

Company: Noble Energy Inc.

Well: EMMY H25-744

Field: DJ BASIN

County: Weld State: Colorado

Neutron Log

Weld  
DJ BASIN  
SW SE SEC:25 TWN:3N RNG: 65W  
EMMY H25-744  
Noble Energy Inc.

Location:		SW SE SEC:25 TWN:3N RNG: 65W	Elev.:	K.B.	4835.00 ft
Permanent Datum:				G.L.	4805.00 ft
Log Measured From:				D.F.	4835.00 ft
Drilling Measured From:					
API Serial No.	Section:	Township:	Range:		
05-123-46970	25	3N	65W		

Logging Date 04-Nov-2018

Run Number ONE

Depth Driller 17254.00 ft

Schlumberger Depth 6645.00 ft

Bottom Log Interval 6645.00 ft

Top Log Interval 45.00 ft

Casing Fluid Type BRINE

Salinity

Density 8.4 lbm/gal

Fluid Level 8.00 ft

BIT/CASING/TUBING STRING

Bit Size 8.50 in

From 1955.00 ft

To 17254.00 ft

Casing/Tubing Size 5.5 in

Weight 20 lbm/ft

Grade P110

From 0.00 ft

To 17237.70 ft

Max Recorded Temperatures 219 degF

Logger on Bottom 04-Nov-2018 15:35:00

Unit Number 2377

Location: Fort Morgan, CO

Recorded By Justin Ray

Witnessed By Bill Mansfield

Disclaimer

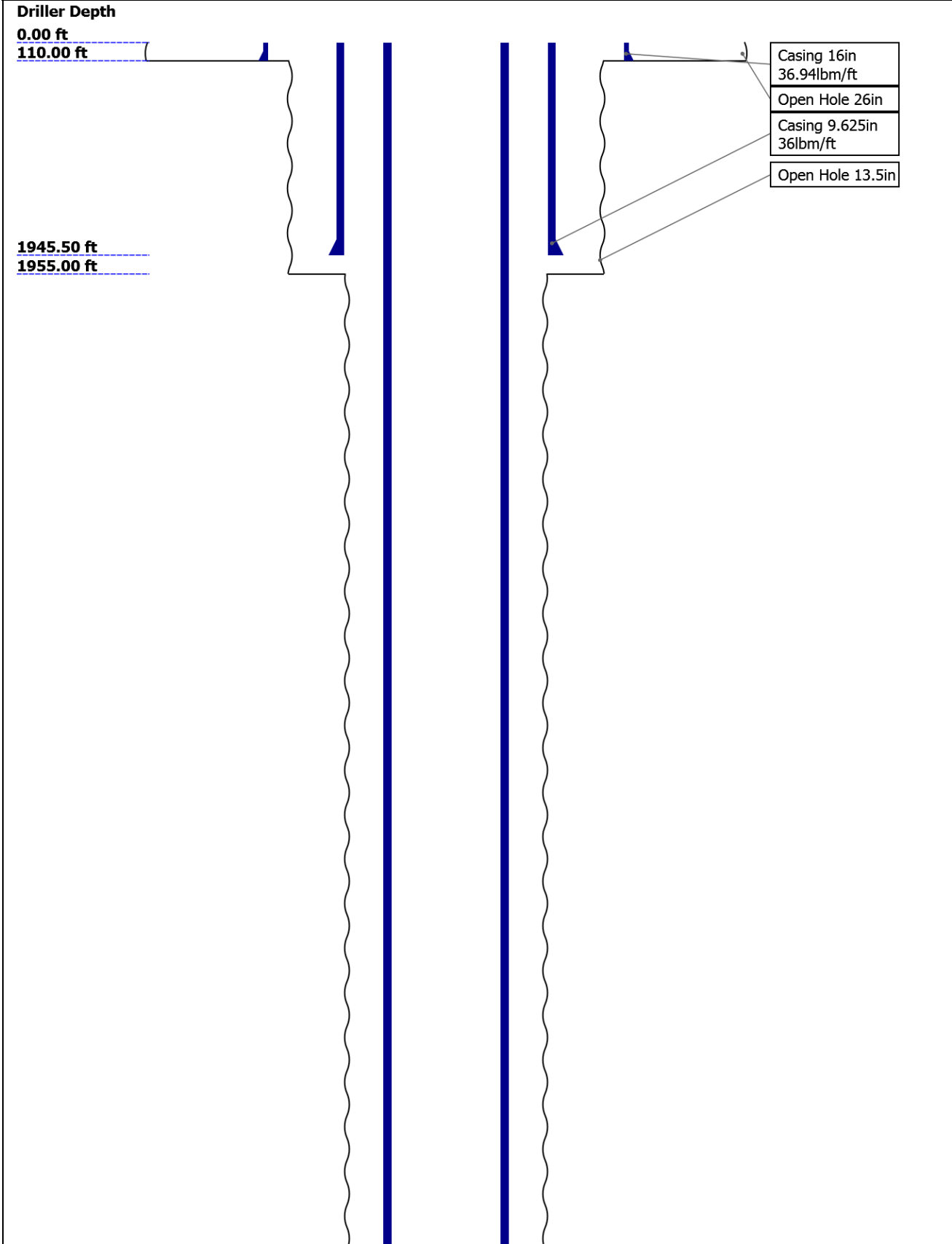
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (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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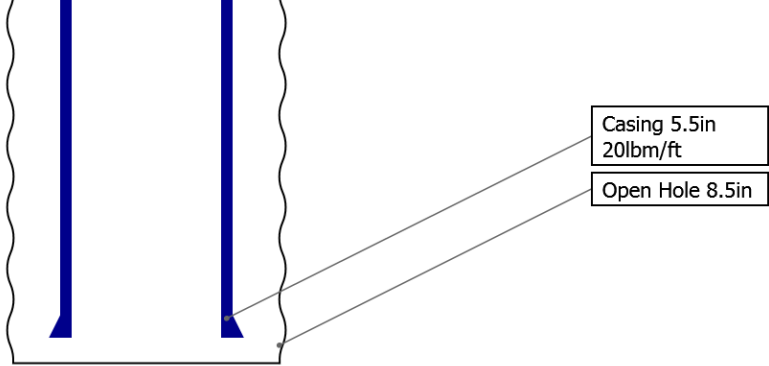
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Well Sketch



17237.70 ft  
17254.00 ft

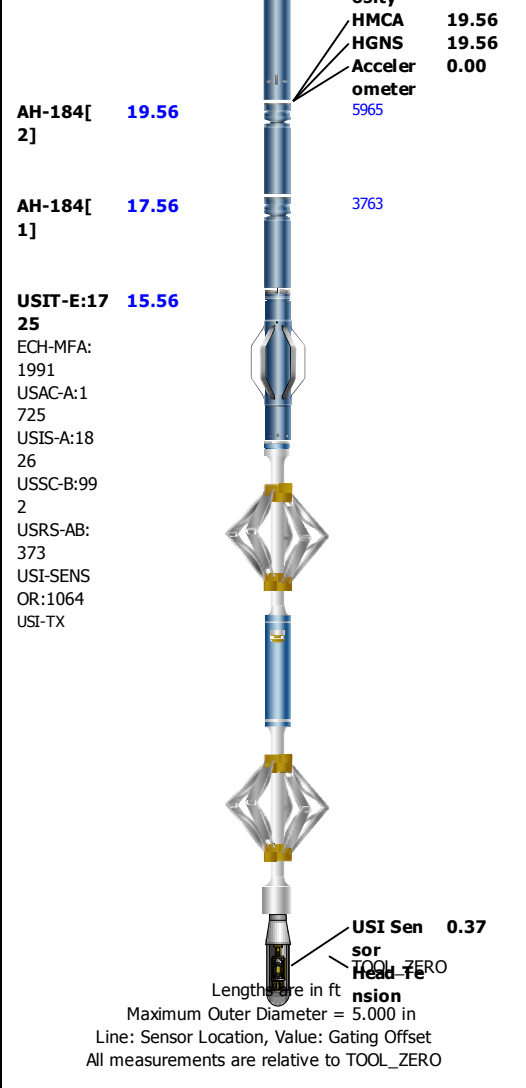


Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	26	13.5	8.5			
Top Driller ( ft )	0	110	1955			
Top Logger ( ft )	0	110	1955			
Bottom Driller ( ft )	110	1955	17254			
Bottom Logger ( ft )	110	1955	17254			
Casing						
Size ( in )	16	9.625	5.5			
Weight ( lbm/ft )	36.94	36	20			
Inner Diameter ( in )	15.572	8.921	4.778			
Grade	N/A	J55	P110			
Top Driller ( ft )	0	0	0			
Top Logger ( ft )	0	0	0			
Bottom Driller ( ft )	110	1945.5	17237.7			
Bottom Logger ( ft )	110	1945.5	17237.7			

Remarks and Equipment Summary

ONE: Toolstring			ONE: Remarks
<div><div><div>Equip nameLength</div><div>LEH-QT38.95</div><div>LEH-QT</div></div><div><div>EDTC-B:9316</div><div>EDTH-B:9373</div><div>EDTG-A:79527</div><div>EDTC-B:9316</div></div><div><div>HGNS-H:4736</div><div>HGNH:2987</div><div>NSR-F:5070</div><div>NPV-N</div><div>HACCZ-H:5118</div><div>HMCA-H</div><div>HGNS-H:4736</div></div></div> <div></div> <div><div>MP nameOffset</div><div>CTEM31.97</div><div>ACCZ0.00</div><div>HV0.00</div><div>Gamma30.1</div><div>Ray</div><div>TelStatu28.97</div><div>s</div><div>Temper28.94</div><div>ature</div><div>GR28.23</div><div>CNL Por21.89</div><div>osity</div></div>	Toolstring ran as per tool sketch		
	Gemcos, booster, and two knuckles ran for tool centralization		
	Main pass ran with 2500 PSI. Repeat pass ran with 0 PSI		
	Thank you for choosing Schlumberger		



Depth Summary			
	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			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		
Logging Cable			
Type	7-46NT-XS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		

Rig Type	CRANE	
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 device
Rig Up Length At Bottom		Z-Chart used as secondary depth control device
Rig Up Length Correction		Log correlated to marker joint at 6331.8-6342.7 FT
Stretch Correction		
Tool Zero Check At Surface		

# ONE

## Nuclear Main Pass

## Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	0	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	0	ft3

## Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Main[4]:Up	Up	41.98 ft	6650.03 ft	04-Nov-2018 5:17:09 PM	04-Nov-2018 7:13:29 PM	ON	62.74 ft	Yes

All depths are referenced to toolstring zero

## Log

Company:Noble Energy Inc. Well:EMMY H25-744

ONE: Main[4]:Up:S015

Description: AIT Basic Log Two   Format: Log ( Noble Nuclear )   Index Scale: 5 in per 100 ft   Index Unit: ft   Index Type: Measured Depth   Creation Date: 05-Nov-2018 00:19:52

Channel	Source	Sampling
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

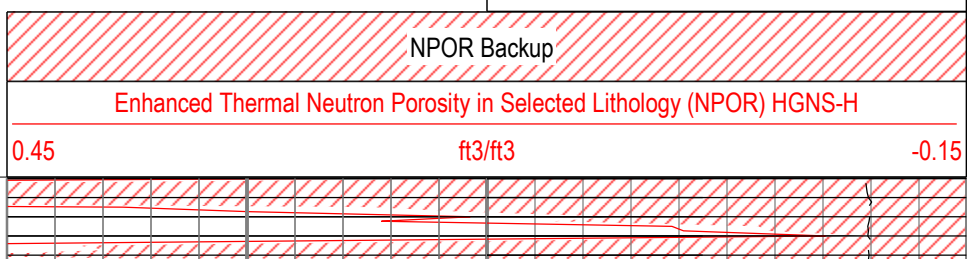
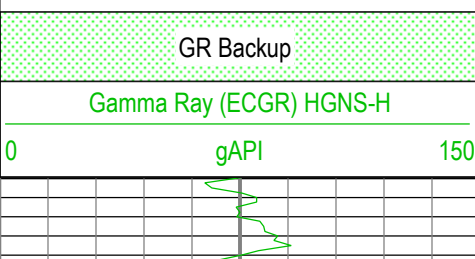
—IHV - Integrated Hole Volume every 10.00 (ft3)

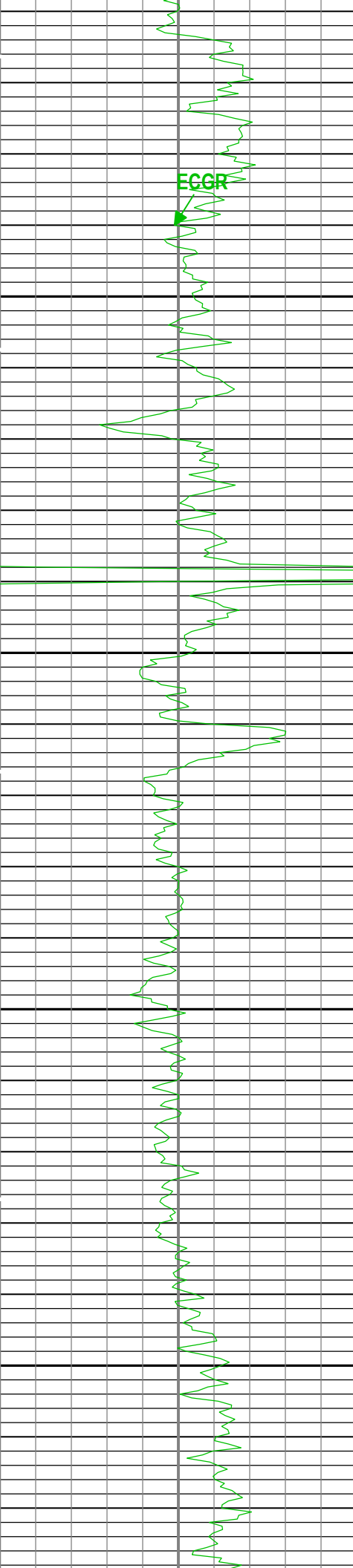
—IHV - Integrated Hole Volume every 100.00 (ft3)

TIME 1900 - Time Marked every 60.00 (s)

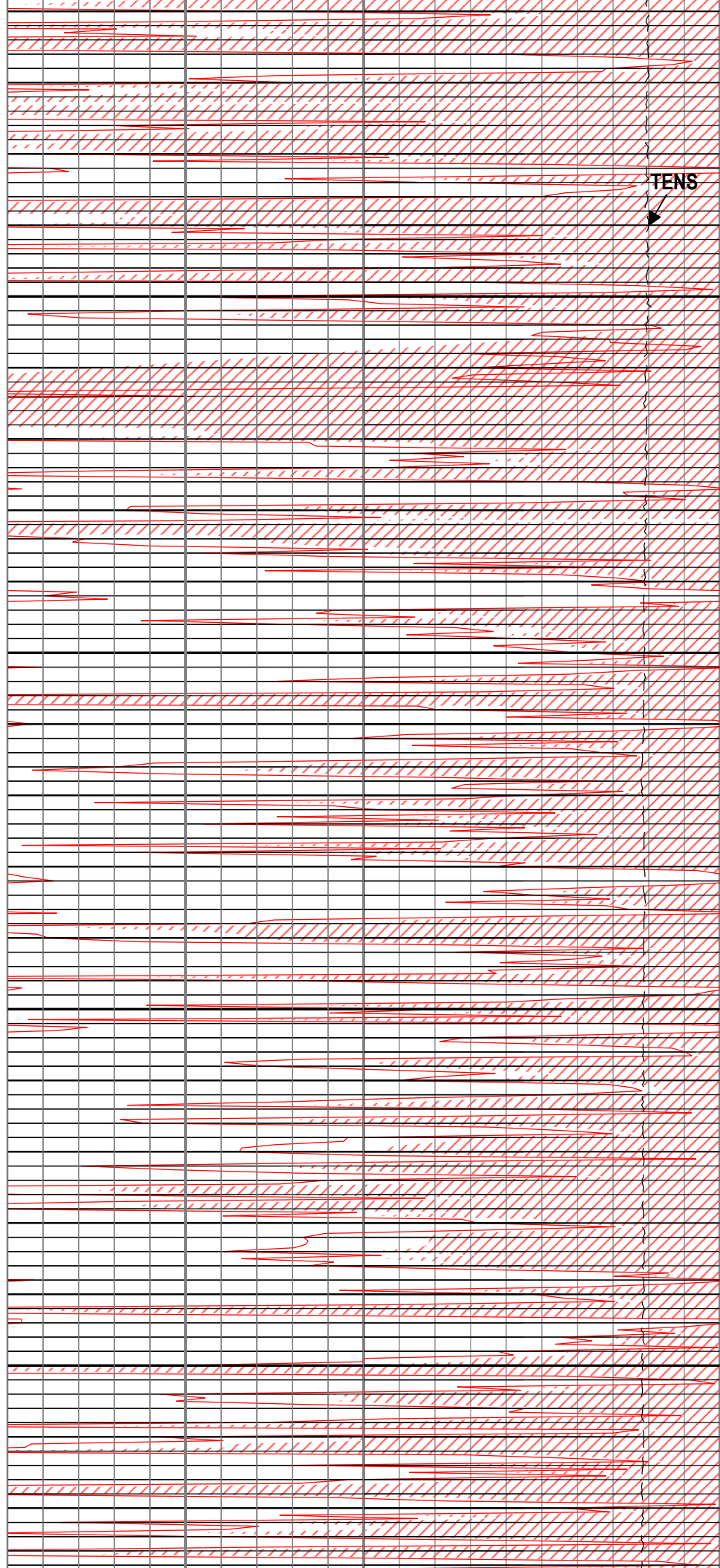
— ICV - Integrated Cement Volume every 10.00 (ft3)

— ICV - Integrated Cement Volume every 100.00 (ft3)

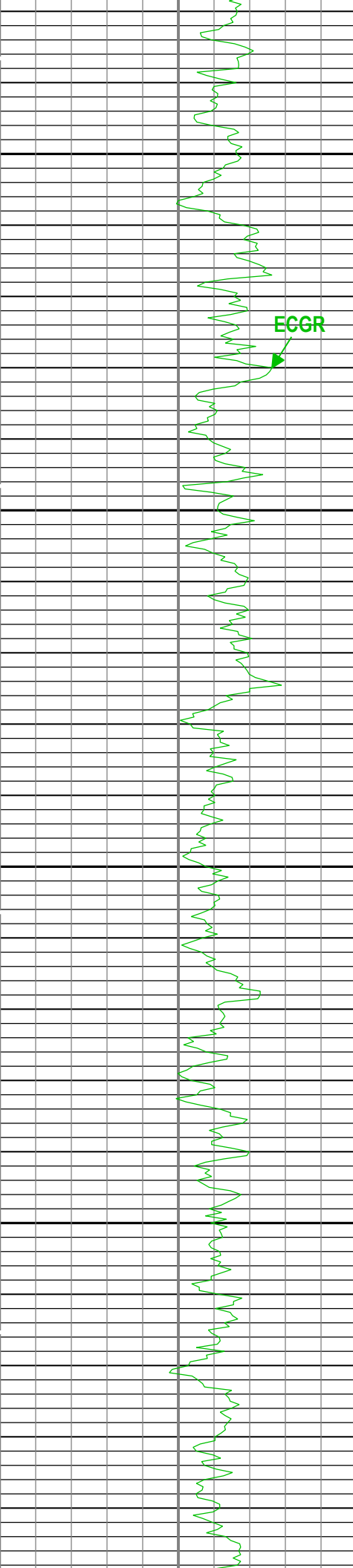




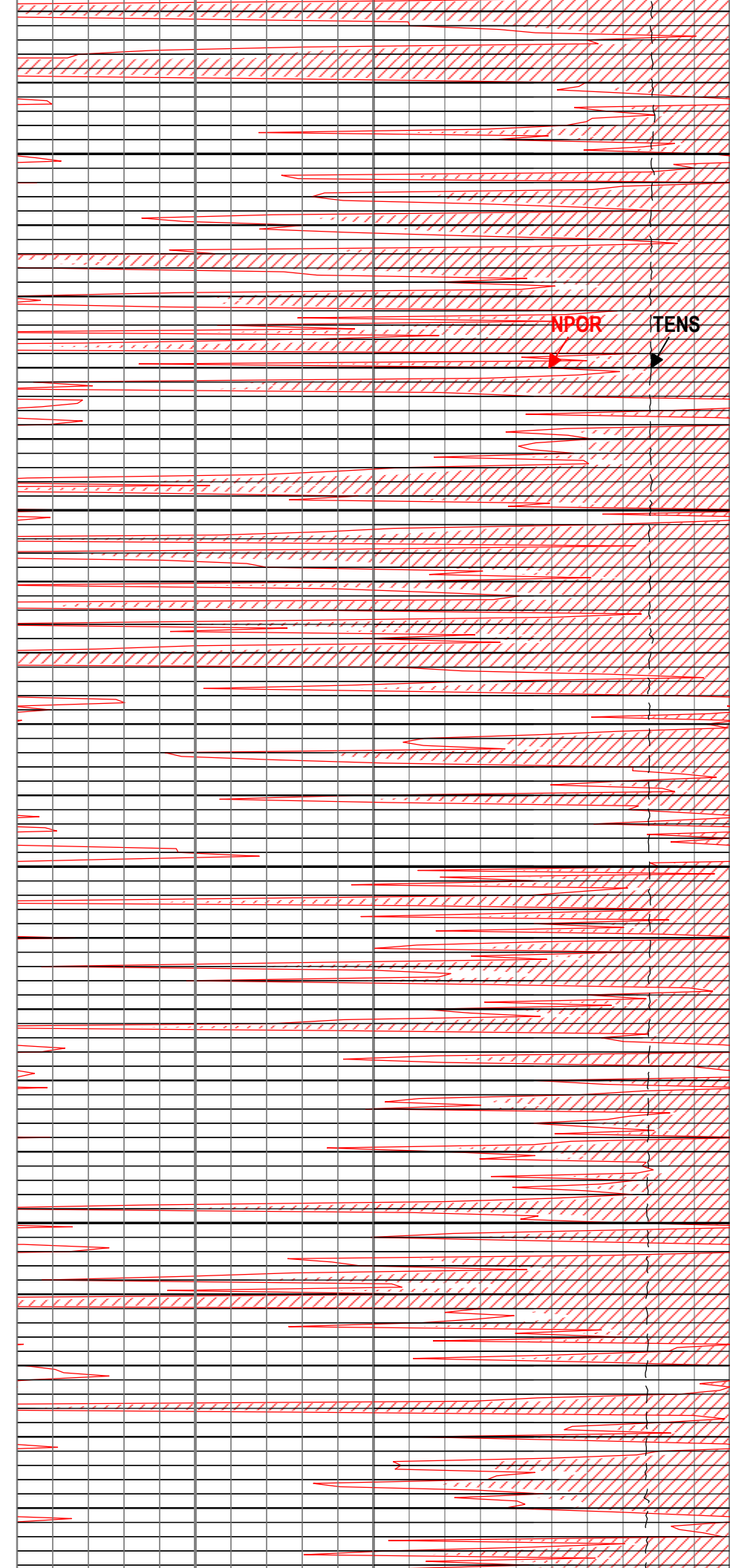
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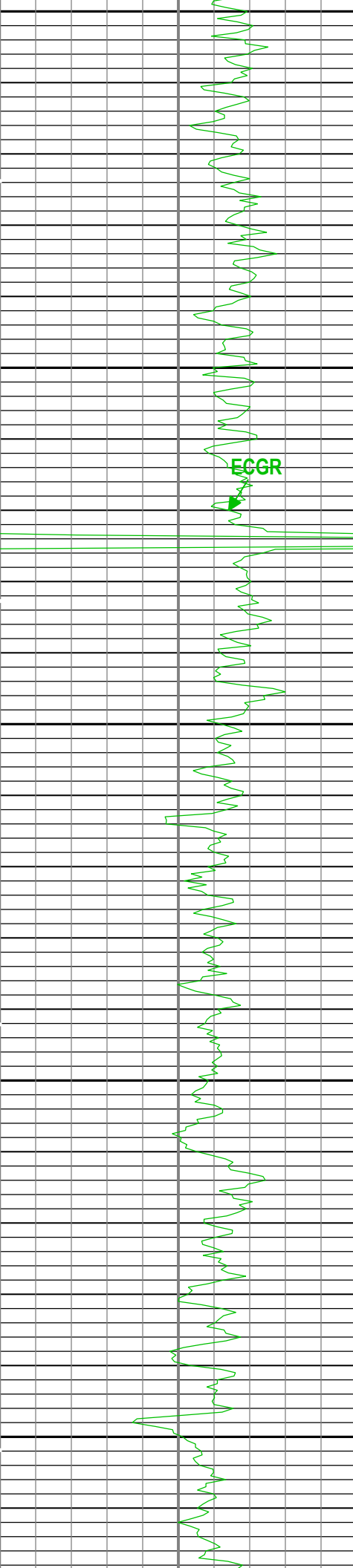


**TENS**



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ECGR



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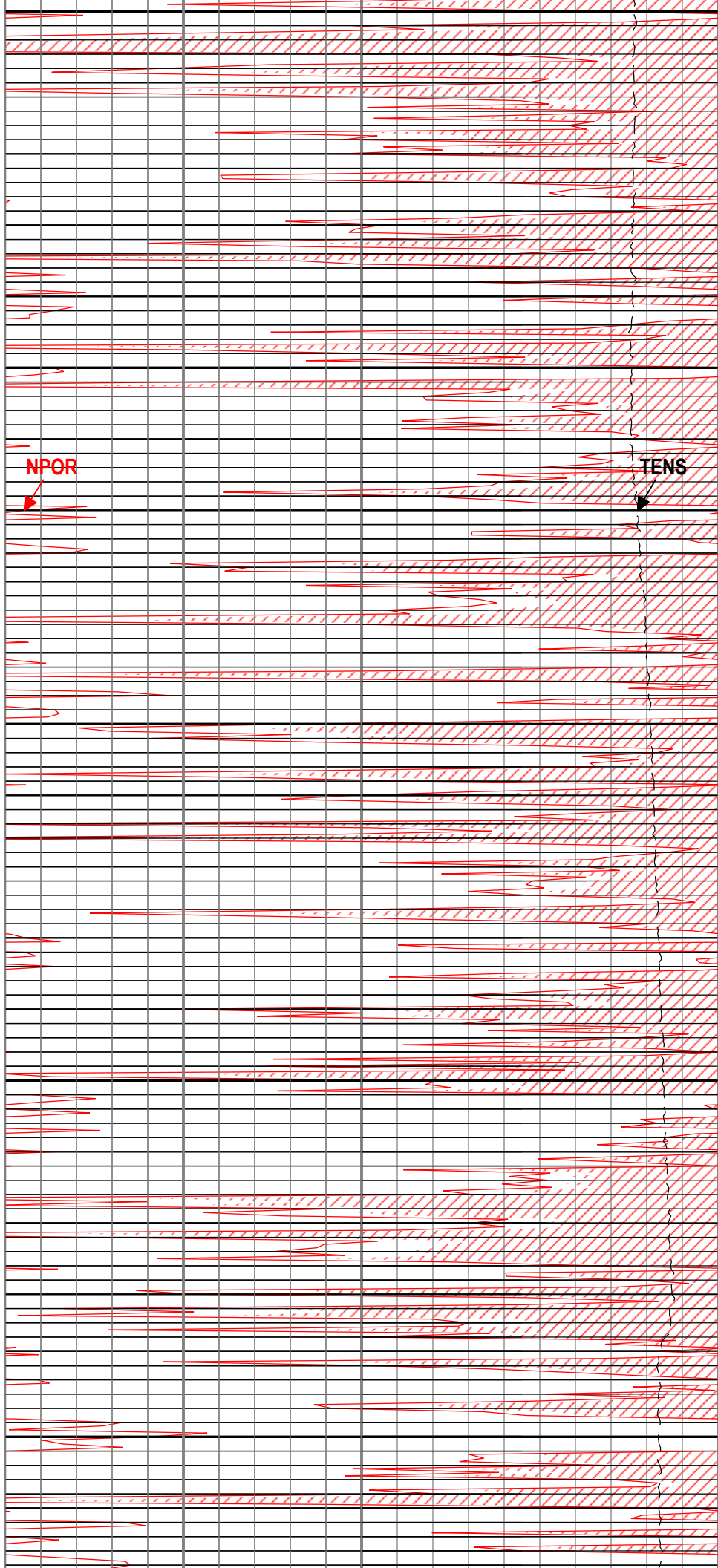
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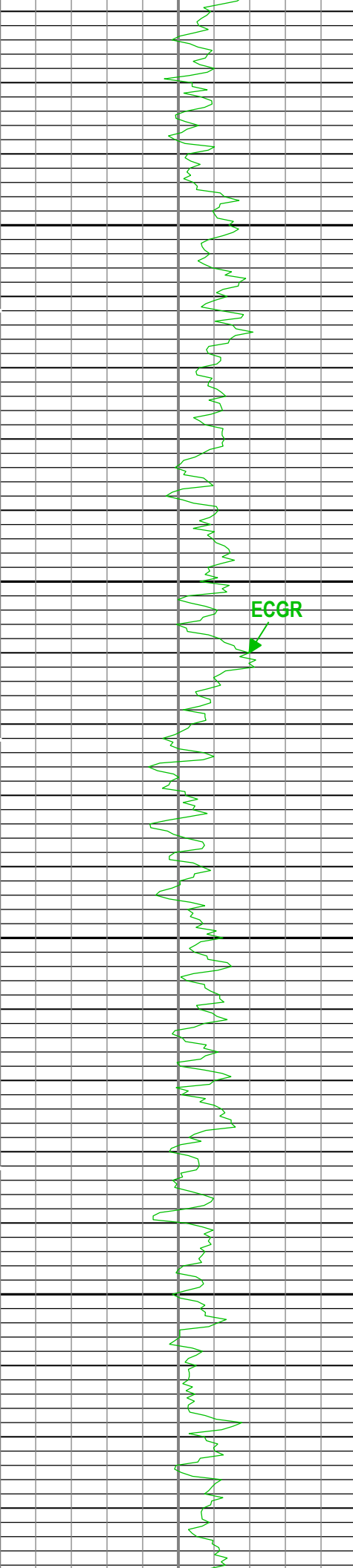
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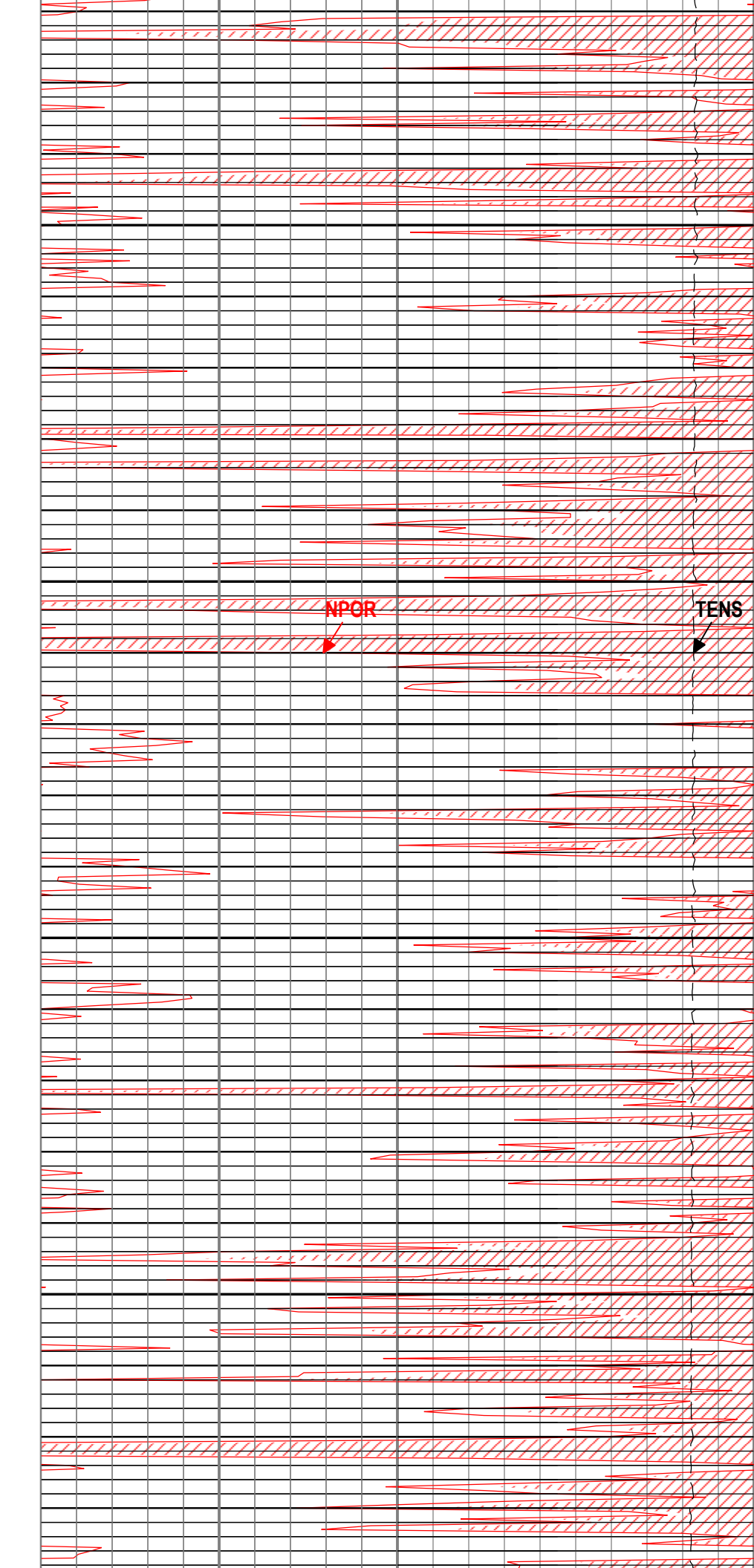
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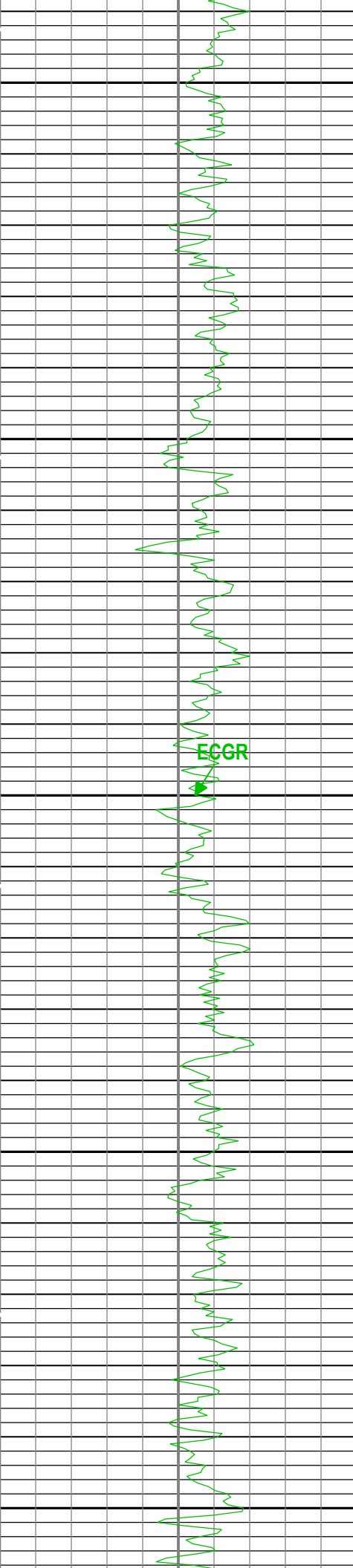




