

Company: NOBLE ENERGY INC.

Well: VOGLER STATE D21-790

Field: WATTENBERG

County: WELD State: COLORADO

NEUTRON LOG

NEUTRON LOG

County:		WELD	
Field:		WATTENBERG	
Location:		SHL: NENE SECTION 21 TOWNSHIP 3N RANGE 6	
Well:		VOGLER STATE D21-790	
Company:		NOBLE ENERGY INC.	
Location:			
SHL: NENE SECTION 21 TOWNSHIP 3N RANGE 6		Elev.:	K.B. 4850.00 ft
BHL: 200' FNL & 660' FEL			G.L. 4820.00 ft
			D.F.
Permanent Datum:	Ground Level	Elev.:	4820.00 f
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		
API Serial No.	Section:	Township:	Range:
05-123-48561	21	3N	64W

Logging Date	07-May-2019		
Run Number	ONE		
Depth Driller	17665.00 ft		
Schlumberger Depth	17665.00 ft		
Bottom Log Interval	6833.00 ft		
Top Log Interval	64.00 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	1957.00 ft		
To	17665.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	P110		
From	0.00 ft		
To	17650.80 ft		
Max Recorded Temperatures	216.52 degF		
Logger on Bottom	Time		
Unit Number	Location:	9108	11:15:00
Recorded By	CODY SPENCE		FORT MORGAN
Witnessed By	BILL MANSFIELD		

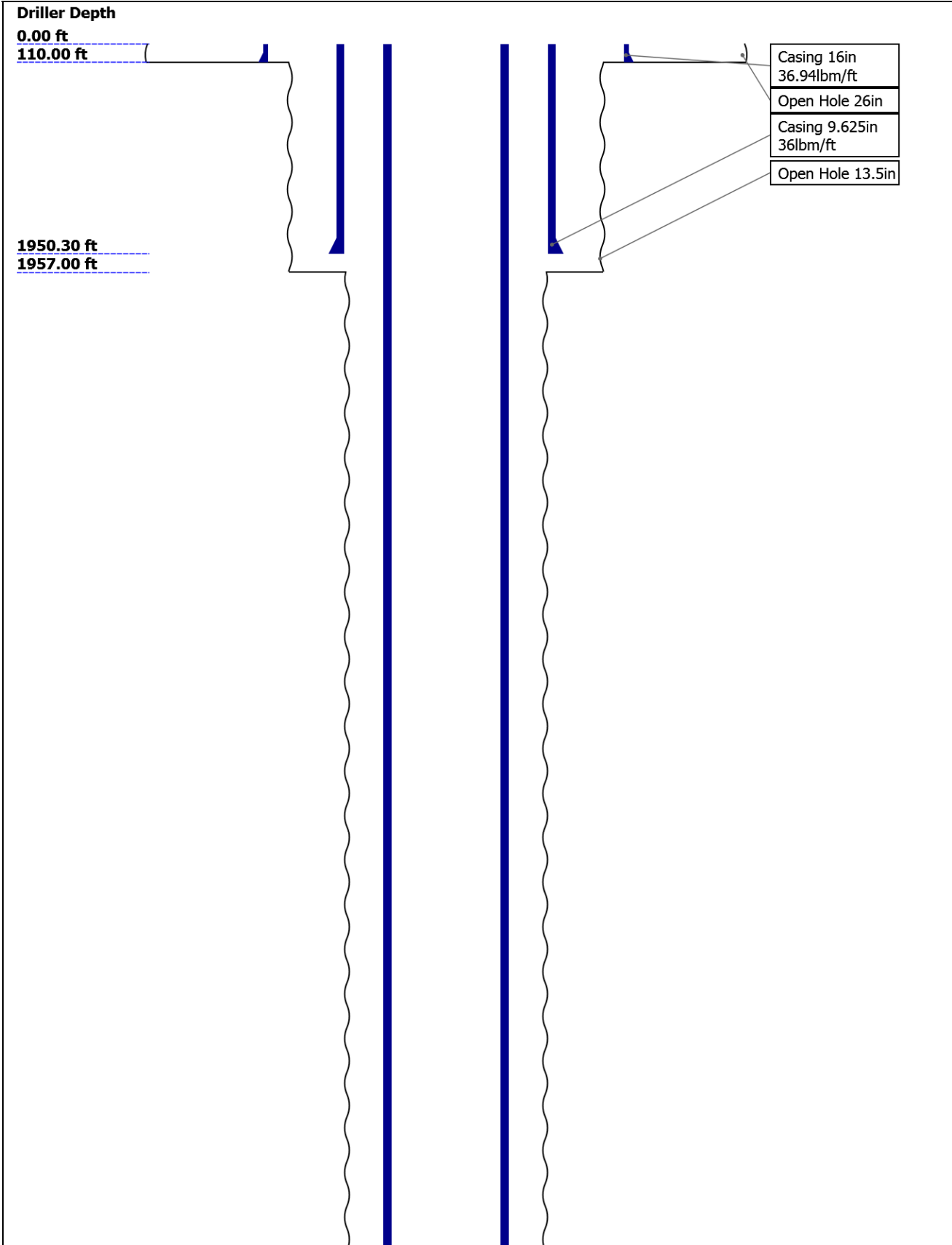
Disclaimer

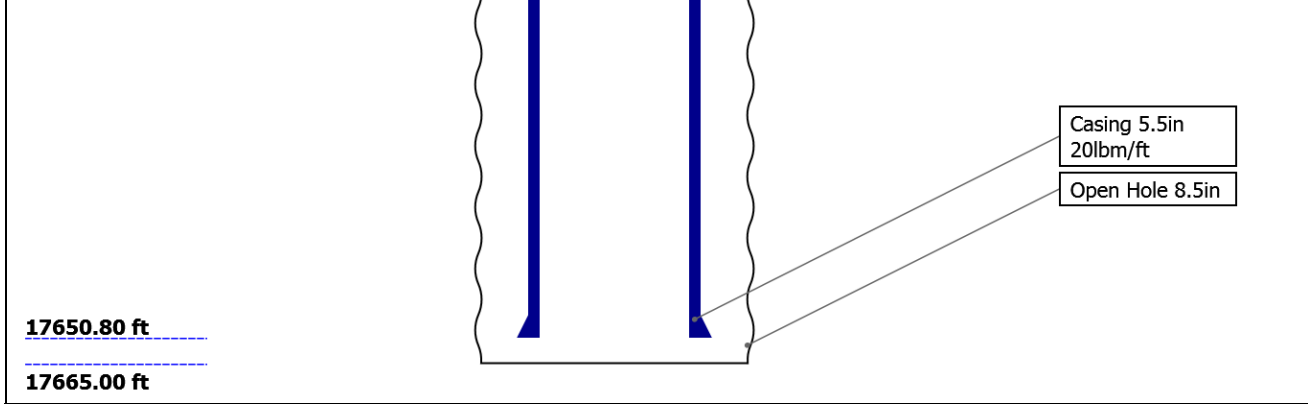
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA;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

Contents

- Header
- Disclaimer
- Contents
- Well Sketch
- Borehole Size/Casing/Tubing Record
- Remarks and Equipment Summary
- Depth Summary
- ONE NOBLE NUCLEAR MAIN PASS 2500PSI [5:100]
 - Integration Summary
 - Software Version
 - Composite Summary
 - Log (Noble Nuclear)
 - Parameter Listing
- ONE NOBLE NUCLEAR REPEAT ANALYSIS [5:100]
 - Composite Summary
 - Noble Nuclear RA
- Tail

Well Sketch




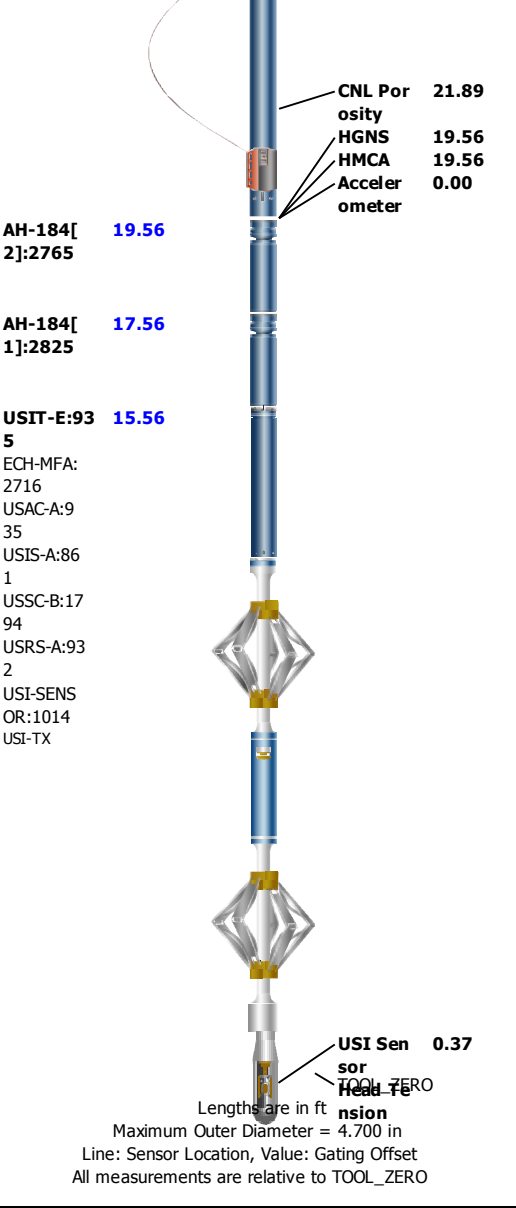


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	1957			
Top Logger (ft)	0	110	1957			
Bottom Driller (ft)	110	1957	17665			
Bottom Logger (ft)	110	1957	17665			
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	X52	J55	P110			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	1950.3	17650.8			
Bottom Logger (ft)	110	1950.3	17650.8			

Remarks and Equipment Summary

ONE: Toolstring				ONE: Remarks	
<div><div><div>Equip nameLength</div><div>LEH-QT40.45</div><div>LEH-QT</div></div><div><div>EDTC-H:ENP22</div><div>EDTH-H:8515</div><div>EDTC-H:ENP22</div></div><div><div>HGNS-B</div><div>HGNH</div><div>NPV-N</div><div>NSR-F:5070</div><div>HACCZ-B:659</div><div>HGNS-B</div><div>HMCA-B</div></div></div> <div></div> <div><div>MP nameOffset</div><div>CTEM36.22</div><div>HV0.00</div><div>ACCZ0.00</div><div>Gamma30.54</div><div>Ray</div><div>Edtch St28.97</div><div>atus</div><div>TelStatu28.97</div><div>s</div><div>Temper28.94</div><div>ature</div><div>GR28.23</div></div>	THANK YOU FOR CHOOSING SCHLUMBERGER TECHNOLOGY CORPORATION!				
	LOGGING OBJECTIVE: CASING AND CEMENT EVALUATION				
	TOOLSTRING RAN AS PER TOOLSKETCH				
	TOOLSTRING CENTRALIZED WITH GEMCOS ON USAC AND USING BOOSTER KIT ON IN-LINE CENTRALIZERS				
	MAIN PASS LOGGED UNDER 2500PSI				
	REPEAT PASS LOGGED UNDER 0PSI				
	CREW: ROB STELTER, CODY SPENCE				



Depth Summary

	ONE		
--	-----	--	--

Depth Measuring Device

Type	IDW-JA		
Serial Number	6527		
Calibration Date	28-Sep-2017		
Calibrator Serial Number	IDWC-C-57		
Calibration Cable Type	7-46 AXS		
Wheel Correction 1	-2		
Wheel Correction 2	-2		

Tension Device

Type	CMTD-B/A		
Serial Number	147		
Calibration Date	28-NOV-2017		
Calibrator Serial Number	88310A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	16		
Calibration Peak Error	25		

Logging Cable

Type	7-32AS-XS		
Serial Number	F715040		
Length	23500.00 ft		
Conveyance Type	Wireline		
Rig Type	LAND		

ONE:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	ALL SCHLUMBERGER DEPTH CONTROL POLICIES AND GUIDELINES FOLLOWED
Rig Up Length At Surface		IDW USED AS PRIMARY DEPTH CONTROL
Rig Up Length At Bottom		Z-CHART USED AS SECONDARY DEPTH CONTROL
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

ONE

NOBLE NUCLEAR MAIN PASS 2500PSI [5:100]

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	8.2.102758.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	41.32 ft	6841.43 ft	07-May-2019 11:20:31 AM	07-May-2019 1:29:24 PM	ON	6.77 ft	Yes

All depths are referenced to toolstring zero

Log

Company:NOBLE ENERGY INC. Well:VOGLER STATE D21-790

ONE: Log[4]:Up:S007

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: 07-May-2019 15:14:29

Channel	Source	Sampling
CCLU	USIT-E:USRS:USI-SENSOR	6in
GR	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
NPOR	HGNS-B:HGNS-B:HGNS-B	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

— IHV - Integrated Hole Volume every 10.00 (ft3)

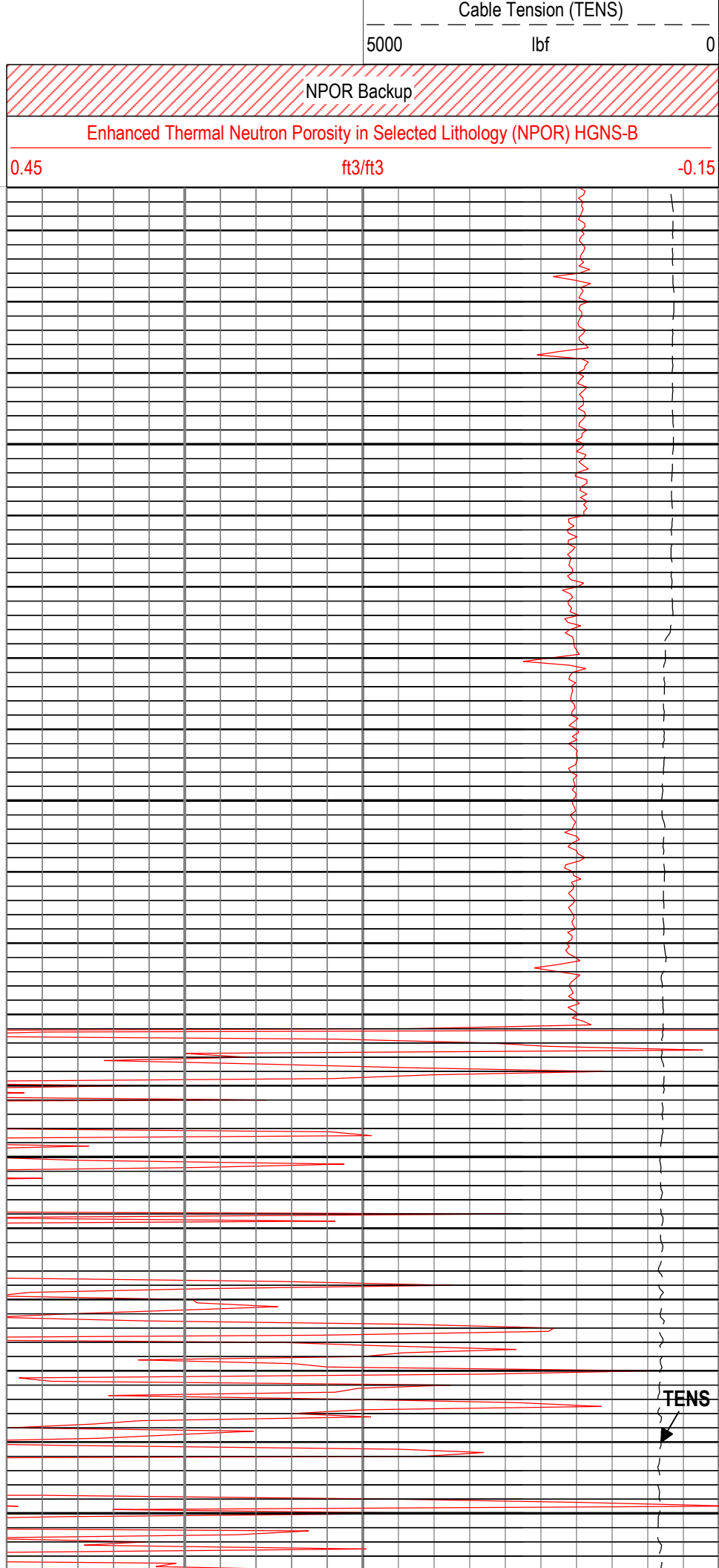
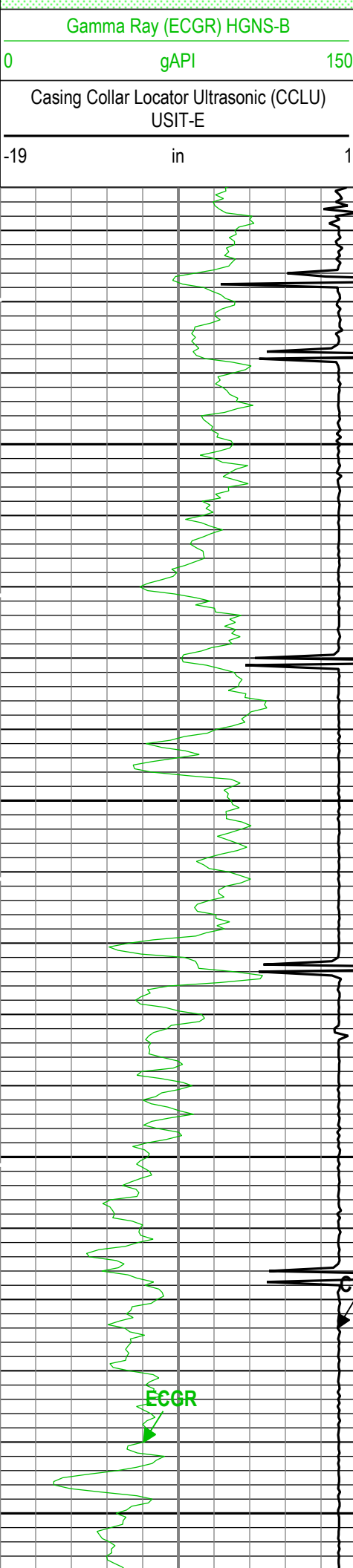
— IHV - Integrated Hole Volume every 100.00 (ft3)

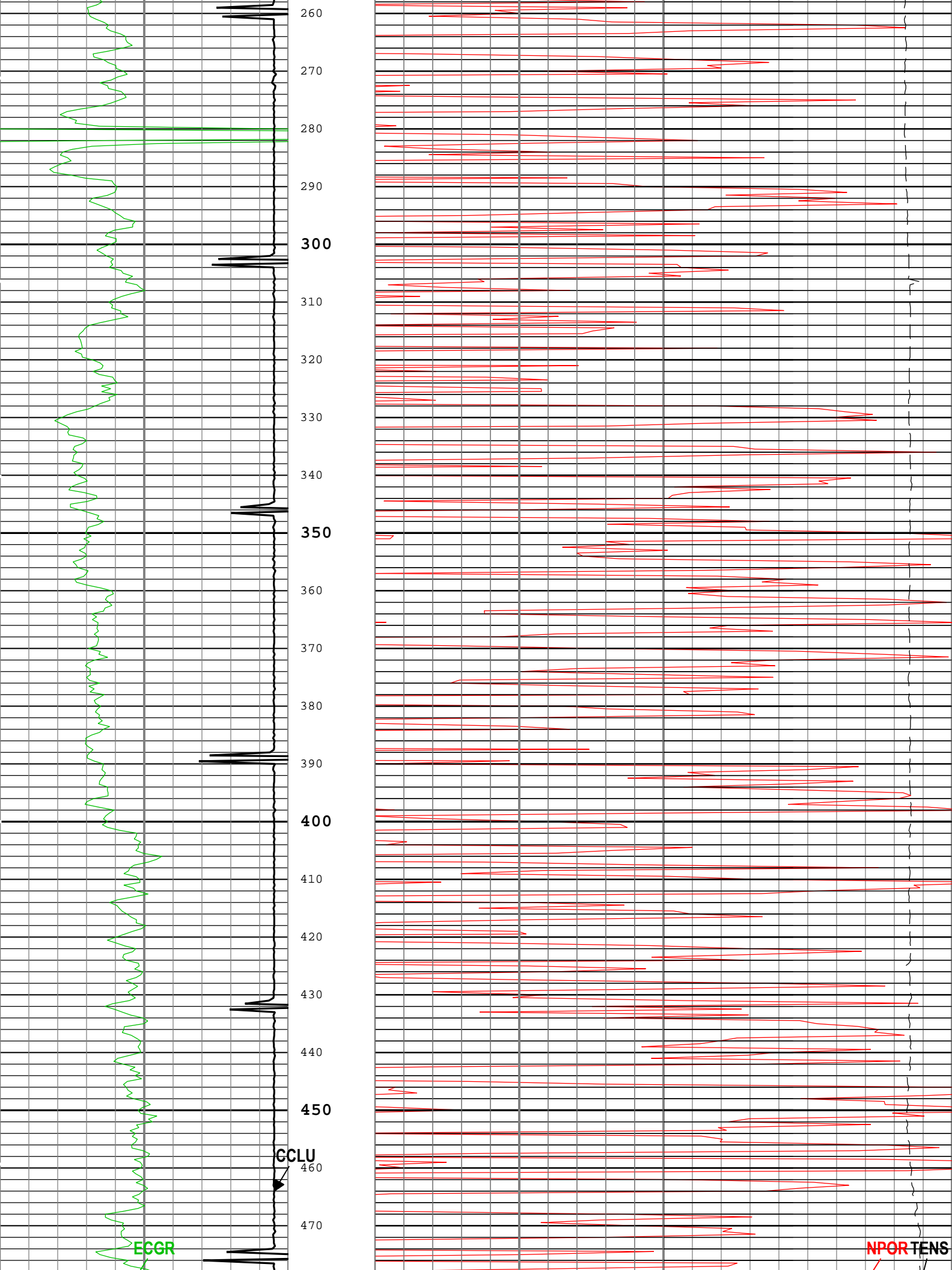
— ICV - Integrated Cement Volume every 10.00 (ft3)

