

Company: Apollo Operating LLC

Well: Rodwell 14-31

Field: Wildcat

County: Washington State: Colorado

Borehole Compensated Sonic  
Gamma RayCounty: Washington  
Field: Wildcat  
Location: SWSW Sec. 31, T4S, R51W  
Well: Rodwell 14-31  
Company: Apollo Operating LLC

Location:	SWSW Sec. 31, T4S, R51W	Elev.:	K.B.	4832.00 ft
	600 FSL, 600 FWL		G.L.	4814.00 ft
	Lat: 39.656390 / Long: -103.139620		D.F.	4831.00 ft
	Permanent Datum:	Ground Level	Elev.:	4814.00 f
Log Measured From:		Kelly Bushing	18.00 ft	above Perm.Datum
Drilling Measured From:		Kelly Bushing		
API Serial No.	Section:	Township:	Range:	
05-121-11052	31	4S	51W	

Logging Date 13-Aug-2017

Run Number One

Depth Driller 7630.00 ft

Schlumberger Depth 7629.00 ft

Bottom Log Interval 7629.00 ft

Top Log Interval 515.00 ft

Casing Driller Size @ Depth 9.625 in @ 519.00 ft

Casing Schlumberger 519 ft

Bit Size 7.875 in

Type Fluid In Hole Water

Density 9.3 lbm/gal 84 s

Fluid Loss PH 6.6 cm3 10

MUD Source of Sample Active Tank

RM @ Meas Temp 0.04 ohm.m @ 75 degF

RMF @ Meas Temp 0.03 ohm.m @ 75 degF

RMC @ Meas Temp 0.07 ohm.m @ 75 degF

Source RMF RMC Calculated

RM @ BHT RMF @ BHT 0.02 @ 175 0.01 @ 175

Max Recorded Temperatures 175 degF

Circulation Stopped 13-Aug-2017 09:40:00

Logger on Bottom Time 13-Aug-2017 23:25:00

Unit Number 9108

Recorded By Brandon Makinson

Witnessed By Randy Say

## 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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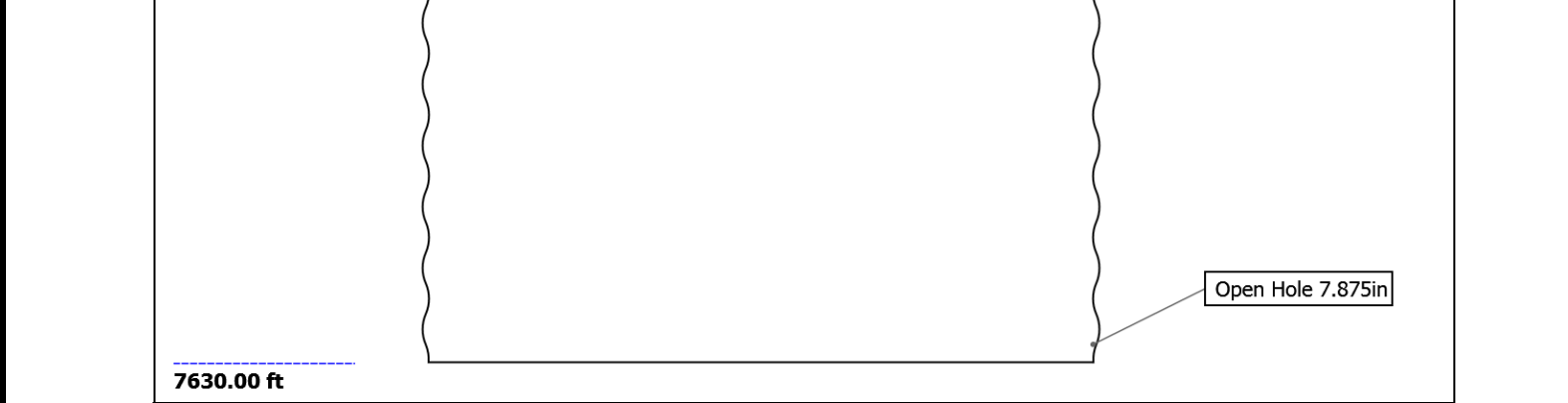
Well Sketch

Driller Depth

0.00 ft

519.00 ft

Casing 9.625in  
36lbm/ft



## Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	7.875					
Top Driller ( ft )	519					
Top Logger ( ft )	519					
Bottom Driller ( ft )	7630					
Bottom Logger ( ft )	7629					
Casing						
Size ( in )	9.625					
Weight ( lbm/ft )	36					
Inner Diameter ( in )	8.921					
Grade	J55					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	519					
Bottom Logger ( ft )	519					

## Operational Run Summary

Parameter ( unit )	One					
Date Log Started	13-Aug-2017					
Time Log Started	22:31:49					
Date Log Finished	14-Aug-2017					
Time Log Finished	01:41:12					
Top Log Interval ( ft )	515.00					
Bottom Log Interval ( ft )	7629.00					
Total Depth ( ft )	7629.00					
Max Hole Deviation ( deg )	0.00					
Azimuth of Max Deviation ( deg )	0.00					
Bit Size ( in )	7.875					
Logging Unit Number	9108					
Logging Unit Location	Fort Morgan					
Recorded By	Brandon Makinson					

Witnessed By	Randy Say					
Service Order Number	DTS9-00017					

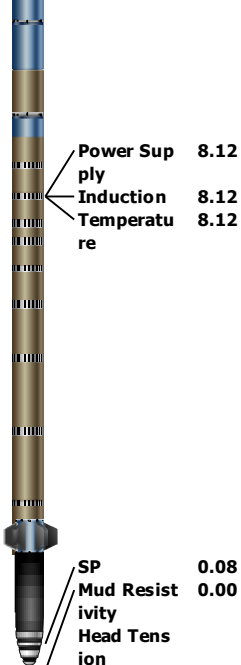
## Borehole Fluids

Parameter( unit )	One					
Fluid Type	Water					
Max Recorded Temperatures ( degF )	175					
Source of Sample	Active Tank					
Salinity ( ppm )	800					
Density ( lbm/gal )	9.3					
Funnel Viscosity ( s )	84					
Fluid Loss ( cm3 )	6.6					
PH	10					
Date/Time Circulation Stopped	13-Aug-2017 09:40:00					
Date Logger on Bottom	13-Aug-2017					
Time Logger on Bottom	23:25:00					
Source RMF	Calculated					
RMC	Calculated					
RM @ Meas Temp ( ohm.m@degF )	0.04 @ 75					
RMF @ Meas Temp ( ohm.m@degF )	0.03 @ 75					
RMC @ Meas Temp ( ohm.m@degF )	0.07 @ 75					
RM @ BHT ( ohm.m@degF )	0.02 @ 175					
RMF @ BHT ( ohm.m@degF )	0.01 @ 175					
RMC @ BHT ( ohm.m@degF )	0.03 @ 175					
Total Solid ( % )	7.2					
High Gravity Solids ( % )						

## Remarks and Equipment Summary

One: Toolstring				One: Remarks
<b>Equip name</b>	<b>Length</b>	<b>MP name</b>	<b>Offset</b>	Tool string run as per tool sketch.
LEH-QT LEH-QT	75.11			Limestone Matrix
				Wyllie Sonic Formula
<b>EDTC-B</b> EDTH-B EDTG-A EDTC-B	72.19			BHT 175 F
				TD 7629 ft, CSG 515 ft
		CTEM	68.69	
		ACCZ	0.00	
		HV	0.00	
		Gamma Ra	66.82	
		y		
		TelStatus	65.69	
<b>HGNS-H</b> HGNH NPV-N NSR-F:5069 HACCZ-H:511 8 HMCA-H HGNS-H	65.69	Temperatu re	65.66	
		GR	64.95	
		CNL Poros ity	58.61	
		HMCA	56.28	
		HGNS	51.22	



 <p>Power Supply 8.12 Induction 8.12 Temperature 8.12 SP 0.08 Mud Resistivity 0.00 Head Tension TOOL_ZERO</p> <p>Lengths are in ft Maximum Outer Diameter = 5.000 in Line: Sensor Location, Value: Gating Offset All measurements are relative to TOOL_ZERO</p>		
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Depth Summary			
	One		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6433		
Calibration Date	14-Sep-2016		
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	-1		
Wheel Correction 2	-1.99		
Tension Device			
Type	CMTD-B/A		
Serial Number			
Calibration Date	05-Jun-2017		
Calibrator Serial Number			
Number of Calibration Points	10		
Calibration Root Mean Square Error	12		
Calibration Peak Error	23		
Logging Cable			
Type	7-39AI-XS		
Serial Number			
Length	22000.00 ft		
Conveyance Type	Wireline		
Rig Type	Triple		
One:Depth Control Parameters		Depth Control Remarks	
Log Sequence	First Log In the Well	All Schlumberger depth control procedures followed.	
Rig Up Length At Surface		IDW used as primary depth control.	

Z-Chart used as secondary depth control.

## Integration Summary

## Software Version

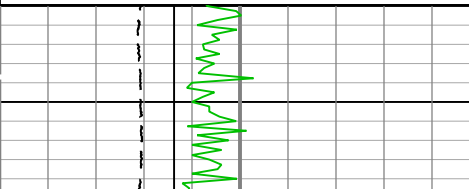
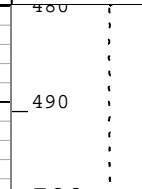
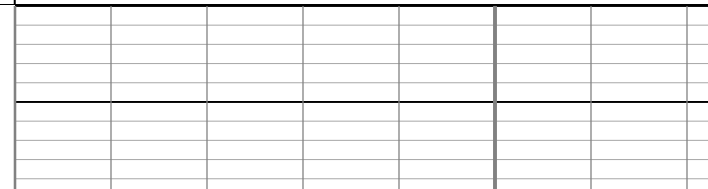
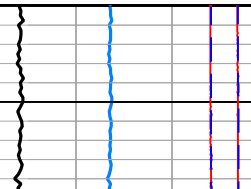
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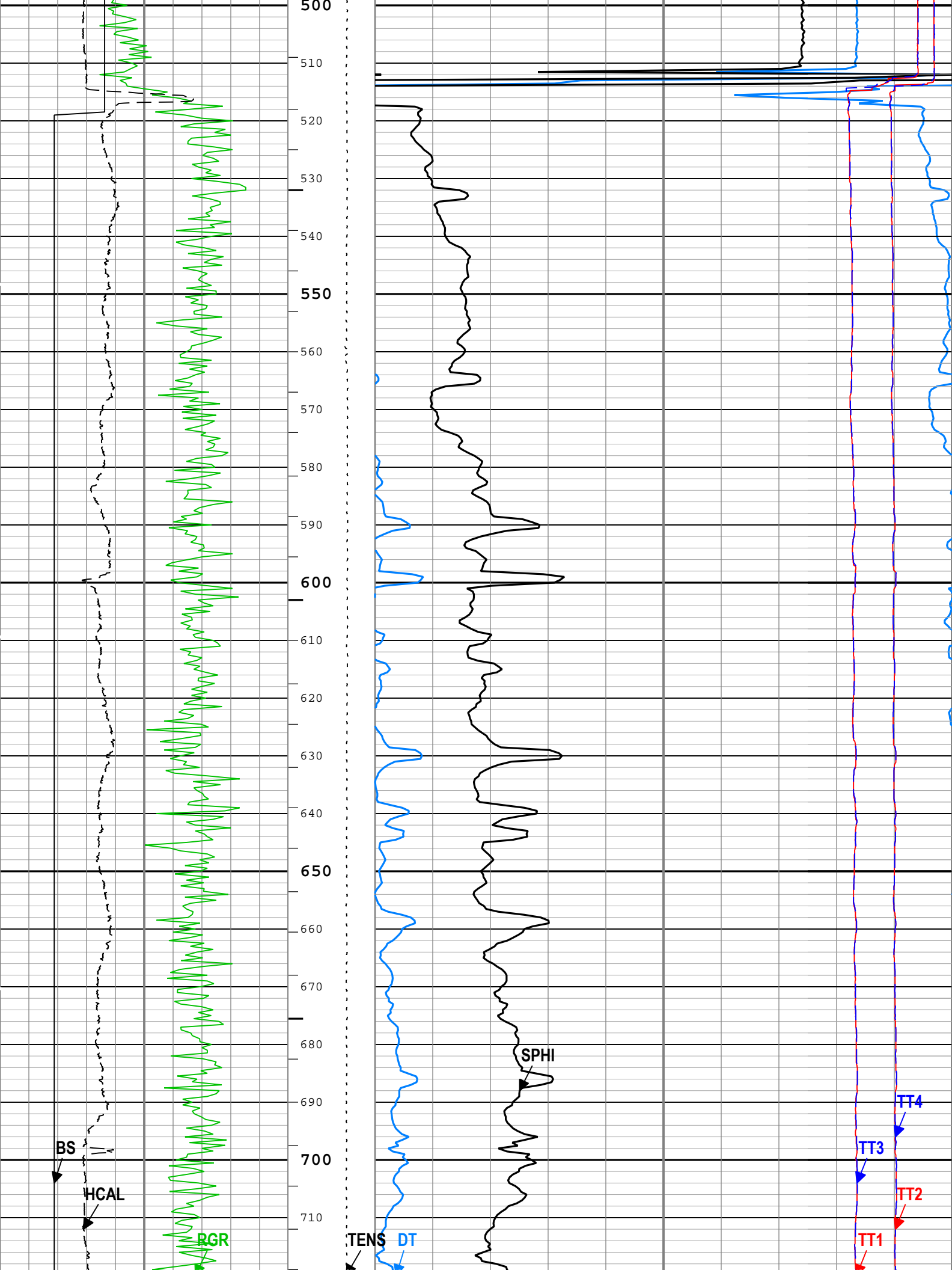
All depths are referenced to toolstring zero

Company: Apollo Operating LLC      Well: Rodwell 14-31  
One: Log[3]:Up:S009

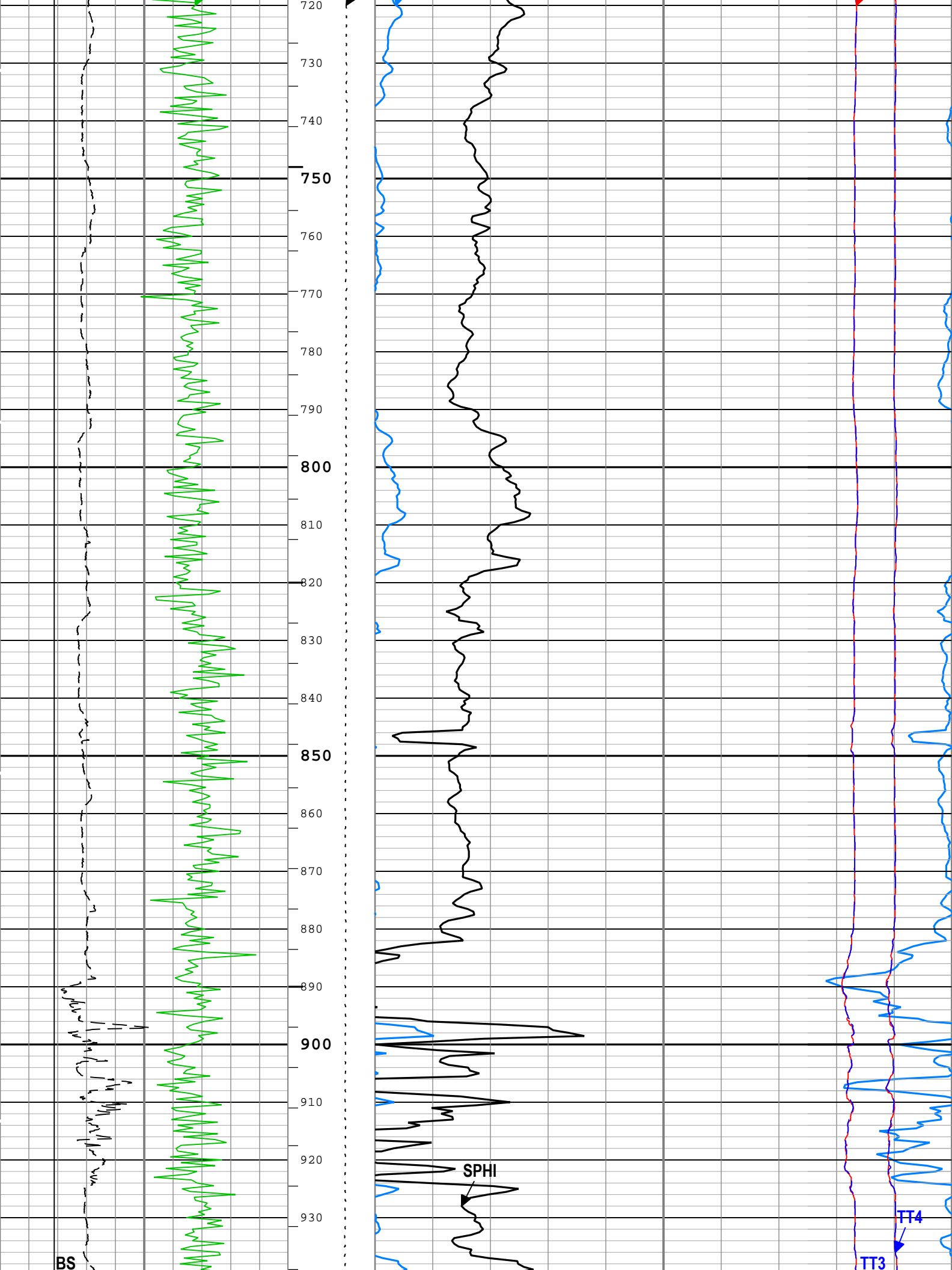
	ITT - Integrated Transit Time every 1.00 (ms)
	ITT - Integrated Transit Time every 10.00 (ms)
TIME_1900 - Time Marked every 60.00 (s)	

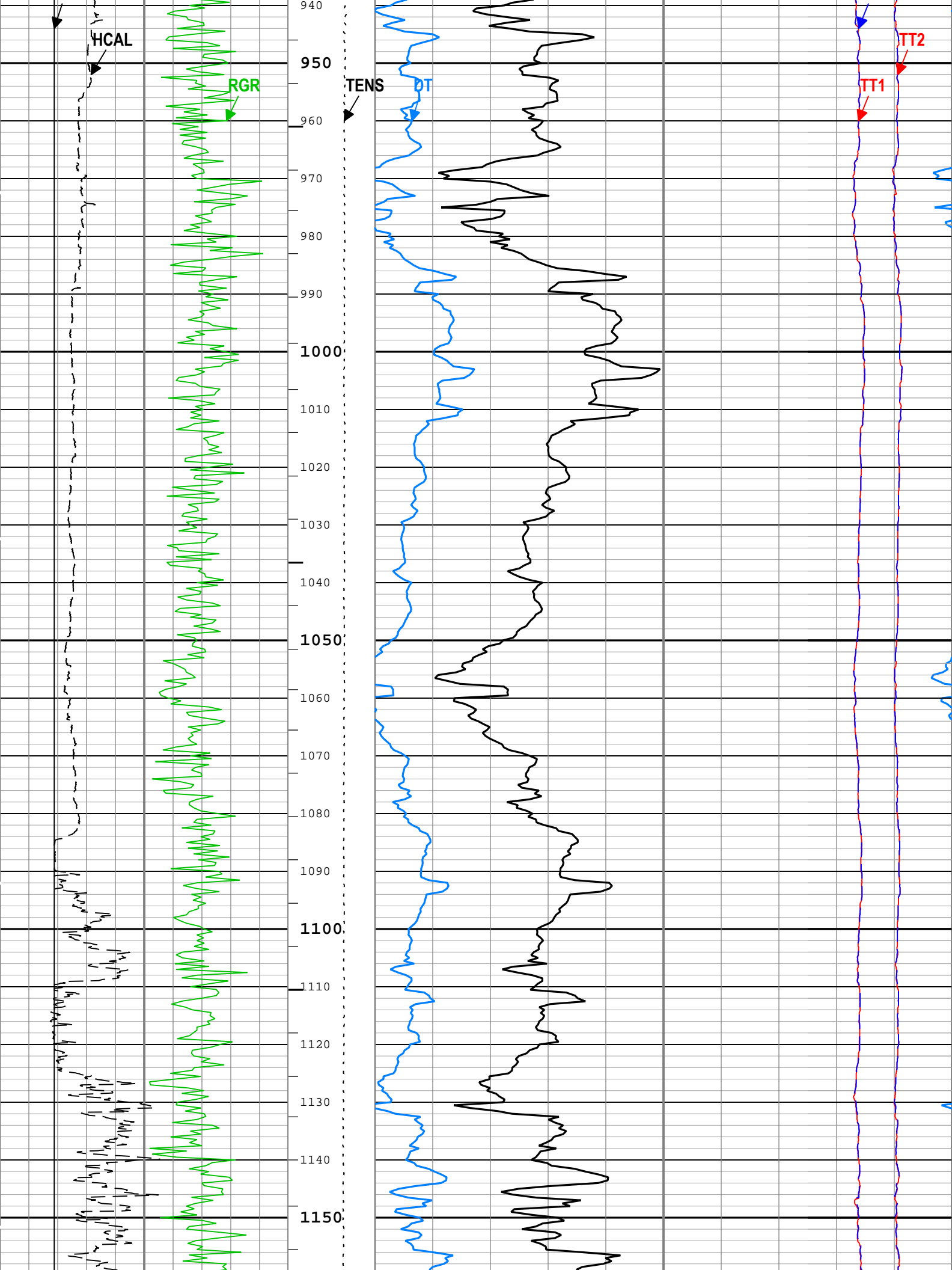
Raw Gamma Ray (RGR) HGNS-H		
0	gAPI	150
Caliper (HCAL) HDRS-H		
6	in	16
Bit Size (BS) RT		
6	in	16

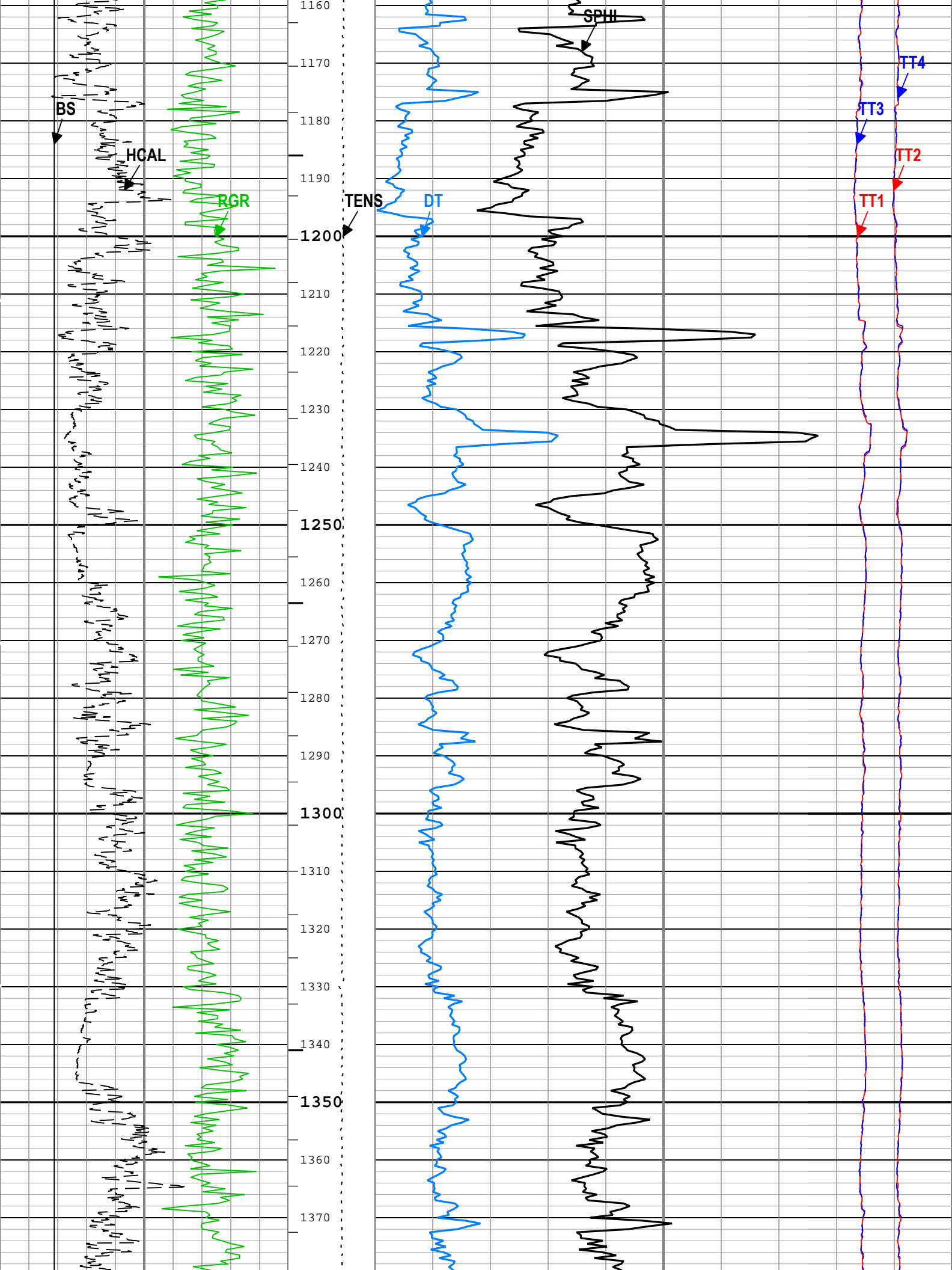
Caliper (HCAL) HDRS-H			Cable Tension (TENS)	Delta-T (also called Slowness or Interval Transit Time) (DT) DSLT-H			
6	in	16		140	us/ft	40	
Bit Size (BS) RT				Sonic Porosity (SPHI) DSLT-H			
6	in	16	5000 lbf	0	0.3	ft3/ft3	-0.
							

