

Company: Noble Energy Inc.

Well: Wells Ranch AF07-645

Field: Wattenberg

County: Weld State: Colorado

DJ Basin UltraSonic Summary Print

| | | | | | |
|--------------|------------------------|---------------------------------|---------------|-----------|------------------|
| County: | Weld | | | | |
| Field: | Wattenberg | | | | |
| Location: | SENE Sec. 8, T5N, R62W | | | | |
| Well: | Wells Ranch AF07-645 | | | | |
| Company: | Noble Energy Inc. | | | | |
| | | SENE Sec. 8, T5N, R62W | Elev.: | K.B. | 4734.00 ft |
| | | SHL: 2388' FNL & 175' FEL | | G.L. | 4704.00 ft |
| | | Lat: 40.41496, Long: -104.33836 | | D.F. | 4734.00 ft |
| | | Permanent Datum: | Ground Level | Elev.: | 4704.00 f |
| | | Log Measured From: | Kelly Bushing | 30.00 ft | above Perm.Datum |
| | | Drilling Measured From: | Kelly Bushing | | |
| | | API Serial No. | Section: | Township: | Range: |
| | | 05-123-44250 | 8 | 5N | 62W |
| Logging Date | 07-Aug-2017 | | | | |

| | | |
|---------------------------|----------------|-------------|
| Run Number | ONE | |
| Depth Driller | 16015.00 ft | |
| Schlumberger Depth | 6515.00 ft | |
| Bottom Log Interval | 6515.00 ft | |
| Top Log Interval | 63.00 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 | 1952.00 ft | |
| To | 6515.00 ft | |
| Casing/Tubing Size | 5.5 in | |
| Weight | 20 lbm/ft | |
| Grade | N/A | |
| From | 30.00 ft | |
| To | 6515.00 ft | |
| Max Recorded Temperatures | 193 degF | |
| Logger on Bottom | 07-Aug-2017 | 19:00:00 |
| Unit Number | Location: | Time |
| Recorded By | 2377 | Fort Morgan |
| Witnessed By | Camila Lang | |
| | Bill Mansfield | |

Disclaimer

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12.1 Integration Summary

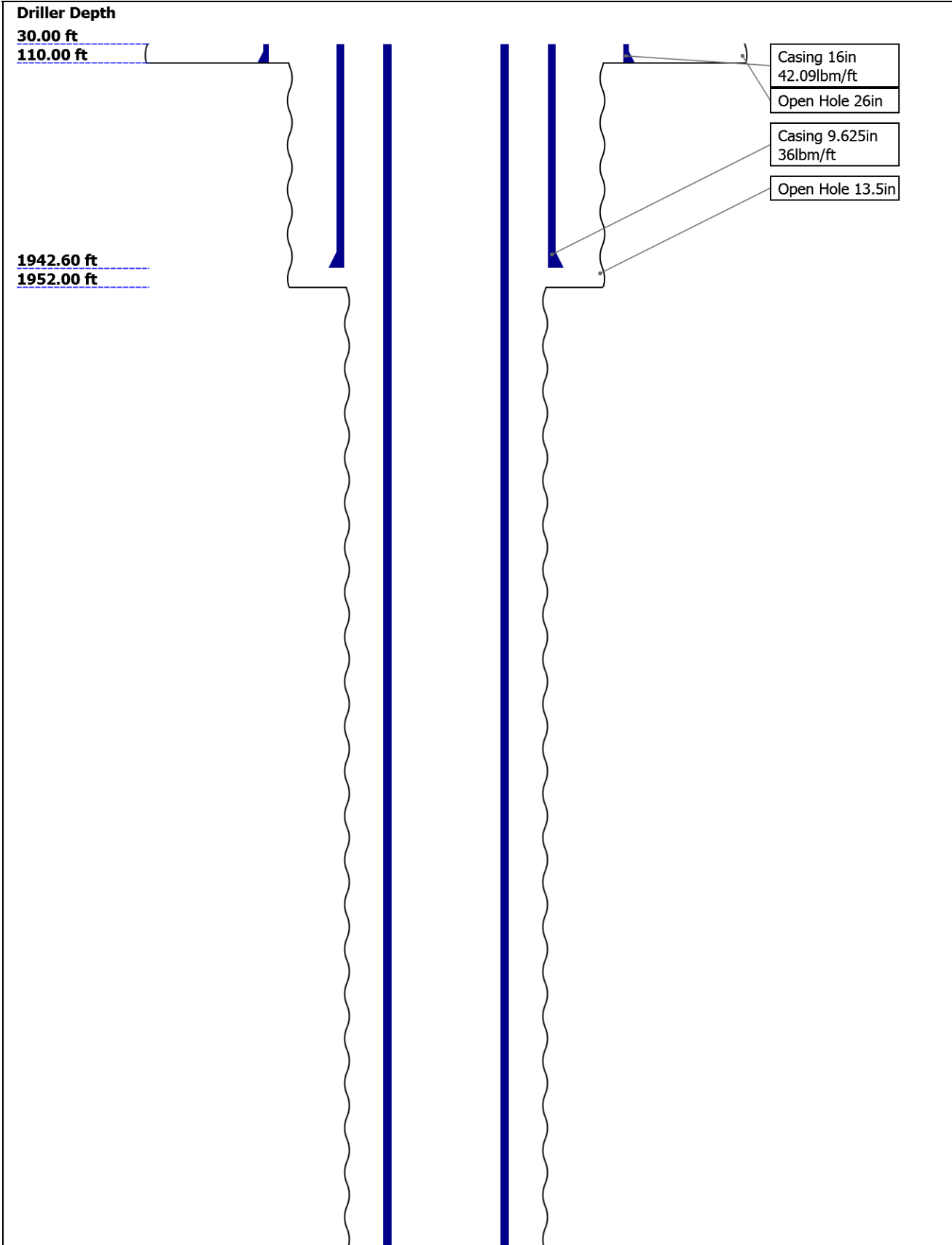
12.2 Software Version

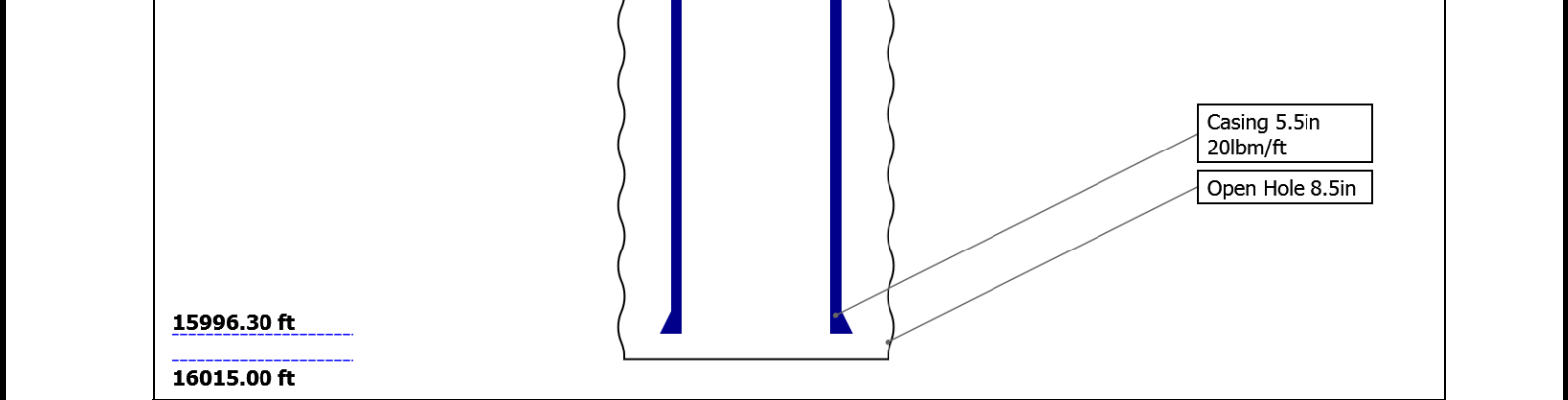
12.3 Composite Summary

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 | 13.5 | 8.5 | | | |
| Top Driller (ft) | 30 | 110 | 1952 | | | |
| Top Logger (ft) | 30 | 110 | 1952 | | | |
| Bottom Driller (ft) | 110 | 1952 | 16015 | | | |
| Bottom Logger (ft) | 110 | 1952 | 6515 | | | |
| Casing | | | | | | |
| Size (in) (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 | 1942.6 | 15996.3 | | | |
| Bottom Logger (ft) | 110 | 1942.6 | 6515 | | | |

Operational Run Summary

| | | | | | | |
|----------------------------------|-------------|--|--|--|--|--|
| Parameter (unit) | ONE | | | | | |
| Date Log Started | 07-Aug-2017 | | | | | |
| Time Log Started | 19:32:36 | | | | | |
| Date Log Finished | 07-Aug-2017 | | | | | |
| Time Log Finished | 20:57:58 | | | | | |
| | | | | | | |
| Top Log Interval (ft) | 63.00 | | | | | |
| Bottom Log Interval (ft) | 6515.00 | | | | | |
| | | | | | | |
| Total Depth (ft) | 6515.00 | | | | | |
| 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 | | | | | |

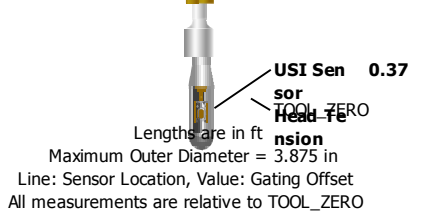
| | | | | | | |
|----------------------|----------------|--|--|--|--|--|
| Witnessed By | Bill Mansfield | | | | | |
| Service Order Number | DVVV-00010 | | | | | |

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 | 19:00:00 | | | | | |
| 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>SAH-F:18</div> <div>30.91</div> <div>17</div> </div> <div> <div>EDTC-B:8</div> <div>26.06</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>AH-184[2]:1951</div> <div>19.56</div> </div> <div> <div>AH-184[1]:2826</div> <div>17.56</div> </div> <div> <div>USIT-E:92</div> <div>15.56</div> <div>1</div> <div>ECH-MFA:1908</div> <div>USAC-A:921</div> <div>USIS-A:902</div> <div>USSC-B:1730</div> <div>USRS-A:786</div> <div>USI-SENSOR</div> </div> | <div> <div>MP name</div> <div>Offset</div> </div> <div>CTEM</div> <div>22.56</div> <div>ACCZ</div> <div>0.00</div> <div>HV</div> <div>0.00</div> <div>Gamma Ray</div> <div>20.69</div> <div>TelStatu</div> <div>19.56</div> <div>s</div> | | This is the first log in the well. | | |
| | | | Tool ran as per tool sketch | | |
| | | | CSG: 9.625" 36lb/ft @ 1942.6' | | |
| | | | 5.5" 20lb/ft @ 15996.3' | | |
| | | | Main pass recorded at 2500 psi, and repeat pass recorded at 0 psi. | | |
| | | | BHT: 183 degF | | |
| | | | Data below 5900' is in the curve and eccentralized. | | |

| | | | |
|---|-----------------------|--|------------------|
| <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 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[6]:Up | 6516.95 | 62.80 |
| 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 : 27.44m(90.02ft) to 28.83m(94.60ft) MUD_N_FRP = 1.06 DFD = 1.01g/cm3(8.40lbm/gal) CZMD median computed in free pipe normalization interval = 1.51 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[6]:Up | Up | 62.80 ft | 6516.95 ft | 07-Aug-2017 8:18:17 PM | 07-Aug-2017 8:57:26 PM | ON | 7.73 ft | Yes |

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc.

