Schlumberger

Company: Crestone Peak Resources Operating LLC

Well: Ruegge #3G-4H-N165

Field: Wattenberg

County: Weld State: Colorado

Cement Bond Log

County: Weld
Field: Wattenberg
Location: SESW Sec 4, T 1N, R 65W
Well: Ruegge #3G-4H-N165
Company: Crestone Peak Resources Operating LLC

Location:				
SESW Sec 4, T 1N, R 65W	Elev.:	K.B.	4939.00	ft
700' FSL & 2097' FWL		G.L.	4916.00	ft
Lat/Long: 40.075241/-104.670915		D.F.	4939.00	ft
Permanent Datum:	Ground Level	Elev.:	4916.00	f
Log Measured From:	Kelly Bushing	23.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

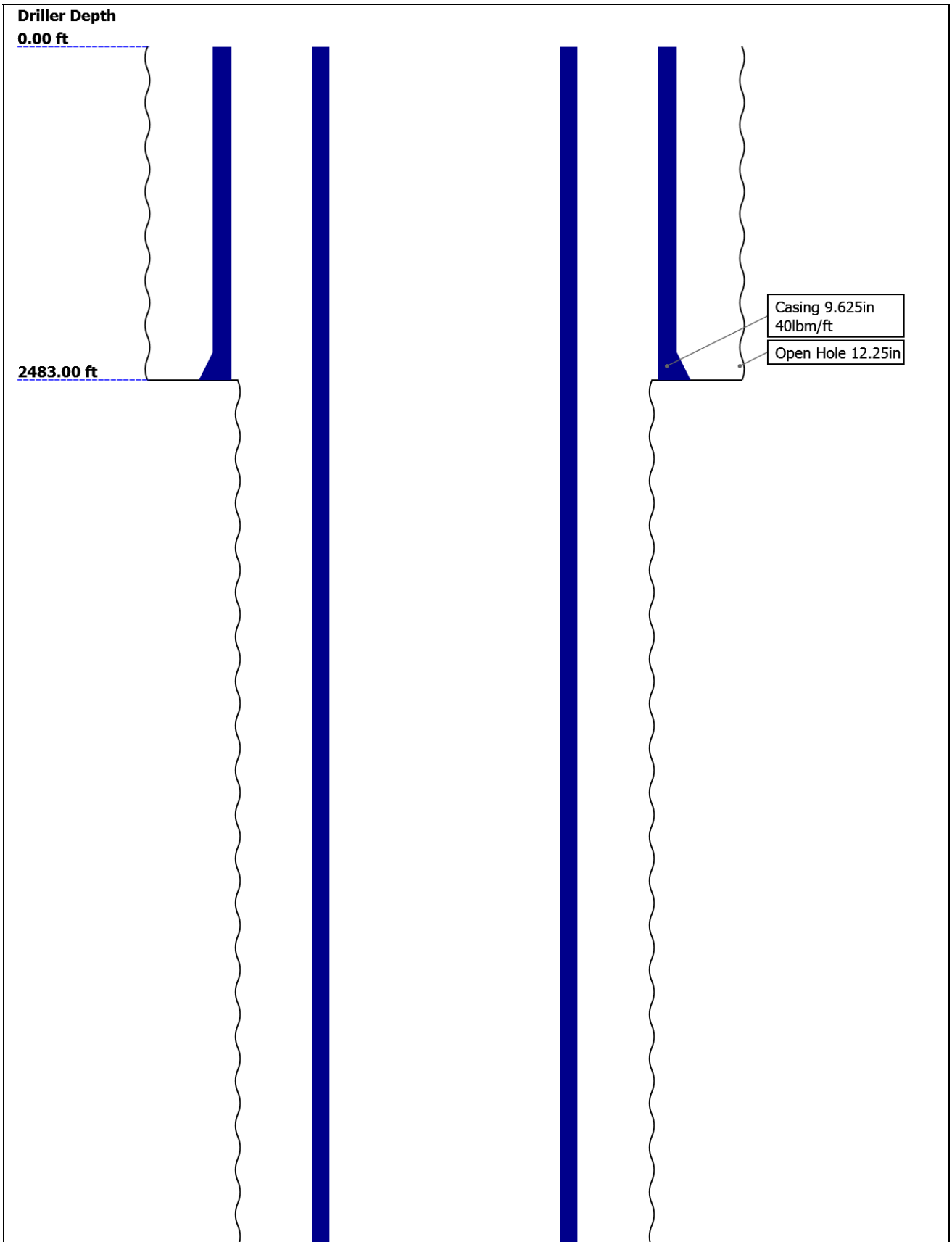
API Serial No.	Section:	Township:	Range:
05-123-46566	4	1N	65W

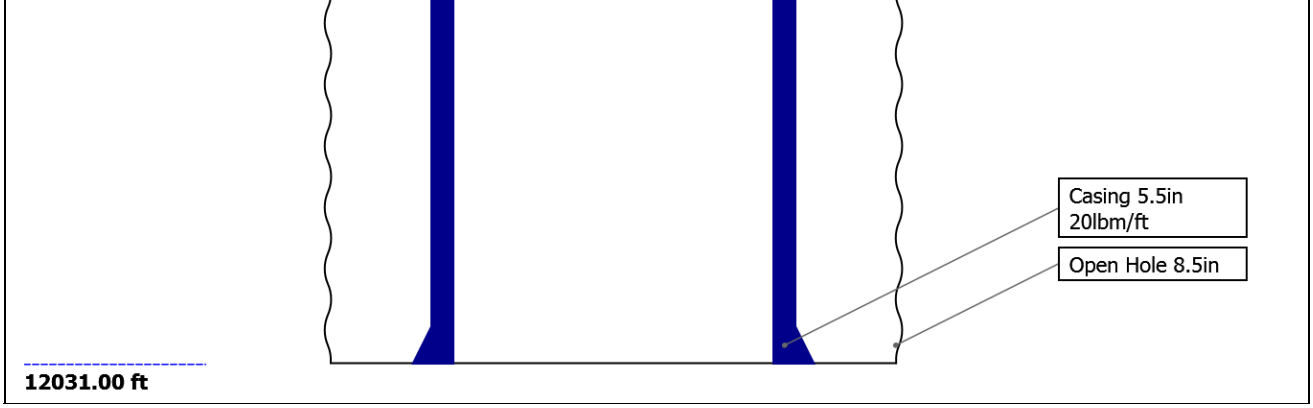
Logging Date	09-Aug-2018		
Run Number	One		
Depth Driller	12031.00 ft		
Schlumberger Depth	6912.00 ft		
Bottom Log Interval	6912.00 ft		
Top Log Interval	100.00 ft		
Casing Fluid Type	Fresh Water		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	0.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.50 in		
From	2483.00 ft		
To	12031.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	P110		
From	0.00 ft		
To	12031.00 ft		
Max Recorded Temperatures	181 degF		
Logger on Bottom Time	09-Aug-2018	11:07:00	
Unit Number Location:	9102	Fort Morgan, CO	
Recorded By	Alan Moreno		
Witnessed By	Keith Kershisnik		

Disclaimer

Contents

Well Sketch





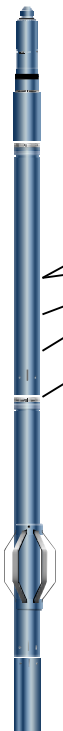
Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	8.5				
Top Driller (ft)	0	2483				
Top Logger (ft)	0	2483				
Bottom Driller (ft)	2483	12031				
Bottom Logger (ft)	2483	12031				
Casing						
Size (in)	9.625	5.5				
Weight (lbm/ft)	40	20				
Inner Diameter (in)	8.835	4.778				
Grade	J55	P110				
Top Driller (ft)	0	0				
Top Logger (ft)	0	0				
Bottom Driller (ft)	2483	12031				
Bottom Logger (ft)	2483	12031				

Remarks and Equipment Summary

One: Toolstring

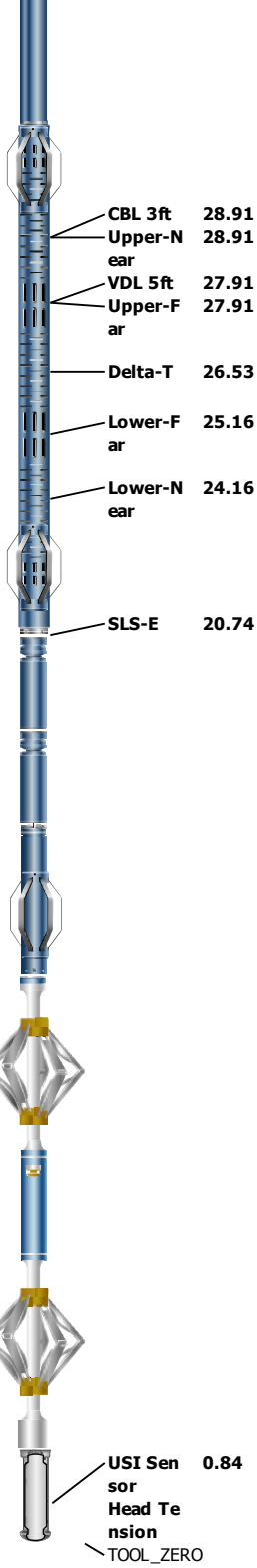
Equip name	Length
LEH-QT:3810	**51.36**
LEH-QT:3810	
EDTC-B:9247	**47.88**
EDTH-B:9309	
EDTG-A:79445	
EDTC-B:9247	
DSLT-H:8279	**41.38**
ECH-KH:8331	
DSLC-H:8279	
SLS-E:8020	



MP name	Offset
CTEM	**44.38**
ACCZ	**0.00**
HV	**0.00**
Gamma Ray	**42.51**
TelStatus	**41.38**

One: Remarks

Thank you for choosing Schlumberger
Log run for cement and casing evaluation
Tool ran centralized as per tool sketch
IBCS-A sub run with USI-TX transducers
Spacer: 11lb/gal, Lead 12.5lb/gal, Tail 13.5lb/gal
All passes logged under 0psi
Log affected by high deviation at bottom



Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		

Wheel Correction 2	0		

Tension Device

Type	CMTD-B/A		
Serial Number			
Calibration Date	14-Jul-2018		
Calibrator Serial Number			
Number of Calibration Points	10		
Calibration Root Mean Square Error			
Calibration Peak Error			

Logging Cable

Type	7-46A-XS		
Serial Number			
Length	22770.00 ft		
Conveyance Type	Wireline		
Rig Type			

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth control procedures followed
Rig Up Length At Surface		IDW used as primary depth control, Z-chart used as secondary
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

One

Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[5]:Up	Up	87.40 ft	6918.98 ft	09-Aug-2018 11:39:04 AM	09-Aug-2018 1:27:51 PM	ON	7.03 ft	No

All depths are referenced to toolstring zero

Log

Company:Crestone Peak Resources Operating LLC Well:Ruegge #3G-4H-N165

One: Log[5]:Up:S006

Description: CBL_Fluid_Compensated Format: Log (Sonic Fluid-Compensated CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 09-Aug-2018 16:35:15

BIEP - Bond Index Event Pips DSLT-H

TIME_1900 - Time Marked every 60.00 (s)

CBL Amplitude (CBL) DSLT-H

0 mV 10

CBL Amplitude (Fluid Compensated) (CBLF) DSLT-H

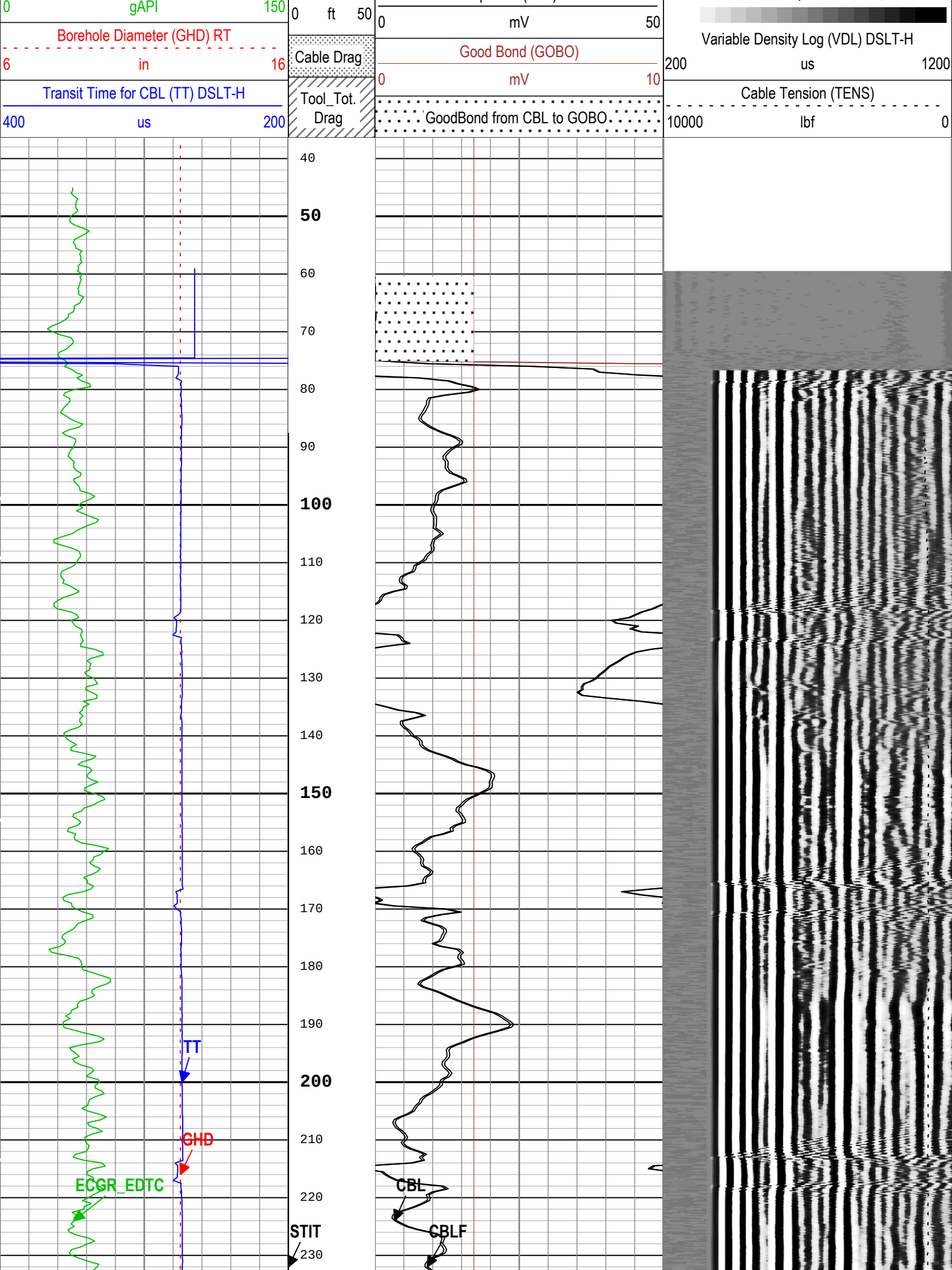
0 mV 50

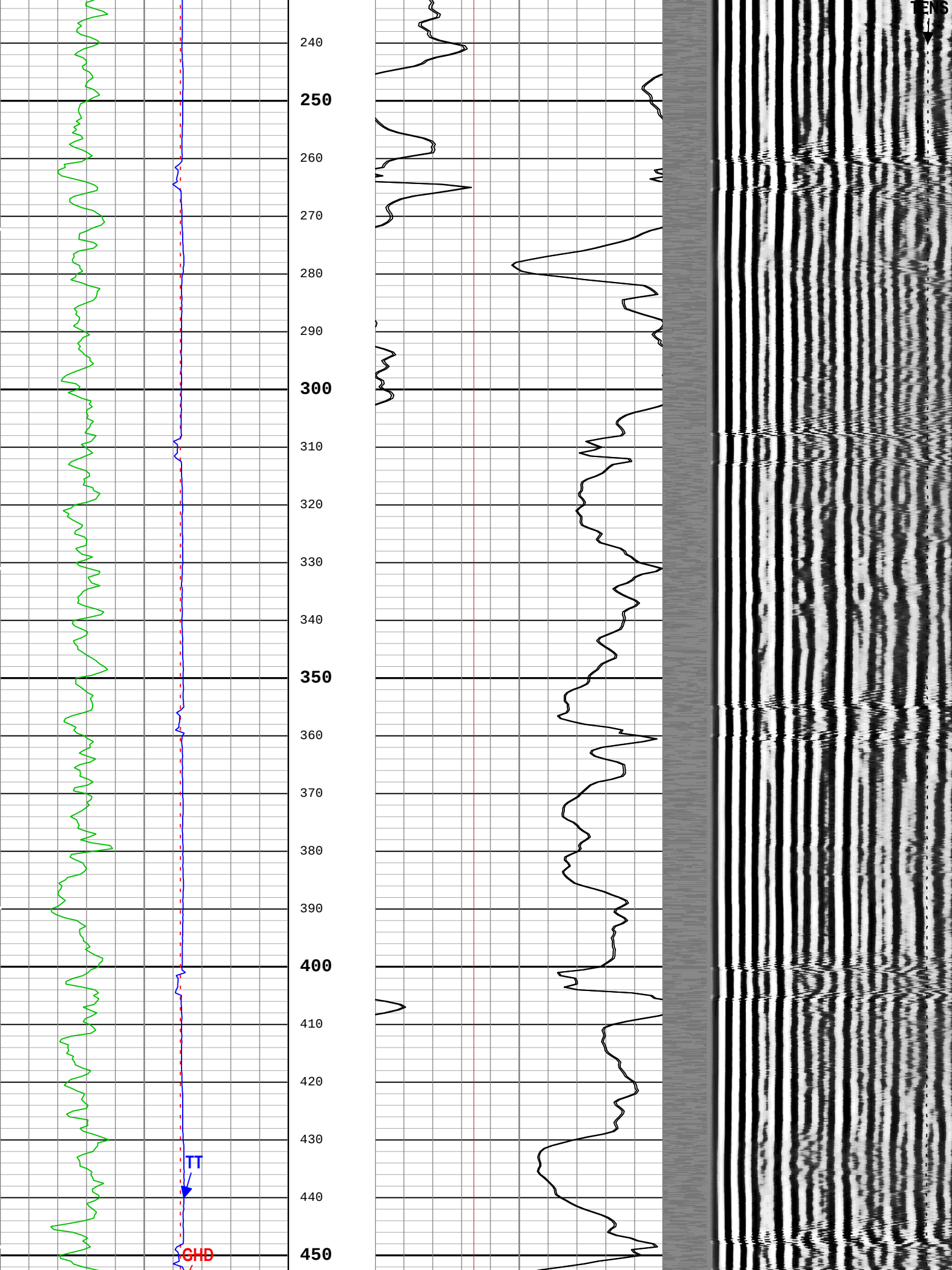
Gamma Ray (ECGR_EDTC) EDTC-B

Stuck Tool Indicator, Total (STIT)

