Schlumberger

Company: Anadarko E&P Onshore LLC

Well: Murphy 1-31 M

Field: Greenwood

County: Morton State: Kansas

PLATFORM EXPRESS

COMPENSATED NEUTRON

LITHOLOGY DENSITY

County:	Morton
Field:	Greenwood
Location:	497.46' FEL & 1335.13' FSL
Well:	Murphy 1-31 M
Company:	Anadarko E&P Onshore LLC

Location:	497.46' FEL & 1335.13' FSL		Elev.	K.B.
	SW.SE.NE.SW			G.L. 3538.19 ft
	SE/4 SEC.31, T32S-R42W			D.F. 3545.19 ft
	Permanent Datum:	Mean Sea Level	Elev.:	0.00 ft
	Log Measured From:	Ground Level	3538.19 ft	above Perm.Datum
	Drilling Measured From:	Ground Level		

API Serial No.	Section:	Township:	Range:
15-129-21957	31	32S	42W

Logging Date			12-Dec-2013			
Run Number			One			
Depth Driller			5250.00 ft			
Schlumberger Depth			5255.00 ft			
Bottom Log Interval			5255.00 ft			
Top Log Interval			1494.00 ft			
Casing Driller Size @ Depth			8.625 in @ 1480.00 ft			
Casing Schlumberger			1494 ft			
Bit Size			7.875 in			
Type Fluid In Hole			Fresh Water			
MUD	Density	Viscosity	8.8 lbm/gal	60 s		
	Fluid Loss	PH	6.2 cm3	10.5		
	Source of Sample		Active Tank			
RM @ Meas Temp			0.72 ohm.m @ 55 degF			
RMF @ Meas Temp			0.62 ohm.m @ 55 degF			
RMC @ Meas Temp			1.01 ohm.m @ 55 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.34 @ 123.4	0.29 @ 123.4		
Max Recorded Temperatures			123.4 degF	123		
Circulation Stopped	Time		12-Dec-2013	07:15:00		
Logger on Bottom	Time		12-Dec-2013	12:02:29		
Unit Number	Location:		2367	Elk City, OK		
Recorded By			Matt Cramer			
Witnessed By			Tom Bingel			

Disclaimer

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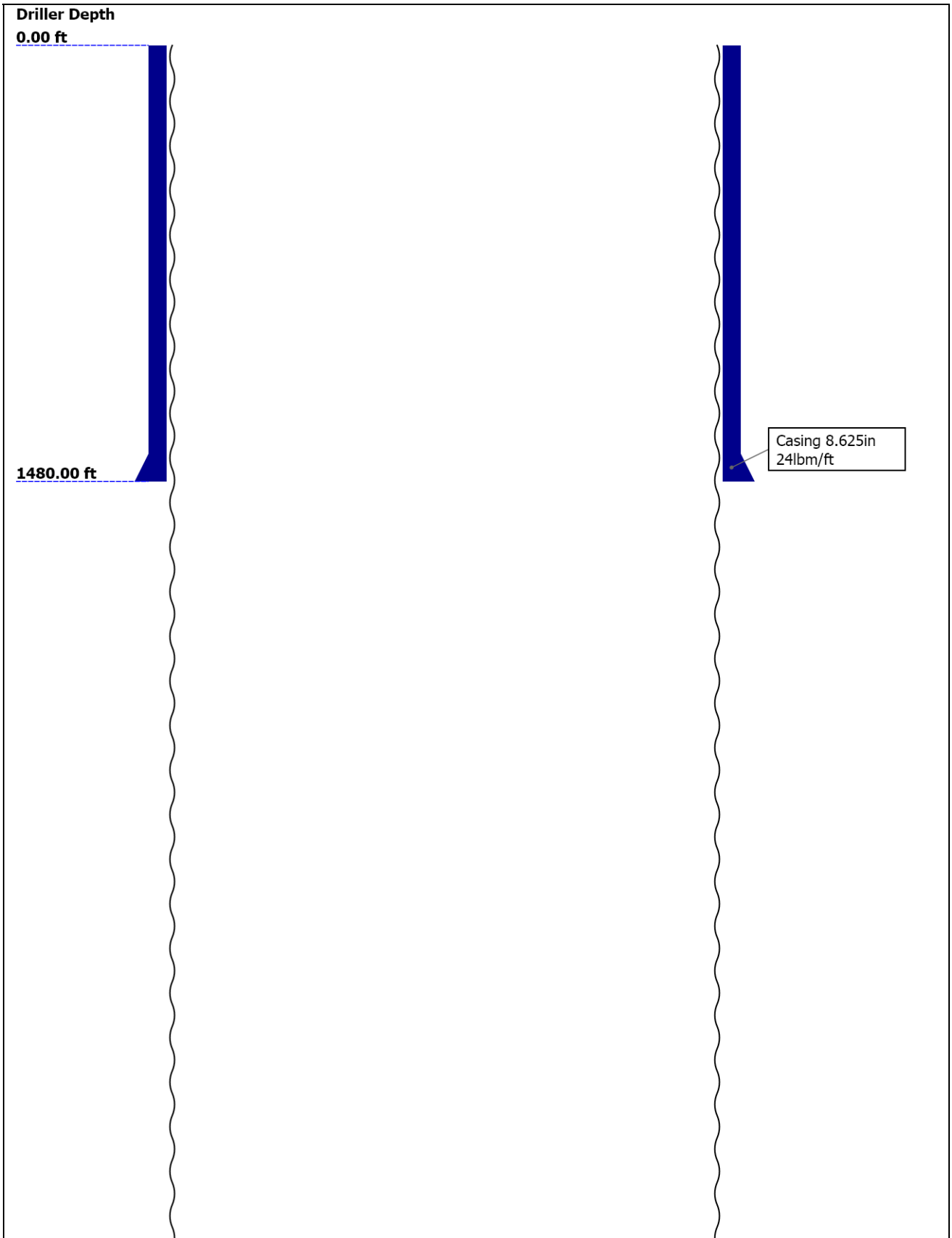
10.2 Software Version
10.3 Composite Summary
10.4 Log (Porosity 5 inch)

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	7.875					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	5250					
Bottom Logger (ft)	5255					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24					
Inner Diameter (in)	8.099					
Grade	J55					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	1480					
Bottom Logger (ft)	1494					

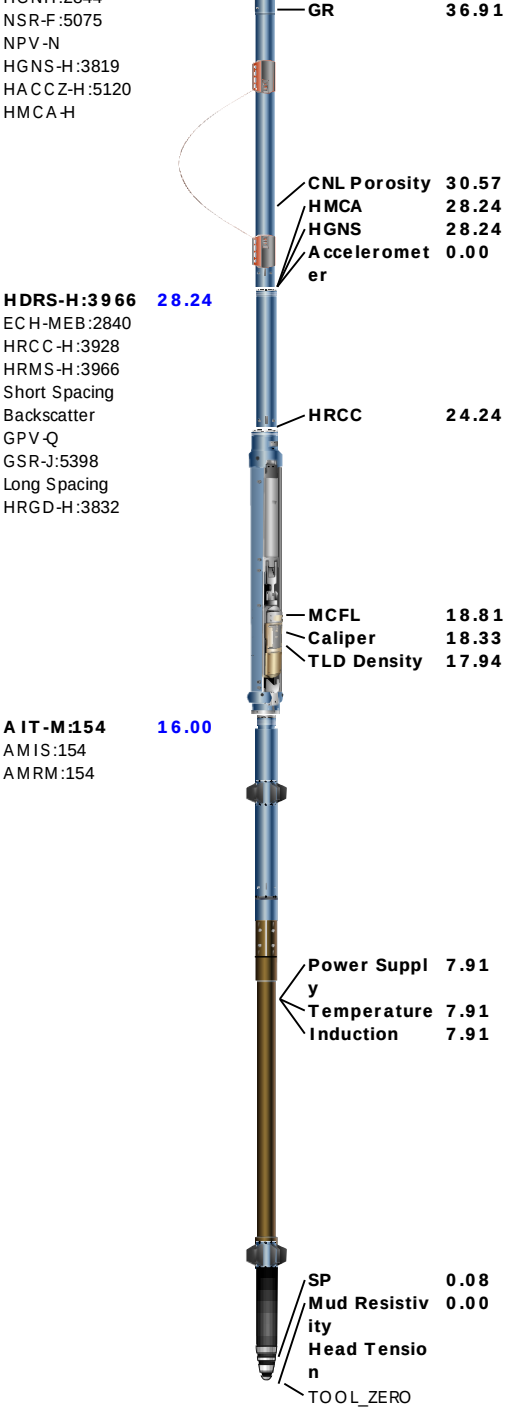
Remarks and Equipment Summary

One: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	58.76		
LEH-QT			
EDTC-B	55.84		
EDTH-B			
EDTG-A			
EDTC-B			
		CTEM	52.34
		ACCZ	0.00
		HV	0.00
		Gamma Ray	50.47
		TelStatus	49.34
HNGS-BA:328	49.34		
HEH-K:328			
HNGS-BA:328			
		GR	46.35
HNGC-B:596	41.15		
HNGH-A:4077			
HNGC-B:596			
		Tel Status	39.4
HGNS-H:3819	37.65		
HGNH:2844		**Temperature**	37.62

One: Remarks

- Thank you for choosing Schlumberger of Elk City, OK- 580-339-6535
- Tools ran as per toolsketch.
- All logs and presentations as per client's request.
- Logging measured from ground level as per client's request. Drilling measured from drill floor at 7' above ground level.
- Thank you for choosing Schlumberger of Elk City, OK.
- 580 225 4300 --Elk City, OK Shop
- Logged on limestone matrix (MDEN=2.56,DTM=47.6)
- Standoff correction & Hole size correction were applied.
- Caliper check inside casing within tolerance.
- Source of maximum recorded temperature is HNGS temperature sensor.



Lengths are in ft
Maximum Outer Diameter = 9.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

Depth Control Parameters	**One**		
Conveyance Type	Wireline		
Log Sequence	ONE		
Depth Remark Parameters	**One**		
Depth Remark 1	First run in hole, All Schlumberger Depth control procedures were followed.		
Depth Remark 2	IDW used as primary depth control & Z-Chart used as secondary.		
Depth Remark 3	Main Log was correlated to the Down log.		
Depth Remark 4	Logging measured from ground level as per client's request. Drilling measured from drill floor at 7' above ground level.		
Depth Measuring Device	**One**		

Type	IDW-JA			
Serial Number	6650			
Calibration Date	25-Apr-2013			
Calibrator Serial Number	33			
Calibration Cable Type	7-39P-LXS			
Wheel Correction 1	-6			
Wheel Correction 2	-3			
Tension Device	**One**			
Type	CMTD-B/A			
Serial Number	2549			
Calibration Date	25-Sep-2013			
Calibrator Serial Number	1018			
Calibration Points	10			
Calibration RMS	12			
Calibration Peak Error	19			
Logging Cable	**One**			
Type	7-39P-LXS			
Serial Number	U712016			
Logging Cable Length (ft)	16100.00			

One

Main Pass Porosity 2" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	3.1.9755.0
DepthCorrection	DepthCorrection	3.1.9755.1799

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	3.1.9755.0	3.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:20

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in

DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in
IHV	Borehole	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

TIME_1900 - Time Marked every 60.00 (s)

Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

Cable Tension (TENS)

0 lbf 8000

ToolDrag

Stuck Tool Indicator, Total (STIT)

0 ft 50

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Possible Perm

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

CROSSOVER

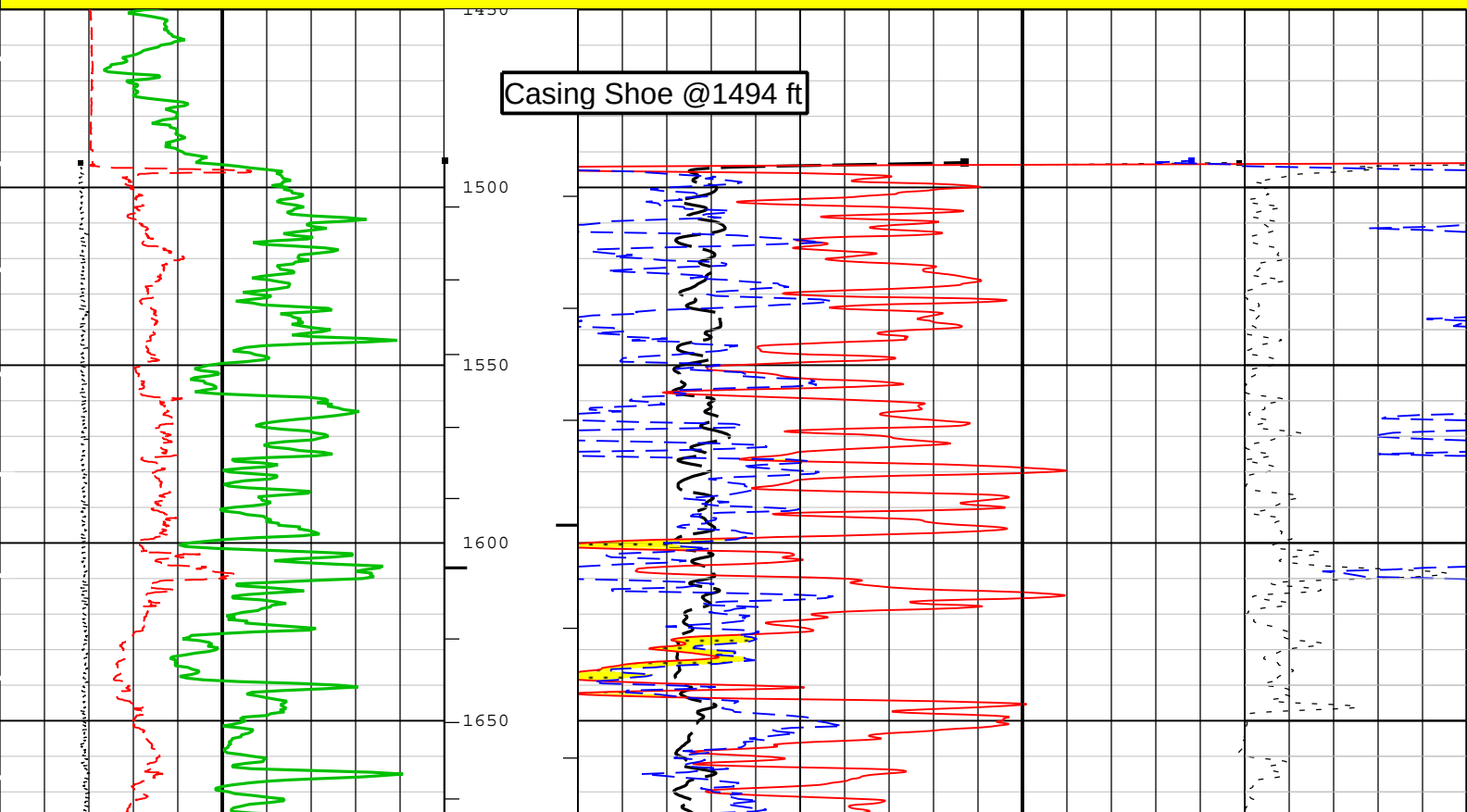
Standard Resolution Density Porosity (DPHZ) HDRS-H

