

Company: Noble Energy Inc

Well: Colt A13-645

Field: Wattenberg

County: Weld

Country: United States

County: Weld

Field: Wattenberg

Location: NSW Sec. 17, T6N, R63W

Well: Colt A13-645

Company: Noble Energy Inc

Slim Cement Mapping Tool

Cement Evaluation

Gamma Ray - CCL Log

Location:	NWSW Sec. 17, T6N, R63W	Elev.:	K.B.	4694.00 ft	
	SHL: 4664' FSL & 424' FWL		G.L.	4664.00 ft	
	Lat/Long: 40.486010/-104.468810		D.F.	4693.00 ft	
Permanent Datum:		Ground Level		Elev.:	4664.00 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:
05-123-40910-0000		0 deg		-104.46881 degrees	40.486010 degrees

Logging Date	21-Apr-2015		
Run Number	Run 1		
Depth Driller	7045.00 ft		
Schlumberger Depth	6780.00 ft		
Bottom Log Interval	6780.00 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	932.00 ft		
To	6780.00 ft		
Casing/Tubing Size	7 in		
Weight	26 lbm/ft		
Grade	P110		
From	30.00 ft		
To	7035.00 ft		
Max Recorded Temperatures	206.49 degF		
Logger on Bottom	21-Apr-2015	08:35:00	
Unit Number	Location:	Time	
3022		Fort Morgan, CO	
Recorded By	Keri Ondrus		
Witnessed By			

Disclaimer

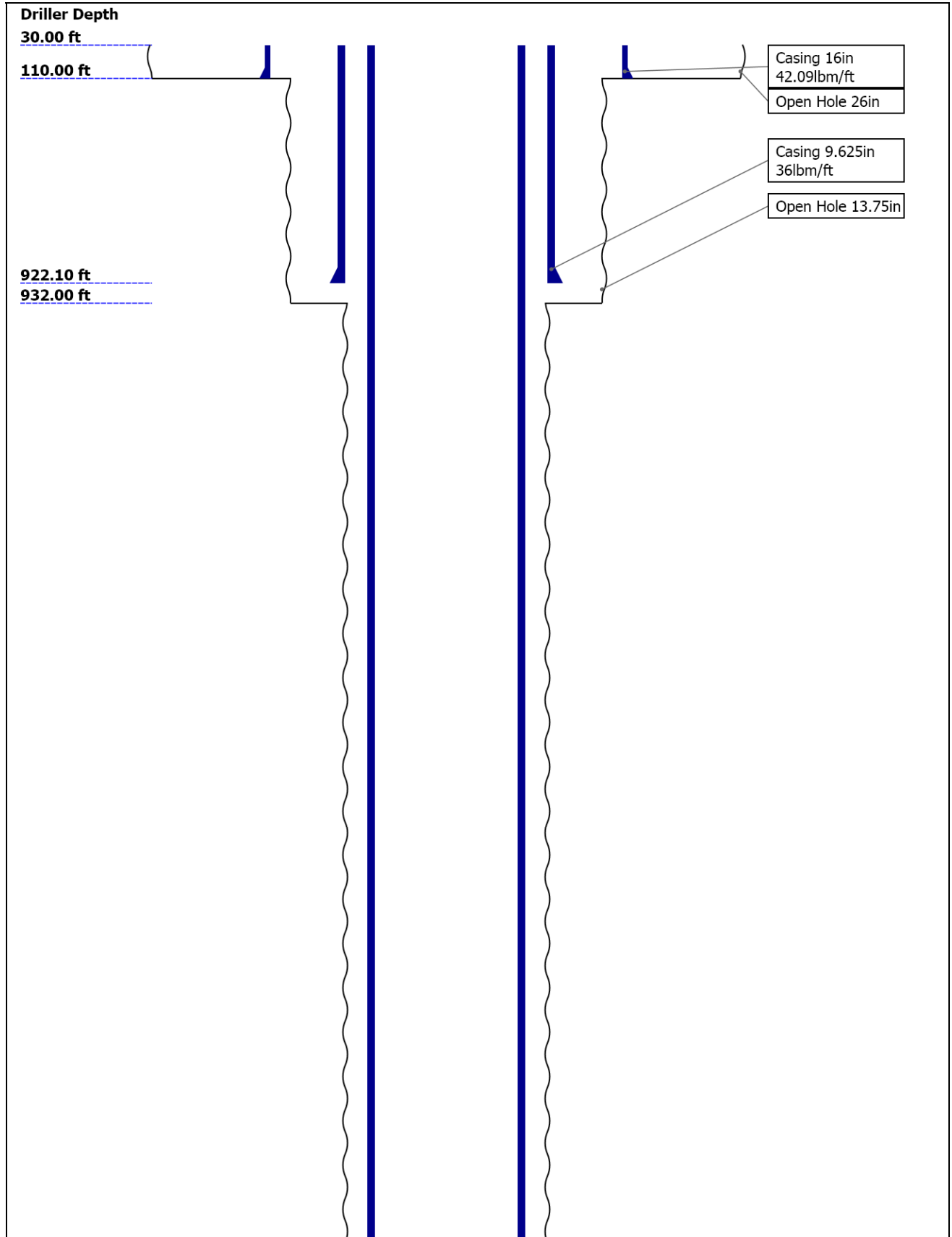
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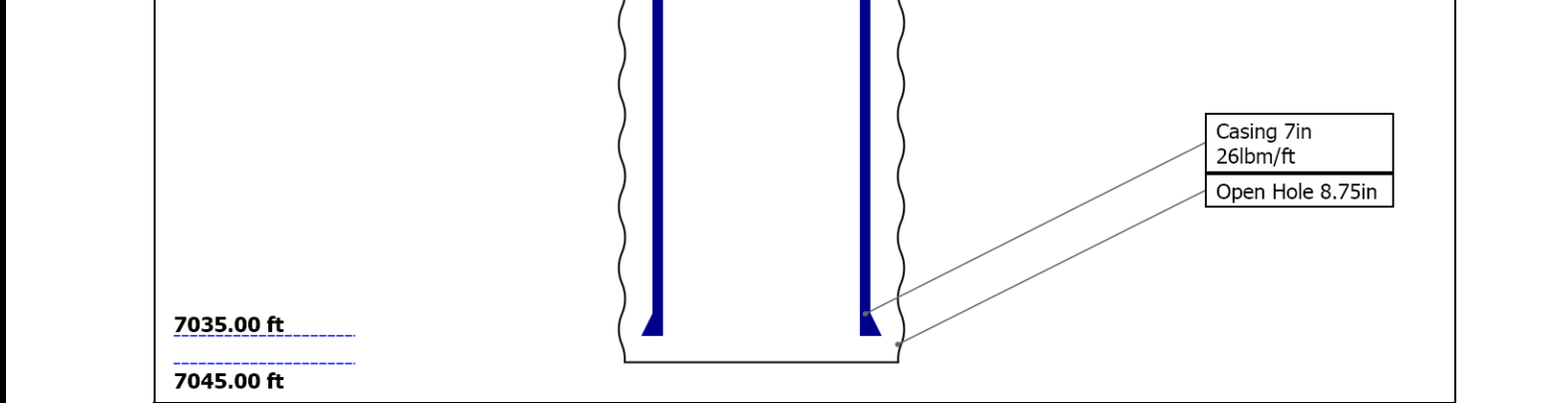
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Well Sketch





Borehole Size/Casing/Tubing Record


Bit						
Bit Size (in)	26	13.75	8.75			
Top Driller (ft)	30	110	932			
Top Logger (ft)	30	110	932			
Bottom Driller (ft)	110	932	7045			
Bottom Logger (ft)	110	932	6780			
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	922.1	7035			
Bottom Logger (ft)	110	922.1	7035			

Operational Run Summary

Parameter (unit)	Run 1					
Date Log Started	21-Apr-2015					
Time Log Started	07:14:10					
Date Log Finished	21-Apr-2015					
Time Log Finished	12:40:49					
Top Log Interval (ft)						
Bottom Log Interval (ft)	6780.00					
Total Depth (ft)	6780.00					
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	BX19-00260					

Borehole Fluids						
Parameter(unit)	Run 1					
Fluid Type	Water					
Max Recorded Temperatures (degF)	206.49					
Salinity (ppm)	0					
Density (lbm/gal)	8.7					
Date Logger on Bottom	21-Apr-2015					
Time Logger on Bottom	08:35:00					
Total Solid (%)						
High Gravity Solids (%)						

Remarks and Equipment Summary						
Run 1: Toolstring				Run 1: Remarks		
Equip name	Length	MP name	Offset	Toolstring run as per toolsketch.		
LEH-QT	36.41			Log objective: Cement and Casing Evaluation		
LEH-QT				Estimated TOC @ 120'. Expected TOC @ 30'.		
AH-63	33.49			Top of 4.5" liner at 6881.7'.		
AH-79	33.17			Bottom log interval at 6780' because tool was not moving in deviation below this point.		
PSTP-A:270	32.34	GR	28.64	Bottom hole temperature was 206.49 deg F.		
2		PSTC	28.34	This is the first run in hole.		
PSC-A		PSTC Too	0.00	0 PSI repeat pass and 2500 PSI main pass.		
PSTC-A		I String Bo				
PBMS-A:2702		ttom	25.55			
Sapphire 10k		Temperat	25.55			
PSI		ure	25.55			
		Sapphire P	25.44			
		ressure	25.44			
		CCL	24.83			
		PBMS	24.08			
CME-AN	24.07					
SCMT-CB:8	20.15					
284						
SECH-CA:82						
35						
SCMC-CA:82						
37						
CMIR-AG						
SCMS-CB:82						
84						
SCMX-CA:82						
38						
		DT	11.06			
		CBL5	9.56			
		DTSC	9.56			
		CBL3	8.56			
		MAP	8.06			
		AUX	7.06			

[illegible]

Type	IDW-B		
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[illegible]

Type	CMTD-B/A		
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Type	7-39P-LXS		
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Log Sequence	First Log In the Well
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All Schlumberger depth control procedures followed.

All Schlumberger depth control procedures followed.

IDW used as primary depth control device.

Z-chart used as secondary depth control device.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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Run 1

Maxwell

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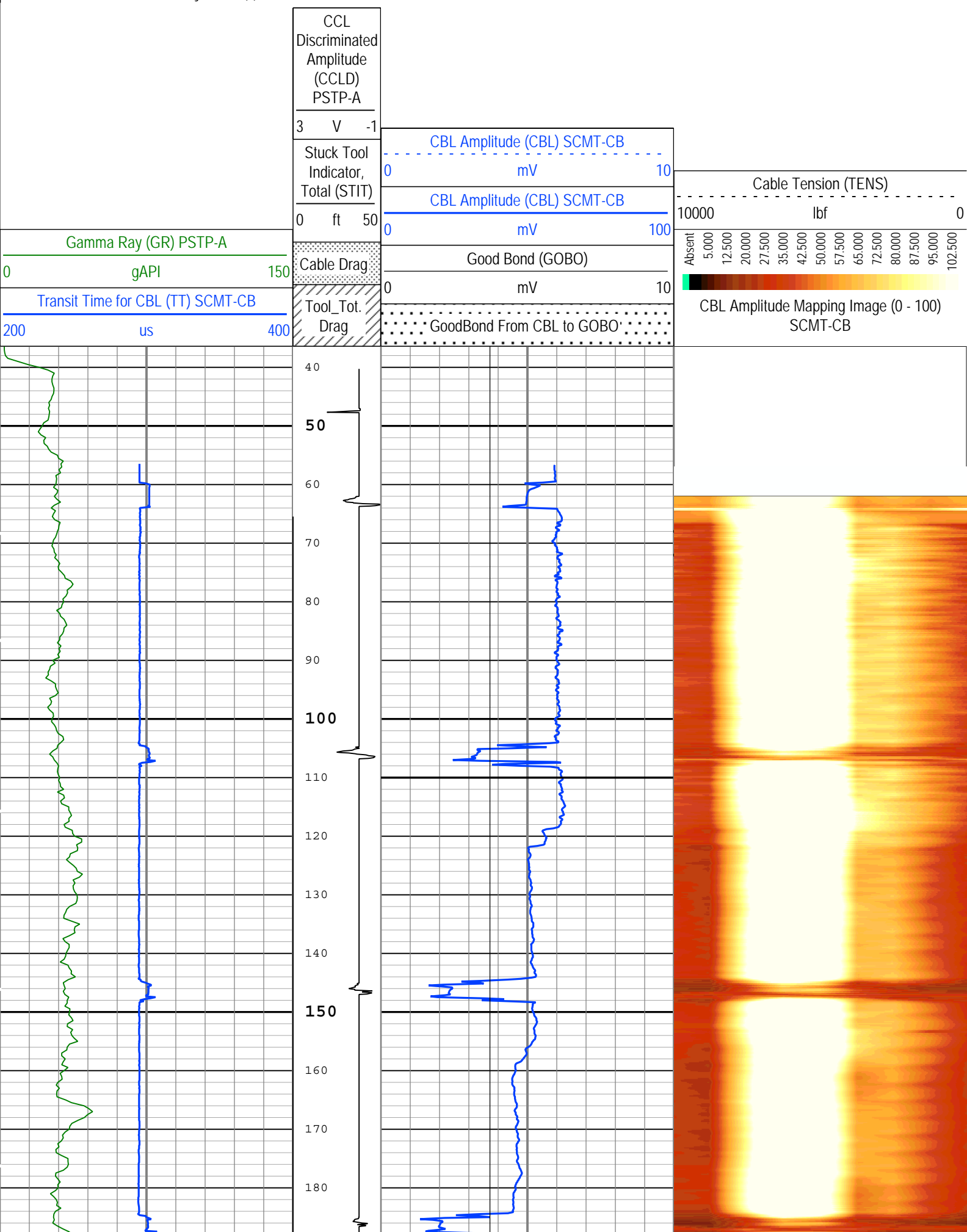
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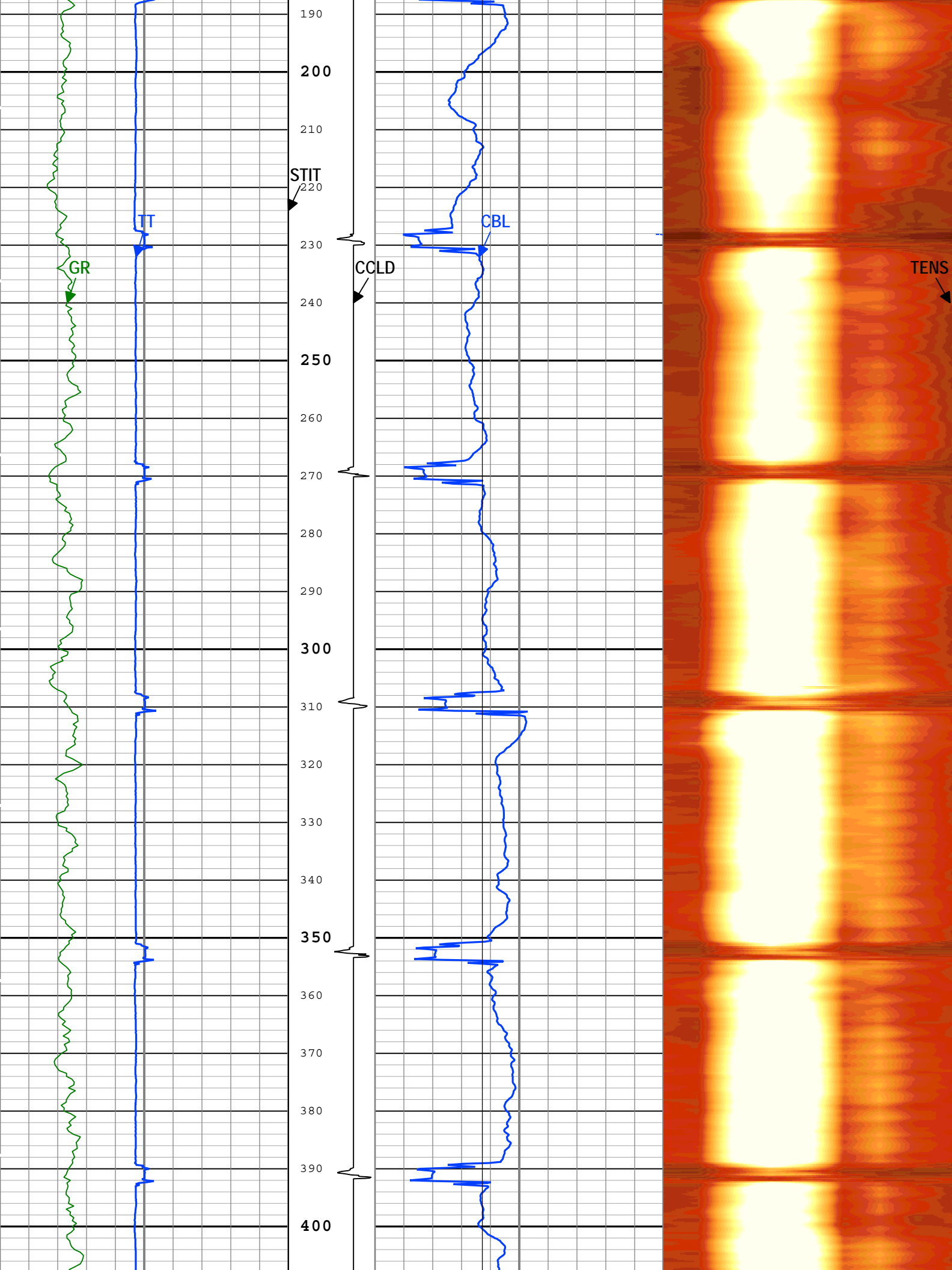
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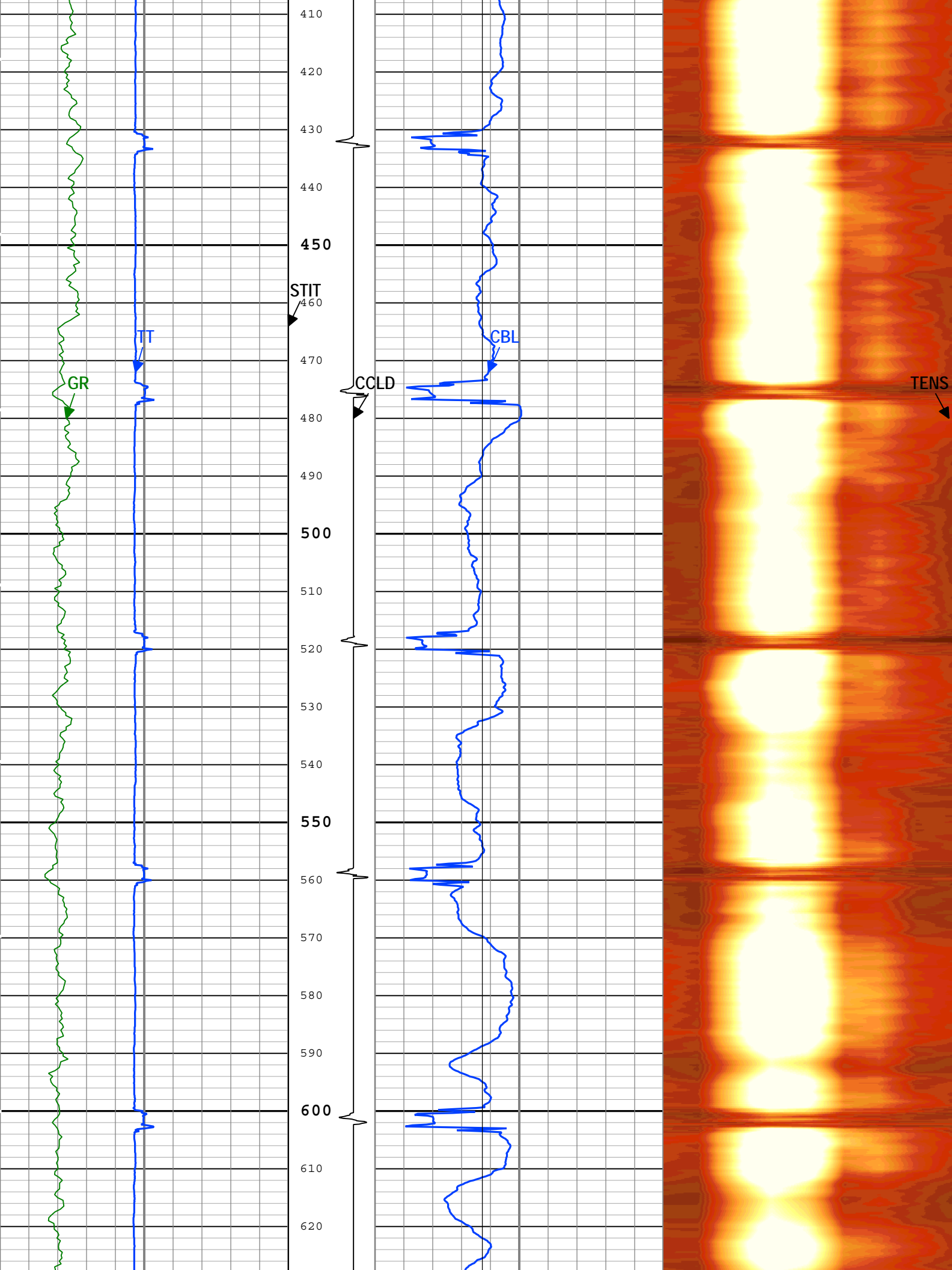
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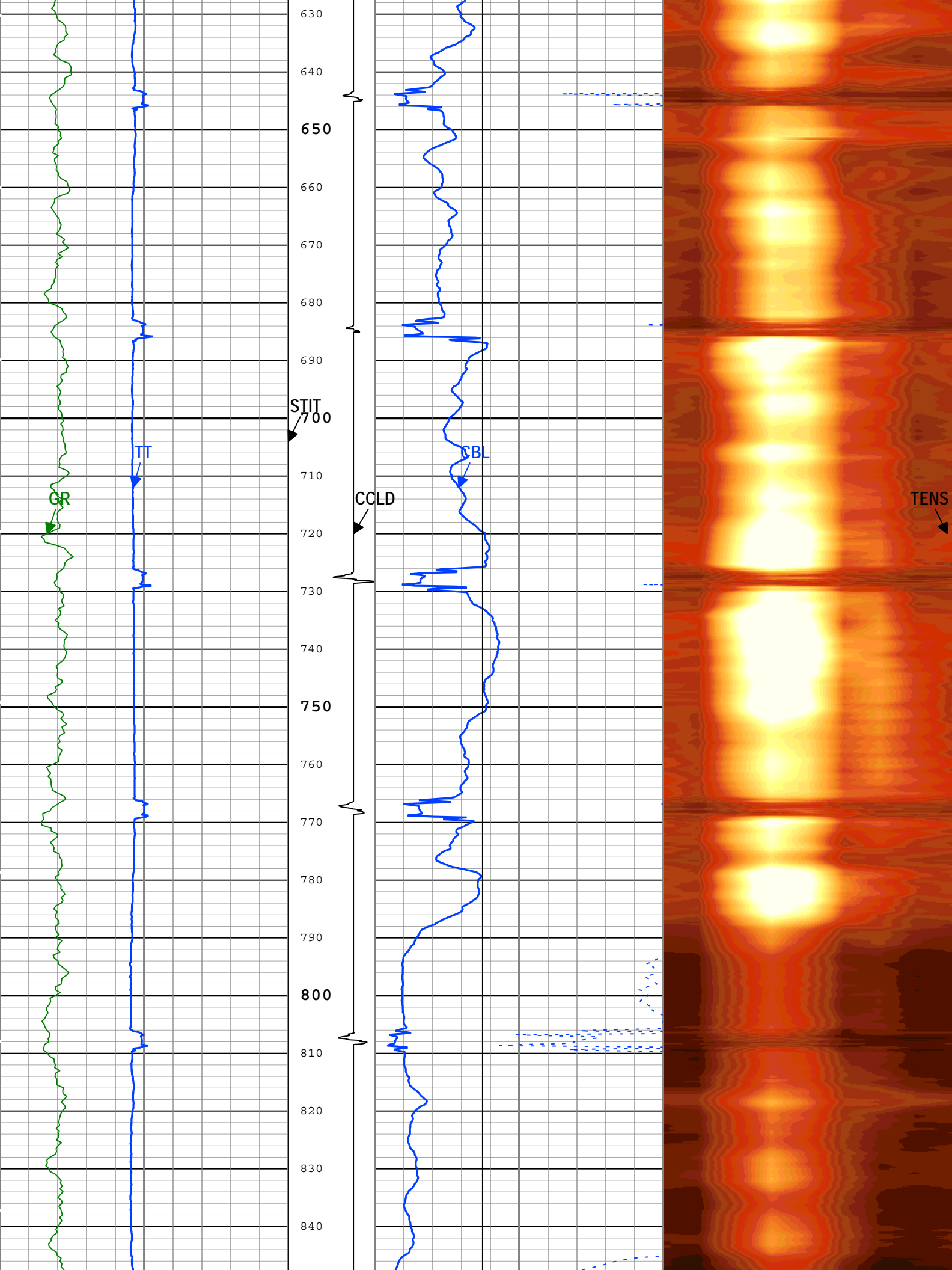
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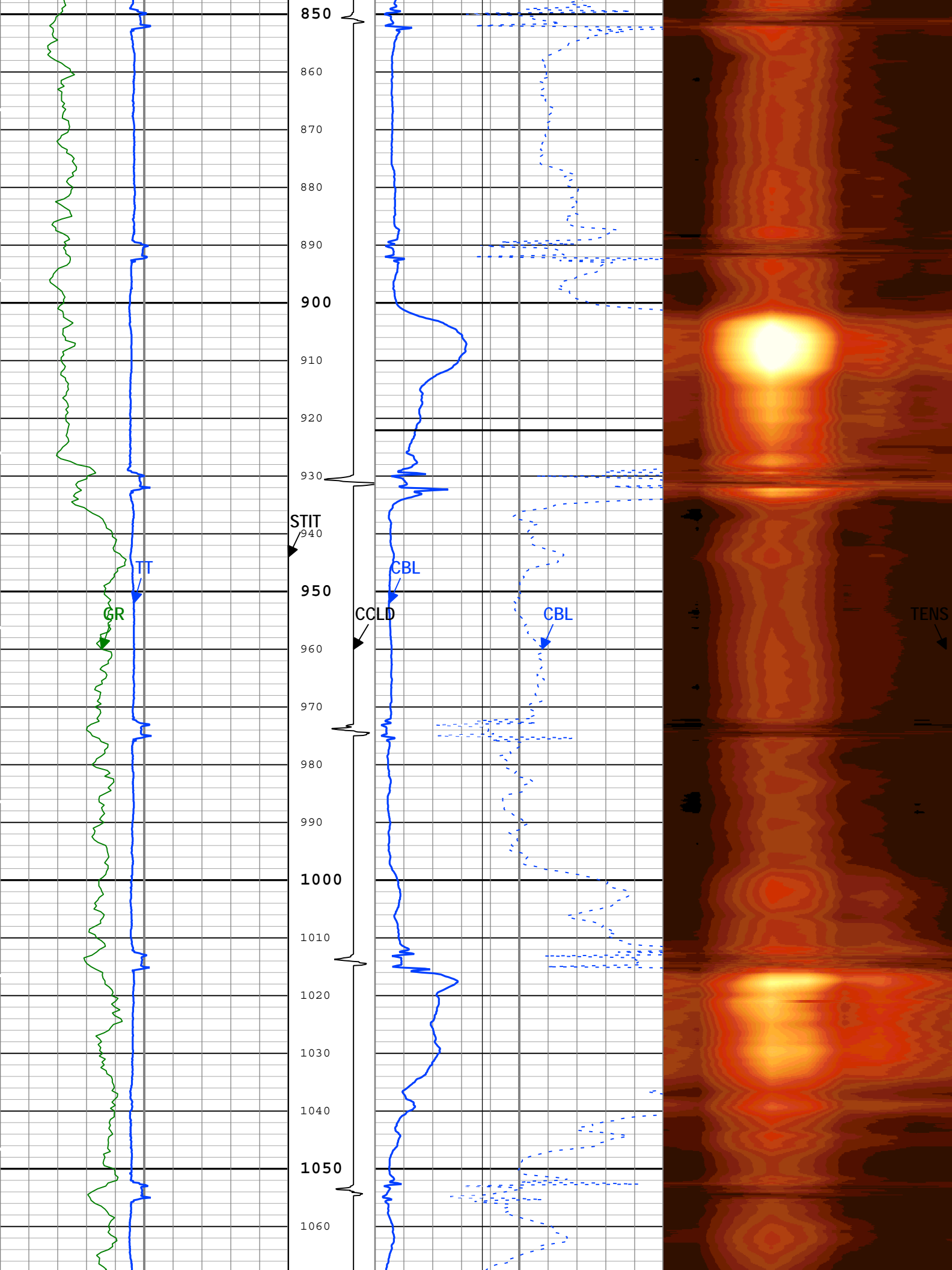
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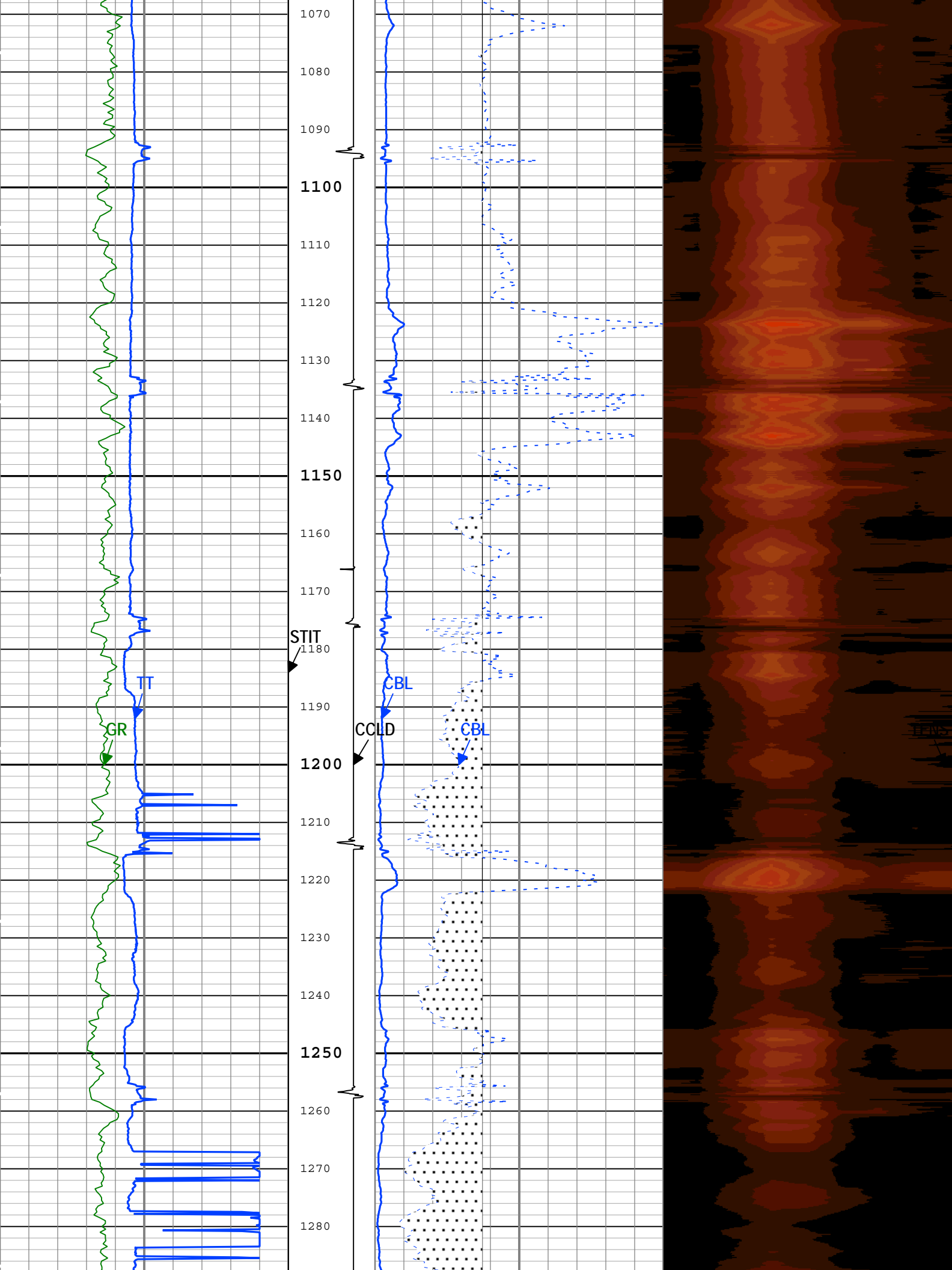


