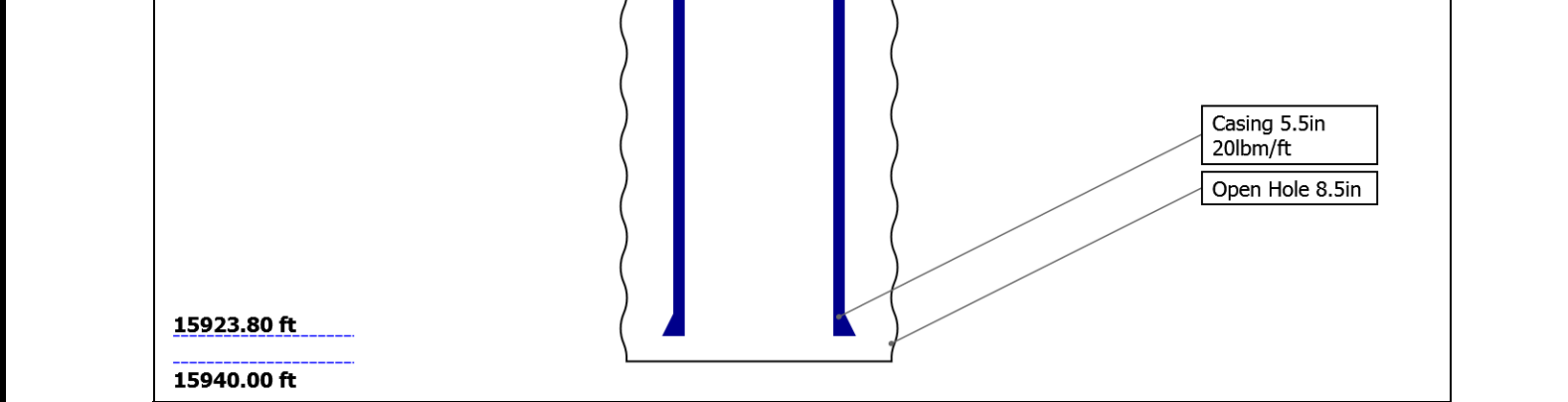
15. Calibration Report

16. Tail

- 12. ONE 0 PSI Repeat Pass
 - 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	13.5	8.5			
Top Driller (ft)	30	110	1948			
Top Logger (ft)	30	110	1948			
Bottom Driller (ft)	110	1948	15940			
Bottom Logger (ft)	110	1948	6544			
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	1938.4	15923.8			
Bottom Logger (ft)	110	1938.4	6544			

Operational Run Summary

Parameter (unit)	ONE					
Date Log Started	07-Aug-2017					
Time Log Started	17:54:44					
Date Log Finished	07-Aug-2017					
Time Log Finished	19:18:48					
Top Log Interval (ft)	58.00					
Bottom Log Interval (ft)	6544.00					
Total Depth (ft)	6544.00					
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	
Equip name LEH-QT LEH-QT	Length 33.83		MP name	Offset	This is the first log in the well.
					Tool ran as per tool sketch.
					CSG 9.625" 36 lb/ft @ 1938.4'
					5.5" 20 lb/ft @ 15923.8'
					Main pass recorded at 2500 psi, and repeat pass recorded at 0 psi
					BHT: 181 degF
					Data below 5900' is in the curve and eccentricized
EDTC-B:8 102 EDTH-B:92 45 EDTG-A:7 7004 EDTC-B:81 02	26.06		CTEM ACCZ HV Gamma Ray TelStatu s	22.56 0.00 0.00 20.69 19.56	
AH-184[2]:1951	19.56				
AH-184[1]:2826	17.56				
USIT-E:92 1 ECH-MFA: 1908 USAC-A:9 21 USIS-A:90 2 USSC-B:17 30 USRS-A:78 6 USI-SENS OR	15.56				

 <p>USI Sensor Head Length = 0.37 TOOL JOINT HEAD LENGTH = 0.37 Lengths are in ft Maximum Outer Diameter = 3.875 in Line: Sensor Location, Value: Gating Offset All measurements are relative to TOOL_ZERO</p>		
---	--	--

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. IDW used as a primary depth reference. Z-chart used a secondary depth reference.	
Rig Up Length At Surface			
Rig Up Length At Bottom			
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	6545.42	58.44
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 : 26.44m(86.74ft) to 27.84m(91.33ft) MUD_N_FRP = 1.07 DFD = 1.01g/cm3(8.40lbm/gal) CZMD median computed in free pipe normalization interval = 1.53 MRayl			
Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
ONE			

2500 PSI Main Pass

Software Version

Acquisition System

Maxwell 2017 SP2

Version

7.2.87778.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	58.44 ft	6545.42 ft	07-Aug-2017 6:39:18 PM	07-Aug-2017 7:18:22 PM	ON	5.57 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc.

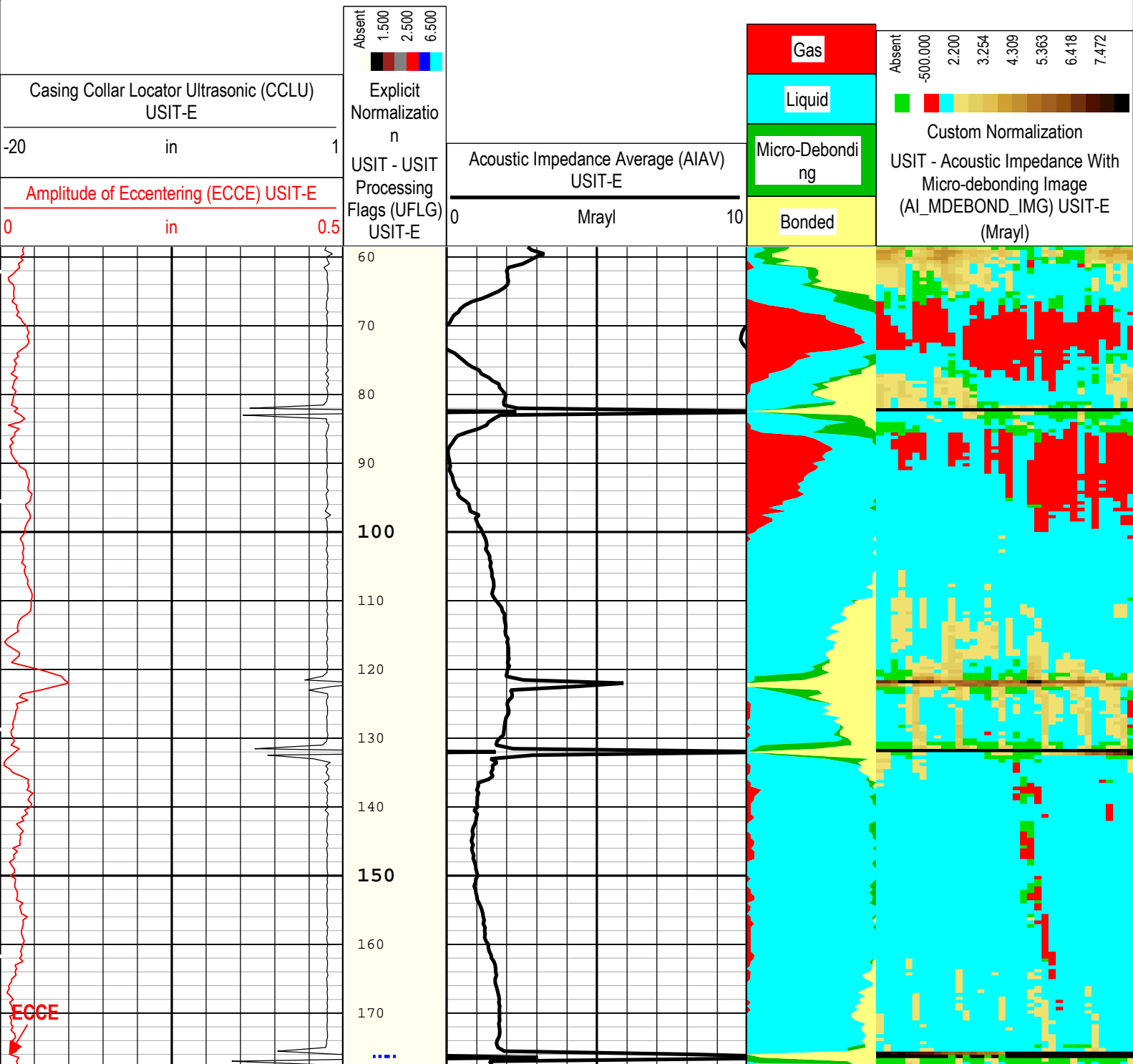
Well:Wells Ranch AF07-651

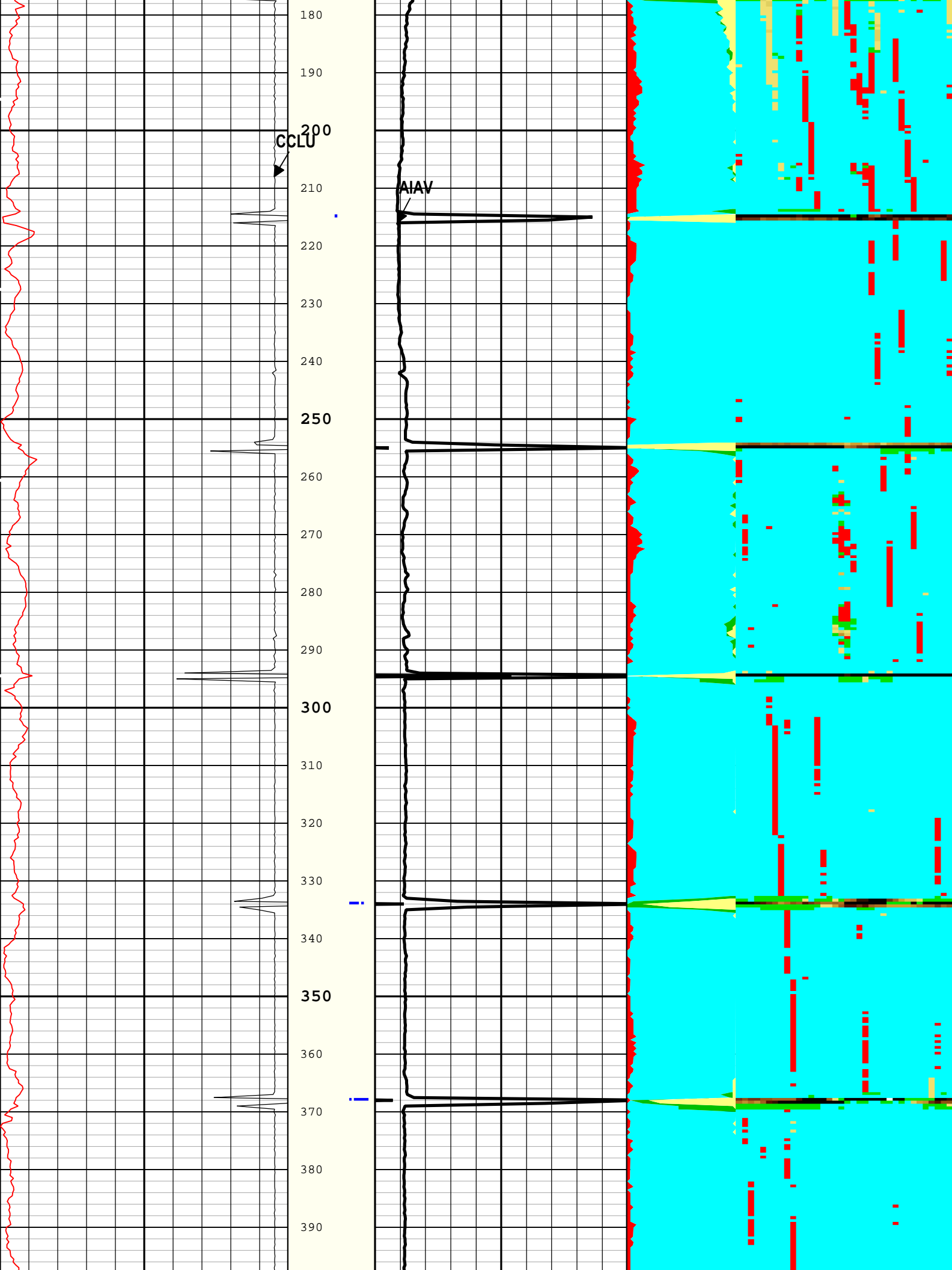
ONE: Log[4]:Up:S005

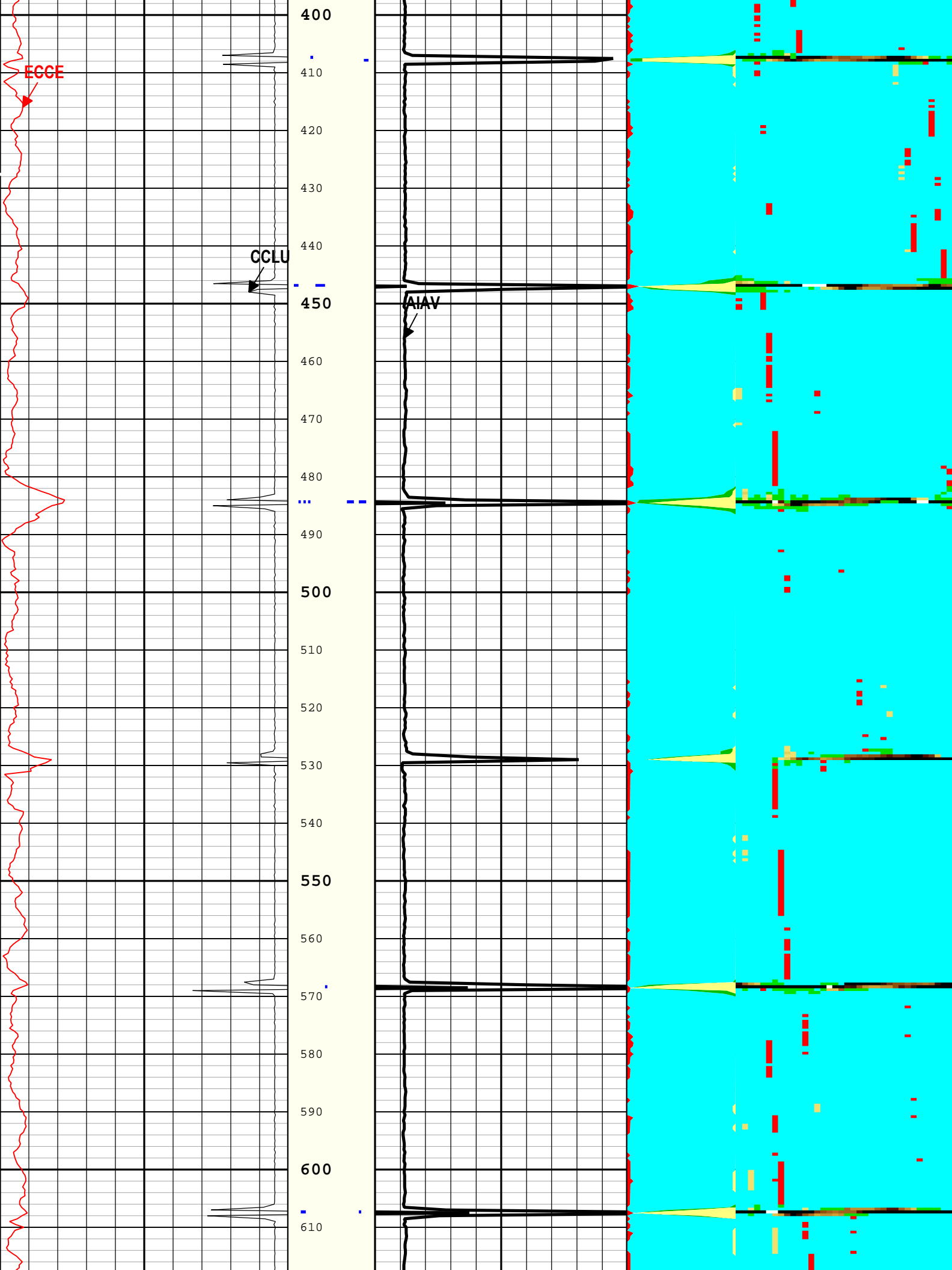
Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