CBL Amplitude (CBL) DSLT-H

Min Amplitude Max


0
gAPI
150
Borehole Diameter (GHD) RT
6
in
16
Transit Time for CBL (TT) DSLT-H
400
us
200
0
ft
50
Cable Drag
Tool_Tot.
Drag
0
mV
50
Good Bond (GOBO)
0
mV
10
GoodBond from CBL to GOBO
Variable Density Log (VDL) DSLT-H
200
us
1200
Cable Tension (TENS)
10000
lbf
0
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
TT
GHD
ECGR_EDTC
CBL
CBLF
STIT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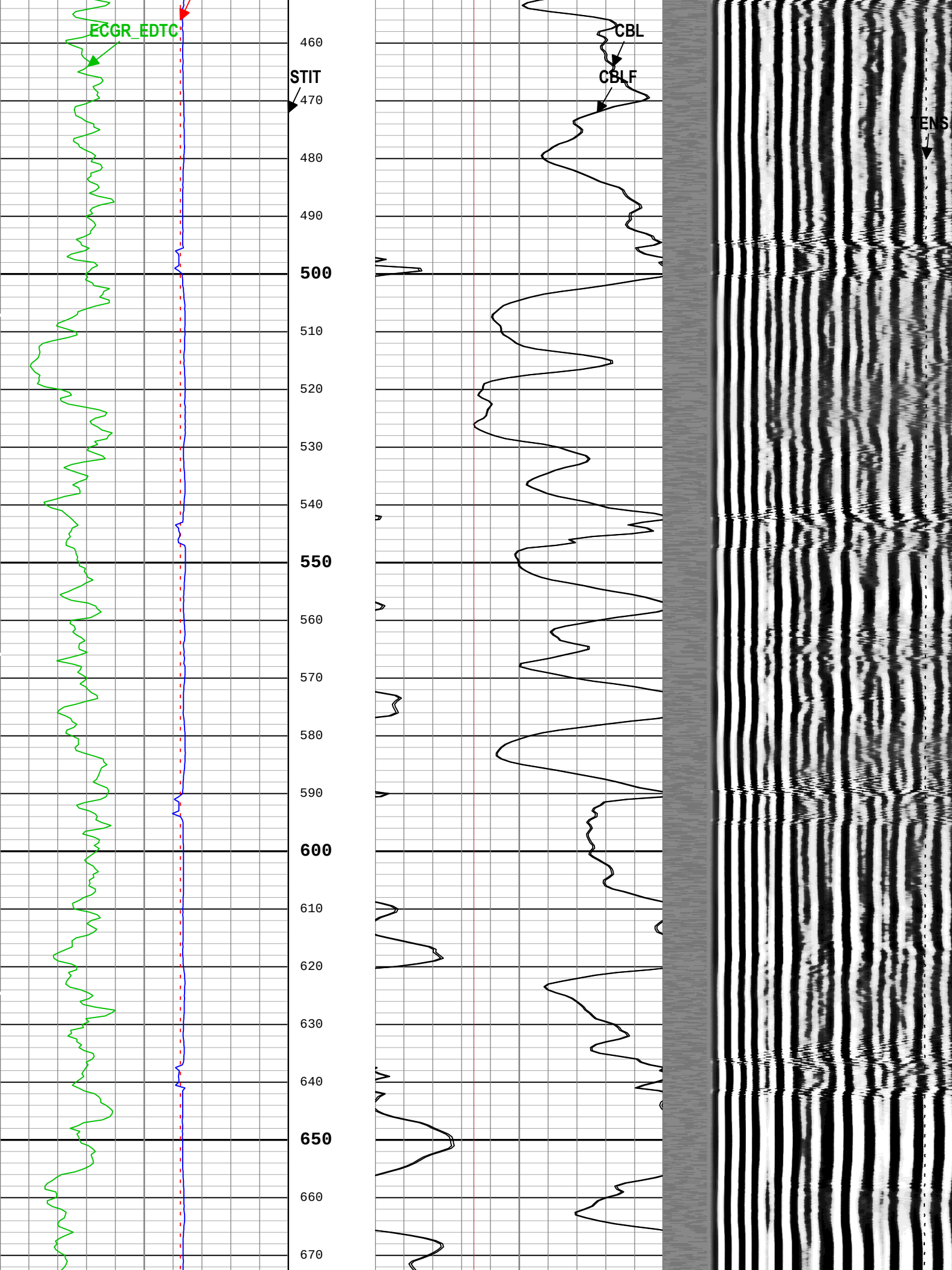
450
TT
GHD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CBLF
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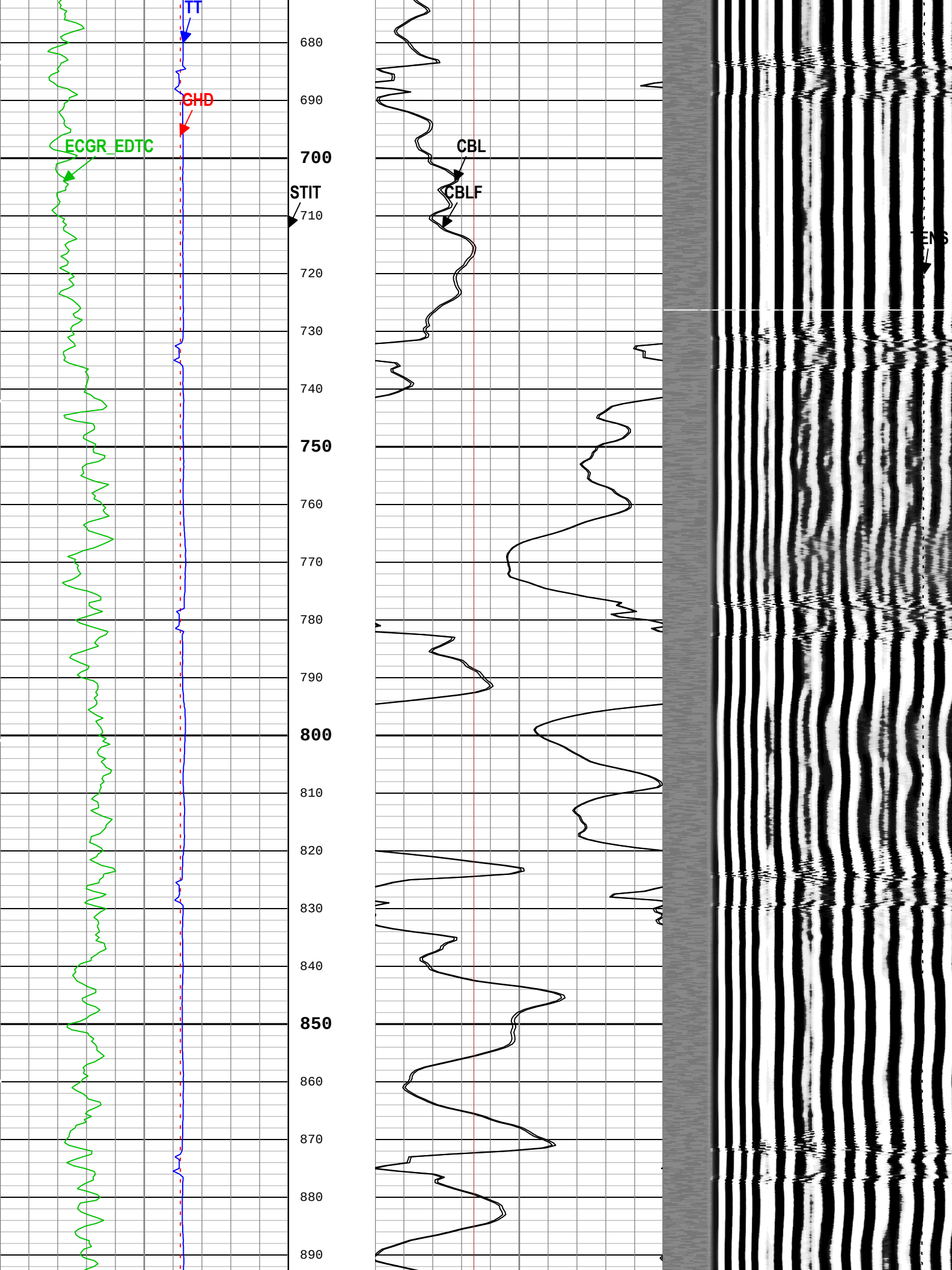