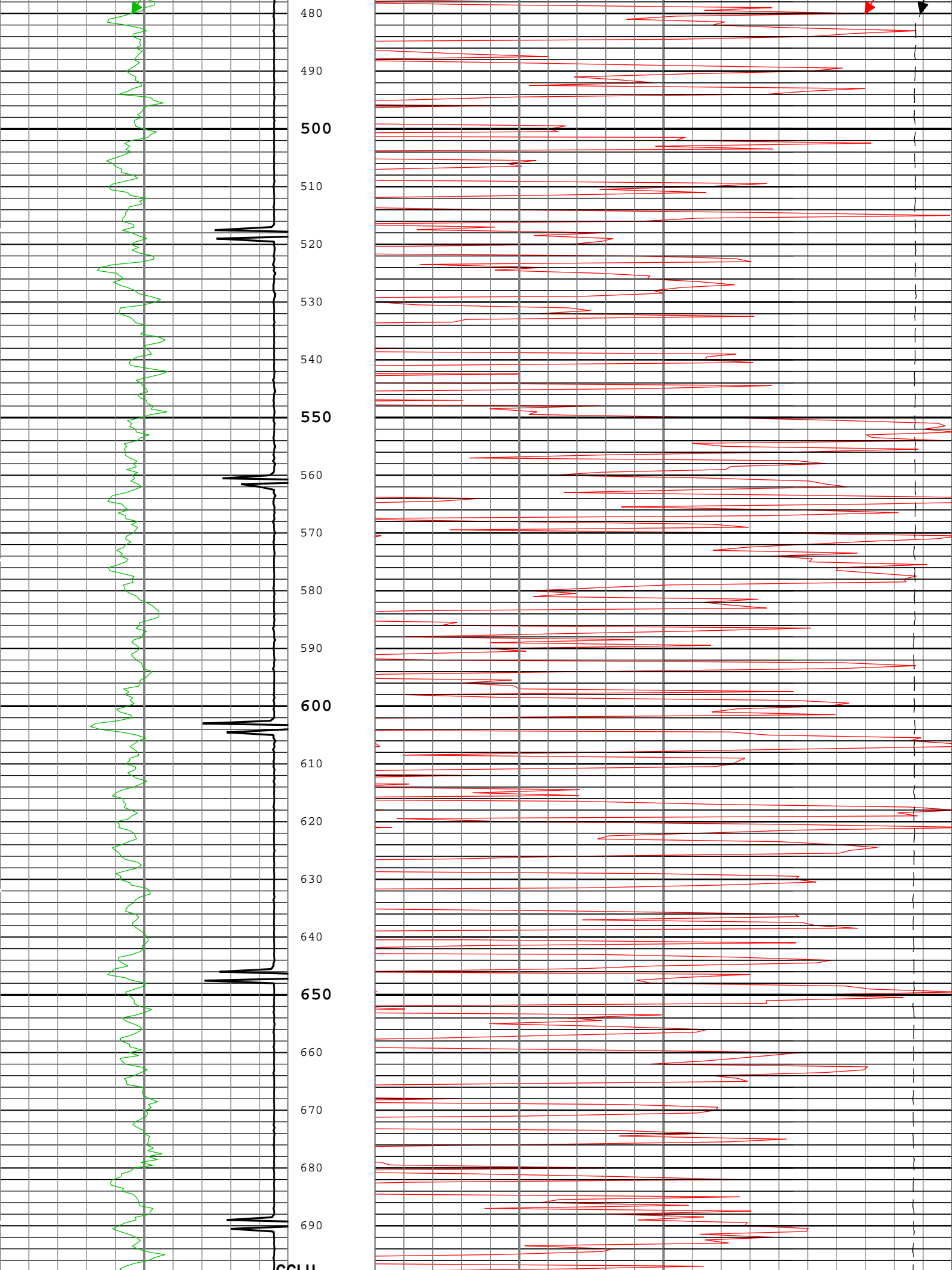
— ICV - Integrated Cement Volume every 100.00 (ft3)

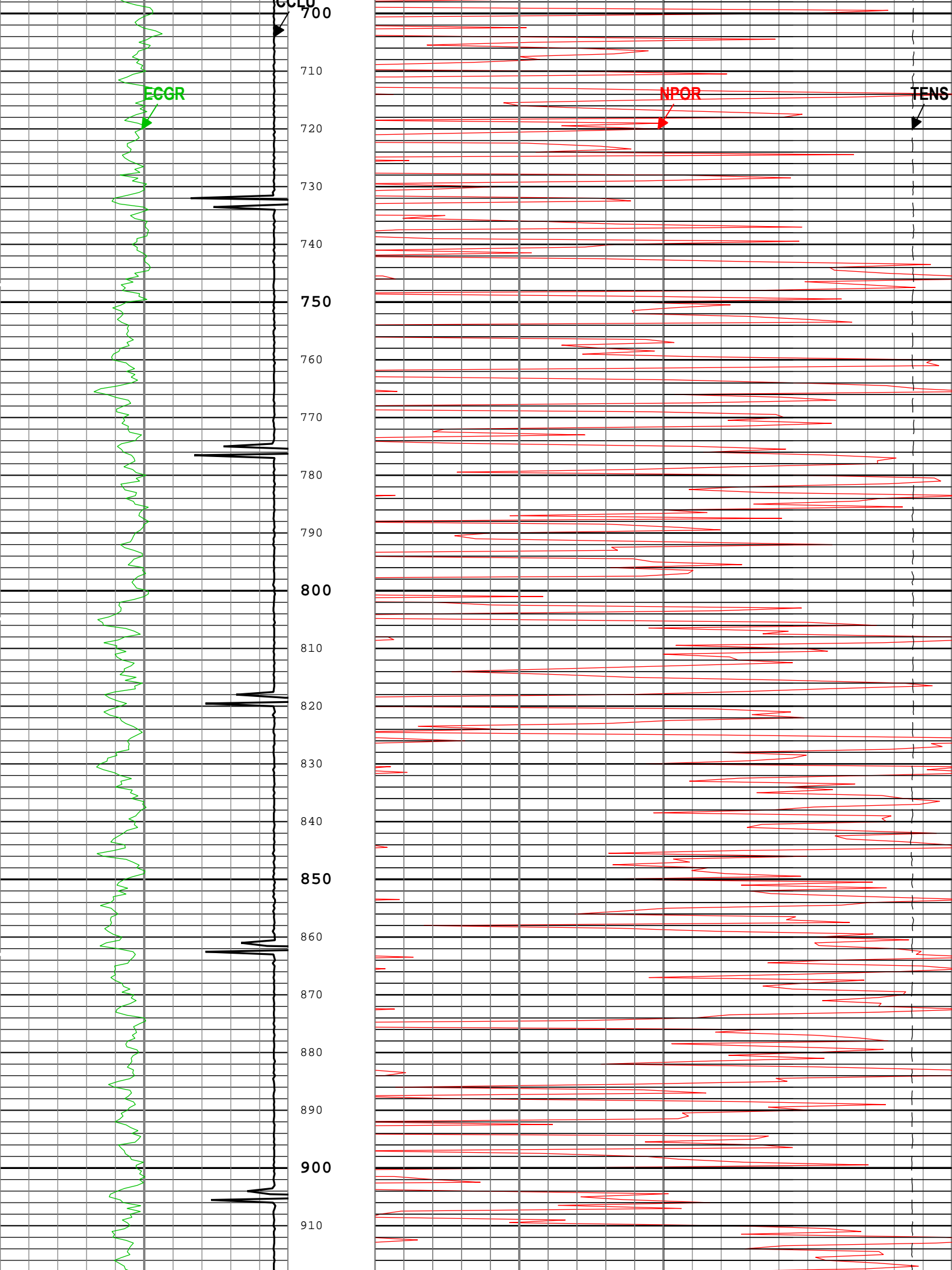
TIME_1900 - Time Marked every 60.00 (s)