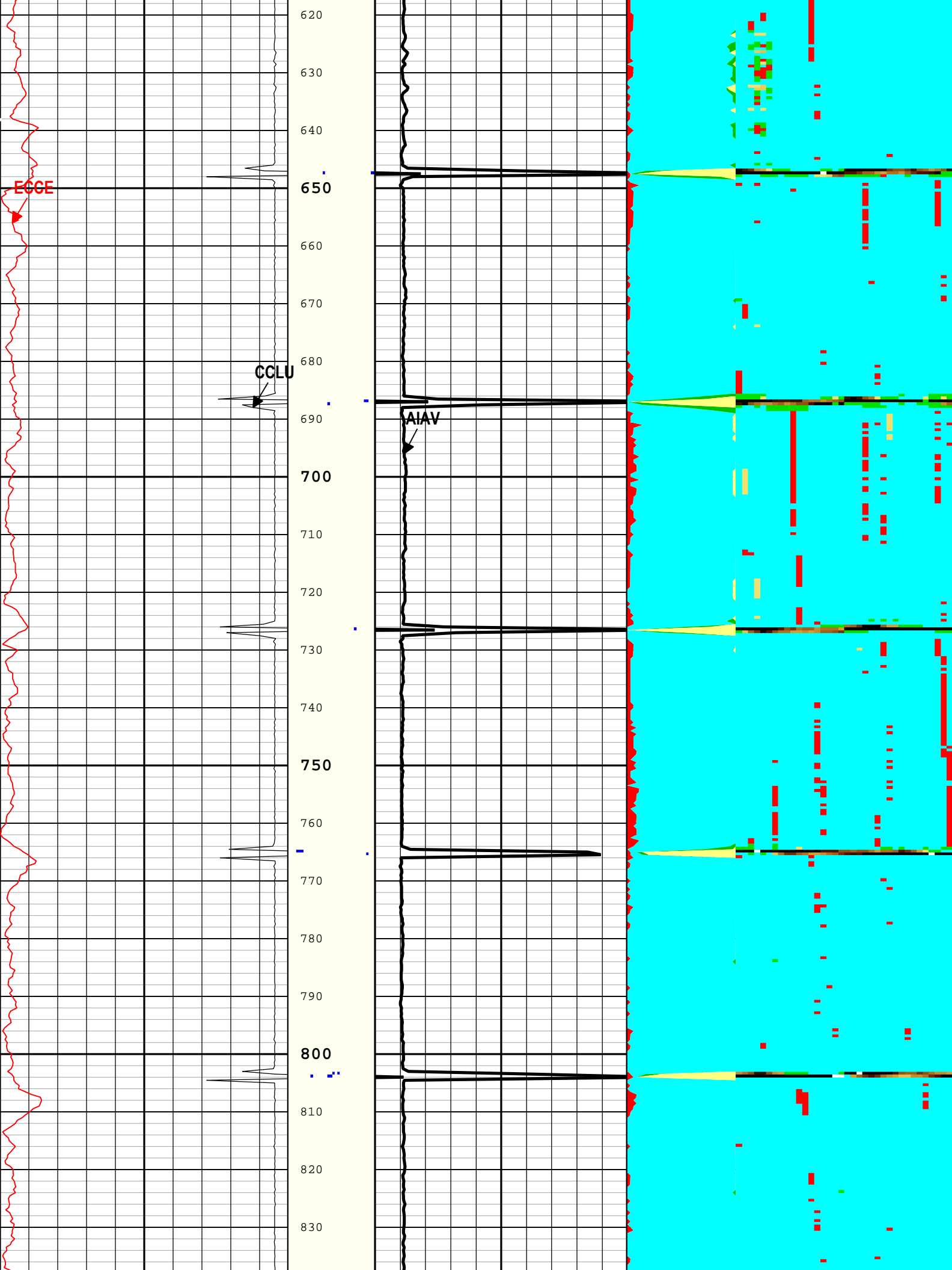
Creation Date: 08-Aug-2017 19:47:06

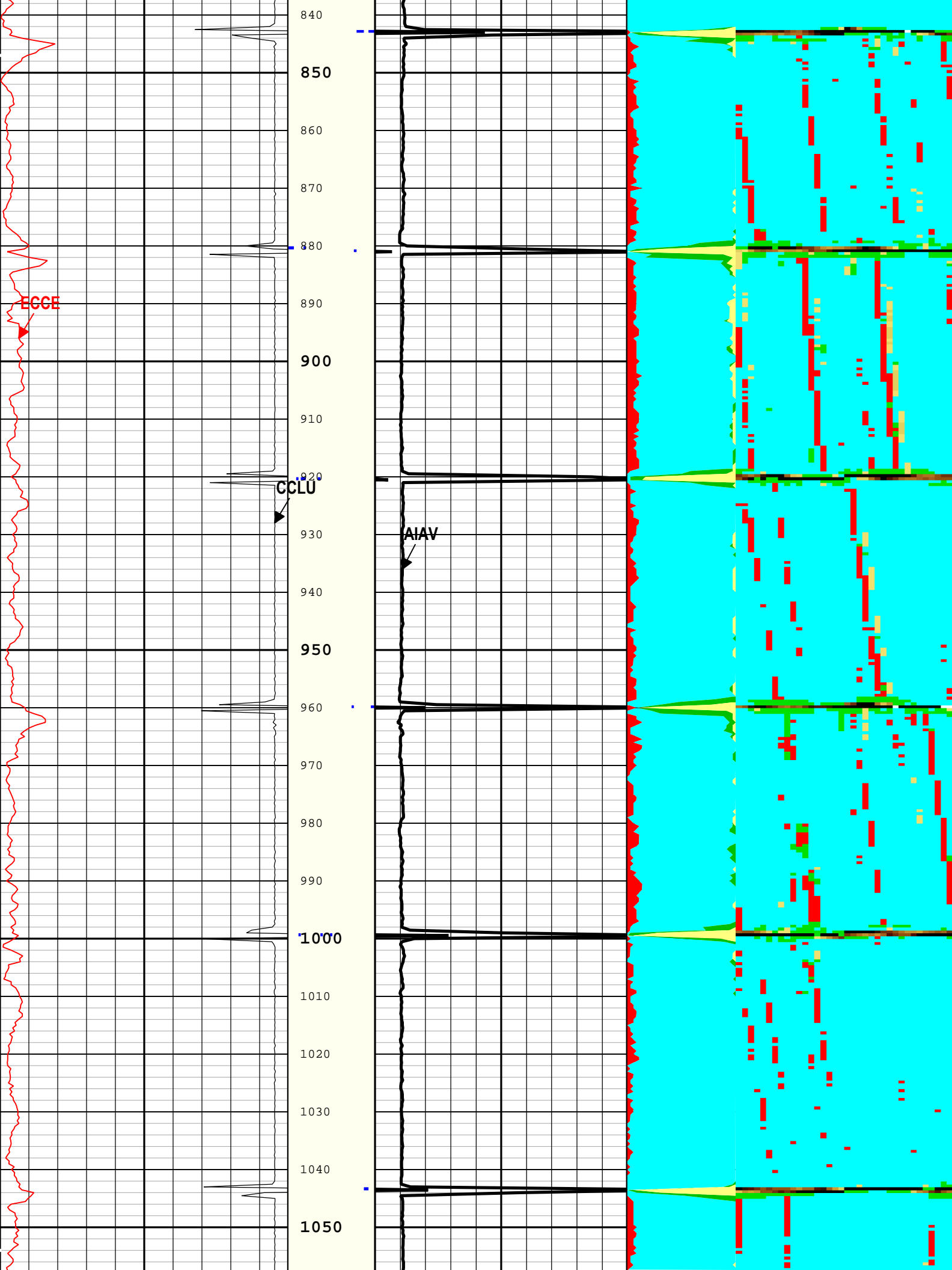
TIME_1900 - Time Marked every 60.00 (s)

