

Company: Noble Energy Inc

Well: Wells Ranch BB09-665

Field: Wattenberg

County: Weld State: Colorado

UltraSonic Summary Print

County: Weld  
Field: Wattenberg  
Location: NWNW  
Well: Wells Ranch BB09-665  
Company: Noble Energy Inc

Location:		Elev.:		K.B.	
NWNW		675 FNL & 235 FWL		4745.00 ft	
Lat/Long: 40.41933/-104.41268		G.L.		4715.00 ft	
Permanent Datum:		Ground Level		4715.00 f	
Log Measured From:		Kelly Bushing		30.00 ft	
Drilling Measured From:		Kelly Bushing		above Perm.Datum	
API Serial No.	Section:	Township:		Range:	
05-123-44967	11	5N		63W	

Logging Date 02-Mar-2019

Run Number 1A

Depth Driller 17087.00 ft

Schlumberger Depth 17087.00 ft

Bottom Log Interval 6515.00 ft

Top Log Interval 100.00 ft

Casing Fluid Type Calcium Chloride Brine

Salinity

Density 8.4 lbm/gal

Fluid Level 0.00 ft

BIT/CASING/TUBING STRING

Bit Size 8.50 in

From 9519.00 ft

To 17087.00 ft

Casing/Tubing Size 5.5 in

Weight 20 lbm/ft

Grade N/A

From 0.00 ft

To 17063.00 ft

Max Recorded Temperatures 216 degF

Logger on Bottom 02-Mar-2019 11:35:00

Unit Number 2143 Location: Fort Morgan

Recorded By Evan Grzecki

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.

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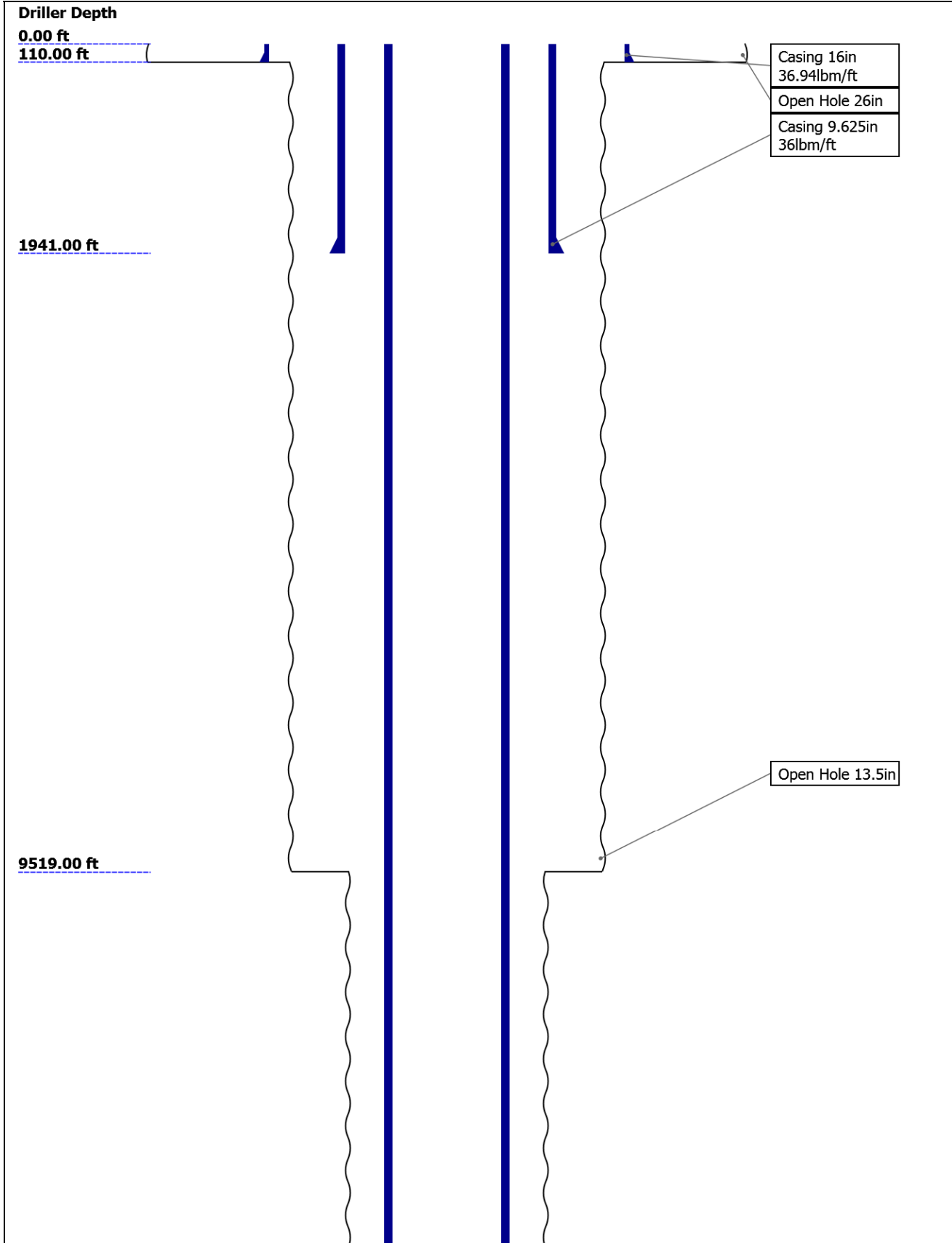
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Well Sketch



17063.00 ft

17087.00 ft


Casing 5.5in  
20lbm/ft

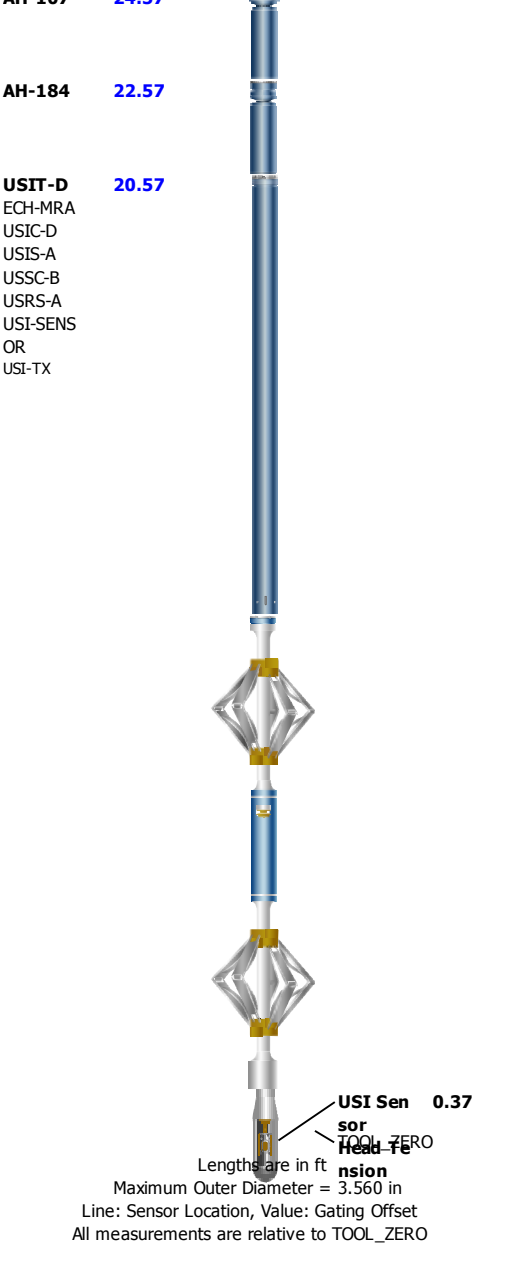
Open Hole 8.5in

Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	26	13.5	8.5			
Top Driller ( ft )	0	110	9519			
Top Logger ( ft )	0	110	9519			
Bottom Driller ( ft )	110	9519	17087			
Bottom Logger ( ft )	110	9519	17087			
Casing						
Size ( in )	16	9.625	5.5			
Weight ( lbm/ft )	36.94	36	20			
Inner Diameter ( in )	15.572	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller ( ft )	0	0	0			
Top Logger ( ft )	0	0	0			
Bottom Driller ( ft )	110	1941	17063			
Bottom Logger ( ft )	110	1941	17063			

Remarks and Equipment Summary

1A: Toolstring				1A: Remarks	
<div><div><div>Equip name</div><div>Length</div><div>MP name</div><div>Offset</div></div><div><div>LEH-QT</div><div>40.47</div><div>LEH-QT</div></div><div><div>DTC-H</div><div>36.98</div><div>ECH-KC</div><div>DTC-H</div></div><div><div>HGNS-B</div><div>33.98</div><div>HGNH</div><div>NSR-F:5070</div><div>NPV-N</div><div>HMCA-B</div><div>HGNS-B</div><div>HACCZ-B:5118</div></div><div><div>AH-107</div><div>24.57</div></div></div> <div></div> <div><div>CNLPorosity</div><div>26.91</div></div> <div><div>HGNS</div><div>24.57</div></div> <div><div>HMCA</div><div>24.57</div></div> <div><div>Accelerometer</div><div>0.00</div></div>	Thank you for choosing Schlumberger!				
	Log run for cement evaluation				
	Toolstring run centralized using USIS centralizers and knuckles				
	USRS-A sub run with USI-TX transducer				
	Main Pass logged under 2500psi; Repeat Pass logged under 0psi				
	Log correlated to downlog				
	Crew: Tim Ludgate, Claude Walz				
	Production Casing Cement: 13.2ppg slurry and 11.5 ppg spacer				
	BHT: 216 Deg F				
	TOC: ~3100'				



USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[4]:Up	6532.5	107.58

Fluid Velocity = "Automatic".  
CFVL equals DFSL channel

Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)
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Mud Impedance = "FreePipe Norm."  
Free Pipe normalization zone is : 45.77m(150.16ft) to 48.75m(159.95ft)  
MUD\_N\_FRP = 1.16  
DFD = 1.01g/cm3(8.40lbm/gal)  
CZMD median computed in free pipe normalization interval = 1.72 MRayl

Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
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1A

2500 PSI Main Pass

Software Version	
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Acquisition System	Version
Maxwell 2018 SP2	8.2.102758.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
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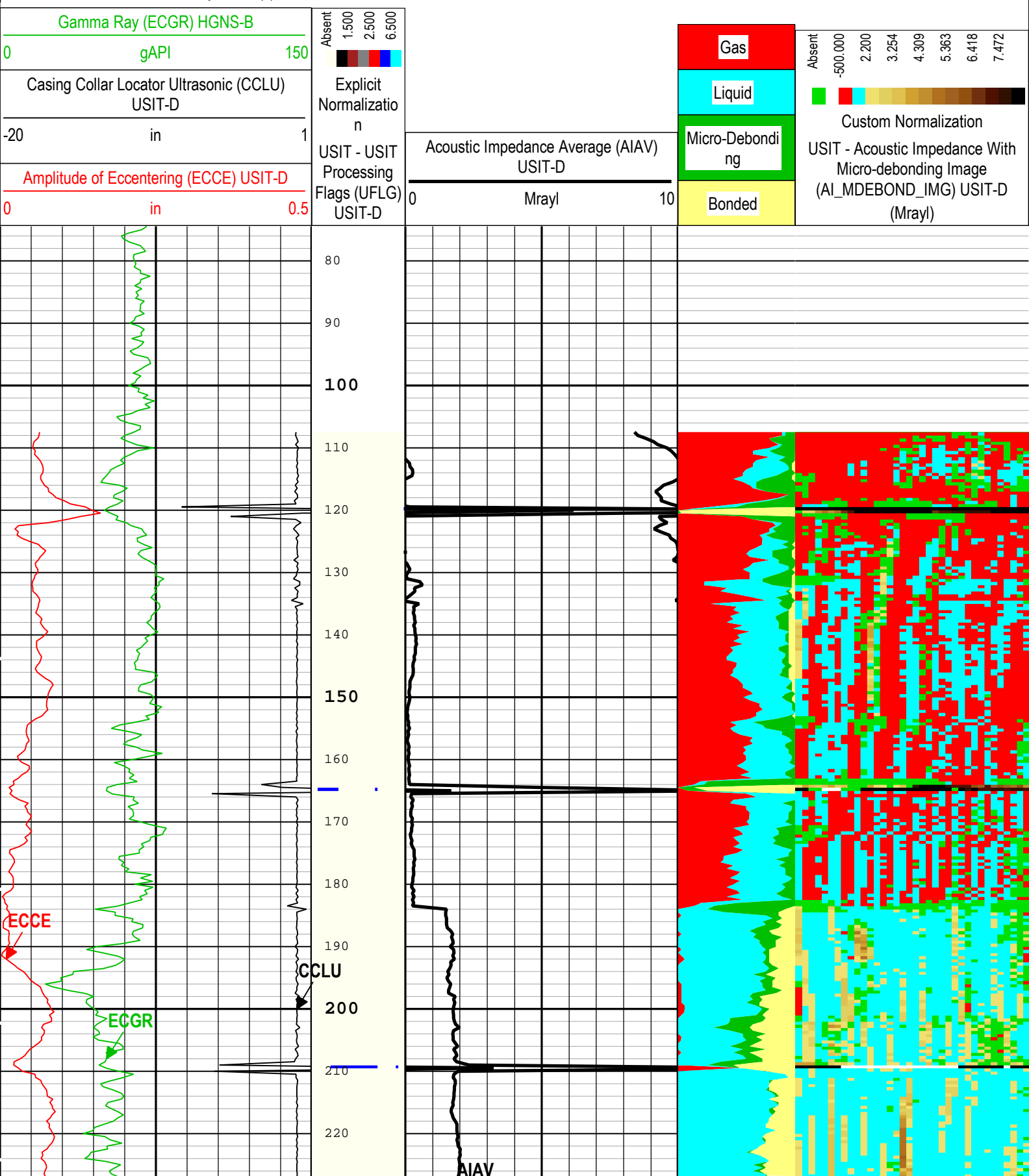
1A	Log[4]:Up	Up	107.58 ft	6532.50 ft	02-Mar-2019 11:34:59 AM	02-Mar-2019 12:19:59 PM	ON	2.86 ft	Yes
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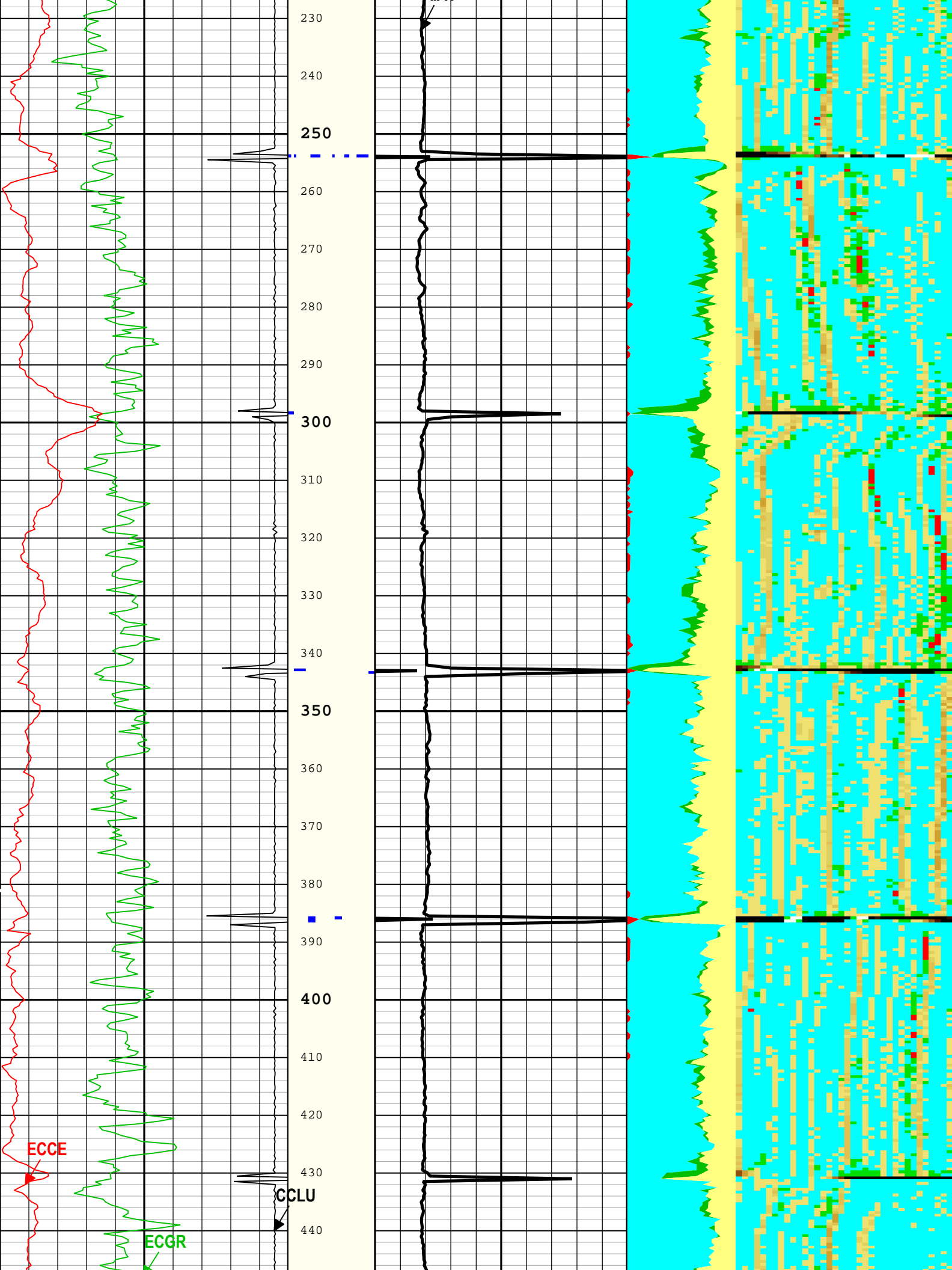
All depths are referenced to toolstring zero