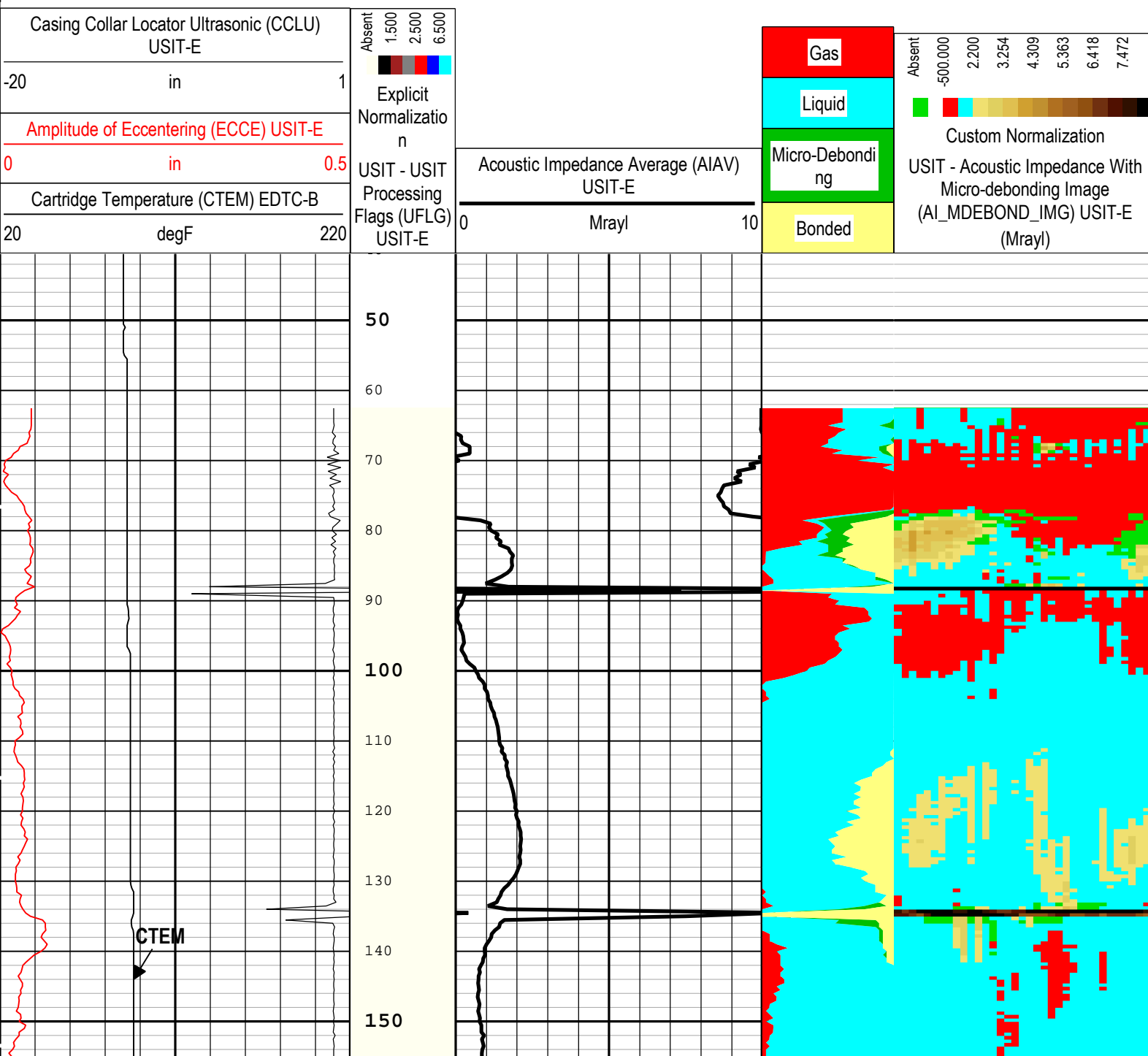
Well:Wells Ranch AF07-645

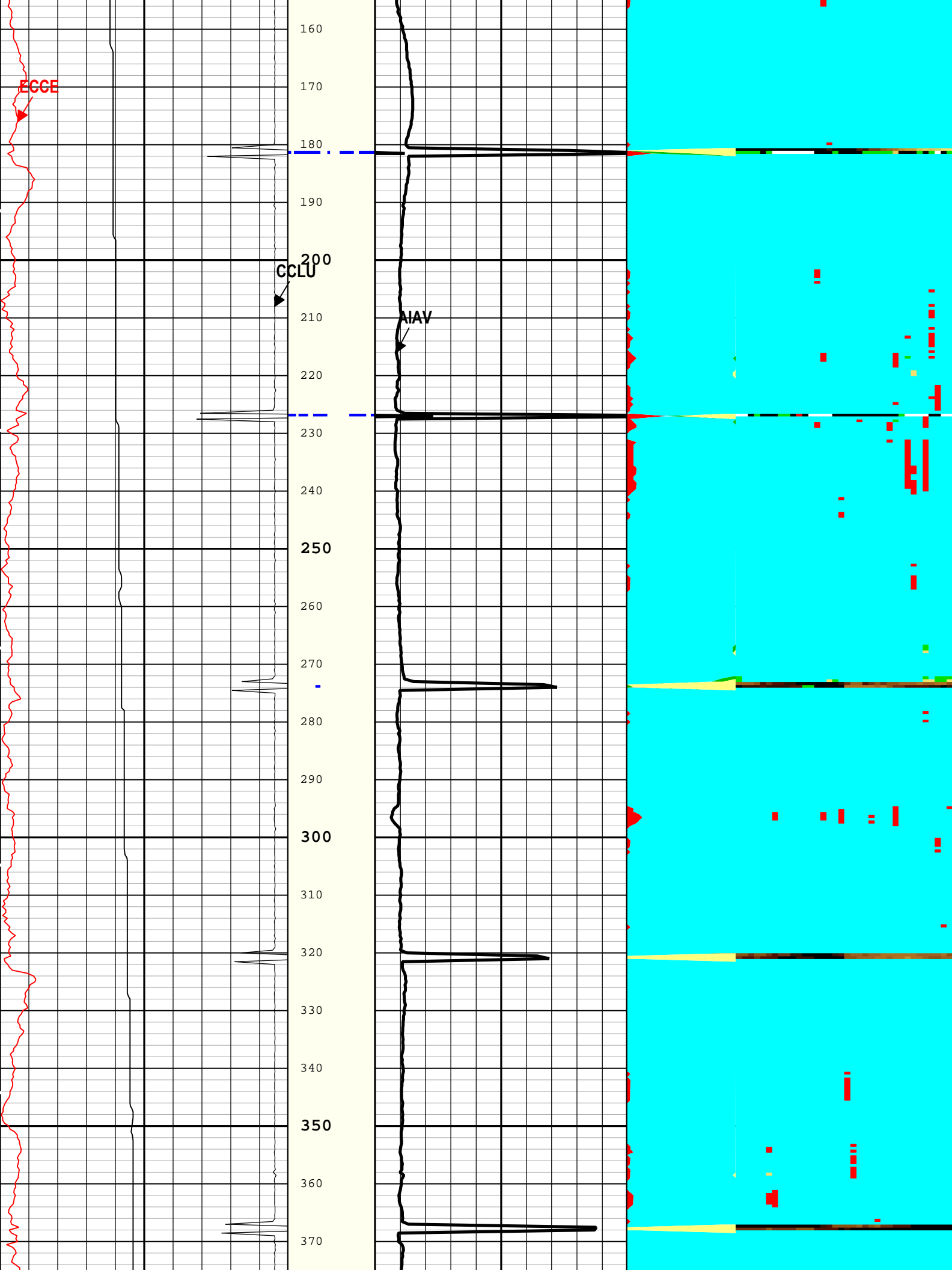
ONE: Log[6]:Up:S006

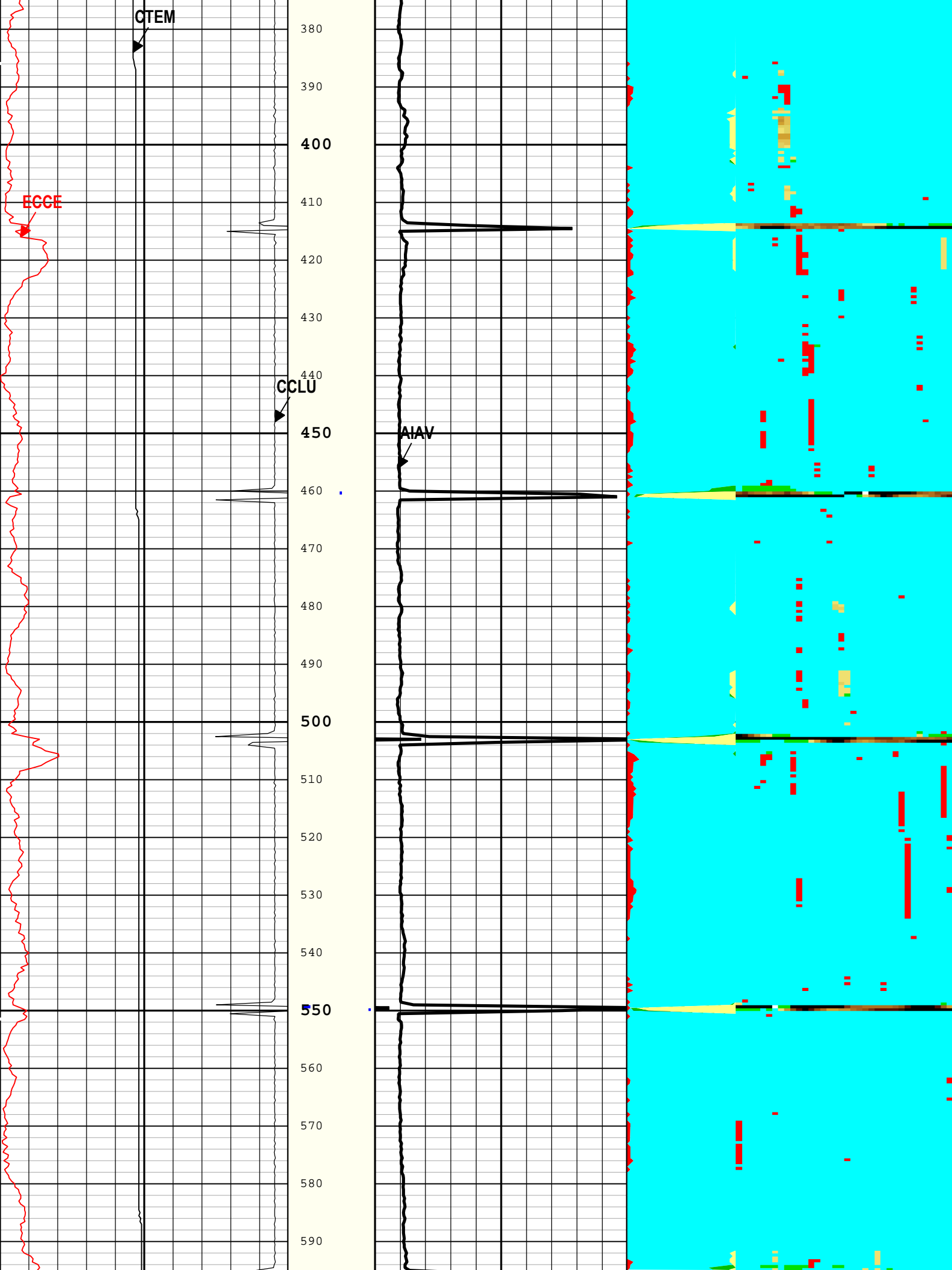
Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

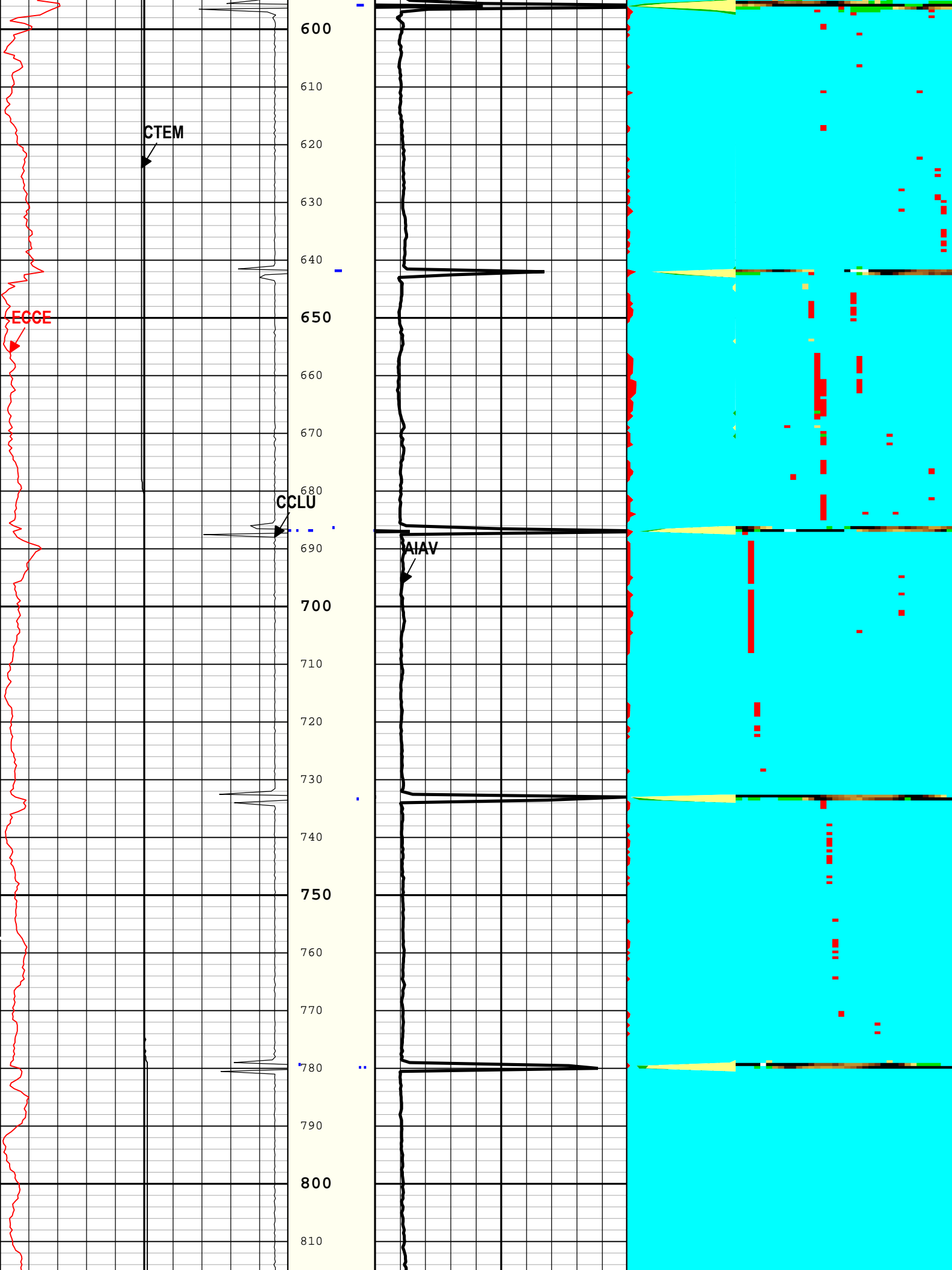
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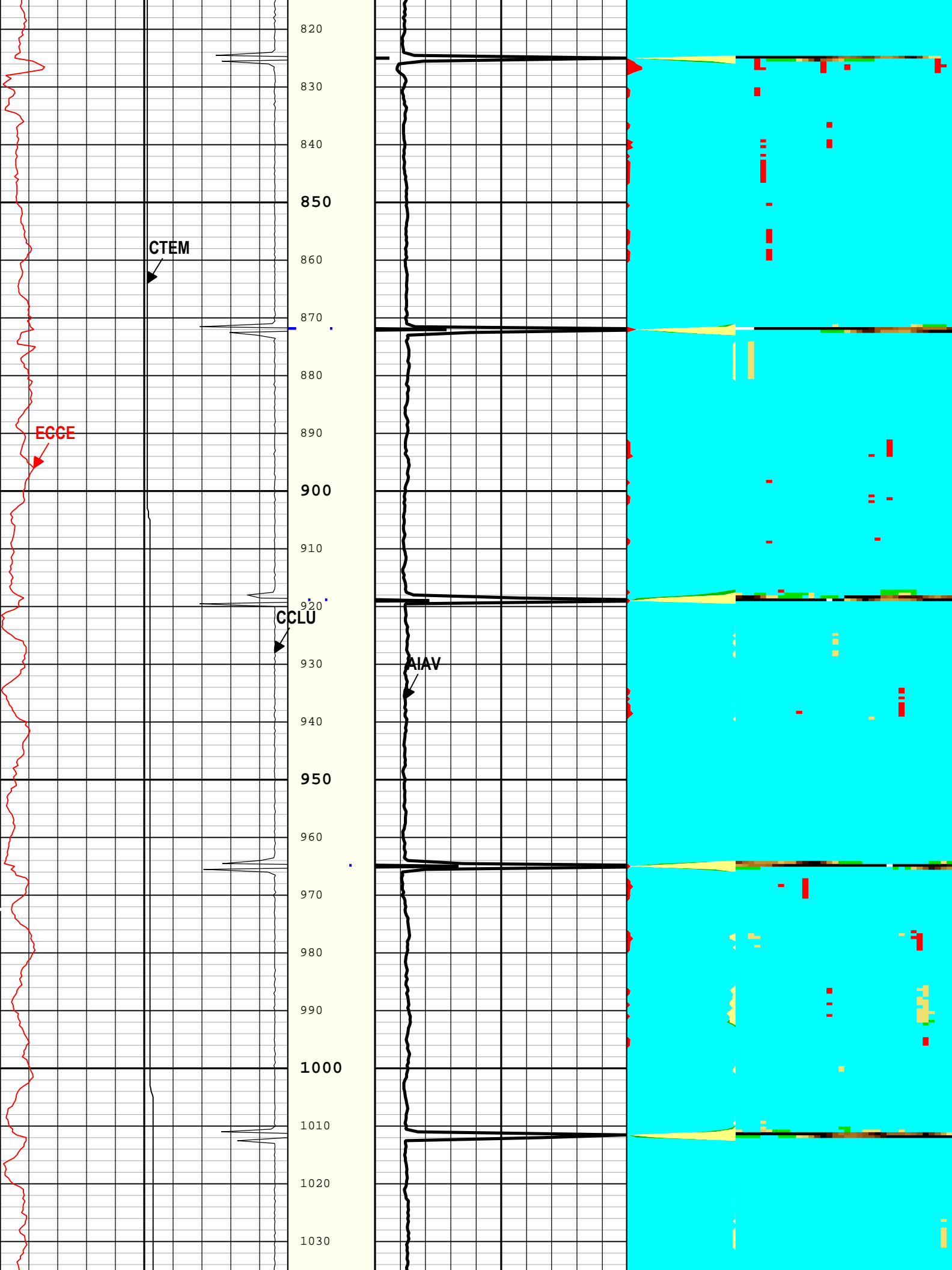
TIME_1900 - Time Marked every 60.00 (s)

