Schlumberger

Company: Noble Energy, Inc.

Well: Minutemen Federal #LC21-615

Field: Wildcat

County: Weld State: Colorado

County: Weld
Field: Wildcat
Location: SWSW Sec 22 T9N R59W
Well: Minutemen Federal #LC21-615
Company: Noble Energy, Inc.

Cased Hole Neutron Porosity

Gamma Ray

Location:				
SWSW Sec 22 T9N R59W		Elev.:	K.B.	4907.00 ft
SHL: 825 FSL 400 FWL			G.L.	4877.00 ft
Latitude: 40.73113 Longitude: -103.97204			D.F.	4906.00 ft
Permanent Datum:	Ground Level	Elev.:	4877.00 f	
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

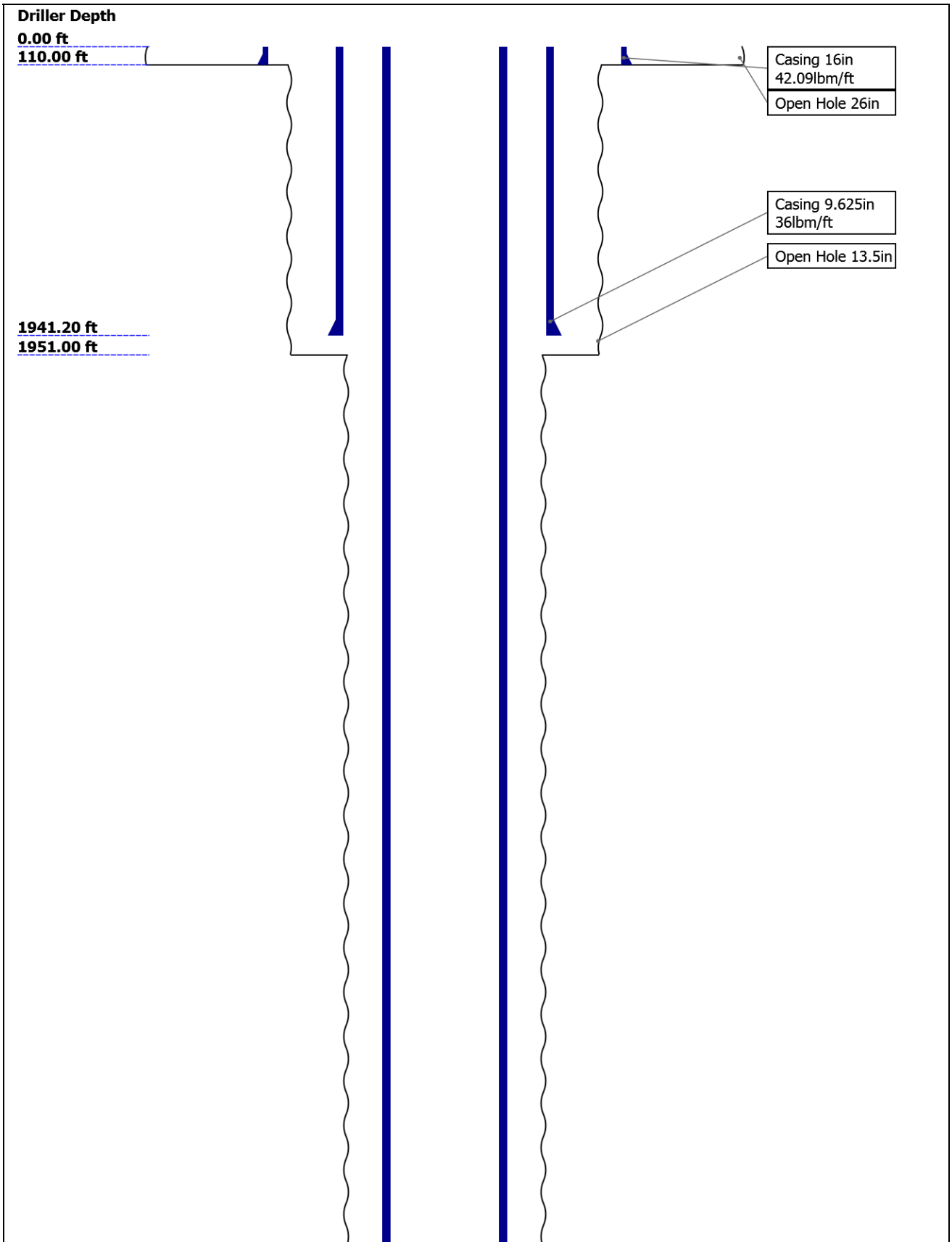
API Serial No.	Section:	Township:	Range:
05-123-42787	22	9N	59W

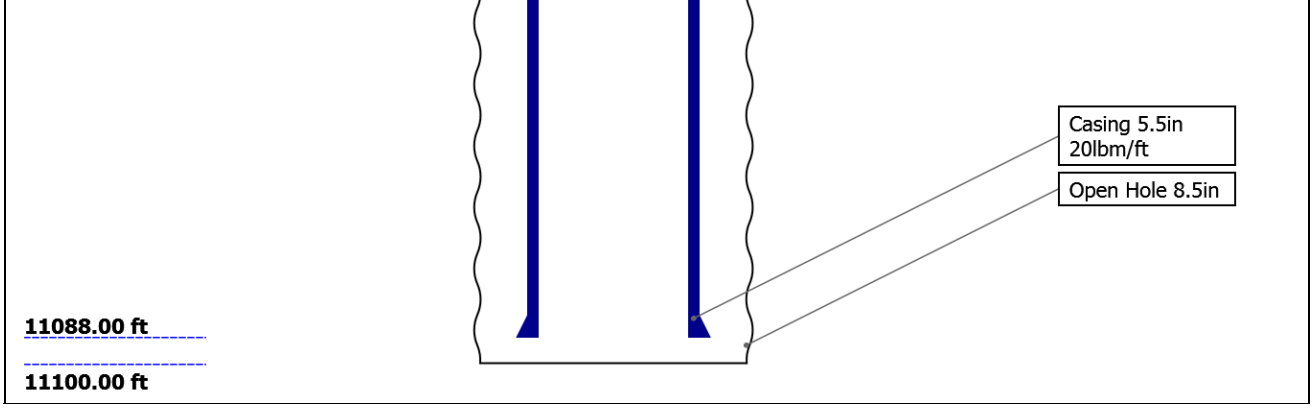
Logging Date		26-Aug-2017		
Run Number		One		
Depth Driller		11100.00 ft		
Schlumberger Depth		11100.00 ft		
Bottom Log Interval		6000.00 ft		
Top Log Interval		0.00 ft		
Casing Fluid Type		Brine		
Salinity				
Density		9.3 lbm/gal		
Fluid Level		8.00 ft		
BIT/CASING/TUBING STRING				
Bit Size		8.50 in		
From		1951.00 ft		
To		11100.00 ft		
Casing/Tubing Size		5.5 in		
Weight		20 lbm/ft		
Grade		N/A		
From		0.00 ft		
To		11088.00 ft		
Max Recorded Temperatures		203 degF		
Logger on Bottom	Time	26-Aug-2017	16:00:00	
Unit Number	Location:	9108	Fort Morgan	
Recorded By		Stephen Tang		
Witnessed By		Bill Mansfield		

Disclaimer

Contents

Well Sketch


Driller Depth
0.00 ft
110.00 ft
1941.20 ft
1951.00 ft
Casing 16in
42.09lbm/ft
Open Hole 26in
Casing 9.625in
36lbm/ft
Open Hole 13.5in

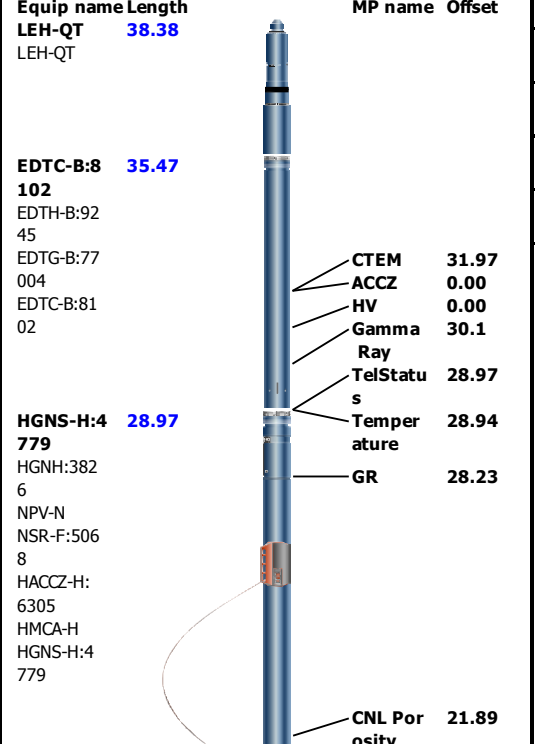


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	1951			
Top Logger (ft)	0	110	1951			
Bottom Driller (ft)	110	1951	11100			
Bottom Logger (ft)	110	1951	11100			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	42.09	36	20			
Inner Diameter (in)	15.511	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	1941.2	11088			
Bottom Logger (ft)	110	1941.2	11088			

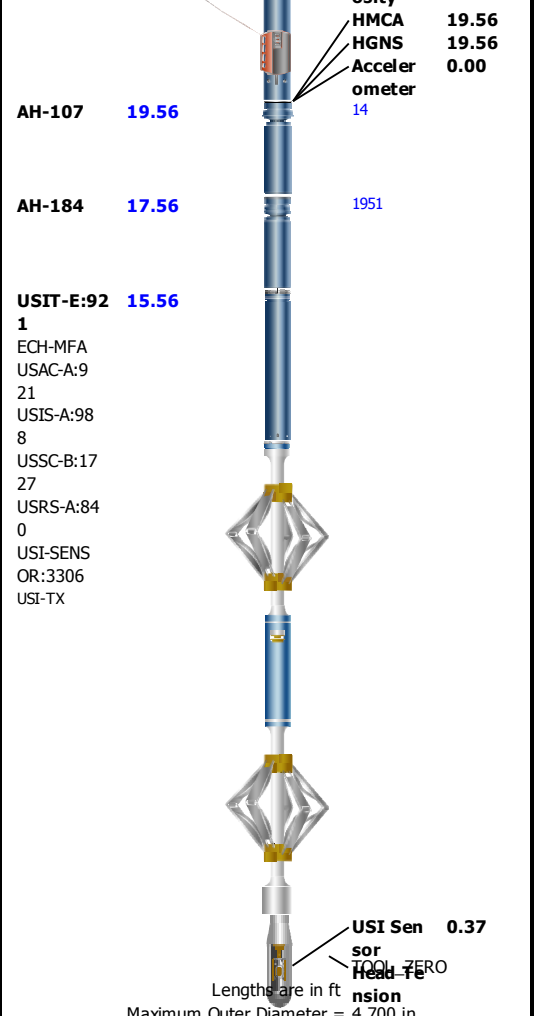
Remarks and Equipment Summary

One: Toolstring



One: Remarks

Toolstring ran as per tool sketch.
Well logged at 10 degree 6 inch.
Main pass logged with 2500 psi.
Repeat pass logged 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	4714071		
Length	24000.00 ft		
Conveyance Type	Wireline		

Rig Type			

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth procedures followed.
Rig Up Length At Surface		IDW used as primary depth device.
Rig Up Length At Bottom		Z-Chart used as secondary depth device.
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

One

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 2017 SP1	7.1.82245.3100
Application Patch	Wireline_NPD-ICE2-2017SP1_7.1.87324

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	73.18 ft	6007.17 ft	26-Aug-2017 2:46:30 PM	26-Aug-2017 4:10:12 PM	ON	3.65 ft	No

All depths are referenced to toolstring zero

Log

Company:Noble Energy, Inc. Well:Minutemen Federal #LC21-615

One: Log[3]:Up:S005

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: 26-Aug-2017 16:45:42

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

TIME_1900 - Time Marked every 60.00 (s)

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)

Cable Tension (TENS)