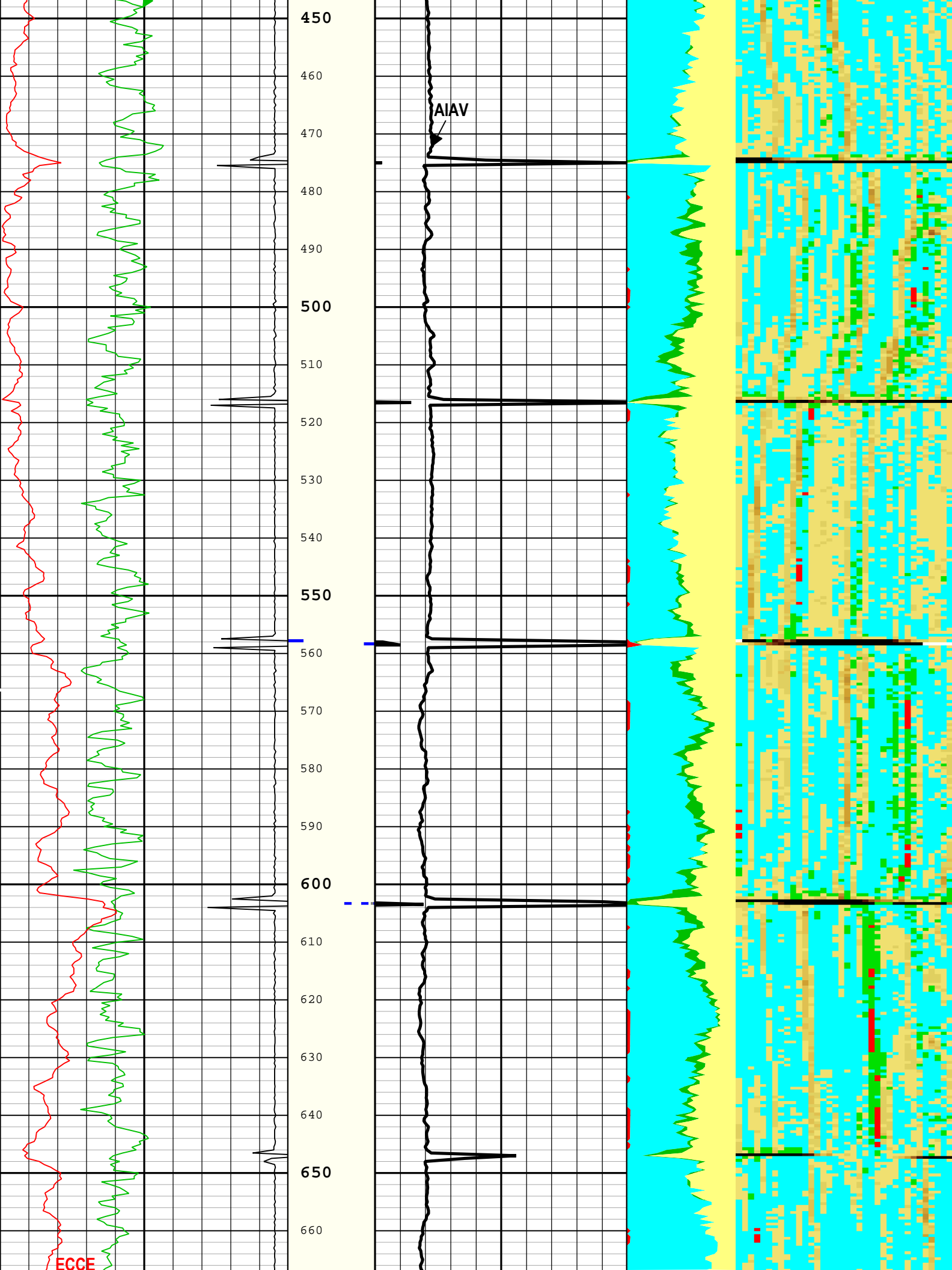
Log	Company:Noble Energy Inc	Well:Wells Ranch BB09-665
		1A: Log[4]:Up:S003

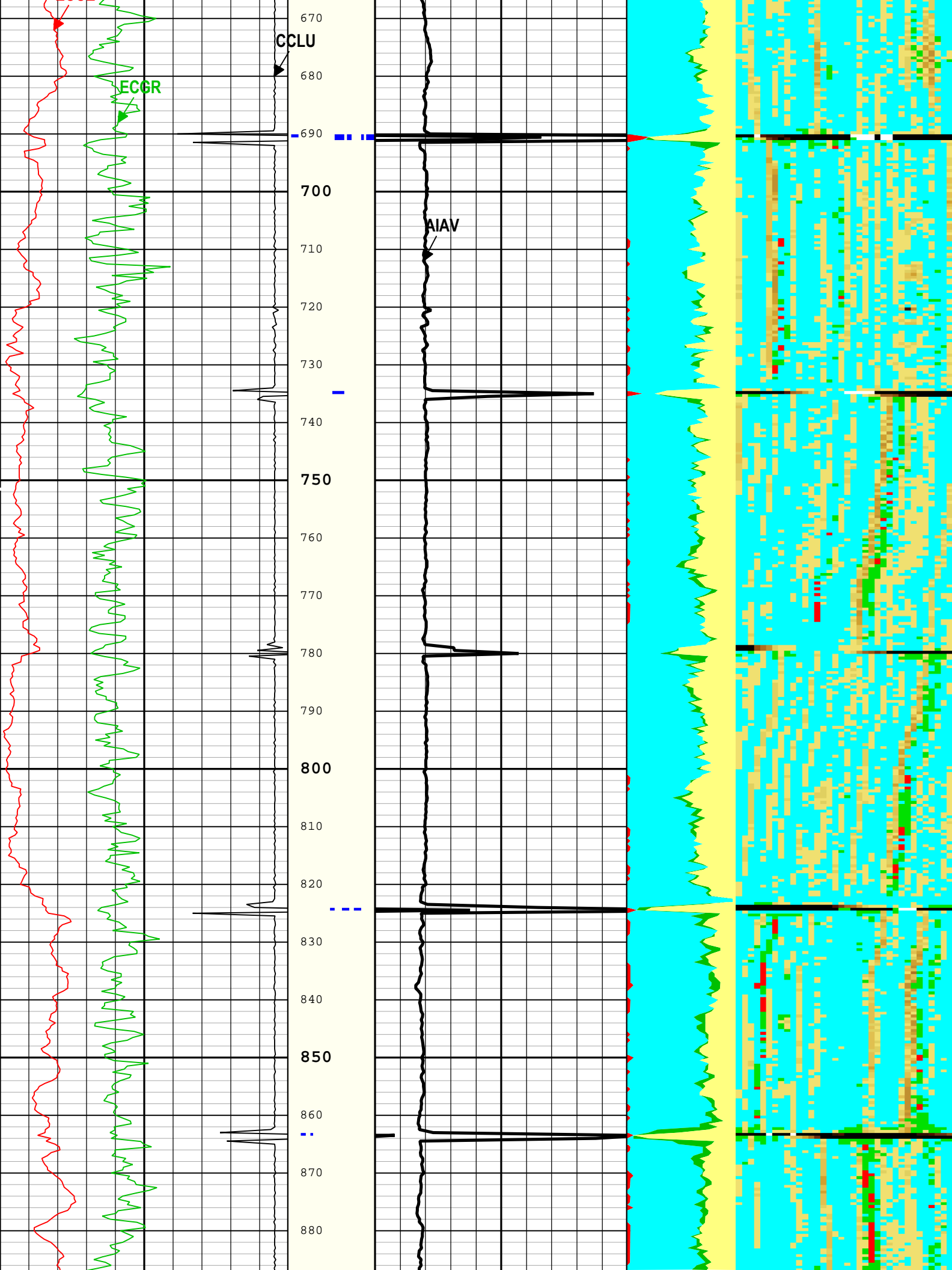
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Creation Date: 02-Mar-2019 15:04:15

TIME\_1900 - Time Marked every 60.00 (s)