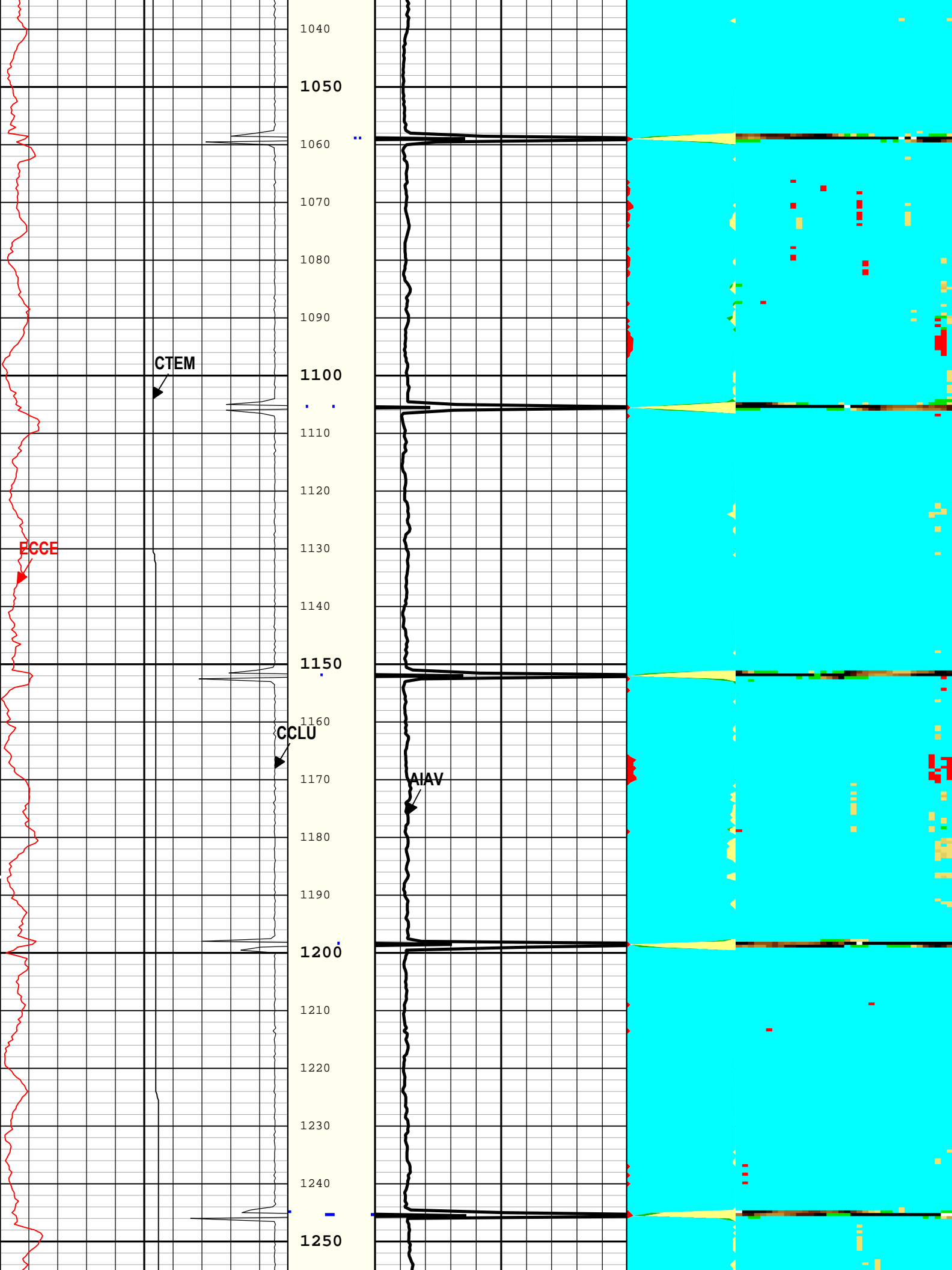


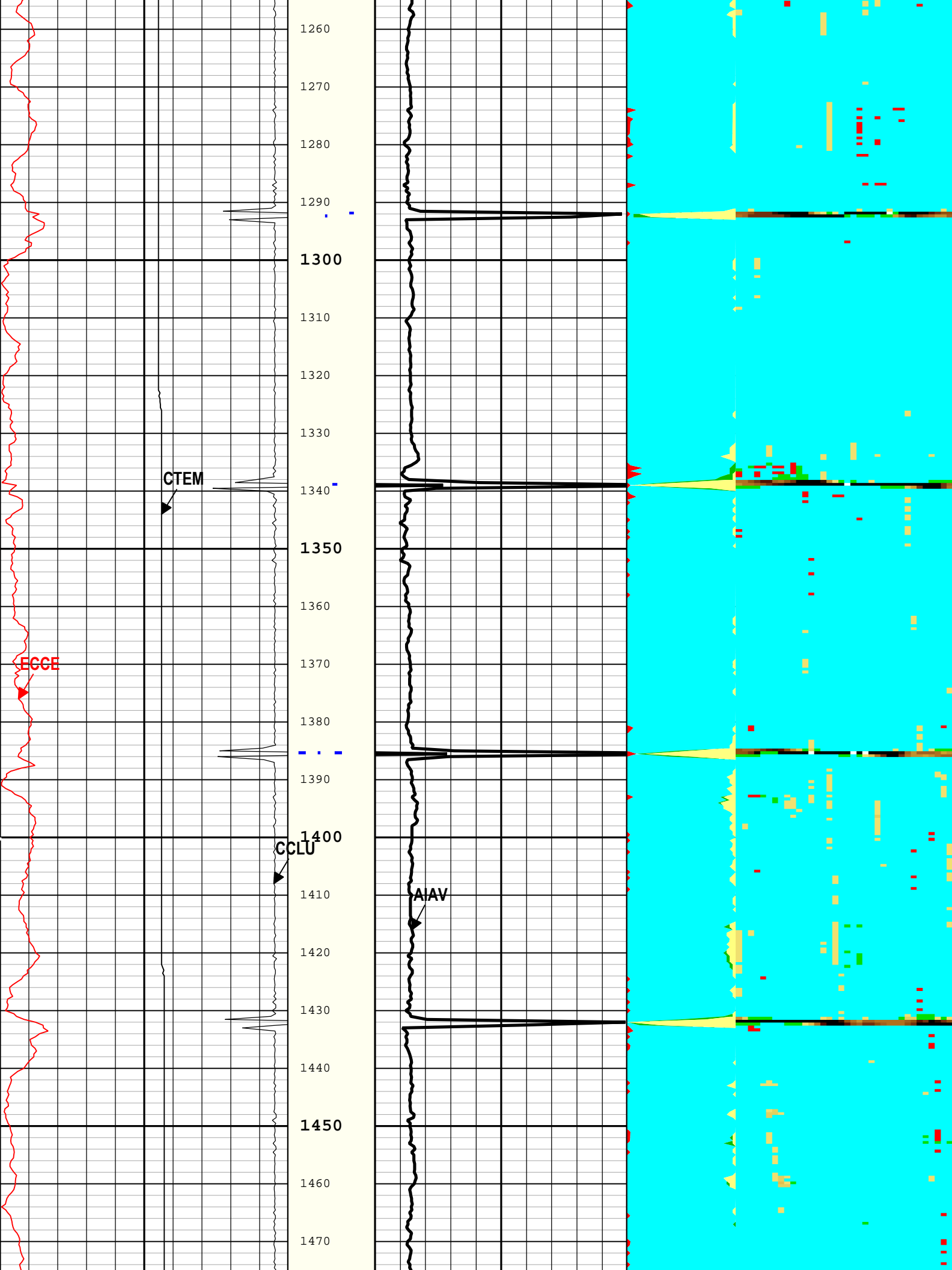


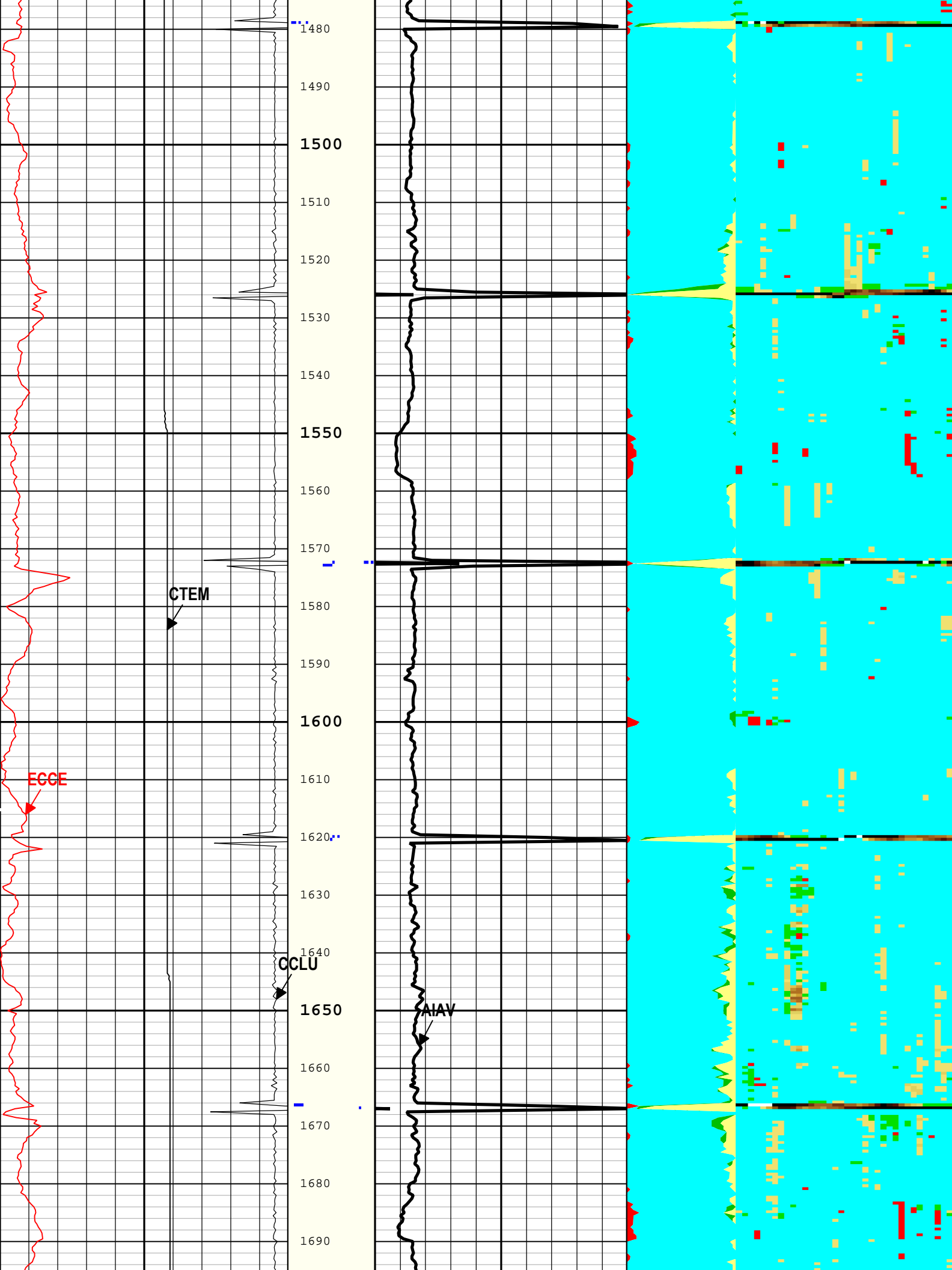


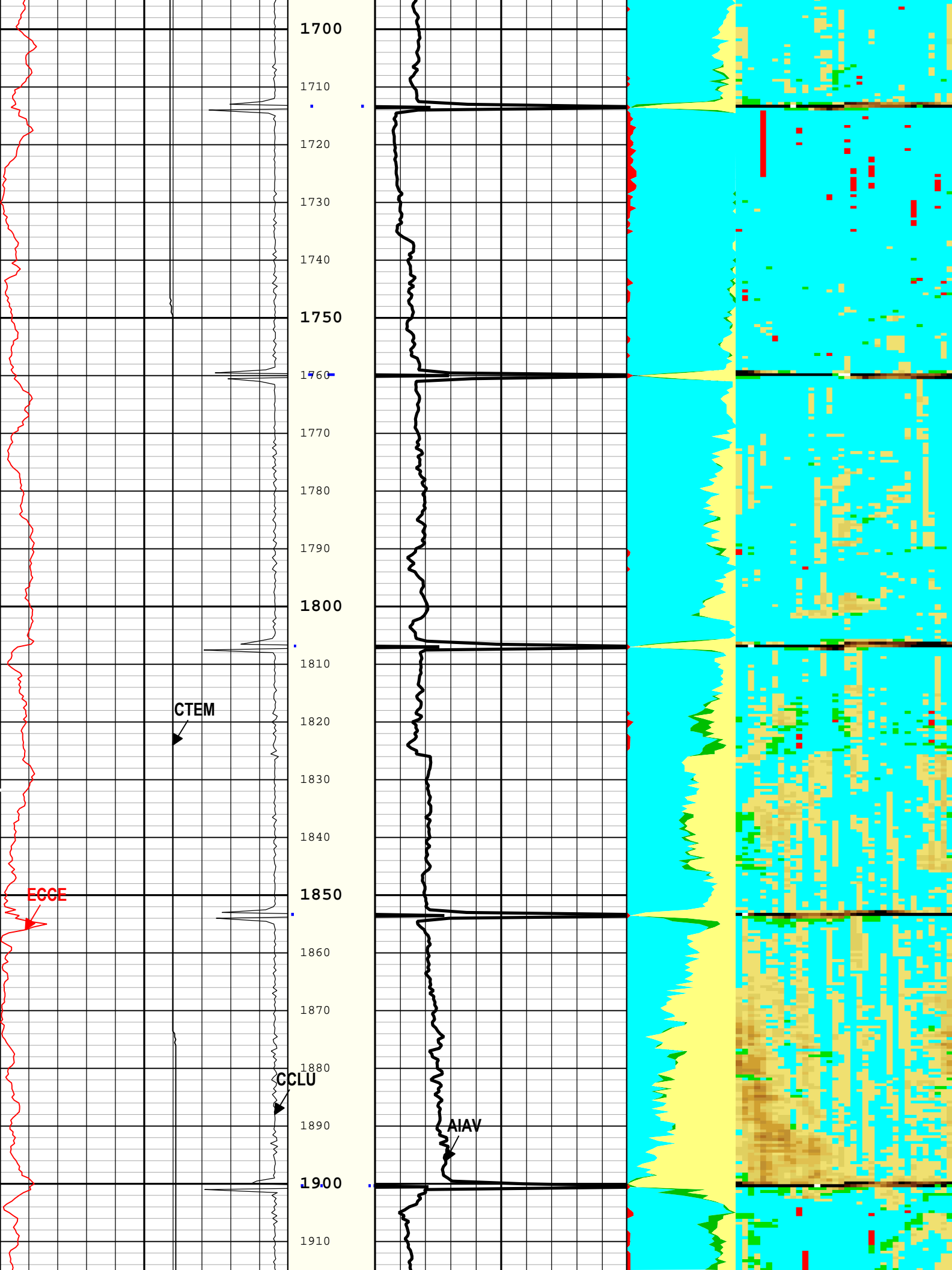


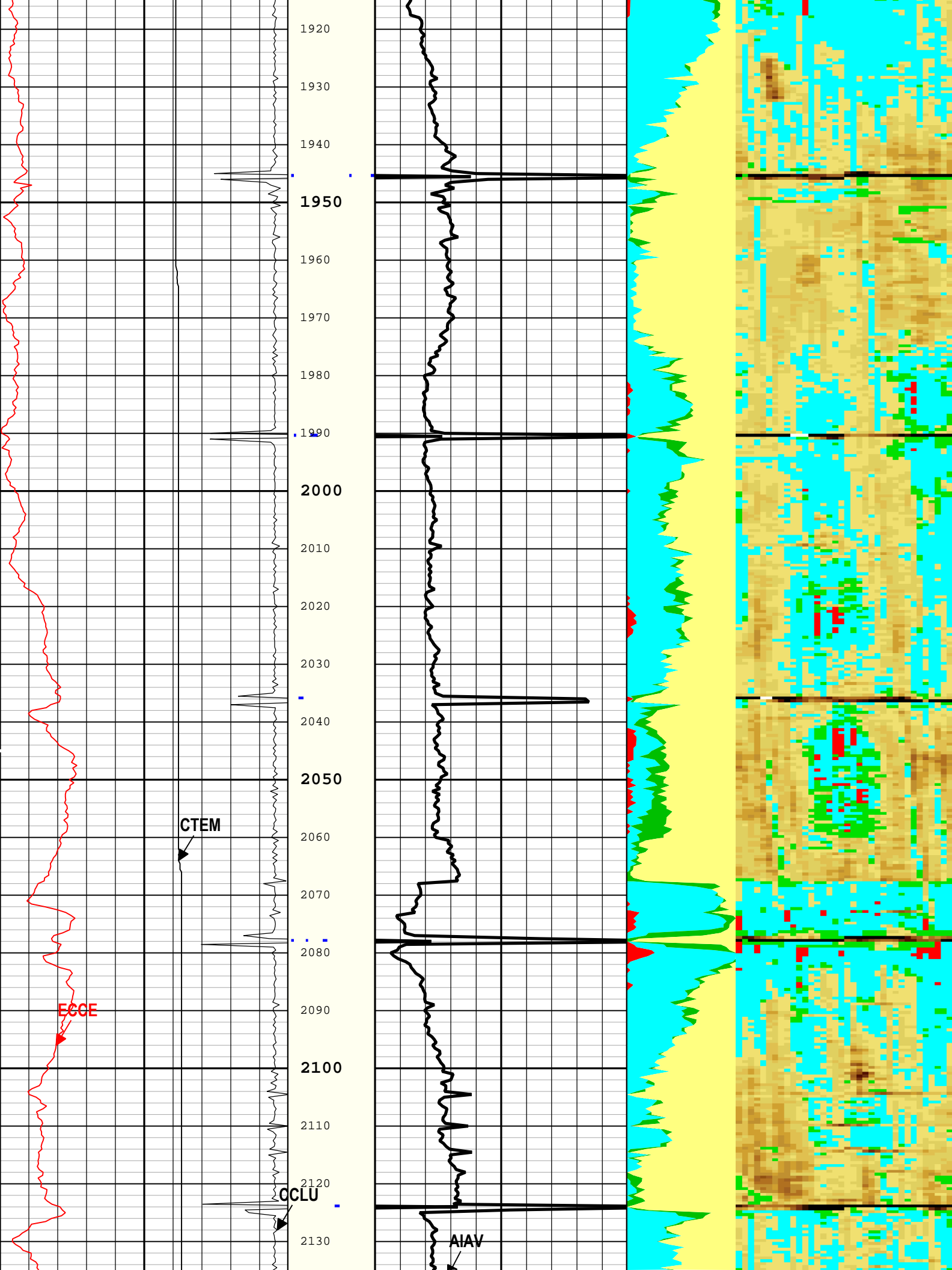


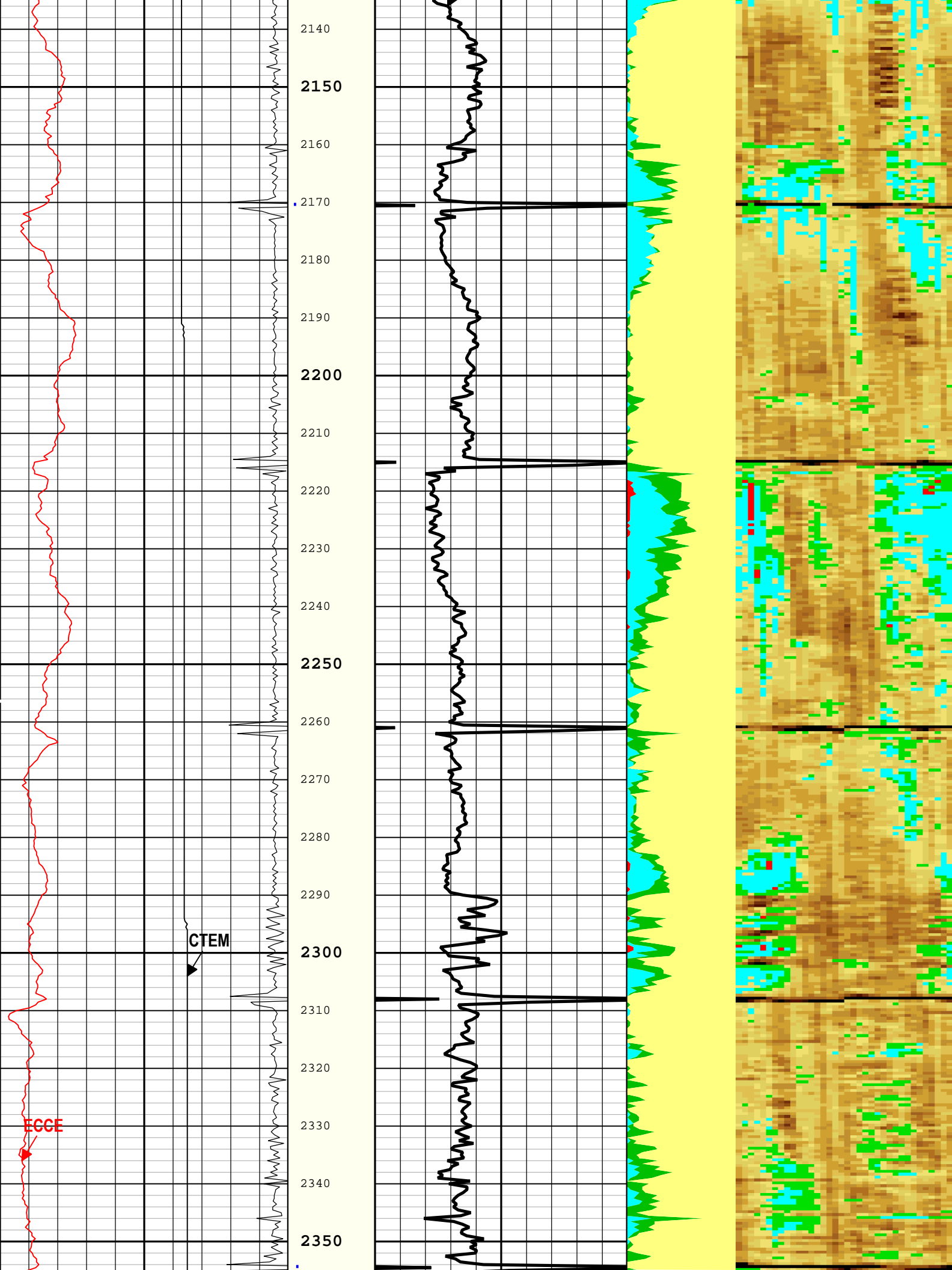


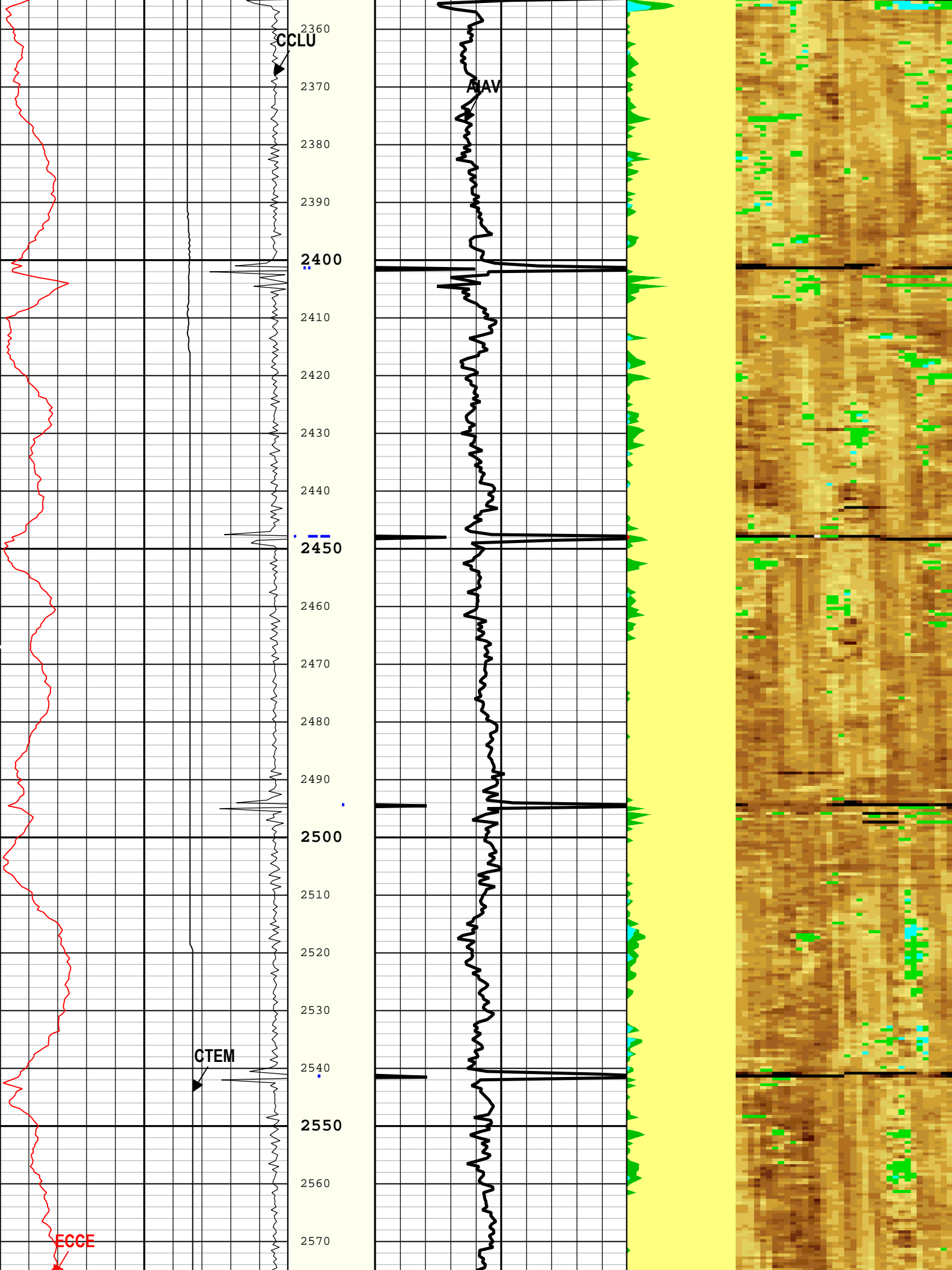


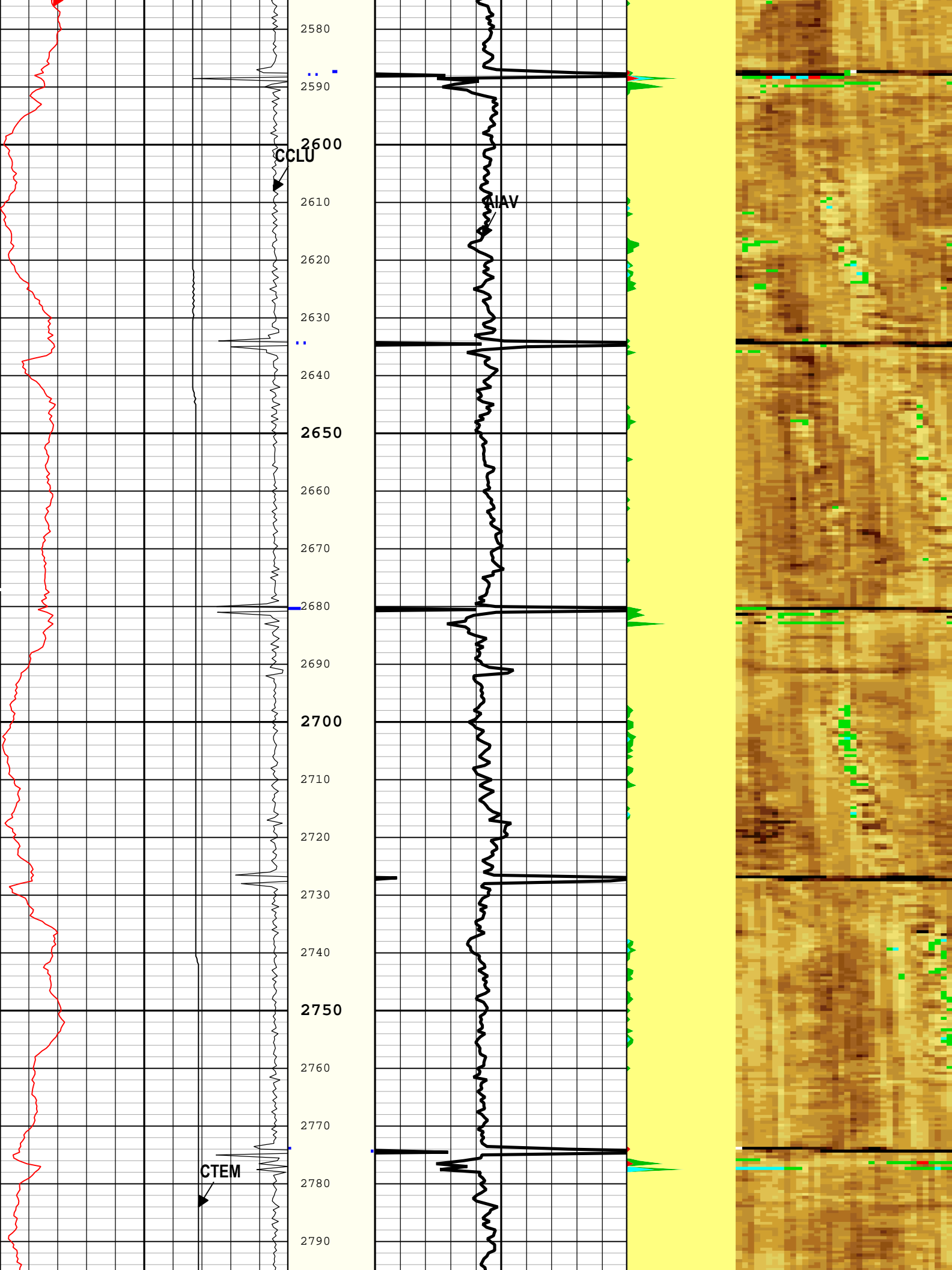


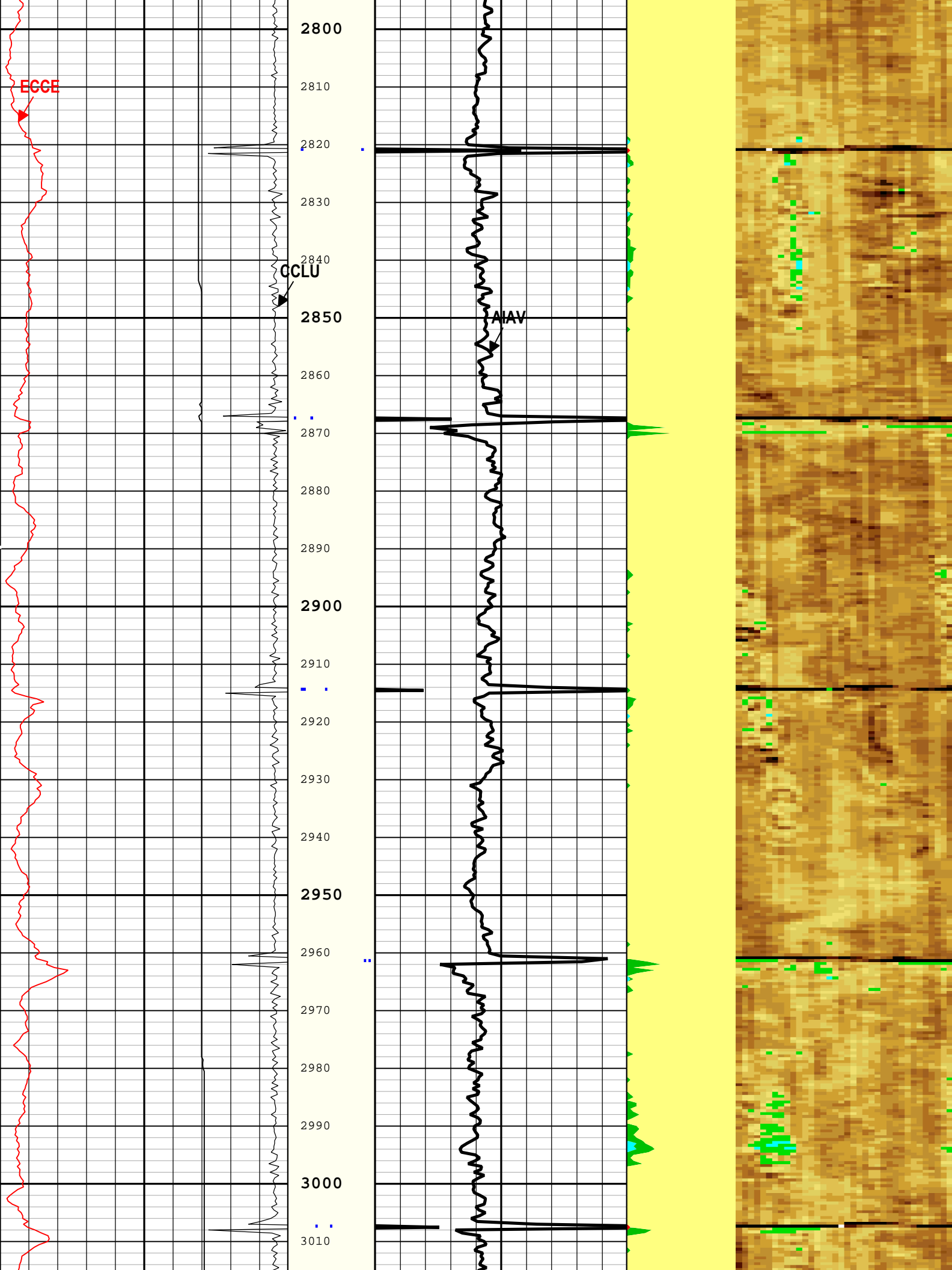


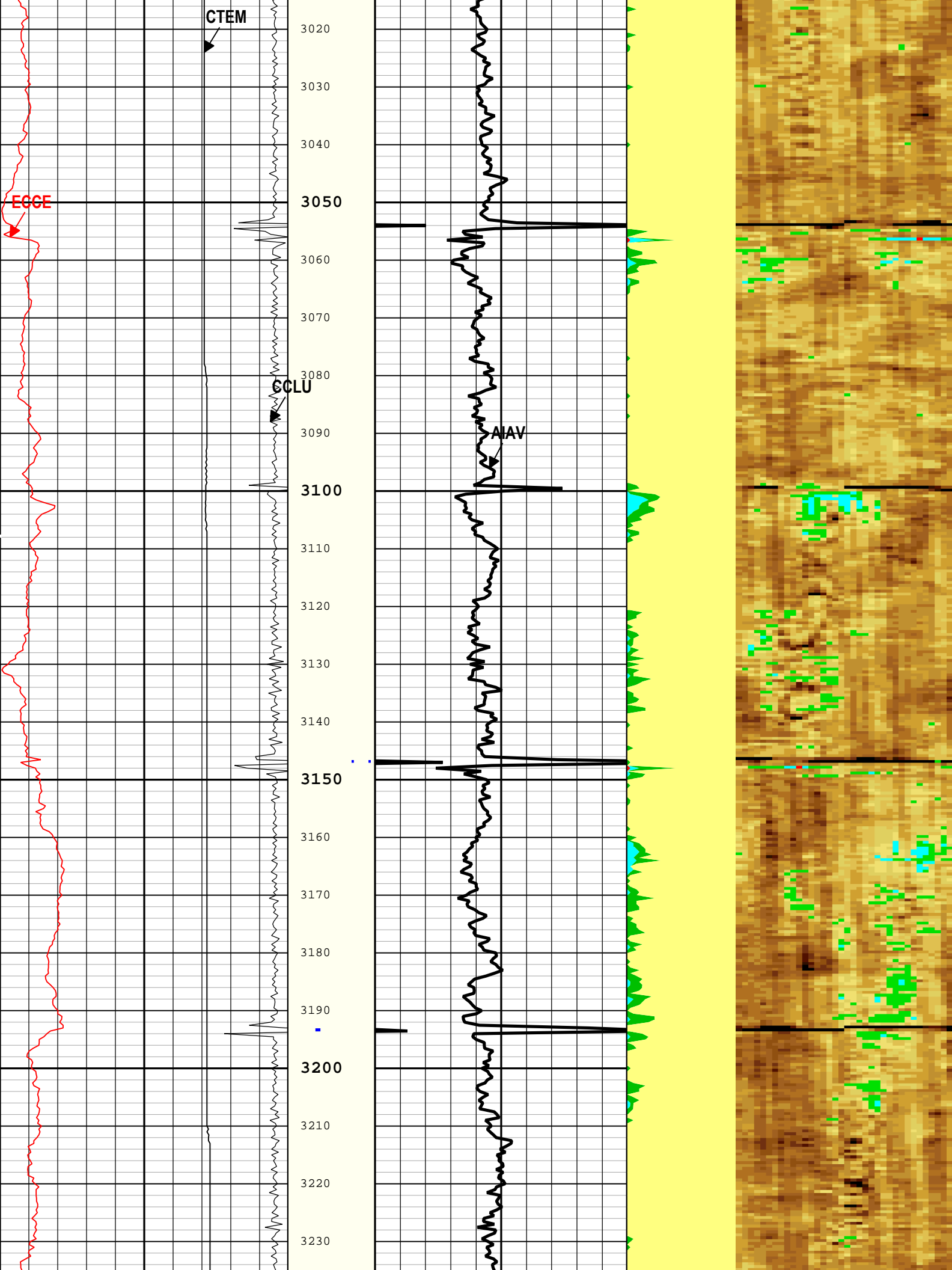


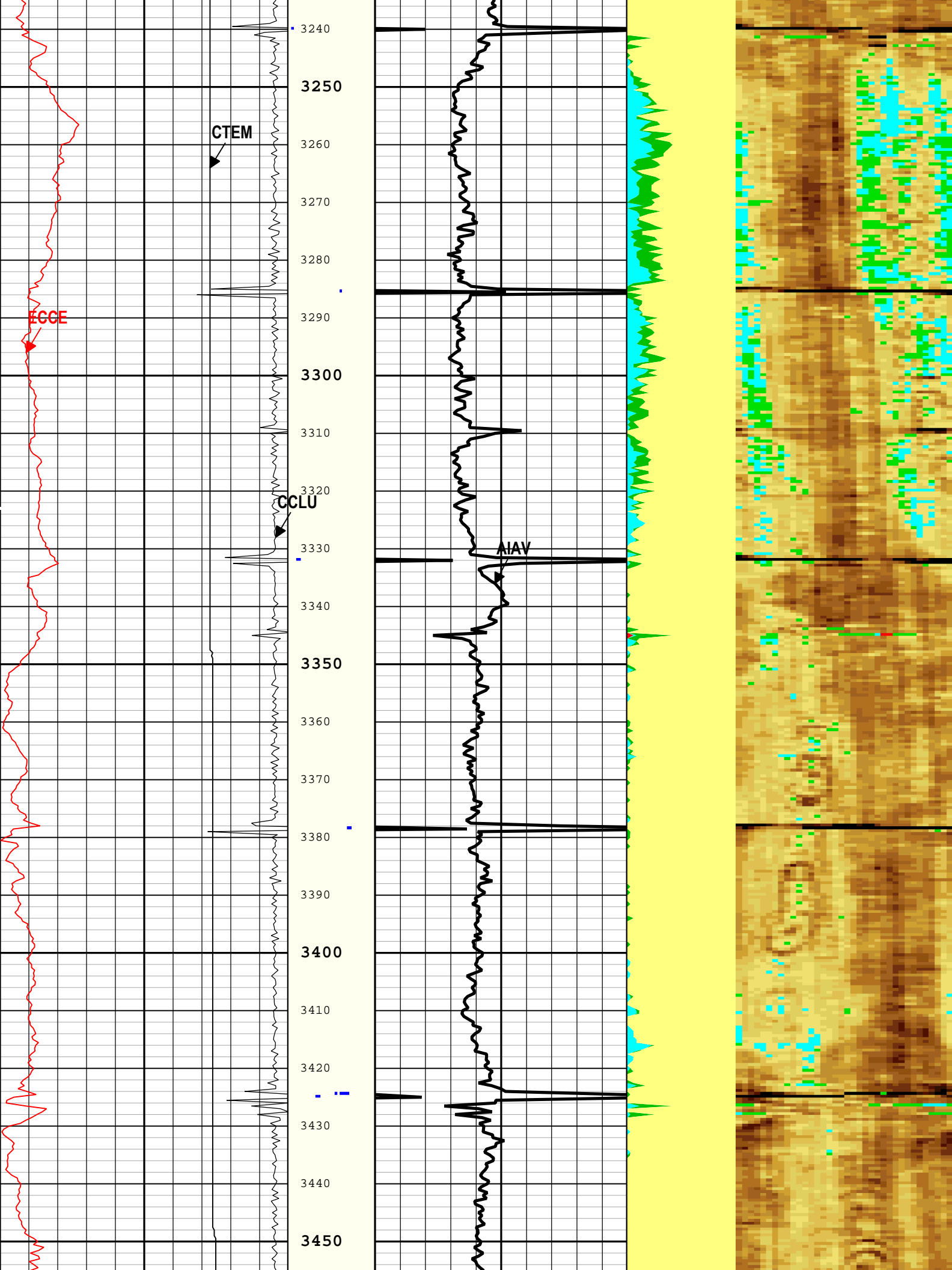


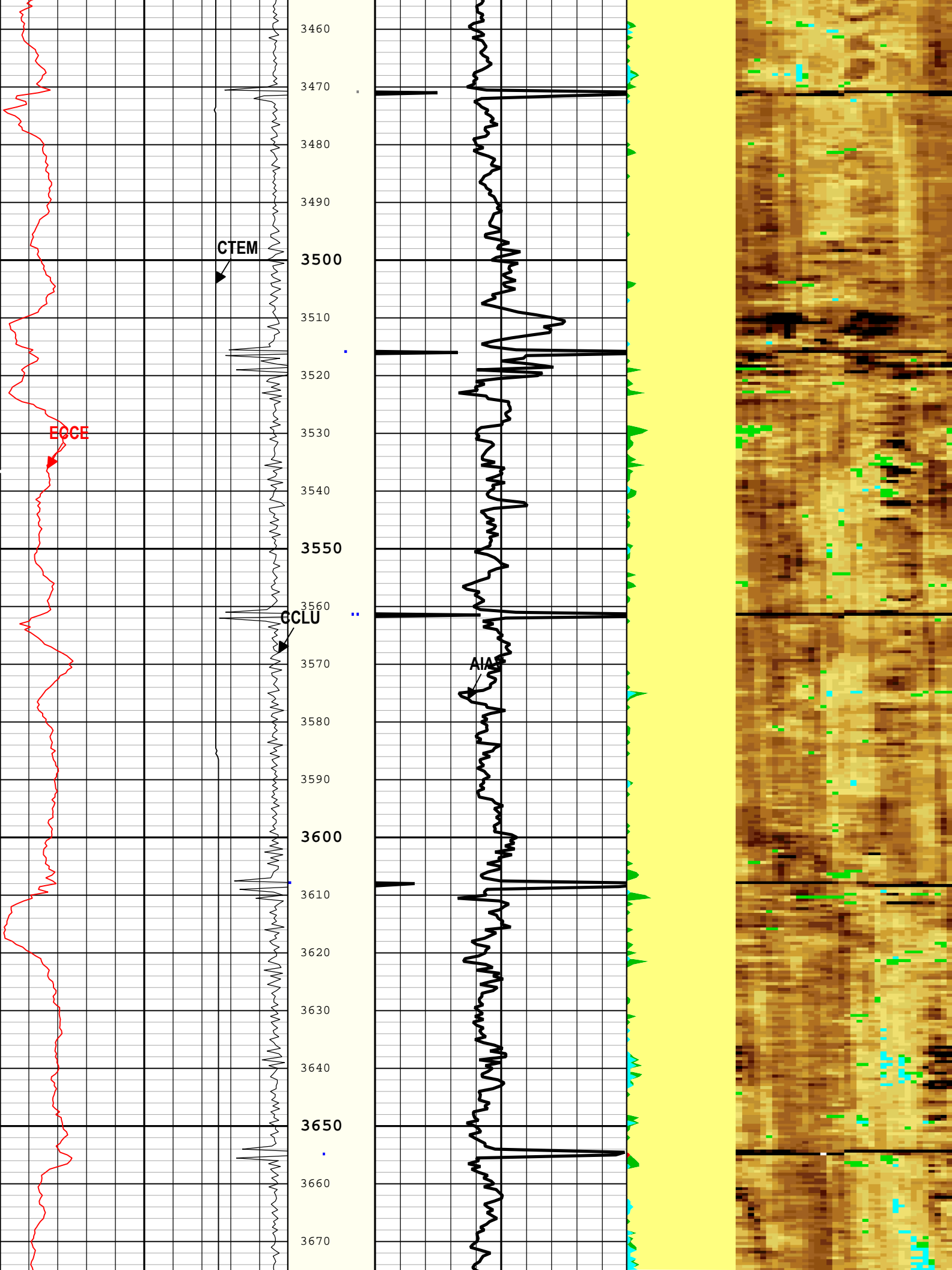