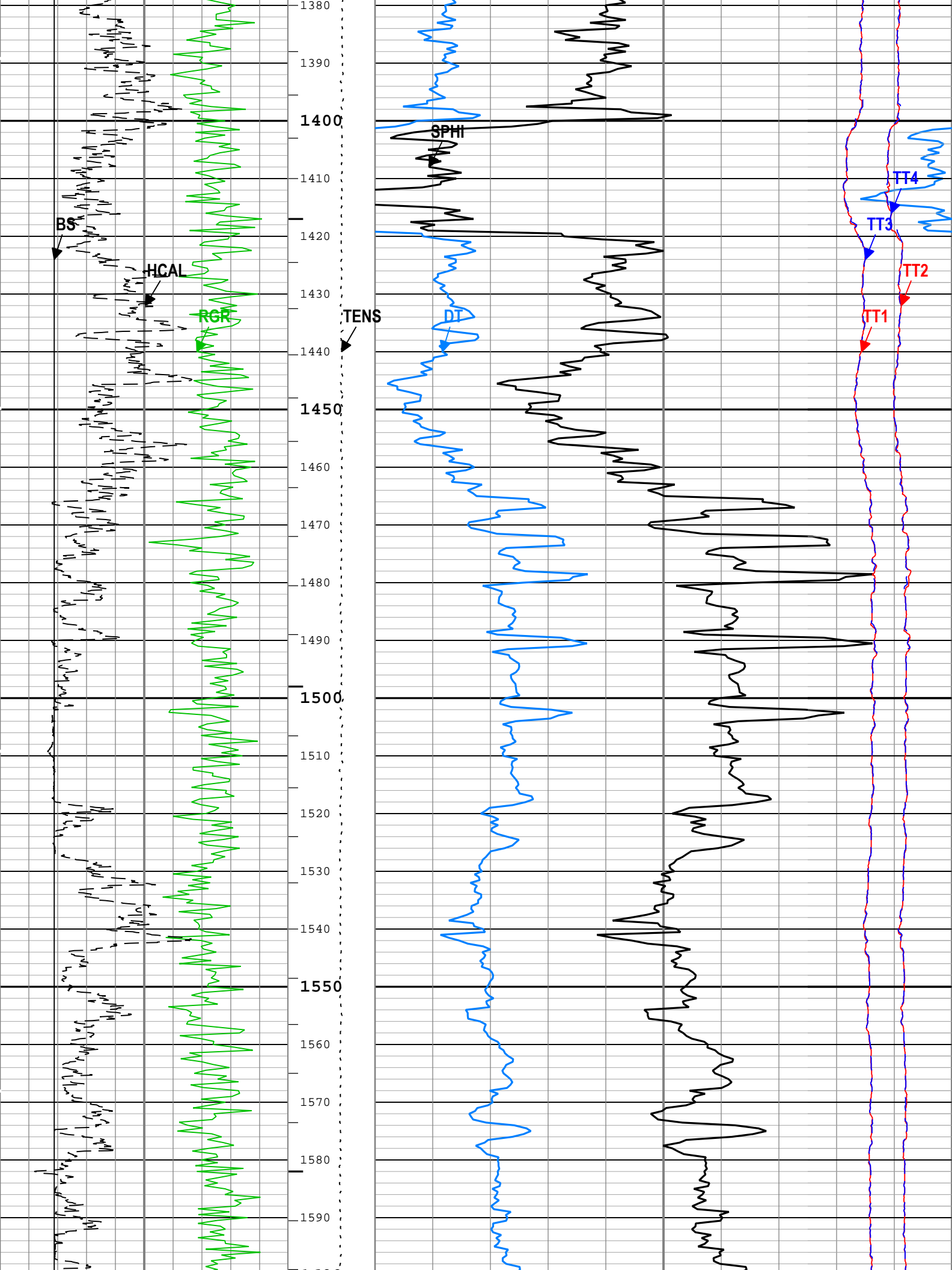


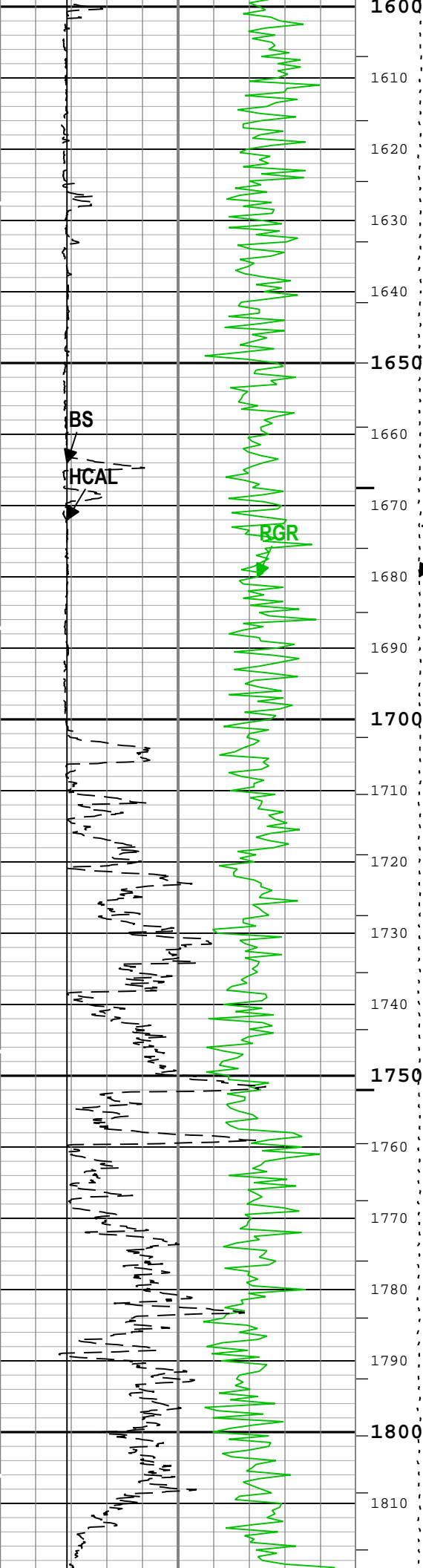




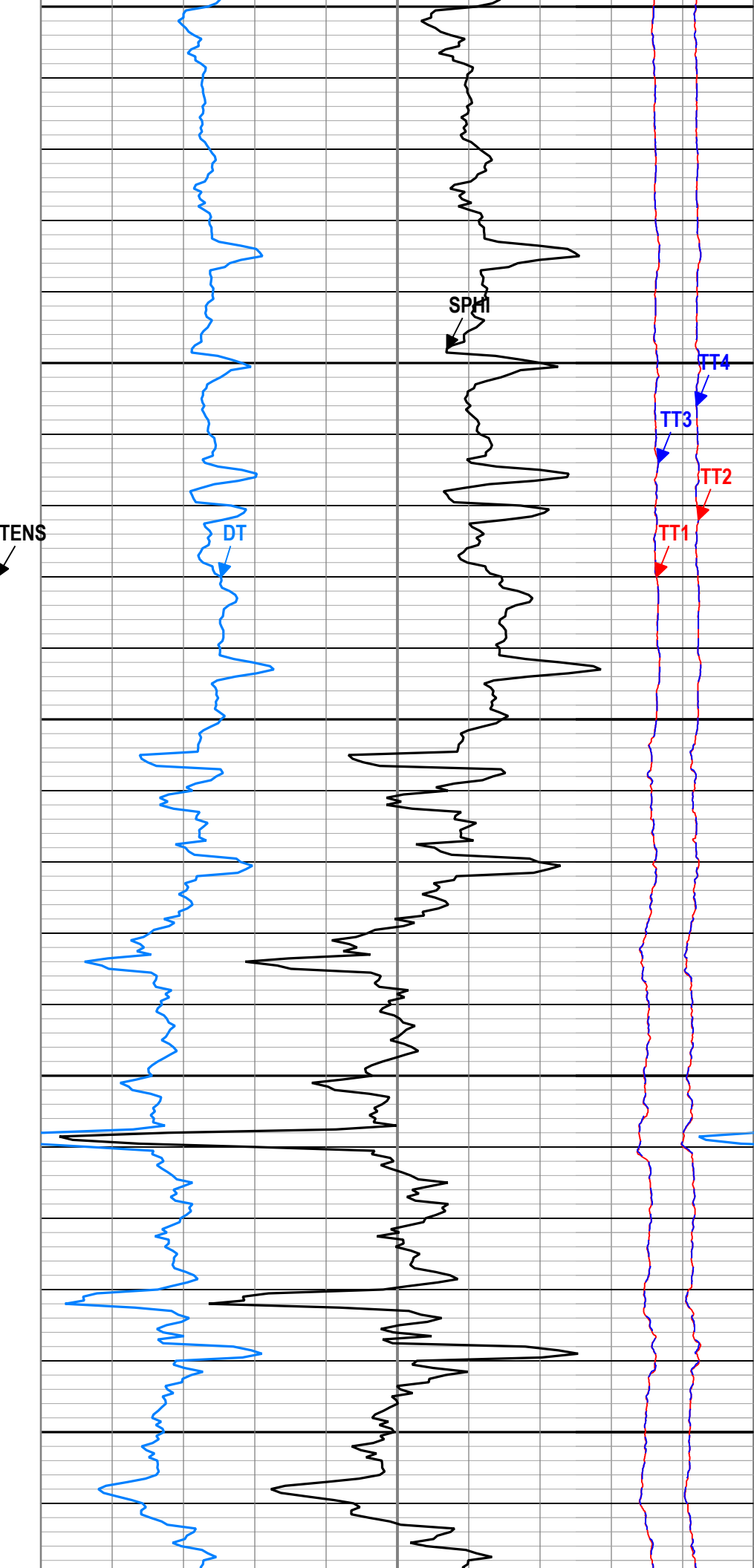




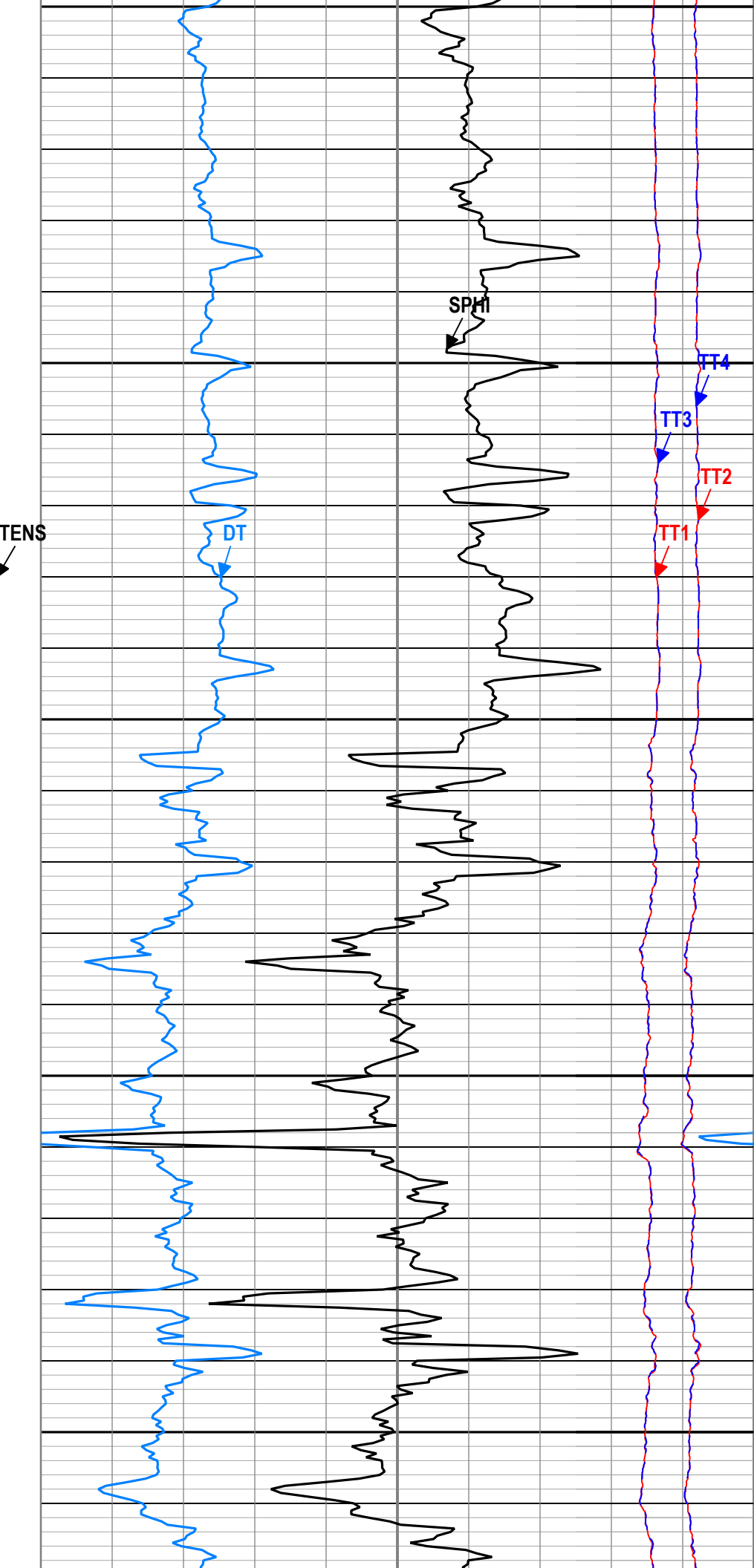




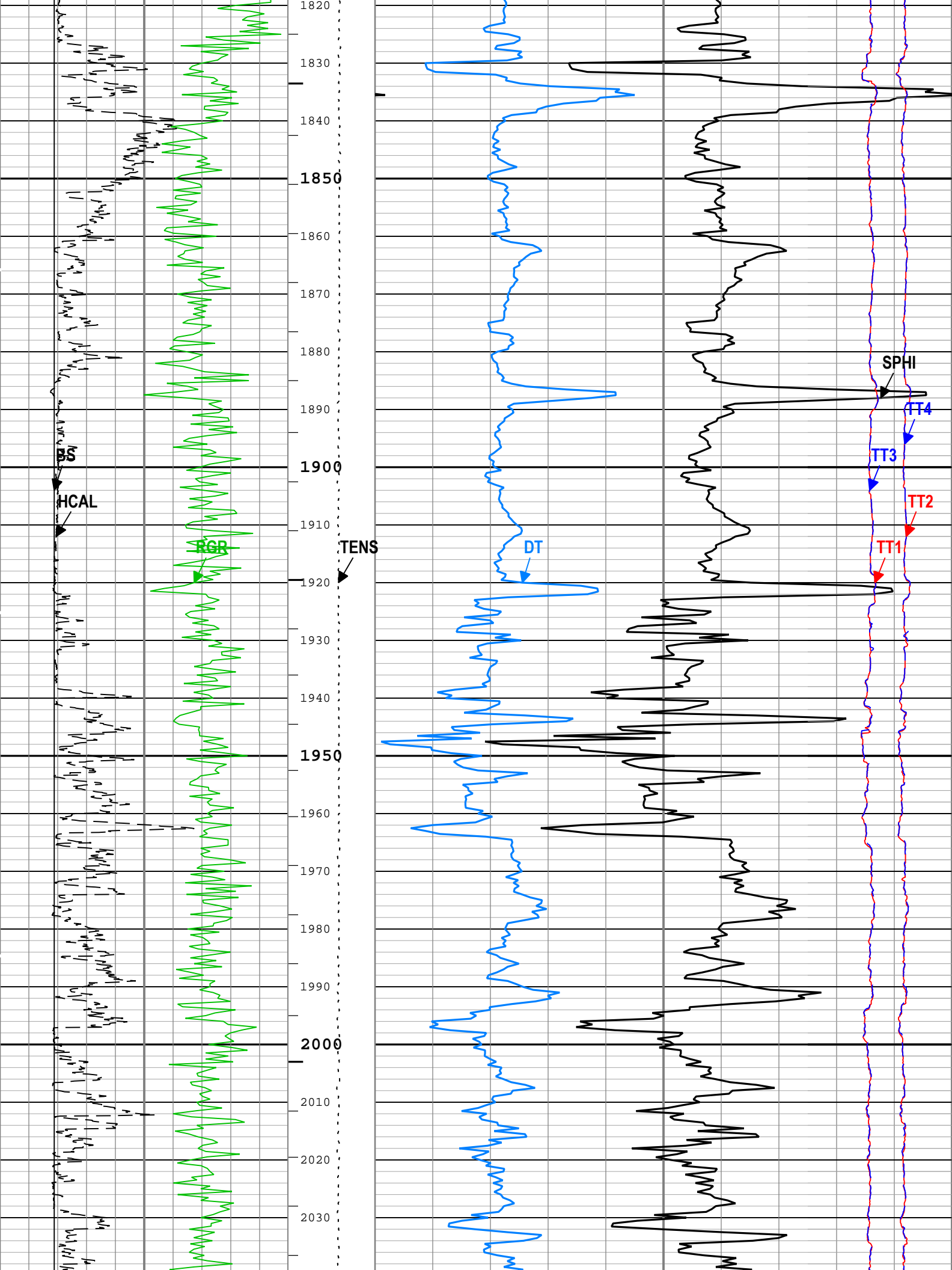
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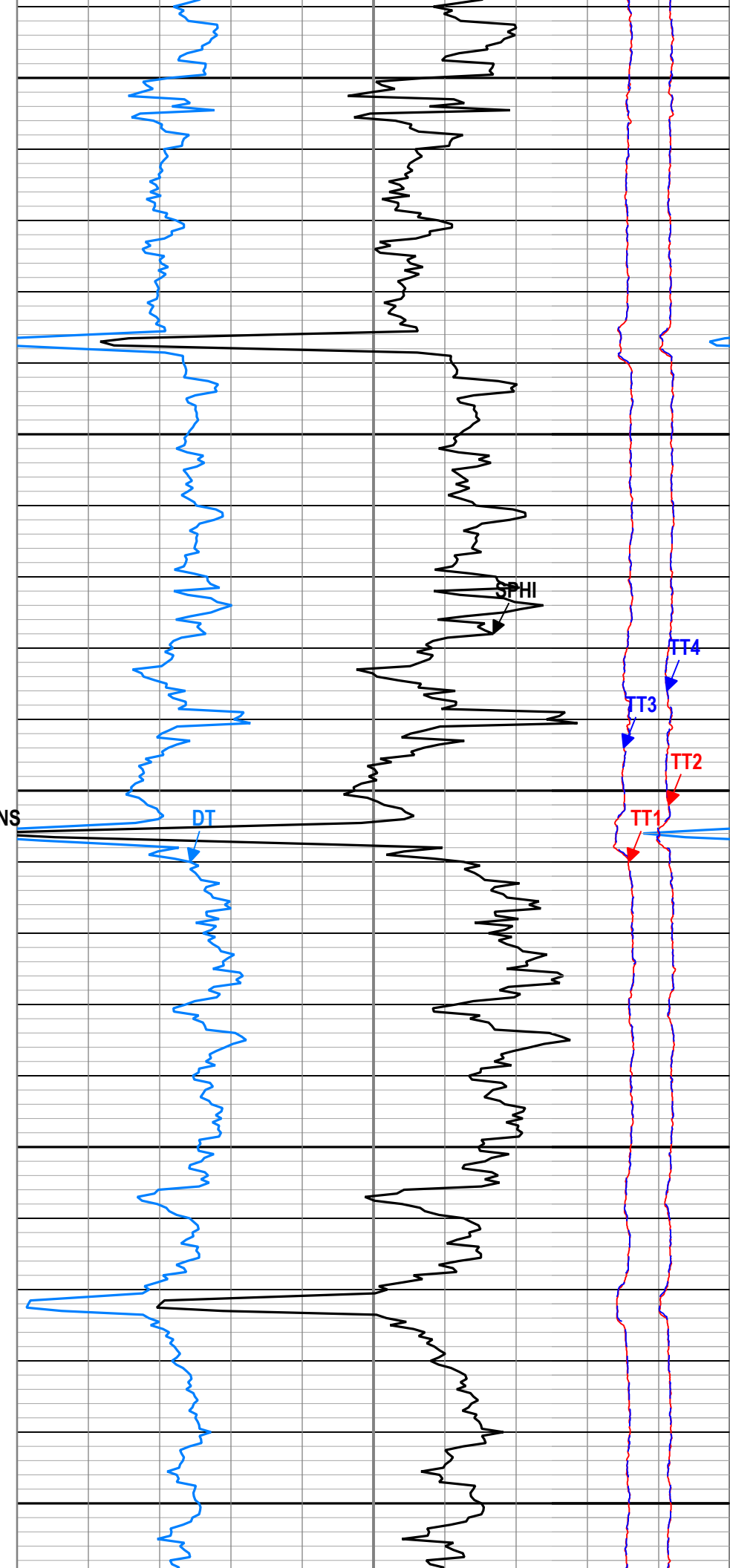
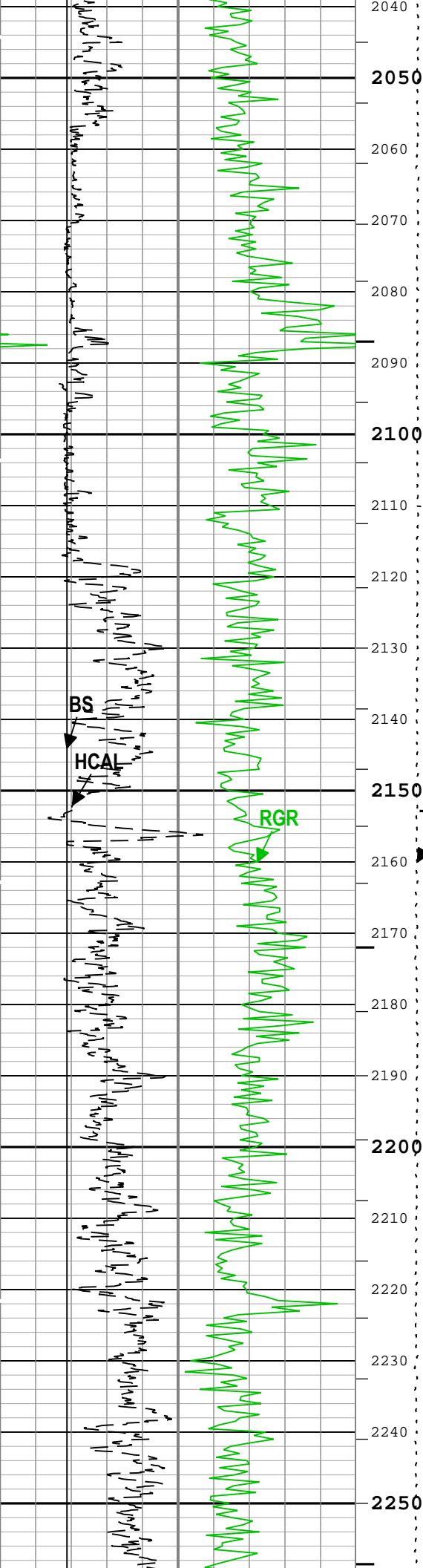