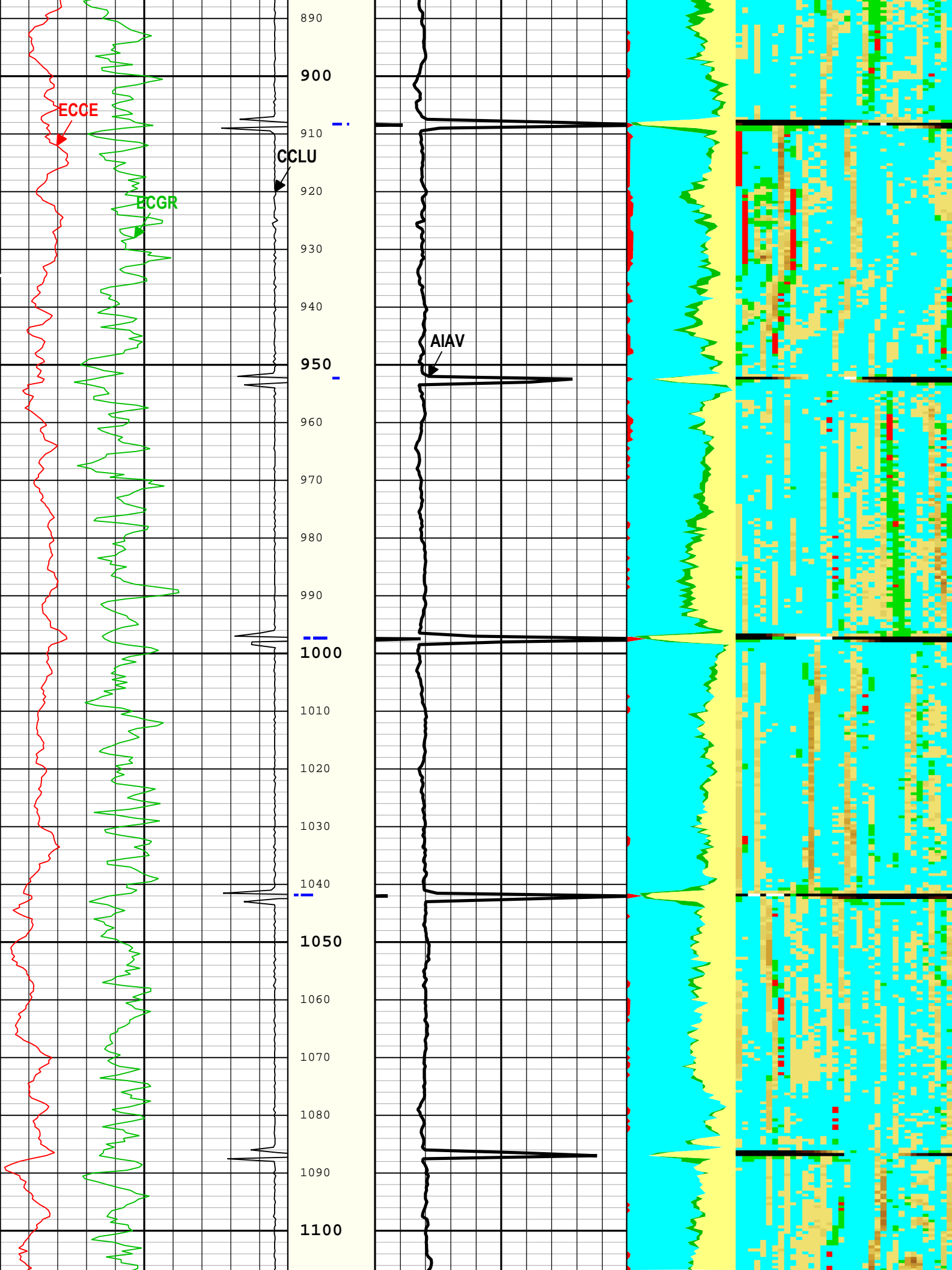


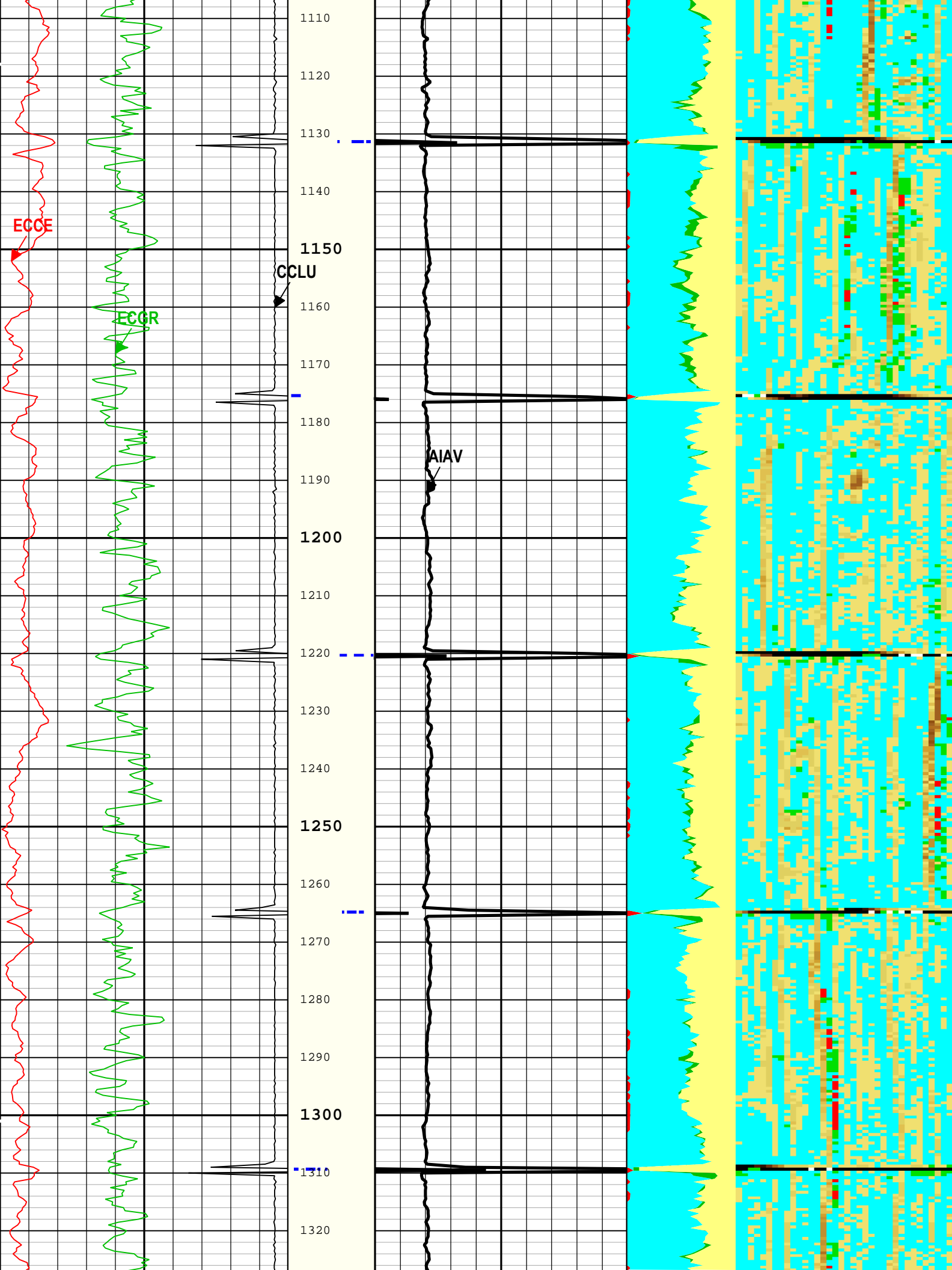


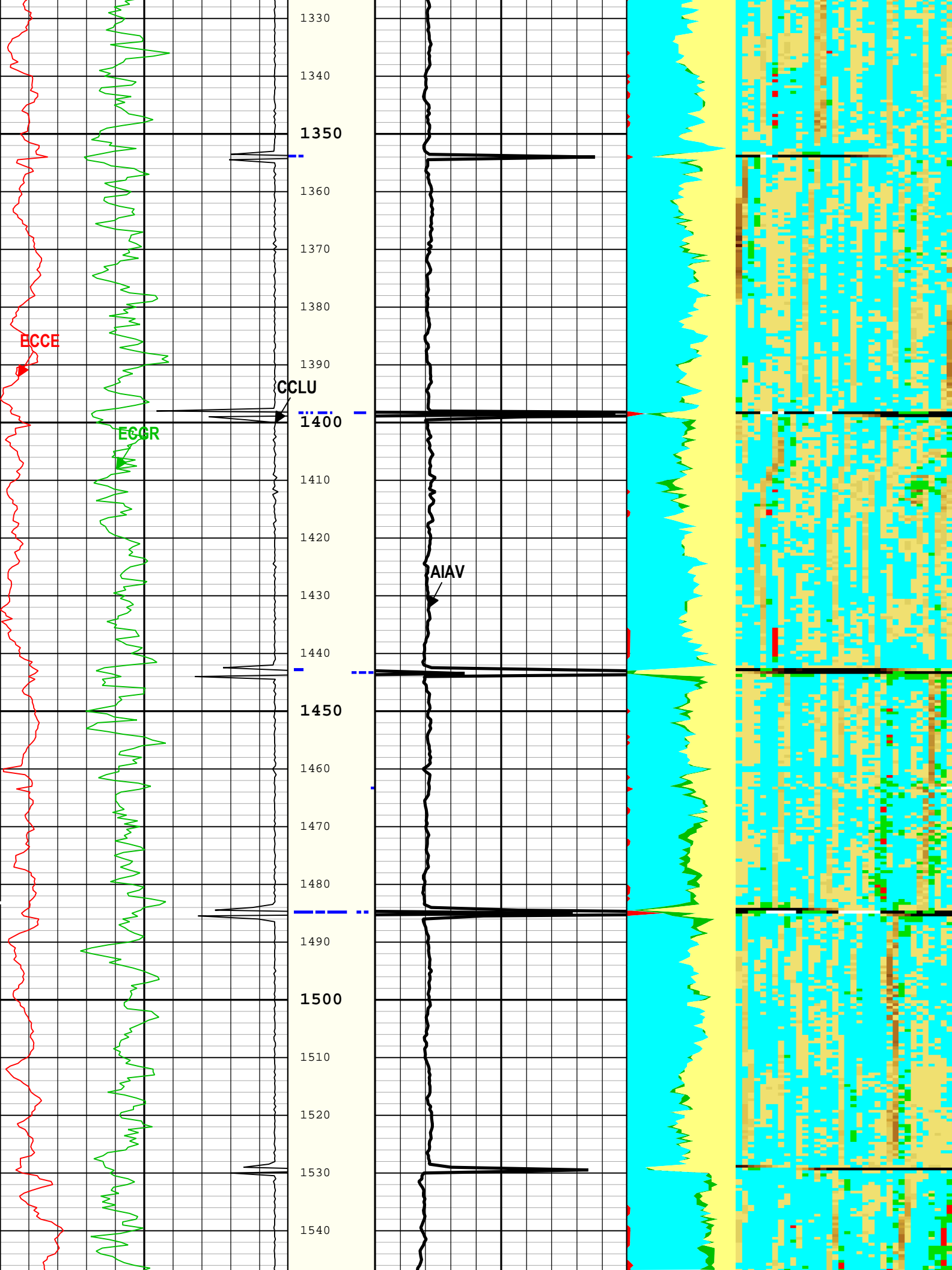


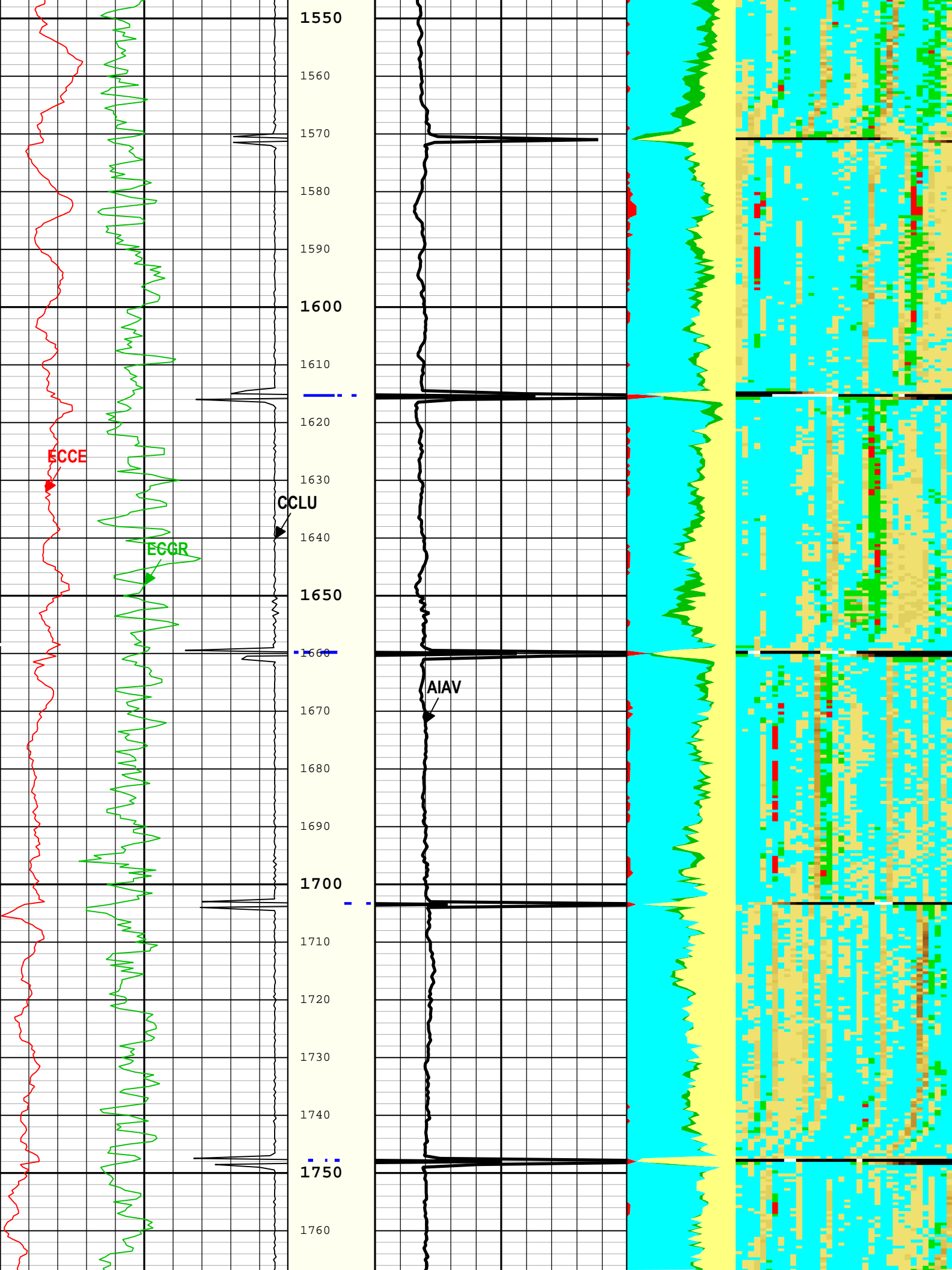


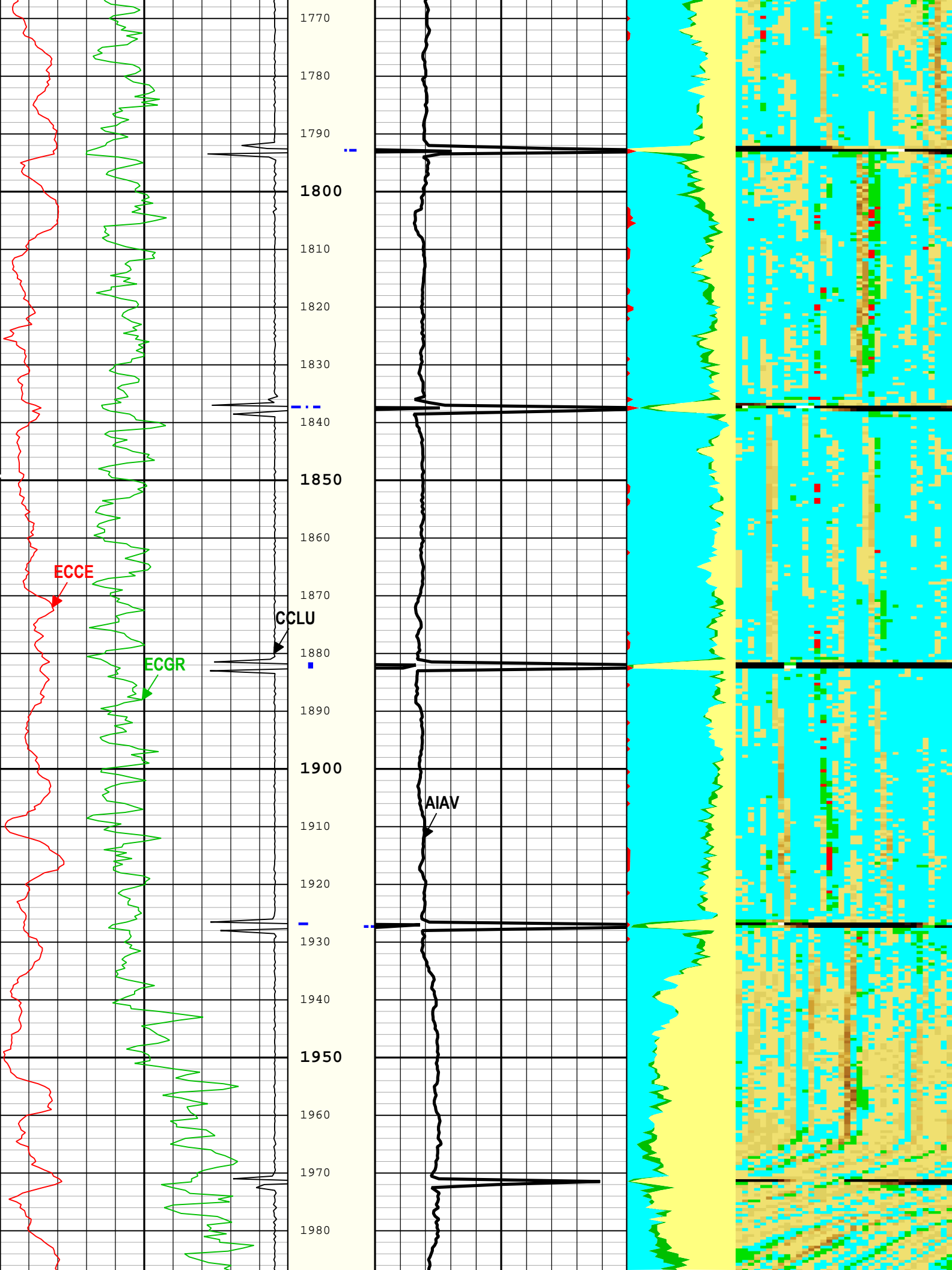


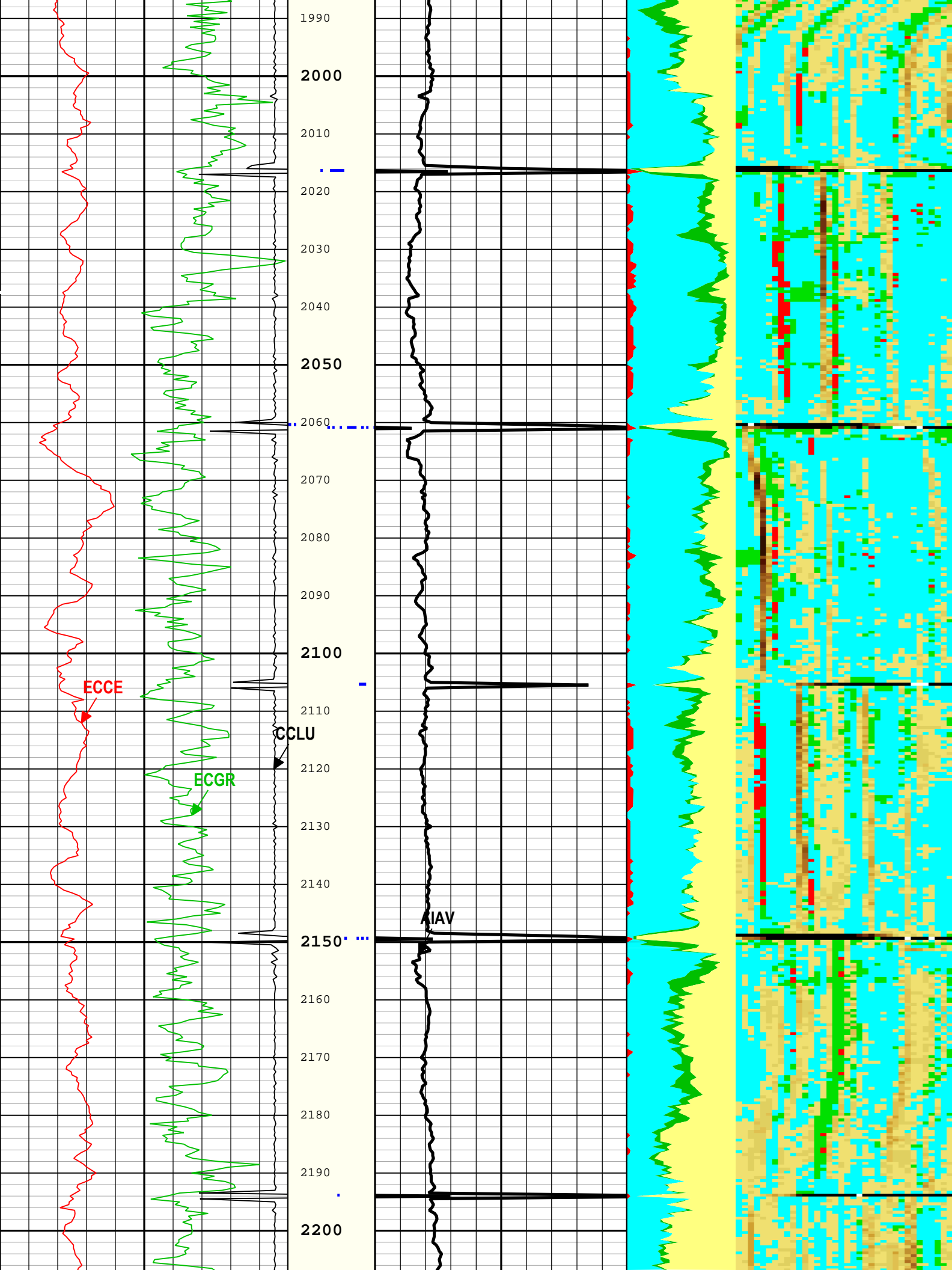


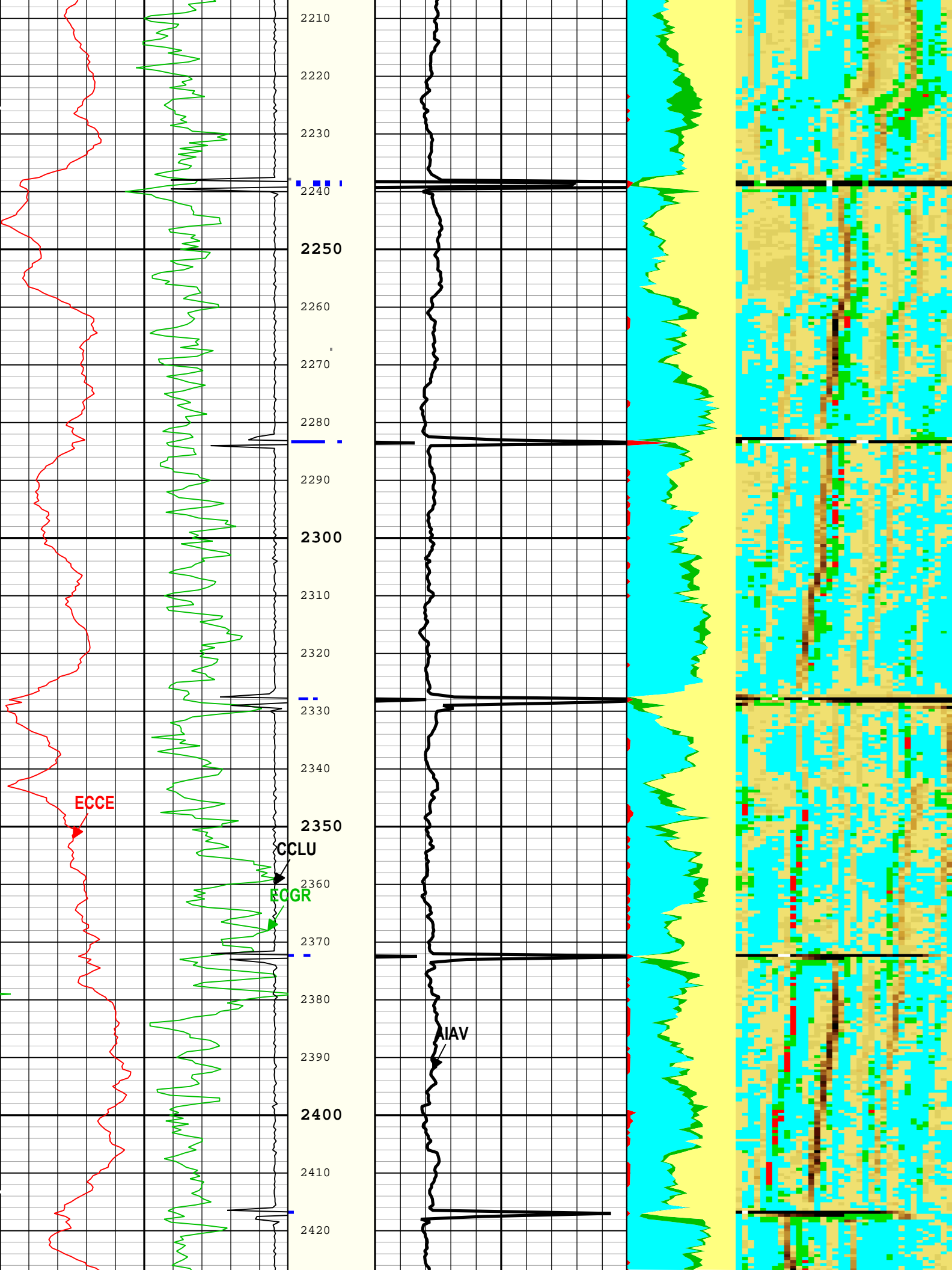


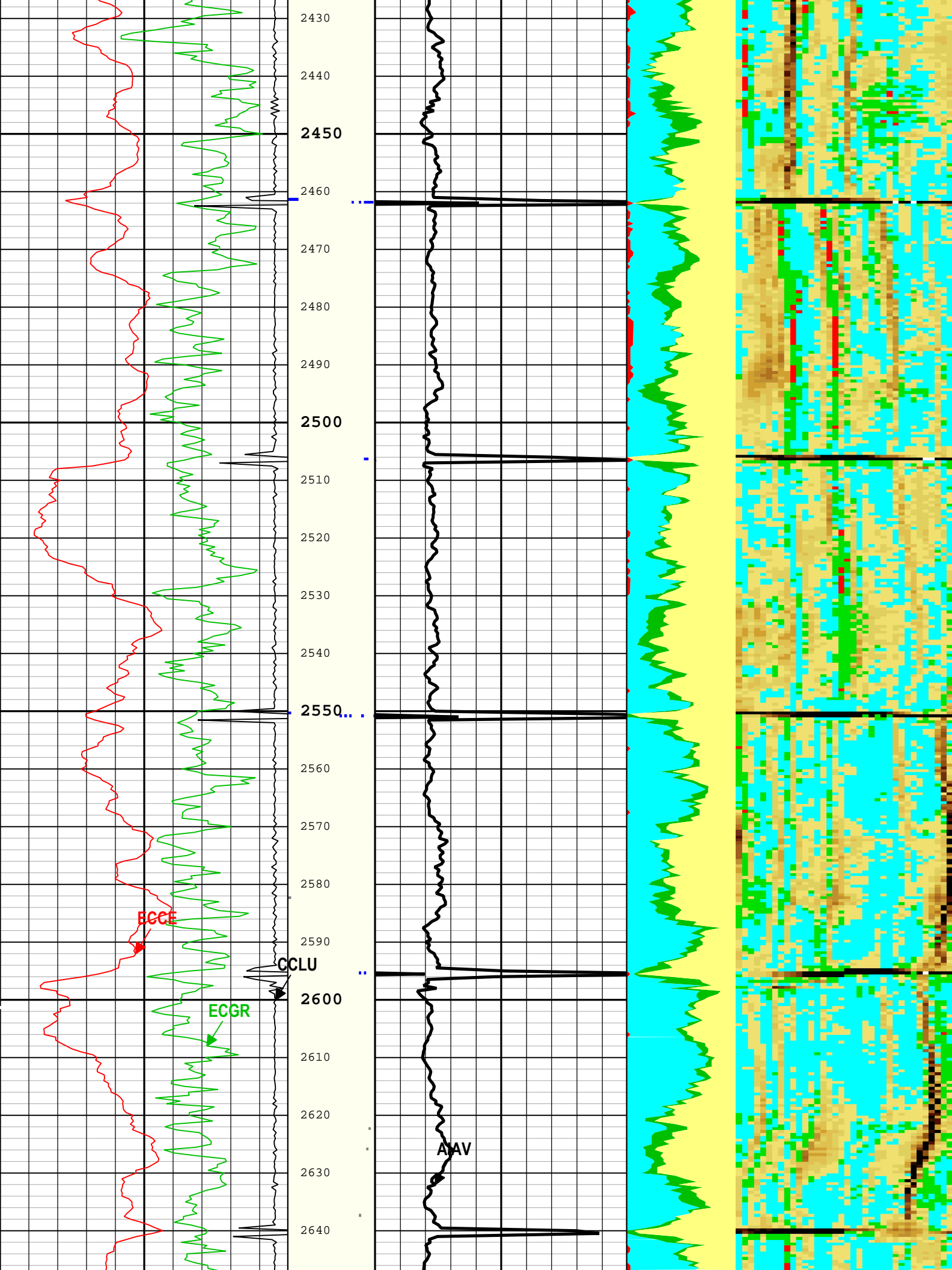




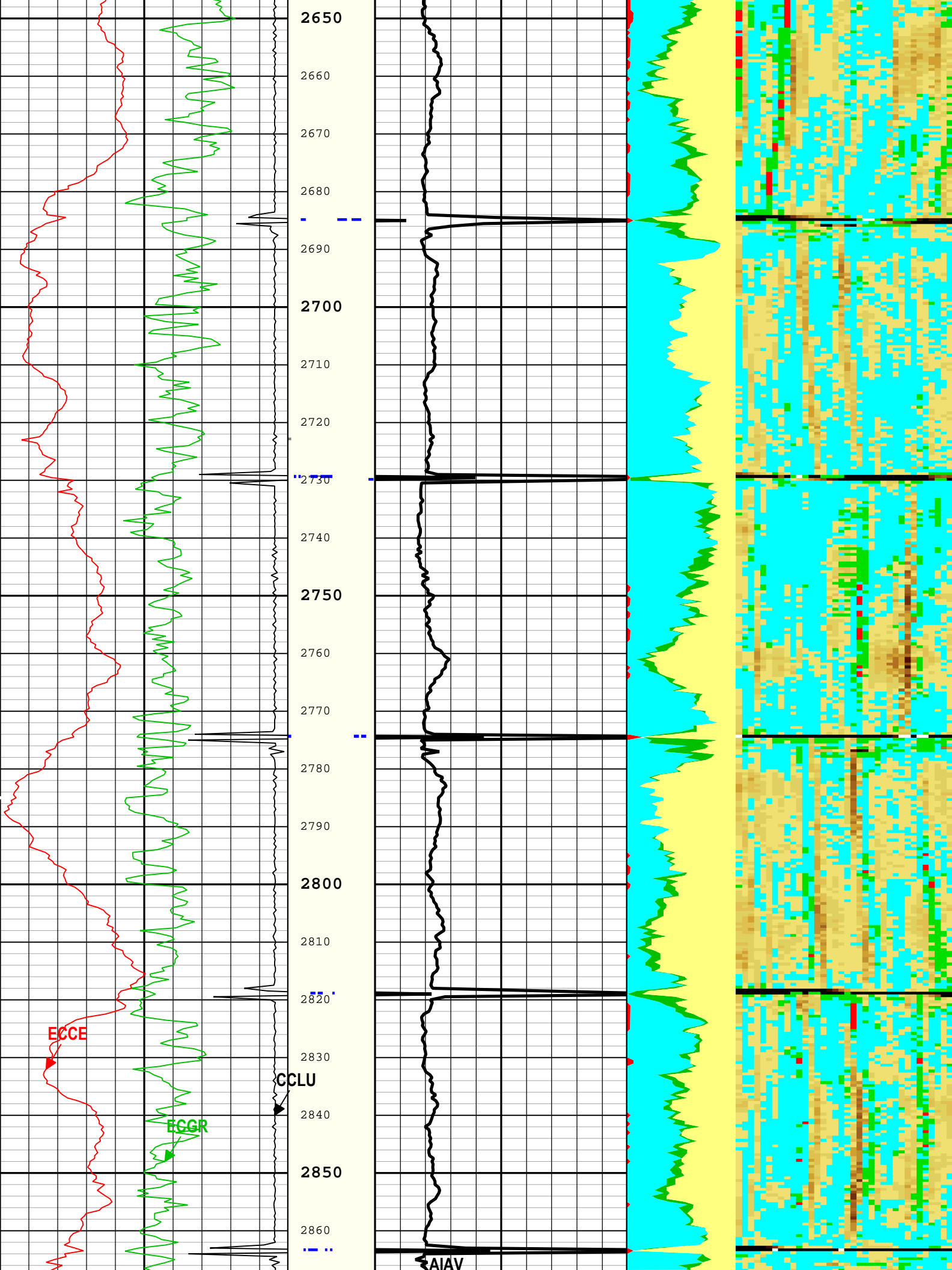


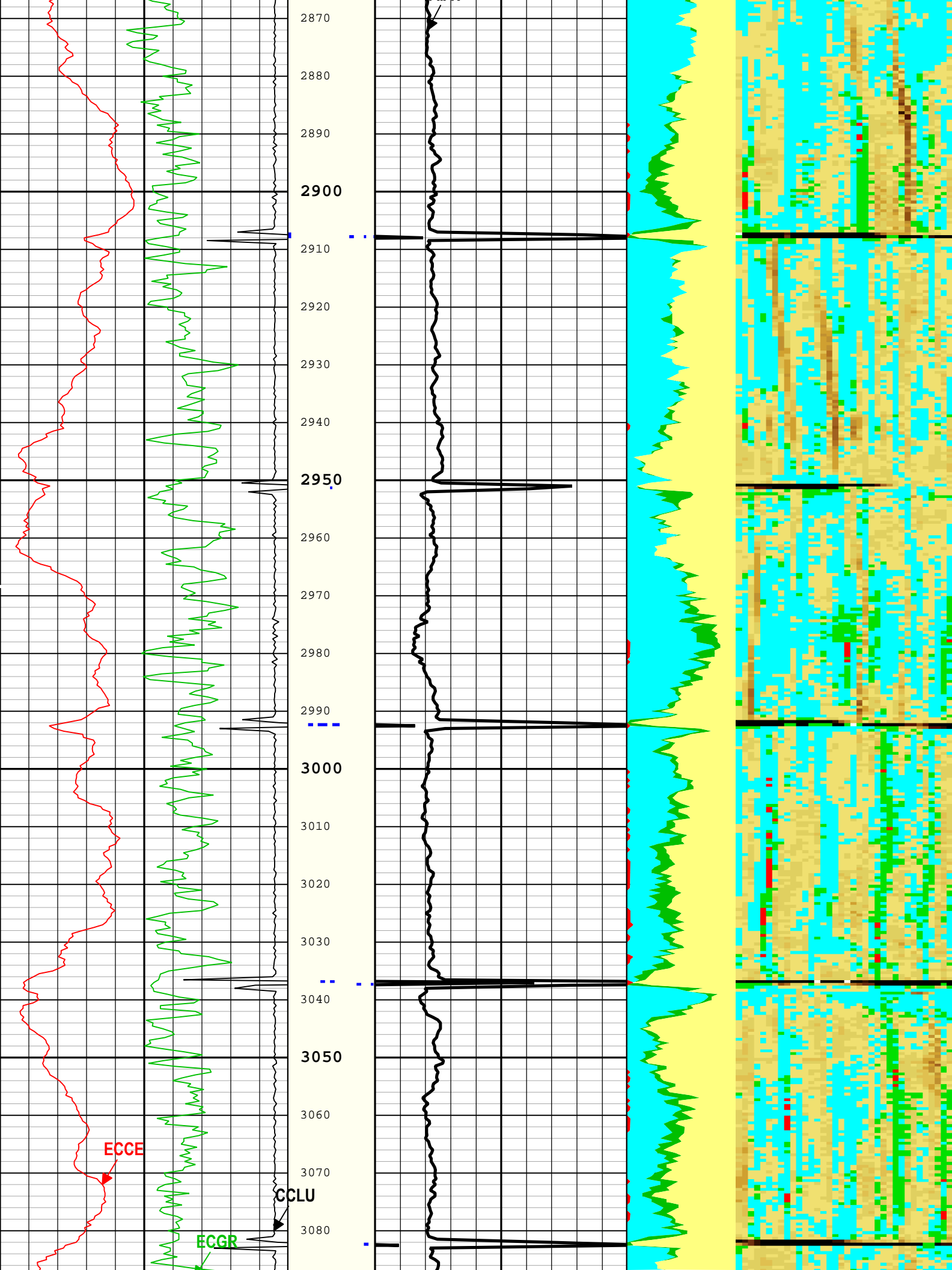


