

Company: Noble Energy Inc.

Well: Shadow A26-663

Field: Wattenberg

County: Weld State: Colorado

Nuclear Print

GR - Neutron Log

County:	Weld
Field:	Wattenberg
Location:	SWNE Sec 30 T6 R63W
Well:	Shadow A26-663
Company:	Noble Energy Inc.
Location:	
SWNE Sec 30 T6 R63W	Elev.: K.B. 4680.00 ft
2261 FNL 2335 FEL	G.L. 4650.00 ft
Latitude: 40.45856 Longitude: -104.47861	D.F. 4679.00 ft
Permanent Datum:	Ground Level
Log Measured From:	Kelly Bushing
Drilling Measured From:	Kelly Bushing
API Serial No.	Section: 30
05-123-42885	Township: 6N
	Range: 63W

Logging Date	29-Jun-2016
Run Number	One
Depth Driller	17466.00 ft
Schlumberger Depth	17466.00 ft
Bottom Log Interval	6650.00 ft
Top Log Interval	0.00 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	1928.00 ft
To	17466.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	P110
From	30.00 ft
To	17450.90 ft
Max Recorded Temperatures	220 degF
Logger on Bottom	29-Jun-2016 08:05:00
Unit Number	2161
Recorded By	Avery Becker / Stephen Tang
Witnessed By	

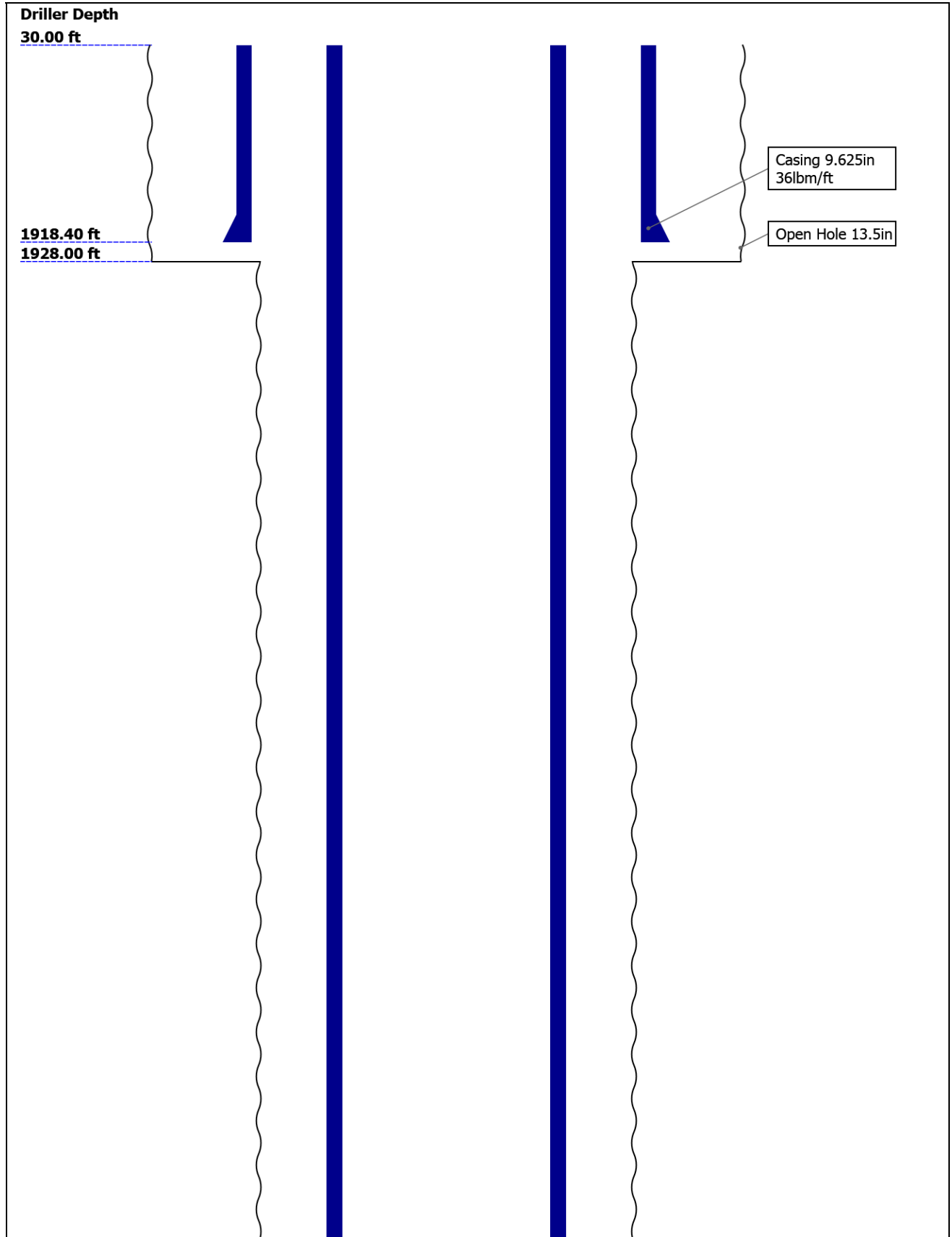
Disclaimer

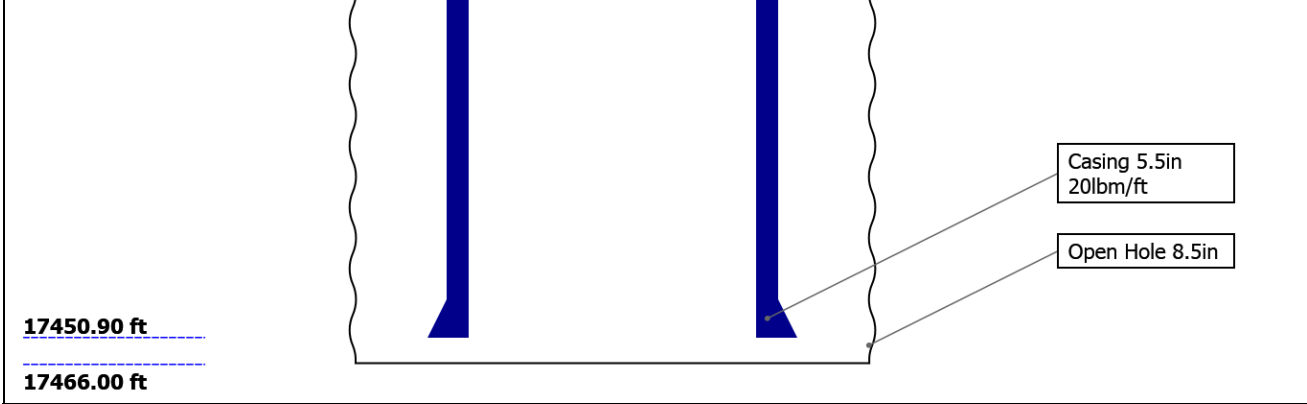
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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Well Sketch




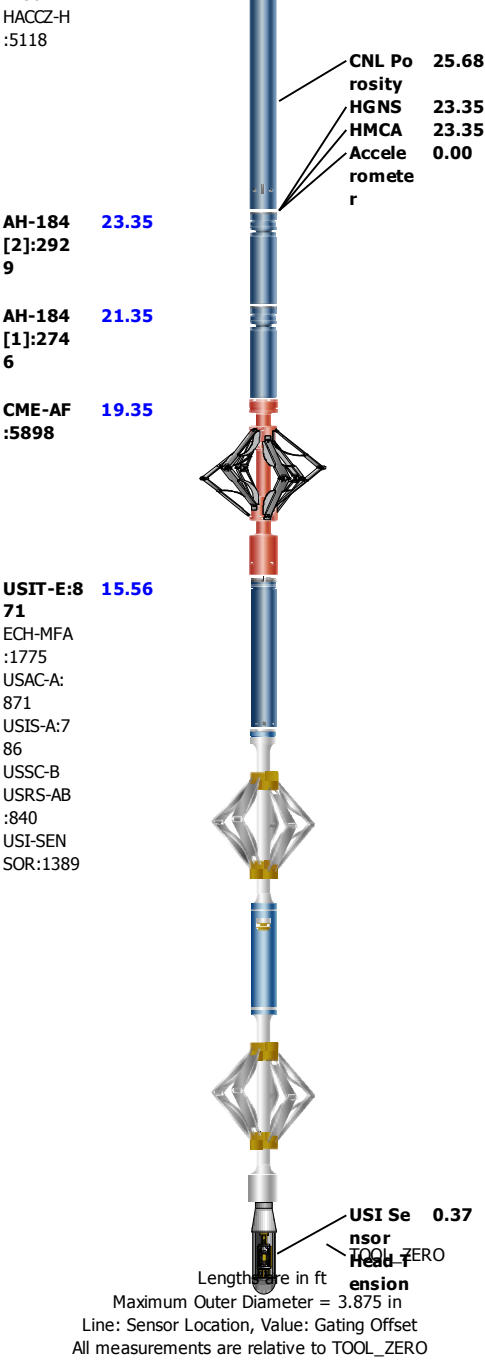


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	13.5	8.5				
Top Driller (ft)	30	1928				
Top Logger (ft)	30	1928				
Bottom Driller (ft)	1928	17466				
Bottom Logger (ft)	1928	17466				
Casing						
Size (in)	9.625	5.5				
Weight (lbm/ft)	36	20				
Inner Diameter (in)	8.921	4.778				
Grade	N/A	P110				
Top Driller (ft)	30	30				
Top Logger (ft)	30	30				
Bottom Driller (ft)	1918.4	17450.9				
Bottom Logger (ft)	1918.4	17450.9				

Remarks and Equipment Summary

One: Toolstring			One: Remarks	
<div><div><div>Equip nameLengthMP nameOffset</div><div>LEH-QT43.53LEH-QT</div><div>SAH-F40.61</div><div>DTC-H:880335.76</div><div>ECH-KC:10354DTC-H:8803</div><div>HGNS-H:473632.76</div><div>HGNH:2987</div><div>NPV-N</div><div>NSR-F:5069</div><div>HMCA-H</div><div>HGNS-H:4736</div></div><div></div></div>			This is the first run in well.	
			Tool string ran as per tool sketch.	
			CSG: 5.5" 20 lb/ft	
			No cement data provided by client.	
			Logs recoded at 10 deg 6"	
			Main pass recorded at 2500psi, repeat pass at 0psi.	



Depth Summary			
		One	
Depth Measuring Device			
Type	IDW-JA		
Serial Number	5896		
Calibration Date			
Calibrator Serial Number	16		
Calibration Cable Type	7-46 PLX		
Wheel Correction 1	-1		
Wheel Correction 2	-3		
Tension Device			
Type	CMTD-B/A		
Serial Number	1109		
Calibration Date	13-Apr-2016		
Calibrator Serial Number	441435A		

Logging Cable

One:Depth Control Parameters	Depth Control Remarks
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One

Integration Summary	
1. Integration of $\frac{1}{x}$	$\int \frac{1}{x} dx = \ln x + C$
2. Integration of x^n (for $n \neq -1$)	$\int x^n dx = \frac{x^{n+1}}{n+1} + C$
3. Integration of e^x	$\int e^x dx = e^x + C$
4. Integration of a^x (for $a > 0, a \neq 1$)	$\int a^x dx = \frac{a^x}{\ln a} + C$
5. Integration of $\ln x$	$\int \ln x dx = x \ln x - x + C$
6. Integration of $\frac{1}{x^2}$	$\int \frac{1}{x^2} dx = -\frac{1}{x} + C$
7. Integration of $\frac{1}{x^3}$	$\int \frac{1}{x^3} dx = -\frac{1}{2x^2} + C$
8. Integration of $\frac{1}{x^4}$	$\int \frac{1}{x^4} dx = -\frac{1}{3x^3} + C$
9. Integration of $\frac{1}{x^5}$	$\int \frac{1}{x^5} dx = -\frac{1}{4x^4} + C$
10. Integration of $\frac{1}{x^6}$	$\int \frac{1}{x^6} dx = -\frac{1}{5x^5} + C$
11. Integration of $\frac{1}{x^7}$	$\int \frac{1}{x^7} dx = -\frac{1}{6x^6} + C$
12. Integration of $\frac{1}{x^8}$	$\int \frac{1}{x^8} dx = -\frac{1}{7x^7} + C$
13. Integration of $\frac{1}{x^9}$	$\int \frac{1}{x^9} dx = -\frac{1}{8x^8} + C$
14. Integration of $\frac{1}{x^{10}}$	$\int \frac{1}{x^{10}} dx = -\frac{1}{9x^9} + C$
15. Integration of $\frac{1}{x^{11}}$	$\int \frac{1}{x^{11}} dx = -\frac{1}{10x^{10}} + C$
16. Integration of $\frac{1}{x^{12}}$	$\int \frac{1}{x^{12}} dx = -\frac{1}{11x^{11}} + C$
17. Integration of $\frac{1}{x^{13}}$	$\int \frac{1}{x^{13}} dx = -\frac{1}{12x^{12}} + C$
18. Integration of $\frac{1}{x^{14}}$	$\int \frac{1}{x^{14}} dx = -\frac{1}{13x^{13}} + C$
19. Integration of $\frac{1}{x^{15}}$	$\int \frac{1}{x^{15}} dx = -\frac{1}{14x^{14}} + C$
20. Integration of $\frac{1}{x^{16}}$	$\int \frac{1}{x^{16}} dx = -\frac{1}{15x^{15}} + C$
21. Integration of $\frac{1}{x^{17}}$	$\int \frac{1}{x^{17}} dx = -\frac{1}{16x^{16}} + C$
22. Integration of $\frac{1}{x^{18}}$	$\int \frac{1}{x^{18}} dx = -\frac{1}{17x^{17}} + C$
23. Integration of $\frac{1}{x^{19}}$	$\int \frac{1}{x^{19}} dx = -\frac{1}{18x^{18}} + C$
24. Integration of $\frac{1}{x^{20}}$	$\int \frac{1}{x^{20}} dx = -\frac{1}{19x^{19}} + C$
25. Integration of $\frac{1}{x^{21}}$	$\int \frac{1}{x^{21}} dx = -\frac{1}{20x^{20}} + C$
26. Integration of $\frac{1}{x^{22}}$	$\int \frac{1}{x^{22}} dx = -\frac{1}{21x^{21}} + C$
27. Integration of $\frac{1}{x^{23}}$	$\int \frac{1}{x^{23}} dx = -\frac{1}{22x^{22}} + C$
28. Integration of $\frac{1}{x^{24}}$	$\int \frac{1}{x^{24}} dx = -\frac{1}{23x^{23}} + C$
29. Integration of $\frac{1}{x^{25}}$	$\int \frac{1}{x^{25}} dx = -\frac{1}{24x^{24}} + C$
30. Integration of $\frac{1}{x^{26}}$	$\int \frac{1}{x^{26}} dx = -\frac{1}{25x^{25}} + C$
31. Integration of $\frac{1}{x^{27}}$	$\int \frac{1}{x^{27}} dx = -\frac{1}{26x^{26}} + C$
32. Integration of $\frac{1}{x^{28}}$	$\int \frac{1}{x^{28}} dx = -\frac{1}{27x^{27}} + C$
33. Integration of $\frac{1}{x^{29}}$	$\int \frac{1}{x^{29}} dx = -\frac{1}{28x^{28}} + C$
34. Integration of $\frac{1}{x^{30}}$	$\int \frac{1}{x^{30}} dx = -\frac{1}{29x^{29}} + C$
35. Integration of $\frac{1}{x^{31}}$	$\int \frac{1}{x^{31}} dx = -\frac{1}{30x^{30}} + C$
36. Integration of $\frac{1}{x^{32}}$	$\int \frac{1}{x^{32}} dx = -\frac{1}{31x^{31}} + C$
37. Integration of $\frac{1}{x^{33}}$	$\int \frac{1}{x^{33}} dx = -\frac{1}{32x^{32}} + C$
38. Integration of $\frac{1}{x^{34}}$	$\int \frac{1}{x^{34}} dx = -\frac{1}{33x^{33}} + C$
39. Integration of $\frac{1}{x^{35}}$	$\int \frac{1}{x^{35}} dx = -\frac{1}{34x^{34}} + C$
40. Integration of $\frac{1}{x^{36}}$	$\int \frac{1}{x^{36}} dx = -\frac{1}{35x^{35}} + C$
41. Integration of $\frac{1}{x^{37}}$	$\int \frac{1}{x^{37}} dx = -\frac{1}{36x^{36}} + C$
42. Integration of $\frac{1}{x^{38}}$	$\int \frac{1}{x^{38}} dx = -\frac{1}{37x^{37}} + C$
43. Integration of $\frac{1}{x^{39}}$	$\int \frac{1}{x^{39}} dx = -\frac{1}{38x^{38}} + C$
44. Integration of $\frac{1}{x^{40}}$	$\int \frac{1}{x^{40}} dx = -\frac{1}{39x^{39}} + C$
45. Integration of $\frac{1}{x^{41}}$	$\int \frac{1}{x^{41}} dx = -\frac{1}{40x^{40}} + C$
46. Integration of $\frac{1}{x^{42}}$	$\int \frac{1}{x^{42}} dx = -\frac{1}{41x^{41}} + C$
47. Integration of $\frac{1}{x^{43}}$	$\int \frac{1}{x^{43}} dx = -\frac{1}{42x^{42}} + C$
48. Integration of $\frac{1}{x^{44}}$	$\int \frac{1}{x^{44}} dx = -\frac{1}{43x^{43}} + C$
49. Integration of $\frac{1}{x^{45}}$	$\int \frac{1}{x^{45}} dx = -\frac{1}{44x^{44}} + C$
50. Integration of $\frac{1}{x^{46}}$	$\int \frac{1}{x^{46}} dx = -\frac{1}{45x^{45}} + C$
51. Integration of $\frac{1}{x^{47}}$	$\int \frac{1}{x^{47}} dx = -\frac{1}{46x^{46}} + C$
52. Integration of $\frac{1}{x^{48}}$	$\int \frac{1}{x^{48}} dx = -\frac{1}{47x^{47}} + C$
53. Integration of $\frac{1}{x^{49}}$	$\int \frac{1}{x^{49}} dx = -\frac{1}{48x^{48}} + C$
54. Integration of $\frac{1}{x^{50}}$	$\int \frac{1}{x^{50}} dx = -\frac{1}{49x^{49}} + C$
55. Integration of $\frac{1}{x^{51}}$	$\int \frac{1}{x^{51}} dx = -\frac{1}{50x^{50}} + C$
56. Integration of $\frac{1}{x^{52}}$	$\int \frac{1}{x^{52}} dx = -\frac{1}{51x^{51}} + C$
57. Integration of \frac	

Software Version	
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Pass Summary	
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%
16	100%
17	100%
18	100%
19	100%
20	100%
21	100%
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30	100%
31	100%
32	100%
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85	100%
86	100%
87	100%
88	100%
89	100%
90	100%
91	100%
92	100%
93	100%
94	100%
95	100%
96	100%
97	100%
98	100%
99	100%
100	100%

