

Company:Whiting Oil & Gas Corporation

Well:Horsetail 30E-1903

Field:Wildcat

County:Weld

State:Colorado

County:Weld

Field:Wildcat

Location:SWNW Sec 30, T10N, R57W

Well:Horsetail 30E-1903

Company:Whiting Oil & Gas Corporation

Cement Bond Log

GR-CCL

SWNW Sec 30, T10N, R57W		Elev.:	K.B.	4738.70 ft
SHL: 2322' FNL x 660' FWL			G.L.	4717.70 ft
Latitude: 40.810703 Longitude: -103.801014			D.F.	4737.70 ft
Permanent Datum:		Ground Level	Elev.:	4717.70 f
Log Measured From:		Kelly Bushing	21.00 ft	above Perm.Datum
Drilling Measured From:		Kelly Bushing		
API Serial No.	Section:	Township:	Range:	
05-123-42870	30	10N	57W	

Logging Date10-Nov-2016

Run NumberOne

Depth Driller13826.50 ft

Schlumberger Depth13826.50 ft

Bottom Log Interval5000.00 ft

Top Log Interval0.00 ft

Casing Fluid TypeWater

Salinity

Density8.4 lbm/gal

Fluid Level8.00 ft

BIT/CASING/TUBING STRING

Bit Size8.75 in

From2068.60 ft

To13826.50 ft

Casing/Tubing Size5.5 in

Weight20 lbm/ft

GradeN/A

From0.00 ft

To13826.50 ft

Max Recorded Temperatures173 degF

Logger on Bottom10-Nov-201610:36:00

Unit Number2161FtMorgan

Recorded ByStephen Tang

Witnessed ByBradd Kothe

Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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9.1 Integration Summary

9.2 Software Version

9.3 Composite Summary

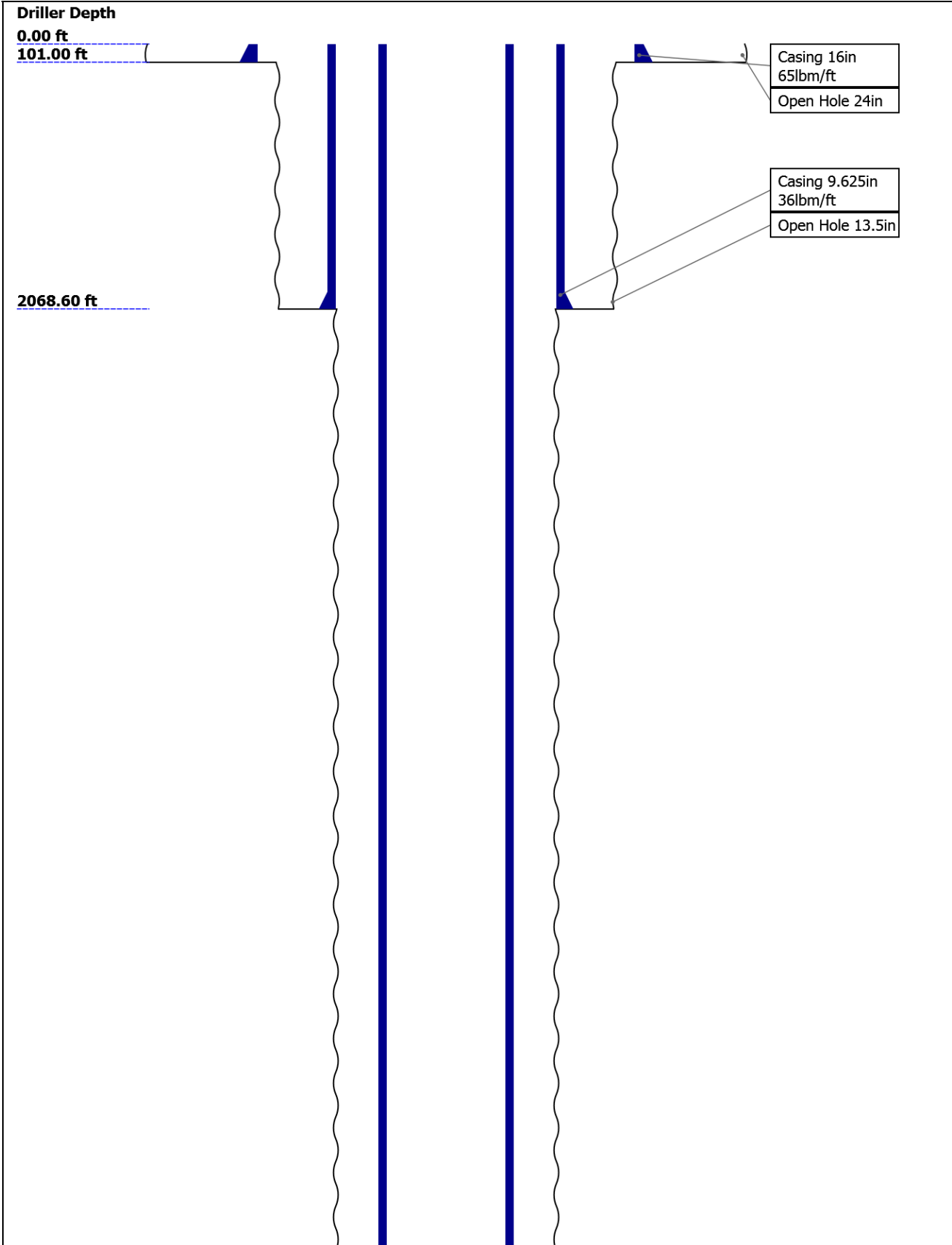
9.4 Log ( Sonic CBL with VDL )

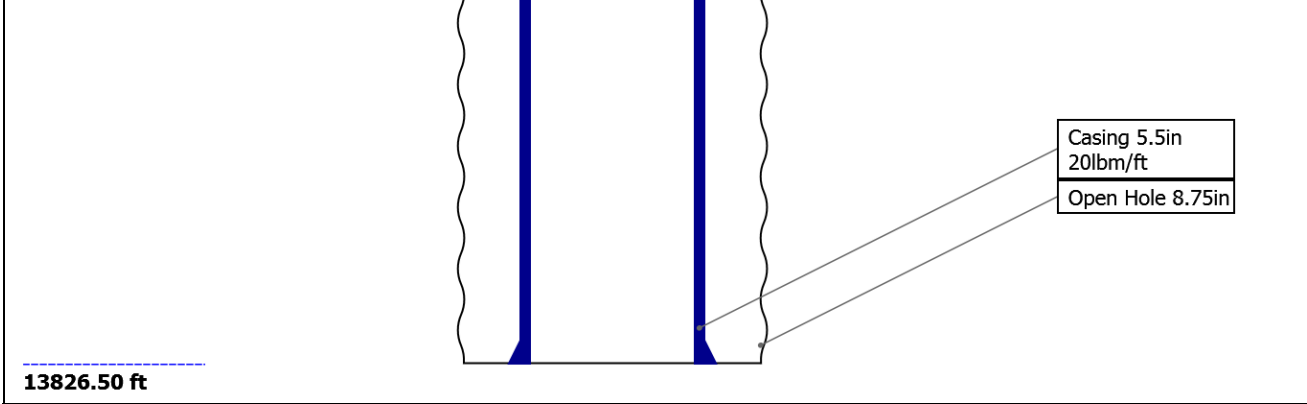
9.5 Parameter Listing

10. Calibration Report

11. Tail

Well Sketch






Borehole Size/Casing/Tubing Record

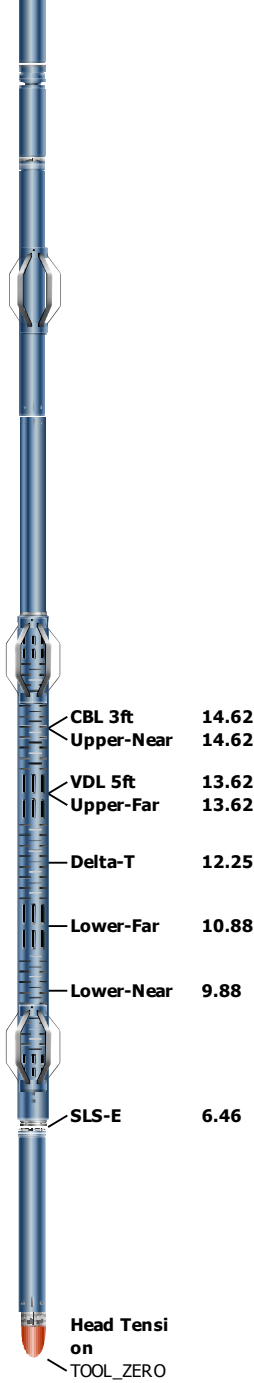
Bit						
Bit Size ( in )	24	13.5	8.75			
Top Driller ( ft )	0	101	2068.6			
Top Logger ( ft )	0	101	2068.6			
Bottom Driller ( ft )	101	2068.6	13826.5			
Bottom Logger ( ft )	101	2068.6	13826.5			
Casing						
Size ( in )	16	9.625	5.5			
Weight ( lbm/ft )	65	36	20			
Inner Diameter ( in )	15.25	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller ( ft )	0	0	0			
Top Logger ( ft )	0	0	0			
Bottom Driller ( ft )	101	2068.6	13826.5			
Bottom Logger ( ft )	101	2068.6	13826.5			

Remarks and Equipment Summary

One: Toolstring				One: Remarks	
<div><div><div>Equip name</div><div>LEH-QT</div><div>LEH-QT</div></div><div><div>Length</div><div>46.01</div></div><div><div>MP name</div><div></div></div><div><div>Offset</div><div></div></div></div> <div></div>				Toolstring ran as per toolsketch.	
				Main pass logged with 1500 psi.	
				Repeat pass logged with 0 psi.	
<div><div><div>CAL-YA:666</div><div>CAL-YA:666</div></div><div><div>43.1</div></div><div><div></div></div><div><div>42.31</div></div></div>					
<div><div><div>DTC-H:8803</div><div>ECH-KC:10354</div><div>DTC-H:8803</div></div><div><div>39.6</div></div><div><div></div></div><div><div>38.7</div><div>0.00</div></div></div>					
<div><div><div>SGT-N:10249</div><div>SGH-K:3039</div><div>SGC-TB:10249</div><div>SGD-TAA:2170</div><div>0</div></div><div><div>36.6</div></div><div><div></div></div><div><div>36.6</div><div>36.6</div></div></div>					
<div><div><div>AH-184[2]:4</div><div></div></div><div><div>31.1</div></div><div><div></div></div><div><div></div></div></div>					

AH-184[1]:3 29.1  
906

DSLTH-H:8150 27.1  
ECH-KH:8150  
DSLCH-H:8150  
SLS-E:1185



Adaptor\_Head 6.46

BNS-STD 0.46

Head Tension

TOOL\_ZERO

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-JA
Serial Number	5896
Calibration Date	29-Apr-2016
Calibrator Serial Number	
Calibration Cable Type	7-39P-LXS
Wheel Correction 1	-1
Wheel Correction 2	-3

### Tension Device

Type	CMTD-B/A
Serial Number	1109

Calibration Date			
Calibrator Serial Number	441435A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	3		
Calibration Peak Error	4		

## Logging Cable

Type	7-39P-LXS		
Serial Number			
Length	15000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane		

## One:Depth Control Parameters

### Depth Control Remarks

Log Sequence	First Log In the Well	All Schlumberger depth procedures followed.
Rig Up Length At Surface		IDW used as primary depth device.
Rig Up Length At Bottom		Z-Chart used as secondary depth device.
Rig Up Length Correction		Depth correlated to short joint at 4874.4 ft
Stretch Correction		
Tool Zero Check At Surface		

# One

## 1500 PSI Main Pass

## Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.68624.3100

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	49.77 ft	4993.95 ft	10-Nov-2016 11:46:52 AM	10-Nov-2016 1:12:09 PM	ON	-6.36 ft	No