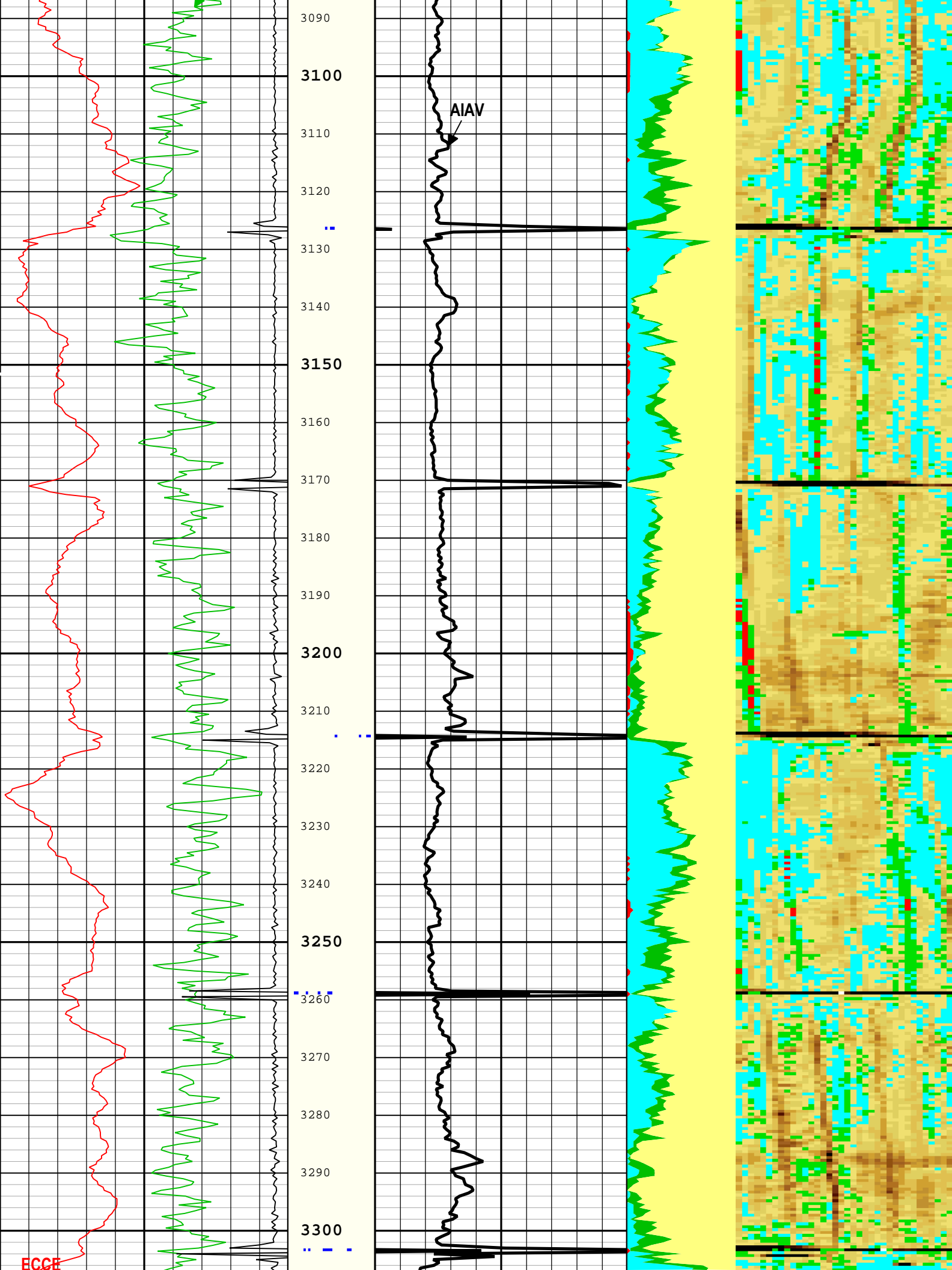


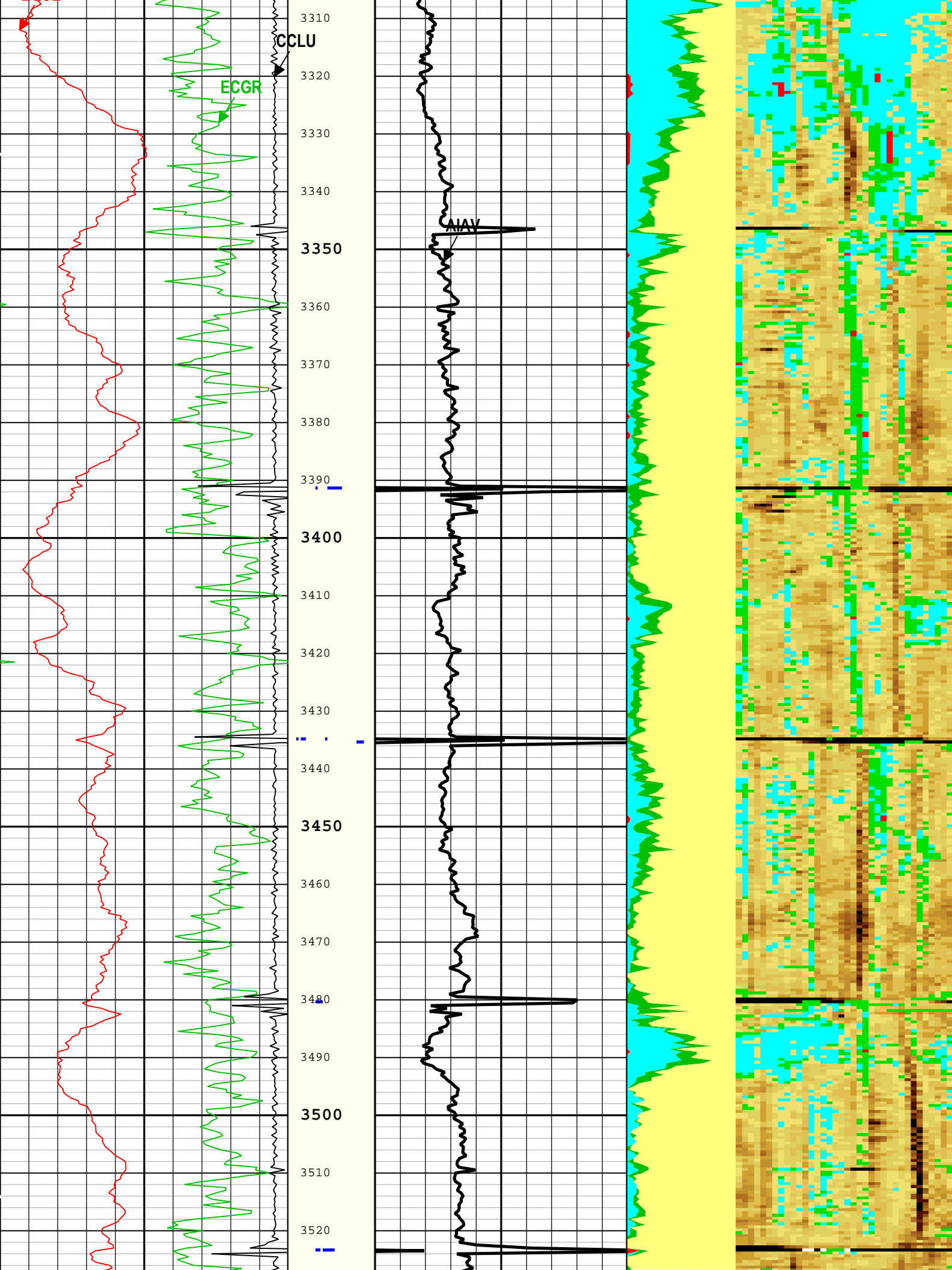


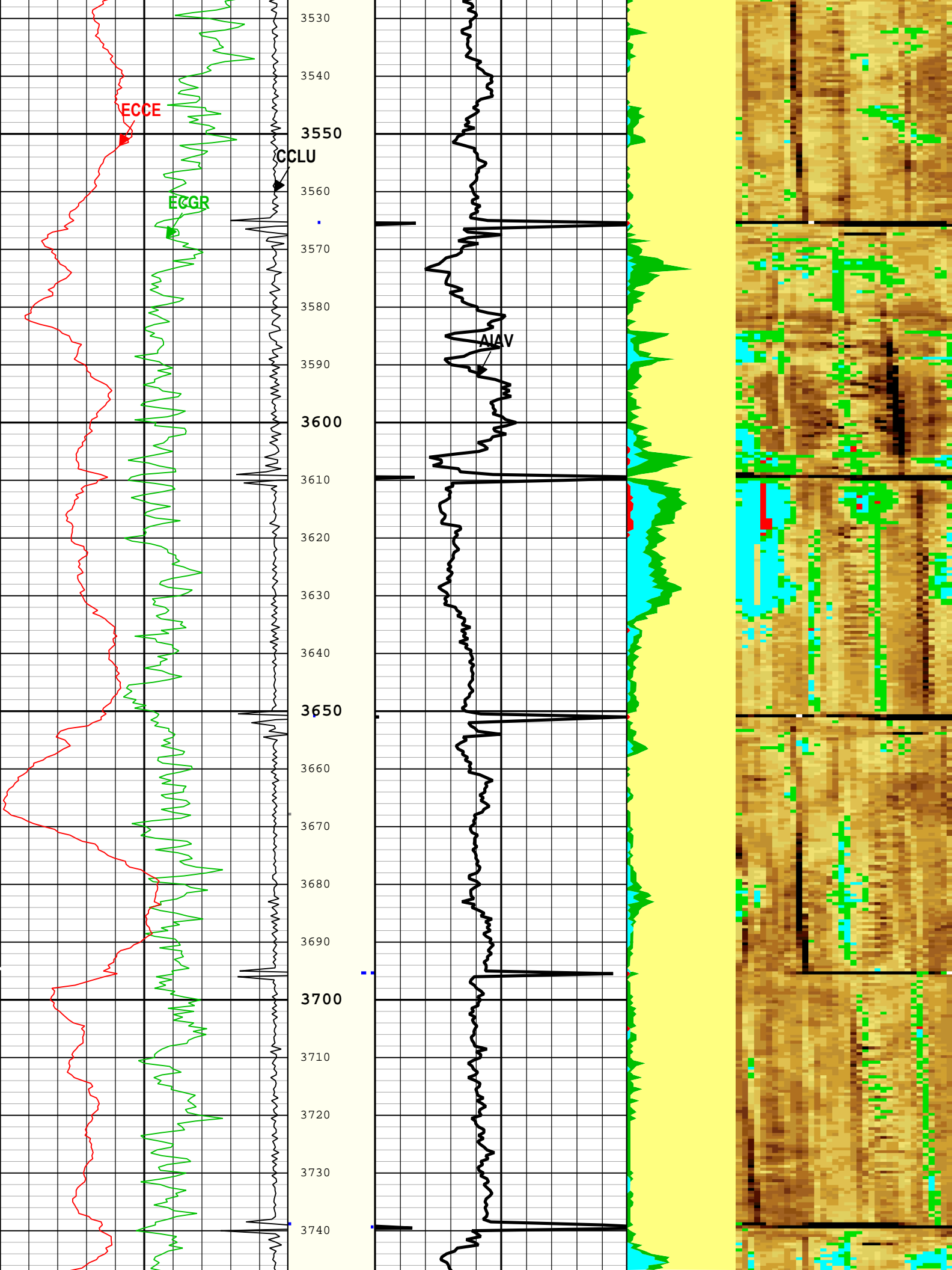


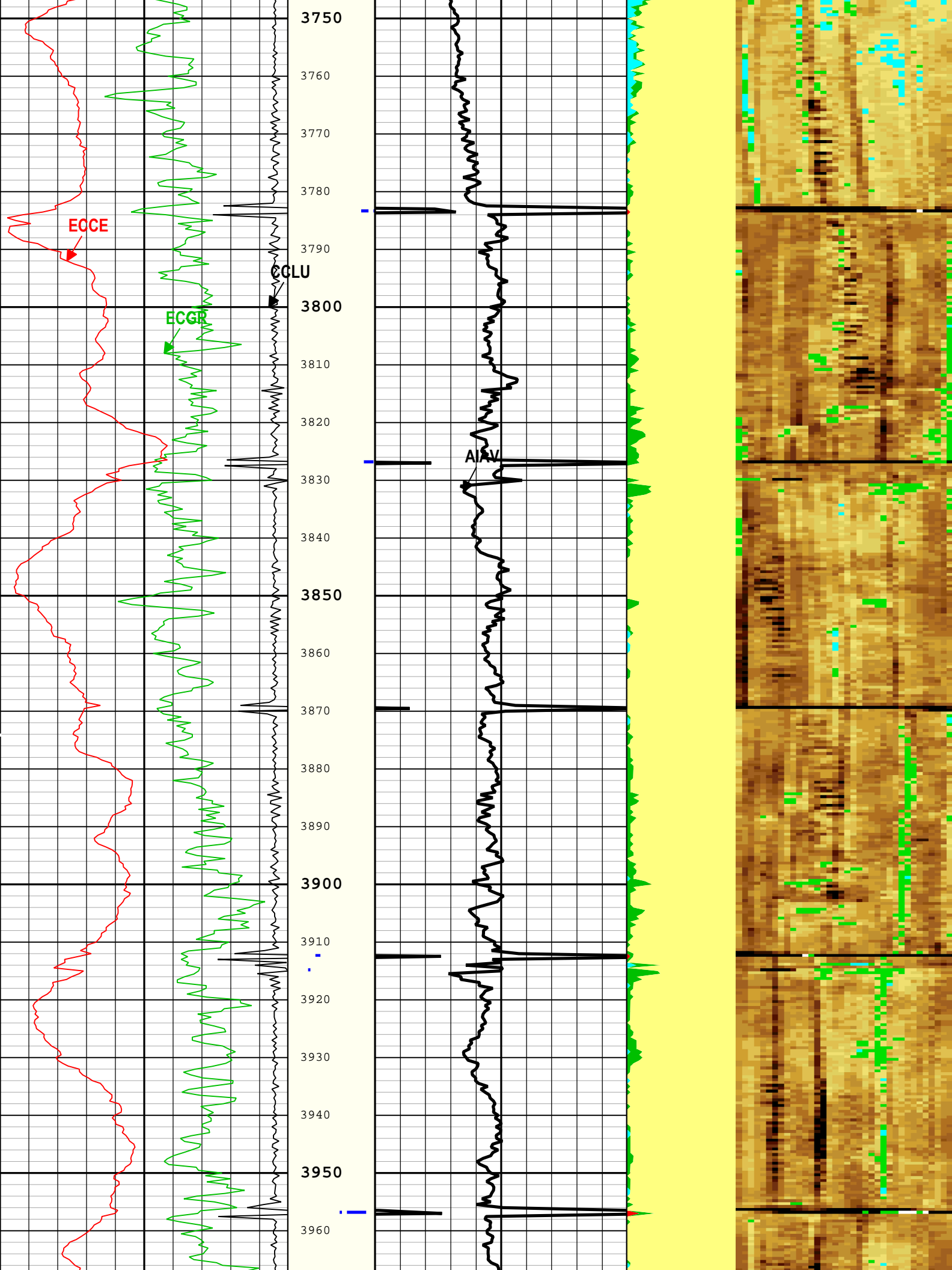


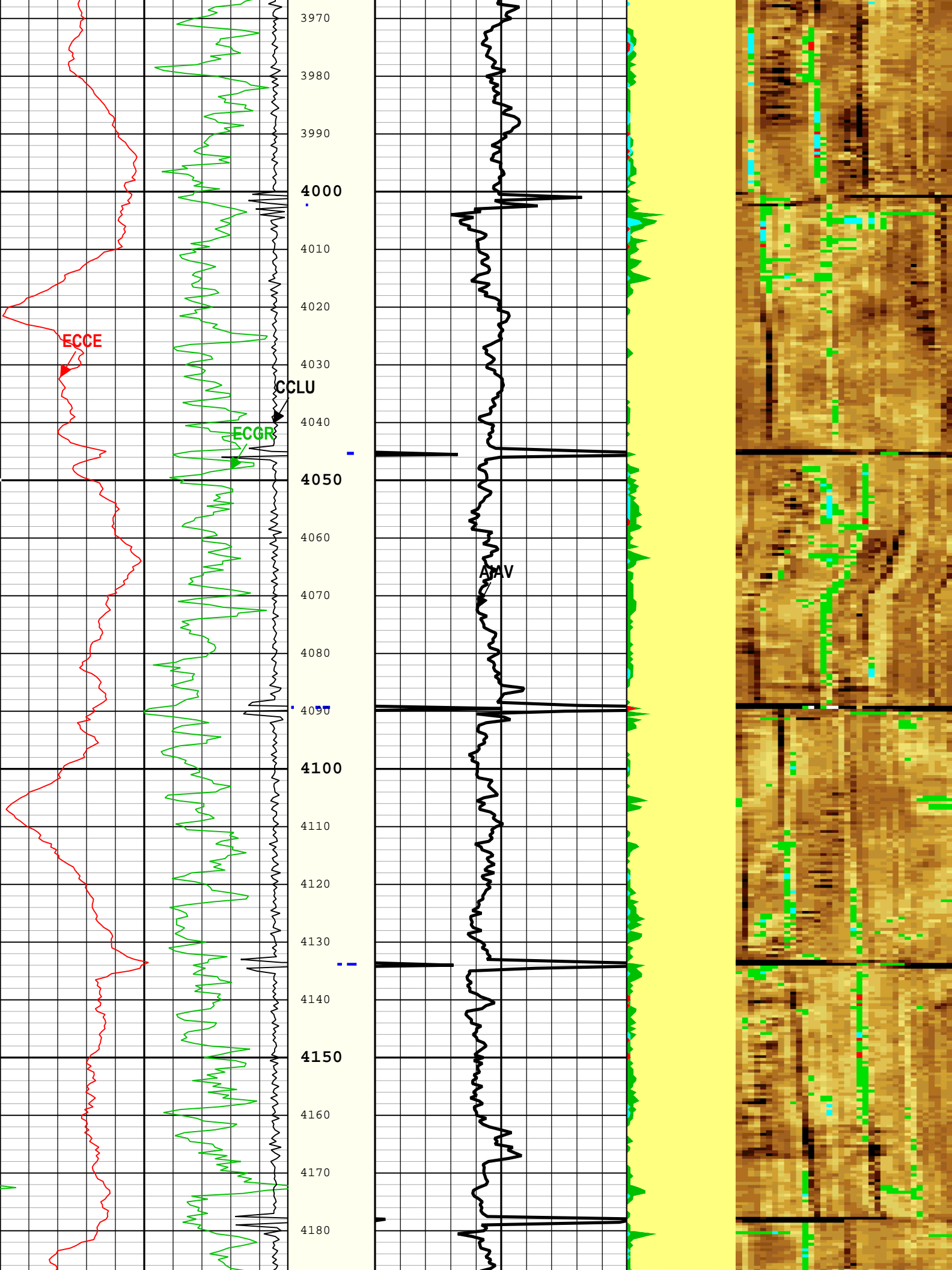


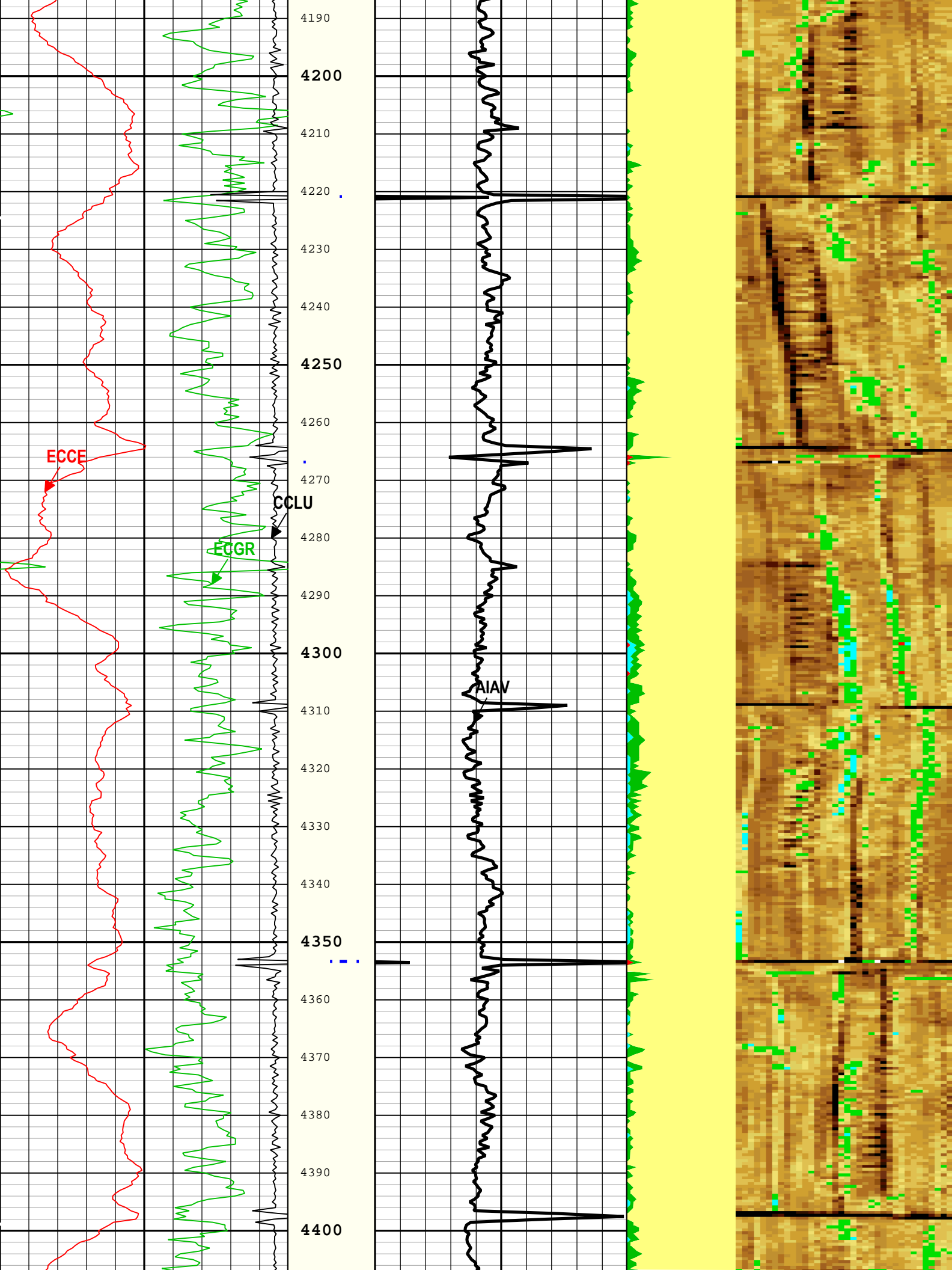




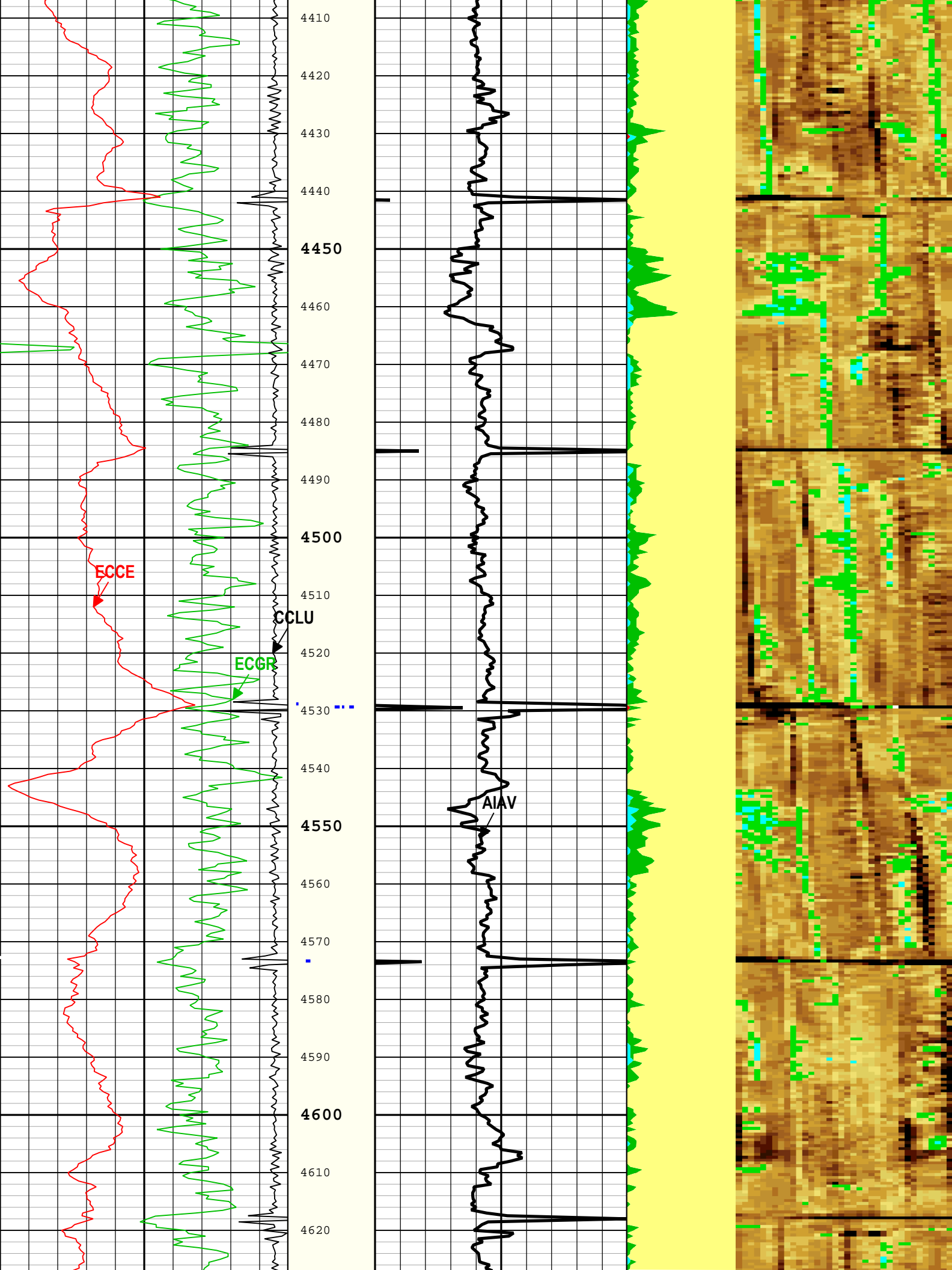


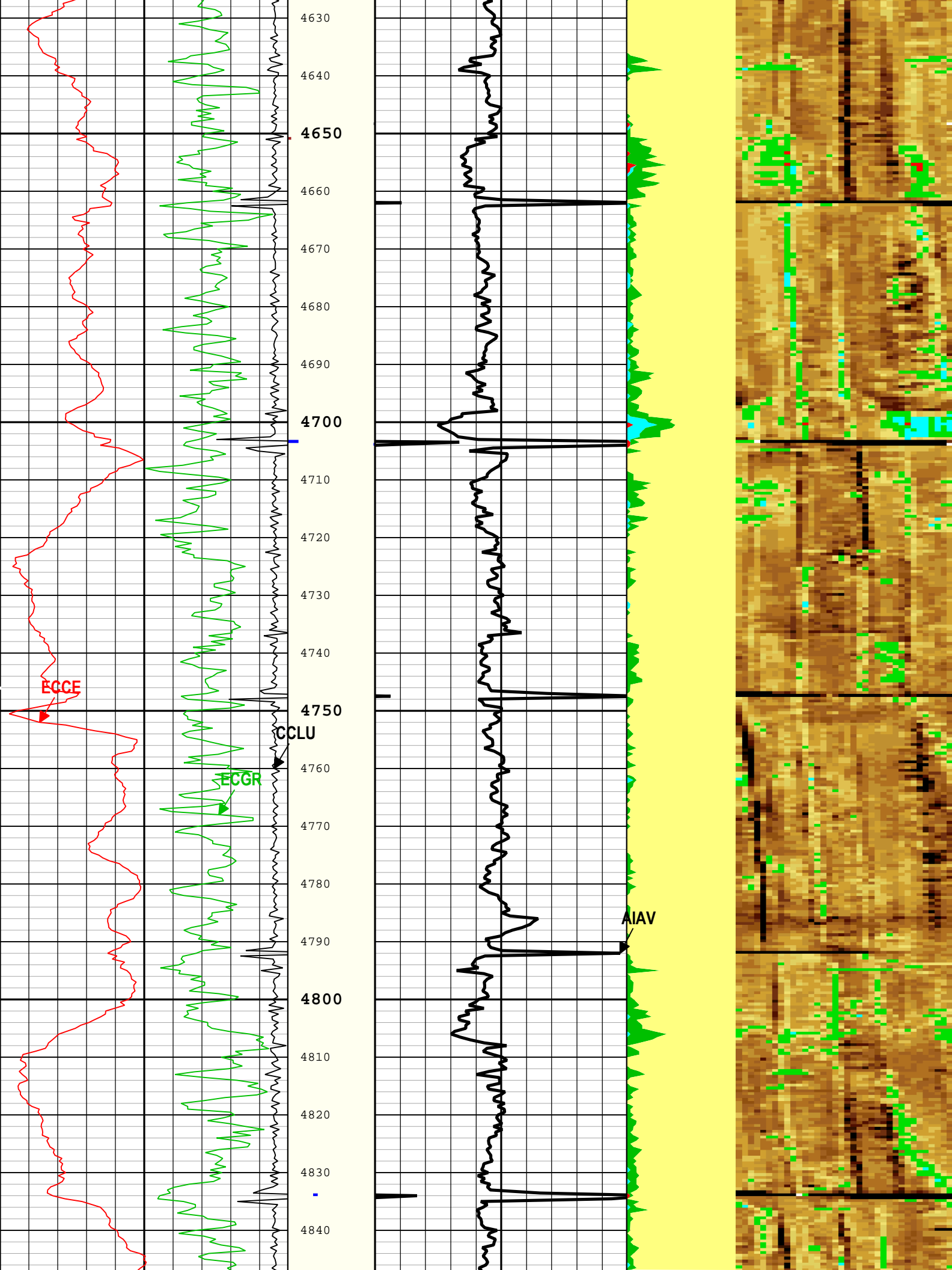


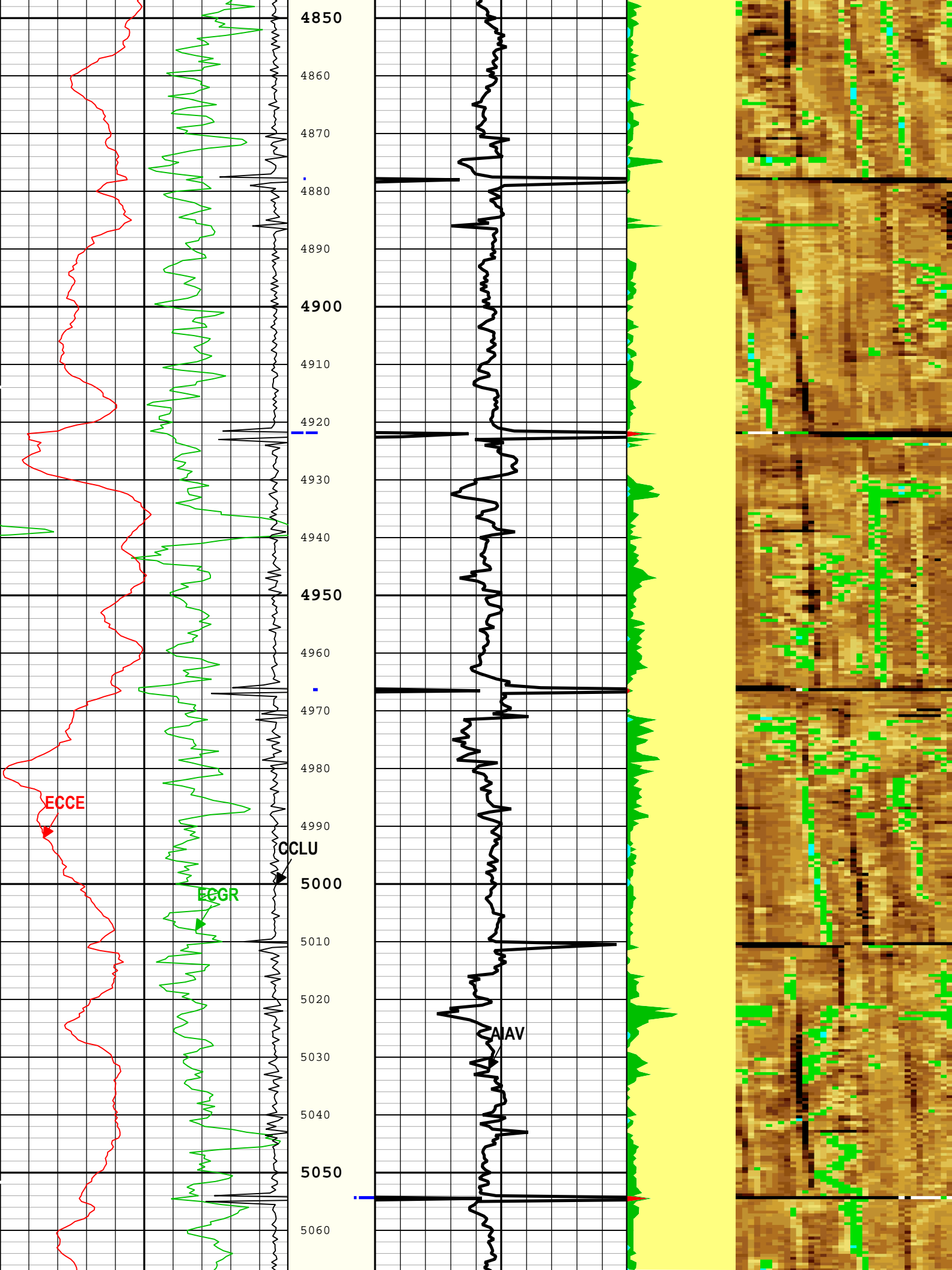


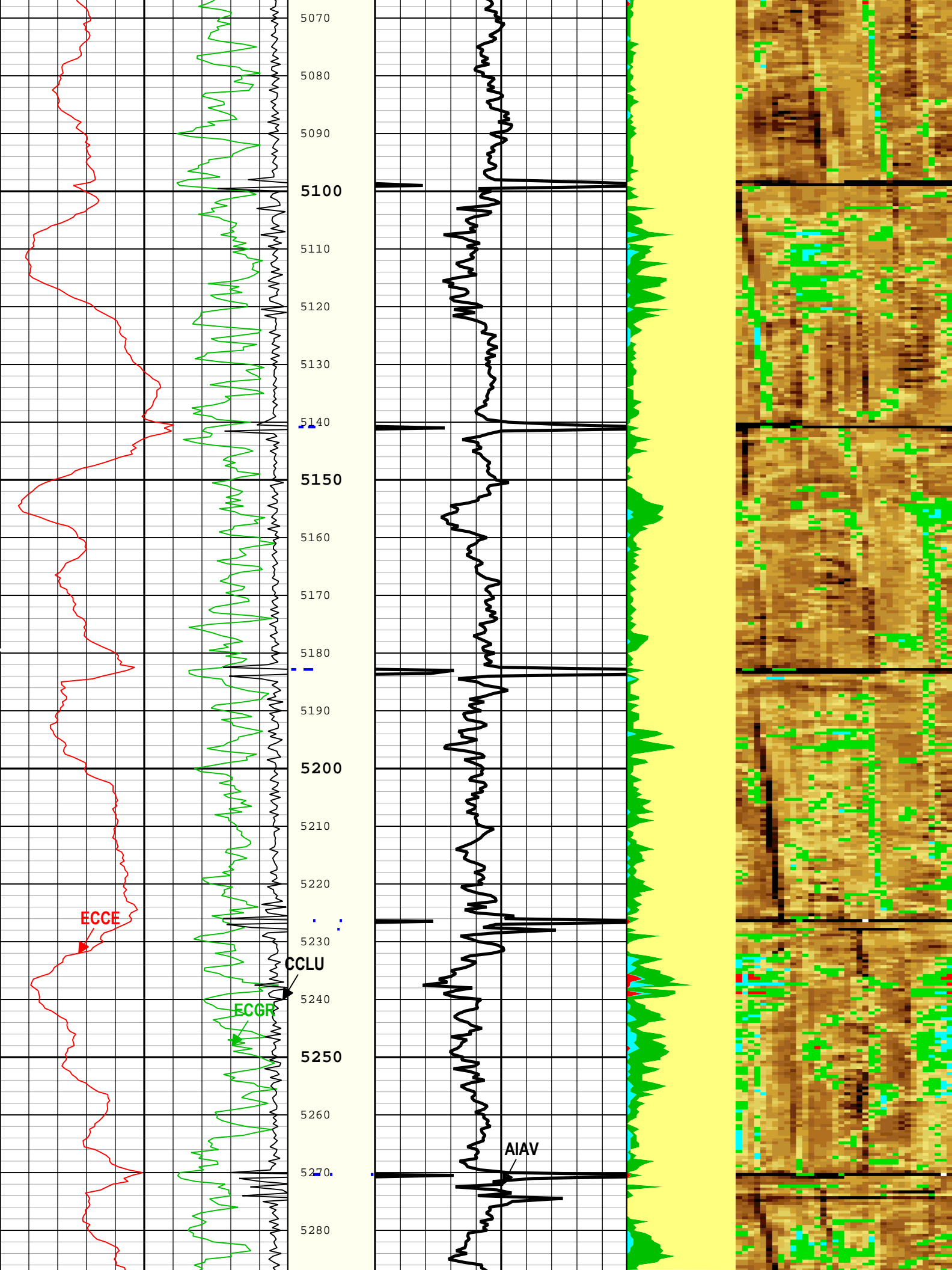


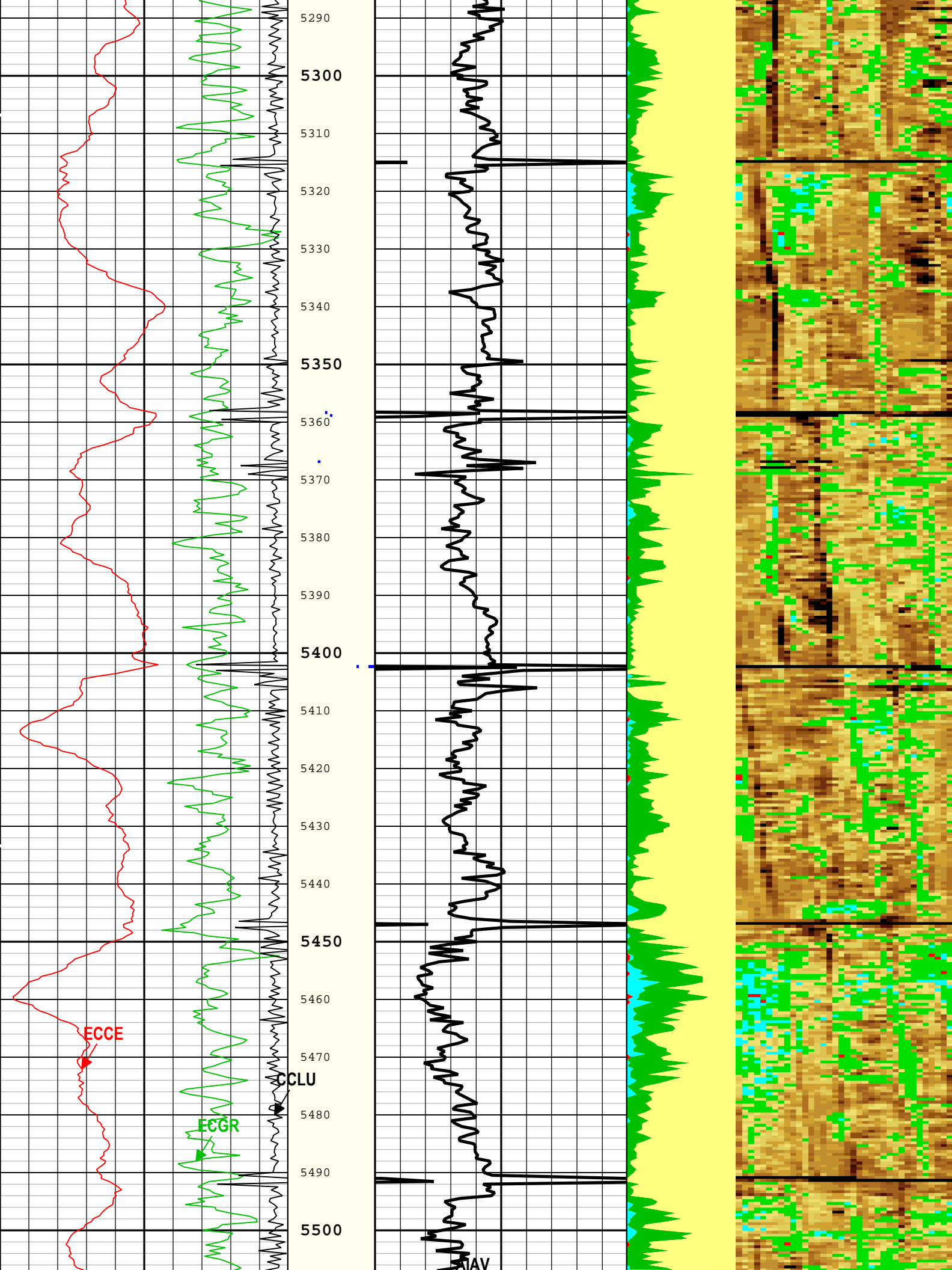