All depths are referenced to toolstring zero

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: 29-Jun-2016 10:10:27

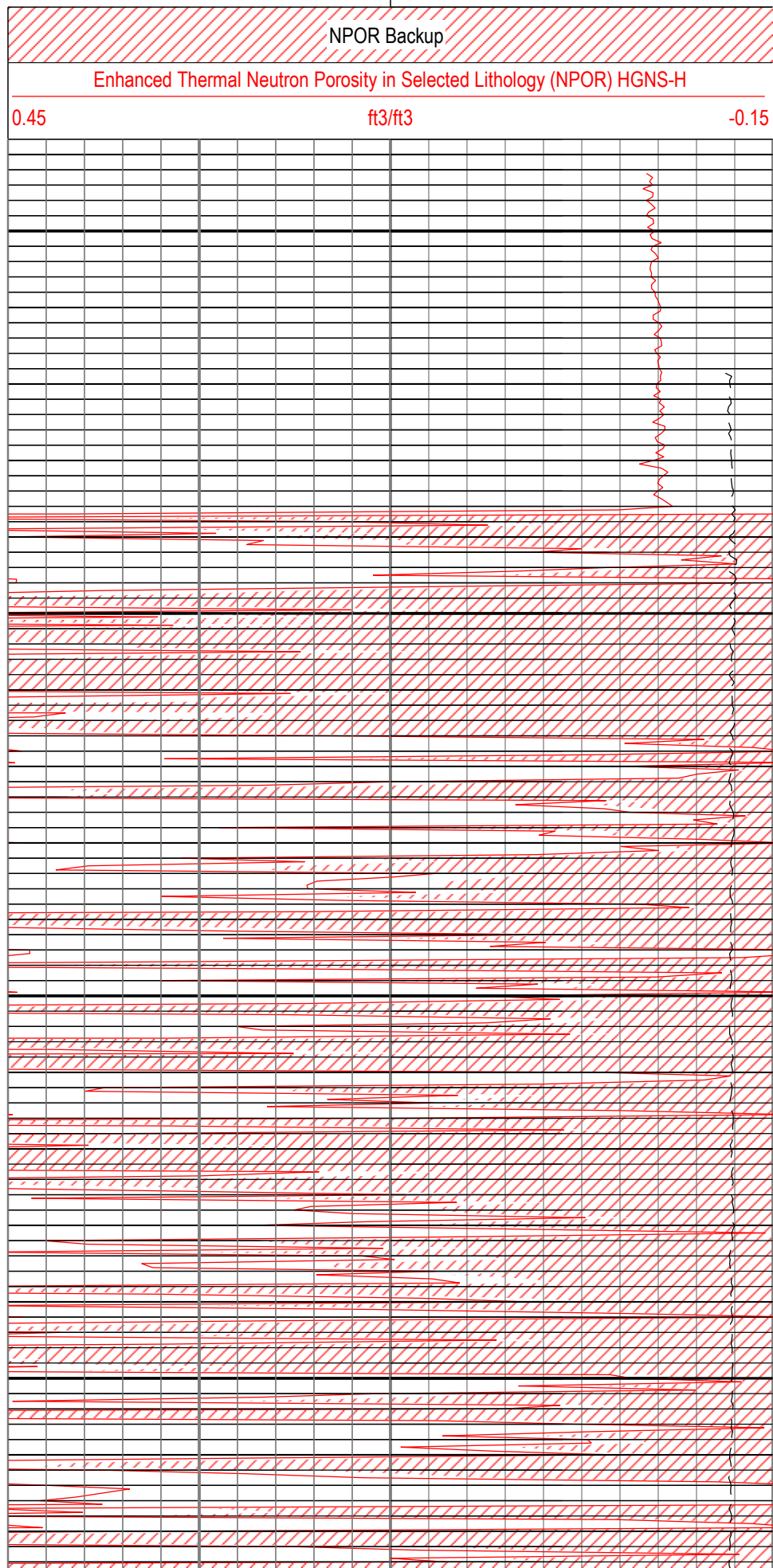
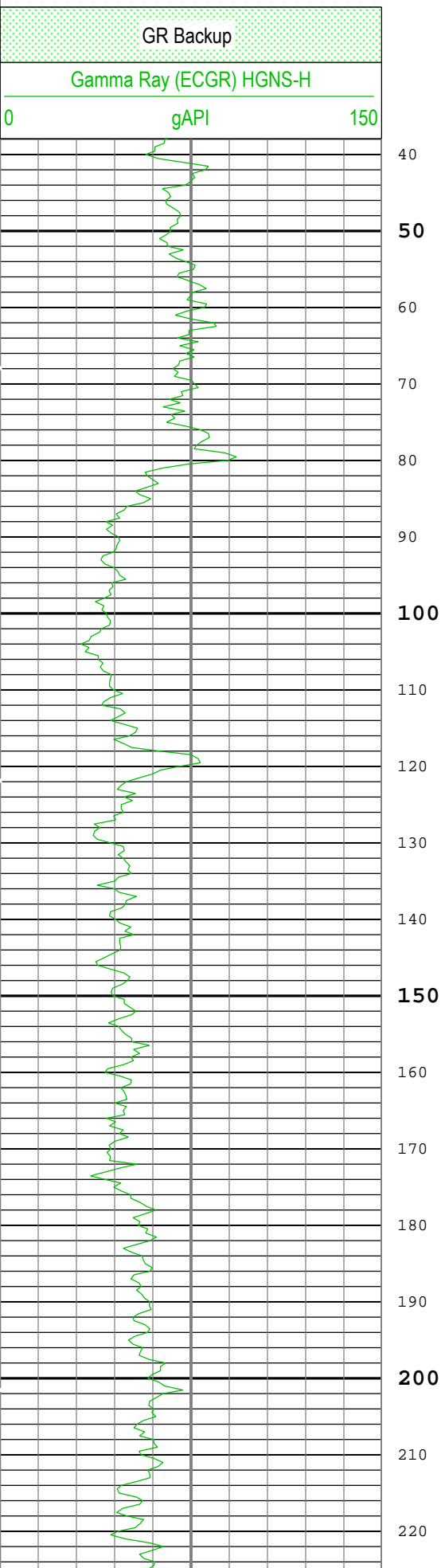
	<div> <div></div> <div>IHV - Integrated Hole Volume every 10.00 (ft3)</div> </div> <div> <div></div> <div>IHV - Integrated Hole Volume every 100.00 (ft3)</div> </div>
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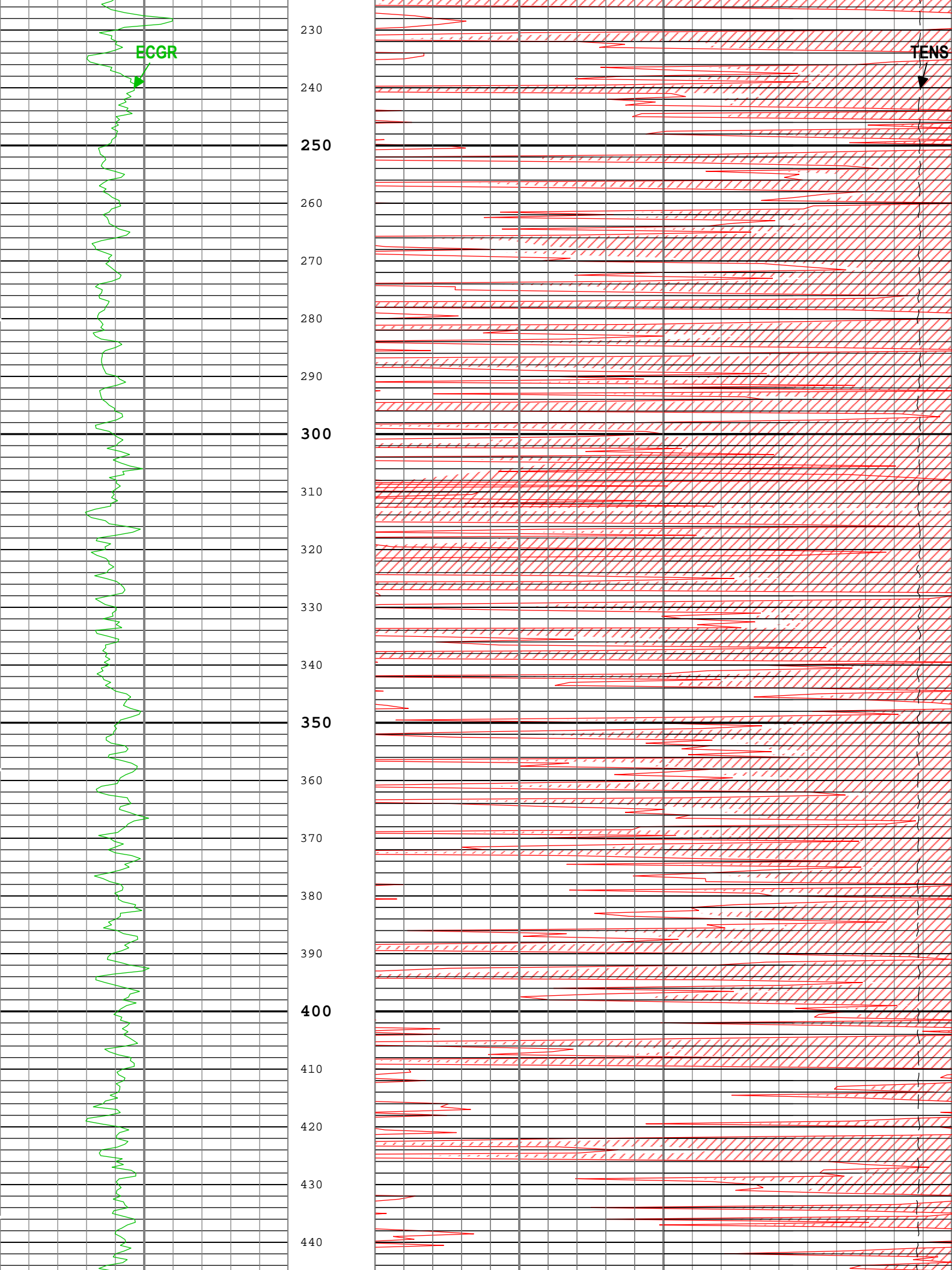
TIME_1900 - Time Marked every 60.00 (s)

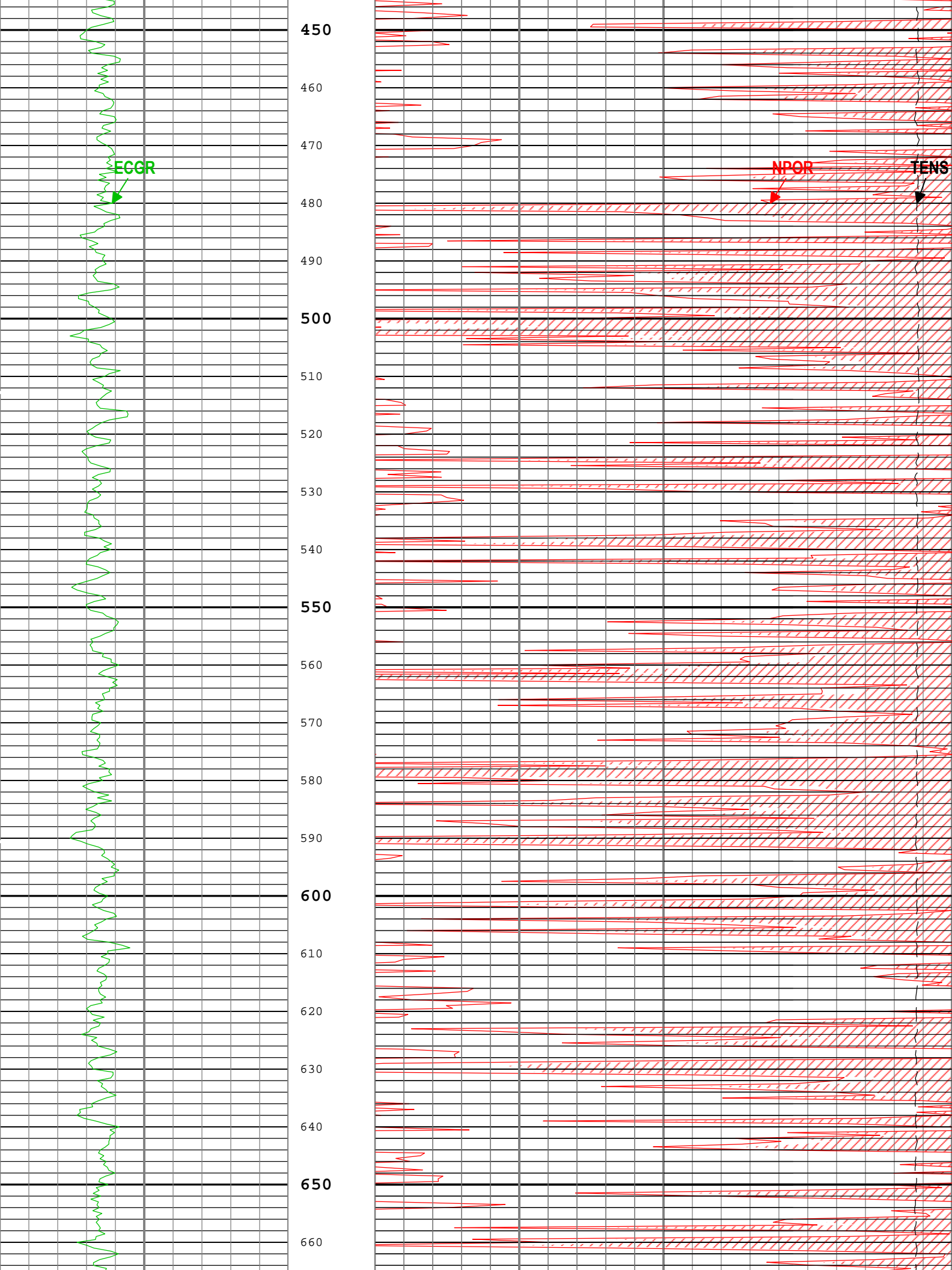
ICV - Integrated Cement Volume every 10.00 (ft3)

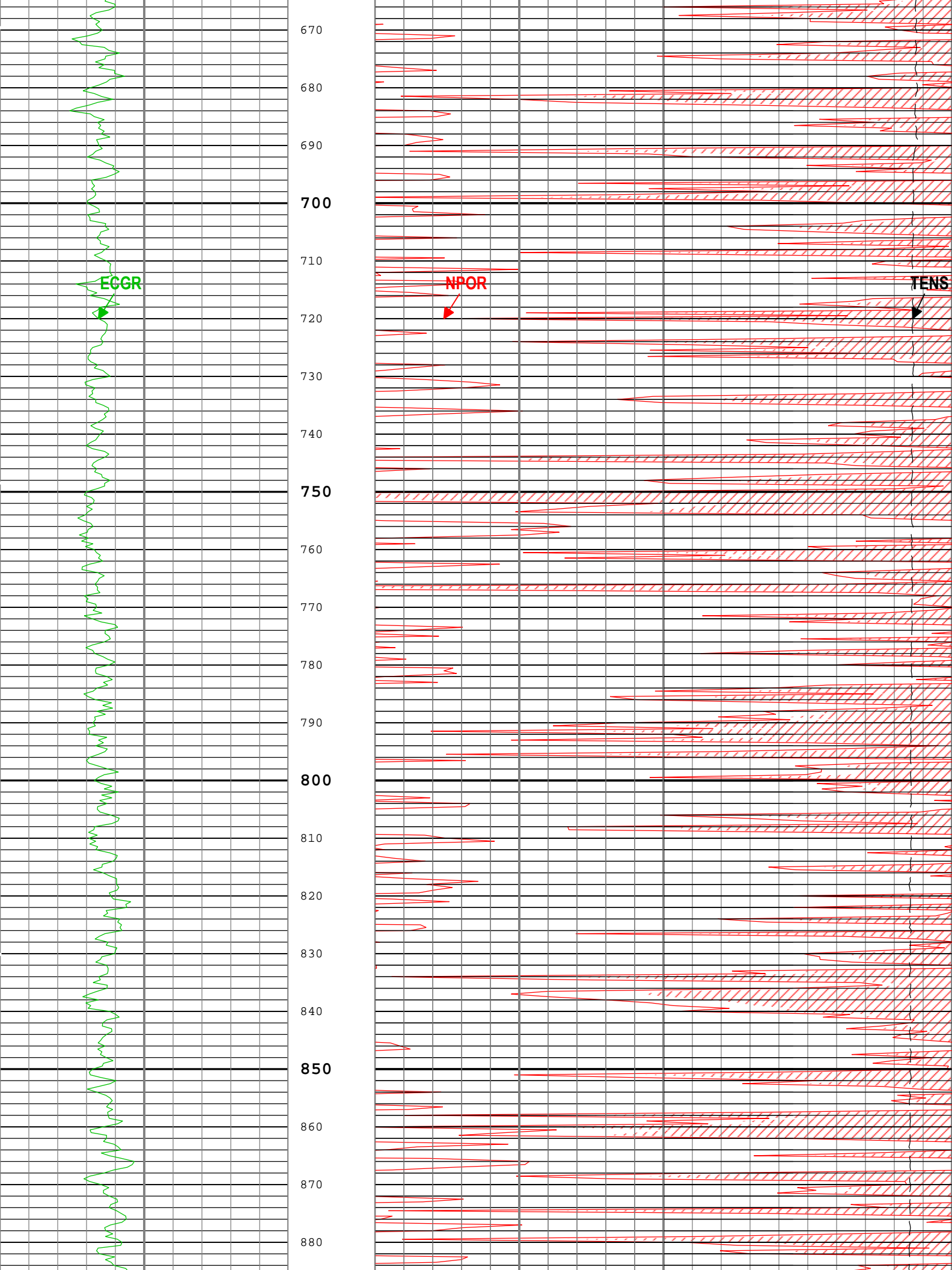
ICV - Integrated Cement Volume every 100.00 (ft3)