5000 lbf 0

GR Backup

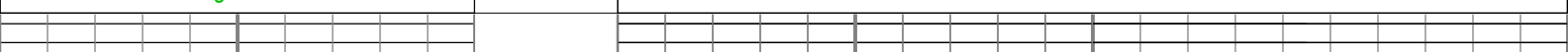
Gamma Ray (ECGR) HGNS-H

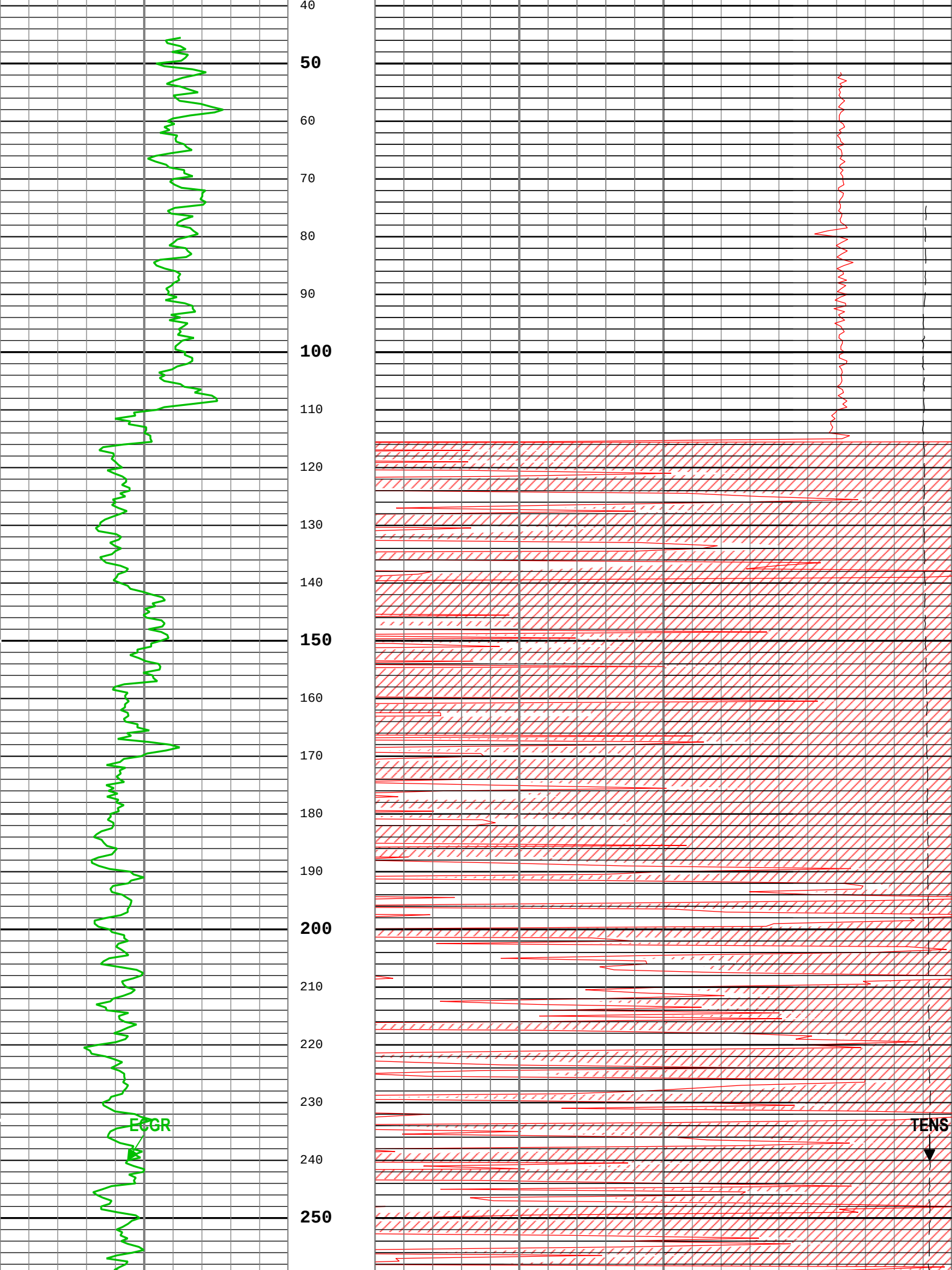
0 gAPI 150

NPOR Backup

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.45 ft3/ft3 -0.15

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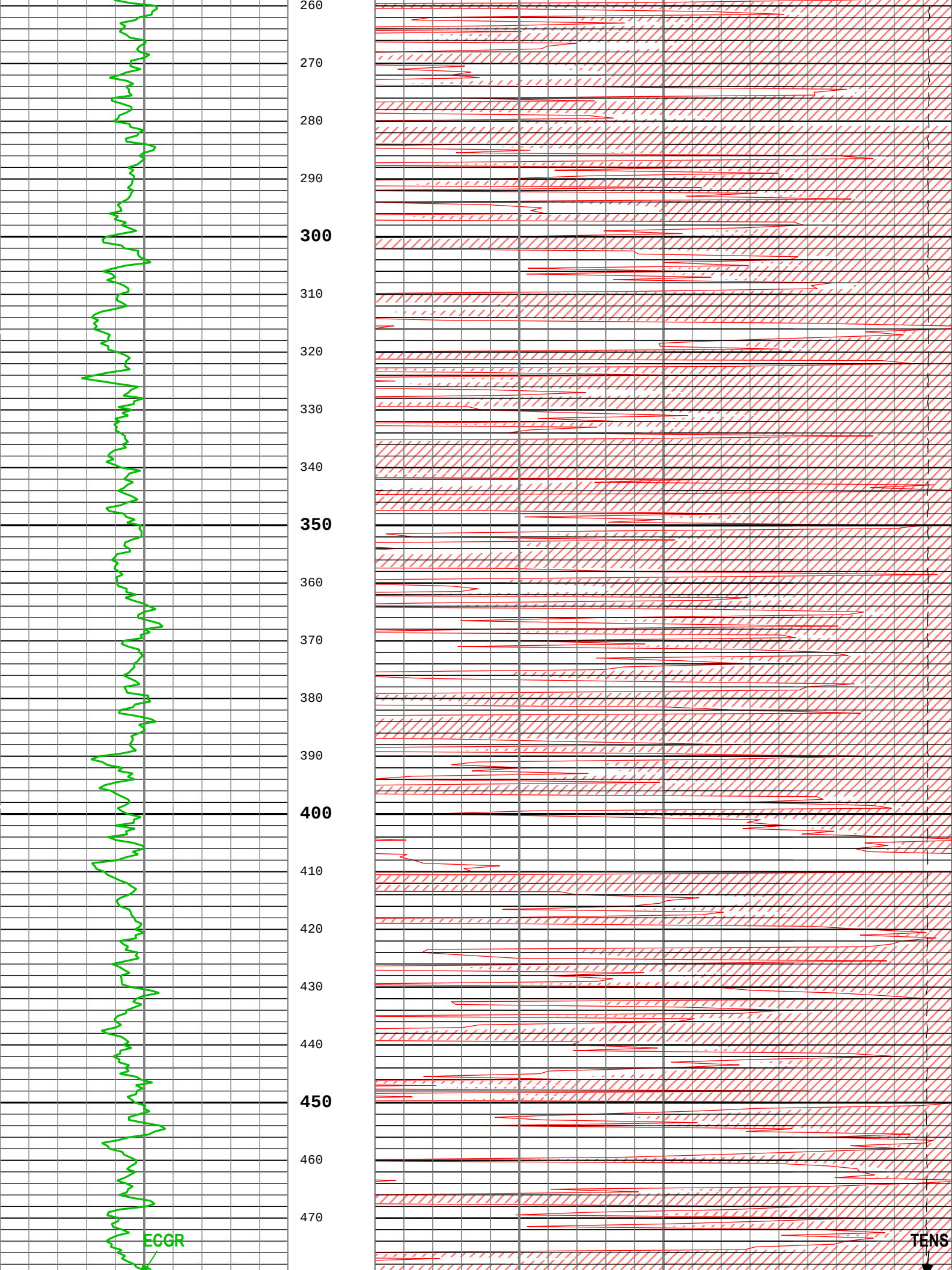
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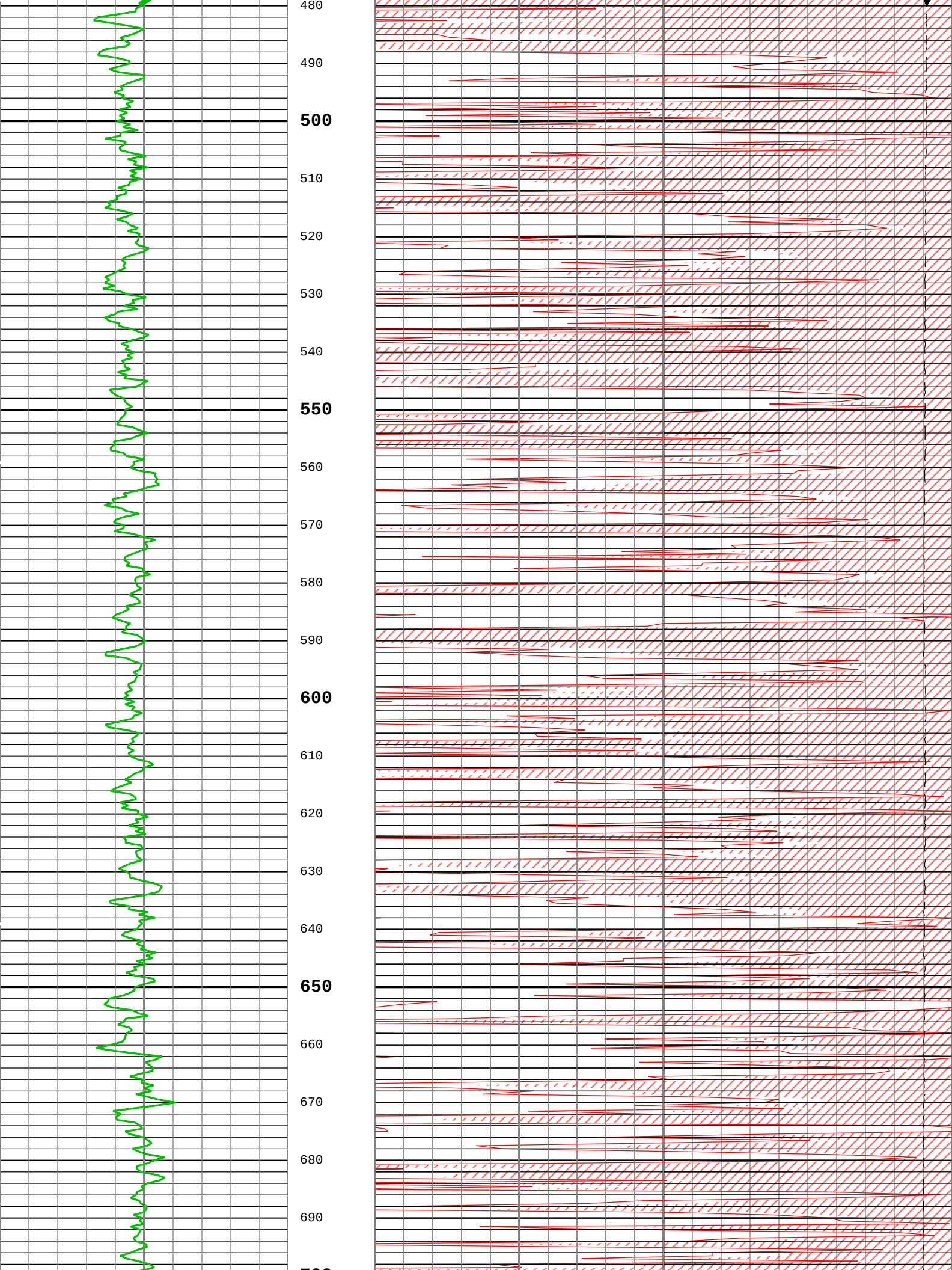
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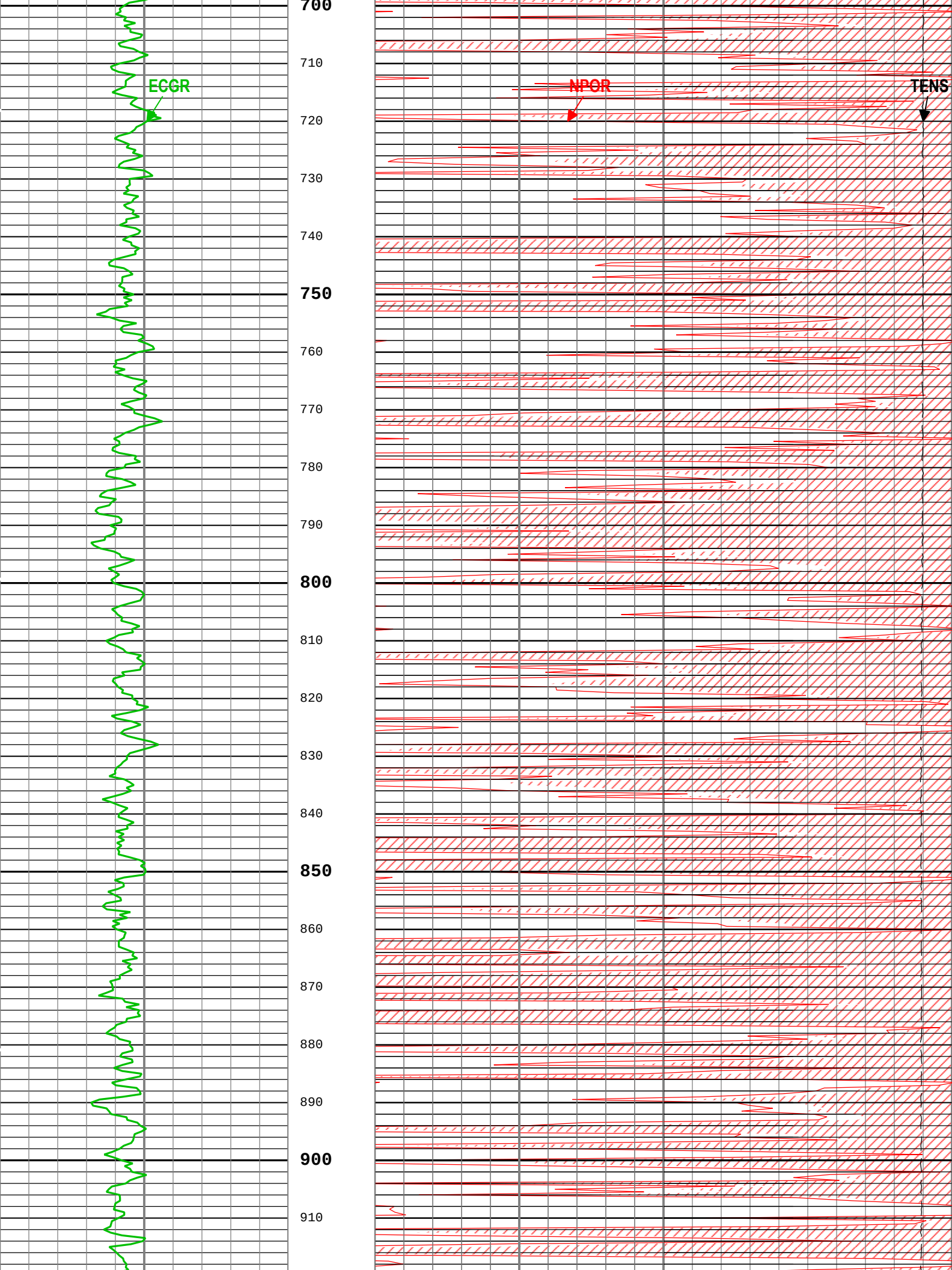
