

Company: Nighthawk Production LLC

Well: Monarch 10-15

Field: Wildcat

County: Lincoln State: Colorado

Platform Express

Combo Print - Limestone Matrix

AIT-TLD-CNL-GR

County: Lincoln

Field: Wildcat

Location: NWSE Sec 15 Town 8S Rng 55W

Well: Monarch 10-15

Company: Nighthawk Production LLC

Location:

NWSE Sec 15 Town 8S Rng 55W

SHL: 1805' FSL & 2410' FEL

Lat/Long: 39.350320/-103.536920

Elev.:

K.B. 5576.00 ft

G.L. 5561.00 ft

D.F. 5576.00 ft

Permanent Datum:

Ground Level

Elev.: 5561.00 f

Log Measured From:

Kelly Bushing

15.00 ft

above Perm.Datum

Drilling Measured From:

Kelly Bushing

API Serial No.

Section:

Township:

Range:

05-073-06699

15

8S

55W

Logging Date

05-Oct-2015

Run Number

Nighthawk

Depth Driller

8640.00 ft

Schlumberger Depth

8656.00 ft

Bottom Log Interval

8646.00 ft

Top Log Interval

485.00 ft

Casing Driller Size @ Depth

8.625 in @ 470.00 ft

Casing Schlumberger

485 ft

Bit Size

7.875 in

Type Fluid In Hole

Water

Density

Viscosity

68 s

Fluid Loss

PH

7.2 cm3

8.76

MUD

Source of Sample

Active Tank

RM @ Meas Temp

0.2 ohm.m @ 68 degF

RMF @ Meas Temp

0.15 ohm.m @ 68 degF

RMC @ Meas Temp

Source RMF

RMC

Pressed

RM @ BHT

RMF @ BHT

0.07 @ 197 0.06 @ 197

Max Recorded Temperatures

197 degF

Circulation Stopped

Time

05-Oct-2015 01:30:00

Logger on Bottom

Time

05-Oct-2015 17:38:00

Unit Number

Location:

9108 Fort Morgan, CO

Recorded By

Evan Meadows

Witnessed By

Jim Weir

Disclaimer

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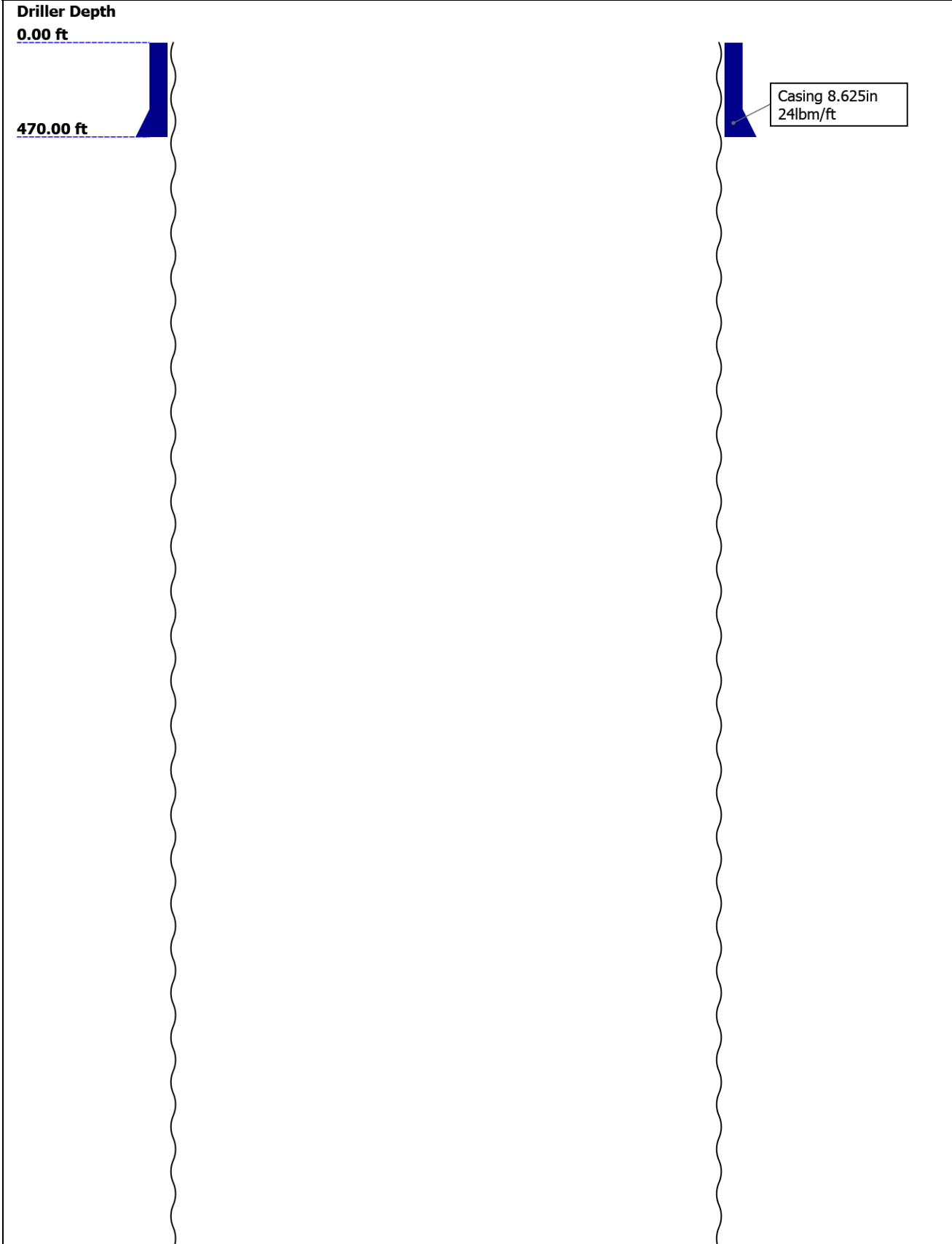
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Well Sketch





Borehole Size/Casing/Tubing Record

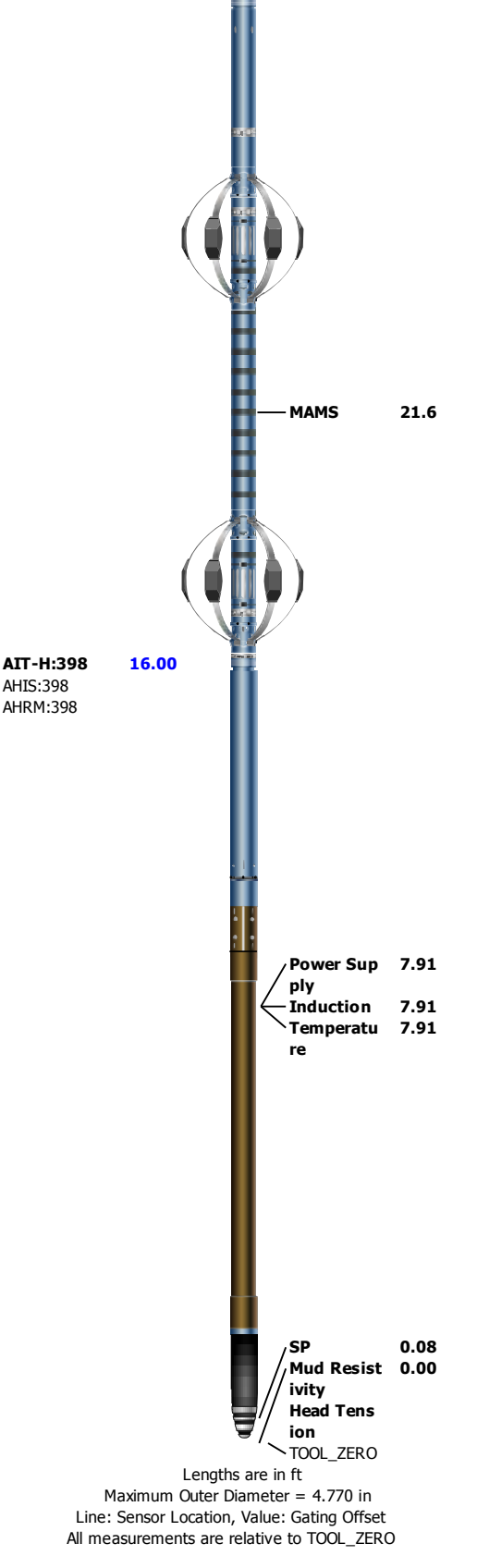
Bit						
Bit Size (in)	7.875					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	8640					
Bottom Logger (ft)	8656					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24					
Inner Diameter (in)	8.097					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	470					
Bottom Logger (ft)	485					

Operational Run Summary

Parameter (unit)	Nighthawk					
Date Log Started	05-Oct-2015					
Time Log Started	16:26:15					
Date Log Finished	05-Oct-2015					
Time Log Finished	20:14:51					
Top Log Interval (ft)	485.00					
Bottom Log Interval (ft)	8646.00					
Total Depth (ft)	8646.00					
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, CO					
Recorded By	Evan Meadows					

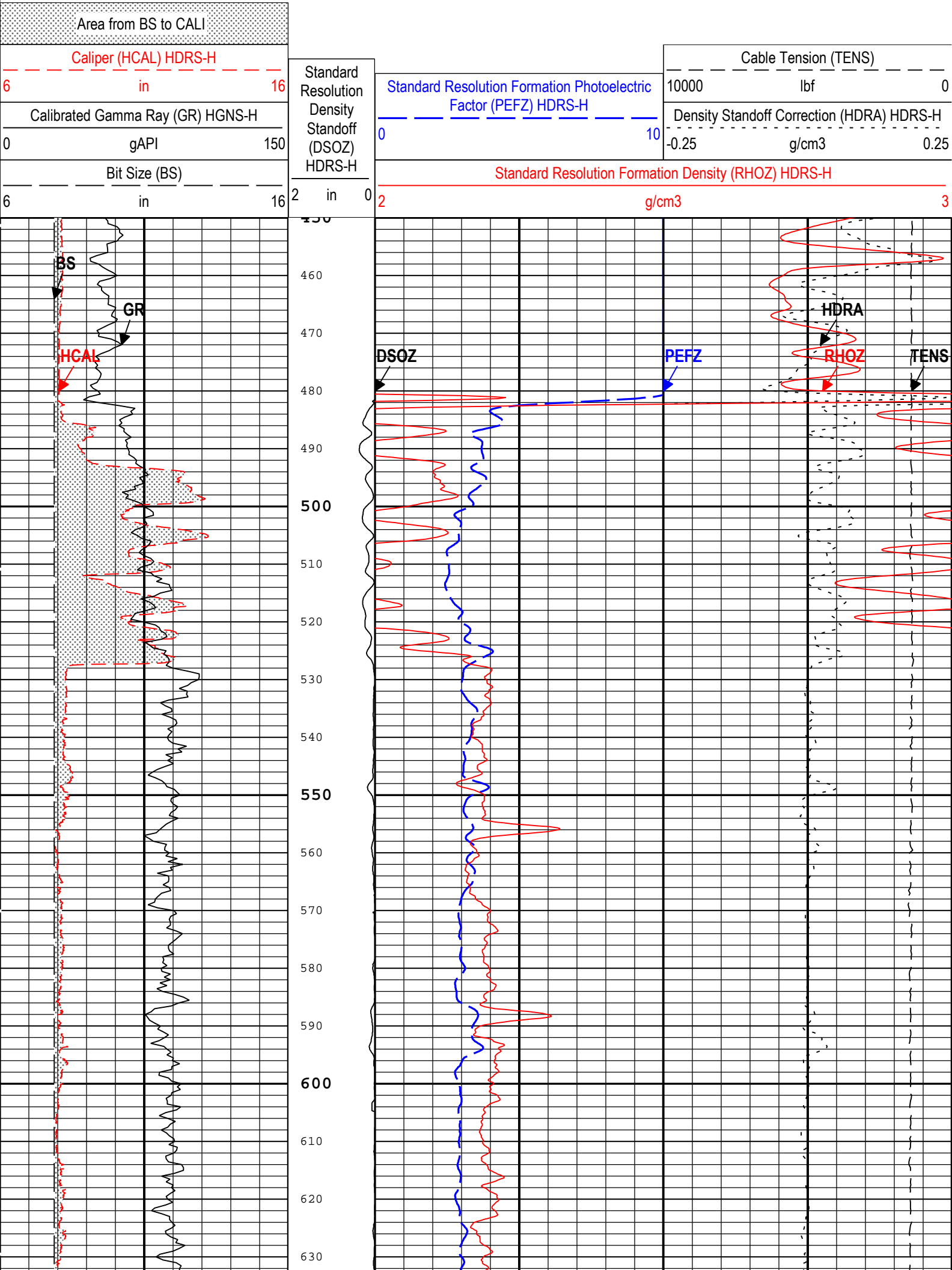
Remarks and Equipment Summary

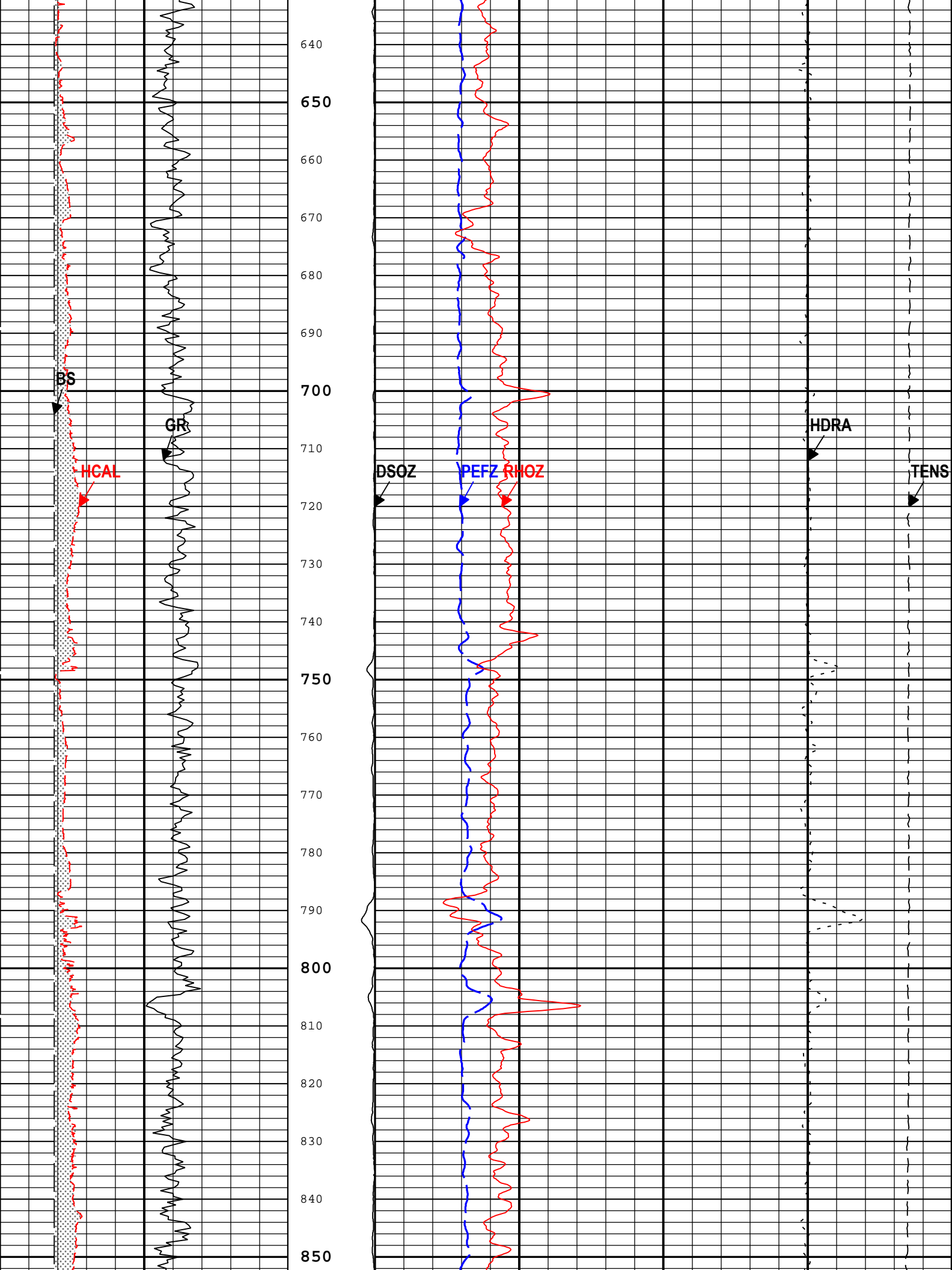
Nighthawk: Toolstring				Nighthawk: Remarks
Equip name LEH-QT LEH-QT	Length 70.61	MP name	Offset	1. THIS IS THE FIRST RUN IN THE WELL
				2. TOOL RAN AS PER TOOL SKETCH
				3. MATRIX: LIMESTONE MDEN: 2.71 G/ML
DTC-H ECH-KC DTC-H	67.69	CTEM HV	66.79 0.00	4. NEUTRON CORRECTIONS: HOLE SIZE (BS), PRESSURE/TEMPERATURE, STANDOFF (0.125")
HGNS-H HGNH NPV-N NSR-F:5069 HACCZ-H:426 9 HMCA-H HGNS-H	64.69	TelStatus ToolStatus Temperature GR	64.69 64.69 64.67 63.95	5. TD: 8,646' CS: 485
				6. CALIPER READS 8.097" IN CASING AFTER
HDRS-H ECH-MEB HRCC-H HRMS-H GPV-Q Short Spacing Long Spacing :28736 HRGD-H:3933 GSR-J:5471 Backscatter	55.28	CNL Porosity HMCA HGNS Accelerometer HRCC	57.62 55.28 55.28 0.00 51.28	
		MCFL Caliper TLD Density	45.85 45.37 44.98	
Adaptor_Head	43.04			
AH-184	39.04			
MAST-B:8075 ECH-SF:8157 MAPC-BA:8159 MAMS-BA:8075	37.04			

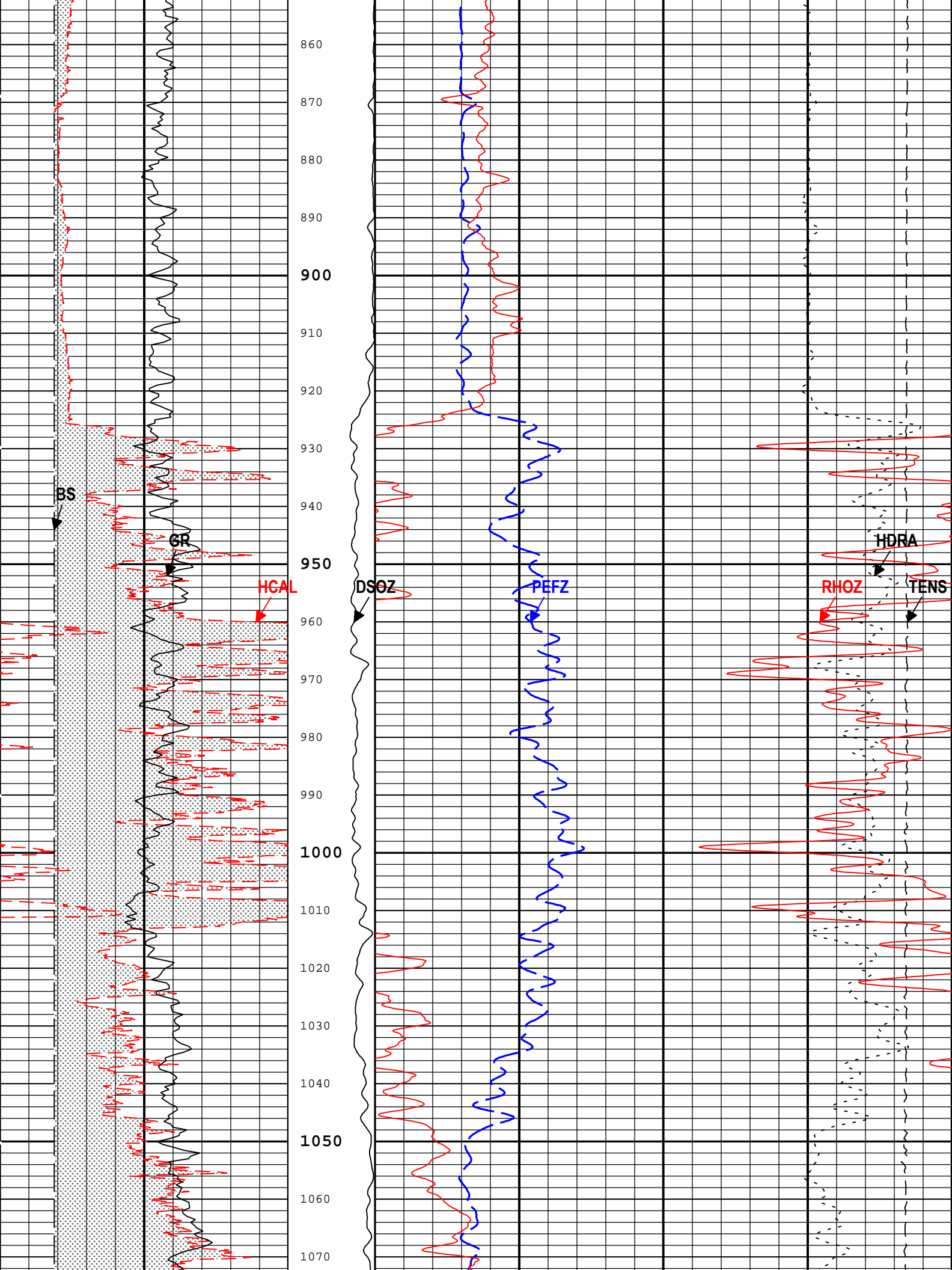


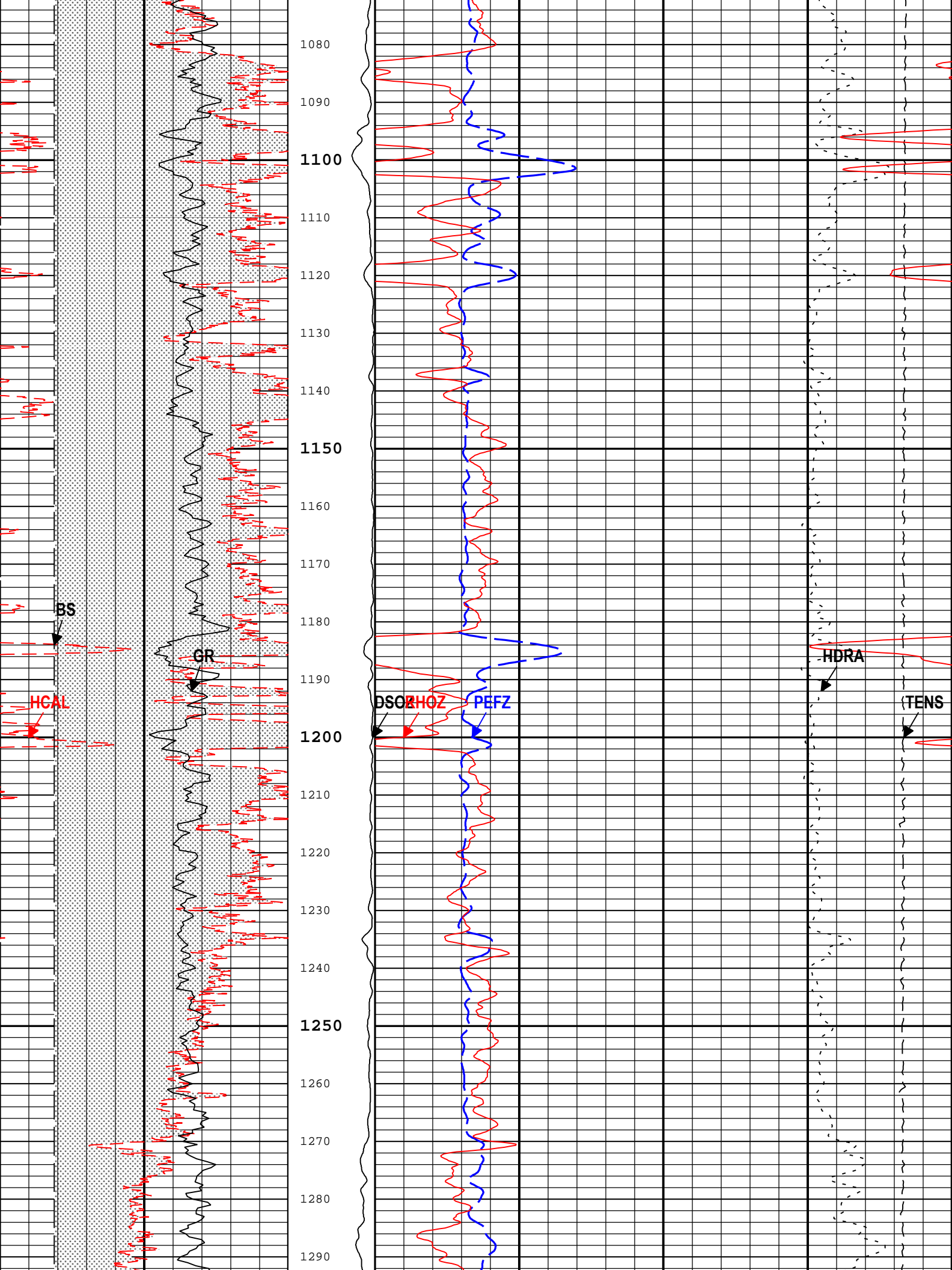
Depth Summary

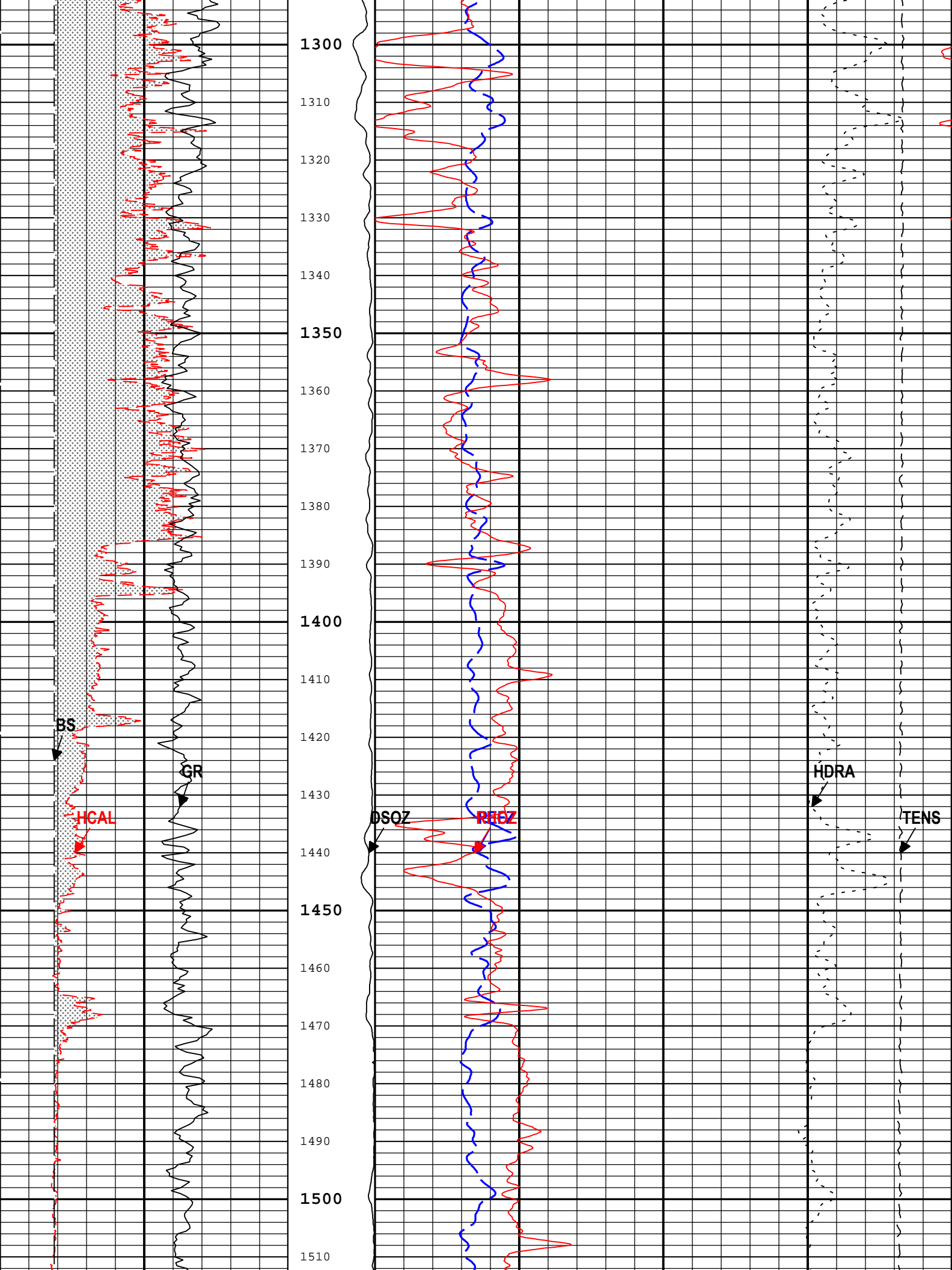
	Nighthawk		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		