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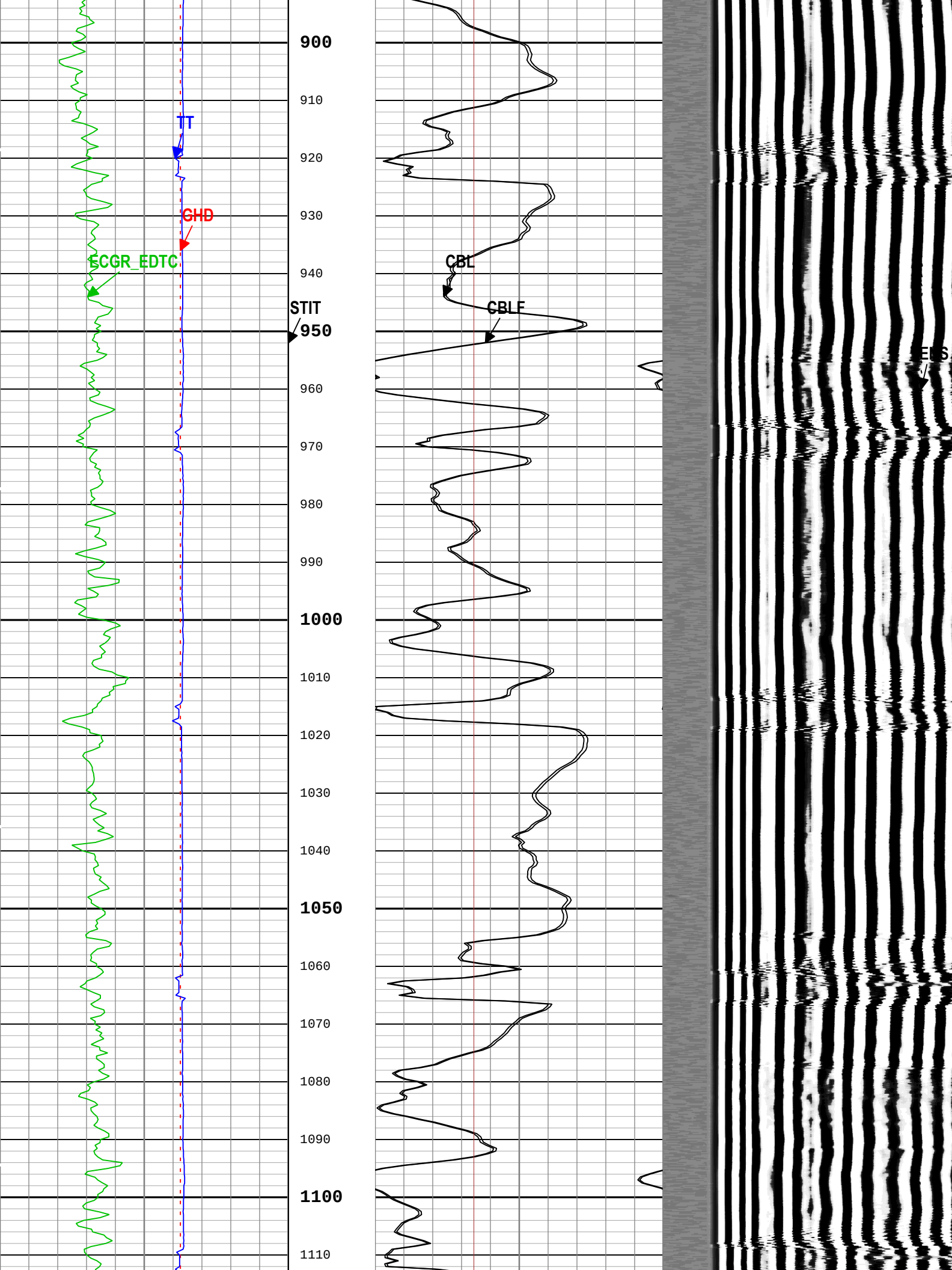
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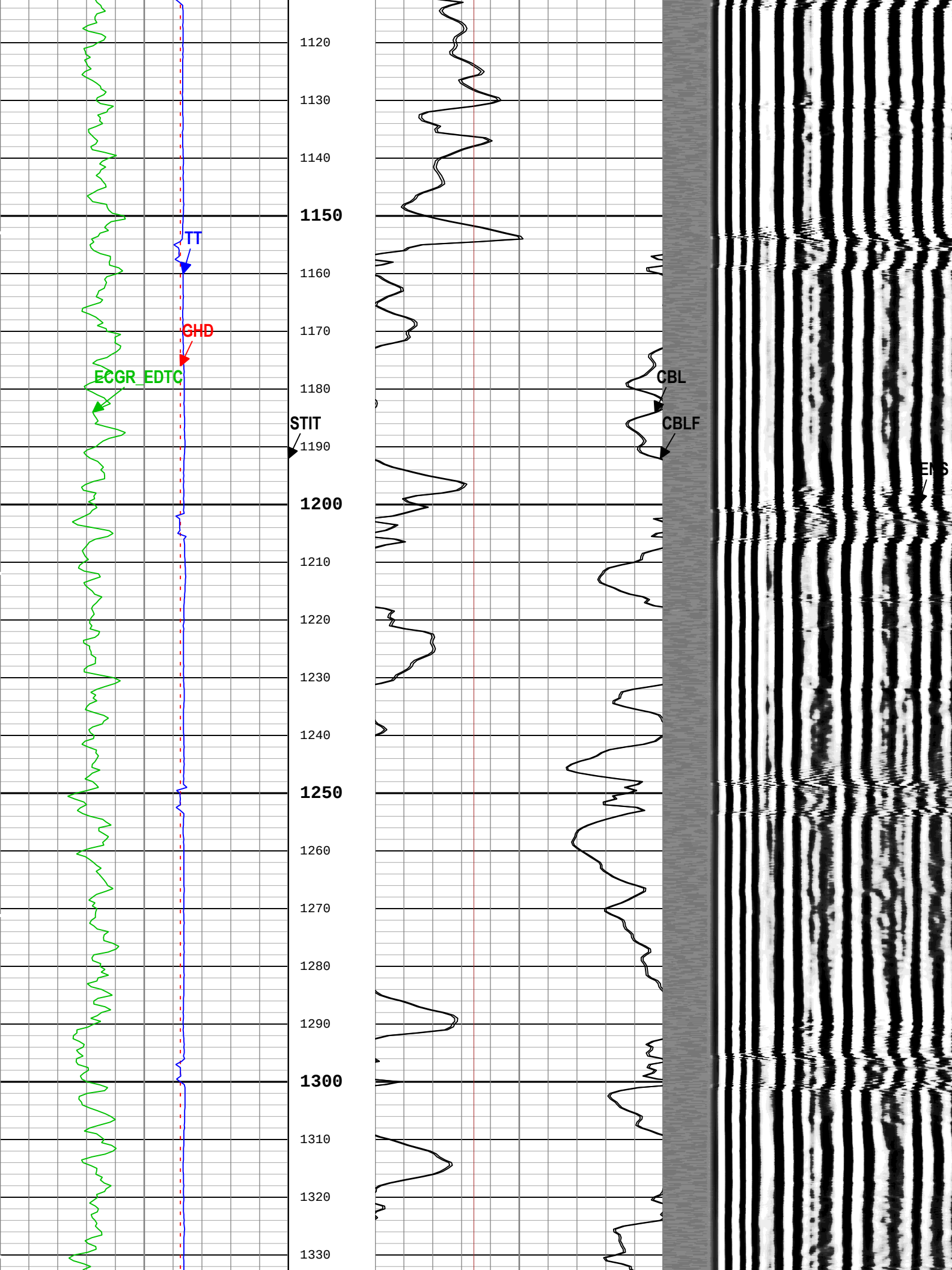
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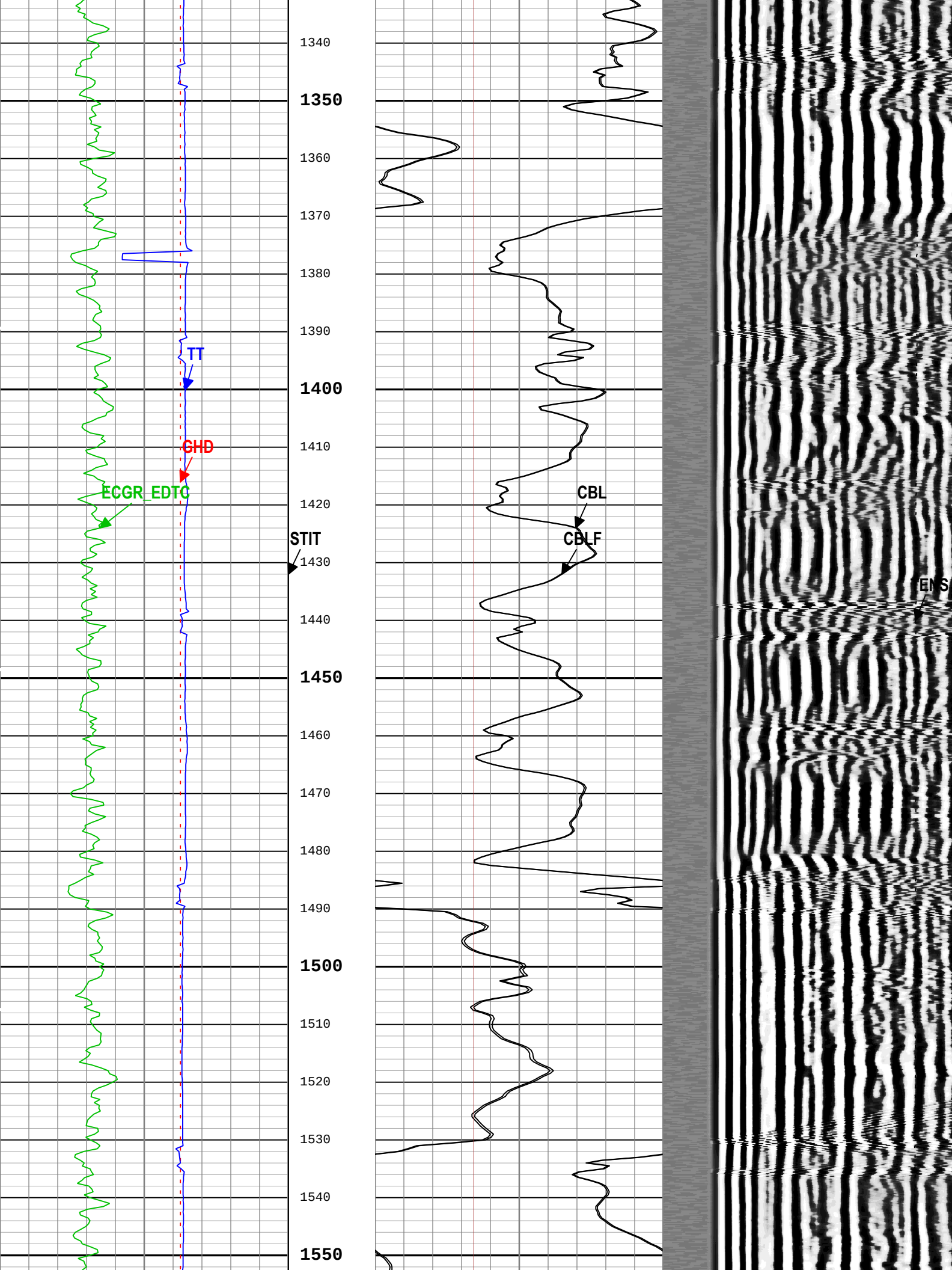
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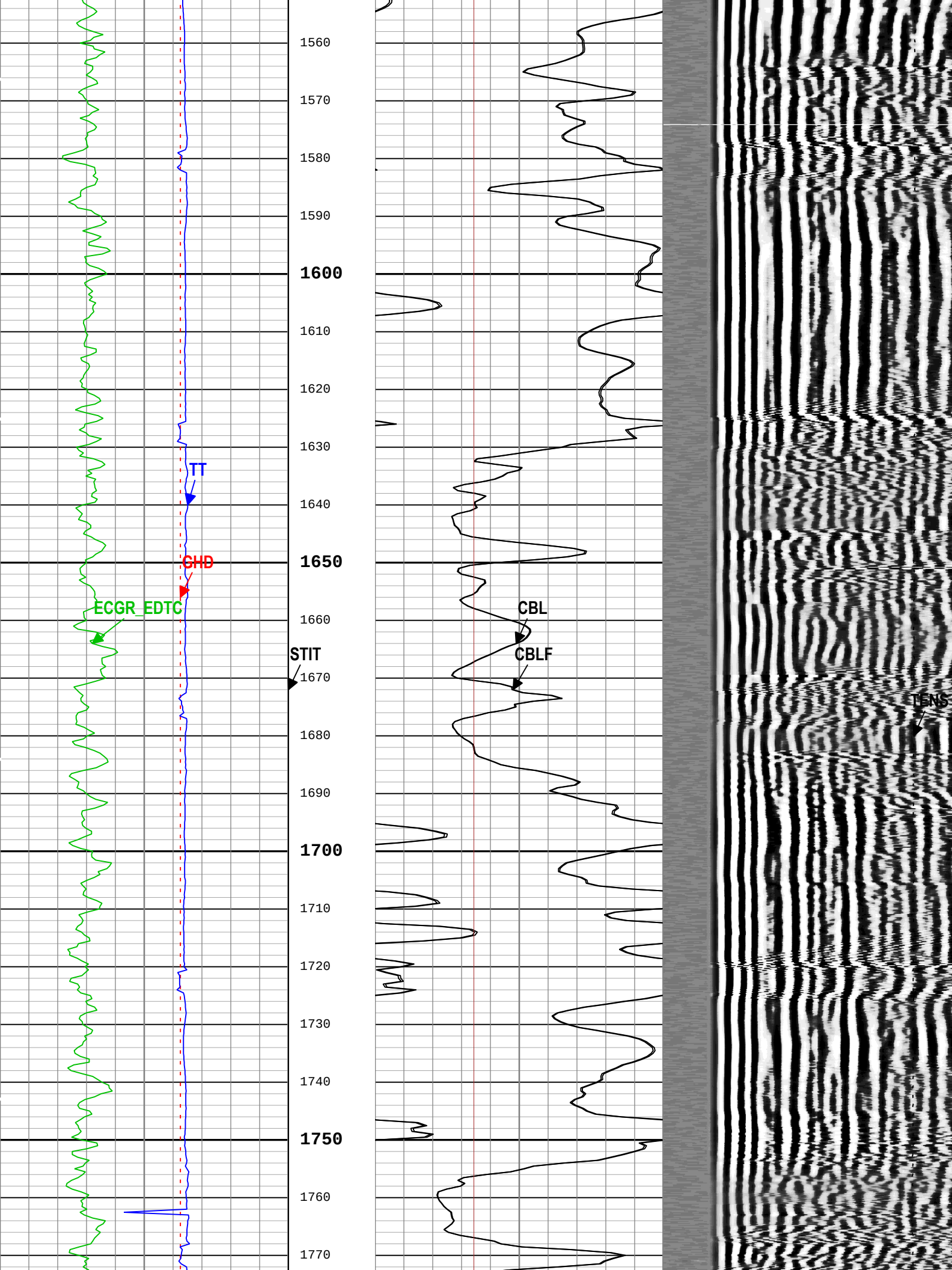
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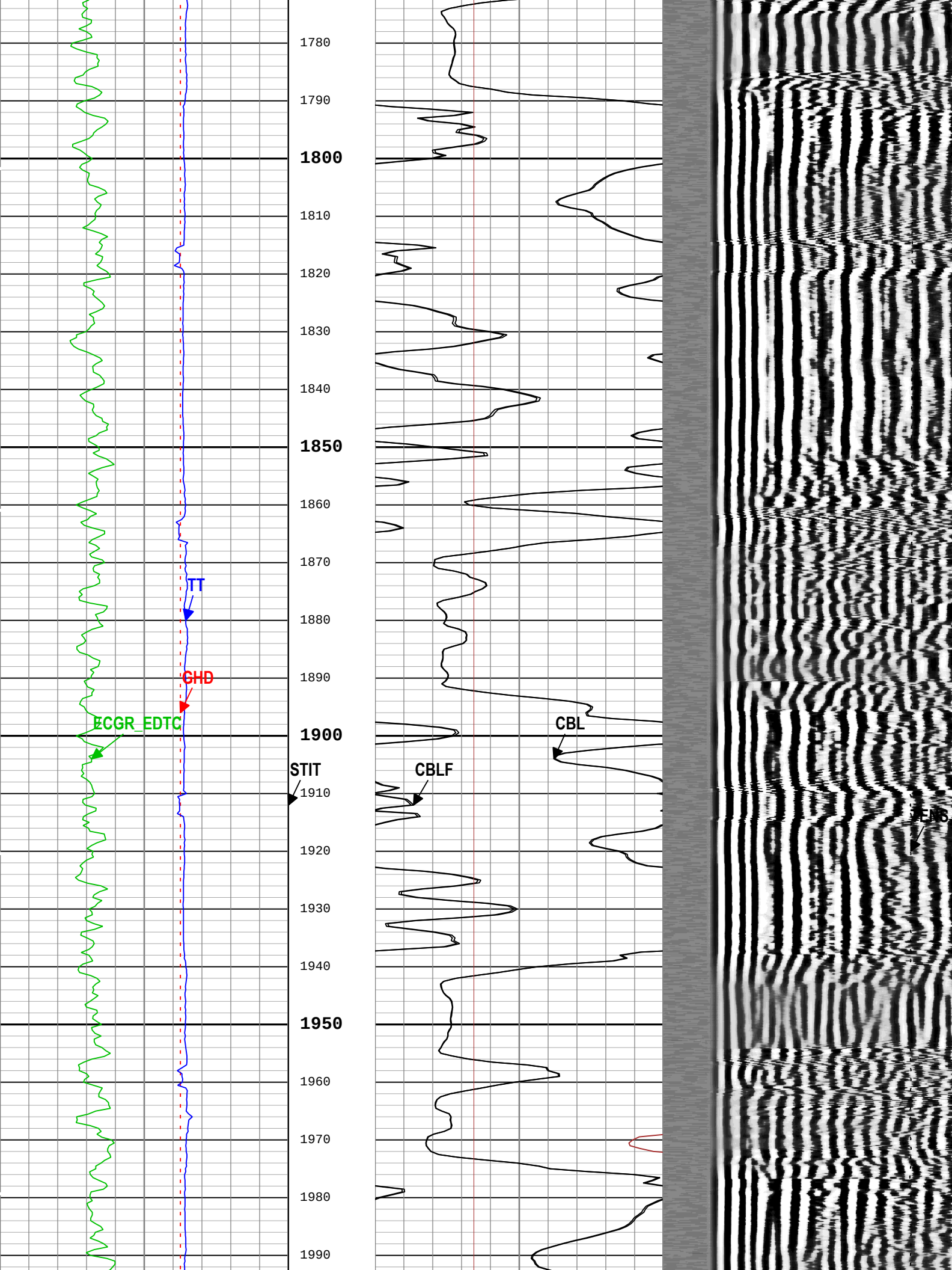
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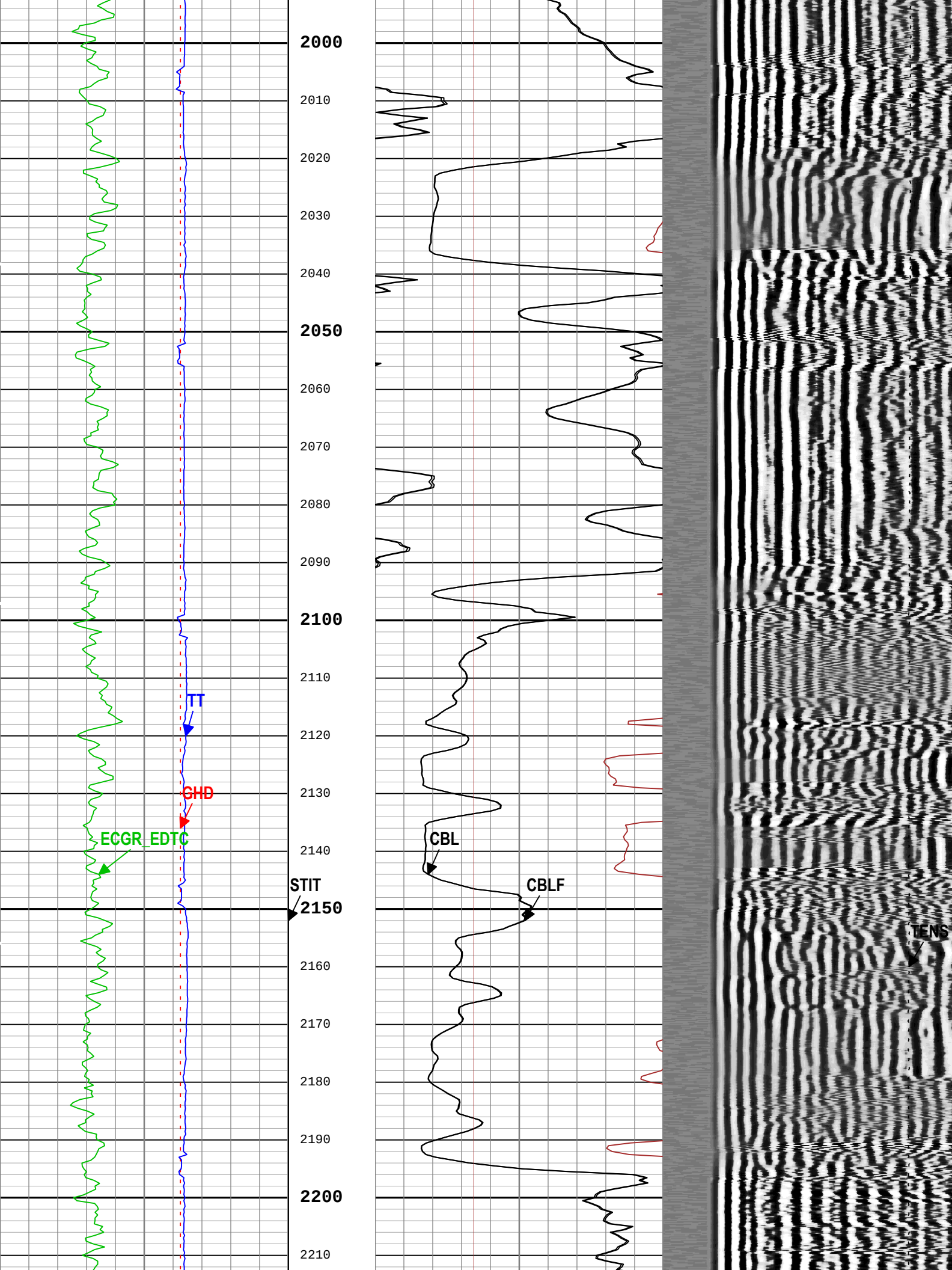
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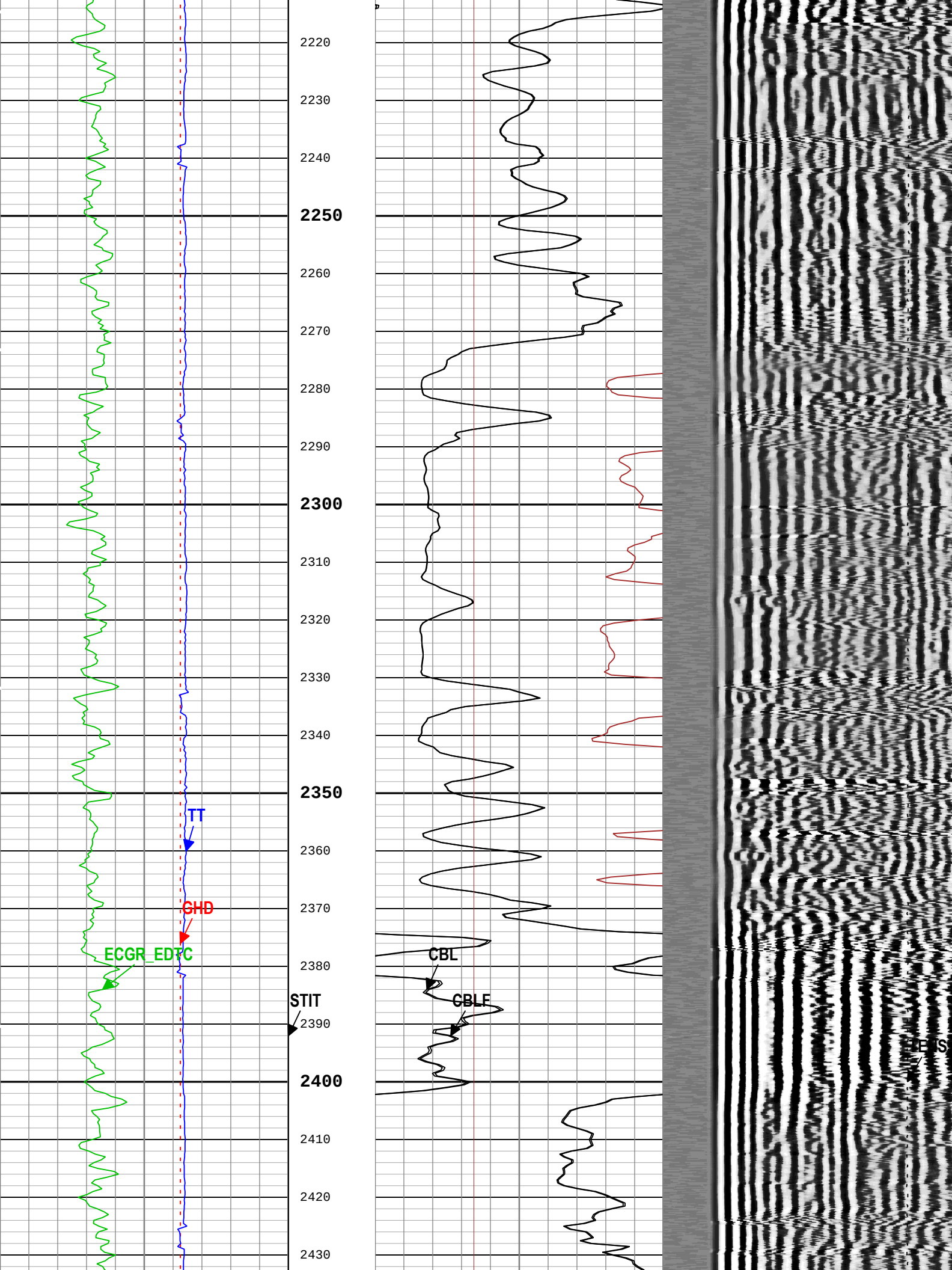
