

Company: Nighthawk Production, LLC

Well: Telluride 13-2

Field: Arikaree Creek

County: Lincoln State: Colorado

Borehole Compensated Sonic

BHC

County:	Lincoln			
Field:	Arikaree Creek			
Location:	Lat/Long: 39.55194/-103.41555			
Well:	Telluride 13-2			
Company:	Nighthawk Production, LLC			
Location:		Lat/Long: 39.55194/-103.41555	Elev.:	K.B. 5201.00 ft
		SHL : 542' FSL X 353' FWL SWSW		G.L. 5186.00 ft
		Permanent Datum:	Ground Level	Elev.: 5186.00 f
		Log Measured From:	Kelly Bushing	15.00 ft above Perm.Datum
		Drilling Measured From:	Kelly Bushing	
API Serial No.		Section:	Township:	Range:
05-073-06562-00		2	6S	54W

Logging Date	11-Dec-2013		
Run Number	Run One		
Depth Driller	8210.00 ft		
Schlumberger Depth	8217.00 ft		
Bottom Log Interval	8217.00 ft		
Top Log Interval	348.00 ft		
Casing Driller Size @ Depth	8.625 in @ 348.00 ft		
Casing Schlumberger	348 ft		
Bit Size	7.875 in		
Type Fluid In Hole	Chemical Gel		
Density	9.1 lbm/gal	80 s	
Fluid Loss	PH 12 cm3	8	
Source of Sample			
RM @ Meas Temp	0.94 ohm.m @ 75 degF		
RMF @ Meas Temp	0.7 ohm.m @ 75 degF		
RMC @ Meas Temp	1.18 ohm.m @ 75 degF		
Source RMF	Calculated	Calculated	
RM @ BHT	0.37 @ 200	0.28 @ 200	
Max Recorded Temperatures	200 degF	200	200
Circulation Stopped	09-Dec-2013	17:00:00	
Logger on Bottom	11-Dec-2013	20:22:51	
Unit Number	Location:	9108	Fort Morgan
Recorded By	Arvin Shi		
Witnessed By	Jim Weir		

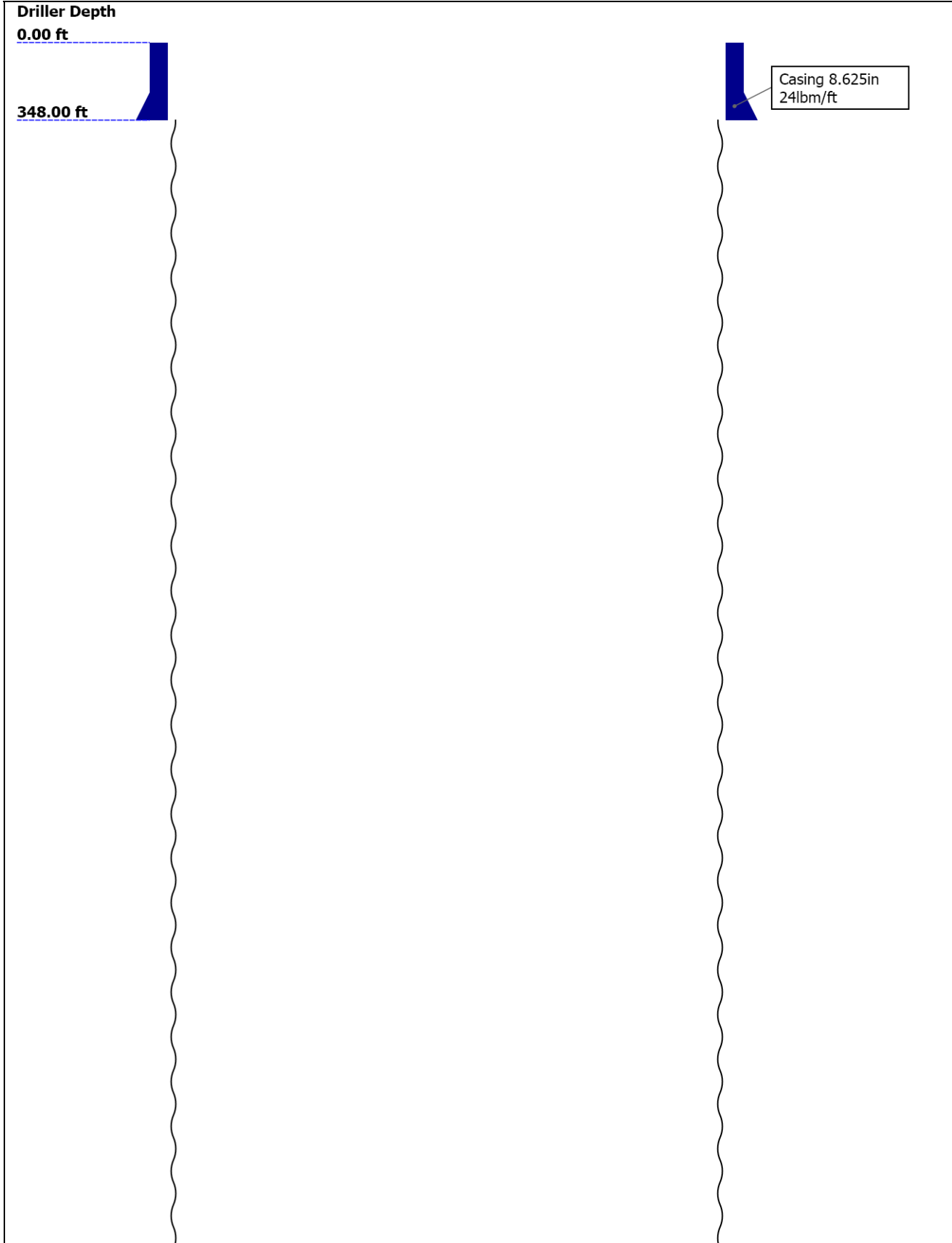
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Contents

- 1. Header
- 2. Disclaimer
- 3. Contents
- 4. Well Sketch
- 5. Borehole Size/Casing/Tubing Record
- 6. Operational Run Summary
- 7. Remarks and Equipment Summary
- 8. Depth Summary
- 9. Run One
 - 9.1 Integration Summary
 - 9.2 Composite Summary
 - 9.3 Log (Sonic Delta-t_1)
 - 9.4 Parameter Listing
- 10. Run One
 - 10.1 Composite Summary
 - 10.2 Log (Sonic Delta-t_1 RA)
- 11. Tail

Well Sketch



8210.00 ft

Open Hole 7.875in

Borehole Size/Casing/Tubing Record

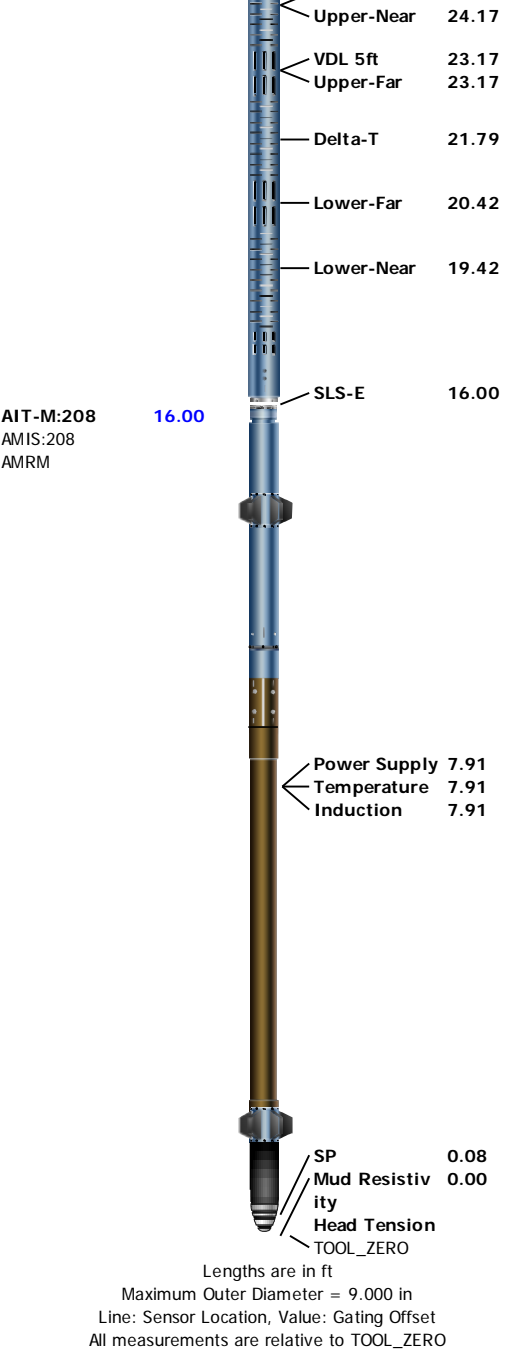
Bit						
Bit Size (in)	7.875					
Top Driller (ft)	348					
Top Logger (ft)	348					
Bottom Driller (ft)	8210					
Bottom Logger (ft)	8217					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24					
Inner Diameter (in)	8.097					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	348					
Bottom Logger (ft)	348					

Operational Run Summary

Parameter (unit)	Run One					
Date Log Started	11-Dec-2013					
Time Log Started	19:24:26					
Date Log Finished	11-Dec-2013					
Time Log Finished	23:56:22					
Top Log Interval (ft)						
Bottom Log Interval (ft)						
Total Depth (ft)	8217.00					
Max Hole Deviation (deg)						
Azimuth of Max Deviation (deg)						
Bit Size (in)	7.875					
Logging Unit Number	9108					
Logging Unit Location	Fort Morgan					
Recorded By	Arvin Shi					
Witnessed By	Jim Weir					
Service Order Number	C6V L00093					

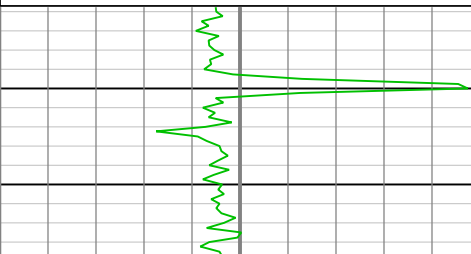
Remarks and Equipment Summary

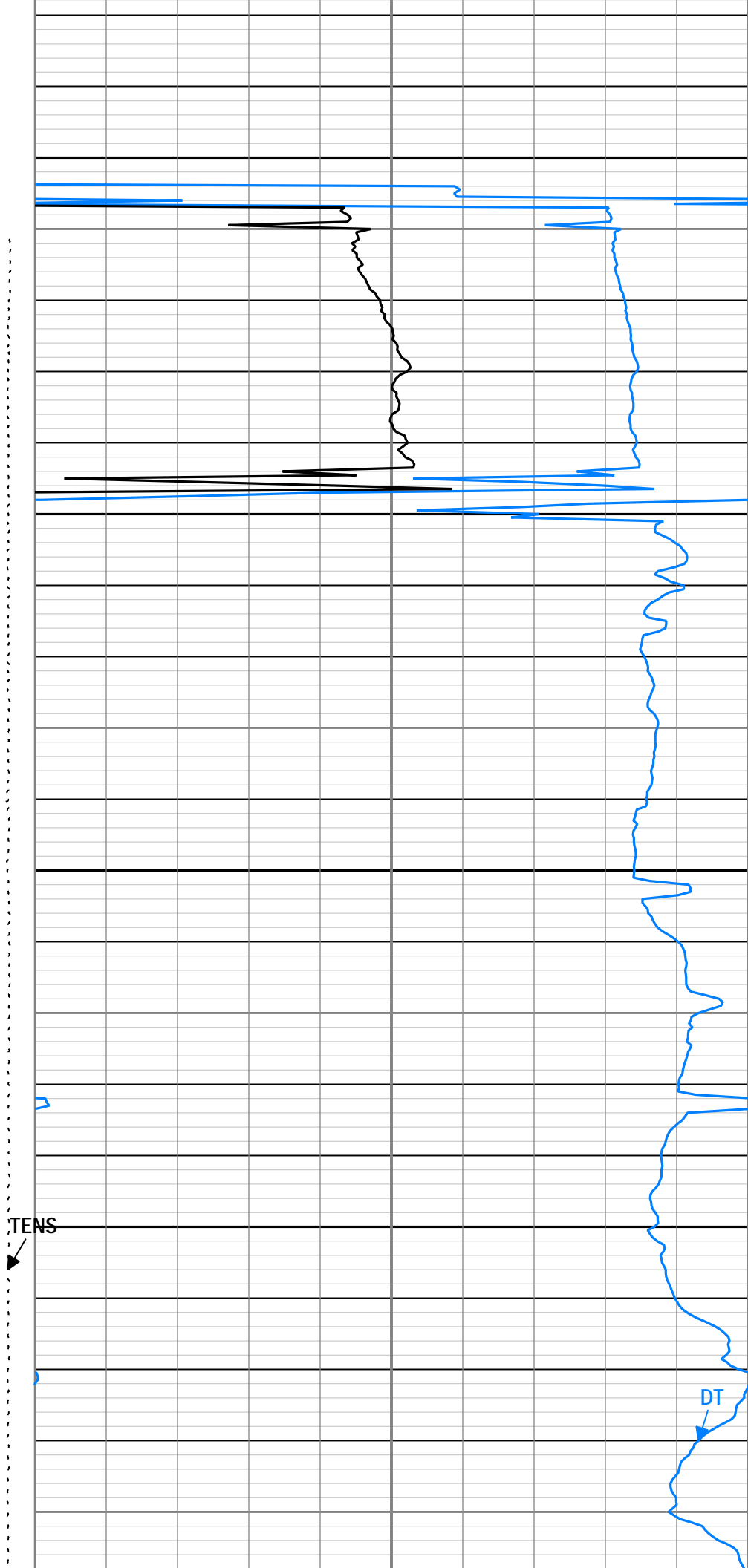
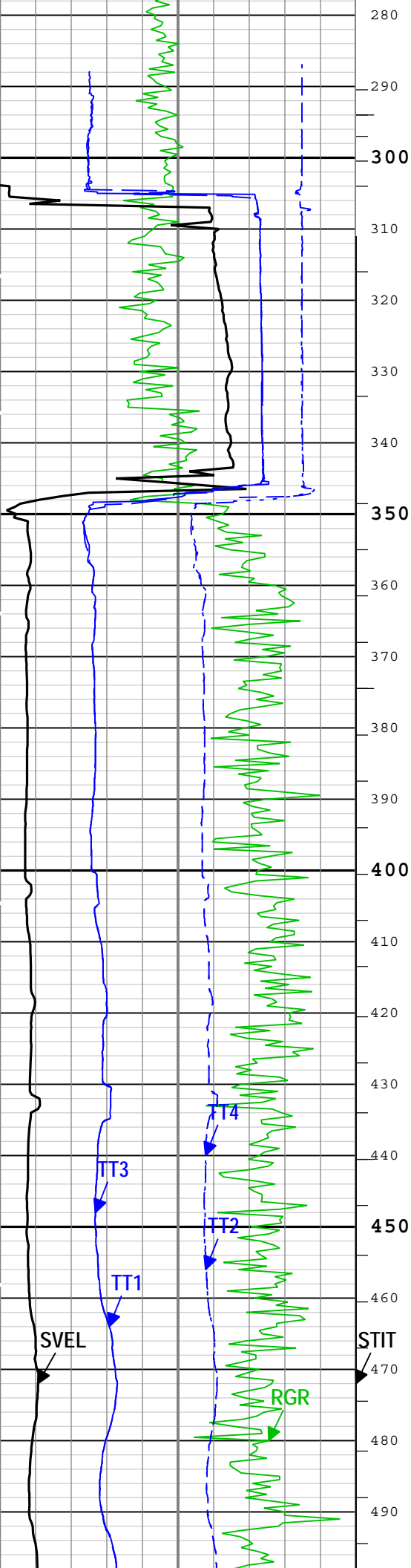
Run One: Toolstring				Run One: Remarks
Equip name	Length	MP name	Offset	All Schlumberger depth measurement policies followed
LEH-QT	66.21			IDW used as primary depth measurement and Z-Chart as secondary depth measurement
LEH-QT				Caliper has to close for about 10 ft at around 5700 ft since pulled to MSP
DTC-H	63.29	CTEM	62.39	
ECH-KC		HV	0.00	
DTC-H				
HGNS-H	60.29	ToolStatus	60.29	
HGNH		TelStatus	60.29	
NSR-F:5215		Temperature	60.26	
NPV-N		GR	59.55	
HGNS-H				
HACCZ-H:5955				
HMCA-H				
		CNL Porosity	53.21	
		HMCA	50.88	
		HGNS	50.88	
		Acceleromete	0.00	
		r		
HDRS-H	50.88			
ECH-MEB				
HRCC-H				
HRMS-H				
GSR-J:5240				
Long Spacing:289				
10				
Backscatter		HRCC	46.88	
HRGD-H:4791				
Short Spacing				
GPV-Q				
		MCFL	41.45	
		Caliper	40.96	
		TLD Density	40.57	
AH-184	38.64			
DSLT-H	36.64			
ECH-KH				
DSLCH				
SLS-E				
		CBL 3ft	24.17	

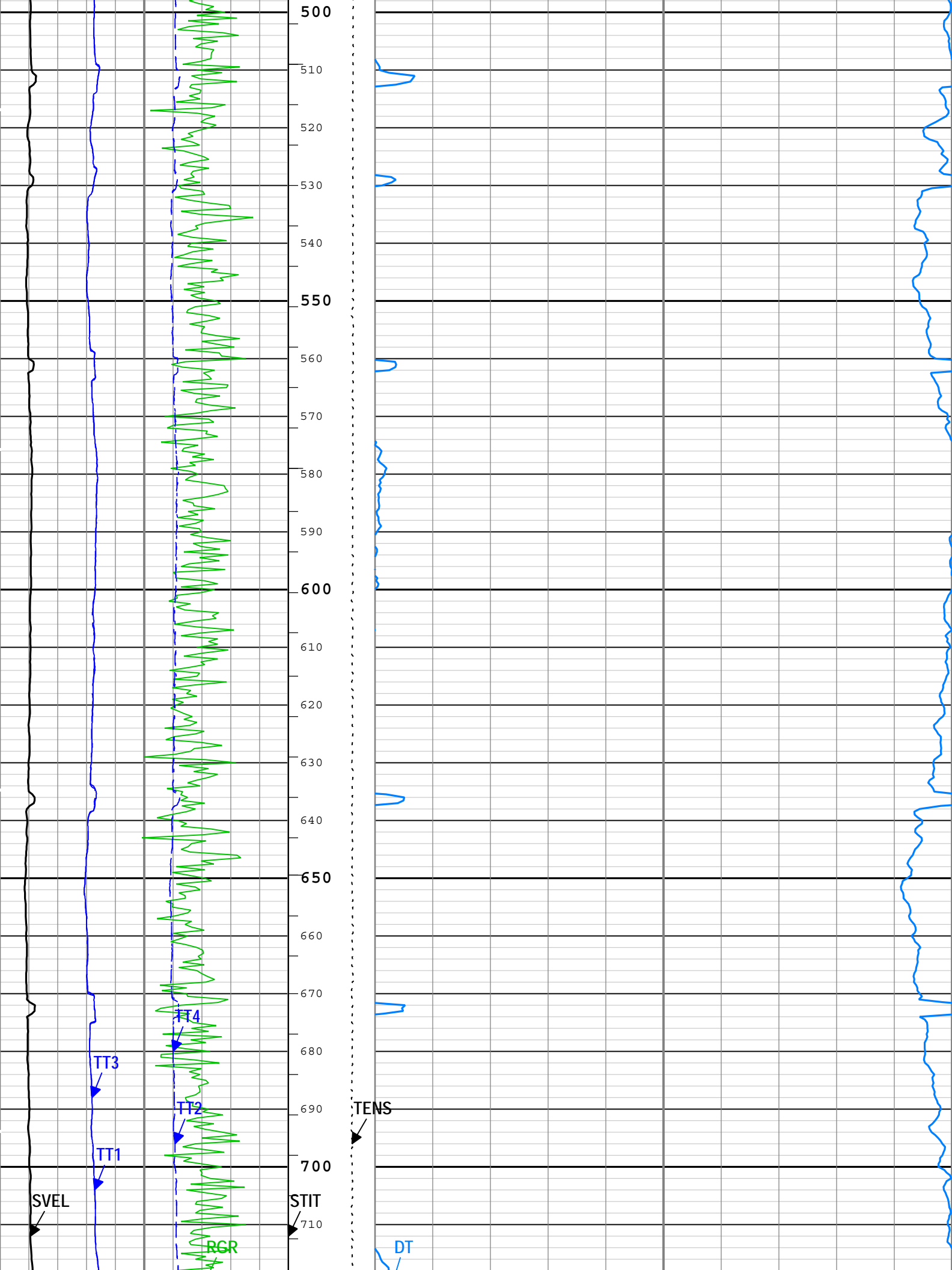


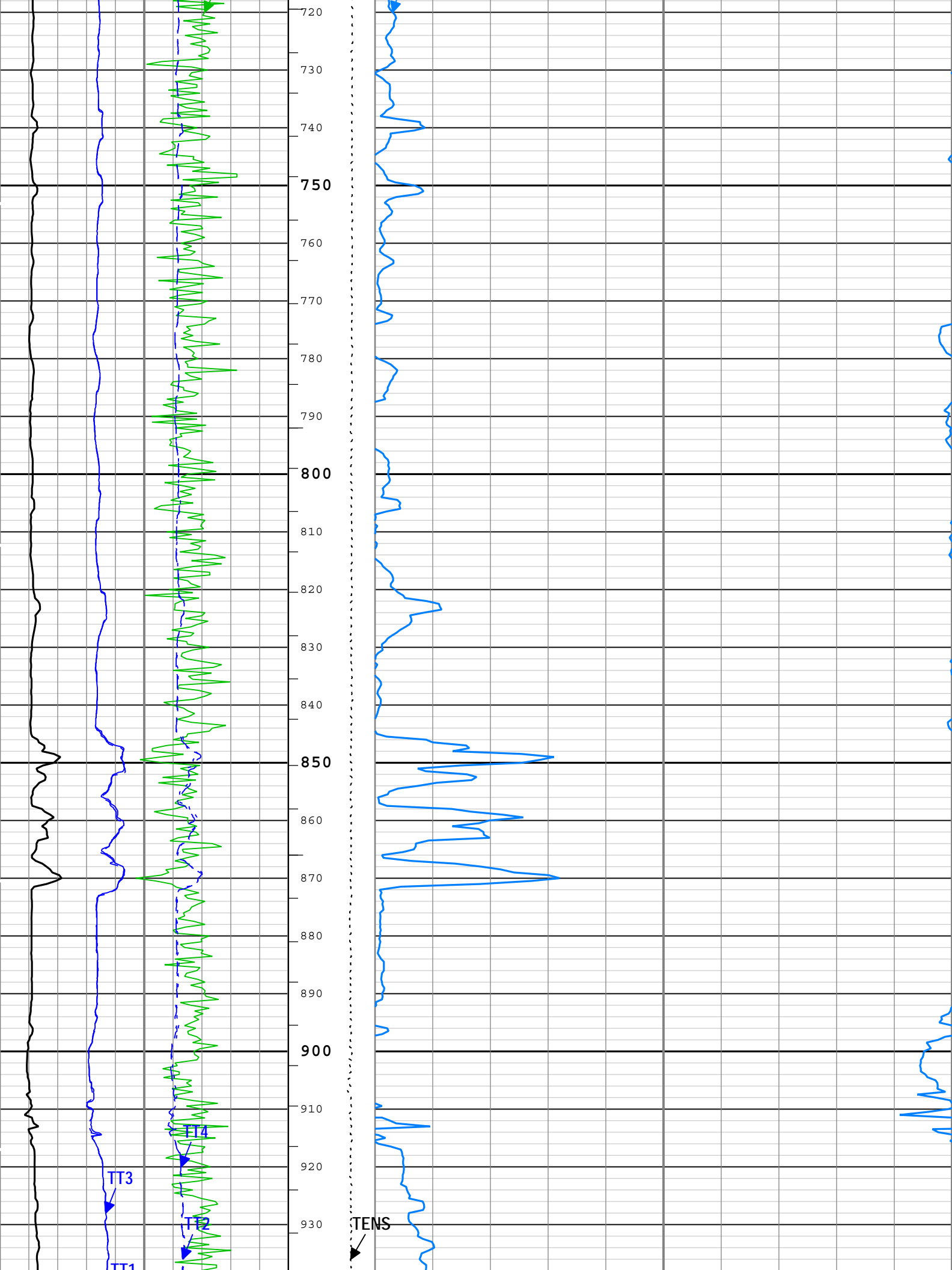
Depth Summary

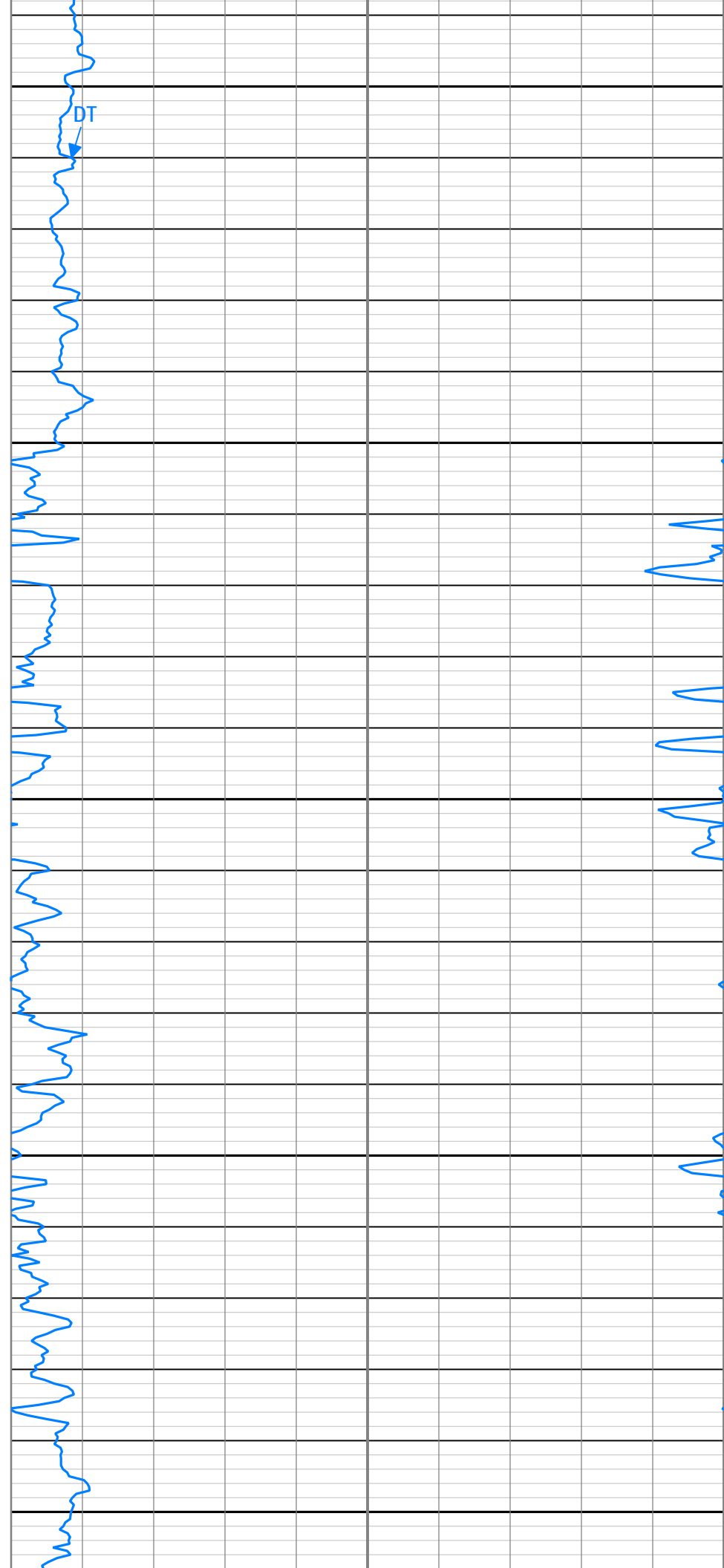
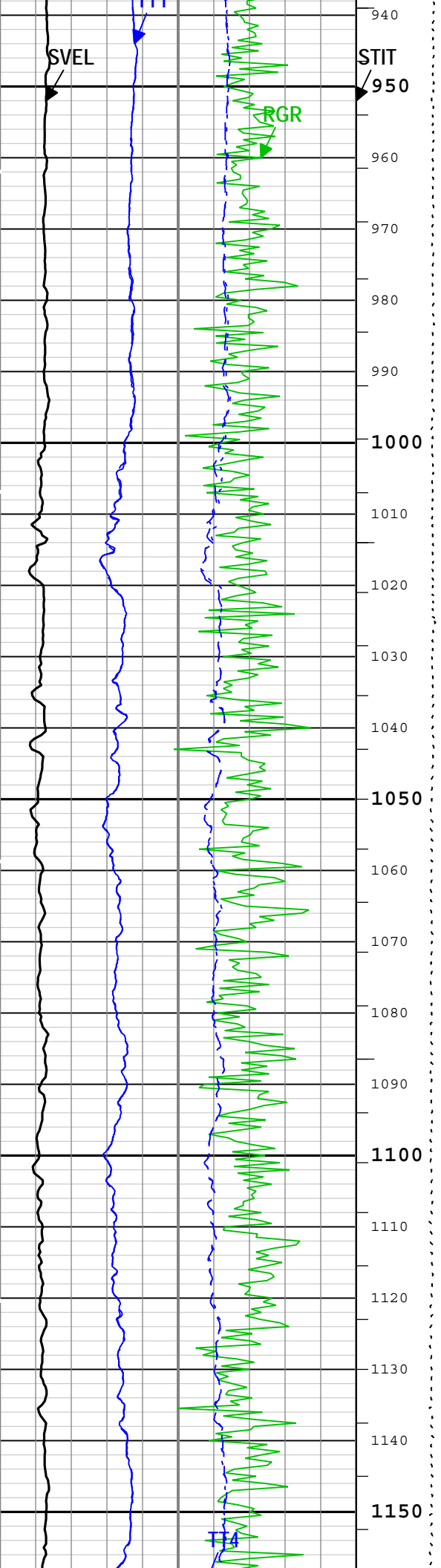
Run One			
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		
Serial Number	147		
Calibration Date	23-Oct-2013		
Calibrator Serial Number			
Number of Calibration Points	10		
Calibration Root Mean Square Error	8		
Calibration Peak Error	12		
Logging Cable			