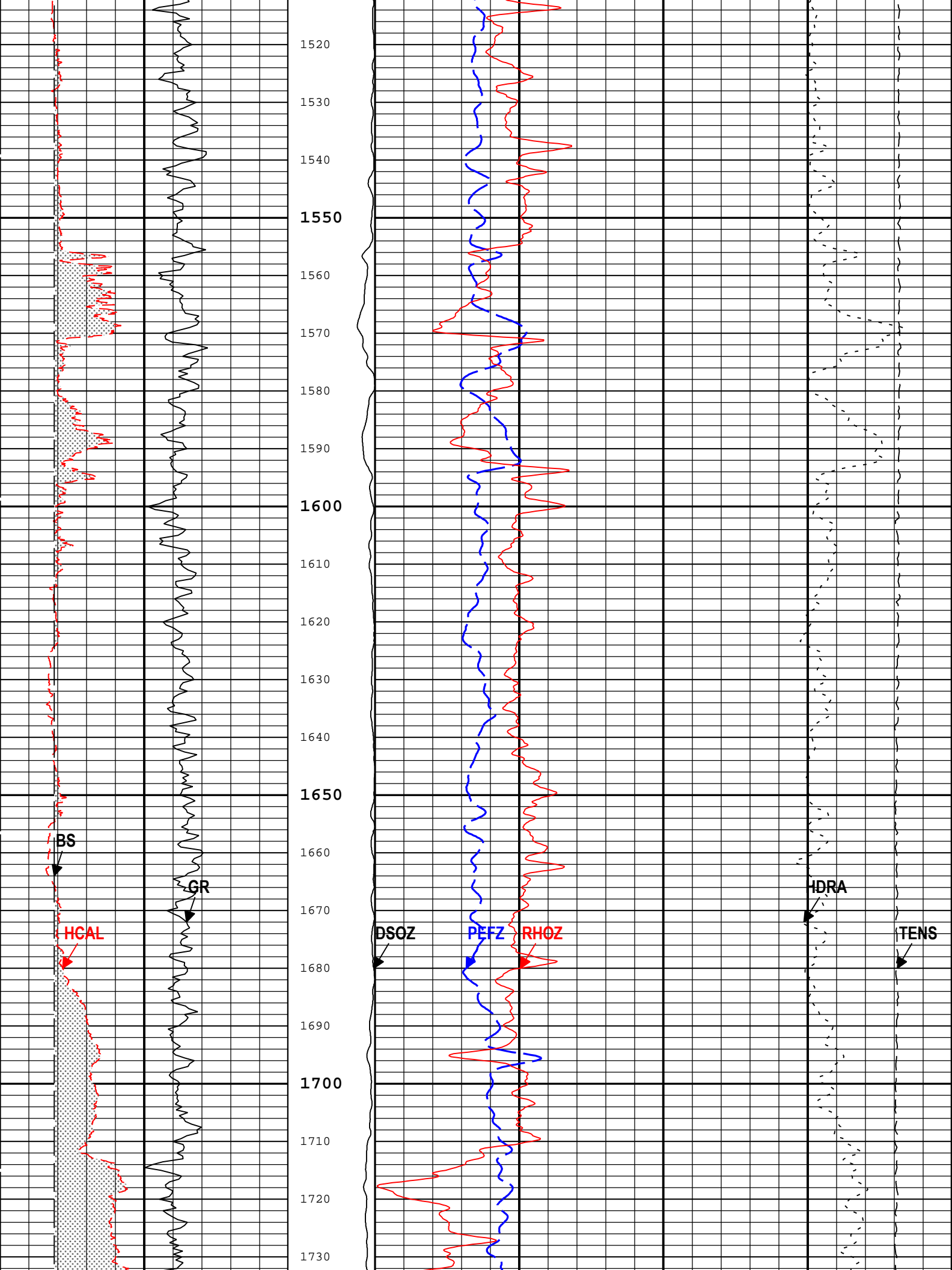


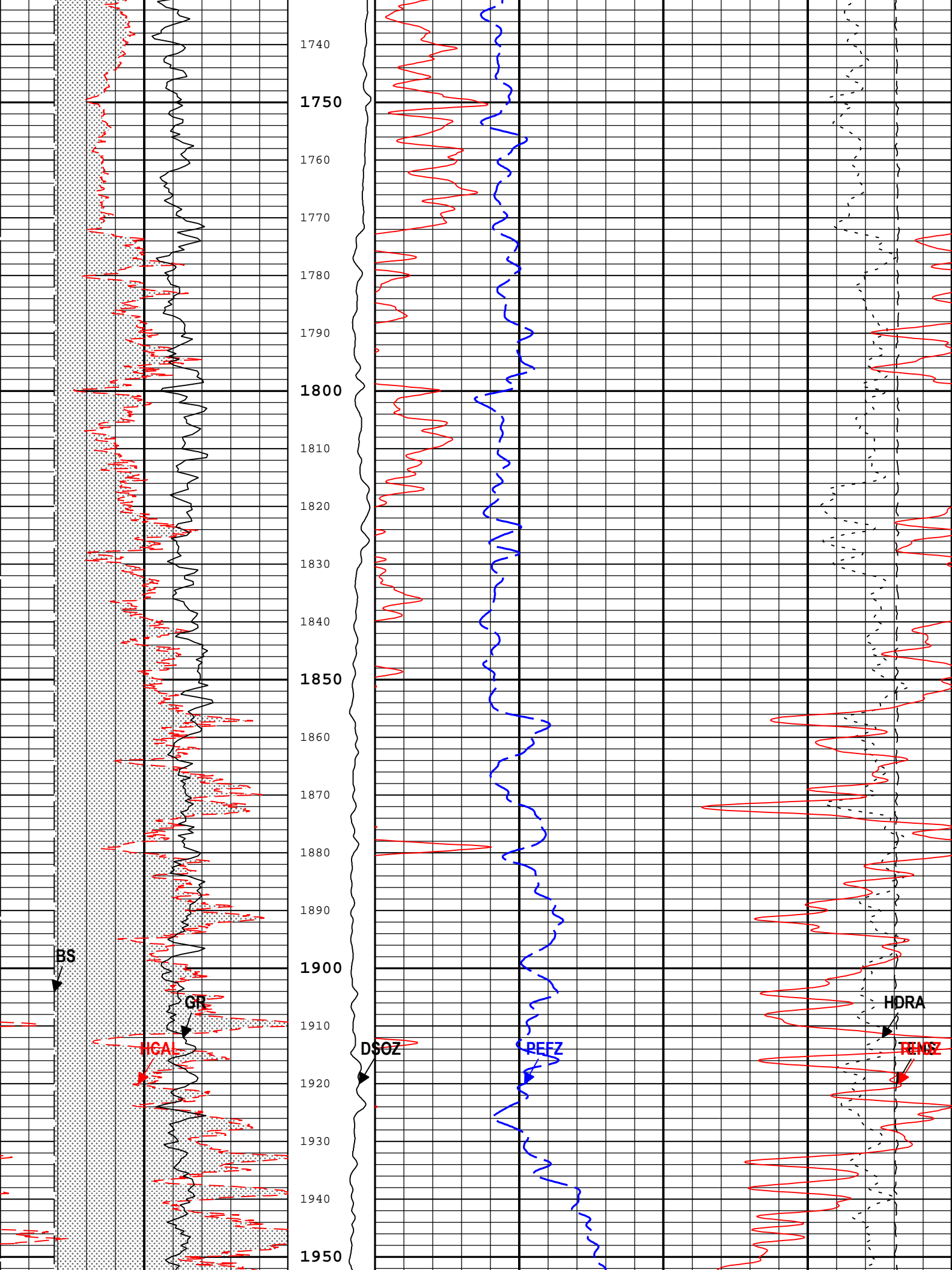


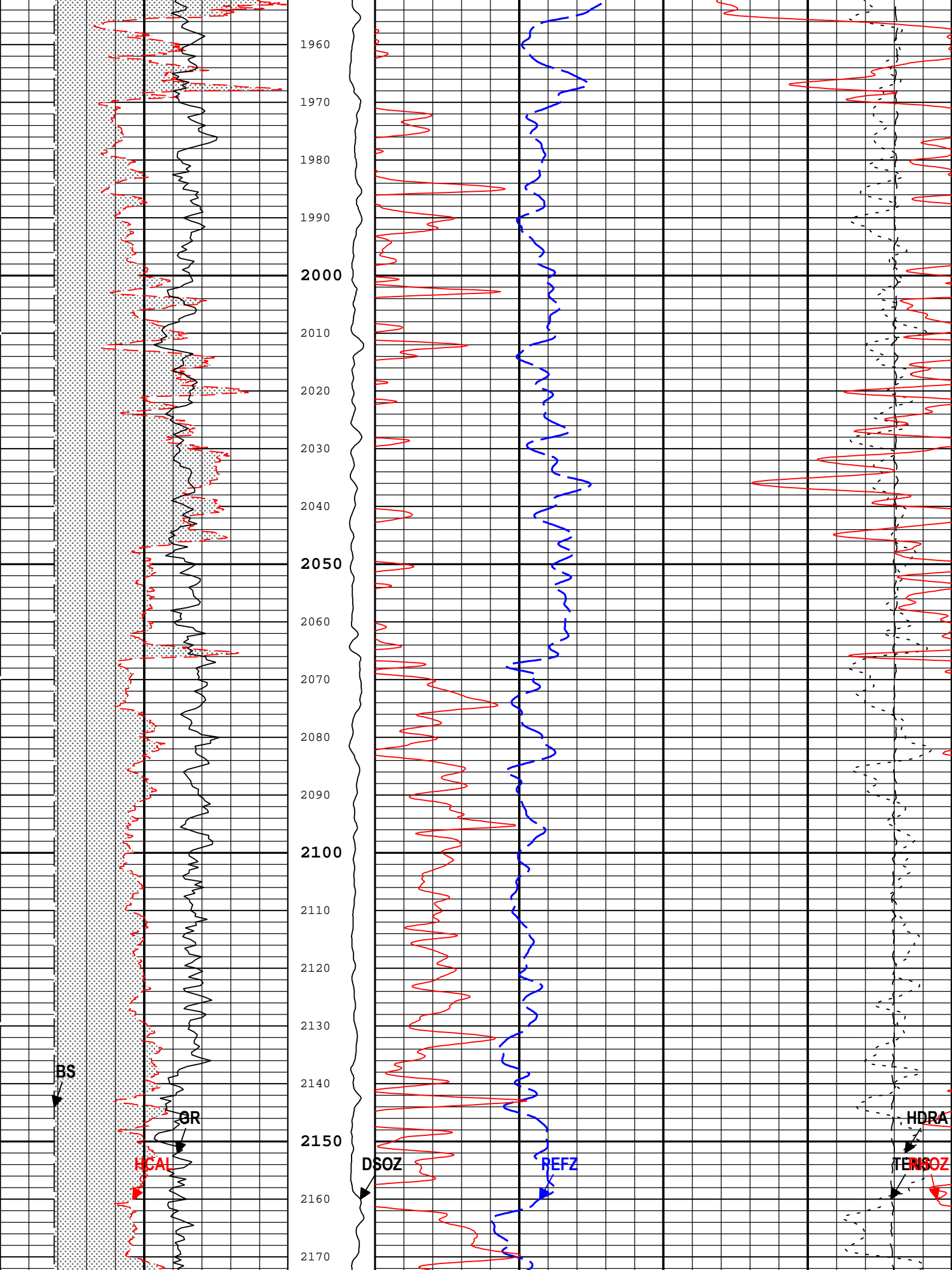


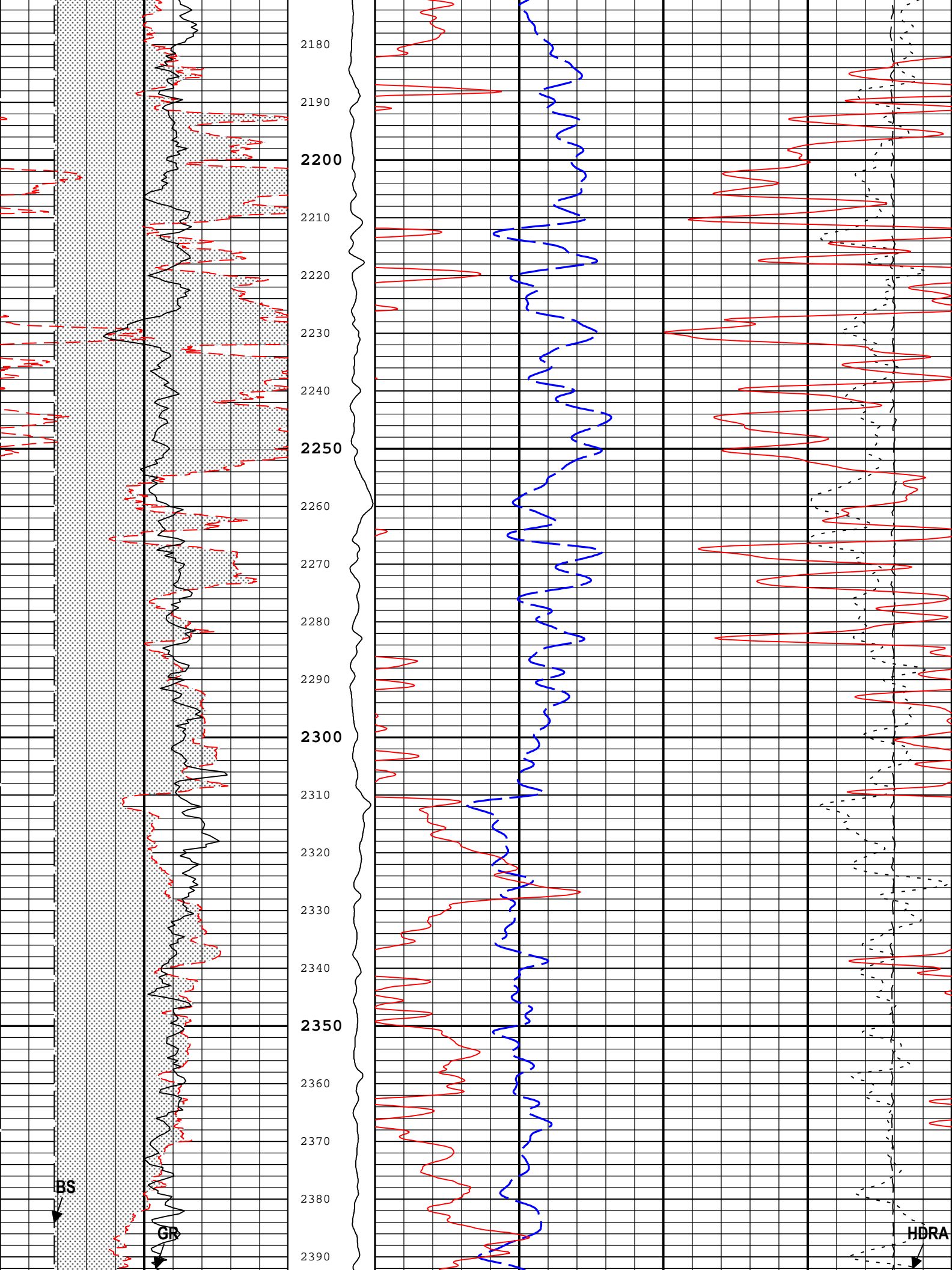


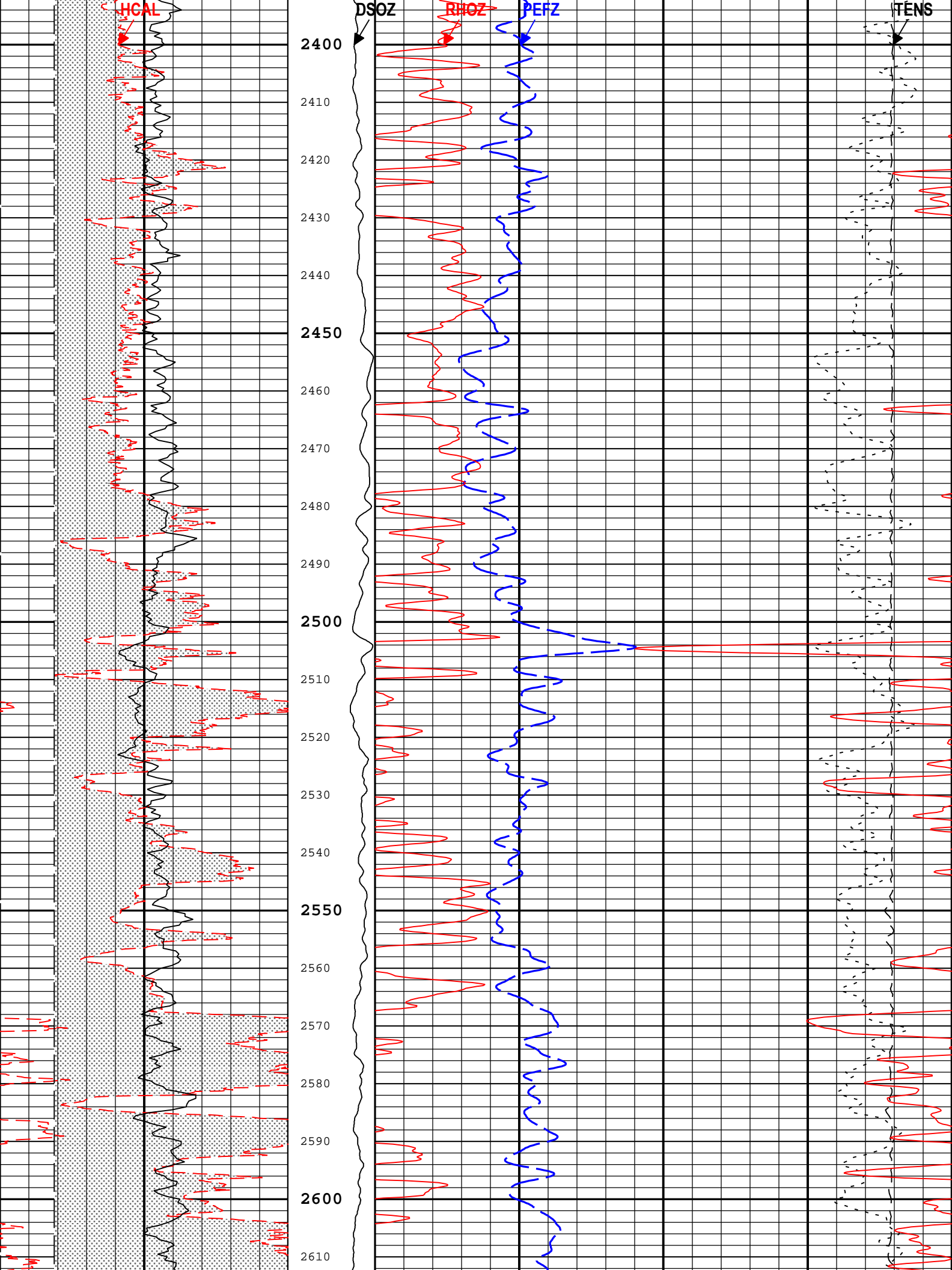


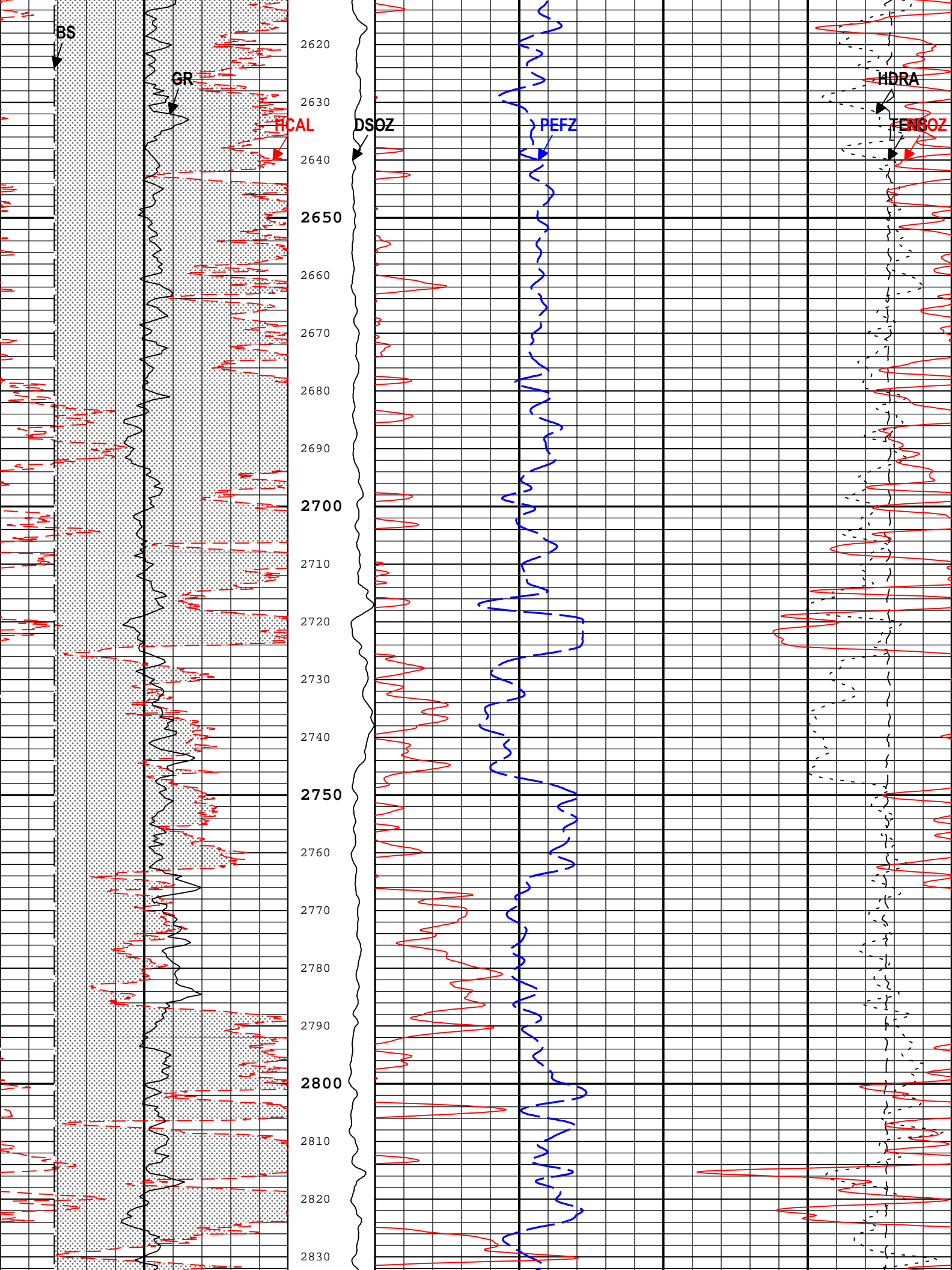


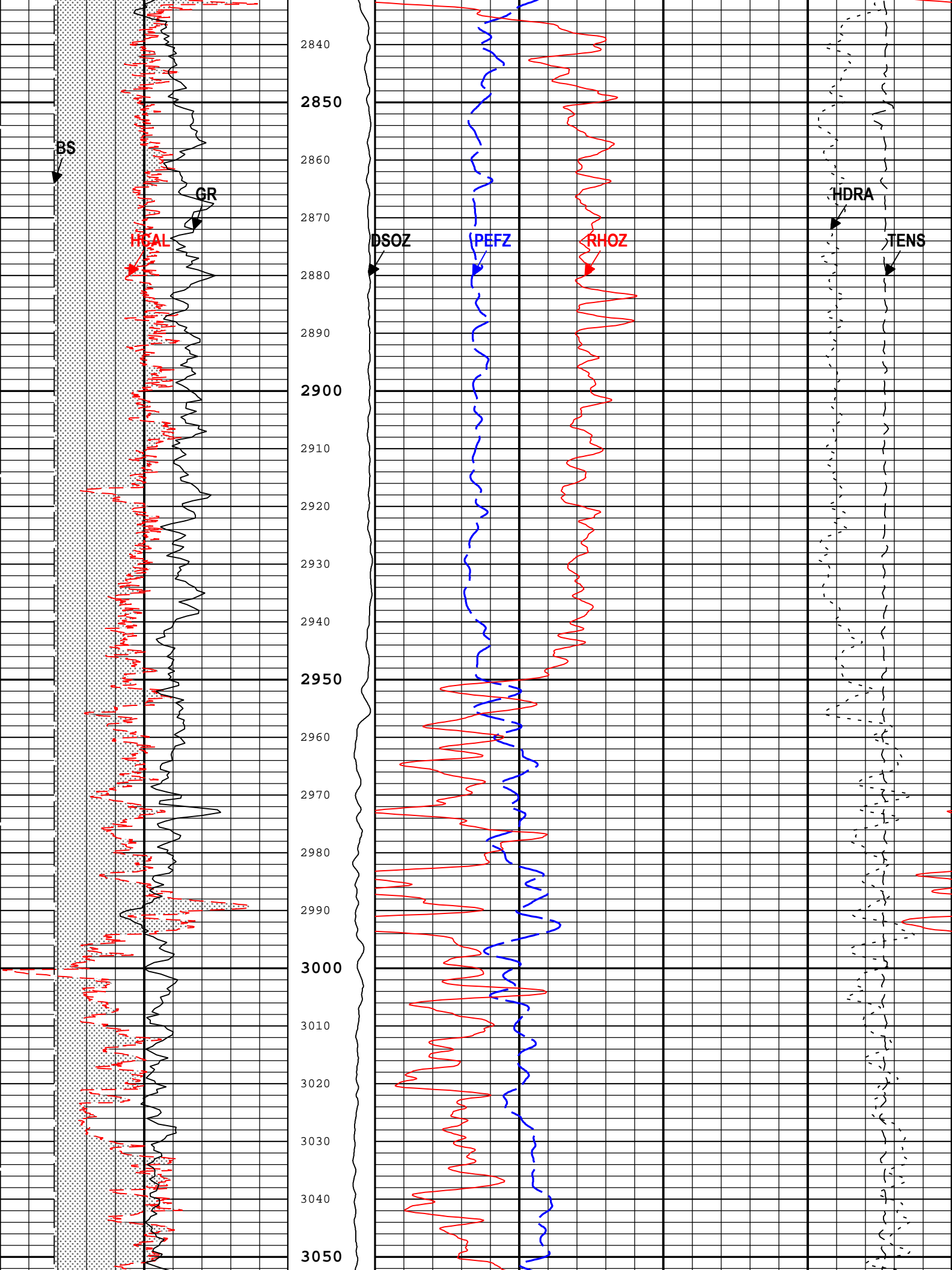


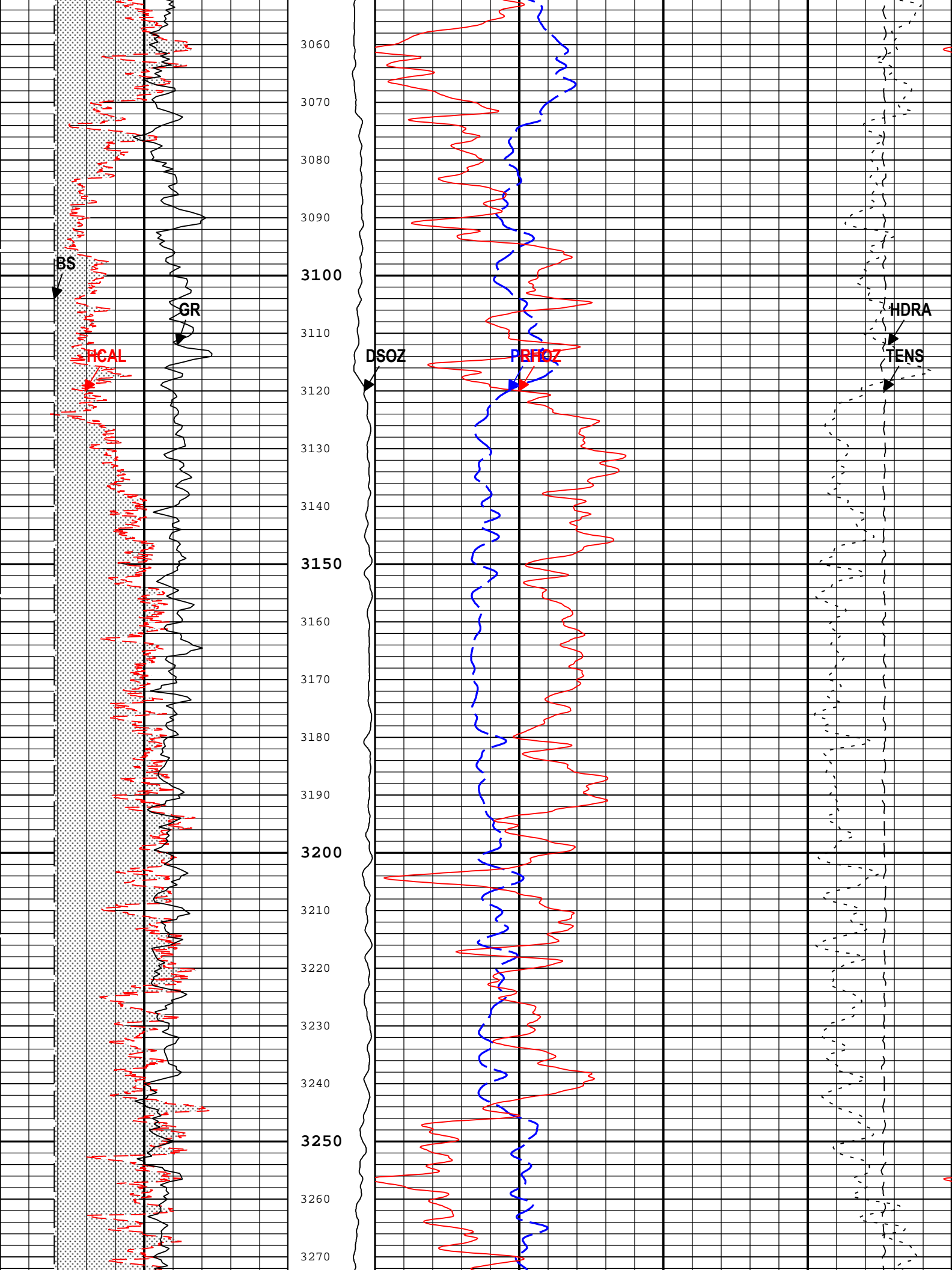


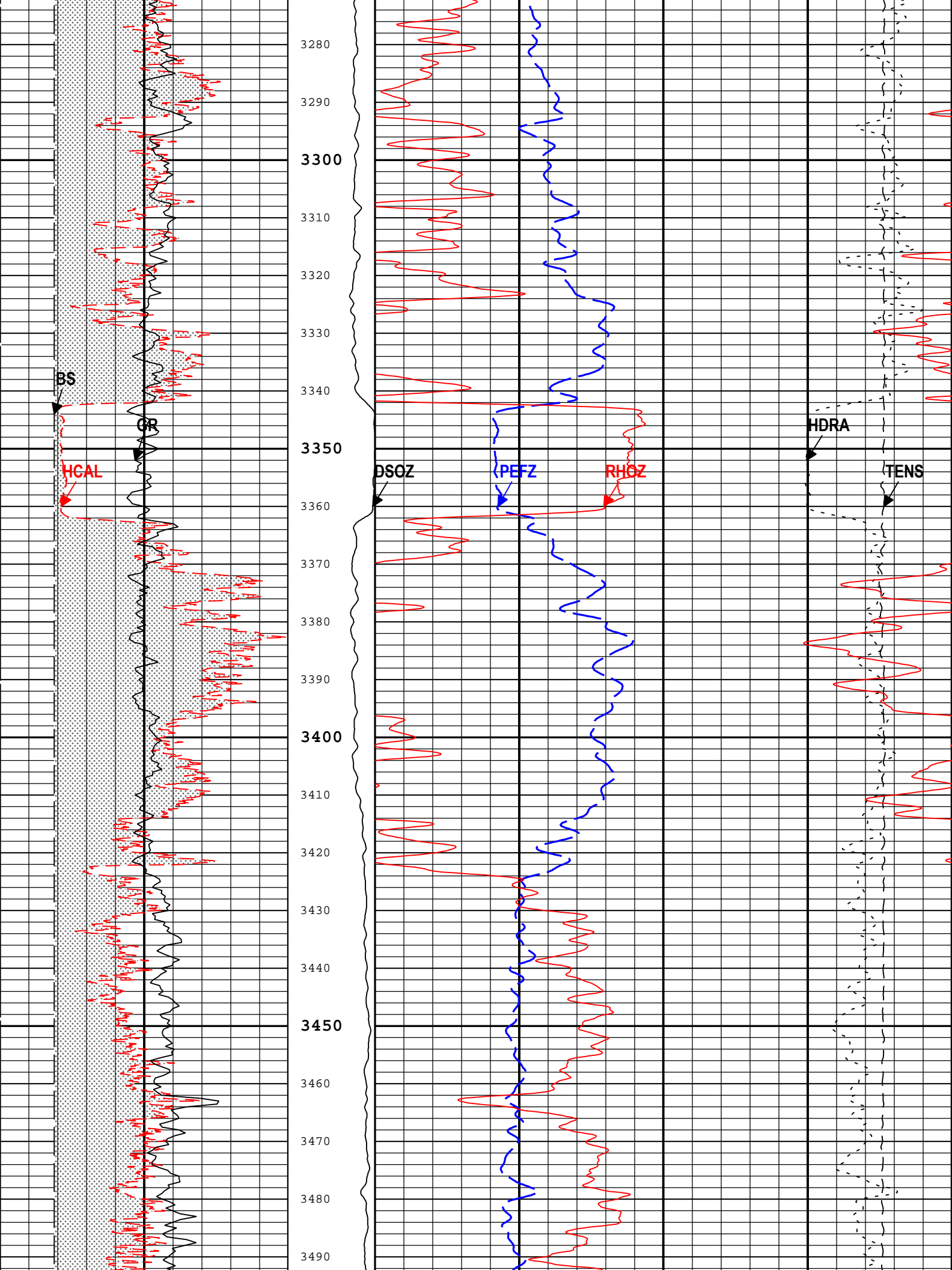


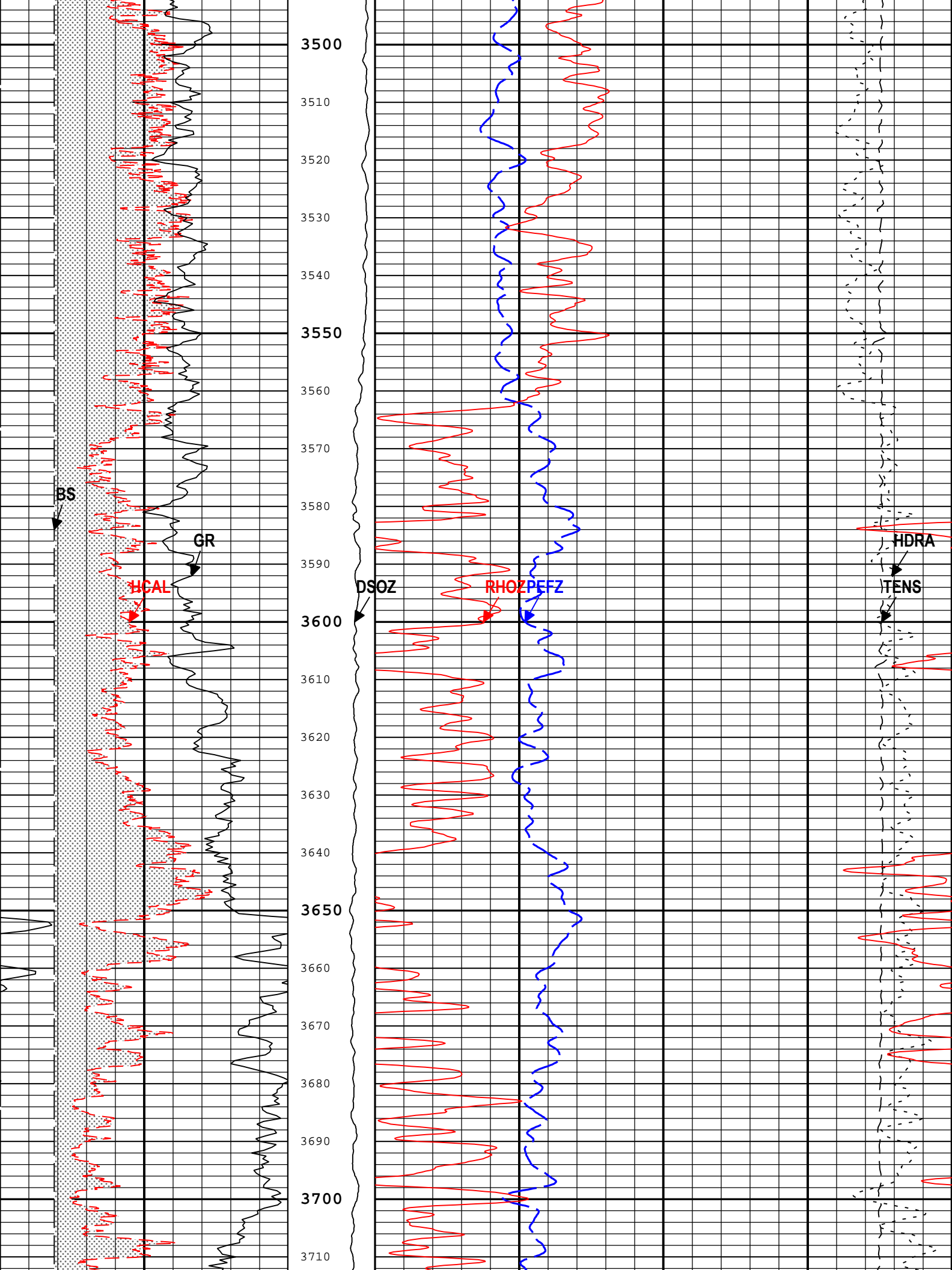


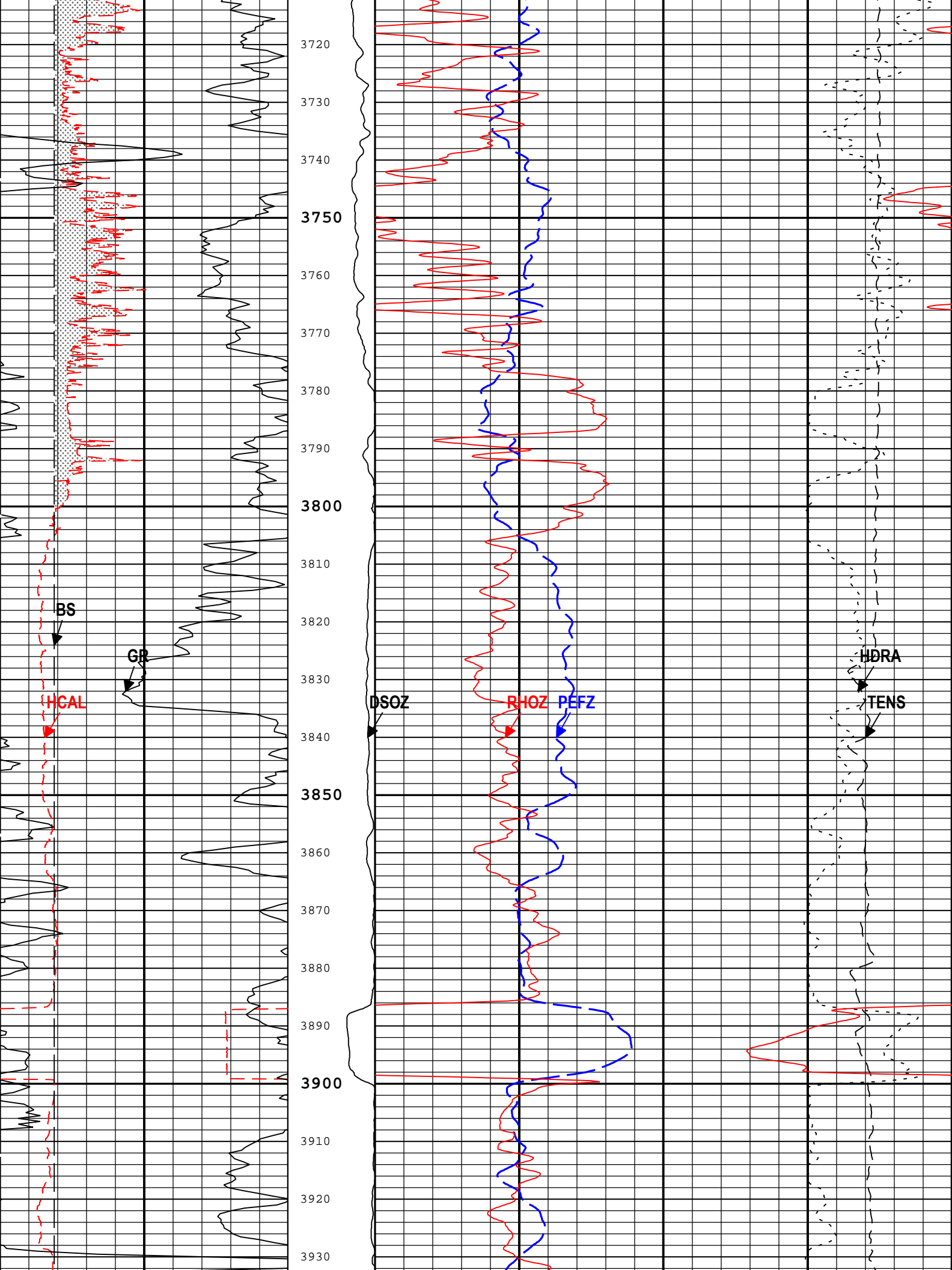


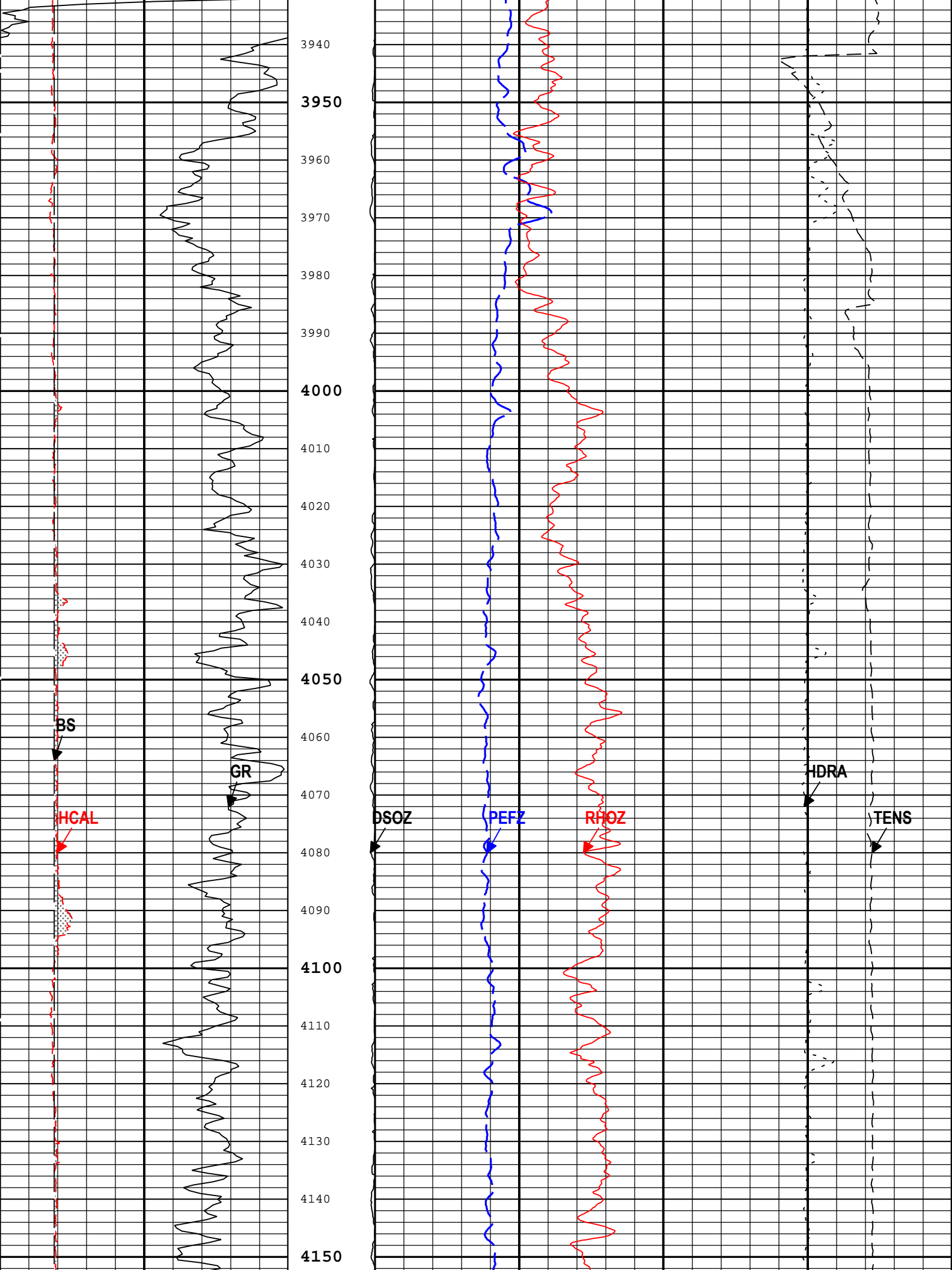


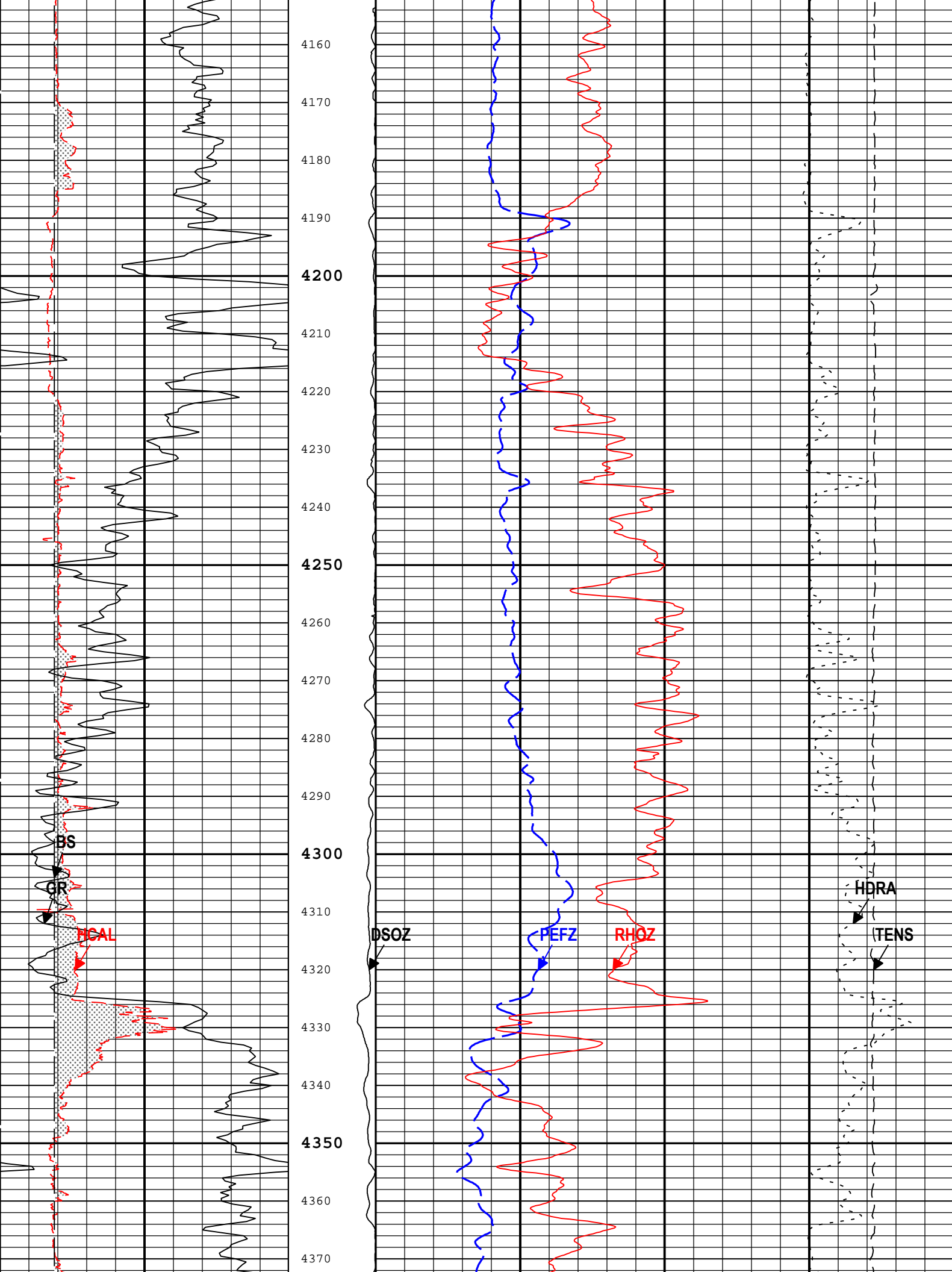


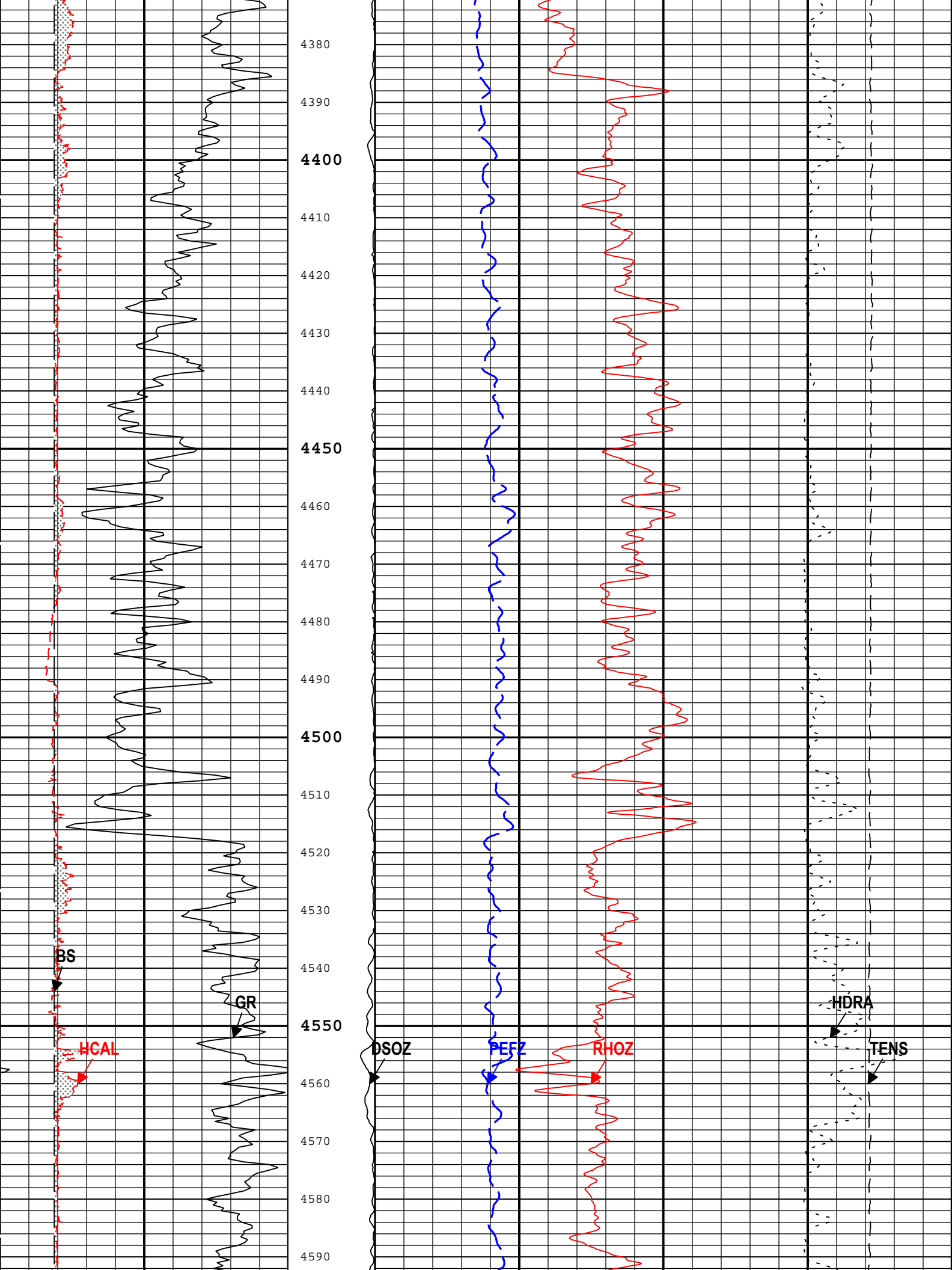


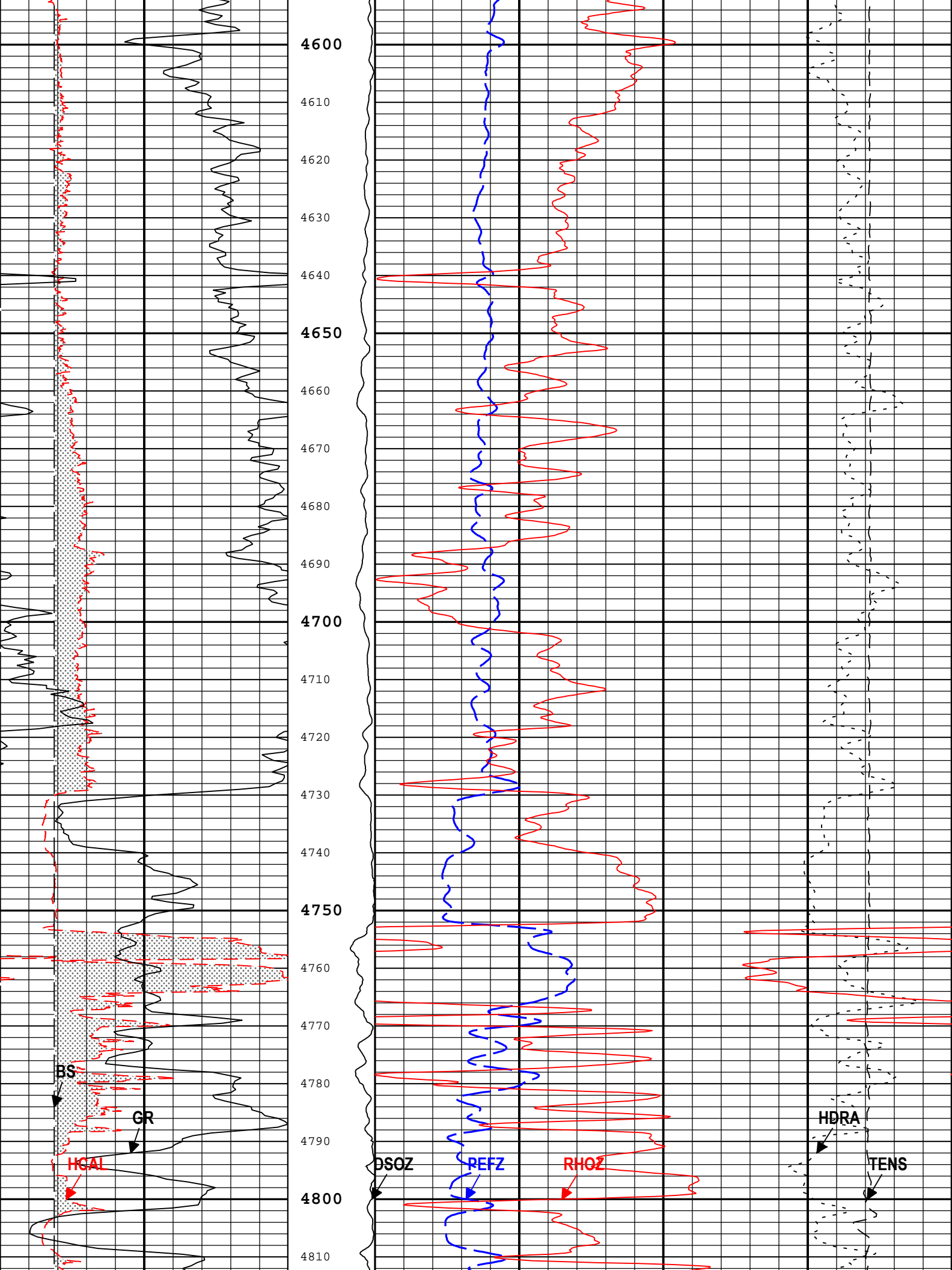


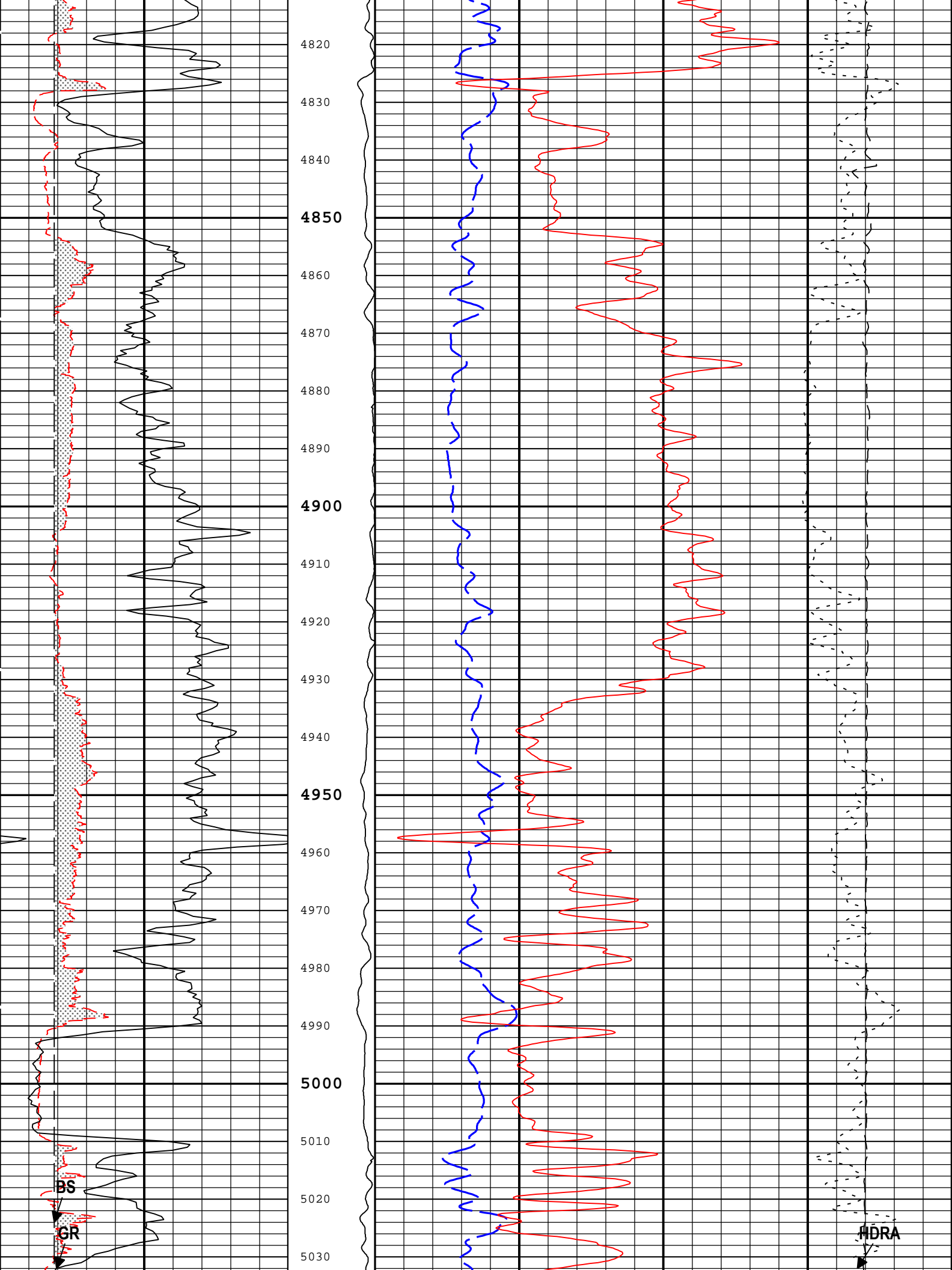