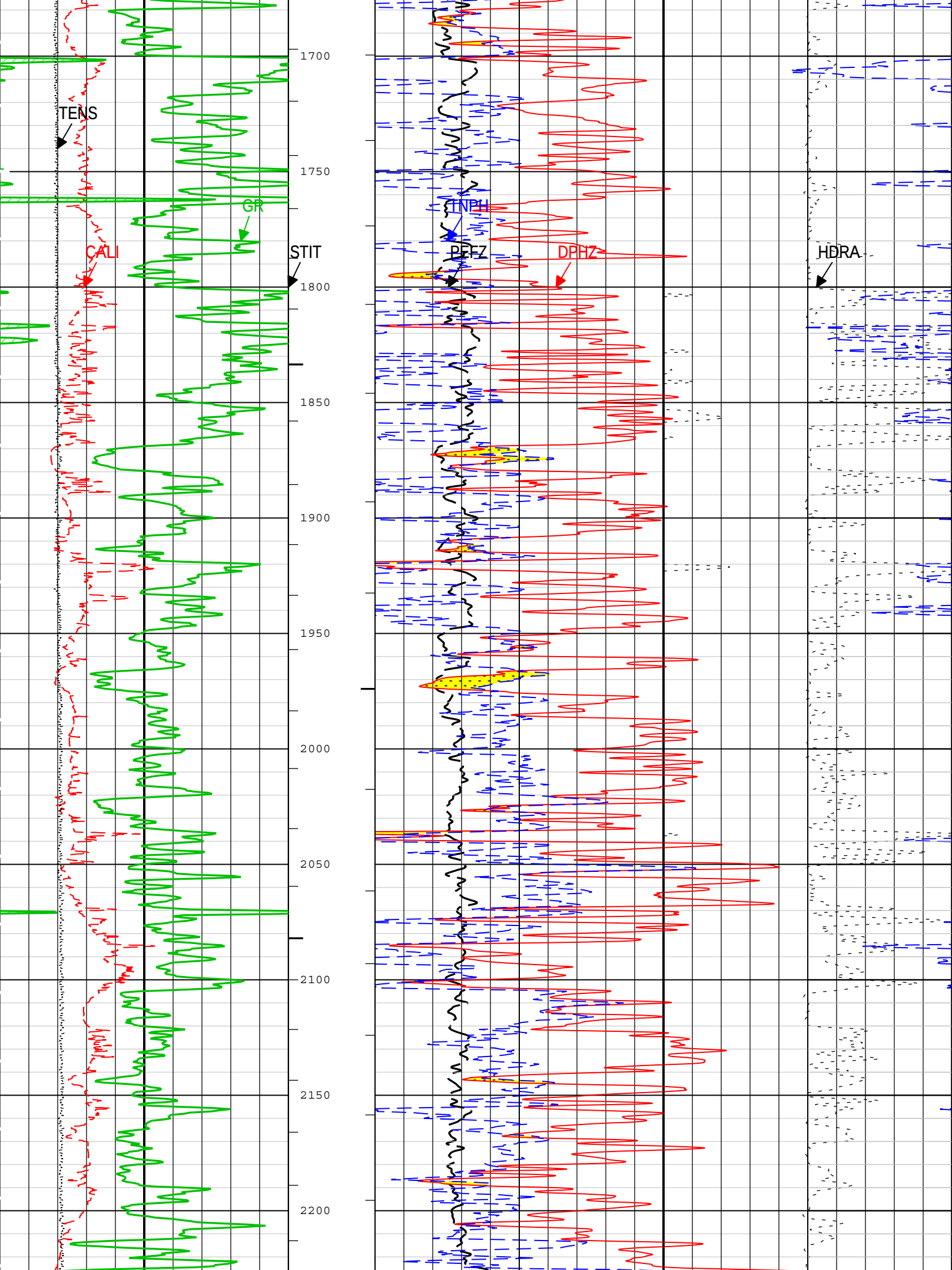
0.3 ft3/ft3 -0.1

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

0.3 ft3/ft3 -0.1

Porosity 2" per 100' Limestone Matrix, 2.71 g/cc

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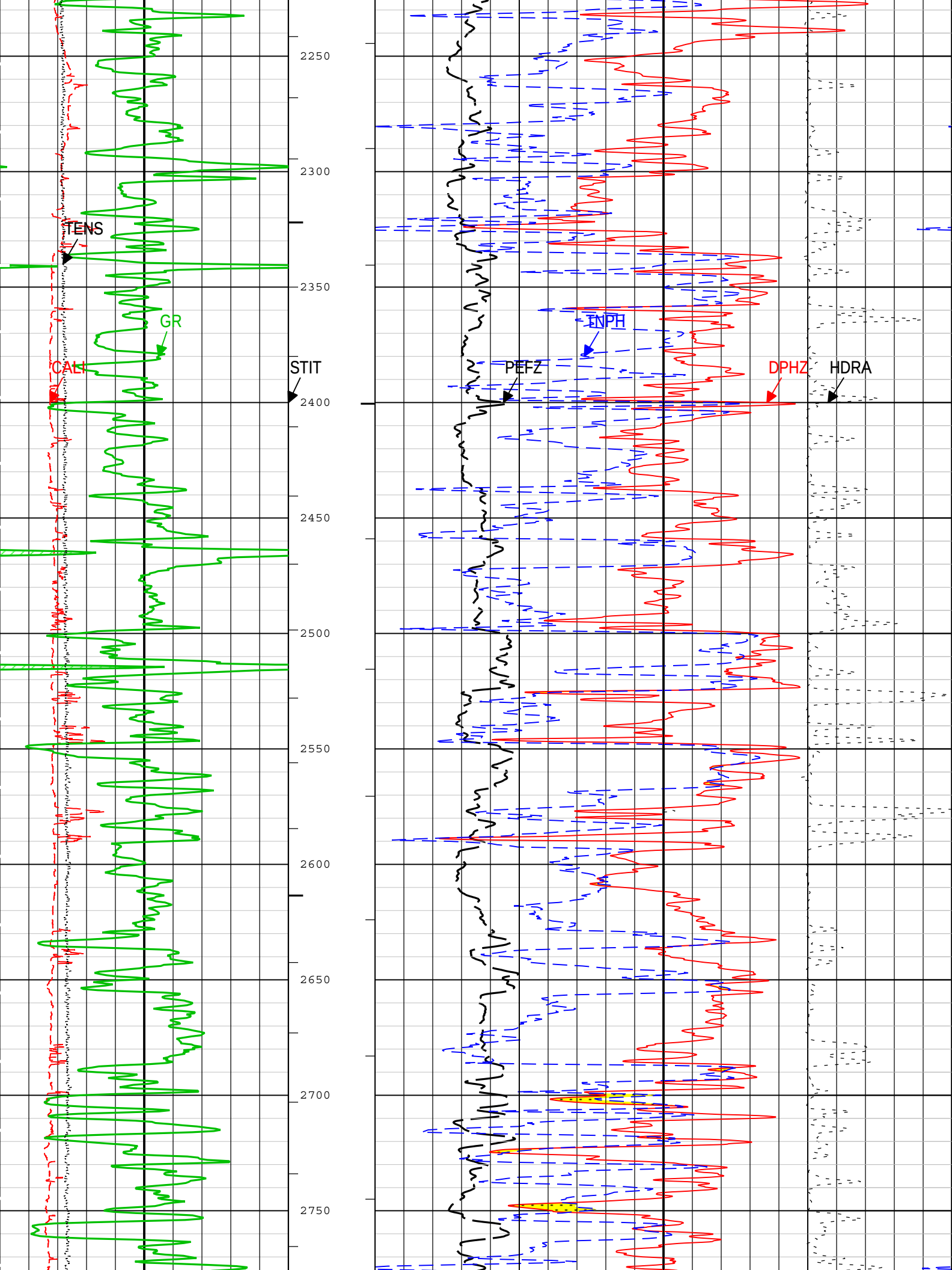
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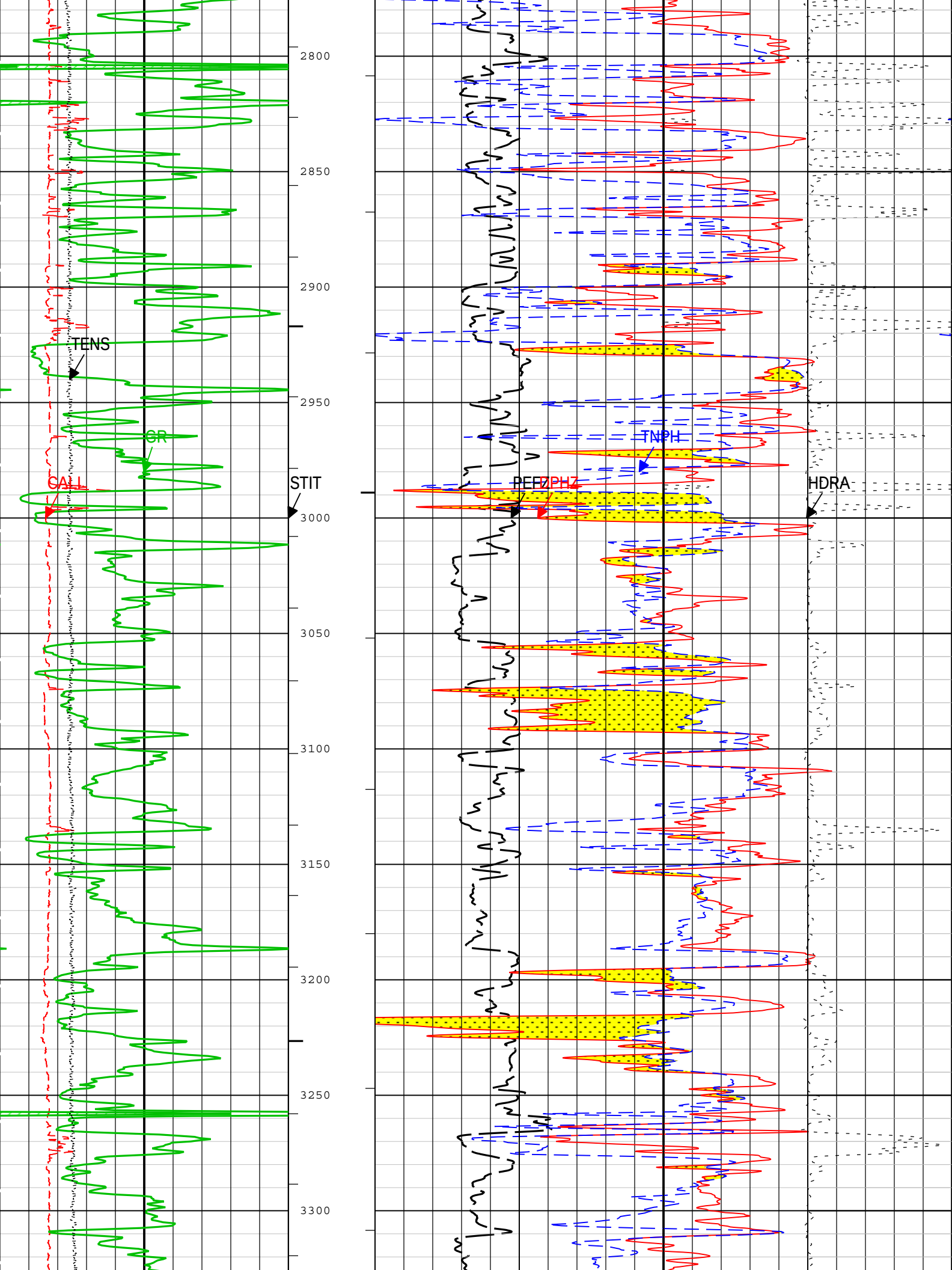