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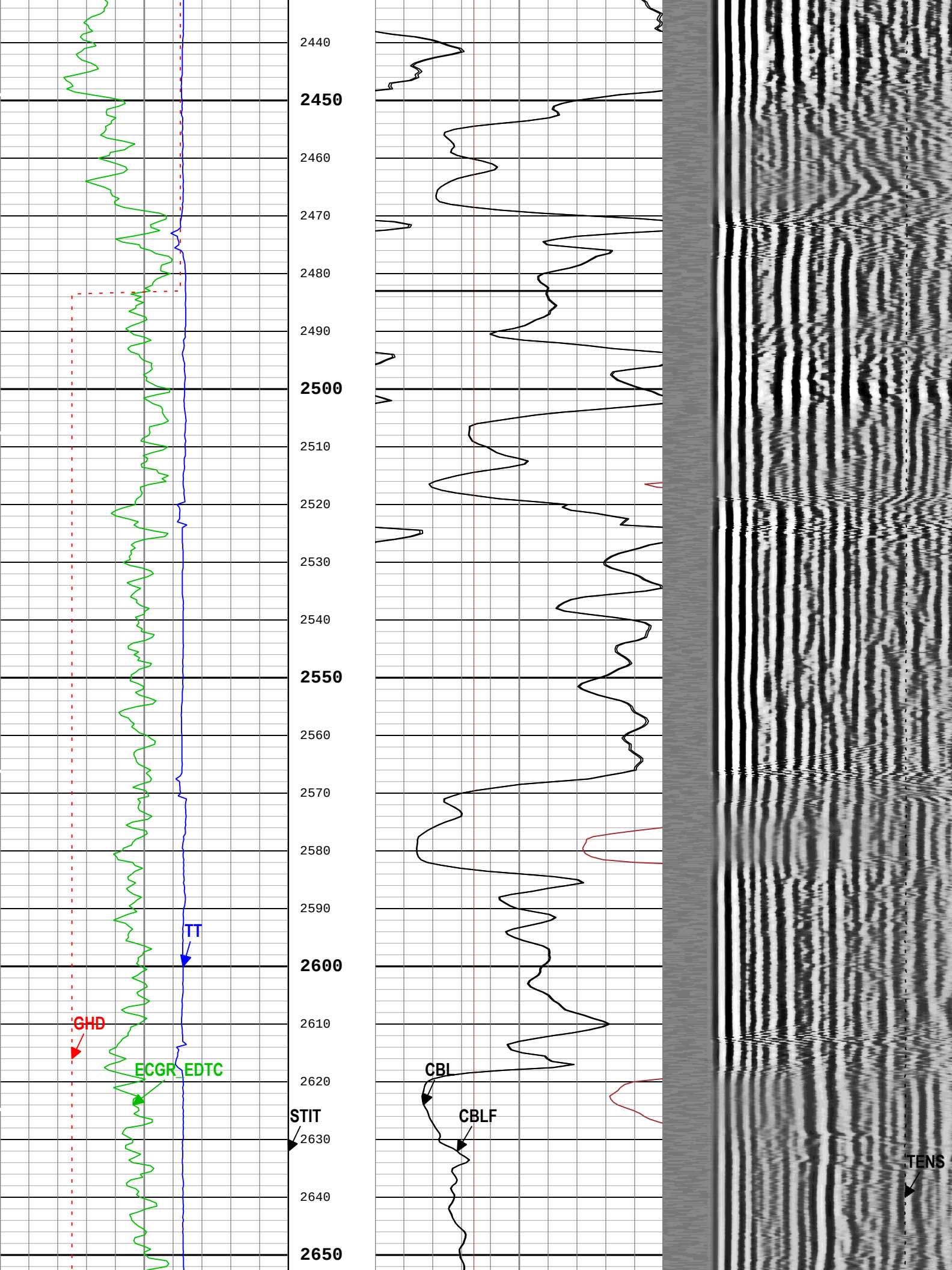
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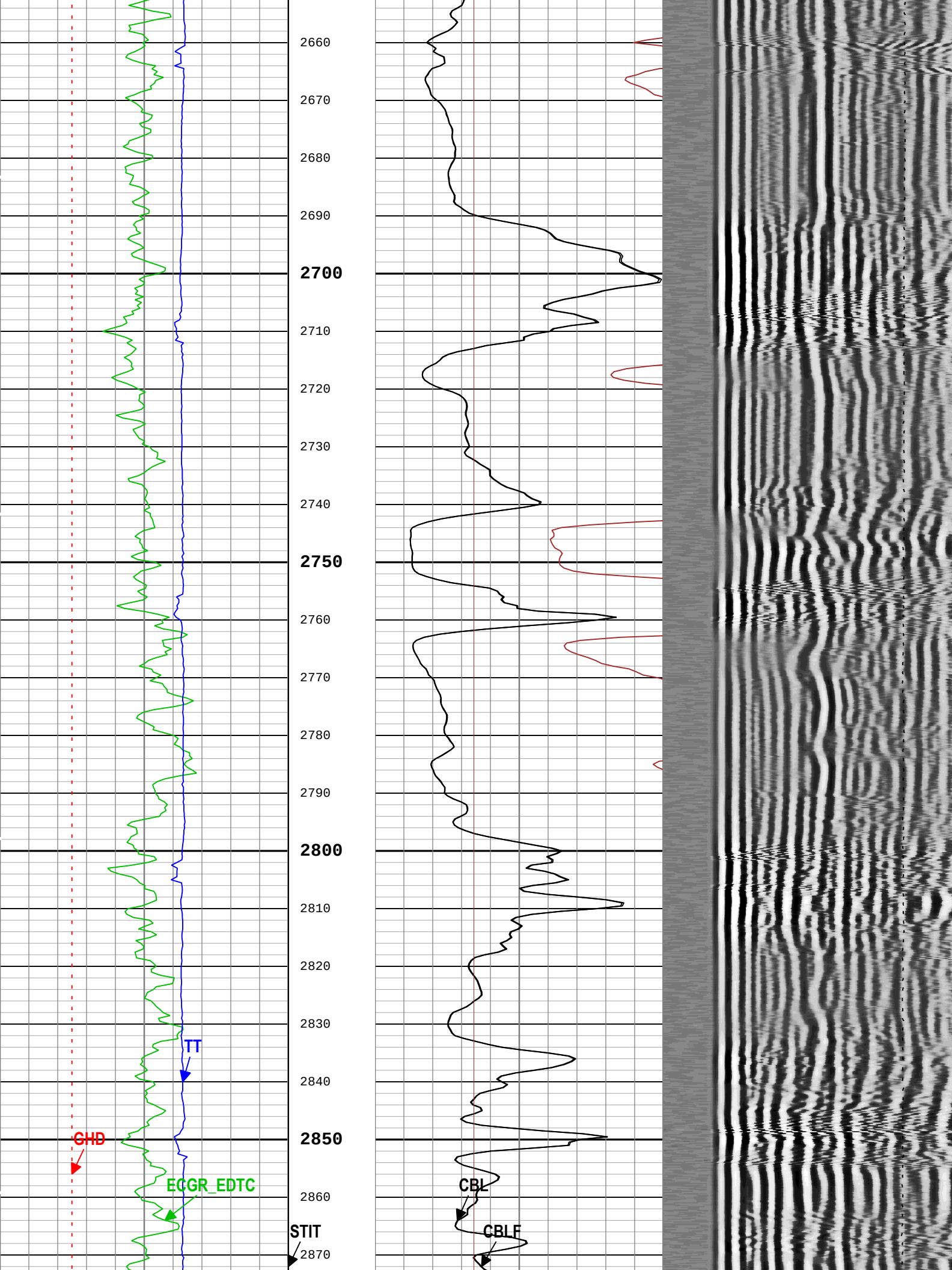
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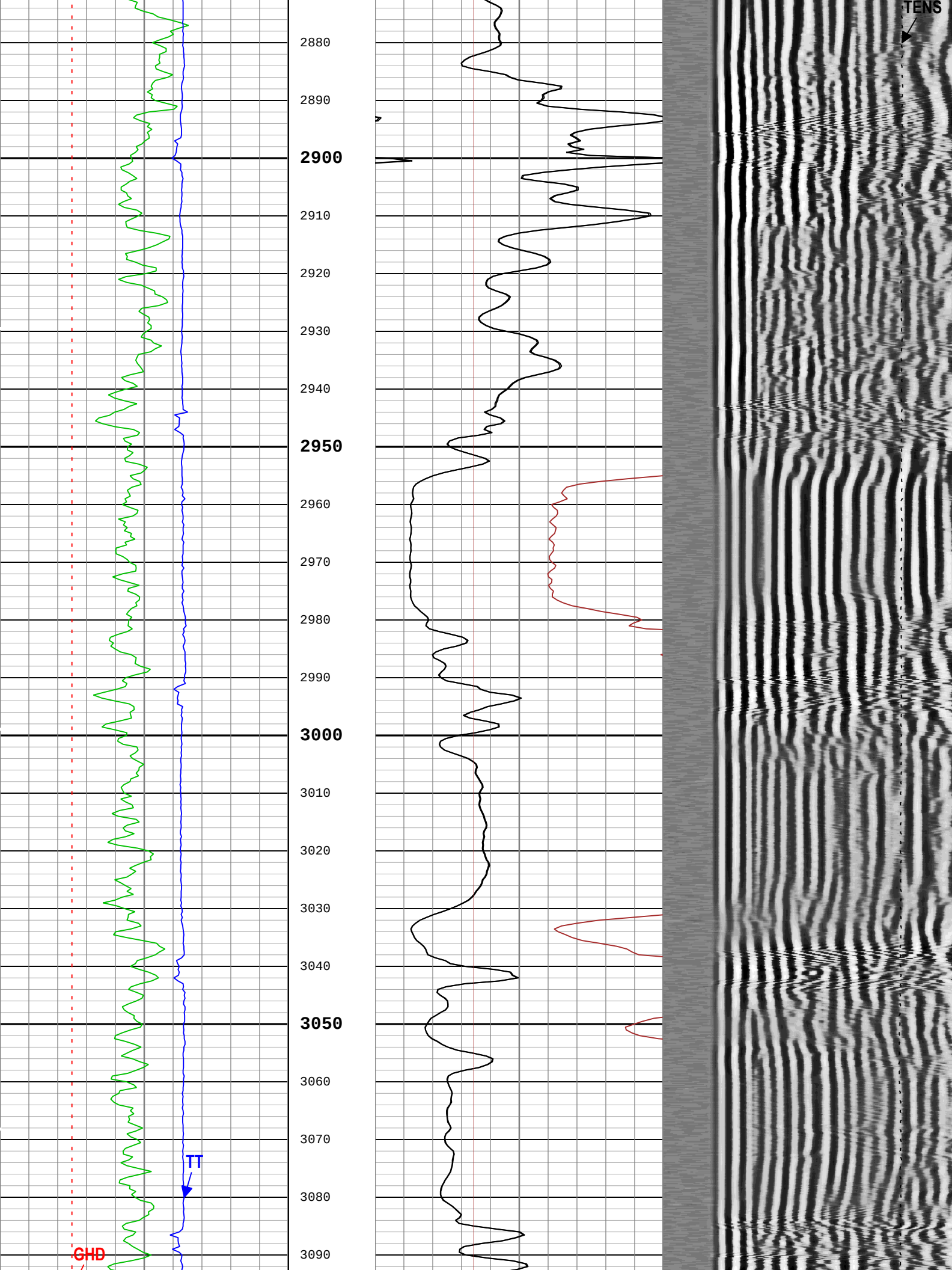
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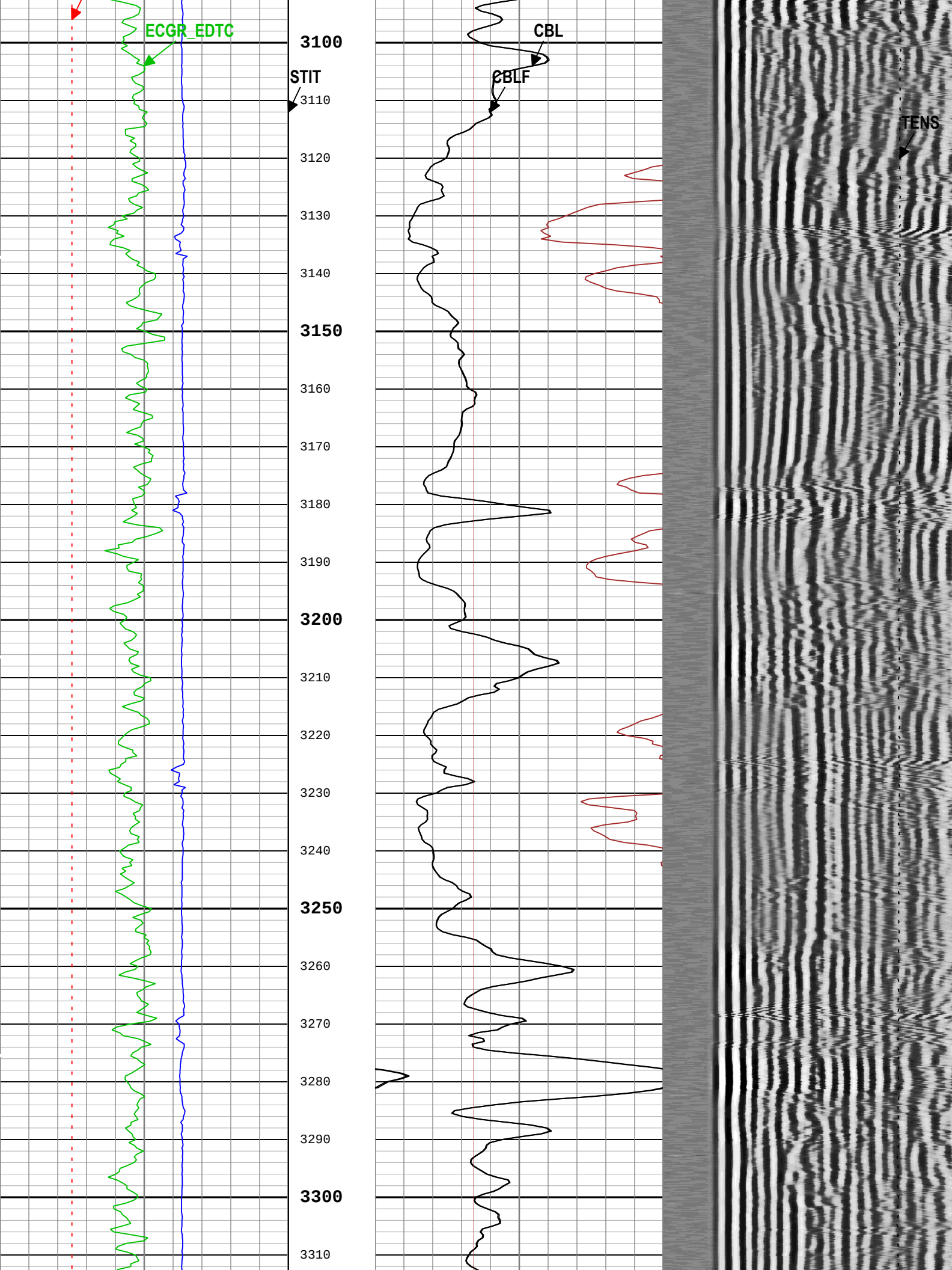
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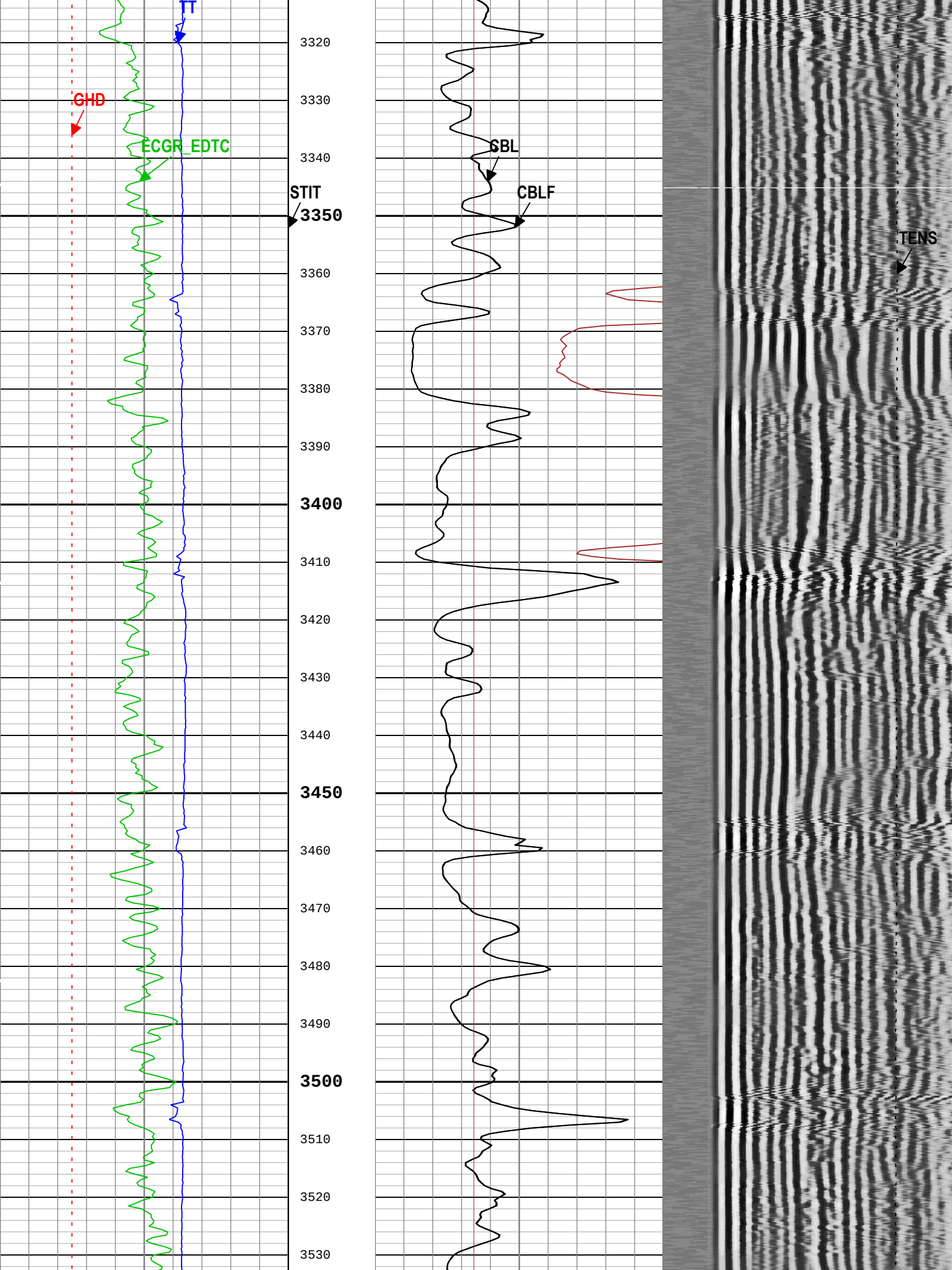
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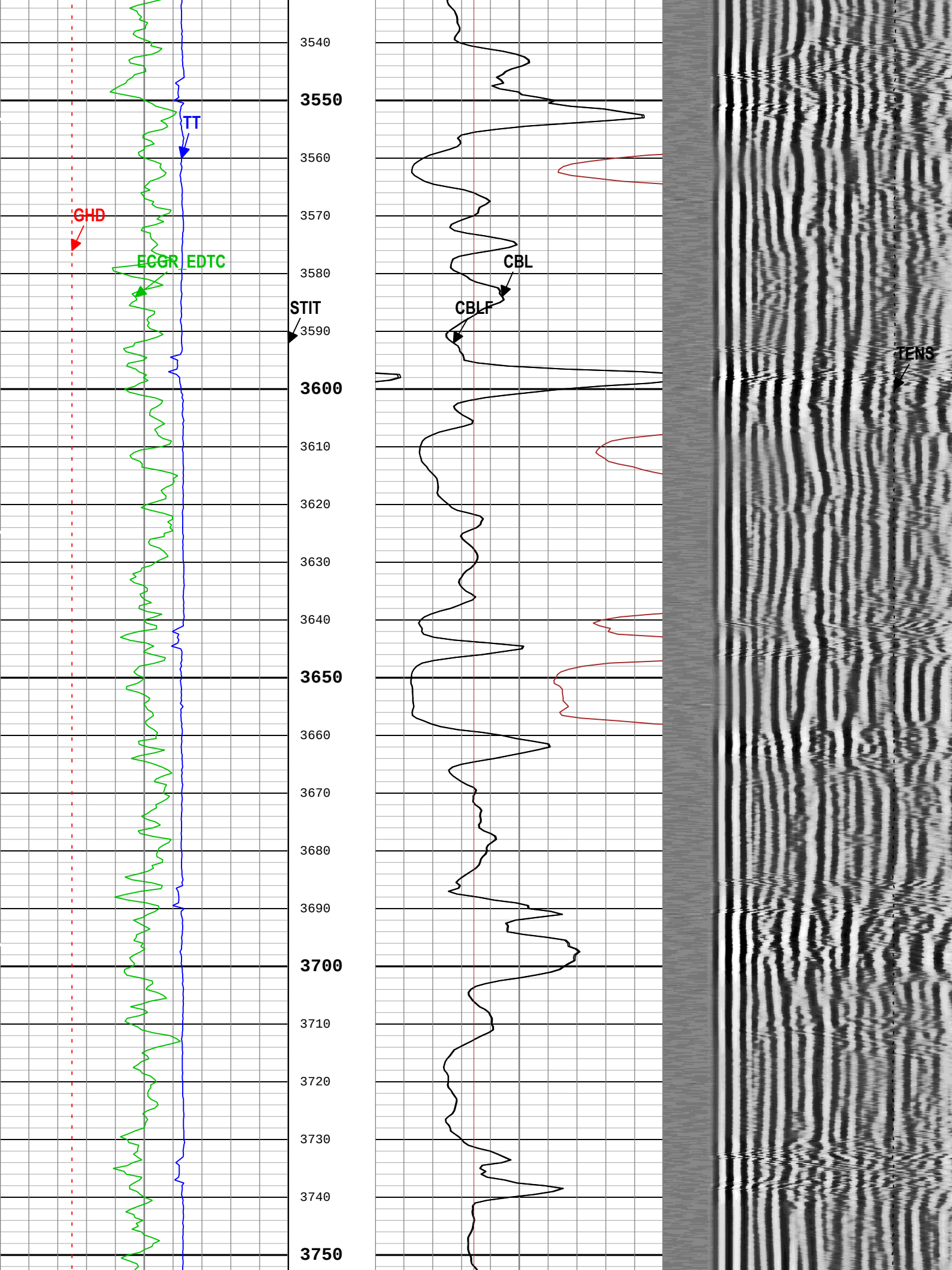
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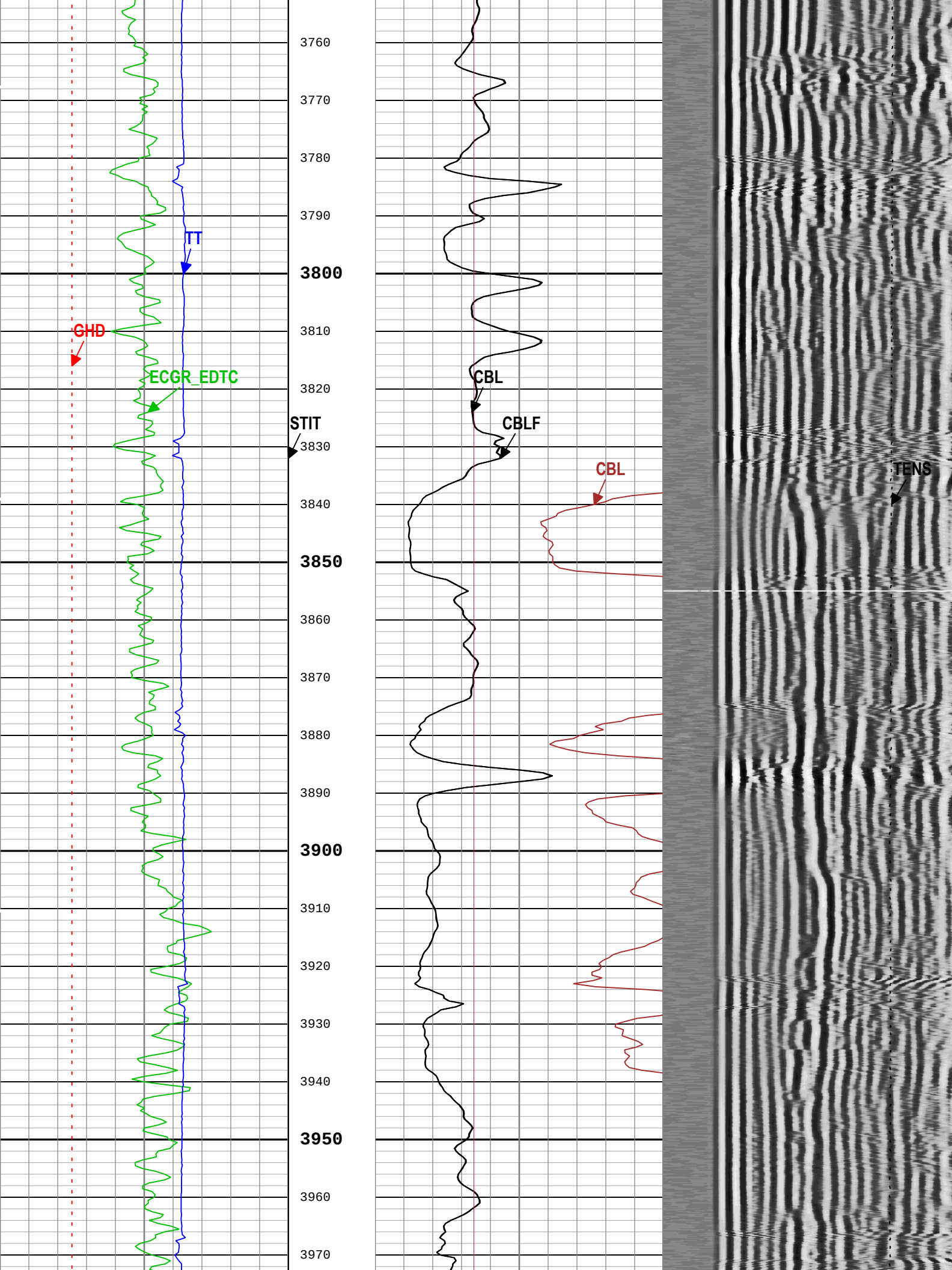