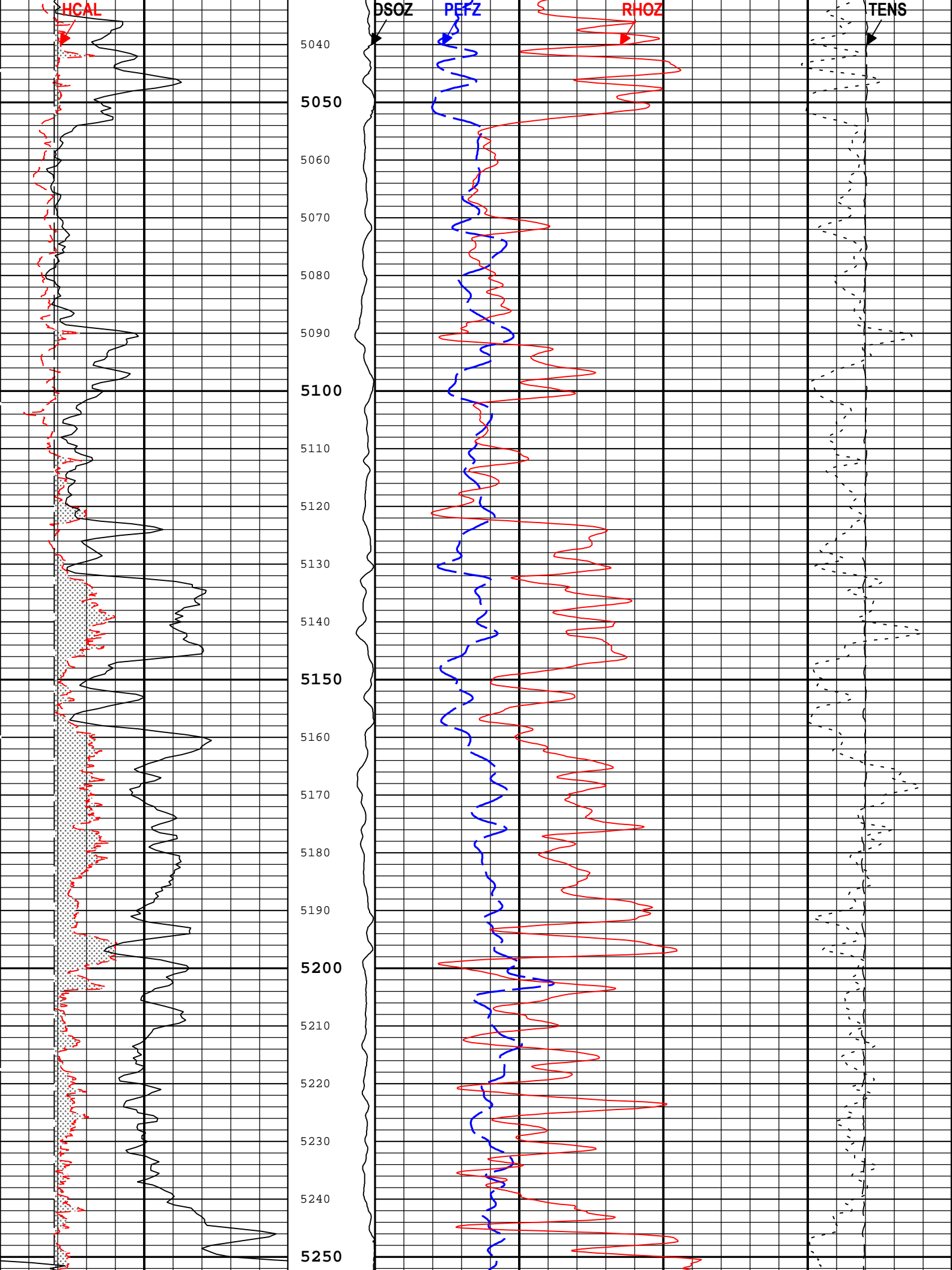


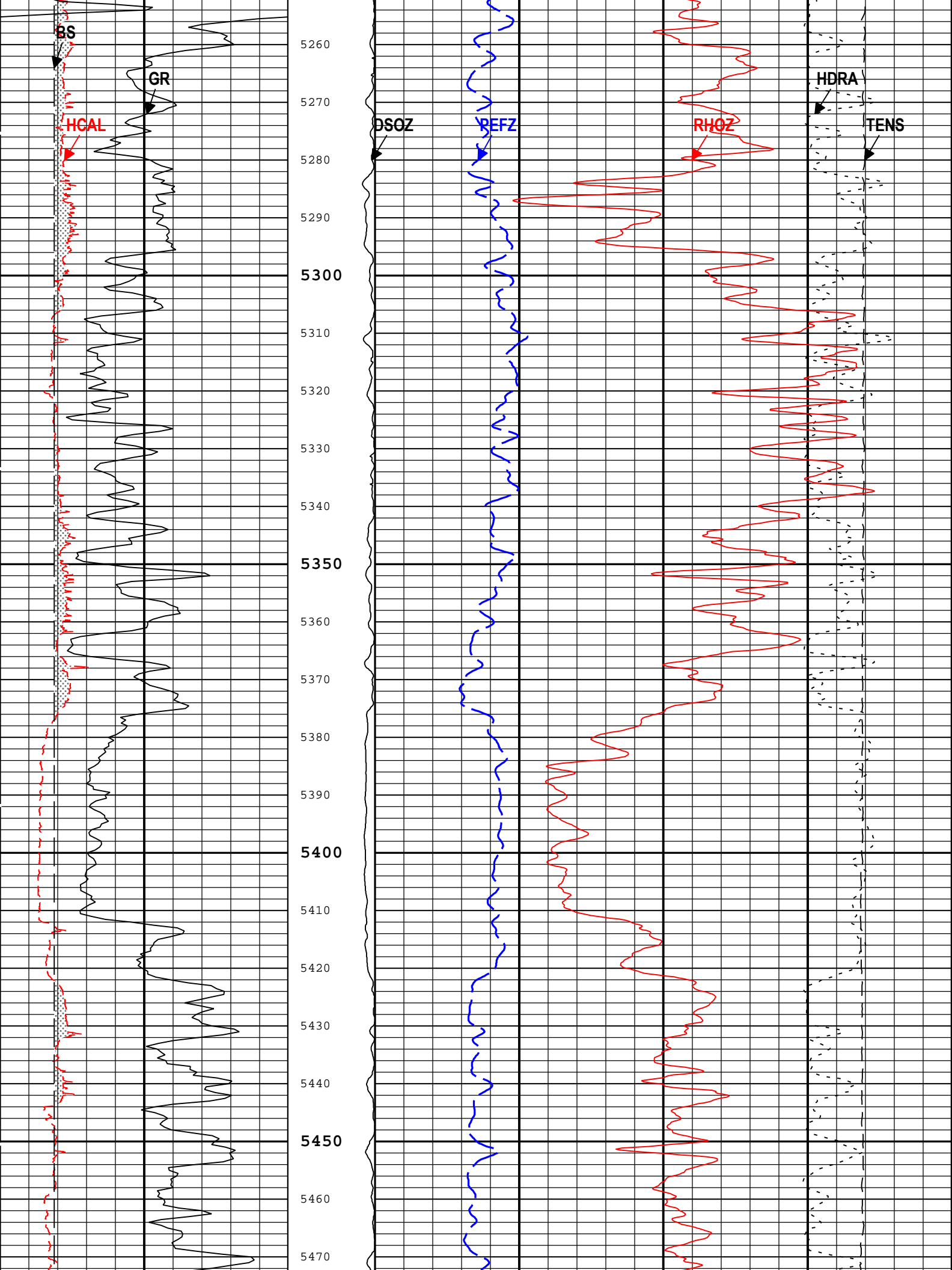


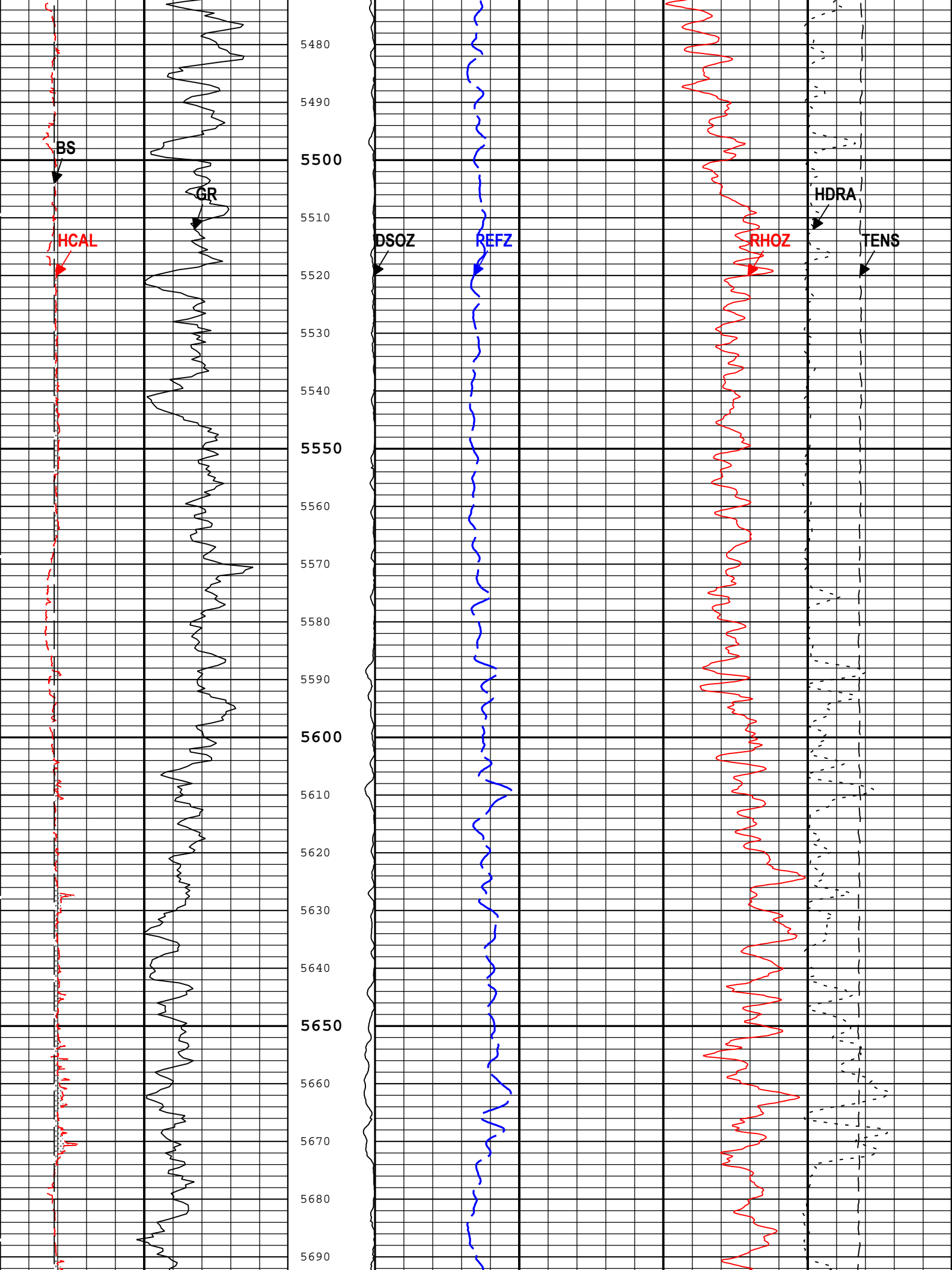


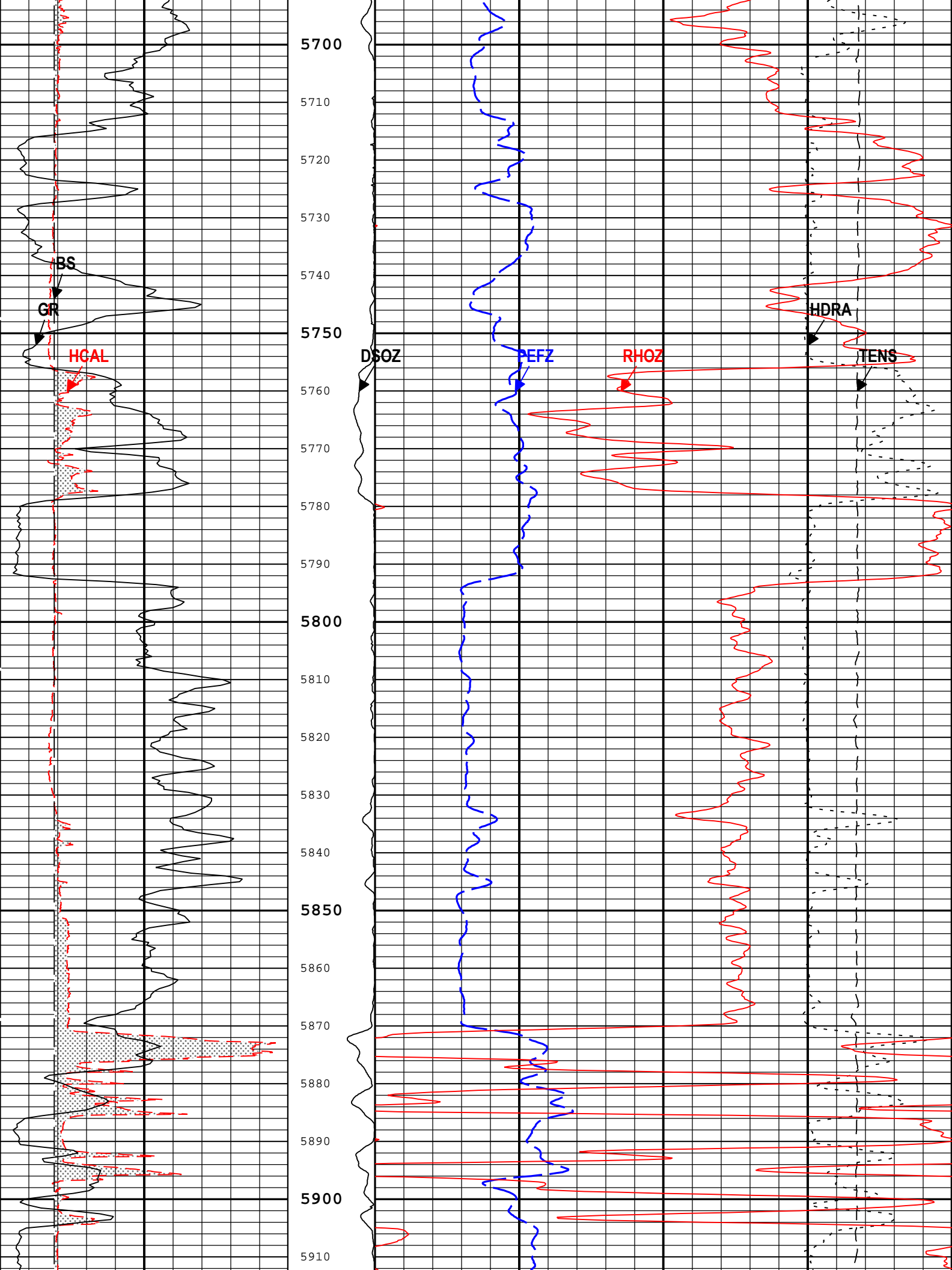


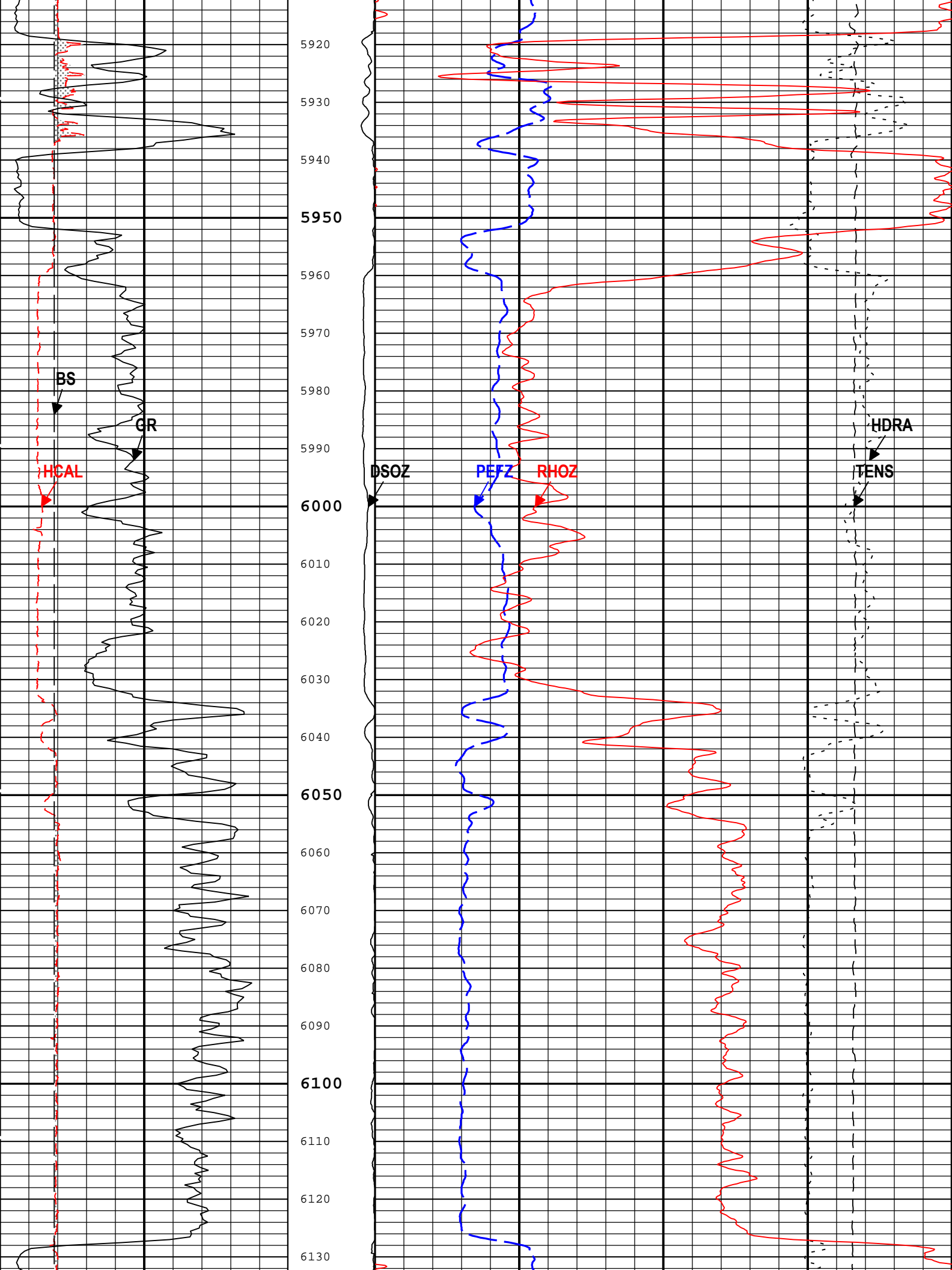


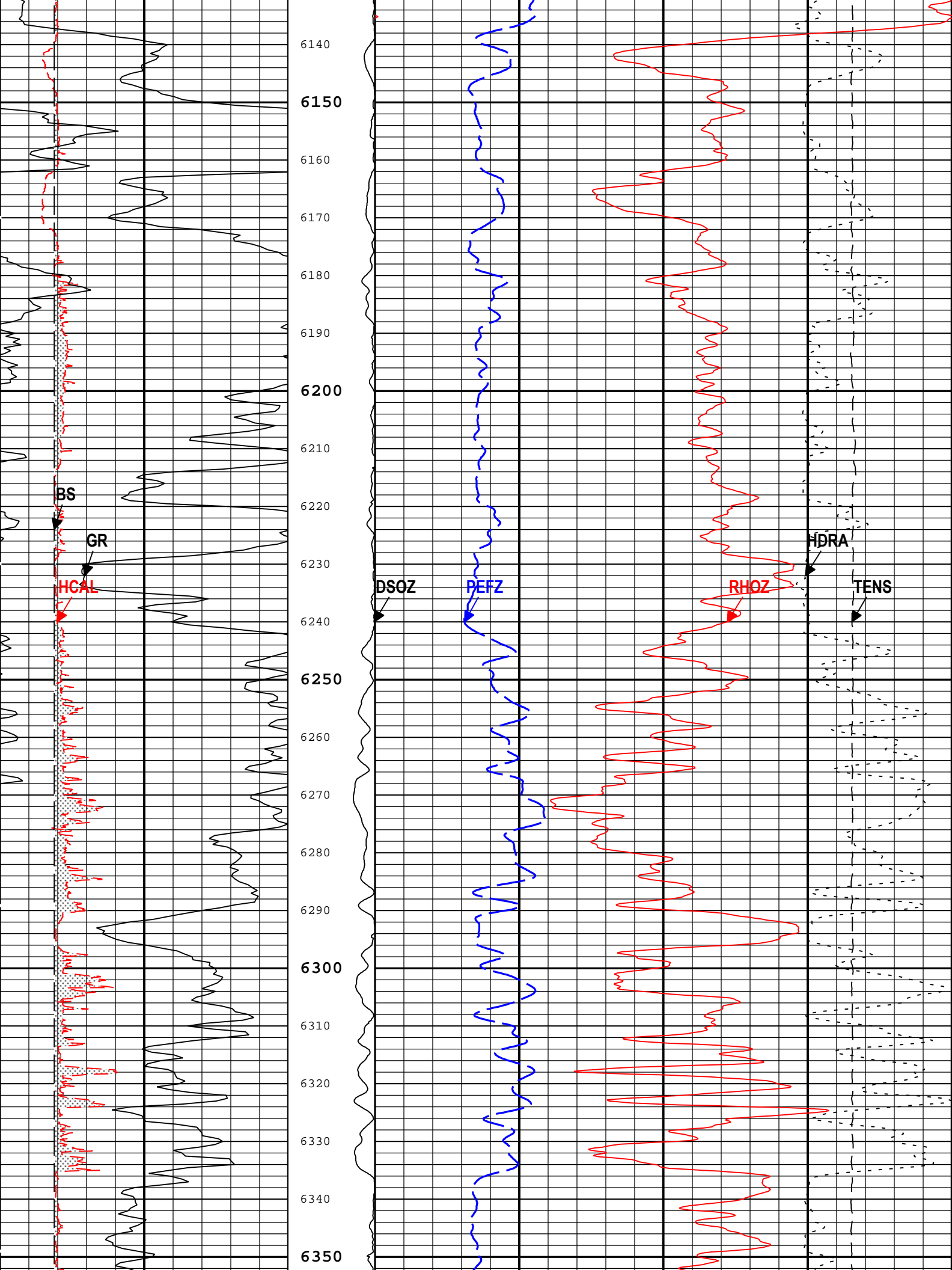


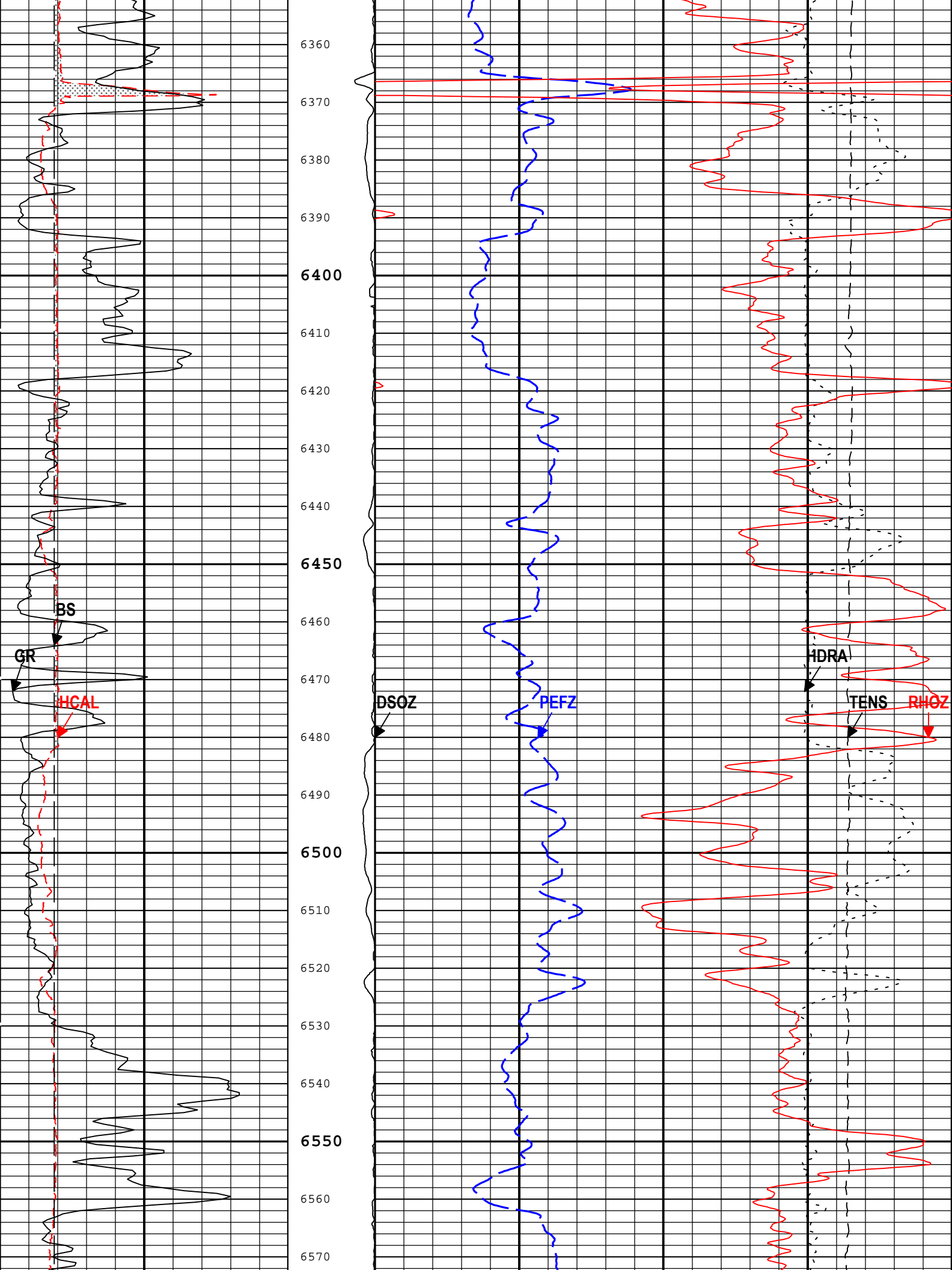


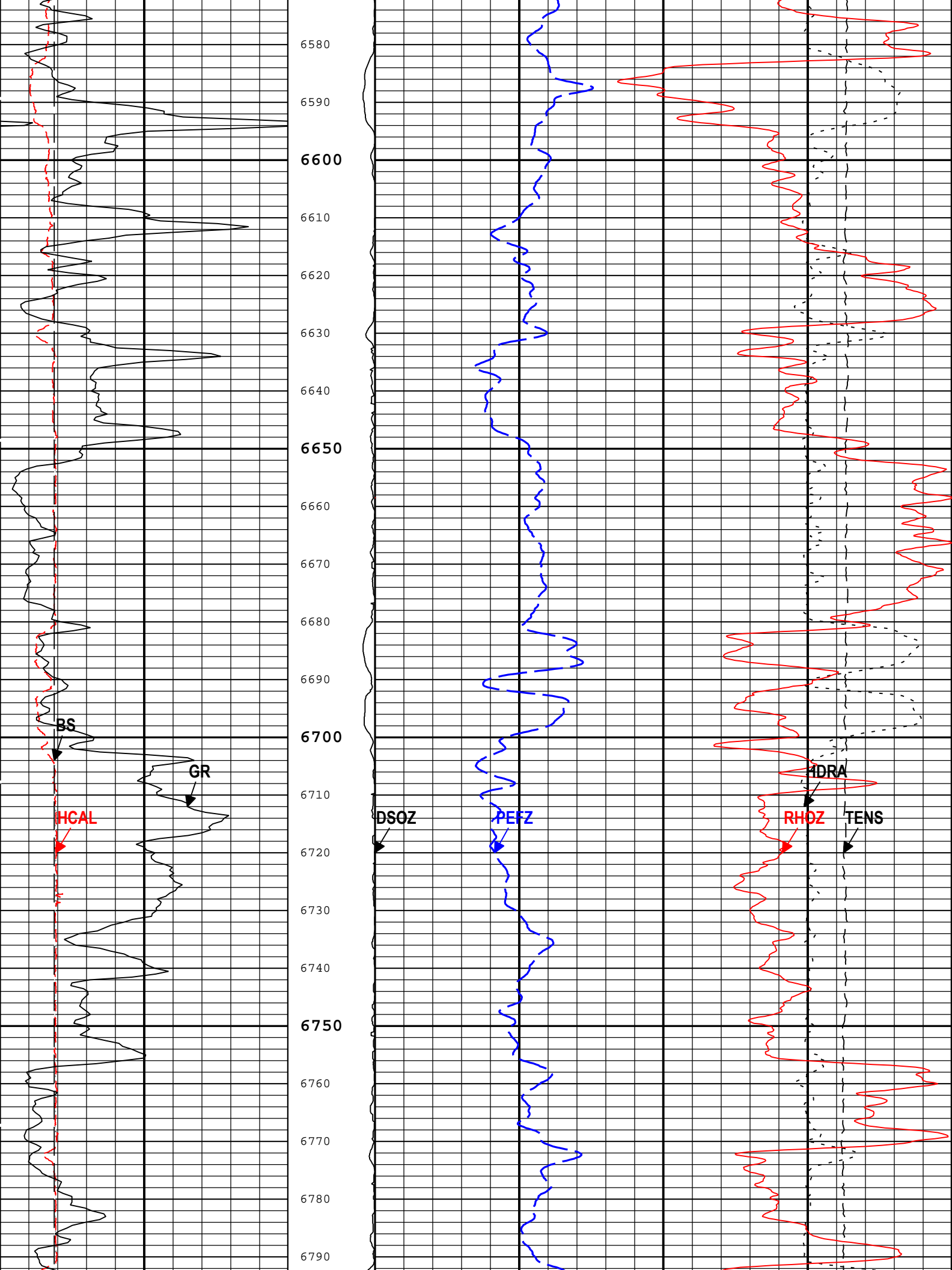


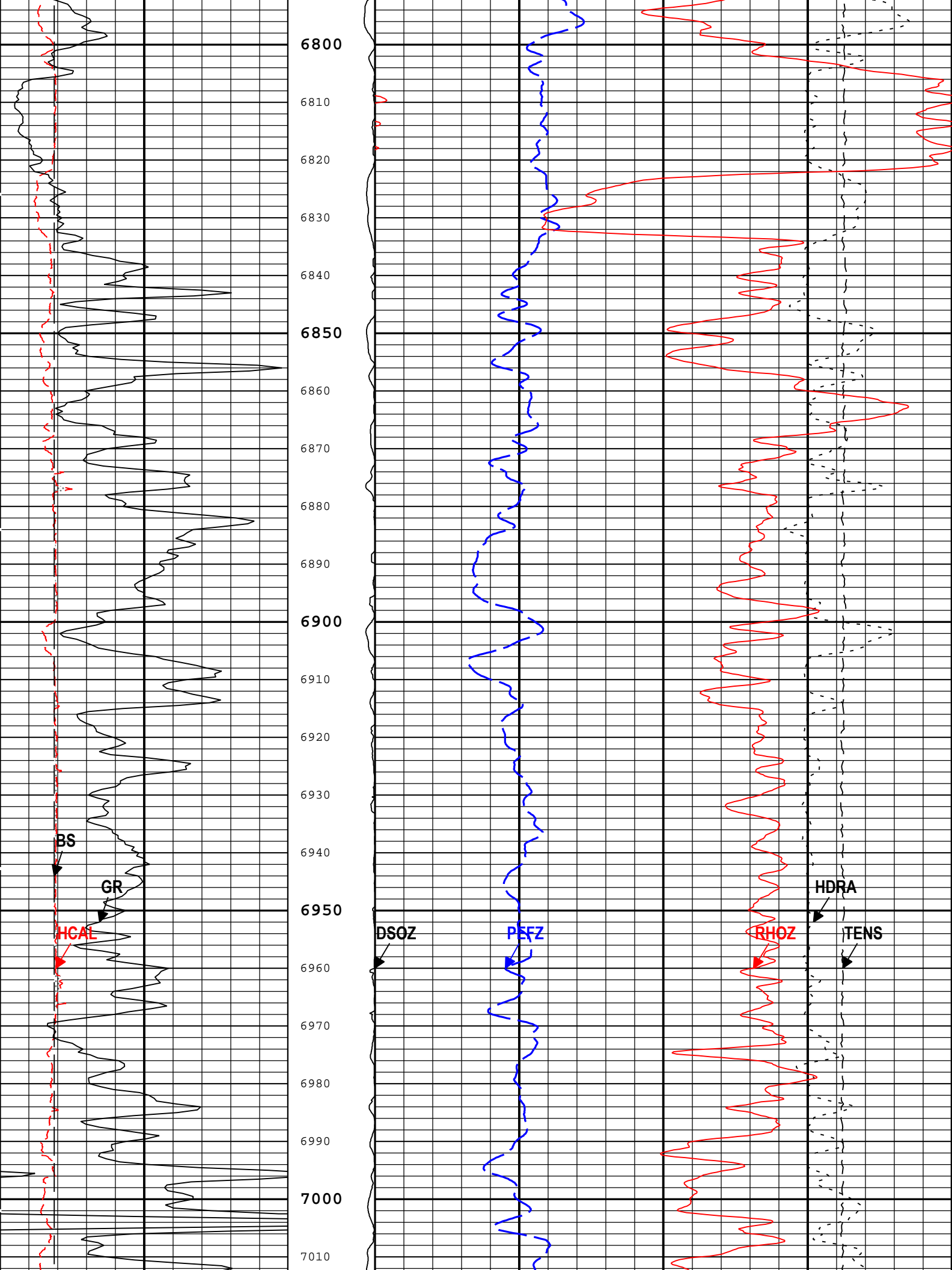


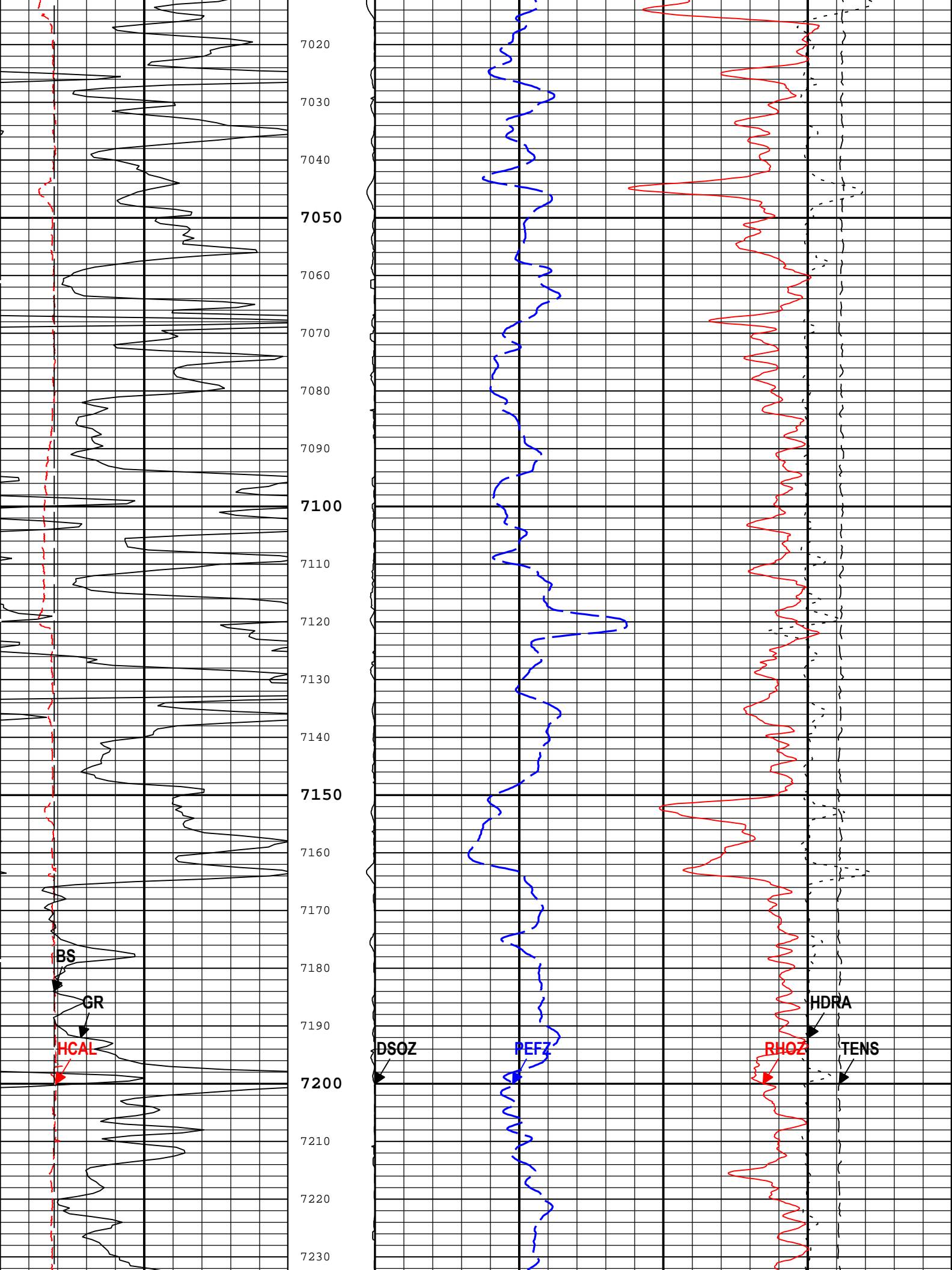


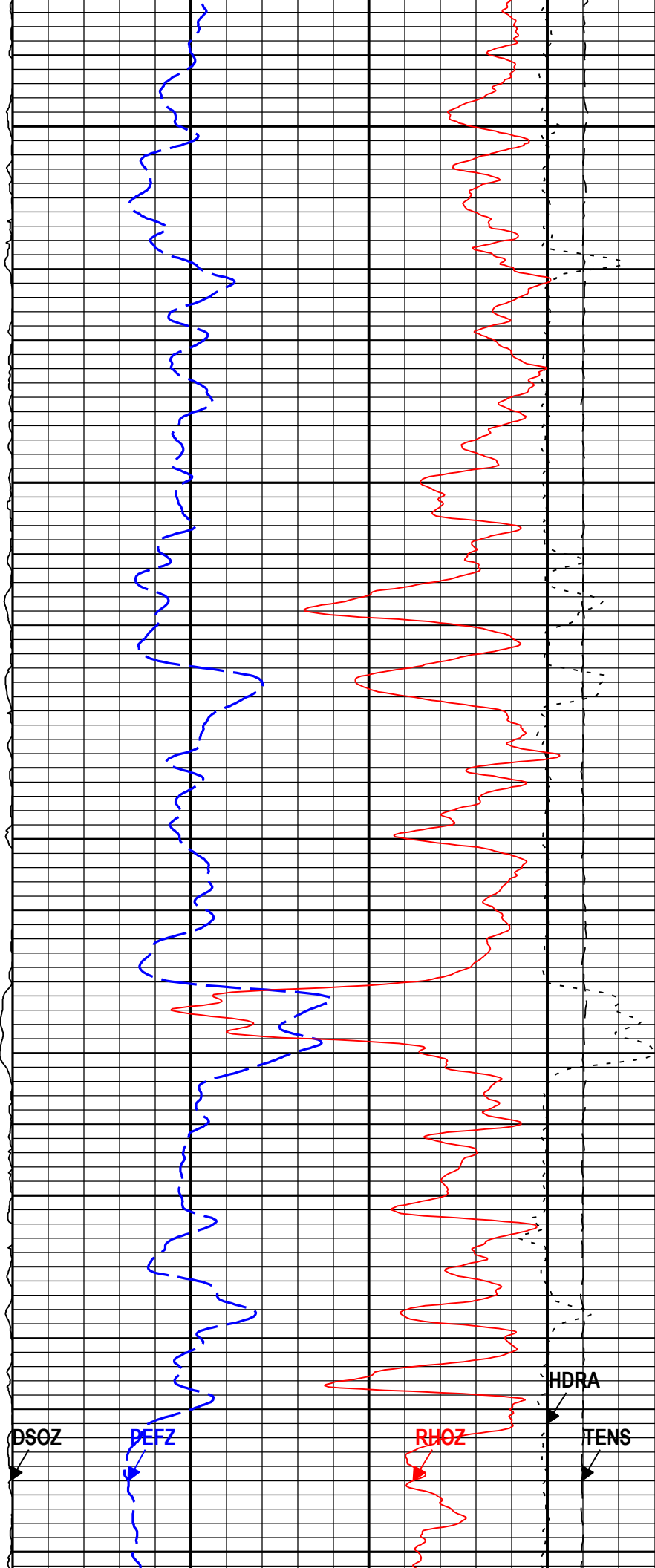
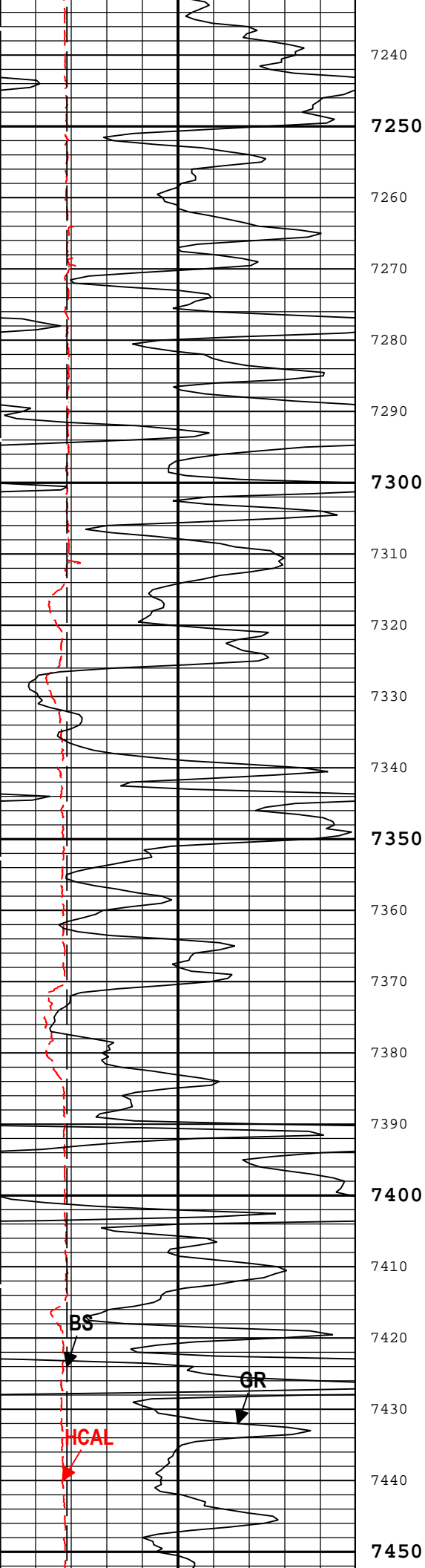


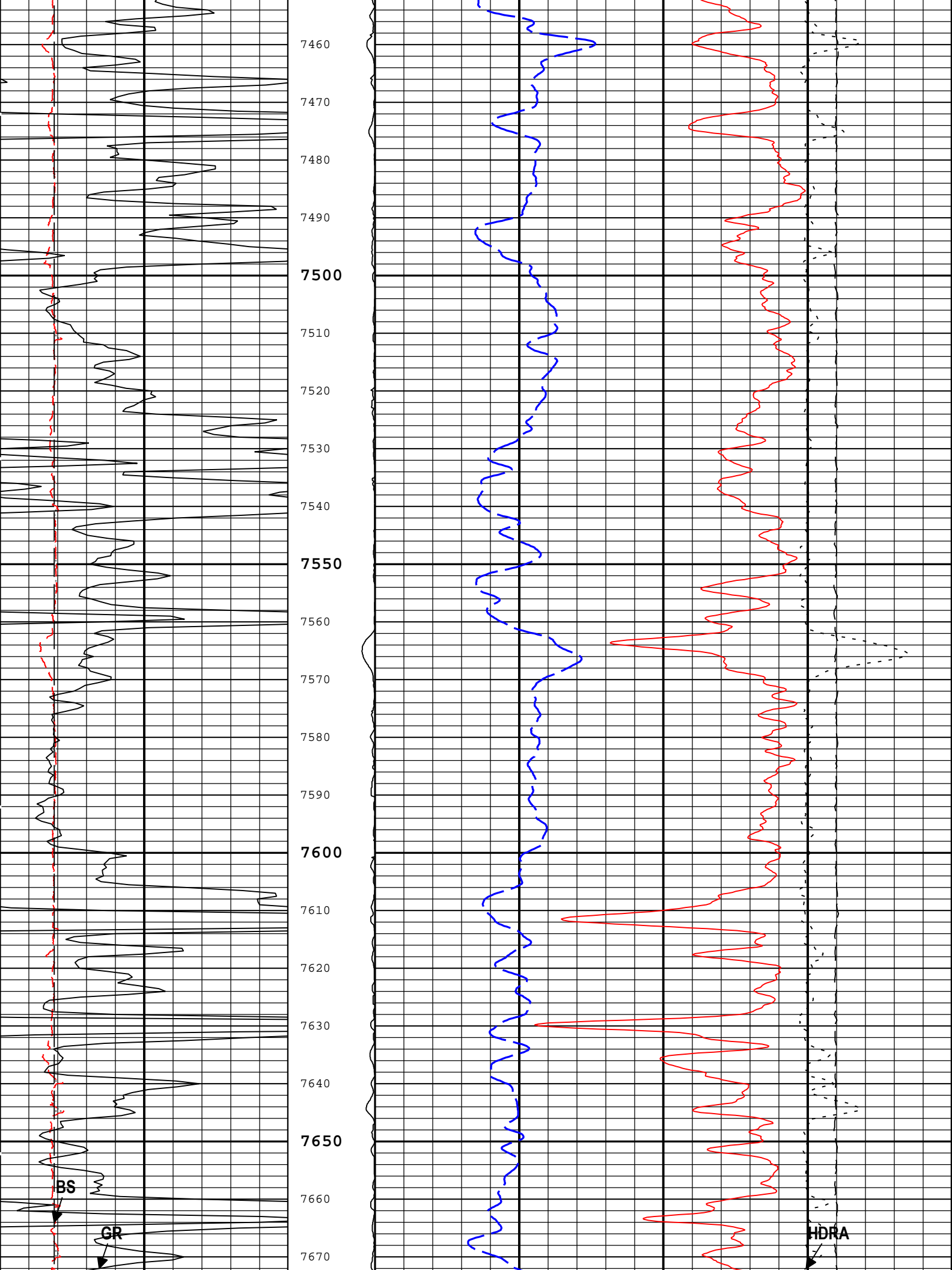


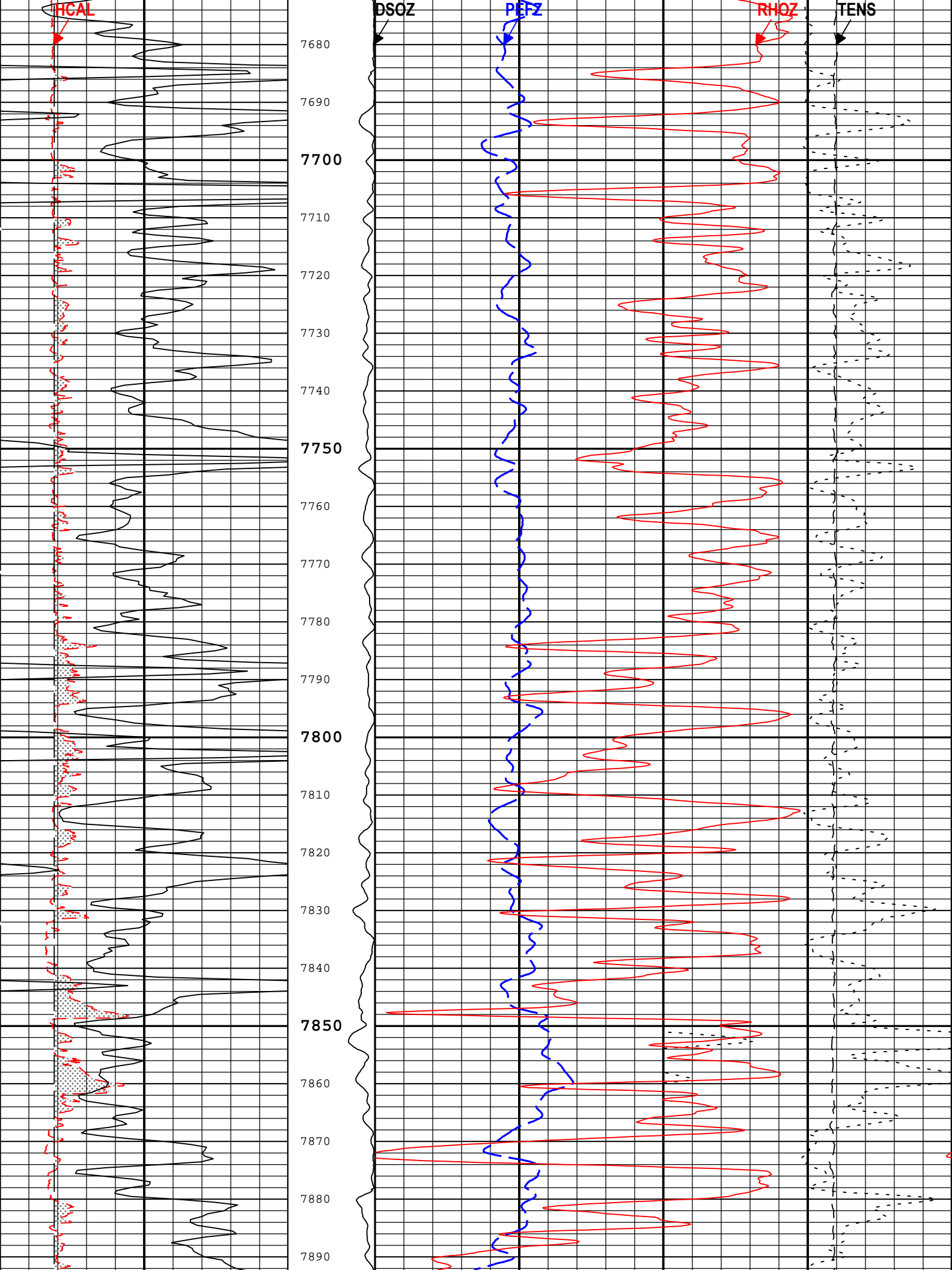


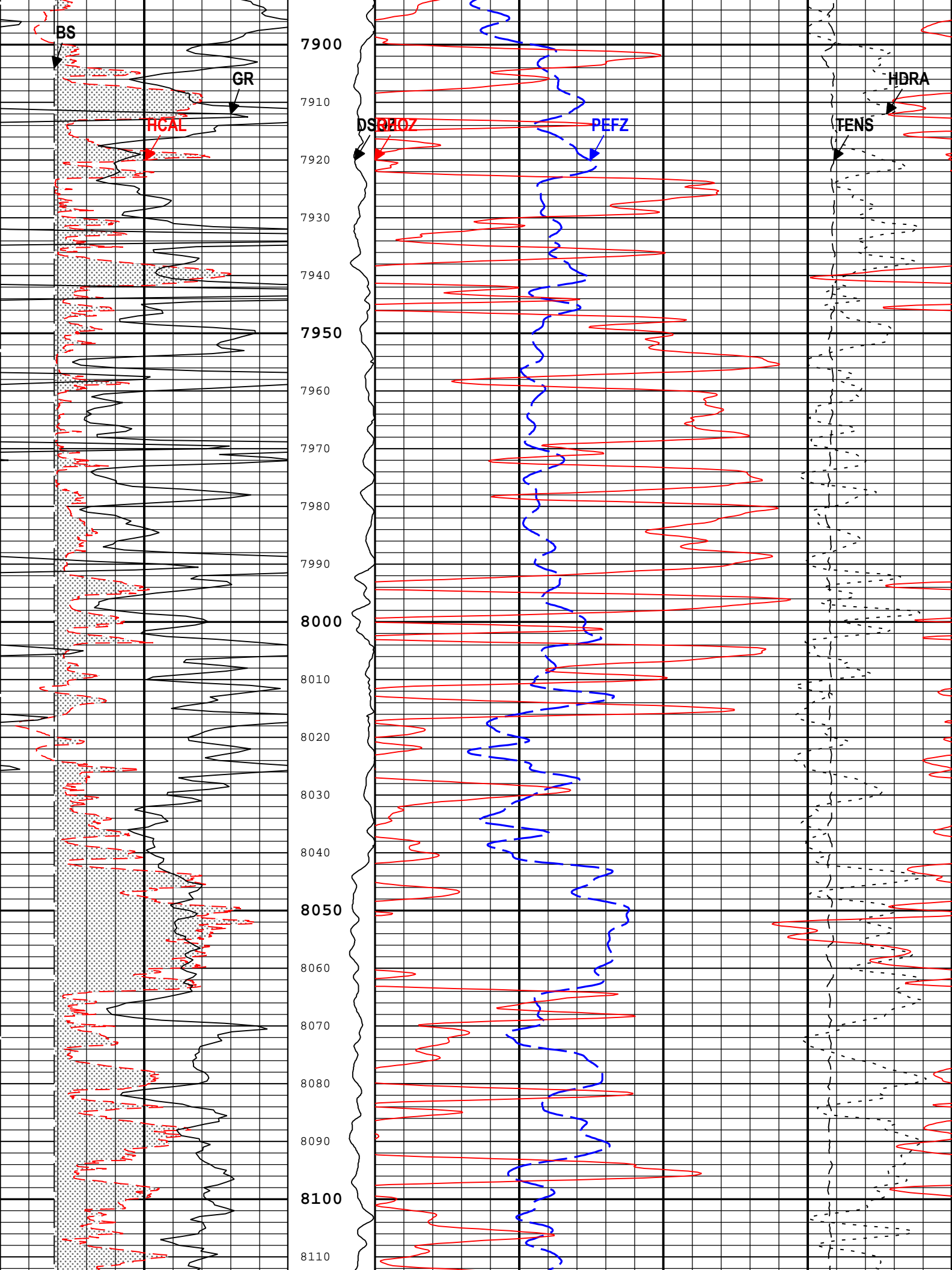


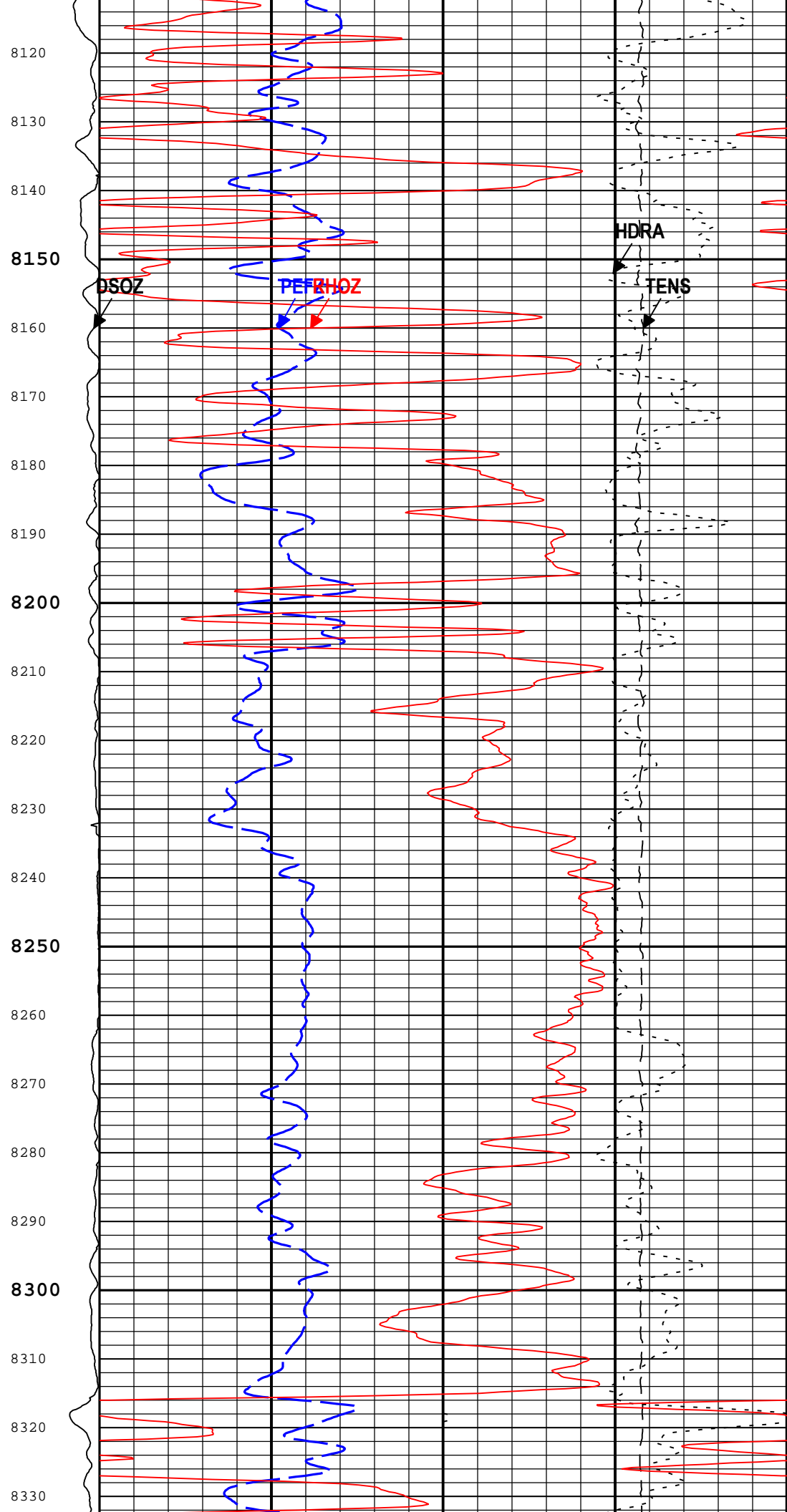
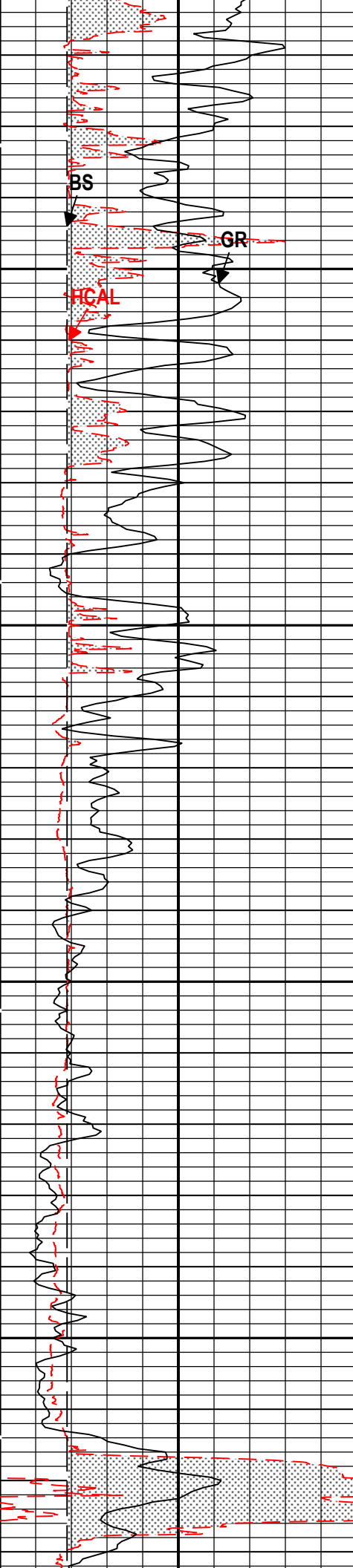