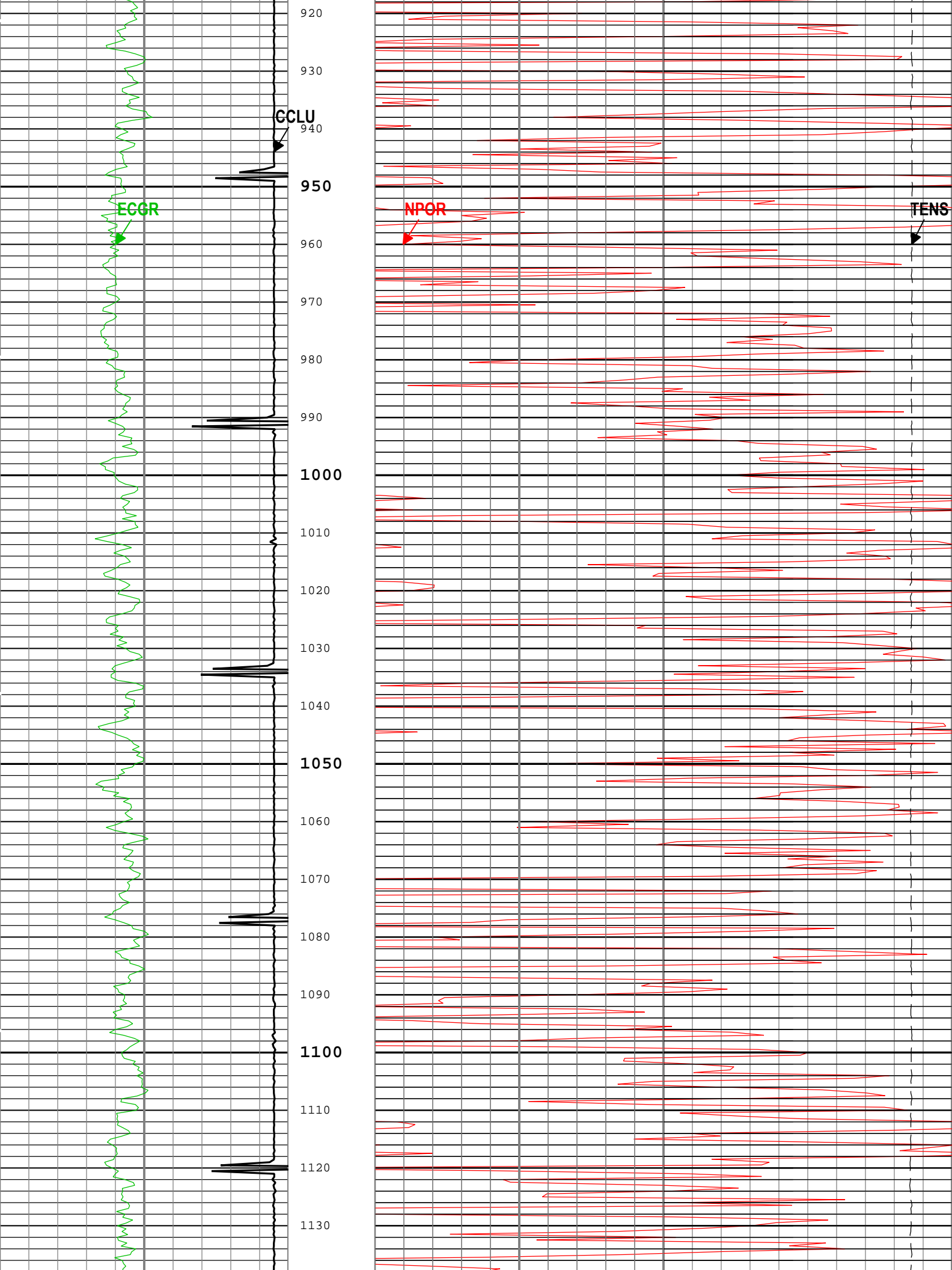
GR Backup

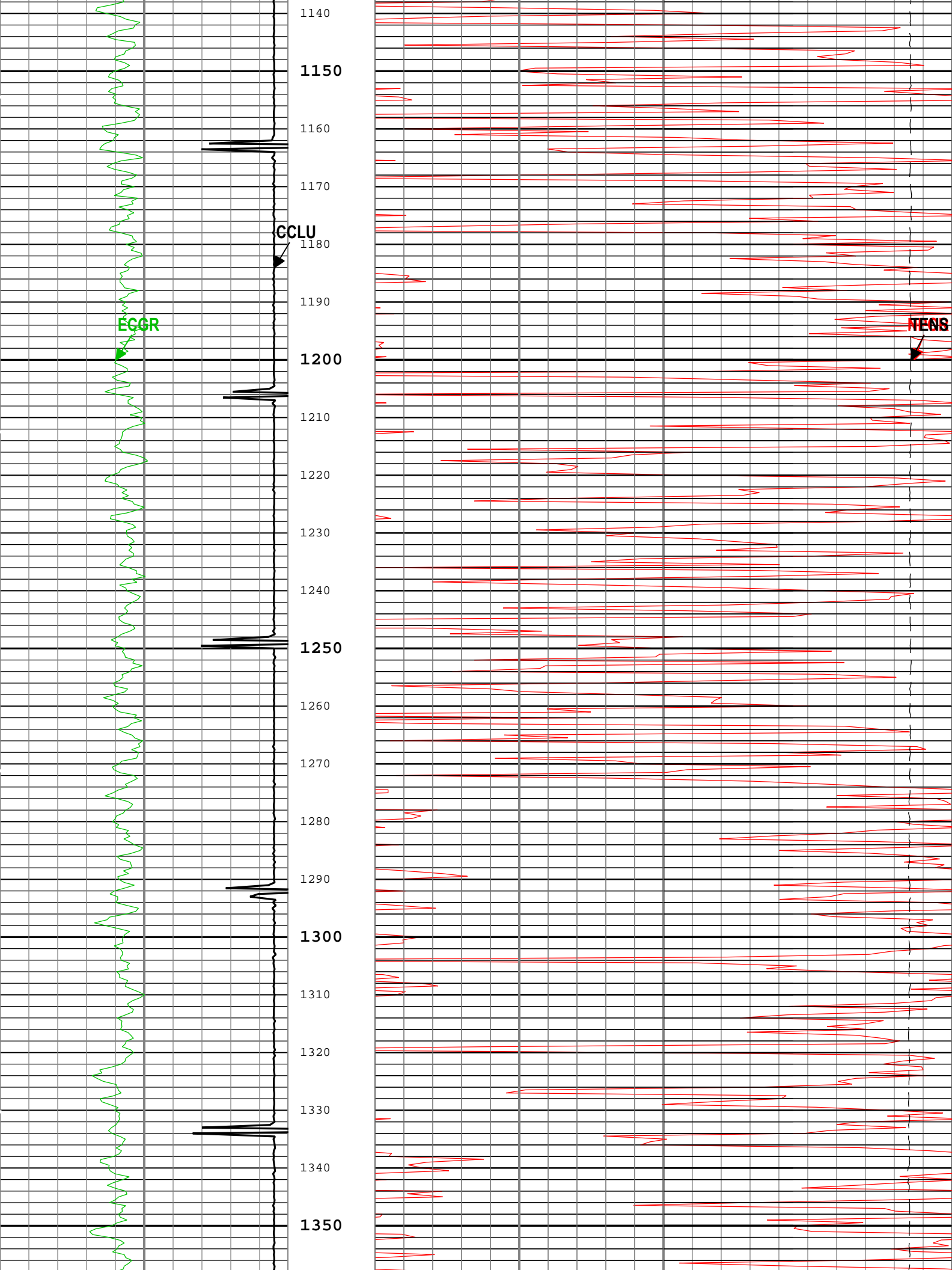


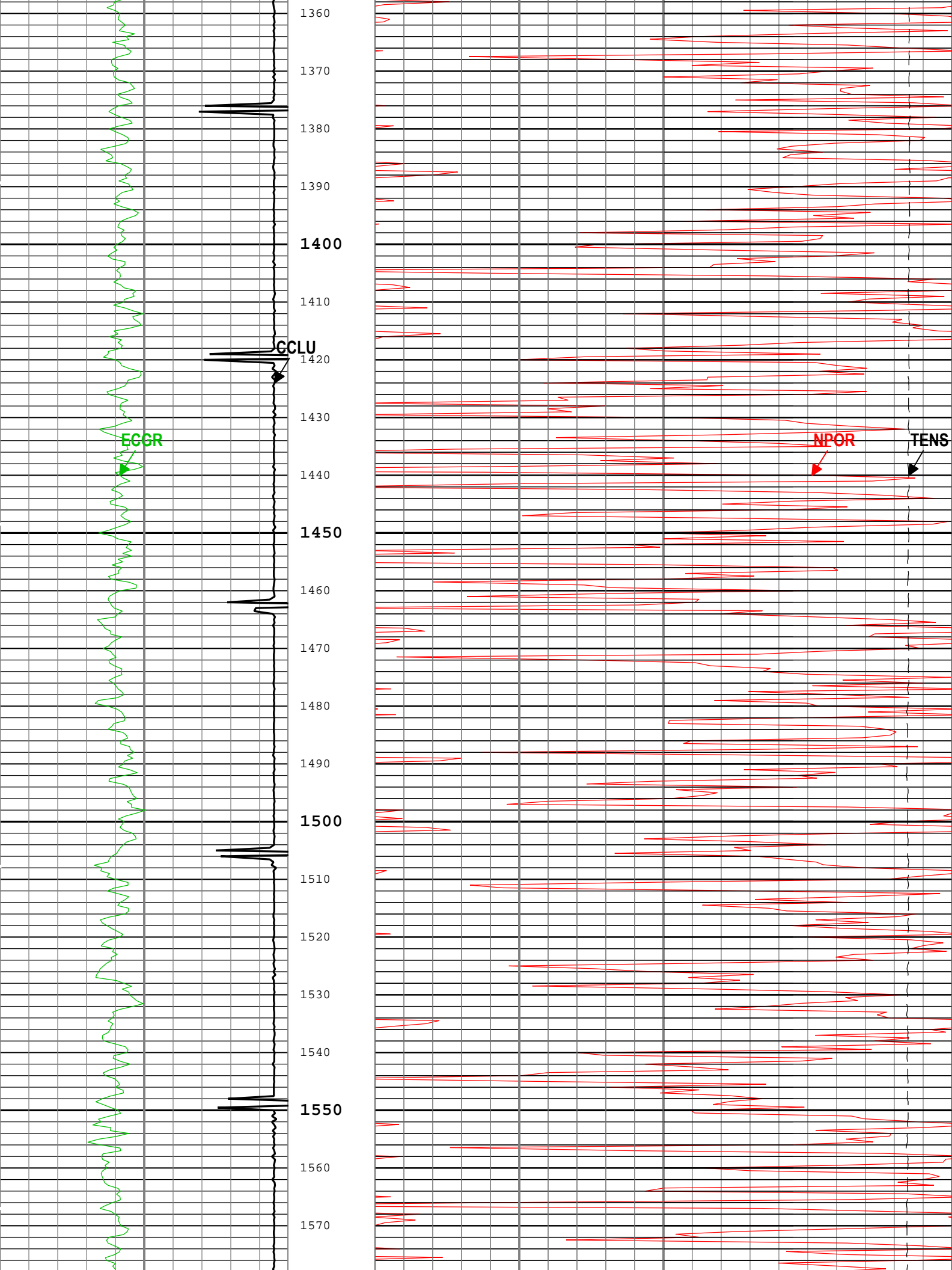


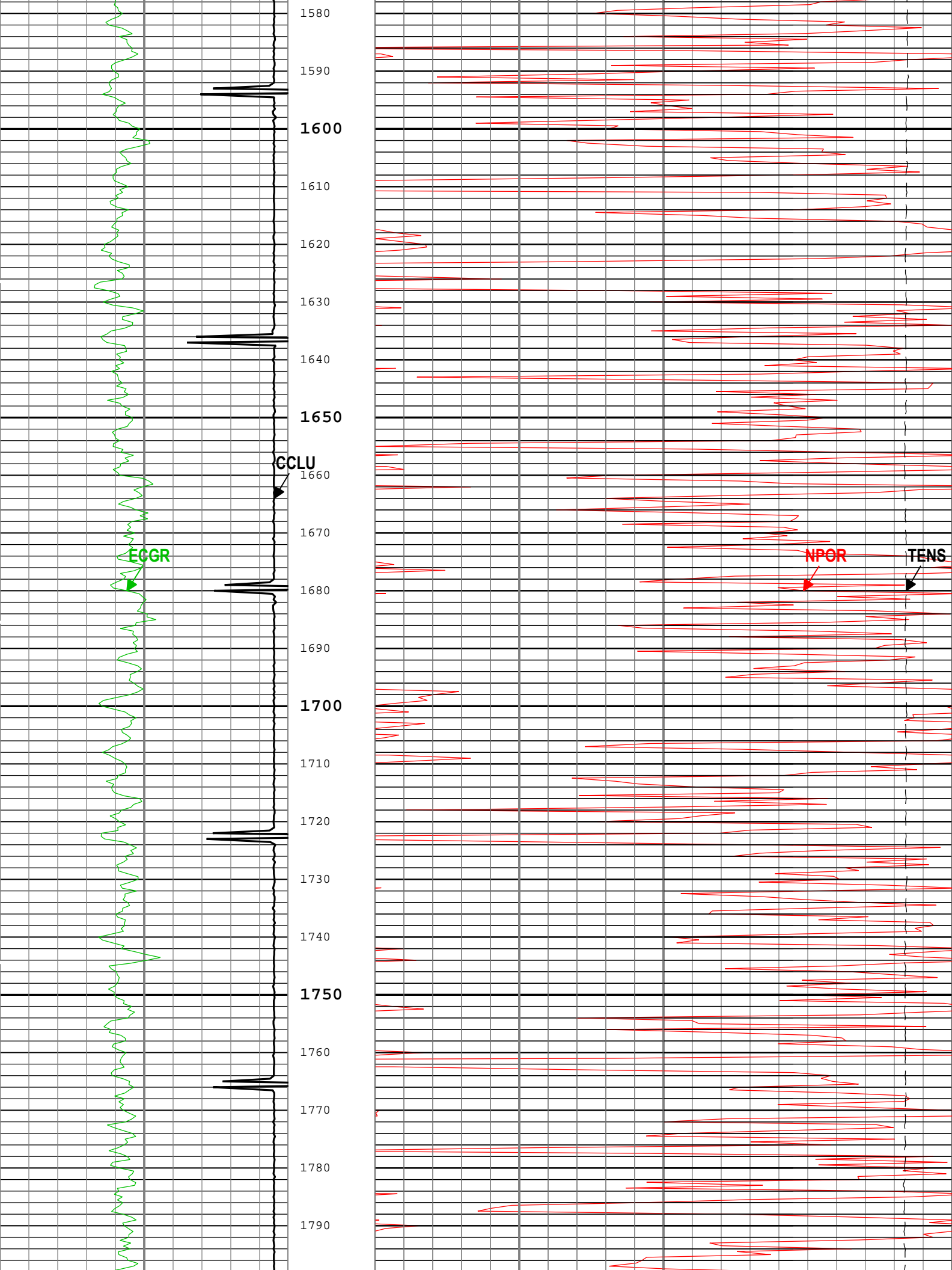


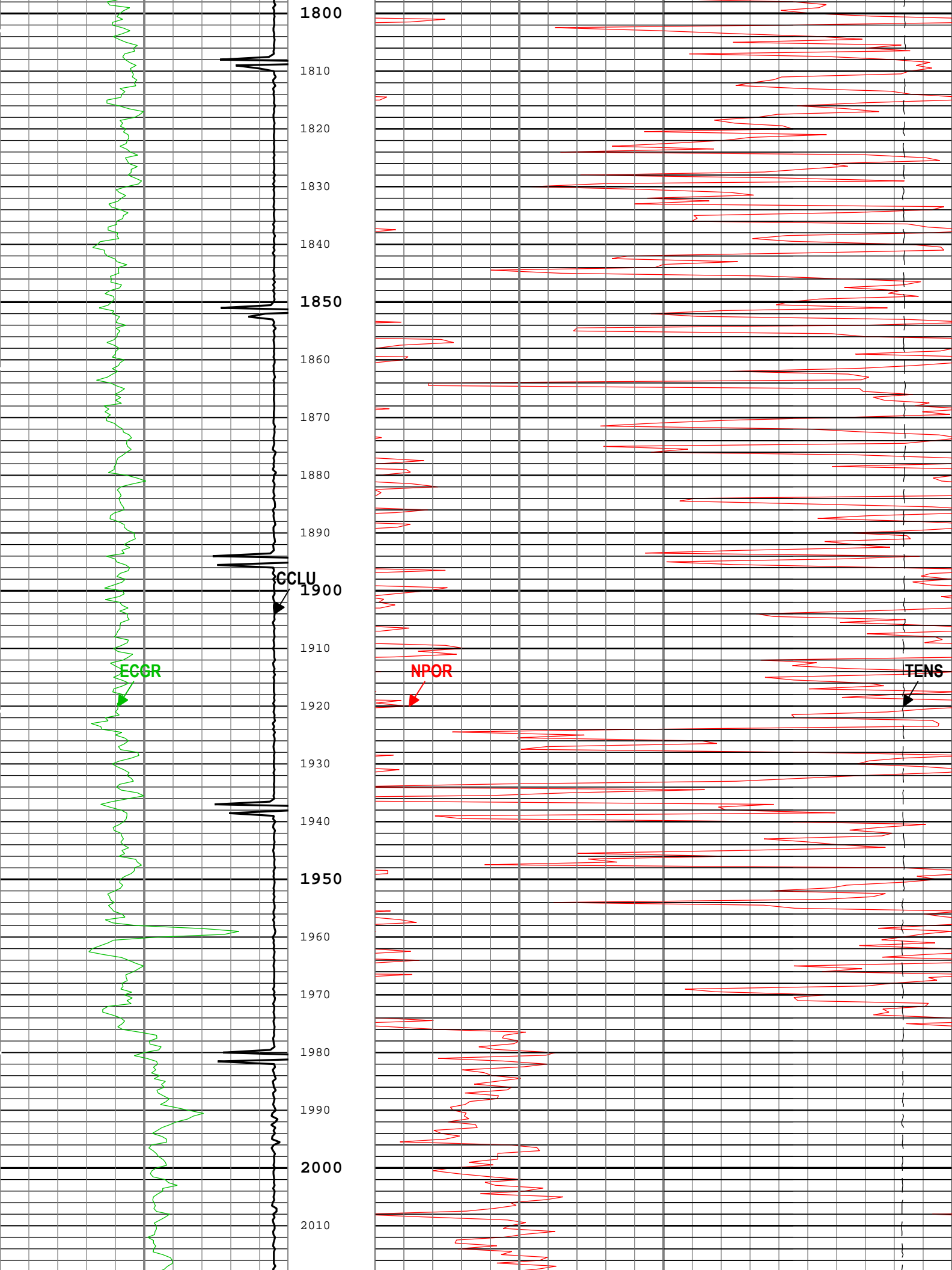


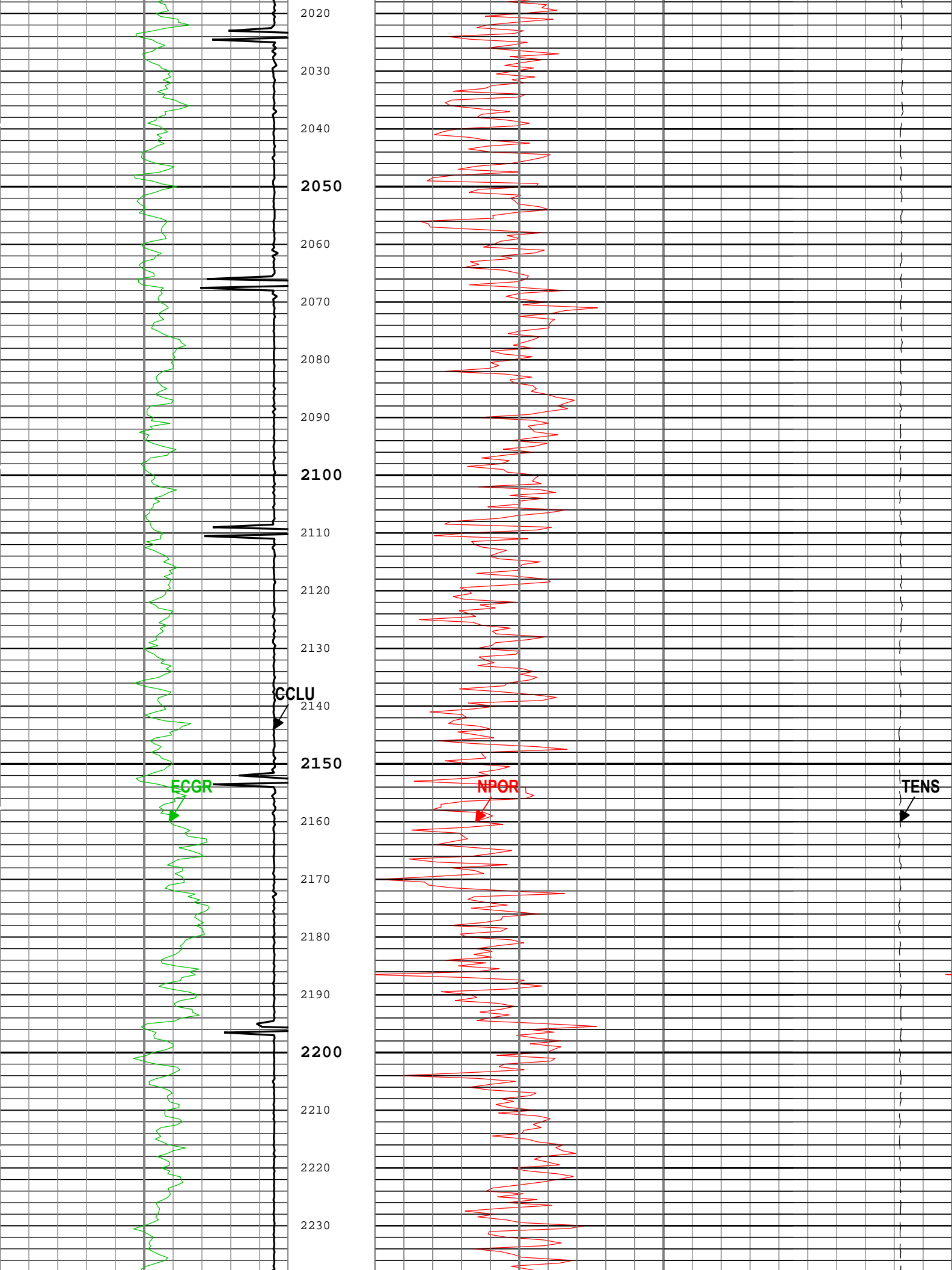


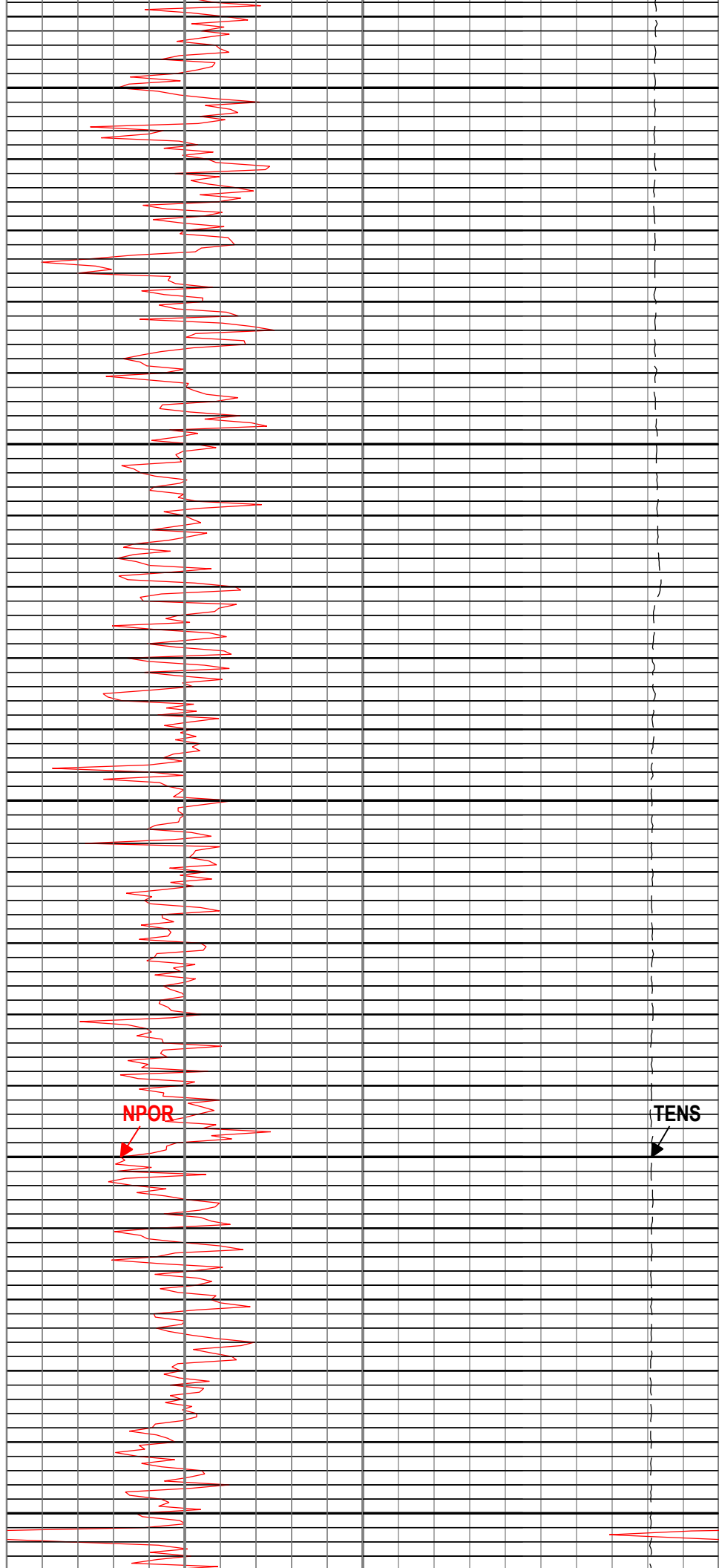
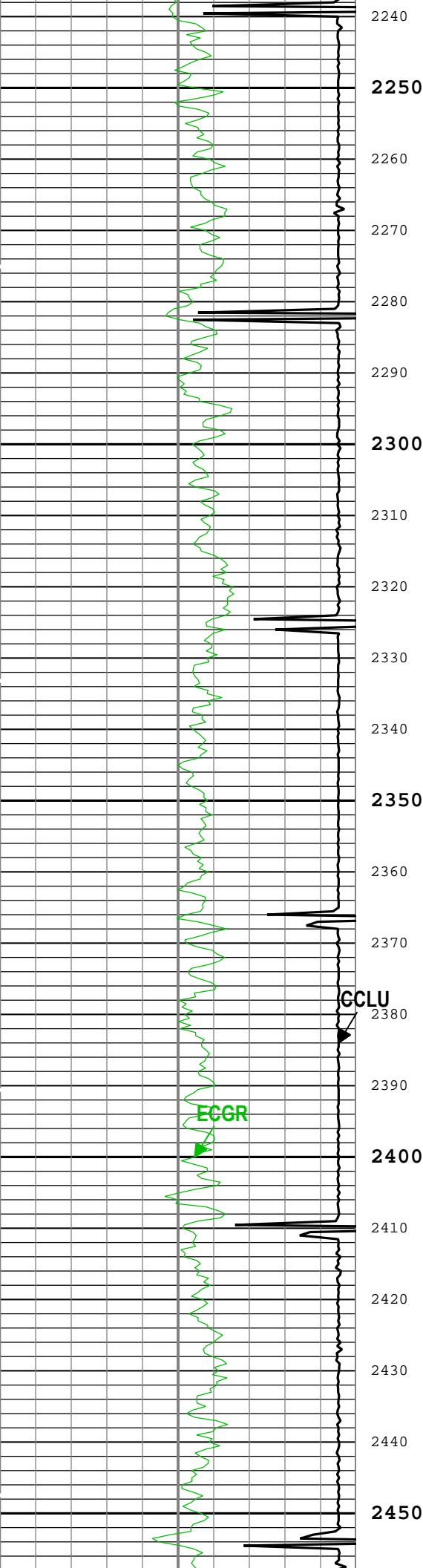


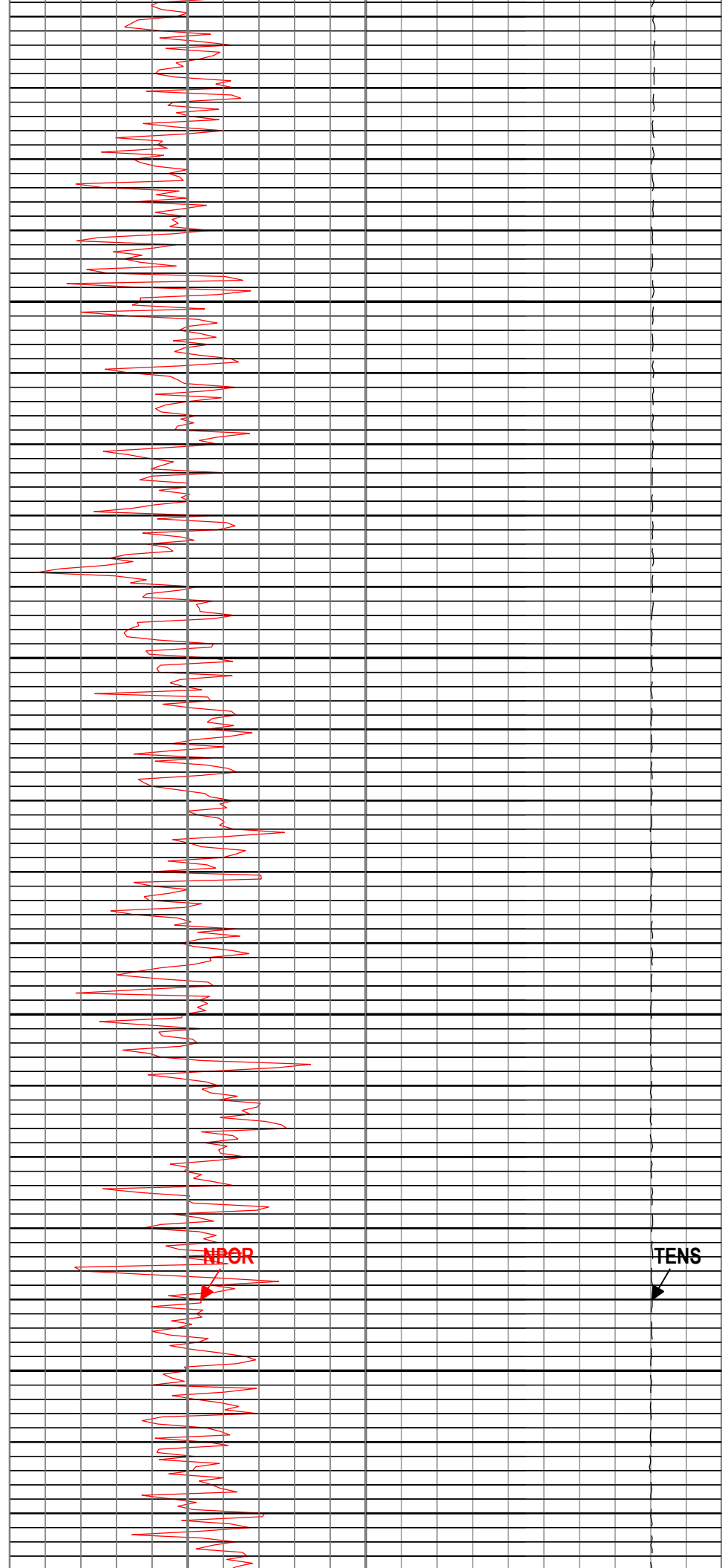
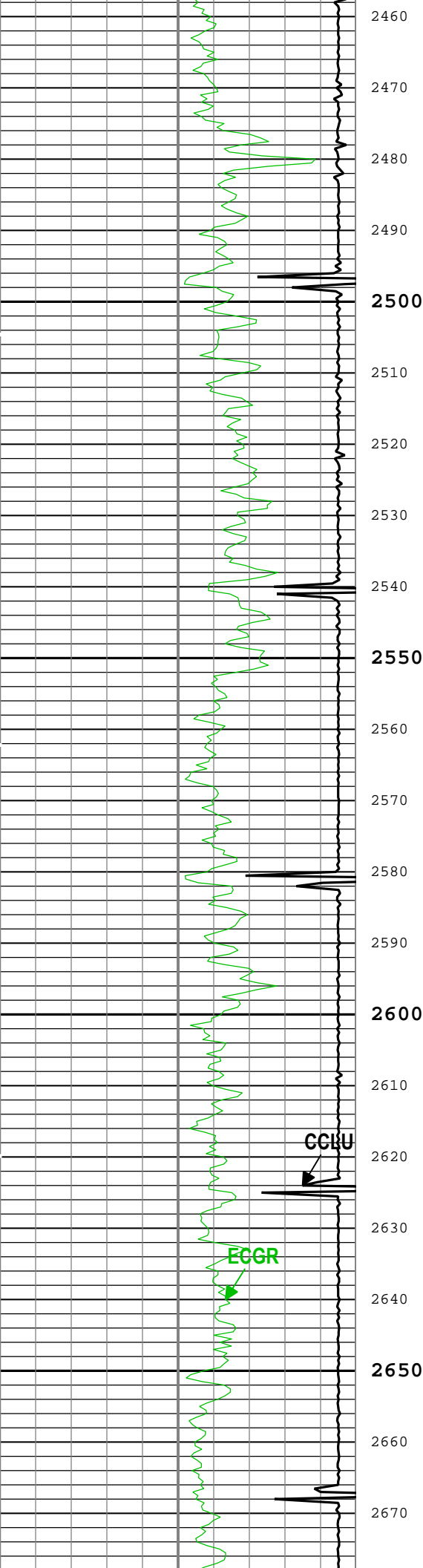