All depths are referenced to toolstring zero

## Log

Company:Whiting Oil & Gas Corporation

Well:Horsetail 30E-1903

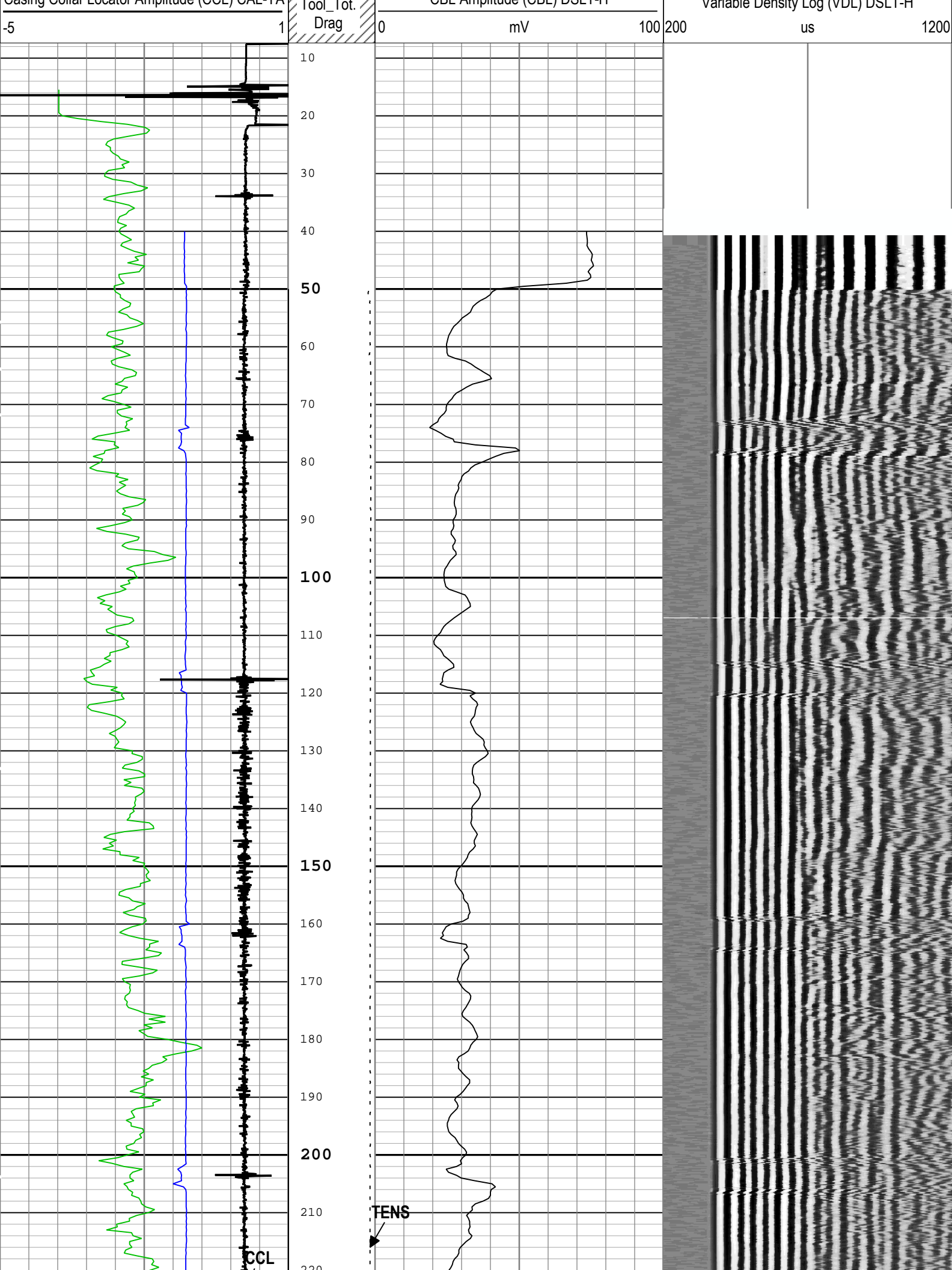
One: Log[4]:Up:S008

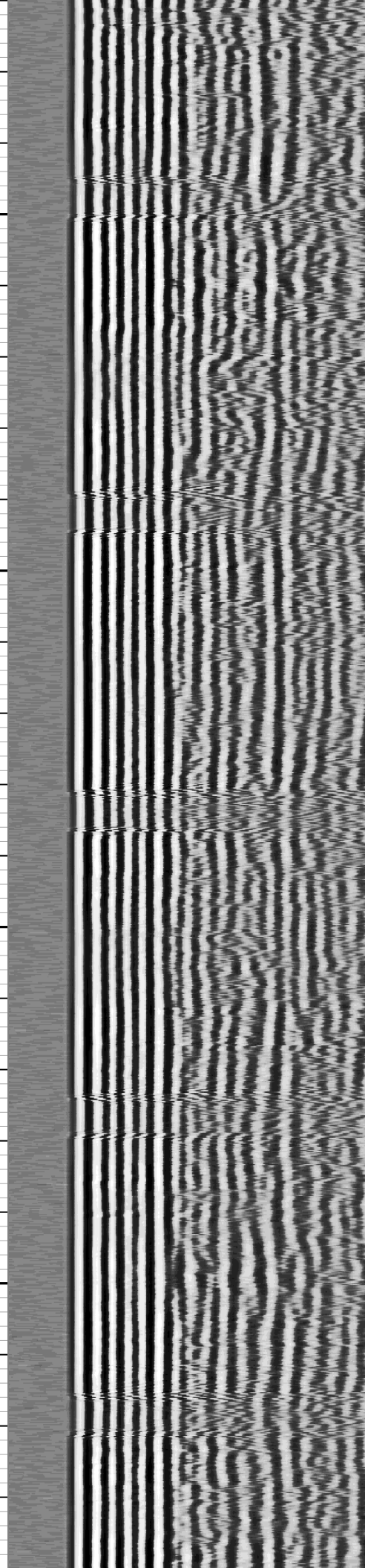
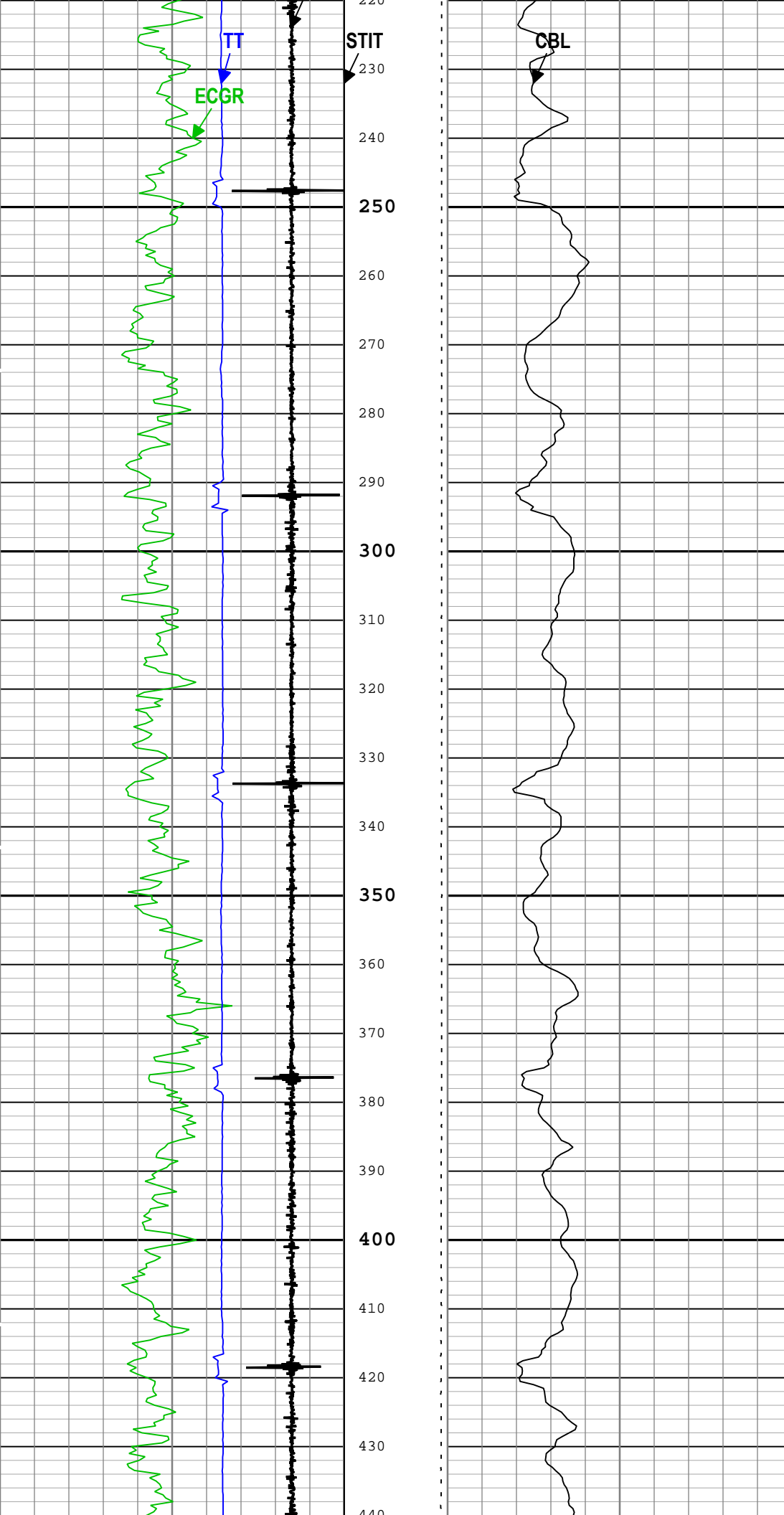
Description: CBL\_VDL    Format: Log ( Sonic CBL with VDL )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 10-Nov-2016 13:35:01

TIME 1900 - Time Marked every 60.00 (s)

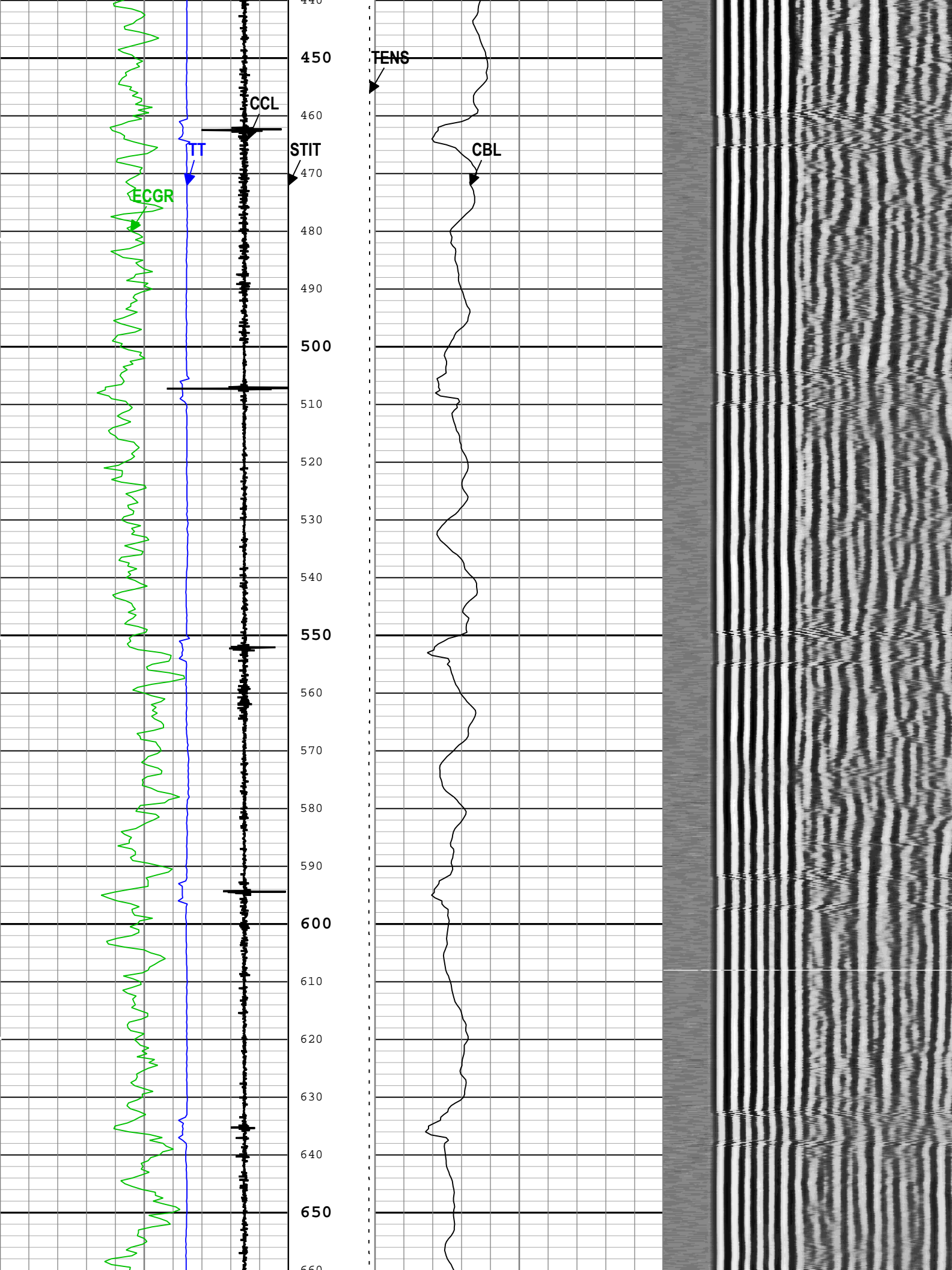
└ BIEP - Bond Index Event Pips DSLT-H

		Stuck Tool Indicator, Total (STIT)		
		0	ft	50
Gamma Ray (ECGR) SGT-N				
0	gAPI	10000		0
		lbf		
Transit Time for CBL (TT) DSLT-H		CBL Amplitude (CBL) DSLT-H		
400	us	200	0	10
			mV	
Casing Collar Locator Amplitude (CCL) CAL-YA		CBL Amplitude (CBL) DSLT-H		
		Variable Density Log (VDL) DSLT-H		

