Schlumberger

Company: Anadarko Petroleum Corporation

Well: Verde 13-3HZ

Field: Wattenberg

County: Weld State: Colorado

Cement Bond Log

Variable Density Log

County: Weld
Field: Wattenberg
Location: NWNW Sec. 13, T1N, R66W
Well: Verde 13-3HZ
Company: Anadarko Petroleum Corporation

Location:				
NWNW Sec. 13, T1N, R66W		Elev.:	K.B.	5122.00 ft
908 FNL, 781 FWL			G.L.	5096.00 ft
Lat/Long: 40.056023, -104.731967			D.F.	5121.00 ft
Permanent Datum:	Ground Level	Elev.:	5096.00 f	
Log Measured From:	Kelly Bushing	26.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

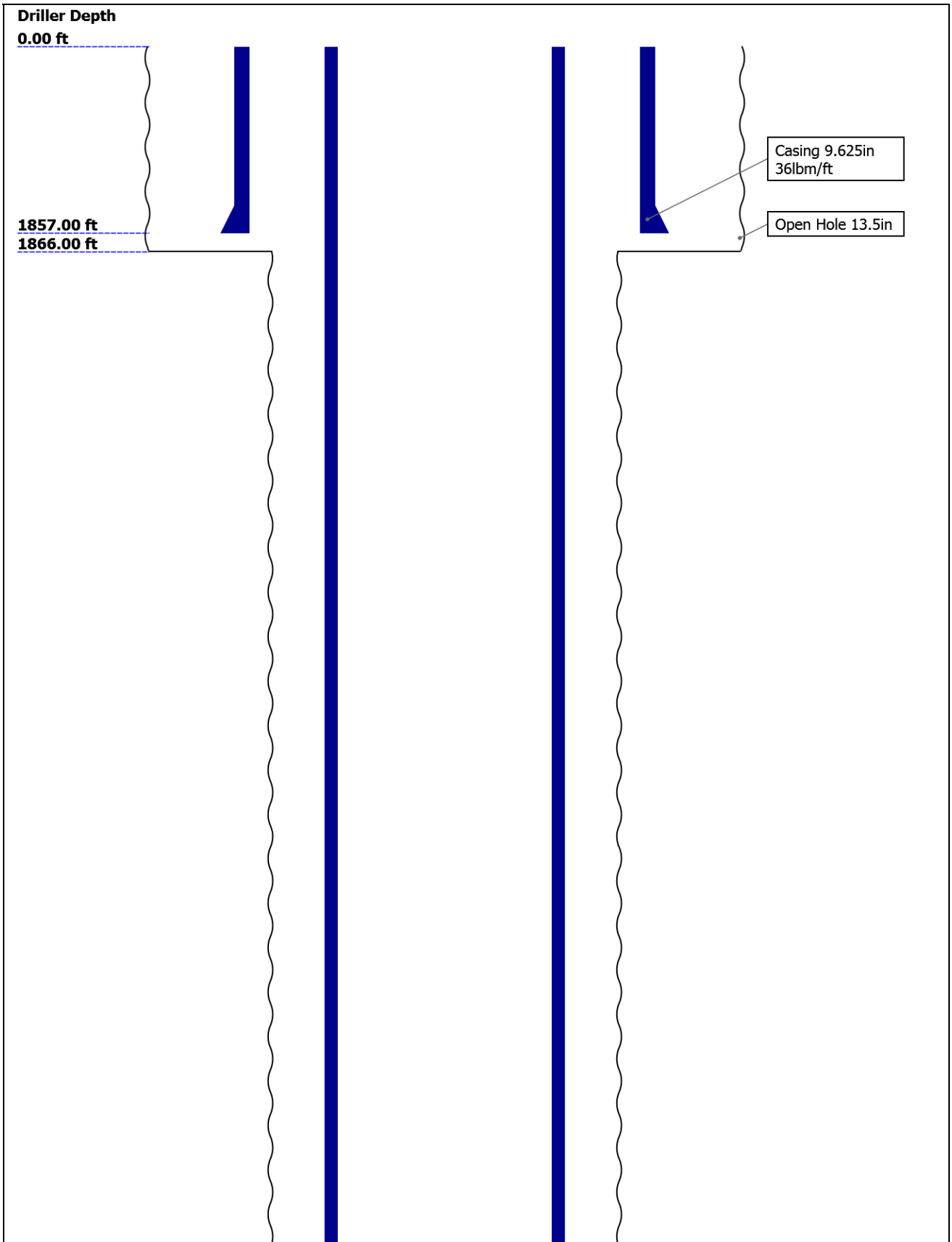
API Serial No.	Section:	Township:	Range:
05-123-46016	13	1N	66W

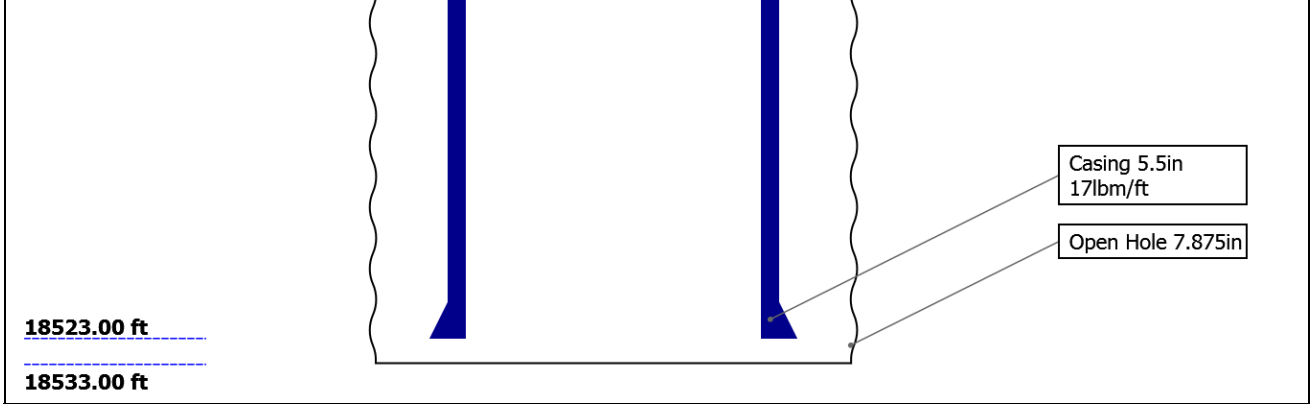
Logging Date	07-Apr-2018		
Run Number	One		
Depth Driller	18533.00 ft		
Schlumberger Depth	6520.00 ft		
Bottom Log Interval	6520.00 ft		
Top Log Interval	20.00 ft		
Casing Fluid Type	Water		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	8.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	7.88 in		
From	1866.00 ft		
To	18533.00 ft		
Casing/Tubing Size	5.5 in		
Weight	17 lbm/ft		
Grade	P110		
From	0.00 ft		
To	18523.00 ft		
Max Recorded Temperatures			
Logger on Bottom Time	07-Apr-2018 08:40:00		
Unit Number Location:	9108 Fort Morgan		
Recorded By	Brandon Makinson		
Witnessed By	Kyle Carver		

Disclaimer

Contents

Well Sketch


Driller Depth
0.00 ft
1857.00 ft
1866.00 ft
Casing 9.625in
36lbm/ft
Open Hole 13.5in



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	13.5	7.875				
Top Driller (ft)	0	1866				
Top Logger (ft)	0	1866				
Bottom Driller (ft)	1866	18533				
Bottom Logger (ft)	1866	18533				
Casing						
Size (in)	9.625	5.5				
Weight (lbm/ft)	36	17				
Inner Diameter (in)	8.921	4.892				
Grade	J55	P110				
Top Driller (ft)	0	0				
Top Logger (ft)	0	0				
Bottom Driller (ft)	1857	18523				
Bottom Logger (ft)	1857	18523				

Operational Run Summary

Parameter (unit)	One					
Date Log Started	07-Apr-2018					
Time Log Started	07:54:25					
Date Log Finished	07-Apr-2018					
Time Log Finished	15:22:05					
Top Log Interval (ft)	20.00					
Bottom Log Interval (ft)	6520.00					
Total Depth (ft)						
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	7.875					
Logging Unit Number	9108					
Logging Unit Location	Fort Morgan					
Recorded By	Brandon Makinson					

Witnessed By	Kyle Carver					
Service Order Number	E1K7-00003					

Borehole Fluids

Parameter(unit)	One					
Fluid Type	Water					
Max Recorded Temperatures (degF)	NaN					
Salinity (ppm)	0					
Density (lbm/gal)	8.4					
Date Logger on Bottom	07-Apr-2018					
Time Logger on Bottom	08:40:00					
Total Solid (%)						
High Gravity Solids (%)						

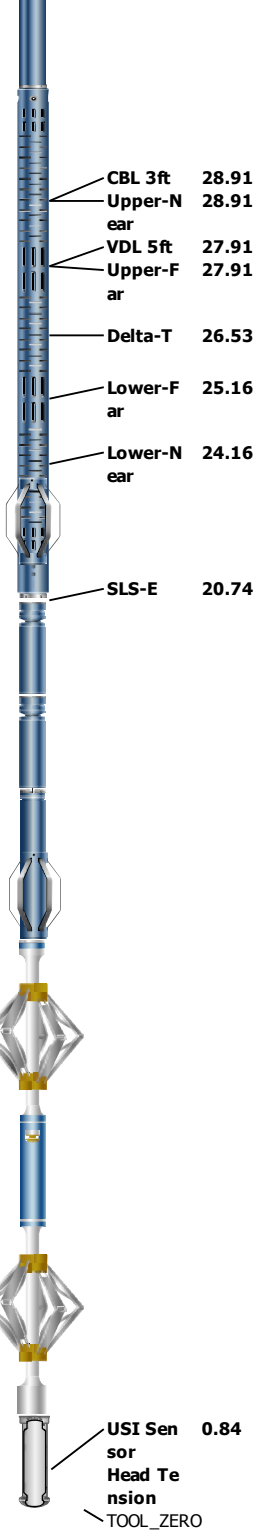
Remarks and Equipment Summary

One: Toolstring

Equip name	Length
LEH-QT:2109	**64.22**
LEH-QT:2109	
SAH-F	**60.73**
EQF-48	**55.88**
EDTC-B:8478	**47.88**
EDTH-B:8470	
EDTG-A:77437	
EDTC-B:8478	
DSLT-H:8416	**41.38**
ECH-KH:67	
DSLC-H:8416	
SLS-E:8020	

One: Remarks

Toolstring run as per tool sketch.
Cement: 12 ppg lead, 13.5 ppg tail.
Isolation scanner run 10 deg, 6" for cement evaluation.
RBP set at 6570', log to 6520'.
0 PSI and 7500 PSI IBC CBL
2800 PSI high speed CBL.



Lengths are in ft
Maximum Outer Diameter = 6.250 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			
Calibrator Serial Number			
Number of Calibration Points	0		

Logging Cable			
Type	7-39AI-XXS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane		

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.
Rig Up Length At Bottom		Z-Chart used as secondary depth control.
Rig Up Length Correction		Log correlated to down log for stretch correction.
Stretch Correction		Pressure differential between runs causing depth discrepancy.
Tool Zero Check At Surface		

One

CBL 2800 PSI

Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	37.63 ft	6533.58 ft	07-Apr-2018 11:04:03 AM	07-Apr-2018 12:17:23 PM	ON	13.02 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Anadarko Petroleum Corporation Well:Verde 13-3HZ

One: Log[3]:Up:S010

Description: CBL_Dual_Gate Format: Log (CBL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 02-Sep-2013 13:47:32

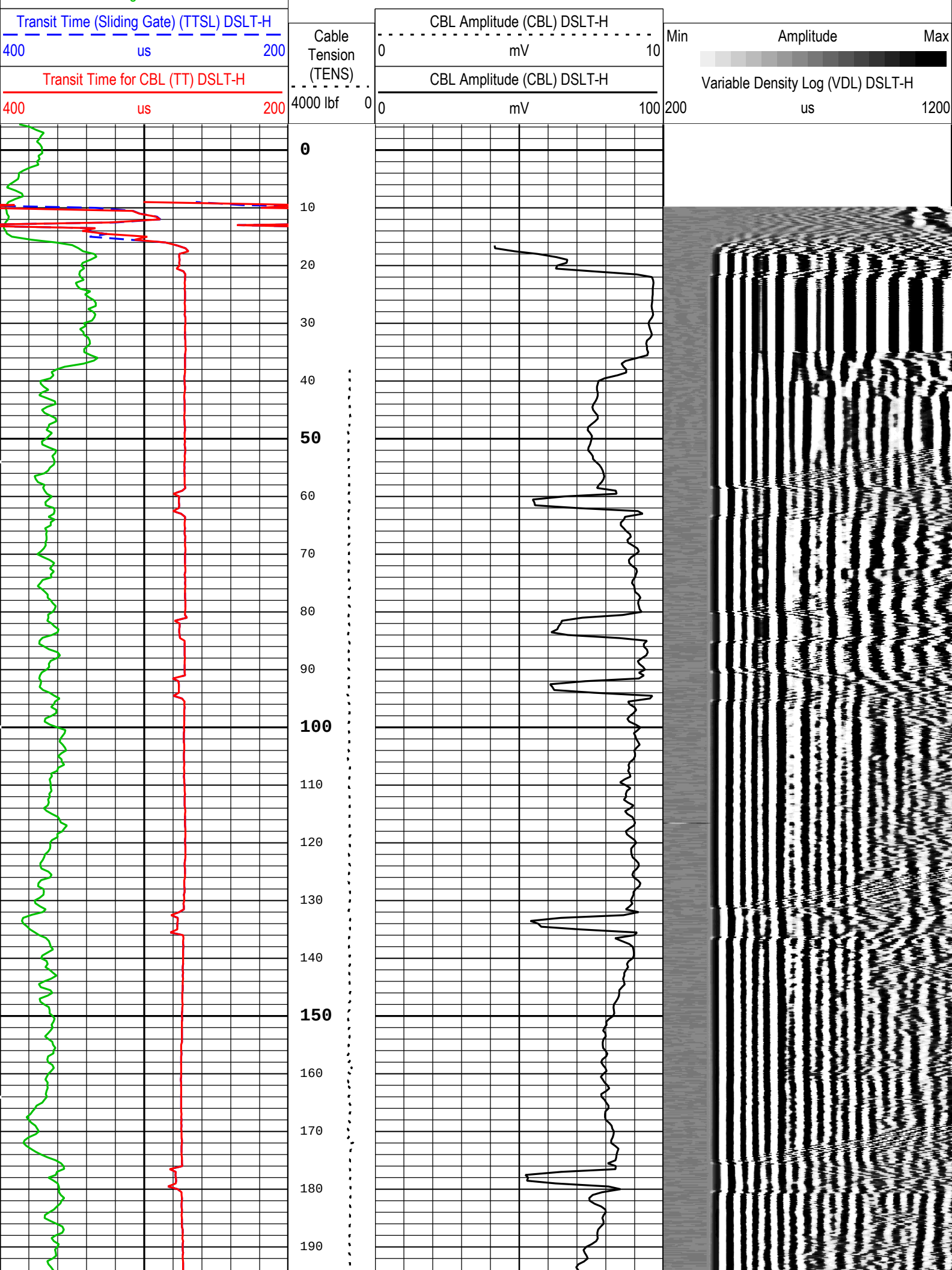
Channel	Source	Sampling
BIEP	DSLT-H:SLS-E:SLS-E	6in
CBL	DSLT-H:SLS-E:SLS-E	6in
GR	EDTC-B:EDTC-B:EDTC-B	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TT	DSLT-H:SLS-E:SLS-E	6in
TTSL	DSLT-H:SLS-E:SLS-E	6in

BIEP - Bond Index Event Pips DSLT-H

TIME_1900 - Time Marked every 60.00 (s)