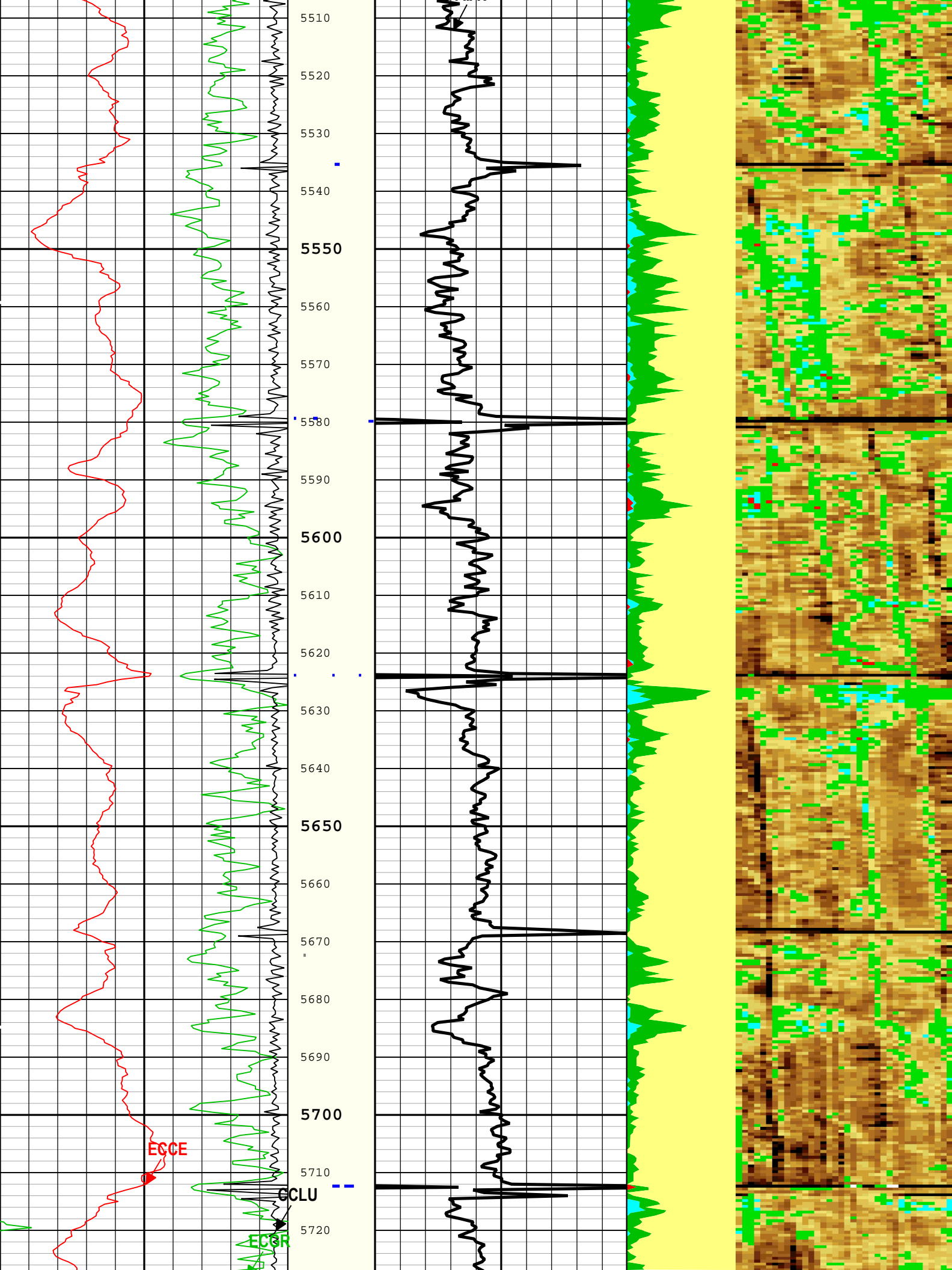


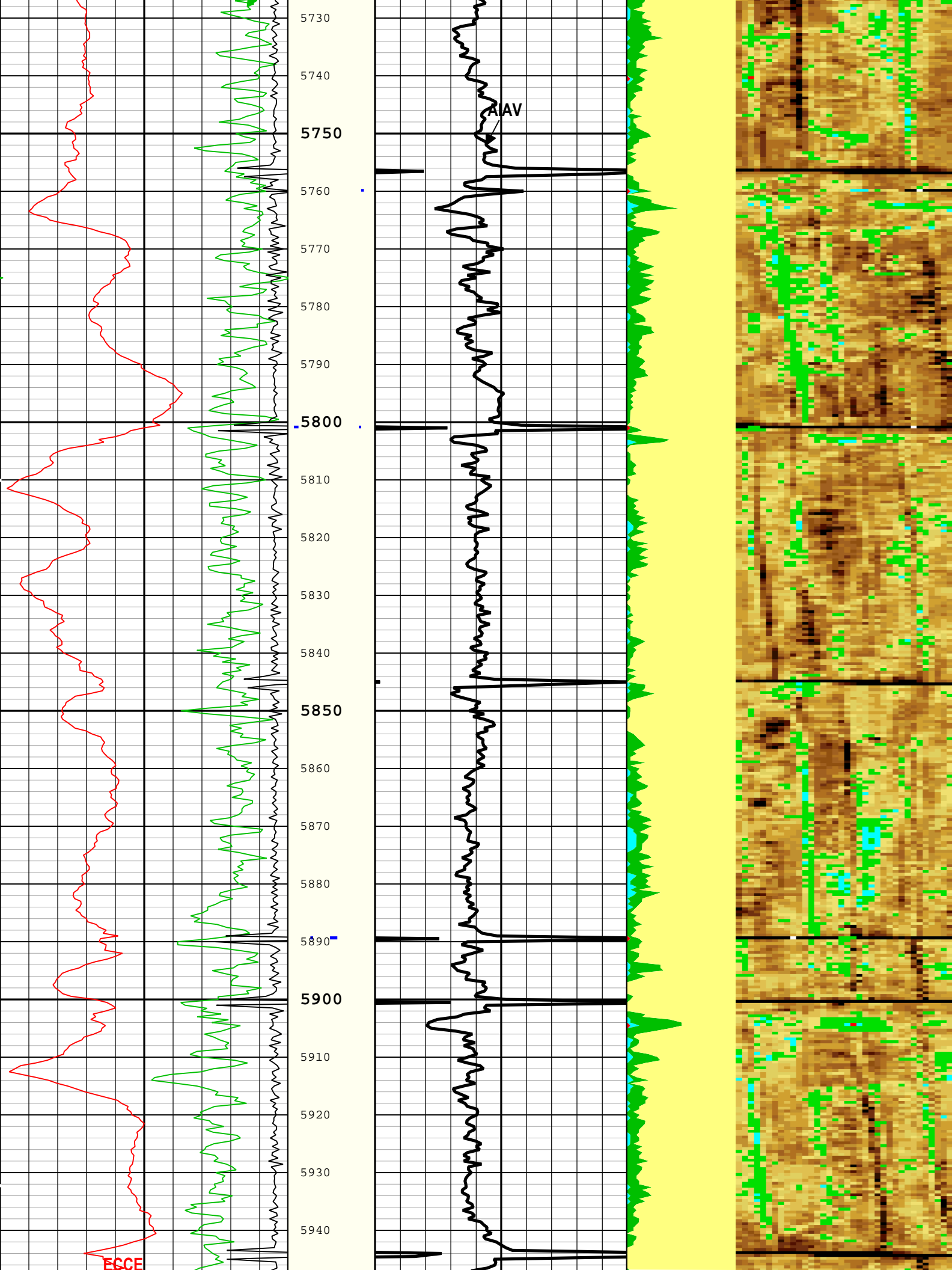




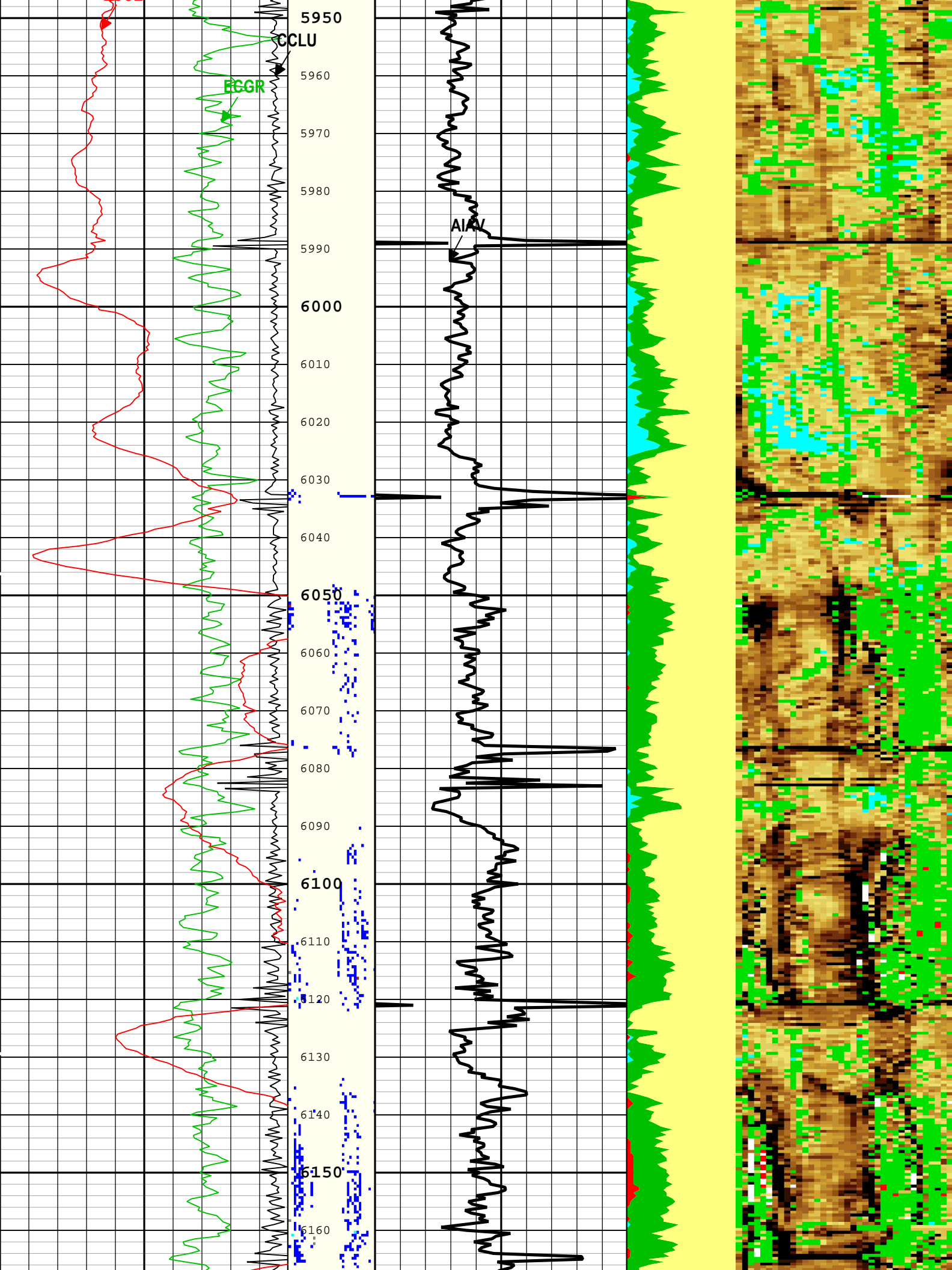




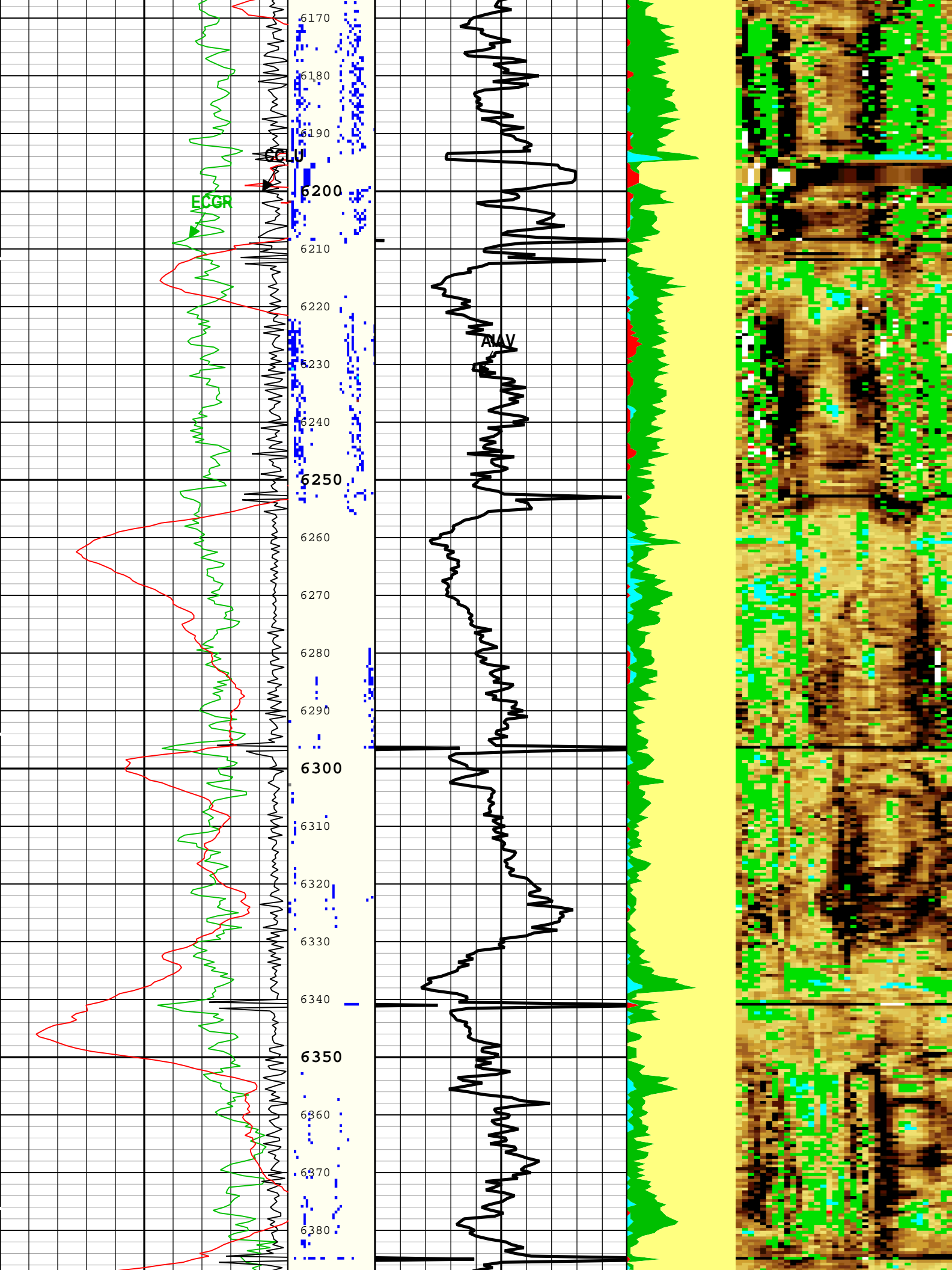


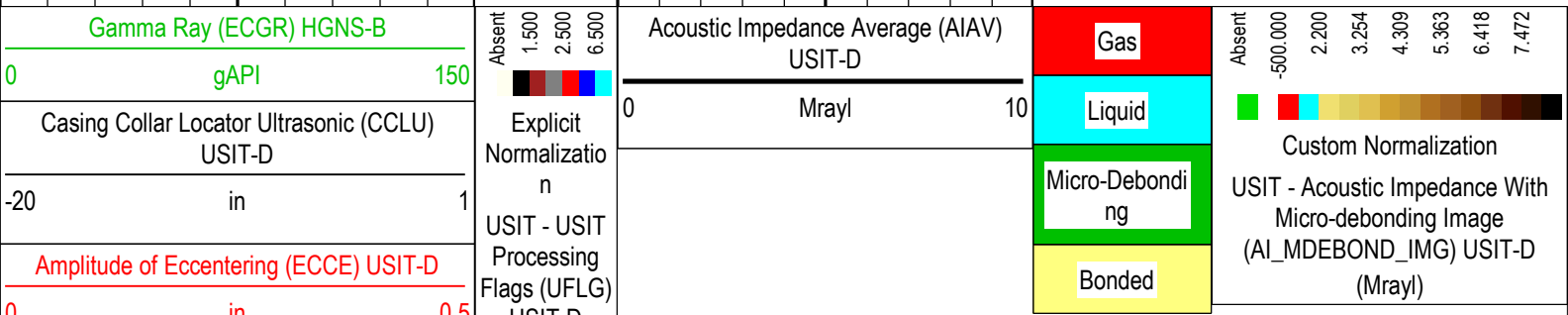
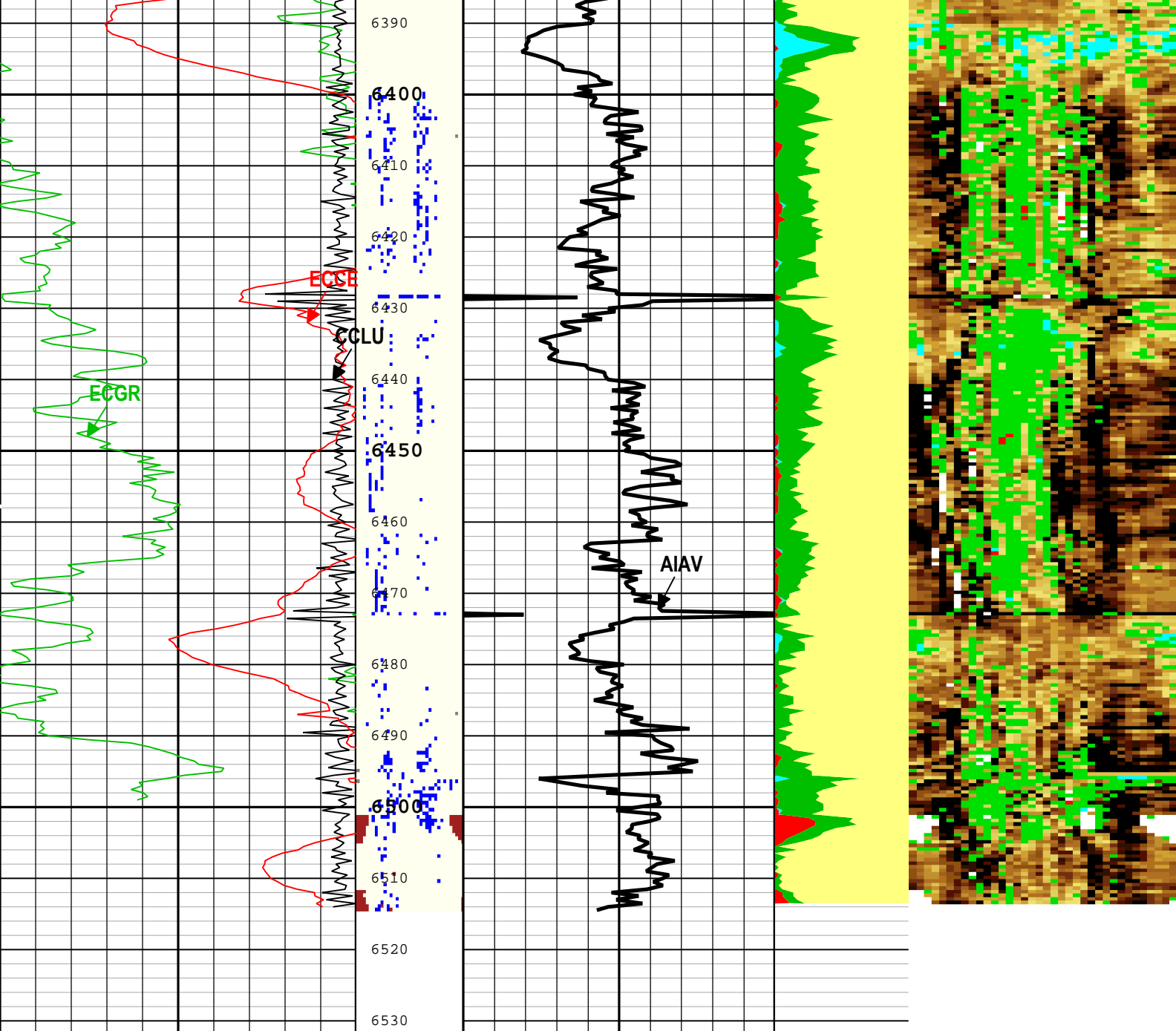












Description: Format: Log ( DJ Basin Ultrasonic Cement Summary Report ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 02-Mar-2019 15:04:15