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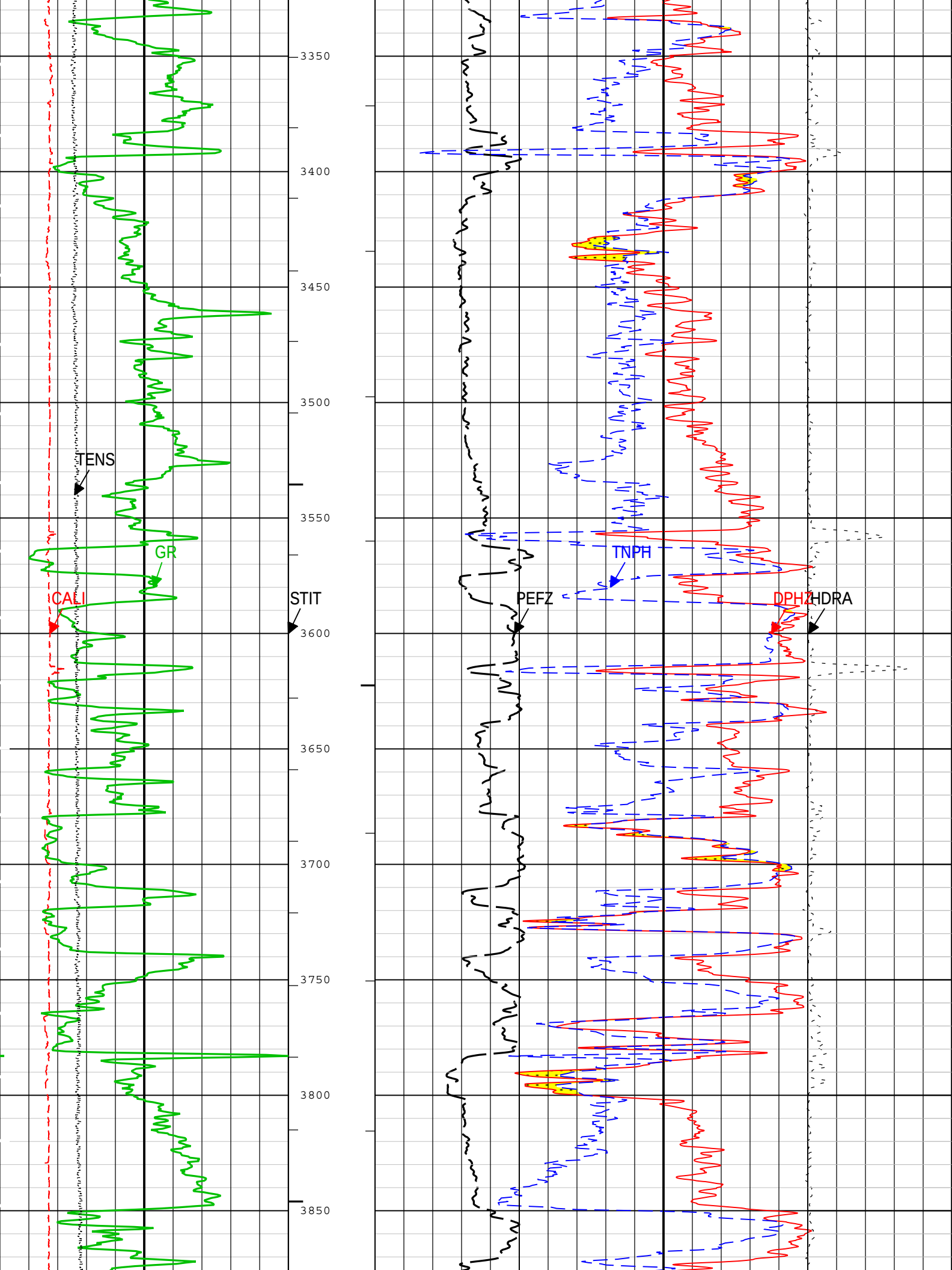
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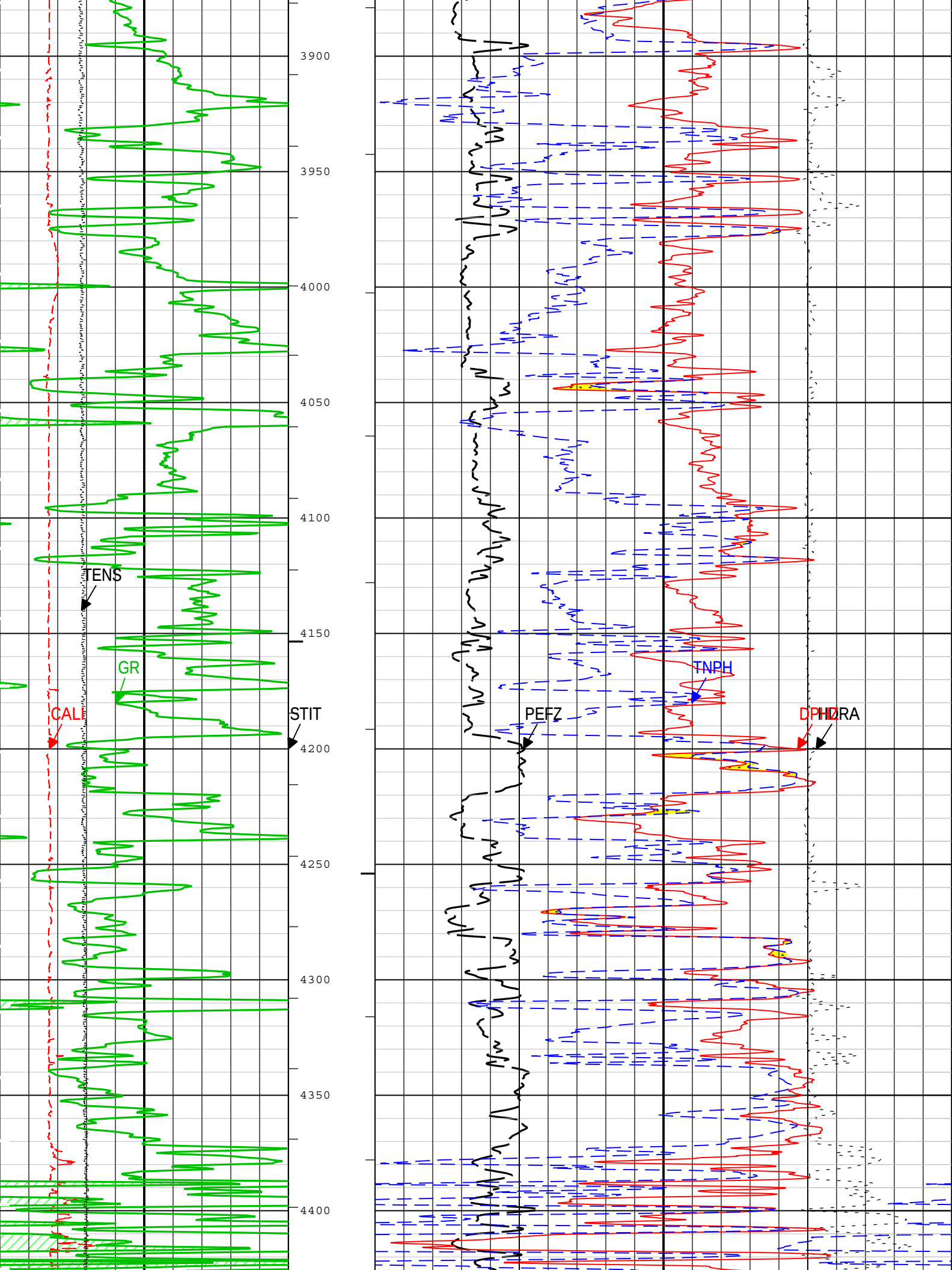
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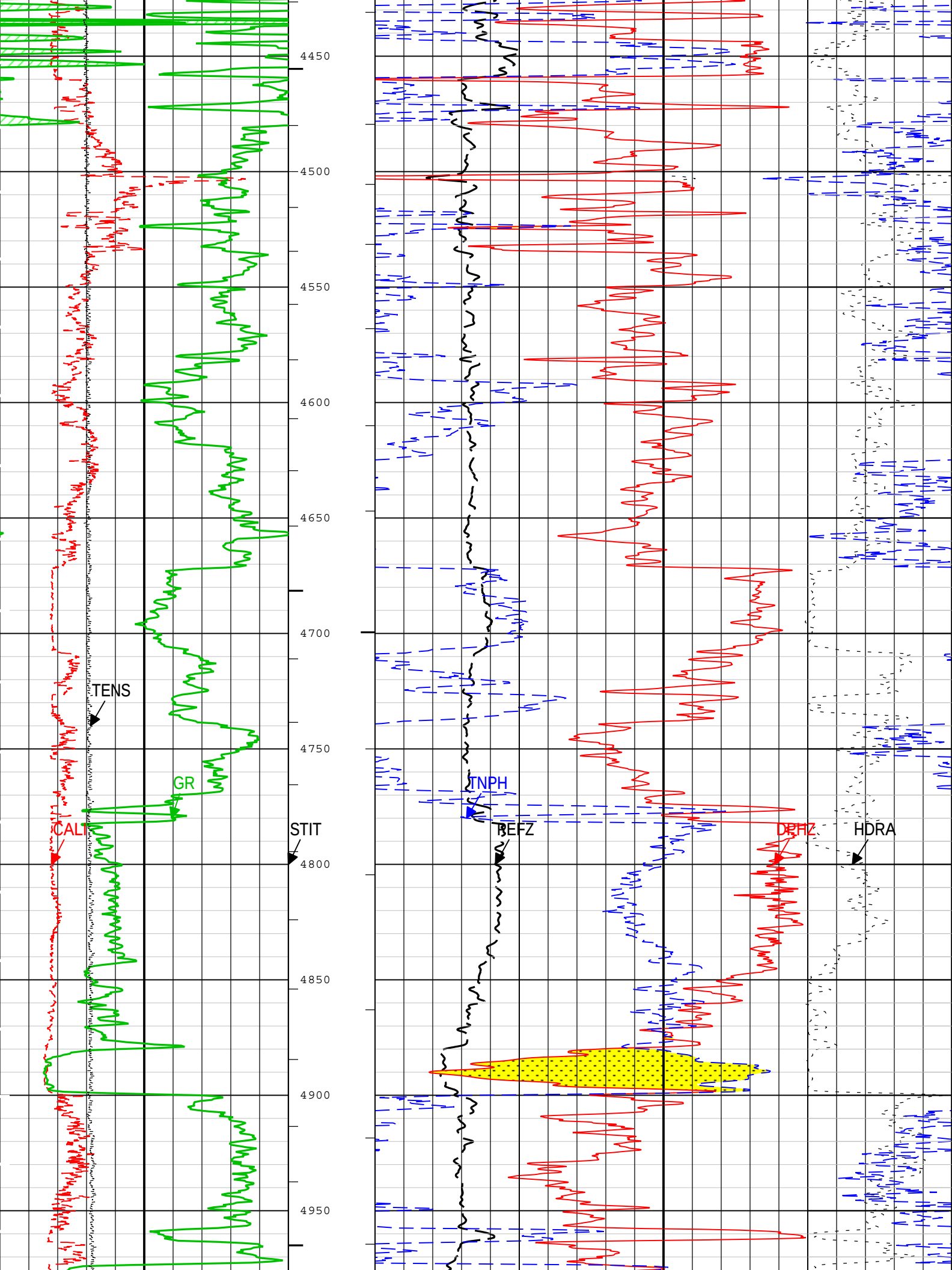
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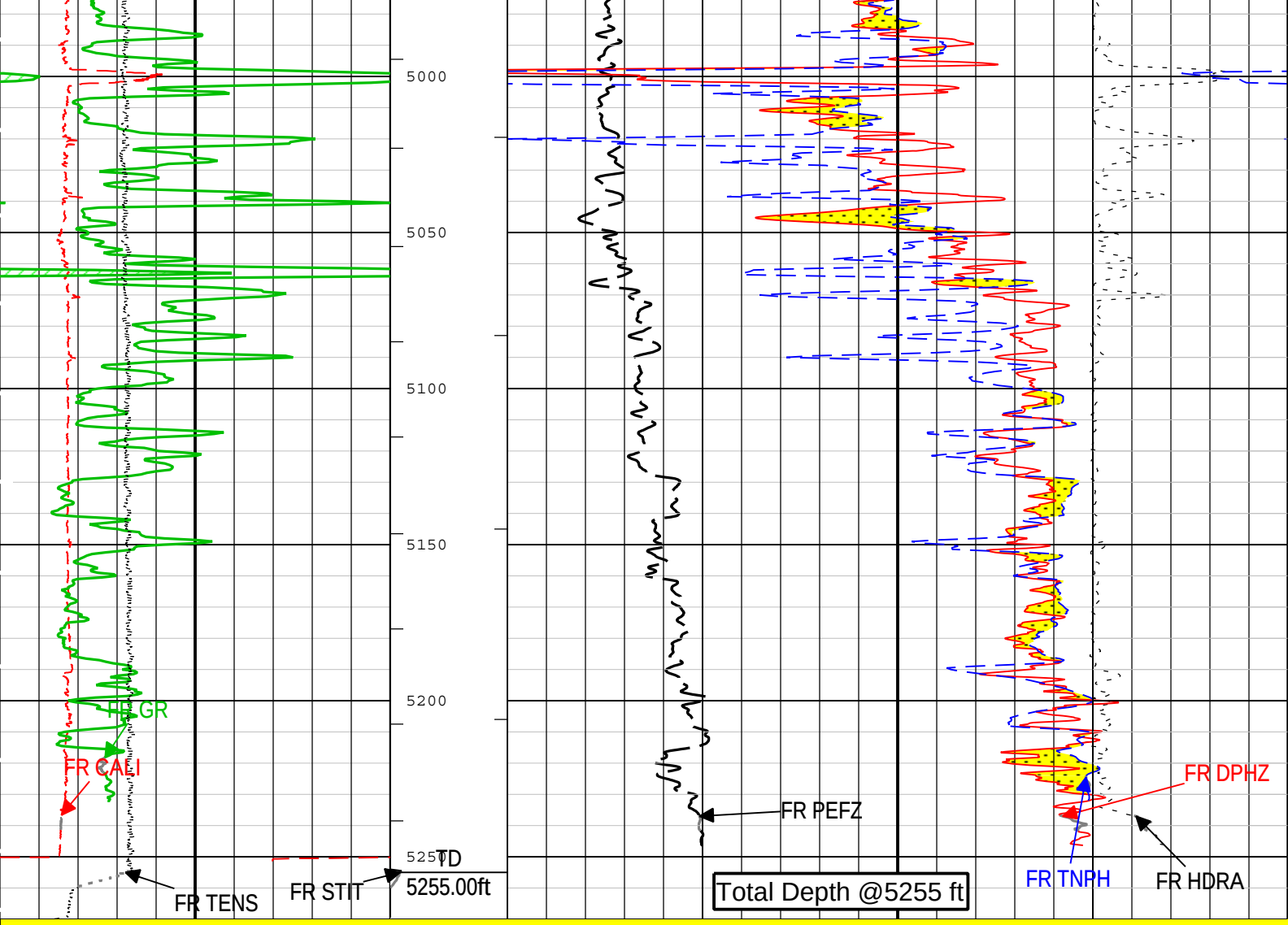