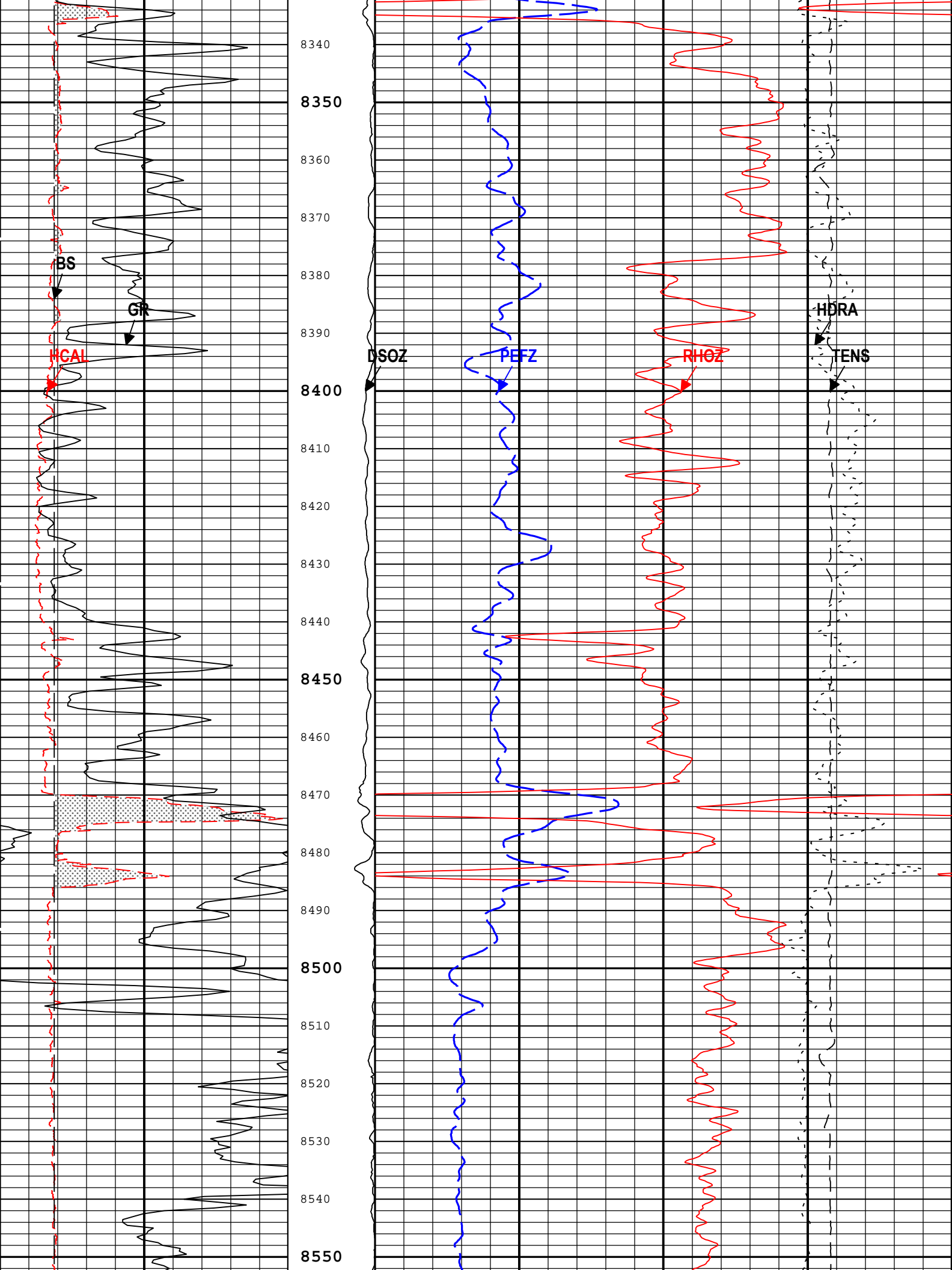


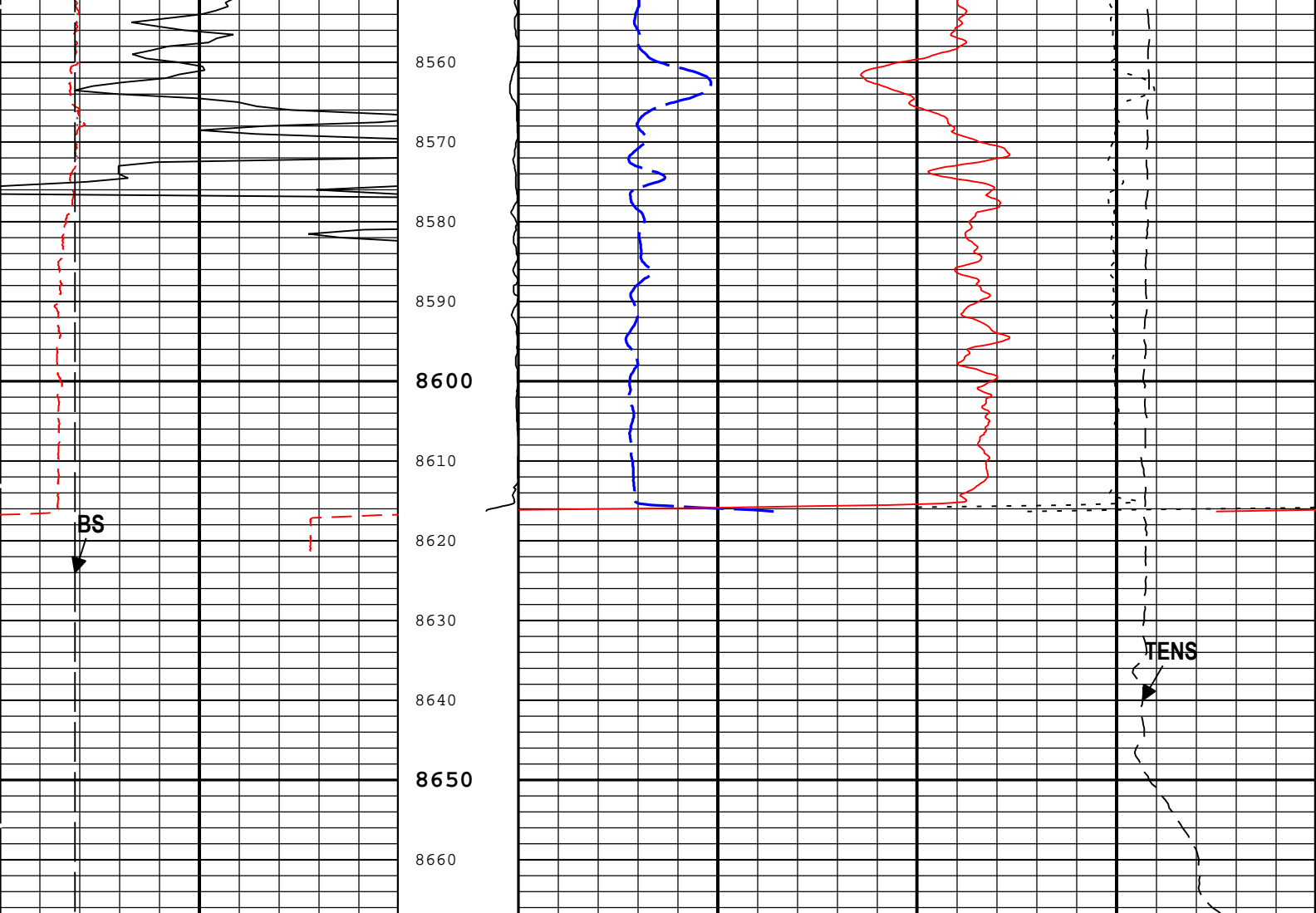












Area from BS to CALI		Standard Resolution Density Standoff (DSOZ) HDRS-H		Standard Resolution Formation Density (RHOZ) HDRS-H		Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H		Cable Tension (TENS)		Density Standoff Correction (HDRA) HDRS-H	
Caliper (HCAL) HDRS-H		2		g/cm3		0		10000		-0.25	
6 in 16		in		3		10		lbf		g/cm3	
Calibrated Gamma Ray (GR) HGNS-H		0		2		0		0		0.25	
gAPI		150									
Bit Size (BS)		6									
in		16									

TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (Dens) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 05-Oct-2015 20:55:51

Channel Processing Parameters

Nighthawk: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.909	in
CBLO	Casing Bottom (Logger)	WLSESSION	485	ft
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.65	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	

Tool Control Parameters

Nighthawk: Parameters

Parameter	Description	Tool	Value	Unit
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

Nighthawk

Main Pass - Triple Combo

Software Version

Acquisition System	Version
Maxwell 2016	6.0.52439.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Nighthawk	Main[5]:Up	Up	89.68 ft	8666.77 ft	05-Oct-2015 5:38:29 PM	05-Oct-2015 8:09:38 PM	ON	9.96 ft	No

All depths are referenced to toolstring zero

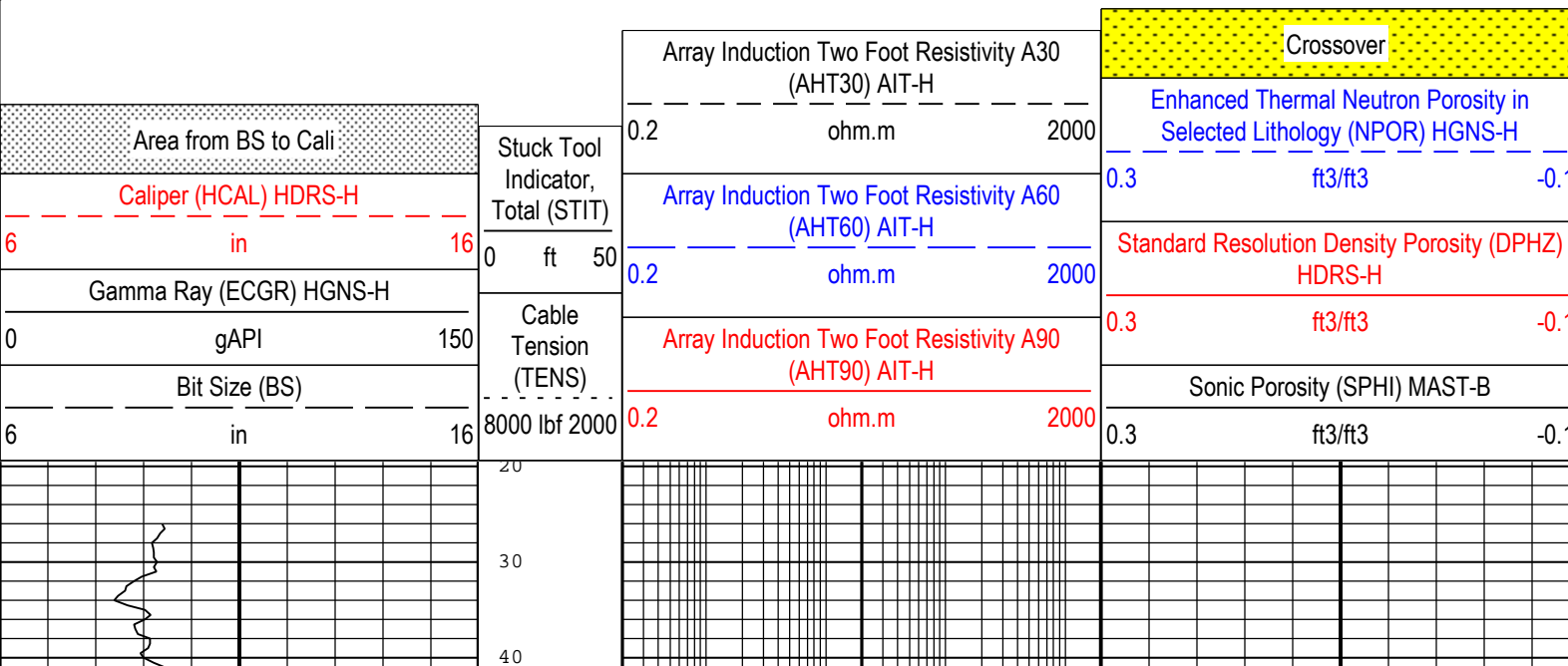
Log

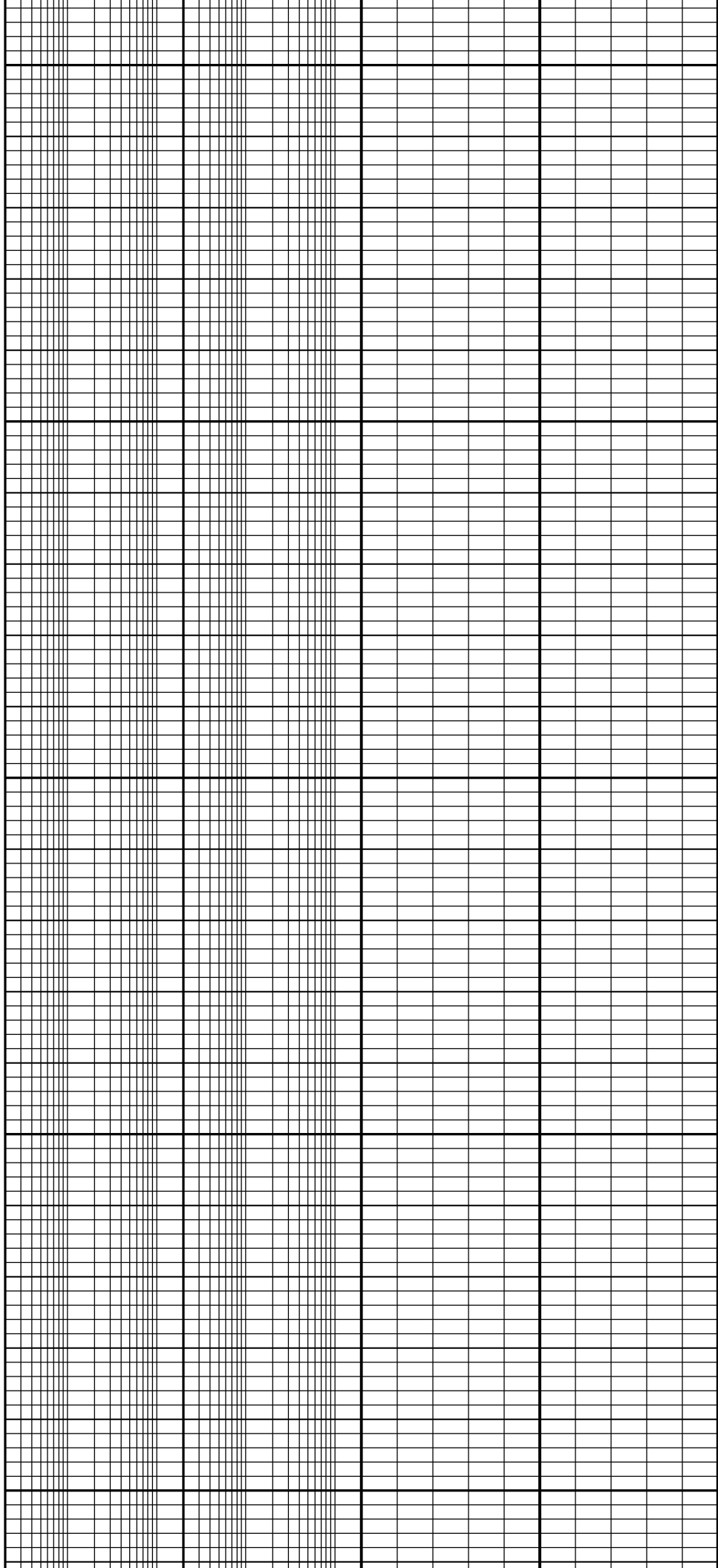
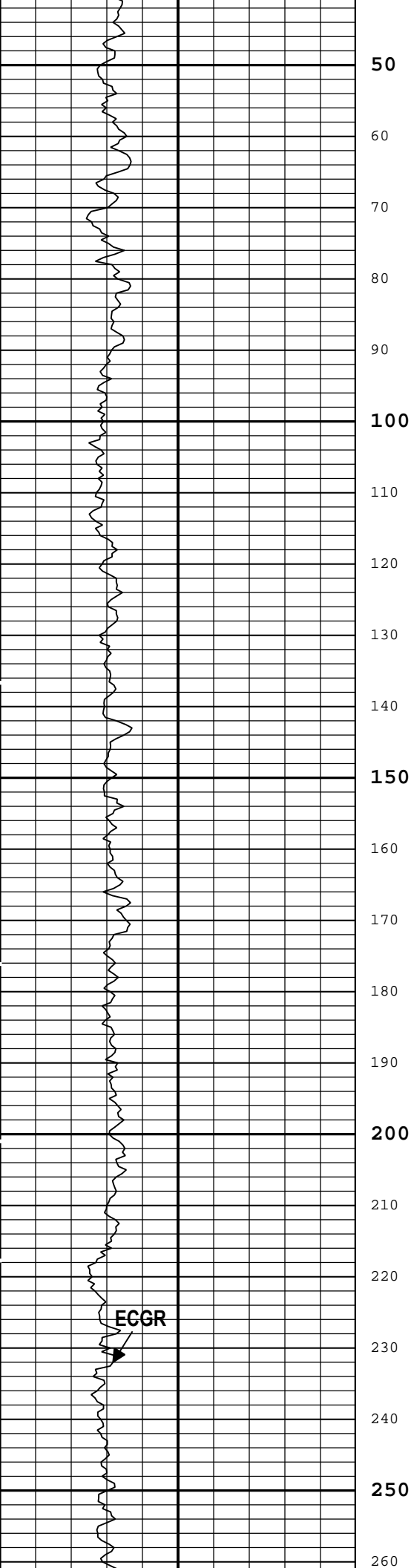
Company:Nighthawk Production LLC Well:Monarch 10-15
Nighthawk: Main[5]:Up:S003

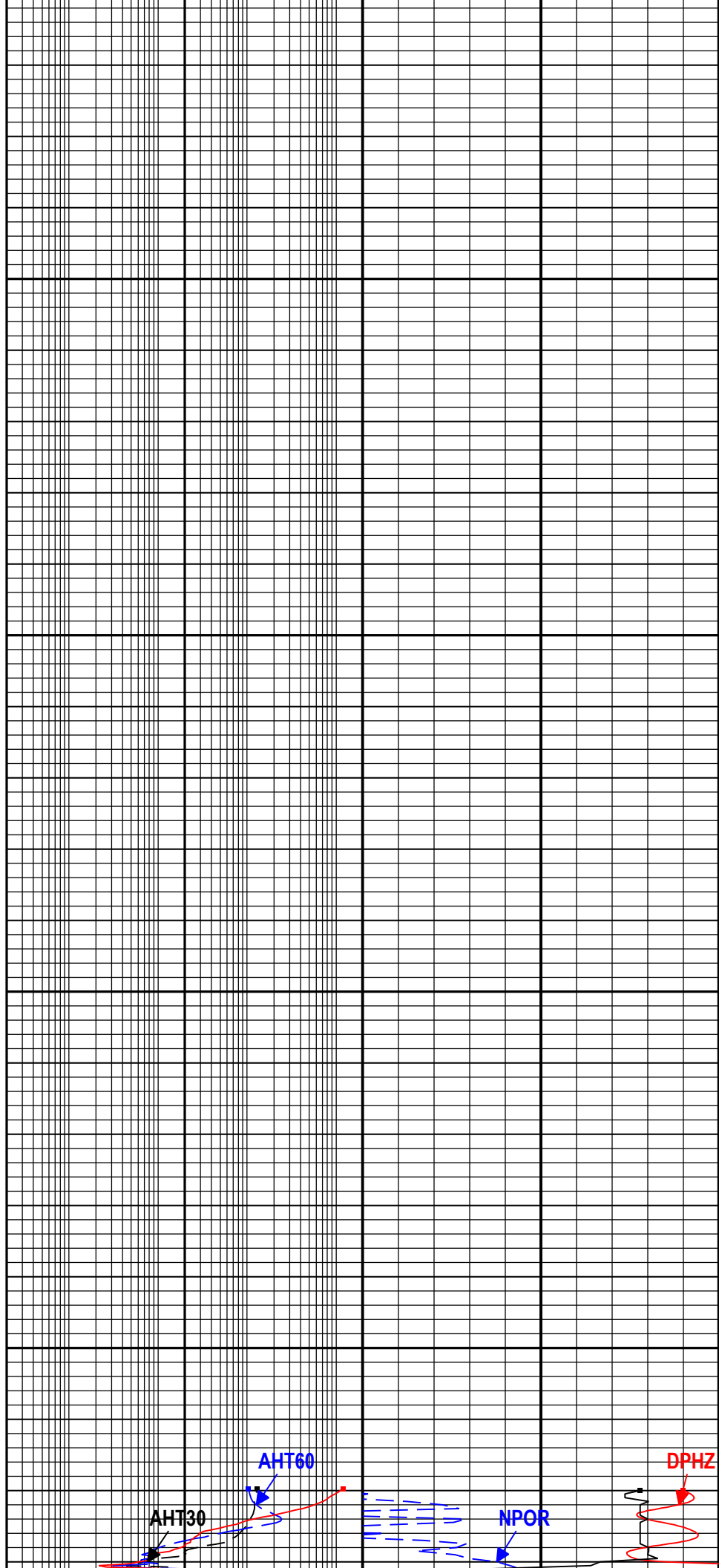
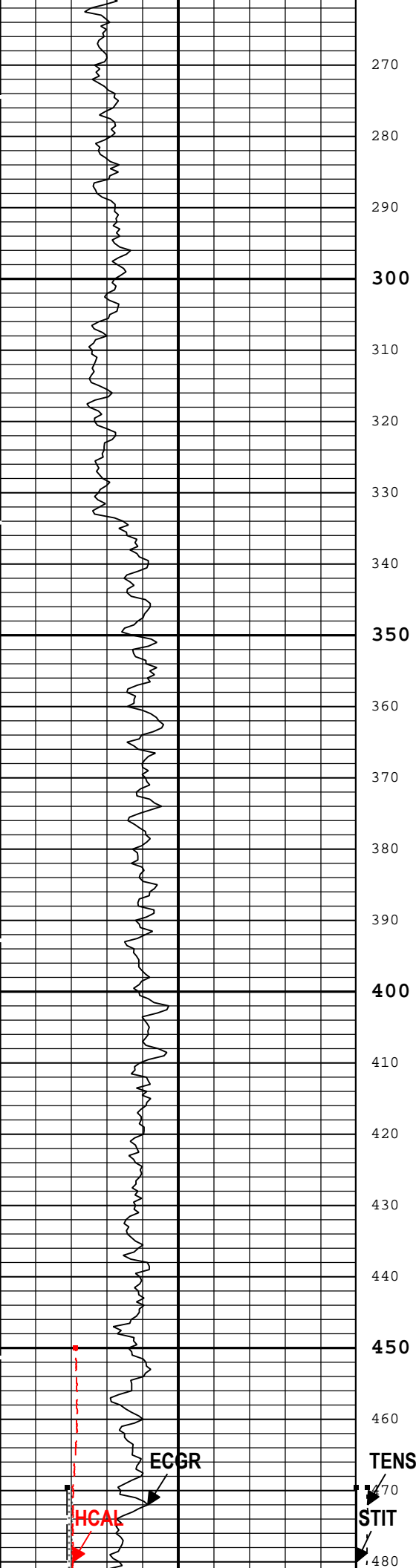
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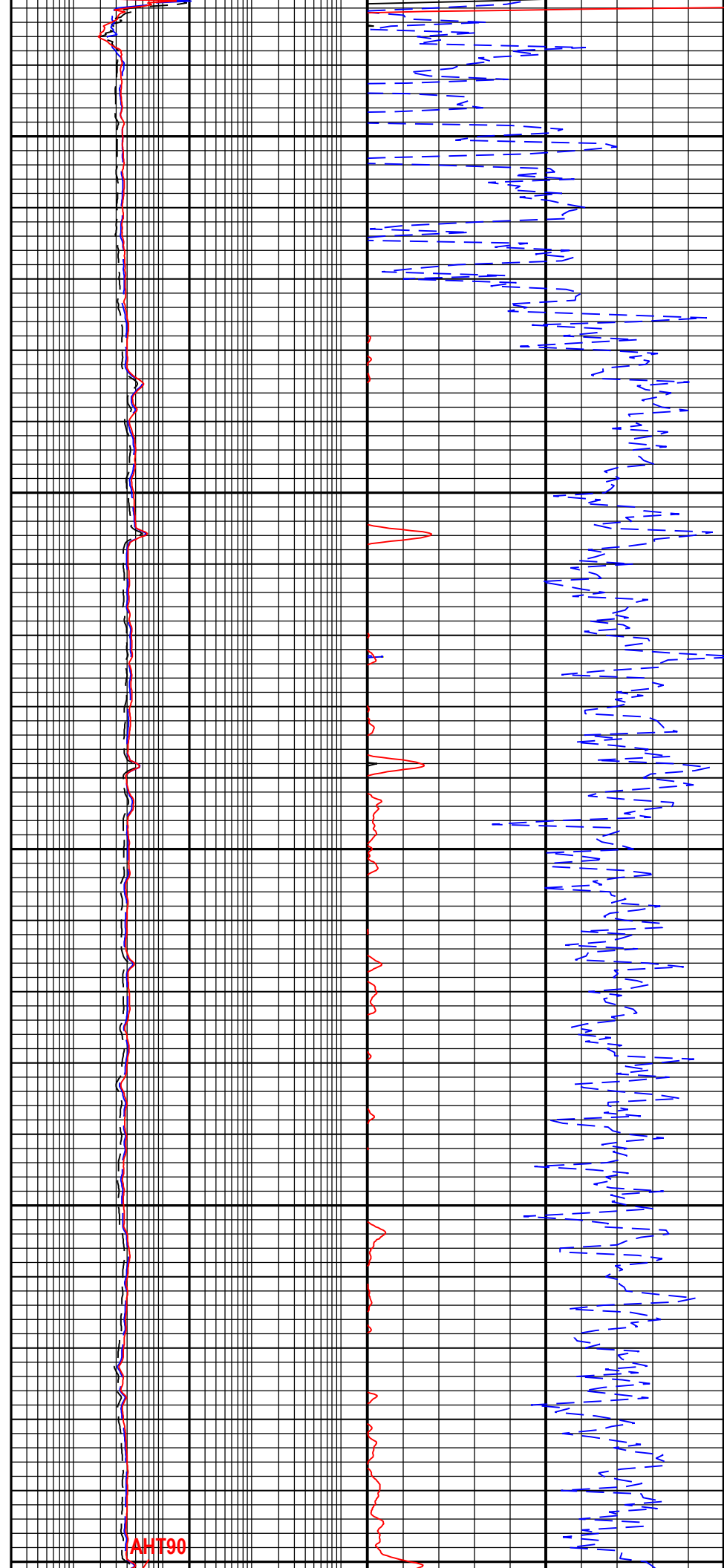
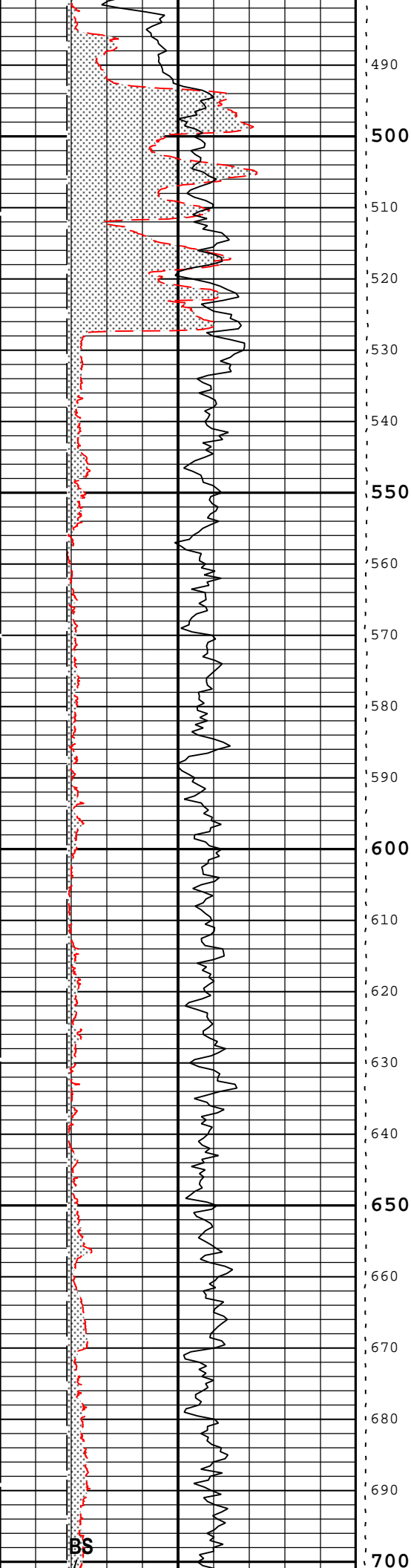
Channel	Source	Sampling
AT30	AIT-H:AHIS:AHIS	3in
AT60	AIT-H:AHIS:AHIS	3in
AT90	AIT-H:AHIS:AHIS	3in
BS	Borehole	6in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
SPHI	MAST-B:MAMS-B:MAMS-BA	6in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

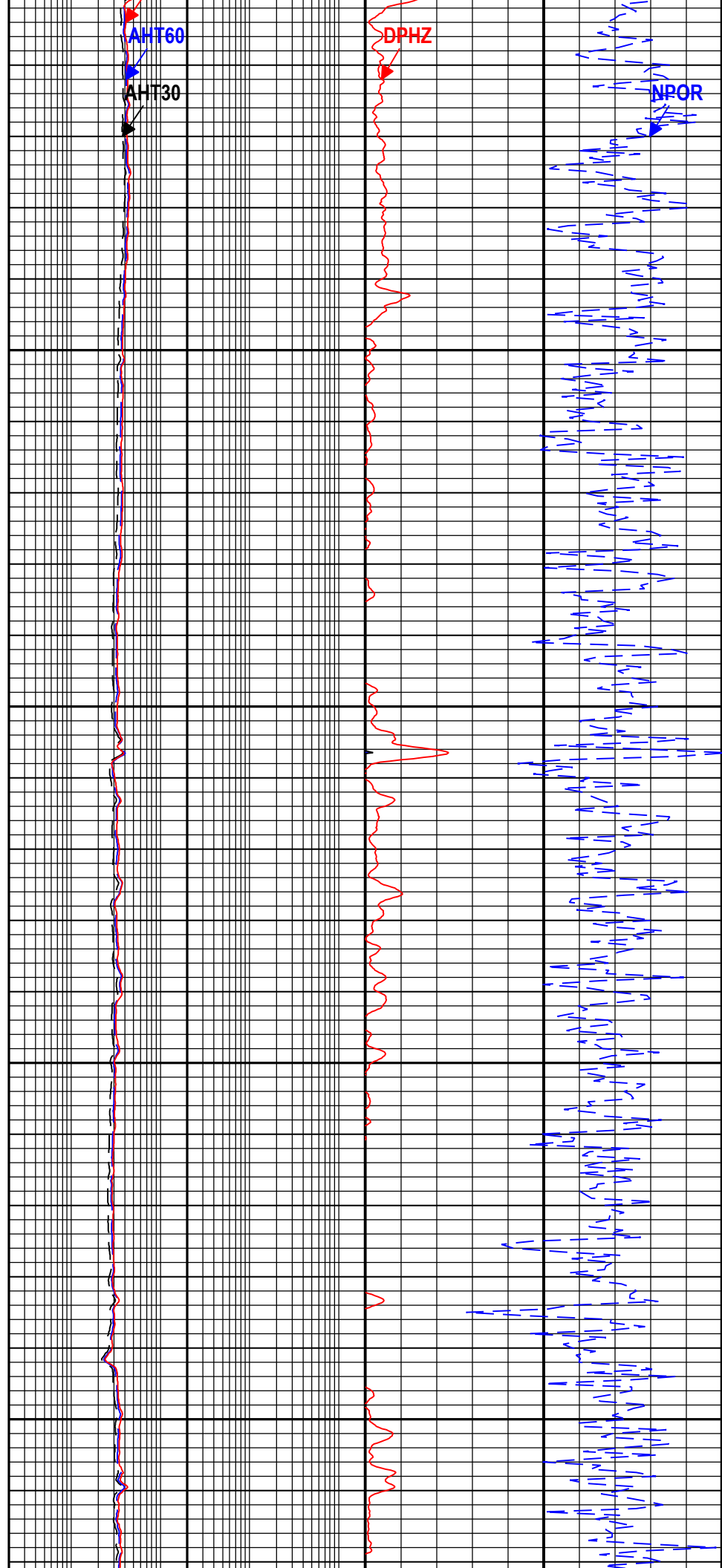
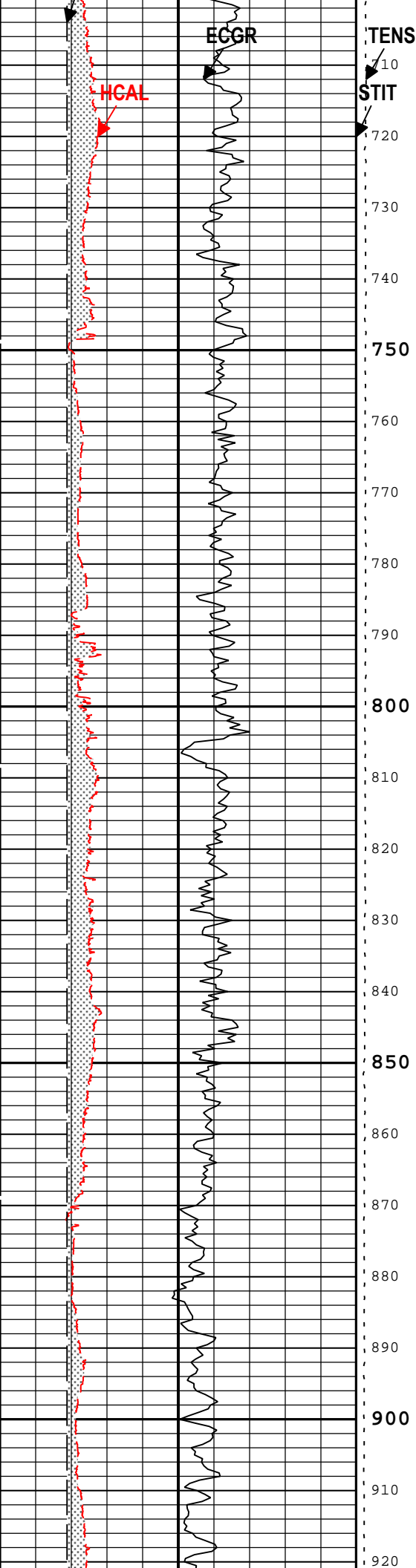
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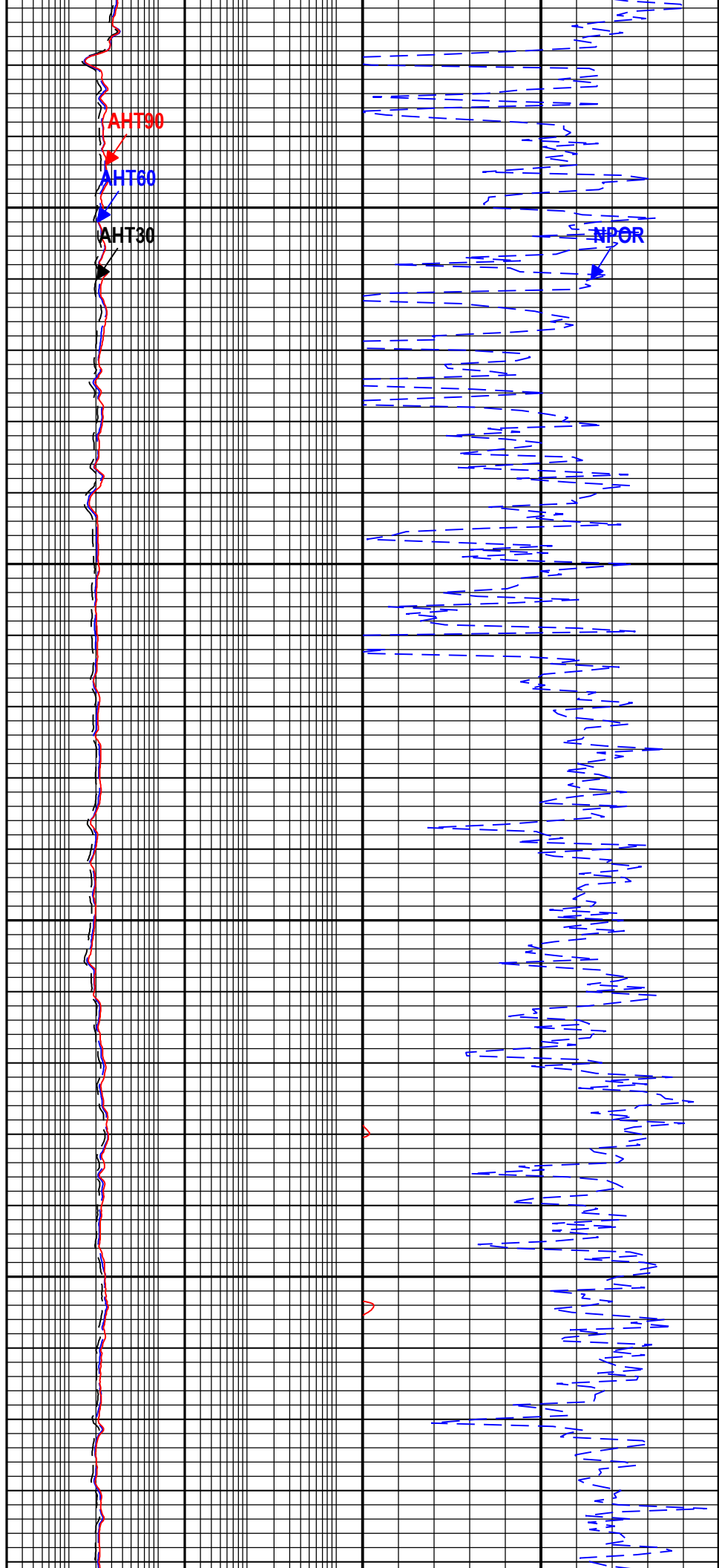
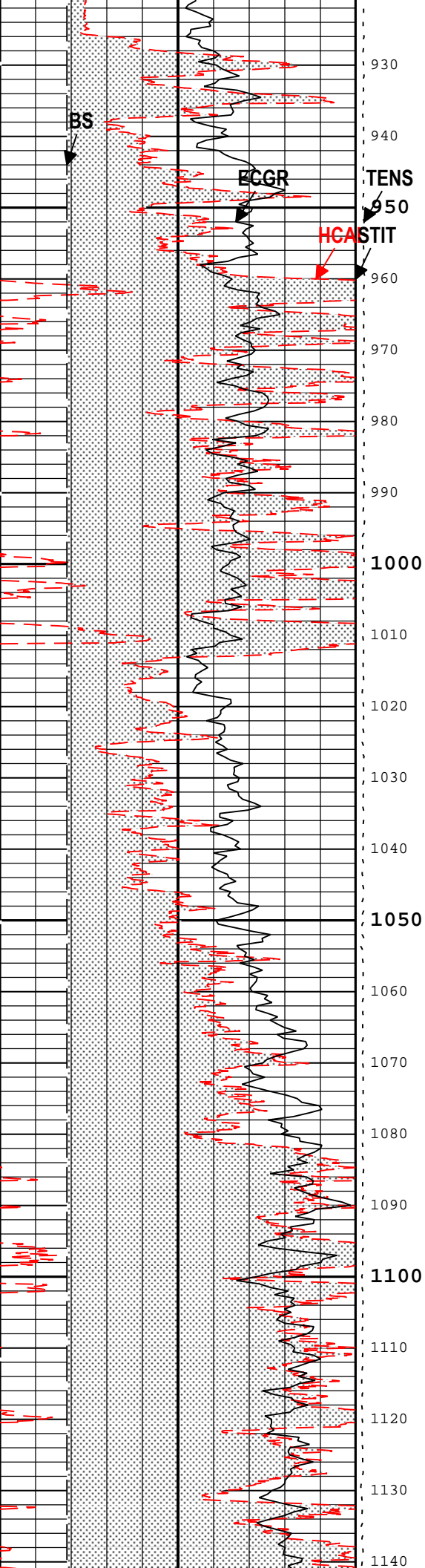


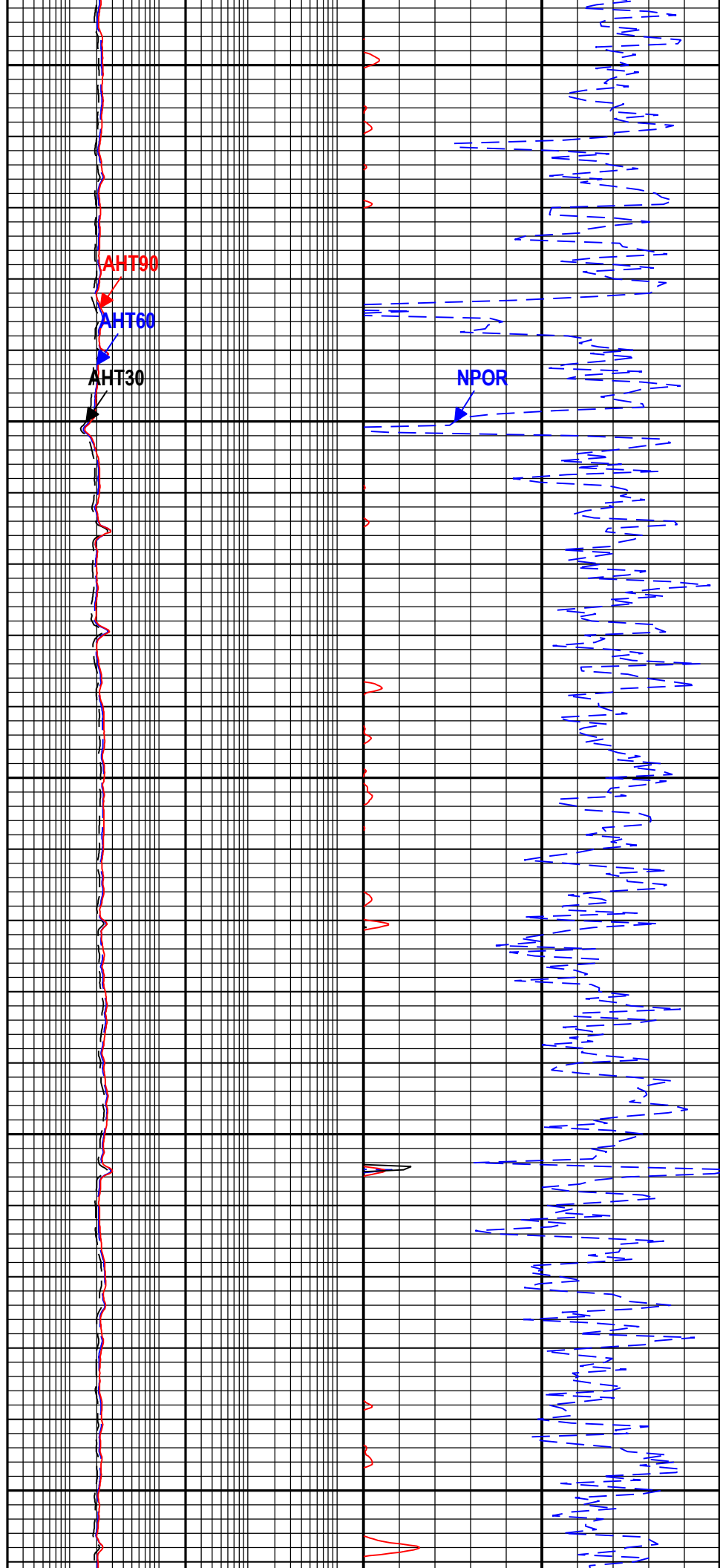
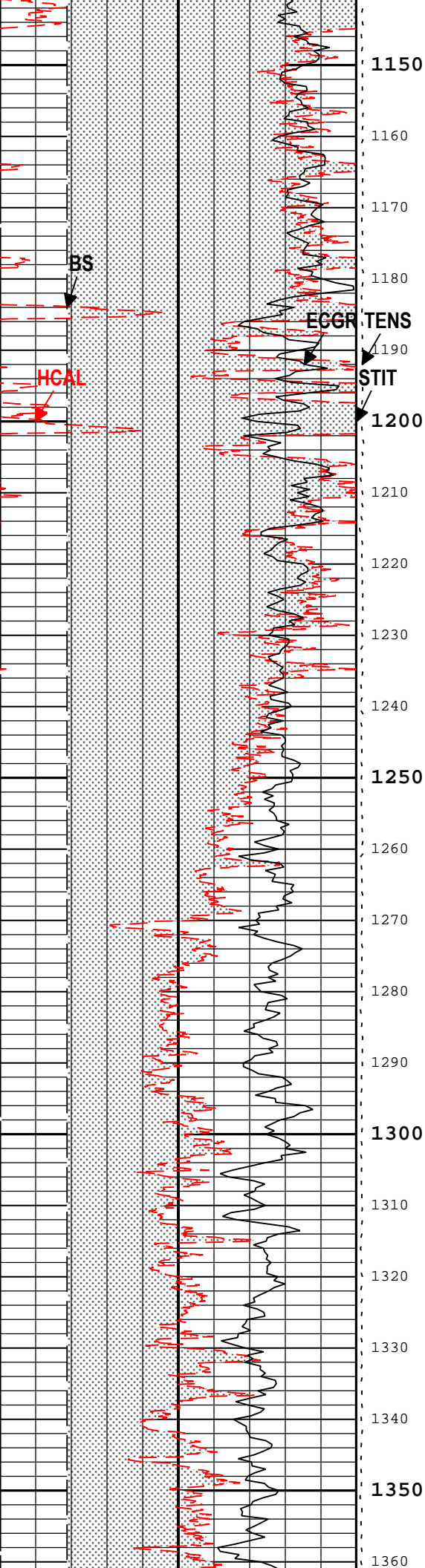


