Schlumberger

Company: Southern California Gas Company

Well: Porter 69F

Field: Aliso Canyon

County: Los Angeles State: California

County: Los Angeles
Field: Aliso Canyon
Location: 1770.14' N & 2661.98W
Well: Porter 69F
Company: Southern California Gas Company

Cement Bond Log

Variable Density Log

Gamma Ray - CCL

Location:			
1770.14' N & 2661.98W From the SE Corner of Section 27 X: 1937428.73 Y: 6393327.81		Elev.: K.B. 2395.00 ft G.L. 2366.00 ft D.F.	
Permanent Datum:	Ground Level	Elev.:	2366.00 f
Log Measured From:	Kelly Bushing	29.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

API Serial No.	Section:	Township:	Range:
04-037-24226	27	4N	16W

Logging Date		07-Apr-2016	
Run Number		Three	
Depth Driller		7451.00 ft	
Schlumberger Depth		7447.00 ft	
Bottom Log Interval		7447.00 ft	
Top Log Interval		65.00 ft	
Casing Fluid Type		Polymer	
Salinity			
Density		9 lbm/gal	
Fluid Level		8.00 ft	
BIT/CASING/TUBING STRING			
Bit Size		12.25 in	
From		860.00 ft	
To		7986.00 ft	
Casing/Tubing Size		9.625 in	
Weight		47 lbm/ft	
Grade		N80	
From		0.00 ft	
To		7980.00 ft	
Max Recorded Temperatures			
Logger on Bottom	Time	07-Apr-2016 09:48:00	
Unit Number	Location:	3189 Ventura	
Recorded By		I. Kartawidjaja	
Witnessed By		Mr. Tom McMahon	

Disclaimer

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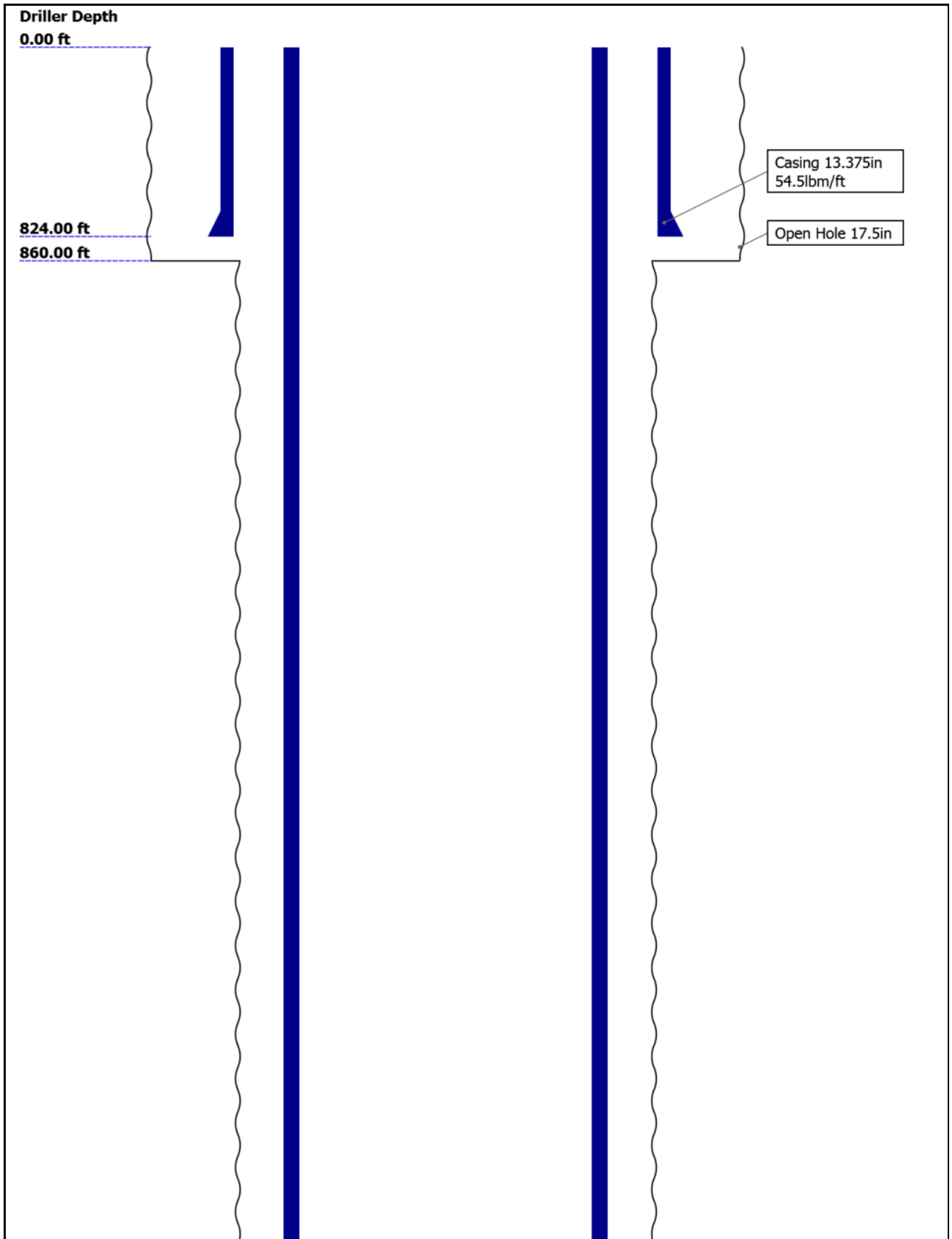
Well Sketch

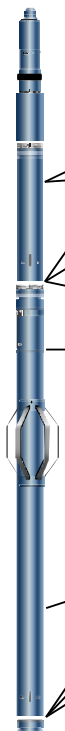


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	17.5	12.25				
Top Driller (ft)	0	860				
Top Logger (ft)	0	860				
Bottom Driller (ft)	860	7986				
Bottom Logger (ft)	860	7986				
Casing						
Size (in)	13.375	9.625				
Weight (lbm/ft)	54.5	47				
Inner Diameter (in)	12.615	8.681				
Grade	K55	N80				
Top Driller (ft)	0	0				
Top Logger (ft)	0	0				
Bottom Driller (ft)	824	7980				
Bottom Logger (ft)	824	7980				

Remarks and Equipment Summary

Three: Toolstring



Equip name	Length	MP name	Offset
LEH-QT:2867 LEH-QT:2867	59.39	Red	
DTC-H ECH-KC DTC-H	56.47	**CTEM HV**	55.57 0.00
		TelStatus	53.47
		ToolStatus	53.47
HGNS-H:3923 HGNH:4819 NPV-N NSR-F:5002 HGNS-H:3923 HACCZ-H:3923 HMCA-H	53.47	**Temperature**	53.44
		GR	52.73
		CNL Porosity	46.4
		HMCA	44.06
		HGNS	44.06
		Accelerometer	0.00
AH-184[	44.06		

Three: Remarks

Depth correlated to SLB Platform Express log dated 25-Oct-2001

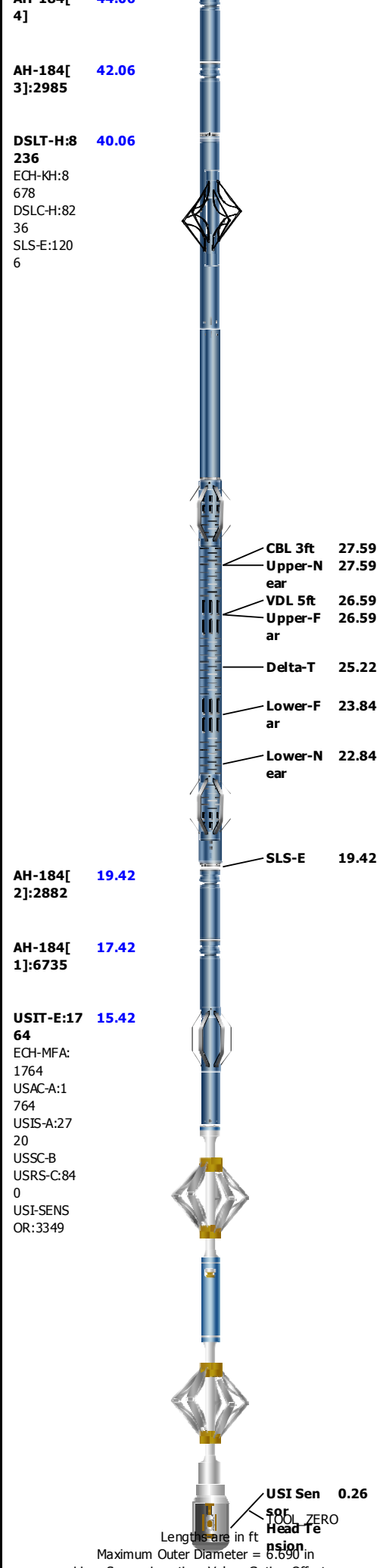
Logging objectives: Cement and corrosion evaluation

USIT logged in 10 deg/1.5 inch, logging speed 2800-3000 fph, Repeated hi-res in 10 deg/0.6 inch, speed 1000 fph

Top of sand at 7451 ft, logged from 7447 ft to 60 ft under 0 psi surface pressure

USIT data above 110 ft affected by insufficient pressure on USI transducer.

A separate pass to capture surface section was logged using lubricator to maintain hydrostatic pressure



Lengths are in ft
Maximum Outer Diameter = 6.690 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Job Event Summary

Event	Time	Duration	Interval	Remark
Run 1				**Apr-07-2016 08:13**
Log[6]:Down	Apr-07-2016 08:56	01:44:08	368.04 - 7449.83 ft	FPM
Log[7]:Up	Apr-07-2016 09:42	00:03:27	7439.12 - 7297.13 ft	Repeat Pass at TD 0 psi
Log[8]:Up	Apr-07-2016 09:48	03:34:39	7446.59 - 59.73 ft	Main Pass 0 psi
Log[9]:Up	Apr-07-2016 13:02	00:08:13	7282.79 - 7139.64 ft	Repeat Very Hi-res
Log[10]:Up	Apr-07-2016 13:21	00:11:24	5051.92 - 4861.17 ft	Repeat Very Hi-res
Log[11]:Up	Apr-07-2016 13:45	00:15:13	2156.5 - 1888.9 ft	Repeat Very Hi-res
Log[12]:Up	Apr-07-2016 14:08	00:04:30	255.69 - 78.89 ft	Repeat Top Section
Run 2				**Apr-07-2016 14:34**
Log[1]:Up	Apr-07-2016 14:39	00:03:48	200.46 - 56.75 ft	Surface Pass Main #1
Log[6]:Up	Apr-07-2016 14:56	00:03:59	149.69 - 24.83 ft	Surface Pass Main #2

Three

Main Pass 5 in = 100 ft

Software Version

Acquisition System	Version
Maxwell 2016 SP1	6.1.58882.3100

Computation	Description	Version
CEVAL	Sonic Cement Evaluation Computation Ensemble provides common Parameters and Channels	6.1.58882.3100

SoftwareVersion_Tool	SoftwareVersion_Run Version	SoftwareVersion_Build Version
WAFE-SEC	Synergy SV451EC version 9.10	Synergy SV451EC version 9.10
WAFE-FEC	Synergy SV451EC version 9.10	Synergy SV451EC version 9.10
WAFE-TMDI	Synergy SV451EC version 46.19	Synergy SV451EC version 46.19

Tool Elements	Description	Software Version	Firmware Version
SLS-E	Sonic Logging Sonde E supports 3'-5'BHC DT and CBL/VDL	6.1.58882.3100	4.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	6.1.58882.3100	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Three	Log[8]:Up	Up	60.69 ft	7447.53 ft	07-Apr-2016 9:48:55 AM	07-Apr-2016 12:23:34 PM	ON	0.96 ft	Yes

All depths are referenced to toolstring zero

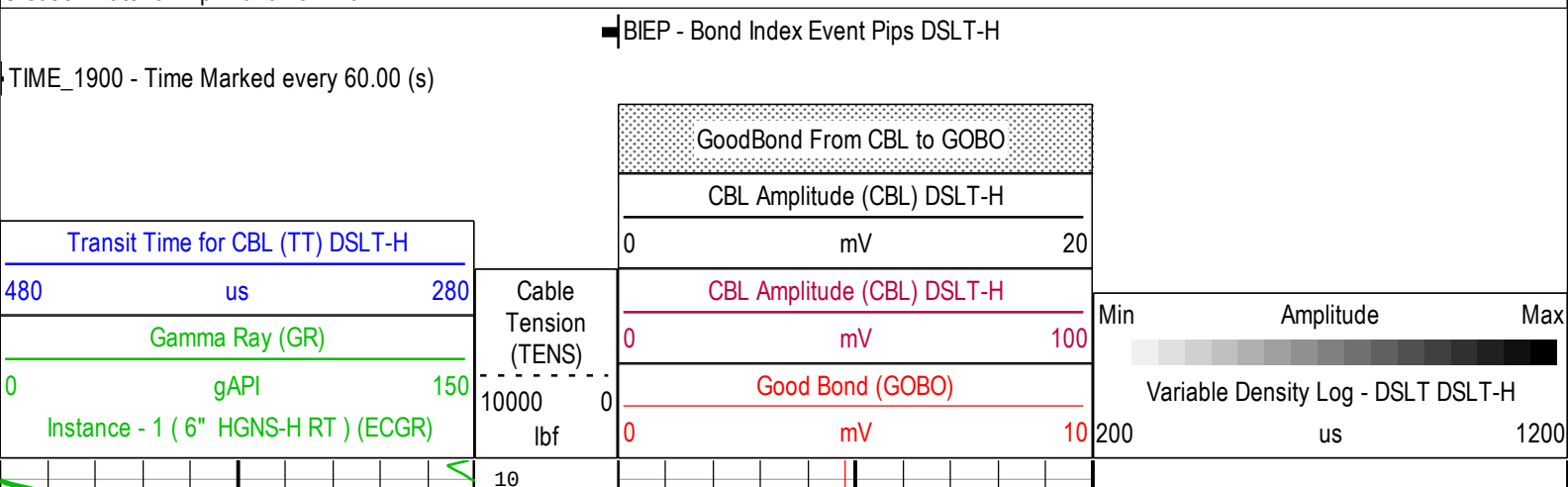
Log

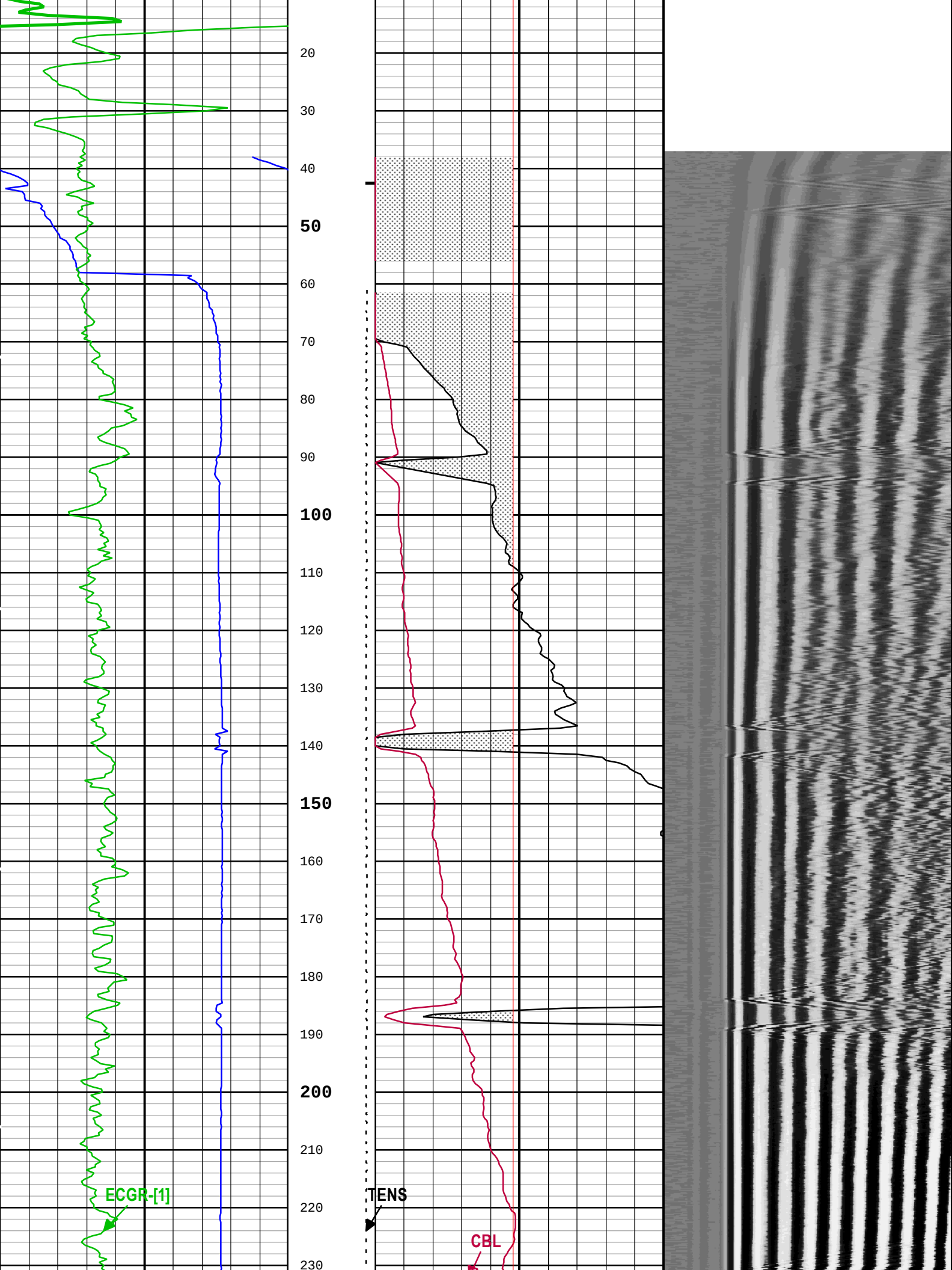
Company:Southern California Gas Company Well:Porter 69F

Three: Log[8]:Up:S001

Description: Sonic CBL with VDL Format: Log (Sonic CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 07-Apr-2016 19:17:04

