

Company: Noble Energy Inc.

Well: Wells Ranch AF07-666

Field: Wattenberg

County: WELD State: Colorado

DJ Basin UltraSonic Summary Print

County: WELD
Field: Wattenberg
Location: SENE Sec. 8, T5N, R62W
Well: Wells Ranch AF07-666
Company: Noble Energy Inc.

Location:		SENE Sec. 8, T5N, R62W SHL: 2275' FNL & 175' FEL Lat: 40.41527 Long: -104.33836	Elev.: K.B. 4735.00 ft G.L. 4705.00 ft D.F. 4735.00 ft
Permanent Datum:	Ground Level	Kelly Bushing	Elev.: 30.00 ft above Perm.Datum
Log Measured From:	Kelly Bushing		
Drilling Measured From:	Kelly Bushing		
API Serial No. 05-123-44240	Section: 8	Township: 5N	Range: 62W

Logging Date 07-Aug-2017

Run Number ONE

Depth Driller 16540.00 ft

Schlumberger Depth 6444.00 ft

Bottom Log Interval 6444.00 ft

Top Log Interval 90.00 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 1946.00 ft

To 6444.00 ft

Casing/Tubing Size 5.5 in

Weight 20 lbm/ft

Grade N/A

From 30.00 ft

To 6444.00 ft

Max Recorded Temperatures 193 degF

Logger on Bottom 07-Aug-2017 14:00:00

Unit Number 2377 Location: Fort Morgan

Recorded By Camila Lang

Witnessed By Bill Mansfield

Disclaimer

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12. ONE 0 PSI Repeat Pass

12.1 Integration Summary

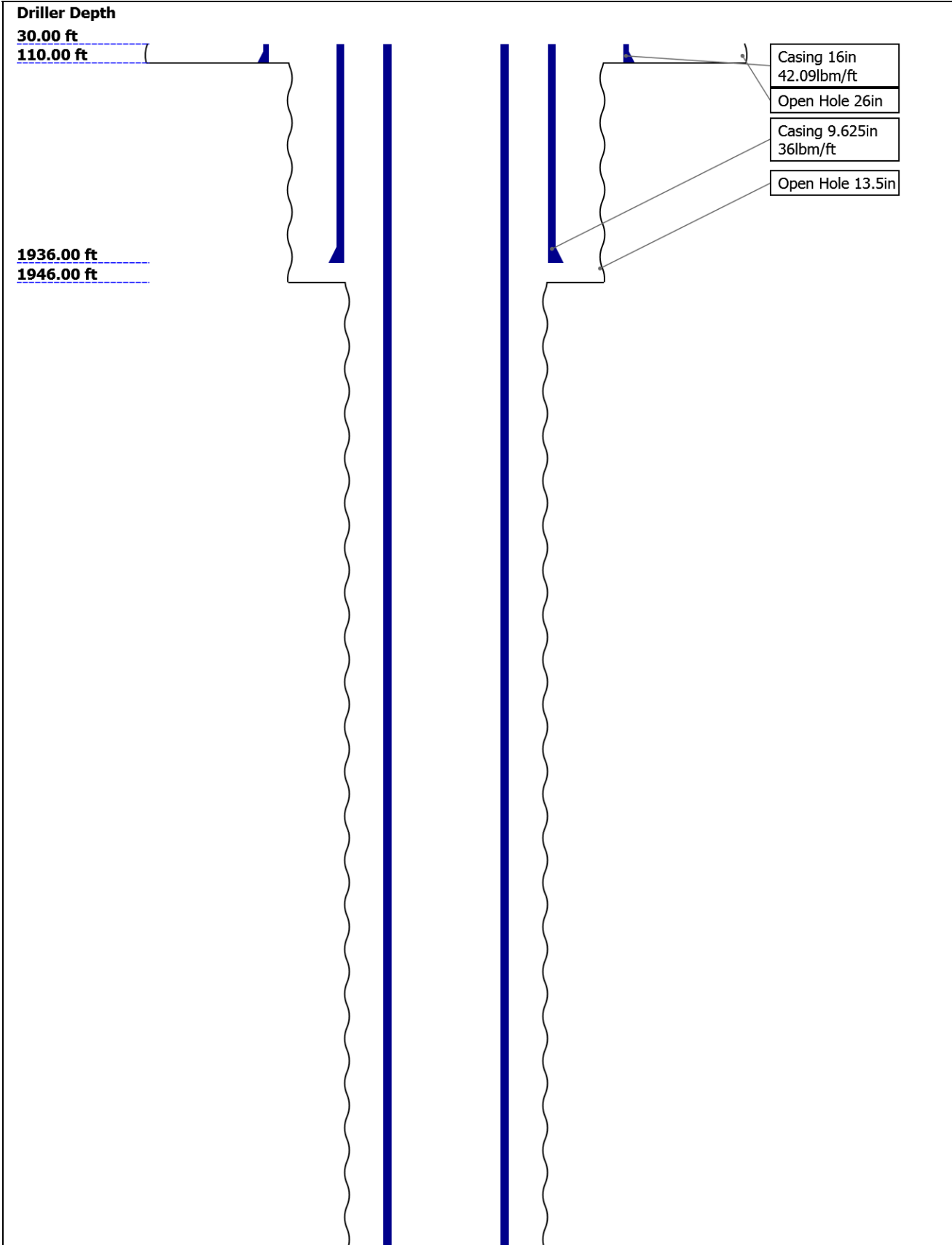
12.2 Software Version

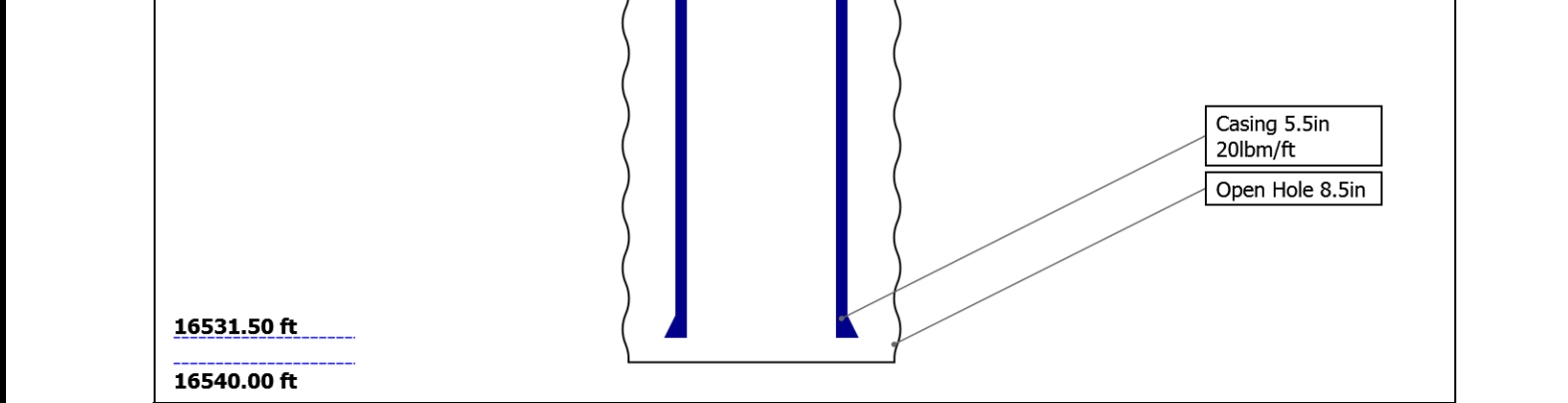
12.3 Composite Summary

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	1946			
Top Logger (ft)	30	110	1946			
Bottom Driller (ft)	110	1946	16540			
Bottom Logger (ft)	110	1946	6444			
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	1936	16531.5			
Bottom Logger (ft)	110	1936	6444			

Operational Run Summary

Parameter (unit)	ONE					
Date Log Started	07-Aug-2017					
Time Log Started	13:21:08					
Date Log Finished	07-Aug-2017					
Time Log Finished	14:48:40					
Top Log Interval (ft)	90.00					
Bottom Log Interval (ft)	6444.00					
Total Depth (ft)	6444.00					
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					

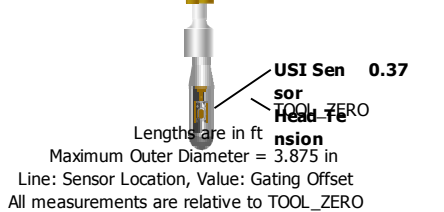
Witnessed By	Bill Mansfield					
Service Order Number	DVWV-00007					

Borehole Fluids

Parameter(unit)	ONE					
Fluid Type	Water					
Fluid Name	Brine					
Max Recorded Temperatures (degF)	193					
Salinity (ppm)	0					
Density (lbm/gal)	8.4					
Date Logger on Bottom	07-Aug-2017					
Time Logger on Bottom	14:00:00					
Total Solid (%)						
High Gravity Solids (%)						

Remarks and Equipment Summary

ONE: Toolstring			ONE: Remarks											
<div><div><div>Equip name</div><div>Length</div></div><div><div>LEH-QT</div><div>33.83</div></div><div>LEH-QT</div></div> <div><div><div>SAH-F:18</div><div>30.91</div></div><div>17</div></div> <div><div><div>EDTC-B:8</div><div>26.06</div></div><div>102</div><div>EDTH-B:92</div><div>45</div><div>EDTG-A:7</div><div>7004</div><div>EDTC-B:81</div><div>02</div></div> <div><div><div>AH-184[2]:1951</div><div>19.56</div></div></div> <div><div><div>AH-184[1]:2826</div><div>17.56</div></div></div> <div><div><div>USIT-E:92</div><div>15.56</div></div><div>1</div><div>ECH-MFA:</div><div>1908</div><div>USAC-A:9</div><div>21</div><div>USIS-A:90</div><div>2</div><div>USSC-B:17</div><div>30</div><div>USRS-A:78</div><div>6</div><div>USI-SENS</div><div>OR</div></div> <div><div><div>CTEM</div><div>22.56</div></div><div><div>ACCZ</div><div>0.00</div></div><div><div>HV</div><div>0.00</div></div><div><div>Gamma</div><div>20.69</div></div><div><div>Ray</div><div>TelStatu</div><div>s</div><div>19.56</div></div></div> <tr><td colspan="2">This was the first log in well.</td></tr> <tr><td colspan="2">Tool ran as per tool sketch.</td></tr> <tr><td colspan="2">CSG: 9.625" 36 lb/ft @ 1936'</td></tr> <tr><td colspan="2">5.5" 20lb/ft @ 16531.5'</td></tr> <tr><td colspan="2">Main pass recorded under 2500 psi, and repeat pass recorded under 0 psi.</td></tr> <tr><td colspan="2">Logs show heavy eccentralization in the curve from TD- 6200'</td></tr> <tr><td colspan="2">BHT: 185 degF</td></tr>	This was the first log in well.		Tool ran as per tool sketch.		CSG: 9.625" 36 lb/ft @ 1936'		5.5" 20lb/ft @ 16531.5'		Main pass recorded under 2500 psi, and repeat pass recorded under 0 psi.		Logs show heavy eccentralization in the curve from TD- 6200'		BHT: 185 degF	
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	Main pass recorded under 2500 psi, and repeat pass recorded under 0 psi.													
	Logs show heavy eccentralization in the curve from TD- 6200'													
BHT: 185 degF														

<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 and standards were followed.	
Rig Up Length At Surface		IDW used as primary depth reference.	
Rig Up Length At Bottom		Z-chart used as seconardary 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	6447.05	62.57
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 : 36.85m(120.89ft) to 38.05m(124.85ft) MUD_N_FRP = 1.04 DFD = 1.01g/cm3(8.40lbm/gal) CZMD median computed in free pipe normalization interval = 1.48 MRayl			
Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
ONE			

2500 PSI Main Pass

Software Version

Acquisition System

Maxwell 2017 SP1

Version

7.1.82245.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	62.57 ft	6447.05 ft	07-Aug-2017 2:10:17 PM	07-Aug-2017 2:47:47 PM	ON	5.31 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc.