Porosity 2" per 100' Limestone Matrix, 2.71 g/cc

Gamma Ray Back-up

Caliper (CALI) HDRS-H
6 in 16

Gamma Ray (GR) HGNS-H
0 gAPI 150

Gamma Ray (GR) HGNS-H
150 gAPI 300

Cable Tension (TENS)
0 lbf 8000

ToolDrag

Stuck Tool Indicator, Total (STIT)
0 ft 50

CROSSOVER

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

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

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

Density Standoff Correction (HDRA) HDRS-H
-0.25 g/cm3 0.25

Possible Perm

TIME_1900 - Time Marked every 60.00 (s)

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:20

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit

BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	10443.66	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.8	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Fresh 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	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
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	55	degF
NPRM	HRDD Nuclear Processing Mode	HDRS-H	High Resolution	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.62	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	5255	ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BRD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

One

Main Pass Porosity 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	3.1.9755.0

DepthCorrection	DepthCorrection		3.1.9755.1799

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	3.1.9755.0	3.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:23

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in
IHV	Borehole	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

ICV - Integrated Cement Volume every 10.00 (ft3)

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)

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

Cable Tension (TENS)

0 lbf 8000

ToolDrag

Stuck Tool Indicator, Total (STIT)

0 ft 50

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Possible Perm

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

CROSSOVER

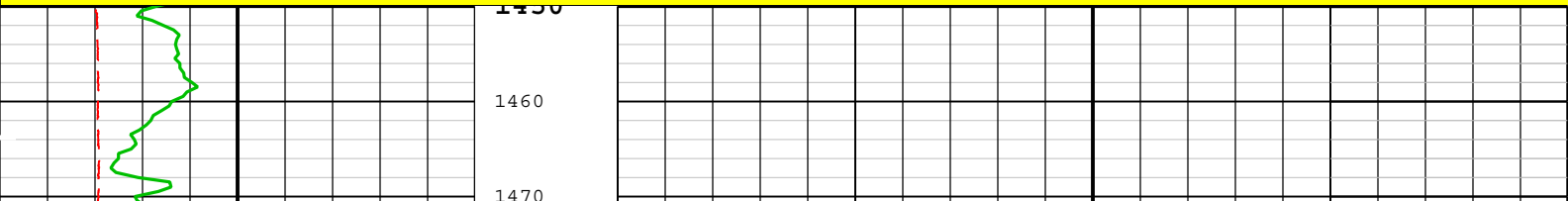
Standard Resolution Density Porosity (DPHZ) HDRS-H