Gamma Ray (ECGR_EDTC) EDTC-B

0 gAPI 200


Transit Time (Sliding Gate) (TTSL) DSLT-H
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us
200
Transit Time for CBL (TT) DSLT-H
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us
200
Cable Tension (TENS)
4000 lbf
0
CBL Amplitude (CBL) DSLT-H
0
mV
10
CBL Amplitude (CBL) DSLT-H
0
mV
100
Min
Amplitude
Max
Variable Density Log (VDL) DSLT-H
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us
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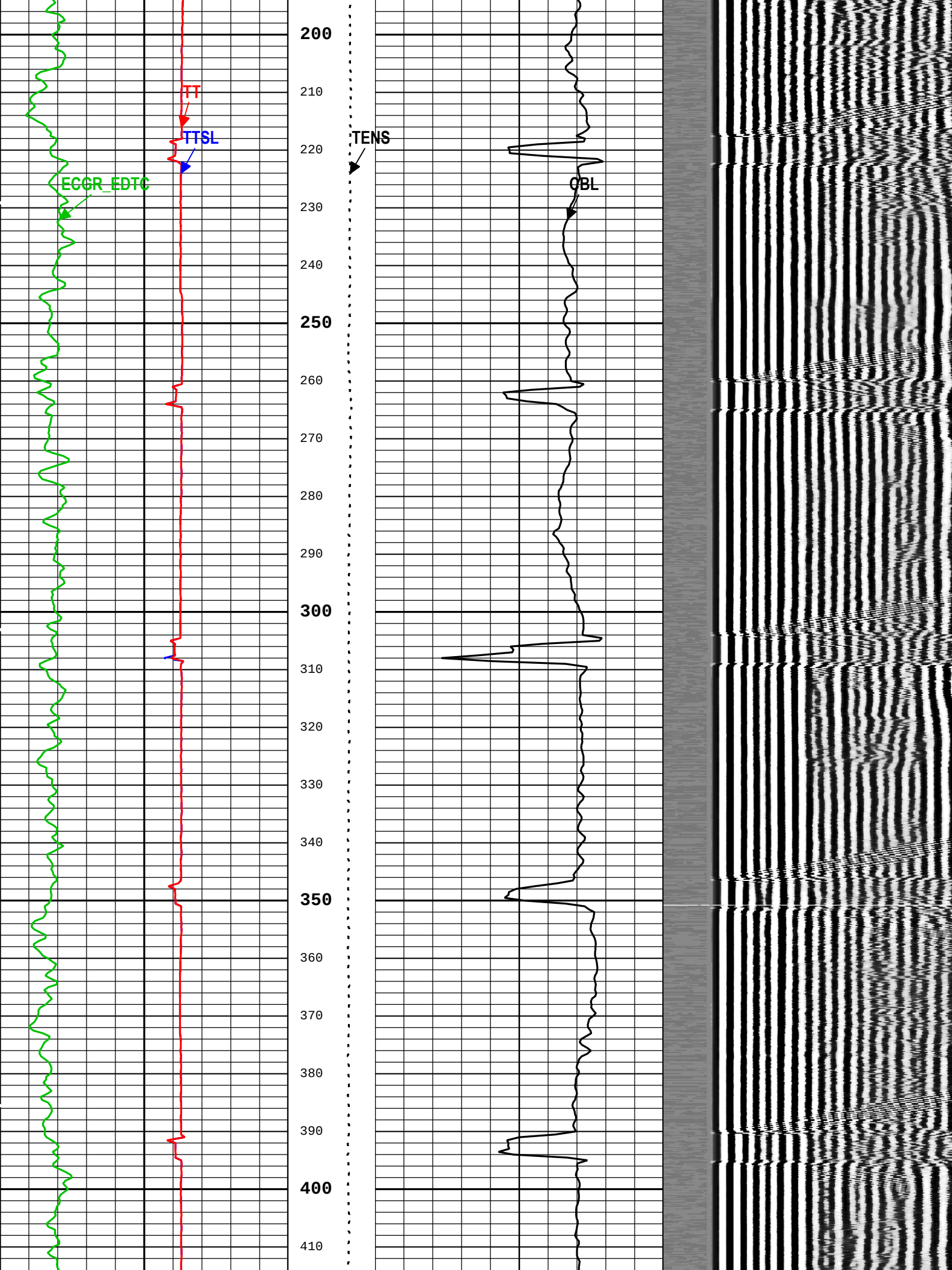