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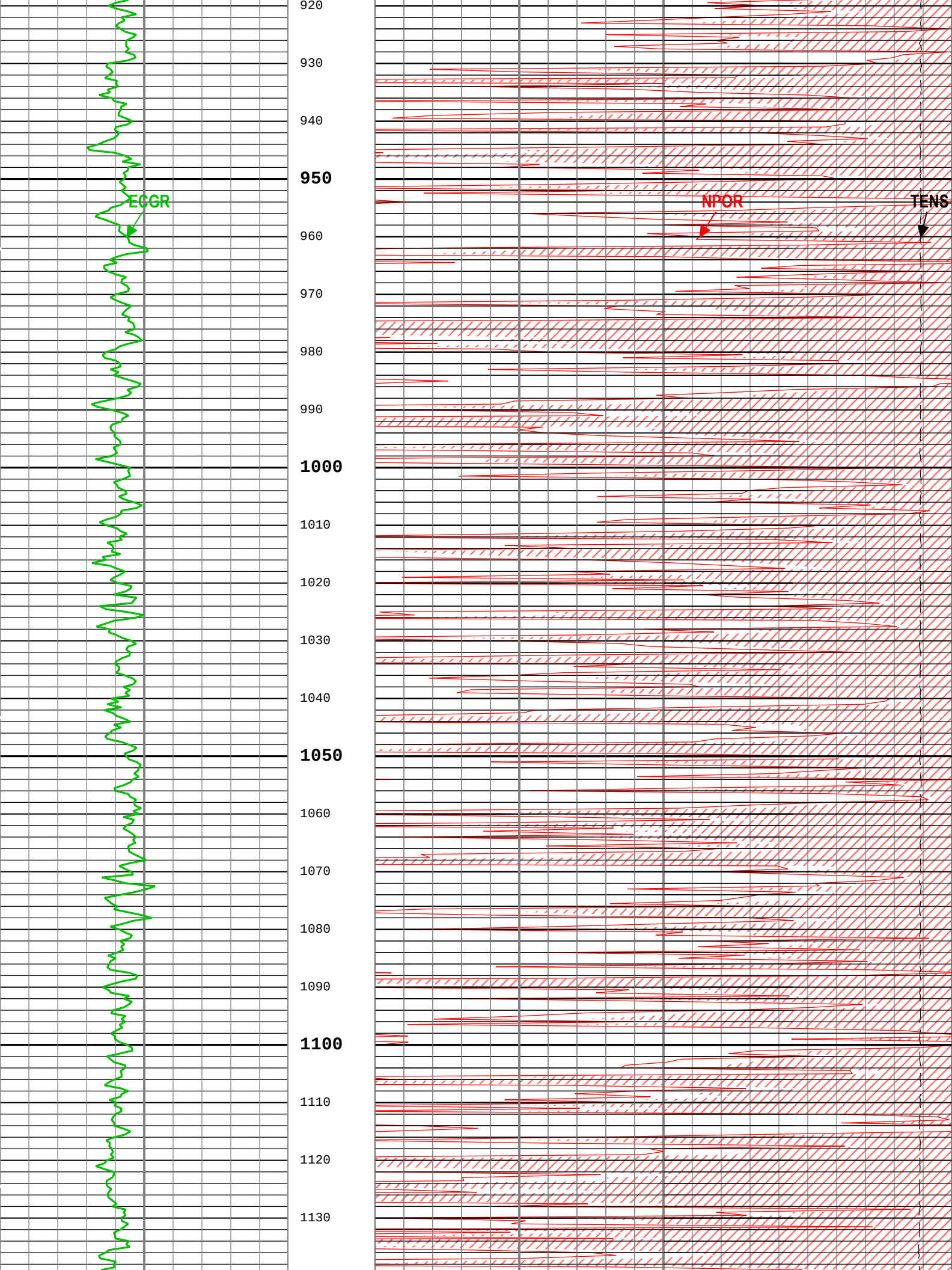
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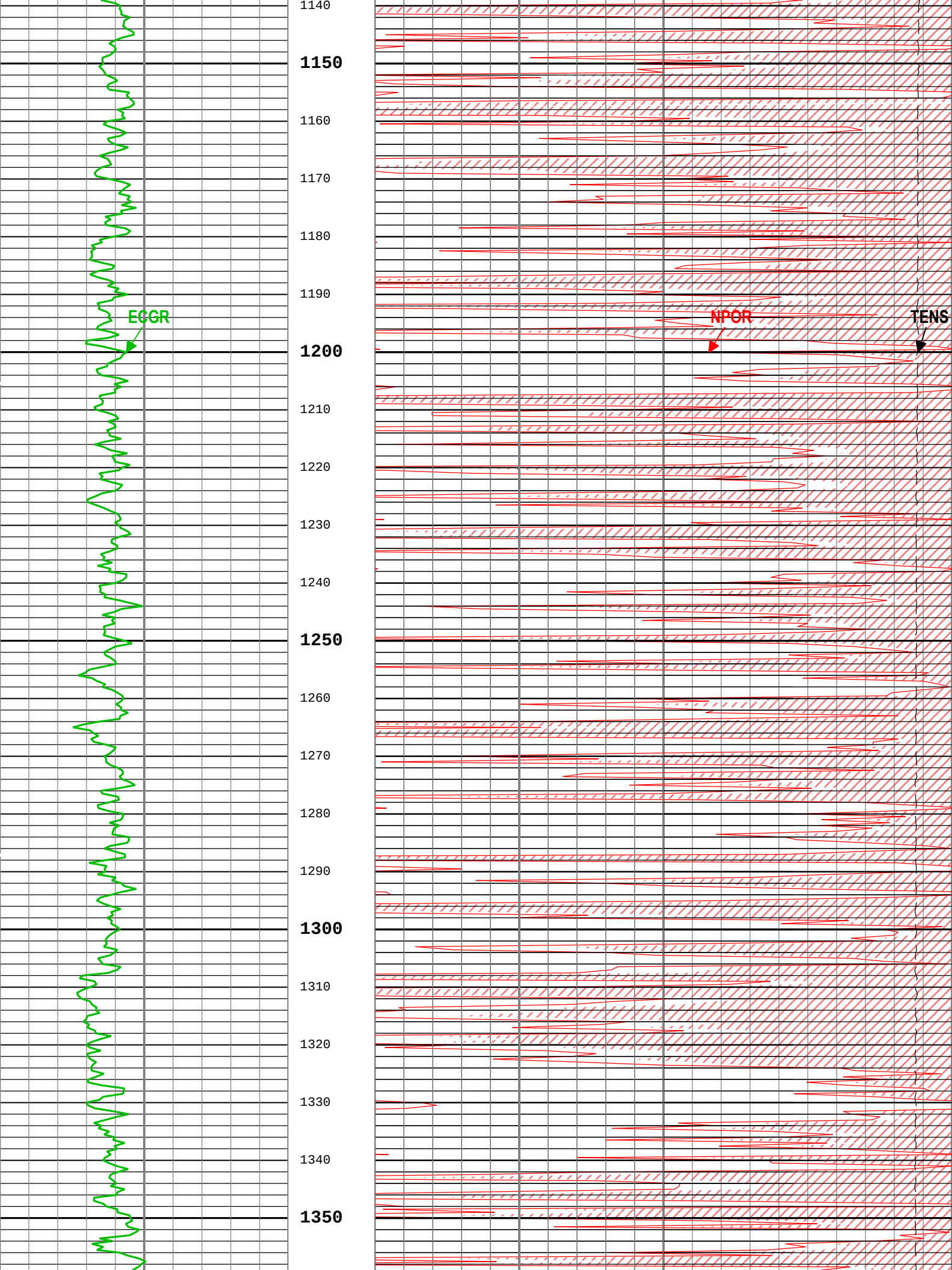
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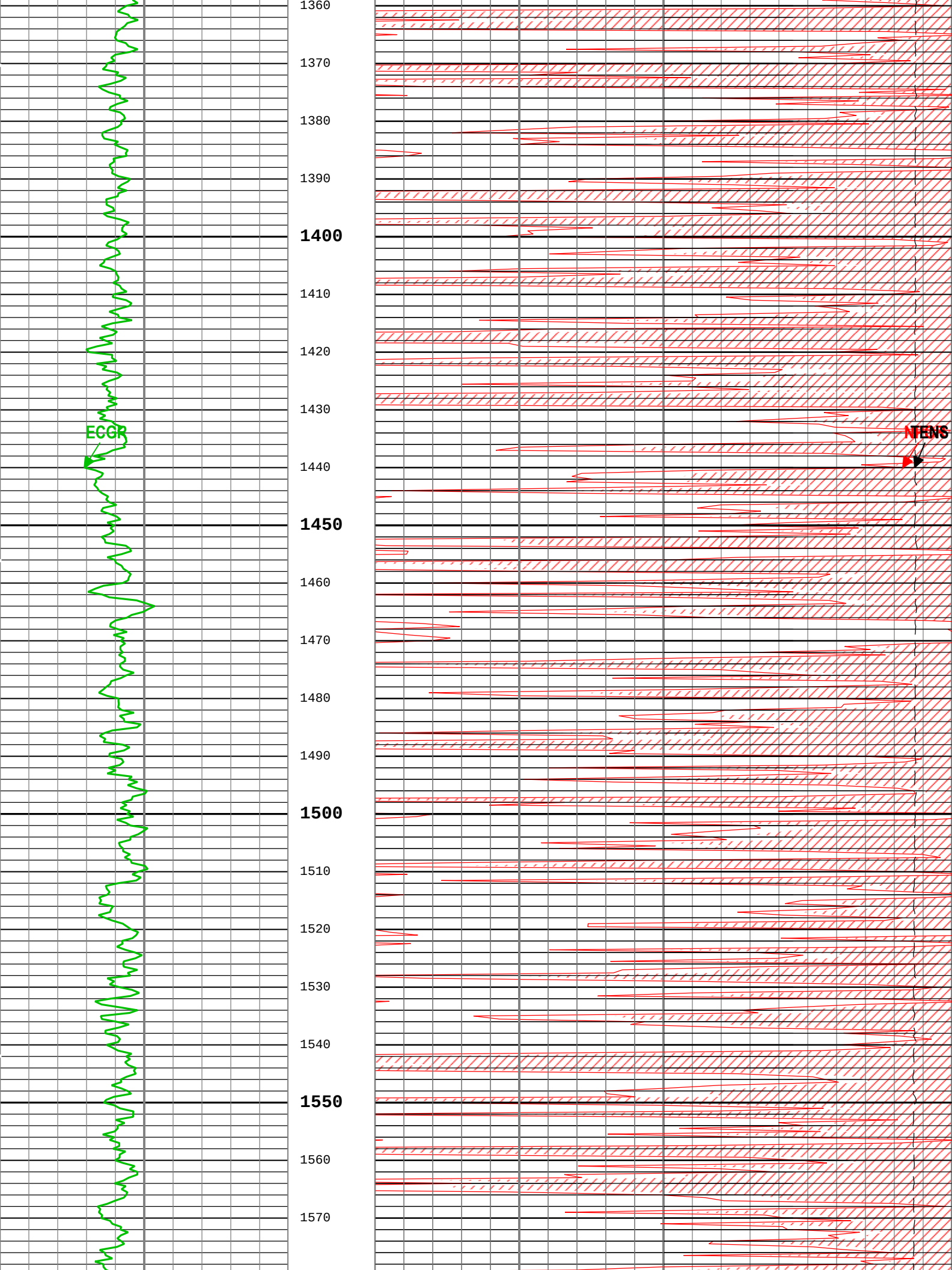
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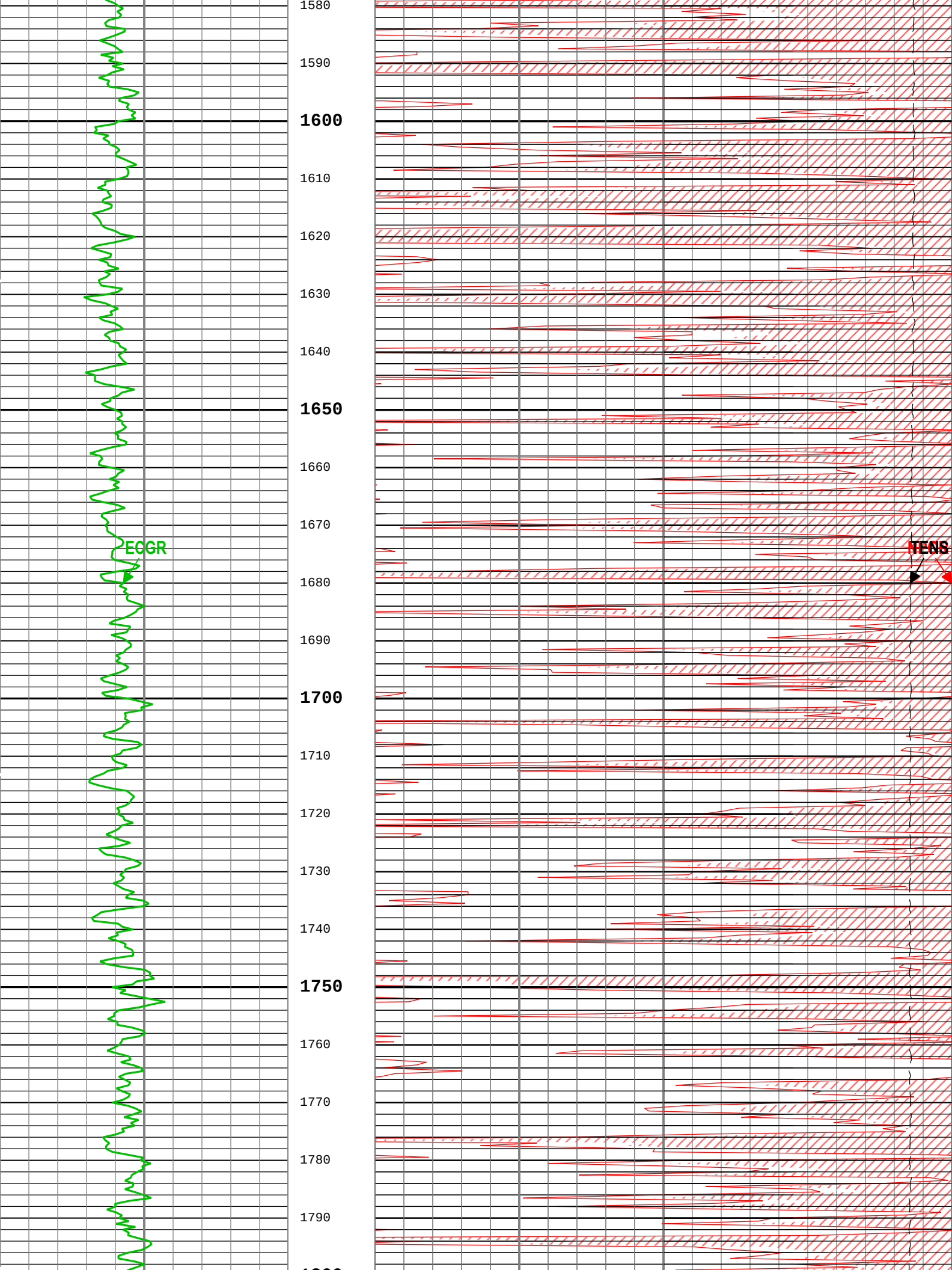
