Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Hobbs
HOBBS OCD
JUL 17 2017
RECEIVED

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on page 2

5. Lease Serial No.
NMLC061842

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
FLAT HEAD FEDERAL COM 27H

2. Name of Operator
COG OPERATING LLC
Contact: KANICIA CASTILLO
E-Mail: kcastillo@concho.com

9. API Well No.
30-025-43147-00-X1

3a. Address
ONE CONCHO CENTER 600 W ILLINOIS AVENUE
MIDLAND, TX 79701-4287

3b. Phone No. (include area code)
Ph: 432-685-4332

10. Field and Pool or Exploratory Area
MALJAMAR

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 14 T17S R32E Lot A 1170FNL 990FEL

11. County or Parish, State
LEA COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☒ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Drilling Operations
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Please see attached logs.

Denied BY NMOCD
PAUL. KANTZ@STATE.NM.US
LOGS ARE TO BE SUBMITTED
ON 1 CONTINUOUS SHEET OF PAPER
SUBMIT TO NMOCD IN CORRECT
FORMAT.

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #374710 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Hobbs
Committed to AFMSS for processing by DEBORAH MCKINNEY on 05/04/2017 (17DLM1005SE)

Name *(Printed/Typed)* KANICIA CASTILLO — Title PREPARER

Signature (Electronic Submission) — Date 05/02/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By ACCEPTED — Title ZOTA STEVENS PET — Date 07/10/2017

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Hobbs

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

Schlumberger

Company: COG OPERATING LLC

Well: FLAT HEAD FEDERAL COM 27H

Field: MALJAMAR YESO WEST

County: LEA State: New Mexico

Platform Express

Compensated Neutron Log

Three Detector Litho-Density

HOBBS OCD

JUL 17 2017

RECEIVED

County: LEA
Field: MALJAMAR YESO WEST
Location: 1170' FNL & 990' FEL
Well: FLAT HEAD FEDERAL COM 27H
Company: COG OPERATING LLC

Location:			
1170' FNL & 990' FEL Sec. 14, T17S-R32E		Elev.: K.B.	8217.00 ft
		G.L.	4100.00 ft
		D.F.	
Permanent Datum:	Ground Level	Elev.:	4100.00 f
Log Measured From:	Kelly Bushing	4117.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

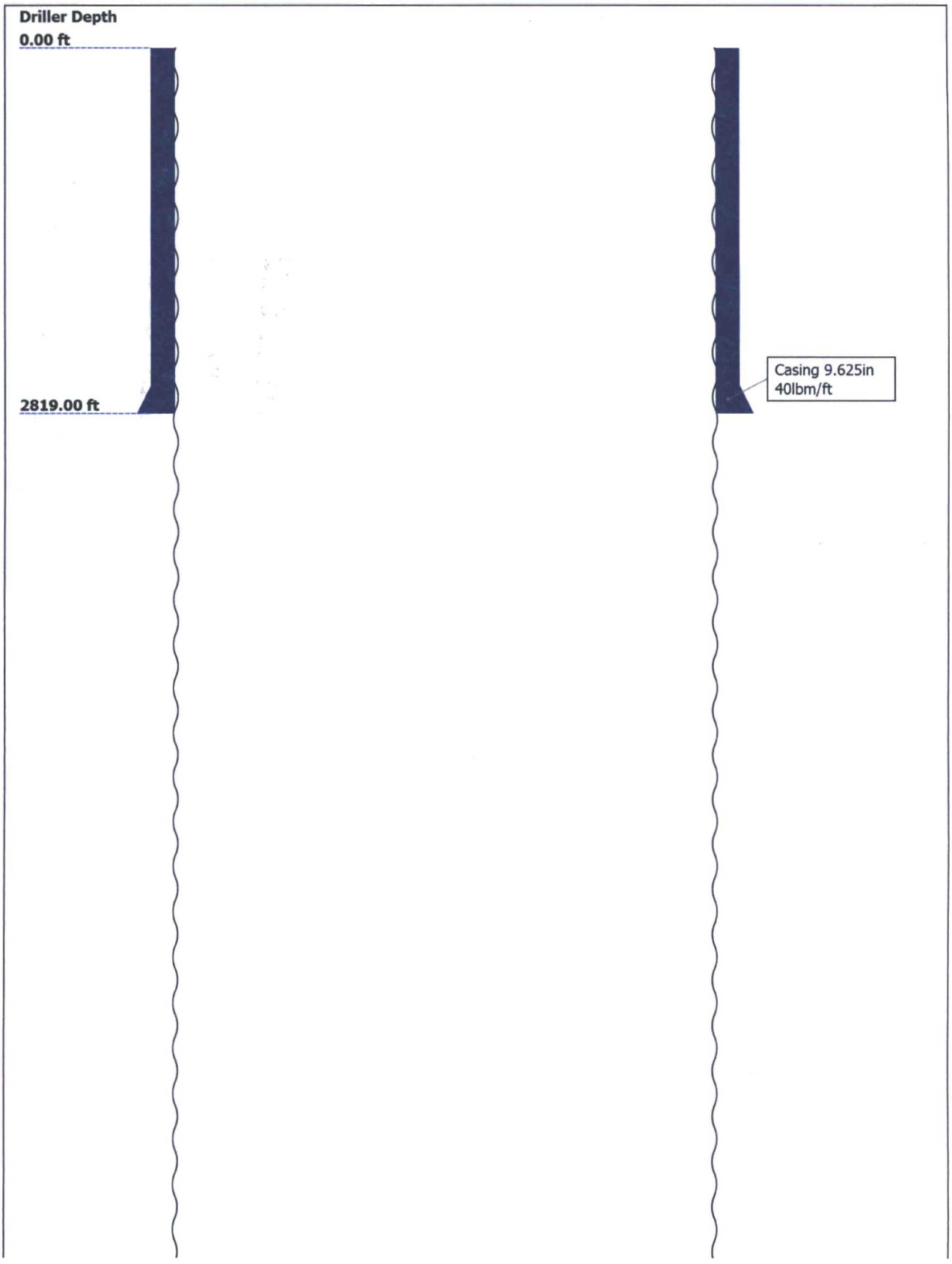
API Serial No.	Section:	Township:	Range:
30-025-43147	14	17S	32E

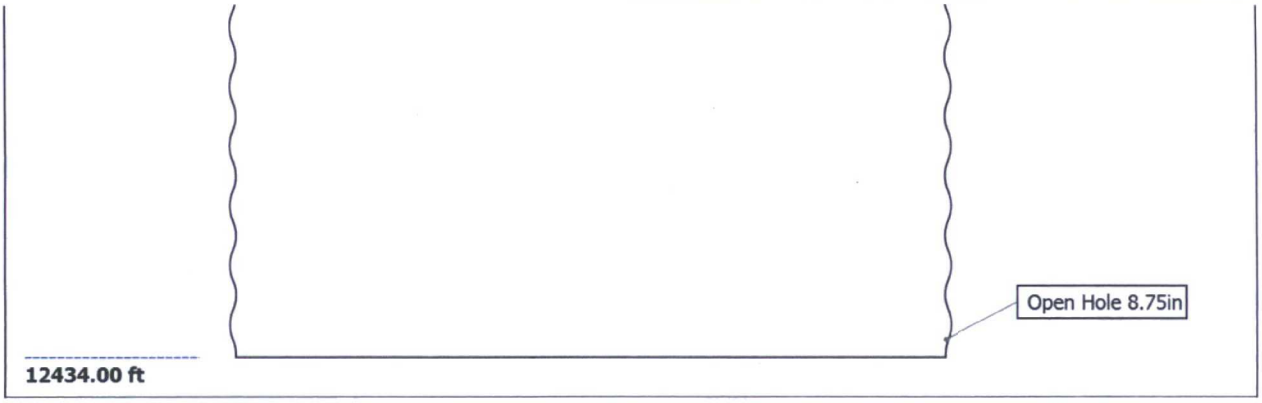
Logging Date			23-Dec-2016			
Run Number			1A			
Depth Driller			12434.00 ft			
Schlumberger Depth			6438.00 ft			
Bottom Log Interval			6438.00 ft			
Top Log Interval			2825.00 ft			
Casing Driller Size @ Depth			9.625 in @ 2819.00 ft			
Casing Schlumberger			2825 ft			
Bit Size			8.75 in			
Type Fluid In Hole			Water			
MUD	Density	Viscosity	8.5 lbm/gal	29 s		
MUD	Fluid Loss	PH	100 cm3	10		
MUD	Source of Sample		Active Tank			
RM @ Meas Temp			0.28 ohm.m @ 68 degF			
RMF @ Meas Temp			0.22 ohm.m @ 68 degF			
RMC @ Meas Temp			0.37 ohm.m @ 68 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.18 @ 108	0.14 @ 108		
Max Recorded Temperatures			108 degF			
Circulation Stopped	Time		23-Dec-2016	12:00:00		
Logger on Bottom	Time		23-Dec-2016	05:53:00		
Unit Number	Location:		2191	Midland, TX		
Recorded By			R Skoll			
Witnessed By			Dennis Andrews			

Disclaimer

Contents

Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	8.75					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	12434					
Bottom Logger (ft)	6438					
Casing						
Size (in)	9.625					
Weight (lbm/ft)	40					
Inner Diameter (in)	8.835					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	2819					
Bottom Logger (ft)	2825					

Remarks and Equipment Summary

1A: Toolstring

Equip name	Length	MP name	Offset
LEH-QT LEH-QT	87.5		
AH-369	84.58		
EDTC-B EDTH-B EDTG-A EDTC-B	83.16		
		CTEM	79.66
		ACCZ	0.00
		HV	0.00
		Gamma Ray	77.79
		TelStatus	76.65
HNGS-BA:129 HEH-K:126 HNGS-BA:129	76.66		
		GR	73.67

1A: Remarks

Thank you for choosing Schlumberger Wireline

Crew: R Skoll, J Pedraza, T Walters

Limestone matrix with MDEN=2.71g/cc

Sonic DTM = 47.6 us/s

Knuckles, bowspring and standoffs used for eccentralization and centralization

Logged into the curve to a final depth of 6438ft before sitting down

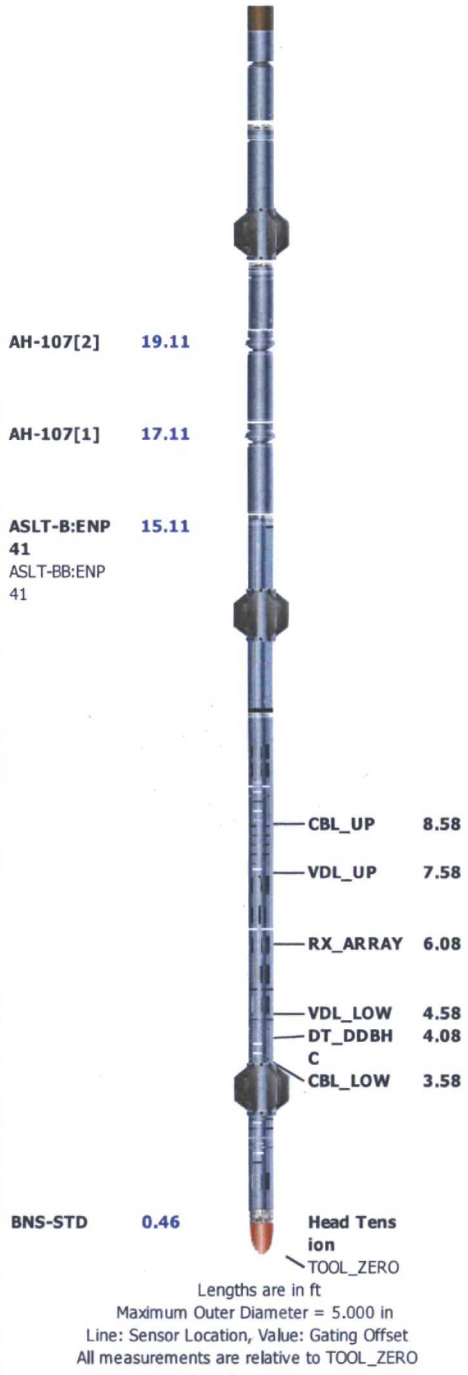
All data logged to CSG, and GR-CNL continued to surface

HNGC-B:523 **68.46**
HNGH-A:4002
HNGC-B:523

HGNS-B:728 **64.96**
HGNH:2945
NSR-F:5027
NPV-N
HGNS-B:728
HACCZ-B:232
HMCA-B

HDRS-H:4814 **55.55**
ECH-MEB:2798
HRCC-H:3921
HRMS-H:4814
HRGD-H:3922
GPV-Q
Short Spacing :27769
Long Spacing :28718
Backscatter:26717
GSR-J:5453

HRLT-B **43.31**
HRUH-B:1833
HRUC-B:1853
HRLS-B
HRLH-B:1884
HRLC-B:1889
AH-270



Depth Summary

	1A		
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	7-46P-XS		
Serial Number			
Length	22100.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

1A:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	
Rig Up Length At Surface		
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

1A

Main Pass 2" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1045.49	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1641.99	ft3

Software Version

Acquisition System	Version
Maxwell 2016 SP3	6.3.75395.3100
Application Patch	Wireline_Hotfix-MAST-2016SP3_6.3.77788

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Main[6]:Up	Up	183.13 ft	6441.88 ft	23-Dec-2016 7:43:54 AM	23-Dec-2016 10:17:52 AM	ON	5.92 ft	Yes

All depths are referenced to toolstring zero

Log

Company:COG OPERATING LLC Well:FLAT HEAD FEDERAL COM 27H

1A: Main[6]:Up:S004

Description: HRLT BASIC LOG Format: Log (Porosity 2 inch General) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:02

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
GR	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
RHOZ	HDRS-H:HRMS-H:HRGD-H	2in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-B:HGNS-B:HGNS-B	6in

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (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)

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

Caliper (HCAL) HDRS-H

3 in 13

Gamma Ray (ECGR) HGNS-B

0 gAPI 150

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

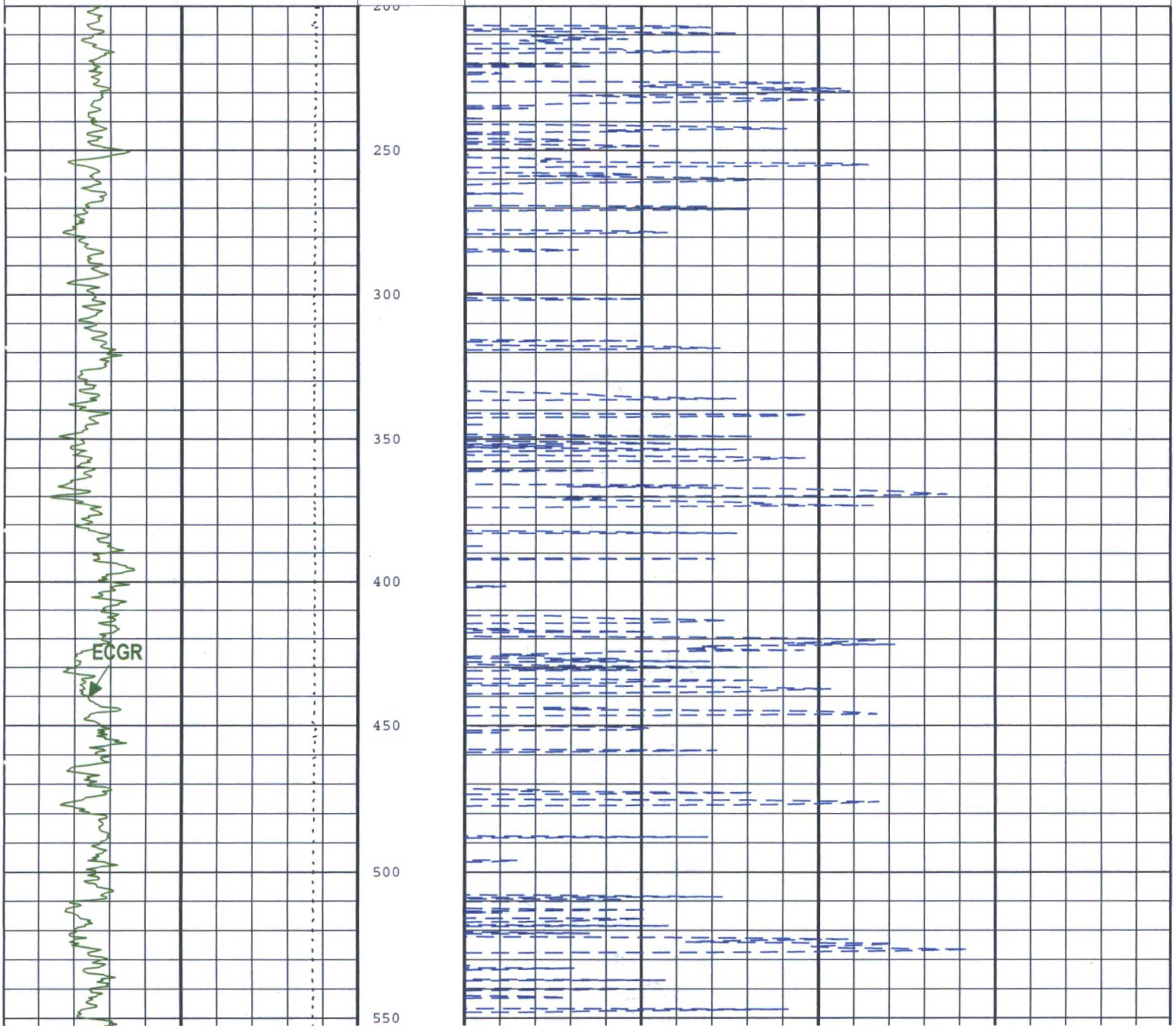
0 10

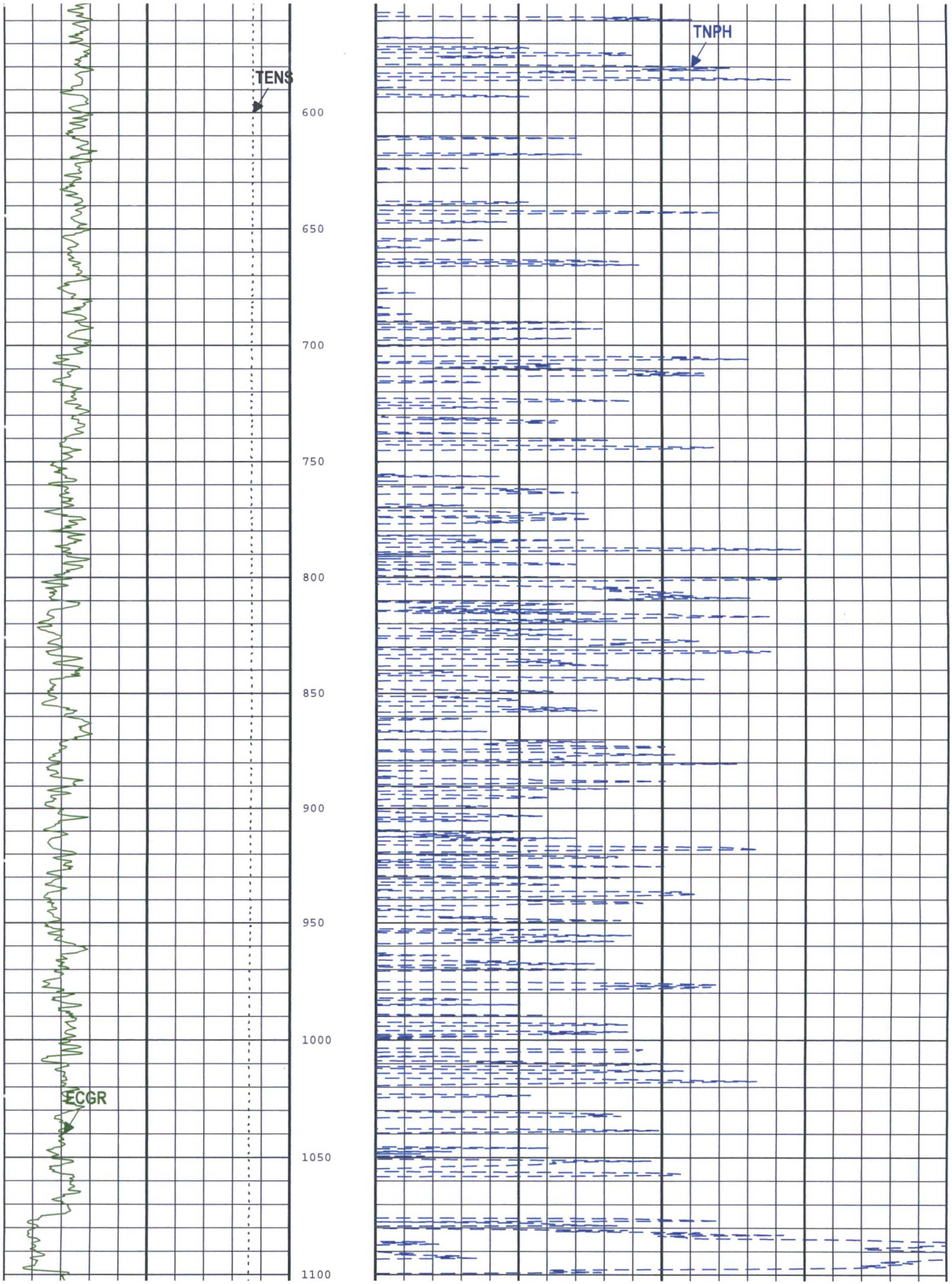
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B