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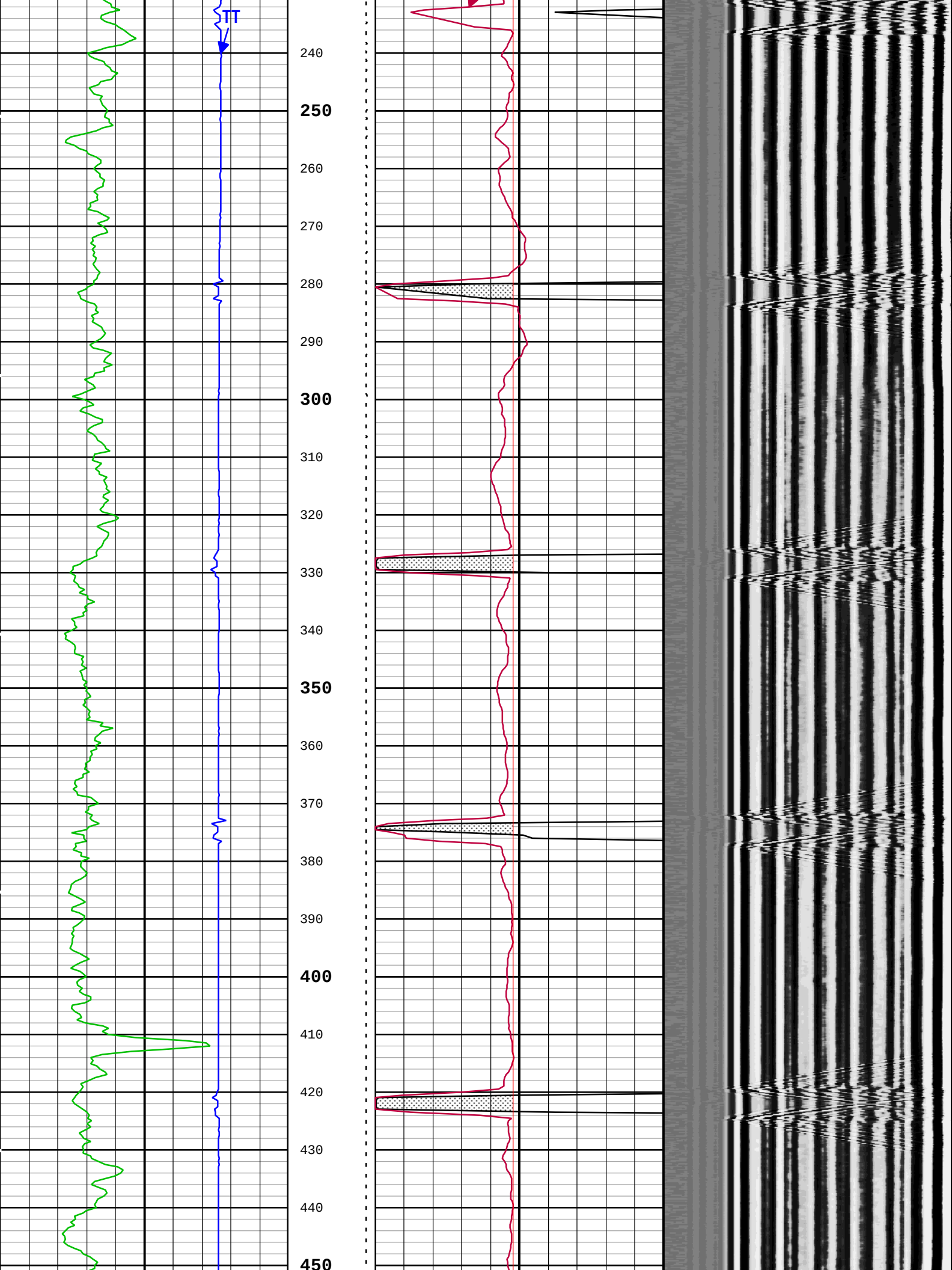
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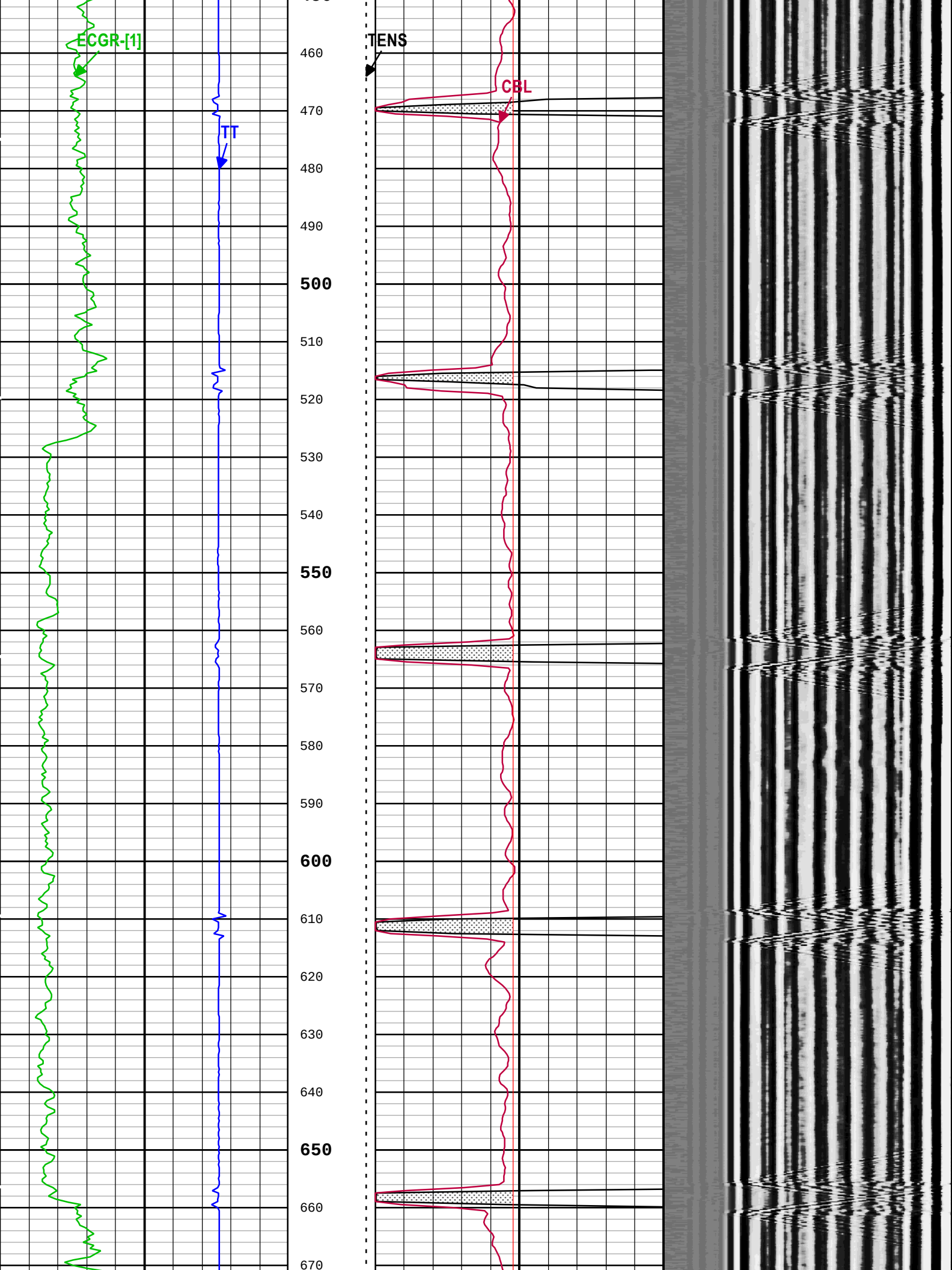
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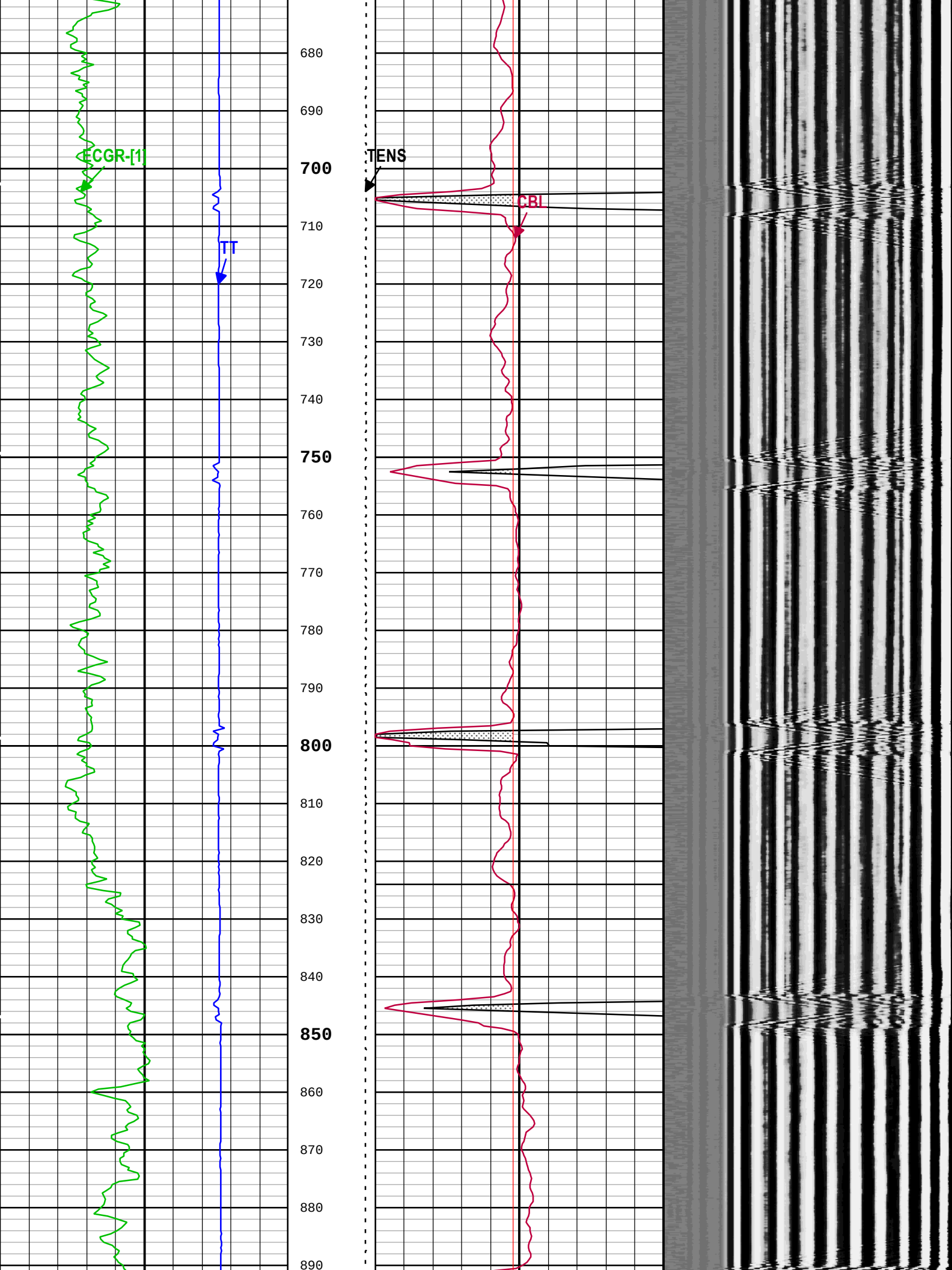
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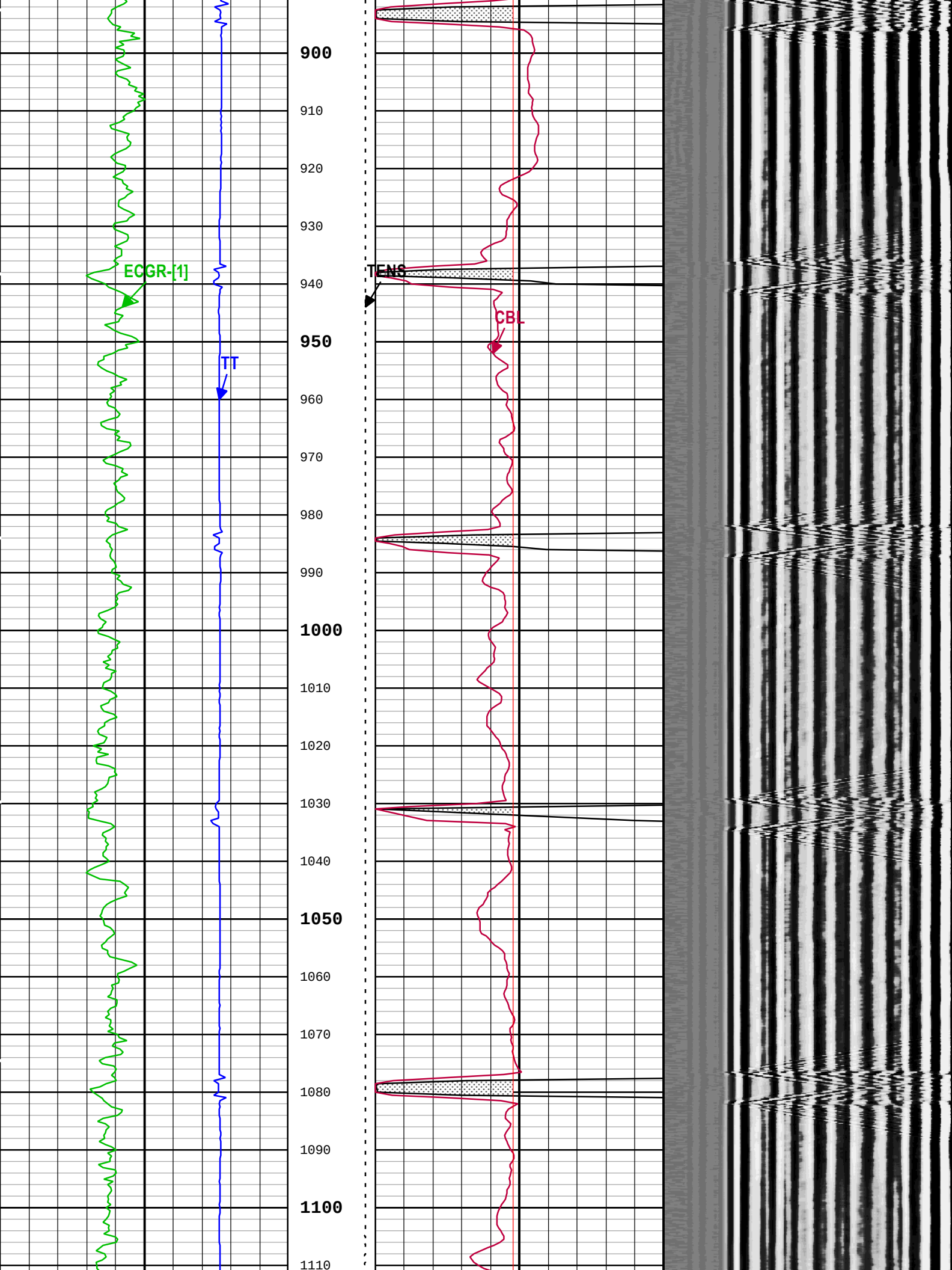
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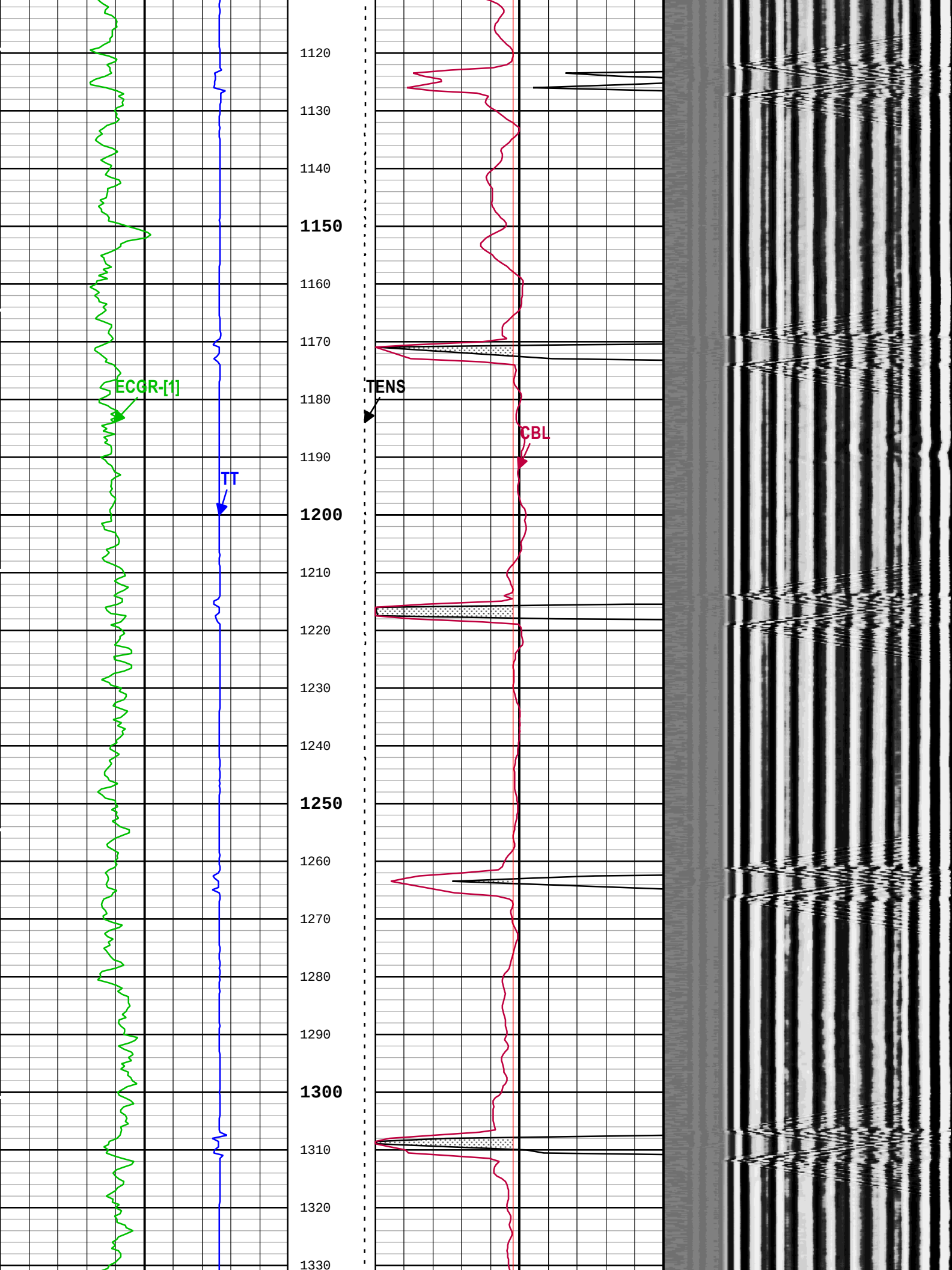
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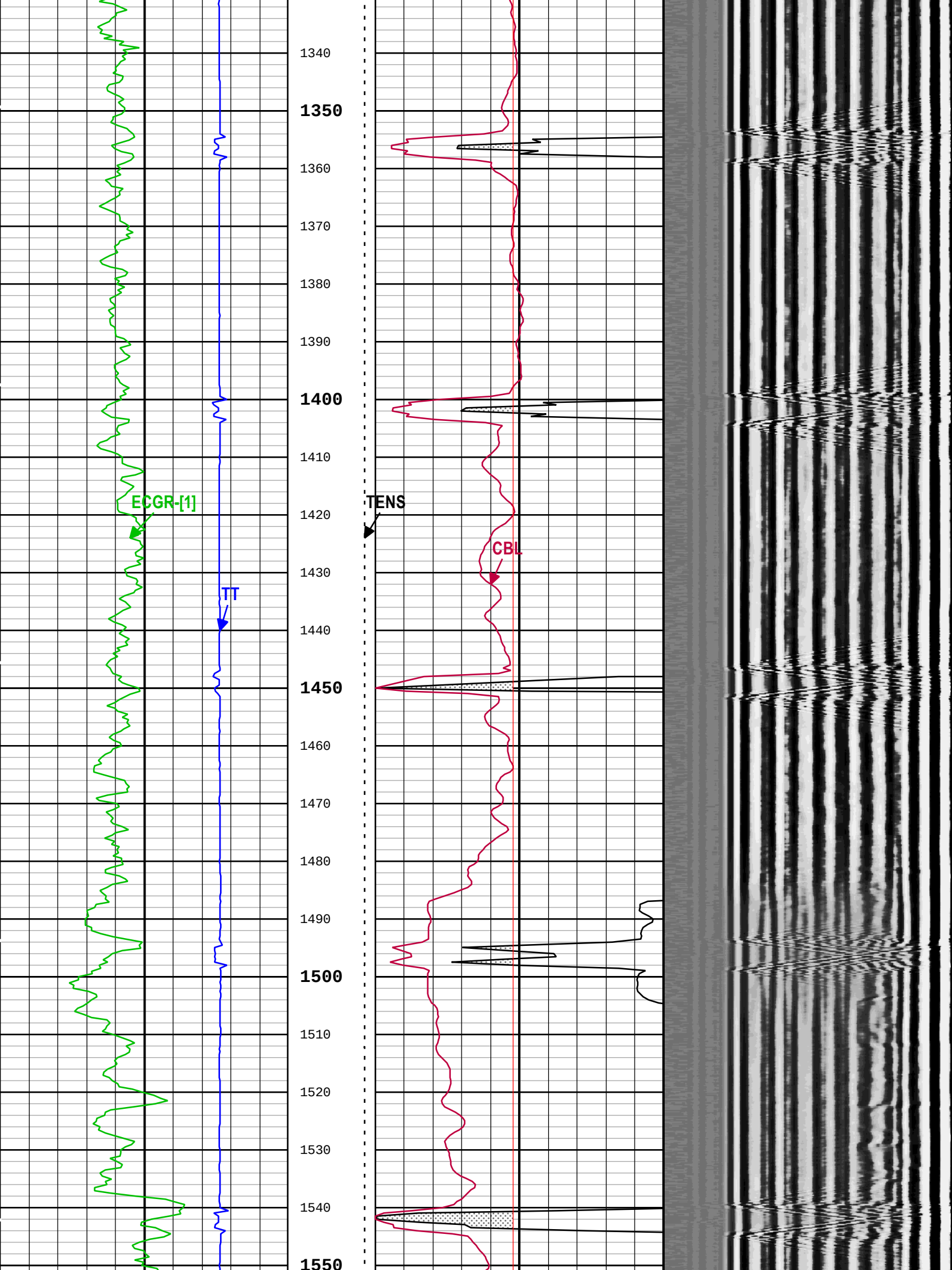
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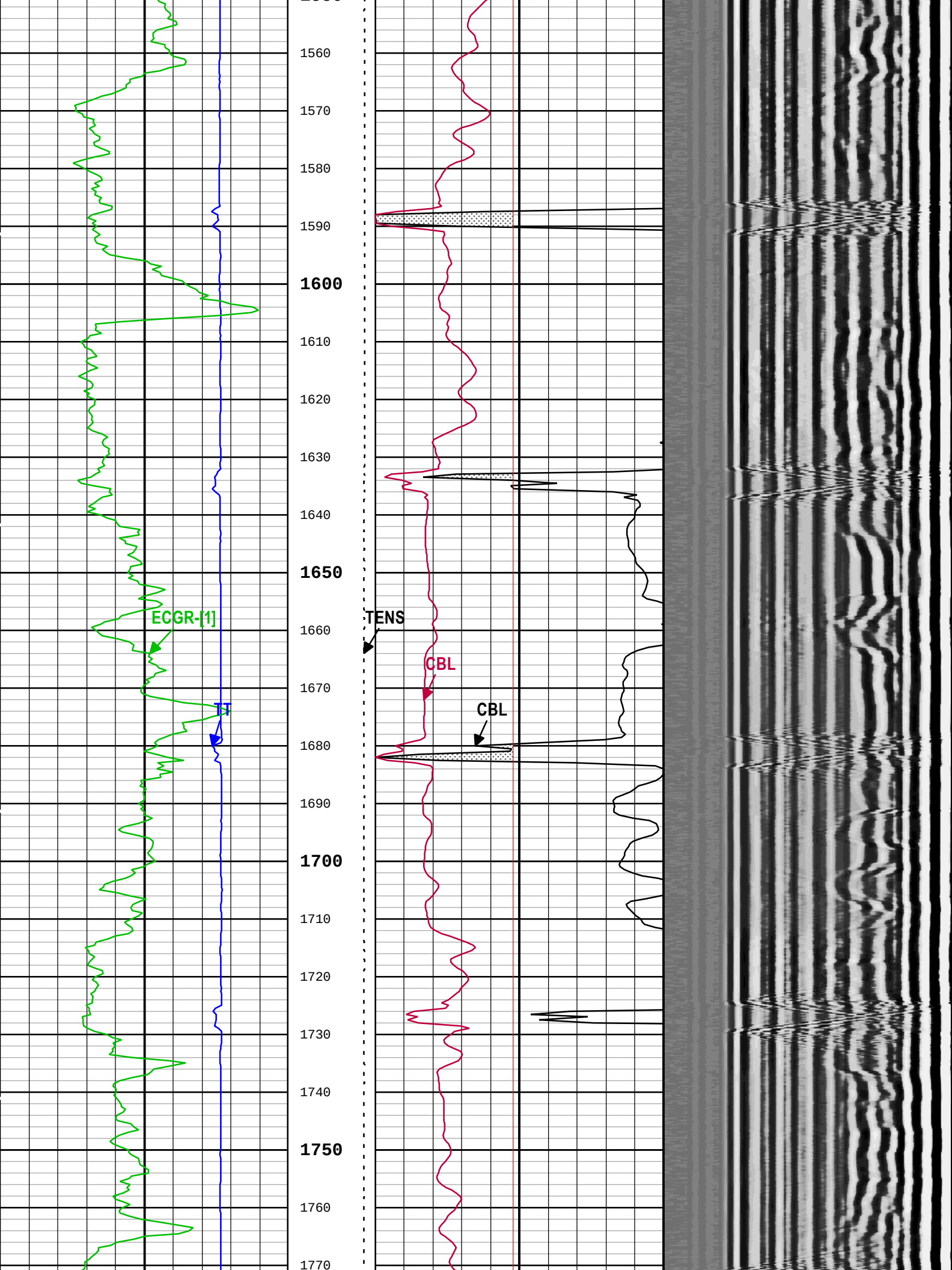
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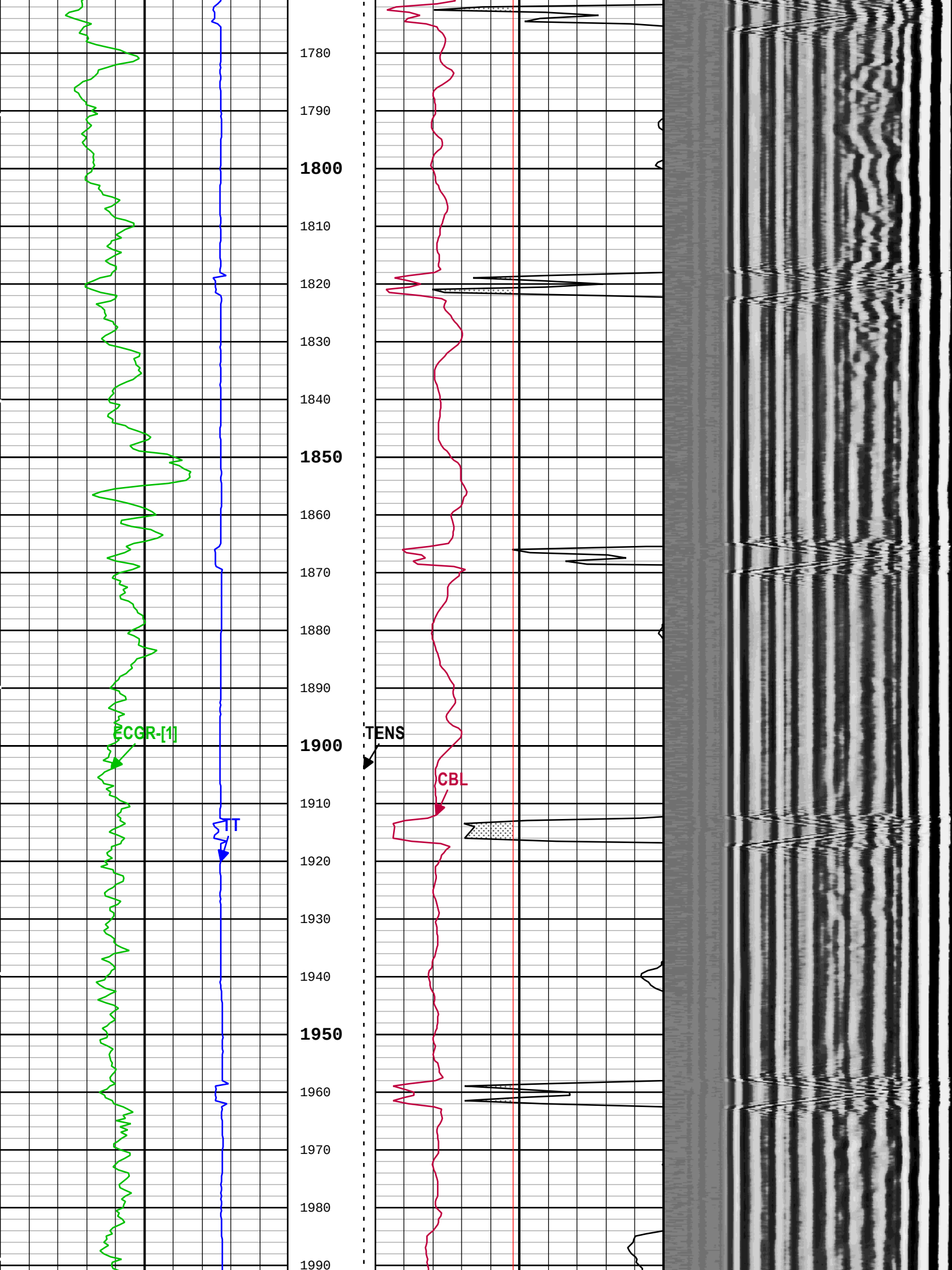
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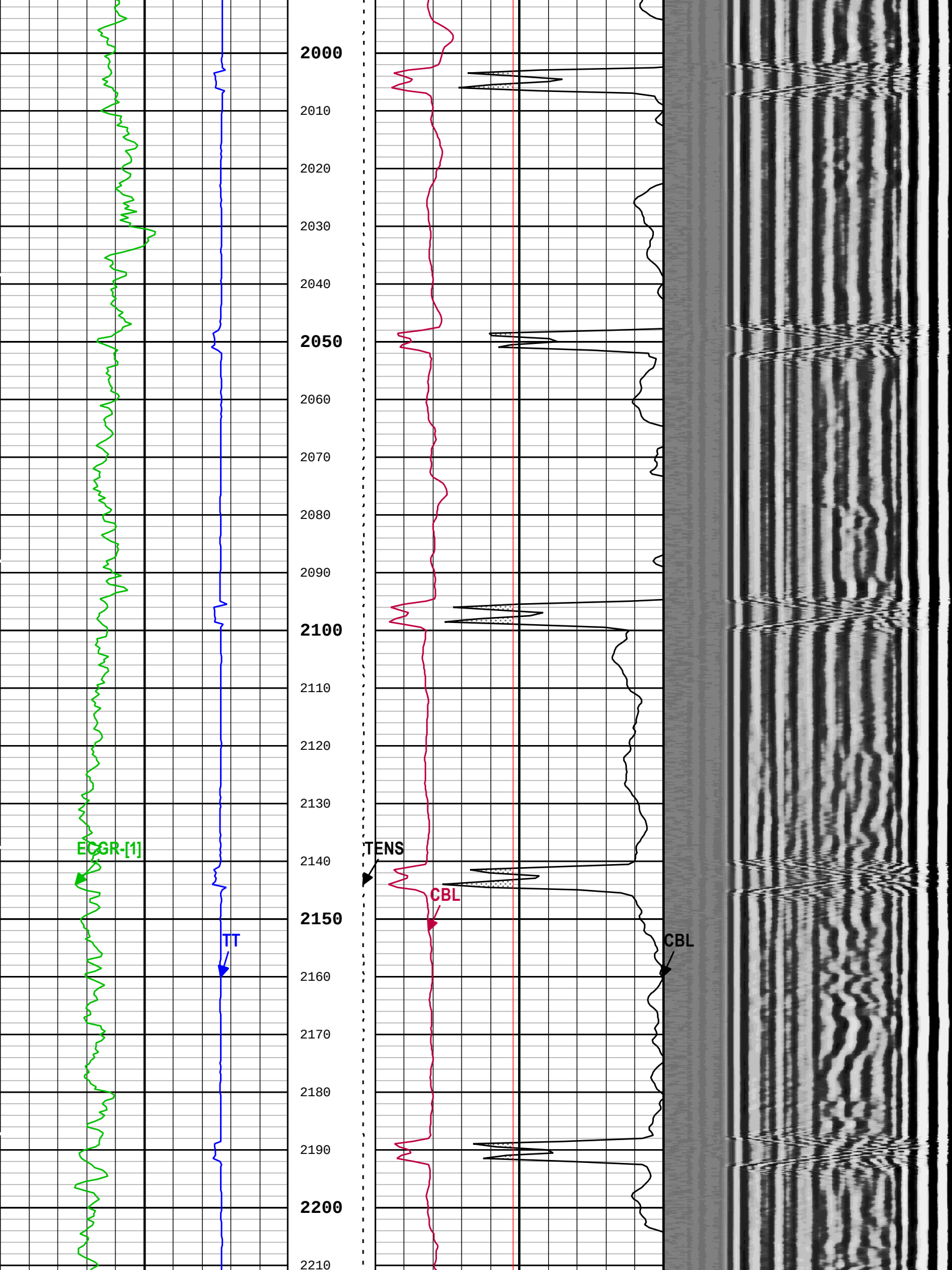
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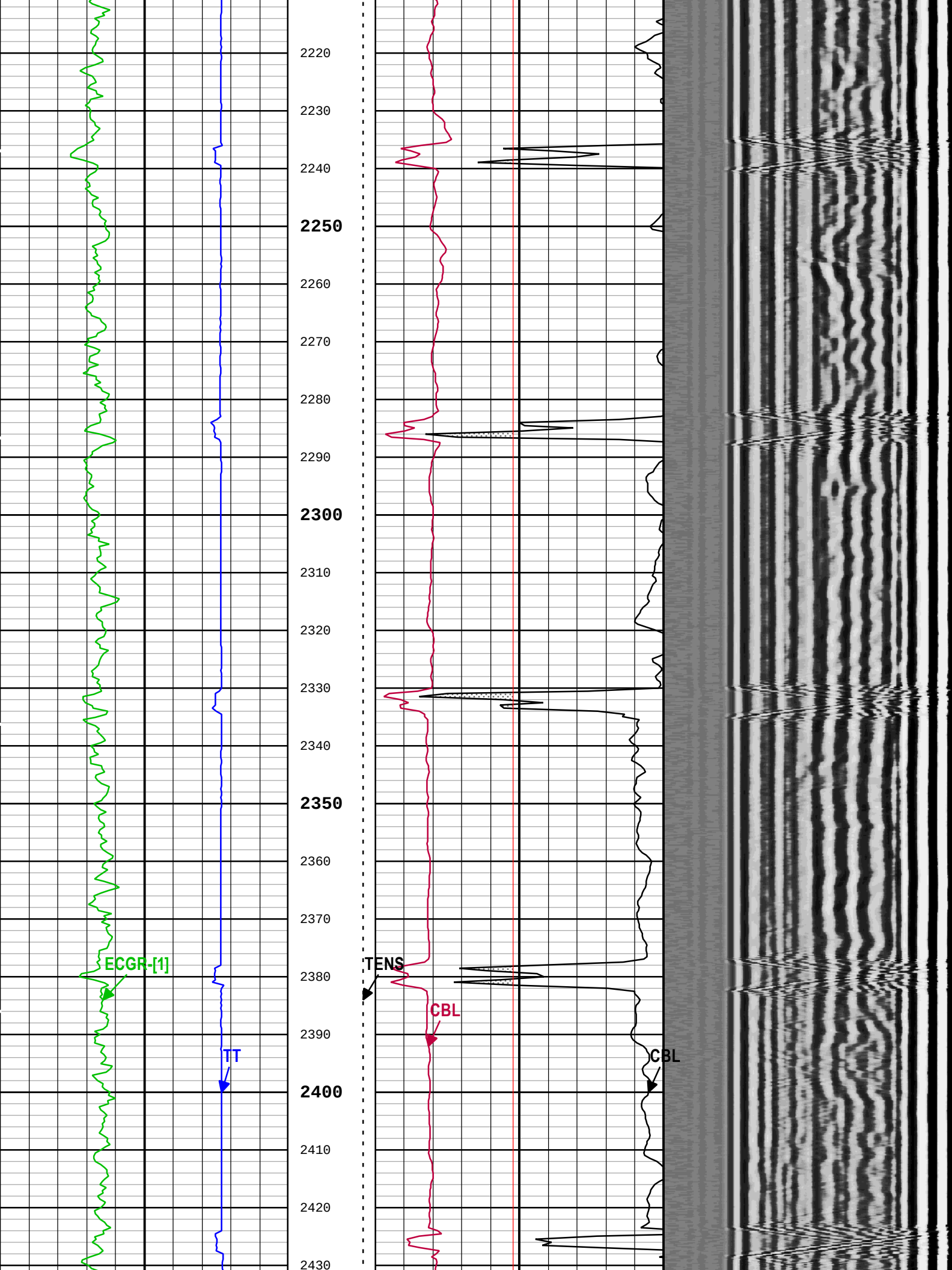
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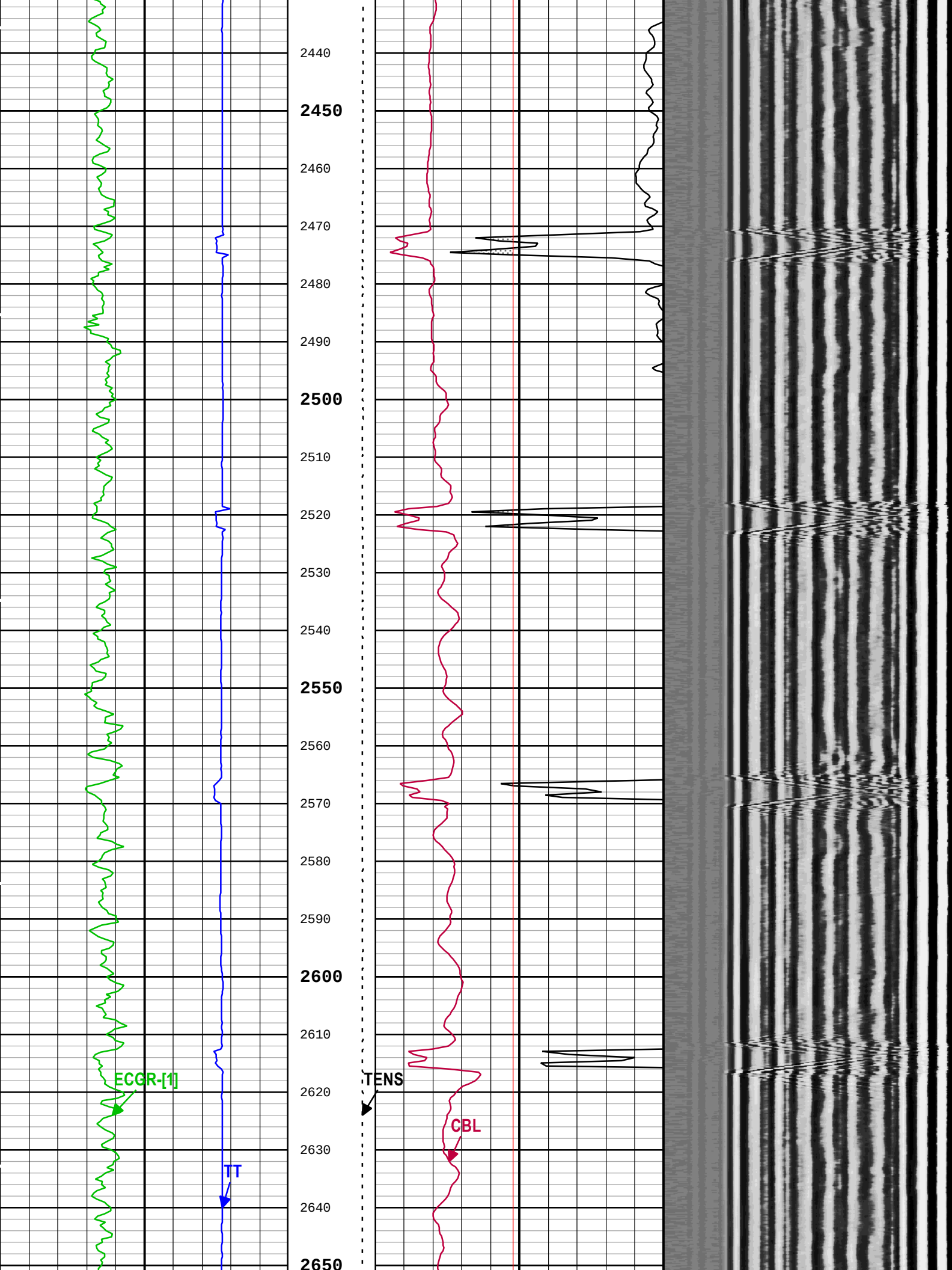
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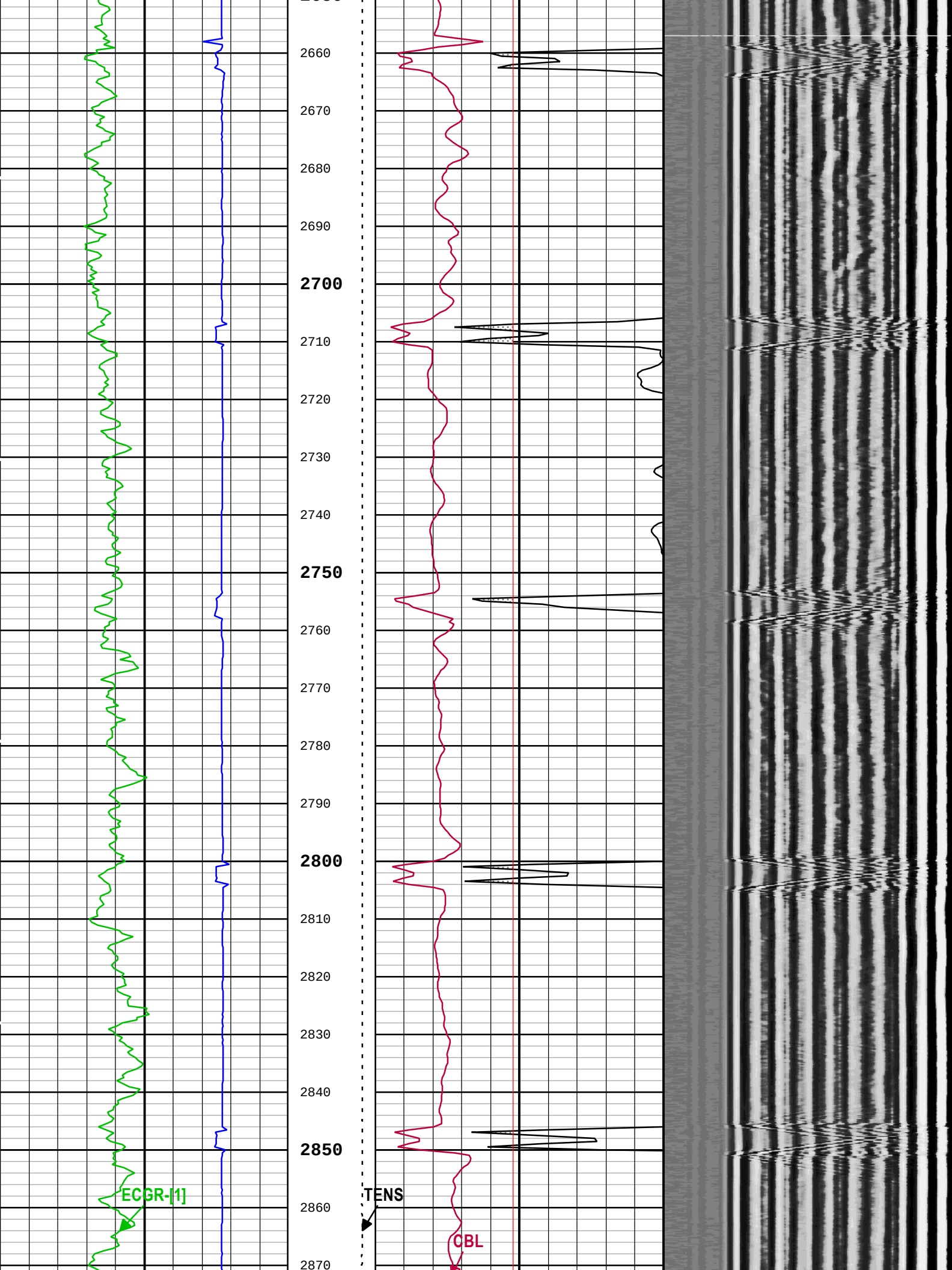
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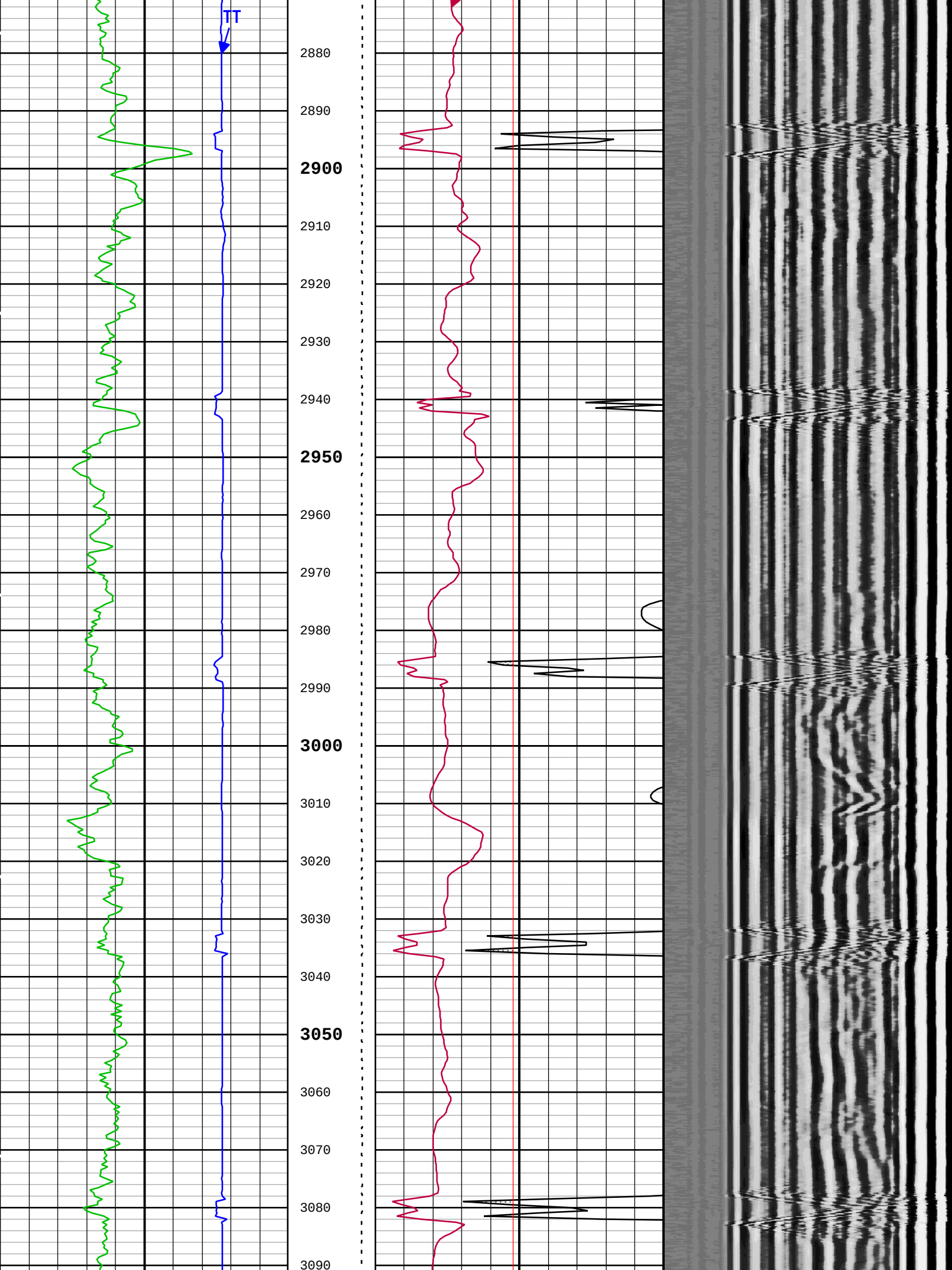
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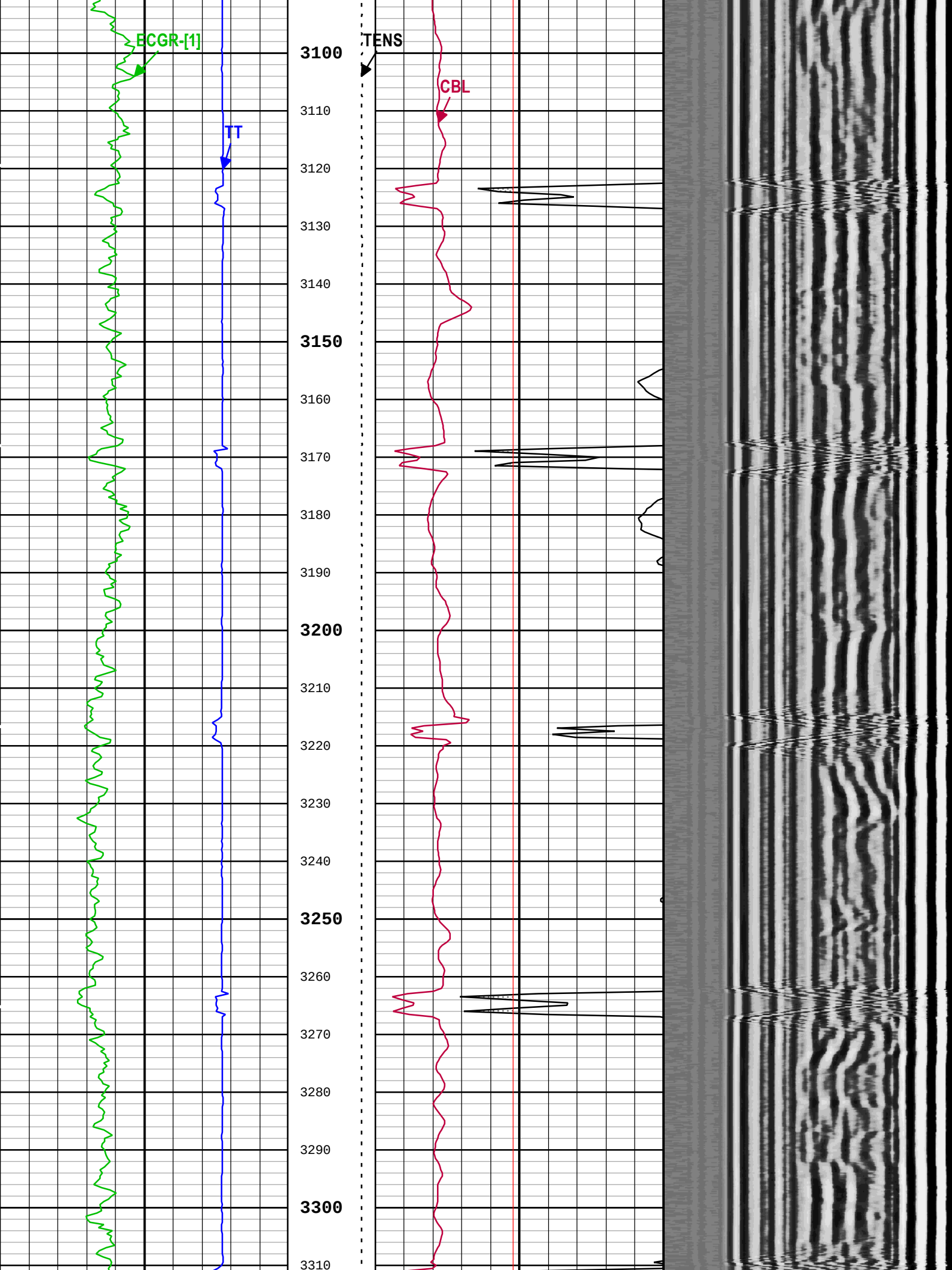
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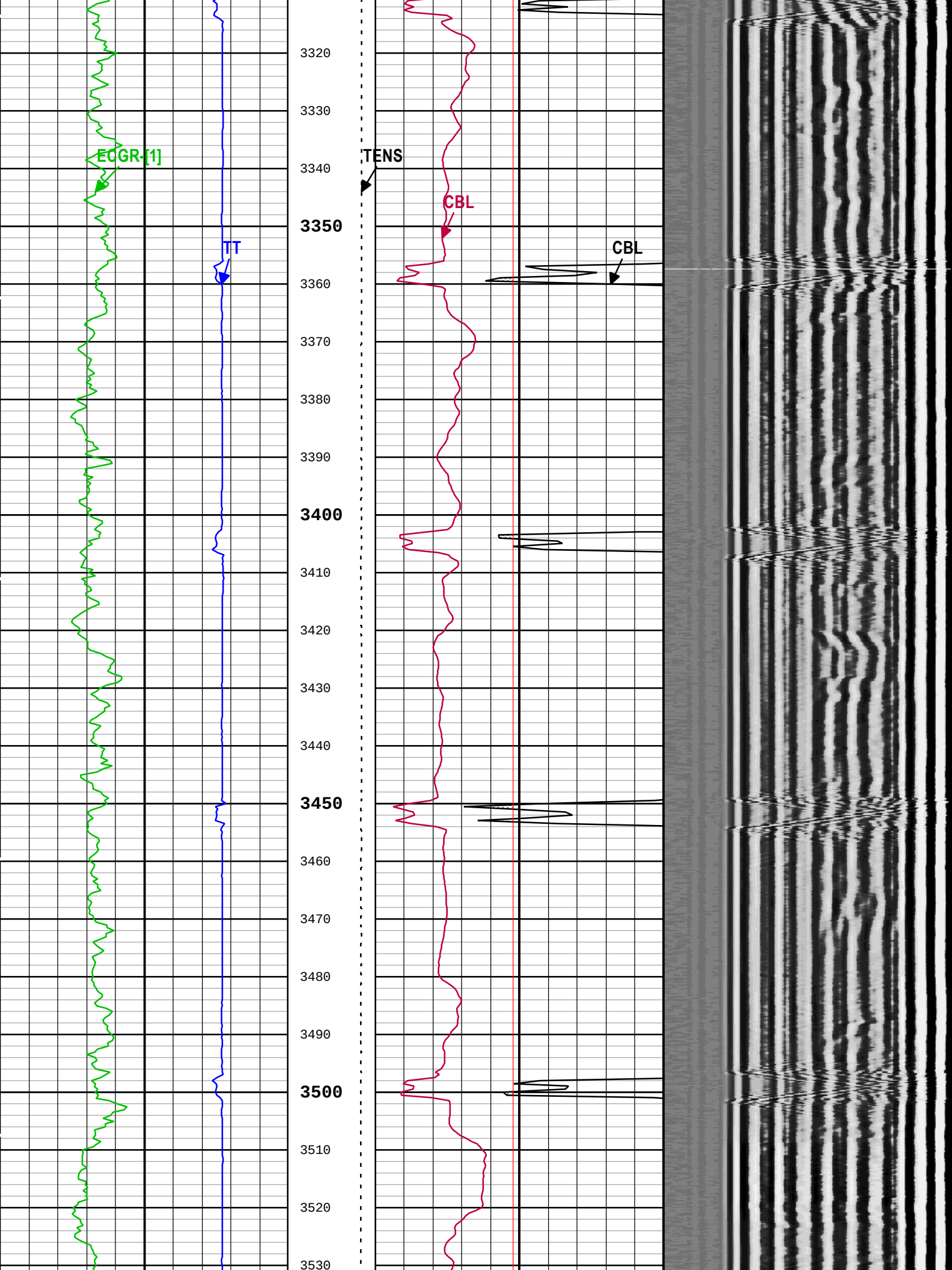
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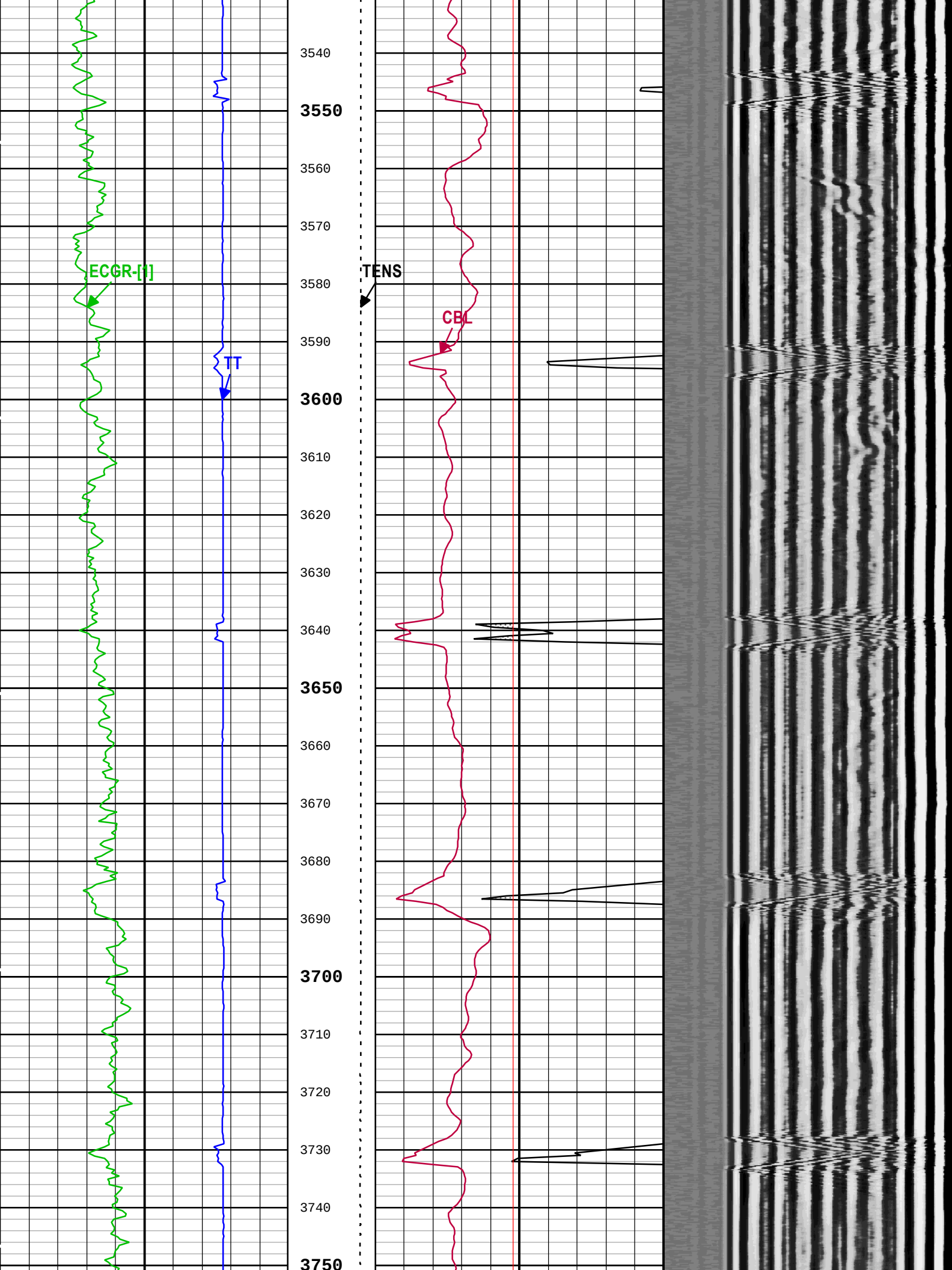
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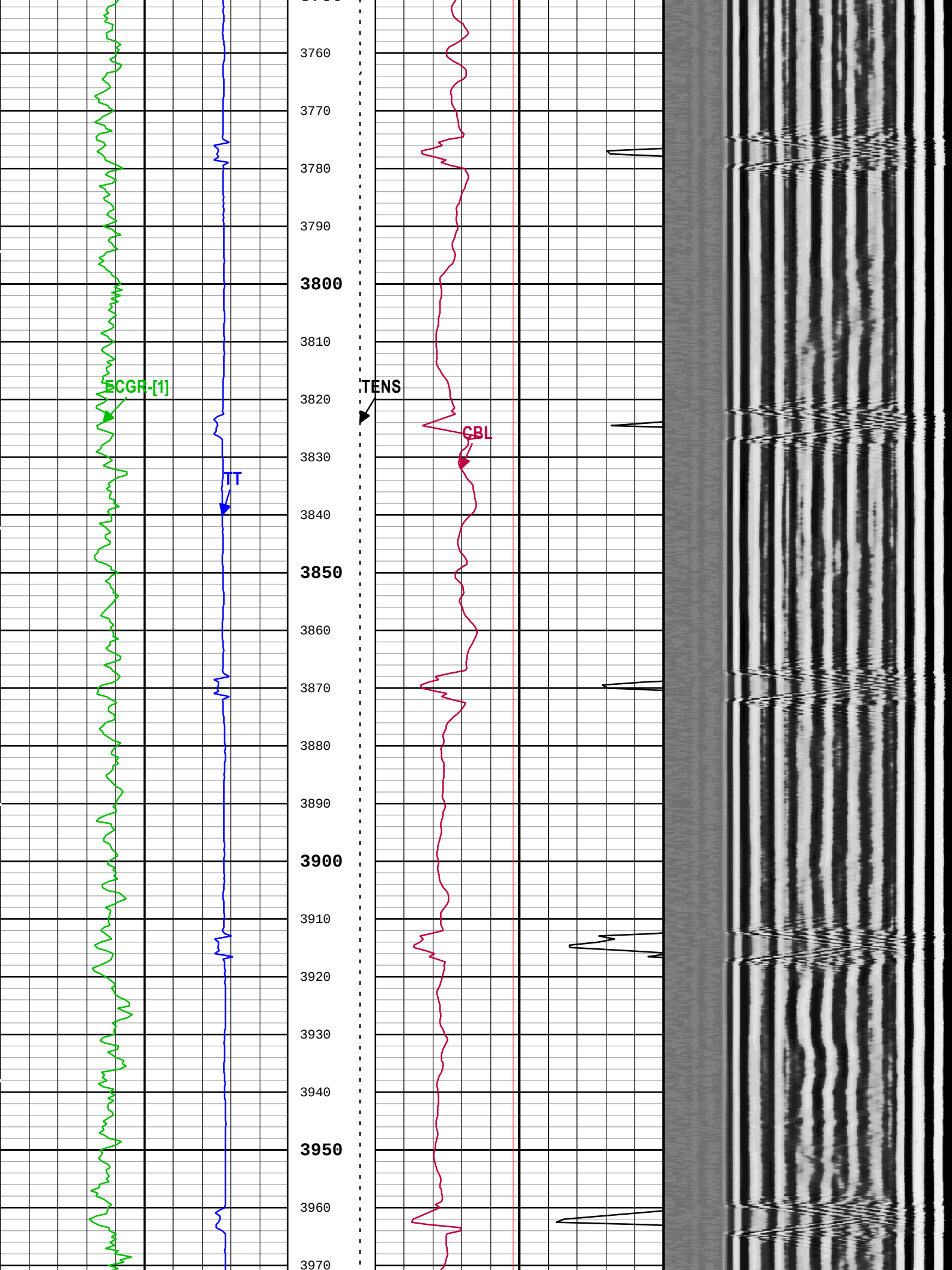