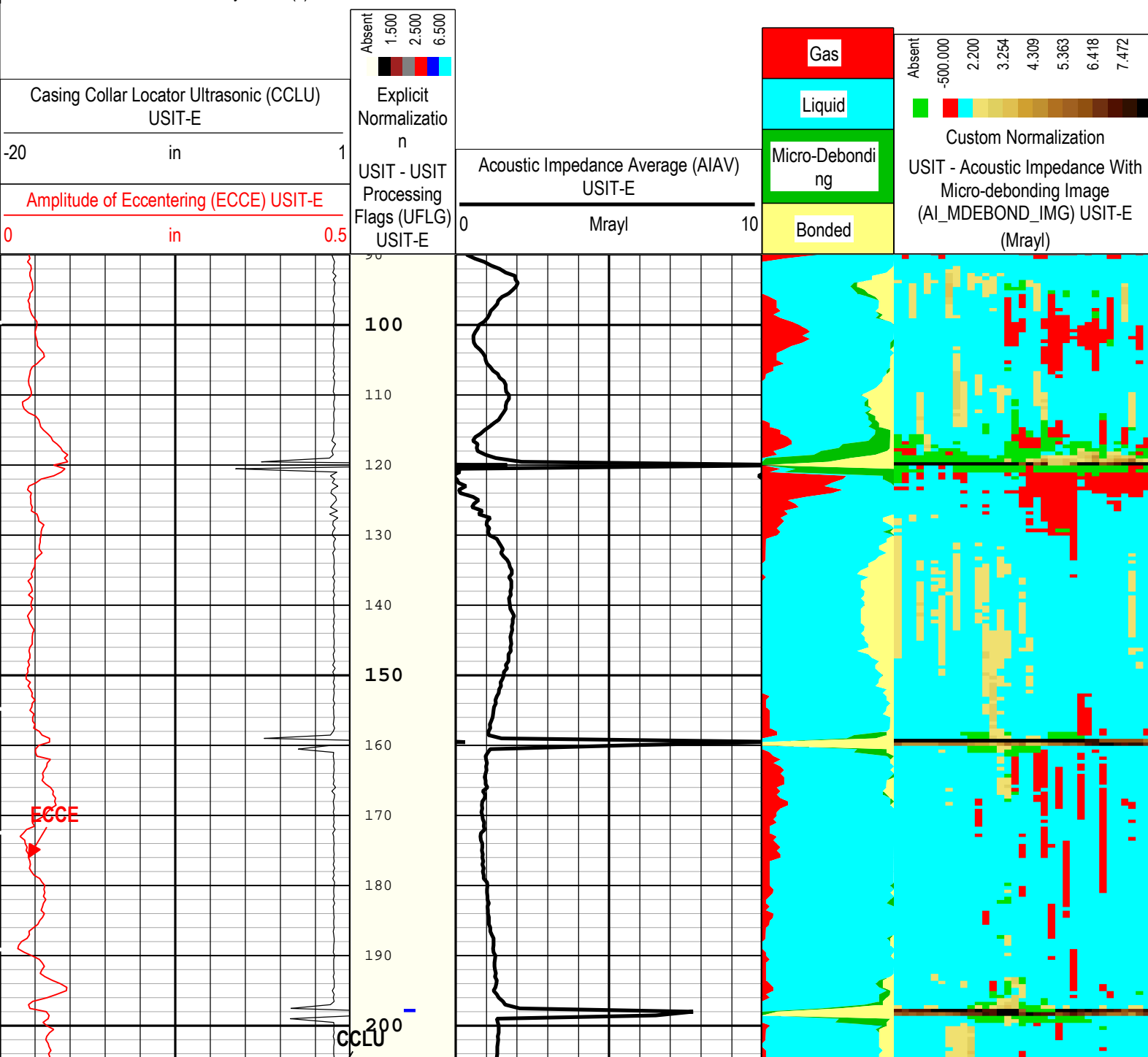
Well:Wells Ranch AF07-666

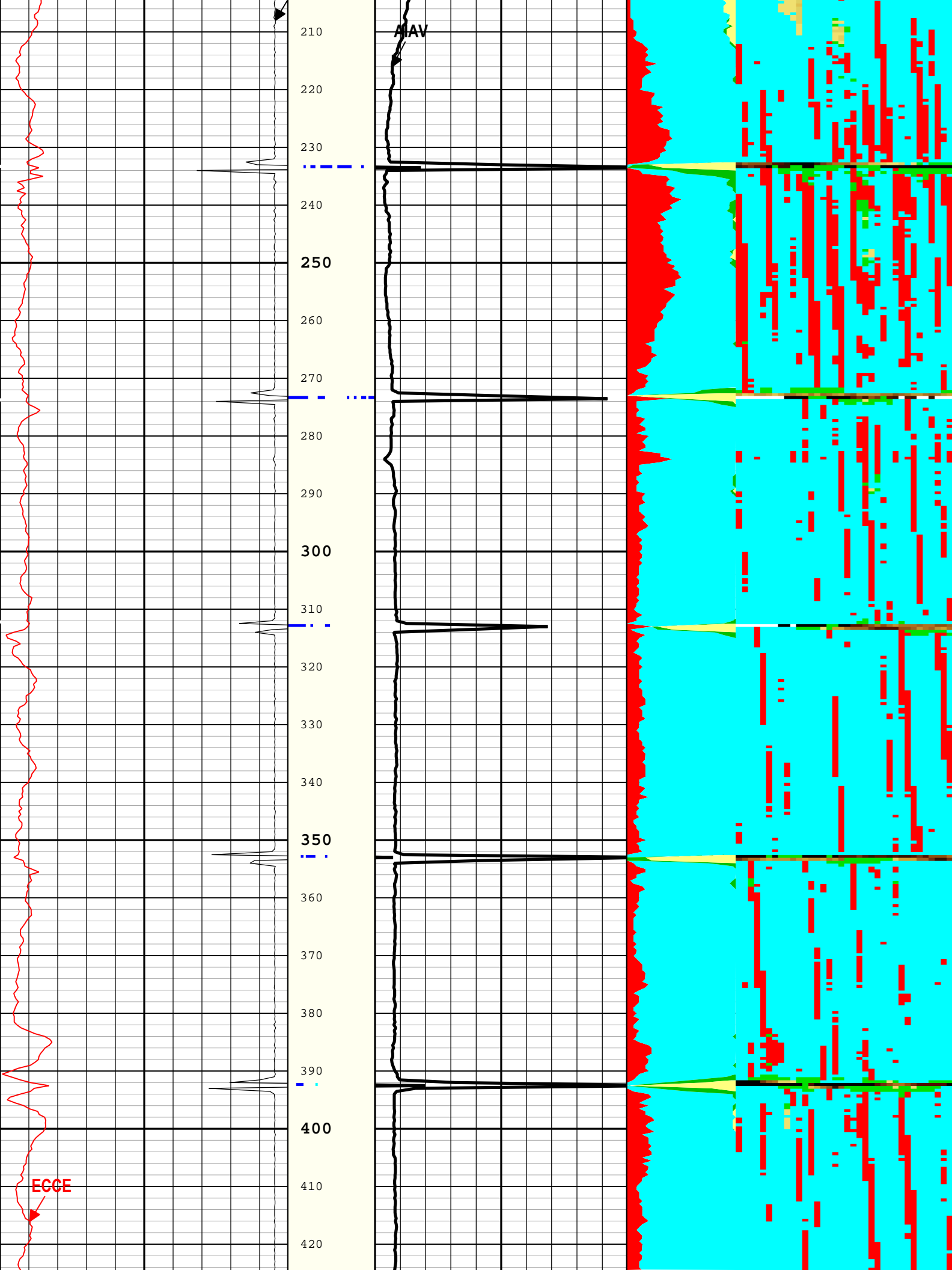
ONE: Log[4]:Up:S009

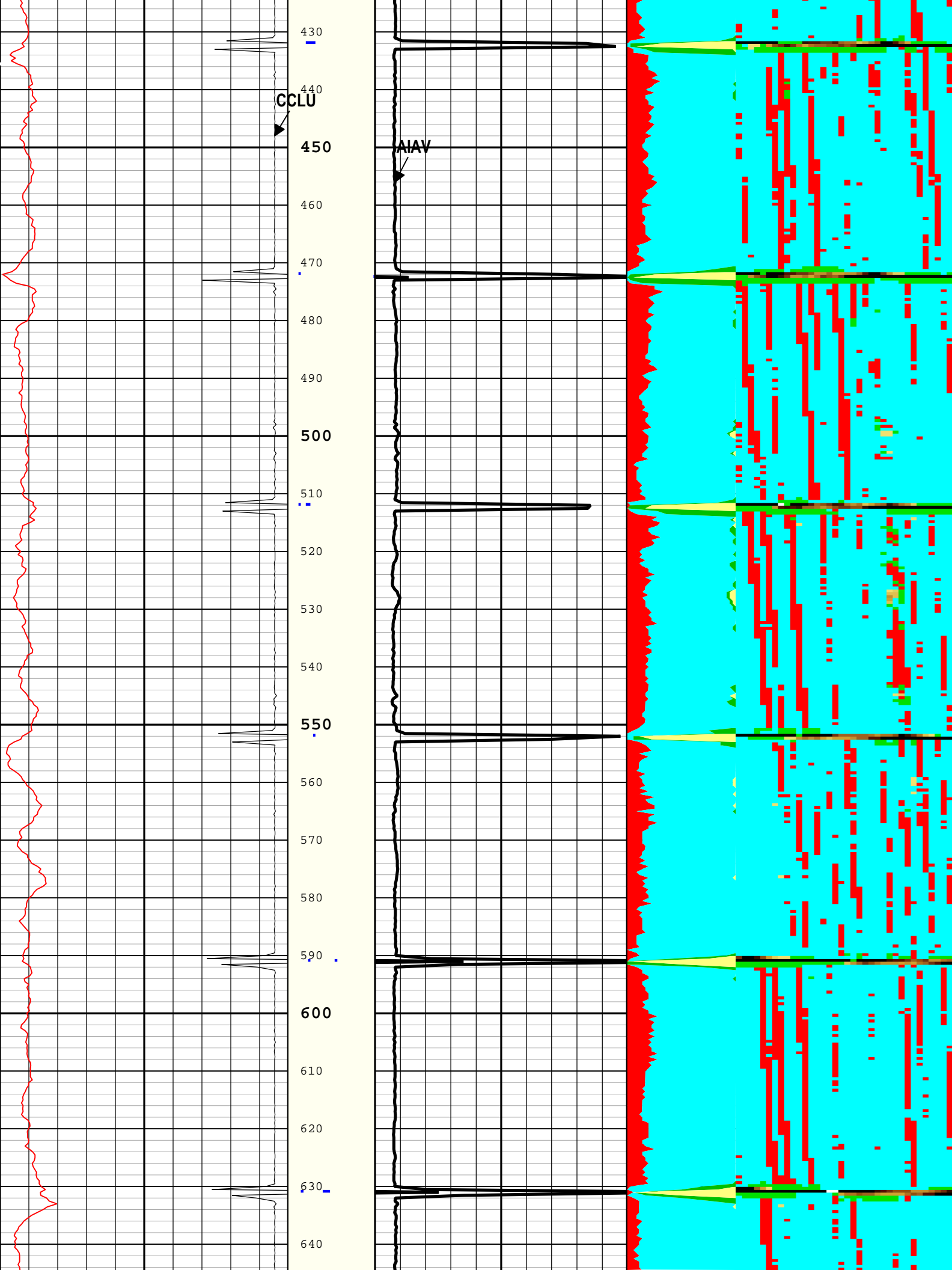
Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

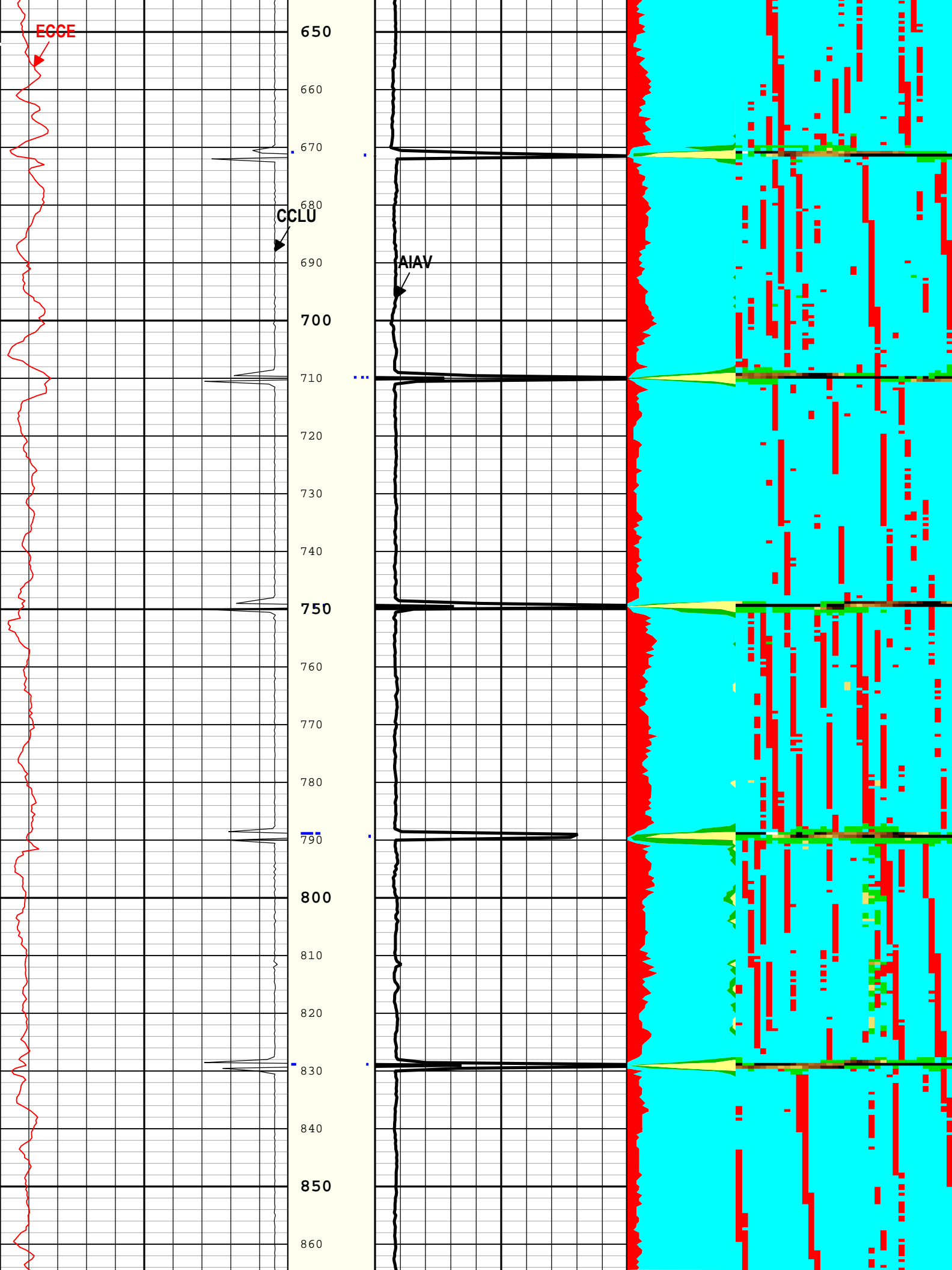
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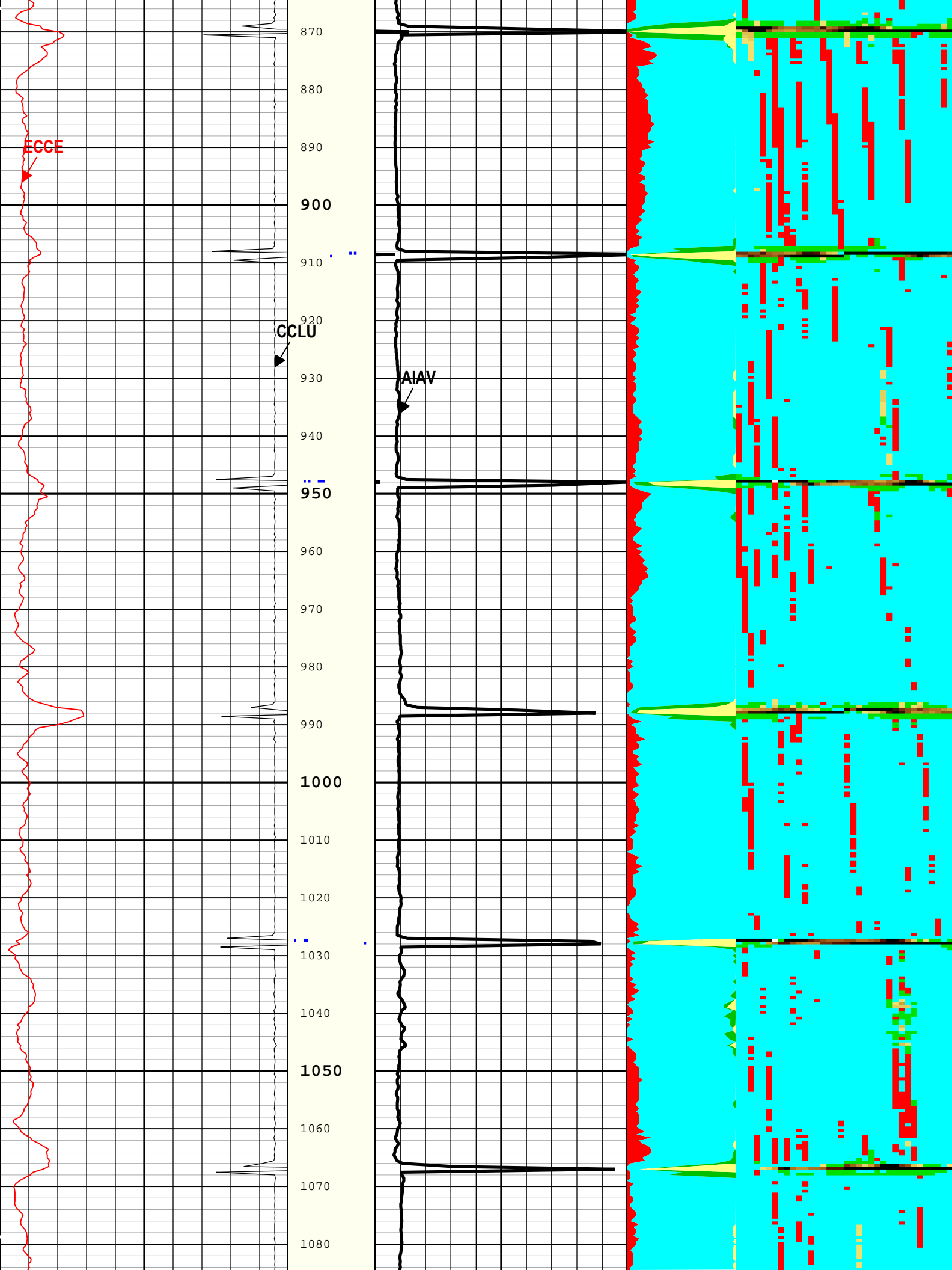
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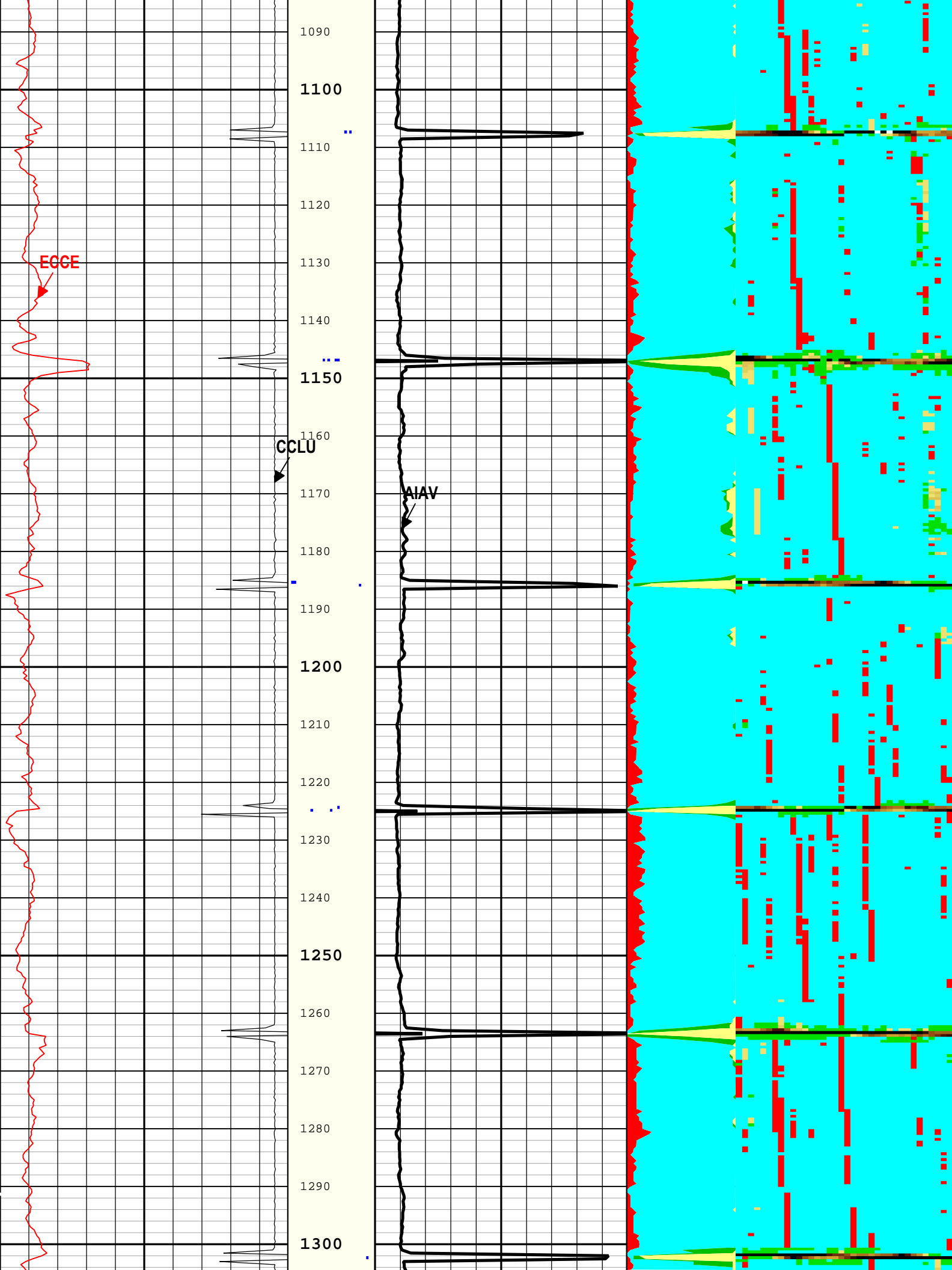