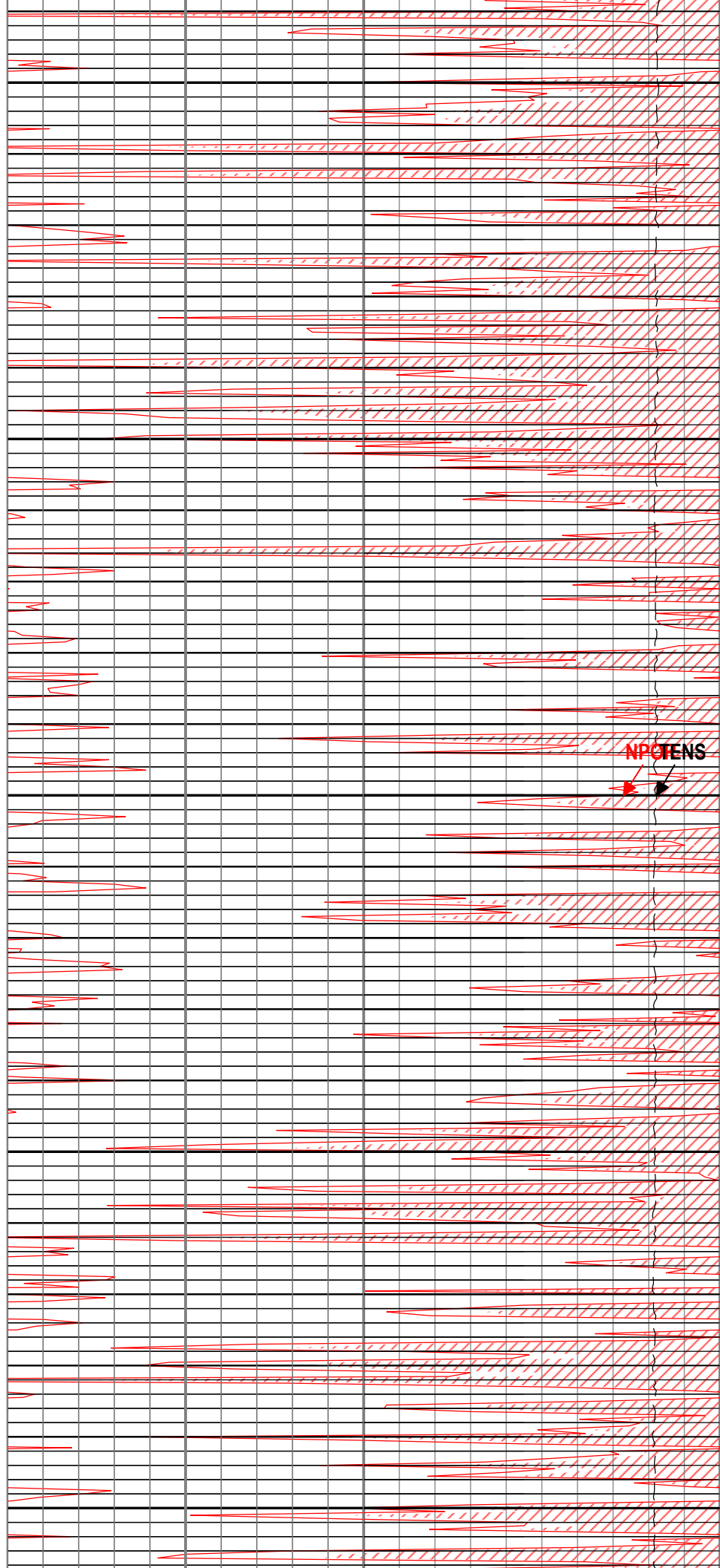


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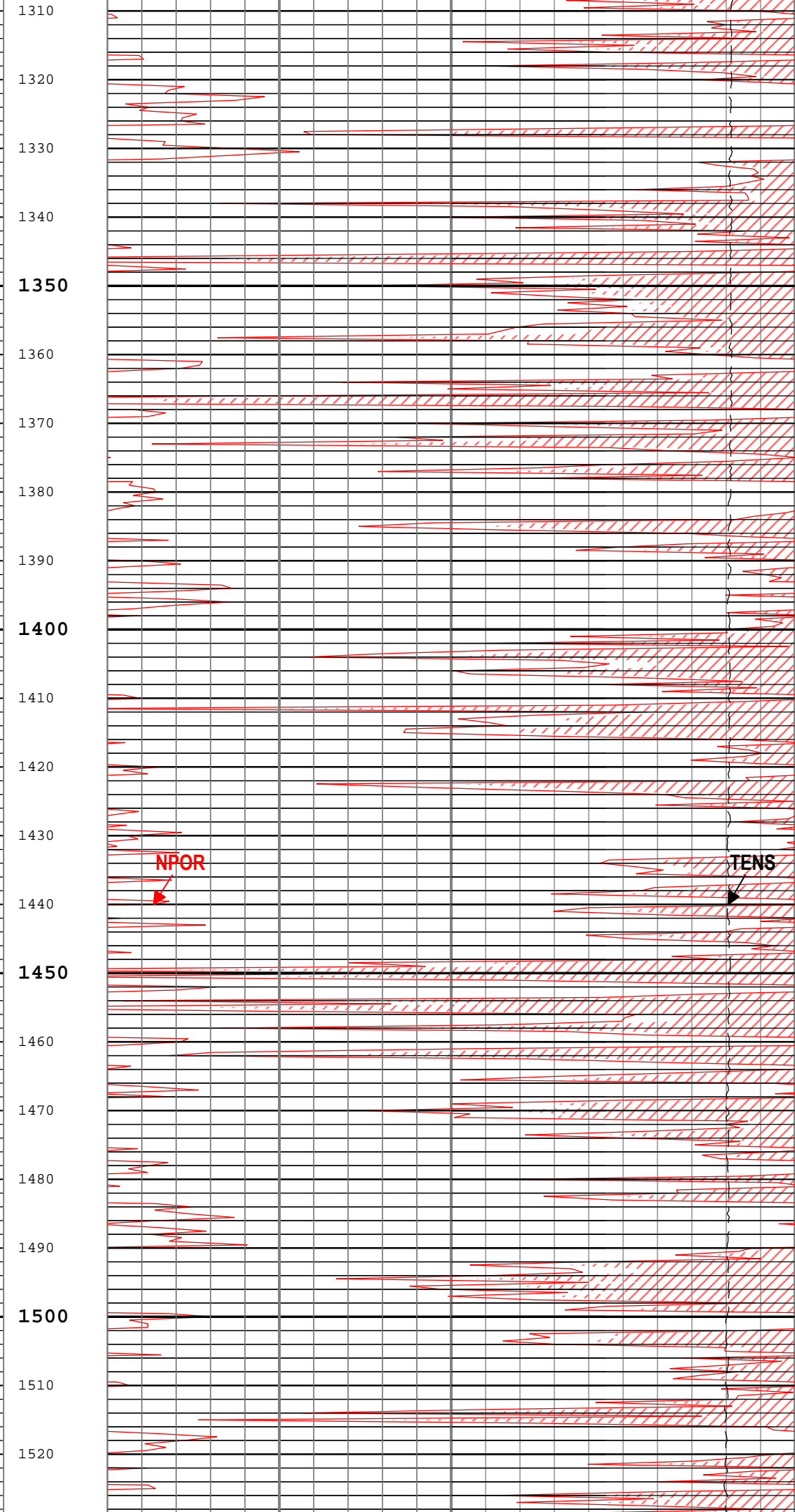
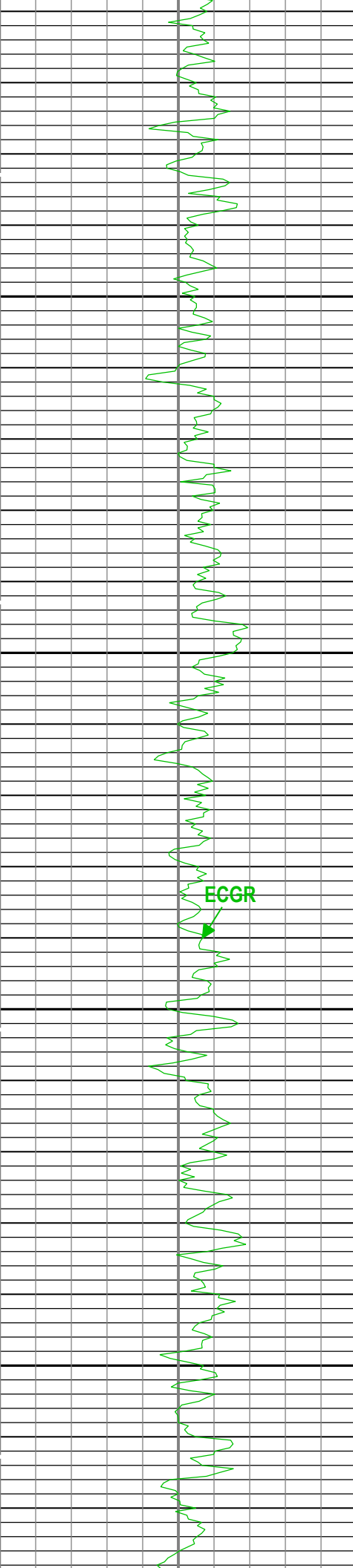


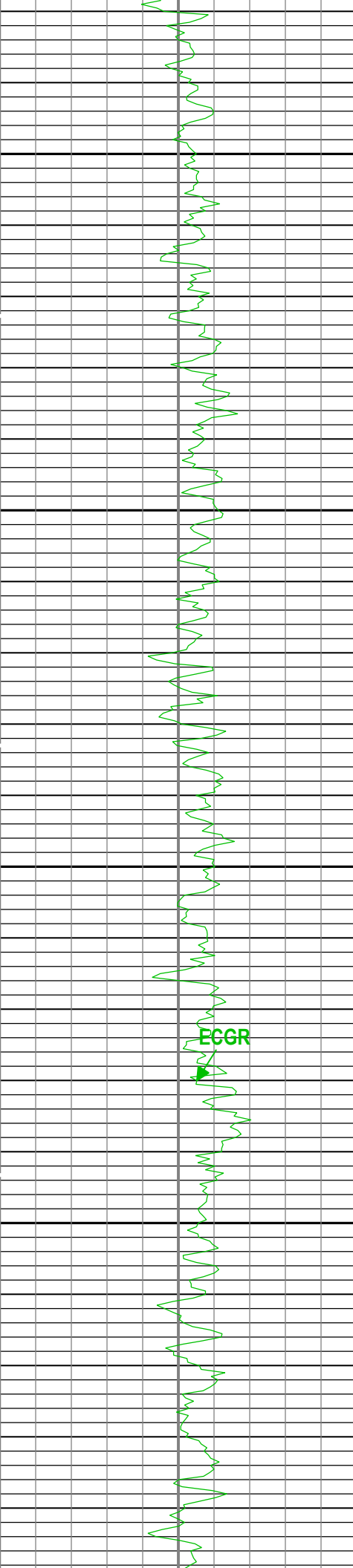


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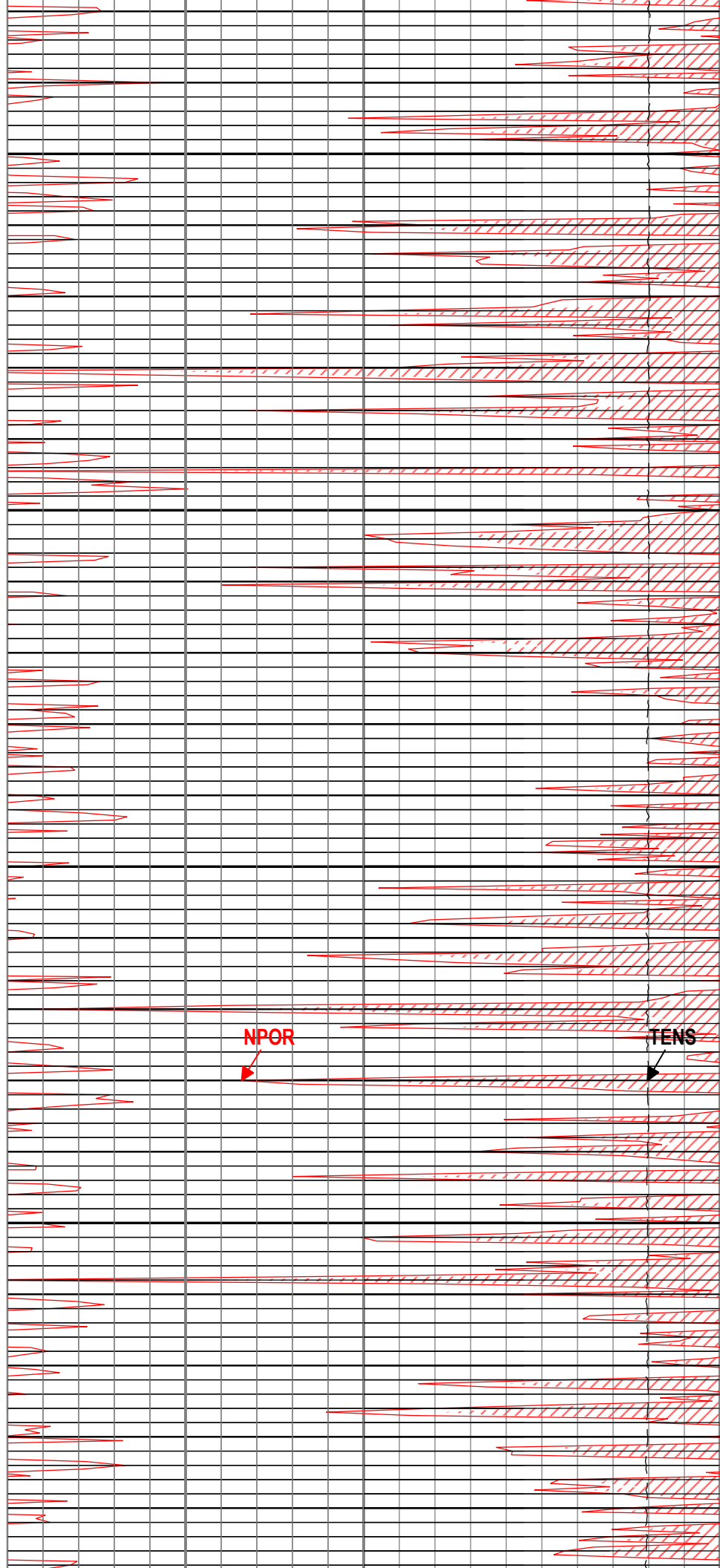


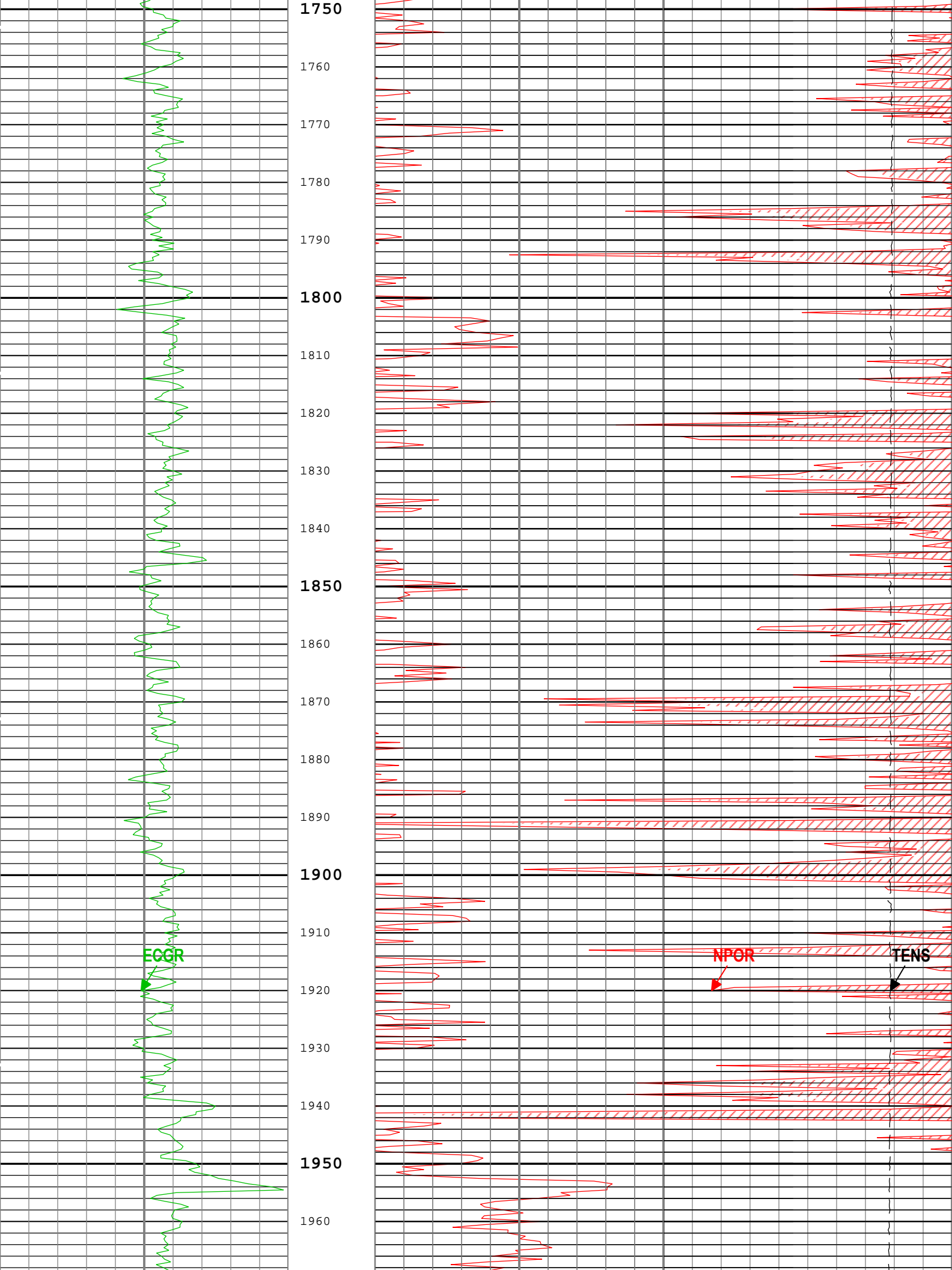
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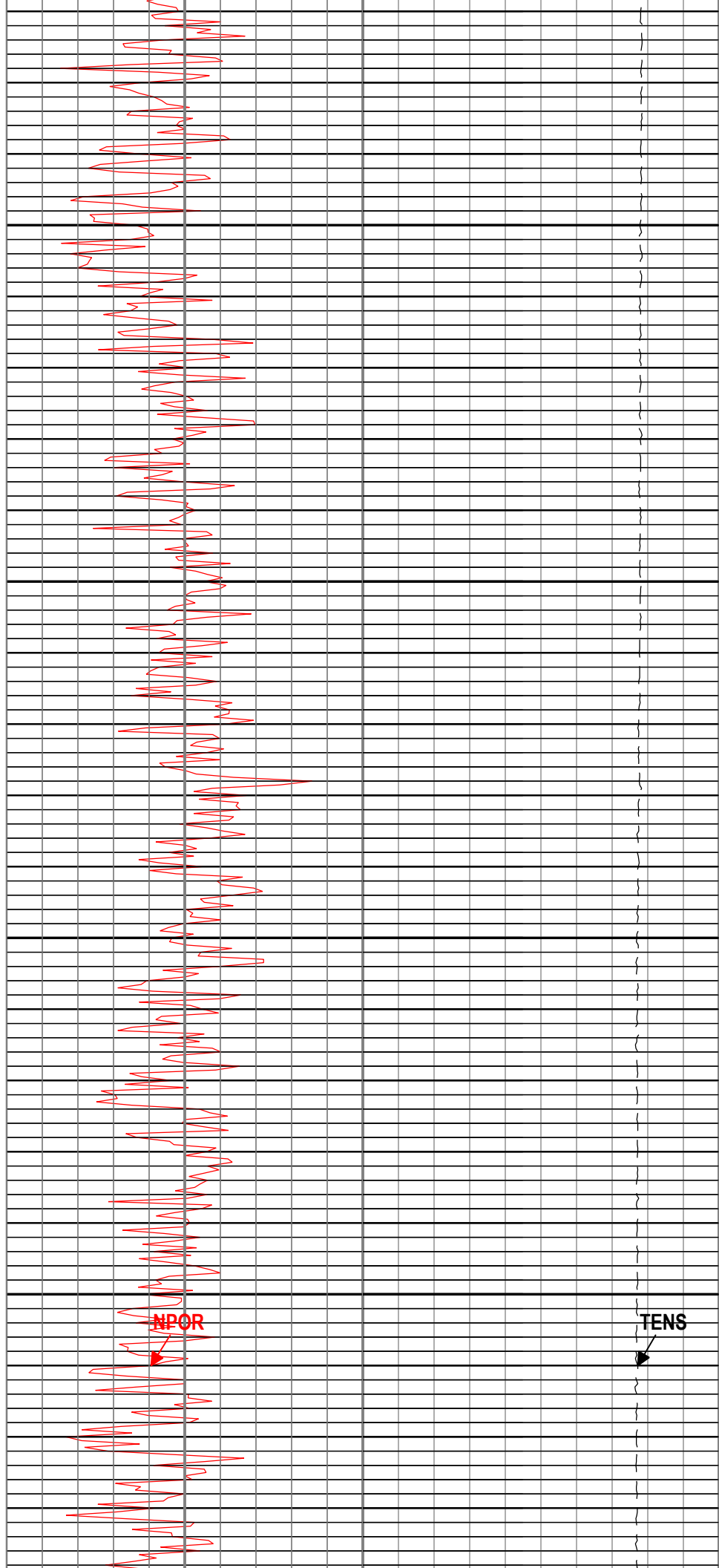
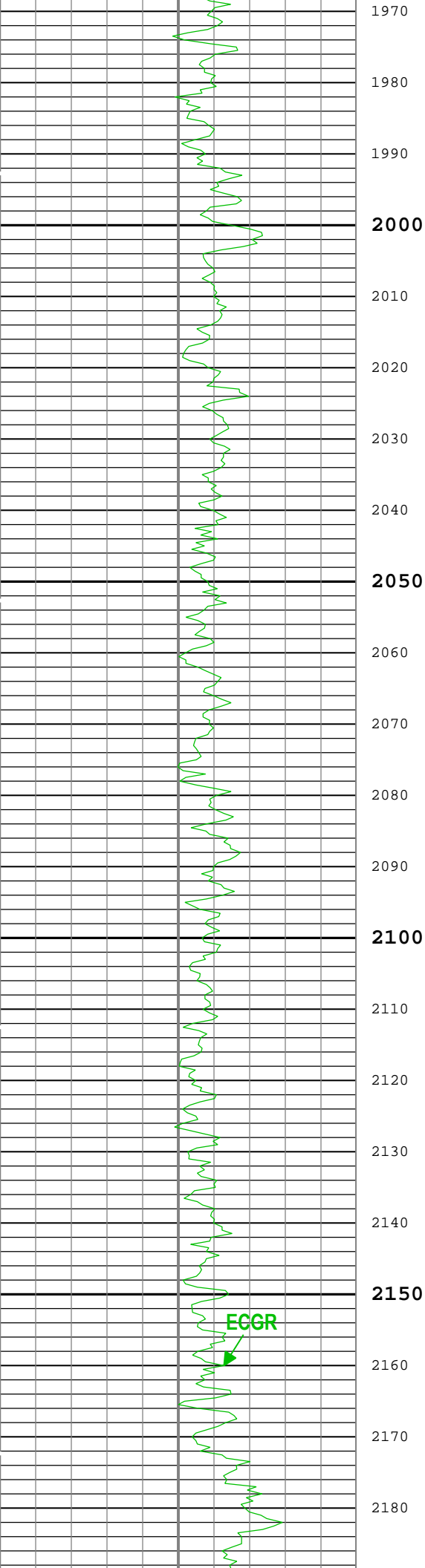


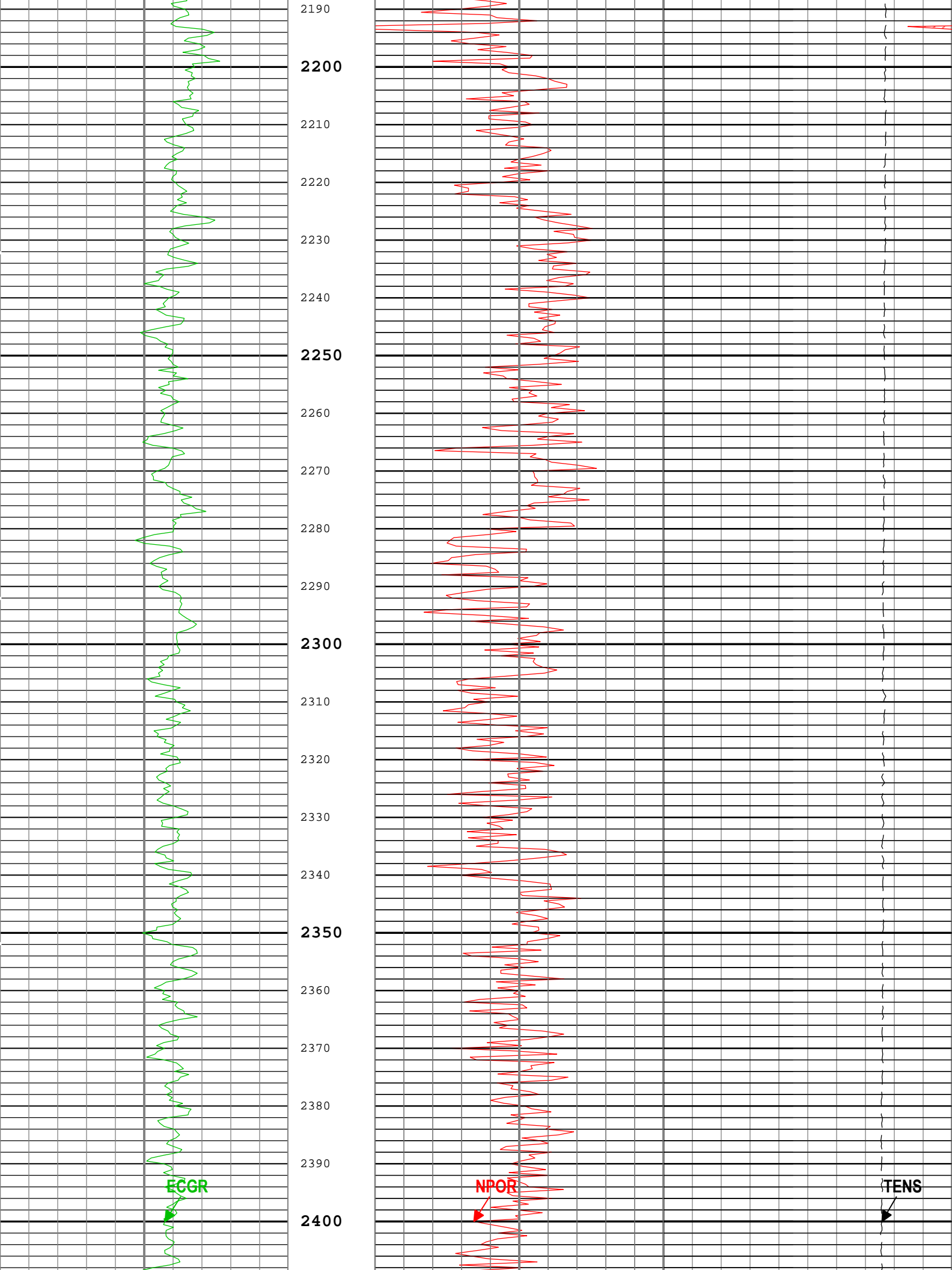


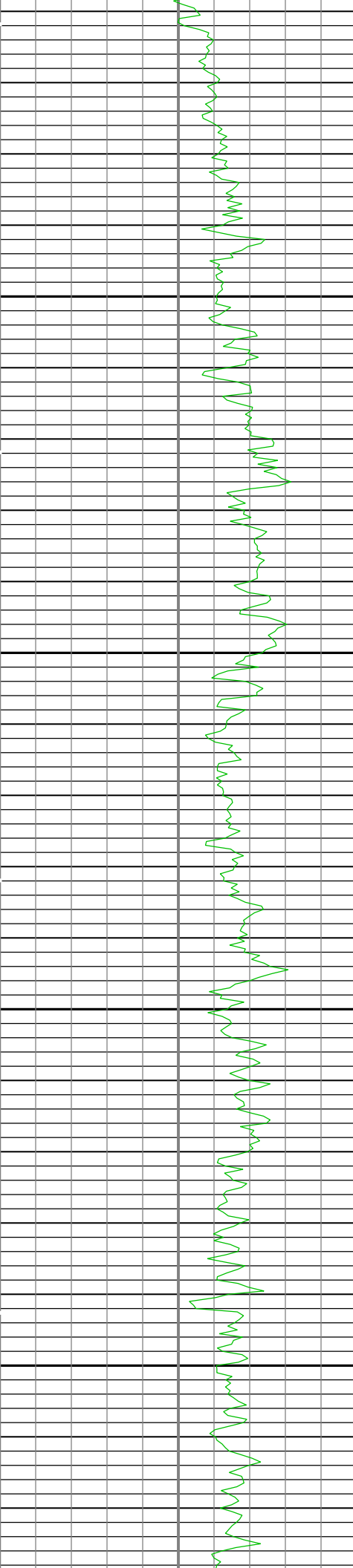
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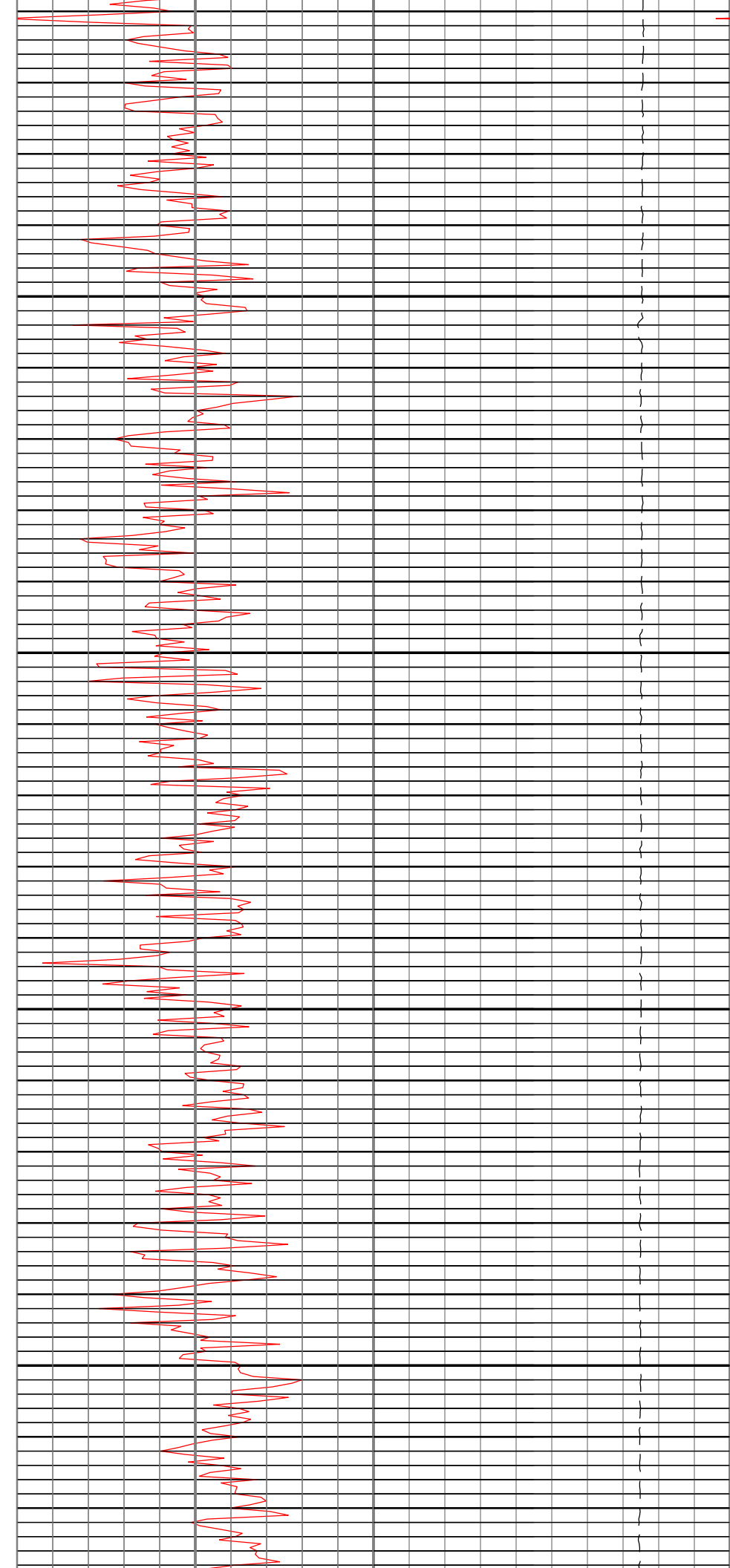




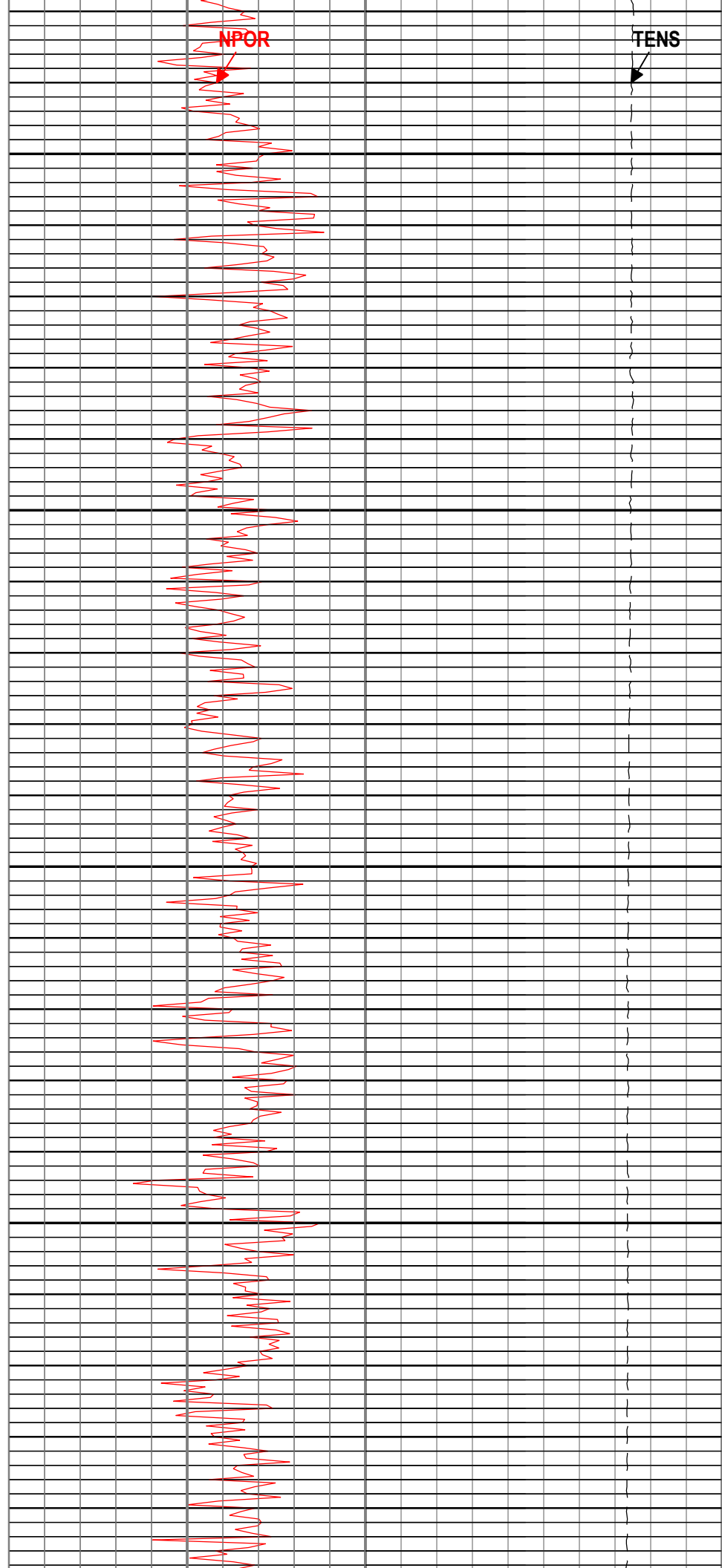
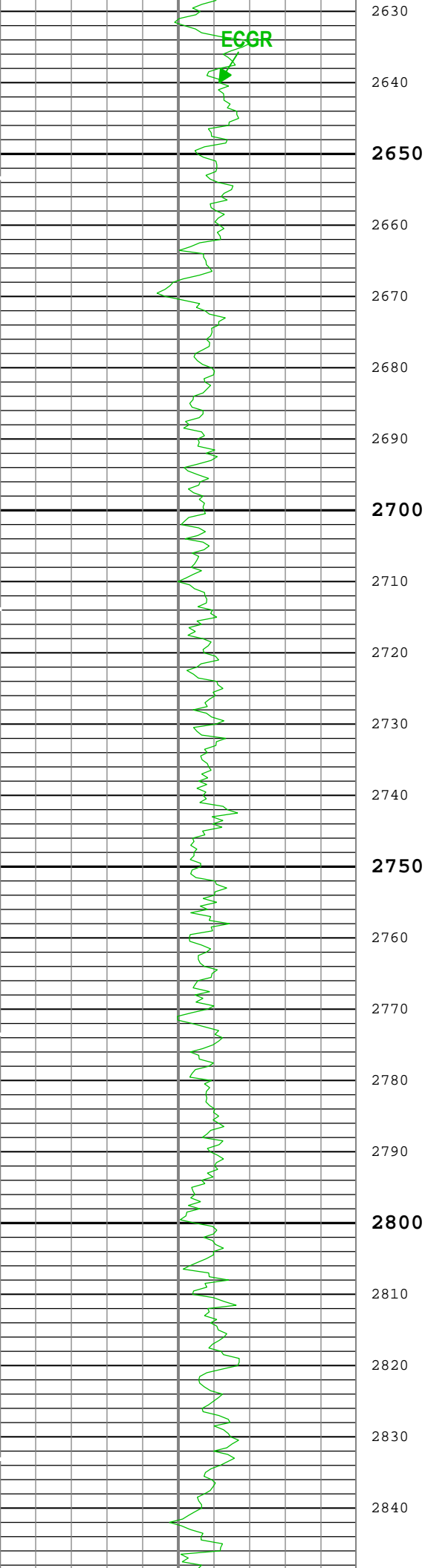


