

Company: Noble Energy Inc

Well: Colt A13-652

Field: Wattenberg

County: Weld Country: United States

Slim Cement Mapping Tool

Cement Evaluation

Gamma Ray - CCL Log

County: Weld

Field: Wattenberg

Location: NWSW Sec. 17, T6N, R63W

Well: Colt A13-652

Company: Noble Energy Inc

Location:

NWSW Sec. 17, T6N, R63W
SHL: 2571' FSL & 424' FWL
Lat/Long: 40.486320/-104.468810

Elev.: K.B. 4693.00 ft
G.L. 4663.00 ft
D.F. 4692.00 ft

Permanent Datum:

Ground Level

Elev.: 4663.00 f

Log Measured From:

Kelly Bushing

30.00 ft

above Perm.Datum

Drilling Measured From:

Kelly Bushing

API Serial No.

Max.Hole Deviation

Longitude:

Latitude:

05-123-40928-0000

0 deg

-104.46881 degrees

40.486320 degrees

Logging Date		20-Apr-2015			
Run Number		Run 2			
Depth Driller		7060.00 ft			
Schlumberger Depth		6850.00 ft			
Bottom Log Interval		6850.00 ft			
Top Log Interval					
Casing Fluid Type		Water			
Salinity					
Density		8.7 lbm/gal			
Fluid Level		8.00 ft			
BIT/CASING/TUBING STRING					
Bit Size		8.75 in			
From		940.00 ft			
To		6850.00 ft			
Casing/Tubing Size		7 in			
Weight		26 lbm/ft			
Grade		P110			
From		30.00 ft			
To		7049.90 ft			
Max Recorded Temperatures					
Logger on Bottom		Time			
Unit Number	Location:	3022	Fort Morgan, CO		
Recorded By		Keri Ondrus			
Witnessed By					

Disclaimer

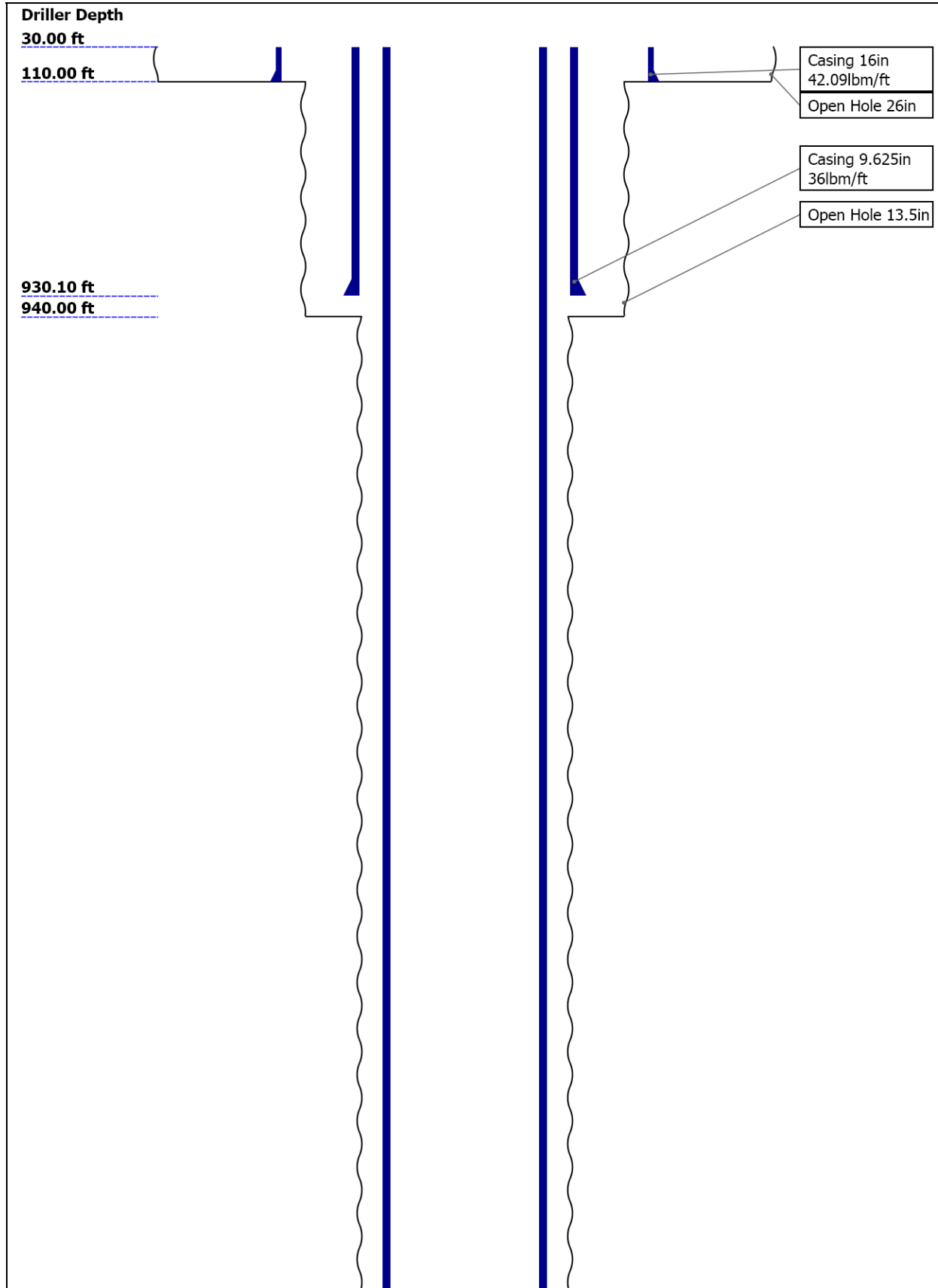
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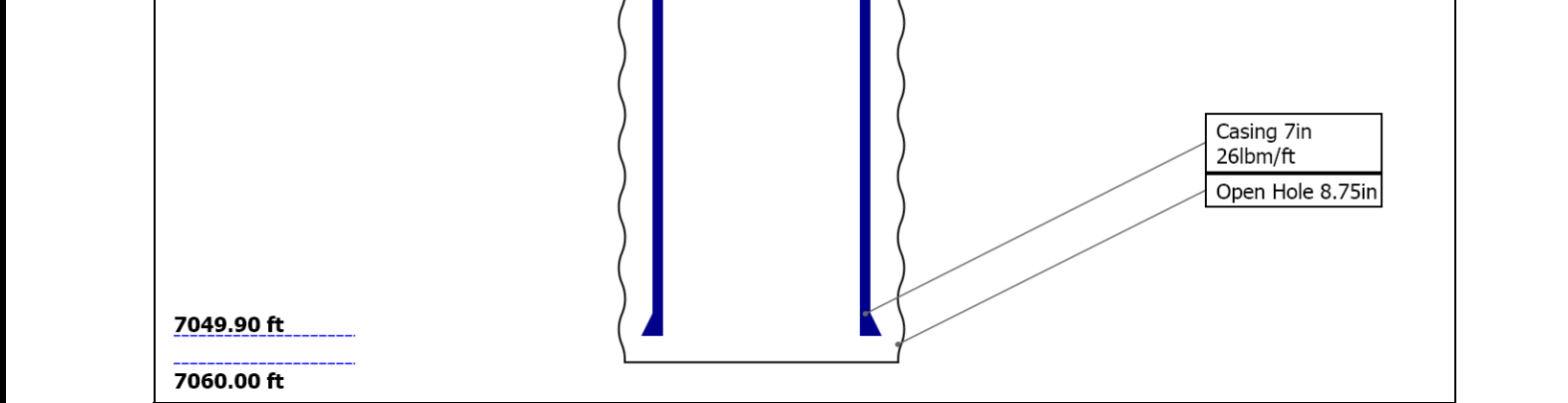
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Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.75			
Top Driller (ft)	30	110	940			
Top Logger (ft)	30	110	940			
Bottom Driller (ft)	110	940	7060			
Bottom Logger (ft)	110	940	6850			
Casing						
Size (in)	16	9.625	7			
Weight (lbm/ft)	42.09	36	26			
Inner Diameter (in)	15.511	8.921	6.276			
Grade	N/A	J55	P110			
Top Driller (ft)	30	30	30			
Top Logger (ft)	30	30	30			
Bottom Driller (ft)	110	930.1	7049.9			
Bottom Logger (ft)	110	930.1	7049.9			

Operational Run Summary

Parameter (unit)	Run 2					
Date Log Started	20-Apr-2015					
Time Log Started	07:45:39					
Date Log Finished	20-Apr-2015					
Time Log Finished	13:48:22					
Top Log Interval (ft)						
Bottom Log Interval (ft)	6850.00					
Total Depth (ft)	6850.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	8.750					
Logging Unit Number	3022					
Logging Unit Location	Fort Morgan, CO					
Recorded By	Keri Ondrus					

Witnessed By						
Service Order Number	BX19-00259					

Borehole Fluids

Parameter(unit)	Run 2					
Fluid Type	Water					
Max Recorded Temperatures (degF)	NaN					
Salinity (ppm)	0					
Density (lbm/gal)	8.7					
Date Logger on Bottom	NaN					
Time Logger on Bottom	NaN					
Total Solid (%)						
High Gravity Solids (%)						

Remarks and Equipment Summary

Run 2: Toolstring			Run 2: Remarks
Equip name	Length	MP name	Offset
LEH-QT LEH-QT	32.48		
AH-63 AH-79	29.57 29.25		
PSTP-A:270 2	28.42		
PSC-A PSTC-A PBMS-A:2702 Sapphire 10kP SI		GR PSTC PSTC Tool String Bottom Temperature Sapphire Pressure CCL PBMS	24.71 24.42 0.00 21.63 21.51 20.9 20.15
SCMT-CB:82 84	20.15		
SECH-CA:823 5 SCMC-CA:823 7 CMIR-AG SCMS-CB:828 4 SCMX-CA:823 8			
		— DT	11.06
		< CBL5 DTSC	9.56 9.56
		— CBL3	8.56
		— MAP	8.06
		— AUX	7.06
		/ SCMT	2.74
			Toolstring run as per toolsketch.
			Log objective: Cement and Casing Evaluation
			Estimated TOC @ 105'. Expected TOC @ 30'.
			Top of 4.5" liner at 6856.6'.
			Bottom log interval at 6850' to maintain distance from top of liner.
			Bottom hole temperature was 209.49 deg F.
			This is a subsequent run in the well.
			0 PSI repeat pass and 2500 PSI main pass.

All measurements are relative to TOOL_ZERO

Depth Measuring Device

Run 2

Logging Cable

Software Version

All depths are referenced to

Log

Company:Noble Energy Inc Well:Colt A13-652

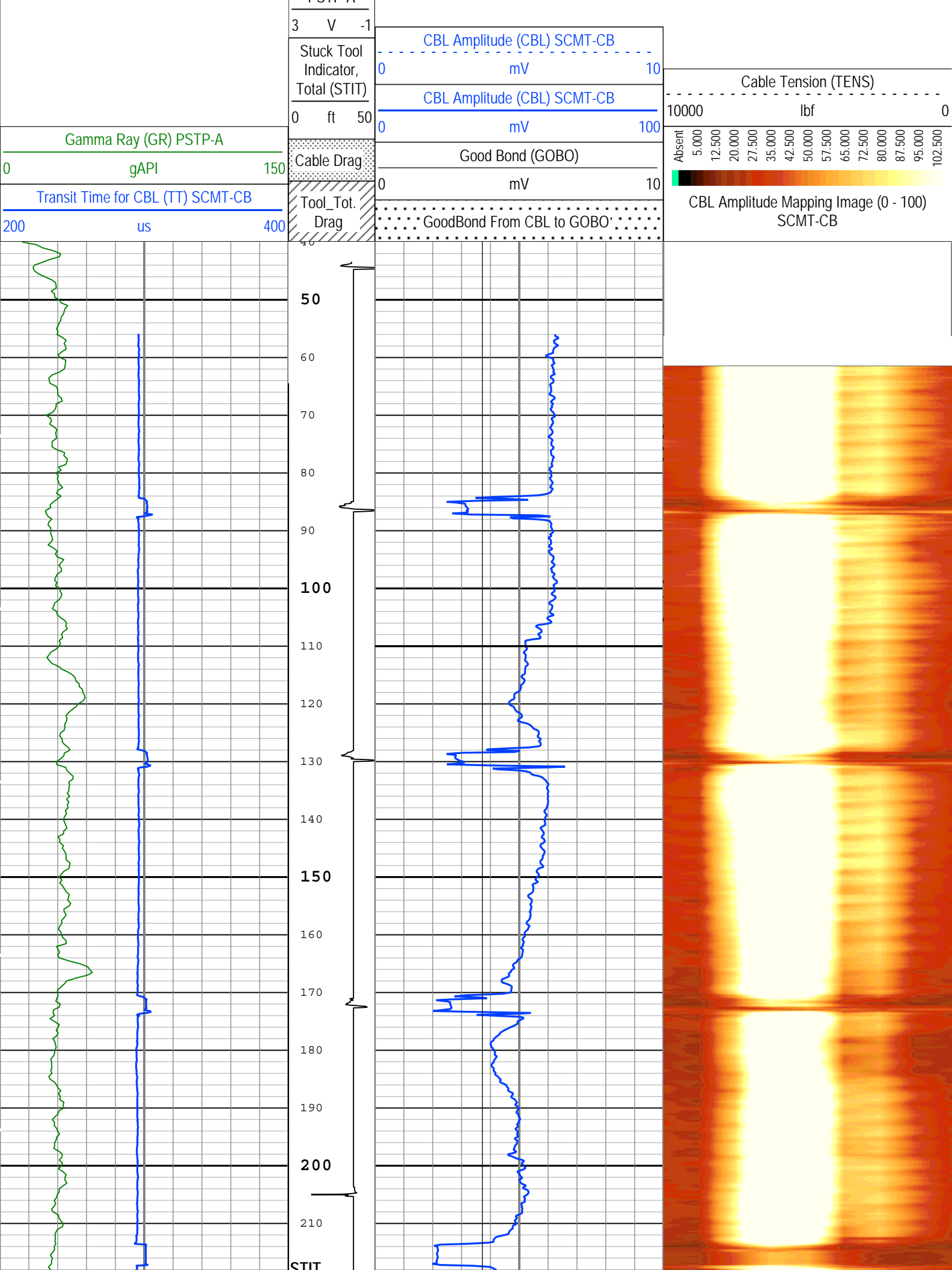
Run 2: Main[5]:Up:S016

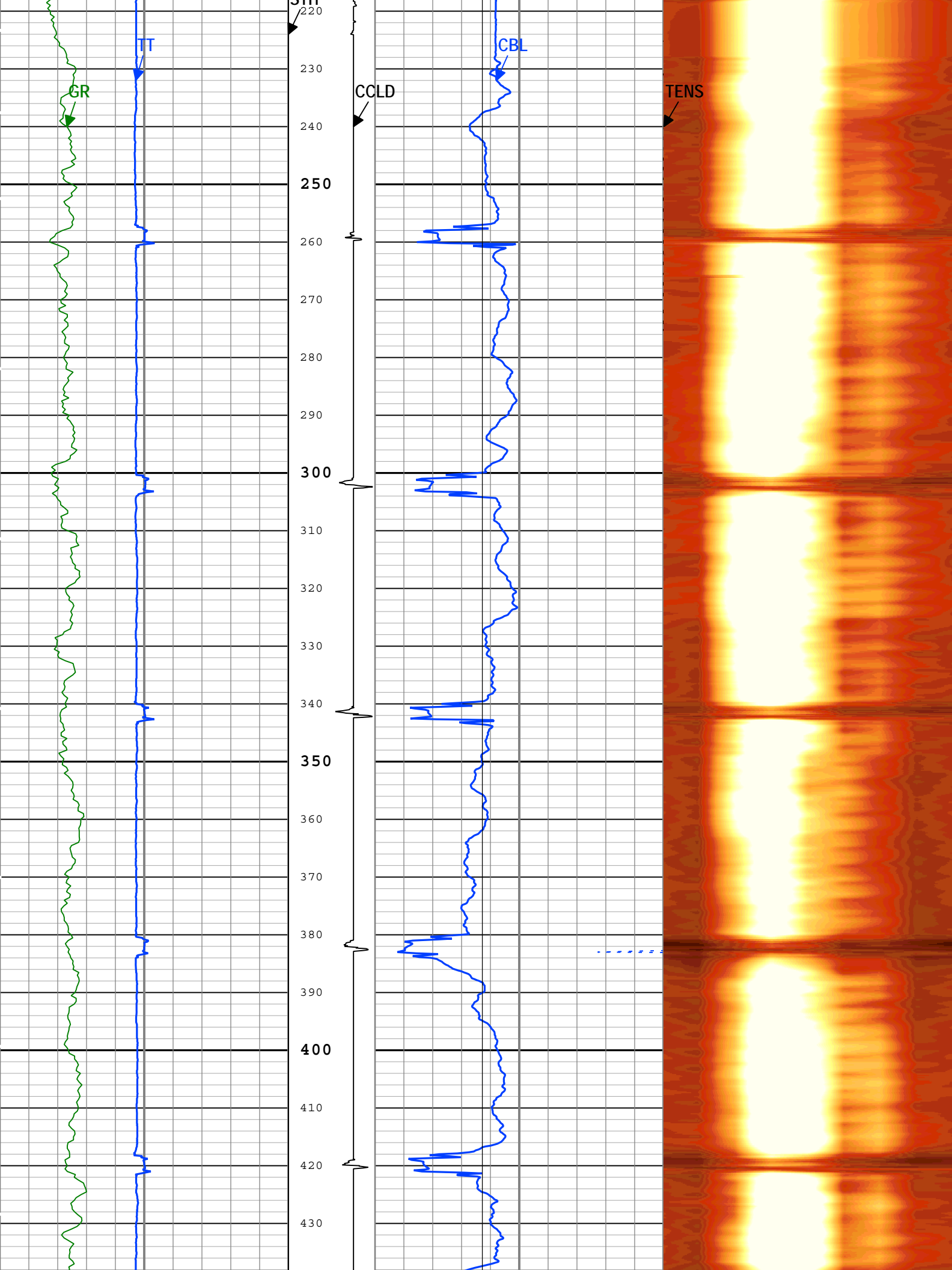
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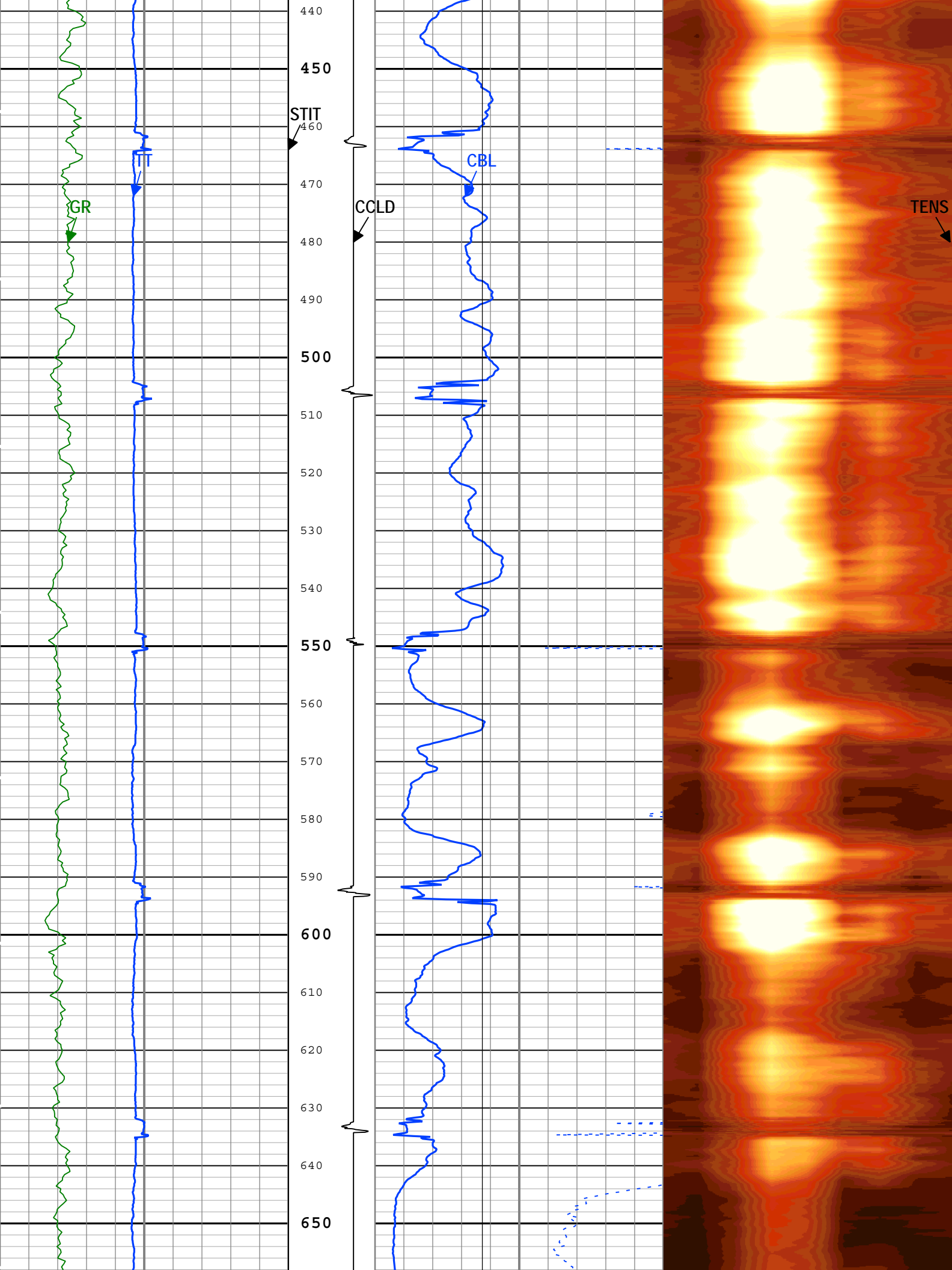
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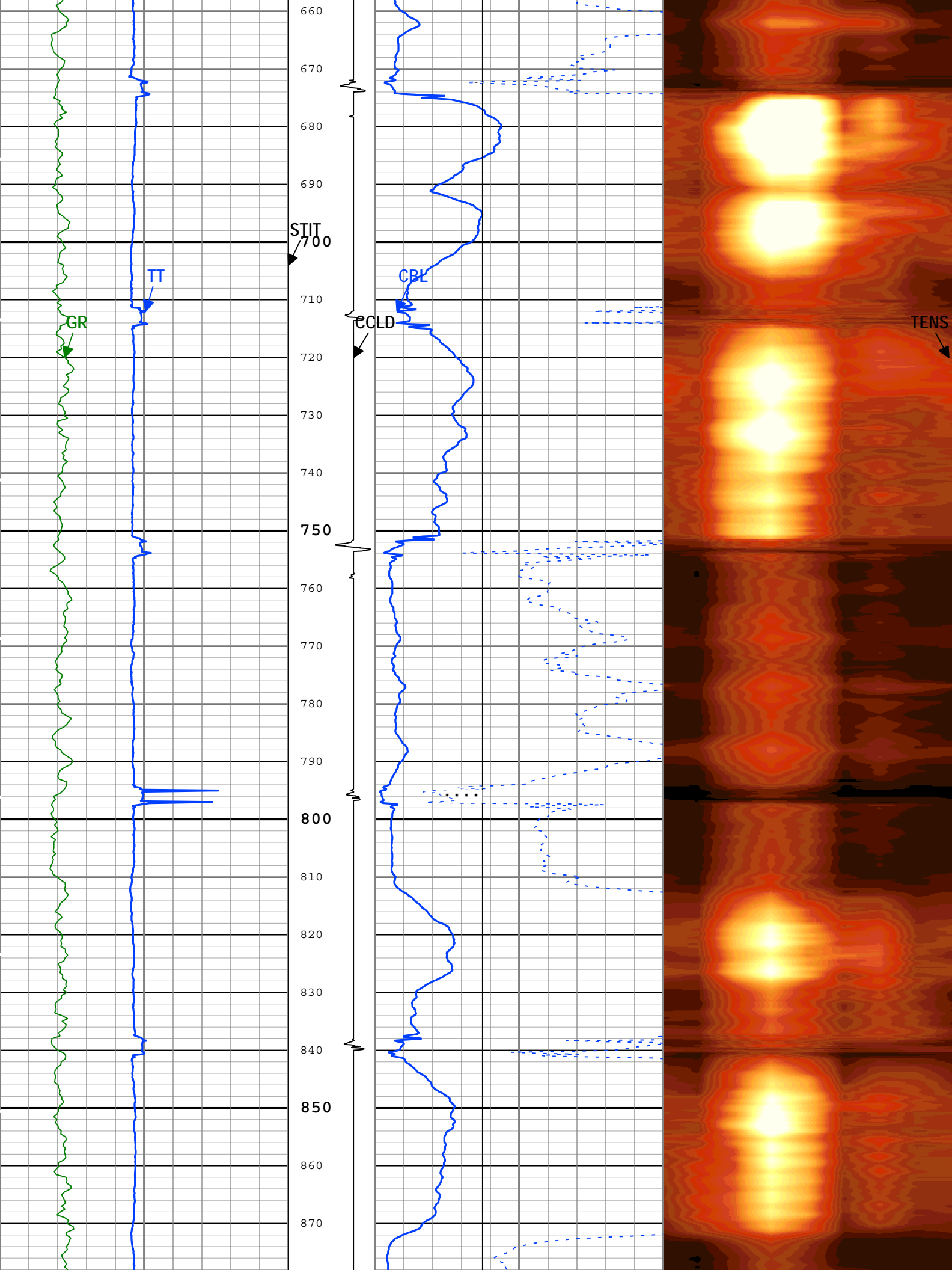
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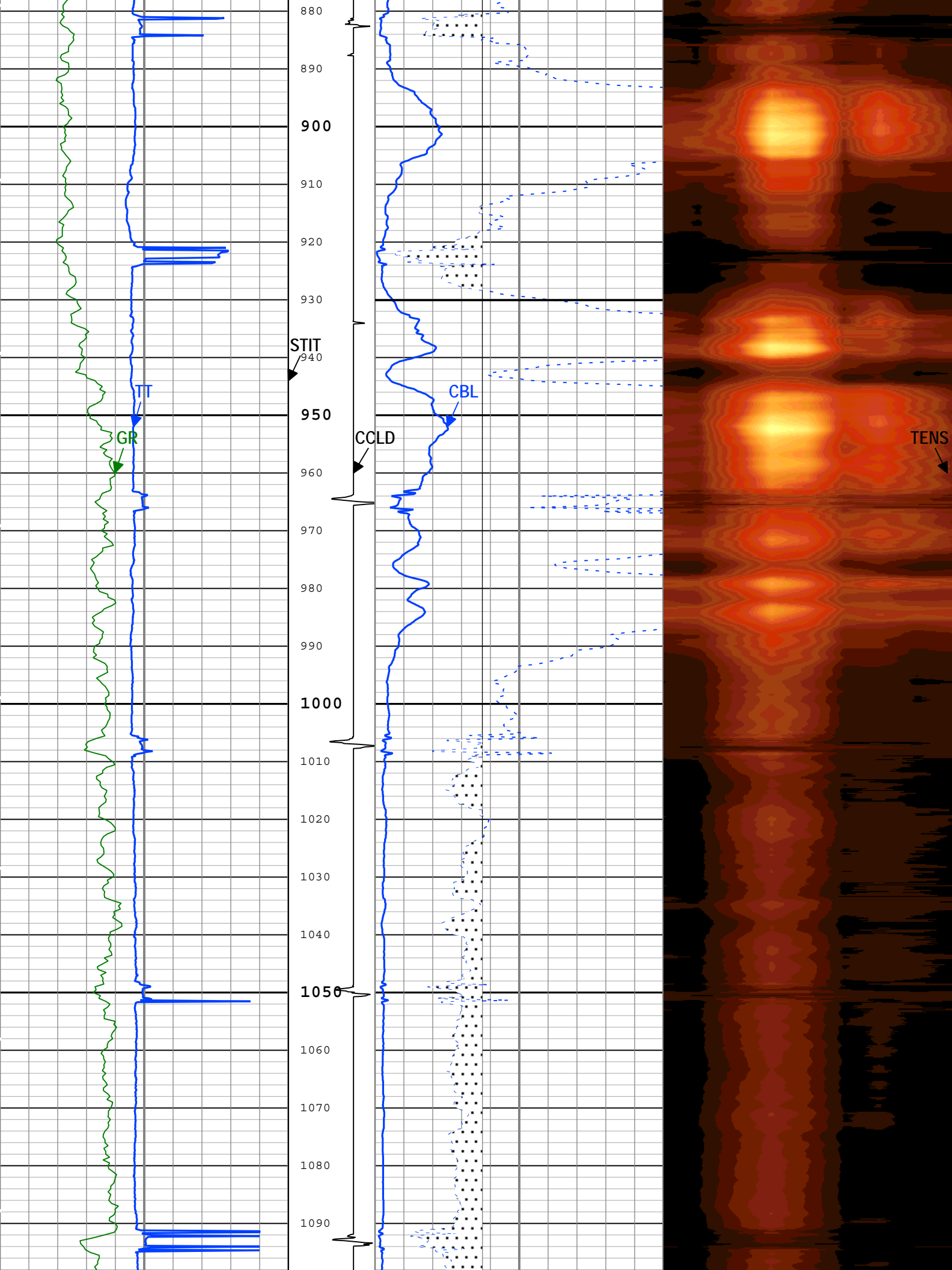
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Discriminated
Amplitude
(CCLD)
PSTP-A