Channel Processing Parameters				
1A: Parameters				
Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
RS	Bit Size	WI SESSION	Depth Zoned	in

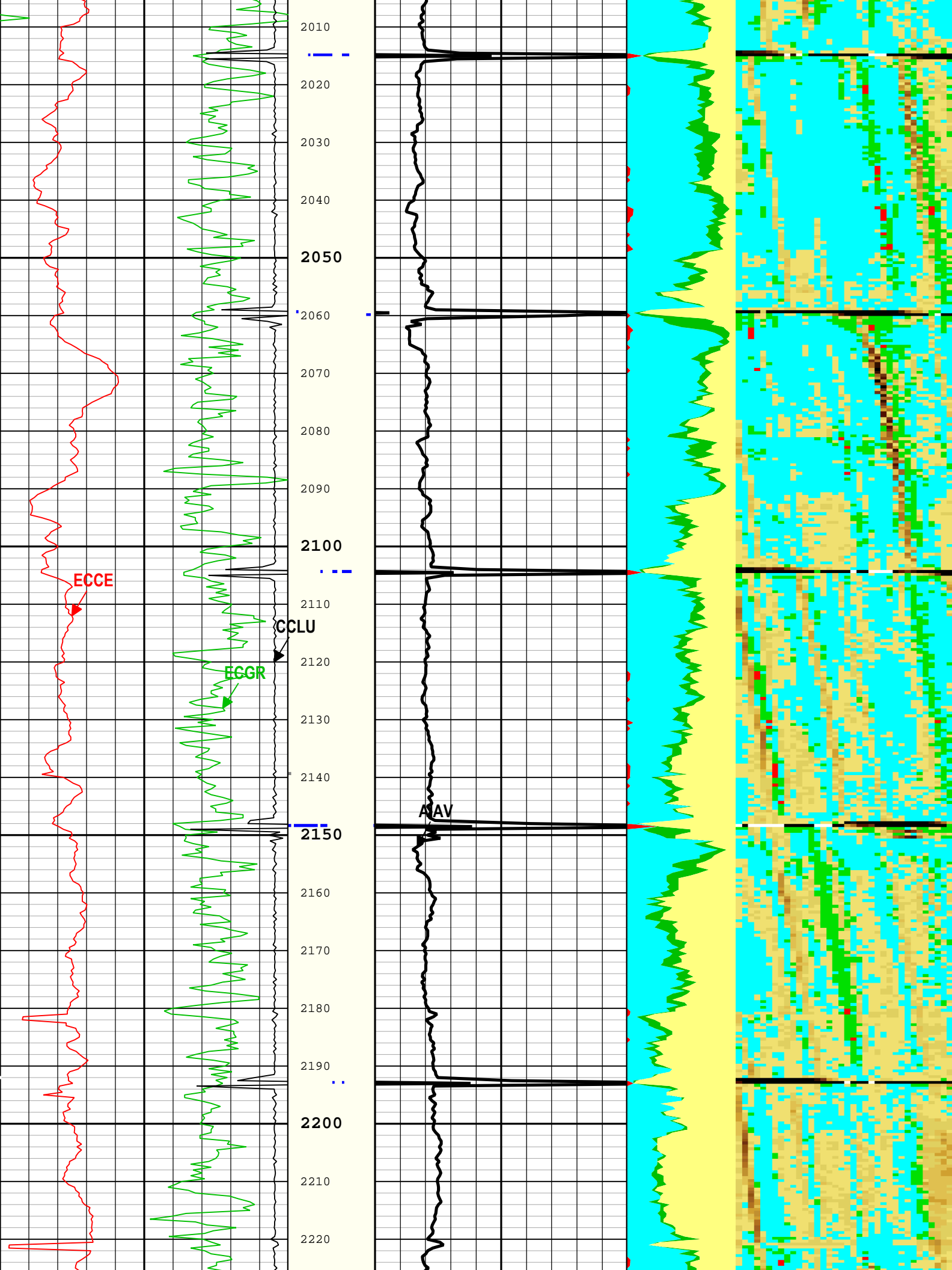
	Bit Size	WLSSESSION	Depth Zoned	in
CBLO	Casing Bottom (Logger)	WLSESSION	17063	ft
CDEN	Cement Density	HGNS-B	16.69	lbm/gal
CMTY(U-USIT_CEMT)	Cement Type	USIT-D	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-D	Yes	
IMAR	Image Rotation	USIT-D	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-D	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-D	1.16	
MUD_N_THE	Theoretical Mud Normalization Factor	USIT-D	1.15	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-D	0.1	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-D	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-D	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-D	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-D	0.3	Mrayl