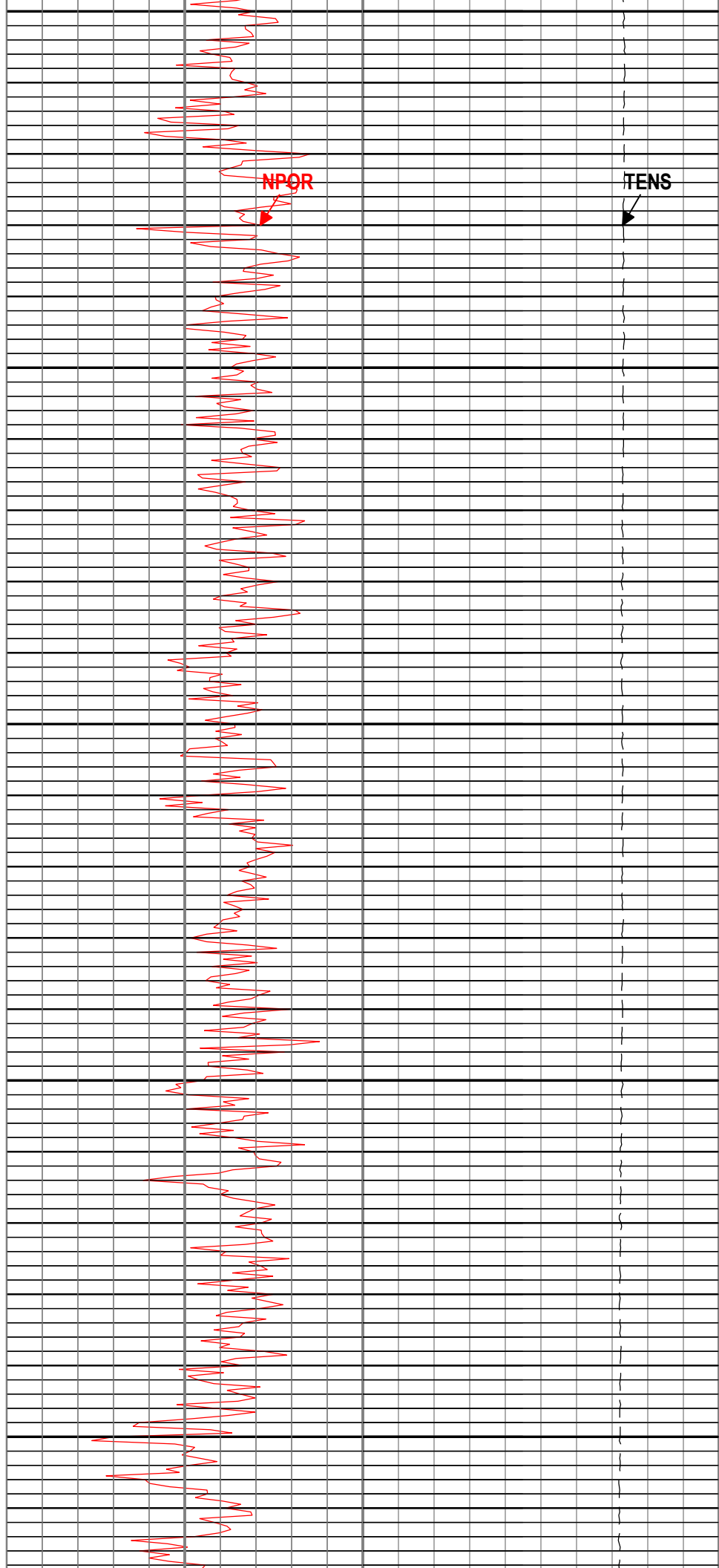
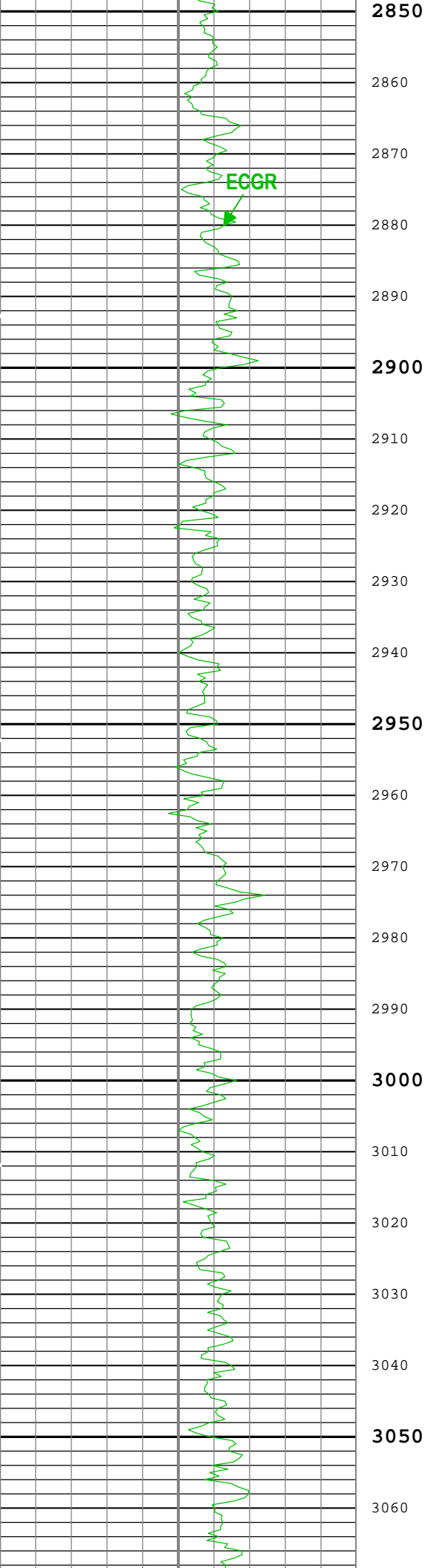


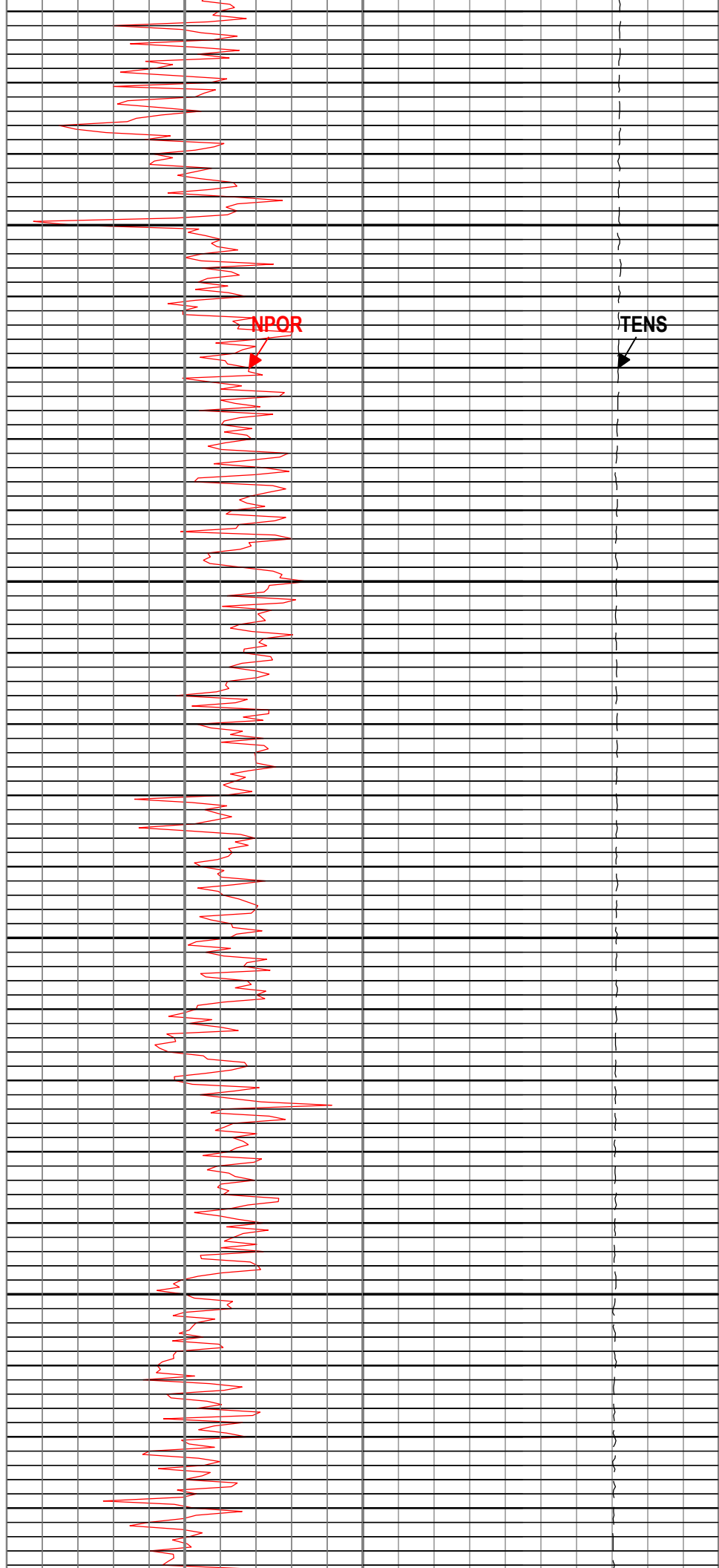
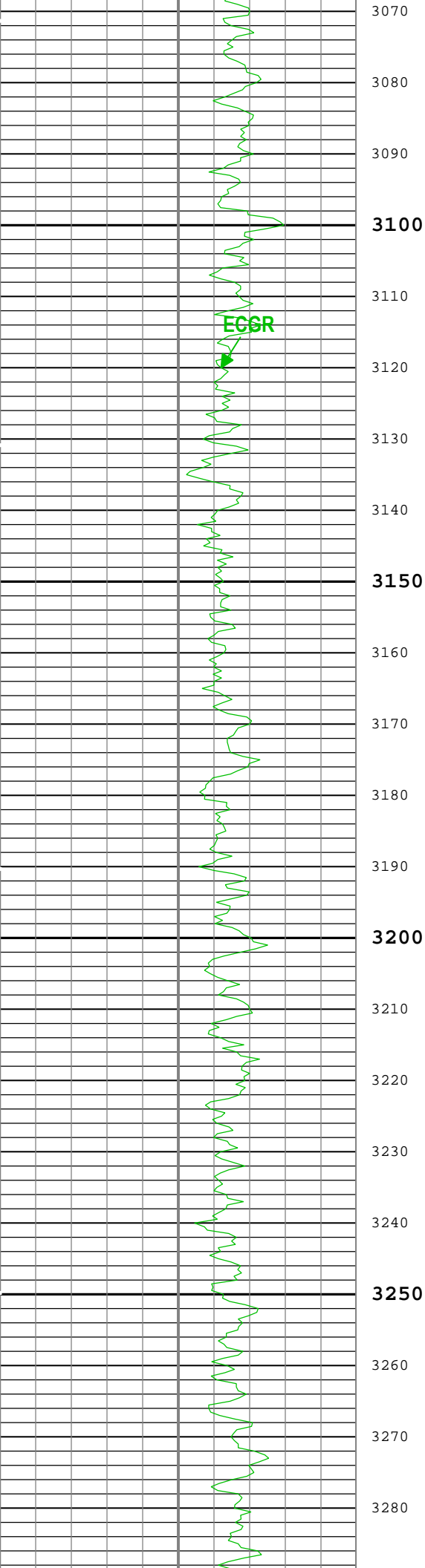
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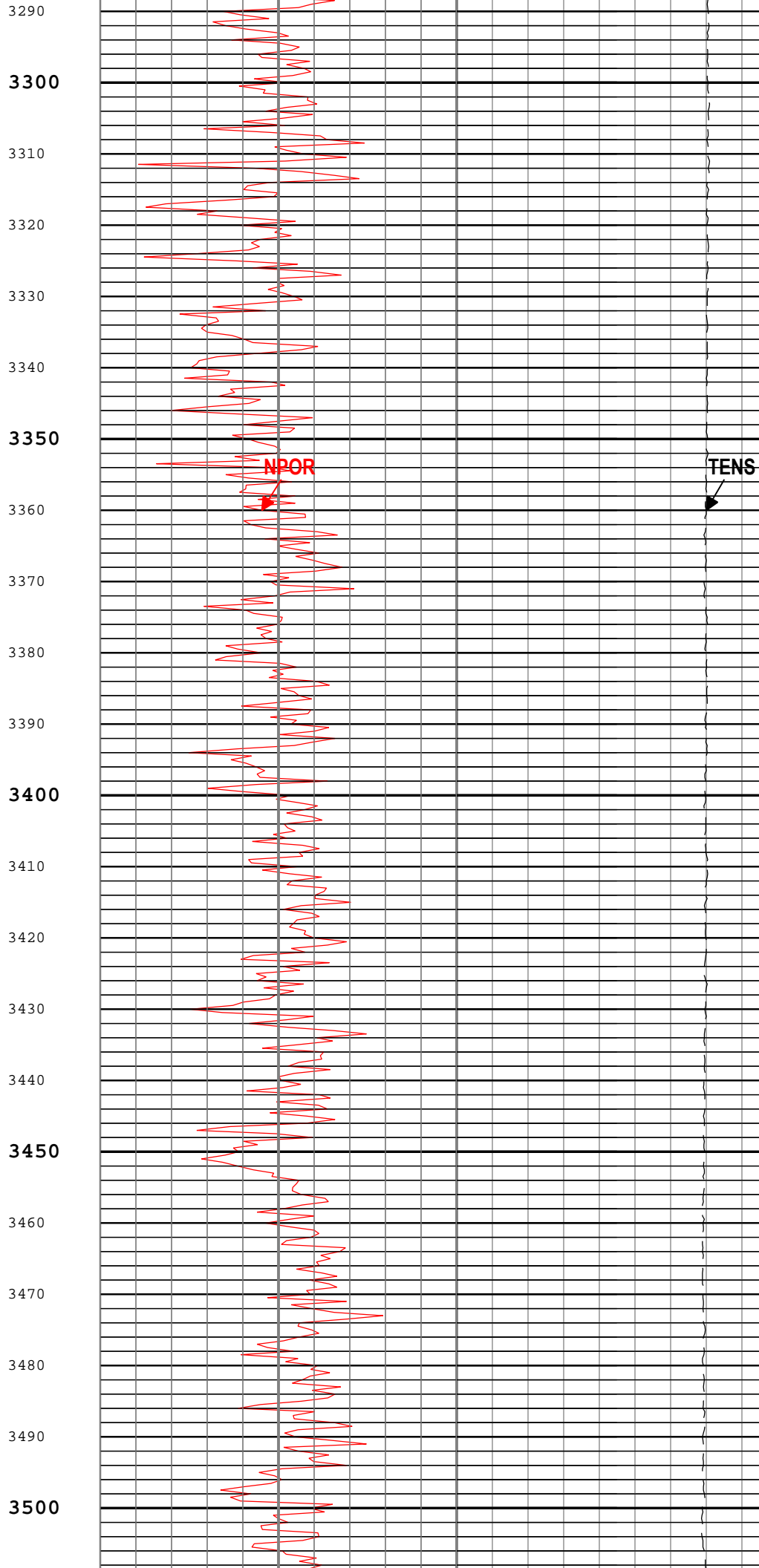
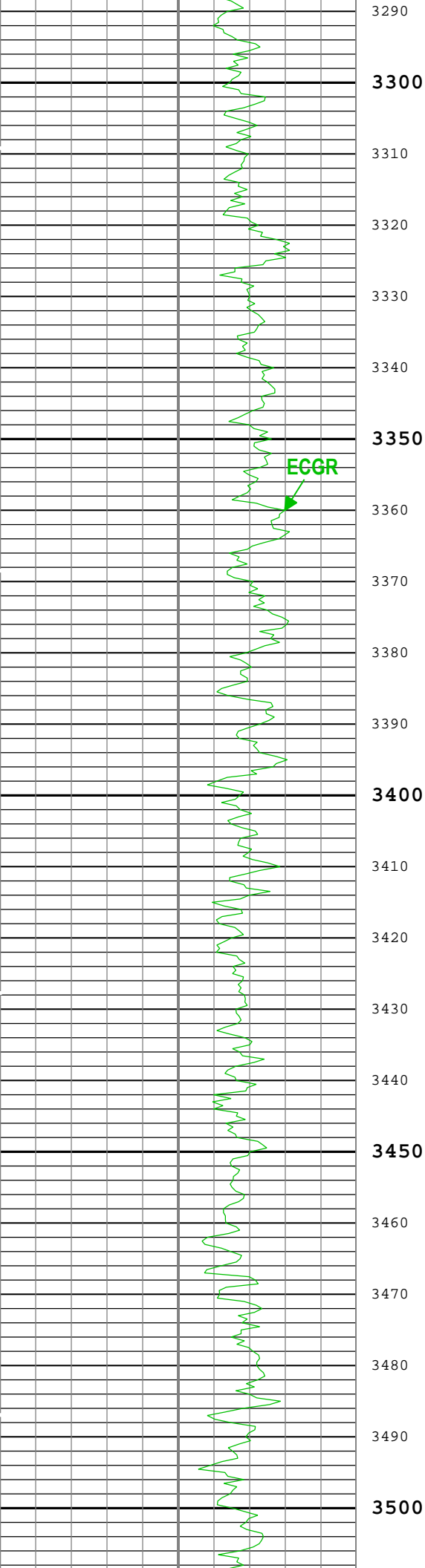


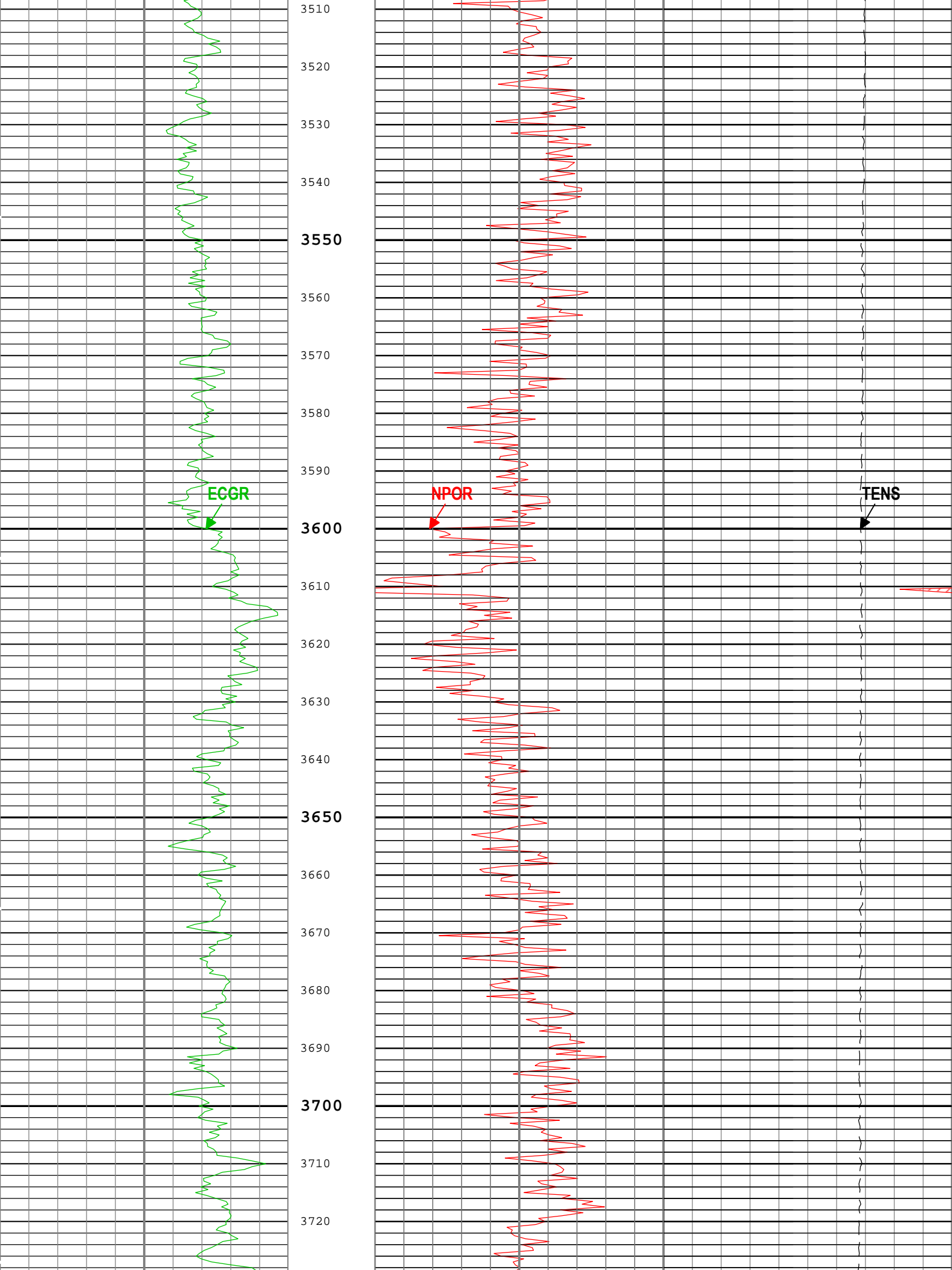


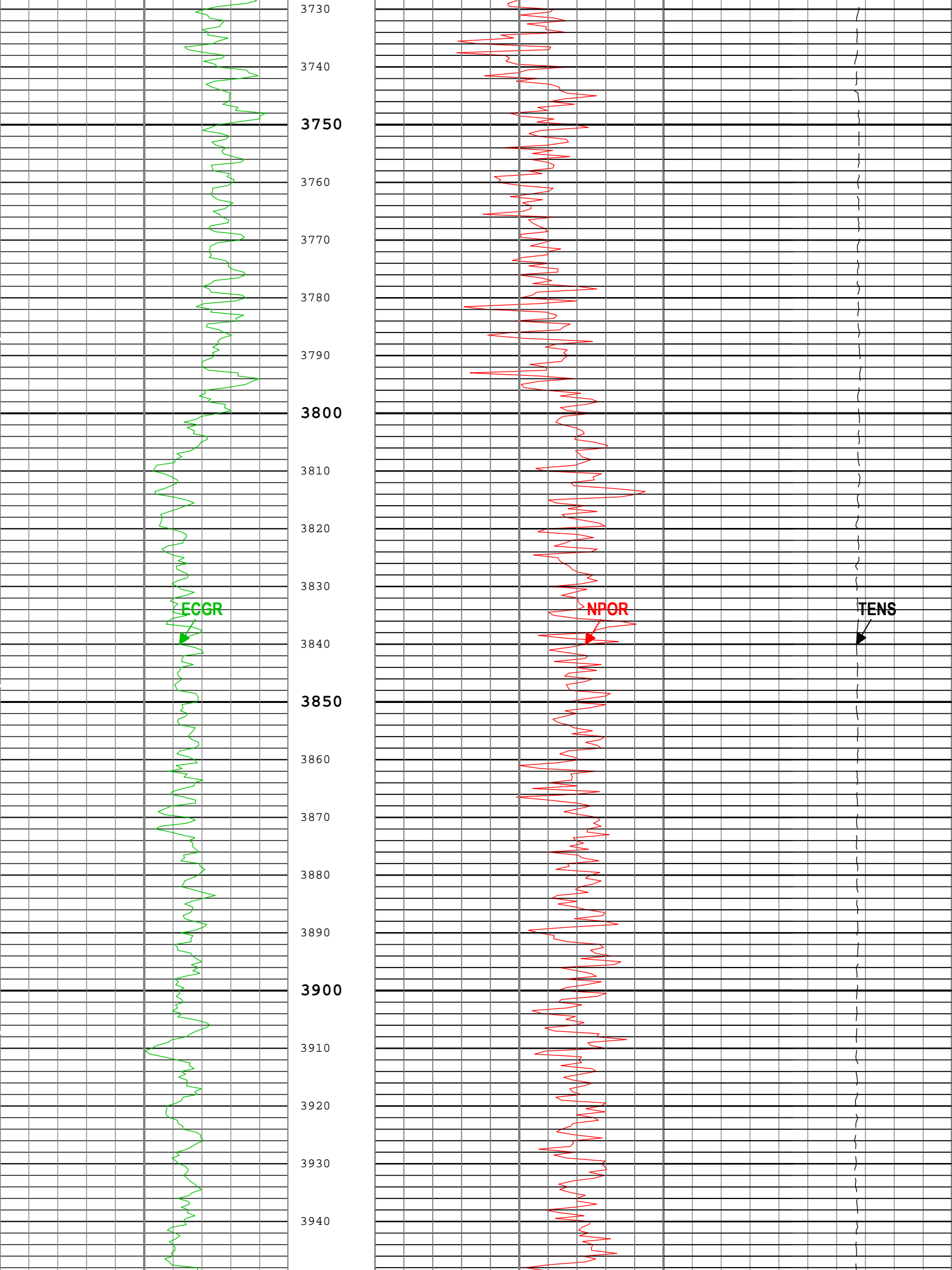


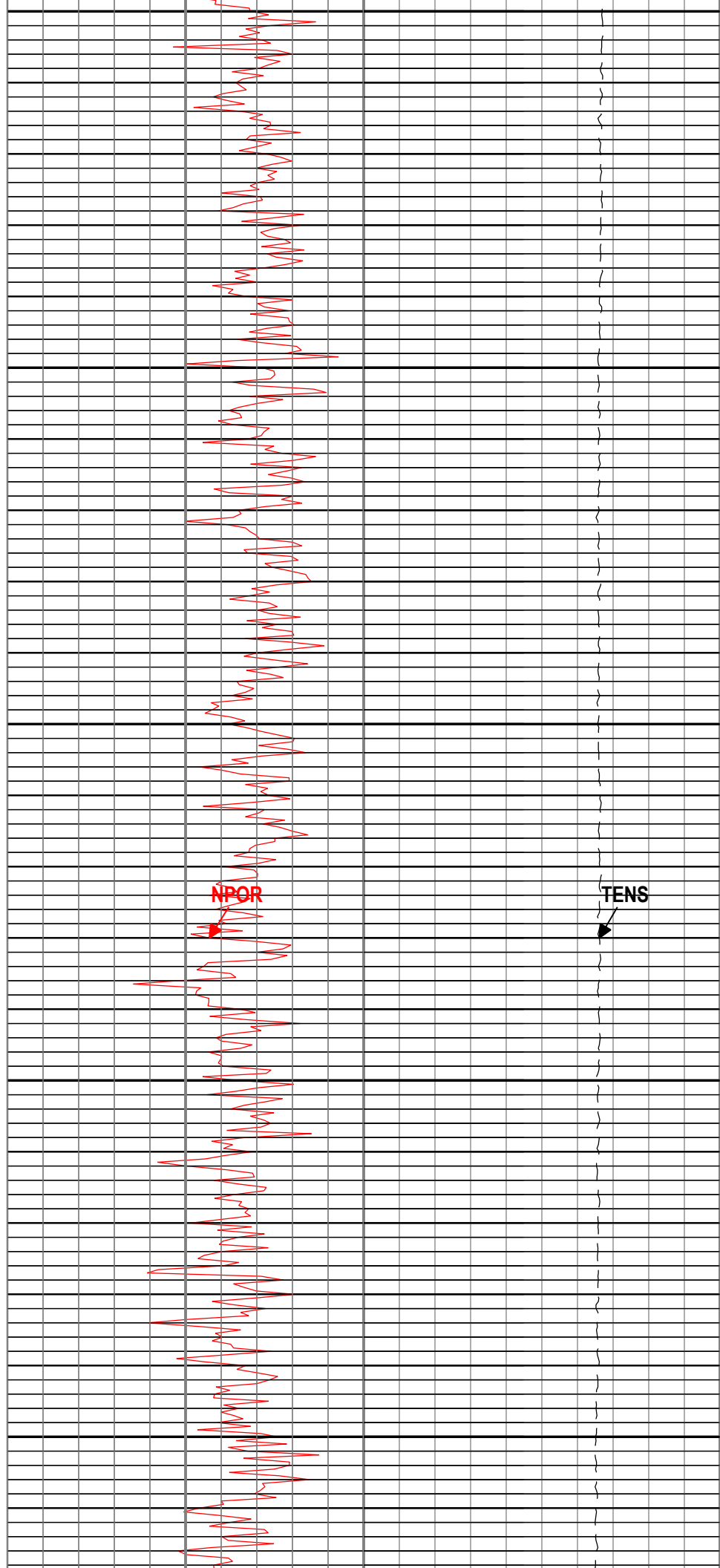
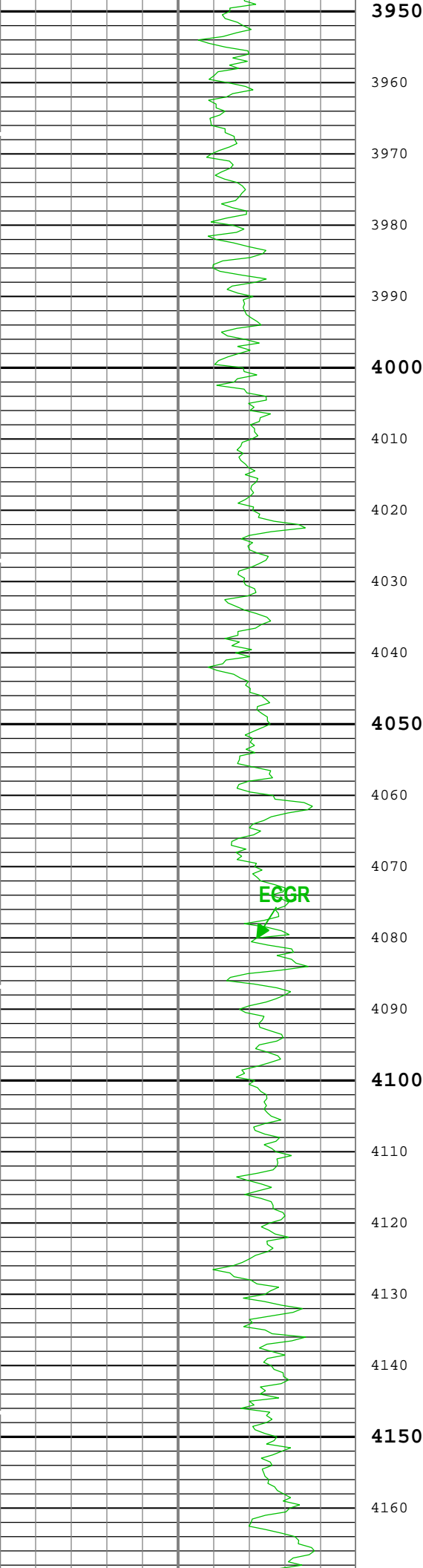


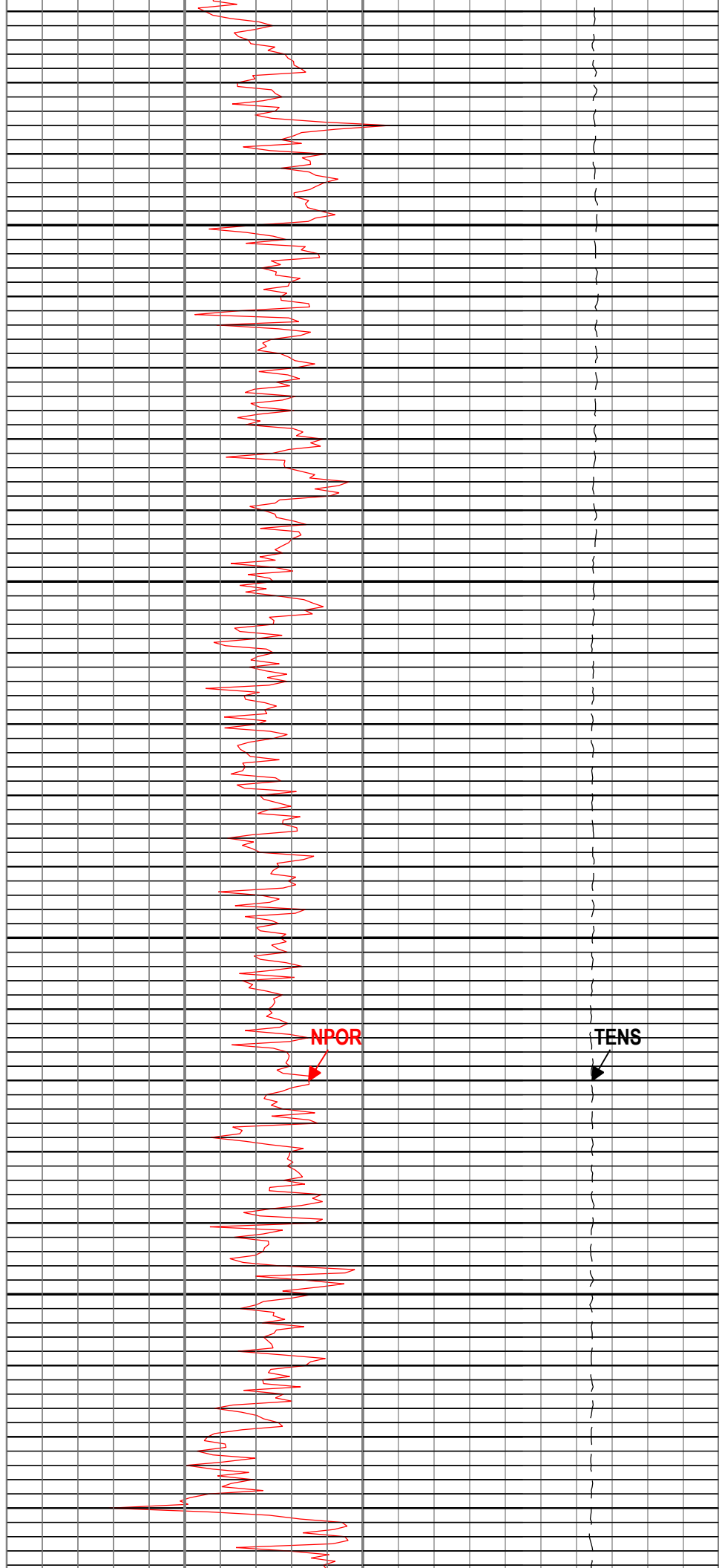
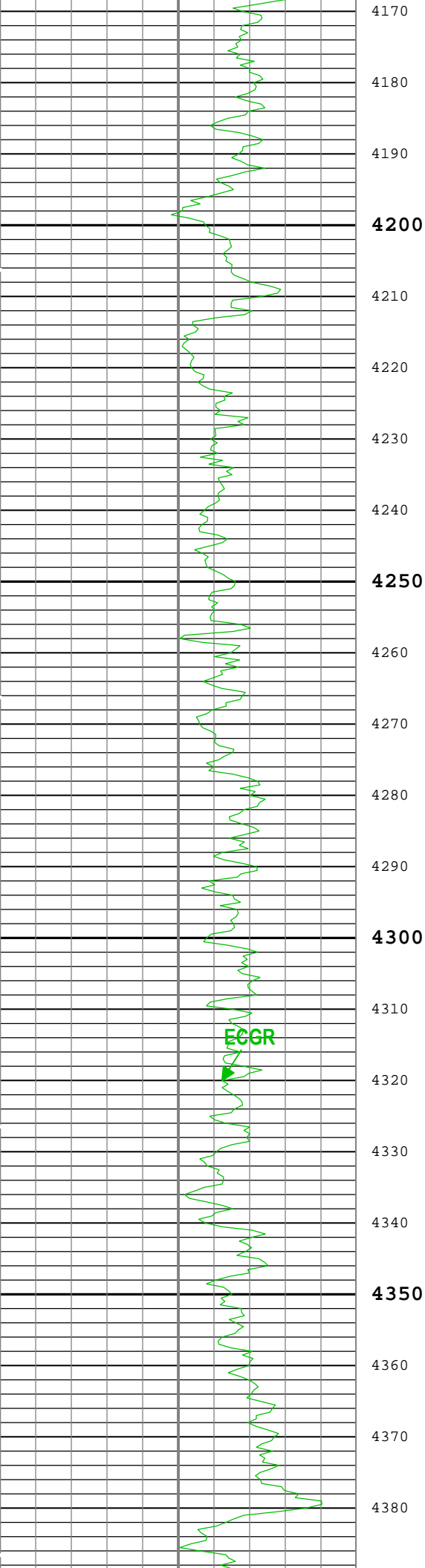