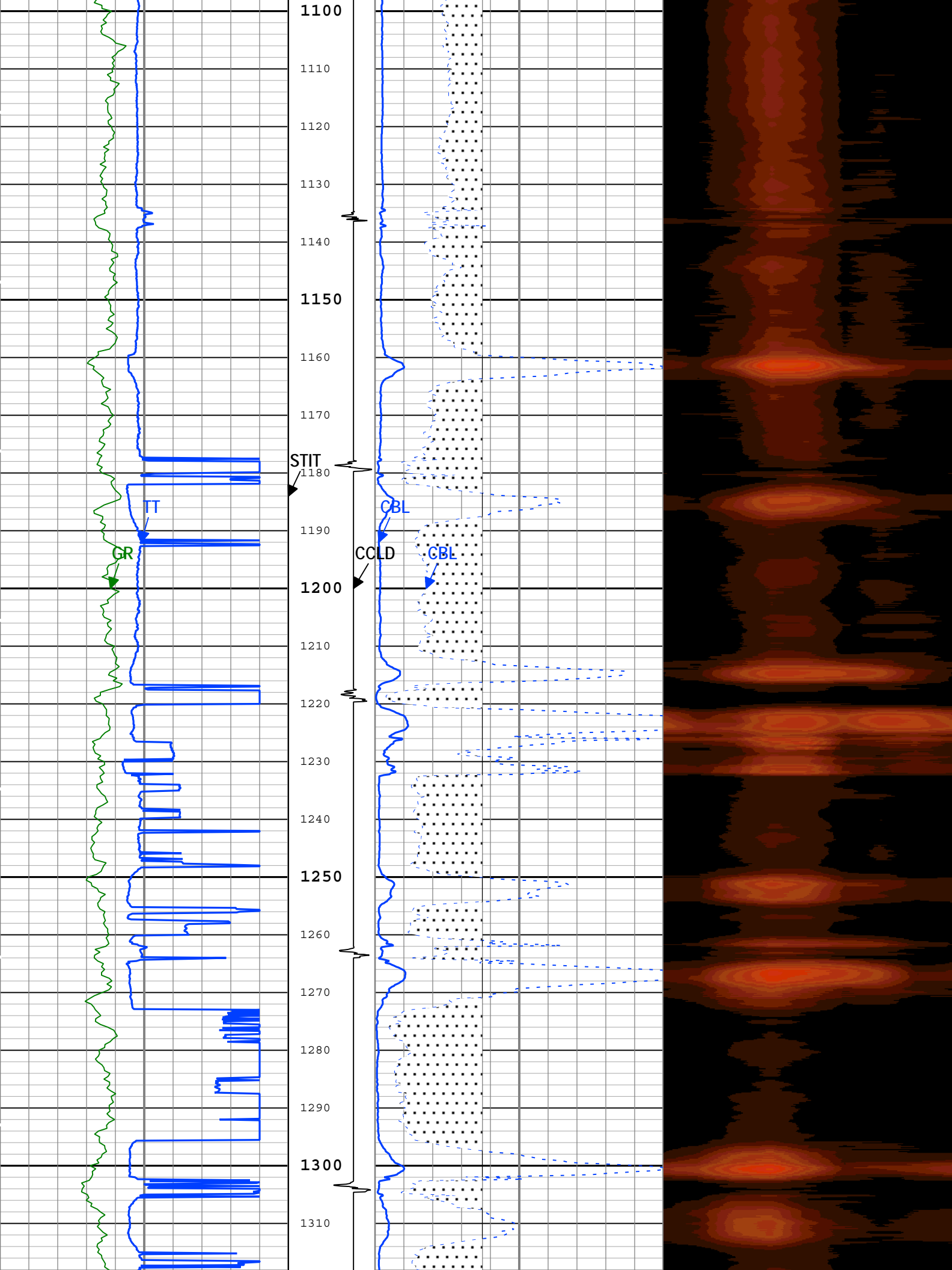


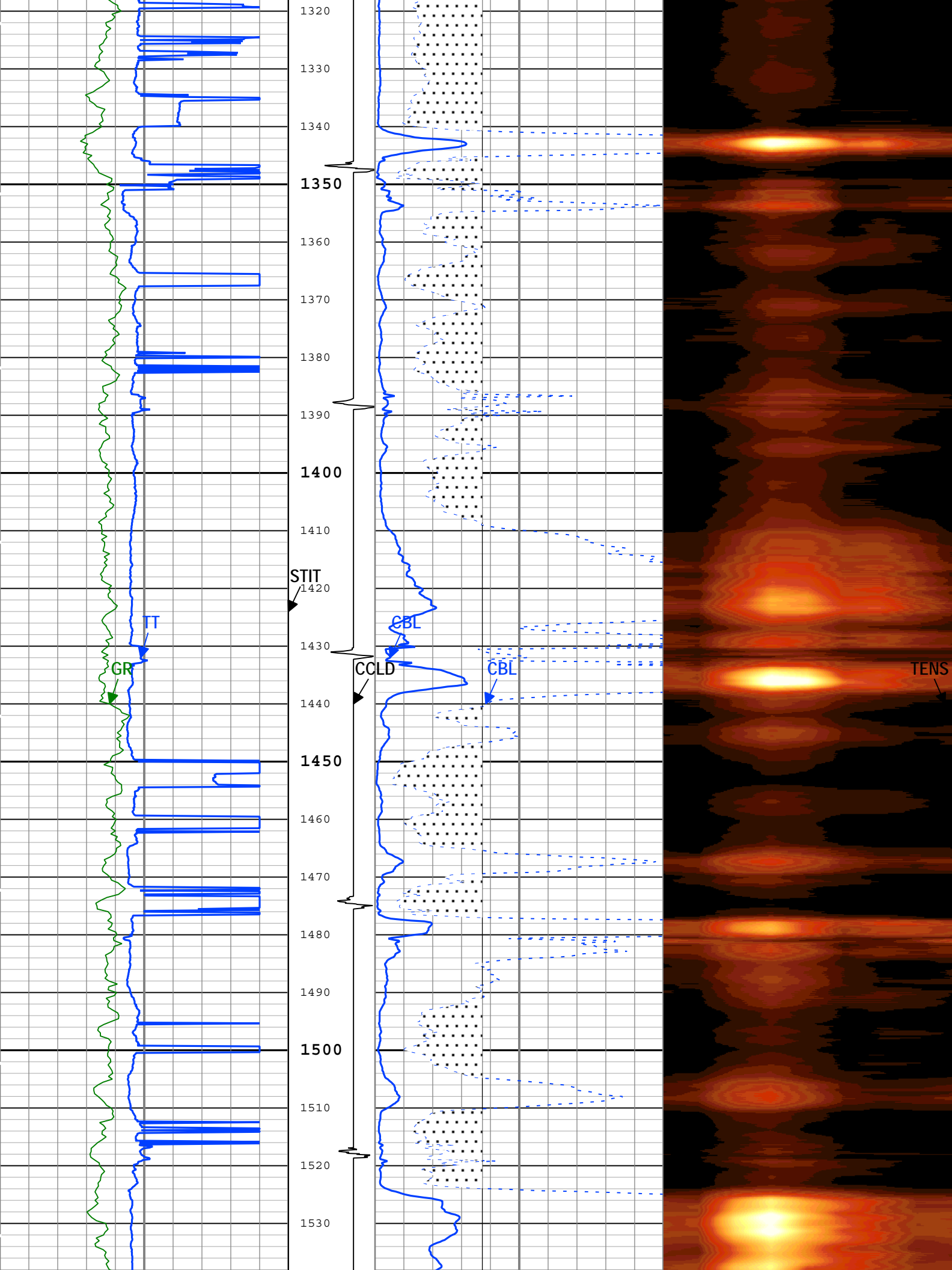


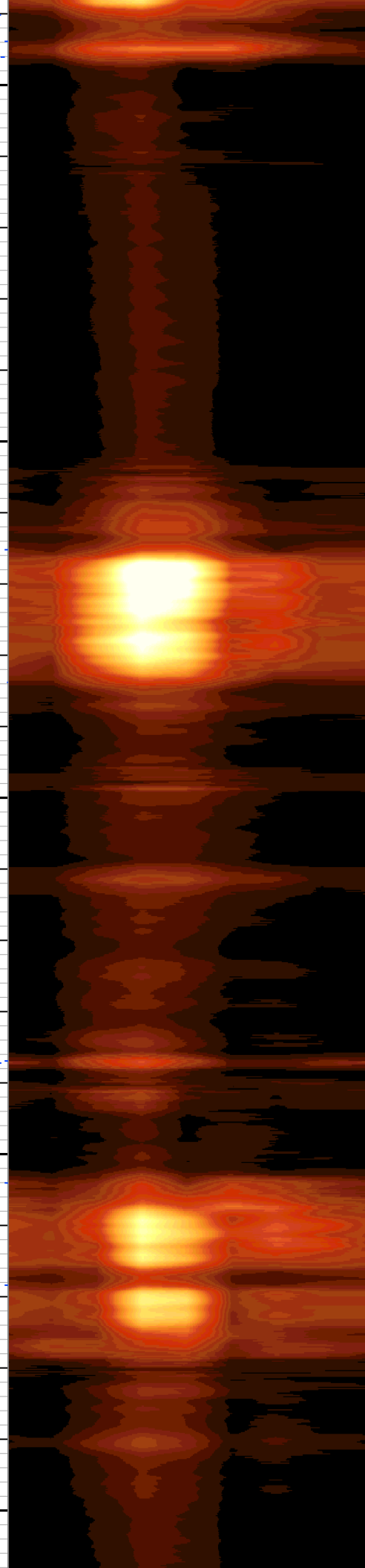
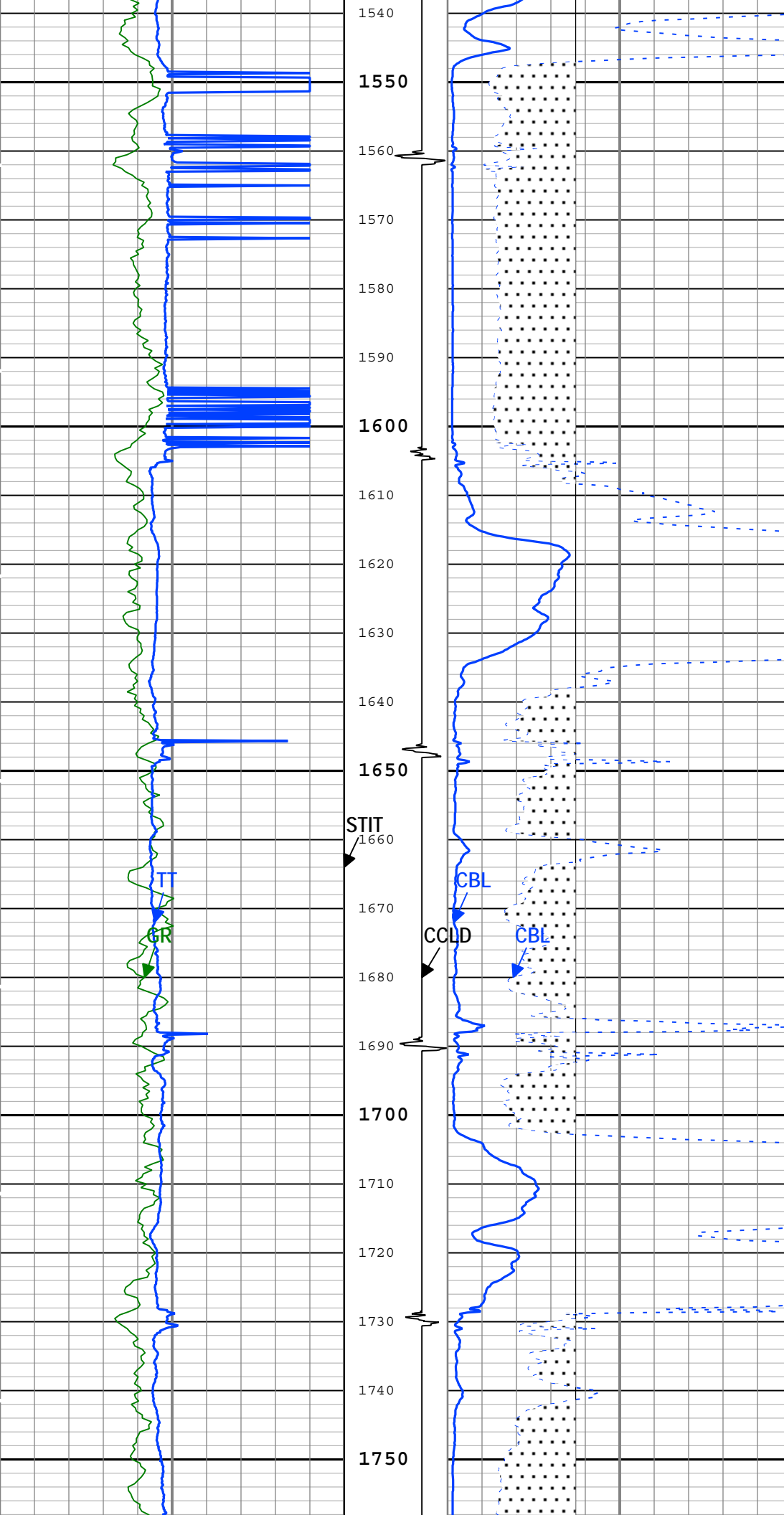


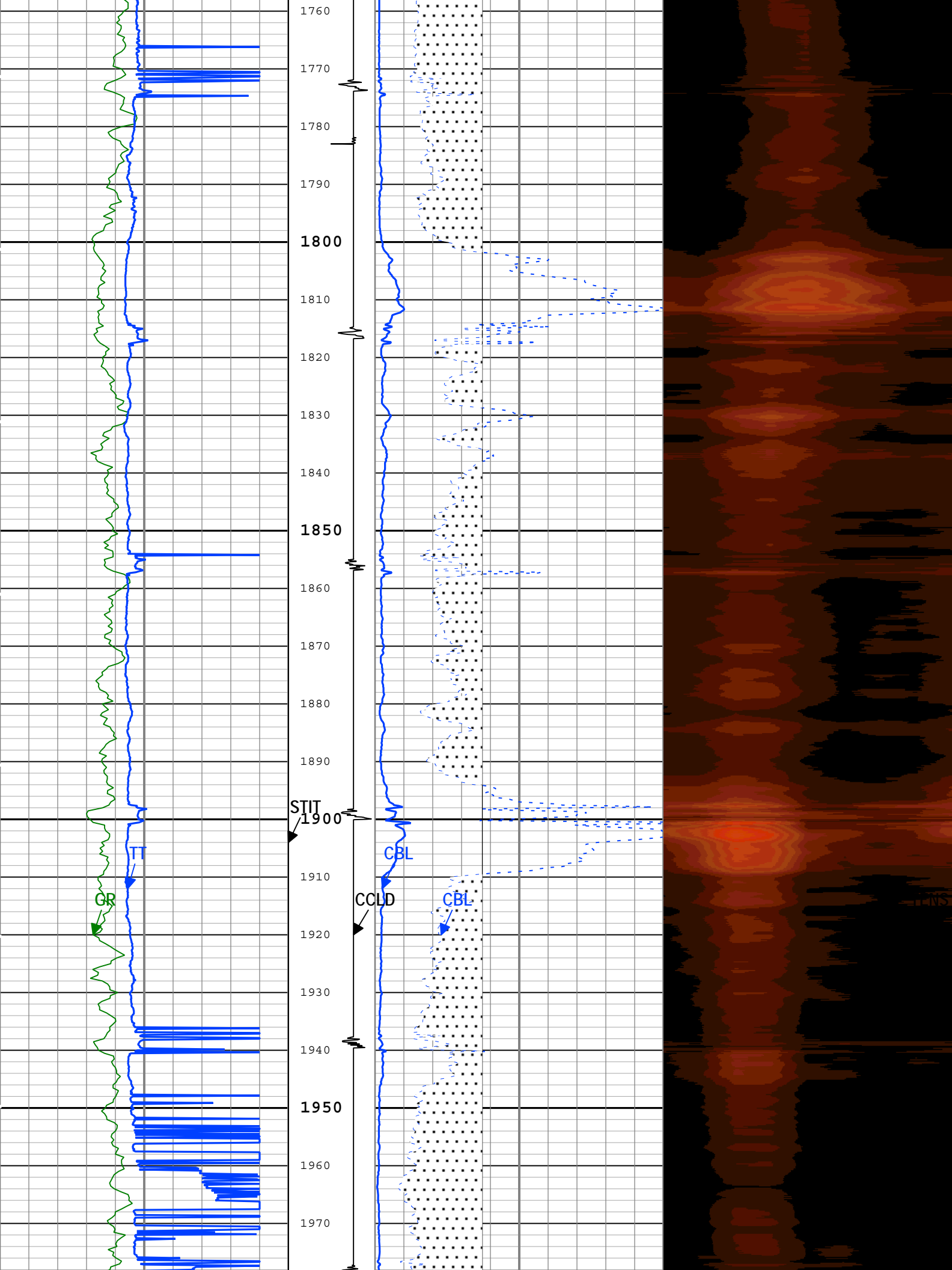


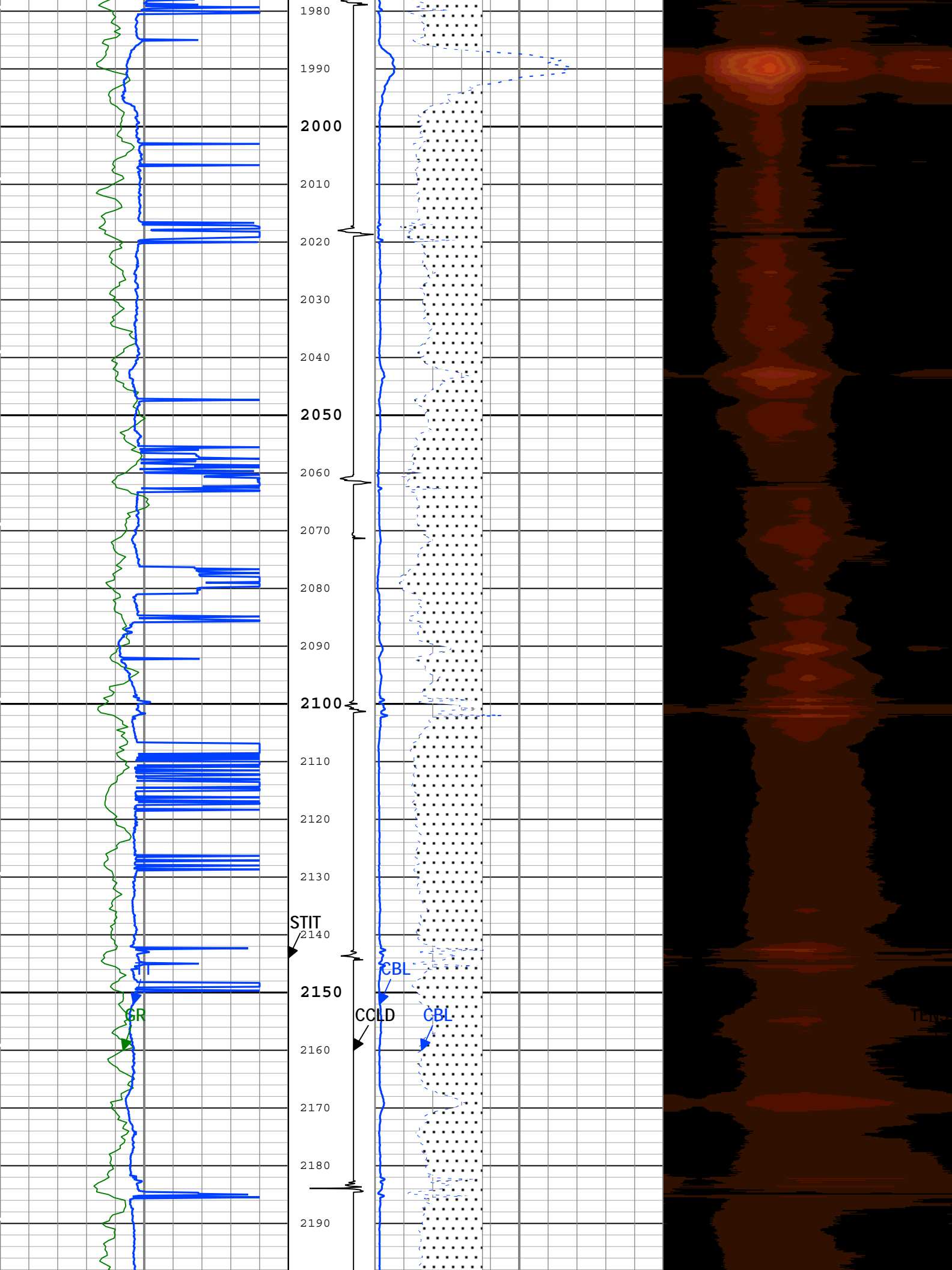


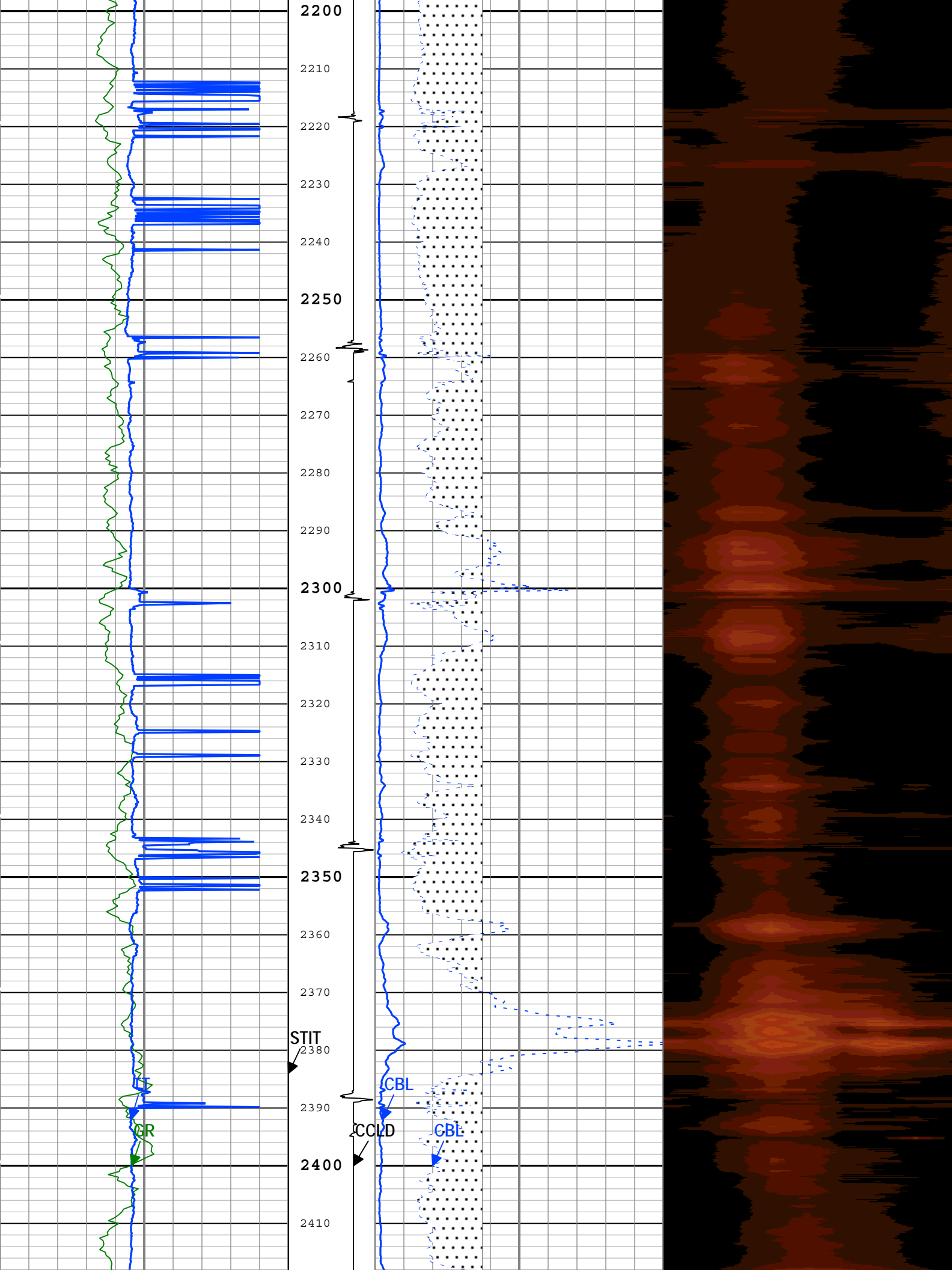


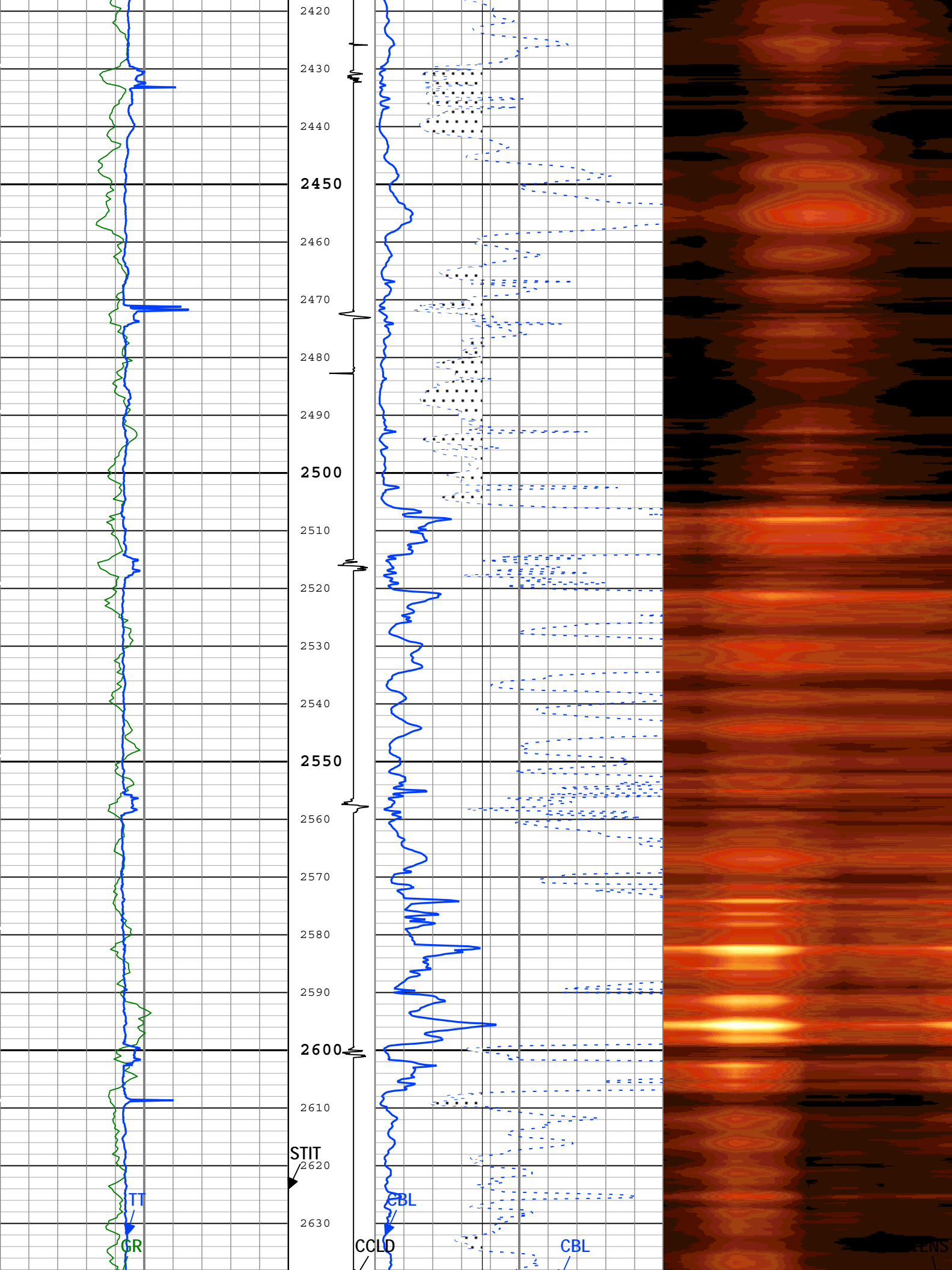


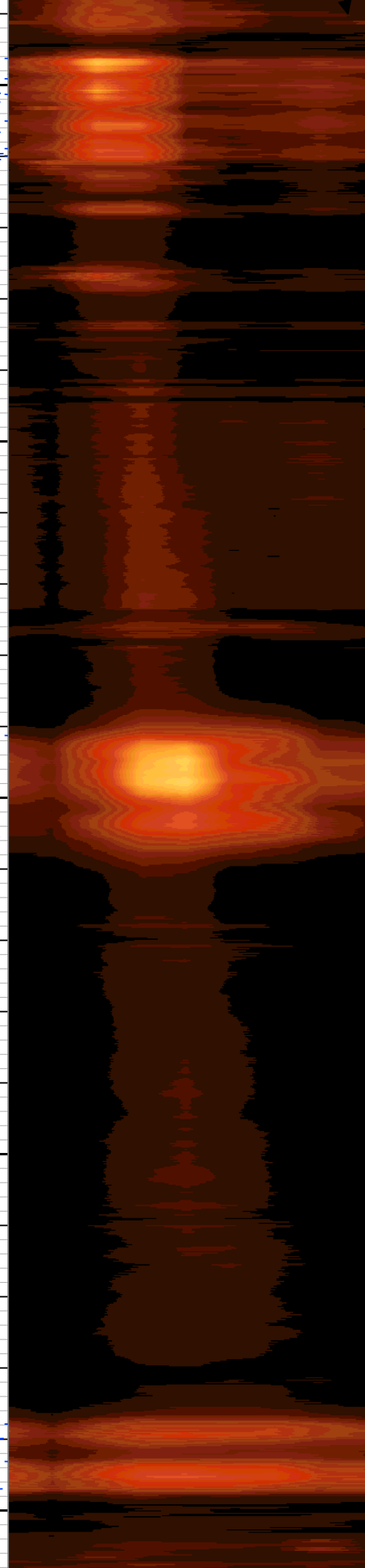
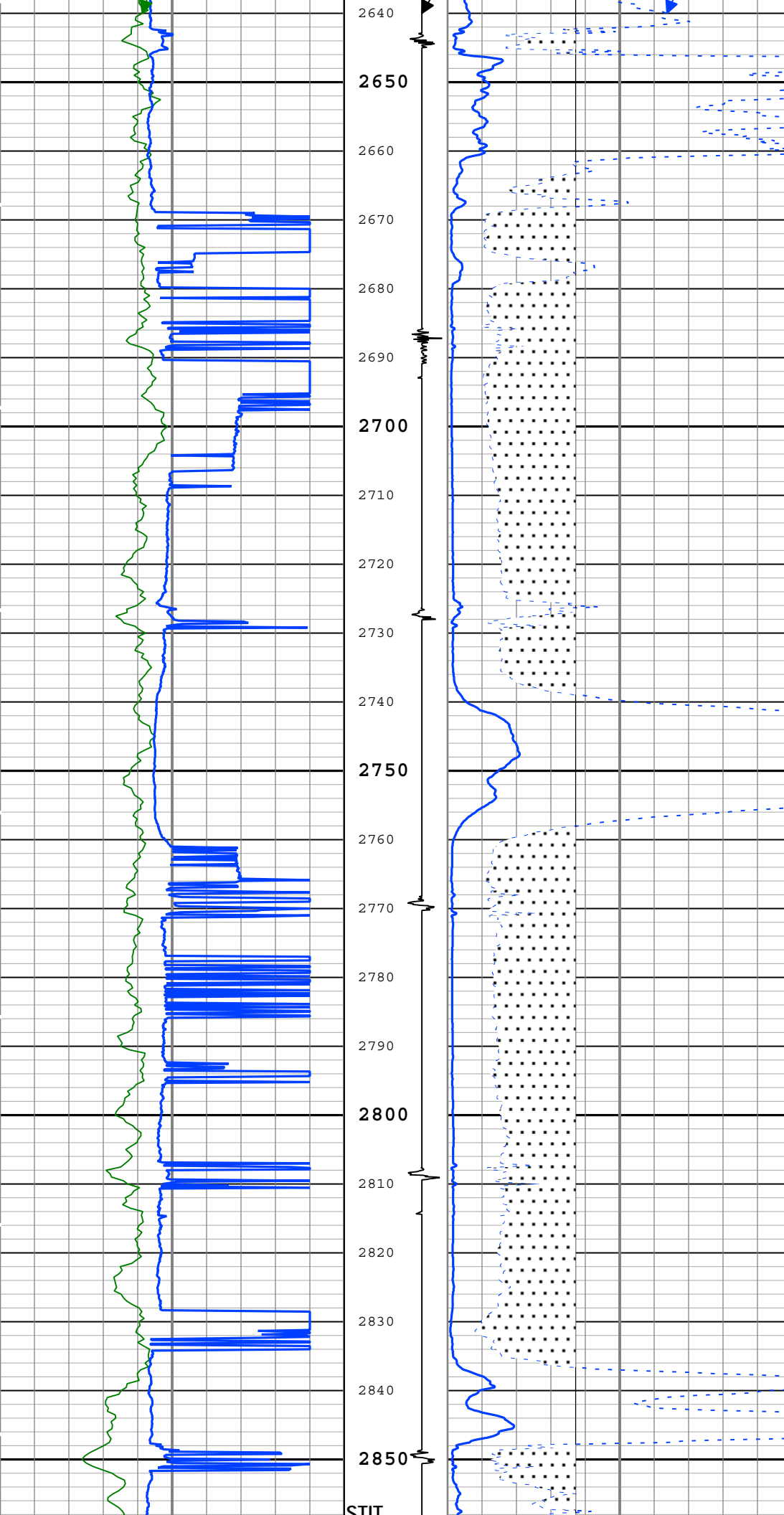


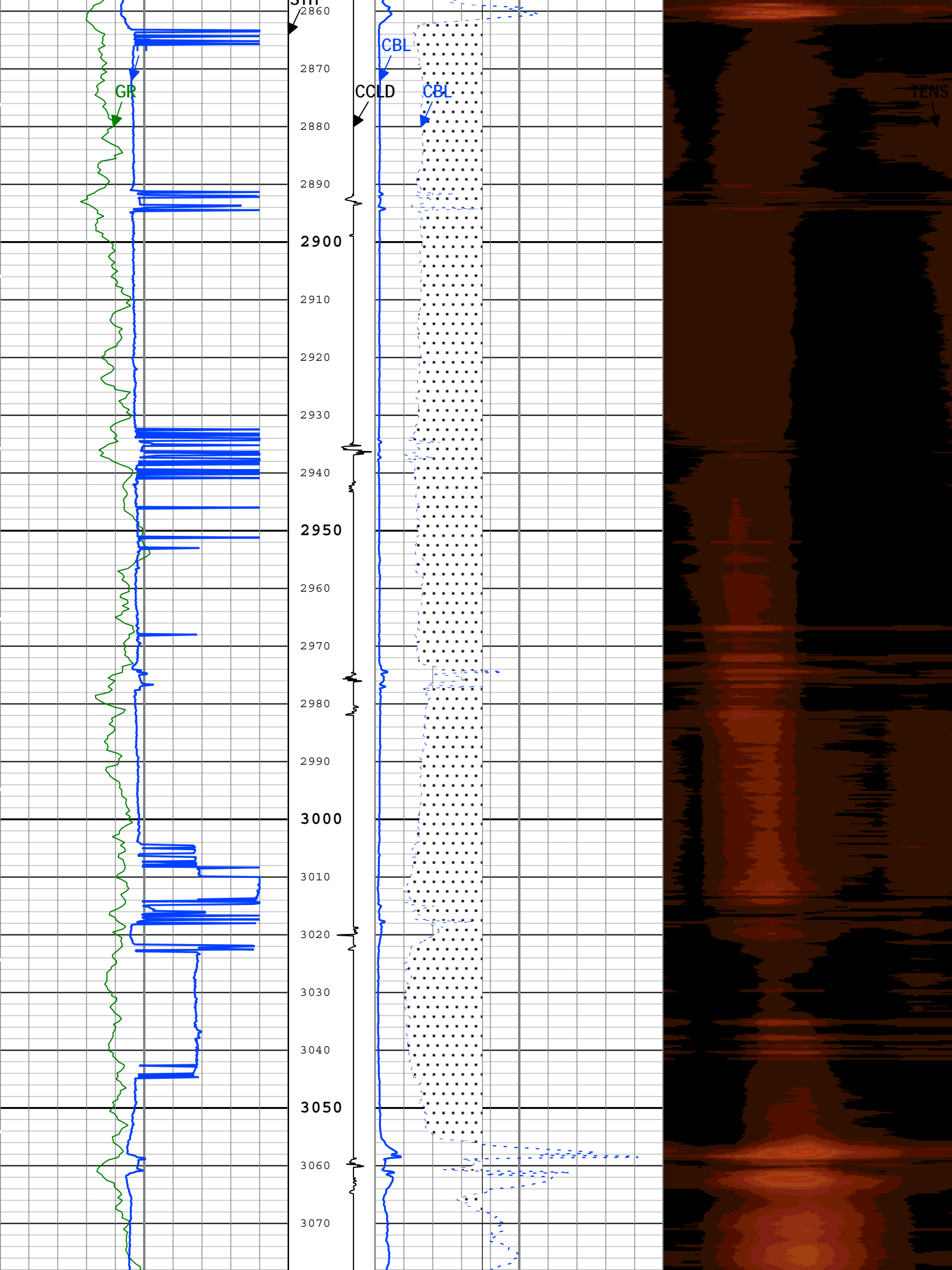


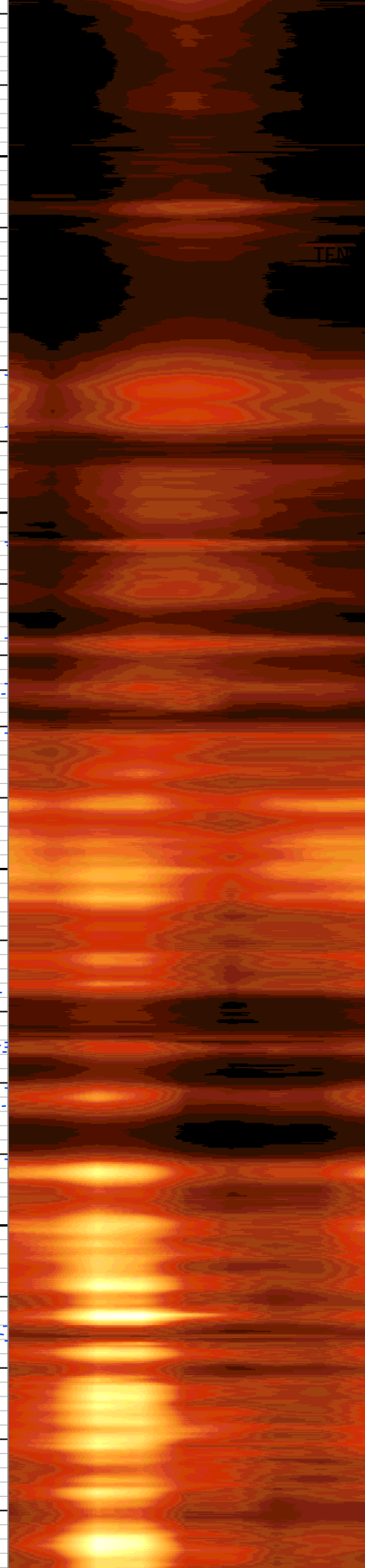
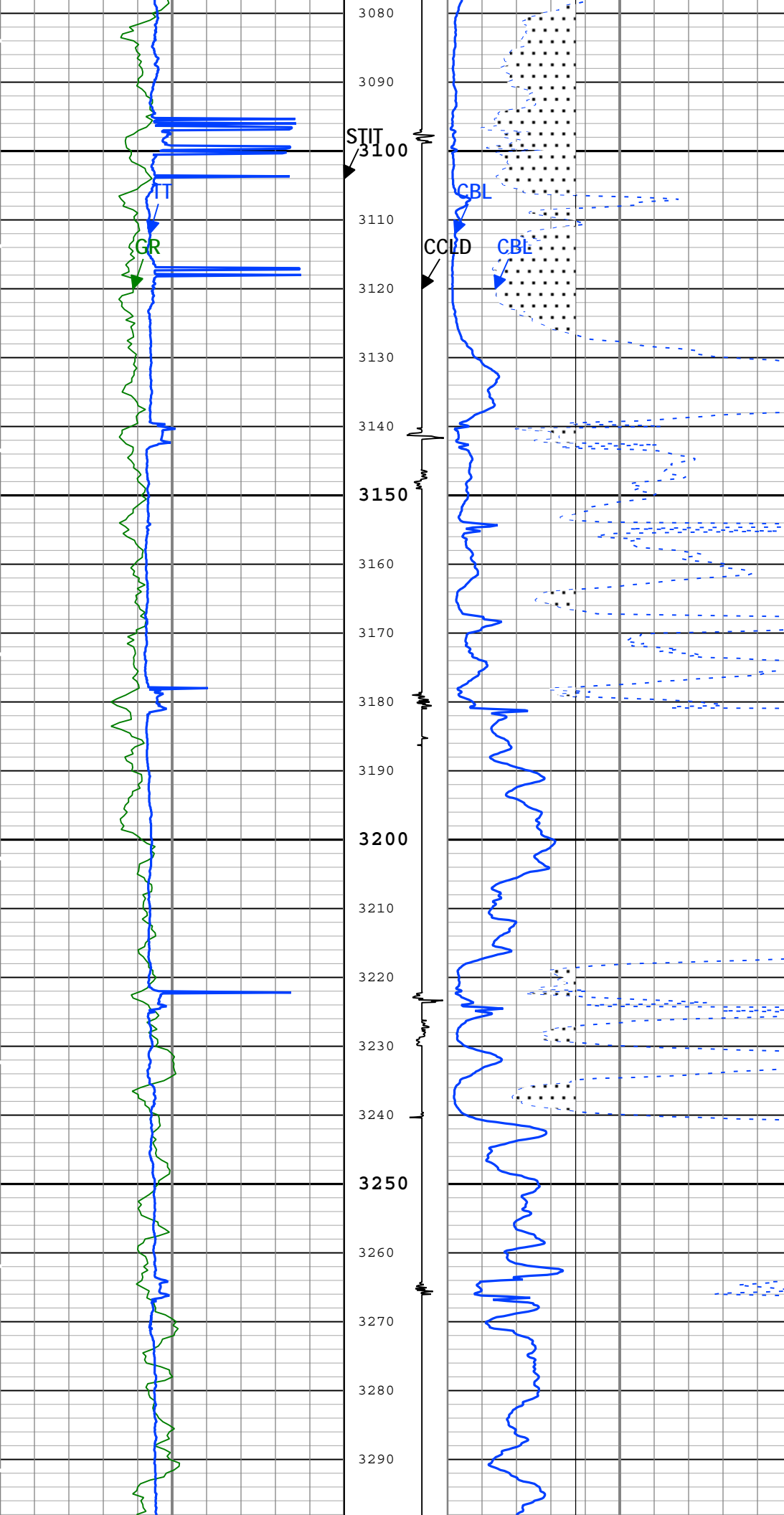