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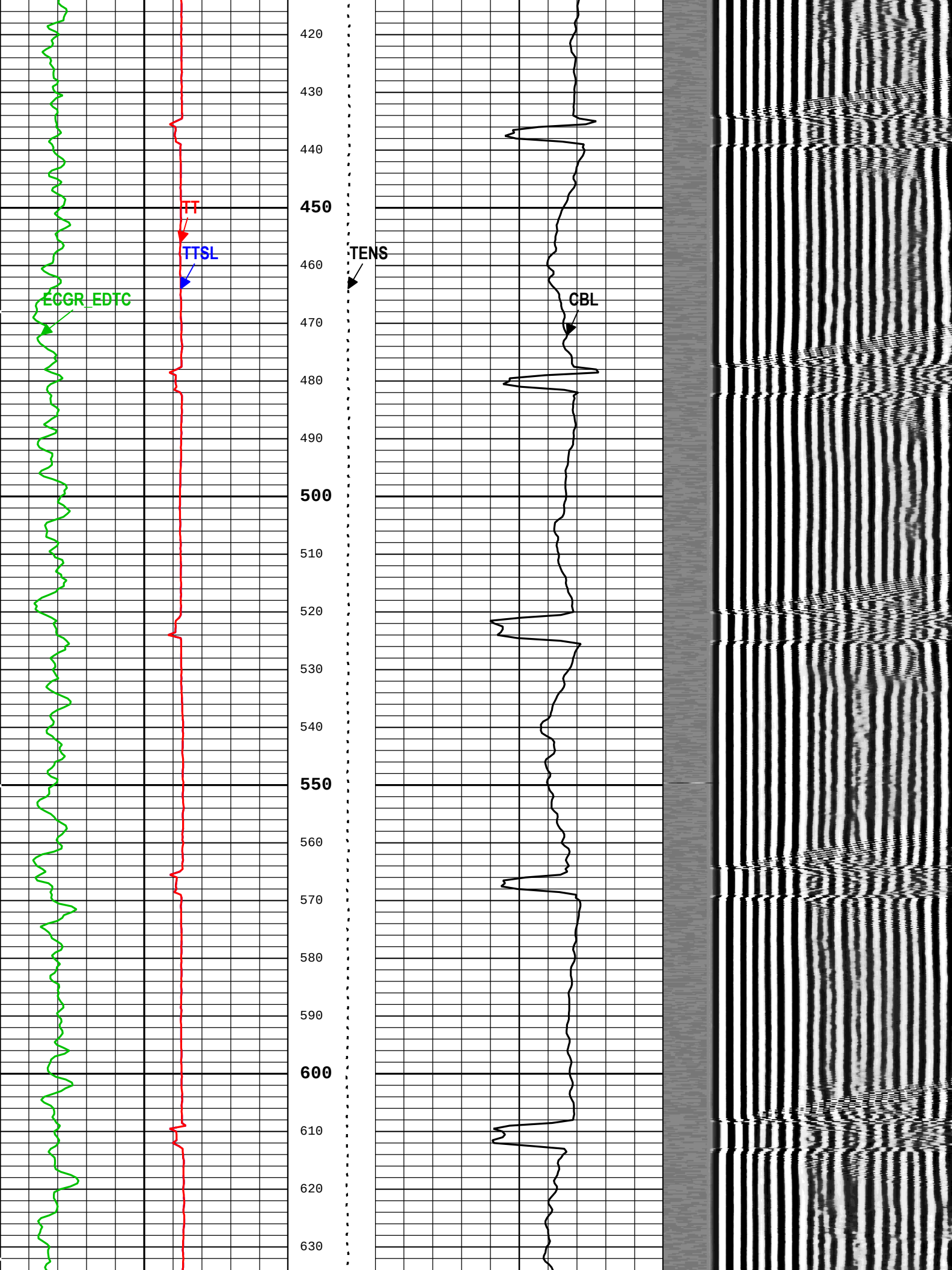
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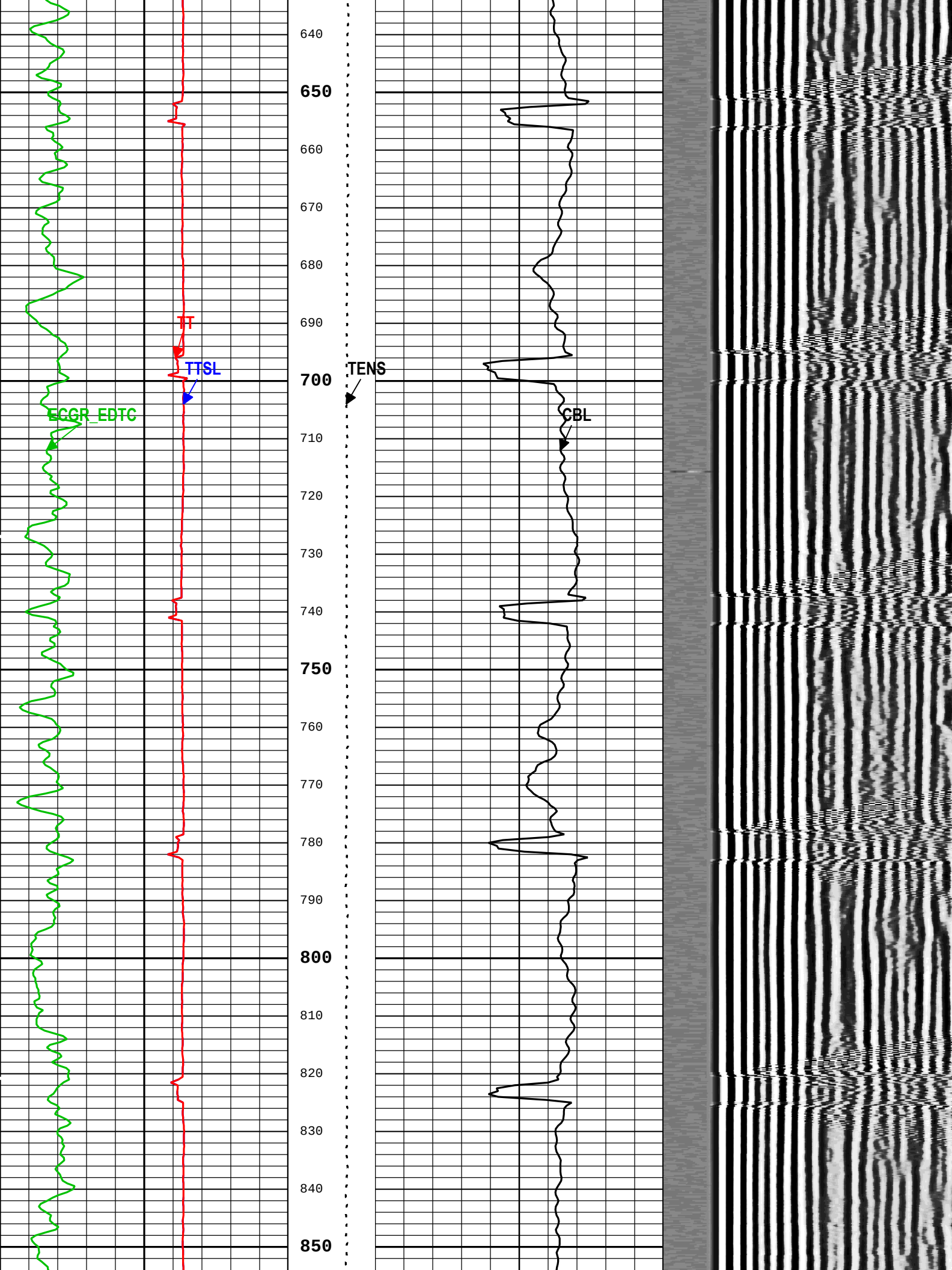
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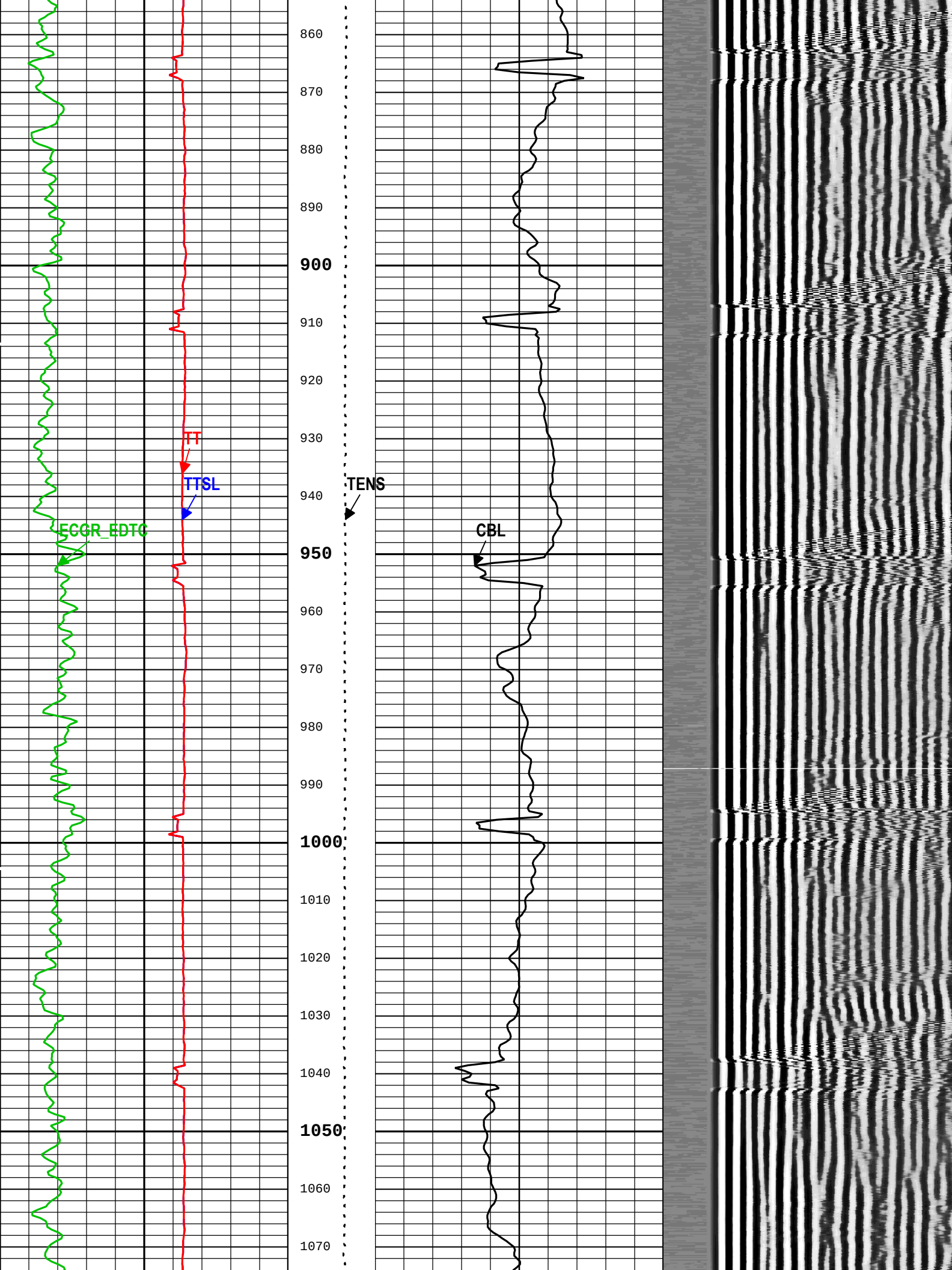
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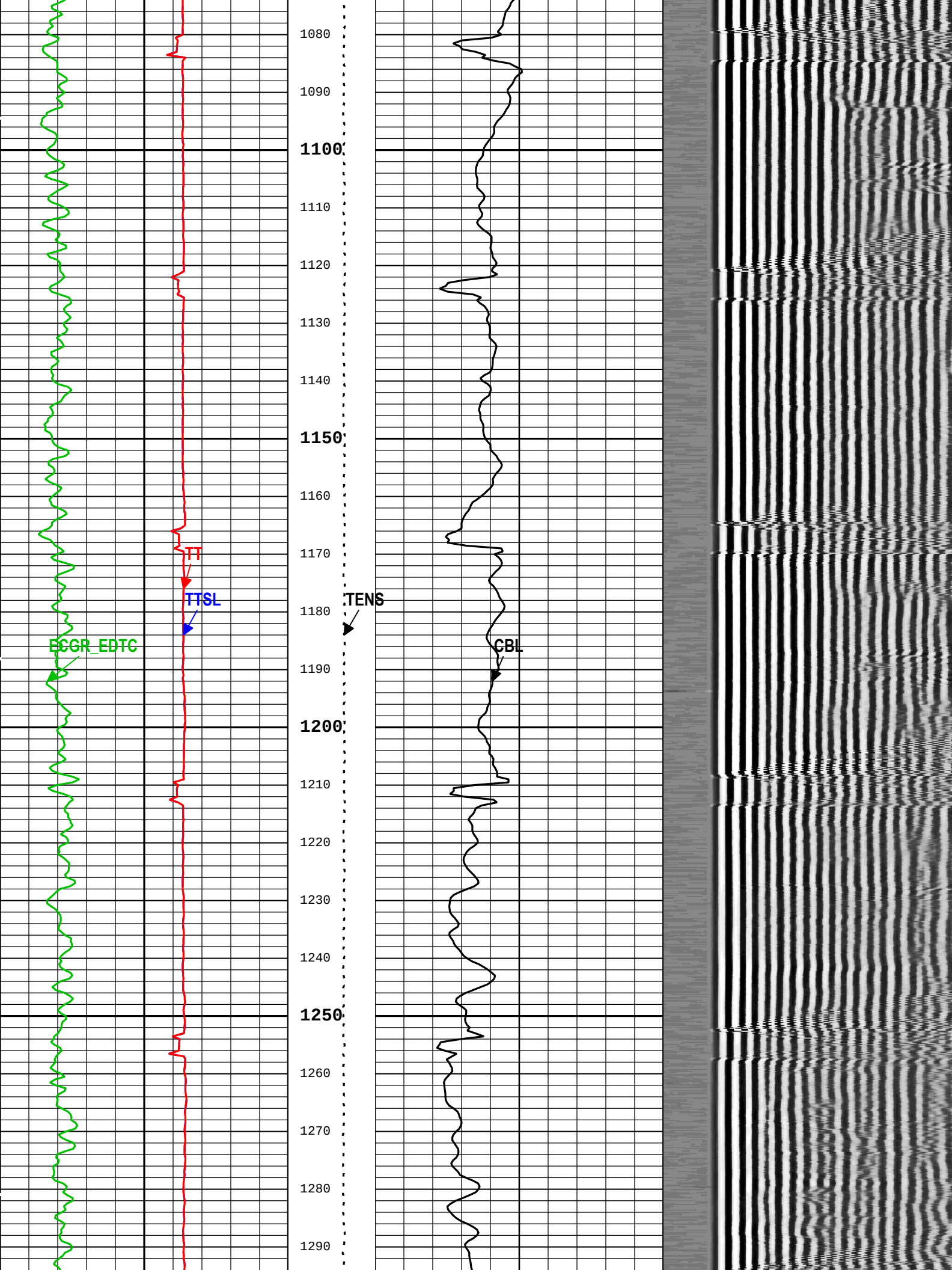
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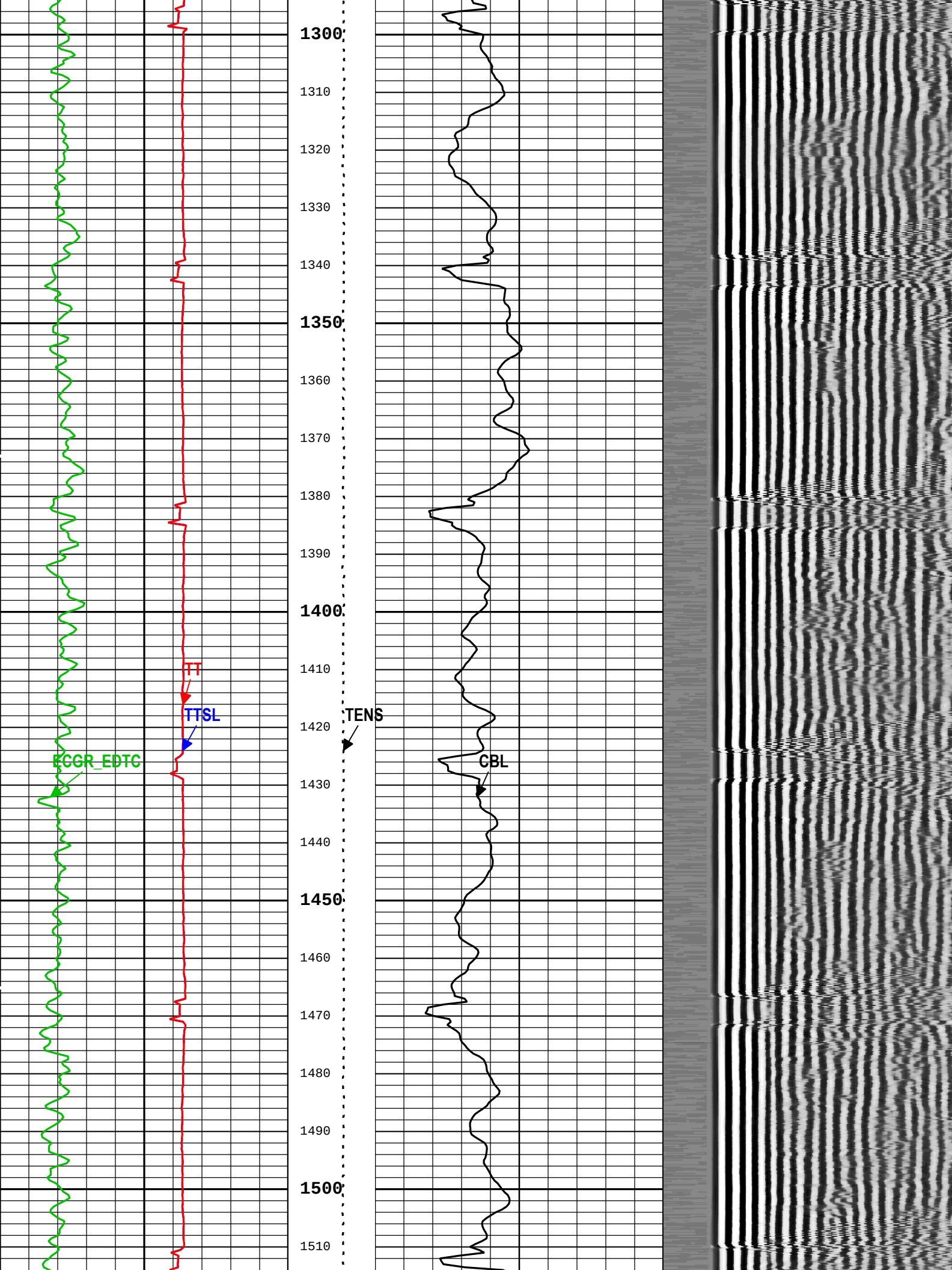