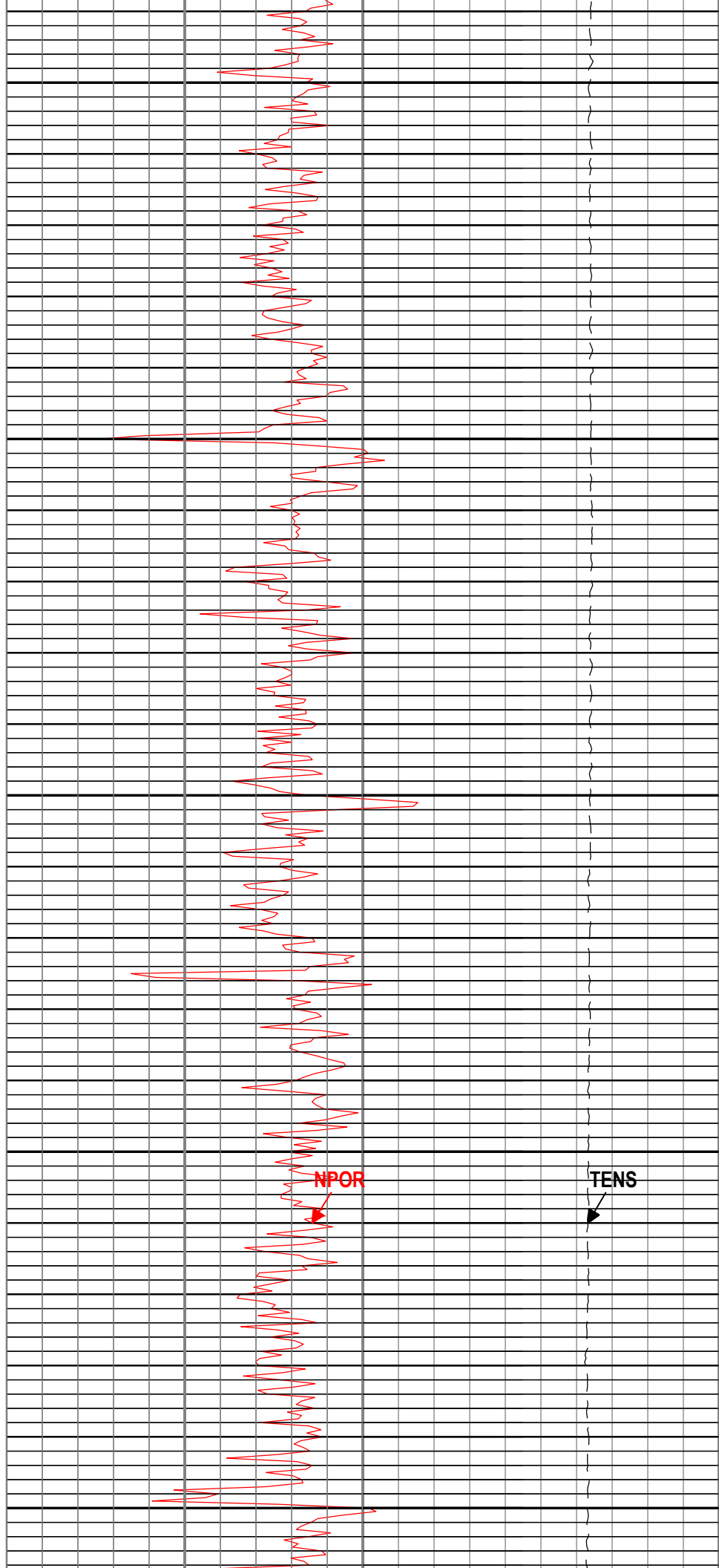
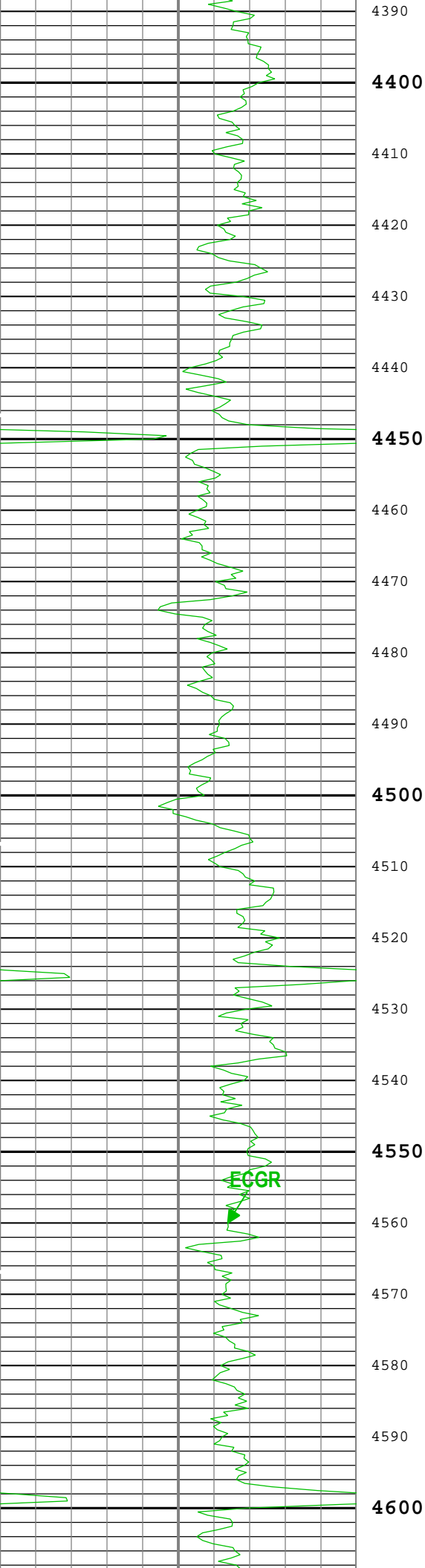


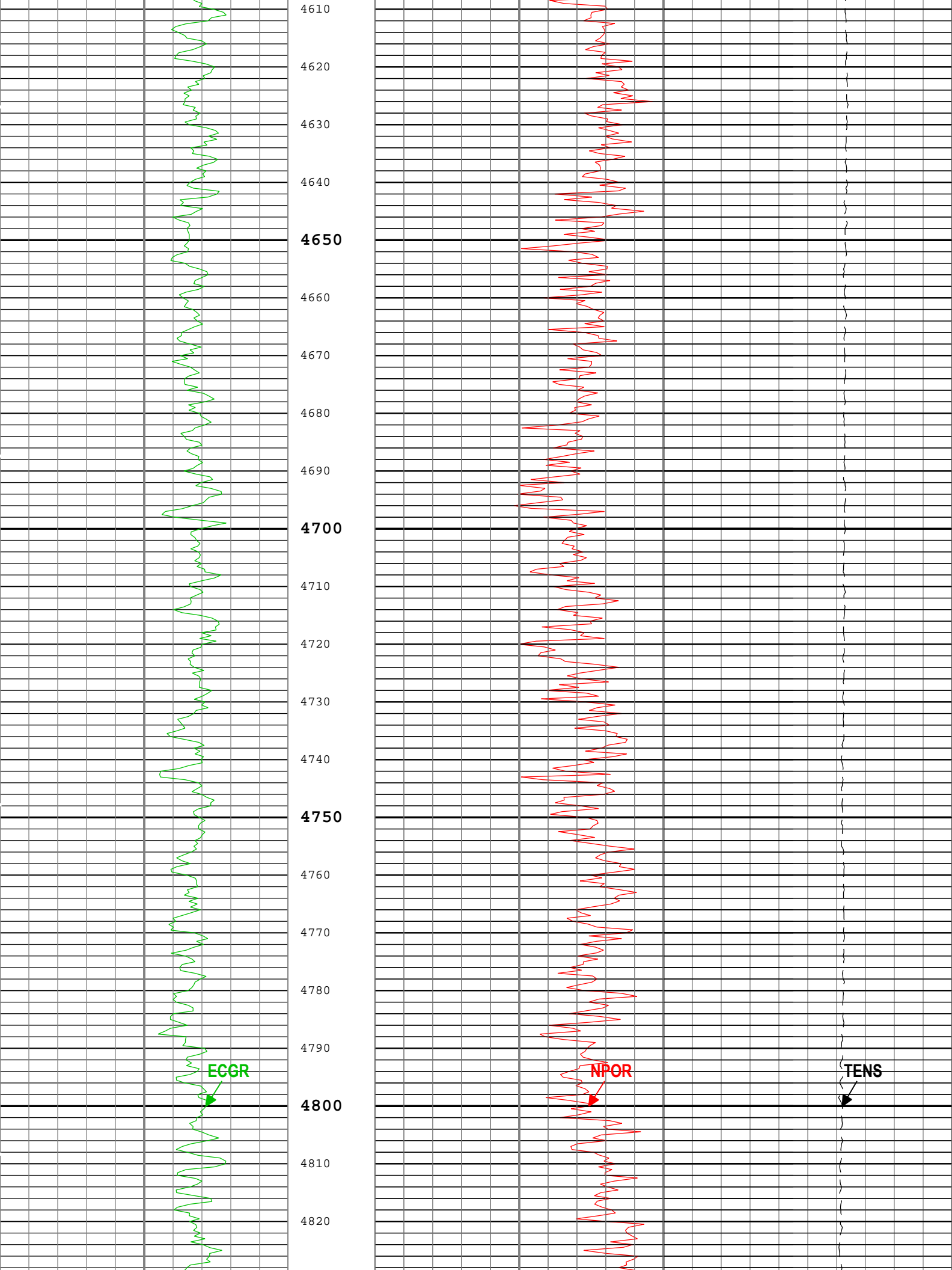


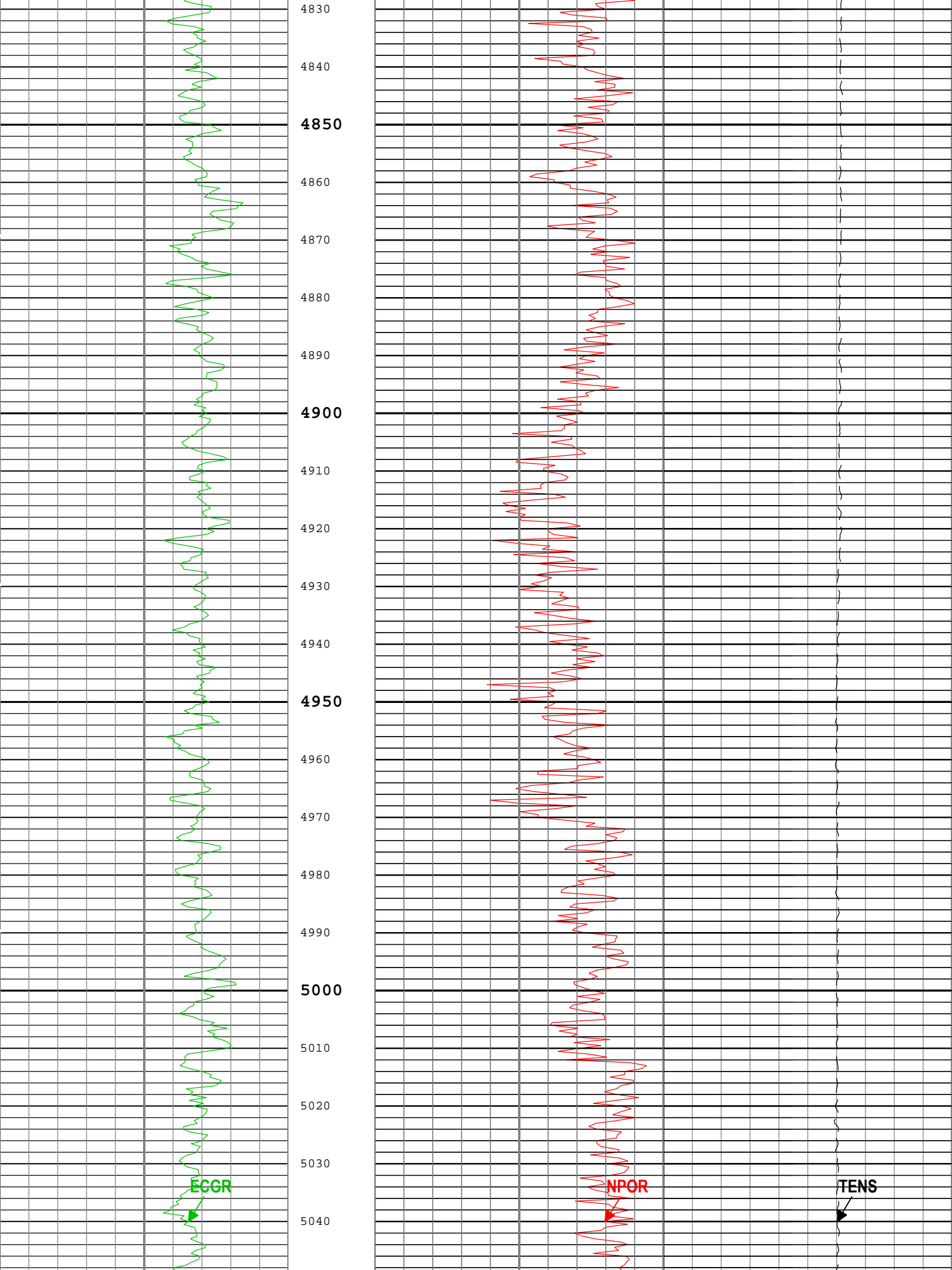


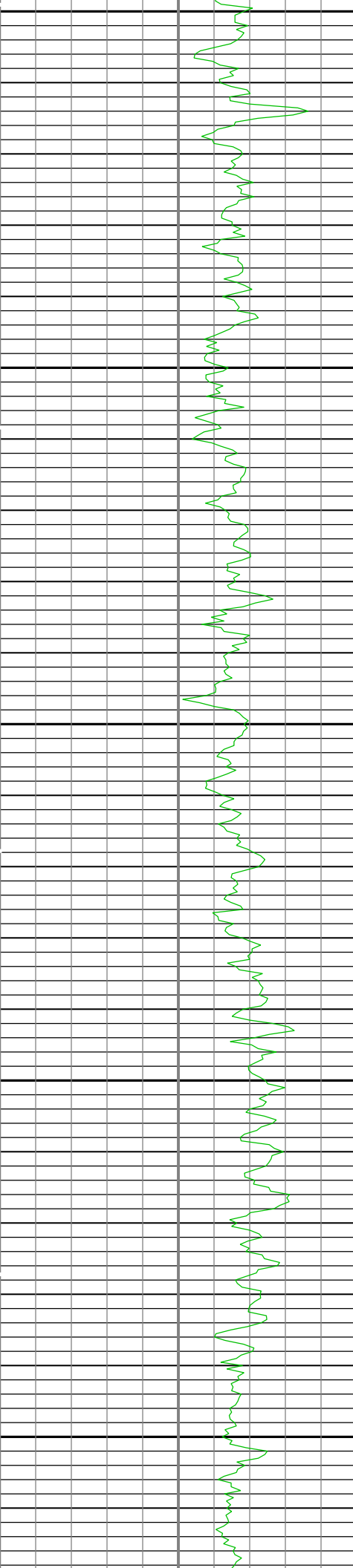












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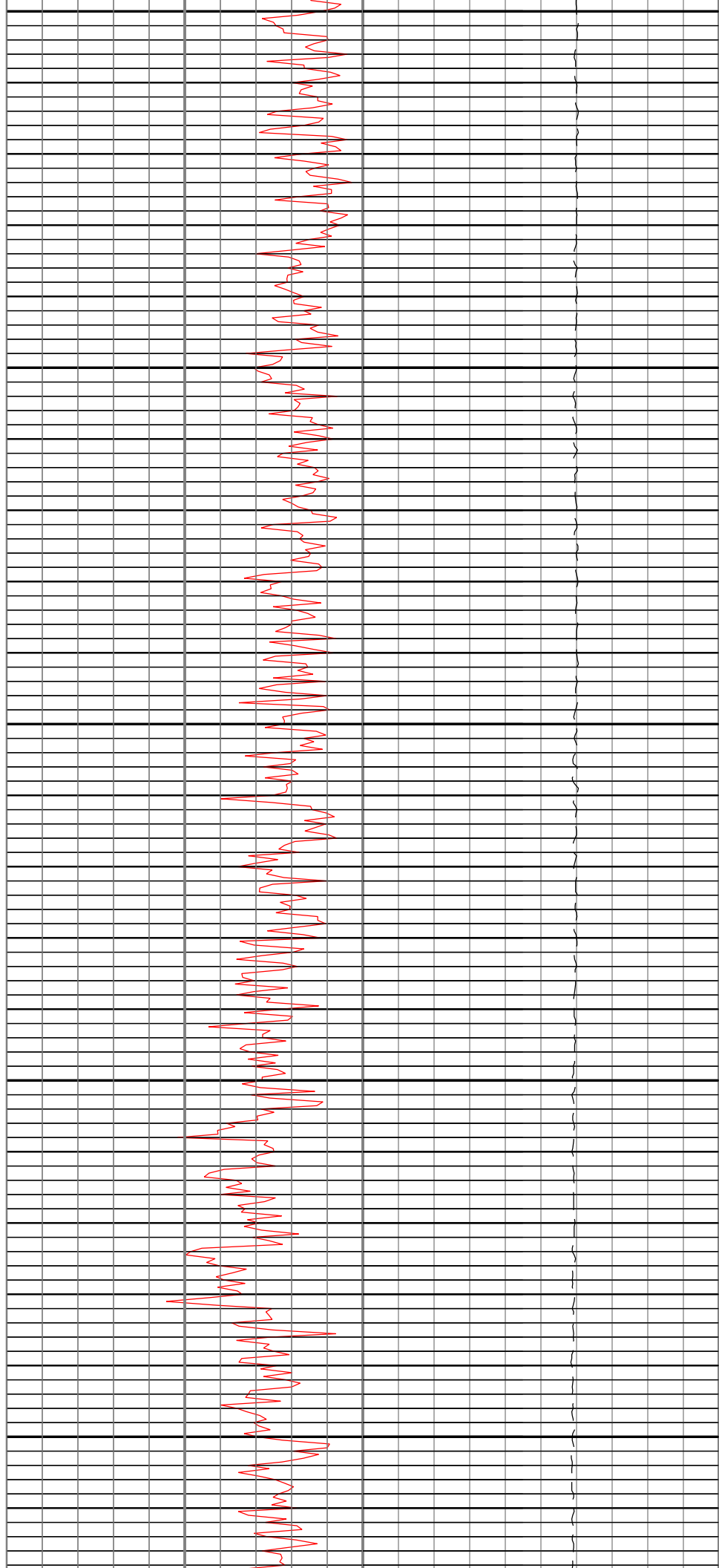
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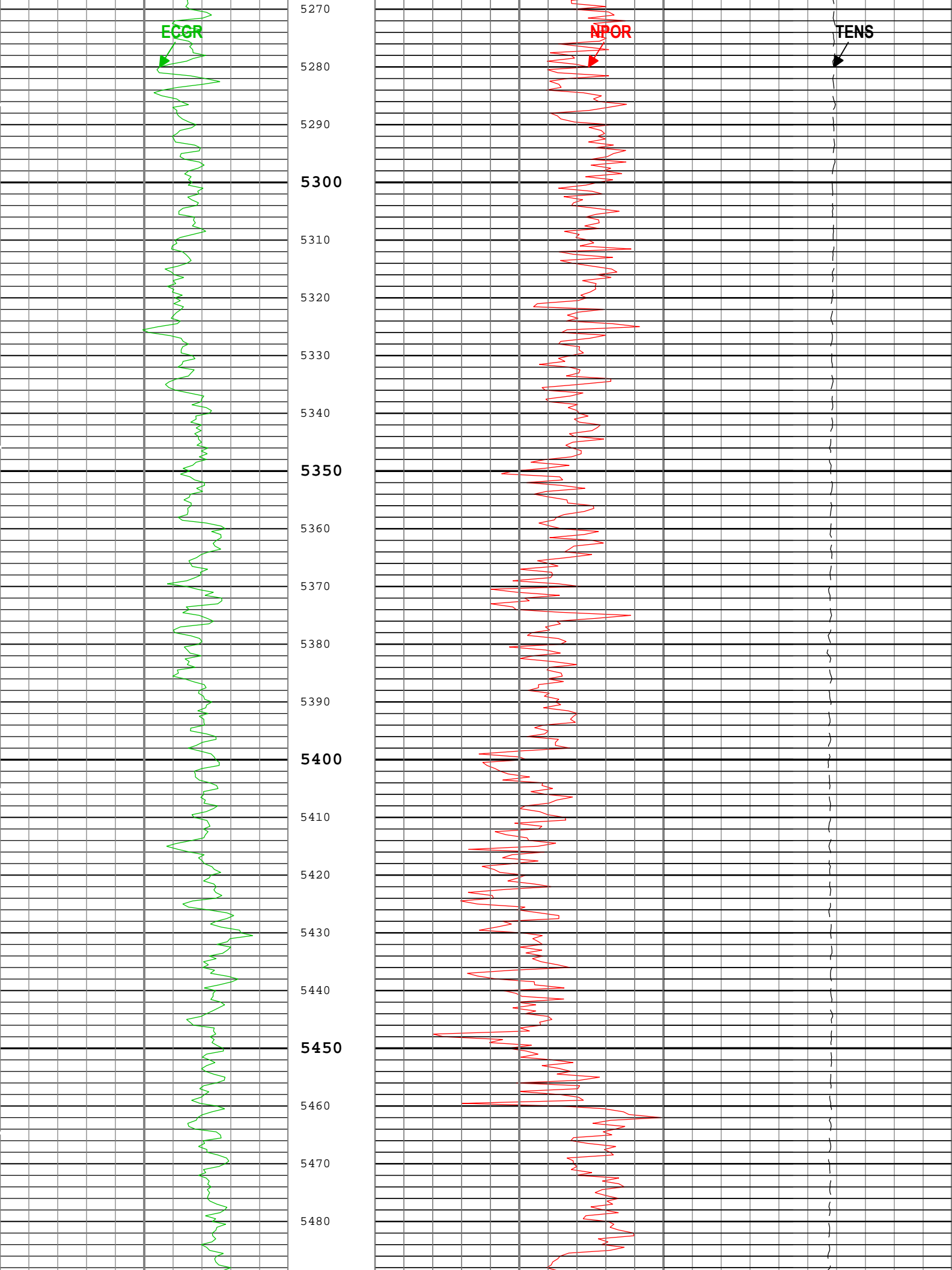
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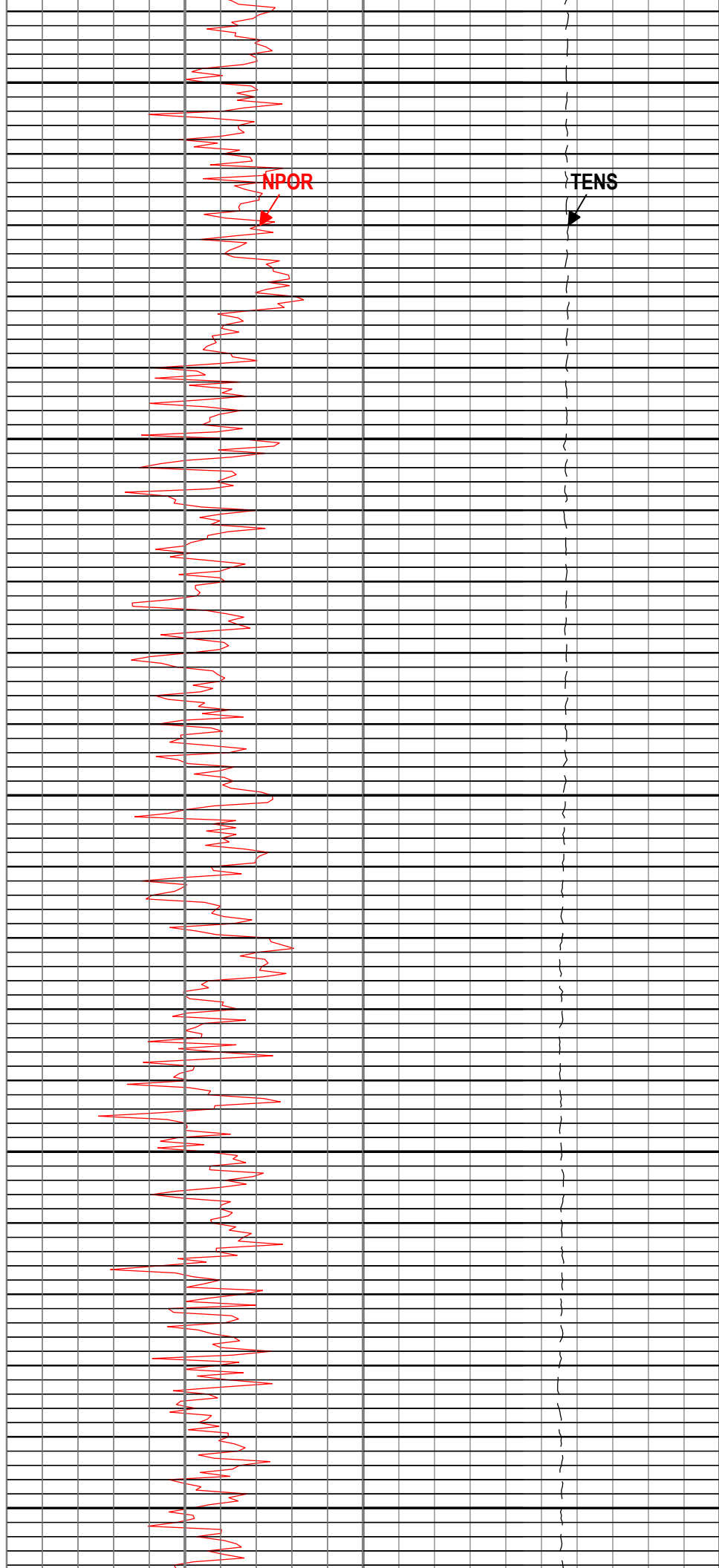
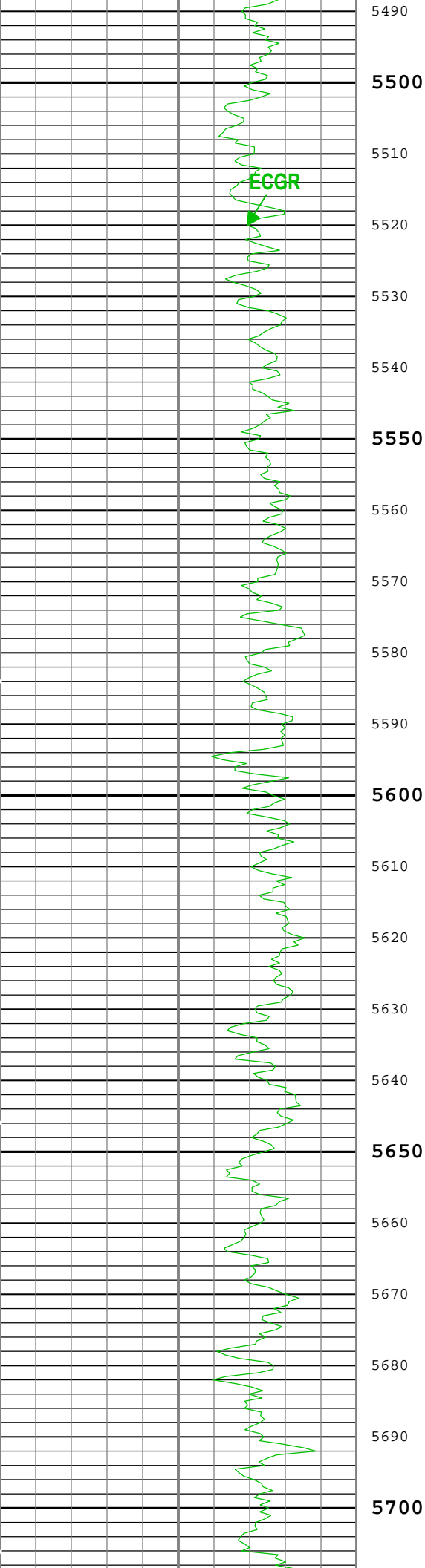
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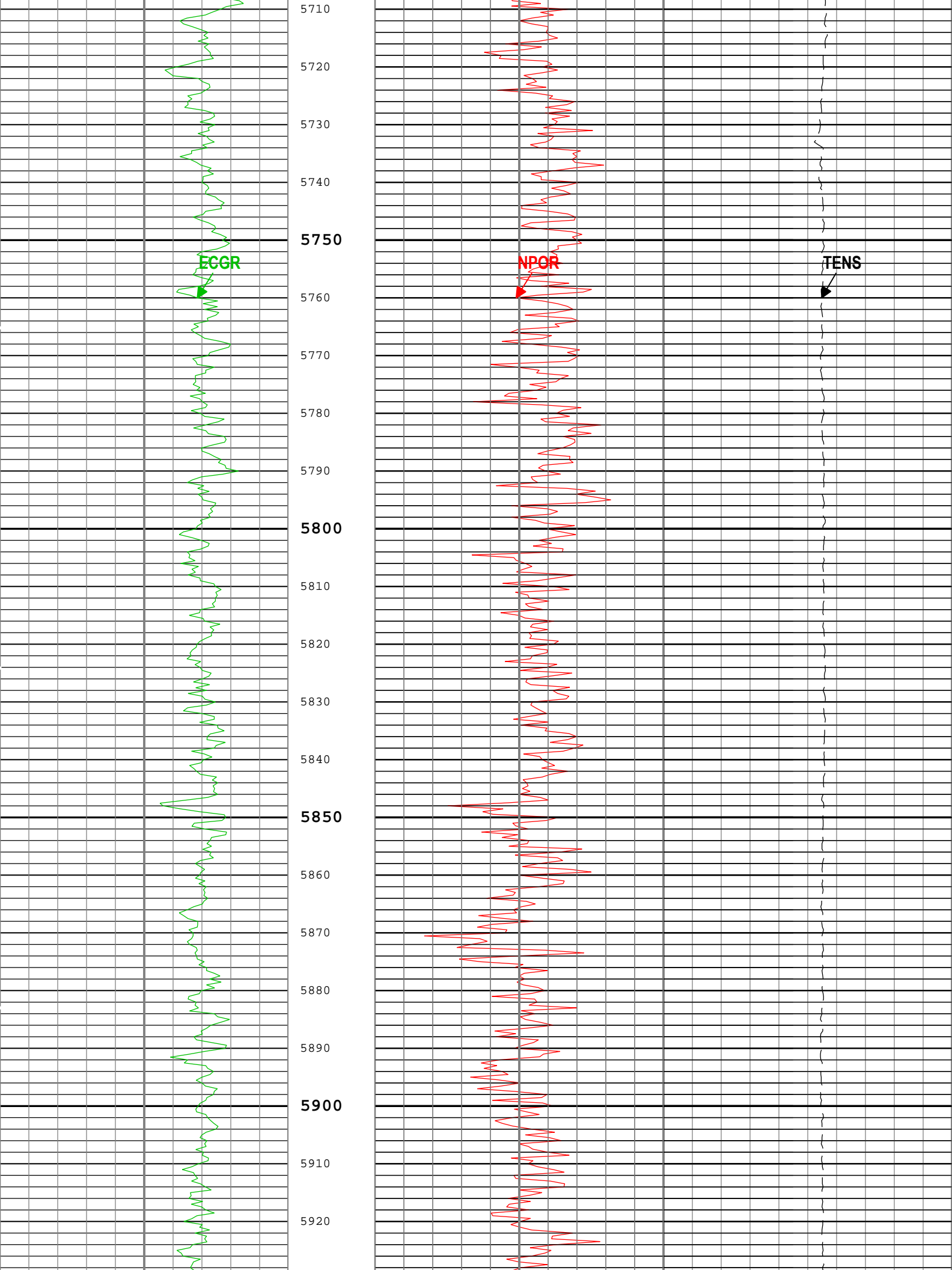
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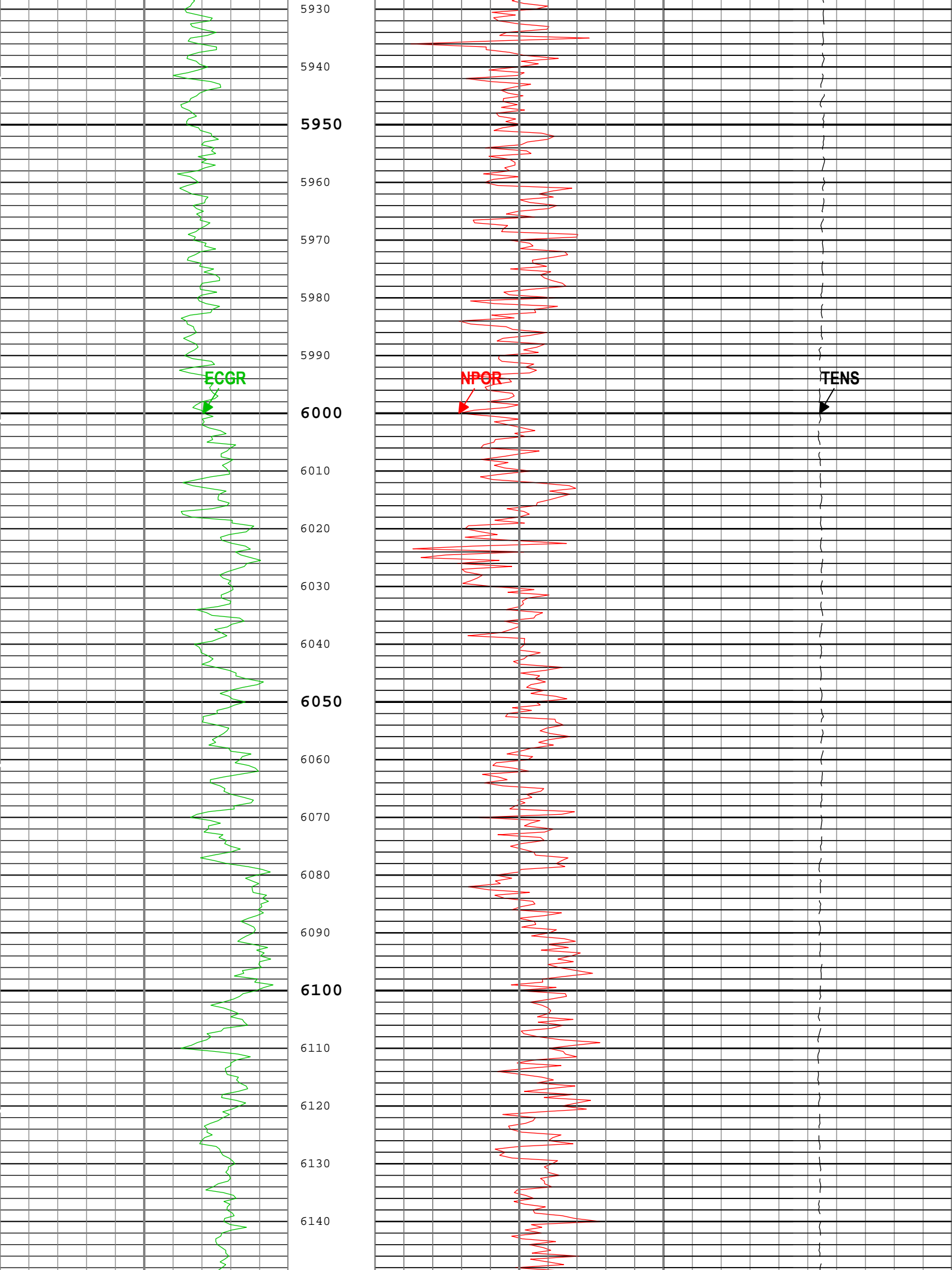
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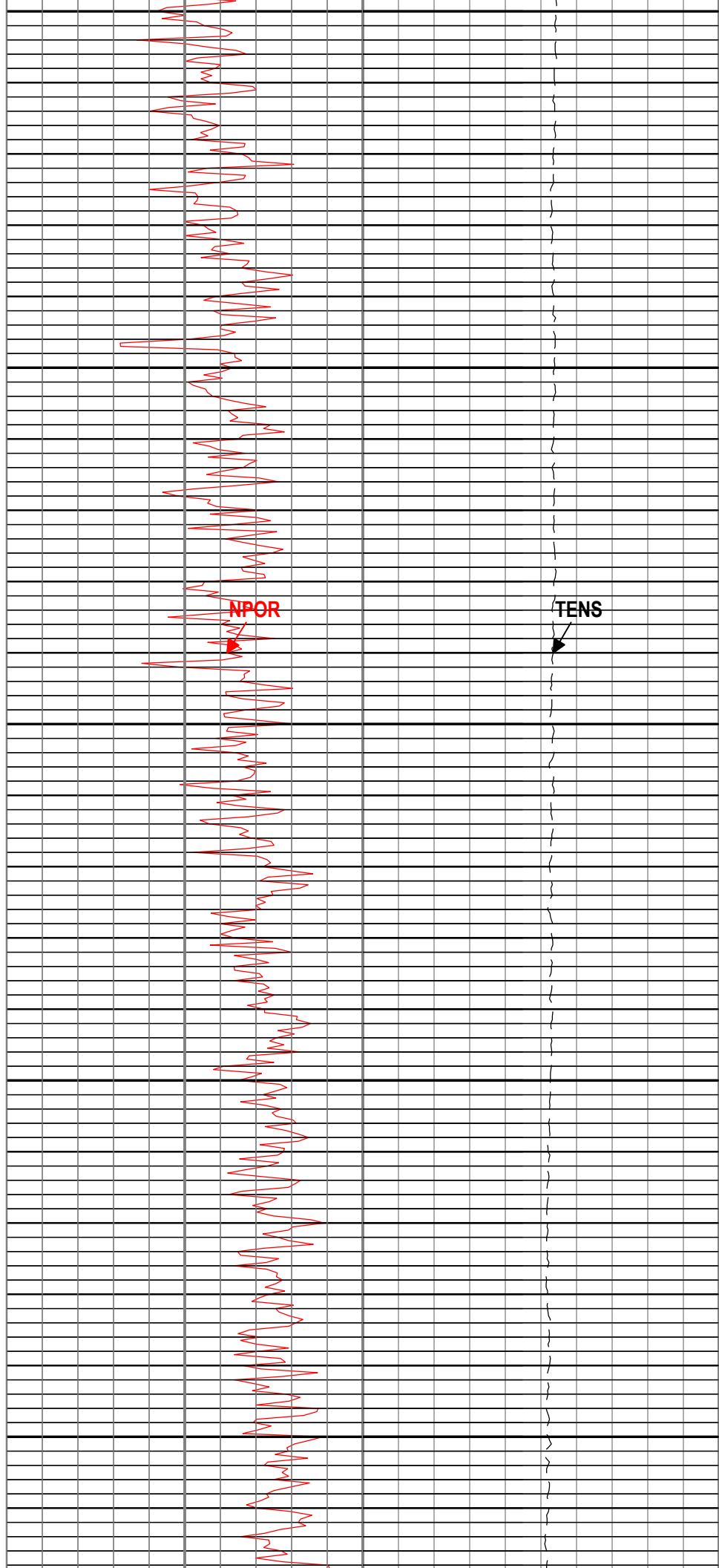
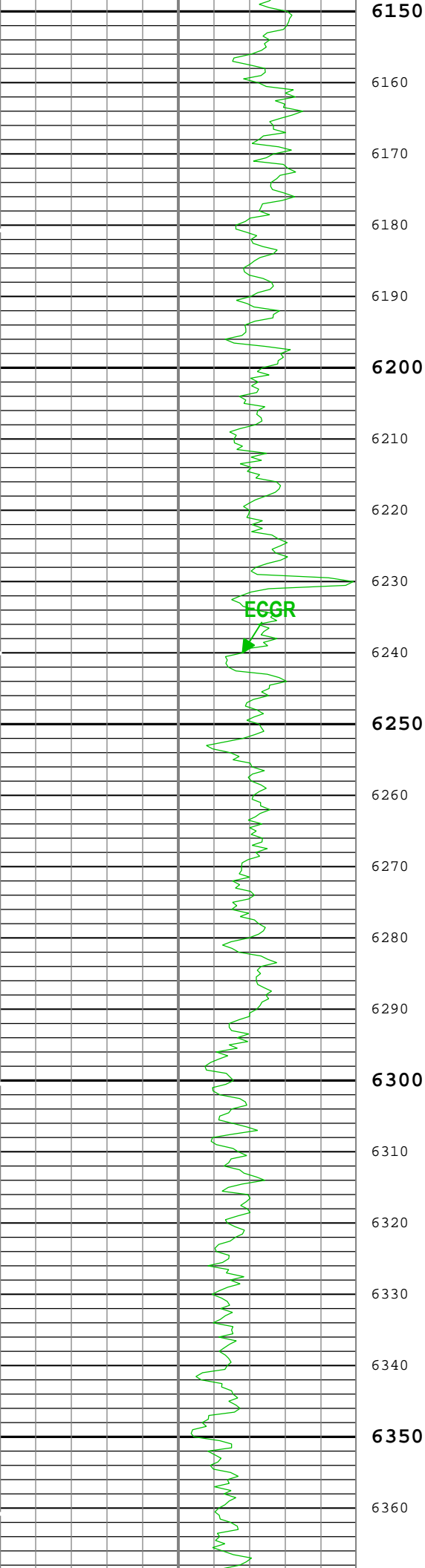