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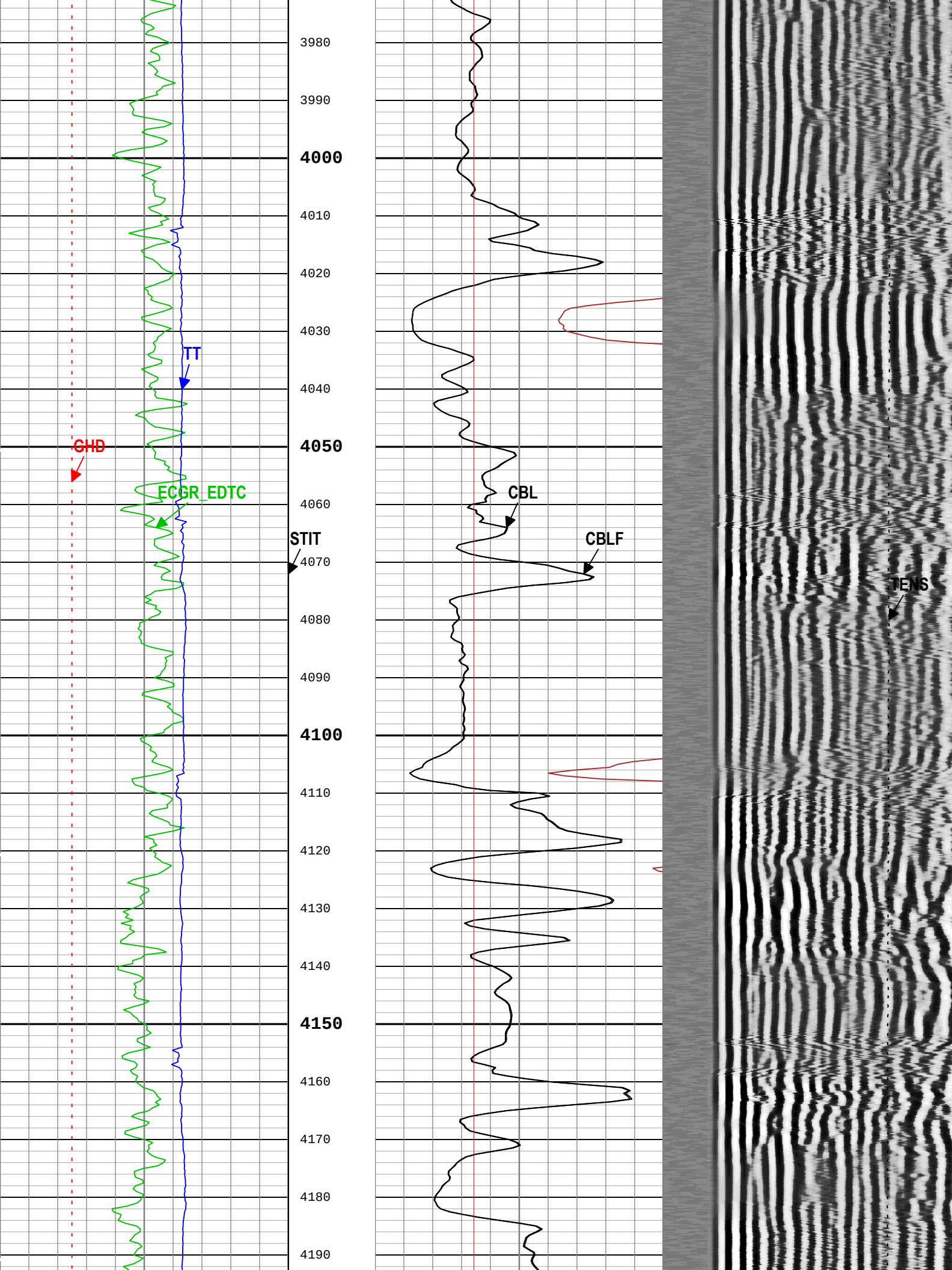
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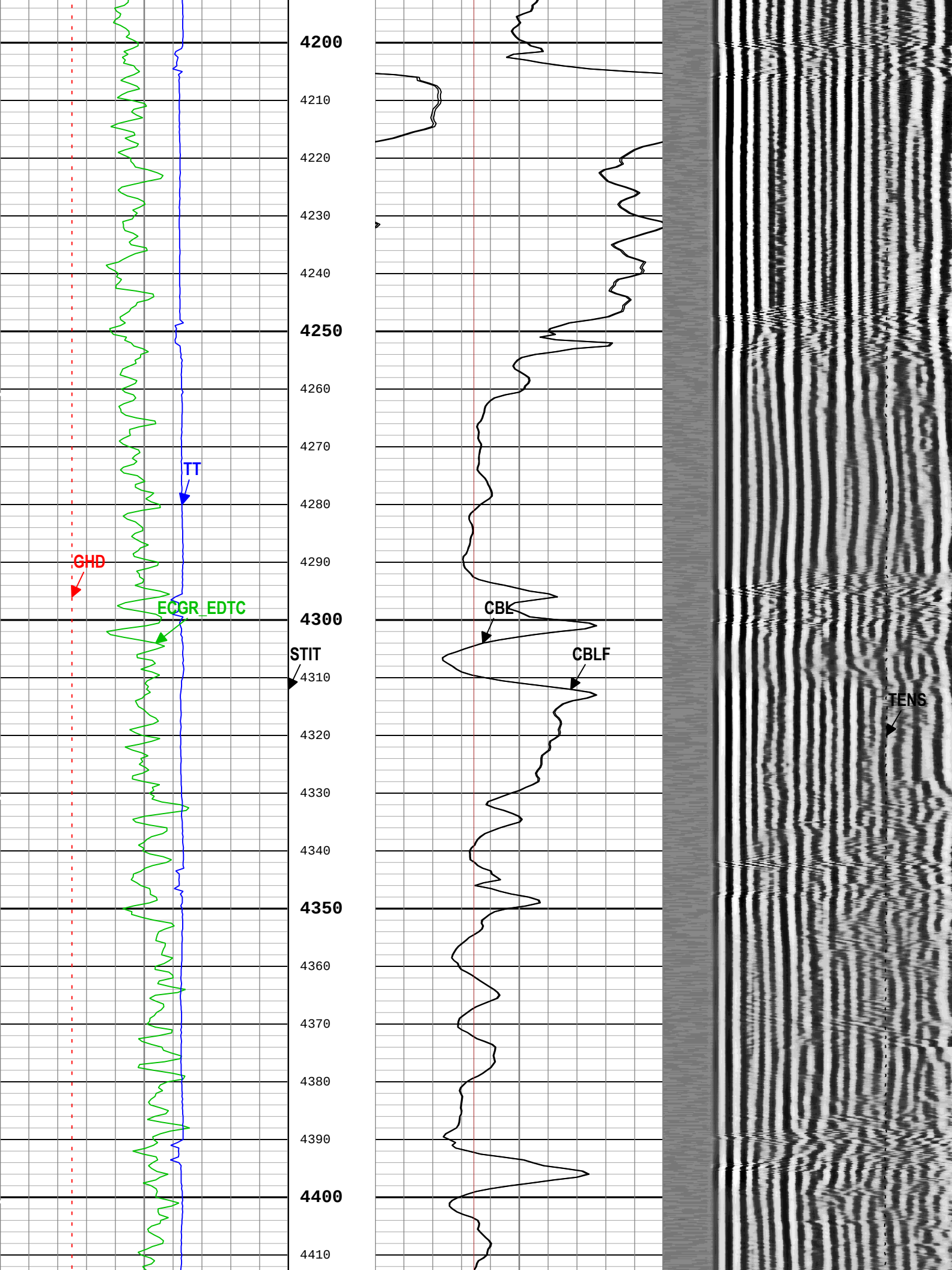
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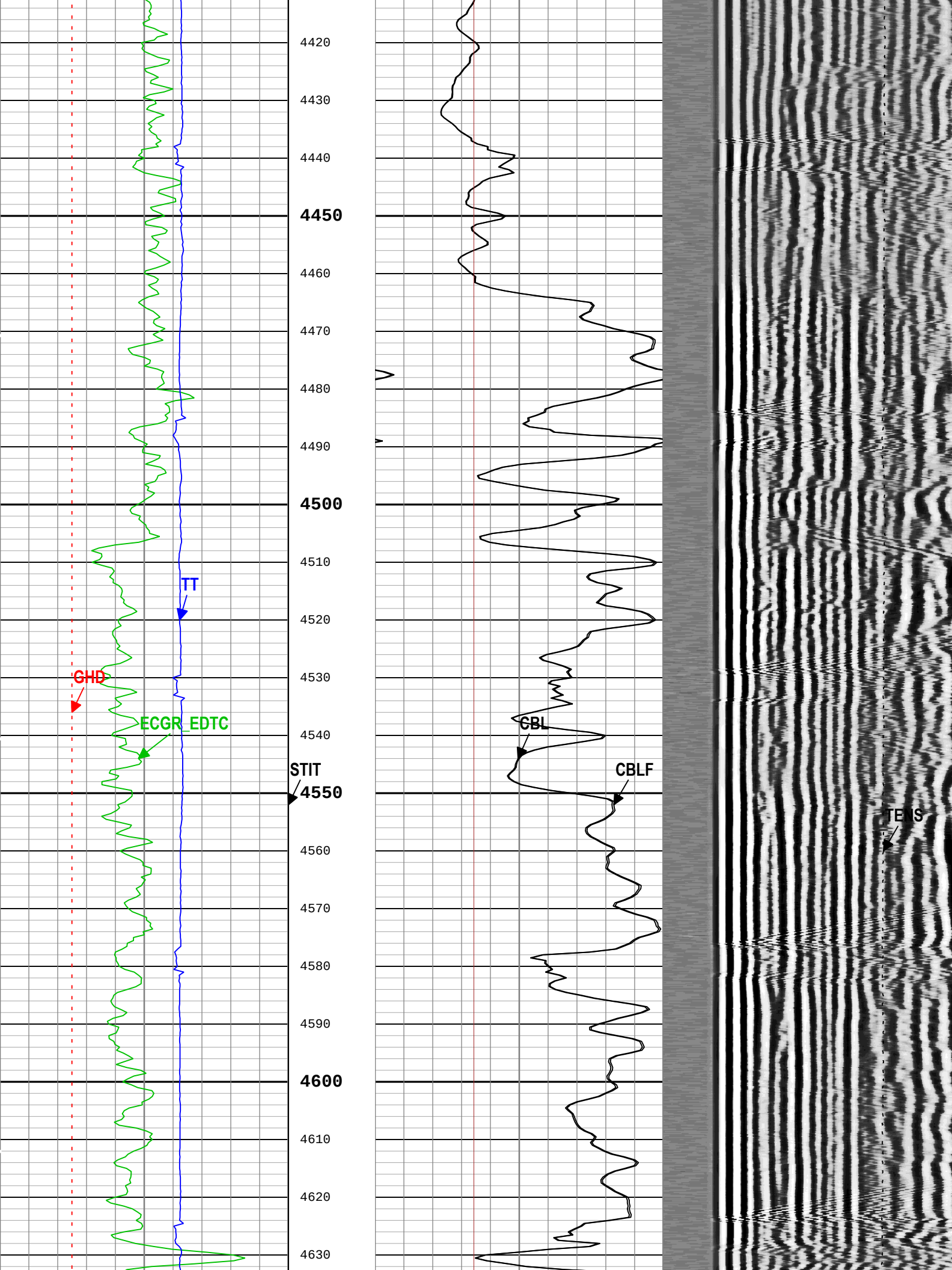
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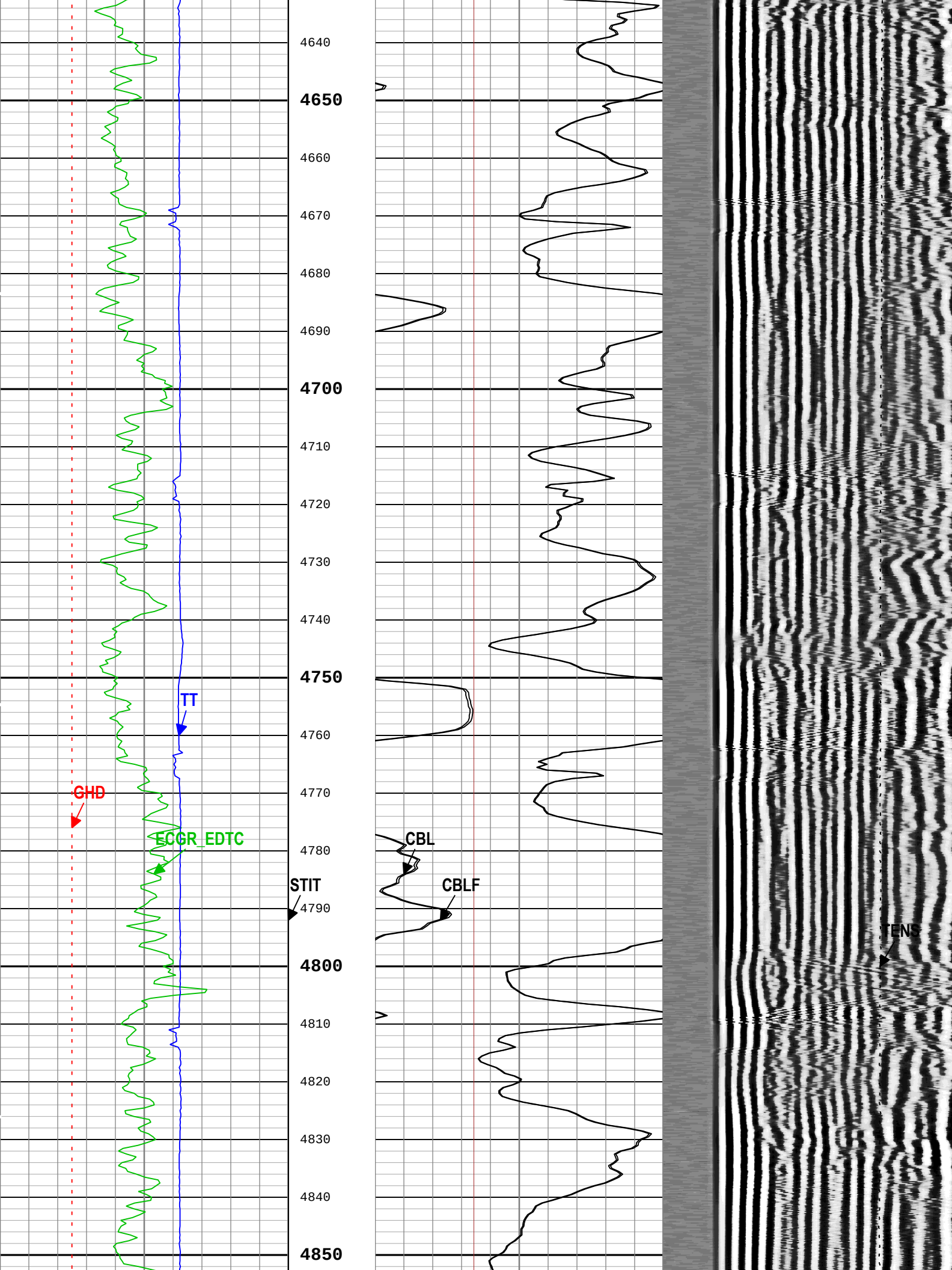
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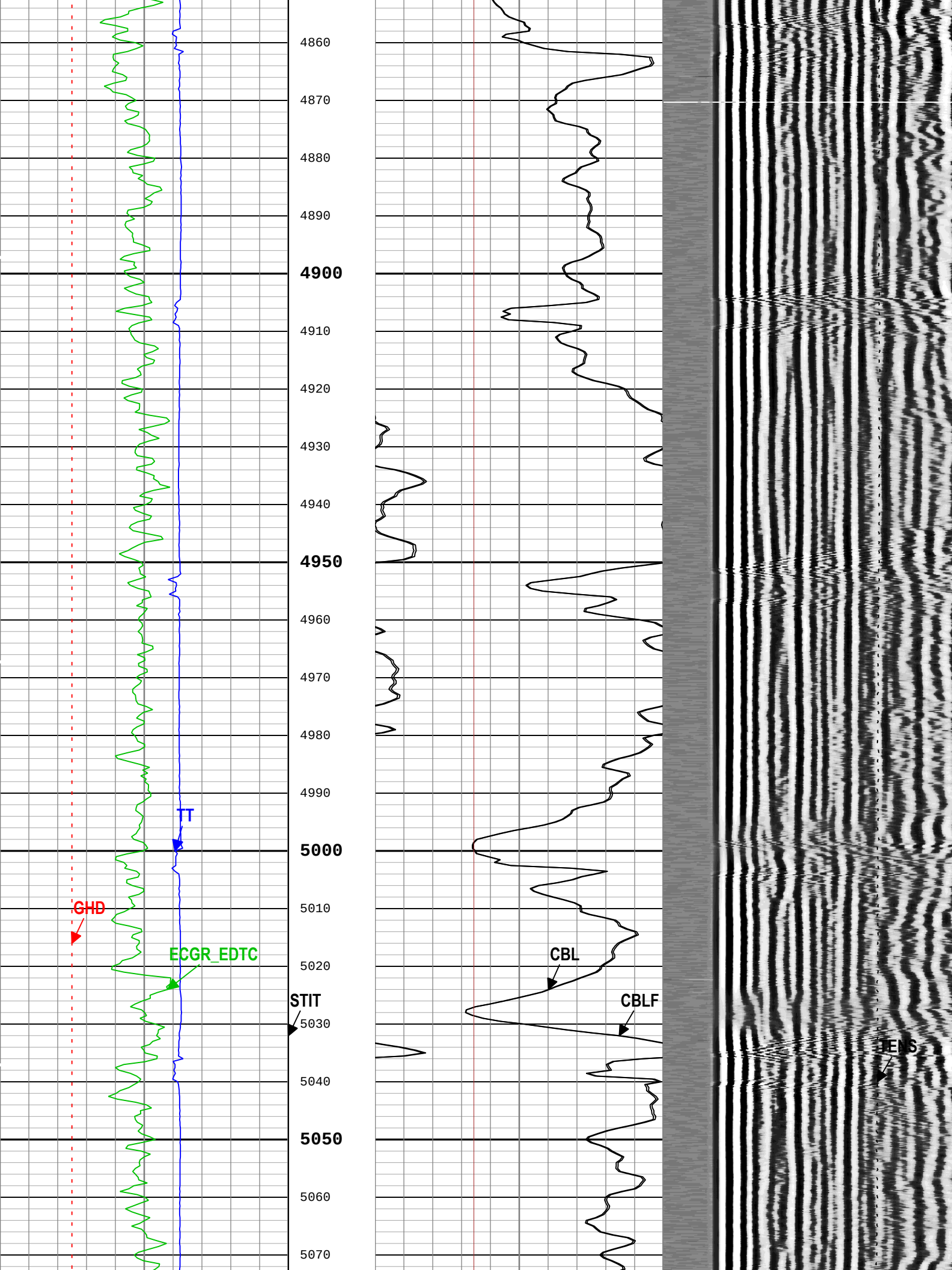
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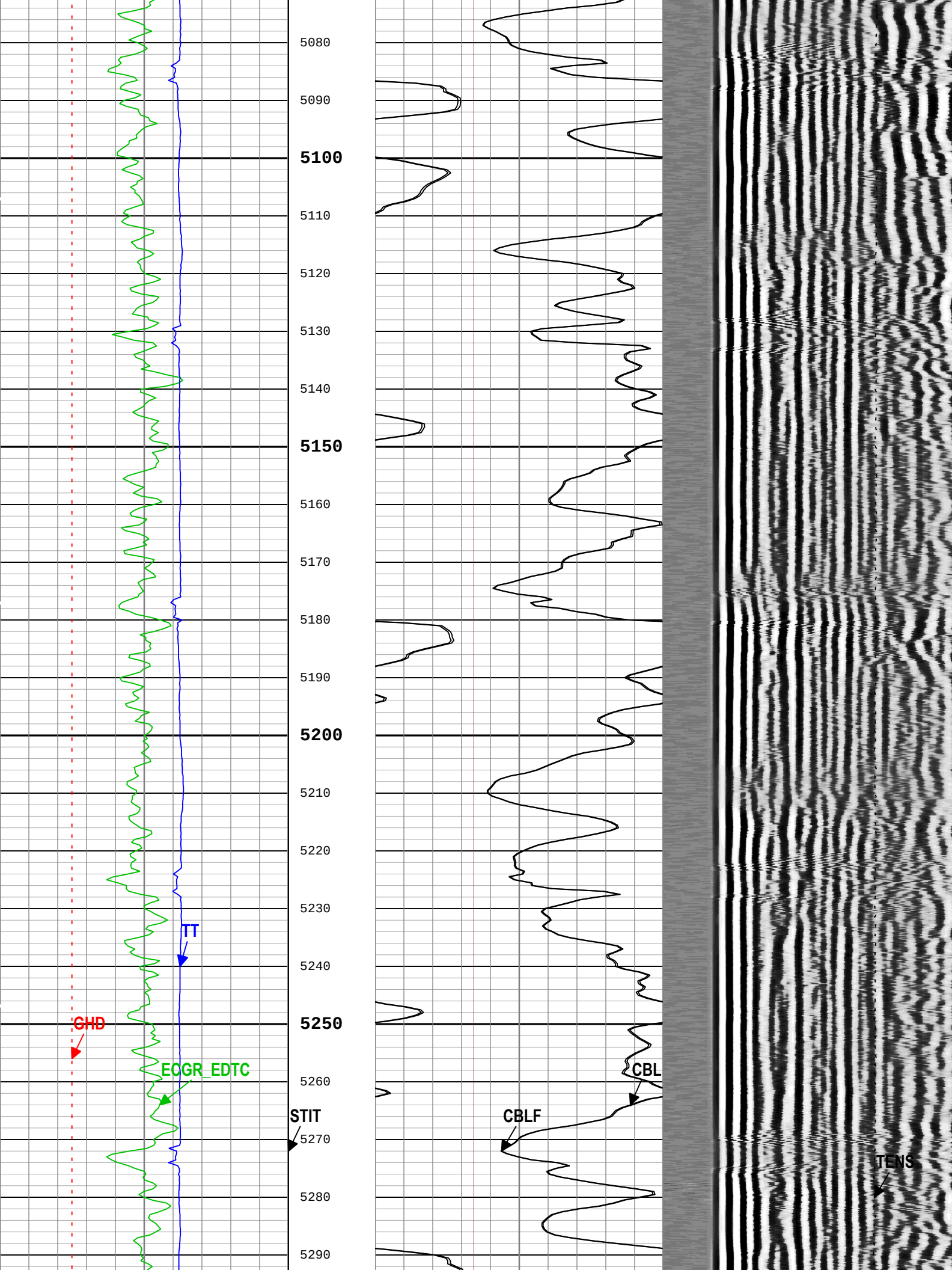
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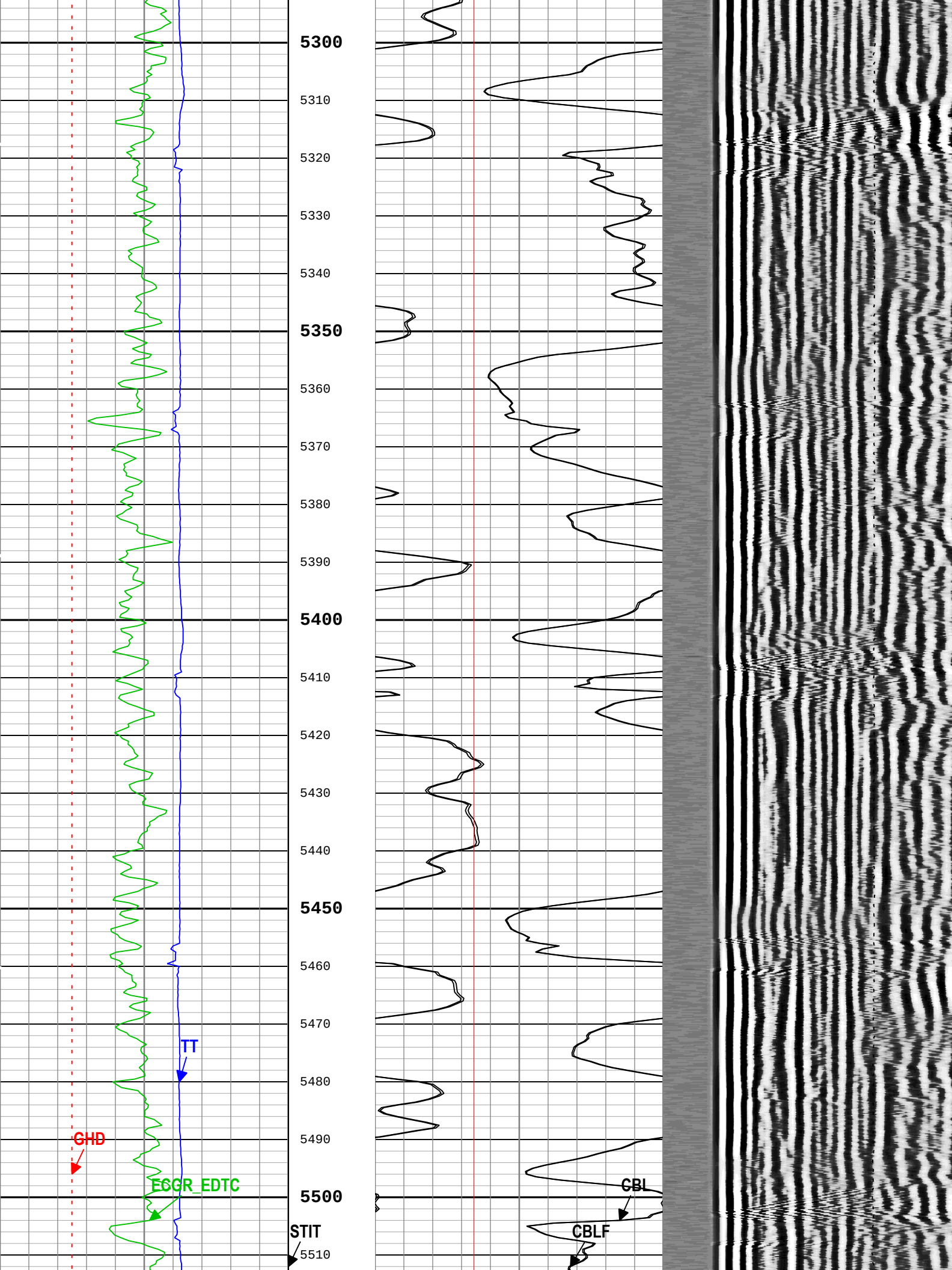