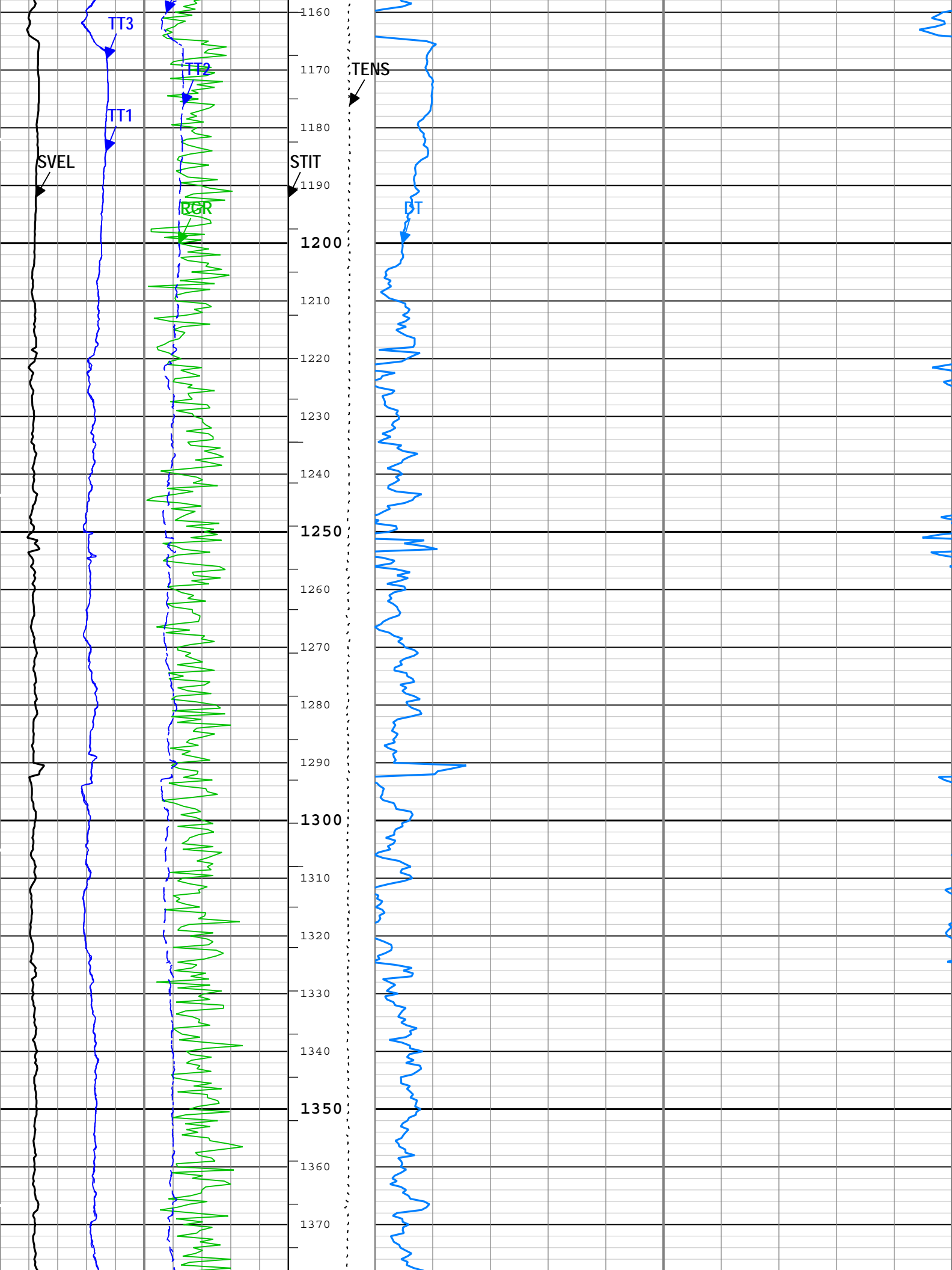
Type		7-46A-XS							
Serial Number									
Length		20000.00 ft							
Conveyance Type		Wireline							
Rig Type		Land							
Run One:Depth Control Parameters				Depth Control Remarks					
Log Sequence		First Log In the Well							
Rig Up Length At Surface									
Rig Up Length At Bottom									
Rig Up Length Correction									
Stretch Correction									
Tool Zero Check At Surface									
Run One									
Integration Summary									
Output Channel(s)		Output Description		Input Parameter		Output Value		Unit	
ITT		Integrated Transit Time		ITTS		0.7613		s	
Pass Summary									
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run One	Log[5]:Up	Up	310.87 ft	8235.43 ft	11-Dec-2013 9:09:48 PM	11-Dec-2013 11:45:17 PM	ON	1.11 ft	No
All depths are referenced to toolstring zero									
Log	Company:Nighthawk Production, LLC Well:Telluride 13-2 Run One: Log[5]:Up:S010								
Description: SONI_Traditional_CompressionalDT_Curves Format: Log (Sonic Delta-t_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 00:43:47									
ITT - Integrated Transit Time every 1.00 (ms)									
ITT - Integrated Transit Time every 10.00 (ms)									
TIME_1900 - Time Marked every 60.00 (s)									
Raw Gamma Ray (RGR) HGNS-H									
0 gAPI 150									
Sonic Velocity (SVEL) DSLT-H									
5000 ft/s 25000									
Transit Time 1 (TT1) DSLT-H									
1200 us 200									
Transit Time 2 (TT2) DSLT-H									
1200 us 200									
Transit Time 3 (TT3) DSLT-H									
1200 us 200									
Transit Time 4 (TT4) DSLT-H									
1200 us 200									
Stuck Tool Indicator, Total (STIT)									
0 ft 50									
CableDrag									
ToolDrag									
Cable Tension (TENS)									
140 us/ft 40									
Sonic Porosity (SPHI) DSLT-H									
0.3 ft3/ft3 -0.1									
									
260									
270									

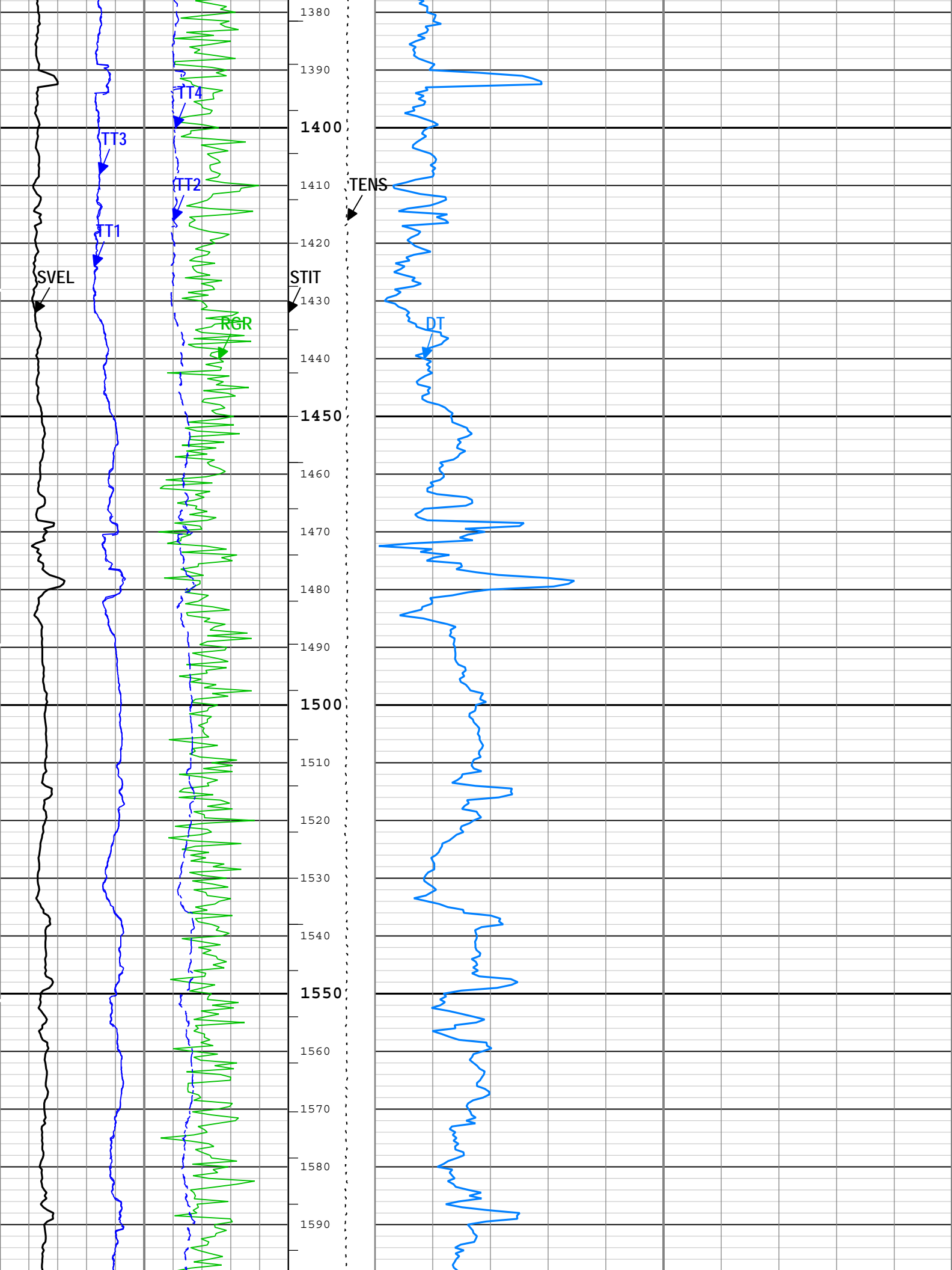


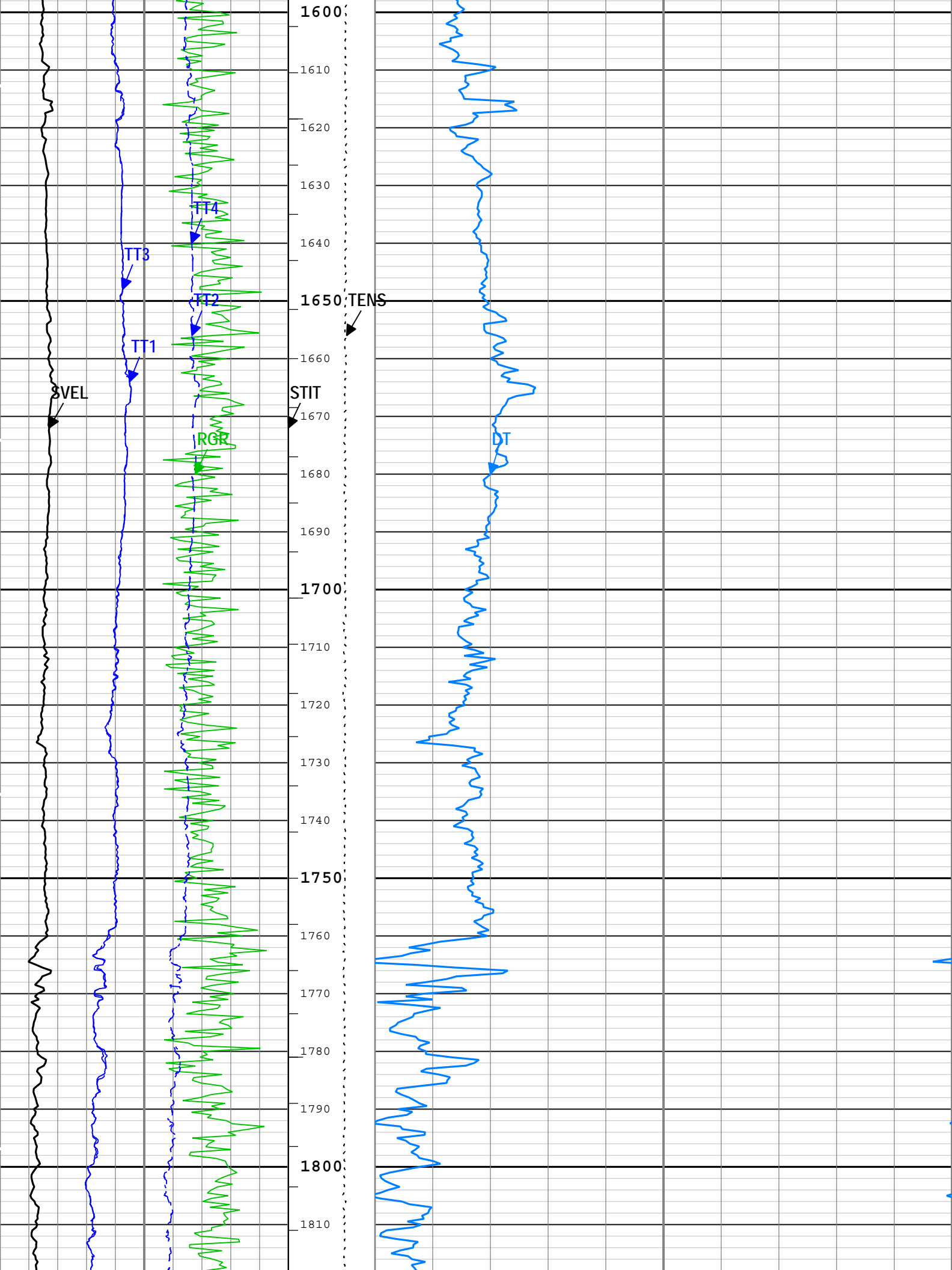


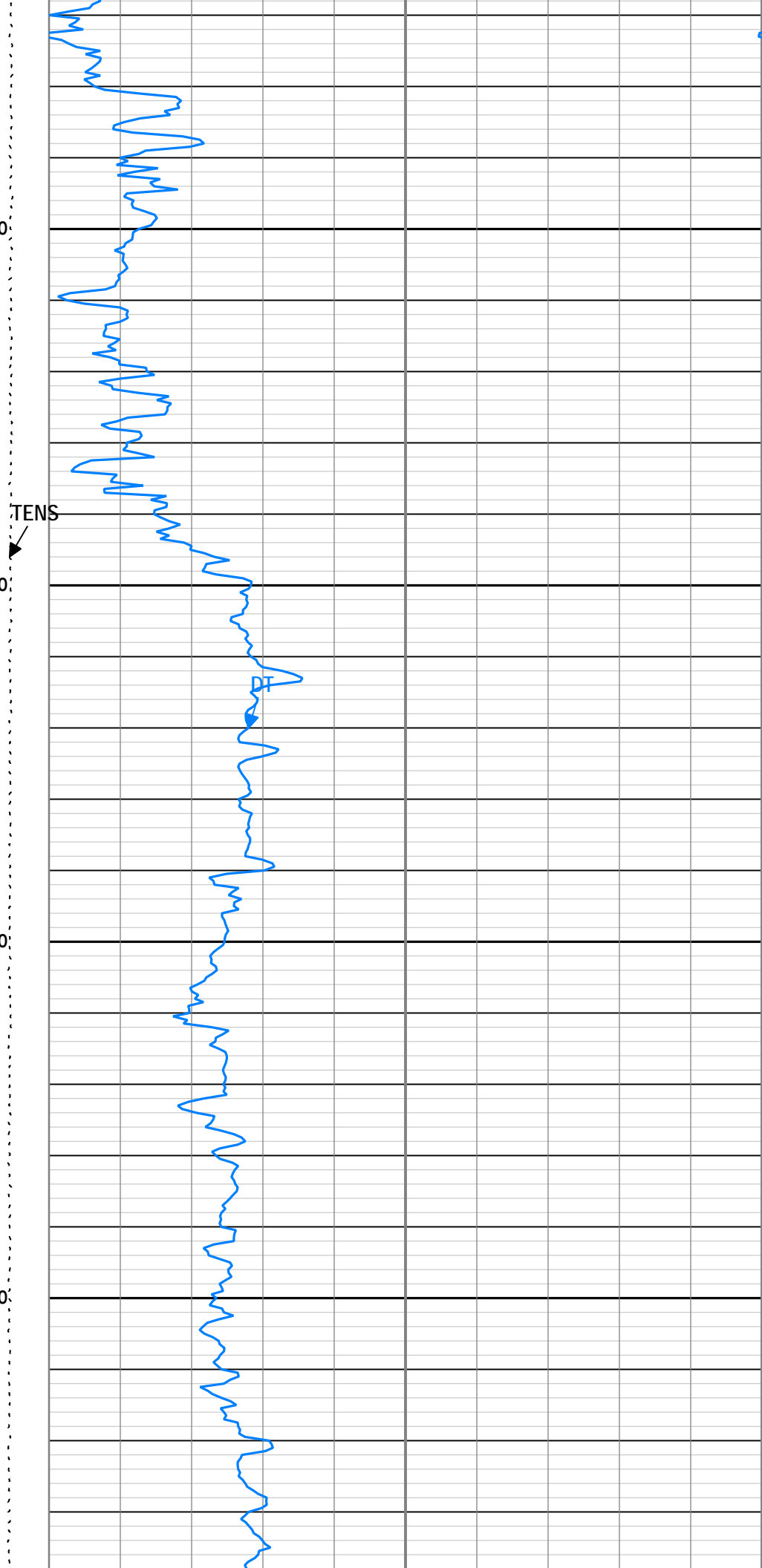
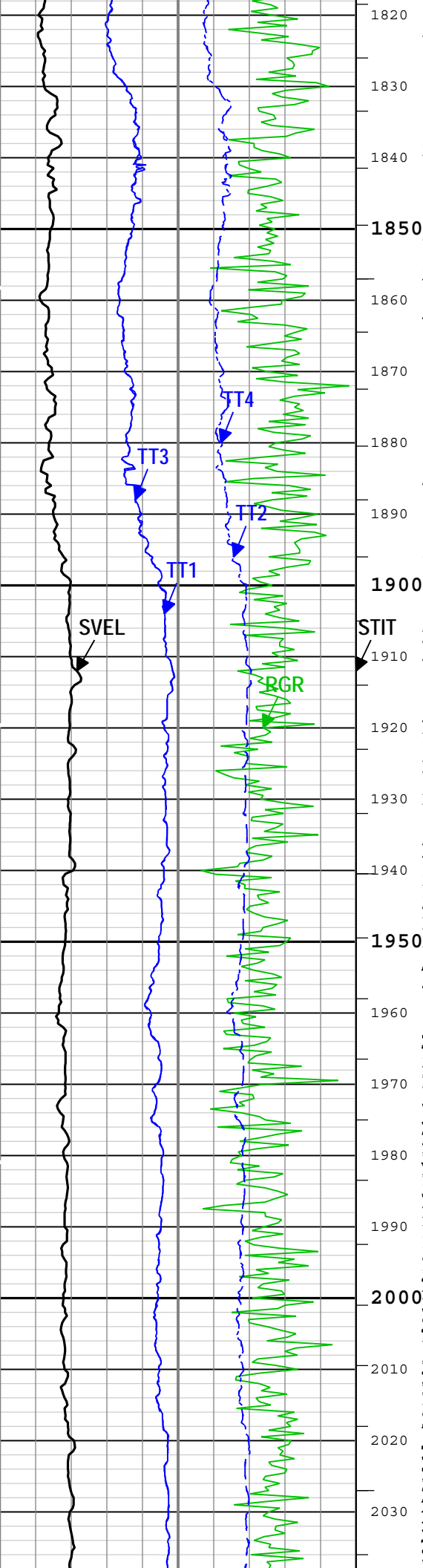


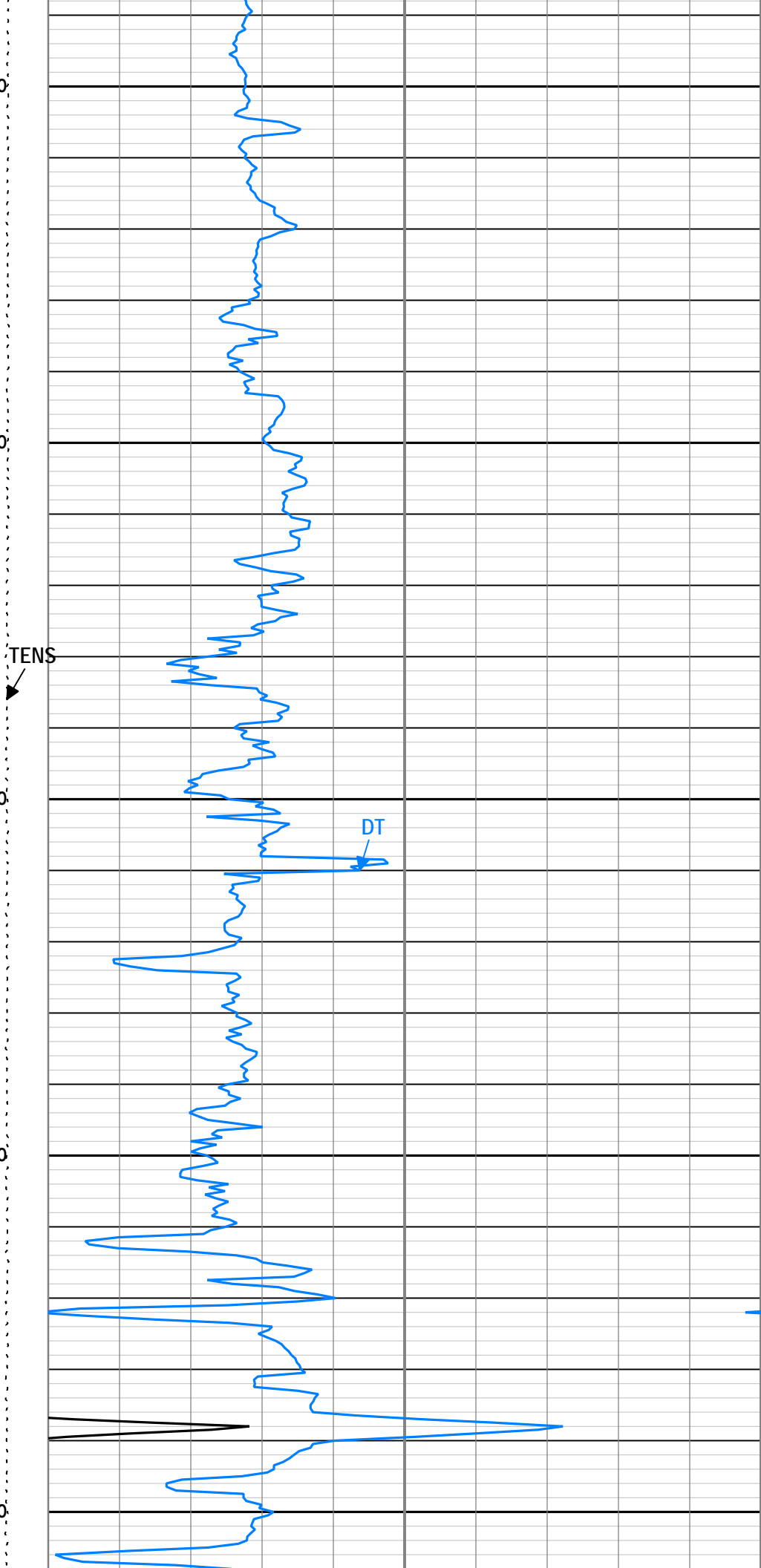
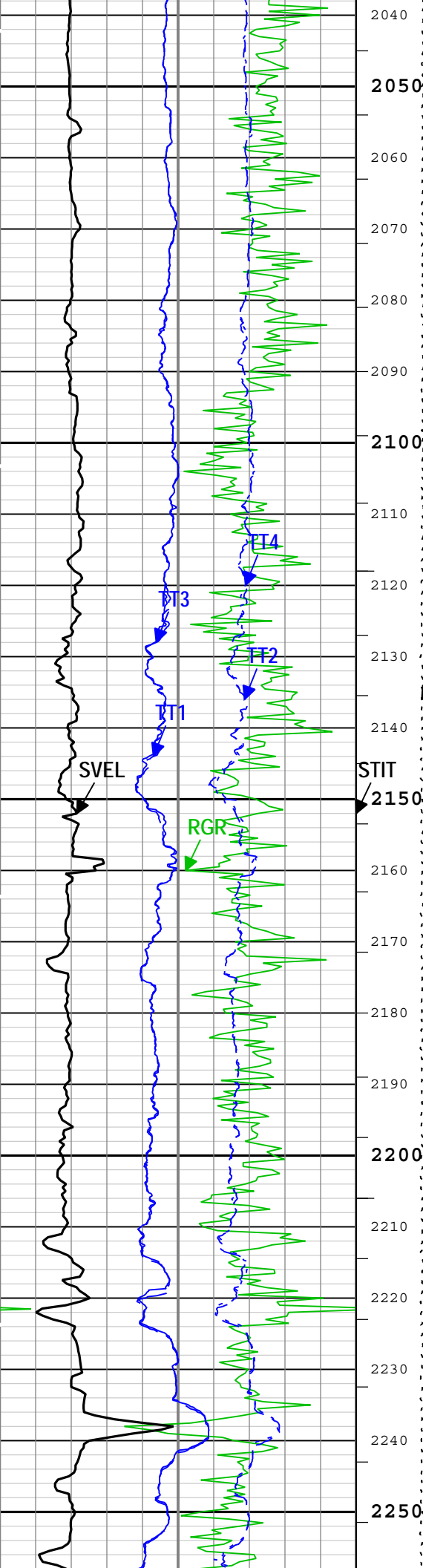


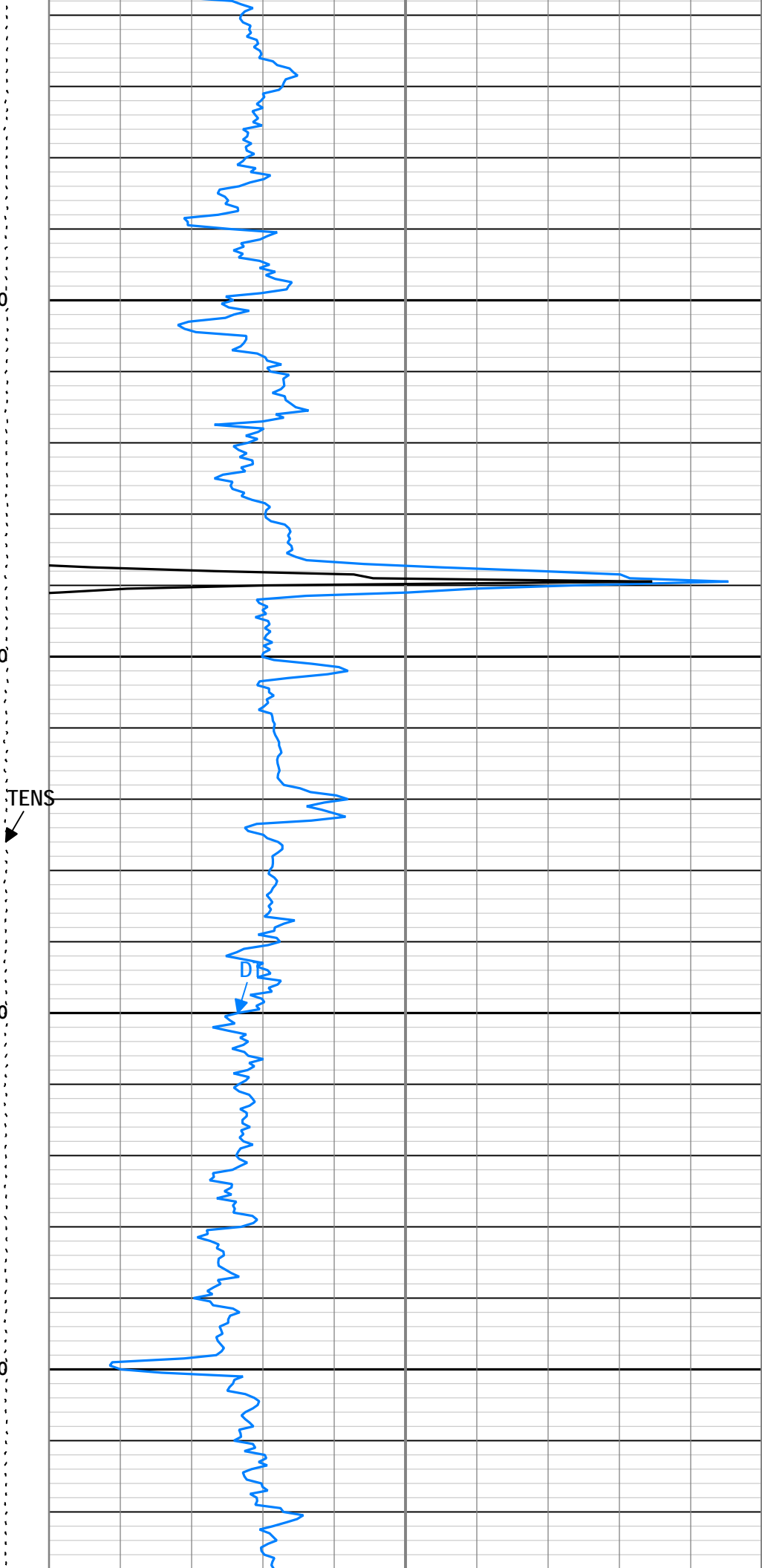
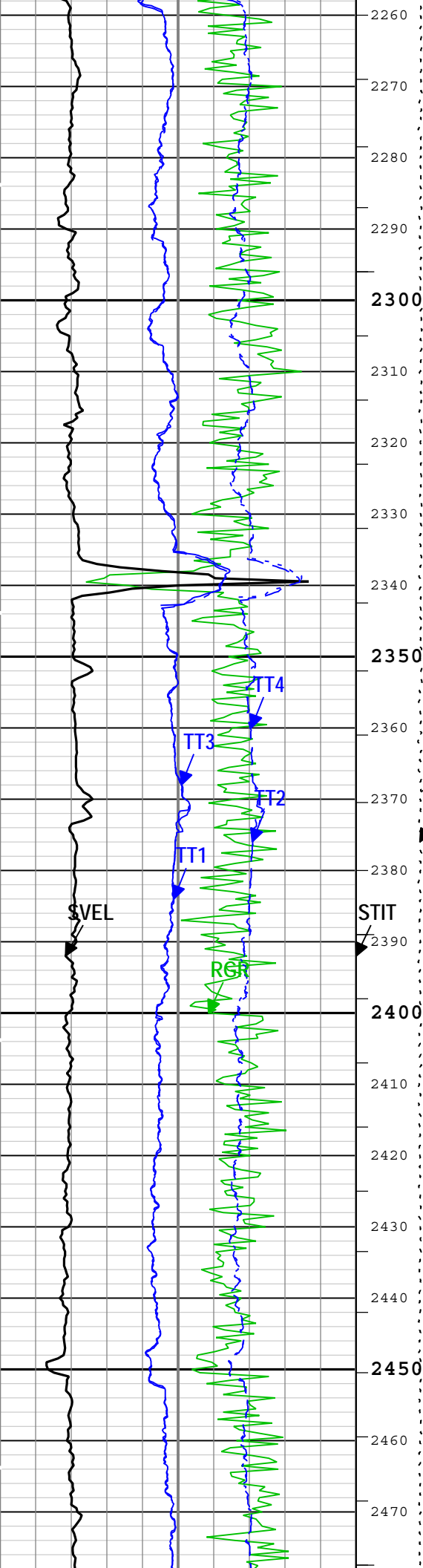