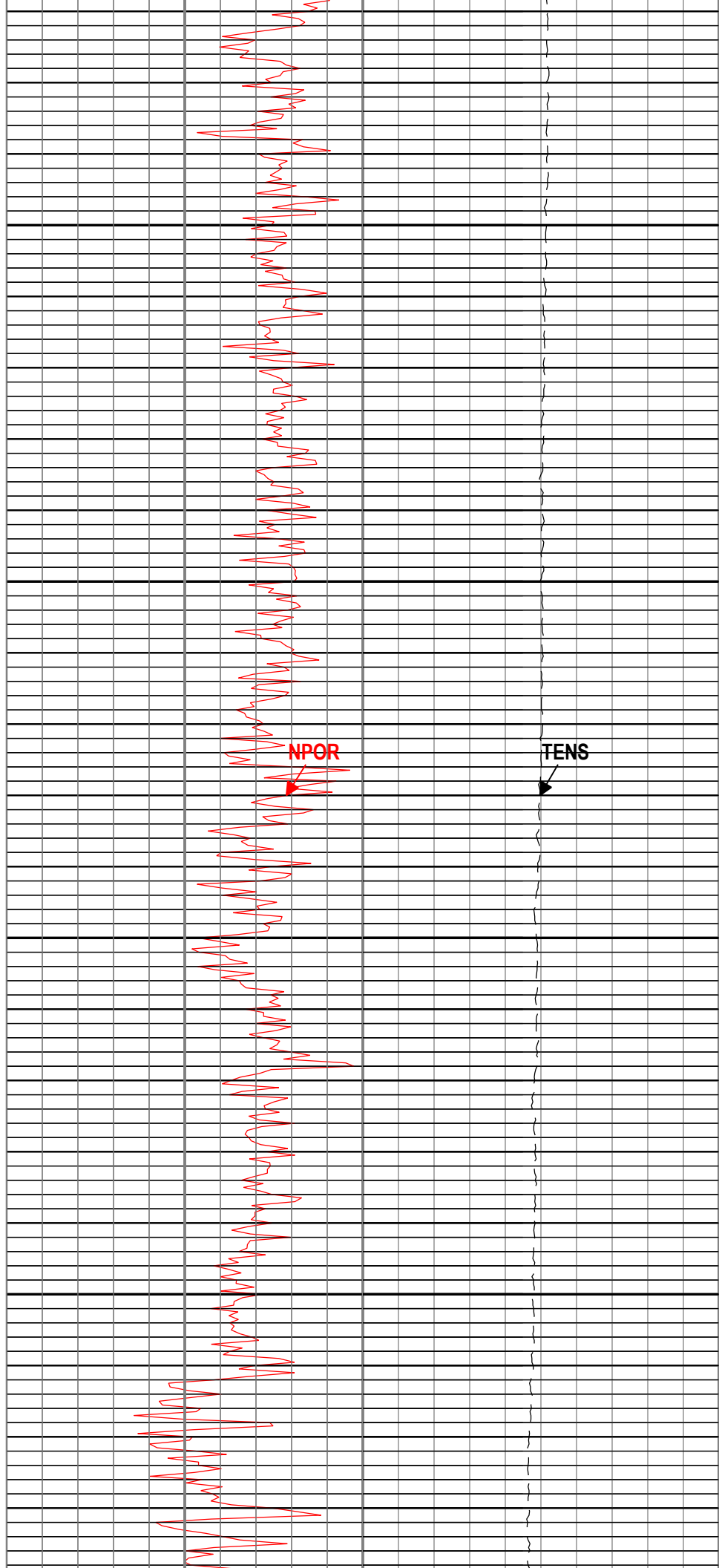
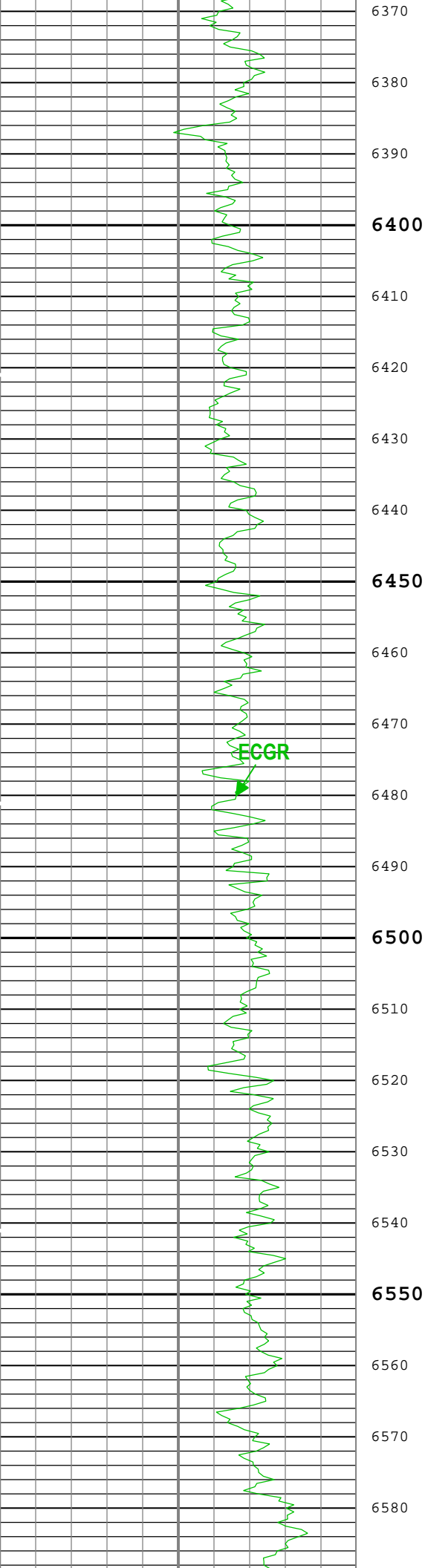


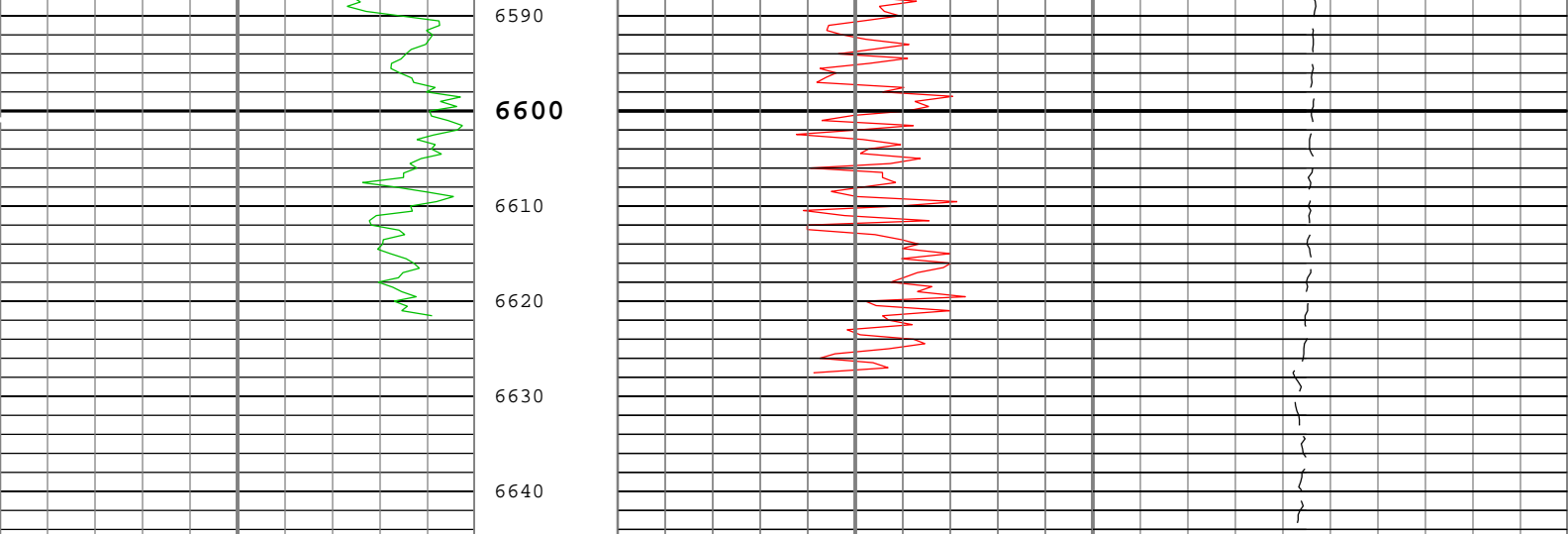












GR Backup		
Gamma Ray (ECGR) HGNS-H		
0	gAPI	150

NPOR Backup		
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H		
0.45	ft3/ft3	-0.15

Cable Tension (TENS)		
5000	lbf	0

└─ ICV - Integrated Cement Volume every 100.00 (ft3)  
└─ ICV - Integrated Cement Volume every 10.00 (ft3)  
  
TIME\_1900 - Time Marked every 60.00 (s)  
  
└─ IHV - Integrated Hole Volume every 100.00 (ft3)  
└─ IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two    Format: Log ( Noble Nuclear )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 05-Nov-2018 00:19:52

## Channel Processing Parameters

### ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BHT	Bottom Hole Temperature	Borehole	219	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	17237.7	ft
CCCO	Casing & Cement Thickness Correction Option	HGNS-H	Yes	
CDEN	Cement Density	HGNS-H	2	g/cm3
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	5.5	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	BRINE	
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	REMS(RT)	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
USCCO	Ulsale Size Correction Option	USIT-E	Yes	

ISCO	Hole Size Correction Option	HGNS-H	Yes	
IMAR	Image Rotation	USIT-E	Off	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
MST	Mud Sample Temperature	Borehole	68	degF
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
RMS	Resistivity of Mud Sample	Borehole	0.2	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	

Depth Zone Parameters			
Parameter	Value	Start ( ft )	Stop ( ft )
BS	13.5	200	1955
BS	8.5	1955	6645
All depth are actual.			

Tool Control Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	

ONE									
Nuclear Repeat Analysis									

Software Version									
Acquisition System						Version			
Maxwell 2018 SP2						8.2.104493.3100			

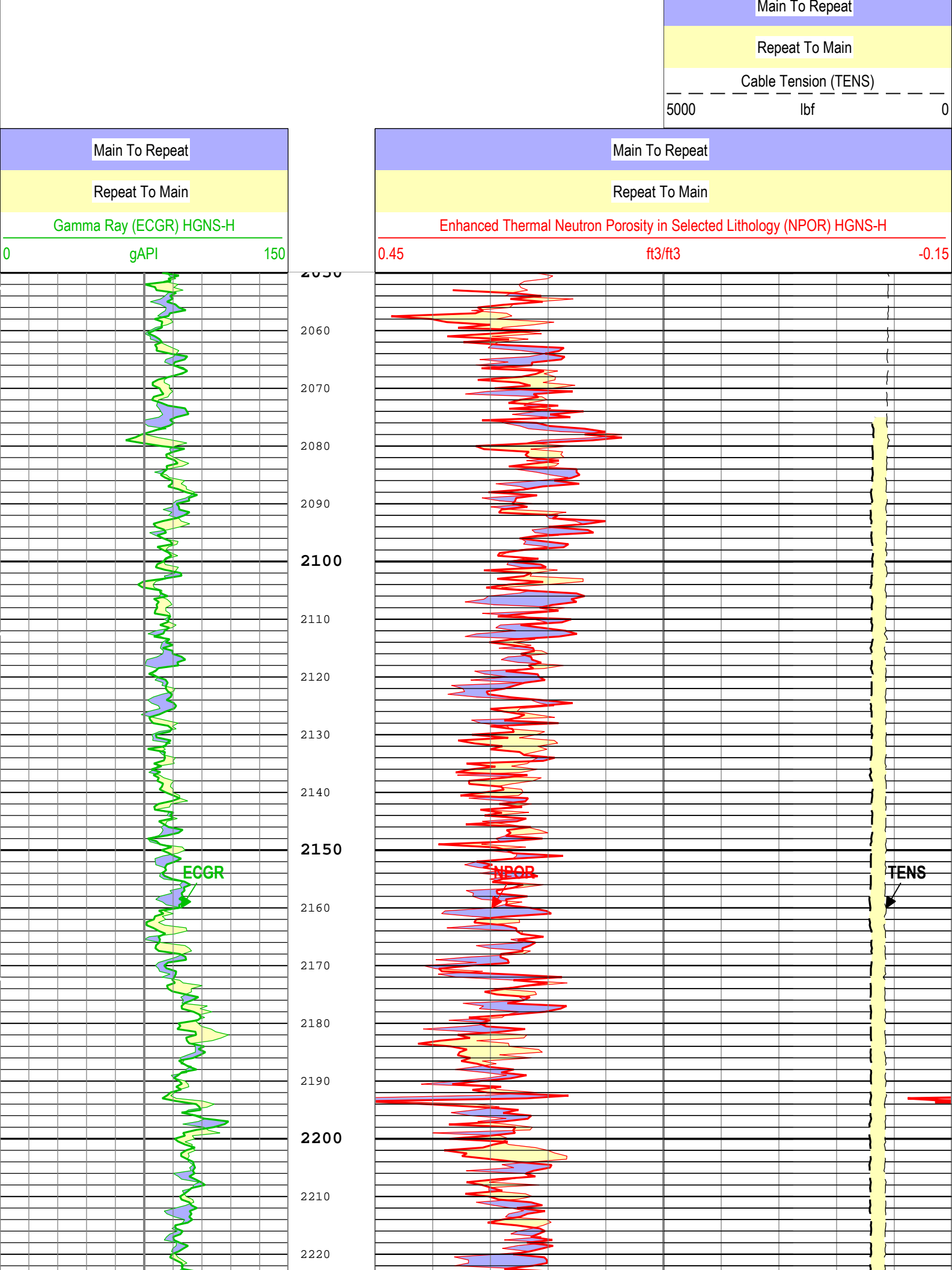
Pass Summary									
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Repeat[2]:Up	Up	2074.68 ft	2621.65 ft	04-Nov-2018 4:27:16 PM	04-Nov-2018 4:36:32 PM	ON	61.24 ft	Yes
ONE	Main[4]:Up	Up	41.98 ft	6650.03 ft	04-Nov-2018 5:17:09 PM	04-Nov-2018 7:13:29 PM	ON	62.74 ft	Yes

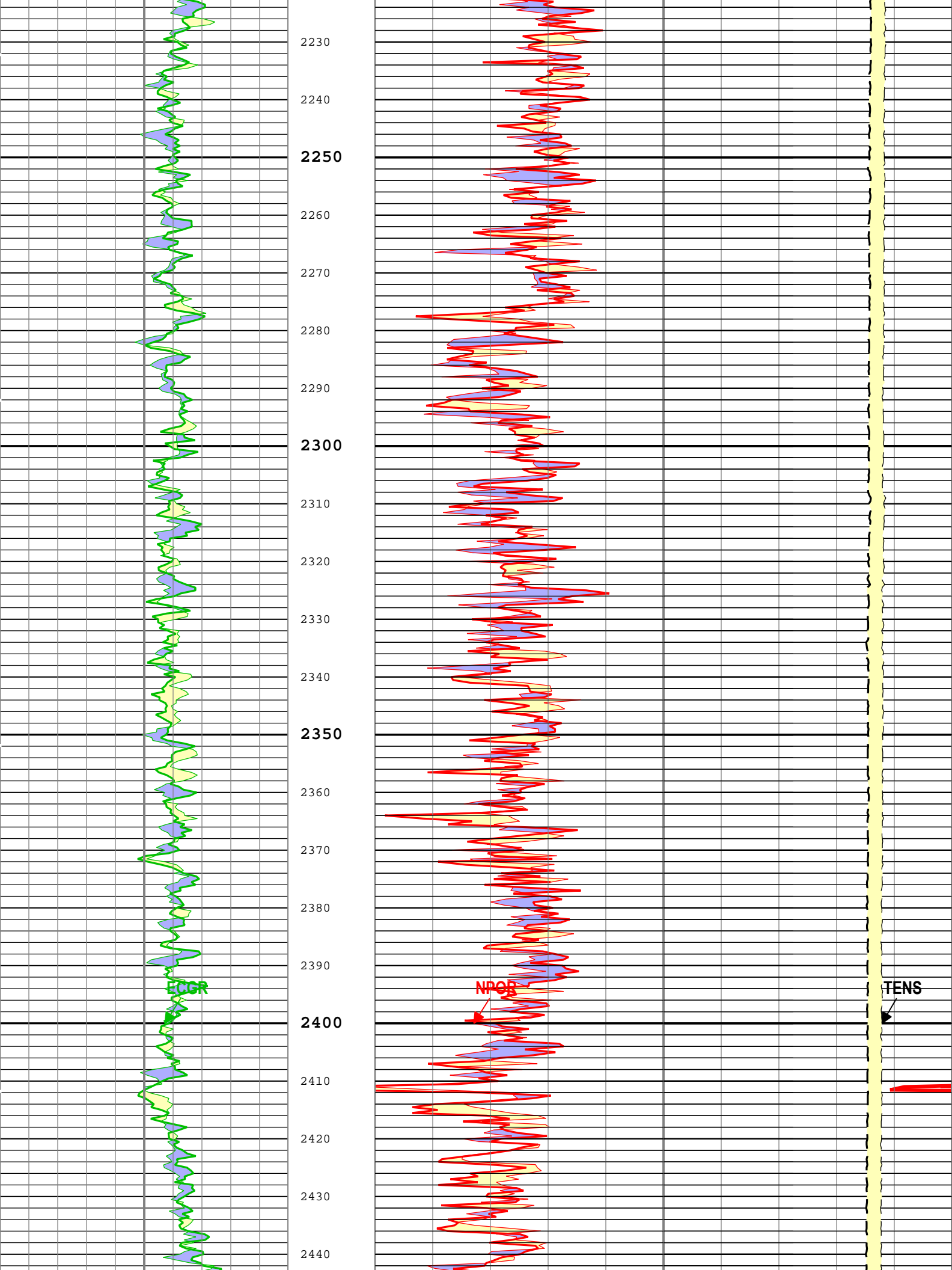
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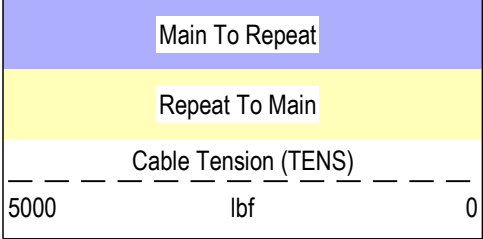
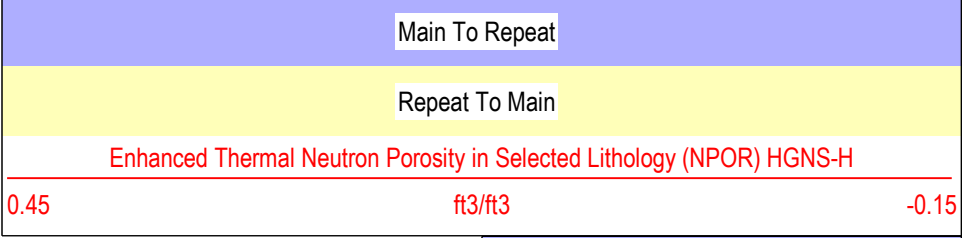
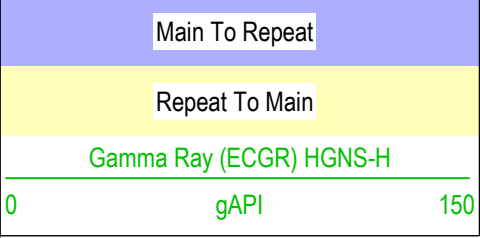
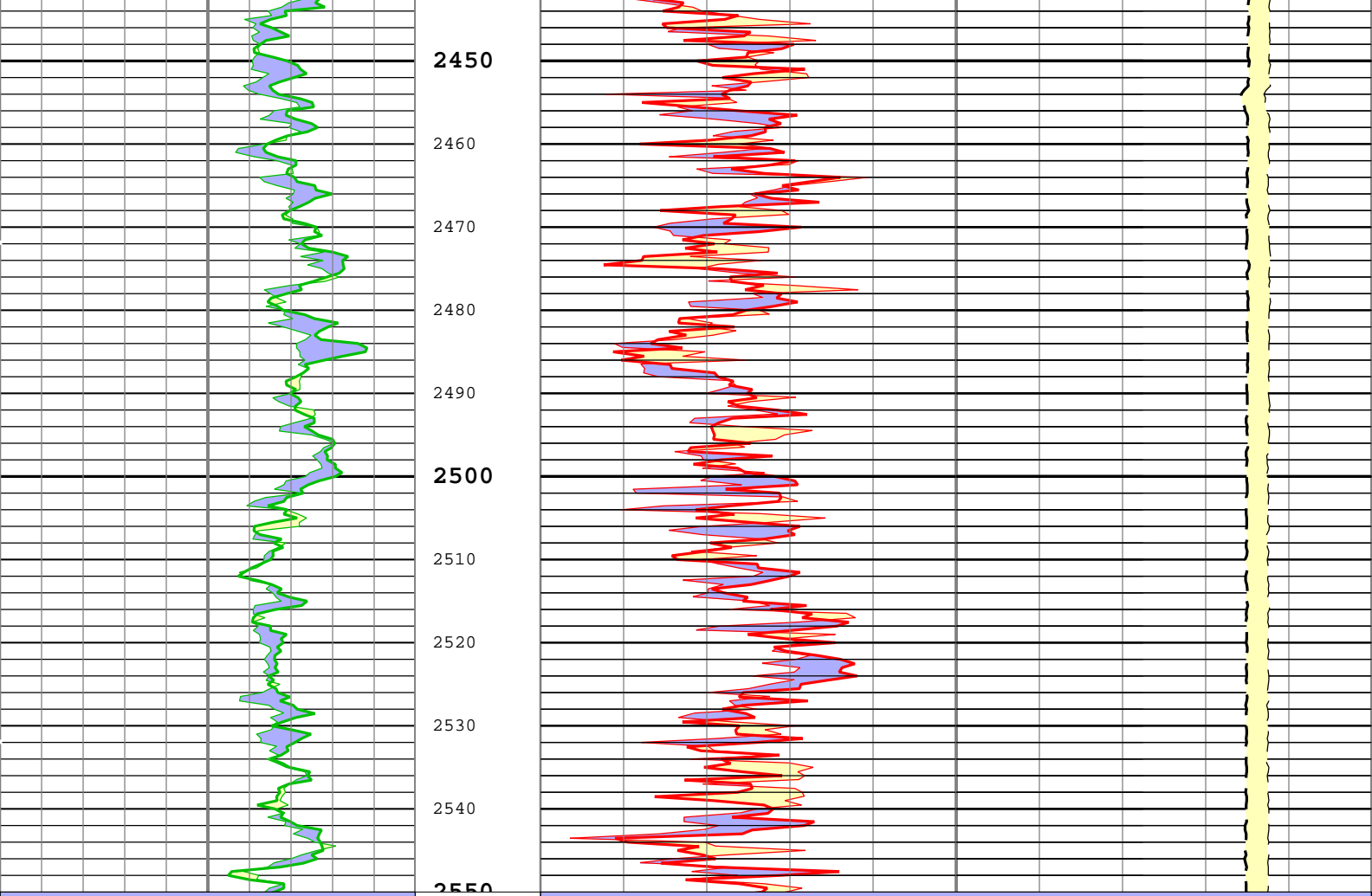
Log	Company:Noble Energy Inc.      Well:EMMY H25-744 ONE: Main[4]:Up:S015								
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Description: AIT Basic Log Two    Format: Noble Nuclear RA    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 05-Nov-2018 00:19:55

—IHV - Integrated Hole Volume every 10.00 (ft3)									
—IHV - Integrated Hole Volume every 100.00 (ft3)									
TIME_1900 - Time Marked every 60.00 (s)									
—ICV - Integrated Cement Volume every 10.00 (ft3)									
—ICV - Integrated Cement Volume every 100.00 (ft3)									







- ICV - Integrated Cement Volume every 100.00 (ft3)
- ICV - Integrated Cement Volume every 10.00 (ft3)
- TIME\_1900 - Time Marked every 60.00 (s)
- IHV - Integrated Hole Volume every 100.00 (ft3)
- IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two    Format: Noble Nuclear RA    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 05-Nov-2018 00:19:55

Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BHT	Bottom Hole Temperature	Borehole	219	degF

BS	Bit Size	WLSESSION	8.5	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	17237.7	ft
CCCO	Casing & Cement Thickness Correction Option	HGNS-H	Yes	
CDEN	Cement Density	HGNS-H	2	g/cm3
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	5.5	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	BRINE	
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	REMS(RT)	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
IMAR	Image Rotation	USIT-E	Off	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
MST	Mud Sample Temperature	Borehole	68	degF
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
RMS	Resistivity of Mud Sample	Borehole	0.2	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	

ONE

LQC Main Pass

Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Main[4]:Up	Up	41.98 ft	6650.03 ft	04-Nov-2018 5:17:09 PM	04-Nov-2018 7:13:29 PM	ON	62.74 ft	Yes

All depths are referenced to toolstring zero

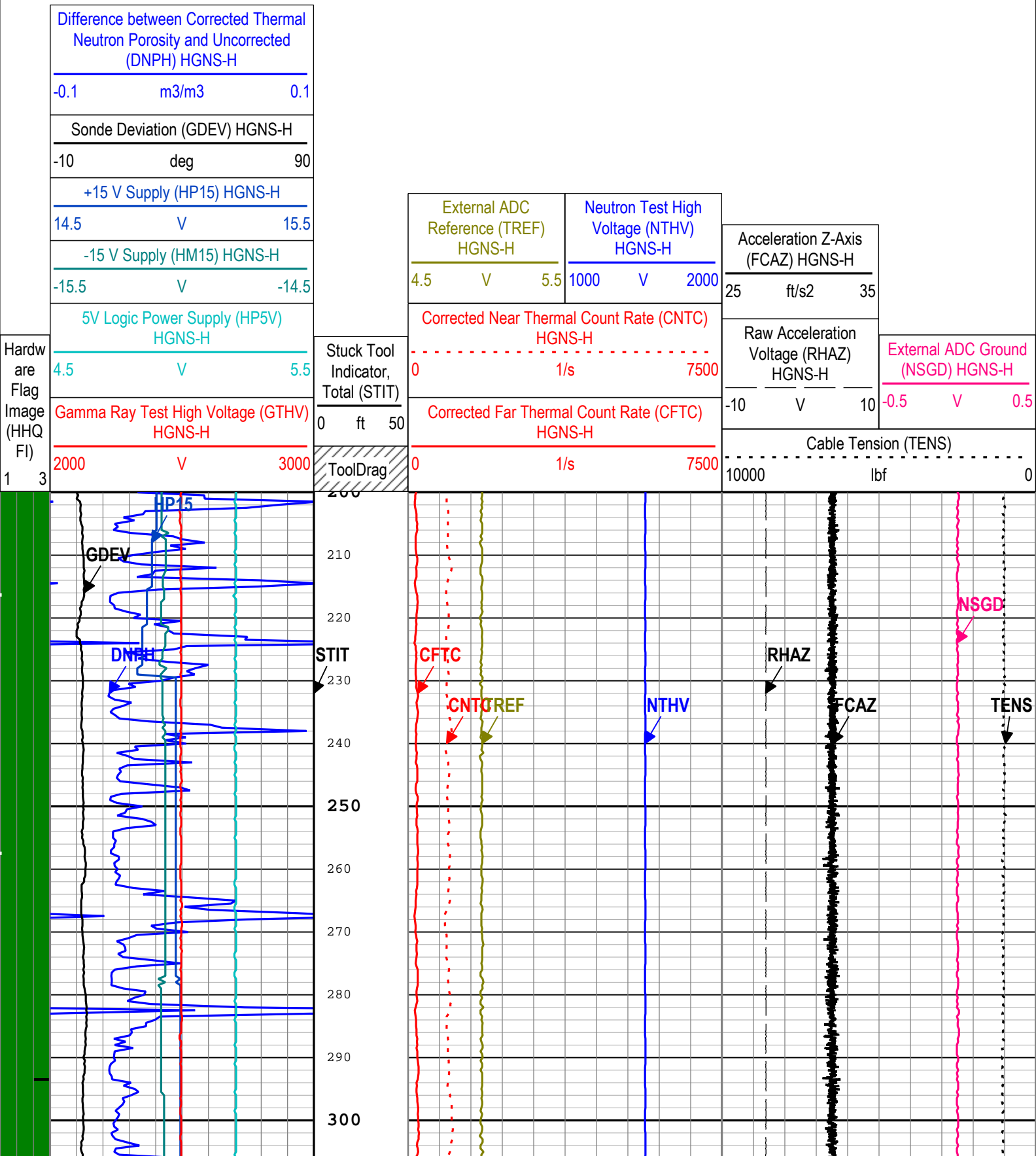


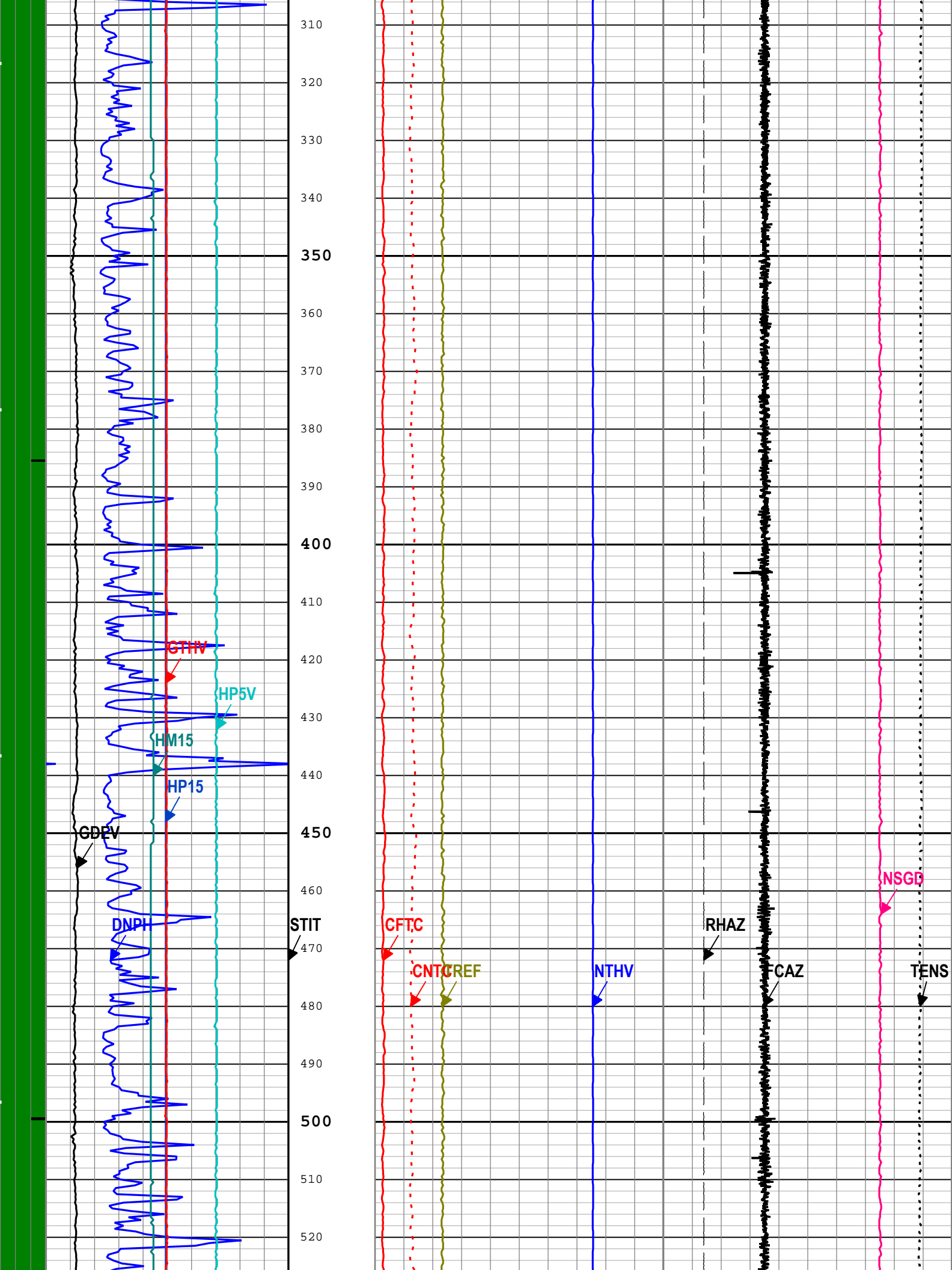
Description: HGNS LQC for Platform Express Format: Log ( PEX LQC HGNS ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 05-Nov-2018 00:19:57