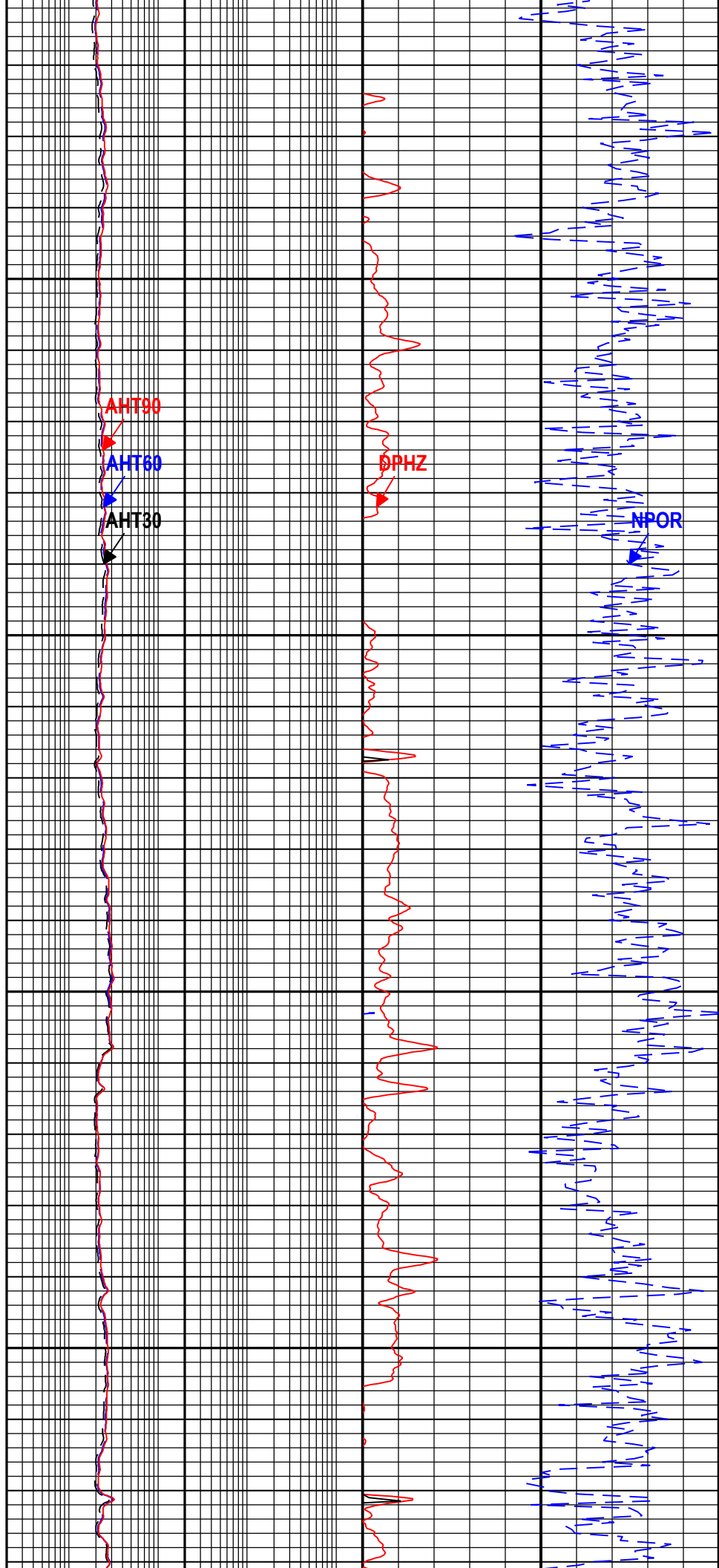
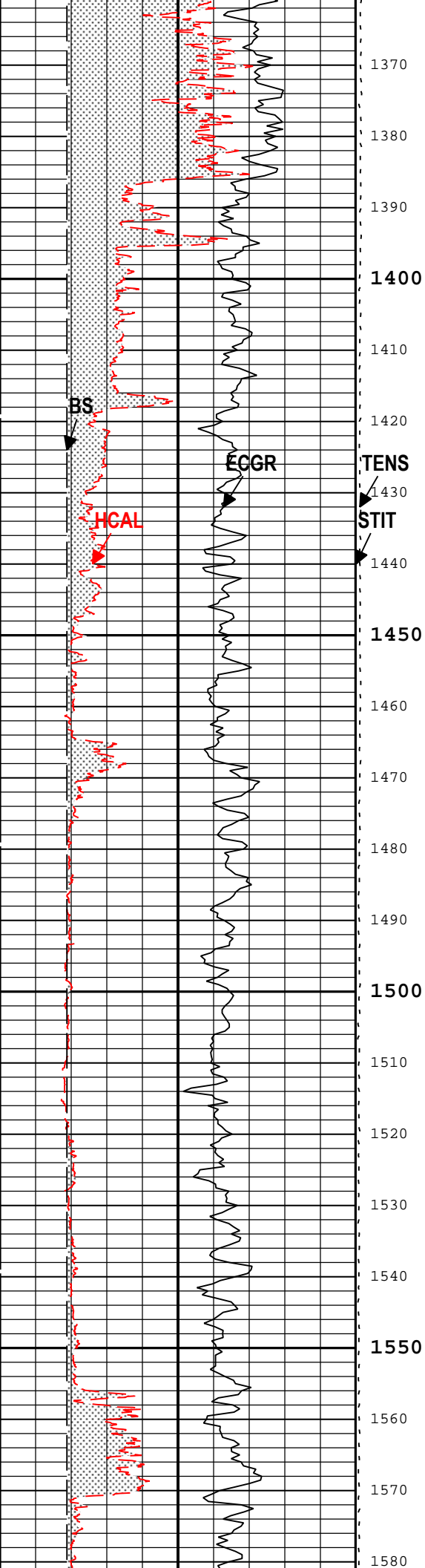


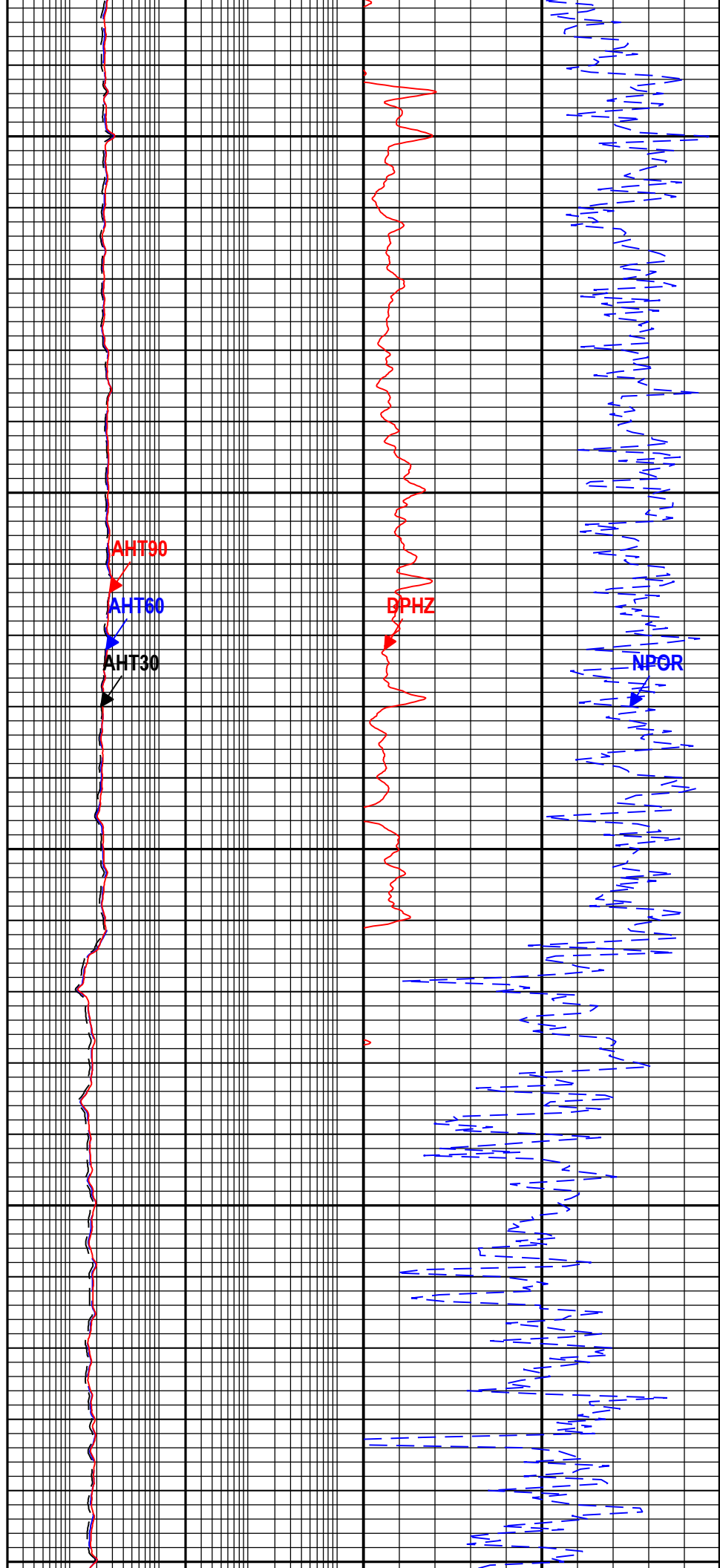
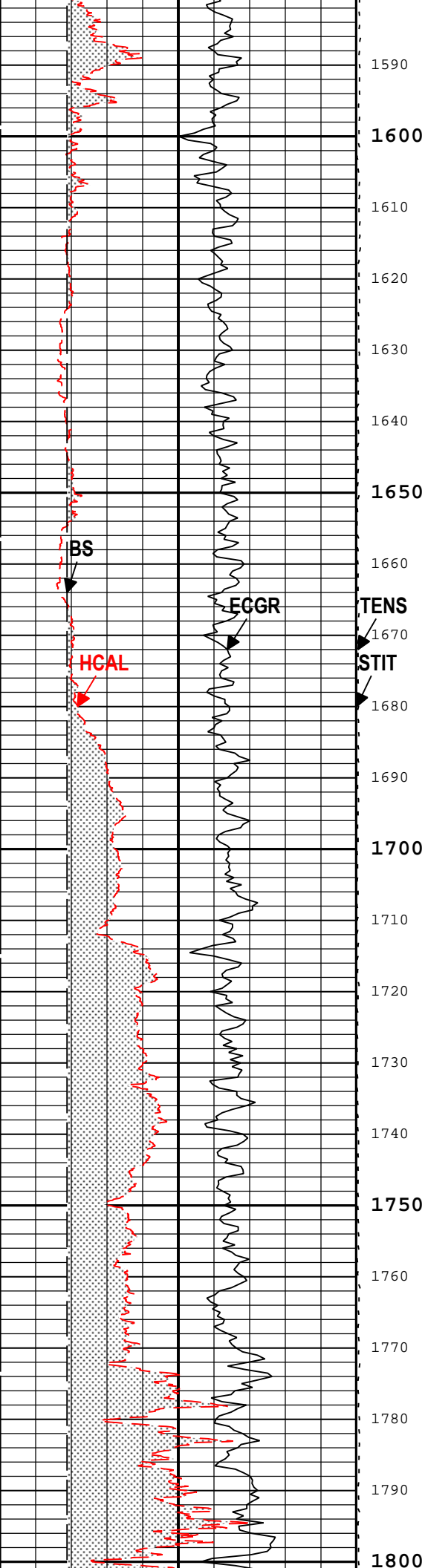


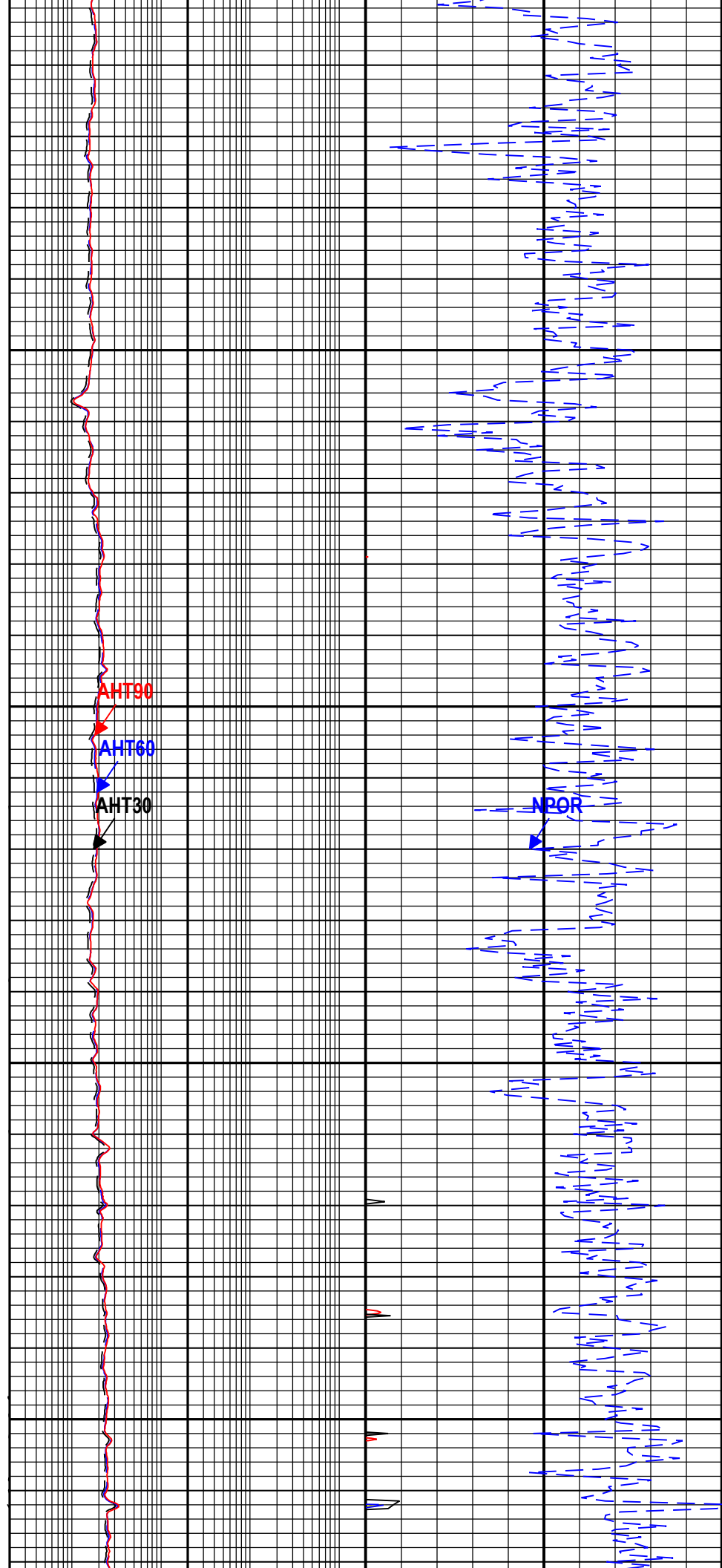
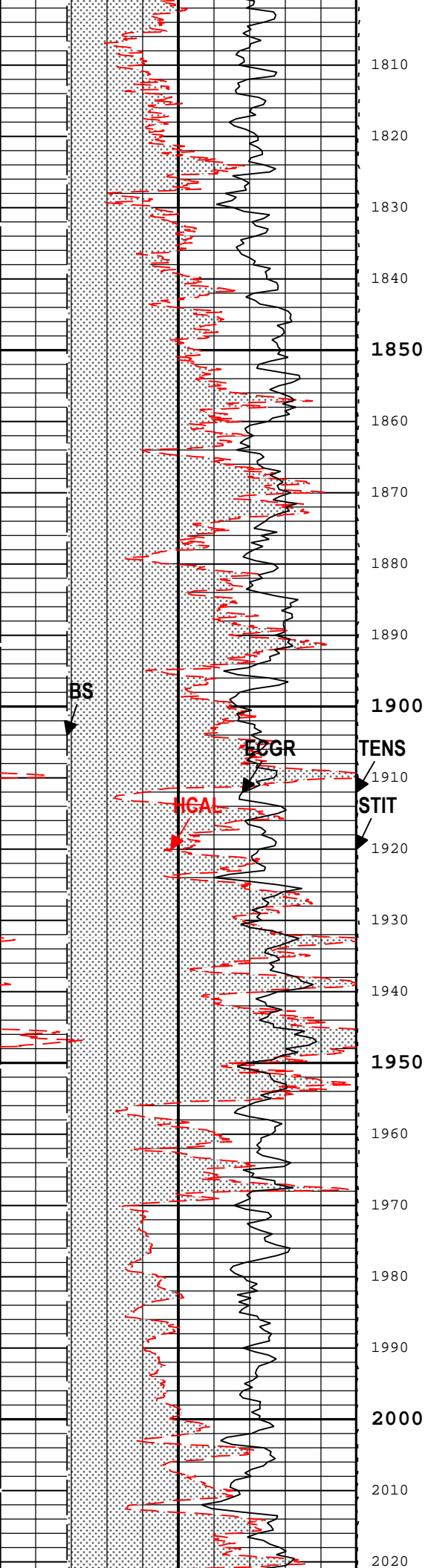


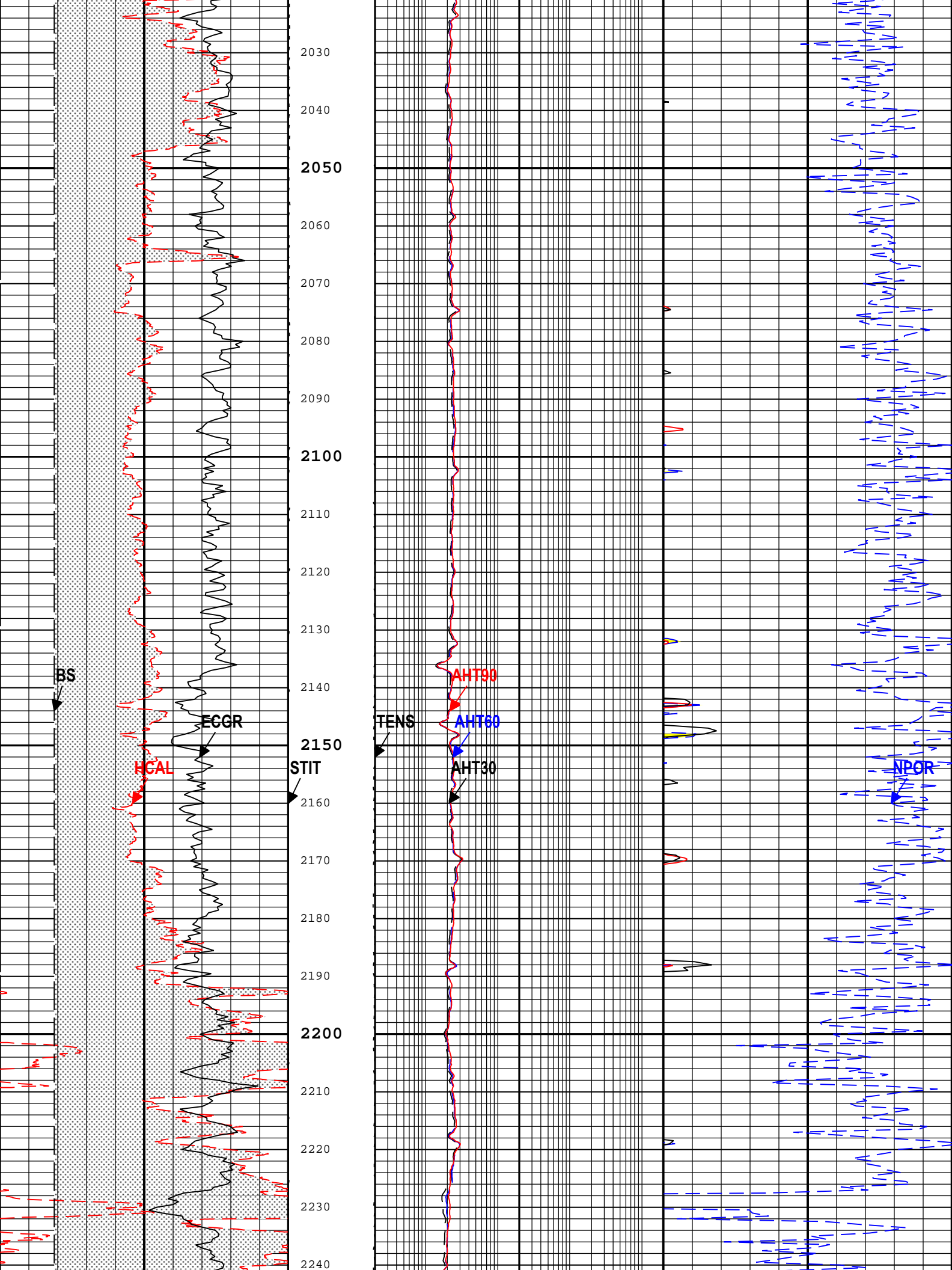


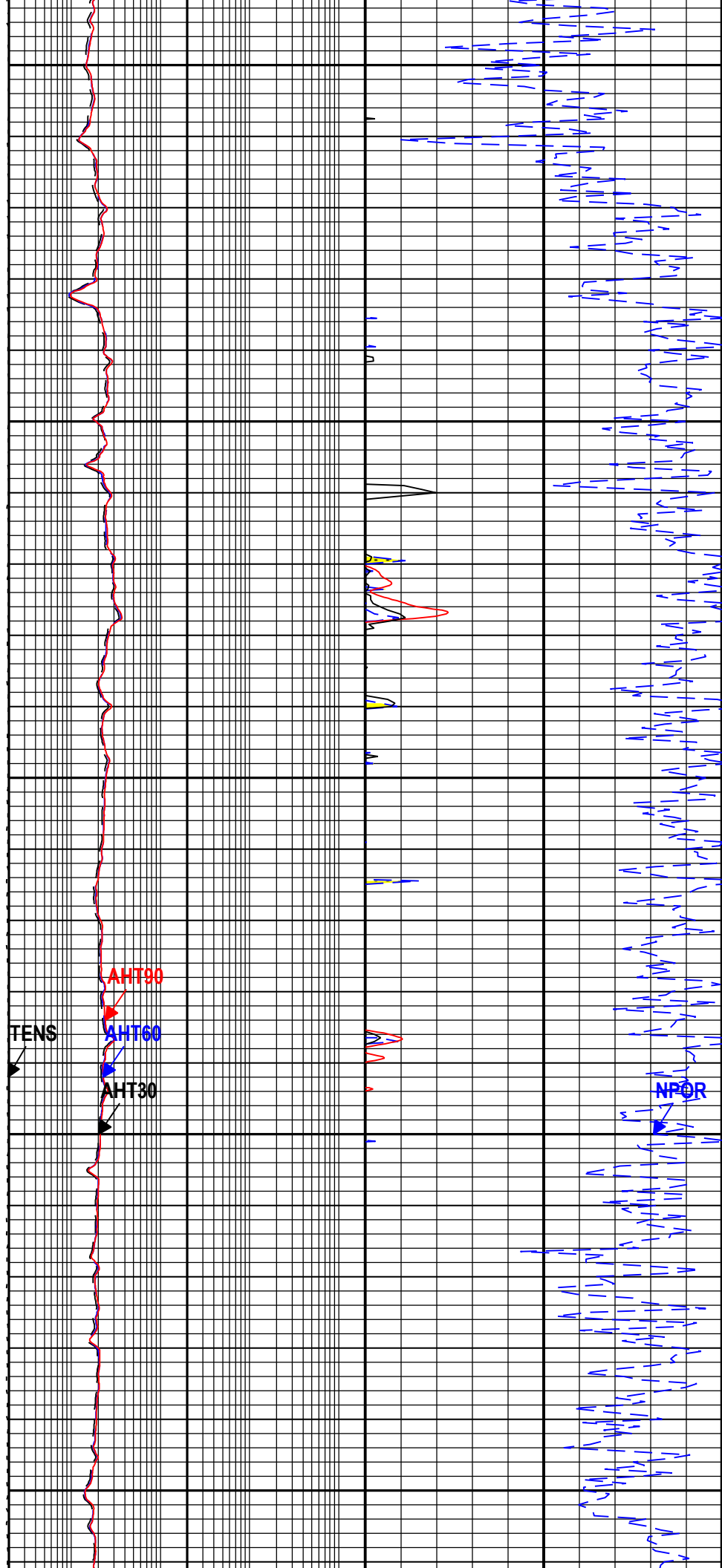
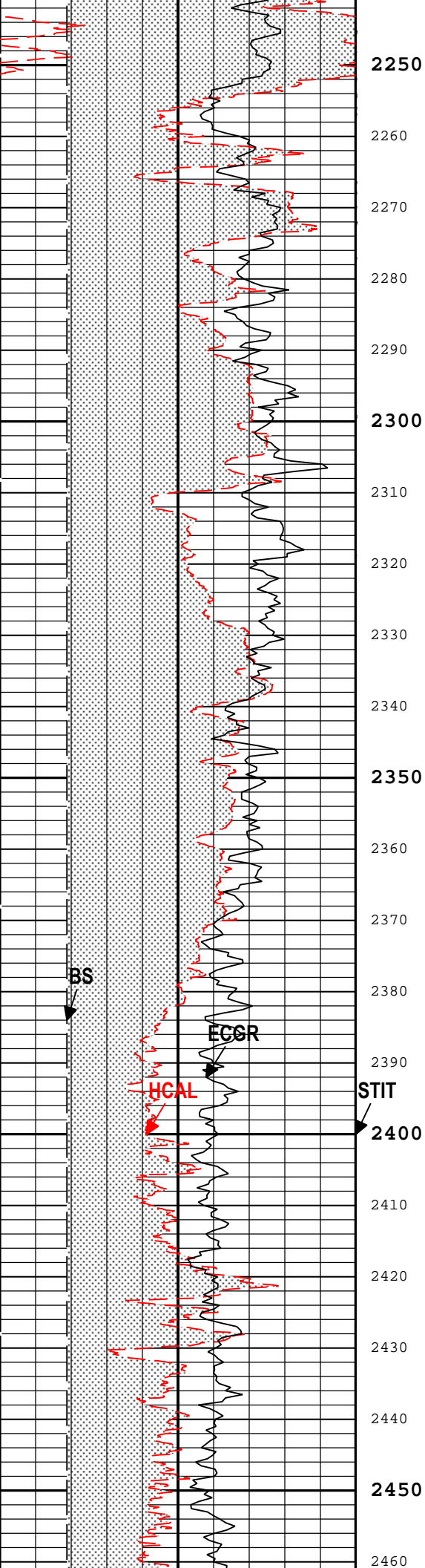


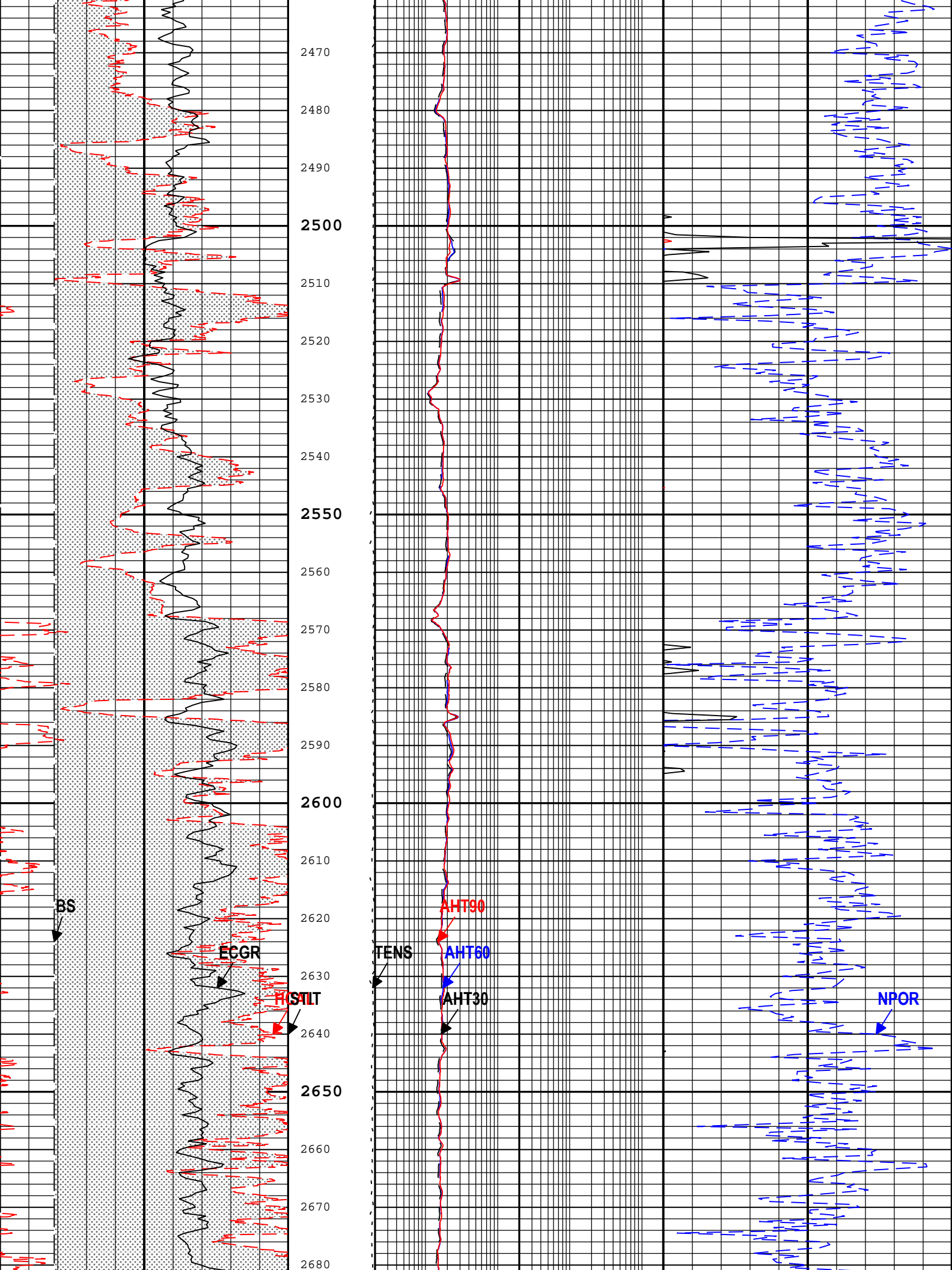


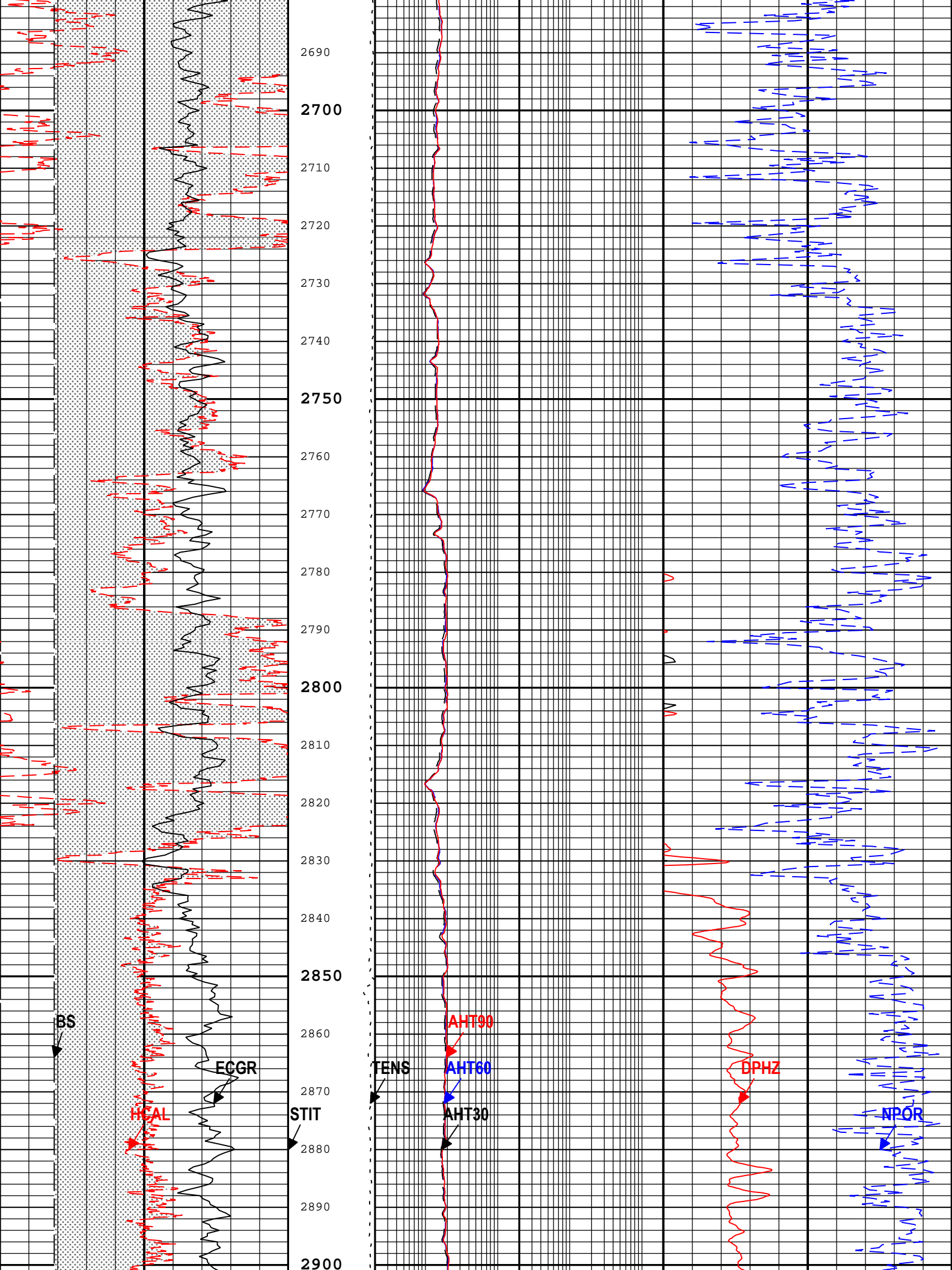


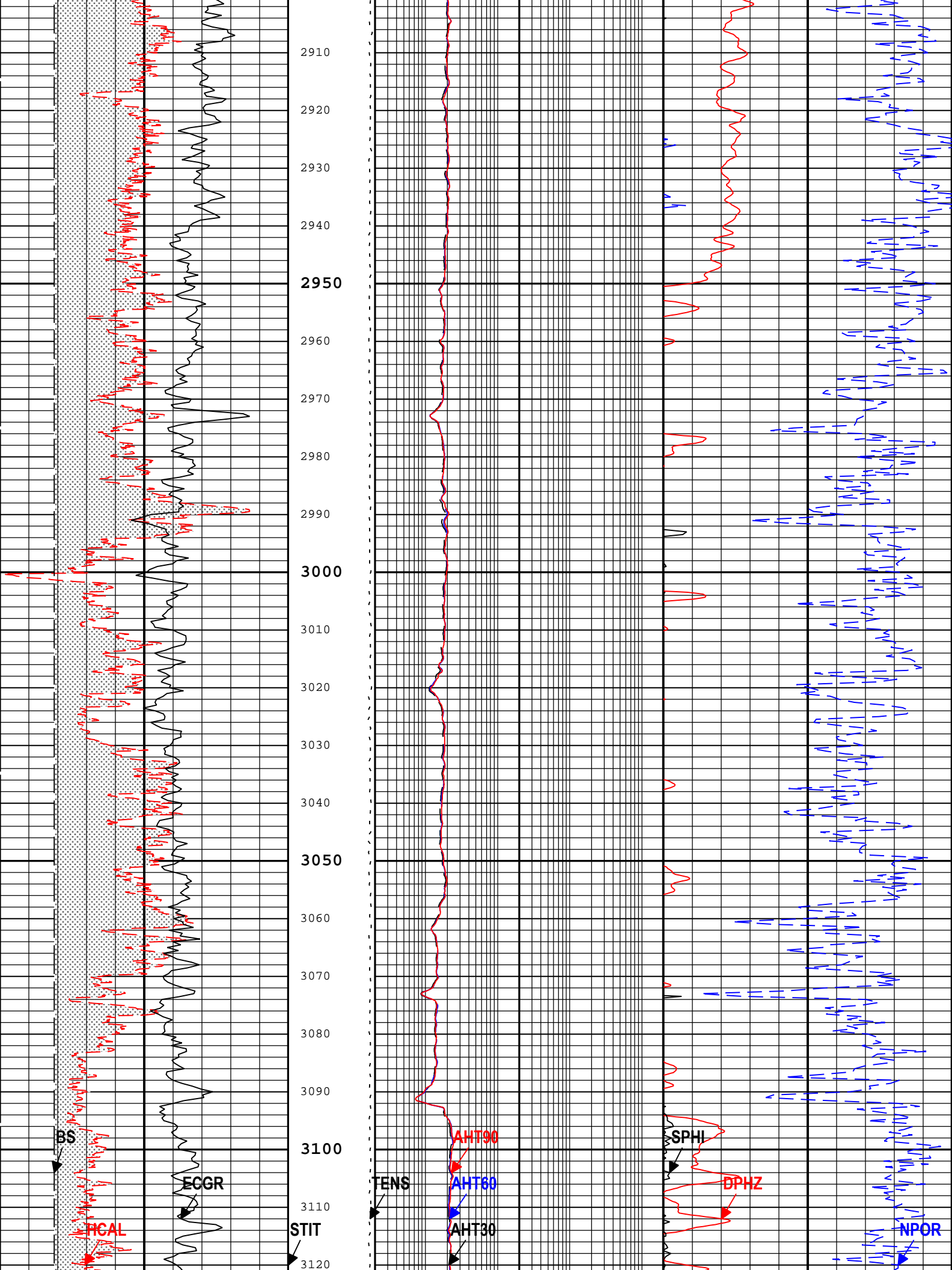


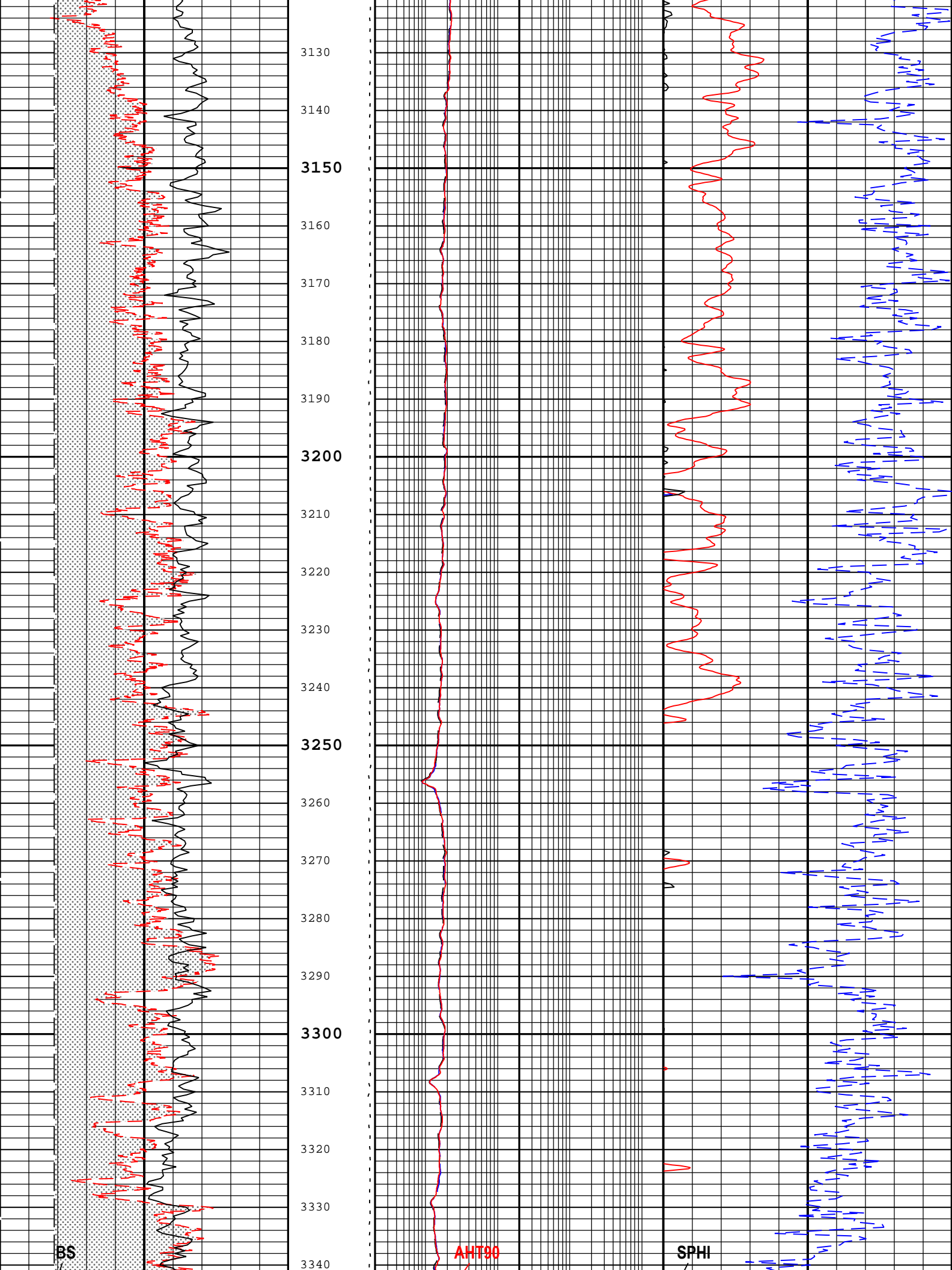


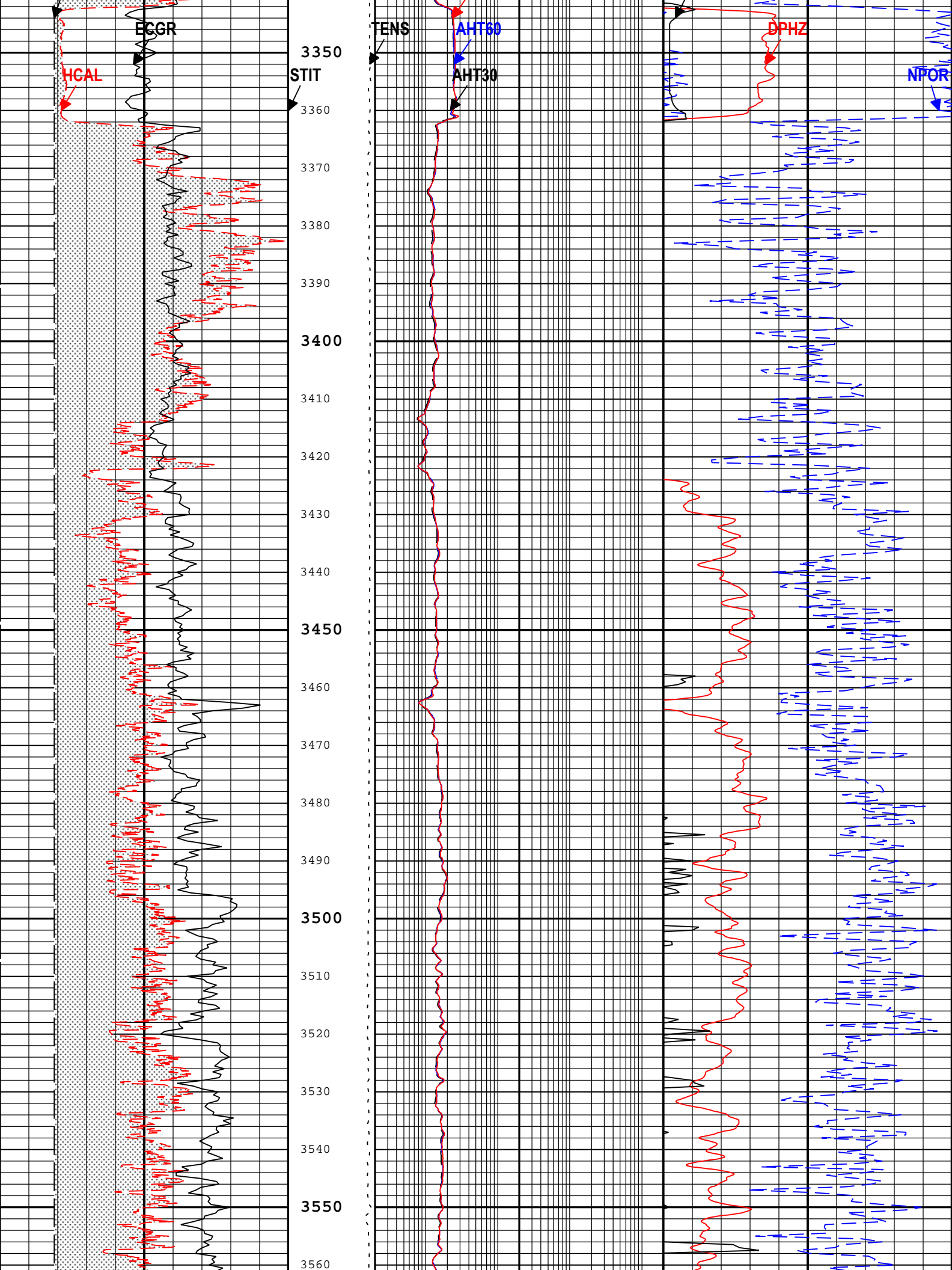


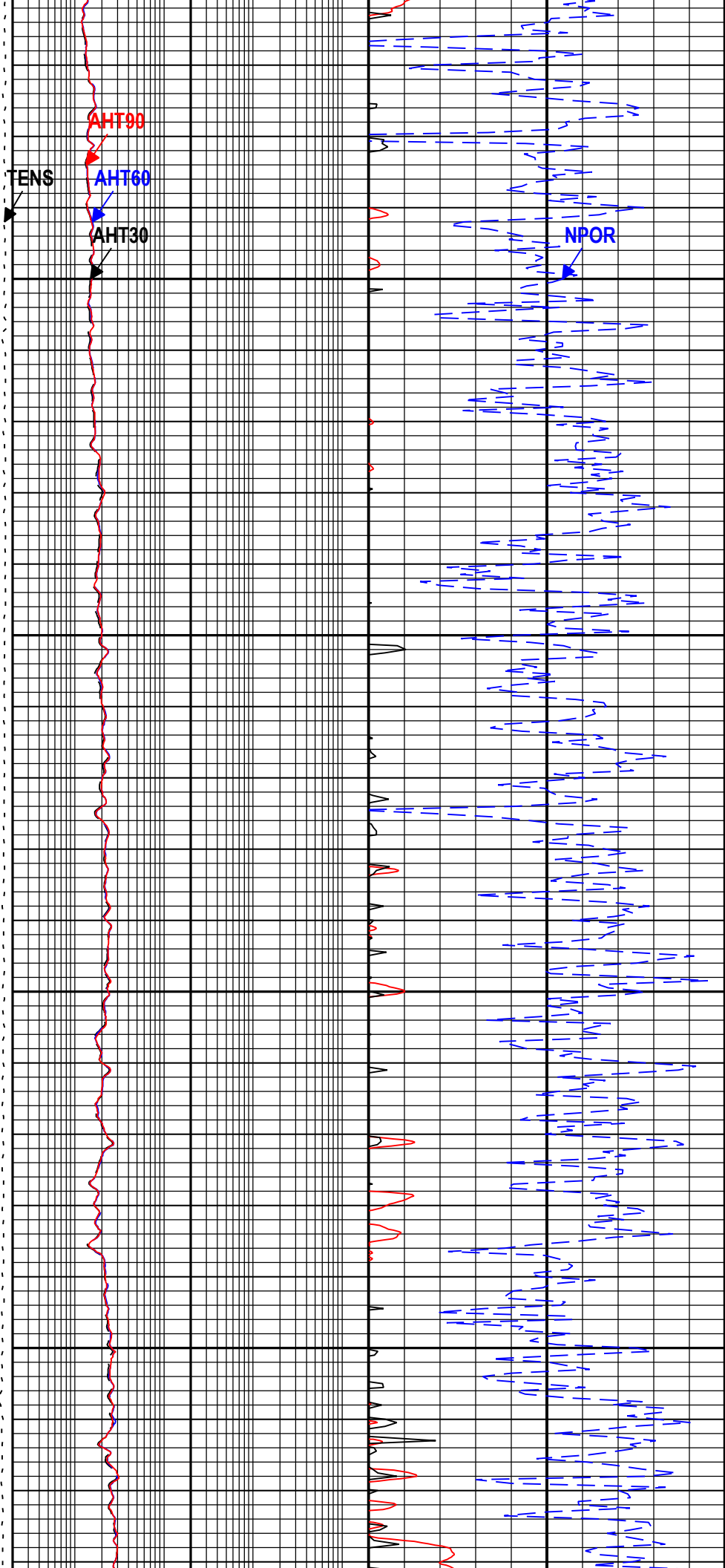
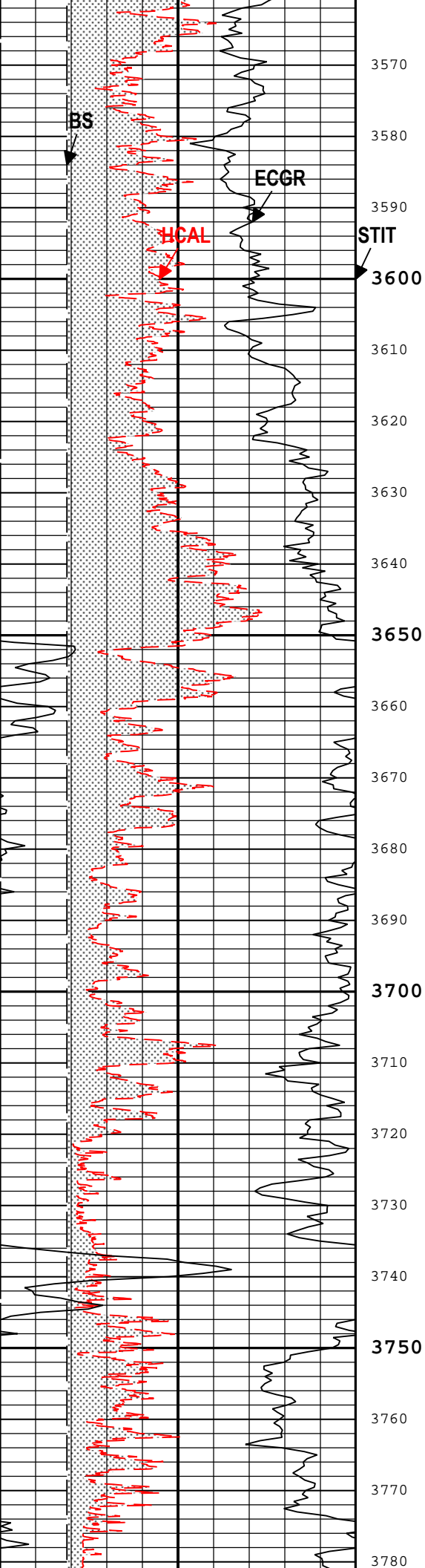