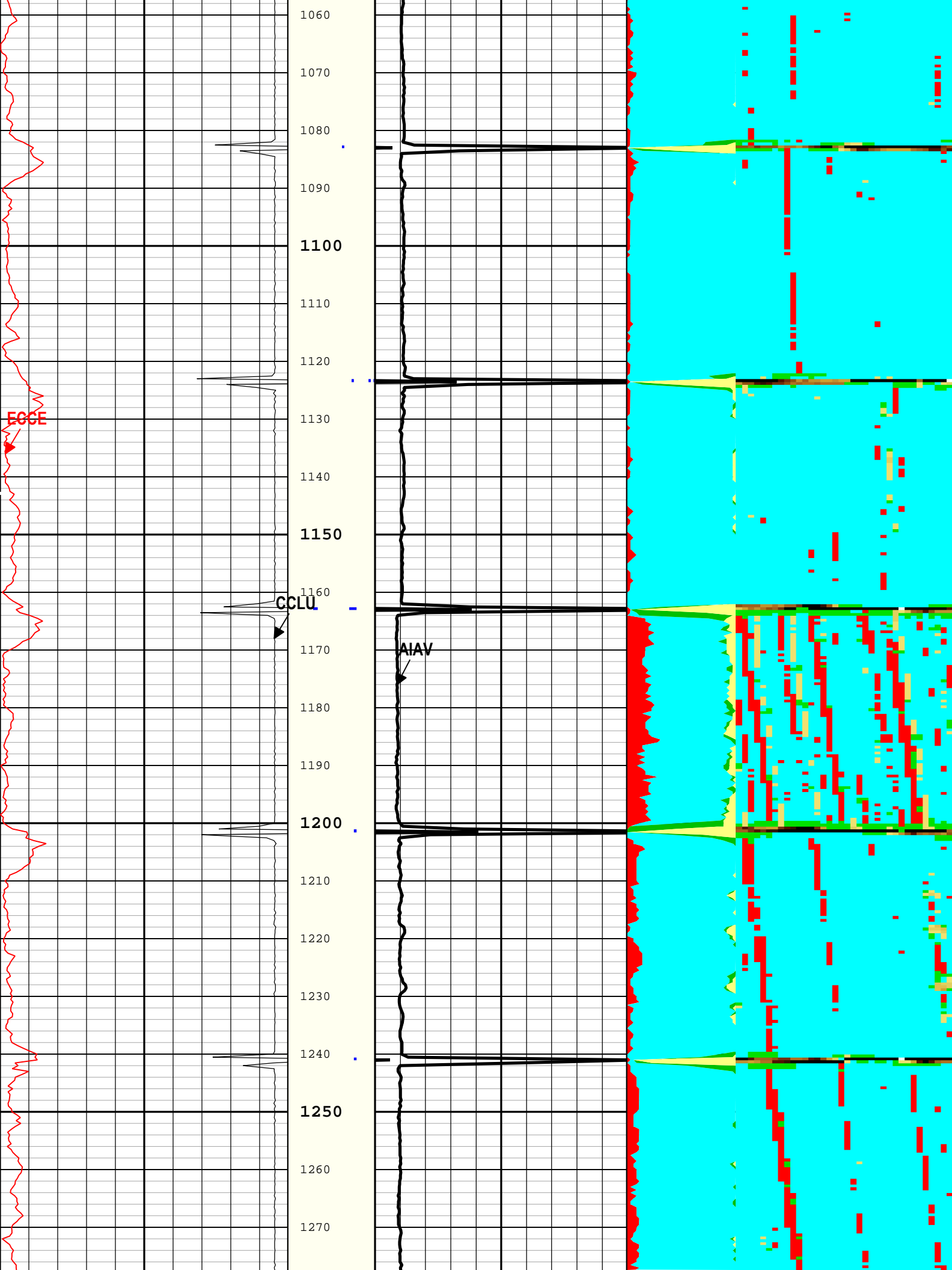


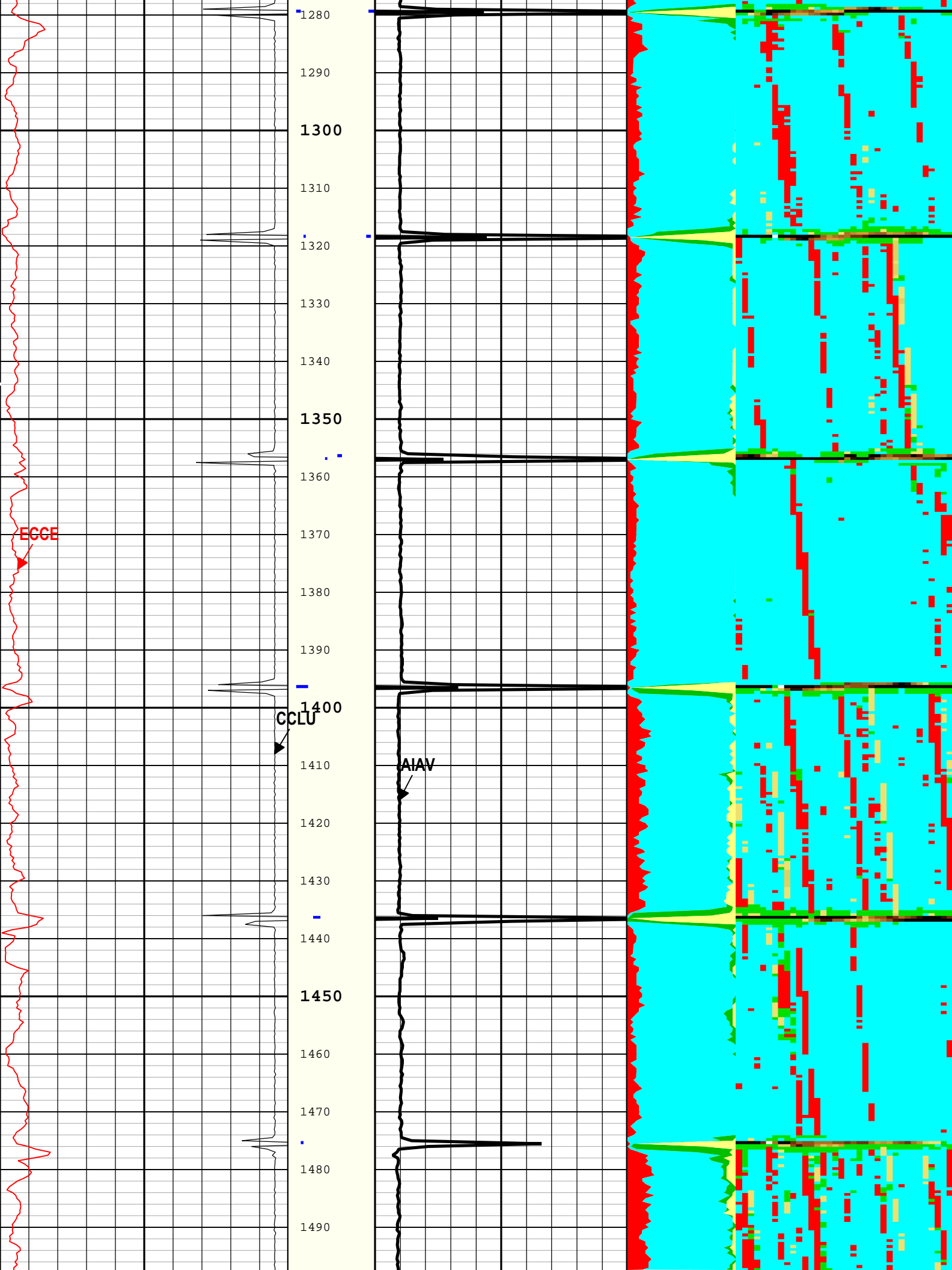


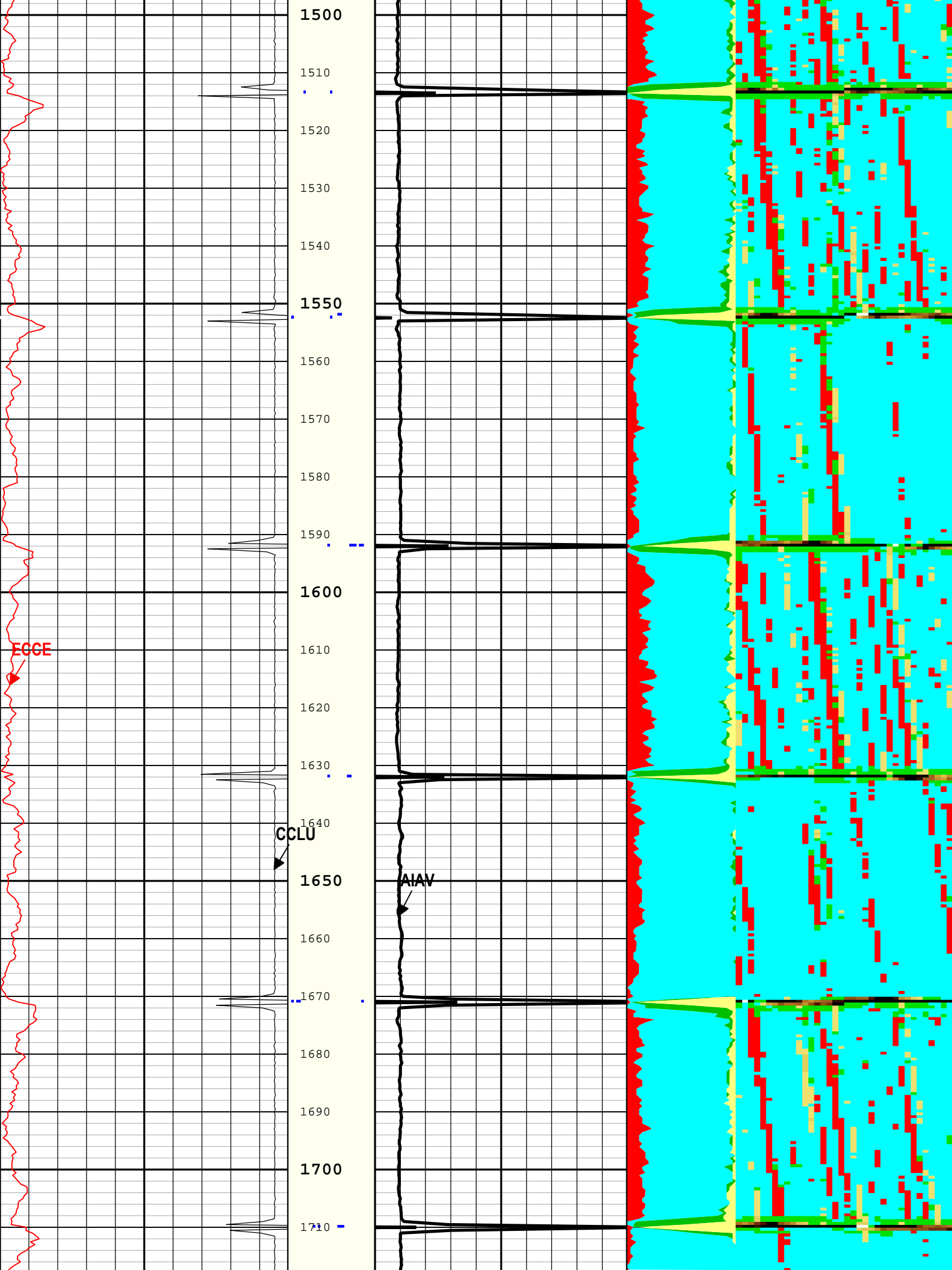


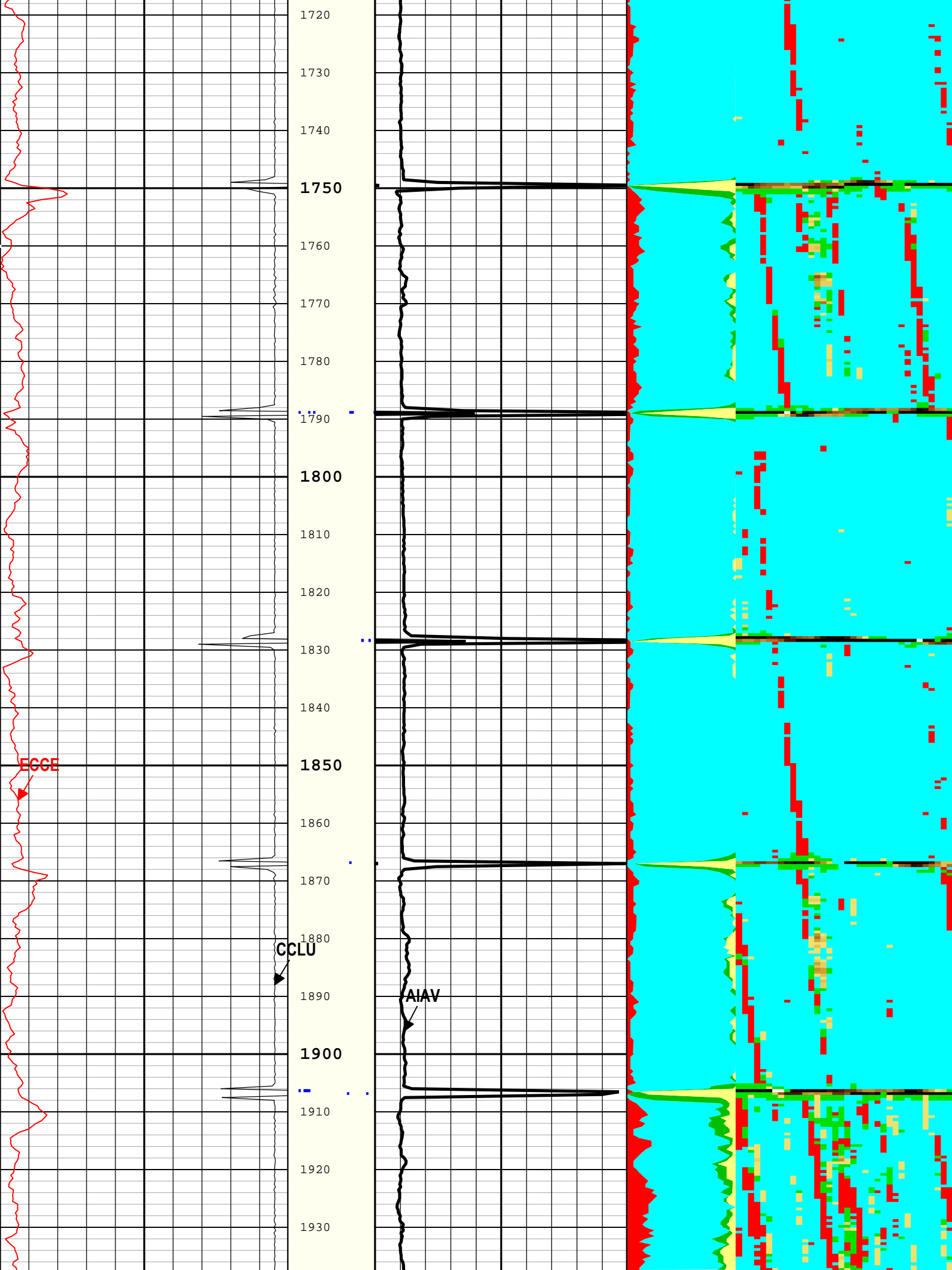


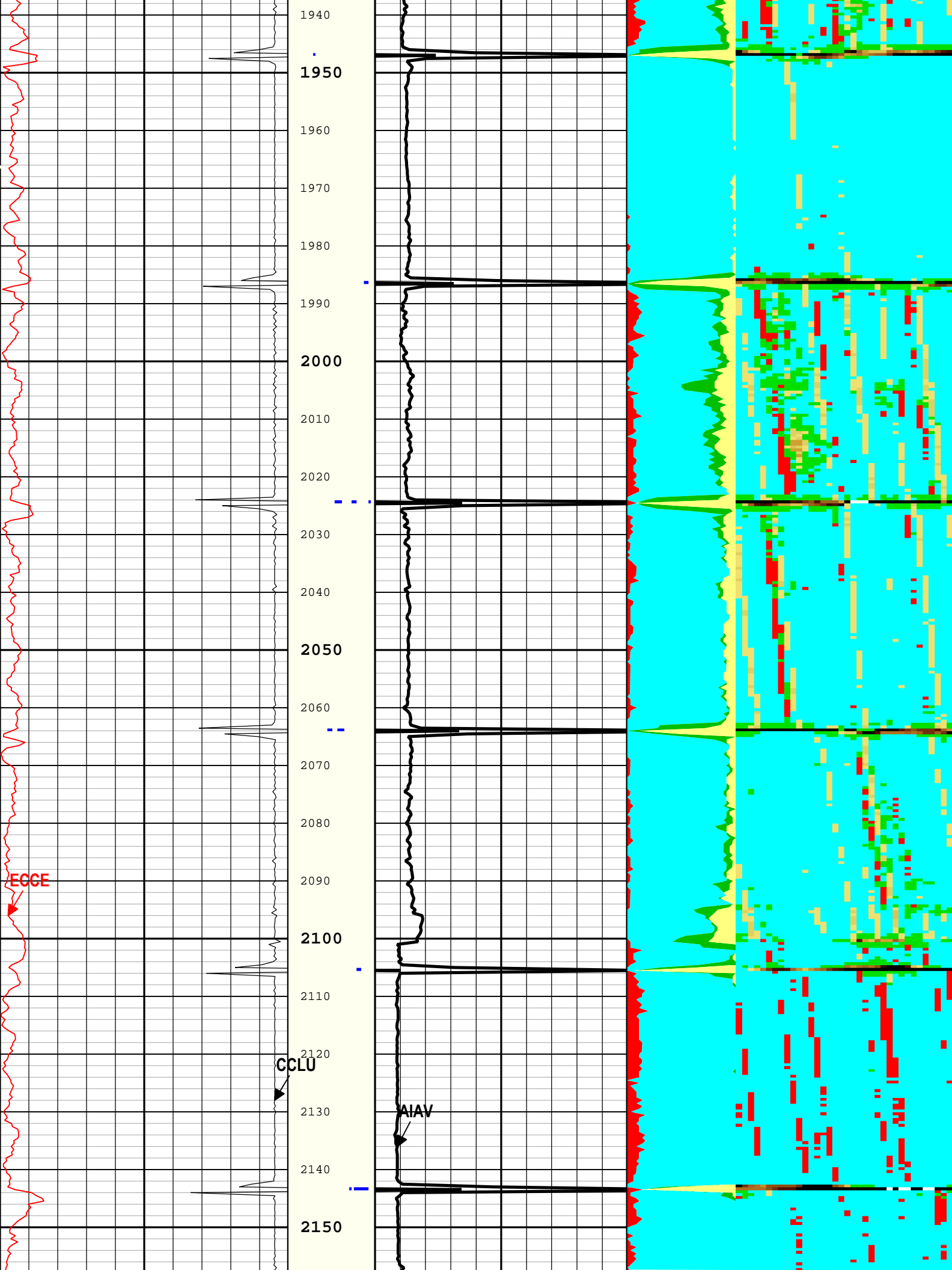


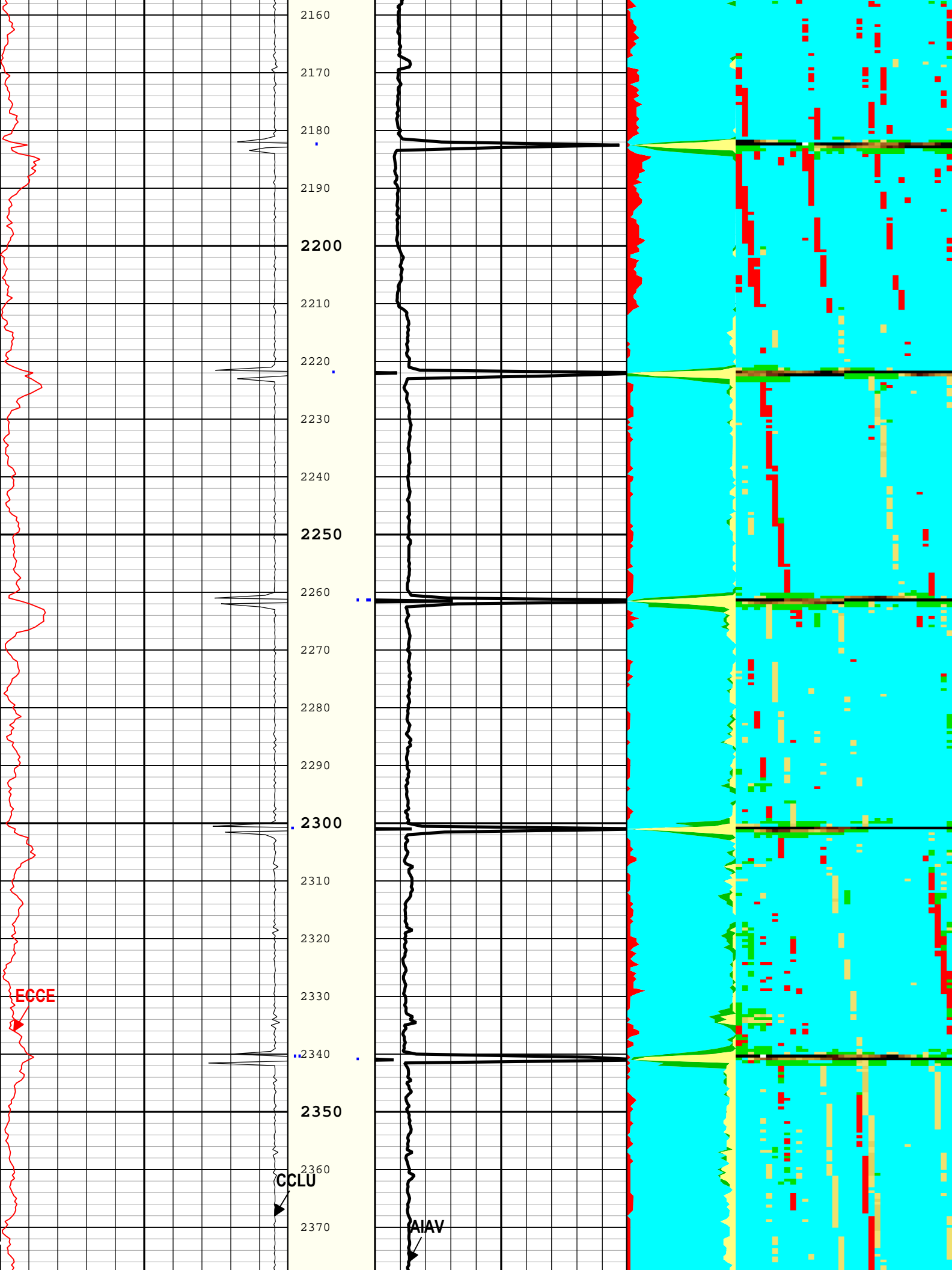


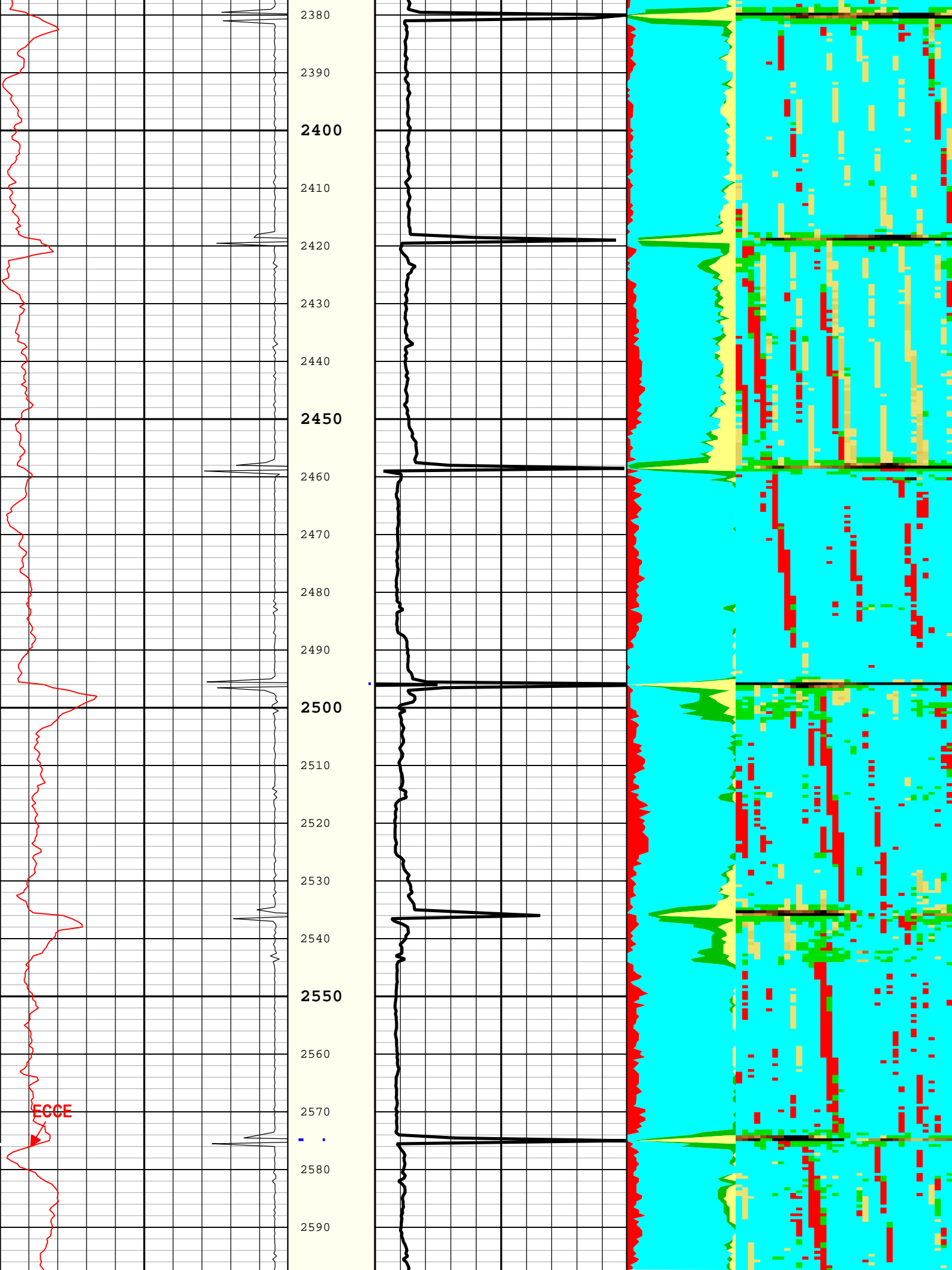


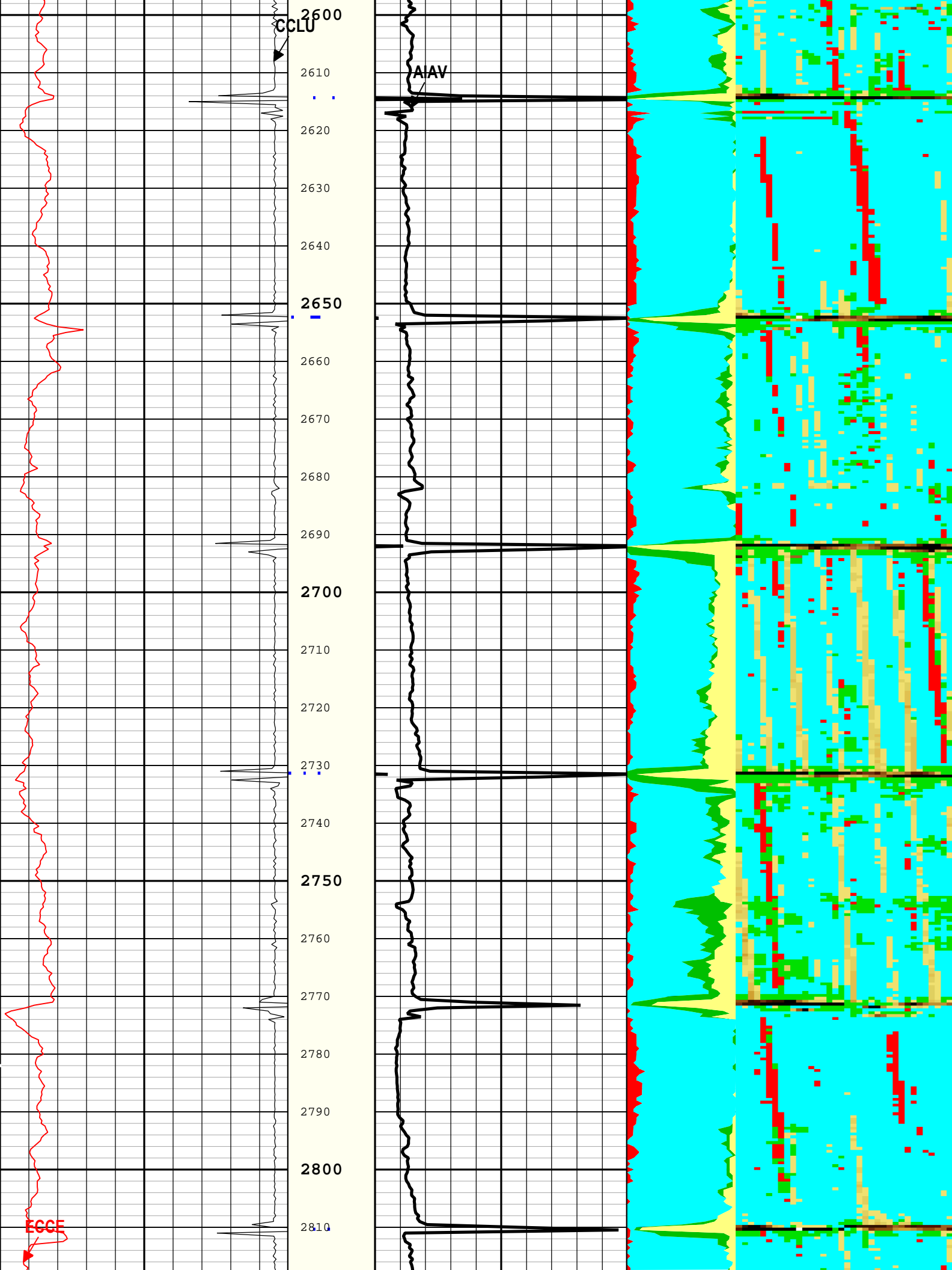


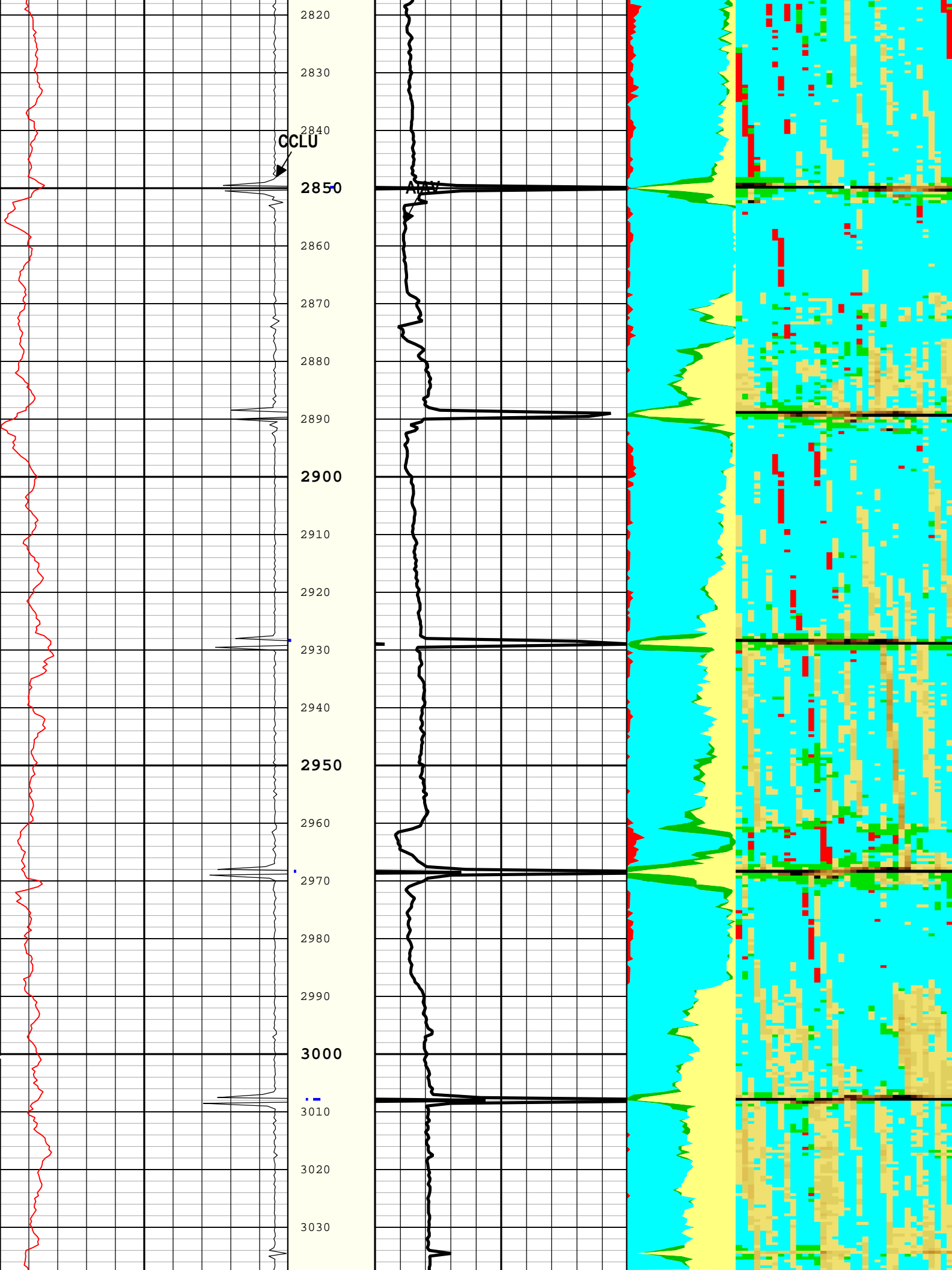


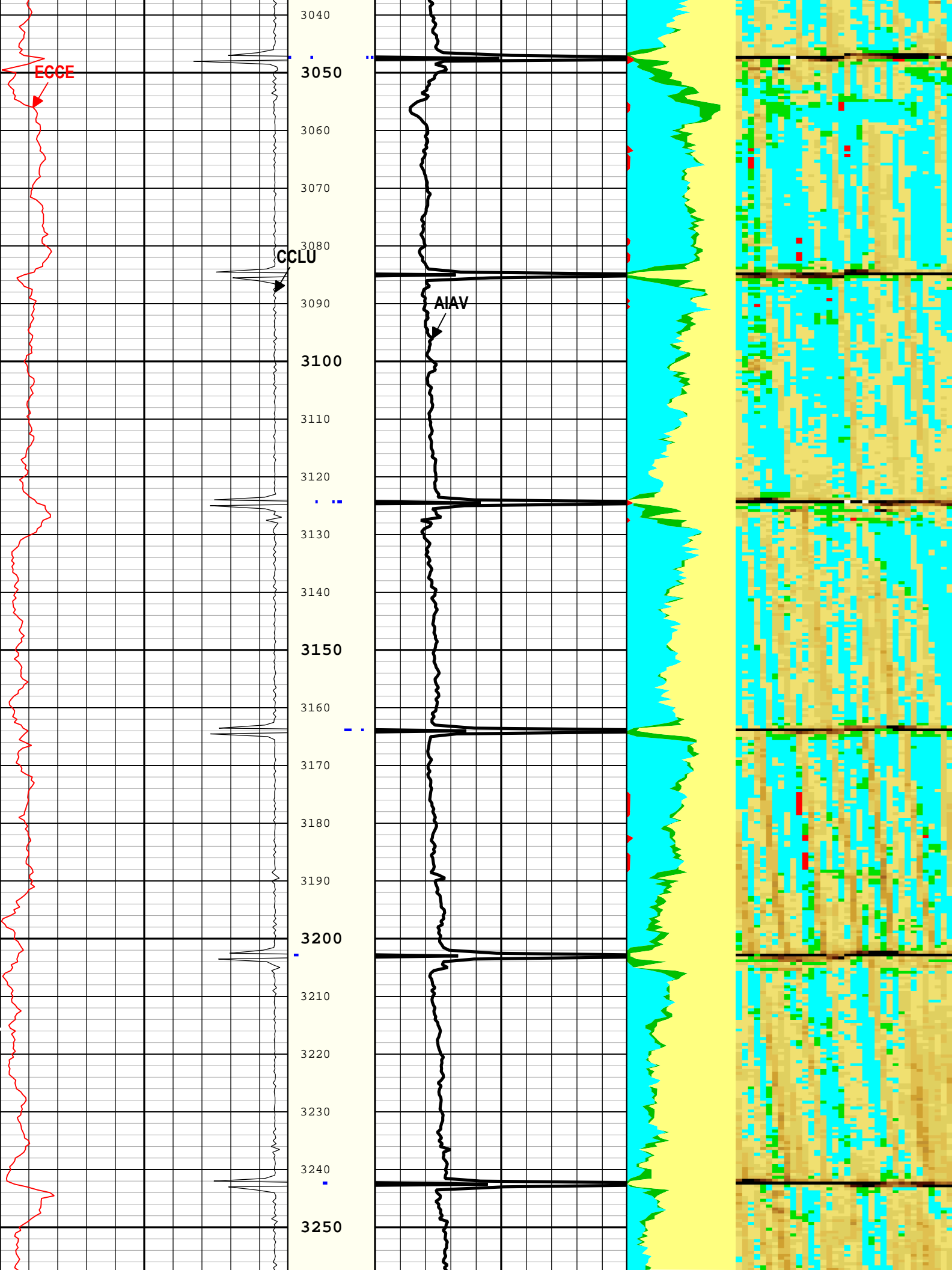


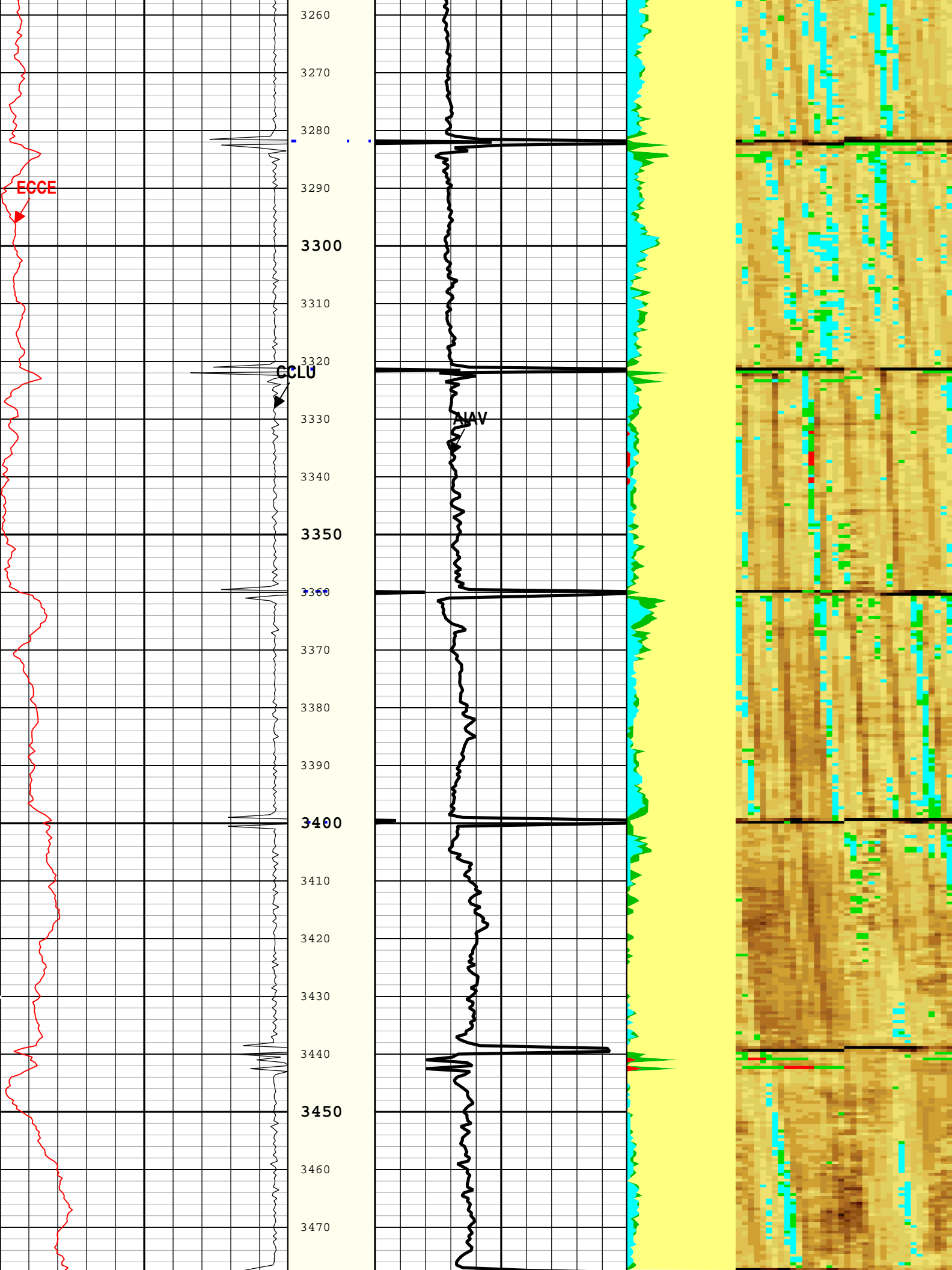


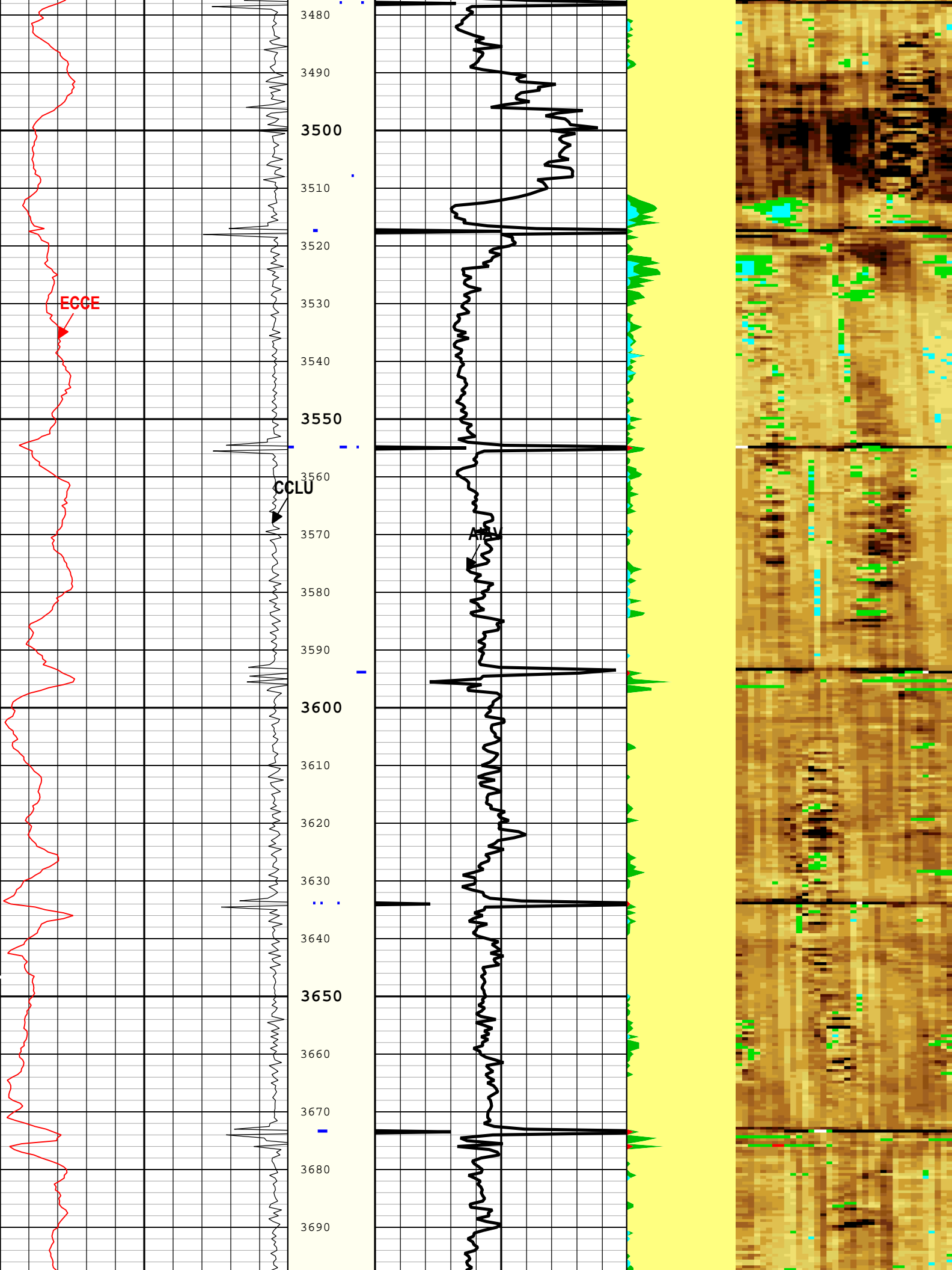