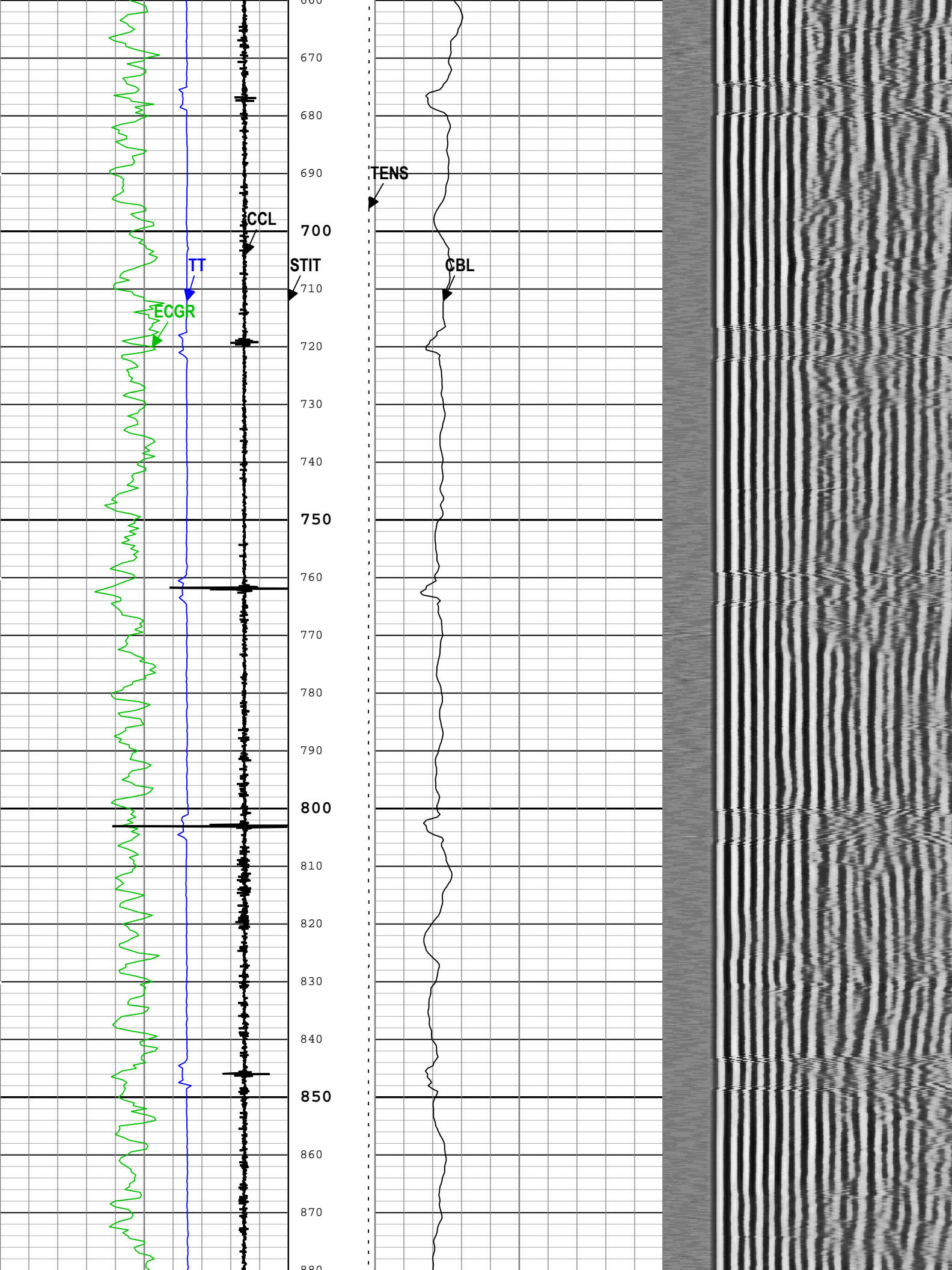


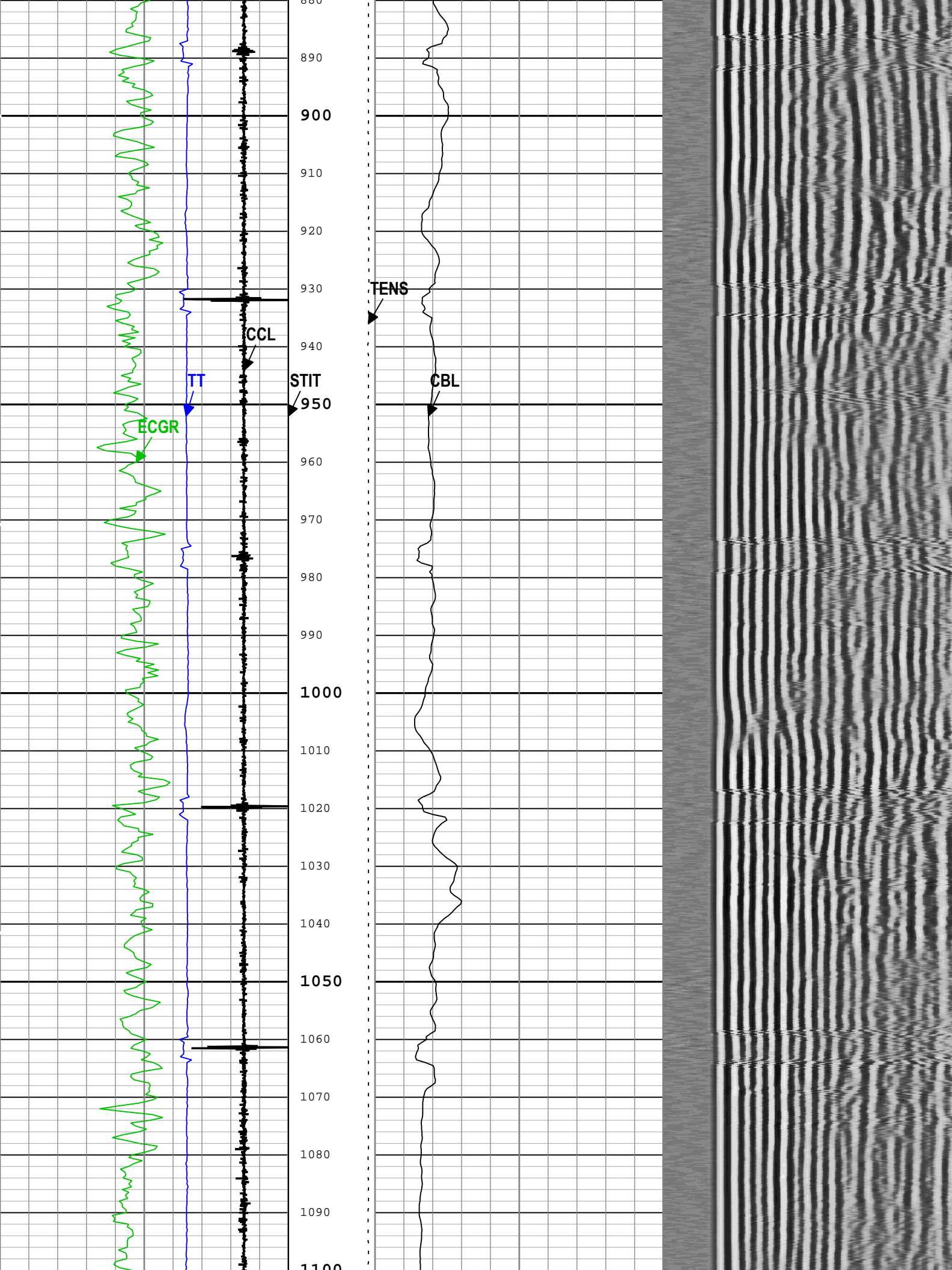


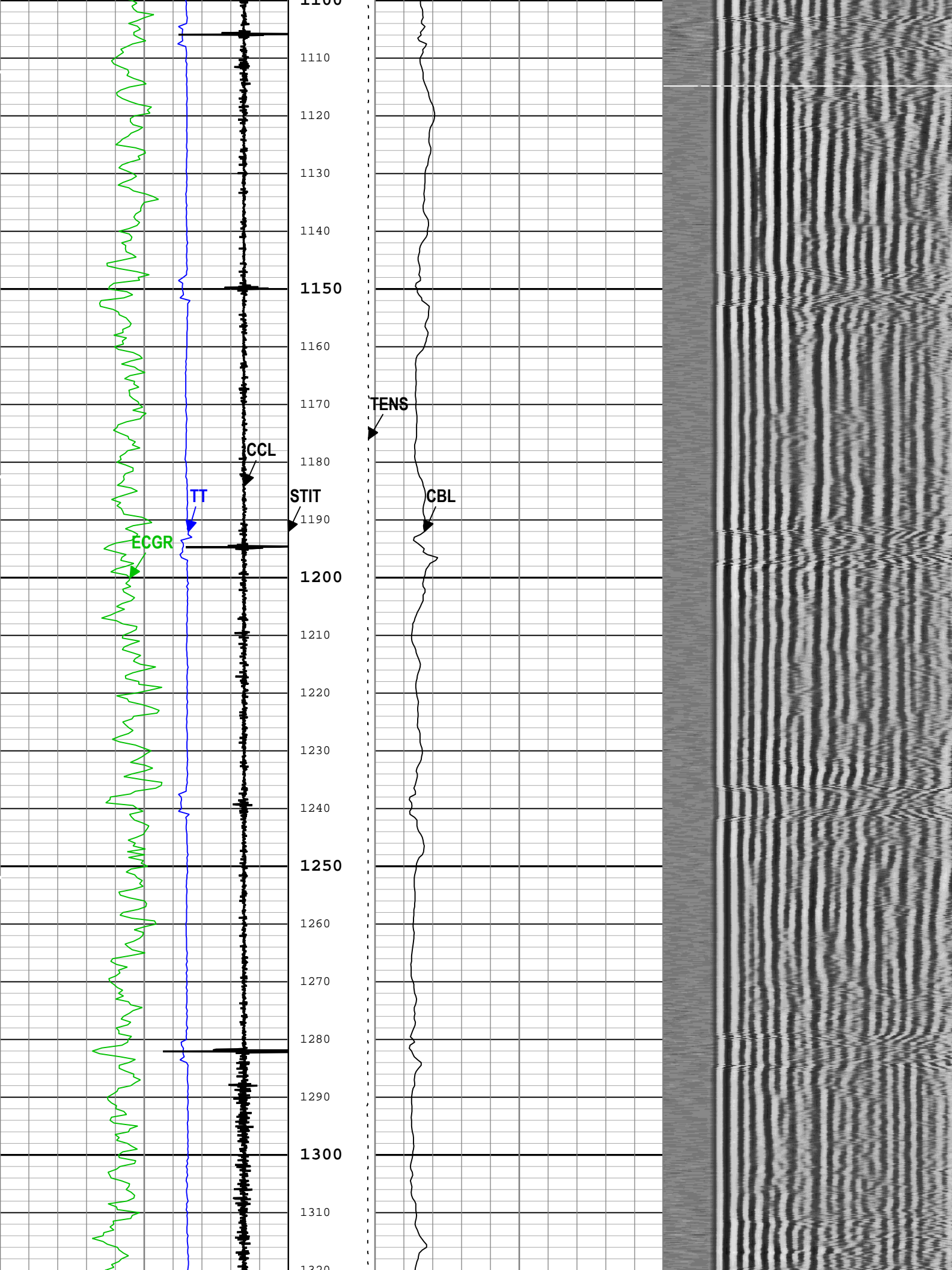




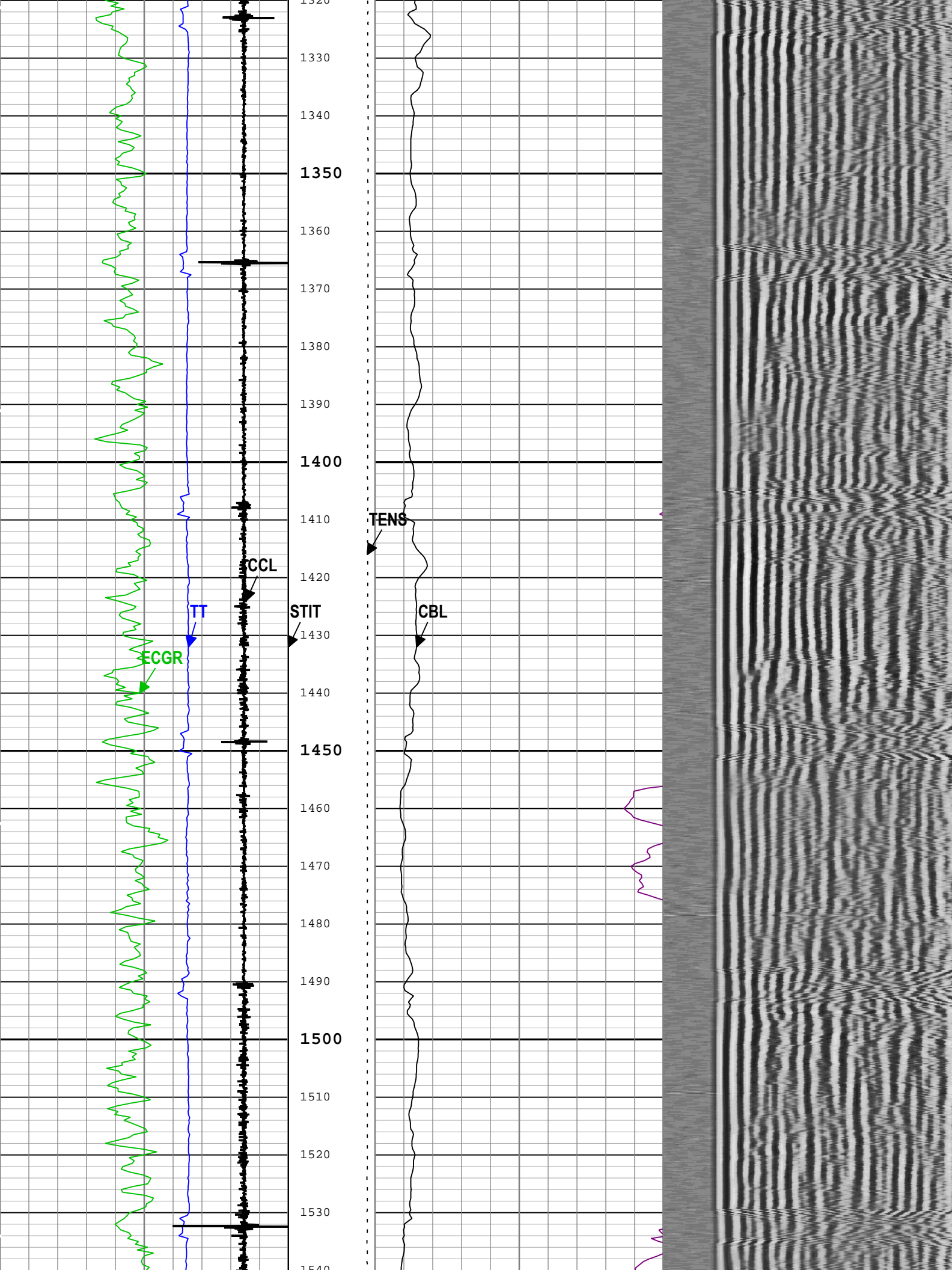