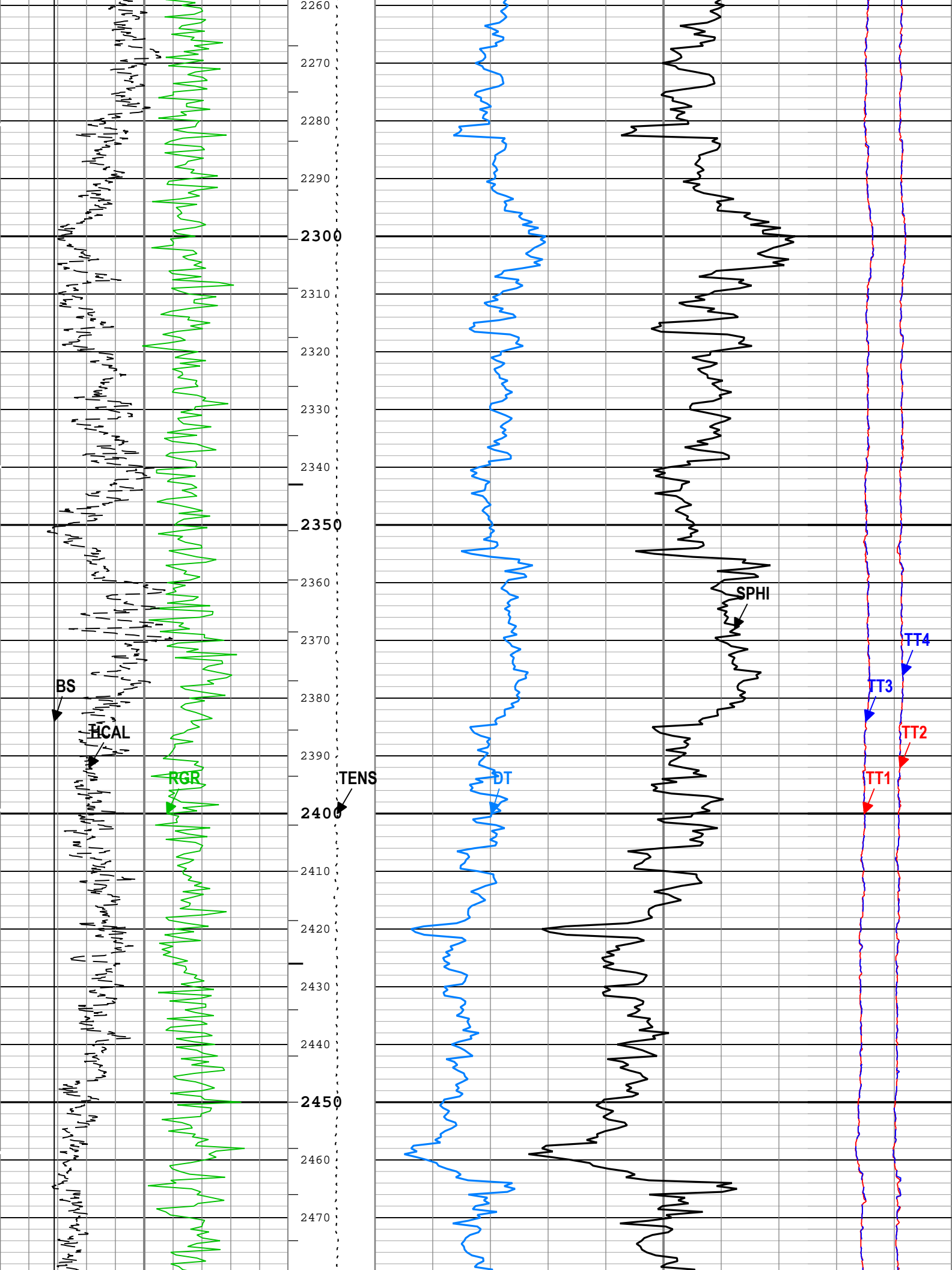
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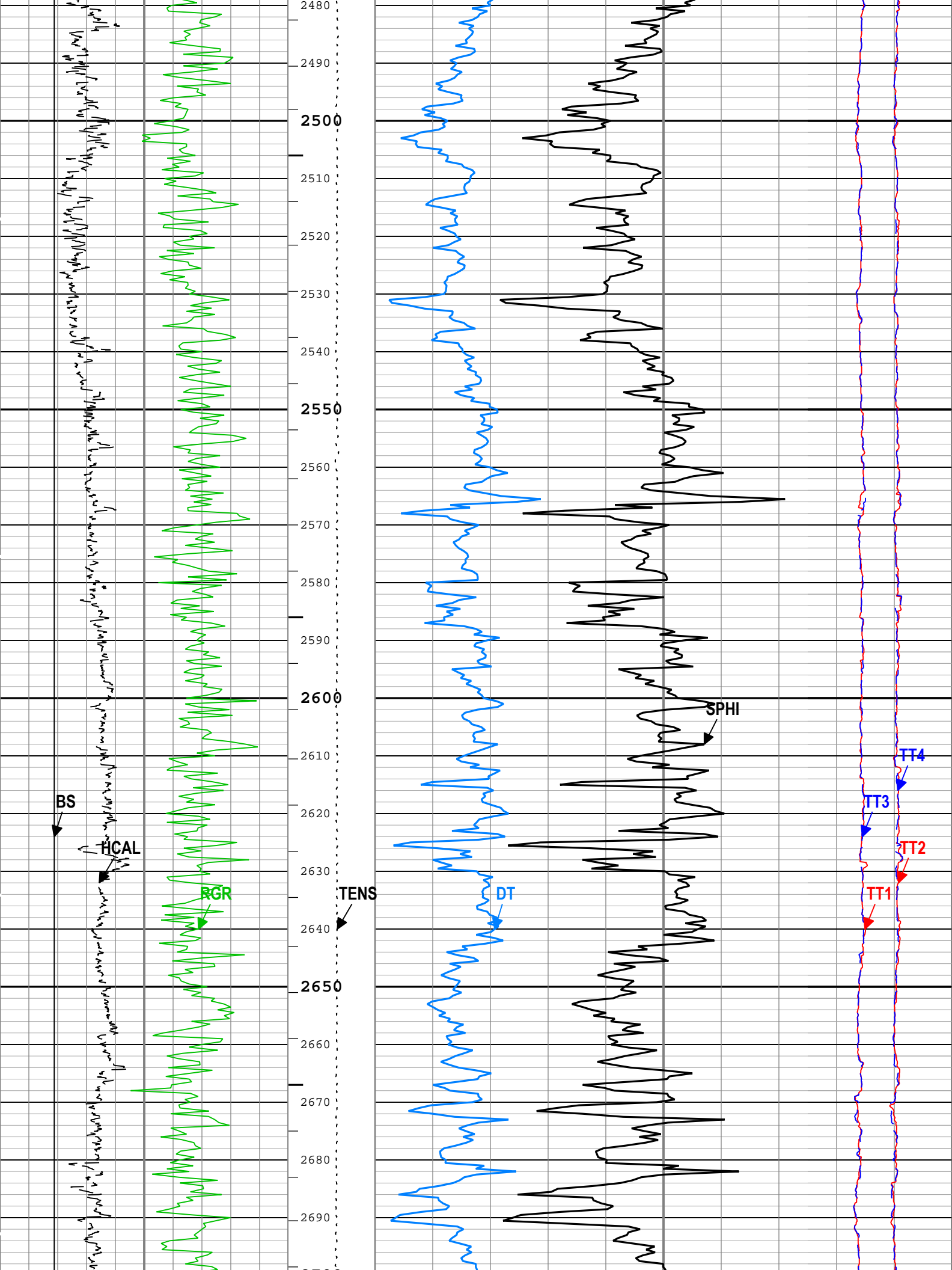
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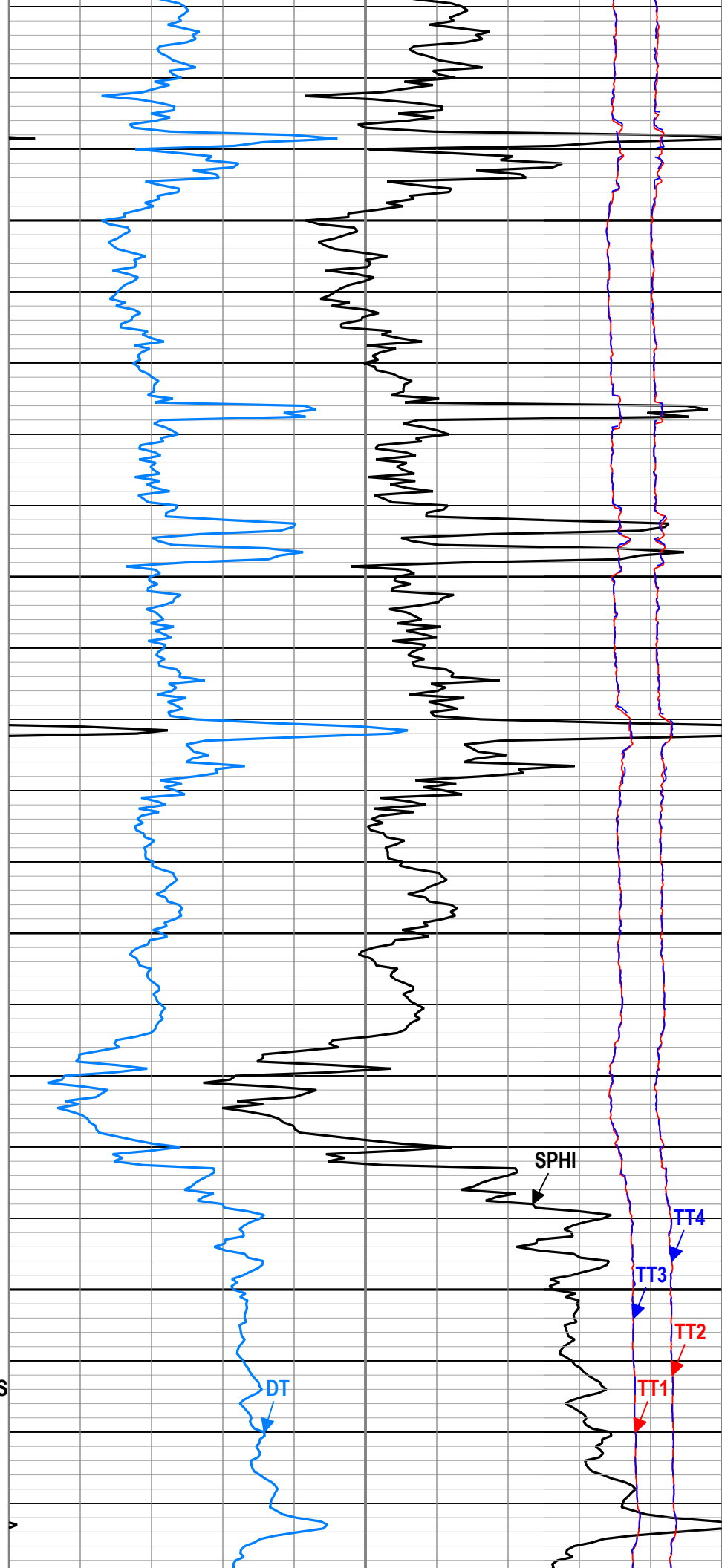
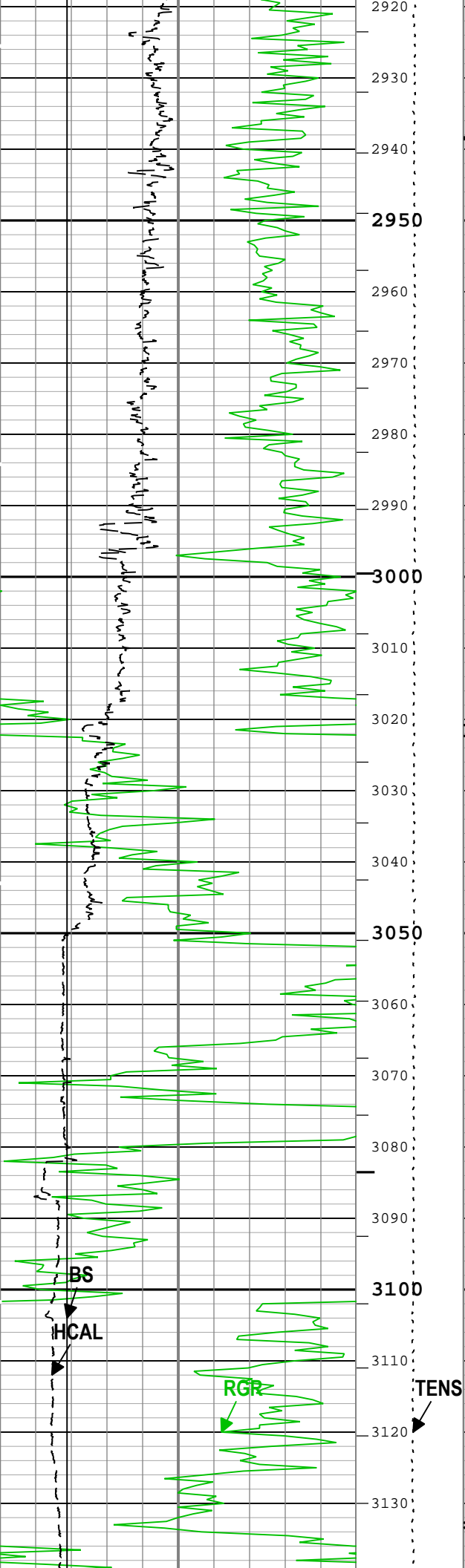


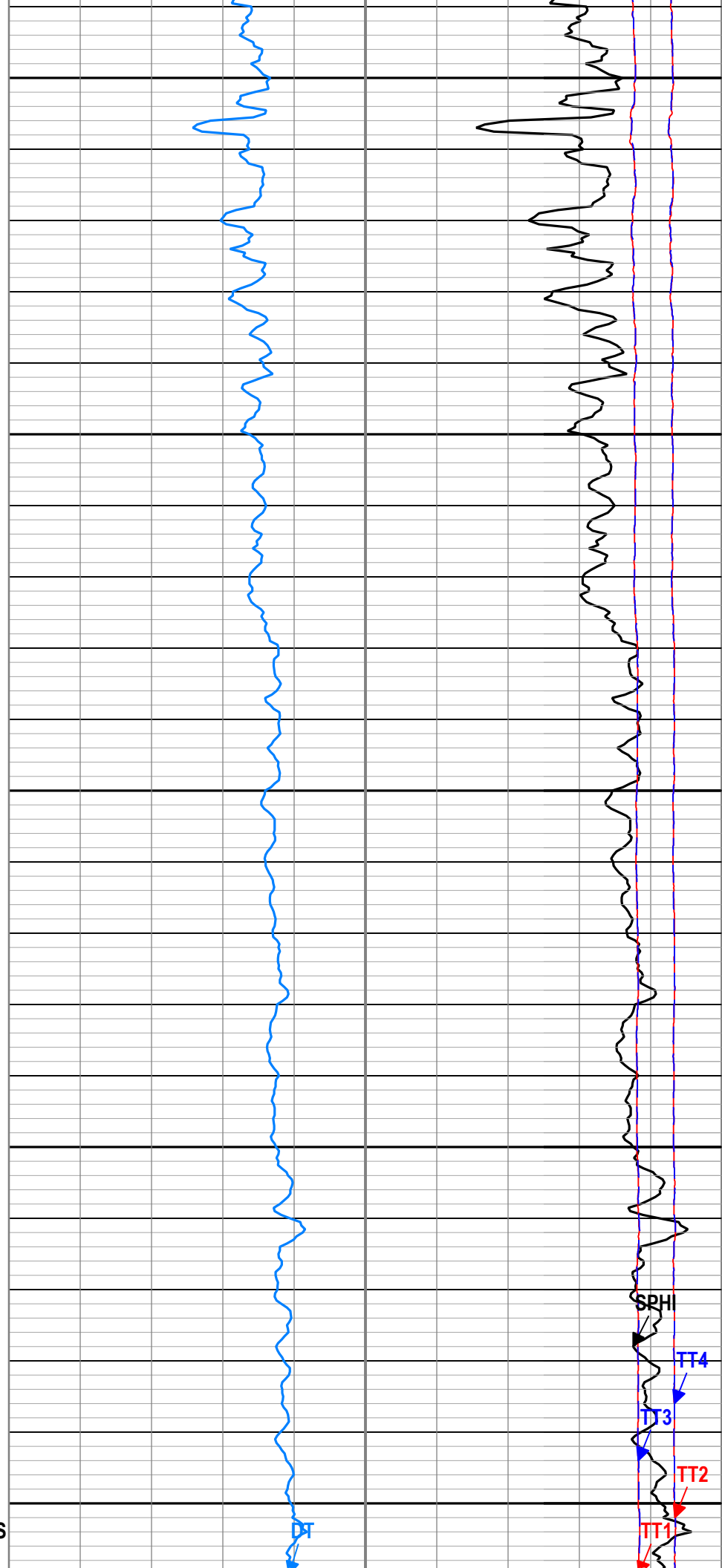
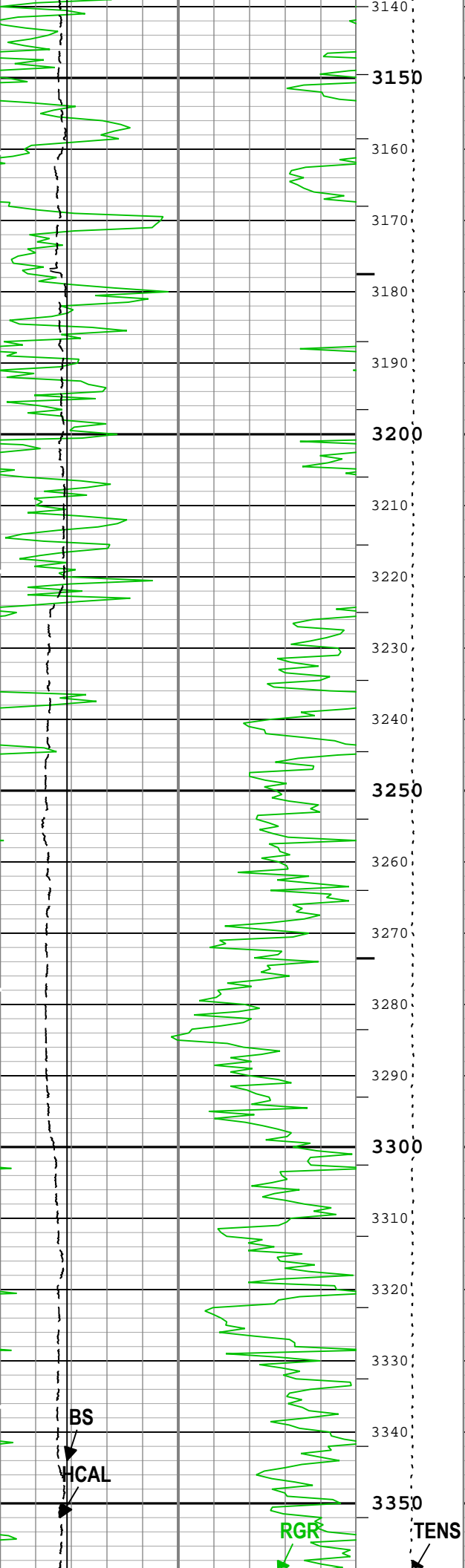