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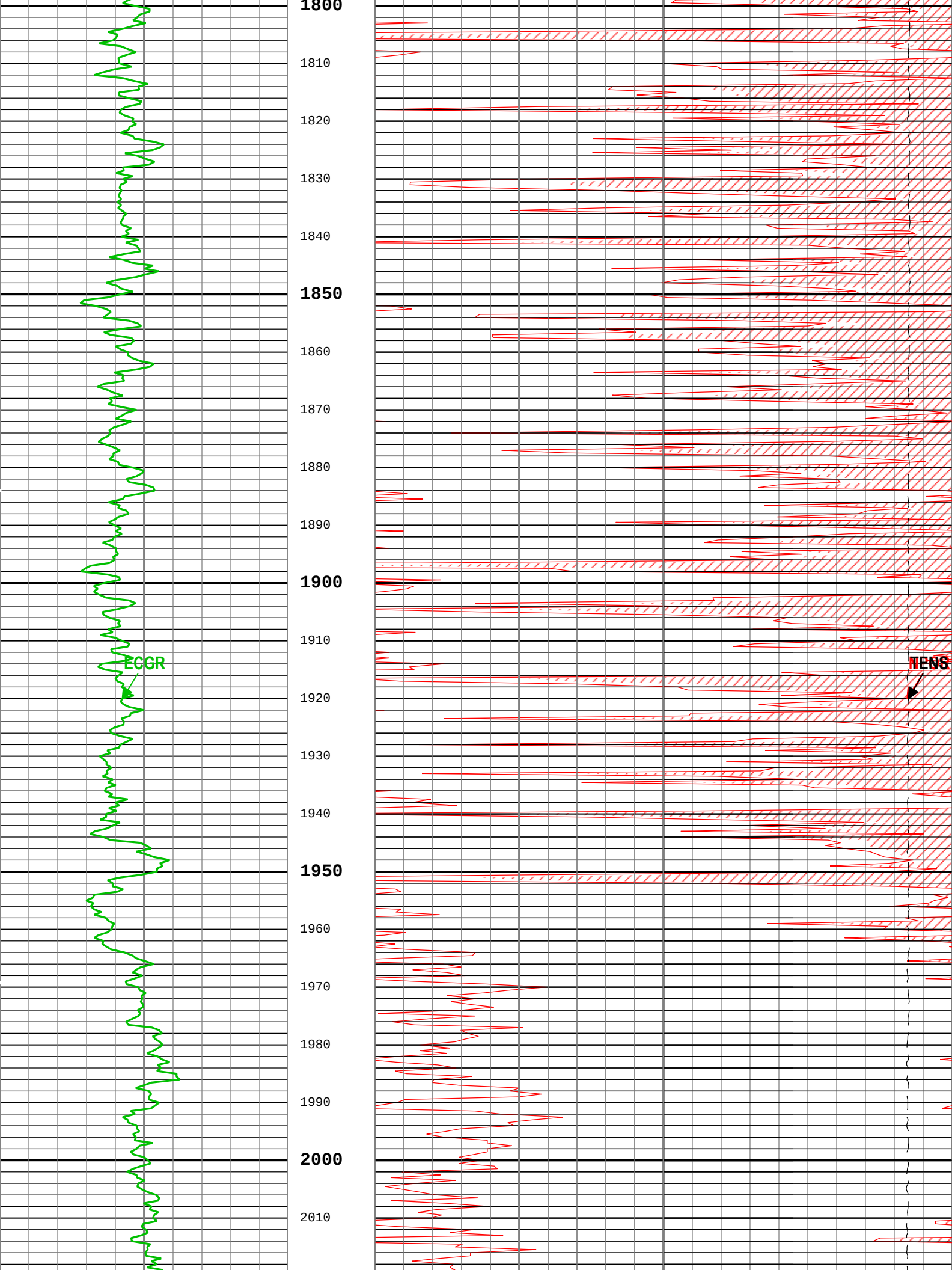
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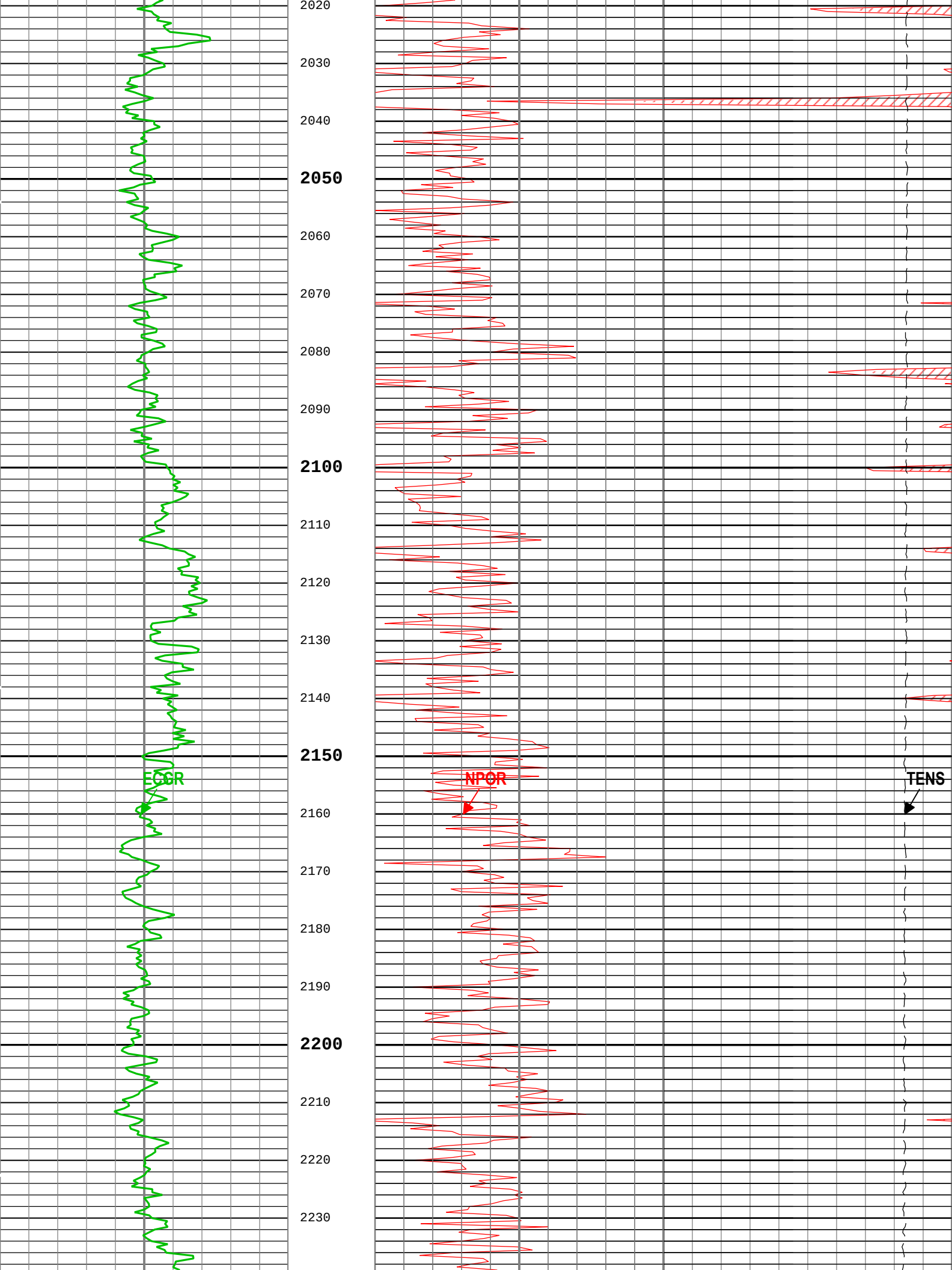
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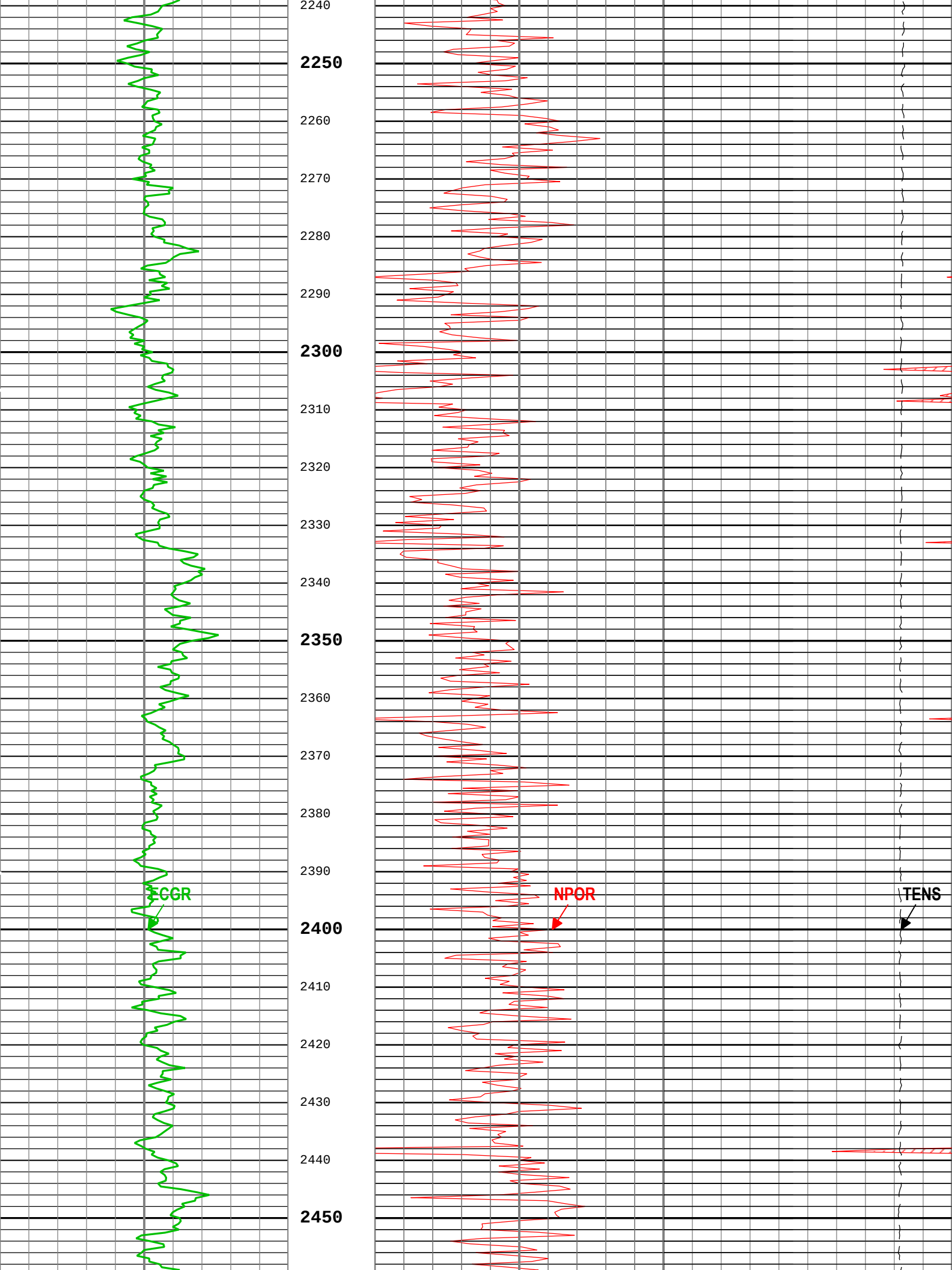
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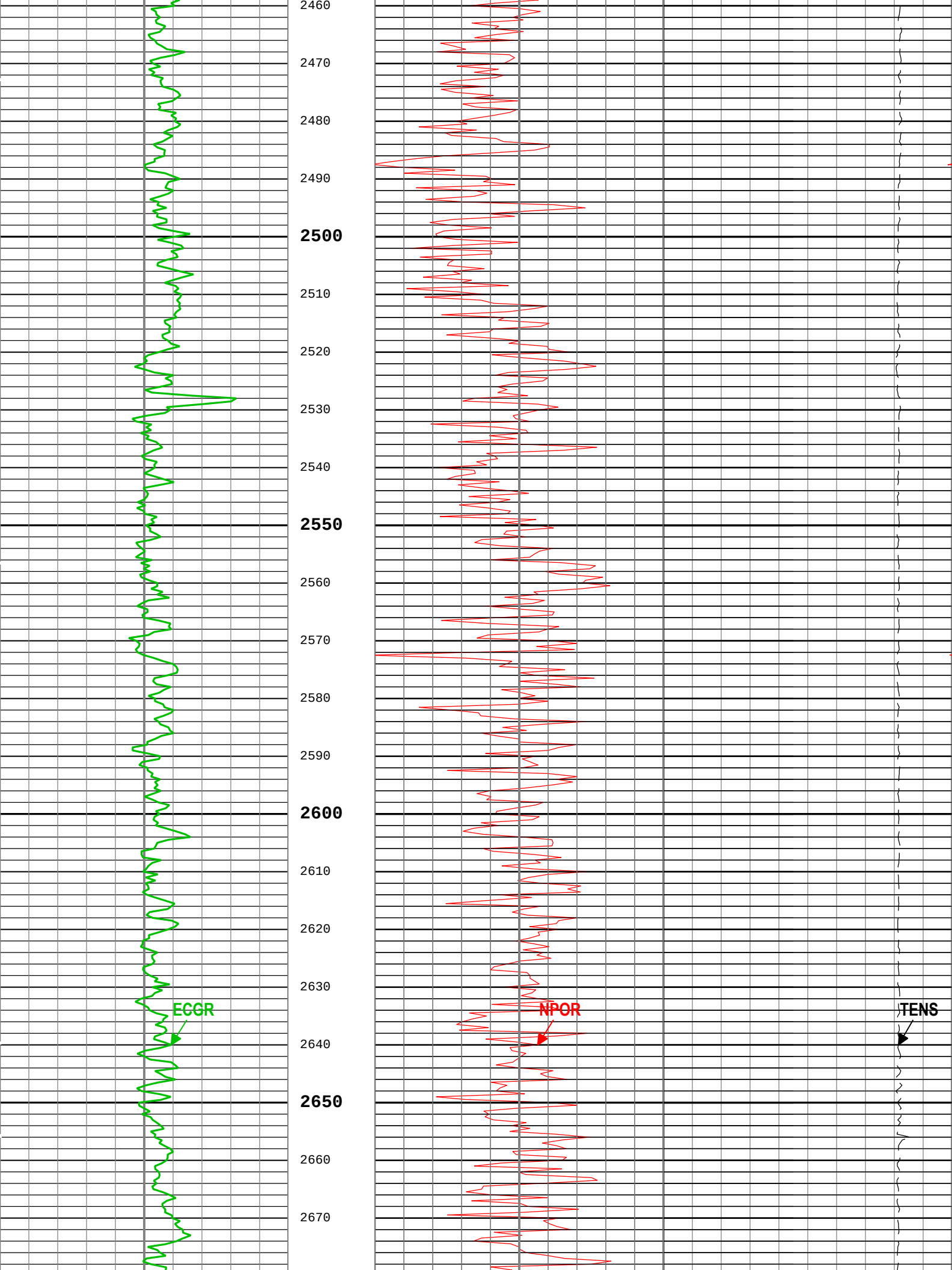
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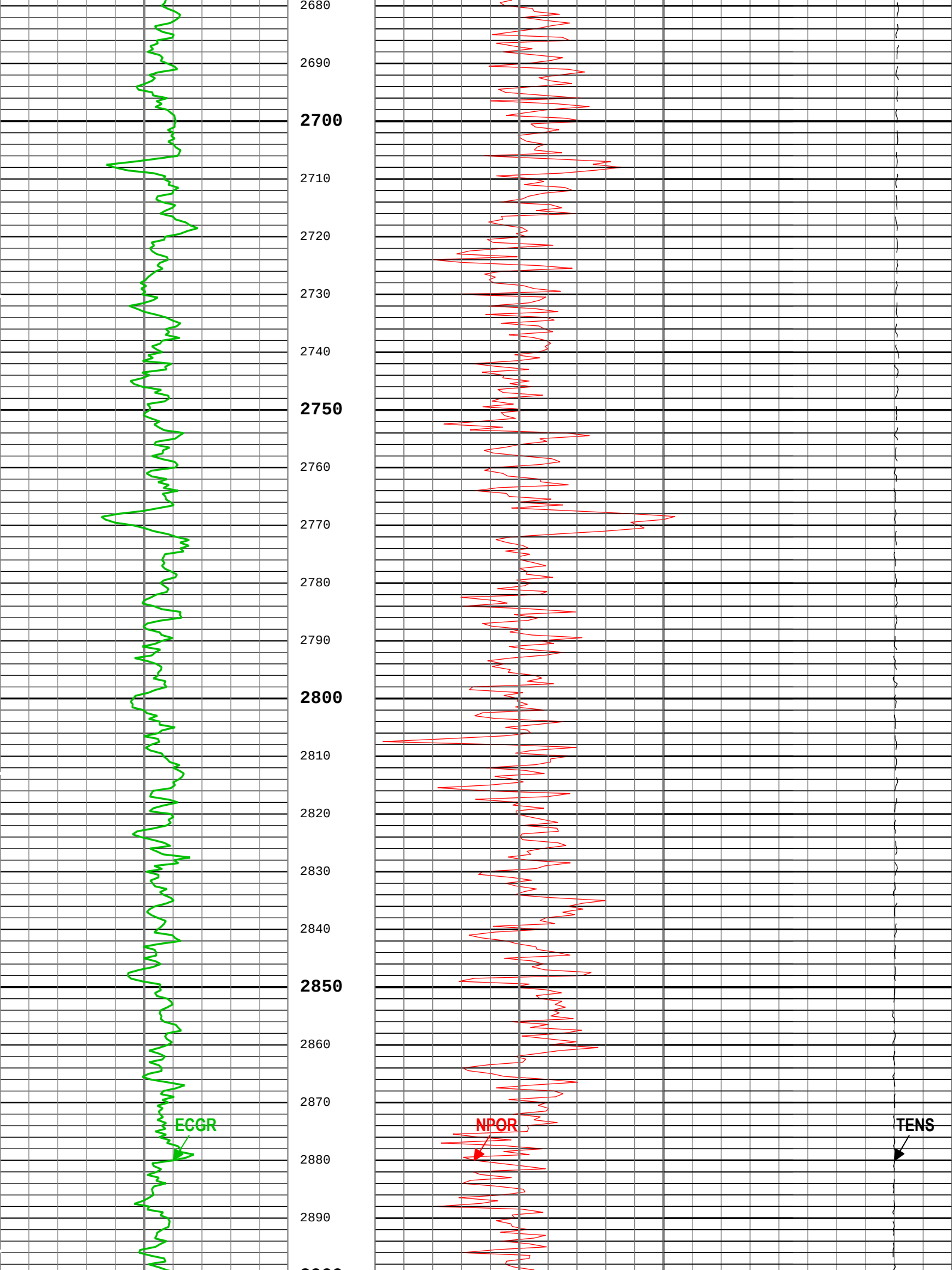