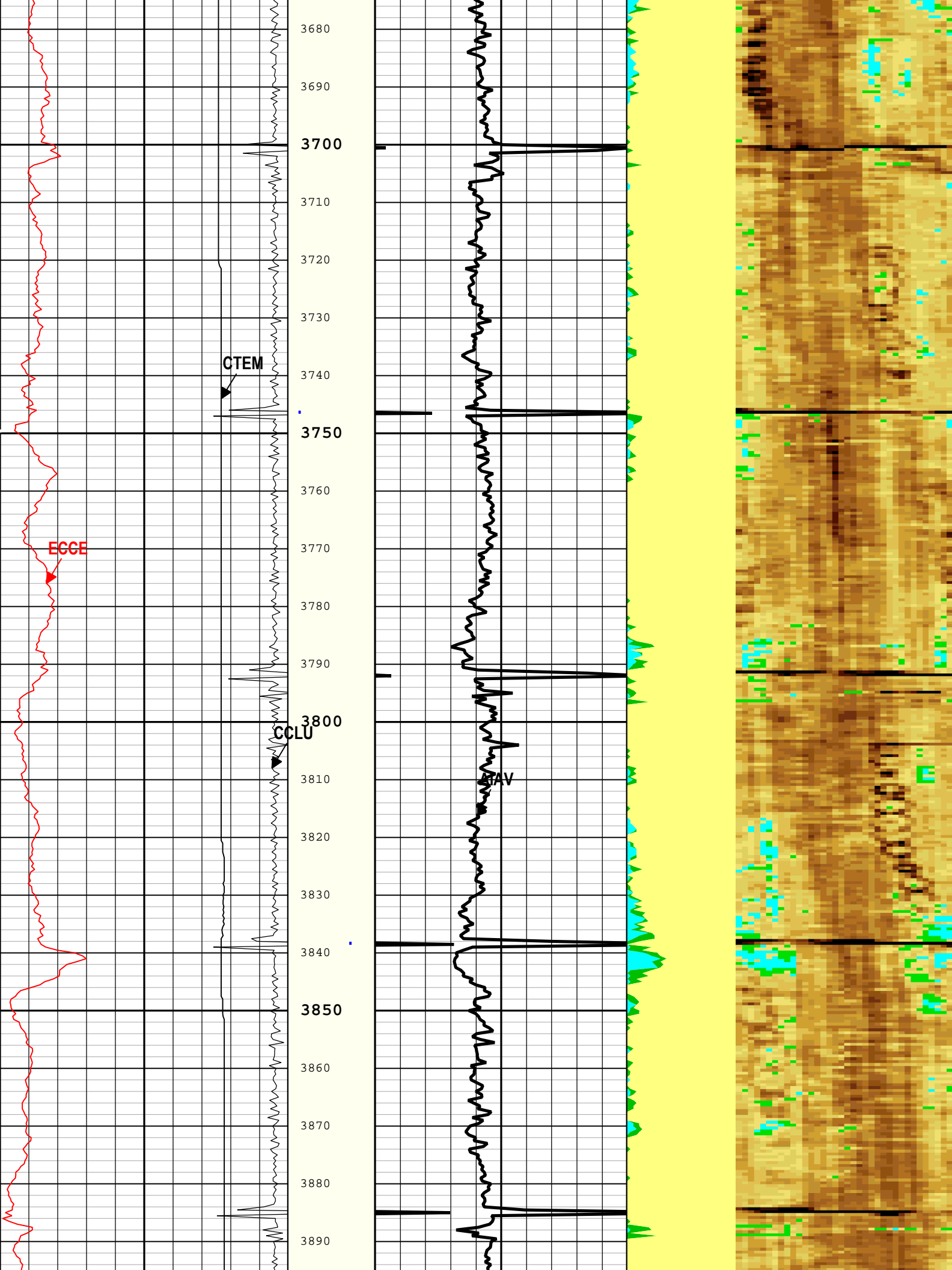


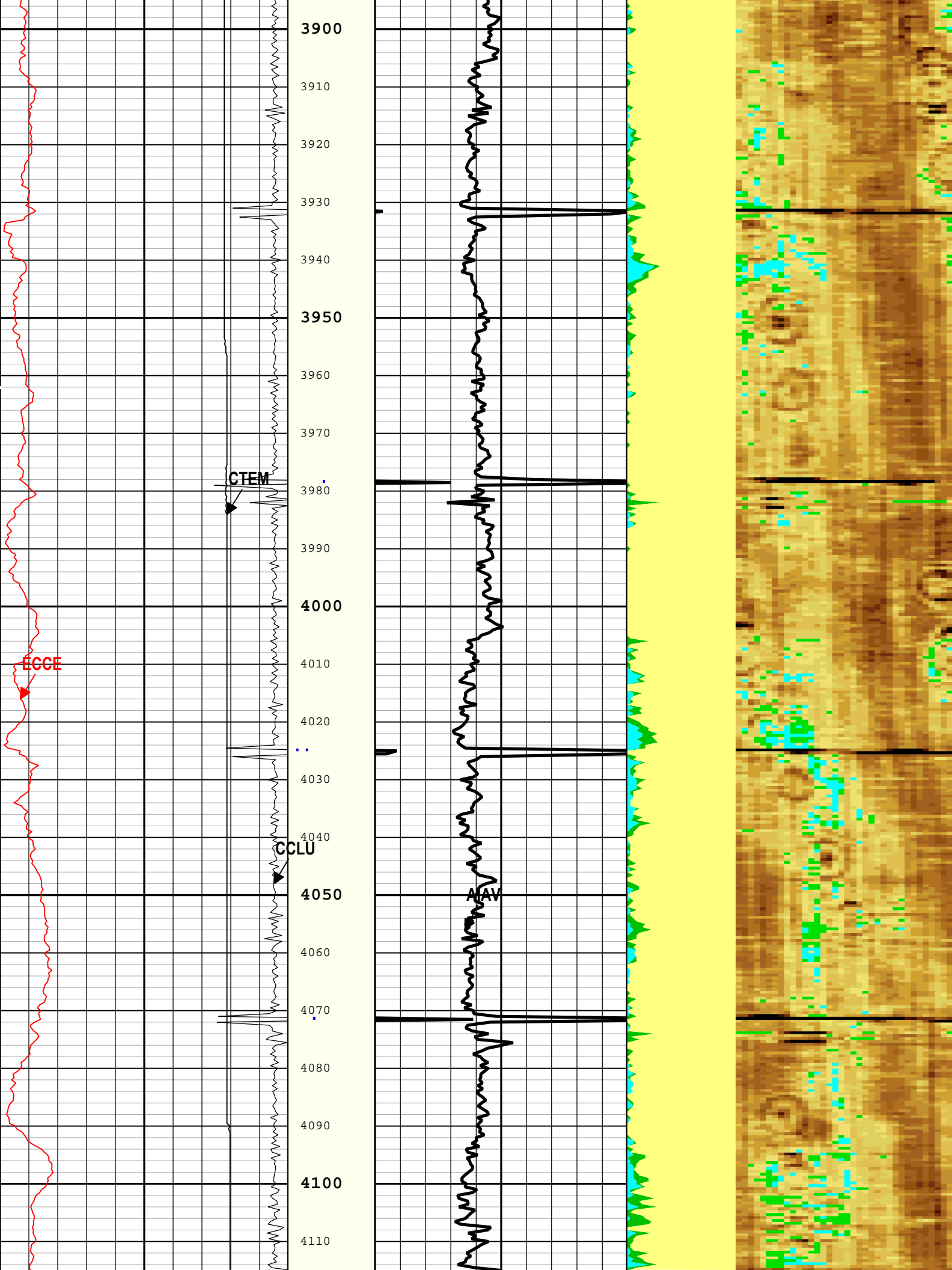


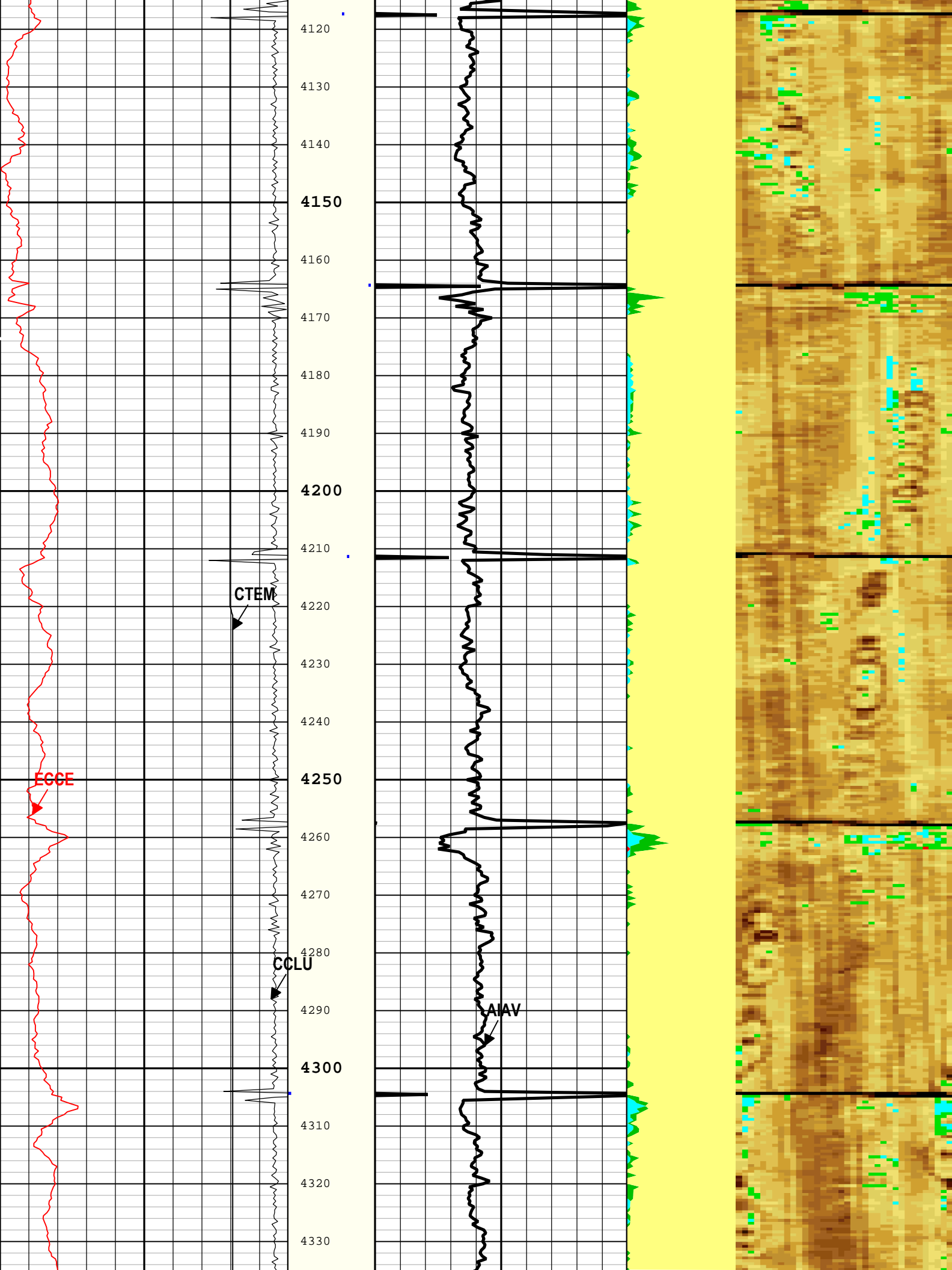


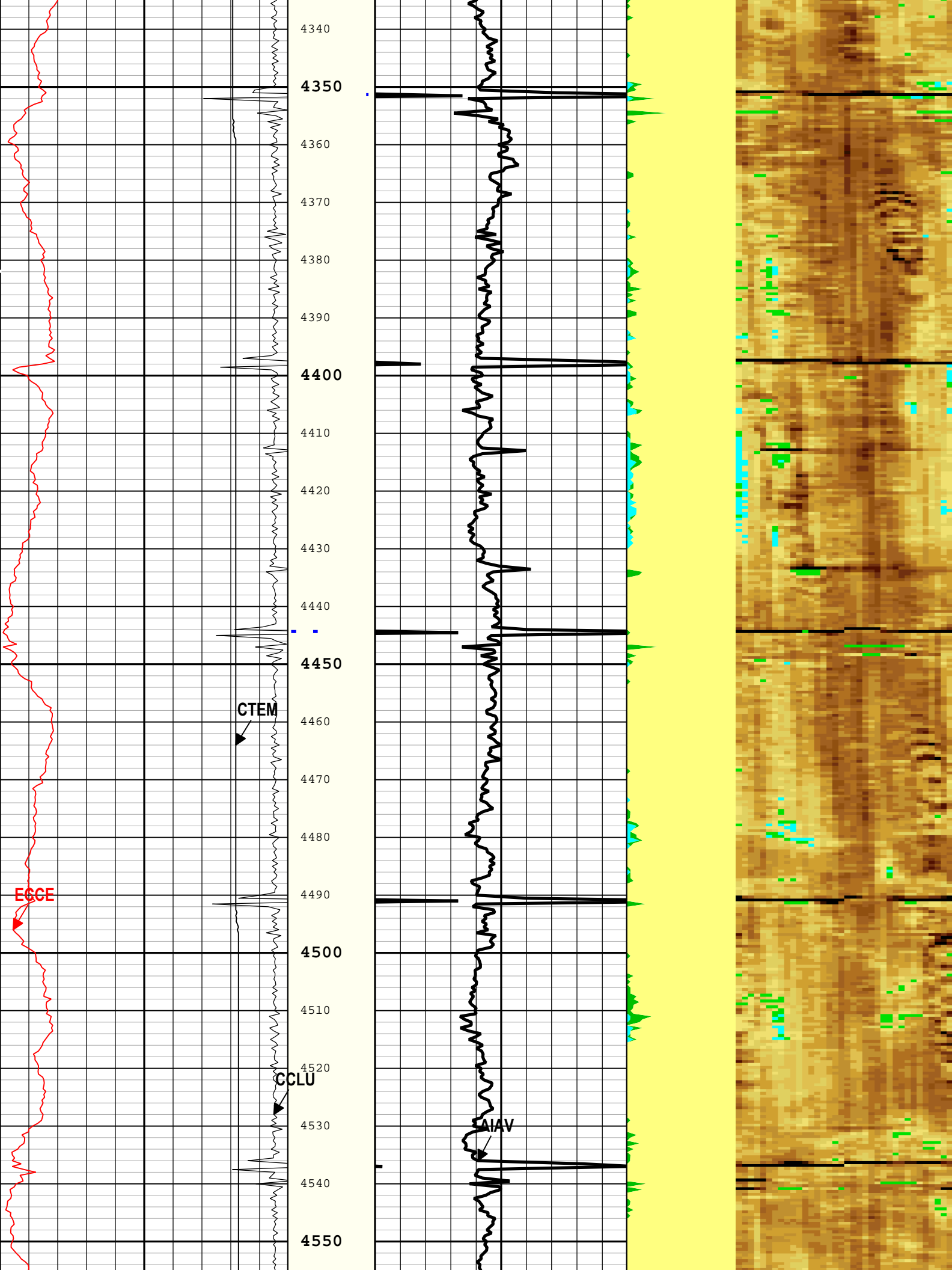


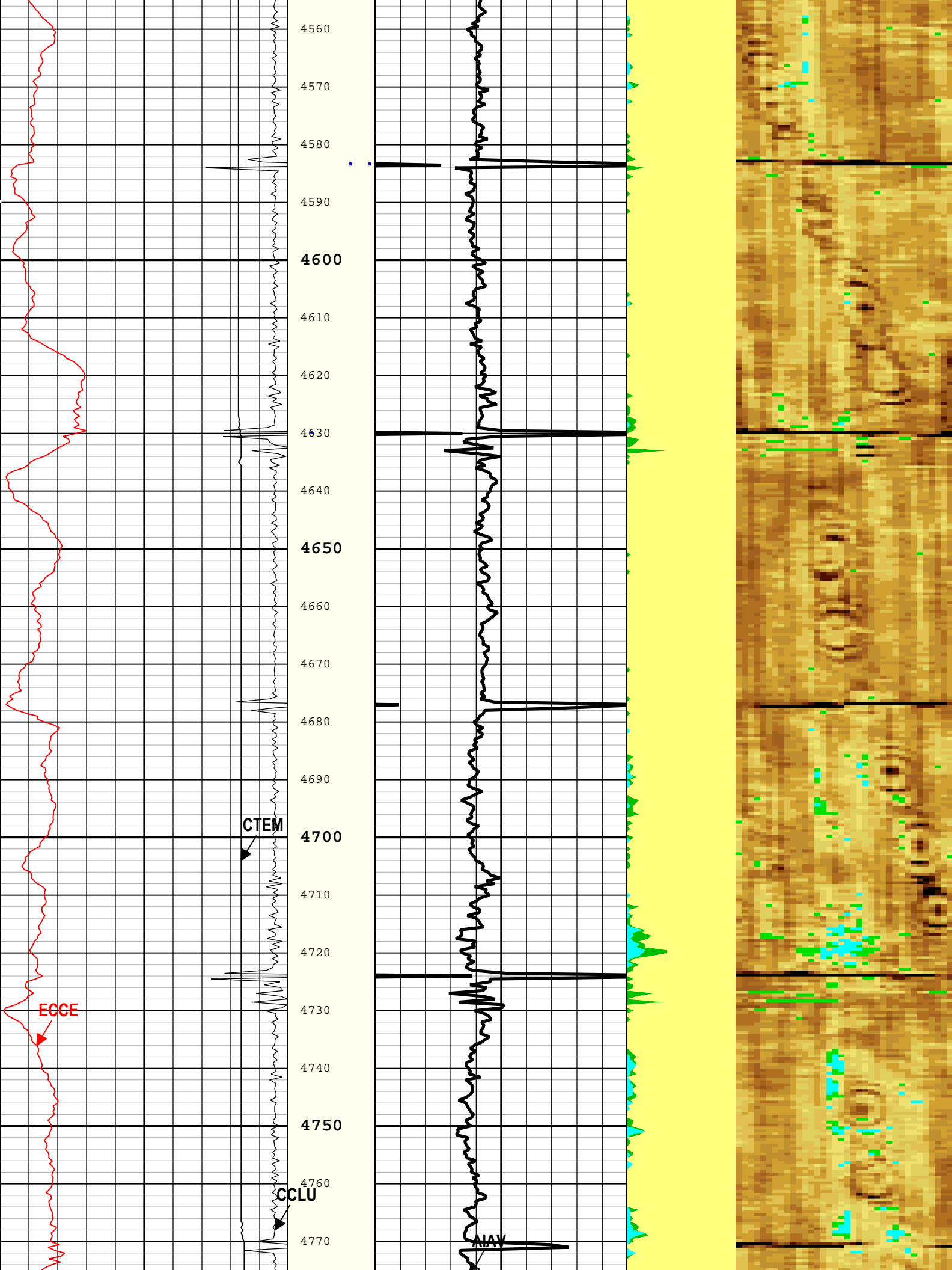


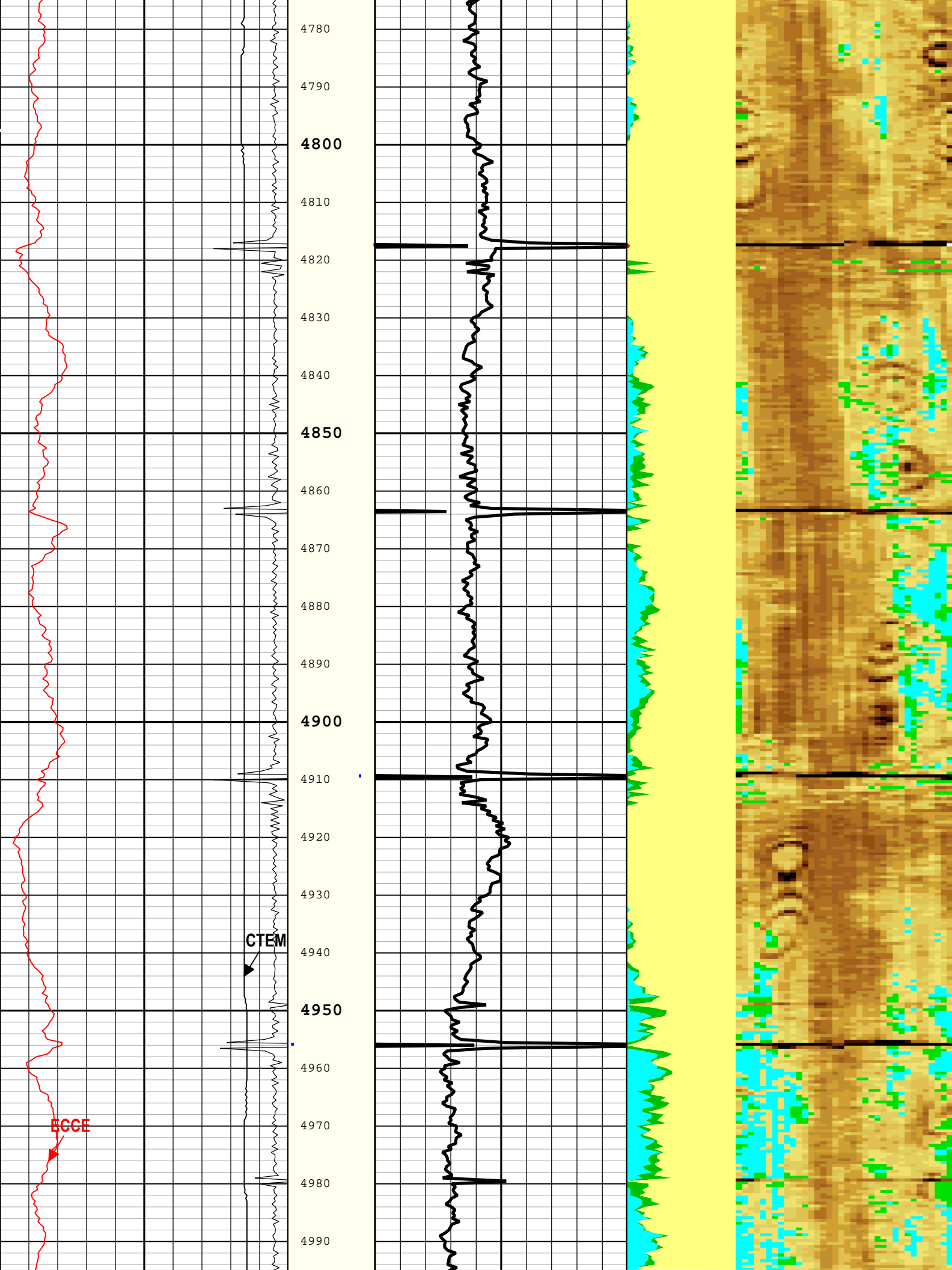


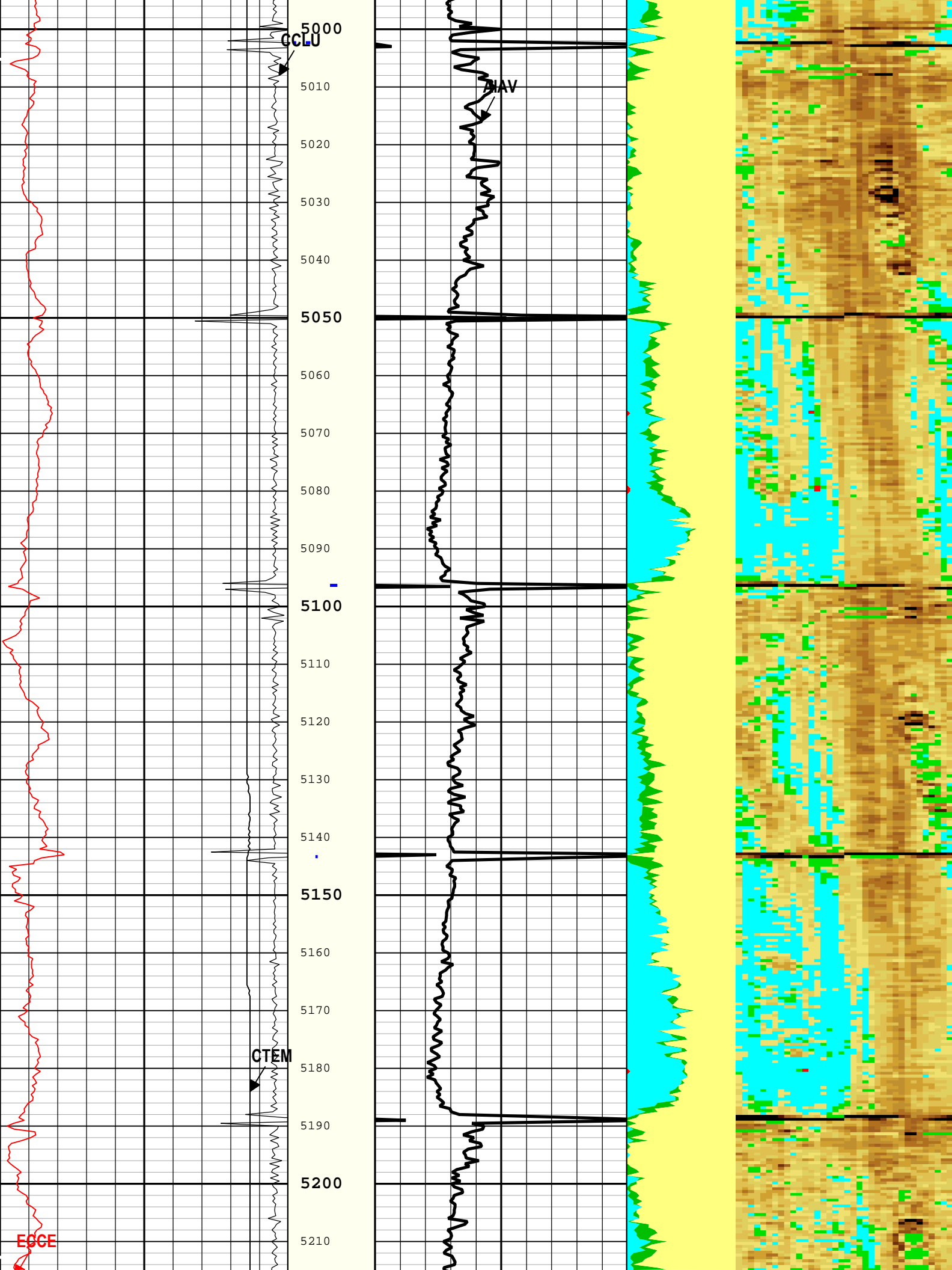


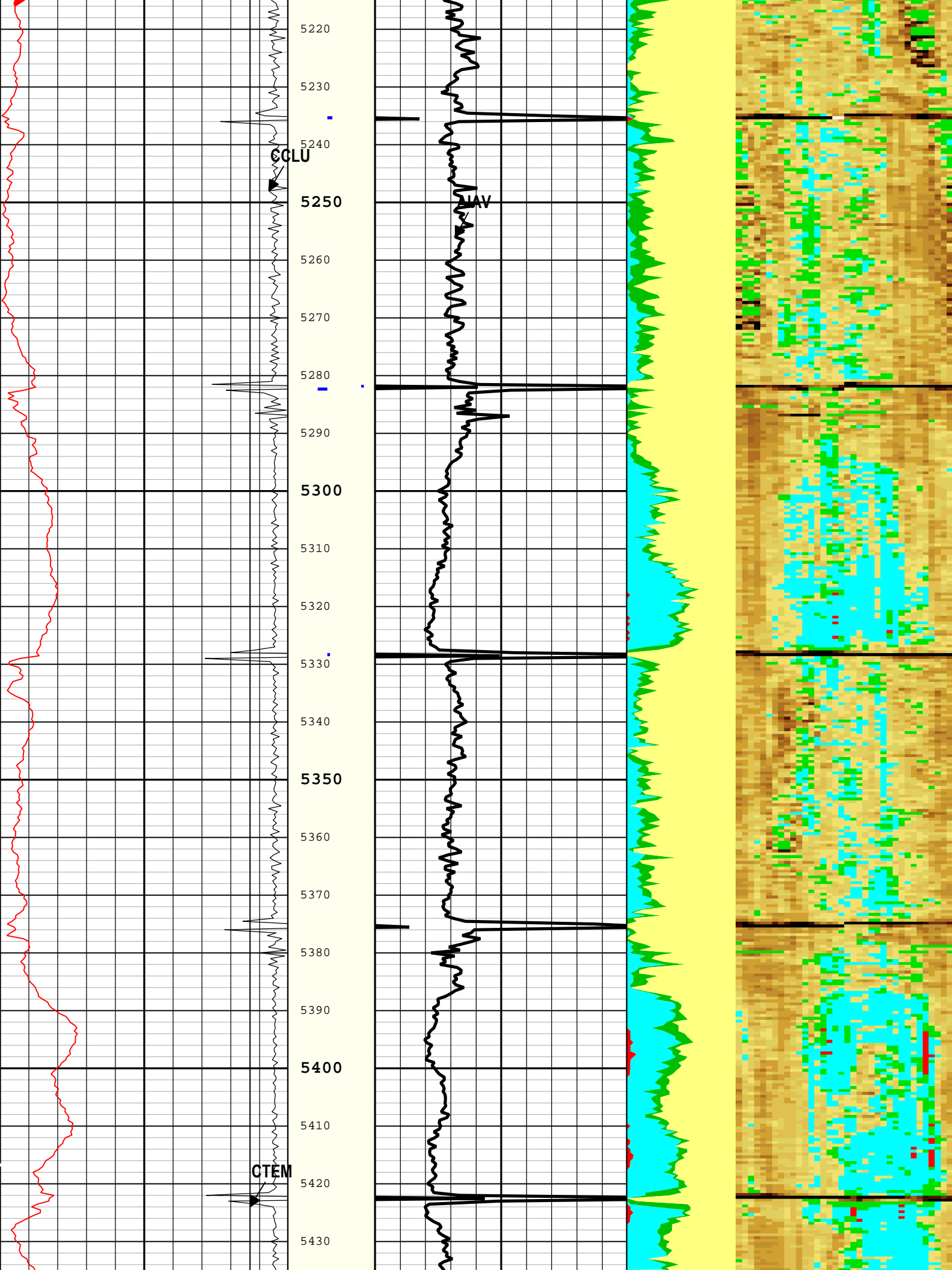


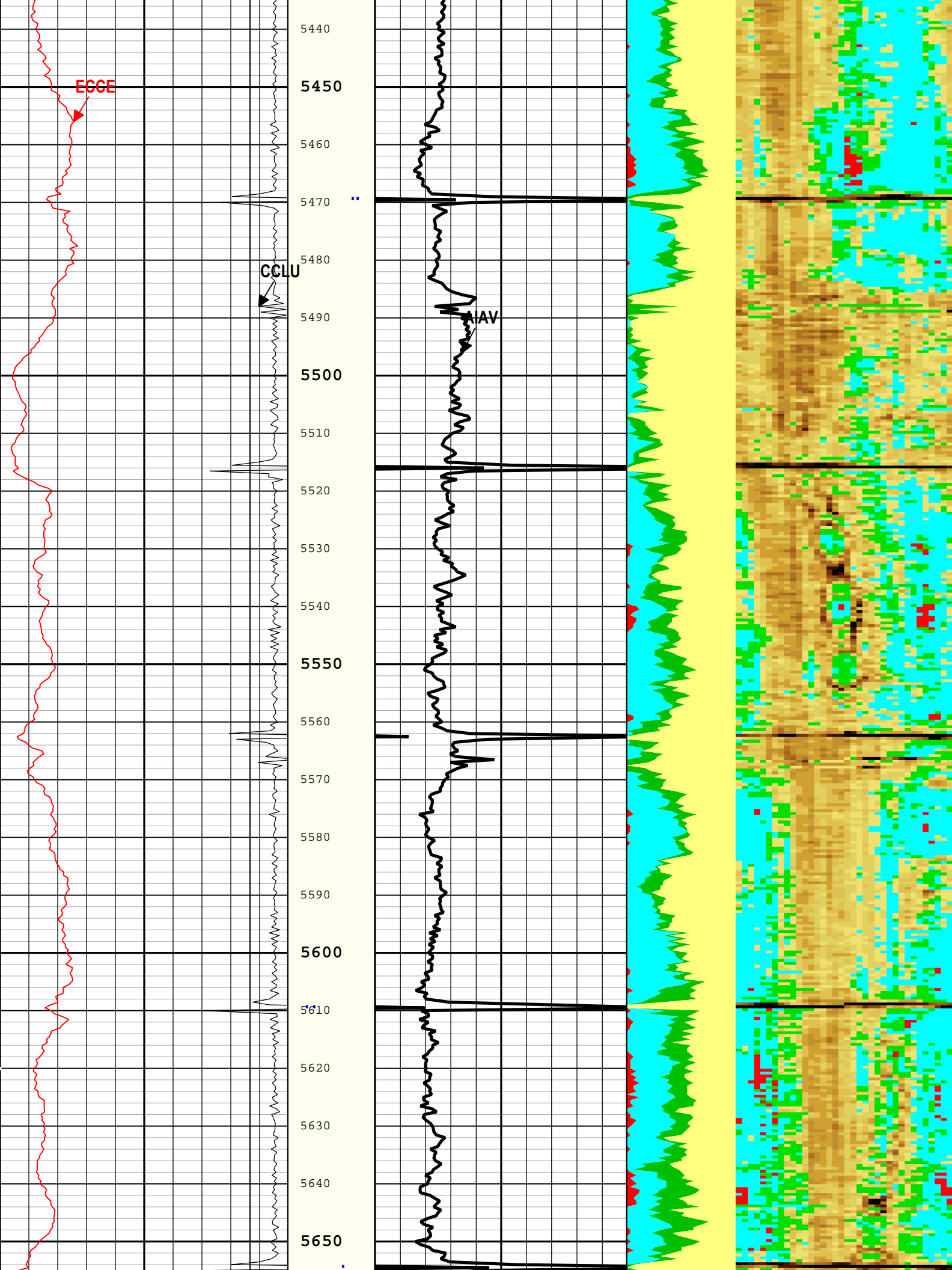


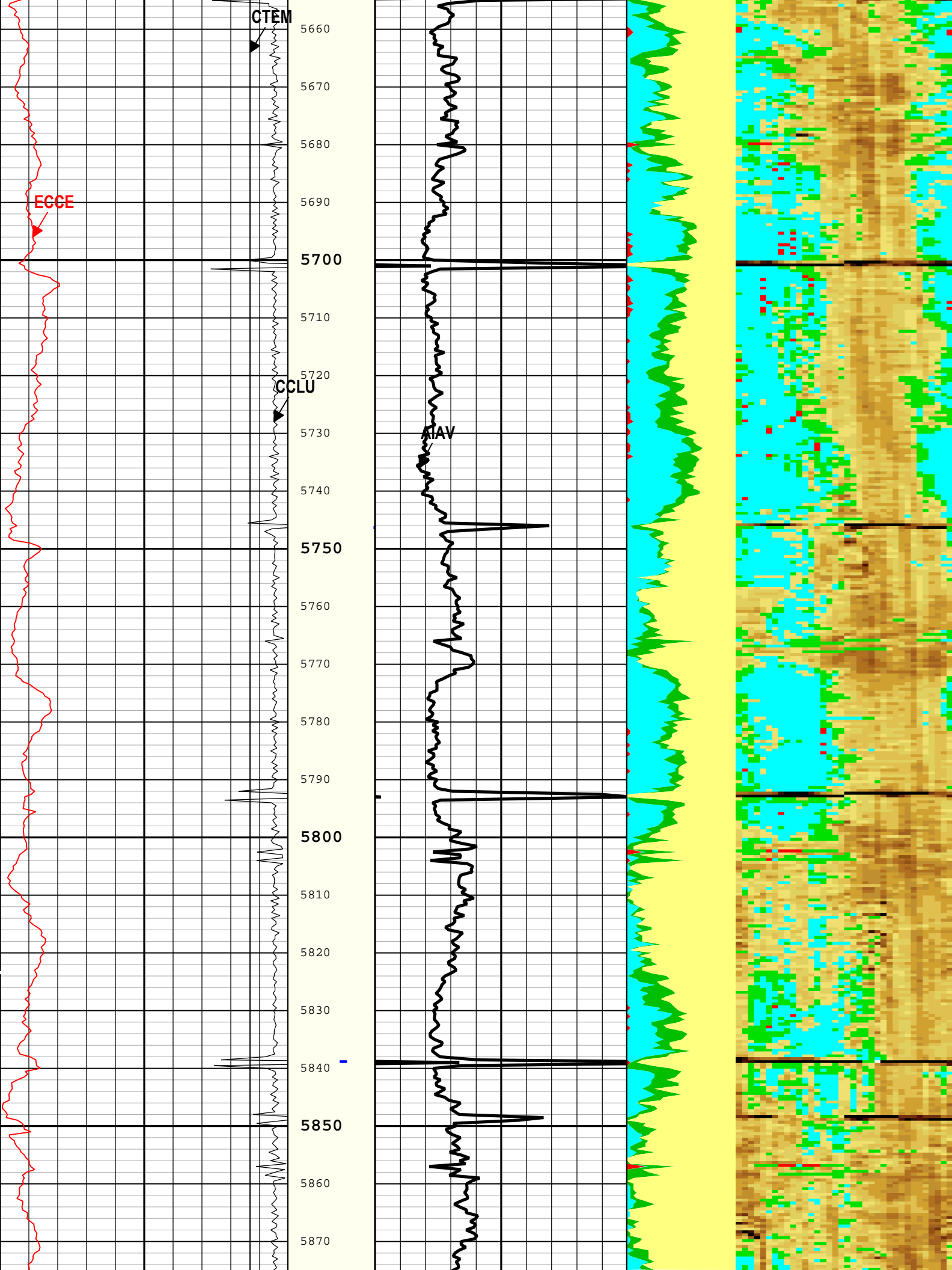


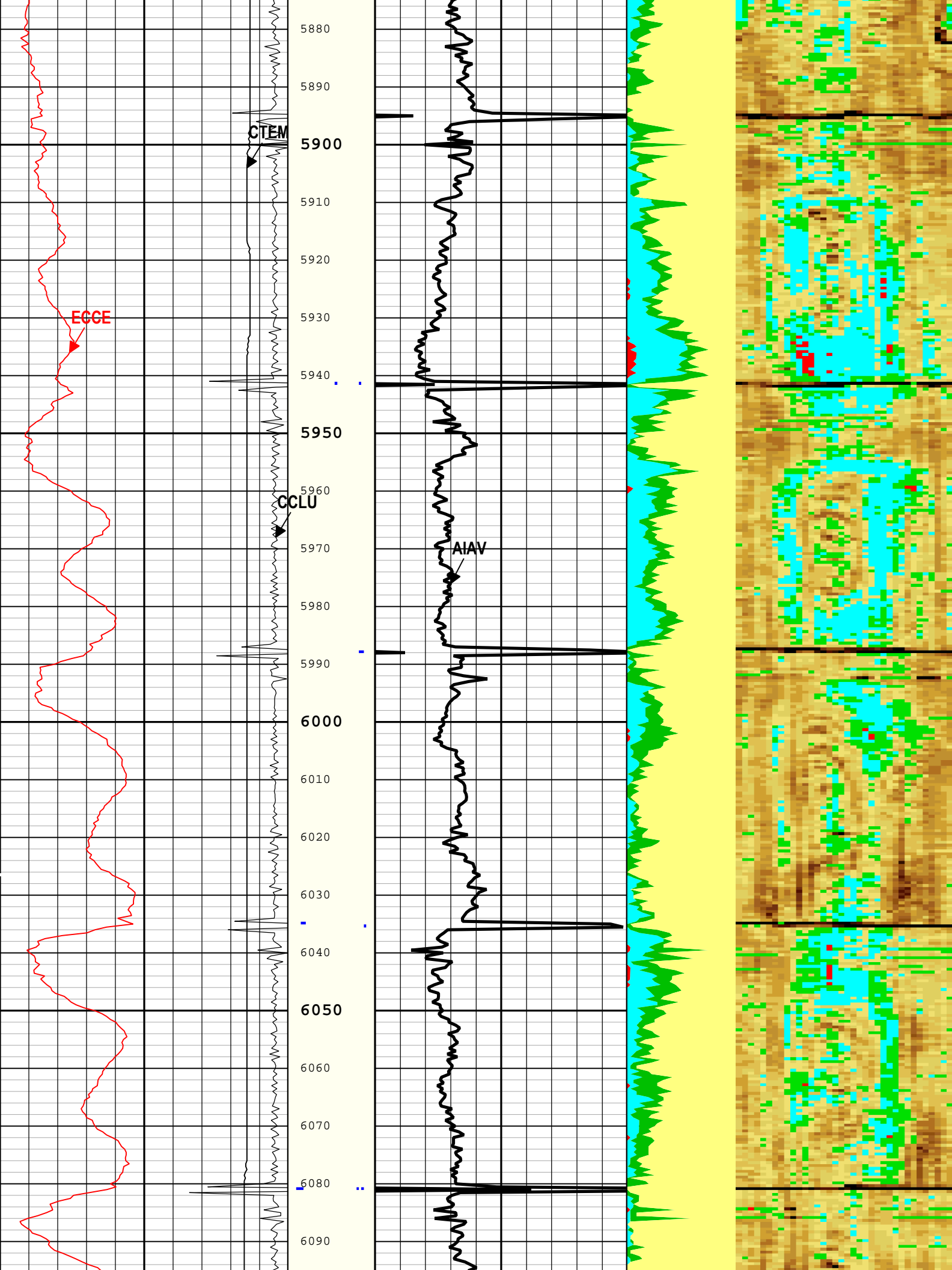


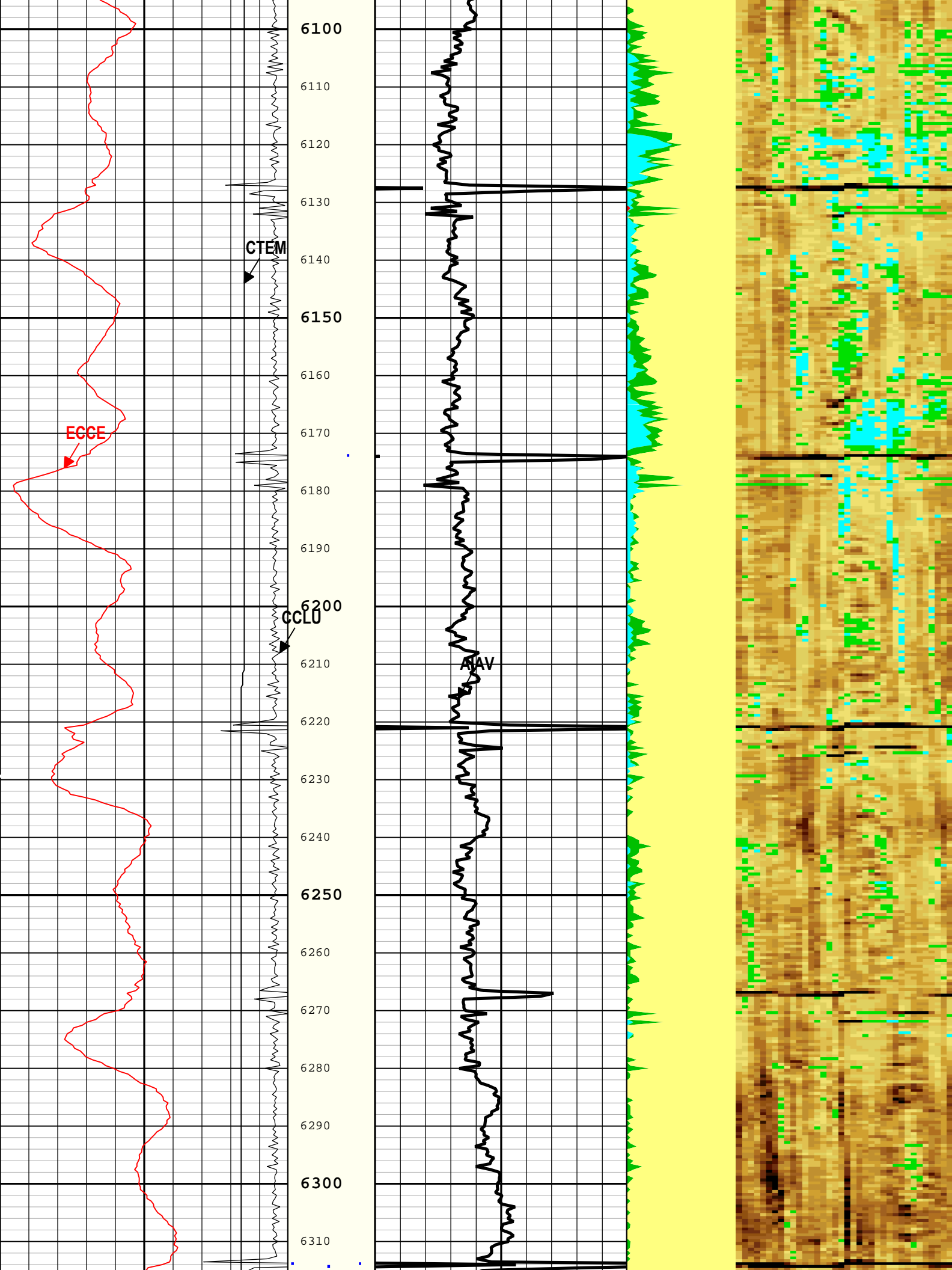