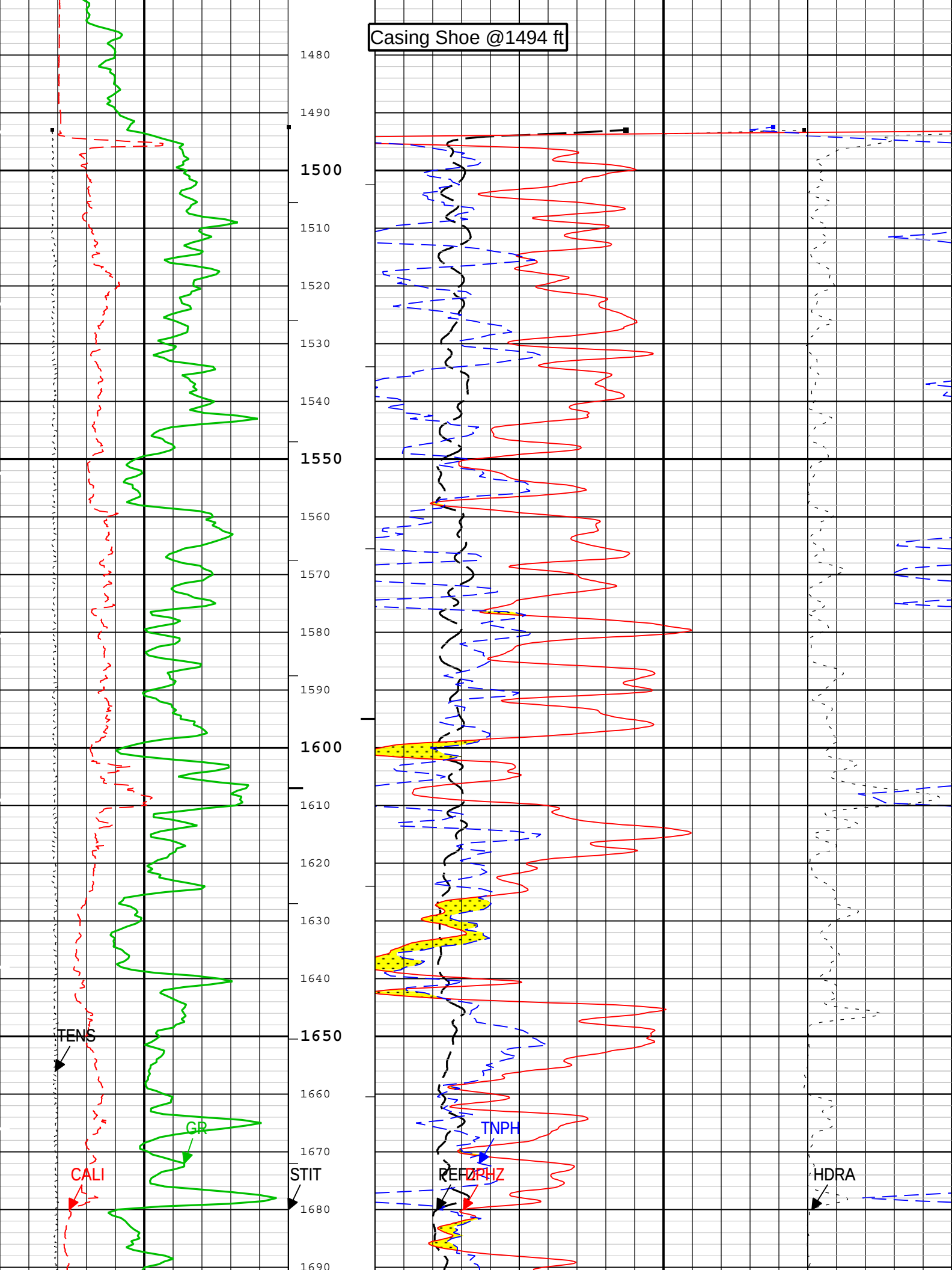
0.3 ft3/ft3 -0.1

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

0.3 ft3/ft3 -0.1

Porosity 2" per 100' Limestone Matrix, 2.71 g/cc

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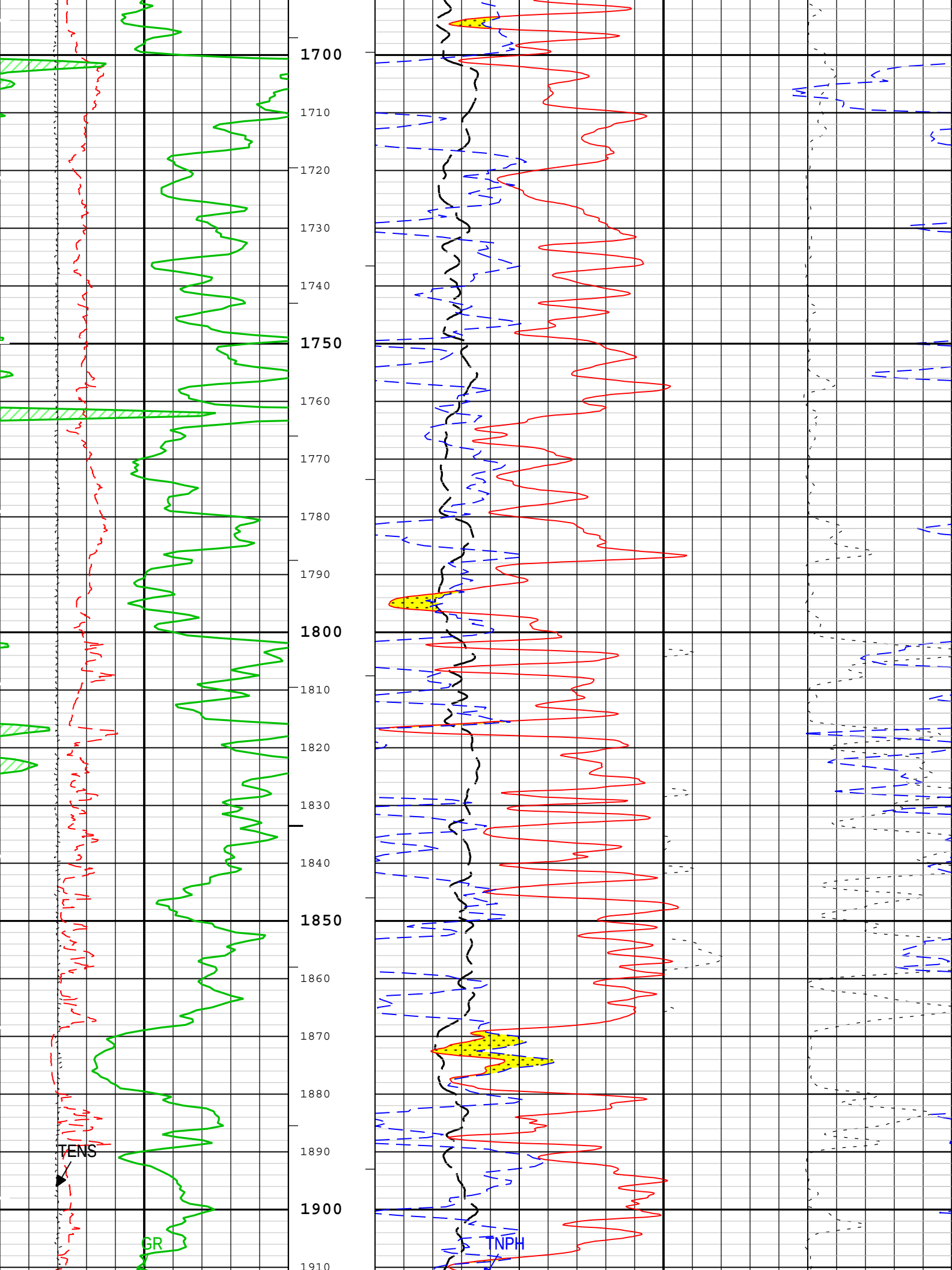
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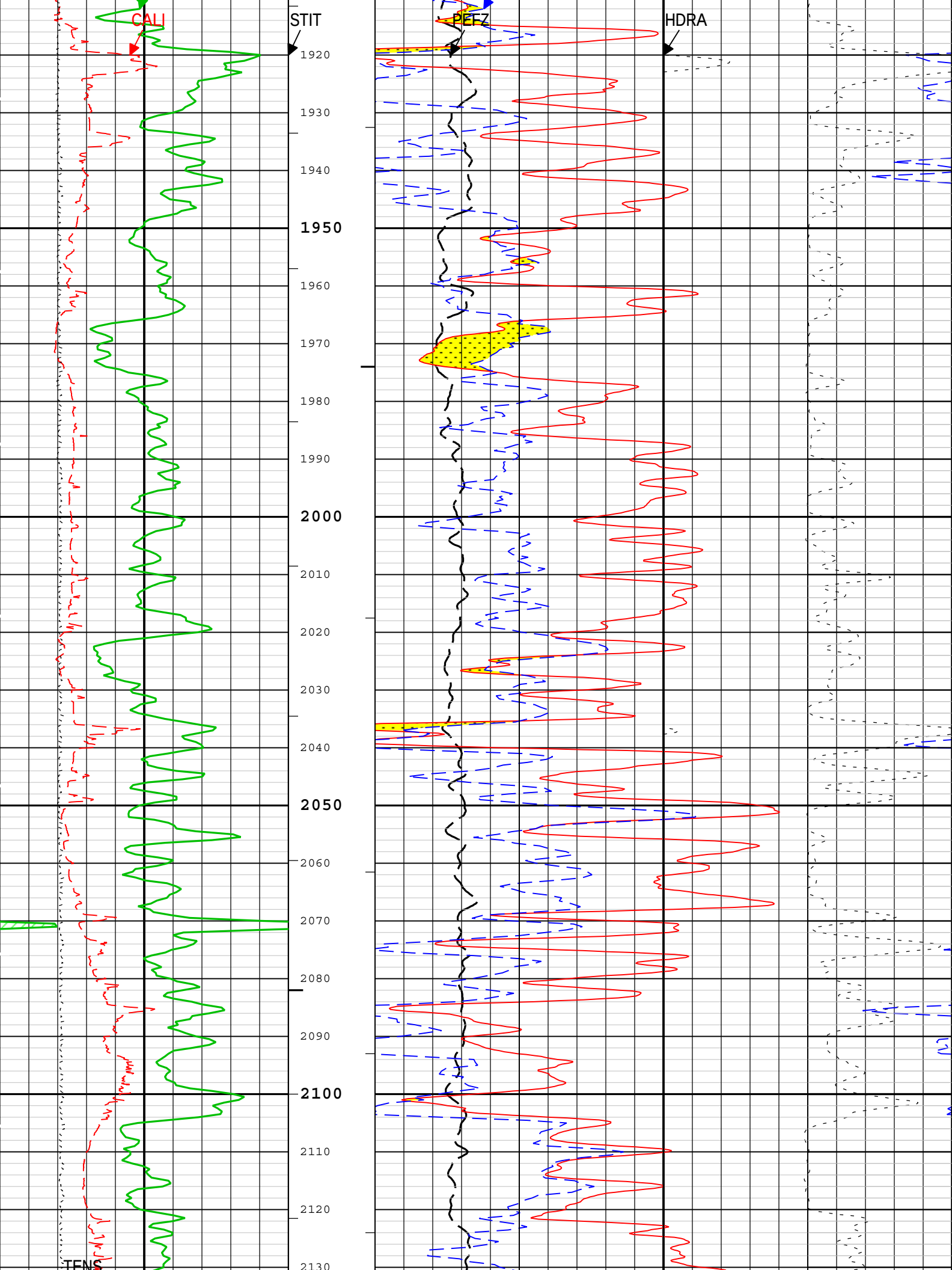