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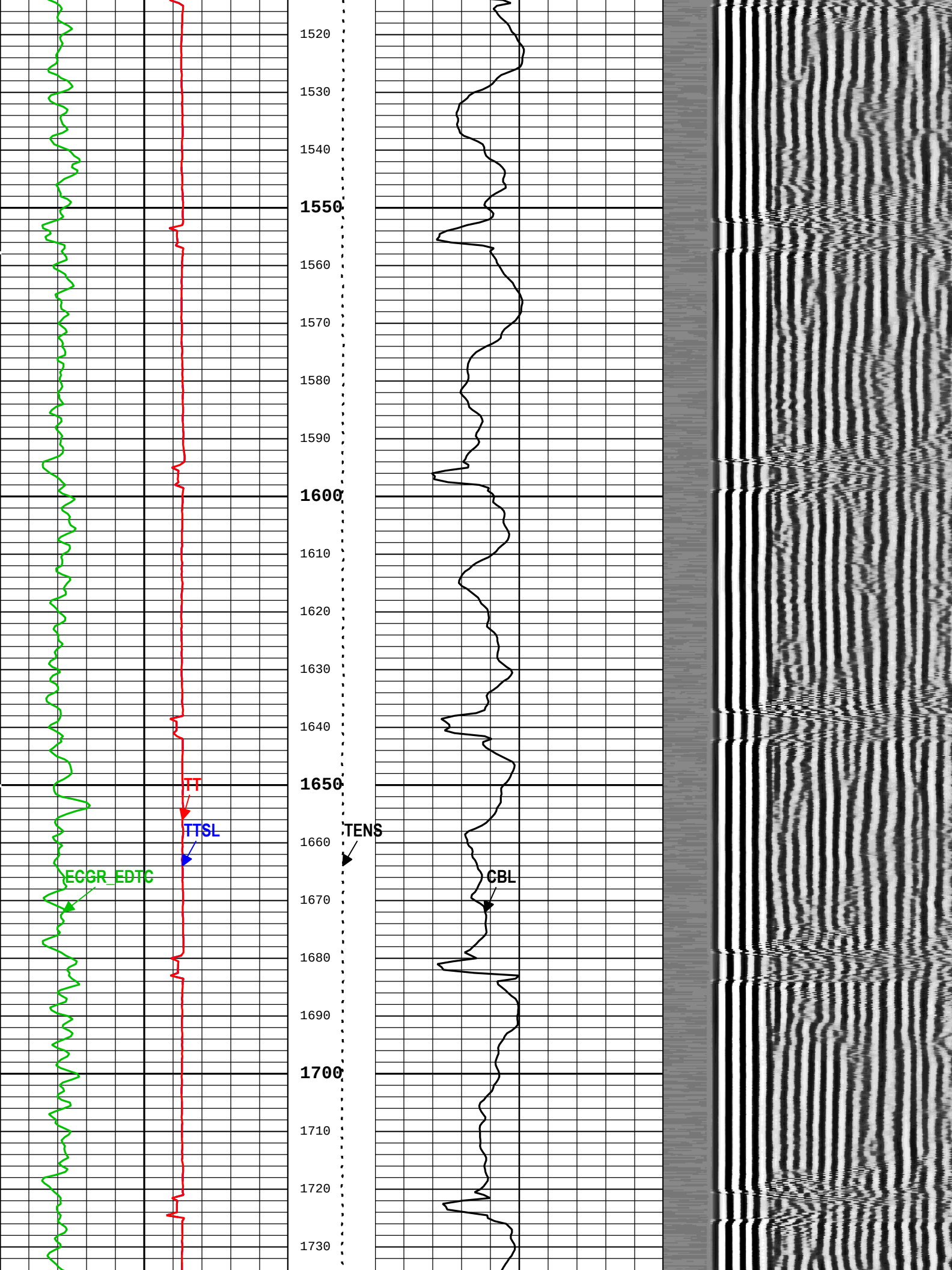
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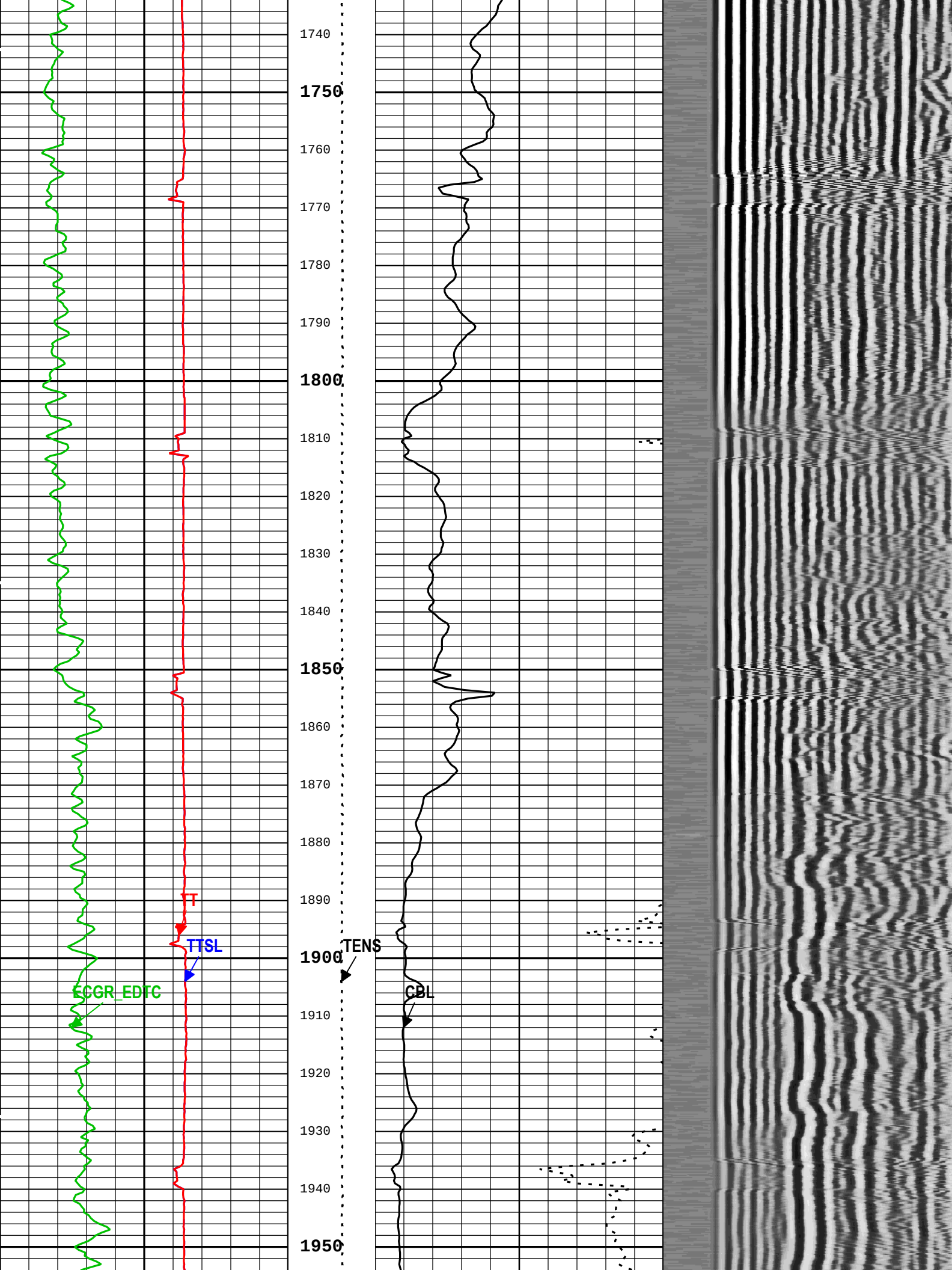
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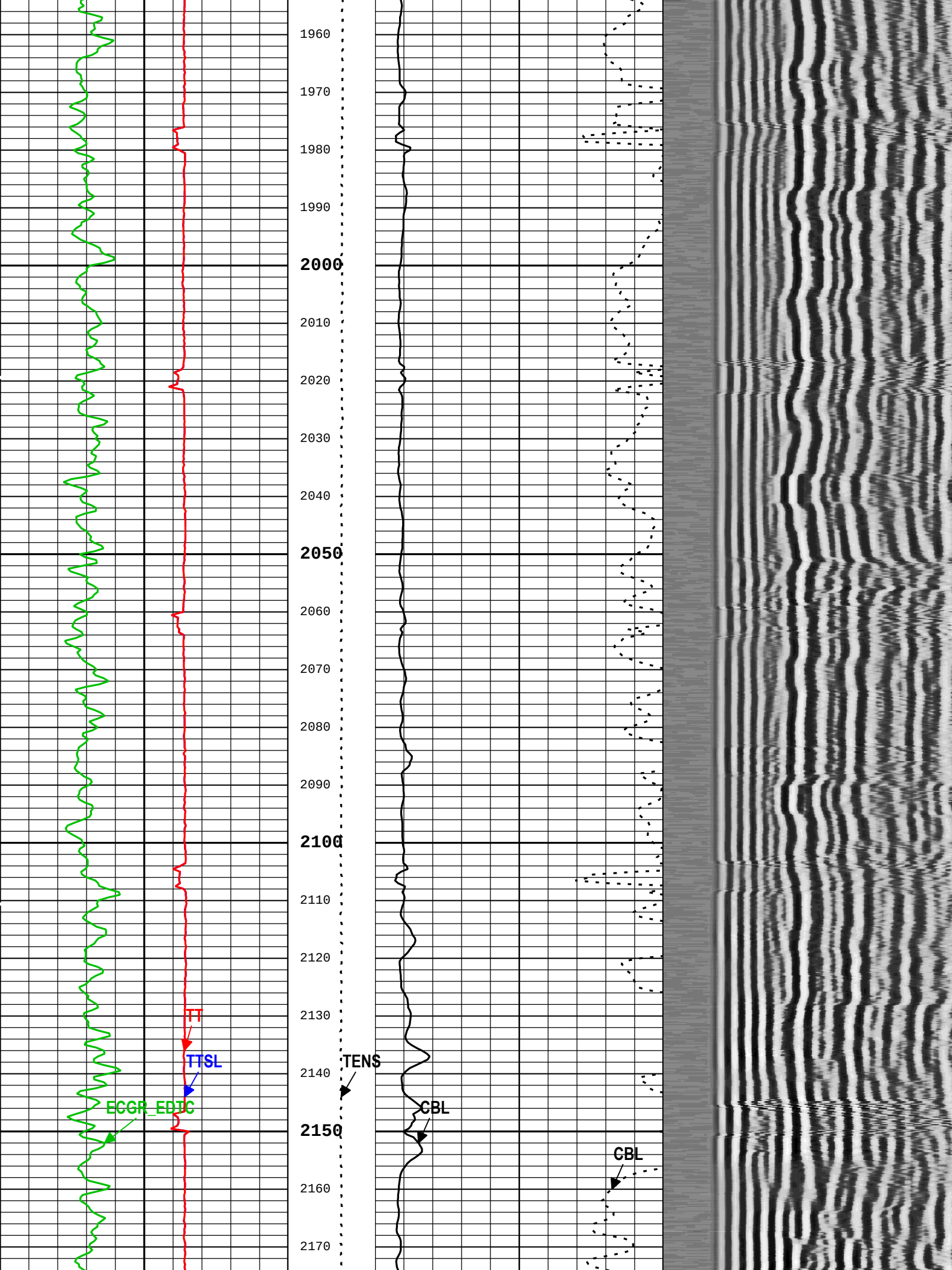
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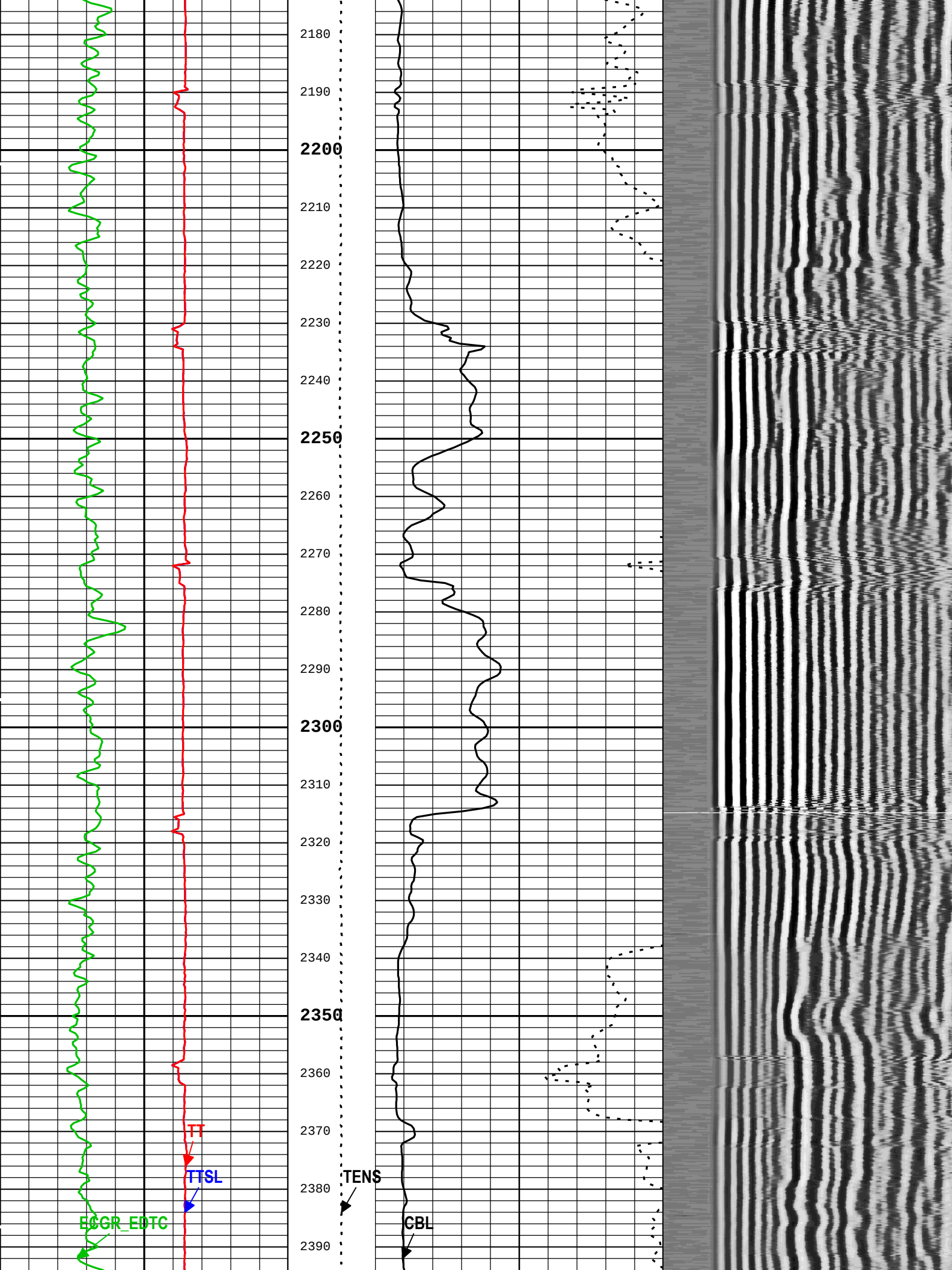
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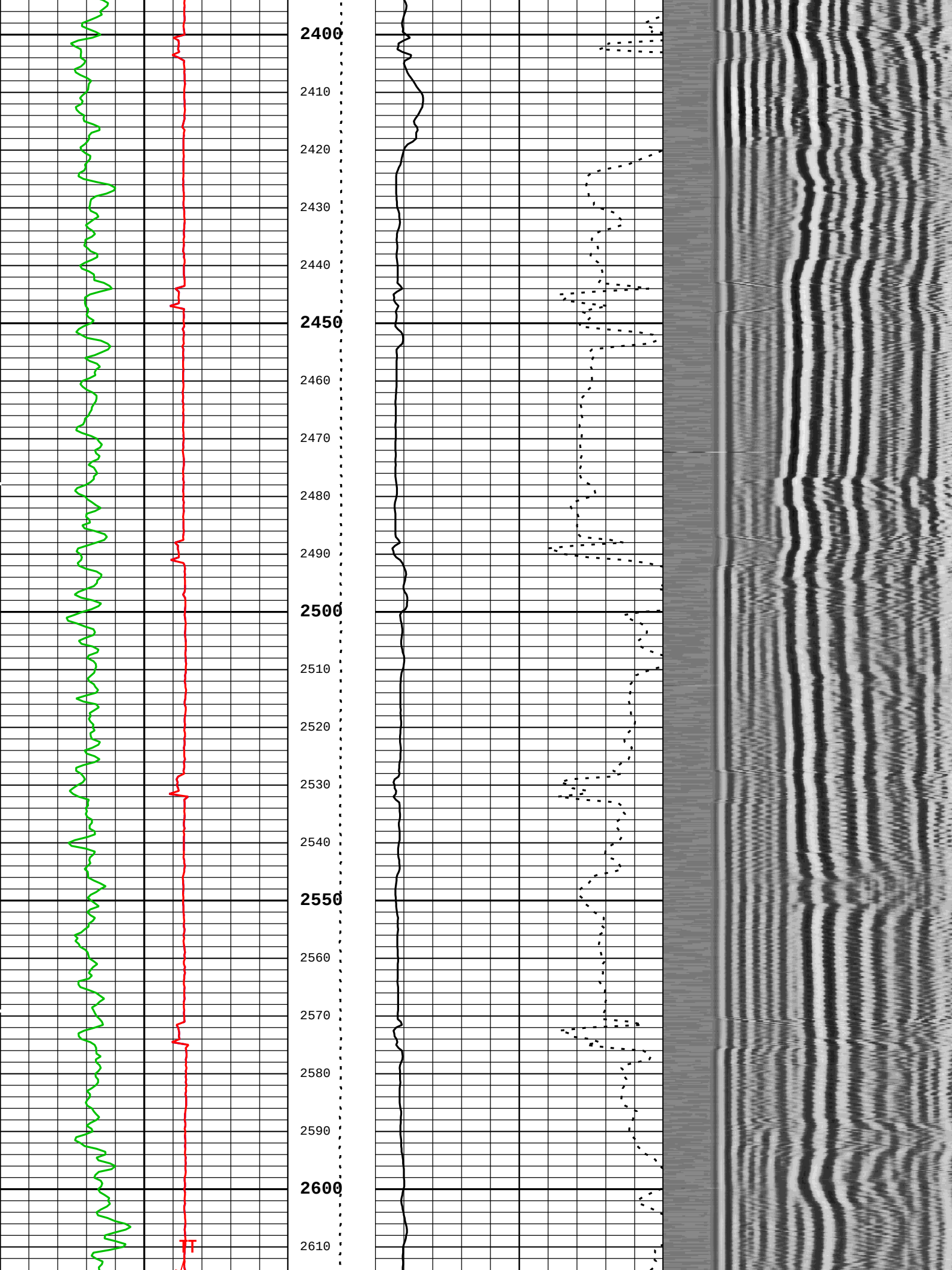
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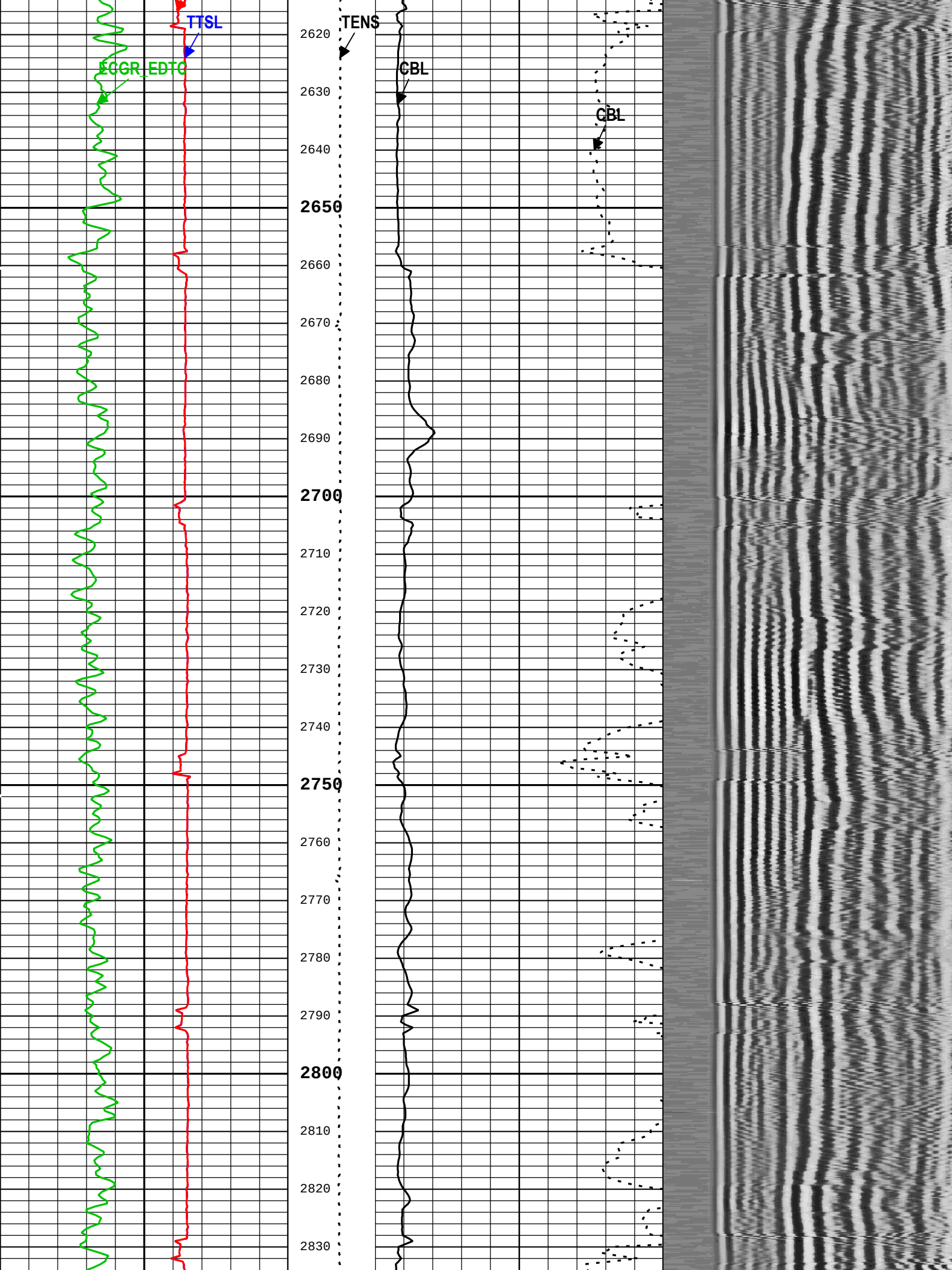