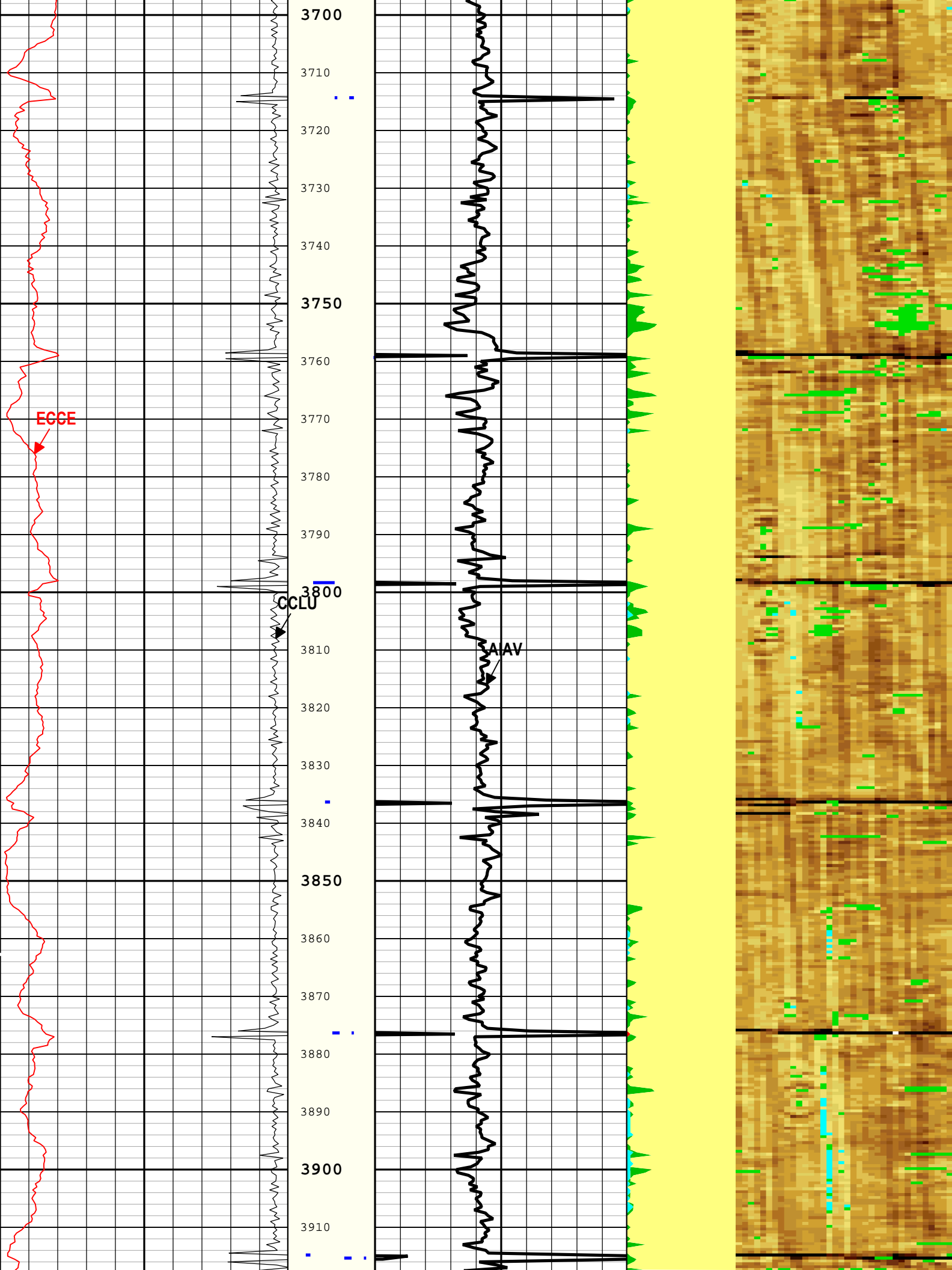


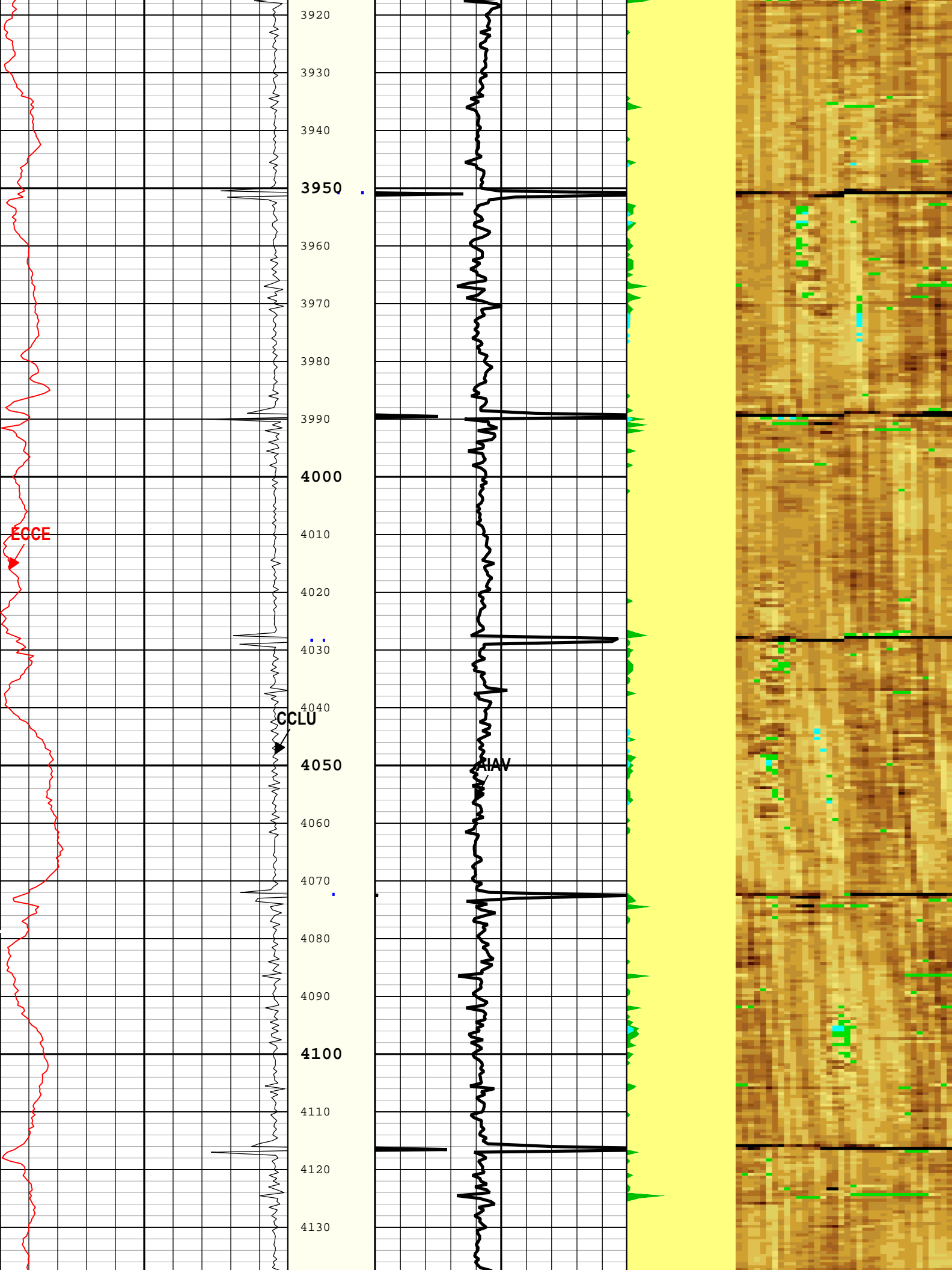


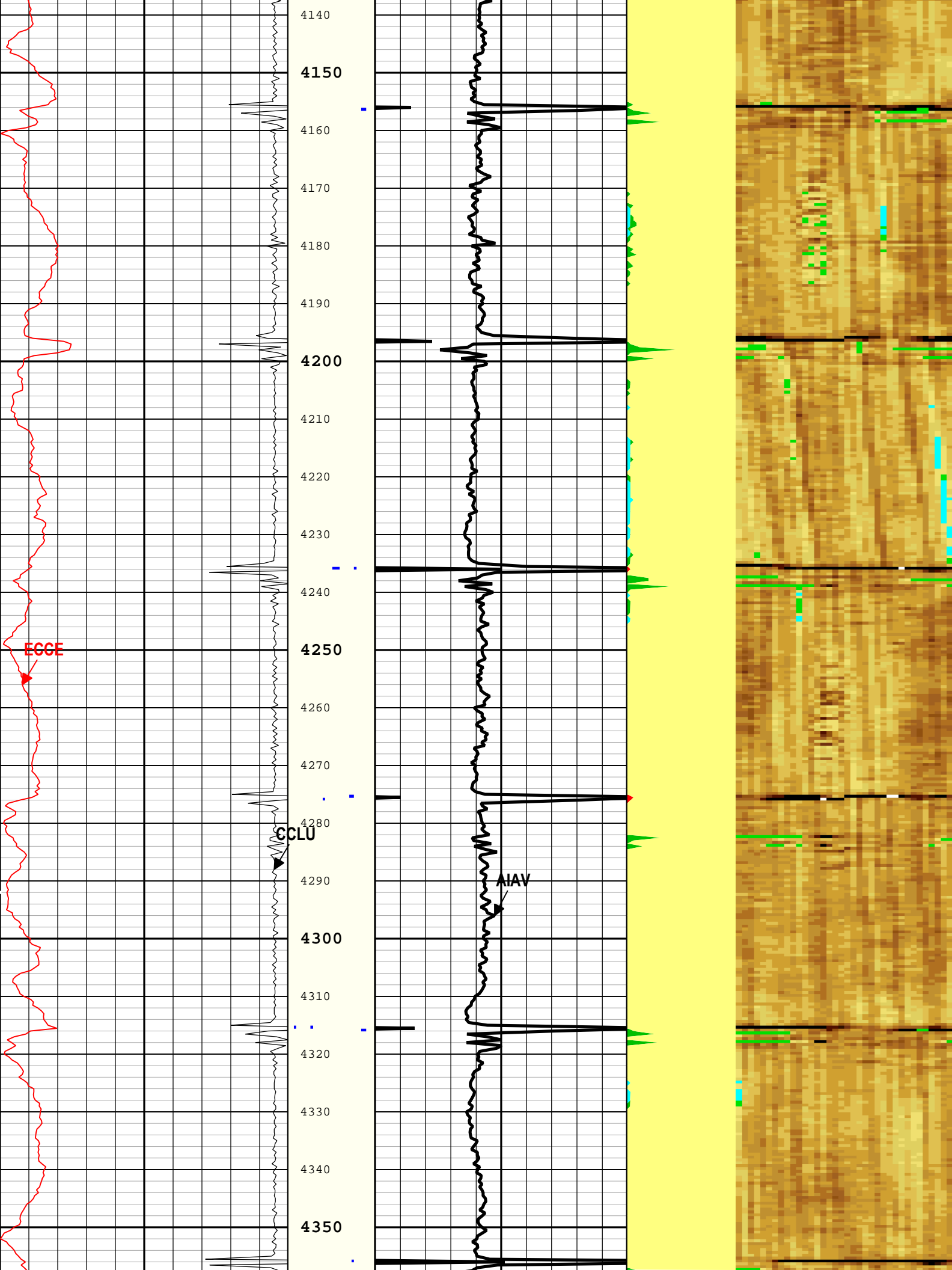


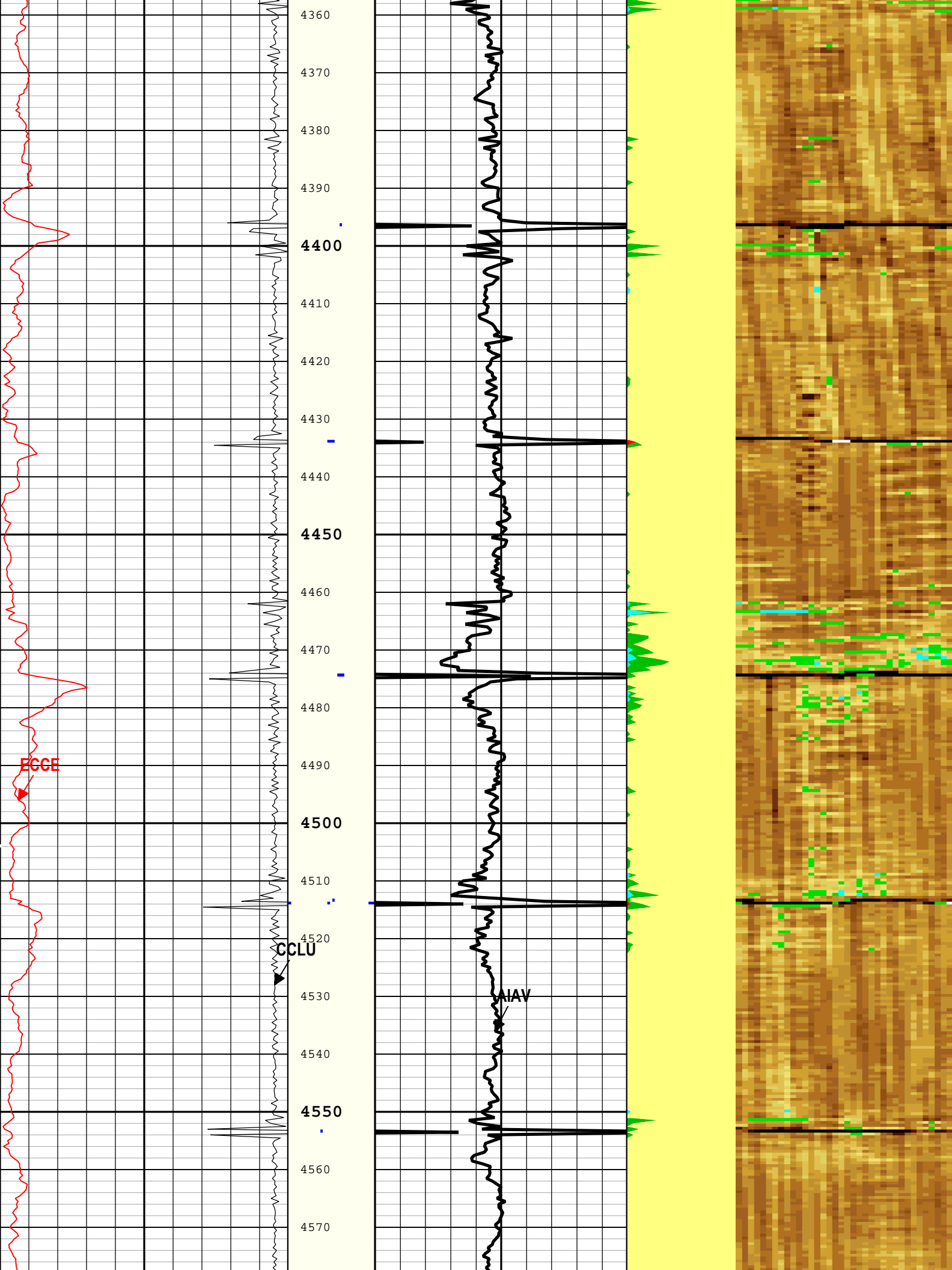


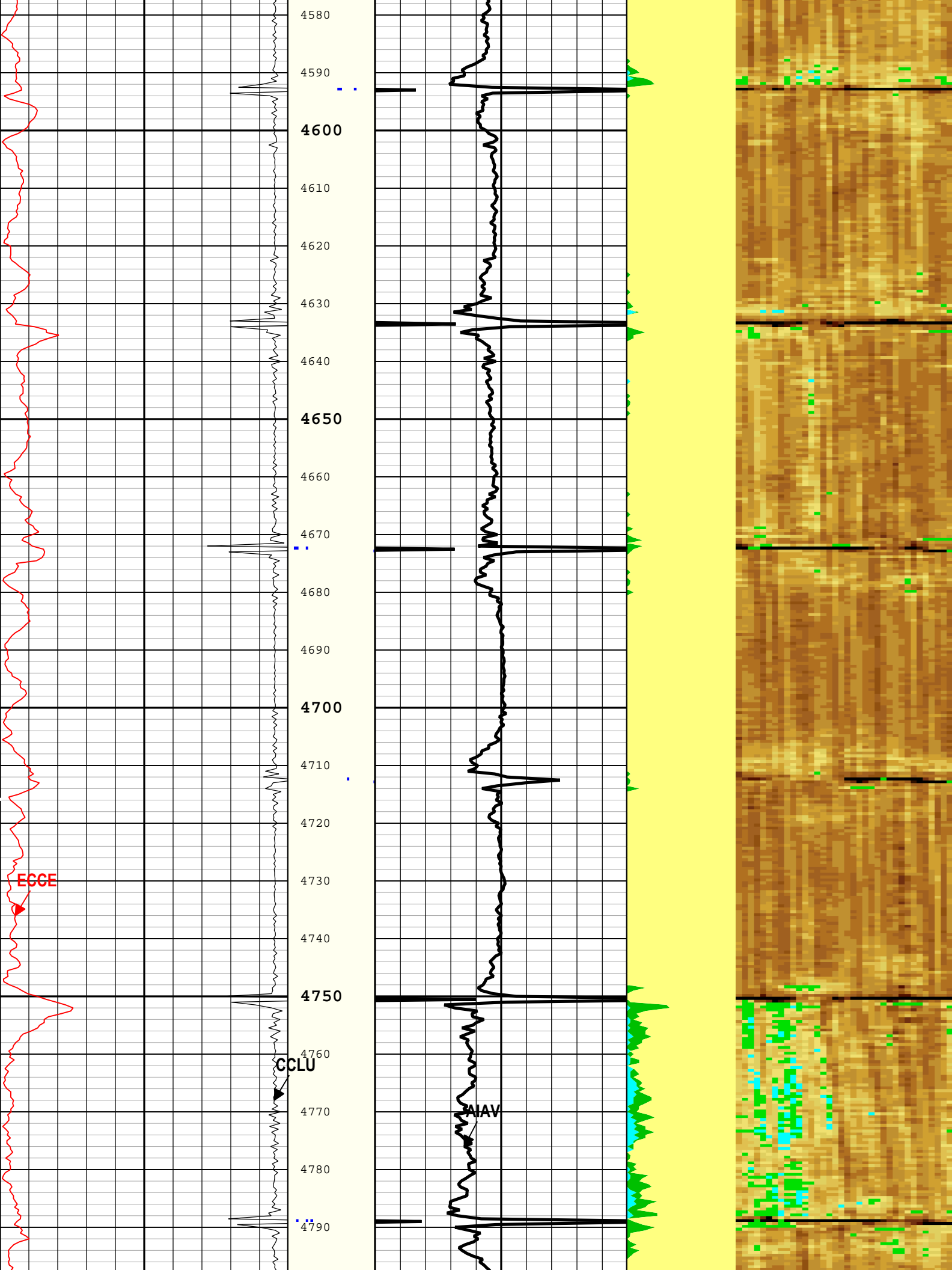


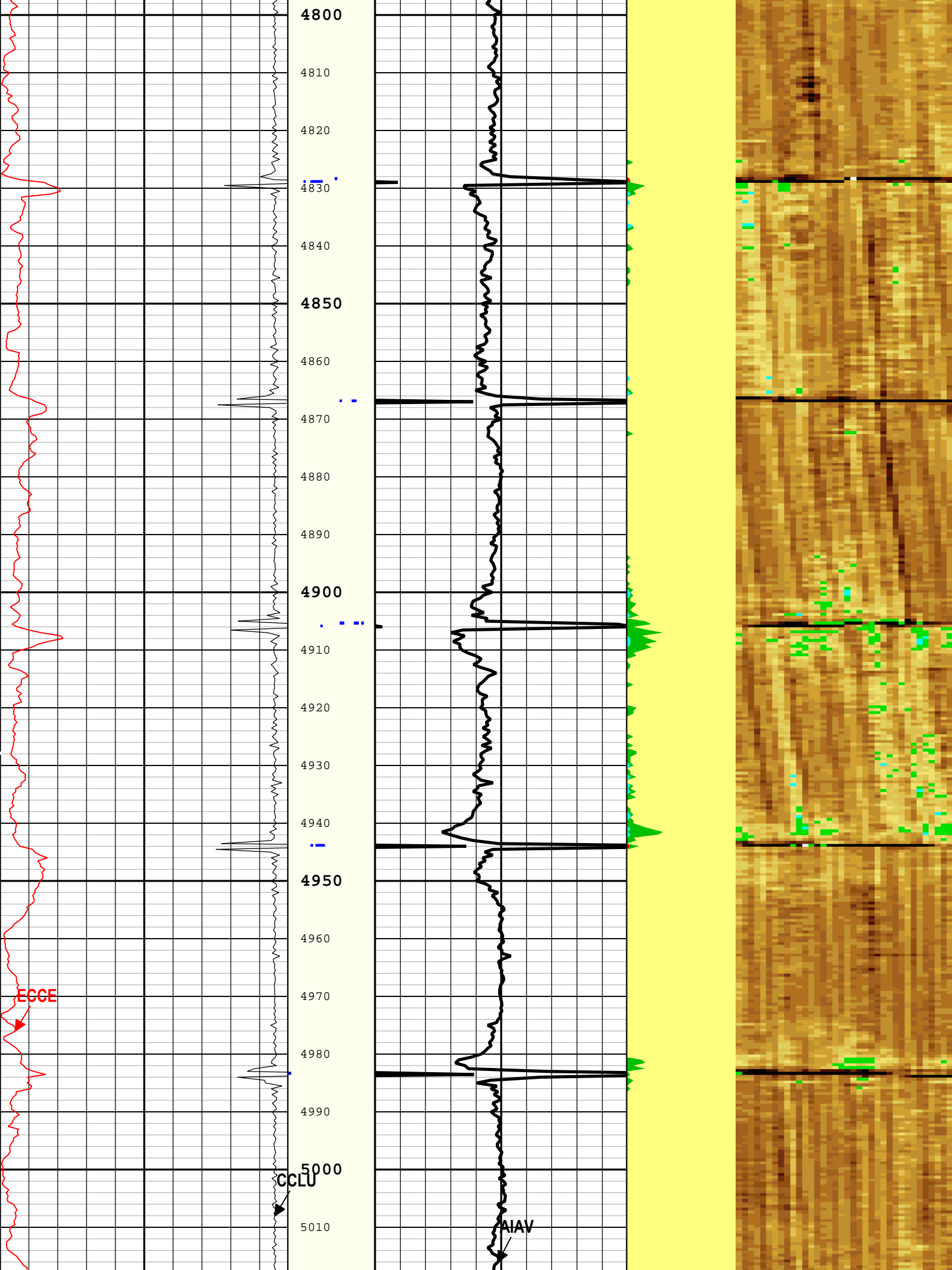


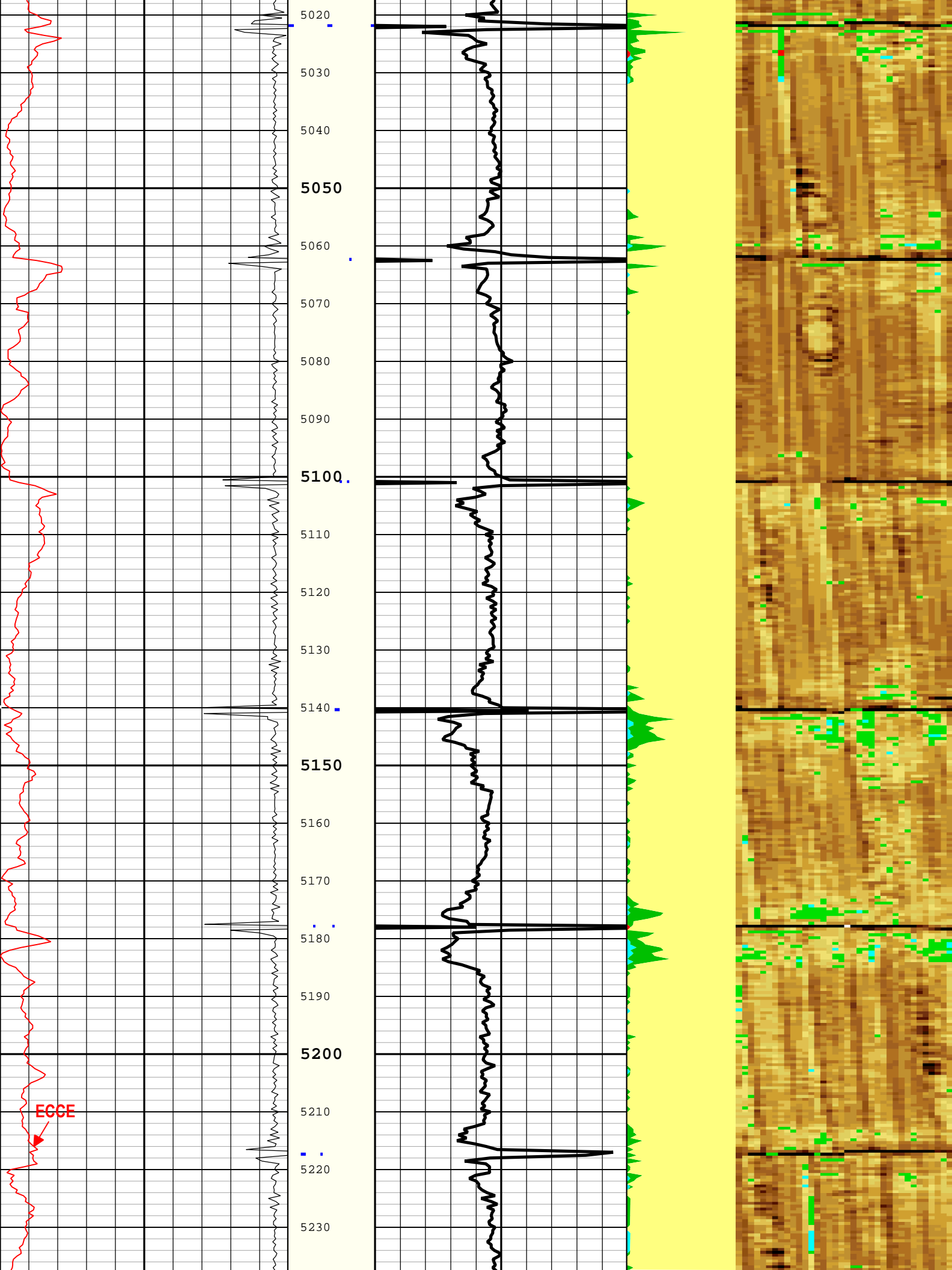


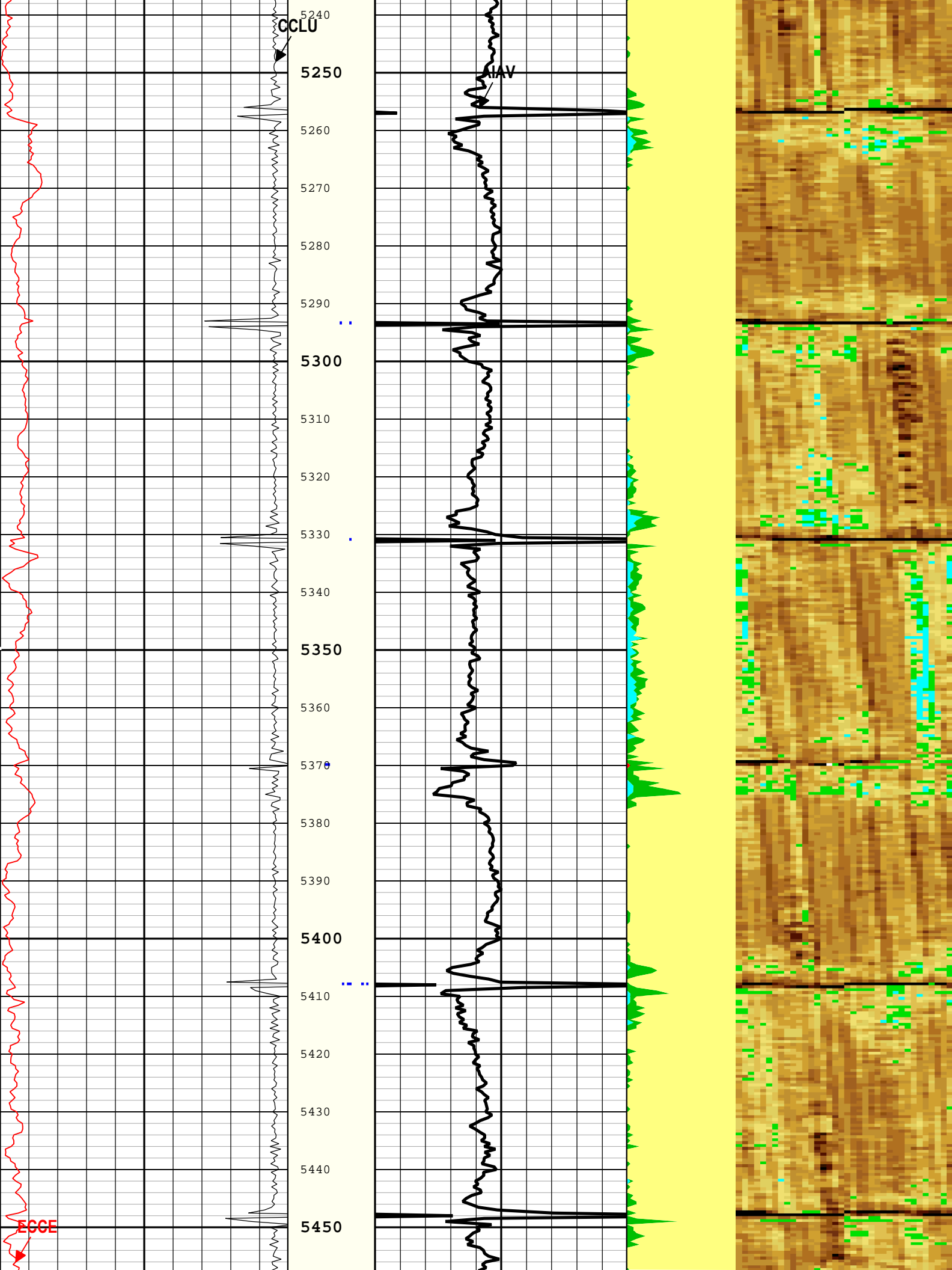


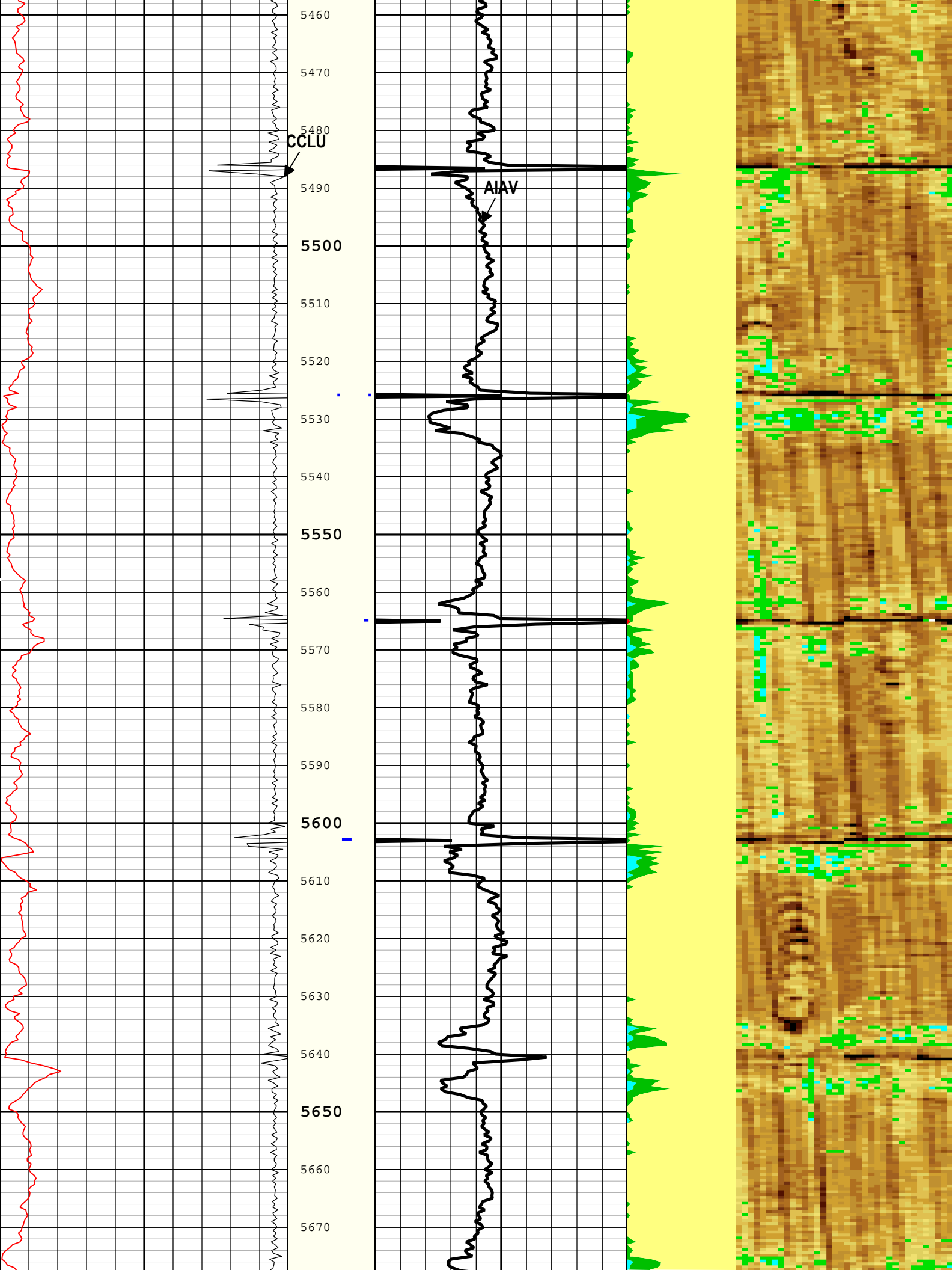


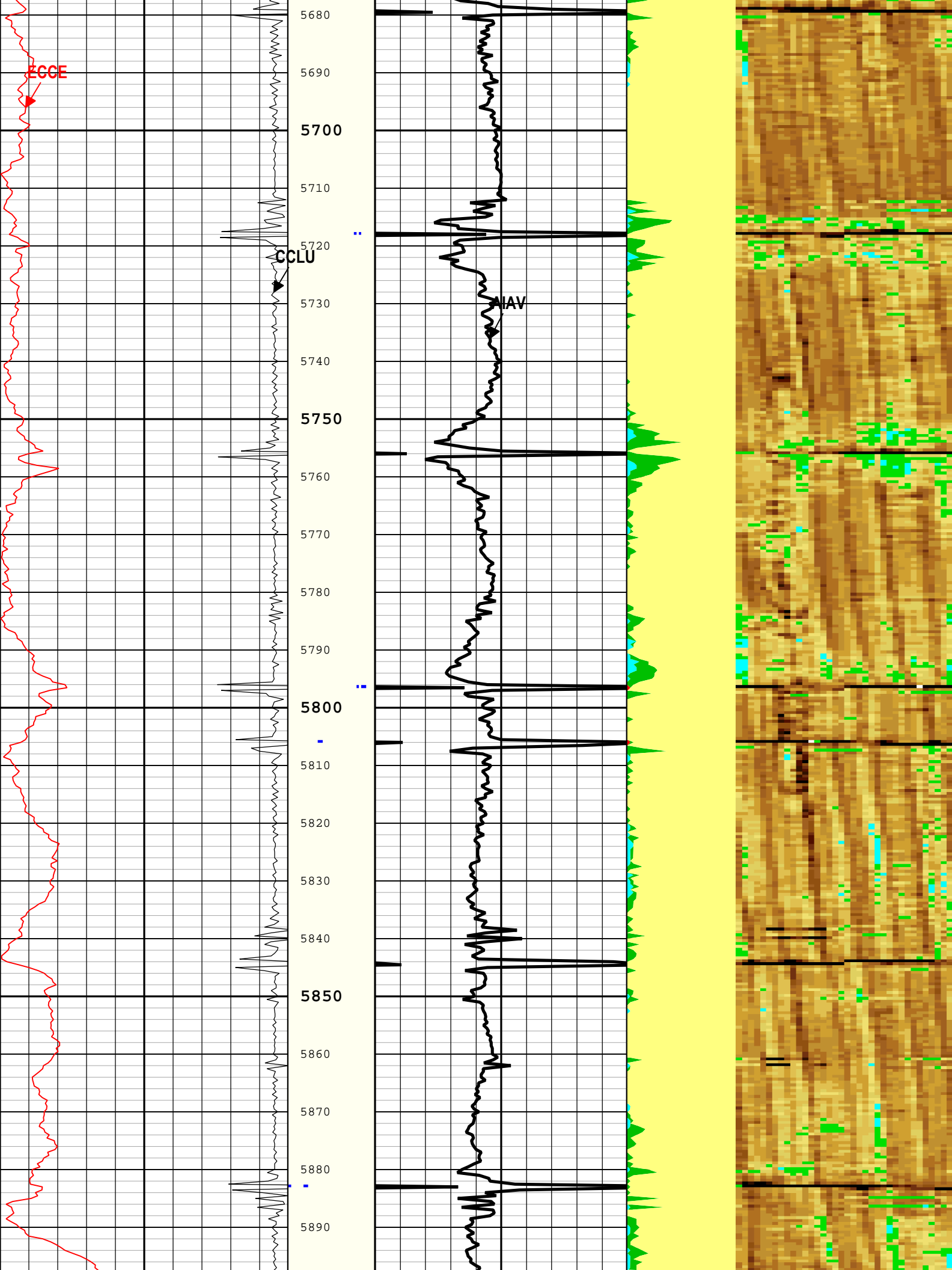


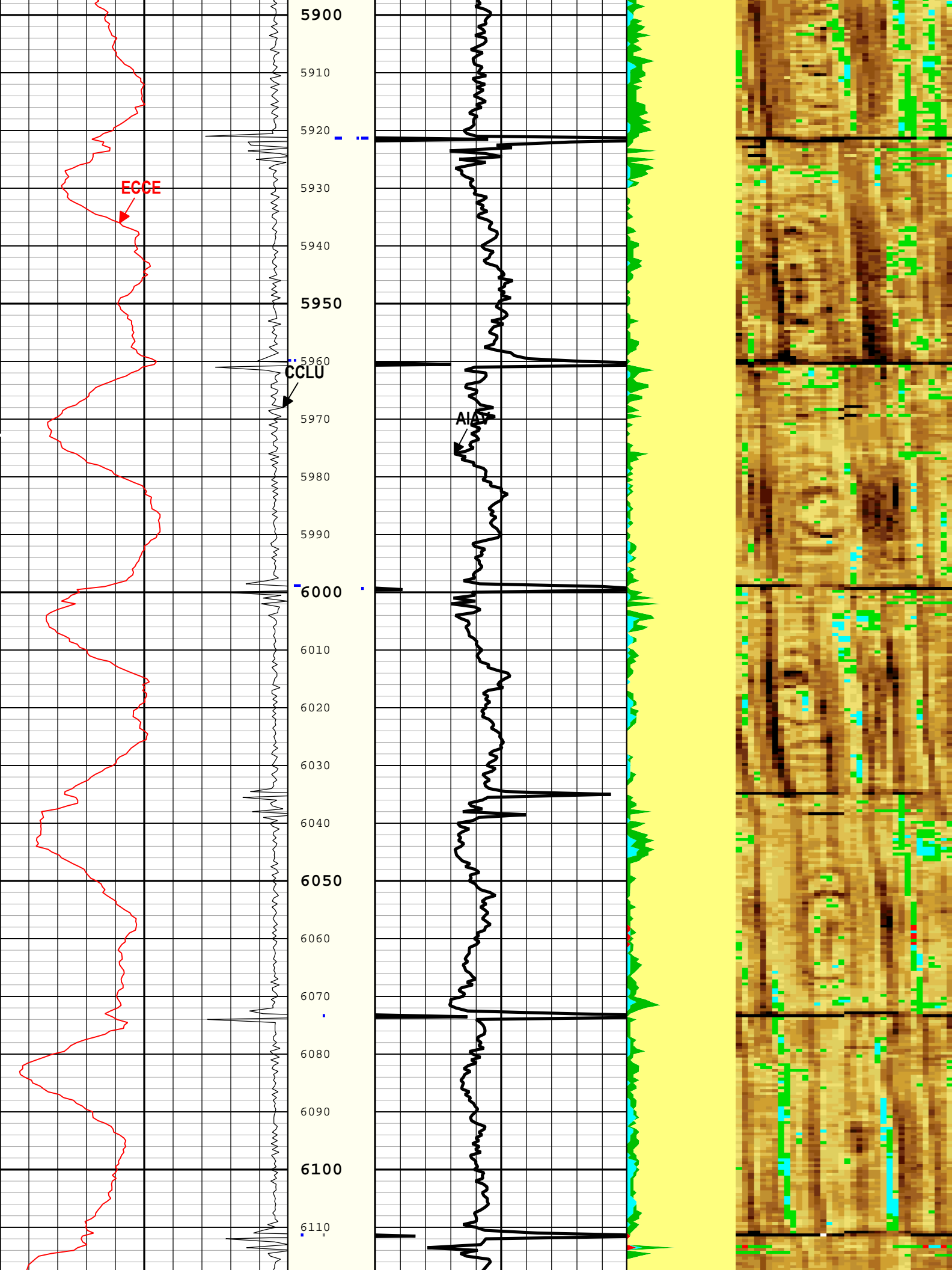


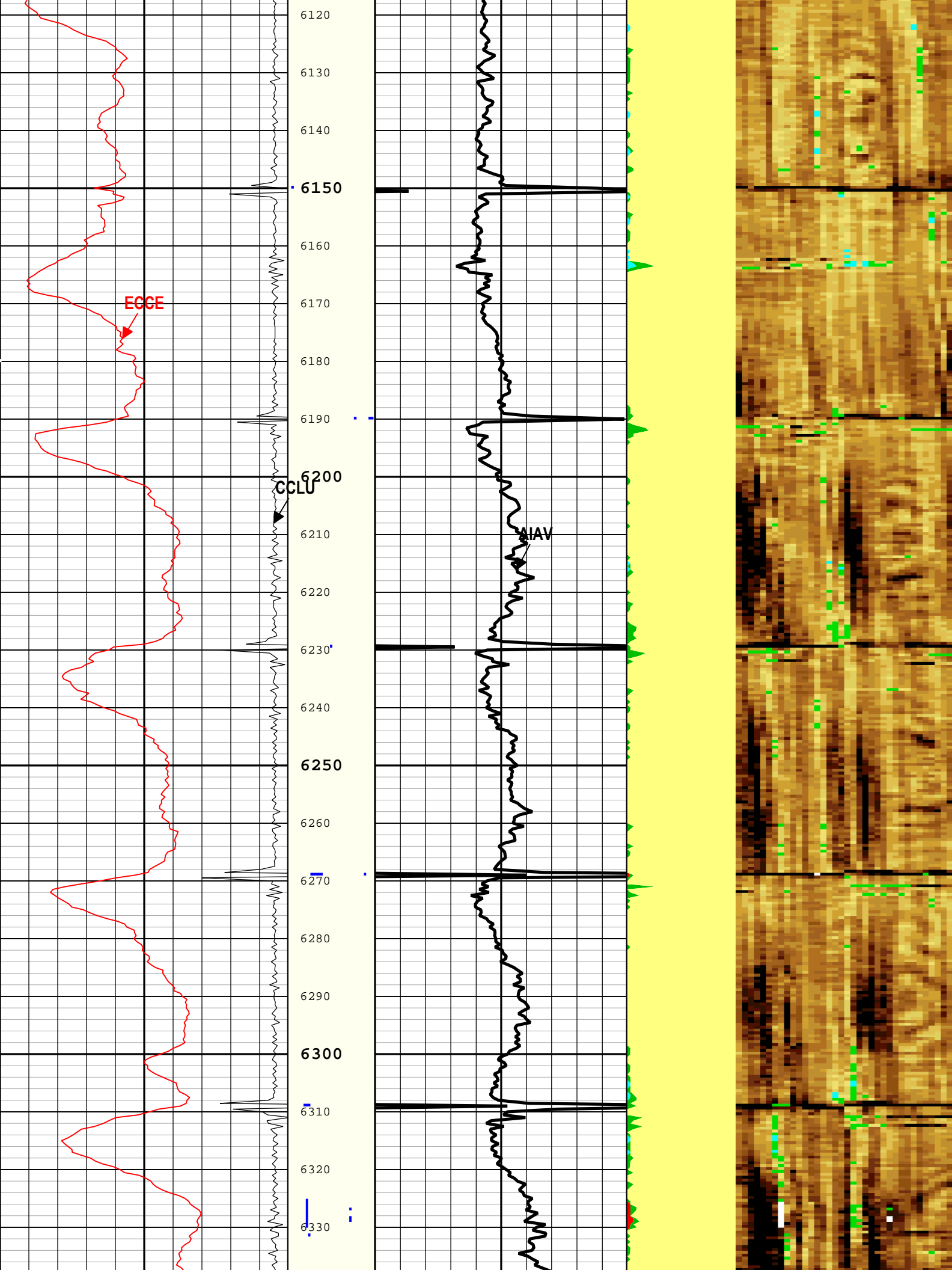