0.3 ft3/ft3 -0.1

Standard Resolution Formation Density (RHOZ) HDRS-H

2 g/cm3 3

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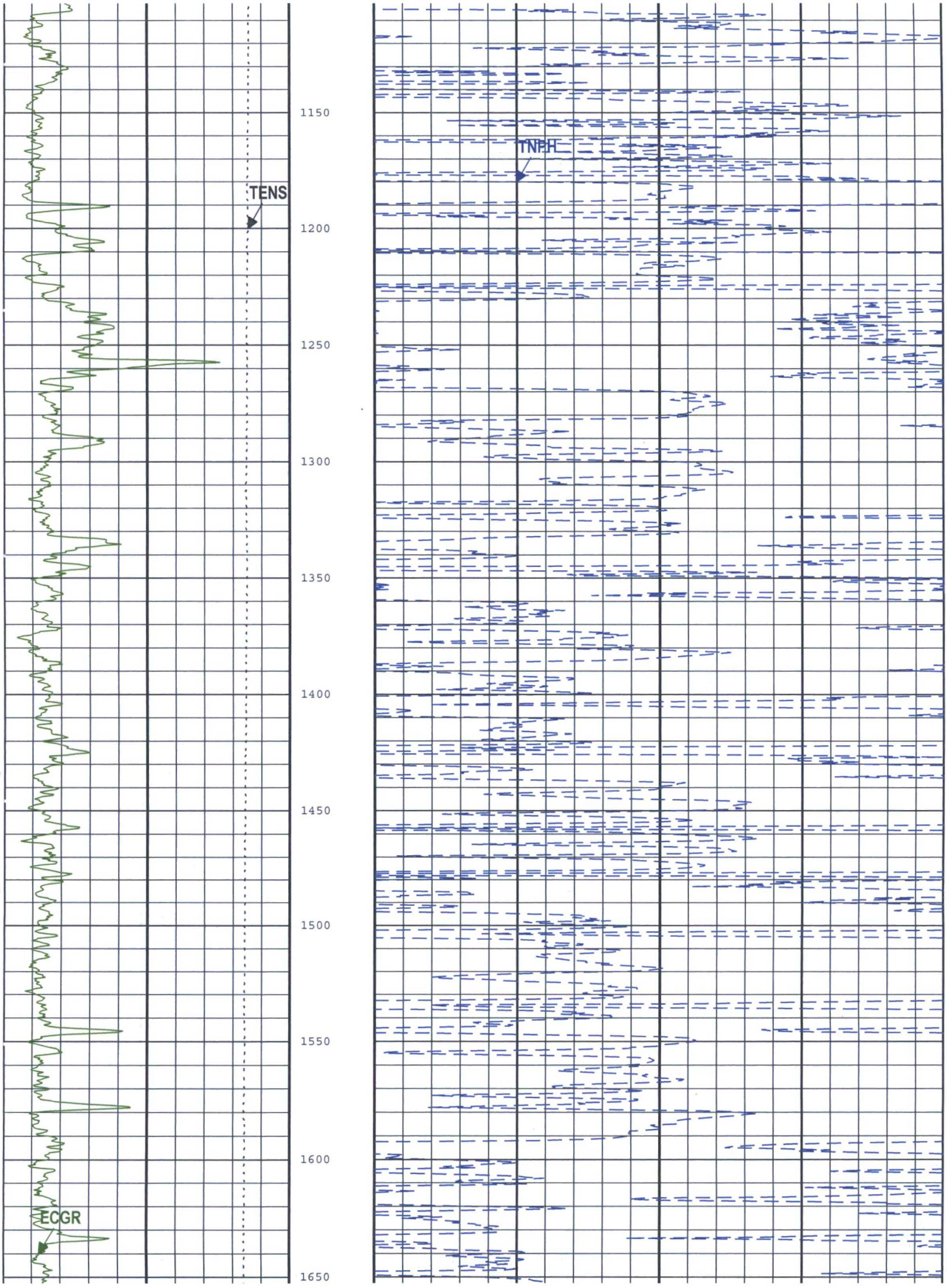
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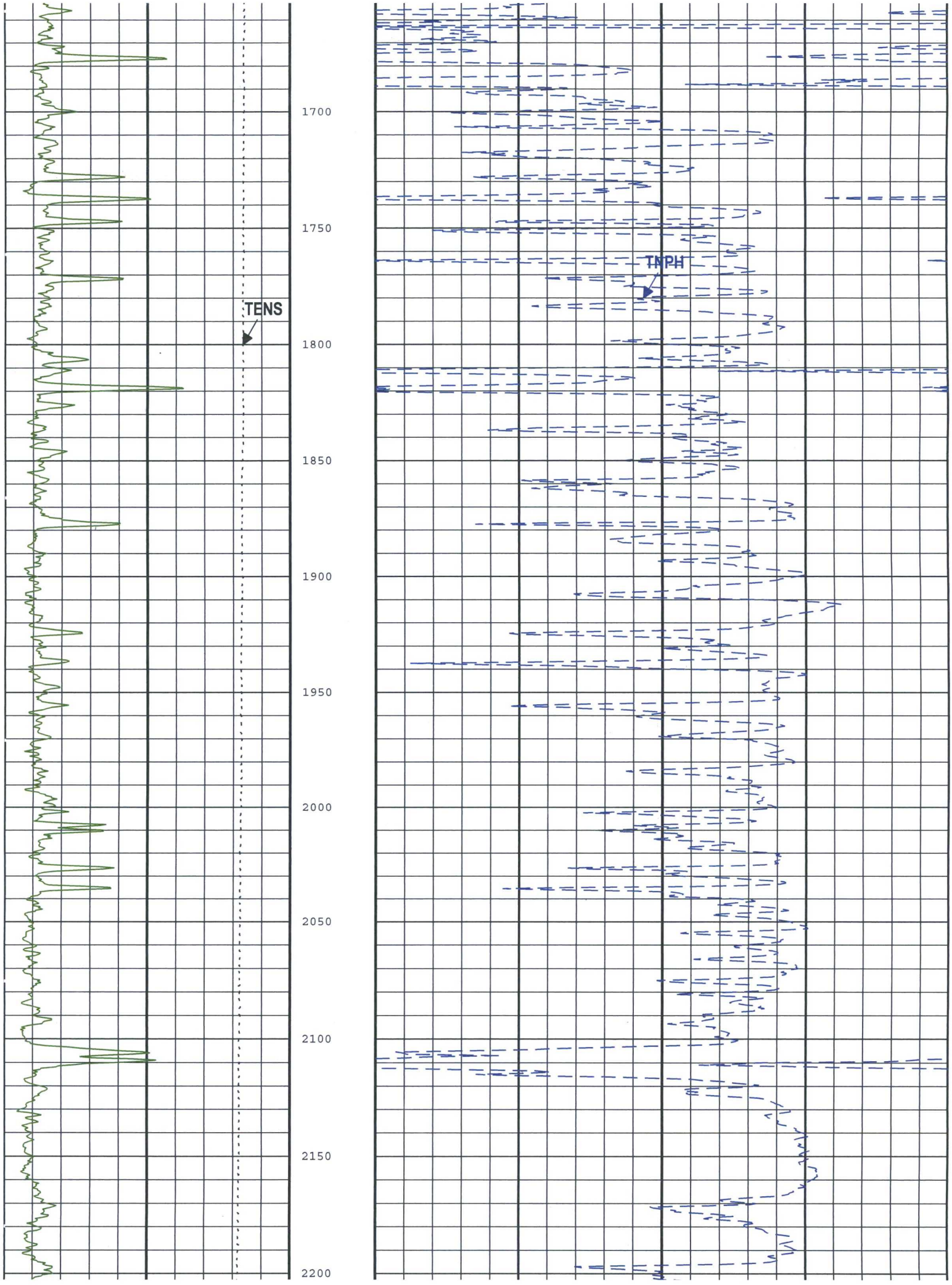
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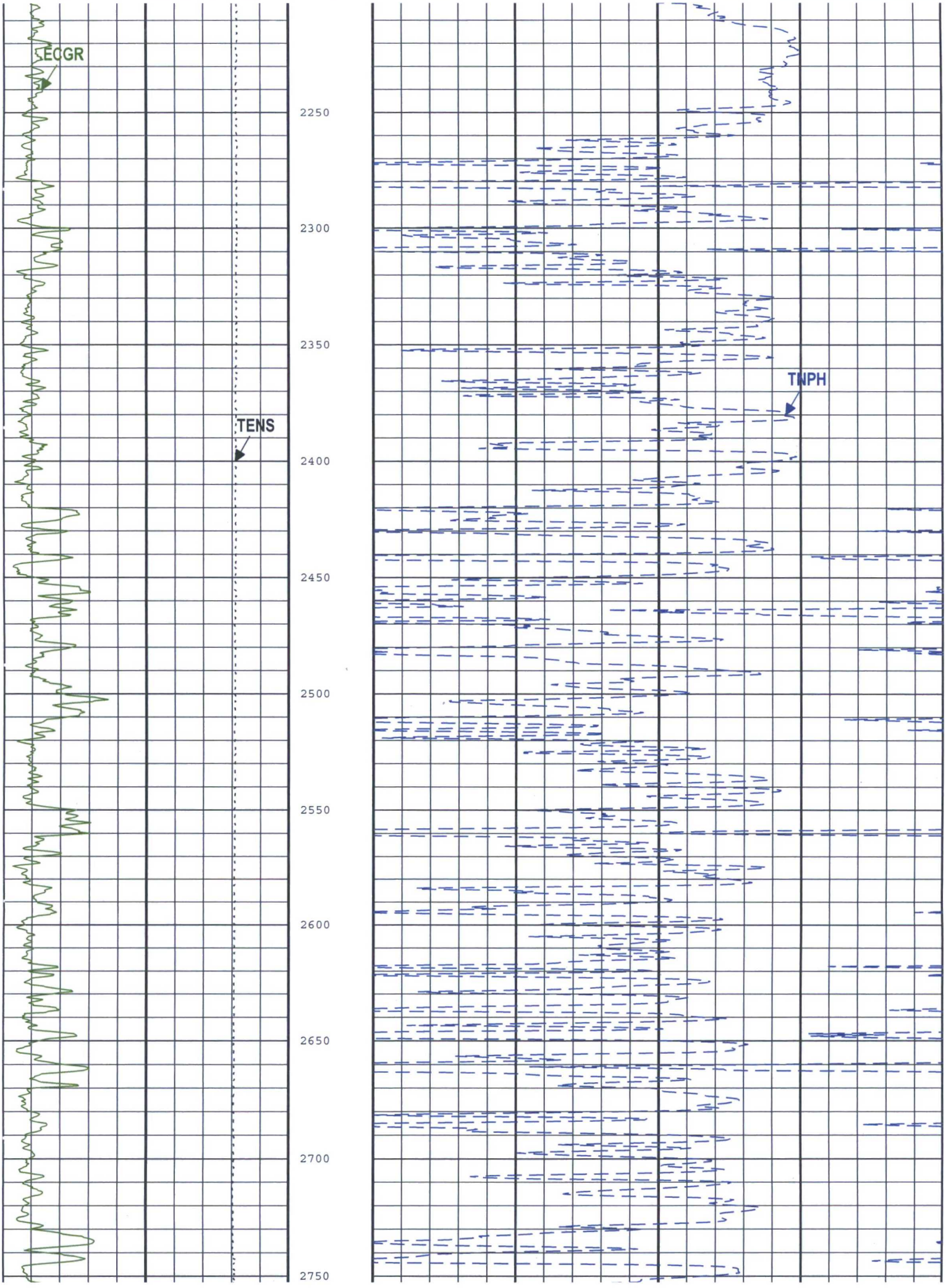
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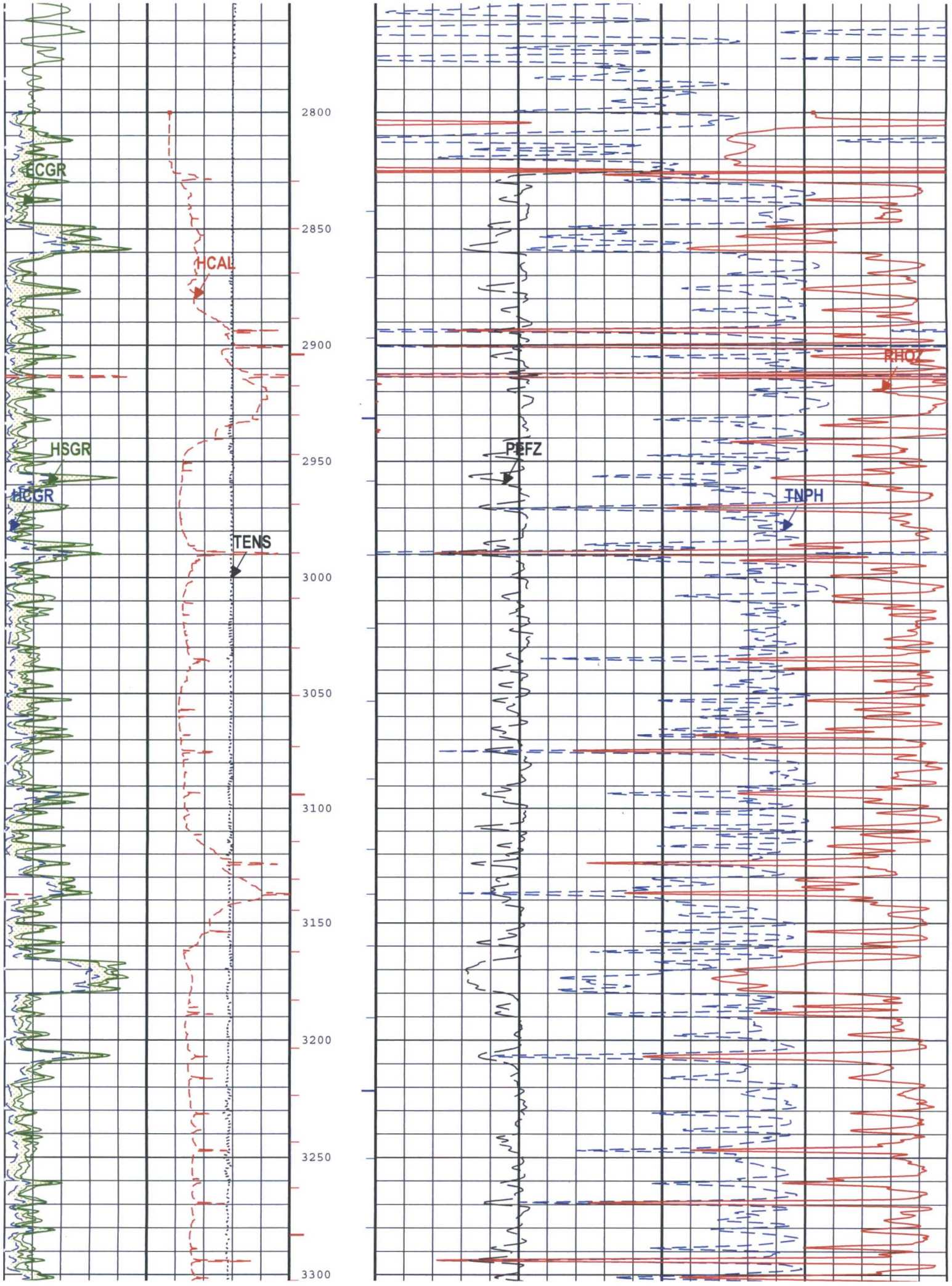
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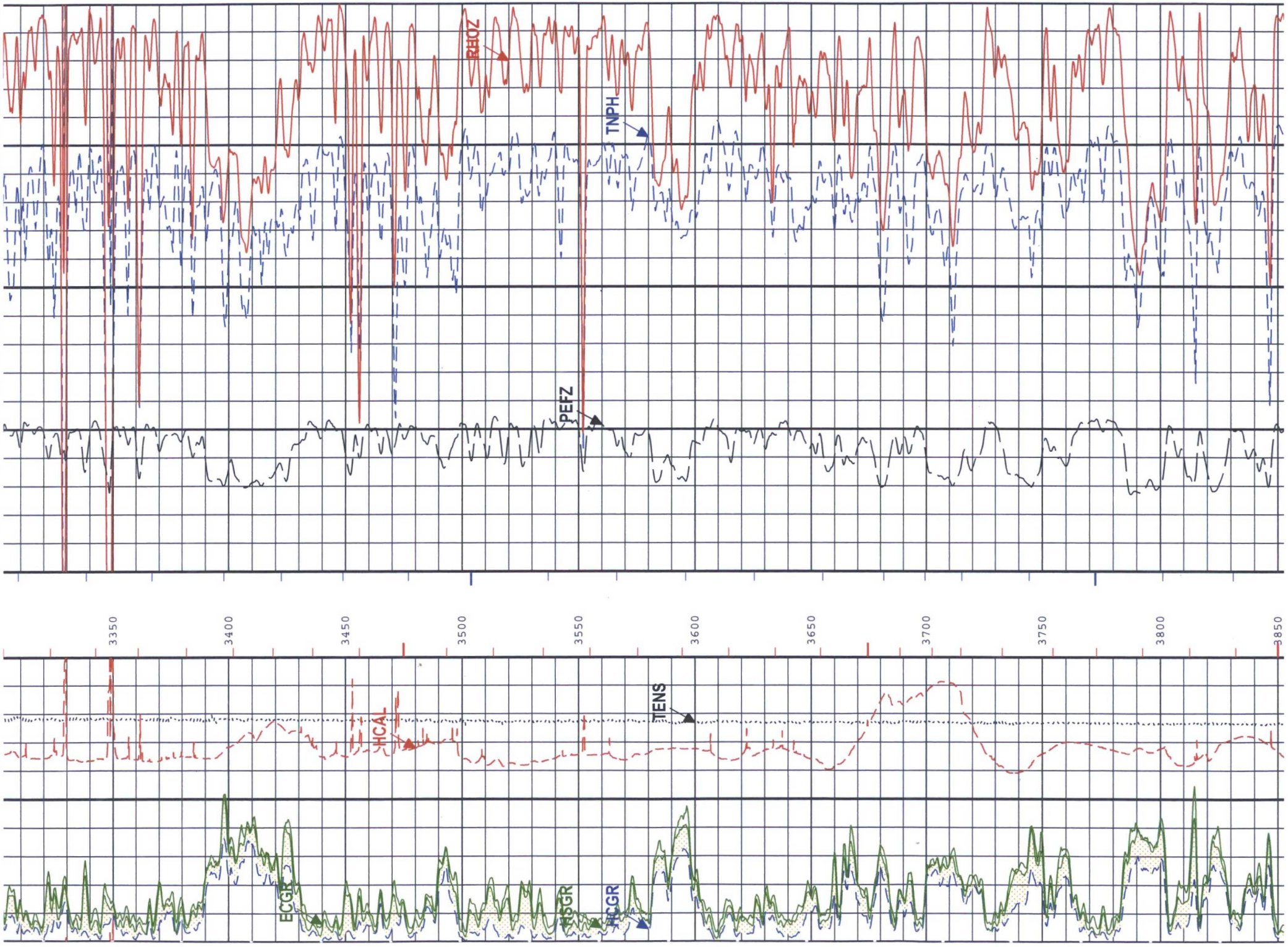
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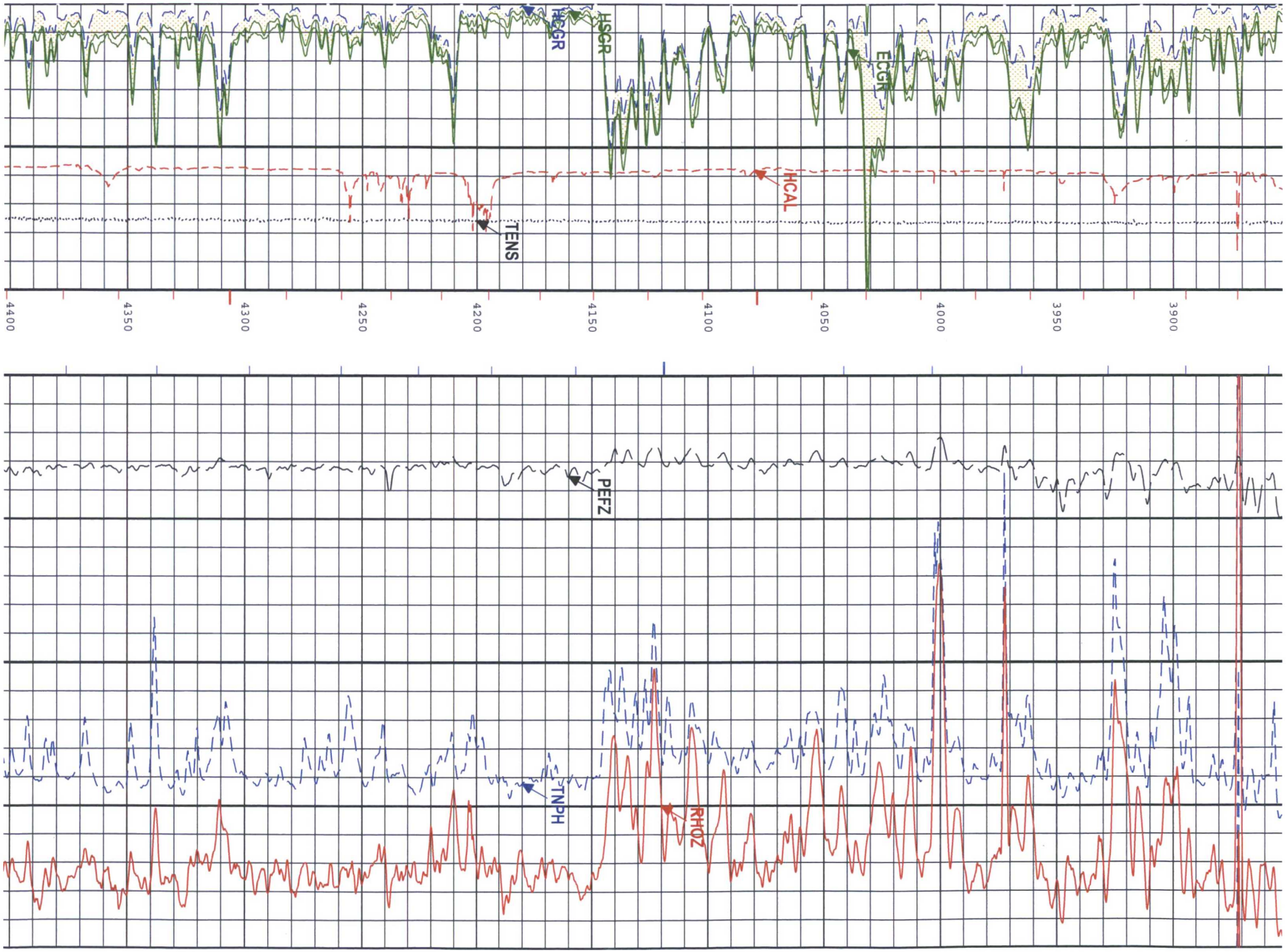
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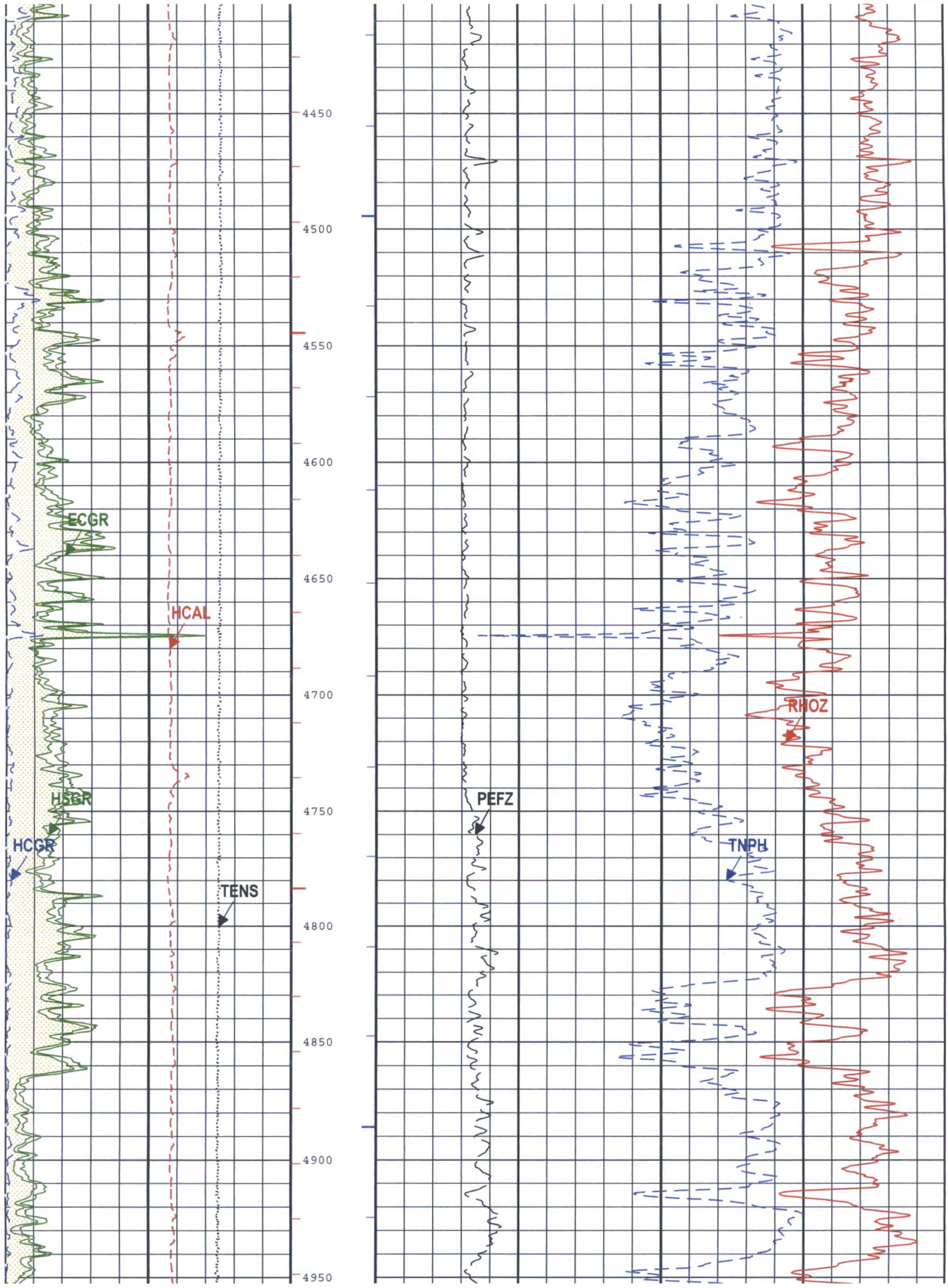
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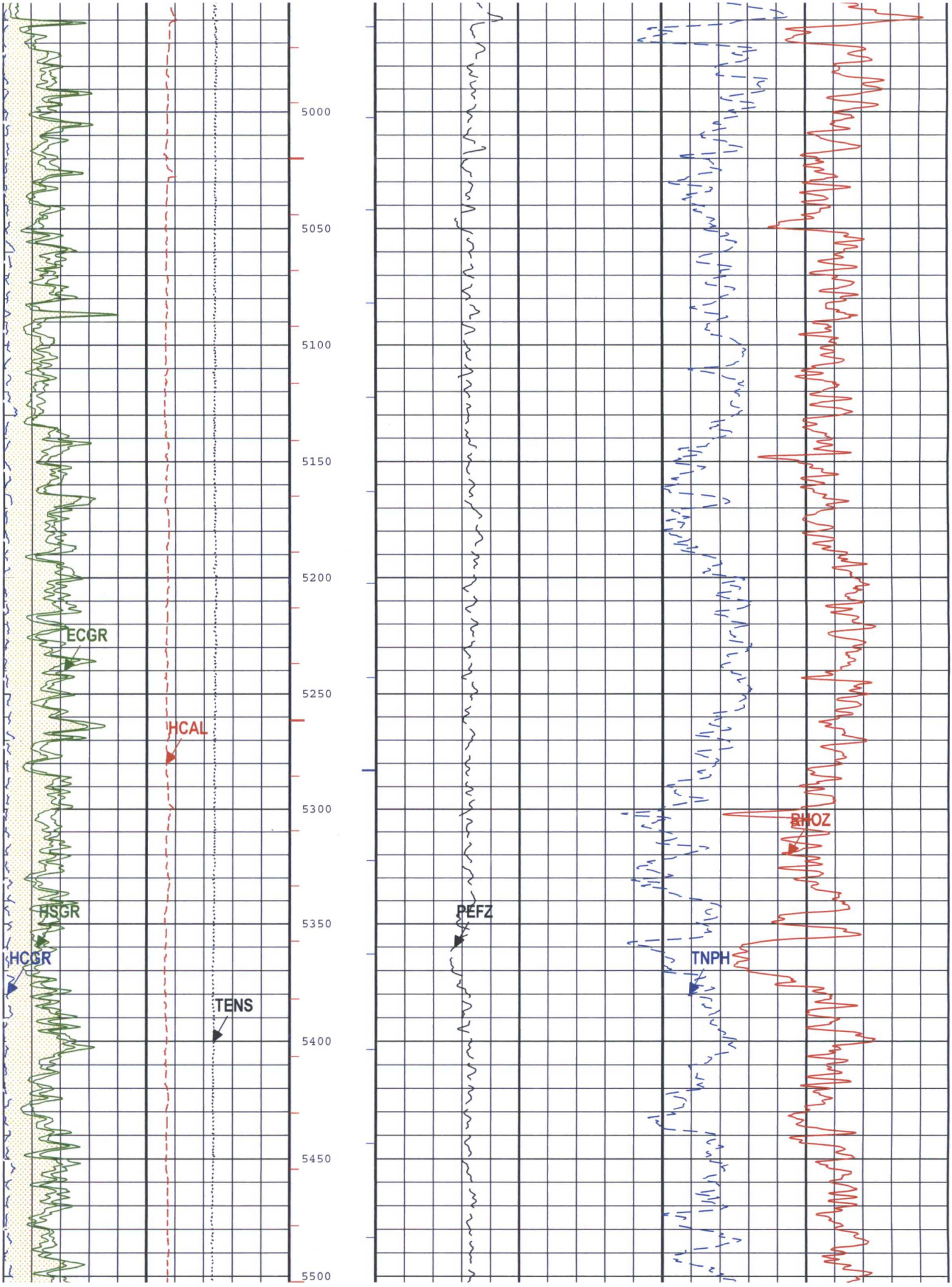
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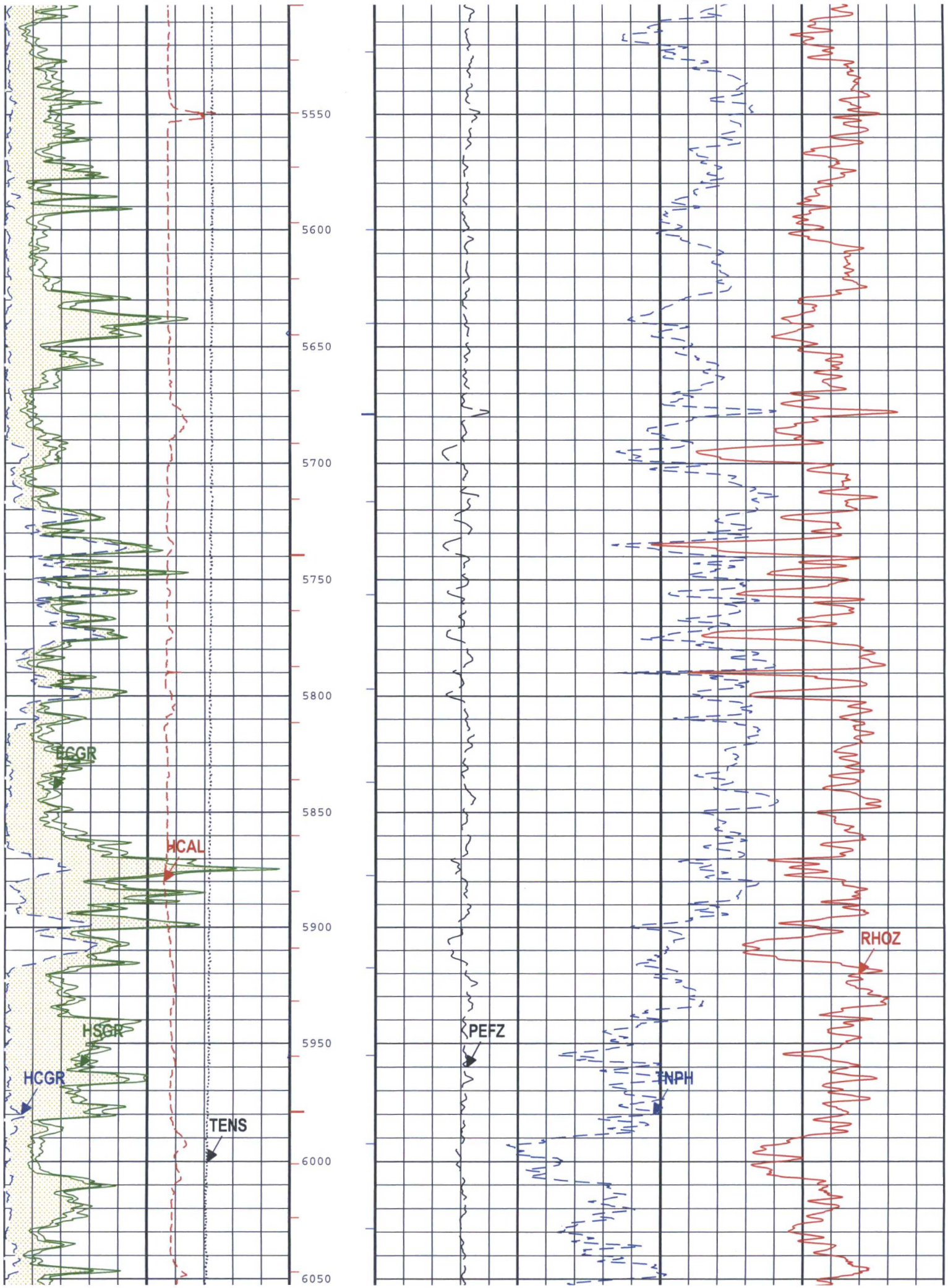
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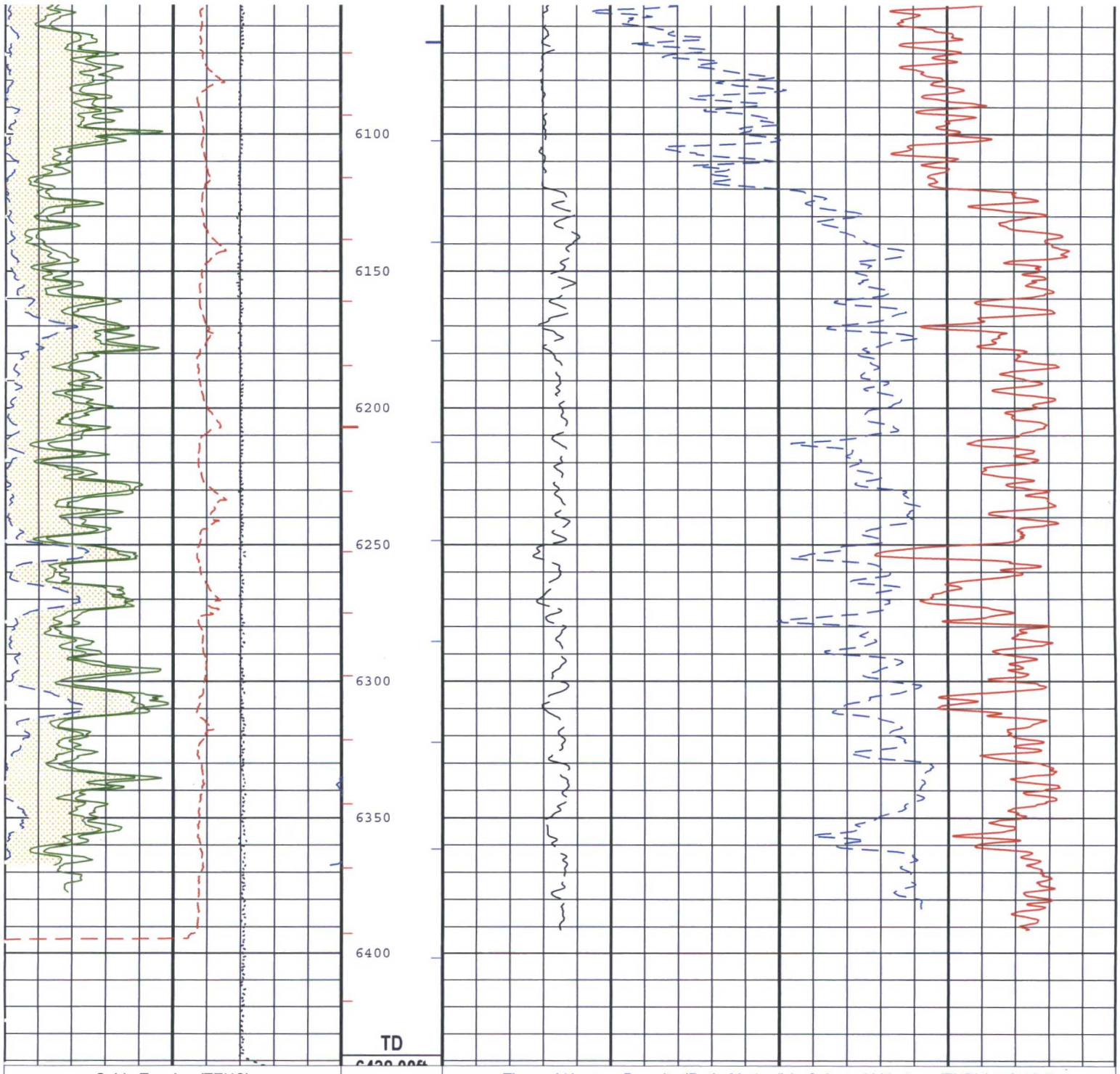