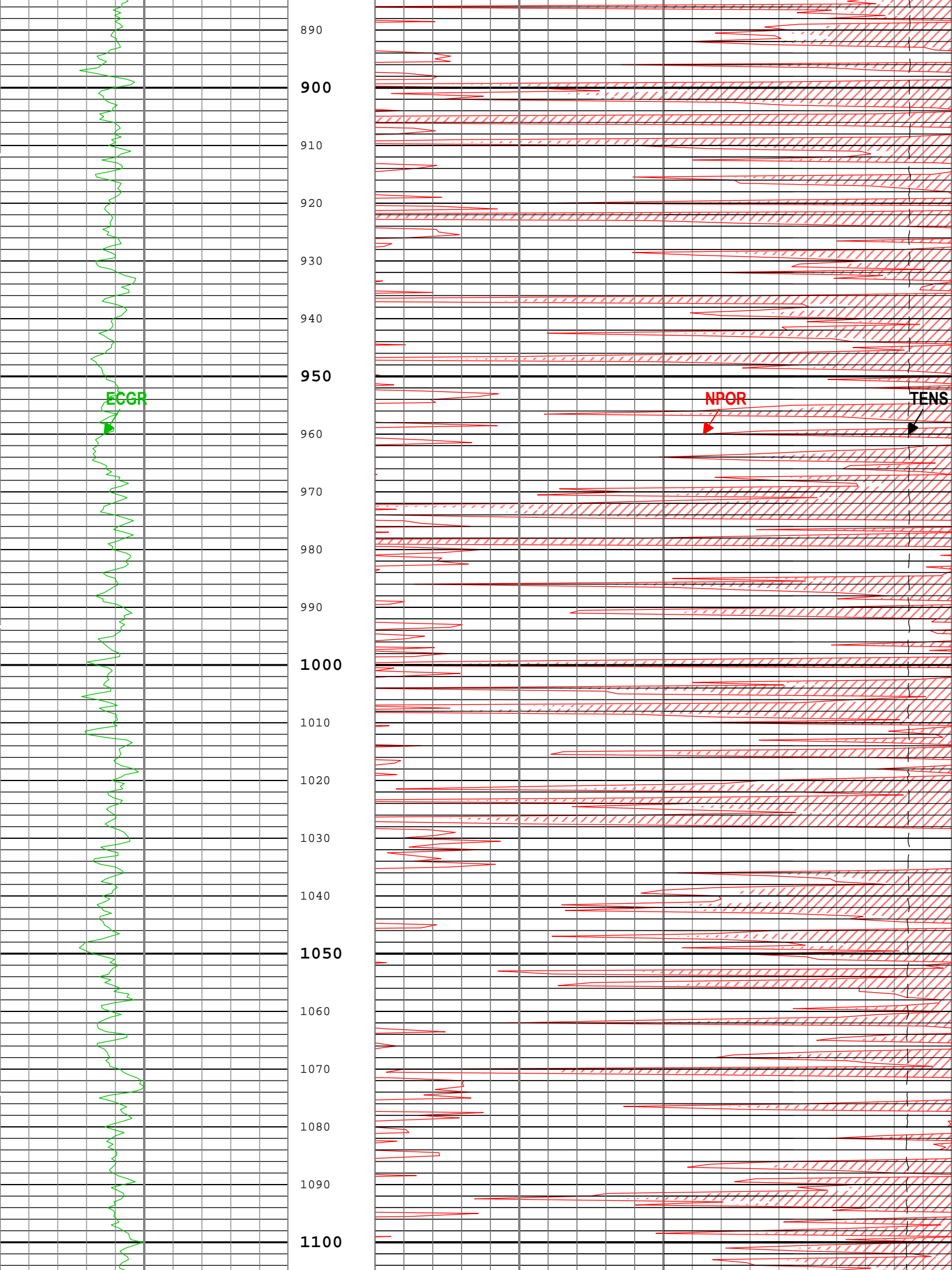
Cable Tension (TENS)
5000 lbf 0

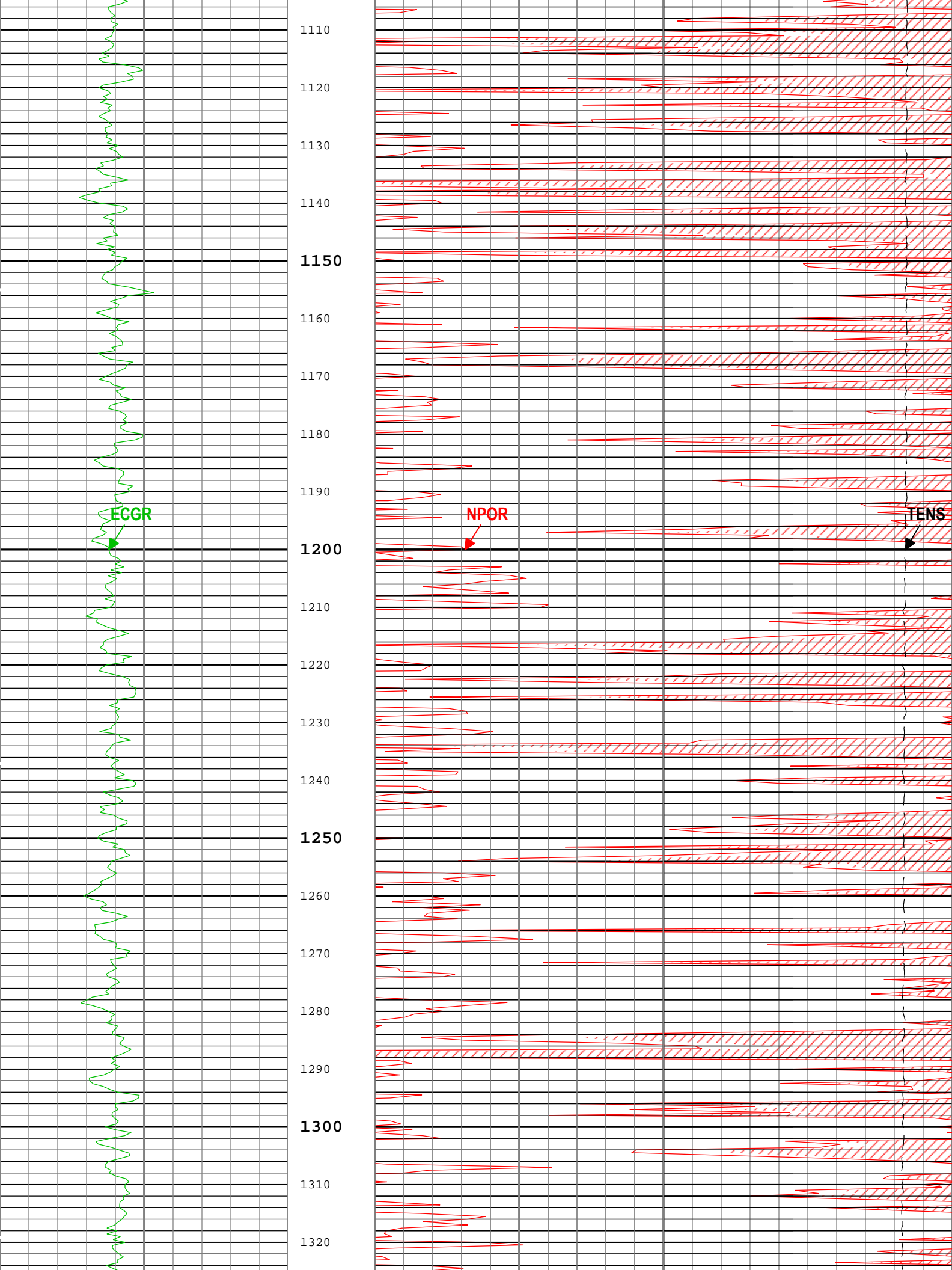


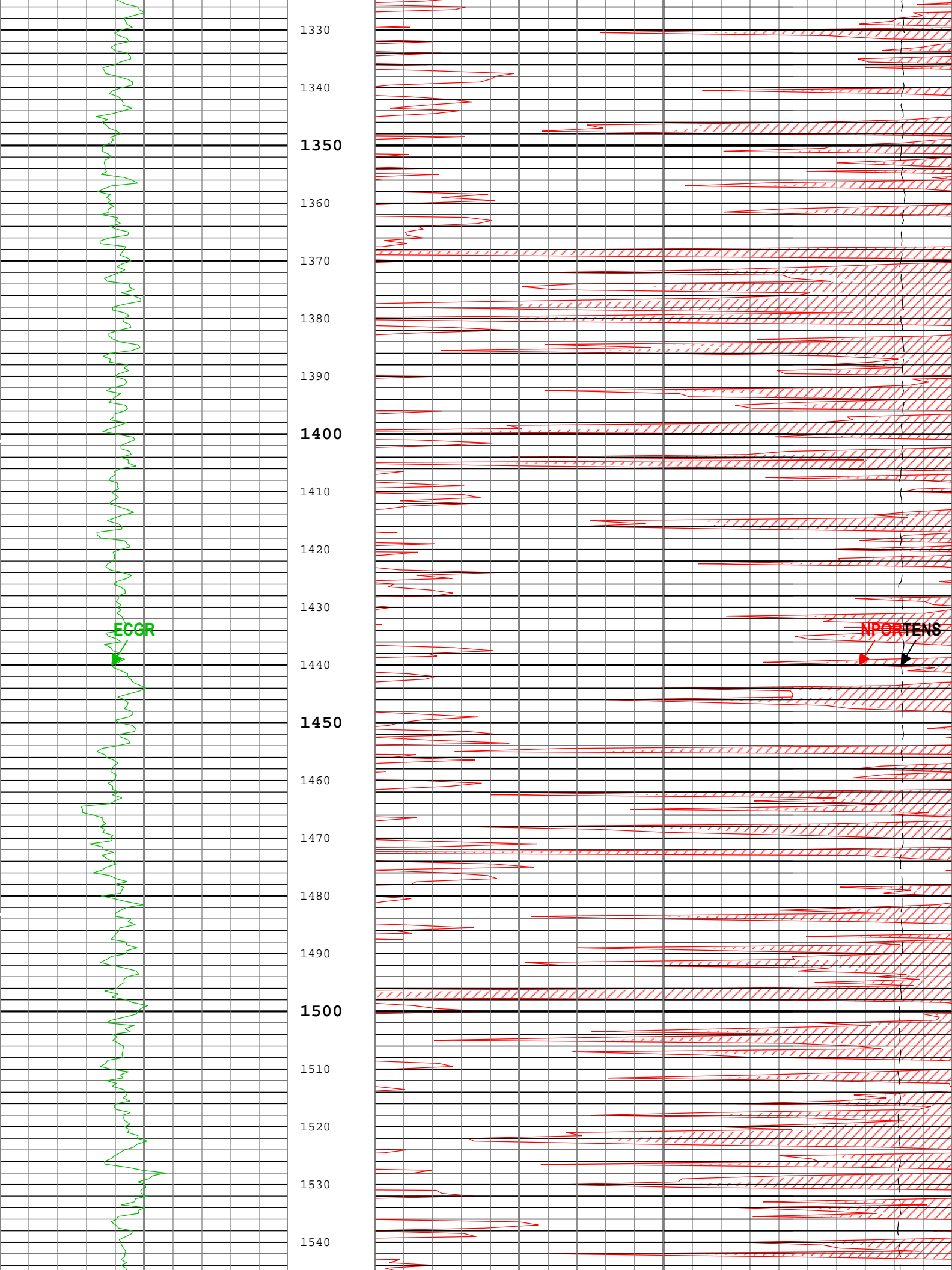


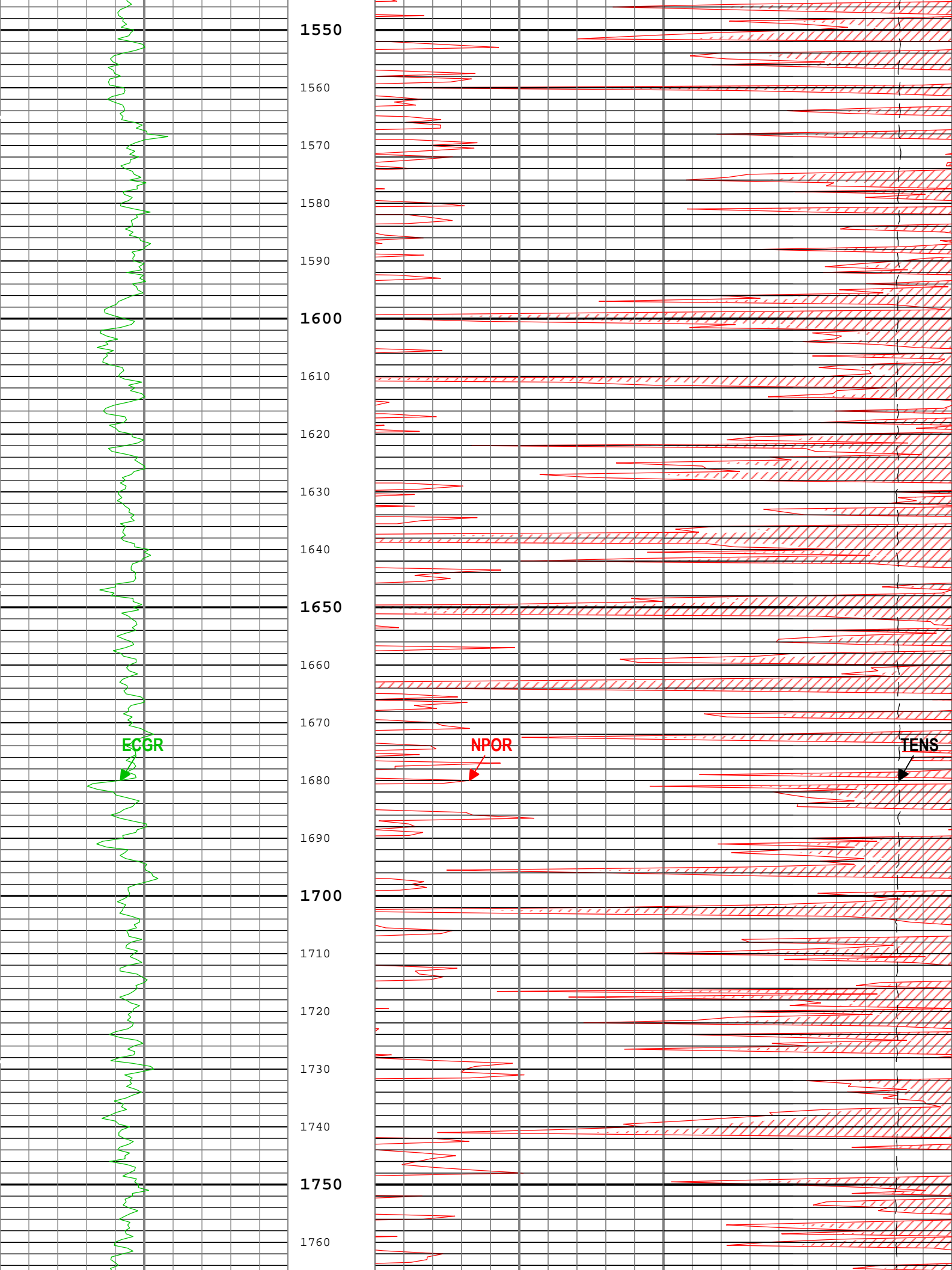


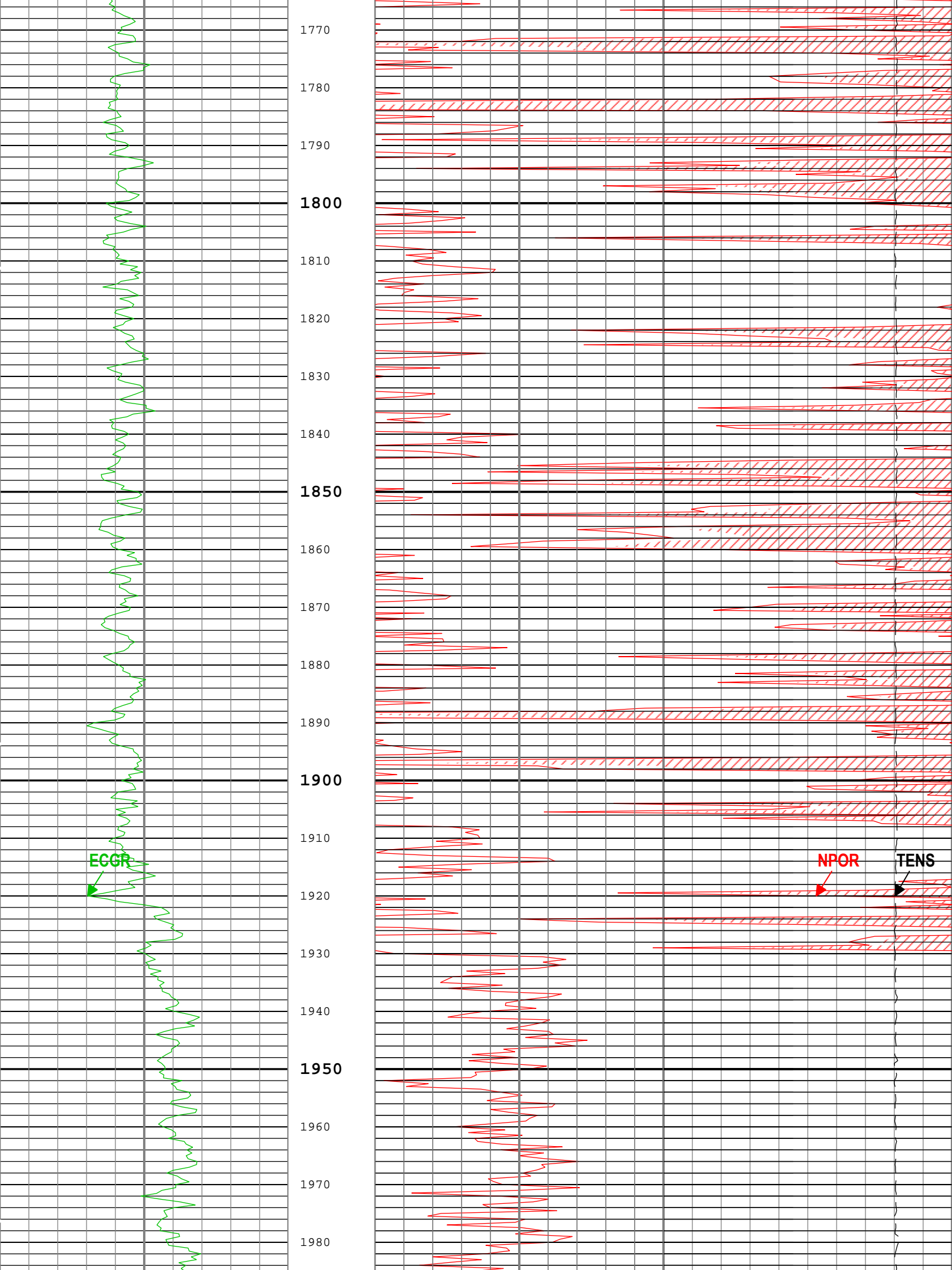


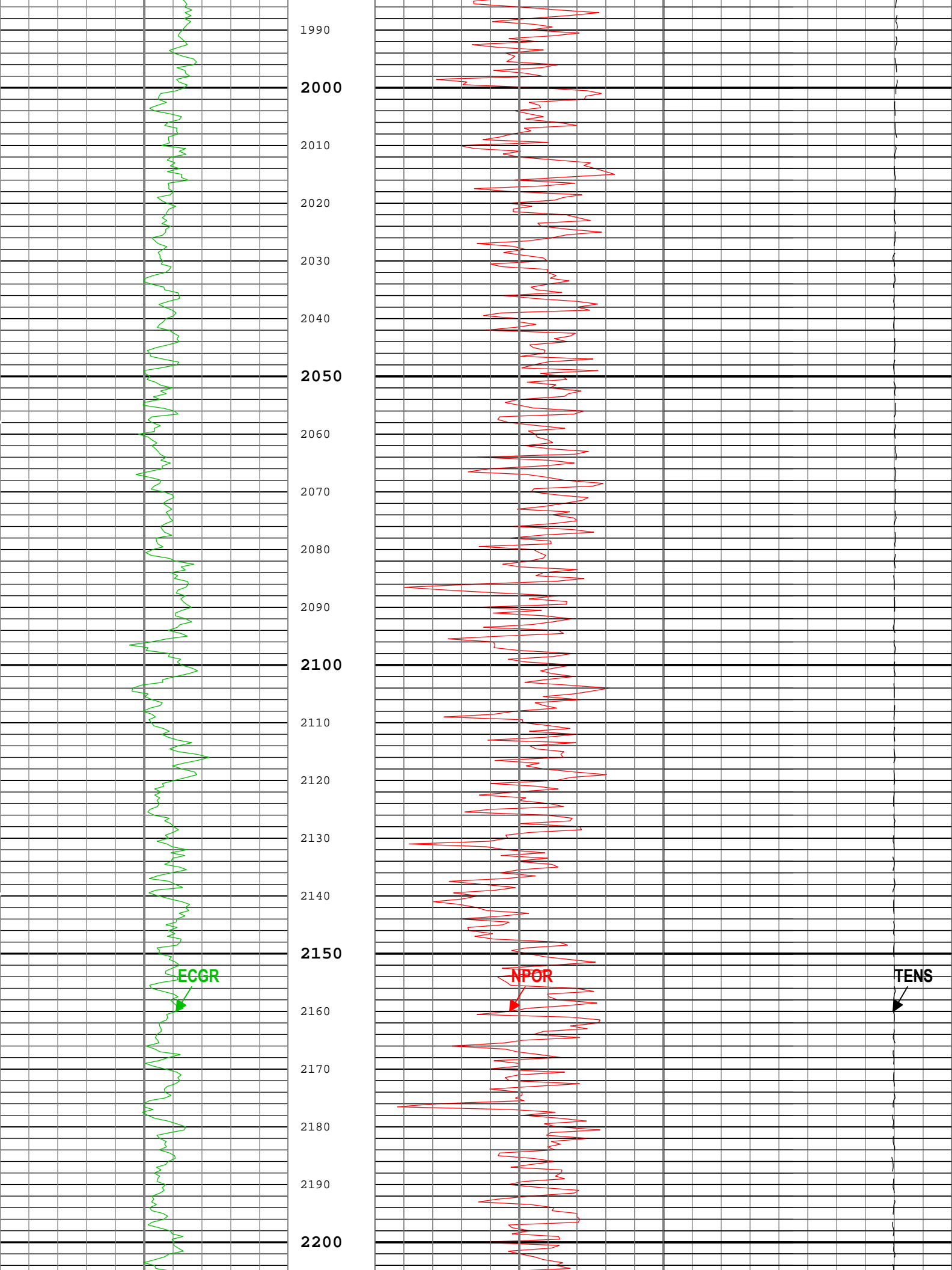