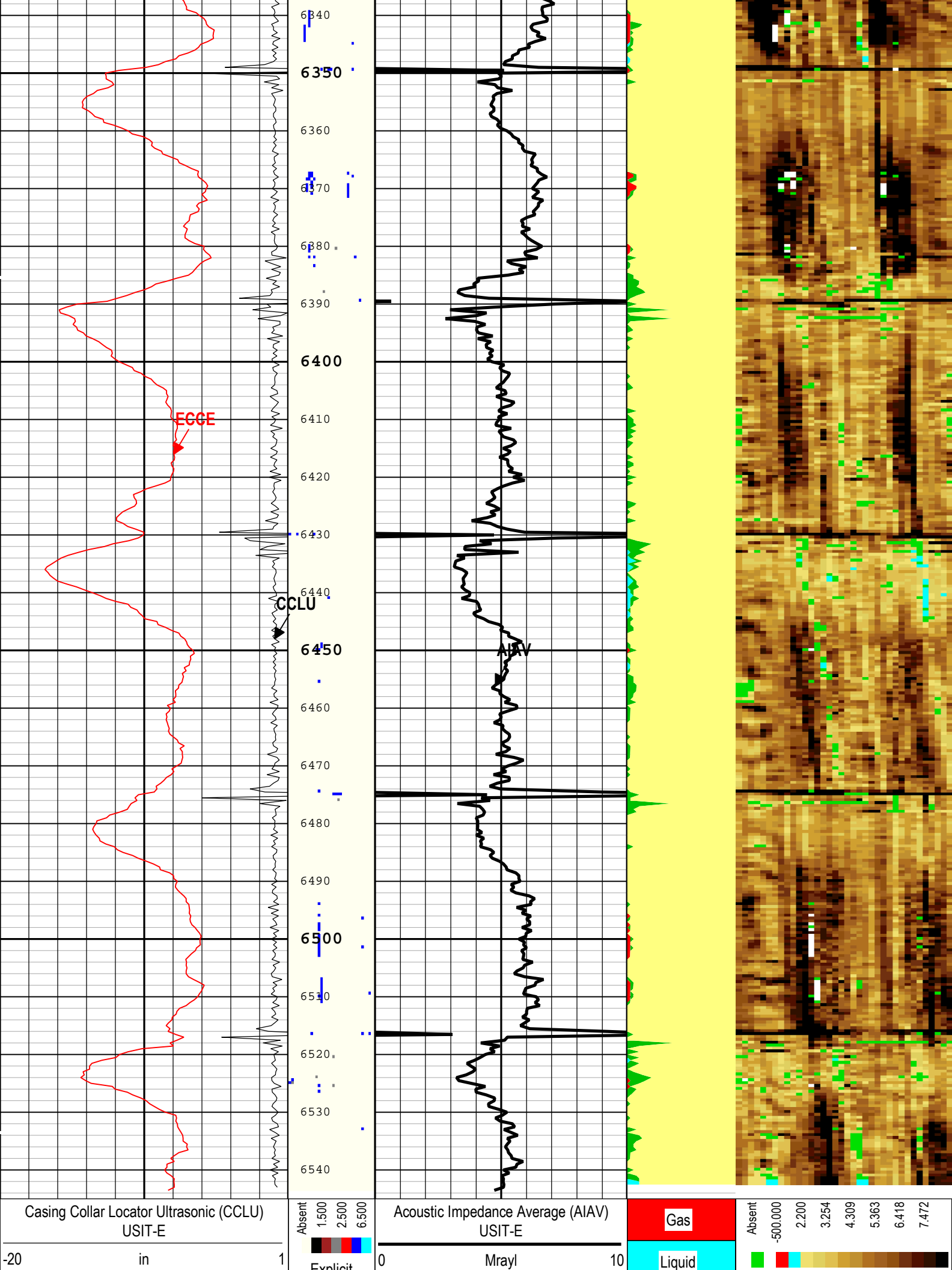












<div>Amplitude of Eccentering (ECCE) USIT-E</div>		Explicit Normalization USIT - USIT Processing Flags (UFLG) USIT-E	<div>Micro-Debonding</div>		Custom Normalization USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)
0	in0.5		<div>Bonded</div>		
TIME_1900 - Time Marked 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: 08-Aug-2017 19:47:06					

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	Depth Zoned	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.07	