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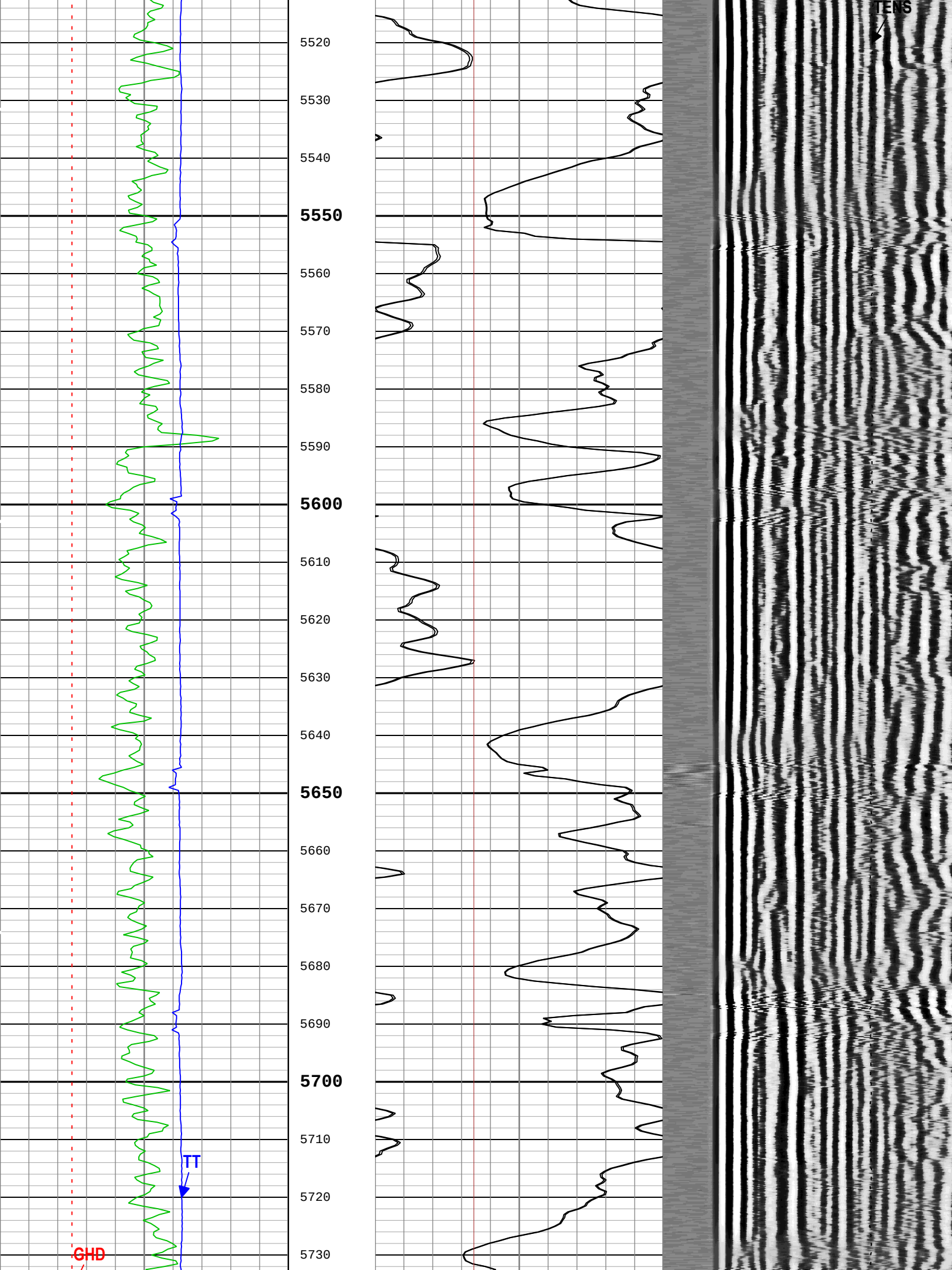
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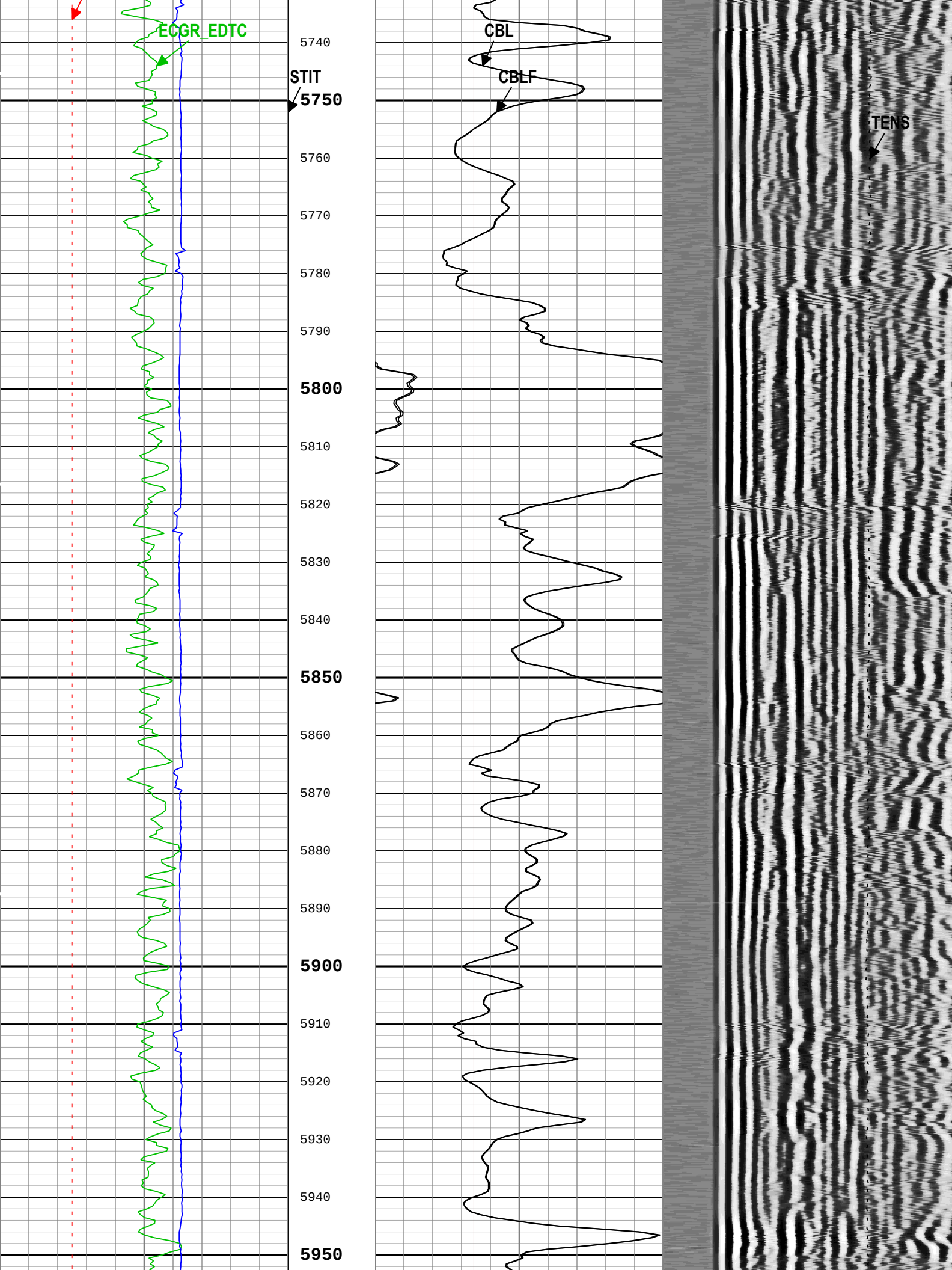
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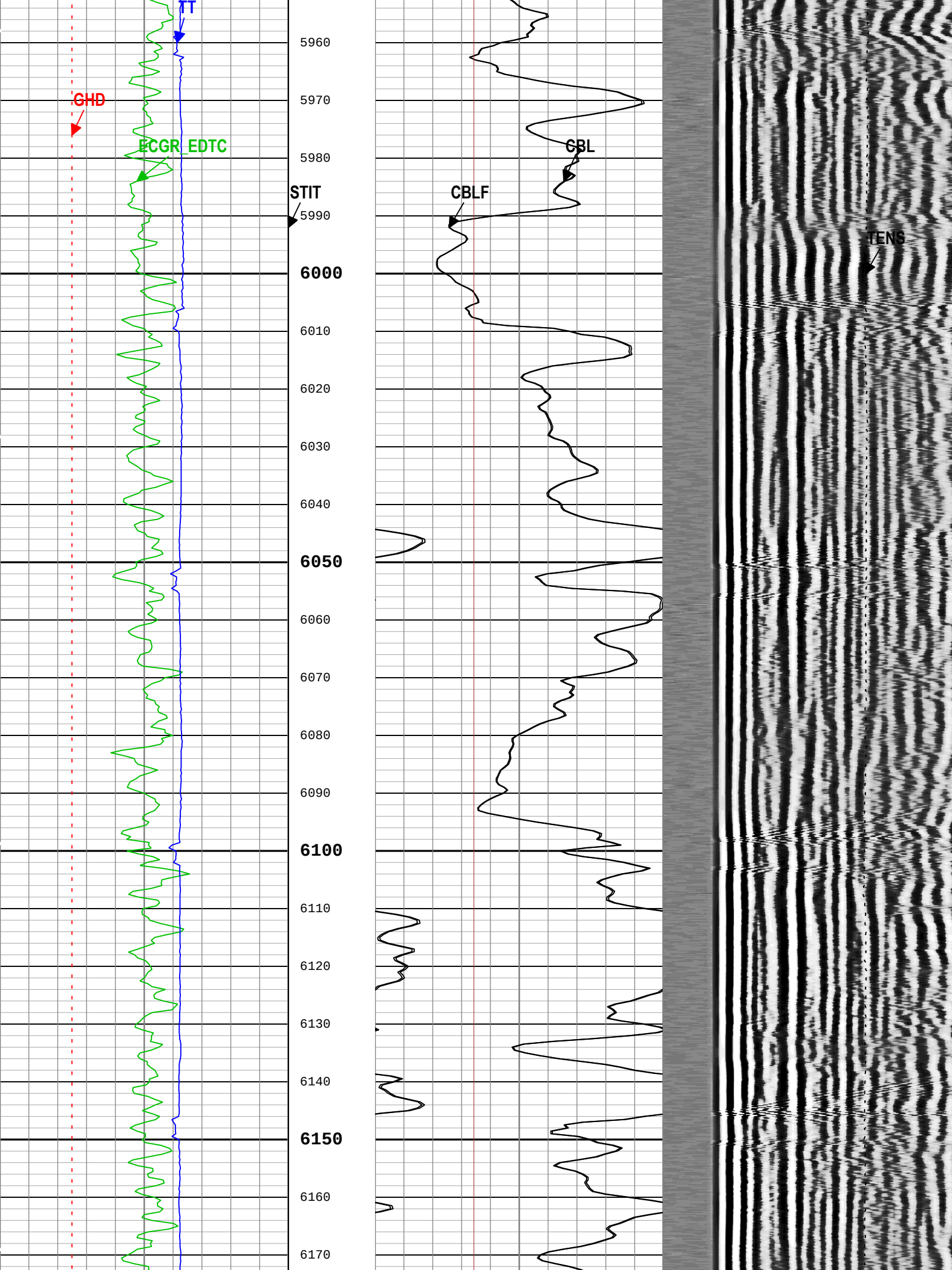
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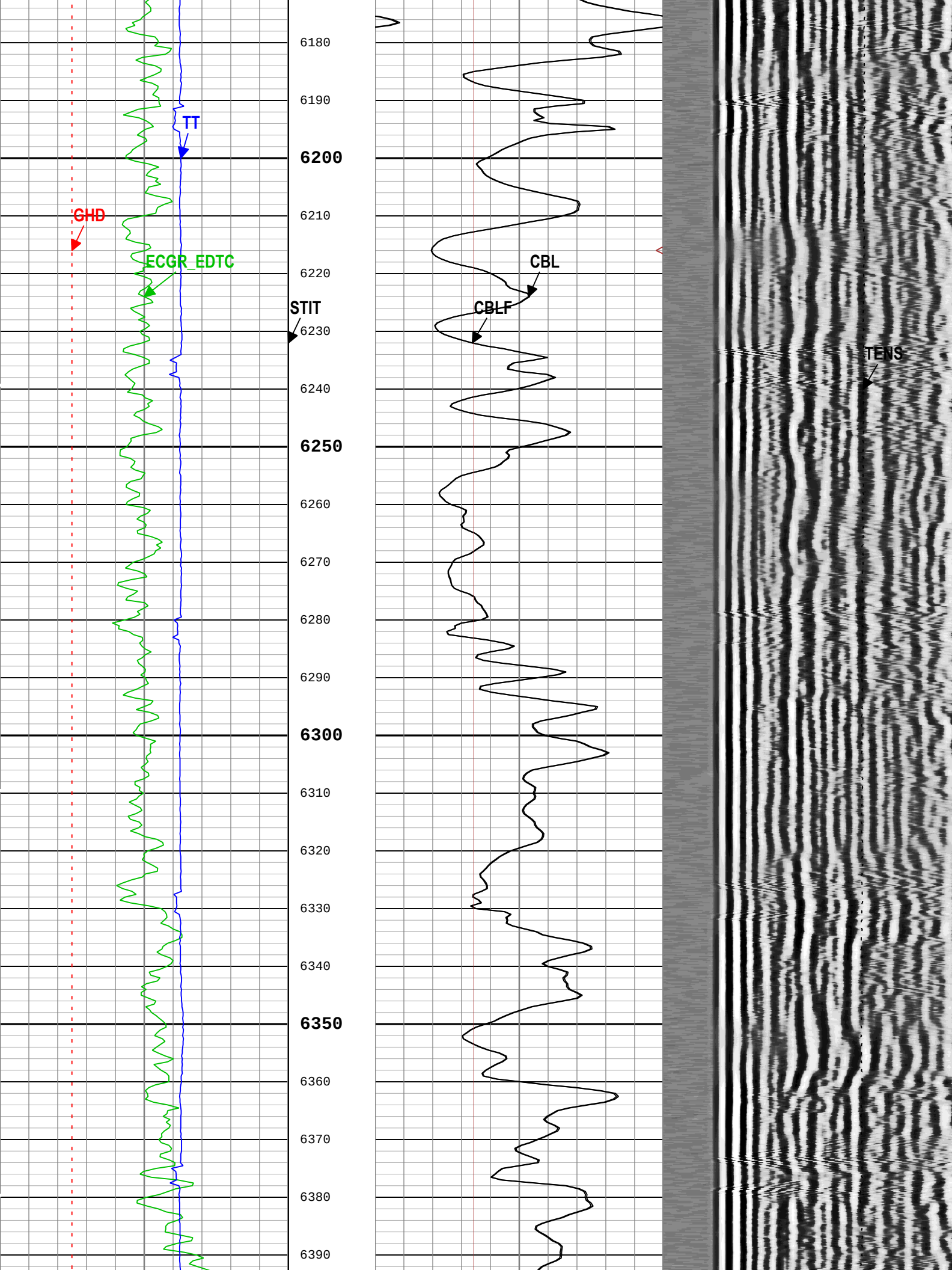
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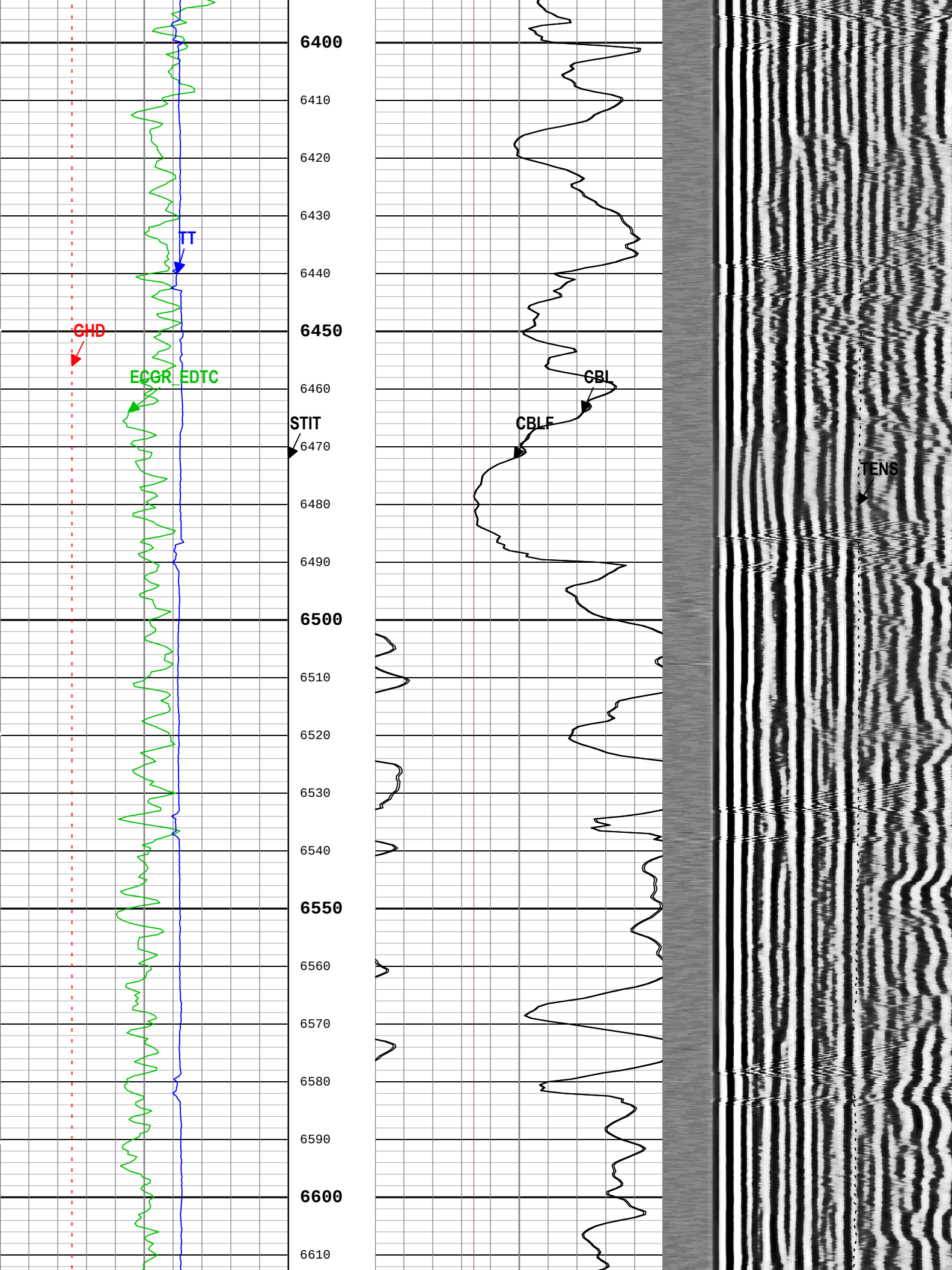
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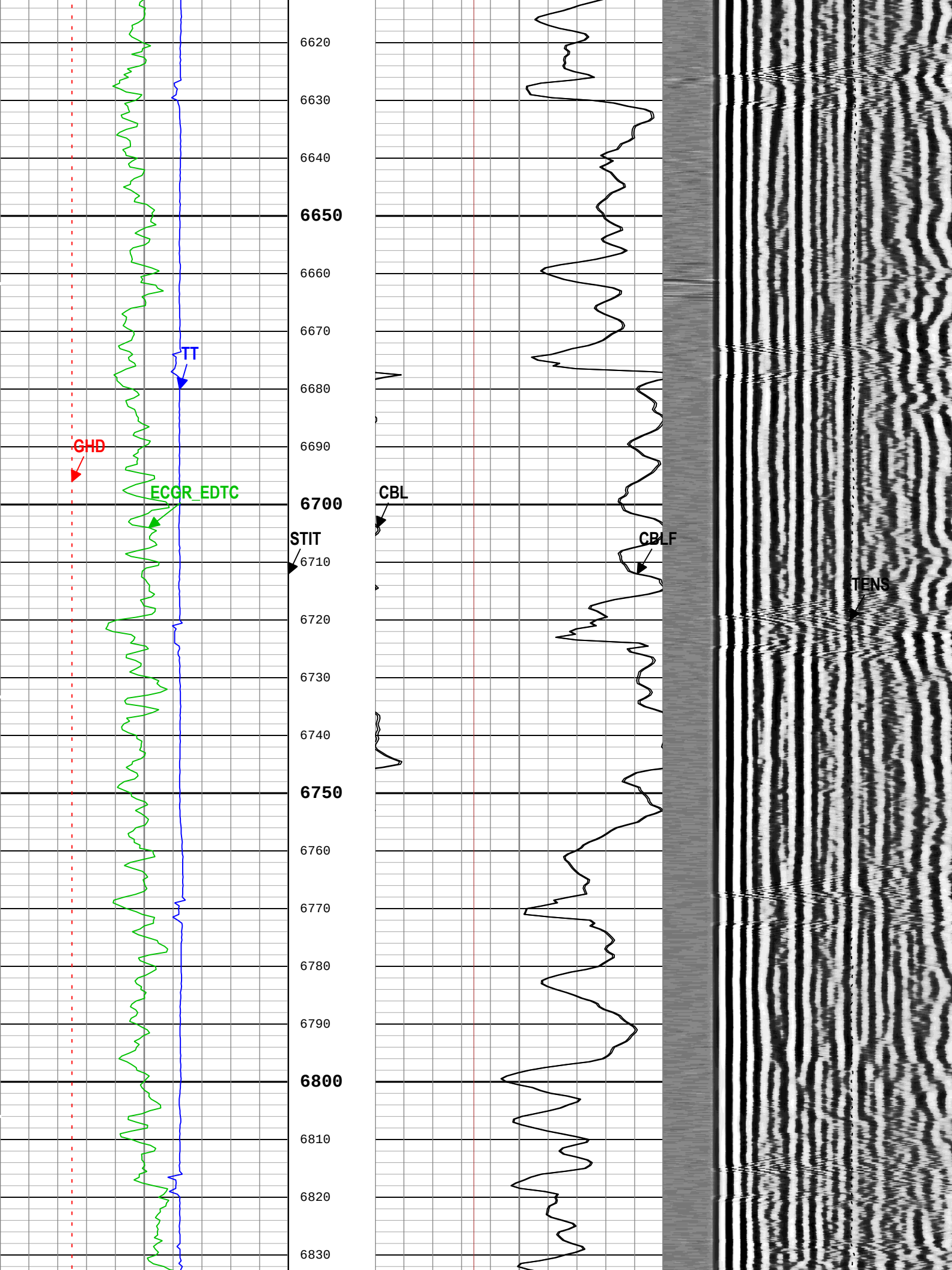
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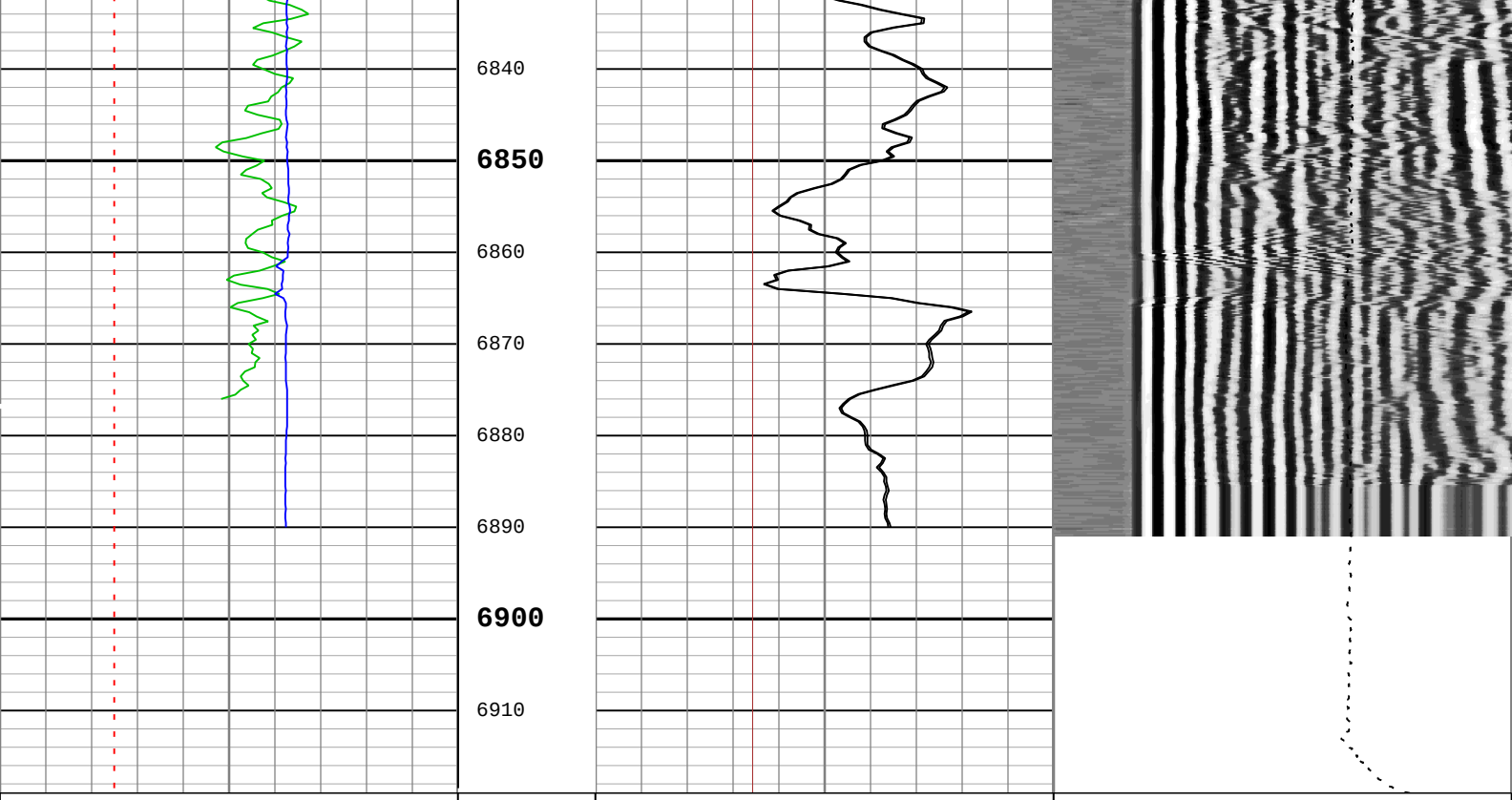