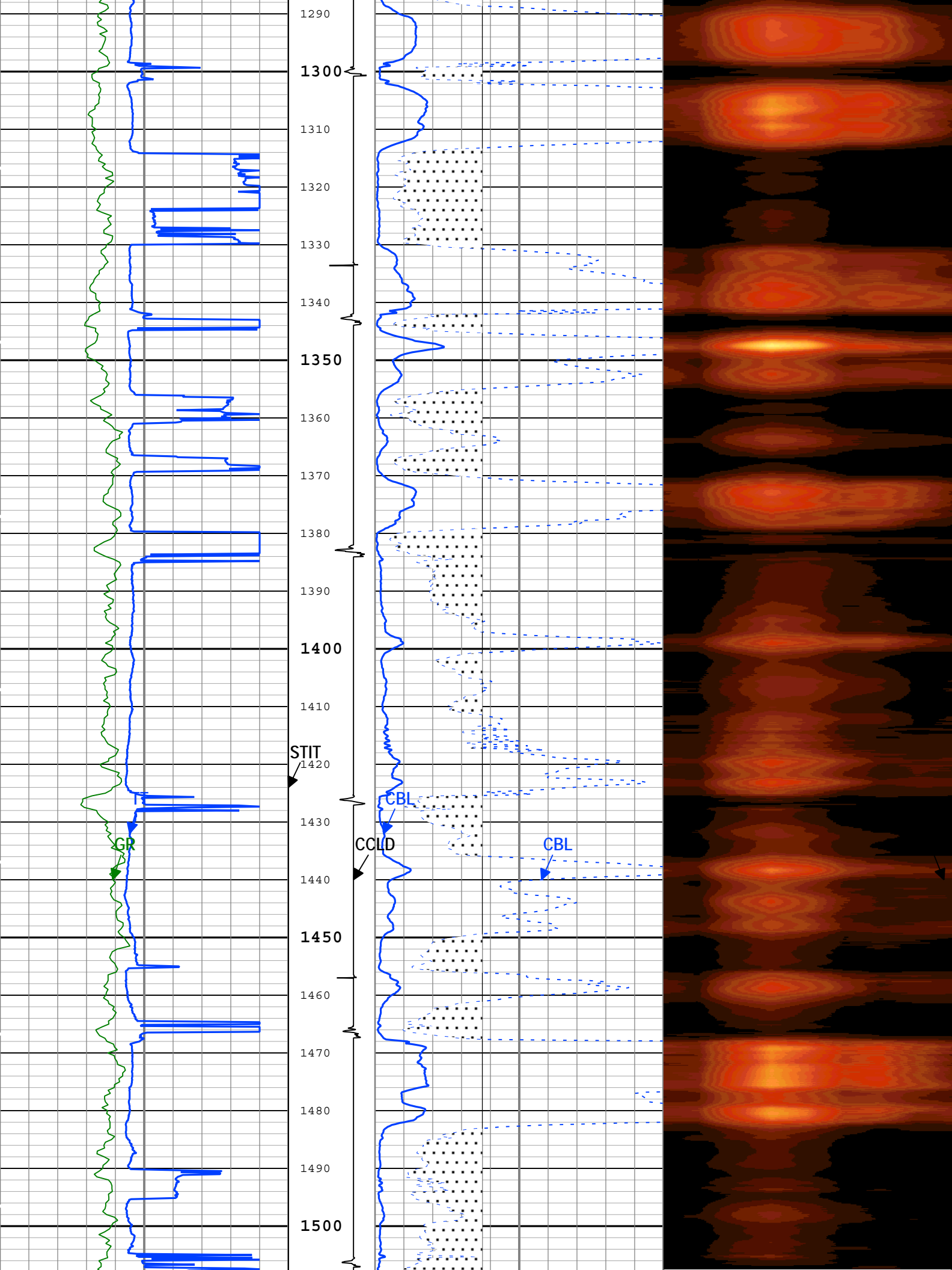


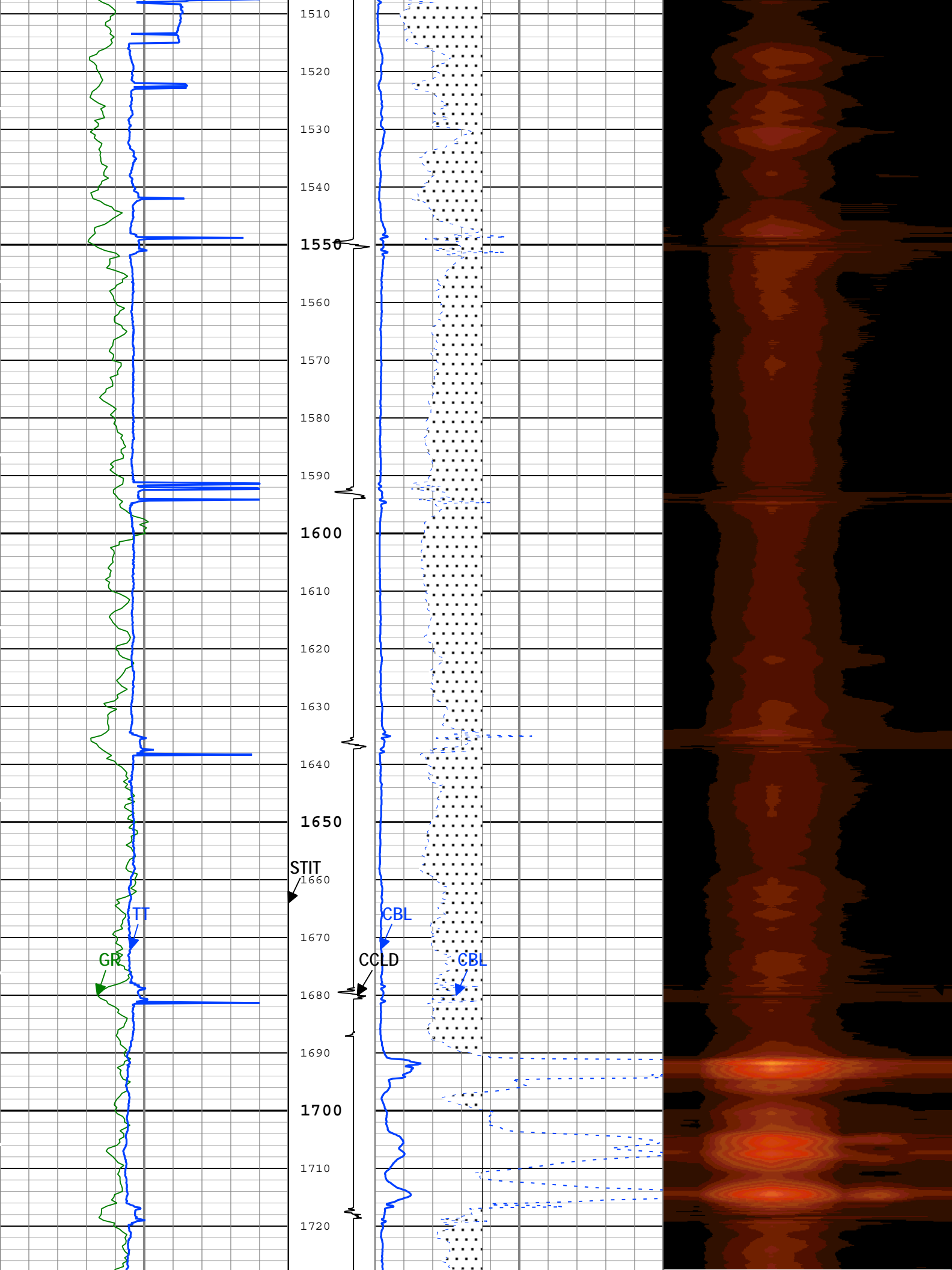


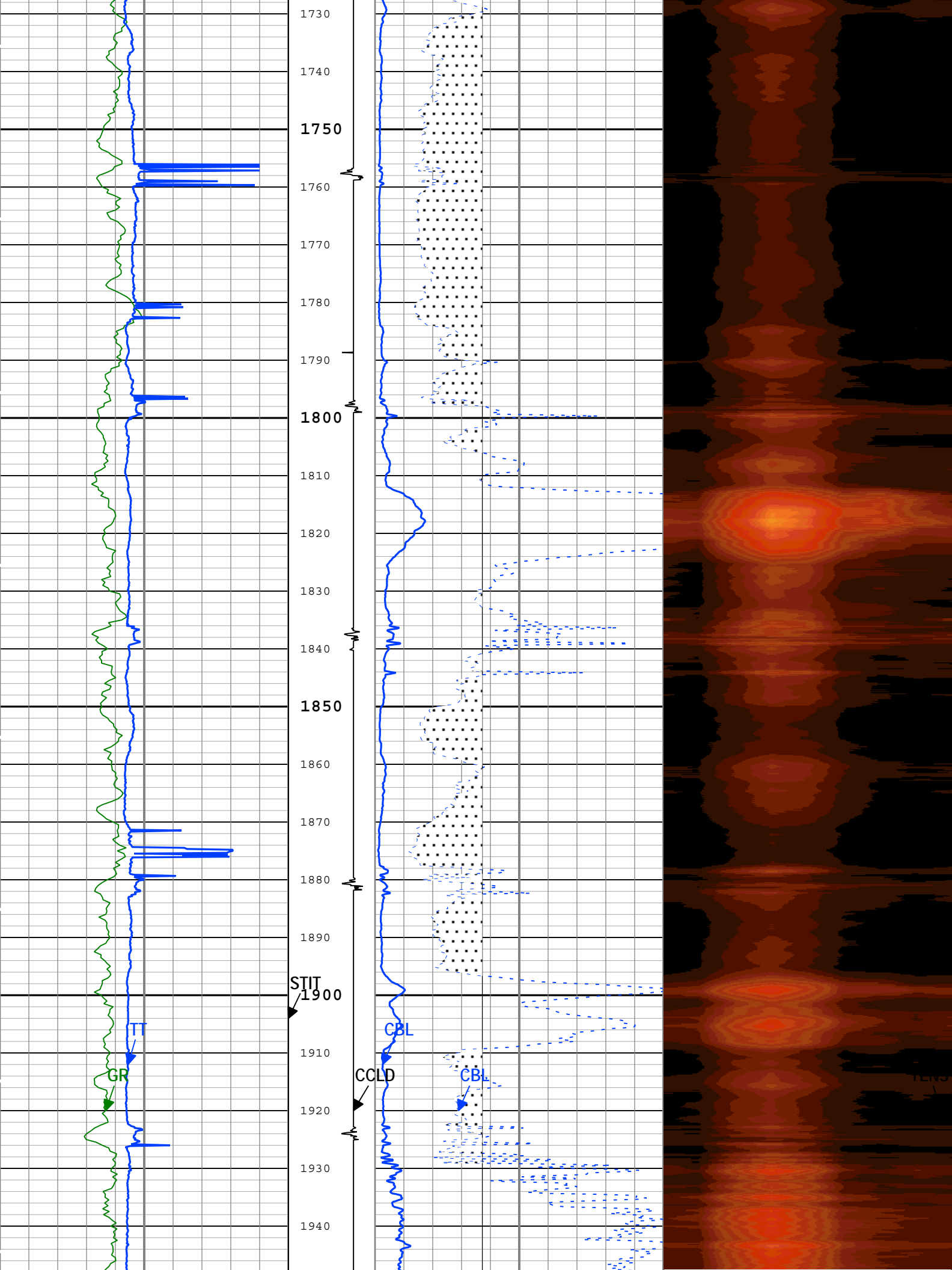


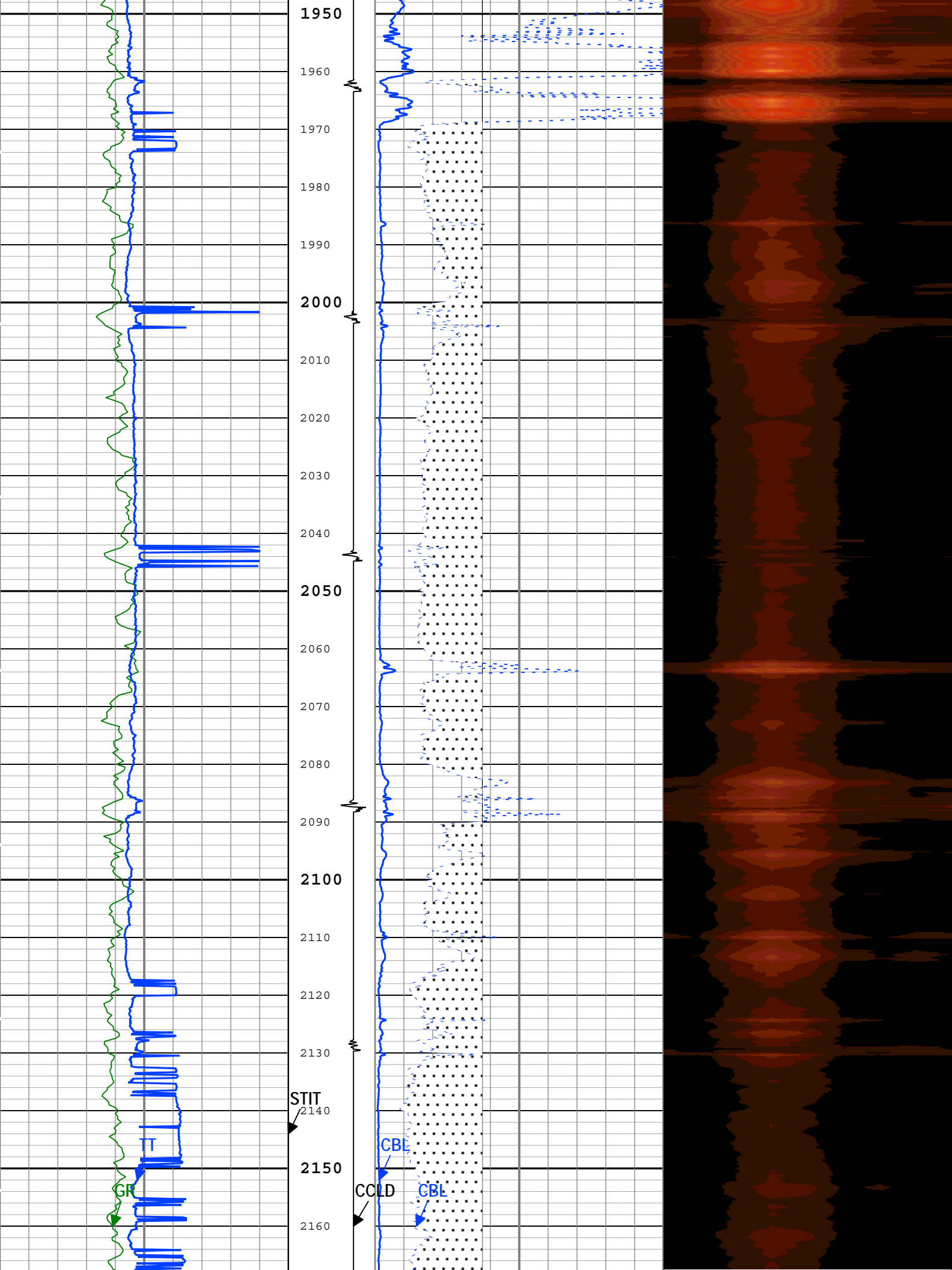


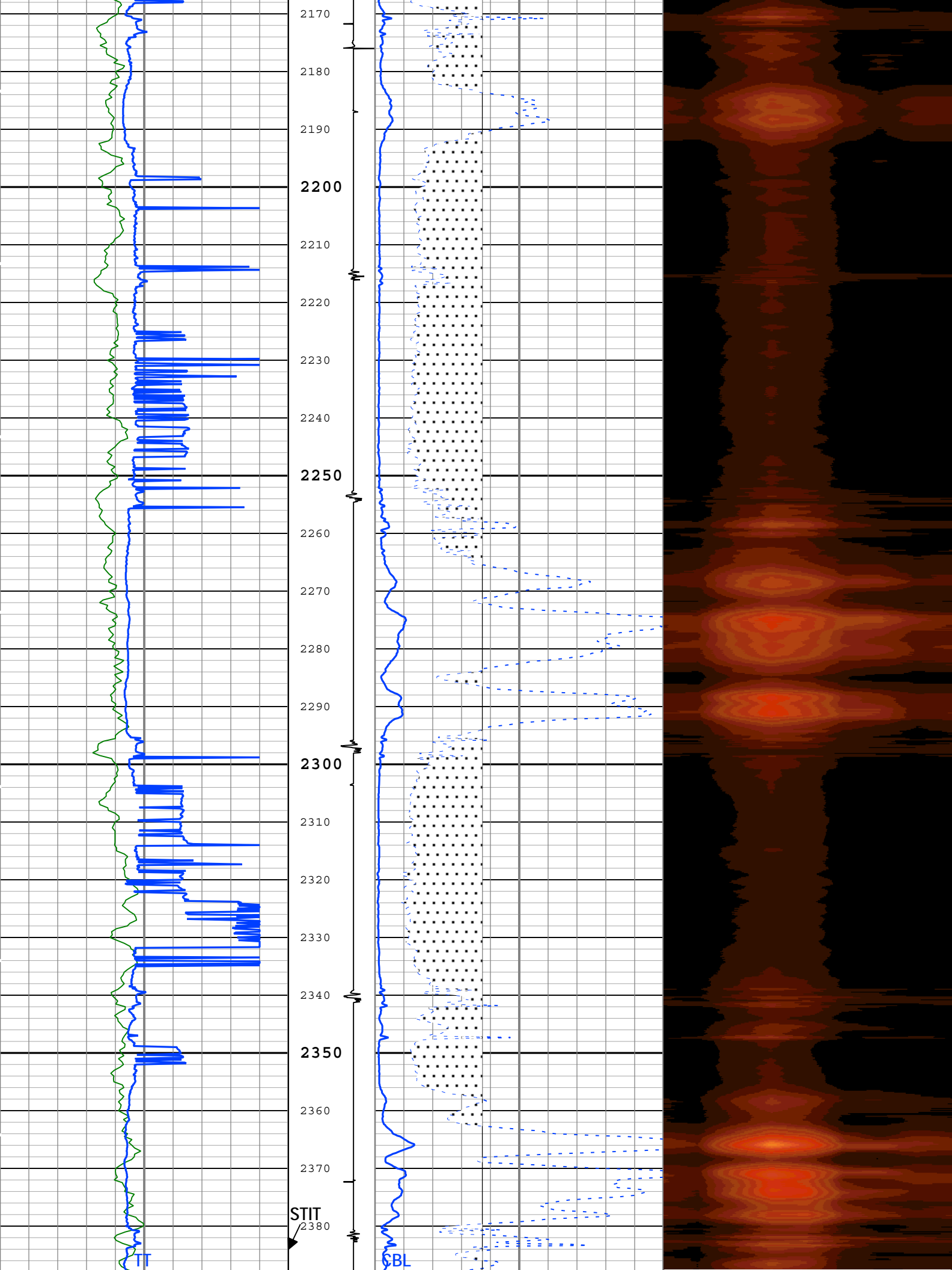


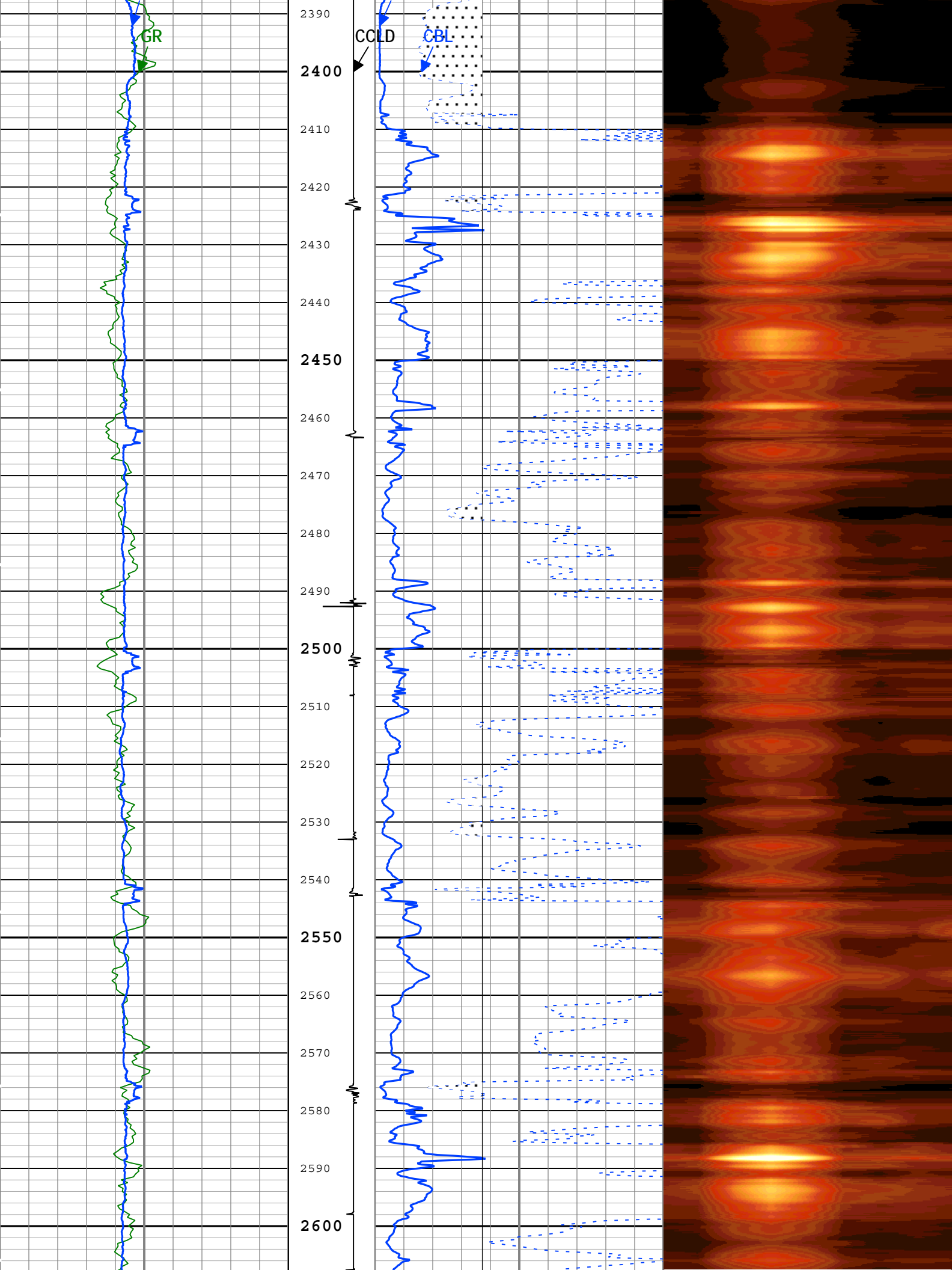


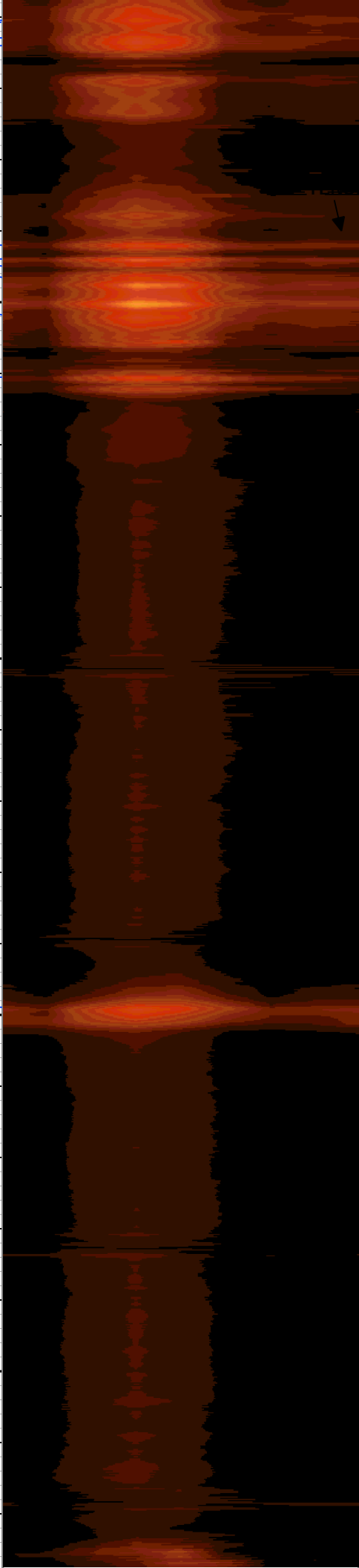
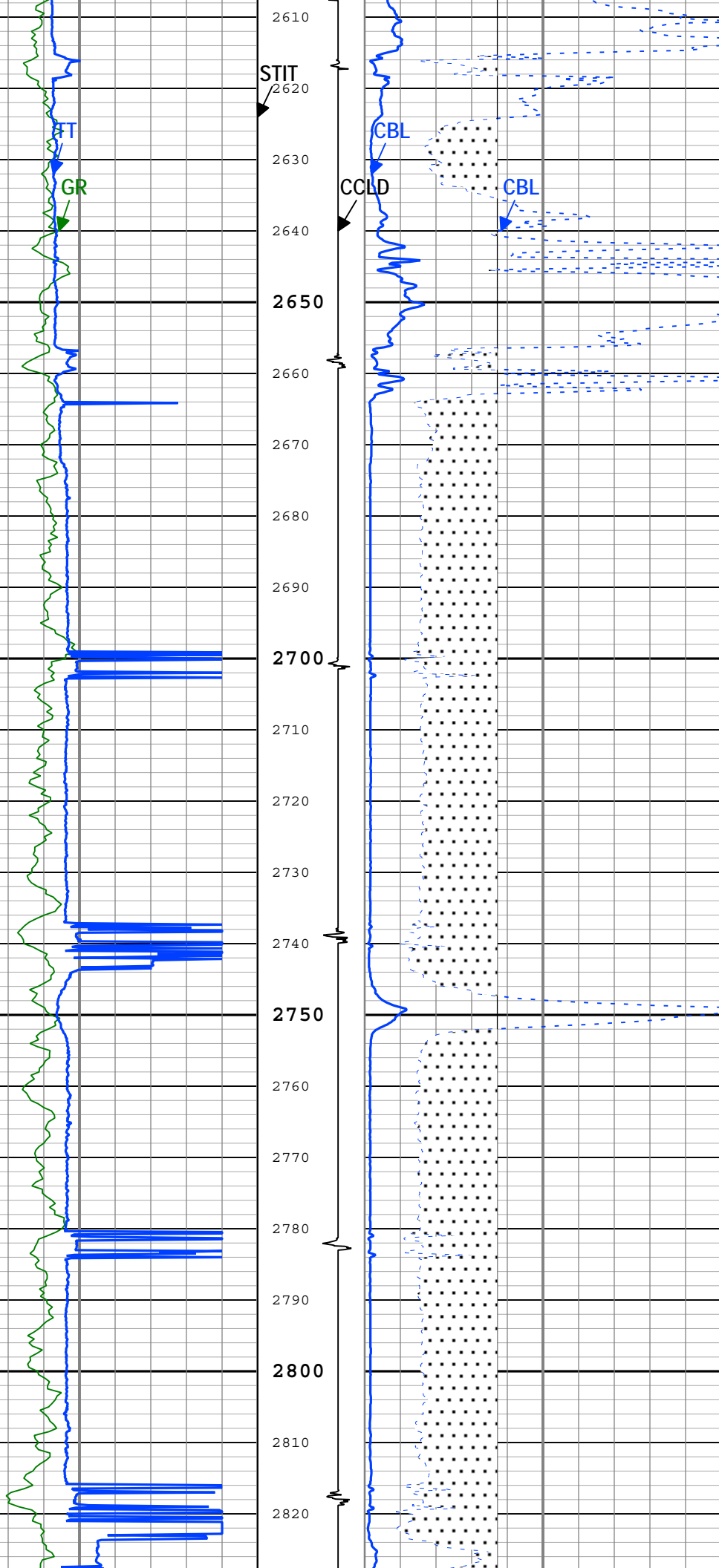


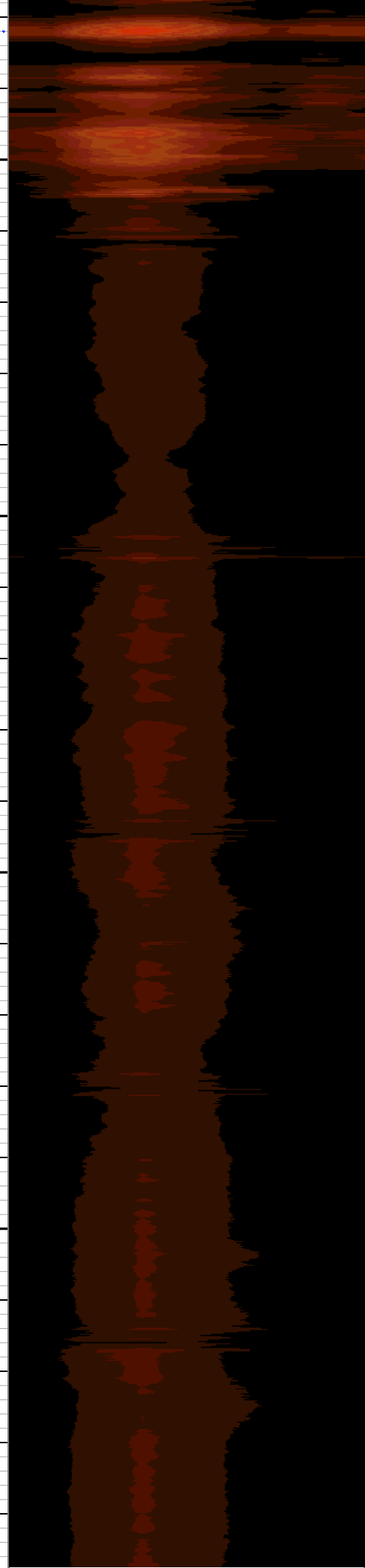
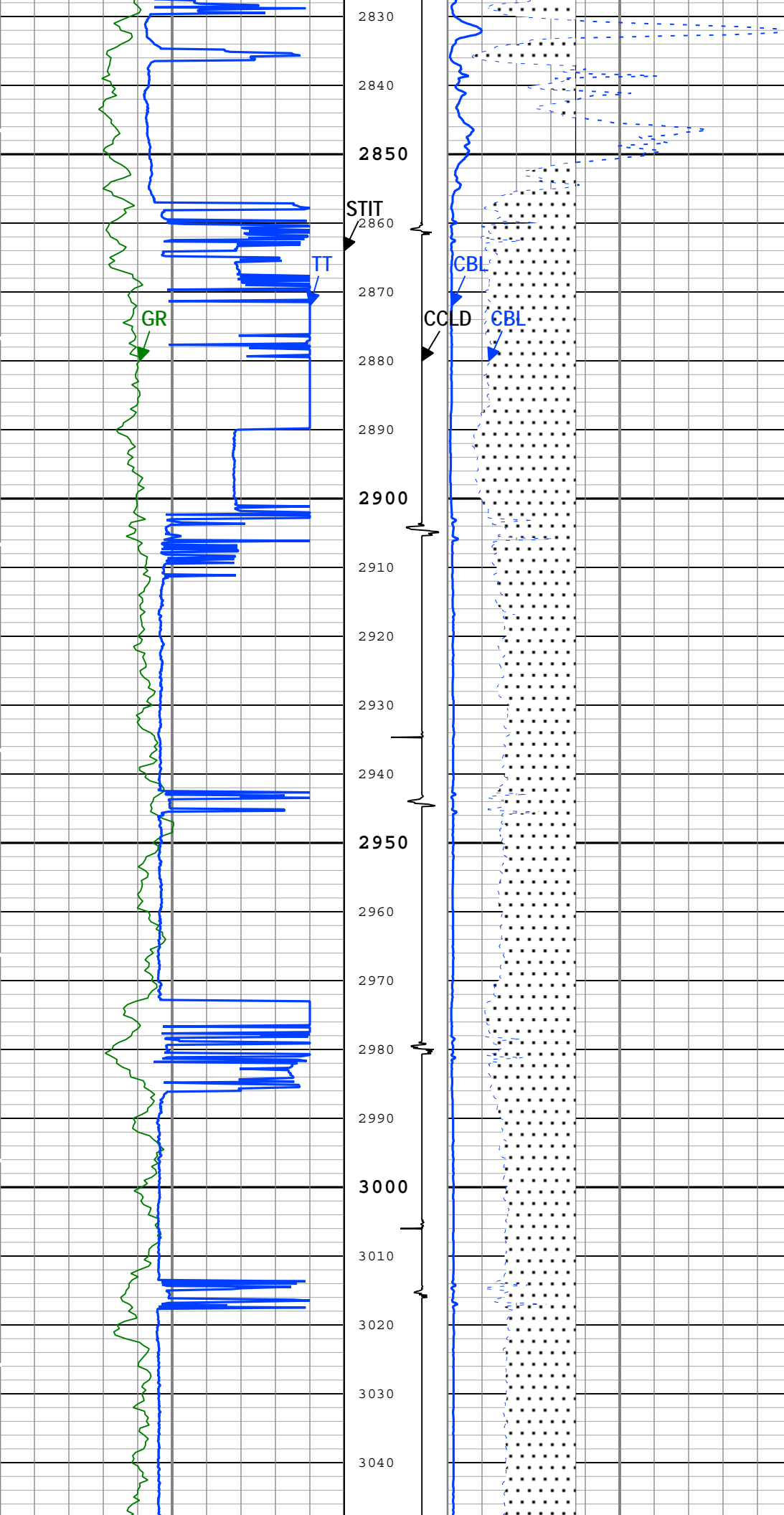