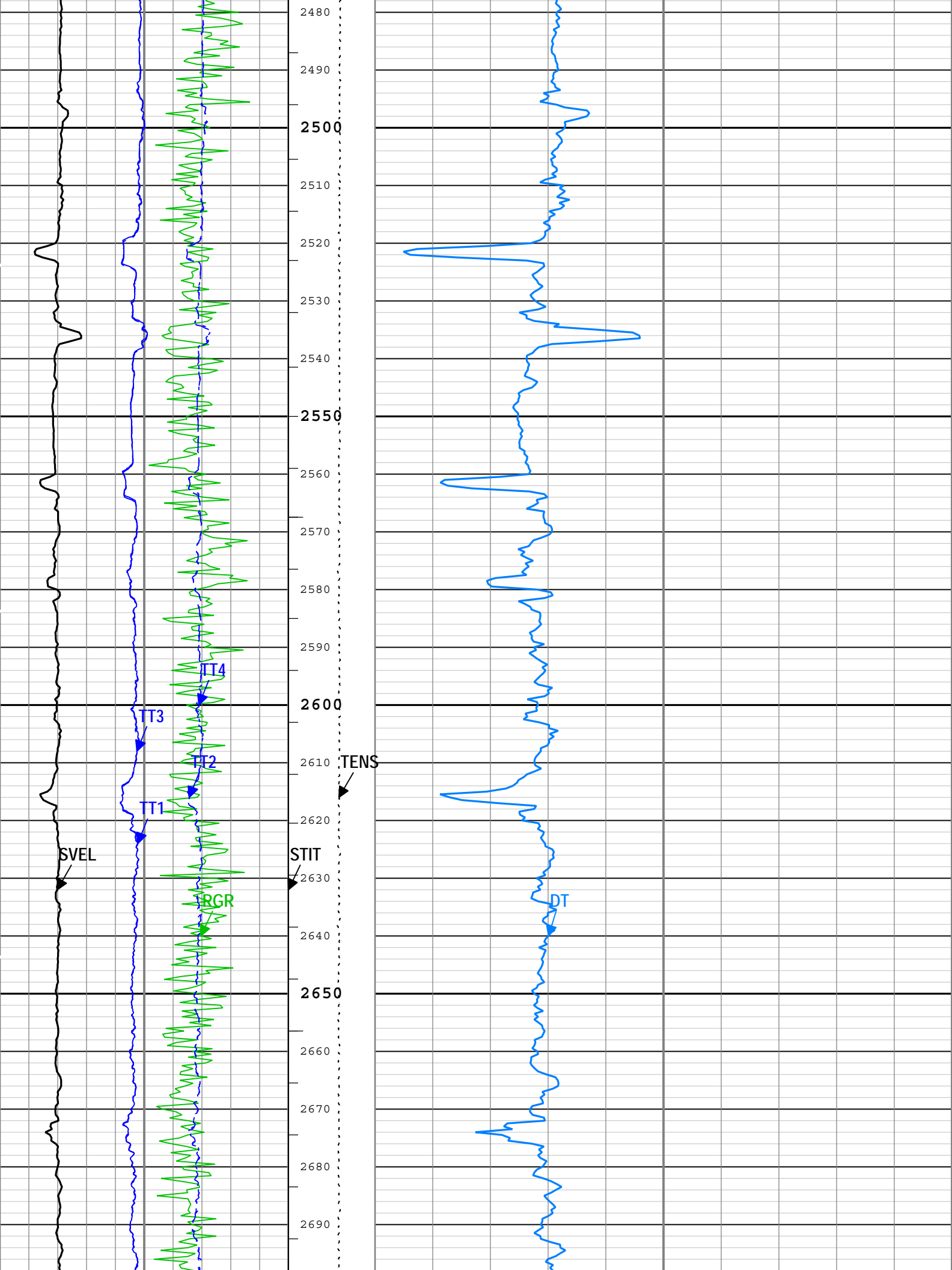


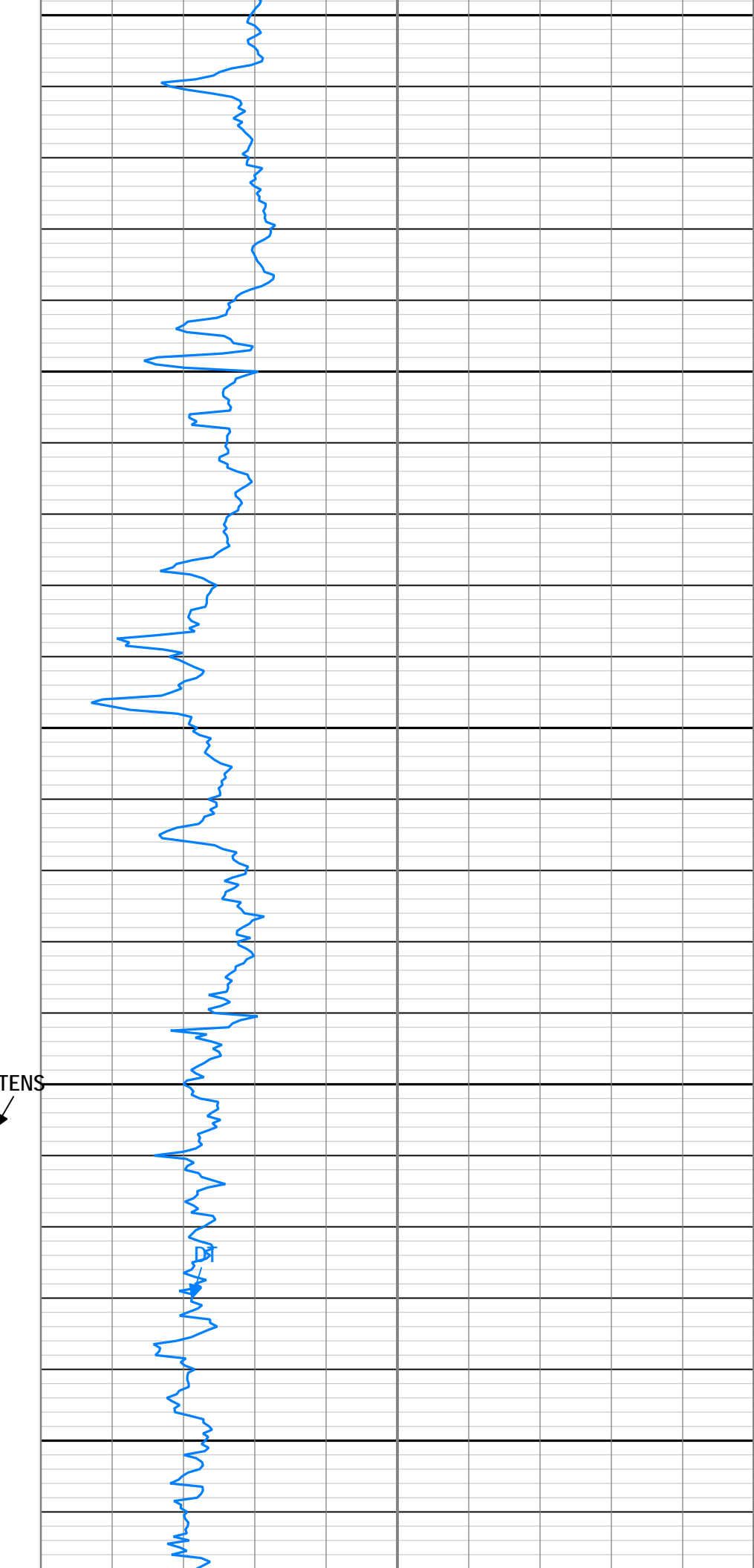
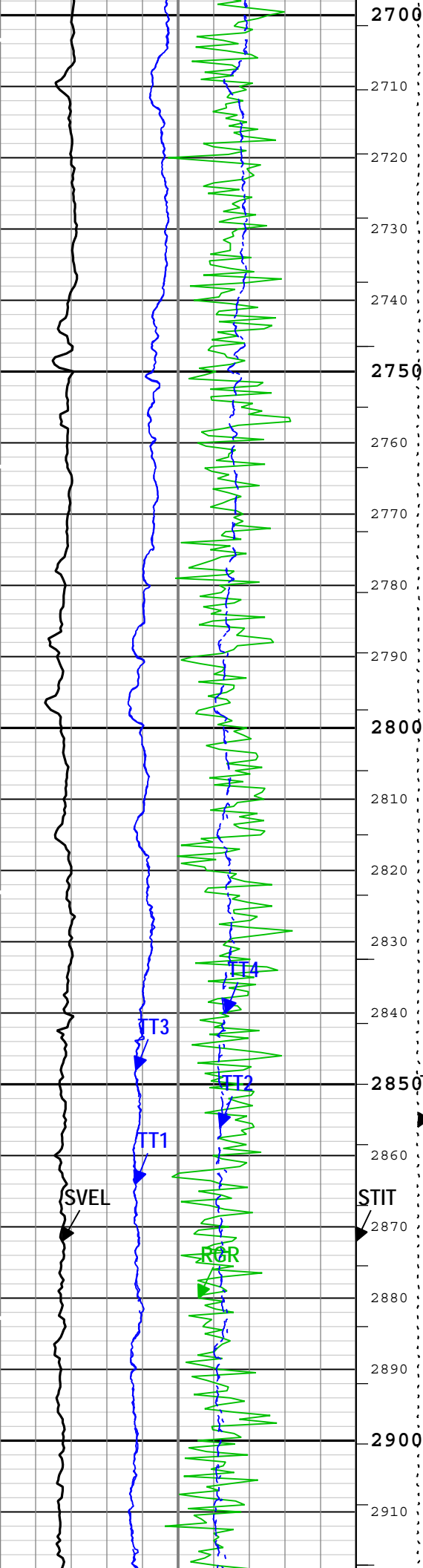


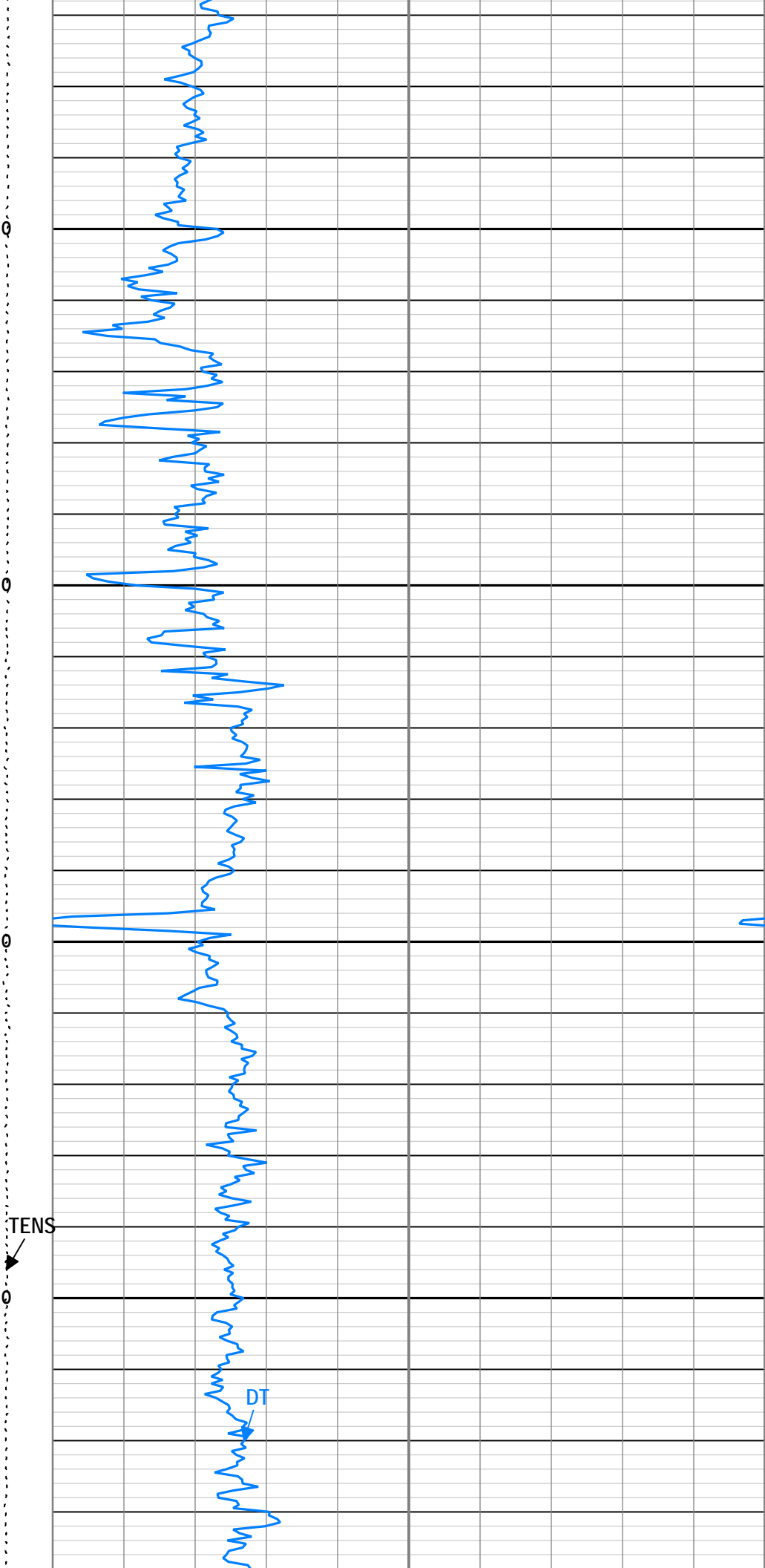
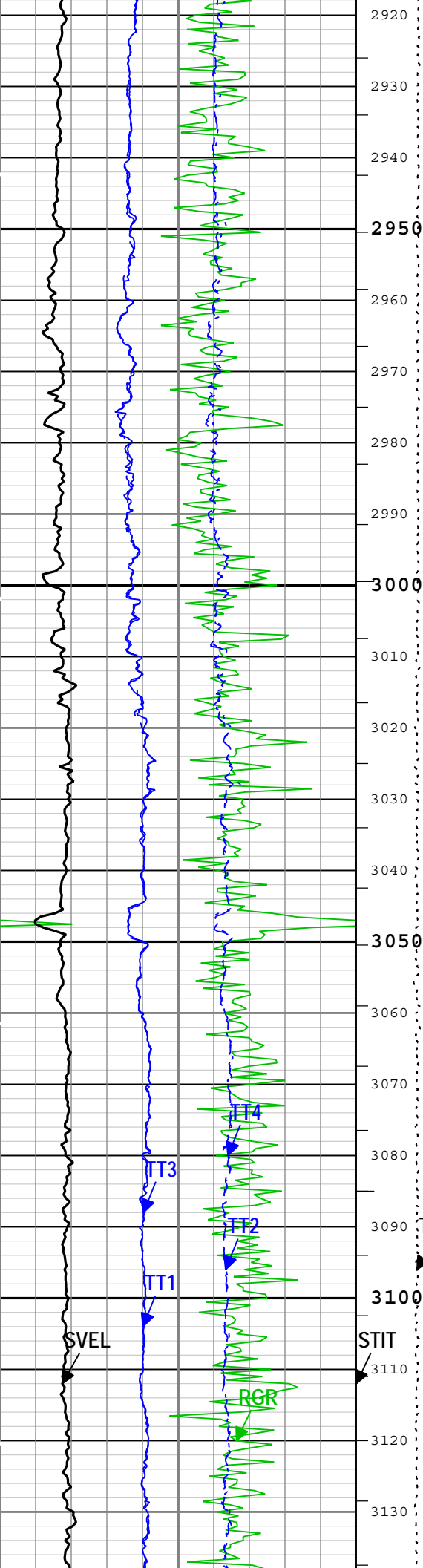


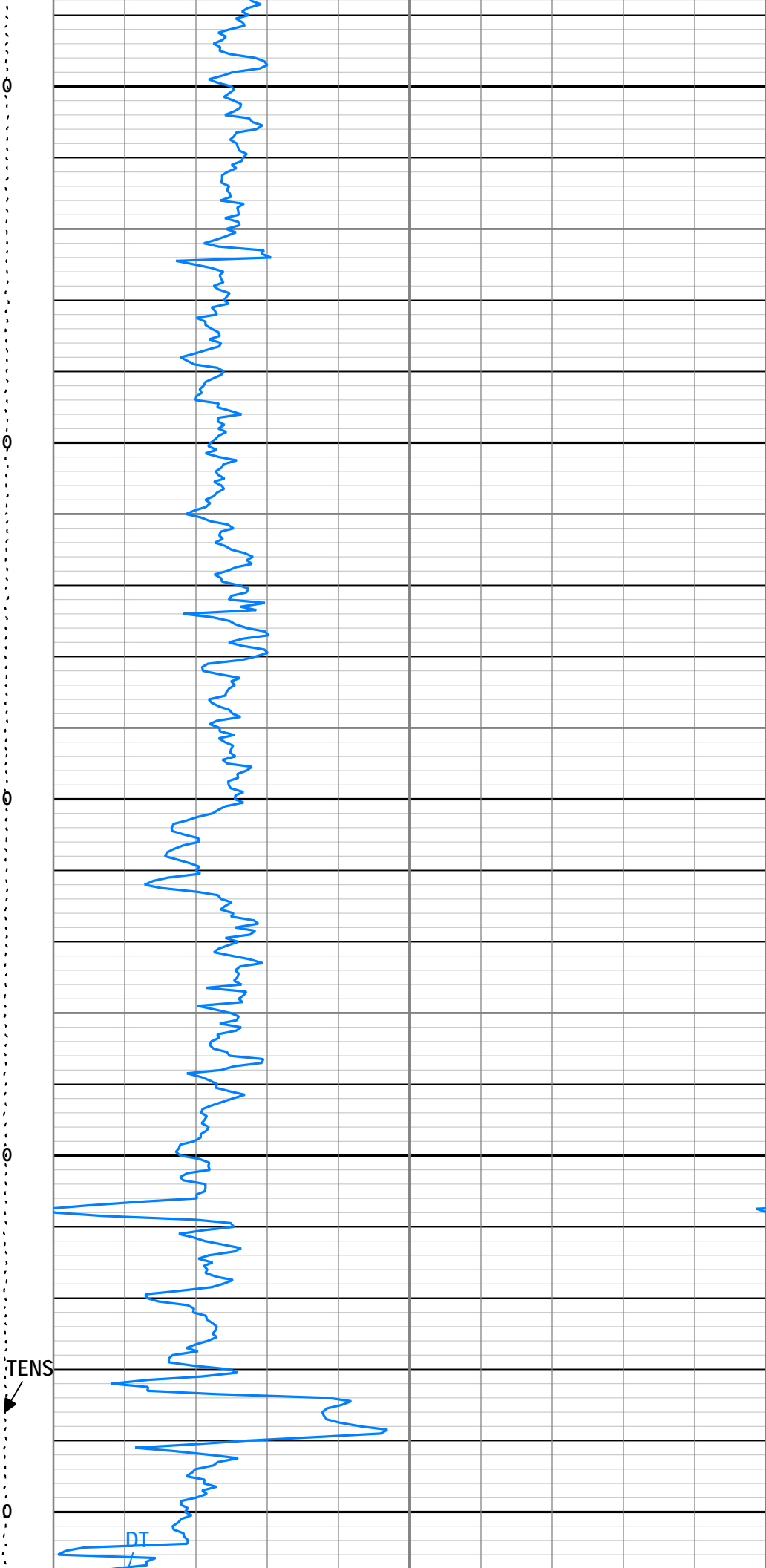
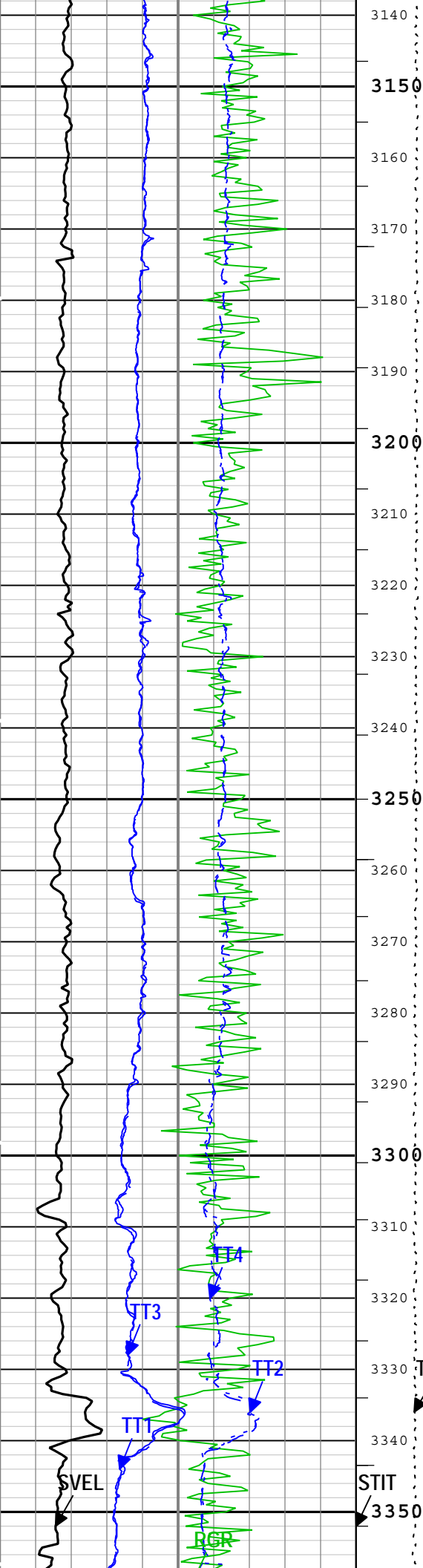


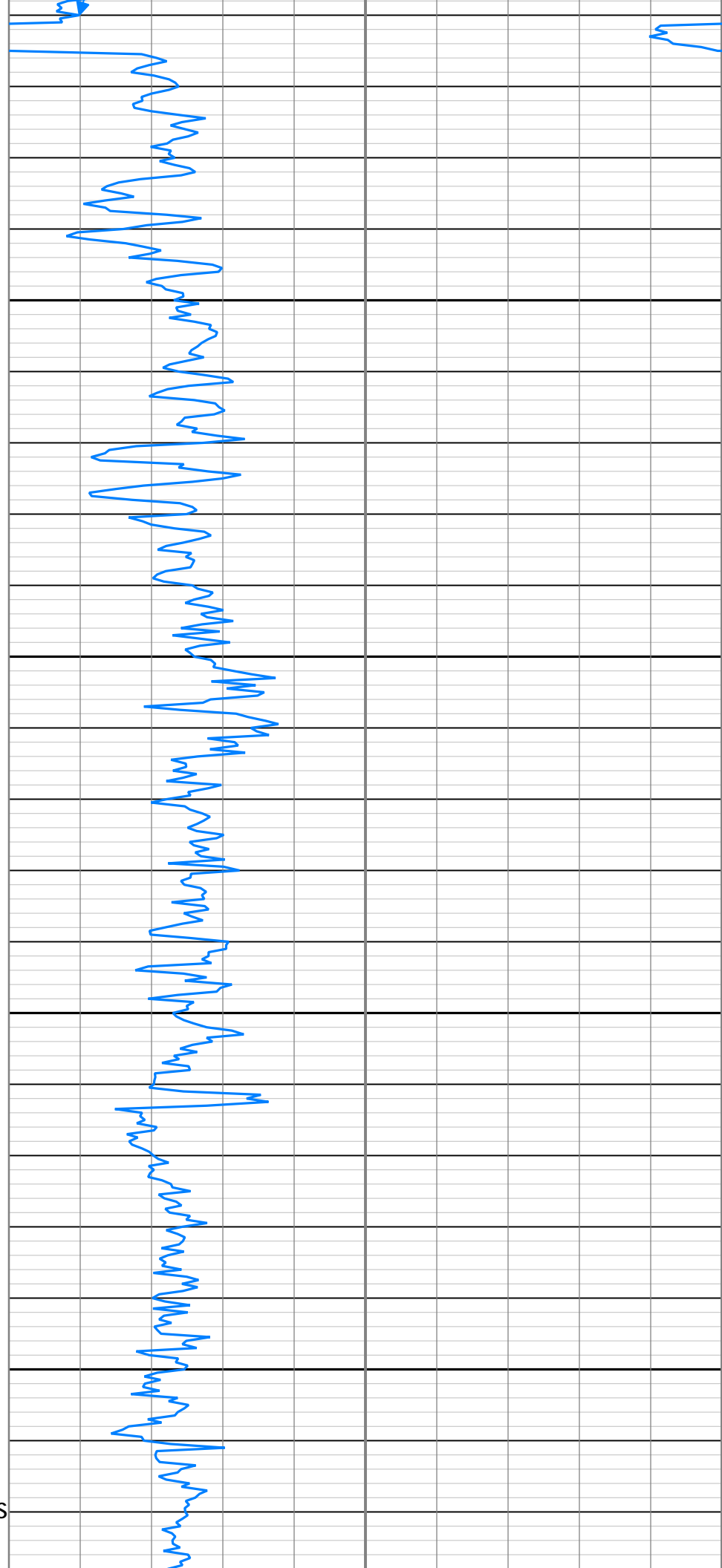
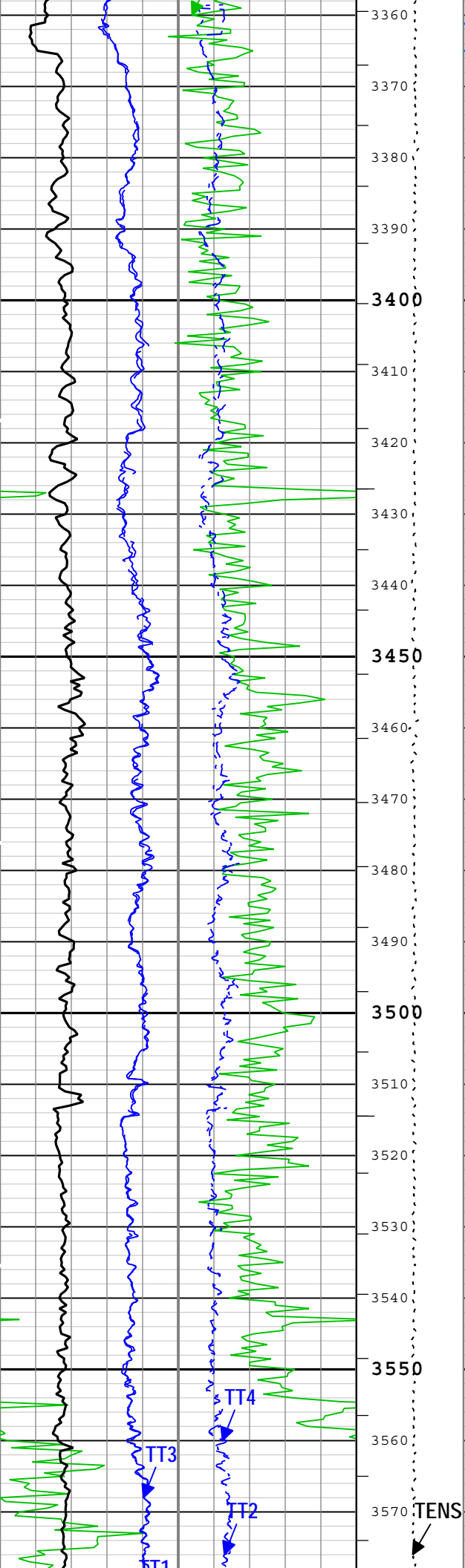