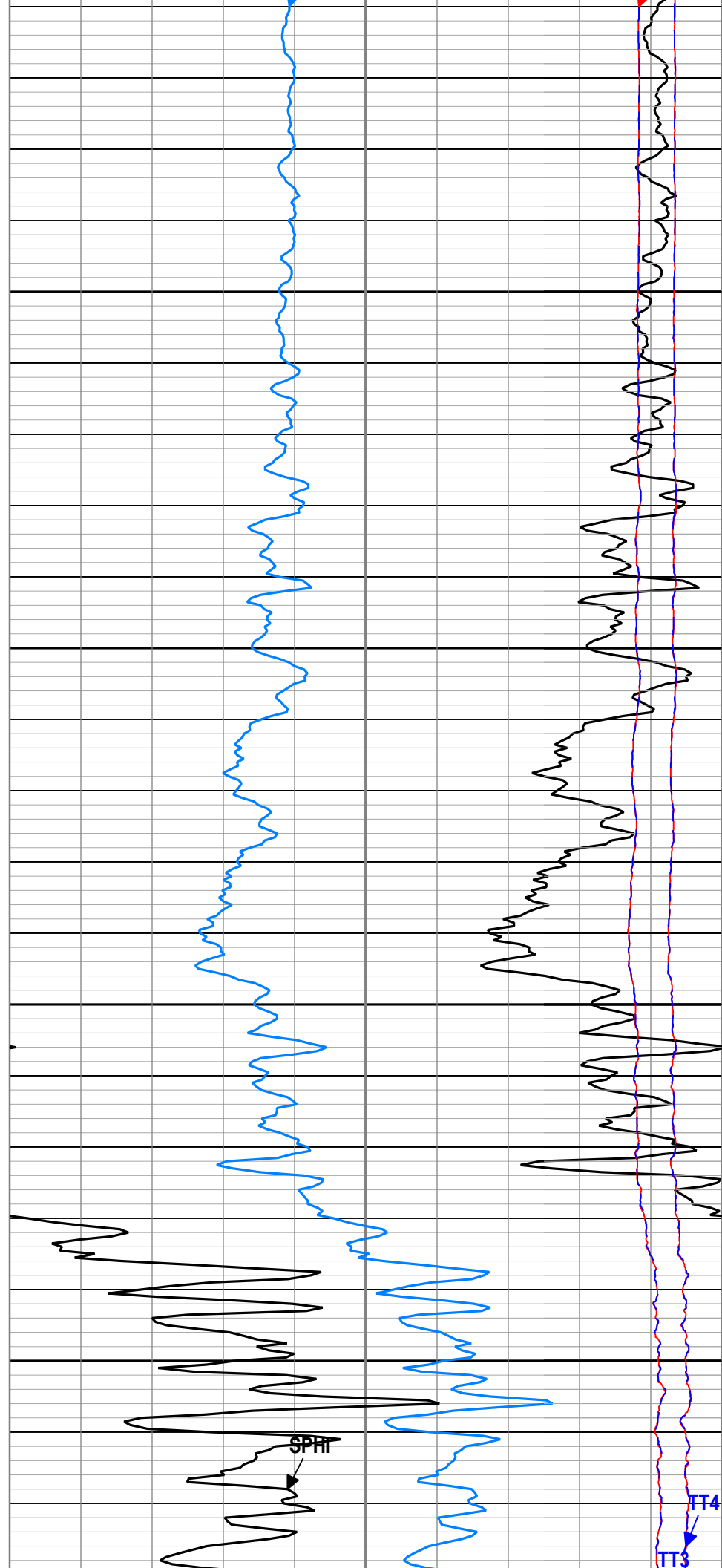
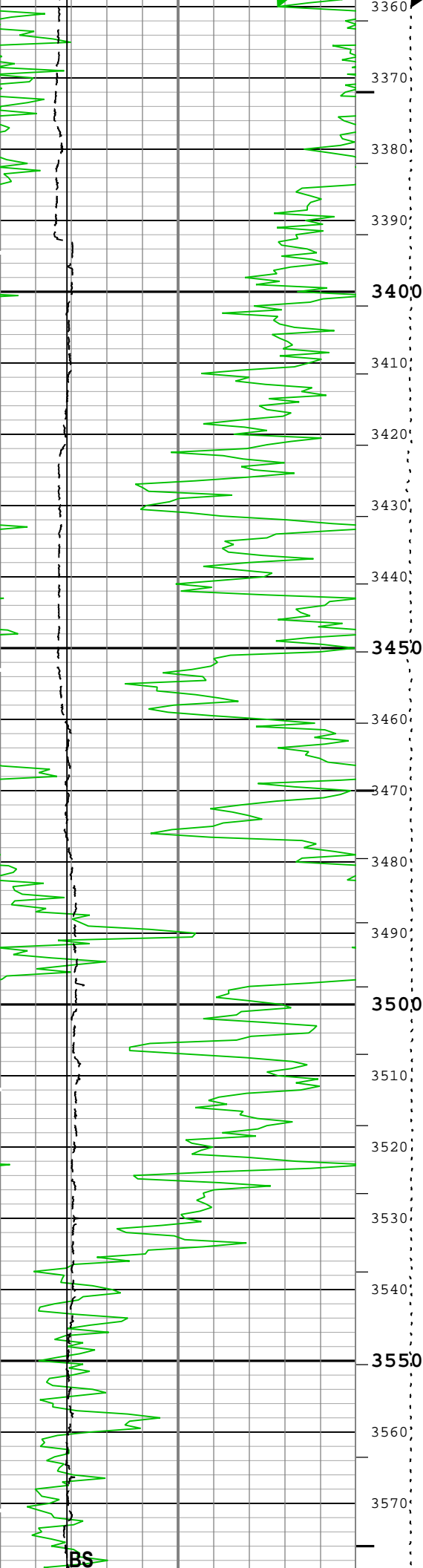


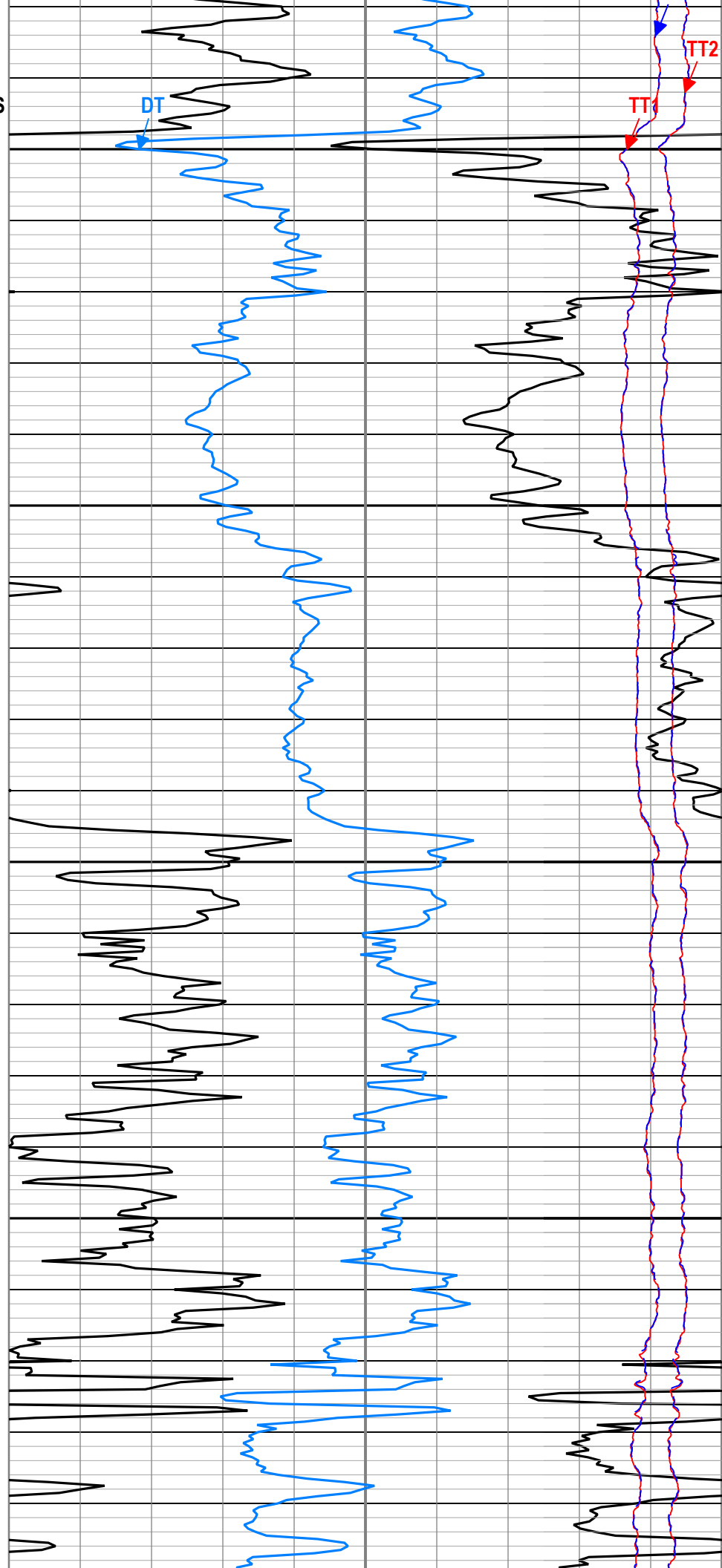
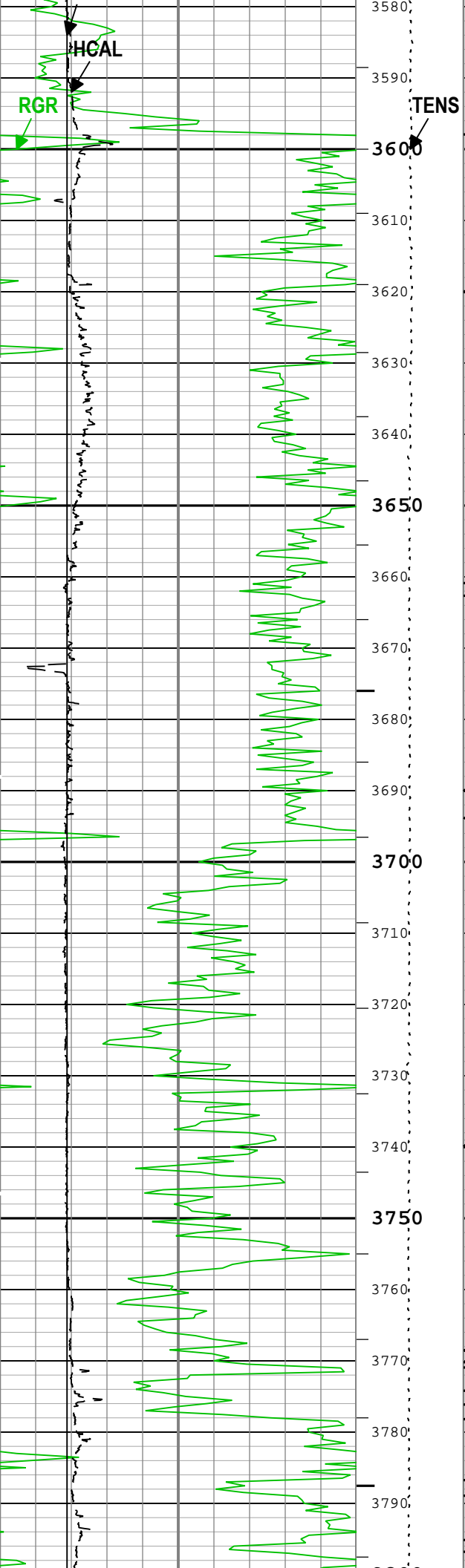


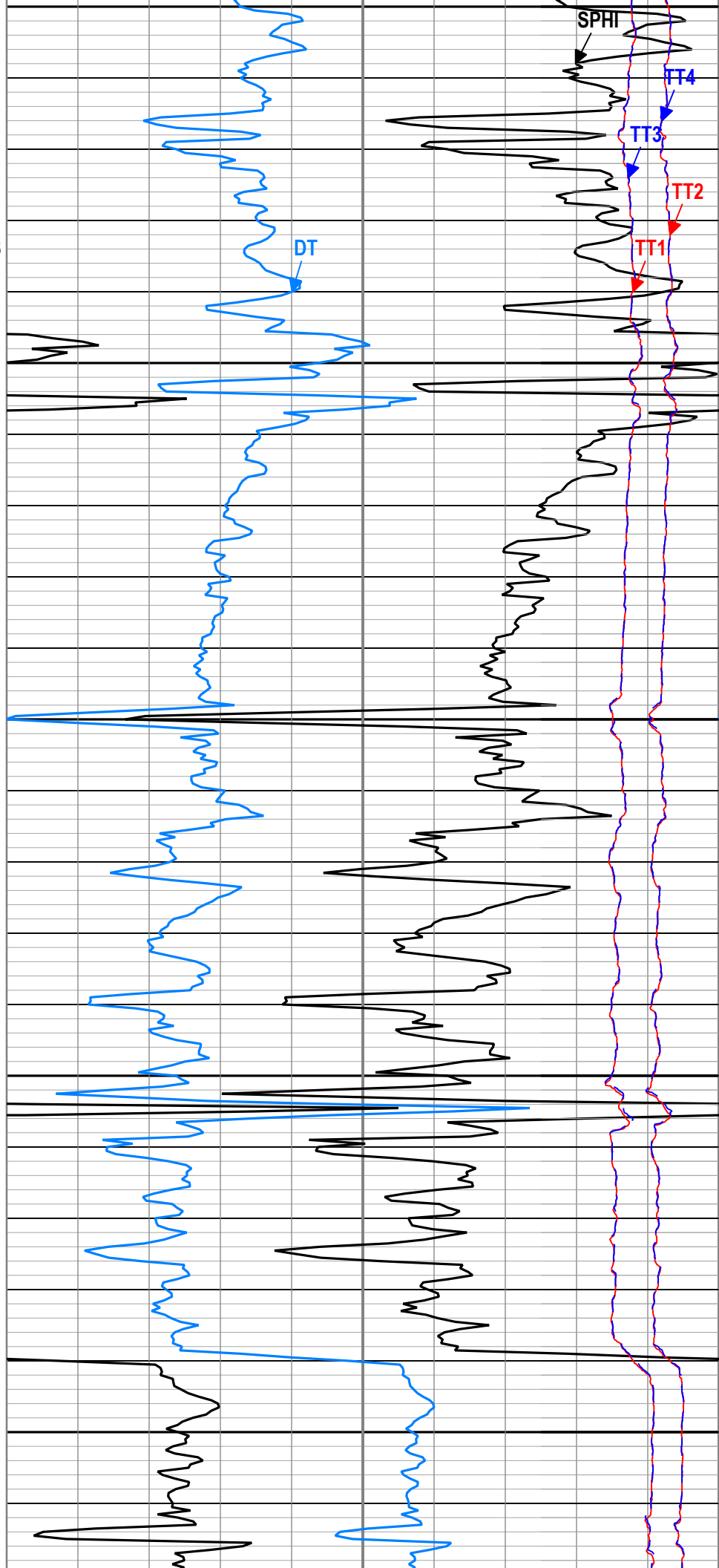
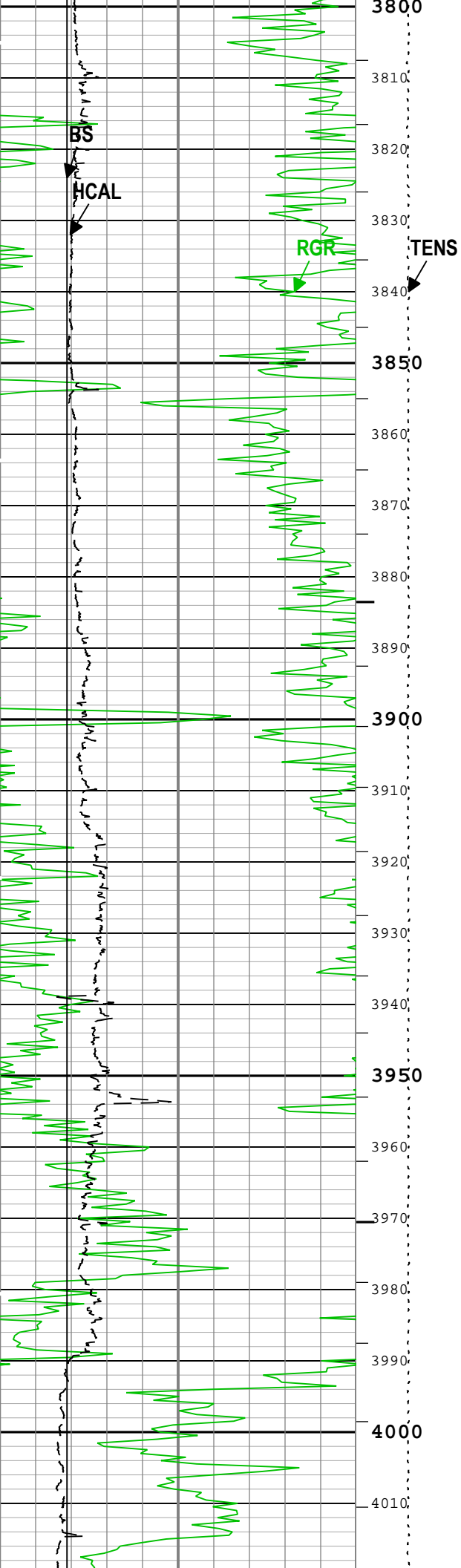


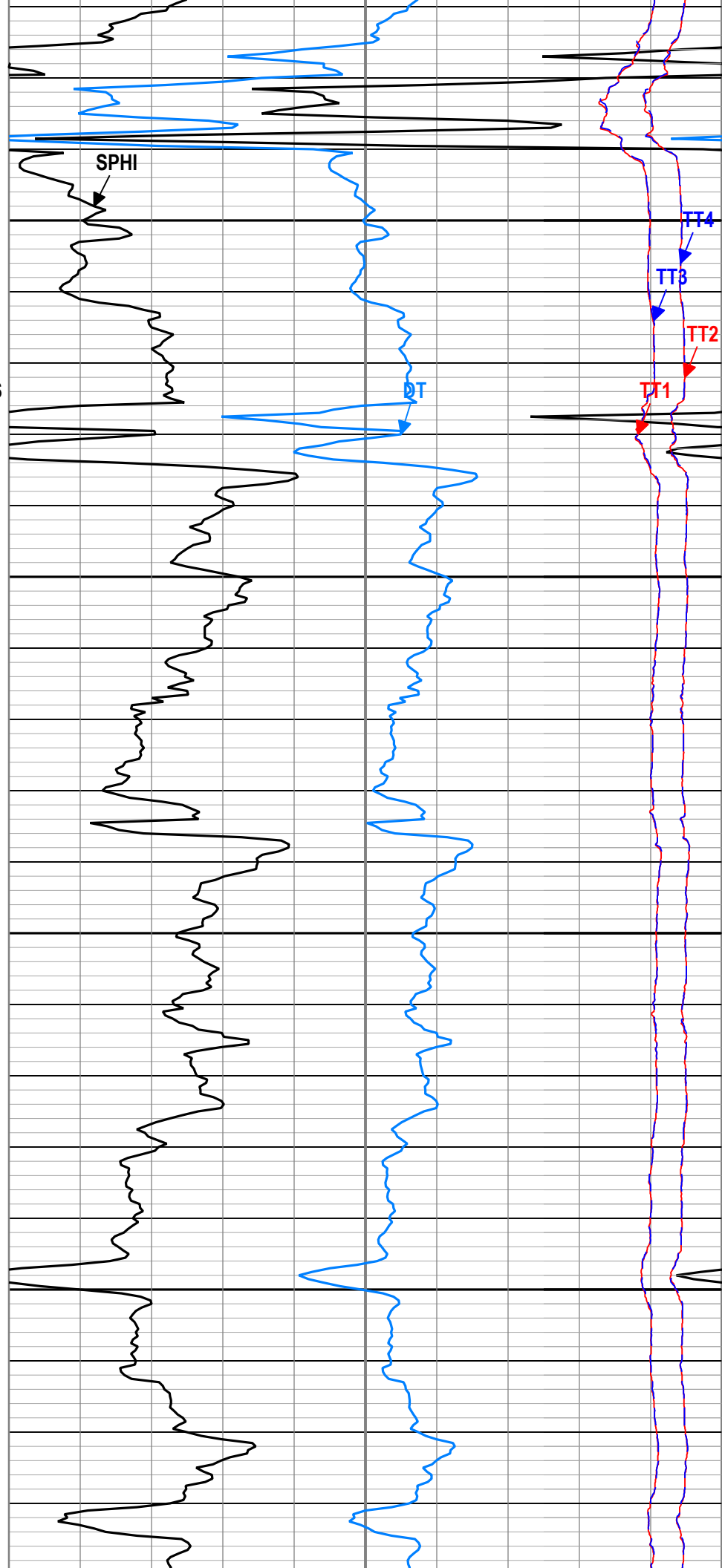
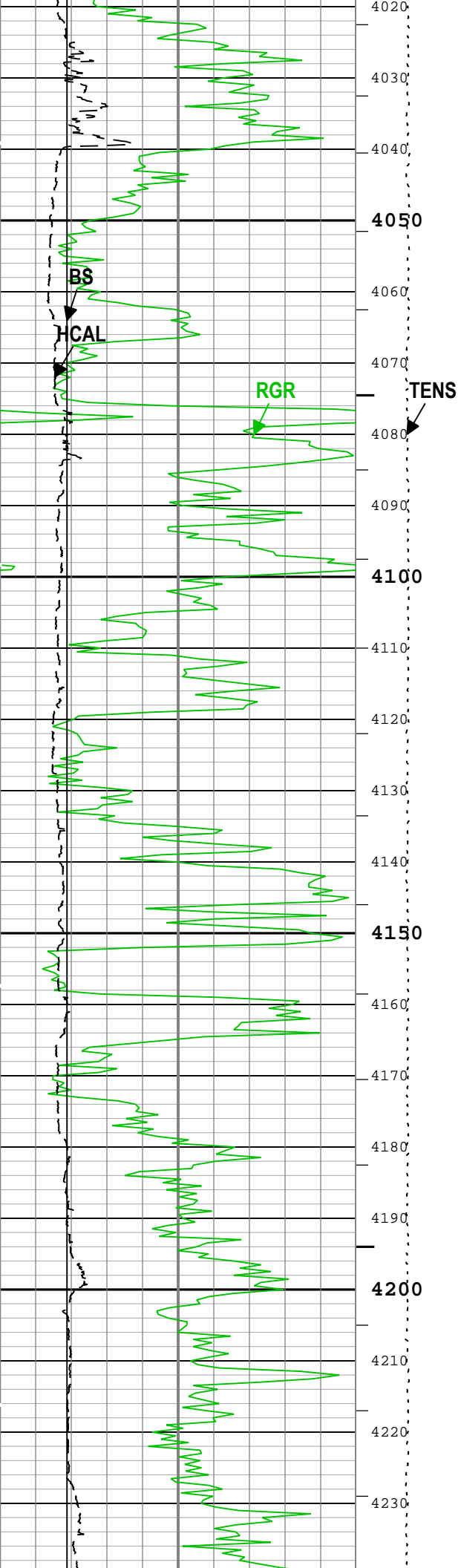