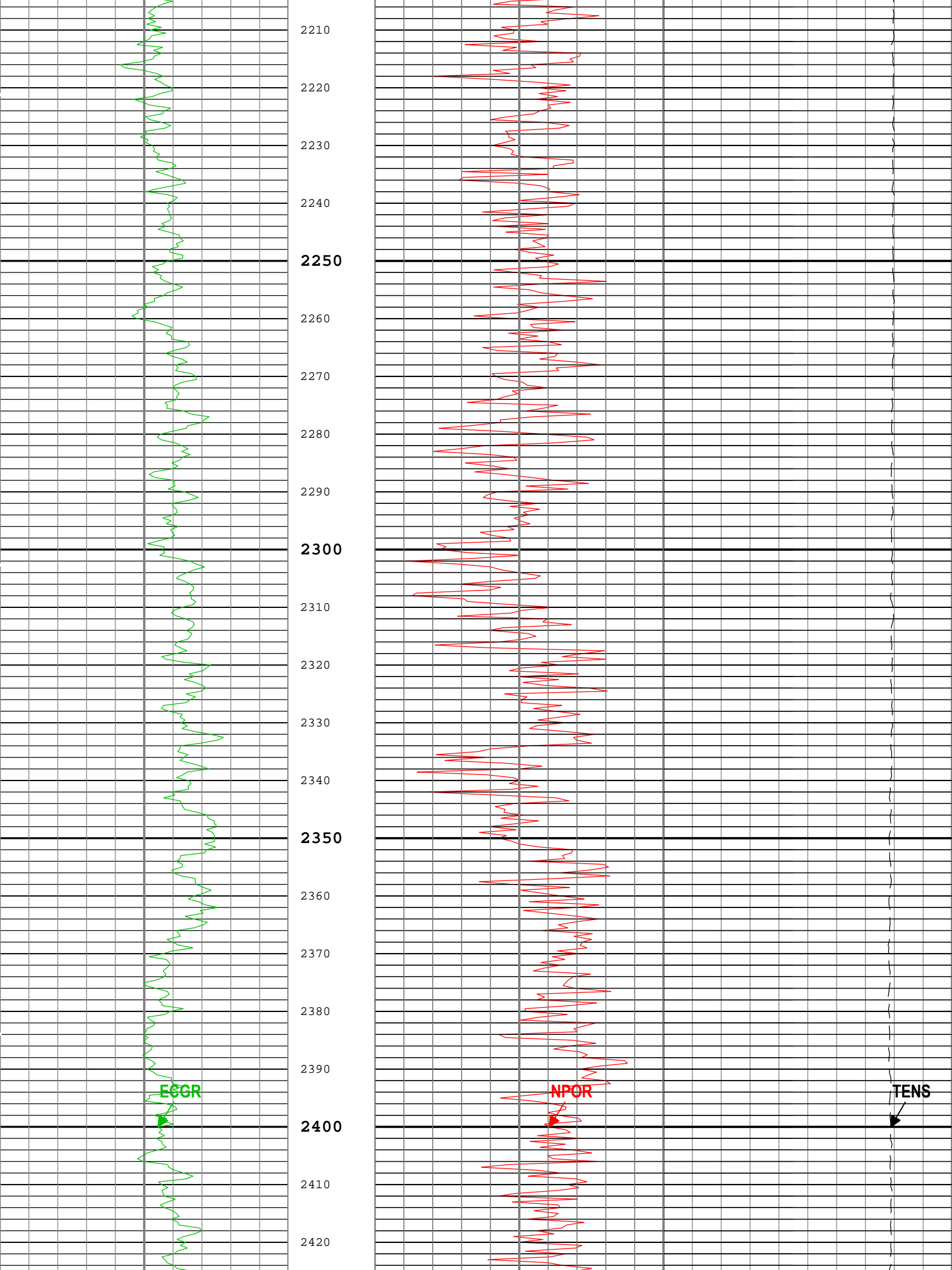


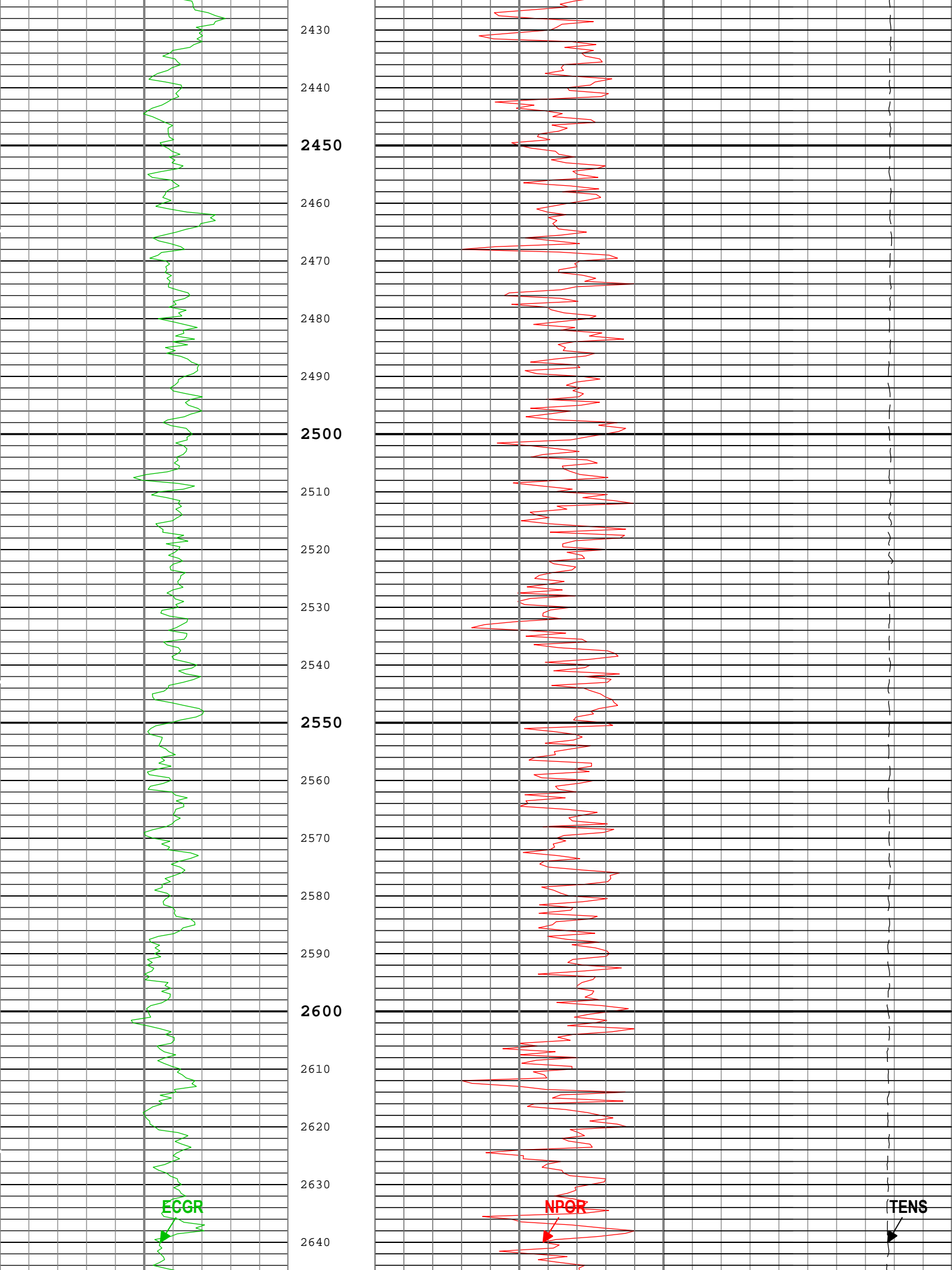


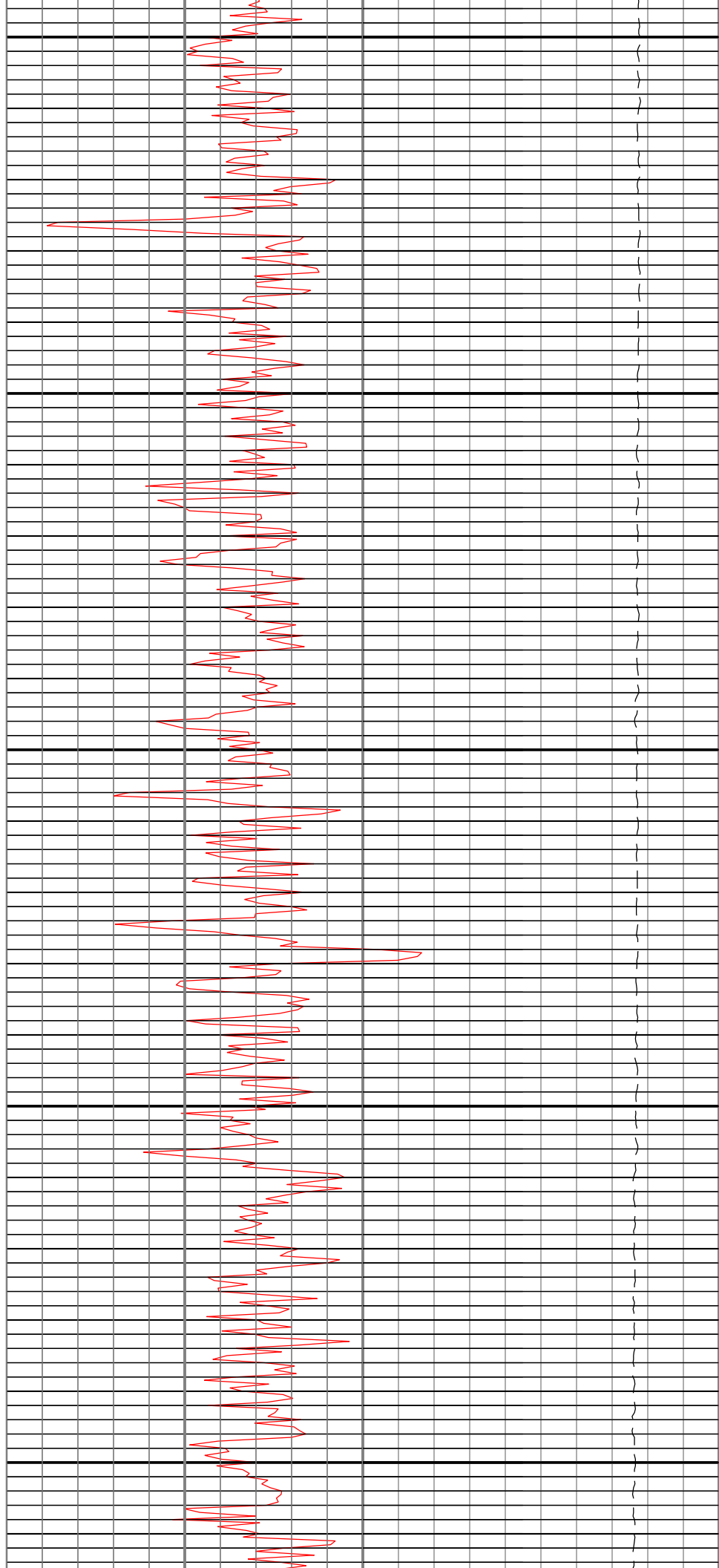
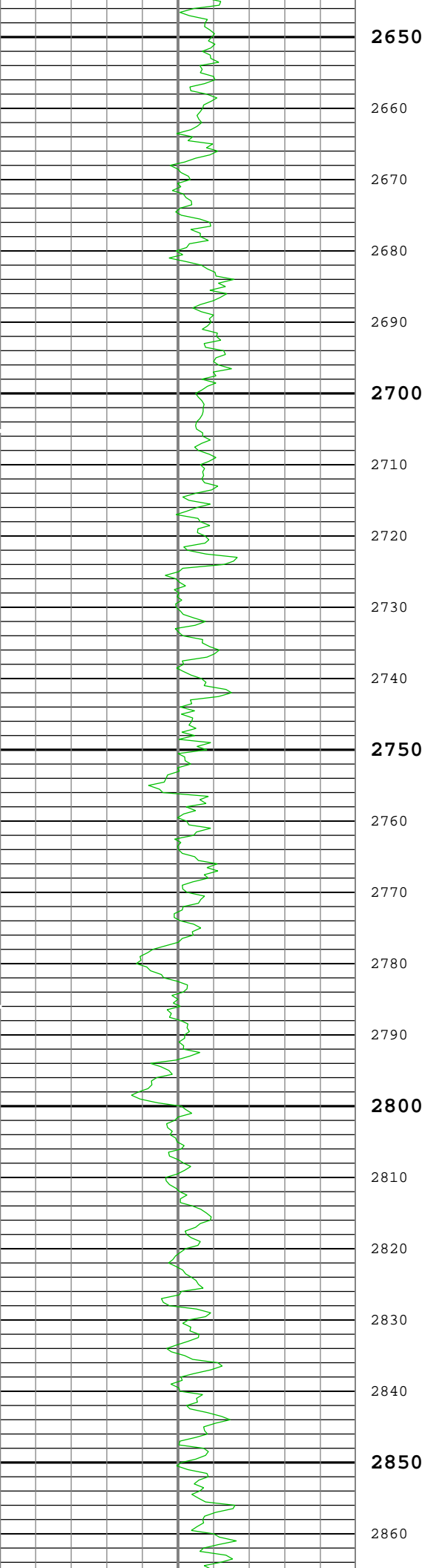


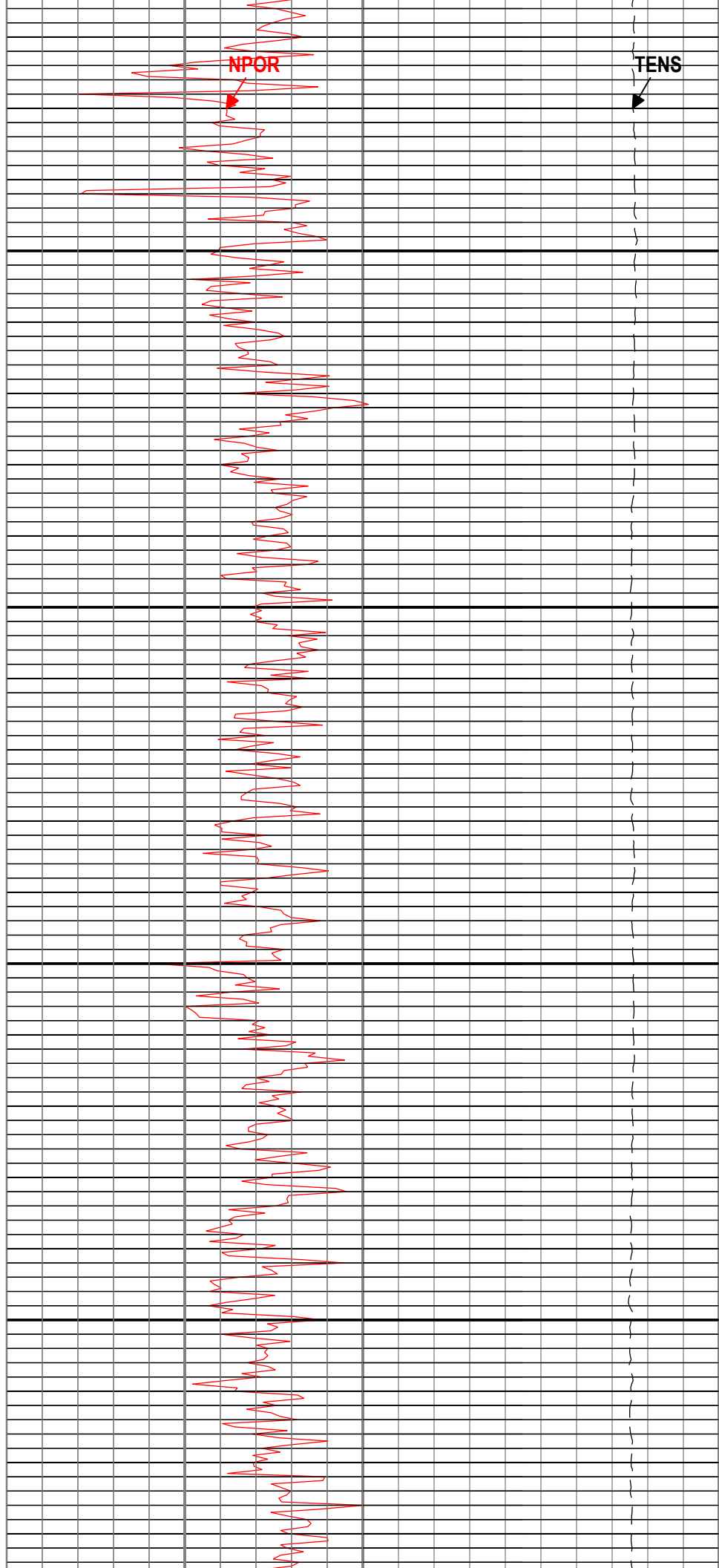
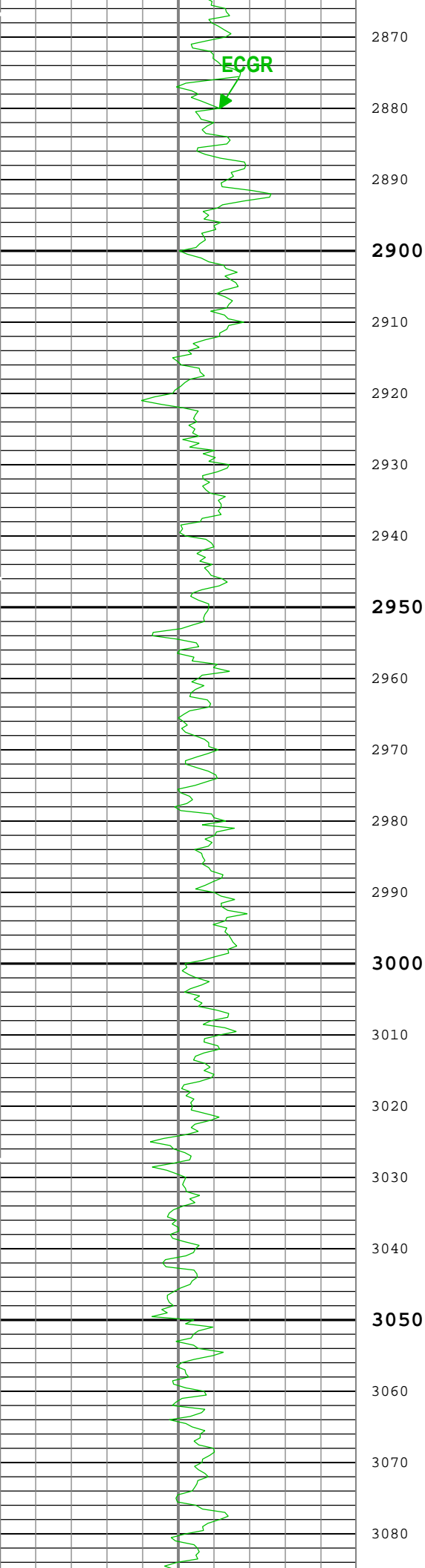