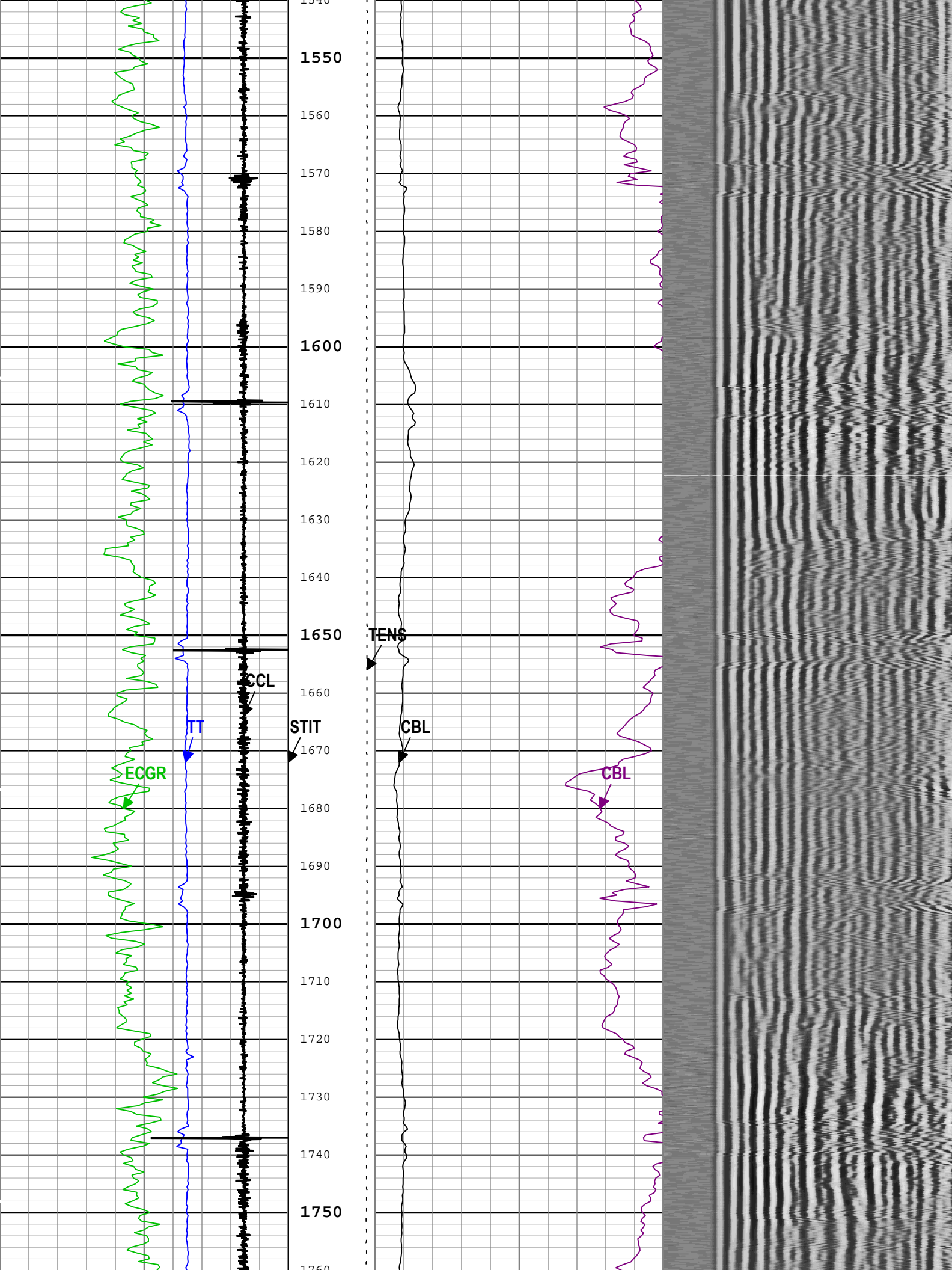


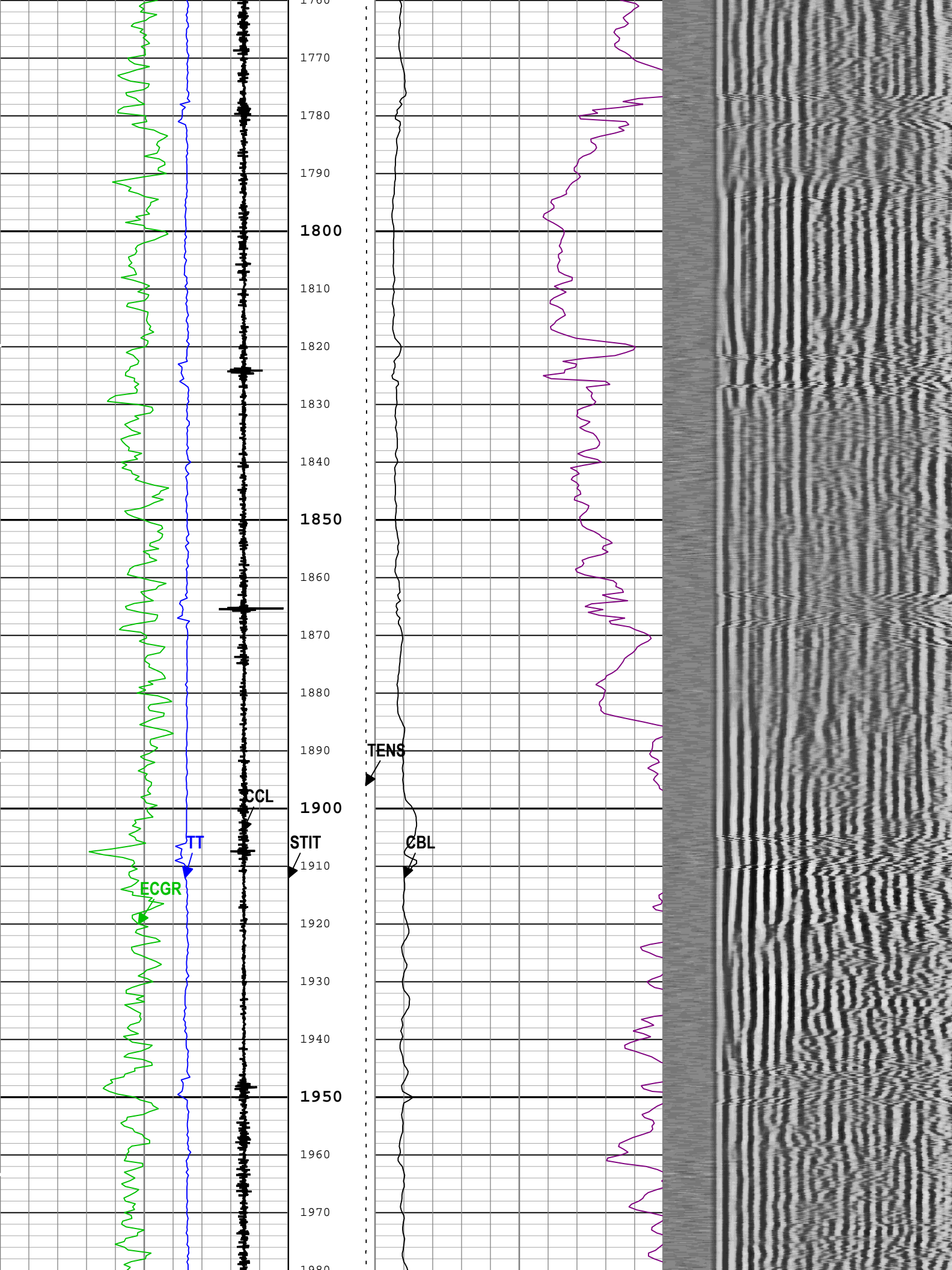




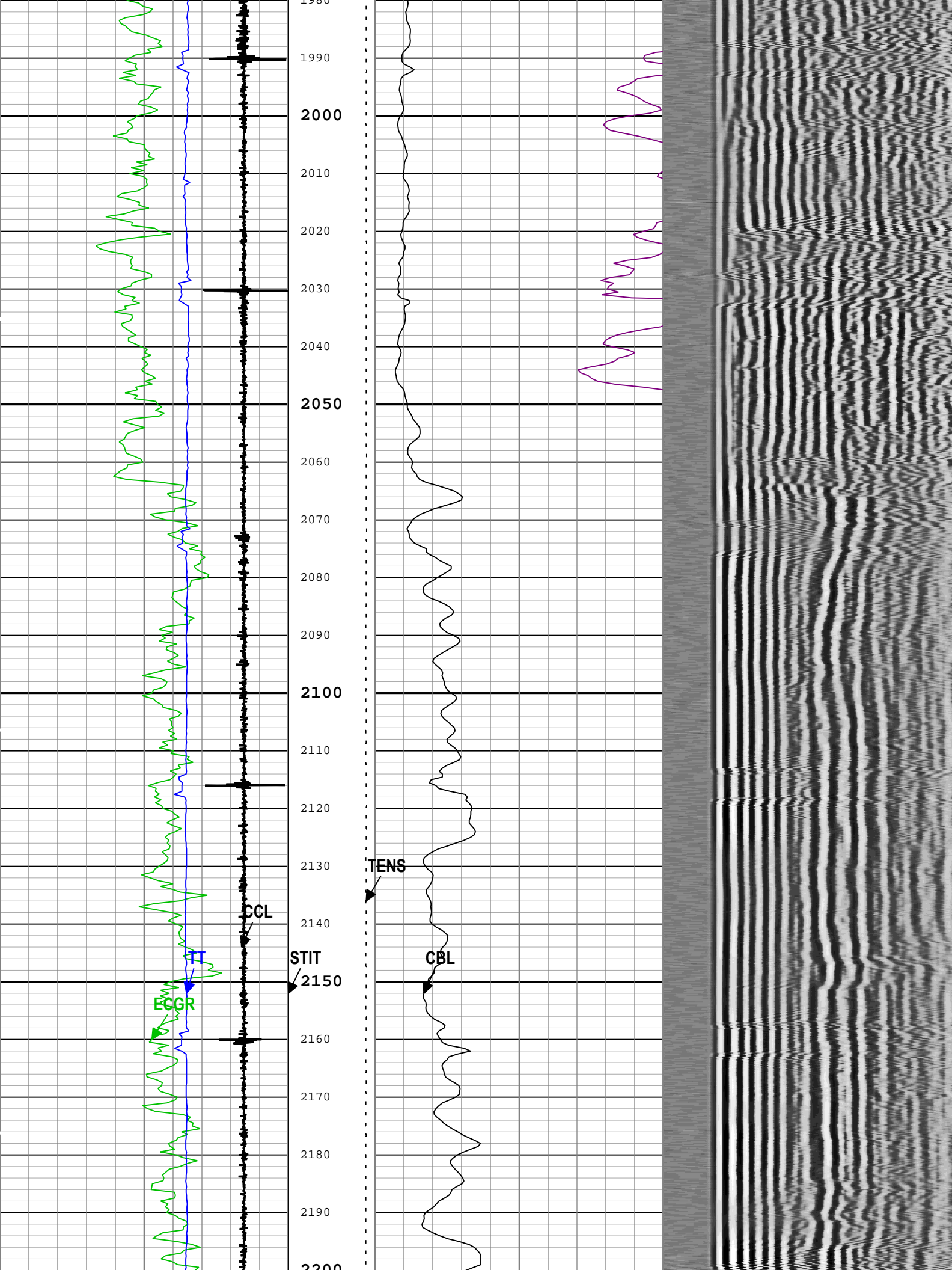


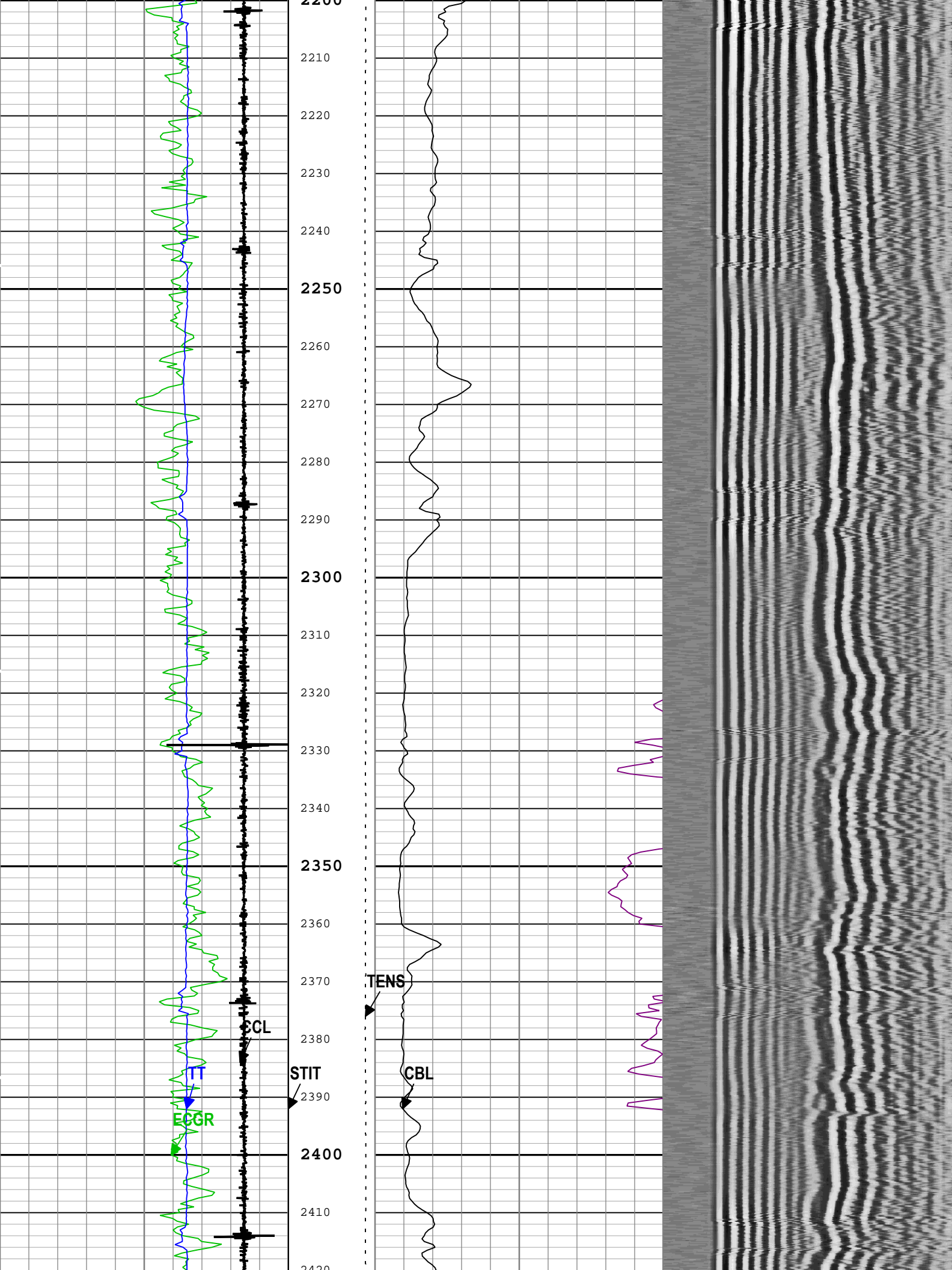