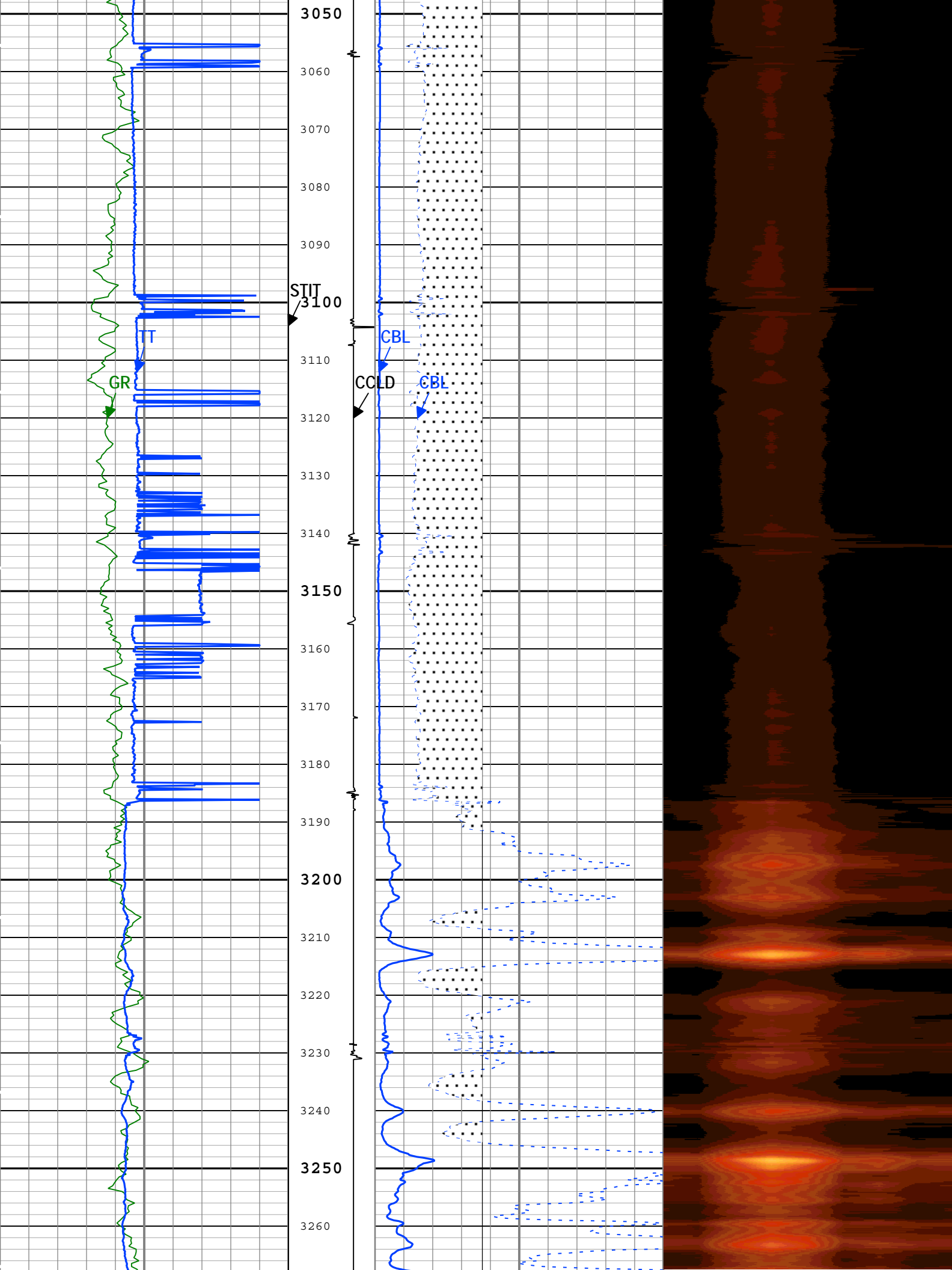


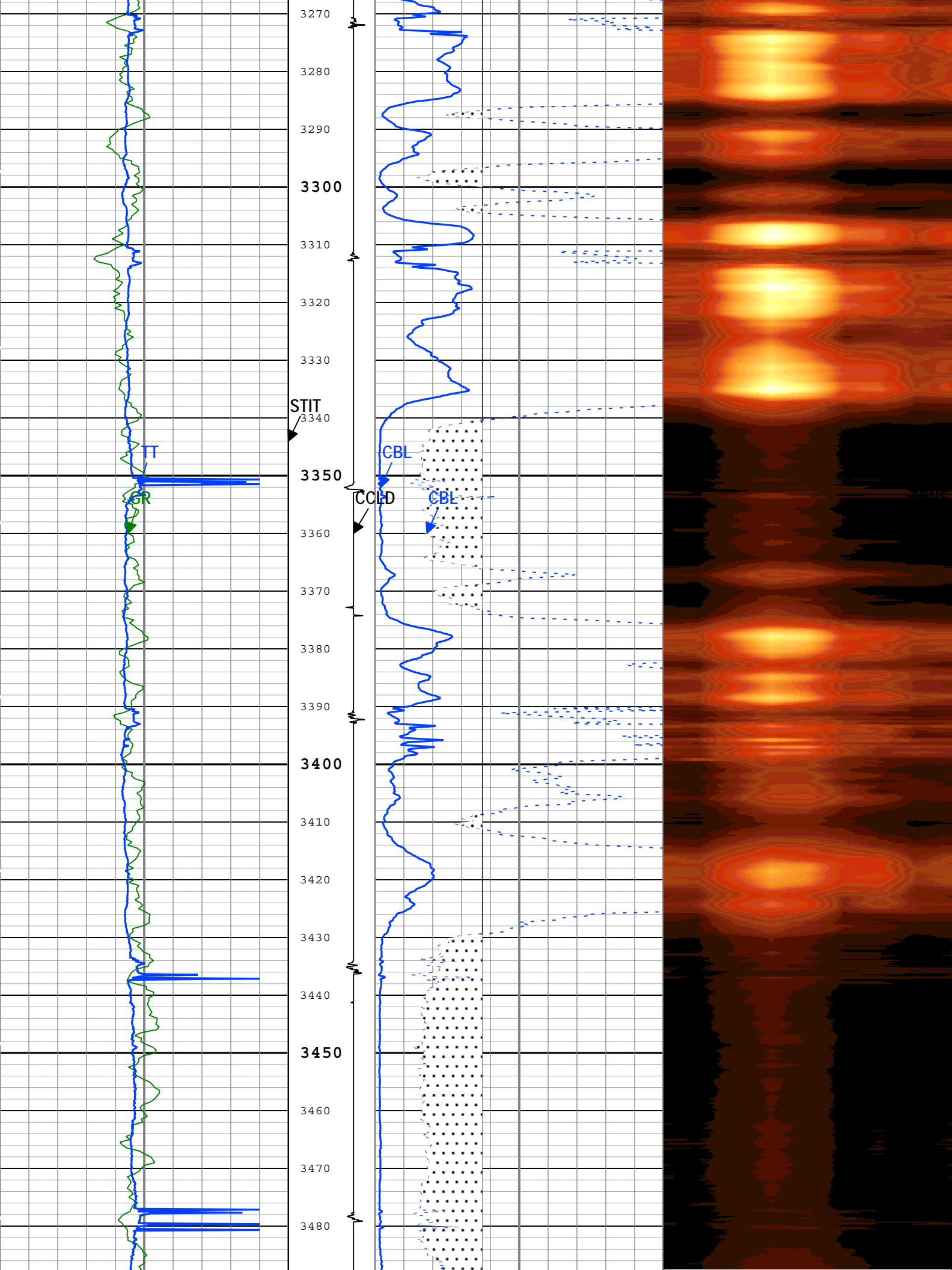


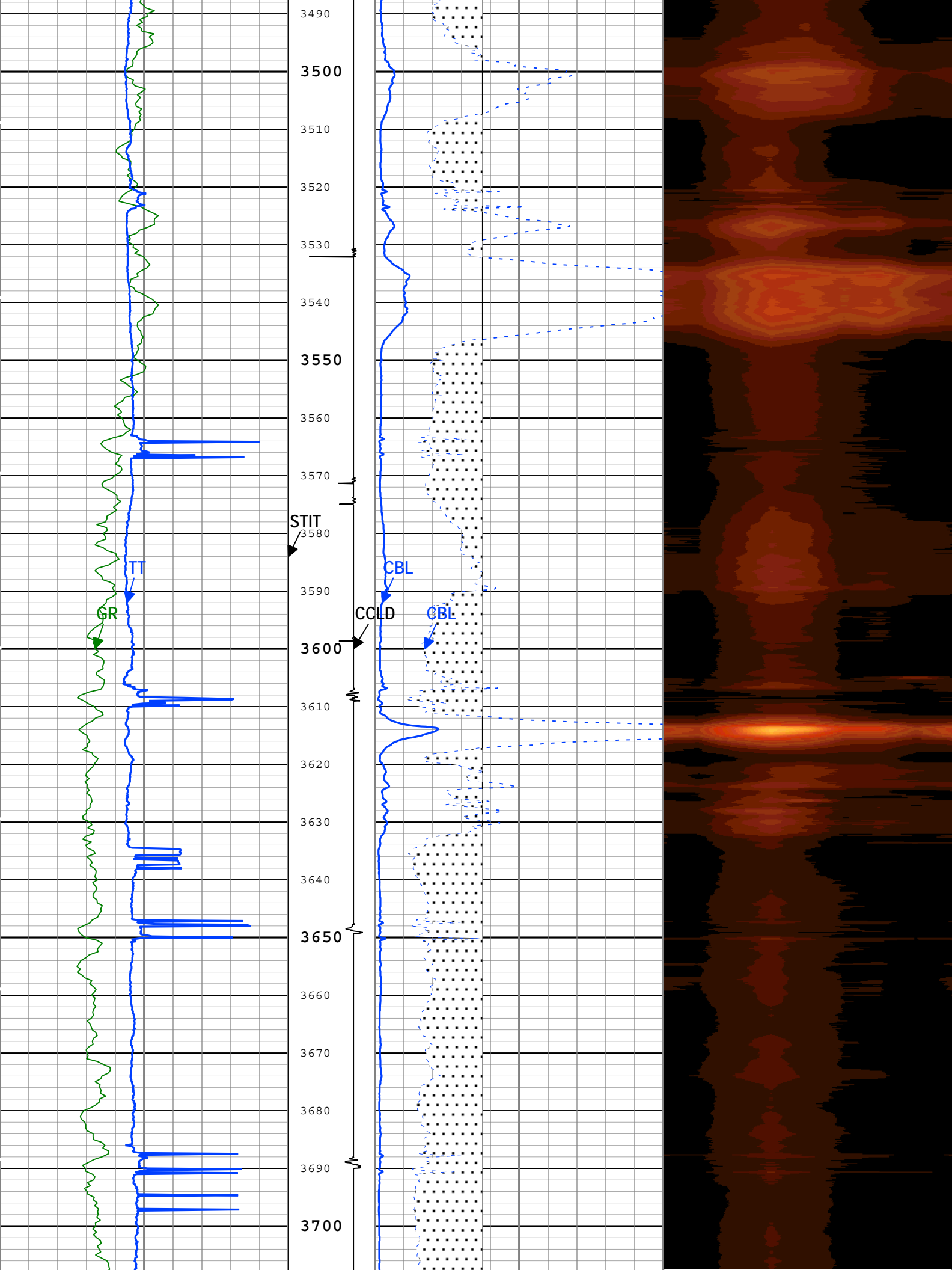


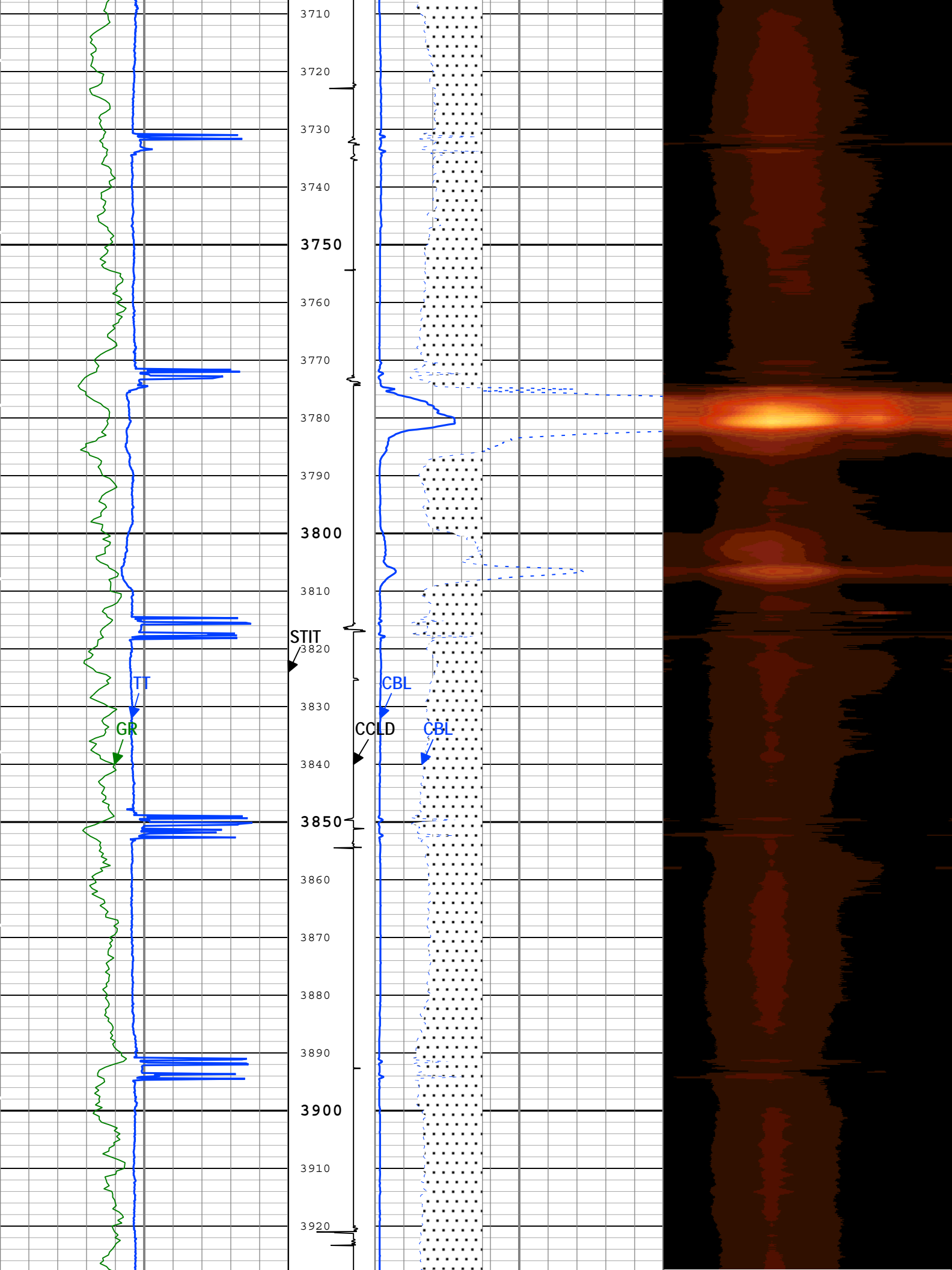


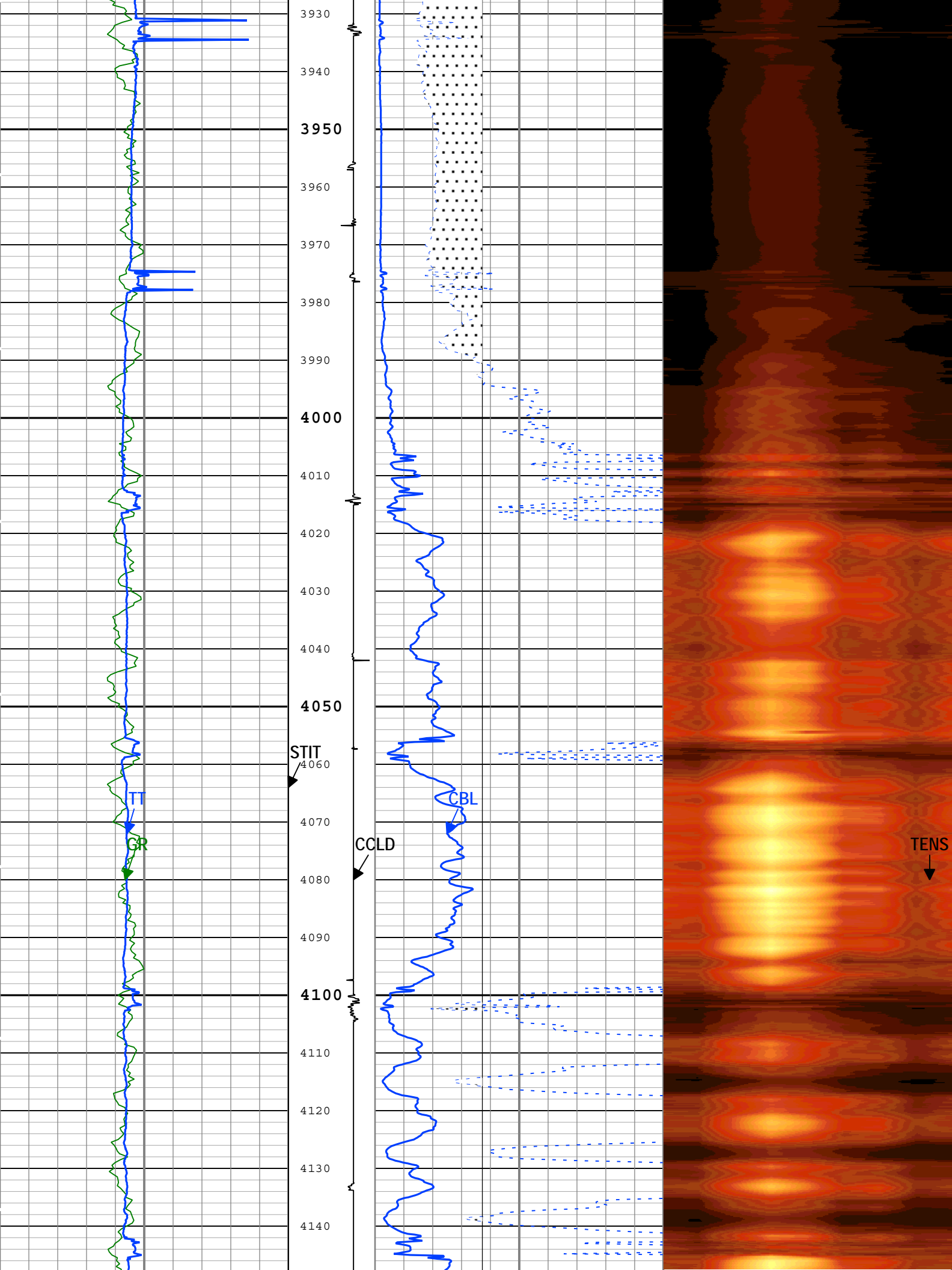


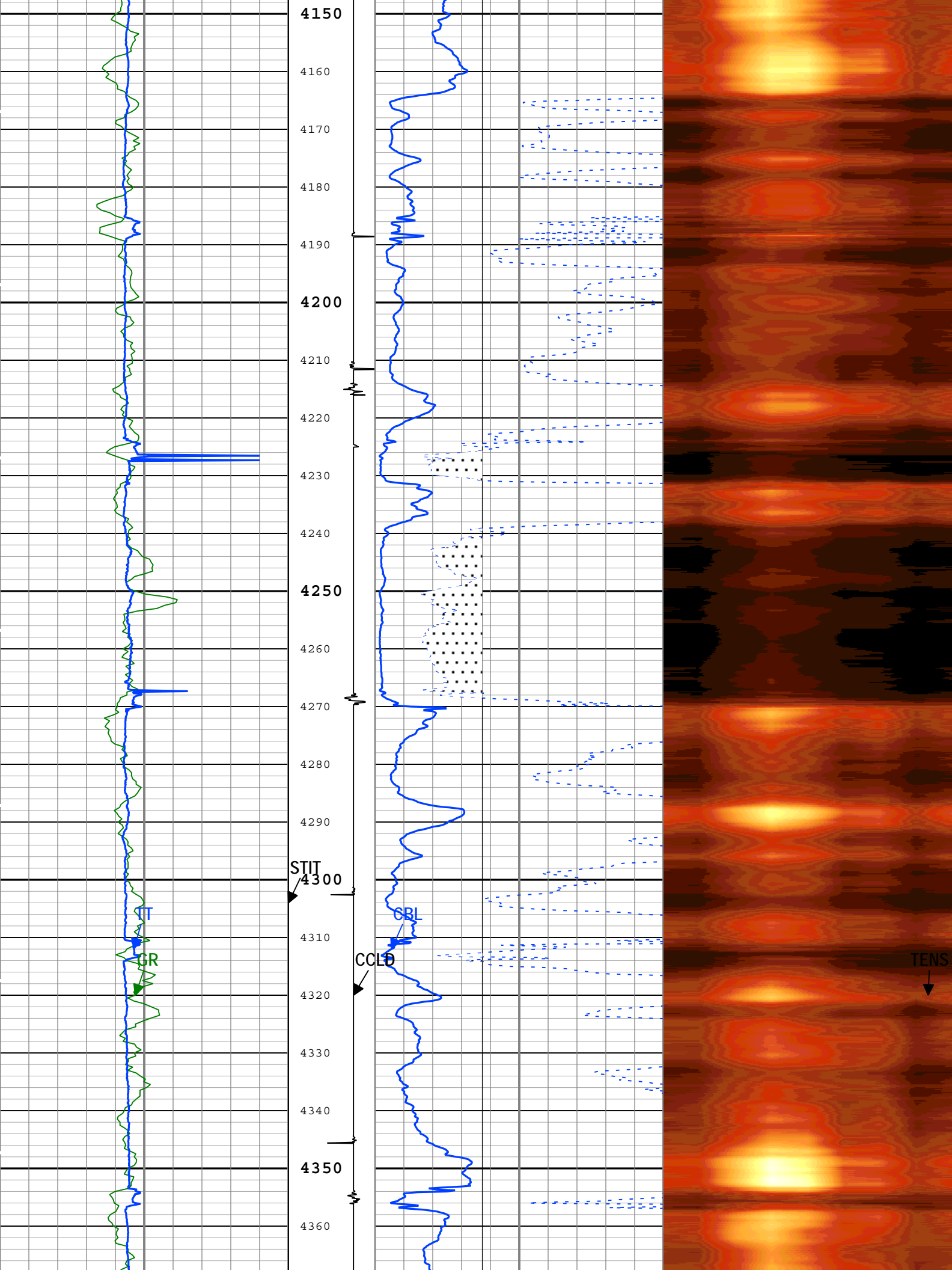


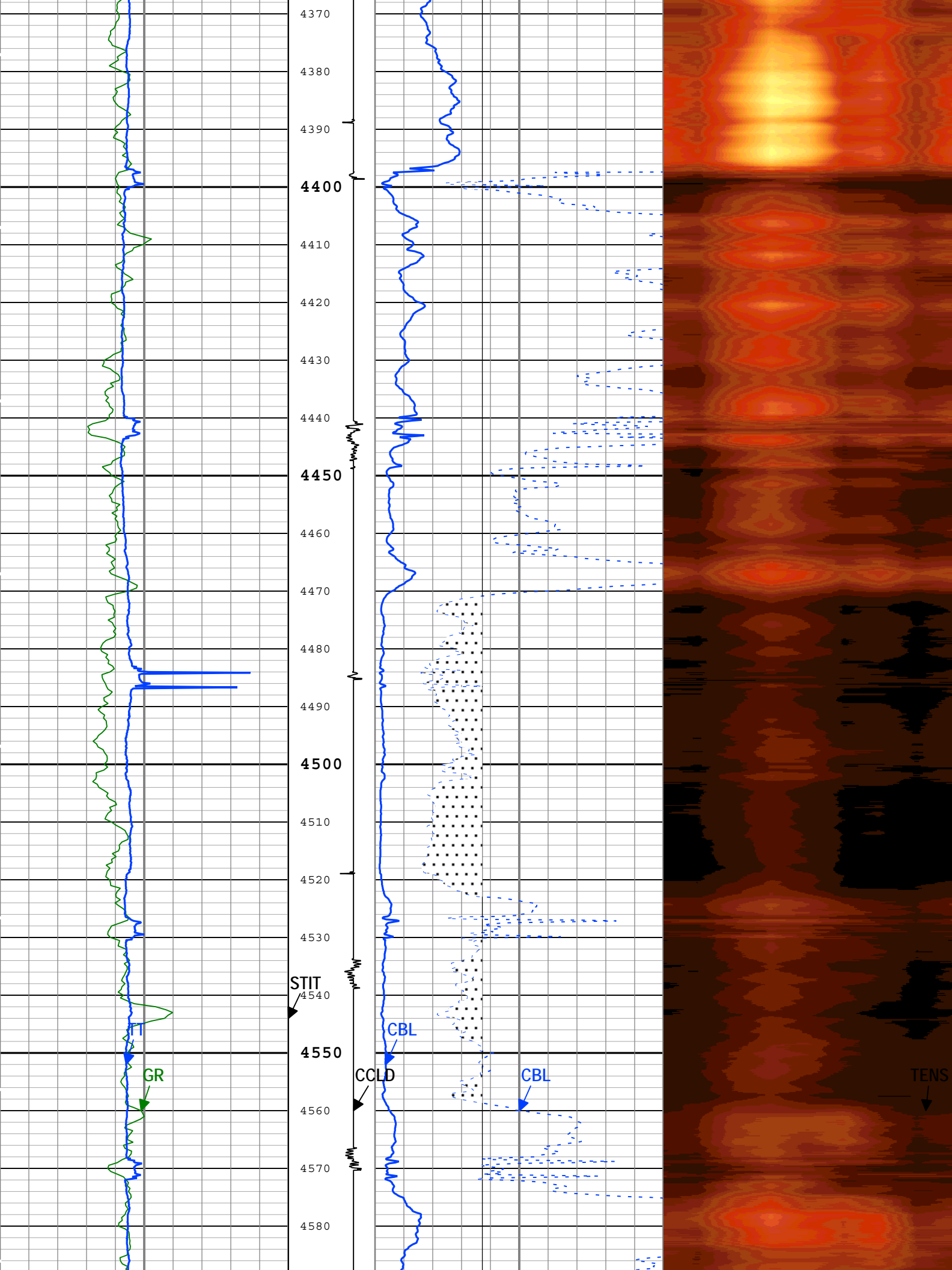


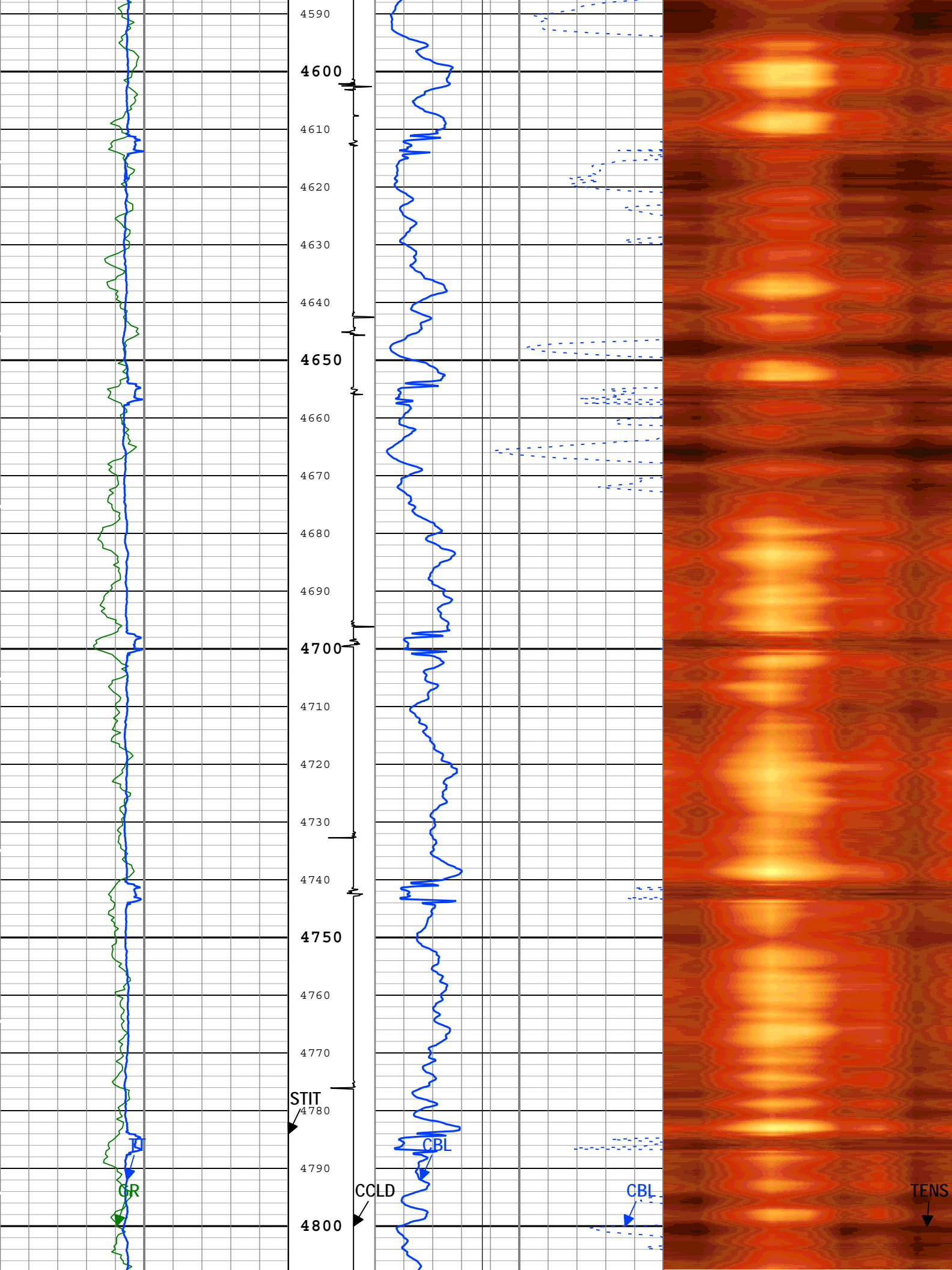


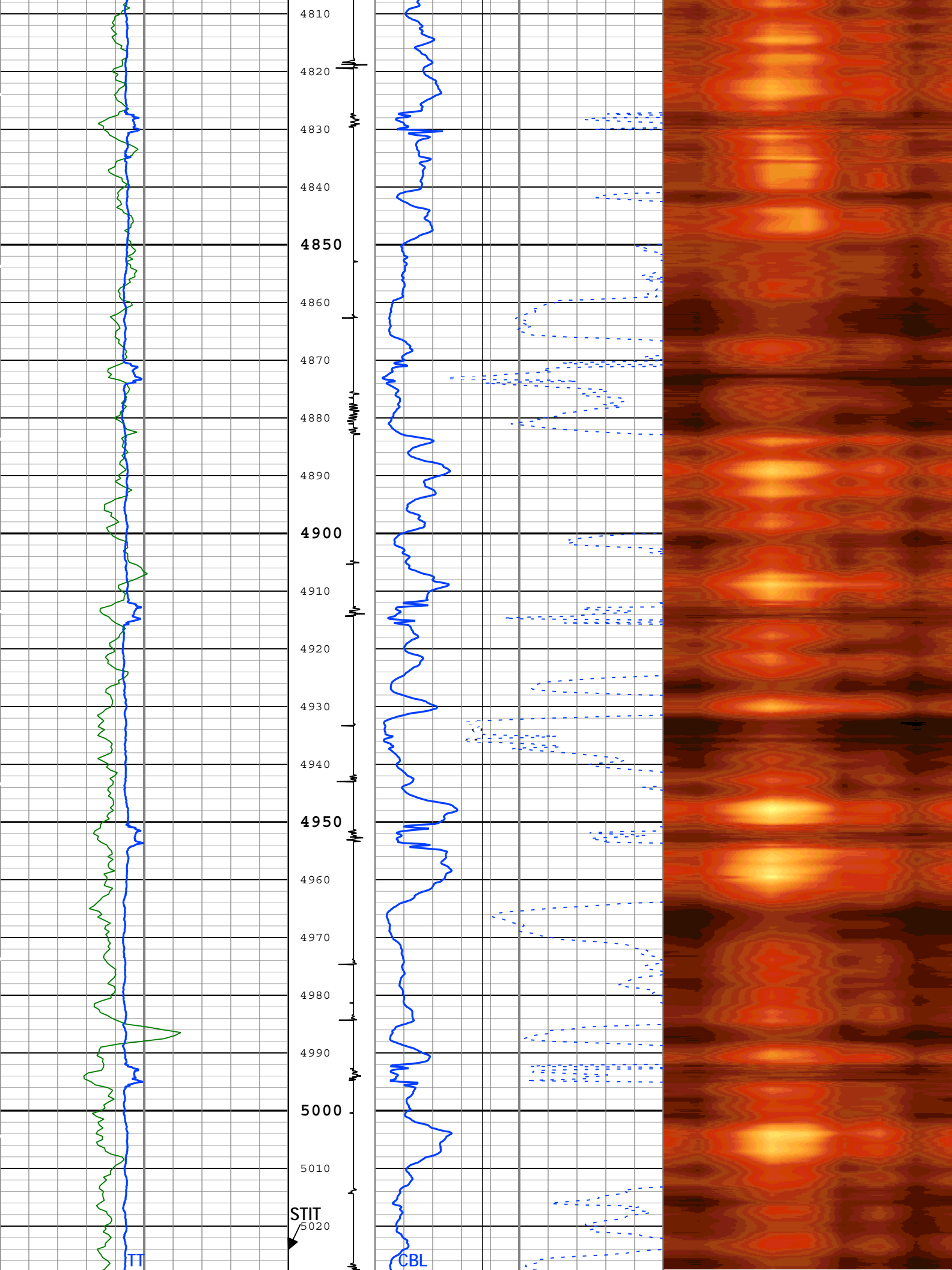


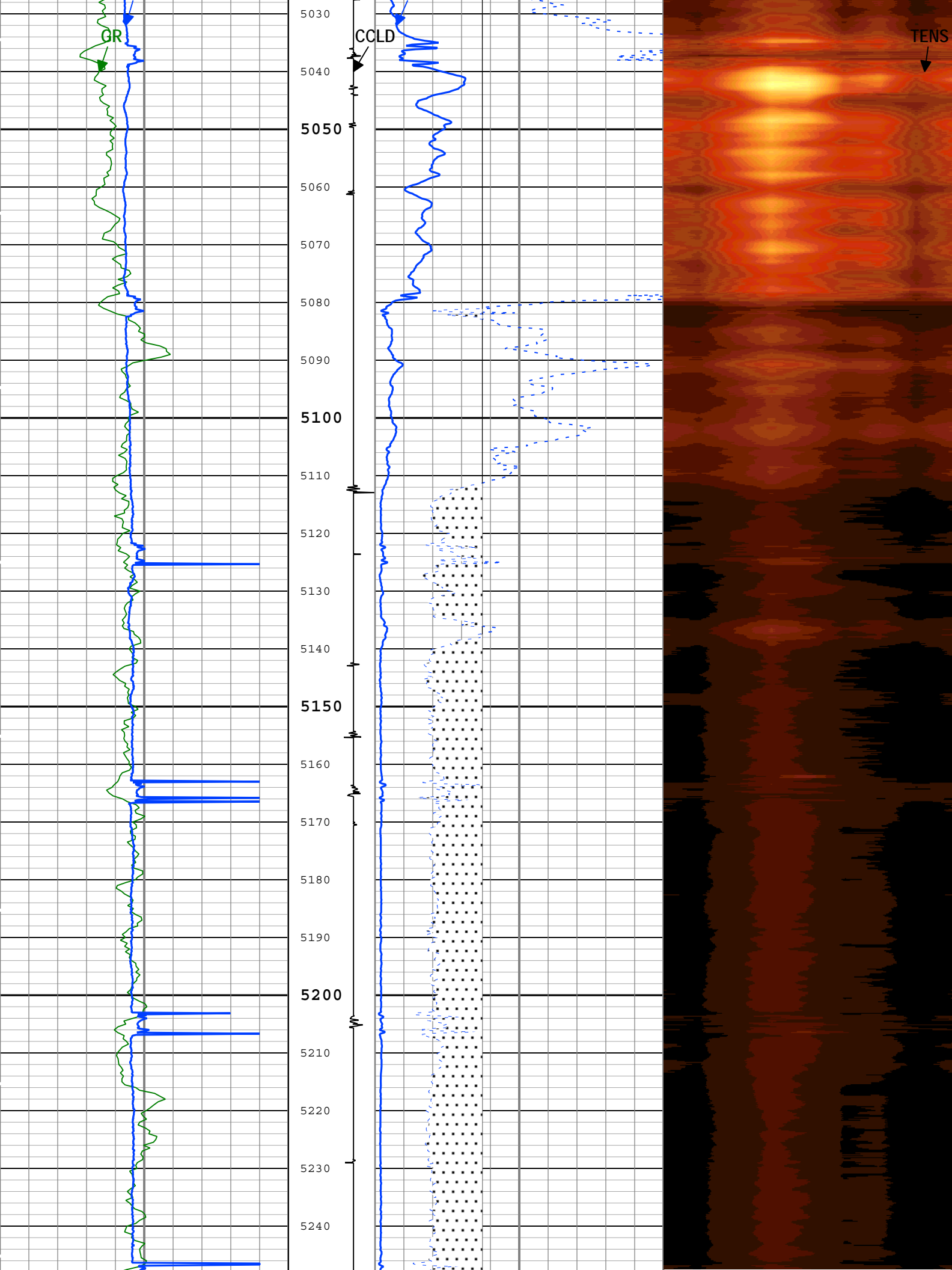