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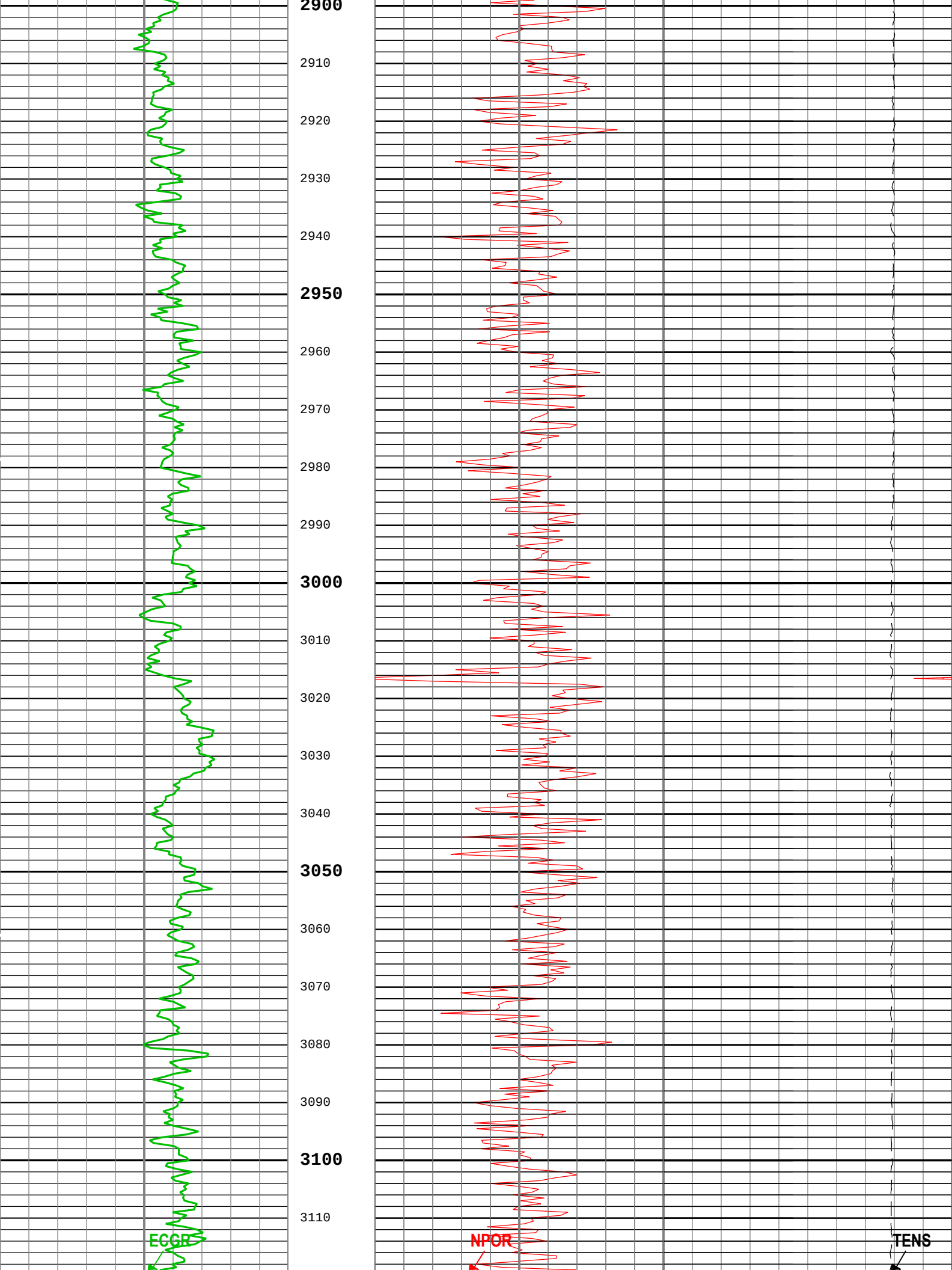
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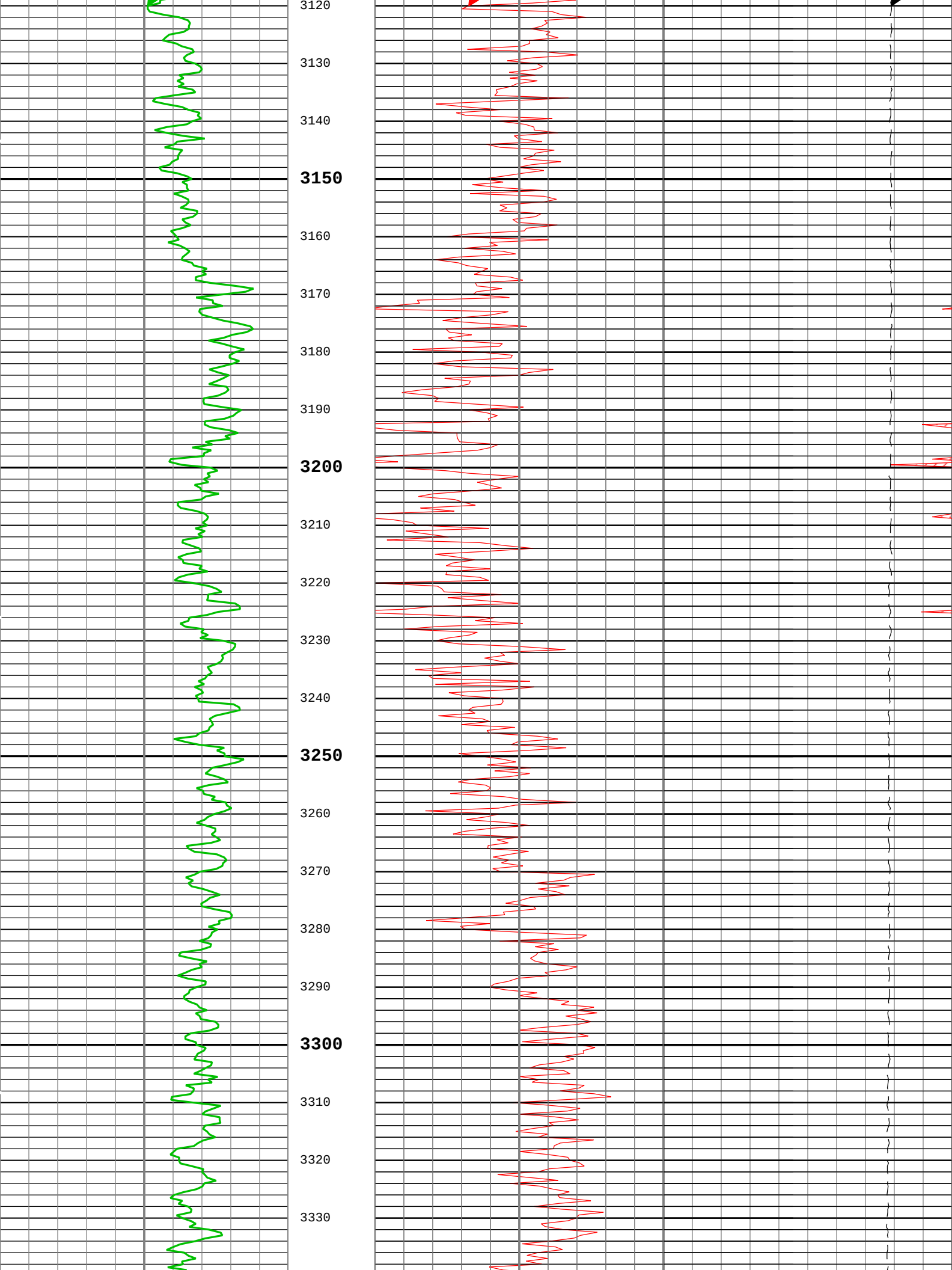
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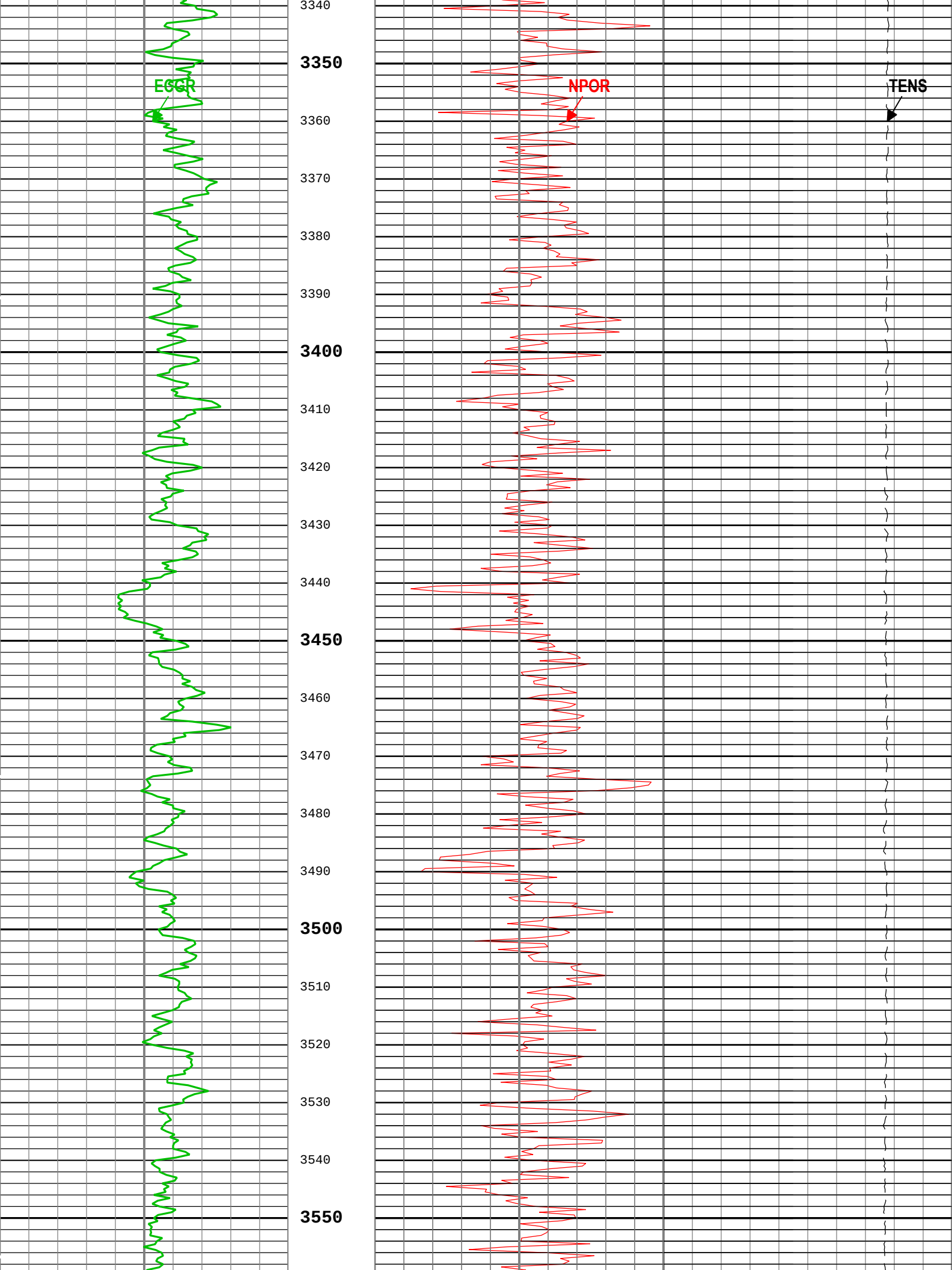
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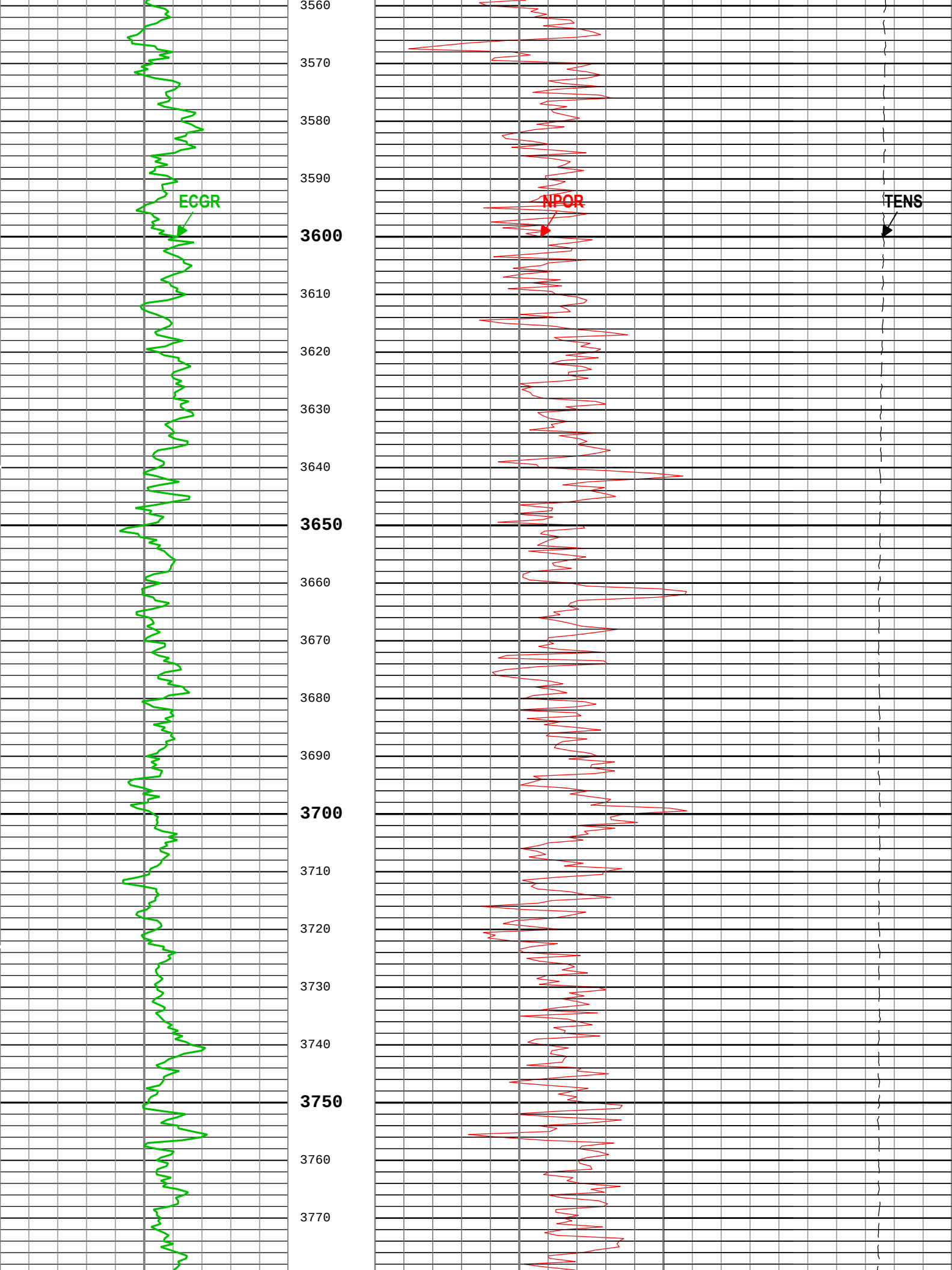
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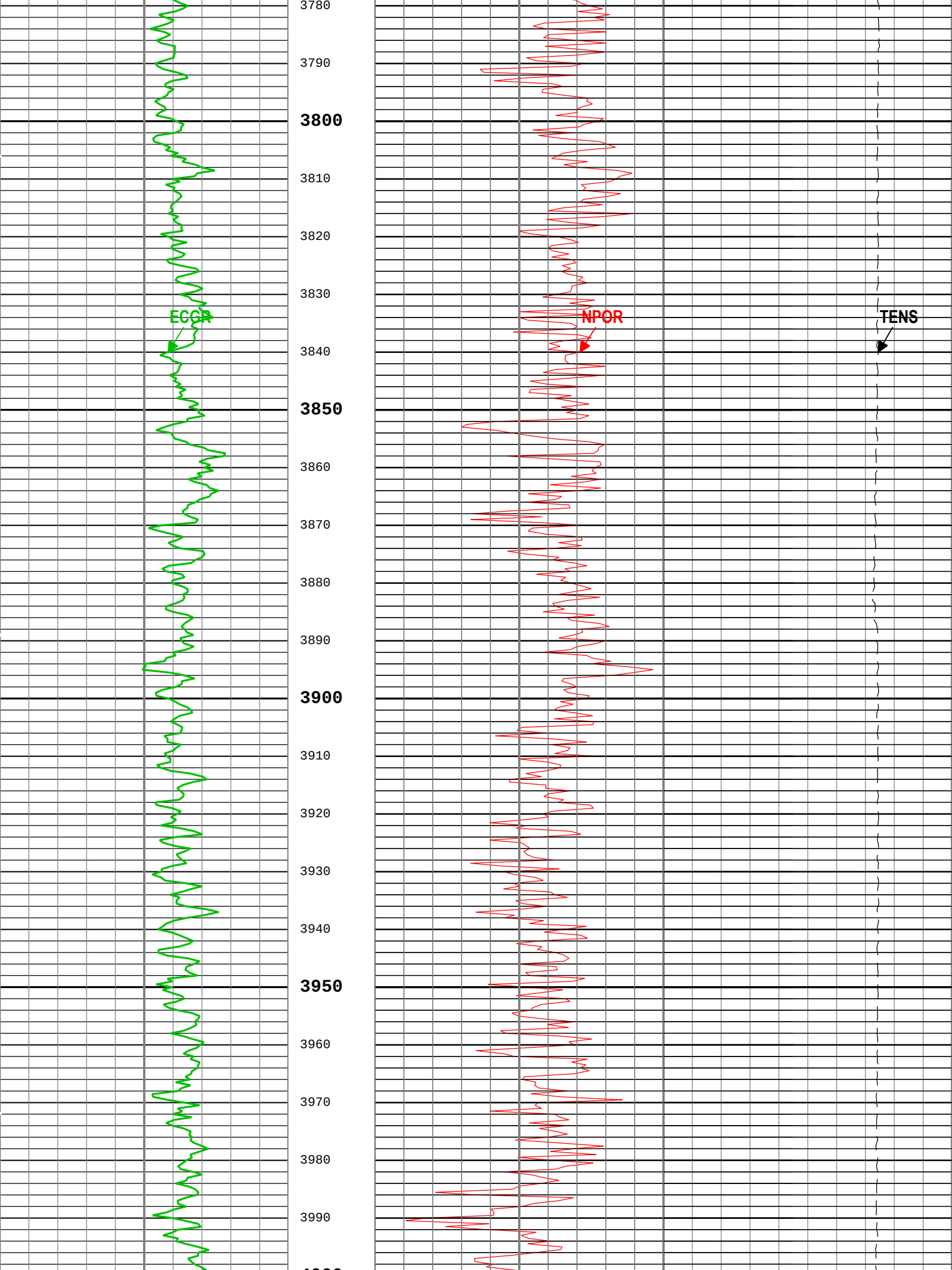