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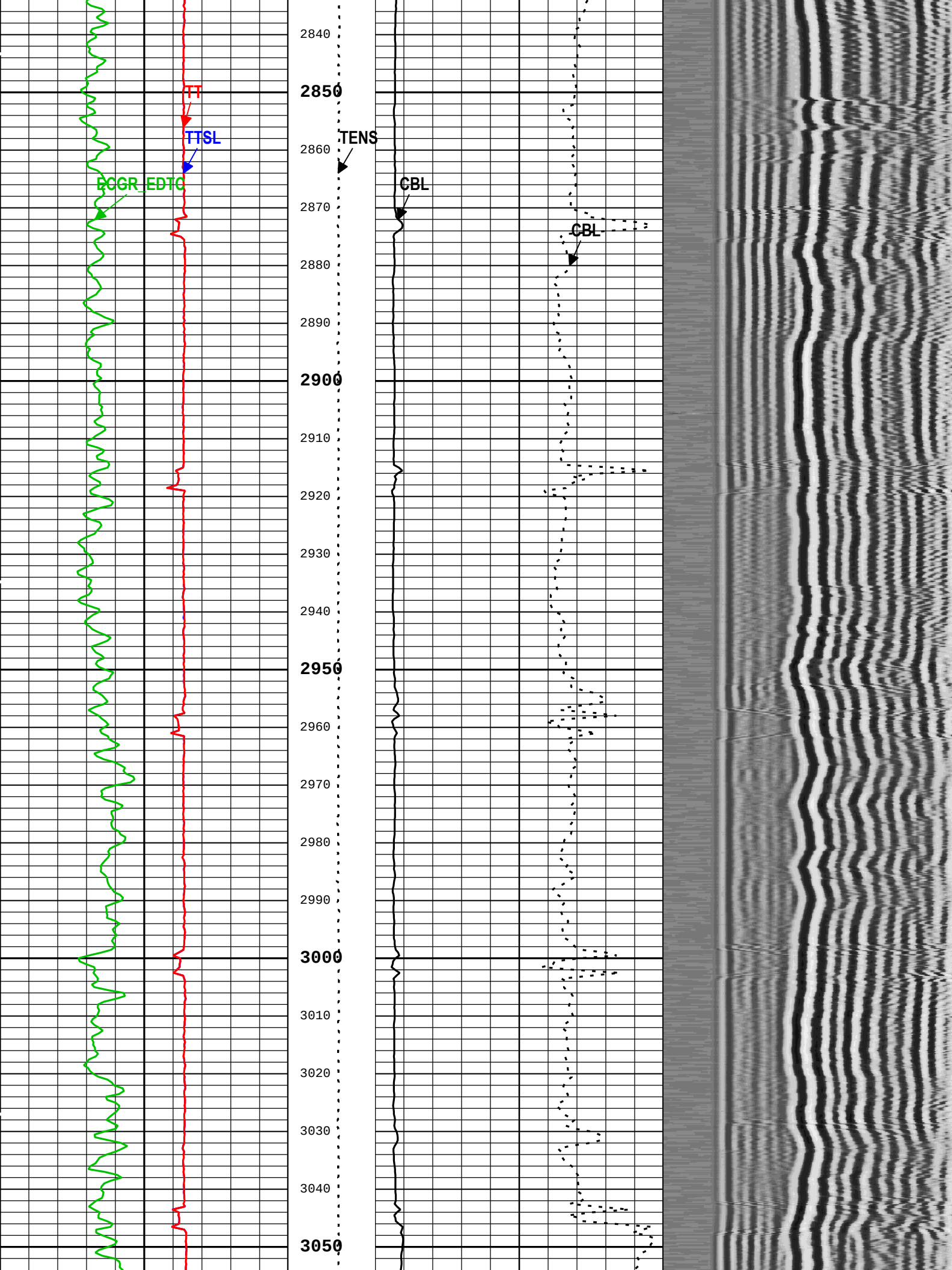
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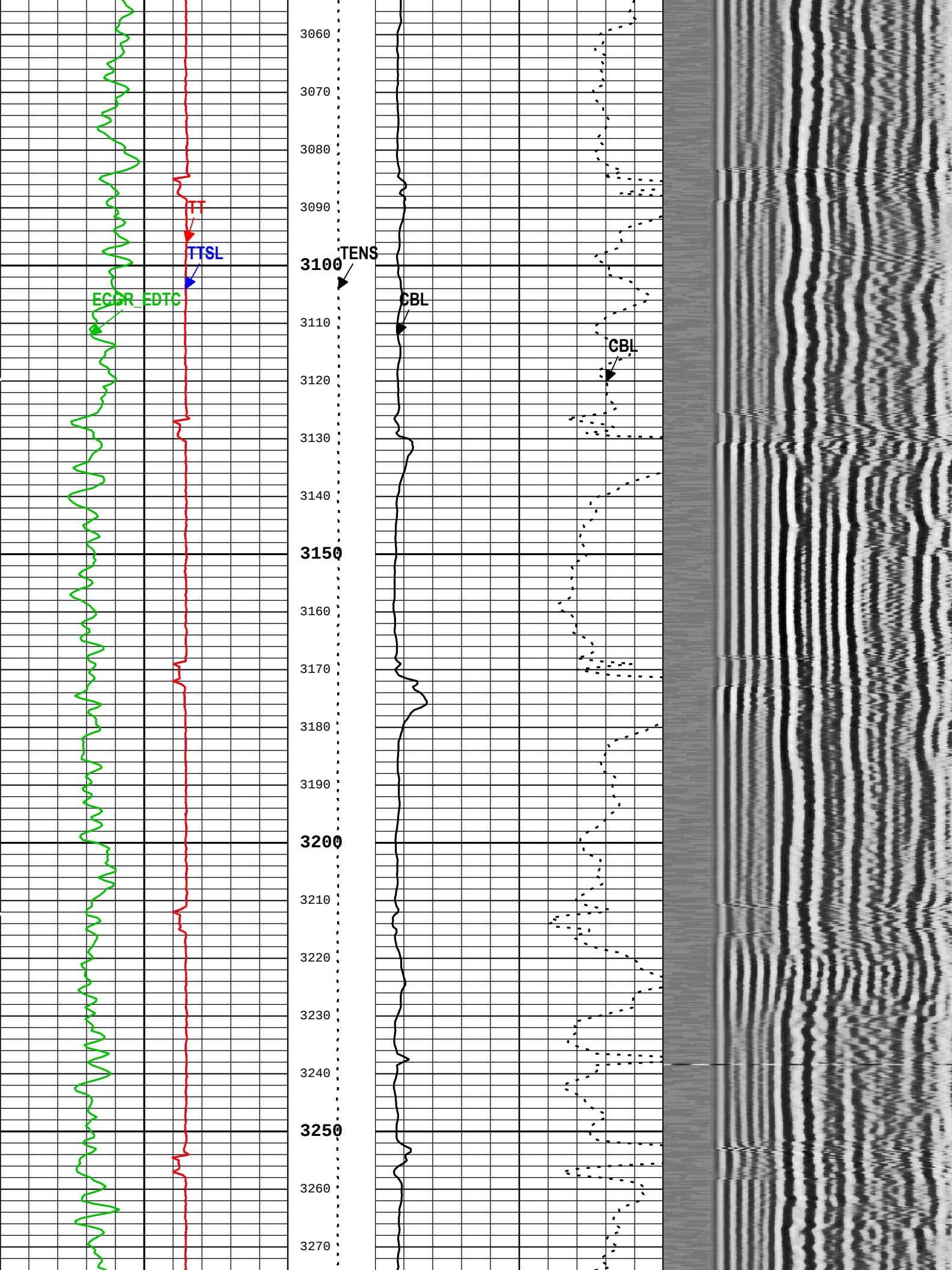
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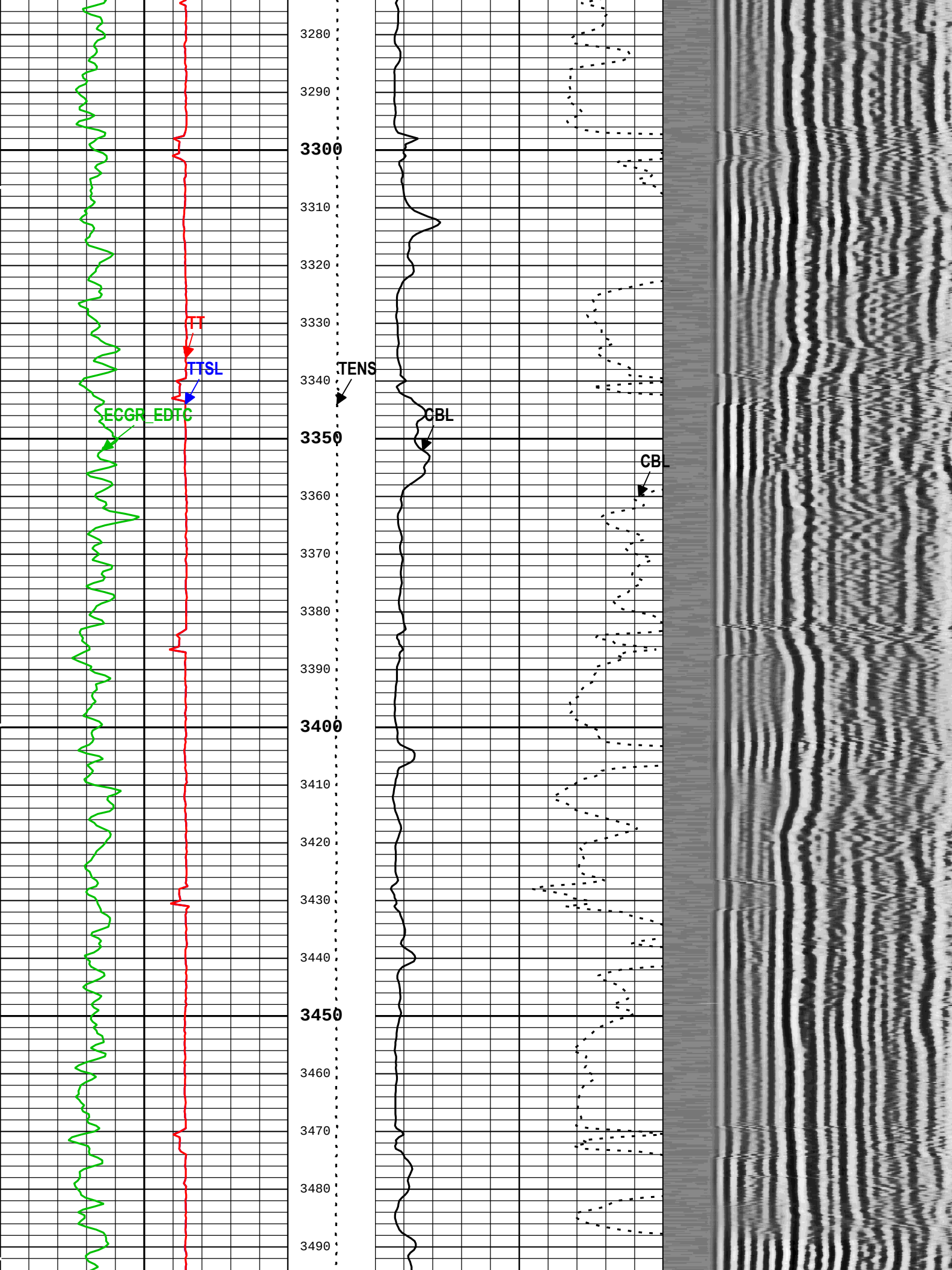
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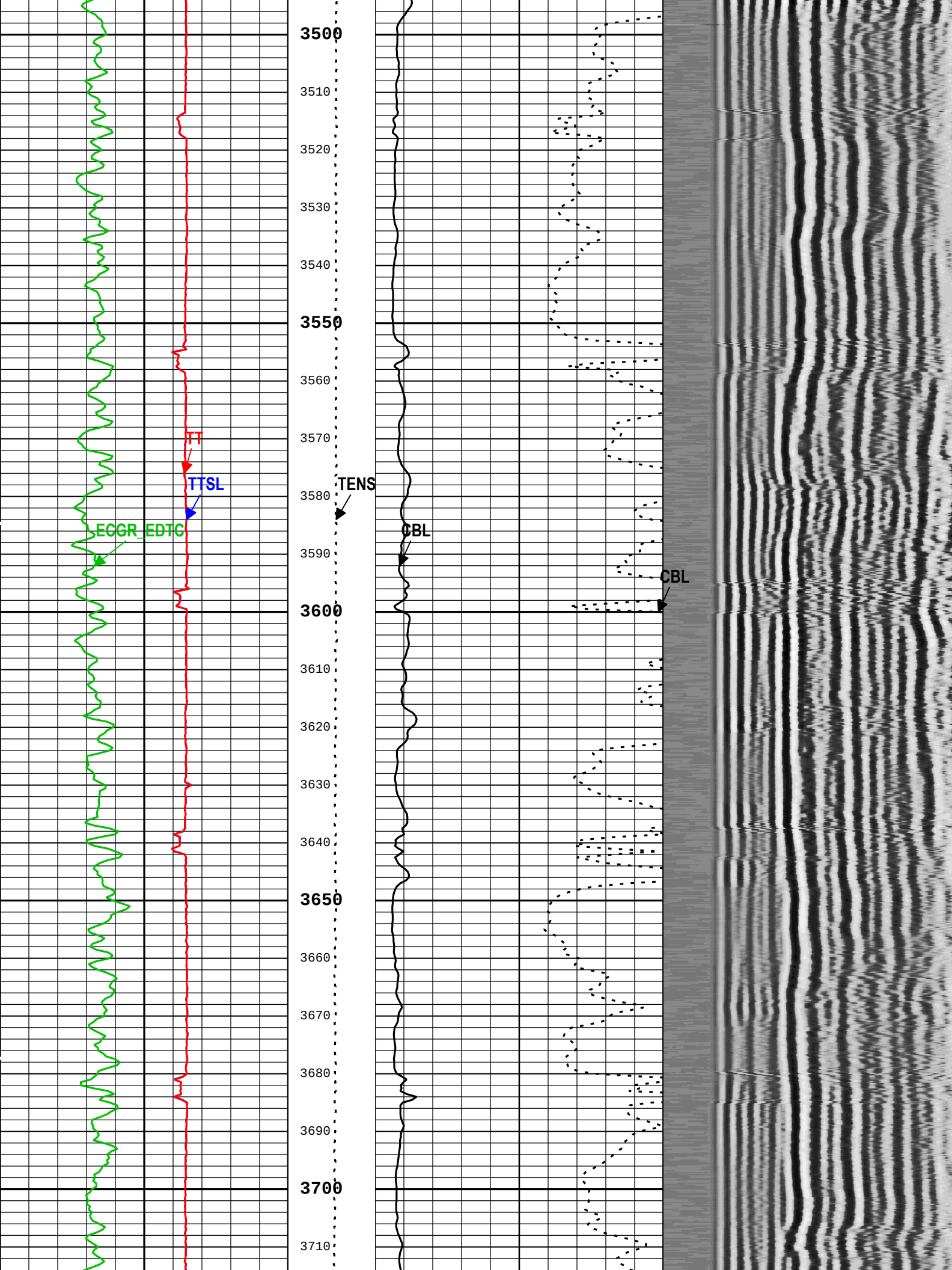
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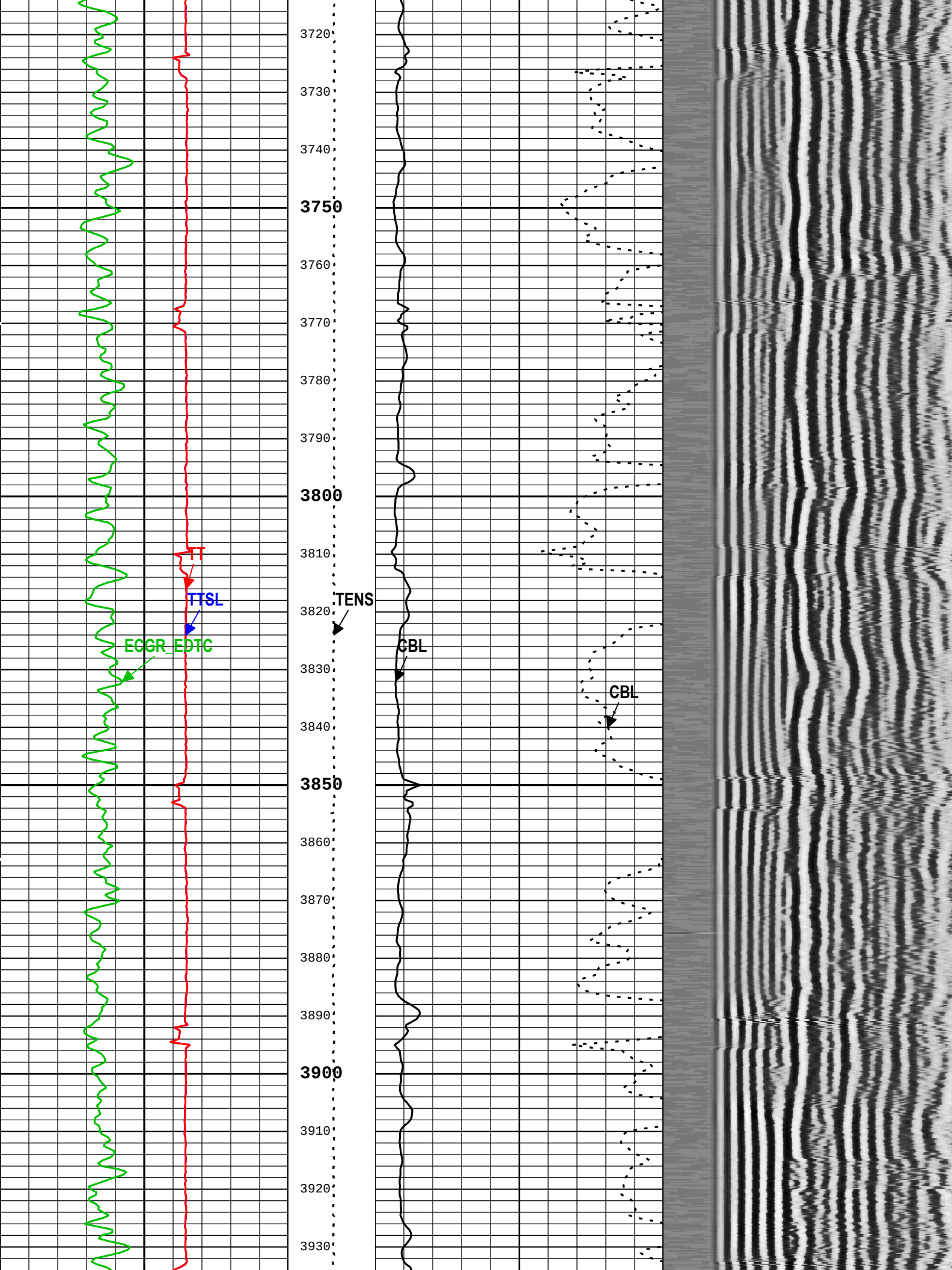
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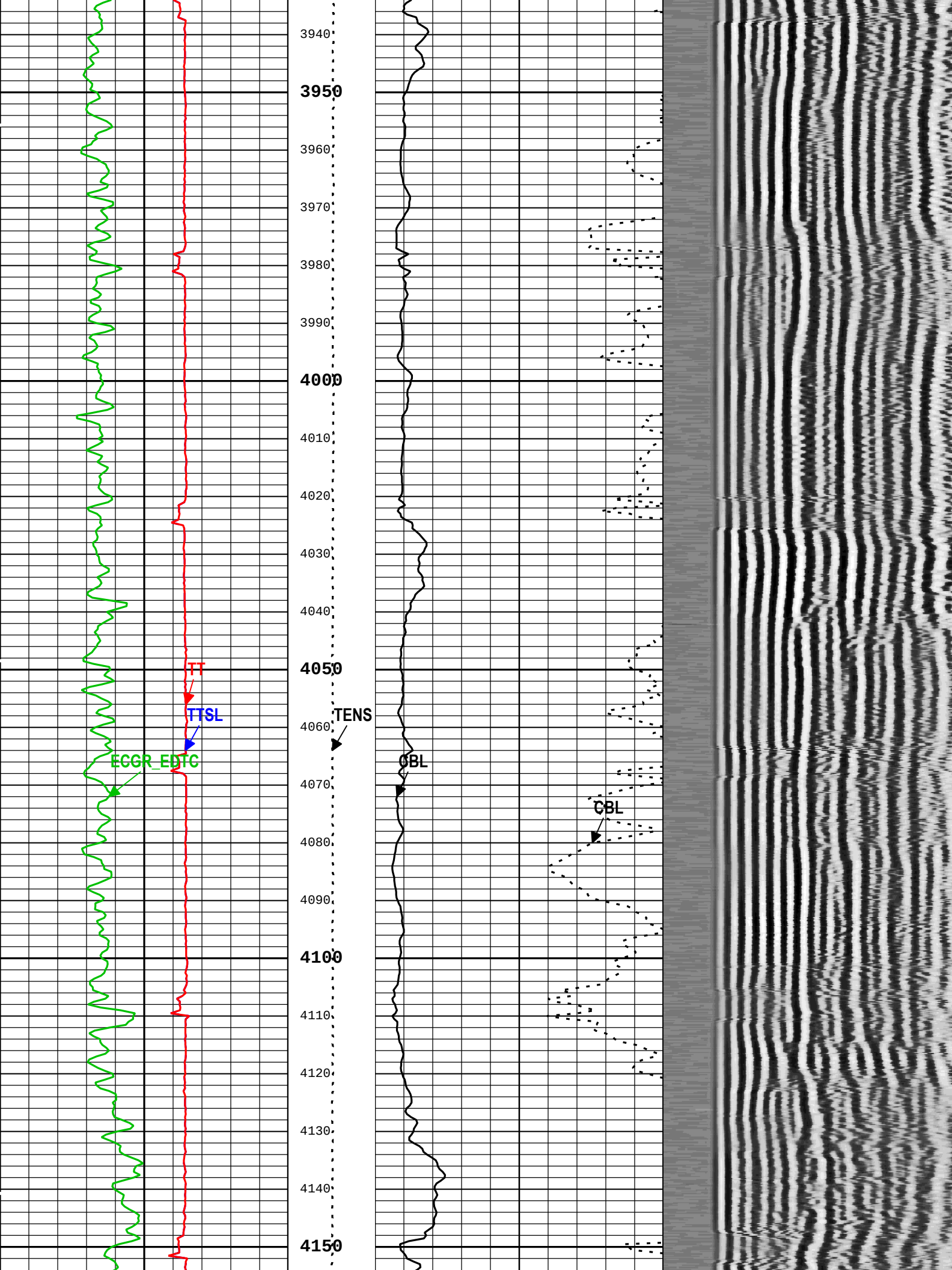