Cable Tension (TENS)
10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA
0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HNGS-BA
0 gAPI 150

Caliper (HCAL) HDRS-H
3 in 13

Gamma Ray (ECGR) HGNS-B
0 gAPI 150

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B
0.3 ft3/ft3 -0.1

Standard Resolution Formation Density (RHOZ) HDRS-H
2 g/cm3 3

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H
0 10

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

Description: HRLT BASIC LOG Format: Log (Porosity 2 inch General) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:02

1A

Main Pass 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1045.49	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1641.99	ft3

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Main[6]:Up	Up	183.13 ft	6441.88 ft	23-Dec-2016 7:43:54 AM	23-Dec-2016 10:17:52 AM	ON	5.92 ft	Yes

All depths are referenced to toolstring zero

Log

Company:COG OPERATING LLC Well:FLAT HEAD FEDERAL COM 27H

1A: Main[6]:Up:S004

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:05

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-B:HGNS-B:HGNS-B	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
PXND	PEQL	6in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-B:HGNS-B:HGNS-B	6in

IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

Density Standoff Correction (HDRA) HDRS-H

-0.05 g/cm3 0.2

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

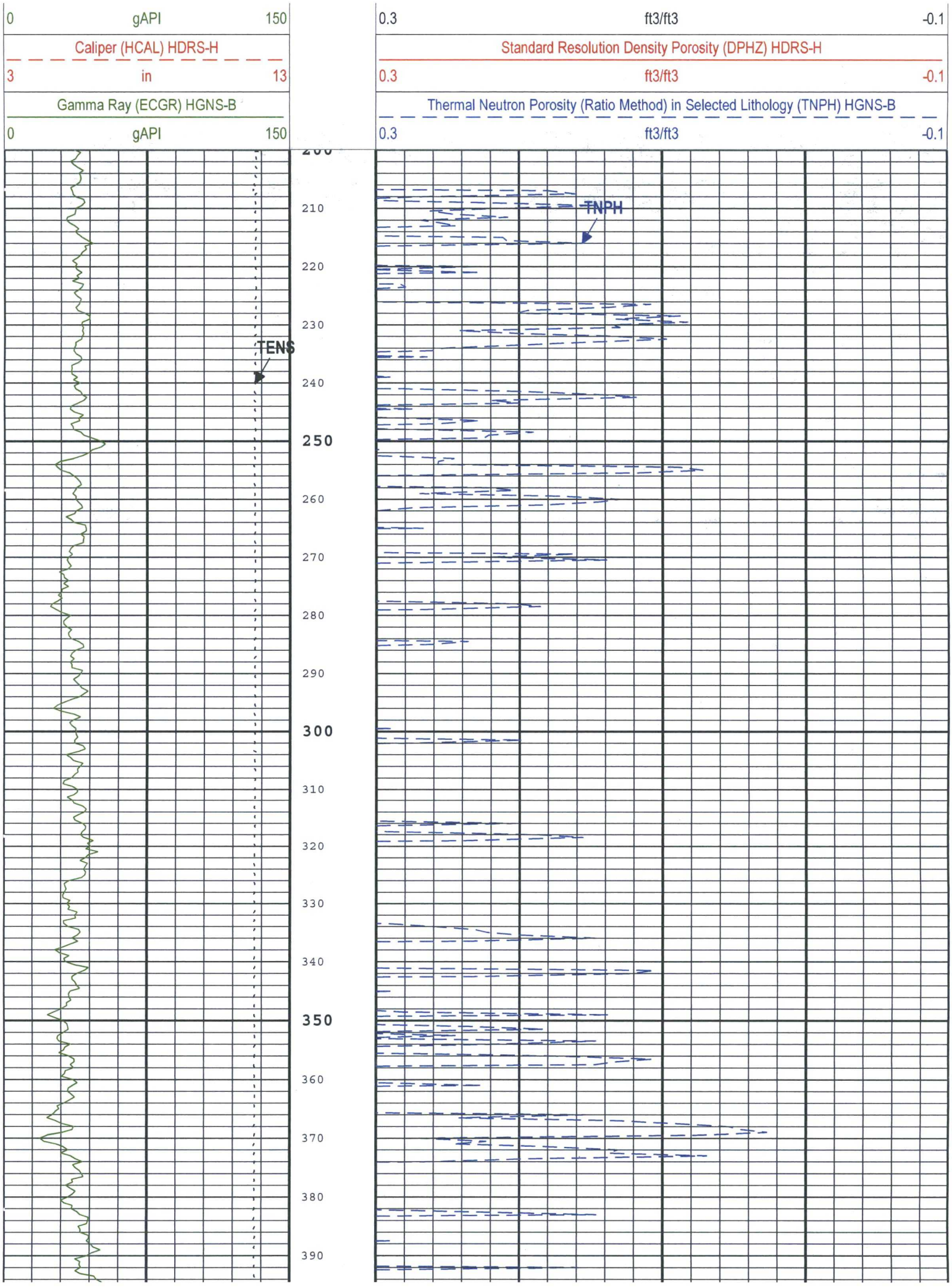
0 gAPI 150

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Spectroscopy Gamma Ray (HSGR) HNGS-BA