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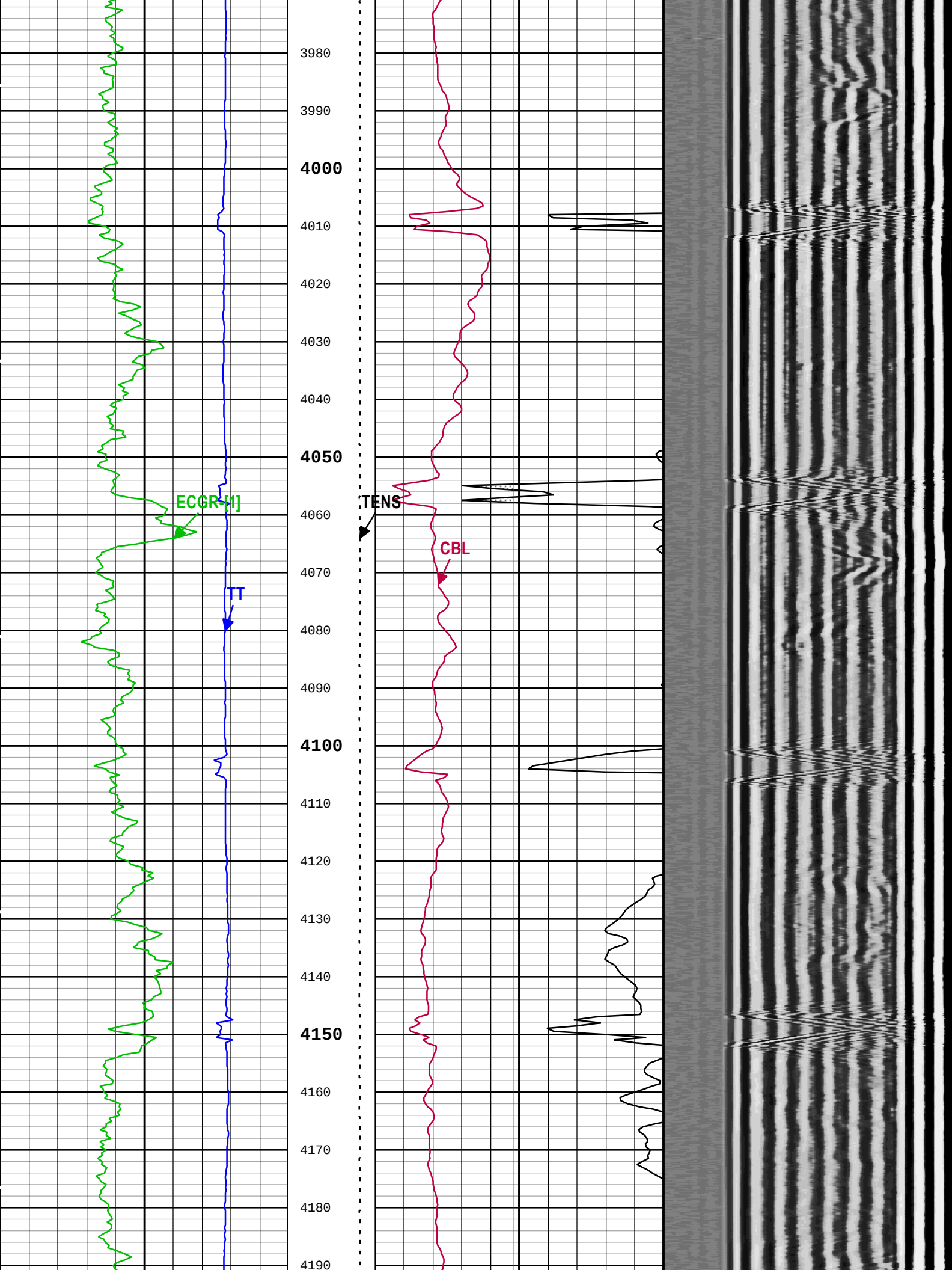
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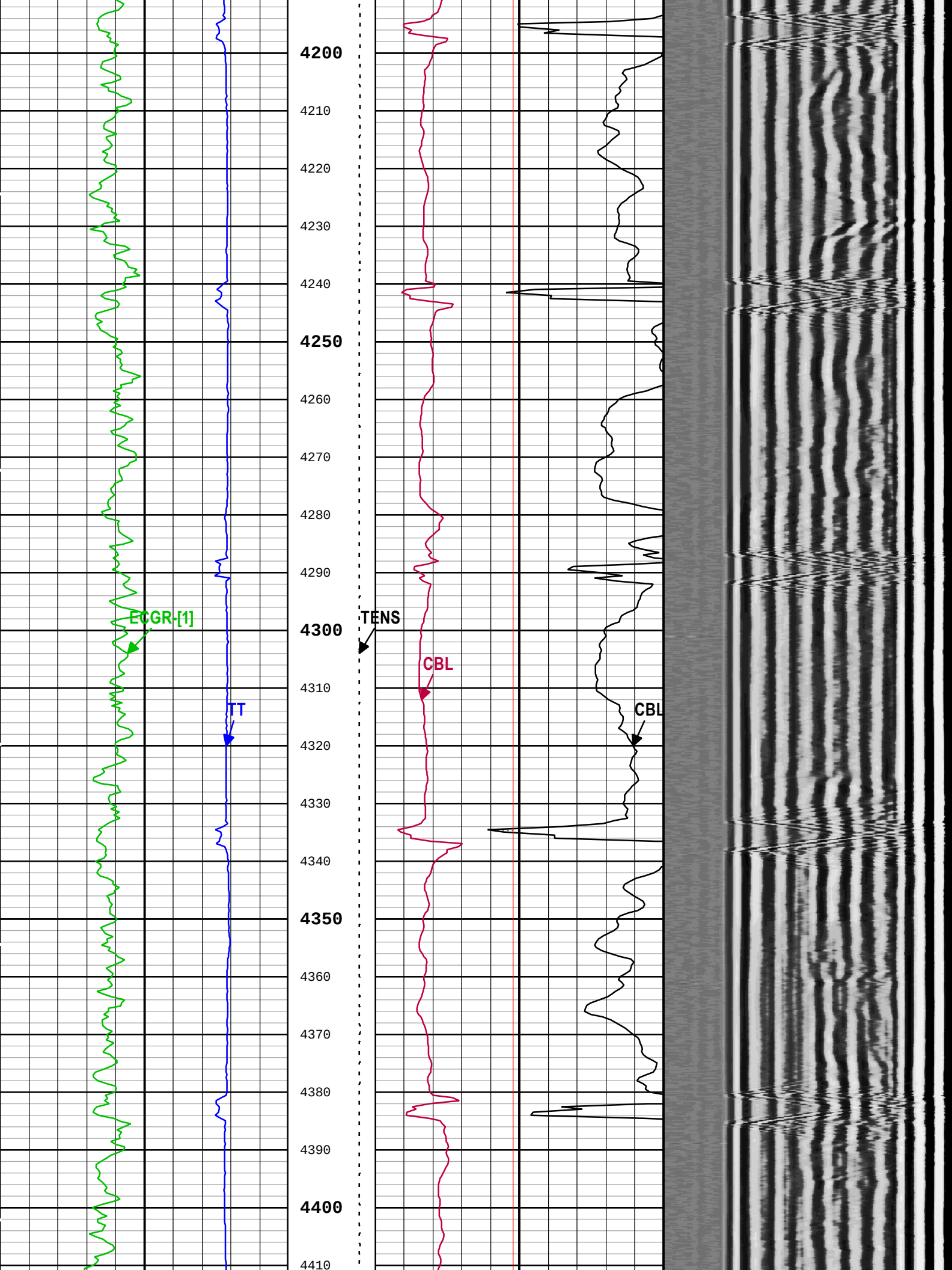
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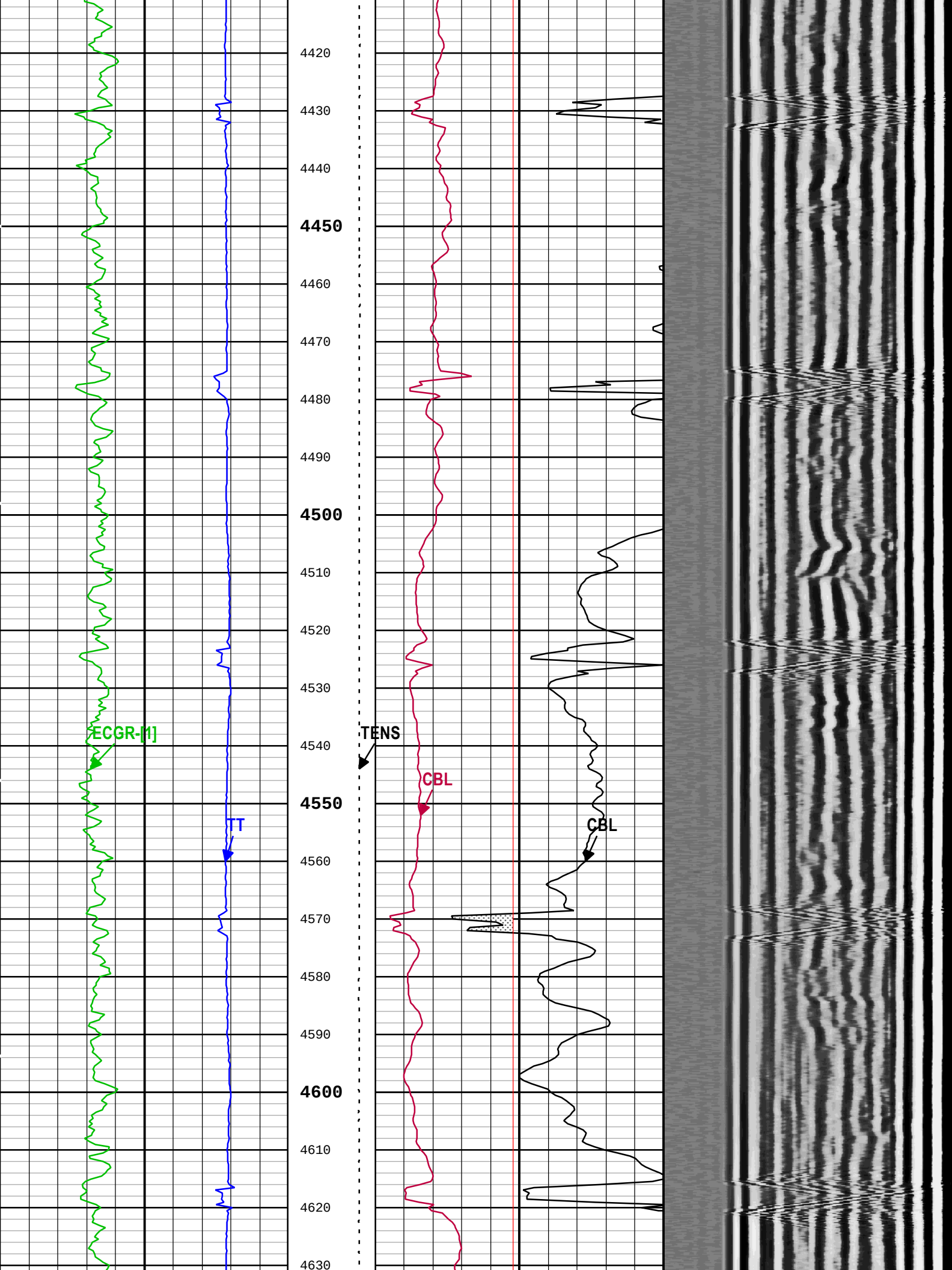
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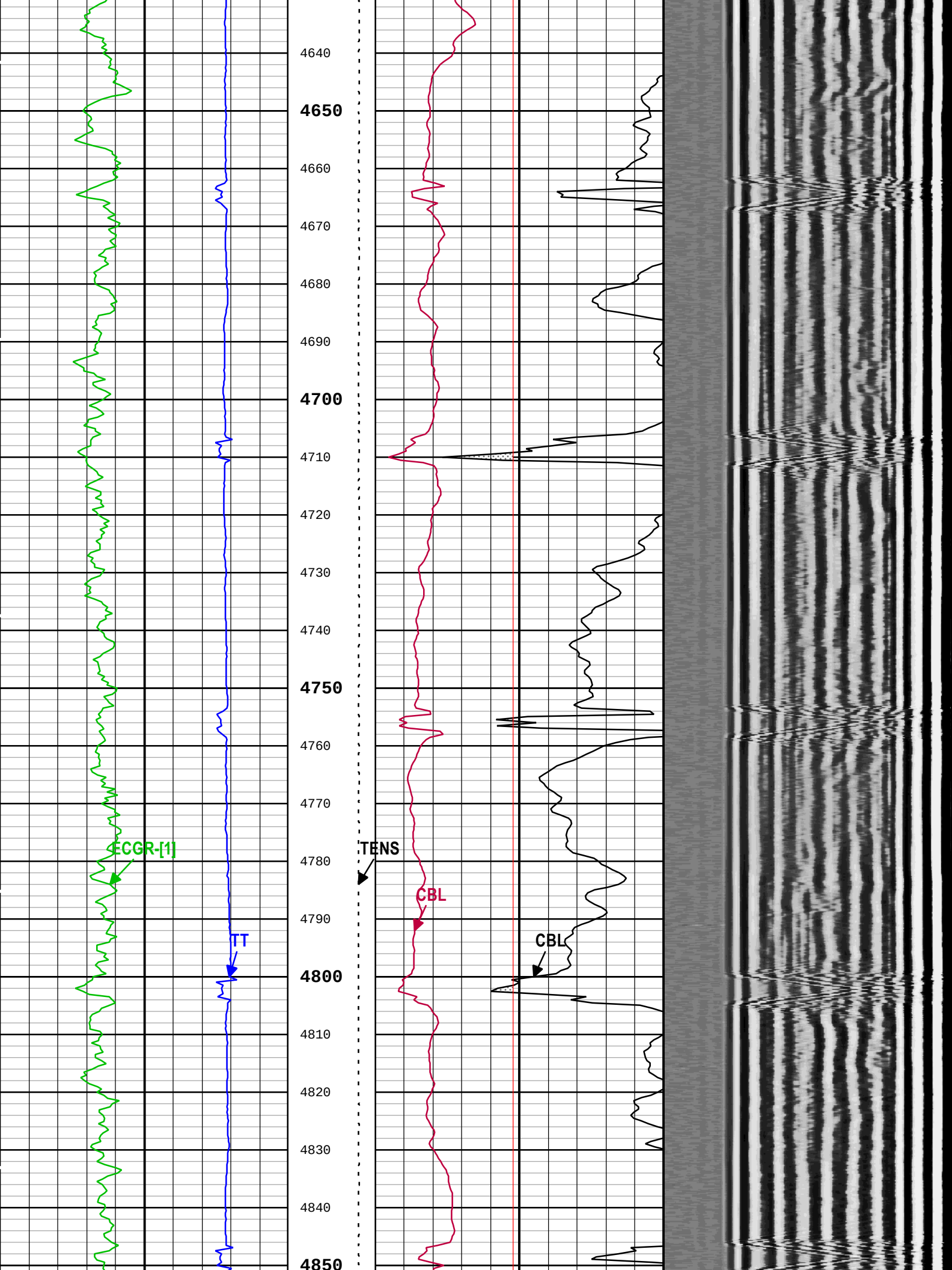
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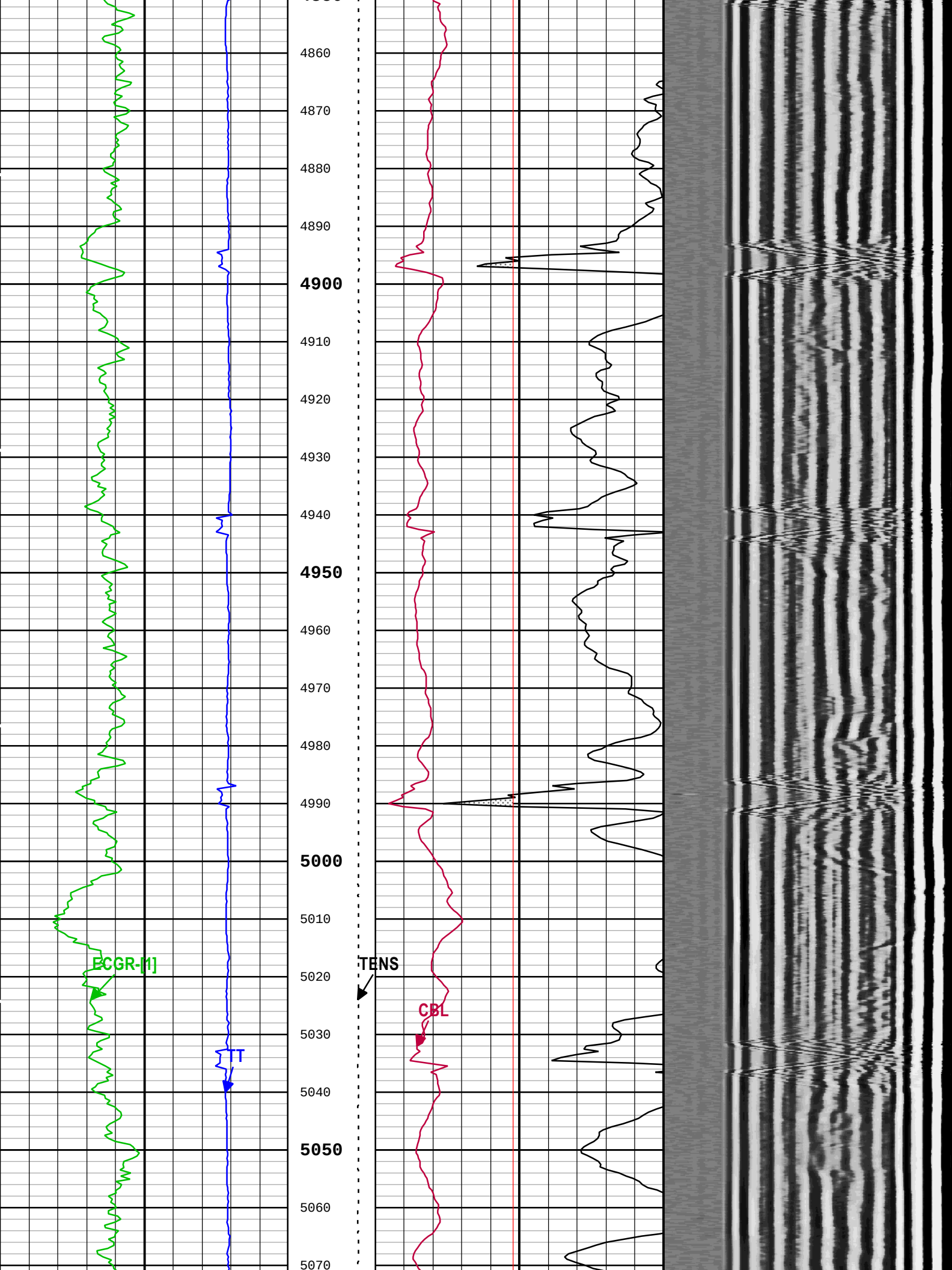
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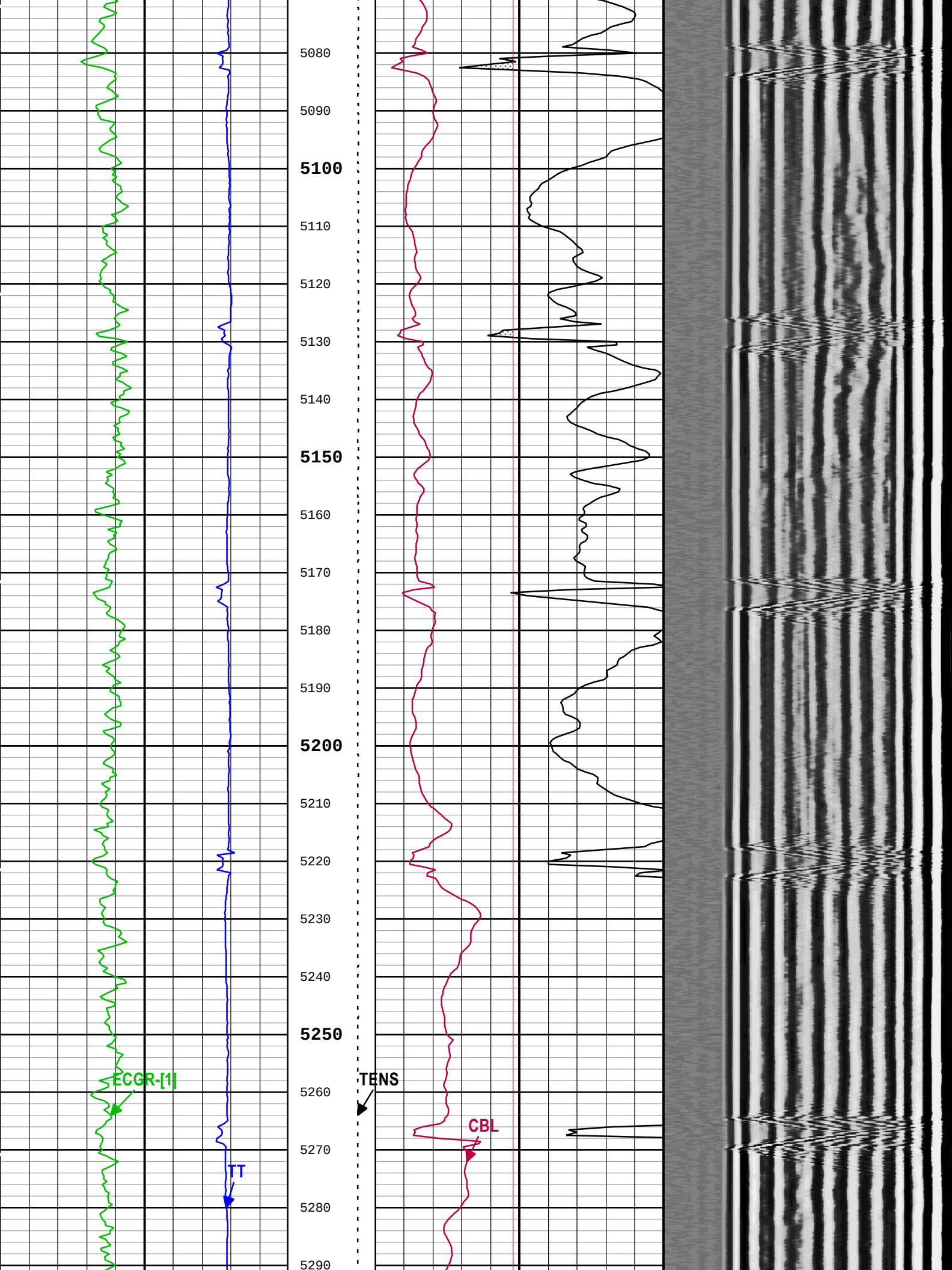
CBL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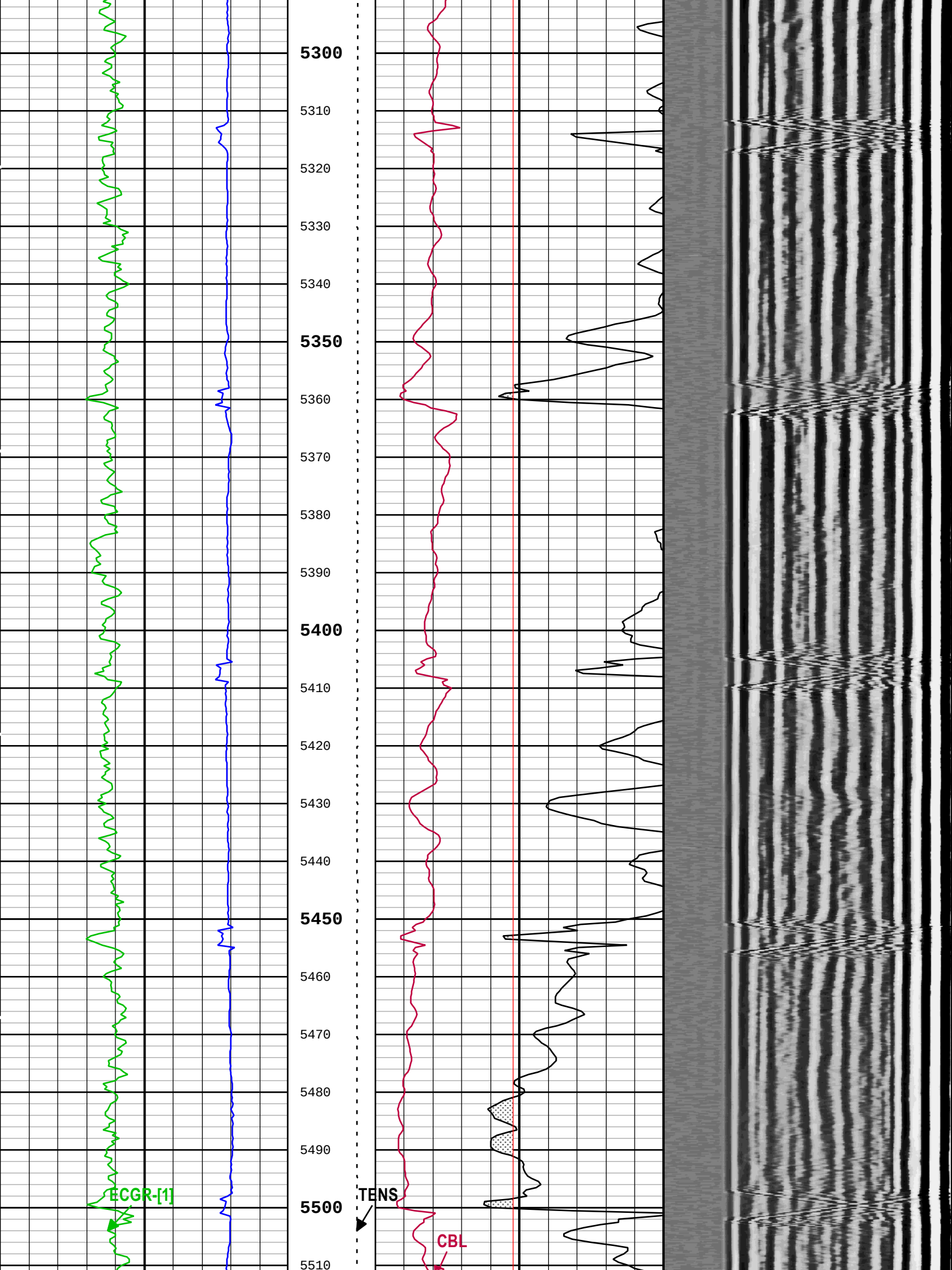
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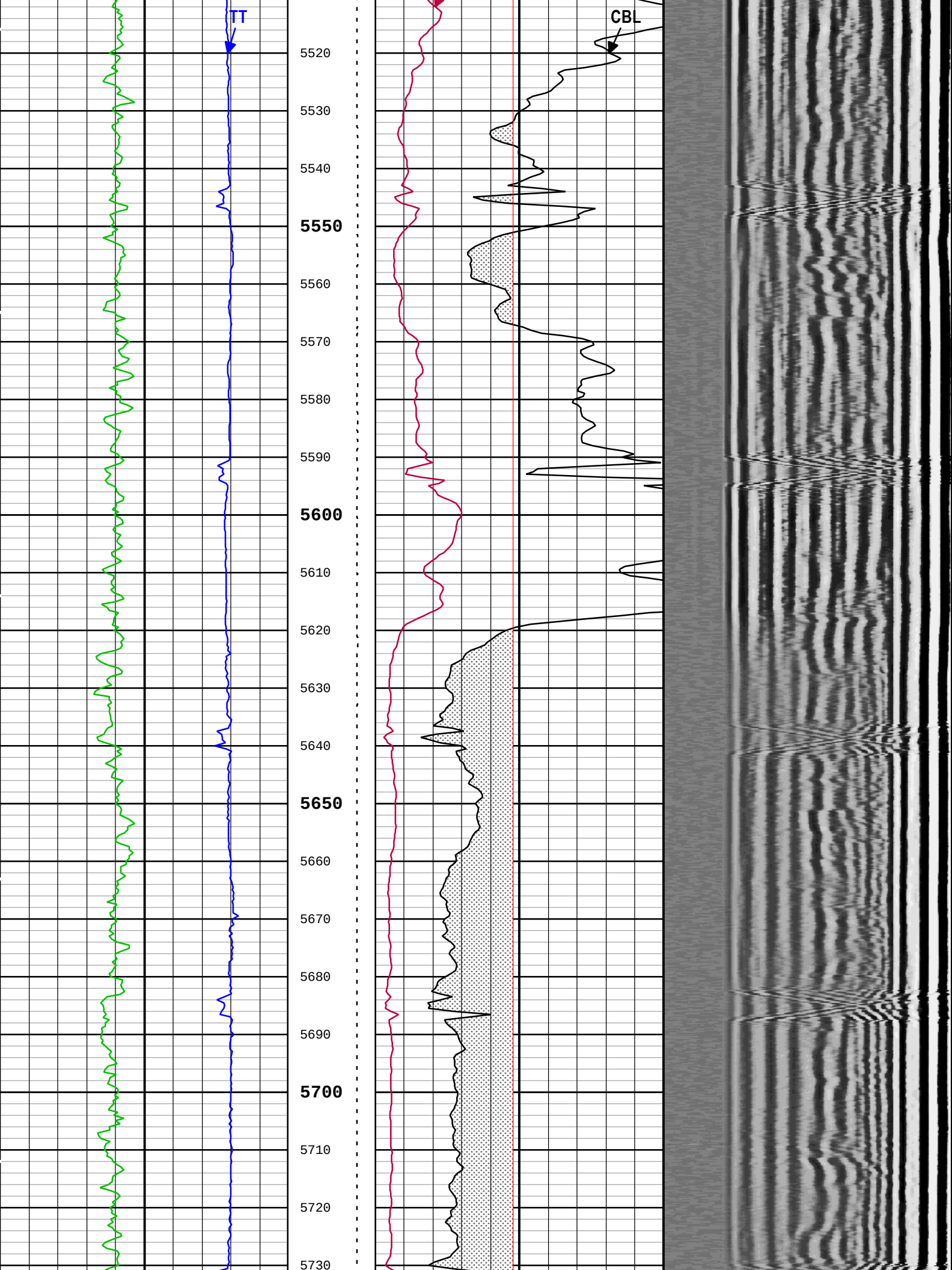
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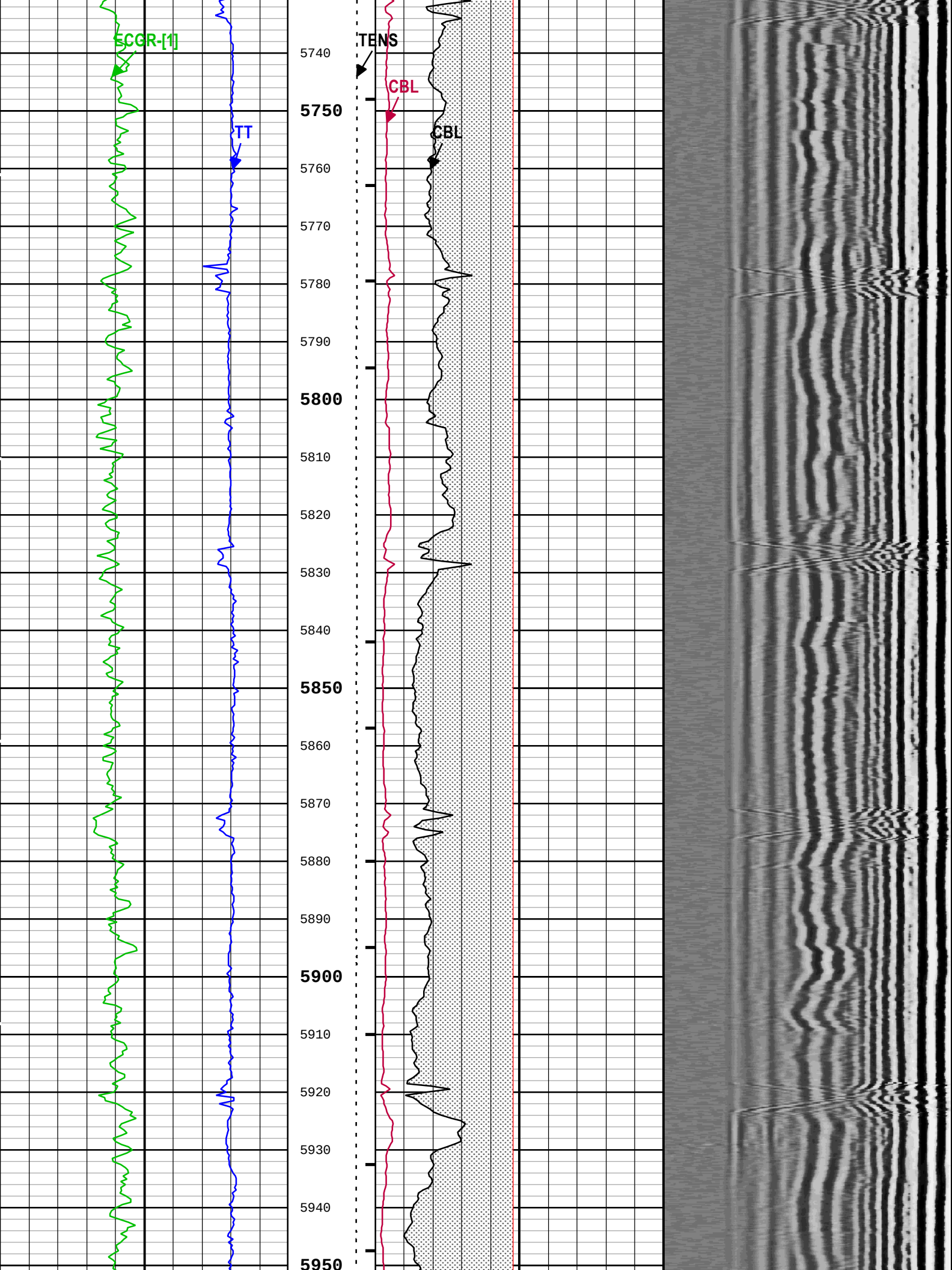
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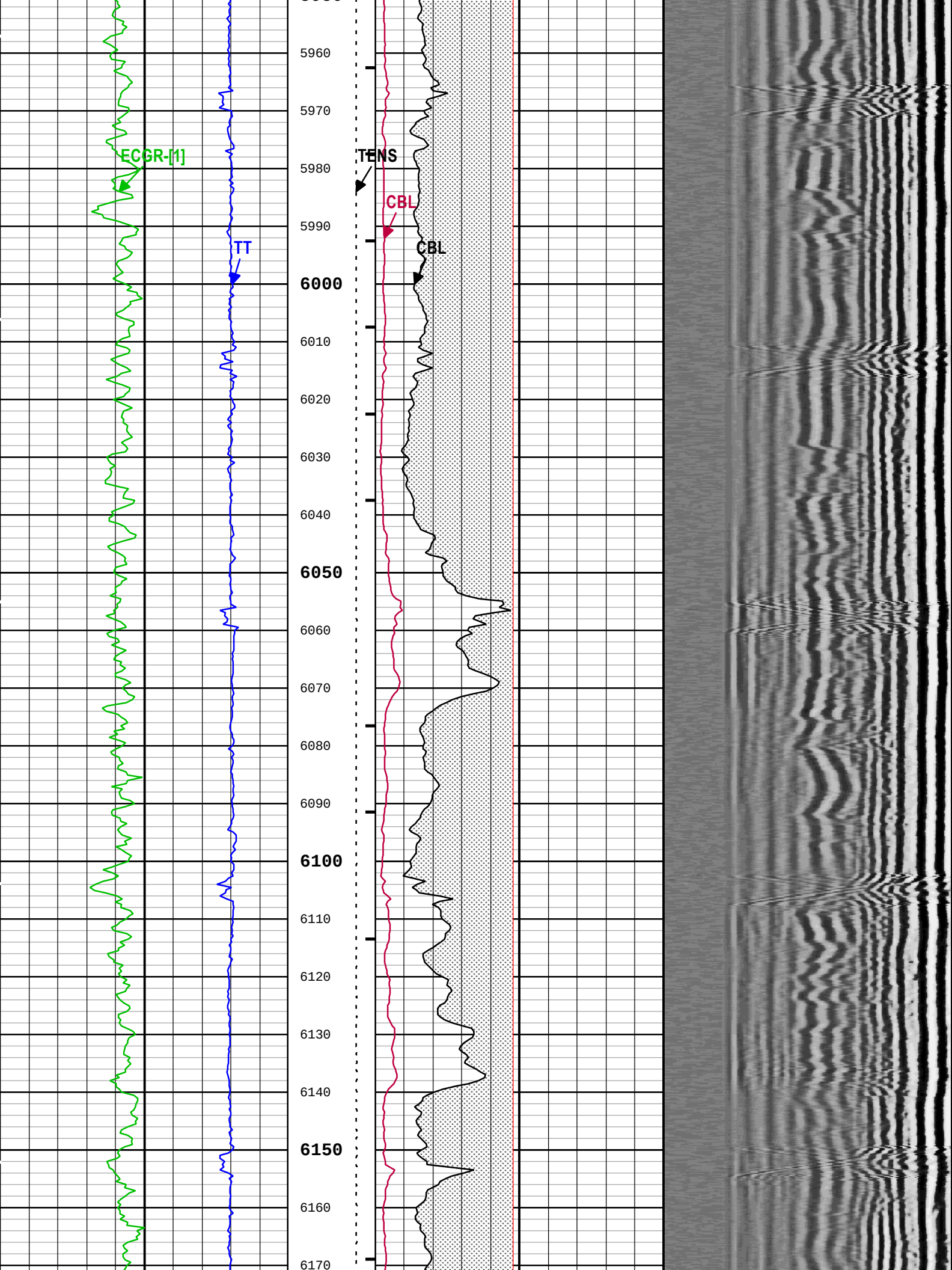
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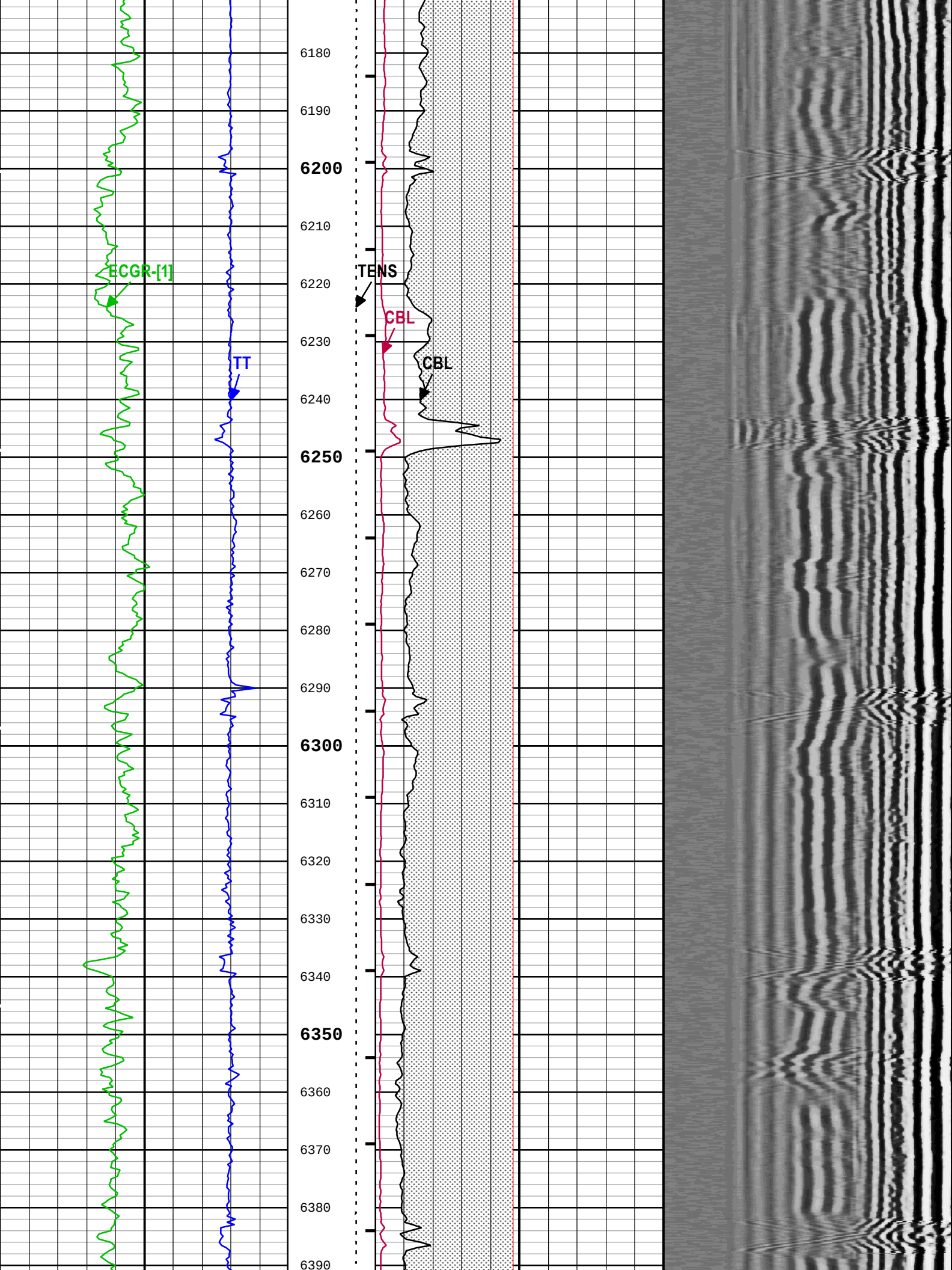
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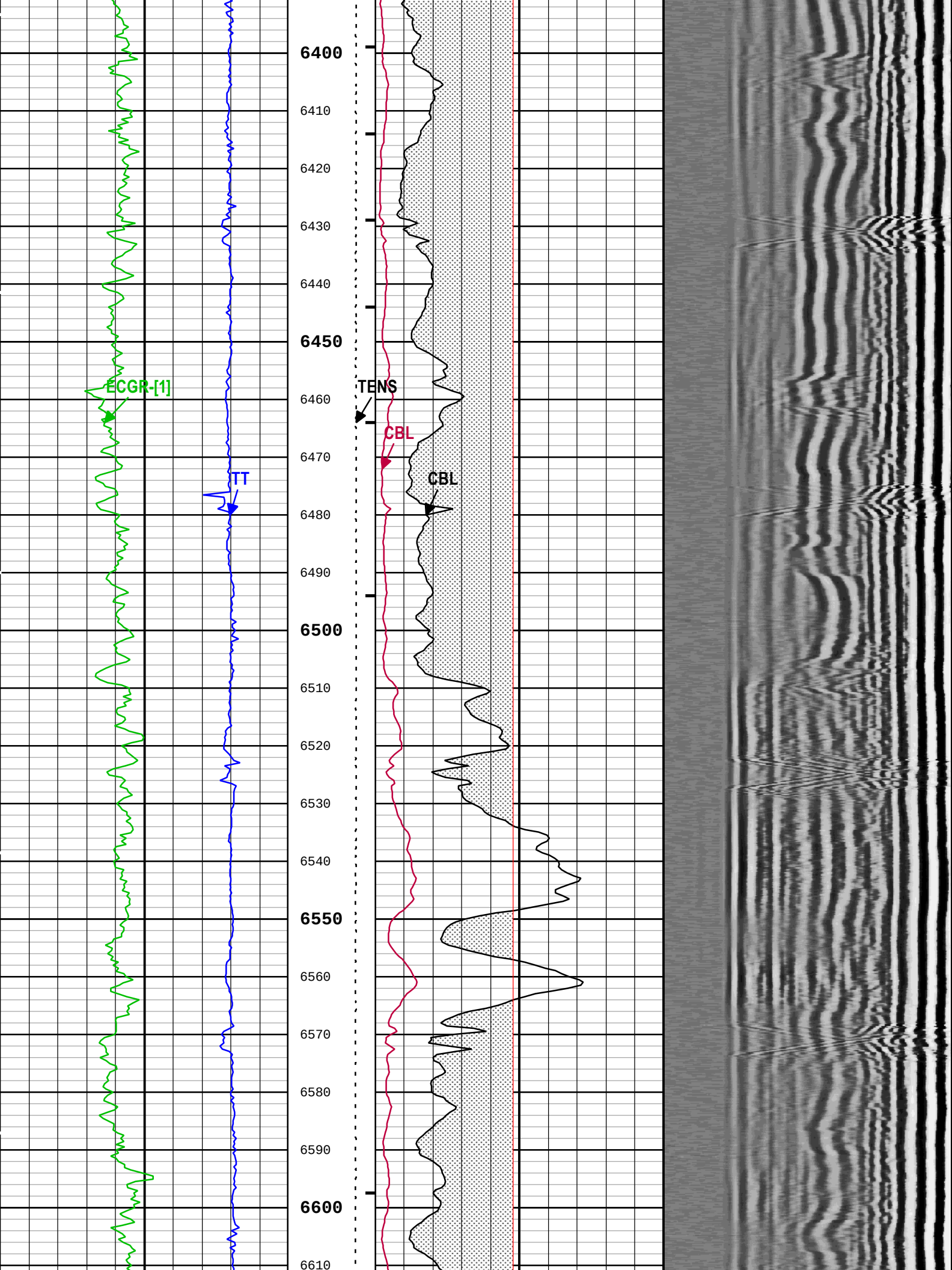
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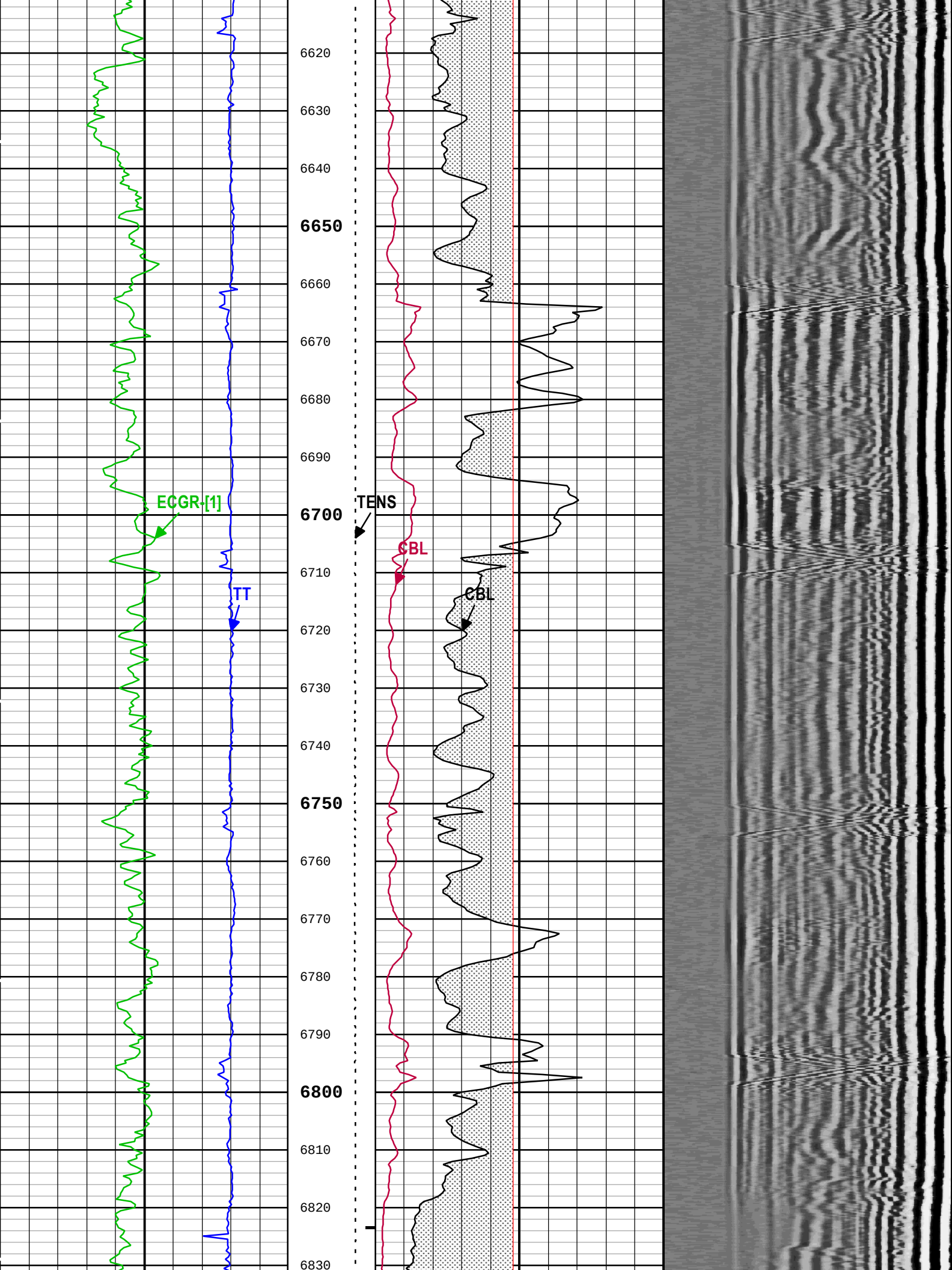
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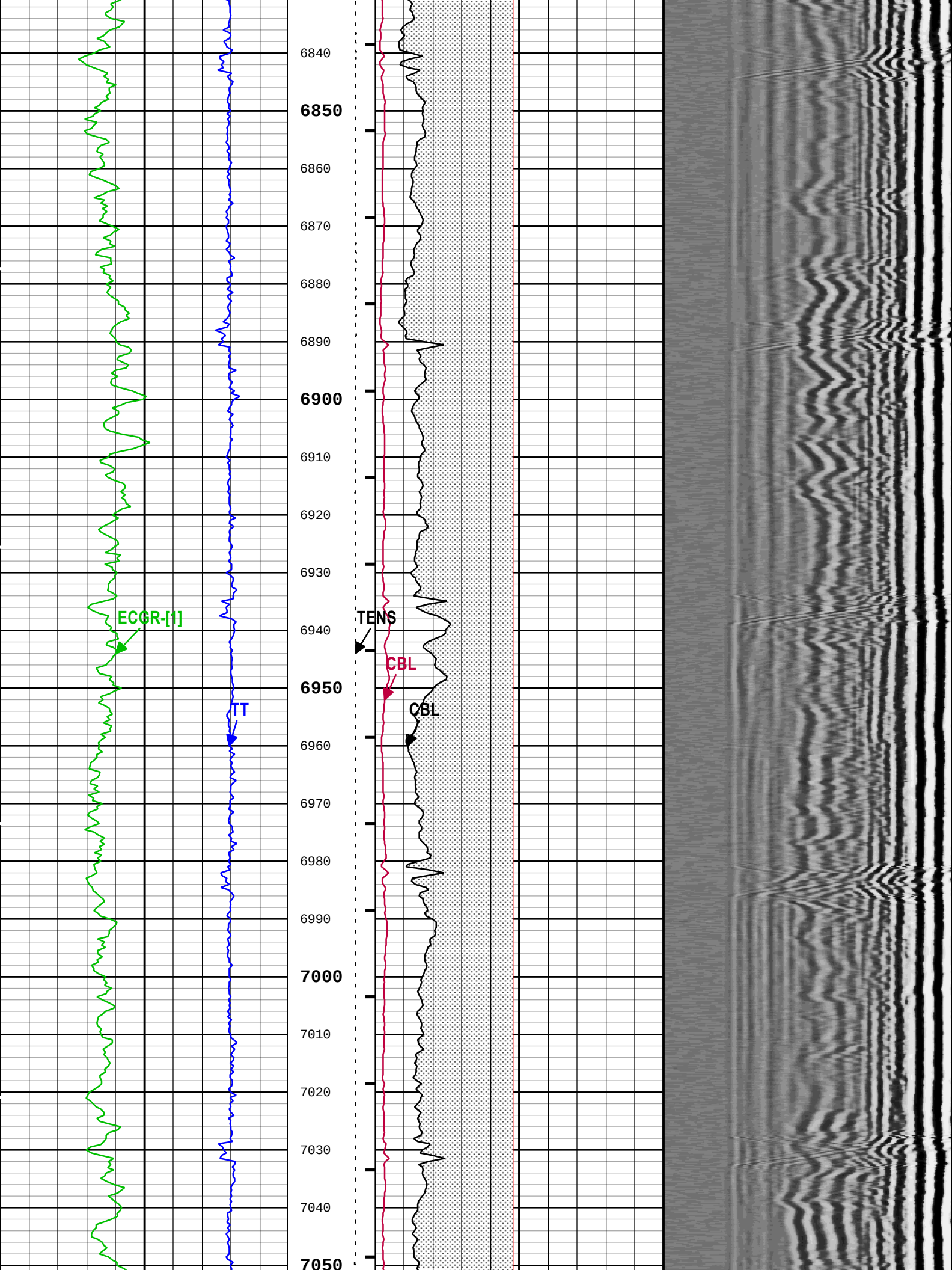
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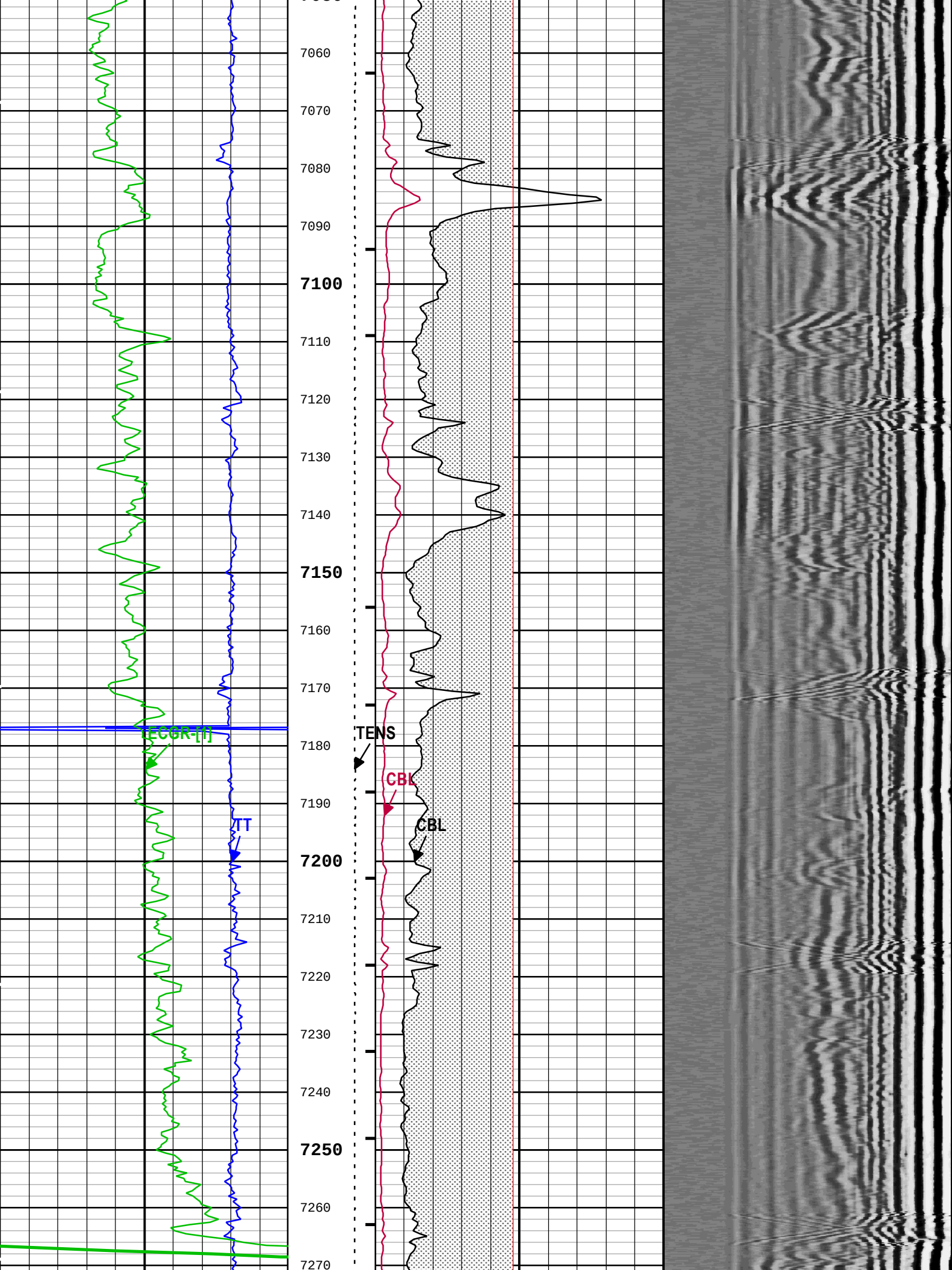
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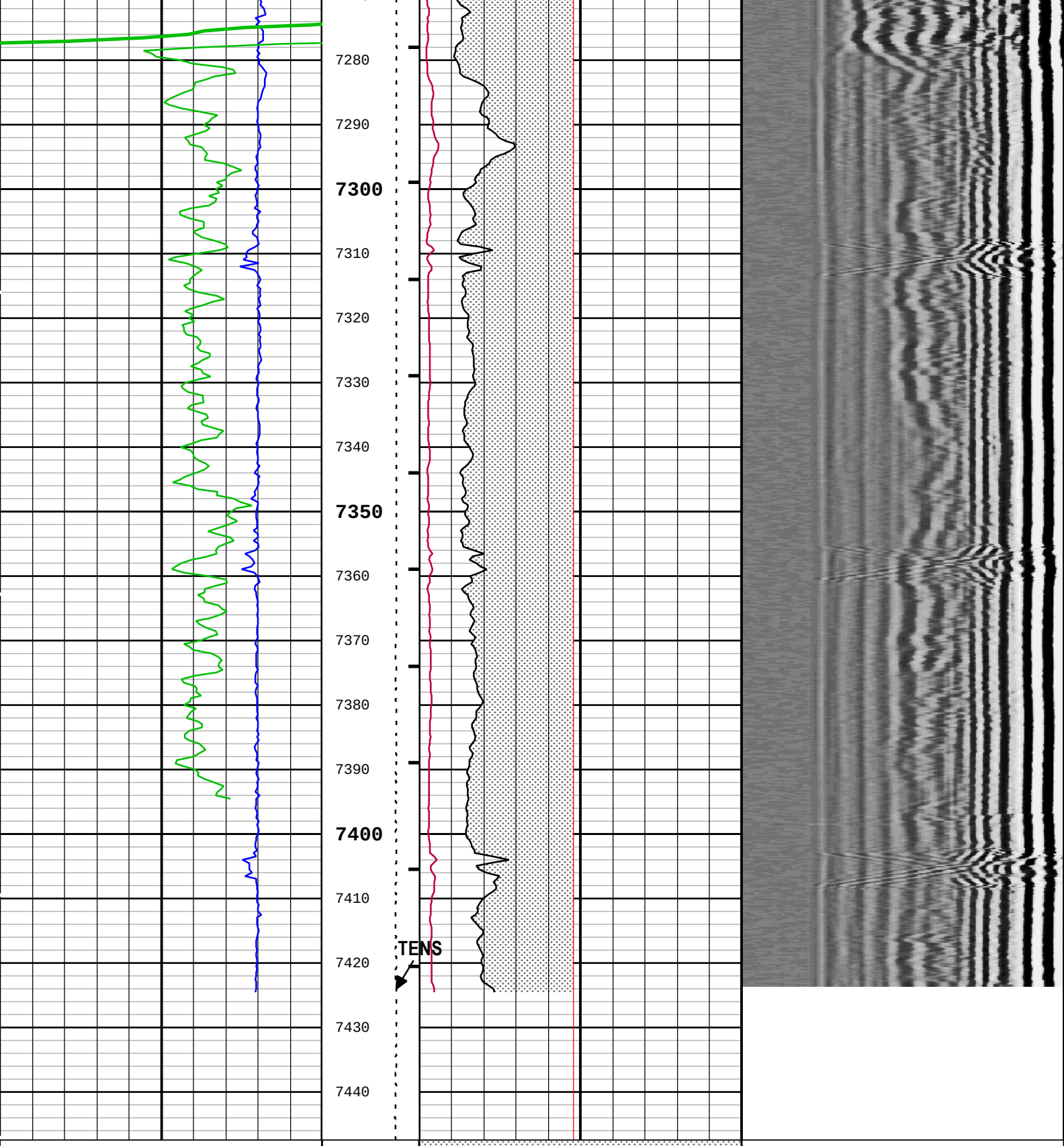