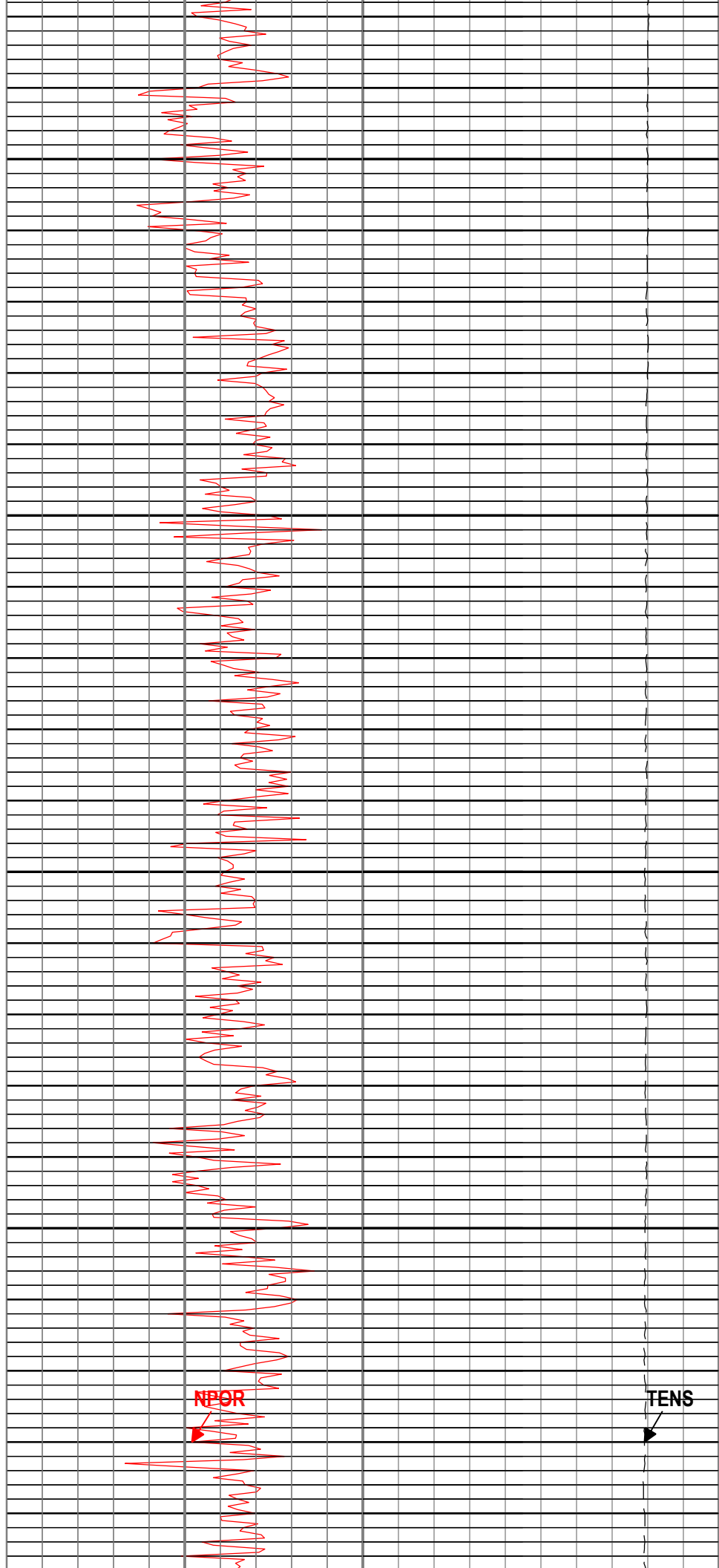
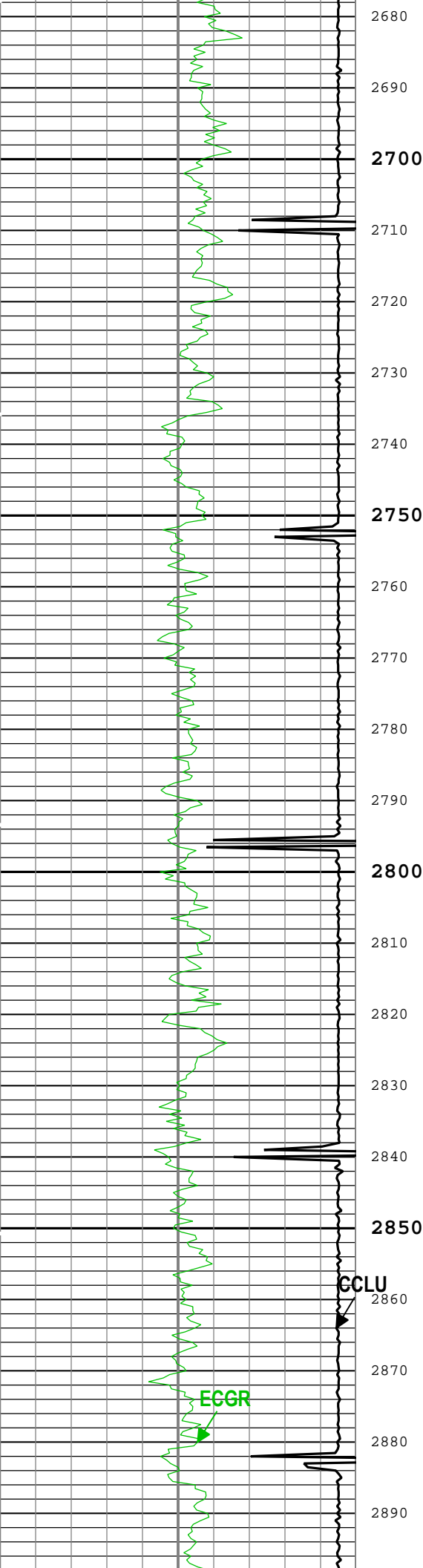


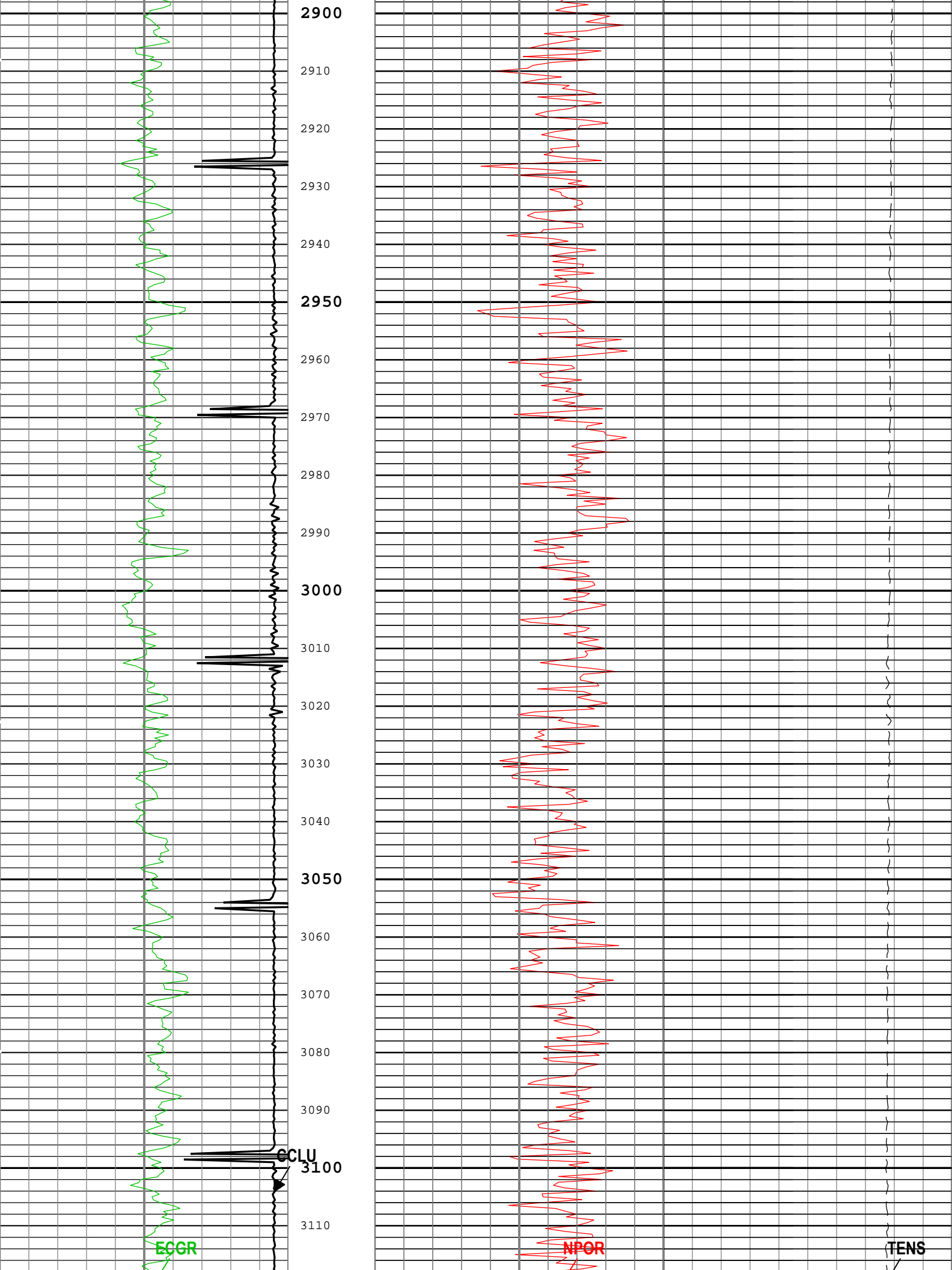


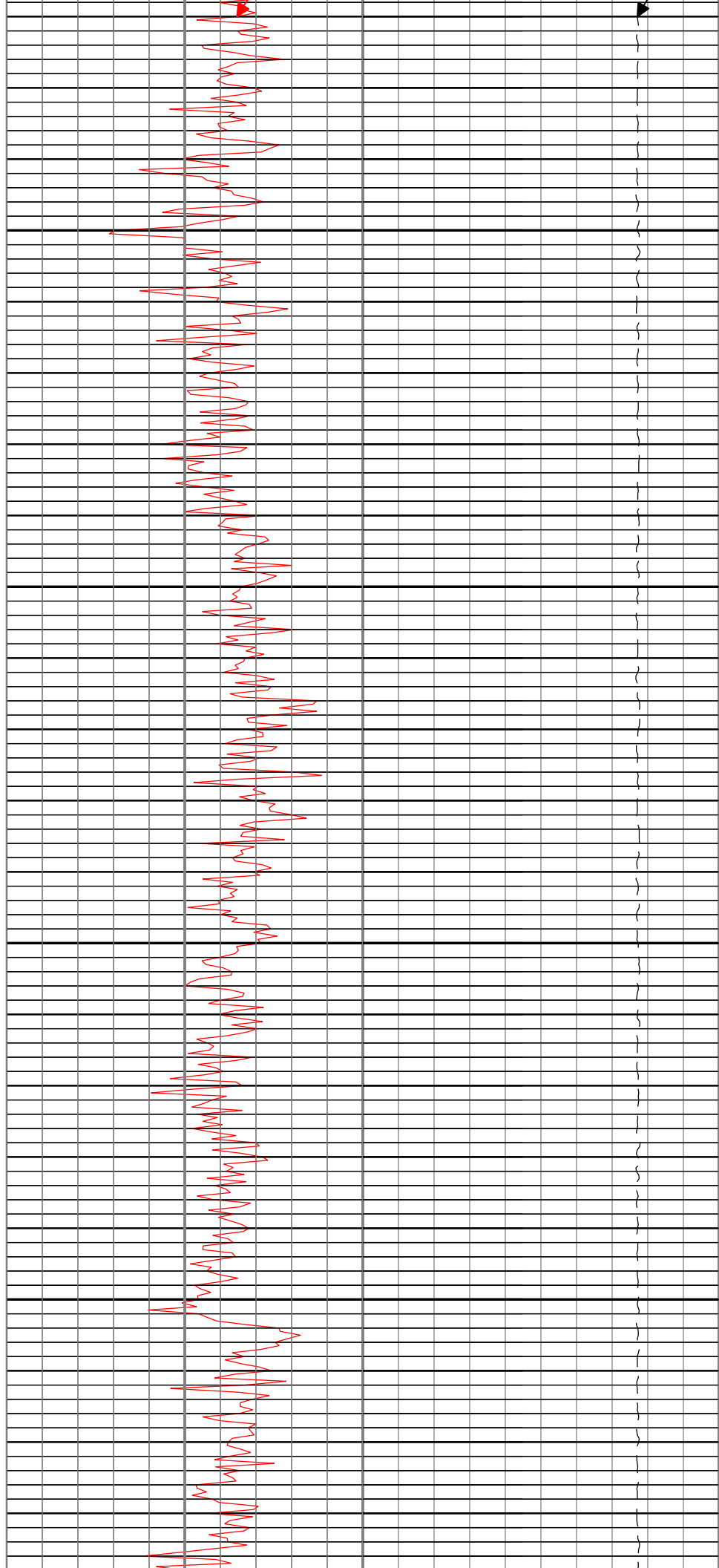
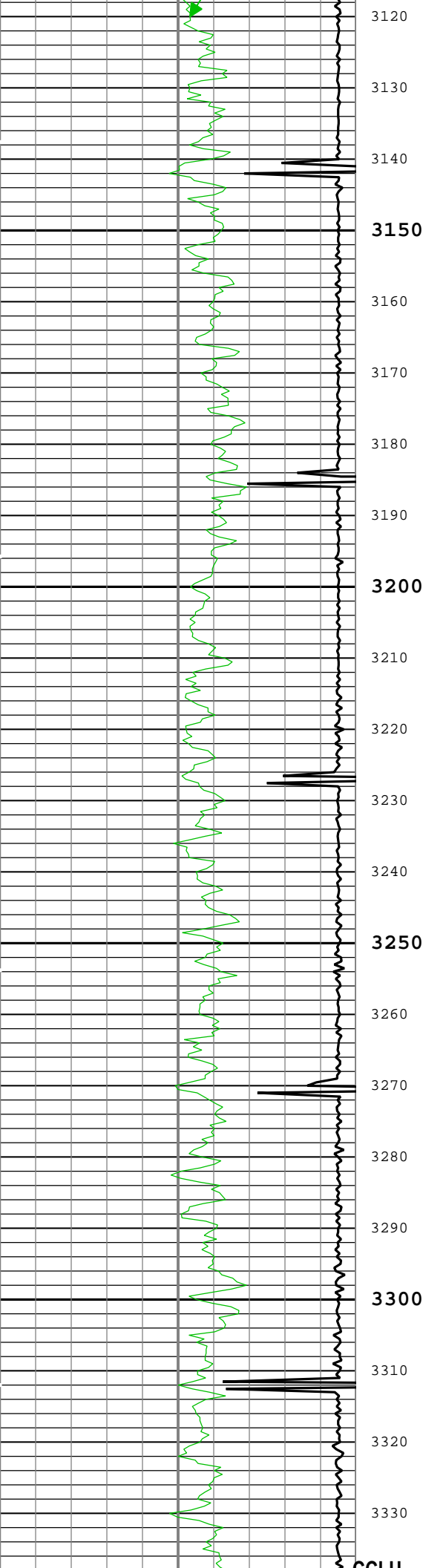


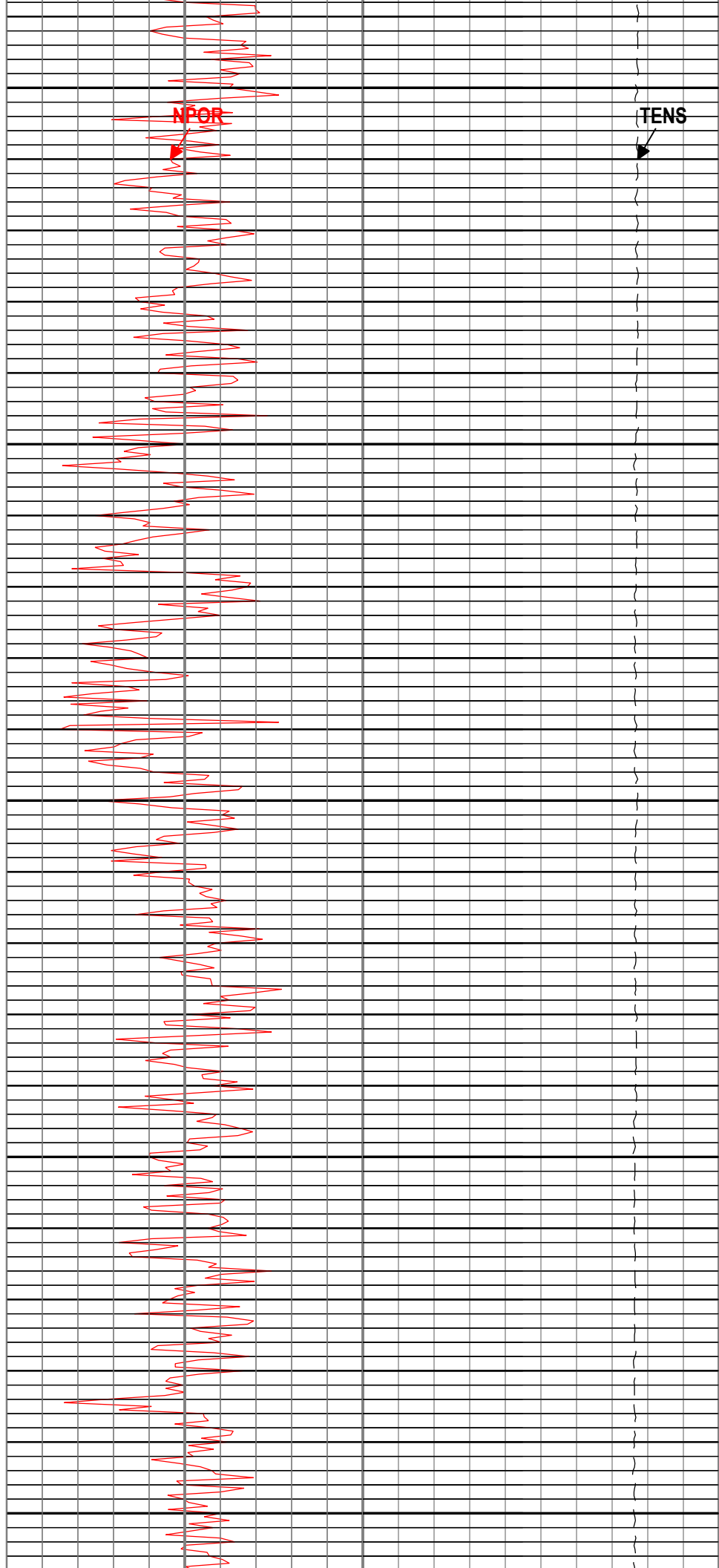
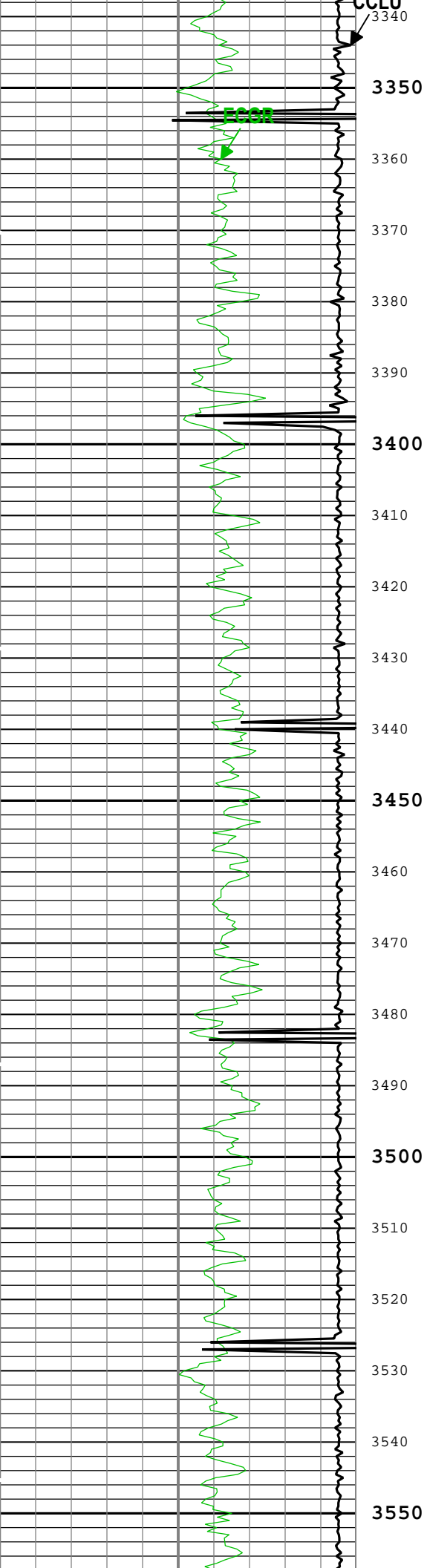