Crossplot Porosity for Neutron-Density (PXND_HILT)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Caliper (HCAL) HDRS-H
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Gamma Ray (ECGR) HGNS-B
0 gAPI 150
0.3 ft3/ft3 -0.1
Standard Resolution Density Porosity (DPHZ) HDRS-H
0.3 ft3/ft3 -0.1
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B
0.3 ft3/ft3 -0.1
TNPH
TENS
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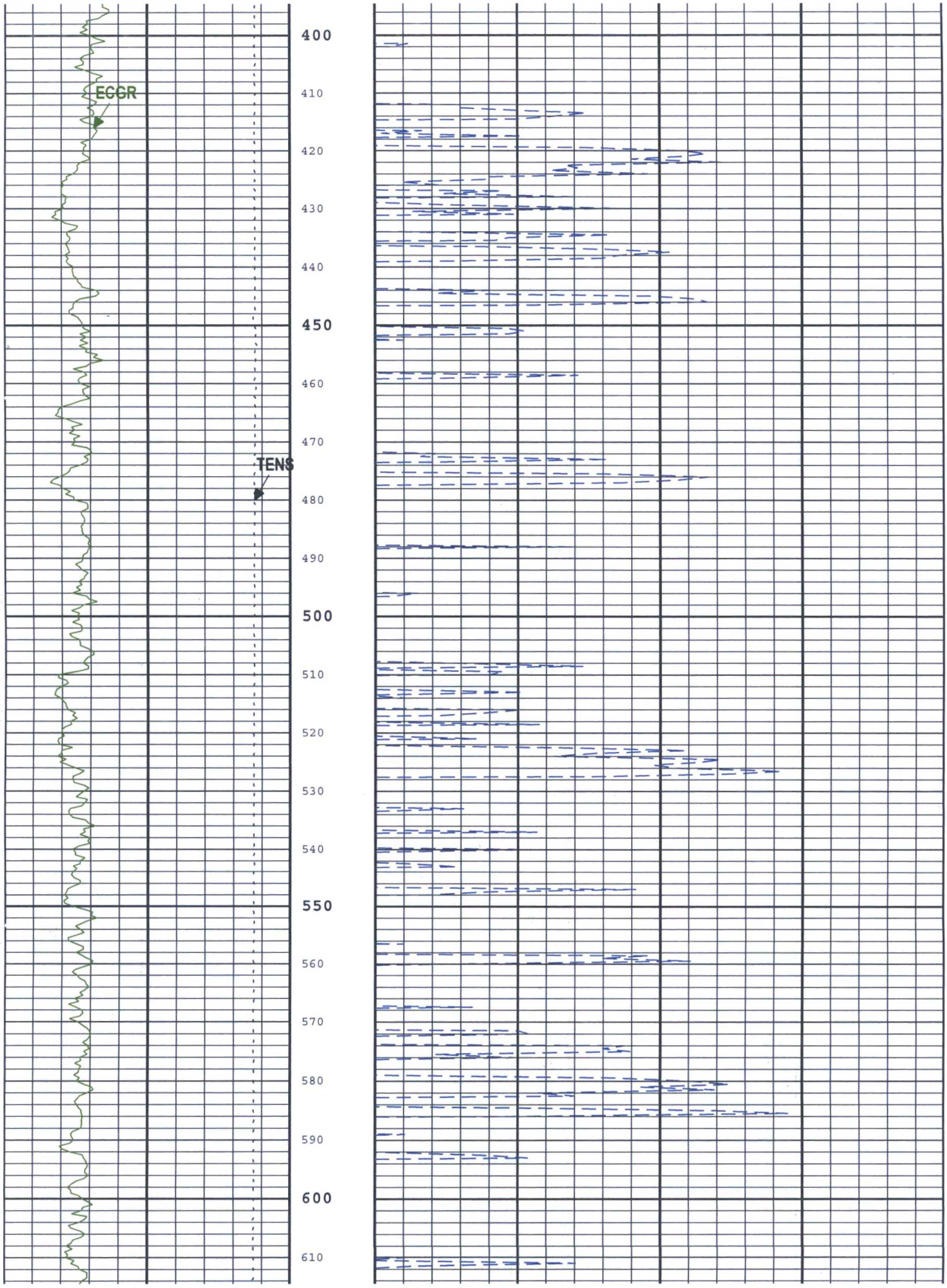
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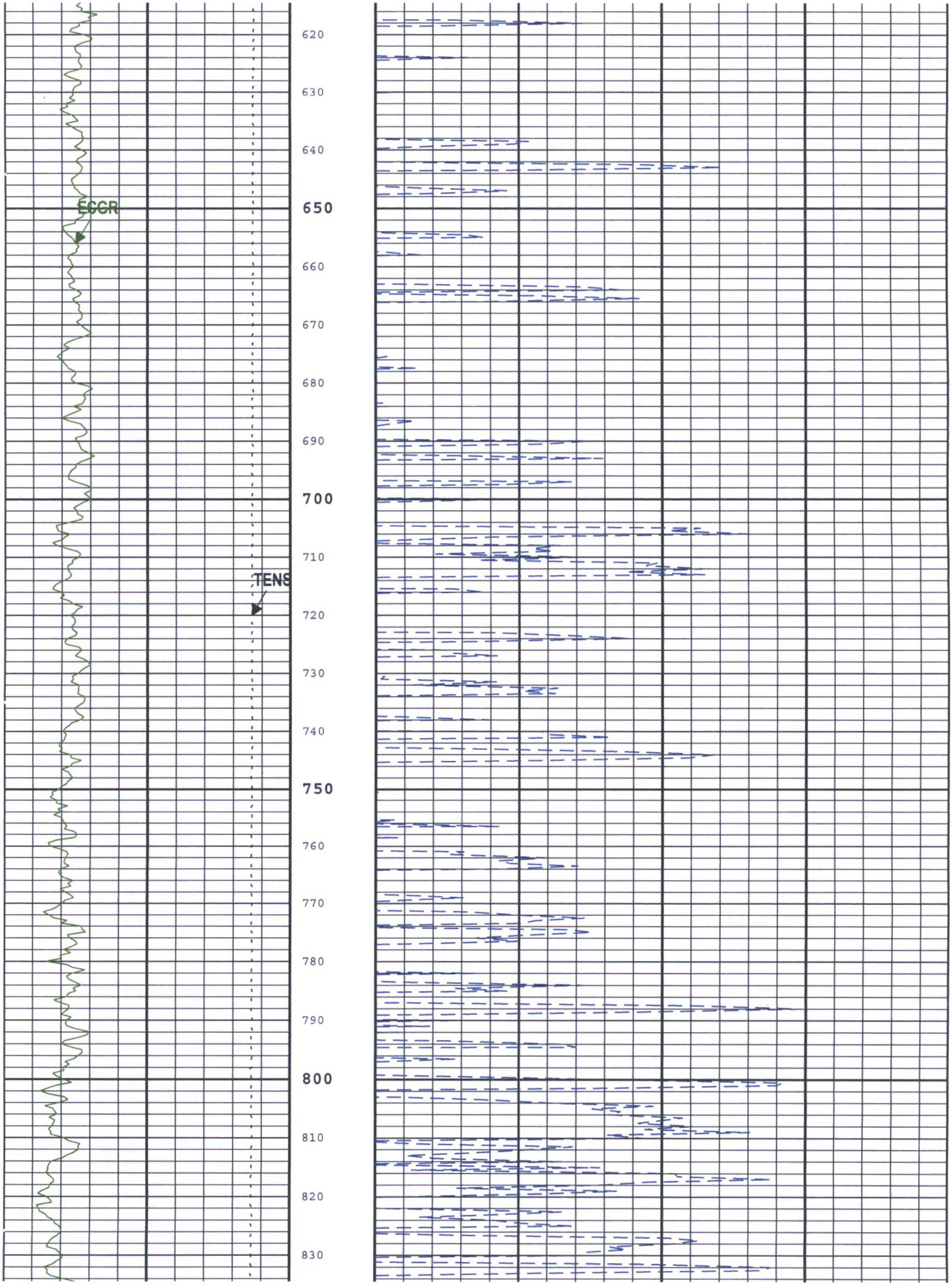
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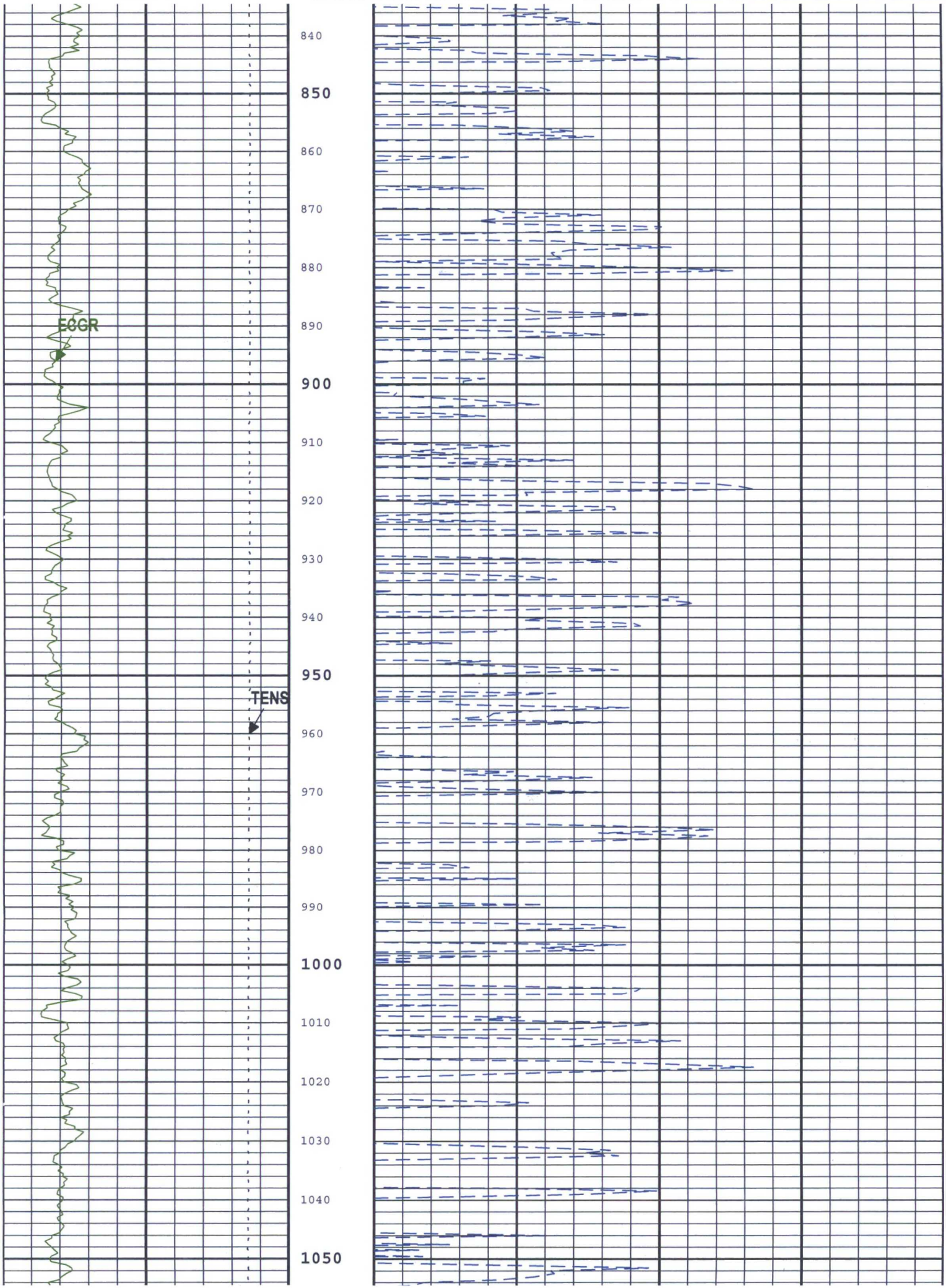
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TENS
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990
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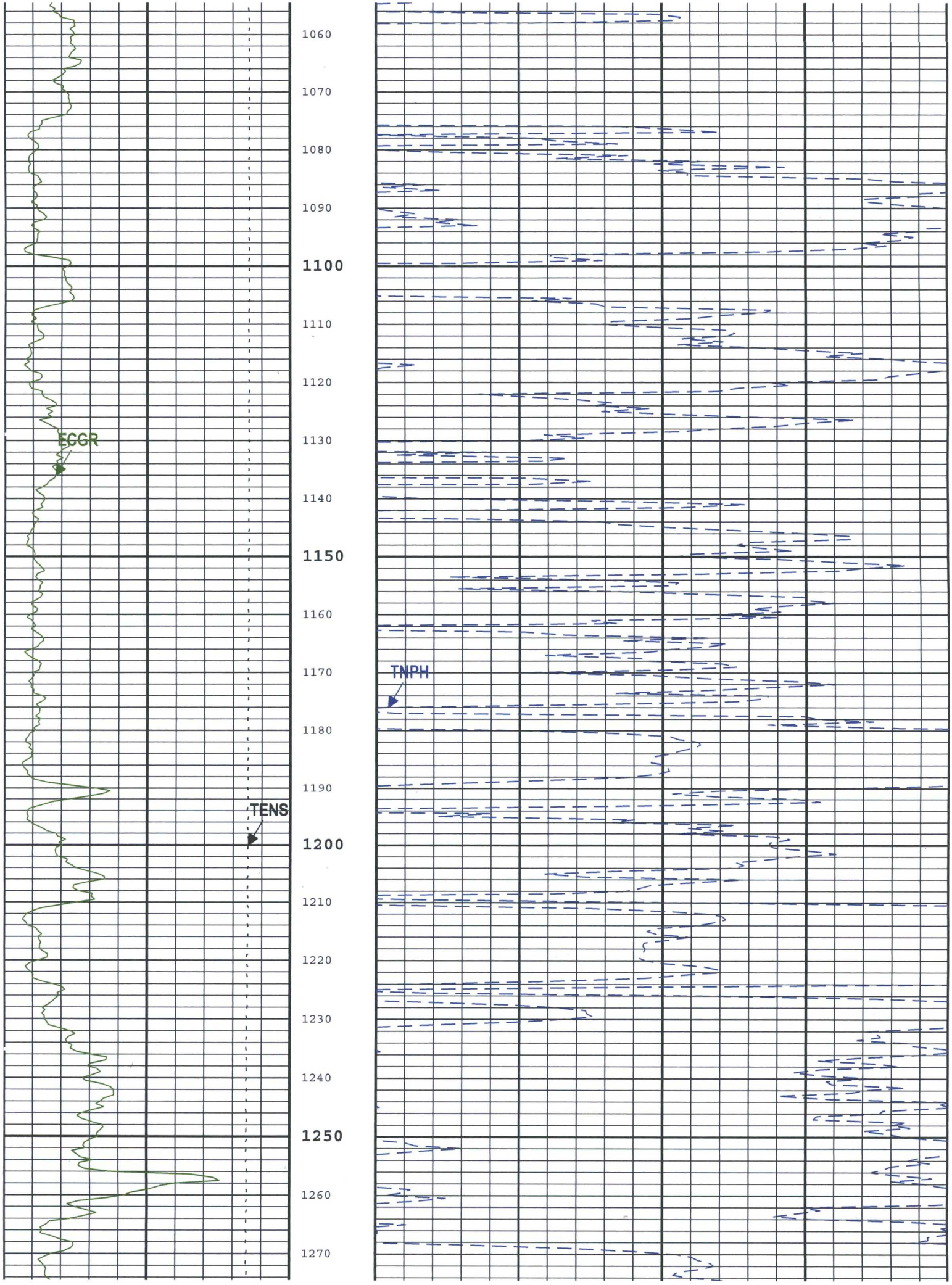
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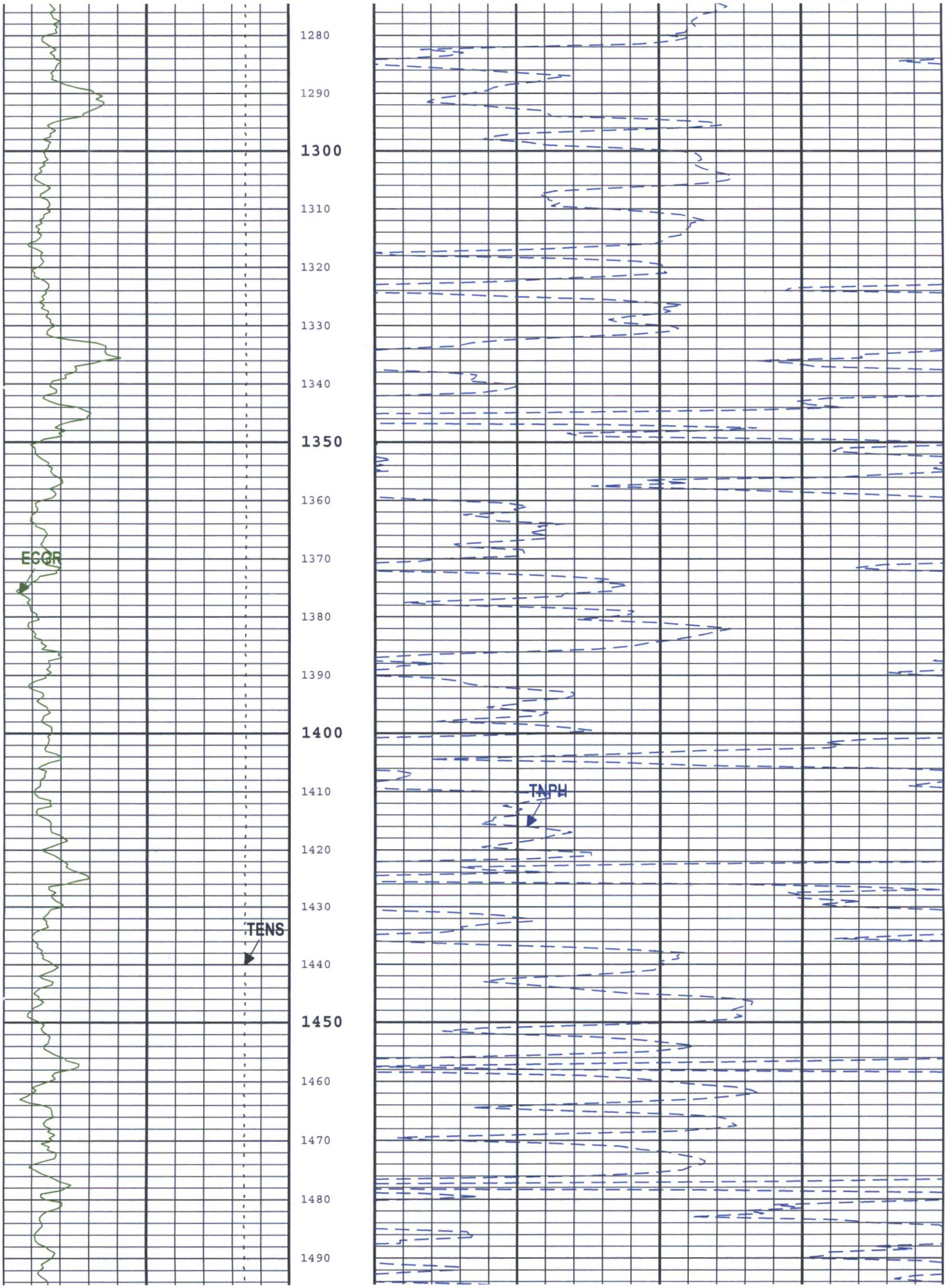
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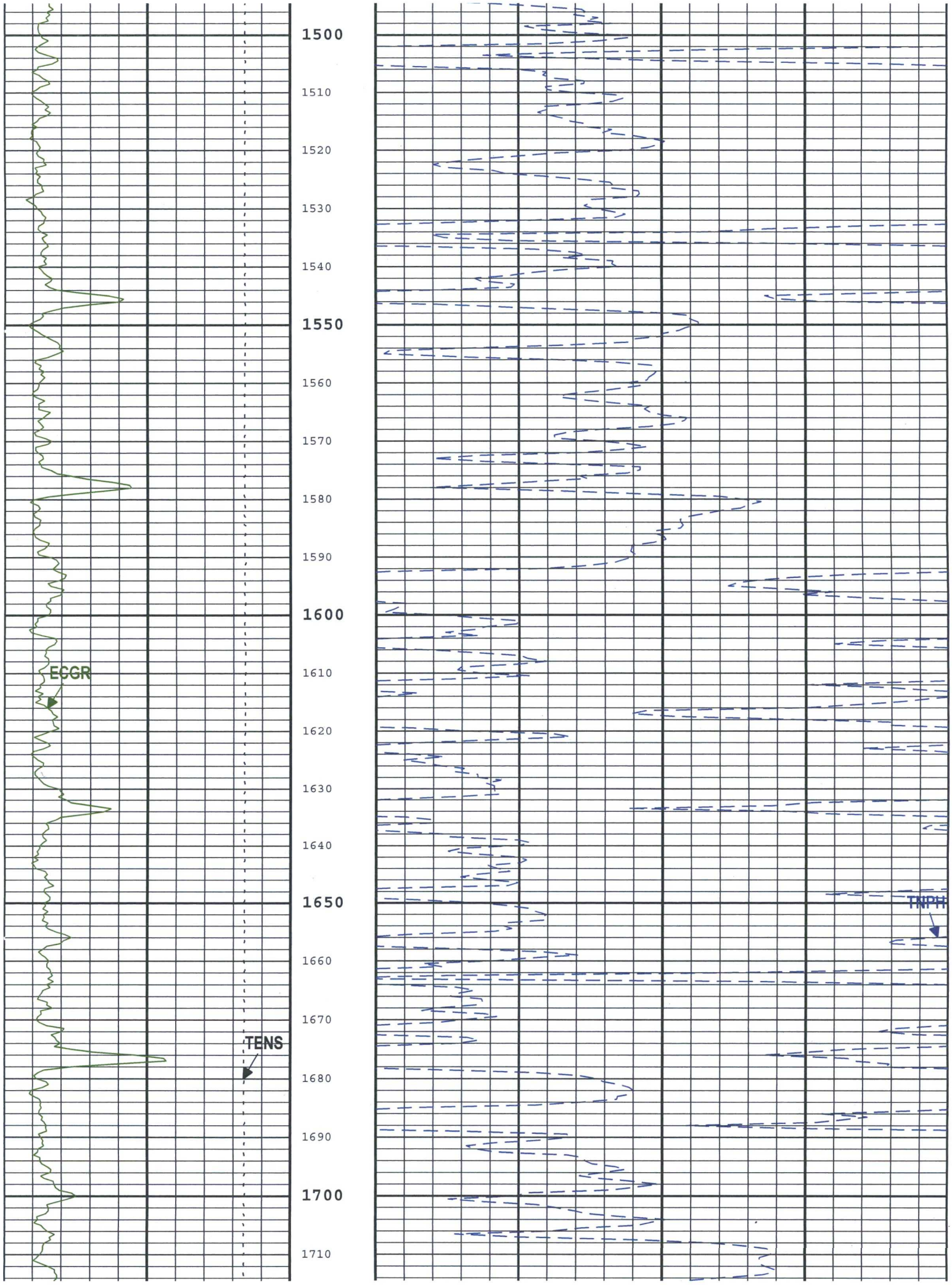