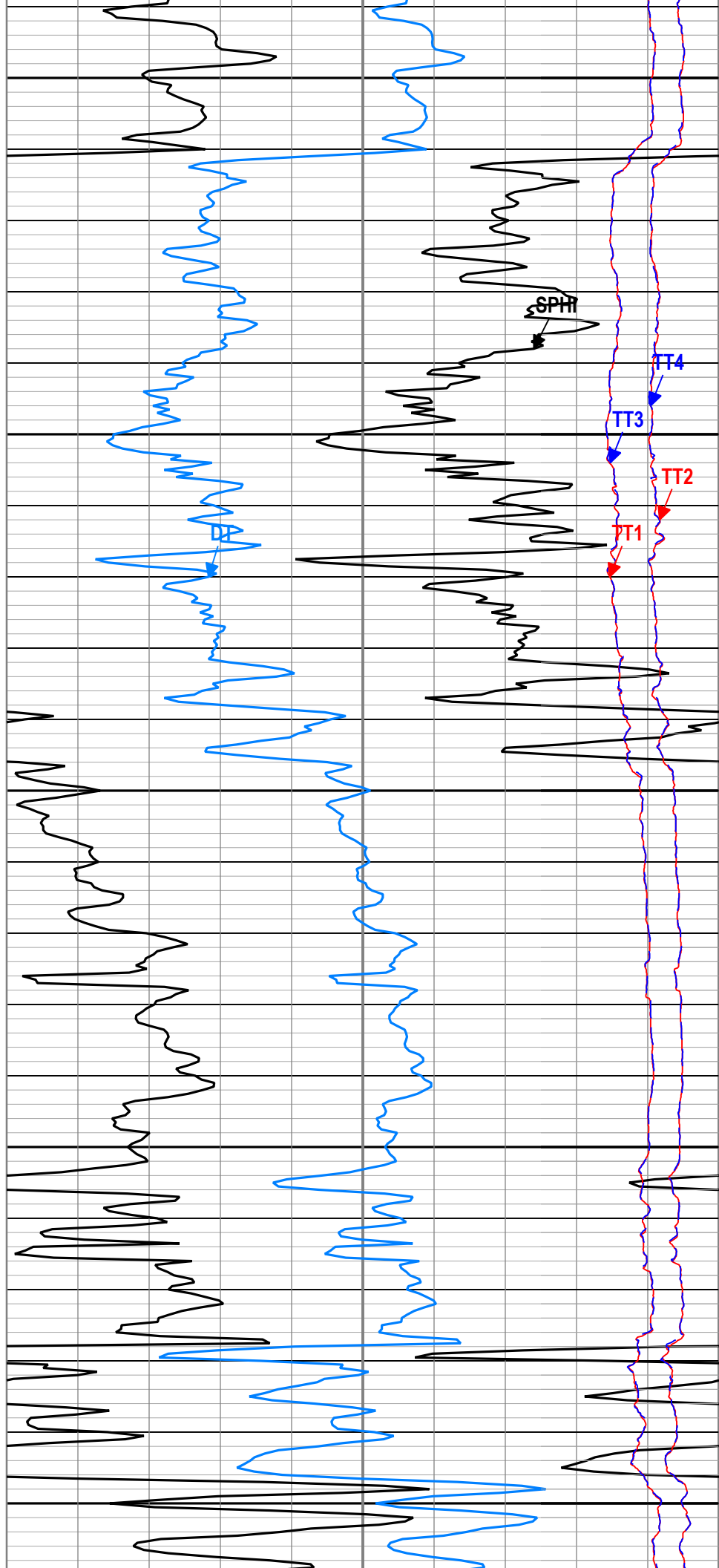
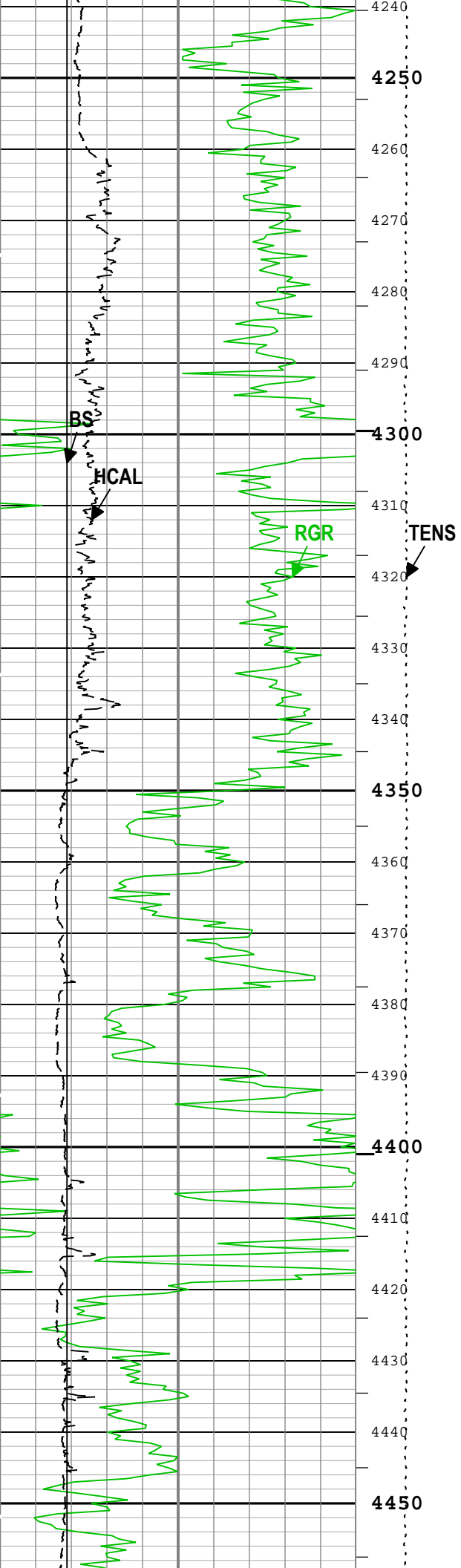


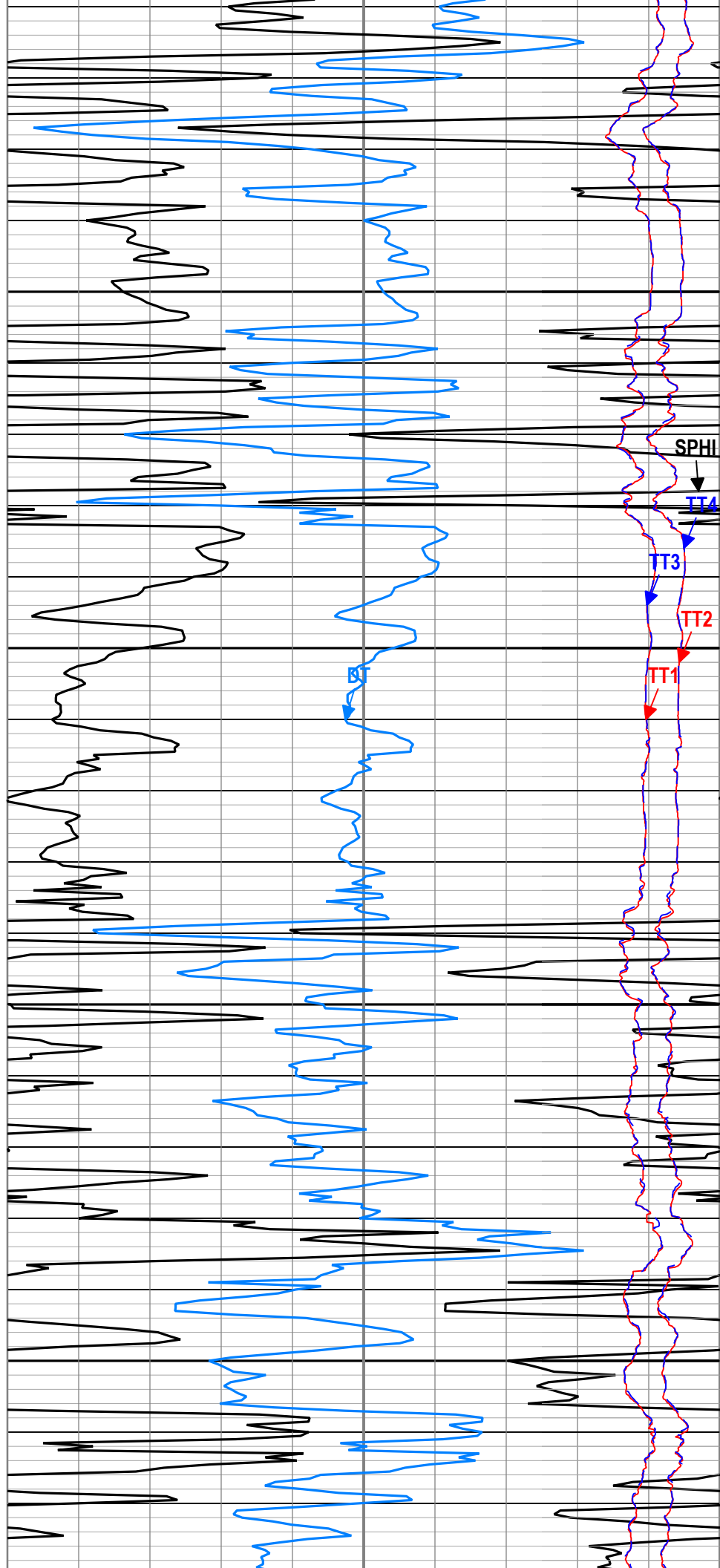
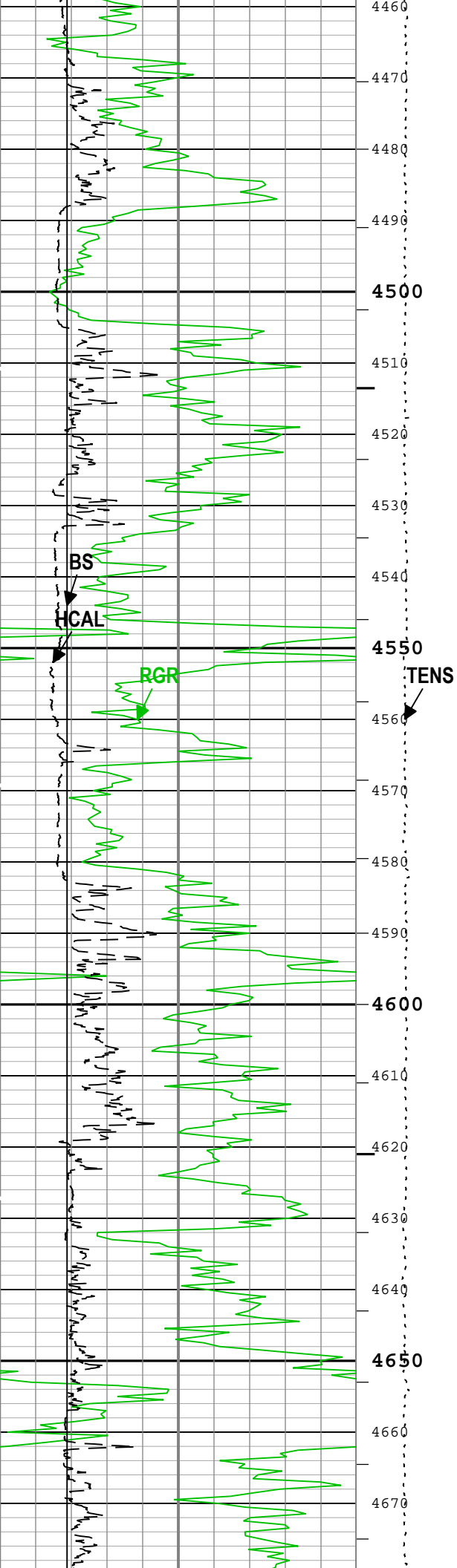


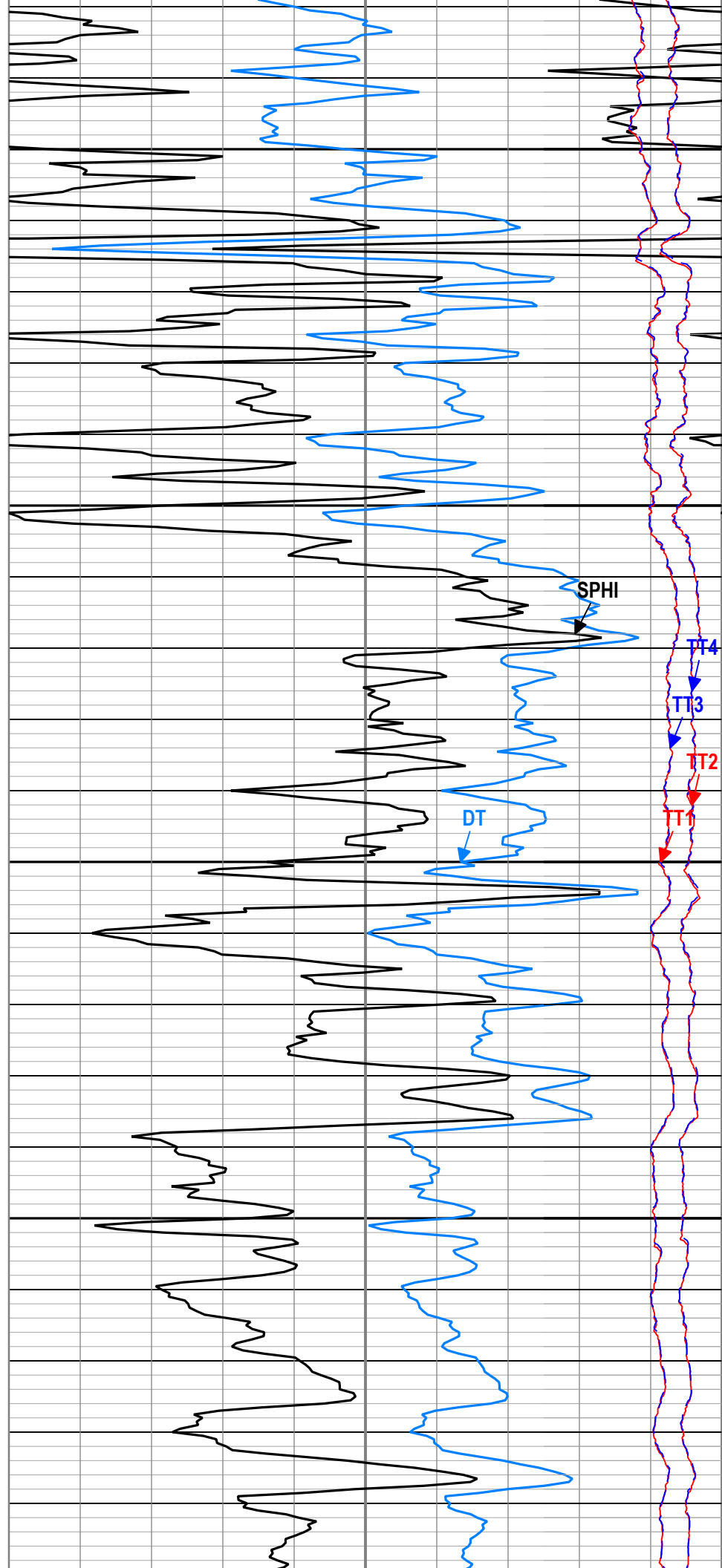
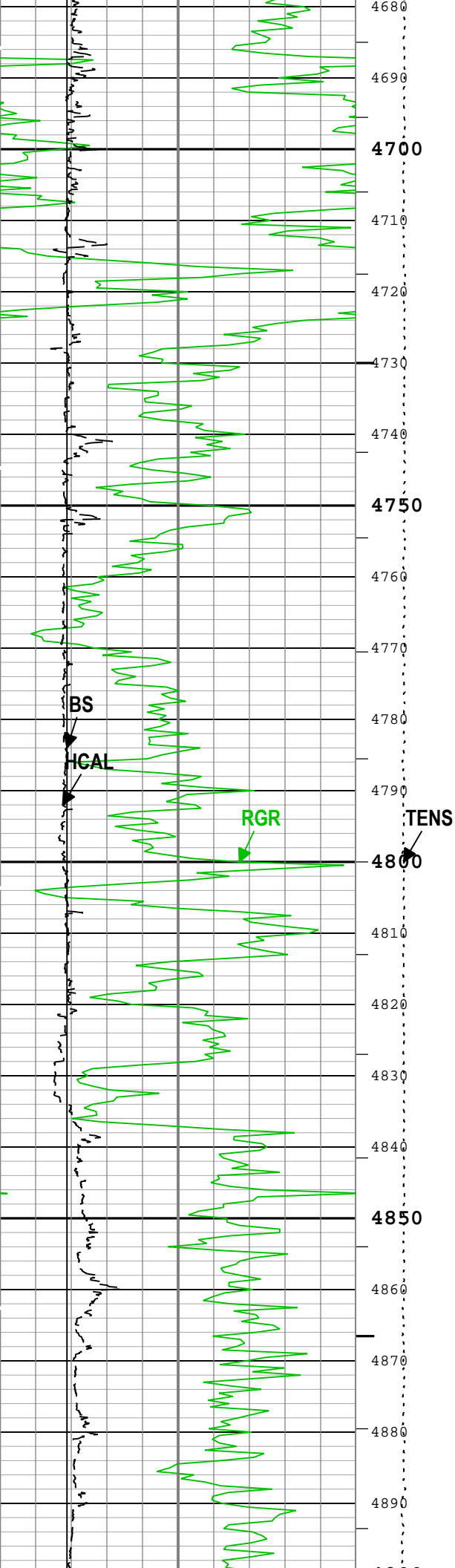


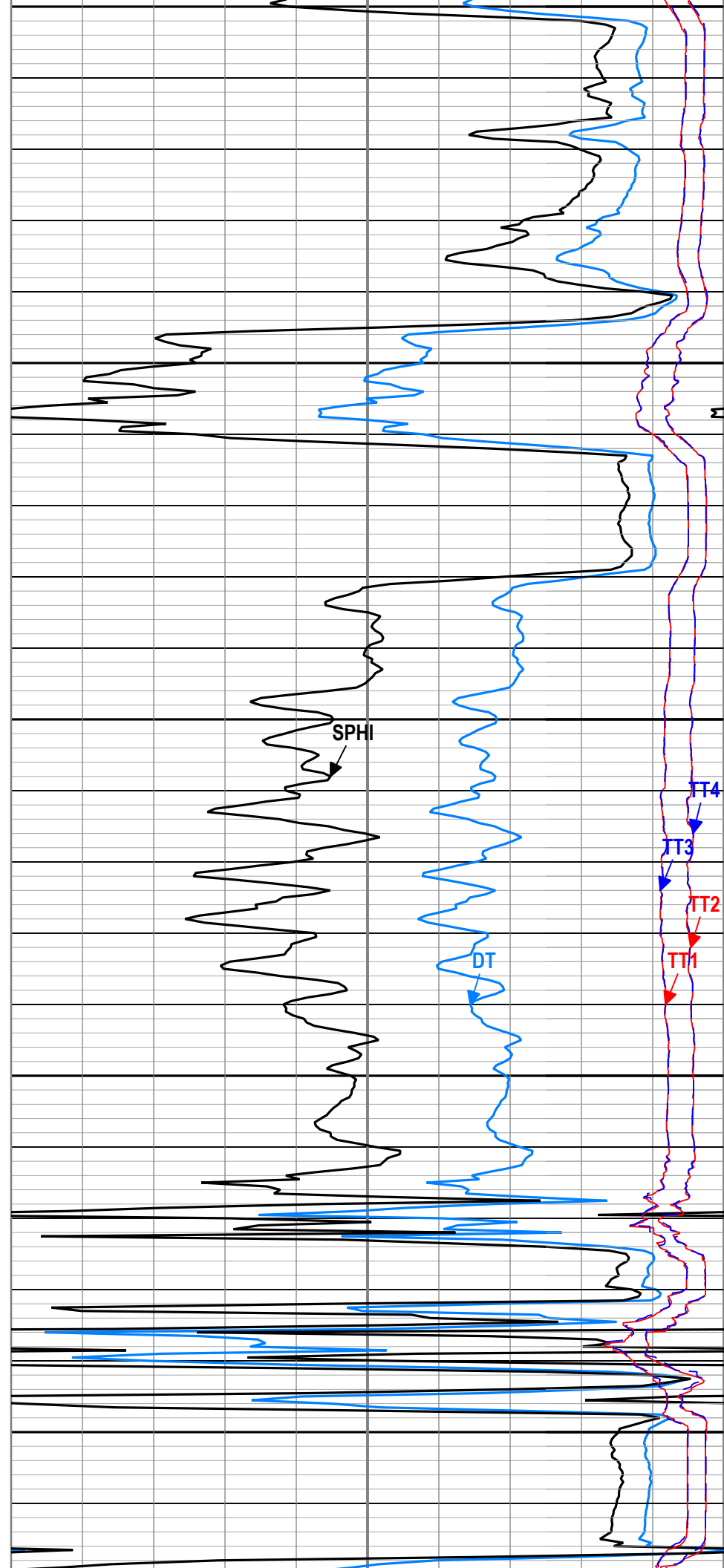
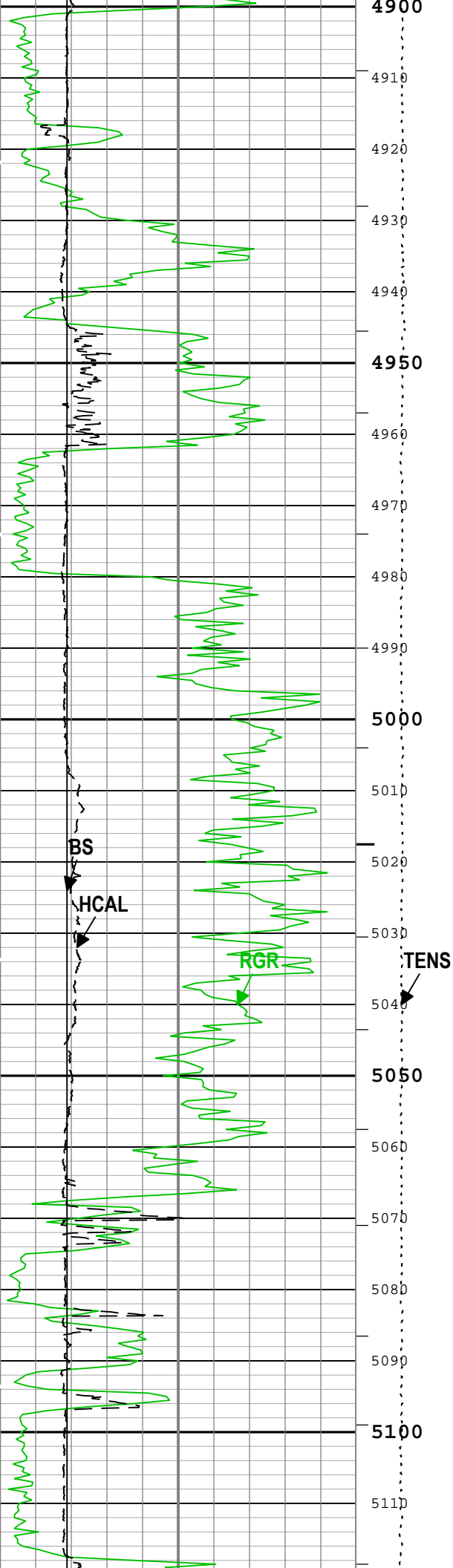