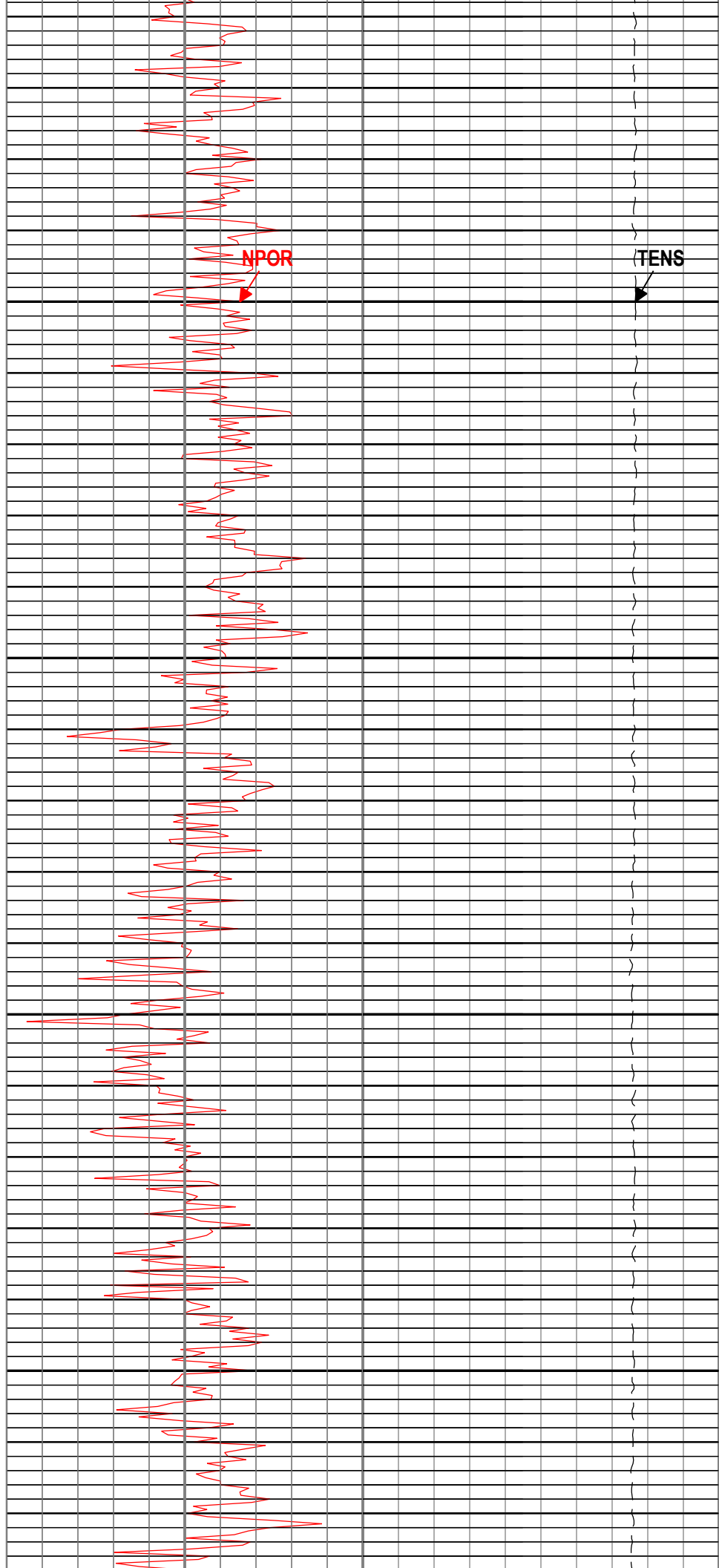
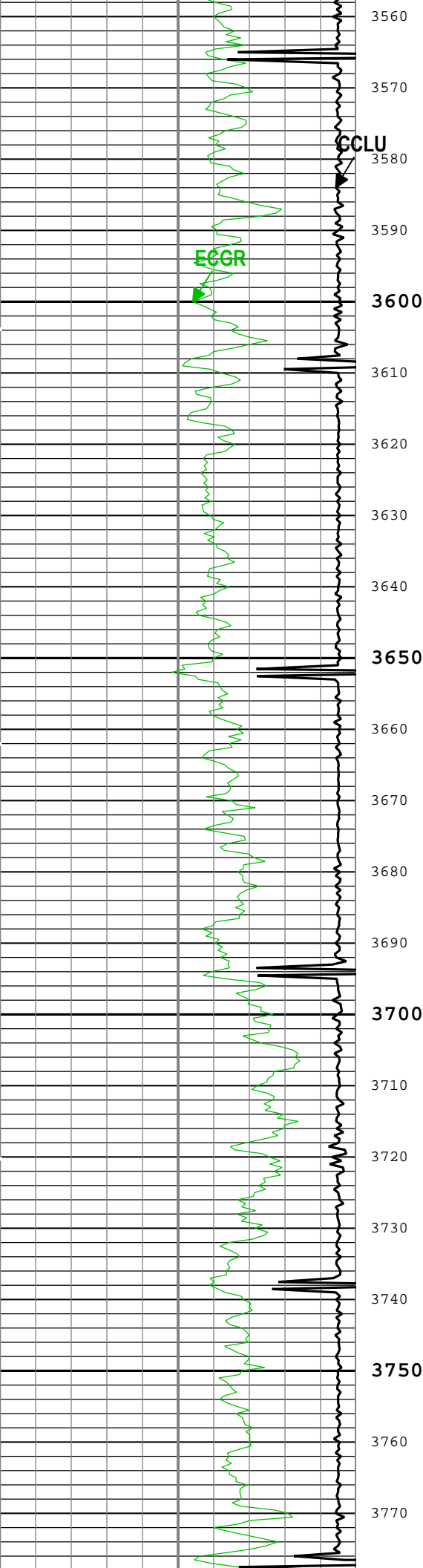


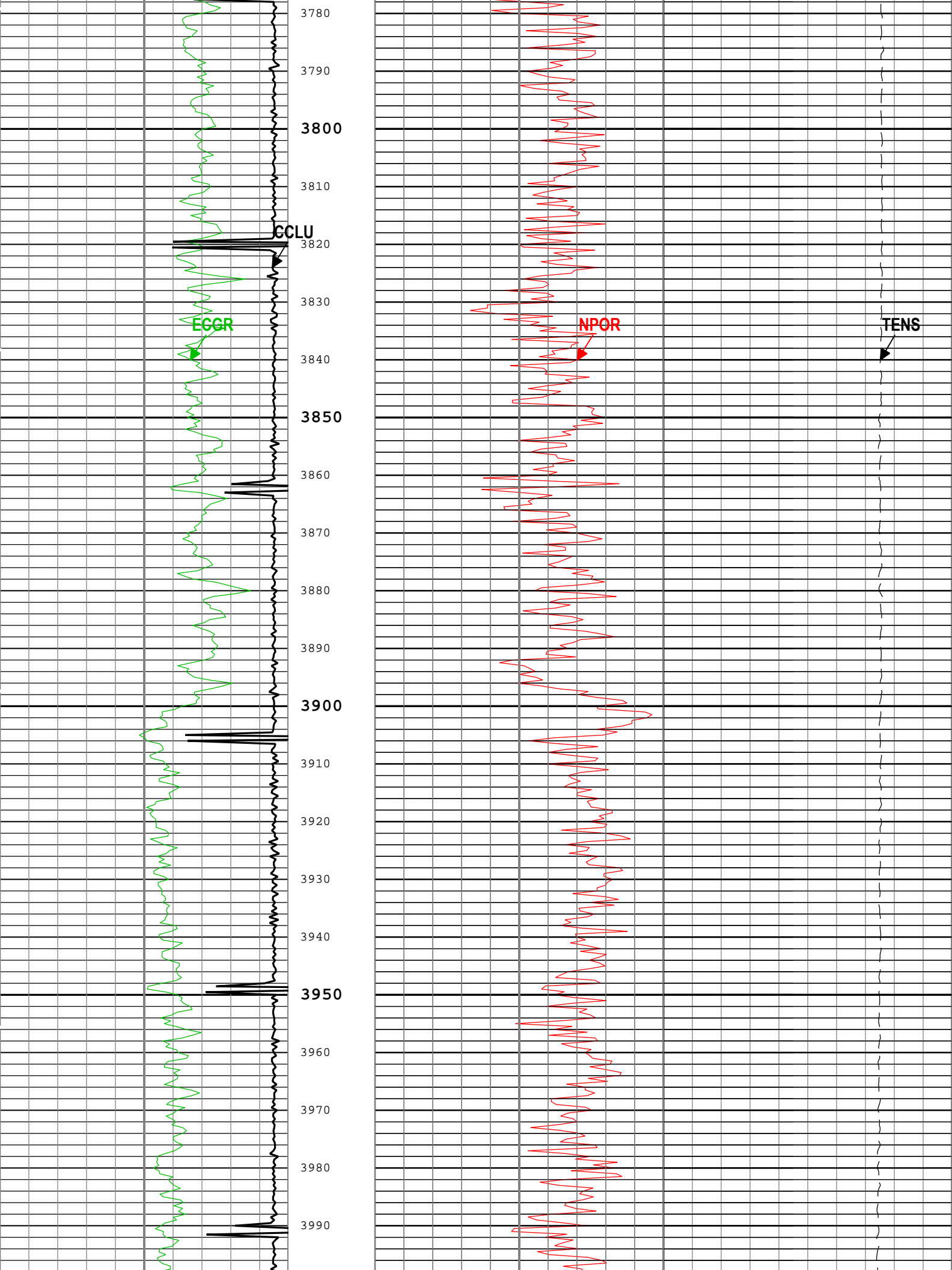


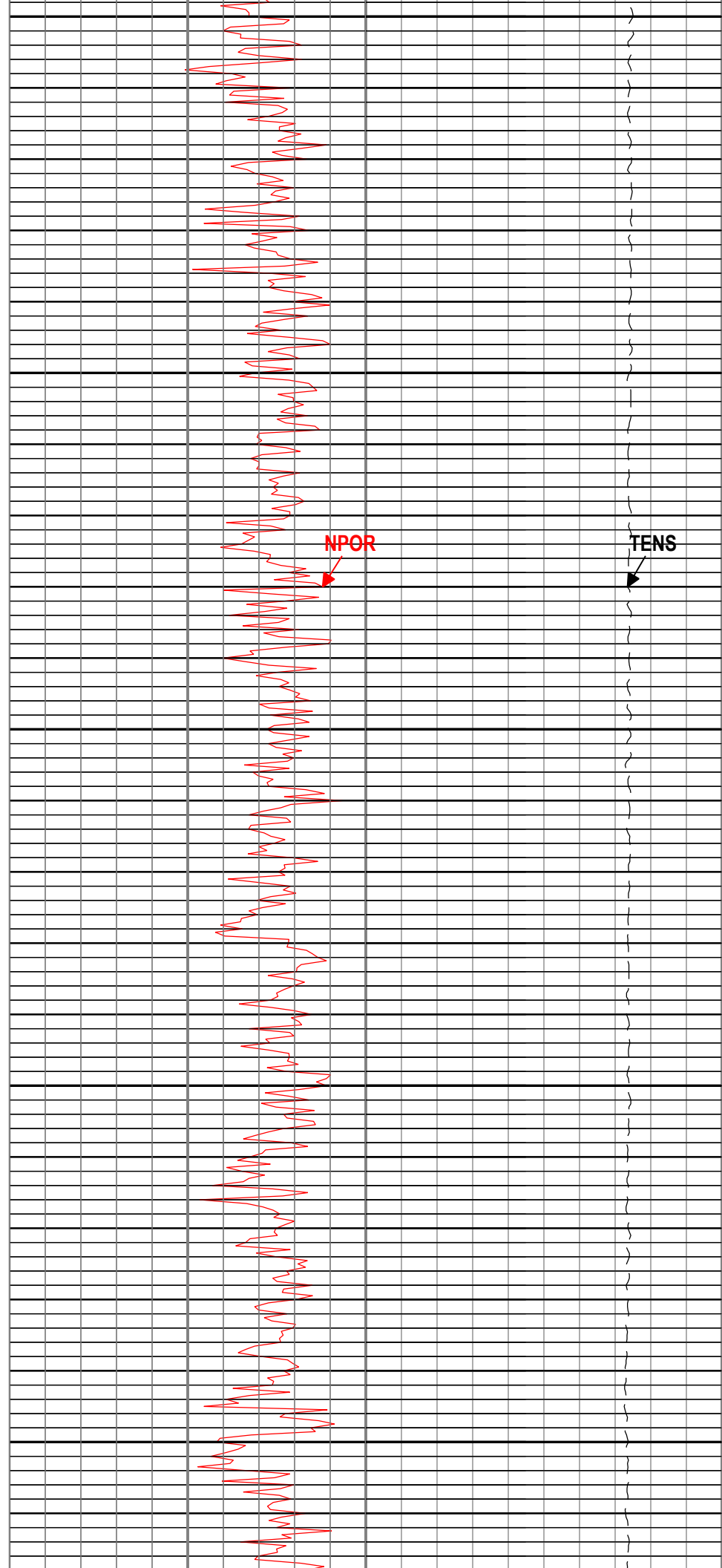
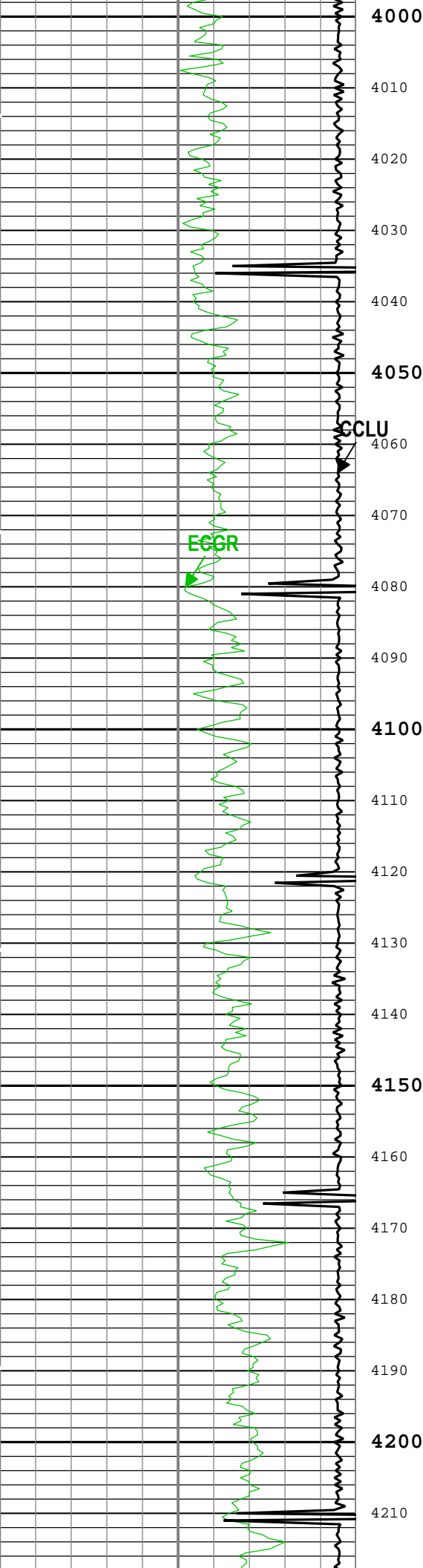


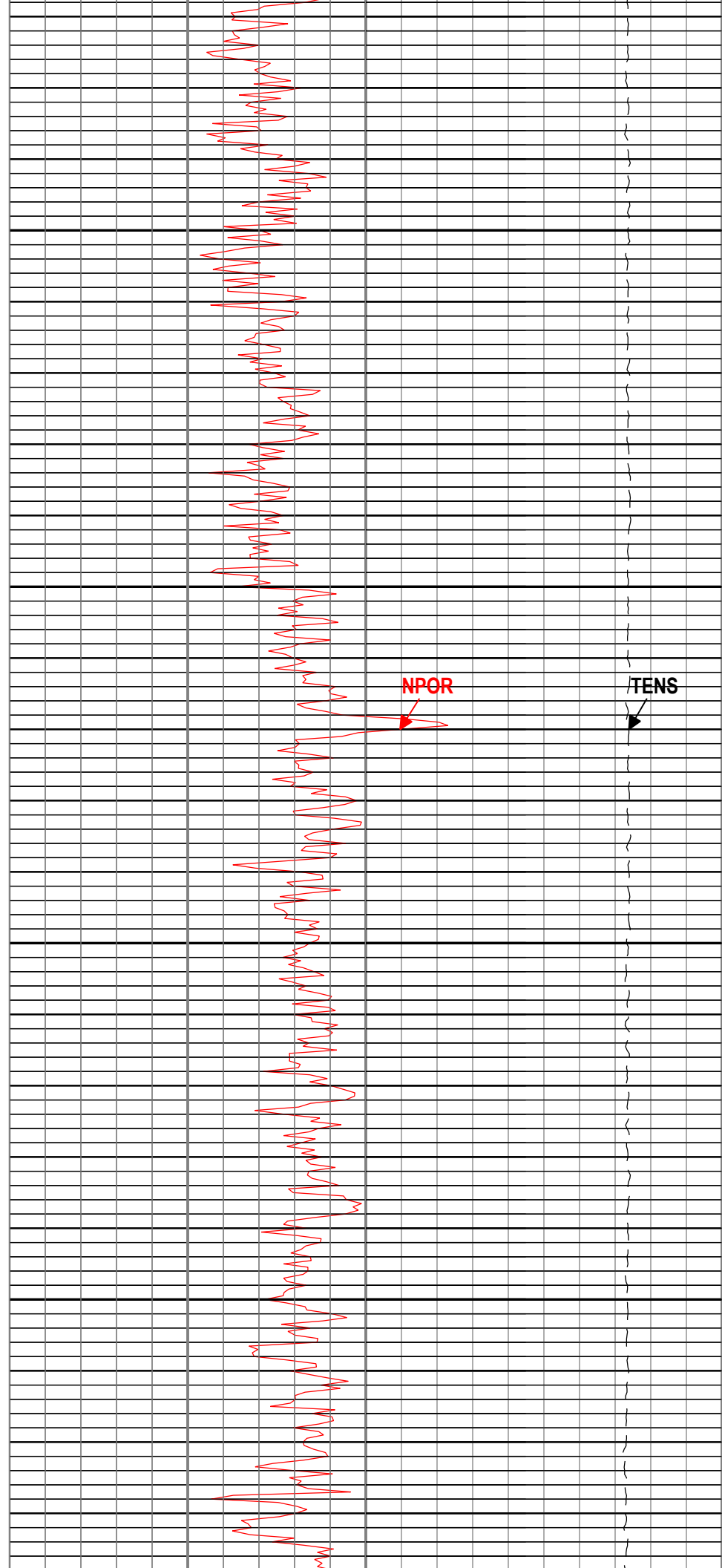
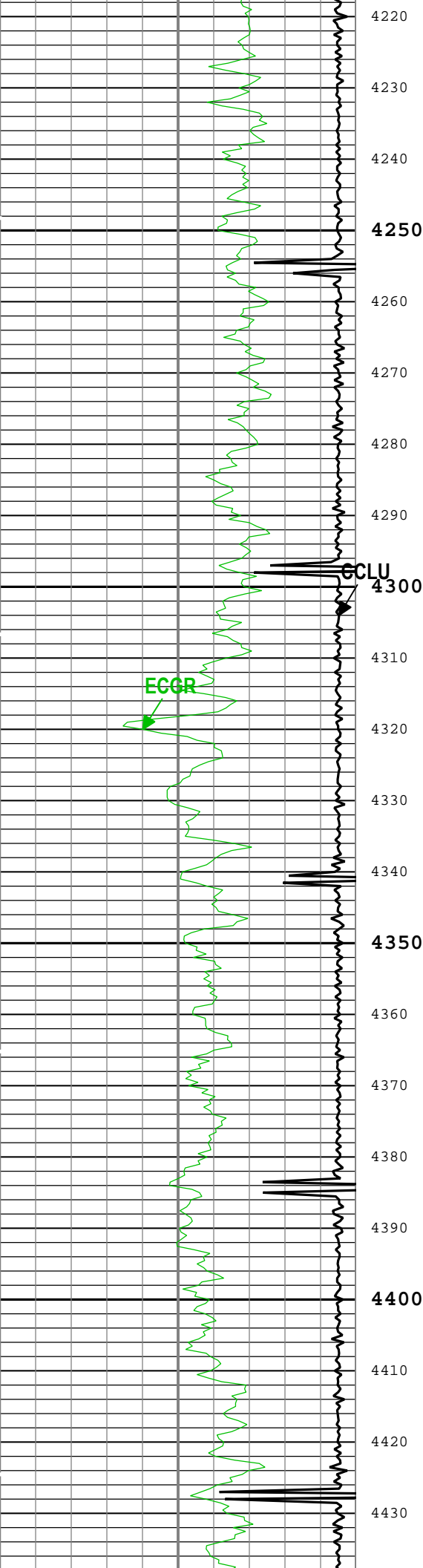


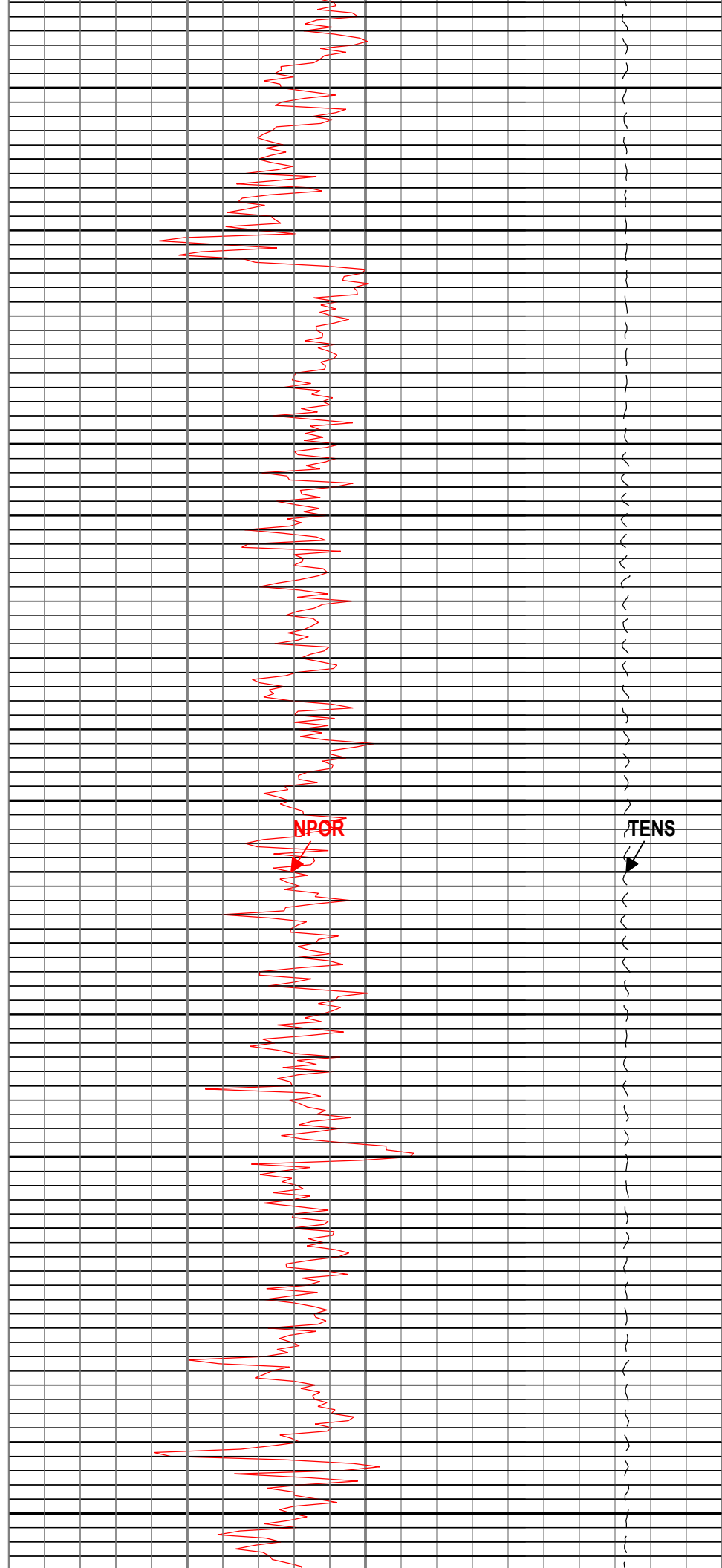
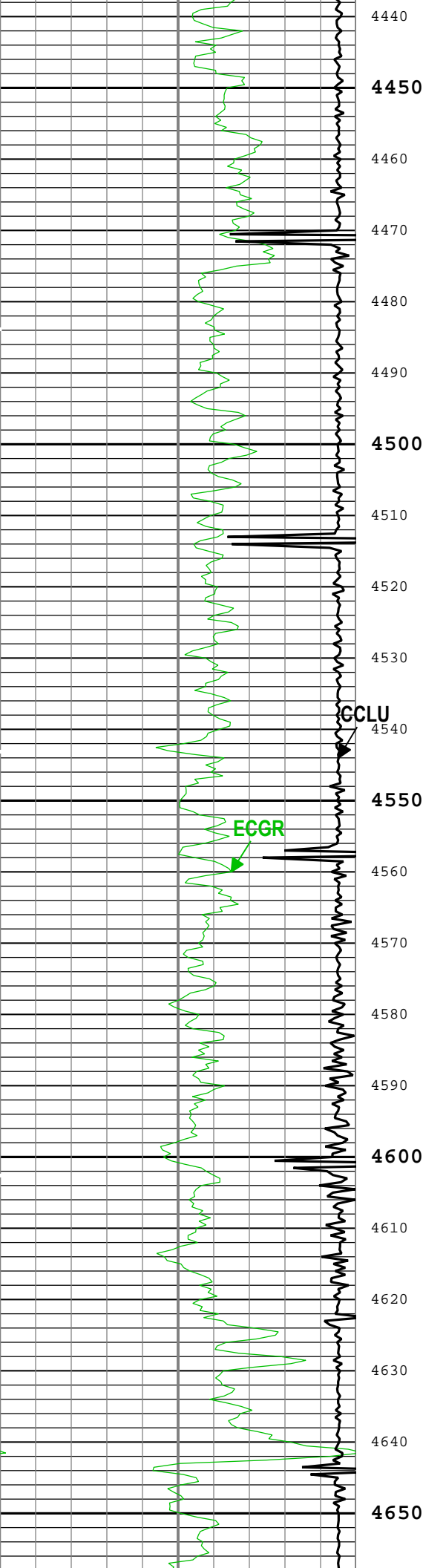