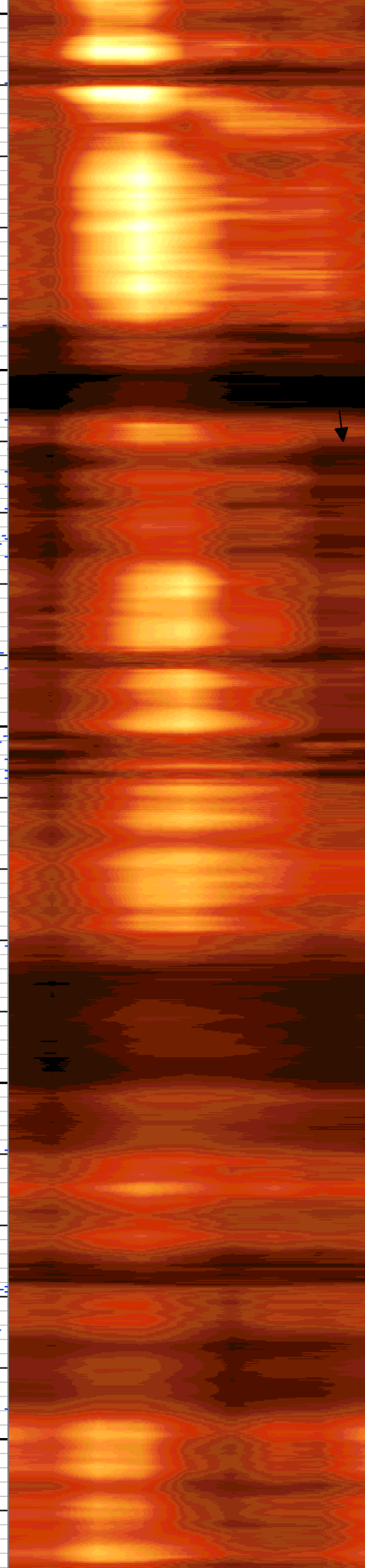
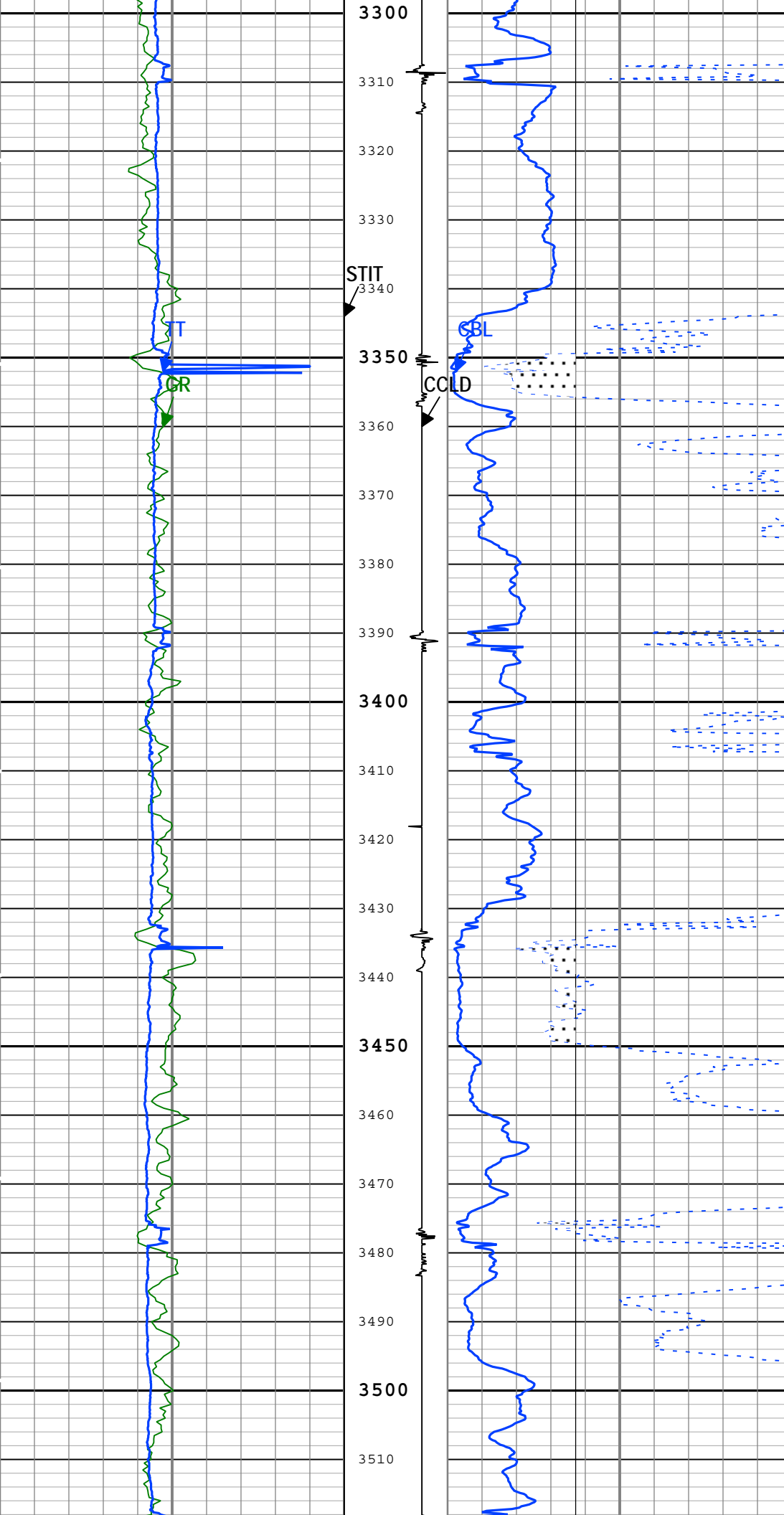


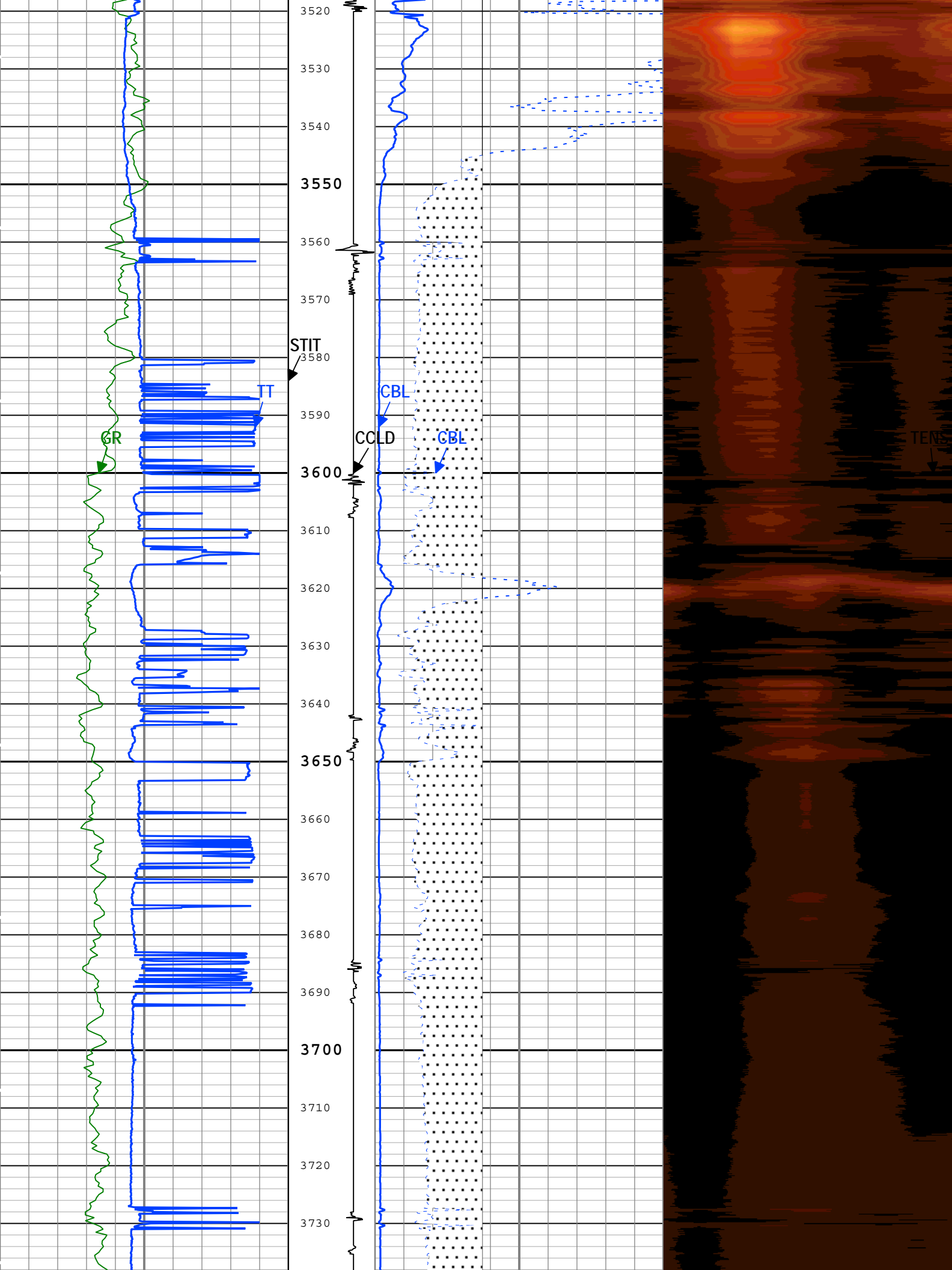


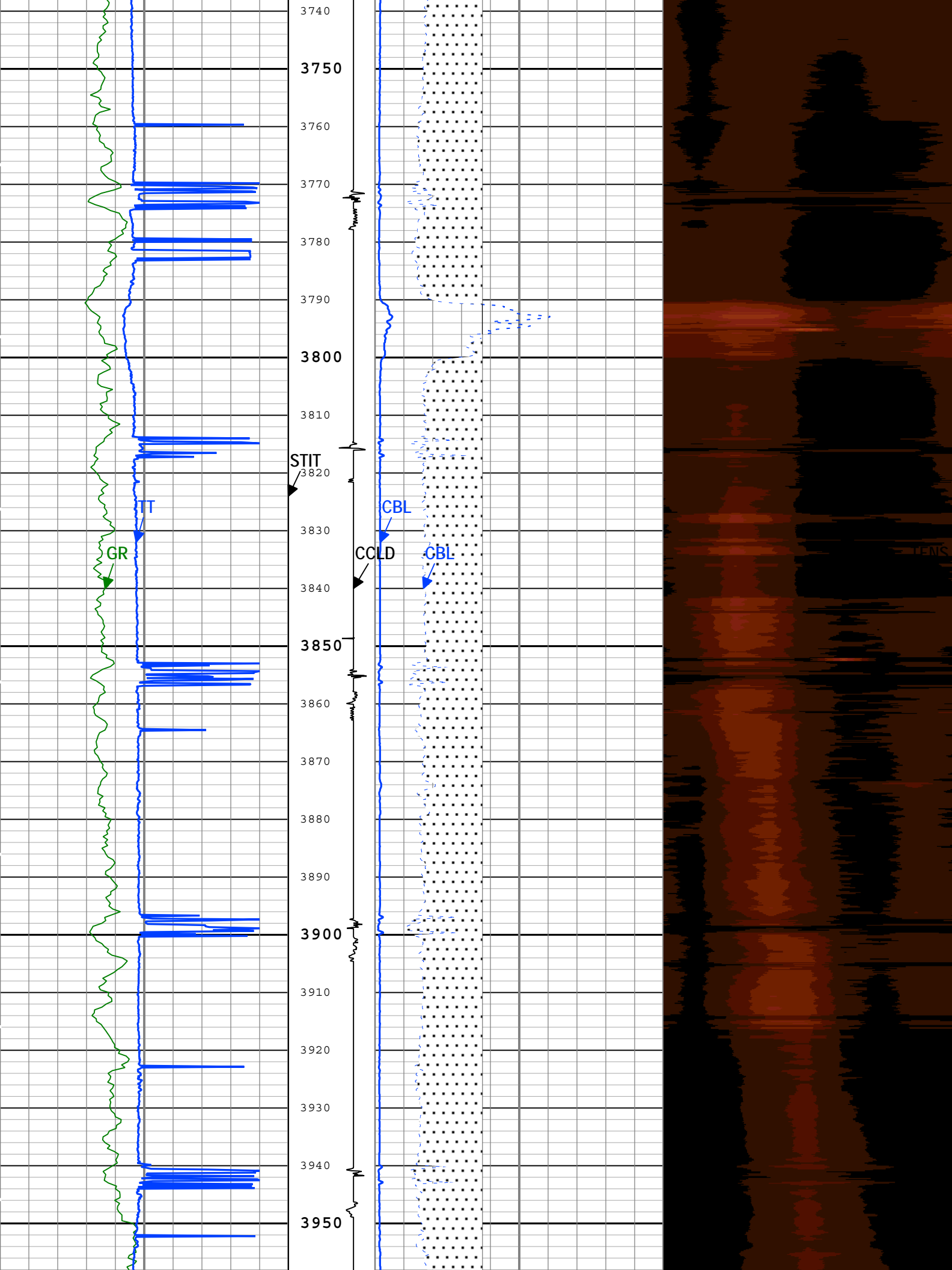


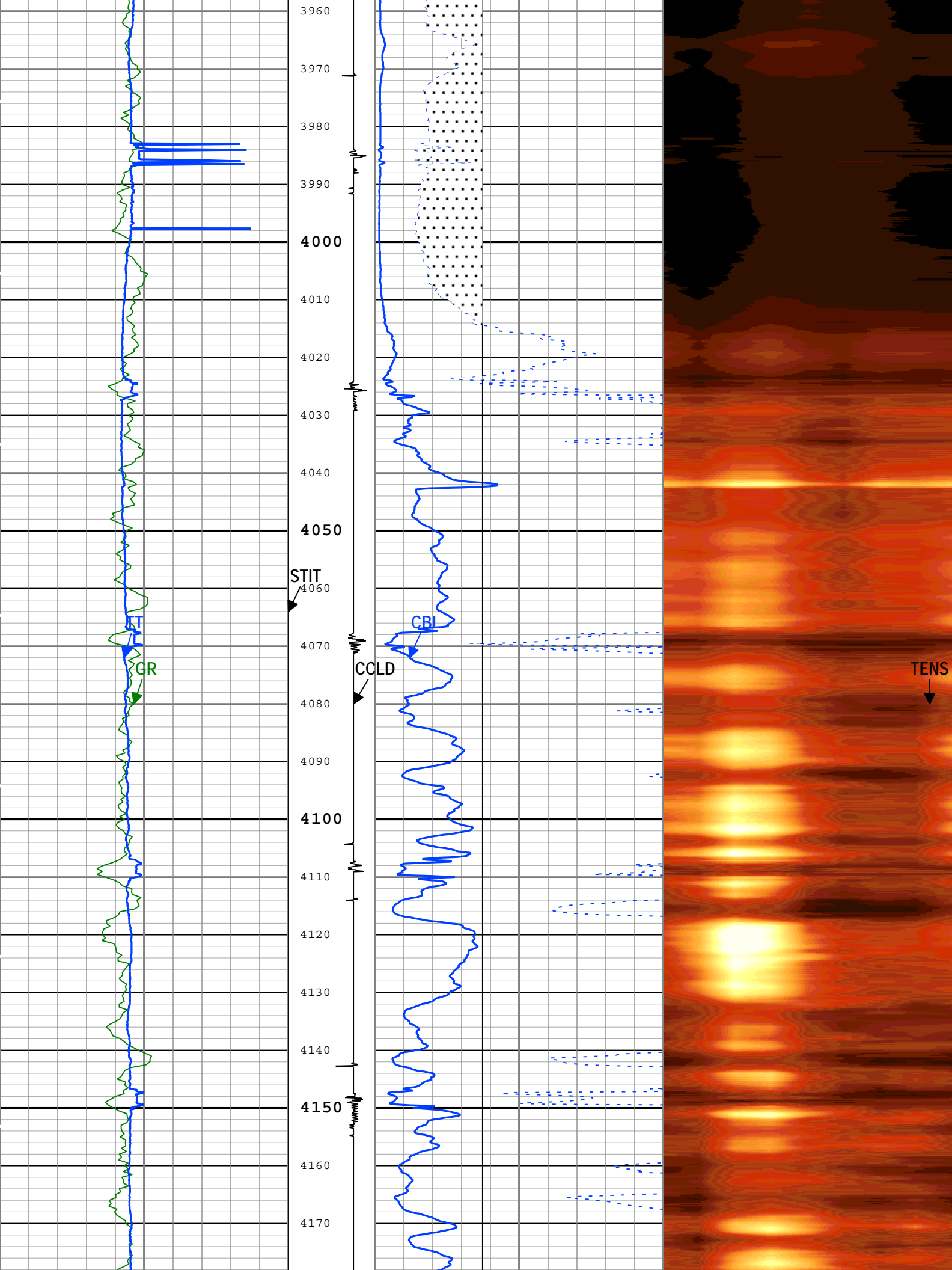


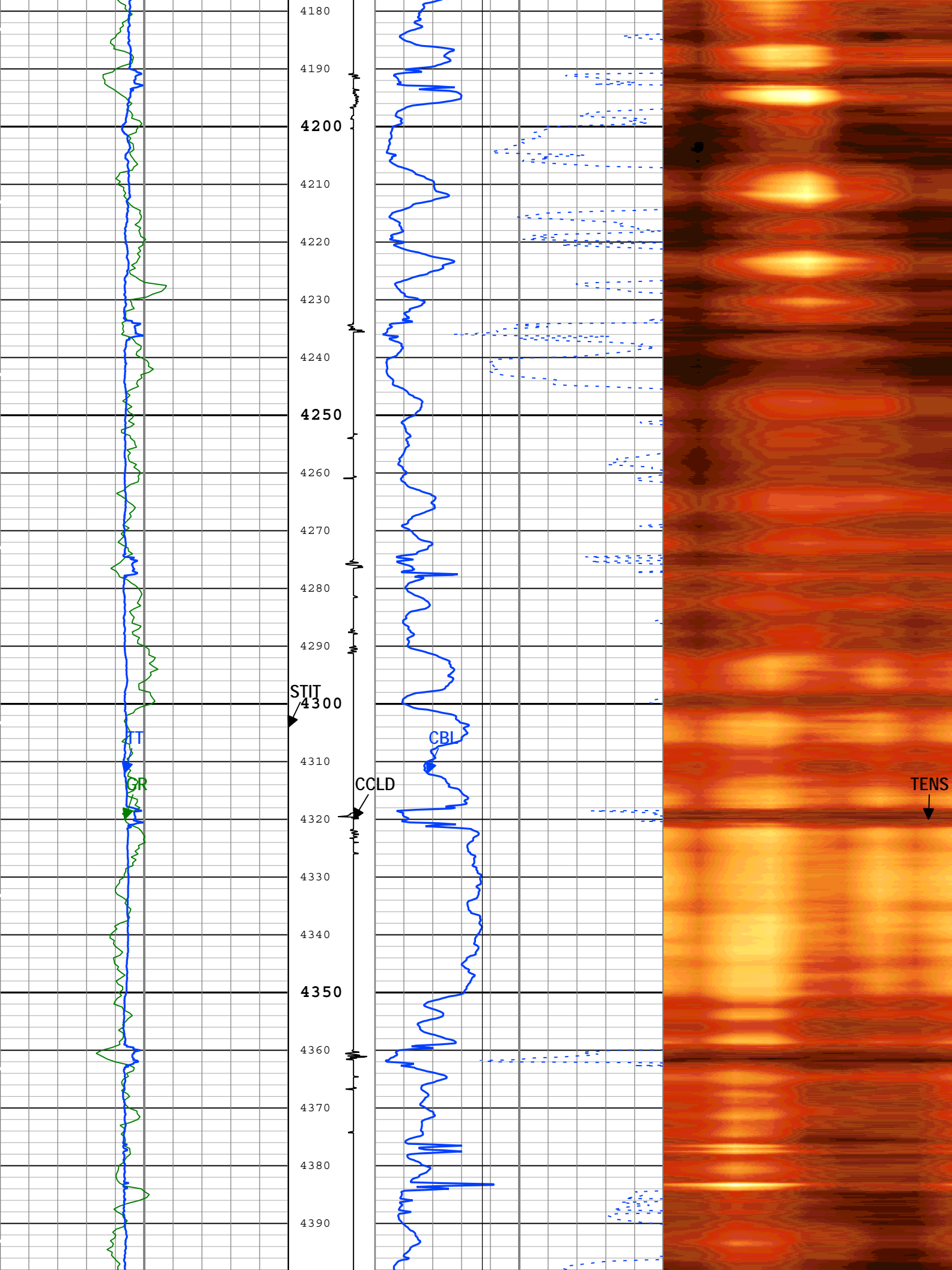


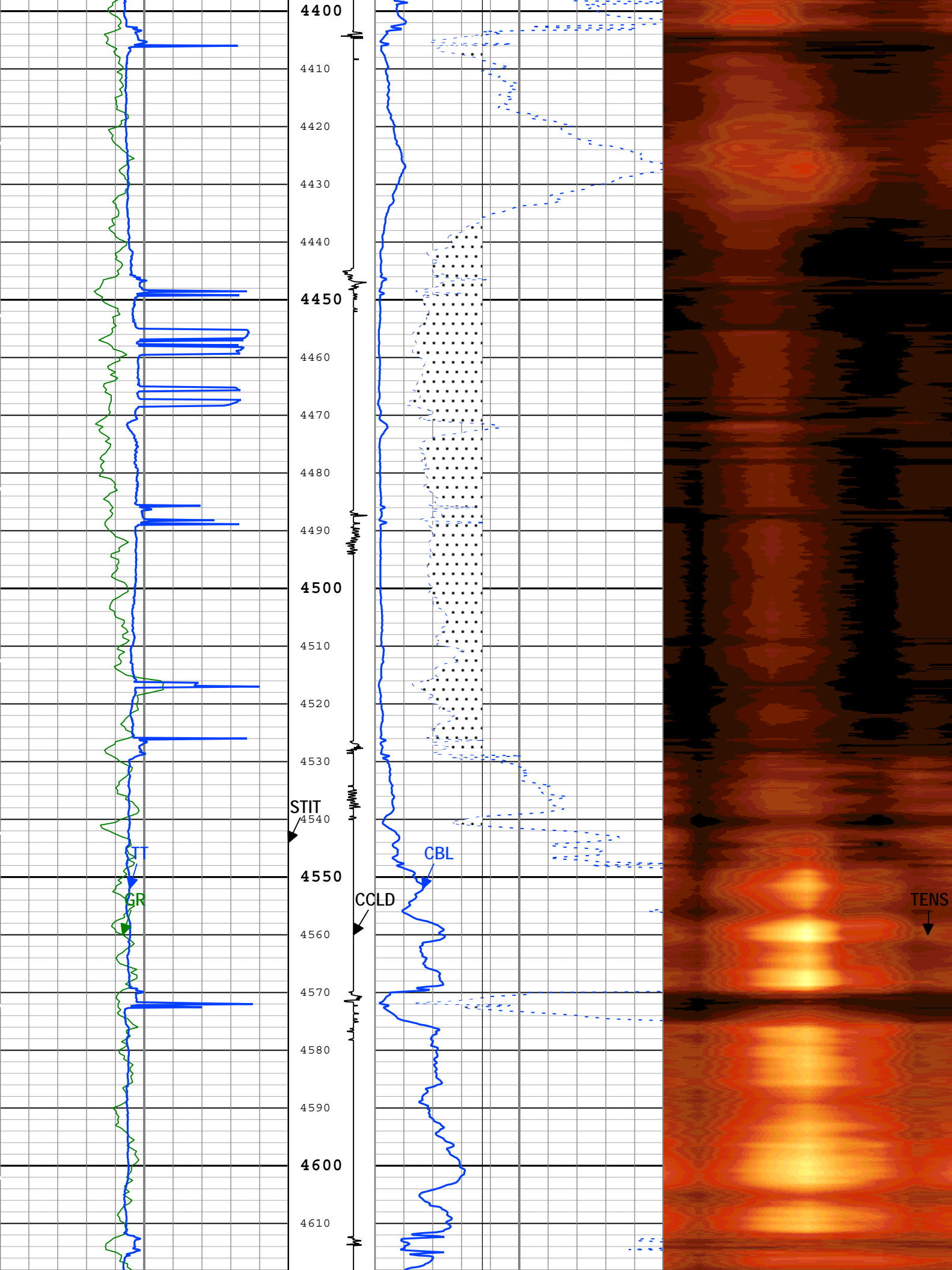


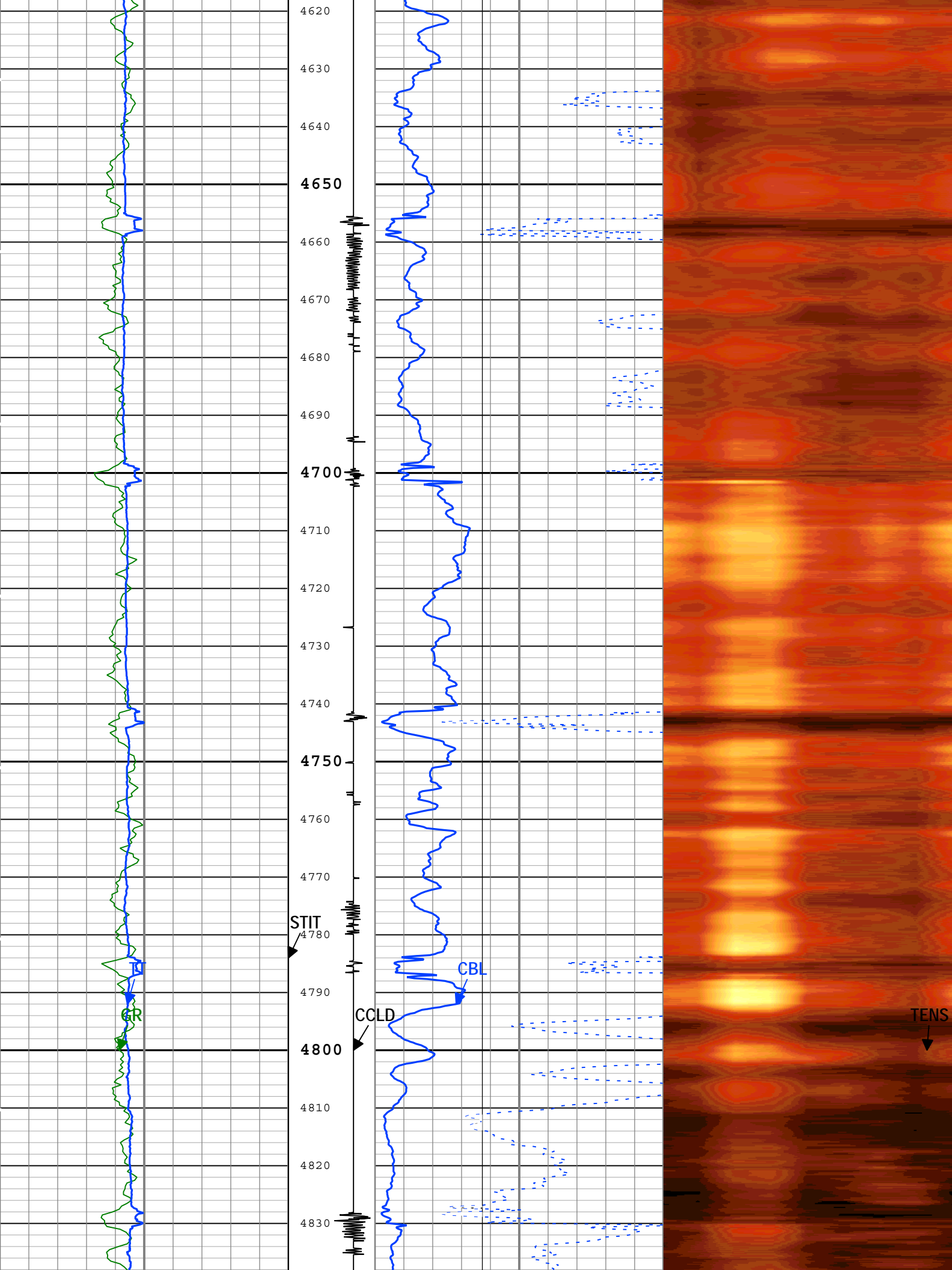


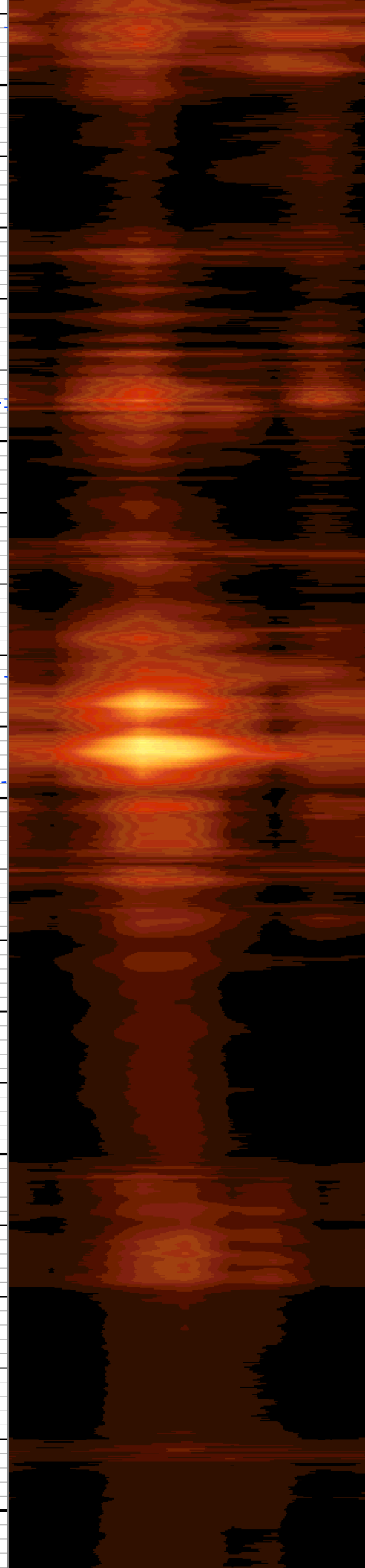
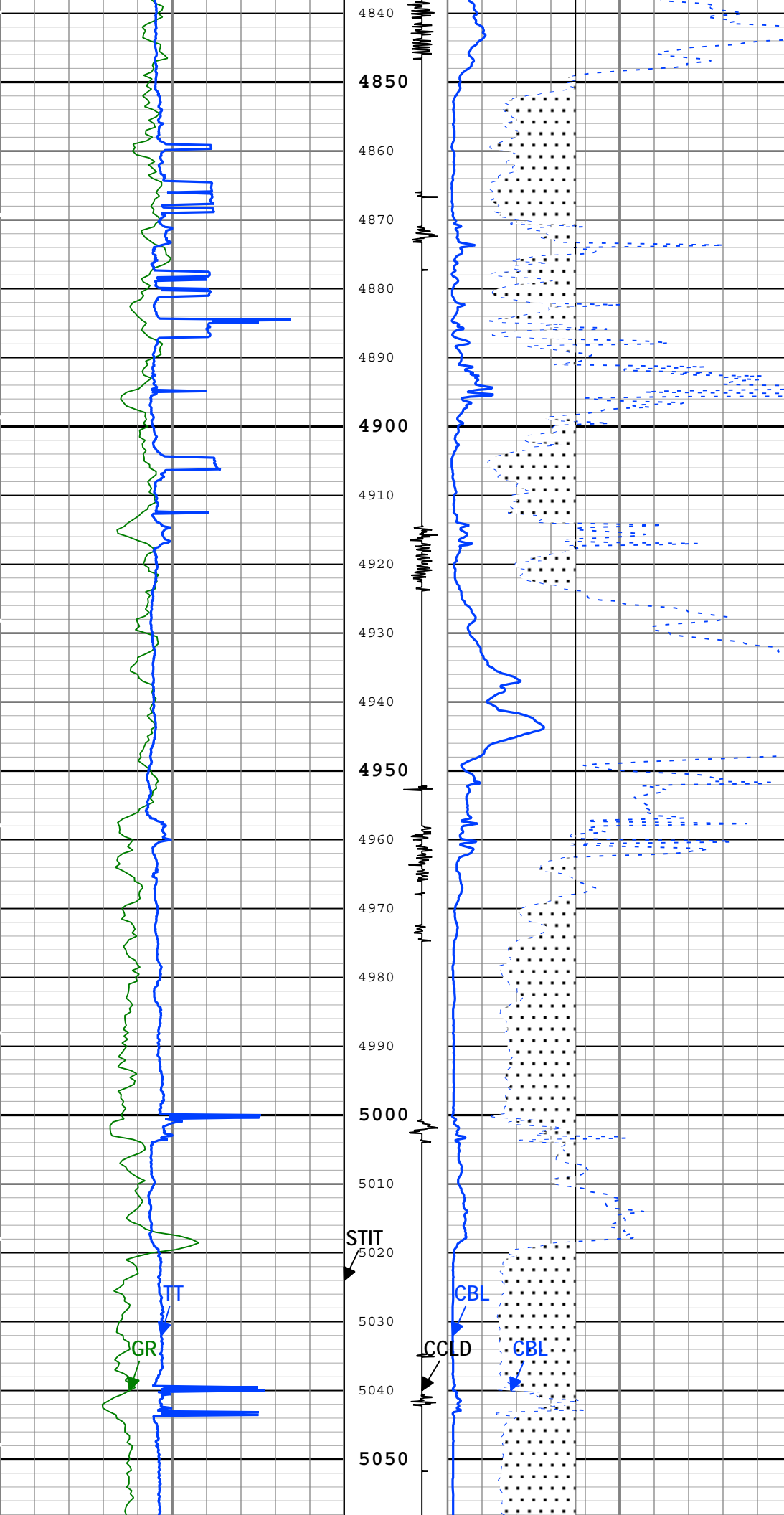