Transit Time for CBL (TT) DSLT-H
480 us 280

Gamma Ray (GR)
0 gAPI 150

Instance - 1 (6" HGNS-H RT) (ECGR)

Cable Tension (TENS)
10000 0
lbf

GoodBond From CBL to GOBO

CBL Amplitude (CBL) DSLT-H
0 mV 20

CBL Amplitude (CBL) DSLT-H
0 mV 100

Good Bond (GOBO)
0 mV 10

Min Amplitude Max

Variable Density Log - DSLT DSLT-H
200 us 1200

TIME_1900 - Time Marked every 60.00 (s)

Description: Sonic CBL with VDL Format: Log (Sonic CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 07-Apr-2016 19:17:04

Channel Processing Parameters

Three: Parameters

Parameter	Description	Tool	Value	Unit
AMSG	Auxiliary Minimum Sliding Gate	DSLT-H	140	us
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BILI	Bond Index Level for Zone Isolation	DSLT-H	0.8	
BS	Bit Size	WLSESSION	Depth Zoned	in
CBLG	CBL Gate Width	DSLT-H	45	us
CBLO	Casing Bottom (Logger)	WLSESSION	7980	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLT-H	52	mV
CDEN	Cement Density	HGNS-H	2	g/cm3
CMCF	CBL Cement Type Compensation Factor	DSLT-H	1	
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DETE	Delta-T Detection	DSLT-H	E1	
DFD	Drilling Fluid Density	Borehole	9	lbm/gal
FCF	CBL Fluid Compensation Factor	DSLT-H	0.89	
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS	
GOBO_CURR	Good Bond in Arbitrary Cement	DSLT-H	4.78	mV
GR_MULTIPLIER	Gamma Ray Multiplier	HGNS-H	1	
IMAR	Image Rotation	USIT-E	Off	
MAHTR	Manual High Threshold Reference for first arrival detection	DSLT-H	120	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	DSLT-H	9.3	dB/ft
MCI	Minimum Cemented Interval for Isolation	DSLT-H	Depth Zoned	ft
MNHTR	Minimum High Threshold Reference for first arrival detection	DSLT-H	100	
MSA	Minimum Sonic Amplitude	DSLT-H	2.63	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLT-H	2.63	mV
NMSG	Near Minimum Sliding Gate	DSLT-H	Time Zoned	us
NMXG	Near Maximum Sliding Gate	DSLT-H	940	us
NUMP	Number of Detection Passes	DSLT-H	2	
RCTH	Reference Calibrator Thickness	USIT-E	0.295	in
SFAF	Sonic Formation Attenuation Factor	DSLT-H	3.25	dB/ft
SGAD	Sliding Gate Status	DSLT-H	Off	
SGCL	Sliding Gate Closing Delta-T	DSLT-H	130	us/ft
SGCW	Sliding Gate Closing Width	DSLT-H	25	us
SGDT	Sliding Gate Delta-T	DSLT-H	57	us/ft
SGW	Sliding Gate Width	DSLT-H	110	us
SLEV	Signal Level for AGC	DSLT-H	5000	mV
SOCN	Standoff Distance	HGNS-H	0.125	in
SOCO	Standoff Correction Option	HGNS-H	No	
TCUB	T^3 Processing Level	USIT-E	Loop	
THDH	Maximum Search Thickness (percentage of nominal)	USIT-E	130	%
THDL	Minimum Search Thickness (percentage of nominal)	USIT-E	65	%
HISC	Tool Position: Centered or Eccentered	HGNS-H	Eccentered	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	1.95	g/cm3

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.	
THDP	Thickness Detection Policy	USIT-E	Fundamental	
VCAS	Ultrasonic Transversal Velocity in Casing	USIT-E	51.4	us/ft
VDLG	VDL Manual Gain	DSLT-H	5	
ZCAS	Acoustic Impedance of Casing	USIT-E	46.25	Mrayl
ZCMT	Acoustic Impedance of Cement	DSLT-H	6.8	Mrayl
ZCMT_NEAT	Acoustic Impedance of Cement in Neat Cement	DSLT-H	6.8	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	17.5	8	860
BS	12.25	860	7447.5
MCI	21.68	8	824
MCI	14.81	824	7447.5

All depth are actual.