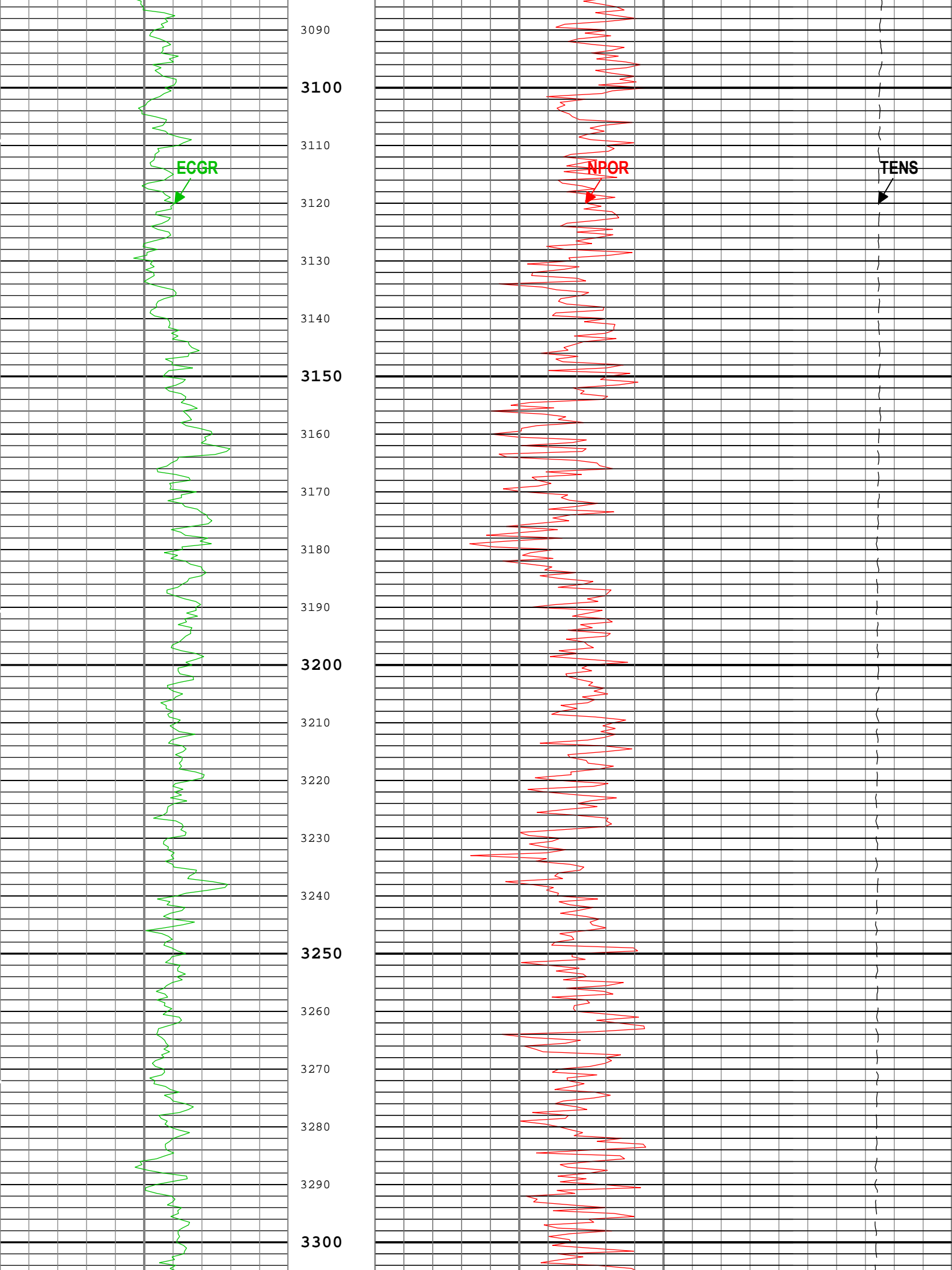


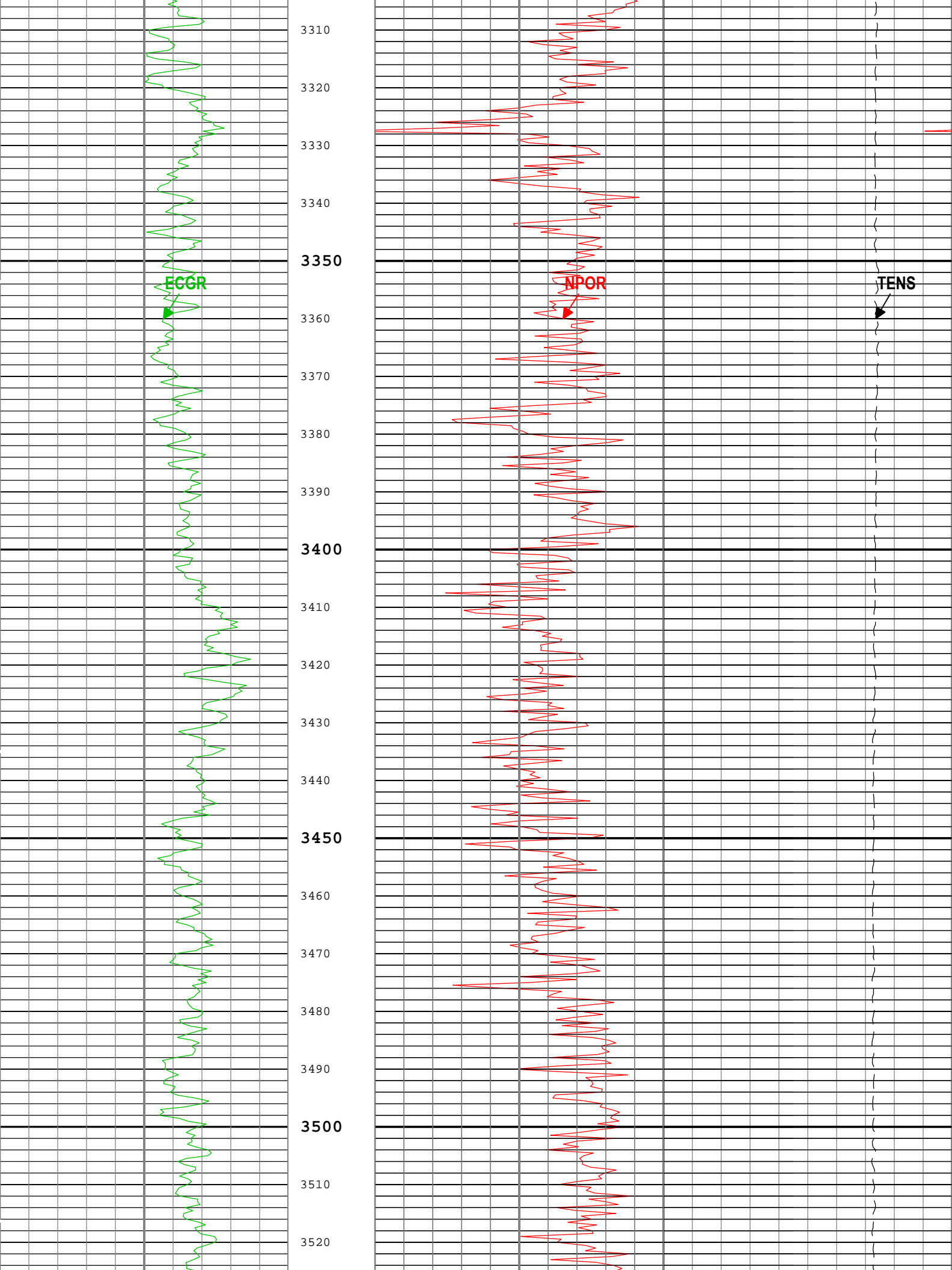


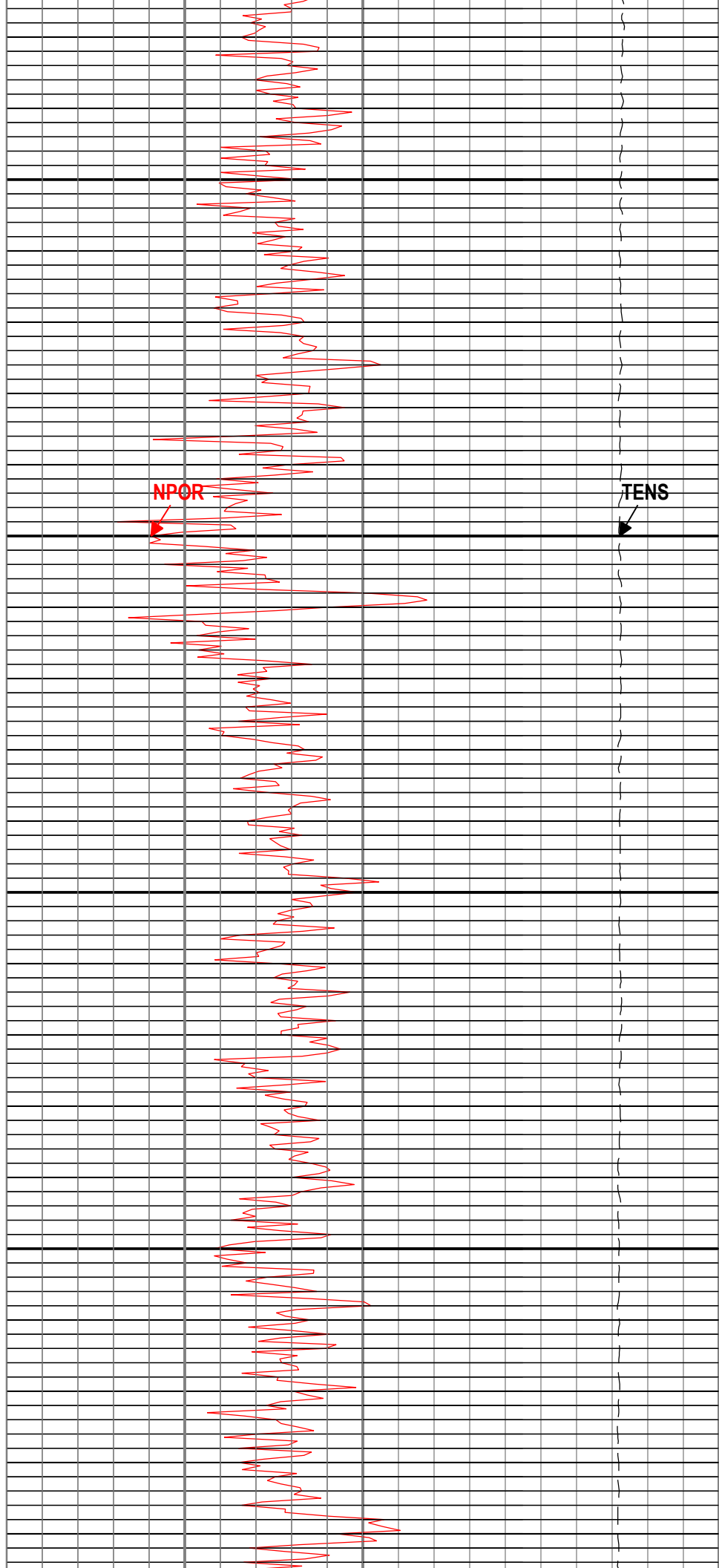
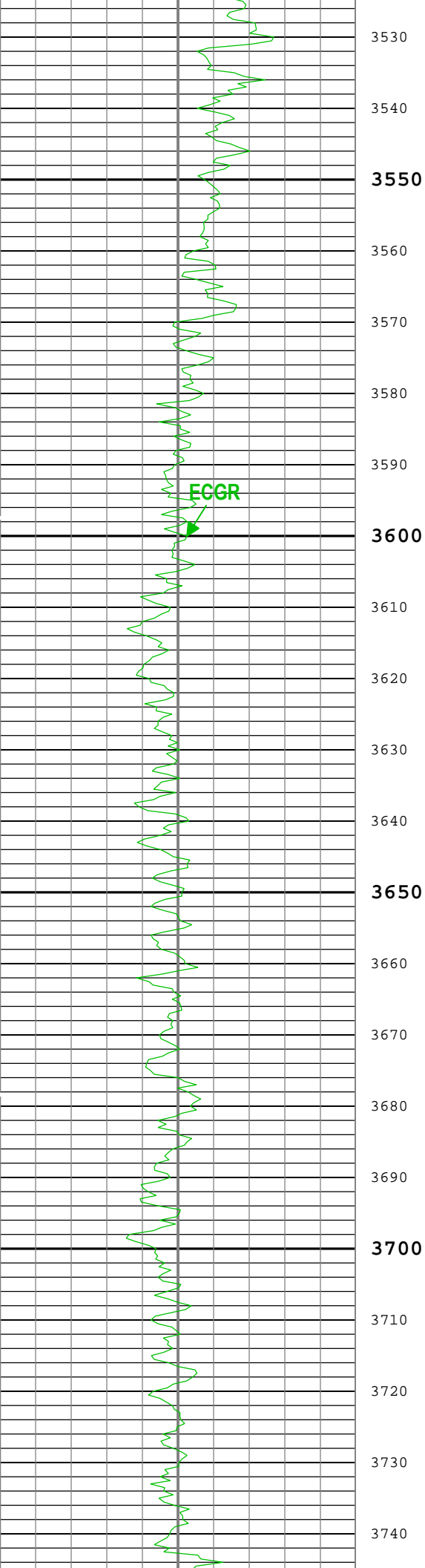


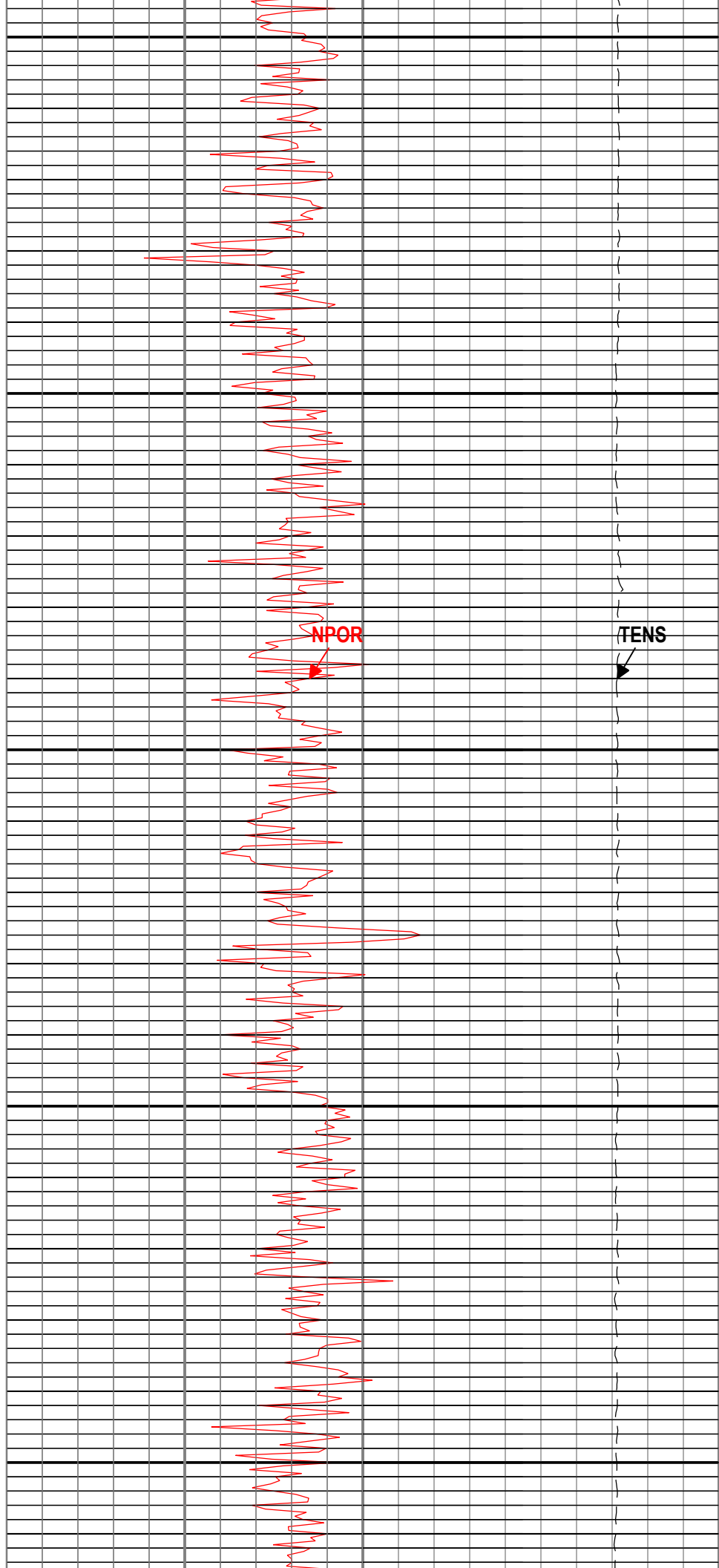
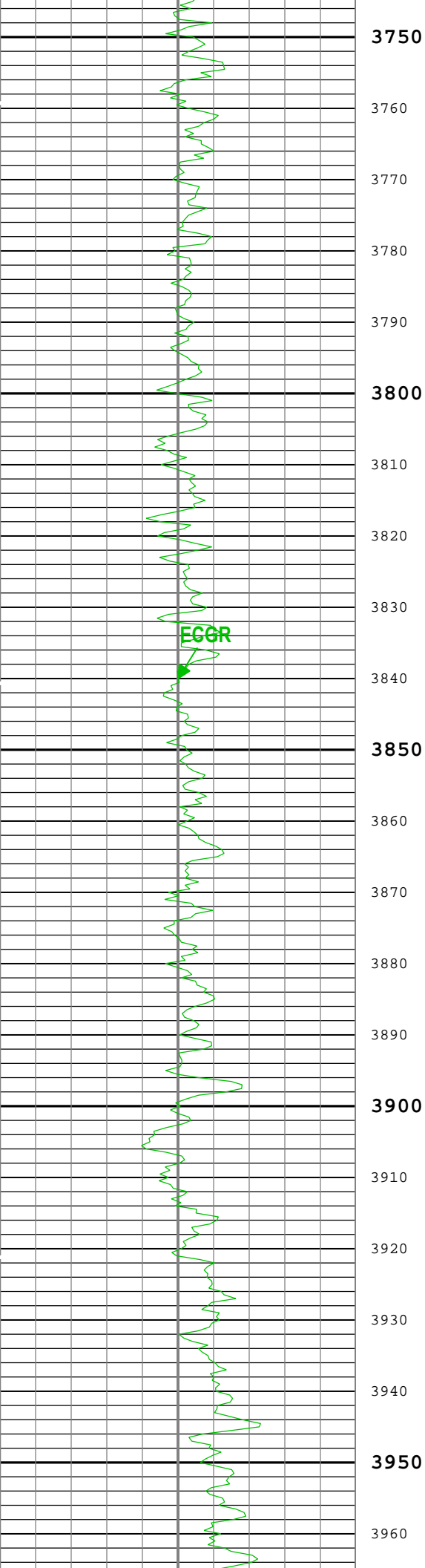


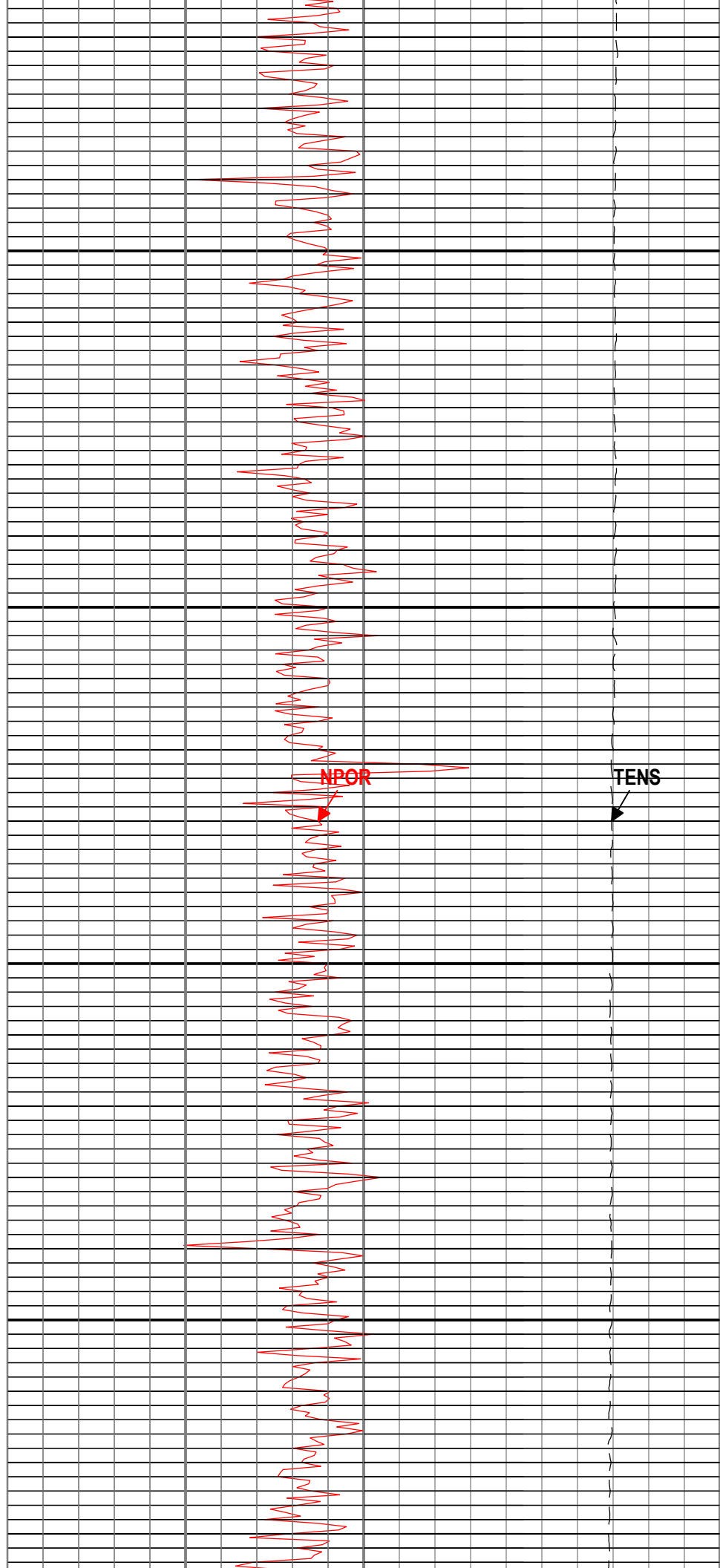
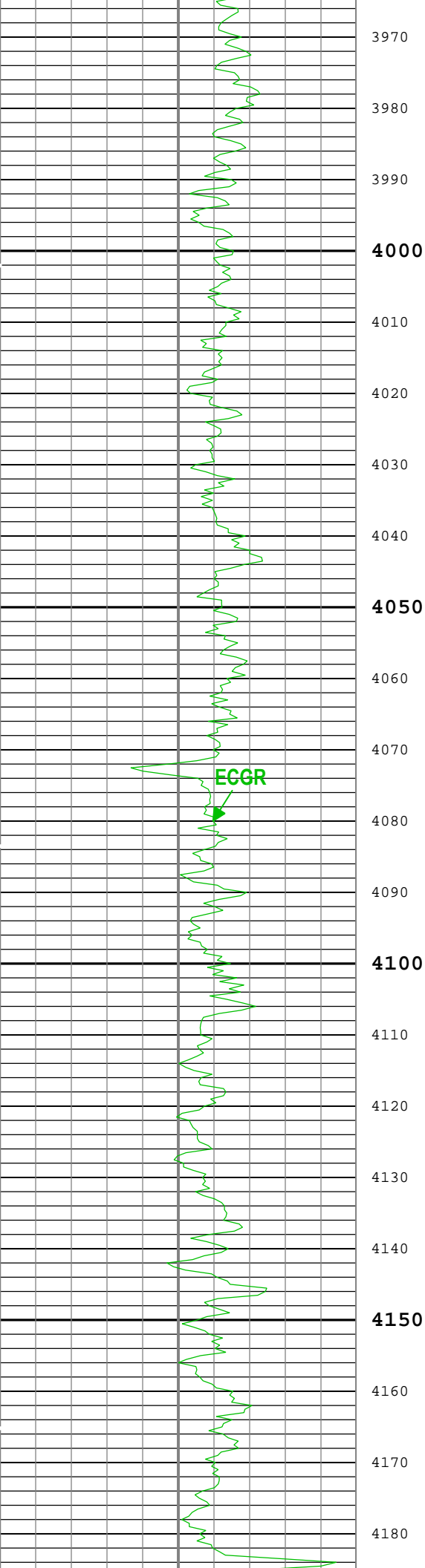