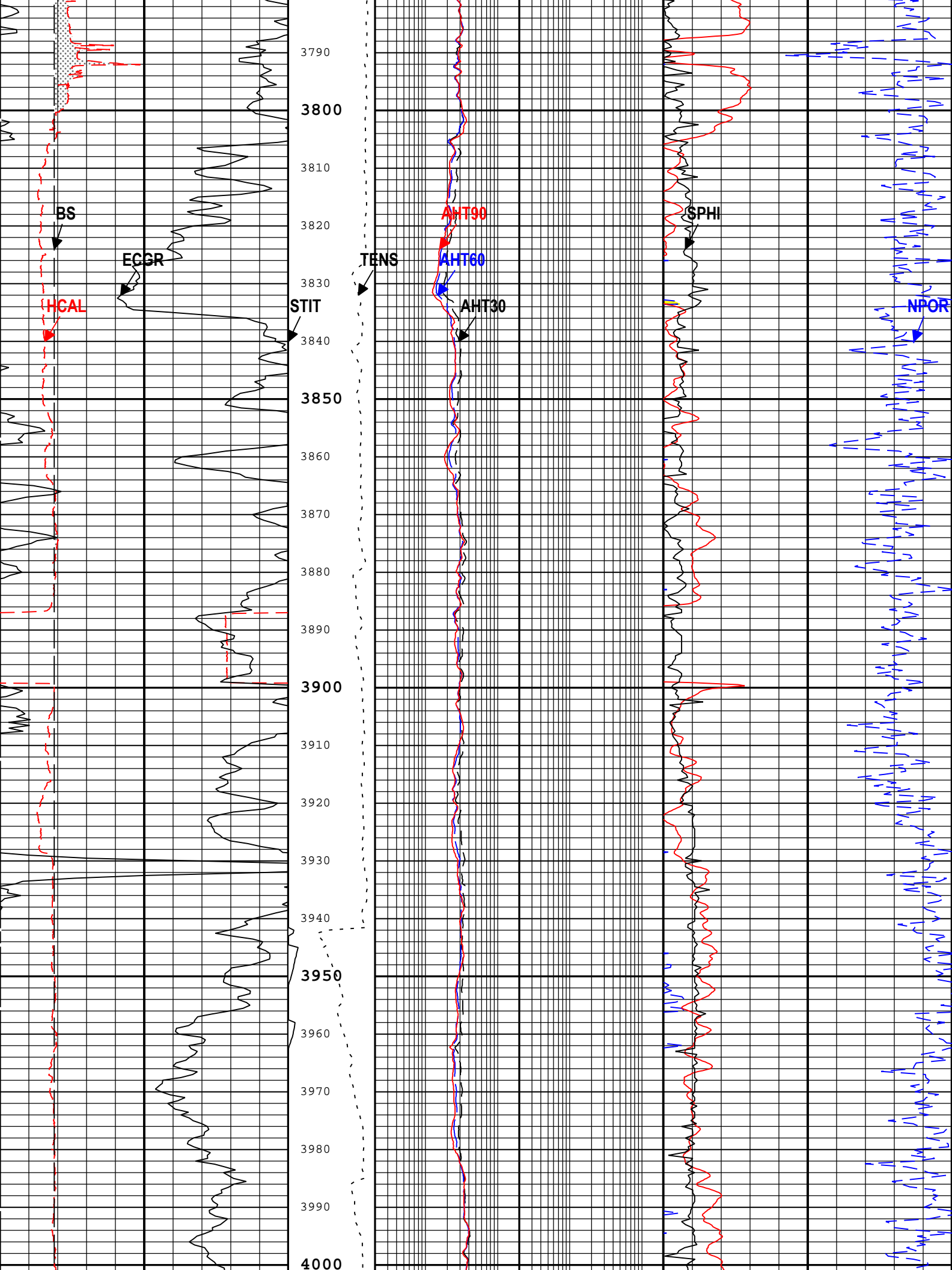


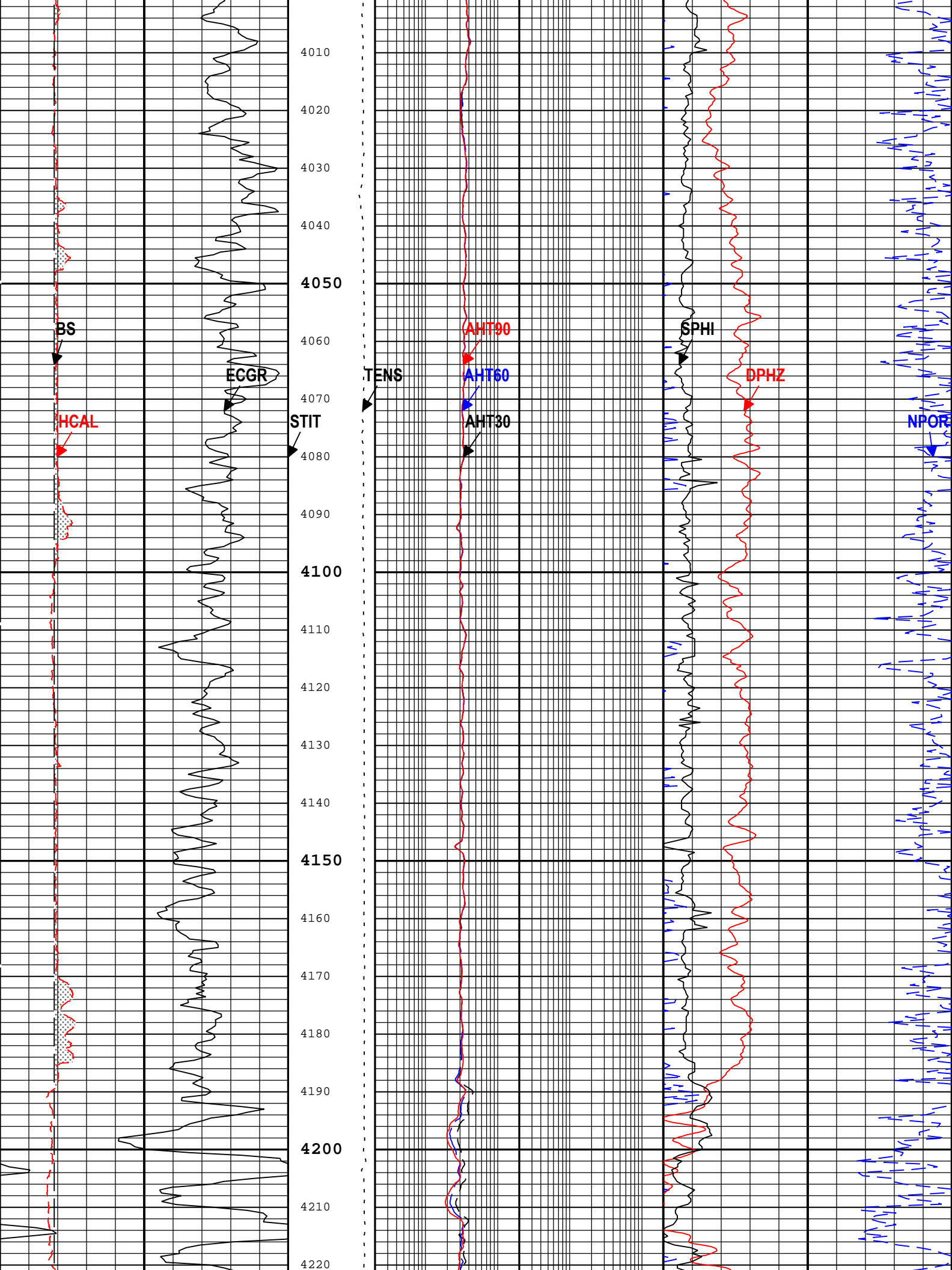


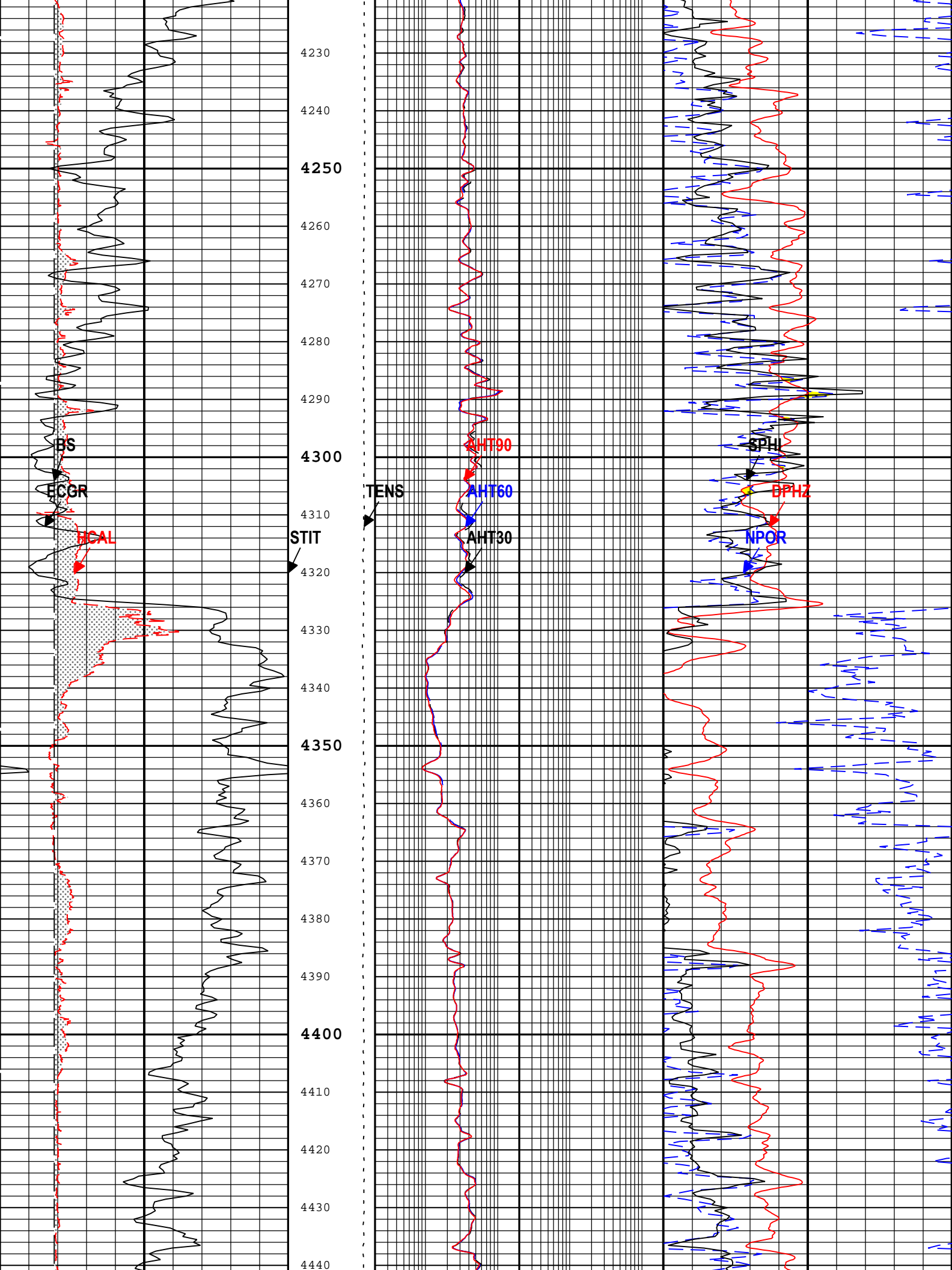


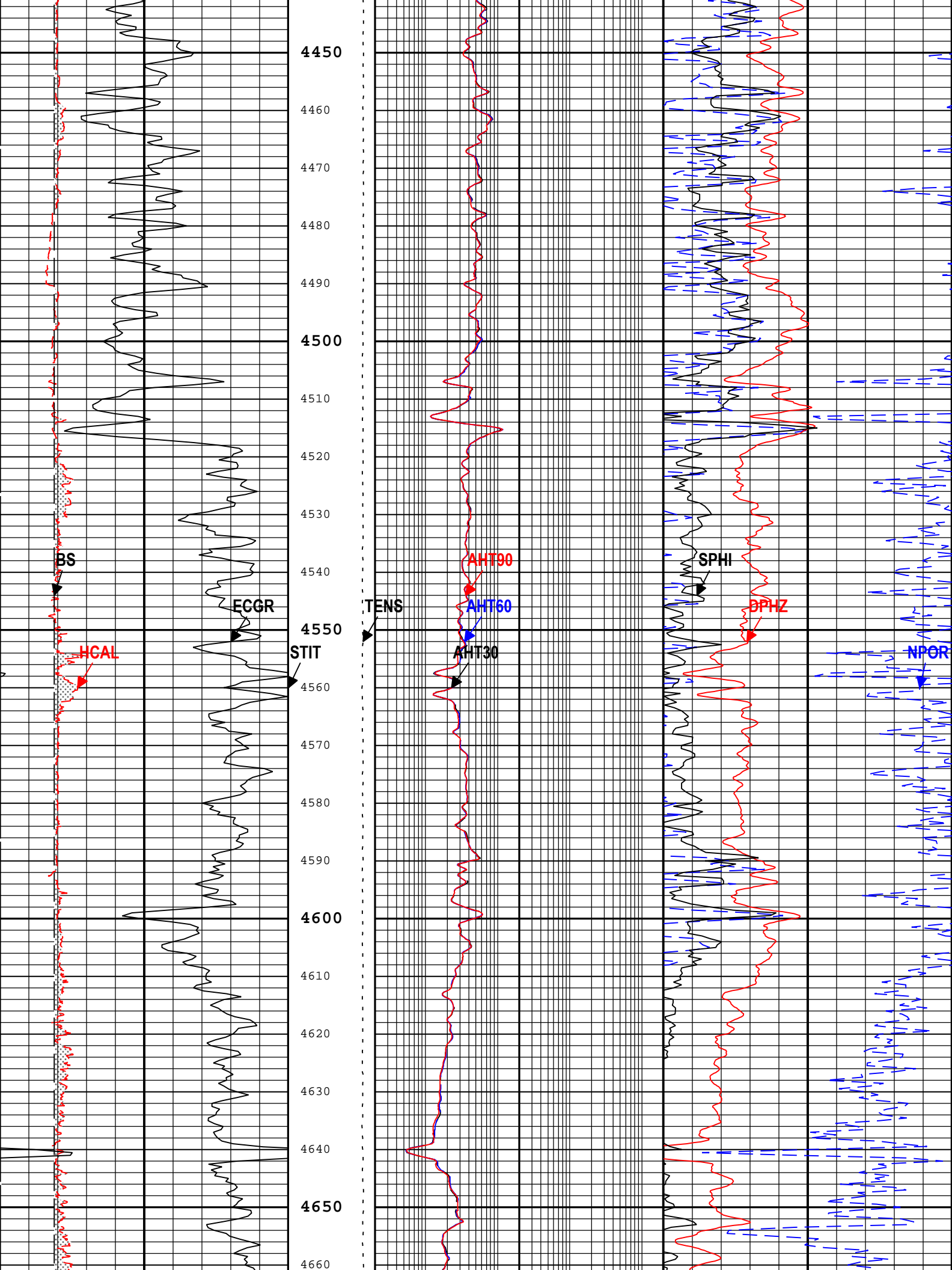


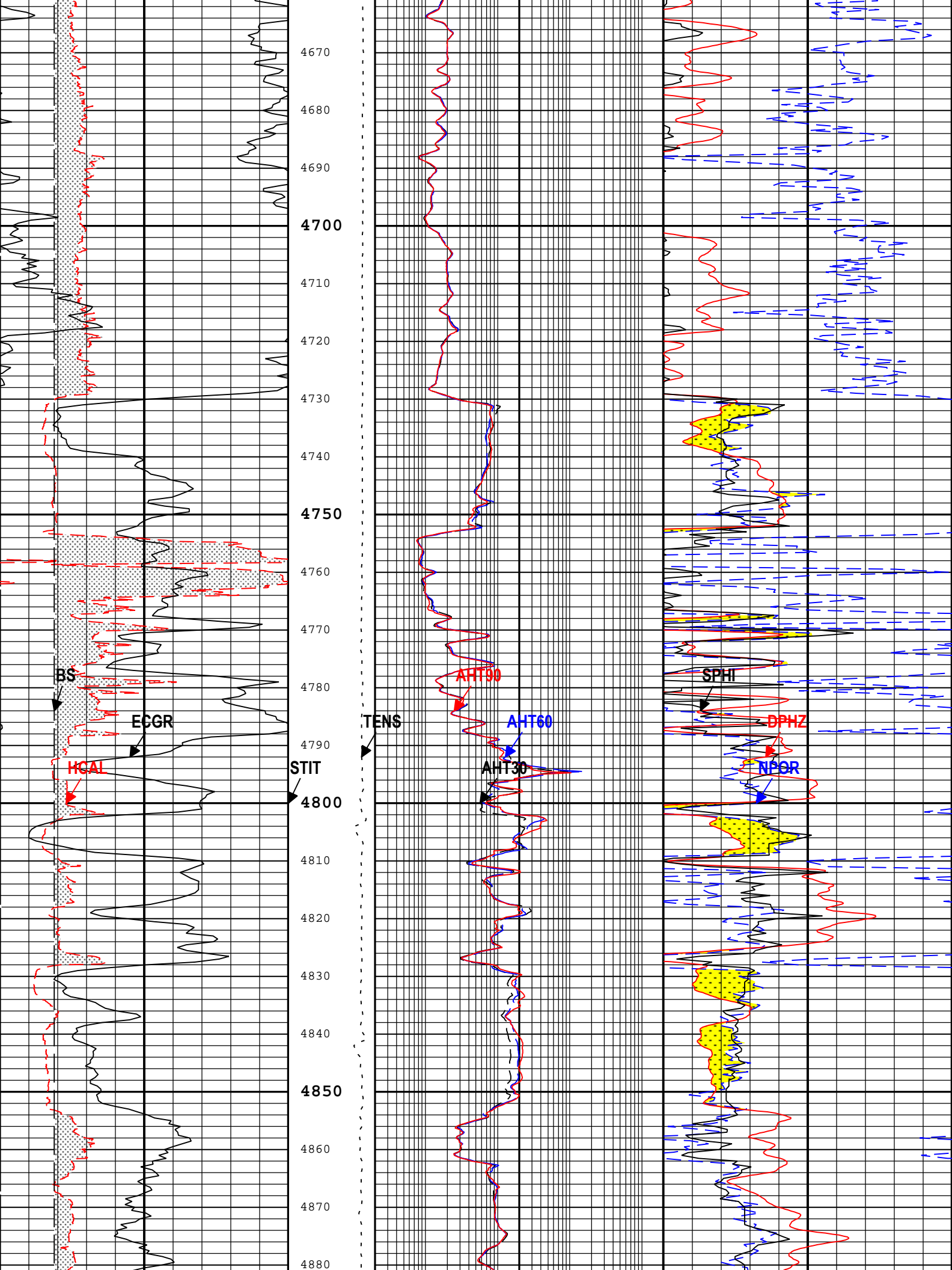


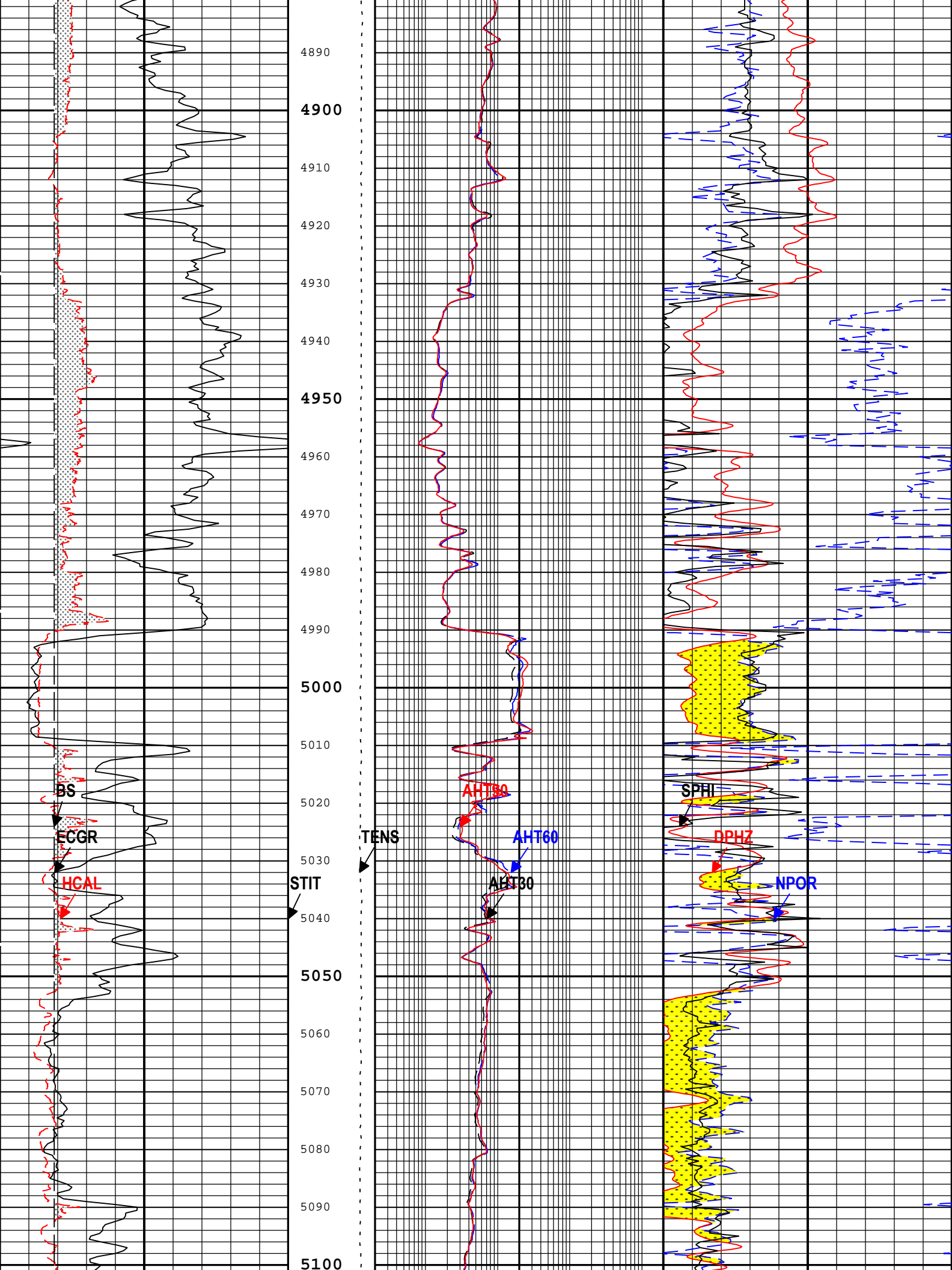


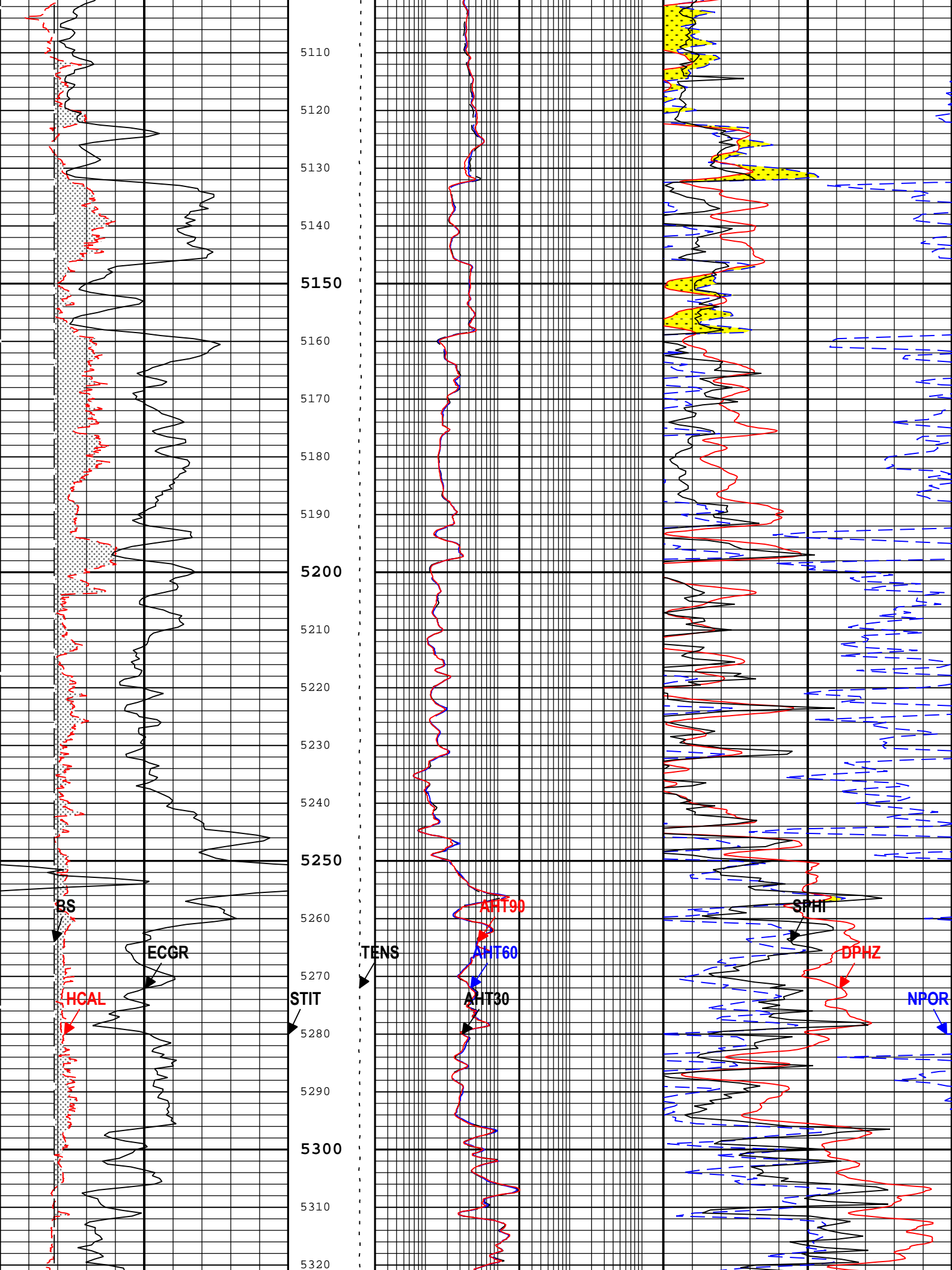


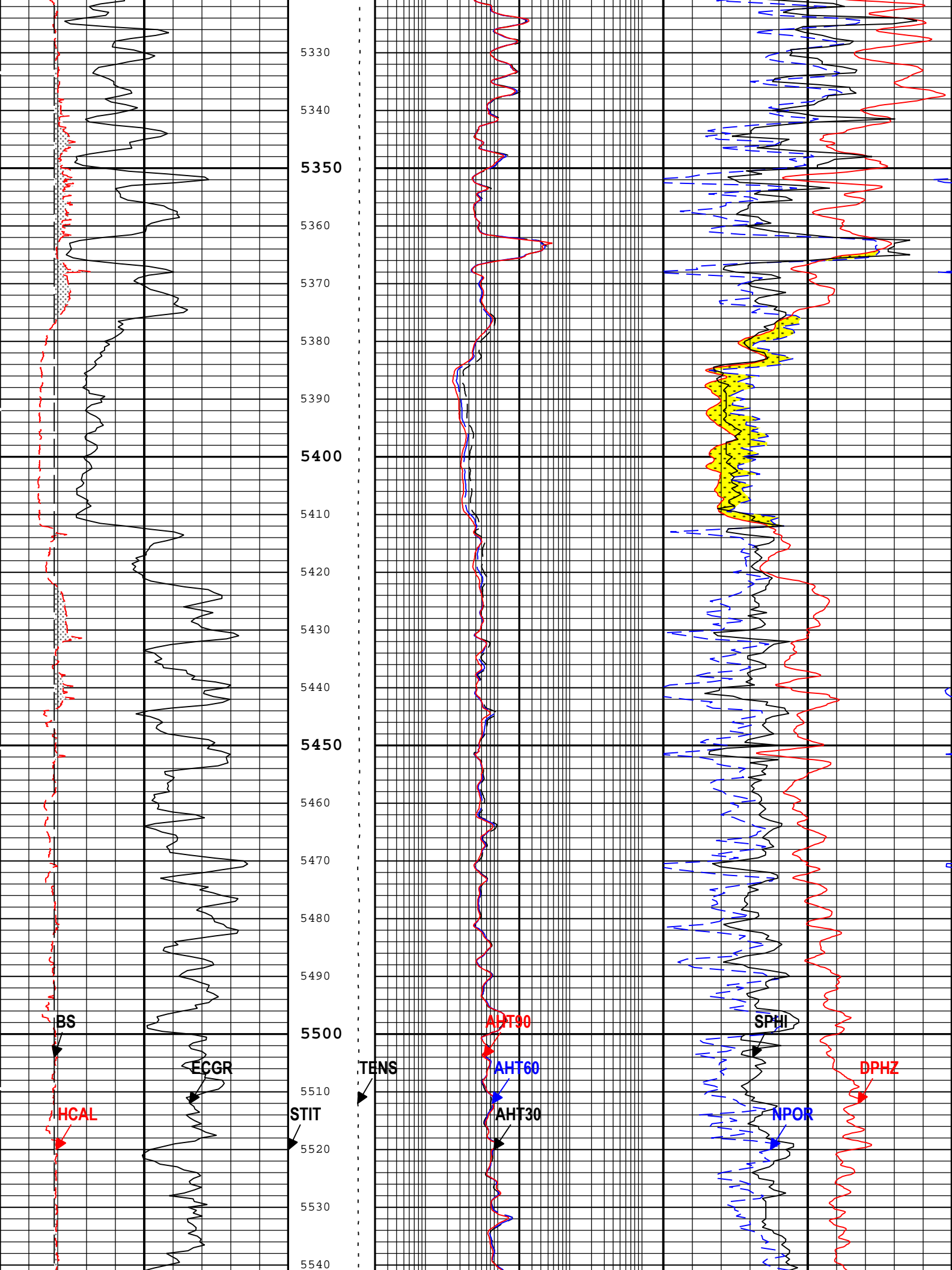


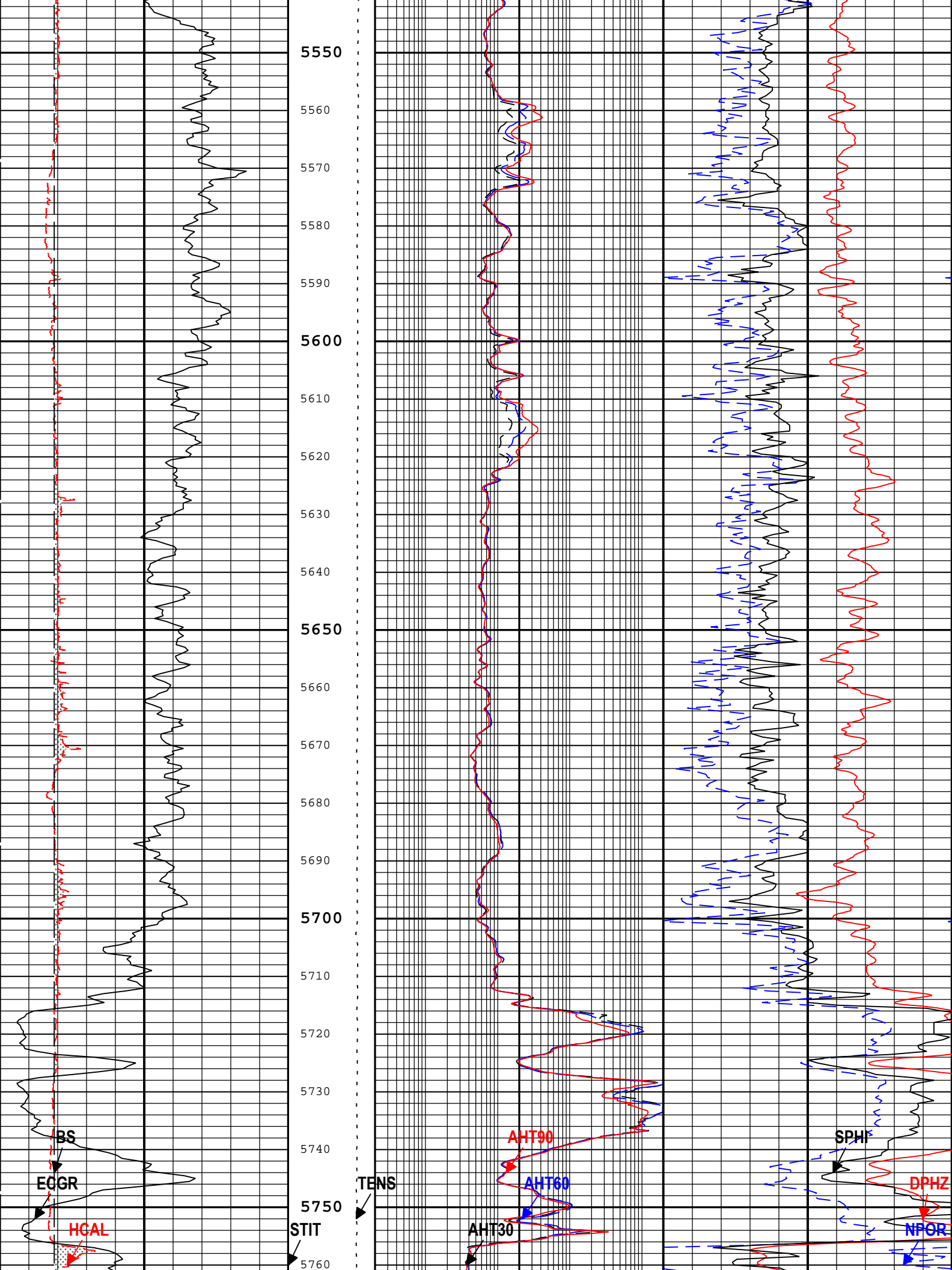


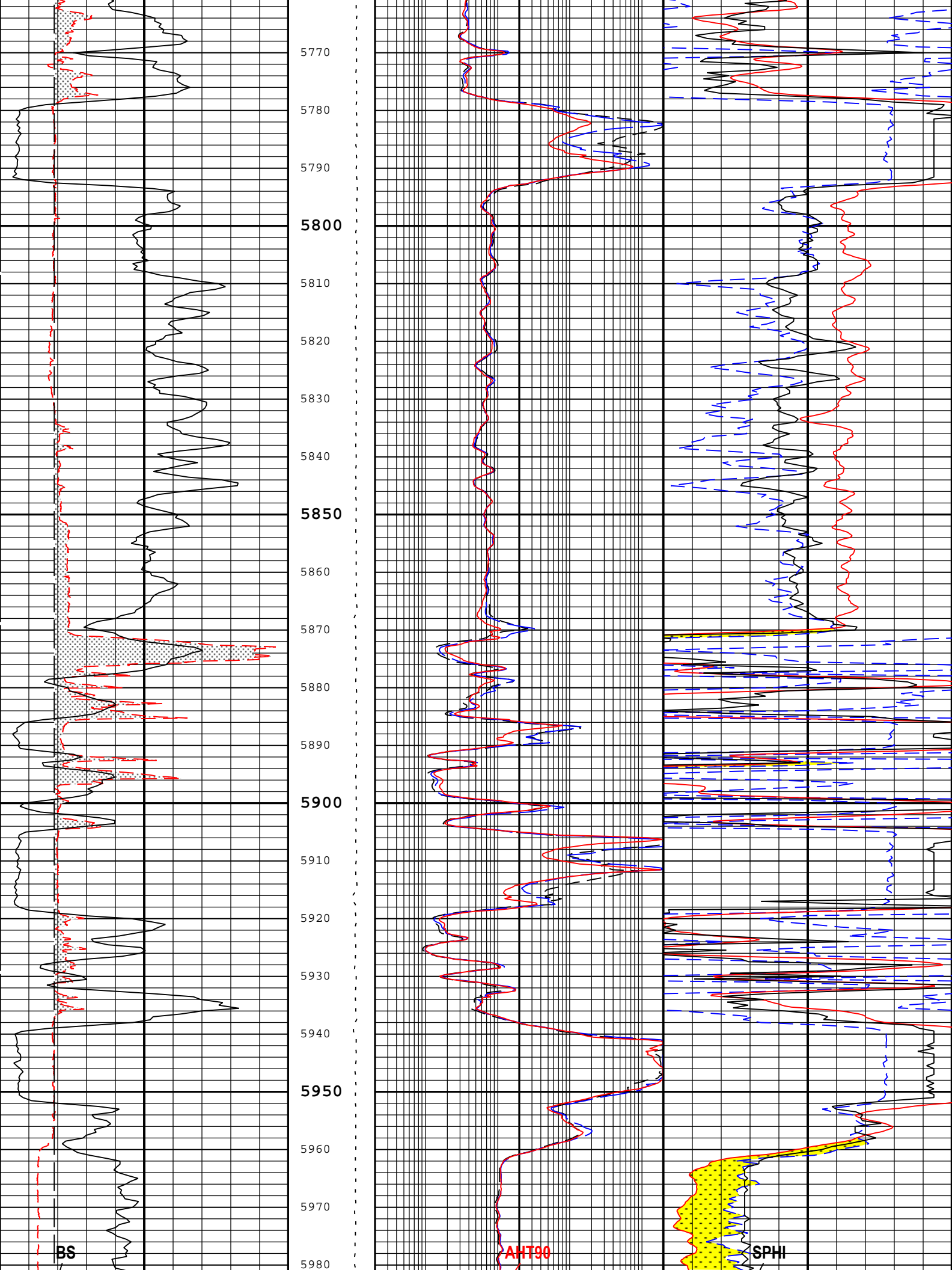


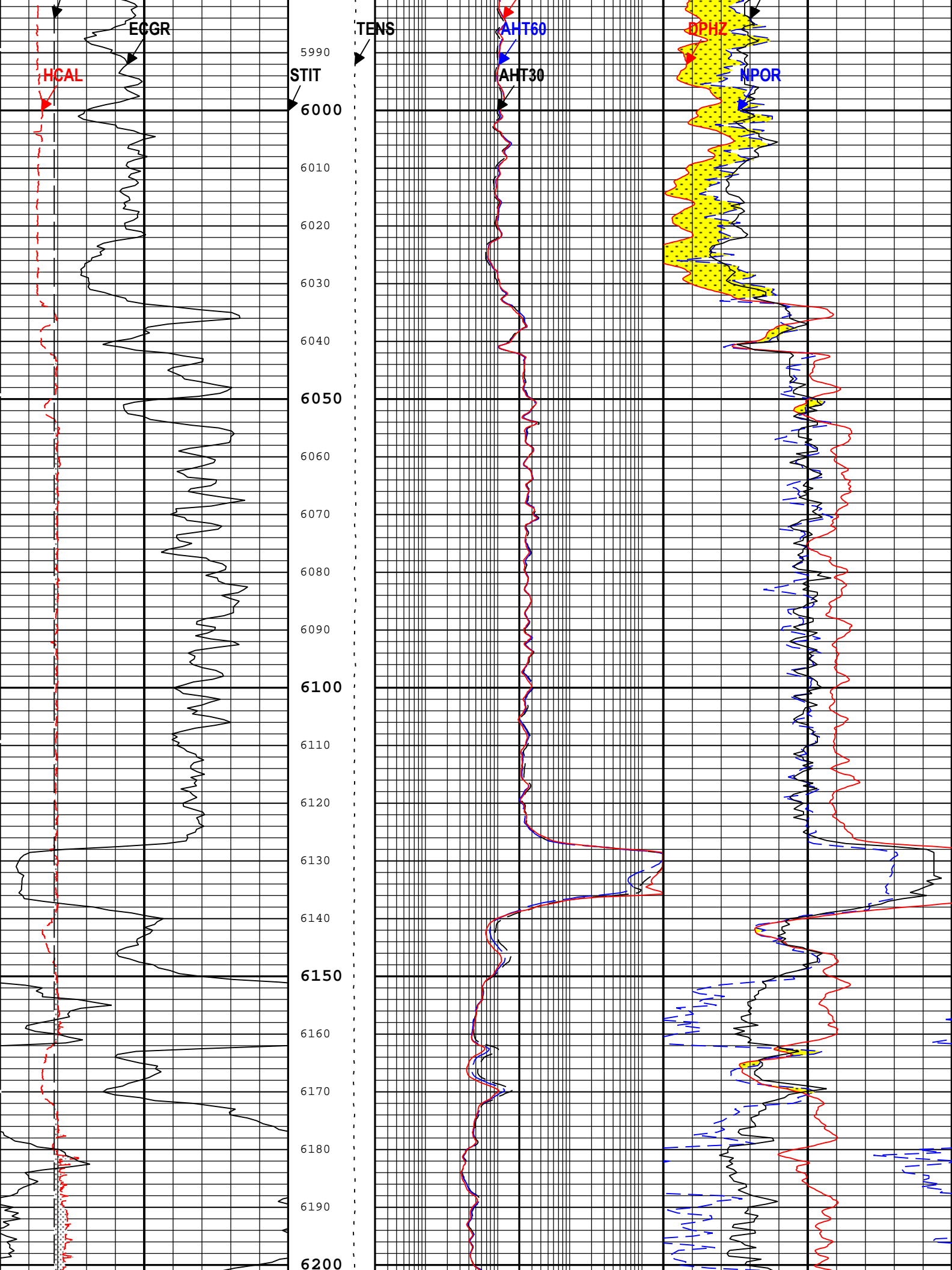


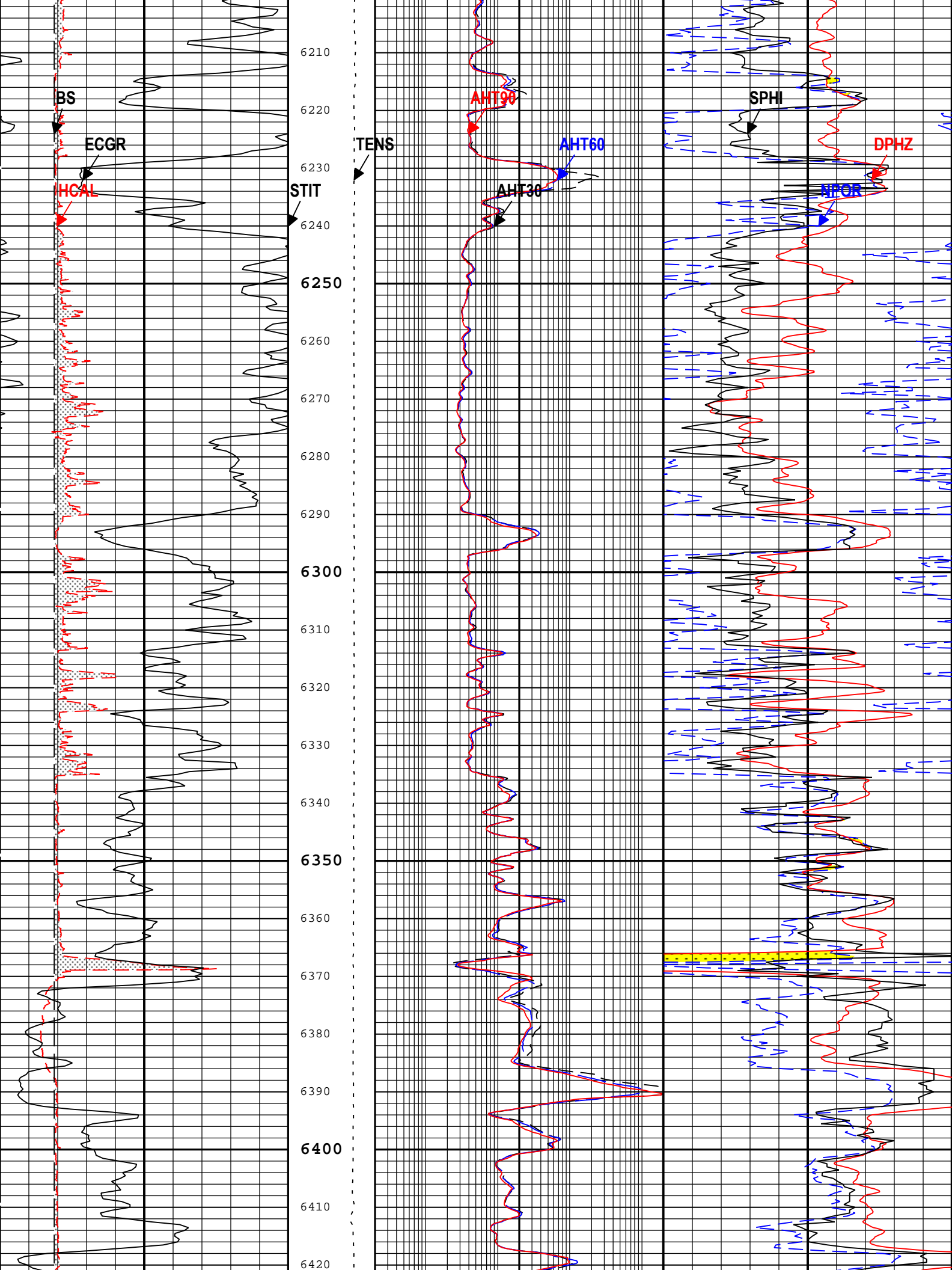


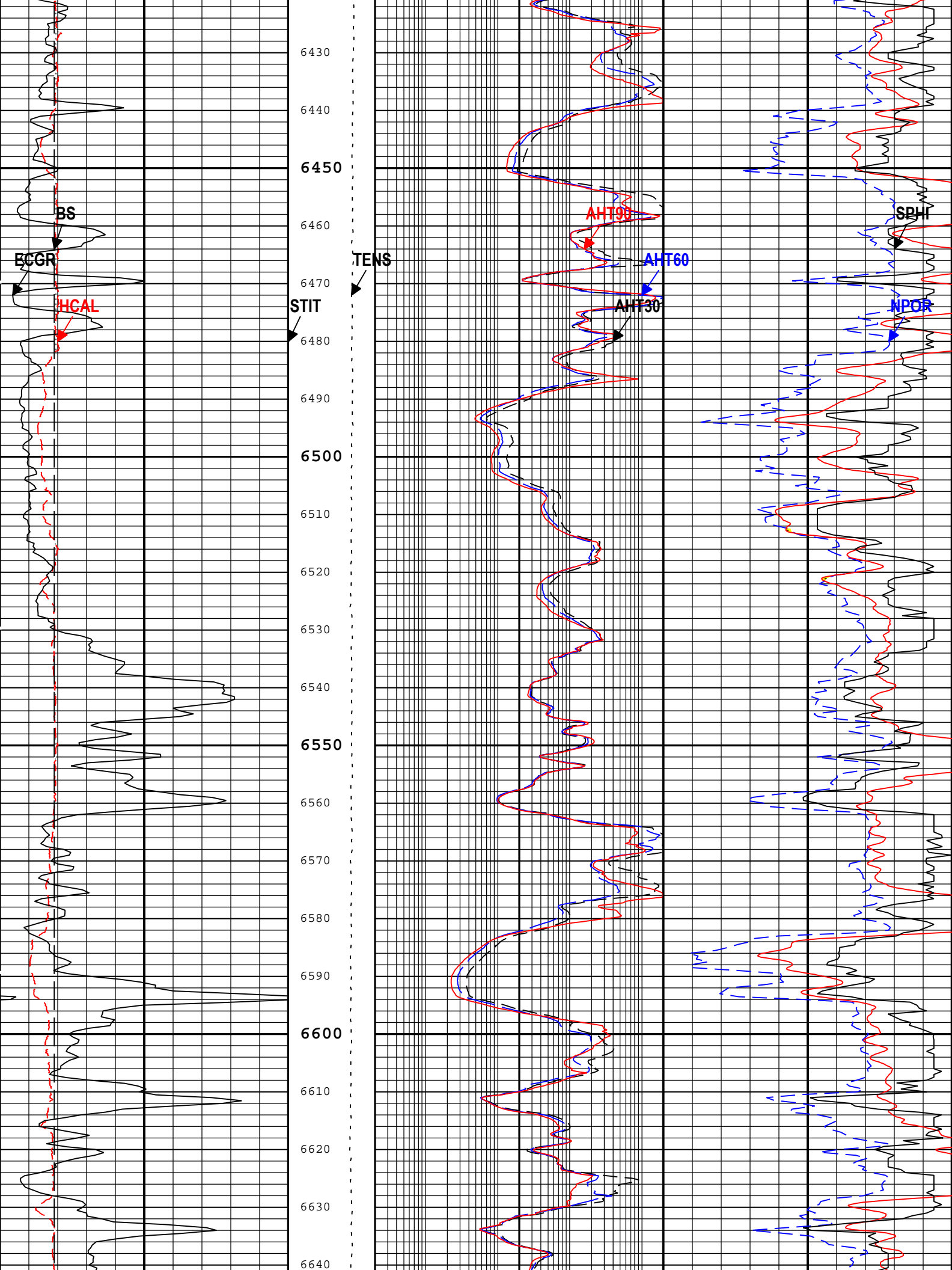


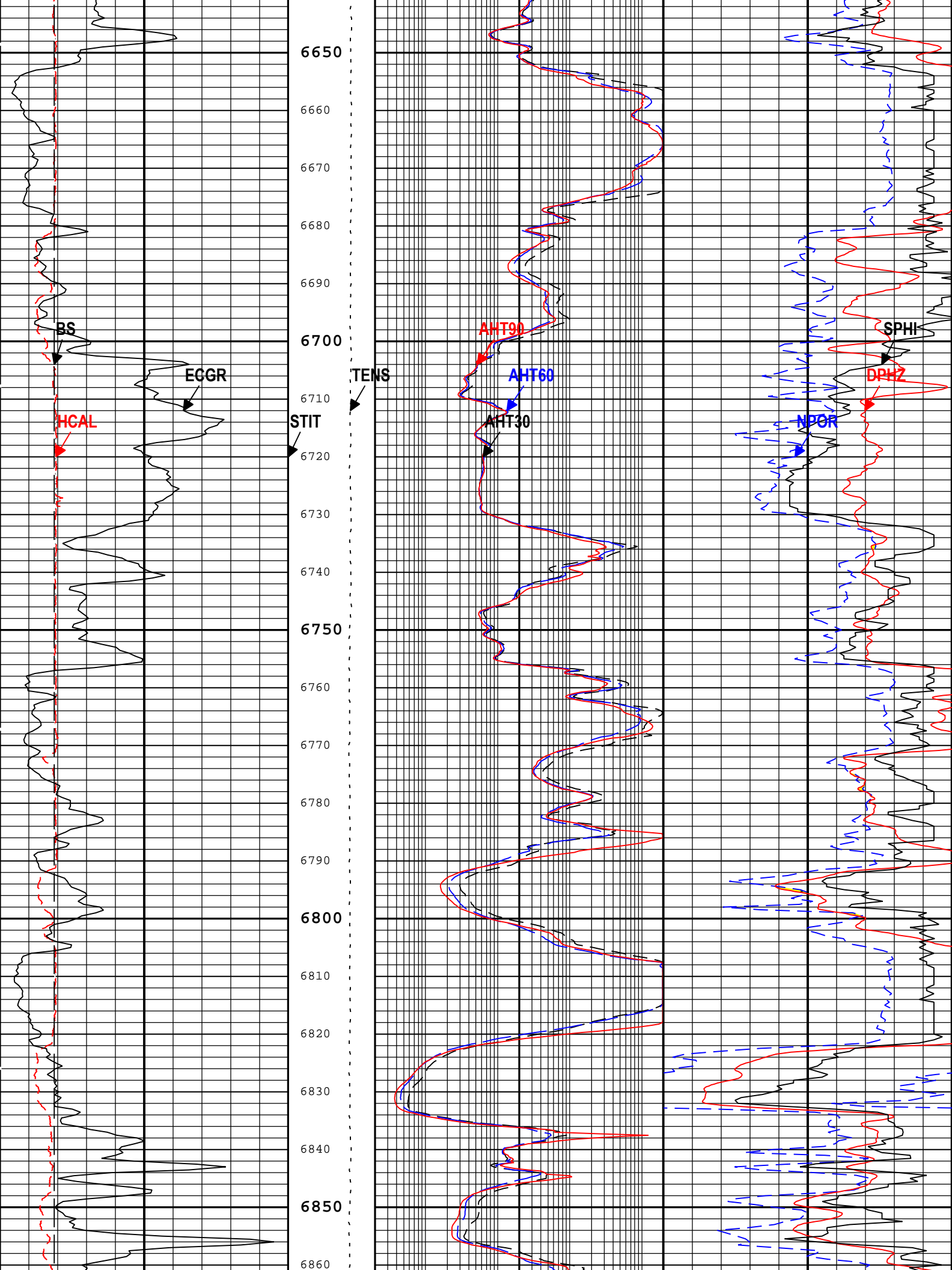


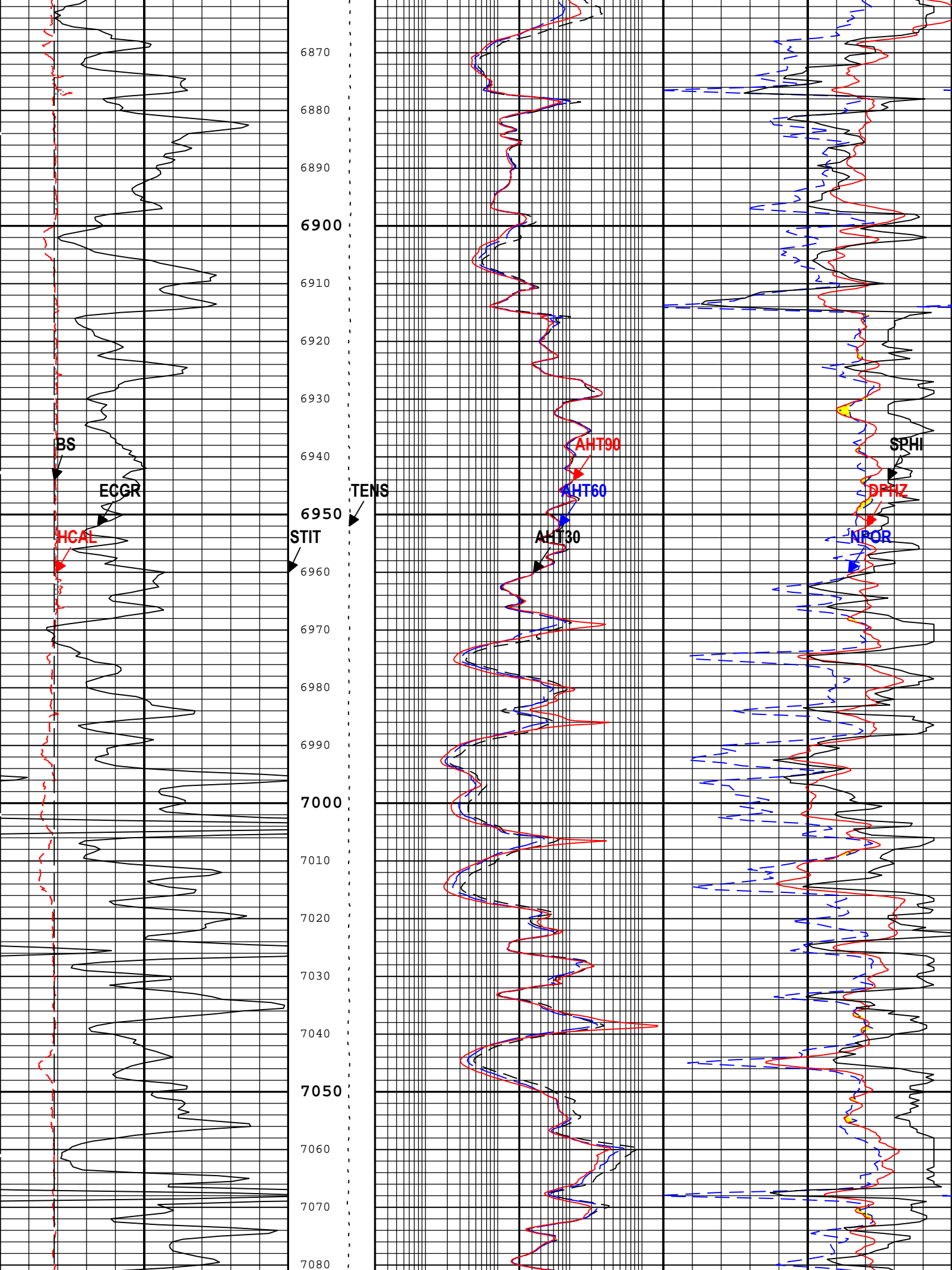


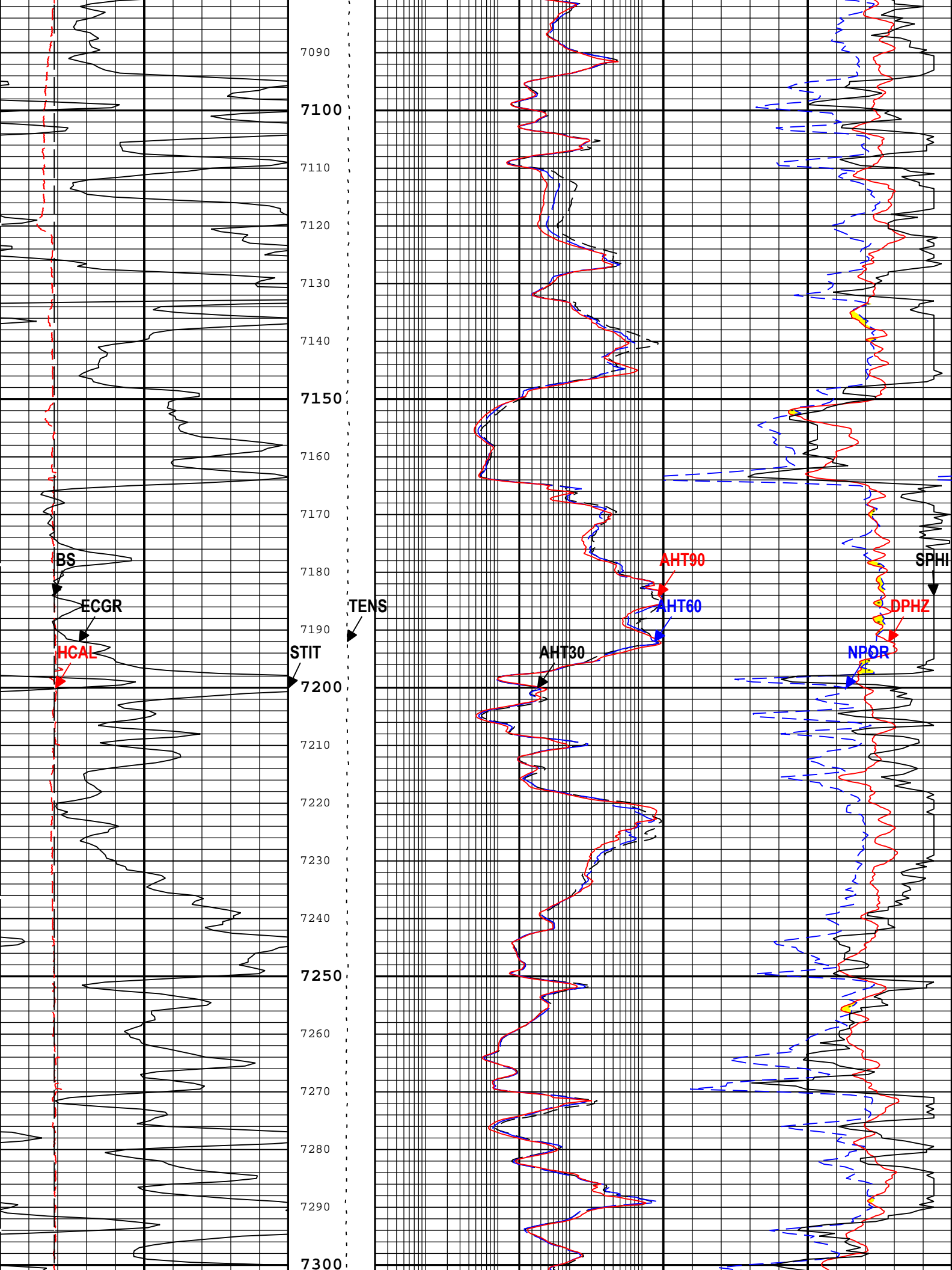


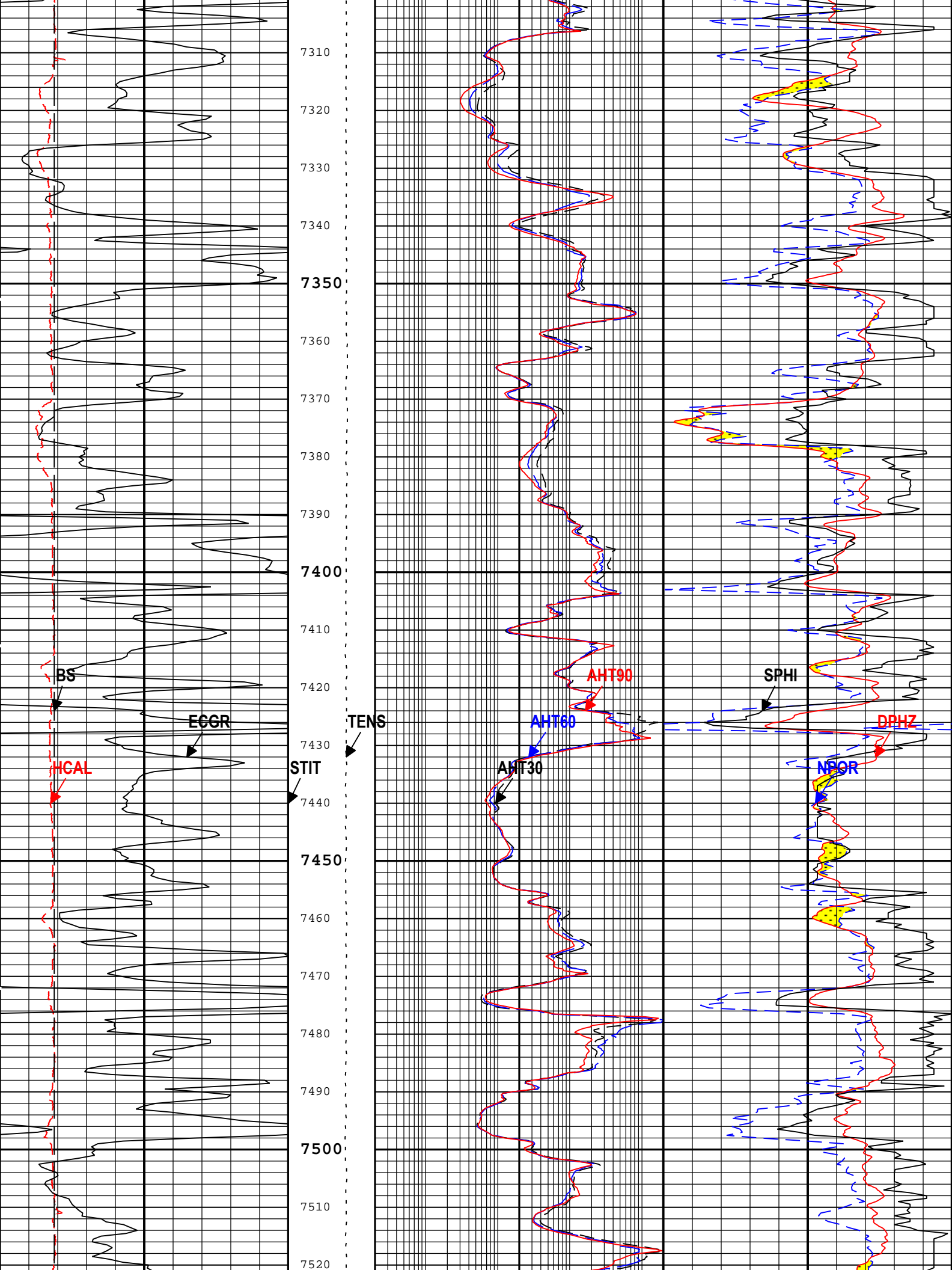


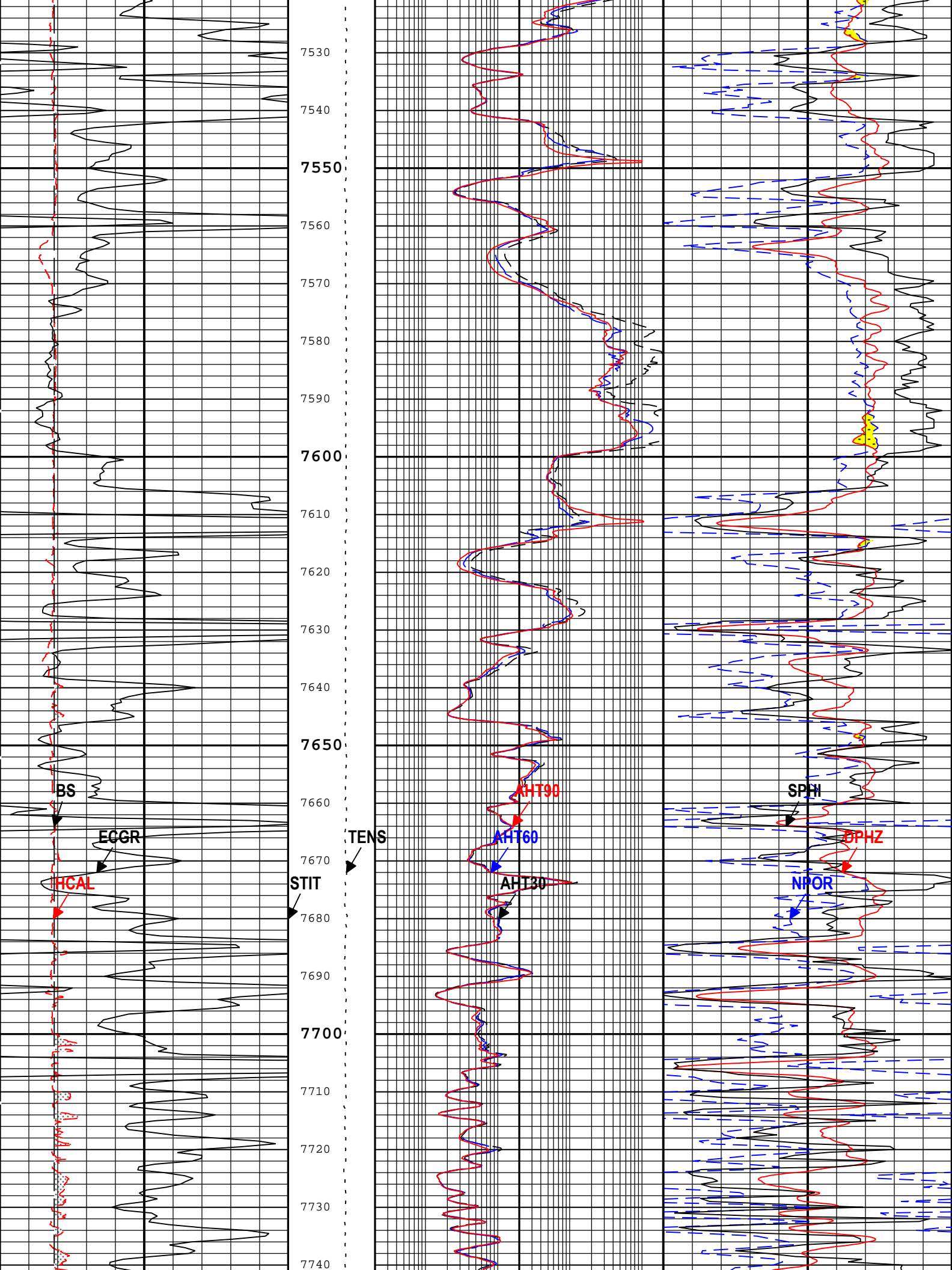


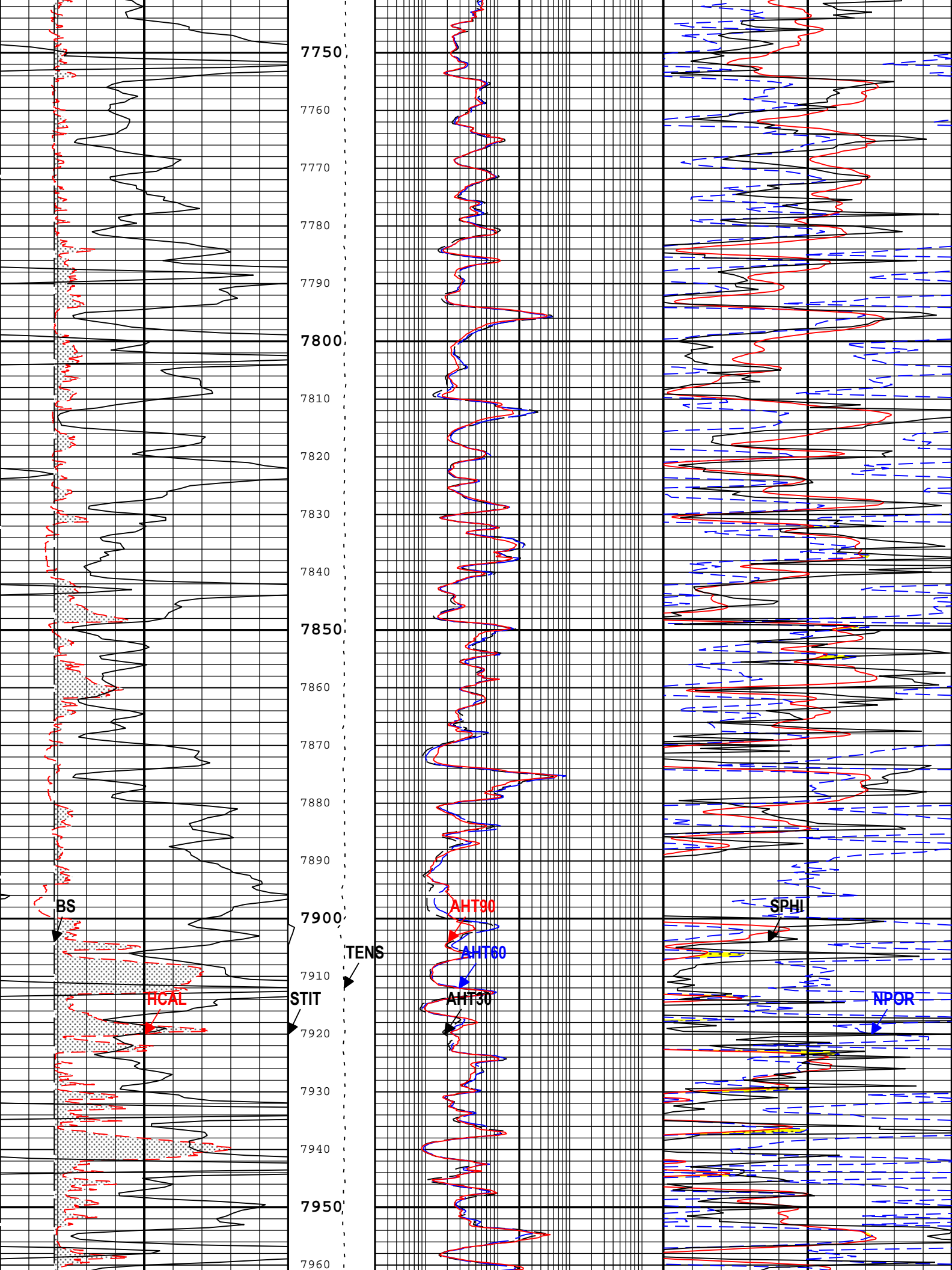


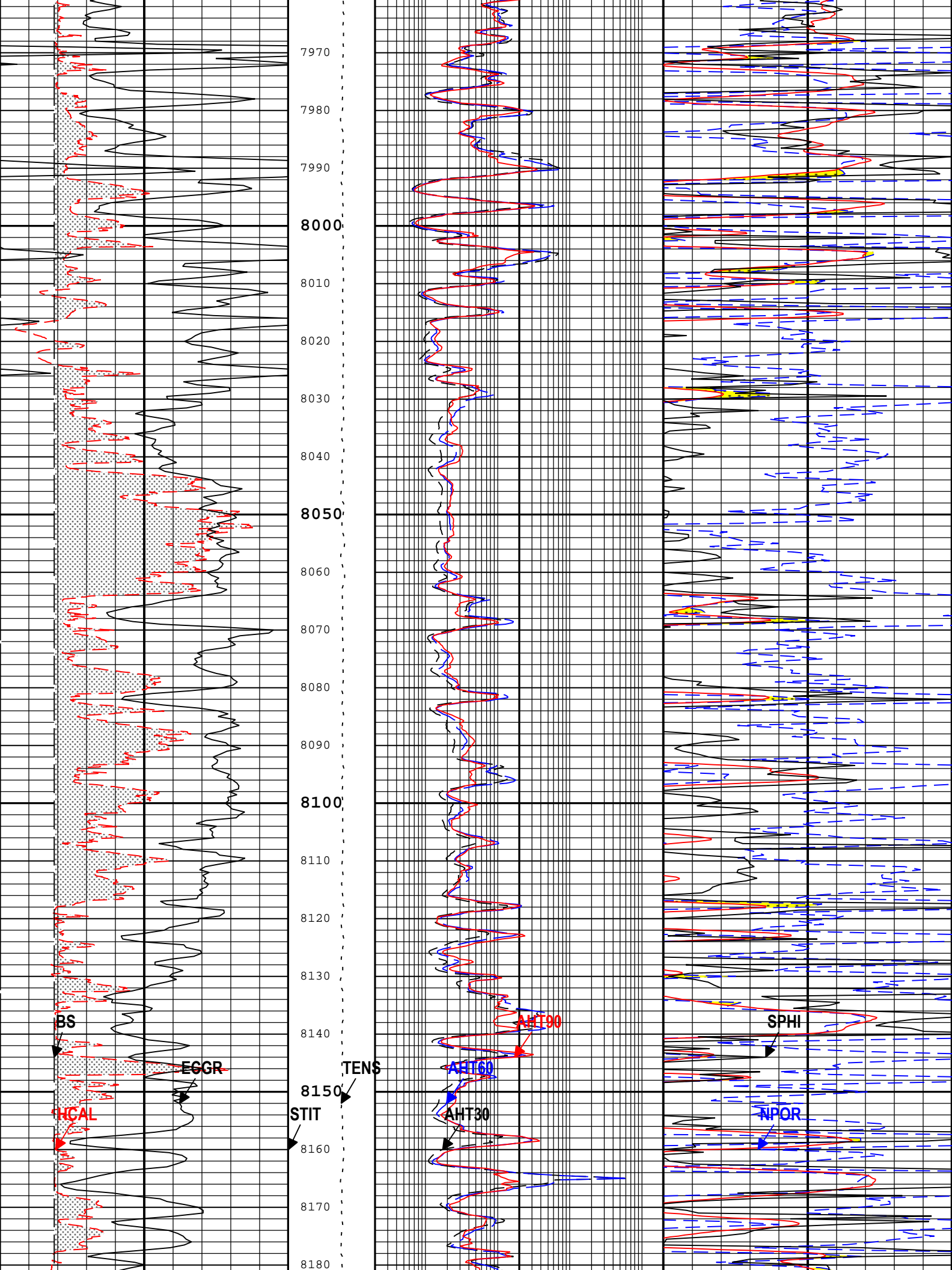


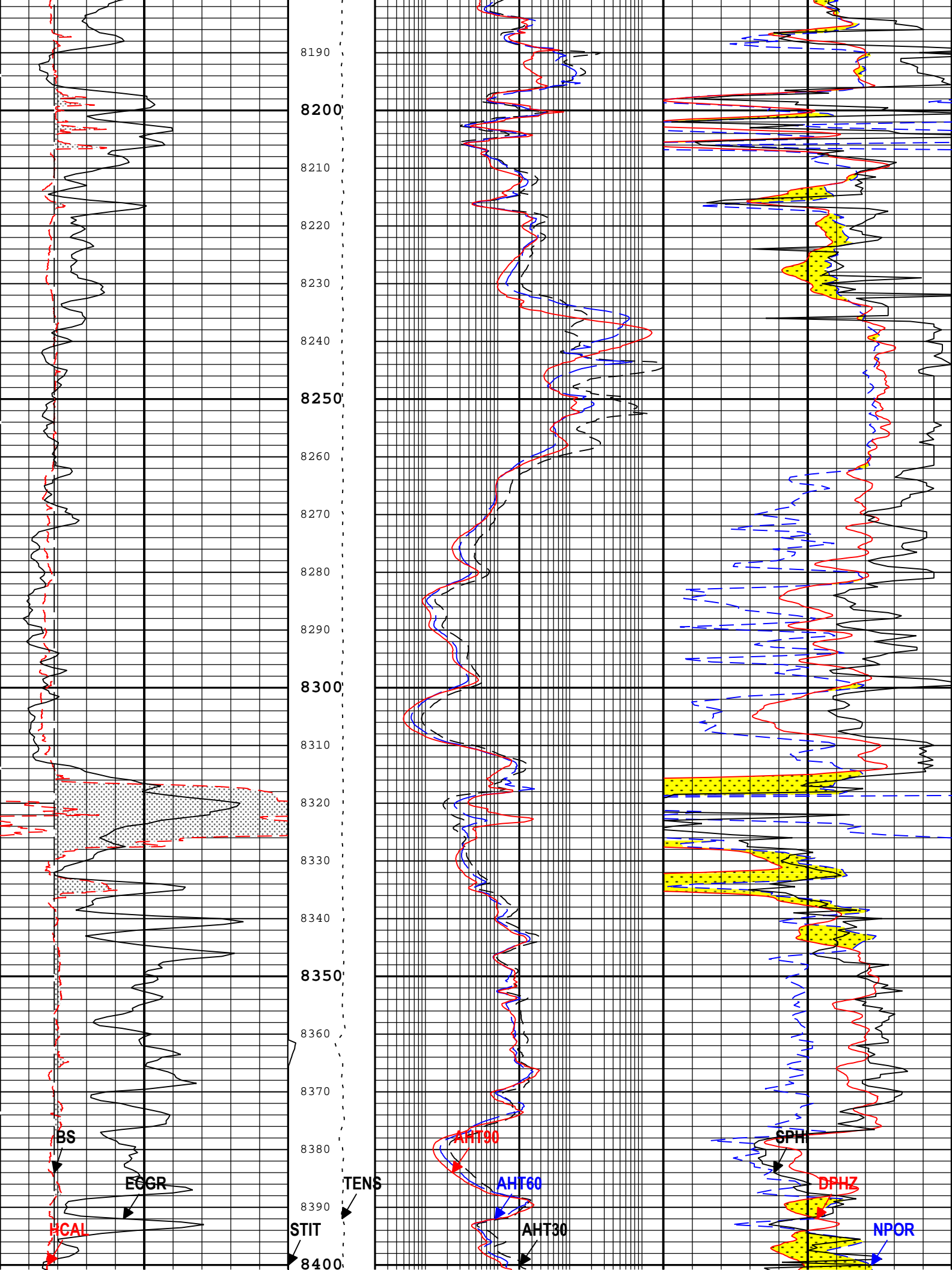


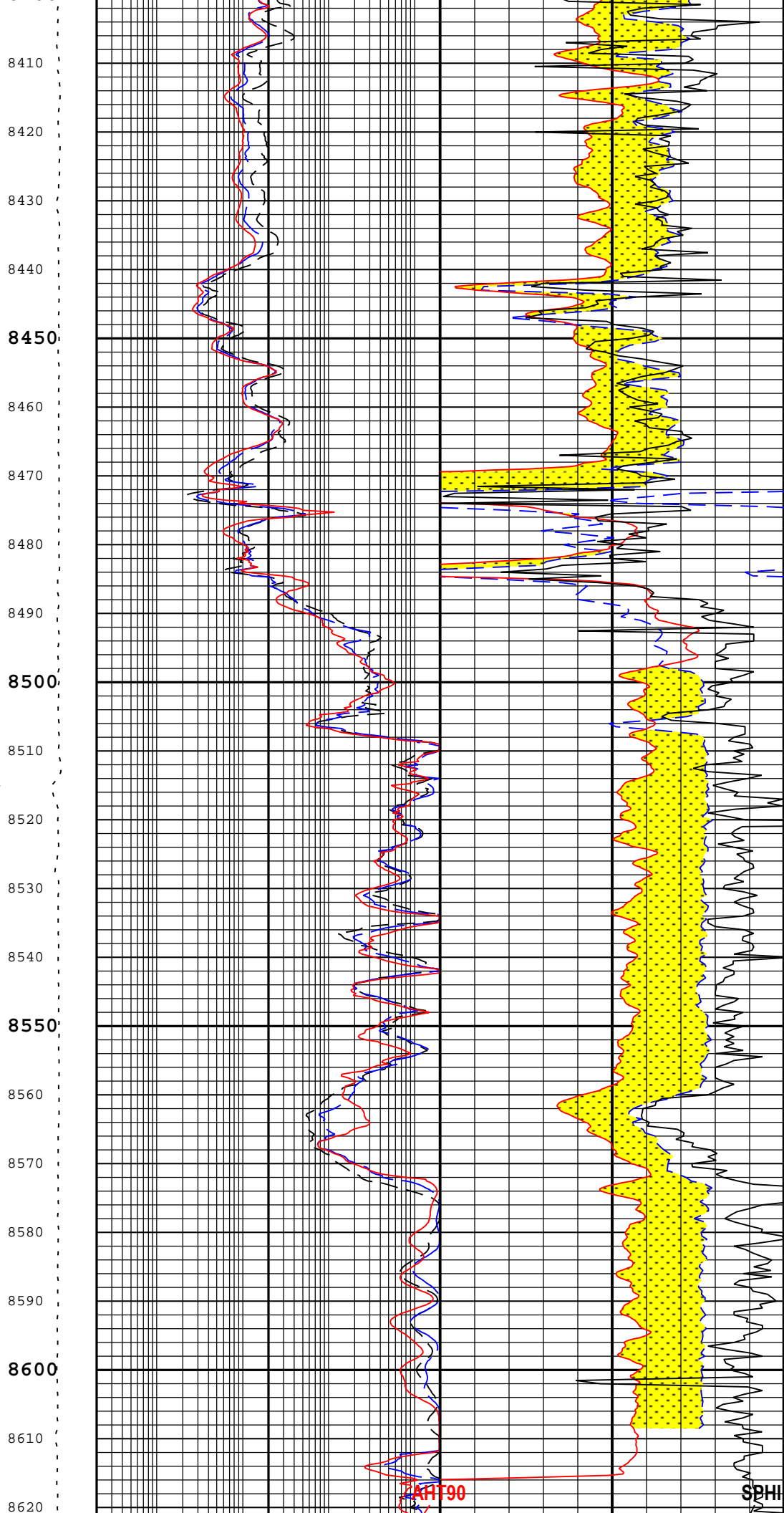
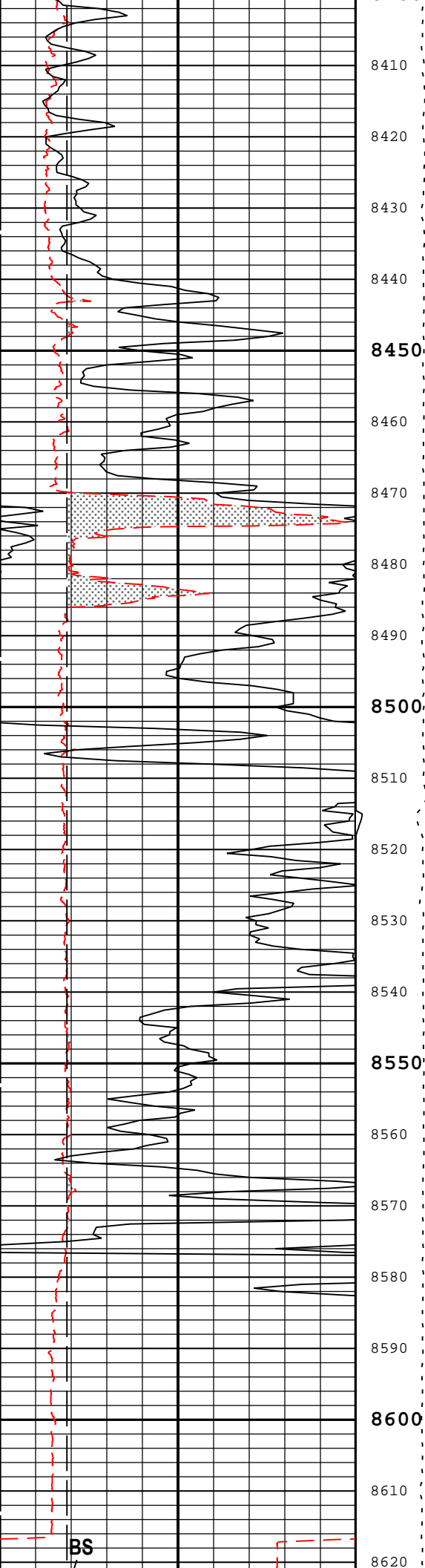


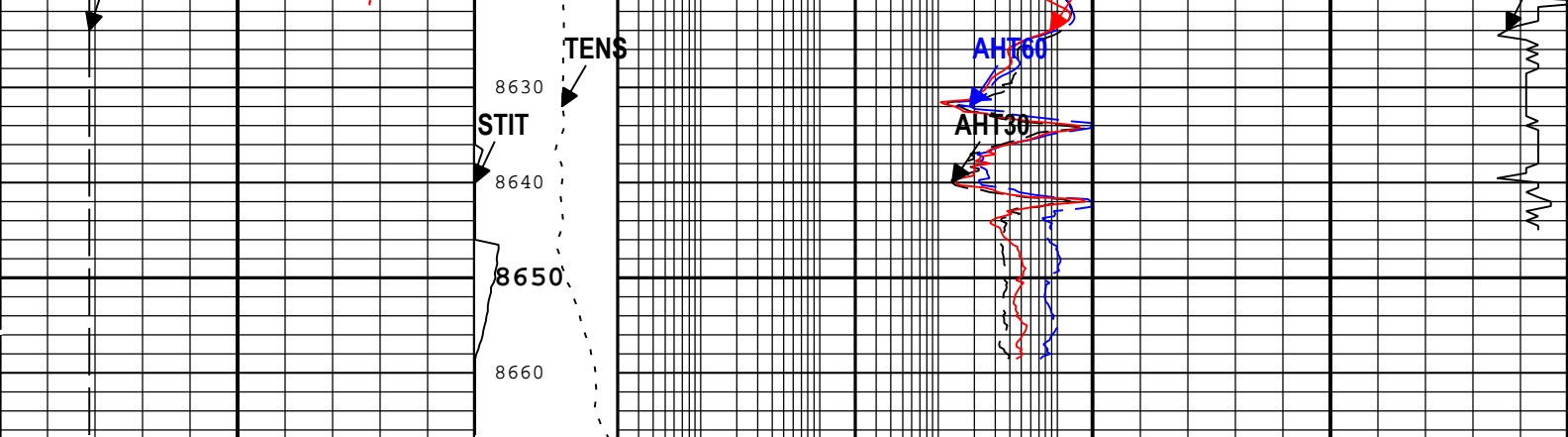












Area from BS to Cali			Stuck Tool Indicator, Total (STIT)	Array Induction Two Foot Resistivity A30 (AHT30) AIT-H			Crossover						
Caliper (HCAL) HDRS-H				0.2	ohm.m		2000	Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H					
6	in		16	0	ft	50	0.3			ft3/ft3		-0.1	
Gamma Ray (ECGR) HGNS-H			Cable Tension (TENS)	Array Induction Two Foot Resistivity A60 (AHT60) AIT-H			0.3			ft3/ft3		-0.1	
gAPI				0	150		0.2			ohm.m		2000	Standard Resolution Density Porosity (DPHZ) HDRS-H
Bit Size (BS)			8000 lbf 2000	Array Induction Two Foot Resistivity A90 (AHT90) AIT-H			0.3			ft3/ft3		-0.1	
6	in			16	0.2			ohm.m		2000	Sonic Porosity (SPHI) MAST-B		
							0.3			ft3/ft3		-0.1	

TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (Combo_Fax) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 05-Oct-2015 20:55:56

Channel Processing Parameters

Nighthawk: Parameters

Parameter	Description	Tool	Value	Unit
AHAPL	Array Induction Answer Product Level(Depth Log/View only)	AIT-H	Radial	
AHBHM	Array Induction Borehole Correction Mode	AIT-H	Compute Standoff	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	AIT-H	Eccentered	
AHMRF	Array Induction Mud Resistivity Factor	AIT-H	1	
AHSTA	Array Induction Tool Standoff	AIT-H	0.125	in
AHTSE	Array Induction Temperature Selection(Sonde Error Correction)	AIT-H	Internal	
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHCCTL	Borehole Compensated Processing Control Flag	MAST-B	On	
BHCSEL_ML	BHC (Borehole Compensation) Receiver Selection for Monopole Lower Transmitter	MAST-B	[Off, Off, Off, Off, Off, On, On, On, On, Off, Off, Off, Off]	
BHCSEL_MU	BHC (Borehole Compensation) Receiver Selection for Monopole Upper Transmitter	MAST-B	[Off, Off, Off, Off, On, On, On, On, On, Off, Off, Off, Off]	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	197	degF
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	1400	ppm
BSCO	Borehole Salinity Correction Option	HGNS-H	No	
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.909	in
CBLO	Casing Bottom (Logger)	WLSESSION	485	ft
CCCO	Casing & Cement Thickness Correction Option	HGNS-H	No	
CDEN	Cement Density	HGNS-H	2	g/cm3