Time Zone Parameters

Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
NMSG	308	07-Apr-2016 09:48:55	07-Apr-2016 09:52:27	7447.53	7294.56
NMSG	300	07-Apr-2016 09:52:27	07-Apr-2016 12:23:34	7294.56	60.69

All depth are at tool zero.

Tool Control Parameters

Three: Parameters

Parameter	Description	Tool	Value	Unit
DDEL	Digitizing Delay	DSLT-H	0	us
MODE	DSLT Acquisition Mode	DSLT-H	CBLB	
RATE	DSLT Firing Rate	DSLT-H	15 Hz	
DTFS	DSLT Telemetry Frame Size	DSLT-H	536	
DWCO	Digitizer Word Count	DSLT-H	250	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3375	ft/h
SDTH	Switch Down Threshold	DSLT-H	20000	
SGAI	Selectable Acquisition Gain	DSLT-H	x1	
SUTH	Switch Up Threshold	DSLT-H	1000	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 500 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 1.5 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	7440	ft
VRES	Vertical Resolution	USIT-E	1.5 in	
WINB	Window Begin Time	USIT-E	20	us
WINE	Window End Time	USIT-E	100	us
WMOD	Waveform Firing Mode	DSLT-H	Full	

Three

Repeat Pass 5 in = 100 ft

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Three	Log[7]:Up	Up	7304.67 ft	7446.62 ft	07-Apr-2016 9:42:32 AM	07-Apr-2016 9:45:59 AM	ON	7.54 ft	Yes

All depths are referenced to toolstring zero

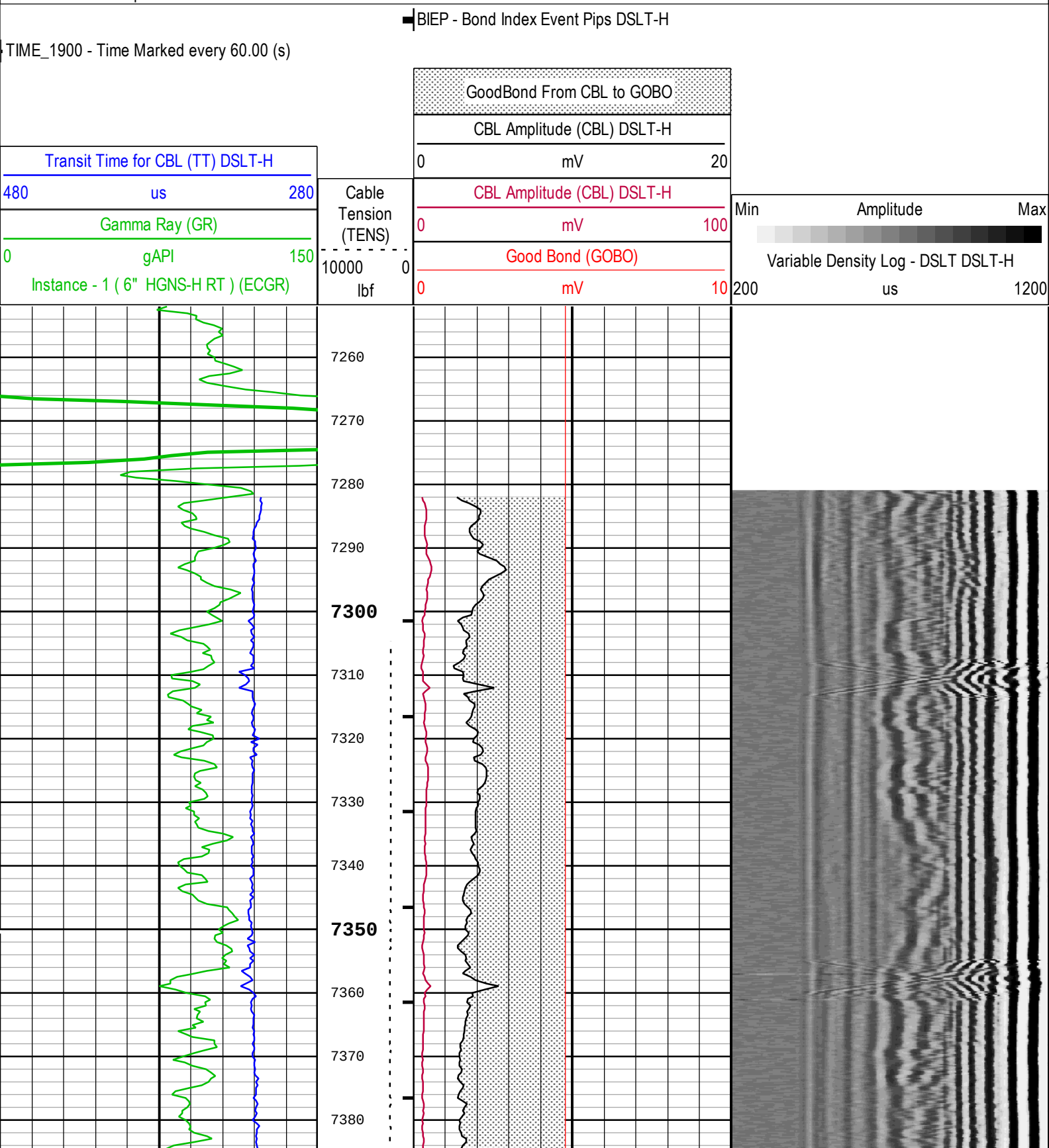
Log

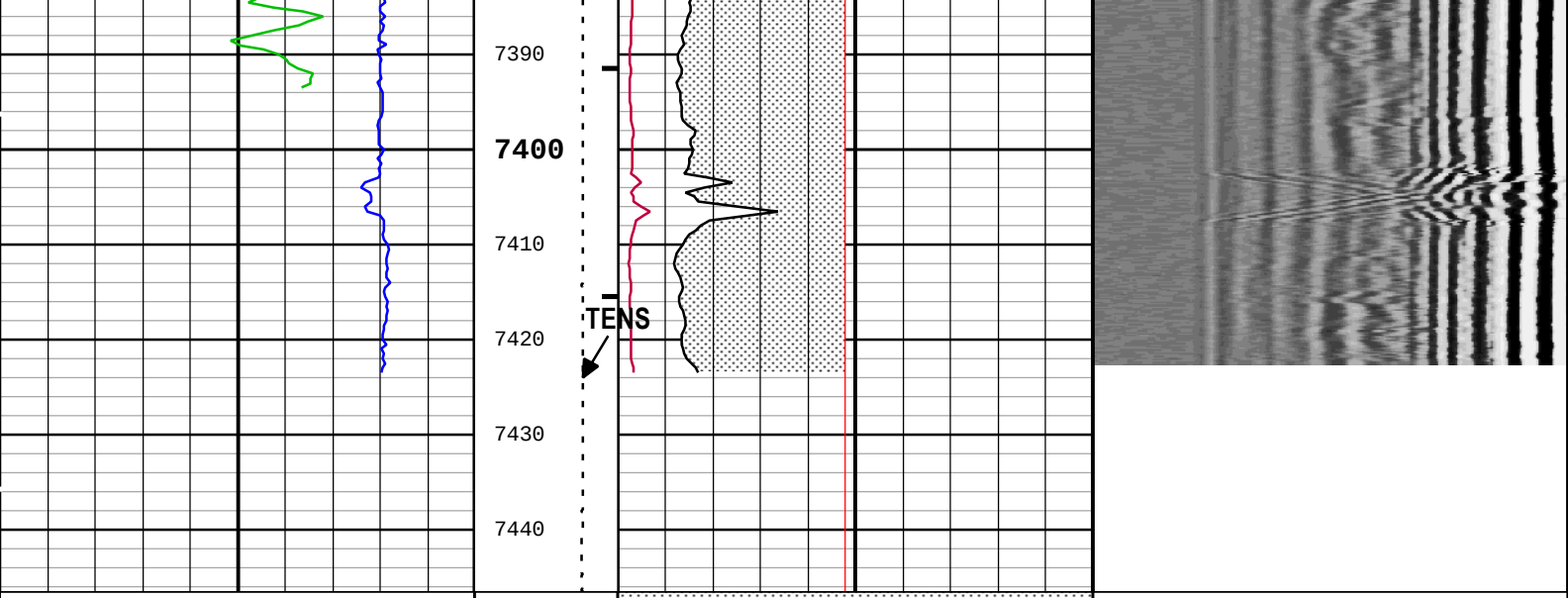
Company:Southern California Gas Company Well:Porter 69F

Three: Log[7]:Up:S001

Description: Sonic CBL with VDL Format: Log (Sonic CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 07-Apr-2016 19:17:10





Transit Time for CBL (TT) DSLT-H
480 us 280

Gamma Ray (GR)
0 gAPI 150
Instance - 1 (6" HGNS-H RT) (ECGR)

Cable Tension (TENS)
10000 0
lbf

GoodBond From CBL to GOBO

CBL Amplitude (CBL) DSLT-H
0 mV 20

CBL Amplitude (CBL) DSLT-H
0 mV 100

Good Bond (GOBO)
0 mV 10

Min Amplitude Max
Variable Density Log - DSLT DSLT-H
200 us 1200

TIME_1900 - Time Marked every 60.00 (s)

BIEP - Bond Index Event Pips DSLT-H

Description: Sonic CBL with VDL Format: Log (Sonic CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 07-Apr-2016 19:17:10

USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[8]:Up	7447.53	60.69

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 : 30.44m(99.87ft) to 39.69m(130.20ft)
MUD_N_FRP = 1.05
DFD = 1.08g/cm3(9.00lbm/gal)
CZMD median computed in free pipe normalization interval = 1.70 MRayl

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

Main Composite

Main Pass 5 in = 100 ft

Composite Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Three	Log[8]:Up	Up	60.69 ft	7447.53 ft	07-Apr-2016 9:48:55 AM	07-Apr-2016 12:23:34 PM	ON	0.96 ft	Yes
Three	Log[12]:Up	Up	85.32 ft	262.12 ft	07-Apr-2016 2:08:49 PM	07-Apr-2016 2:13:19 PM	ON	6.42 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Southern California Gas Company Well:Porter 69F
Main Composite:S001

Description: USI VDL Cement Format: Log (LBV1_USI-VDL (DSLT) Cement 9.625inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type:

Measured Depth Creation Date: 07-Apr-2016 19:17:17

TIME_1900 - Time Marked every 60.00 (s)

ERAV_IRAV | ERAV_RHF1

IRAV_LHF1 | IRAV_ERAV

LHF1_ERAV | RHF1_IRAV

Median of Unflagged External Radii (ERAV_RF) USIT-E[1]
5 in 4 | 4 in 5

Median Internal Radius of Casing Corrected for Eccentering (IRAV_RF) USIT-E[1]
5 in 4

Minimum of Unflagged Internal Radii (IRMN_RF) USIT-E[1]
5 in 4

Maximum of Unflagged Internal Radii (IRMX_RF) USIT-E[1]
5 in 4

Casing Collar Locator Ultrasonic (CCLU) USIT-E[1]
-30 in 10

Amplitude of Eccentering for Unflagged Waves (ECCE_RF) USIT-E[1]
0 in 0.5

Gamma Ray (ECGR) HGNS[1]
0 gAPI 150

Minimum of Unflagged Internal Radii (IRMN_RF) USIT-E[1]
4 in 5

Maximum of Unflagged Internal Radii (IRMX_RF) USIT-E[1]
4 in 5

Median Internal Radius of Casing Corrected for Eccentering (IRAV_RF) USIT-E[1]
4 in 5

Absent 1.000 2.500 4.000 5.500 7.000
Custom Normalization
USIT - Acoustic Impedance (AIBK) USIT-E[1] (Mrayl)

Acoustic Impedance Minimum (AIMN) USIT-E[1]
-1 Mrayl 9

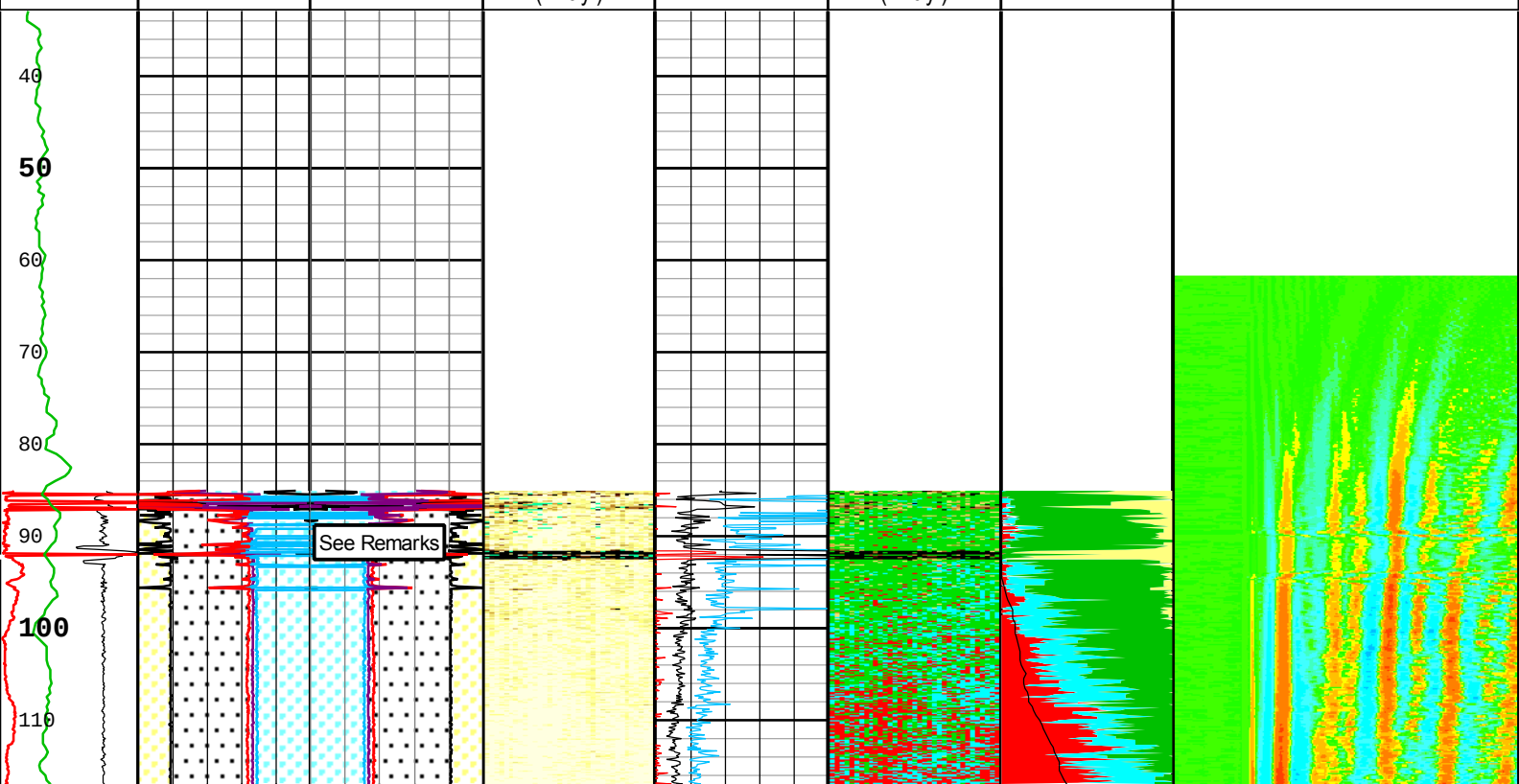
Acoustic Impedance Average (AIAV) USIT-E[1]
-1 Mrayl 9

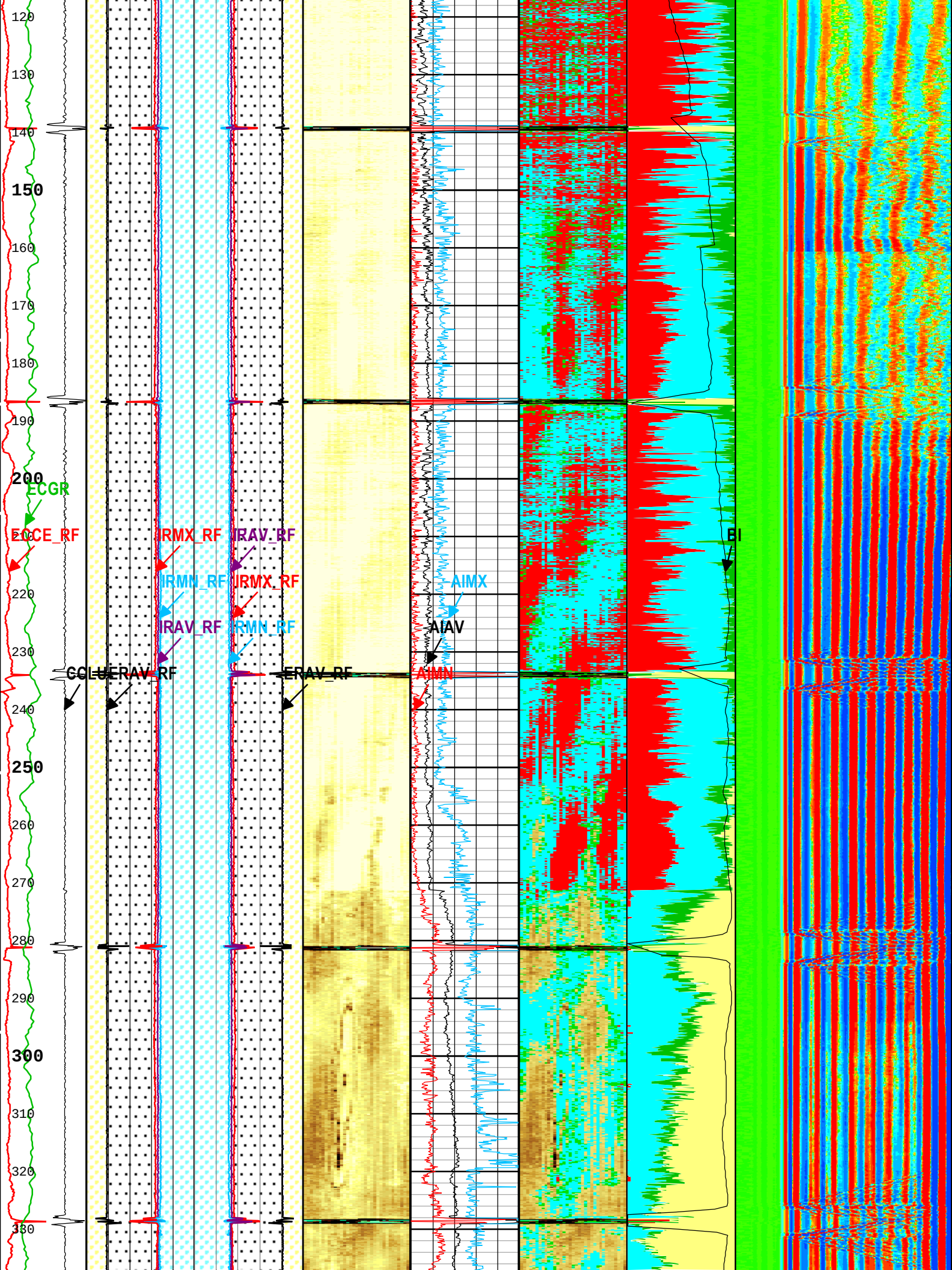
Acoustic Impedance Maximum (AIMX) USIT-E[1]
-1 Mrayl 9

Absent 0.300 3.581 5.054 6.527 8.000
Custom Normalization
USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E[1] (Mrayl)