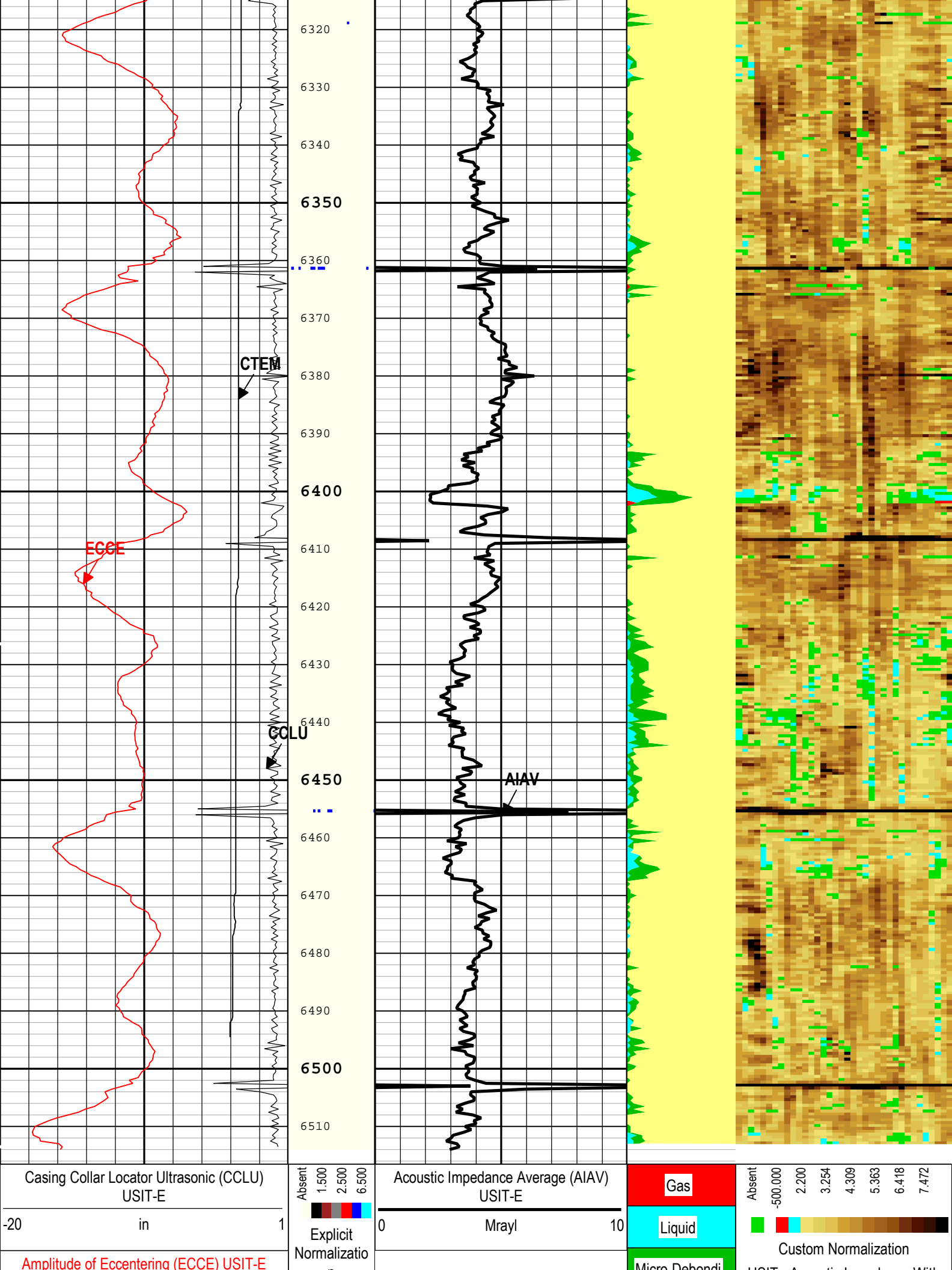












| | | |
|-------------------------------------|------|-----|
| 0 | in | 0.5 |
| Cartridge Temperature (CTEM) EDTC-B | | |
| 20 | degF | 220 |

USIT - USIT
Processing
Flags (UFLG)
USIT-E

| |
|-----------------|
| Micro-Debonding |
| Bonded |

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: 08-Aug-2017 21:04:25

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 | 1.06 | |
| 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 | 40.5 | 110 |
| BS | 13.5 | 110 | 1952 |
| BS | 8.5 | 1952 | 6515 |