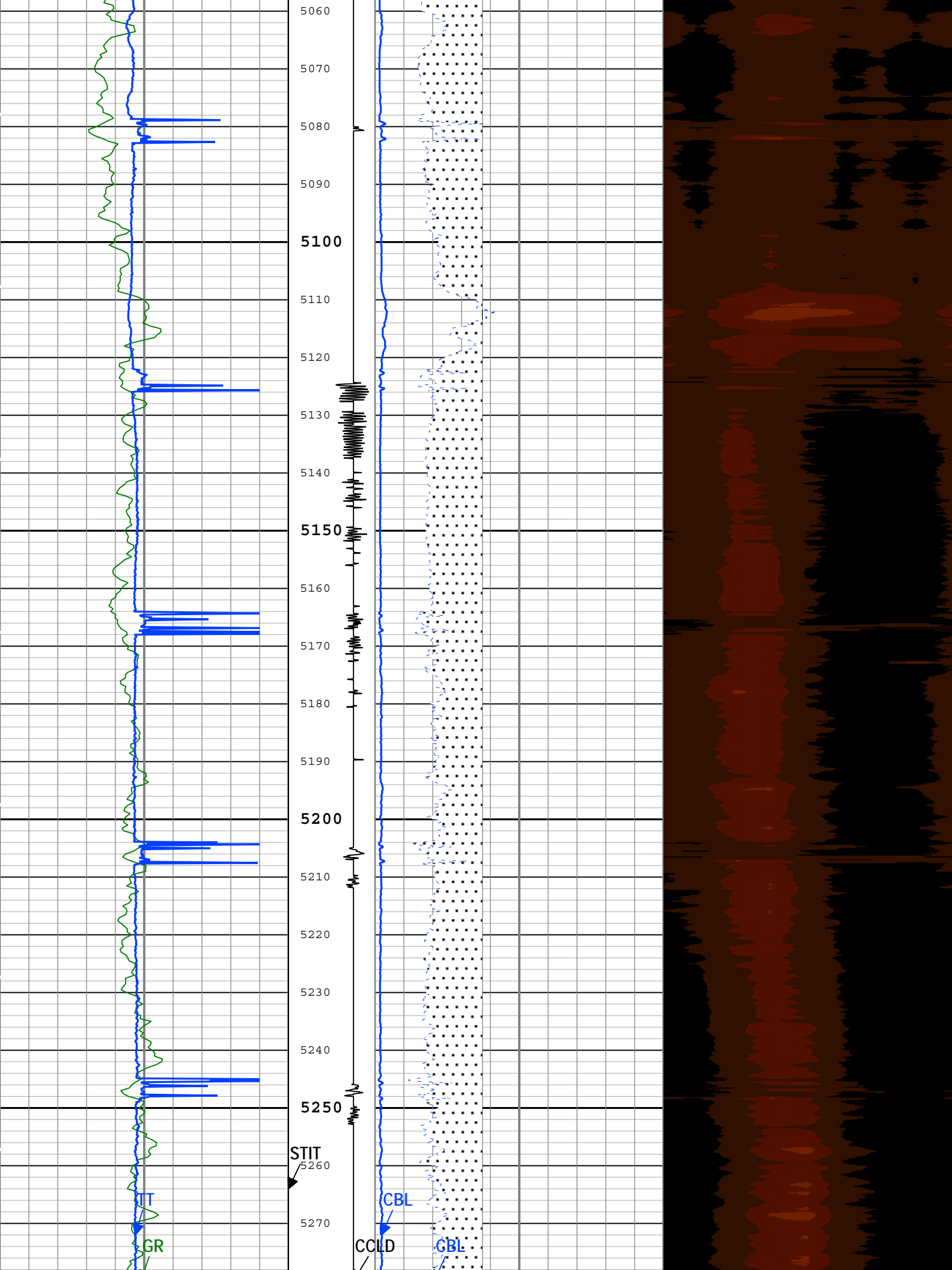


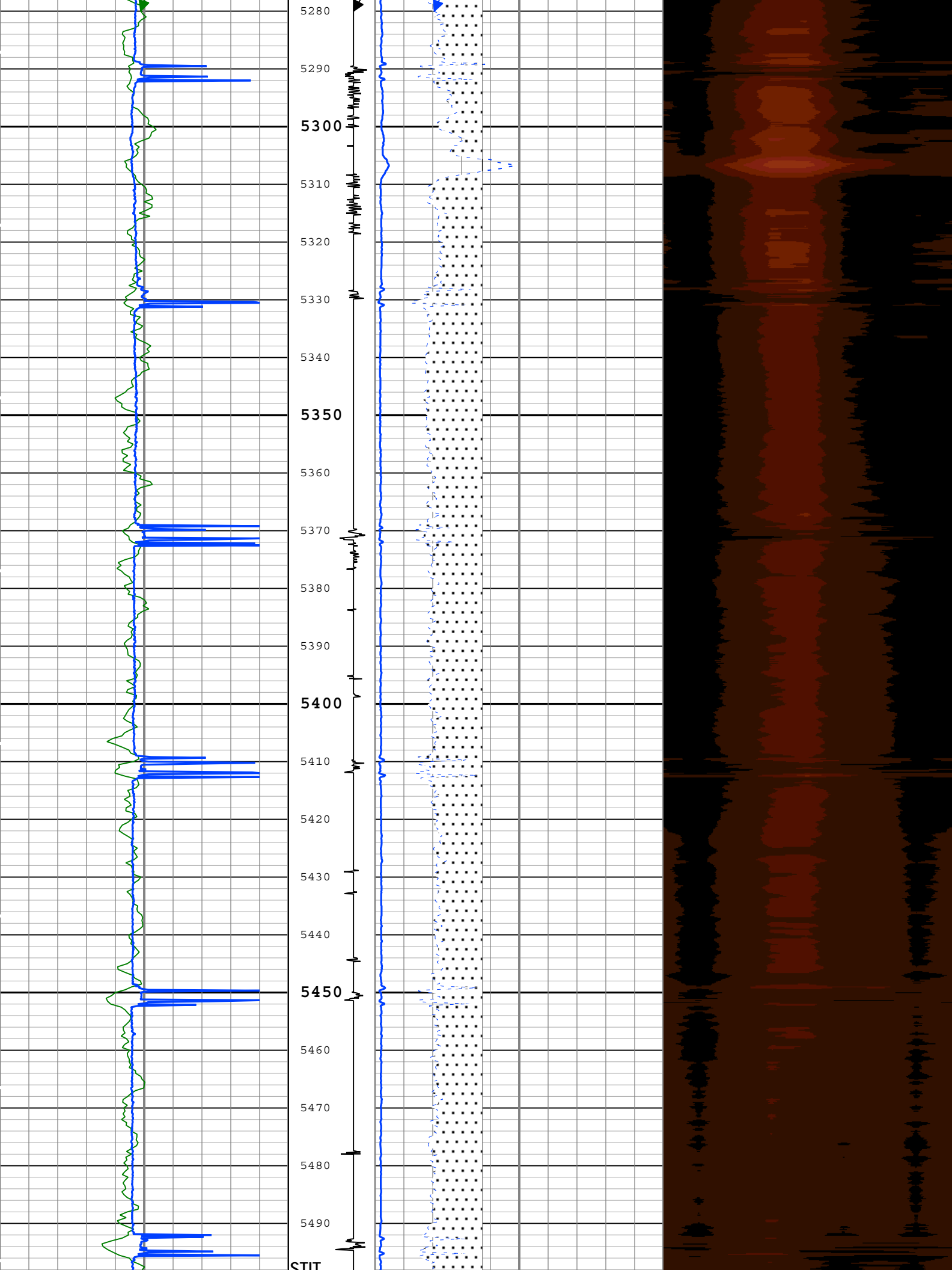


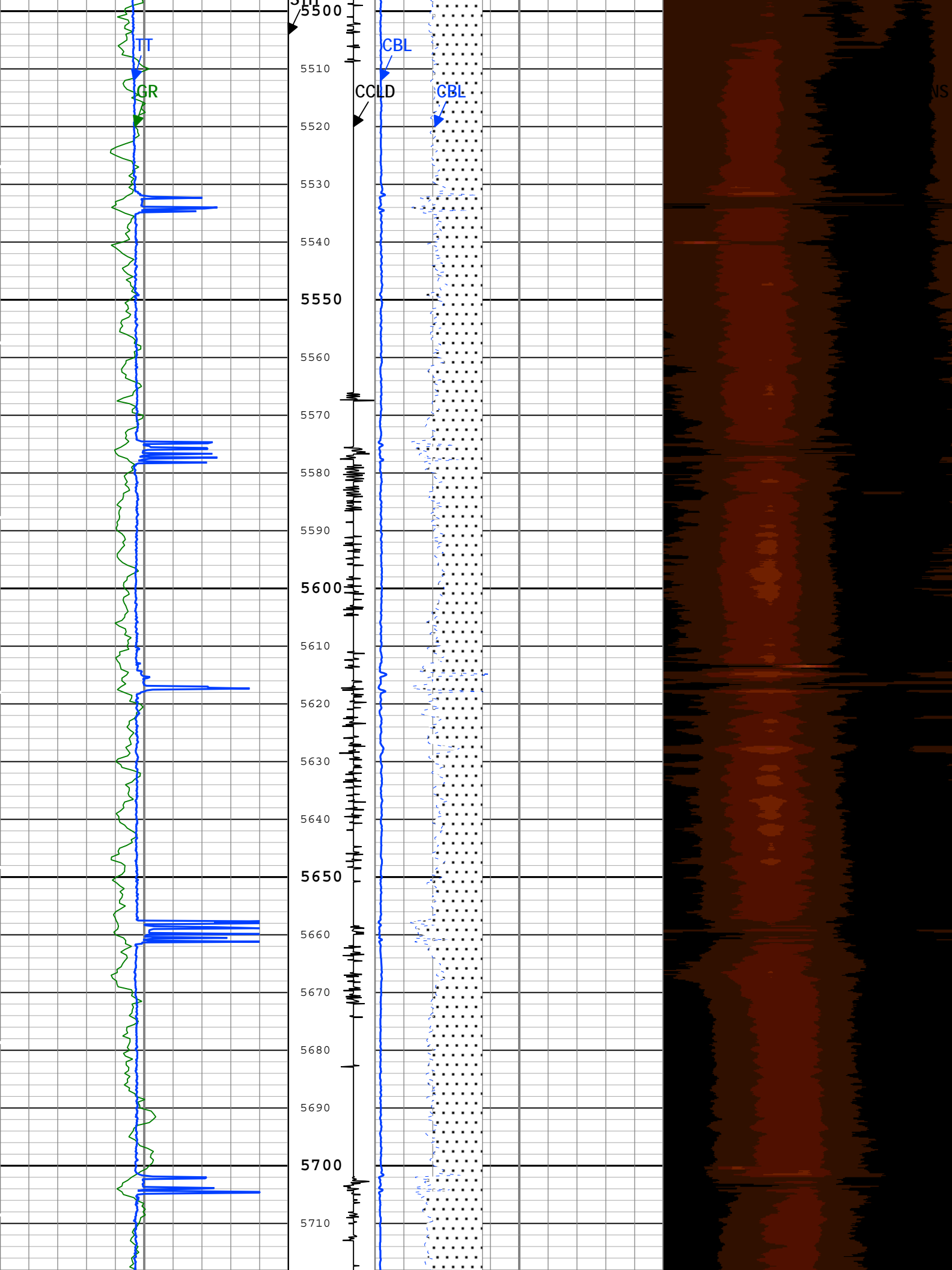


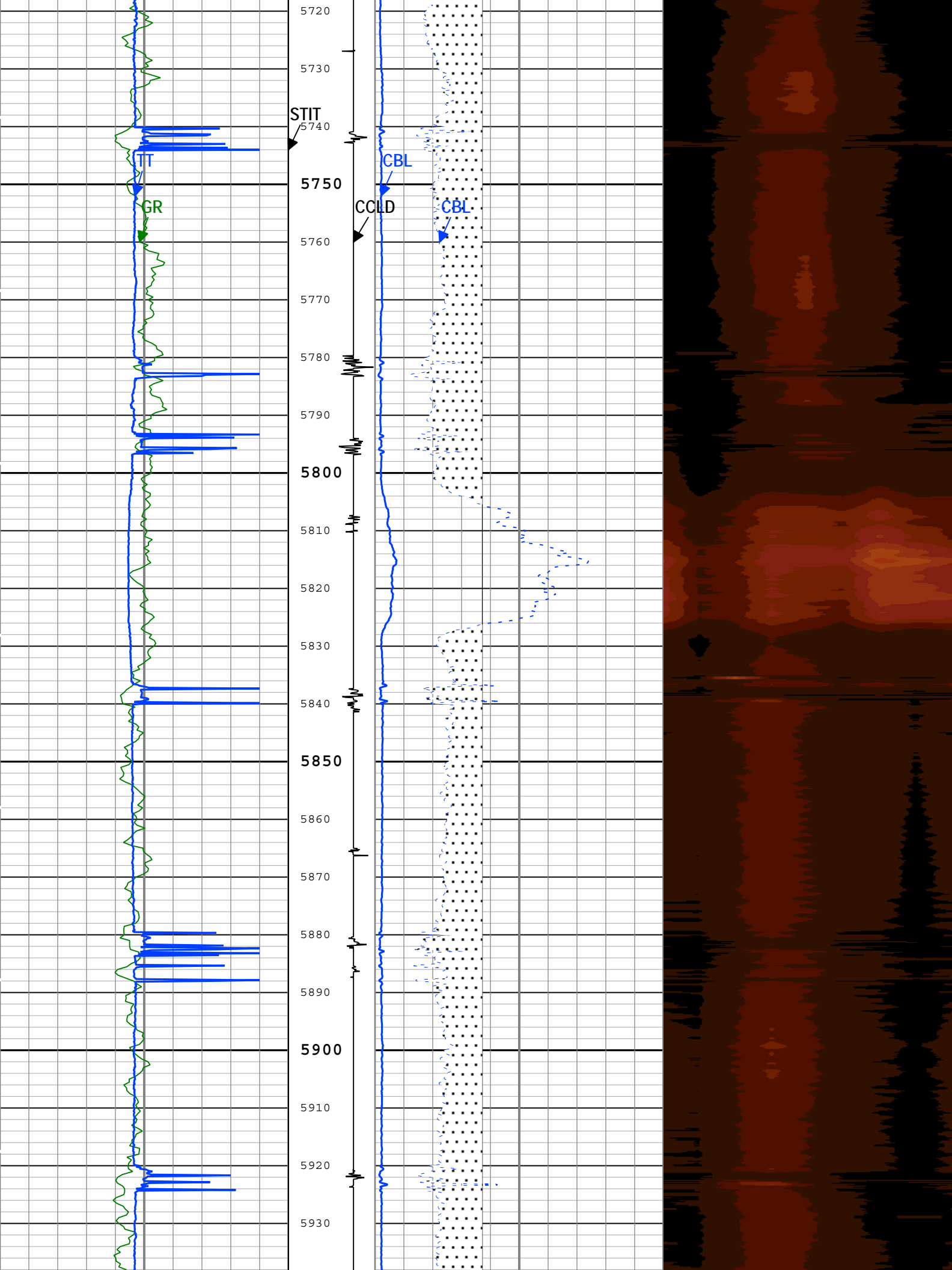


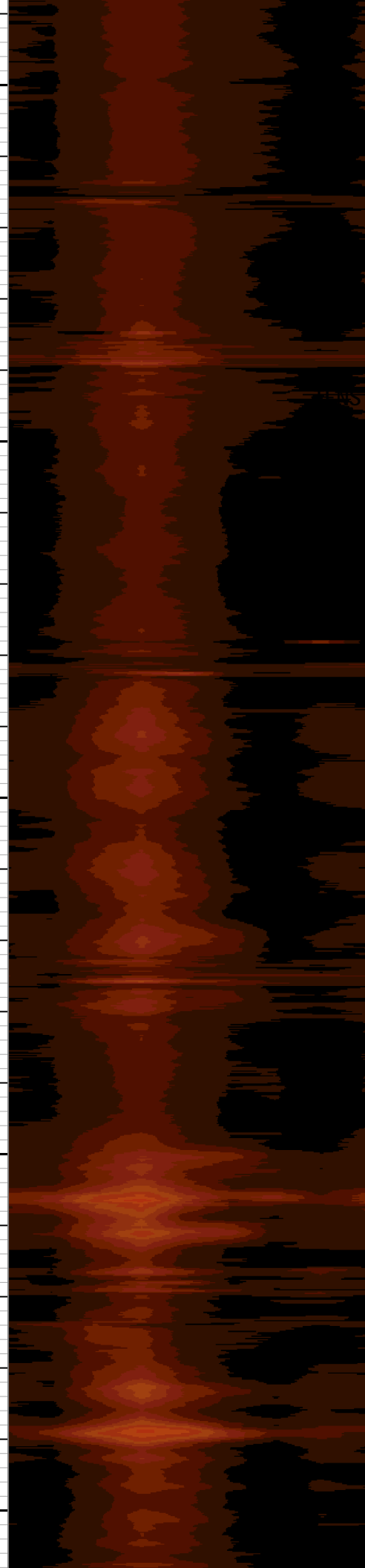
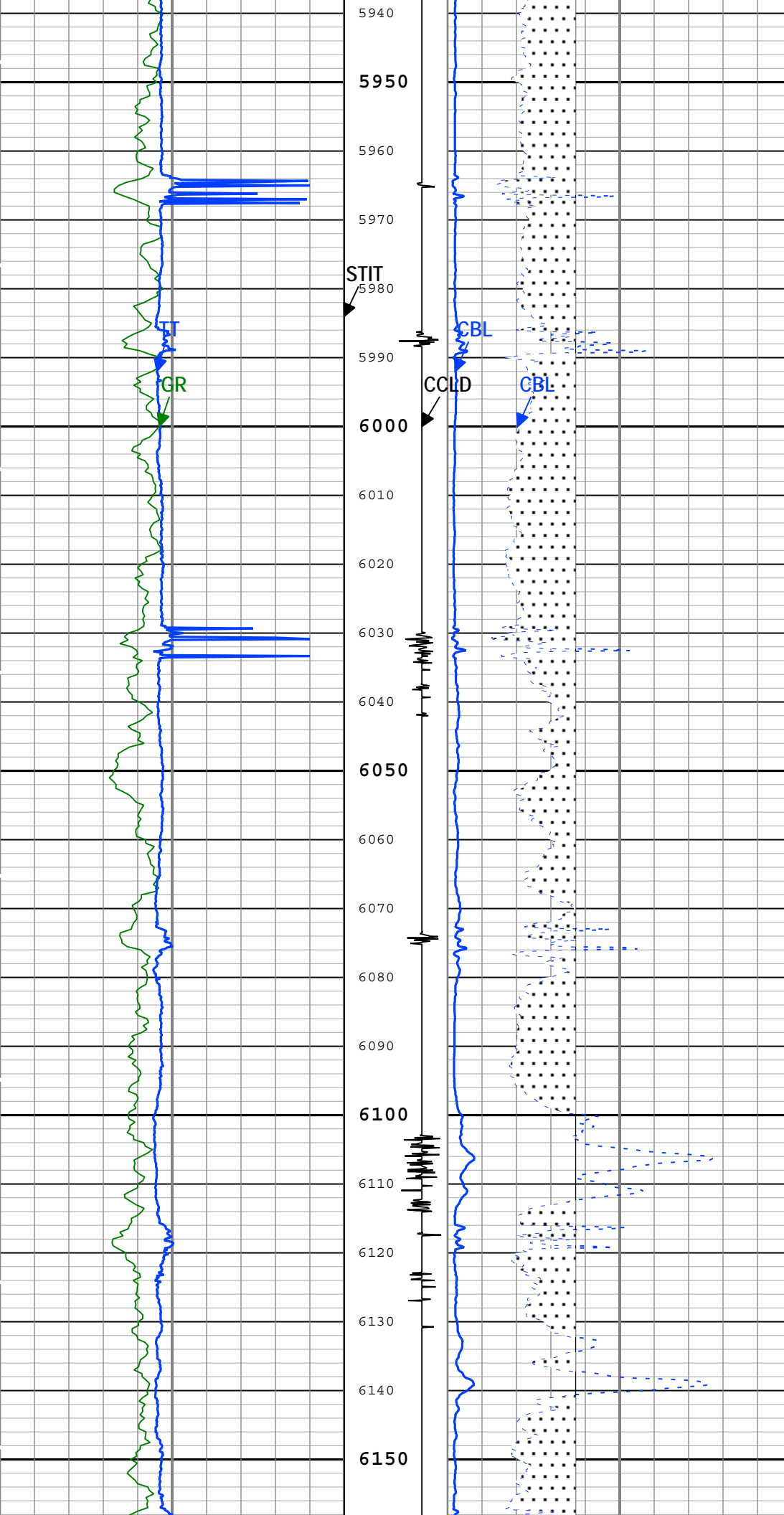