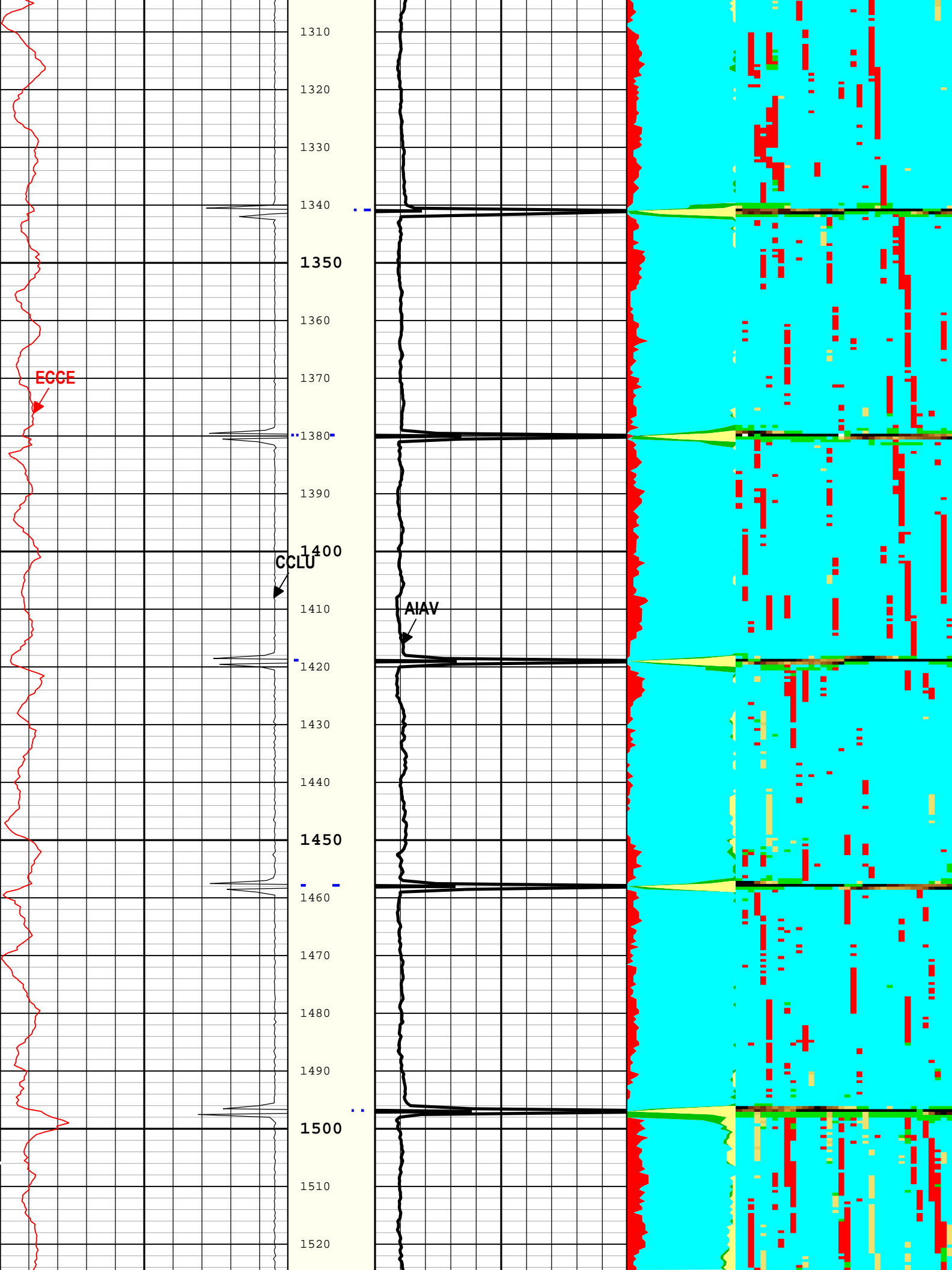


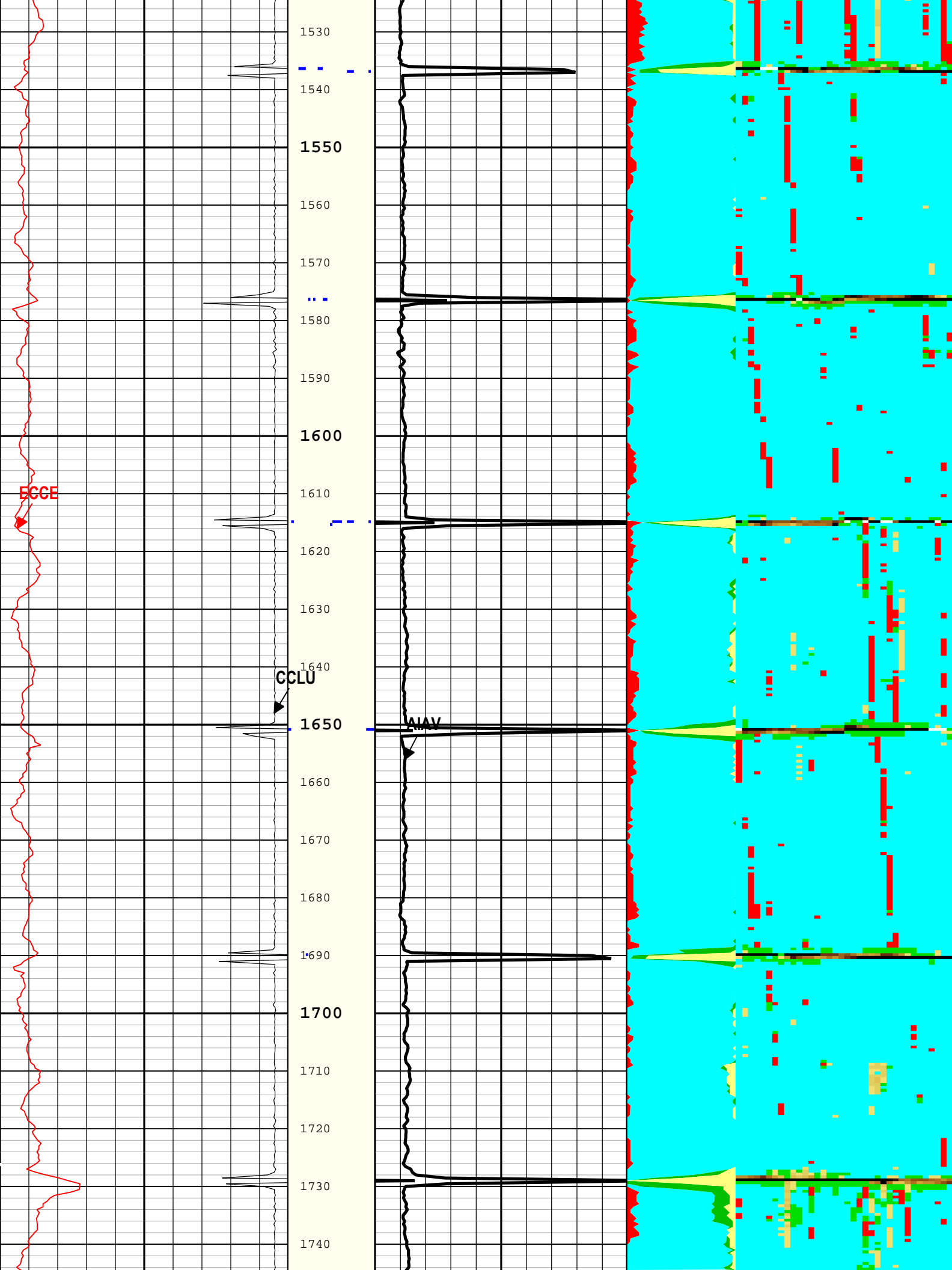


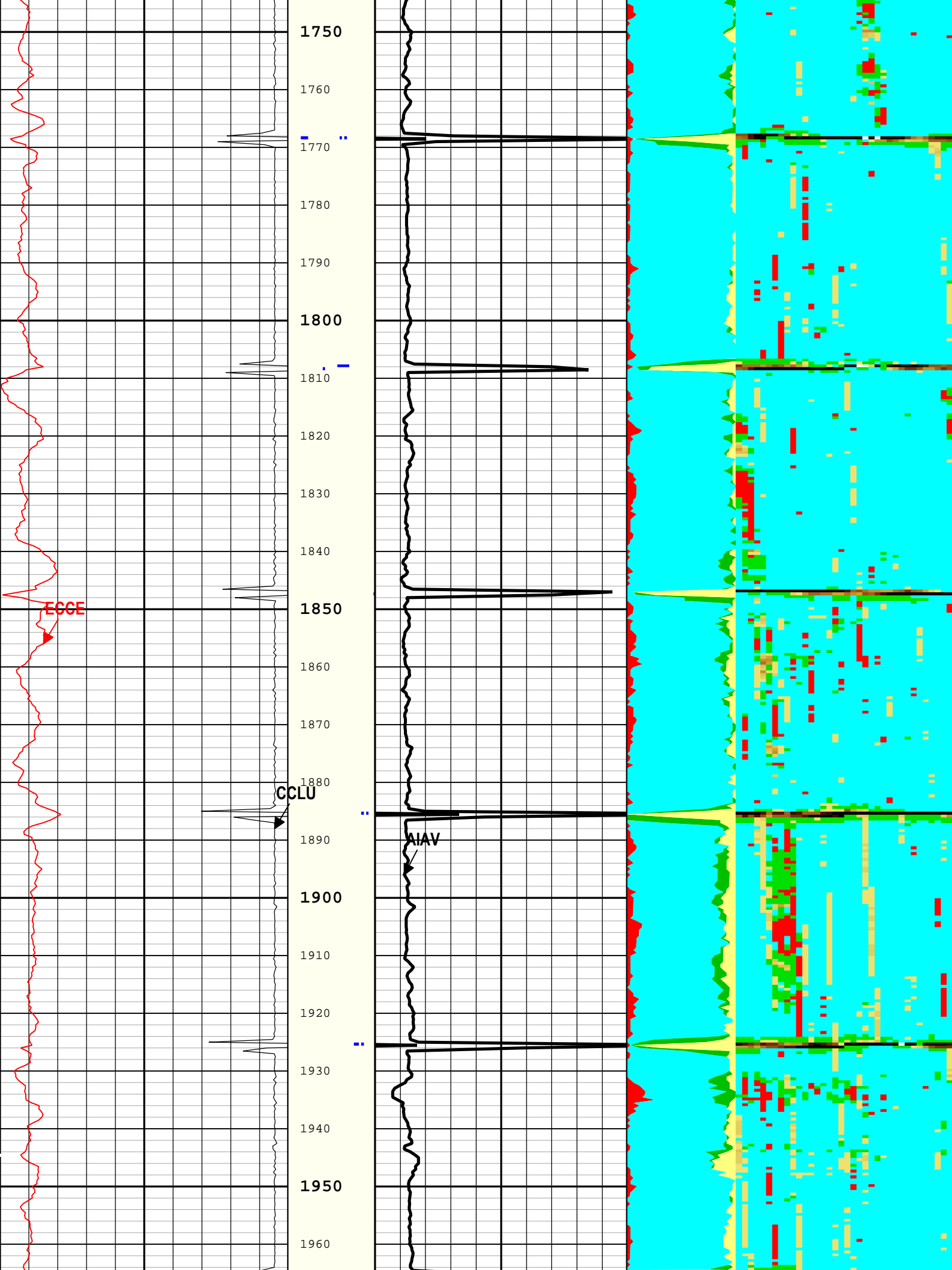


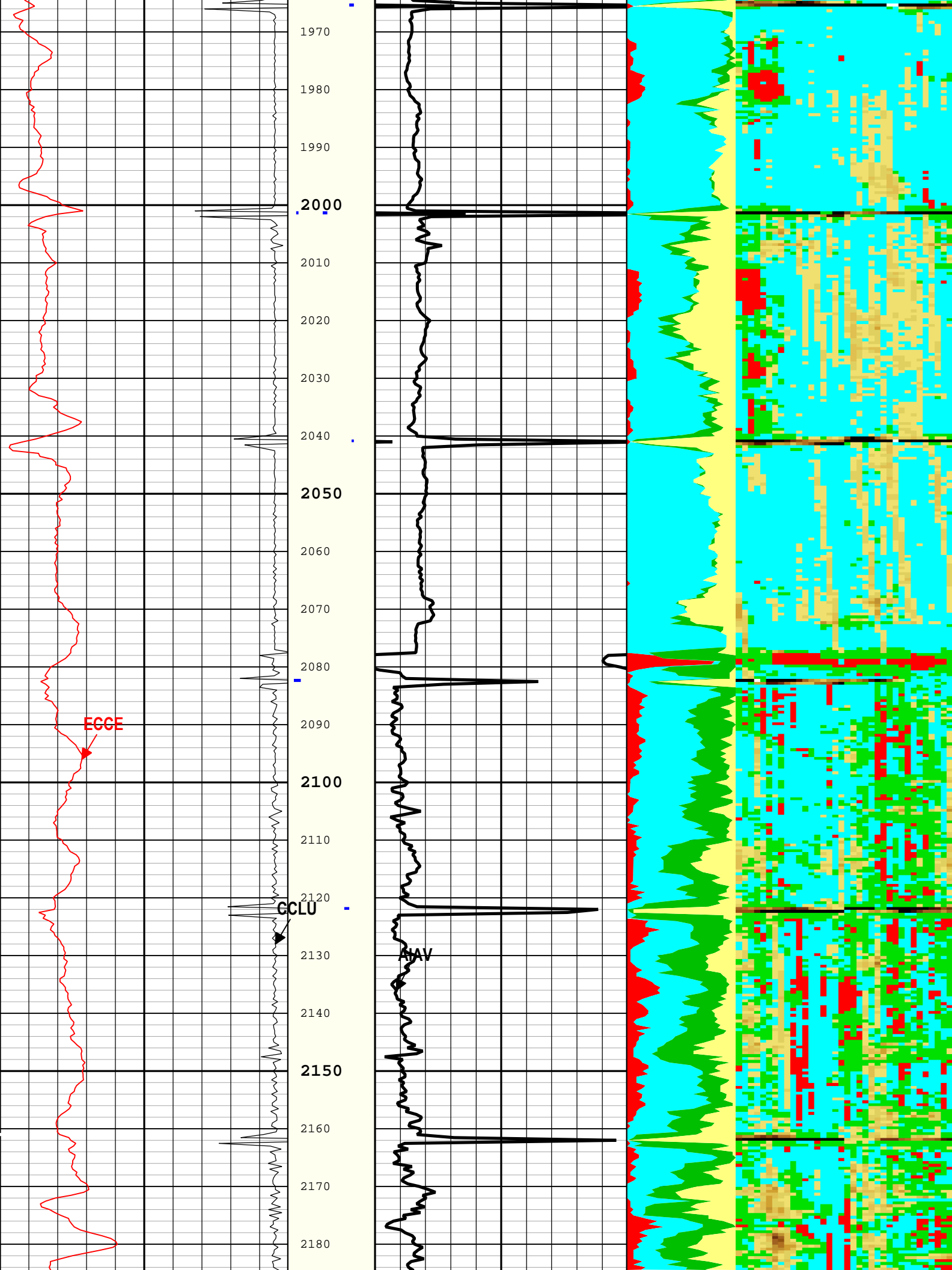


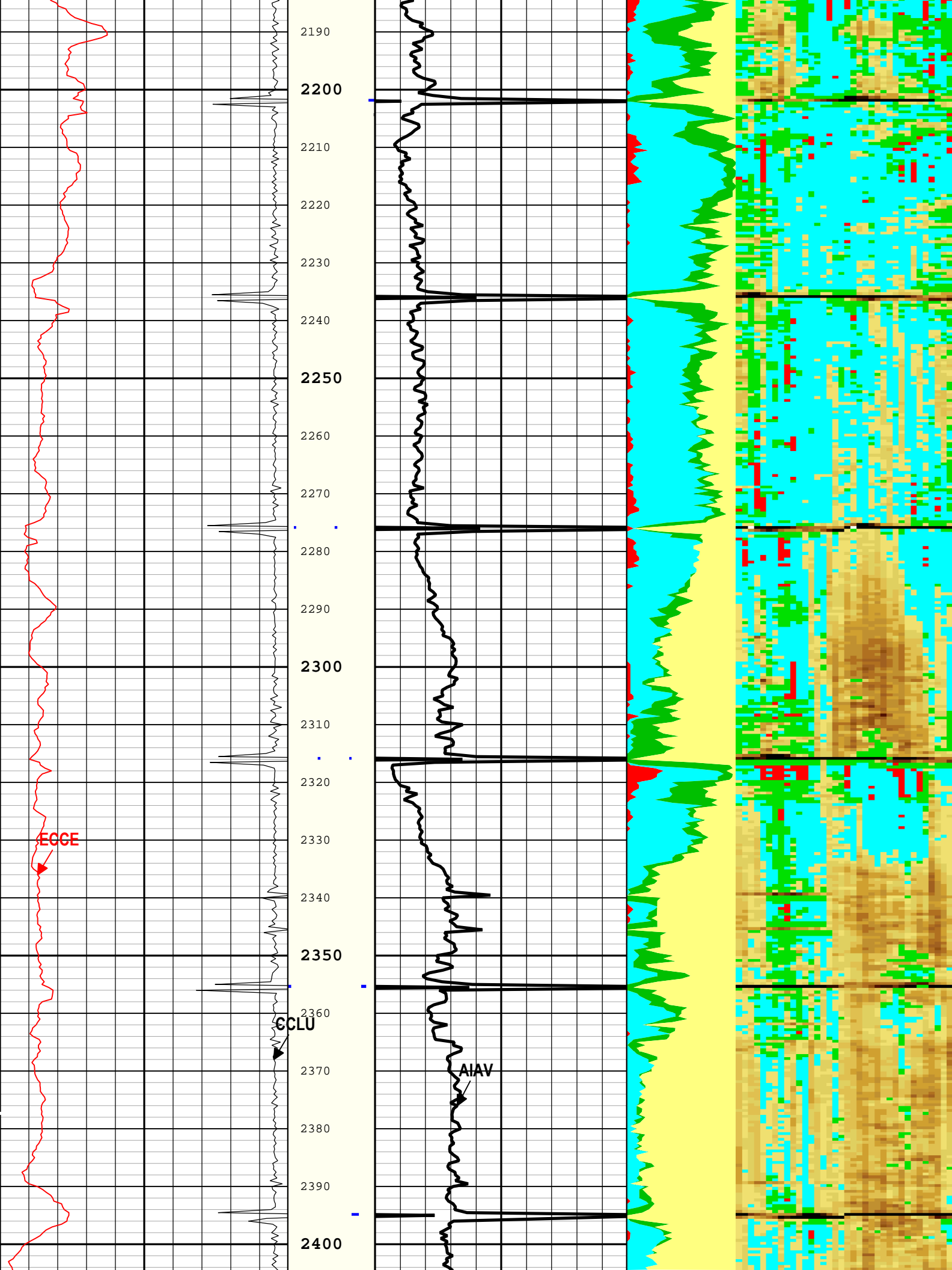


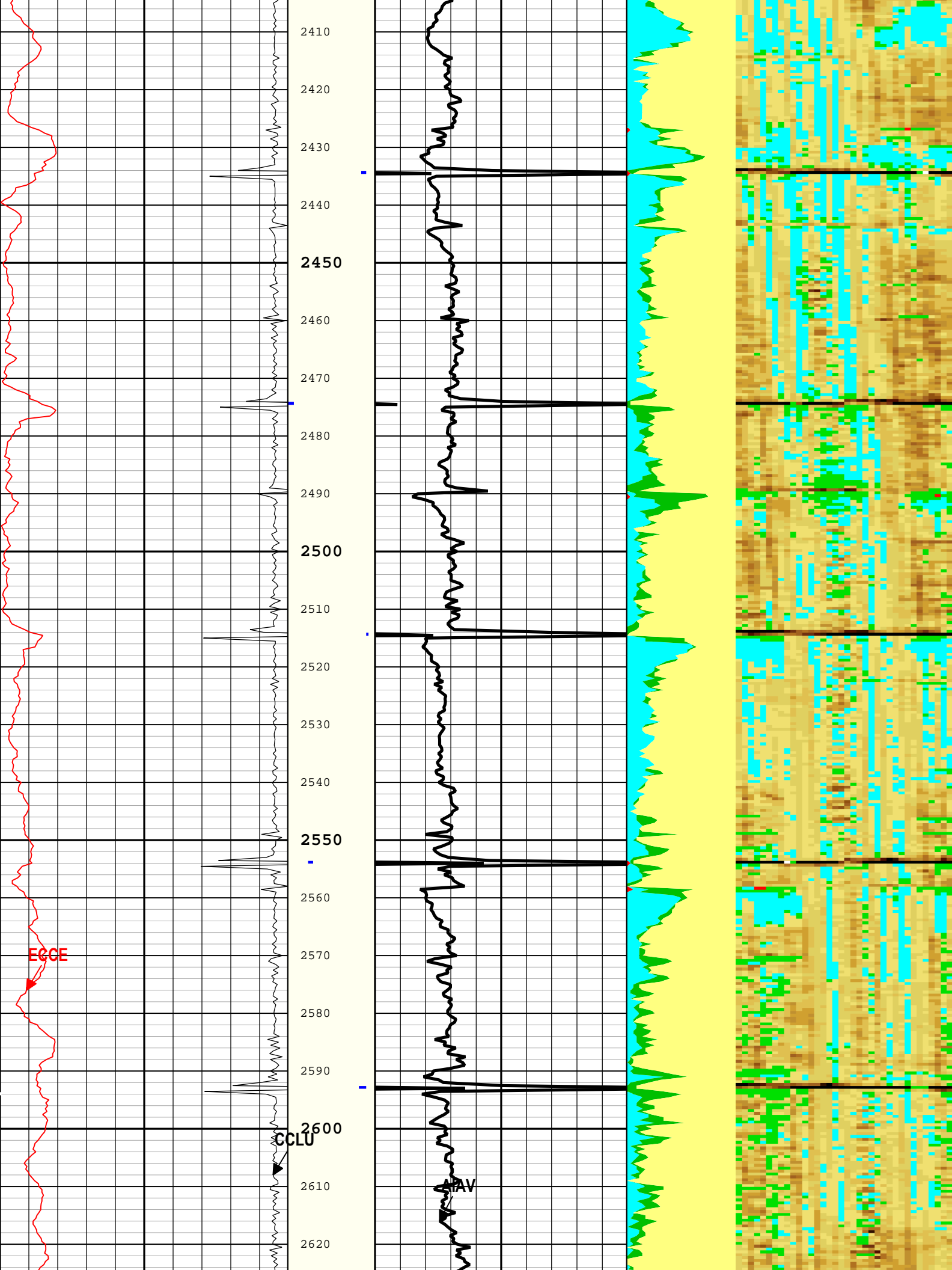


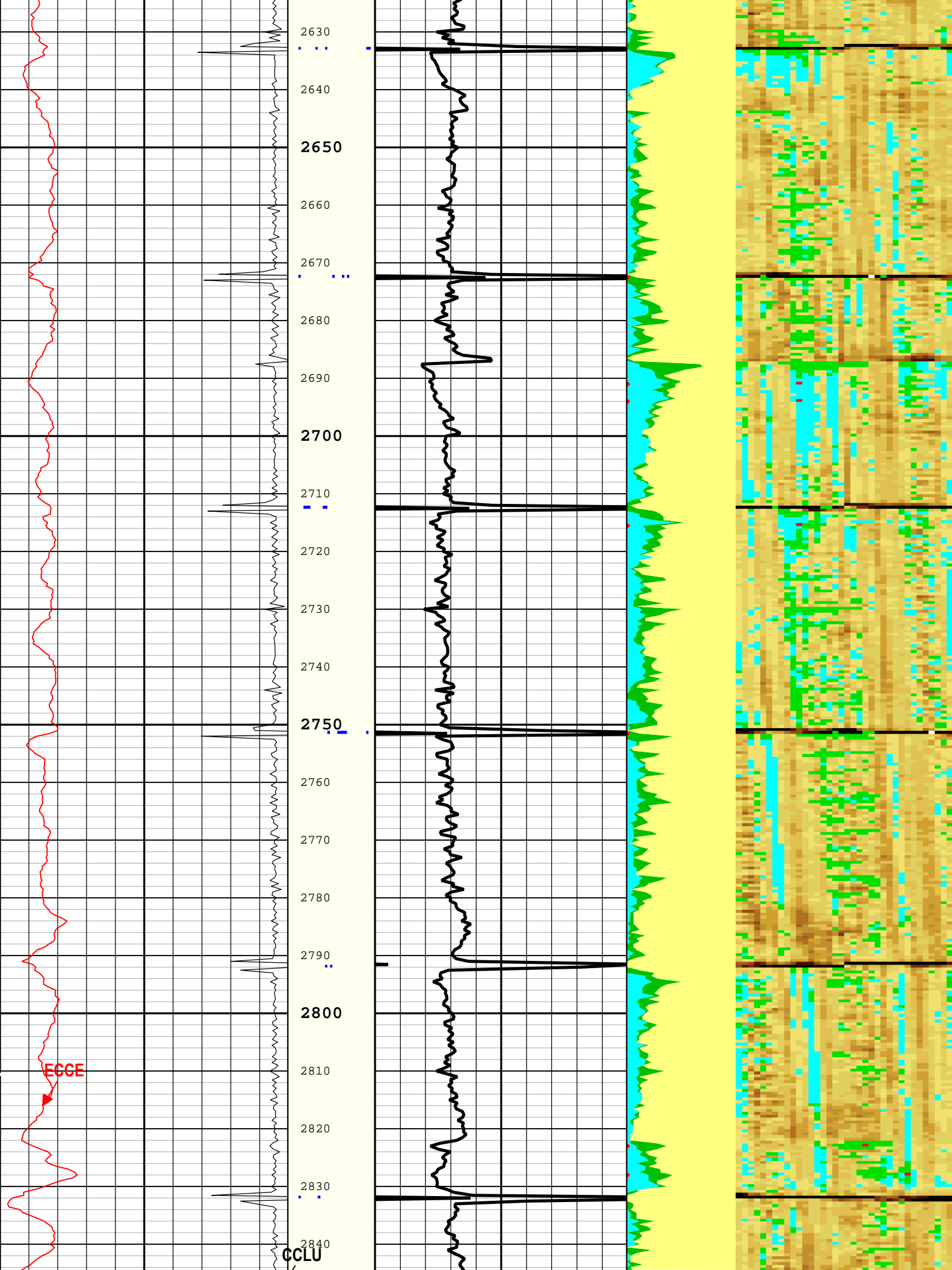


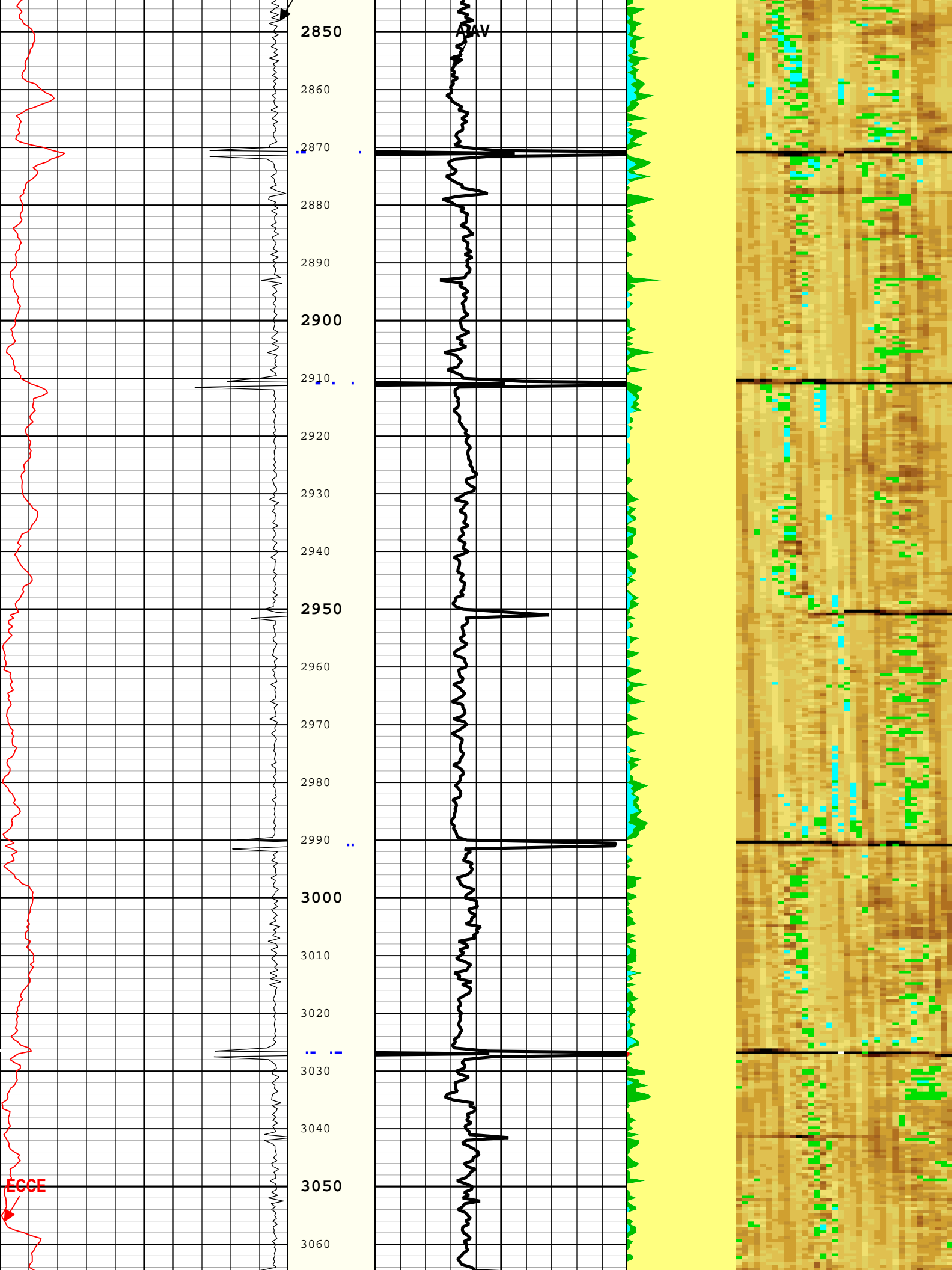


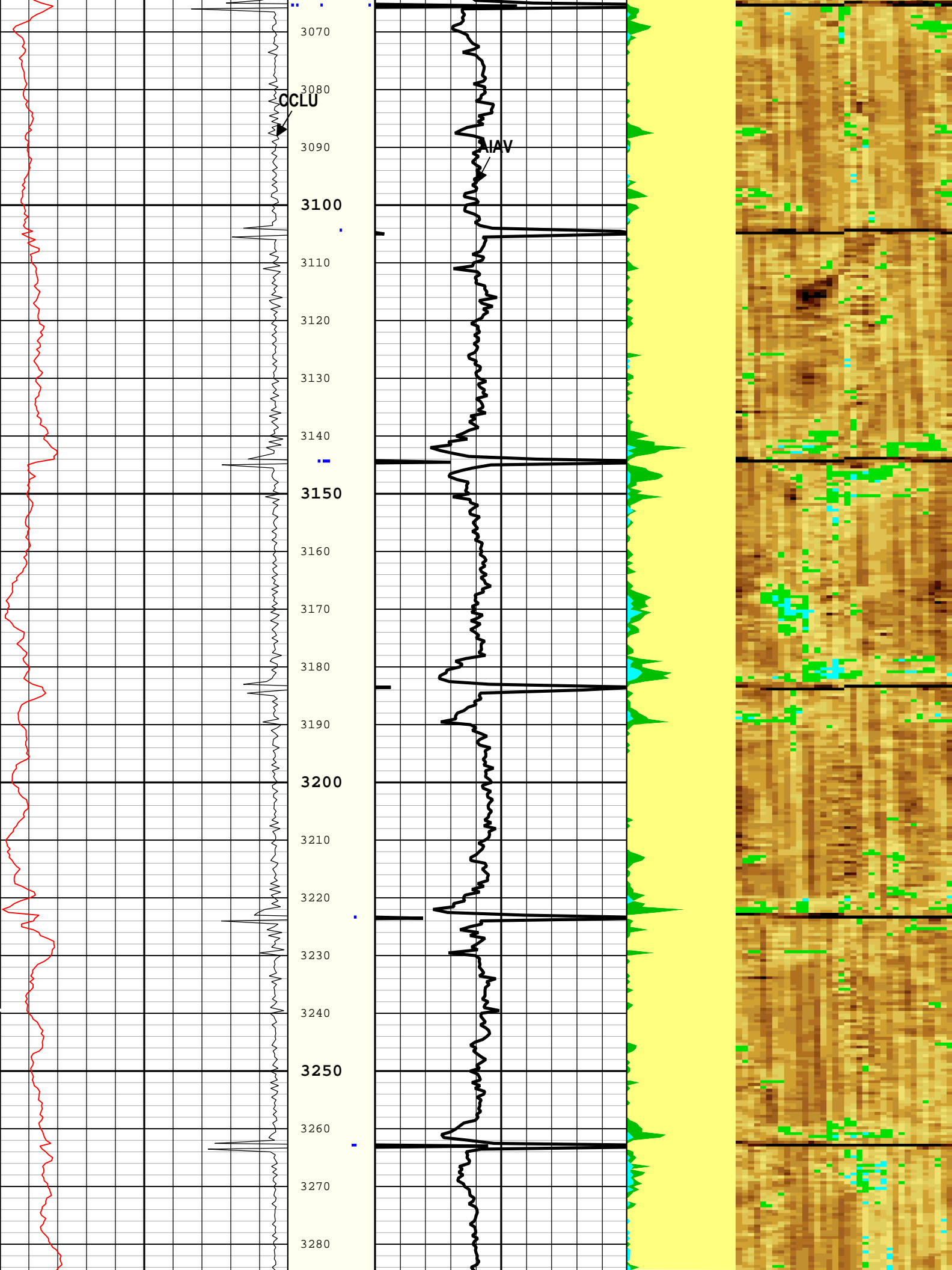