Gamma Ray (ECGR_EDTC) EDTC-B
0 gAPI 150

Borehole Diameter (GHD) RT
6 in 16

Transit Time for CBL (TT) DSLT-H
400 us 200

Stuck Tool Indicator, Total (STIT)
0 ft 50

Cable Drag

Tool_Tot. Drag

CBL Amplitude (CBL) DSLT-H
0 mV 10

CBL Amplitude (Fluid Compensated) (CBLF) DSLT-H
0 mV 50

CBL Amplitude (CBL) DSLT-H
0 mV 50

Good Bond (GOBO)
0 mV 10

GoodBond from CBL to GOBO

Min Amplitude Max

Variable Density Log (VDL) DSLT-H
200 us 1200

Cable Tension (TENS)
10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

BIEP - Bond Index Event Pips DSLT-H

Description: CBL_Fluid_Compensated Format: Log (Sonic Fluid-Compensated CBL with VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 09-Aug-2018 16:35:15

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CBLO	Casing Bottom (Logger)	WLSESSION	12031	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLT-H	72	mV
CDEN	Cement Density	EDTC-B	16.69	lbm/gal
CDEN	Cement Density	USIT-E	12.5	lbm/gal
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DETE	Delta-T Detection	DSLT-H	E1	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal

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)	
GOBO_CURR	Good Bond in Arbitrary Cement	DSLT-H	3.42	mV
IBC_FRP_OFFSET	IBC Flexural Offset from Free Pipe	USIT-E	-8.87	dB/m
IBC_FVEL_SEL	IBC Fluid Velocity Selection	USIT-E	Automatic	
IBC_OFFSET_SEL	IBC Flexural Offset Selector	USIT-E	UFAO	
IBC_ZMUD_SEL	IBC Mud Impedance Selection	USIT-E	FreePipe Norm.	
IMAR	Image Rotation	USIT-E	RB	
MAHTR	Manual High Threshold Reference for first arrival detection	DSLT-H	120	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	DSLT-H	38.88	dB/m
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	1.6	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLT-H	1.6	mV
NMSG	Near Minimum Sliding Gate	DSLT-H	265	us
SGAD	Sliding Gate Status	DSLT-H	Off	
SGDT	Sliding Gate Delta-T	DSLT-H	57	us/ft
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.61	Mrayl
U-USIT_UFAO	SIT Flexural Attenuation Offset	USIT-E	-4.85	dB/m
U-USIT_UIAP	IBC Answer Product Enabled	USIT-E	SolidLiquidGasMap	

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25	36.5	2483
BS	8.5	2483	6919
MCI	14.81	36.5	2483
MCI	4.75	2483	6919

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MODE	DSLT Acquisition Mode	DSLT-H	CBL	
RATE	DSLT Firing Rate	DSLT-H	15 Hz	
DTFS	DSLT Telemetry Frame Size	DSLT-H	536	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	4408.8	ft/h
SGAI	Selectable Acquisition Gain	DSLT-H	x1	
U-USIT_UFWB	Far Receiver Window Begin Time	USIT-E	131	us
U-USIT_UFWE	Far Receiver Window End Time	USIT-E	171	us
U-USIT_UNWB	Near Receiver Window Begin Time	USIT-E	100	us
U-USIT_UNWE	Near Receiver Window End Time	USIT-E	140	us
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	10 deg at 6.0 in	
U-USIT_UTAN	Transducer Angles	USIT-E	33_DEG	
VRES	Vertical Resolution	USIT-E	6.0 in	