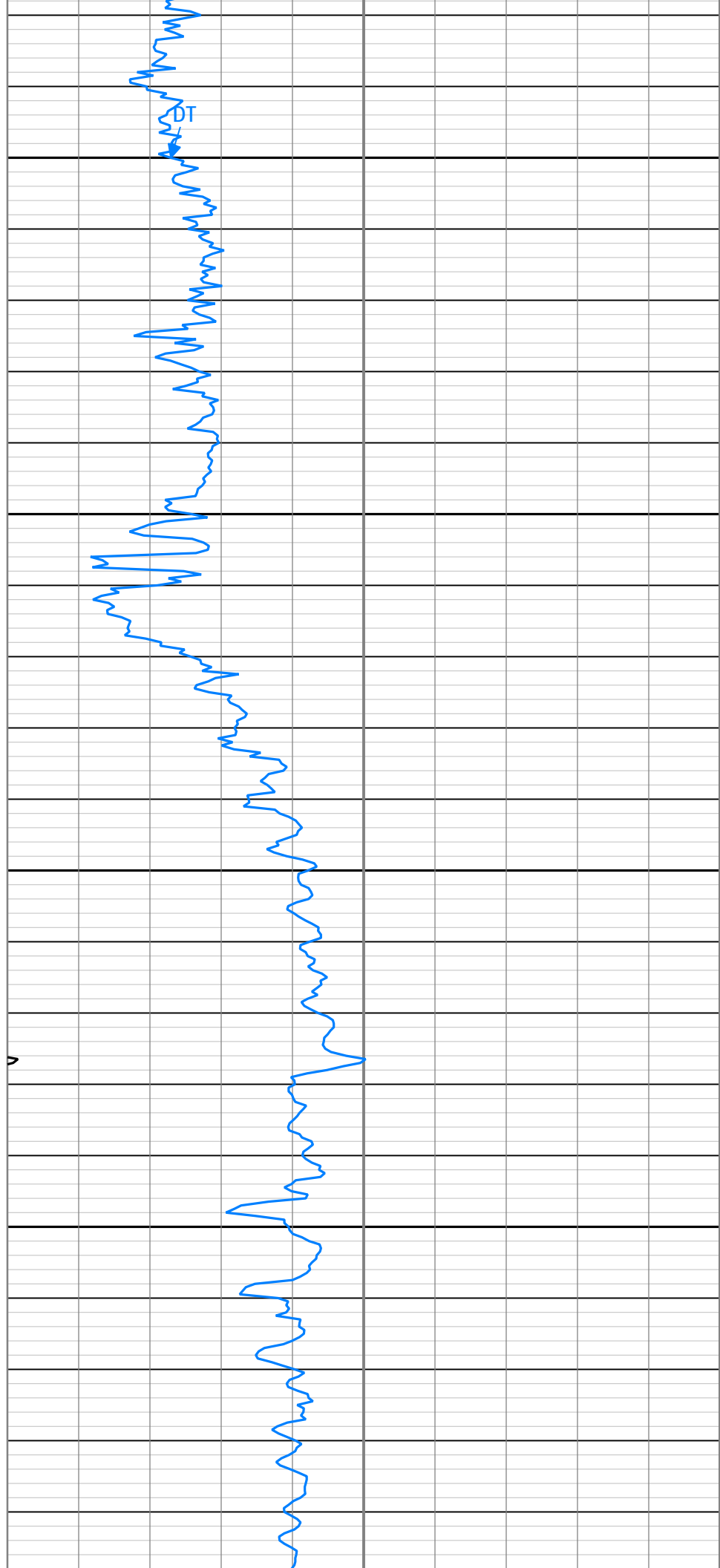
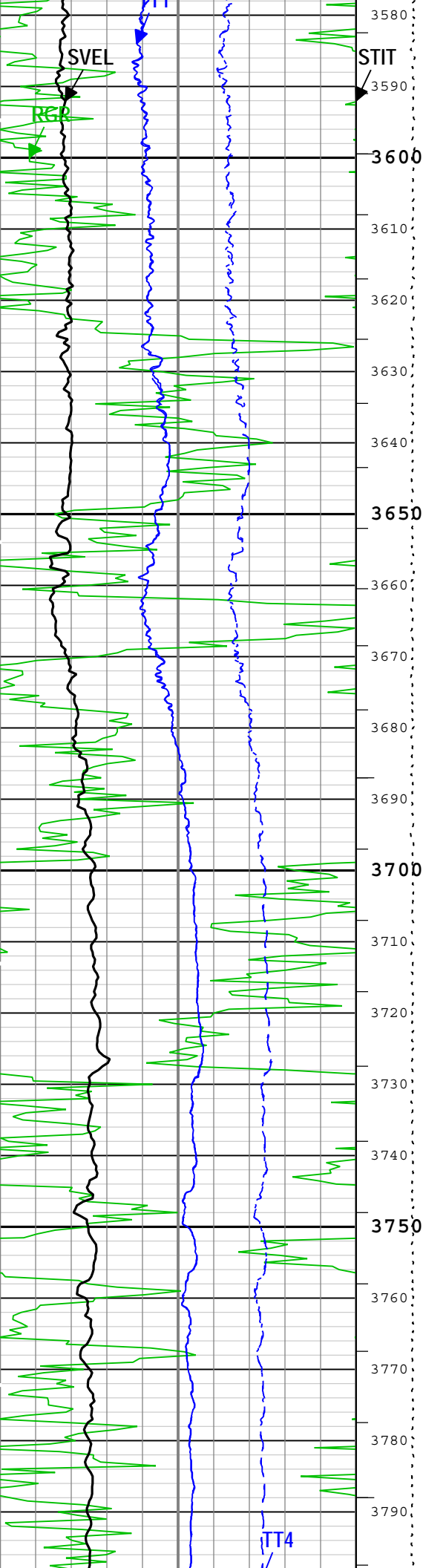


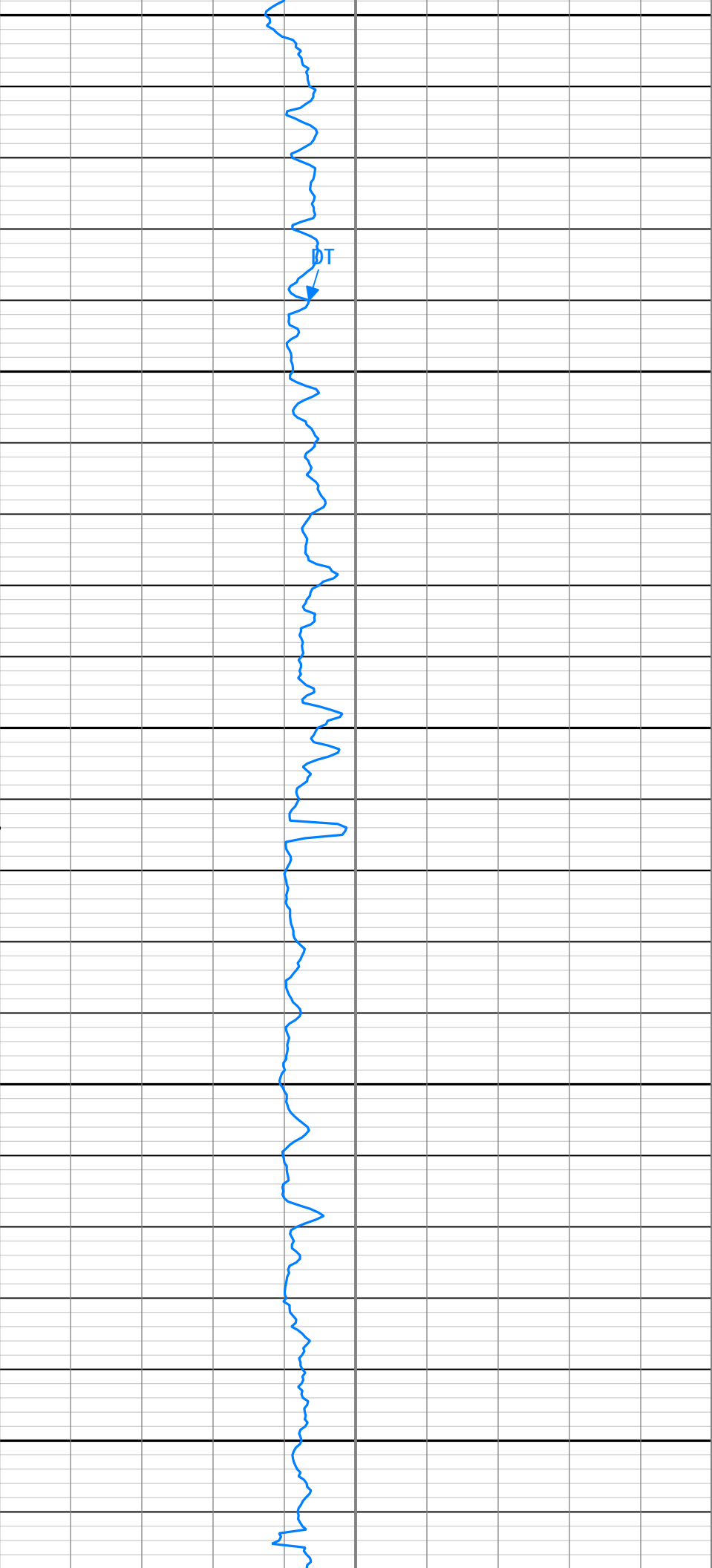
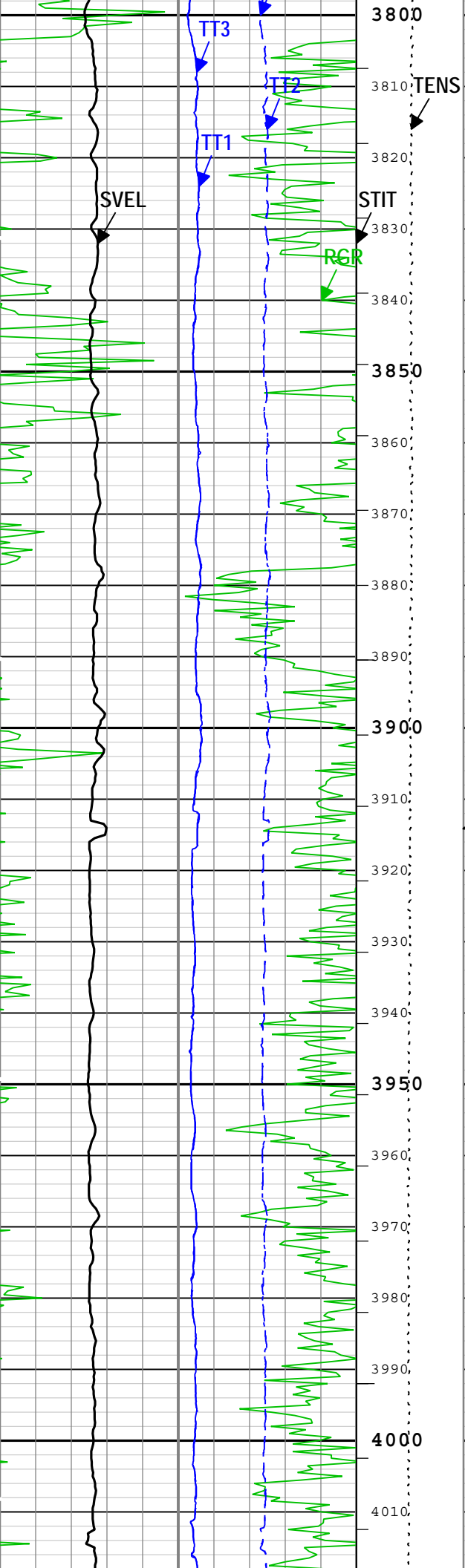


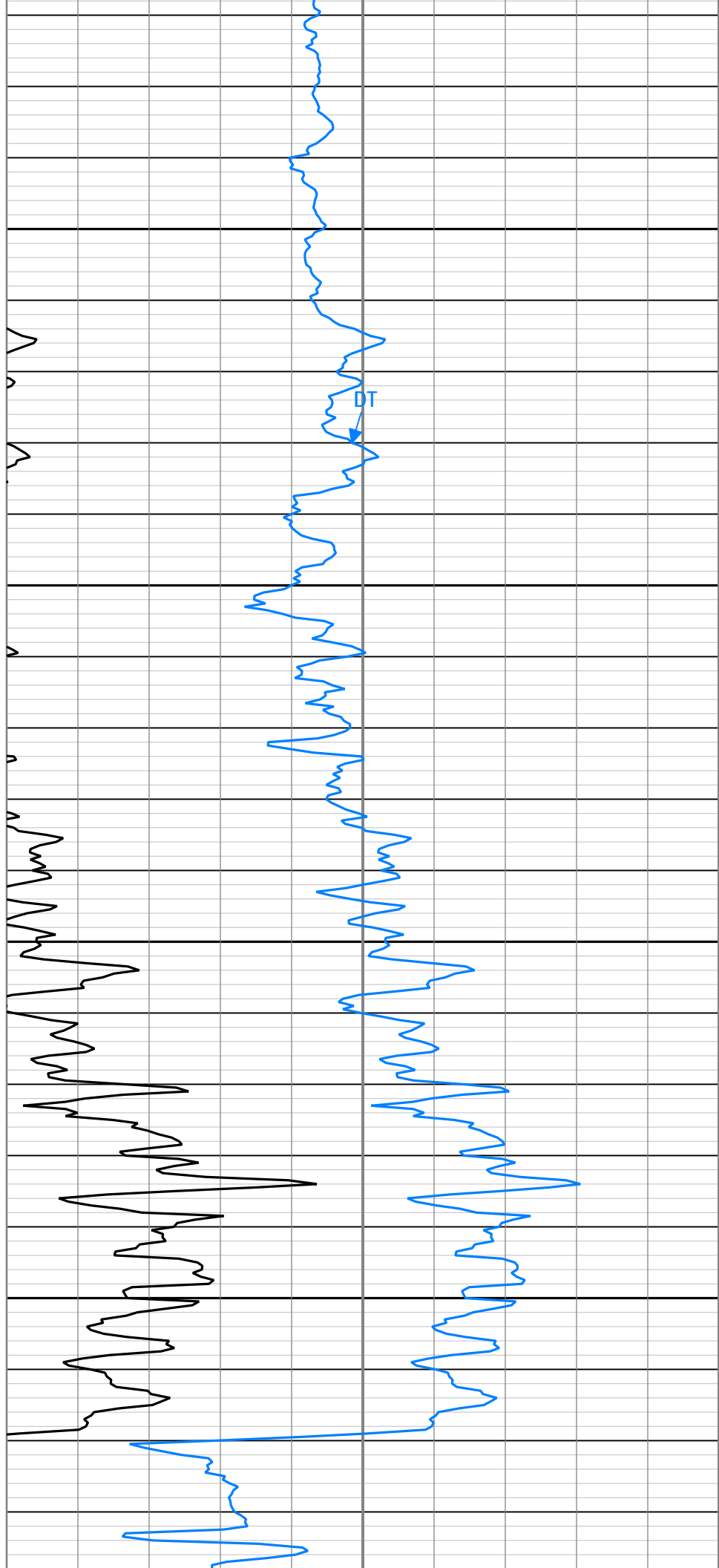
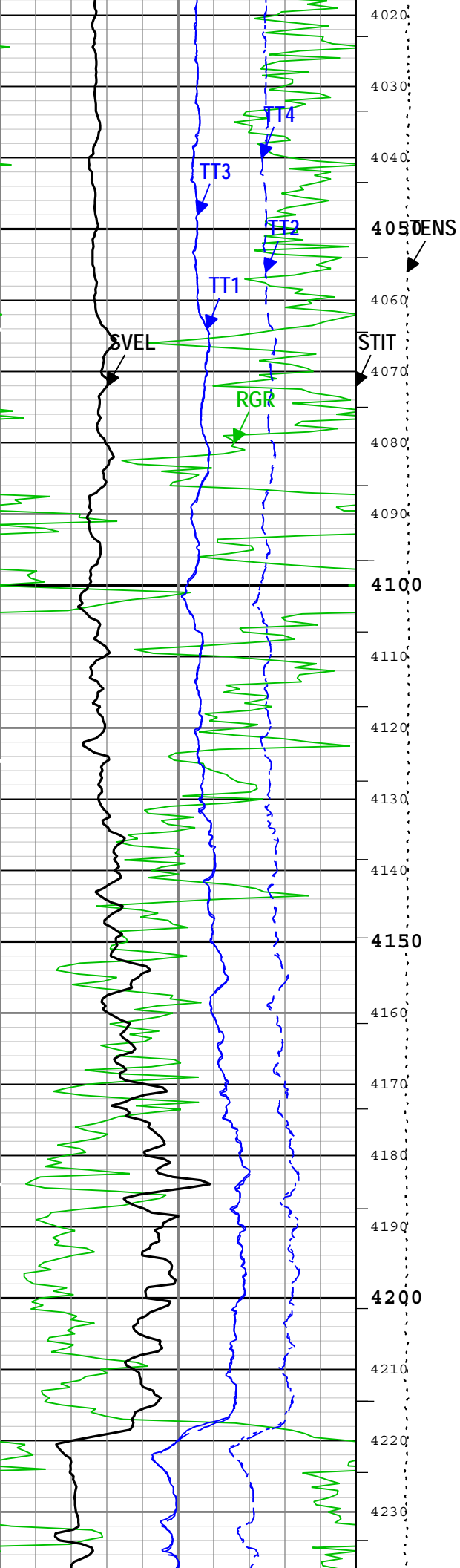


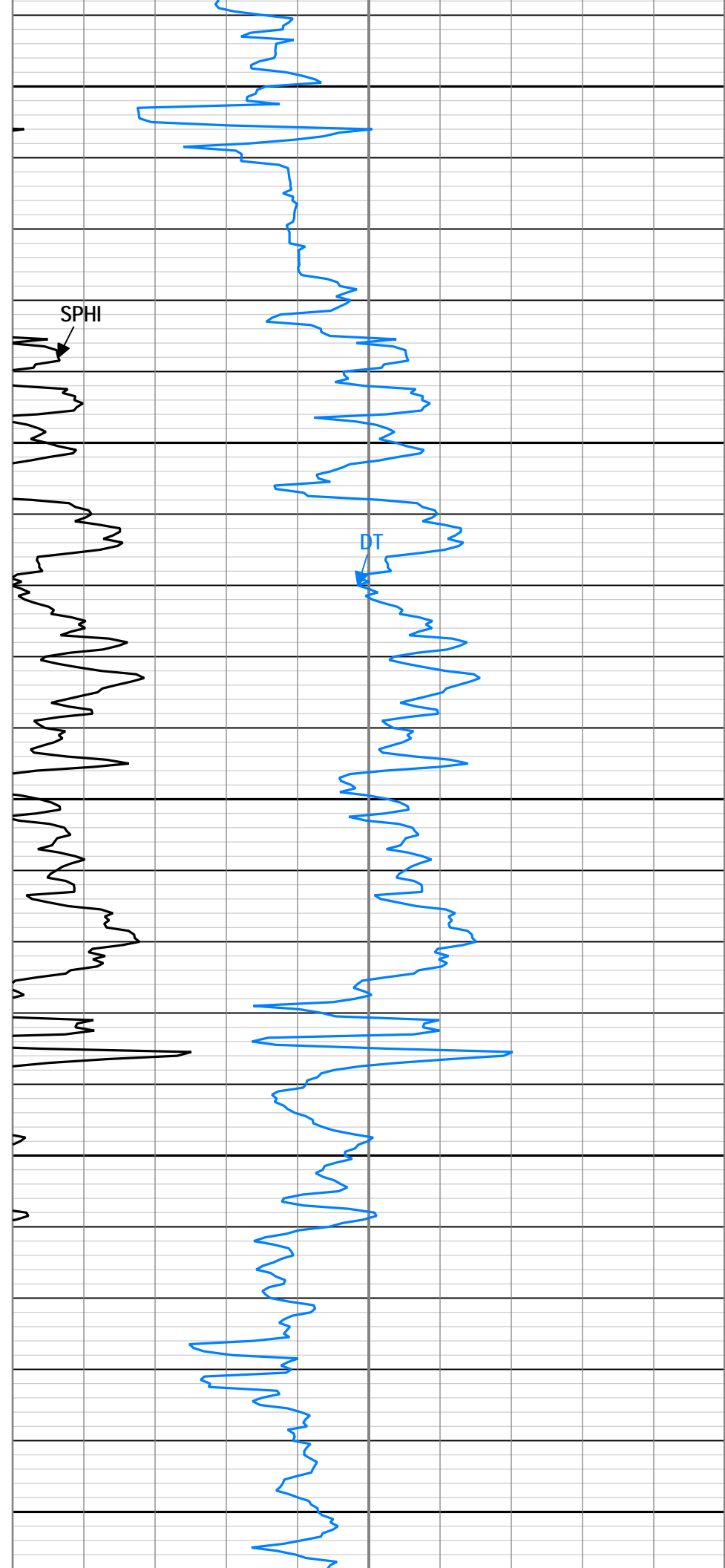
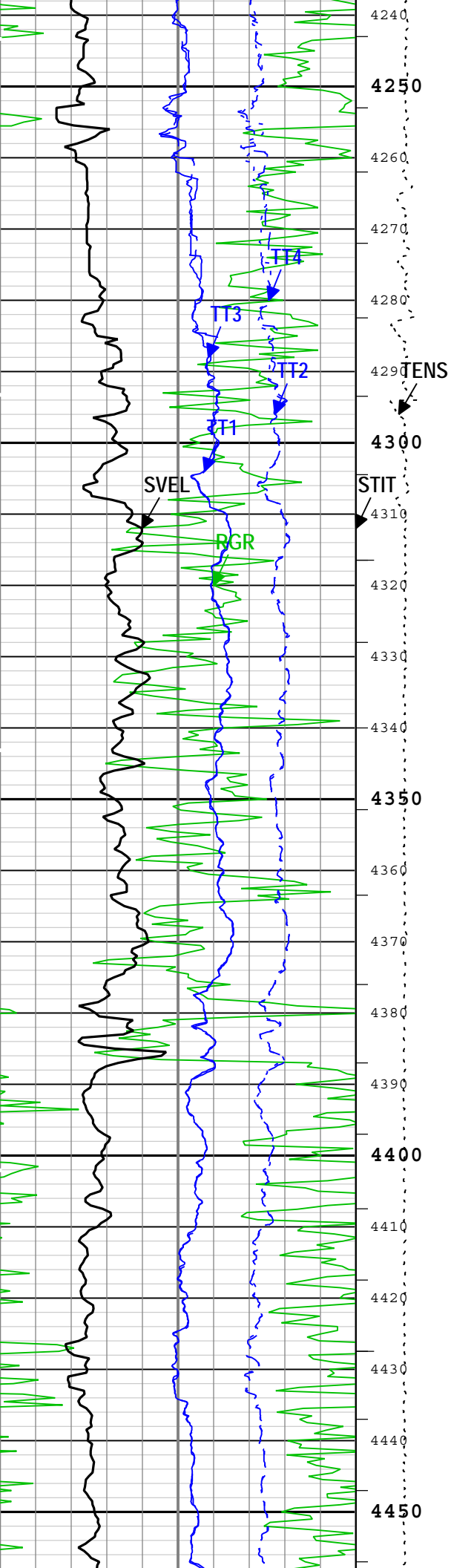


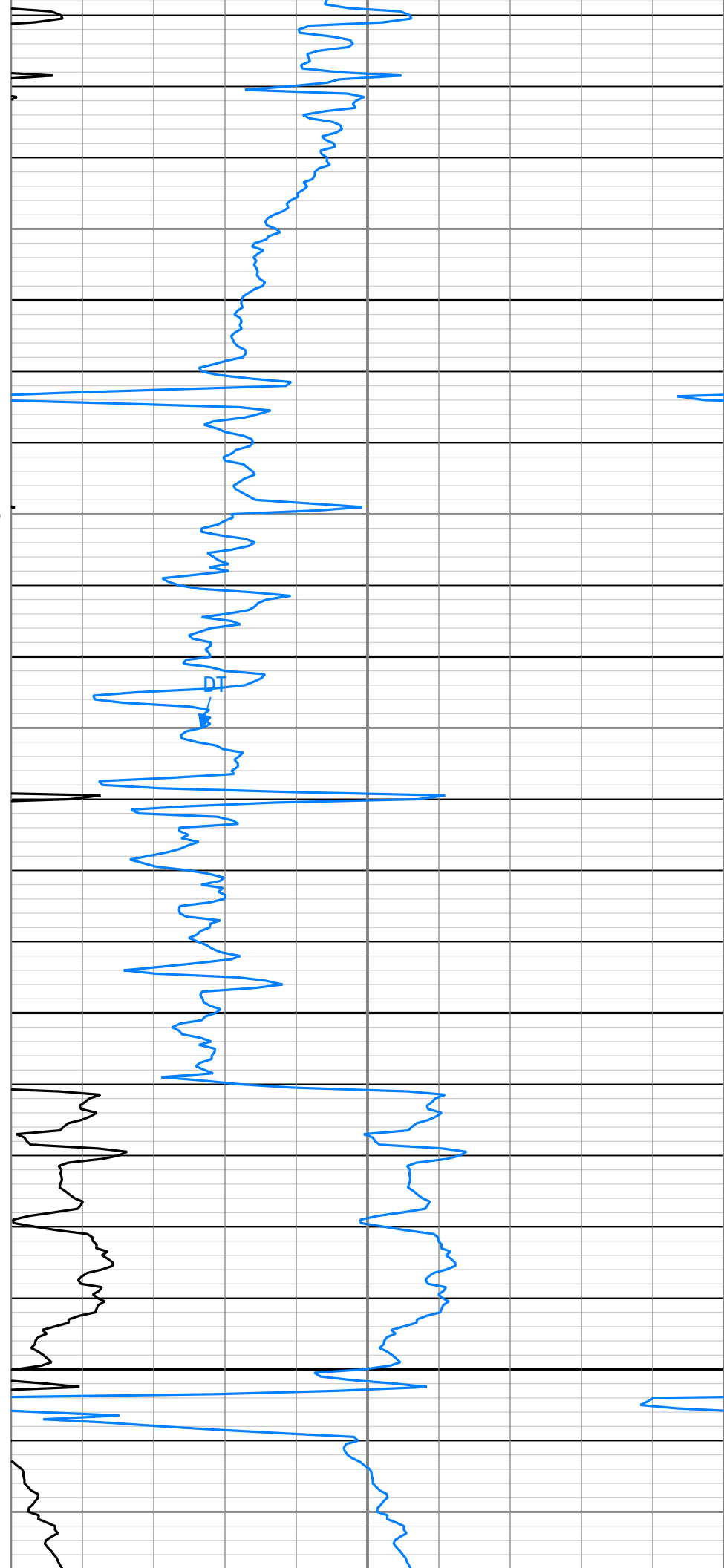
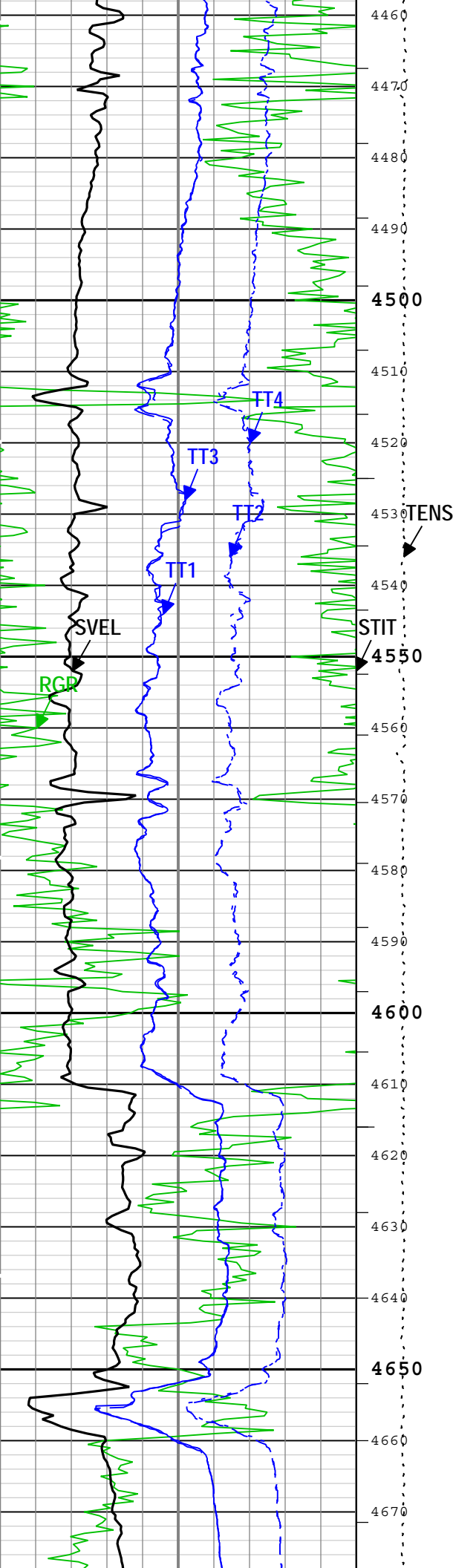


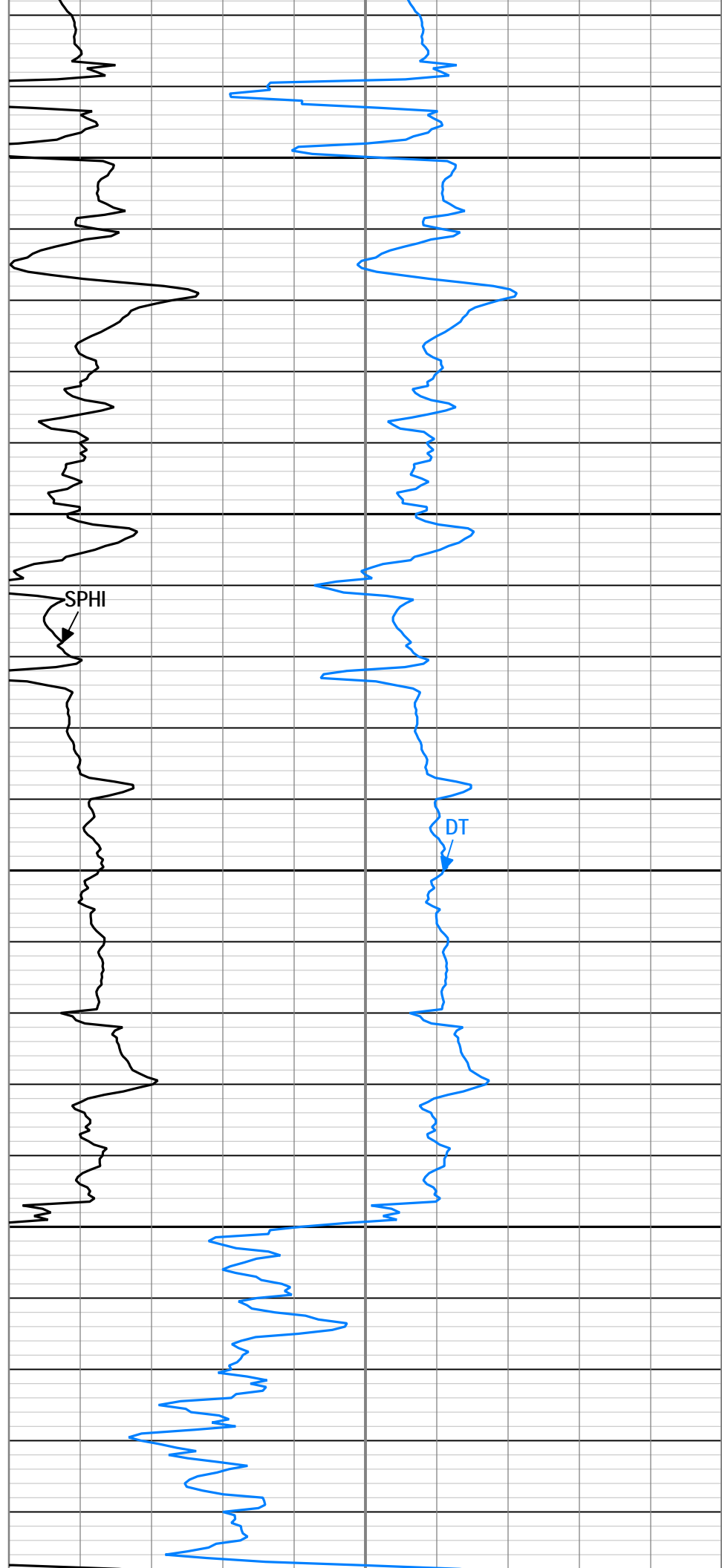
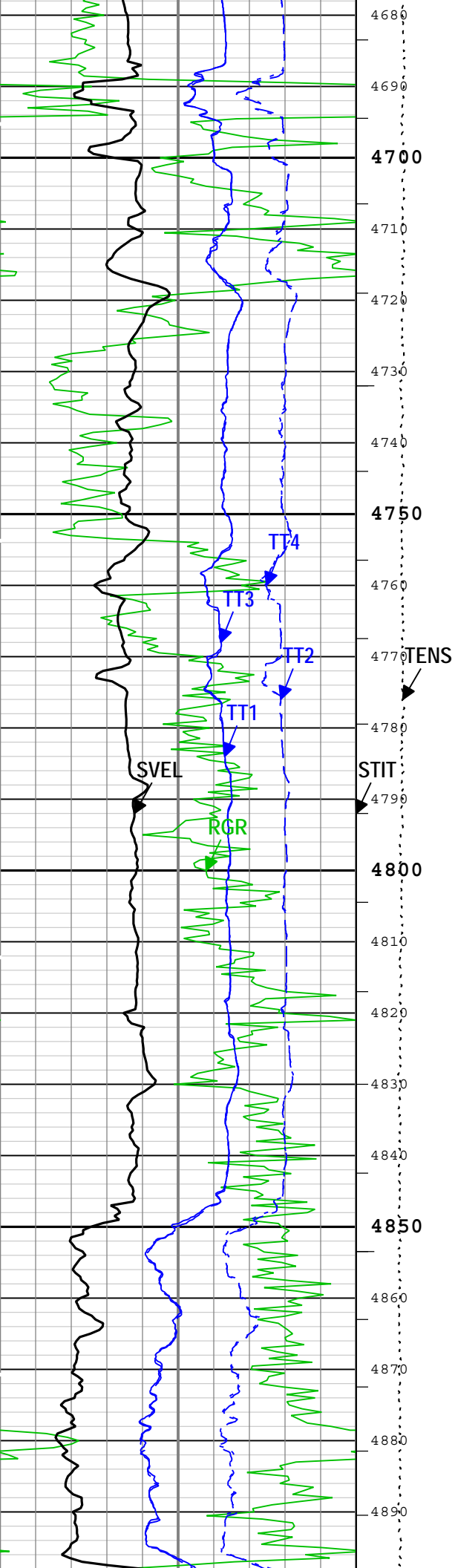