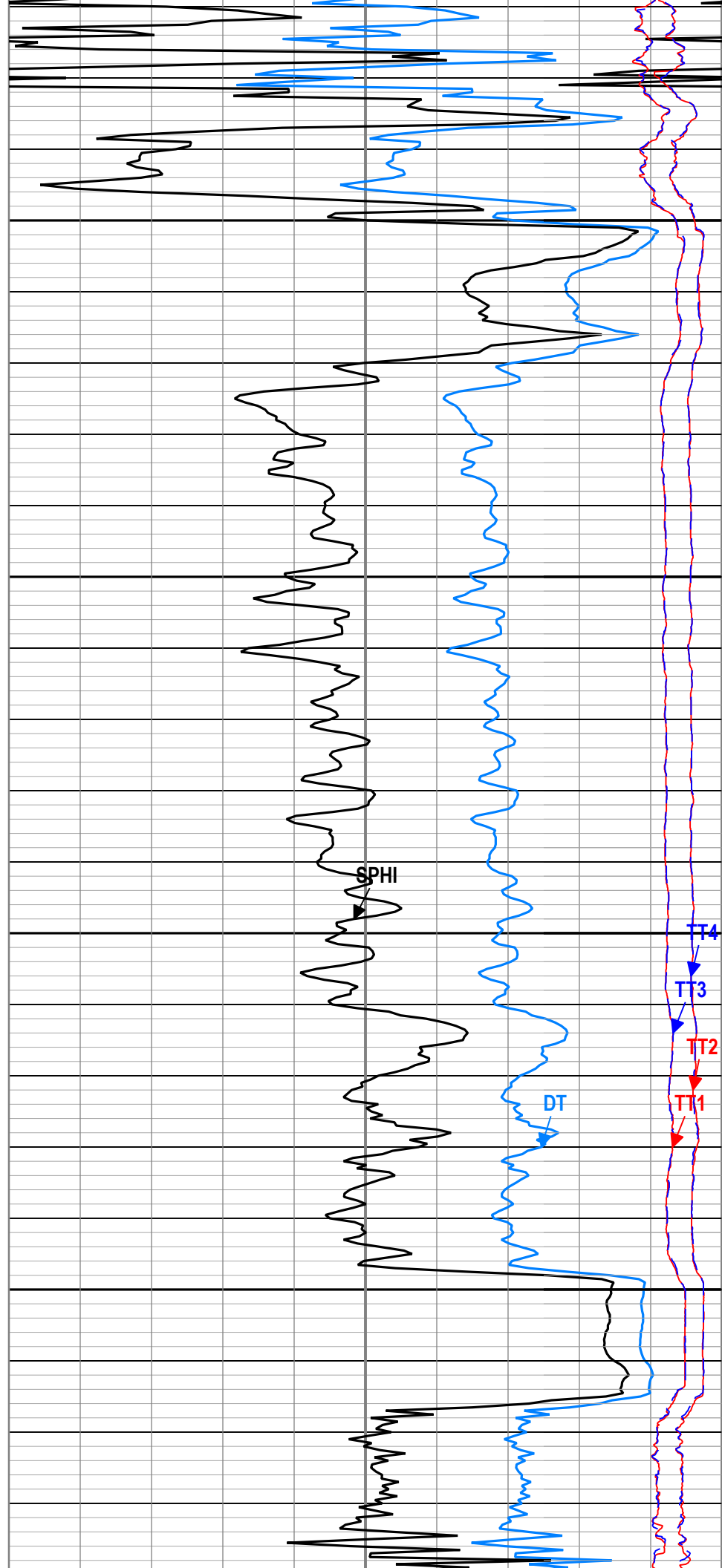
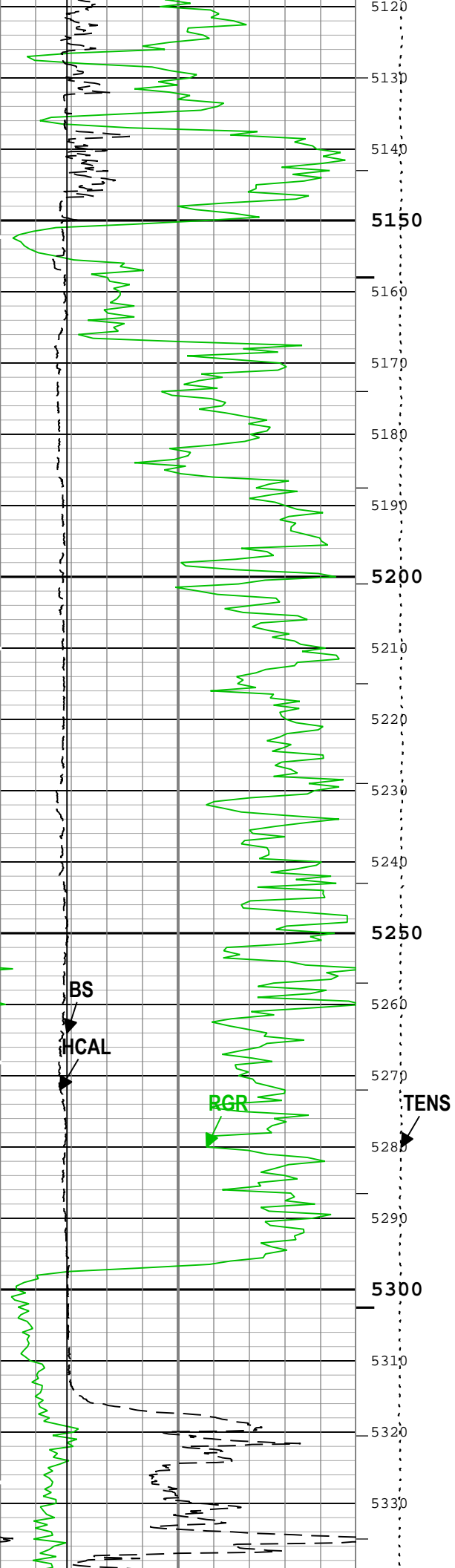


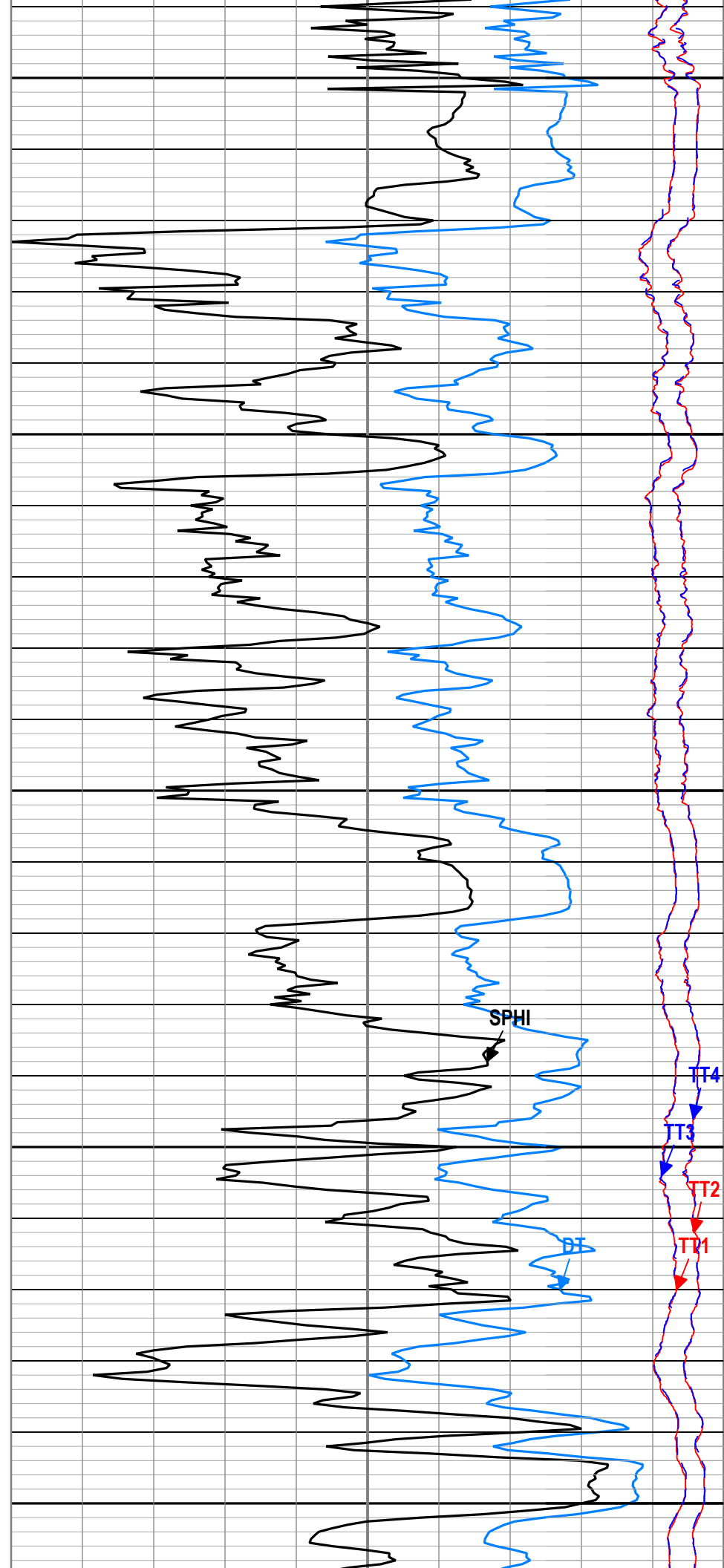
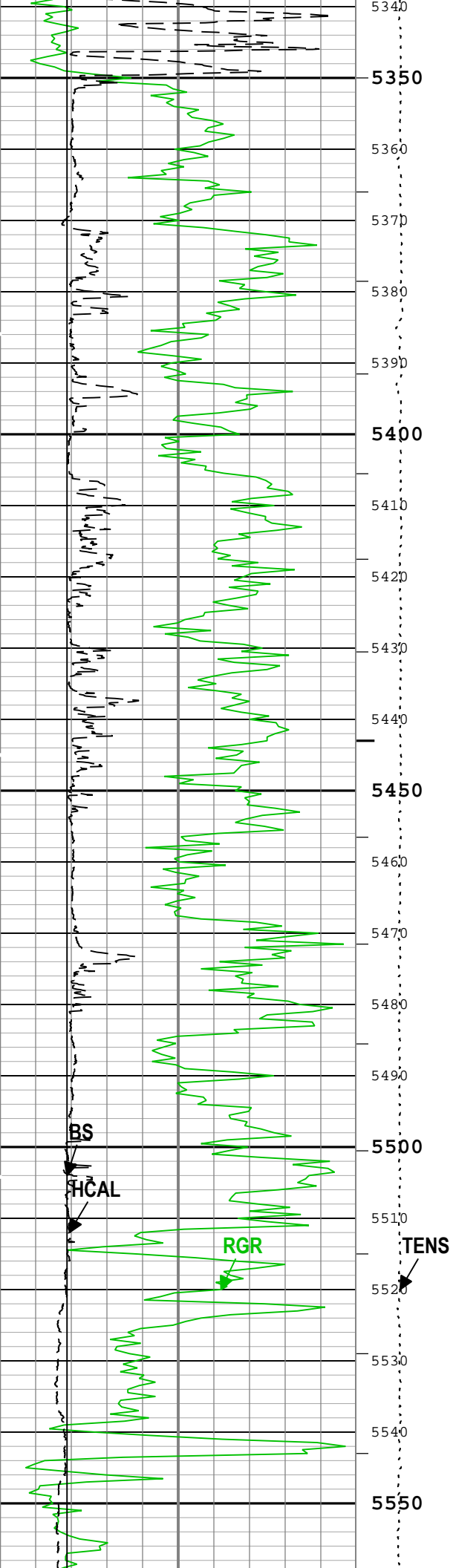


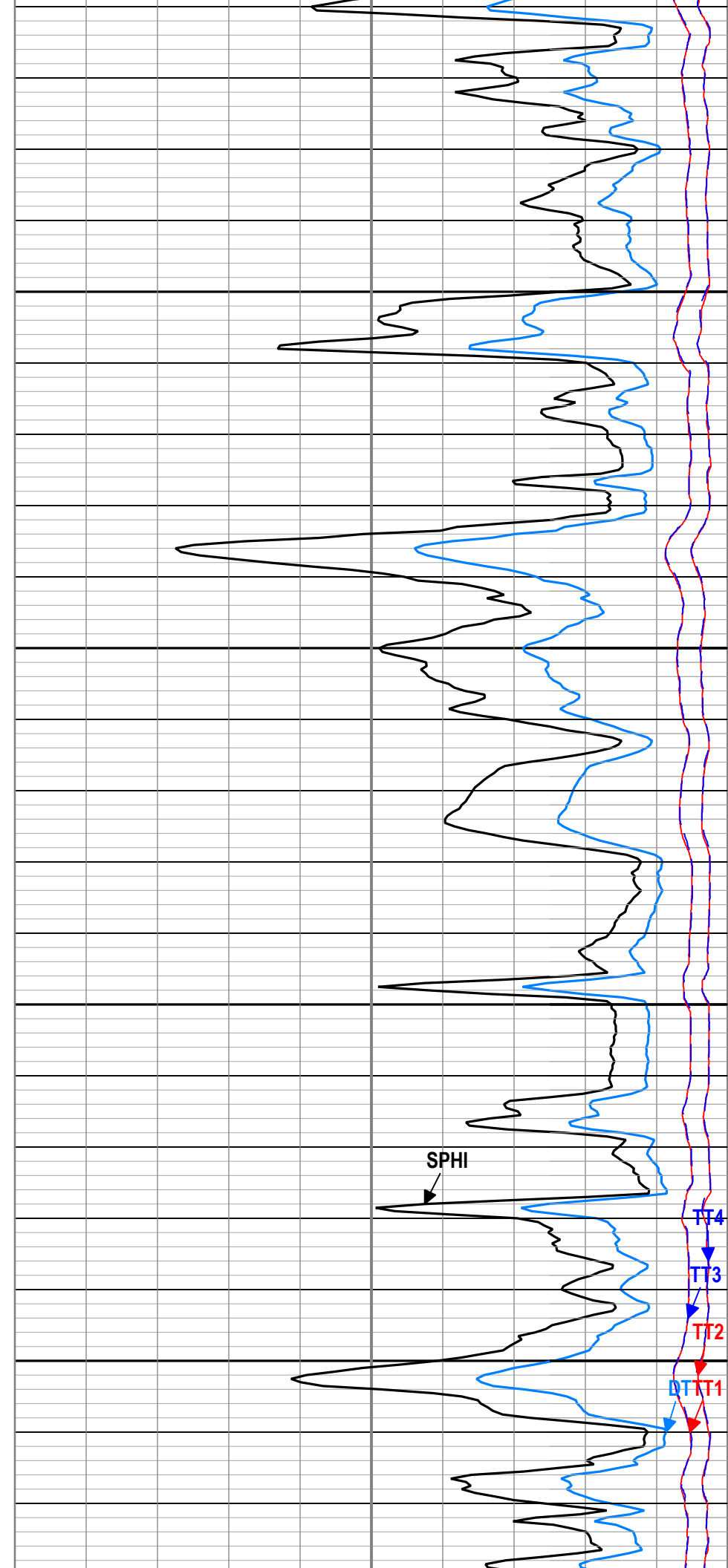
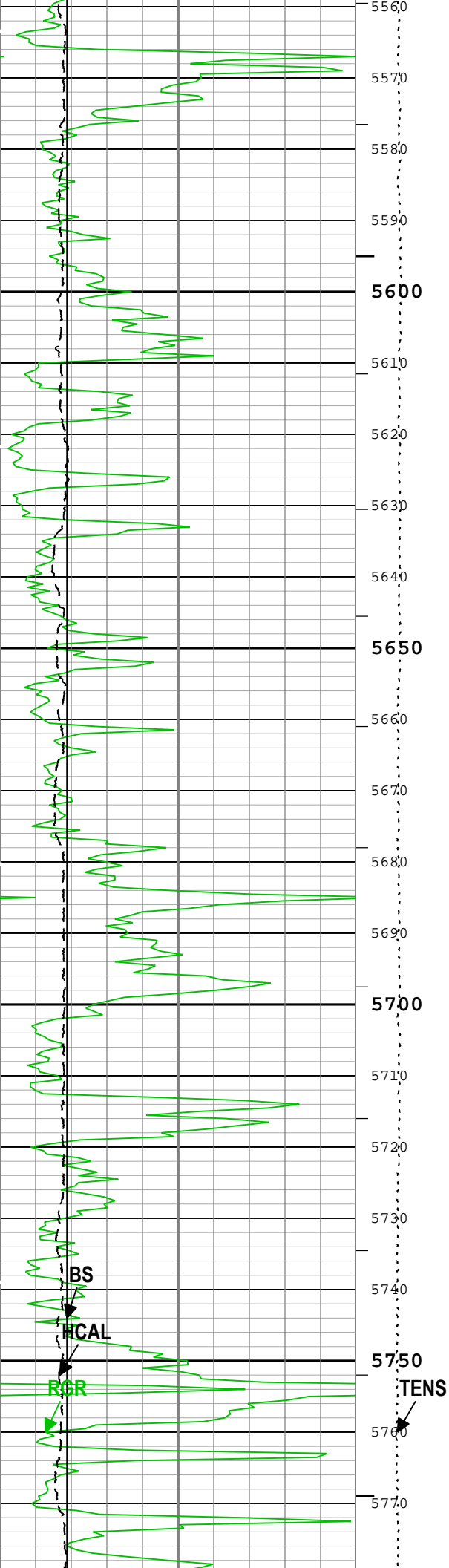


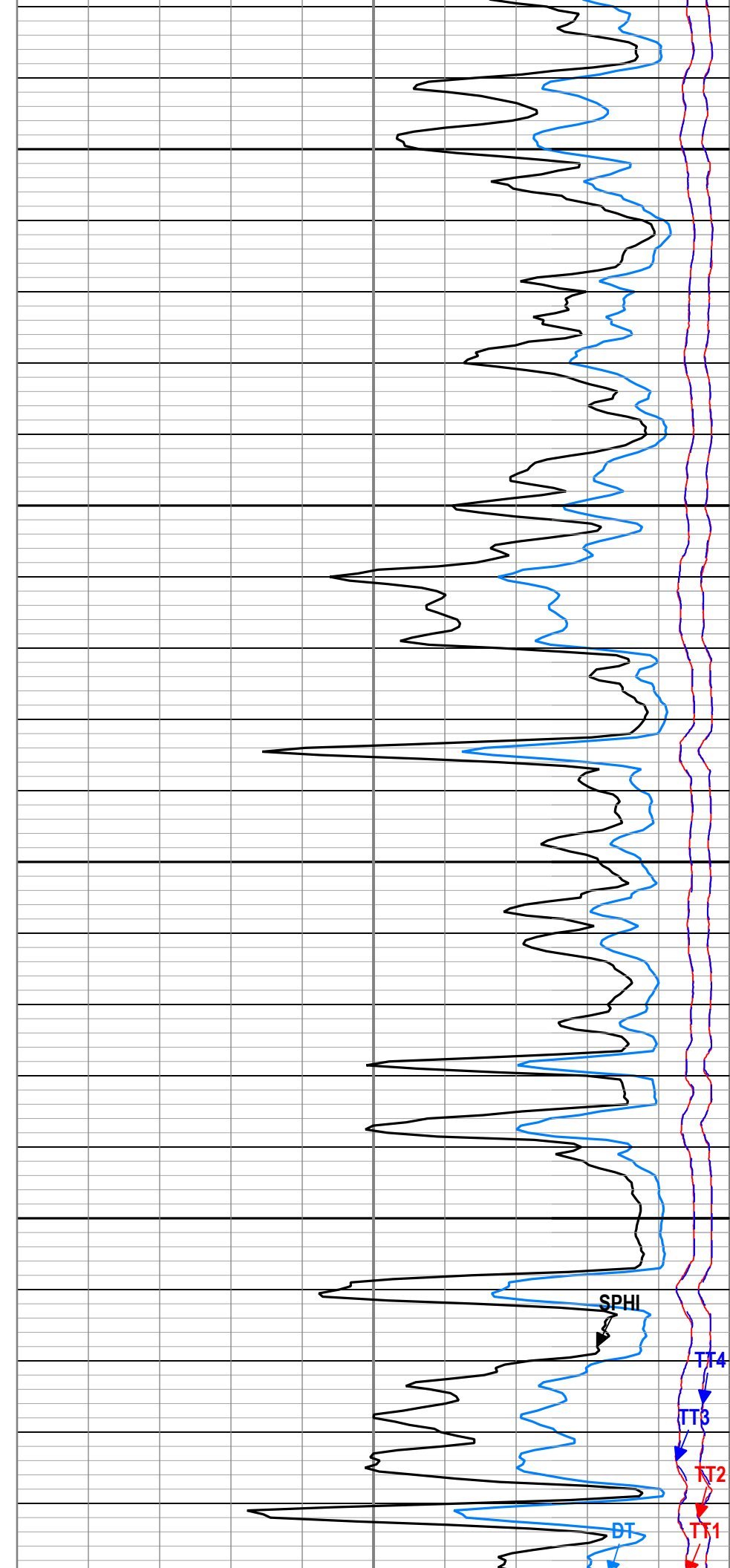
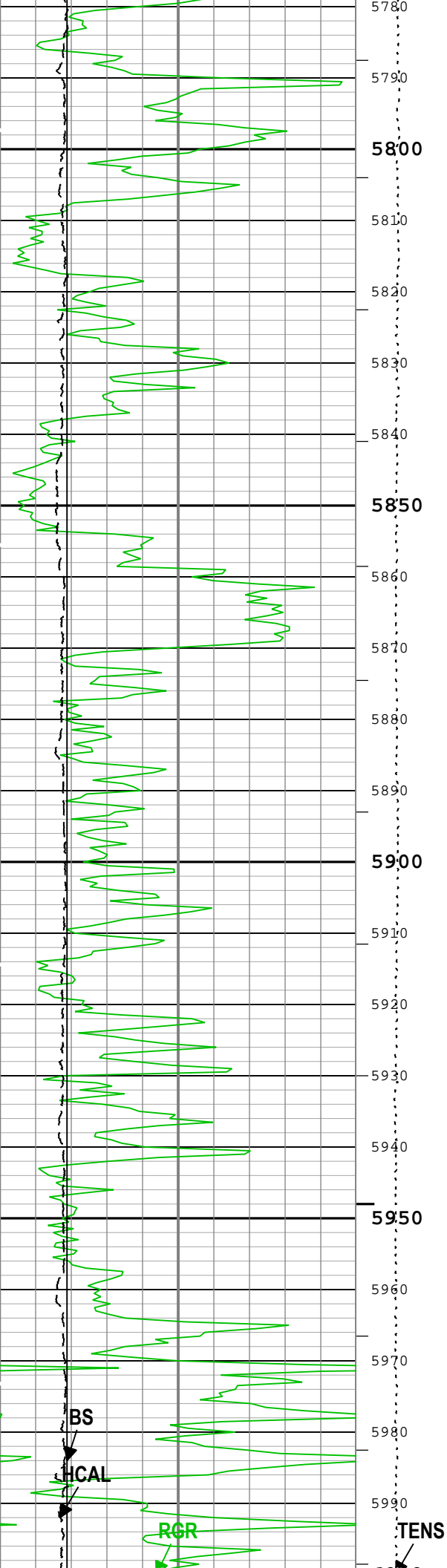