| MEAS_WLEN | 22.44 | 40.5 | 6515 |
| MEAS_WLEN | 20 | 6515 | 6516.5 |

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 | |

| | | | | |
|---------------|------------------------------------|--------|----------------------------------|----|
| MUC | 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 | 7100 | 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 20:18:17 | 07-Aug-2017 20:19:16 | 6516.95 | 6502.98 |
| WINE | 67.51 | 07-Aug-2017 20:19:16 | 07-Aug-2017 20:19:36 | 6502.98 | 6476.05 |
| WINE | 63.66 | 07-Aug-2017 20:19:36 | 07-Aug-2017 20:19:47 | 6476.05 | 6457.45 |
| WINE | 65.2 | 07-Aug-2017 20:19:47 | 07-Aug-2017 20:29:09 | 6457.45 | 4557.75 |
| WINE | 68.28 | 07-Aug-2017 20:29:09 | 07-Aug-2017 20:39:14 | 4557.75 | 2414.87 |
| WINE | 69.05 | 07-Aug-2017 20:39:14 | 07-Aug-2017 20:49:24 | 2414.87 | 368.16 |
| WINE | 70.59 | 07-Aug-2017 20:49:24 | 07-Aug-2017 20:54:16 | 368.16 | 181.18 |
| WINE | 73.67 | 07-Aug-2017 20:54:16 | 07-Aug-2017 20:57:26 | 181.18 | 62.8 |
| All depth are at tool zero. | | | | | |