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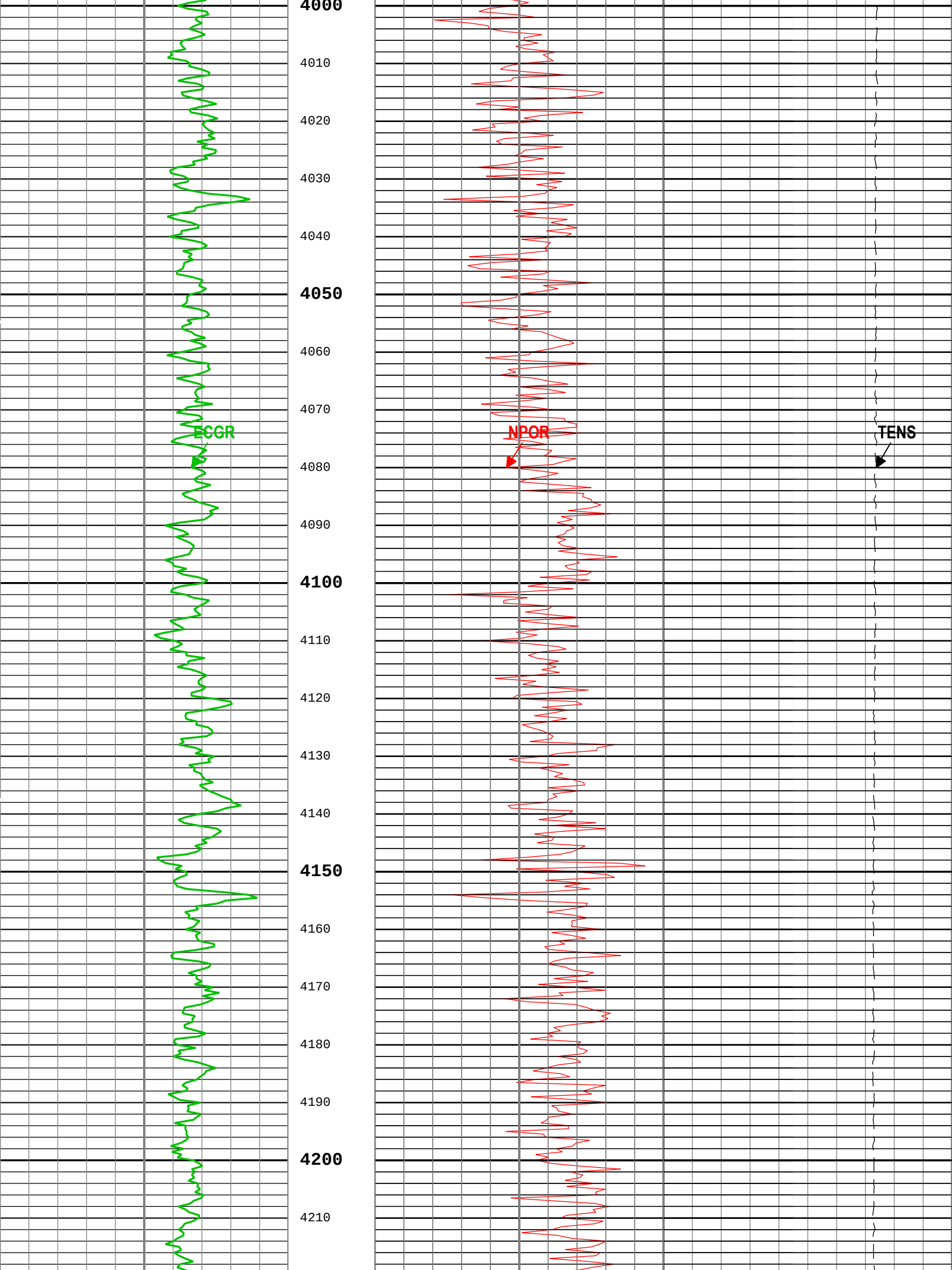
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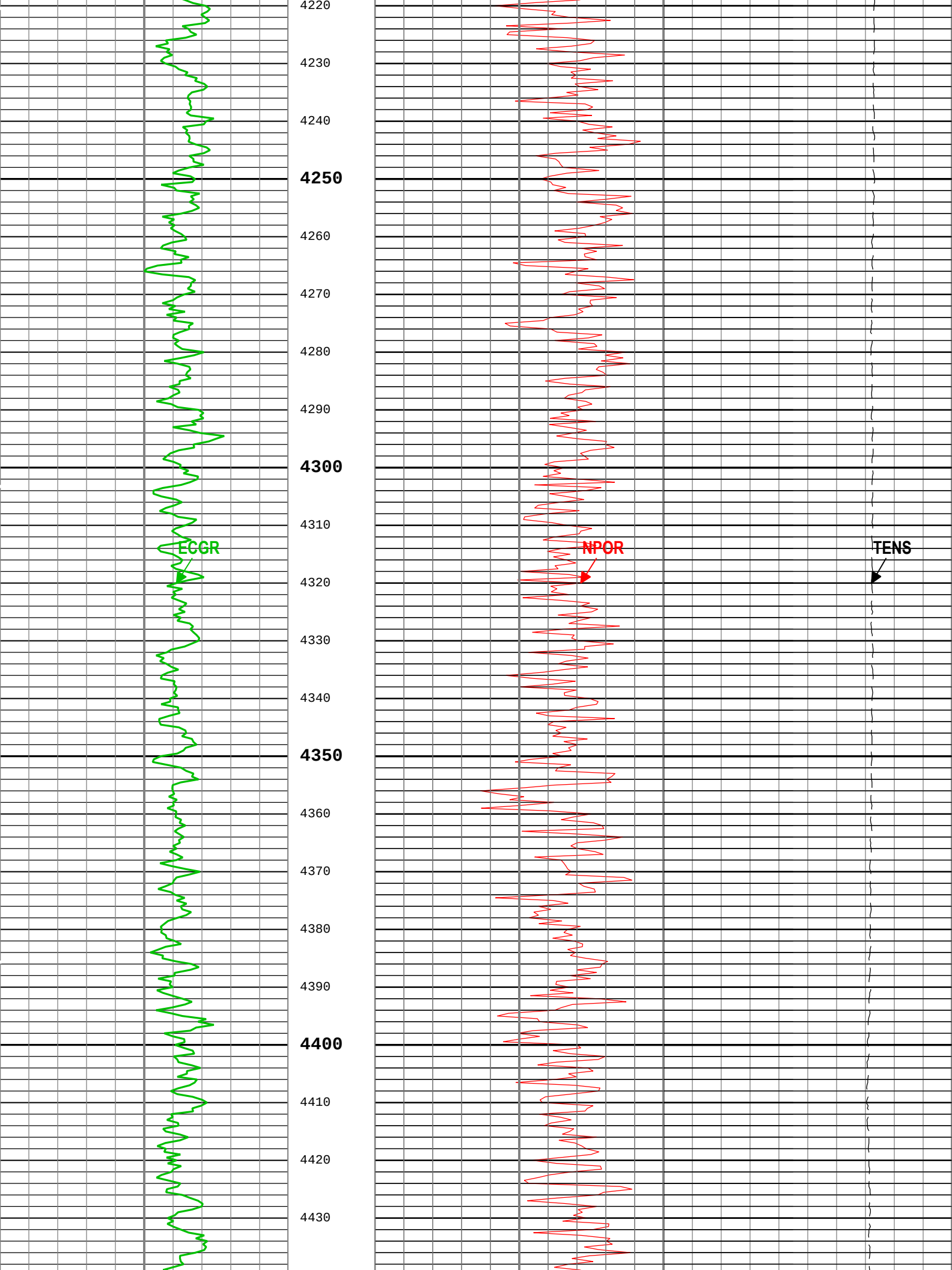
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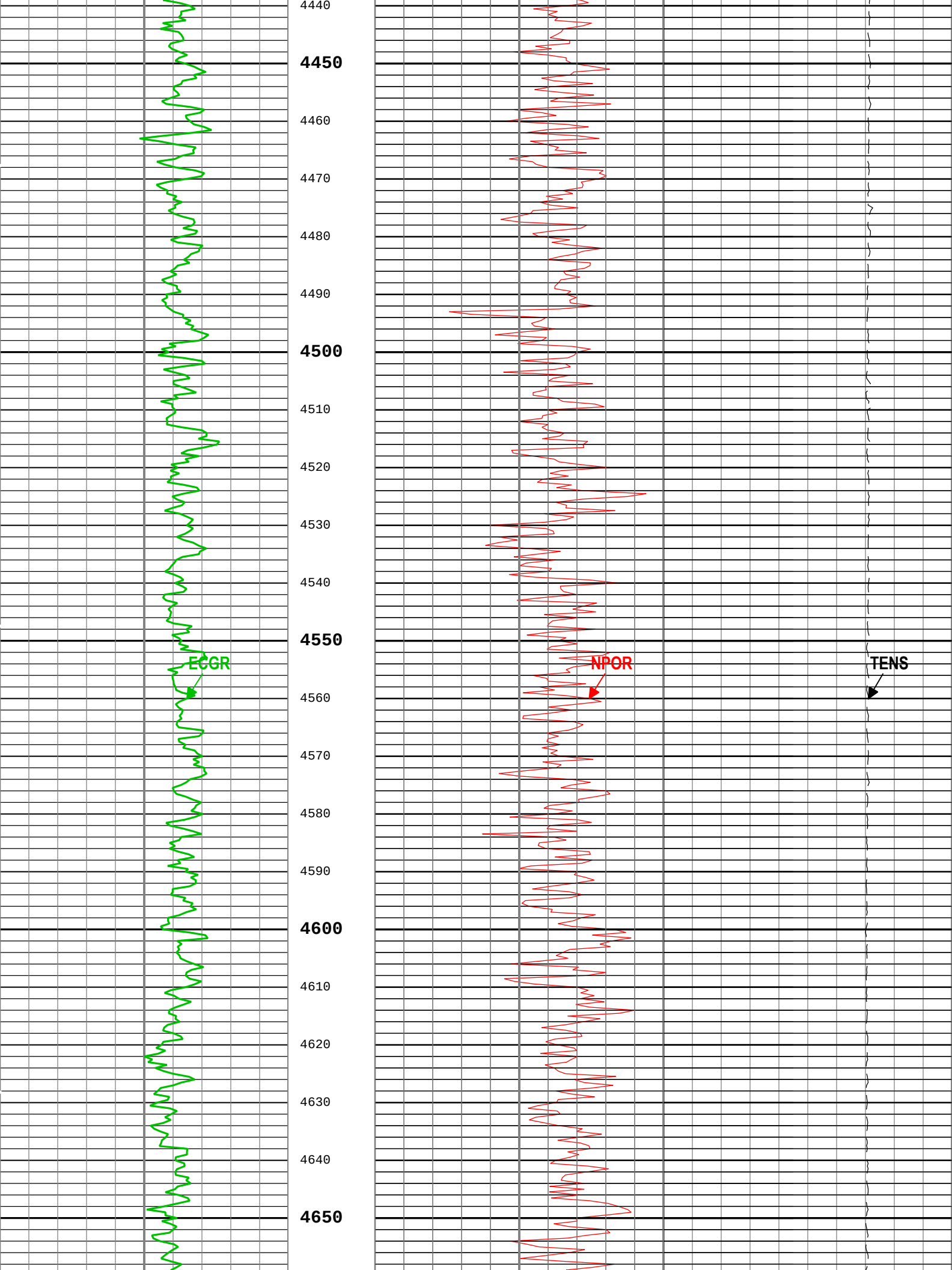
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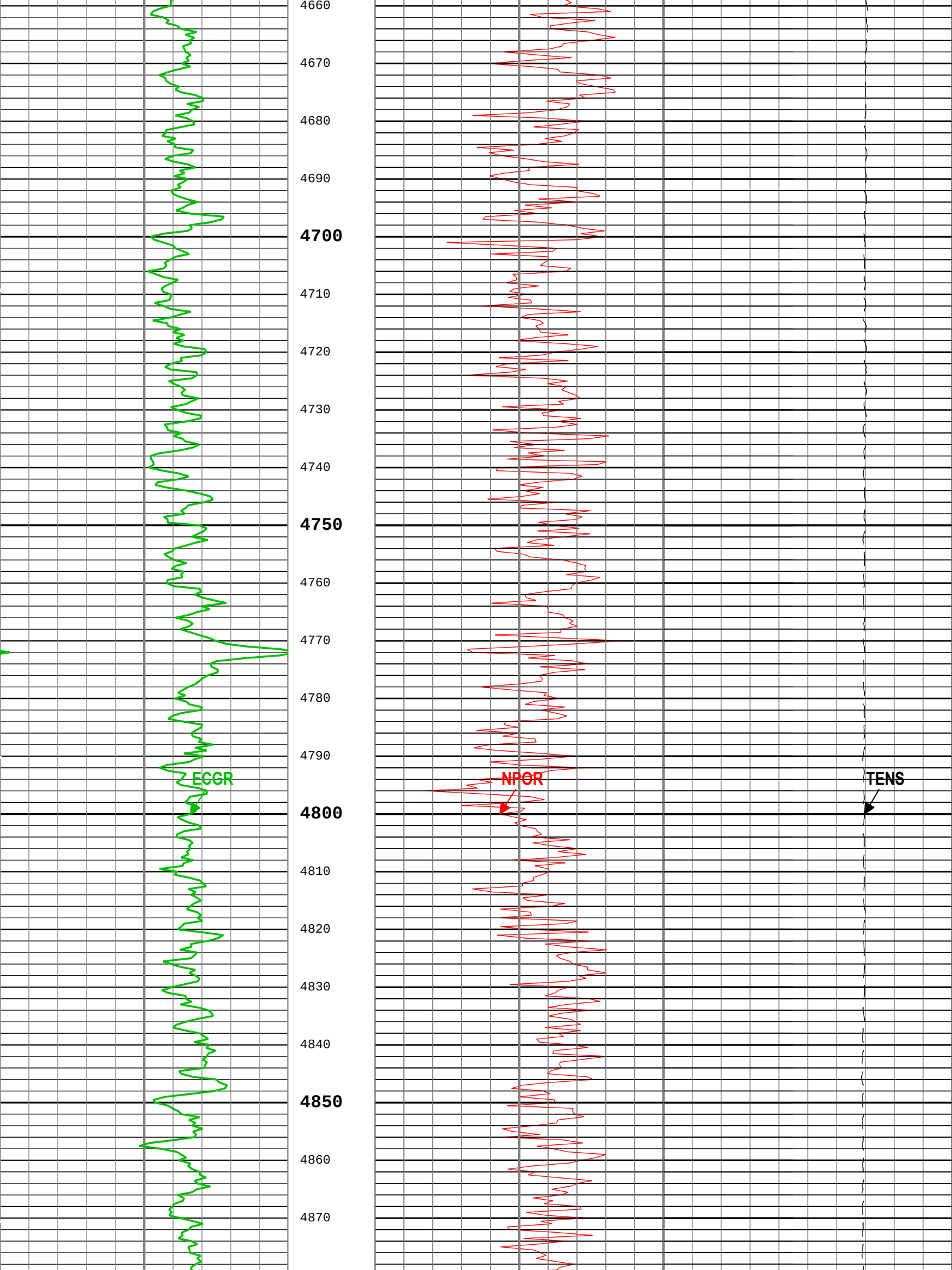
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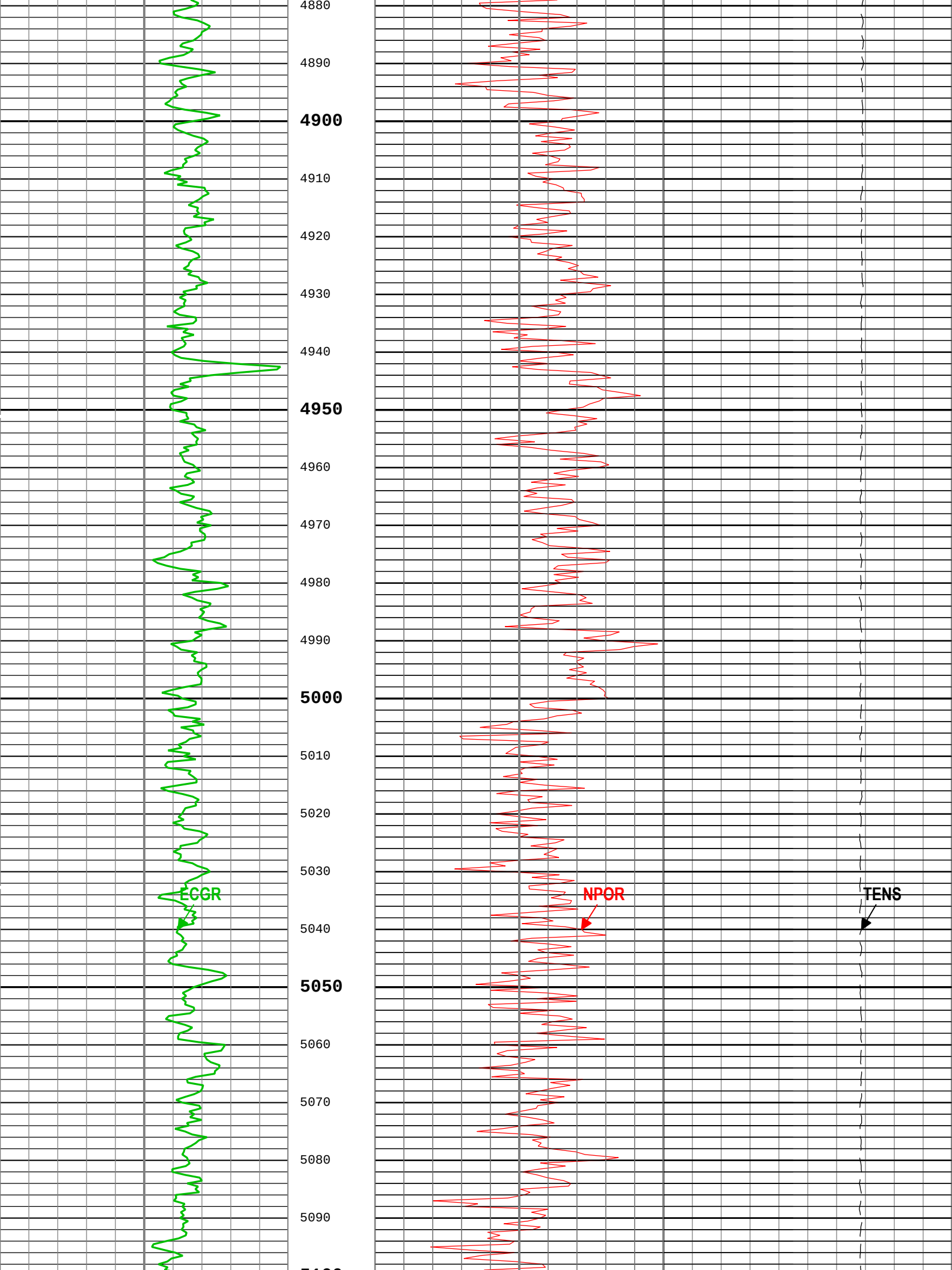