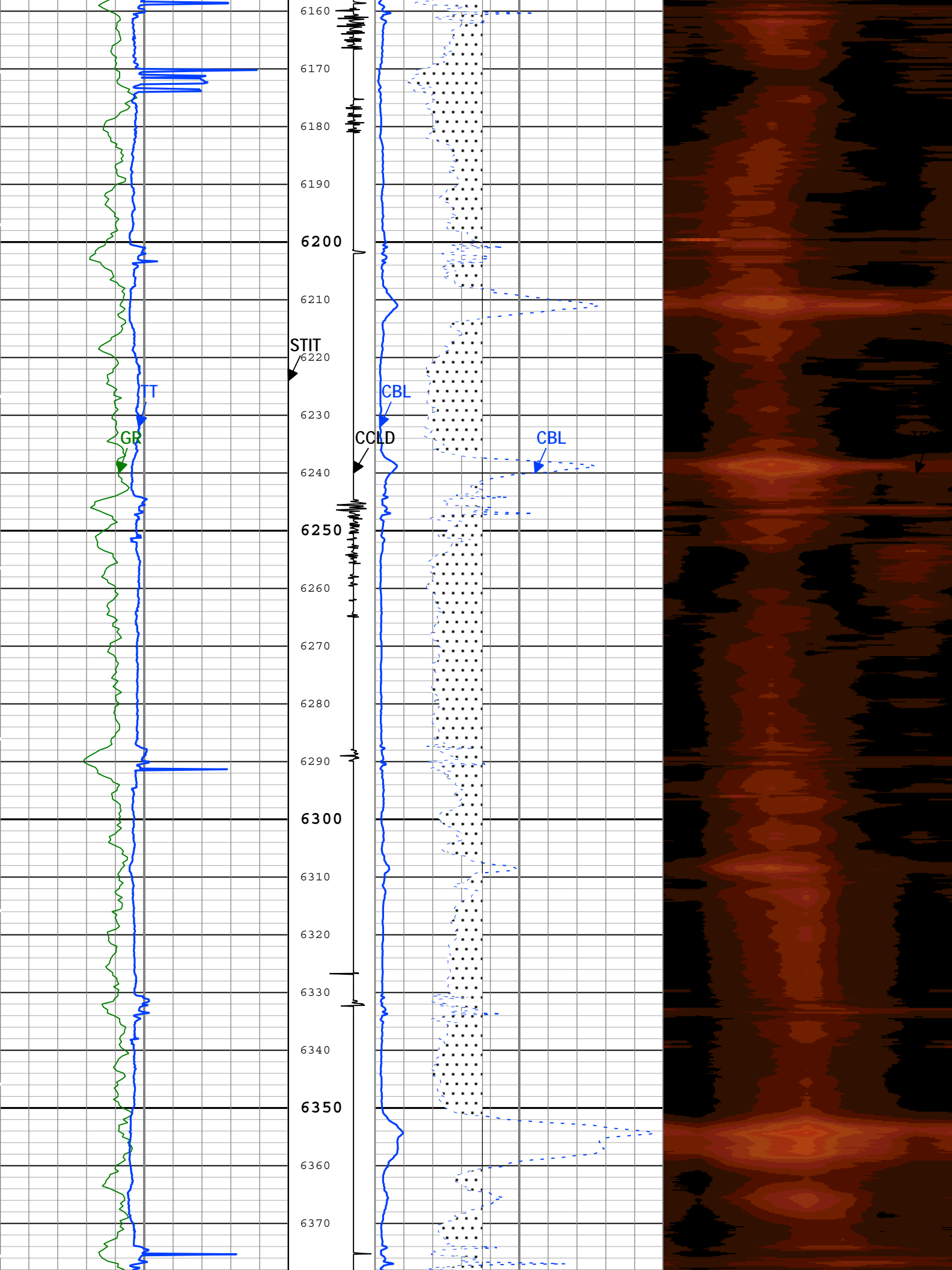


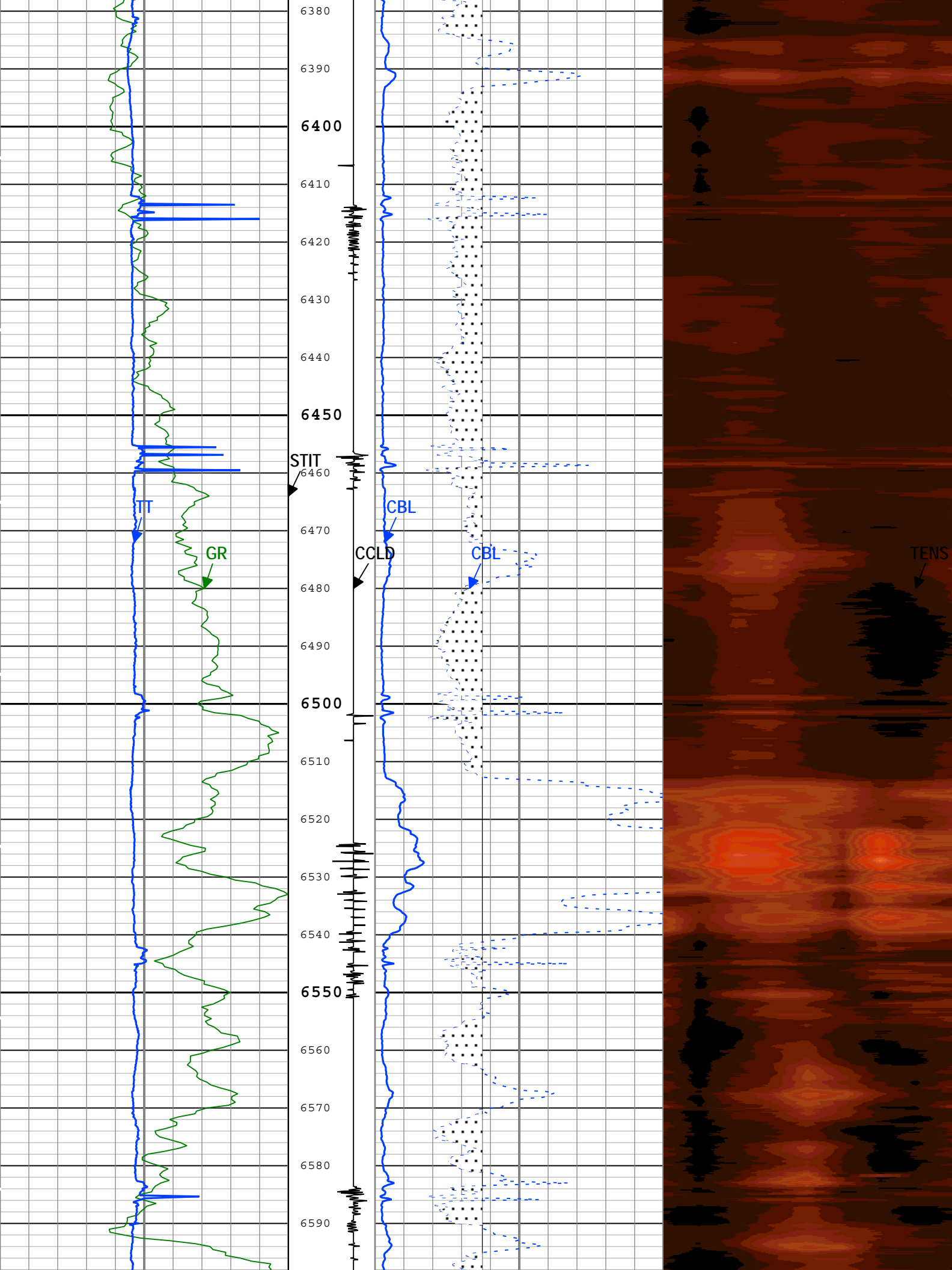


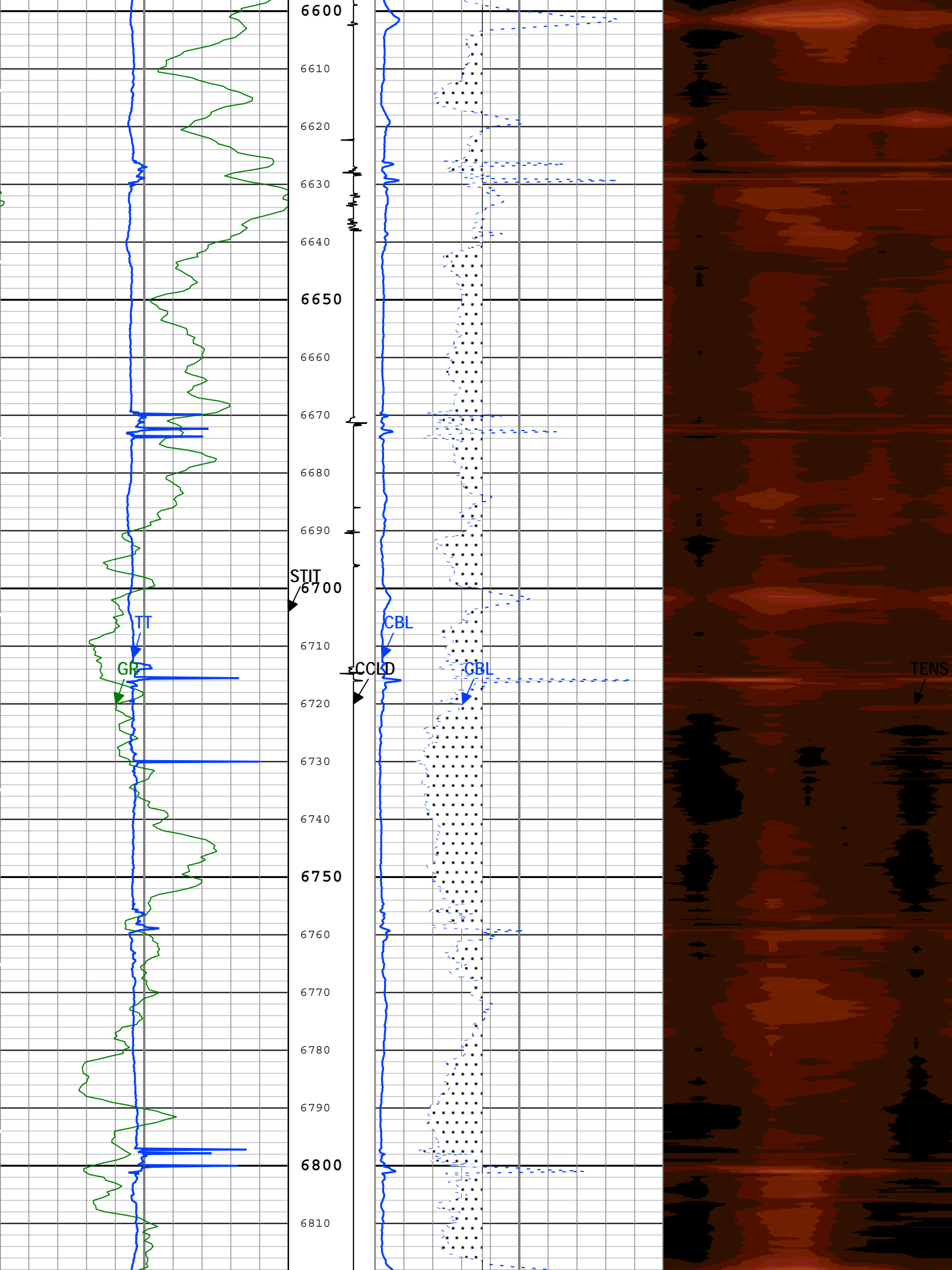


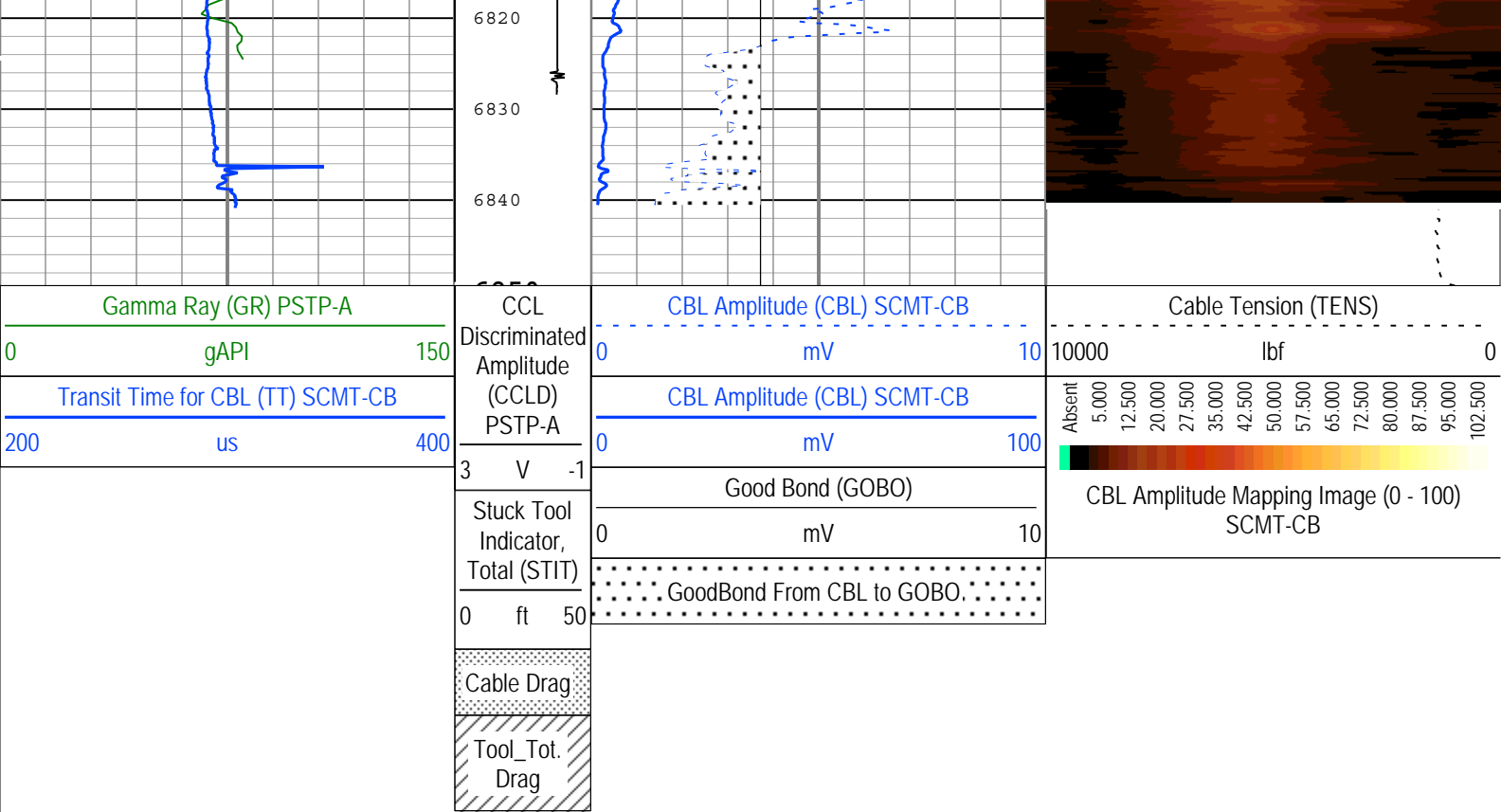












TIME_1900 - Time Marked every 60.00 (s)

Description: SCMT Amplitudes and MAP Image Format: Log (SCMT_Amp_Image) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 21-Apr-2015 06:56:36

Channel Processing Parameters				
Run 2: Parameters				
Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	212	degF
CB3G	SCMT CBL 3 ft Peak Detection T0_Delay and Noise Gate	SCMT-CB	280	us
CBLG	CBL Gate Width	SCMT-CB	40	us
CBRA	CBL LQC Reference Amplitude in Free Pipe	SCMT-CB	62	mV
CMCF	CBL Cement Type Compensation Factor	SCMT-CB	0.6	
DFD	Drilling Fluid Density	Borehole	8.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	29	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4663	ft
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GOBO_CURR	Good Bond in Arbitrary Cement	SCMT-CB	5.58	mV
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST	
MAPG	SCMT MAP Peak Detection T0_Delay and Noise Gate	SCMT-CB	215	us
MATT_CURR	Maximum Attenuation in Arbitrary Cement	SCMT-CB	10.19	dB/ft
MCCF	MAP Cement Type Compensation Factor	SCMT-CB	0.73	
MCI	Minimum Cemented Interval for Isolation	SCMT-CB	Depth Zoned	ft
MMSA	MAP Minimum Sonic Amplitude	SCMT-CB	10.86	mV
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	SCMT-CB	3.06	mV
PDAT	Permanent Datum	WLSESSION	GL	
RUN_SNUM	Run Sequence Number	WSDRUN	4	
SHT	Surface Hole Temperature	Borehole	68	degF
TD	Total Measured Depth	Borehole	6850	ft

ZCMT	Acoustic Impedance of Cement	SCMT-CB	5.5	Mrayl
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Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
MCI	26.48	40	110
MCI	14.81	110	930.1
MCI	10	930.1	6849.42

All depth are actual.

Tool Control Parameters

Run 2: Parameters

Parameter	Description	Tool	Value	Unit
CMTM	SCMT Operating Mode	SCMT-CB	Log	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

Run 2

Software Version

Acquisition System	Version
Maxwell	5.2.40401.3100

Pass Summary

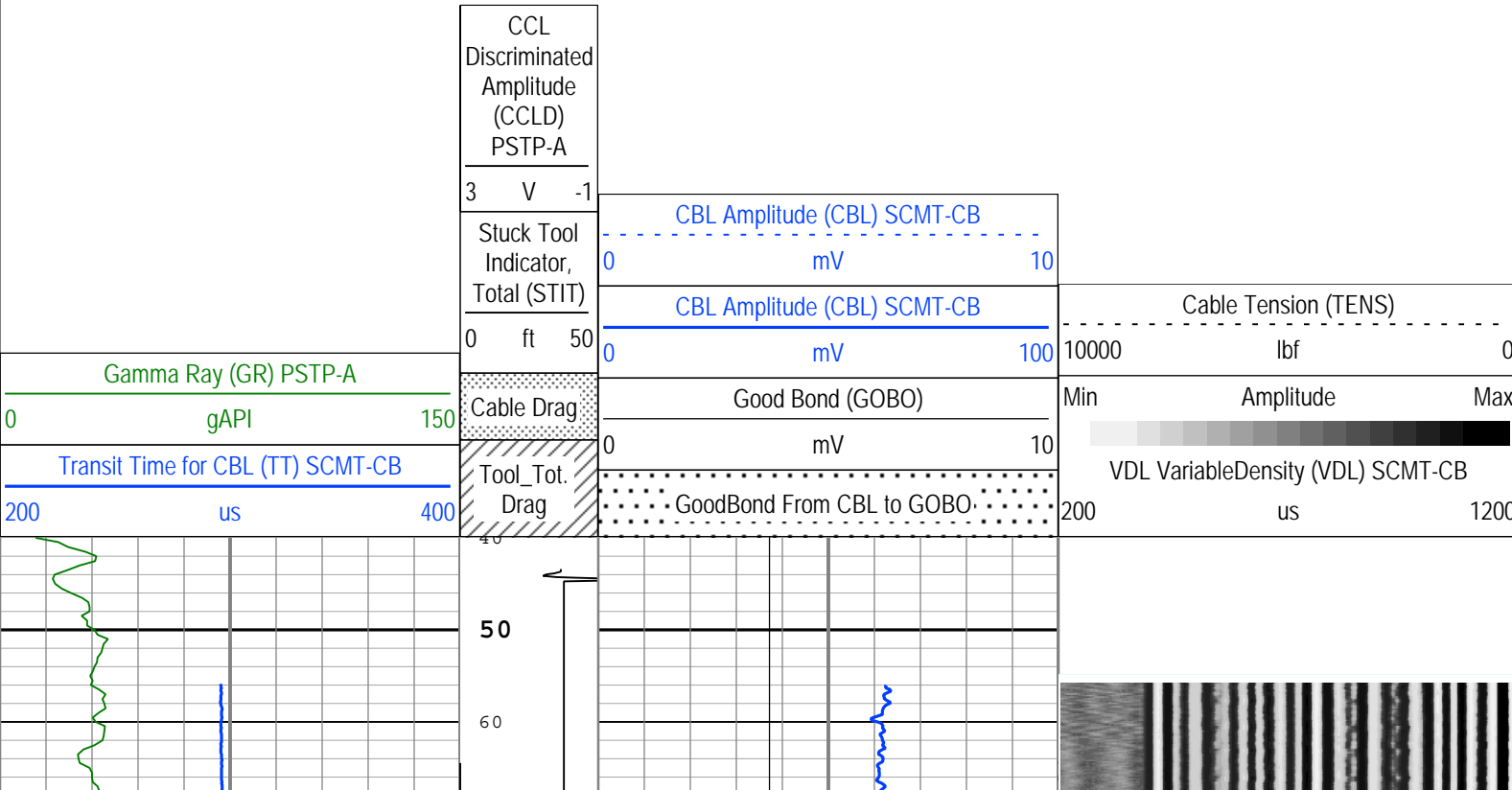
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run 2	Main[5]:Up	Up	64.27 ft	6849.39 ft	20-Apr-2015 9:07:55 AM	20-Apr-2015 1:17:36 PM	ON	3.57 ft	Yes

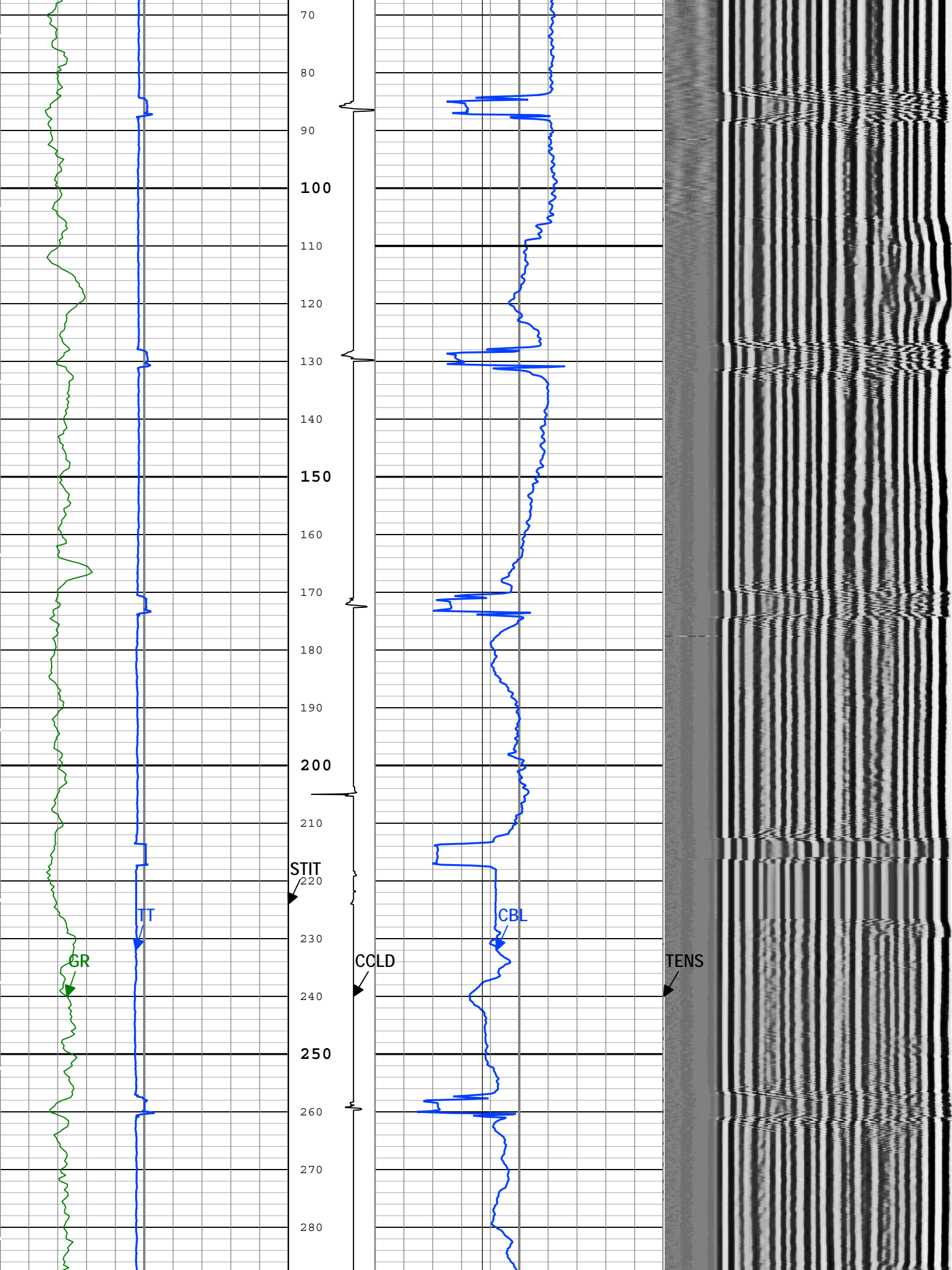
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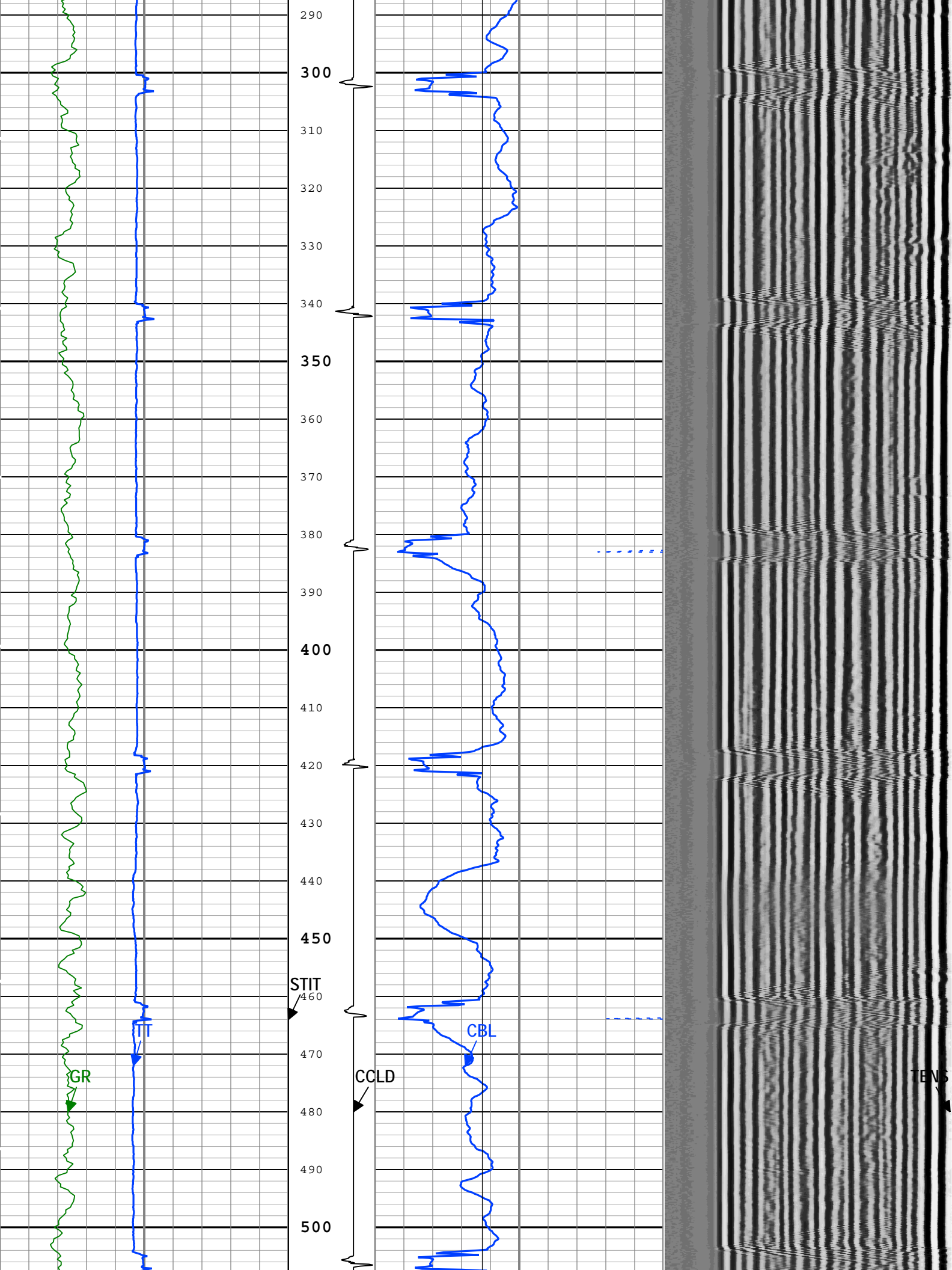
Log	Company:Noble Energy Inc Well:Colt A13-652 Run 2: Main[5]:Up:S016
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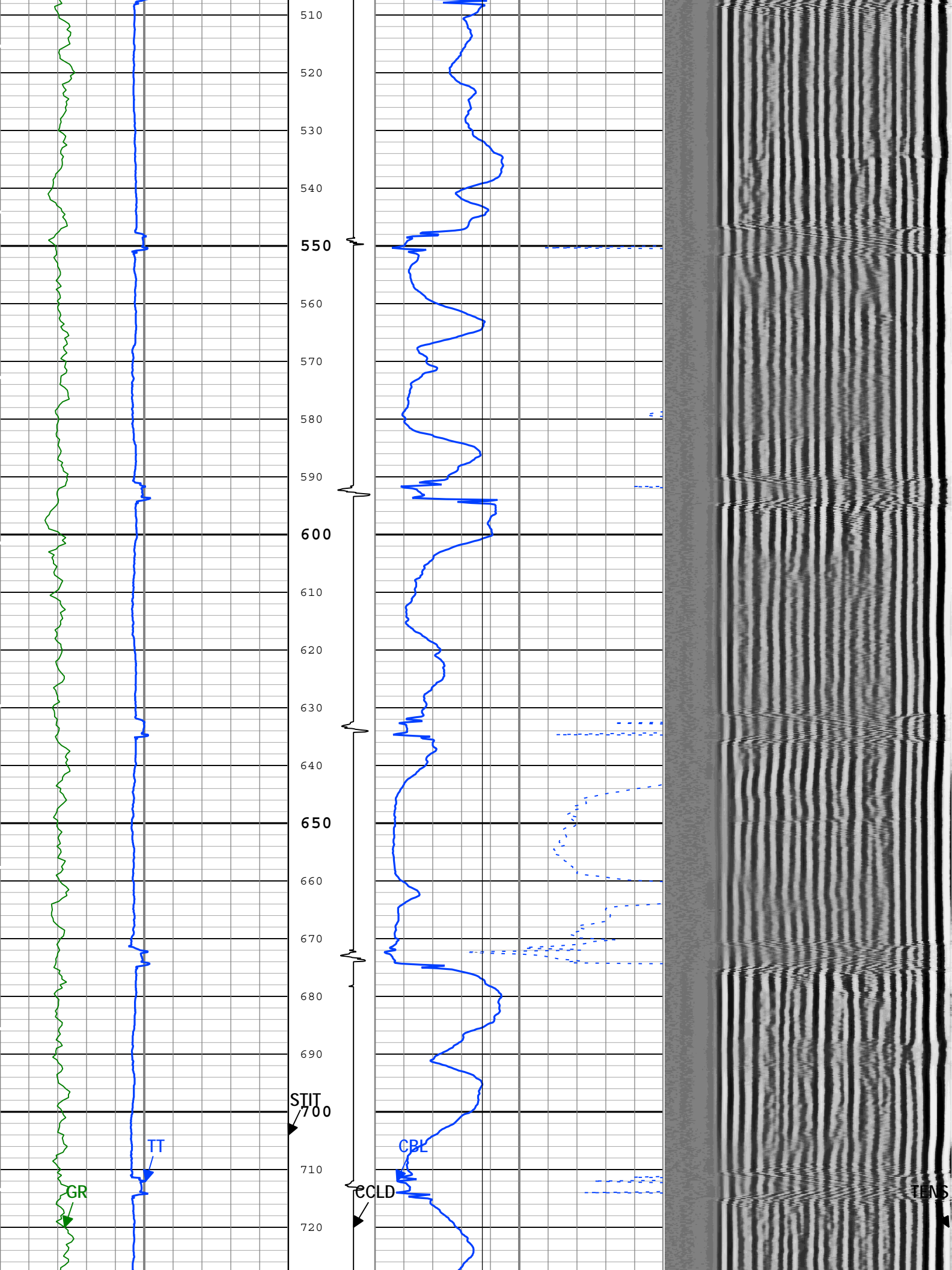
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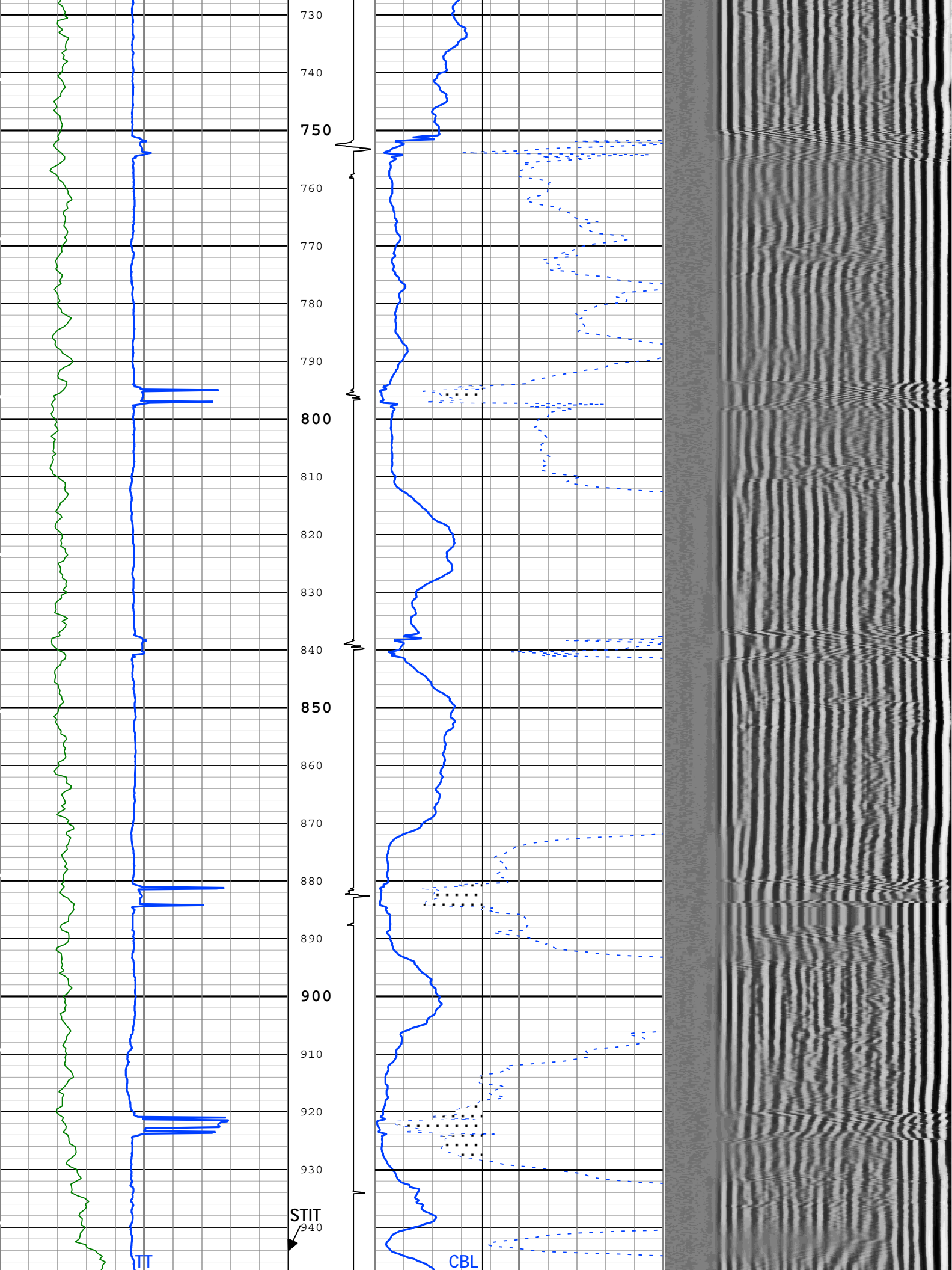
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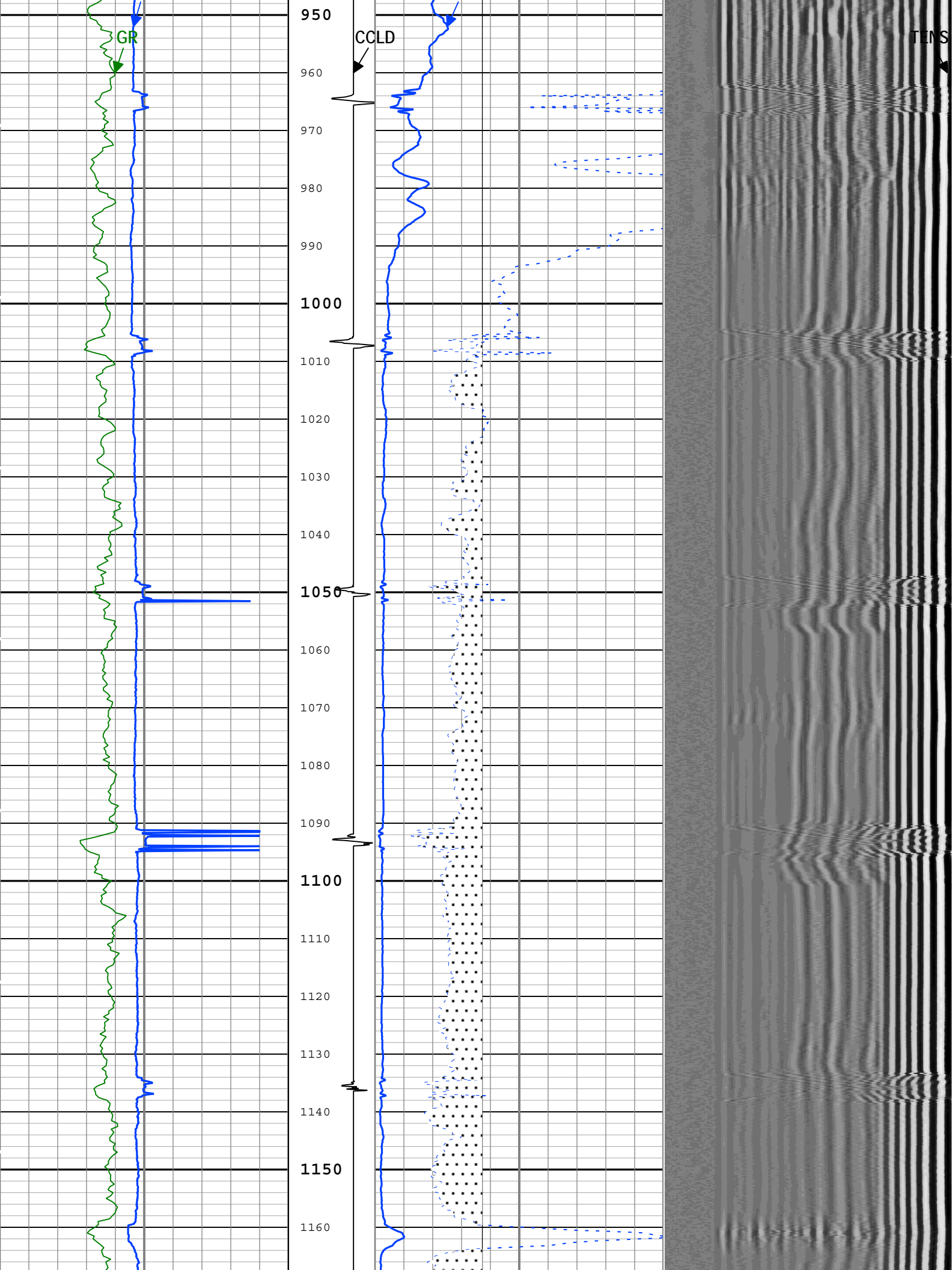