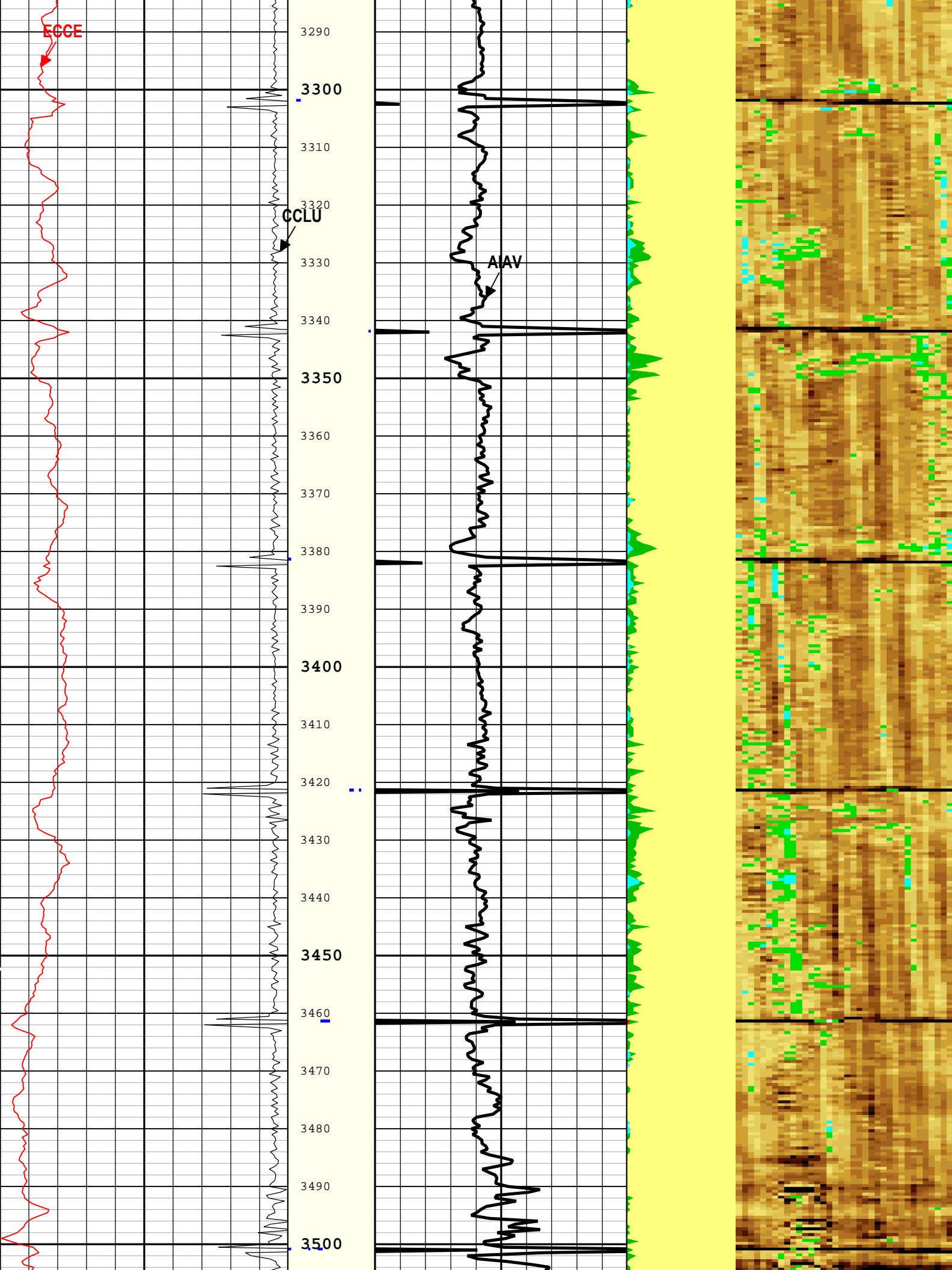


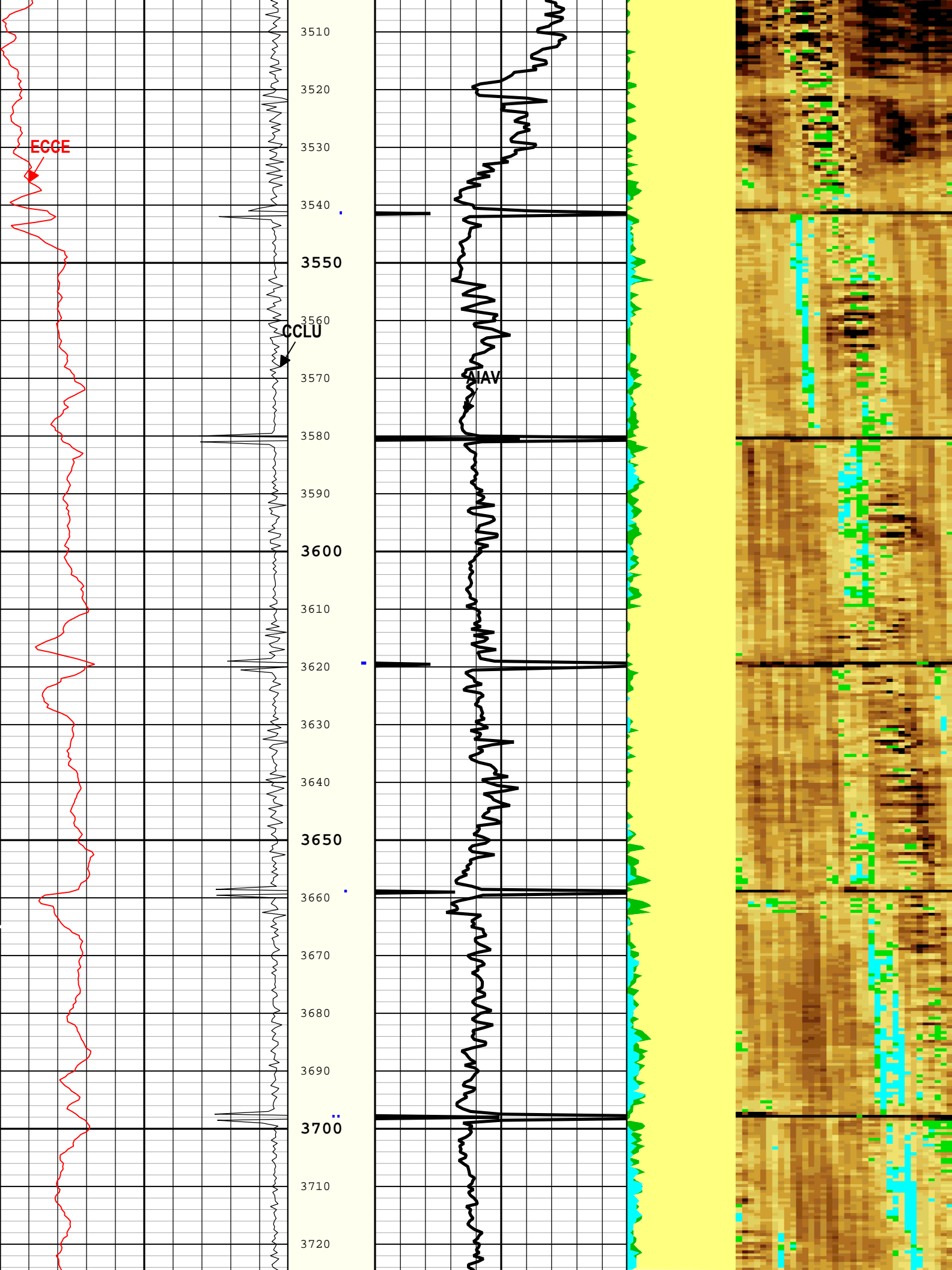


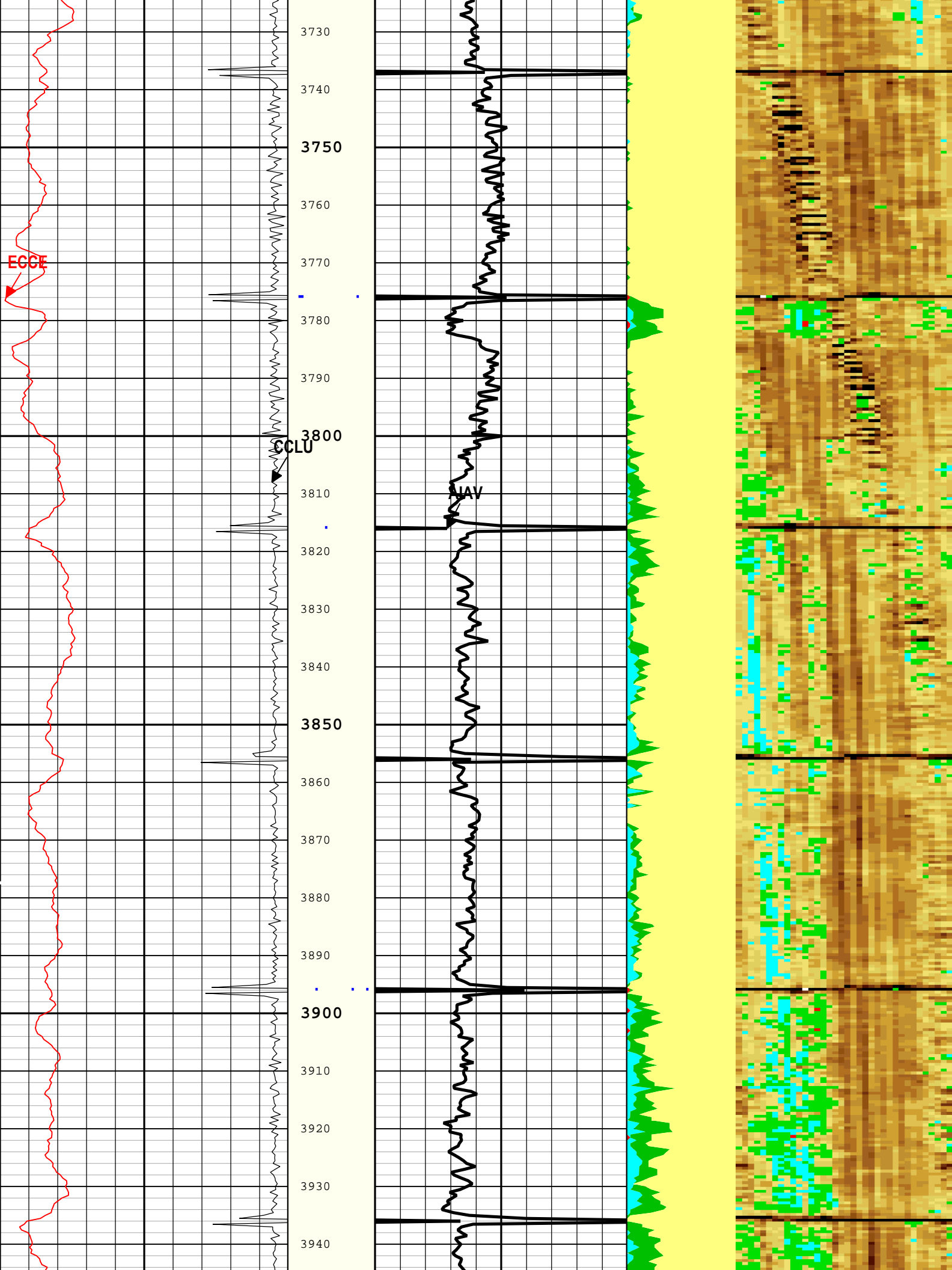


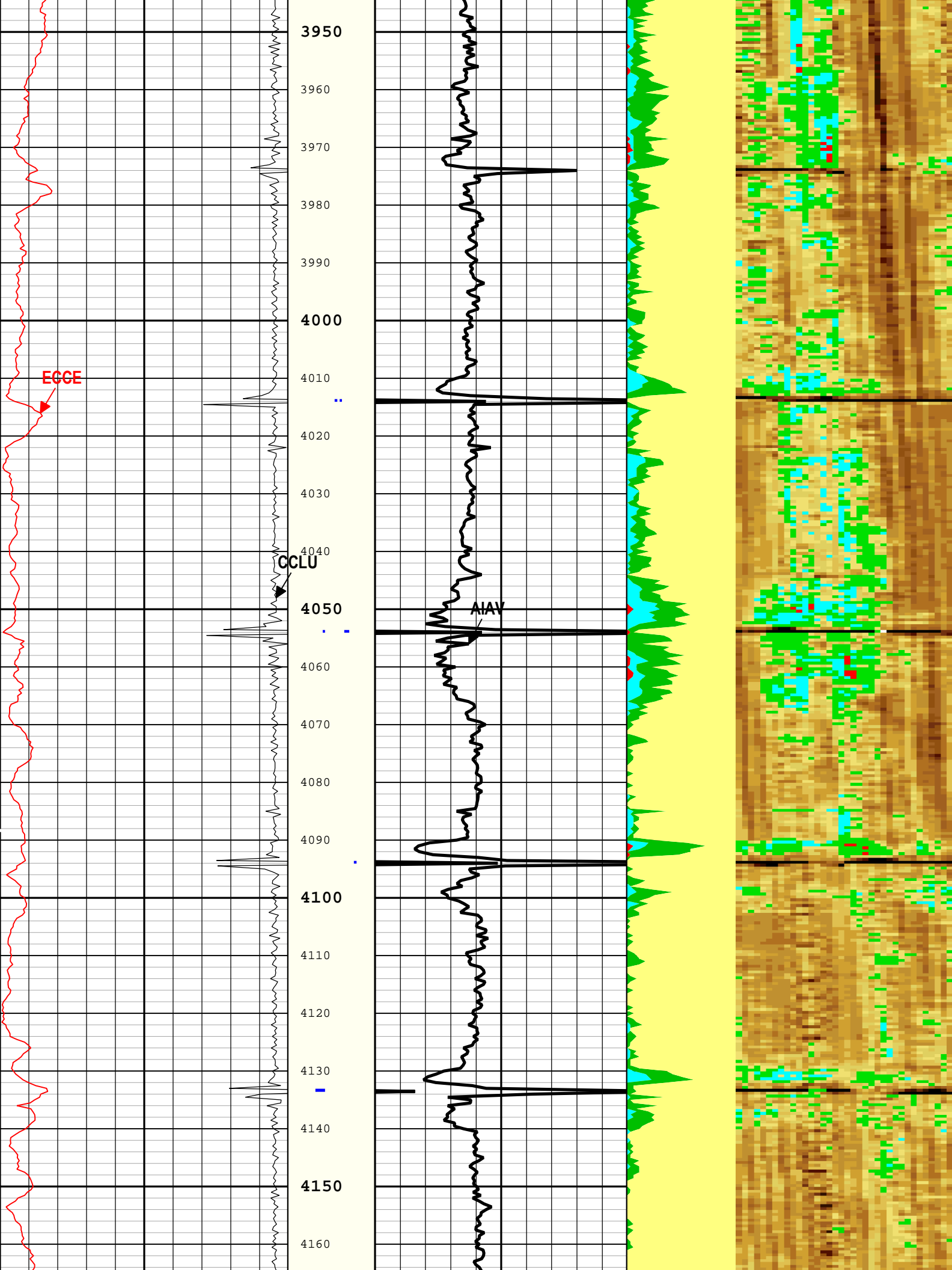


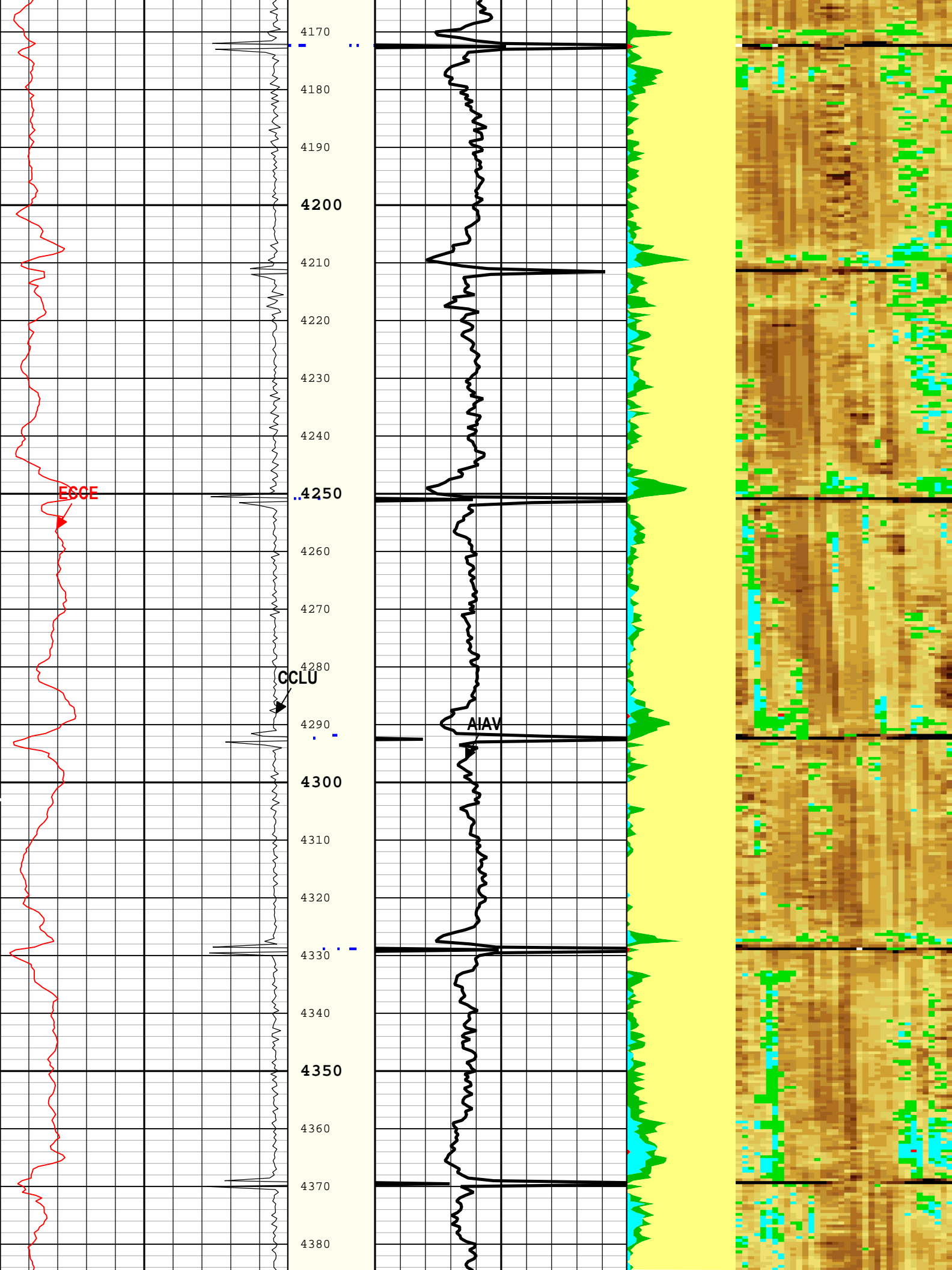


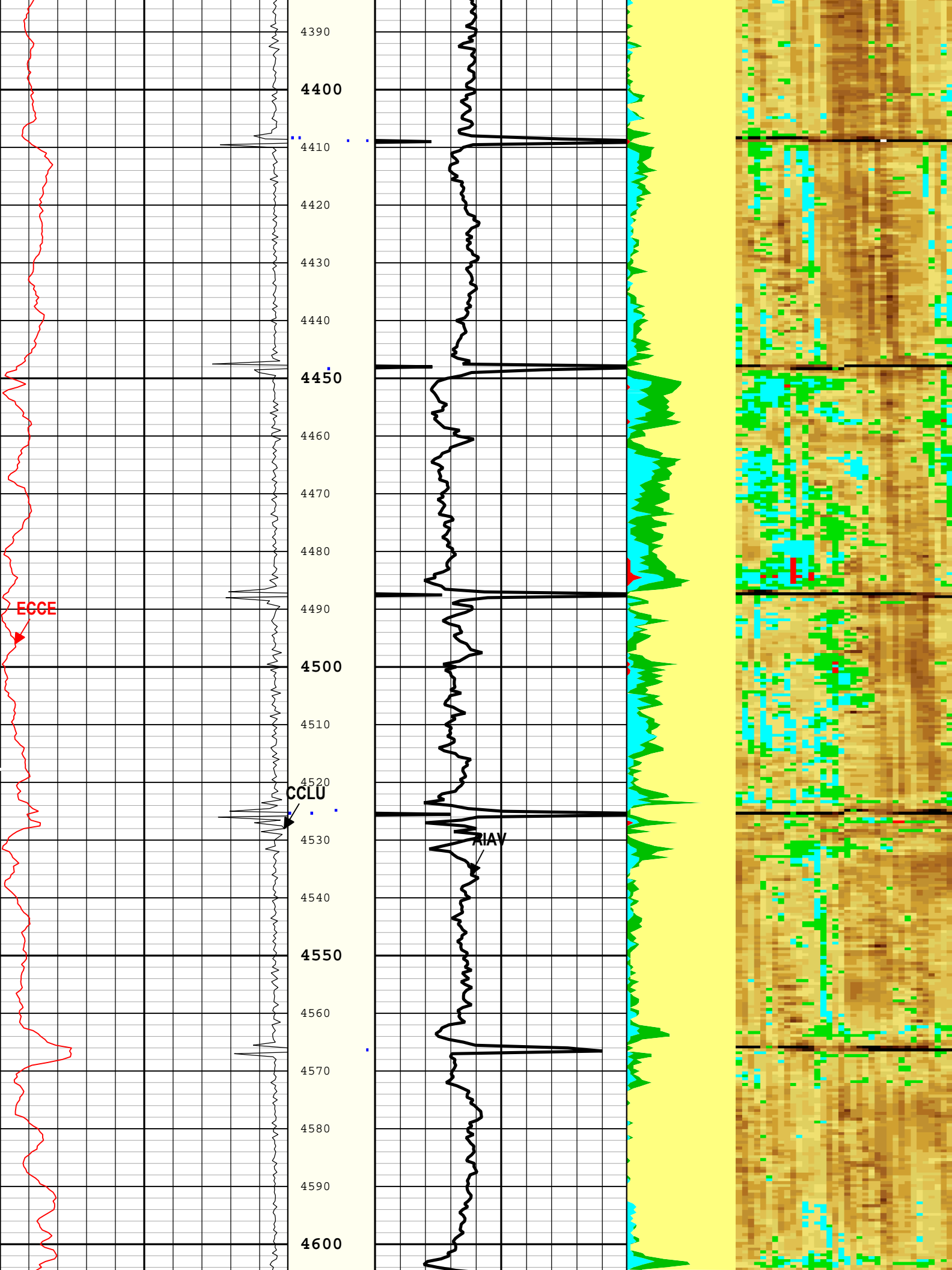


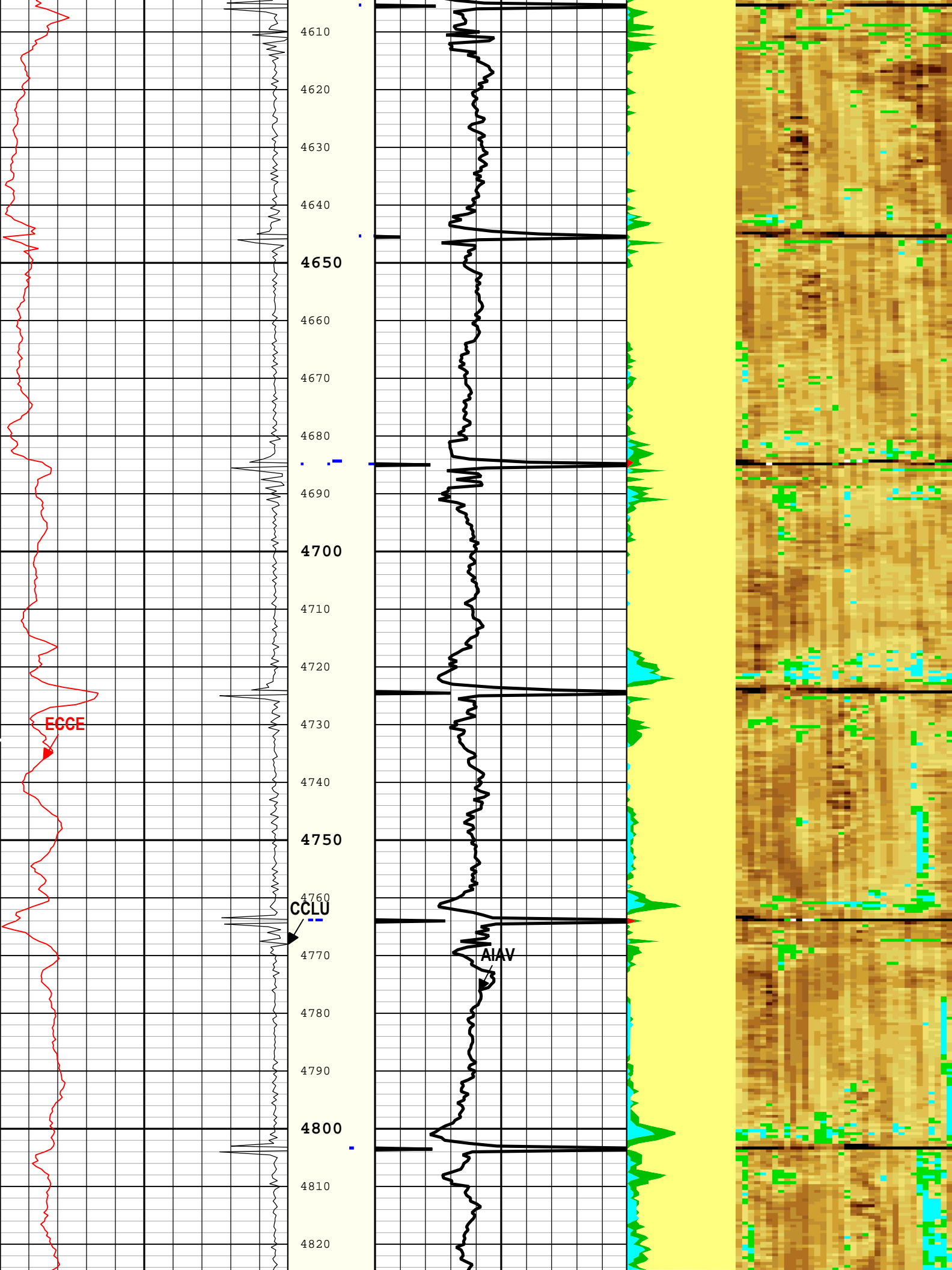


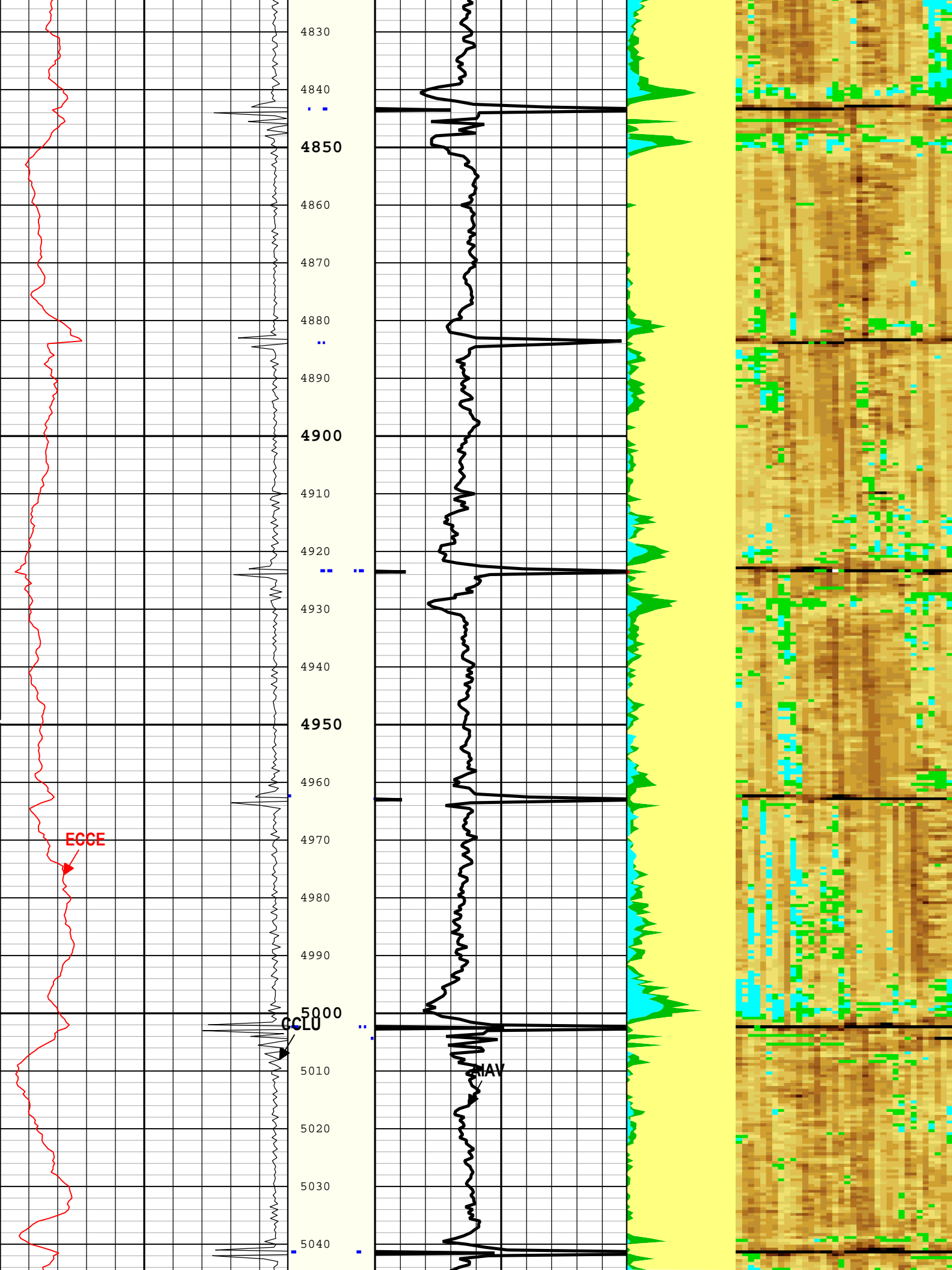


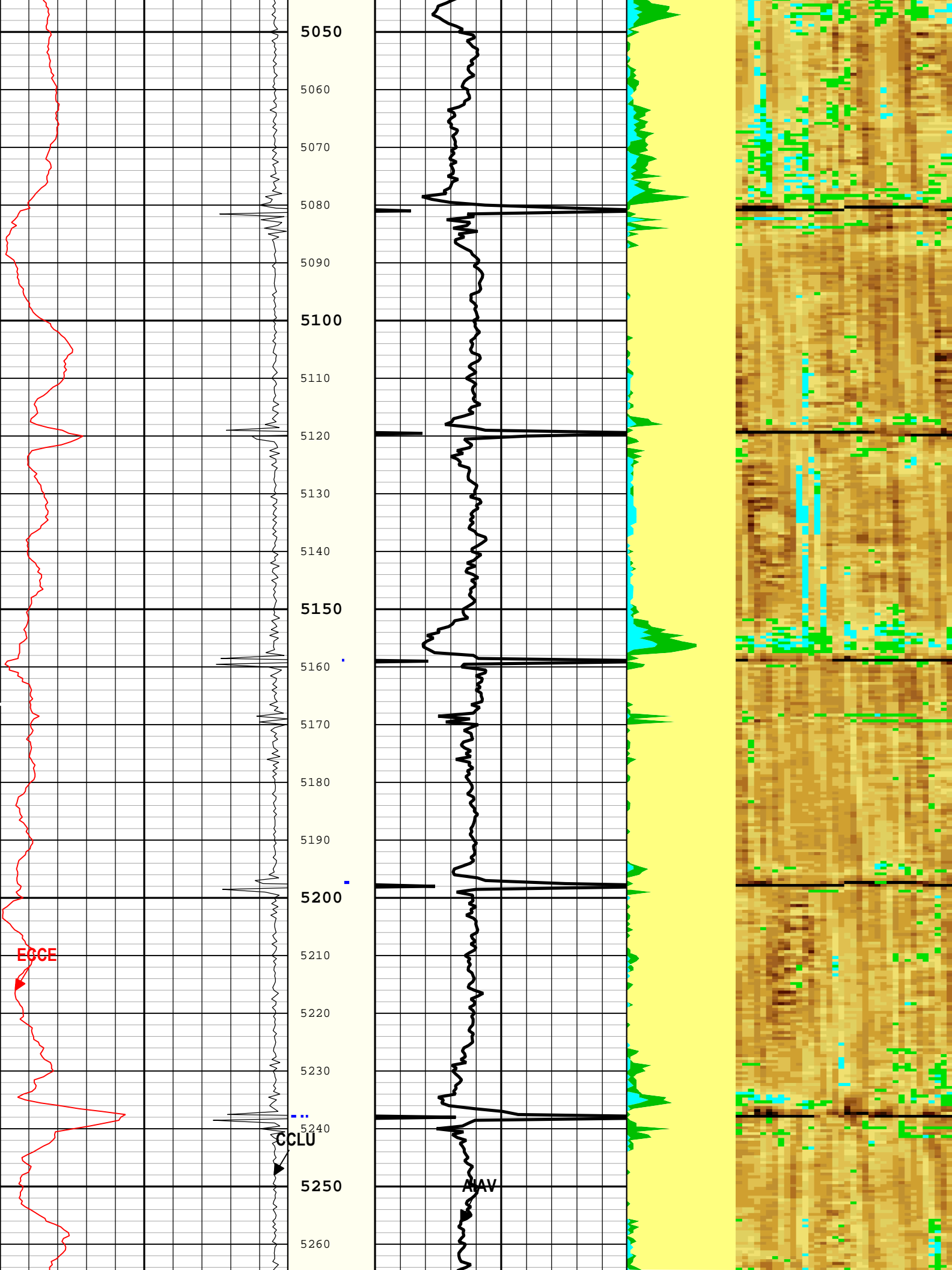


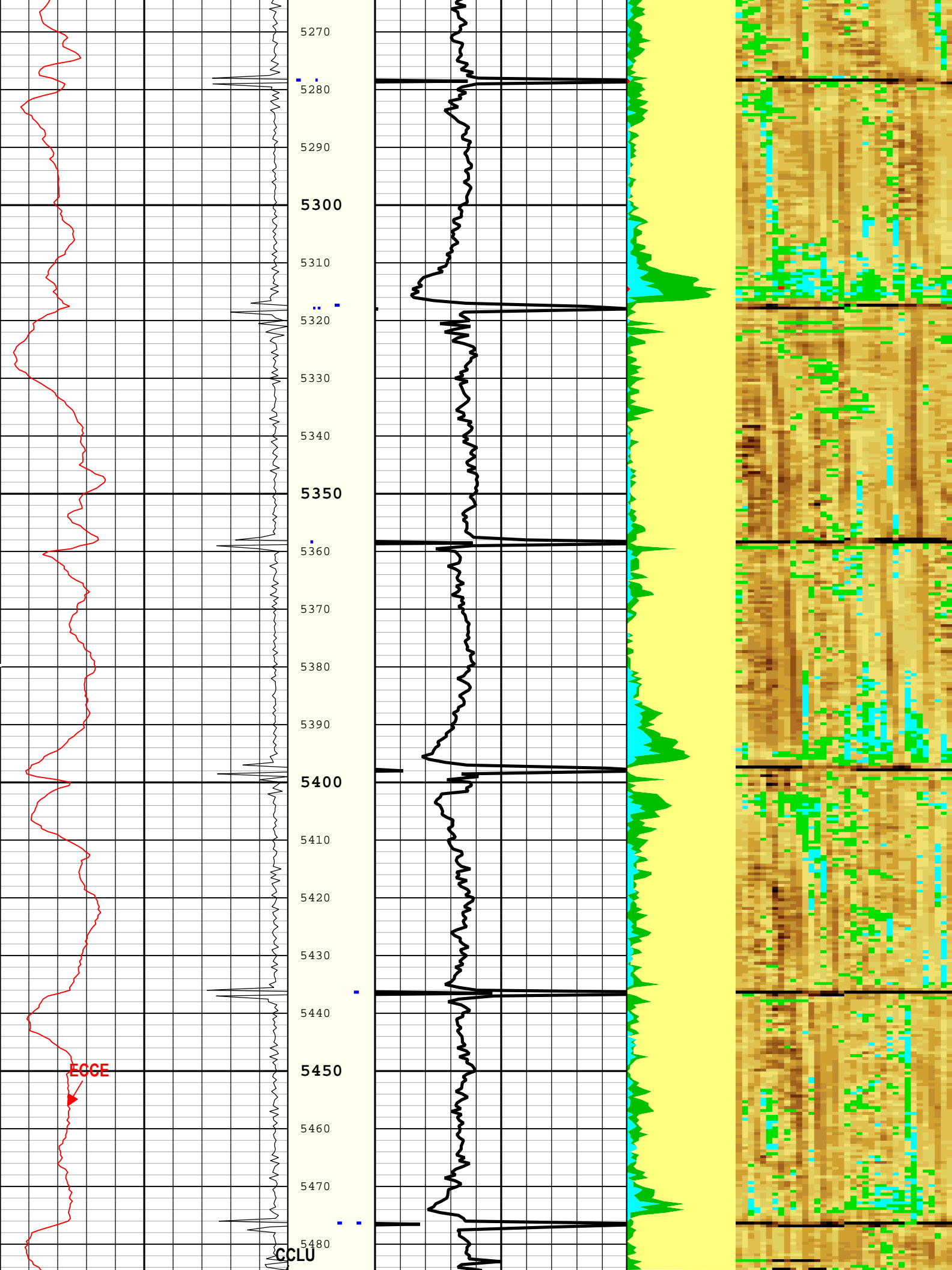