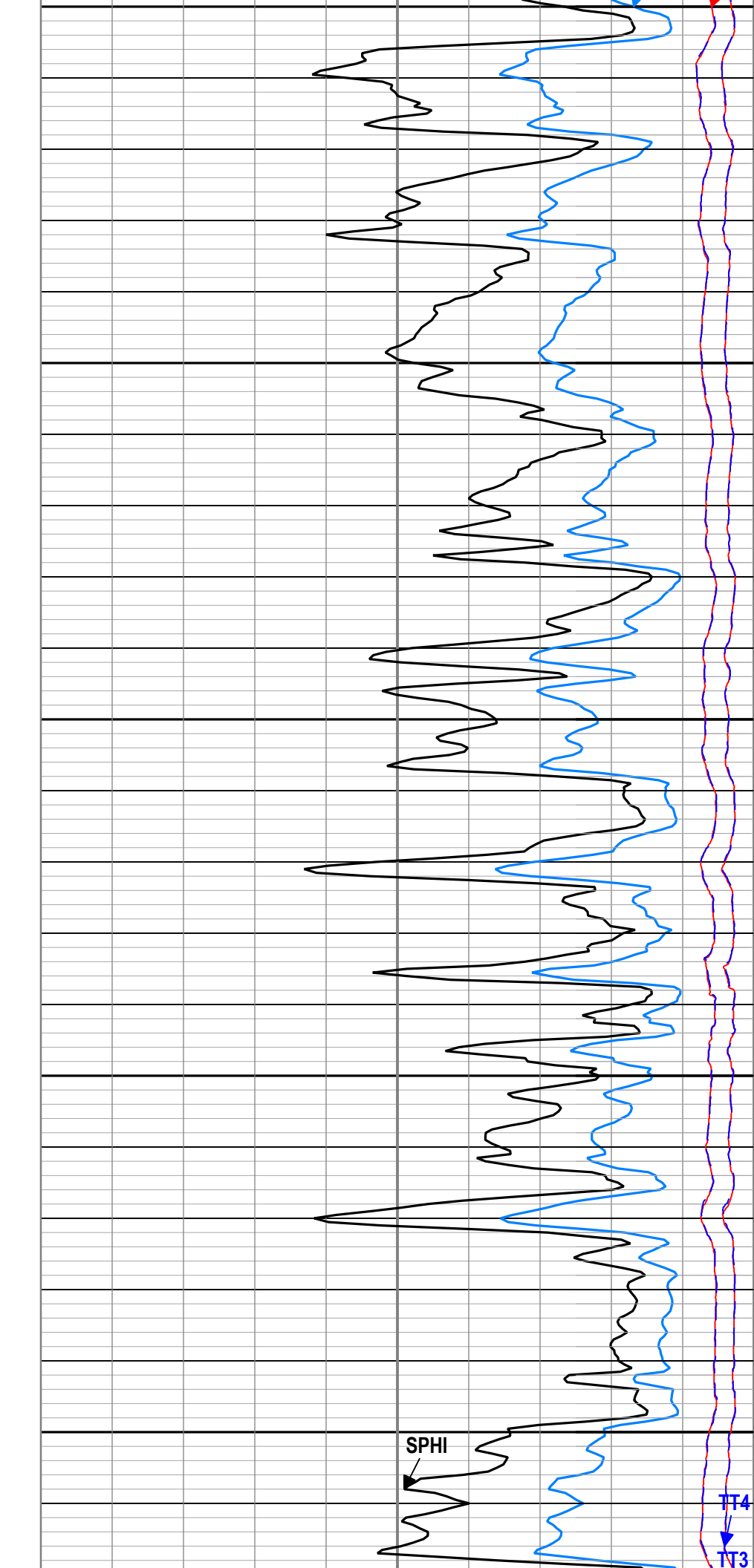
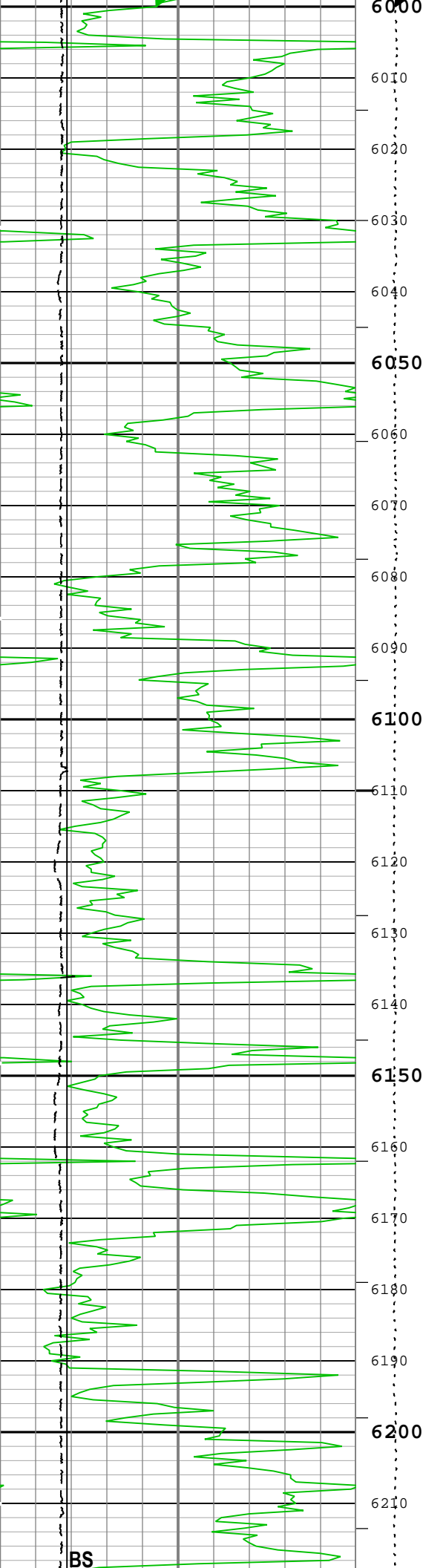


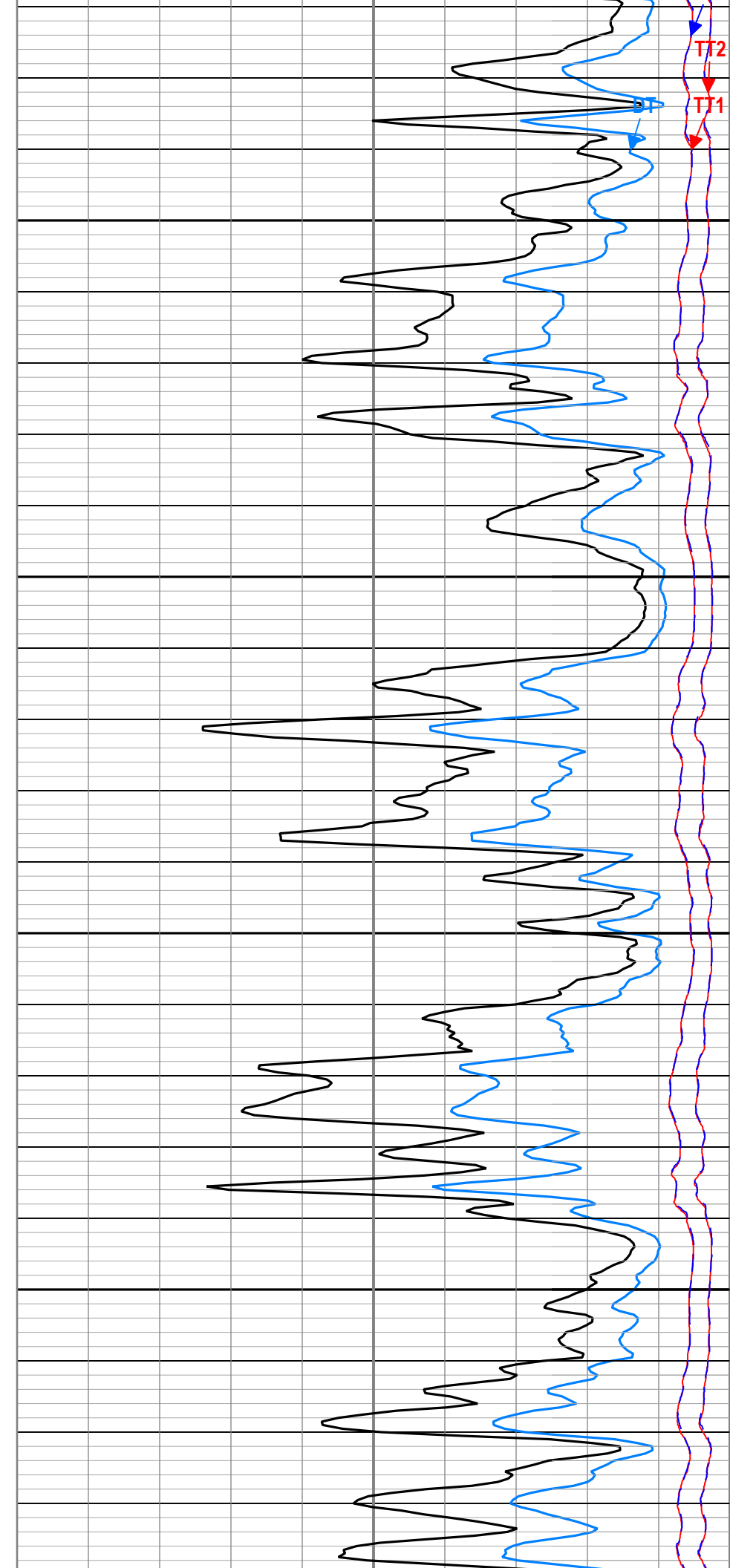
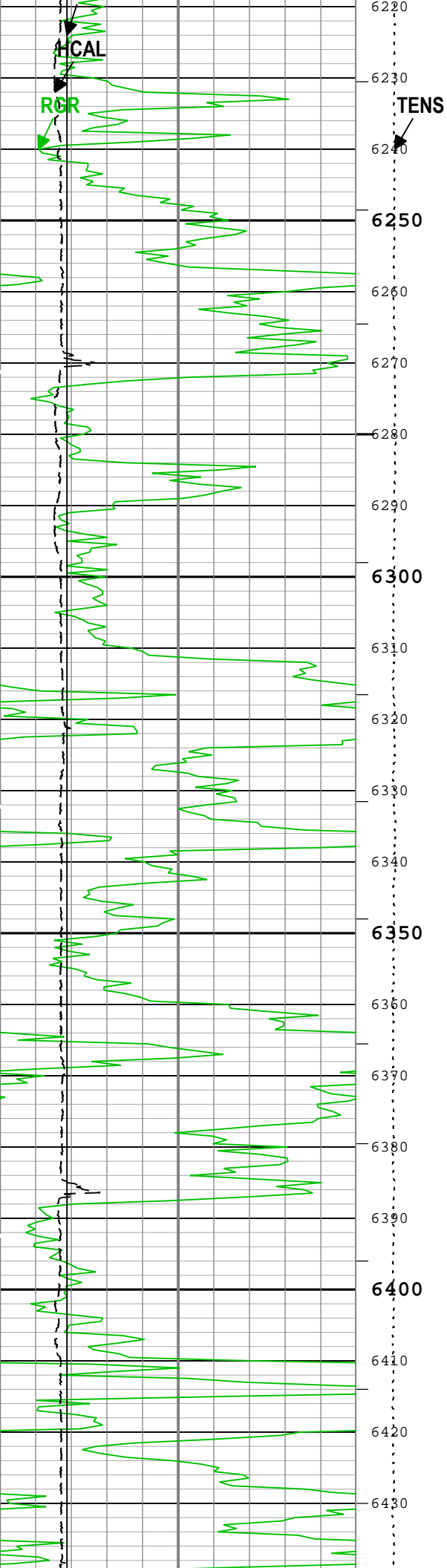


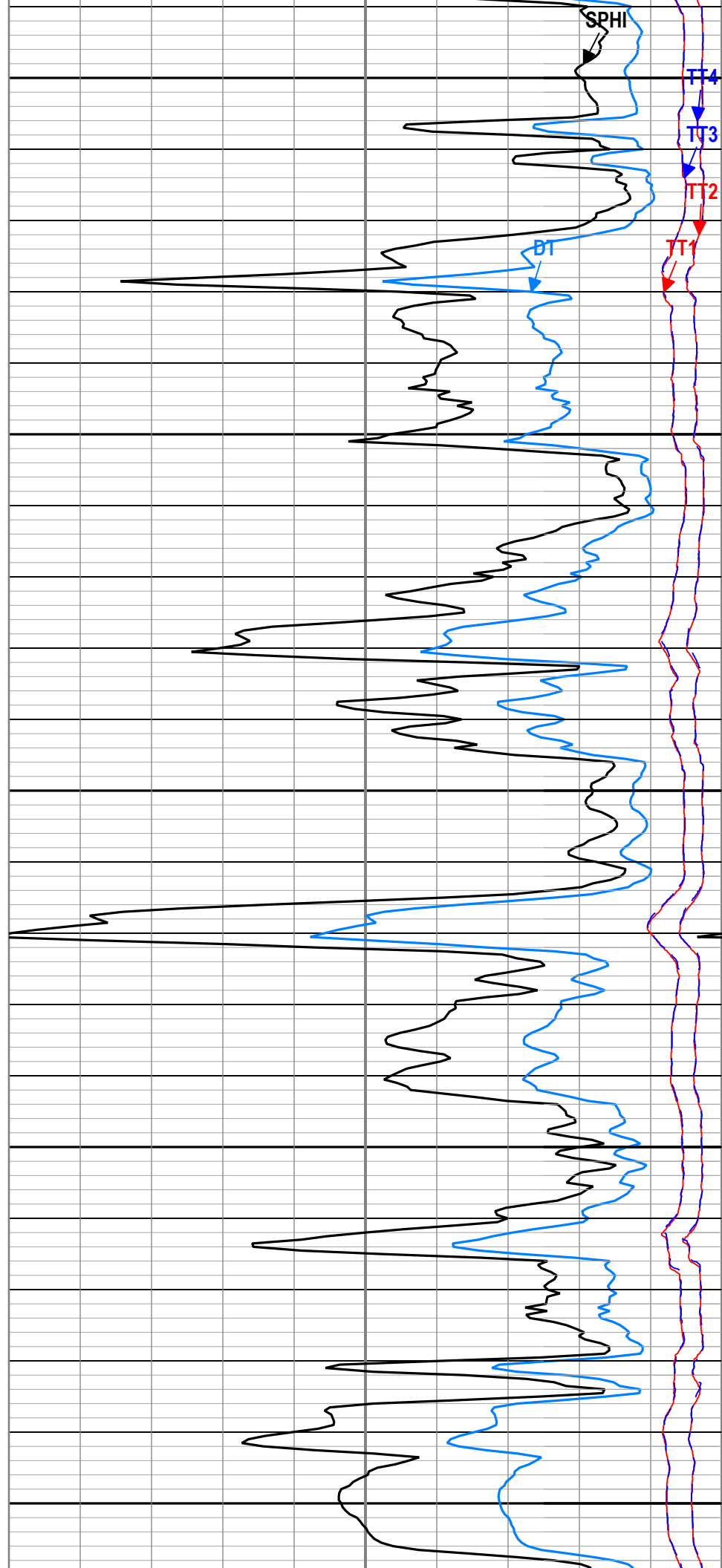
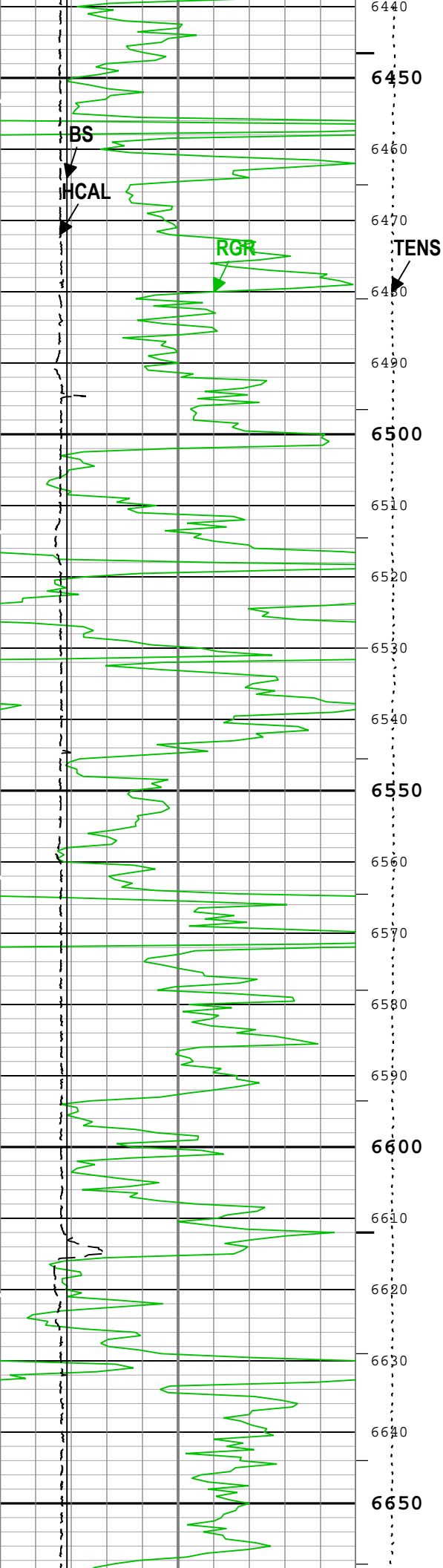


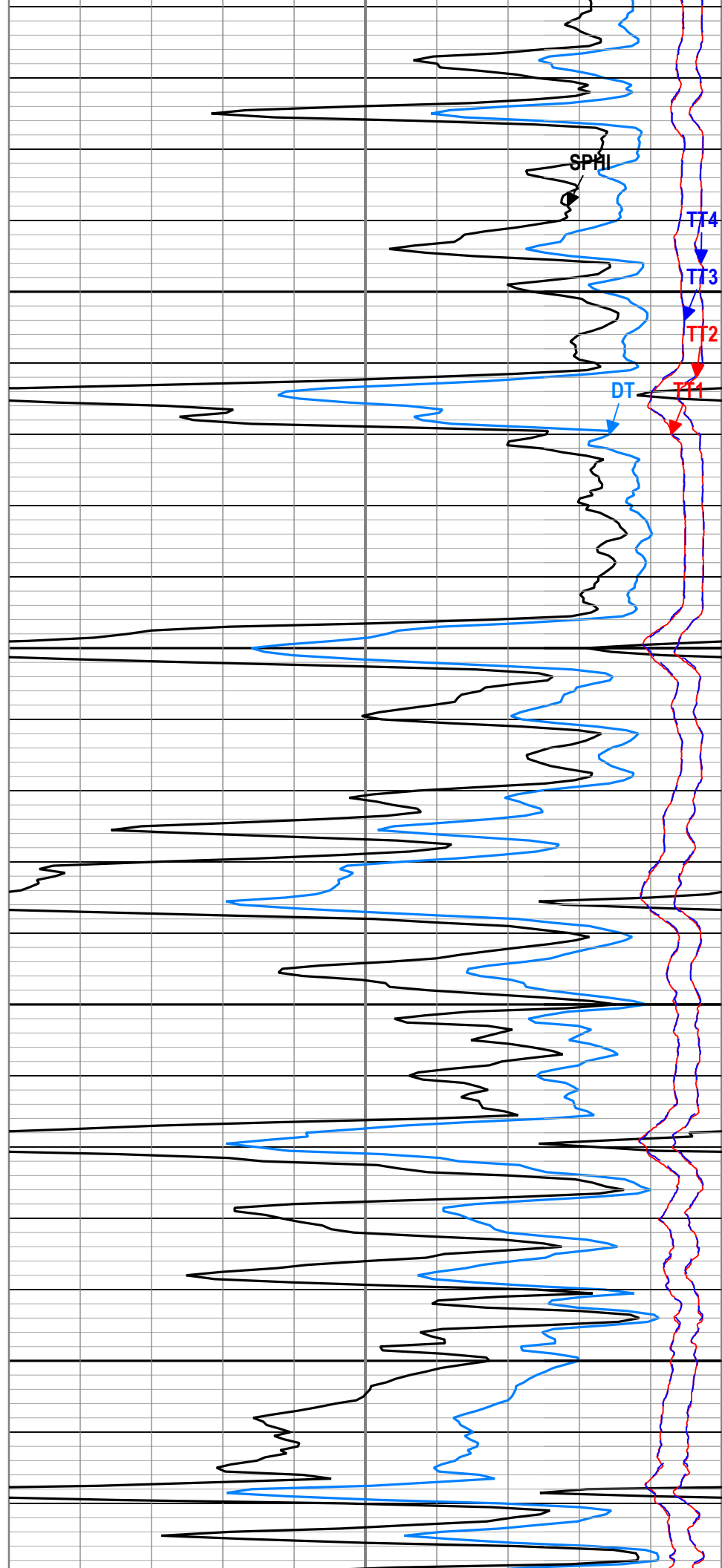
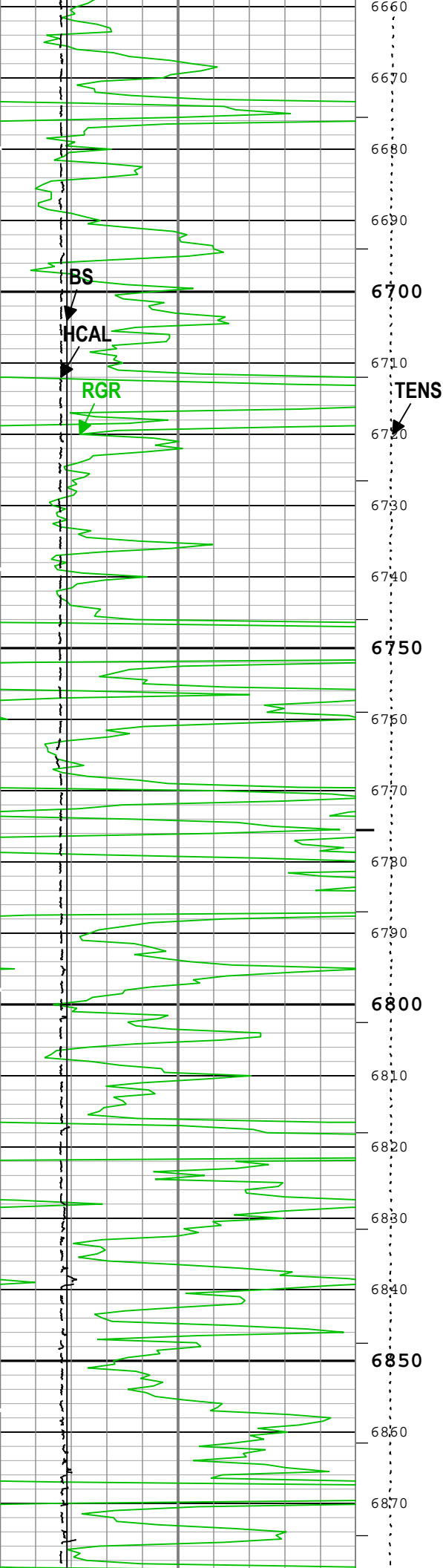