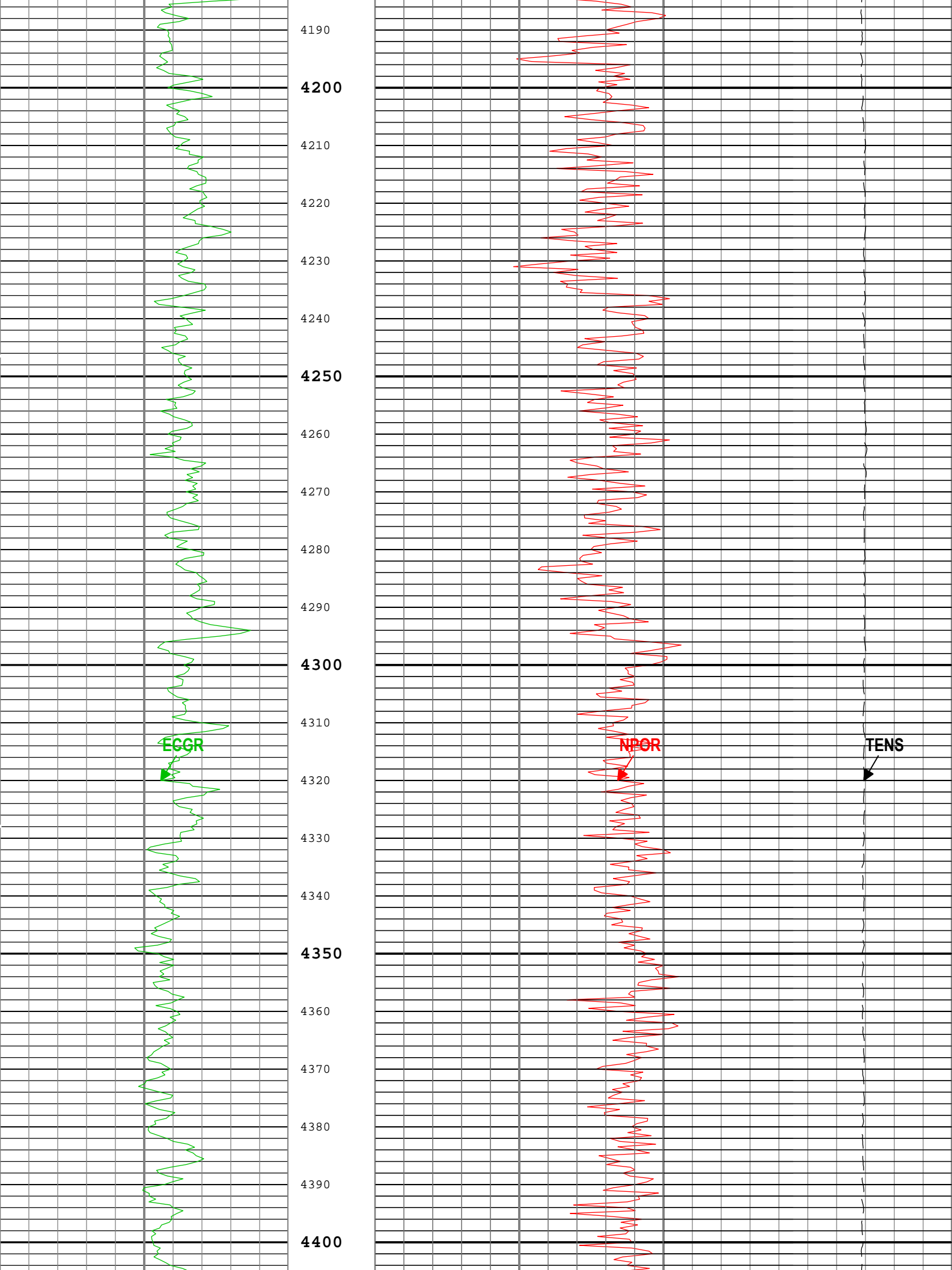


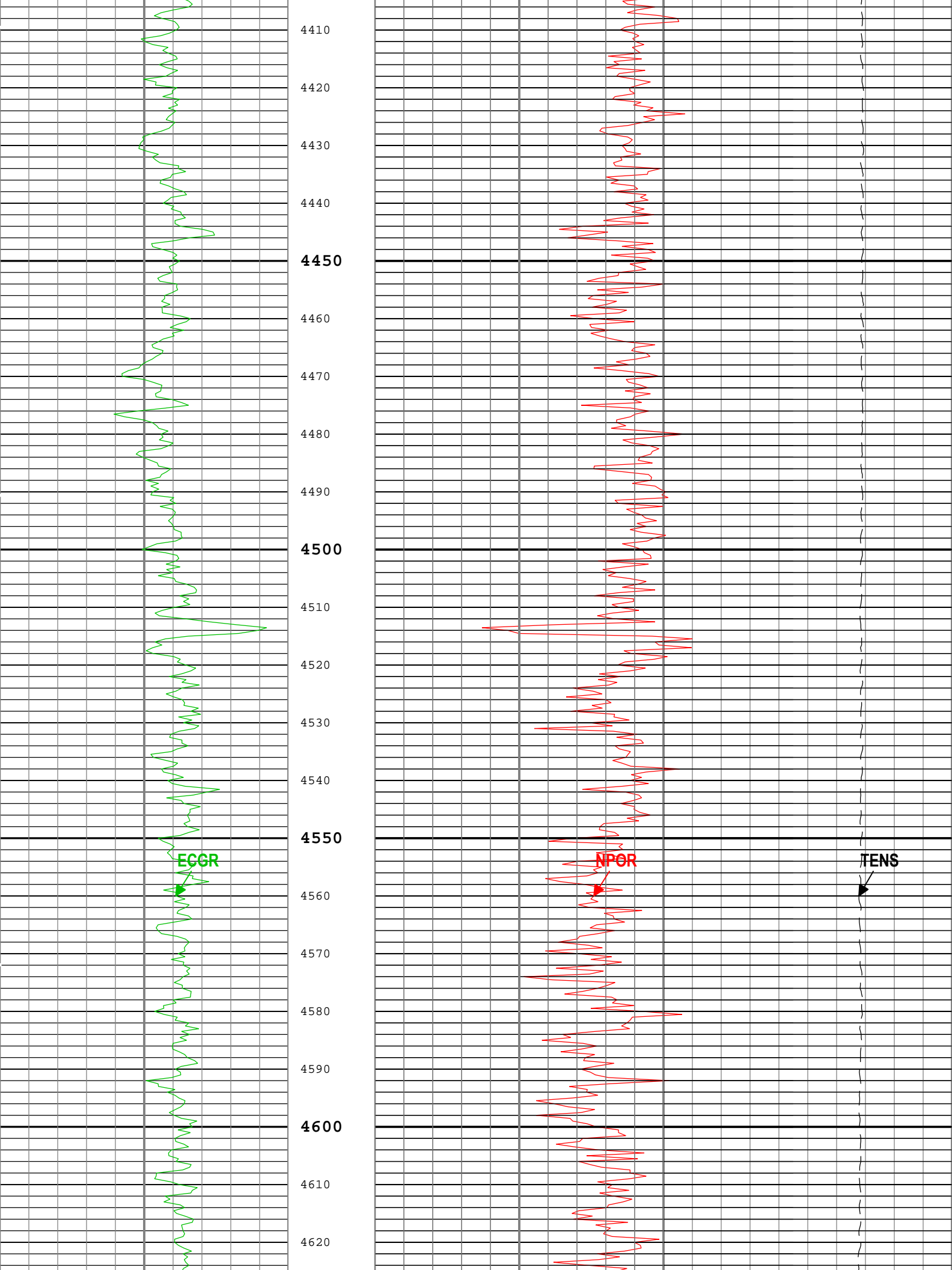


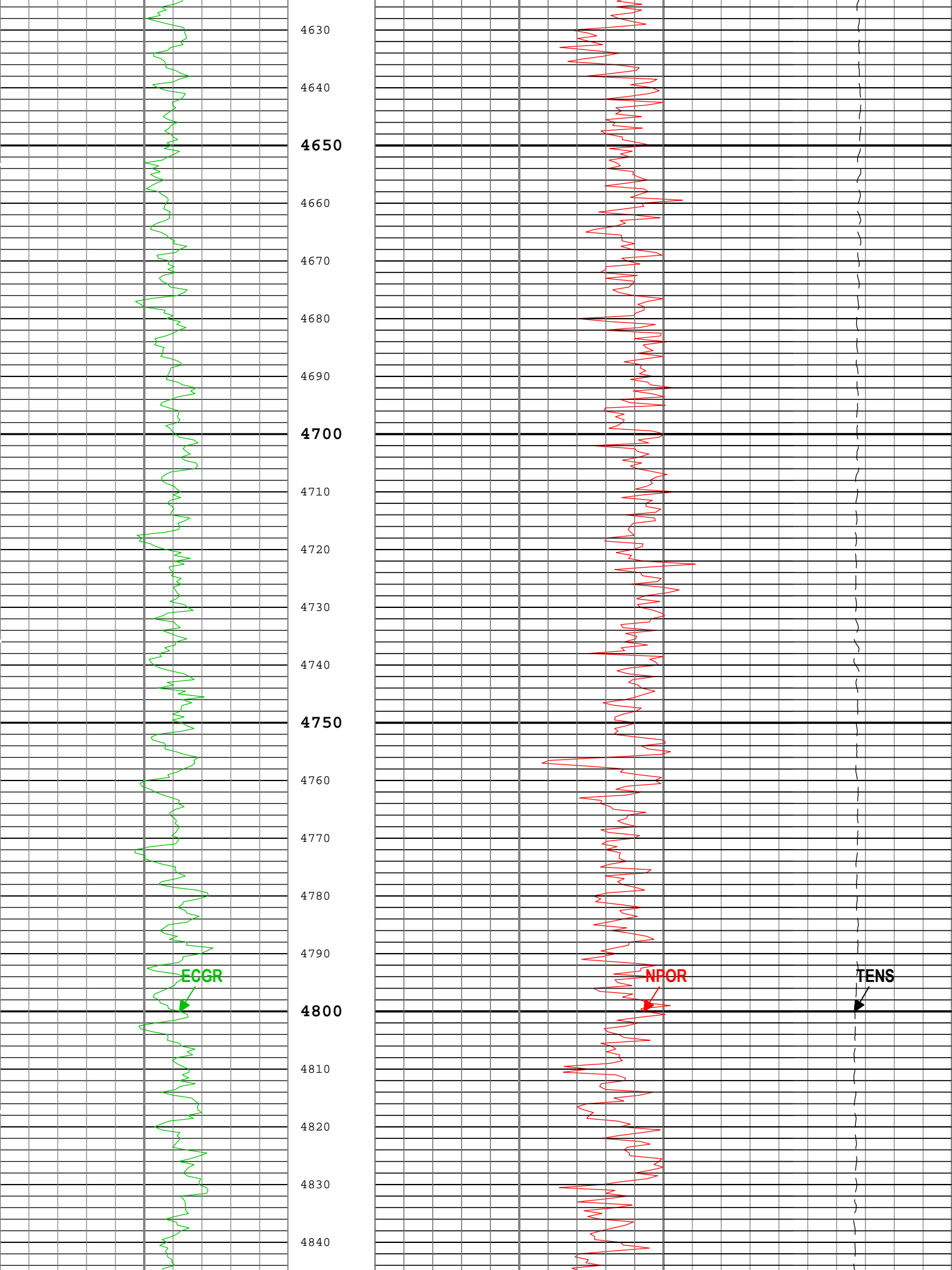


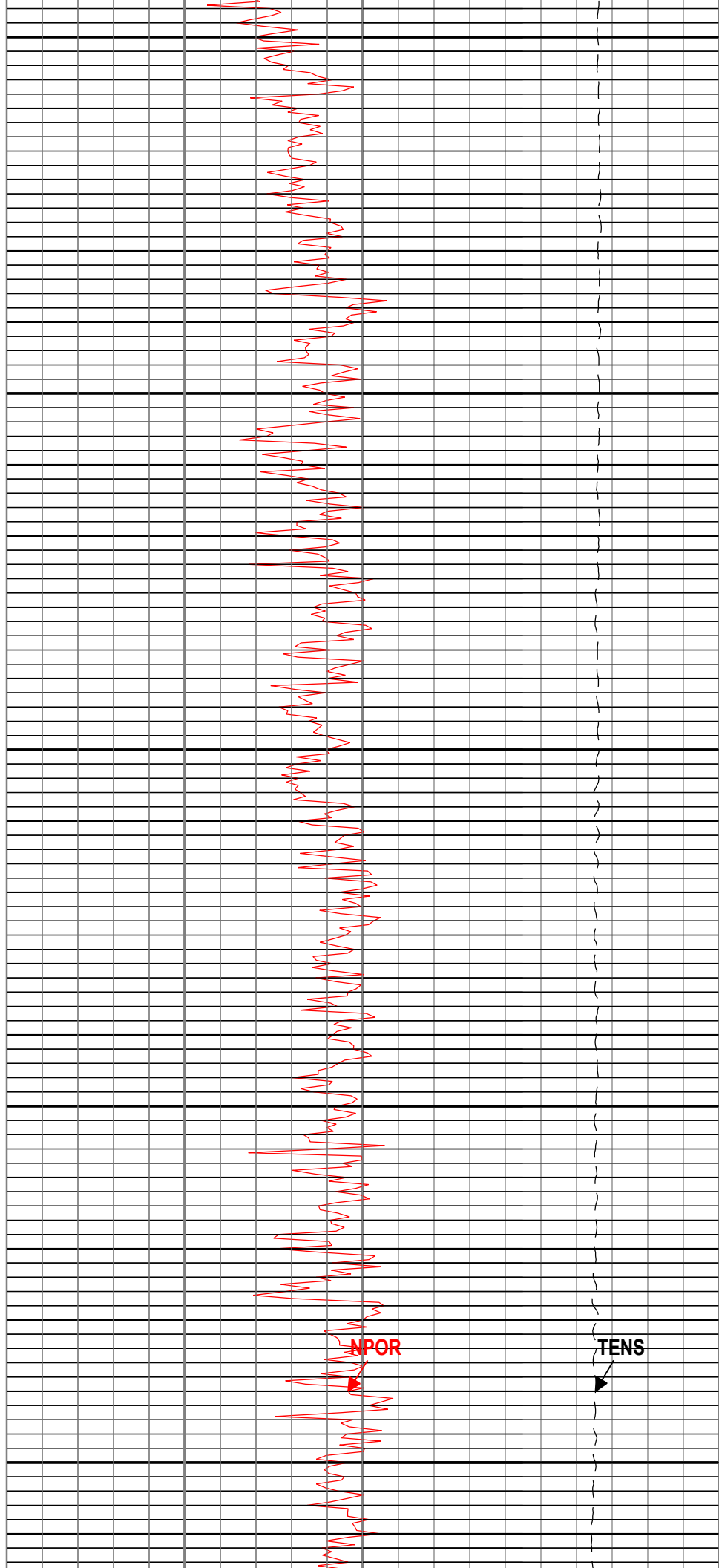
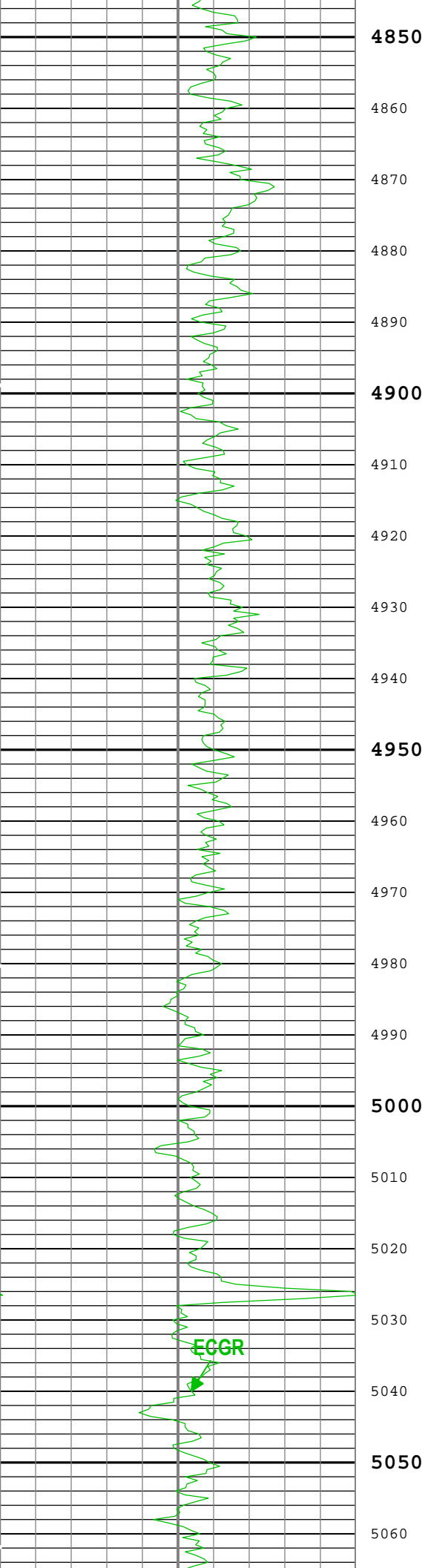