CDTS	Correction for Delta-T Shale, Empirical	Borehole	100	us/ft
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DCRMVL	DC removal option	MAST-B	On	

DET_STOP_MLM_M	Detection Stop Time for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	583.33	us
DET_STOP_MUM_M	Detection Stop Time for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	583.33	us
DET_STRT_MLM_M	Detection Start Time for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	106.67	us
DET_STRT_MUM_M	Detection Start Time for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	106.67	us
DFD	Drilling Fluid Density	Borehole	9.65	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
DT_MAX_MLM_M	Detection Maximum slowness for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	130	us/ft
DT_MAX_MUM_M	Detection Maximum slowness for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	130	us/ft
DT_MIN_MLM_M	Detection Minimum Slowness for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	40	us/ft
DT_MIN_MUM_M	Detection Minimum Slowness for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	40	us/ft
DTCO_SELECT	Compressional Slowness Selection for Slowness-Time Coherence	MAST-B	MF	
DTF	Delta-T Fluid	Borehole	189	us/ft
DTM	Delta-T Matrix	Borehole	56	us/ft
DTSH_SELECT	Shear Slowness Selection for Slowness-Time Coherence	MAST-B	90D	
FD	Fluid Density	Borehole	1	g/cm3
FMDCTL_MLM_M	First Motion Detection Processing Control Flag for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	On	
FMDCTL_MUM_M	First Motion Detection Processing Control Flag for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	On	
FMDRS_MLM_M	First Motion Detection Receiver Selection for Monopole Lower Transmitter Mid Frequency Firing Monopole Component	MAST-B	[1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0]	
FMDRS_MUM_M	First Motion Detection Receiver Selection for Monopole Upper Transmitter Mid Frequency Firing Monopole Component	MAST-B	[0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1]	
FSAL	Formation Salinity	Borehole	0	ppm
FSCO	Formation Salinity Correction Option	HGNS-H	No	
GCLF	Coal-Like Formation	HDRS-H	No	
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GR_MULTIPLIER	Gamma Ray Multiplier	HGNS-H	1	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
ITTS	Integrated Transit Time Source	MAST-B	DTCO	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MCCO	Mud Cake Correction Option	HGNS-H	No	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
MODALCTL_MLM	Modal Decomposition Processing Control Flag for Monopole Lower Transmitter Mid Frequency Firing	MAST-B	On	
MODALCTL_MUM	Modal Decomposition Processing Control Flag for Monopole Upper Transmitter Mid Frequency Firing	MAST-B	On	
MWCO	Mud Weight Correction Option	HGNS-H	No	
NACO	Neutron Activation Correction	HDRS-H	Off	
NPRM	HRDD Nuclear Processing Mode	HDRS-H	Standard Resolution	
NTCO	HRDD Nuclear Temperature Correction Option	HDRS-H	On	
PBHCCTL	Pseudo Borehole Compensated Processing Control Flag	MAST-B	Off	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
SFTY	Slowness Formation Type (Fast, Intermediate, Slow, etc.)	Borehole	Intermediate	
SOCN	Standoff Distance	HGNS-H	0.125	in