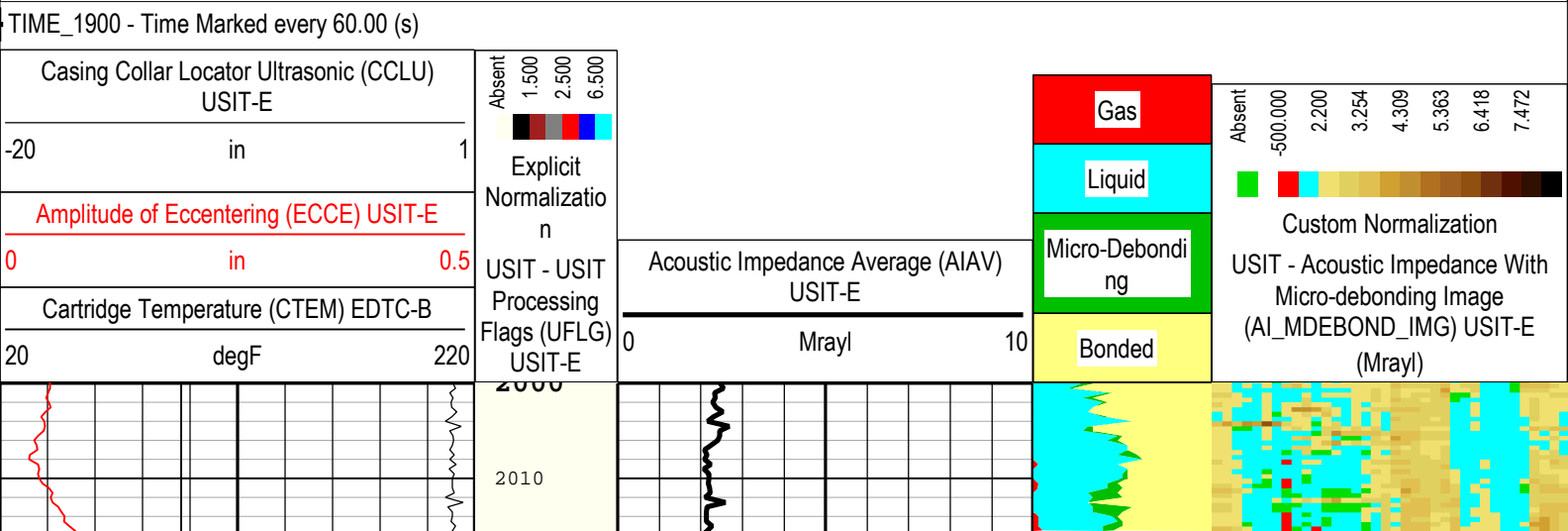
| ONE |
|-------------------|
| 0 PSI Repeat Pass |

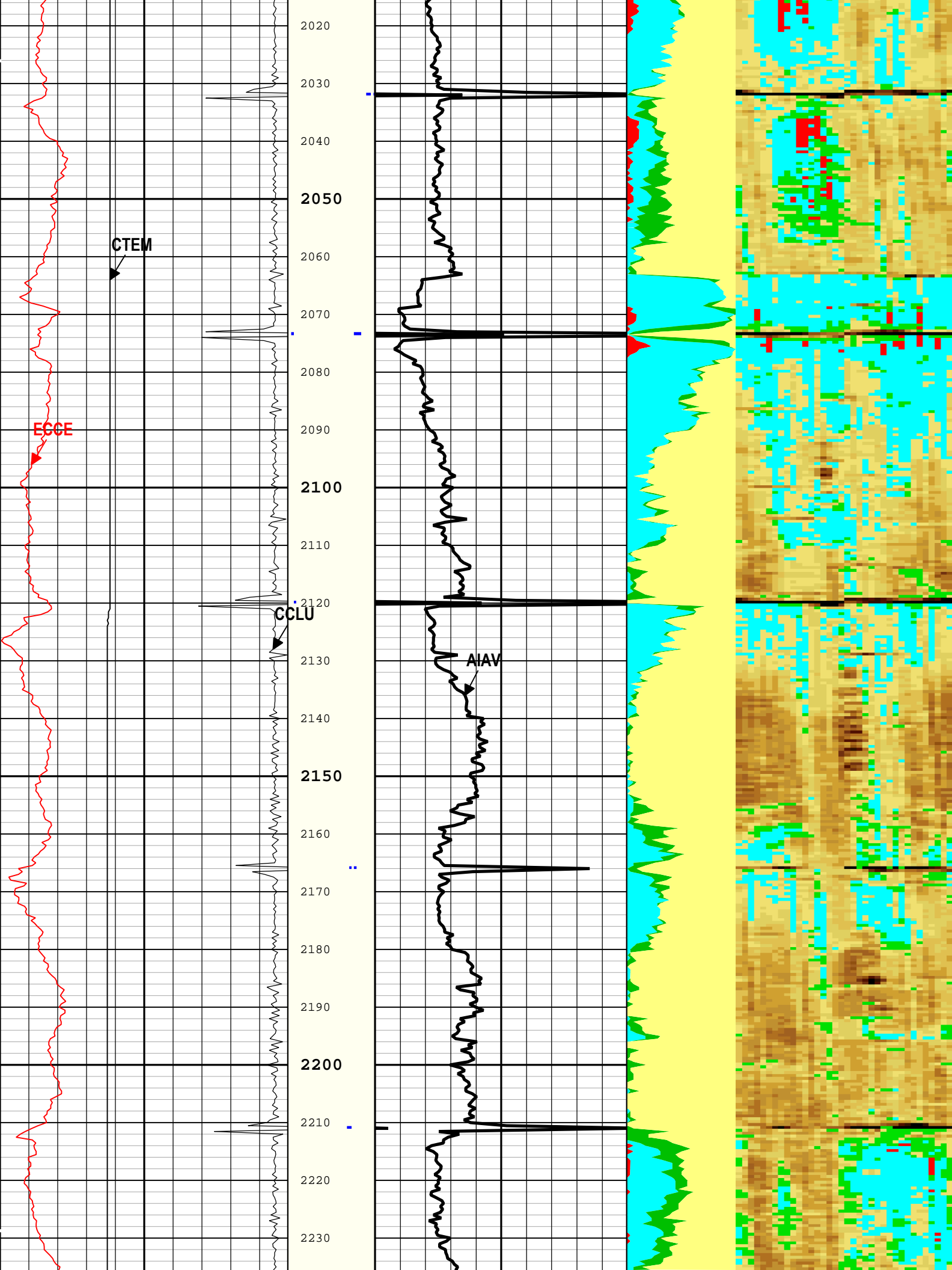
| Software Version | |
|--------------------|----------------|
| Acquisition System | Version |
| Maxwell 2017 SP2 | 7.2.87778.3100 |

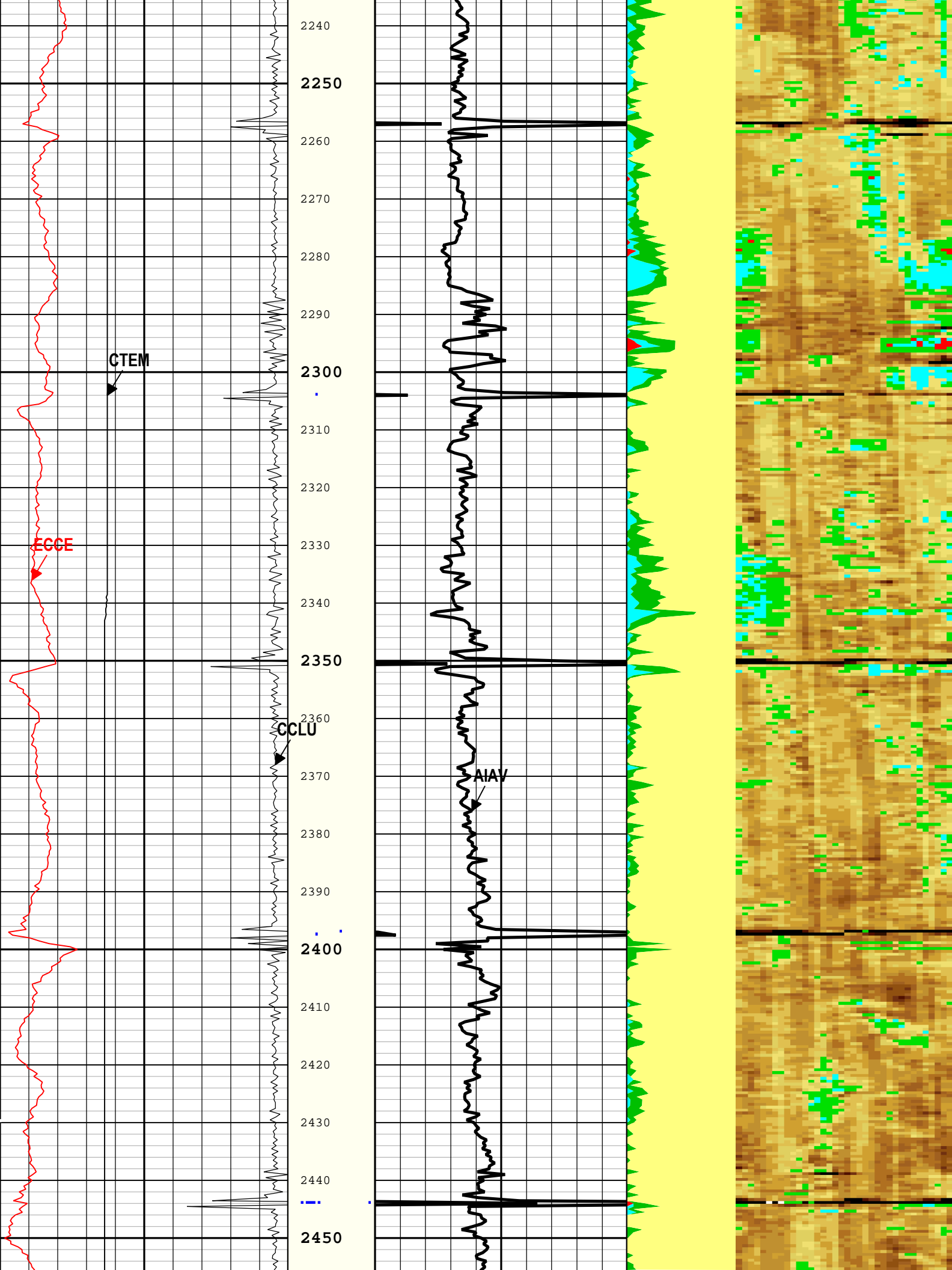
| Pass Summary | | | | | | | | | |
|--|----------------|-----------|------------|------------|------------------------|------------------------|----------|-------------|-----------------------|
| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | DSC Mode | Depth Shift | Include Parallel Data |
| ONE | Log[3]:Up | Up | 1949.94 ft | 2532.18 ft | 07-Aug-2017 7:49:54 PM | 07-Aug-2017 7:54:00 PM | ON | 1.51 ft | Yes |
| All depths are referenced to toolstring zero | | | | | | | | | |

| Log | Company:Noble Energy Inc. Well:Wells Ranch AF07-645 ONE: Log[3]:Up:S006 |
|-----|---|
|-----|---|

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 21:04:37







| 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 |

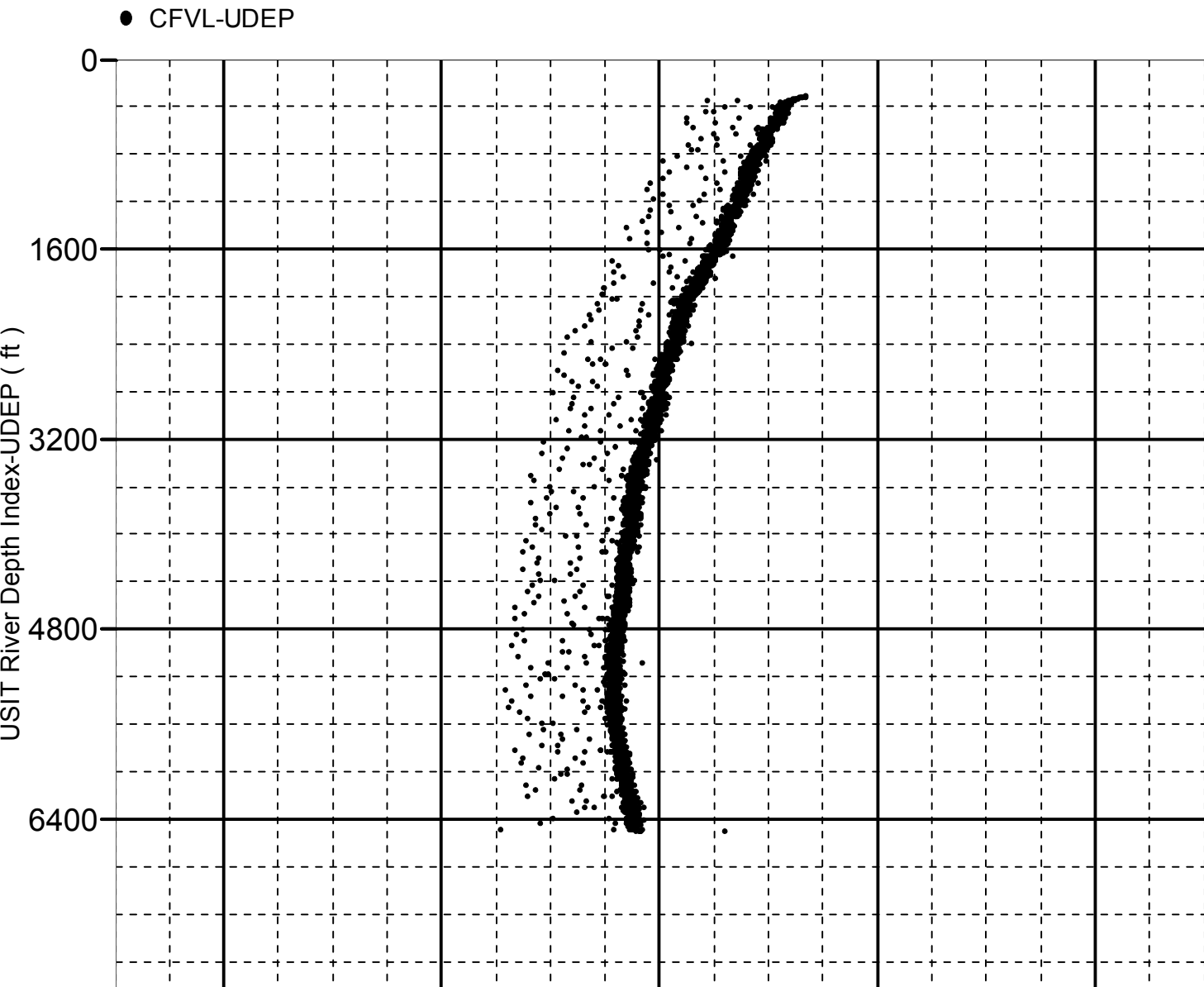
XYZ

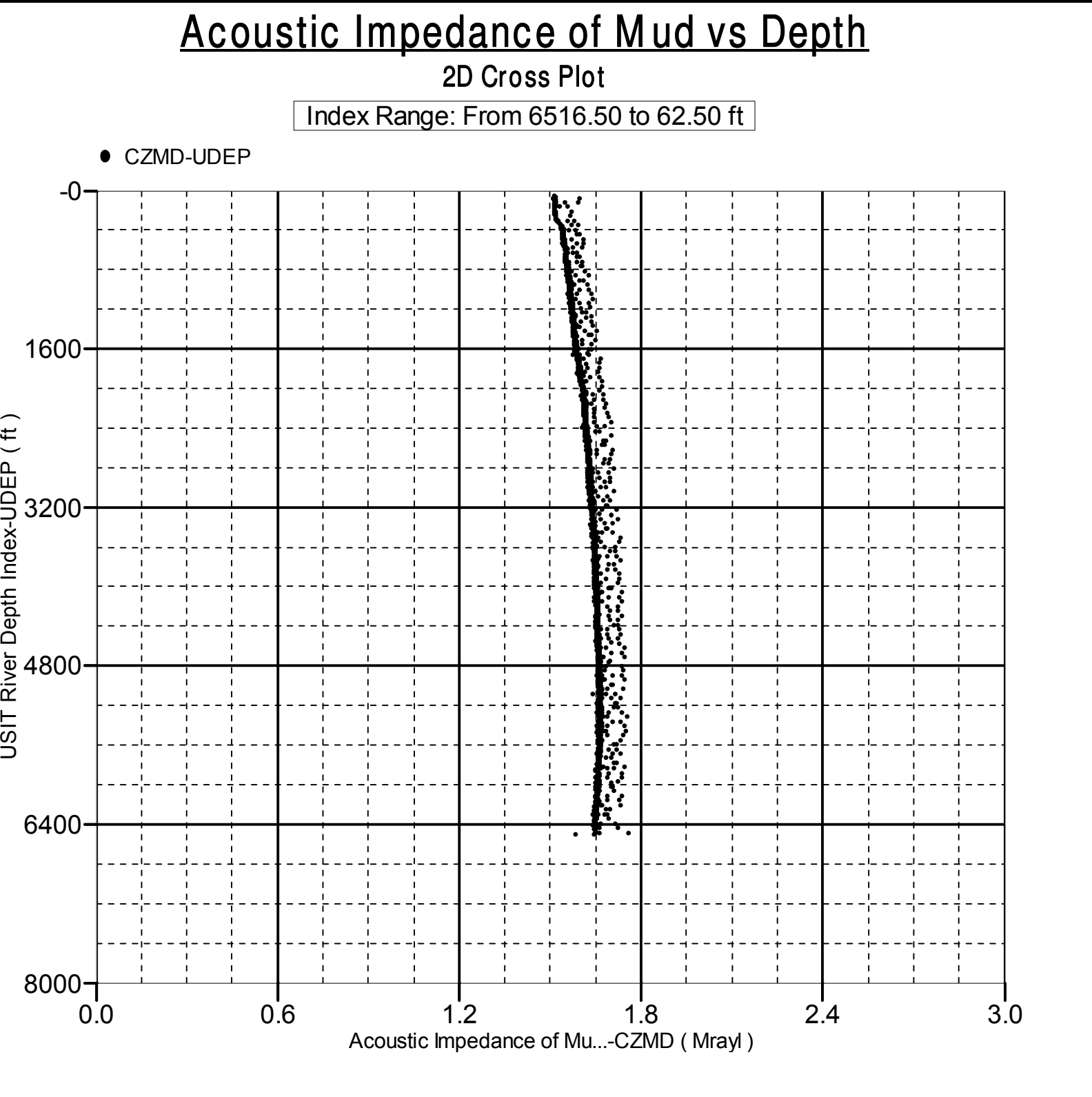
Company:Noble Energy Inc. Well:Wells Ranch AF07-645
ONE: Log[6]:Up:S006

Fluid Acoustic Slow ness vs Depth

2D Cross Plot

Index Range: From 6516.50 to 100.00 ft





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 | | |

Company: Noble Energy Inc.

Schlumberger

Well: Wells Ranch AF07-645

Field: Wattenberg

| | |
|-----------------------------------|----------|
| County: | Weld |
| State: | Colorado |
| DJ Basin UltraSonic Summary Print | |