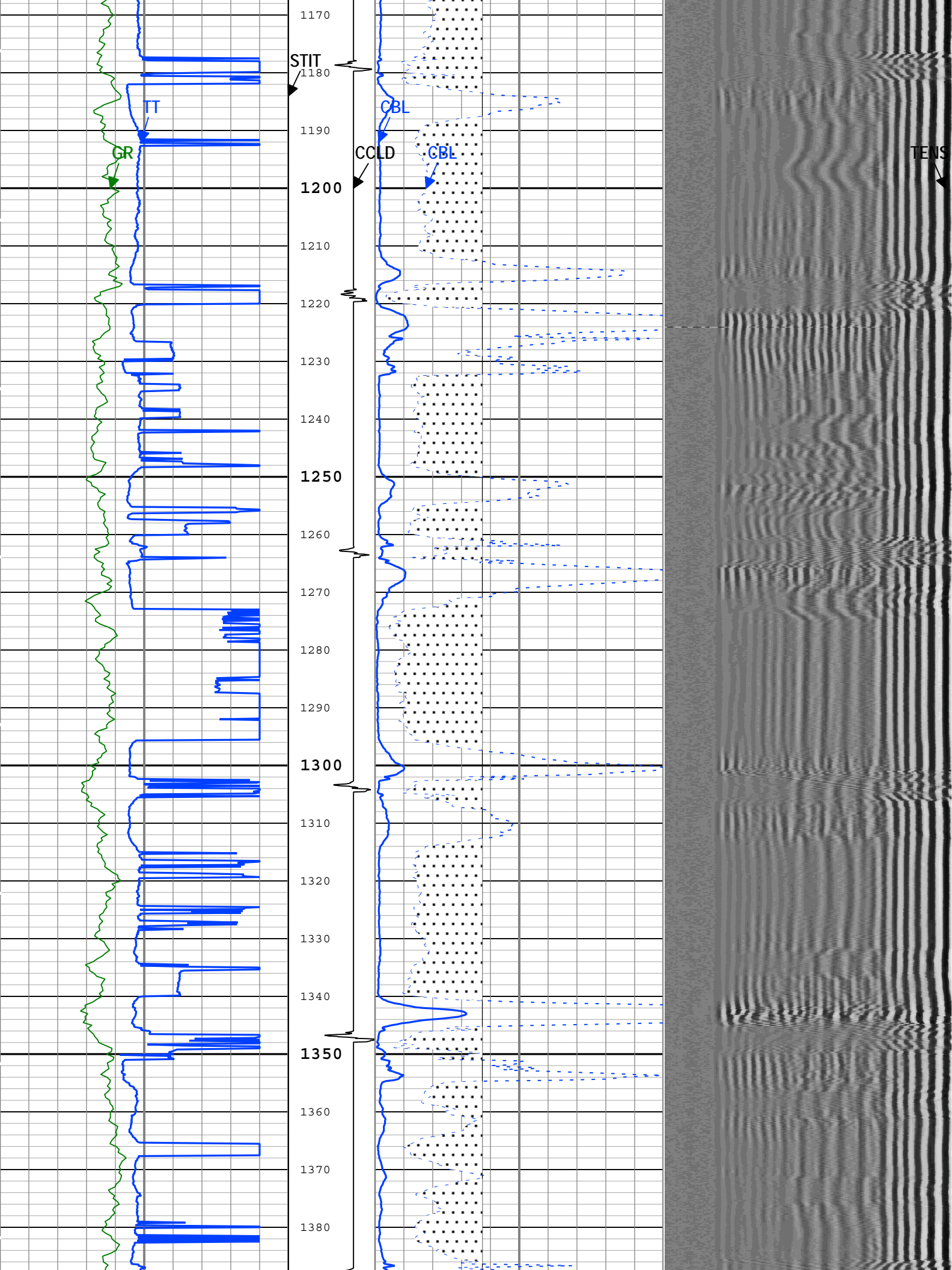


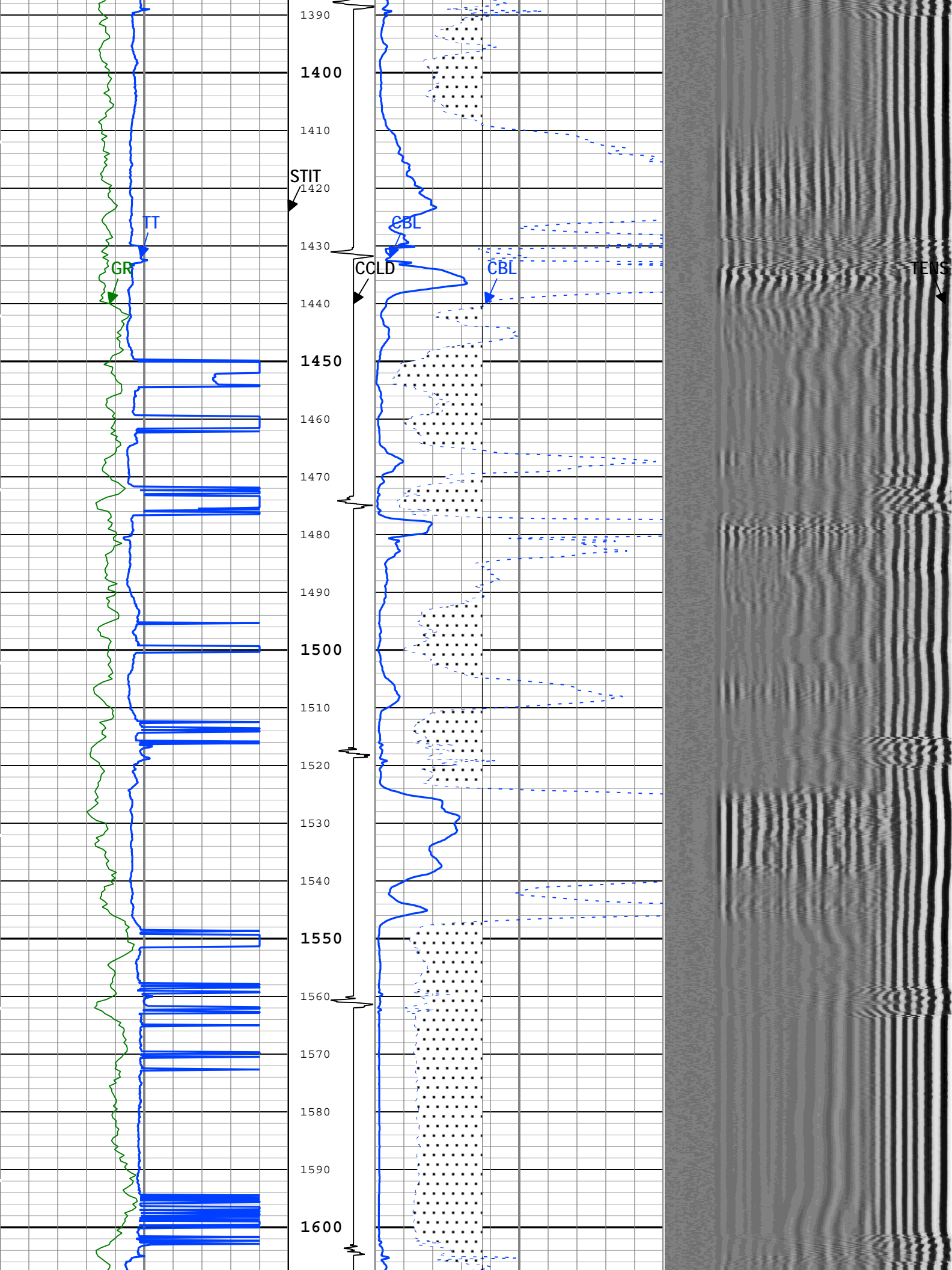


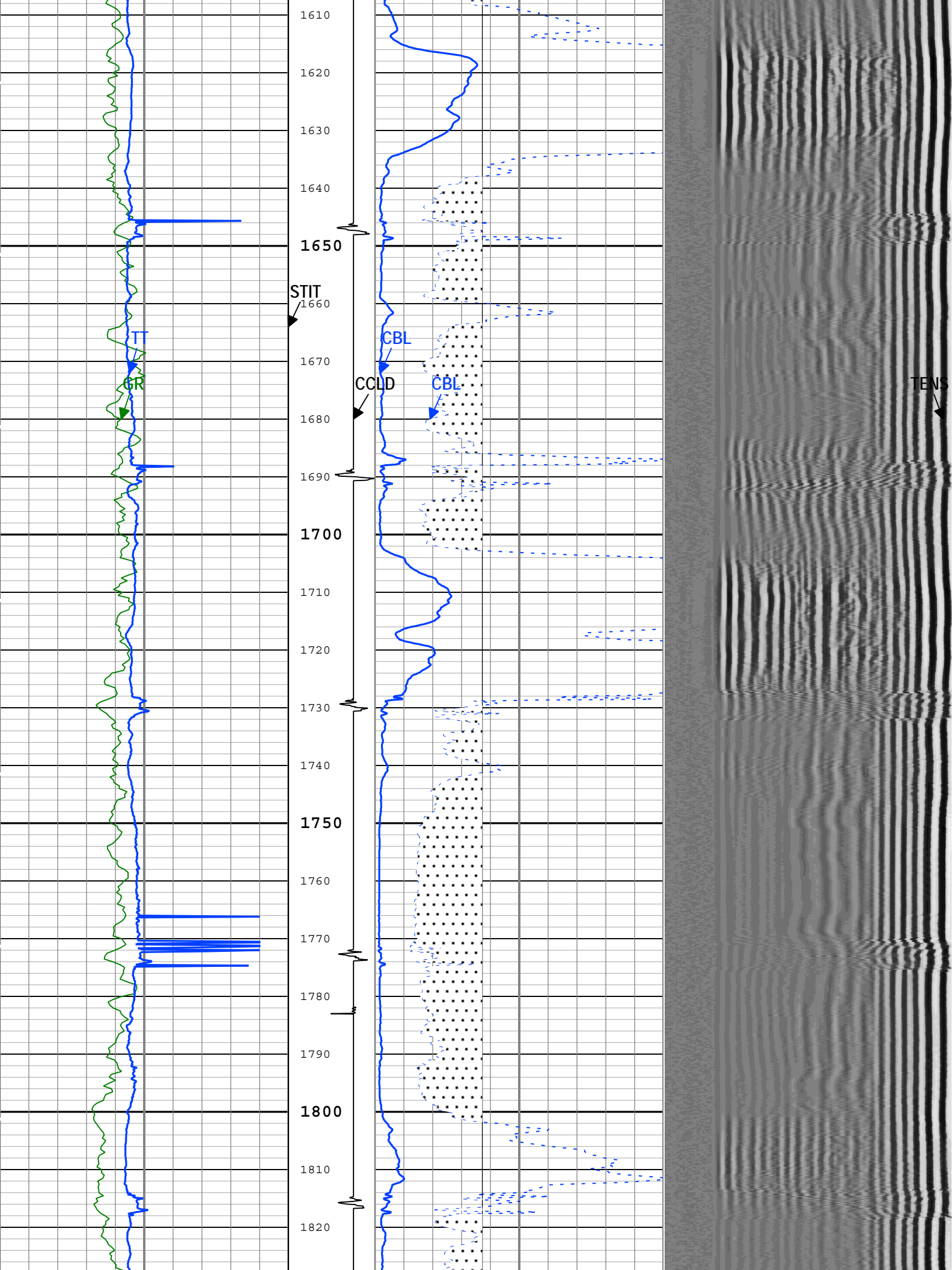


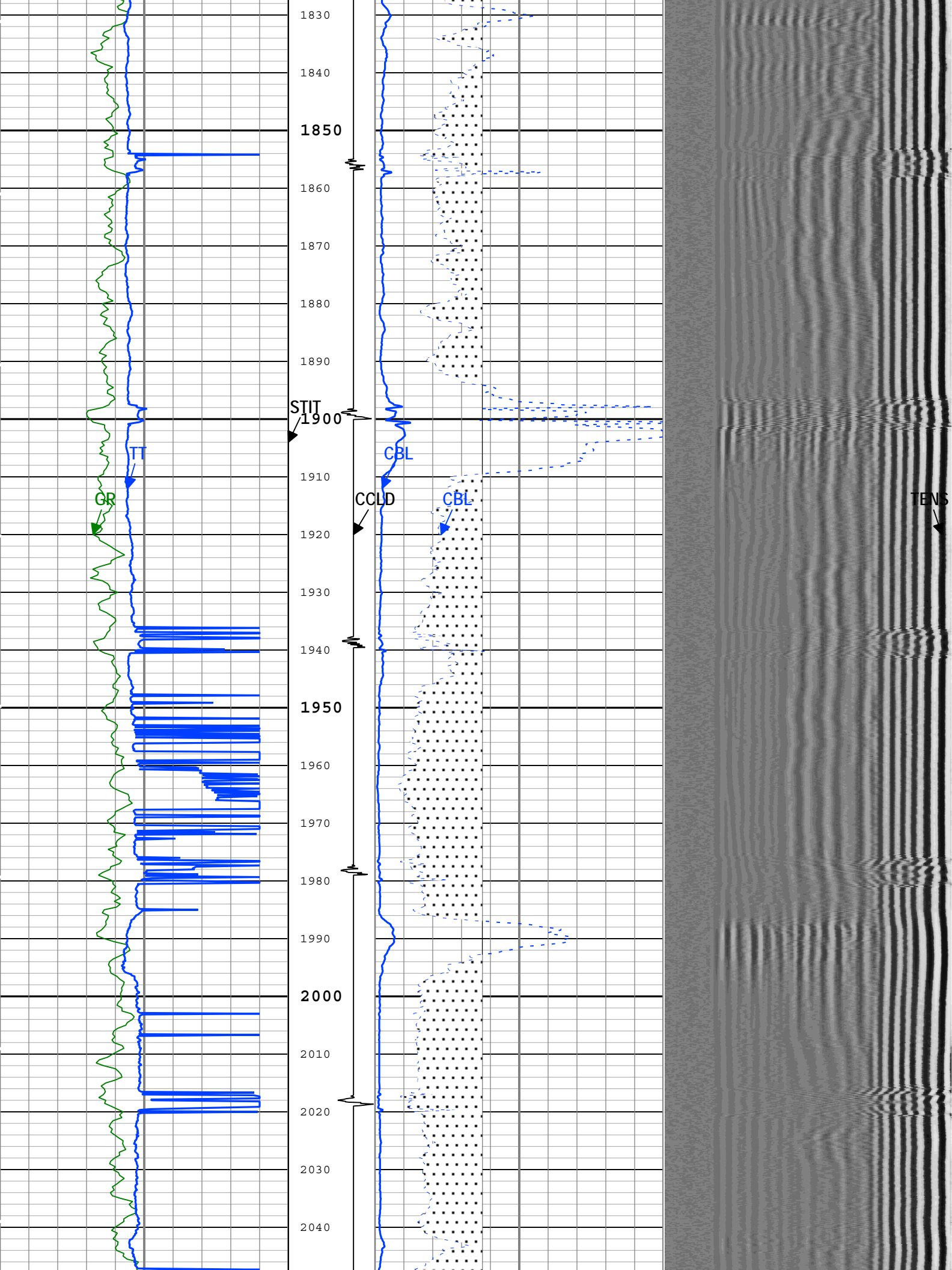


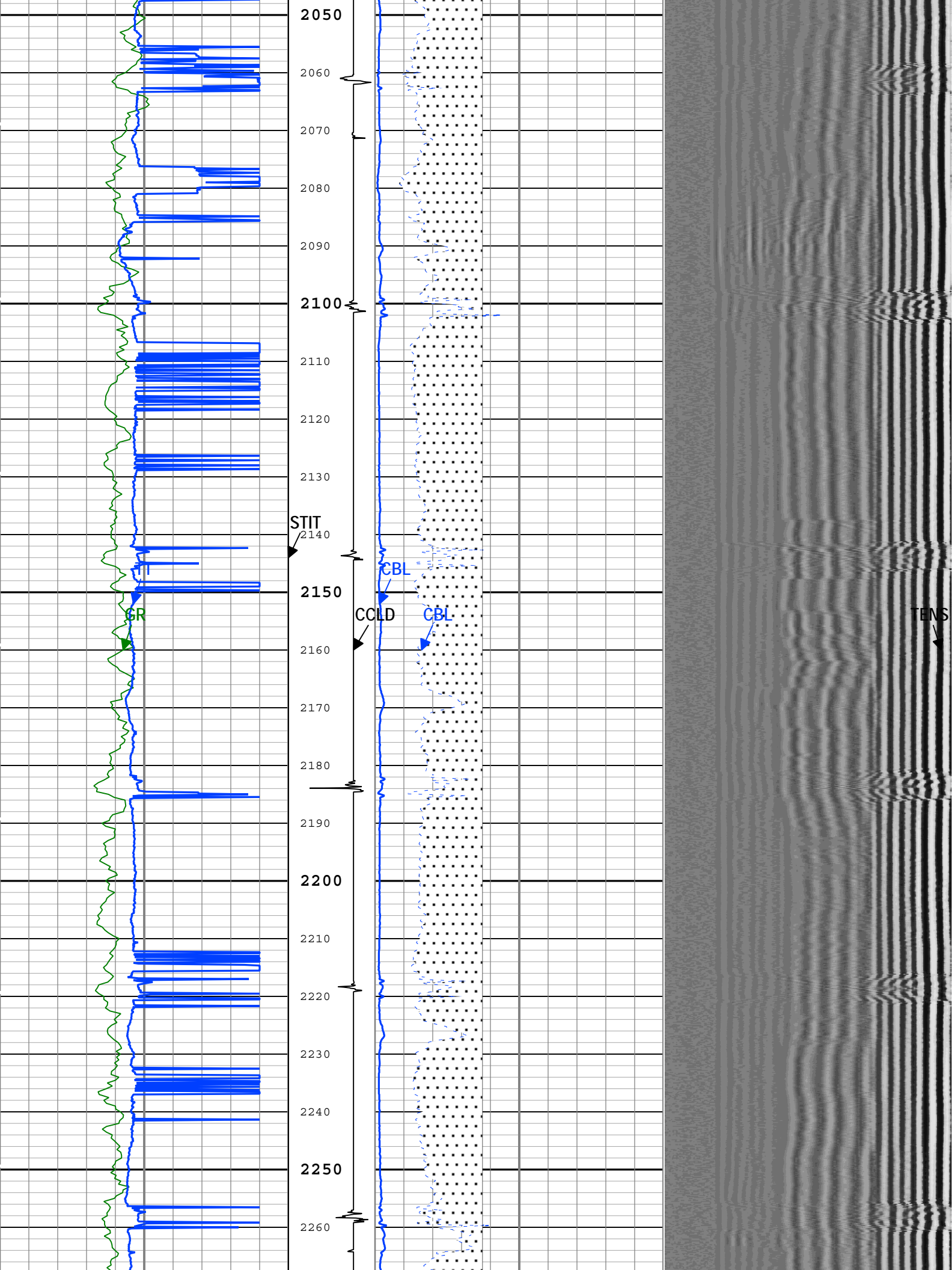


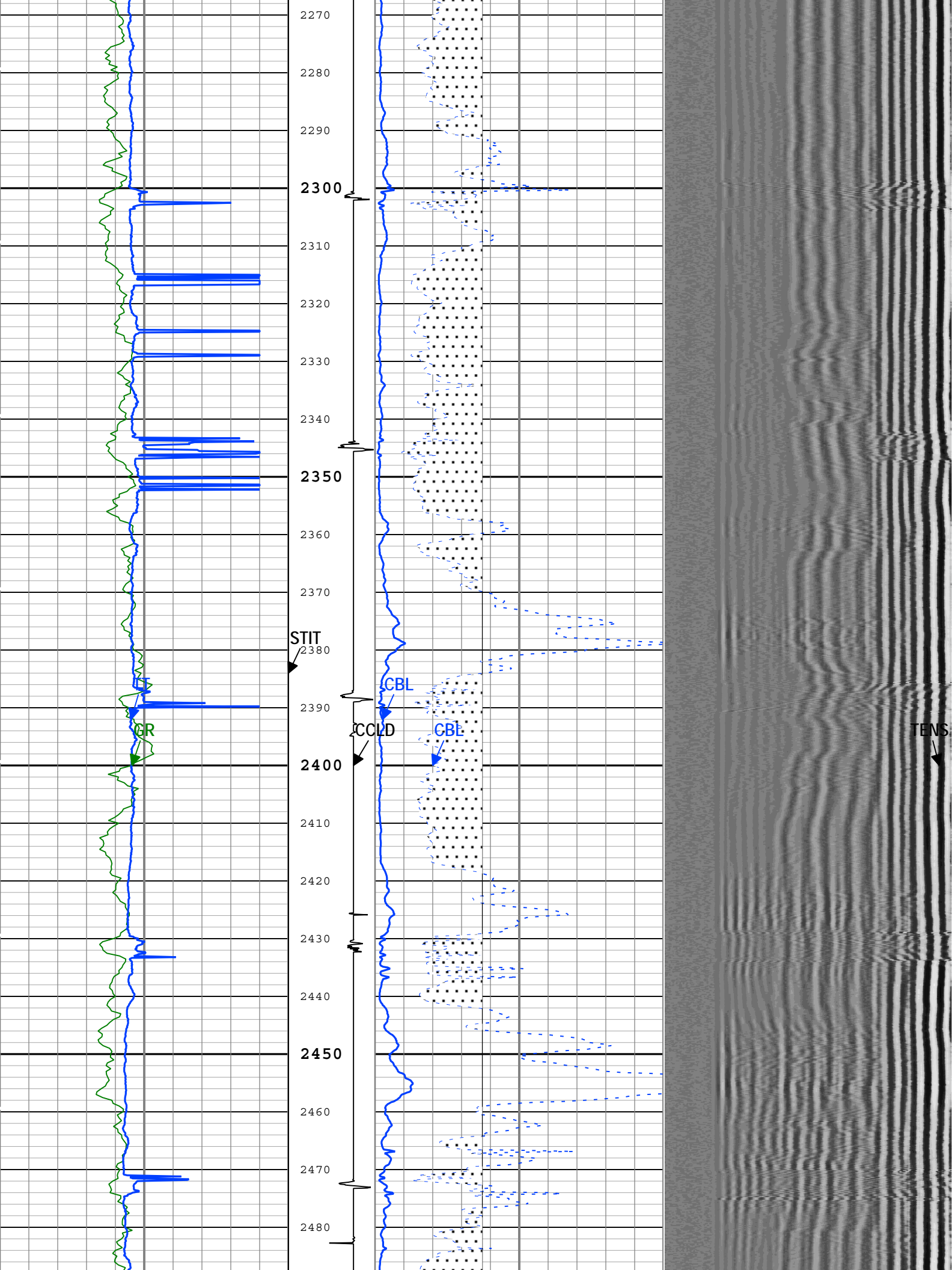


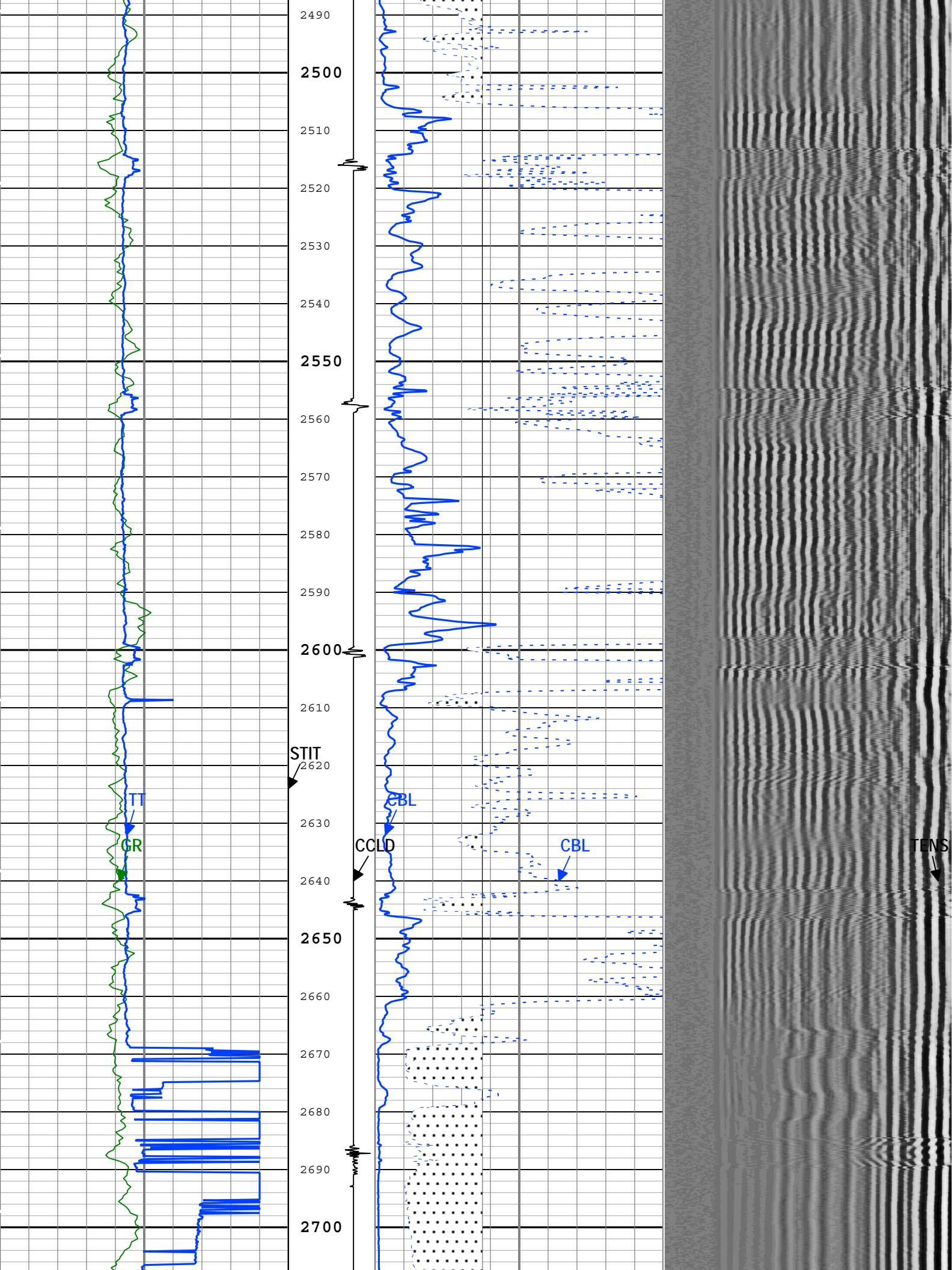


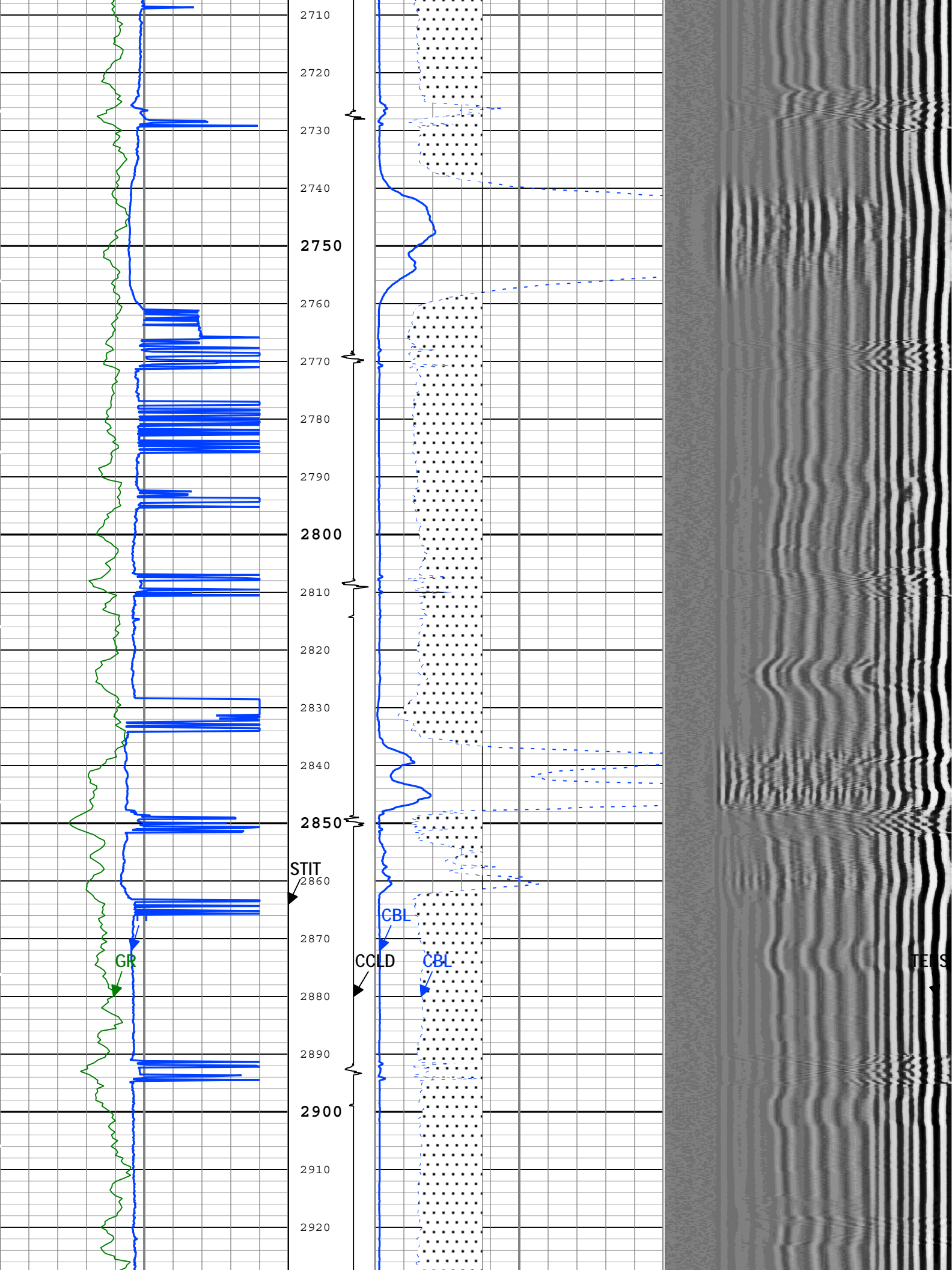


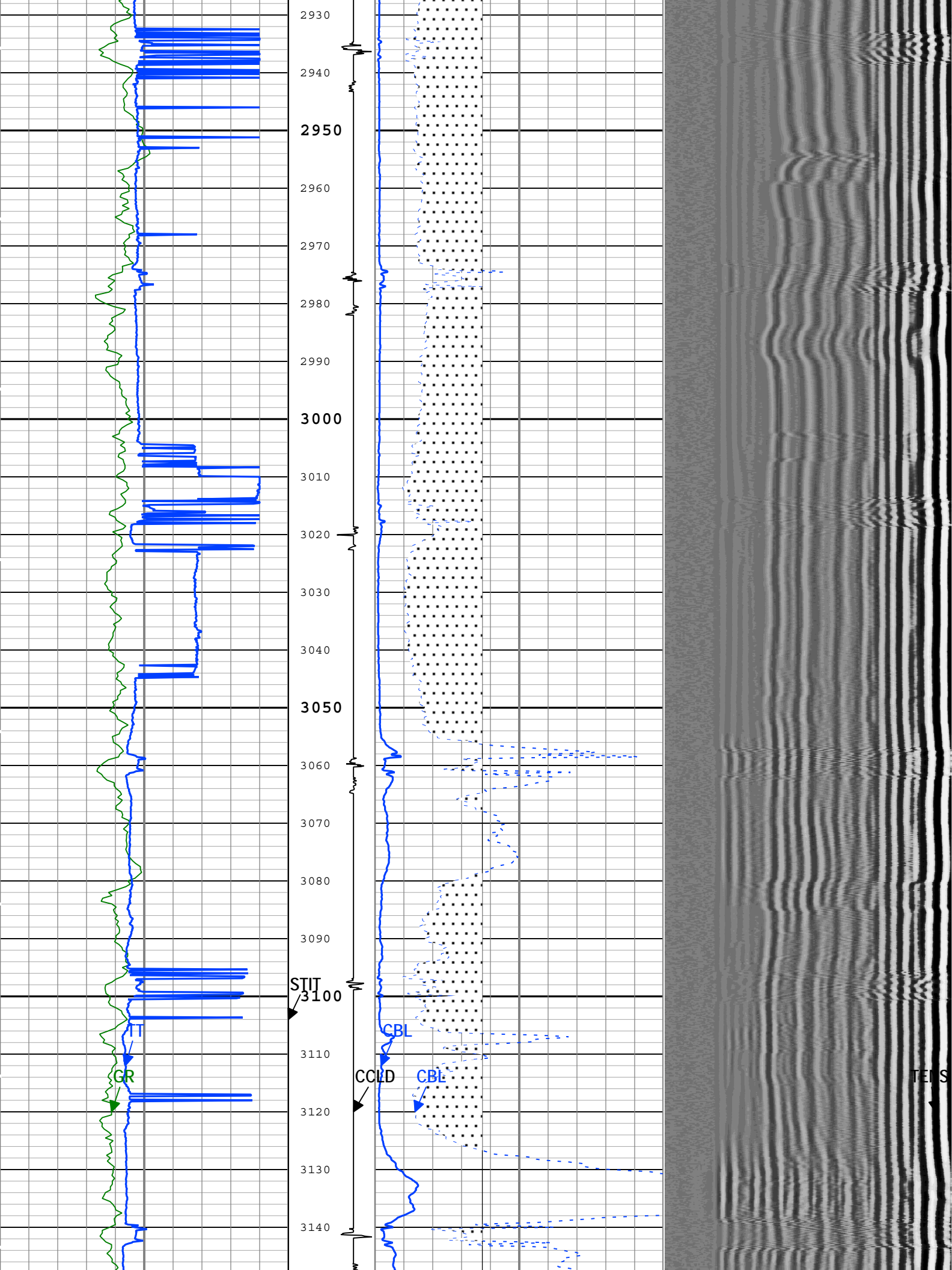


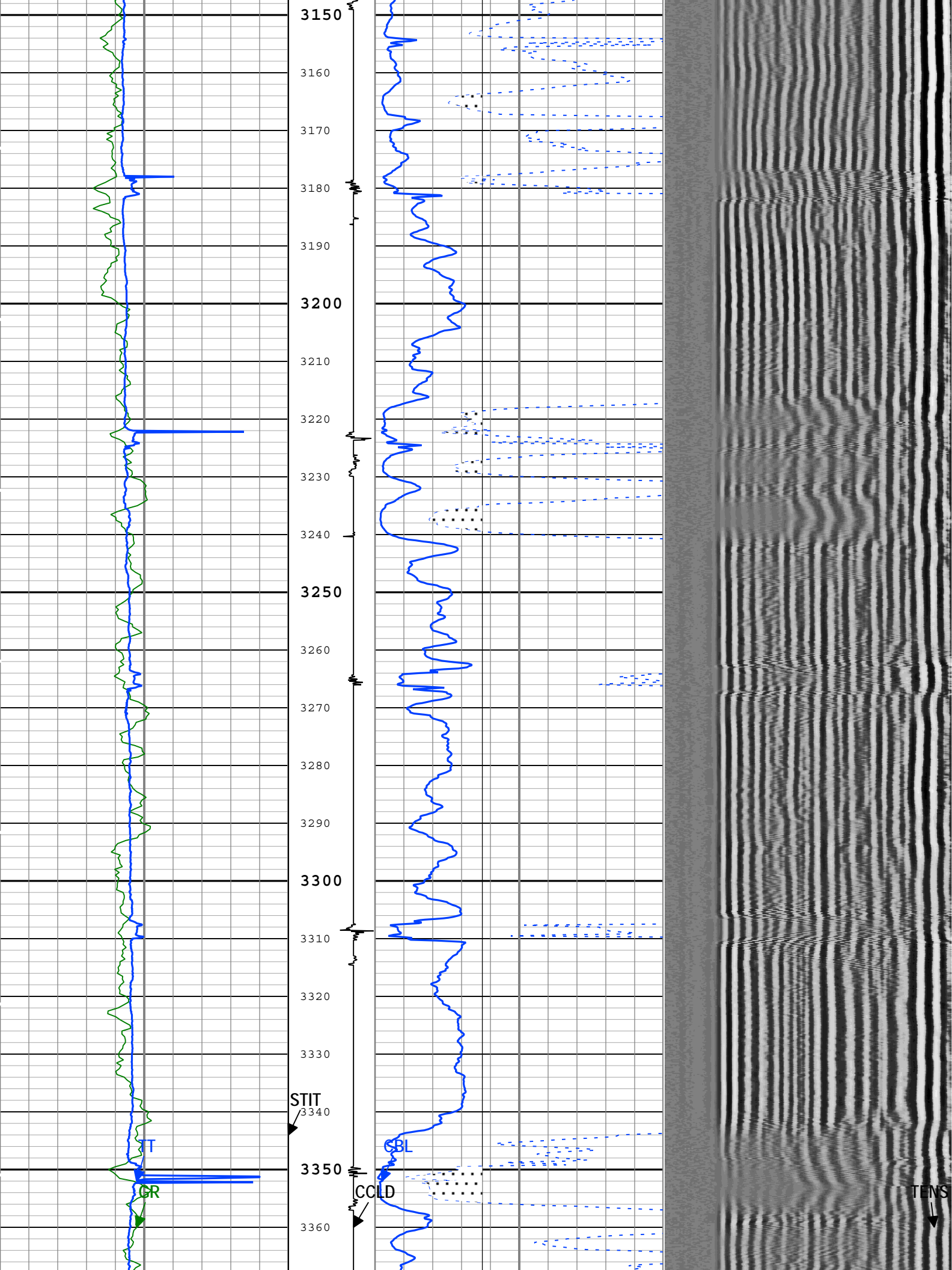


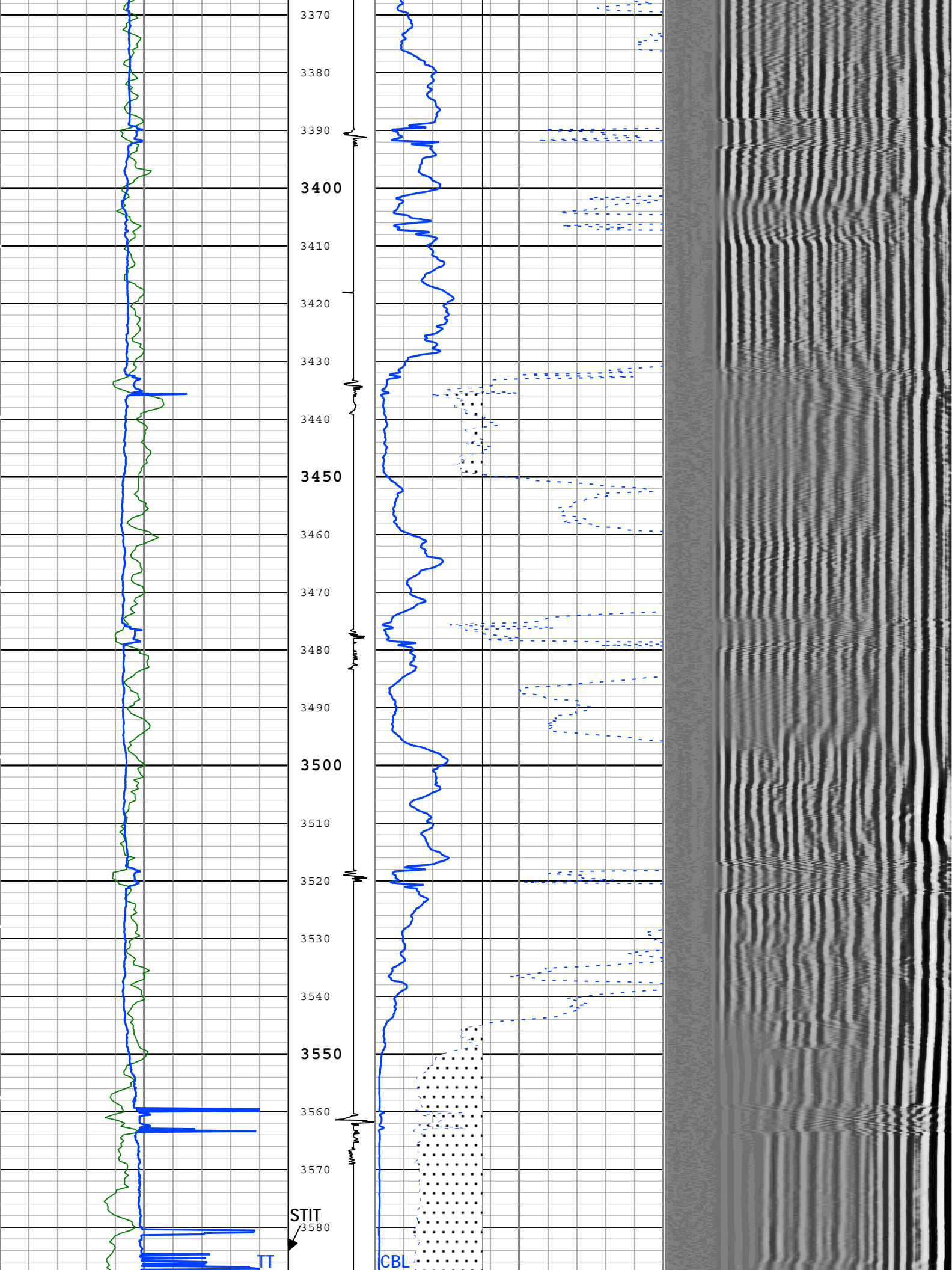


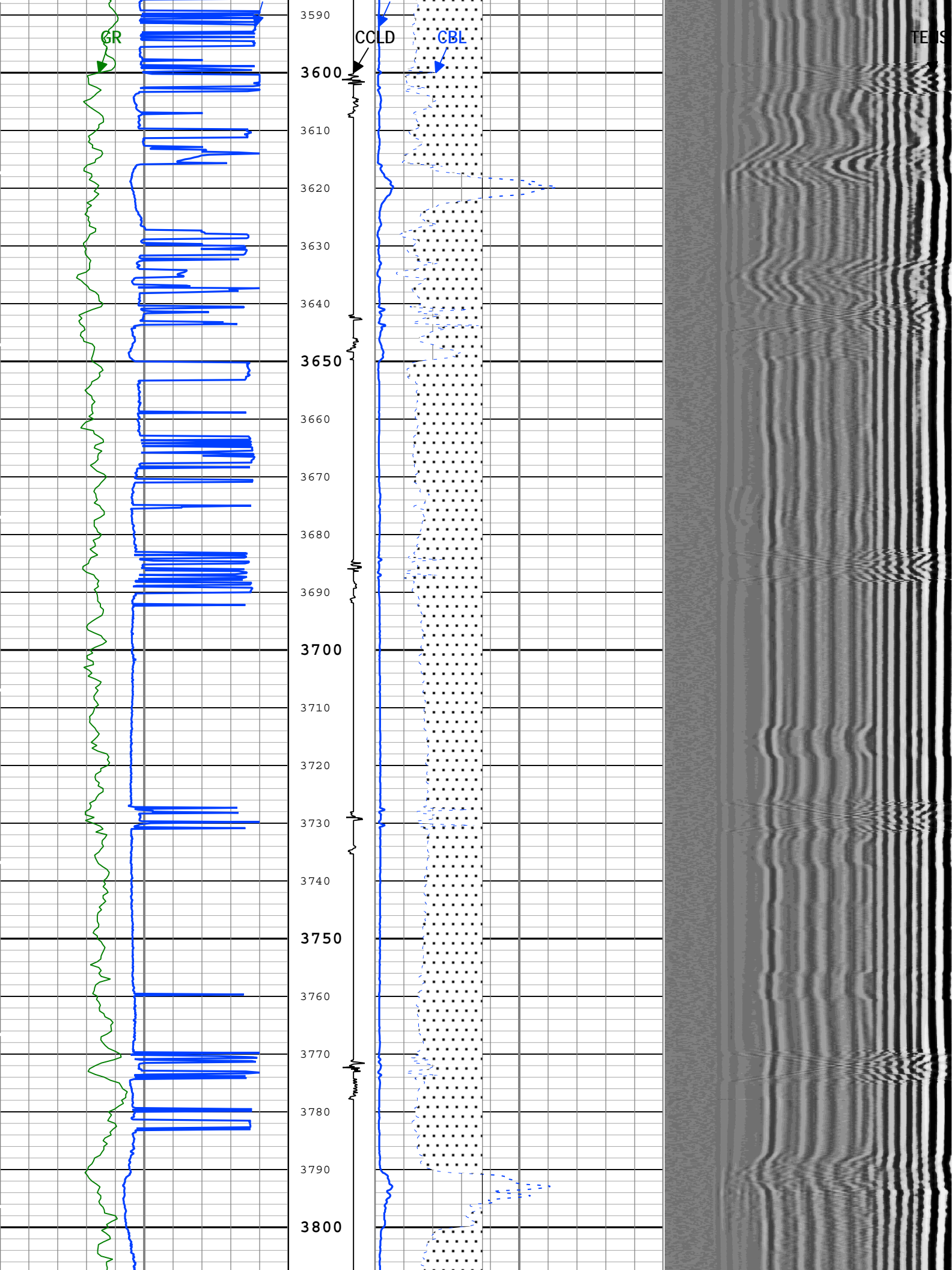


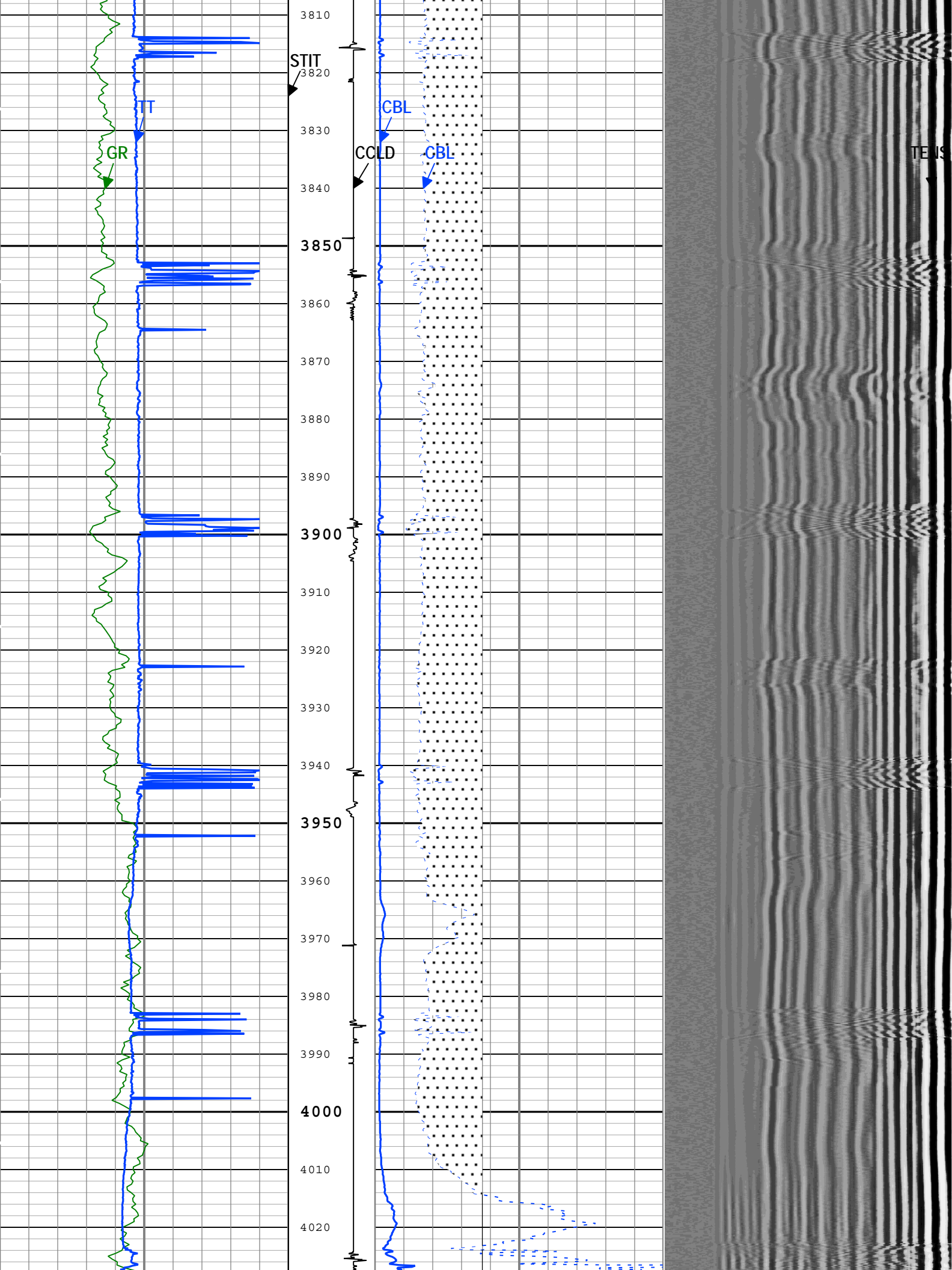


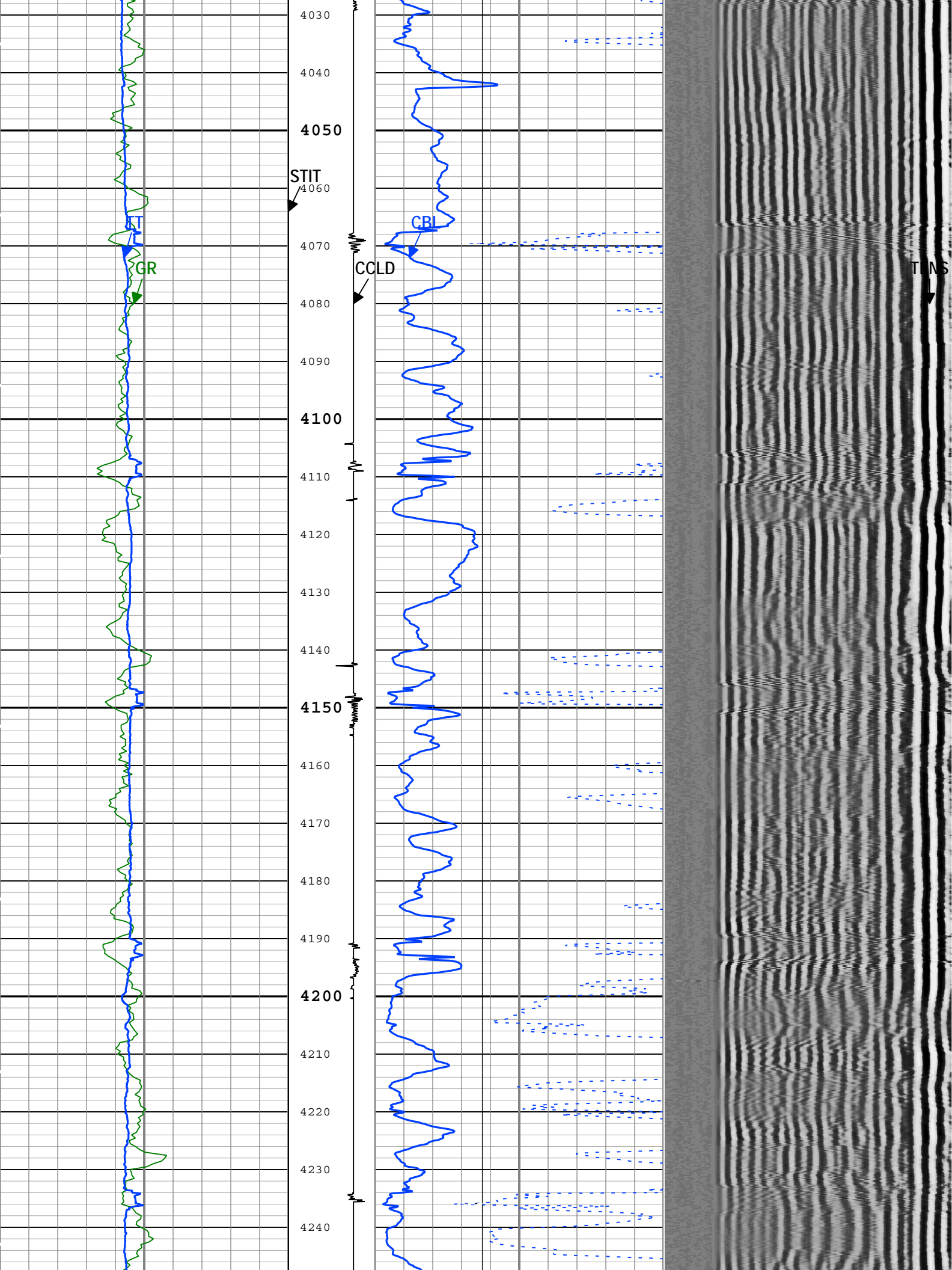


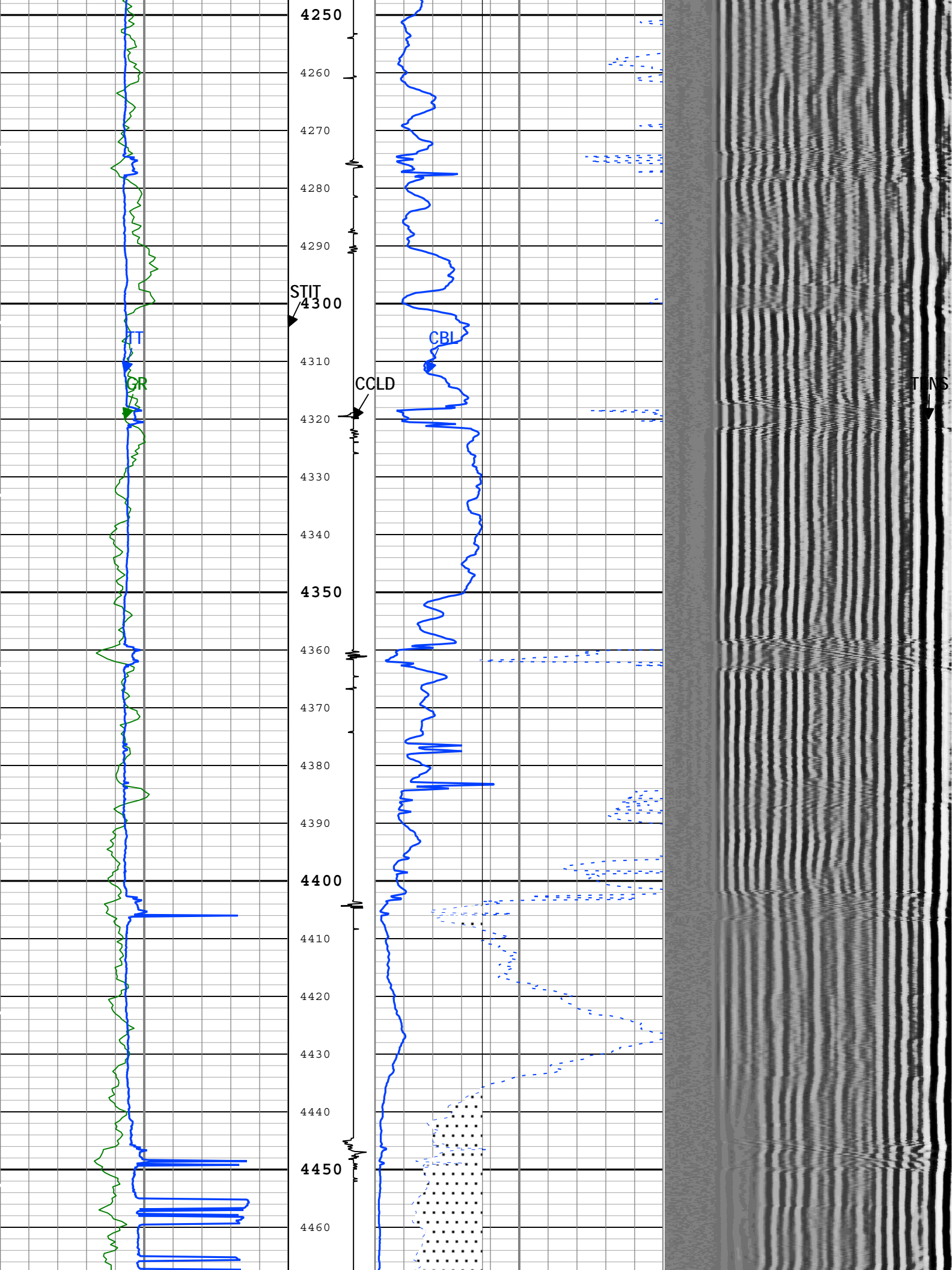


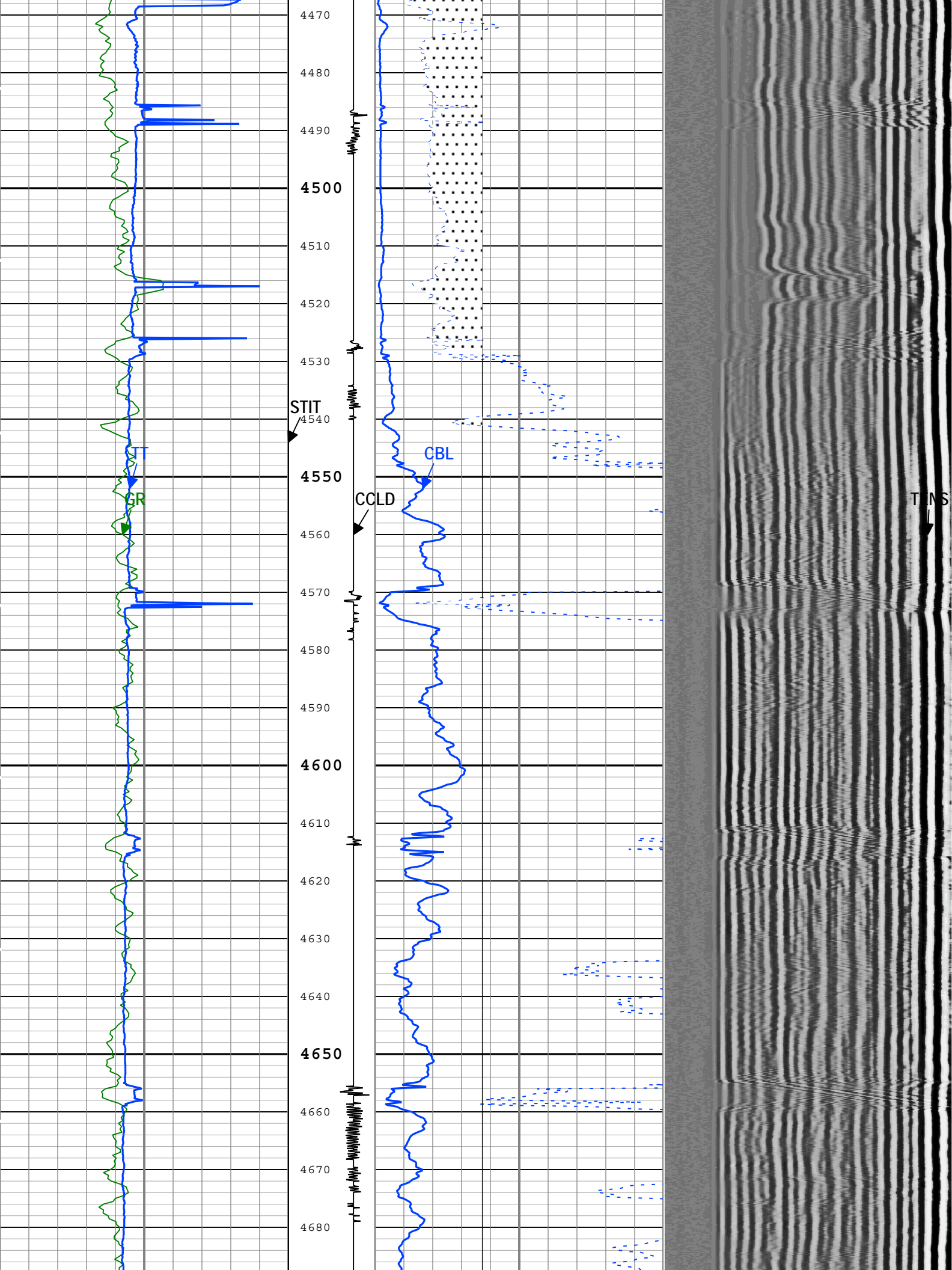


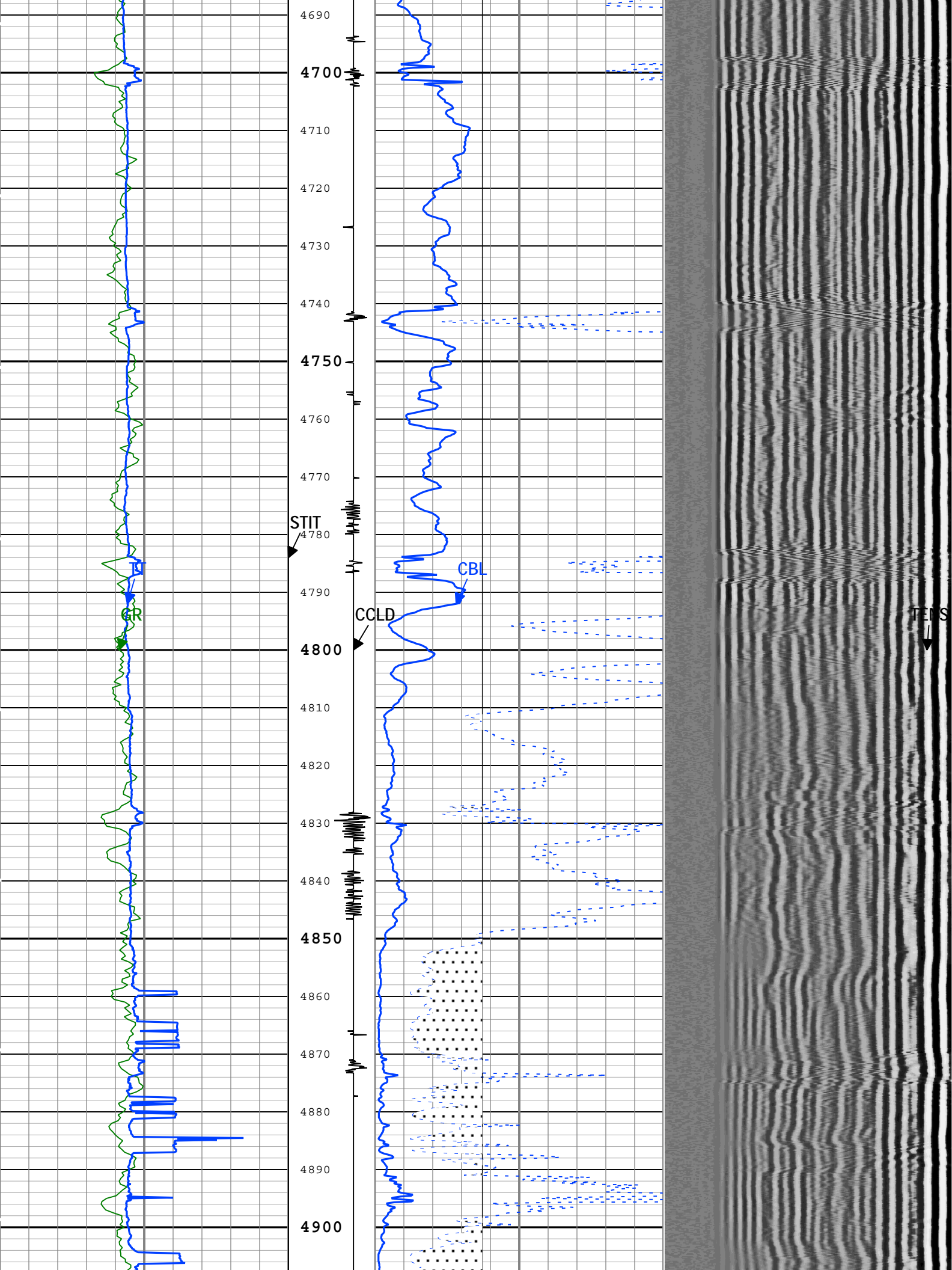


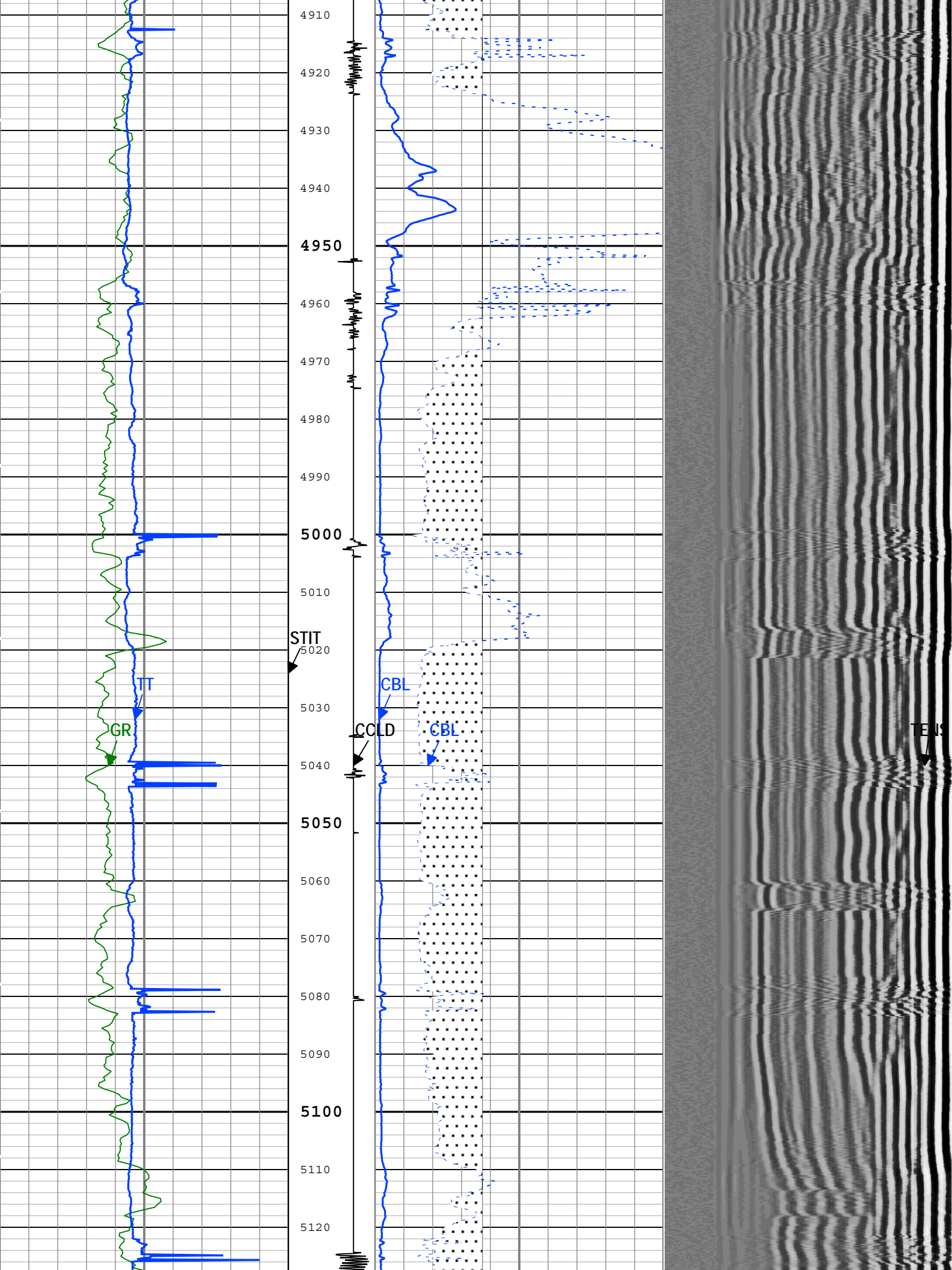


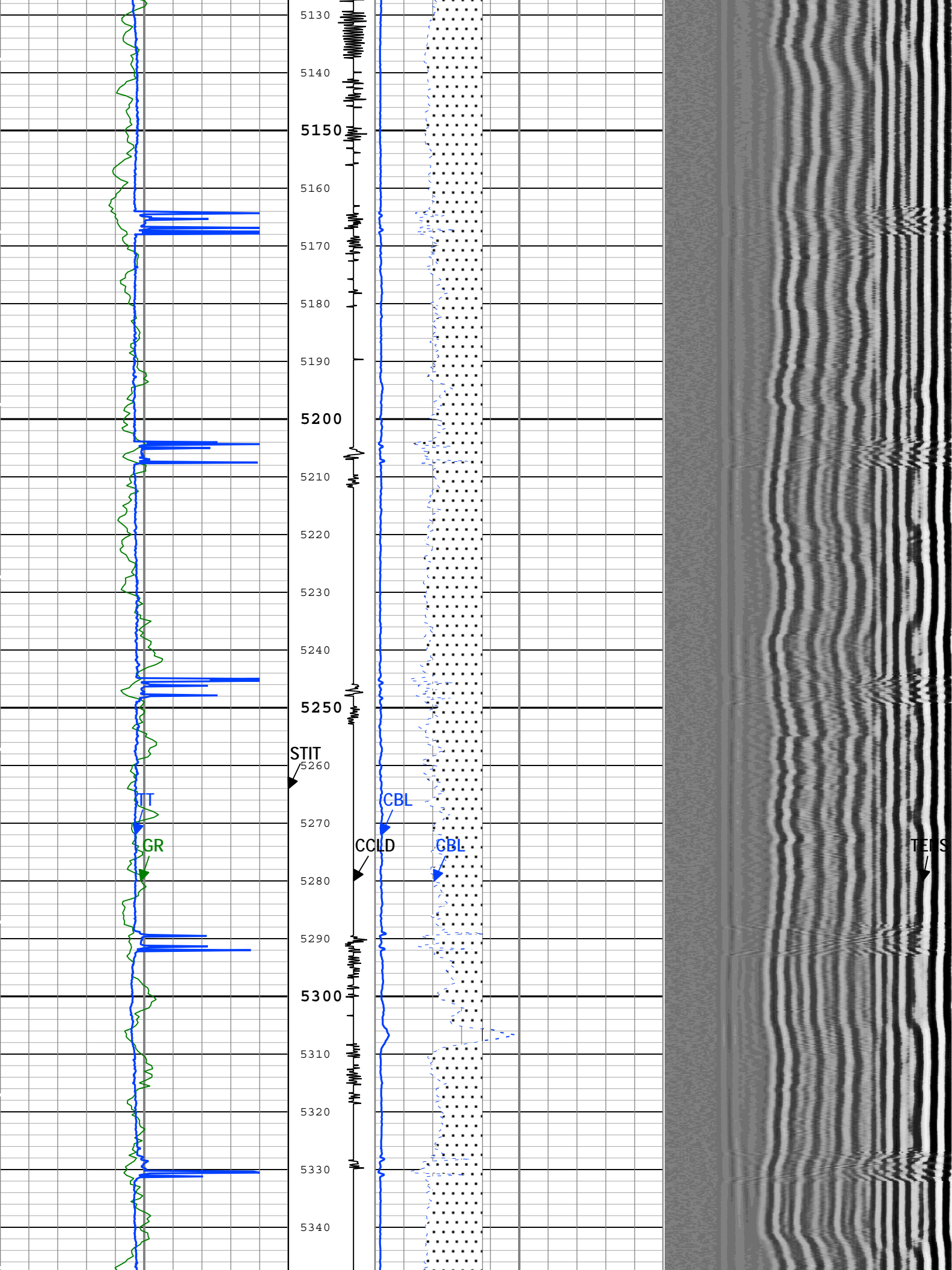


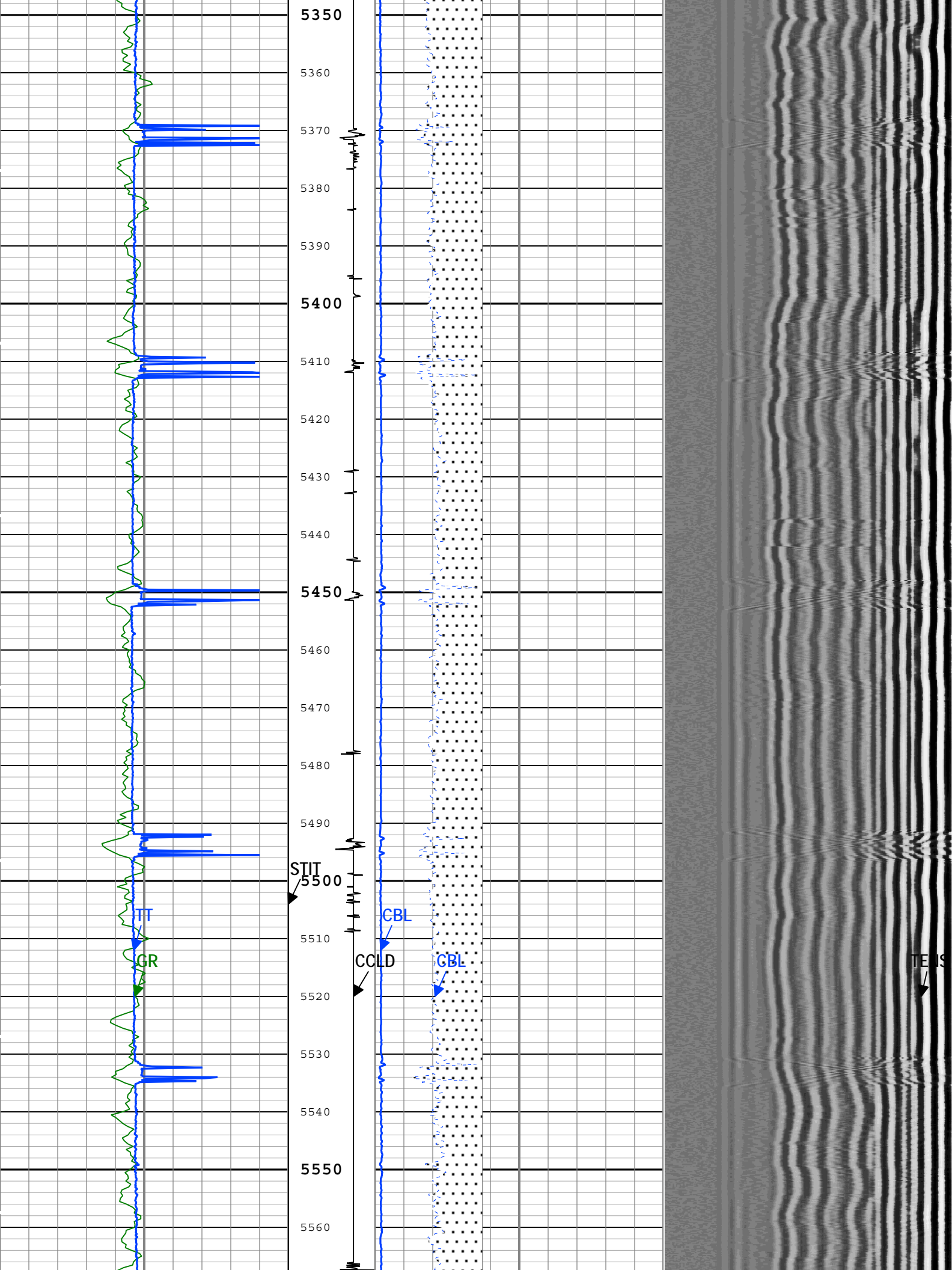


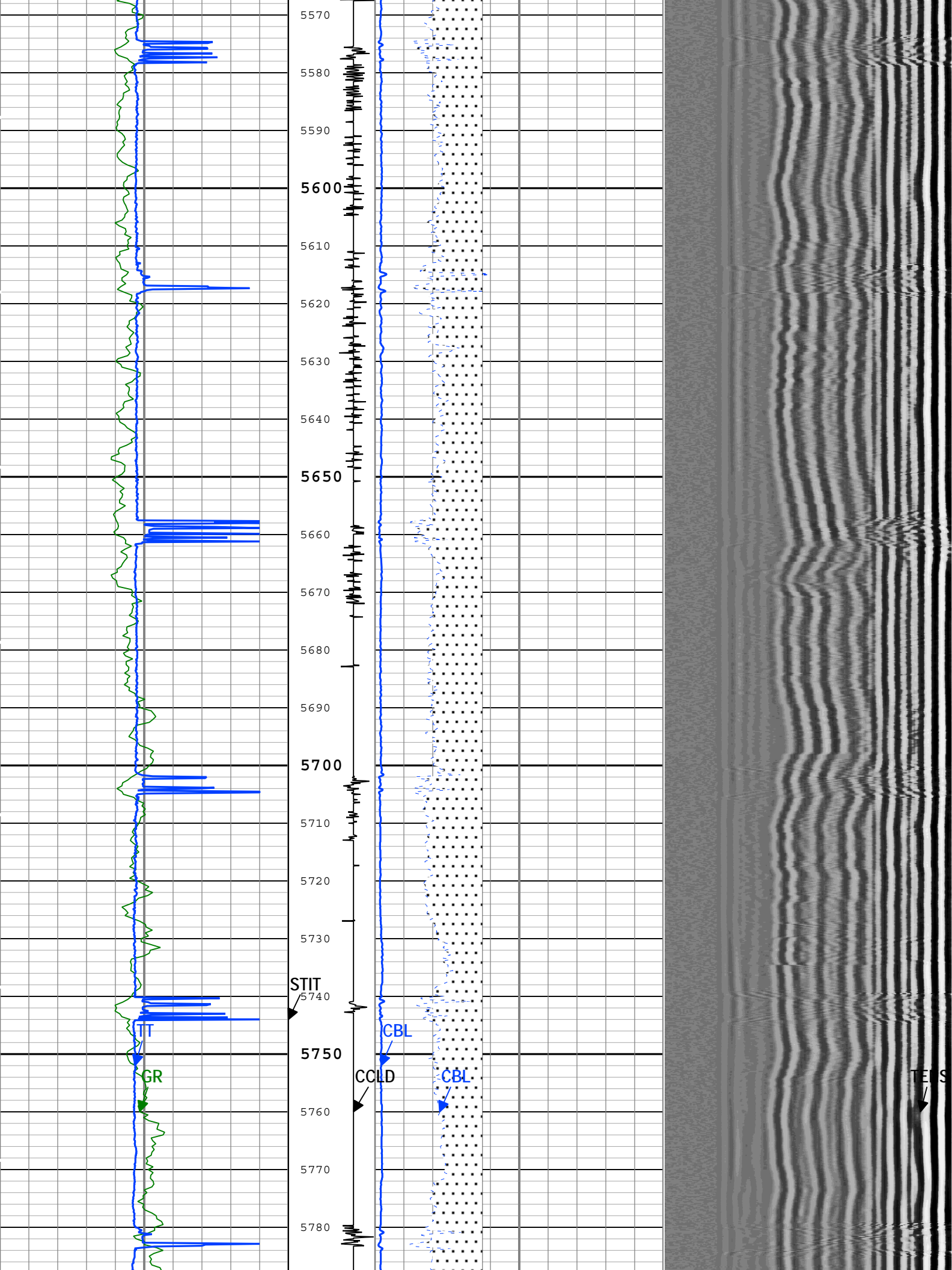


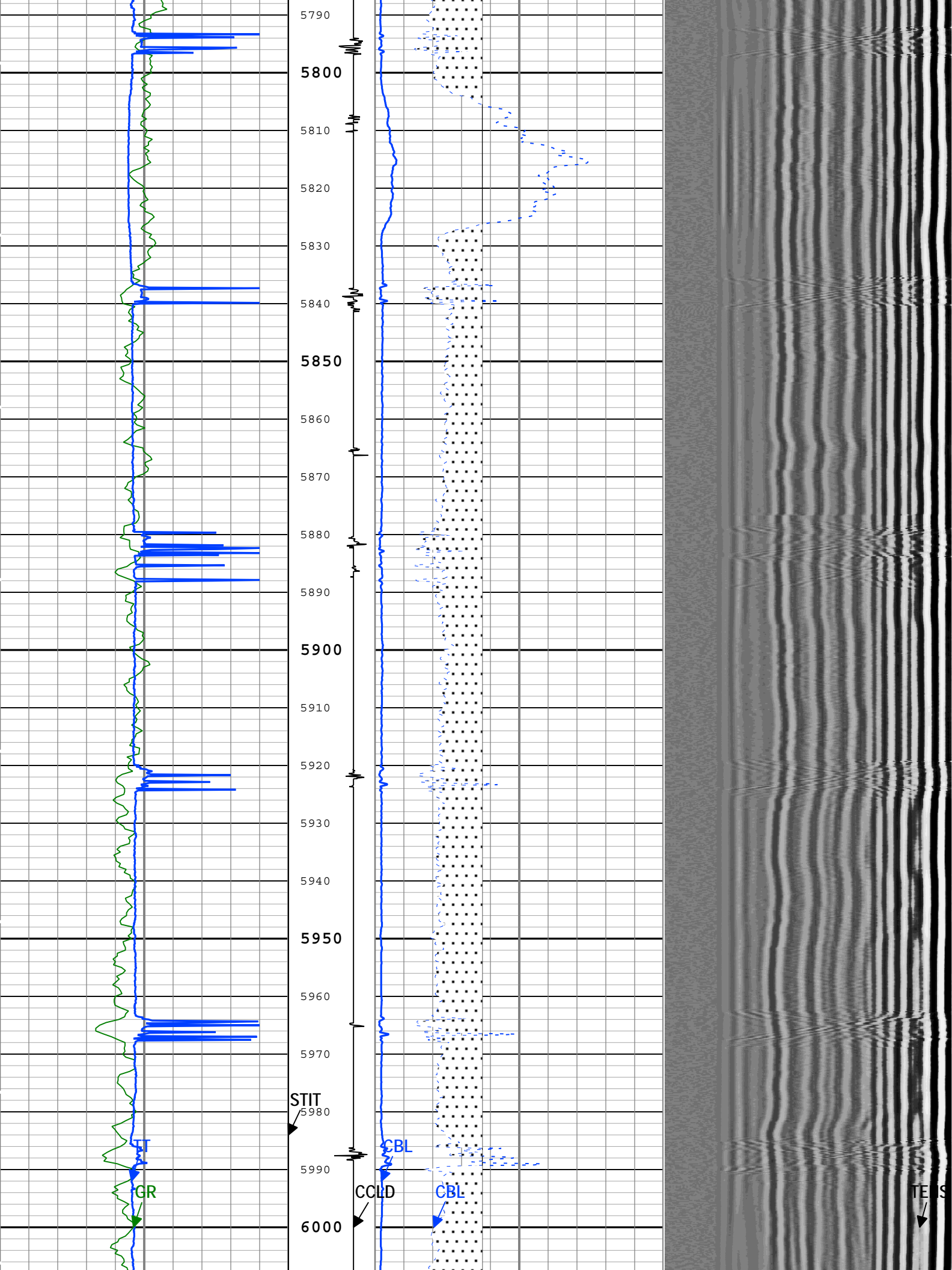


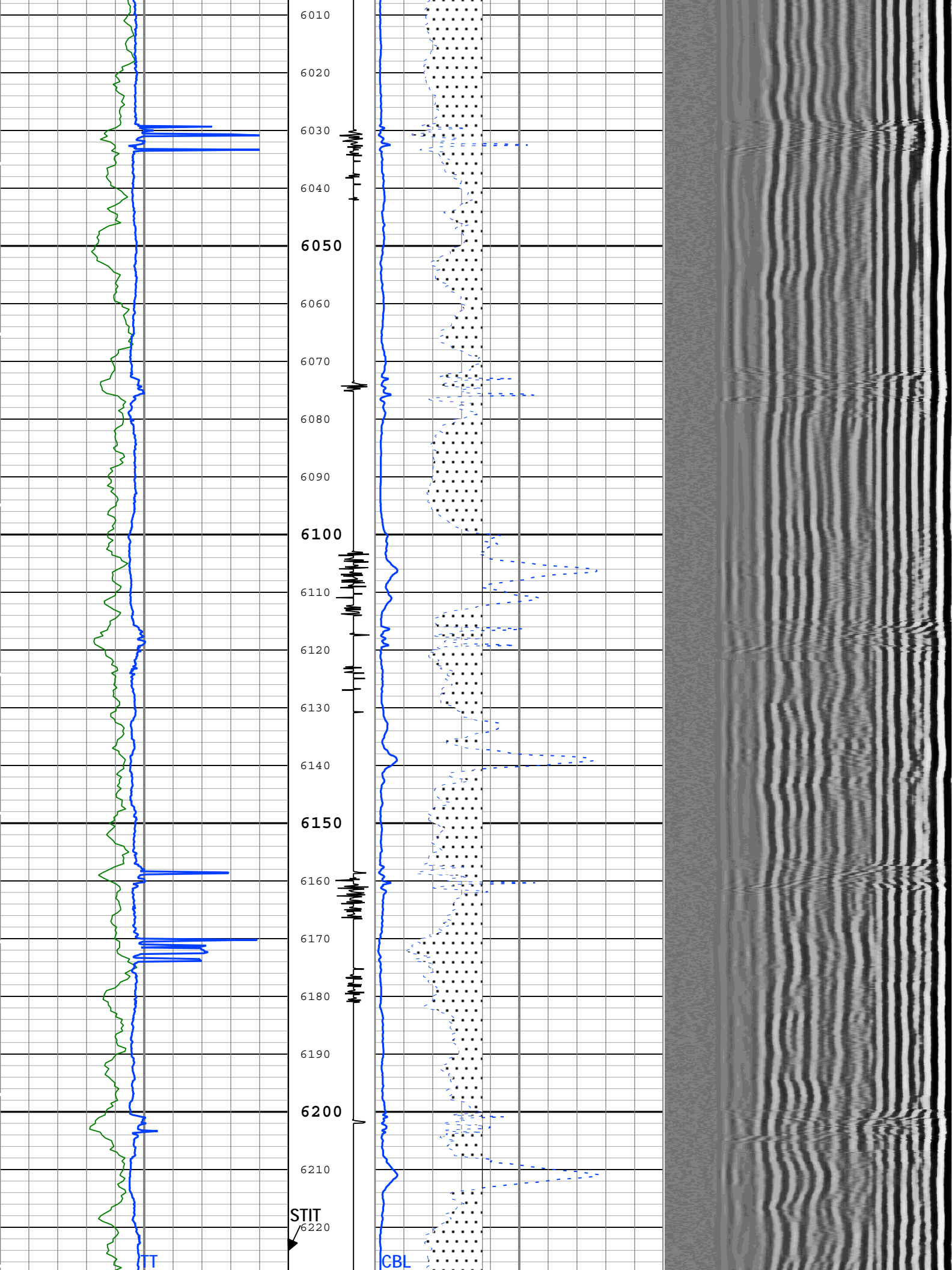


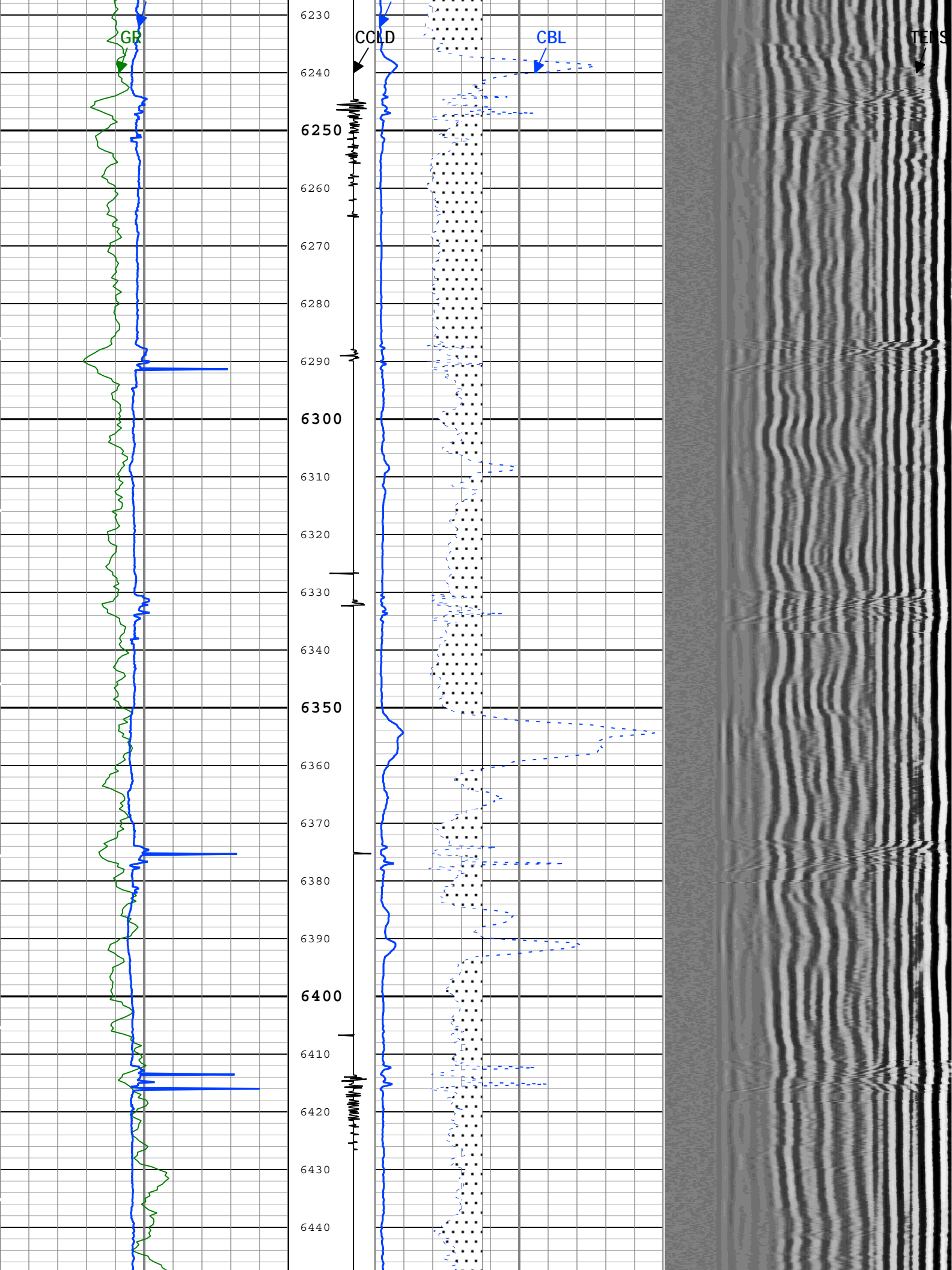


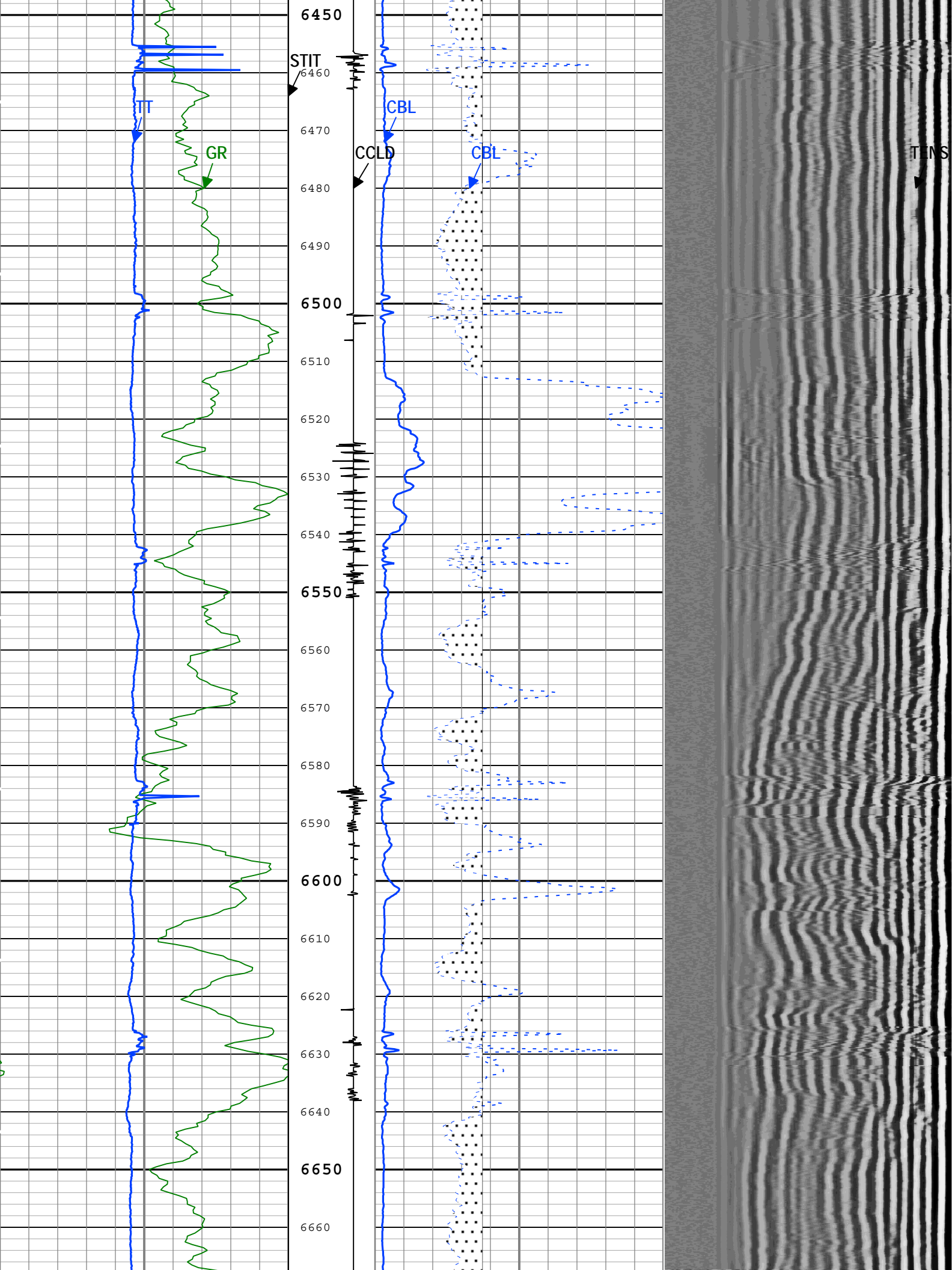


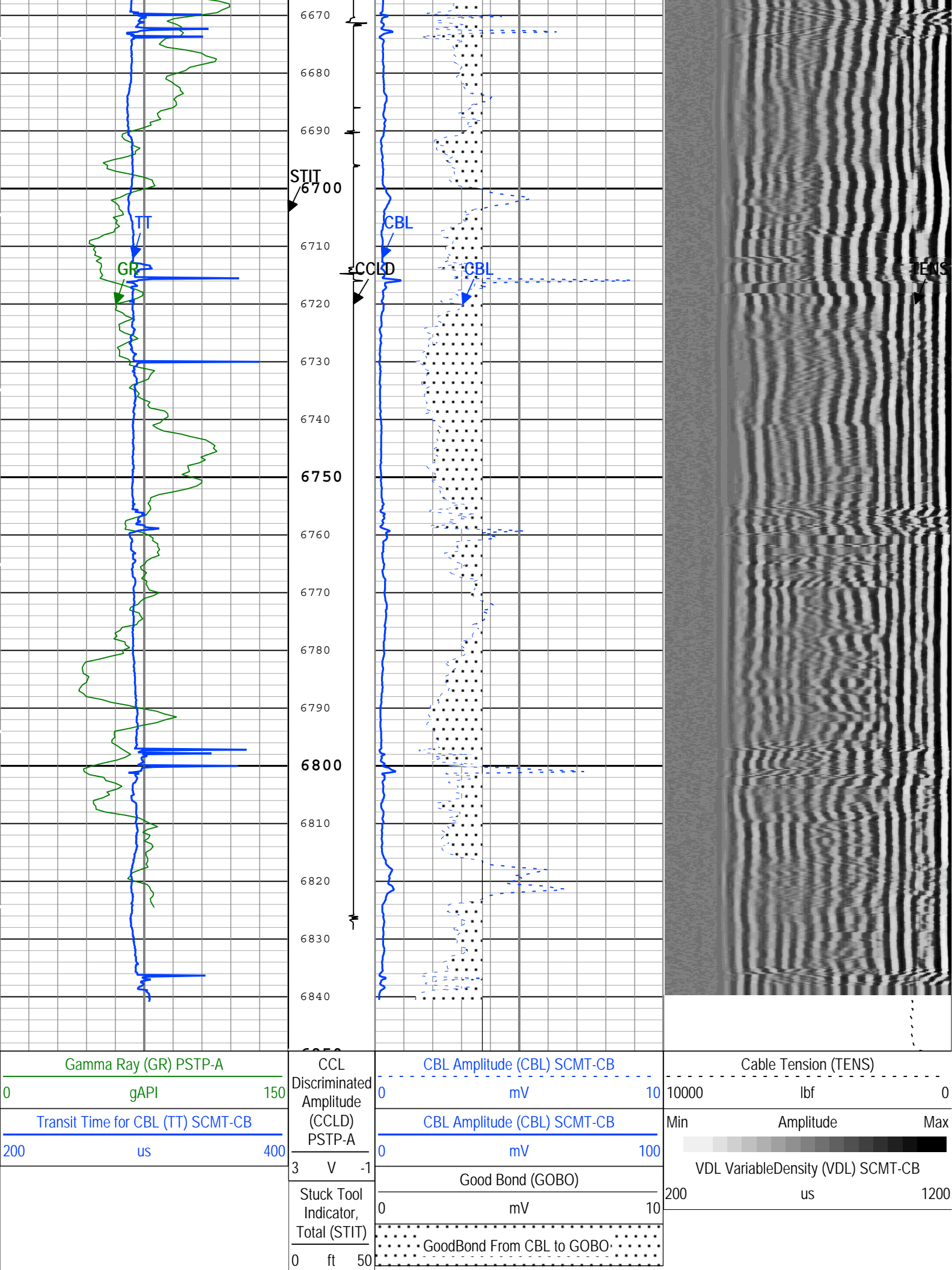


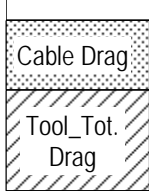












TIME_1900 - Time Marked every 60.00 (s)

Description: SCMT Amplitudes and VDL Format: Log (SCMT_Amp_VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 21-Apr-2015 06:56:41

Channel Processing Parameters

Run 2: Parameters

Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	212	degF
CB3G	SCMT CBL 3 ft Peak Detection T0_Delay and Noise Gate	SCMT-CB	280	us
CBLG	CBL Gate Width	SCMT-CB	40	us
CBRA	CBL LQC Reference Amplitude in Free Pipe	SCMT-CB	62	mV
CMCF	CBL Cement Type Compensation Factor	SCMT-CB	0.6	
DFD	Drilling Fluid Density	Borehole	8.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	29	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4663	ft
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GOBO_CURR	Good Bond in Arbitrary Cement	SCMT-CB	5.58	mV
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST	
MATT_CURR	Maximum Attenuation in Arbitrary Cement	SCMT-CB	10.19	dB/ft
MCI	Minimum Cemented Interval for Isolation	SCMT-CB	Depth Zoned	ft