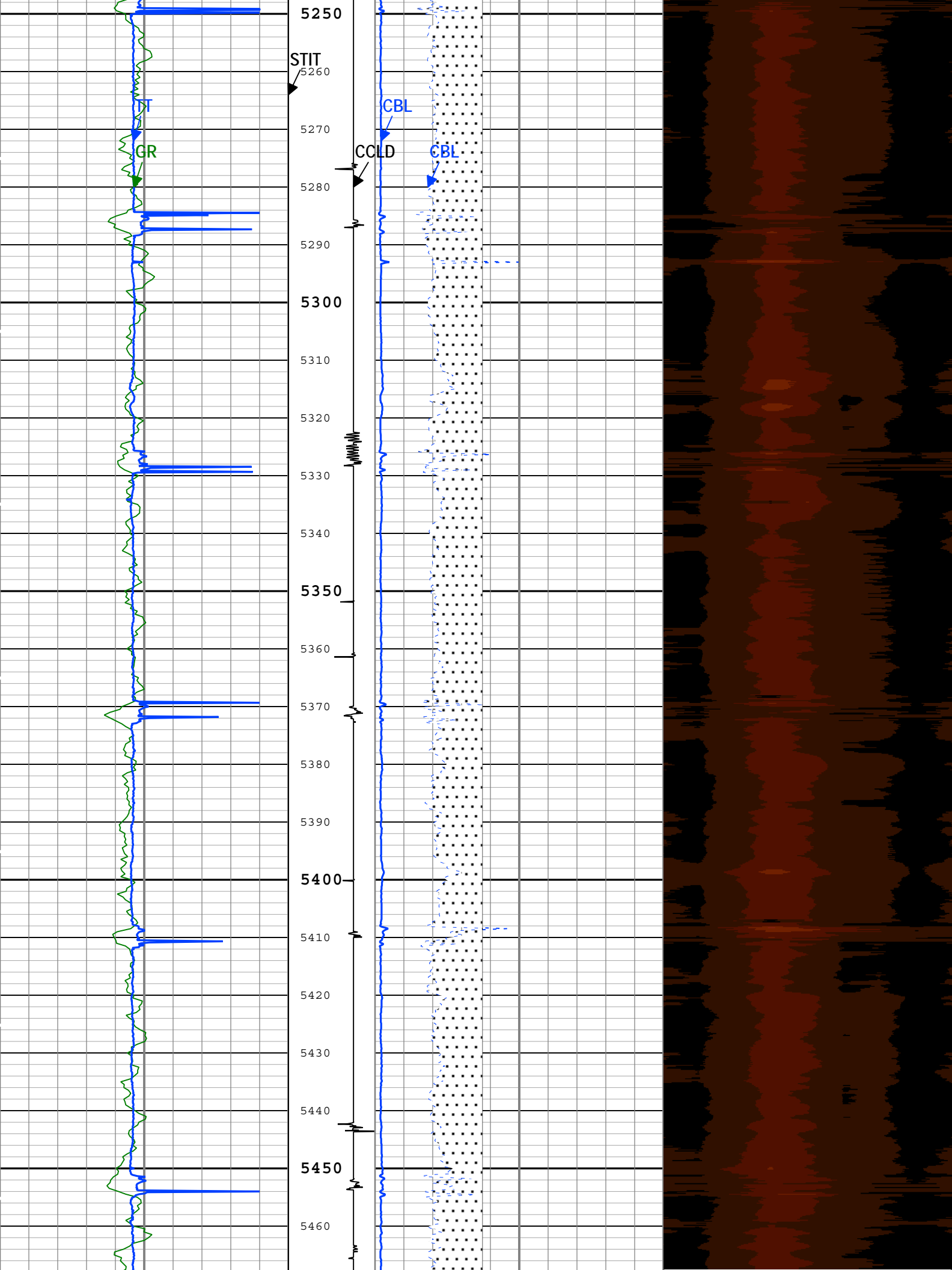


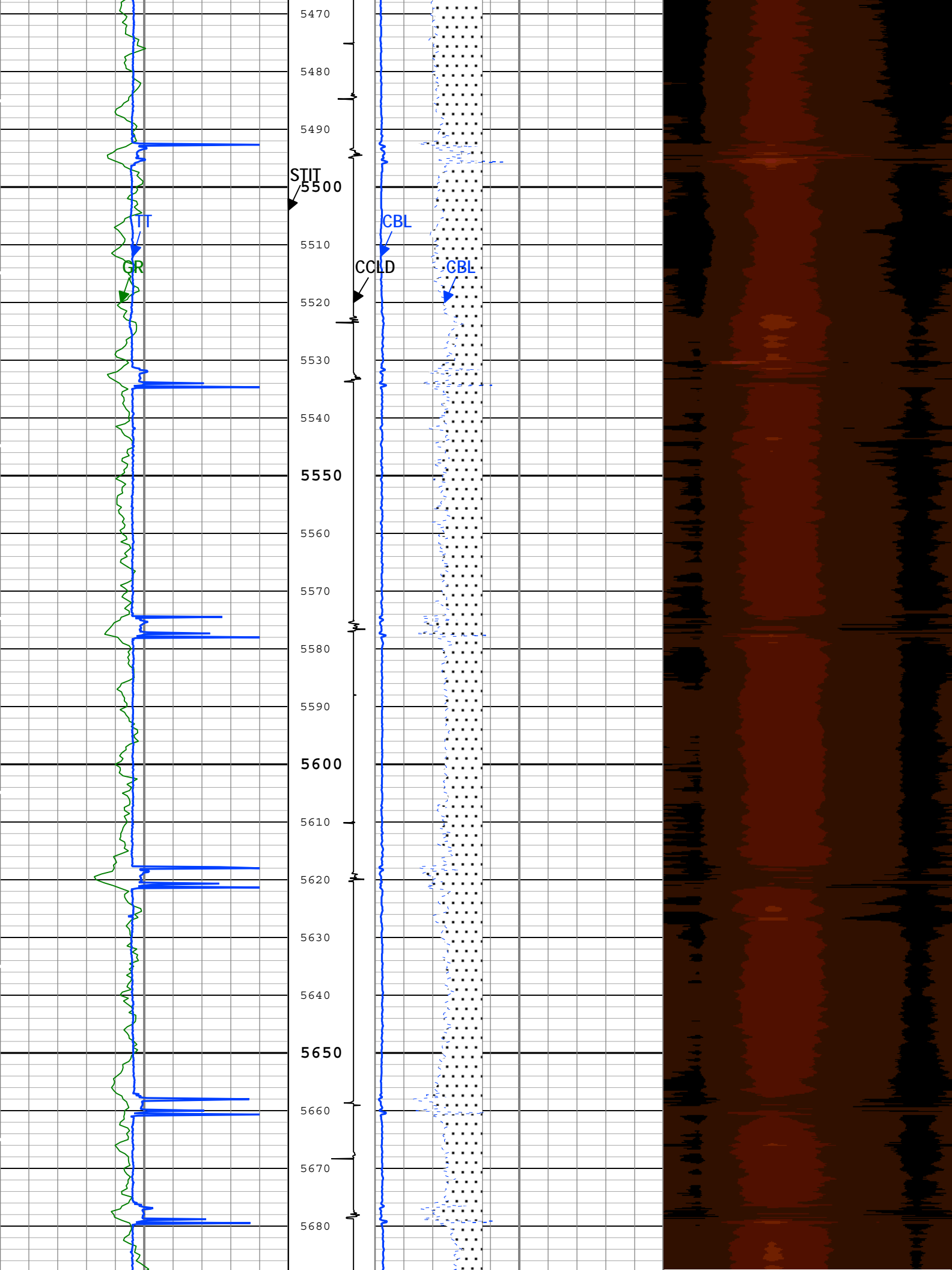


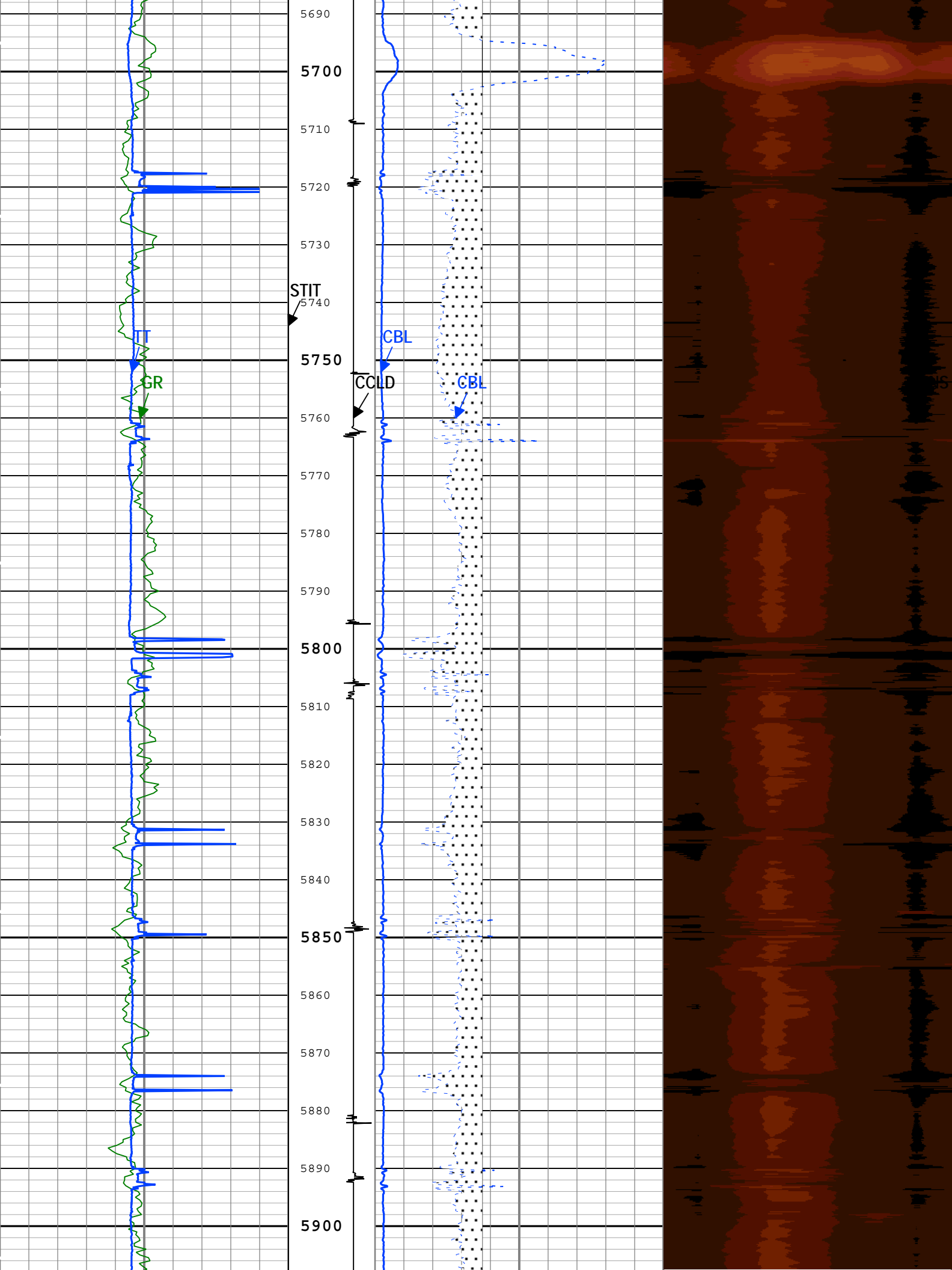


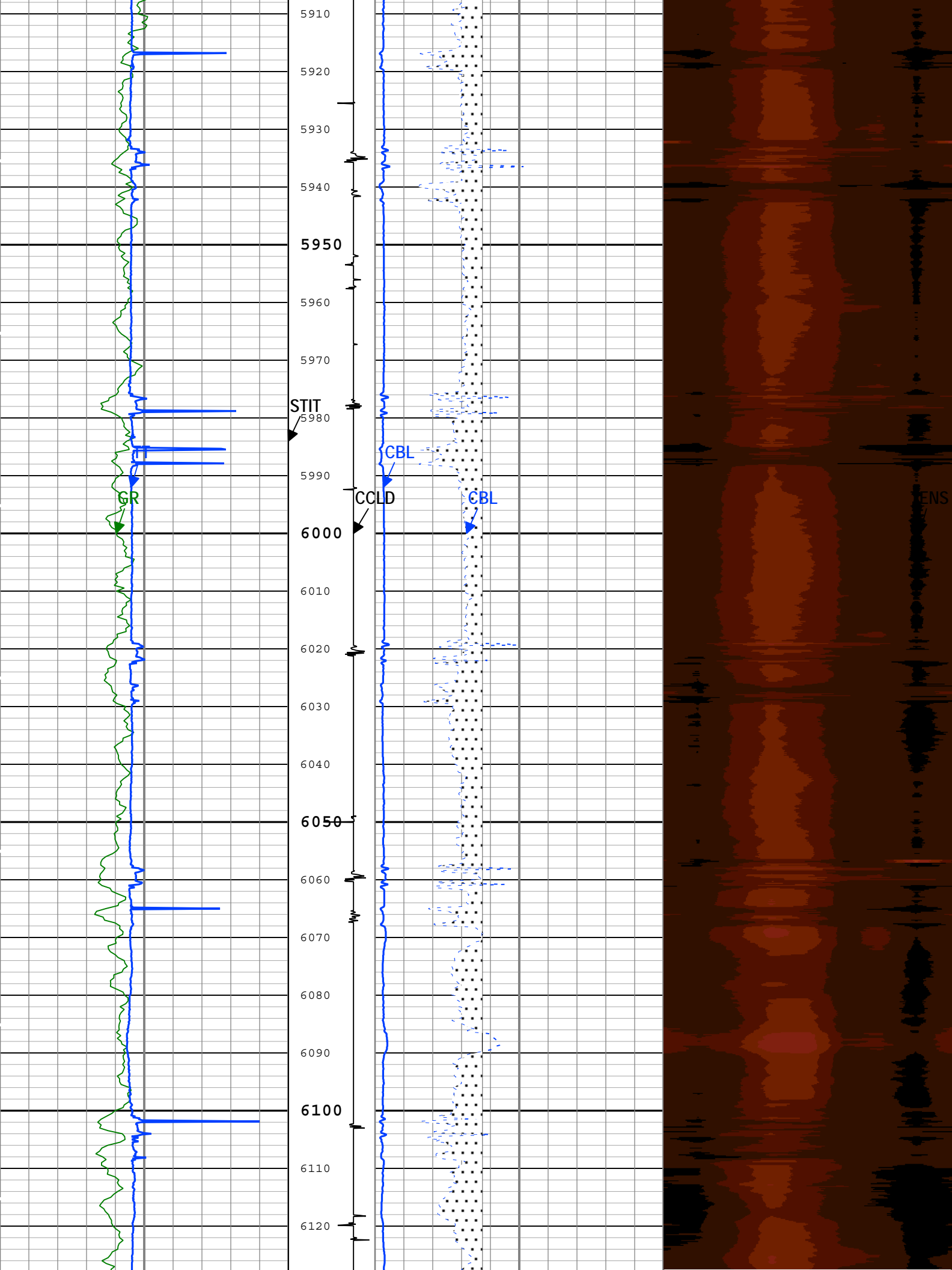


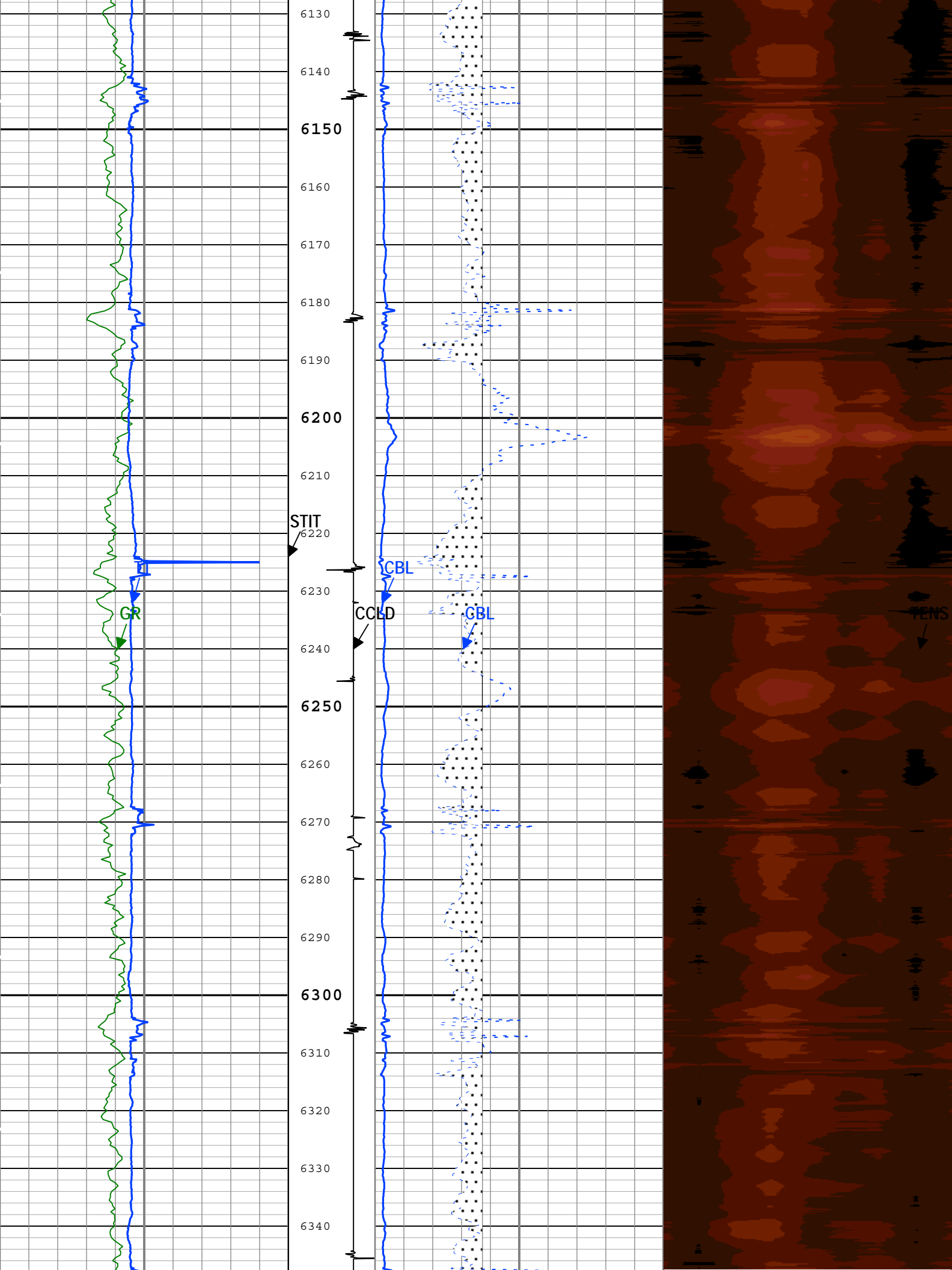


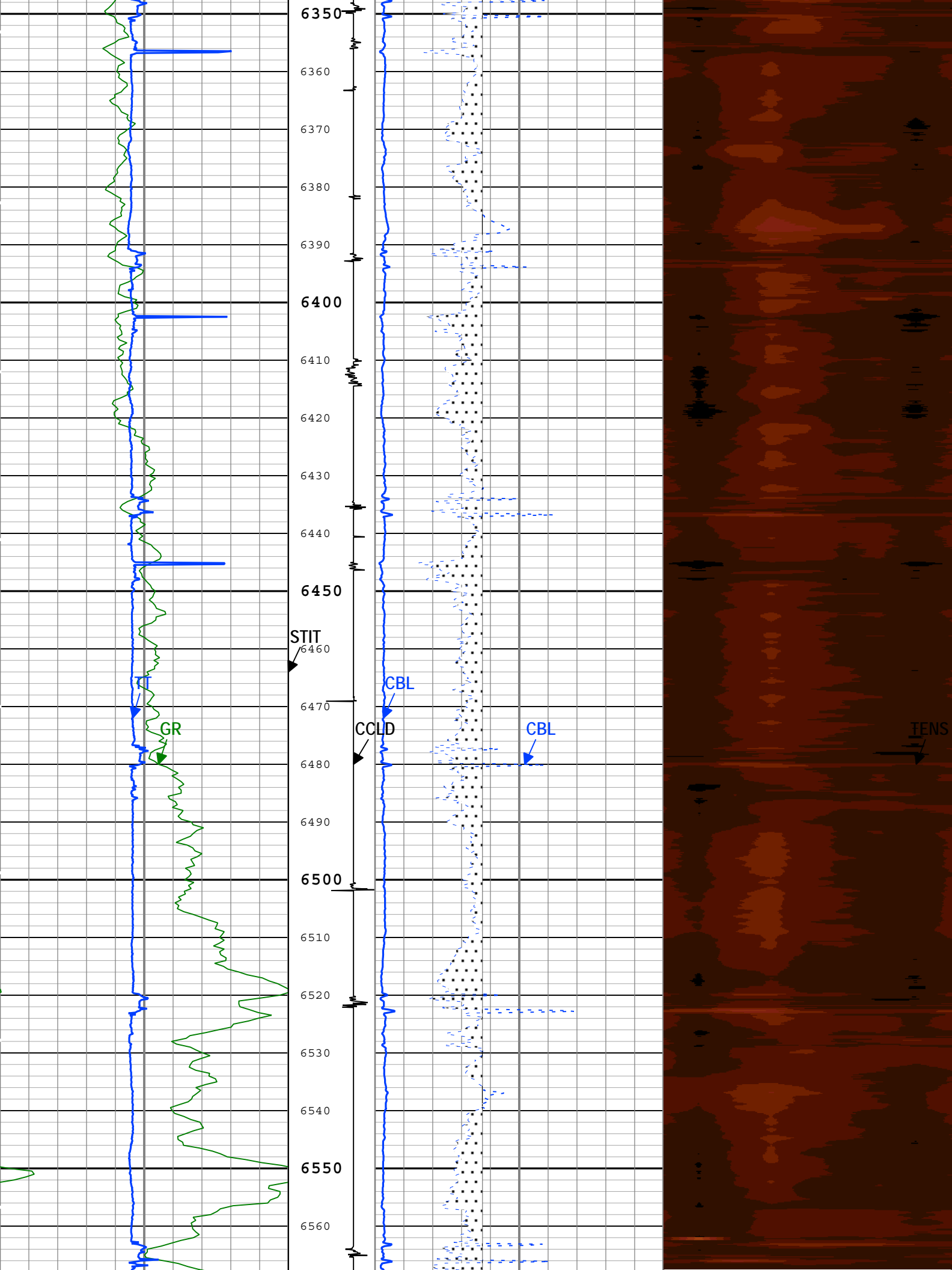


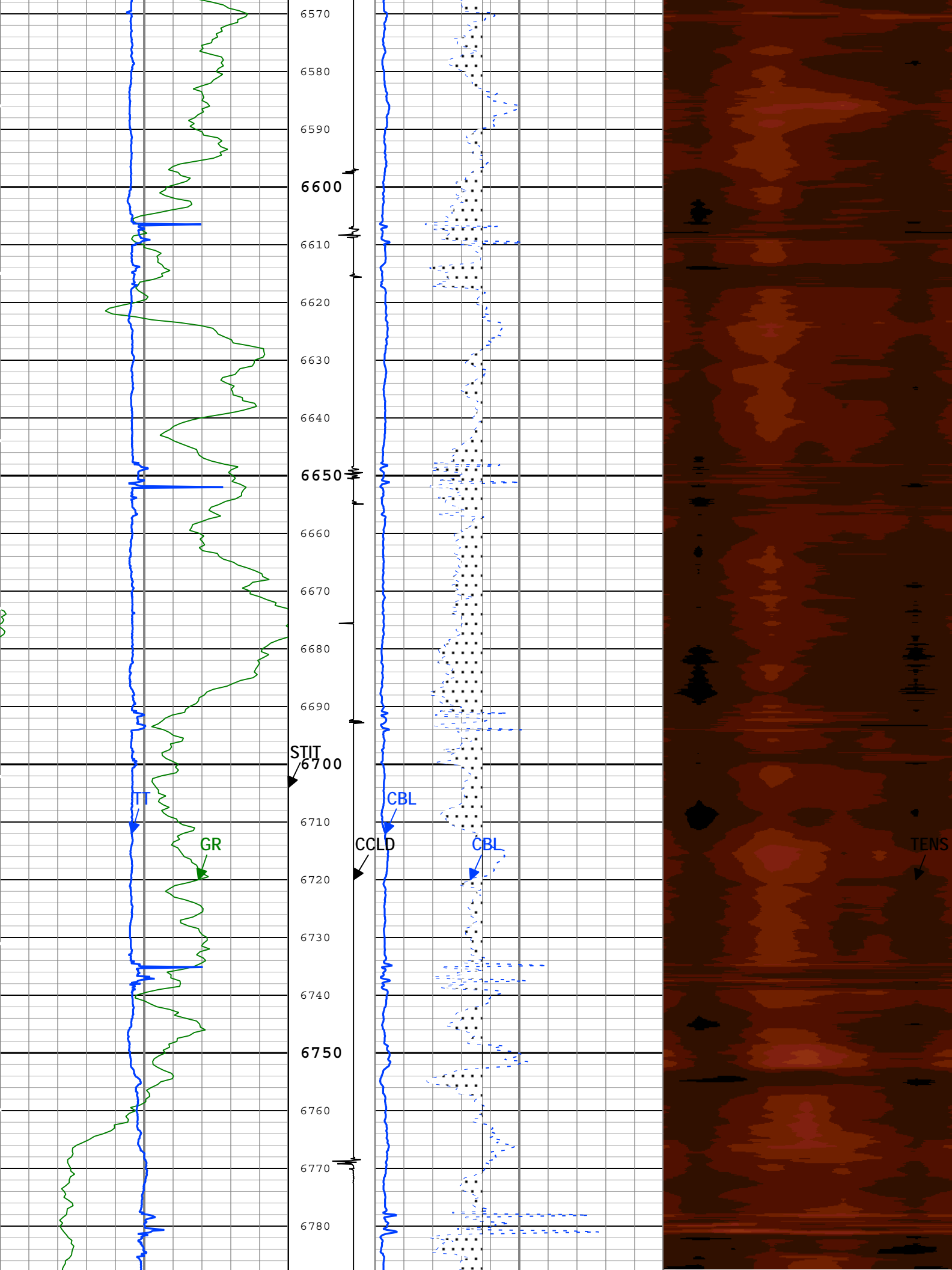


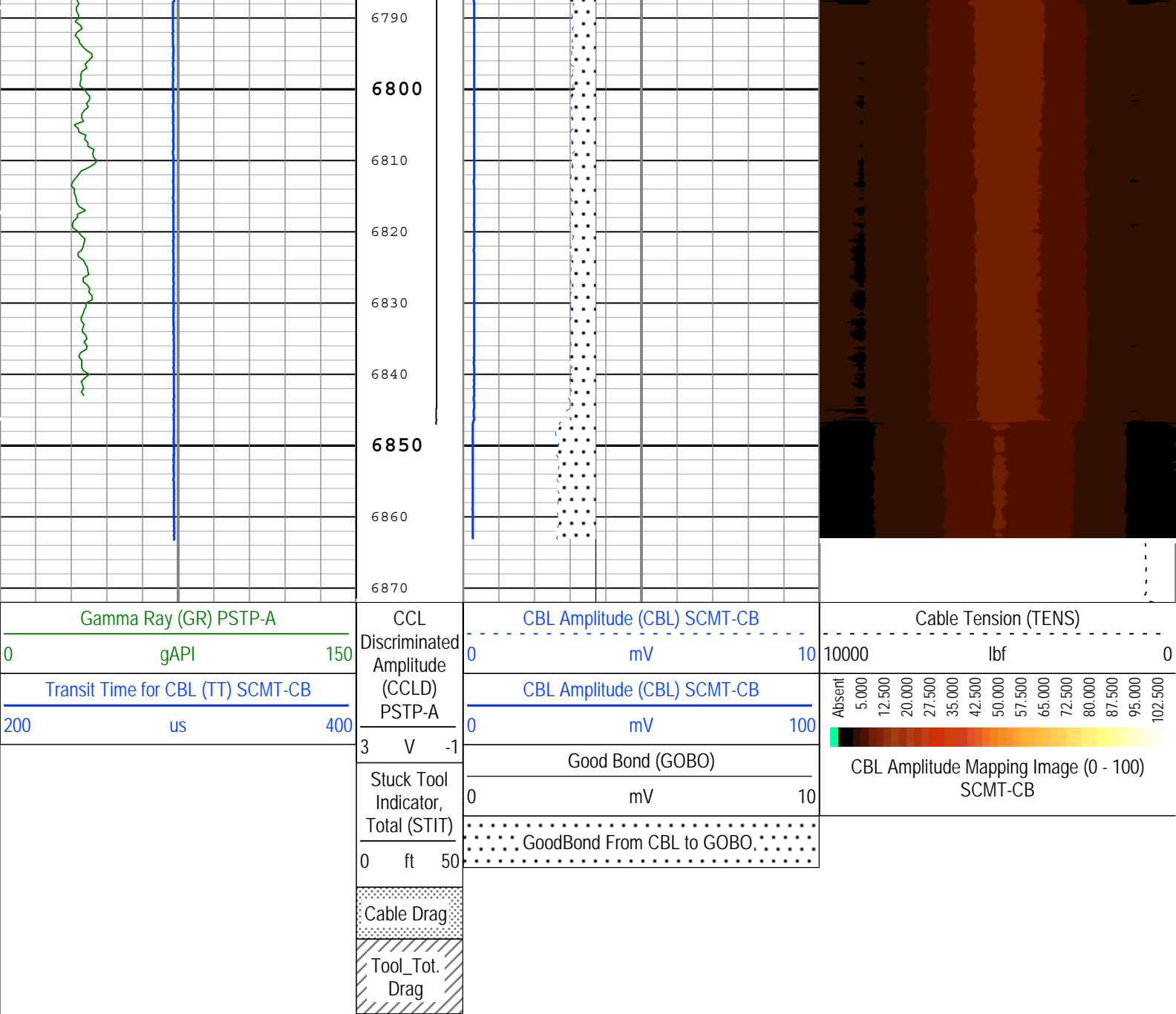












TIME_1900 - Time Marked every 60.00 (s)