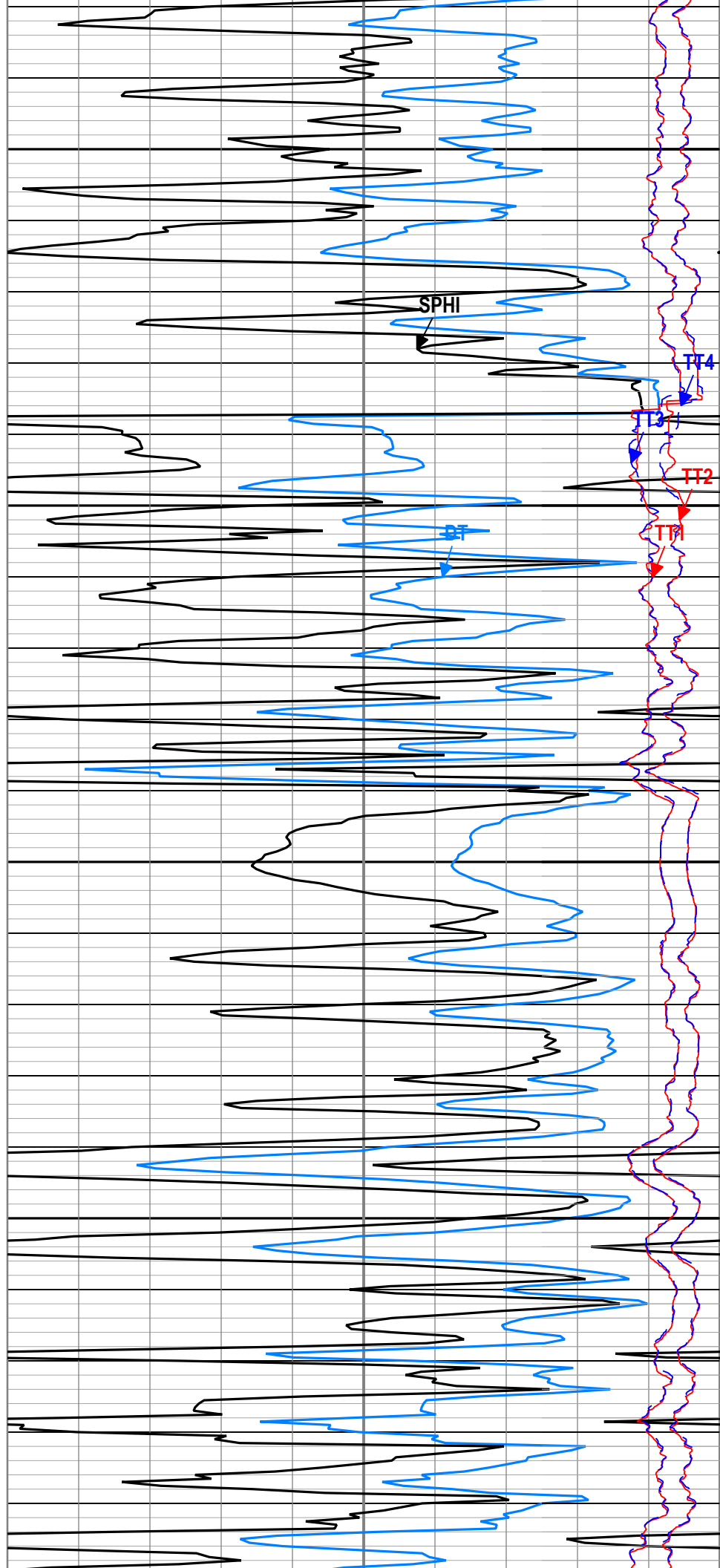
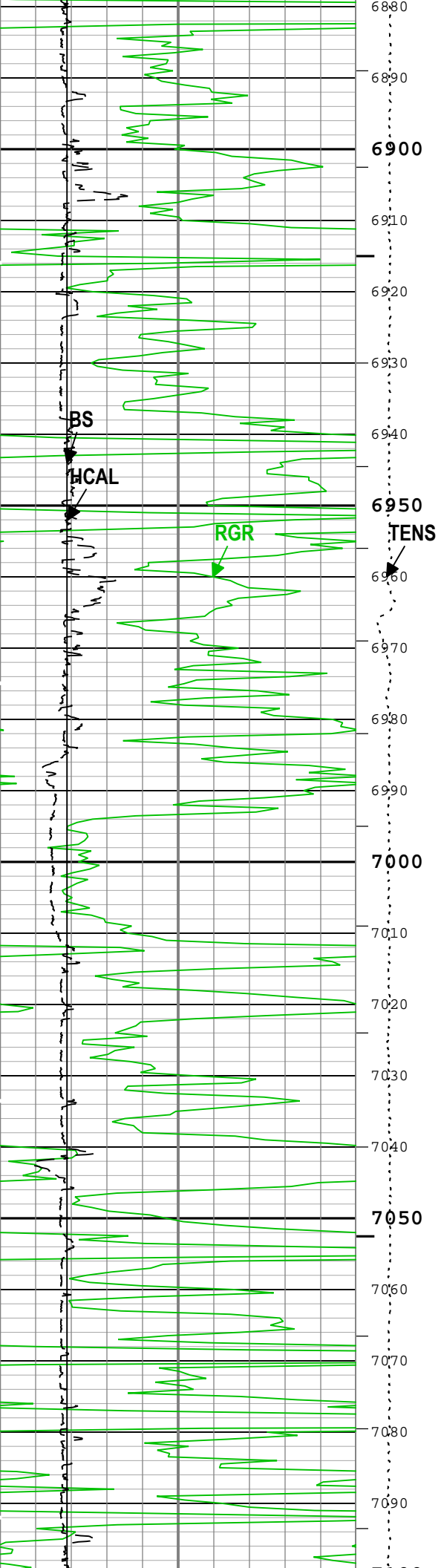


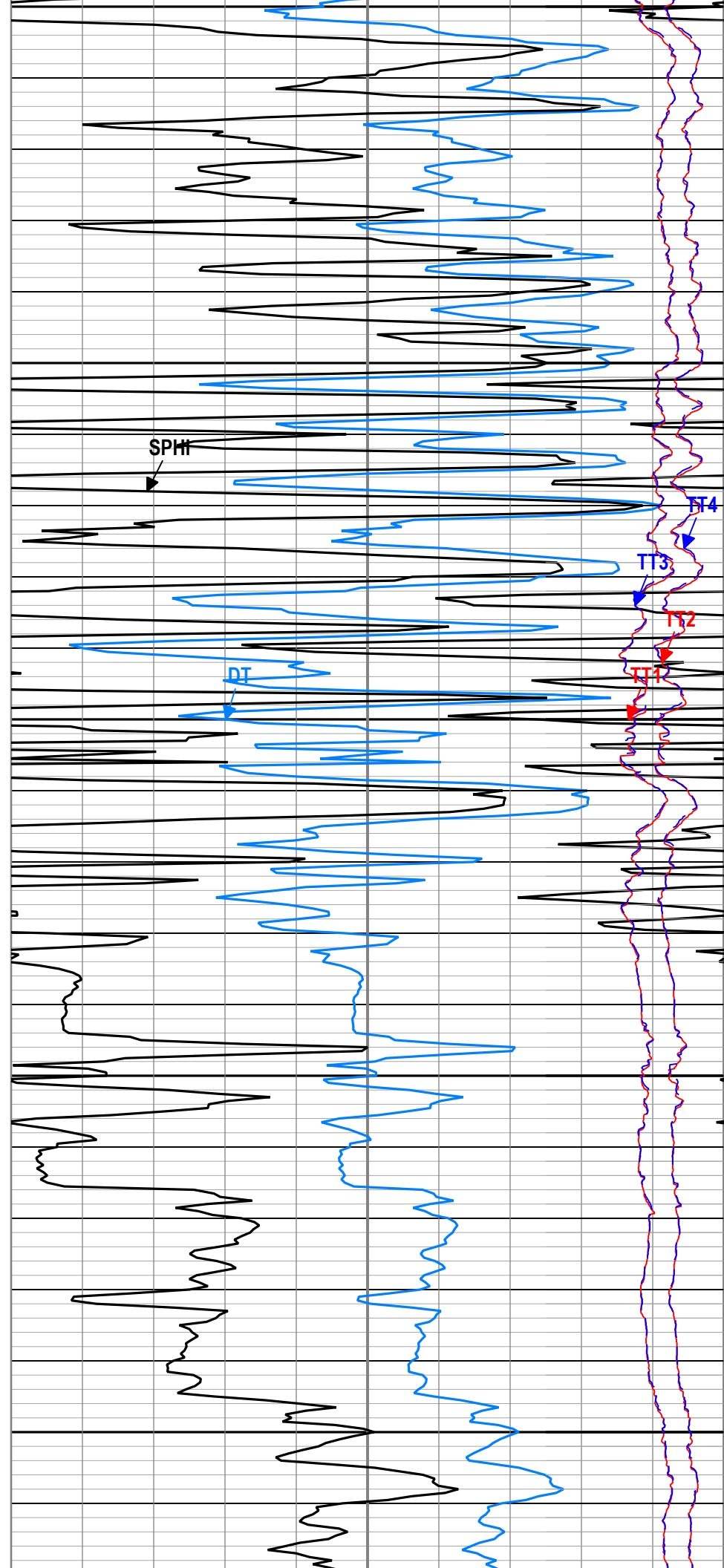
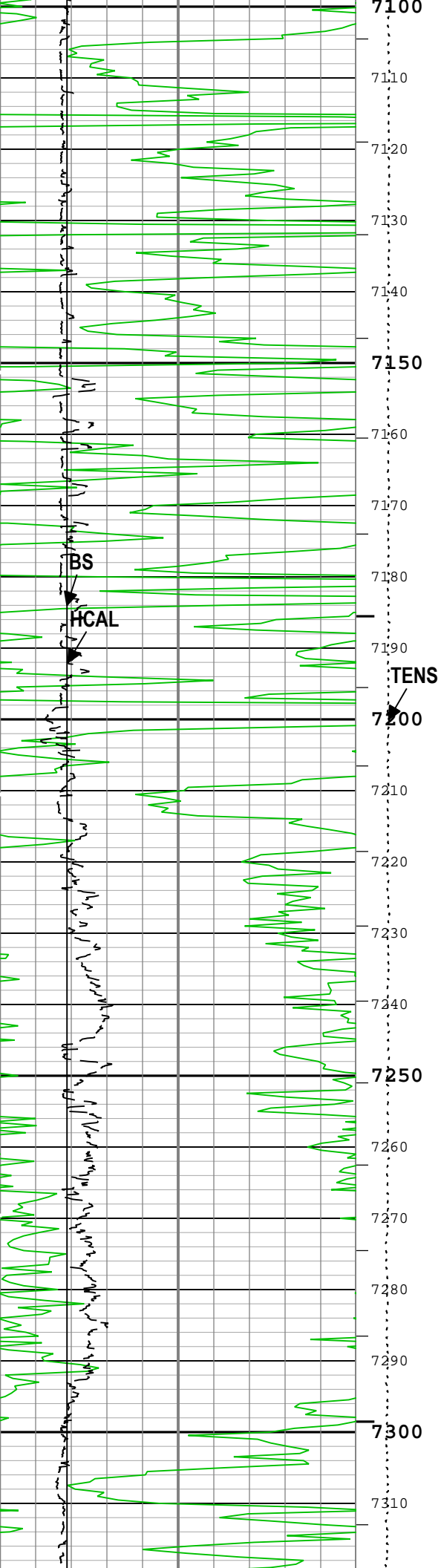


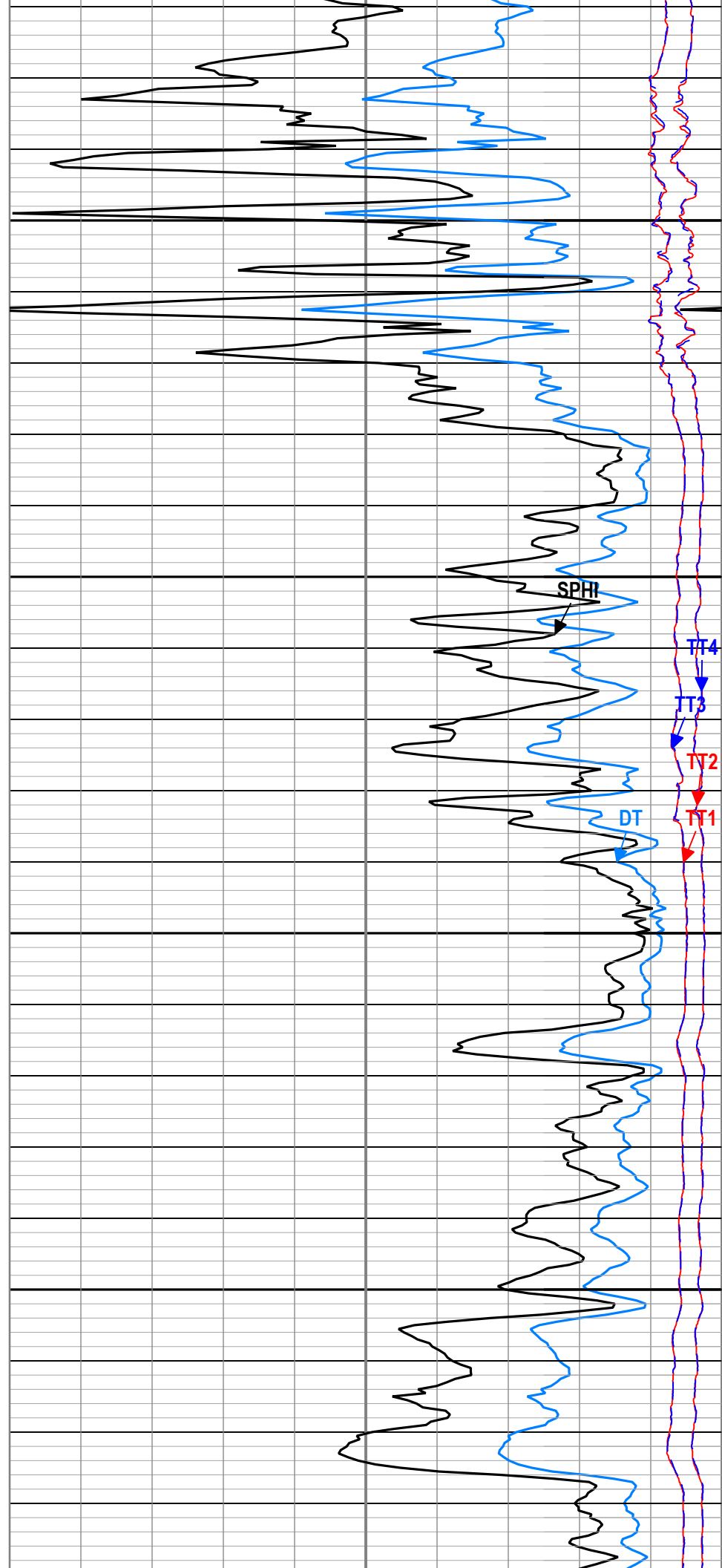
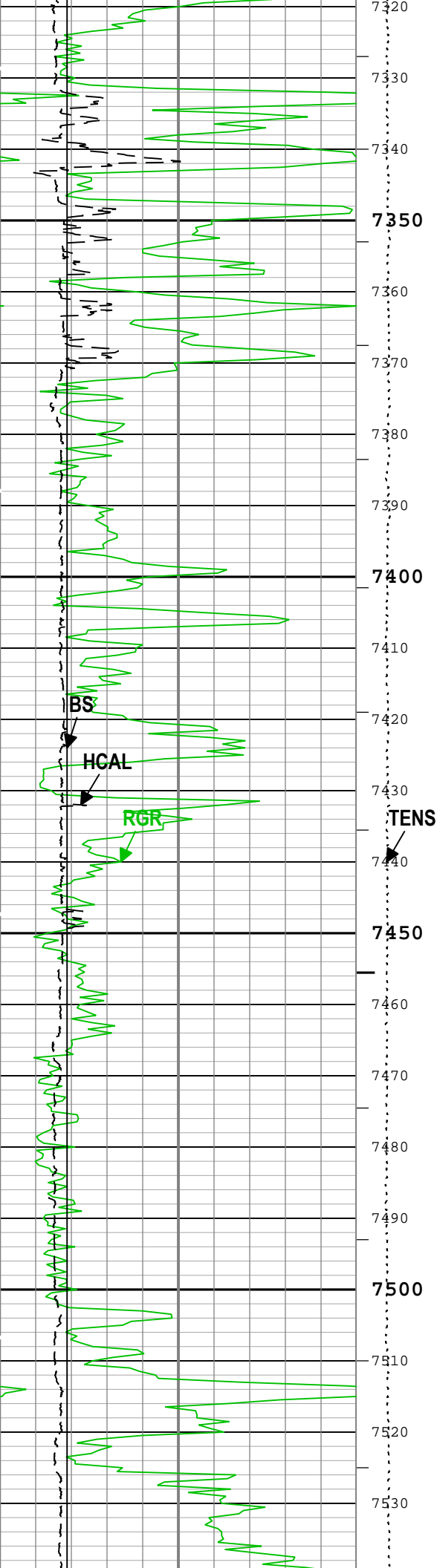


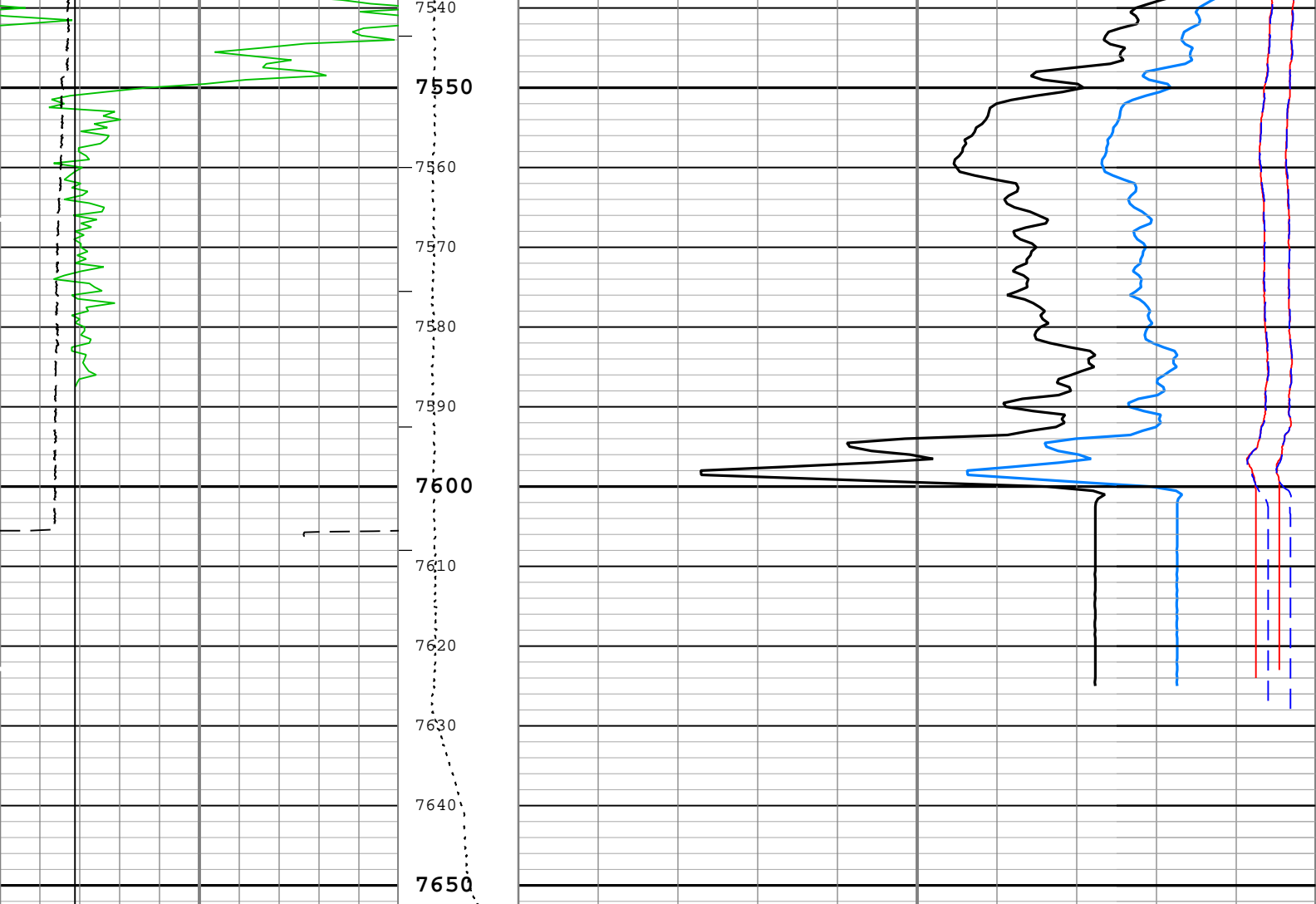












Raw Gamma Ray (RGR) HGNS-H		
0	gAPI	150
Caliper (HCAL) HDRS-H		
6	in	16
Bit Size (BS) RT		
6	in	16

Cable Tension (TENS)
5000 lbf
0

Delta-T (also called Slowness or Interval Transit Time) (DT) DSLT-H		
140	us/ft	40
Sonic Porosity (SPHI) DSLT-H		
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)



# Channel: Processing Parameters

## One: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.4	in
CBLO	Casing Bottom (Logger)	WLSESSION	519	ft
CDTS	Correction for Delta-T Shale, Empirical	Borehole	100	us/ft
DETE	Delta-T Detection	DSLTH	E2	
DTCM	Delta-T Computation Mode	DSLTH	Full	
DTF	Delta-T Fluid	Borehole	189	us/ft
DTM	Delta-T Matrix	Borehole	56	us/ft
ITTS	Integrated Transit Time Source	DSLTH	DT	
MAHTR	Manual High Threshold Reference for first arrival detection	DSLTH	120	
MNHTR	Minimum High Threshold Reference for first arrival detection	DSLTH	100	
NMSG	Near Minimum Sliding Gate	DSLTH	140	us
SGAD	Sliding Gate Status	DSLTH	On	
SPFS	Sonic Porosity Formula	Borehole	Wyllie	
SPSO	Sonic Porosity Source	DSLTH	DT	

## Tool Control Parameters

## One: Parameters

Parameter	Description	Tool	Value	Unit
MODE	DSLTH Acquisition Mode	DSLTH	BHC	
RATE	DSLTH Firing Rate	DSLTH	15 Hz	
DTFS	DSLTH Telemetry Frame Size	DSLTH	536	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

Company: Apollo Operating LLC

**Schlumberger**

Well: Rodwell 14-31

Field: Wildcat

County: Washington

State: Colorado

Borehole Compensated Sonic  
Gamma Ray