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	58.5	110
BS	13.5	110	1948
BS	8.5	1948	6544
MEAS_WLEN	22.44	58.5	6544
MEAS_WLEN	20	6544	6545

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	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	7000	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	Time Zoned	us

--	--

WINE	71.88	07-Aug-2017 18:39:18	07-Aug-2017 18:39:42	6545.42	6542.95
WINE	71.11	07-Aug-2017 18:39:42	07-Aug-2017 18:39:58	6542.95	6535.09
WINE	67.27	07-Aug-2017 18:39:58	07-Aug-2017 18:41:30	6535.09	6279.99
WINE	65.74	07-Aug-2017 18:41:30	07-Aug-2017 18:45:55	6279.99	5364.33
WINE	71.11	07-Aug-2017 18:45:55	07-Aug-2017 19:18:22	5364.33	58.44

ONE

3. Repeat Pass

Software Version
1.0.0

Acquisition System	Version
Maxwell 2017 SP2	7.2.87778.3100

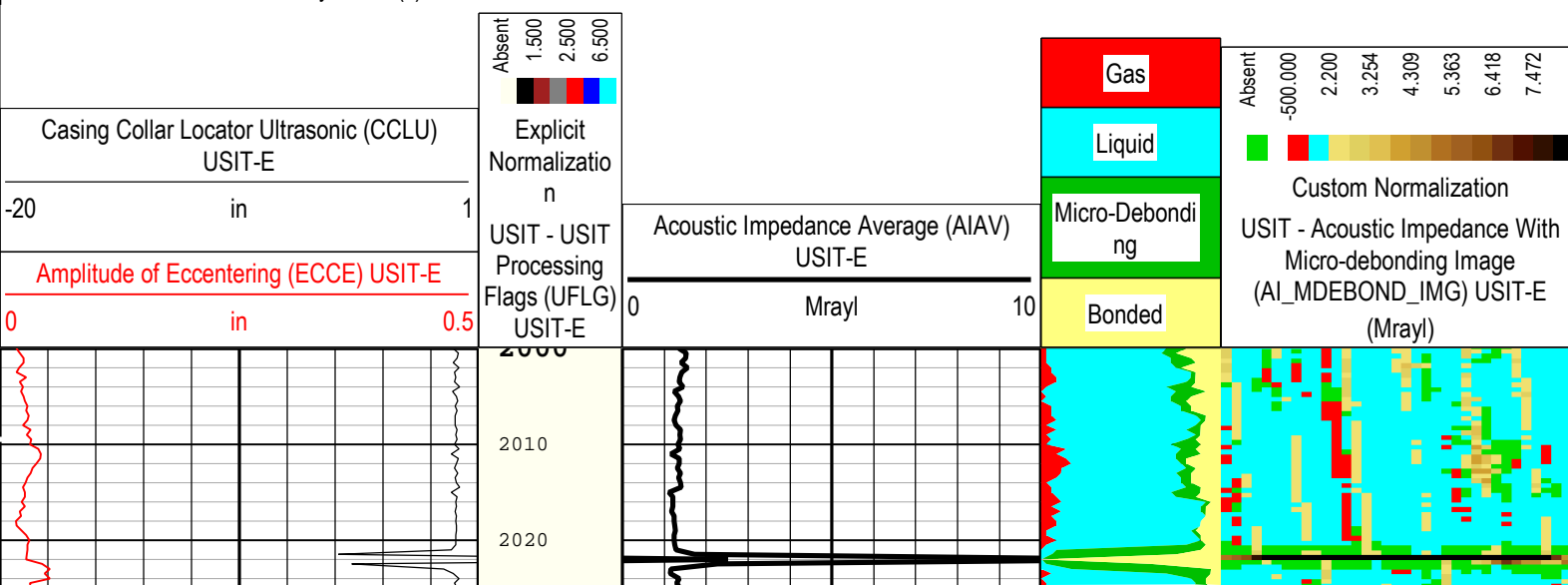
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include
----------	----------------	-----------	-----	--------	-------	------	----------	-------------	---------