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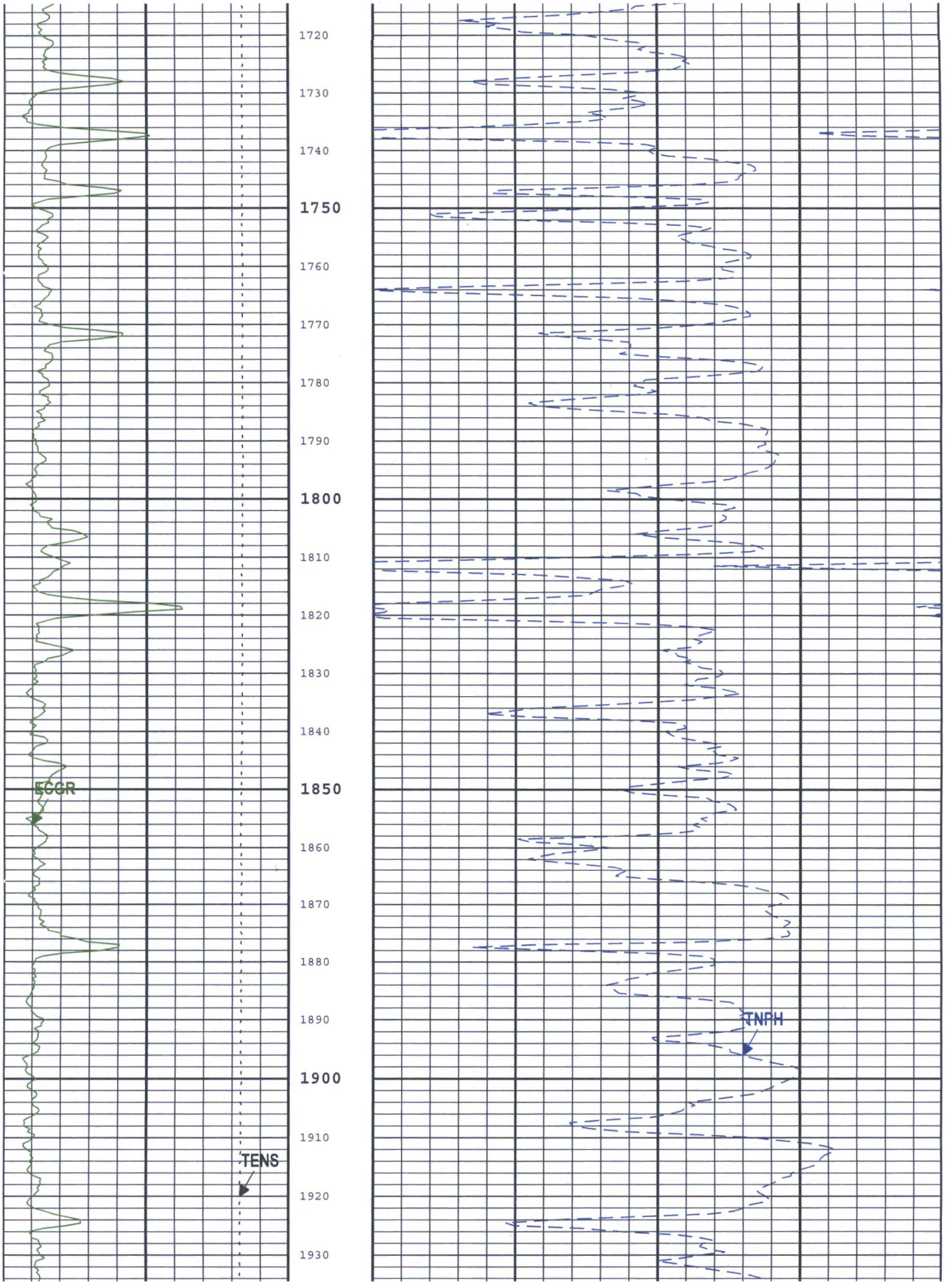
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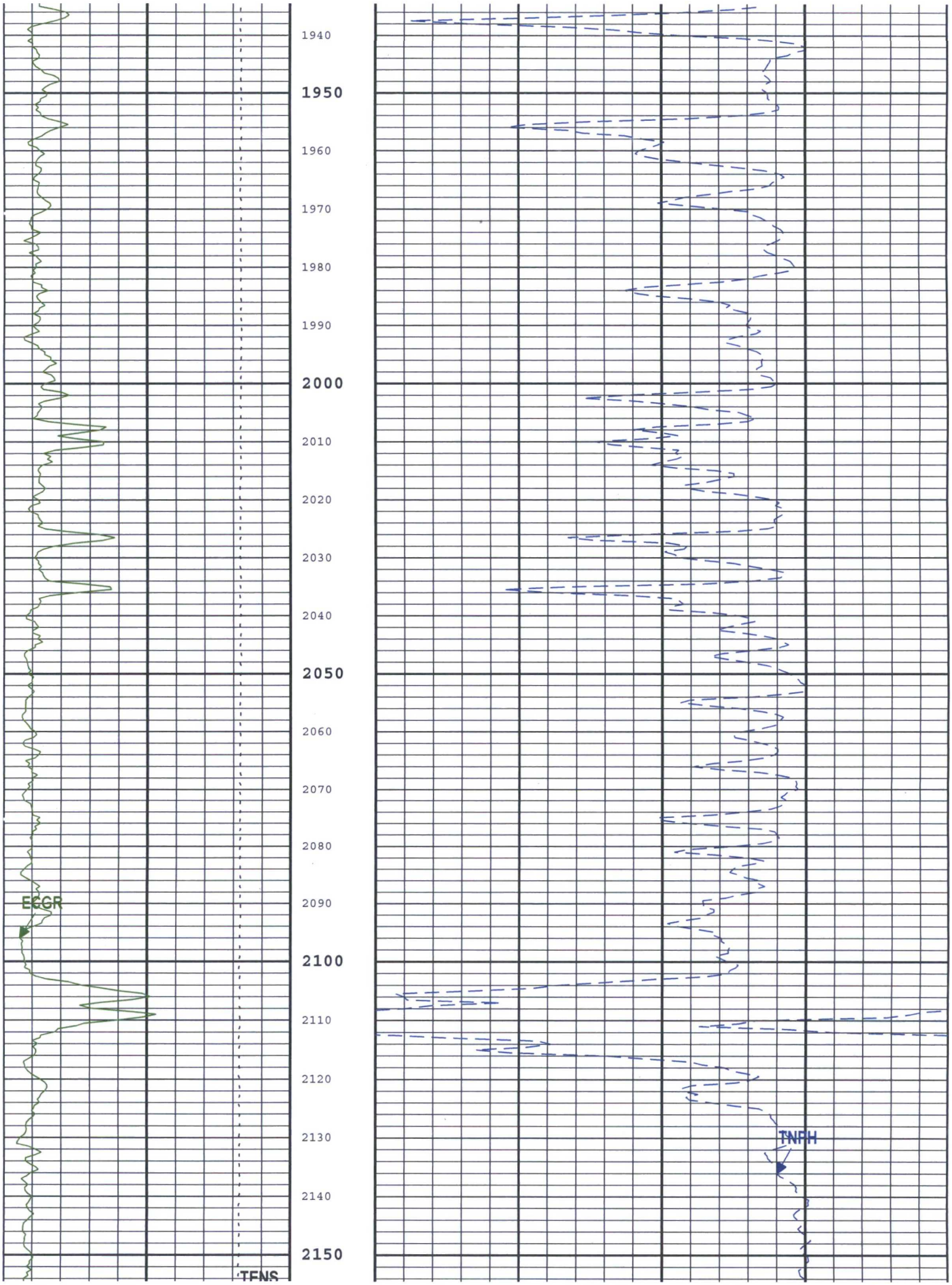
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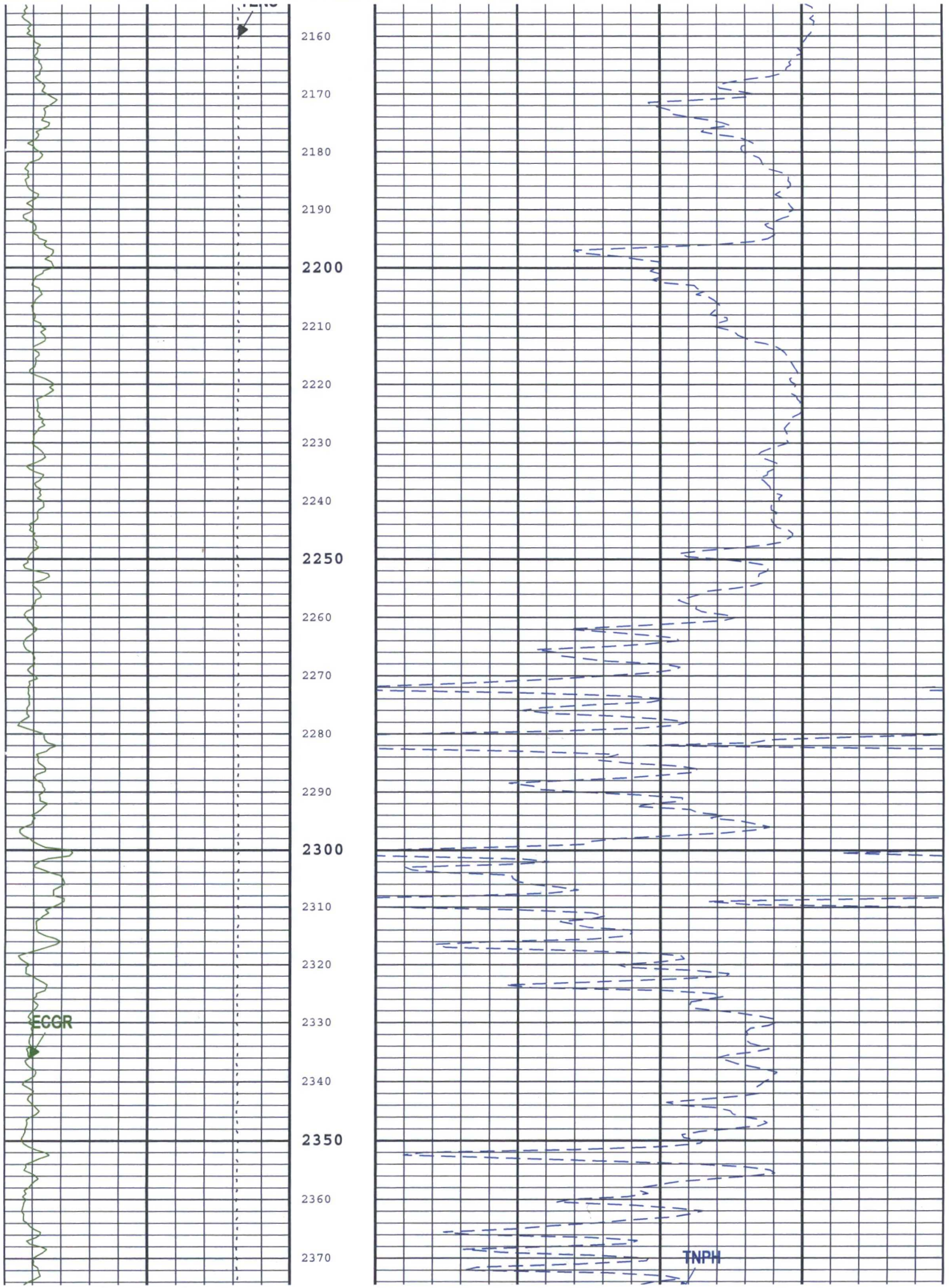
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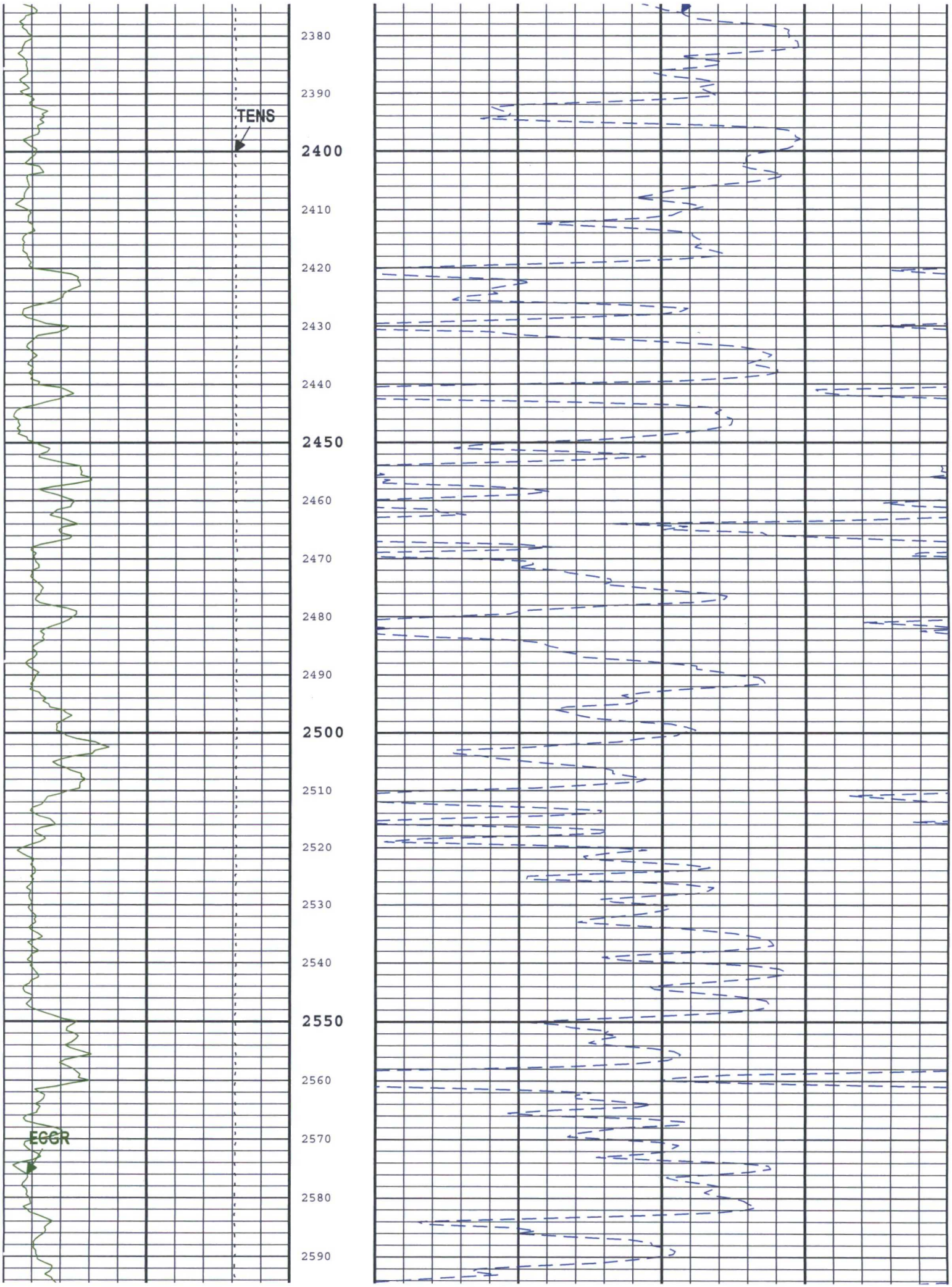
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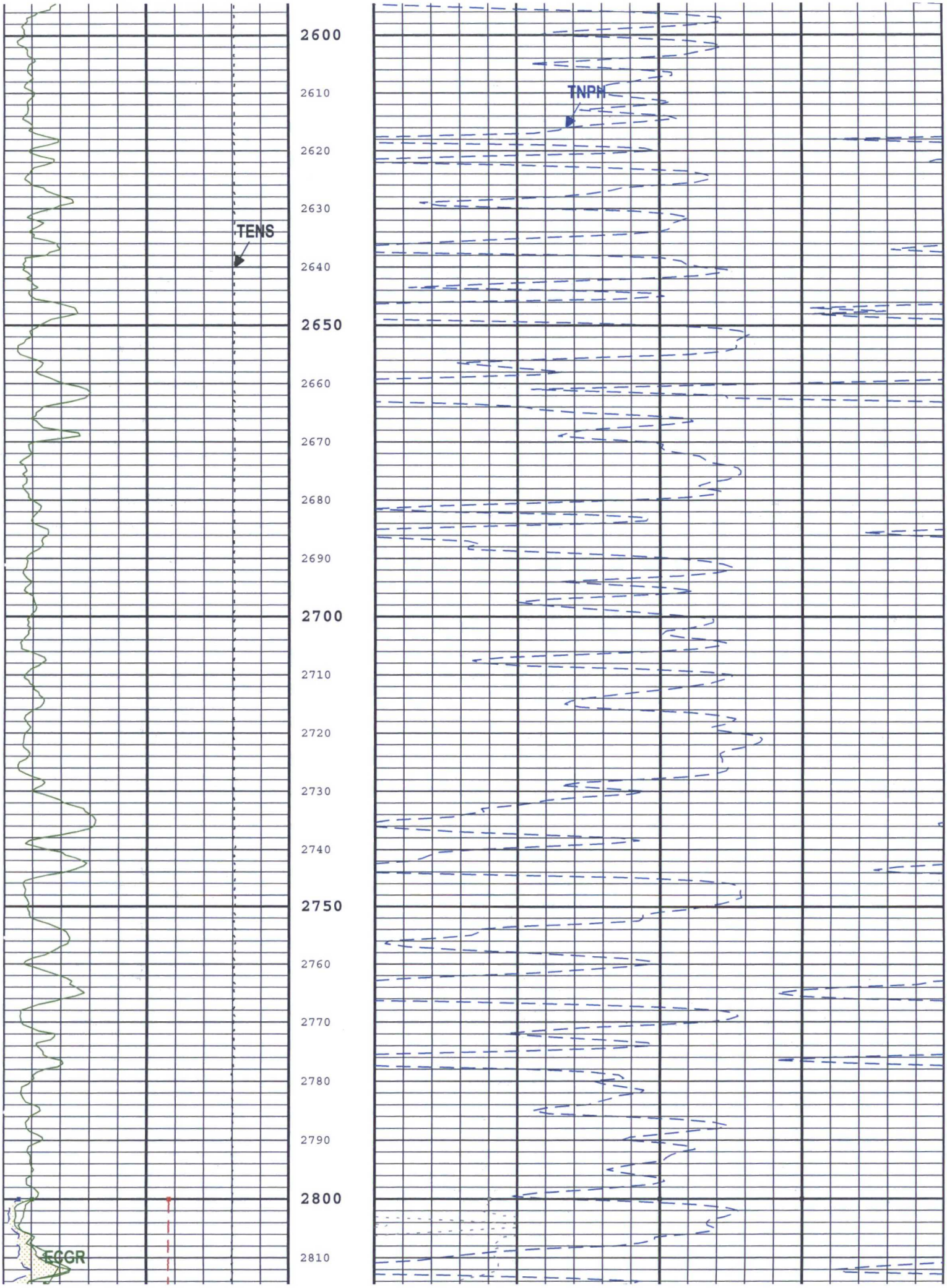
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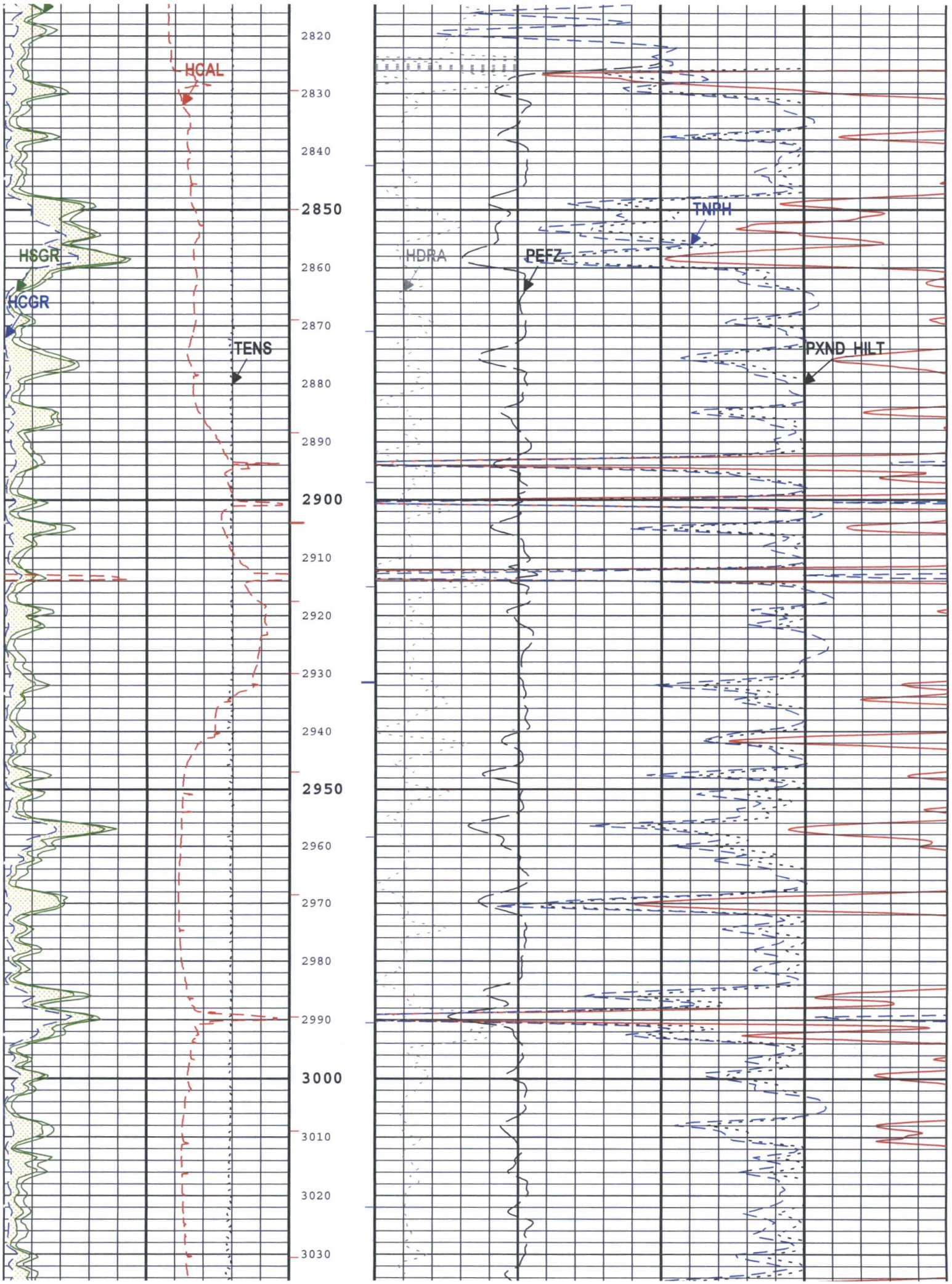
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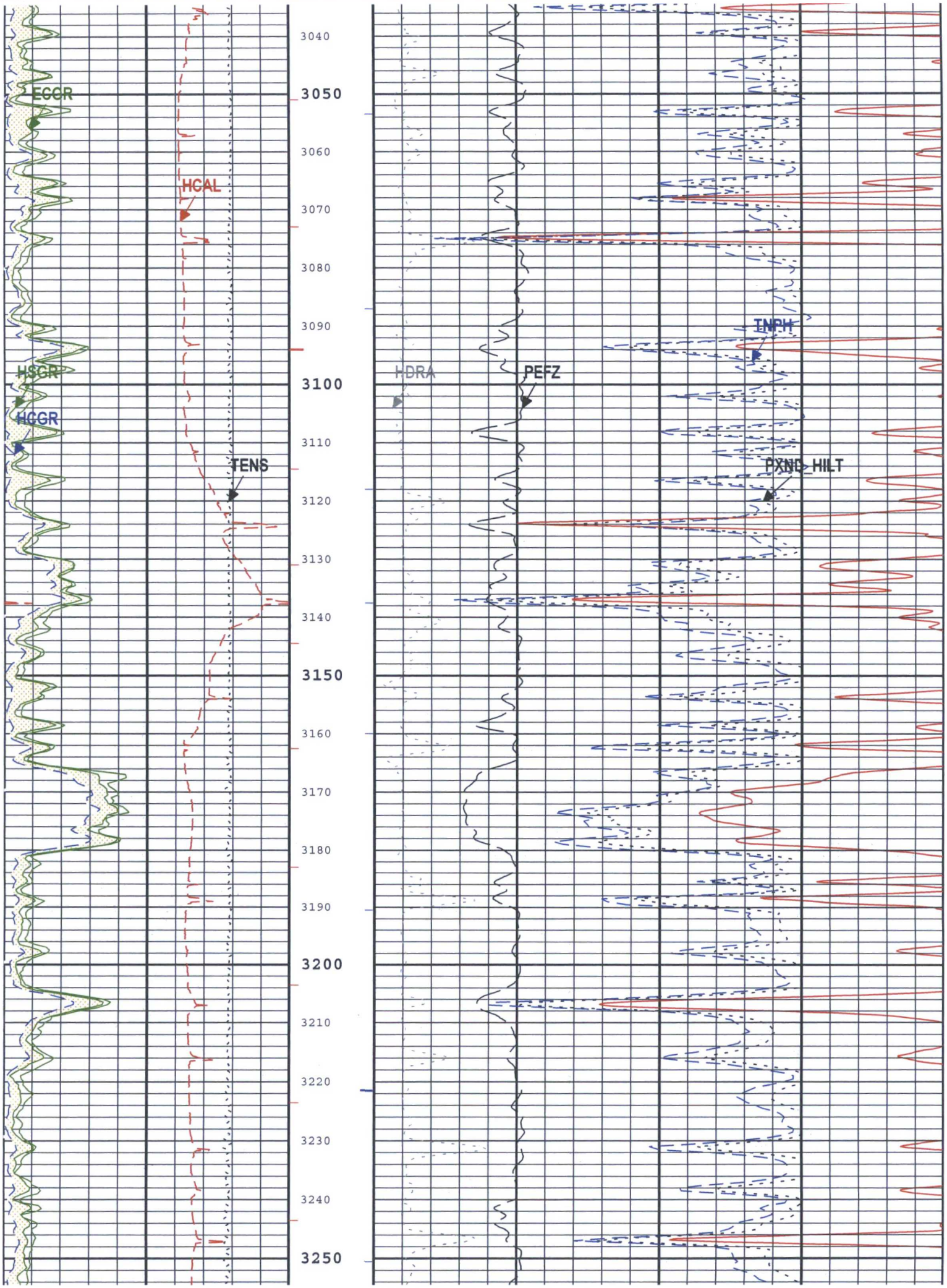
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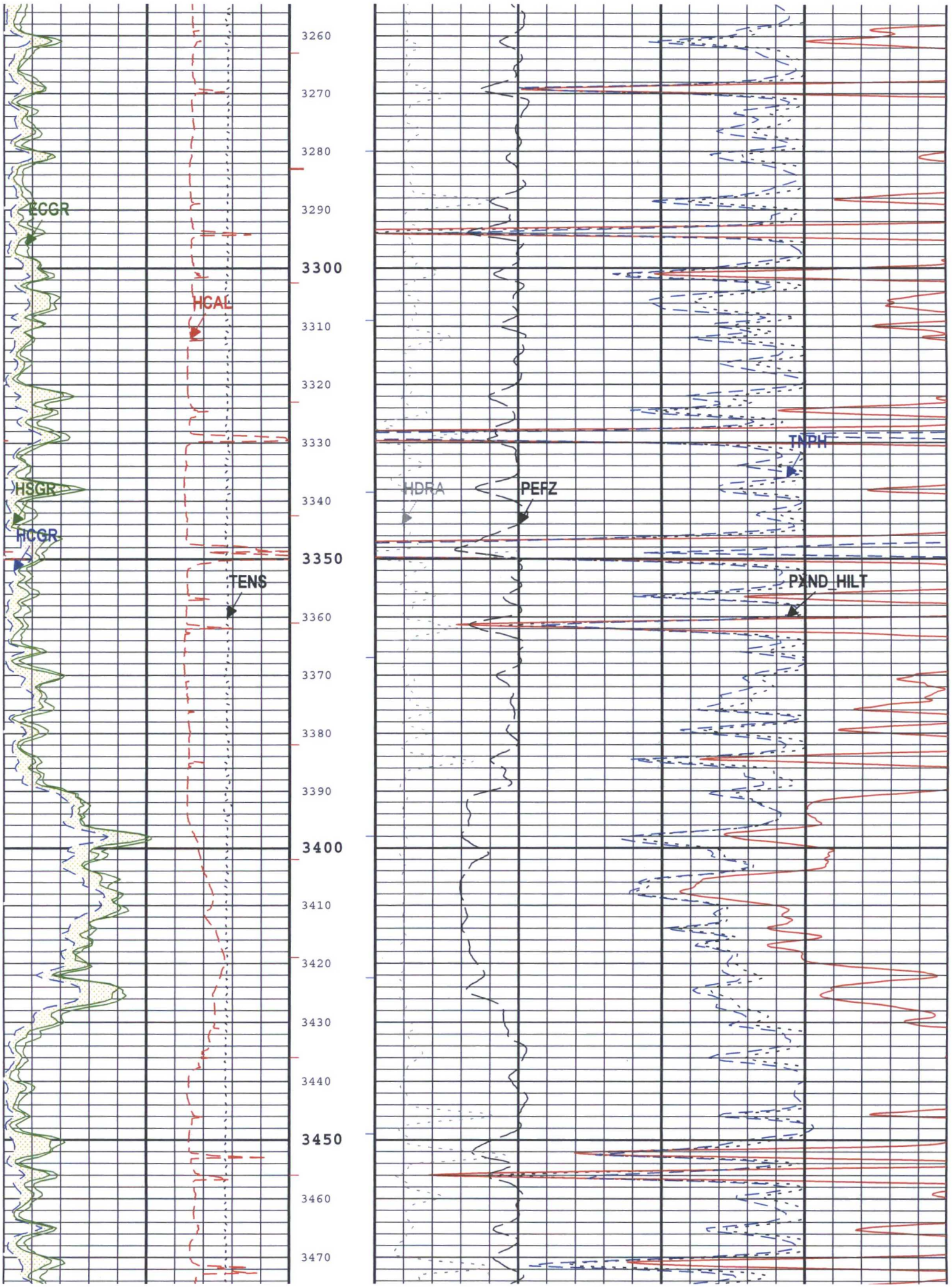
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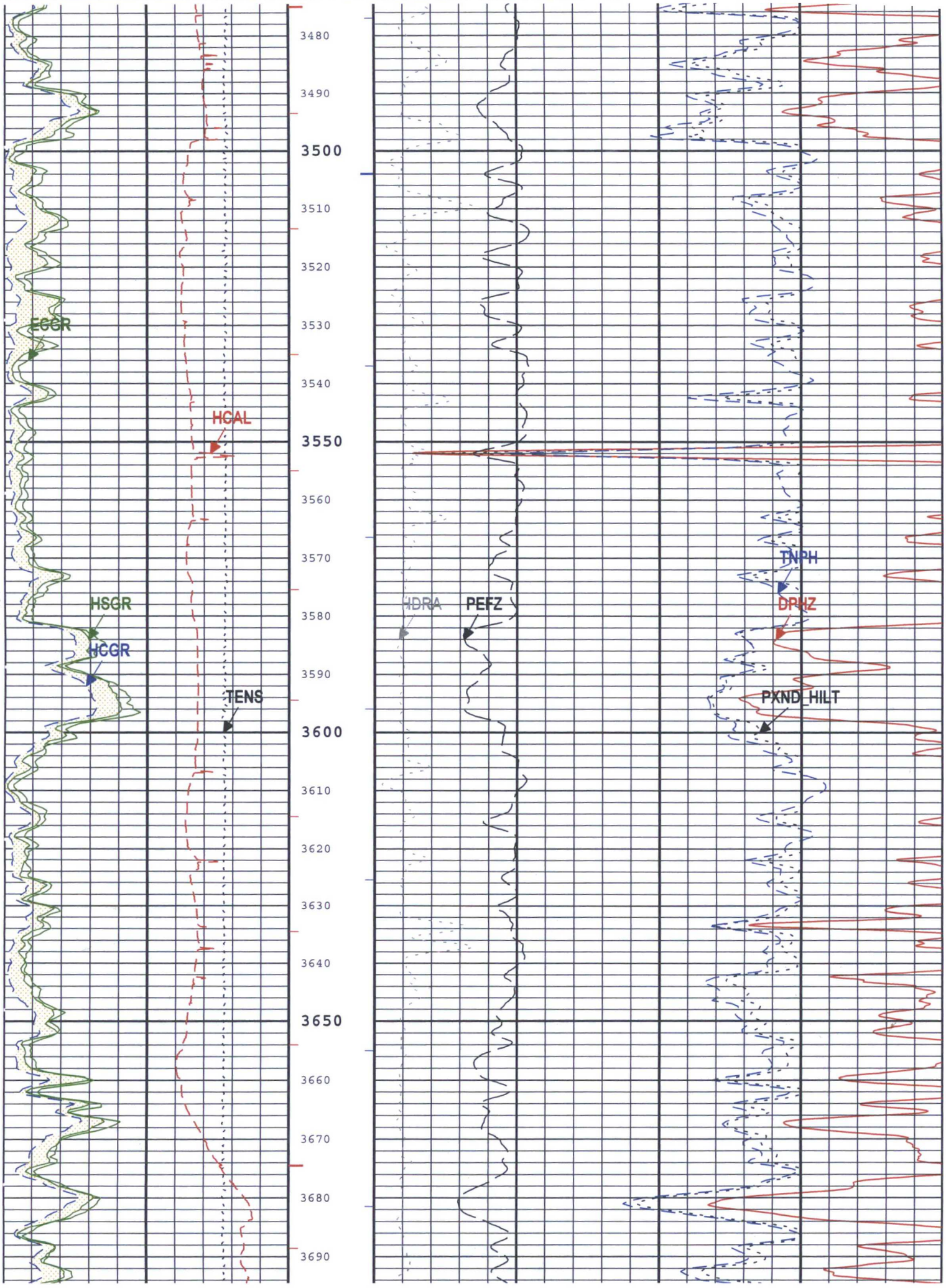
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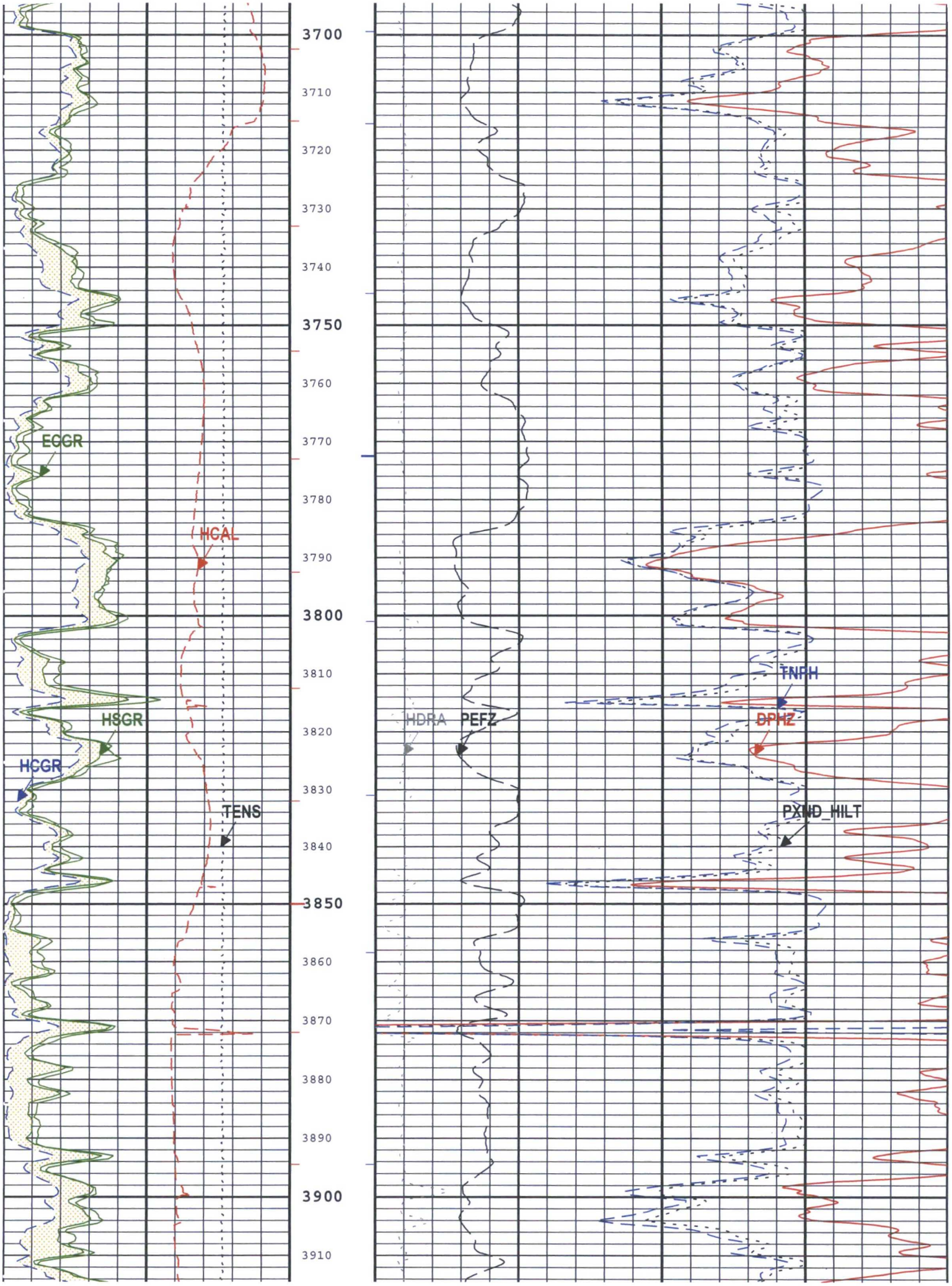
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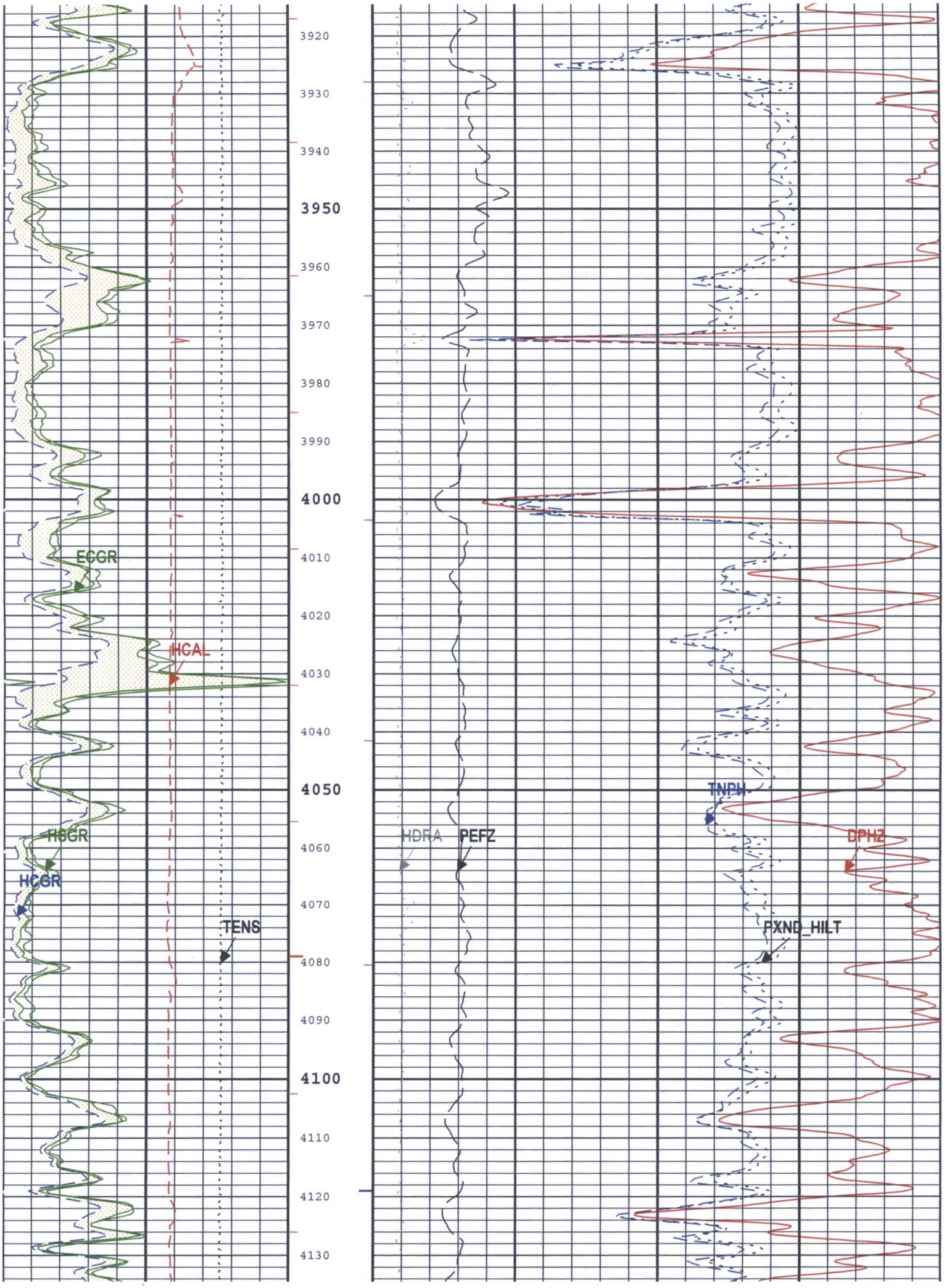