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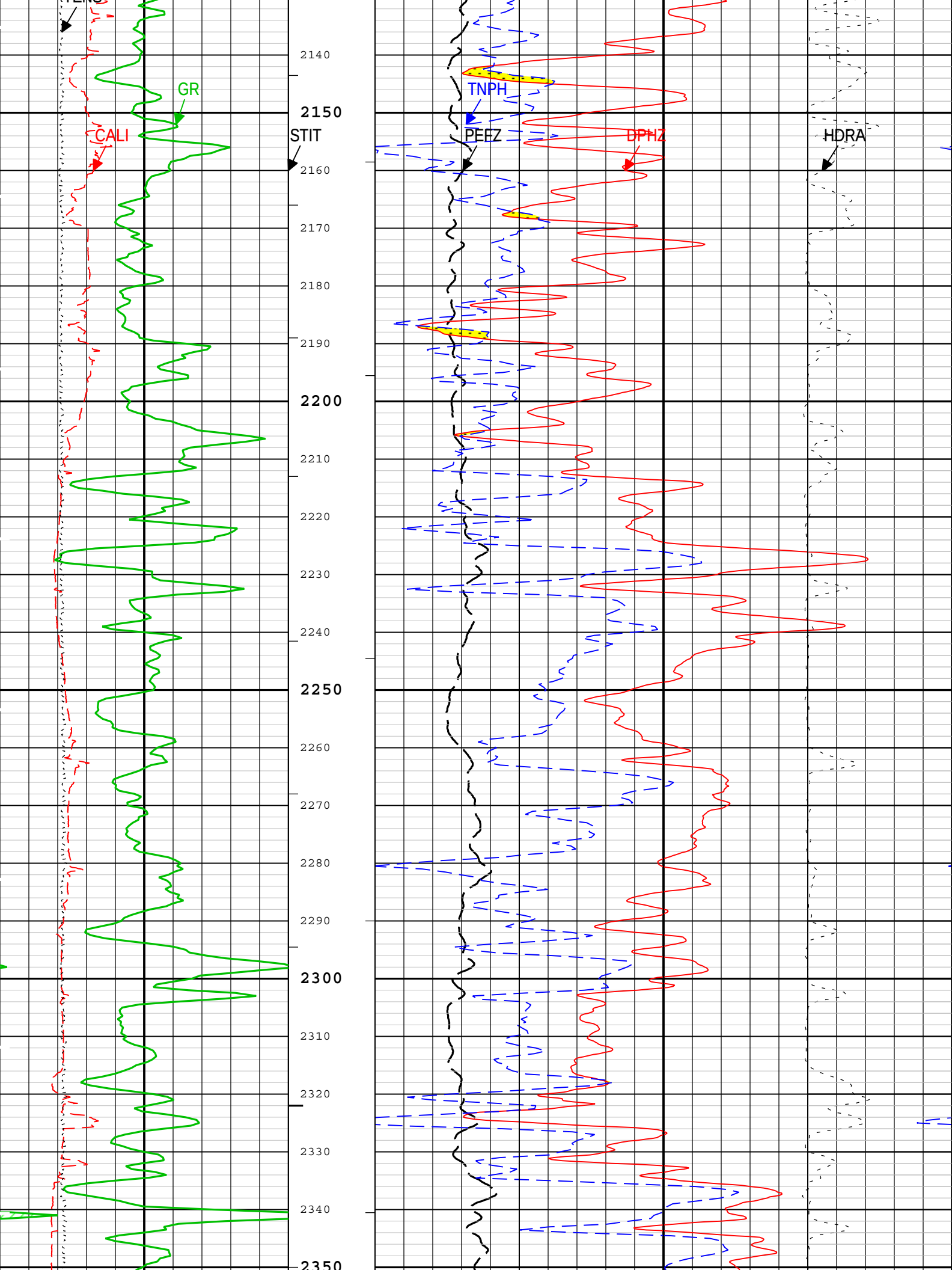
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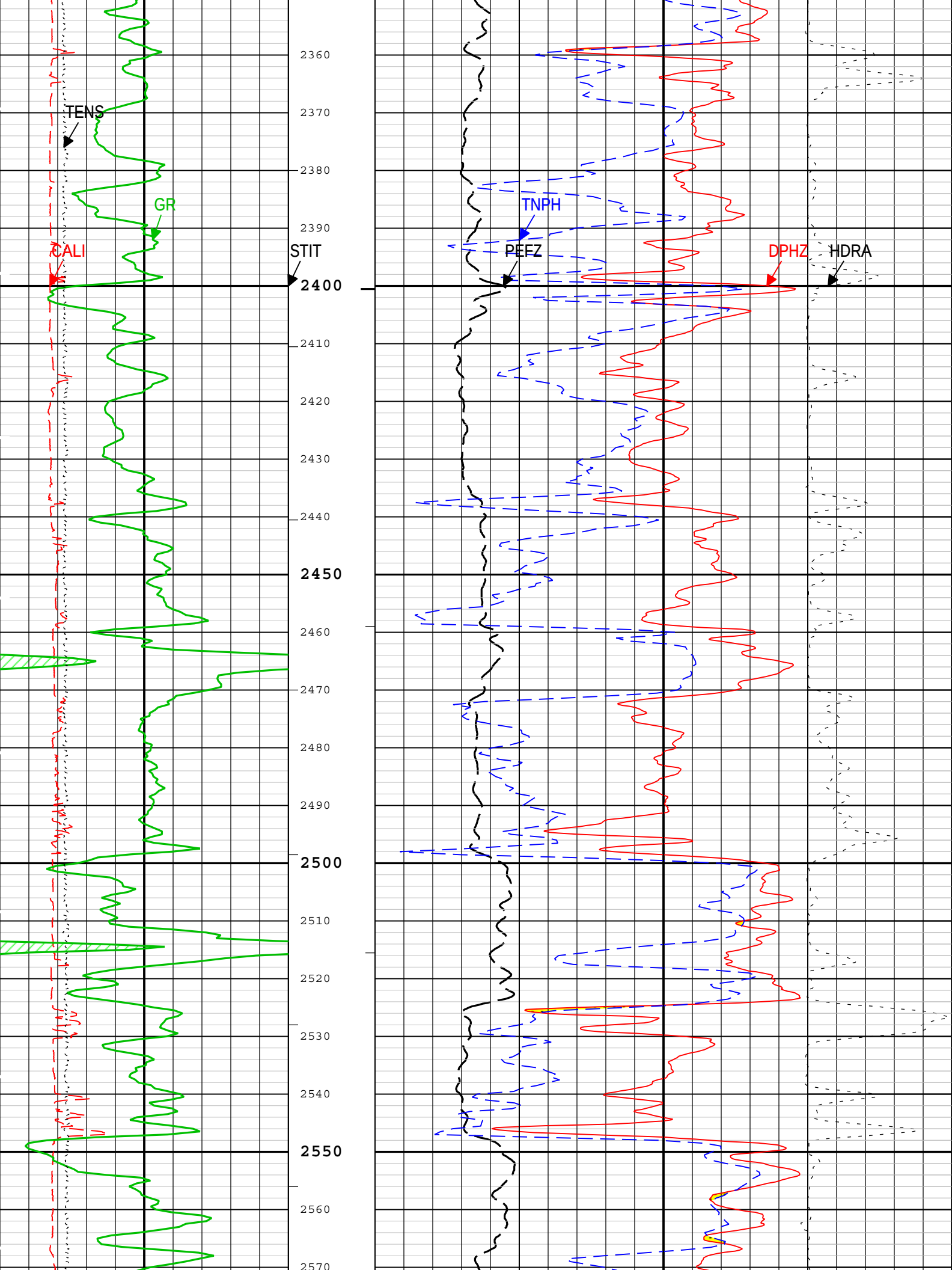
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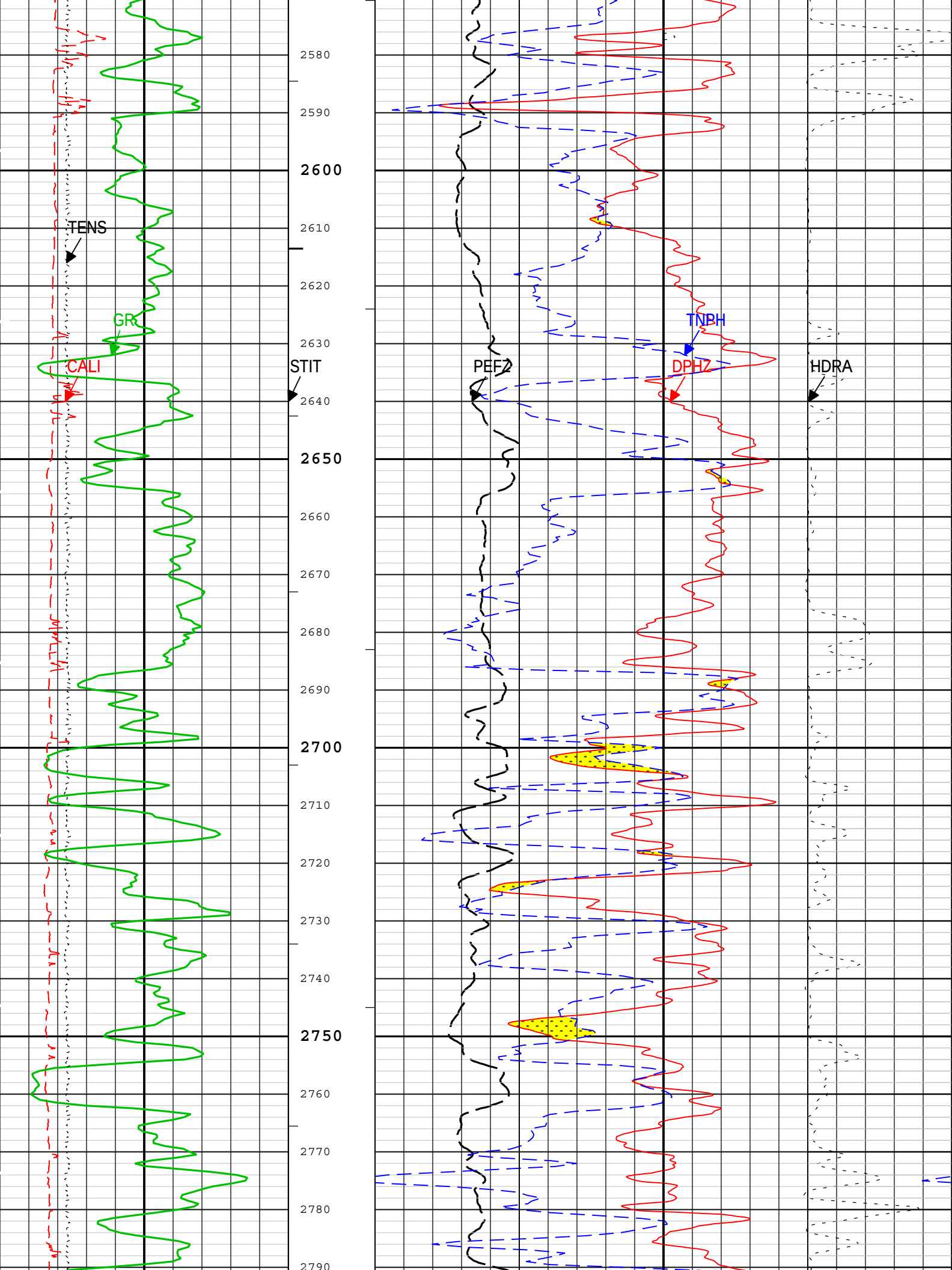
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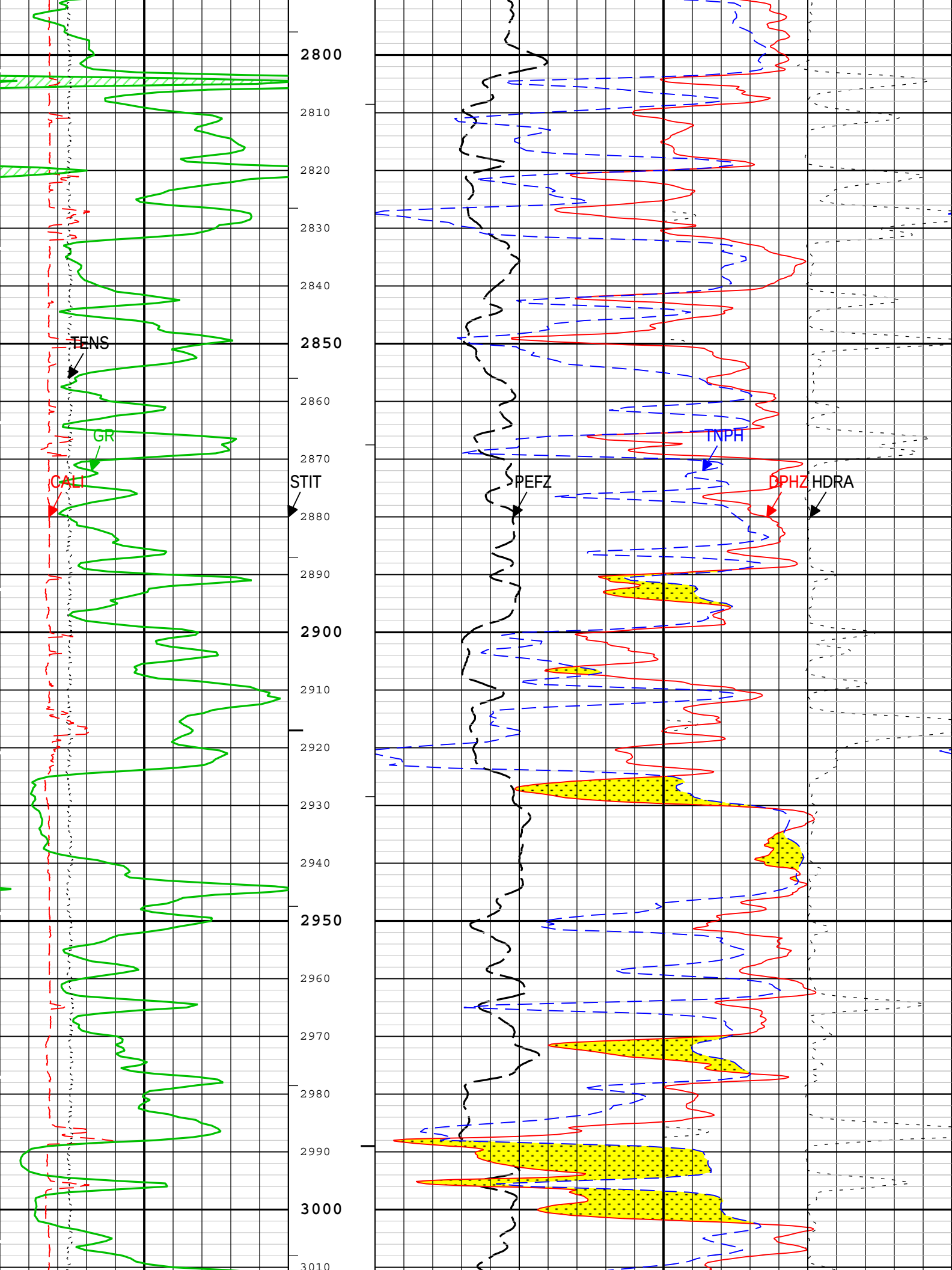
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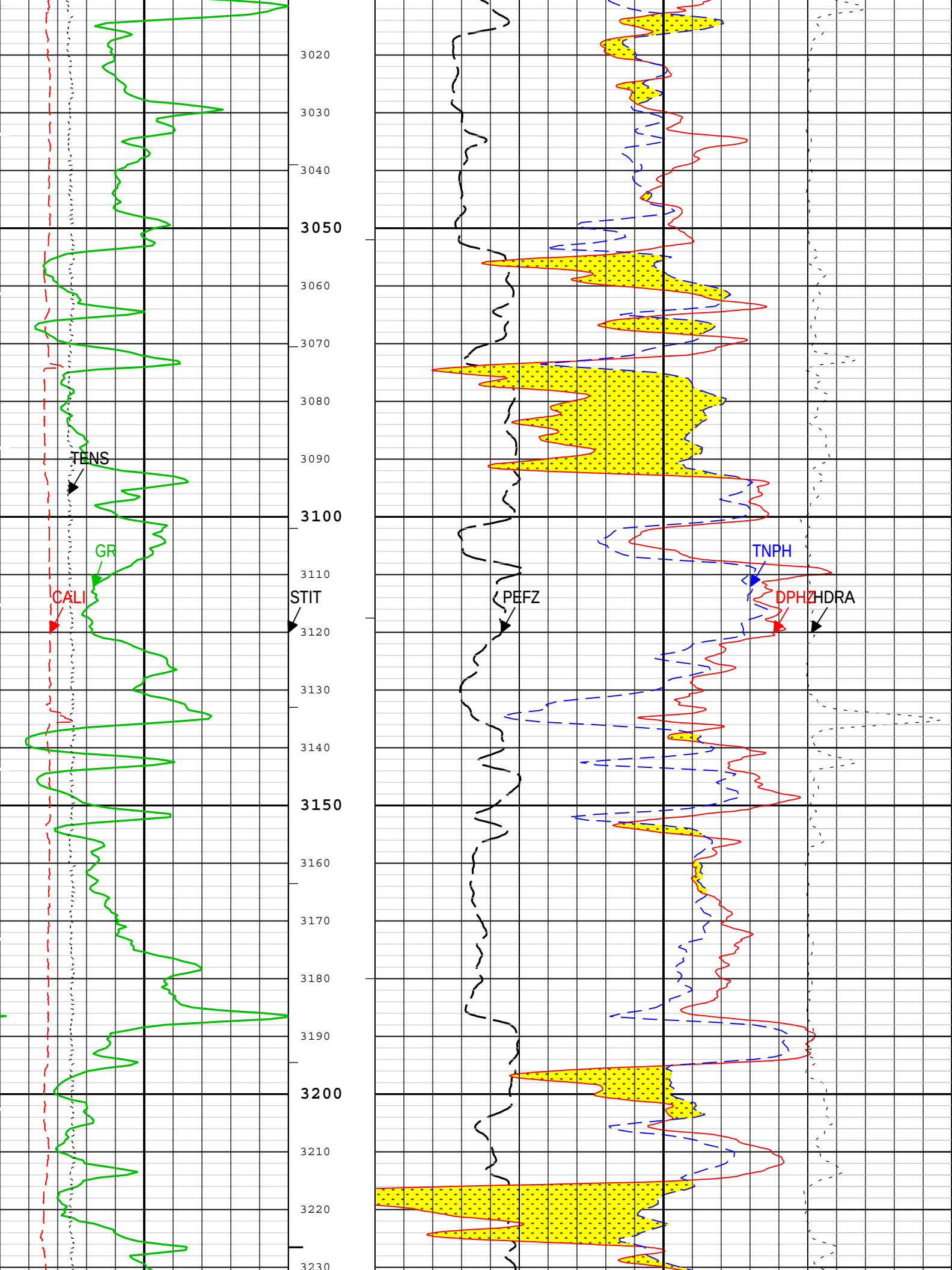