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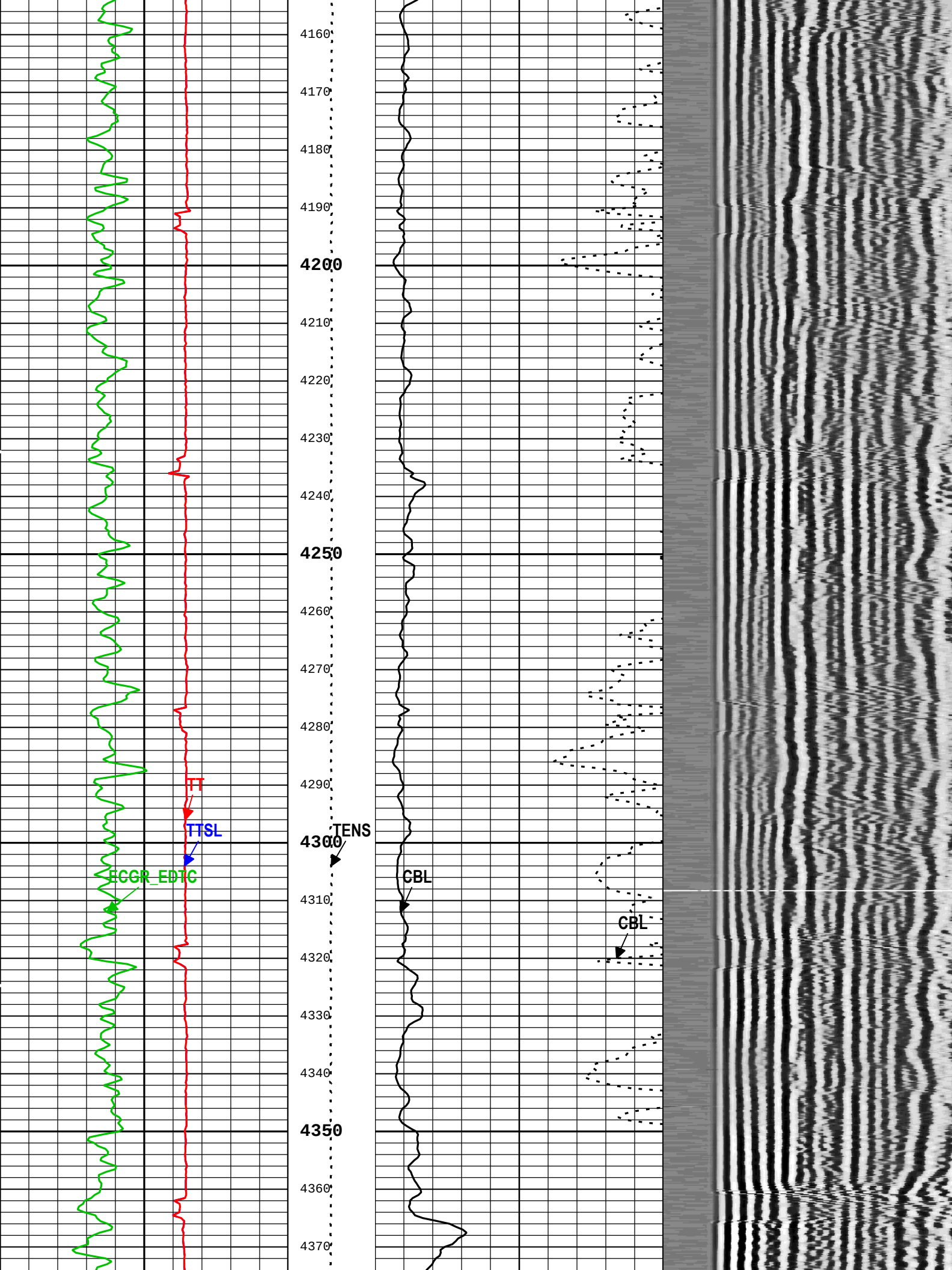
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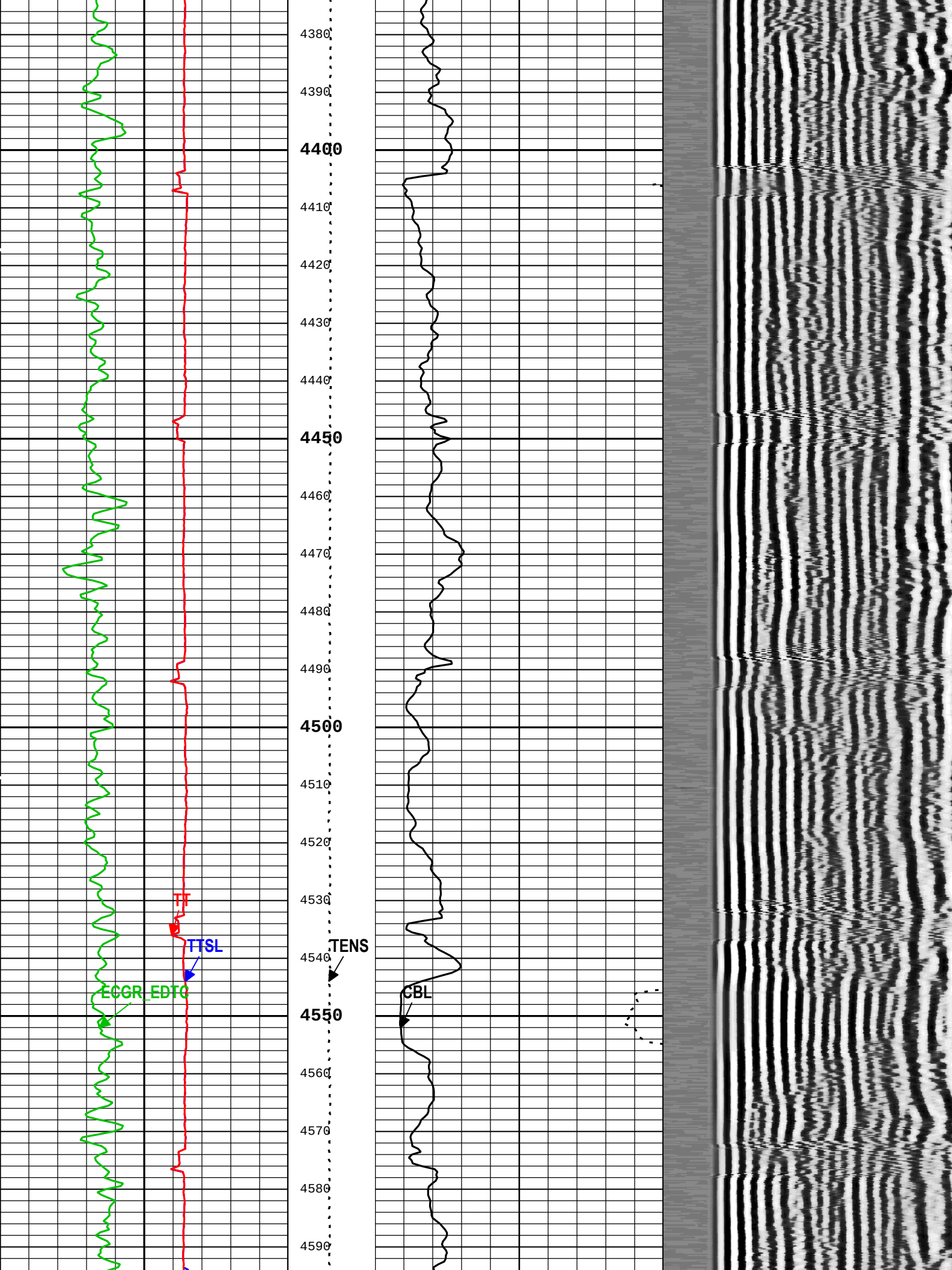
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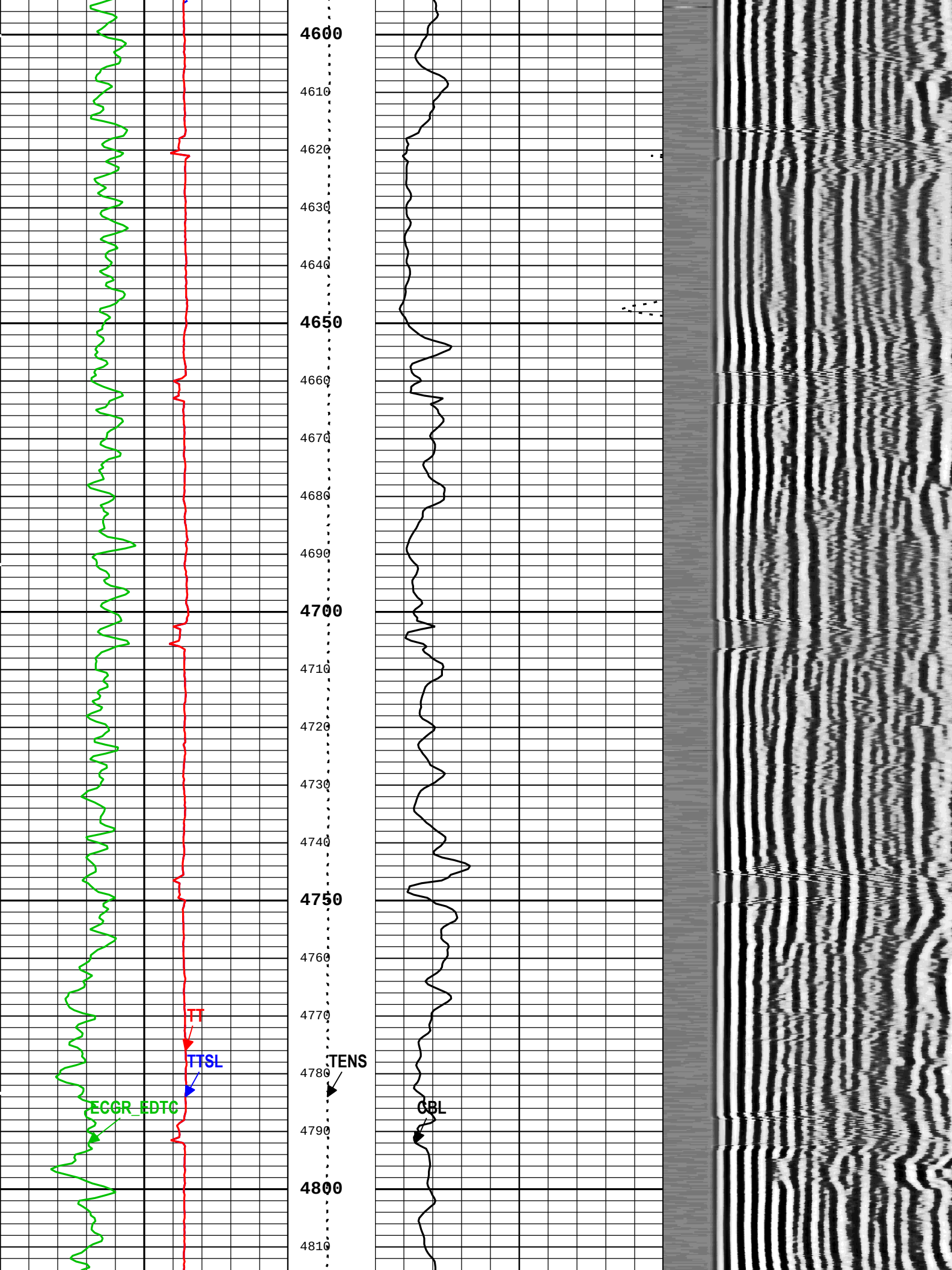
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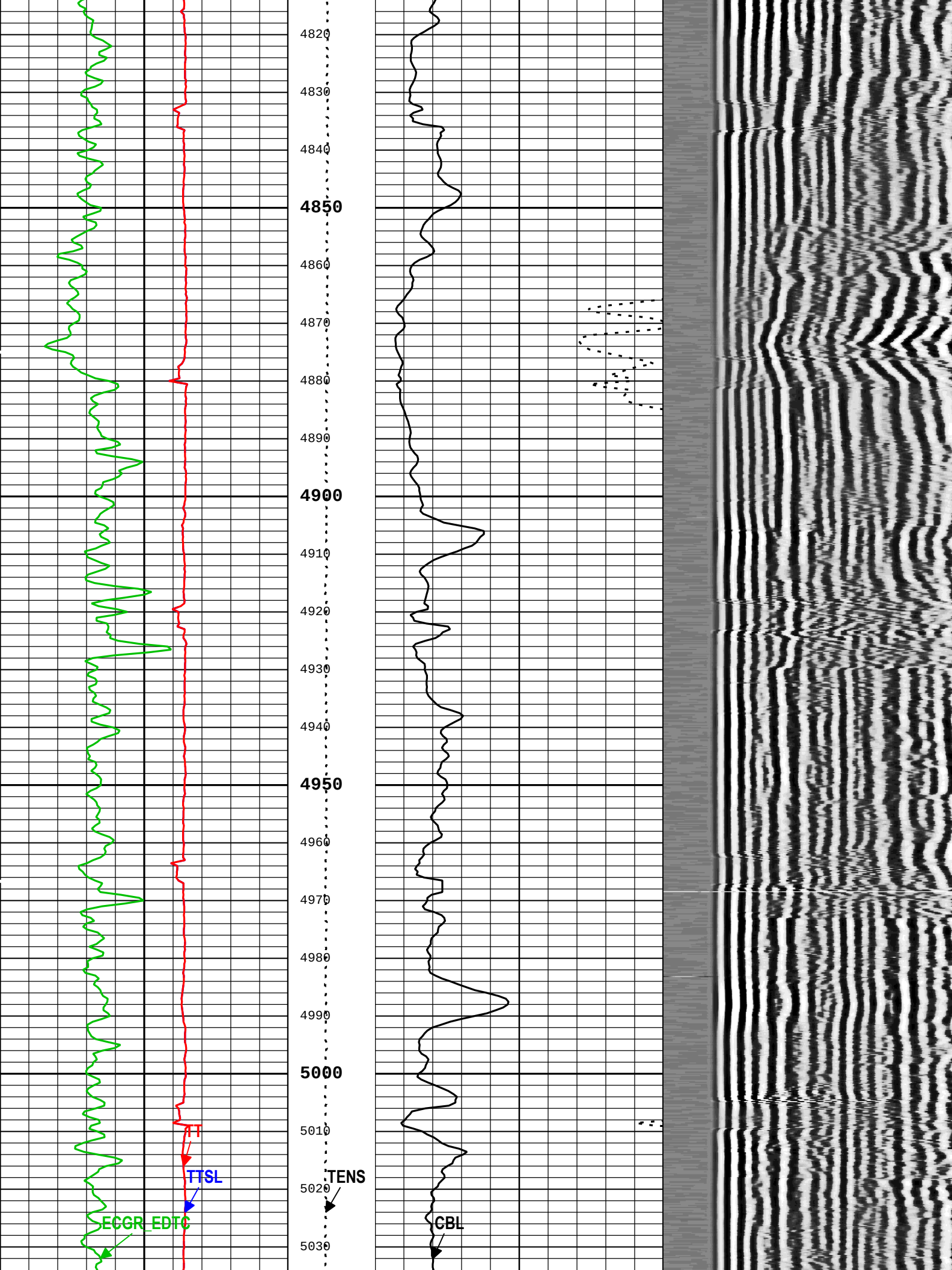
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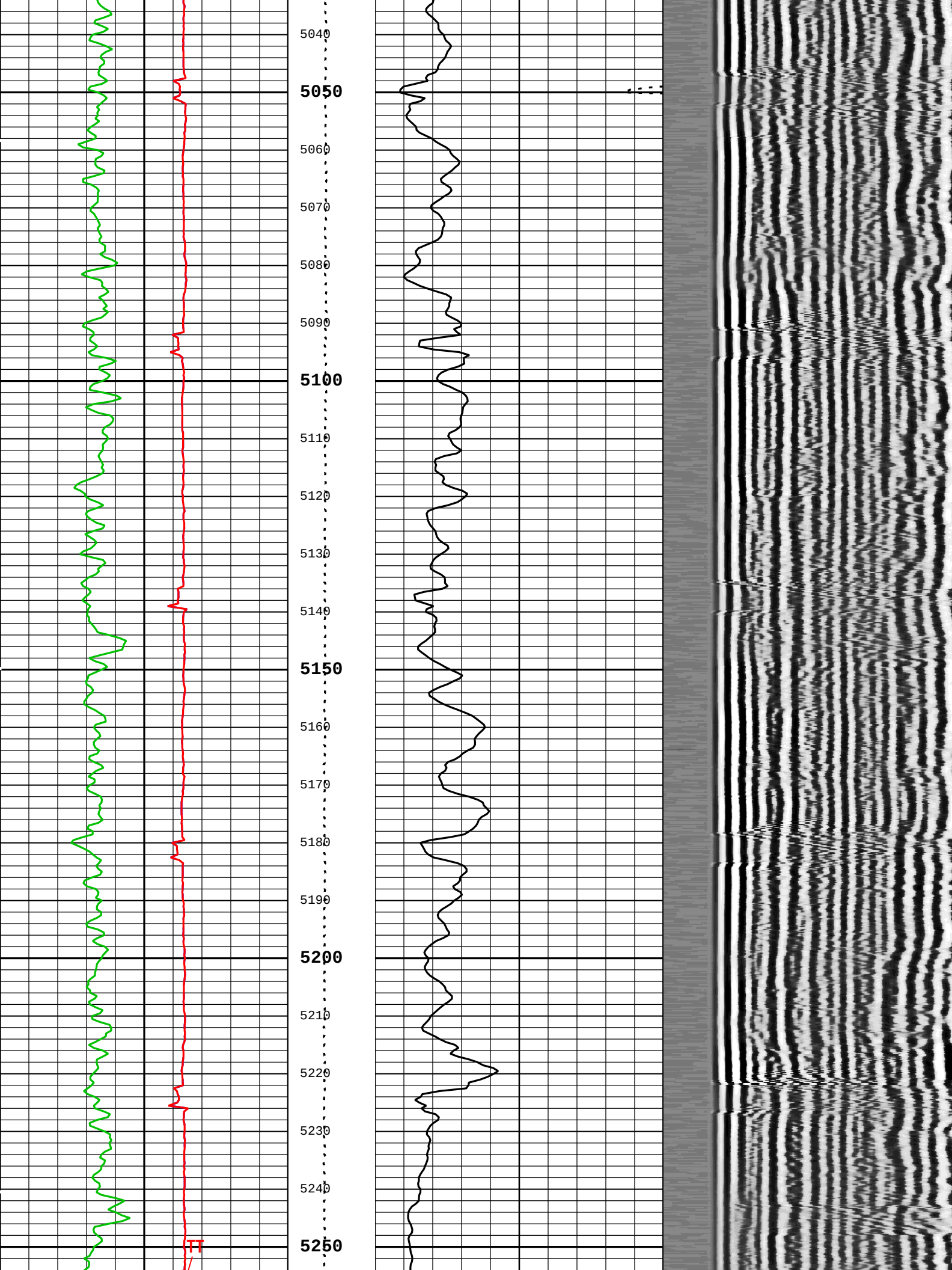