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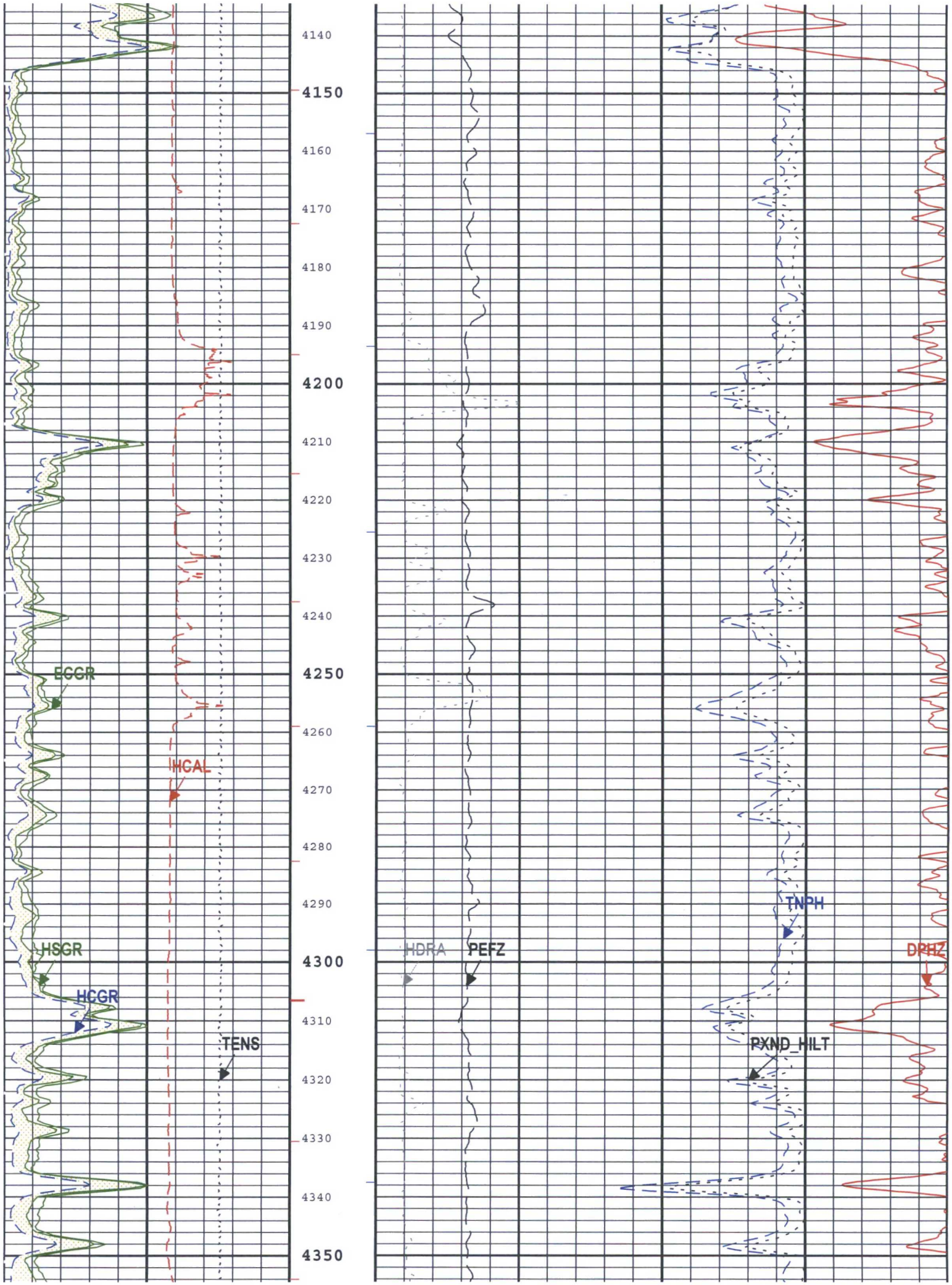
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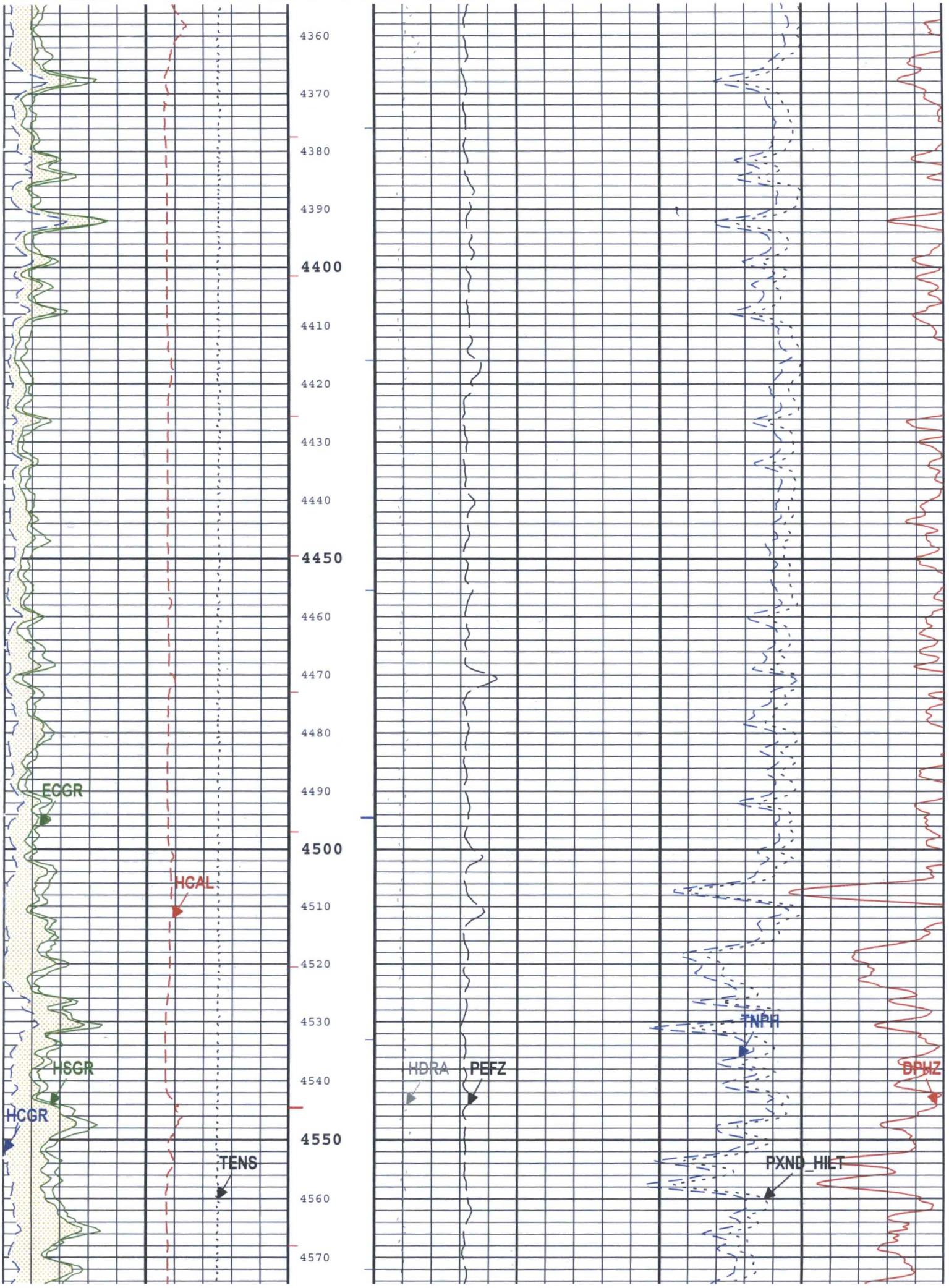
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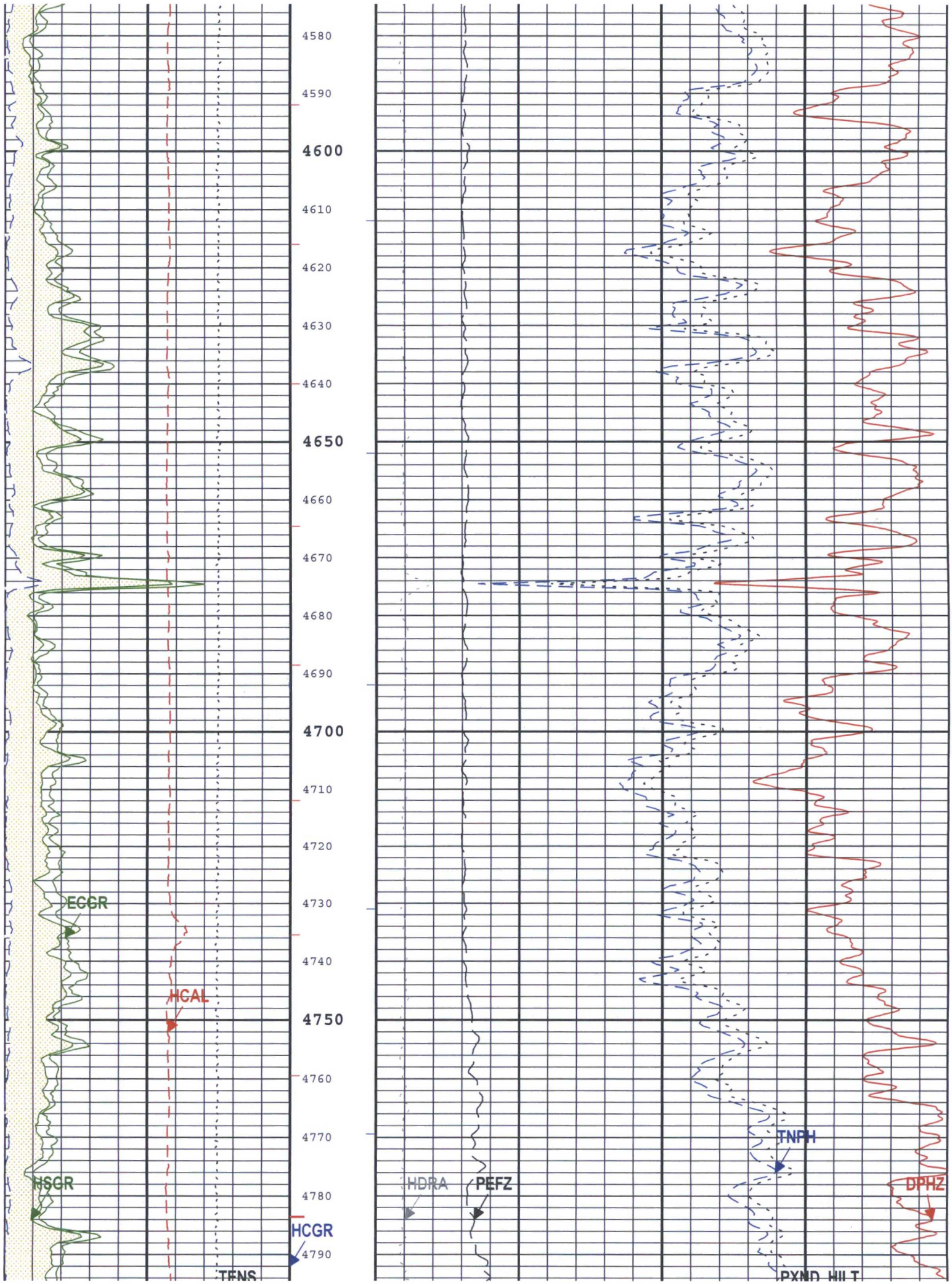
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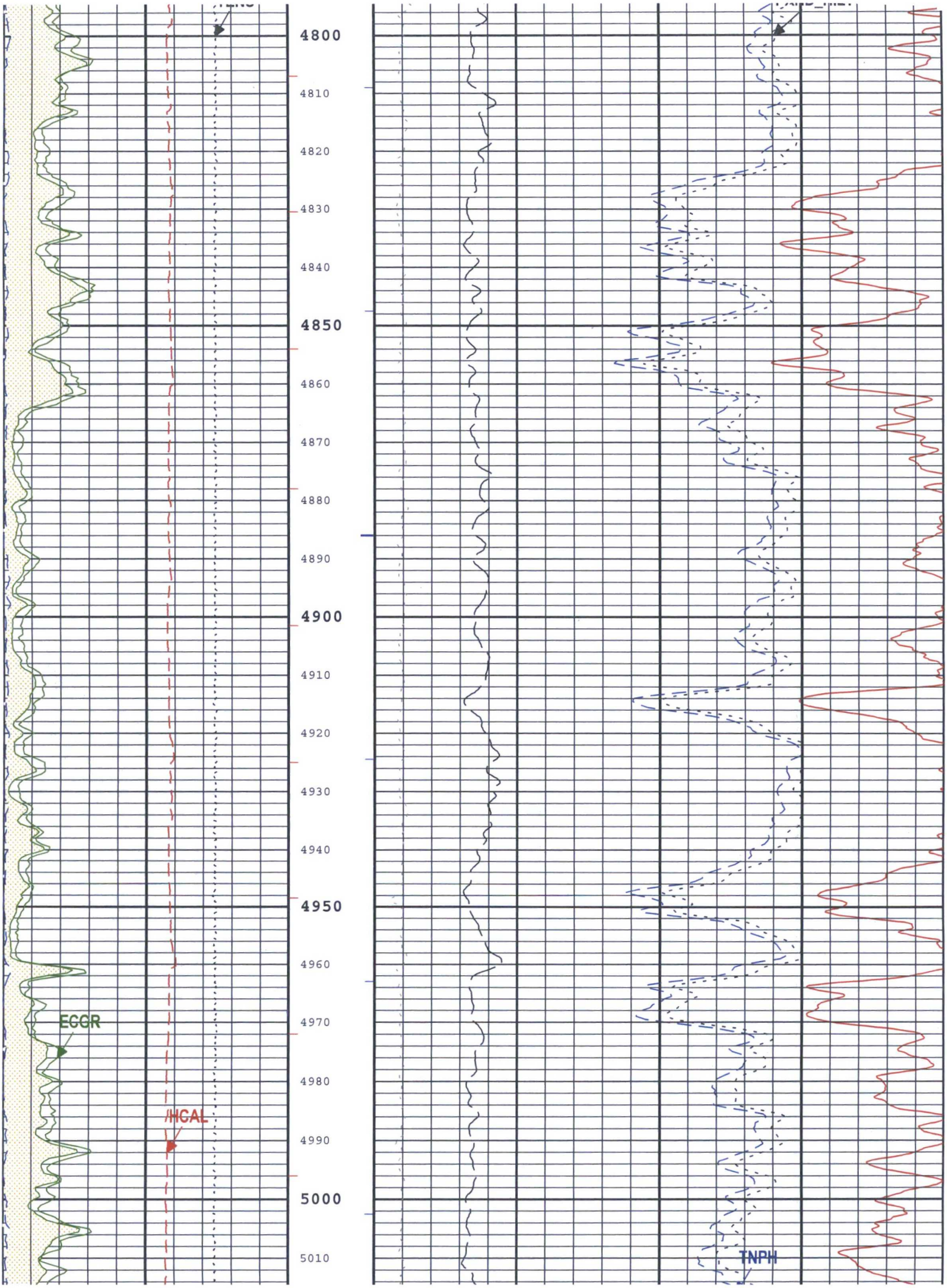
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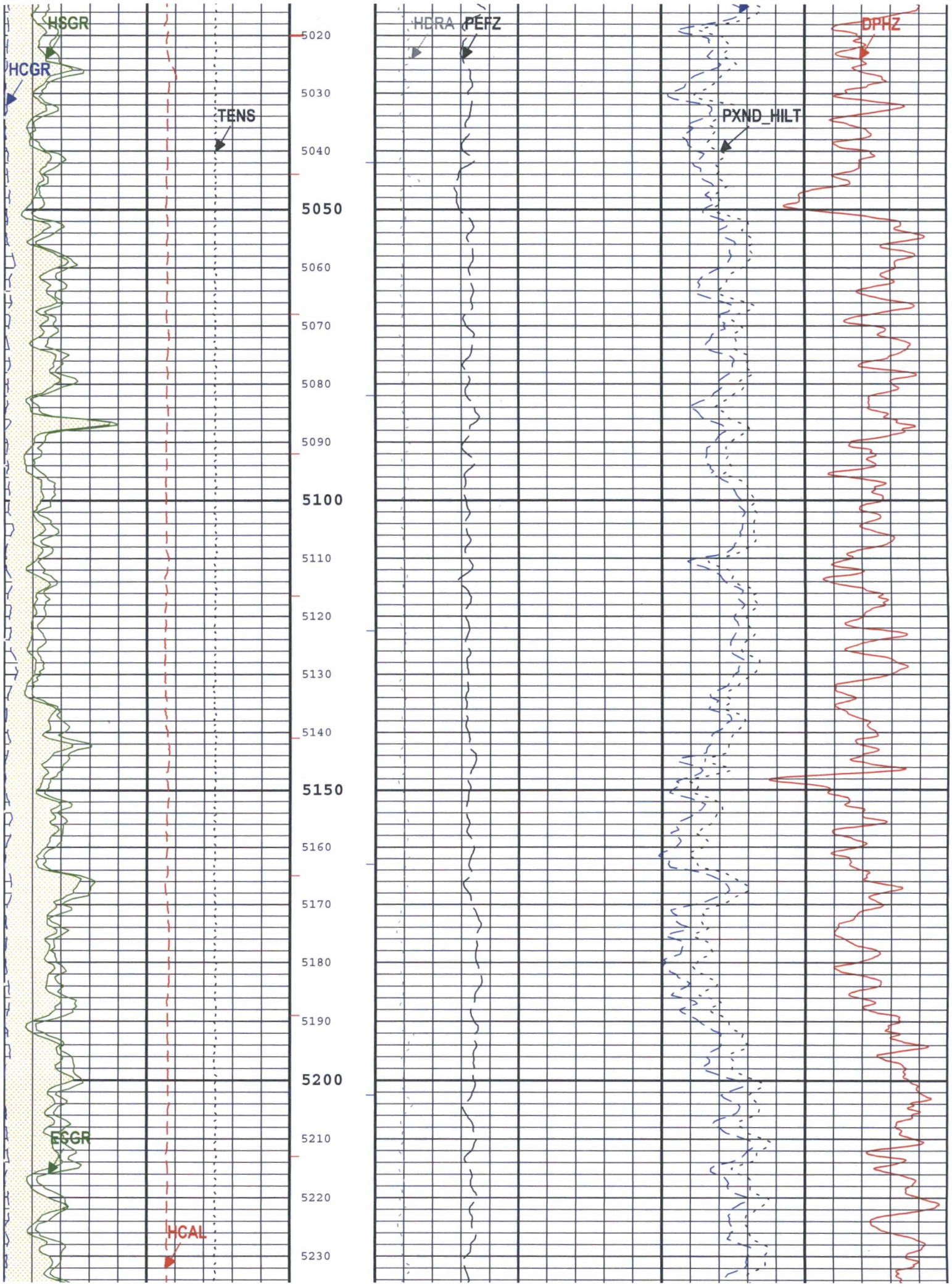
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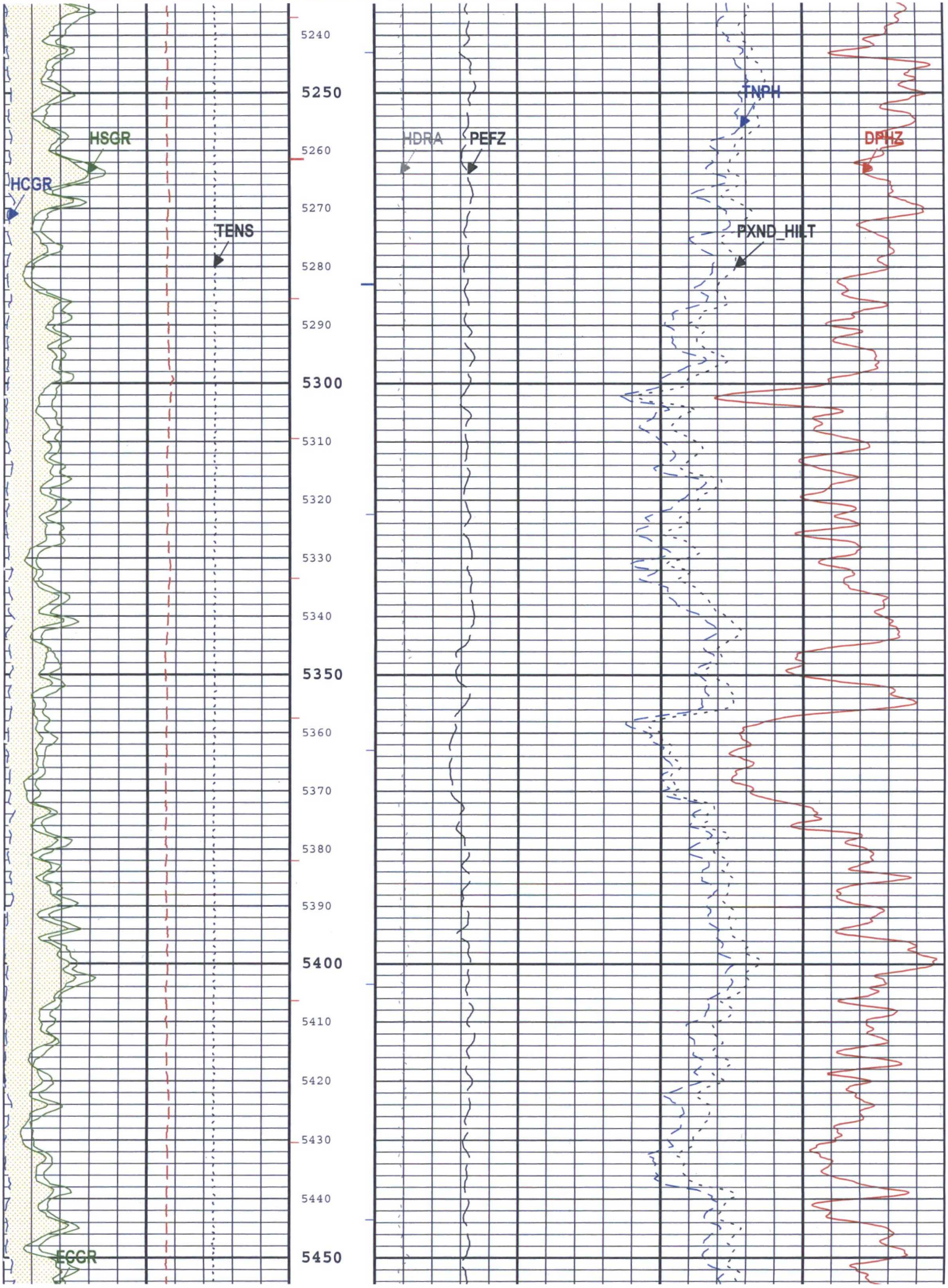
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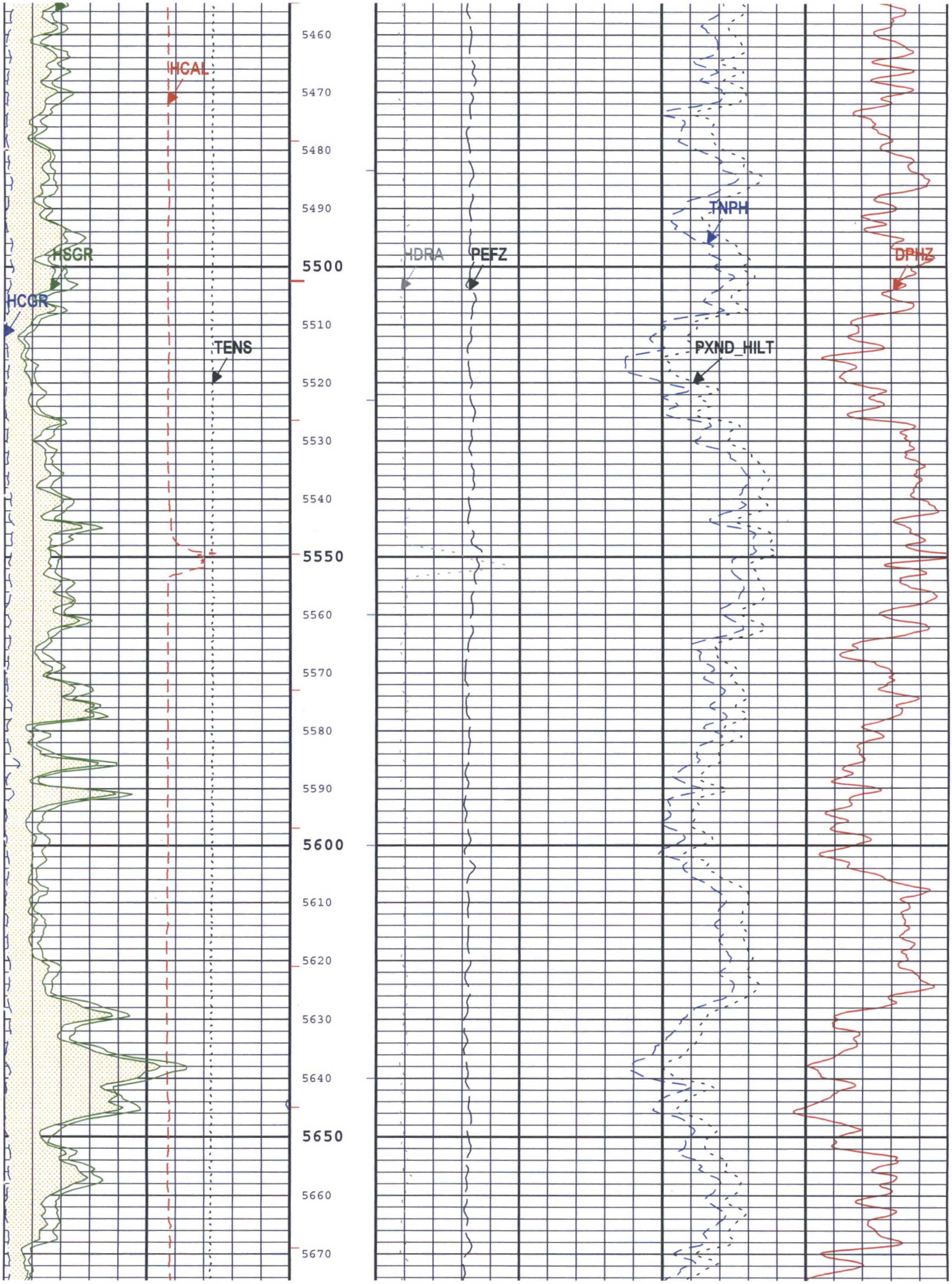
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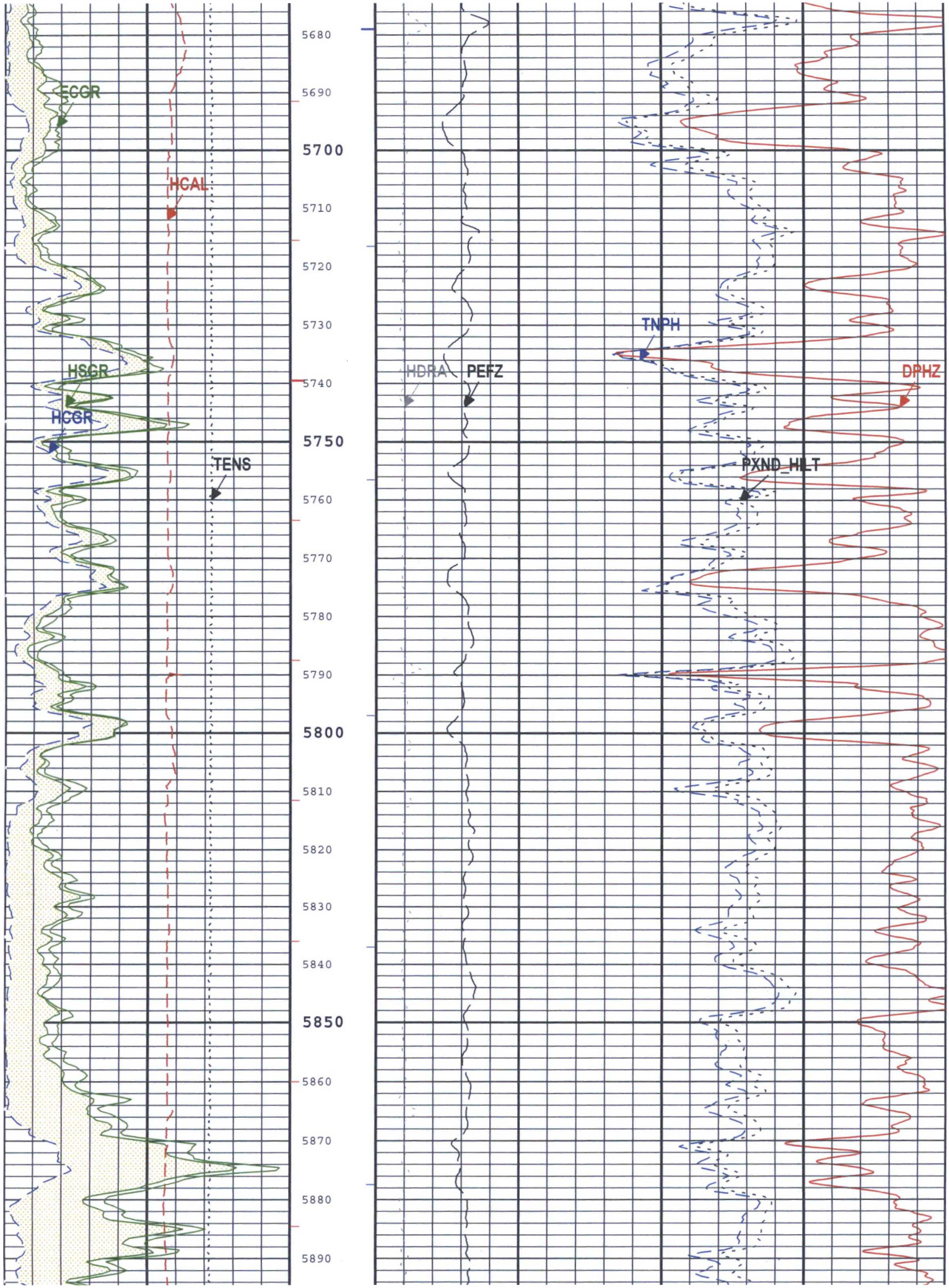
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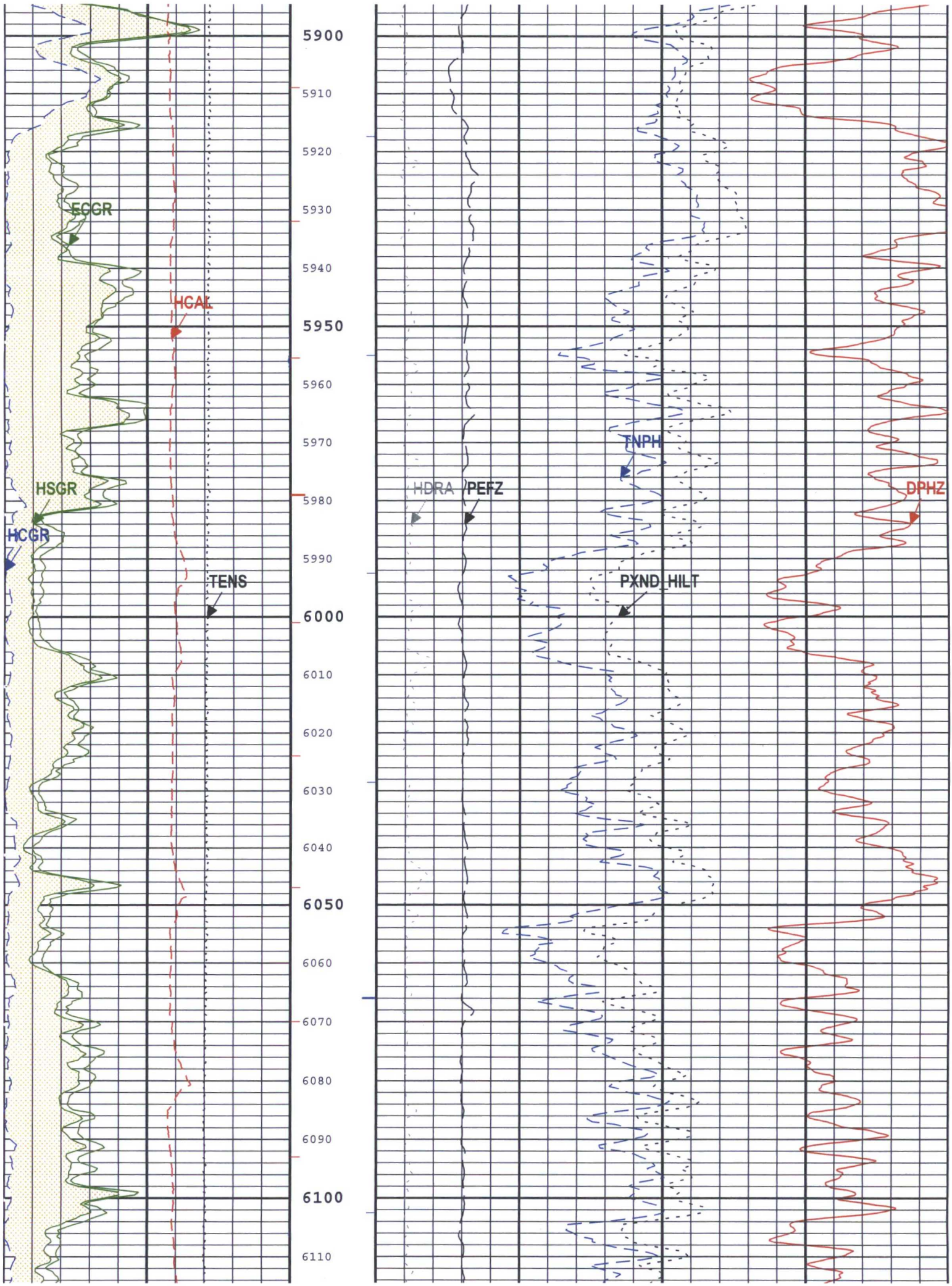
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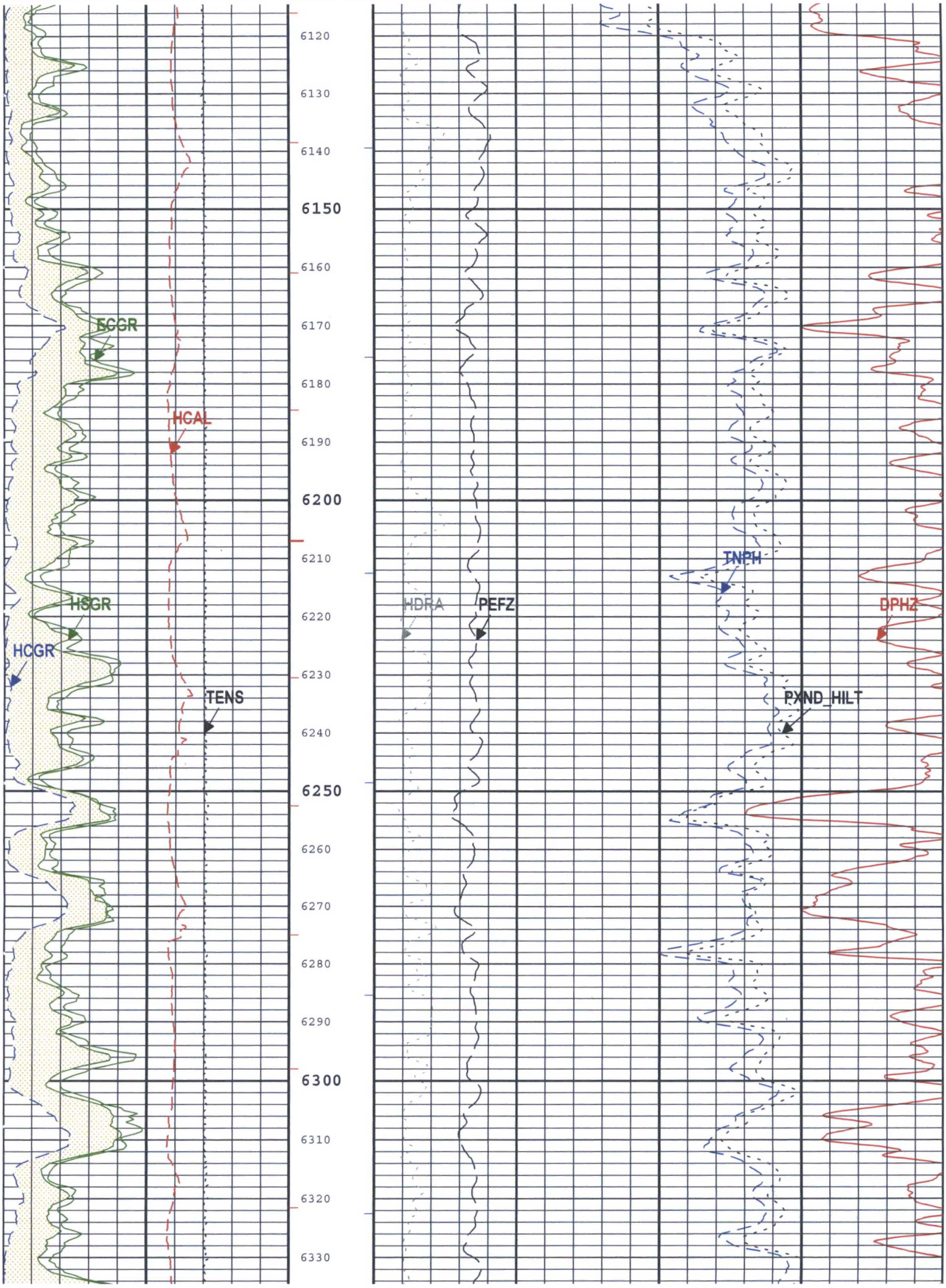
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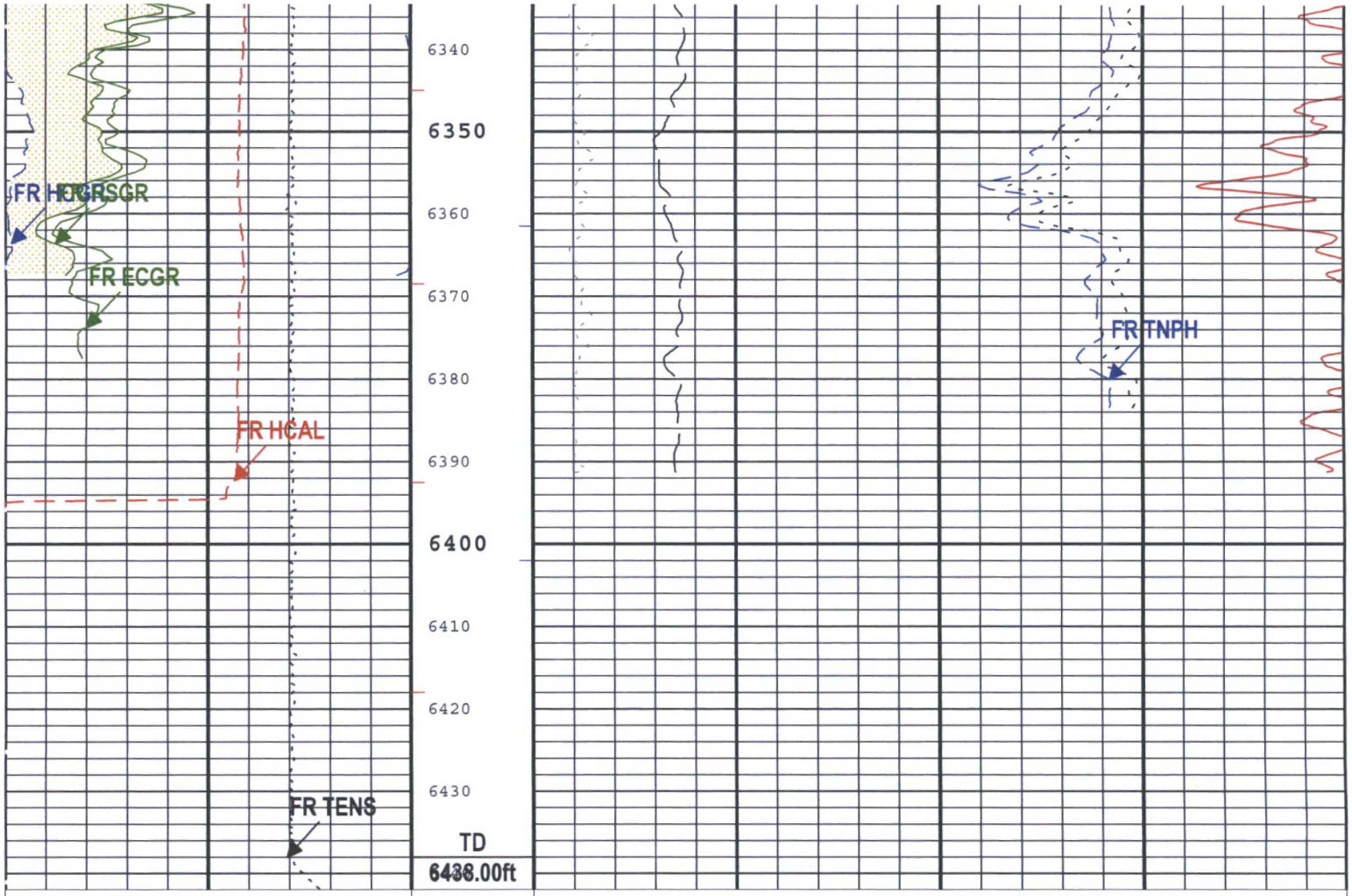