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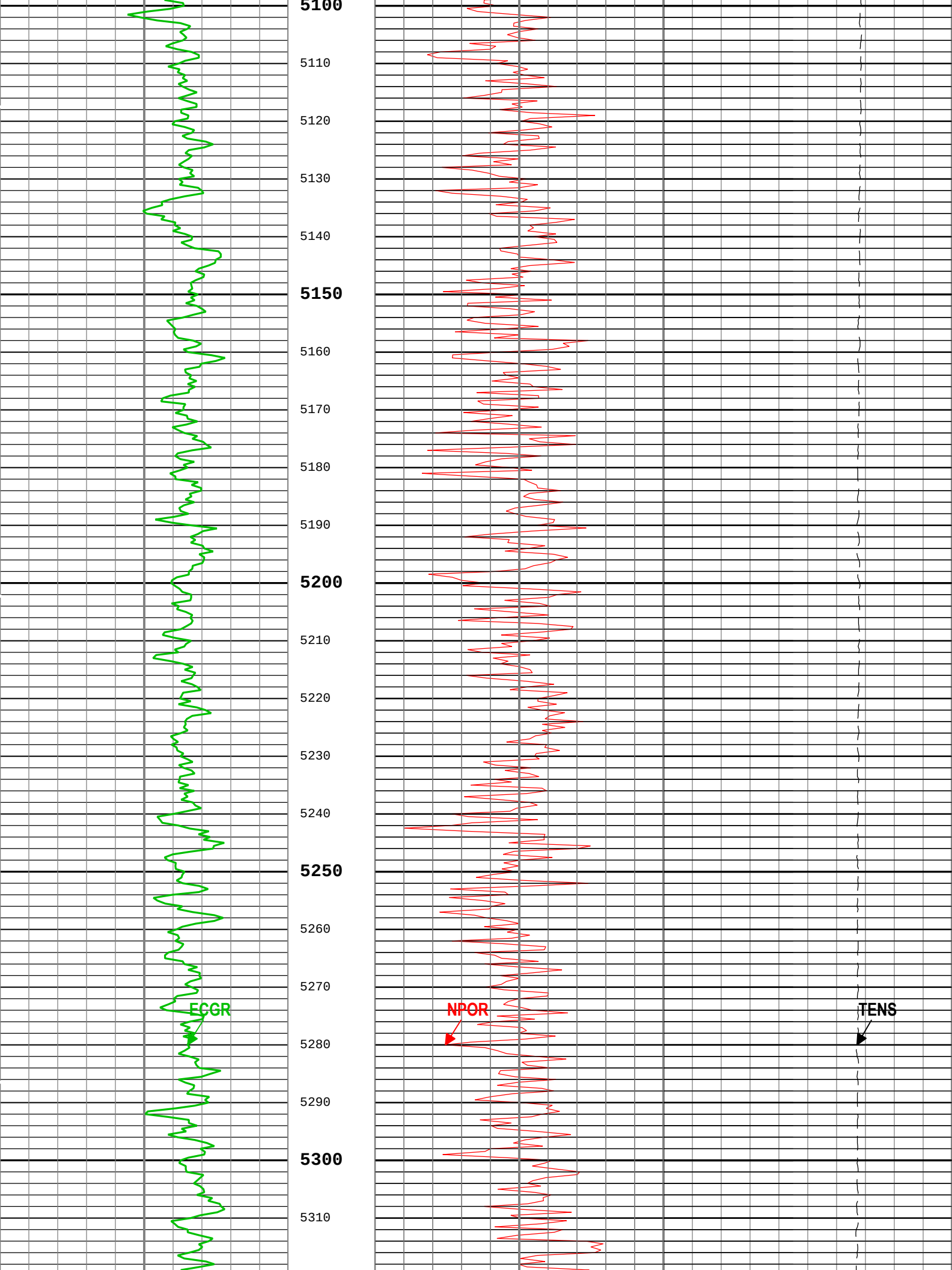
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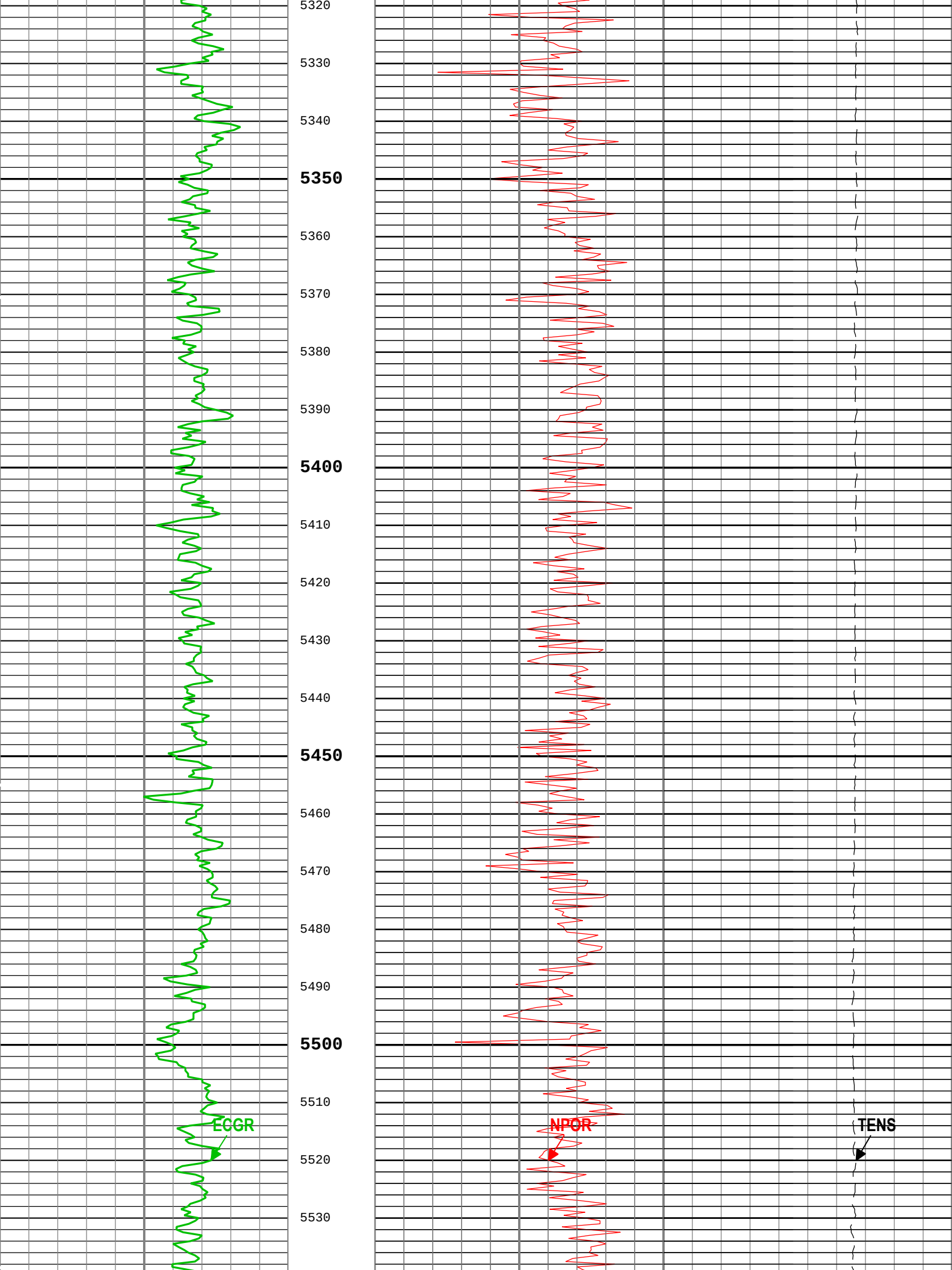
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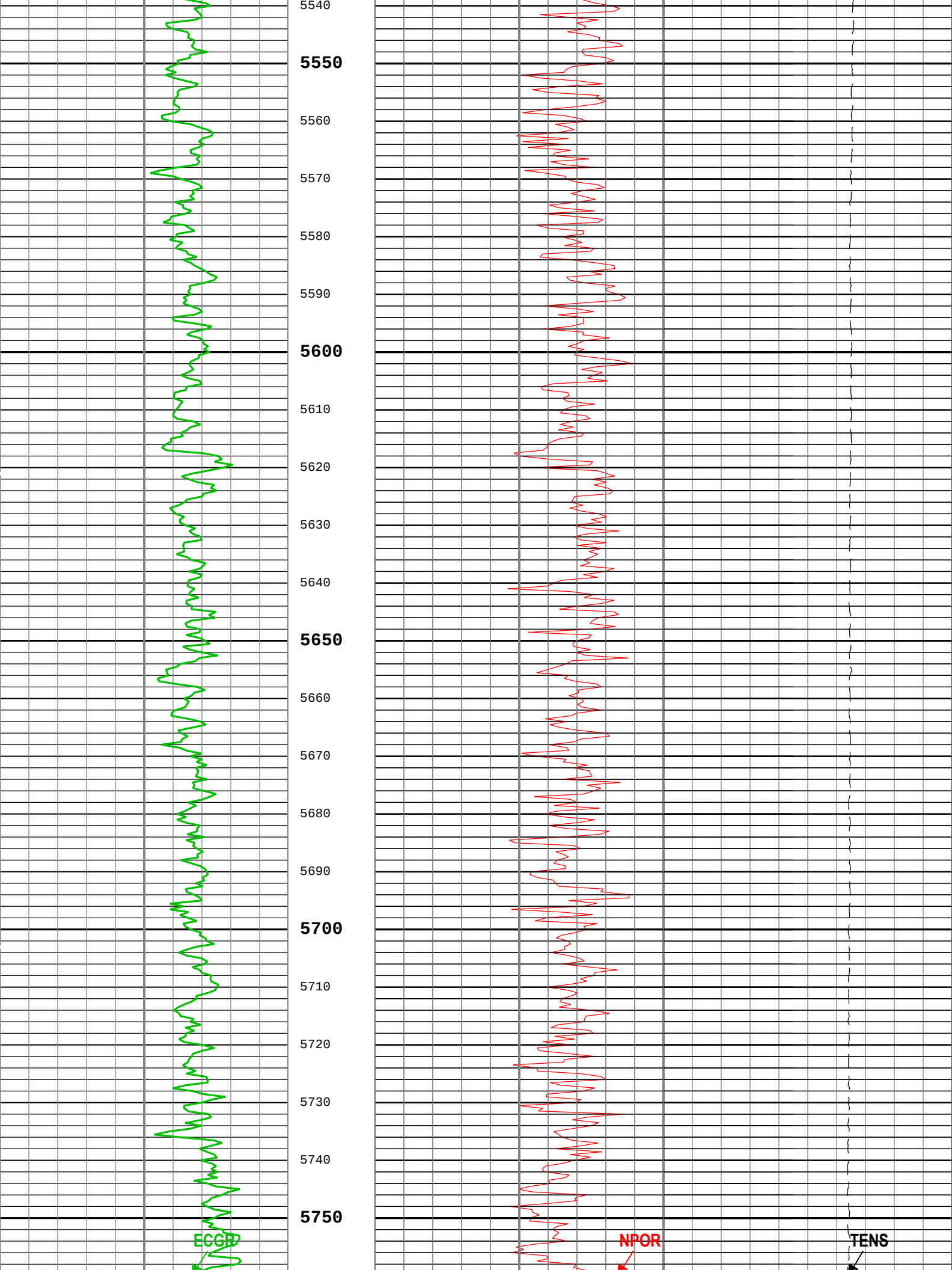
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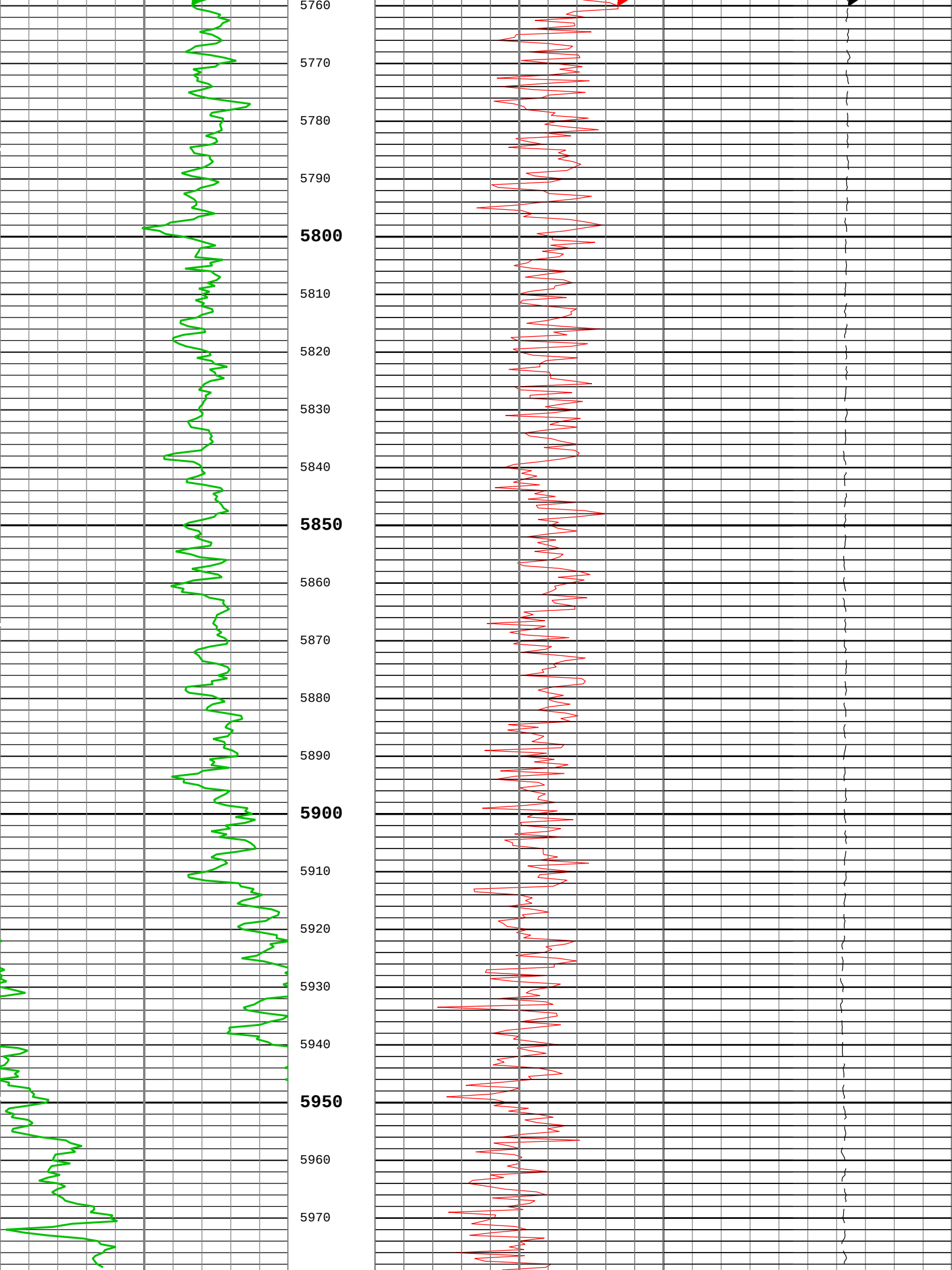
ECGR
NPOR
TENS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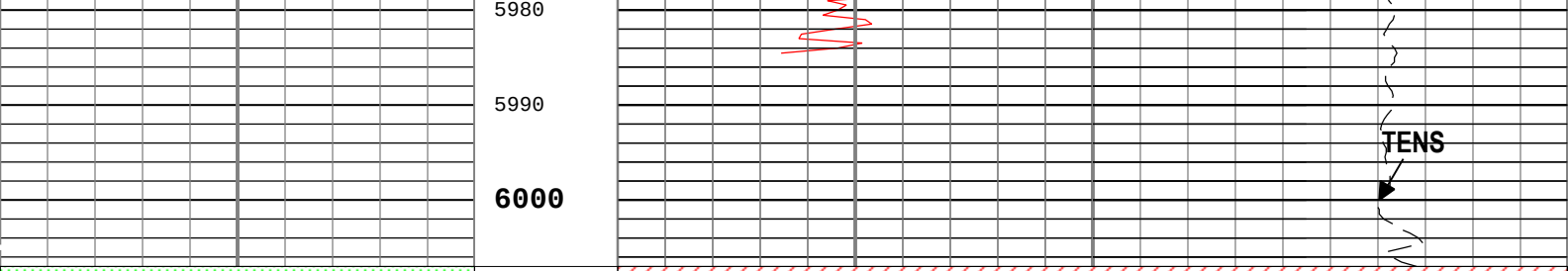