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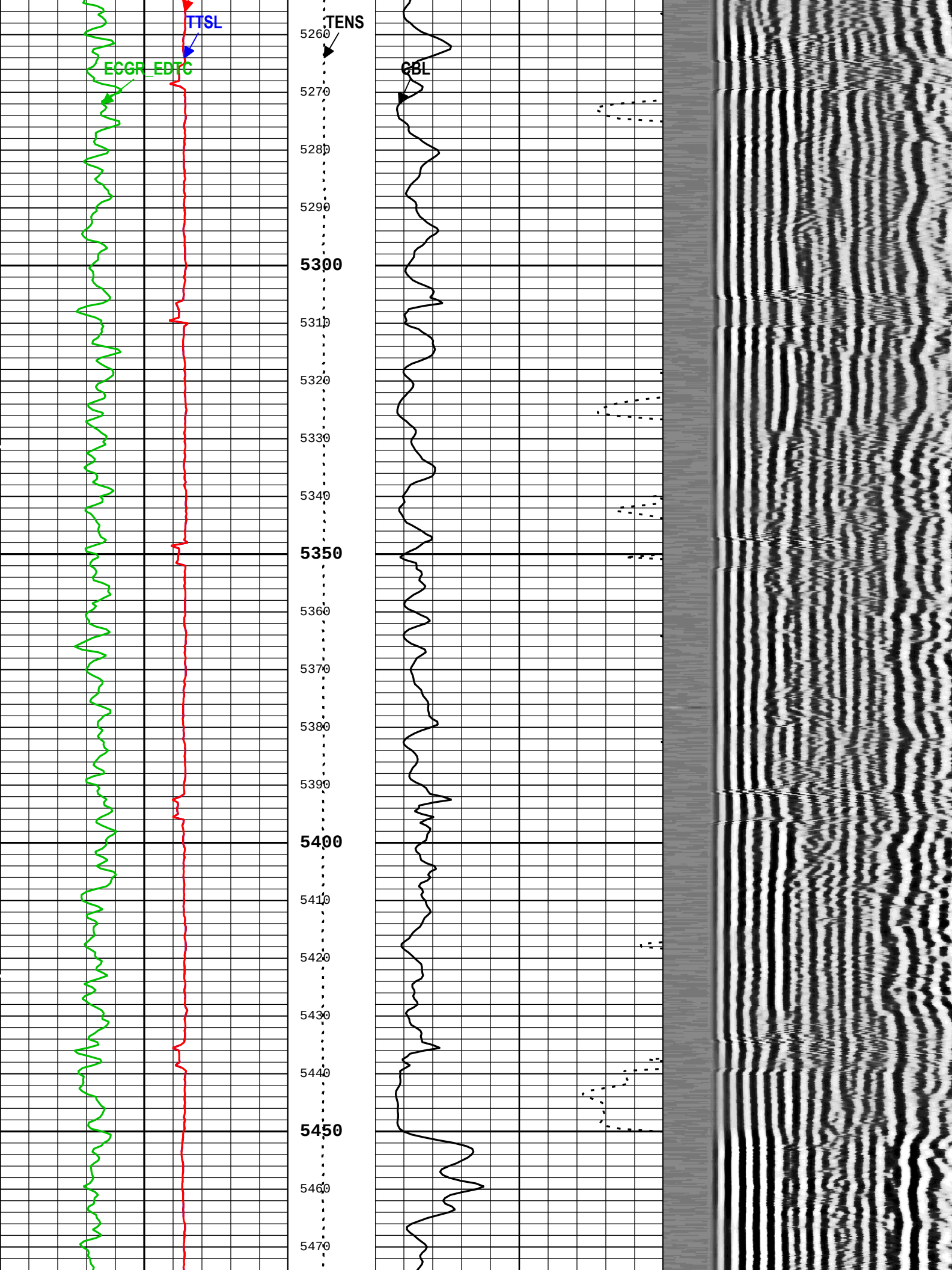
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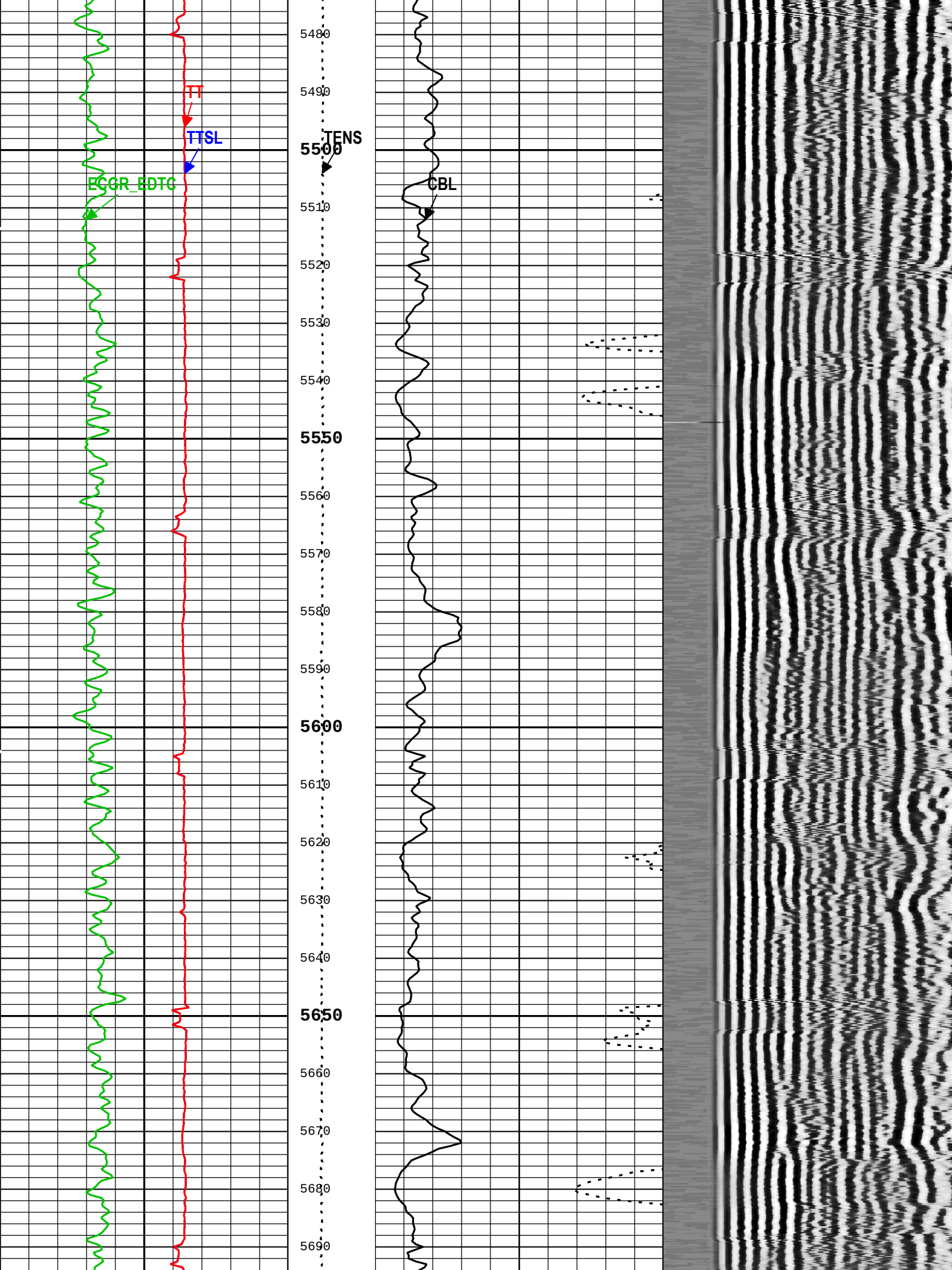
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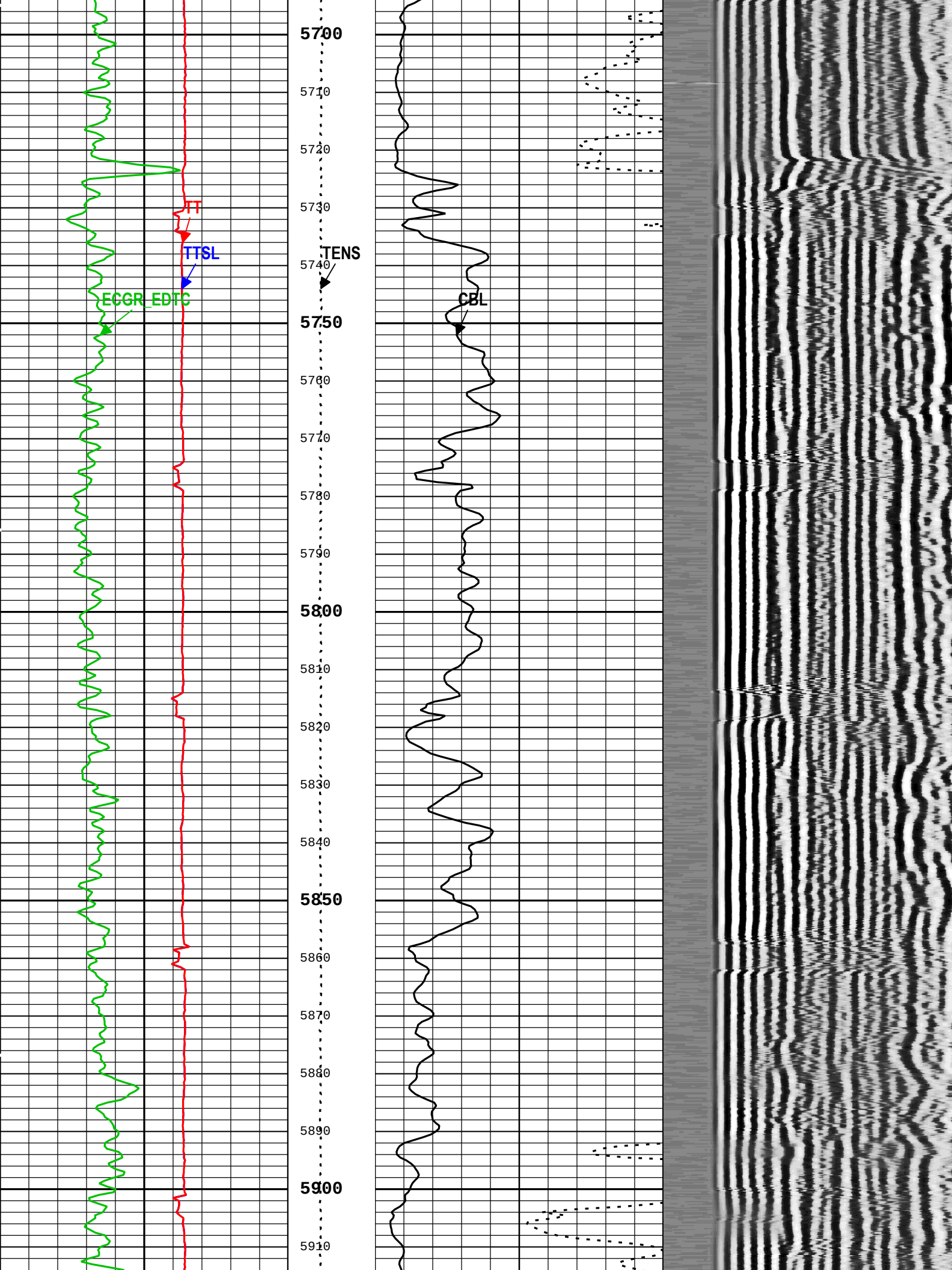
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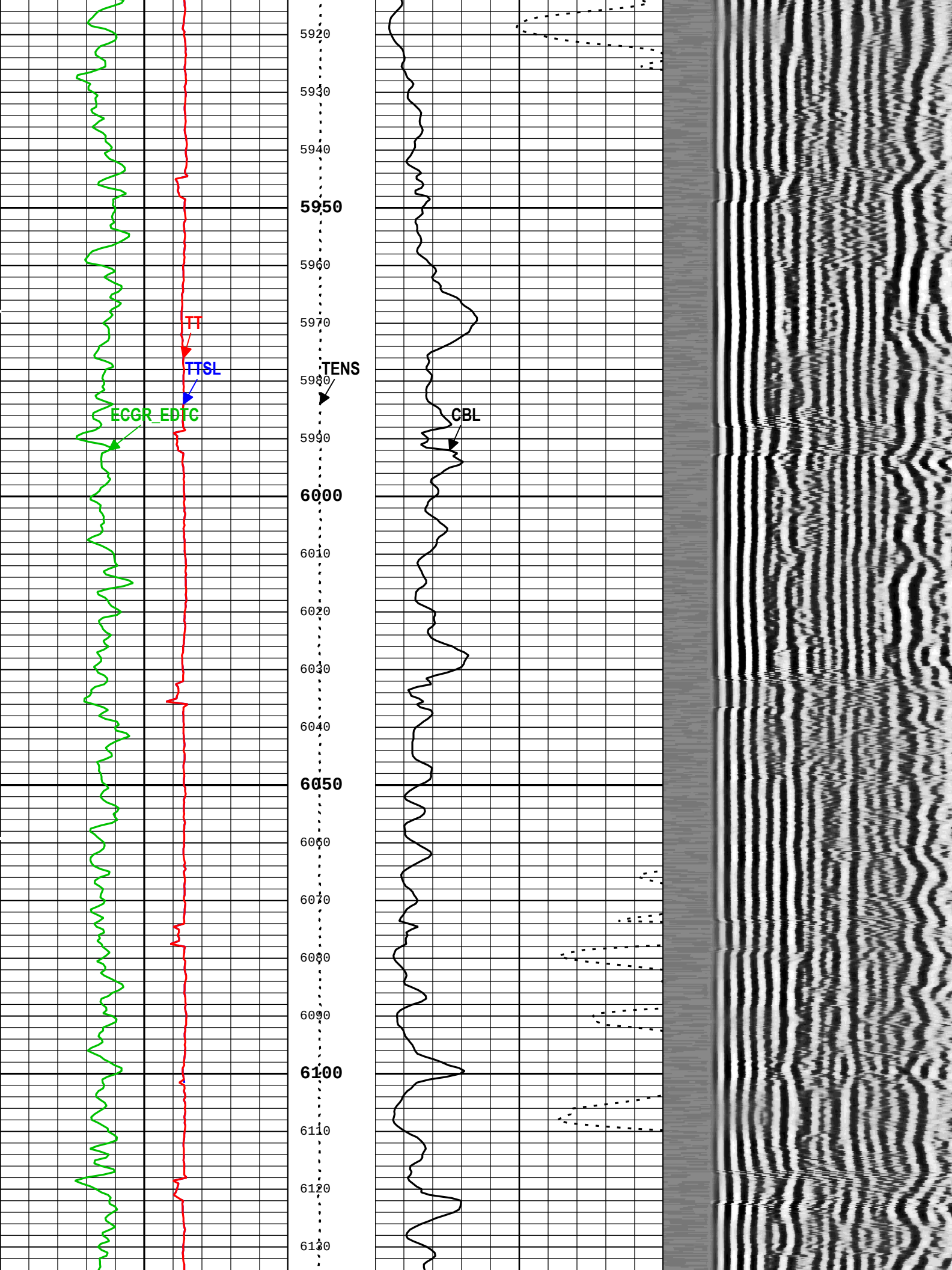
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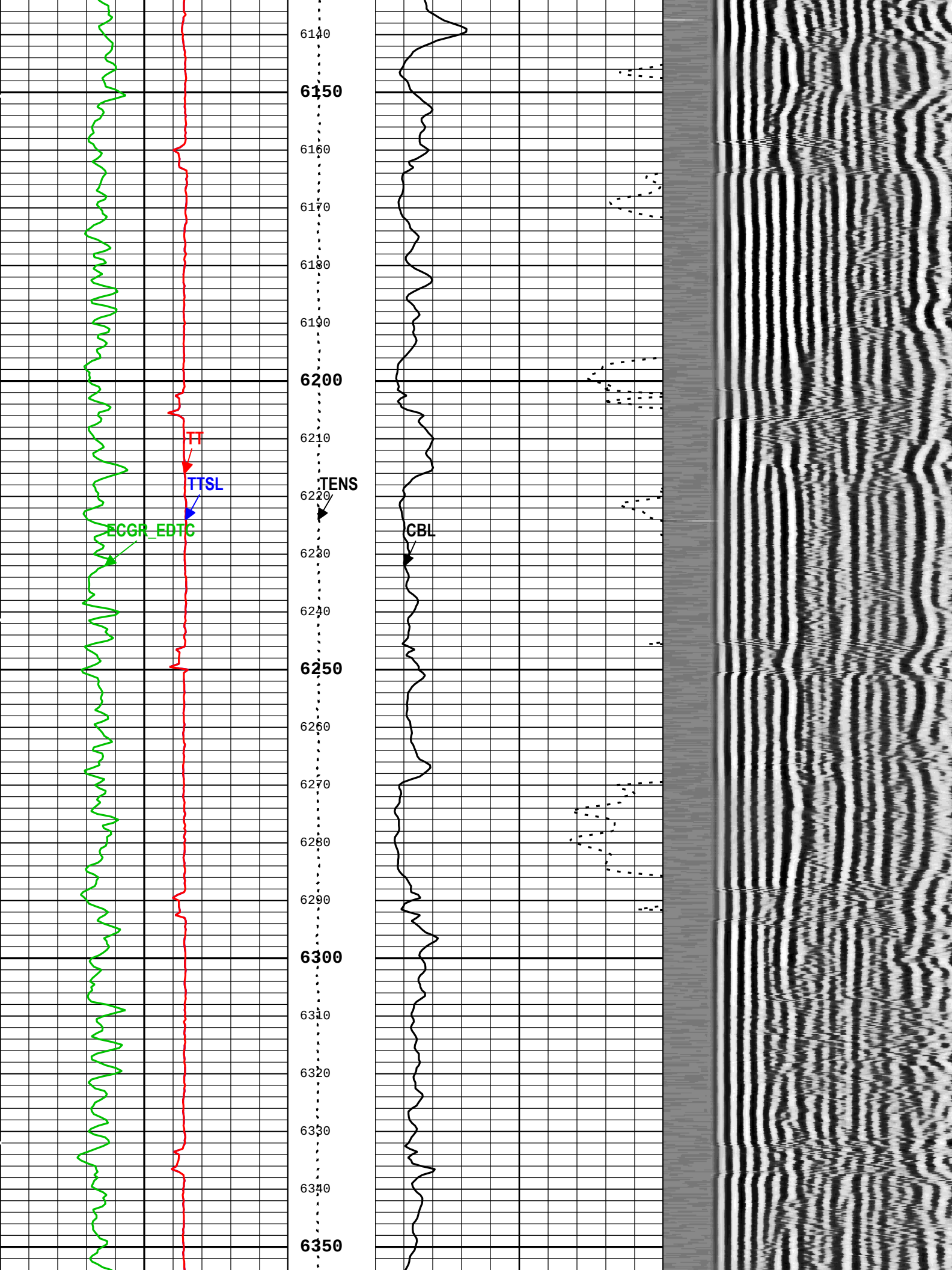
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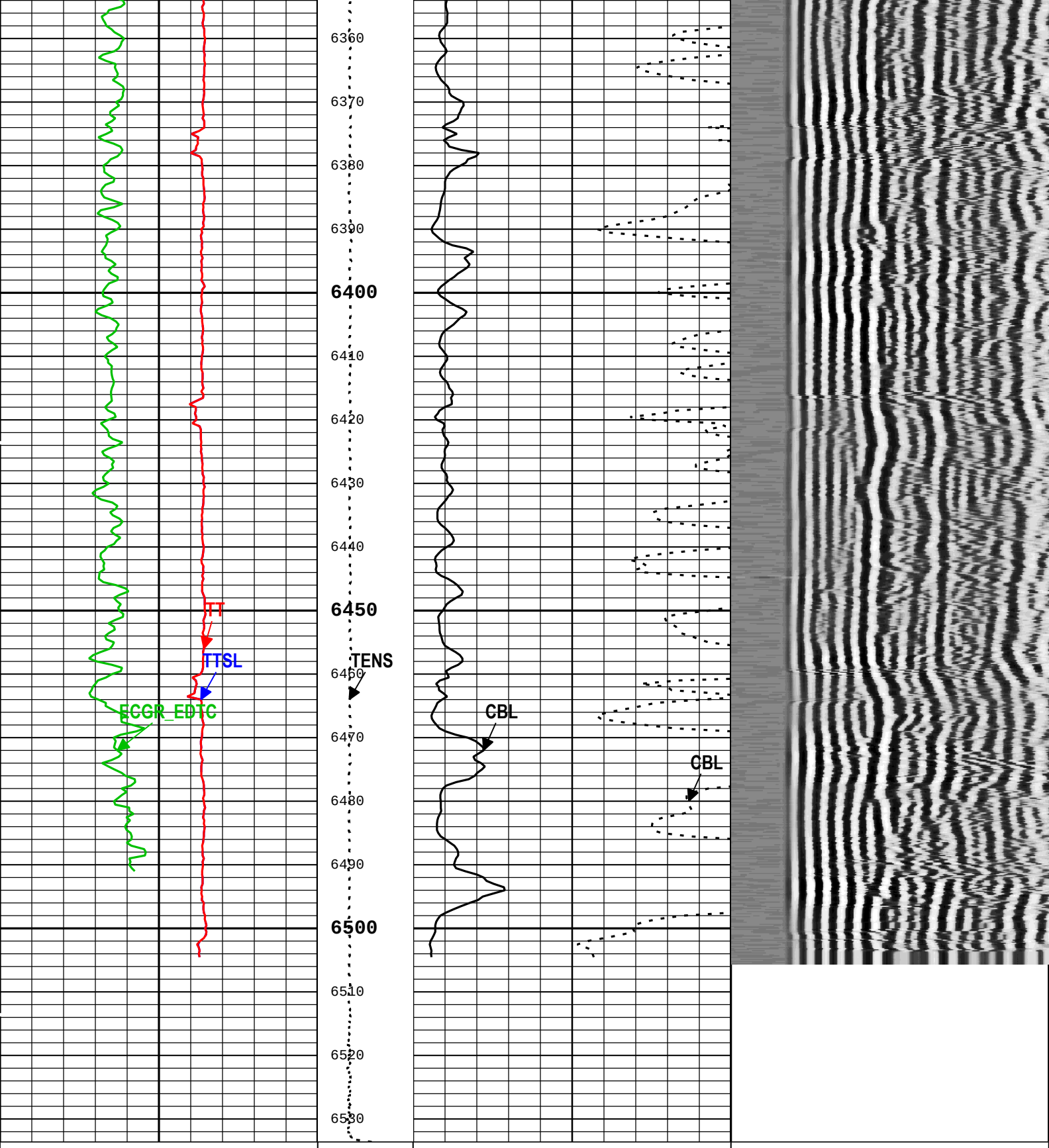