Cable Tension (TENS)
10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA
0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HNGS-BA
0 gAPI 150

Caliper (HCAL) HDRS-H
3 in 13

Gamma Ray (ECGR) HGNS-B
0 gAPI 150

Crossplot Porosity for Neutron-Density (PXND_HILT)
0.3 ft3/ft3 -0.1

Standard Resolution Density Porosity (DPHZ) HDRS-H
0.3 ft3/ft3 -0.1

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B
0.3 ft3/ft3 -0.1

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H
0 10

Density Standoff Correction (HDRA) HDRS-H
-0.05 g/cm3 0.2

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 100.00 (ft3)

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:05

Channel Processing Parameters

1A: Parameters

Parameter	Description	Tool	Value	Unit

ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHK	Drilling Fluid Potassium Concentration	Borehole	0	%
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	108	degF
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	17000	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	2825	ft
CDEN	Cement Density	HGNS-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DBCC	Barite Constant Correction Flag	HNGS-BA	None	
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.5	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	MRES	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HCRB	Apply Borehole Potassium Correction	HNGS-BA	None	
HEMA	Hematite Presence Flag	Borehole	No	
PROCRM	Mud Resistivity Select	HRLT-B	HRLT Compute	
HSCO	Hole Size Correction Option	HGNS-B	Yes	
KFAC_HRLT	HRLT Geometrical Factor Option	HRLT-B	Sonde	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
PROCMSO	Mechanical Standoff Size	HRLT-B	1.5	in
PROCSPO	Sonde Position	HRLT-B	Eccentered	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.22	ohm.m
SGRC	Standard Gamma Ray Correction Flag	HNGS-BA	Yes	

Tool Control Parameters

1A: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-B	0	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

1A

Repeat Pass 5" = 100'

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[2]:Up	Up	5165.46 ft	5876.28 ft	23-Dec-2016 6:53:35 AM	23-Dec-2016 7:18:29 AM	ON	1.82 ft	Yes
1A	Main[6]:Up	Up	183.13 ft	6441.88 ft	23-Dec-2016 7:43:54 AM	23-Dec-2016 10:17:52 AM	ON	5.92 ft	Yes

All depths are referenced to toolstring zero

Log

Company:COG OPERATING LLC Well:FLAT HEAD FEDERAL COM 27H

1A: Main[6]:Up:S004

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:08

IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

Main To Repeat

Repeat To Main

Density Standoff Correction (HDRA) HDRS-H

-0.05 g/cm3 0.2

Main To Repeat

Repeat To Main

Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

3 in 13

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Main To Repeat

Repeat To Main

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

0 gAPI 150

Main To Repeat

Repeat To Main

Crossplot Porosity for Neutron-Density (PXND_HILT)

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Spectroscopy Gamma Ray (HSGR) HNGS-BA

150 gAPI 300

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Cable Tension (TENS)

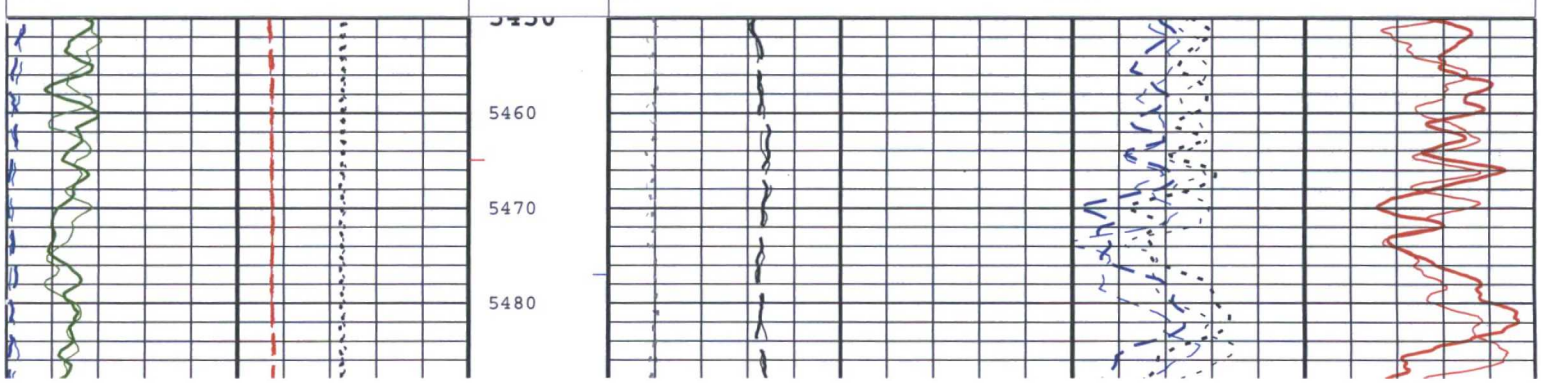
10000 lbf 0

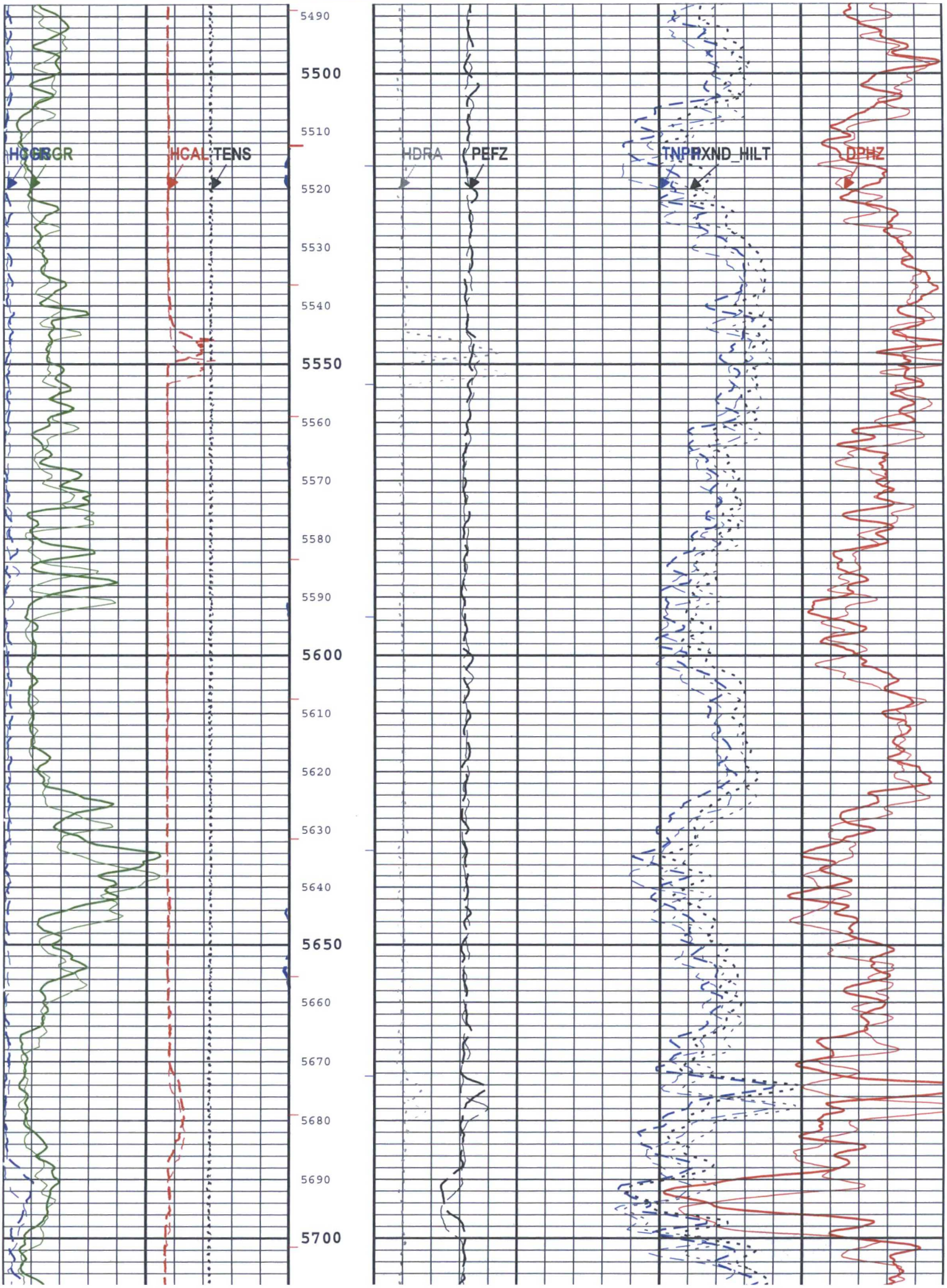
Main To Repeat

Repeat To Main

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B

0.3 ft3/ft3 -0.1




HCGR
GR
HCAL
TENS
HDRA
PEFZ
TNPH
RXND_HILT
DPHZ
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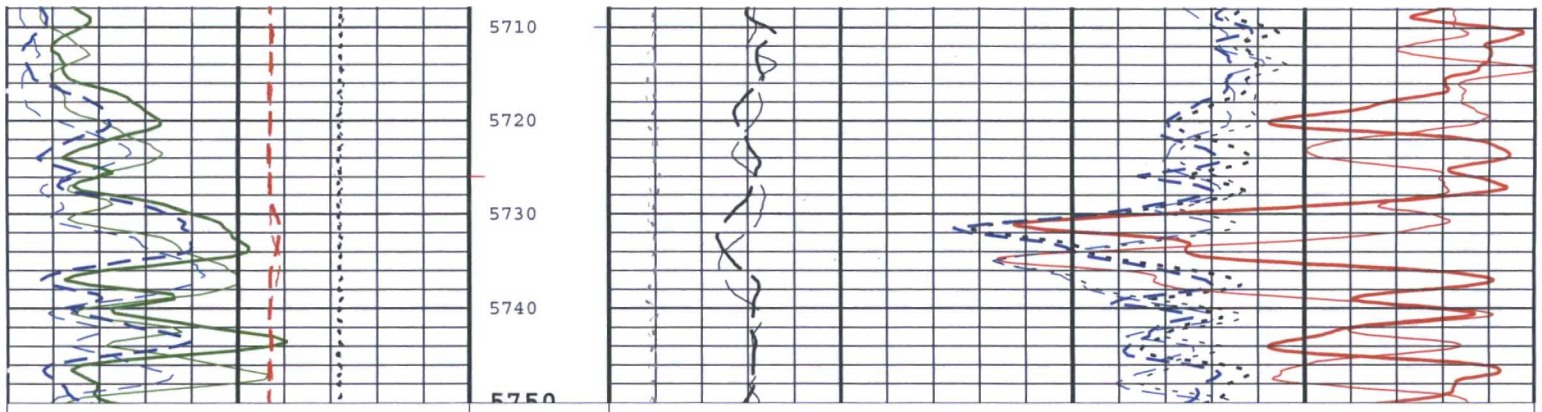


Main To Repeat

Repeat To Main

Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

Main To Repeat

Repeat To Main

Crossplot Porosity for Neutron-Density (PXND_HILT)

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

3 in 13

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

0 gAPI 150

Main To Repeat

Repeat To Main

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Spectroscopy Gamma Ray (HSGR) HNGS-BA

150 gAPI 300

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

Main To Repeat

Repeat To Main

Density Standoff Correction (HDRA) HDRS-H

-0.05 g/cm3 0.2

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 100.00 (ft3)

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:08

Calibration Report

HDRS-H (HILT Density and Rxo Sonde, 150 degC) Calibration - Run 1A

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3921
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3922

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	26717
HRDD Long Spacing Detector	Long Spacing	28718
HRDD Short Spacing Detector	Short Spacing	27769
Cesium 137 Gamma-Ray Logging Source	GSR-J	5453
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3921
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4814

Calibration Parameter :

Small Ring Size (Caliper Calibration Small Ring)	8.00
Large Ring Size (Caliper Calibration Large Ring)	12.00