Description: AIT Basic Log Two Format: Log (Noble Nuclear) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 26-Aug-2017 16:45:42

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BHT	Bottom Hole Temperature	Borehole	203	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	11088	ft
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	9.3	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Brine	
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	29	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4877	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-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

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	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	1.95	g/cm3
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
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	26	35	110
BS	13.5	110	1951
BS	8.5	1951	6007

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UPLIHT	Ultrasonic Pulse Echo Large Inhibit Time	USIT-E	Off	
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	2500	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	71.88	us

One

Software Version

Acquisition System	Version
Maxwell 2017 SP1	7.1.82245.3100
Application Patch	Wireline_NPD-ICE2-2017SP1_7.1.87324

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[1]:Up	Up	2316.48 ft	2549.58 ft	26-Aug-2017 2:24:40 PM	26-Aug-2017 2:29:24 PM	ON	3.39 ft	No
One	Log[3]:Up	Up	73.18 ft	6007.17 ft	26-Aug-2017 2:46:30 PM	26-Aug-2017 4:10:12 PM	ON	3.65 ft	No

All depths are referenced to toolstring zero

Log

Company:Noble Energy, Inc. Well:Minutemen Federal #LC21-615

One: Log[3]:Up:S005

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: 26-Aug-2017 16:45:46

IHV - Integrated Hole Volume every 10.00 (ft3)

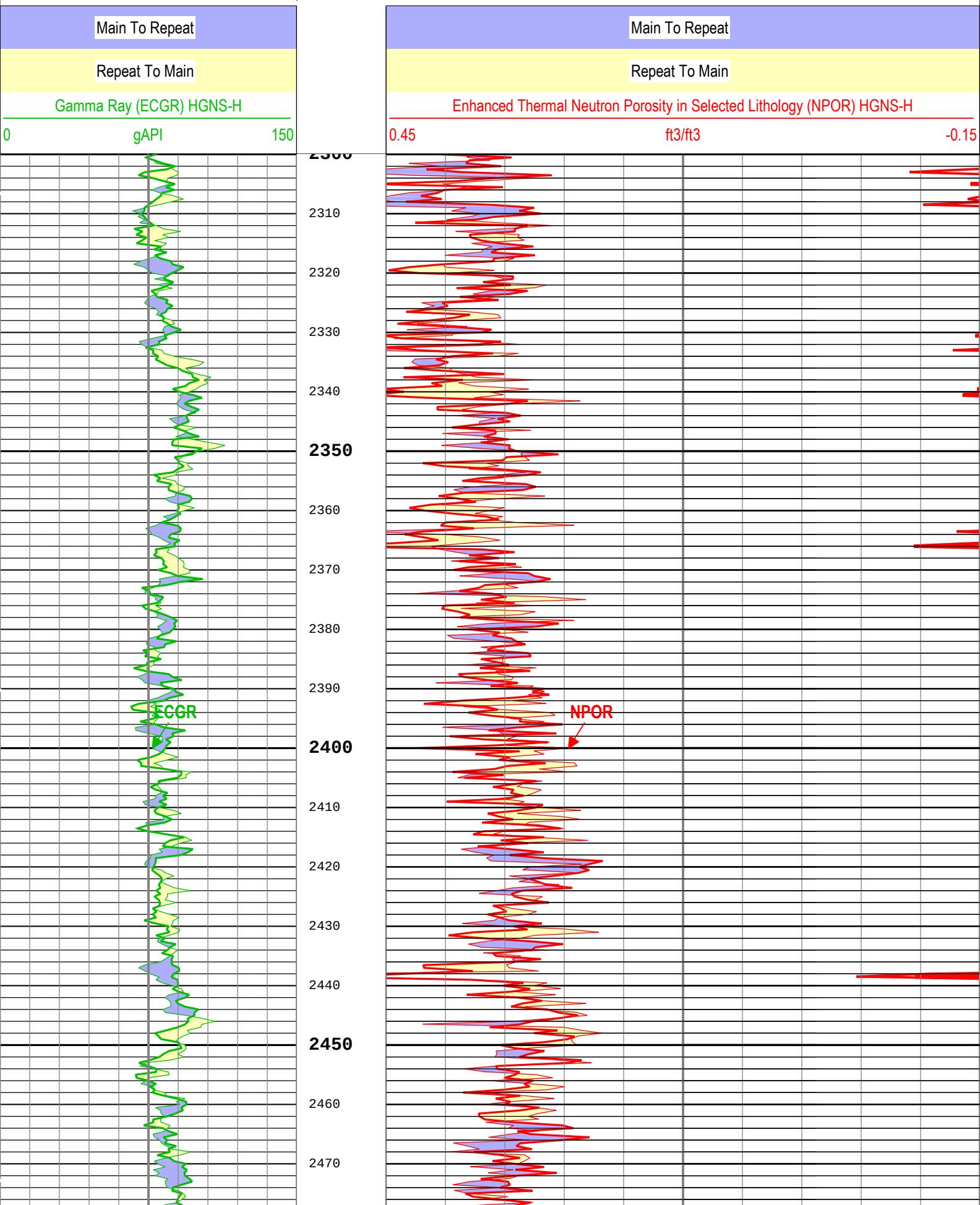
IHV - Integrated Hole Volume every 100.00 (ft3)

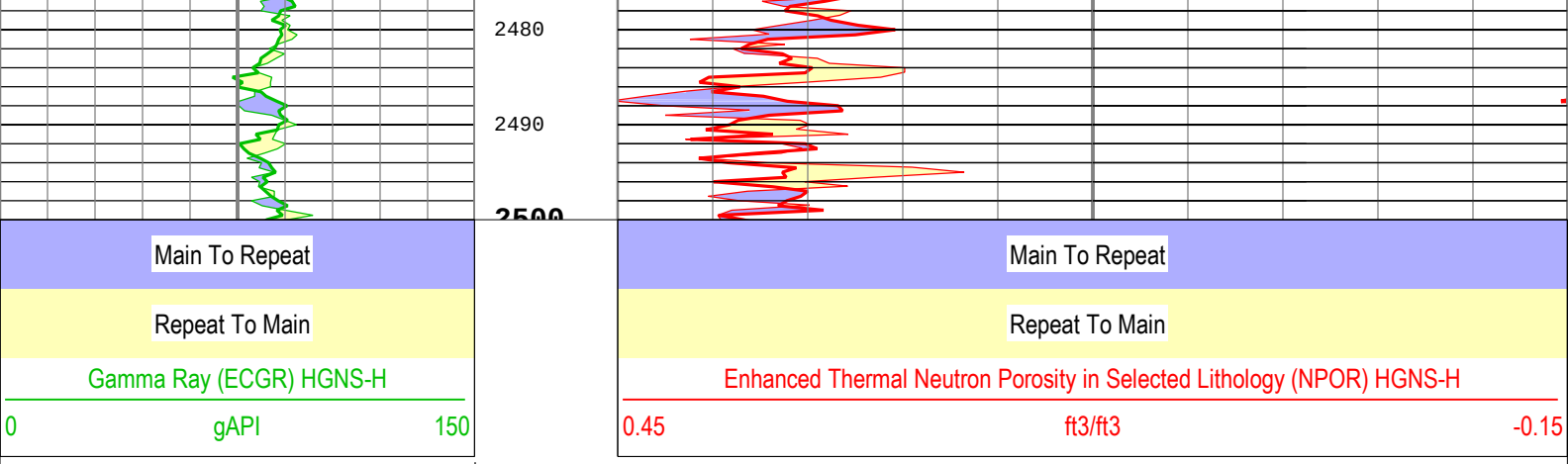
IHV - Integrated Hole Volume every 100.00 (ft3)

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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GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_LINEST(RT)	
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
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USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
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UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	2500	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	71.88	us

Company:	Noble Energy, Inc.
Well:	Minutemen Federal #LC21-615
Field:	Wildcat
County:	Weld
State:	Colorado

Schlumberger

Cased Hole Neutron Porosity
Gamma Ray