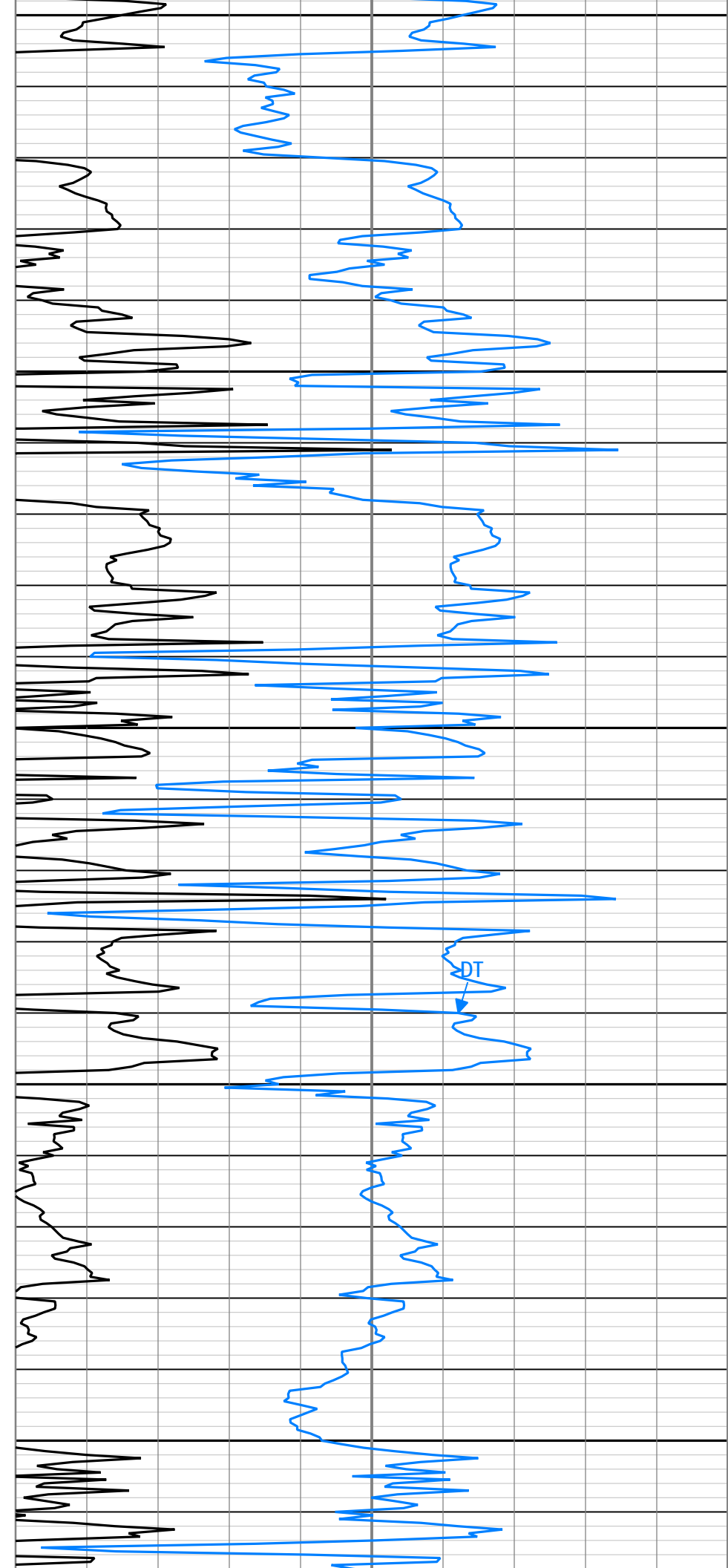
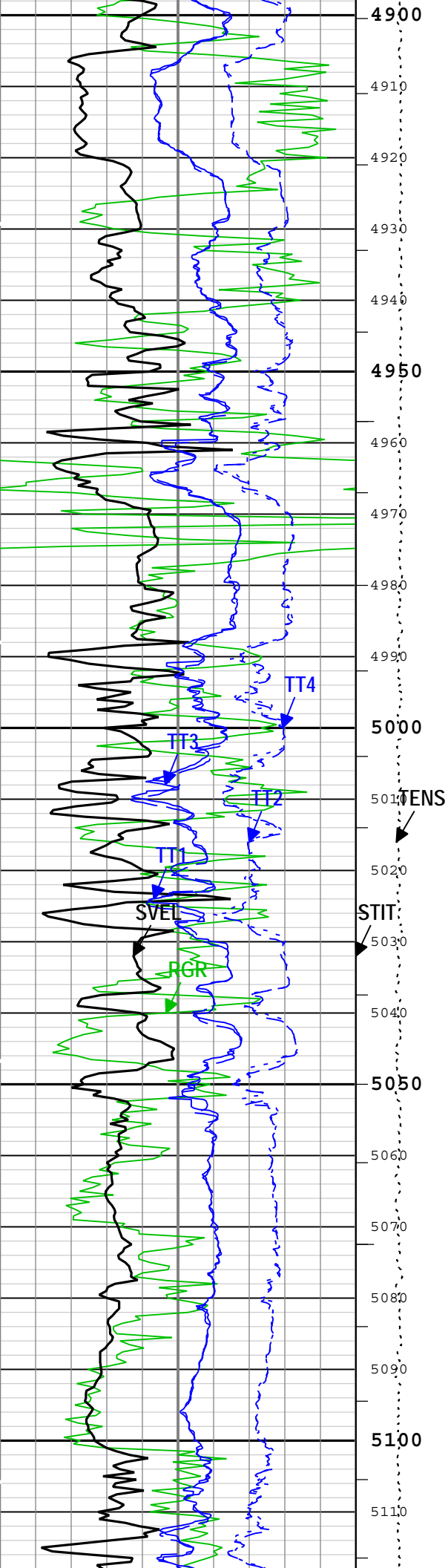


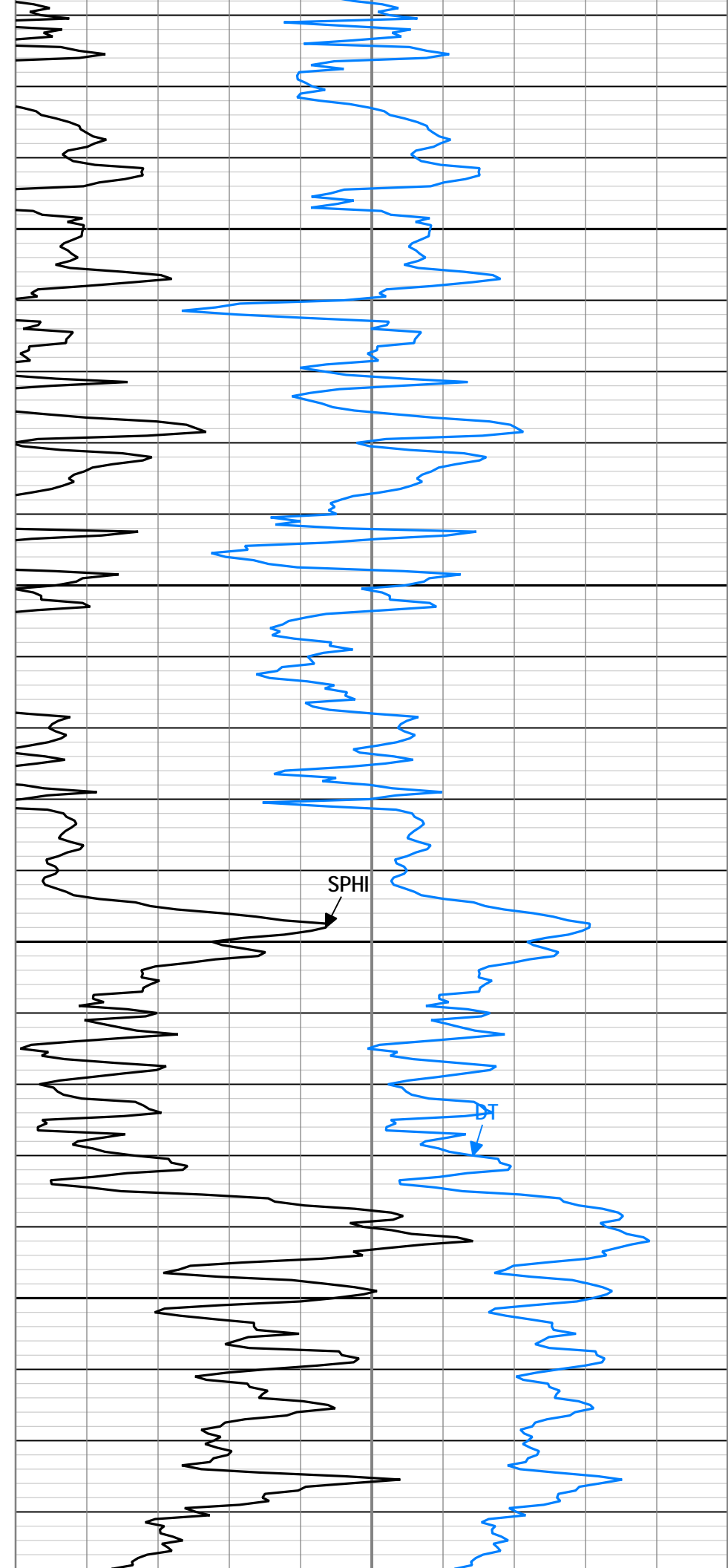
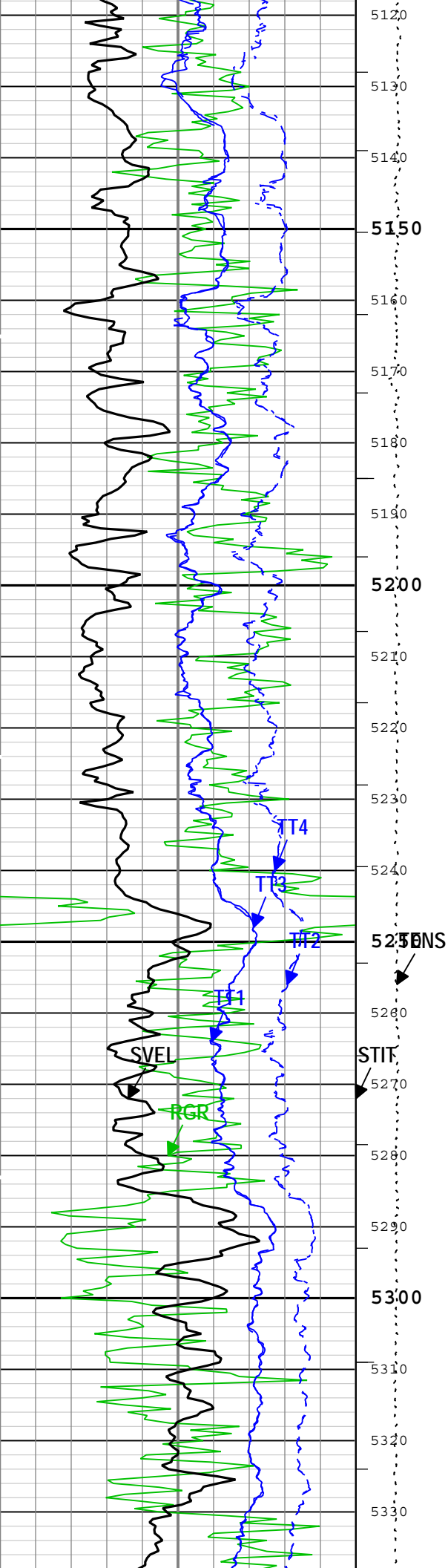


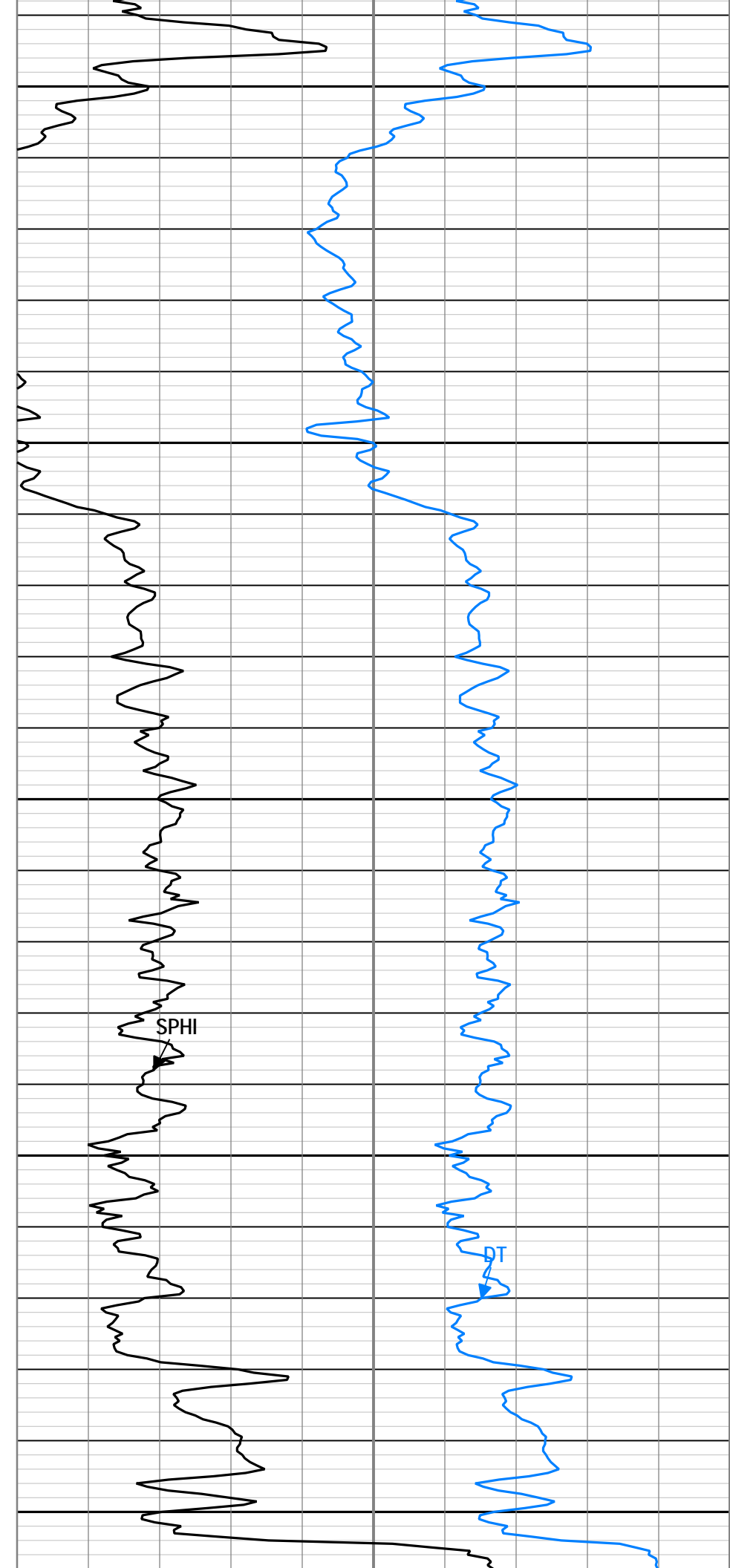
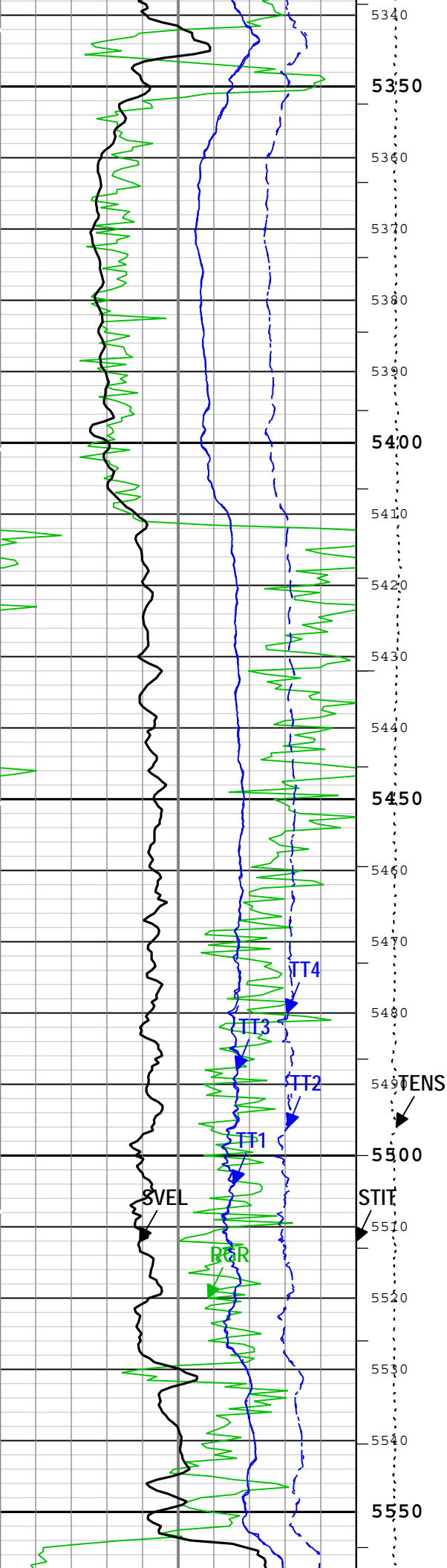


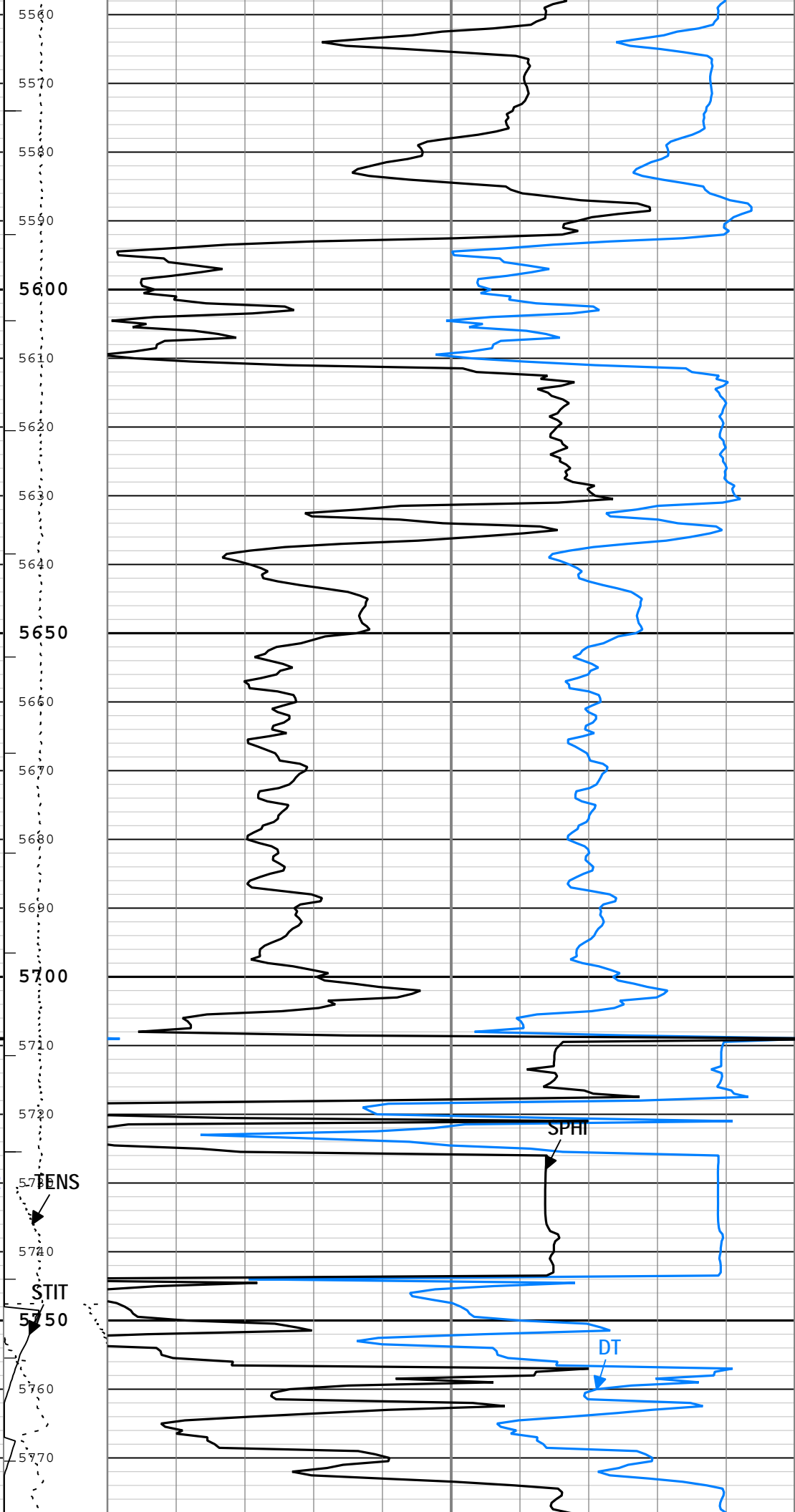
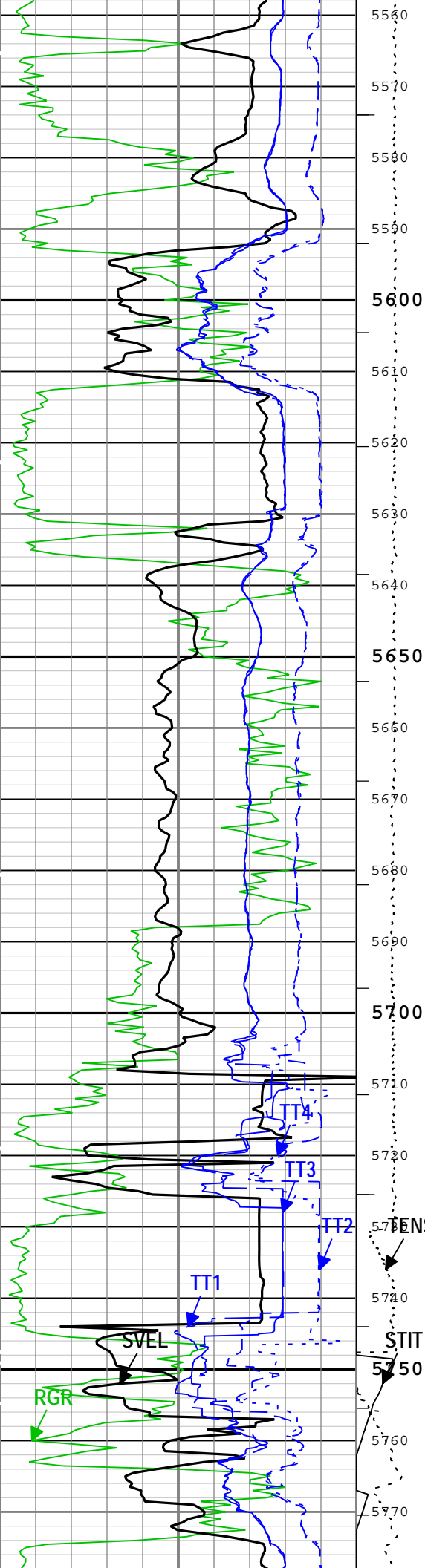


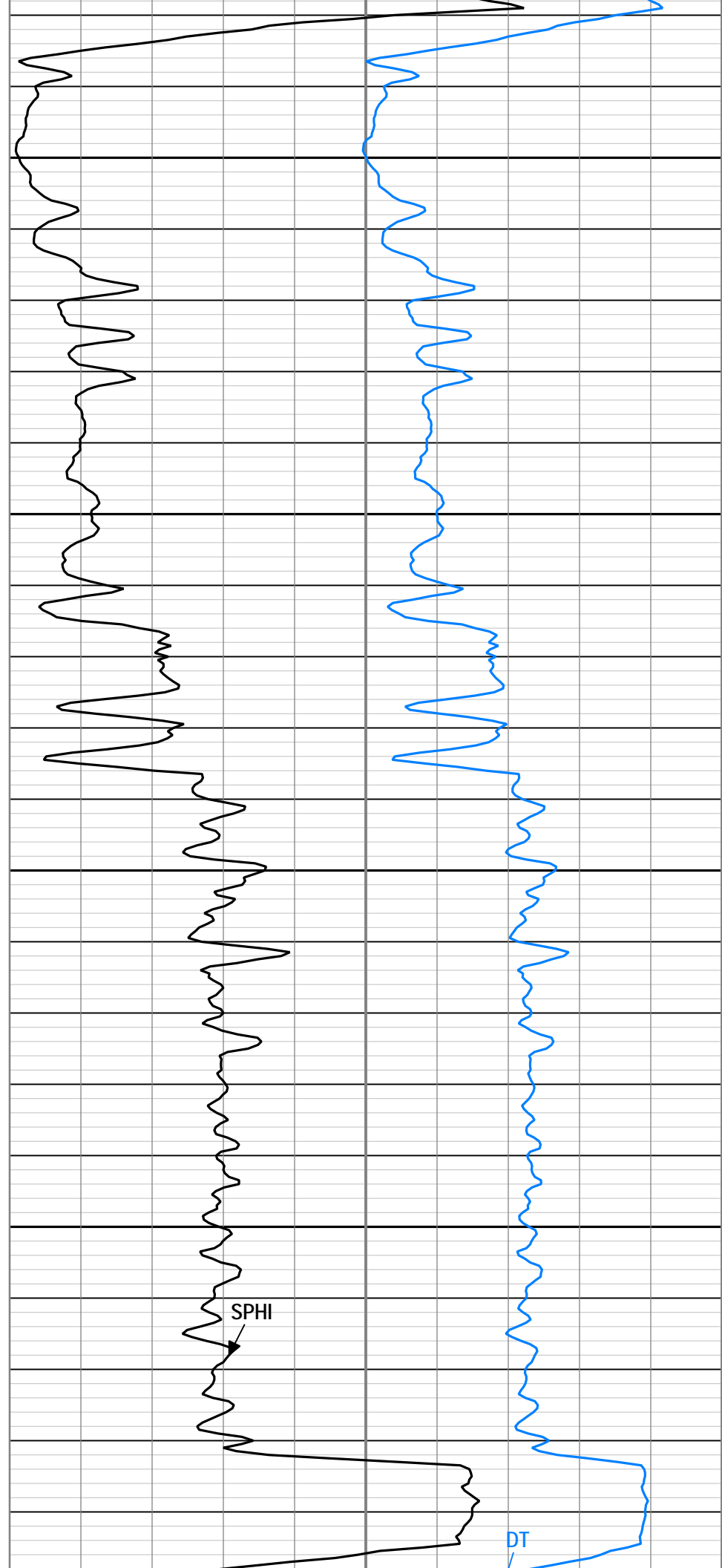
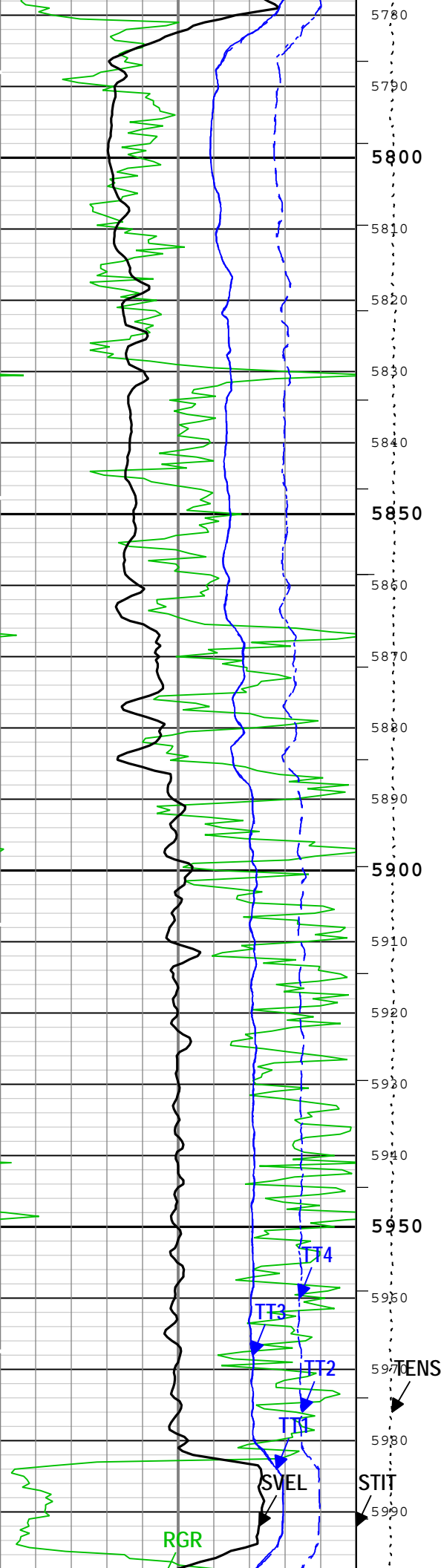