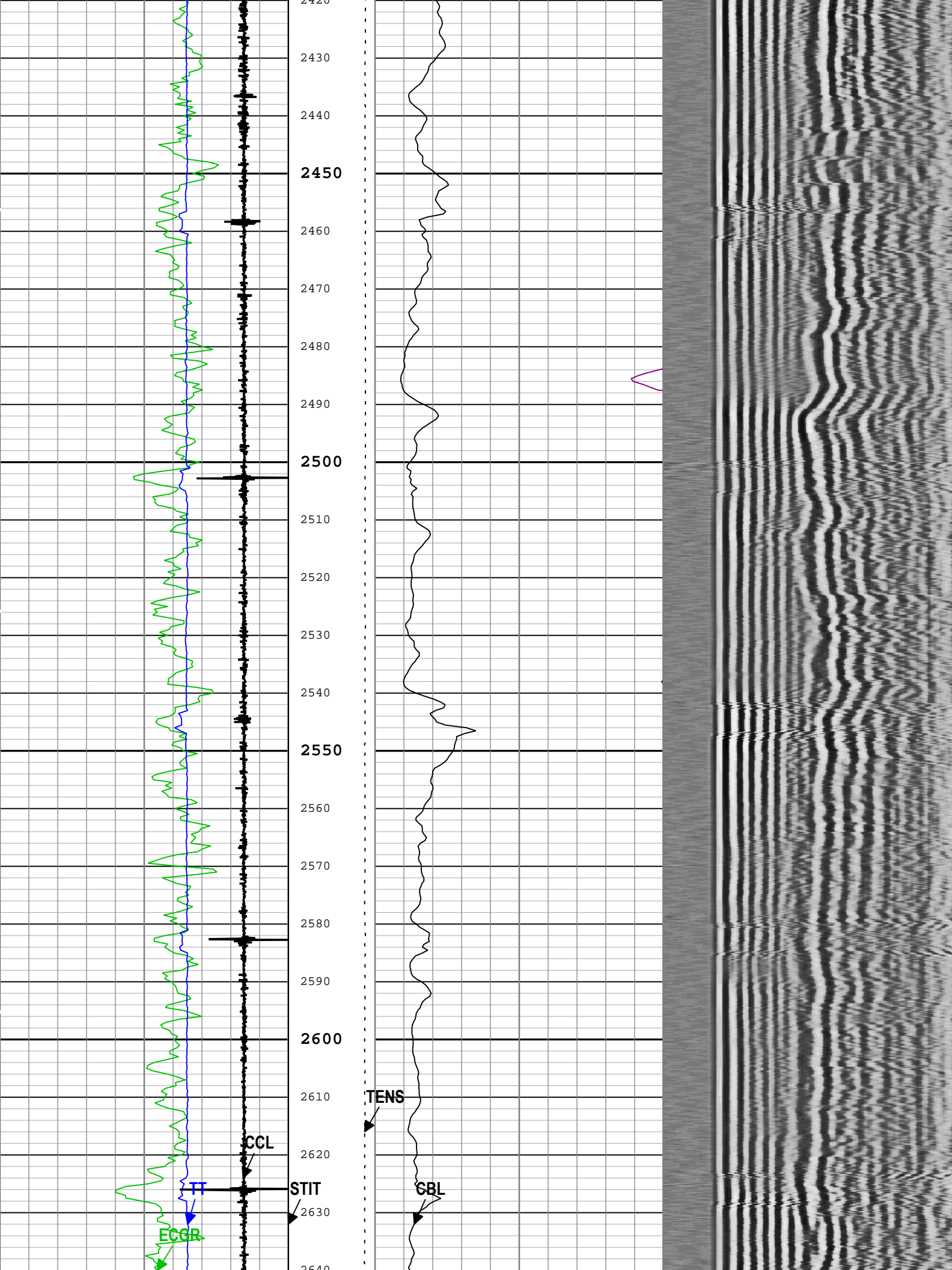




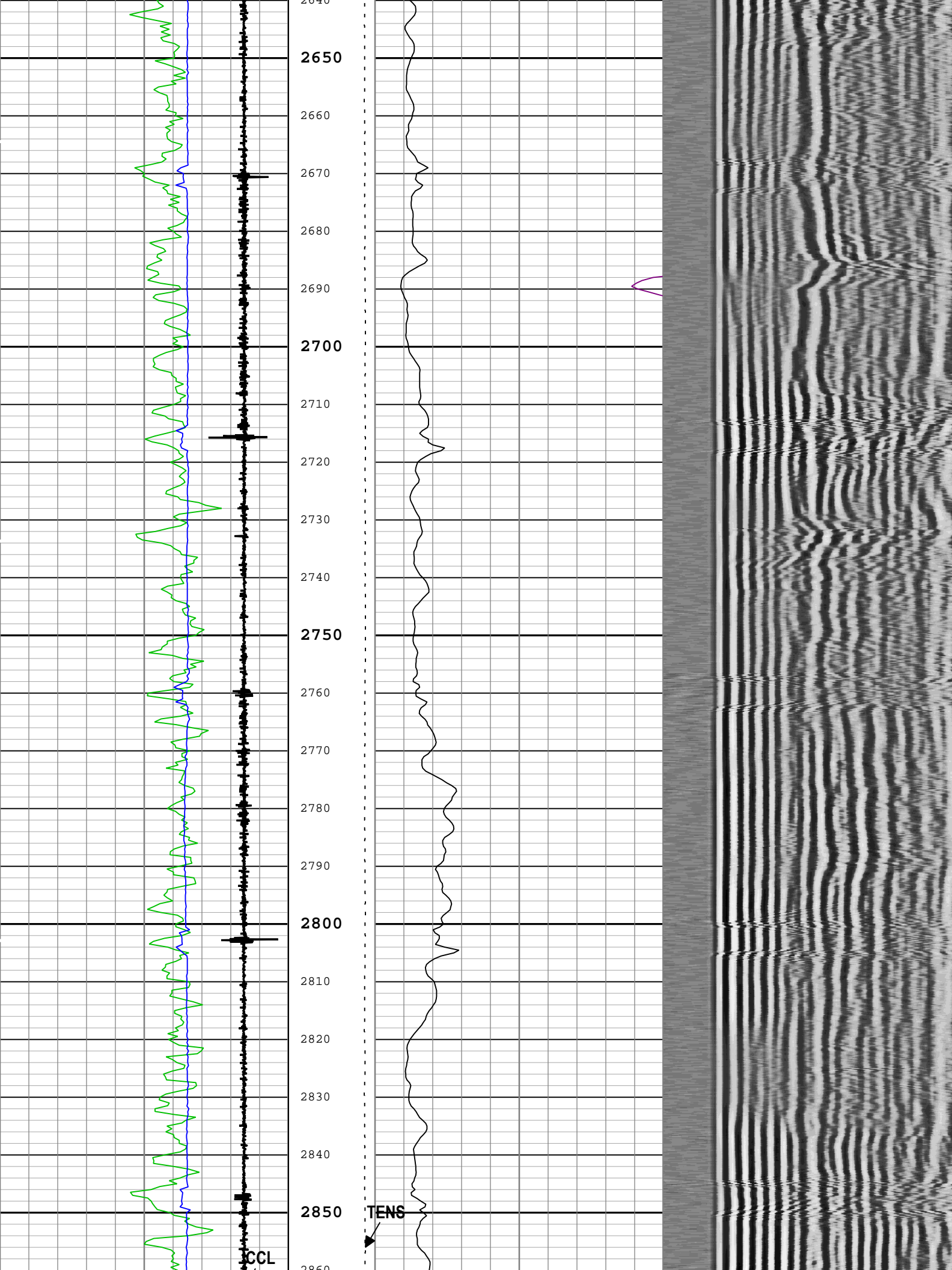


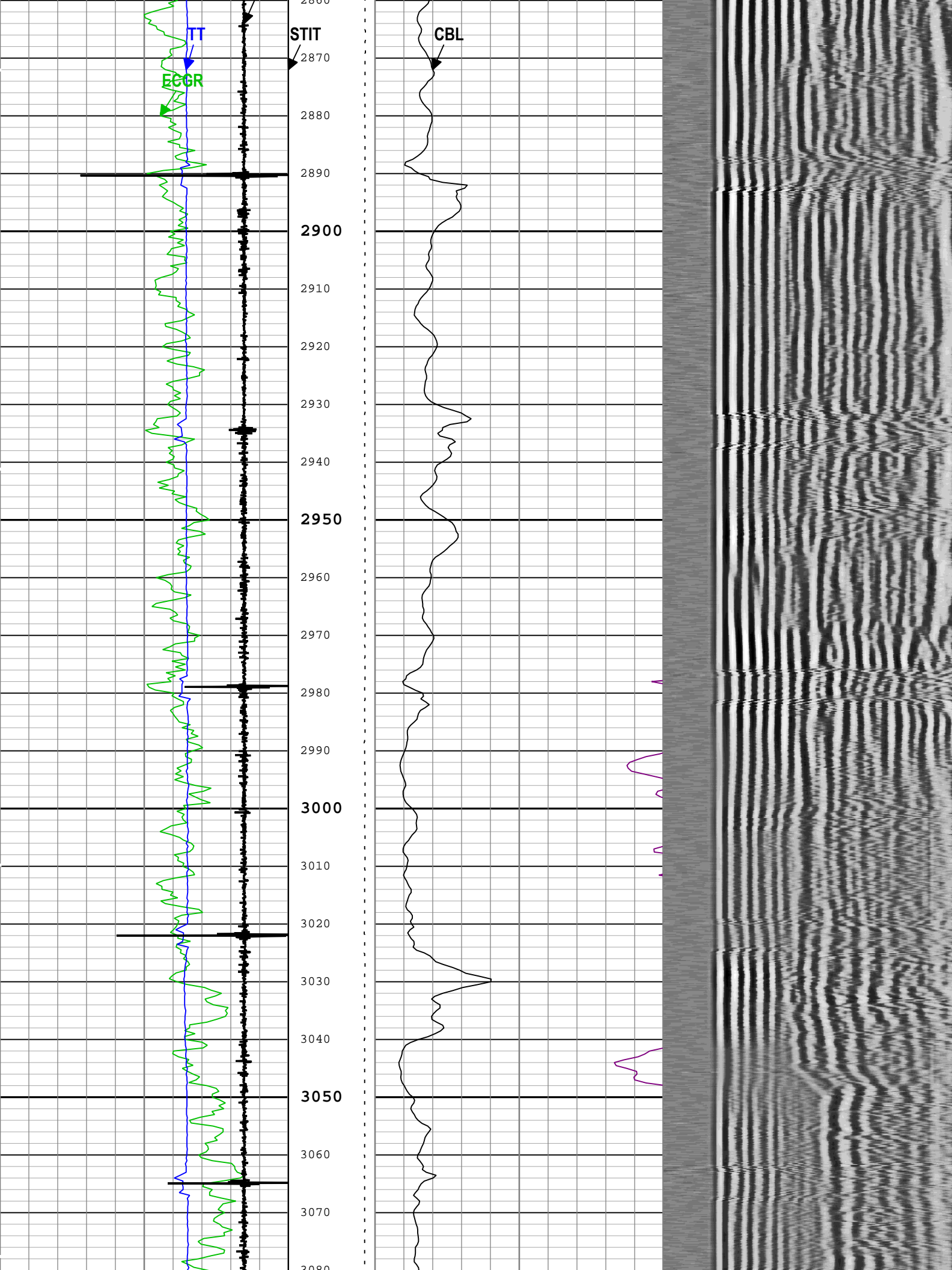


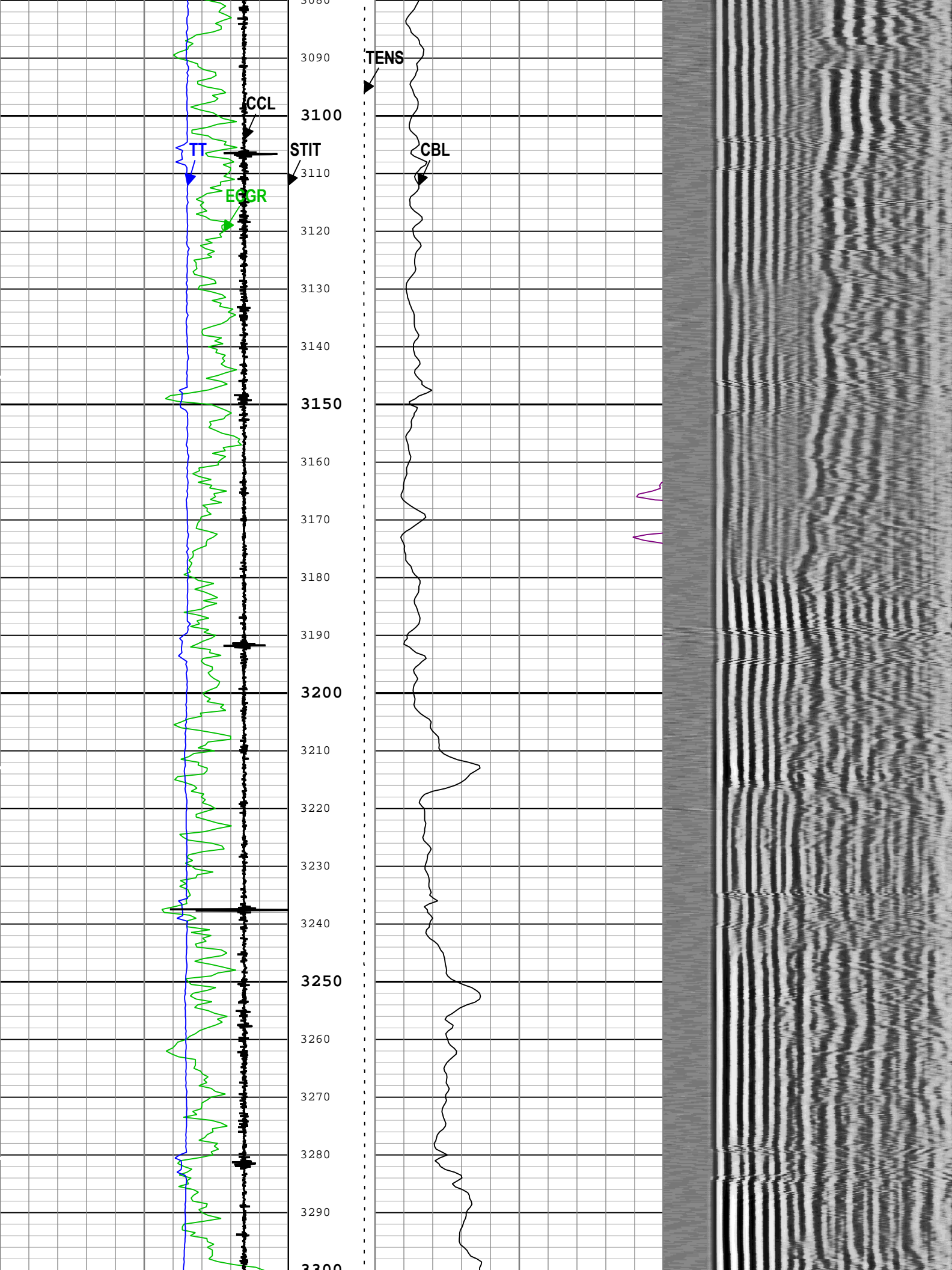




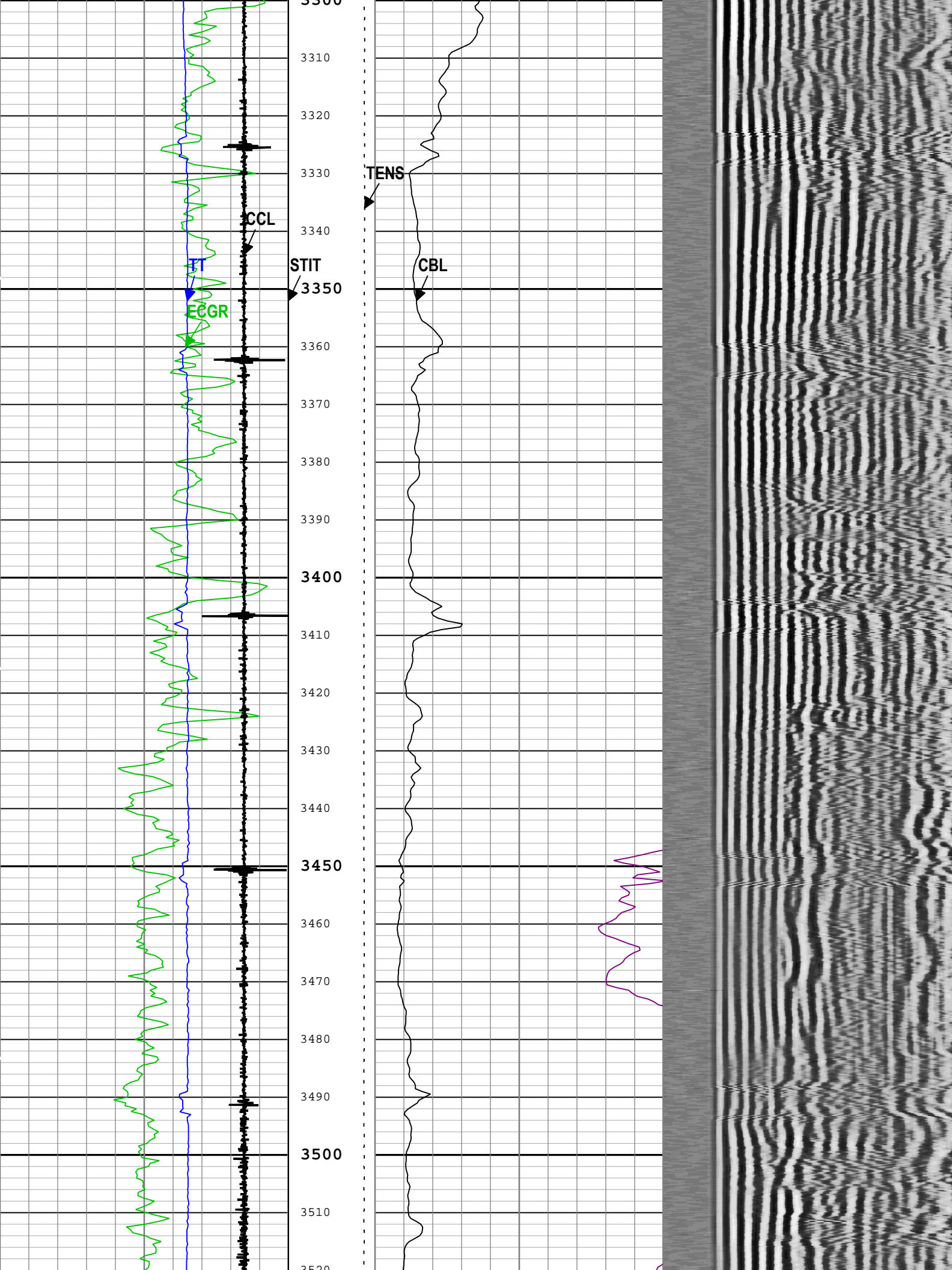