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	SCMT-CB	3.06	mV
PDAT	Permanent Datum	WLSESSION	GL	
RUN_SNUM	Run Sequence Number	WSDRUN	4	
SHT	Surface Hole Temperature	Borehole	68	degF
TD	Total Measured Depth	Borehole	6850	ft
ZCMT	Acoustic Impedance of Cement	SCMT-CB	5.5	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
MCI	26.48	40	110
MCI	14.81	110	930.1
MCI	10	930.1	6849.42

All depth are actual.

Tool Control Parameters

Run 2: Parameters

Parameter	Description	Tool	Value	Unit
CMTM	SCMT Operating Mode	SCMT-CB	Log	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

Calibration Report

SCMT-CB (Slim Cement Mapping Tool, 1-11/16 OD) Calibration - Run 2

Primary Equipment :		
Slim Cement Mapping Sonde	SCMS-CB	8284

CBL and MAP Amplitude Normalization Measurements

MAP 8 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
--	----	--------	------	------	------	------	--

CBL and MAP Amplitude Normalization - Coefficients

Master (File): 17:53:28 17-Apr-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Normalization Temperature in SFT Tube	degF	Master			87.70		
CBL Correction Factor		Master	0		0.072		
MAP 1 Correction Factor		Master	0		0.102		
MAP 2 Correction Factor		Master	0		0.103		
MAP 3 Correction Factor		Master	0		0.108		
MAP 4 Correction Factor		Master	0		0.097		
MAP 5 Correction Factor		Master	0		0.089		
MAP 6 Correction Factor		Master	0		0.076		
MAP 7 Correction Factor		Master	0		0.097		
MAP 8 Correction Factor		Master	0		0.090		

CBL and MAP Amplitude Adjustment - Measurements

Before (Manual Entry): 13:41:13 20-Apr-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Amplitude - 0	mV	Before	----	----	----	----	
Average MAP Amplitude (Fluid Compensated) - 0	mV	Before	----	----	----	----	
Measurement Depth - 0	ft	Before	----	----	----	----	

CBL and MAP Amplitude Adjustment - Coefficients

Before (Manual Entry): 13:41:13 20-Apr-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Adjustment Factor		Before			0.818		
CBL LQC Reference Amplitude in Free Pipe	mV	Before			62.00		
MAP Adjustment Factor		Before			1.068		
Depth of Before Calibration	ft	Before			102.96		

PSTP-A (PSP Telemetry Platform A - Sapphire) Calibration - Run 2

Primary Equipment :