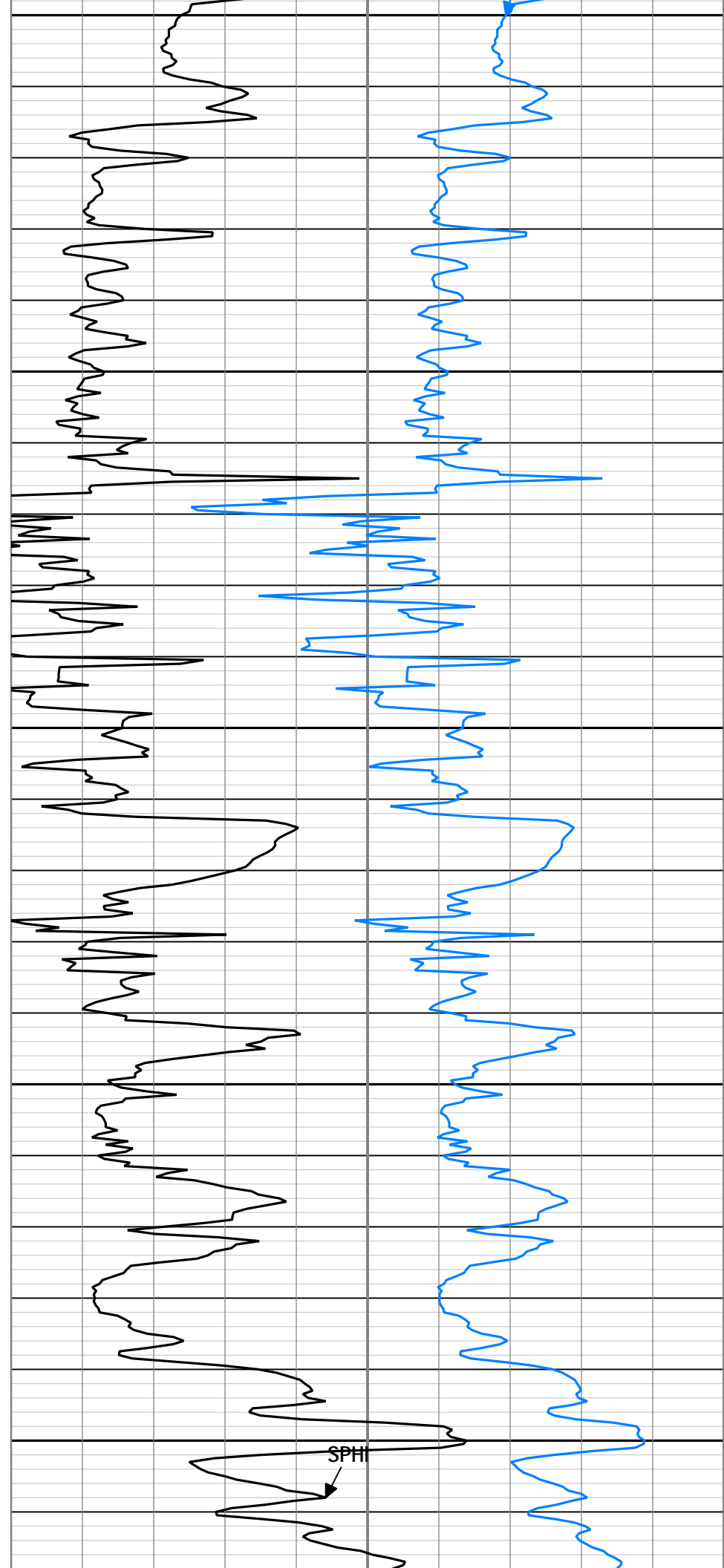
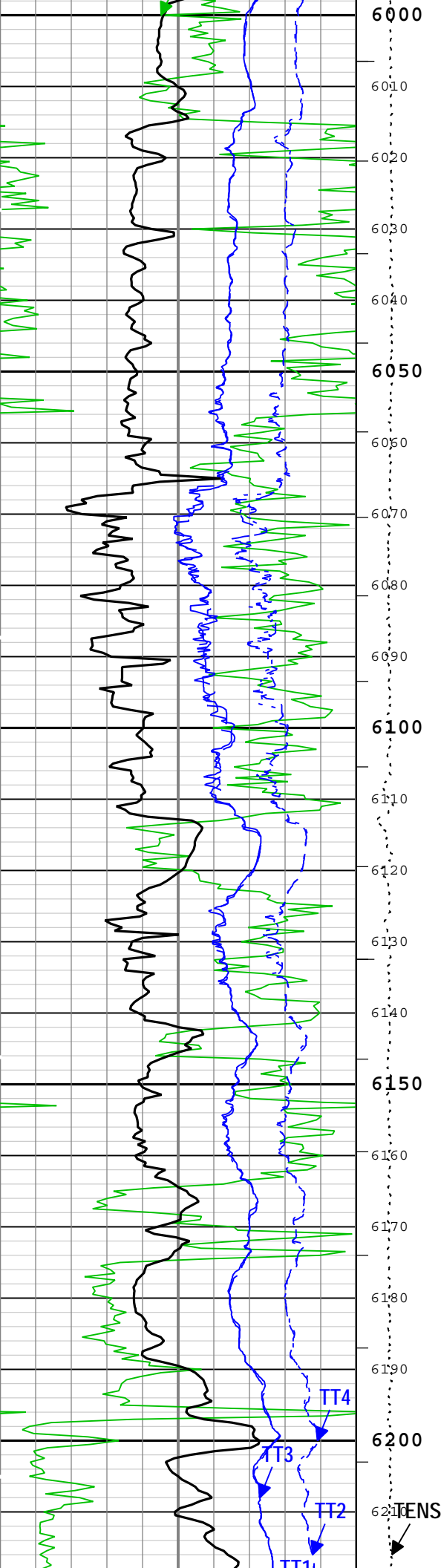


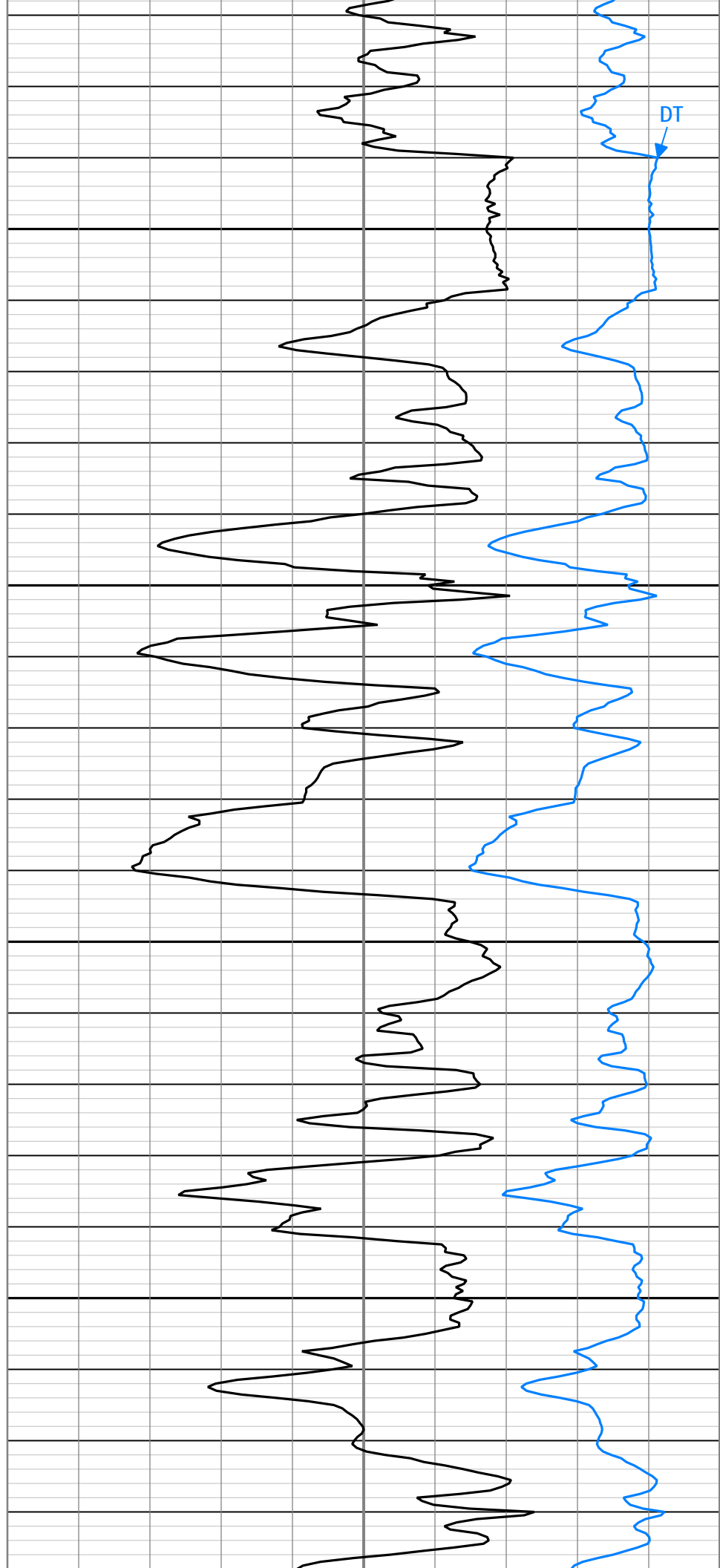
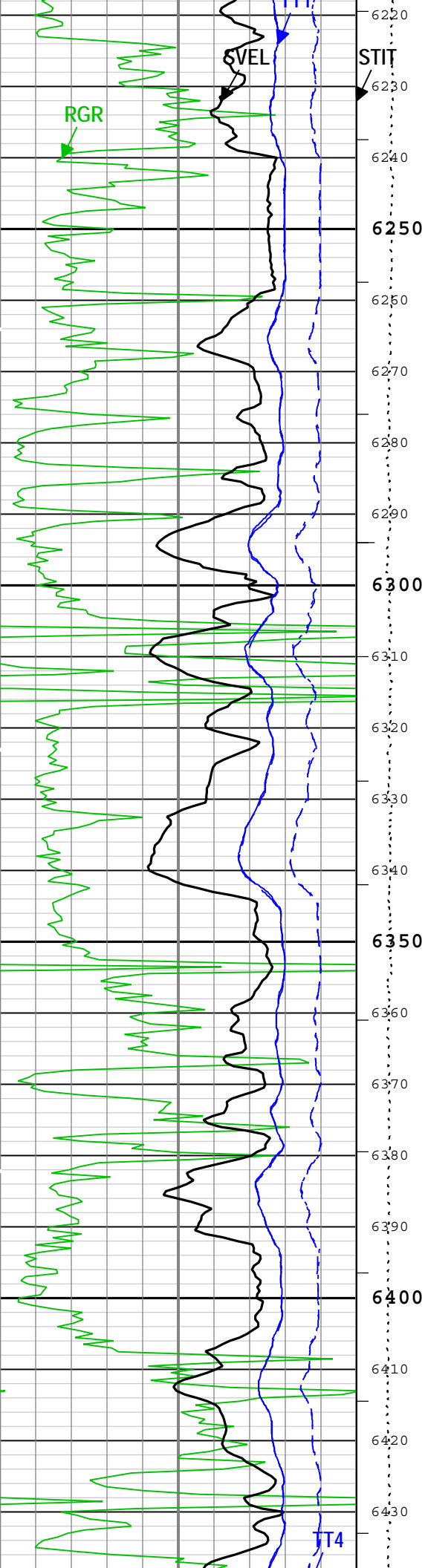


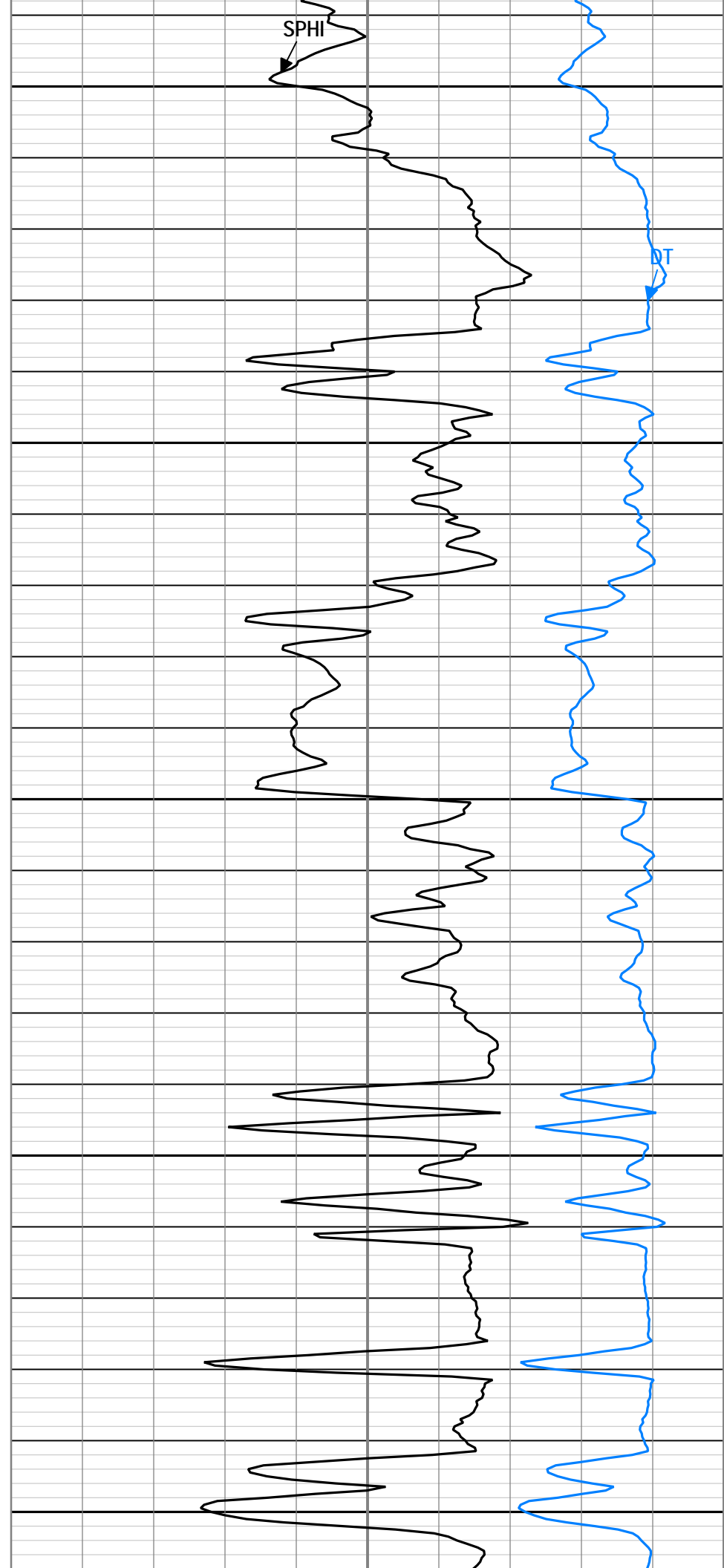
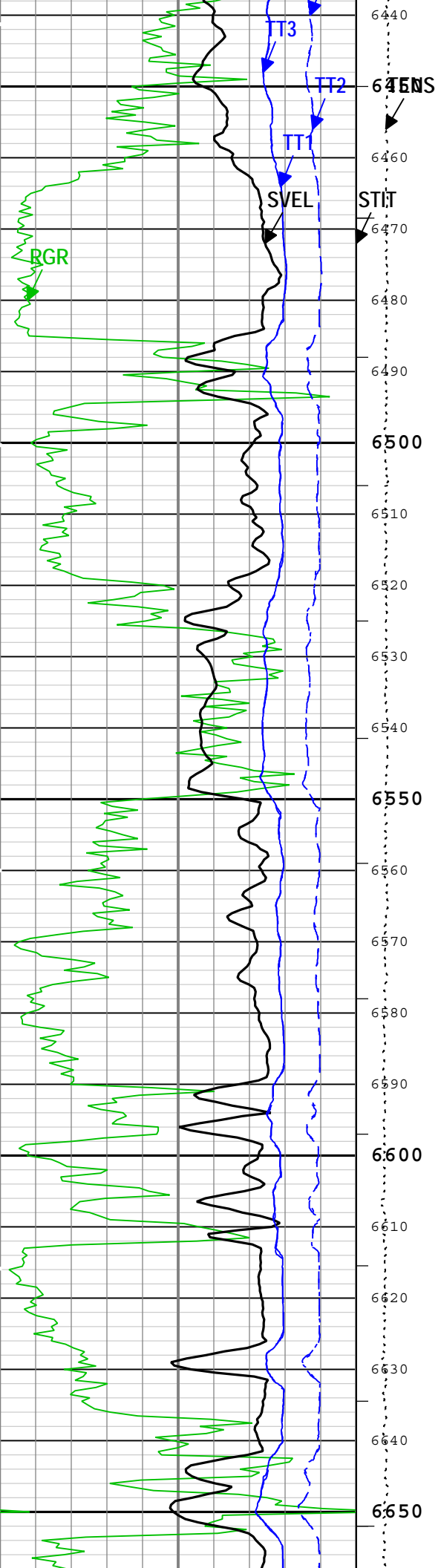


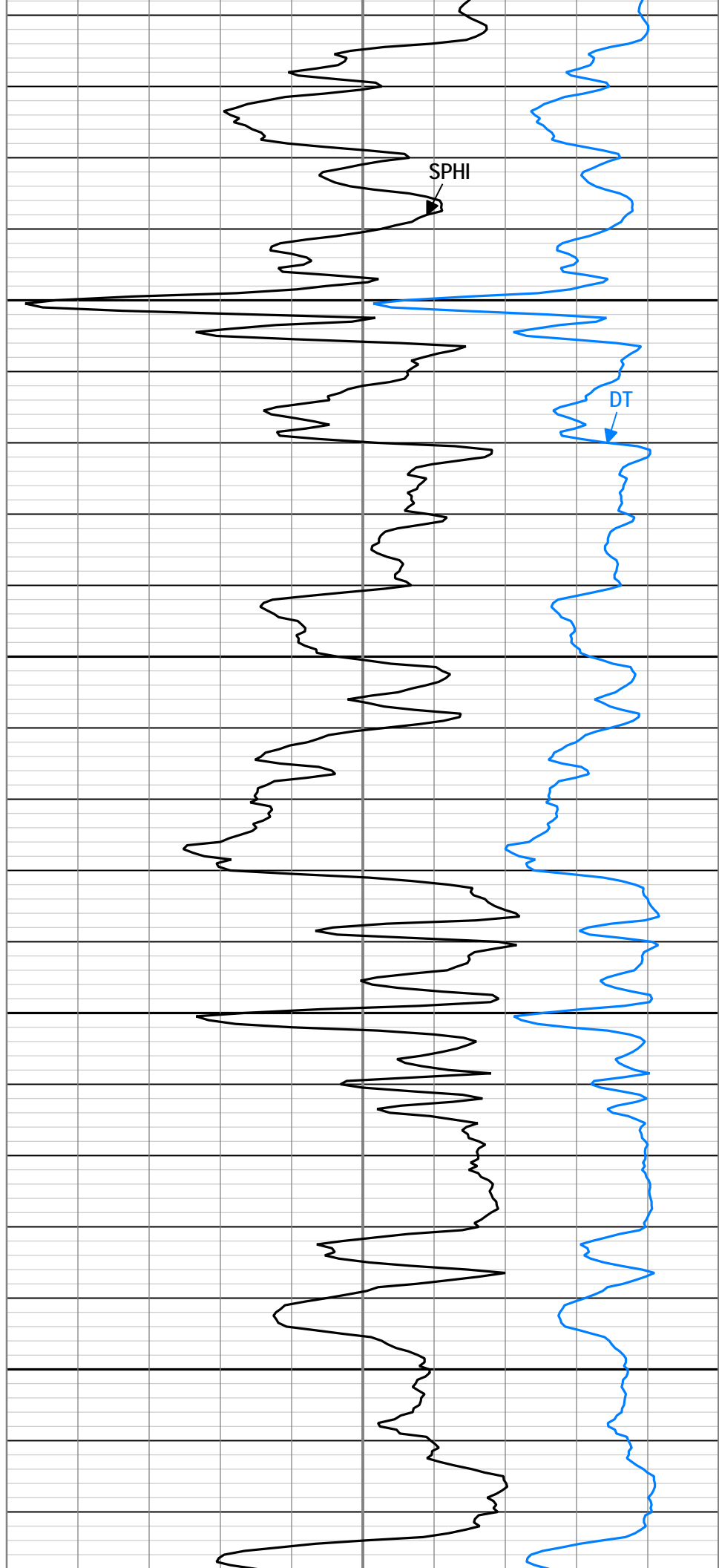
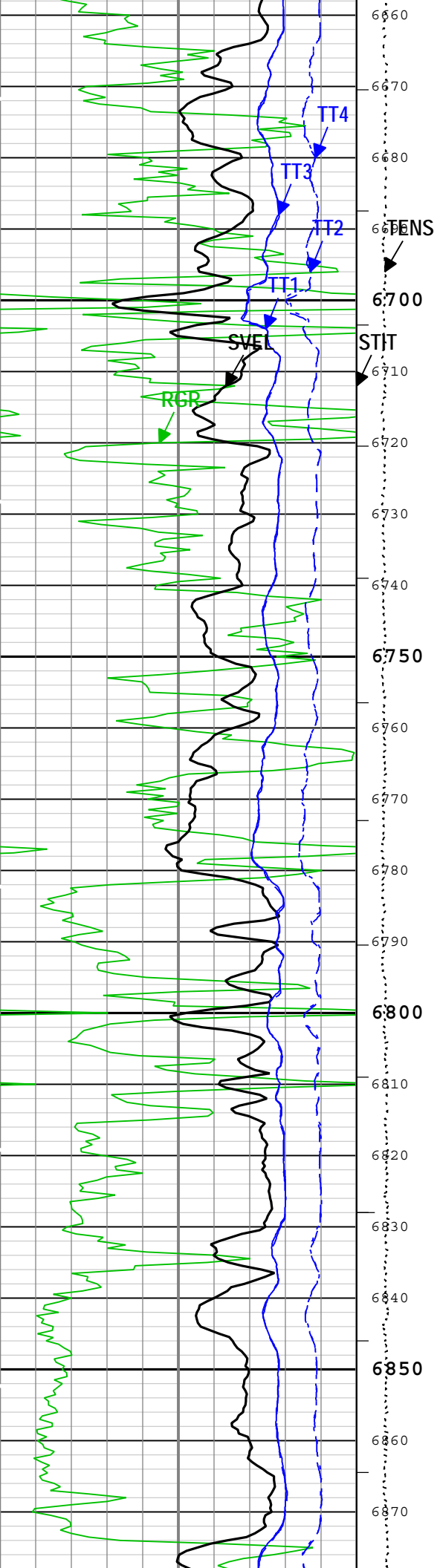


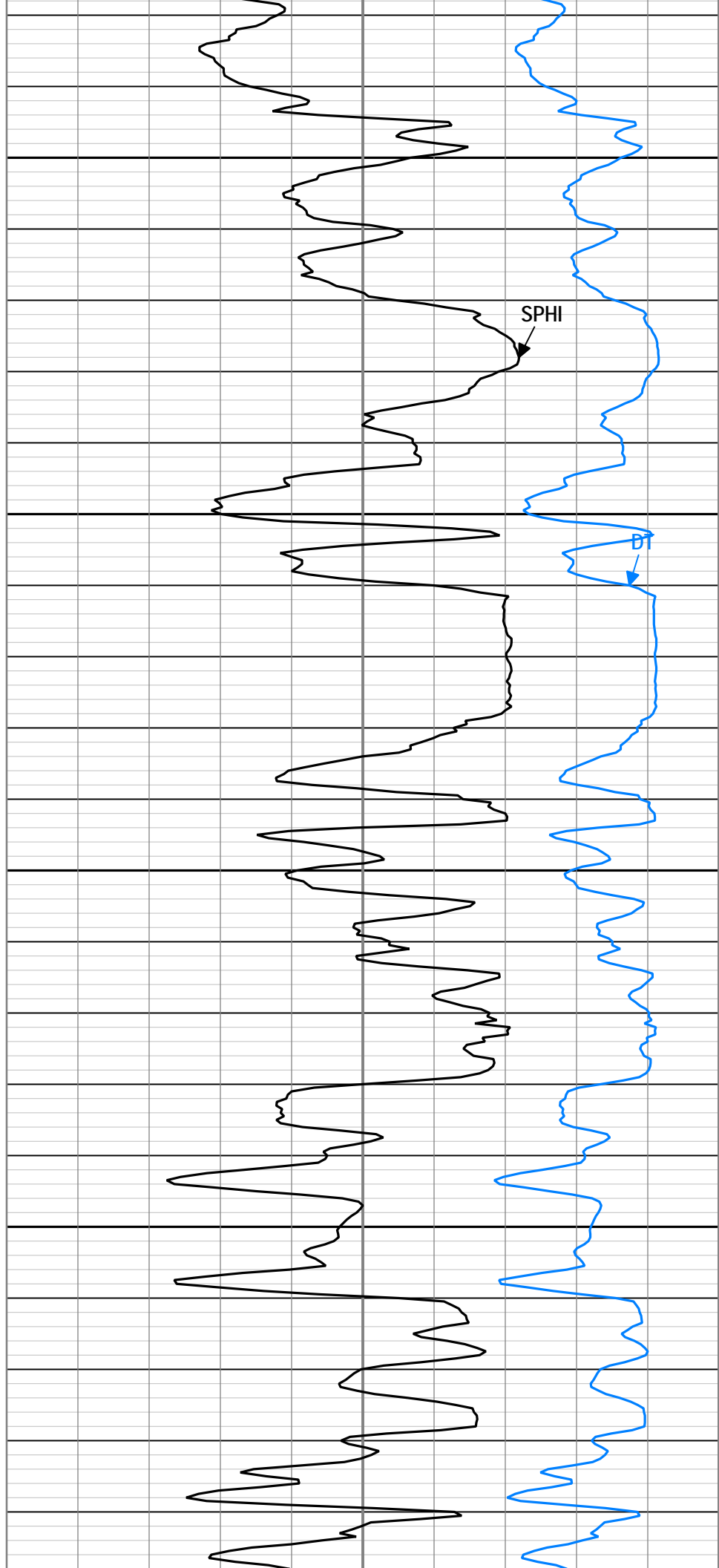
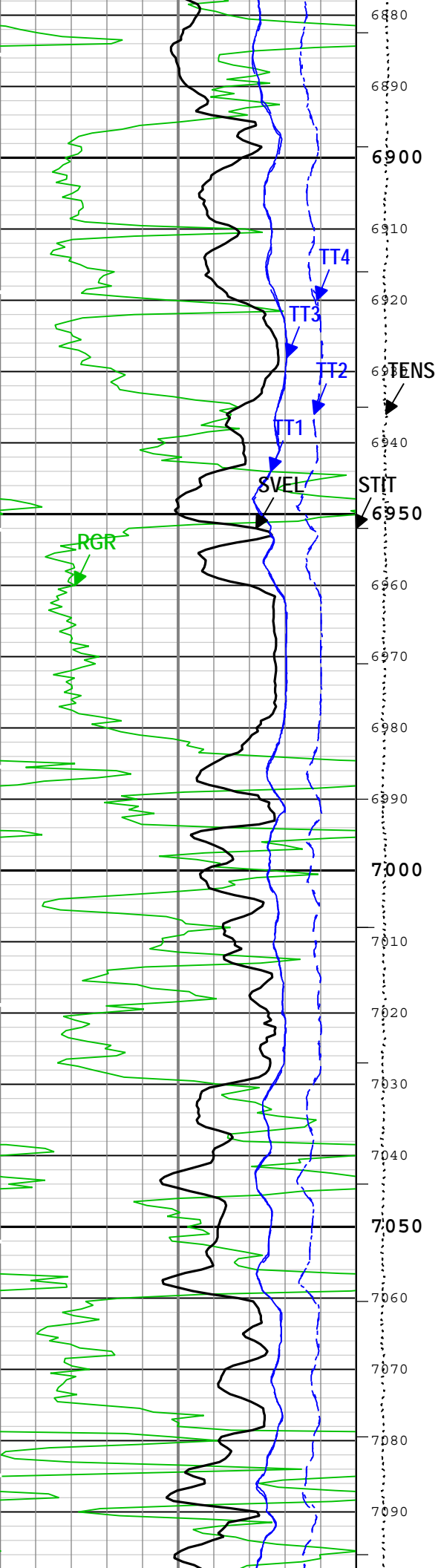