One

Repeat Pass

Software Version

Acquisition System	Version

Maxwell 2018 SP2	8.2.104493.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[6]:Up	Up	1123.97 ft	1638.16 ft	09-Aug-2018 1:36:22 PM	09-Aug-2018 1:45:20 PM	ON	7.03 ft	No

All depths are referenced to toolstring zero

Log

Company:Crestone Peak Resources Operating LLC Well:Ruegge #3G-4H-N165

One: Log[6]:Up:S006

Description: CBL_Fluid_Compensated Format: Log (Sonic Fluid-Compensated CBL with VDL_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 09-Aug-2018 16:35:23

BIEP - Bond Index Event Pips DSLT-H

TIME_1900 - Time Marked every 60.00 (s)

Gamma Ray (ECGR_EDTC) EDTC-B
0 gAPI 150

Borehole Diameter (GHD) RT
6 in 16

Transit Time for CBL (TT) DSLT-H
400 us 200

Stuck Tool Indicator, Total (STIT)
0 ft 50

Cable Drag

Tool_Tot. Drag

CBL Amplitude (CBL) DSLT-H
0 mV 10

CBL Amplitude (Fluid Compensated) (CBLF) DSLT-H
0 mV 50

CBL Amplitude (CBL) DSLT-H
0 mV 50

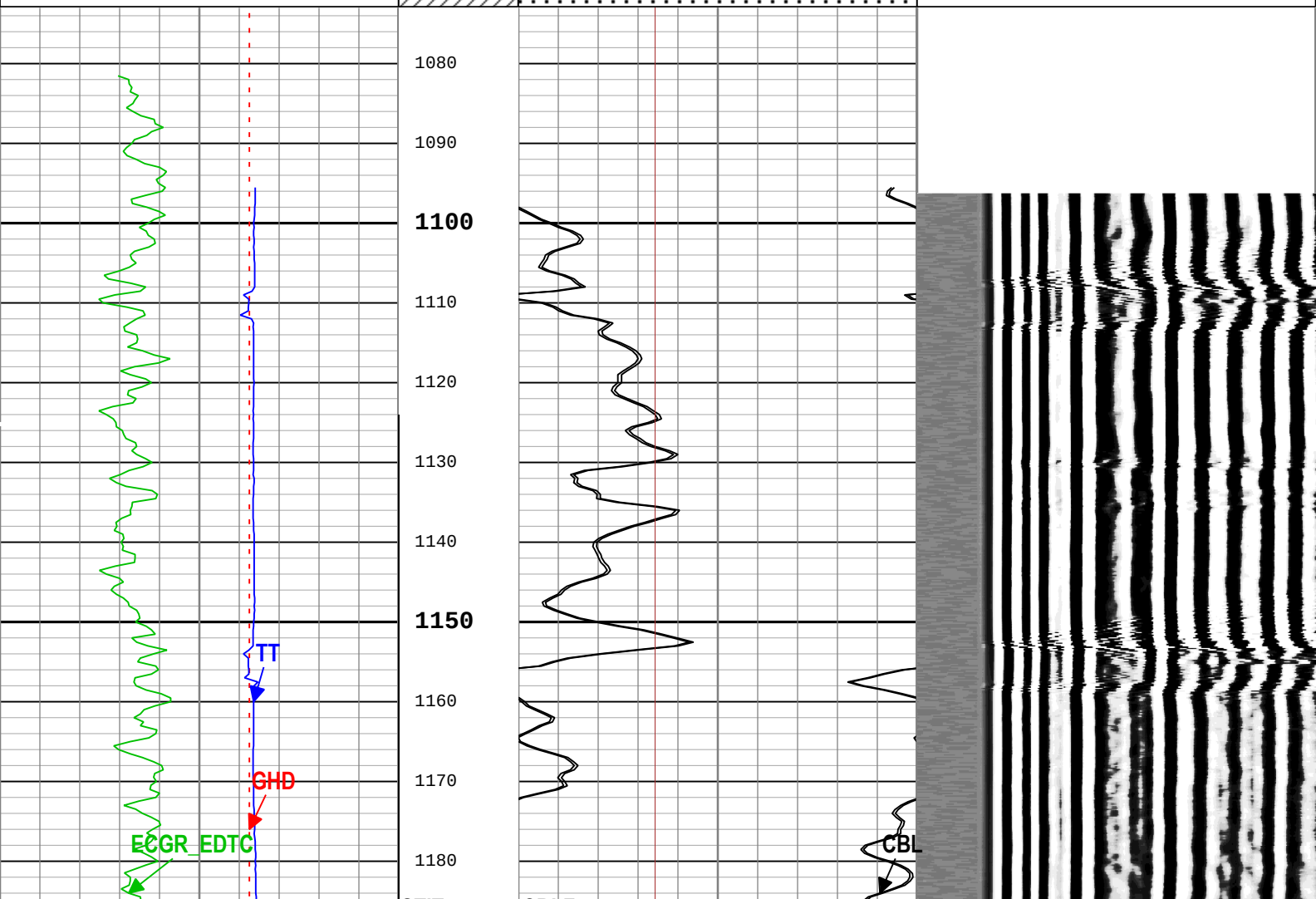
Good Bond (GOBO)
0 mV 10

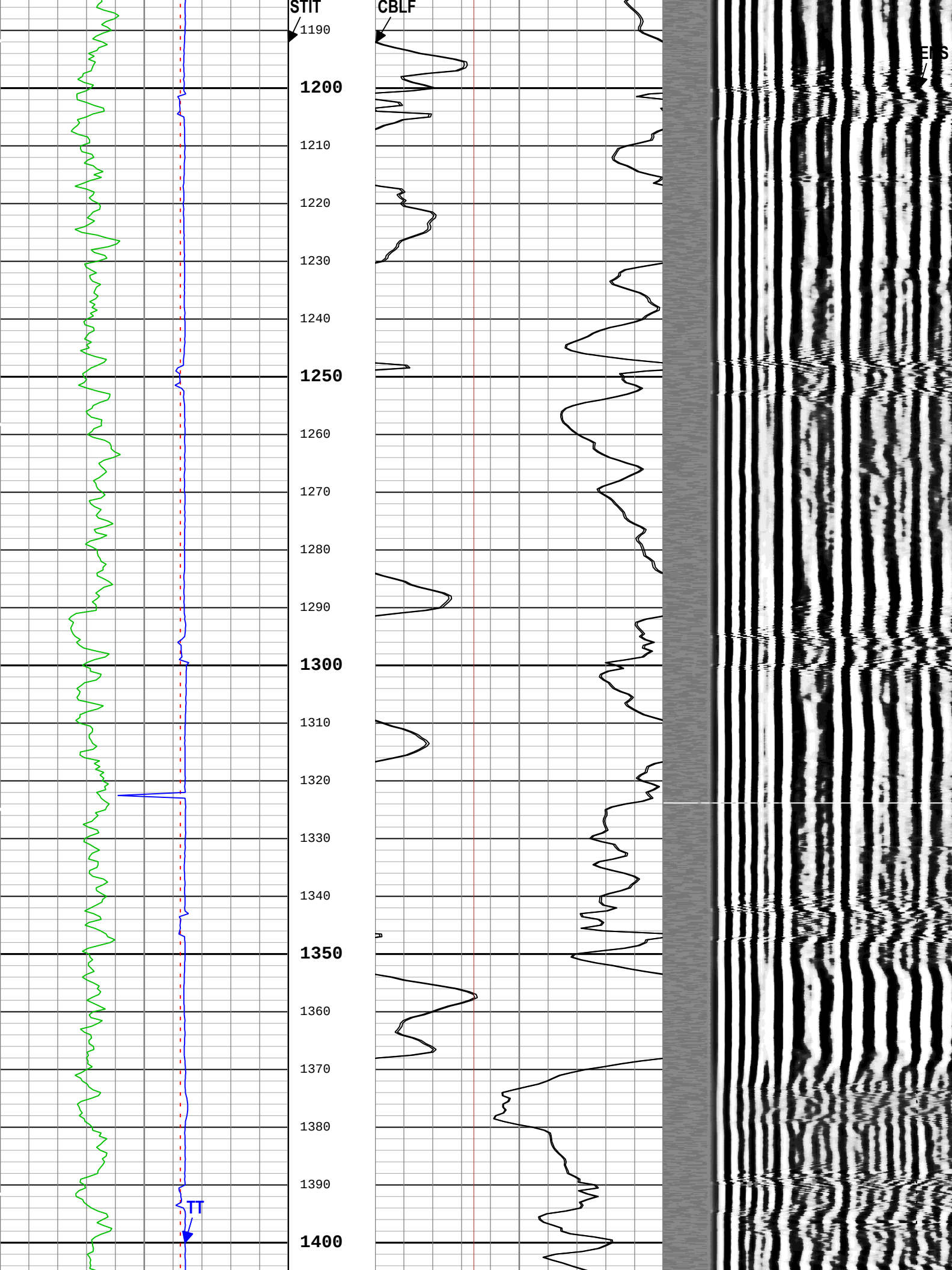
GoodBond from CBL to GOBO

Min Amplitude Max

Variable Density Log (VDL) DSLT-H
200 us 1200

Cable Tension (TENS)
10000 lbf 0

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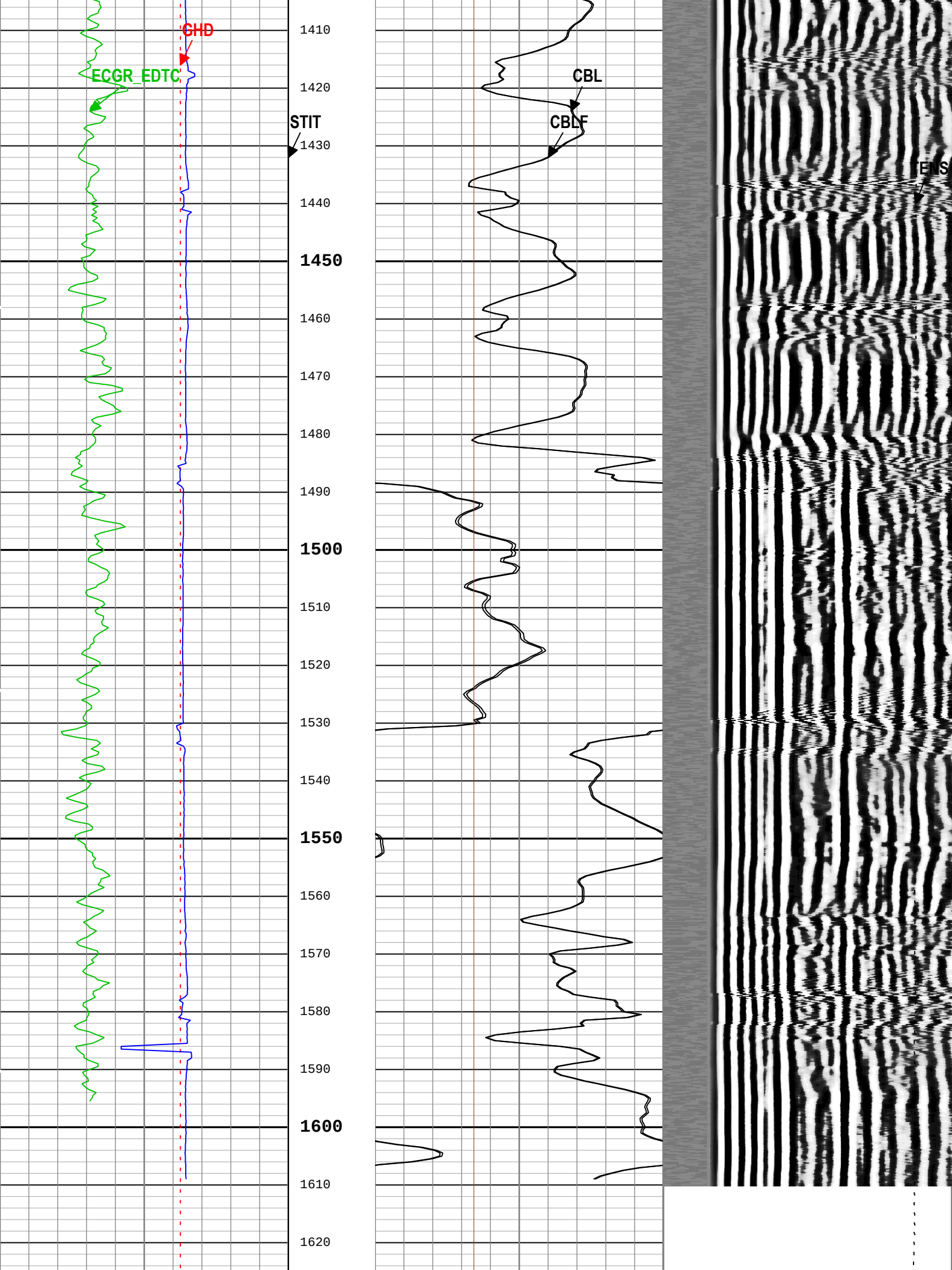
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STIT
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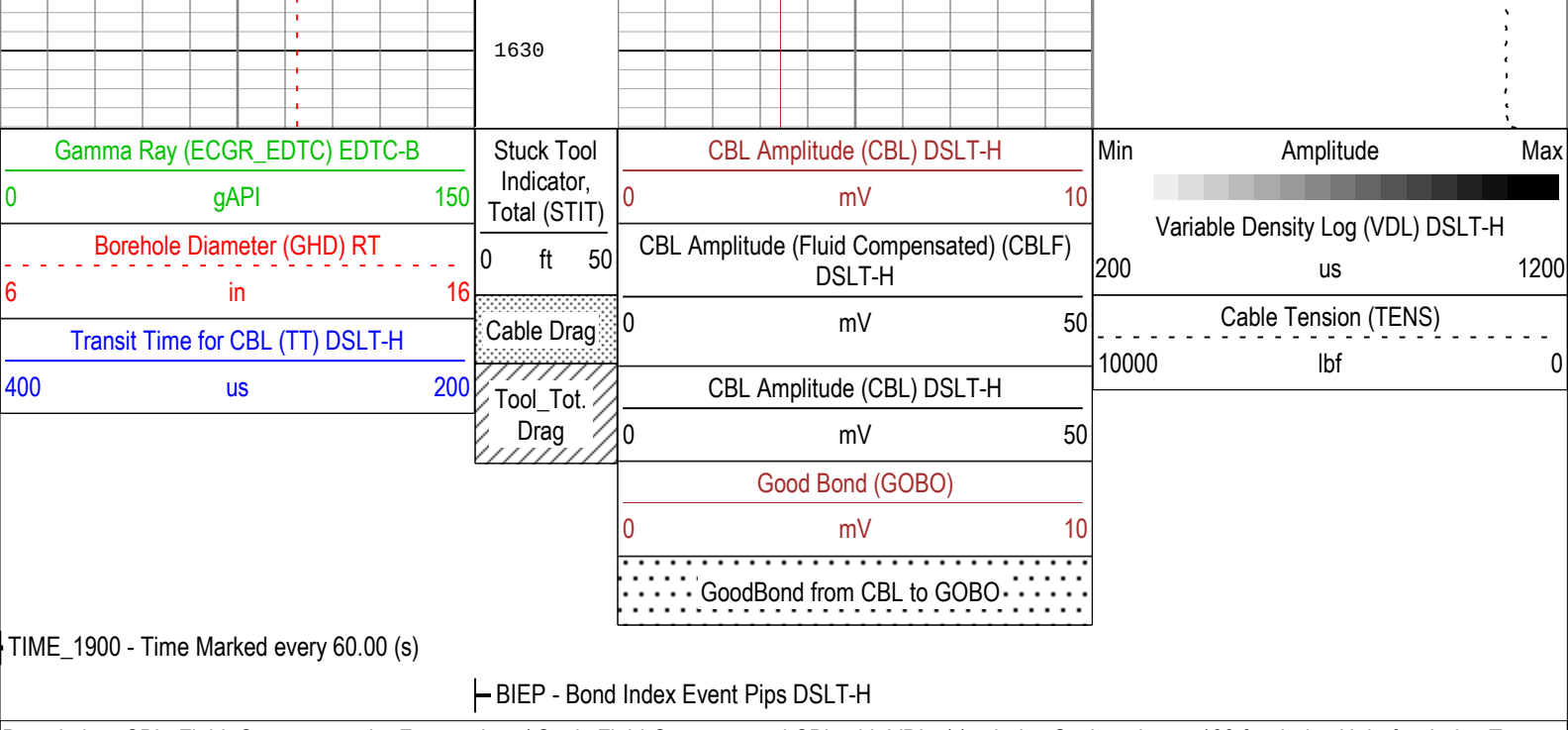

Description: CBL_Fluid_Compensated Format: Log (Sonic Fluid-Compensated CBL with VDL_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 09-Aug-2018 16:35:23

Channel Processing Parameters

One: Parameters

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BS	Bit Size	WLSESSION	12.25	in
CBLO	Casing Bottom (Logger)	WLSESSION	12031	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLT-H	72	mV
CDEN	Cement Density	EDTC-B	16.69	lbm/gal
CDEN	Cement Density	USIT-E	12.5	lbm/gal
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DETE	Delta-T Detection	DSLT-H	E1	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
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)	
GOBO_CURR	Good Bond in Arbitrary Cement	DSLT-H	3.42	mV
IBC_FRP_OFFSET	IBC Flexural Offset from Free Pipe	USIT-E	-8.87	dB/m
IBC_FVEL_SEL	IBC Fluid Velocity Selection	USIT-E	Automatic	
IBC_OFFSET_SEL	IBC Flexural Offset Selector	USIT-E	UFAO	
IBC_ZMUD_SEL	IBC Mud Impedance Selection	USIT-E	FreePipe Norm.	
IMAR	Image Rotation	USIT-E	RB	
MAHTR	Manual High Threshold Reference for first arrival detection	DSLT-H	120	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	DSLT-H	38.88	dB/m
MCI	Minimum Cemented Interval for Isolation	DSLT-H	14.81	ft
MNHTR	Minimum High Threshold Reference for first arrival detection	DSLT-H	100	
MSA	Minimum Sonic Amplitude	DSLT-H	1.6	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLT-H	1.6	mV
NMSG	Near Minimum Sliding Gate	DSLT-H	265	us
SGAD	Sliding Gate Status	DSLT-H	Off	

SGDT	Sliding Gate Delta-T	DSLT-H	57	us/ft
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.61	Mrayl
U-USIT_UFAO	SIT Flexural Attenuation Offset	USIT-E	-4.85	dB/m
U-USIT_UIAP	IBC Answer Product Enabled	USIT-E	SolidLiquidGasMap	

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MODE	DSLT Acquisition Mode	DSLT-H	CBL	
RATE	DSLT Firing Rate	DSLT-H	15 Hz	
DTFS	DSLT Telemetry Frame Size	DSLT-H	536	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	4408.8	ft/h
SGAI	Selectable Acquisition Gain	DSLT-H	x1	
U-USIT_UFWB	Far Receiver Window Begin Time	USIT-E	137	us
U-USIT_UFWE	Far Receiver Window End Time	USIT-E	177	us
U-USIT_UNWB	Near Receiver Window Begin Time	USIT-E	106	us
U-USIT_UNWE	Near Receiver Window End Time	USIT-E	146	us
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	10 deg at 6.0 in	
U-USIT_UTAN	Transducer Angles	USIT-E	33_DEG	
VRES	Vertical Resolution	USIT-E	6.0 in	

County:	Weld
State:	Colorado

Cement Bond Log