Bonded
Gas
Liquid
Micro-debonding
Bond Index (BI) DSLT-H[1]
1 0

Min Amplitude Max
Sonic VDL Curve DSLT-H[1]
200 us 1200

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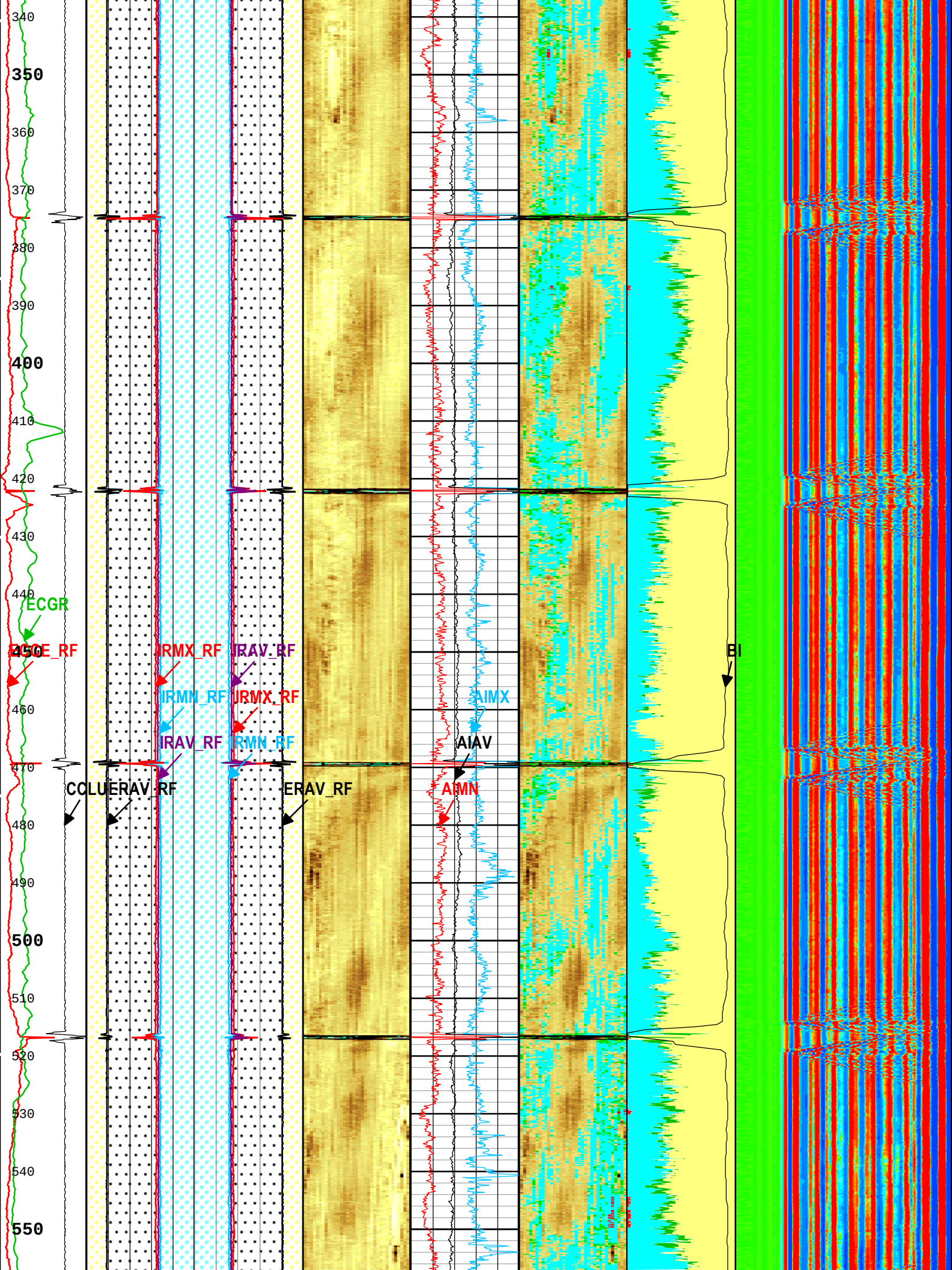
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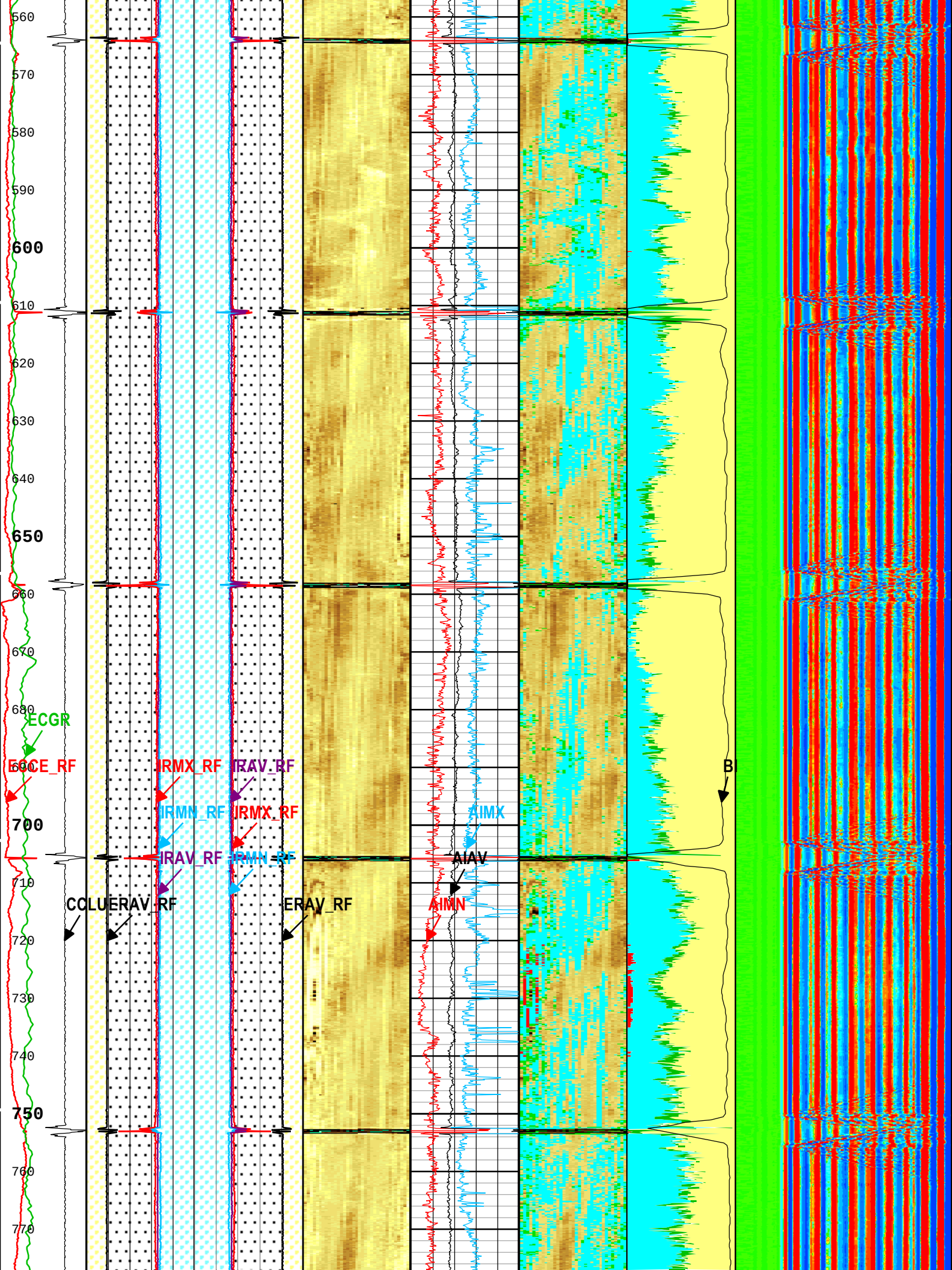
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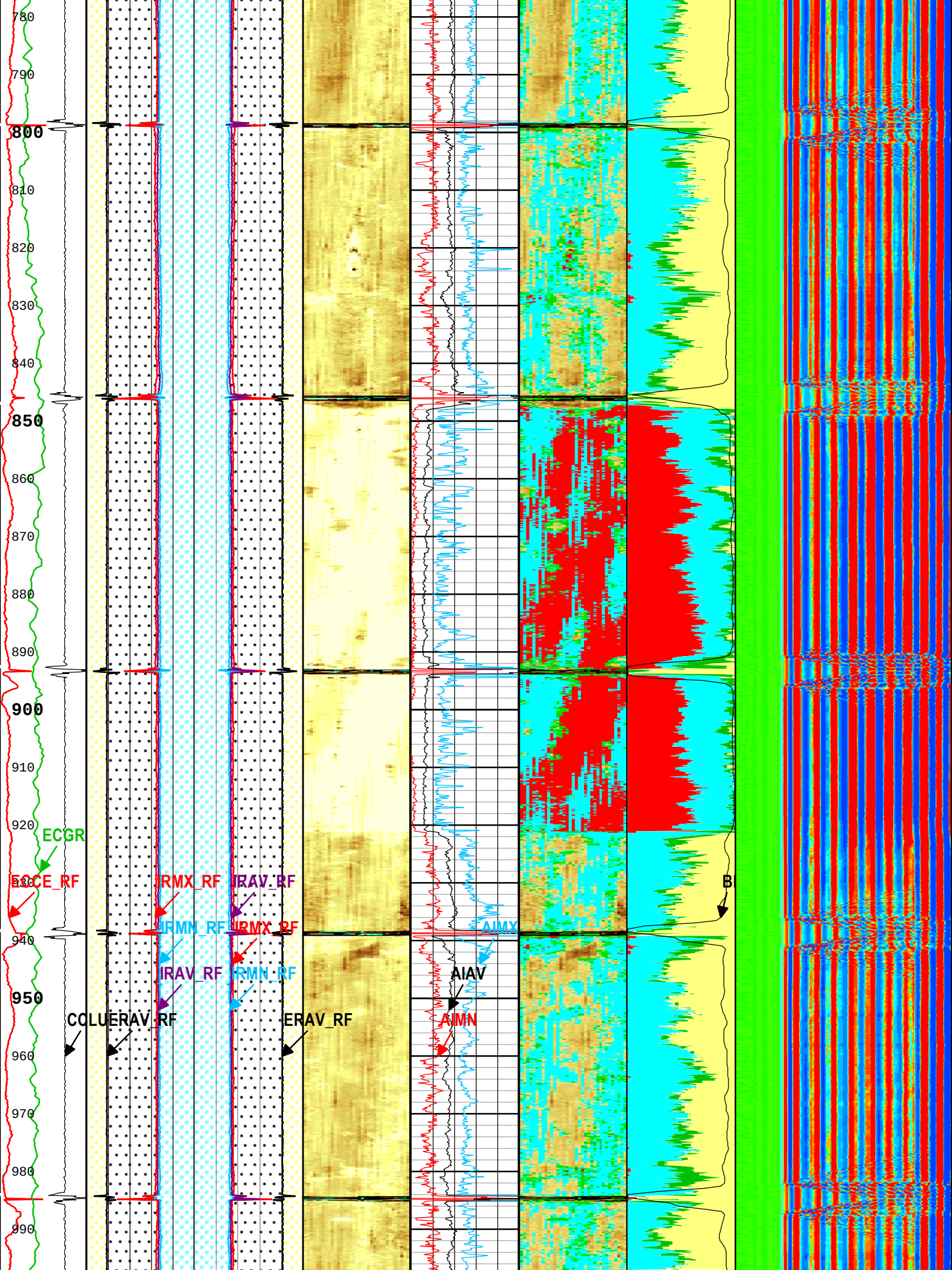
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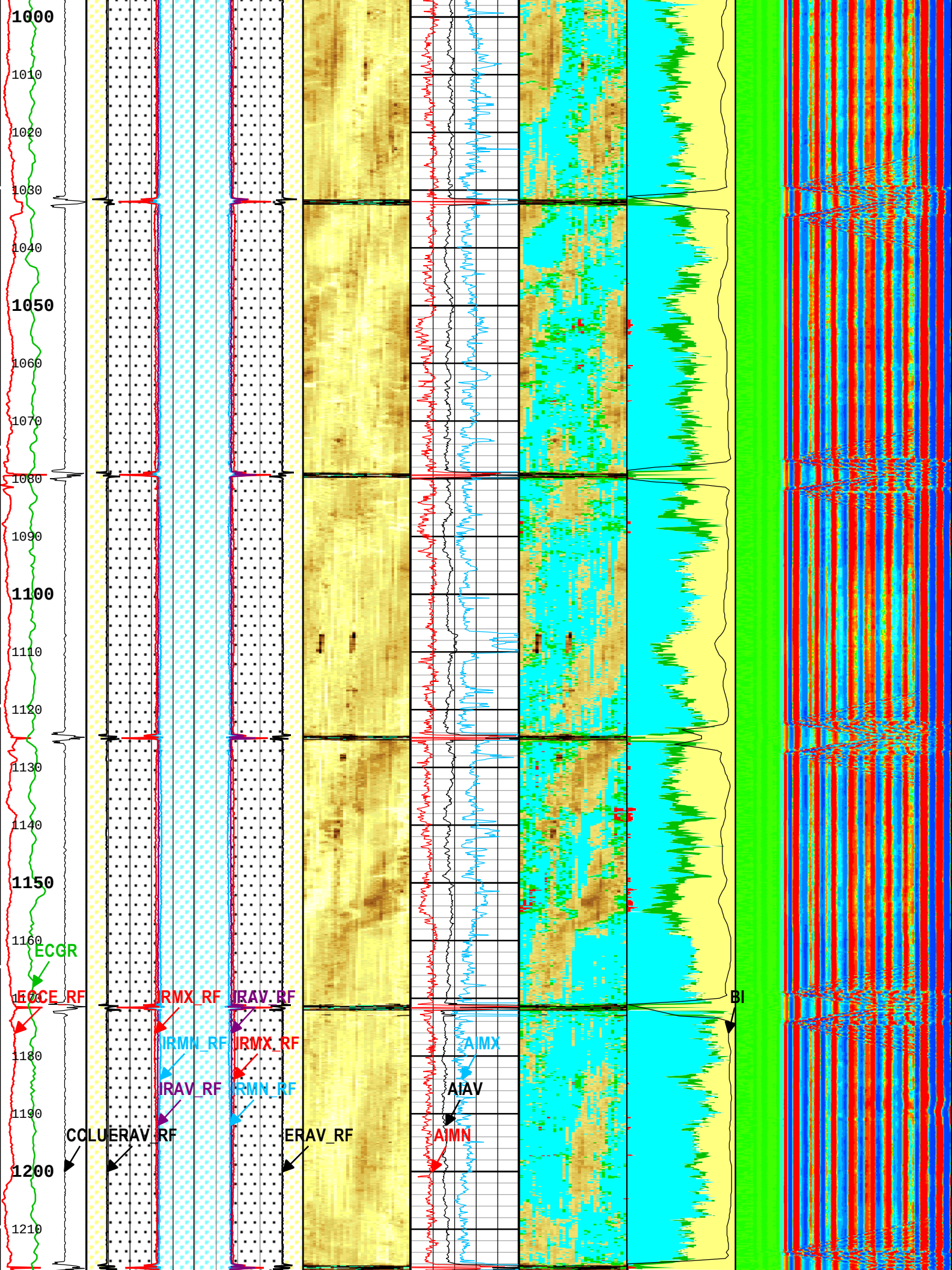
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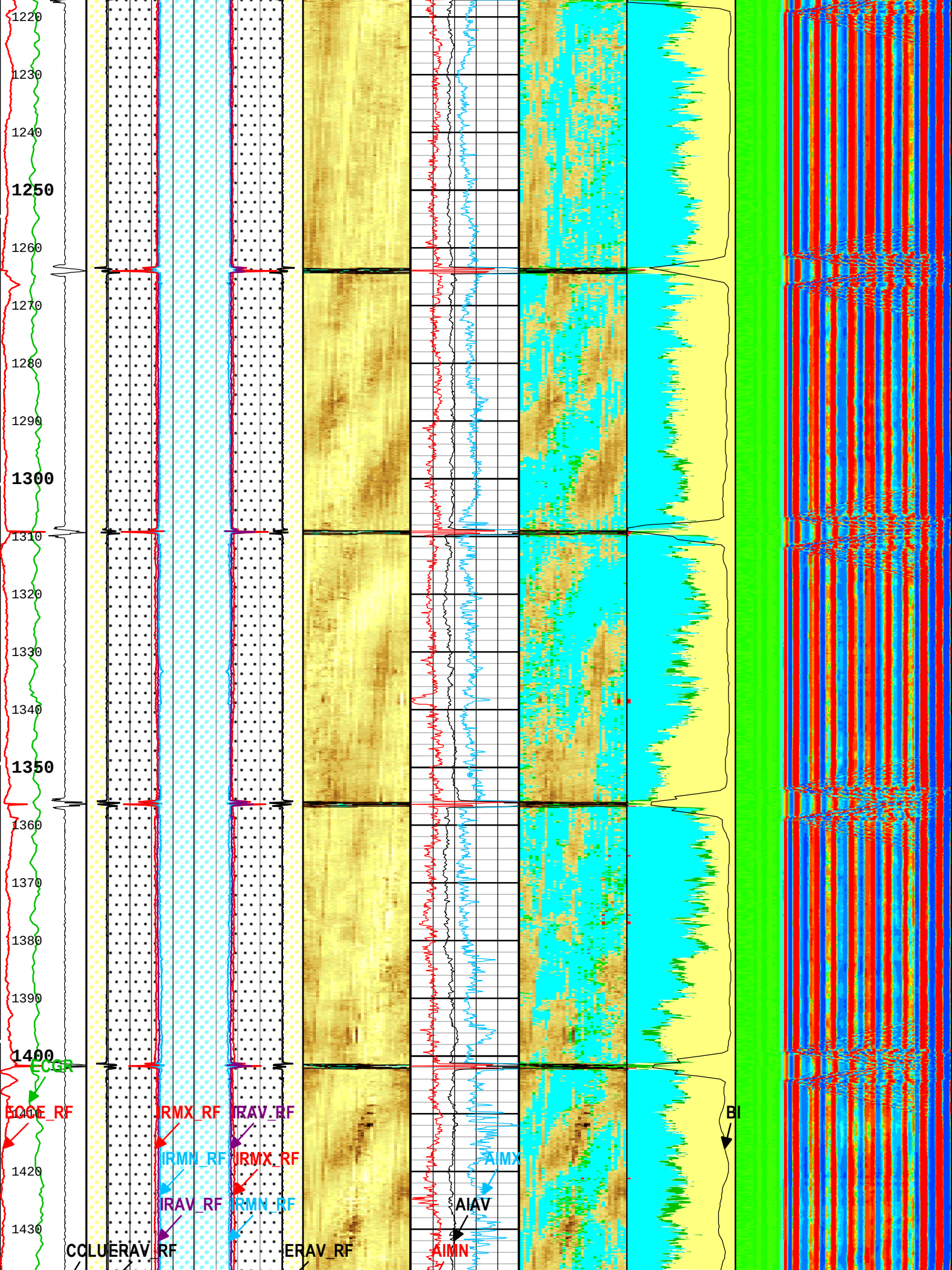
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IRAV_RF
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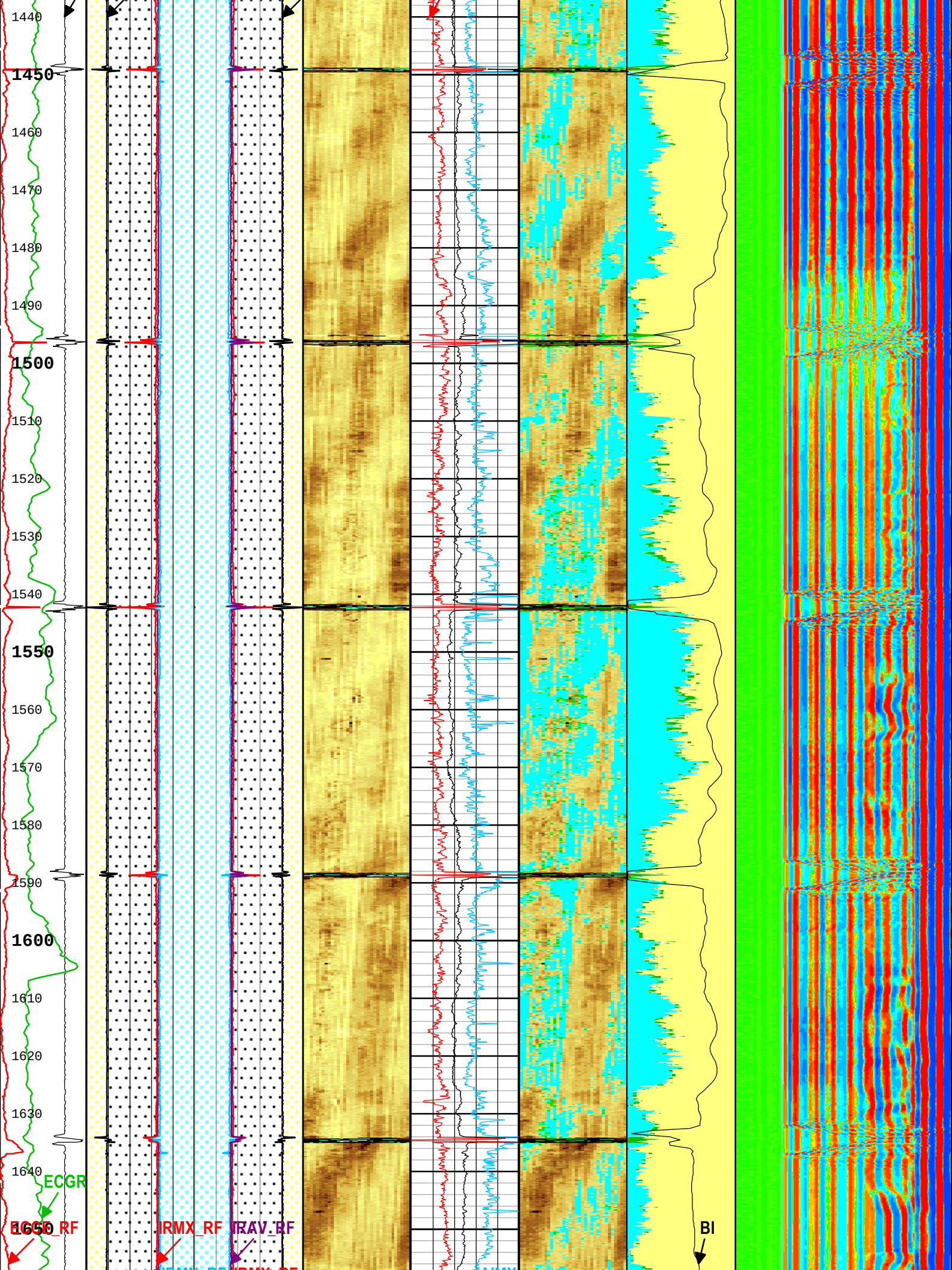
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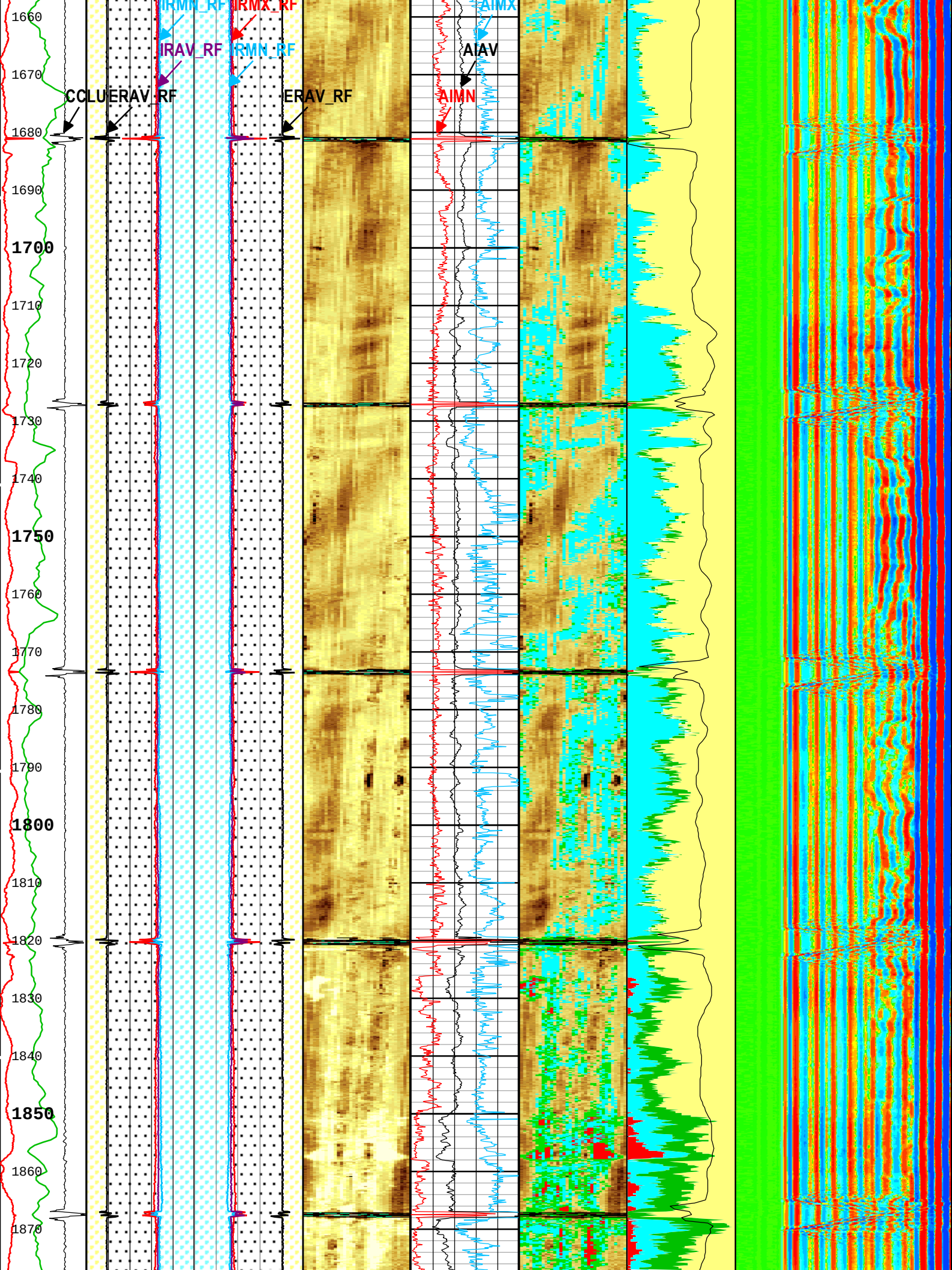
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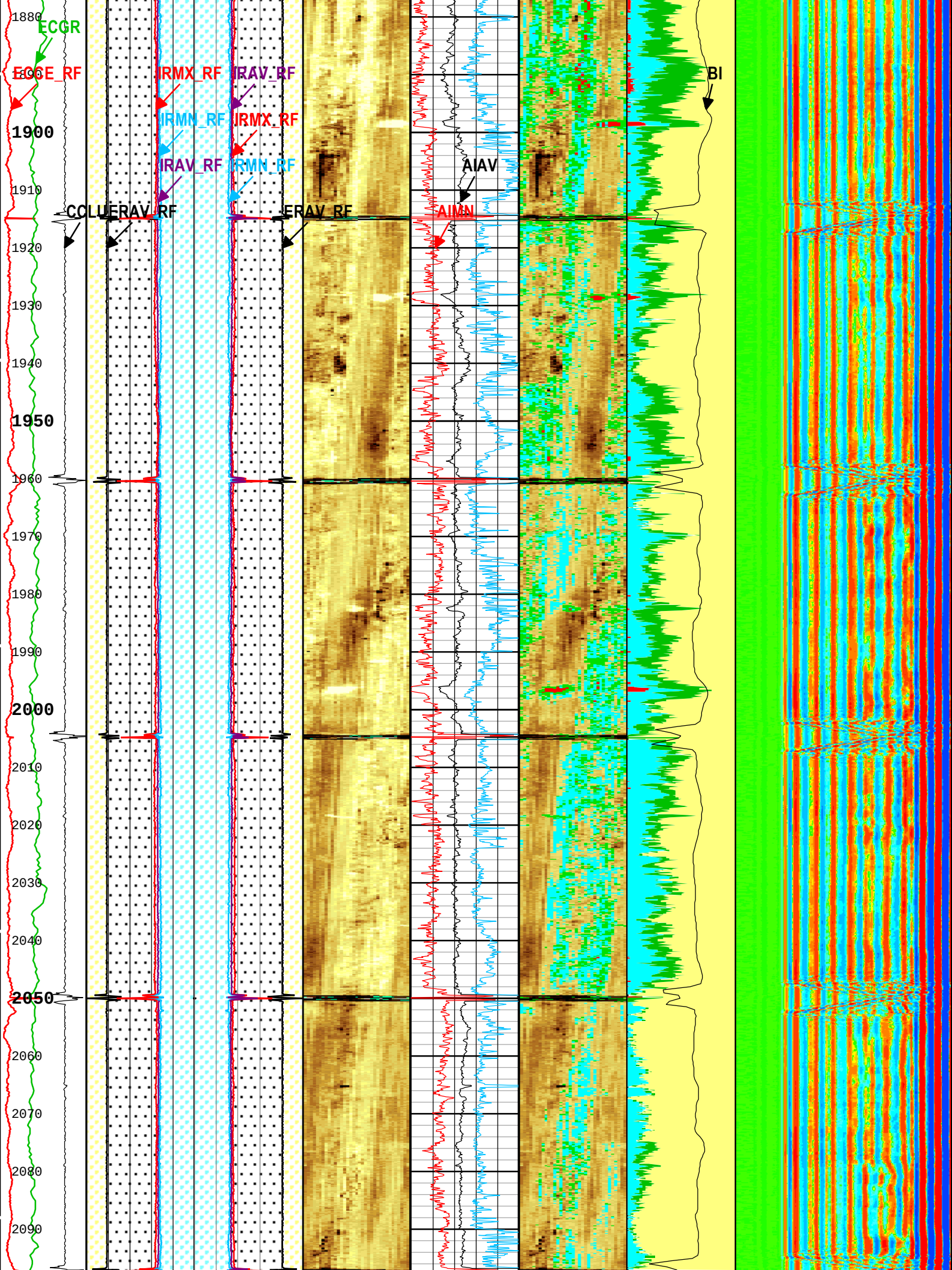
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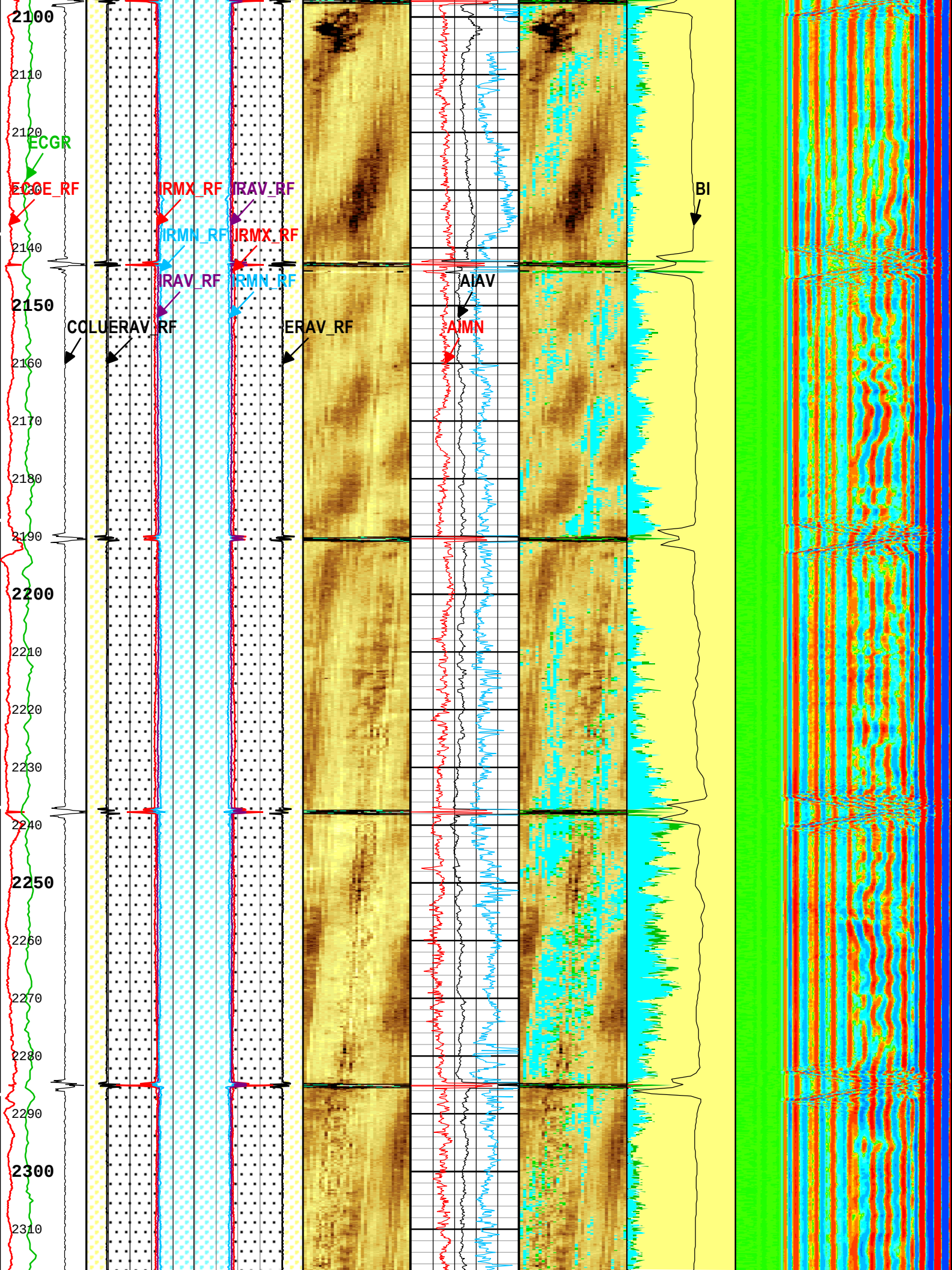
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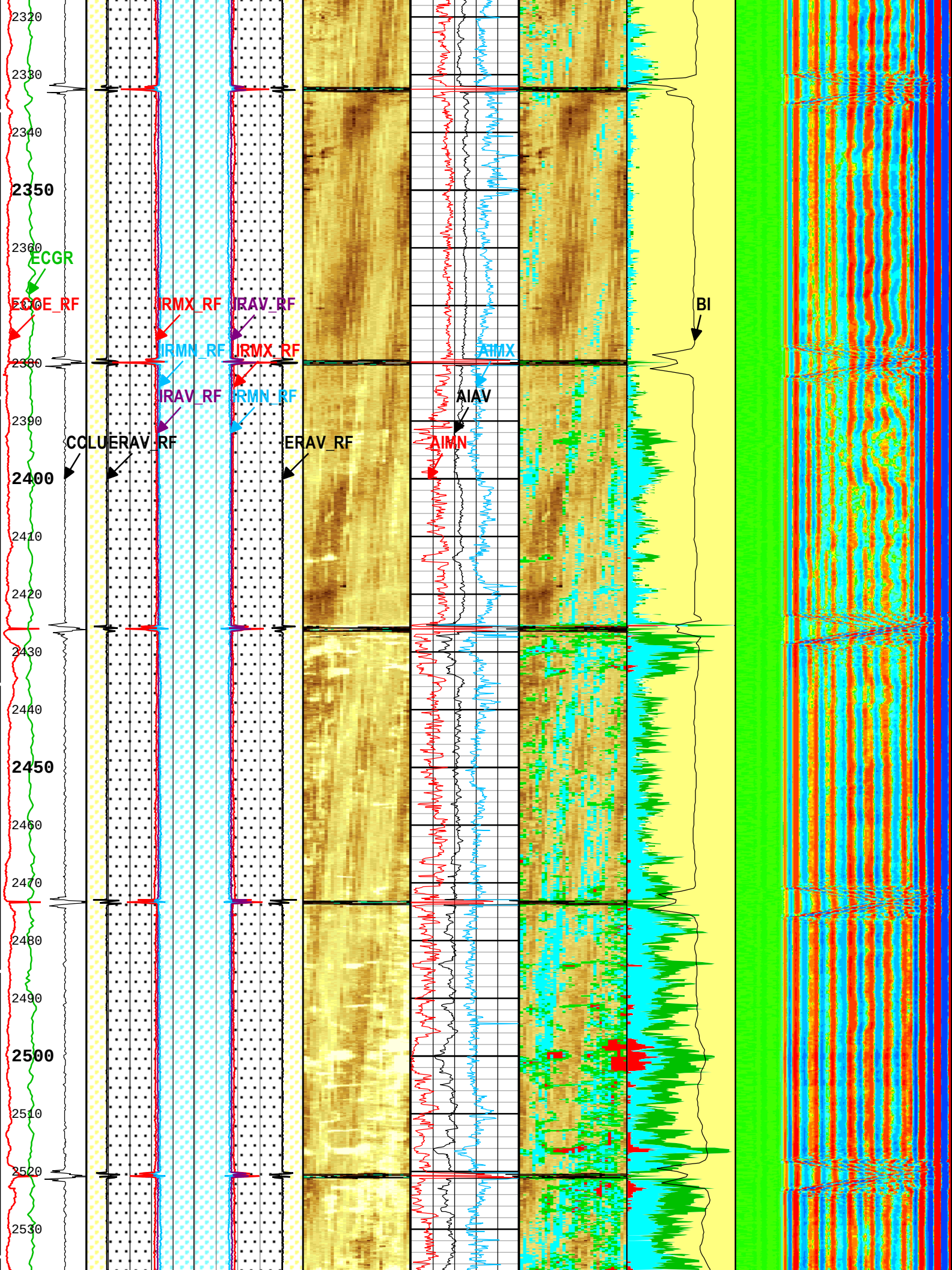
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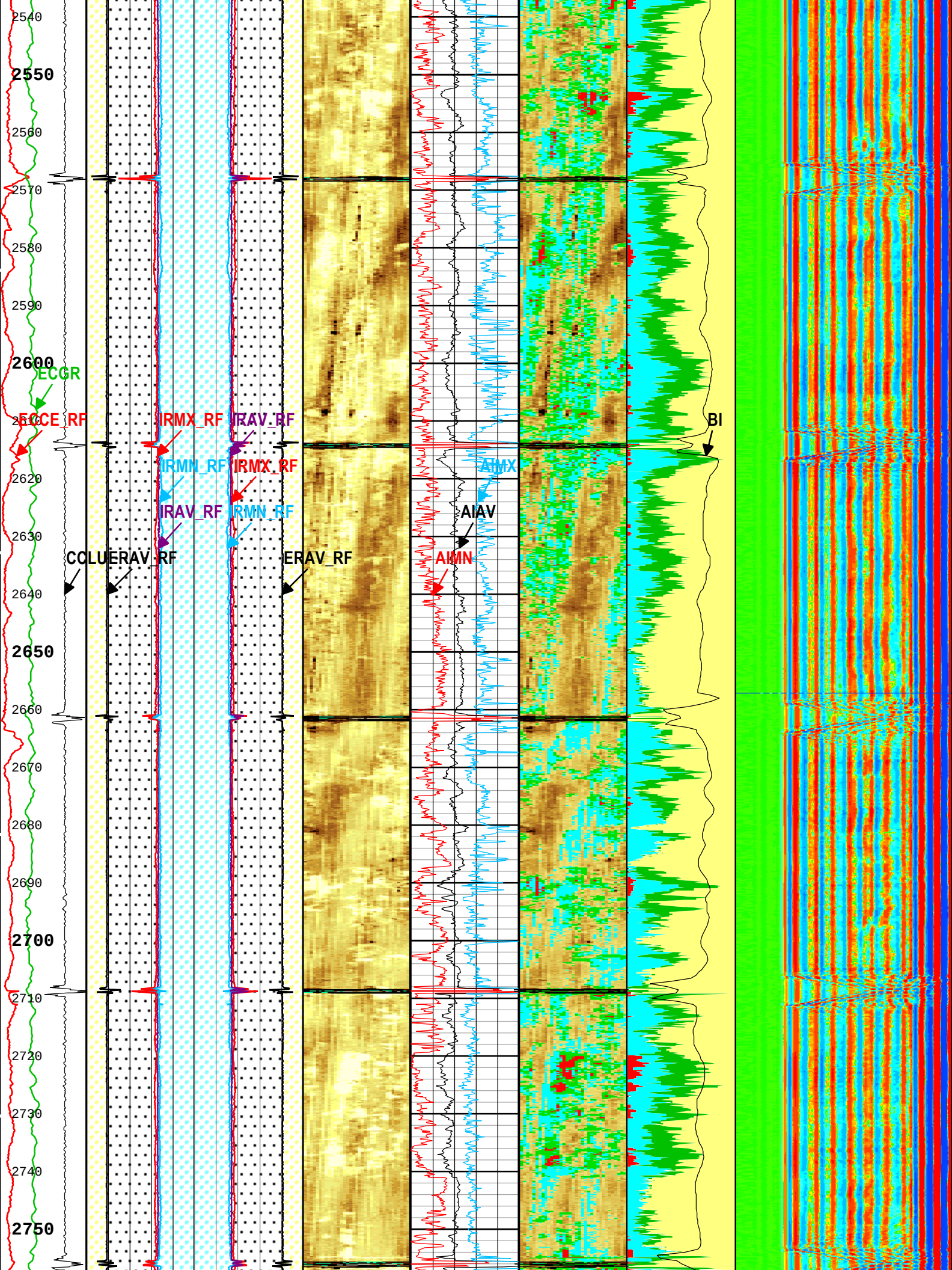
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ERAV_RF
ERAV_RF
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AIAV
AIMN
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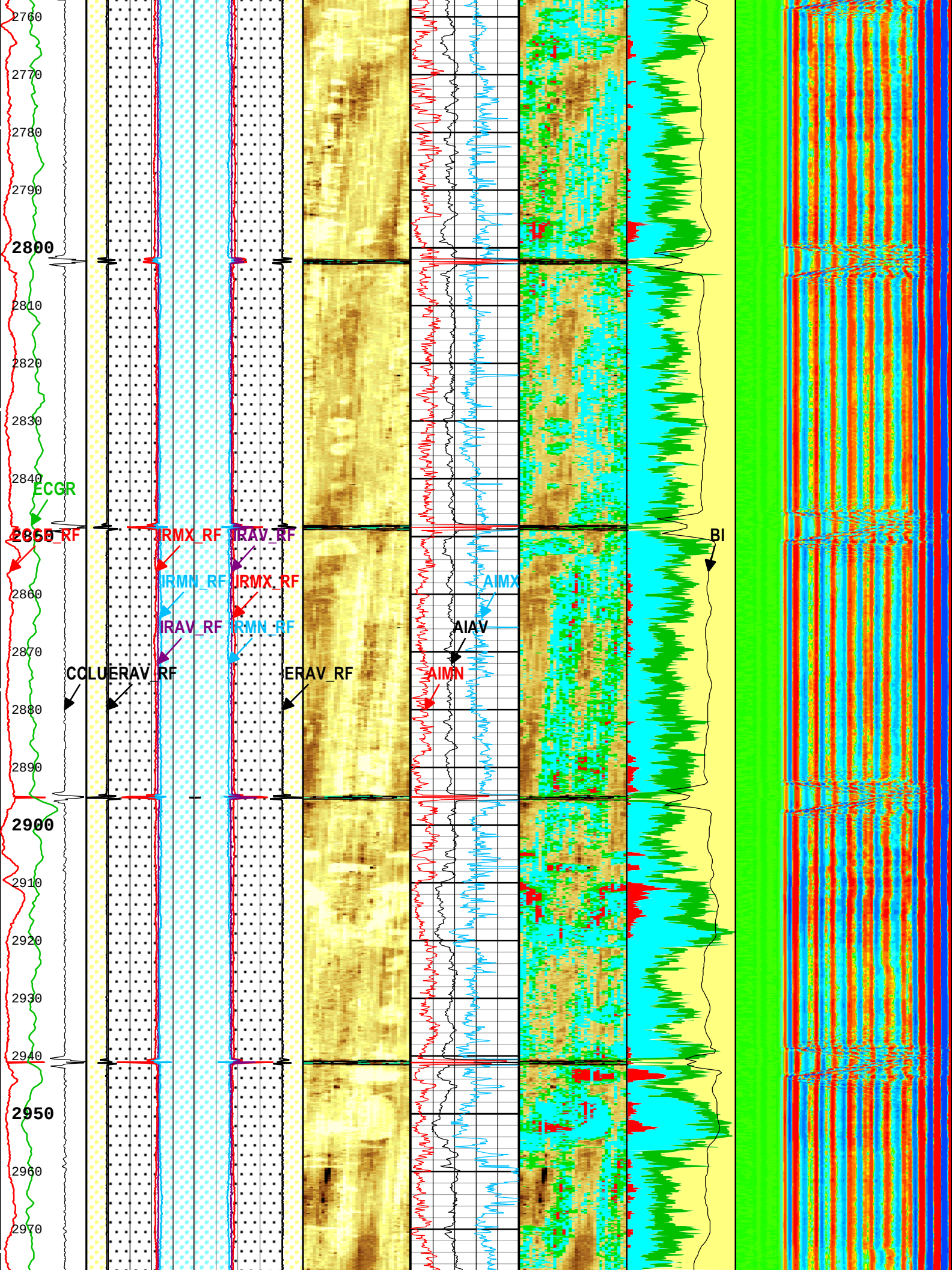
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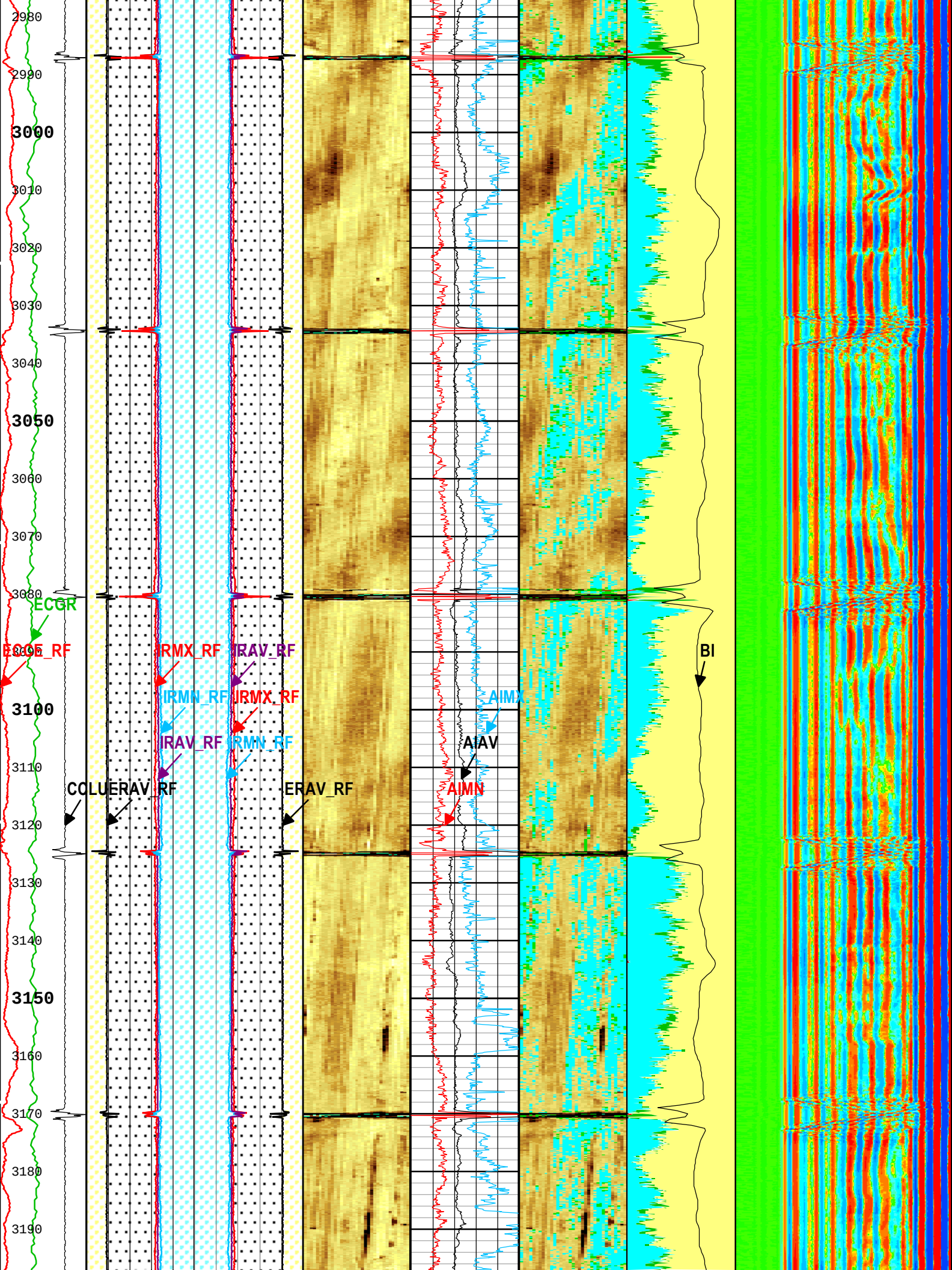
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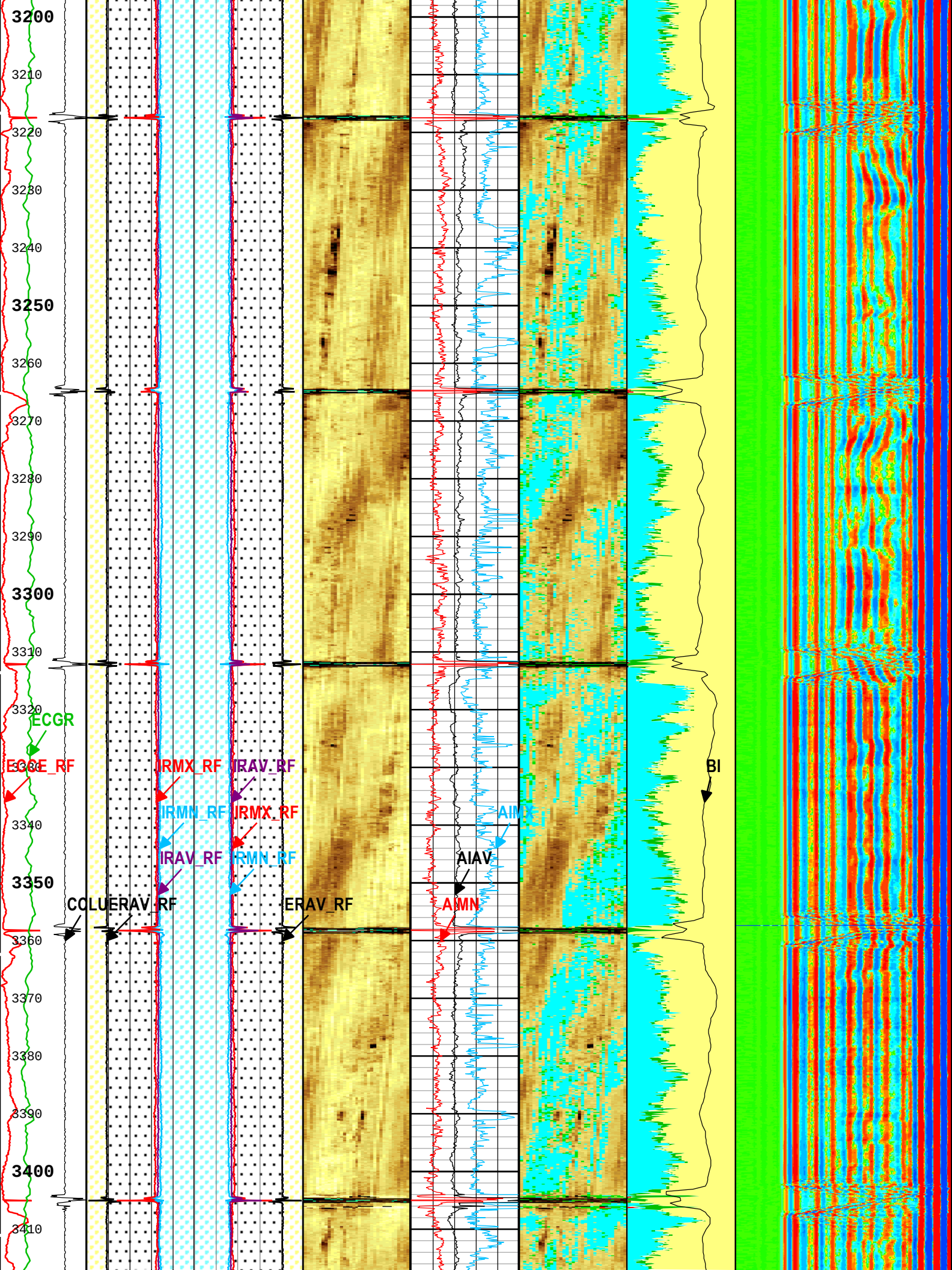
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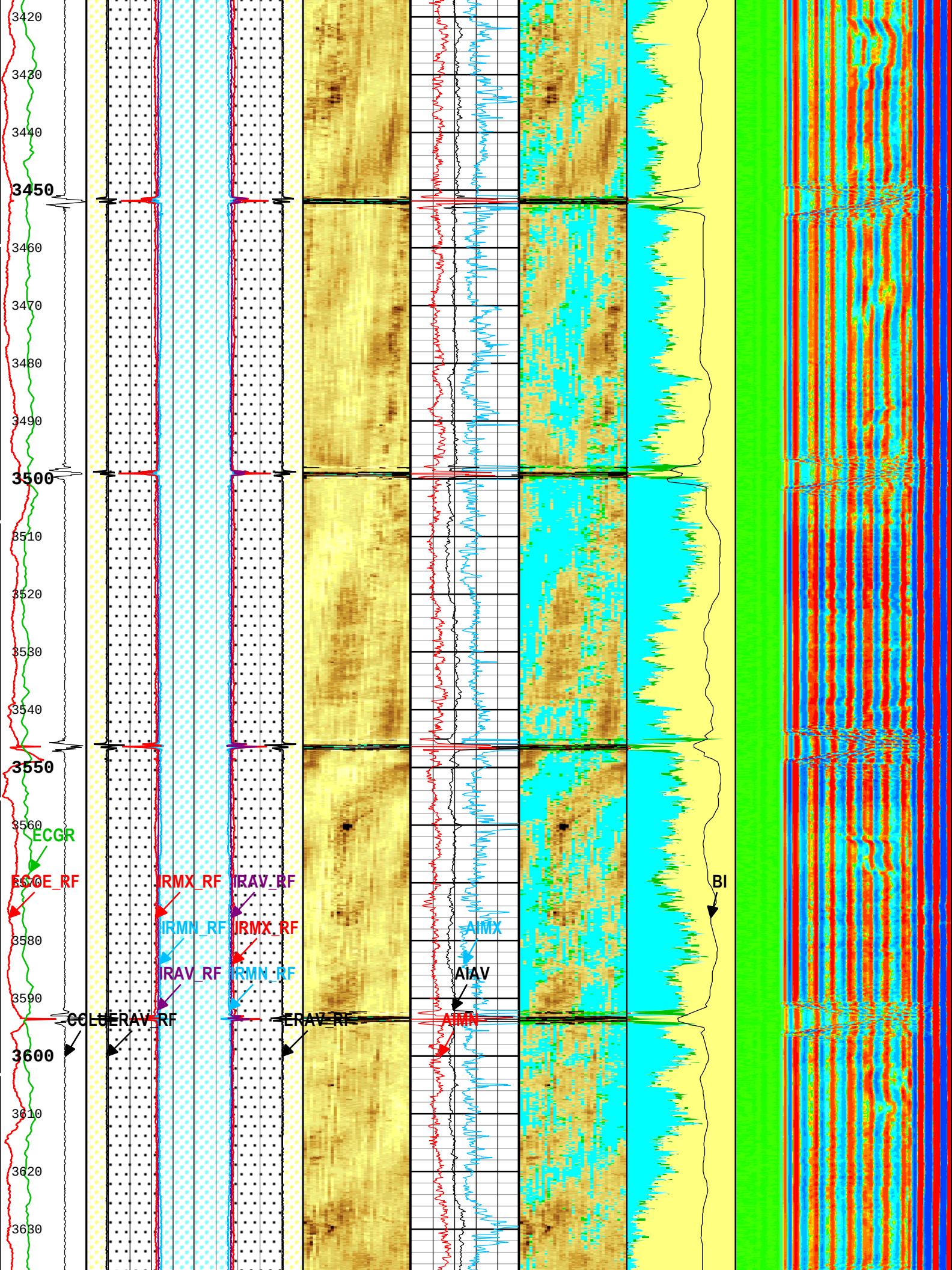