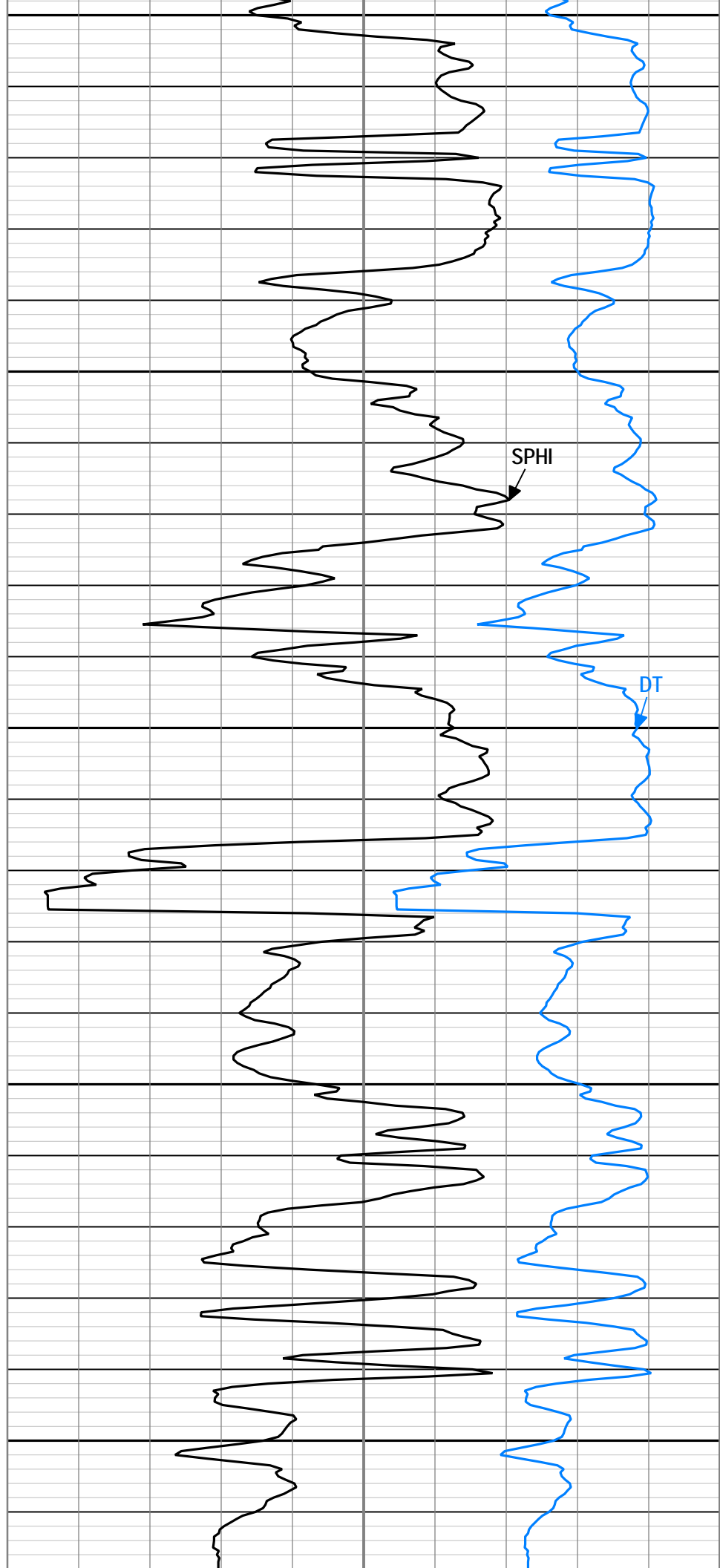
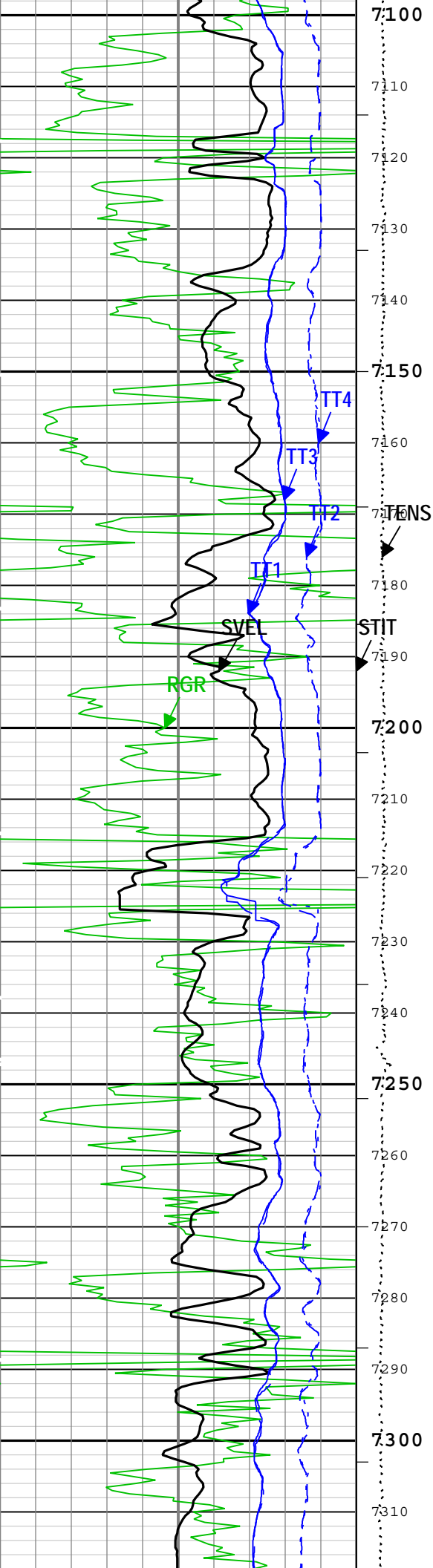


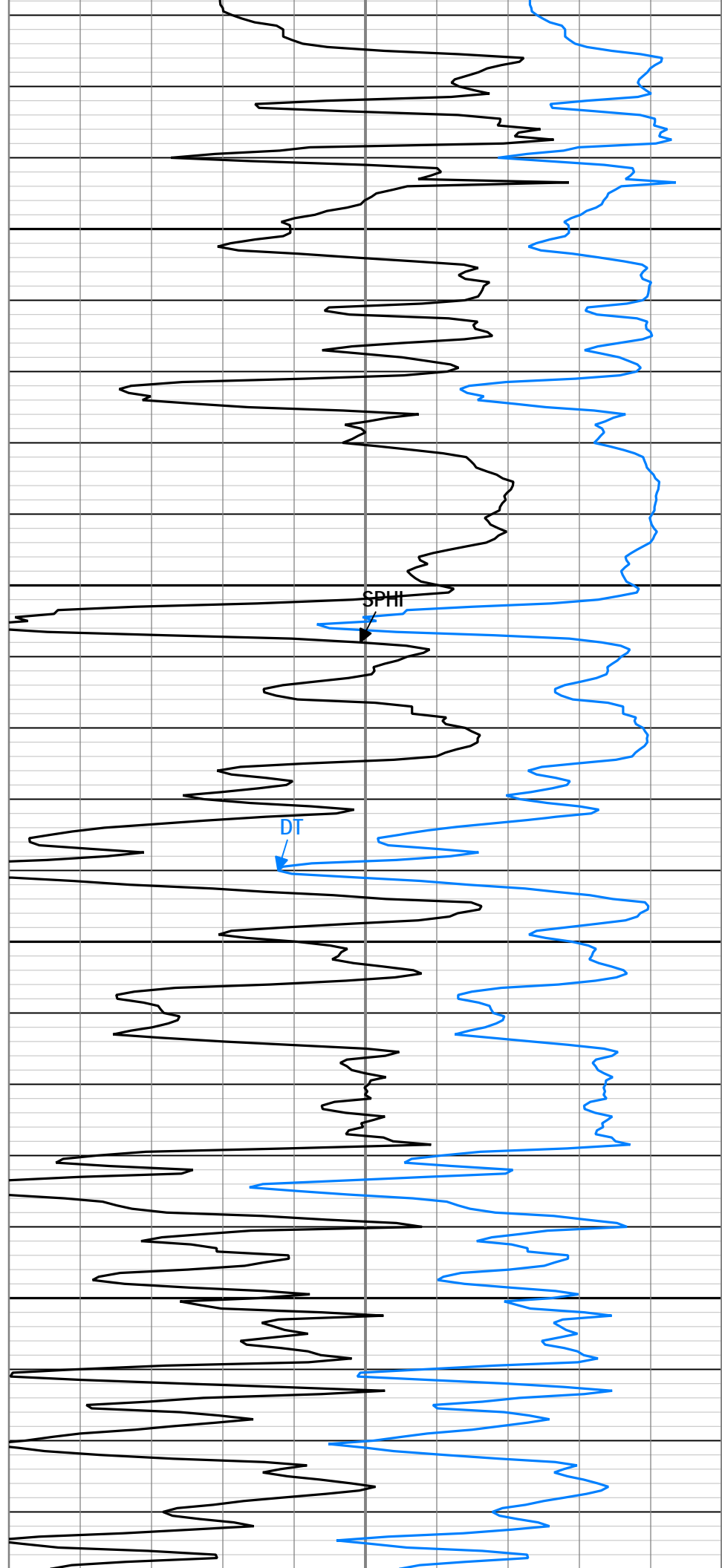
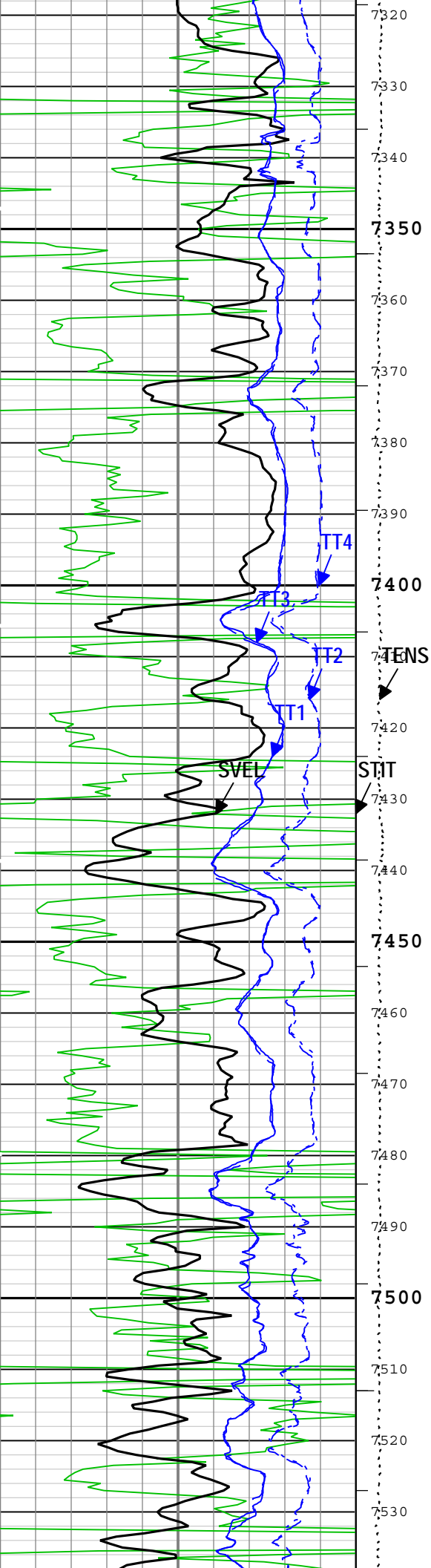


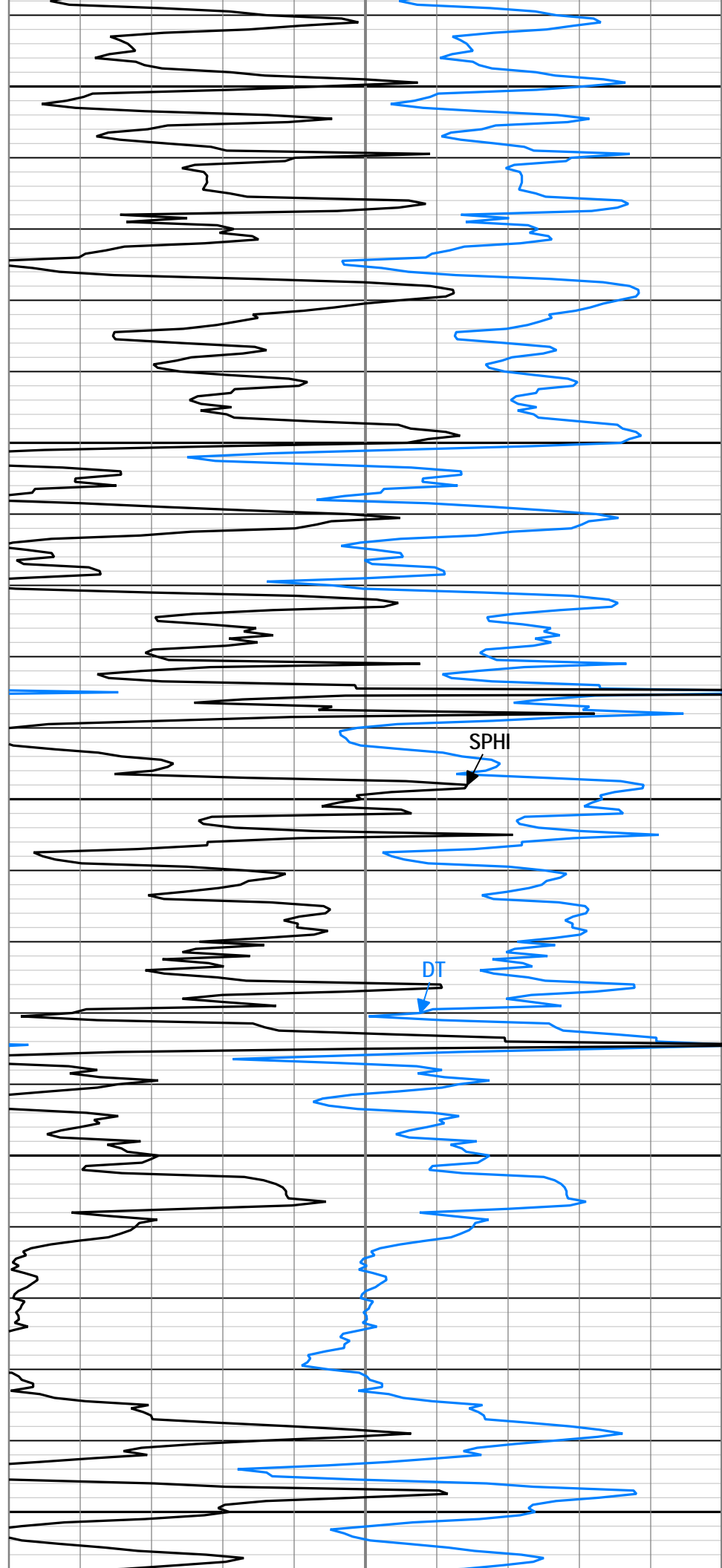
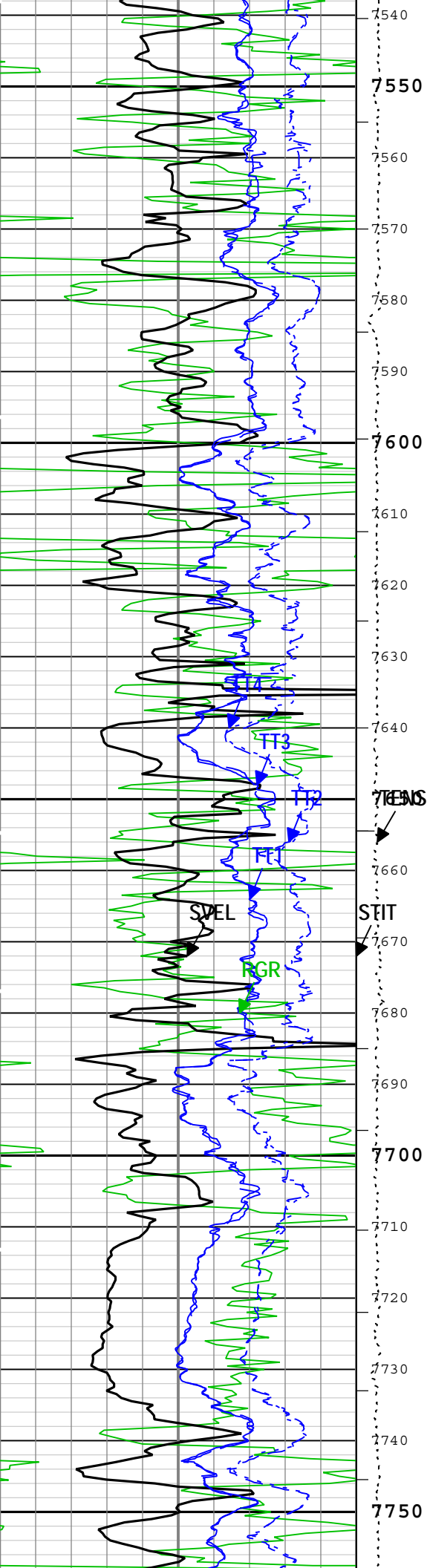


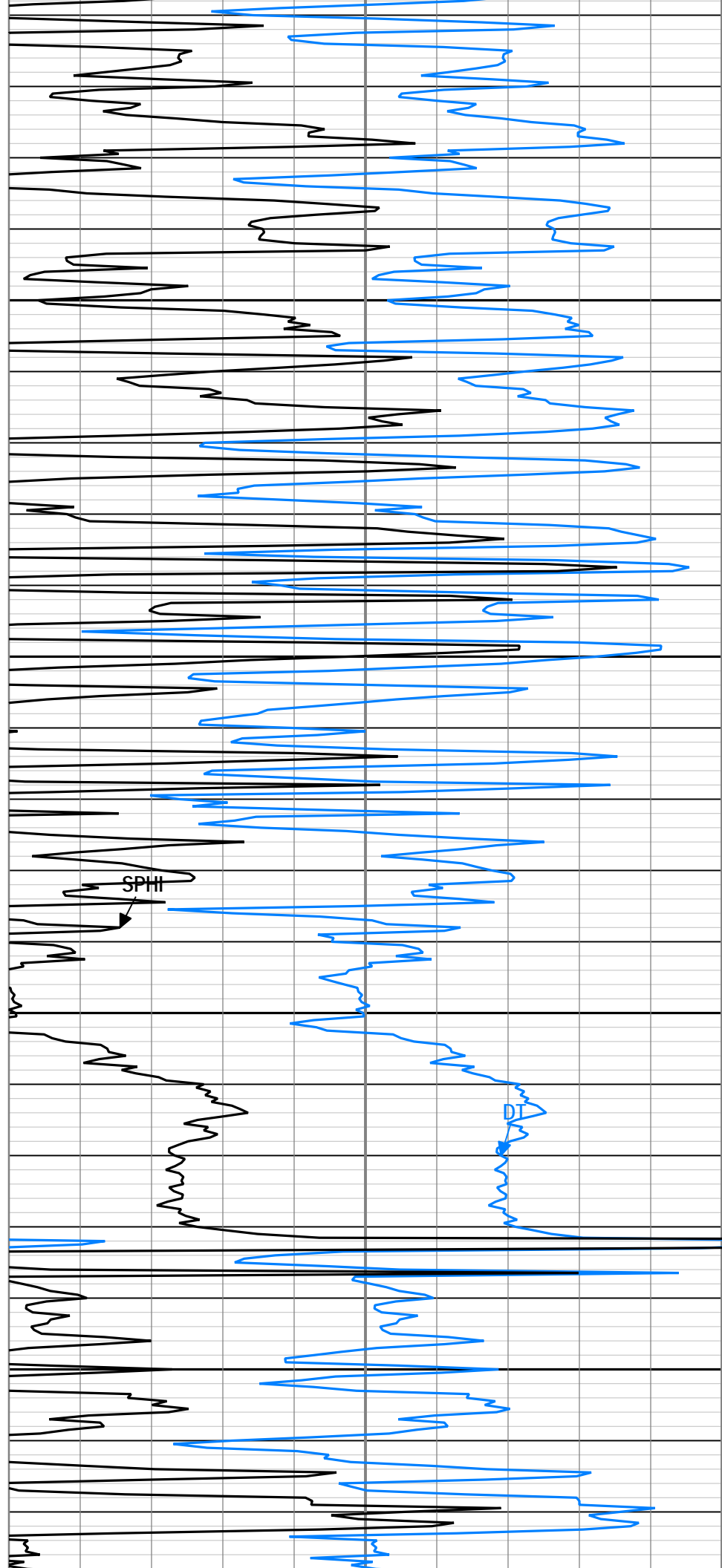
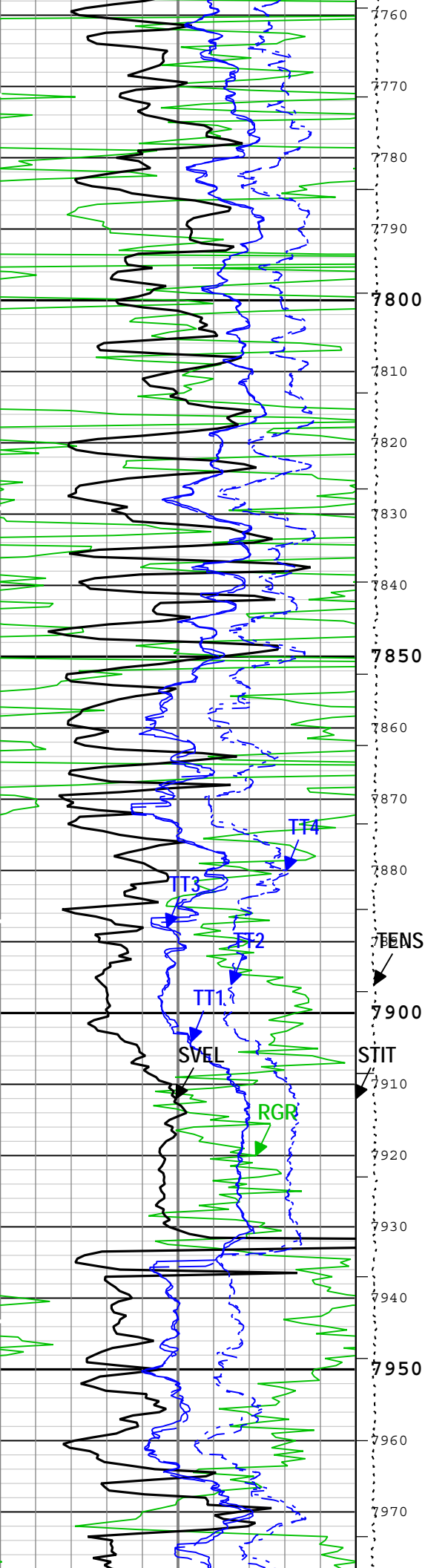


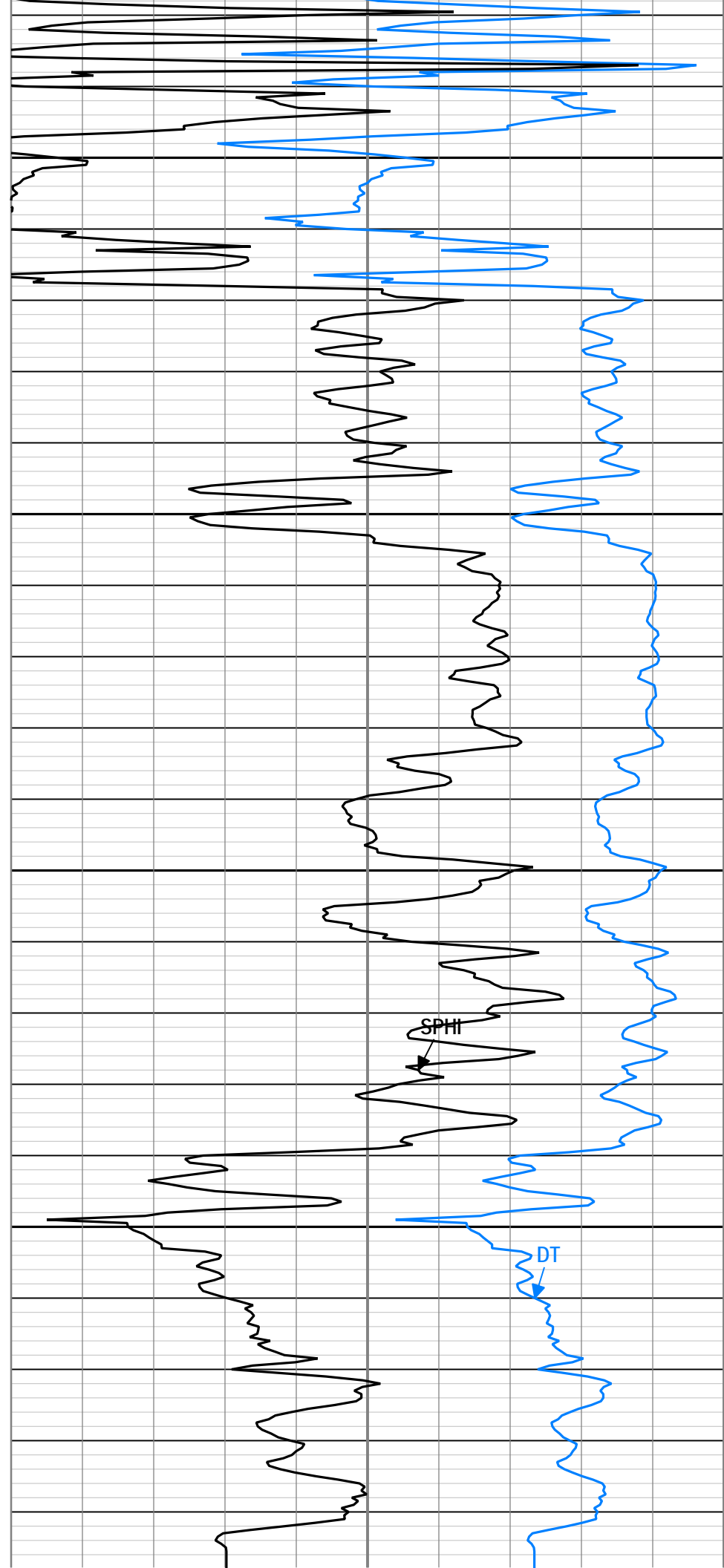
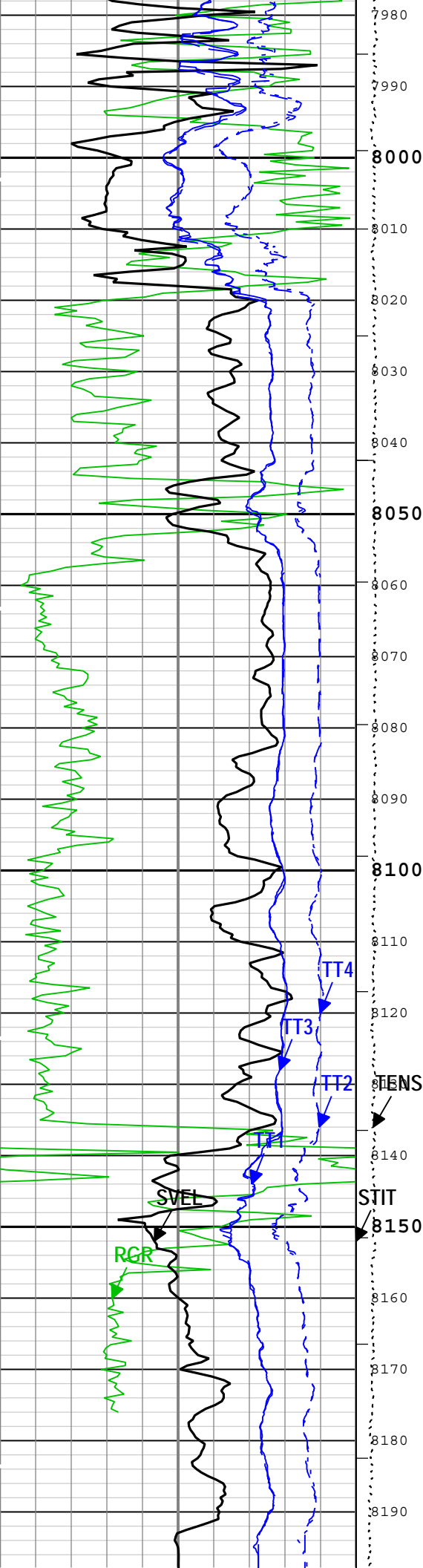


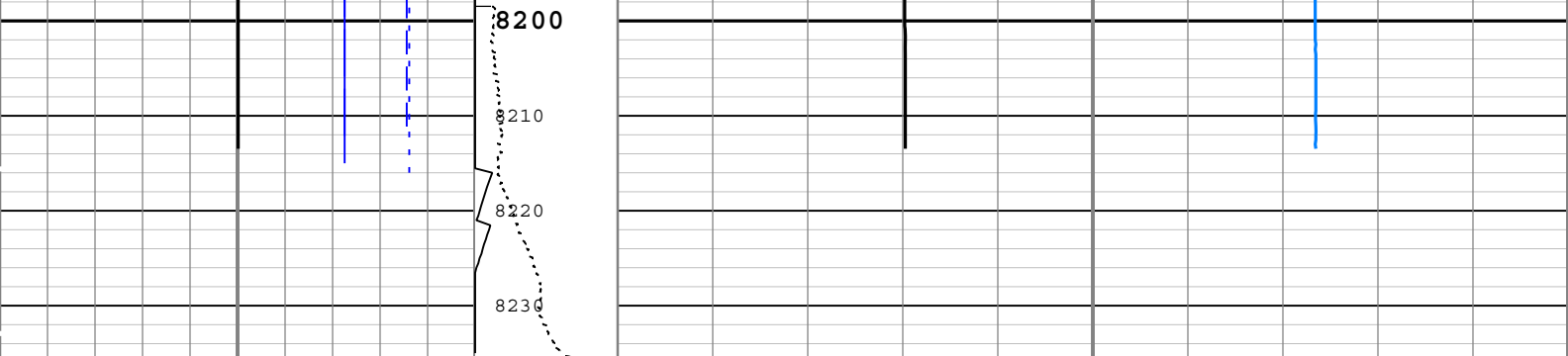












Raw Gamma Ray (RGR) HGNS-H			Stuck Tool Indicator, Total (STIT) <div>0 ft 50</div> <div>CableDrag</div> <div>ToolDrag</div> <div>Cable Tension (TENS) 6000 lbf 0</div>	Delta-T (also called Slowness or Interval Transit Time) (DT) DSLT-H		
0	gAPI	150		140	us/ft	40
Sonic Velocity (SVEL) DSLT-H				Sonic Porosity (SPHI) DSLT-H		
5000	ft/s	25000		0.3	ft3/ft3	-0.1
Transit Time 1 (TT1) DSLT-H						
1200	us	200				
Transit Time 2 (TT2) DSLT-H						
1200	us	200				
Transit Time 3 (TT3) DSLT-H						
1200	us	200				
Transit Time 4 (TT4) DSLT-H						
1200	us	200				

TIME_1900 - Time Marked every 60.00 (s)

ITT - Integrated Transit Time every 10.00 (ms)

ITT - Integrated Transit Time every 1.00 (ms)

Description: SONI_Traditional_CompressionalDT_Curves Format: Log (Sonic Delta-t_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 00:43:47