Gamma Ray (ECGR_EDTC) EDTC-B
0 gAPI 200

Transit Time (Sliding Gate) (TTSL) DSLT-H
400 us 200

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

Cable Tension (TENS)
4000 lbf 0

CBL Amplitude (CBL) DSLT-H
0 mV 10

CBL Amplitude (CBL) DSLT-H
0 mV 100

Min Amplitude Max

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

TIME_1900 - Time Marked every 60.00 (s)

BIEP - Bond Index Event Pips DSLT-H

Description: CBL_Dual_Gate Format: Log (CBL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 02-Sep-2013 13:47:32

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	Depth Zoned	in
CBLG	CBL Gate Width	DSLT-H	60	us
CBLO	Casing Bottom (Logger)	WLSESSION	18523	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLT-H	71	mV
CDEN	Cement Density	EDTC-B	2	g/cm3
CDEN	Cement Density	USIT-E	1.44	g/cm3
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DETE	Delta-T Detection	DSLT-H	E1	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
FCF	CBL Fluid Compensation Factor	DSLT-H	1.01	
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	1.89	mV
IBC_FRP_OFFSET	IBC Flexural Offset from Free Pipe	USIT-E	6.73	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	Theoretical	
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	13.94	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	0.76	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLT-H	0.76	mV
NMSG	Near Minimum Sliding Gate	DSLT-H	240	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	1.95	Mrayl
U-USIT_UFAO	SIT Flexural Attenuation Offset	USIT-E	-33.5	dB/m
U-USIT_UIAP	IBC Answer Product Enabled	USIT-E	SolidLiquidGasMap	

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	13.5	0	1866
BS	7.875	1866	6533.58
MCI	14.81	0	1857
MCI	4.75	1857	6533.58

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
U-USIT_UFWB	Far Receiver Window Begin Time	USIT-E	138	us
U-USIT_UFWE	Far Receiver Window End Time	USIT-E	178	us
U-USIT_UNWB	Near Receiver Window Begin Time	USIT-E	107	us
U-USIT_UNWE	Near Receiver Window End Time	USIT-E	147	us
UPAT	USIT Emission Pattern	USIT-E	Pattern 500 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	

Calibration Report

DSLT-H (Digitizing Sonic Logging Tool - H) Calibration - Run One

Primary Equipment :

Sonic Logging Sonde E supports 3'-5'BHC DT and CBL/VDL SLS-E 8020

CBL Normalization - CBL Accumulations

Master (Measured): 10:11:51 21-Jun-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Upper Far Amplitude		Master	4200.0	3200.0	3708.0	
Upper Near Raw Amplitude	mV	Master	33.000	27.000	30.616	43.000
Lower Far Amplitude		Master	4200.0	3200.0	3531.4	
Lower Near Raw Amplitude	mV	Master	46.000	27.000	38.102	68.000

CBL Normalization - CBL/VDL Coefficients

Master (Measured): 10:11:51 21-Jun-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
CBL Correction Factor for UT		Master	3.500	2.700	3.789	4.300
CBL Correction Factor for LT		Master	2.500	1.700	3.044	4.300
VDL Ratio between UT and LT for CBLB Mode		Master	1.000		0.952	

Company:	Anadarko Petroleum Corporation
Well:	Verde 13-3HZ
Field:	Wattenberg
County:	Weld
State:	Colorado

Schlumberger

Cement Bond Log
Variable Density Log