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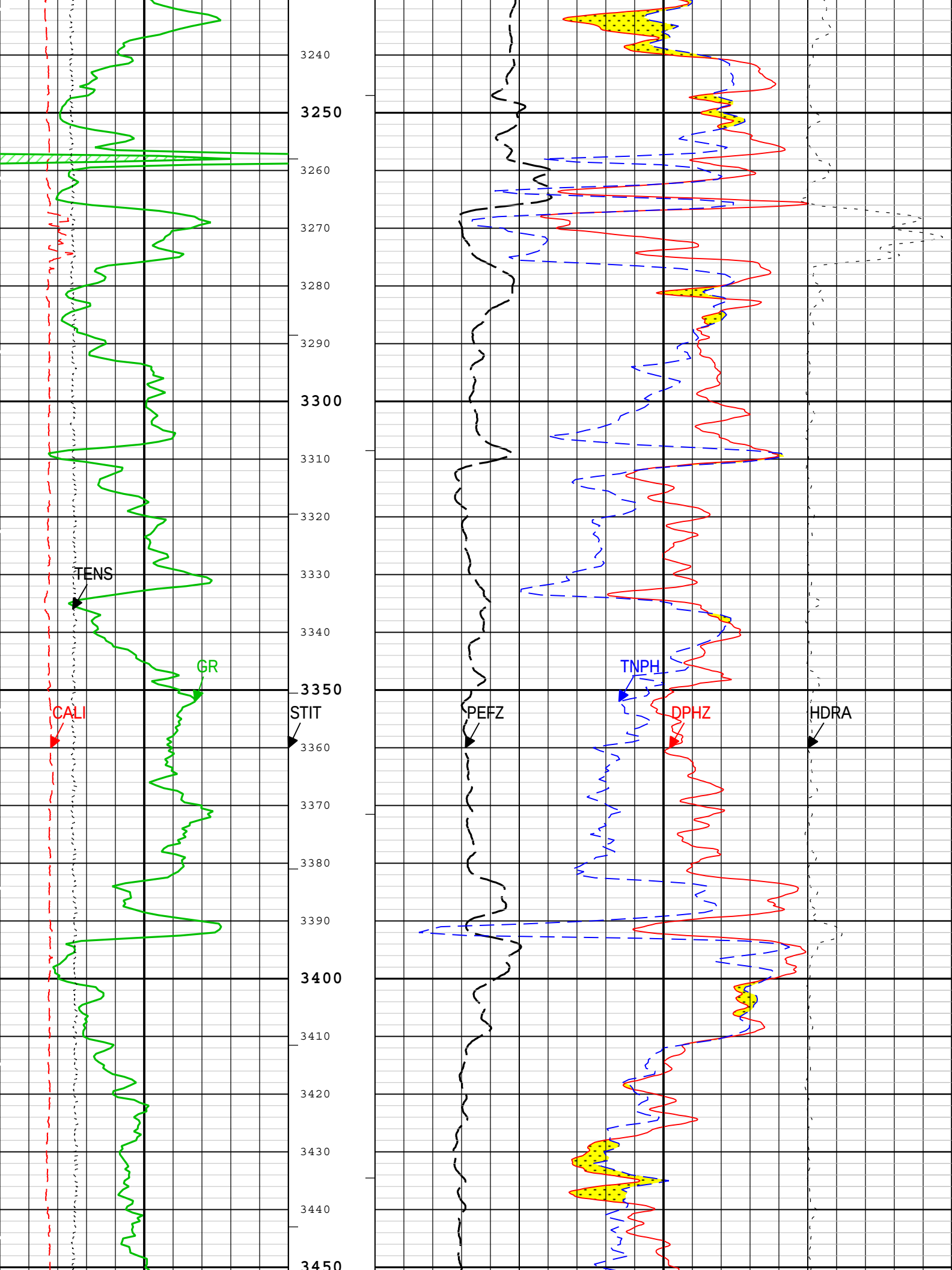
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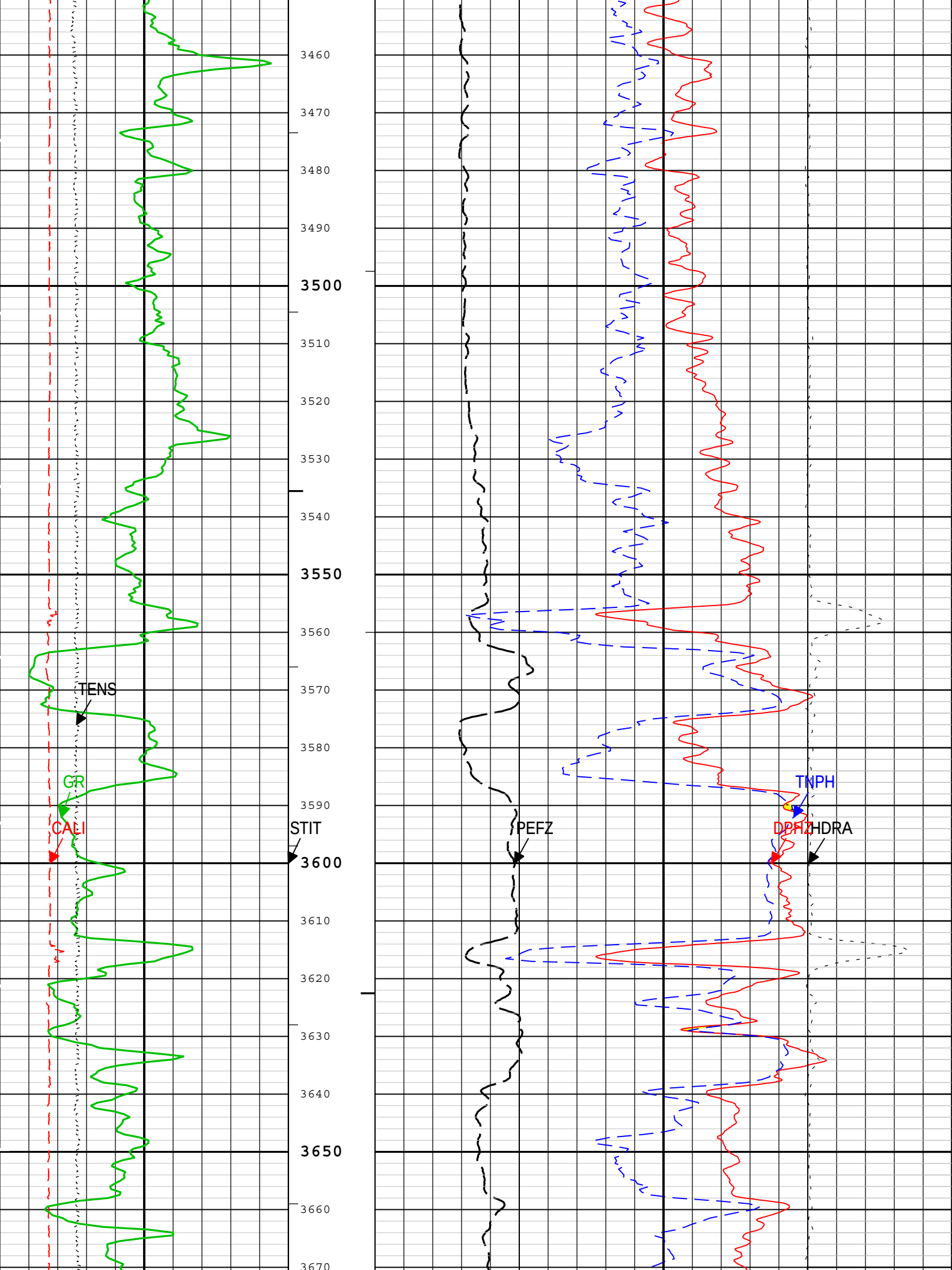
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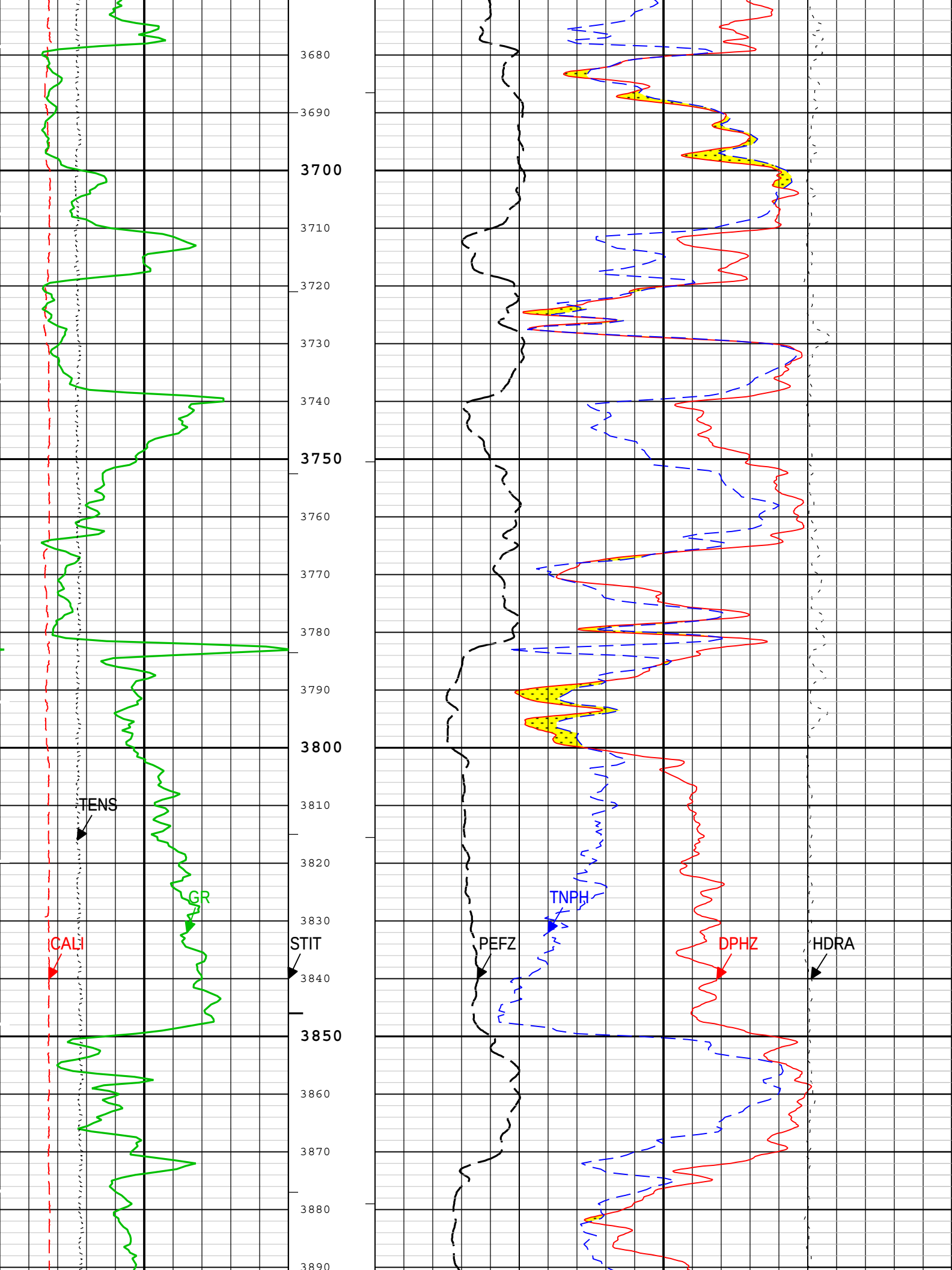
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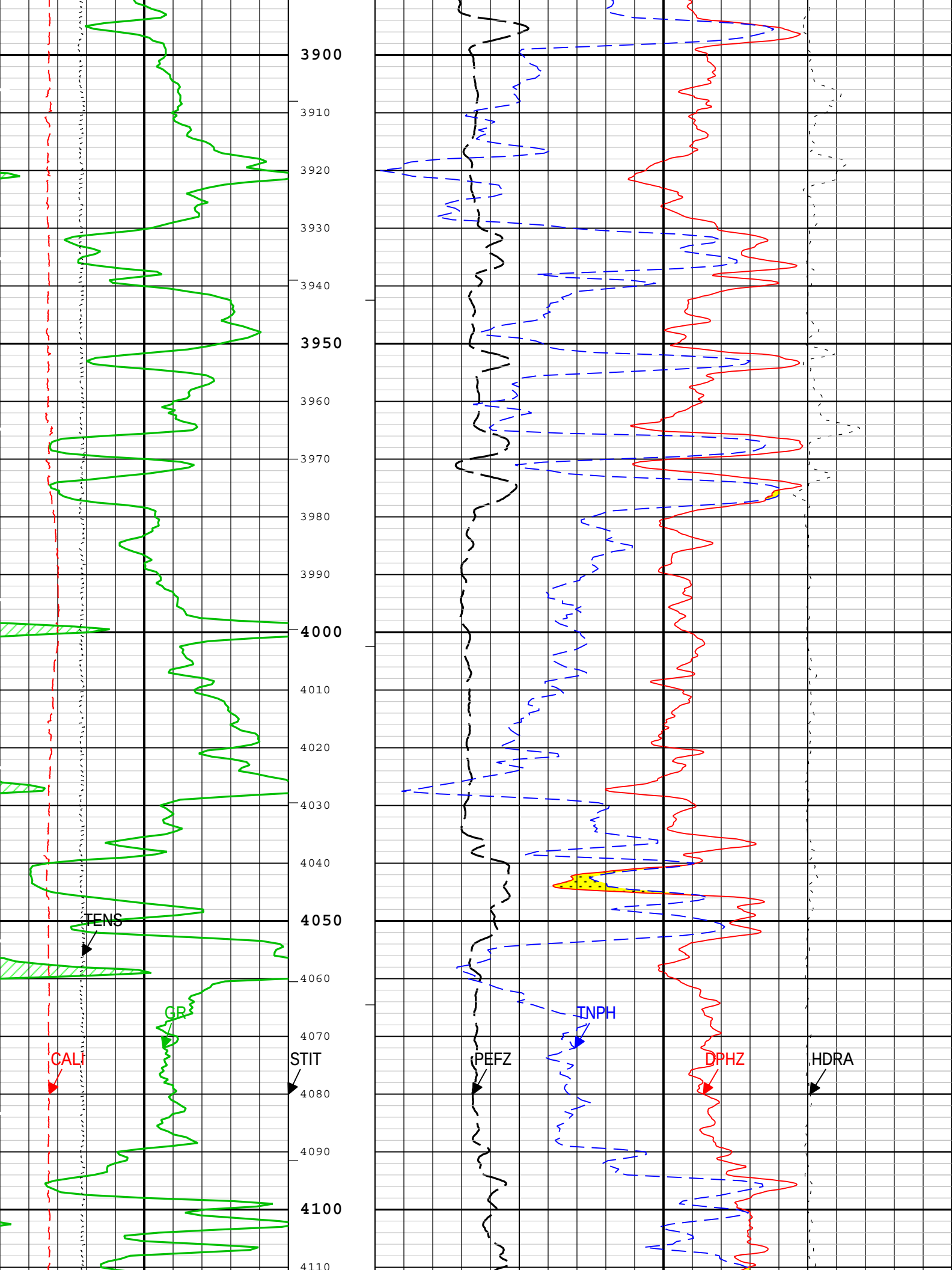