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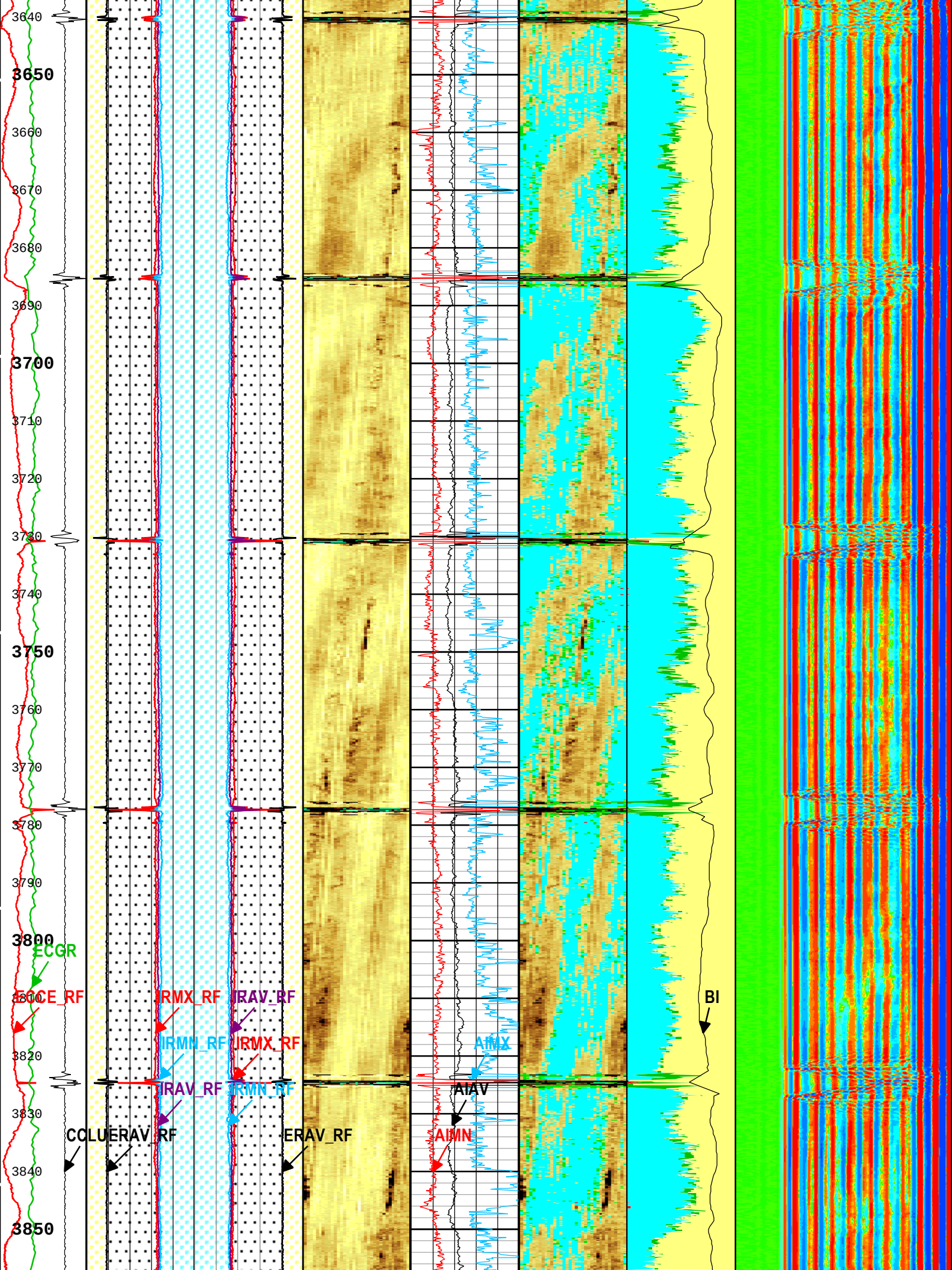
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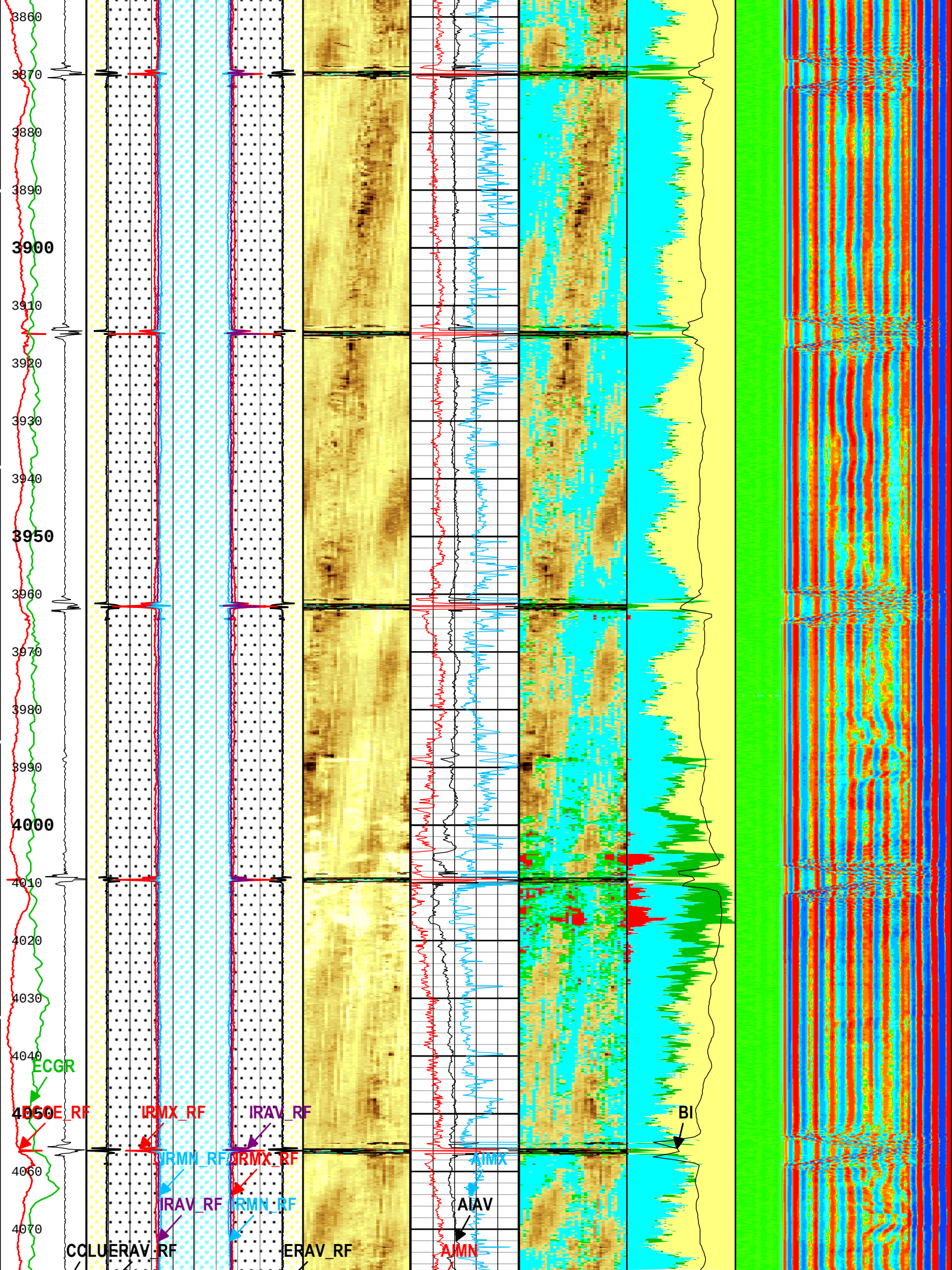
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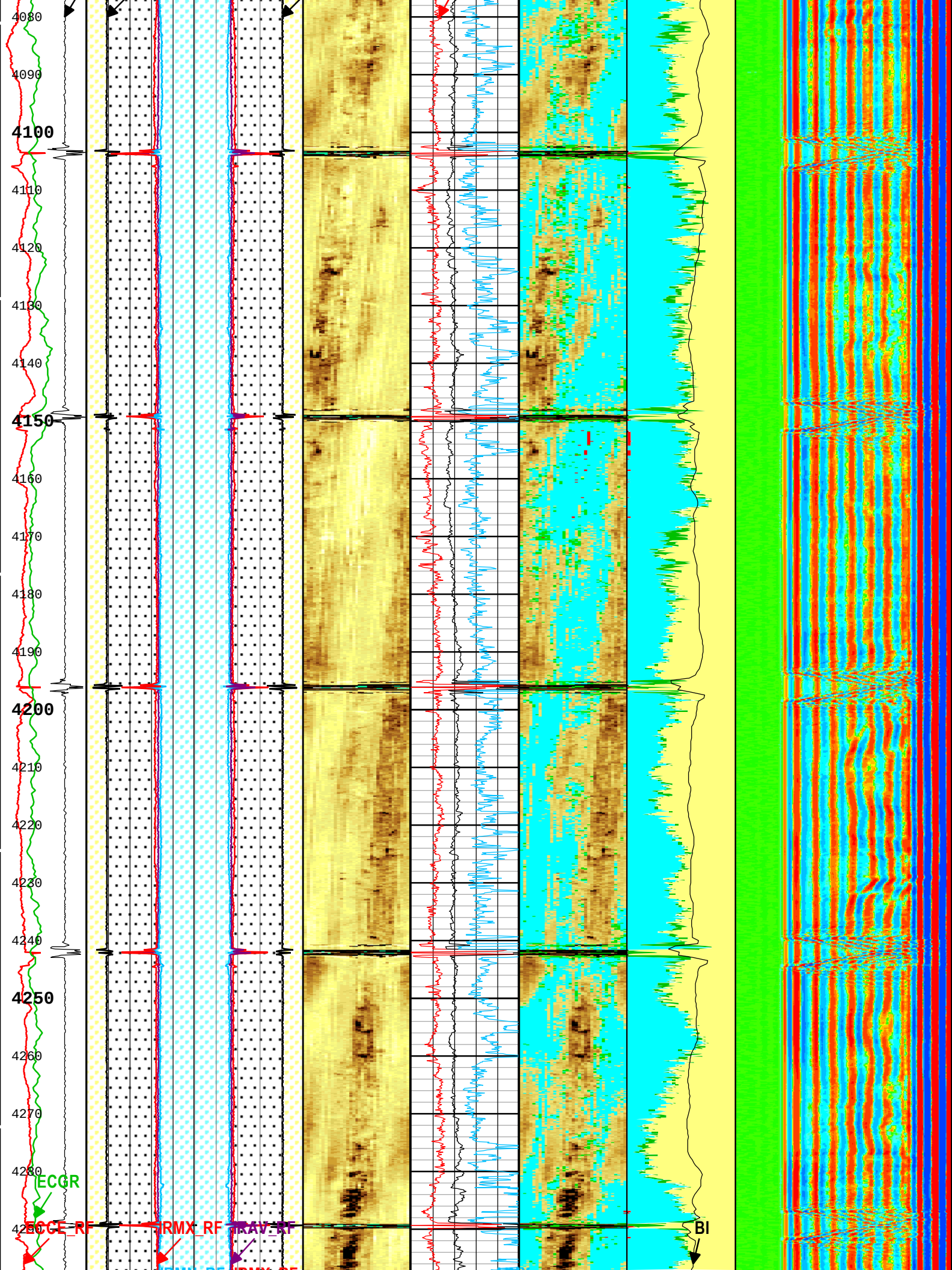
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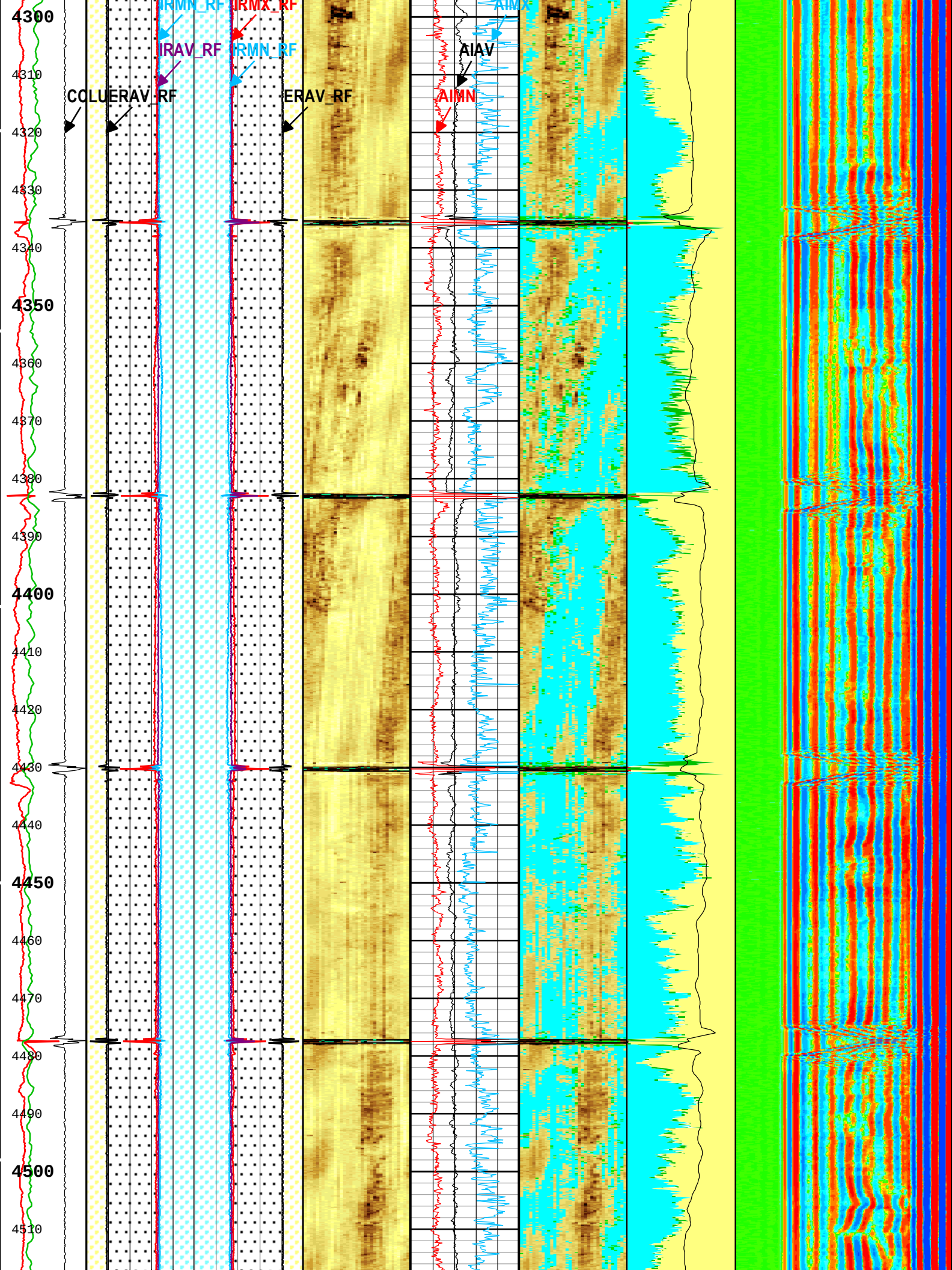
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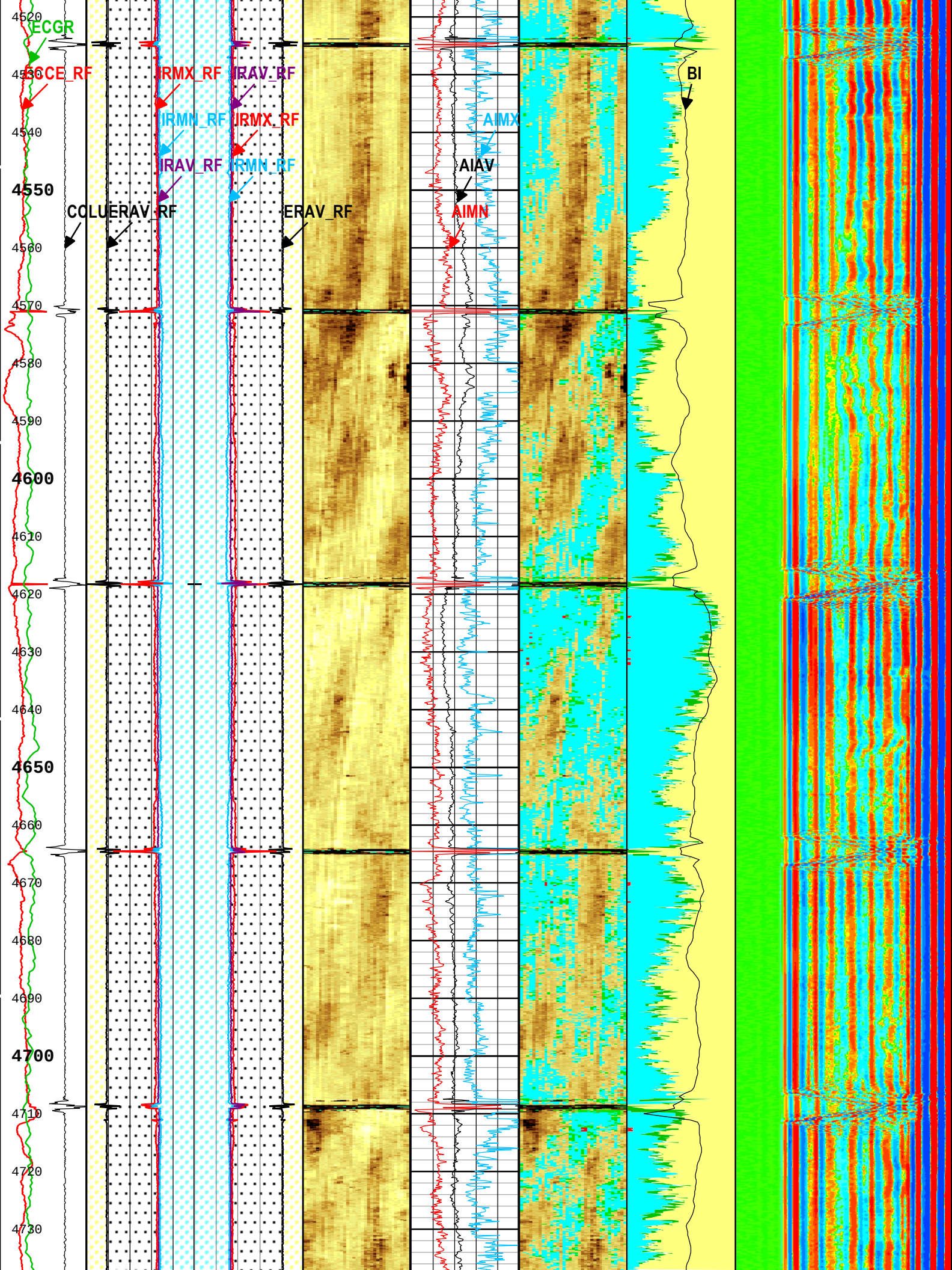
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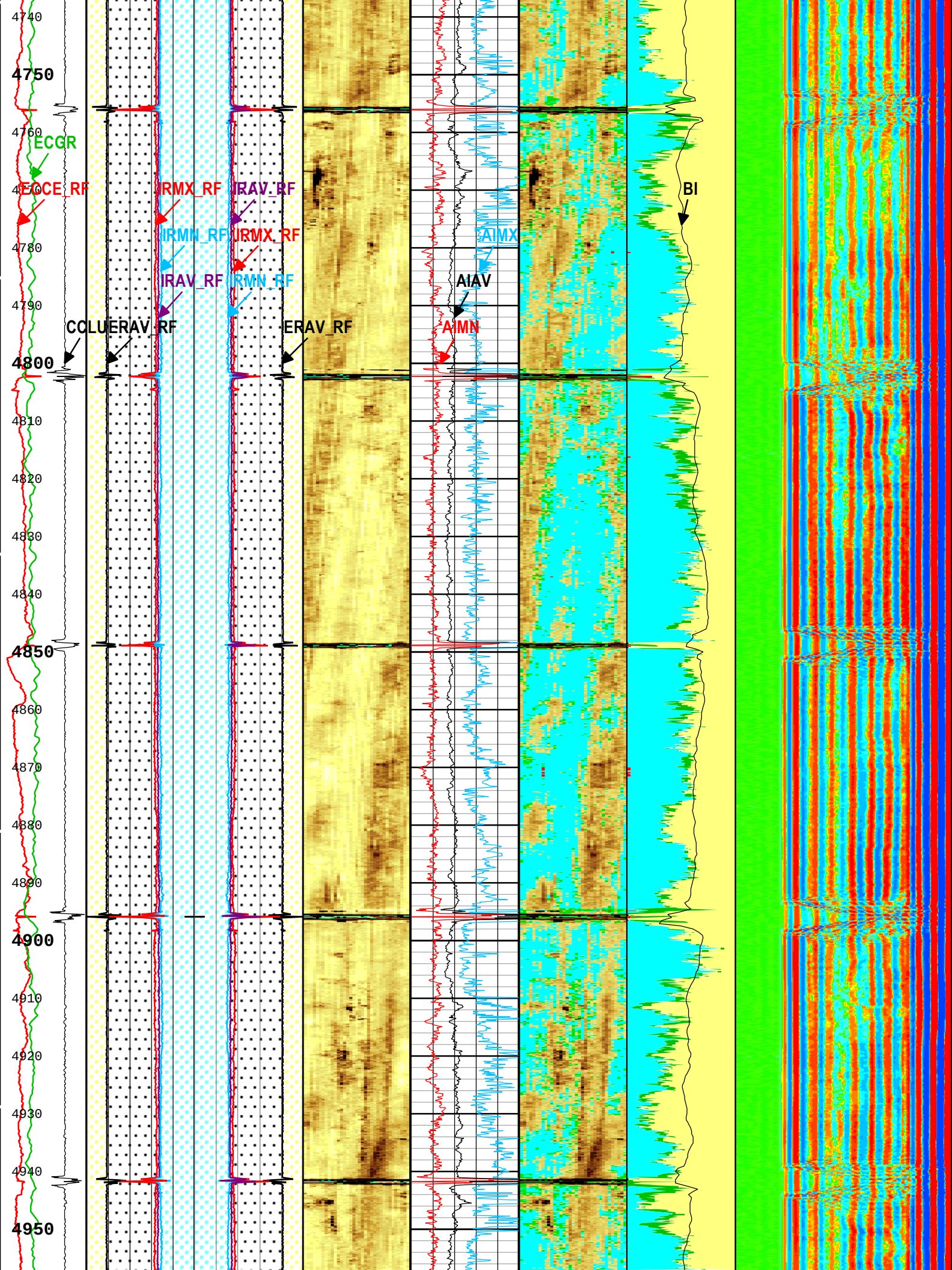
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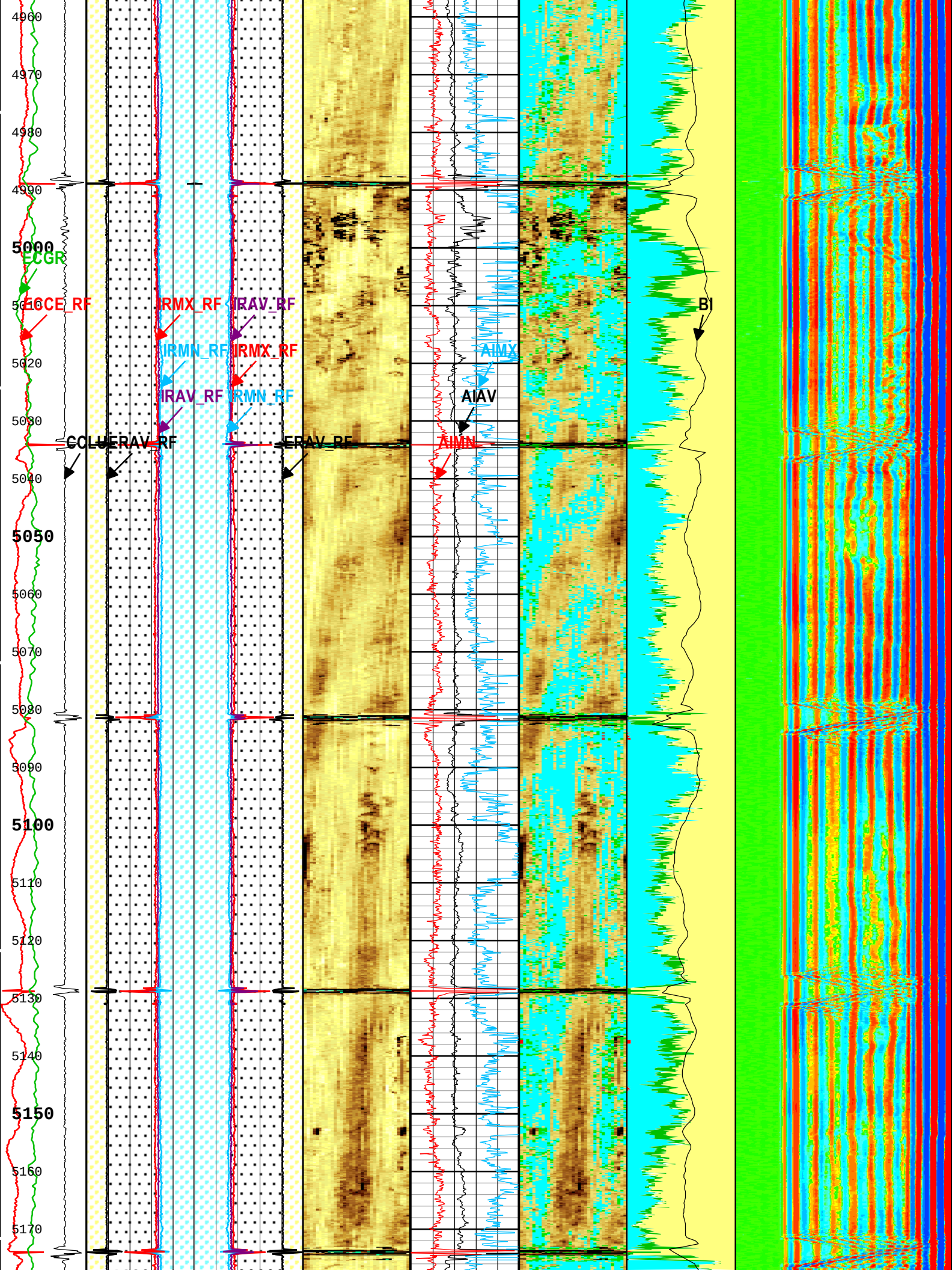
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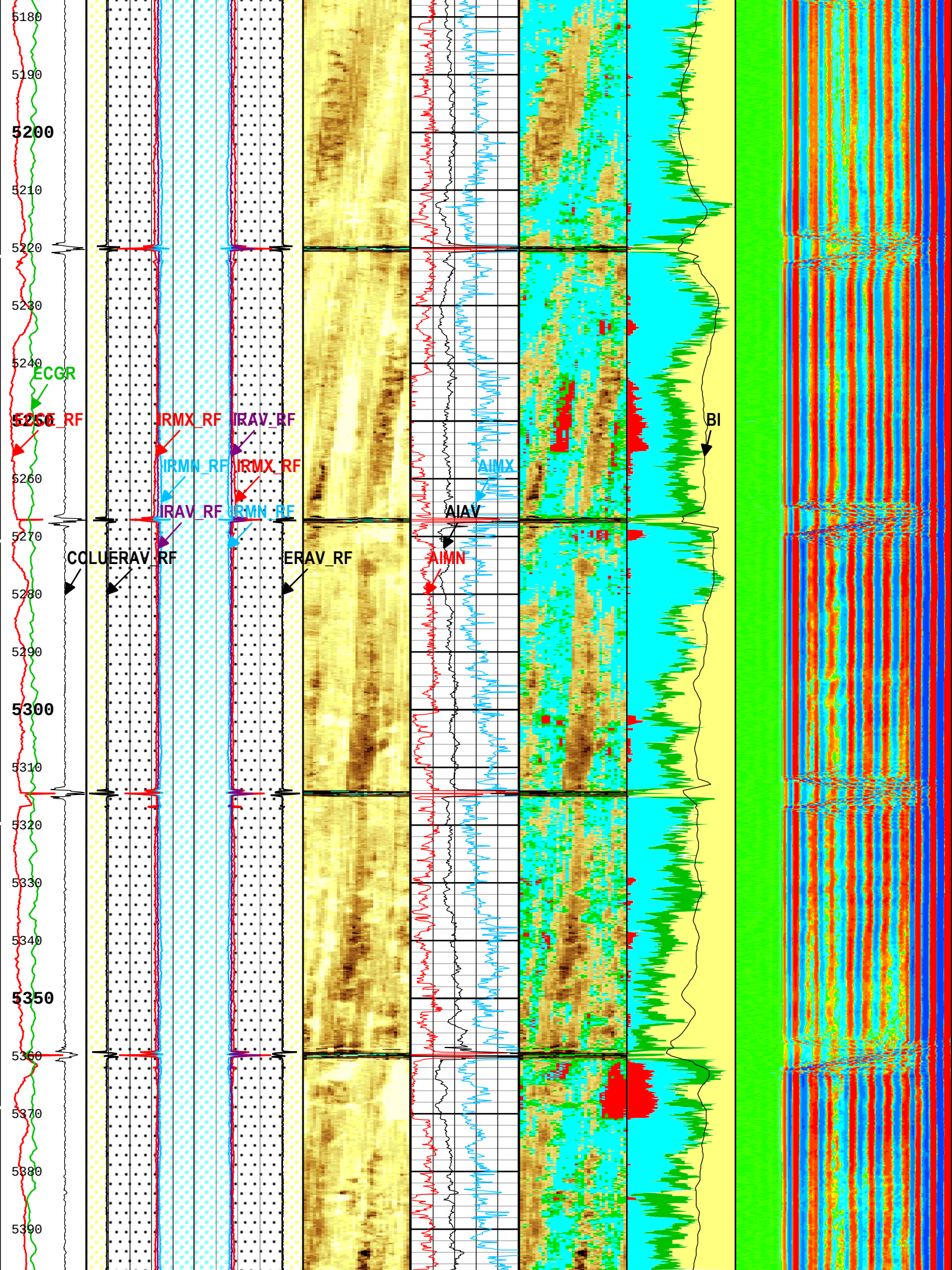
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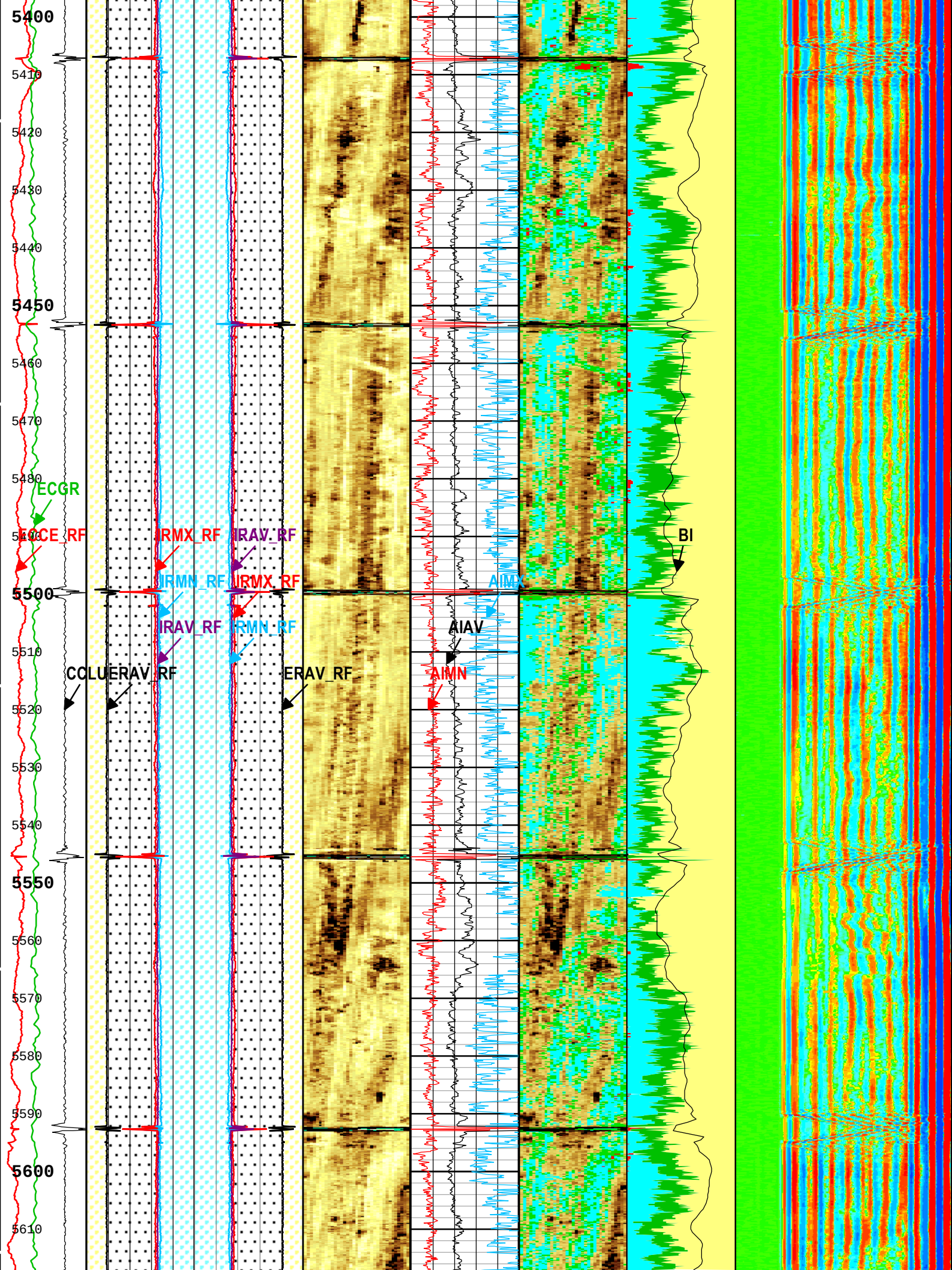
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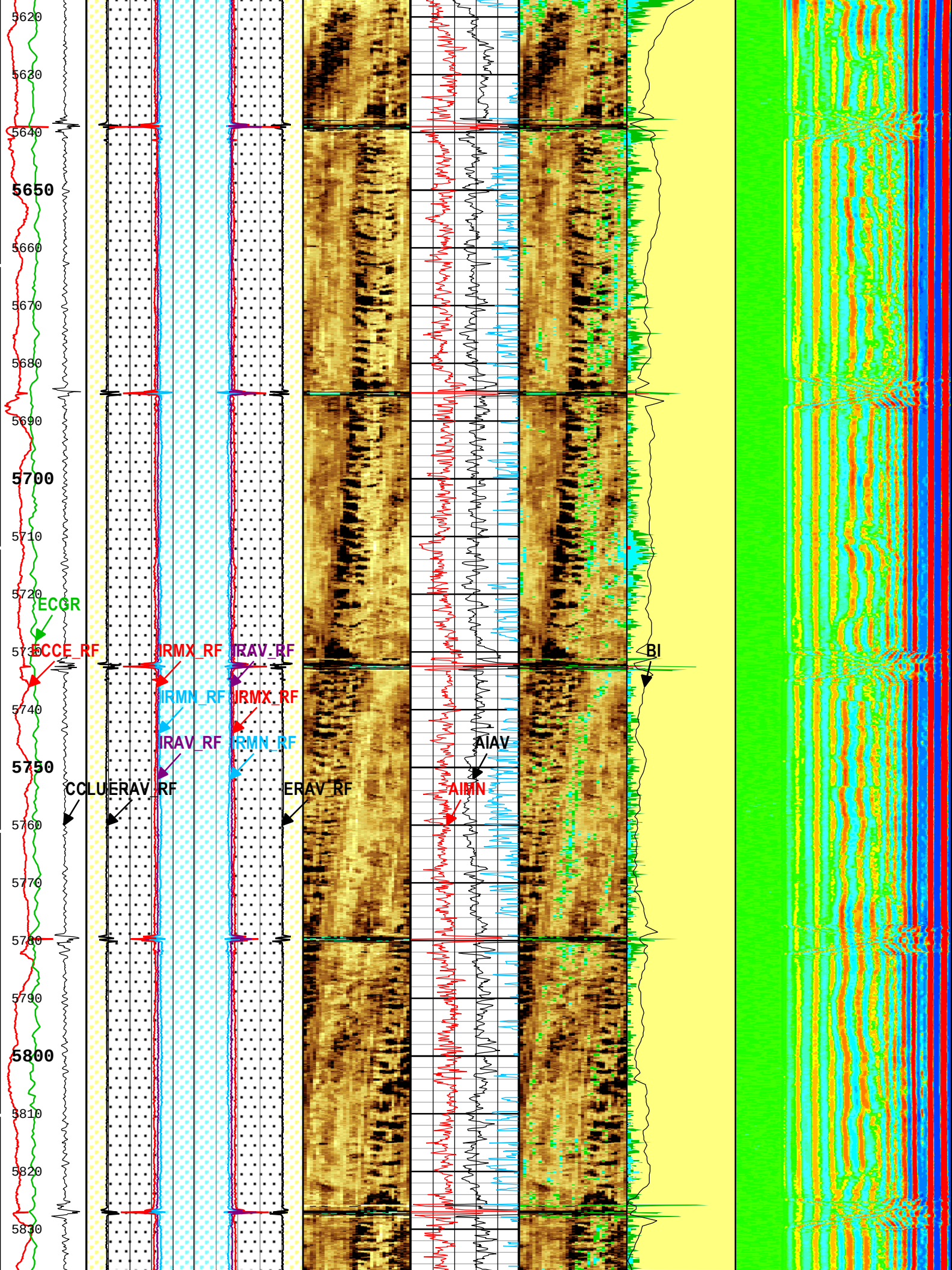
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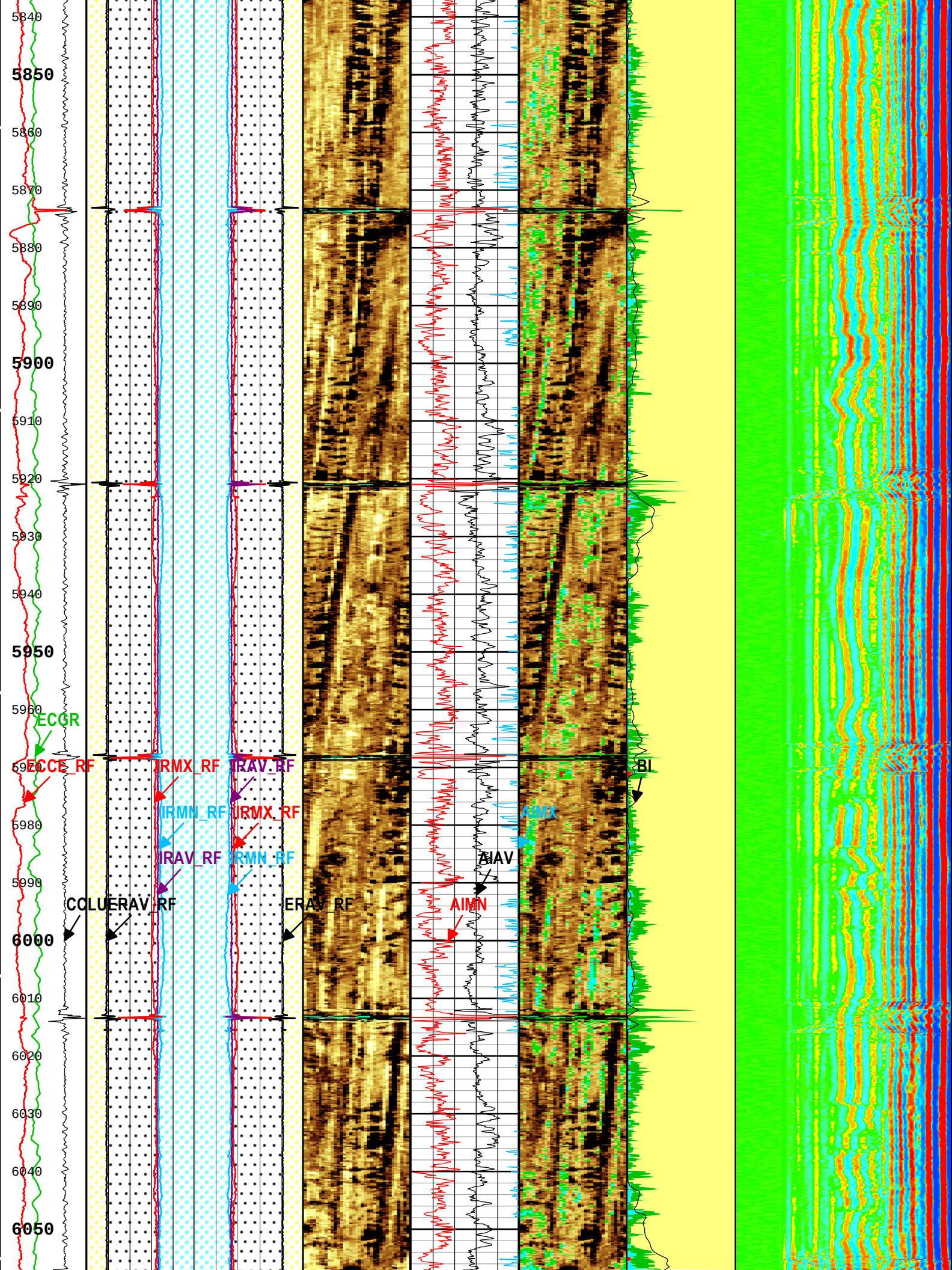
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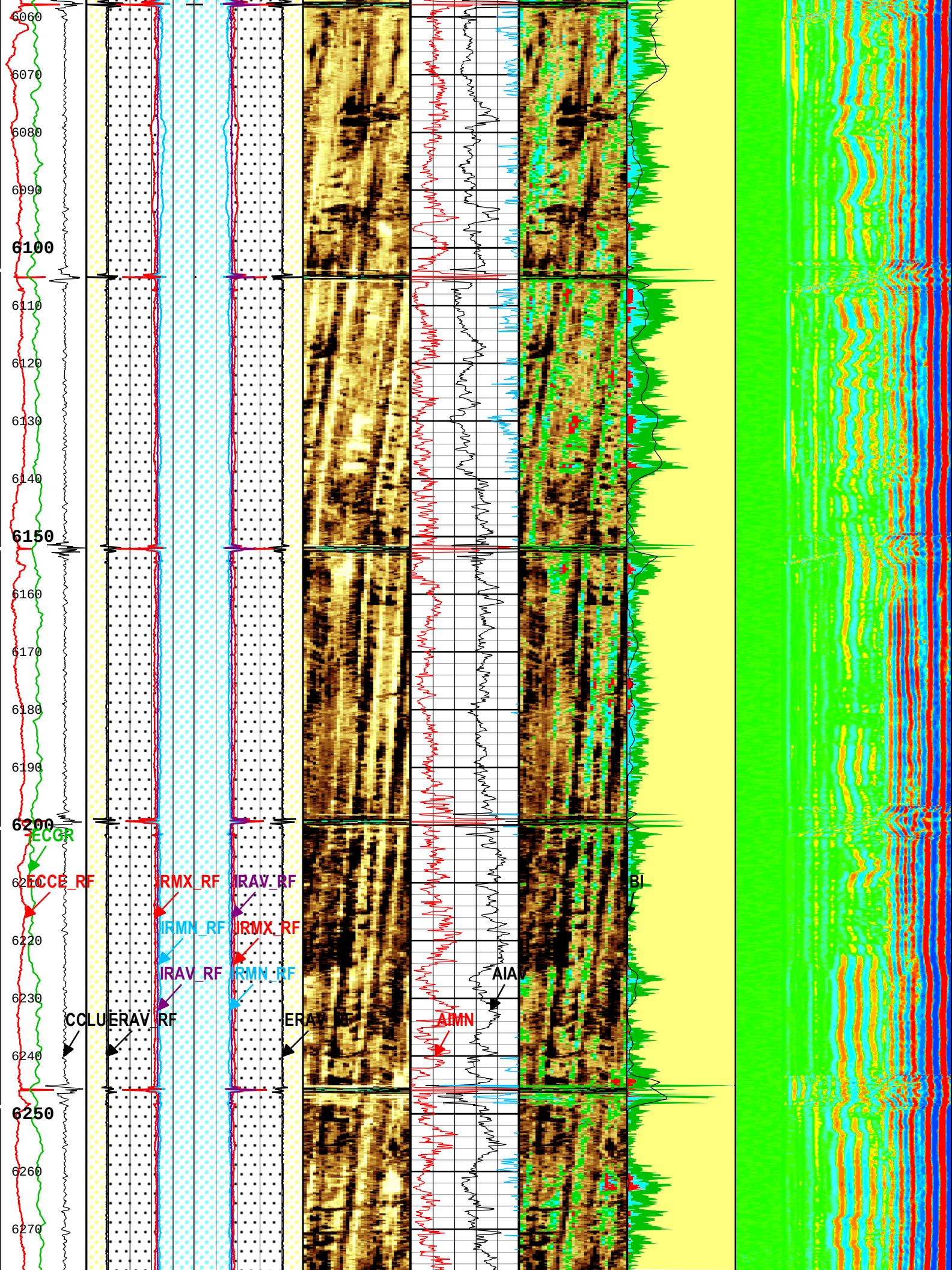
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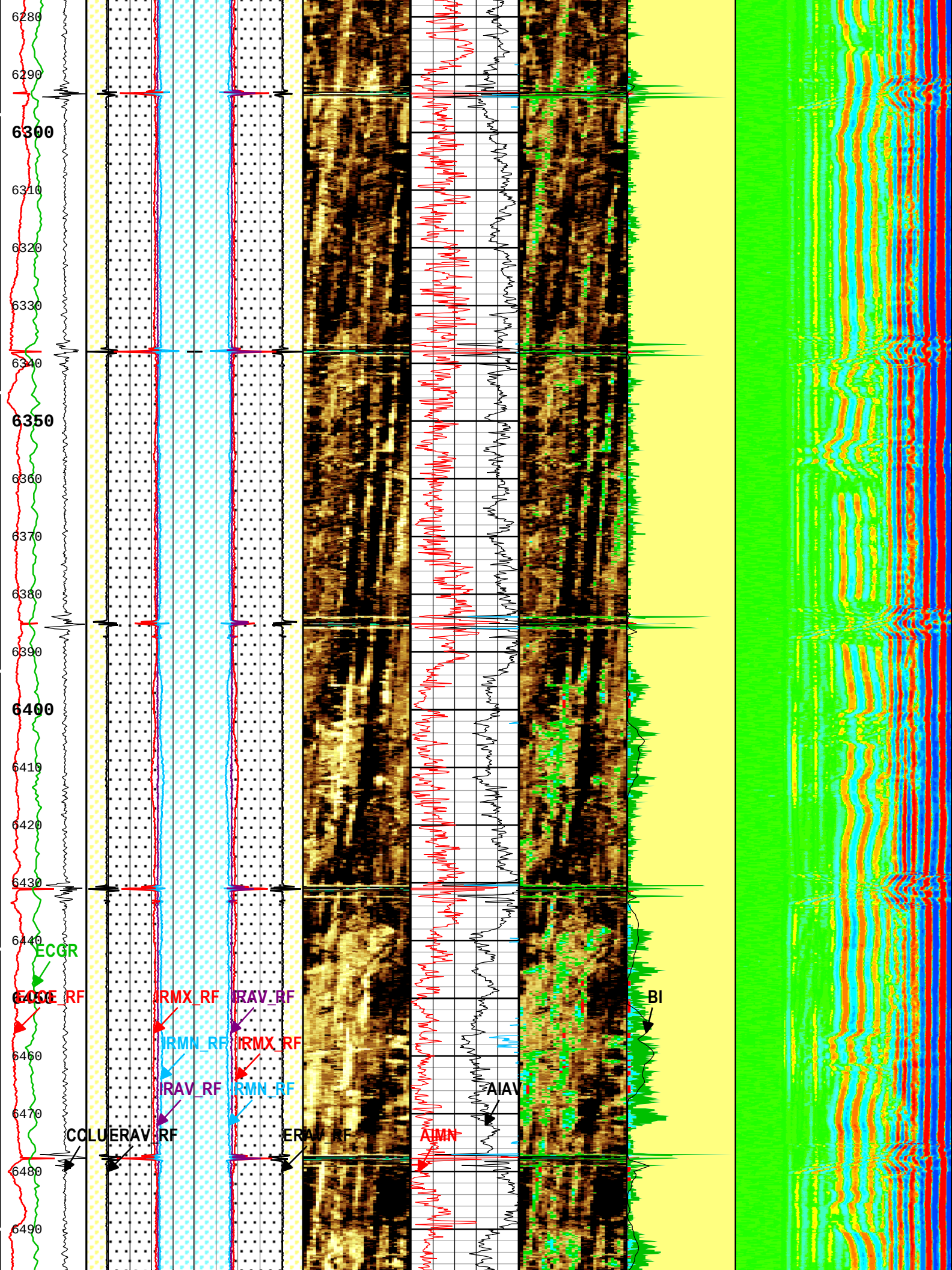
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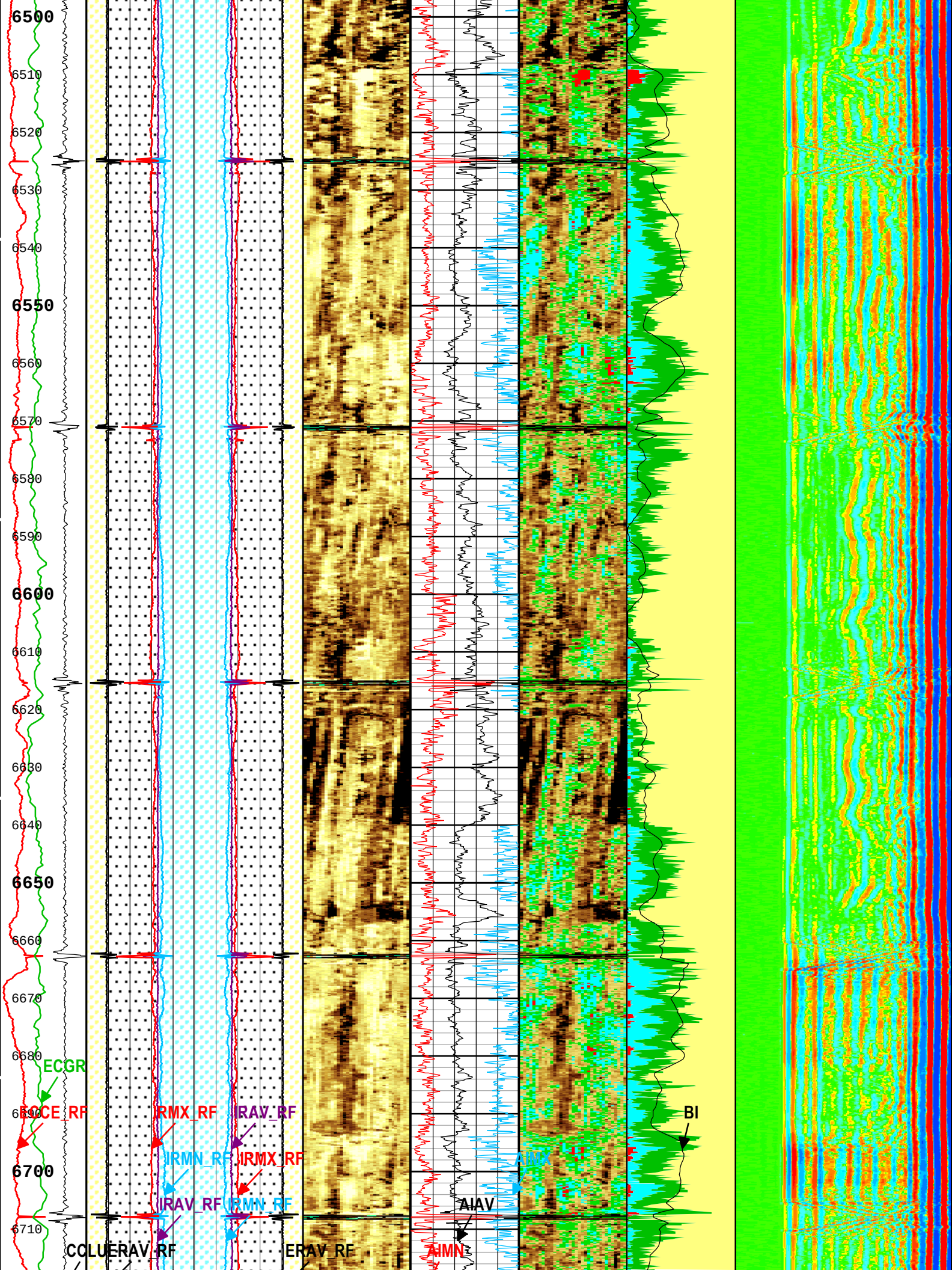
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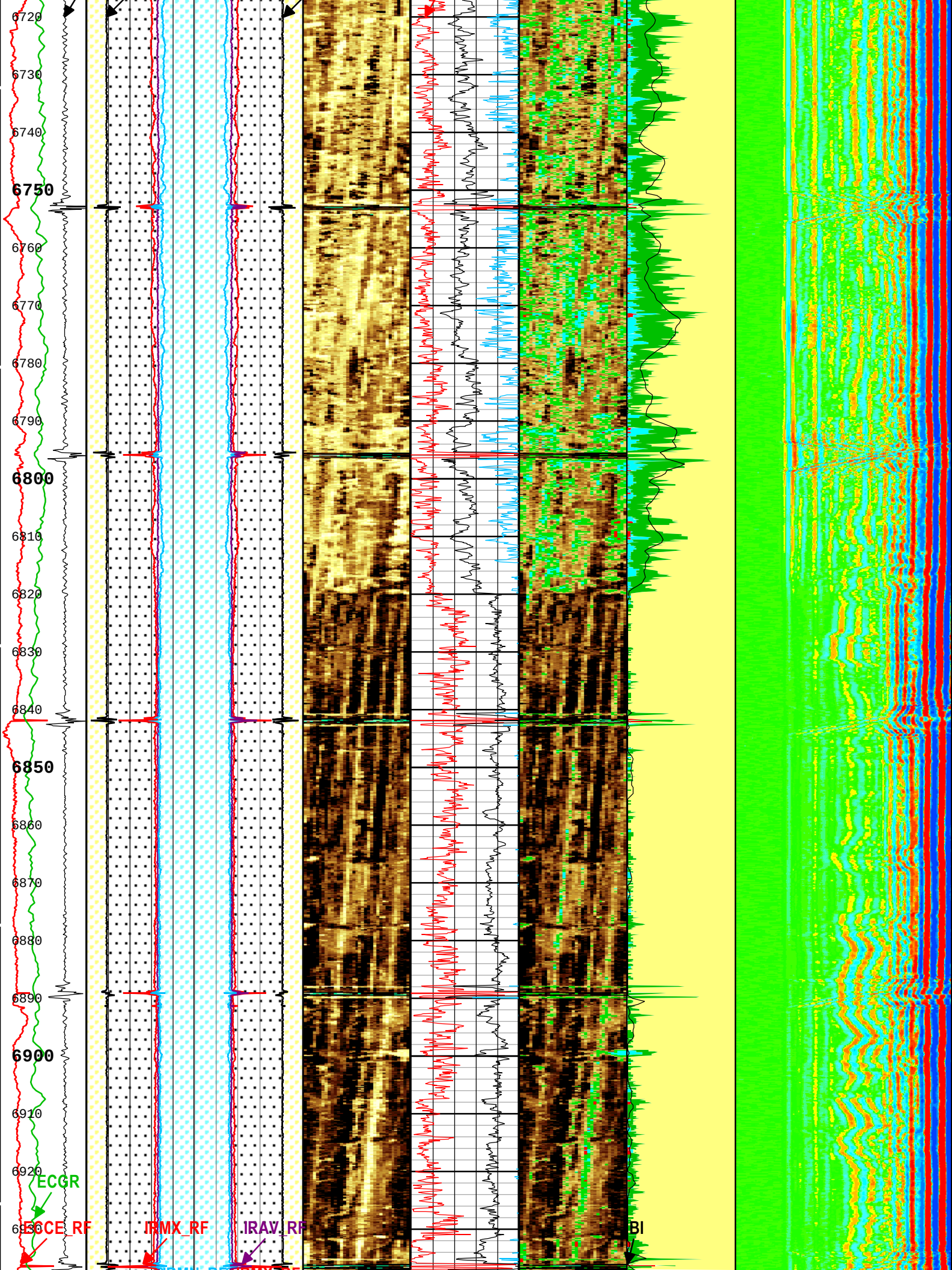
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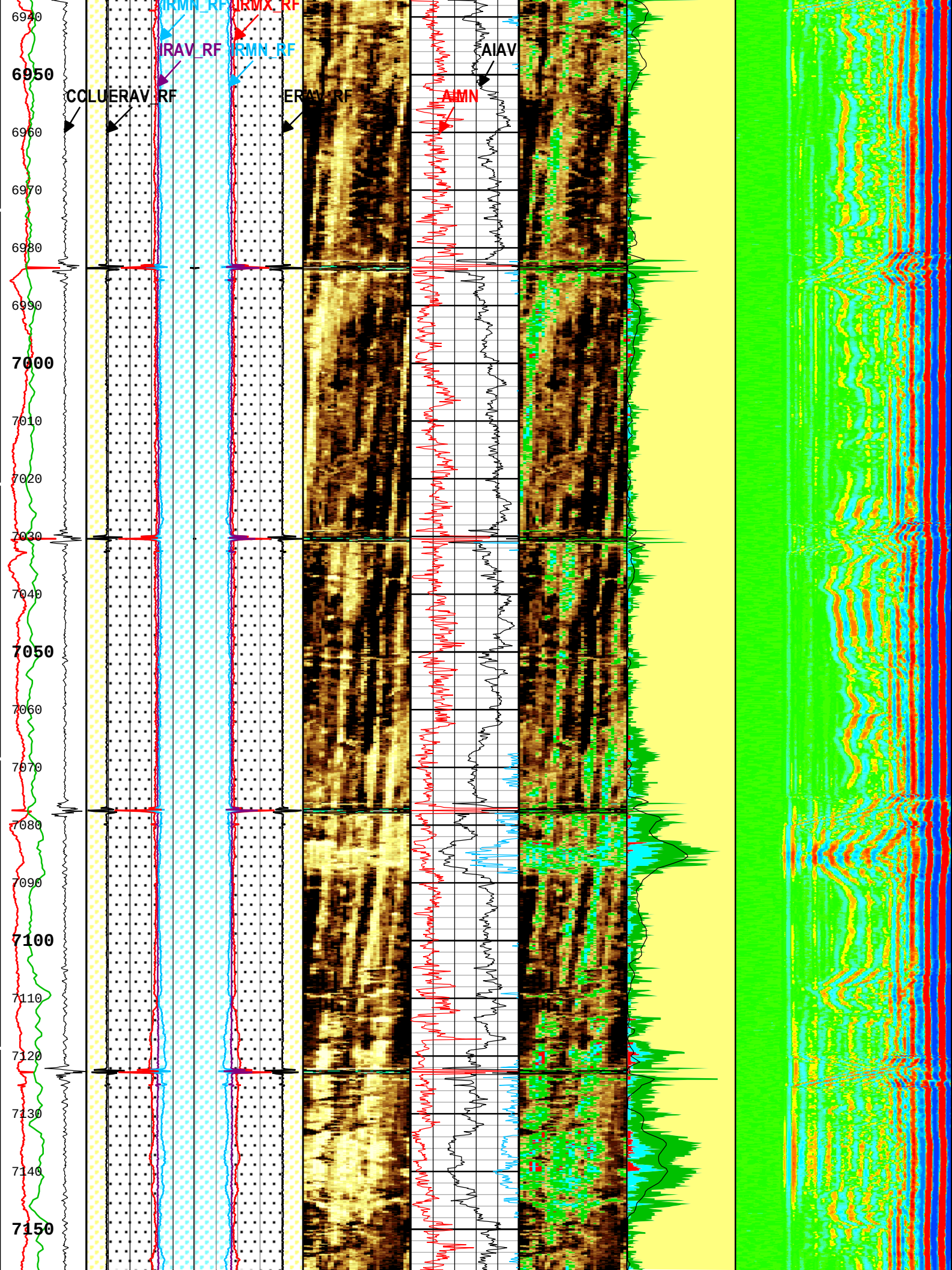
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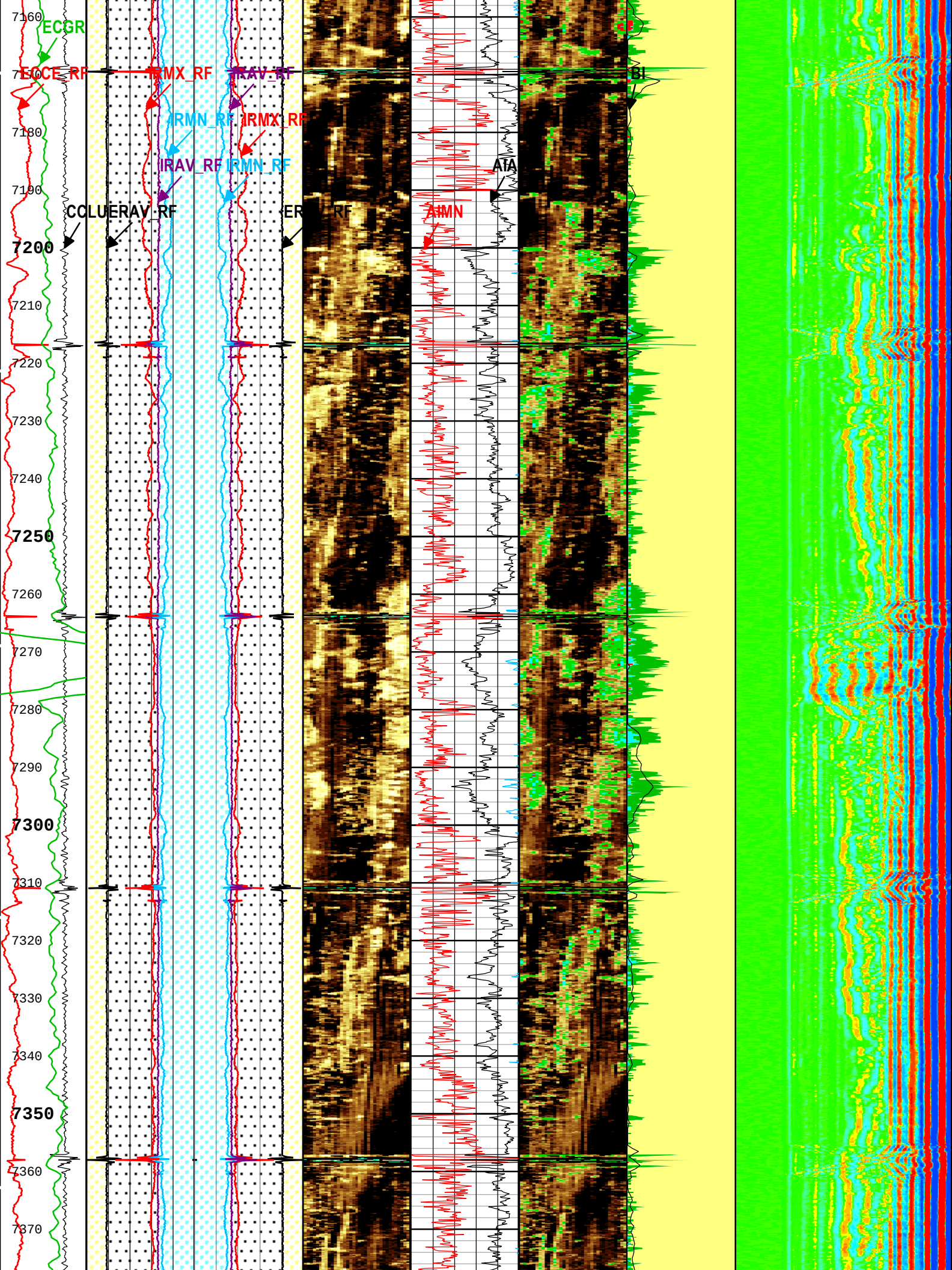
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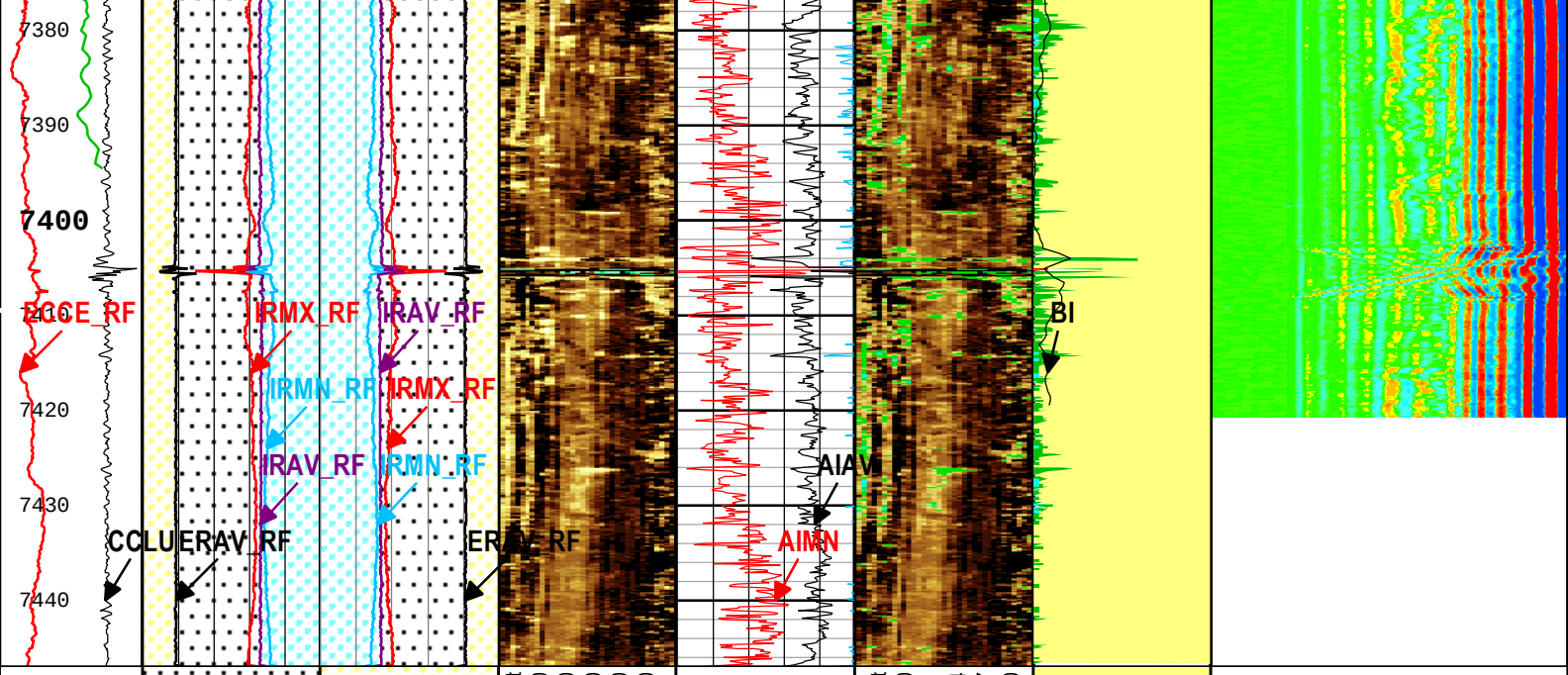