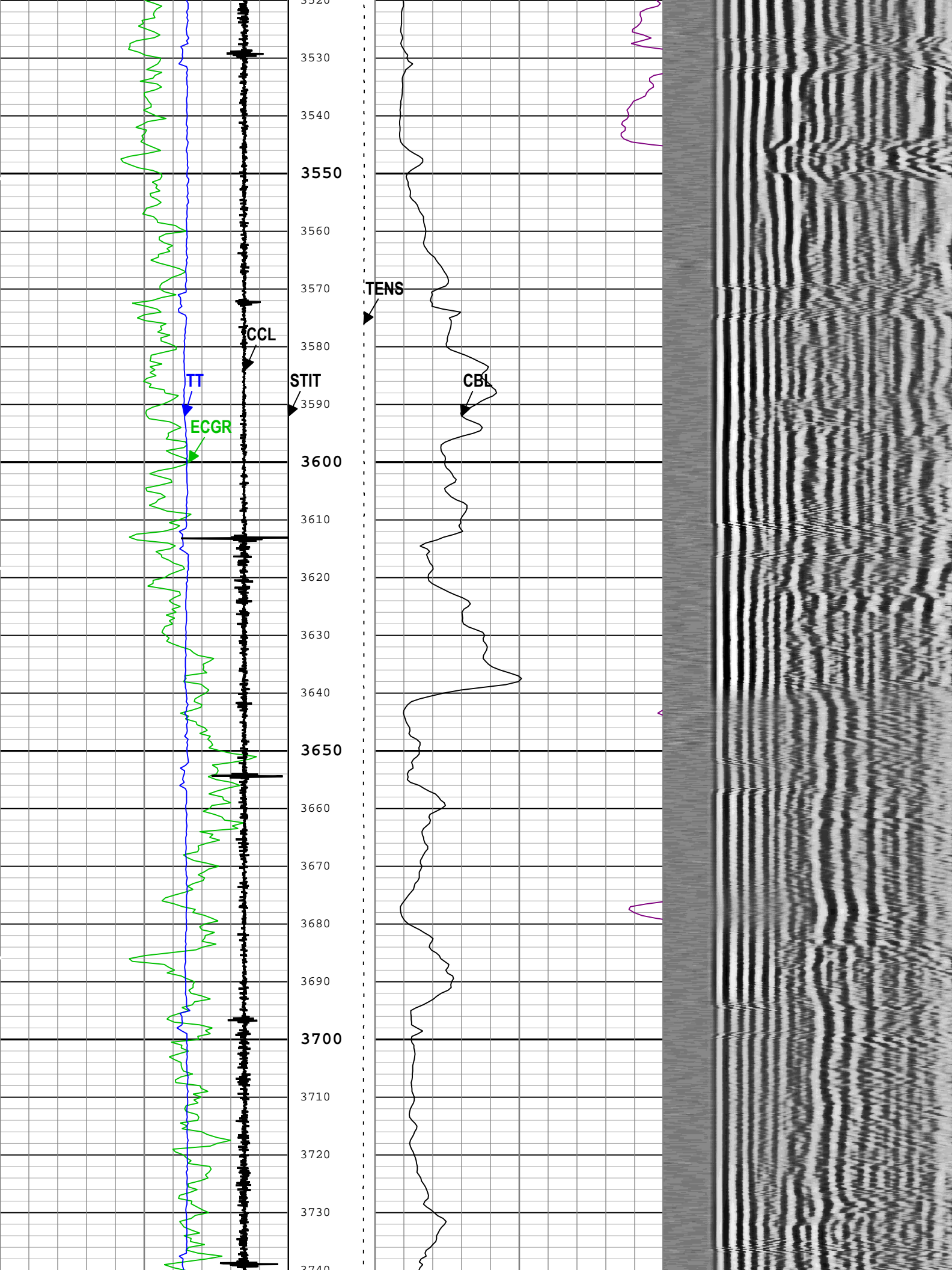


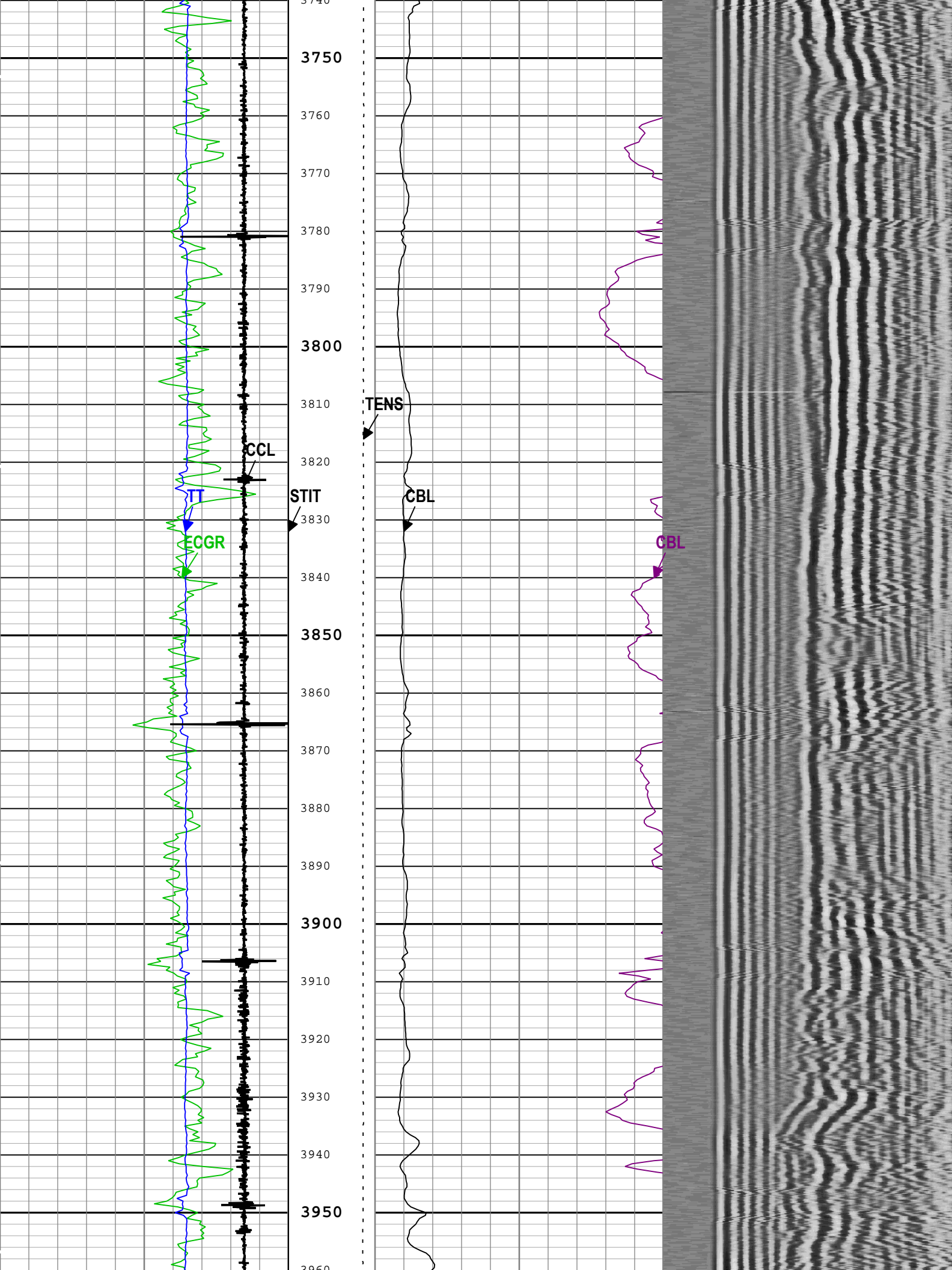




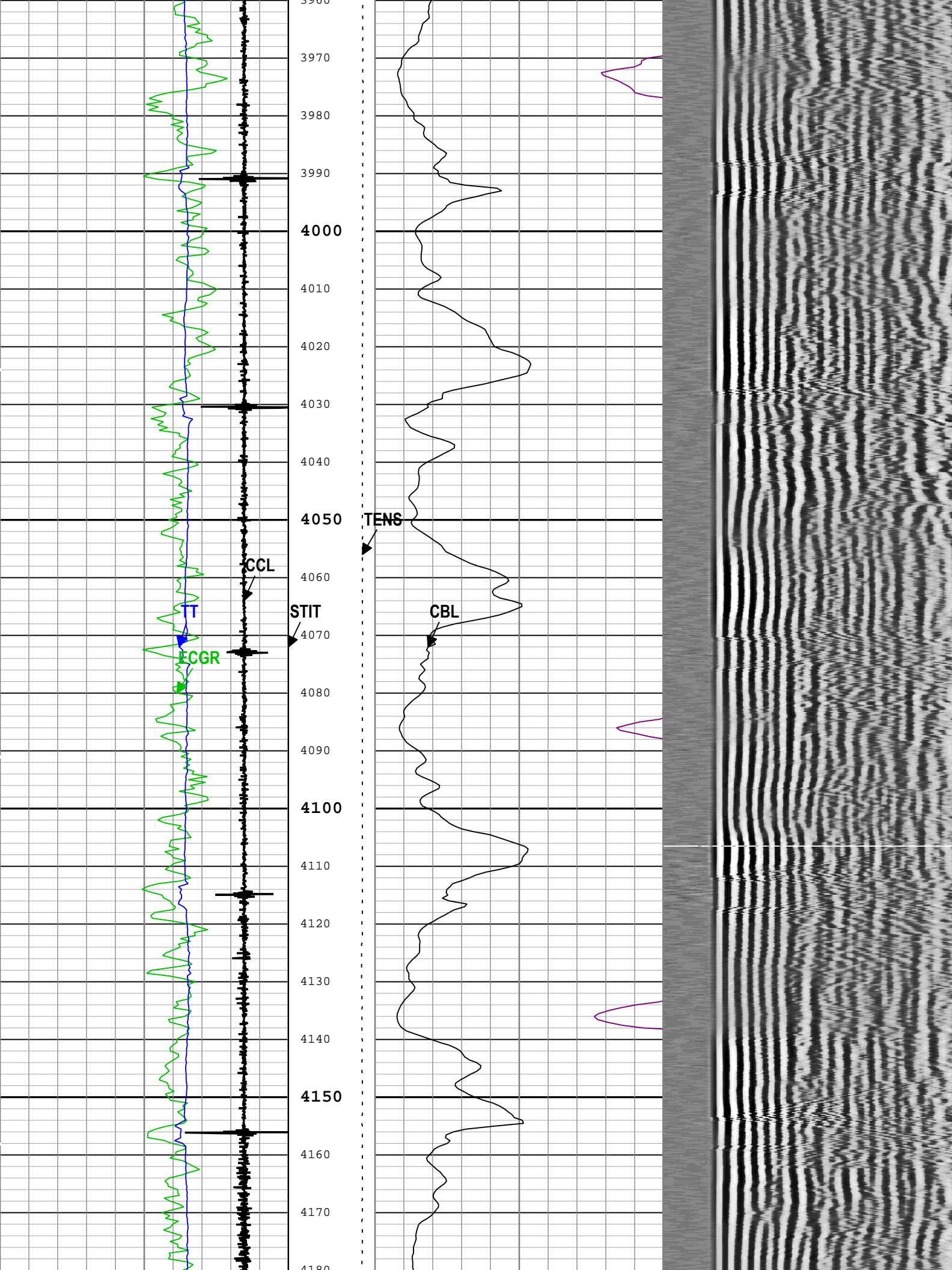


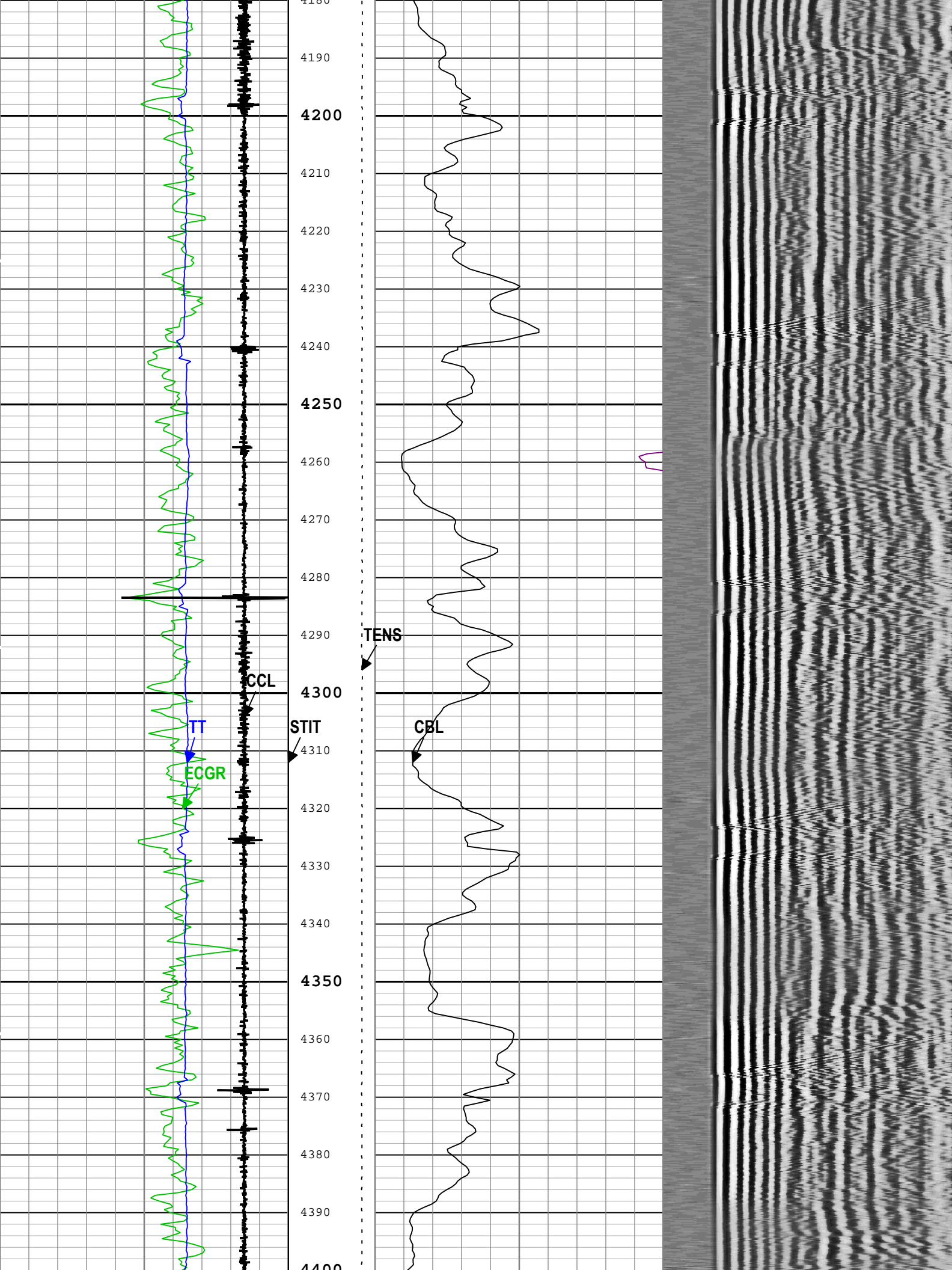