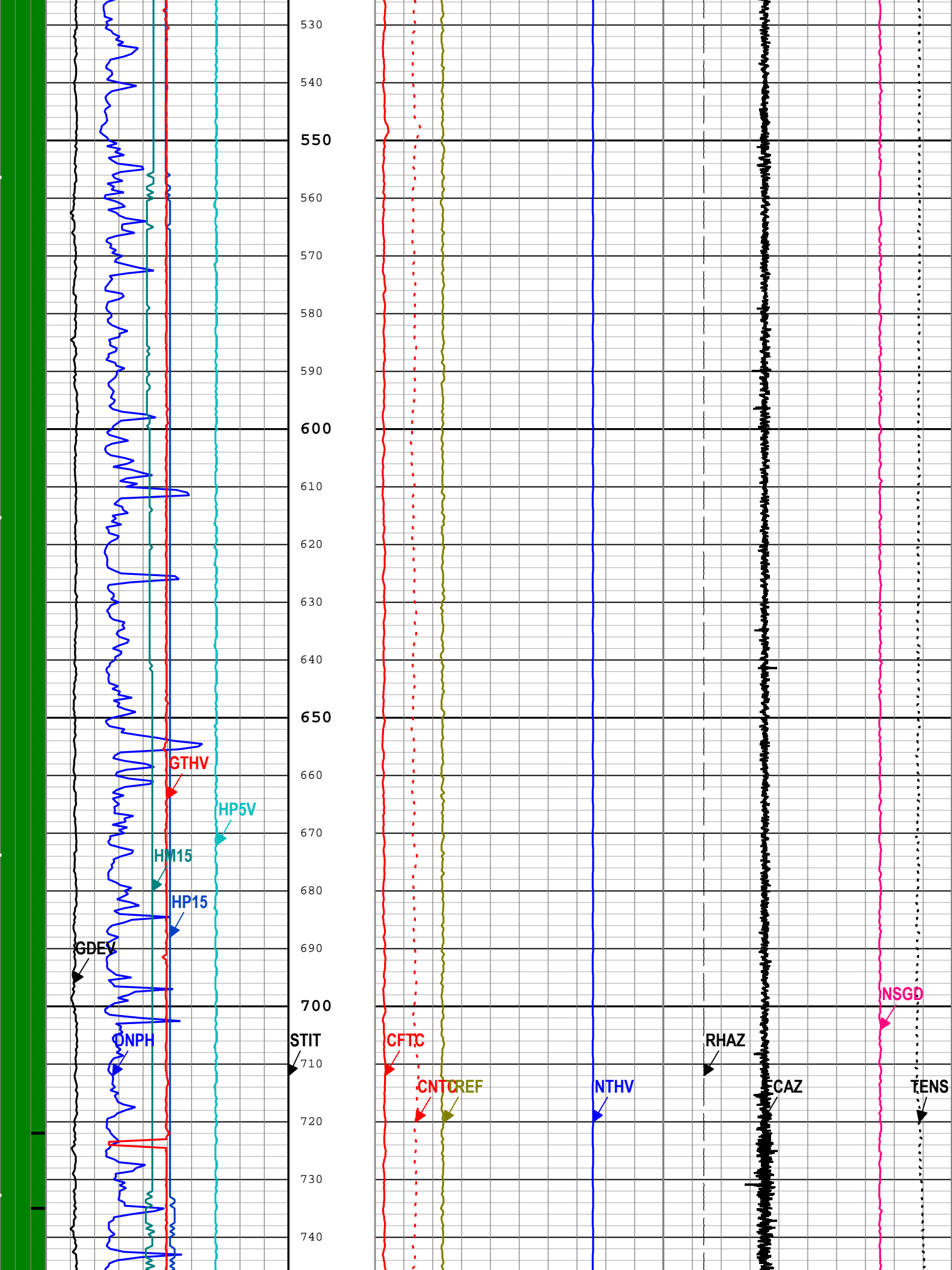
## Hardware Flag Image (HHQFI)

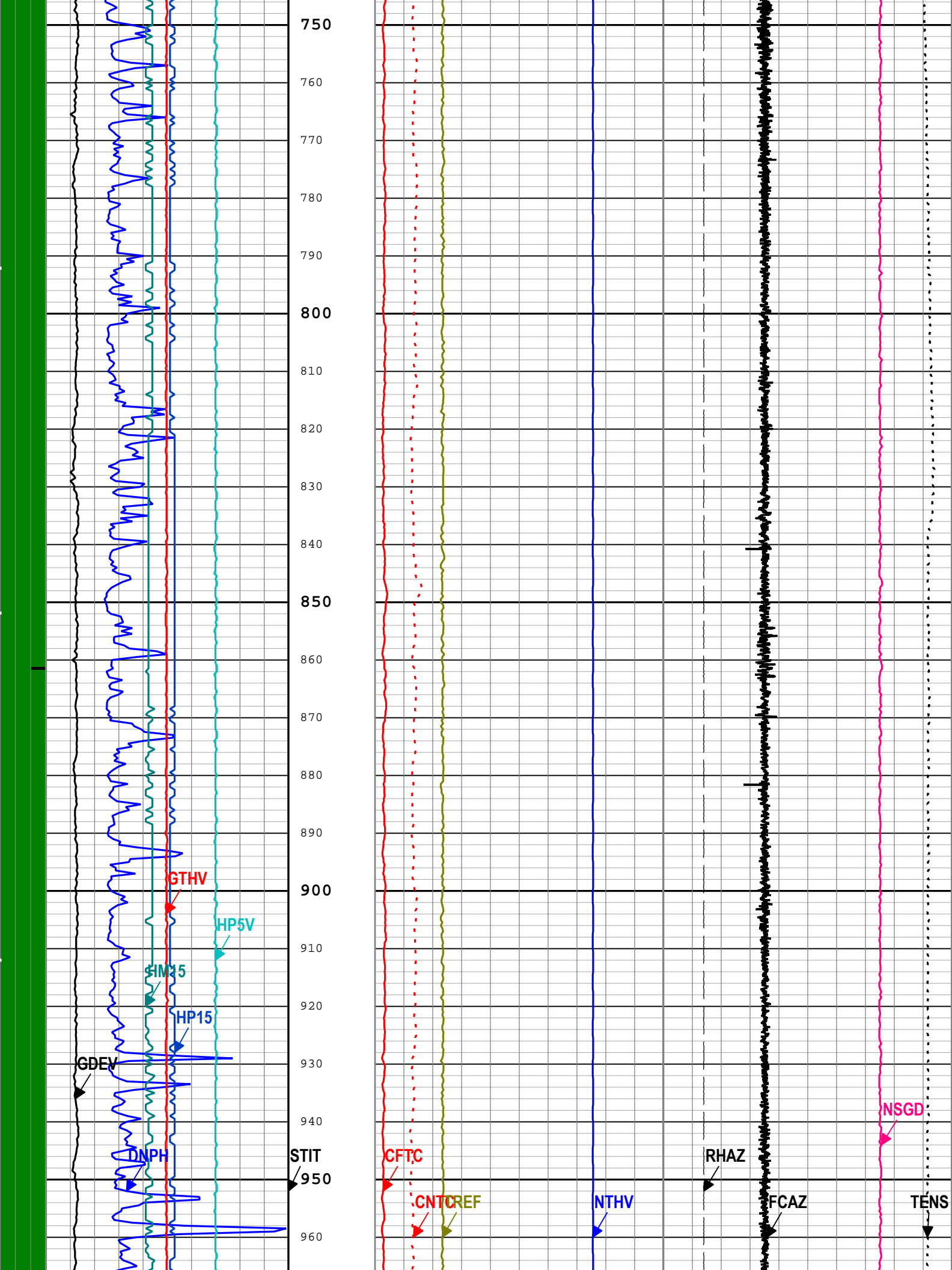
- 1 - HGNS H/W Flag - : ■ HGNS hardware valid ■ HGNS hardware error  
2 - Porosity Flag - : ■ Porosity valid ■ Porosity error  
3 - Accelerometer Flag - : ■ Accelerometer valid ■ Accelerometer error

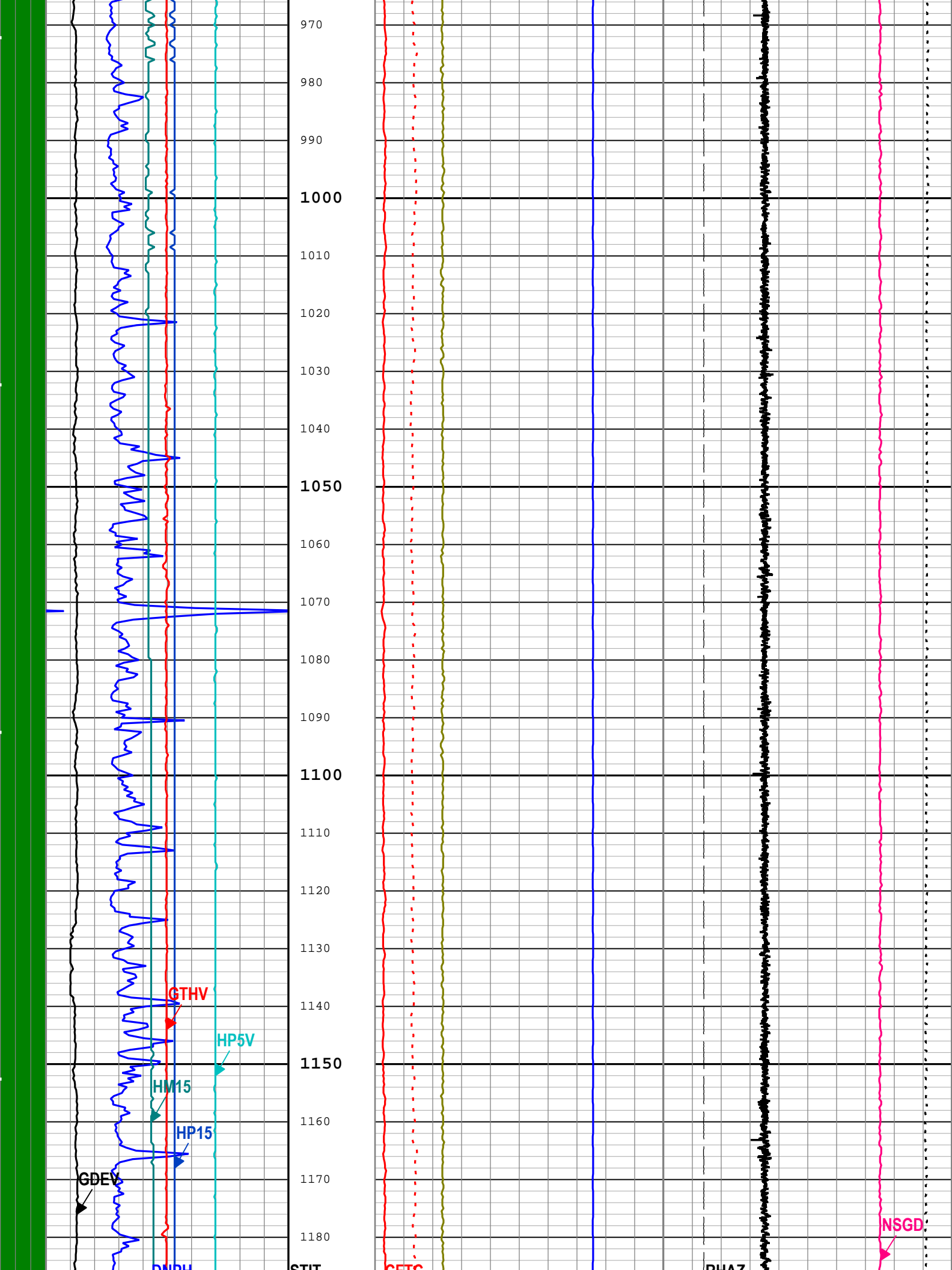
TIME\_1900 - Time Marked every 60.00 (s)

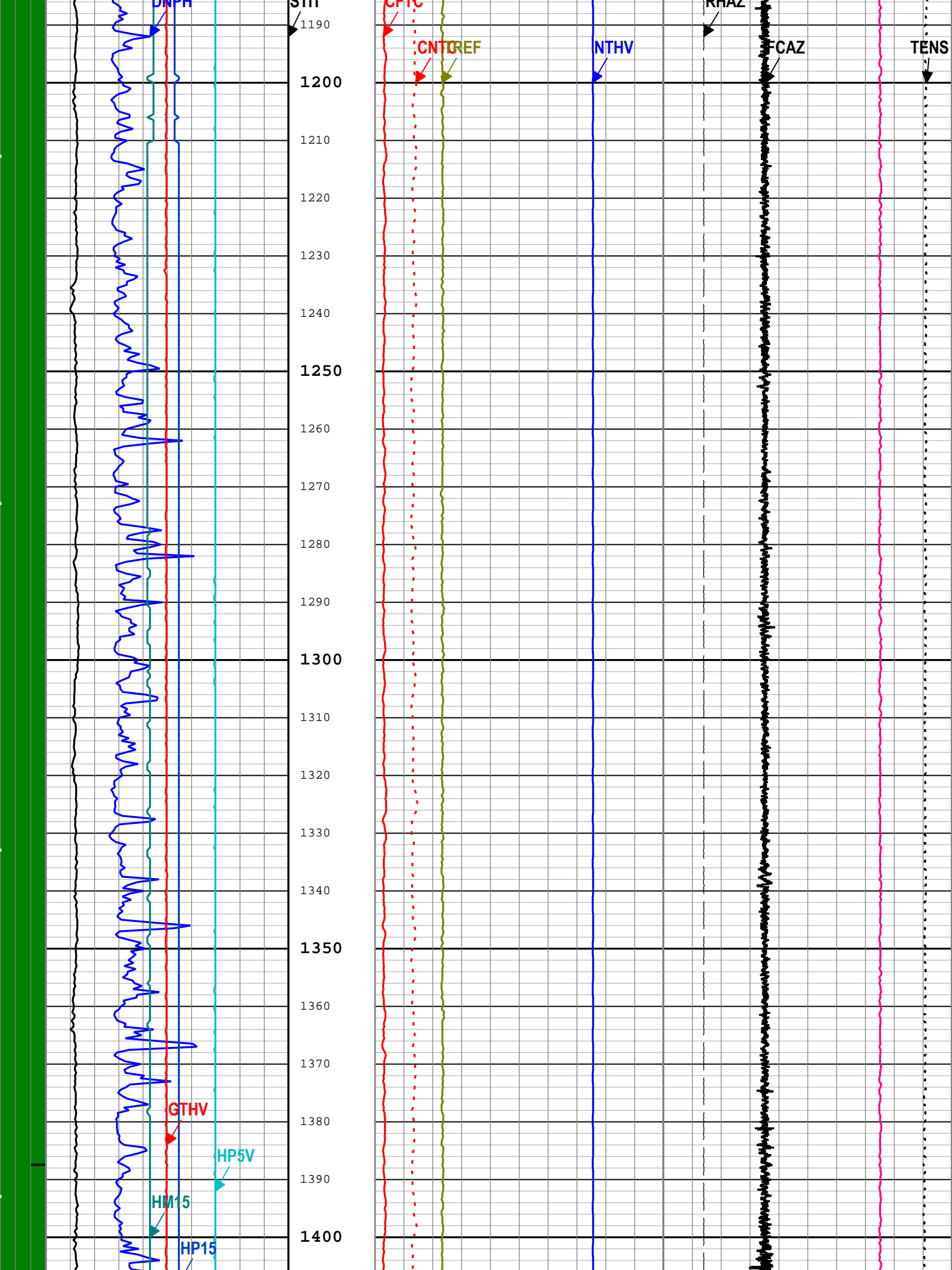


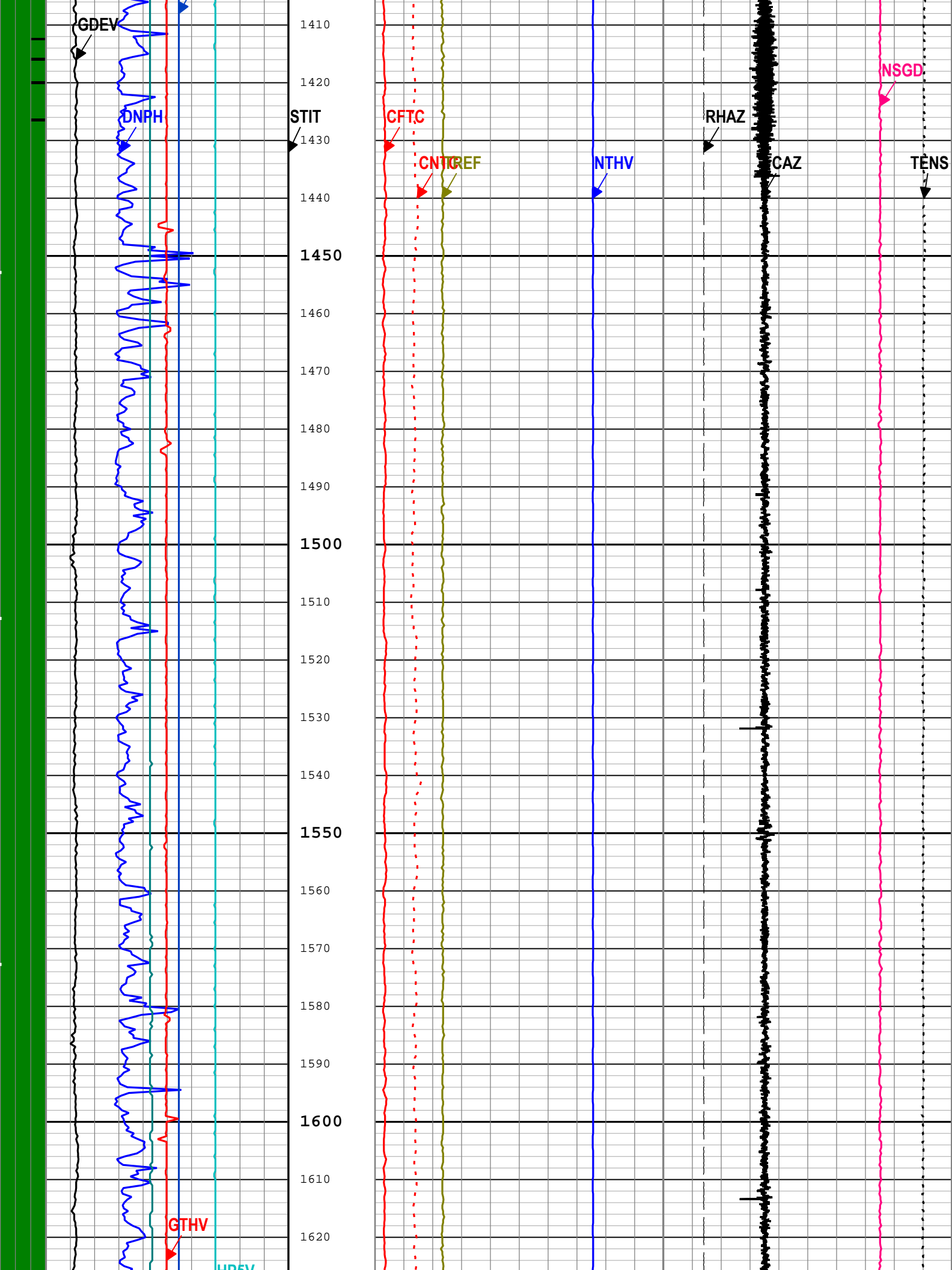


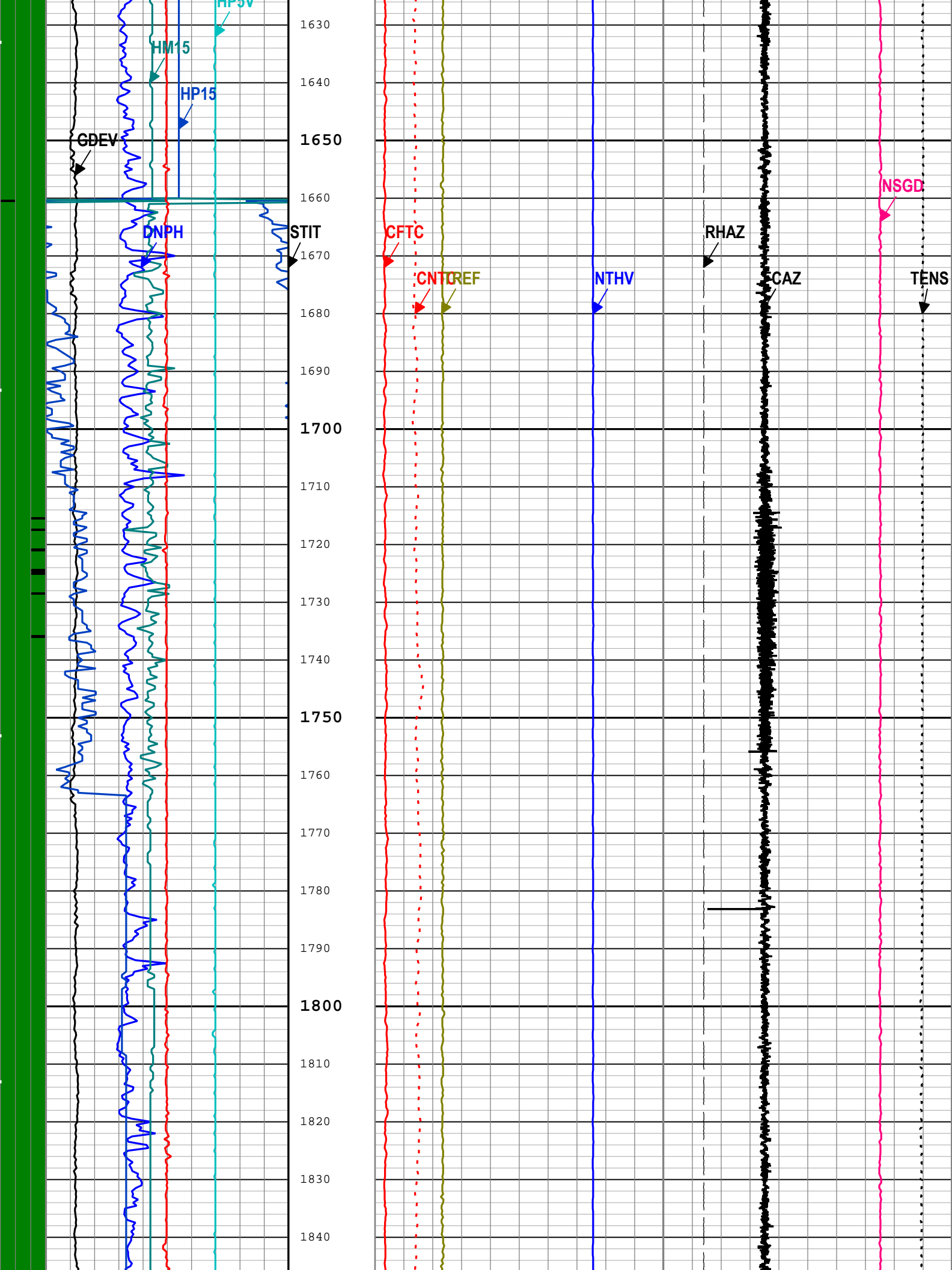




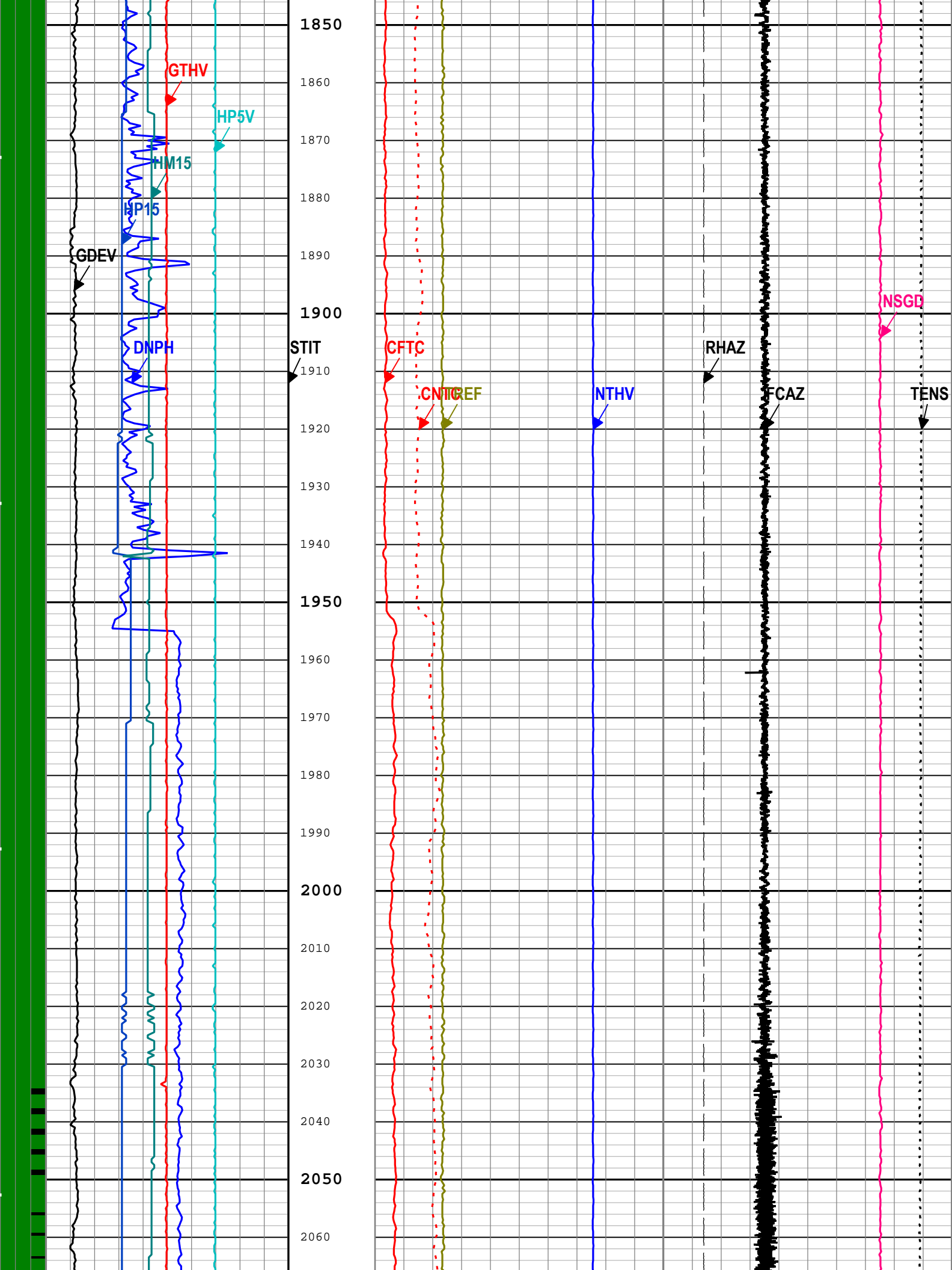


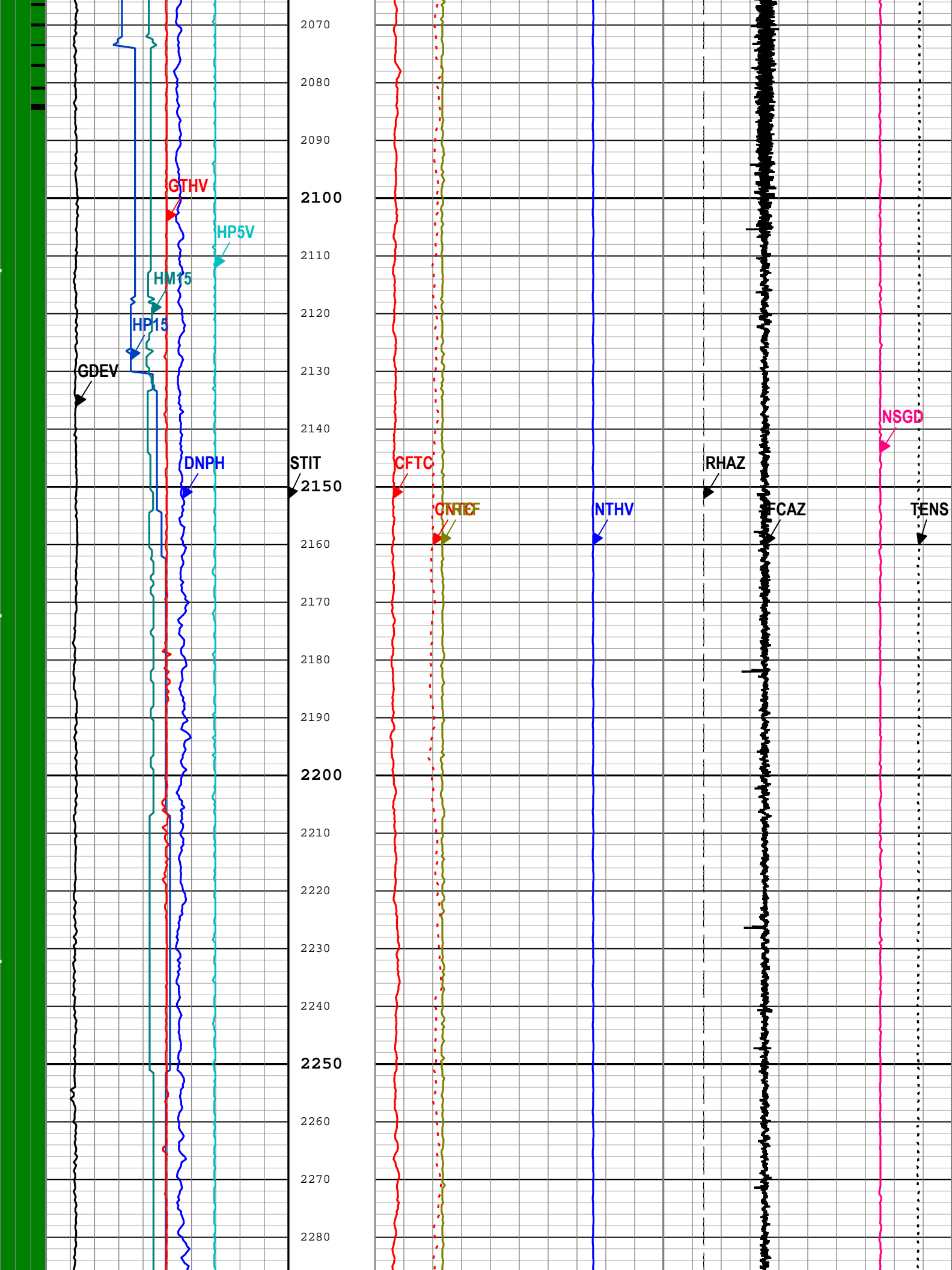


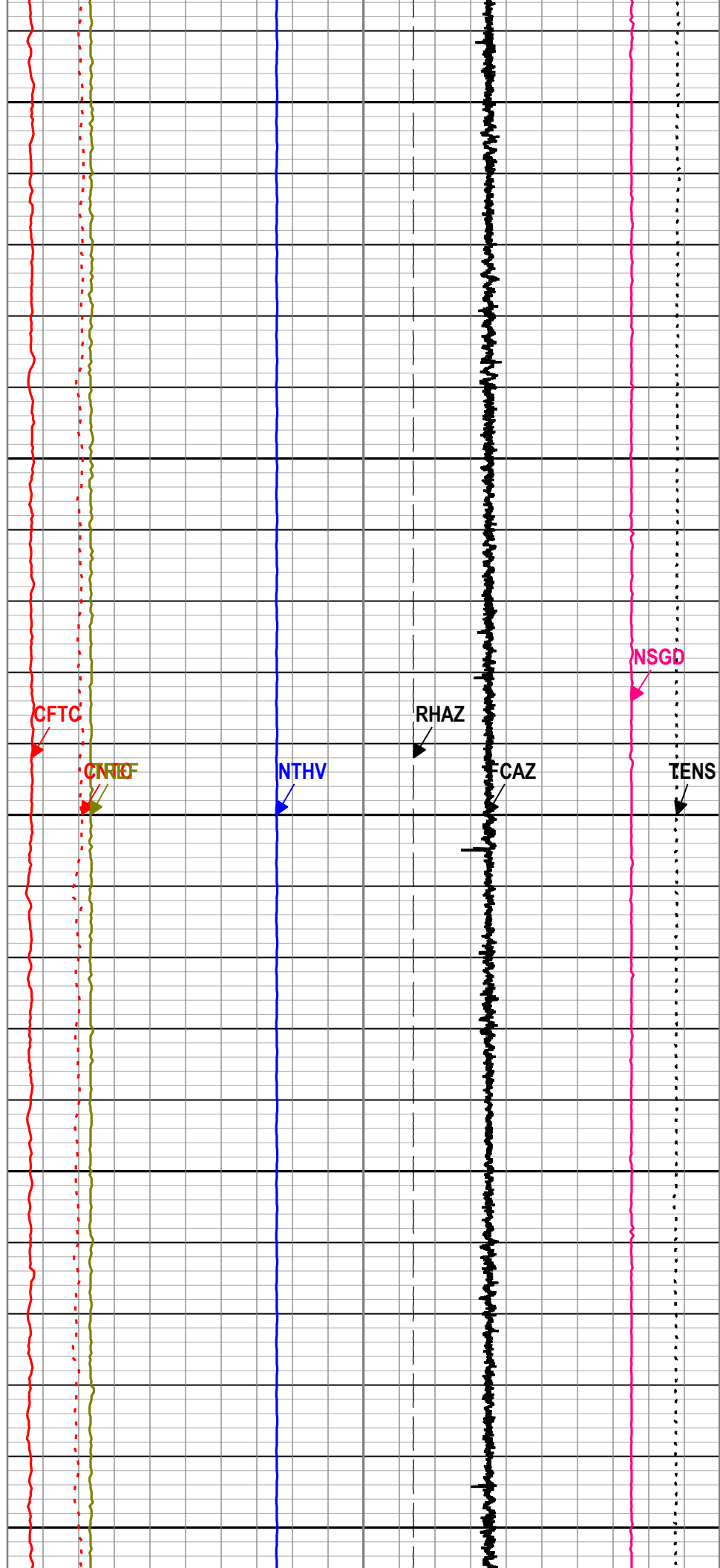
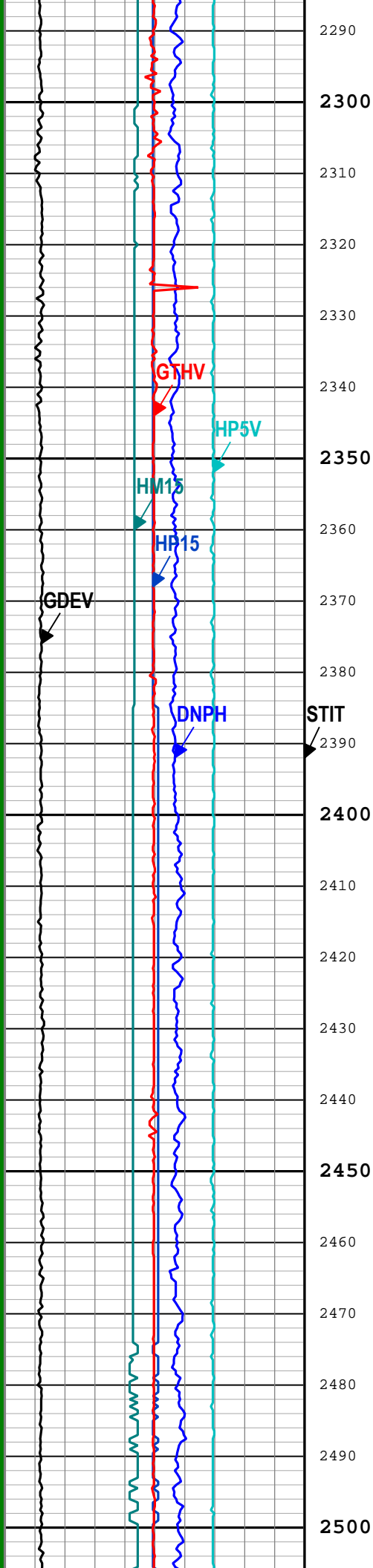