Casing Collar Locator Ultrasonic (CCLU) USIT-E[1]
-30 in 10

Amplitude of Eccentering for Unflagged Waves (ECCE_RF) USIT-E[1]
0 in 0.5

Gamma Ray (ECGR) HGNS[1]
0 gAPI 150

ERAV_IRAV | ERAV_RHF1
IRAV_LHF1 | IRAV_ERAV
LHF1_ERAV | RHF1_IRAV

Median of Unflagged External Radii (ERAV_RF) USIT-E[1]
5 in 4

Median of Unflagged External Radii (ERAV_RF) USIT-E[1]
4 in 5

Median Internal Radius of Casing Corrected for Eccentering (IRAV_RF) USIT-E[1]
5 in 4

Minimum of Unflagged Internal Radii (IRMN_RF) USIT-E[1]
4 in 5

Minimum of Unflagged Internal Radii (IRMN_RF) USIT-E[1]
5 in 4

Maximum of Unflagged Internal Radii (IRMX_RF) USIT-E[1]
4 in 5

Maximum of Unflagged Internal Radii (IRMX_RF) USIT-E[1]
5 in 4

Median Internal Radius of Casing Corrected for Eccentering (IRAV_RF) USIT-E[1]
4 in 5

Absent 1.000 2.500 4.000 5.500 7.000
Custom Normalization
USIT - Acoustic Impedance (AIBK) USIT-E[1] (Mrayl)

Acoustic Impedance Minimum (AIMN) USIT-E[1]
-1 Mrayl 9

Acoustic Impedance Average (AIAV) USIT-E[1]
-1 Mrayl 9

Acoustic Impedance Maximum (AIMX) USIT-E[1]
-1 Mrayl 9

Absent 0.300 3.581 5.054 6.527 8.000
Custom Normalization
USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E[1] (Mrayl)

Bonded
Gas
Liquid
Micro-debonding

Bond Index (BI) DSLT-H[1]
1 0

Min Amplitude Max
Sonic VDL Curve DSLT-H[1]
200 us 1200

TIME_1900 - Time Marked every 60.00 (s)

Description: USI VDL Cement Format: Log (LBV1_USI-VDL (DSLT) Cement 9.625inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Apr-2016 19:17:17

Company:	Southern California Gas Company
Well:	Porter 69F
Field:	Aliso Canyon
County:	Los Angeles
State:	California

Schlumberger

Cement Bond Log
Variable Density Log
Gamma Ray - CCL