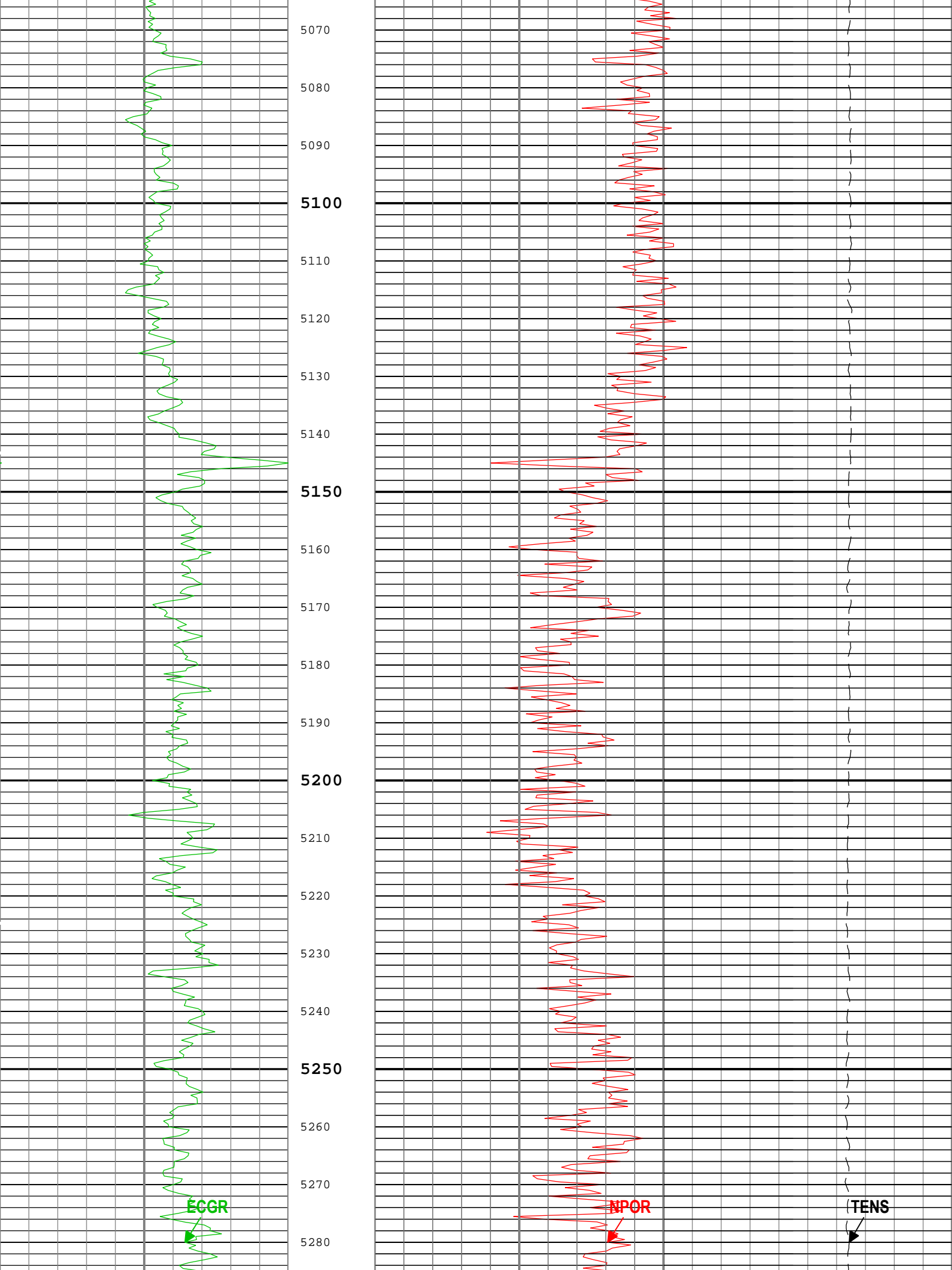


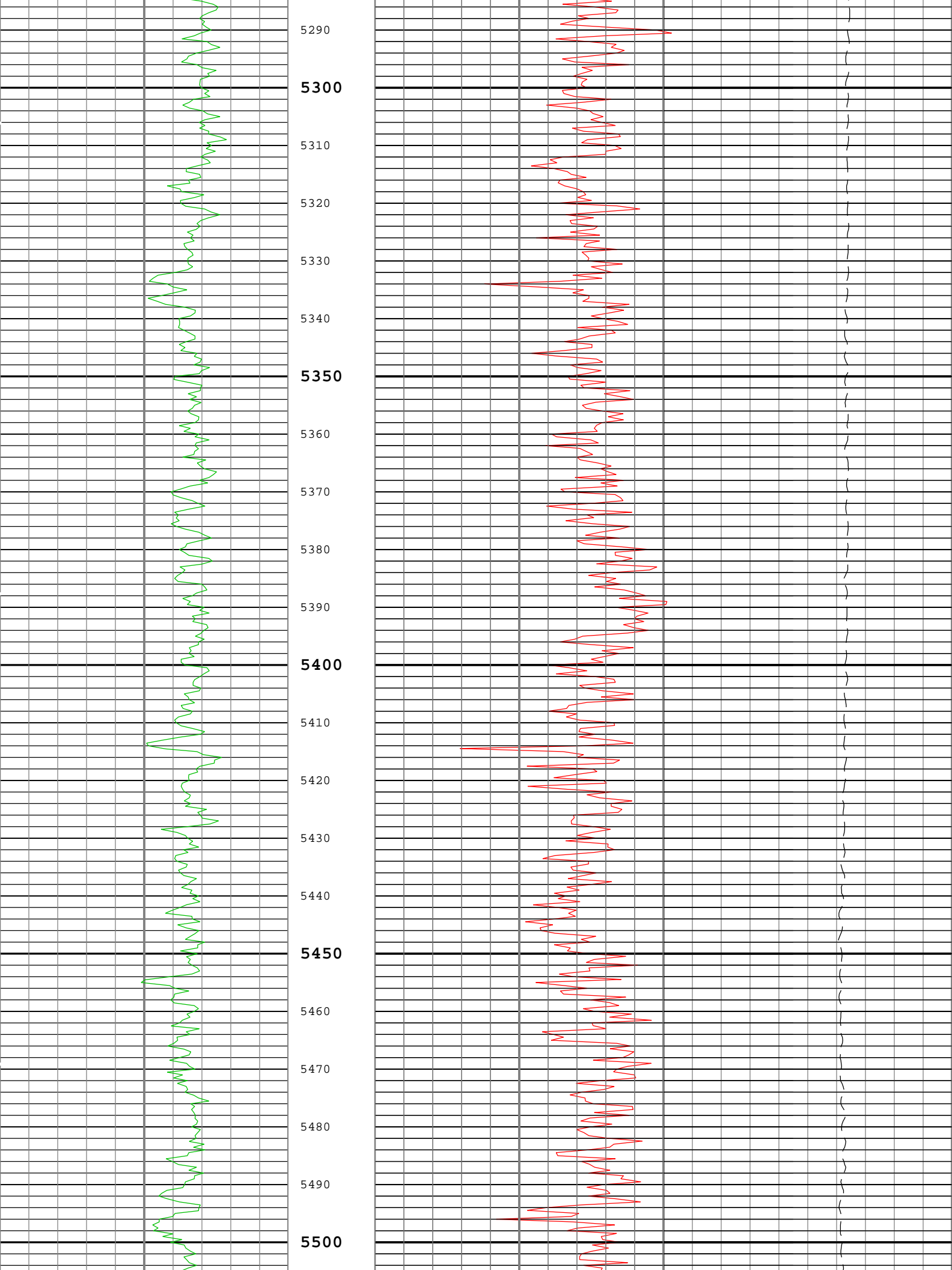


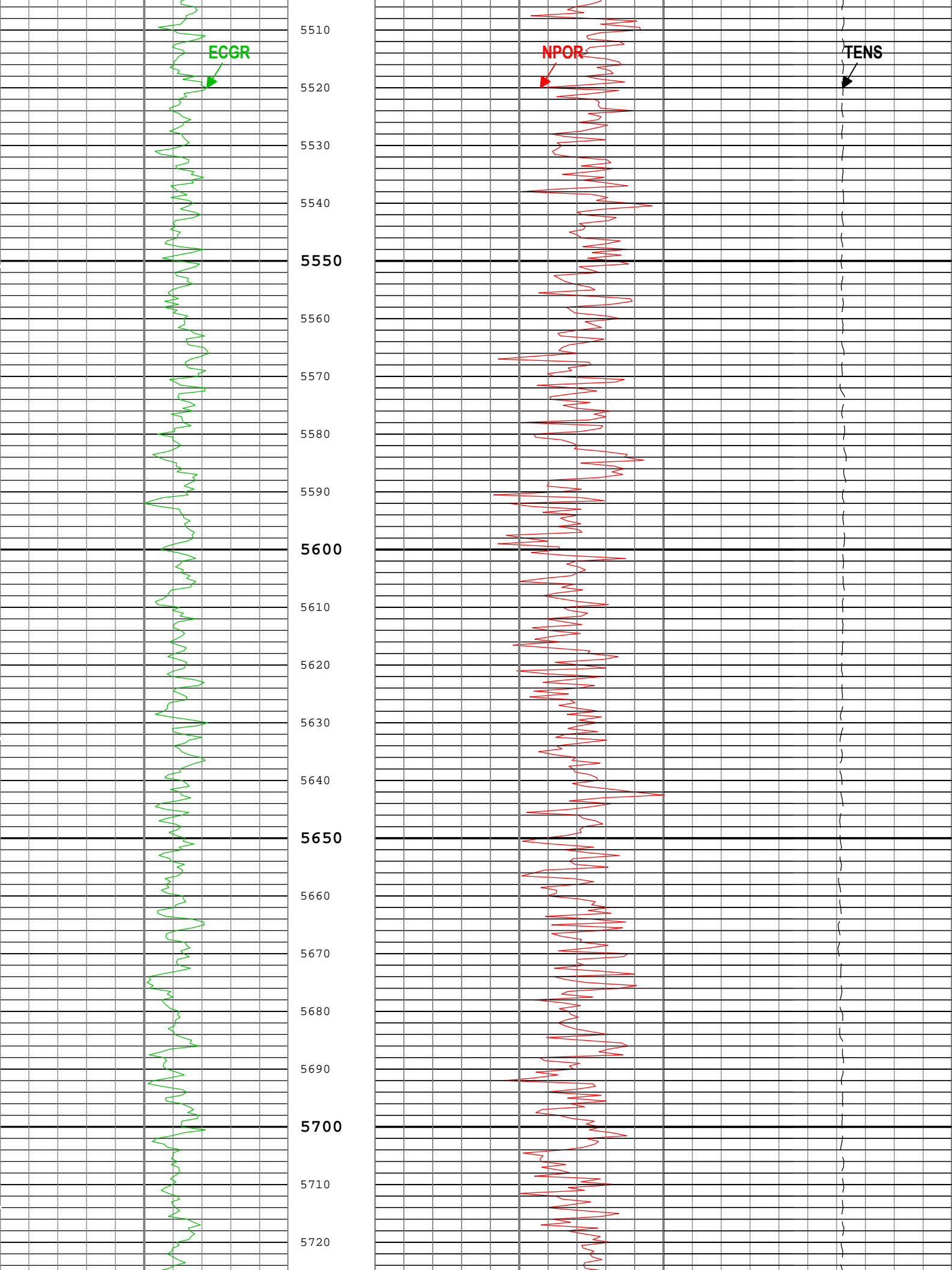


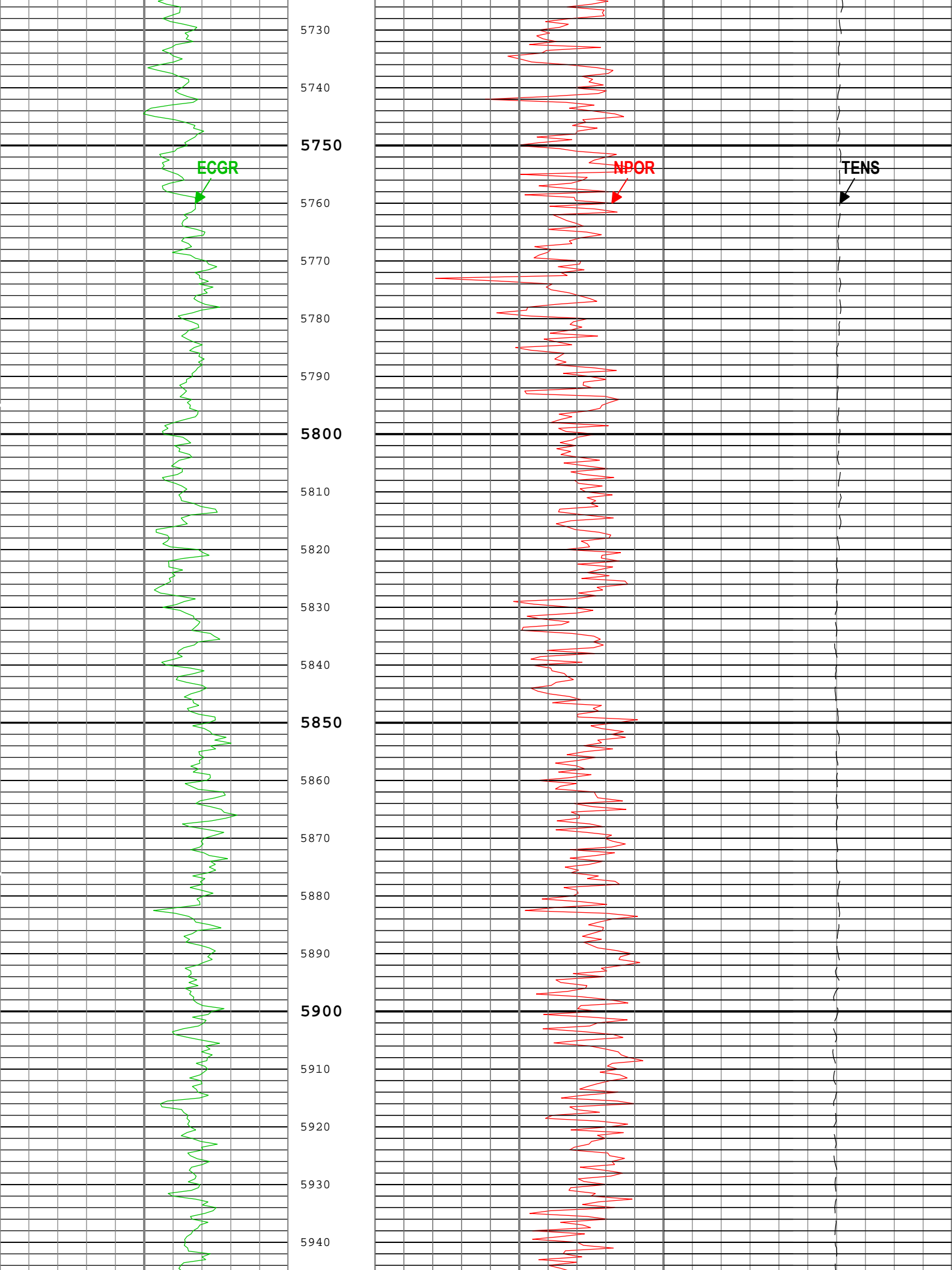


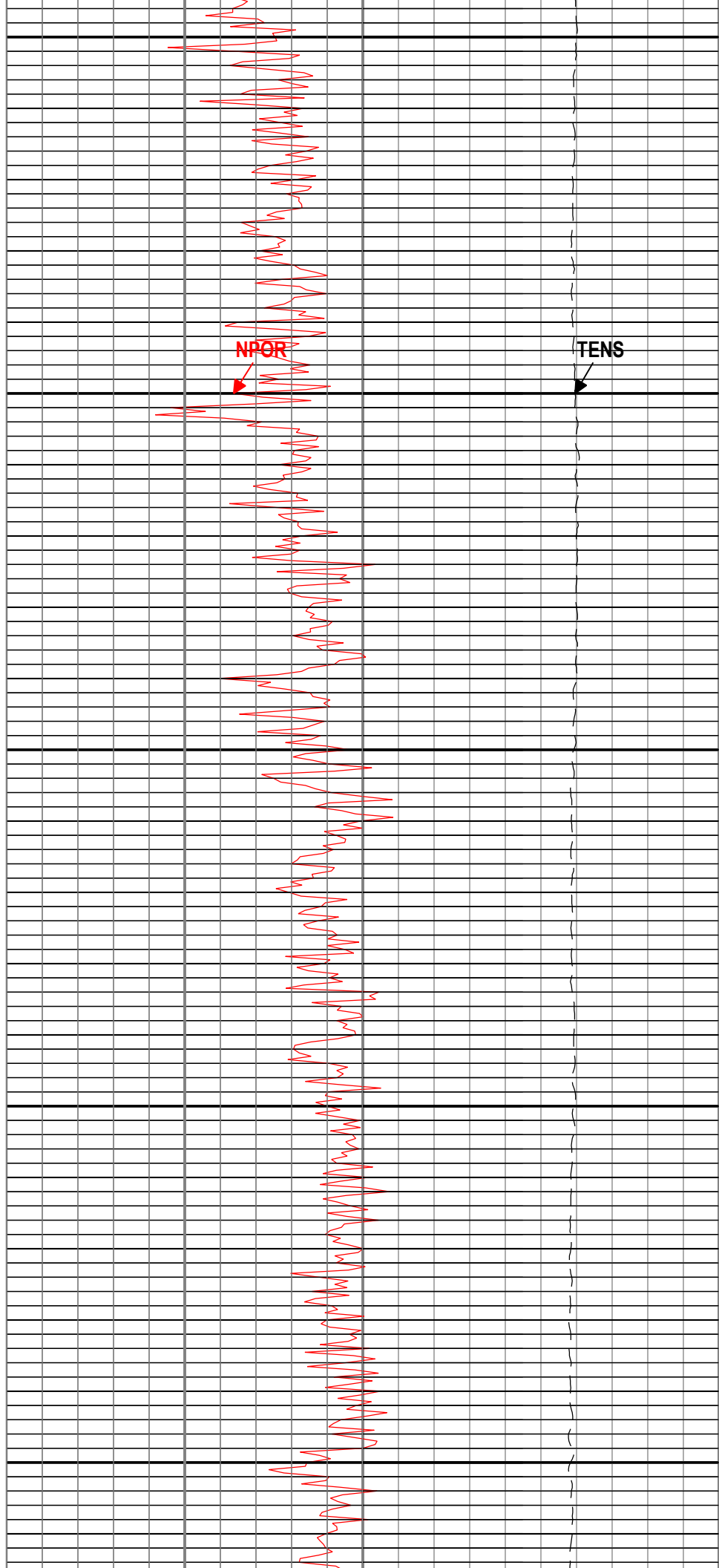
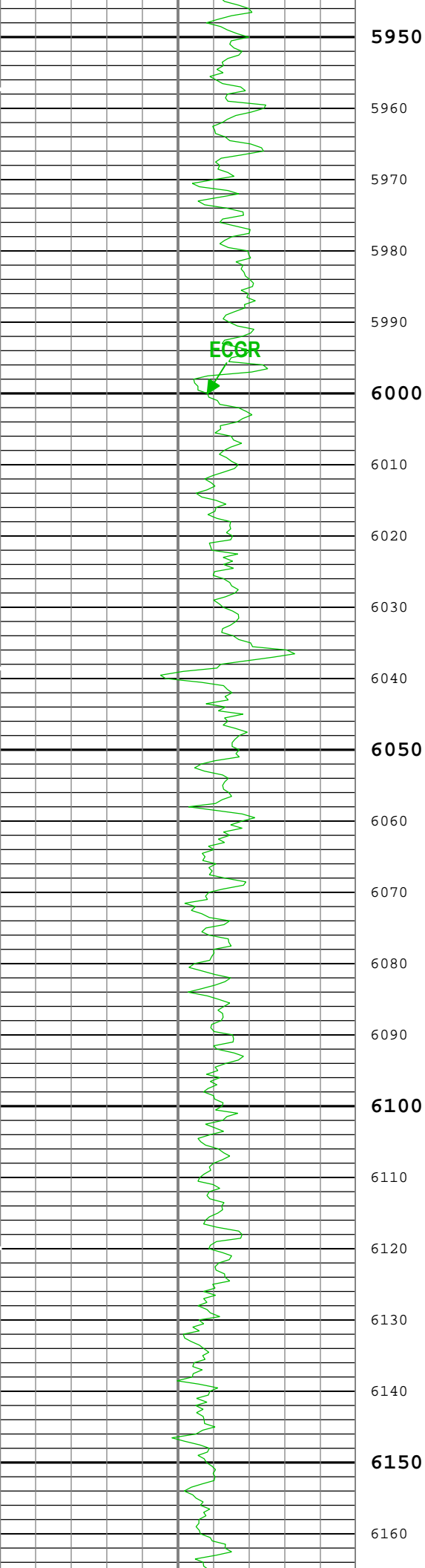