PBMS-A

PBMS-A

2702

Calibration Parameter :

JIG-BKGD (Jig minus background reference)

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PBMS Gamma Ray Check - PBMSA Gamma Ray Accumulations

Before (Measured): 15:40:33 17-Apr-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
GR Zero Average	gAPI	Before	30	0	68.79333	120	
GR Zero Standard Deviation	gAPI	Before			27.54417		
GR Zero Max Deviation	gAPI	Before			124.2792		
GR Plus Average	gAPI	Before			244.4637		
GR Plus Standard Deviation	gAPI	Before			55.79148		
GR Plus Max Deviation	gAPI	Before			167.4243		
Jig-Background	gAPI	Before	165	150	175.6704	180	

PBMS Well Temp Master Calibration

Master (EEPROM): 00:00:00 08-Oct-2004

PBMS_RTD_THERM (Master) RTD Coefficients

	Tt**0	Tt**1	Tt**2	Tt**3	Tt**4	Tt**5
Tt**0	-1799.09	1662.227	-617.1353	108.8717	-7.149958	0

PBMS Gamma Ray Master Calibration

Master (EEPROM): 00:00:00 09-Aug-2004

PBMS_GR_MODEL GR Coefficients (Master)		
	Rt**0	Rt**1
Rt**0	2000	2640

PBMS A Reference Clock Master Calibration						
Master (EEPROM): 00:00:00 08-Oct-2004						
PBMS_REF_CLOCK PBMS A Clock Coefficients (Master)						
	Temp**0	Temp**1	Temp**2	Temp**3	Temp**4	Temp**5
Temp**0	109.1373	-8.123132	0.00245278	-0.0001326561	4.957816E-06	0

PBMS A Sapphire Master Calibration						
Master (EEPROM): 00:00:00 08-Oct-2004						
PBMS_P_GAUGE_PRES Sapphire Pressure Model Coefficients (Master)						
	Tt**0	Tt**1	Tt**2	Tt**3	Tt**4	Tt**5
Tp**0	-2775.166	3999.948	-2267.865	424.0844	-28.94072	0
Tp**1	5116.926	-4147.714	2010.187	-367.7473	25.01963	0
Tp**2	-10.72299	11.4629	-3.7961	0	0	0
Tp**3	-1.833663	0.5695261	0	0	0	0
Tp**4	0	0	0	0	0	0
Tp**5	0	0	0	0	0	0
PBMS_P_GAUGE_TEMP Sapphire Temperature Model Coefficients (Master)						
	Tp**0	Tp**1	Tp**2	Tp**3	Tp**4	Tp**5
Tt**0	-363.5885	-12.65834	4.797672	-1.494675	0.1462443	0
Tt**1	130.998	6.423772	-1.132448	0.4128172	-0.04101843	0
Tt**2	-5.720248	-1.297287	-0.0471031	0	0	0
Tt**3	0.7255451	0.1332451	0	0	0	0
Tt**4	0	0	0	0	0	0
Tt**5	0	0	0	0	0	0

Company:	Noble Energy Inc	Schlumberger
Well:	Colt A13-652	
Field:	Wattenberg	
County:	Weld	
Country:	United States	
Slim Cement Mapping Tool		
Cement Evaluation		
Gamma Ray - CCL Log		