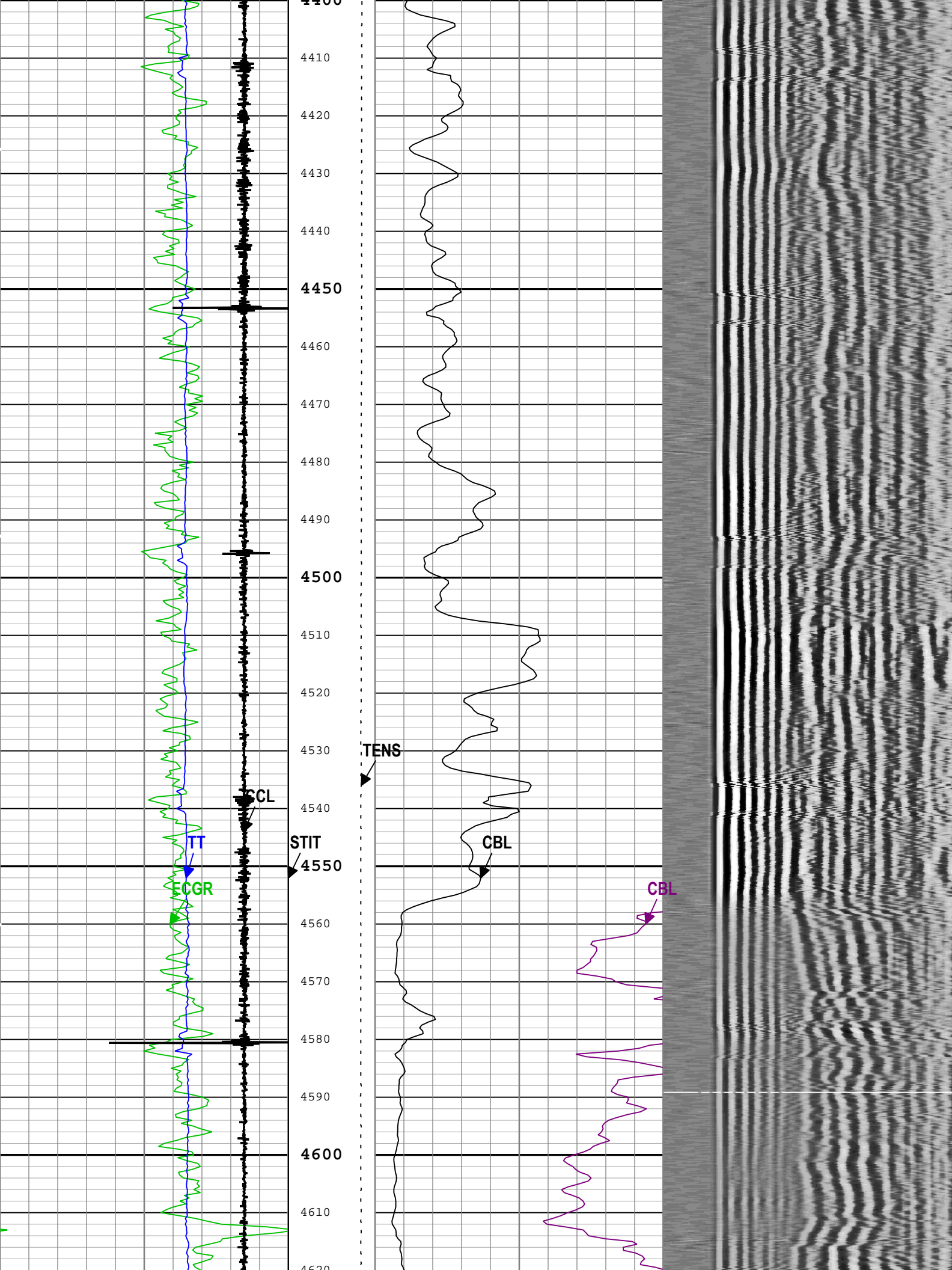




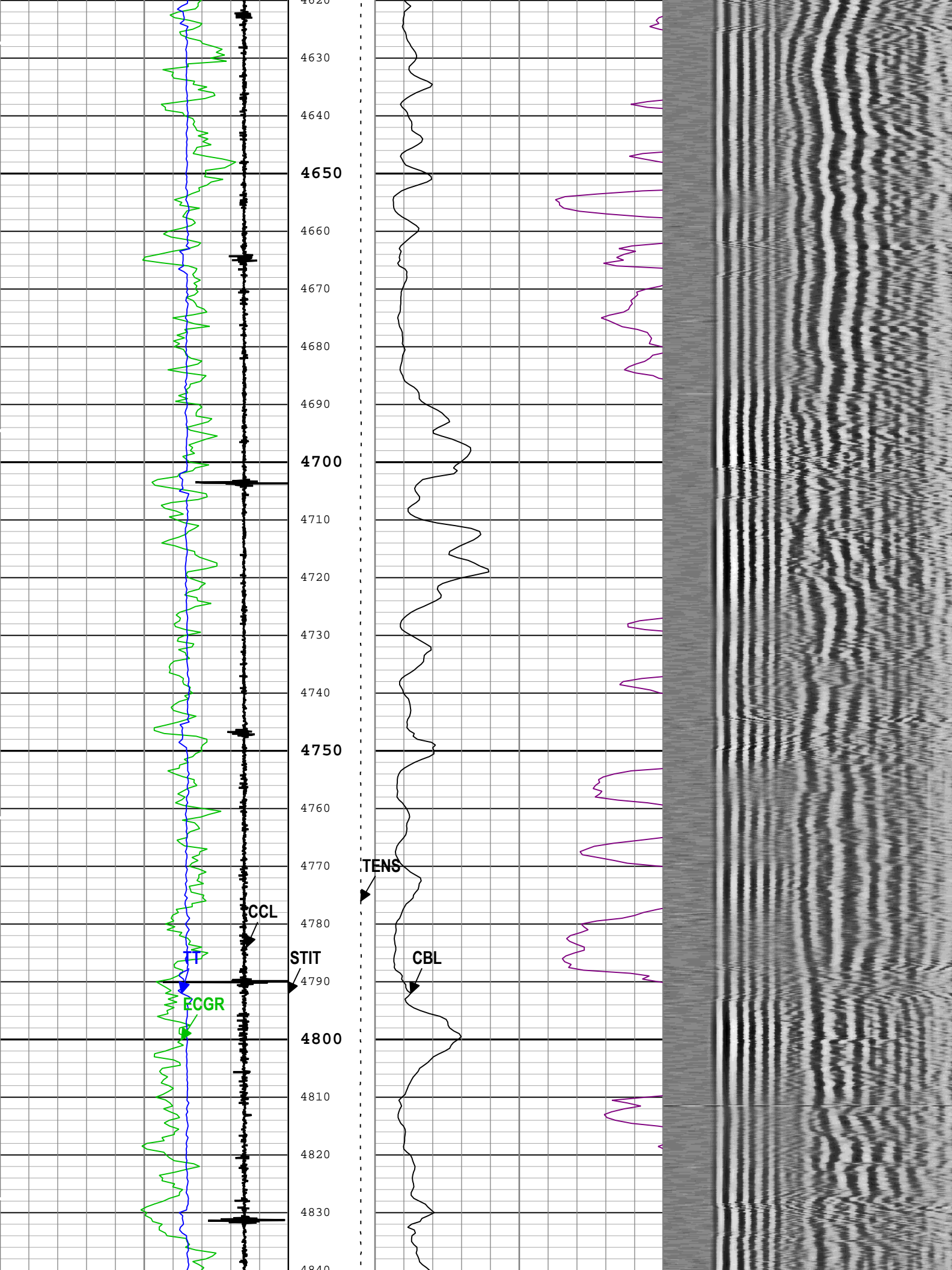


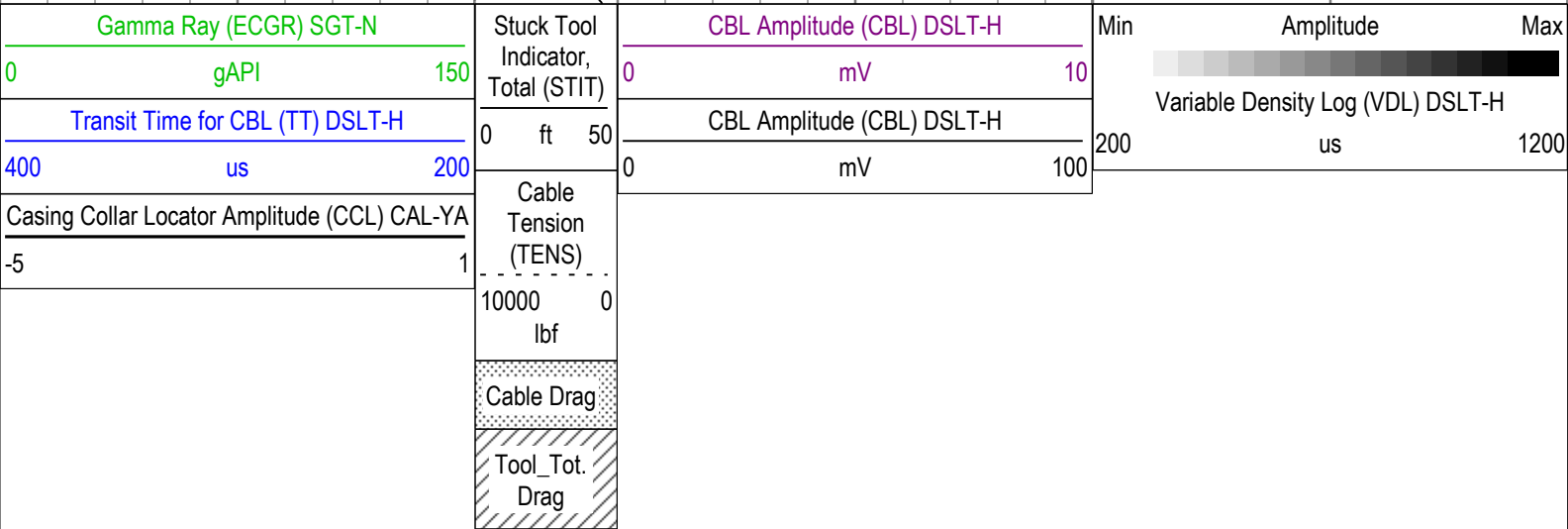
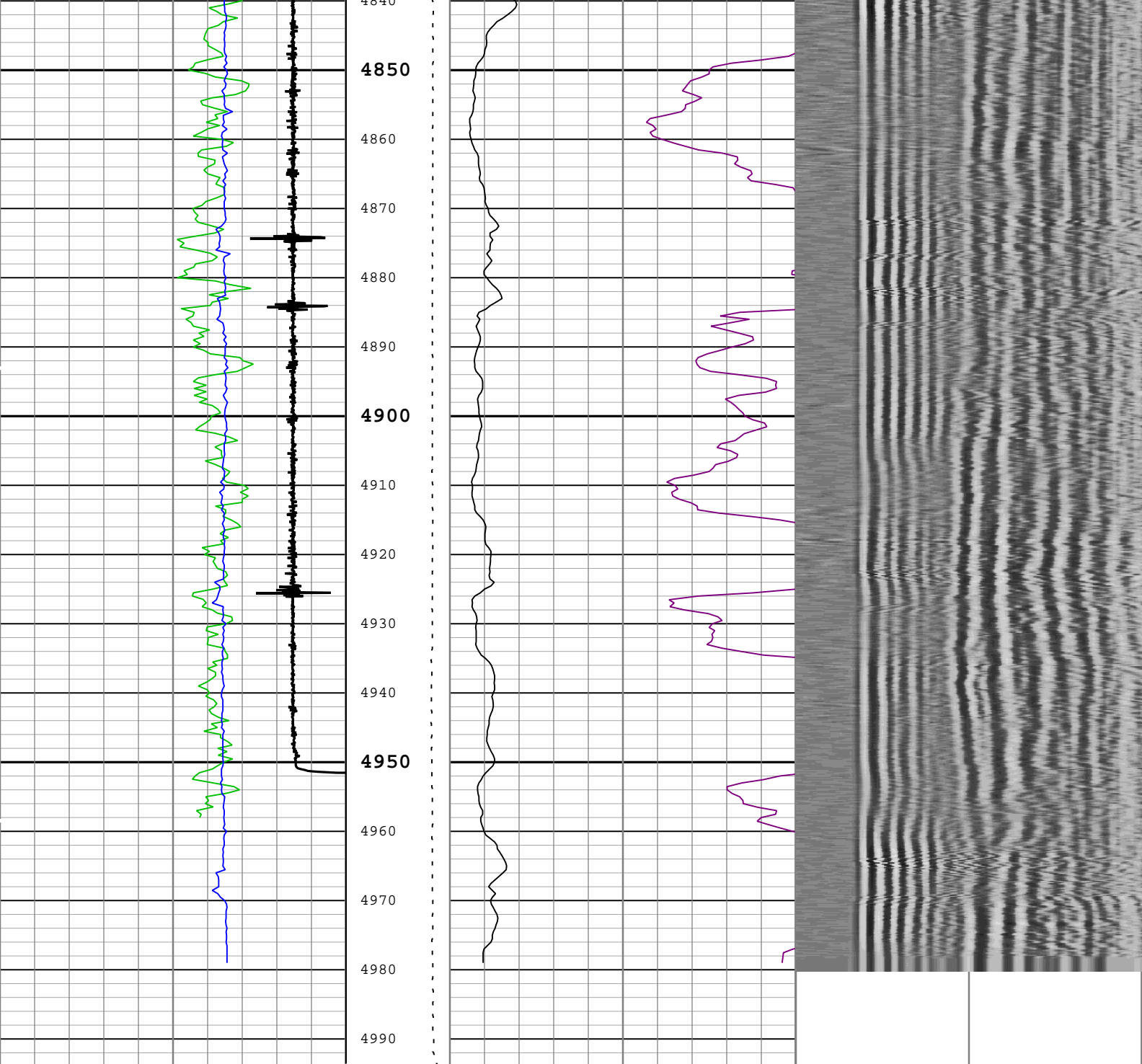