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 15:02:19

Channel Processing Parameters				
Run 1: Parameters				
Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	206.49	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	
THNO	Nominal Casing Thickness - Zoned along logger depths	WLSESSION	0.362	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	29	ft

EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4664	ft
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
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
MCCF	MAP Cement Type Compensation Factor	SCMT-CB	0.73	
MMSA	MAP Minimum Sonic Amplitude	SCMT-CB	10.86	mV
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
PDAT	Permanent Datum	WLSESSION	GL	
RUN_SNUM	Run Sequence Number	WSDRUN	1	
SHT	Surface Hole Temperature	Borehole	68	degF
TD	Total Measured Depth	Borehole	6780	ft

Tool Control Parameters

Run 1: 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 1

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 1	Main[5]:Up	Up	65.03 ft	6871.98 ft	21-Apr-2015 8:28:11 AM	21-Apr-2015 12:23:26 PM	ON	5.22 ft	No

All depths are referenced to toolstring zero

Log

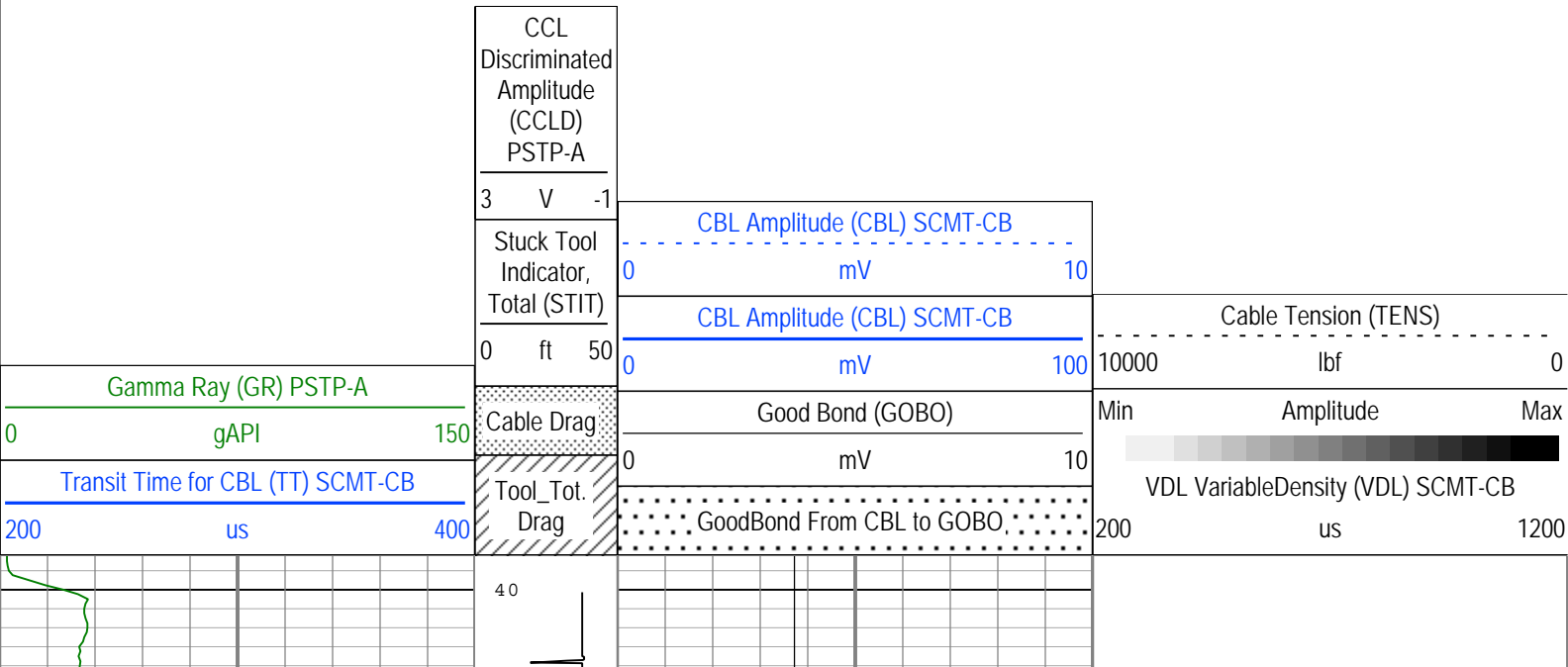
Company:Noble Energy Inc Well:Colt A13-645

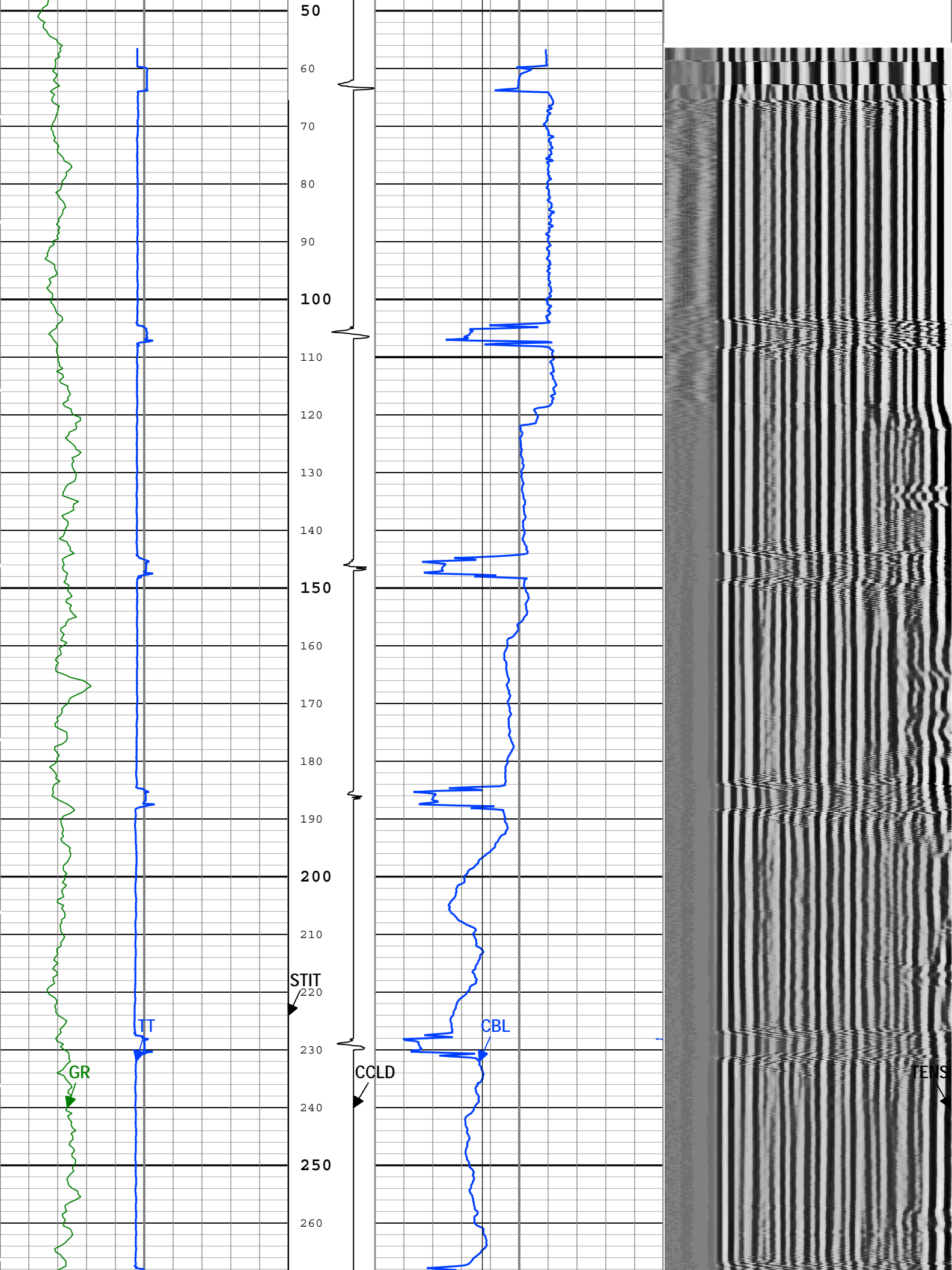
Run 1: Main[5]:Up:S007

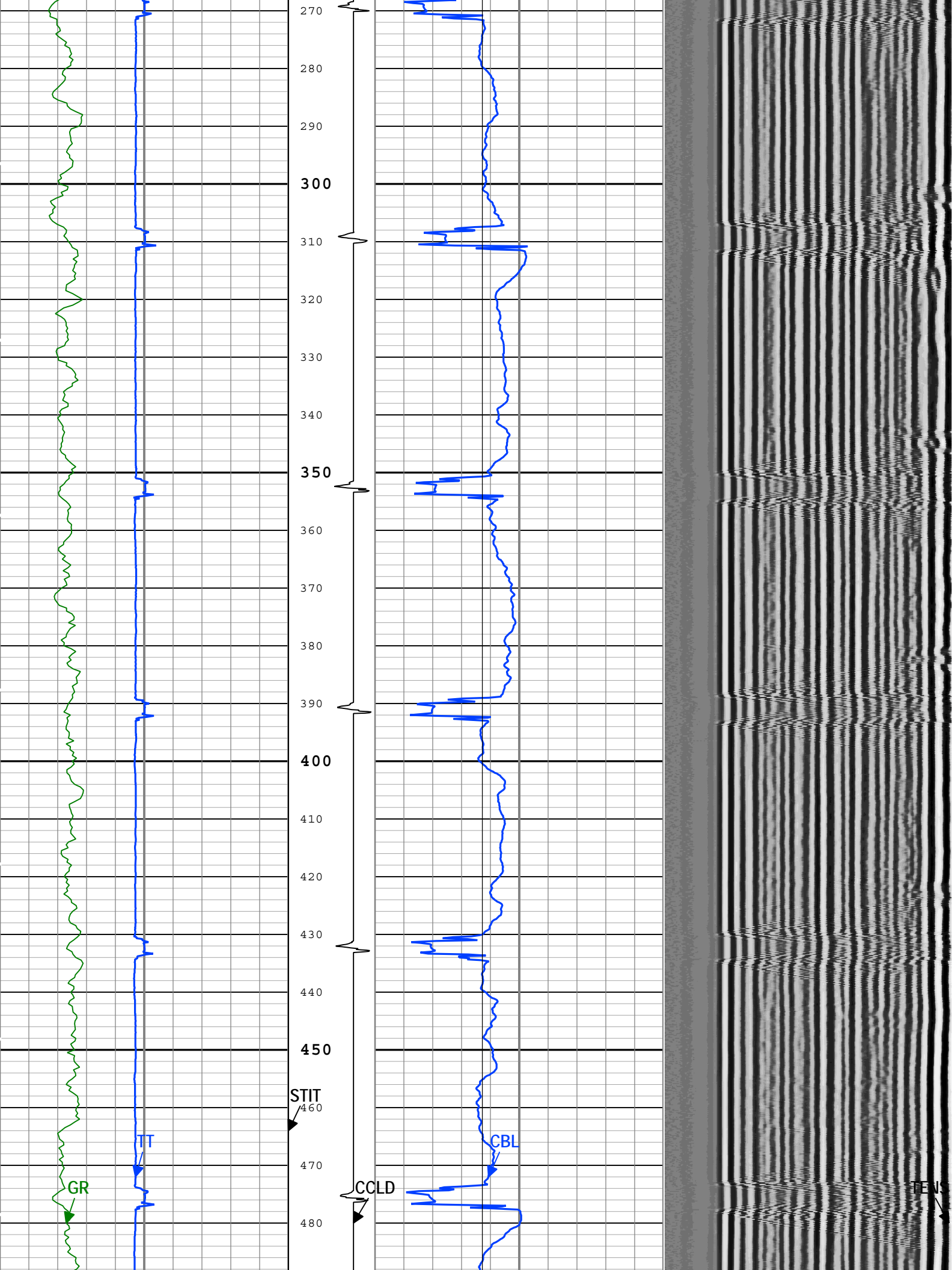
Description: SCMT Amplitudes and VDL Format: Log (SCMT_Amp_VDL) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

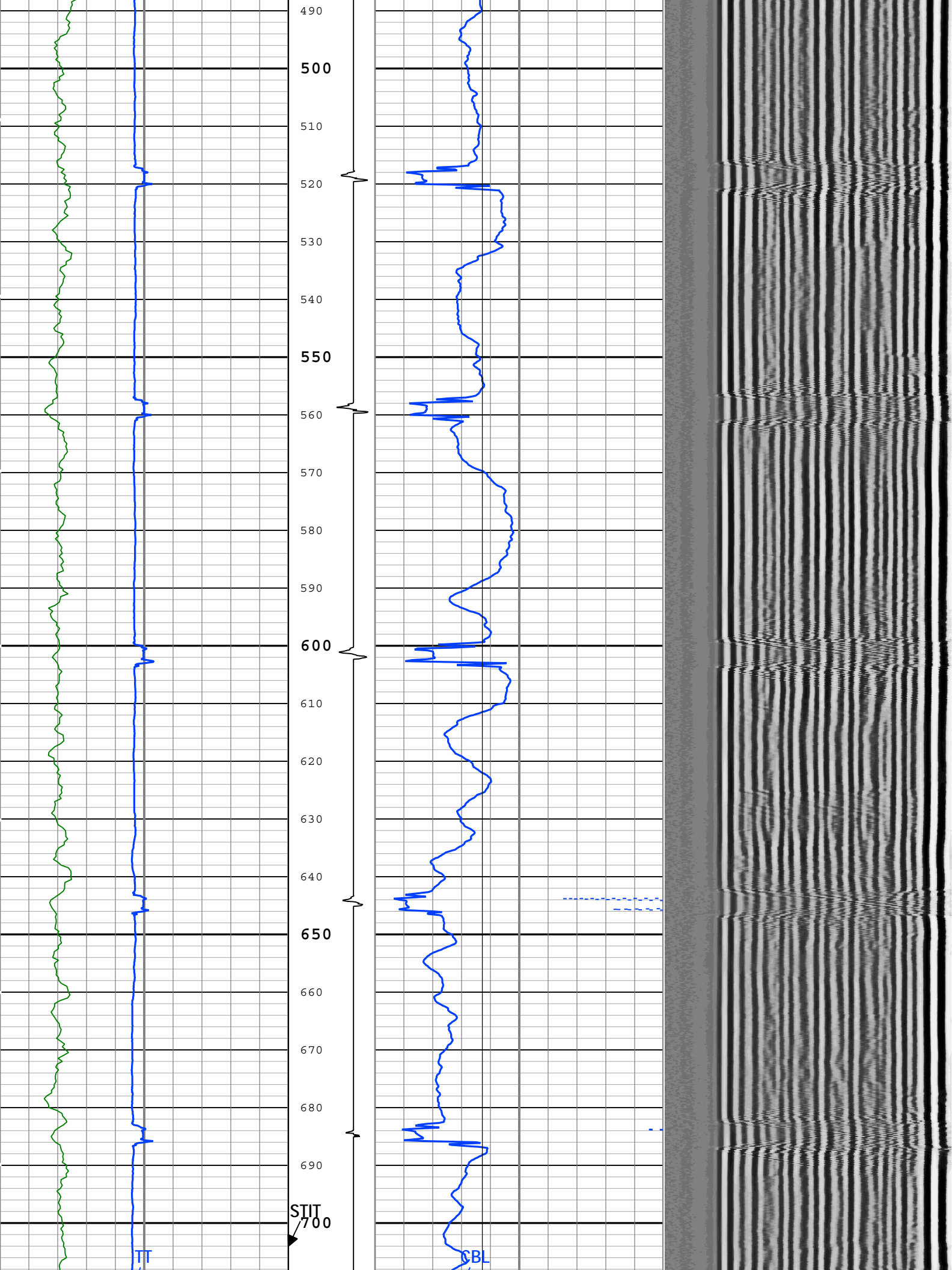
Creation Date: 21-Apr-2015 15:02:25

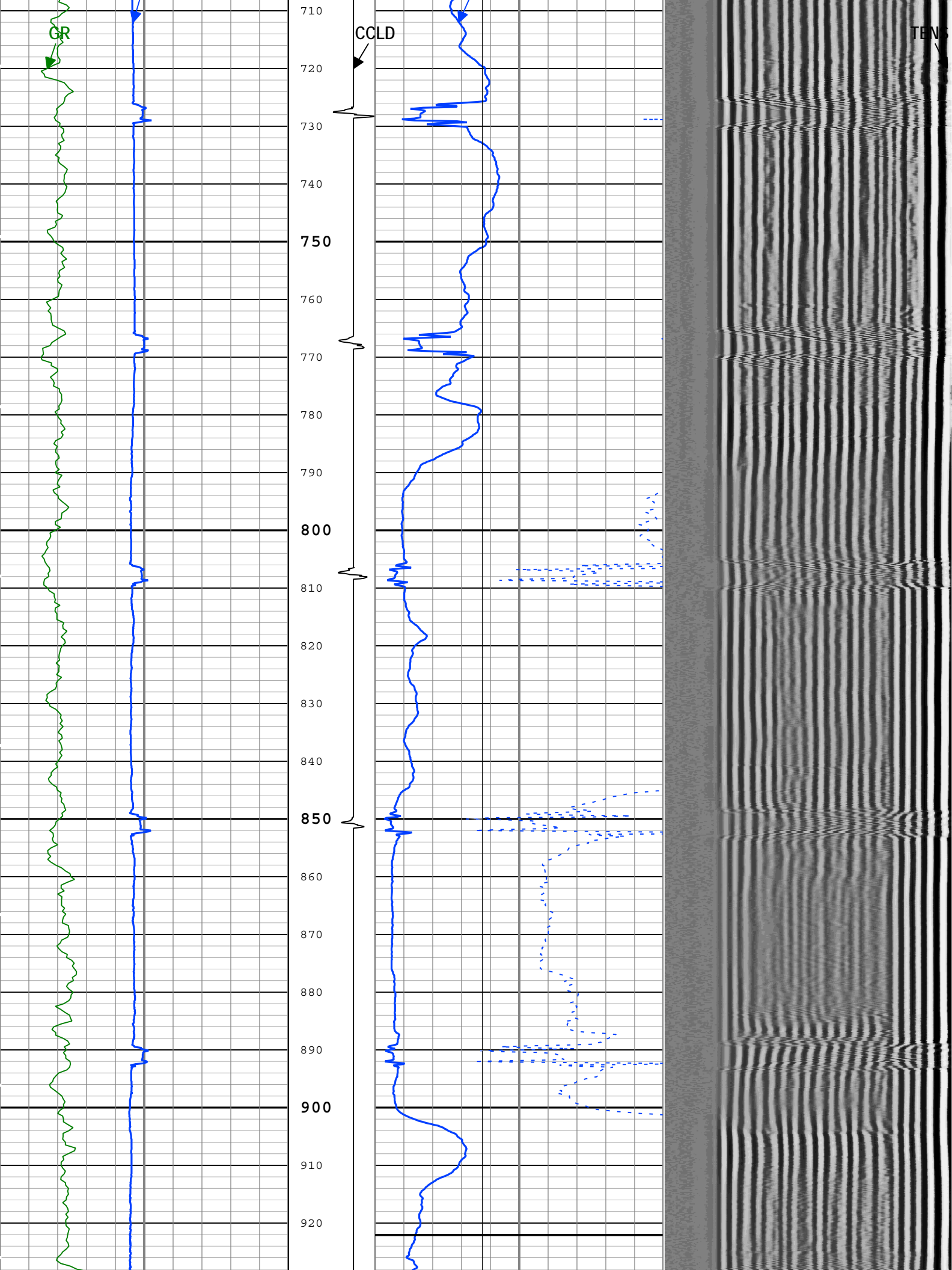
TIME_1900 - Time Marked every 60.00 (s)