SOCO	Standoff Correction Option	HGNS-H	Yes	
SPFS	Sonic Porosity Formula	Borehole	Raymer-Hunt	
SPSO	Sonic Porosity Source	MAST-B	DTCO	
SSCCTL_MLM	Sensor Sensitivity Correction Processing Control Flag for Monopole Lower Transmitter Mid Frequency Firing	MAST-B	On	
SSCCTL_MUM	Sensor Sensitivity Correction Processing Control Flag for Monopole Upper Transmitter Mid Frequency Firing	MAST-B	On	
TD	Total Measured Depth	Borehole	8646	ft
TKORHOCTL	TKO_RHO Processing Control Flag	MAST-B	On	
HISC	Tool Position: Centered or Eccentered	HGNS-H	Eccentered	

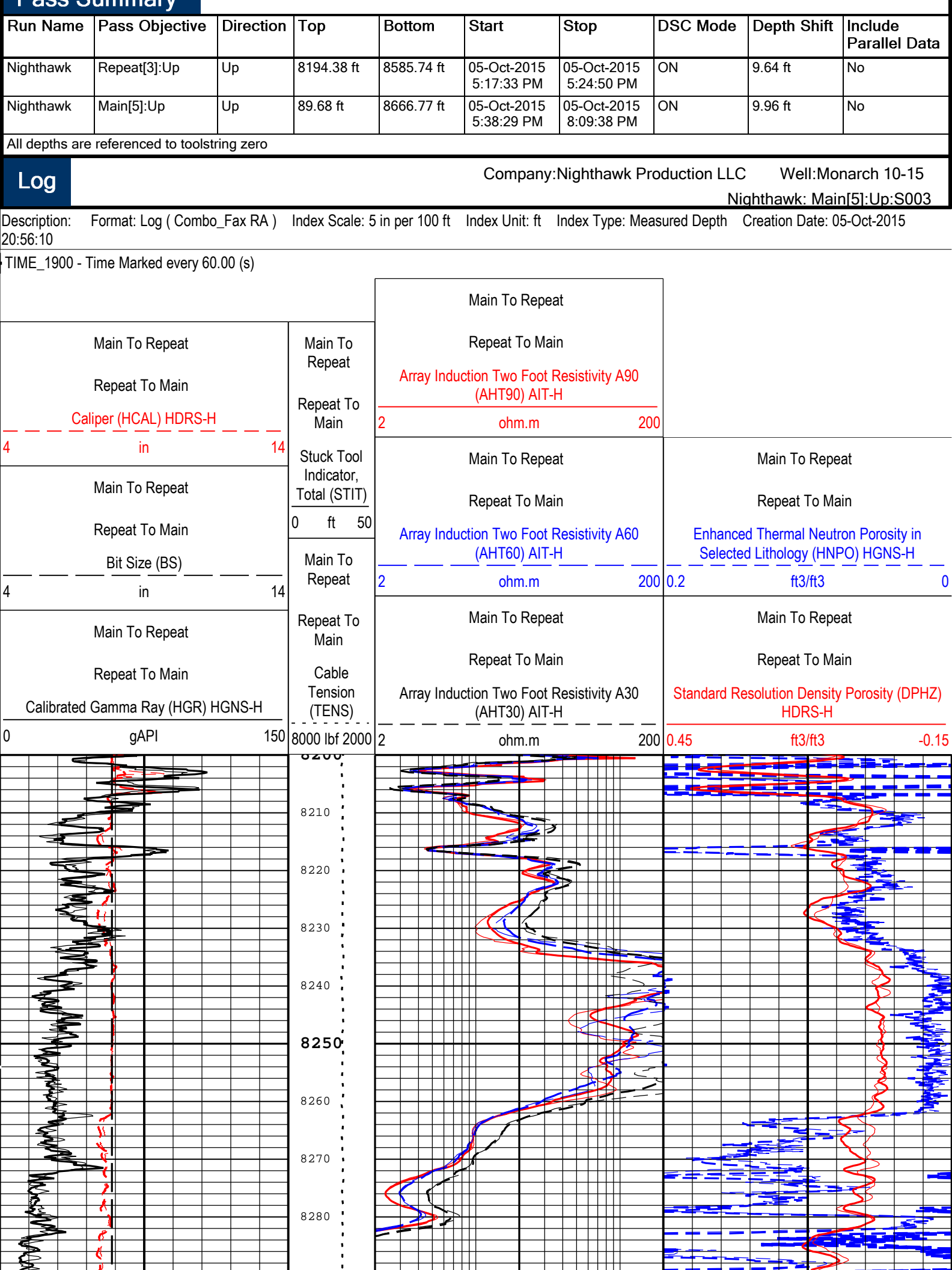
Tool Control Parameters

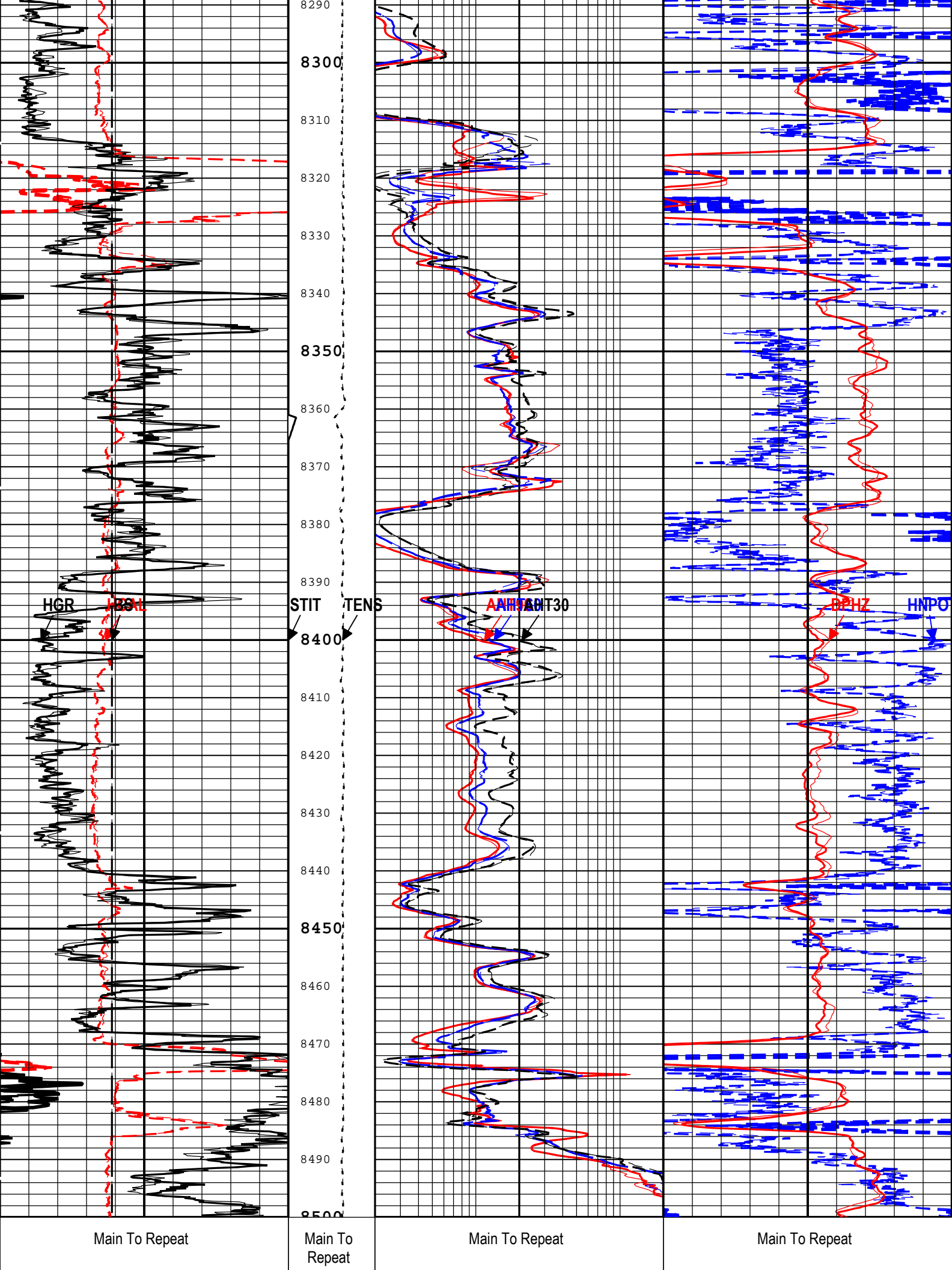
Nighthawk: Parameters

Parameter	Description	Tool	Value	Unit
ACQ_DOMAIN	Custom Acquisition Domain Name	MAST-B	[UMMF, LMMF]	
ACQCTL	Acquisition Control	MAST-B	[1, 1]	
CBOOTSTA_MAPC	MAMS Controller Boot Status	MAST-B	1	
CONTROLLER_FIRM_REV_MAPC	MAPC Firmware Revision of Controller Electronics	MAST-B	1840	
COMPCTL	Data Compression Control	MAST-B	[MZIPA, MZIPA]	
DHMODALCTL	Downhole/Surface Modal Computation Control	MAST-B	[OFF, OFF]	
DIGDEL	Waveform Digitizing Delay	MAST-B	[0, 0]	us
DIGDT	Sonic Waveform Digitizing Slowness	MAST-B	[0, 0]	us/ft
DIGTIME	Digitizing Time	MAST-B	[2550, 2550]	us
DIIN_WF_CHN	Dipole Inline Component Waveform Data Channel Name	MAST-B	[.]	
DIIN_WFN_CHN	Dipole Inline Component Waveform Normalization Data Channel Name	MAST-B	[.]	
DIOF_WF_CHN	Dipole Offline Component Waveform Data Channel Name	MAST-B	[.]	
DIOF_WFN_CHN	Dipole Offline Component Waveform Normalization Data Channel Name	MAST-B	[.]	
GNINT	Automatic Gain Selection Time Interval	MAST-B	[2550, 2550]	us
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
MAX_TOOL_SPEED	Maximum service speed allowed for, or attained by, a logging tool.	MAST-B	Time Zoned	ft/h
MONO_WF_CHN	Monopole Component Waveform Data Channel Name	MAST-B	[SWMUM_M, SWMLM_M]	
MONO_WFN_CHN	Monopole Component Waveform Normalization Data Channel Name	MAST-B	[SWMUMN_M, SWMLMN_M]	
MSMT_LIST	Measurement List	MAST-B	[MUM, MLM]	
NDTC	Nuclear Dead Time Correction	HDRS-H	On	
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	
NUMMSMT	Number of active measurements	MAST-B	2	
PROD_MASTUI	MAST Product Class Selection	MAST-B	BHC	
SENSOR10_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #10	MAST-B	1057	
SENSOR11_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #11	MAST-B	1057	
SENSOR12_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #12	MAST-B	1057	
SENSOR13_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #13	MAST-B	1057	
SENSOR1_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #1	MAST-B	1057	
SENSOR2_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #2	MAST-B	1057	
SENSOR3_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #3	MAST-B	1057	
SENSOR4_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #4	MAST-B	1057	
SENSOR5_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #5	MAST-B	1057	
SENSOR6_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #6	MAST-B	1057	
SENSOR7_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #7	MAST-B	1057	
SENSOR8_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #8	MAST-B	1057	

SENSOR8_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #8	MAST-B	1057	
SENSOR9_FIRM_REV_MAPC	MAPC Firmware Revision of Sensor Electronics Station #9	MAST-B	1057	
RBOOTSTA_MAPC	MAMS Receiver Boot Status	MAST-B	1	
RXDO	Receiver Depth Offset	MAST-B	[36, 30, 24, 18, 12, 6, 0, -6, -12, -18, -24, -30, -36]	in
RXRB	Receiver Relative Bearing	MAST-B	[0, 45, 90, 135, 180, 225, 270, 315]	deg
RXSEL	Receiver Station Select	MAST-B	[[Off, On], [Off, On], [Off, On], [Off, On], [On, On], [On, On], [On, On], [On, On], [On, Off], [On, Off], [On, Off], [On, Off]]	
SAMINT	Sonic Waveform Sampling Interval	MAST-B	[10, 10]	
SERVICE_LIST	Service Selection List	MAST-B	[NMSTC, NMATD, BHC]	
SNSR_WF_CHN	Sensor Waveforms Data Channel Name	MAST-B	[RSWMUM, RSWMLM]	
SNSR_WFN_CHN	Sensor Waveforms Normalization Factor Channel Name	MAST-B	[SWMUMN, SWMLMN]	
SNSRSEL	Sensor Element Select	MAST-B	[[On, On], [Off, Off], [On, On], [Off, Off], [On, On], [Off, Off], [On, On], [Off, Off]]	
STSO_HRDD	Temperature Source for the Density Algorithm	HDRS-H	HET data channel	
TX_AMP	Transmitter Amplitude Factor	MAST-B	[THREEQUARTER, THREEQUARTER]	
TX_WF_SIGNAL	Sonic Drive Signal	MAST-B	[PREDEFINED, PREDEFINED]	
TXDO	Transmitter Depth Offset	MAST-B	[-48, 48, 165.36, 138.36, 150.36]	in
TXRB	Transmitter Relative Bearing	MAST-B	[0, 0, 0, 90, 0]	deg
TXSEL	Transmitter Drive Selection	MAST-B	[UM, LM]	
WF_CR_CHN	Waveform Compression Rate Channel Name	MAST-B	[WCRMUM, WCRMLM]	
WF_DEPTH_CHN	Waveform Depth Channel Name	MAST-B	[WDMUM, WDMLM]	
WF_QI_CHN	Waveform Quality Indicator Channel Name	MAST-B	[WQMUM, WQMLM]	
WFSEL	Transmitter Drive Waveform Selection	MAST-B	[mp_mf_d, mp_mf_d]	

Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
MAX_TOOL_SPEED	4322	05-Oct-2015 17:38:29	05-Oct-2015 17:39:18	8666.77	8643.78
MAX_TOOL_SPEED	4058	05-Oct-2015 17:39:18	05-Oct-2015 17:42:20	8643.78	8472.94
MAX_TOOL_SPEED	4274	05-Oct-2015 17:42:20	05-Oct-2015 17:48:23	8472.94	8108.32
MAX_TOOL_SPEED	4566	05-Oct-2015 17:48:23	05-Oct-2015 17:55:27	8108.32	7684.18
MAX_TOOL_SPEED	4313	05-Oct-2015 17:55:27	05-Oct-2015 18:05:33	7684.18	7086.76
MAX_TOOL_SPEED	4088	05-Oct-2015 18:05:33	05-Oct-2015 18:18:41	7086.76	6307.47
MAX_TOOL_SPEED	4391	05-Oct-2015 18:18:41	05-Oct-2015 19:06:08	6307.47	3735.11
MAX_TOOL_SPEED	4711	05-Oct-2015 19:06:08	05-Oct-2015 19:49:30	3735.11	1141.53
MAX_TOOL_SPEED	4953	05-Oct-2015 19:49:30	05-Oct-2015 20:00:36	1141.53	475.17
MAX_TOOL_SPEED	4654	05-Oct-2015 20:00:36	05-Oct-2015 20:01:36	475.17	415.46
MAX_TOOL_SPEED	4194	05-Oct-2015 20:01:36	05-Oct-2015 20:07:40	415.46	153.13
MAX_TOOL_SPEED	3967	05-Oct-2015 20:07:40	05-Oct-2015 20:08:40	153.13	96.78
MAX_TOOL_SPEED	4230	05-Oct-2015 20:08:40	05-Oct-2015 20:09:38	96.78	89.68
All depth are at tool zero.					
Nighthawk					
Repeat					
Software Version					
Acquisition System			Version		
Maxwell 2016			6.0.52439.3100		





Repeat To Main		Repeat To Main	Repeat To Main		Repeat To Main			
Caliper (HCAL) HDRS-H			Array Induction Two Foot Resistivity A90 (AHT90) AIT-H		Enhanced Thermal Neutron Porosity in Selected Lithology (HNPO) HGNS-H			
4	in	14	2	ohm.m	200	0.2	ft3/ft3	0
Main To Repeat		Stuck Tool Indicator, Total (STIT)	Main To Repeat		Main To Repeat			
Repeat To Main			Repeat To Main		Repeat To Main			
Bit Size (BS)		Main To Repeat	Array Induction Two Foot Resistivity A60 (AHT60) AIT-H		Standard Resolution Density Porosity (DPHZ) HDRS-H			
4	in	14	2	ohm.m	200	0.45	ft3/ft3	-0.15
Main To Repeat		Repeat To Main	Main To Repeat					
Repeat To Main			Repeat To Main					
Calibrated Gamma Ray (HGR) HGNS-H		Cable Tension (TENS)	Array Induction Two Foot Resistivity A30 (AHT30) AIT-H					
0	gAPI	150	2	ohm.m			200	
		8000 lbf 2000						

TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (Combo_Fax RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 05-Oct-2015 20:56:10

Channel Processing Parameters				
Nighthawk: Parameters				
Parameter	Description	Tool	Value	Unit
AHBHM	Array Induction Borehole Correction Mode	AIT-H	Compute Standoff	
AHSTA	Array Induction Tool Standoff	AIT-H	0.125	in
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	197	degF
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	1400	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.909	in
CBLO	Casing Bottom (Logger)	WLSESSION	485	ft
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.65	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Tool Marked Depth	Borehole	2210	ft

		Total Measured Depth			Borehole			8646			ft
Tool Control Parameters											
Nighthawk: Parameters											
Parameter		Description			Tool		Value		Unit		
HMCA_BOARD_TYPE		HMCA Board Type			HGNS-H		1				
HRGD_BOARD_TYPE		HRGD Board Type			HDRS-H		WITH_HET				
MAX_LOG_SPEED		Toolstring Maximum Logging Speed			WLSESSION		3600		ft/h		
NPUC		Nuclear Pile-Up Correction			HDRS-H		On				
Calibration Report											
AIT-H (Array Induction Tool - H) Calibration - Run Nighthawk											
Primary Equipment :											
File code for AIT-HA Sonde Tool Element				AHIS		398					
Auxiliary Equipment :											
AITH Rm/SP Bottom Nose				AHRM		398					
AIT Sonde Calibration - Test Loop Gain											
Master (EEPROM):		13:16:41 01-Sep-2015									
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit				
Test Loop Gain - 0			Master	1.000	0.950	1.016	1.050				
Test Loop Phase - 0		deg	Master	0	-3.000	0.334	3.000				
Test Loop Gain - 1			Master	1.000	0.950	1.016	1.050				
Test Loop Phase - 1		deg	Master	0	-3.000	0.521	3.000				
Test Loop Gain - 2			Master	1.000	0.950	1.017	1.050				
Test Loop Phase - 2		deg	Master	0	-3.000	-0.089	3.000				
Test Loop Gain - 3			Master	1.000	0.950	1.016	1.050				
Test Loop Phase - 3		deg	Master	0	-3.000	-0.193	3.000				
Test Loop Gain - 4			Master	1.000	0.950	0.997	1.050				
Test Loop Phase - 4		deg	Master	0	-3.000	-0.135	3.000				
Test Loop Gain - 5			Master	1.000	0.950	0.990	1.050				
Test Loop Phase - 5		deg	Master	0	-3.000	-0.399	3.000				
Test Loop Gain - 6			Master	1.000	0.950	0.998	1.050				
Test Loop Phase - 6		deg	Master	0	-3.000	-0.062	3.000				
Test Loop Gain - 7			Master	1.000	0.950	1.014	1.050				
Test Loop Phase - 7		deg	Master	0	-3.000	-0.436	3.000				
AIT Sonde Calibration - Sonde Error Correction											
Master (EEPROM):		13:16:41 01-Sep-2015									
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit				
Sonde Error Correction Real - 0		mS/m	Master	-----	-231.000	-85.371	119.000				
Sonde Error Correction Quad - 0			Master	-----	-2250.000	179.340	2250.000				
Sonde Error Correction Real - 1		mS/m	Master	-----	114.000	168.762	204.000				
Sonde Error Correction Quad - 1			Master	-----	-625.000	125.387	625.000				
Sonde Error Correction Real - 2		mS/m	Master	-----	66.000	111.435	156.000				
Sonde Error Correction Quad - 2			Master	-----	-350.000	14.893	350.000				
Sonde Error Correction Real - 3		mS/m	Master	-----	39.000	59.165	89.000				
Sonde Error Correction Quad - 3			Master	-----	-250.000	48.281	250.000				
Sonde Error Correction Real - 4		mS/m	Master	-----	15.000	23.014	35.000				
Sonde Error Correction Quad - 4			Master	-----	-63.000	-13.729	63.000				
Sonde Error Correction Real - 5		mS/m	Master	-----	4.000	13.554	24.000				
Sonde Error Correction Quad - 5			Master	-----	-50.000	0.729	50.000				
Sonde Error Correction Real - 6		mS/m	Master	-----	5.000	9.191	15.000				
Sonde Error Correction Quad - 6			Master	-----	-30.000	4.790	30.000				
Sonde Error Correction Real - 7		mS/m	Master	-----	-5.000	-1.204	5.000				
Sonde Error Correction Quad - 7			Master	-----	-30.000	3.135	30.000				
AIT Mud Calibration - Mud Calibration Gain											
Master (EEPROM):		13:16:41 01-Sep-2015									
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit				

Coarse Gain		Master	1.000	0.800	0.820	1.200	<div><div></div><div></div><div></div><div></div><div></div></div>
Fine Gain		Master	1.000	0.800	0.818	1.200	<div><div></div><div></div><div></div><div></div><div></div></div>

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 13:16:41 01-Sep-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 0	V	Master	-----	0.363	0.624	0.847	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 0	deg	Master	-----	11.000	74.464	131.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 1	V	Master	-----	0.762	1.278	1.778	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 1	deg	Master	-----	10.000	73.429	130.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 2	V	Master	-----	0.374	0.634	0.872	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	-----	6.000	69.246	126.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 3	V	Master	-----	0.422	0.719	0.986	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master	-----	5.000	68.346	125.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 4	V	Master	-----	0.802	1.341	1.872	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 4	deg	Master	-----	-1.000	61.388	119.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 5	V	Master	-----	1.173	1.937	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master	-----	-3.000	59.211	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master	-----	1.173	1.933	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master	-----	-3.000	59.276	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master	-----	0.849	1.375	1.981	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master	-----	-7.000	53.676	113.000	<div><div></div><div></div><div></div><div></div><div></div></div>
SPA Zero	mV	Master		-50.000	-0.050	50.000	<div><div></div><div></div><div></div><div></div><div></div></div>
SPA Plus	mV	Master		941.000	993.007	1040.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Temperature Zero	V	Master		-0.050	0.000	0.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Temperature Plus	V	Master		0.870	0.920	0.960	<div><div></div><div></div><div></div><div></div><div></div></div>

MAST-B (Multimode Array Sonic Service Tool) Calibration - Run Nighthawk

Primary Equipment :

MAMS-BA

MAMS-BA

8075

MAST Master Characterization Coefficients - Characterization Coefficients Summary

Master (EEPROM): 18:45:00 01-Oct-2013 Expired by 643 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Sensitivity Correction Factor Minimum		Master	1.000	0.500	0.946	1.700	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Sensitivity Correction Factor Maximum		Master	1.000	0.500	1.078	1.700	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Time Delay Factor Minimum	us	Master	0	-2.000	-0.881	2.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Time Delay Factor Maximum	us	Master	0	-2.000	1.213	2.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Sensitivity Correction Factor Low Frequency to High Frequency Ratio Minimum		Master	1.000	0.900	0.916	1.700	<div><div></div><div></div><div></div><div></div><div></div></div>
Sensor Sensitivity Correction Factor Low Frequency to High Frequency Ratio Maximum		Master	1.000	0.900	1.096	1.700	<div><div></div><div></div><div></div><div></div><div></div></div>

Characterization Coefficients

Master (EEPROM): 18:45:00 01-Oct-2013 Expired by 643 days

CALI_SSCF (Master) Sensor Sensitivity Correction Factor

Minimum/Nominal/Maximum 0.500/1.000/1.700

Unit

	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	0.999	0.984	0.987	0.998	0.991	1.028	0.985	0.960
SO2	1.008	0.987	1.019	1.044	1.013	0.993	0.957	1.009
SO3	1.009	1.006	0.982	1.030	1.004	0.957	0.961	0.949
SO4	0.985	1.026	1.026	1.016	1.024	0.985	0.957	0.948
SO5	0.997	1.027	1.024	1.024	0.975	0.971	0.954	0.979
SO6	0.999	1.018	1.011	1.012	1.011	1.007	0.980	1.013
SO7	0.984	1.017	1.029	1.039	1.037	0.974	0.991	0.974
SO8	0.978	1.036	1.022	1.034	1.001	0.990	1.004	0.963
SO9	1.003	0.989	1.008	0.990	0.999	0.986	0.991	0.962

SO9	0.983	0.993	1.003	0.993	1.003	0.993	0.983	0.973	
SO10	0.960	0.988	0.976	1.078	1.022	1.018	1.023	0.946	
SO11	0.982	0.999	1.016	1.004	1.011	0.948	0.956	0.975	
SO12	0.981	1.003	1.014	1.048	1.006	0.965	0.999	0.985	
SO13	1.018	1.003	1.028	1.027	1.013	0.999	1.000	0.981	
CALI_STDF (Master) Sensor Time Delay Factor									
Minimum/Nominal/Maximum							-2.000/0/2.000	Unit	us
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8	
SO1	-0.195	-0.063	0.111	0.213	0.172	0.063	-0.130	-0.148	
SO2	-0.211	-0.250	0.071	0.192	0.135	0.101	-0.071	-0.440	
SO3	-0.288	-0.102	0.307	0.512	0.442	0.058	-0.058	-0.294	
SO4	-0.282	-0.379	0.142	0.507	0.156	0.064	0.368	-0.144	
SO5	-0.566	-0.299	-0.061	0.194	0.270	-0.024	0.035	0.028	
SO6	-0.354	-0.351	-0.020	0.432	0.190	0.813	0.154	-0.161	
SO7	-0.259	-0.202	-0.144	0.256	0.479	0.829	0.061	-0.288	
SO8	-0.549	-0.415	0.156	-0.077	0.426	0.051	0.019	-0.073	
SO9	-0.156	-0.049	0.258	0.378	0.075	-0.156	-0.014	-0.281	
SO10	-0.132	-0.212	0.034	0.057	0.101	0.093	0.032	-0.076	
SO11	-0.359	0.064	0.100	0.234	0.523	-0.064	-0.206	-0.110	
SO12	-0.242	-0.104	0.276	0.055	-0.101	-0.055	0.528	1.213	
SO13	-0.617	0.272	0.415	0.257	0.295	-0.257	-0.607	-0.881	
CALI_SSCR (Master) Sensor Sensivity Correction Factor Low Frequency to High Frequency Ratio									
Minimum/Nominal/Maximum							0.900/1.000/1.700	Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8	
SO1	1.057	1.038	1.005	1.000	0.995	0.987	0.986	1.034	
SO2	1.033	1.022	1.005	1.005	0.979	0.966	0.971	1.006	
SO3	0.995	1.090	1.036	0.957	0.922	0.974	0.974	0.949	
SO4	1.062	1.036	0.998	0.987	0.984	0.974	0.986	1.023	
SO5	1.096	1.043	1.024	1.002	0.984	0.957	1.001	1.051	
SO6	1.049	1.014	1.001	0.966	0.965	0.968	0.970	1.019	
SO7	0.954	0.989	1.022	1.039	1.037	1.024	0.990	0.952	
SO8	0.973	0.991	1.023	1.042	1.072	1.035	0.980	0.944	
SO9	0.974	0.997	1.037	1.054	1.044	0.996	0.955	0.929	
SO10	0.967	0.982	1.035	1.063	1.058	1.012	0.982	0.949	
SO11	0.934	1.003	1.040	1.032	1.017	1.016	0.970	0.916	
SO12	0.962	0.997	1.062	1.048	1.023	1.016	0.994	0.984	
SO13	0.952	0.991	1.057	1.045	1.042	0.995	0.987	0.940	
CALI_SSCTF (Master) Sensor Sensivity Correction Transmitter Failure Flag									
Minimum/Nominal/Maximum							0/0/0	Unit	
Monopole Upper Transmitter					0				
Monopole Lower Transmitter					0				
CALI_SSCHF (Master) Sensor Sensivity Correction High Frequency Diagnostic Failure Flag									
Minimum/Nominal/Maximum							0/0/0	Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8	
SO1	0	0	0	0	0	0	0	0	
SO2	0	0	0	0	0	0	0	0	
SO3	0	0	0	0	0	0	0	0	

SO3	0	0	0	0	0	0	0	0
SO4	0	0	0	0	0	0	0	0
SO5	0	0	0	0	0	0	0	0
SO6	0	0	0	0	0	0	0	0
SO7	0	0	0	0	0	0	0	0
SO8	0	0	0	0	0	0	0	0
SO9	0	0	0	0	0	0	0	0
SO10	0	0	0	0	0	0	0	0
SO11	0	0	0	0	0	0	0	0
SO12	0	0	0	0	0	0	0	0
SO13	0	0	0	0	0	0	0	0

CALI_SSCLF (Master) Sensor Sensitivity Correction Low Frequency Diagnostic Failure Flag

Minimum/Nominal/Maximum		0/0/0						Unit
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	0	0	0	0	0	0	0	0
SO2	0	0	0	0	0	0	0	0
SO3	0	0	0	0	0	0	0	0
SO4	0	0	0	0	0	0	0	0
SO5	0	0	0	0	0	0	0	0
SO6	0	0	0	0	0	0	0	0
SO7	0	0	0	0	0	0	0	0
SO8	0	0	0	0	0	0	0	0
SO9	0	0	0	0	0	0	0	0
SO10	0	0	0	0	0	0	0	0
SO11	0	0	0	0	0	0	0	0
SO12	0	0	0	0	0	0	0	0
SO13	0	0	0	0	0	0	0	0

CALI_SSCHA (Master) Sensor Sensitivity Correction High Frequency Normalized Amplitudes

Minimum/Nominal/Maximum		----/1.000/----						Unit
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	0.990	1.005	1.002	0.991	0.998	0.962	1.004	1.031
SO2	1.001	1.022	0.990	0.966	0.996	1.016	1.054	0.999
SO3	0.984	0.987	1.011	0.964	0.989	1.037	1.033	1.047
SO4	1.015	0.975	0.975	0.985	0.977	1.016	1.046	1.055
SO5	0.991	0.961	0.965	0.964	1.013	1.017	1.035	1.009
SO6	1.011	0.992	0.999	0.998	0.999	1.003	1.031	0.997
SO7	1.020	0.987	0.976	0.966	0.968	1.030	1.013	1.031
SO8	1.025	0.968	0.981	0.970	1.001	1.013	0.999	1.041
SO9	0.987	1.002	0.983	1.001	0.991	1.005	0.999	1.030
SO10	1.043	1.014	1.027	0.929	0.980	0.983	0.978	1.058
SO11	1.009	0.991	0.974	0.986	0.980	1.044	1.035	1.016
SO12	1.021	0.998	0.987	0.955	0.995	1.038	1.002	1.016
SO13	0.990	1.005	0.981	0.981	0.995	1.009	1.008	1.028

CALI_SSCLA (Master) Sensor Sensitivity Correction Low Frequency Normalized Amplitudes

Minimum/Nominal/Maximum		----/1.000/----						Unit
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8

SO1	1.047	1.043	1.007	0.992	0.993	0.949	0.990	1.065
SO2	1.034	1.044	0.995	0.971	0.975	0.981	1.024	1.005
SO3	0.980	1.076	1.048	0.922	0.912	1.011	1.007	0.993
SO4	1.079	1.010	0.973	0.972	0.961	0.990	1.031	1.079
SO5	1.086	1.003	0.988	0.966	0.997	0.973	1.036	1.061
SO6	1.060	1.006	1.000	0.964	0.964	0.971	1.000	1.016
SO7	0.973	0.977	0.997	1.003	1.003	1.055	1.003	0.981
SO8	0.997	0.960	1.003	1.011	1.074	1.048	0.979	0.983
SO9	0.962	0.999	1.019	1.055	1.035	1.001	0.954	0.956
SO10	1.009	0.996	1.063	0.988	1.037	0.996	0.961	1.004
SO11	0.942	0.994	1.013	1.018	0.996	1.061	1.004	0.930
SO12	0.982	0.995	1.048	1.000	1.018	1.054	0.996	1.000
SO13	0.942	0.996	1.036	1.026	1.036	1.004	0.994	0.966

CALI_SSTRS (Master)		Sensor Sensitivity Correction Transmitter-Receiver Spacing						
Minimum/Nominal/Maximum							Unit	ft
-----/4.000/-----								
Monopole Upper Transmitter					4.000			
Monopole Lower Transmitter					4.000			

CALI_TTMUH (Master)		Sensor Sensitivity Transit Time from Monopole Upper Transmitter High Frequency Firing						
Minimum/Nominal/Maximum							Unit	us
0/0/5000.000								
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	500.722	500.590	500.416	500.314	500.355	500.464	500.657	500.675
SO2	471.667	471.706	471.385	471.265	471.322	471.356	471.528	471.897
SO3	443.783	443.597	443.188	442.983	443.053	443.438	443.553	443.790
SO4	413.992	413.812	413.258	413.259	413.374	413.453	413.782	413.943
SO5	384.921	384.748	384.326	384.232	384.288	384.345	384.571	384.753
SO6	356.000	355.631	355.367	355.069	355.179	355.118	355.550	355.680
SO7	326.892	326.539	326.495	326.183	326.163	326.223	326.446	326.756
SO8	297.604	297.386	297.350	297.372	297.220	297.311	297.271	297.628
SO9	268.432	268.442	268.161	268.118	268.073	268.181	268.105	268.361
SO10	239.288	239.165	239.111	239.038	238.985	239.168	239.182	239.273
SO11	210.262	210.076	210.201	210.197	210.161	210.330	210.236	210.236
SO12	181.167	181.093	180.870	180.991	181.097	181.206	180.999	181.242
SO13	151.886	151.558	151.286	151.064	151.325	151.473	151.527	151.792

CALI_TTMLH (Master)		Sensor Sensitivity Transit Time from Monopole Lower Transmitter High Frequency Firing						
Minimum/Nominal/Maximum							Unit	us
0/0/5000.000								
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	150.666	150.767	150.566	150.666	150.510	149.761	150.263	150.990
SO2	180.617	180.748	180.548	180.219	180.345	180.393	180.519	180.624
SO3	208.496	209.067	208.352	209.298	206.945	208.035	207.737	207.876
SO4	236.750	237.125	236.635	235.904	236.492	236.597	235.659	236.523
SO5	266.852	266.491	266.439	266.022	265.814	266.346	266.002	265.833
SO6	295.539	295.902	295.504	294.898	295.273	294.087	294.972	295.472
SO7	323.472	323.711	323.638	323.151	322.725	321.965	323.279	323.666
SO8	353.823	353.774	352.667	353.111	352.257	352.916	353.020	352.846
SO9	381.941	381.716	381.383	381.186	381.837	382.192	381.982	382.261
SO10	411.800	412.082	411.644	411.670	411.636	411.470	411.578	411.703

SO11	441.515	441.092	441.056	440.923	440.634	441.221	441.363	441.266
SO12	470.303	470.165	469.785	470.006	470.162	470.116	469.533	468.847
SO13	499.442	498.552	498.410	498.567	498.530	499.082	499.432	499.706

CALI_AMPMUH (Master) Sensor Sensitivity First Break Amplitude from Monopole Upper Transmitter High Frequency Firing								
Minimum/Nominal/Maximum -50000.000/0/50000.000							Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	4853.119	4924.710	4912.444	4858.871	4889.808	4714.450	4922.774	5051.636
SO2	5045.157	5149.583	4990.194	4871.563	5020.813	5119.463	5313.749	5037.139
SO3	5287.833	5302.994	5433.686	5176.329	5310.688	5571.589	5549.999	5622.337
SO4	5624.173	5413.661	5411.666	5527.577	5441.848	5636.934	5842.312	5872.279
SO5	5788.751	5655.148	5652.258	5681.797	5966.925	5974.112	6077.190	5947.544
SO6	6107.326	5968.101	6023.423	6056.200	6030.177	6113.867	6227.435	6002.623
SO7	6597.355	6372.560	6305.465	6242.458	6242.453	6713.046	6535.623	6643.384
SO8	6838.963	6488.900	6625.150	6519.823	6795.124	6858.826	6731.167	7029.828
SO9	7085.596	7219.283	7077.258	7219.848	7096.783	7224.500	7184.715	7381.029
SO10	7741.659	7503.189	7573.977	6837.227	7218.457	7307.484	7284.769	7888.403
SO11	7970.040	7837.718	7582.756	7657.566	7605.077	8153.438	8138.366	8065.485
SO12	8420.625	8088.298	7801.284	7360.106	7636.366	8253.396	8242.049	8587.939
SO13	7921.893	7928.883	7295.137	6925.896	7098.138	7386.022	7741.010	8038.728

CALI_AMPMLH (Master) Sensor Sensitivity First Break Amplitude from Monopole Lower Transmitter High Frequency Firing								
Minimum/Nominal/Maximum -50000.000/0/50000.000							Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	7784.195	8174.038	7887.834	7337.262	7524.383	7564.900	7908.047	8020.891
SO2	7737.512	7826.556	7535.887	7288.364	7545.744	7735.434	8071.286	7680.260
SO3	6787.618	6922.229	6978.596	6715.412	6438.903	6997.104	6924.625	7072.640
SO4	7030.901	6733.188	6737.133	6733.086	6730.799	7019.663	7180.385	7274.375
SO5	6686.533	6444.532	6489.677	6450.559	6784.025	6830.008	6949.764	6750.114
SO6	6314.964	6221.629	6255.555	6204.897	6250.386	6216.313	6442.018	6247.413
SO7	6036.695	5856.145	5781.354	5726.457	5746.798	6055.060	6009.270	6122.937
SO8	5901.958	5552.873	5577.974	5545.666	5669.521	5745.372	5692.719	5922.637
SO9	5423.623	5481.205	5380.229	5470.179	5459.590	5514.438	5480.492	5663.717
SO10	5427.188	5296.587	5378.219	4879.724	5142.187	5115.975	5079.639	5484.988
SO11	5058.181	4972.884	4886.795	4947.585	4912.829	5238.024	5192.061	5093.542
SO12	4836.440	4728.560	4677.091	4525.535	4715.669	4916.387	4748.799	4814.051
SO13	4447.619	4516.861	4406.873	4409.625	4469.287	4534.643	4528.258	4616.790

CALI_AMPMUL (Master) Sensor Sensitivity First Break Amplitude from Monopole Upper Transmitter Low Frequency Firing								
Minimum/Nominal/Maximum -50000.000/0/50000.000							Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	-4160.754	-3979.388	-3637.779	-3512.115	-3600.096	-3508.888	-3812.458	-4278.166
SO2	-5313.874	-5238.303	-4929.395	-4747.651	-4942.087	-5088.681	-5291.274	-5095.556
SO3	-7126.739	-7264.913	-7013.809	-6521.816	-6718.549	-6992.842	-7084.032	-7122.116
SO4	-7159.687	-6838.335	-6981.436	-7093.320	-6998.604	-7297.006	-7463.930	-7253.367
SO5	-8255.652	-8160.471	-8683.326	-8570.374	-8976.024	-8704.947	-9118.712	-8548.476
SO6	-8966.141	-8799.707	-9131.033	-9195.248	-9222.716	-9183.672	-9054.123	-8775.055
SO7	-12587.270	-12637.420	-12907.530	-12984.750	-12984.460	-13656.010	-12972.530	-12697.180
SO8	-12572.330	-12103.490	-12649.410	-12749.330	-13541.990	-13220.060	-12343.520	-12396.610

SO9	-13418.710	-13933.550	-14211.240	-14714.510	-14434.710	-13963.910	-13310.080	-13337.540
SO10	-14538.200	-14353.740	-15320.470	-14241.270	-14943.910	-14349.860	-13850.370	-14474.520
SO11	-18711.450	-19761.250	-20127.300	-20224.310	-19796.660	-21082.440	-19947.710	-18481.580
SO12	-17516.910	-17745.590	-18688.640	-17840.790	-18148.080	-18793.910	-17765.530	-17823.370
SO13	-19240.460	-20342.040	-21168.840	-20950.060	-21161.340	-20509.110	-20308.260	-19725.580
CALI_AMPMLL (Master) Sensor Sensitivity First Break Amplitude from Monopole Lower Transmitter Low Frequency Firing								
Minimum/Nominal/Maximum -50000.000/0/50000.000							Unit	
	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8
SO1	-25645.740	-25536.660	-24666.830	-24283.720	-24315.850	-23245.170	-24247.720	-26092.970
SO2	-22645.080	-22870.870	-21795.740	-21278.050	-21367.520	-21491.870	-22428.720	-22020.850
SO3	-16333.360	-17939.540	-17470.100	-15377.680	-15203.030	-16848.510	-16784.060	-16562.710
SO4	-13897.690	-13013.010	-12533.340	-12524.550	-12384.340	-12751.250	-13278.970	-13902.790
SO5	-12179.810	-11244.100	-11078.550	-10833.400	-11178.170	-10909.710	-11616.210	-11892.350
SO6	-13369.240	-12677.350	-12609.730	-12153.940	-12160.010	-12244.840	-12605.720	-12807.190
SO7	-10702.390	-9989.101	-9499.549	-9352.105	-9218.663	-9841.935	-9675.545	-10334.480
SO8	-9082.130	-8628.236	-8712.243	-8252.144	-8396.715	-8712.523	-8670.417	-9022.473
SO9	-7625.785	-8031.072	-7963.358	-7846.614	-7373.584	-7571.259	-7605.628	-7781.584
SO10	-8828.550	-8683.118	-9041.745	-8068.875	-8689.428	-8396.218	-8175.714	-8666.803
SO11	-6180.554	-6149.550	-6378.698	-6718.831	-6568.194	-6683.696	-6329.596	-6096.533
SO12	-6389.044	-6261.180	-6620.121	-6567.637	-6843.471	-6614.354	-6171.413	-6316.070
SO13	-5279.658	-5594.735	-5936.063	-6142.349	-6237.082	-6049.613	-5415.070	-5239.465

HDRS-H (HILT Density and Rxo Sonde, 150 degC) Calibration - Run Nighthawk

Primary Equipment :			
	HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
	HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3933
Auxiliary Equipment :			
	HRDD Backscatter Detector	Backscatter	
	HRDD Long Spacing Detector	Long Spacing	28736
	HRDD Short Spacing Detector	Short Spacing	
	Cesium 137 Gamma-Ray Logging Source	GSR-J	5471
	HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
	HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	
Calibration Parameter :			
	Small Ring Size		
	Large Ring Size		

HDRS Density Calibration - Inversion Results

Master (EEPROM):		16:13:32 24-Sep-2015						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
Rho Aluminum	g/cm3	Master	2.596	2.586	2.594	2.606		
Rho Magnesium	g/cm3	Master	1.686	1.676	1.690	1.696		
Pe Aluminum		Master	2.570	2.470	2.512	2.670		
Pe Magnesium		Master	2.650	2.550	2.637	2.750		

HDRS Density Calibration - Deviation Summary

Master (EEPROM):		16:13:32 24-Sep-2015						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
BS Average Deviation	%	Master	0	-0.6000	0.2062	0.6000		

BS Max Deviation	%	Master	0	-1.6000	0.4510	1.6000	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Average Deviation	%	Master	0	-1.0000	0.3966	1.0000	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Max Deviation	%	Master	0	-2.5000	0.8911	2.5000	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Average Deviation	%	Master	0	-1.5000	1.1853	1.5000	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Max Deviation	%	Master	0	-3.5000	2.7355	3.5000	<div><div></div><div></div><div></div><div></div><div></div></div>

HDRS Density Calibration - Background Summary

Master (EEPROM):		16:13:32 24-Sep-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
BS Window Ratio		Master	1.0000		0.7498		<div><div></div><div></div></div>
BS Window Sum	1/s	Master	1		22859		<div><div></div><div></div></div>
SS Window Ratio		Master	1.0000		0.4882		<div><div></div><div></div></div>
SS Window Sum	1/s	Master	1		10721		<div><div></div><div></div></div>
LS Window Ratio		Master	1.0000		0.3020		<div><div></div><div></div></div>
LS Window Sum	1/s	Master	1		1169		<div><div></div><div></div></div>

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM):		16:13:32 24-Sep-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
BS PM High Voltage	V	Master		1000	1654	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
SS PM High Voltage	V	Master		1000	1499	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
LS PM High Voltage	V	Master		1000	1283	2400	<div><div></div><div></div><div></div><div></div><div></div></div>

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM):		16:13:32 24-Sep-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
BS Crystal Resolution	%	Master		5.00	11.05	25.00	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Crystal Resolution	%	Master		5.00	9.70	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Crystal Resolution	%	Master		5.00	8.43	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>

HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run Nighthawk

Primary Equipment :		HILT Gamma-Ray and Neutron Sonde, 150 degC HGNS-H					
Auxiliary Equipment :		HGNS Accelerometer, 150 degC HACCZ-H 4269					
		AmBe Neutron Logging Source NSR-F 5069					
Calibration Parameter :		Water Temperature (Calibration Tank Water Temperature) 71.0					
		Housing Size (Thermal Housing Size) 3.37					
		JIG-BKG					

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM):		00:00:00 15-Aug-2005					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Accelerometer Manufacturer		Master			QAT_160		<div><div></div><div></div></div>
Accelerometer Reference Temperature	degF	Master		30.2	77.0	122.0	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 0		Master	-----	-----	336.900	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 1		Master	-----	-----	37.580	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 2		Master	-----	-----	-0.019	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 4		Master	-----	-----	2.730	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 8		Master	-----	-----	299.000	-----	<div><div></div><div></div></div>
Accelerometer Coefficients - 9		Master	-----	-----	1.007	-----	<div><div></div><div></div></div>

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM):		13:38:16 08-Jul-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>

Near Zero Measurement	1/s	Master	0	5.0	27.2	40.0	
Far Zero Measurement	1/s	Master	0	5.0	26.0	40.0	
Near Plus Measurement	1/s	Master	6031.0	4700.0	4650.0	6900.0	
Far Plus Measurement	1/s	Master	2793.0	1900.0	1984.0	2900.0	
Near Corrected Plus Measurement	1/s	Master		4700.0	4620.0	6900.0	
Far Corrected Plus Measurement	1/s	Master		1900.0	1955.0	2900.0	


LEH-QT (Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor) Calibration - Run Nighthawk

Primary Equipment :	
Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor	LEH-QT

HTEN Master Calibration - HTEN Master Calibration

Master: _____

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
HTEN Shop Gain		Master	1.000	0.800	NOT DONE	4.500		
HTEN Shop Offset	lbf	Master	0	-1000.000	NOT DONE	1000.000		

Company:	Nighthawk Production LLC	
Well:	Monarch 10-15	
Field:	Wildcat	
County:	Lincoln	
State:	Colorado	

Platform Express
Combo Print - Limestone Matrix
AIT-TLD-CNL-GR