— BIEP - Bond Index Event Pips DSLT-H

TIME\_1900 - Time Marked every 60.00 (s)

## Channel Processing Parameters

### One: Parameters

Parameter	Description	Tool	Value	Unit
AMSG	Auxiliary Minimum Sliding Gate	DSLT-H	240	us
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	59	us
CBLO	Casing Bottom (Logger)	WLSESSION	13826.5	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLT-H	72	mV
CCL_MULTIPLIER	Casing Collar Locator Multiplier	CAL-YA	3	
CDEN	Cement Density	SGT-N	2	g/cm3
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
MAHTR	Manual High Threshold Reference for first arrival detection	DSLT-H	120	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	DSLT-H	11.85	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	1.6	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLT-H	1.6	mV
NMSG	Near Minimum Sliding Gate	DSLT-H	249	us
NMXG	Near Maximum Sliding Gate	DSLT-H	474	us
SGAD	Sliding Gate Status	DSLT-H	Off	
SGDT	Sliding Gate Delta-T	DSLT-H	55	us/ft
VDLG	VDL Manual Gain	DSLT-H	4.09	

### Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	24	7.5	101
BS	13.5	101	2068.6
BS	8.75	2068.6	4993.92
MCI	26.48	7.5	101
MCI	14.81	101	2068.6
MCI	4.75	2068.6	4993.92

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	3600	ft/h
SGAI	Selectable Acquisition Gain	DSLT-H	x1	

## 0 PSI Repeat Pass

## Software Version

Acquisition System

Maxwell 2016 SP2

Version

6.2.68624.3100

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	4690.98 ft	4995.91 ft	10-Nov-2016 11:36:27 AM	10-Nov-2016 11:41:10 AM	ON	-6.95 ft	No

All depths are referenced to toolstring zero

## Log

Company:Whiting Oil &amp; Gas Corporation

Well:Horsetail 30E-1903

One: Log[3]:Up:S008

Description: CBL\_VDL Format: Log ( Sonic CBL with VDL ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Nov-2016 13:35:06

TIME\_1900 - Time Marked every 60.00 (s)

BIEP - Bond Index Event Pips DSLT-H

Stuck Tool Indicator, Total (STIT)

0 ft 50

Cable Tension (TENS)

10000 0 lbf

Gamma Ray (ECGR) SGT-N

0 gAPI 150

Transit Time for CBL (TT) DSLT-H

400 us 200

Casing Collar Locator Amplitude (CCL) CAL-YA

-5 1

Cable Drag

CBL Amplitude (CBL) DSLT-H

0 mV 10

Tool\_Tot. Drag

CBL Amplitude (CBL) DSLT-H

0 mV 100

Min

Amplitude

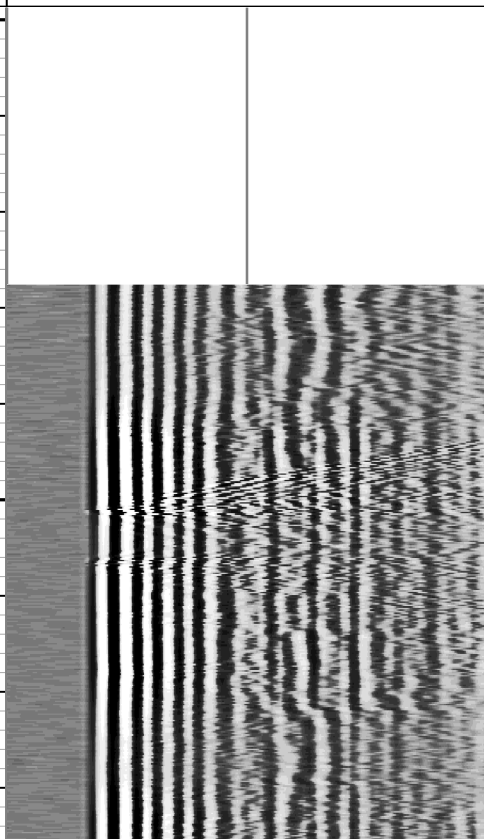
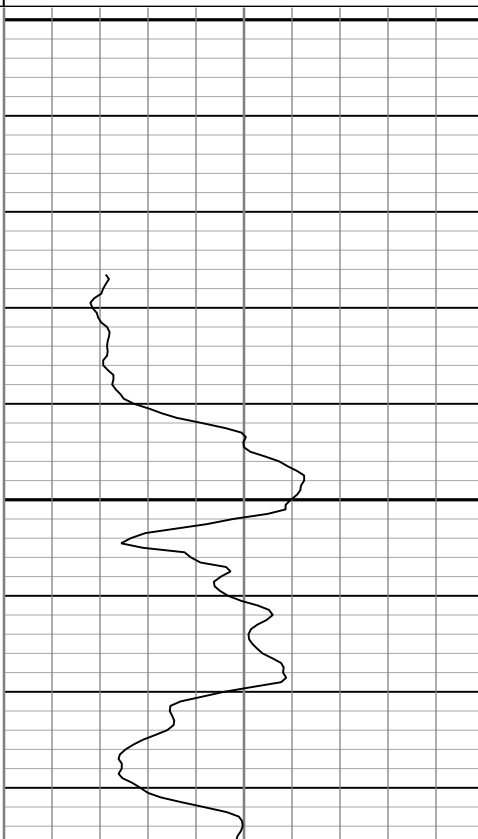
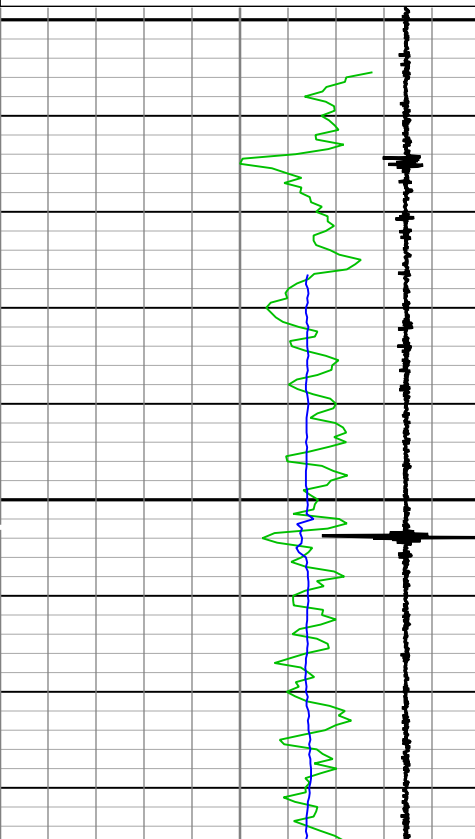
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Variable Density Log (VDL) DSLT-H

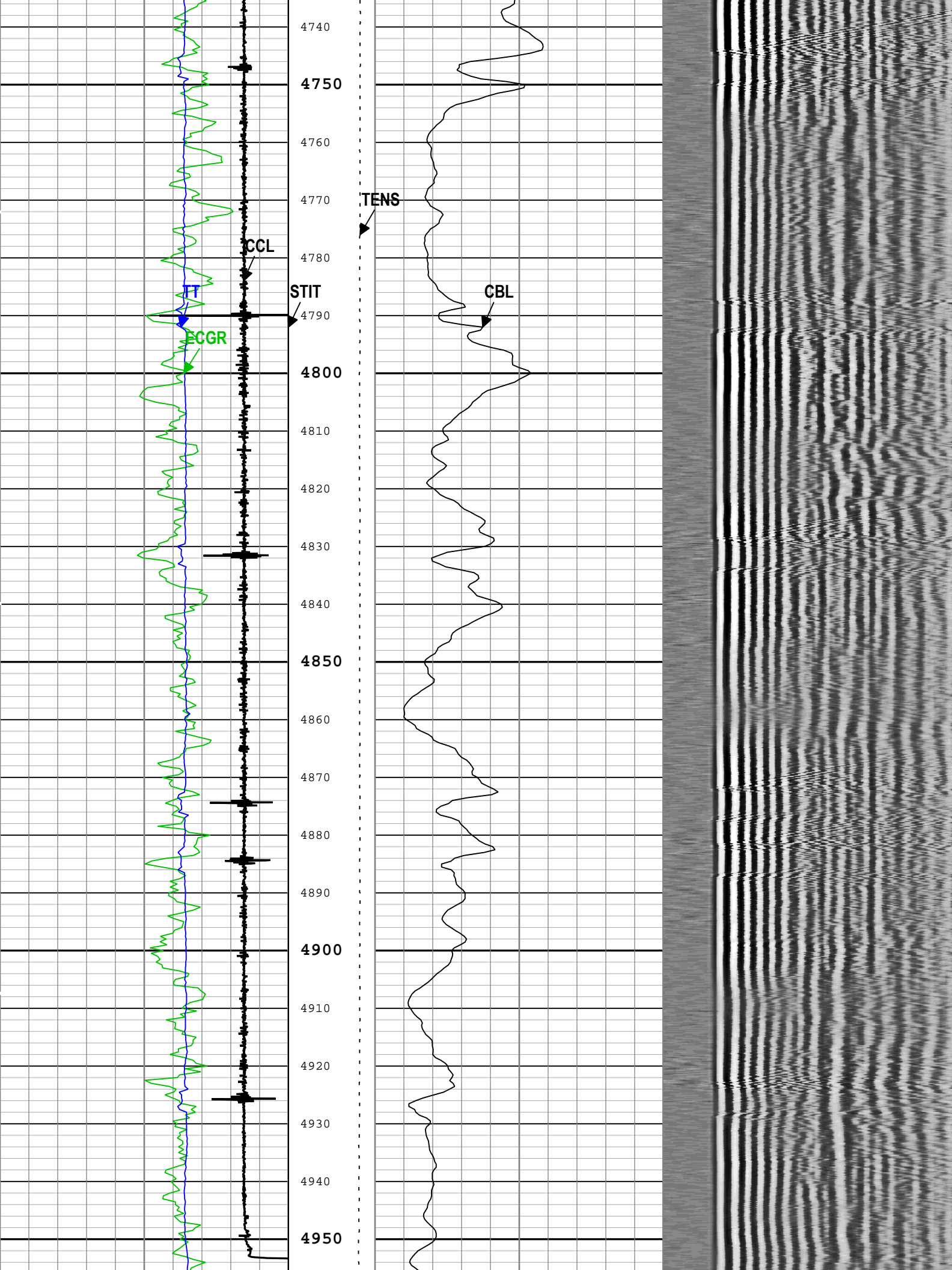
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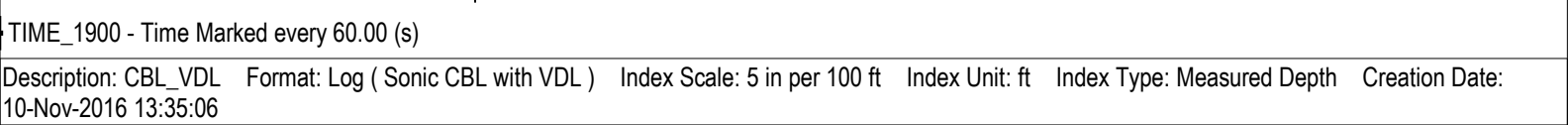
us

1200









## One: Parameters

Parameter	Description	Tool	Value	Unit
AMSG	Auxiliary Minimum Sliding Gate	DSLTH	240	us
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	8.75	in
CBLG	CBL Gate Width	DSLTH	59	us
CBLO	Casing Bottom (Logger)	WLSESSION	13826.5	ft
CBRA	CBL LQC Reference Amplitude in Free Pipe	DSLTH	72	mV
CCL_MULTIPLIER	Casing Collar Locator Multiplier	CAL-YA	3	
CDEN	Cement Density	SGT-N	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DETE	Delta-T Detection	DSLTH	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	DSLTH	3.42	mV
MAHTR	Manual High Threshold Reference for first arrival detection	DSLTH	120	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	DSLTH	11.85	dB/ft
MCI	Minimum Cemented Interval for Isolation	DSLTH	4.75	ft
MNHTR	Minimum High Threshold Reference for first arrival detection	DSLTH	100	
MSA	Minimum Sonic Amplitude	DSLTH	1.6	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	DSLTH	1.6	mV

DSLT-H	Minimum Sonic Amplitude in Arbitrary Count	DSLT-H	1.0	us
NMSG	Near Minimum Sliding Gate	DSLT-H	249	us
NMXG	Near Maximum Sliding Gate	DSLT-H	474	us
SGAD	Sliding Gate Status	DSLT-H	Off	
SGDT	Sliding Gate Delta-T	DSLT-H	55	us/ft
VDLG	VDL Manual Gain	DSLT-H	4.09	

## 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	3600	ft/h
SGAI	Selectable Acquisition Gain	DSLT-H	x1	

## 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

1185

### CBL Free Pipe Adjustment - Free Pipe Measurement

Before (Measured): 11:21:09 10-Nov-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Amplitude	mV	Before	60.00	15.00	88.03	174.00	<div><div></div></div>
CBL Reference Amplitude (CBRA)	mV	Before			72.00		<div><div></div></div>
Measurement Depth	ft	Before			326.93		<div><div></div></div>

### CBL Free Pipe Adjustment - CBL Amplitude Coefficient

Before (Measured): 11:21:09 10-Nov-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Adjustment Factor		Before	1.000	0.200	0.818	5.000	<div><div></div></div>
Depth of Before Calibration	ft	Before			326.93		<div><div></div></div>

### SGT-N (Scintillation Gamma-Ray Tool) Calibration - Run One

Primary Equipment :

Scintillation Gamma Cartridge

SGC-TB

10249

Calibration Parameter :

Plus Reference (Jig minus background reference)

165

### SGT-N Gamma-Ray Calibration - Gamma Ray Coefficients

Before (Measured): 17:57:13 08-Nov-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Gain		Before			1.135		<div><div></div></div>

### SGT-N Gamma-Ray Calibration - Gamma Ray Accumulations

Before (Measured): 17:57:13 08-Nov-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before		0	67.925	120.000	<div><div></div></div>
RGR Plus Measurement	gAPI	Before	145.340	132.128	145.340	158.553	<div><div></div></div>

### SGT-N Gamma-Ray Plateau Check - Gamma Ray Plateau Check

Before (Measured): 17:59:50 08-Nov-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Plus Plateau Measurement	gAPI	Before			215.418		<div><div></div></div>
RGR Minus Plateau Measurement	gAPI	Before			209.727		<div><div></div></div>



Company:	Whiting Oil & Gas Corporation	<b>Schlumberger</b>
Well:	Horsetail 30E-1903	
Field:	Wildcat	
County:	Weld	
State:	Colorado	

Cement Bond Log