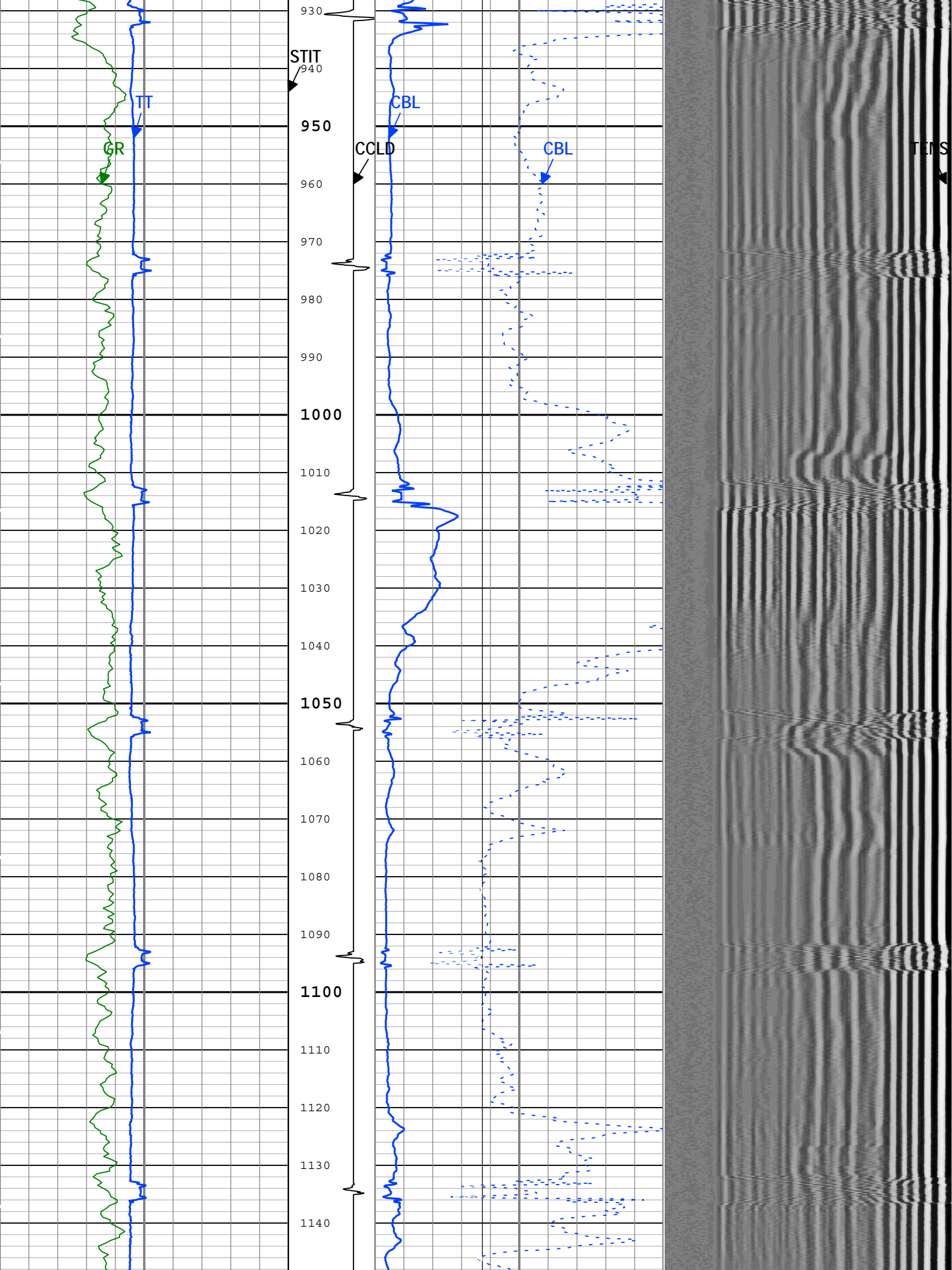


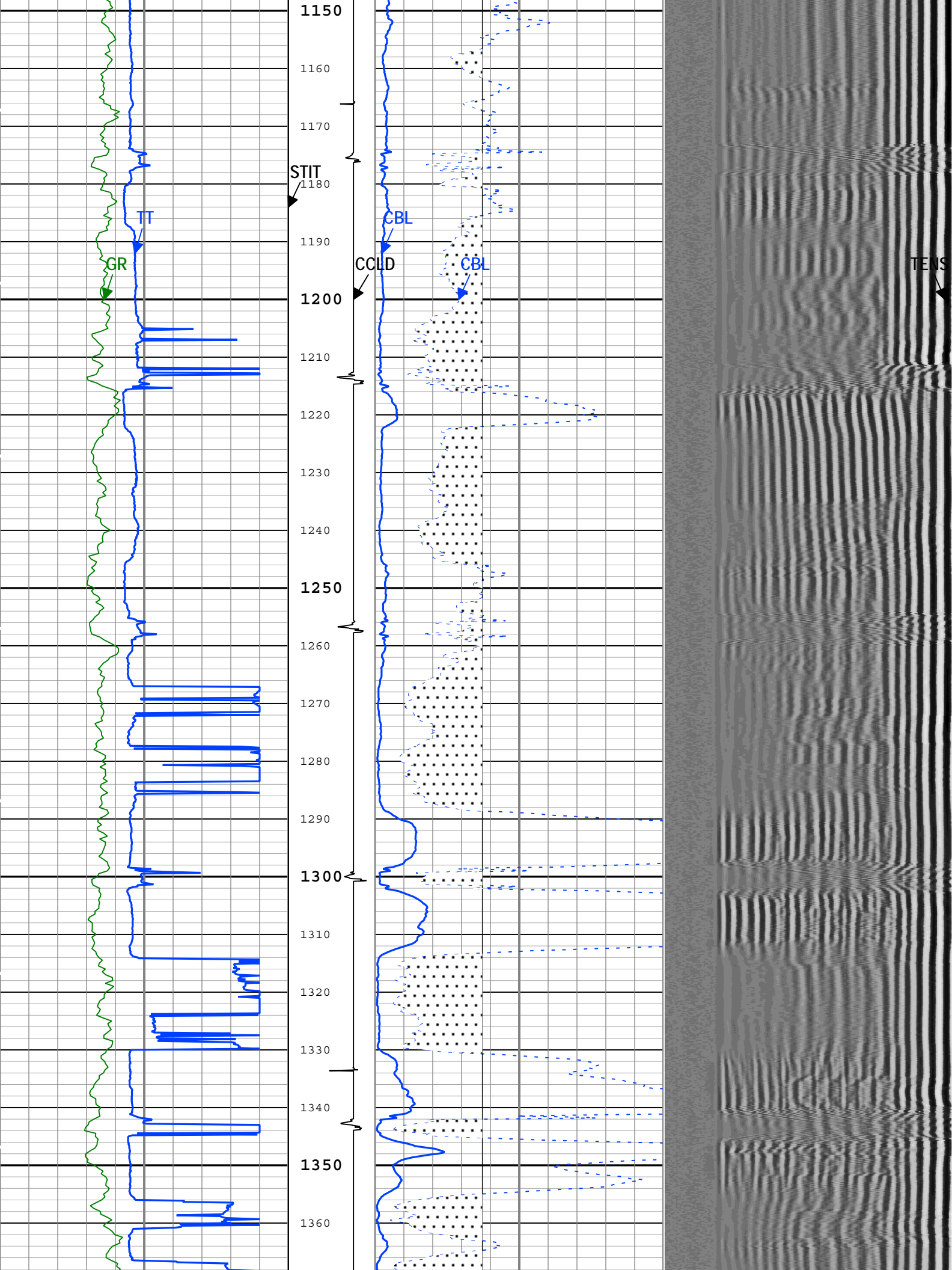


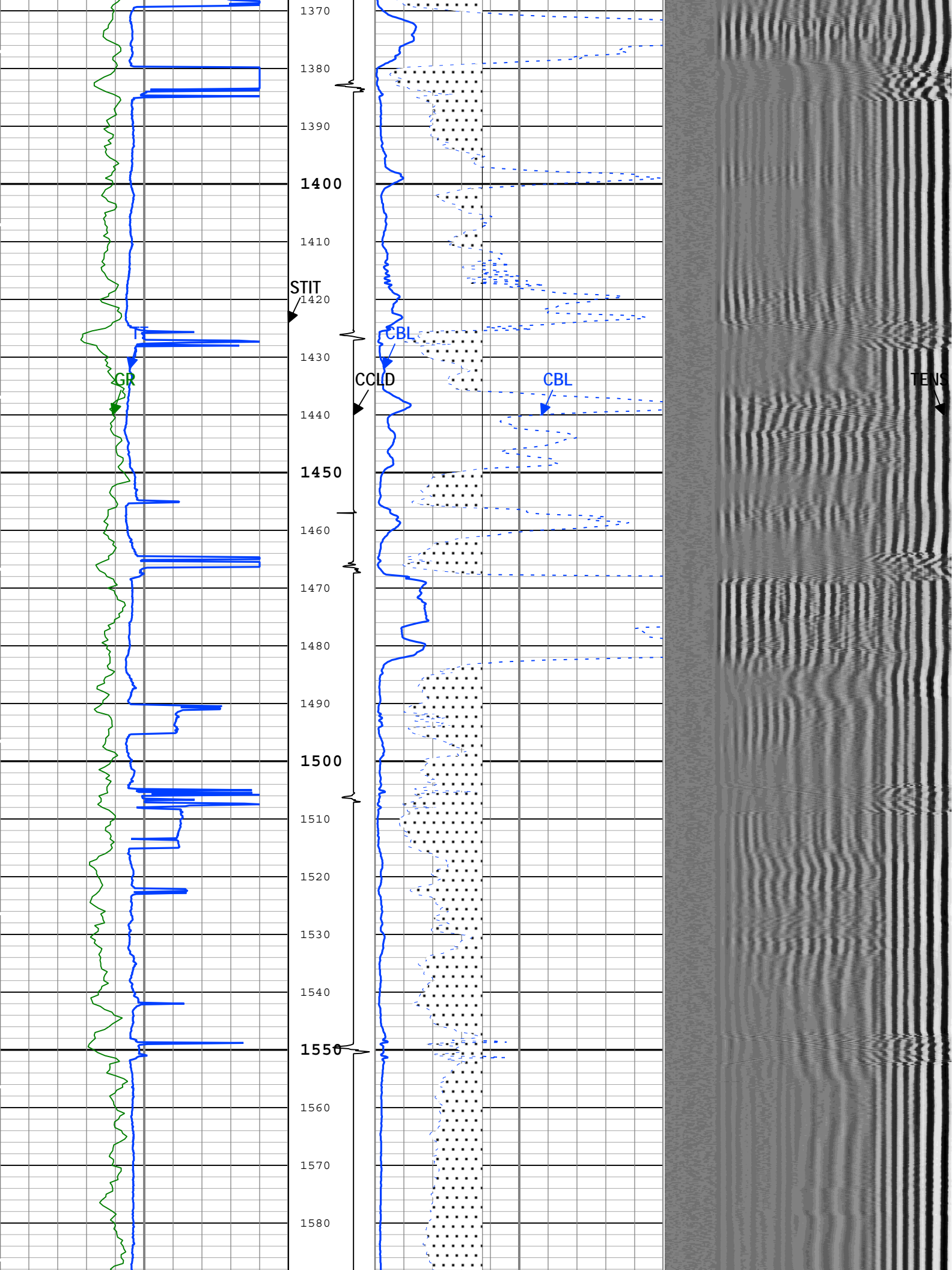


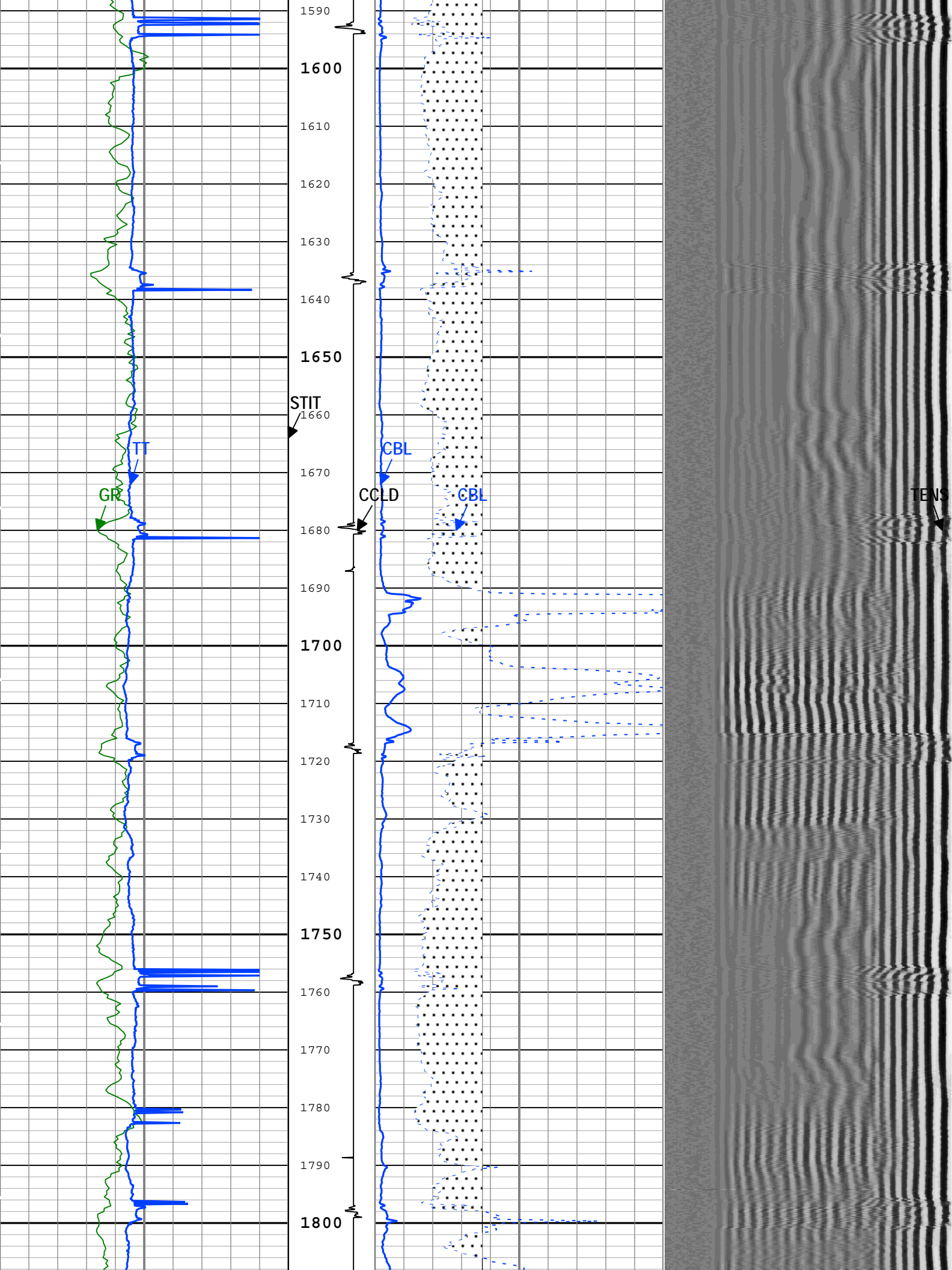


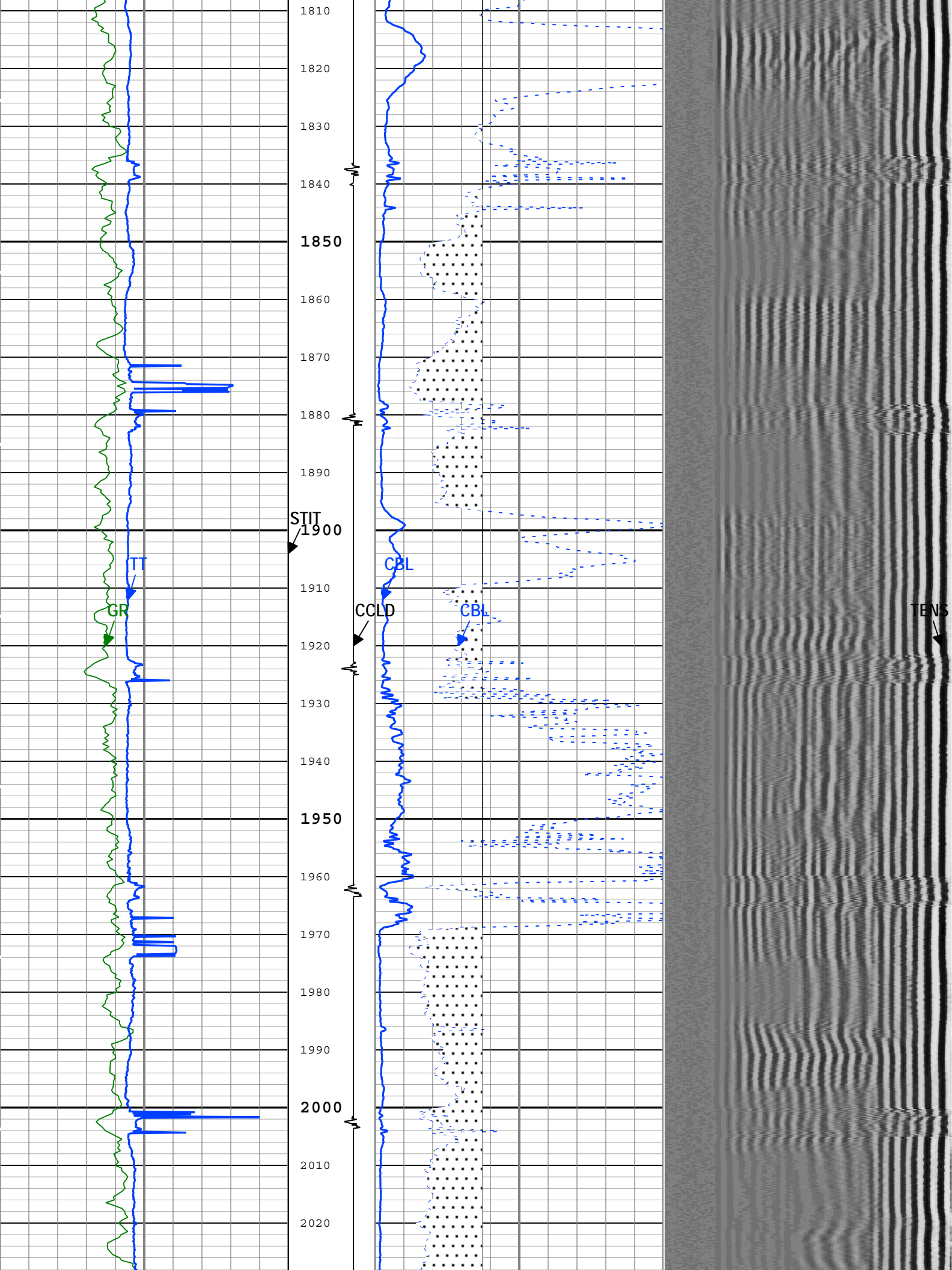


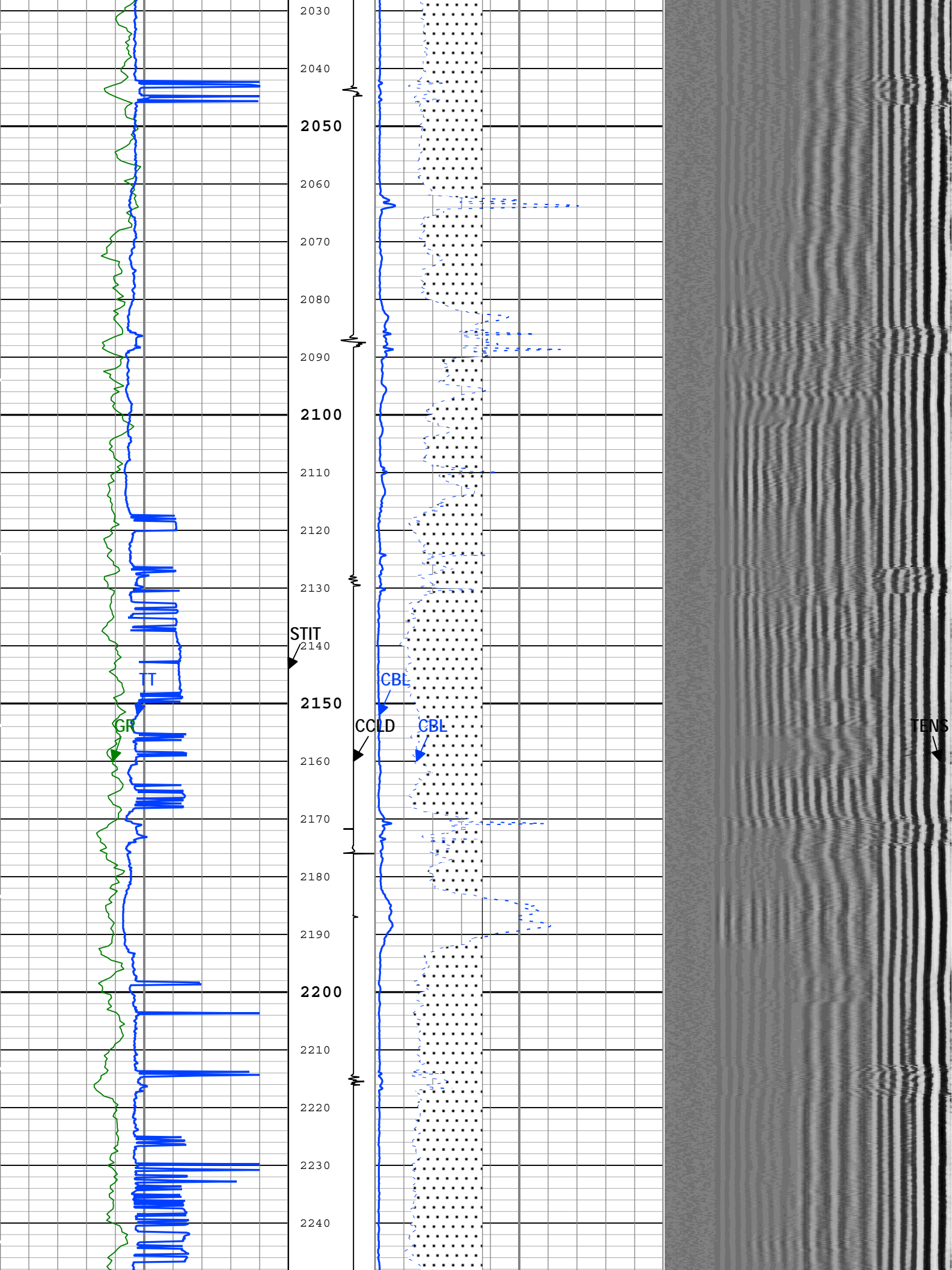


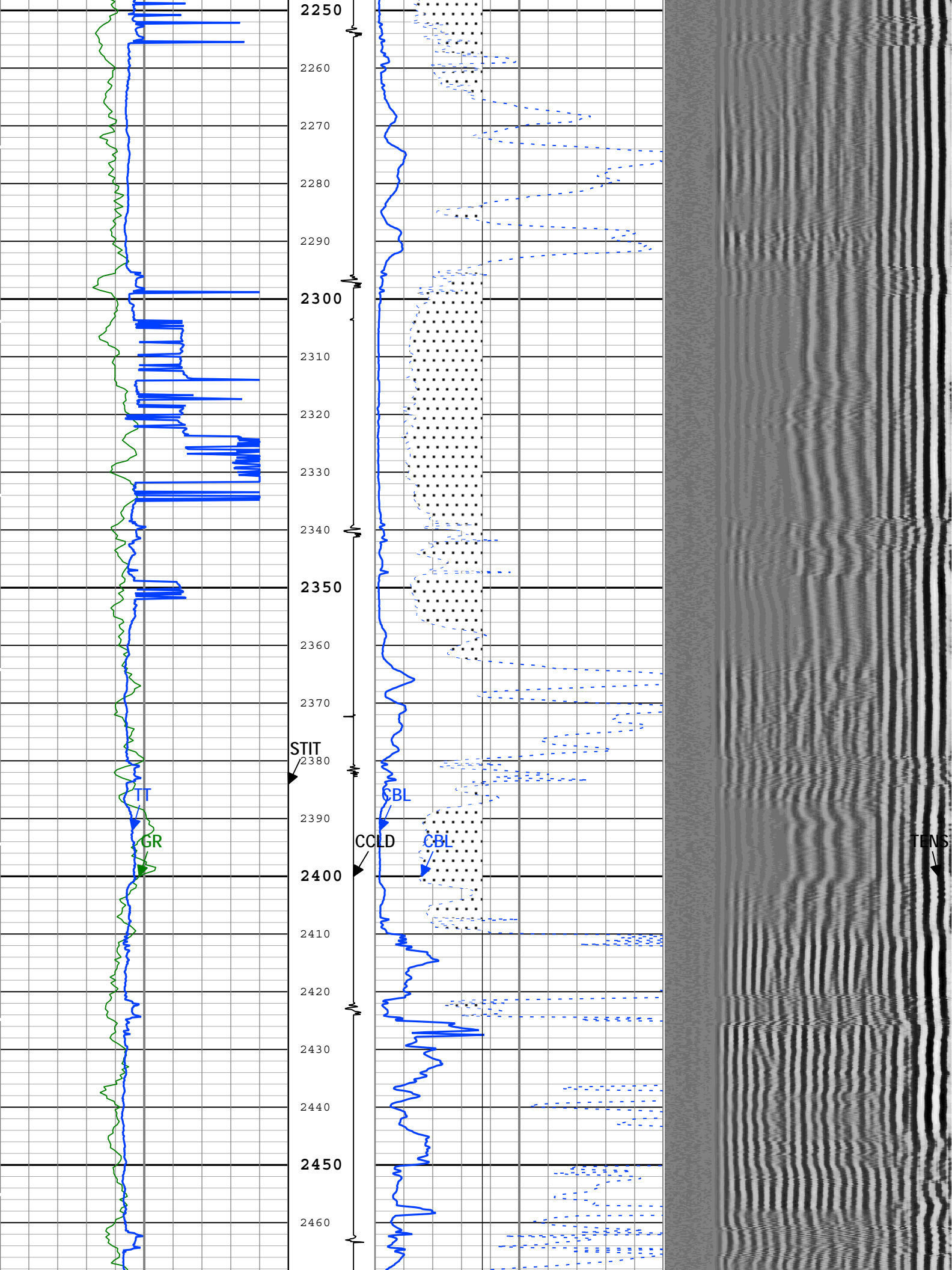


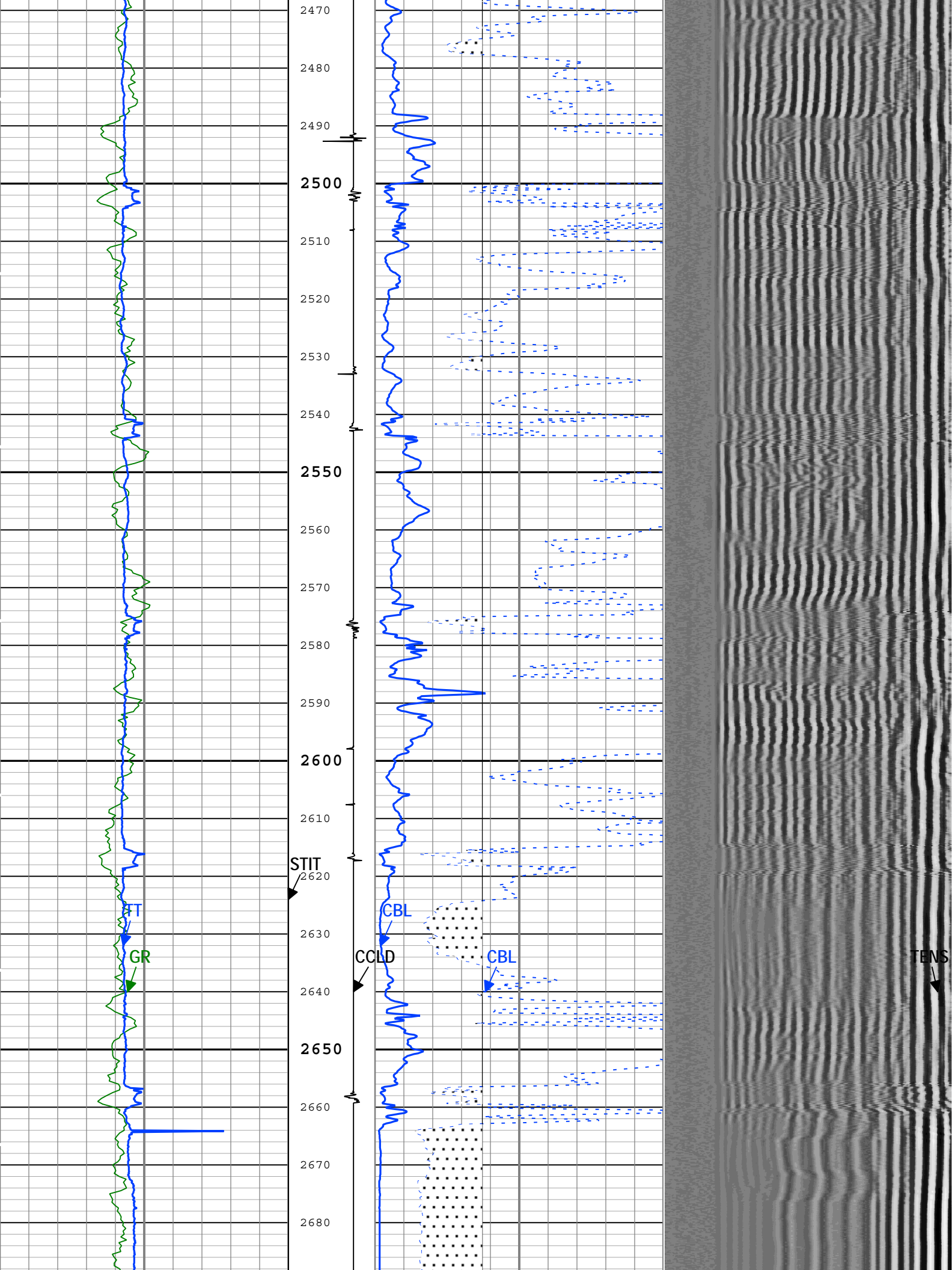


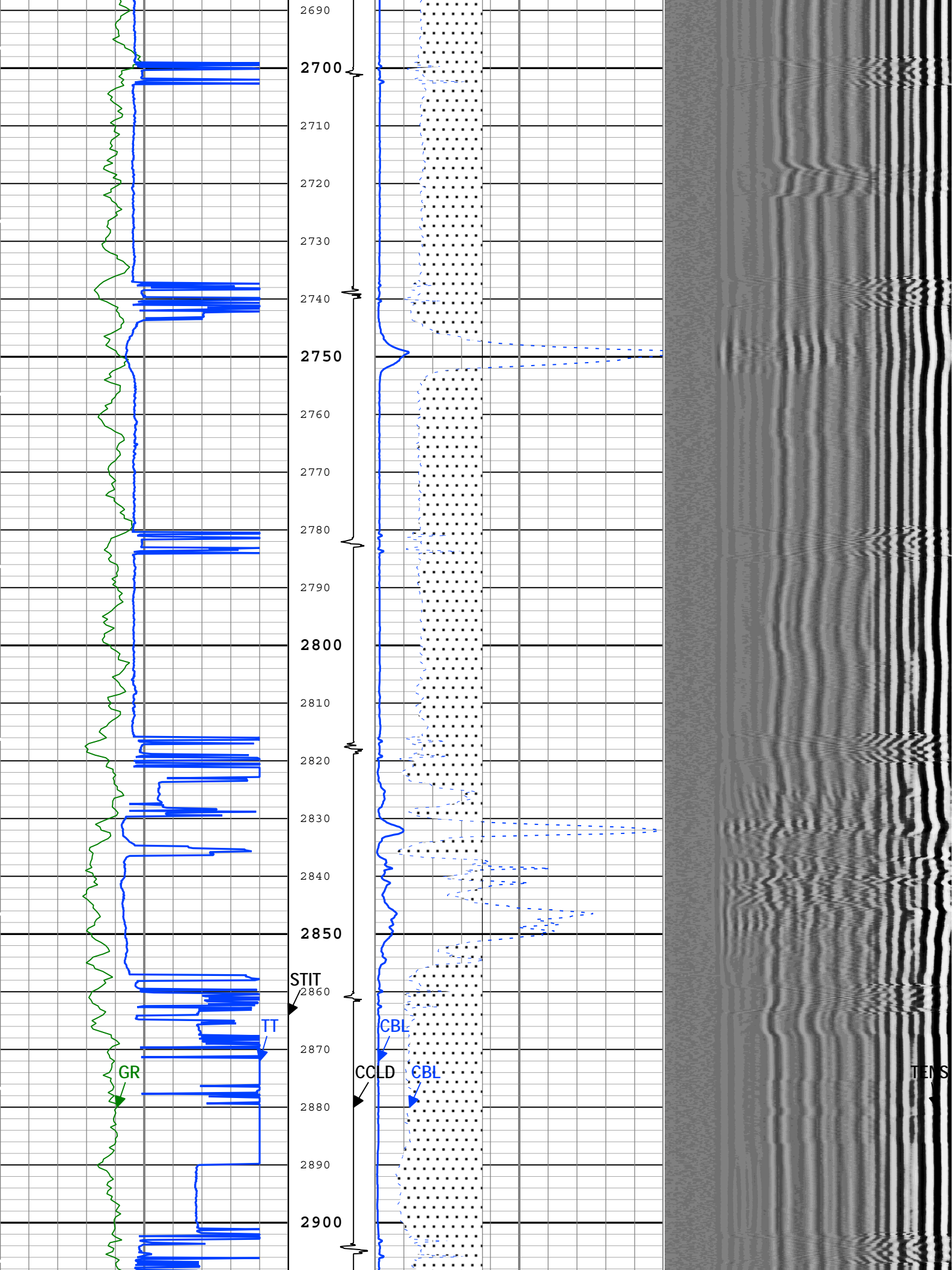


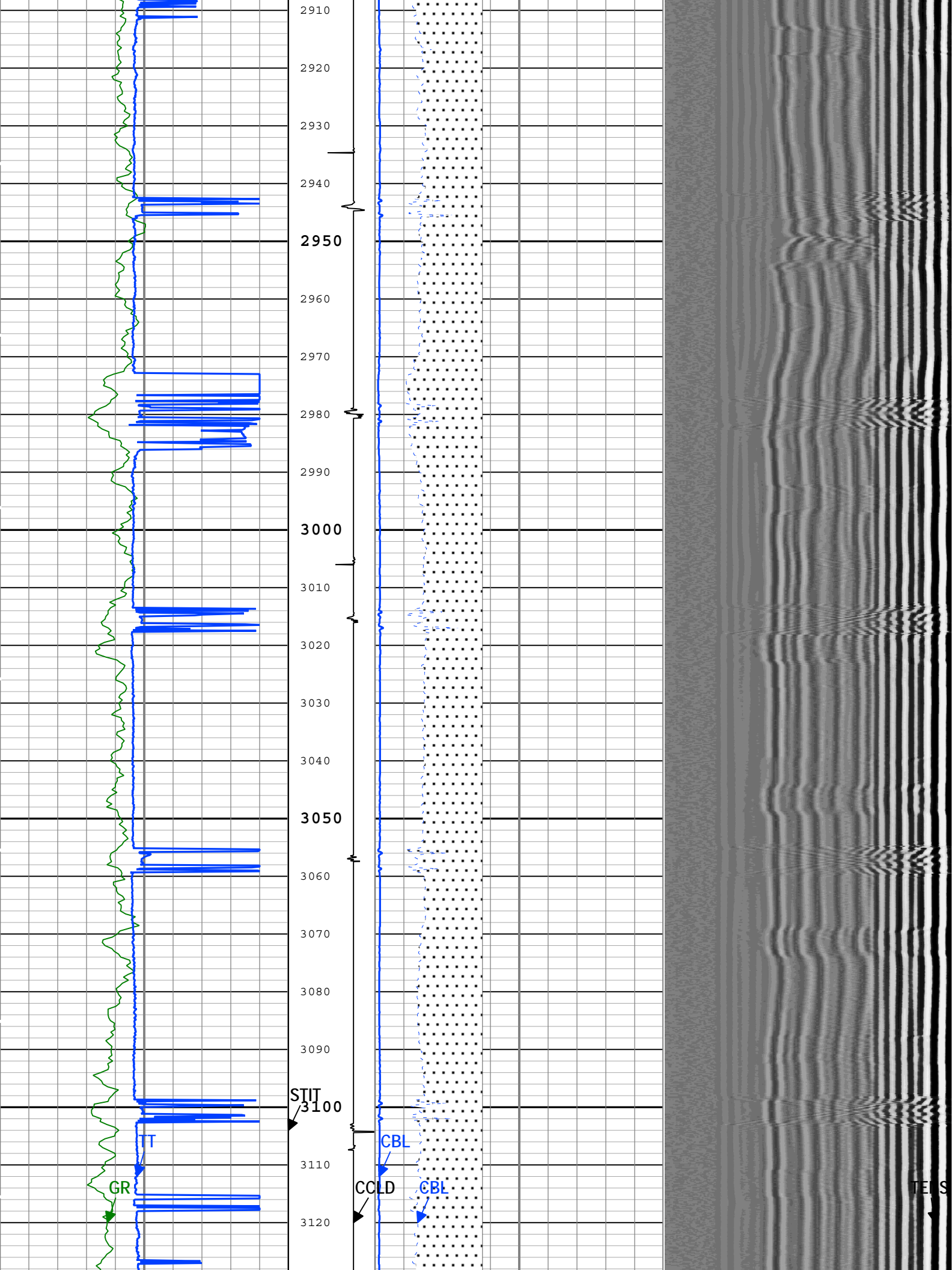


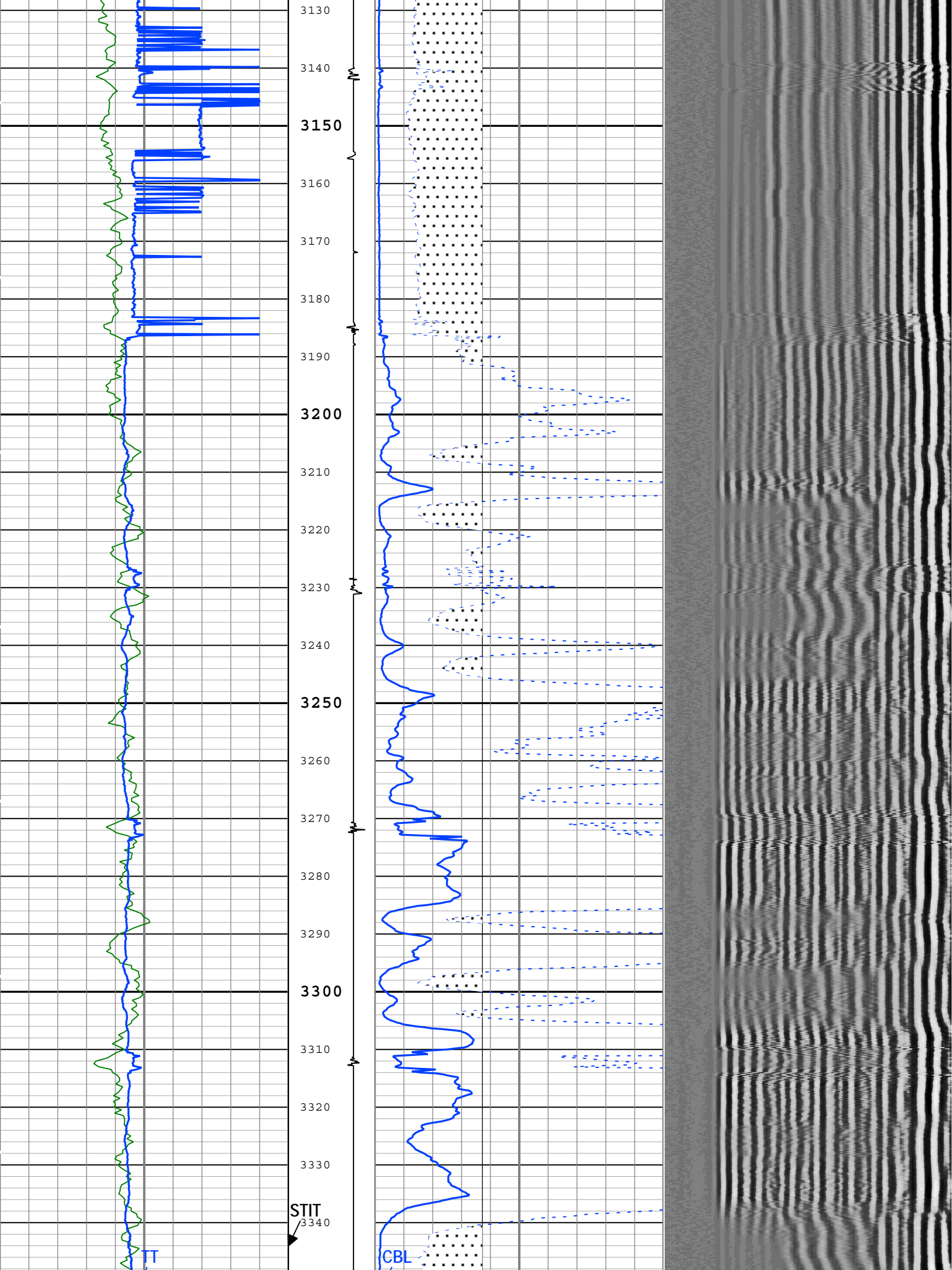