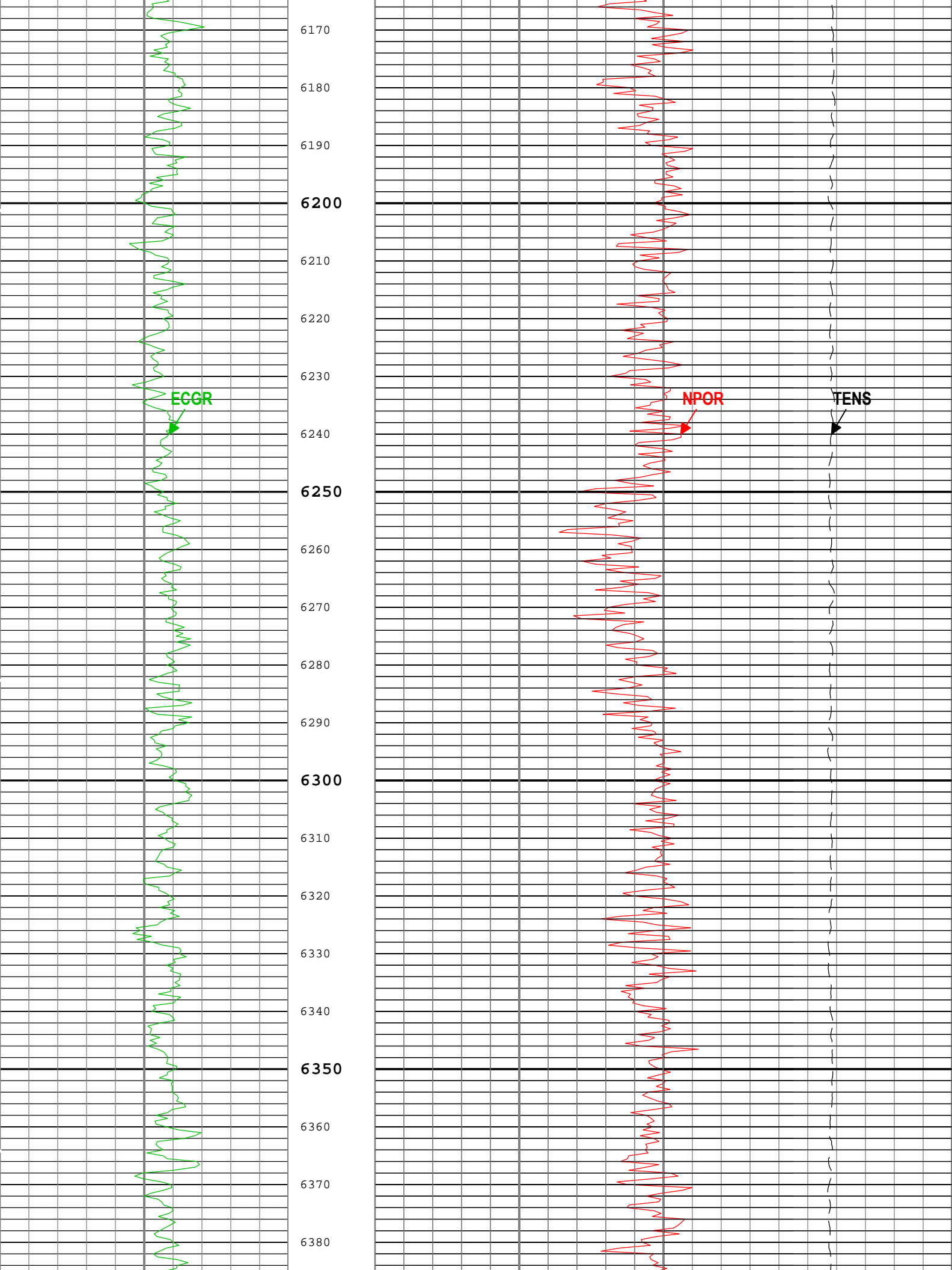


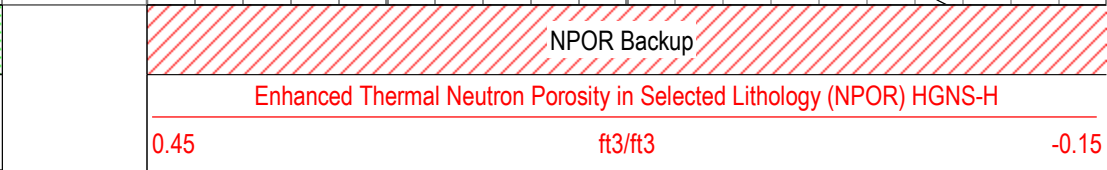
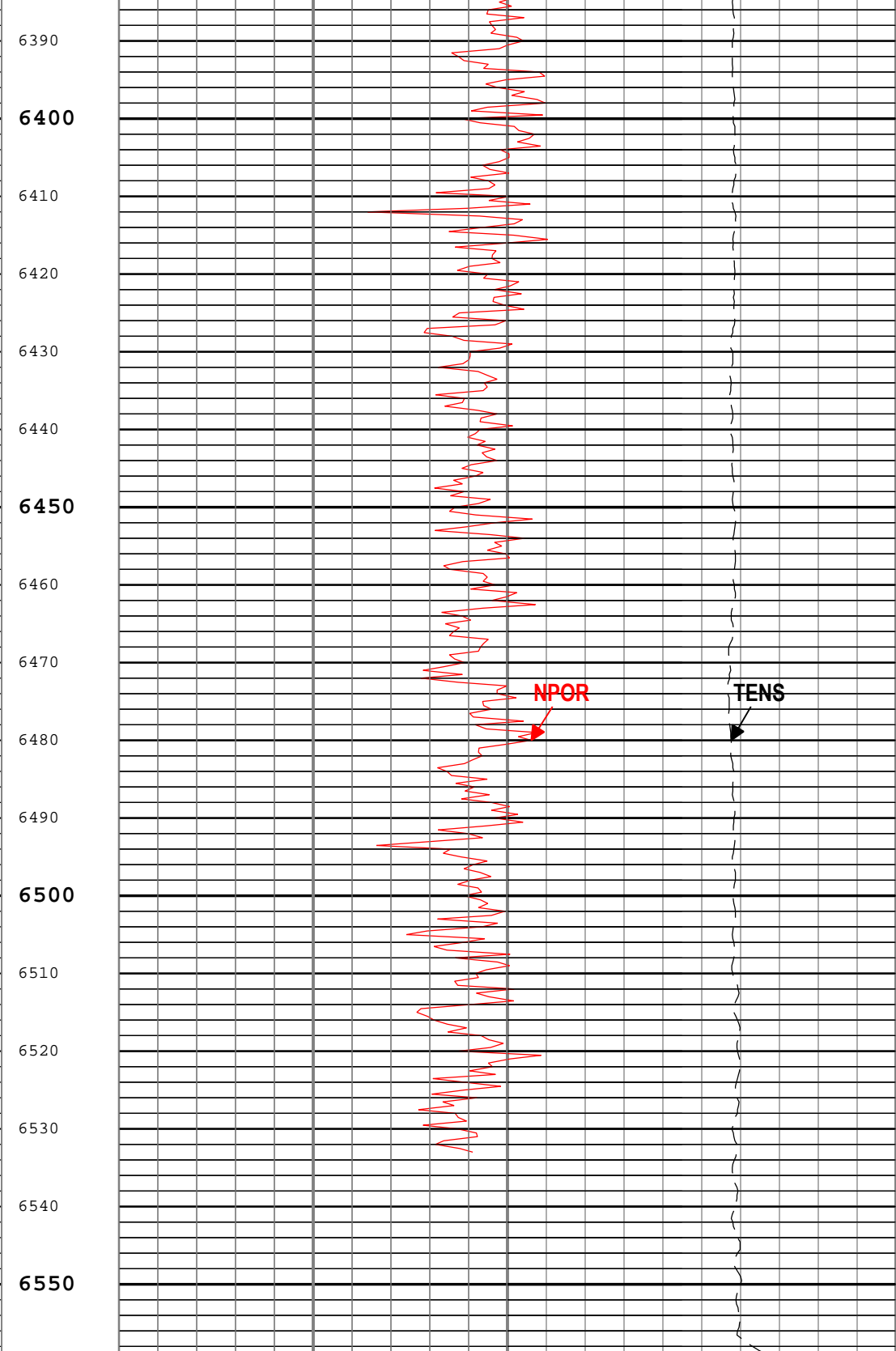
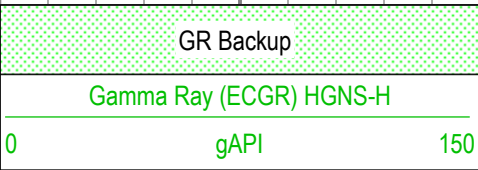
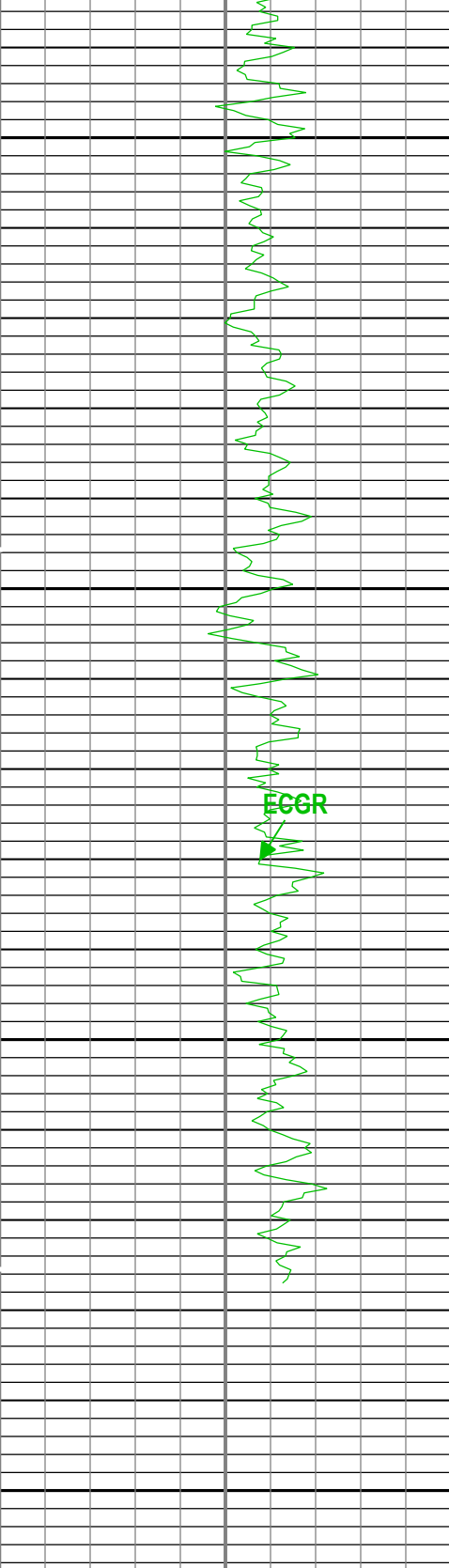










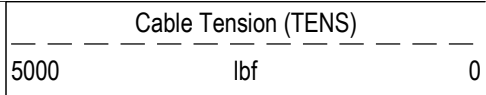


— ICV - Integrated Cement Volume every 100.00 (ft3)

— ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

— IHV - Integrated Hole Volume every 100.00 (ft3)



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: 29-Jun-2016 10:10:27

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	220	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	0	ppm
CBLO	Casing Bottom (Logger)	WLSESSION	17450.9	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	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
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.15	ohm.m
RMS	Resistivity of Mud Sample	Borehole	0.2	ohm.m
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.85	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	13.5	38	1928
BS	8.5	1928	6559

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
WMA_DEPTH_ZONE	WMA Depth Zone	WMA_ZONE	0	

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	
UMFR	Modulation Frequency	USIT-E	333333	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	5000	ft
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	Time Zoned	us

One

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.64464.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[8]:Up	Up	67.94 ft	6559.23 ft	29-Jun-2016 7:32:21 AM	29-Jun-2016 8:53:02 AM	ON	5.73 ft	Yes
One	Log[9]:Up	Up	2823.98 ft	3214.45 ft	29-Jun-2016 9:04:54 AM	29-Jun-2016 9:10:04 AM	ON	0.39 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc. Well:Shadow A26-663

One: Log[8]:Up:S012

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: 29-Jun-2016 10:10:30

—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)

Main To Repeat

Repeat To Main

Cable Tension (TENS)

5000

lbf

0

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

0

gAPI

150

ECGR

Main To Repeat

Repeat To Main

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

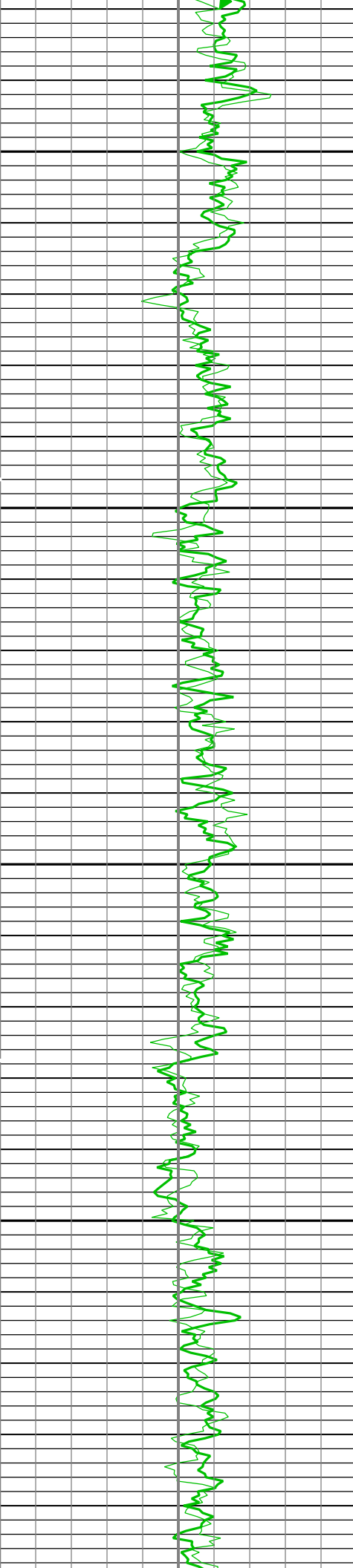
0.45

ft3/ft3

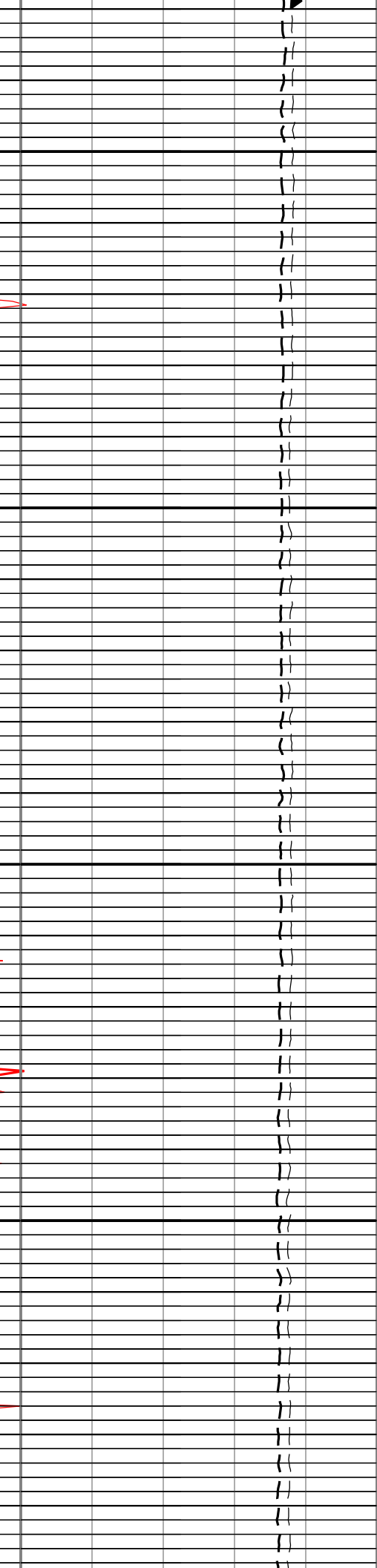
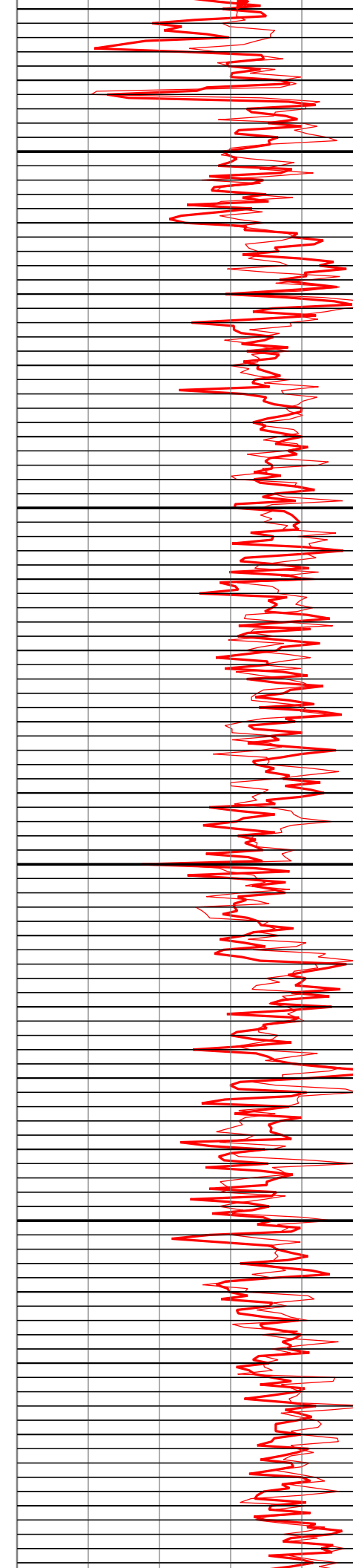
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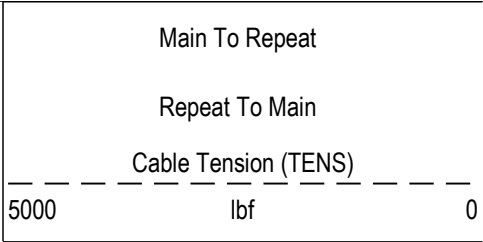
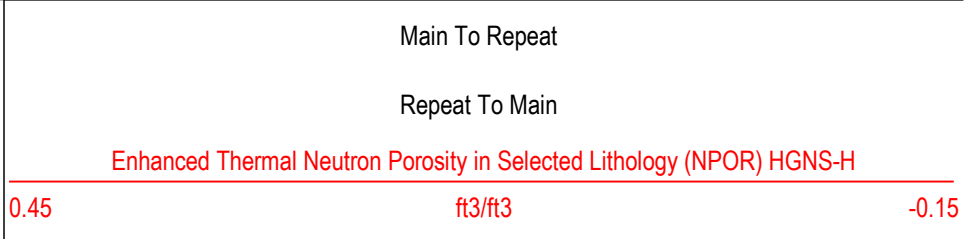
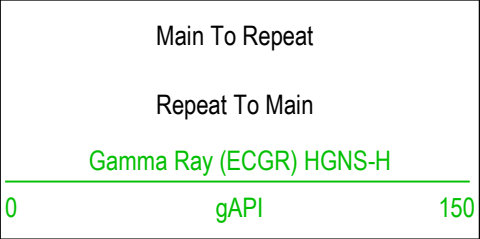
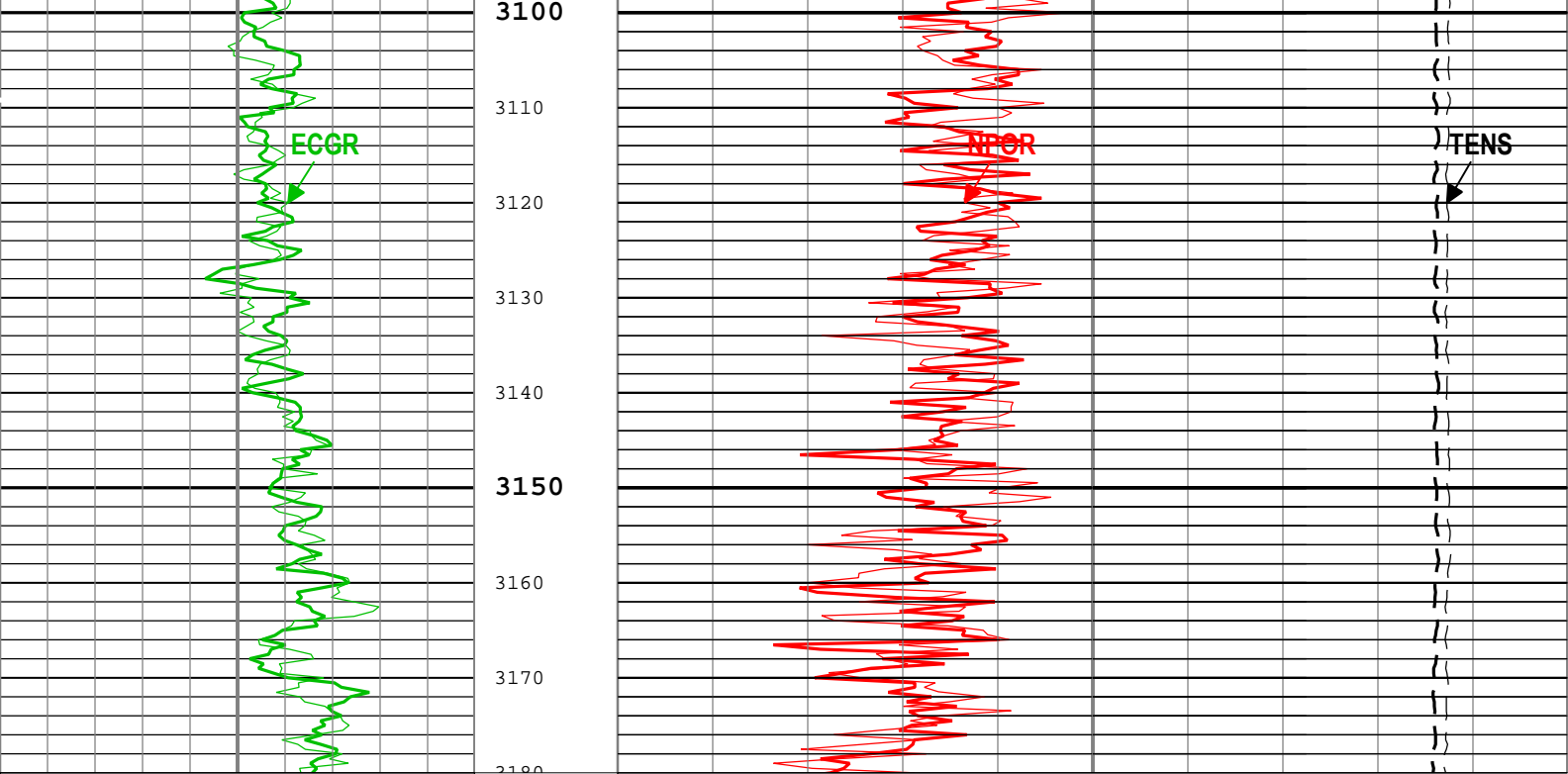
NPOR

TENS



2880
2890
2900
2910
2920
2930
2940
2950
2960
2970
2980
2990
3000
3010
3020
3030
3040
3050
3060
3070
3080
3090





— 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)

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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: 29-Jun-2016 10:10:30

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One: Parameters				
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CBLO	Casing Bottom (Logger)	WLSESSION	17450.9	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	

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IMAR	Image Rotation	USIT-E	Off	
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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.	

Tool Control Parameters				
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Parameter	Description	Tool	Value	Unit
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ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	5000	ft
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	Time Zoned	us

Company:	Noble Energy Inc.	Schlumberger
Well:	Shadow A26-663	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	
Nuclear Print		
GR - Neutron Log		