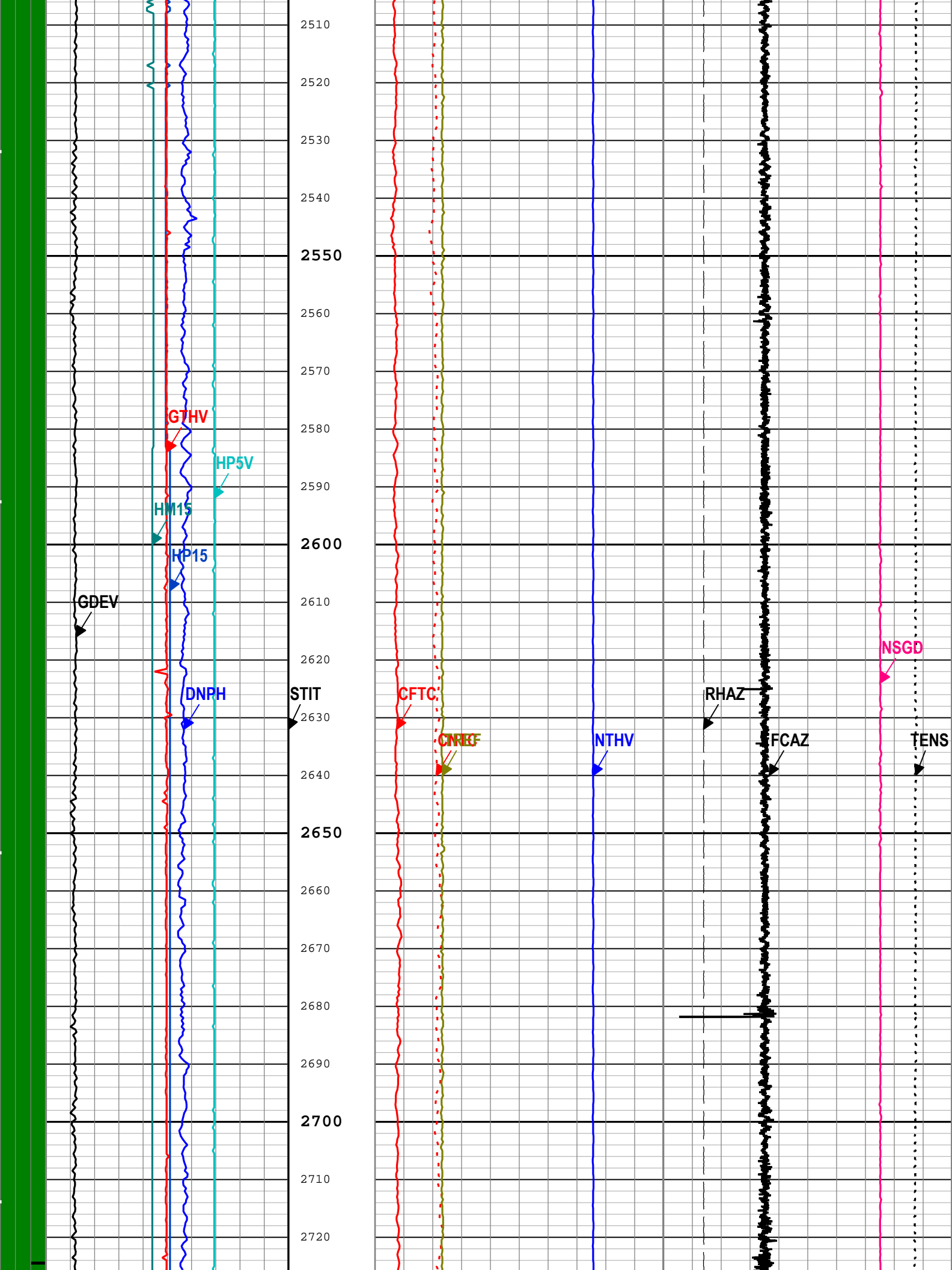


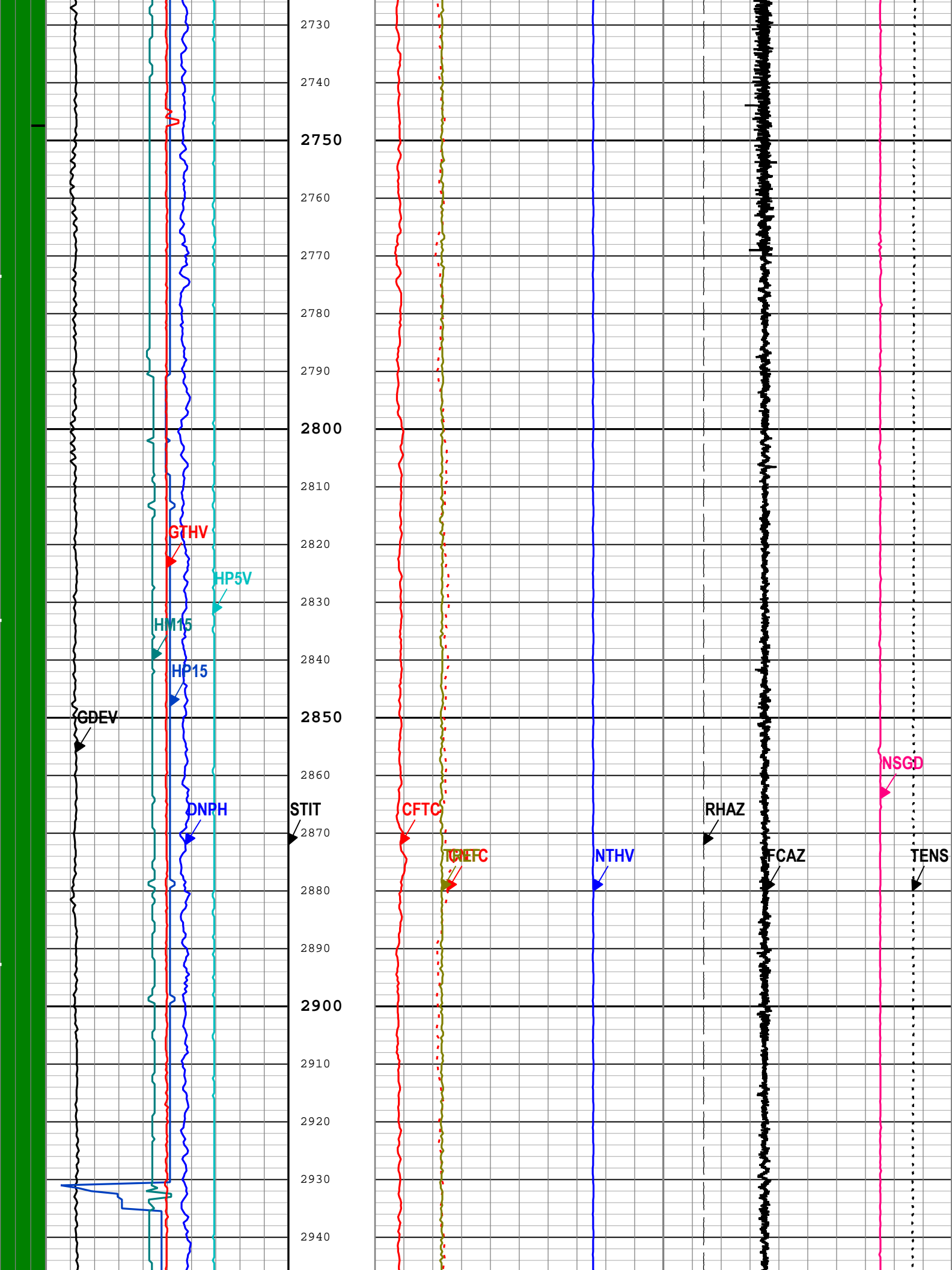


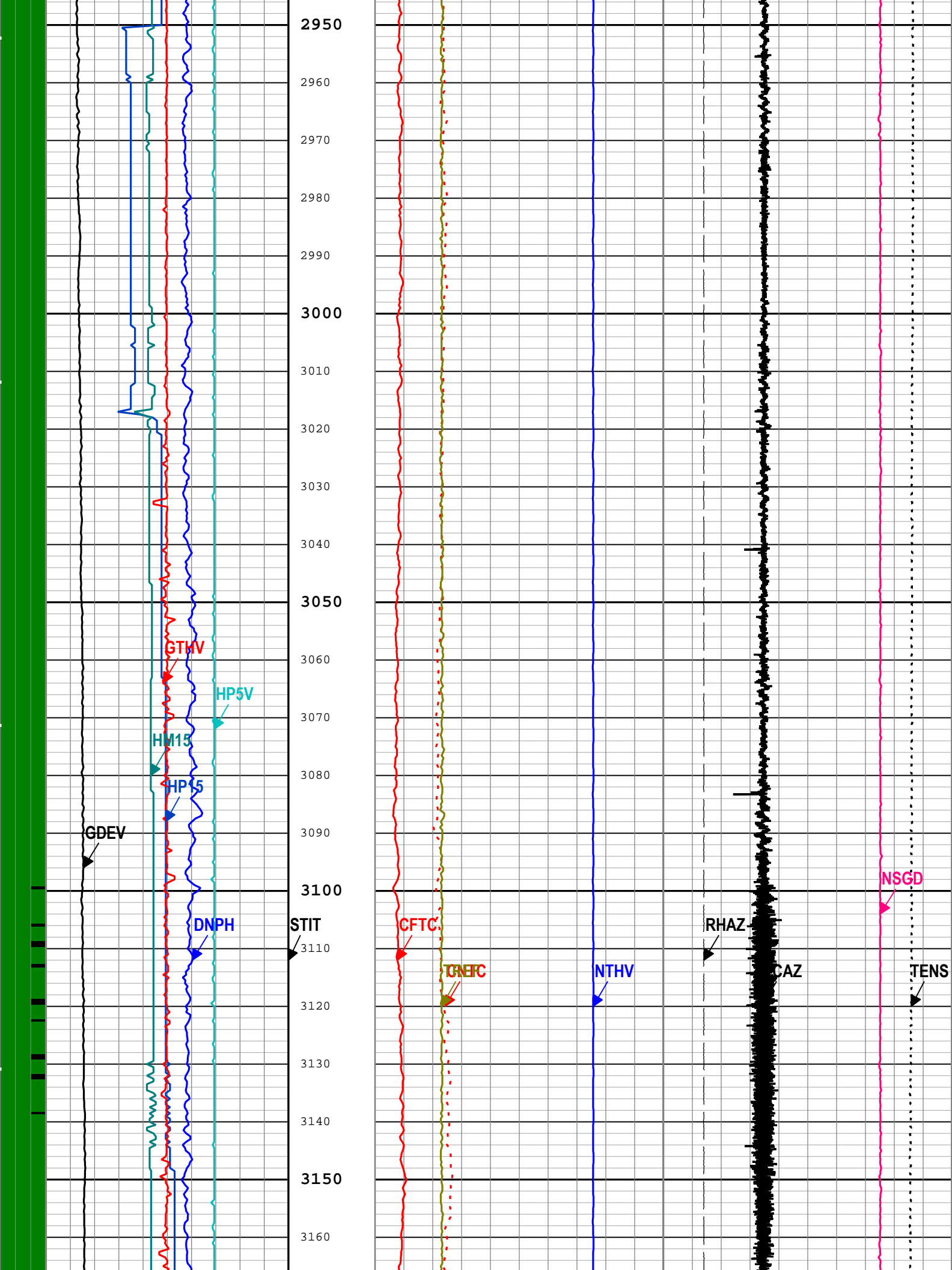


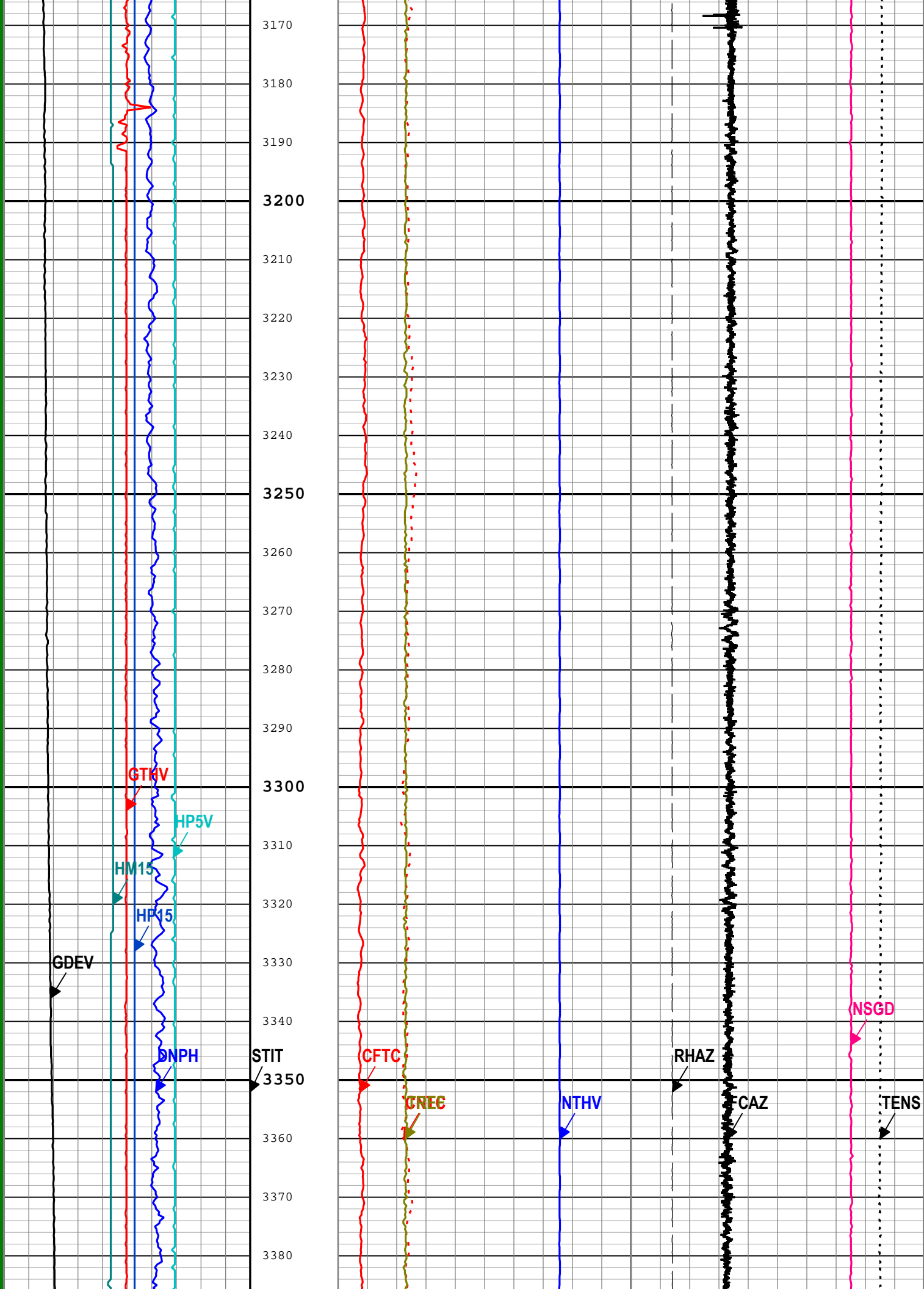


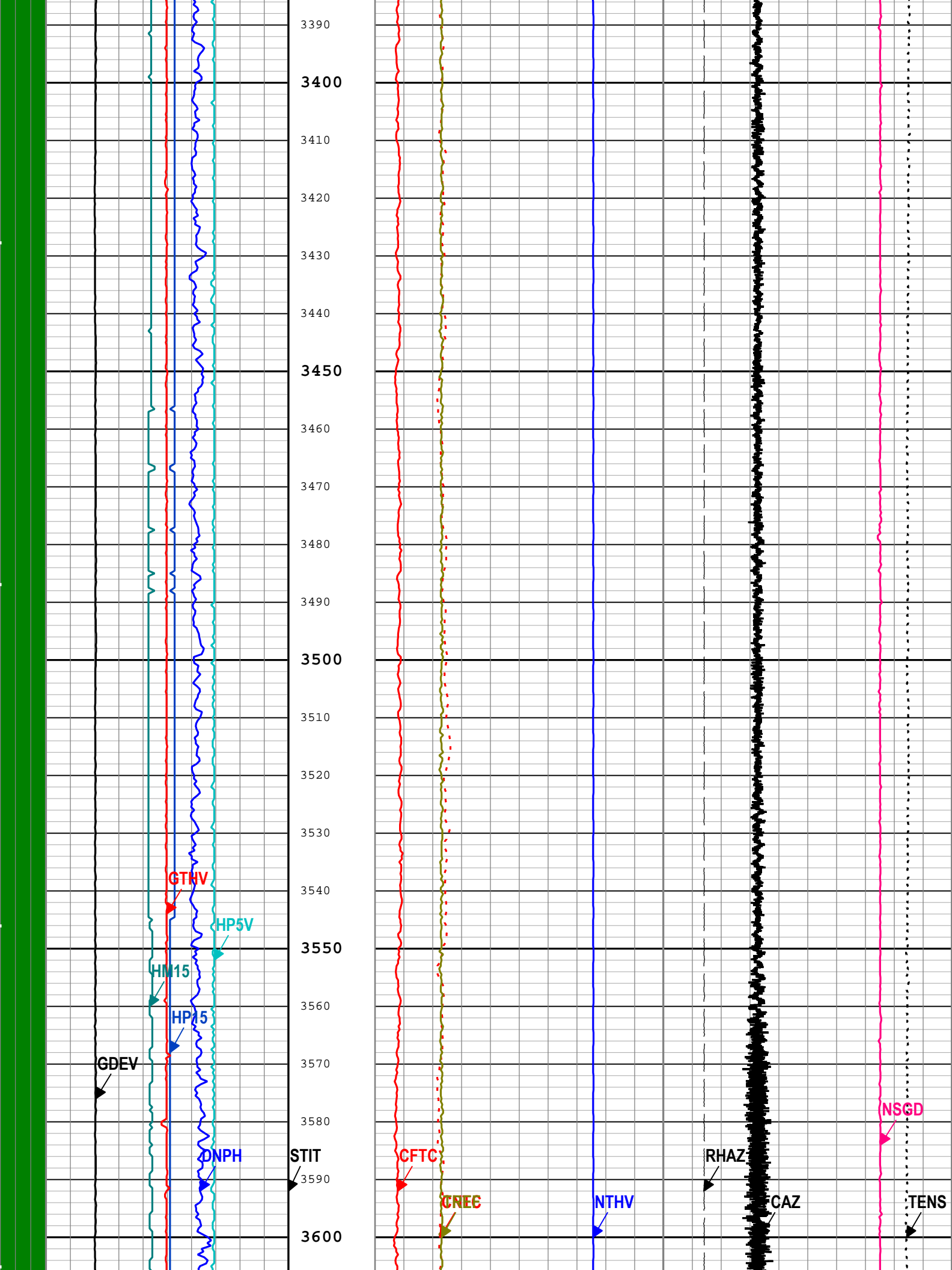




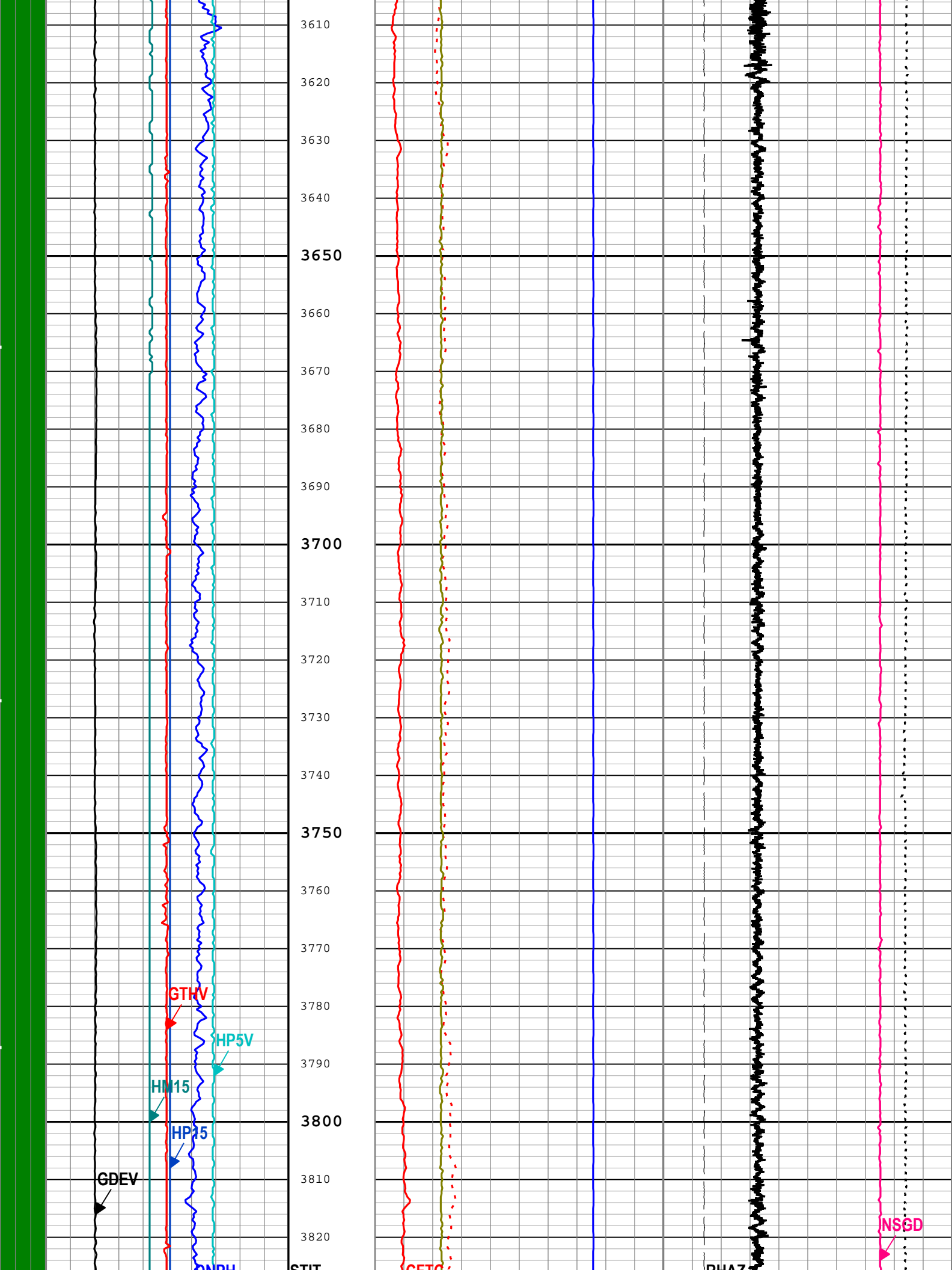


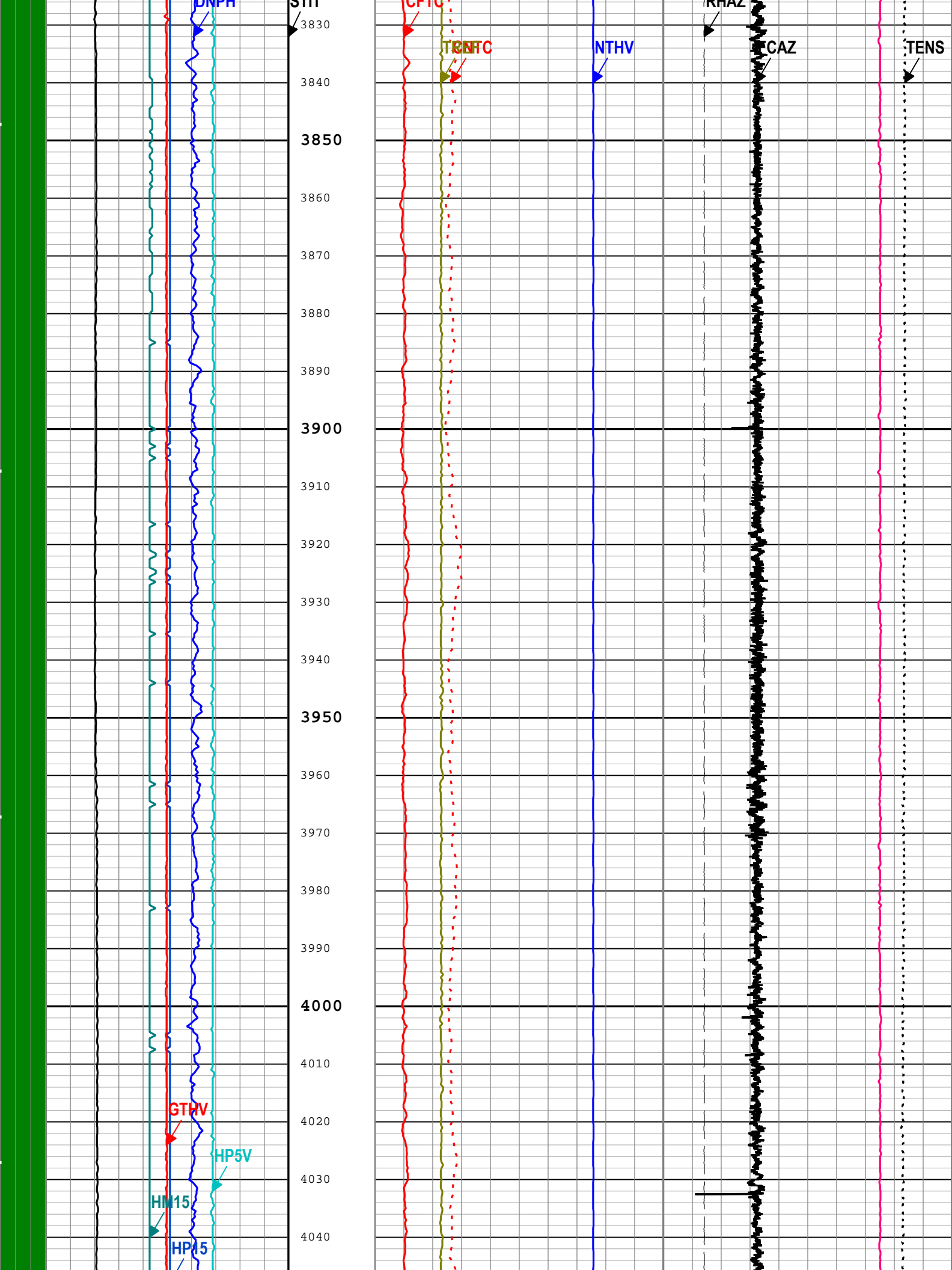


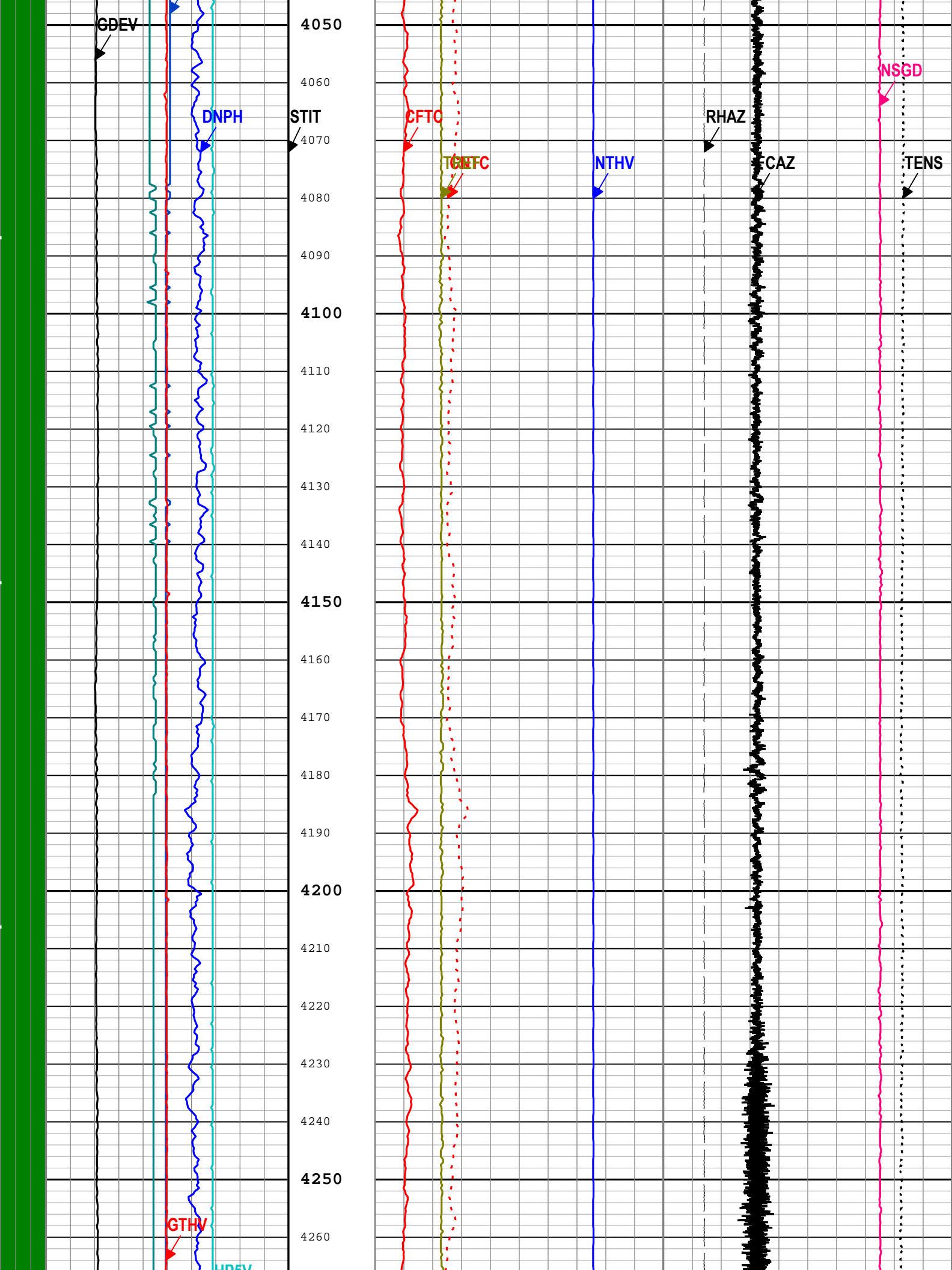


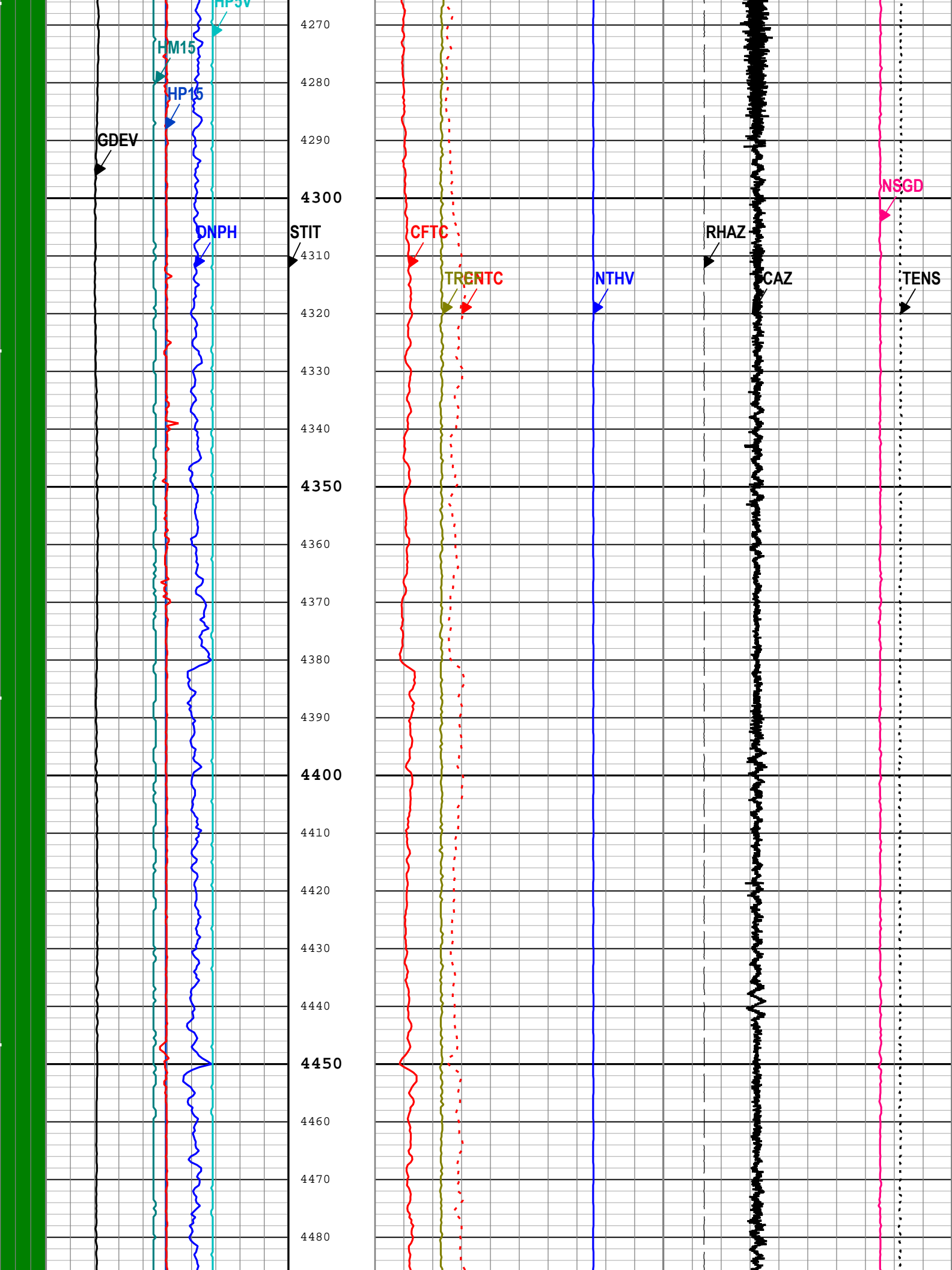


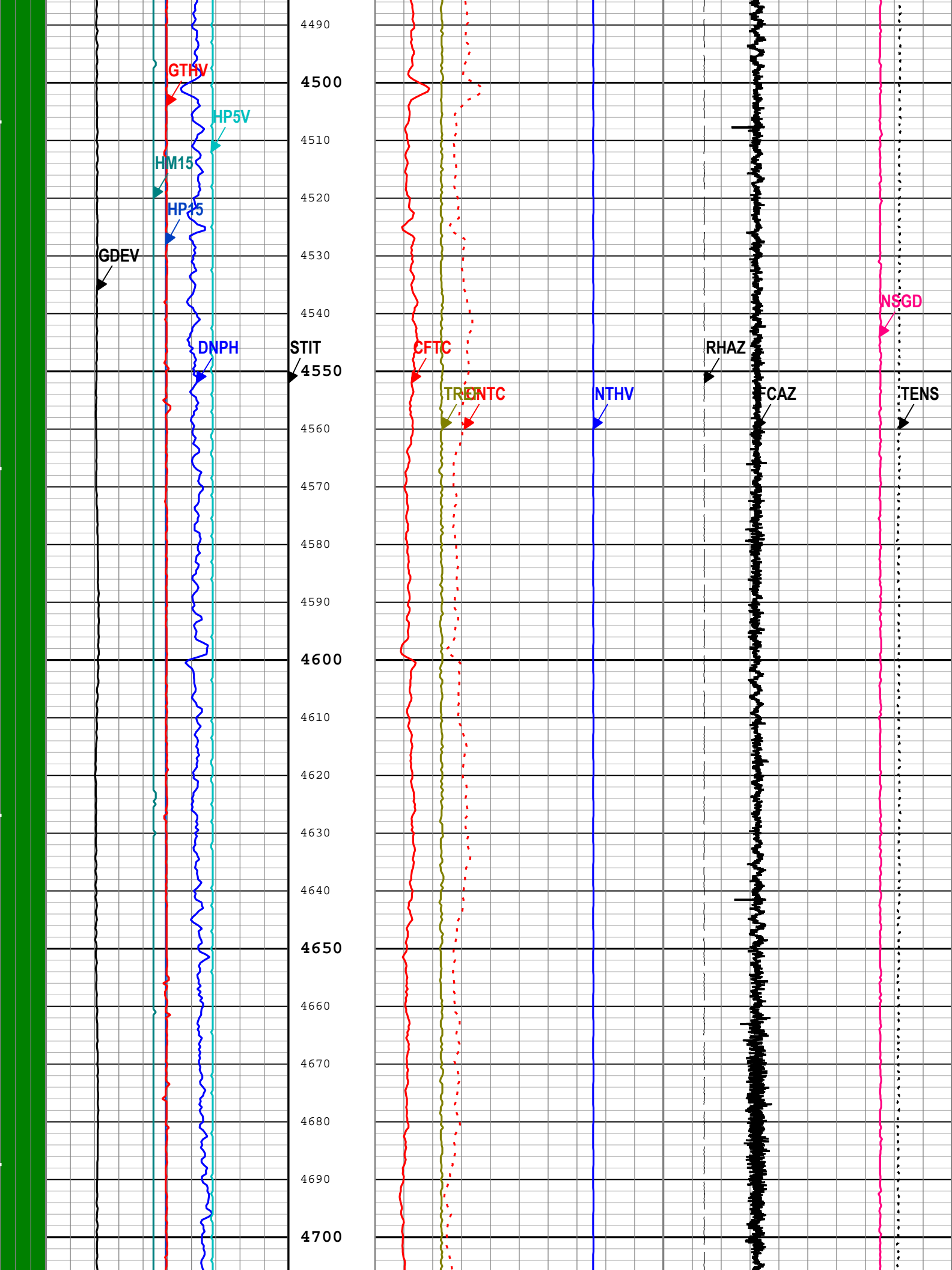


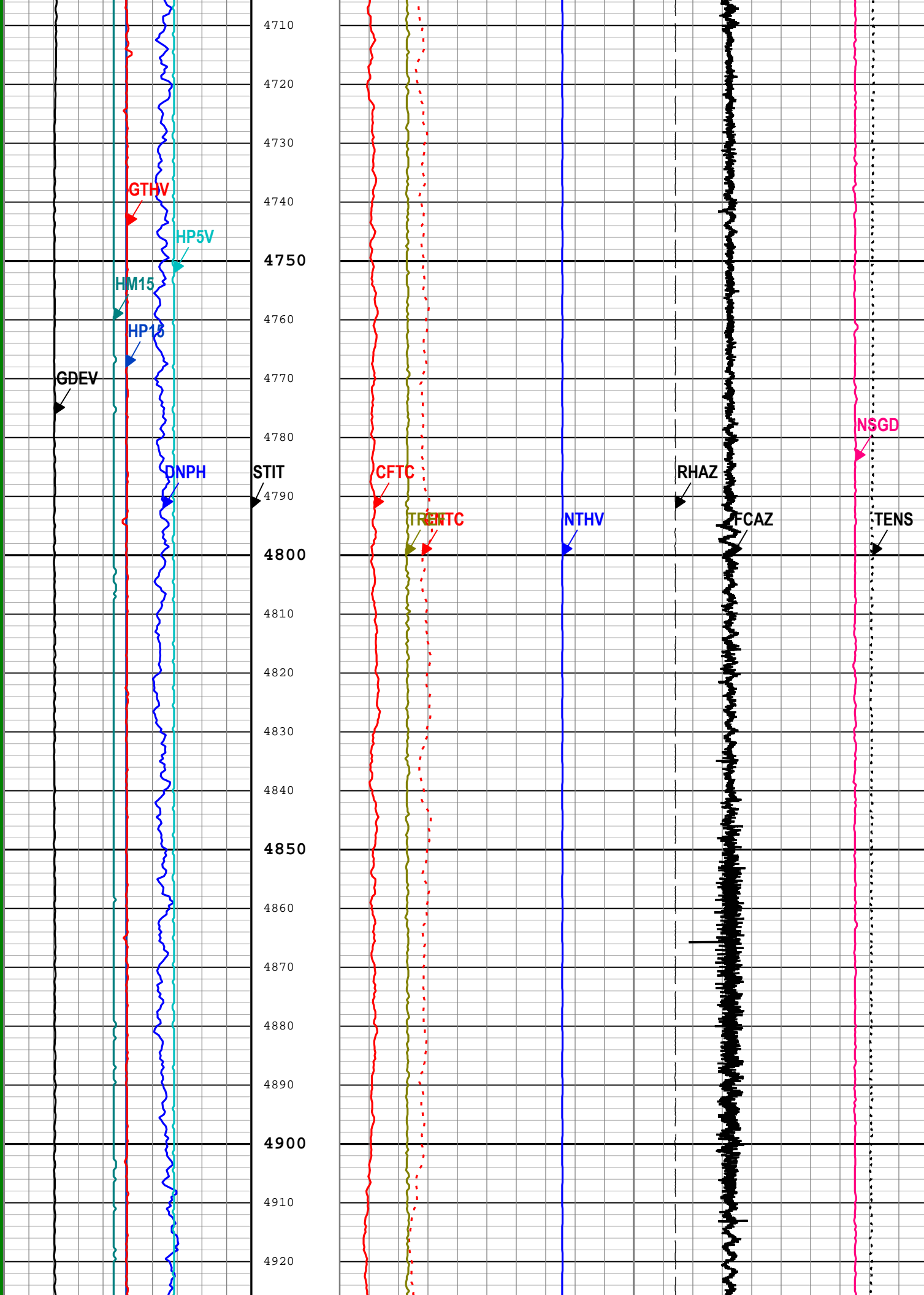


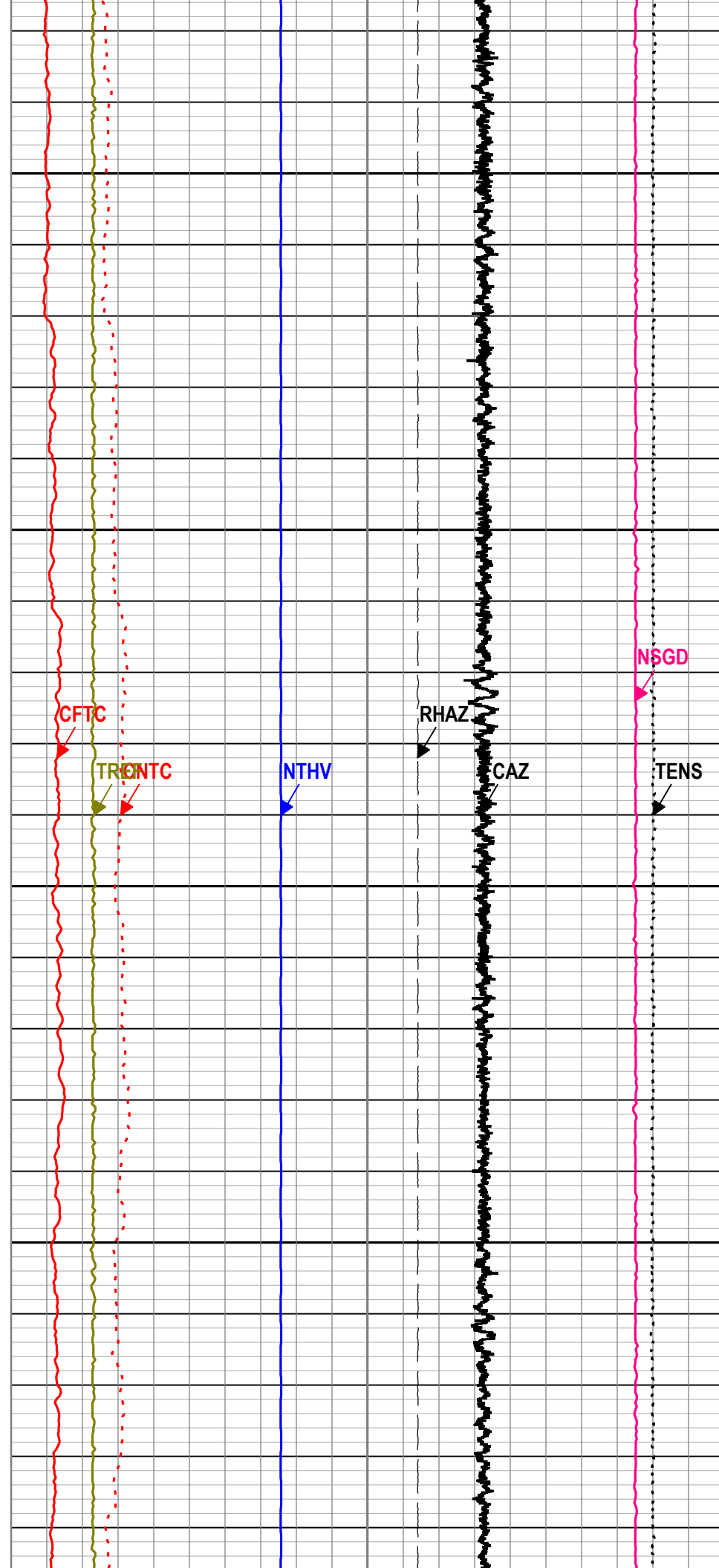
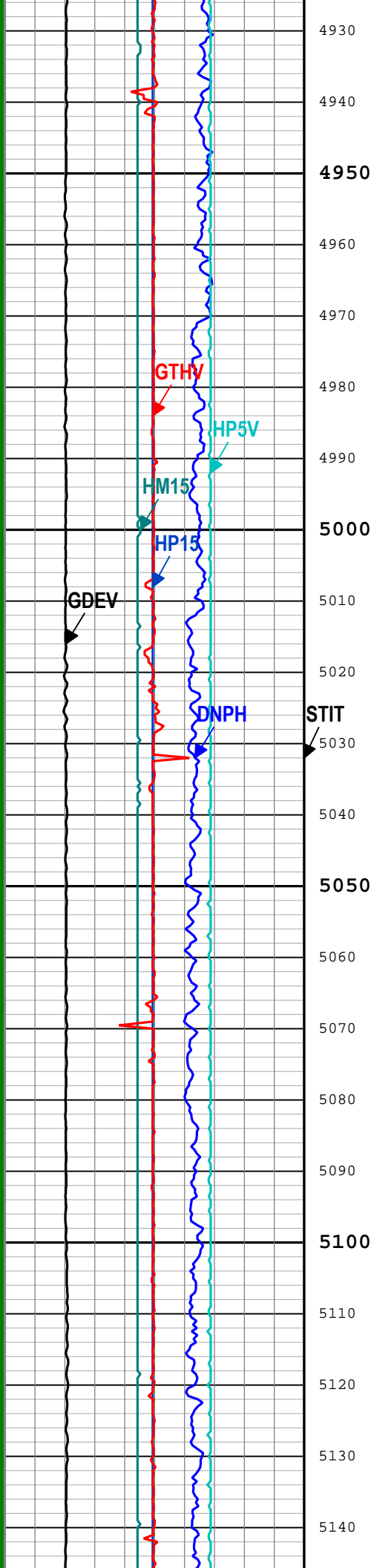


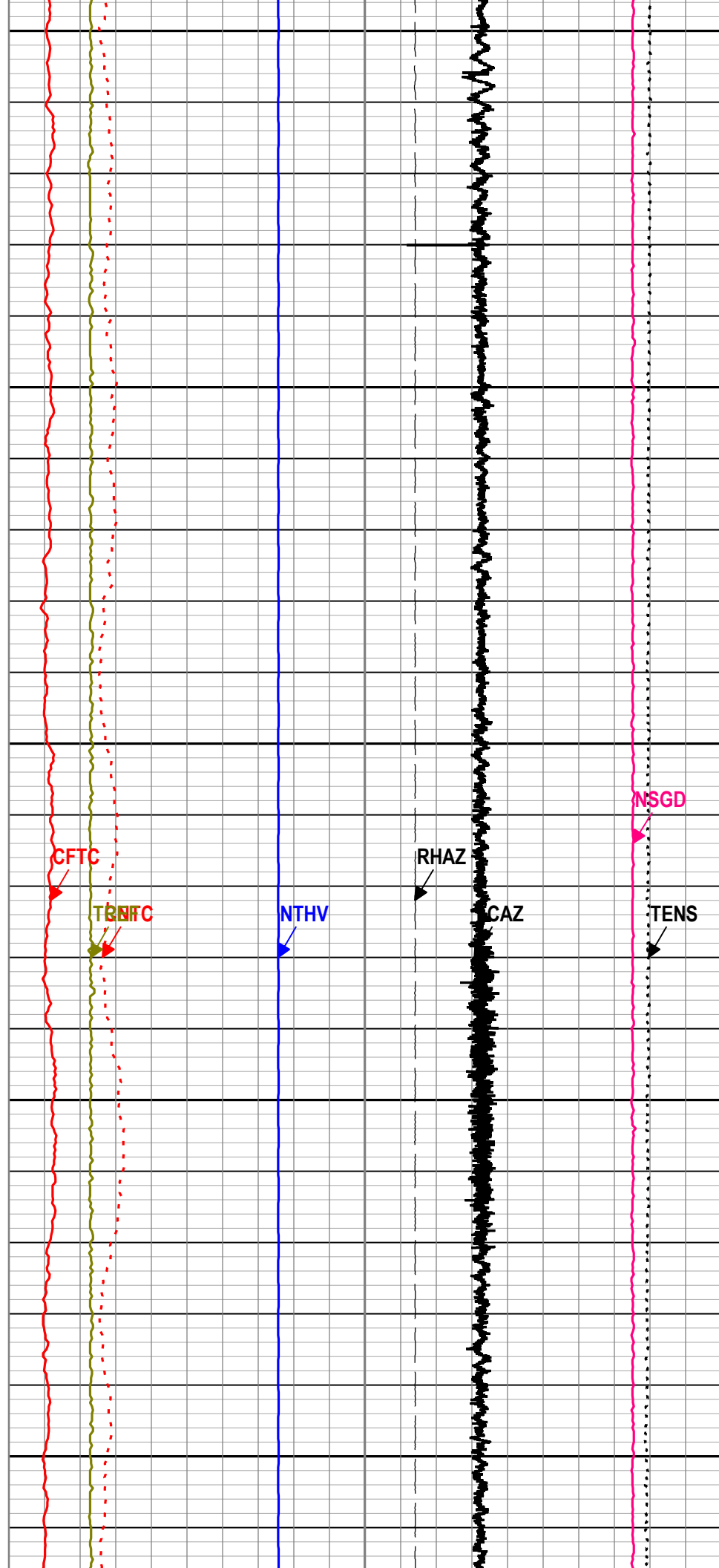