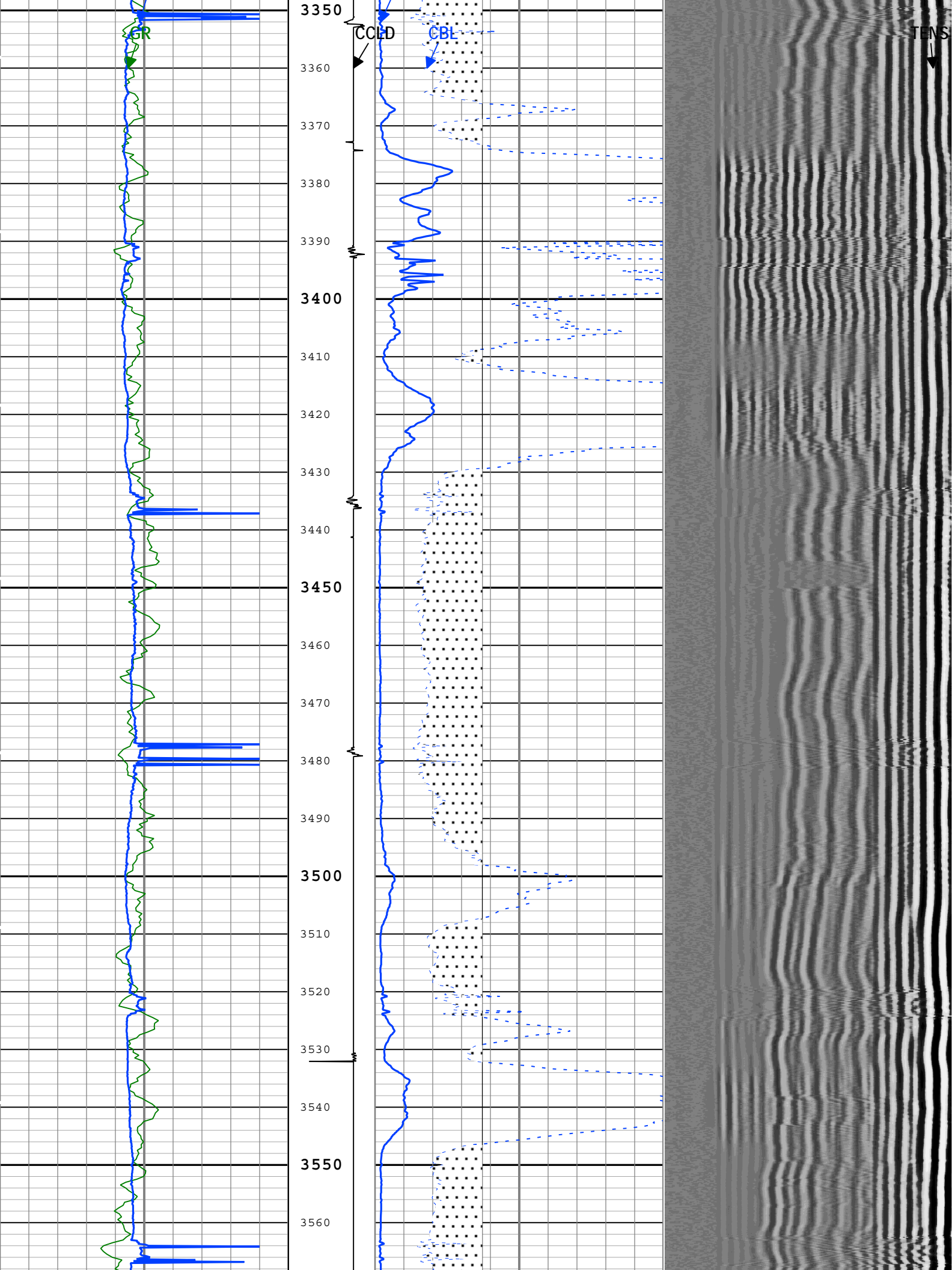


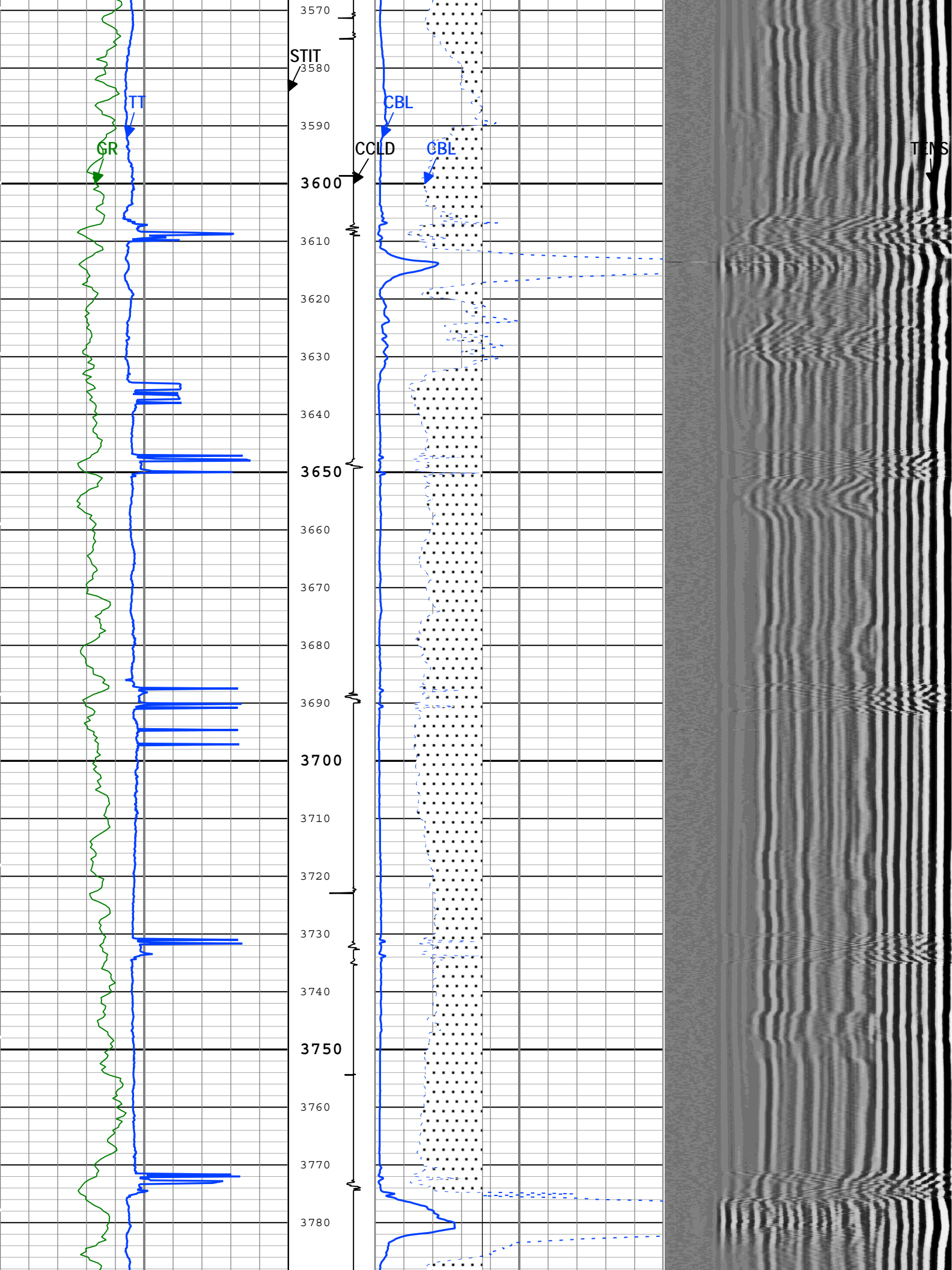


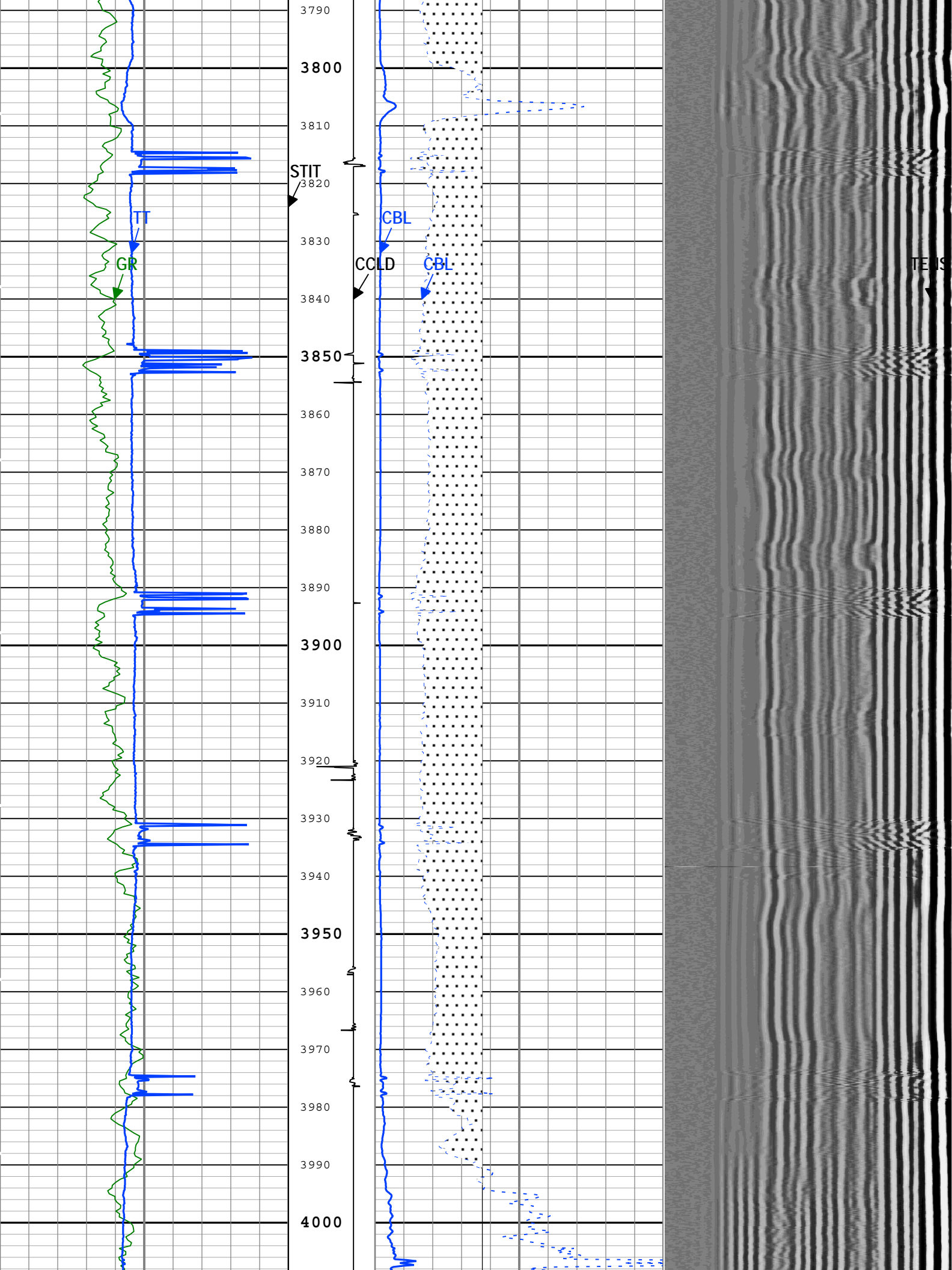


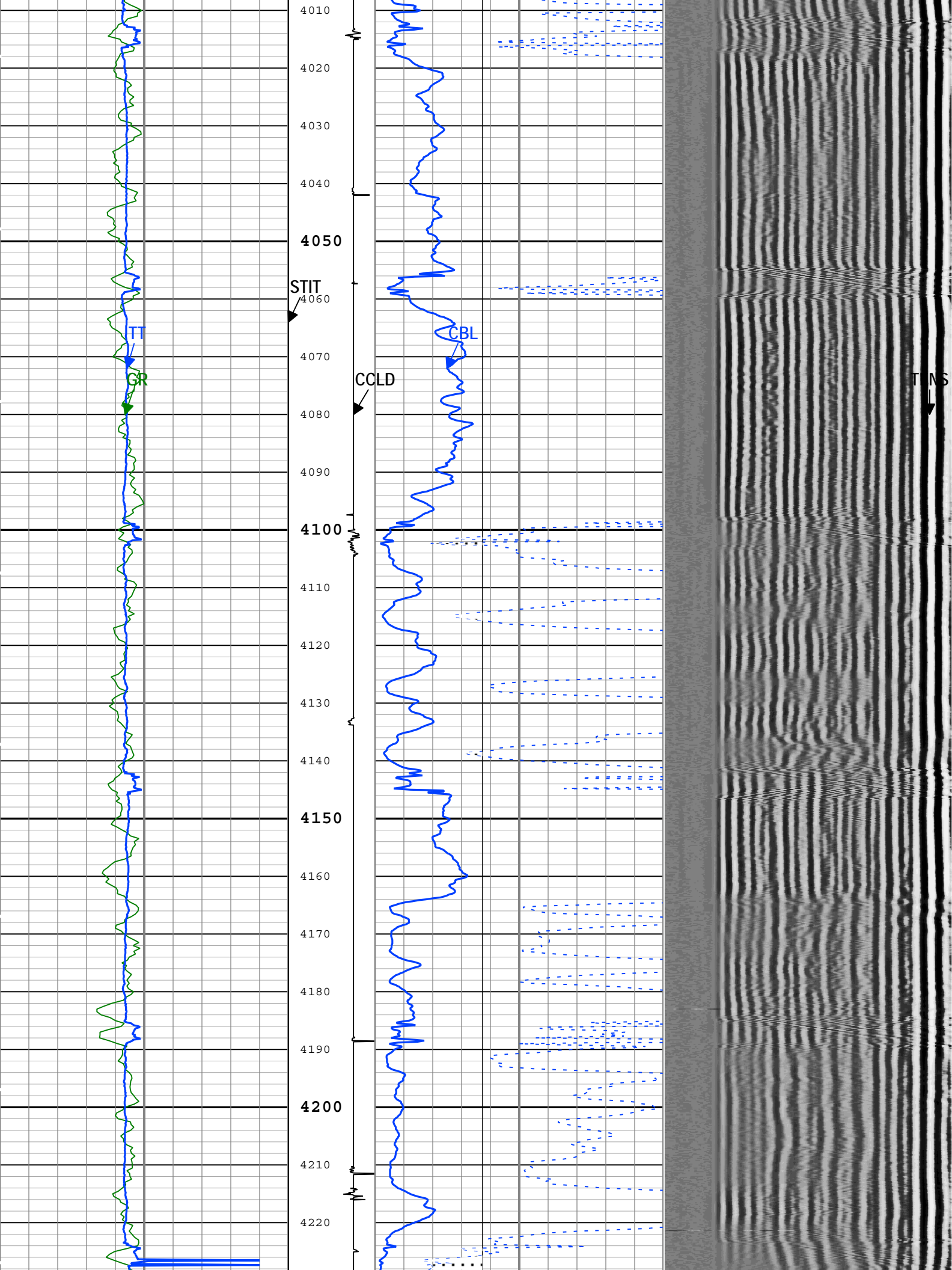


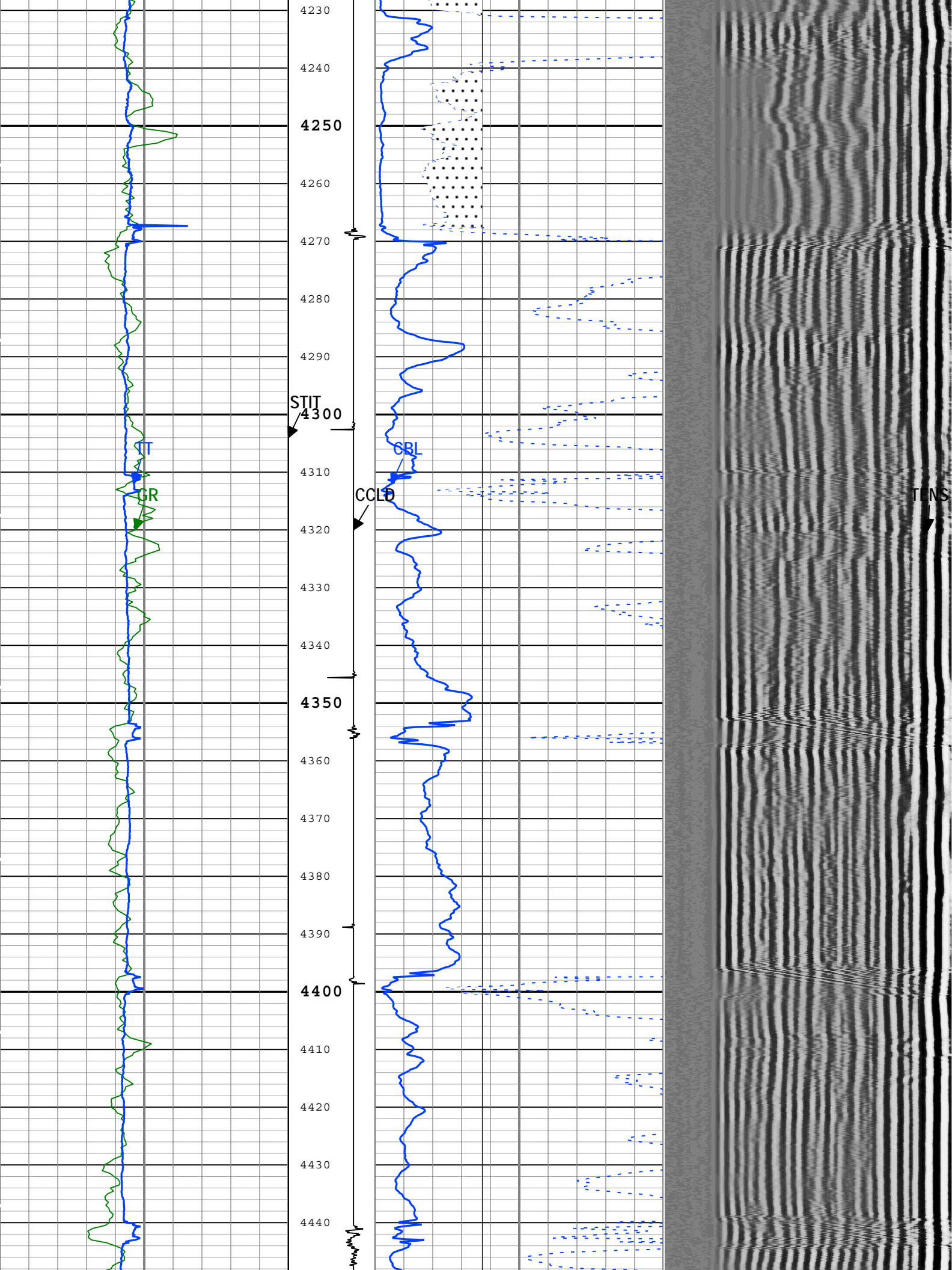


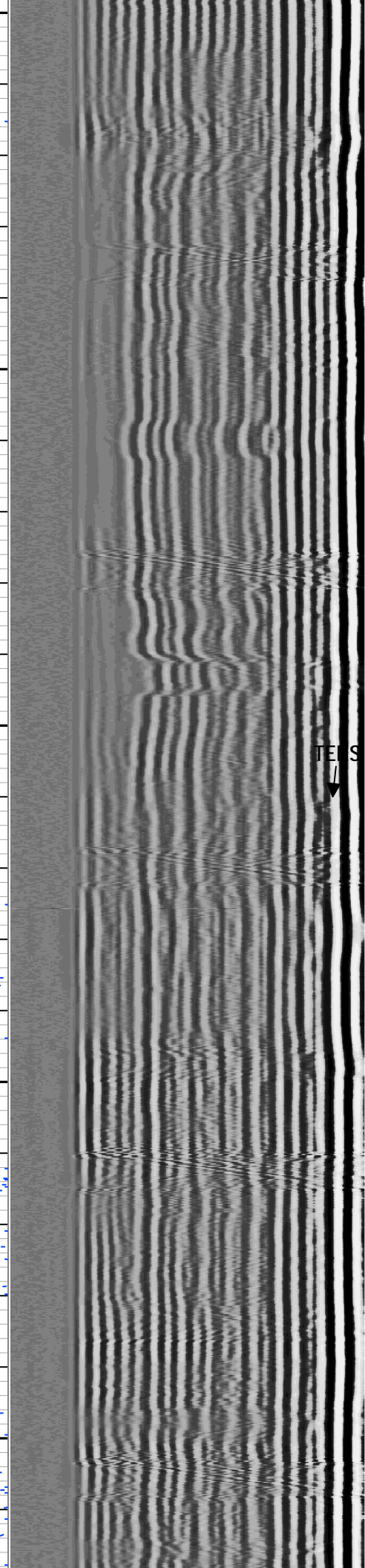
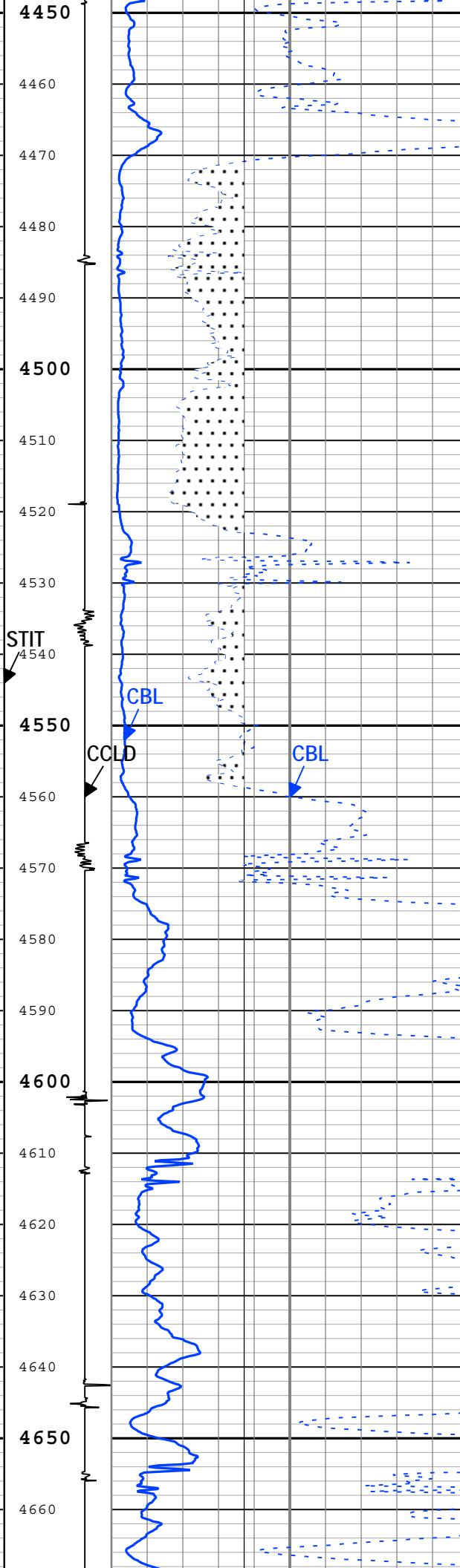
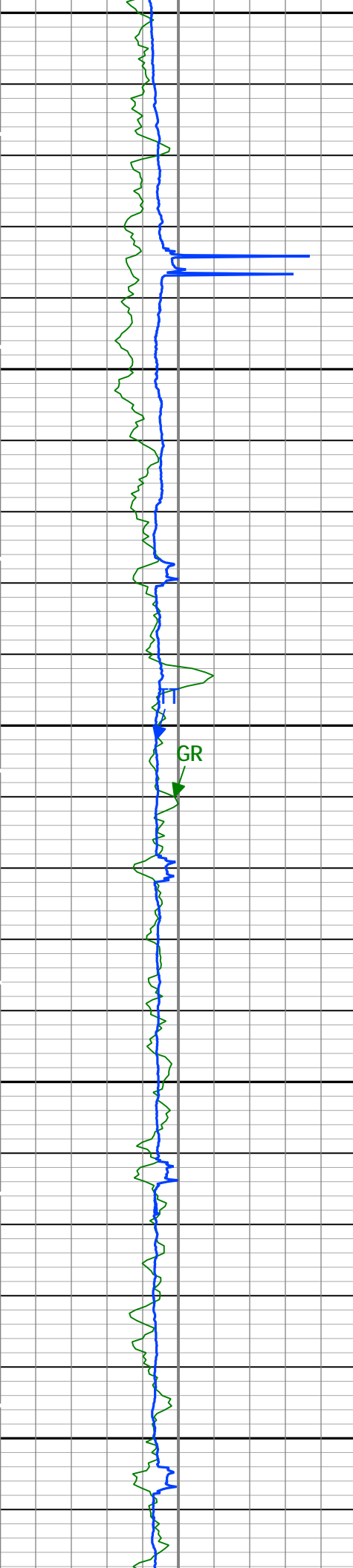


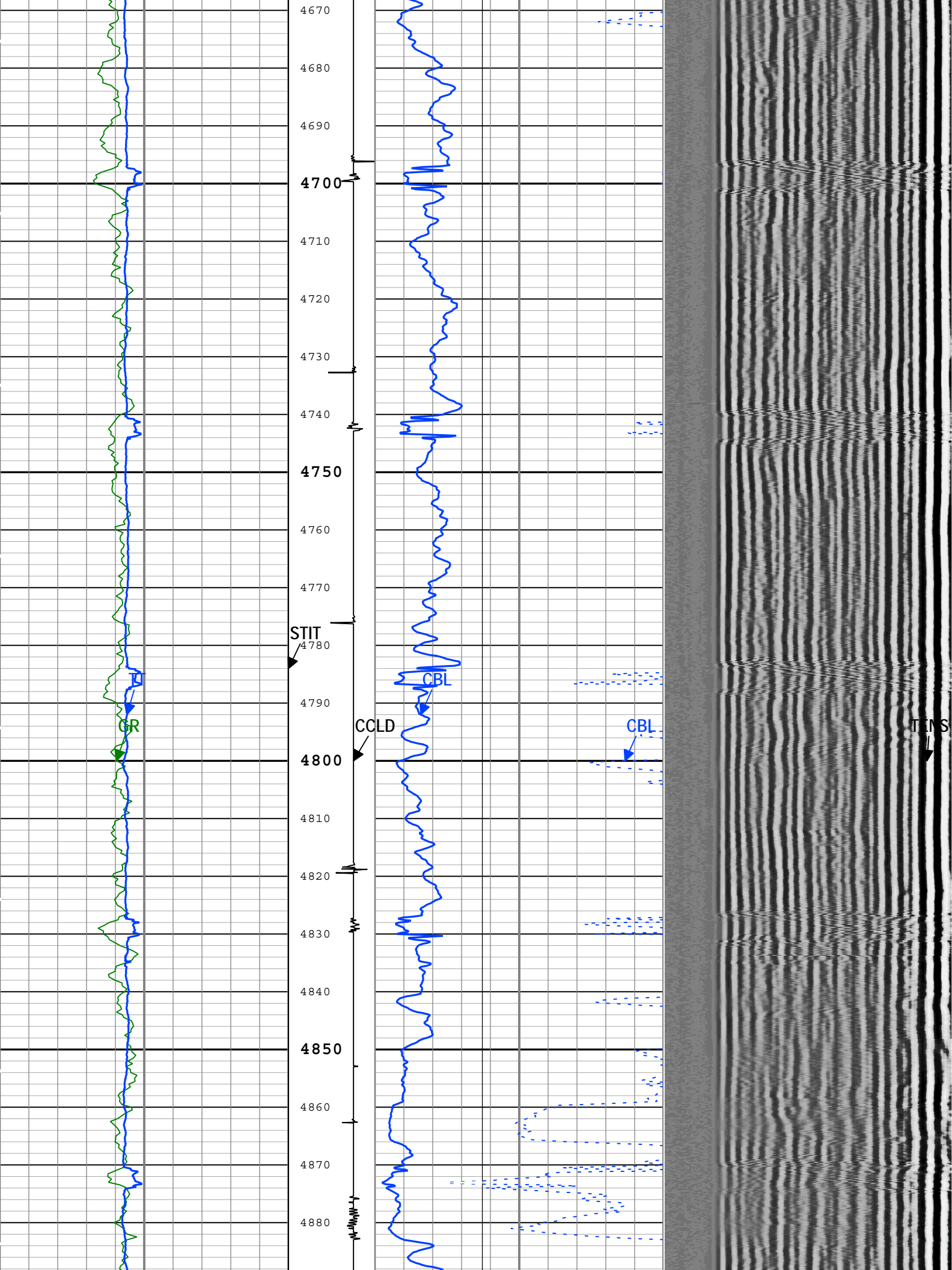


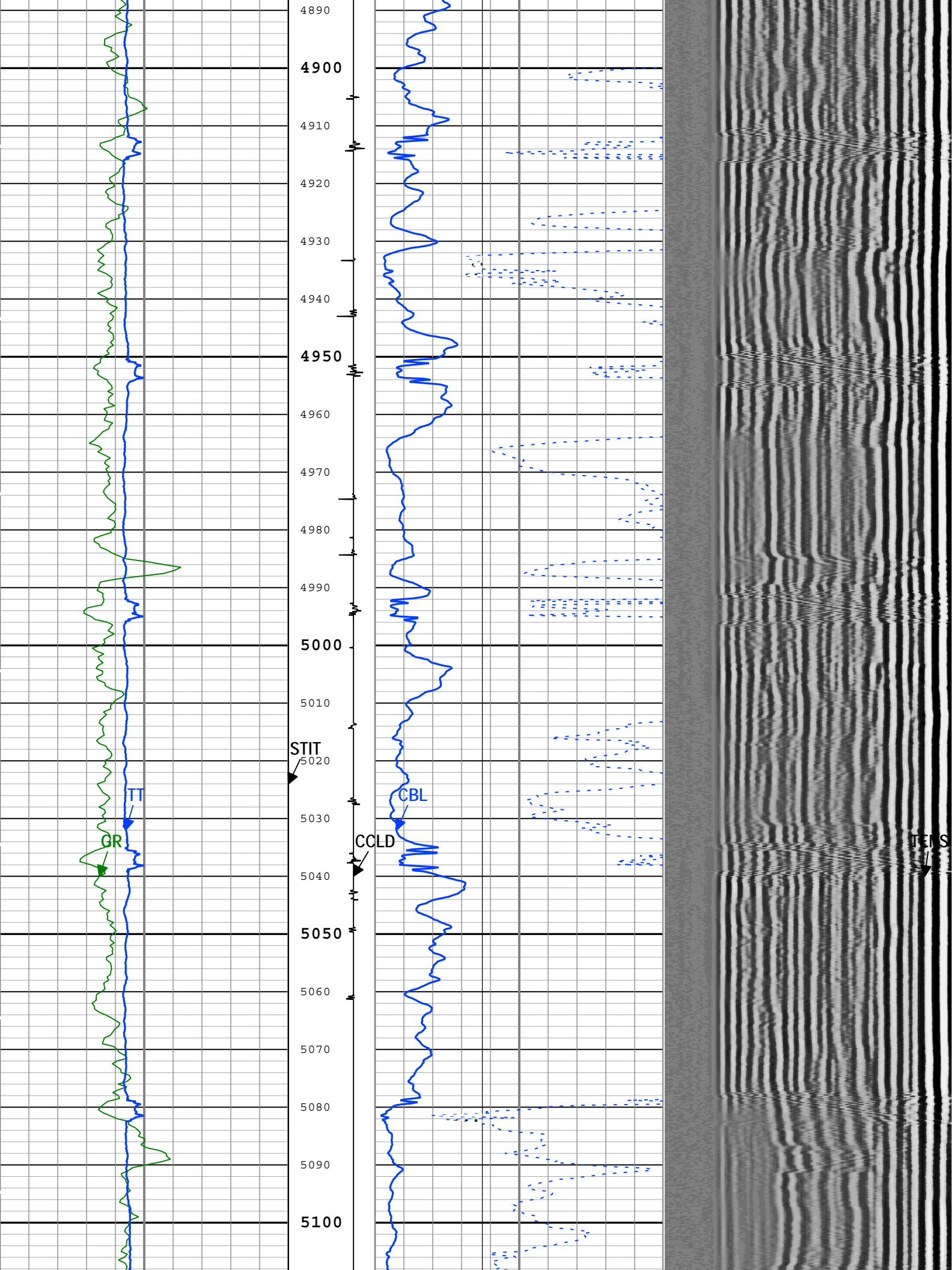


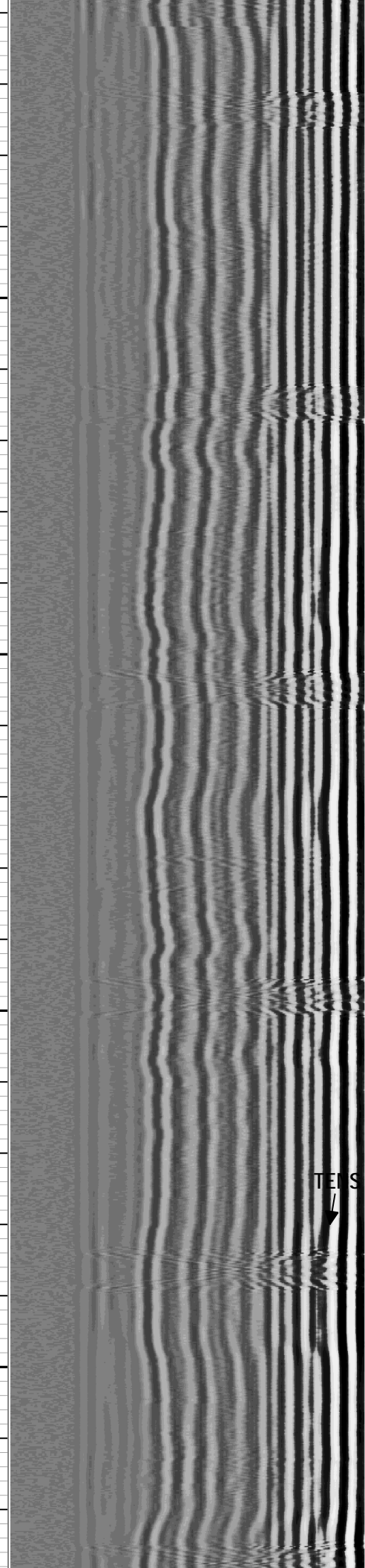
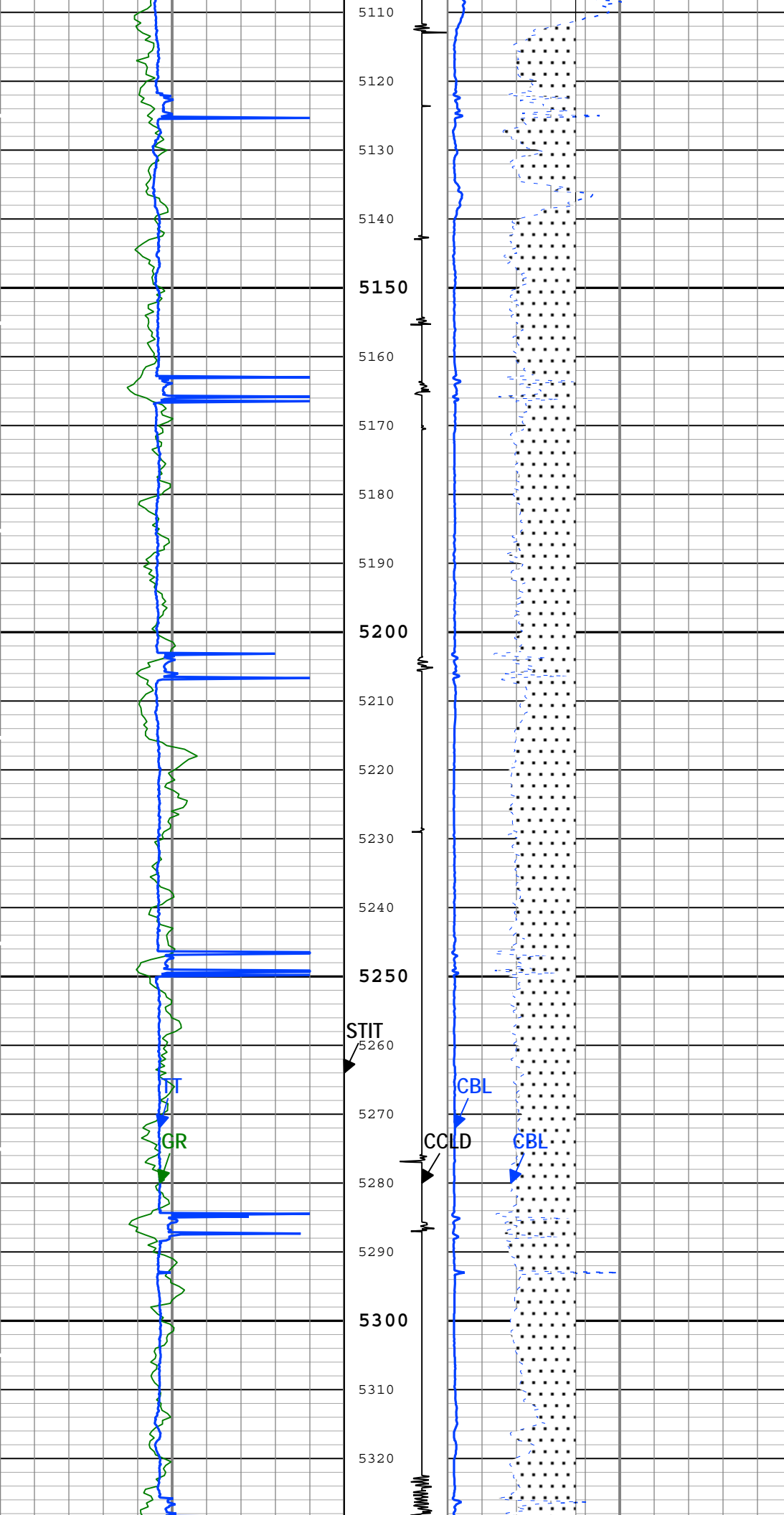