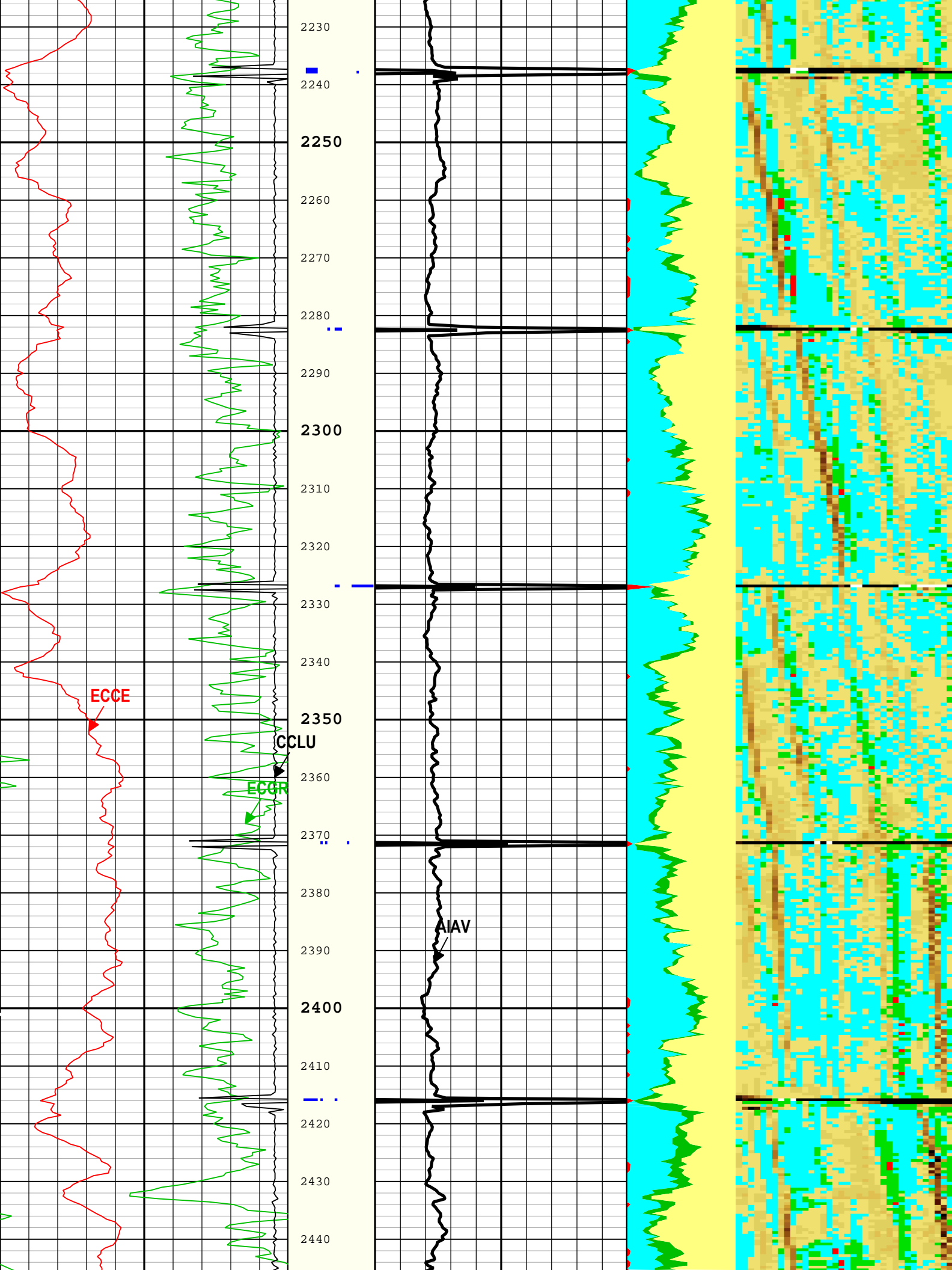
Depth Zone Parameters			
Parameter	Value	Start ( ft )	Stop ( ft )
BS	26	74.5	110
BS	13.5	110	6532
All depth are actual.			

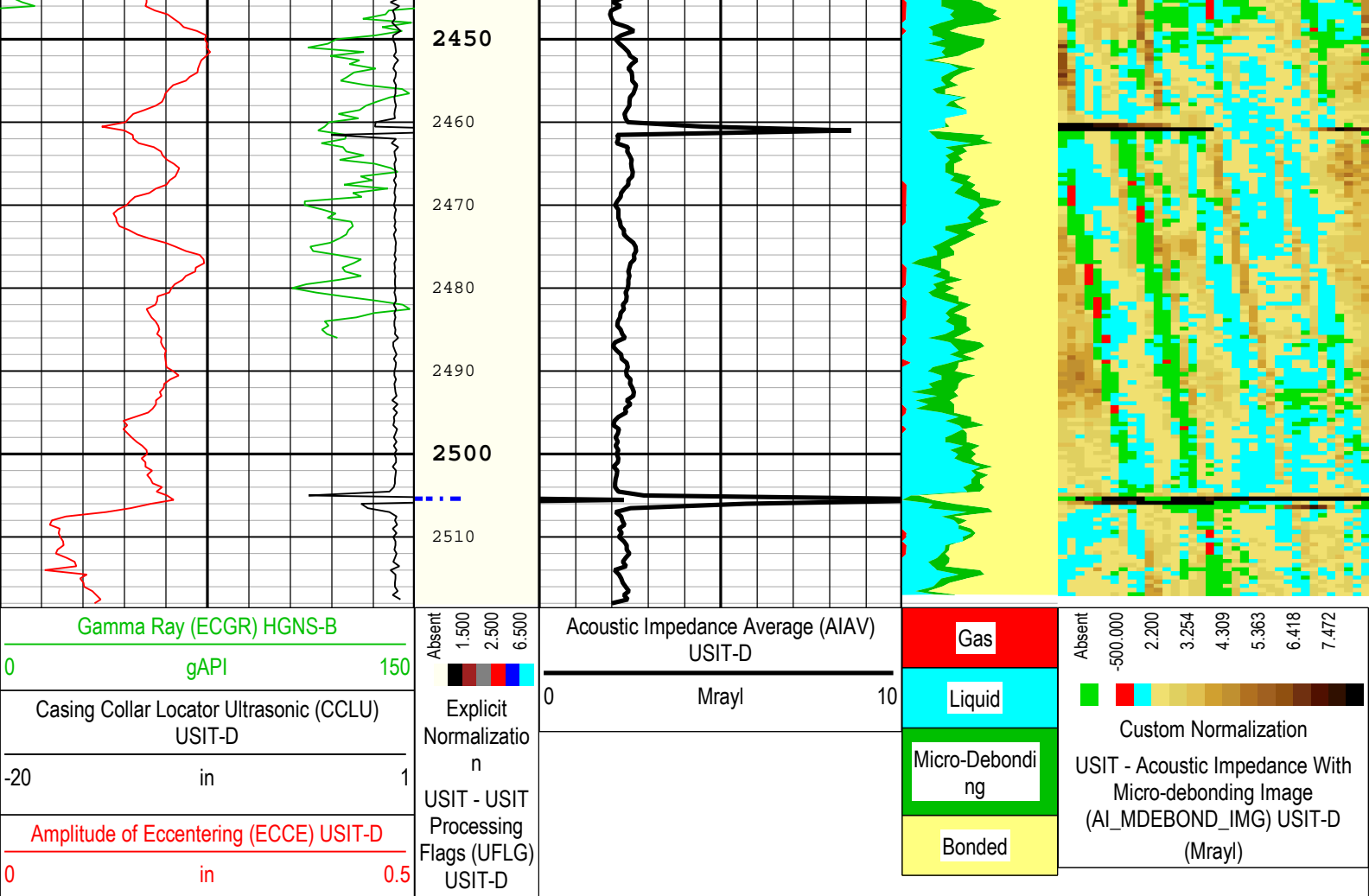
Tool Control Parameters				
1A: Parameters				
Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-D	-4	dB
AGMX	Maximum Gain of Cartridge	USIT-D	20	dB
EMXV	EMEX Voltage	USIT-D	Time Zoned	V
HRES	Horizontal Resolution	USIT-D	10 deg	
ULOG	Logging Objective	USIT-D	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-D	500000	Hz
UPAT	USIT Emission Pattern	USIT-D	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-D	Uncompressed 10 deg at 6.0 in LF	
WINB	Window Begin Time	USIT-D	Time Zoned	us
WINE	Window End Time	USIT-D	Time Zoned	us

Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
EMXV	50	02-Mar-2019 11:34:59	02-Mar-2019 11:35:46	6532.5	6476.52
EMXV	60	02-Mar-2019 11:35:46	02-Mar-2019 11:51:50	6476.52	4600.16
EMXV	50	02-Mar-2019 11:51:50	02-Mar-2019 12:19:59	4600.16	107.58
WINB	31.88	02-Mar-2019 11:34:59	02-Mar-2019 11:35:27	6532.5	6501.75
WINB	25.06	02-Mar-2019 11:35:27	02-Mar-2019 11:35:30	6501.75	6497.8
WINB	18.93	02-Mar-2019 11:35:30	02-Mar-2019 11:37:39	6497.8	6323
WINB	28.13	02-Mar-2019 11:37:39	02-Mar-2019 11:37:42	6323	6318.16









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: 02-Mar-2019 15:04:22

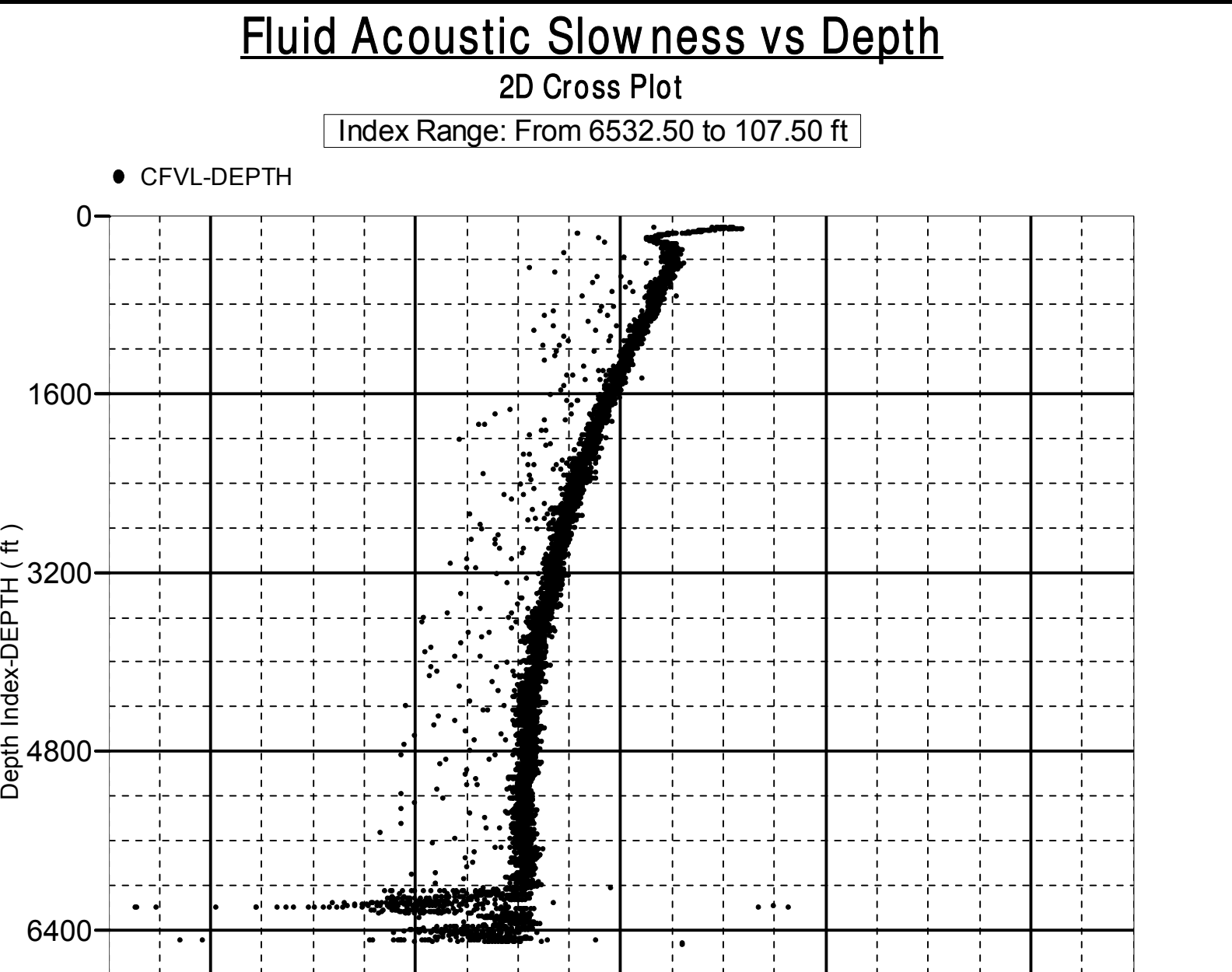
## Channel Processing Parameters

### 1A: Parameters

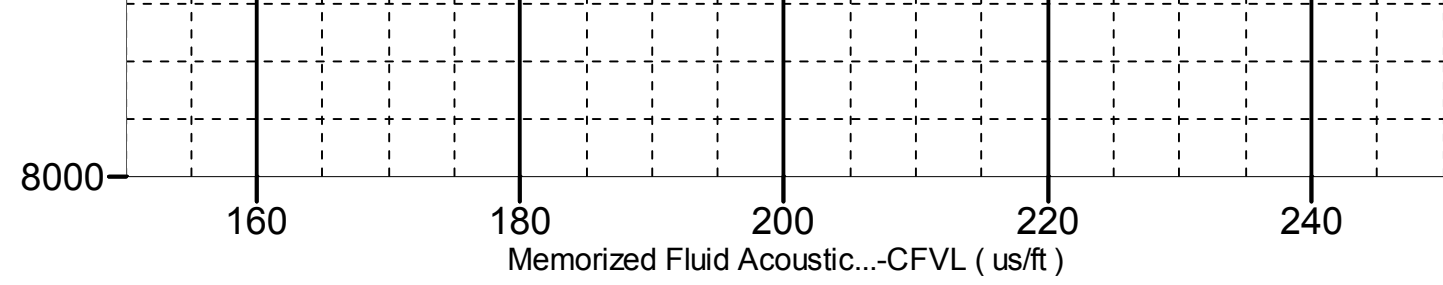
Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	13.5	in
CBLO	Casing Bottom (Logger)	WLSESSION	17063	ft
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DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
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ICE_PROCESS	ICE Processing	USIT-D	Yes	
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MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-D	22.44	us
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MUD_N_THE	Theoretical Mud Normalization Factor	USIT-D	1.15	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-D	0.1	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-D	Automatic	

USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-D	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-D	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-D	0.3	Mrayl

Tool Control Parameters				
1A: Parameters				
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AGMX	Maximum Gain of Cartridge	USIT-D	20	dB
EMXV	EMEX Voltage	USIT-D	50	V
HRES	Horizontal Resolution	USIT-D	10 deg	
ULOG	Logging Objective	USIT-D	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-D	500000	Hz
UPAT	USIT Emission Pattern	USIT-D	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-D	Uncompressed 10 deg at 6.0 in LF	
WINB	Window Begin Time	USIT-D	31.88	us
WINE	Window End Time	USIT-D	71.88	us
XYZ		Company:Noble Energy Inc Well:Wells Ranch BB09-665 1A: Log[4]:Up:S003		







XYZ

Company:Noble Energy Inc Well:Wells Ranch BB09-665

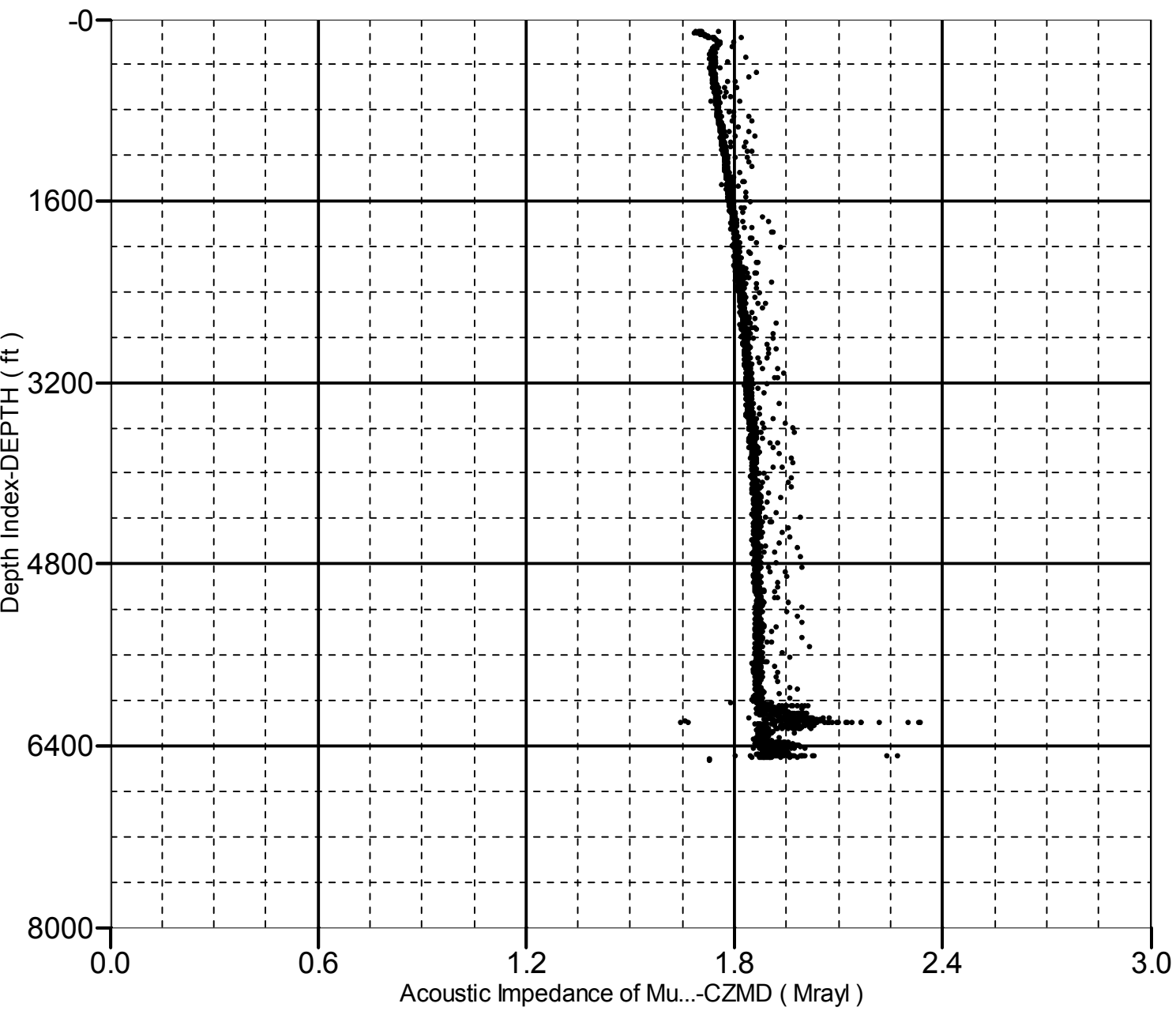
1A: Log[4]:Up:S003

# Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6532.50 to 107.50 ft

● CZMD-DEPTH



Company:	Noble Energy Inc	<b>Schlumberger</b>
Well:	Wells Ranch BB09-665	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	