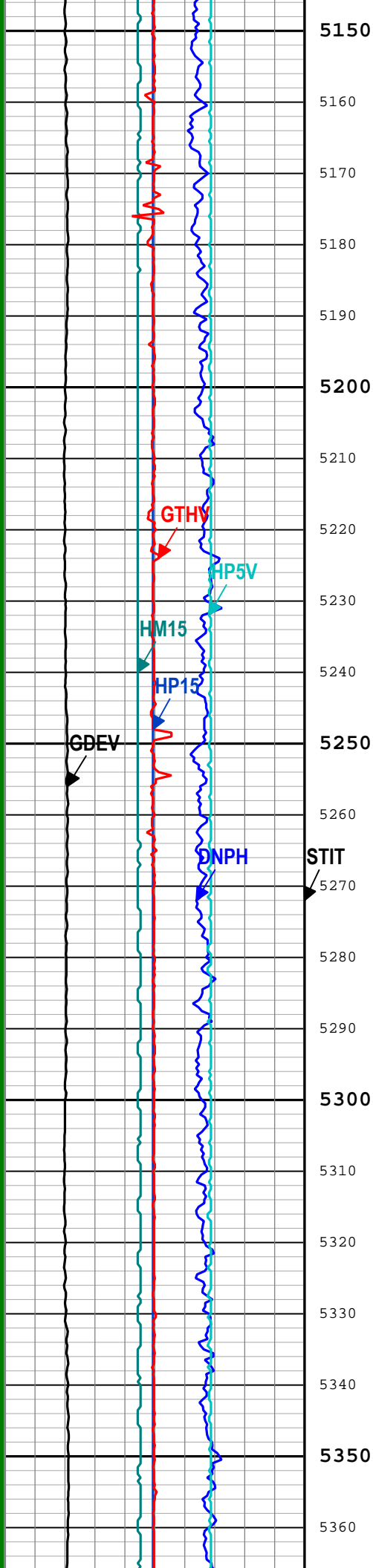




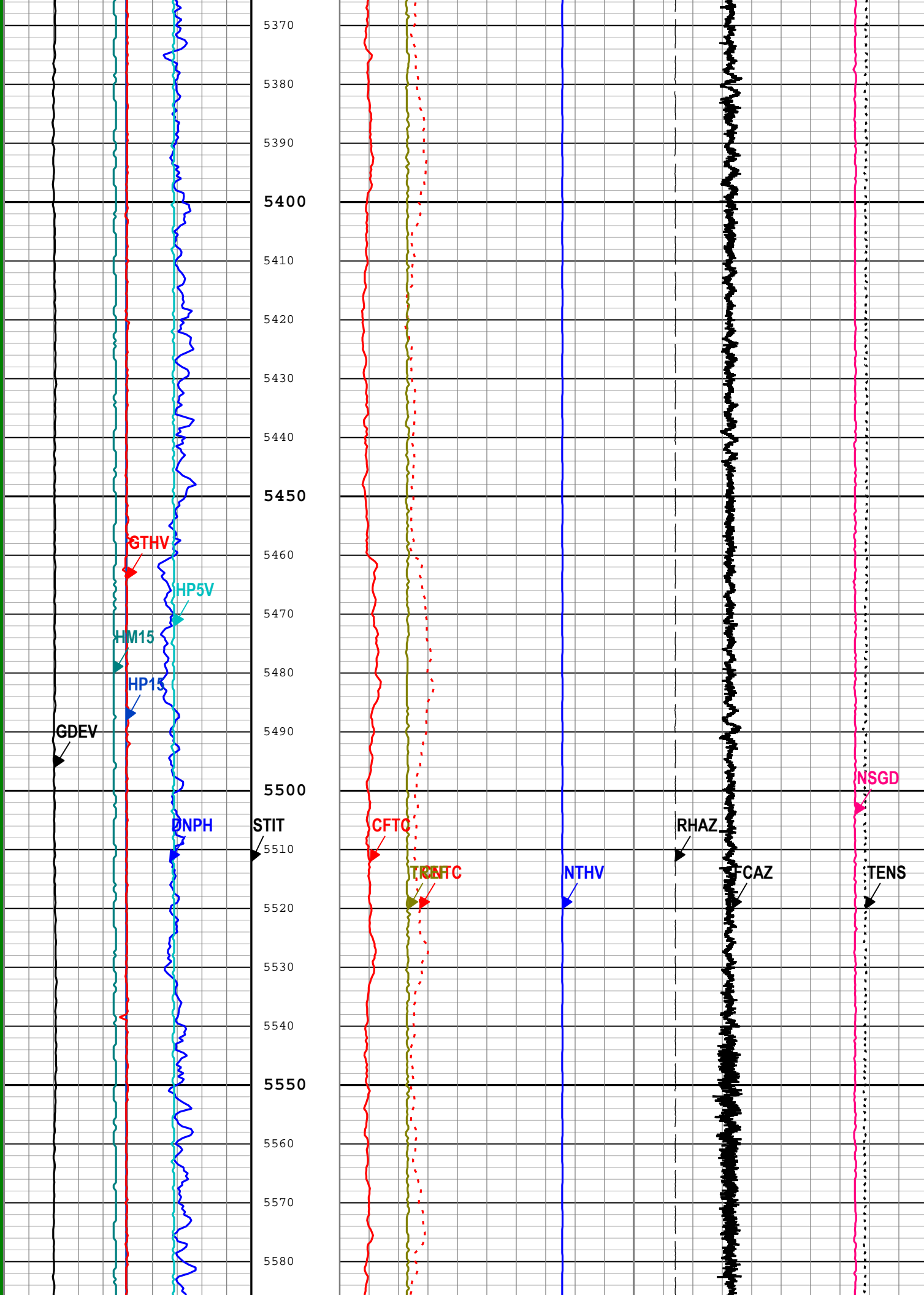


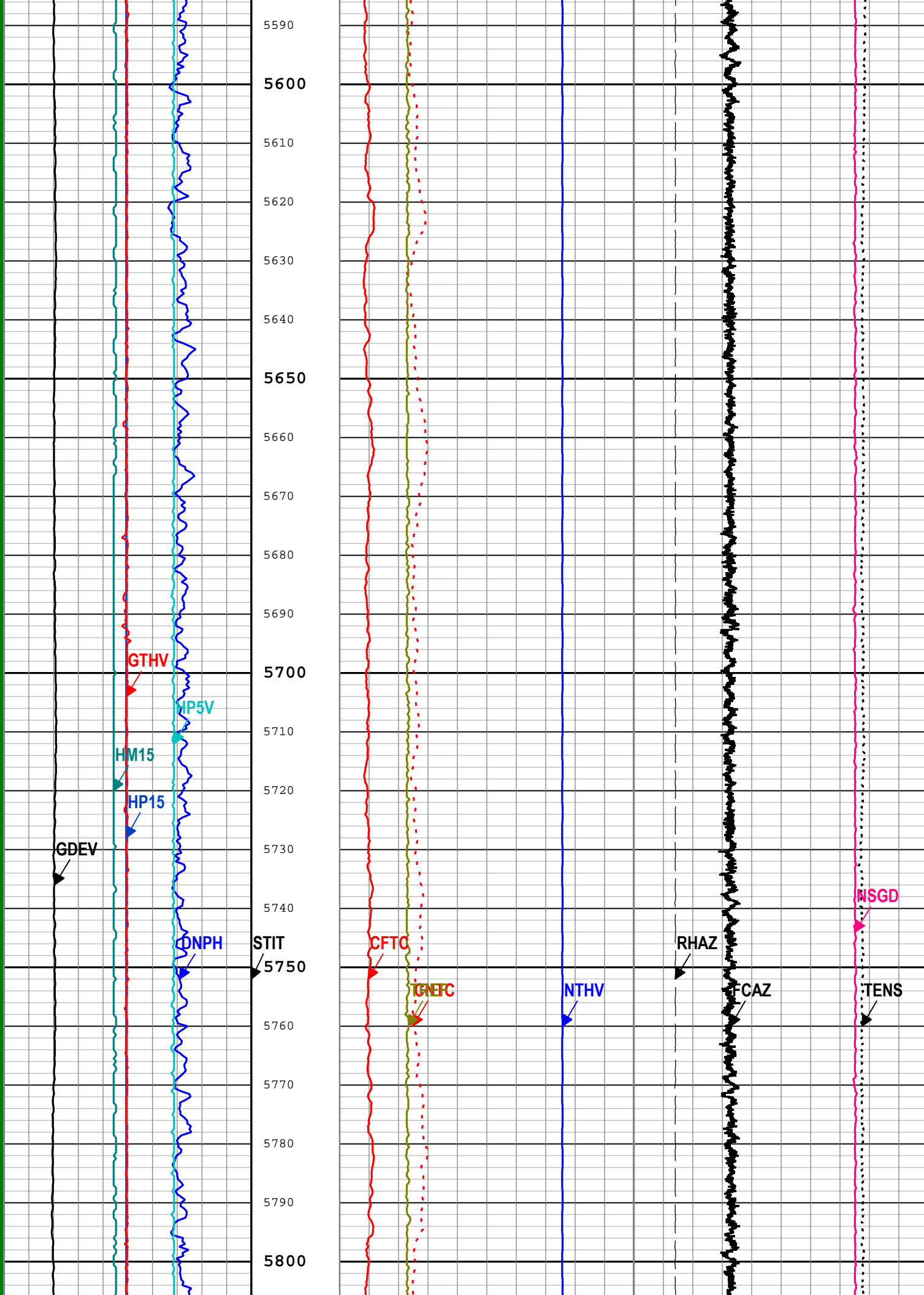


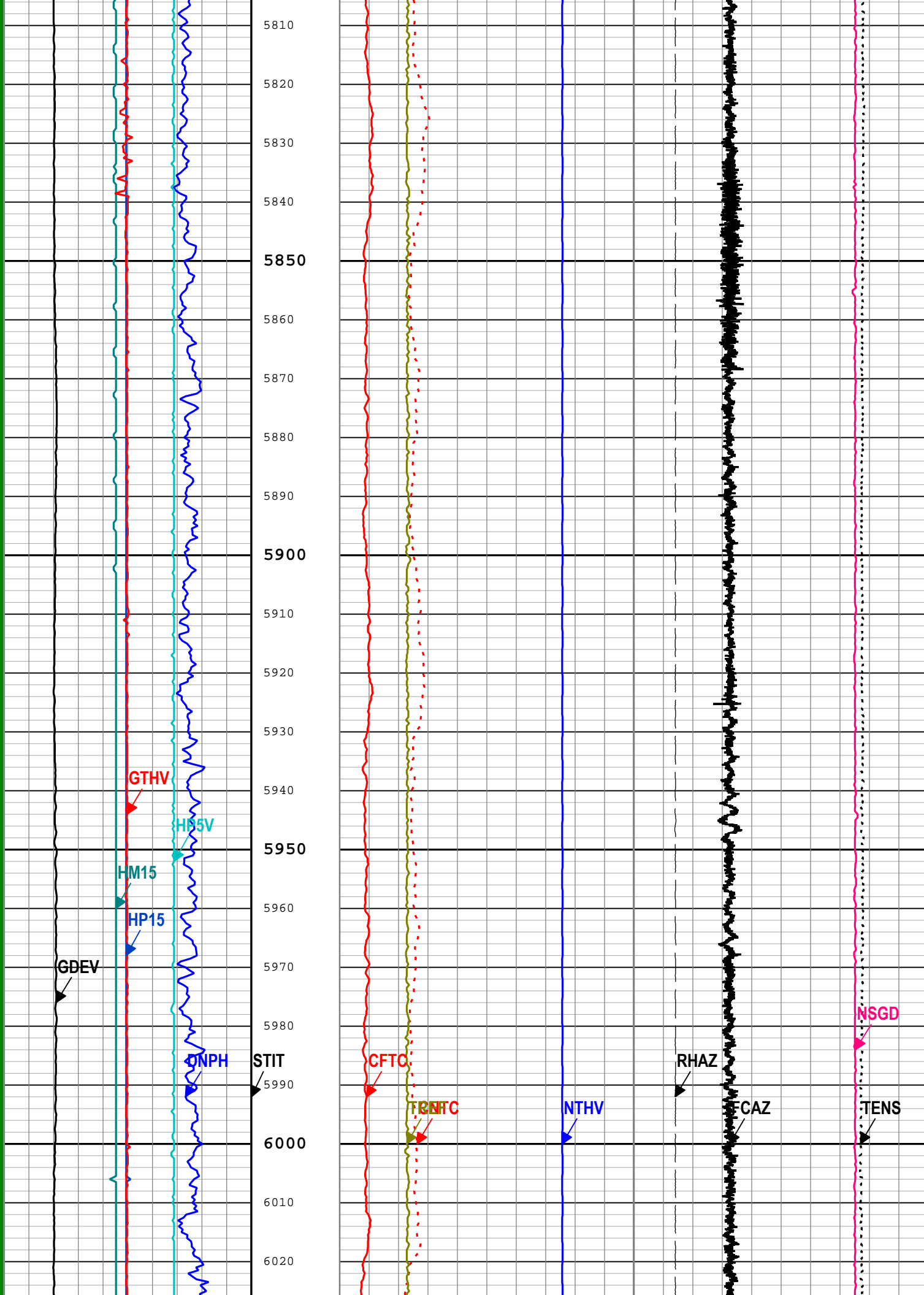


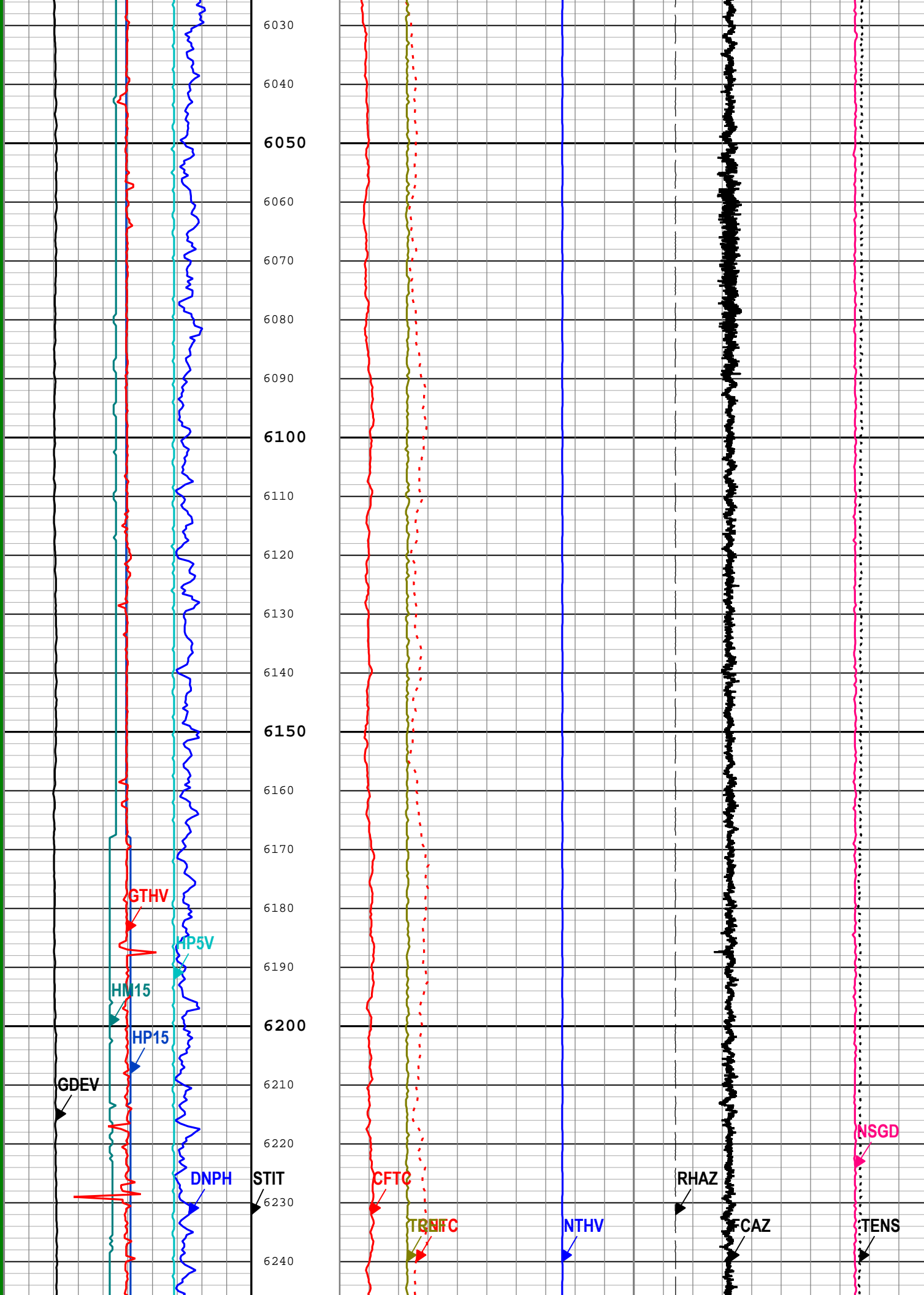


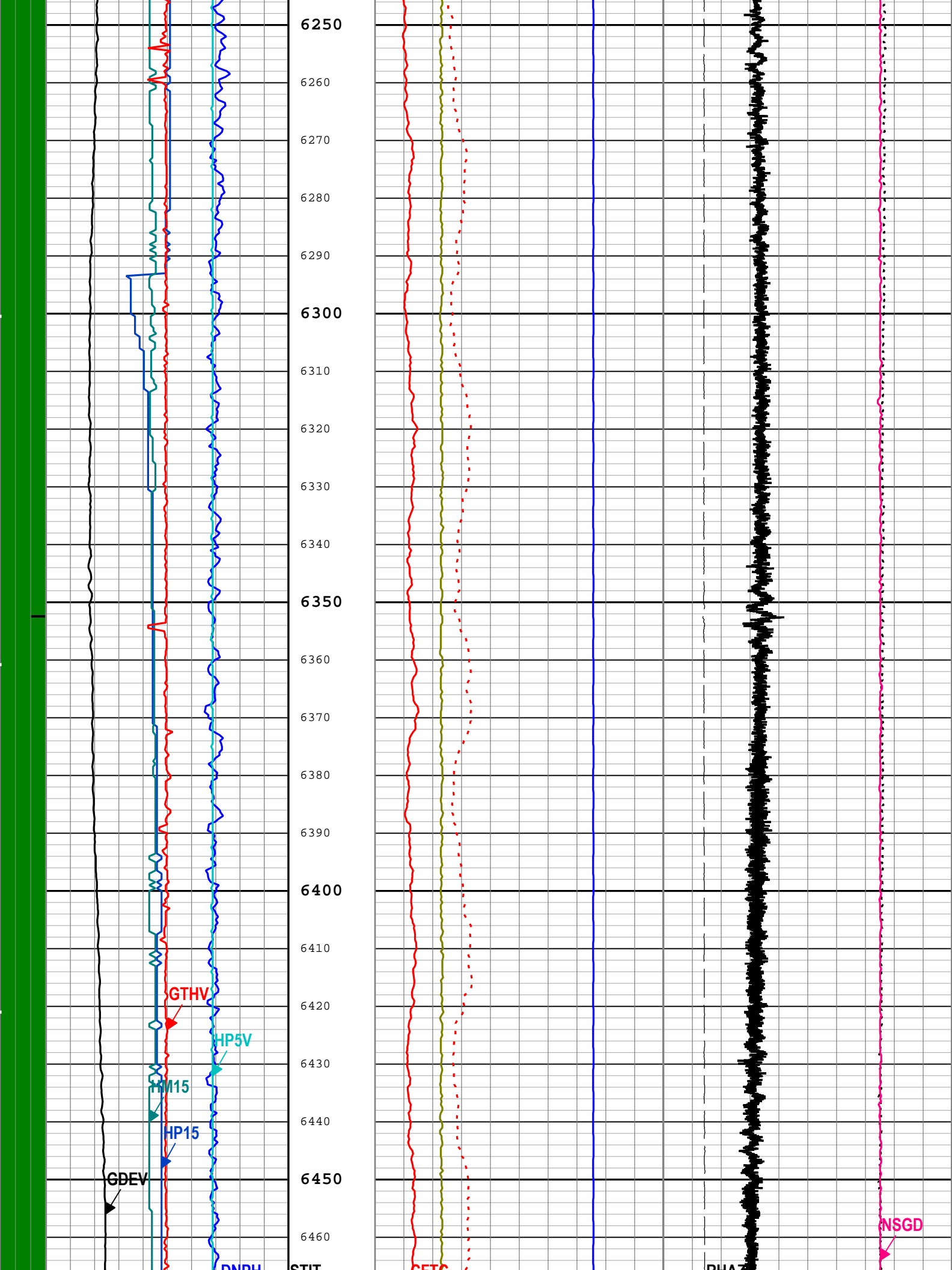


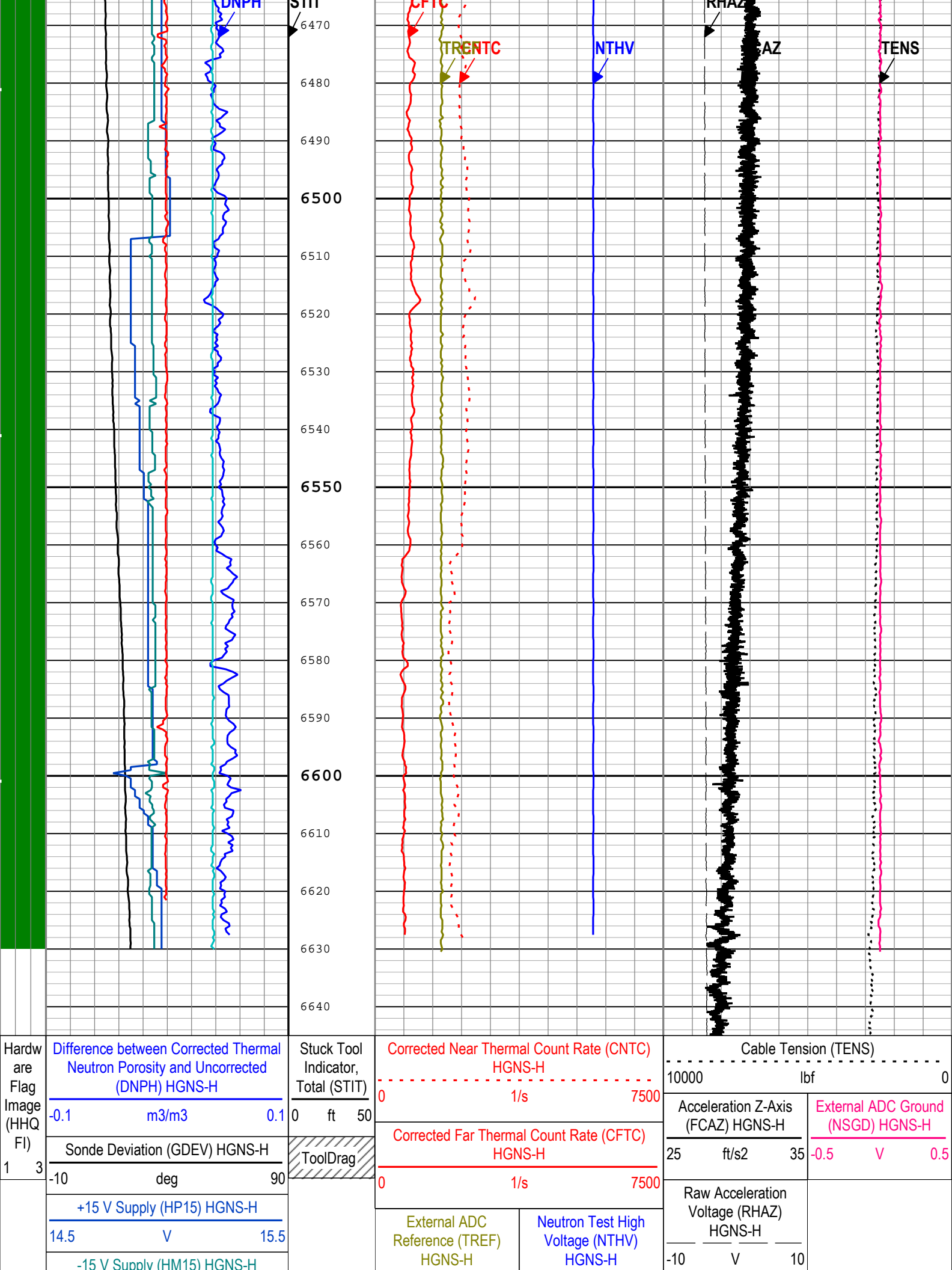














Parameter	Value	Start ( ft )	Stop ( ft )
BS	13.5	200	1955
BS	8.5	1955	6645

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	

Company:

Noble Energy Inc.

Schlumberger

Well:

EMMY H25-744

Field:

DJ BASIN

County:

Weld

State:

Colorado

Neutron Log