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 16:10:34 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Small Ring	in	Before	8.00	6.00	8.20	10.00
Large Ring	in	Before	12.00	9.00	12.64	15.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 12:37:32 10-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.597	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.689	1.696
Pe Aluminum		Master	2.570	2.470	2.541	2.670
Pe Magnesium		Master	2.650	2.550	2.620	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 12:37:32 10-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.2840	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.5637	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.2628	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.7932	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.6664	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.7871	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 12:37:32 10-Dec-2016 Before (Measured): 16:15:31 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7570	
		Before	0.7570	0.7192	0.7586	0.7949
		Before-Master	----	----	0.0016	----
BS Window Sum	1/s	Master	1		24218	
		Before	24218	23007	24224	25429
		Before-Master	----	----	6	----
SS Window Ratio		Master	1.0000		0.4862	
		Before	0.4862	0.4618	0.4859	0.5105
		Before-Master	----	----	-0.0003	----
SS Window Sum	1/s	Master	1		10727	
		Before	10727	10191	10708	11264
		Before-Master	----	----	-19	----
LS Window Ratio		Master	1.0000		0.3045	
		Before	0.3045	0.2892	0.3024	0.3197
		Before-Master	----	----	-0.0021	----
LS Window Sum	1/s	Master	1		1150	
		Before	1150	1093	1145	1208
		Before-Master	----	----	-5	----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 12:37:32 10-Dec-2016 Before (Measured): 16:15:31 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1442	2400
		Before		1000	1442	2400
		Before-Master	—	-100	0	100
SS PM High Voltage	V	Master		1000	1450	2400
		Before		1000	1452	2400
		Before-Master	—	-100	2	100
LS PM High Voltage	V	Master		1000	1306	2400
		Before		1000	1313	2400
		Before-Master	—	-100	7	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 12:37:32 10-Dec-2016 Before (Measured): 16:15:31 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	10.86	25.00
		Before		5.00	10.86	25.00
		Before-Master	—	-1.00	0.00	1.00
SS Crystal Resolution	%	Master		5.00	9.27	20.00
		Before		5.00	9.44	20.00
		Before-Master	—	-1.00	0.17	1.00
LS Crystal Resolution	%	Master		5.00	8.56	20.00
		Before		5.00	8.78	20.00
		Before-Master	—	-1.00	0.22	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 05:48:50 23-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3871	4185
Deep Resistivity	ohm.m	Before	3830	3524	3824	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3831	4136

HGNS-B (HILT Gamma-Ray and Neutron Sonde, 125 degC) Calibration - Run 1A

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 125 degC	HGNS-B	728

Auxiliary Equipment :

HGNS Accelerometer, 125 degC	HACCZ-B	232
AmBe Neutron Logging Source	NSR-F	5027

Calibration Parameter :

Water Temperature	
Housing Size	
JIG-BKG (Jig minus background reference)	165

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 05:49:15 23-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.3	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-Apr-1995

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Accelerometer Manufacturer		Master			Sunstrand	
Accelerometer Reference Temperature	degF	Master		30.2	68.0	122.0
Accelerometer Coefficients - 0		Master	—	—	3039.000	—
Accelerometer Coefficients - 1		Master	—	—	12.370	—
Accelerometer Coefficients - 2		Master	—	—	0.021	—
Accelerometer Coefficients - 3		Master	—	—	0.000	—
Accelerometer Coefficients - 4		Master	—	—	2.239	—
Accelerometer Coefficients - 5		Master	—	—	0.000	—
Accelerometer Coefficients - 6		Master	—	—	0.000	—

Accelerometer Coefficients - 7		Master	—	—	0.000	—
Accelerometer Coefficients - 8		Master	—	—	295.300	—
Accelerometer Coefficients - 9		Master	—	—	1.005	—

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 13:10:24 09-Nov-2016 Before (Measured): 16:09:47 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	29.1	40.0
		Before	0	5.0	28.6	40.0
		Before-Master	—	-4.4	-0.5	4.4
Far Zero Measurement	1/s	Master	0	5.0	32.1	40.0
		Before	0	5.0	29.4	40.0
		Before-Master	—	-4.8	-2.7	4.8
Near Plus Measurement	1/s	Master	6031.0	4700.0	5390.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Far Plus Measurement	1/s	Master	2793.0	1900.0	2326.0	2900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Near Corrected Plus Measurement	1/s	Master		4700.0	5355.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Far Corrected Plus Measurement	1/s	Master		1900.0	2291.0	2900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 16:09:13 22-Dec-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	35.4	120.0
RGR Plus Measurement	gAPI	Before	185.4	157.1	178.3	206.3
GR Calibration Gain		Before	0.89	0.80	0.93	1.05

Company: COG OPERATING LLC

Schlumberger

Well: FLAT HEAD FEDERAL COM 27H

Field: MALJAMAR YESO WEST

County: LEA

State: New Mexico

Platform Express
Compensated Neutron Log
Three Detector Litho-Density

1A

Main Pass 1" = 100'

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Main[6]:Up	Up	183.13 ft	6441.88 ft	23-Dec-2016 7:43:54 AM	23-Dec-2016 10:17:52 AM	ON	5.92 ft	Yes

All depths are referenced to toolstring zero

Log

Company:COG OPERATING LLC Well:FLAT HEAD FEDERAL COM 27H

1A: Main[6]:Up:S004

Description: HRLT BASIC LOG Format: Log (Porosity 1 inch General) Index Scale: 1 in per 100 ft
Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:11

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
GR_CAL	HGNS-B:HGNS-B:HGNS-B	6in

RHOZ	HDRS-H:HRMS-H:HRGD-H	2in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-B:HGNS-B:HGNS-B	6in

TIME_1900 - Time Marked every 60.00 (s)

Cable Tension (TENS)
10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA
0 gAPI 150

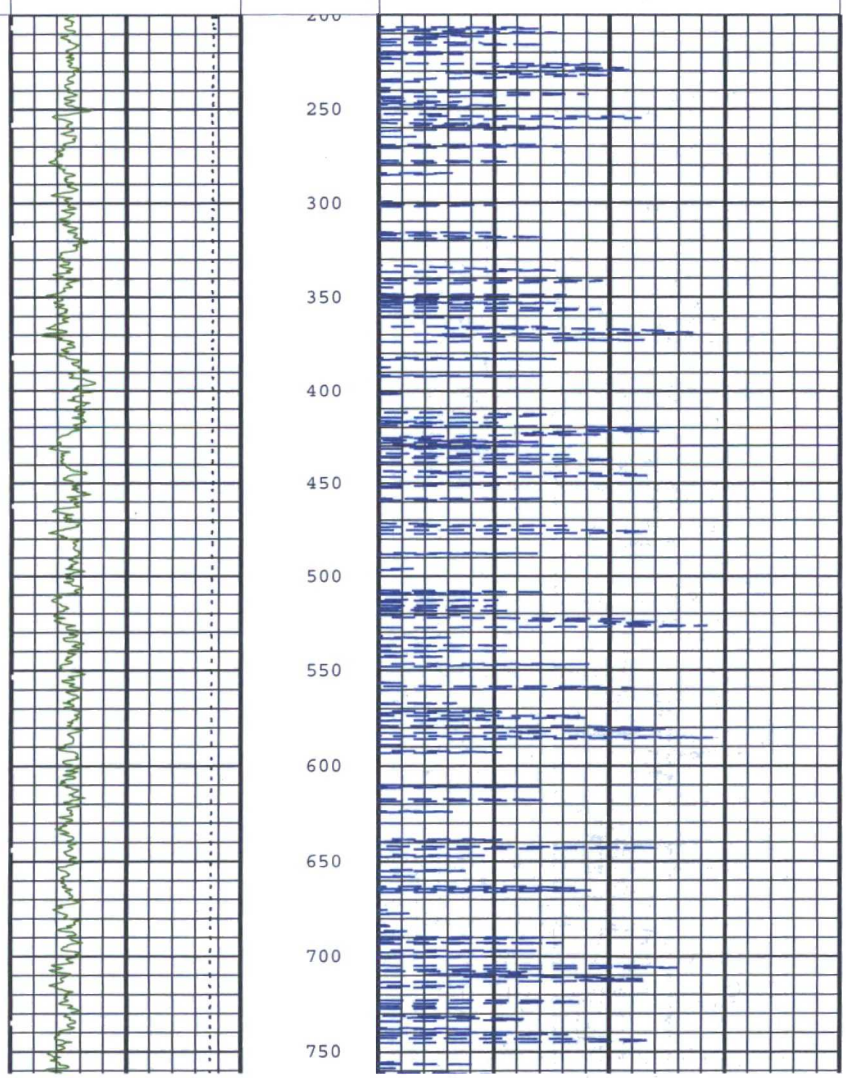
Spectroscopy Gamma Ray (HSGR) HNGS-BA
0 gAPI 150

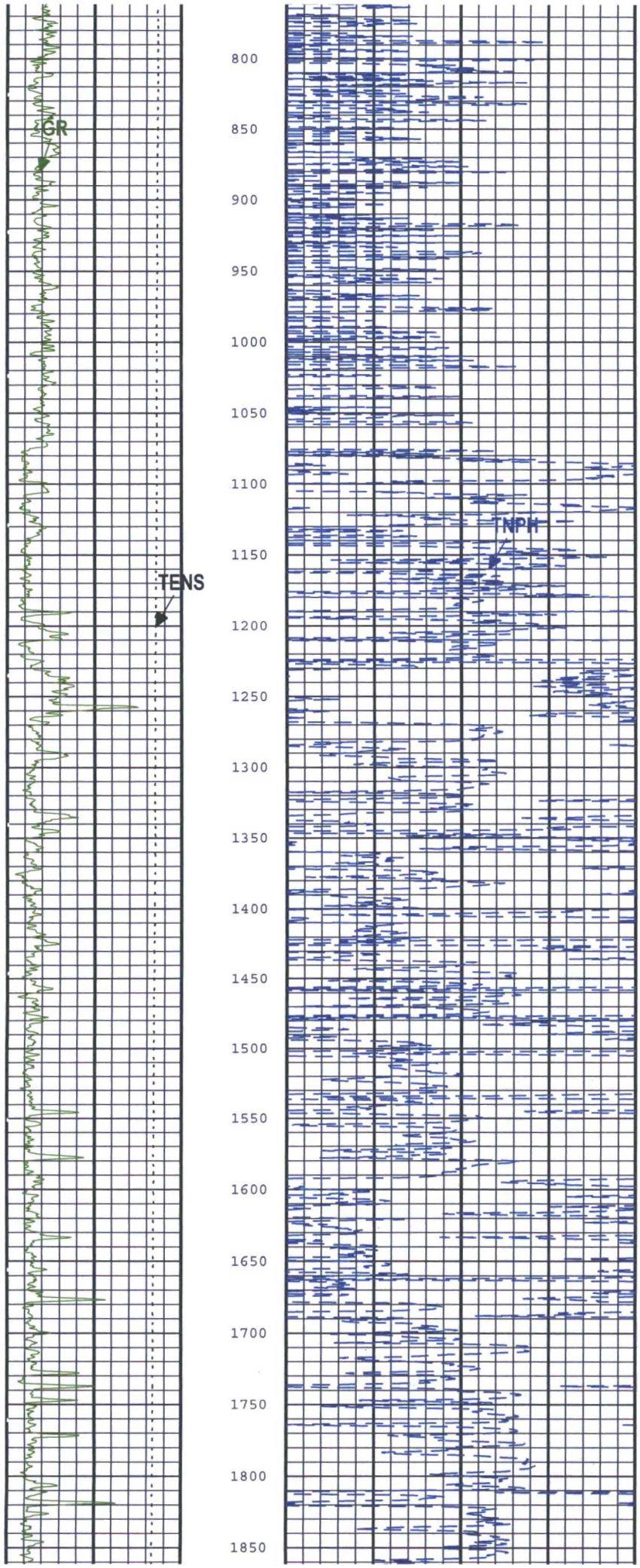
Caliper (HCAL) HDRS-H
6 in 16

Calibrated Gamma Ray (GR) HNGS-B
0 gAPI 150

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B
0.3 ft3/ft3 -0.1

Standard Resolution Formation Density (RHOZ) HDRS-H
2 g/cm3 3

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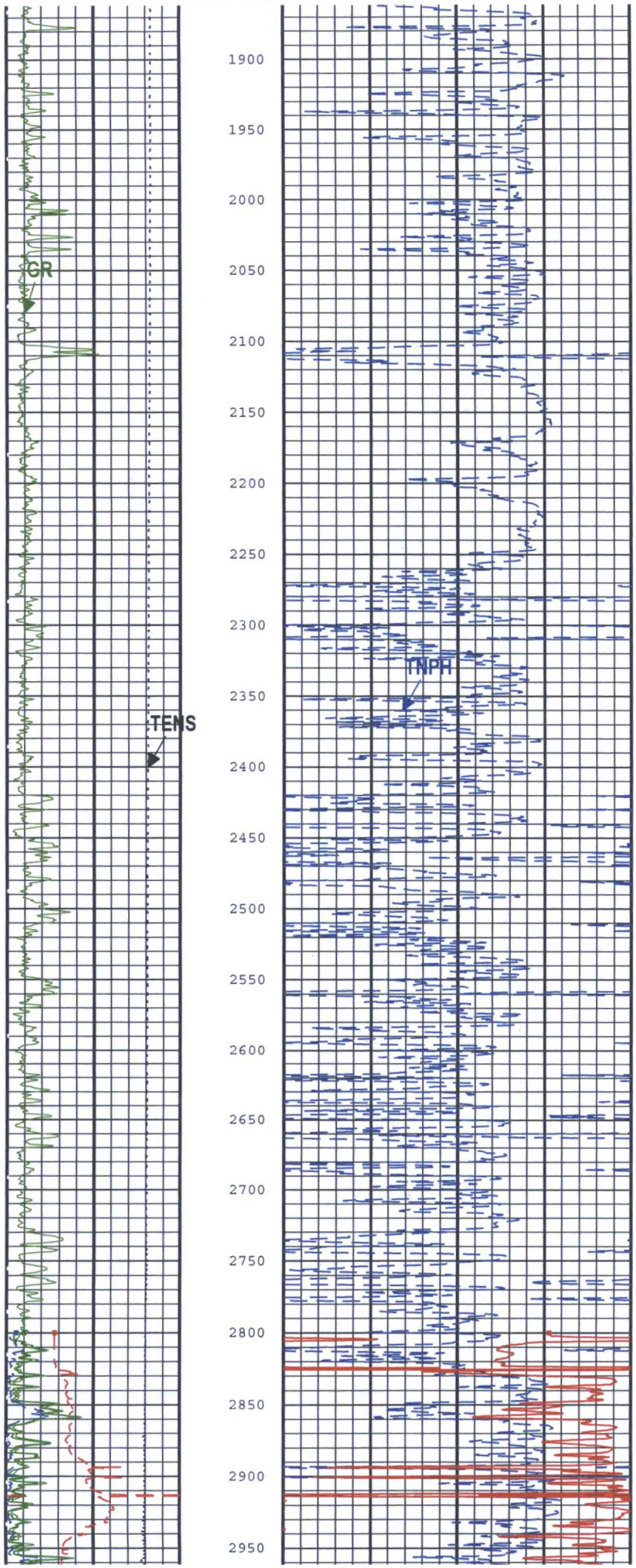
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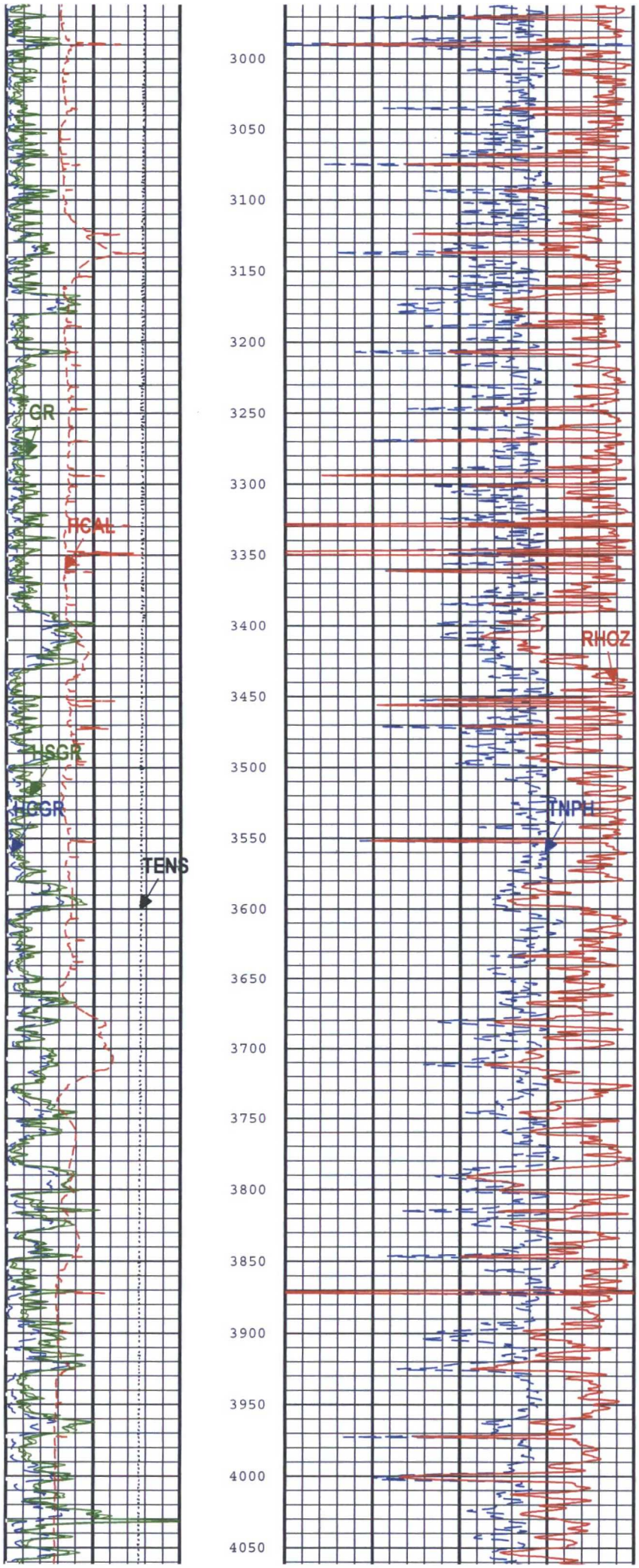
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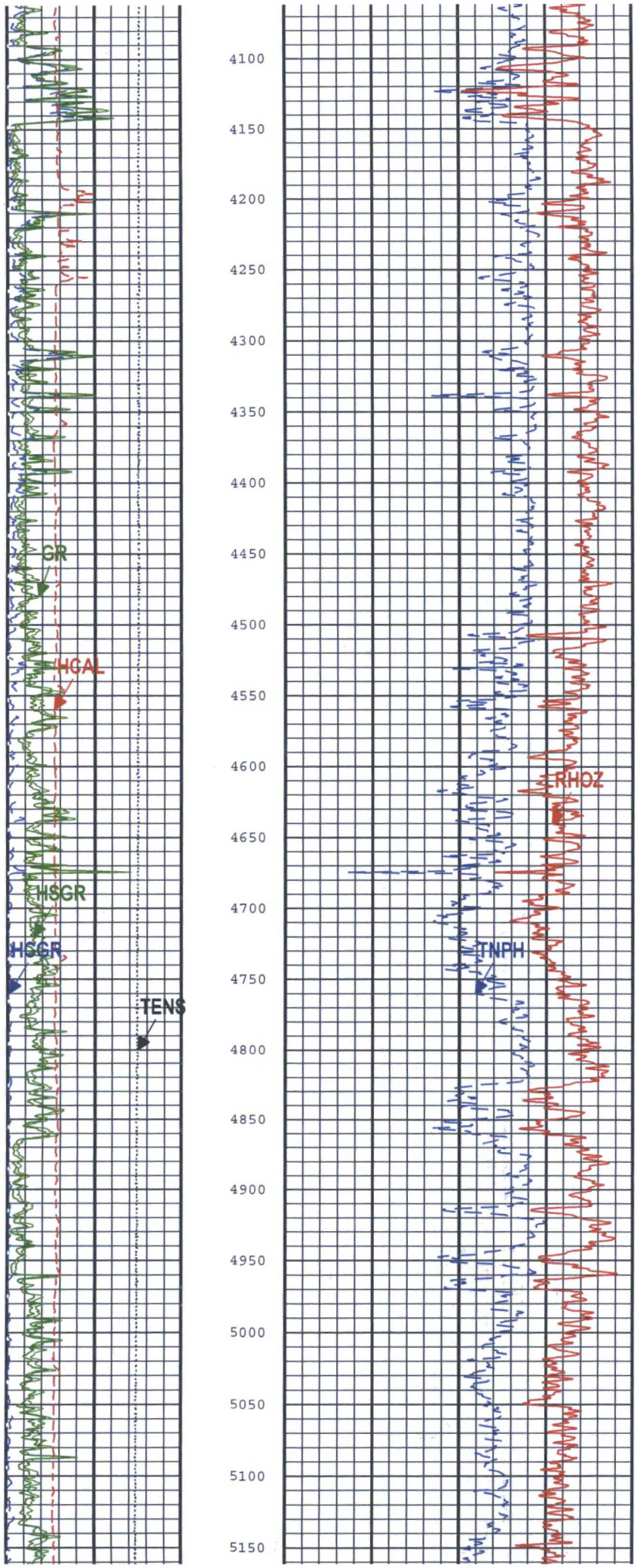
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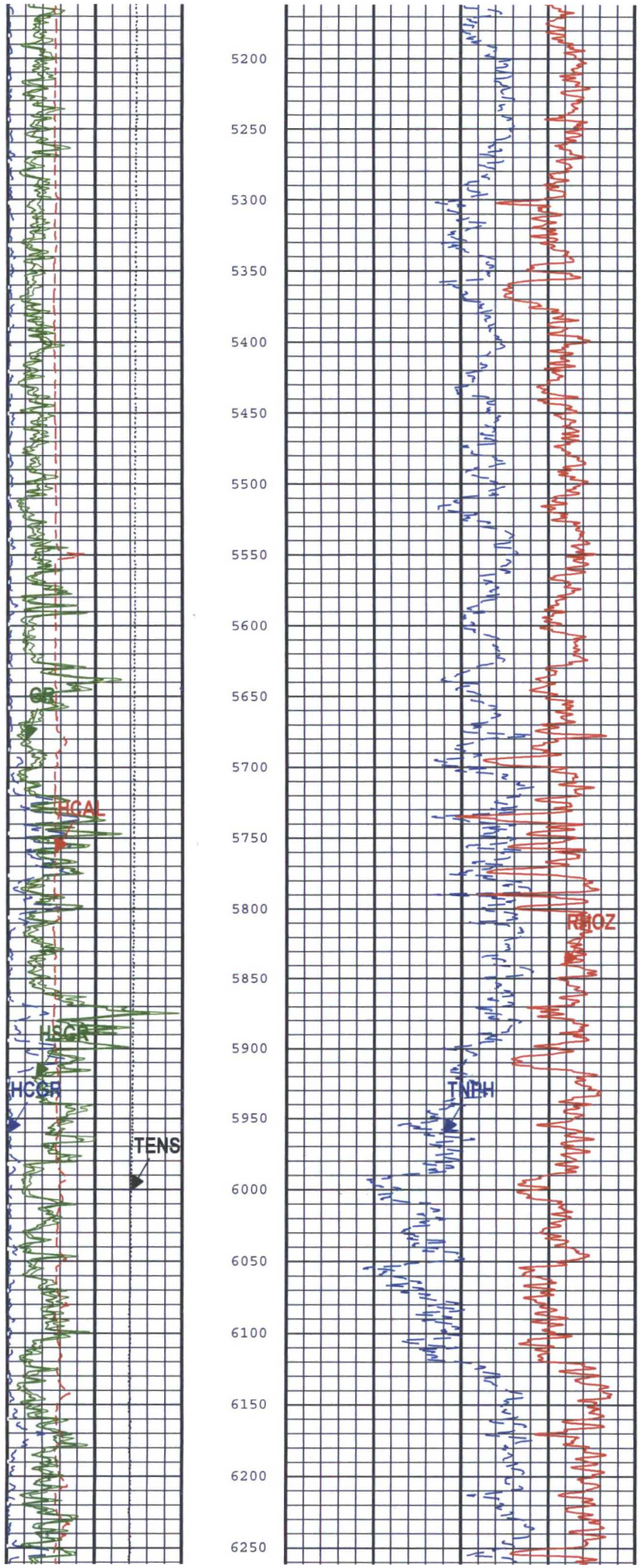
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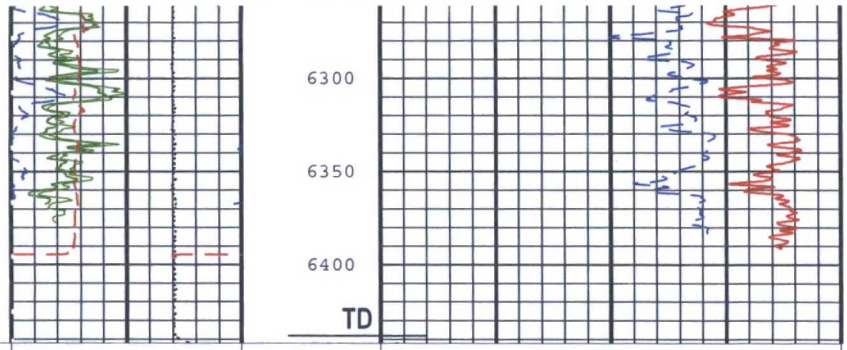

Cable Tension (TENS)
10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA
0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HNGS-BA
0 gAPI 150

Caliper (HCAL) HDRS-H
6 in 16

Calibrated Gamma Ray (GR) HGNS-B
0 gAPI 150

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-B
0.3 ft3/ft3 -0.1

Standard Resolution Formation Density (RHOZ) HDRS-H
2 g/cm3 3

TIME_1900 - Time Marked every 60.00 (s)

Description: HRLT BASIC LOG Format: Log (Porosity 1 inch General) Index Scale: 1 in per 100 ft
Index Unit: ft Index Type: Measured Depth Creation Date: 23-Dec-2016 11:11:11