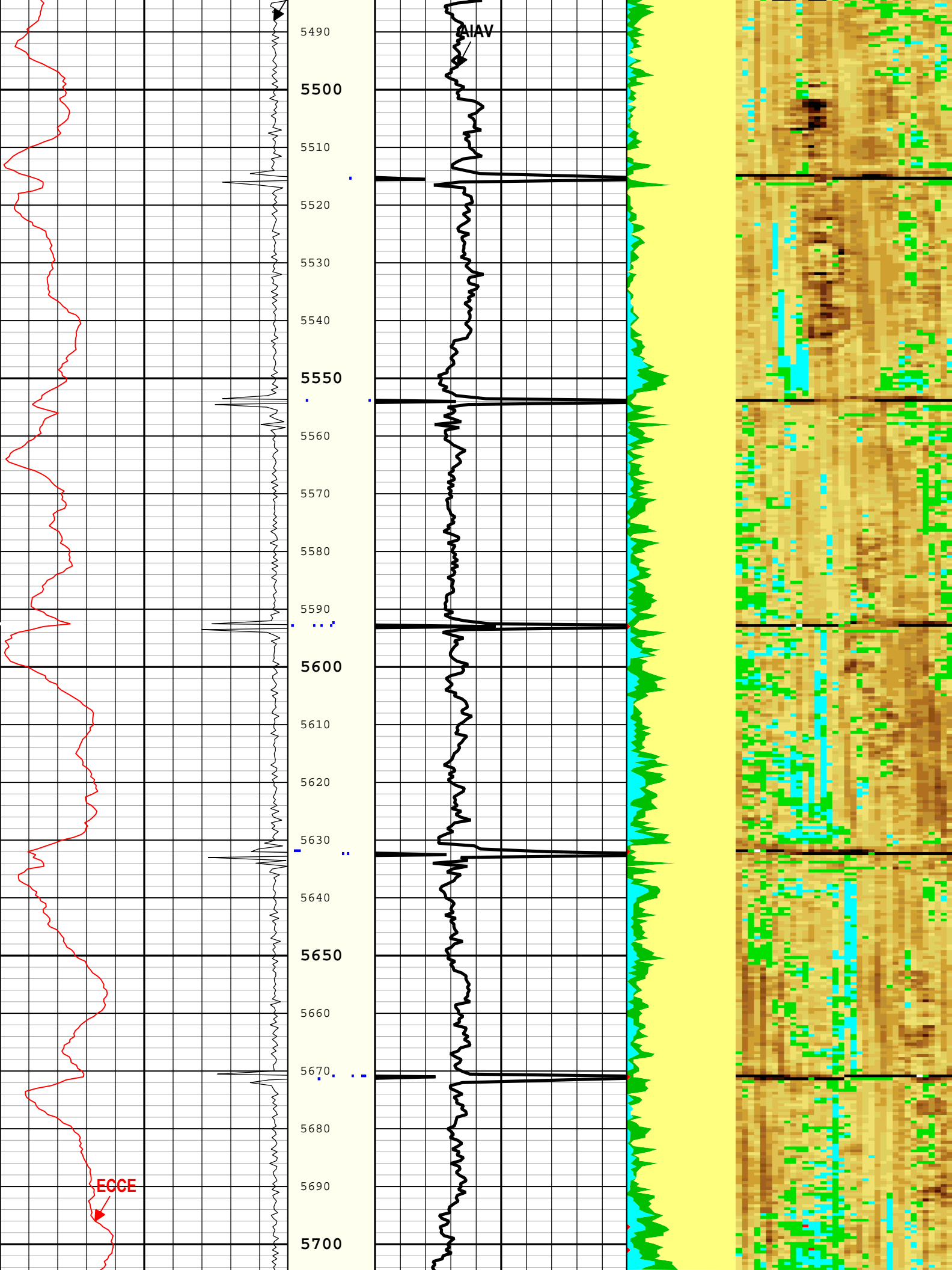


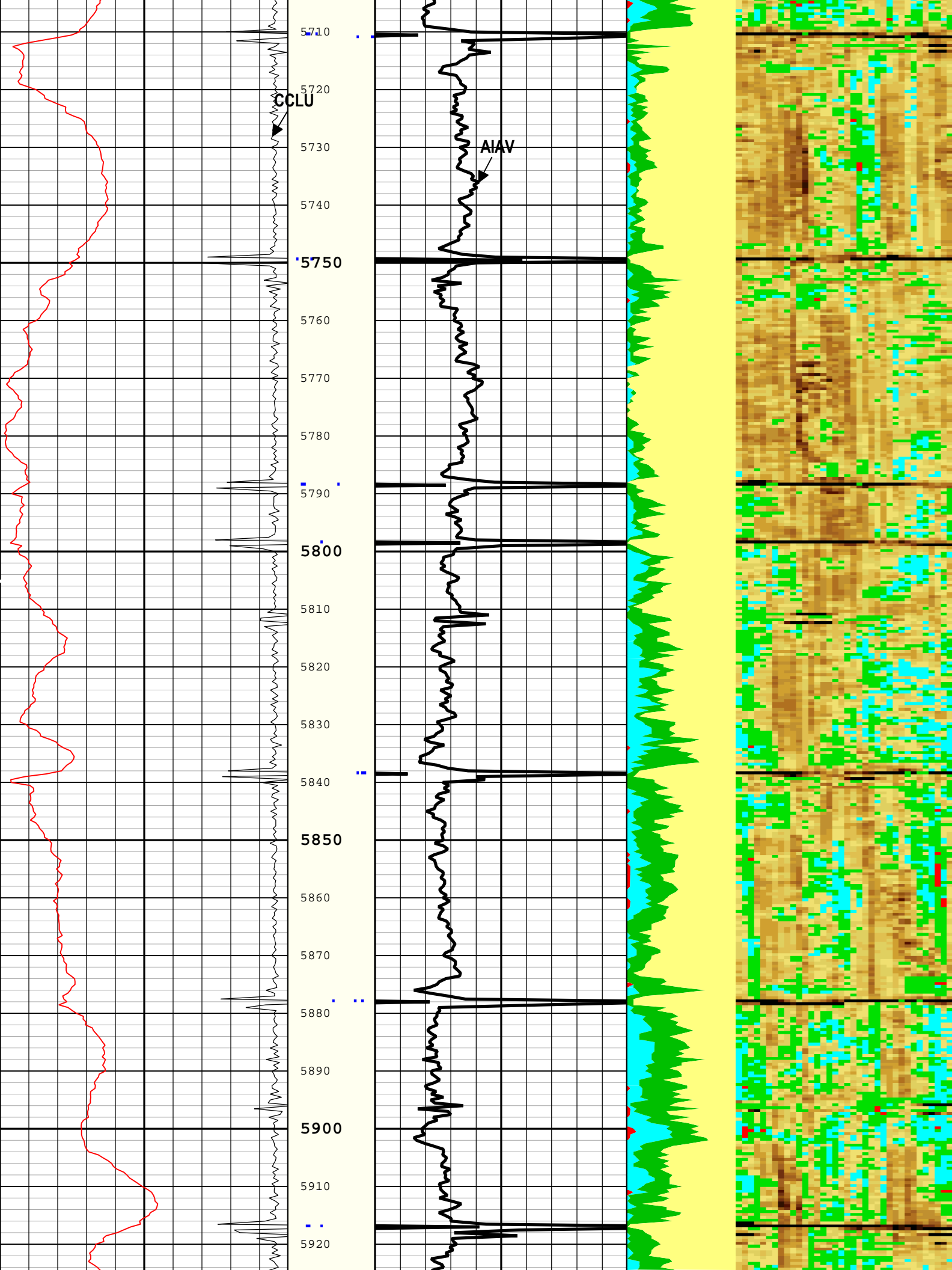


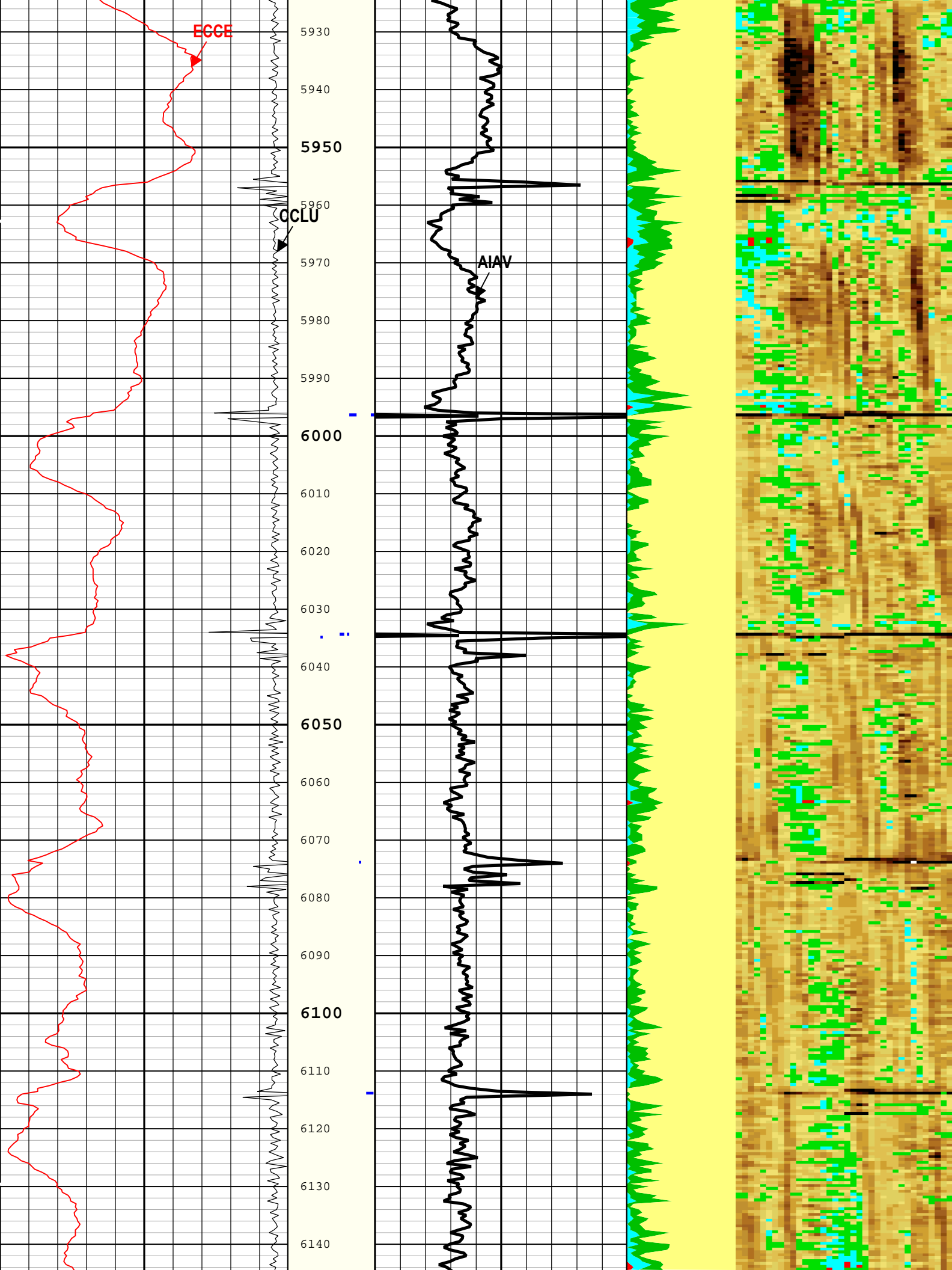


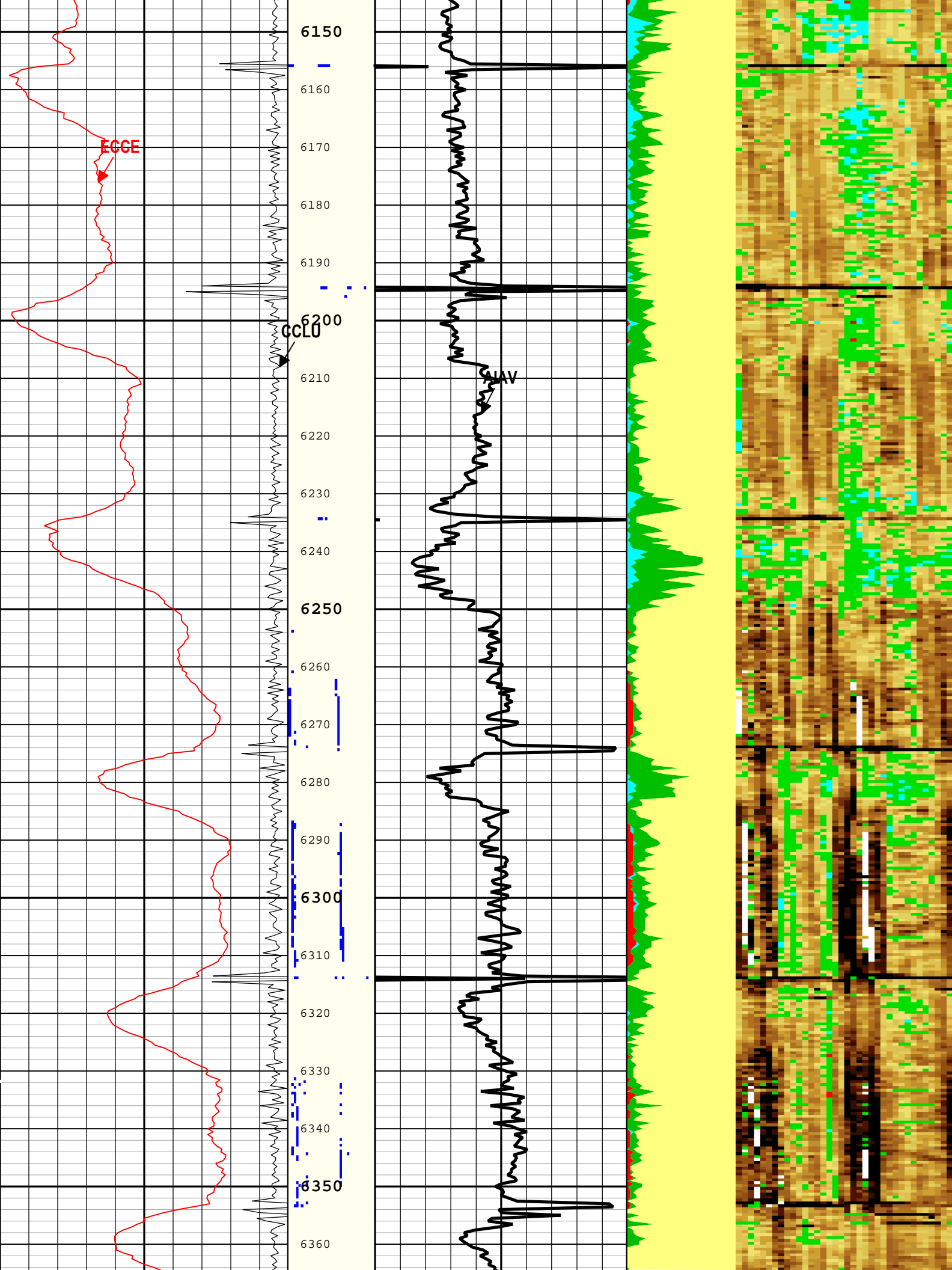


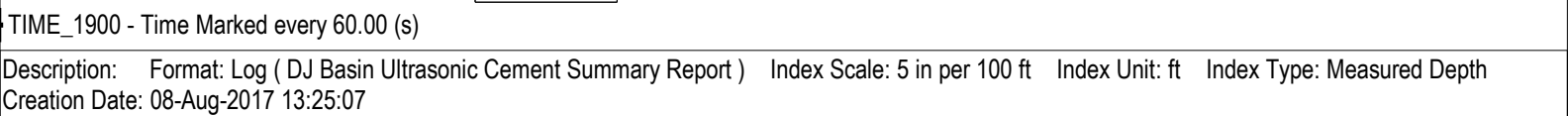












ONE: Parameters

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	1.04	
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	90	110
BS	13.5	110	1946