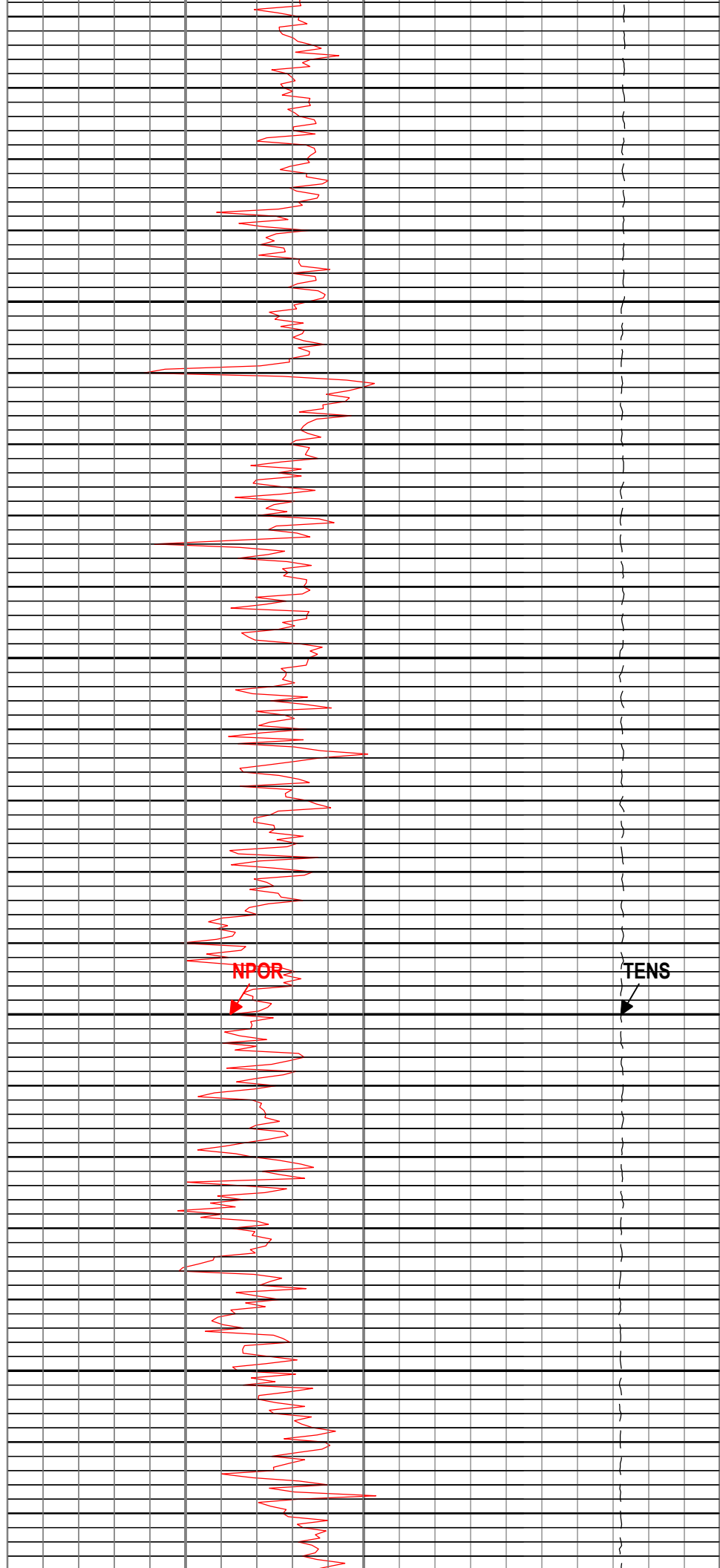
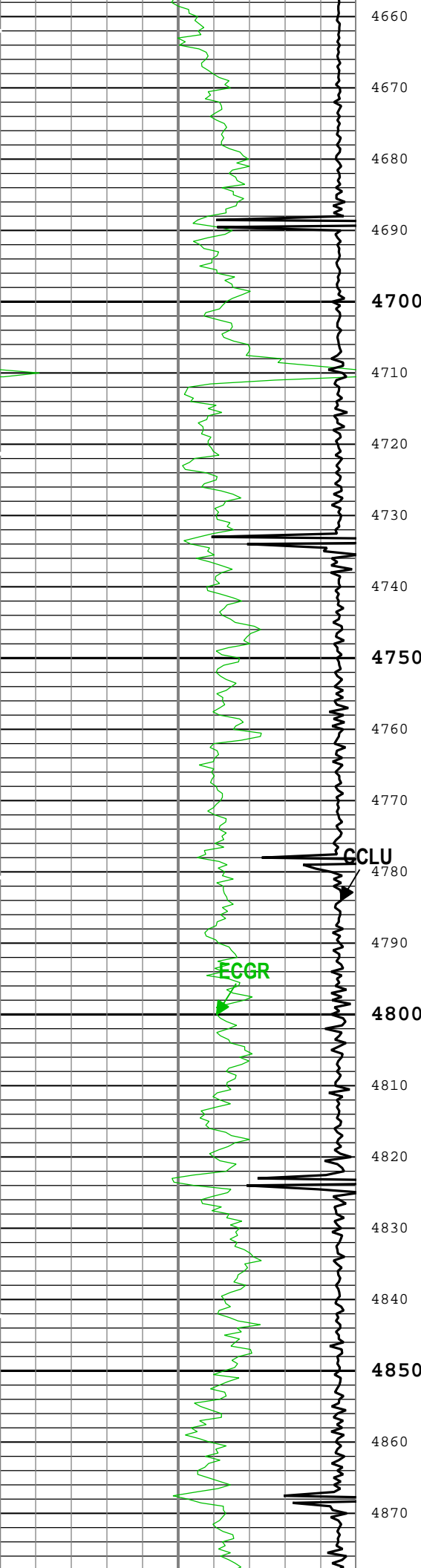


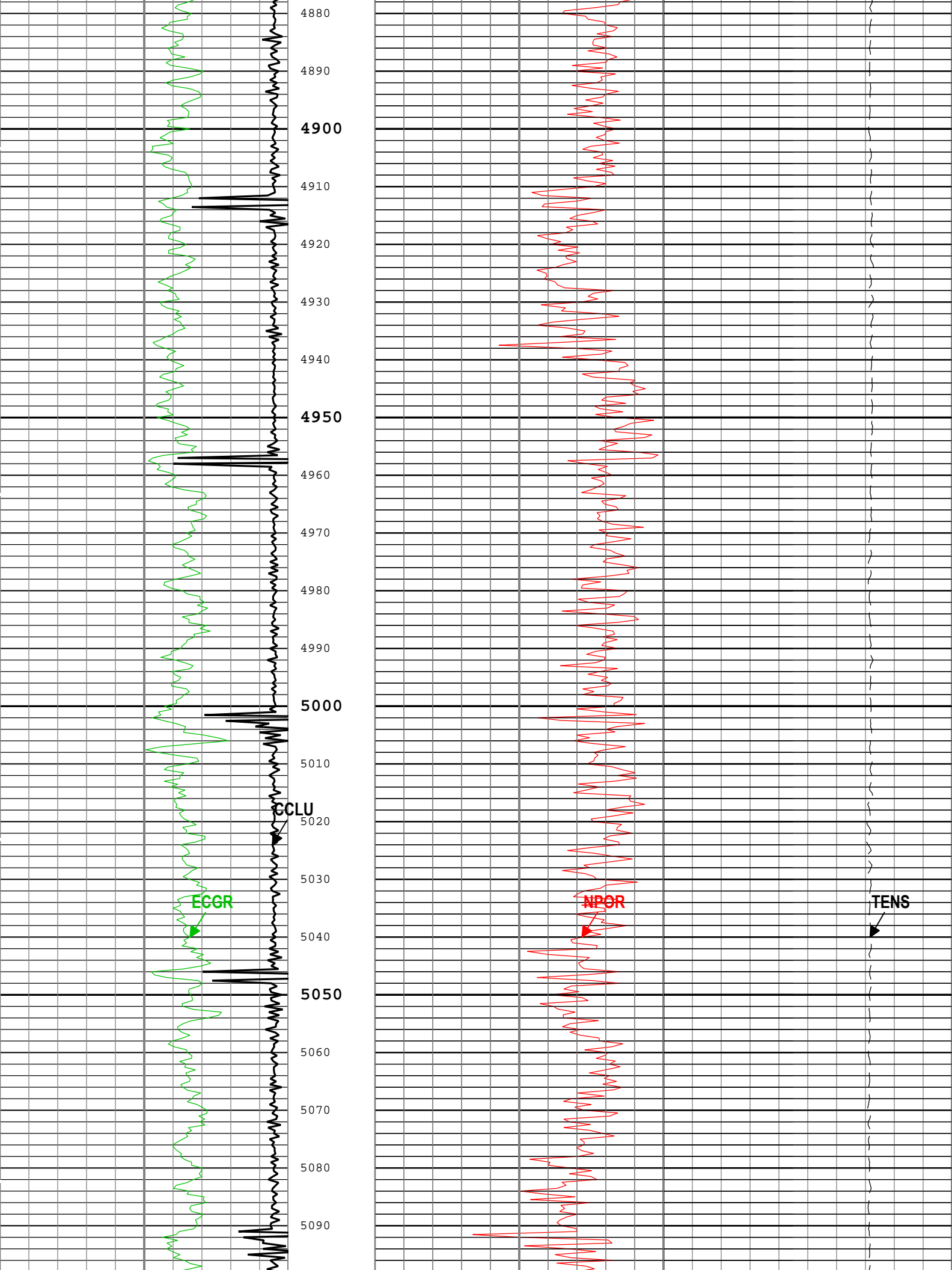


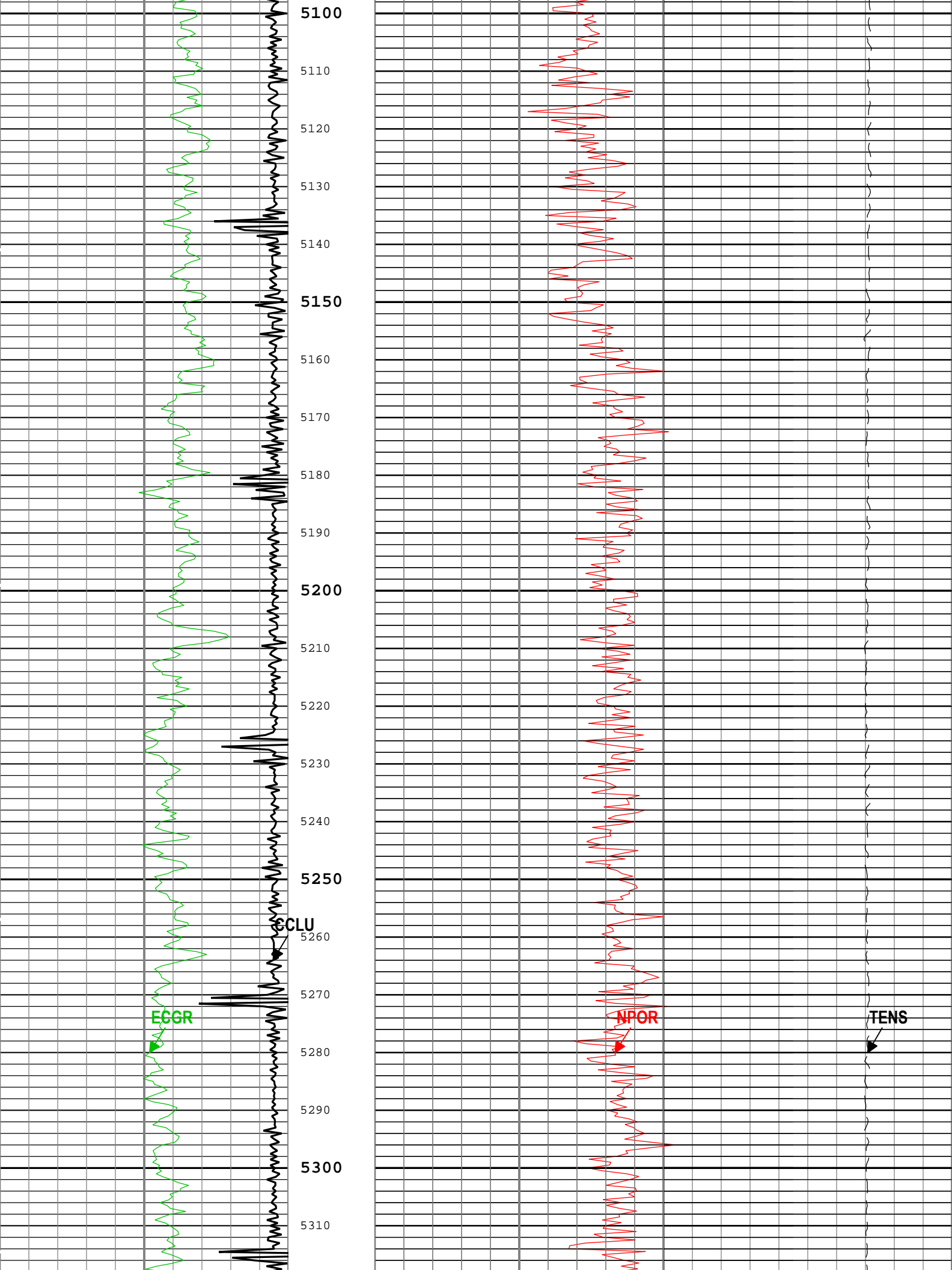


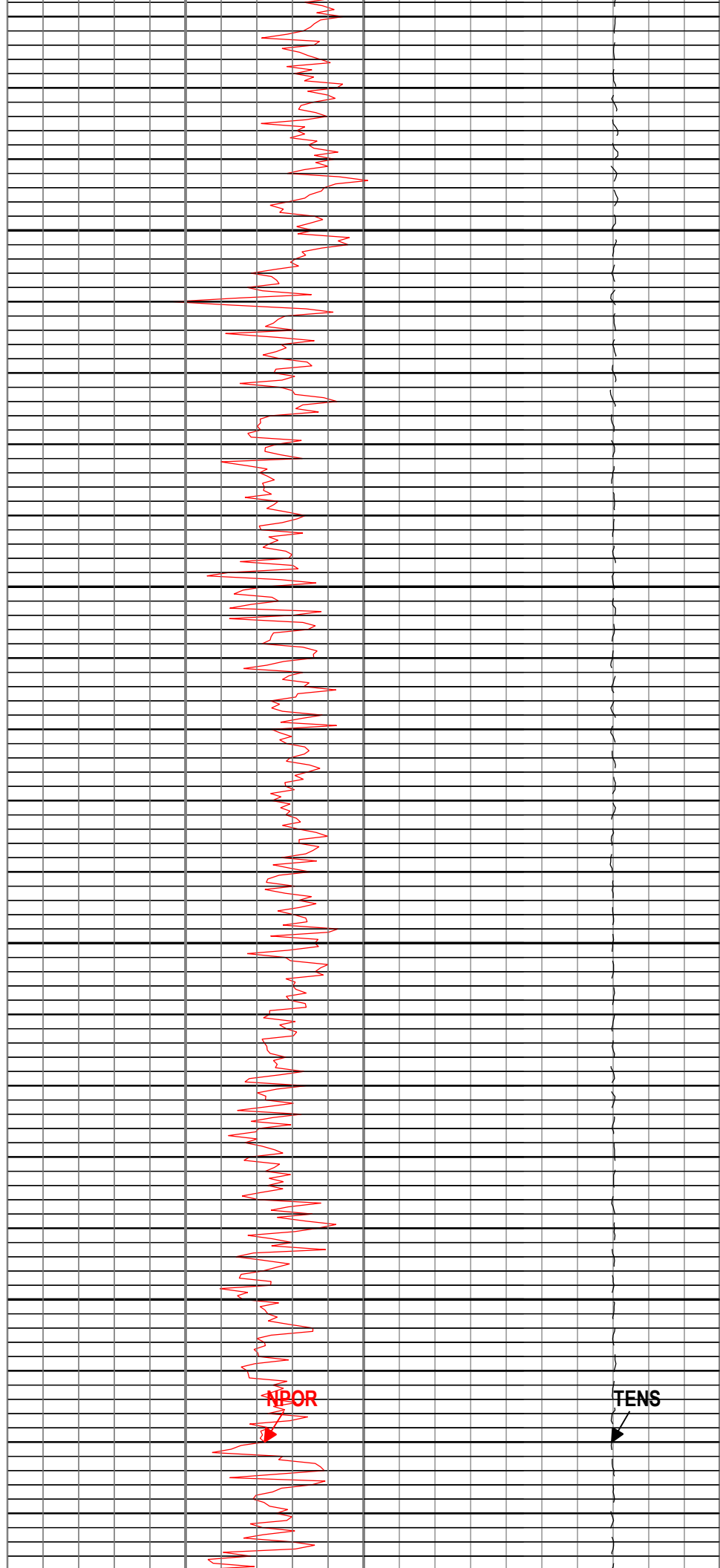
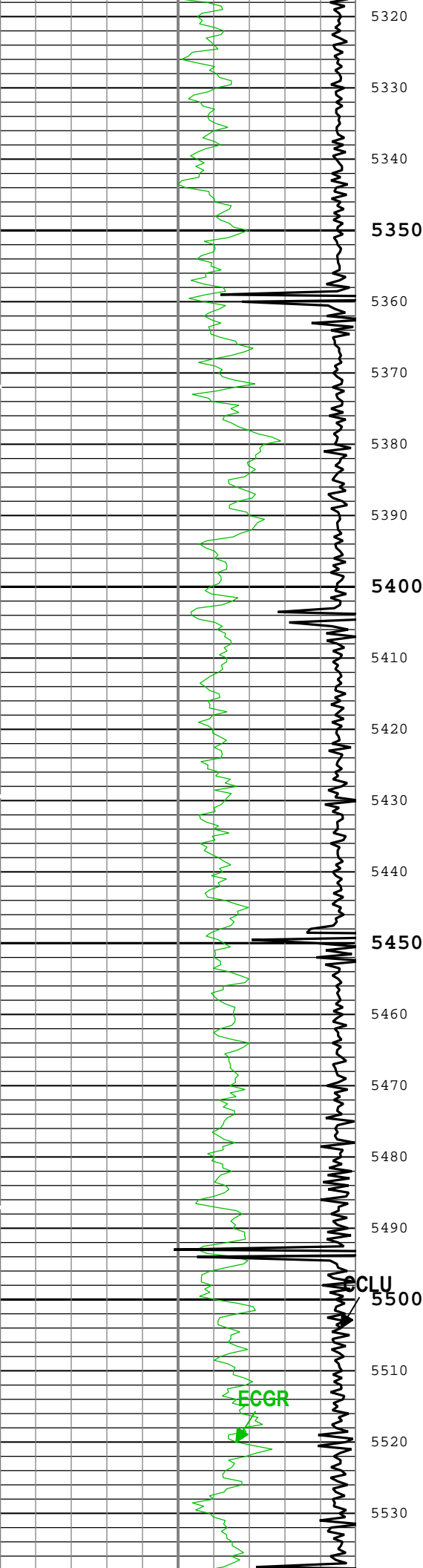