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
CDS	Correction for Delta-T Shale, Empirical	Borehole	100	us/ft
DETE	Delta-T Detection	DSLT-H	E2	
DTCM	Delta-T Computation Mode	DSLT-H	Full	
DTF	Delta-T Fluid	Borehole	189	us/ft
DTM	Delta-T Matrix	Borehole	47.5	us/ft
ITTS	Integrated Transit Time Source	DSLT-H	DT	
MAHTR	Manual High Threshold Reference for first arrival detection	DSLT-H	120	
MNHTR	Minimum High Threshold Reference for first arrival detection	DSLT-H	100	
NMSG	Near Minimum Sliding Gate	DSLT-H	140	us
SGAD	Sliding Gate Status	DSLT-H	On	
SPFS	Sonic Porosity Formula	Borehole	Raymer-Hunt	
SPSO	Sonic Porosity Source	DSLT-H	DT	
TD	Total Measured Depth	Borehole	8217	ft

Tool Control Parameters				
Parameter	Description	Tool	Value	Unit
DSLT_MODE	DSLT Acquisition Mode	DSLT-H	BHC	
DSLT_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

Run One

Run One

Pass Summary	
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%
16	100%
17	100%
18	100%
19	100%
20	100%
21	100%
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31	100%
32	100%
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88	100%
89	100%
90	100%
91	100%
92	100%
93	100%
94	100%
95	100%
96	100%
97	100%
98	100%
99	100%
100	100%

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run One	Log[4]:Up	Up	6997.27 ft	8229.10 ft	11-Dec-2013 8:31:34 PM	11-Dec-2013 8:54:50 PM	ON	14.00 ft	No
Run One	Log[5]:Up	Up	310.87 ft	8235.43 ft	11-Dec-2013 9:09:48 PM	11-Dec-2013 11:45:17 PM	ON	1.11 ft	No

All depths are referenced to toolstring zero

Log	Company:Nighthawk Production, LLC	Well:Telluride 13-2
		Run One: Log[5]:Up:S010

Company:Nighthawk Production, LLC Well:Telluride 13-2

Run One: Log[5]:Up:S010

Description: SONI_Traditional_CompressionalDT_Curves Format: Log (Sonic Delta-t_1 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type:

Measured Depth Creation Date: 12-Dec-2013 00:43:49

ITT - Integrated Transit Time every 1.00 (ms)

ITT - Integrated Transit Time every 10.00 (ms)

TIME_1900 - Time Marked every 60.00 (s)

Main To Repeat

Repeat To Main

Sonic Velocity (SVEL) DSLT-H

5000 ft/s 25000

Main To Repeat

Repeat To Main

Transit Time 1 (TT1) DSLT-H

1200 us 200

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Transit Time 2 (TT2) DSLT-H

1200 us 200

Main To Repeat

Repeat To Main

Transit Time 3 (TT3) DSLT-H

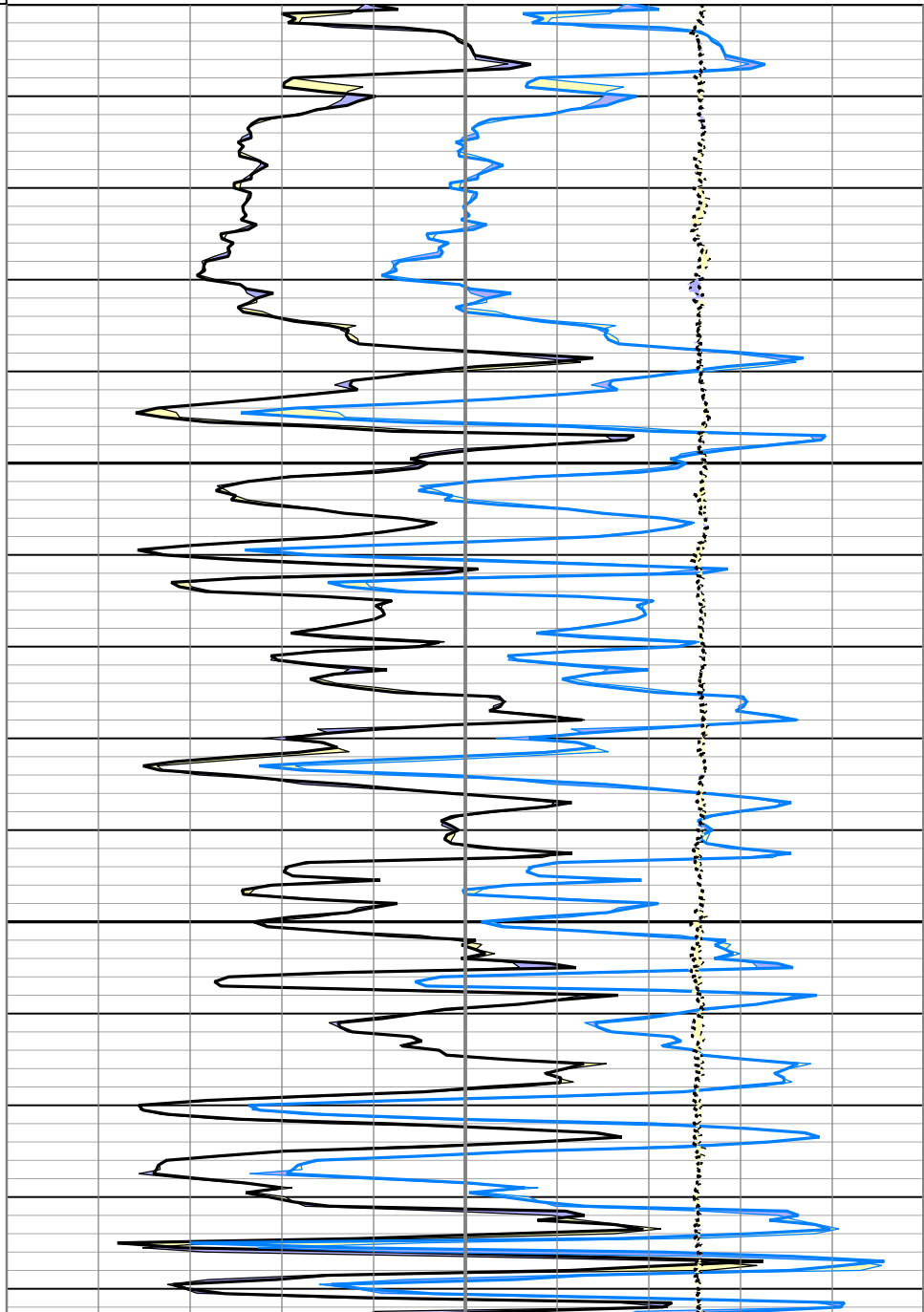
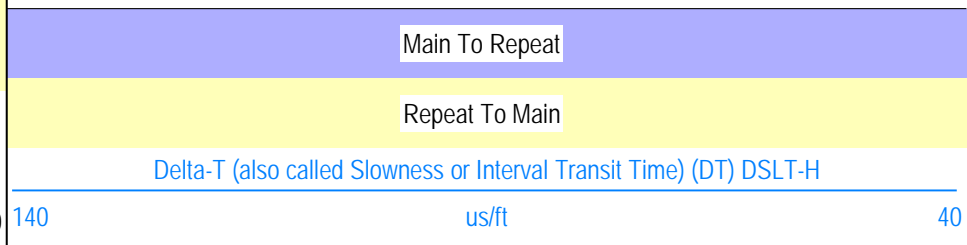
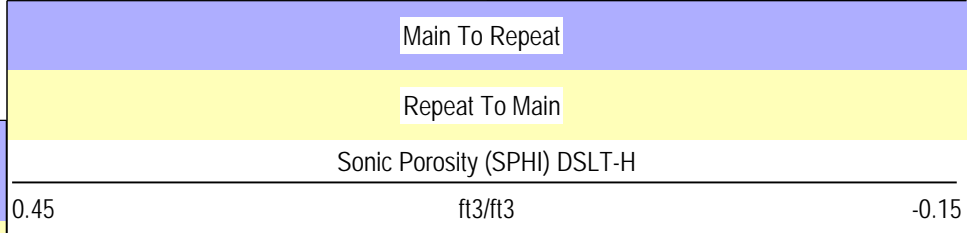
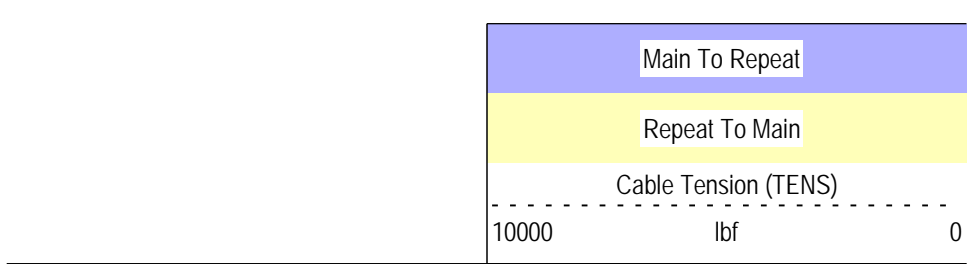
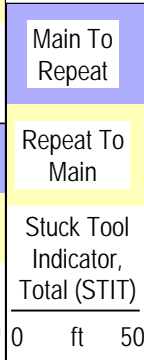
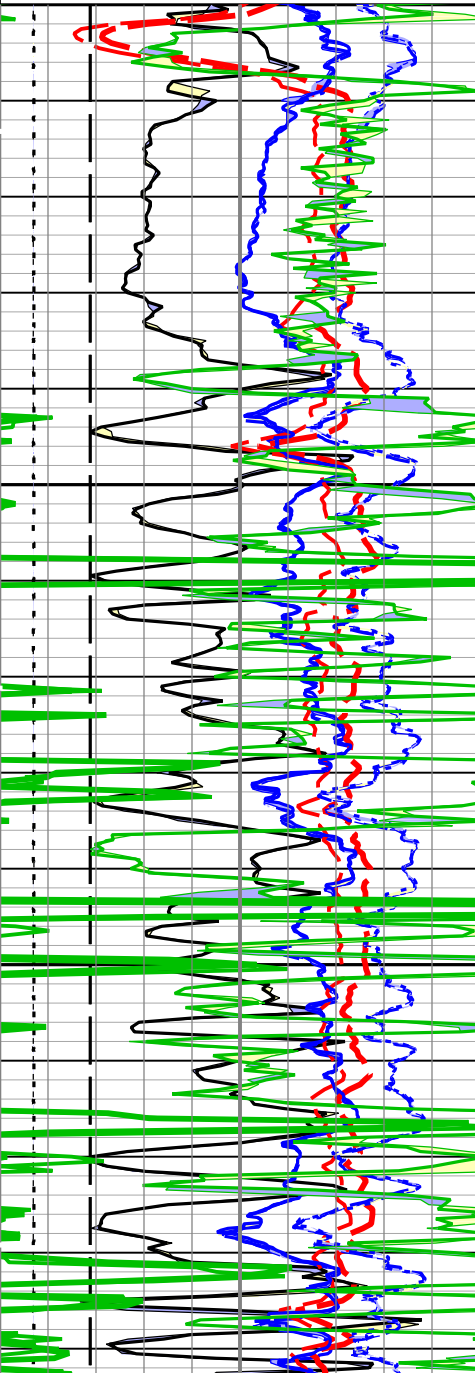
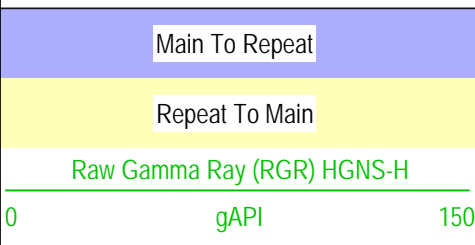
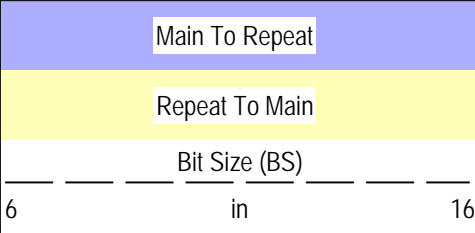
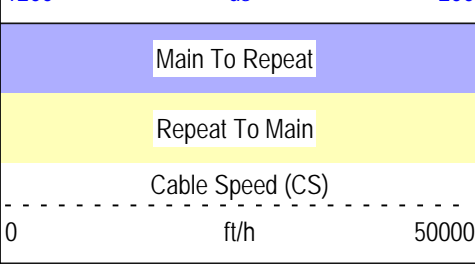
1200 us 200

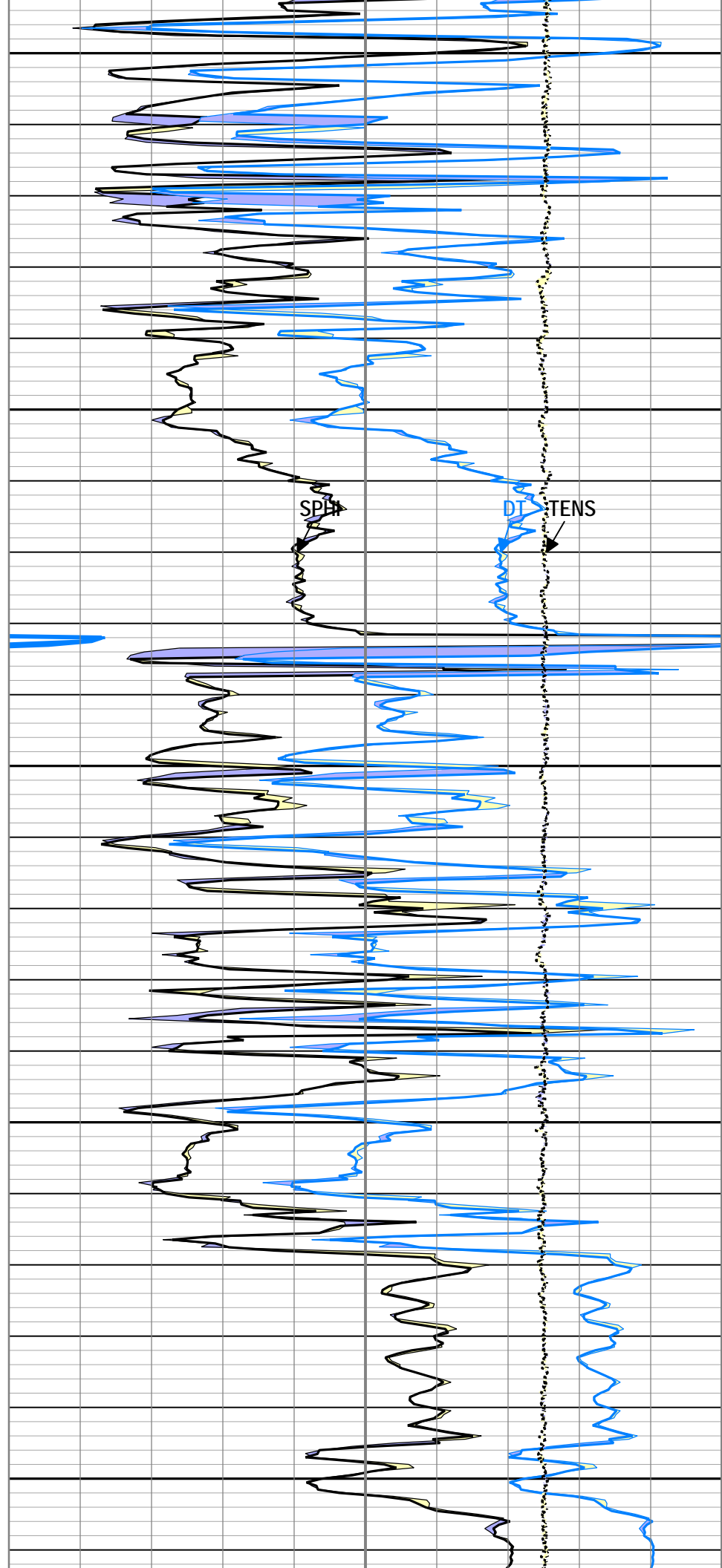
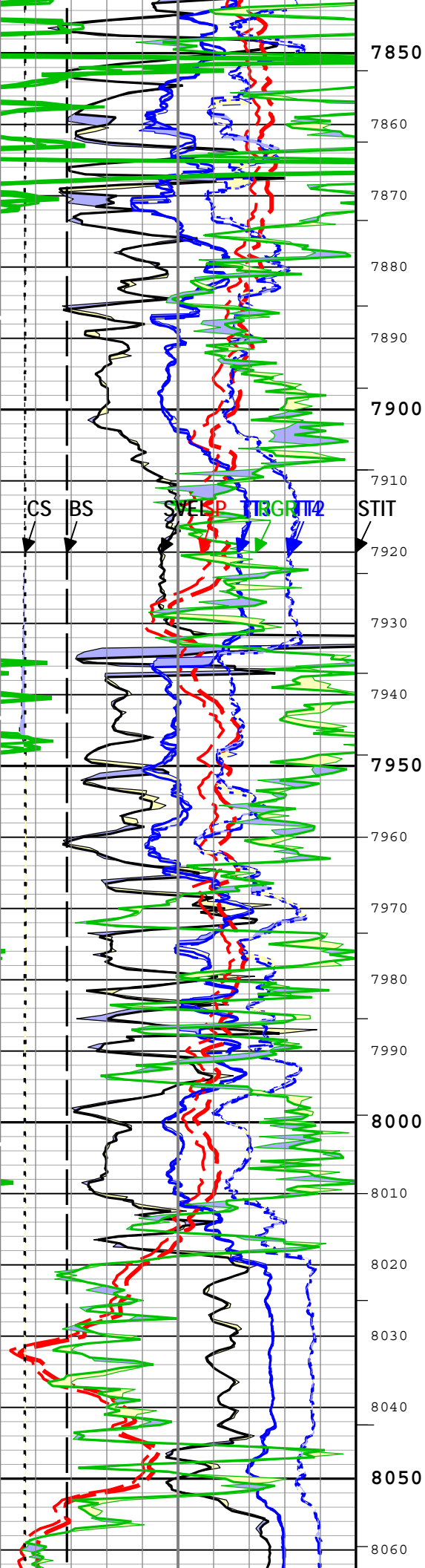
Main To Repeat

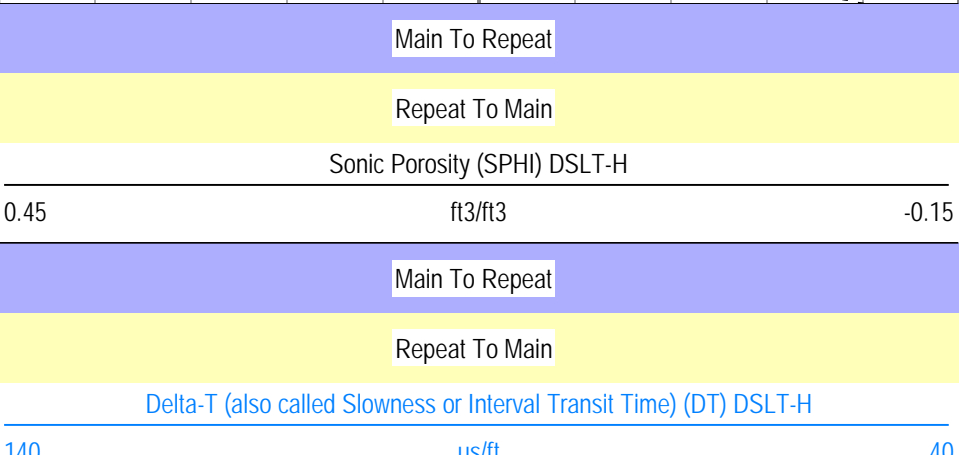
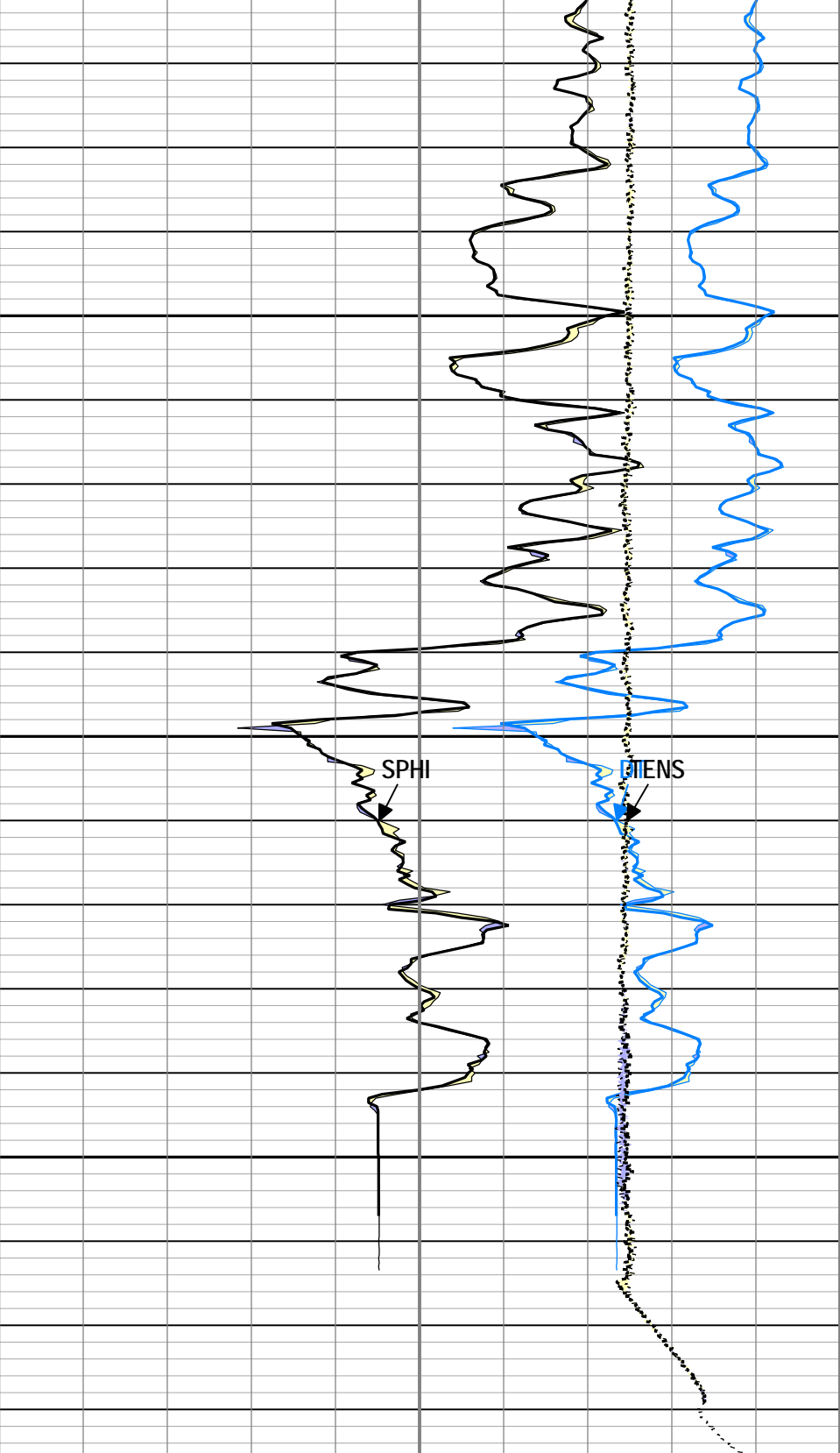
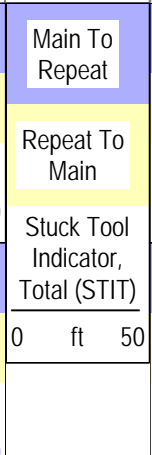
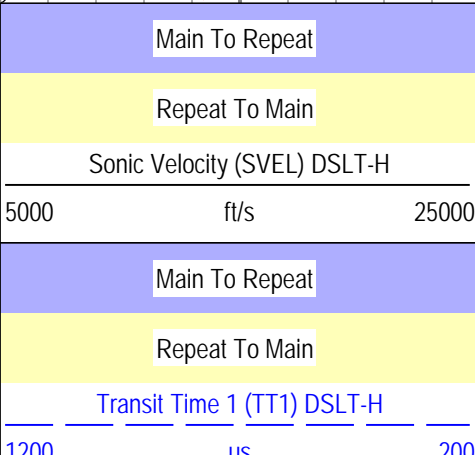
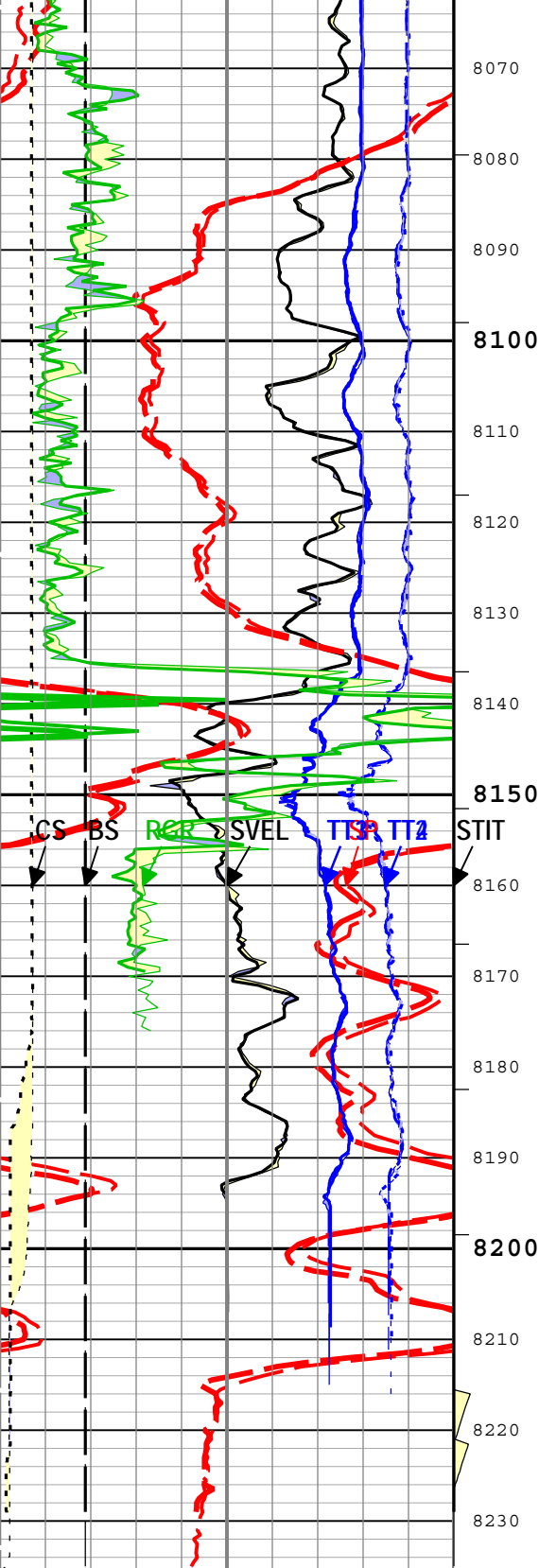
Repeat To Main

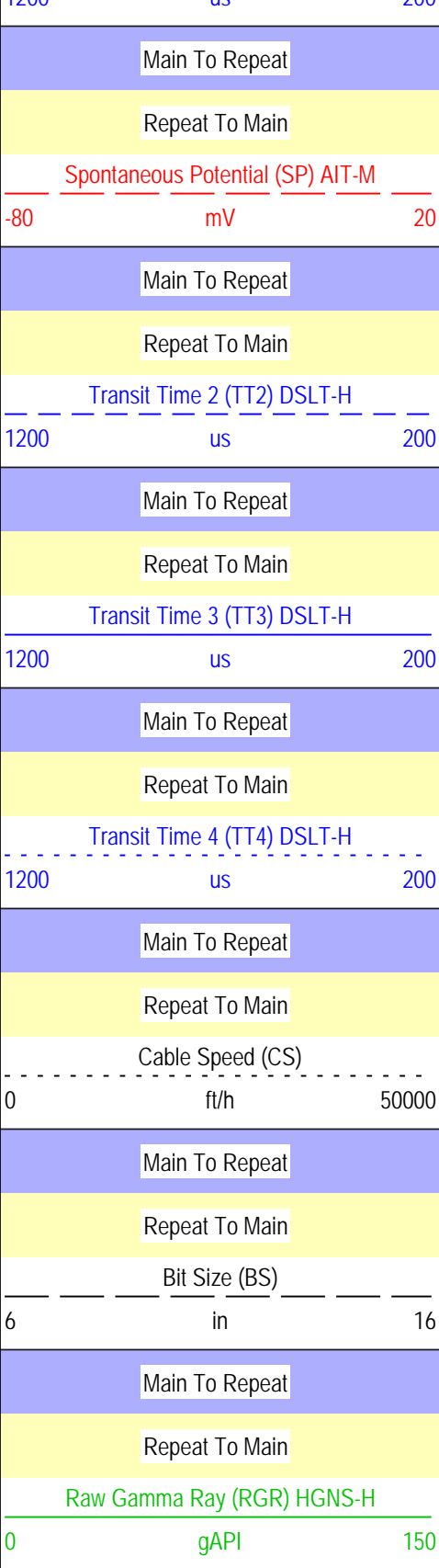
Transit Time 4 (TT4) DSLT-H

1200 US 200







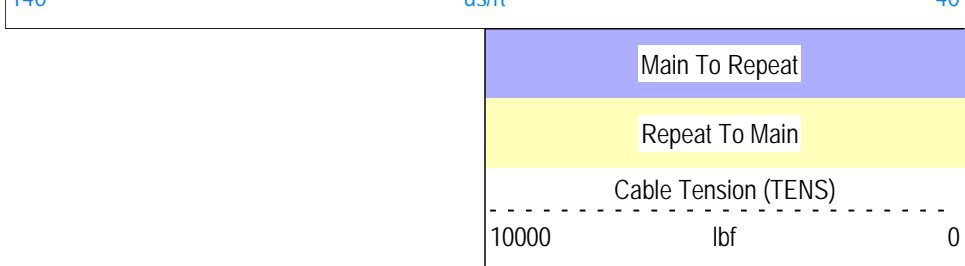


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Description: SONI_Traditional_CompressionalDT_Curves Format: Log (Sonic Delta-t_1 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 00:43:49



Company:	Nighthawk Production, LLC	Schlumberger
Well:	Telluride 13-2	
Field:	Arikaree Creek	
County:	Lincoln	
State:	Colorado	
Borehole Compensated Sonic BHC		