BS	8.5	1946	6444
MEAS_WLEN	22.44	90	6444
MEAS_WLEN	20	6444	6446.5

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	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	8000	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 14:10:17	07-Aug-2017 14:10:55	6447.05	6439.2
WINE	71.11	07-Aug-2017 14:10:55	07-Aug-2017 14:14:02	6439.2	5962.81
WINE	71.88	07-Aug-2017 14:14:02	07-Aug-2017 14:44:25	5962.81	172.49
WINE	74.18	07-Aug-2017 14:44:25	07-Aug-2017 14:47:47	172.49	62.57

All depth are at tool zero.

ONE

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP1	7.1.82245.3100

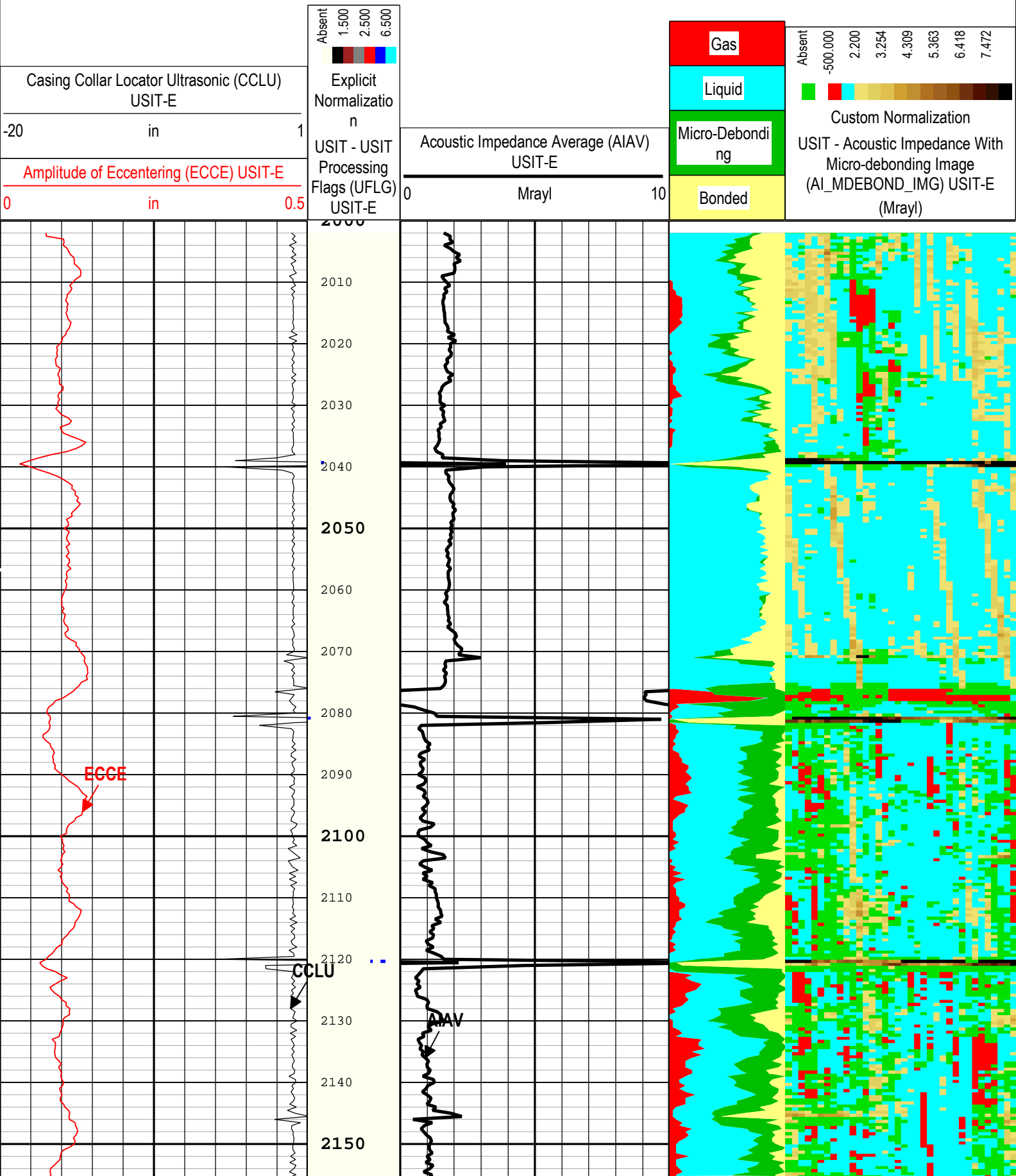
Pass Summary

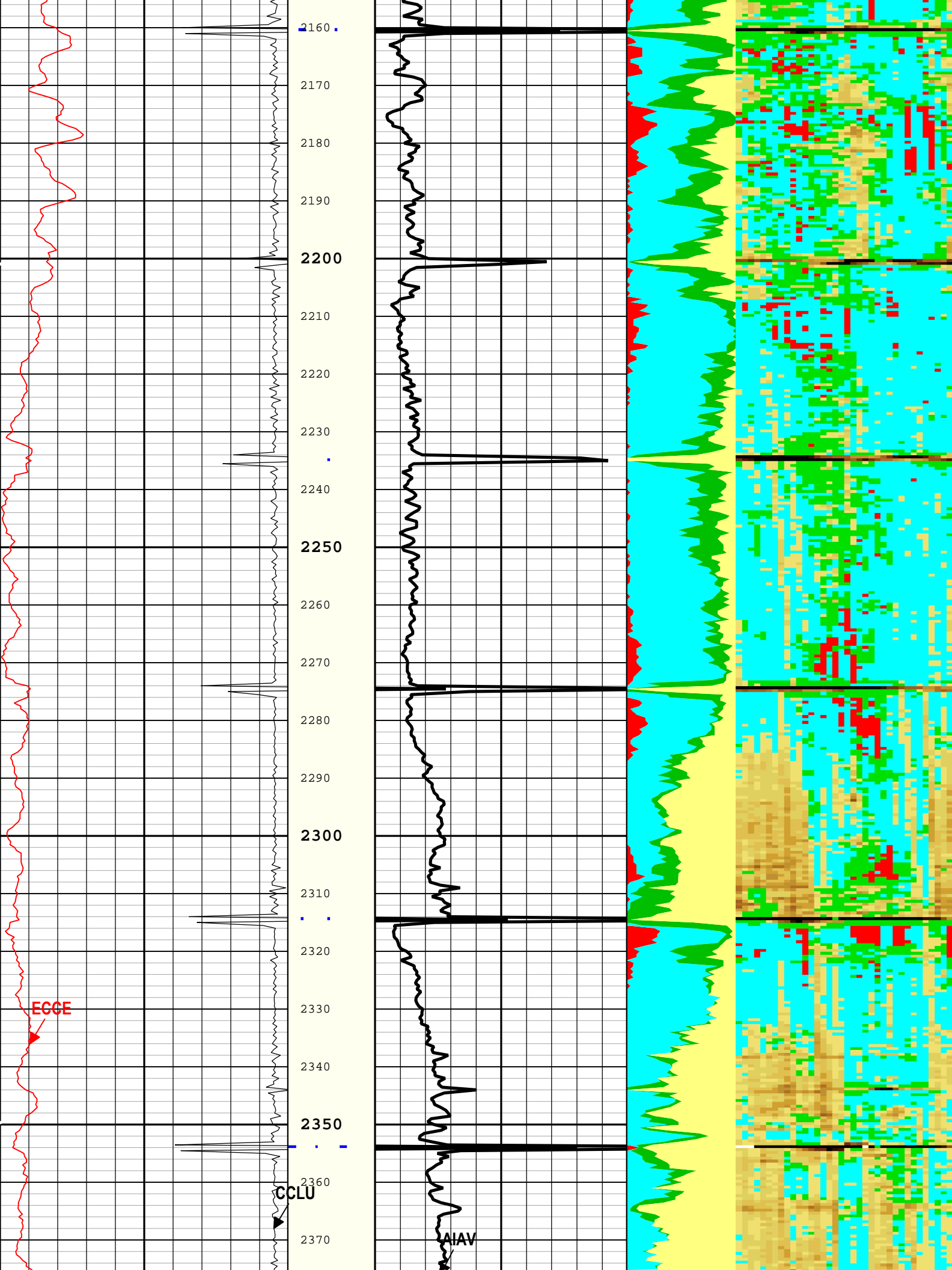
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[21]:Ln	Ln	2002.08 ft	2535.03 ft	07-Aug-2017	07-Aug-2017	ON	2.05 ft	Yes