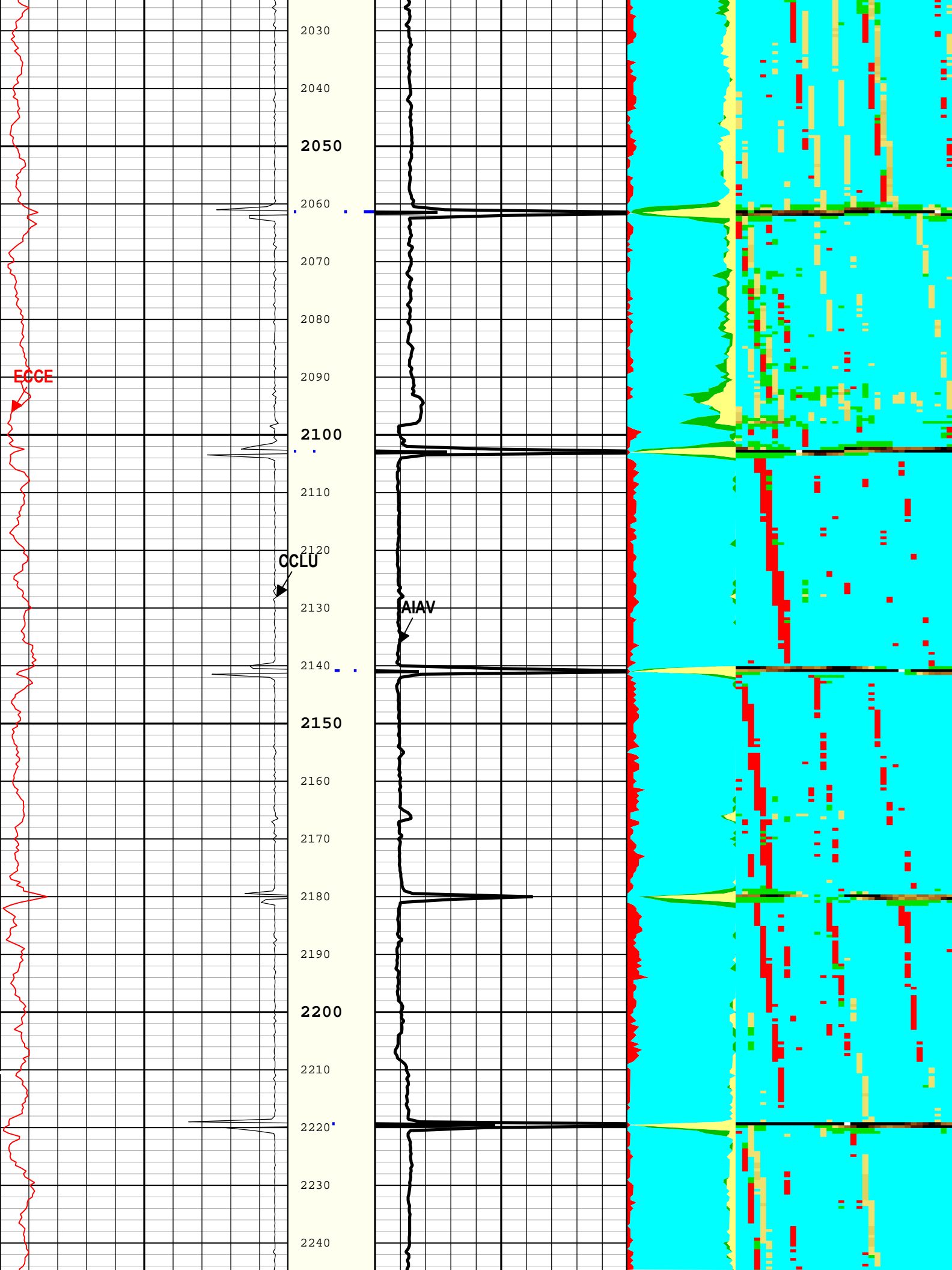
Run Name	Test Sequence	Direction	Top	Bottom	Start	Stop	SSC mode	Depth (ft)	SSC mode
ONE	Log[2]:Up	Up	1950.44 ft	2550.50 ft	07-Aug-2017 6:11:54 PM	07-Aug-2017 6:15:30 PM	ON	0.62 ft	Yes

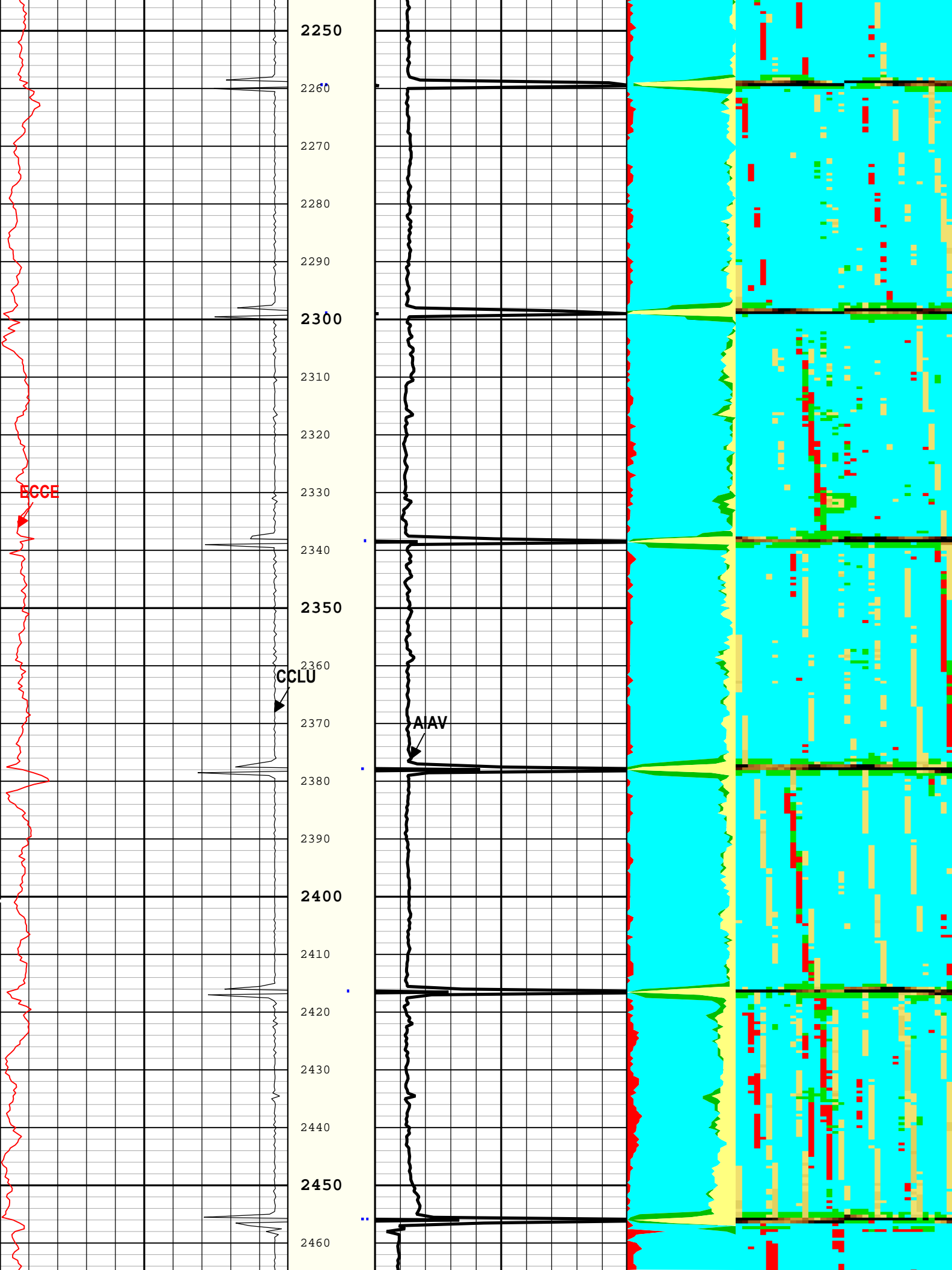
Log Company:Noble Energy Inc. Well:Wells Ranch AF07-651
ONE: Log[2]:Ln:S005

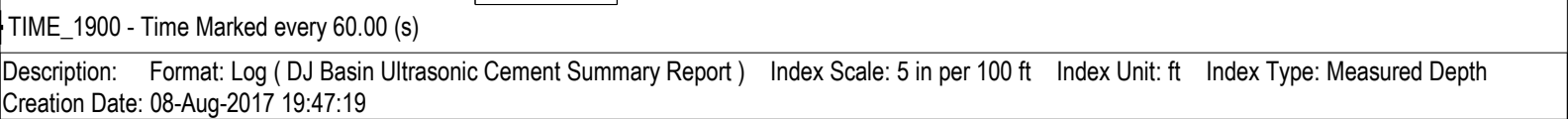
Creation Date: 08-Aug-2017 19:47:19

TIME_1900 - Time Marked every 60.00 (s)









ONE: Parameters

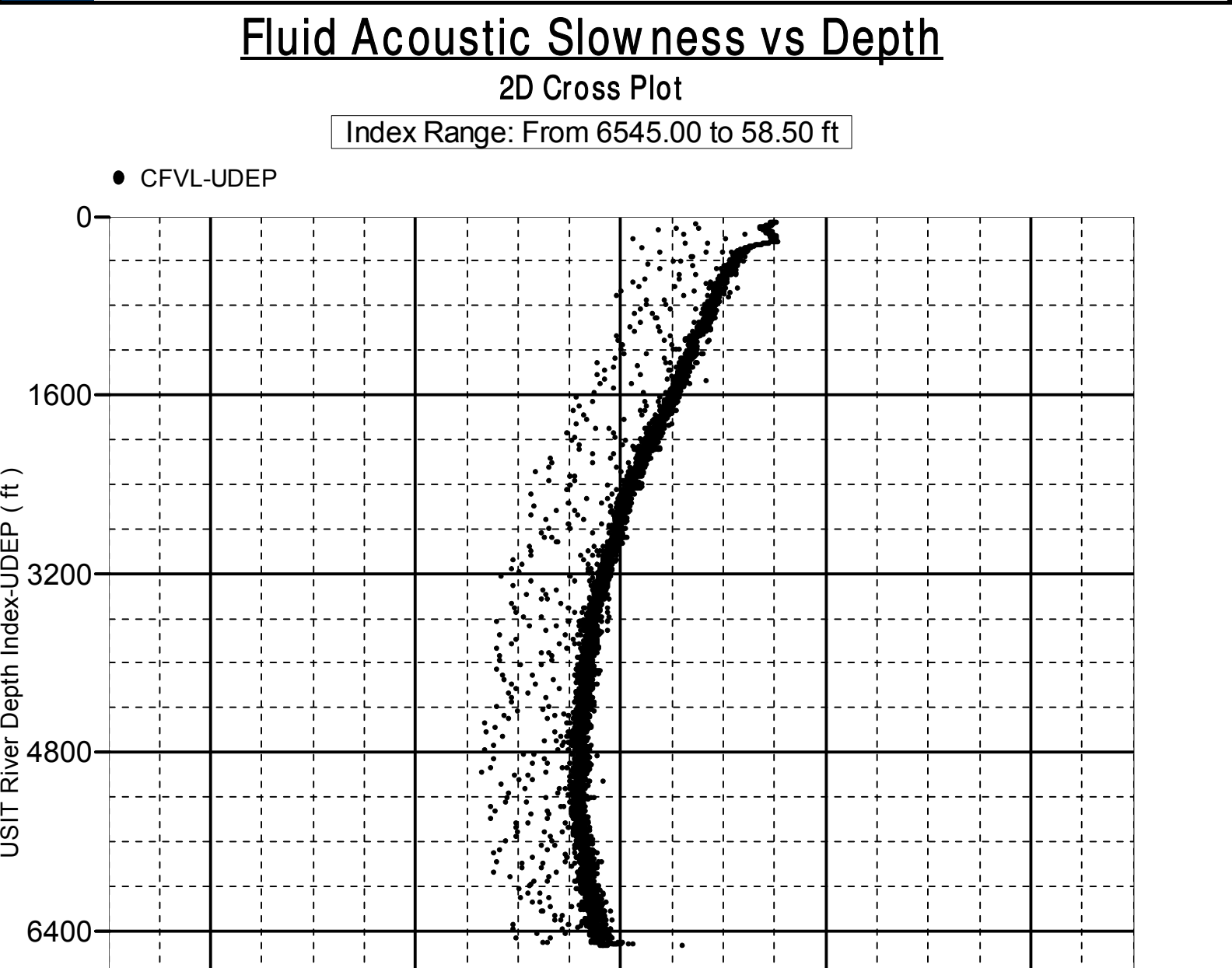
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	8.5	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	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	1.07	
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

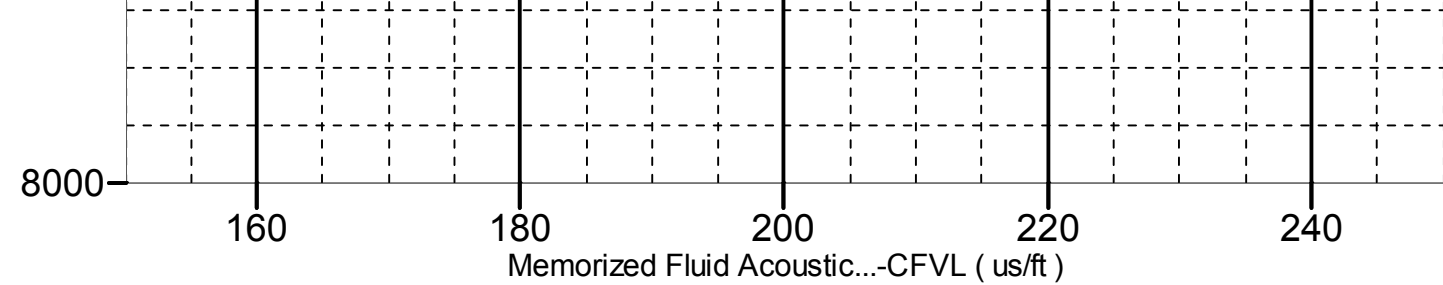
ONE: Parameters

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	Time Zoned	us

Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
WINE	71.88	07-Aug-2017 18:11:54	07-Aug-2017 18:12:18	2550.5	2533.16
WINE	76.48	07-Aug-2017 18:12:18	07-Aug-2017 18:15:30	2533.16	1950.44
All depth are at tool zero.					
XYZ		Company:Noble Energy Inc. Well:Wells Ranch AF07-651 ONE: Log[4]:Up:S005			

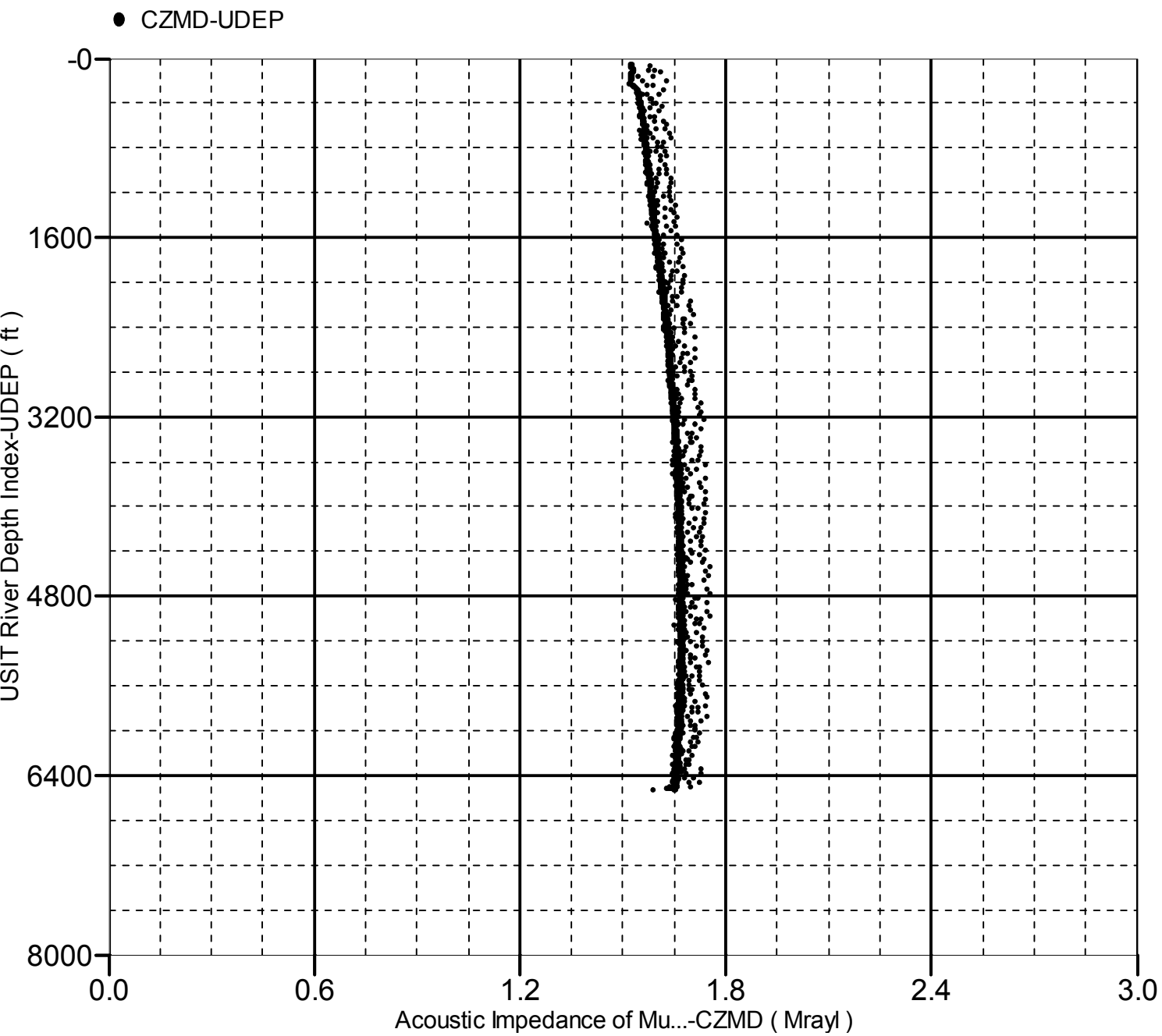




Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6545.00 to 58.50 ft



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

Primary Equipment :			
EDTC-B	EDTC-B	8102	
Calibration Parameter :			
Plus Reference (Jig minus background reference)	165		

EDTC-B Accelerometer Calibration - EDTC-B Accelerometer Calibration

Before (Measured):		17:55:50 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	

County:	Weld
State:	Colorado
DJ Basin UltraSonic Summary Print	