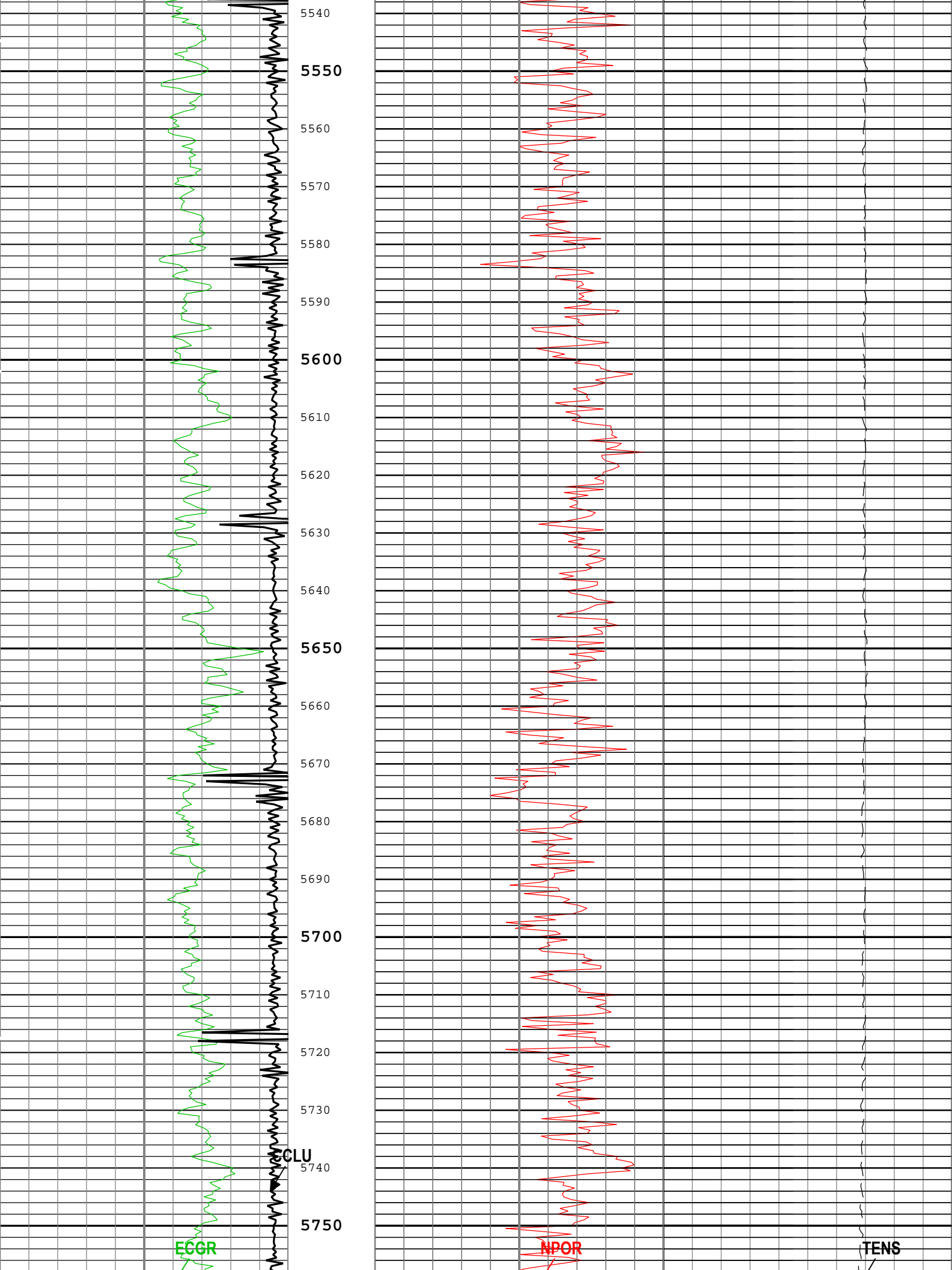


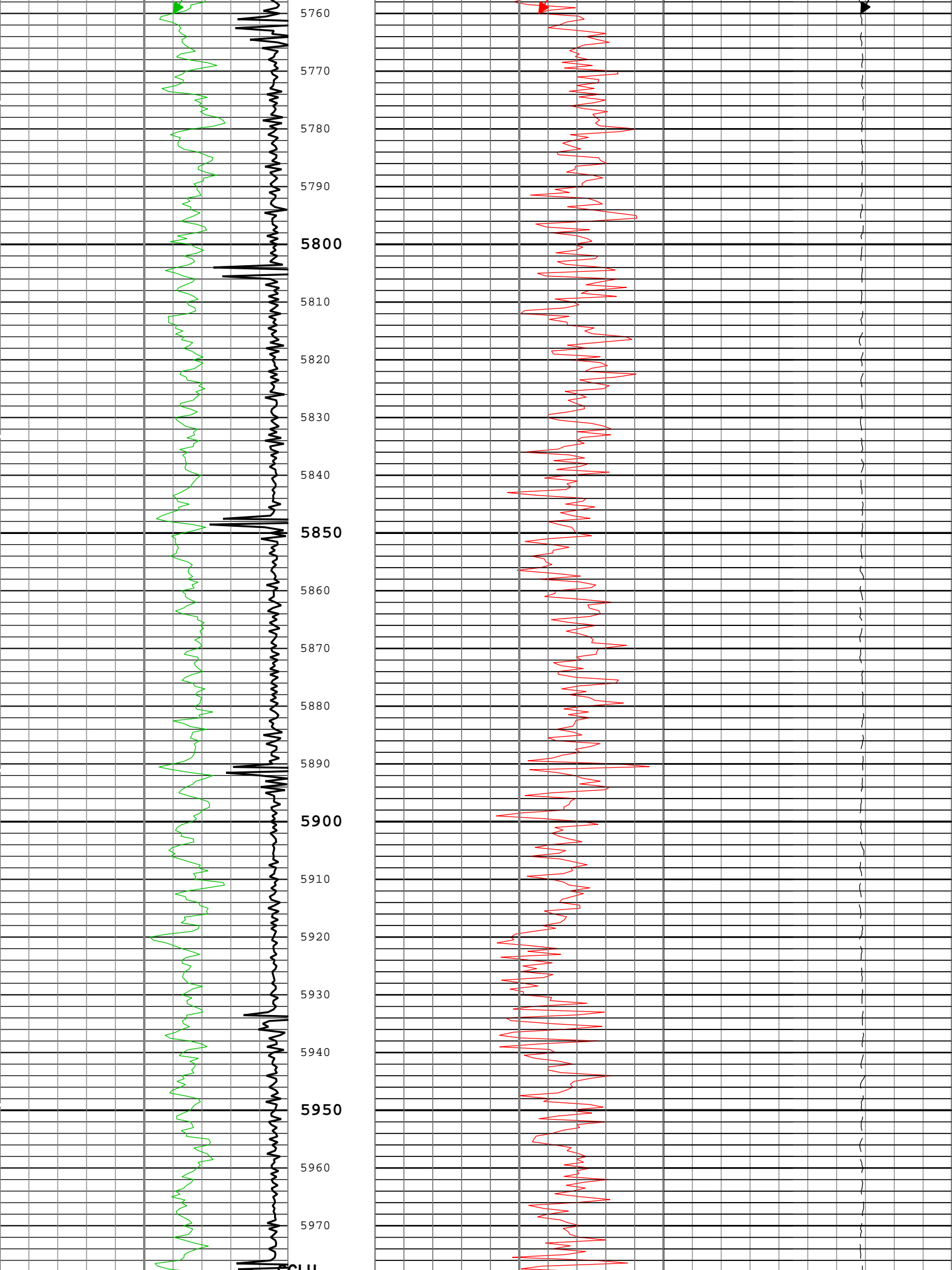


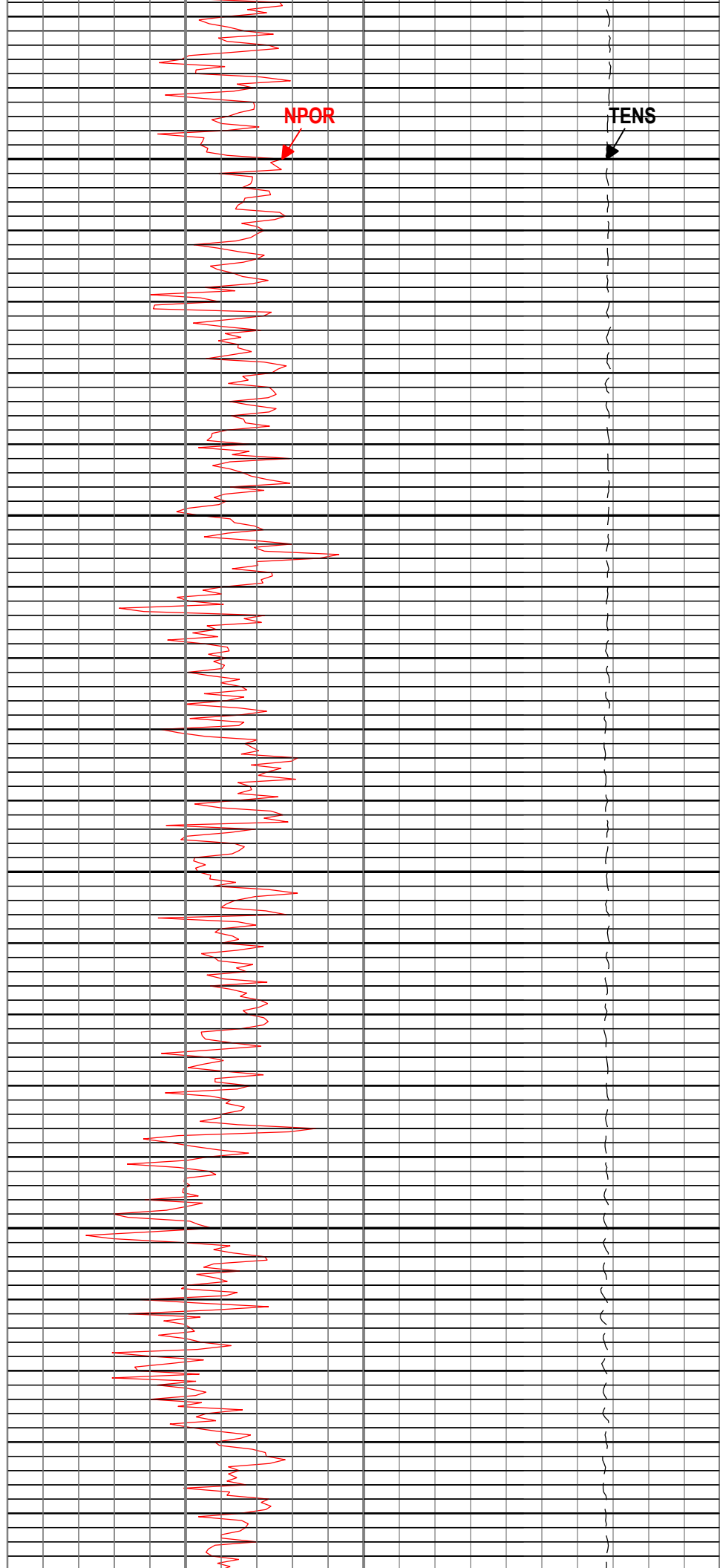
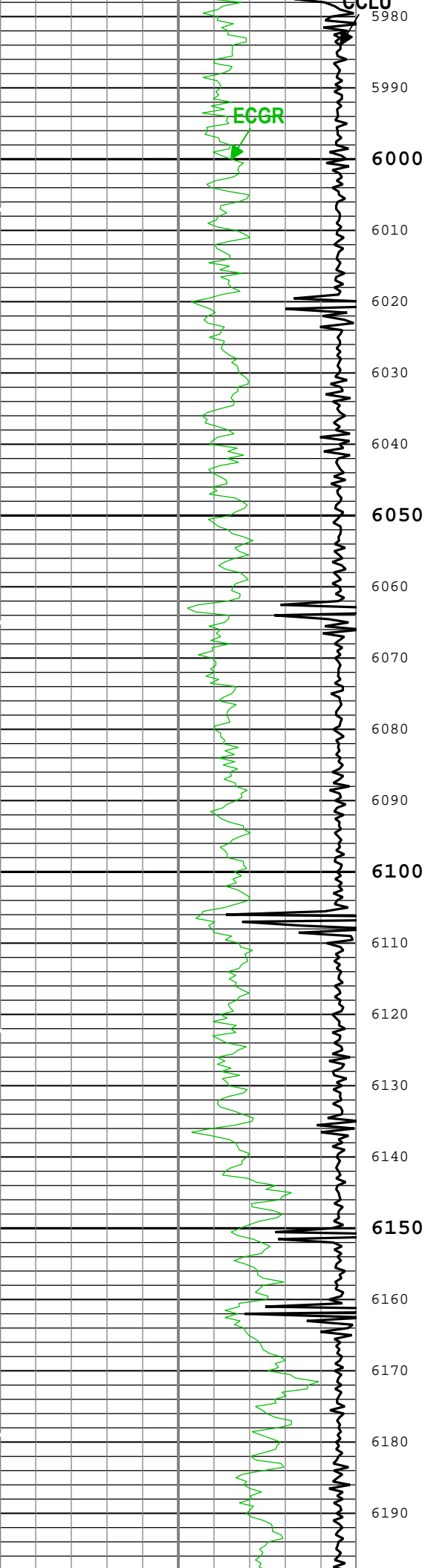


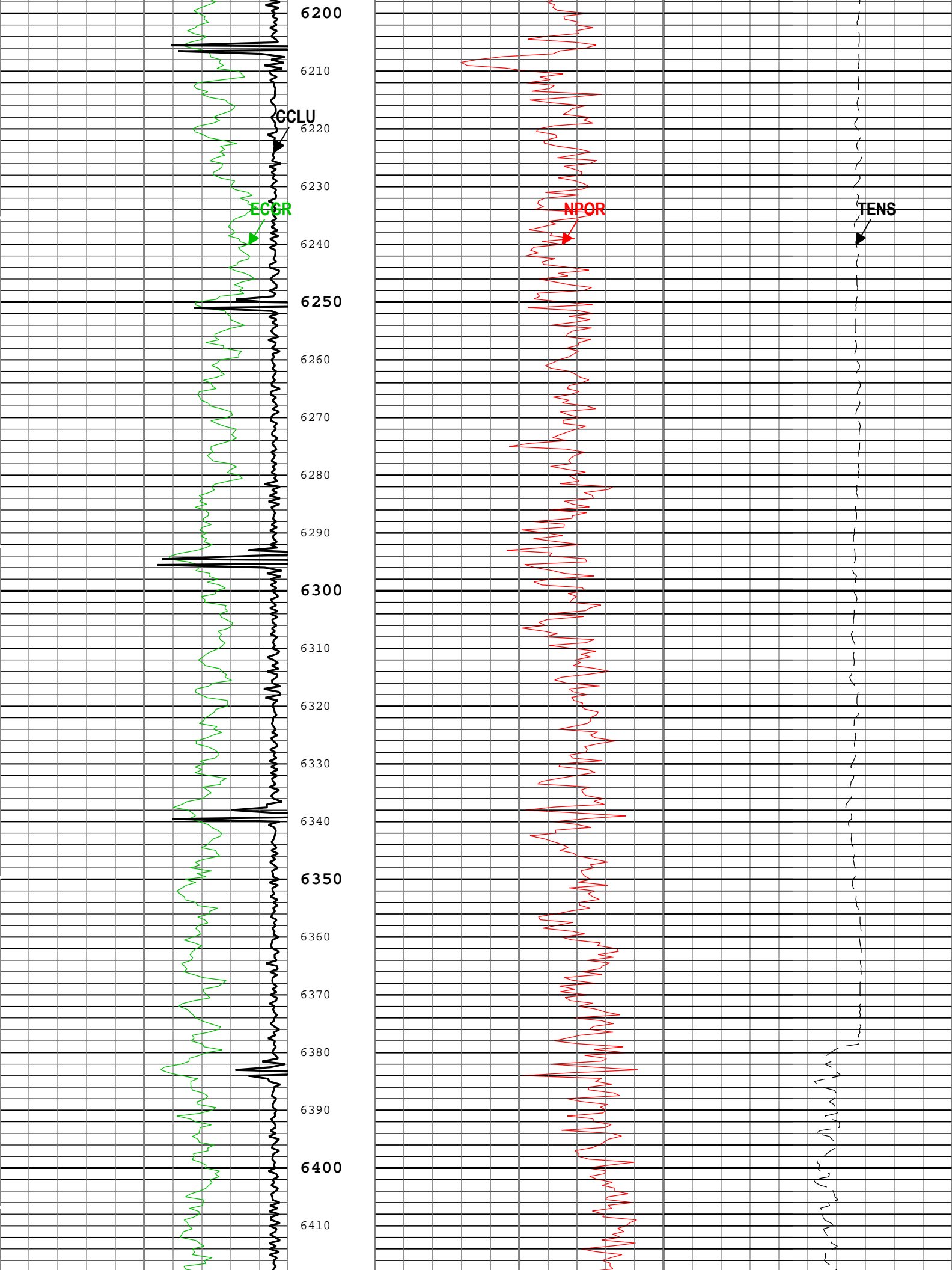


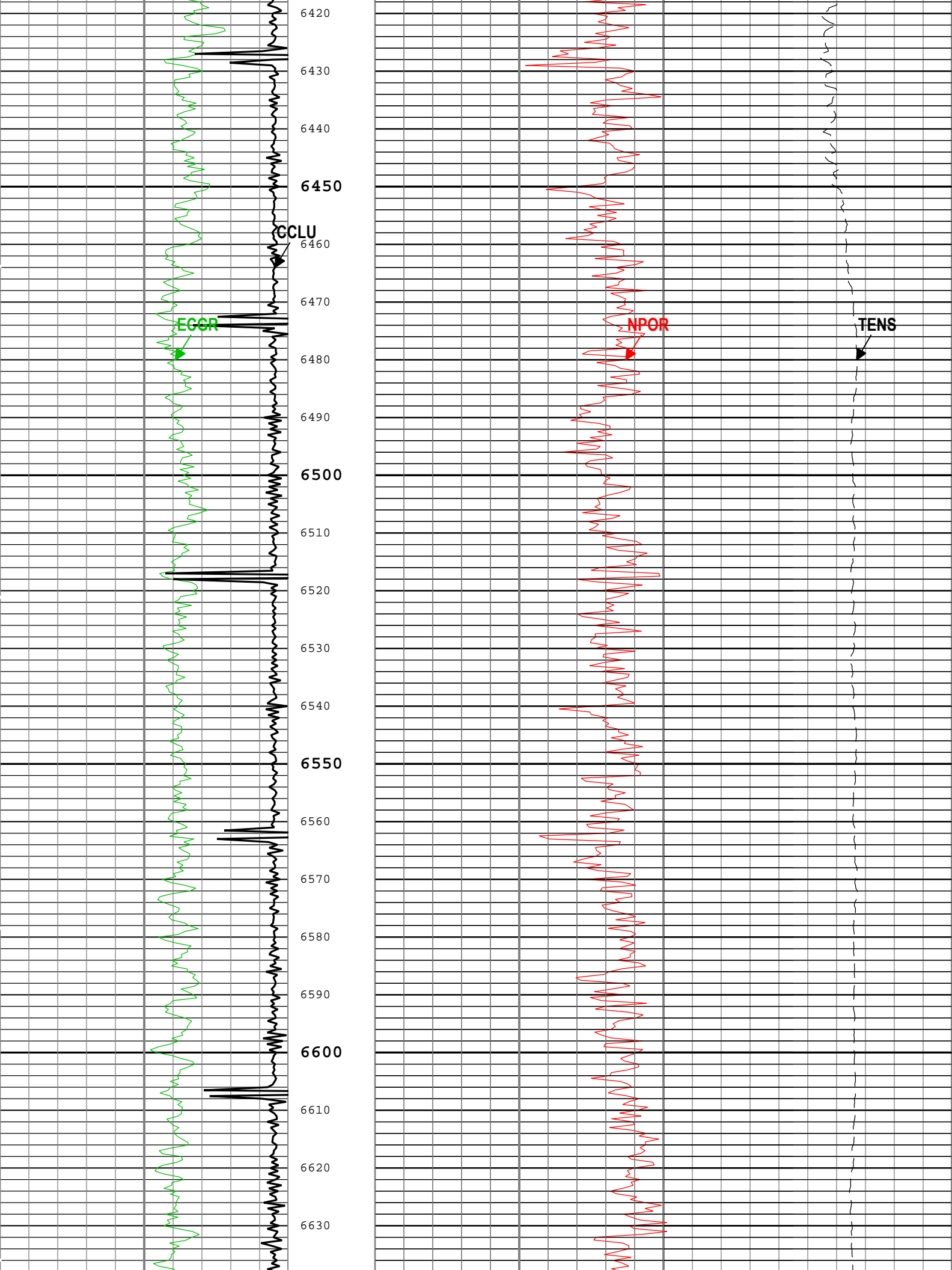


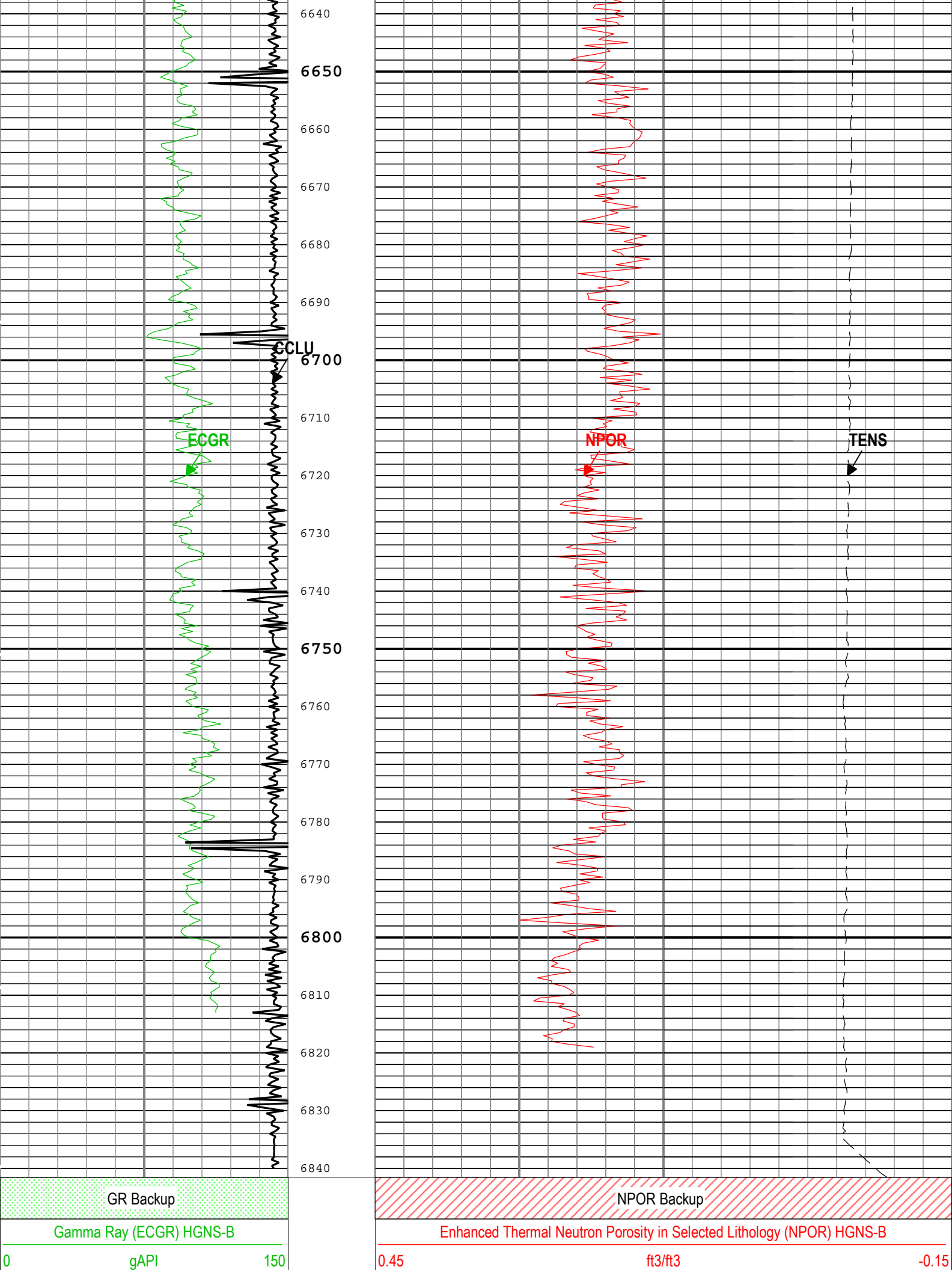












Casing Collar Locator Ultrasonic (CCLU) USIT-E			Cable Tension (TENS)		
-19	in	1	5000	lbf	0
TIME_1900 - Time Marked every 60.00 (s)					
— ICV - Integrated Cement Volume every 100.00 (ft3)					
— ICV - Integrated Cement Volume every 10.00 (ft3)					
— IHV - Integrated Hole Volume every 100.00 (ft3)					
— 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: 07-May-2019 15:14:29					

Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
BAR(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BHT	Bottom Hole Temperature	Borehole	212	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	17650.8	ft
CDEN	Cement Density	HGNS-B	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	
DTMD	Borehole Fluid Slowness	Borehole	196	us/ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4820	ft
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)	
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	REMS(RT)	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST(RT)	
HEMA	Hematite Presence Flag	Borehole	No	
HSCO	Hole Size Correction Option	HGNS-B	Yes	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	RB	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
MST	Mud Sample Temperature	Borehole	68	degF
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.16	
PDAT	Permanent Datum	WLSESSION	GL	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
RMS	Resistivity of Mud Sample	Borehole	0.2	ohm.m
SHT	Surface Hole Temperature	Borehole	68	degF
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.6	Mravl

USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.57	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	26	64	110
BS	13.5	110	1957
BS	8.5	1957	6841.5

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-4	dB
AGMX	Maximum Gain of Cartridge	USIT-E	20	dB
EMXV	EMEX Voltage	USIT-E	60	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	Yes	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-E	666667	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	Time Zoned	us

Time Zone Parameters

Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
WINB	29.36	07-May-2019 11:20:31	07-May-2019 11:28:12	6841.43	6796.63
WINB	23.6	07-May-2019 11:28:12	07-May-2019 11:55:24	6796.63	5232.94
WINB	28.49	07-May-2019 11:55:24	07-May-2019 11:56:40	5232.94	5159.92
WINB	31.63	07-May-2019 11:56:40	07-May-2019 13:29:24	5159.92	41.32
WINE	69.36	07-May-2019 11:20:31	07-May-2019 11:29:58	6841.43	6695.17
WINE	71.39	07-May-2019 11:29:58	07-May-2019 13:29:24	6695.17	41.32

All depth are at tool zero.

ONE

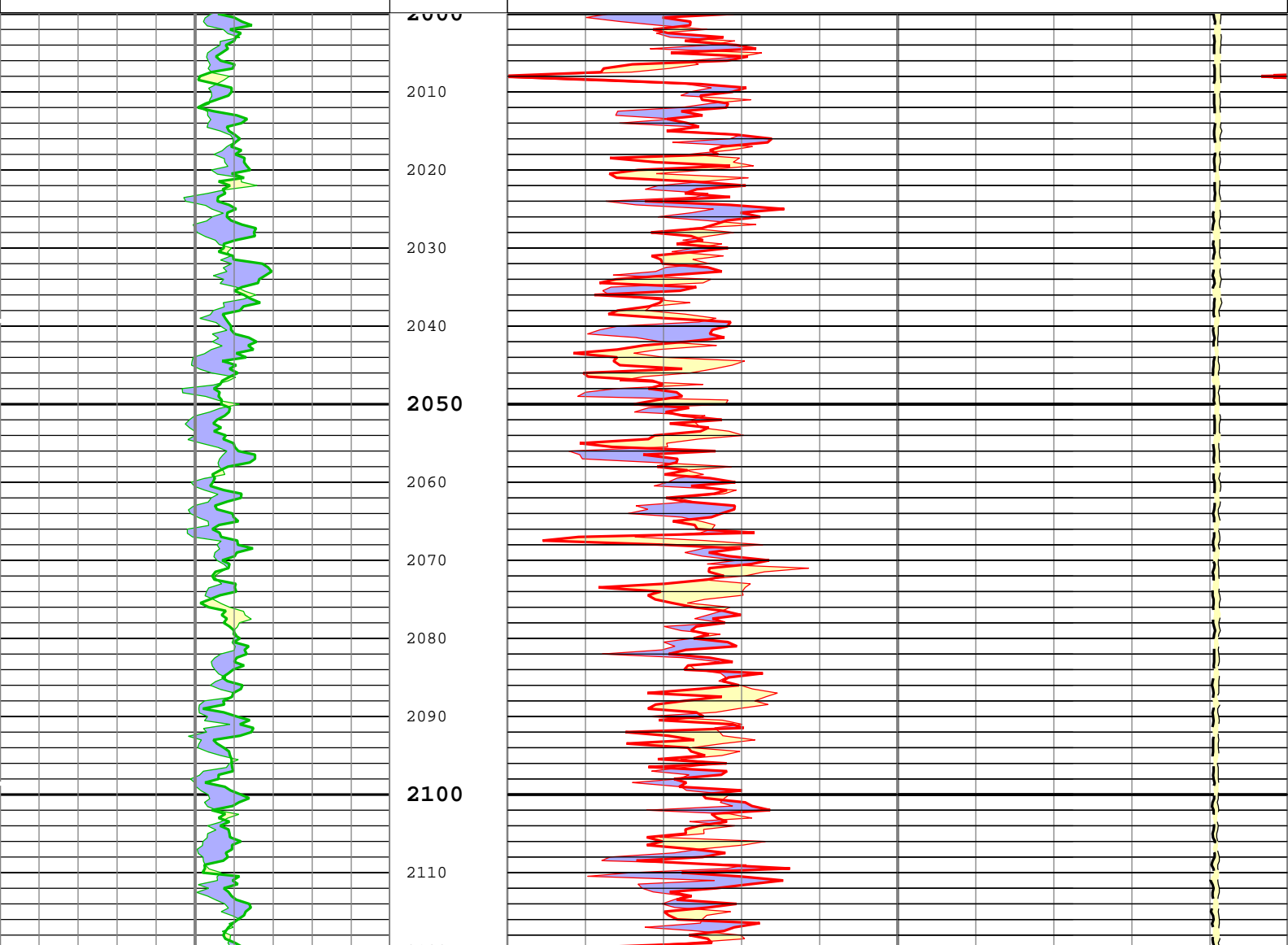
NOBLE NUCLEAR REPEAT ANALYSIS [5:100]

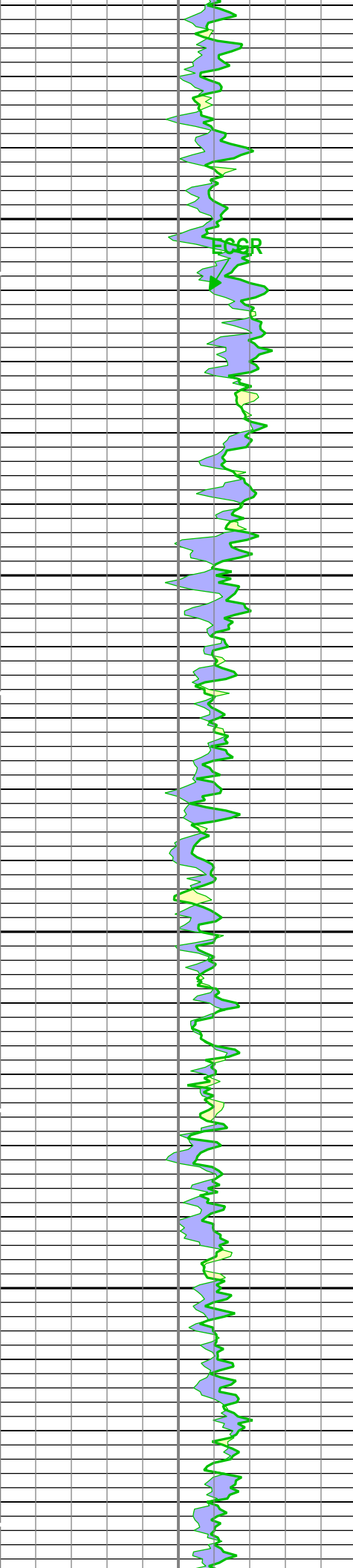
Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.102758.3100

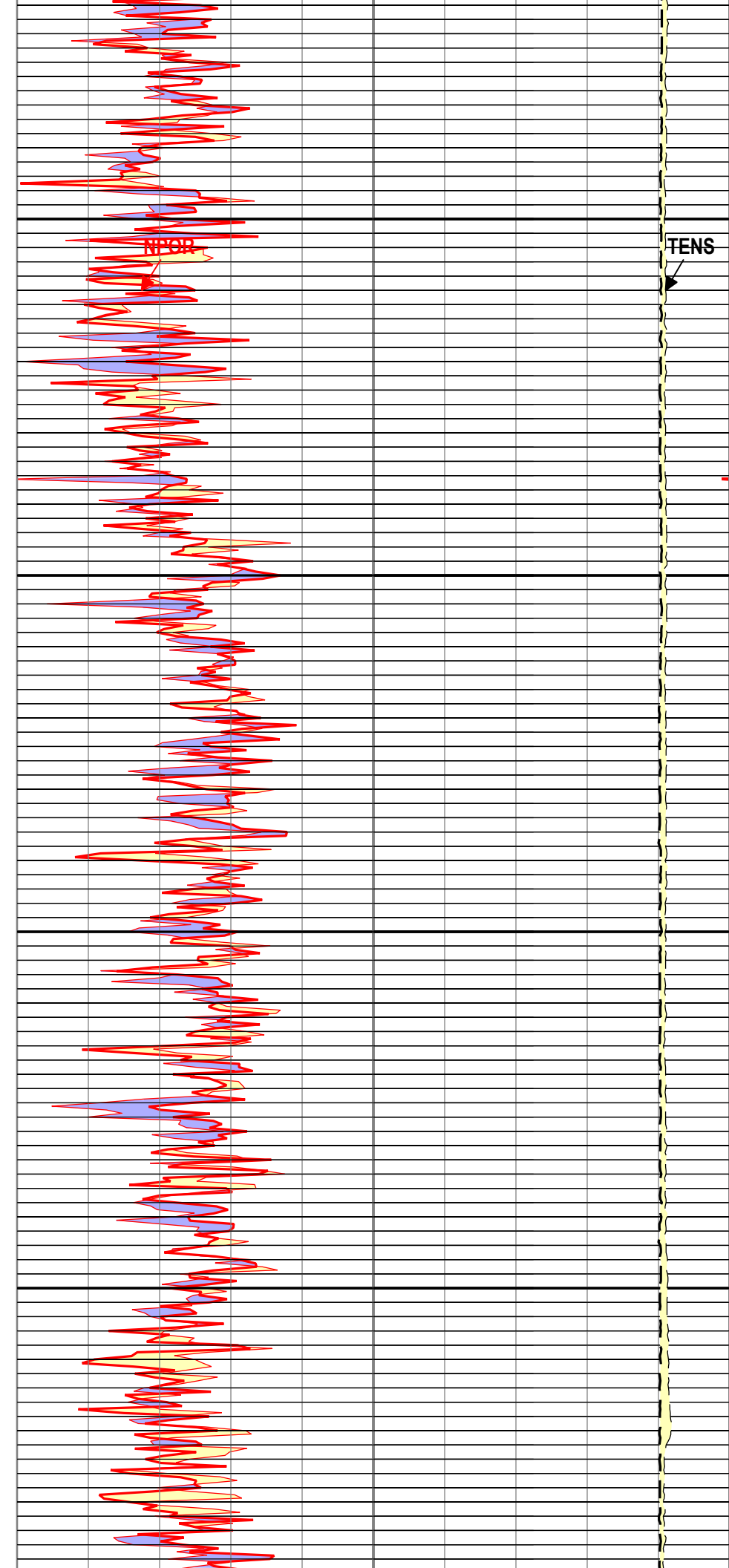
Pass Summary

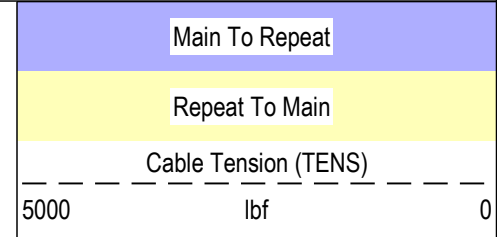
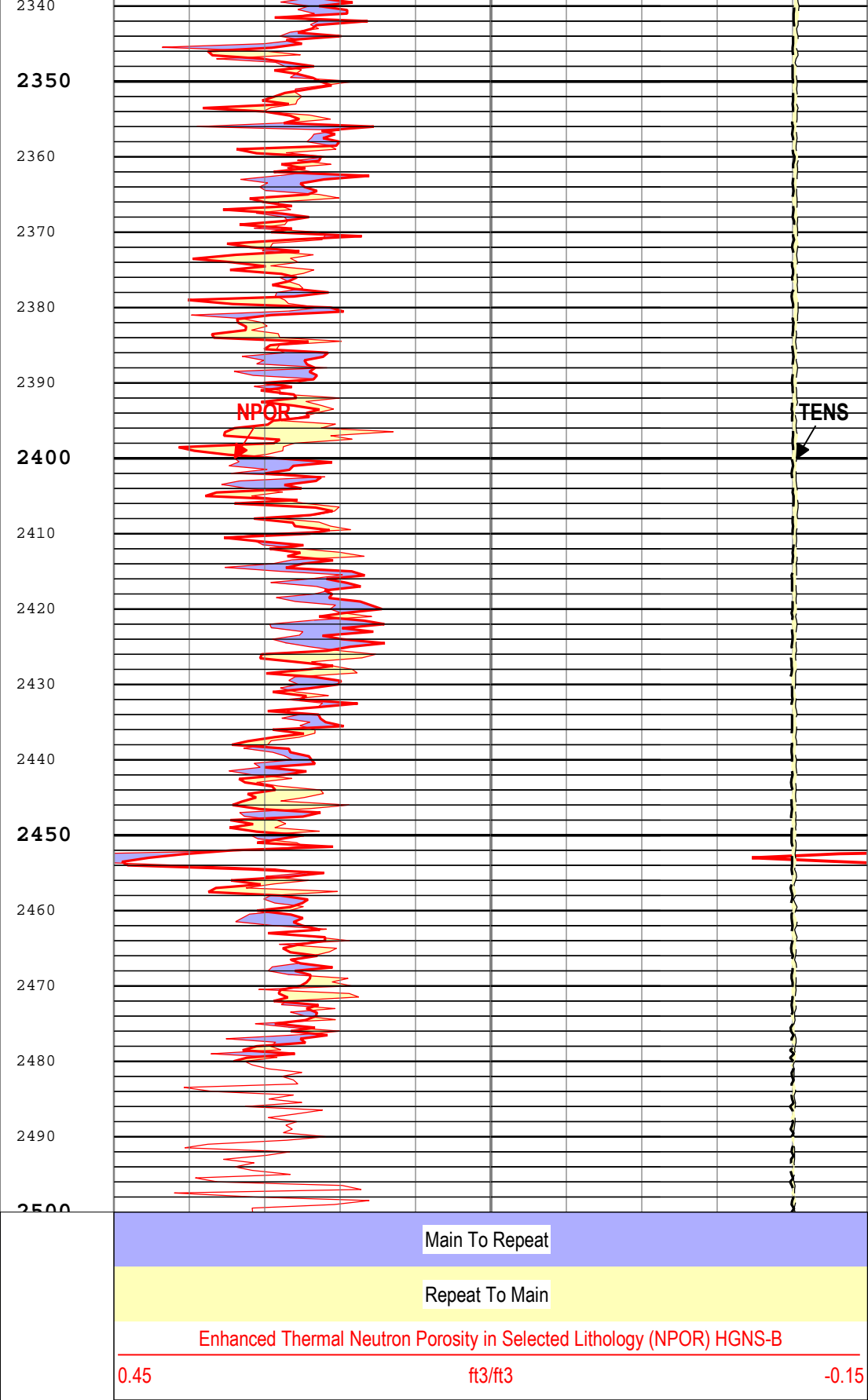
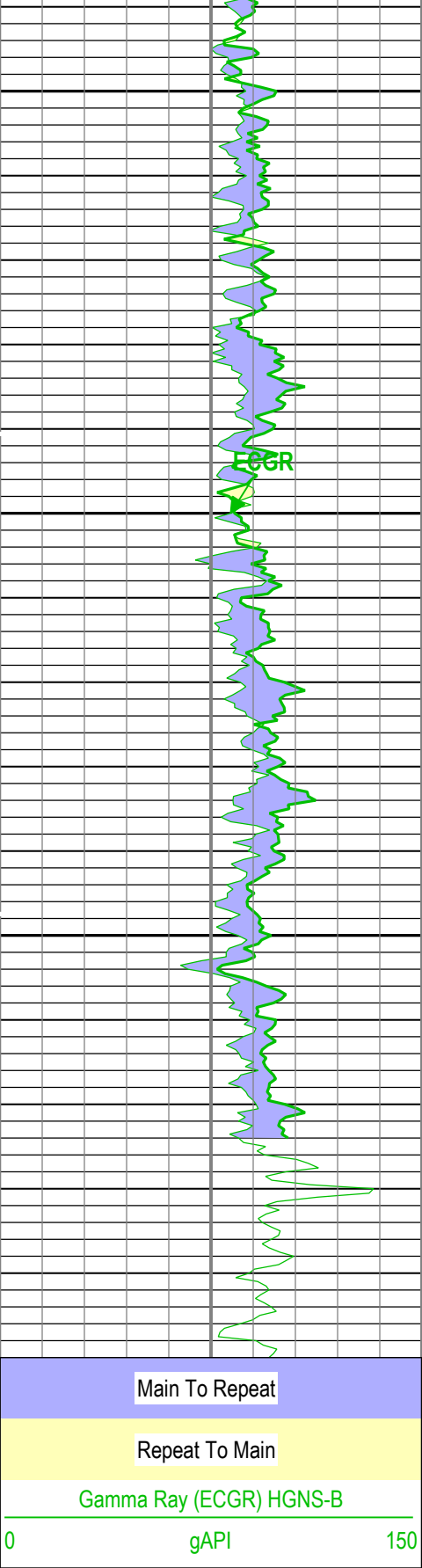
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[2]:Up	Up	1980.36 ft	2502.34 ft	07-May-2019 10:42:15 AM	07-May-2019 10:53:23 AM	ON	1.45 ft	Yes





2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
2240
2250
2260
2270
2280
2290
2300
2310
2320
2330





TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

<div> <div>└─ ICV - Integrated Cement Volume every 10.00 (ft3)</div> <div>└─ IHV - Integrated Hole Volume every 100.00 (ft3)</div> <div>└─ IHV - Integrated Hole Volume every 10.00 (ft3)</div> </div>				
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: 07-May-2019 15:14:53				
<div> <div>Channel Processing Parameters</div> <div></div> </div>				
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	212	degF
BS	Bit Size	WLSESSION	8.5	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	17650.8	ft
CDEN	Cement Density	HGNS-B	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	
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4820	ft
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)	
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	REMS(RT)	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST(RT)	
HSCO	Hole Size Correction Option	HGNS-B	Yes	
IMAR	Image Rotation	USIT-E	RB	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
MST	Mud Sample Temperature	Borehole	68	degF
PDAT	Permanent Datum	WLSESSION	GL	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
RMS	Resistivity of Mud Sample	Borehole	0.2	ohm.m
SHT	Surface Hole Temperature	Borehole	68	degF
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.6	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
<div> <div>Tool Control Parameters</div> <div></div> </div>				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
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: VOGLER STATE D21-790

Field: WATTENBERG

County:	WELD
State:	COLORADO
NEUTRON LOG	