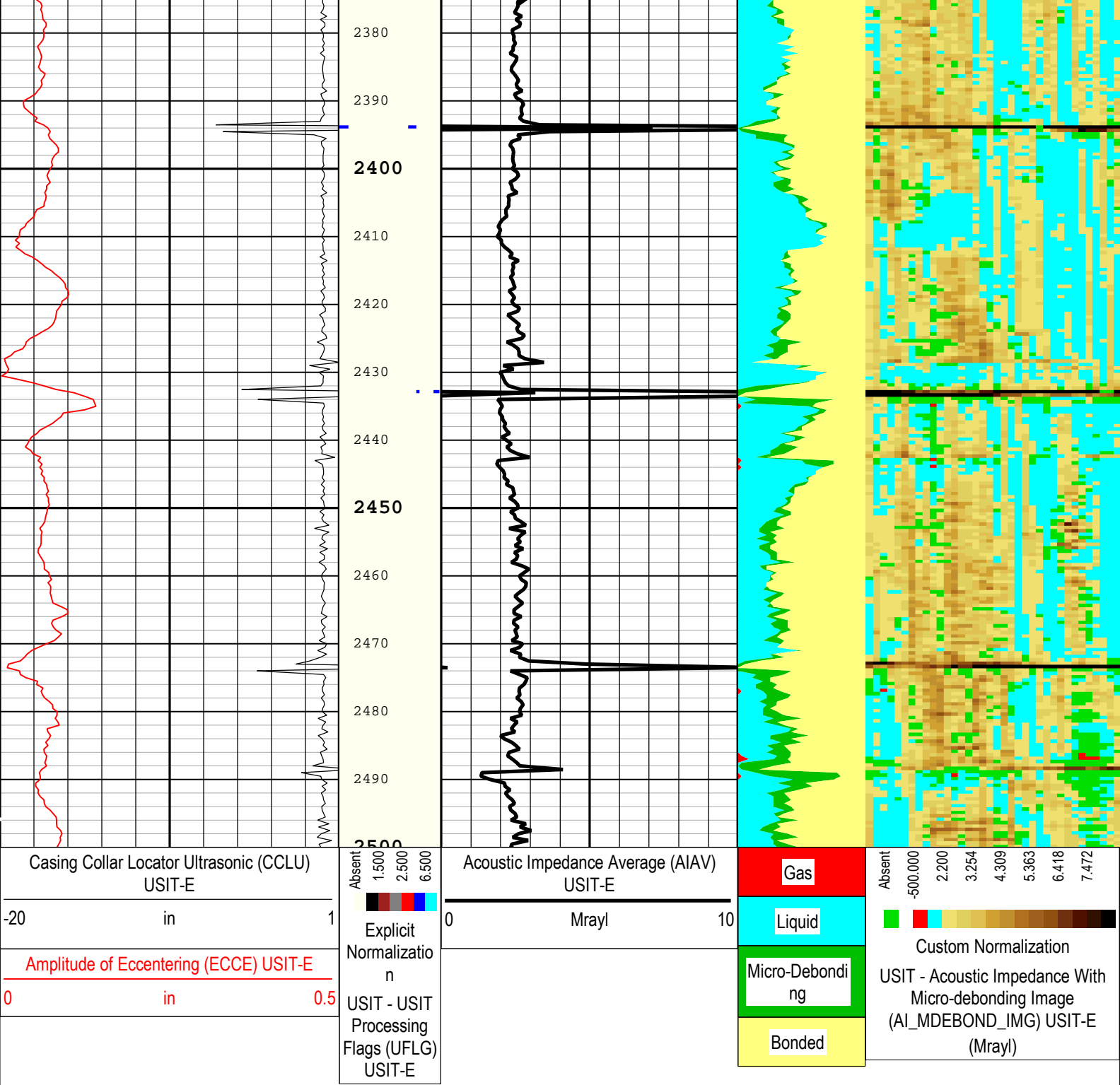
All depths are referenced to toolstring zero

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 13:25:15

TIME_1900 - Time Marked every 60.00 (s)







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 13:25:15

Channel Processing Parameters				
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	1.04	
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

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

XYZ

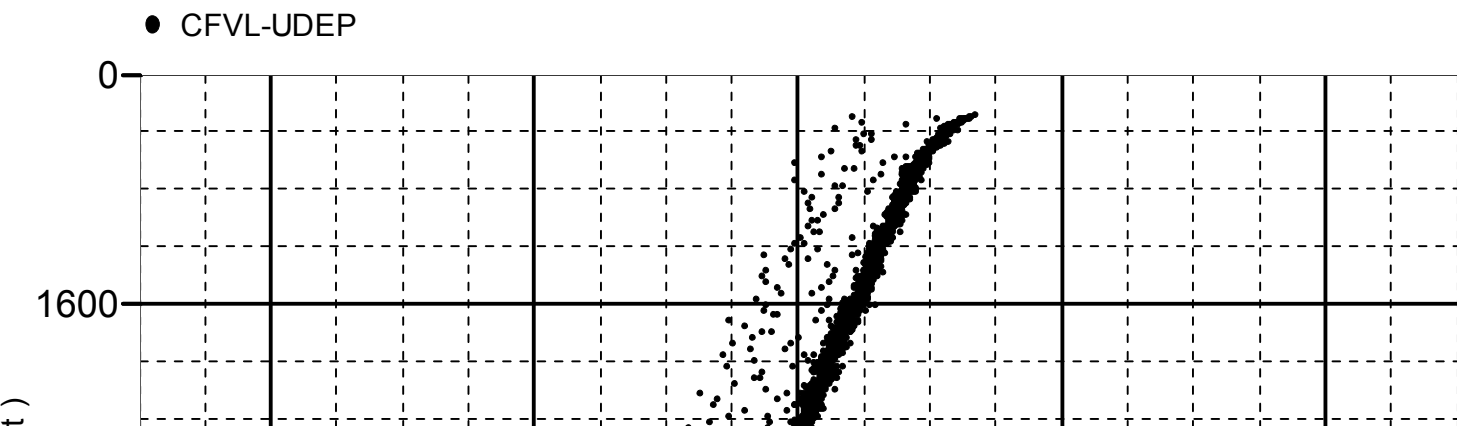
Company:Noble Energy Inc. Well:Wells Ranch AF07-666

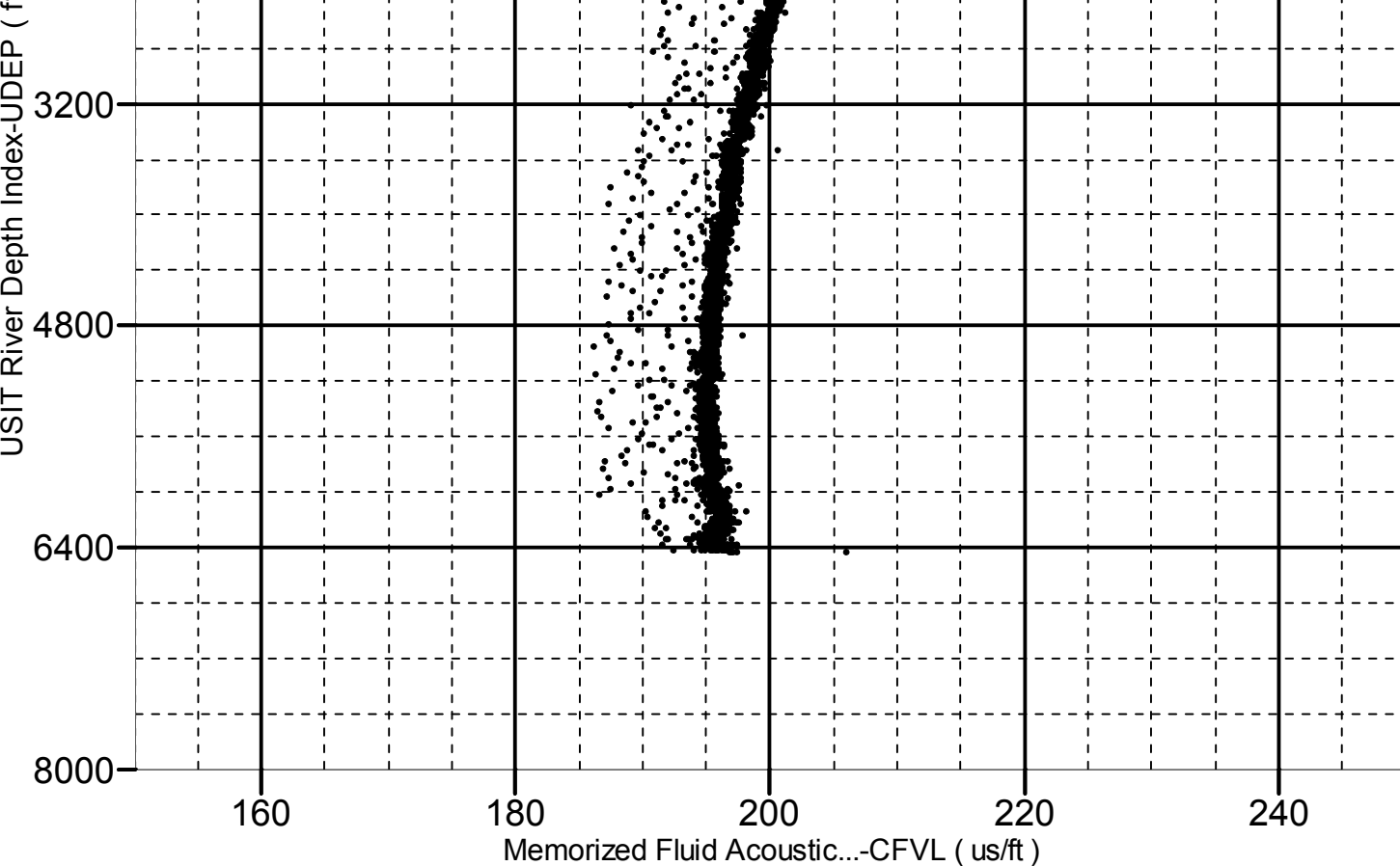
ONE: Log[4]:Up:S009

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6446.50 to 90.00 ft

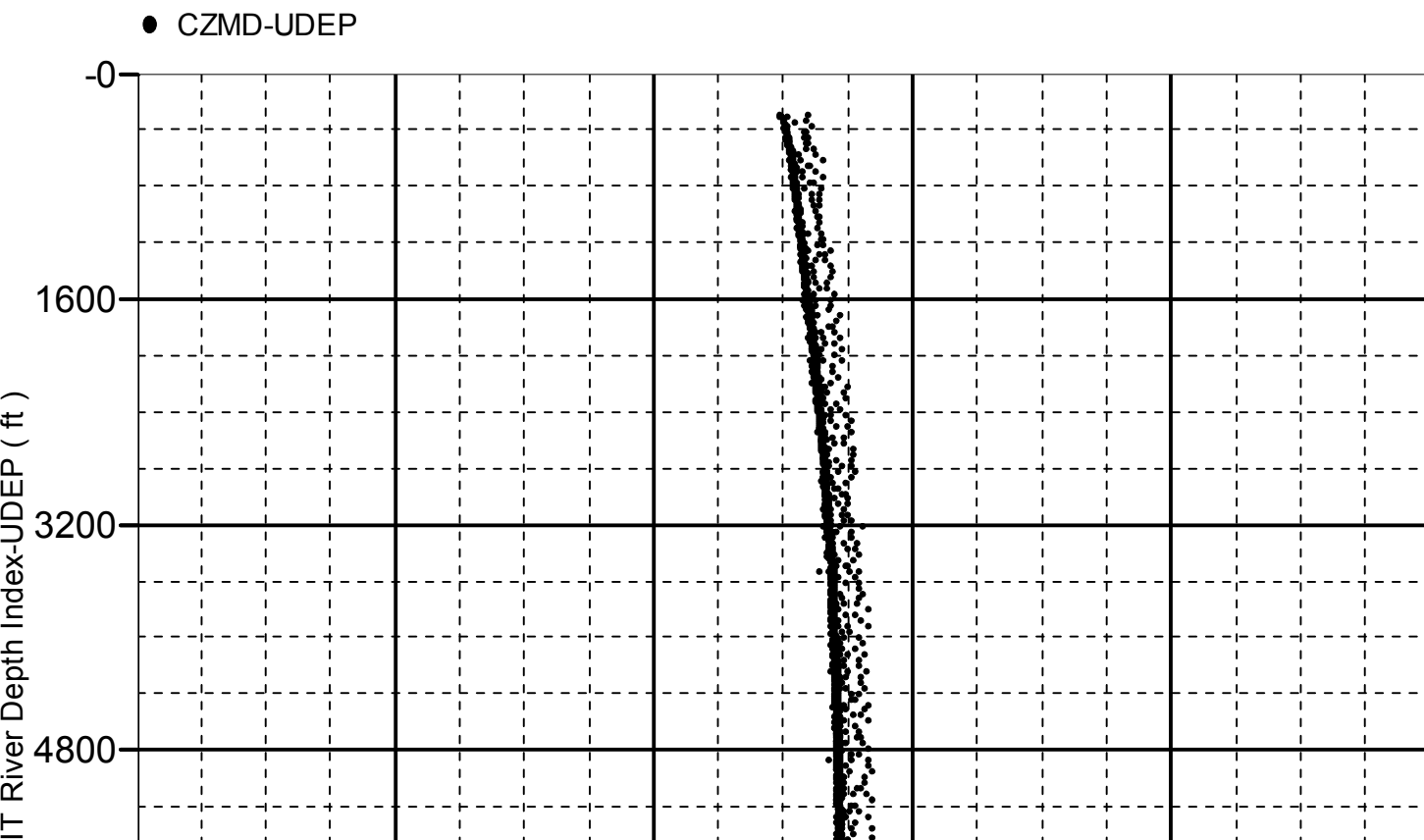


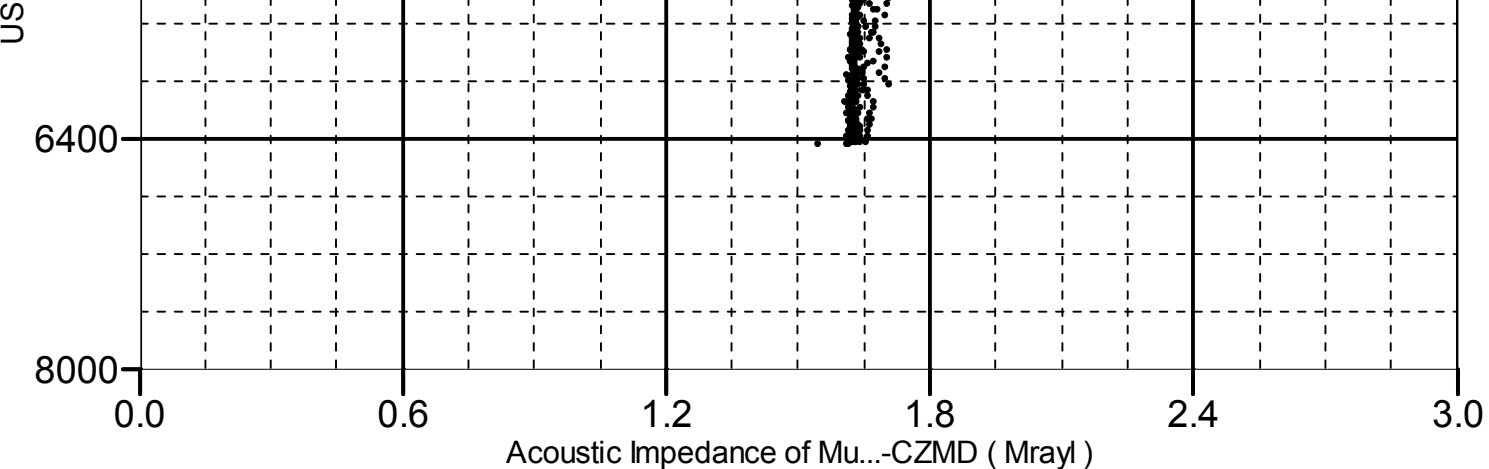


Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6446.50 to 90.00 ft





Calibration Report

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):

13:23:01 07-Aug-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.19	31.53	32.13	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.	
Well:	Wells Ranch AF07-666	
Field:	Wattenberg	
County:	WELD	
State:	Colorado	