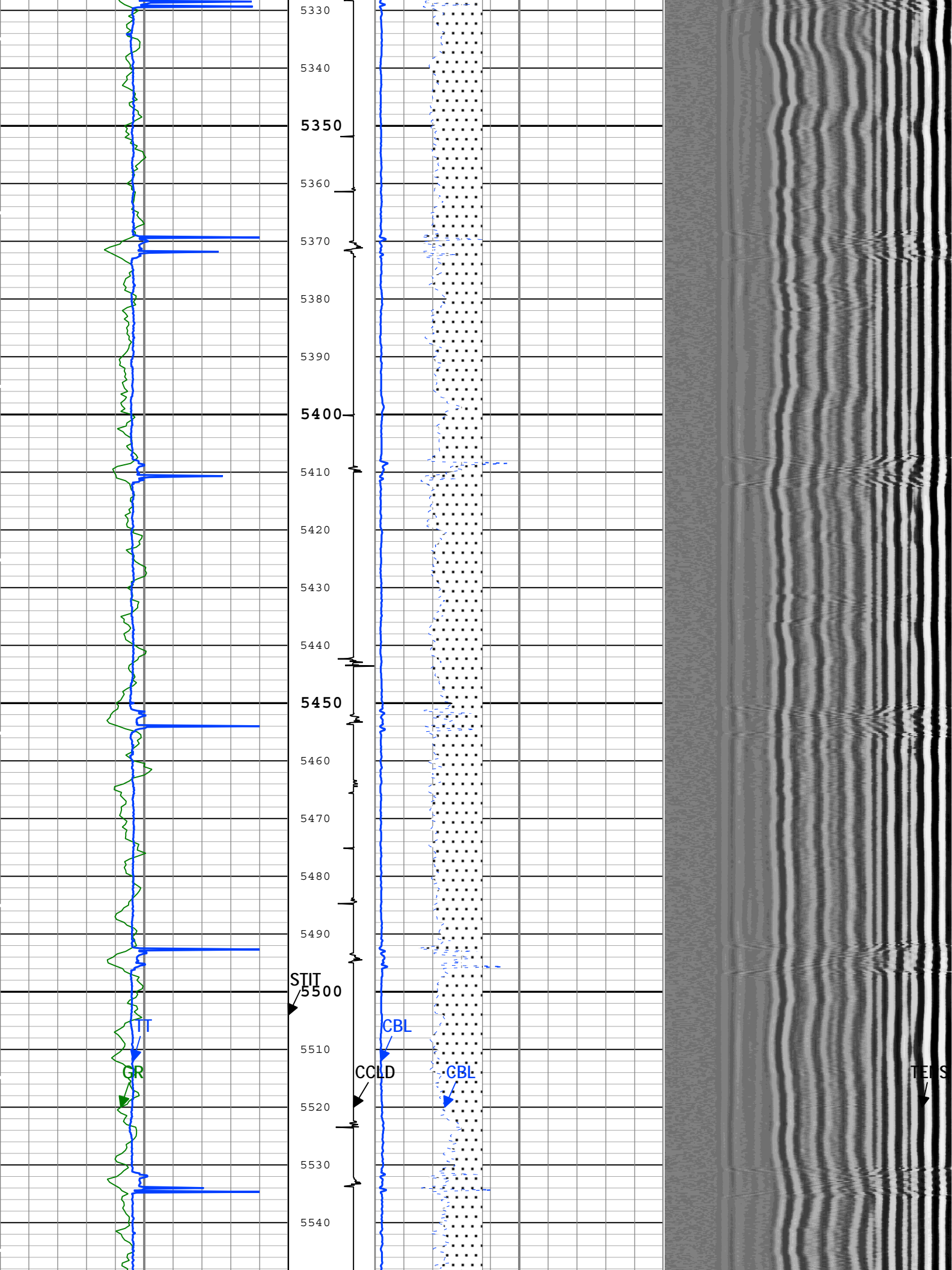


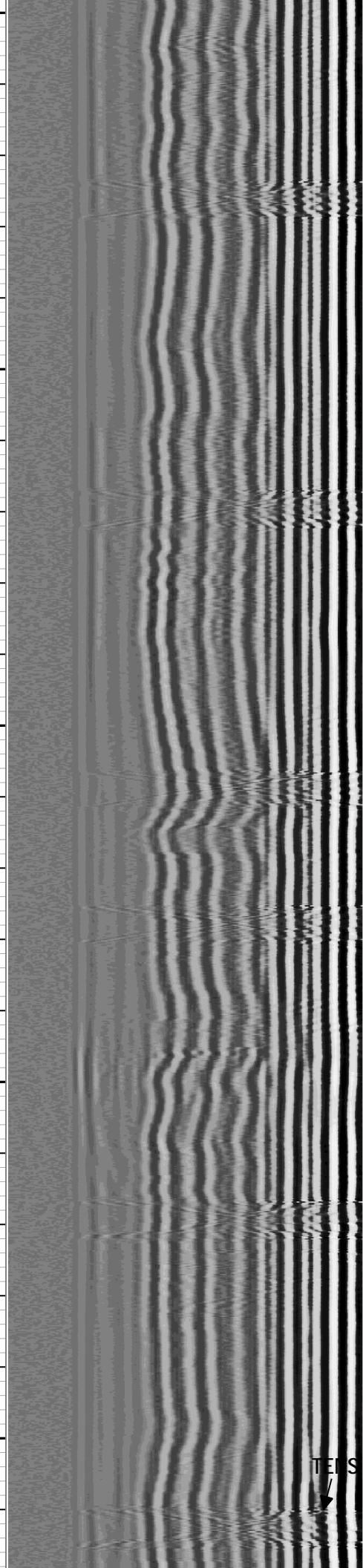
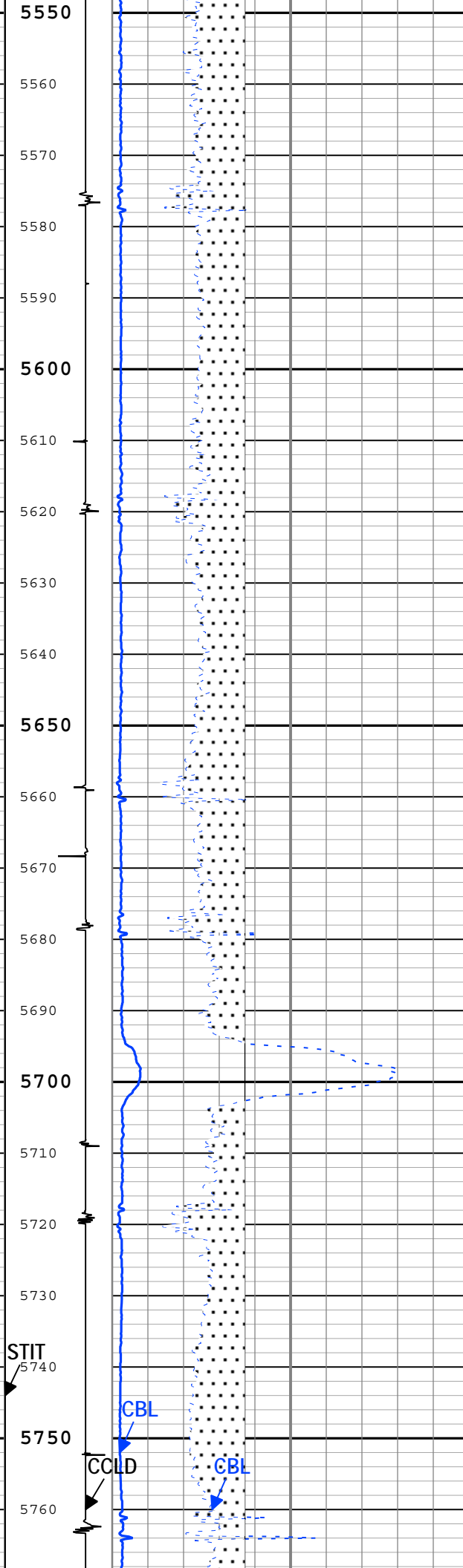
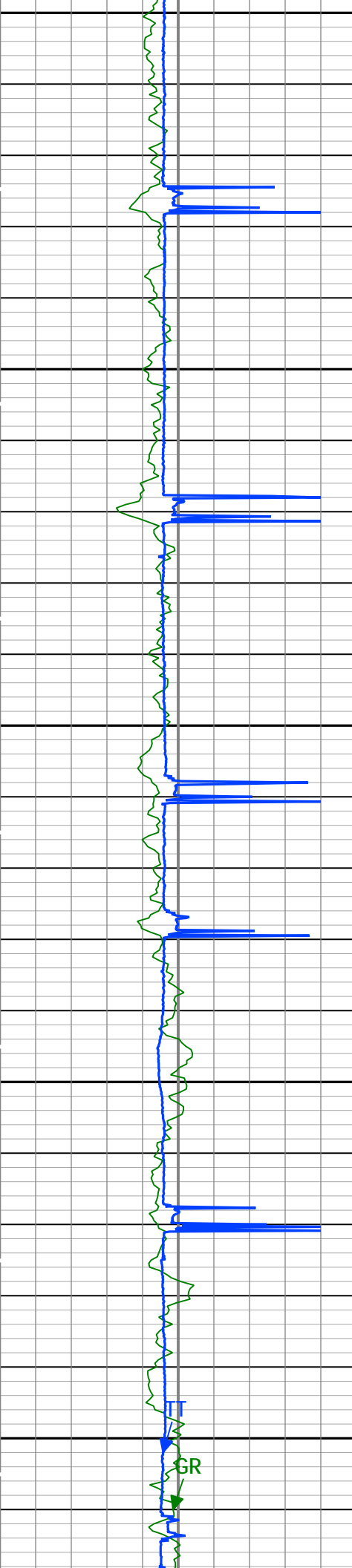












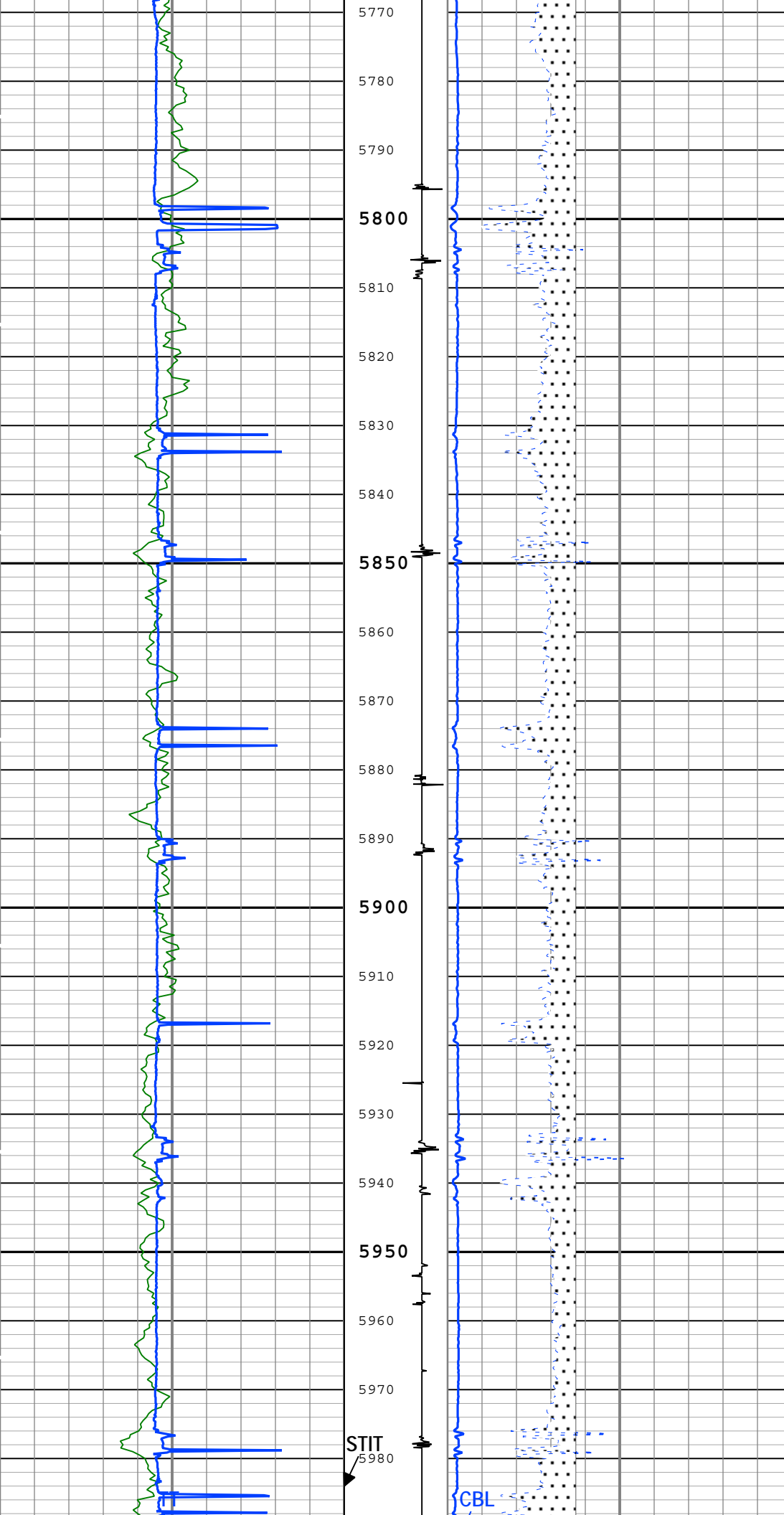
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5740

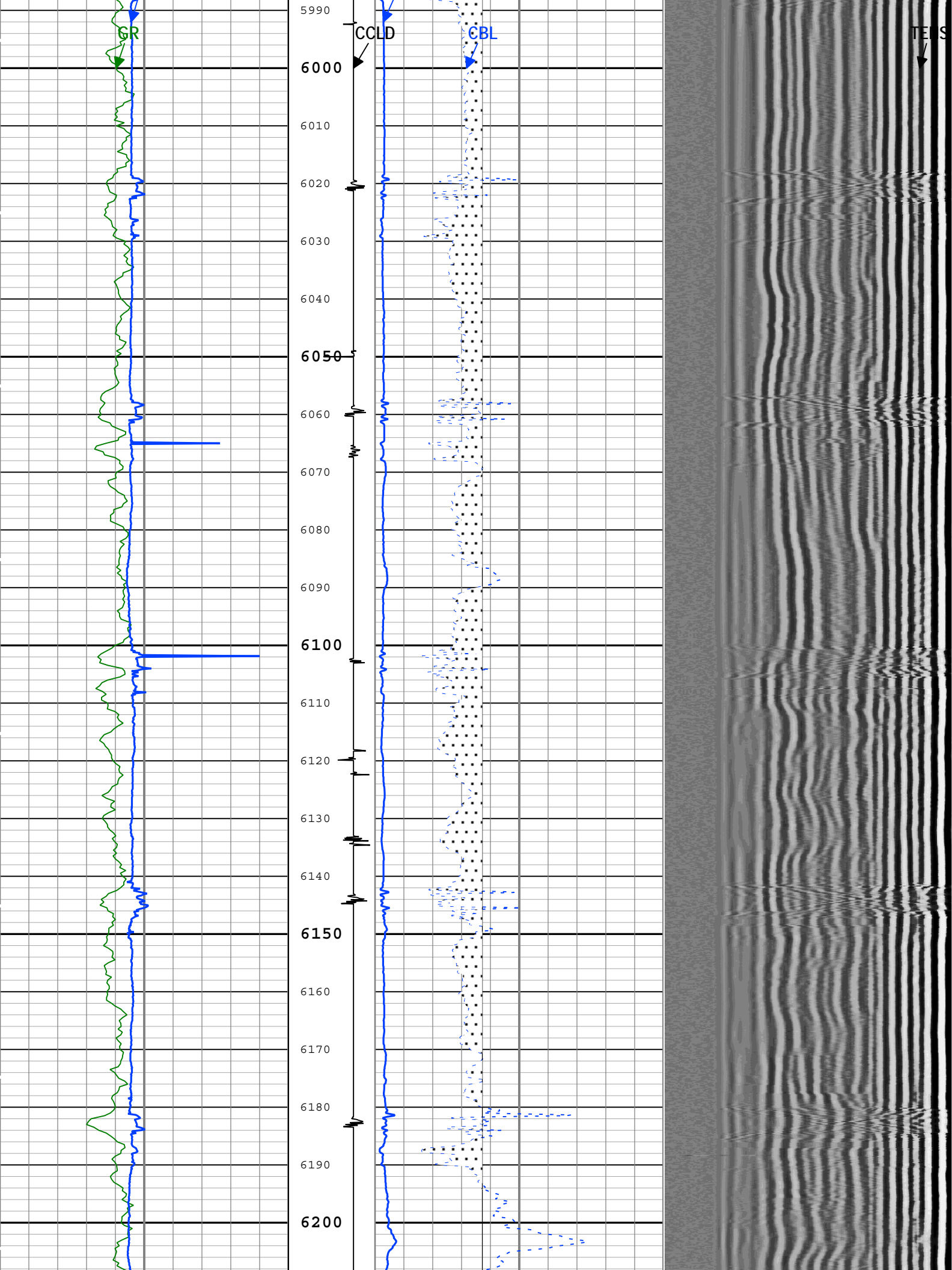
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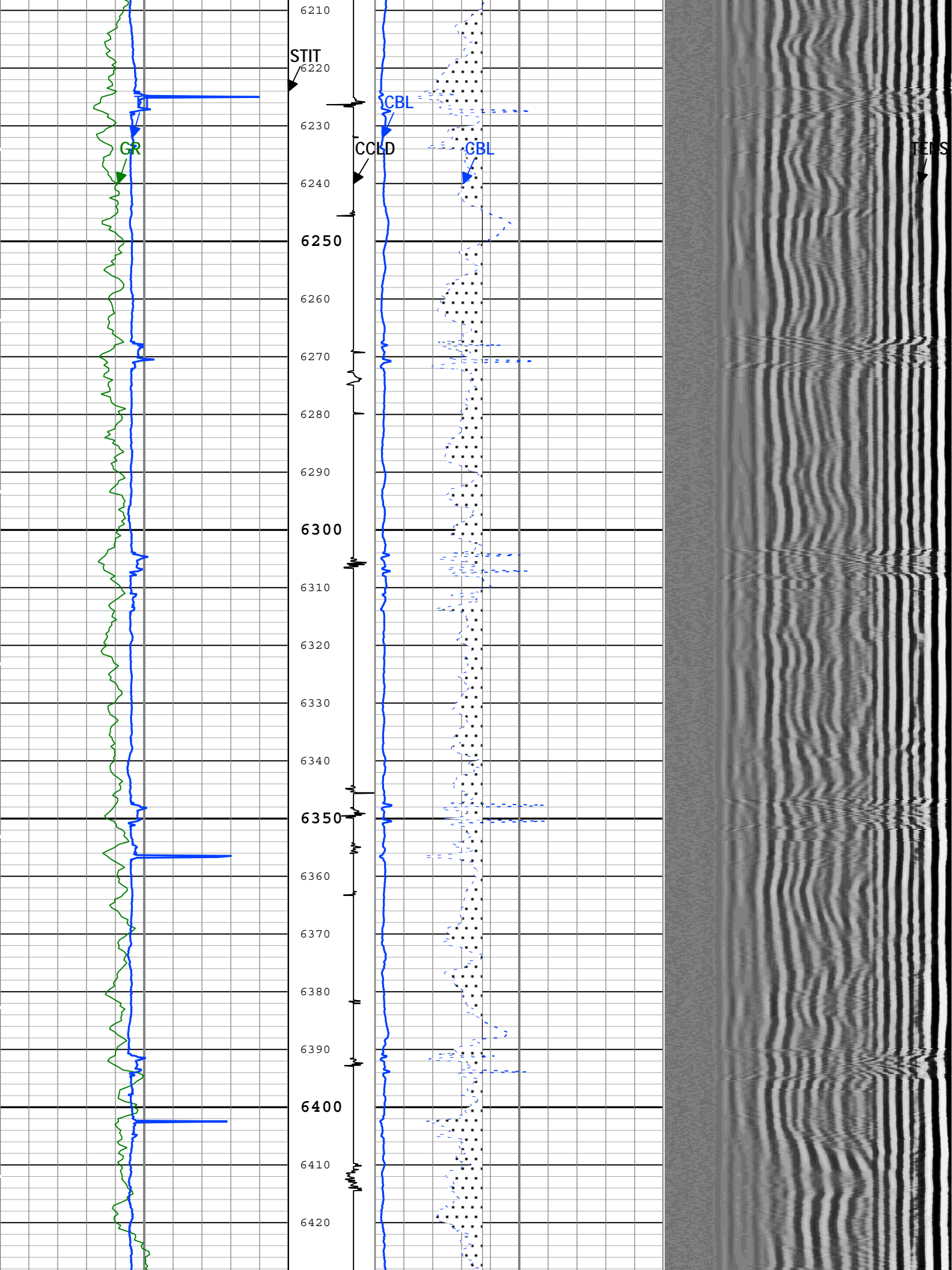
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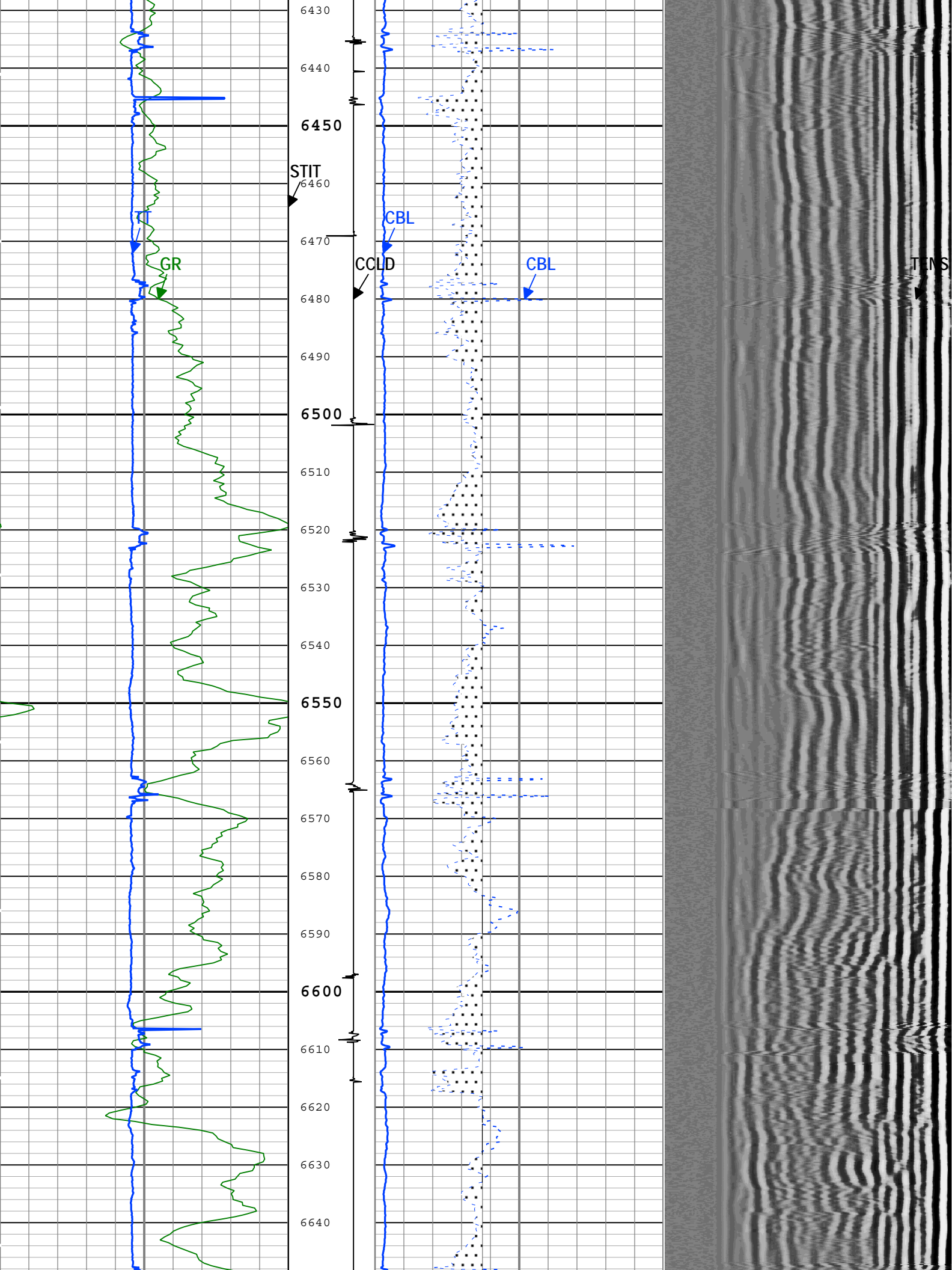
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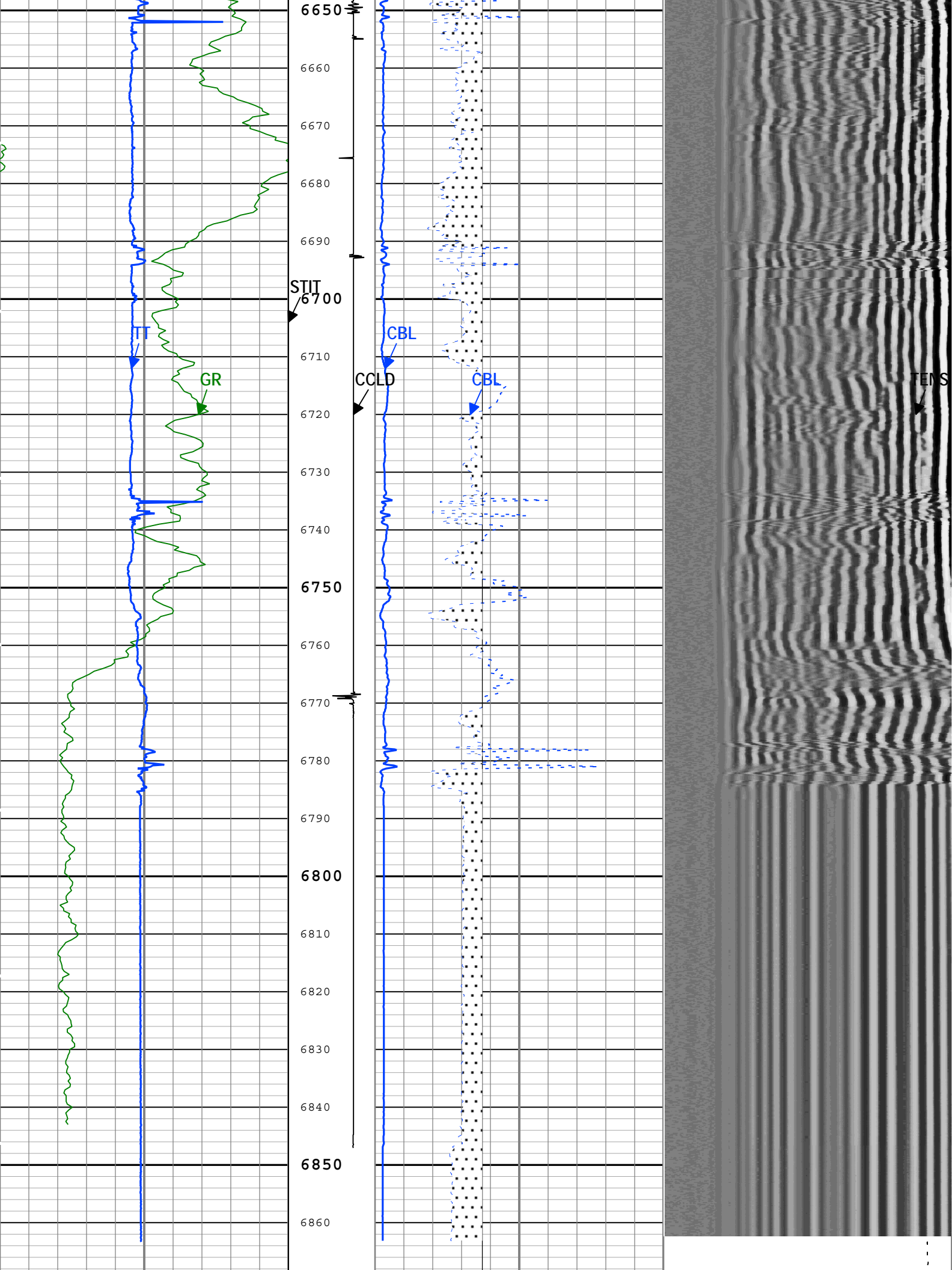
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TIME_1900 - Time Marked every 60.00 (s)

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 15:02:25

Channel Processing Parameters				
Run 1: Parameters				
Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	206.49	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	
THNO	Nominal Casing Thickness - Zoned along logger depths	WLSESSION	0.362	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	29	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4664	ft
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST	
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
PDAT	Permanent Datum	WLSESSION	GL	
RUN_SNUM	Run Sequence Number	WSDRUN	1	
SHT	Surface Hole Temperature	Borehole	68	degF
TD	Total Measured Depth	Borehole	6780	ft

Tool Control Parameters				
Run 1: 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 1		
Primary Equipment :		
Slim Cement Mapping Sonde	SCMS-CB	8284

CBL and MAP Amplitude Normalization - Measurements

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

[illegible]

MAP 7 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	-----	-----	-----	-----	
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):		12:41:47 21-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):		12:41:47 21-Apr-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Adjustment Factor		Before			0.802		
CBL LQC Reference Amplitude in Free Pipe	mV	Before			62.00		
MAP Adjustment Factor		Before			1.012		
Depth of Before Calibration	ft	Before			95.28		

PSTP-A (PSP Telemetry Platform A - Sapphire) Calibration - Run 1

Primary Equipment :			
PBMS-A		PBMS-A	2702
Calibration Parameter :			
JIG-BKGD (Jig minus background reference)		165	

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 A13-645	
Field:	Wattenberg	
County:	Weld	
Country:	United States	
Slim Cement Mapping Tool		
Cement Evaluation		
Gamma Ray - CCL Log		