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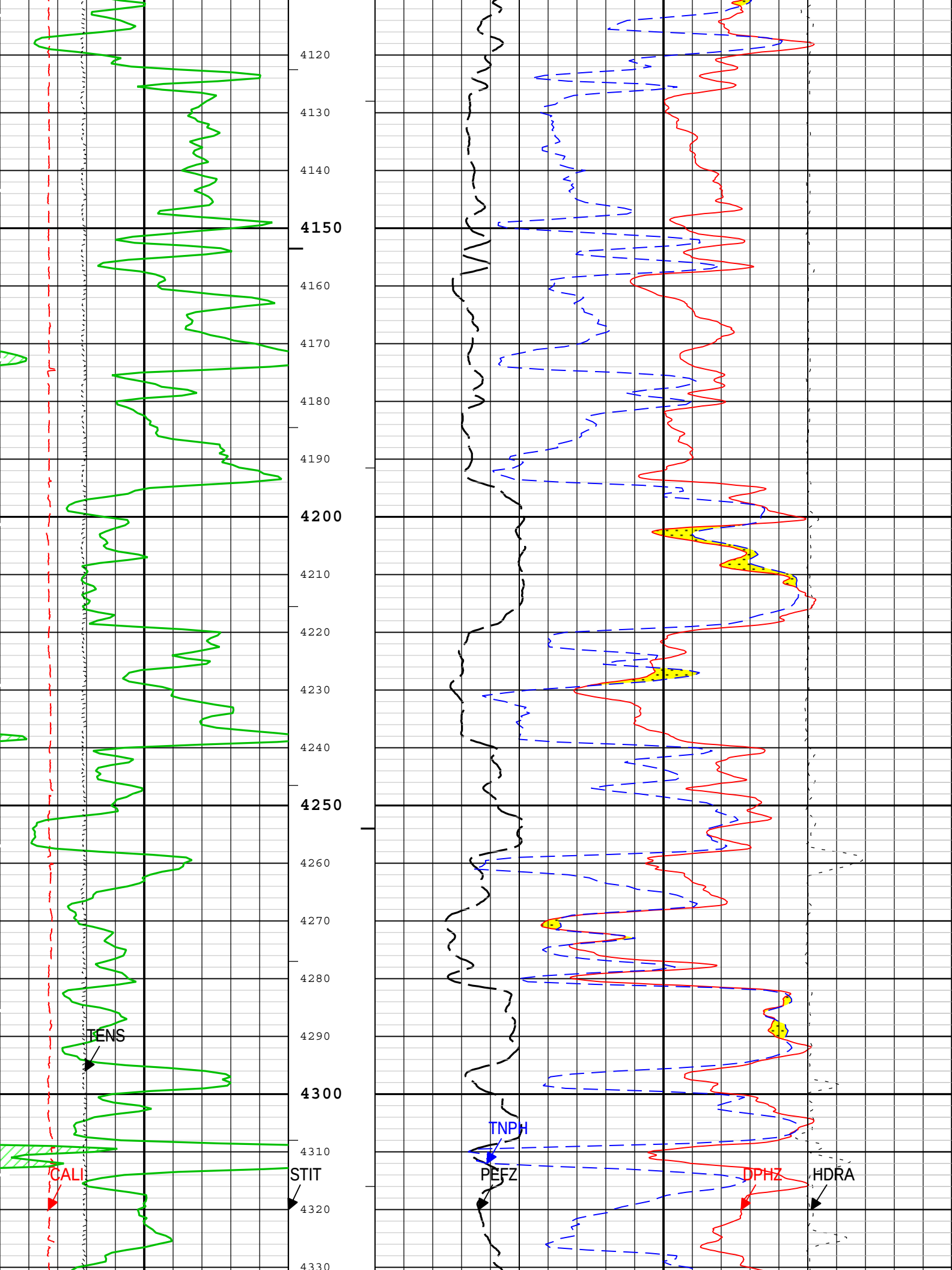
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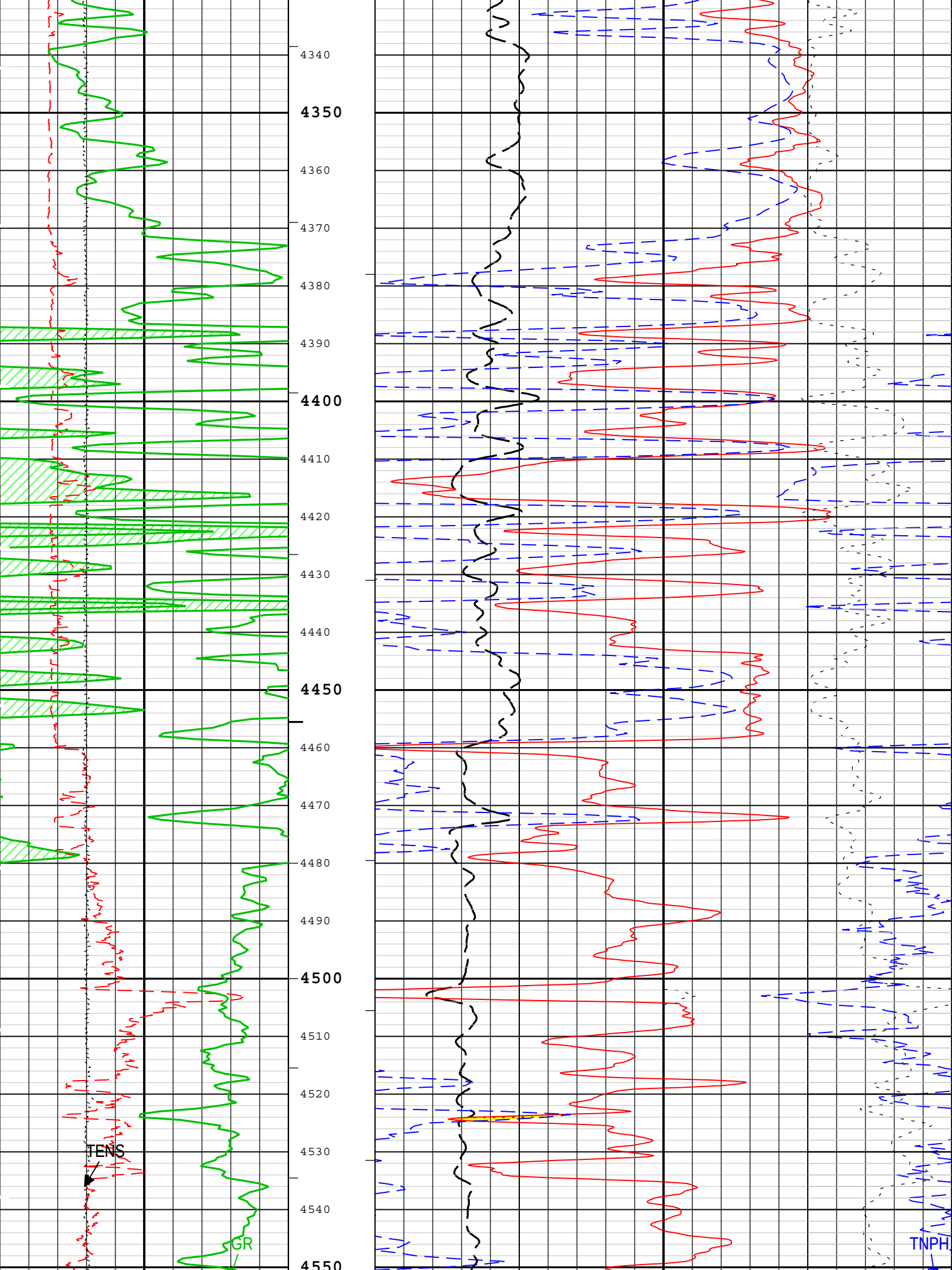
DPHZ
HDRA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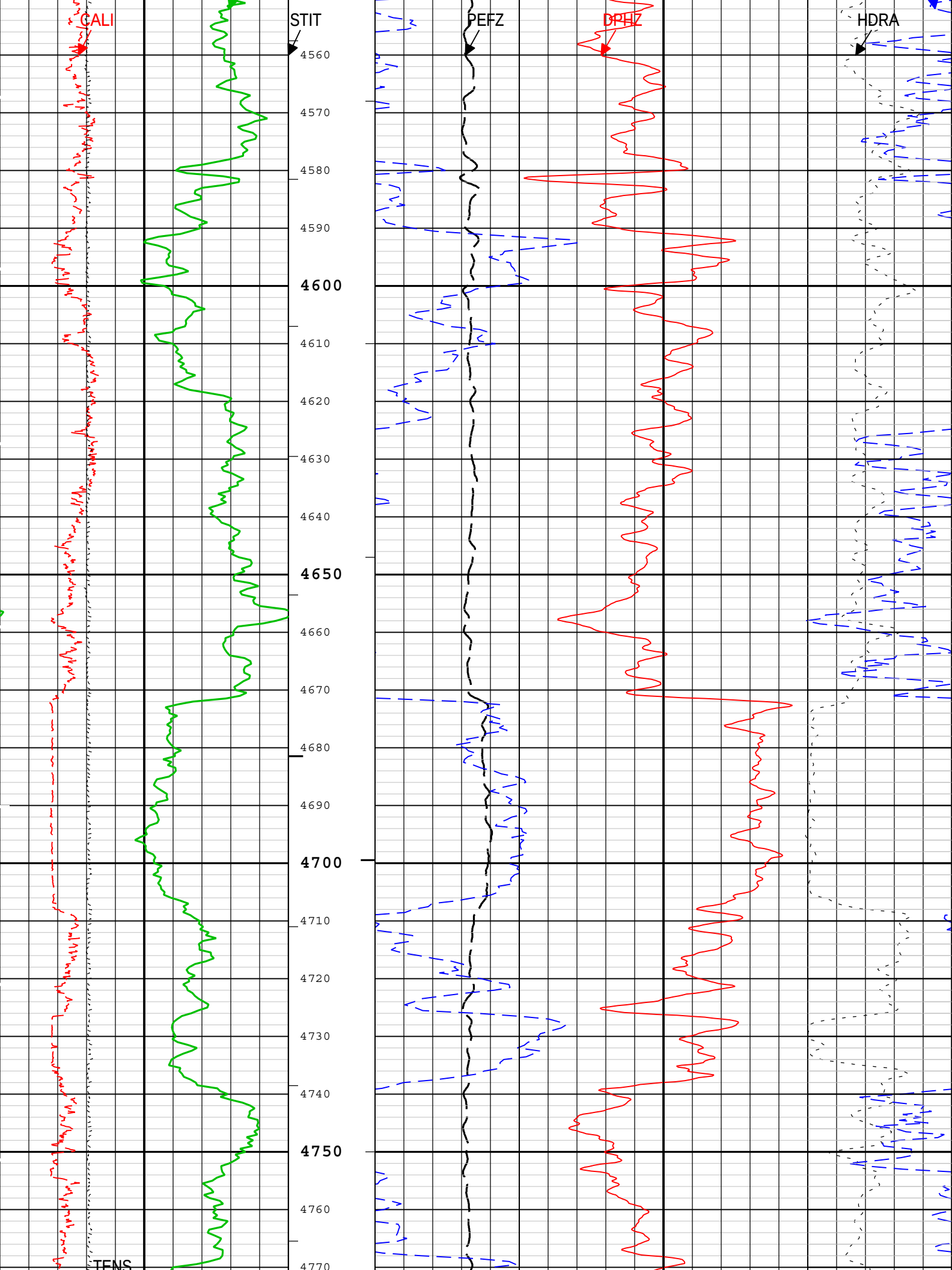
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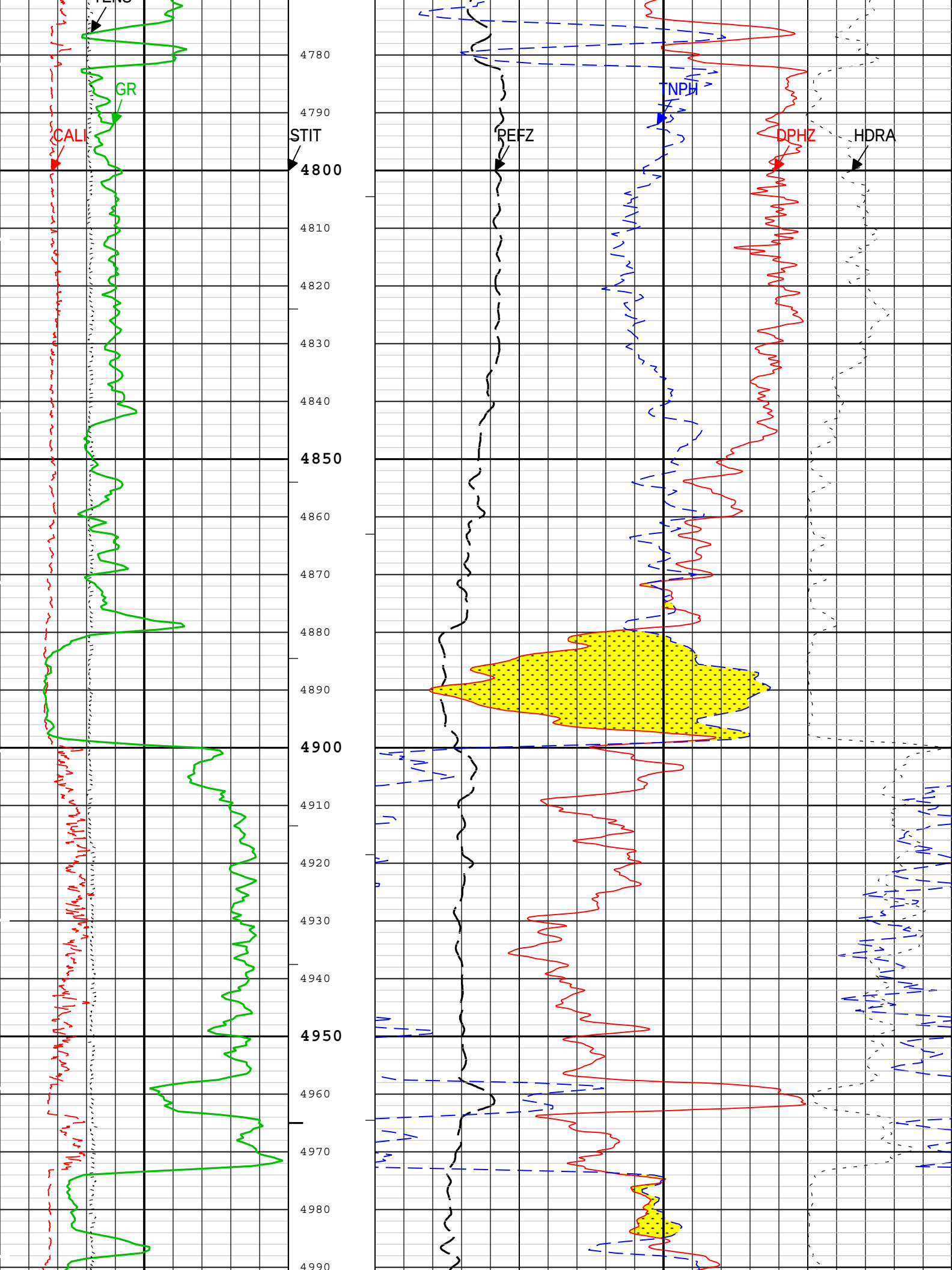
TENS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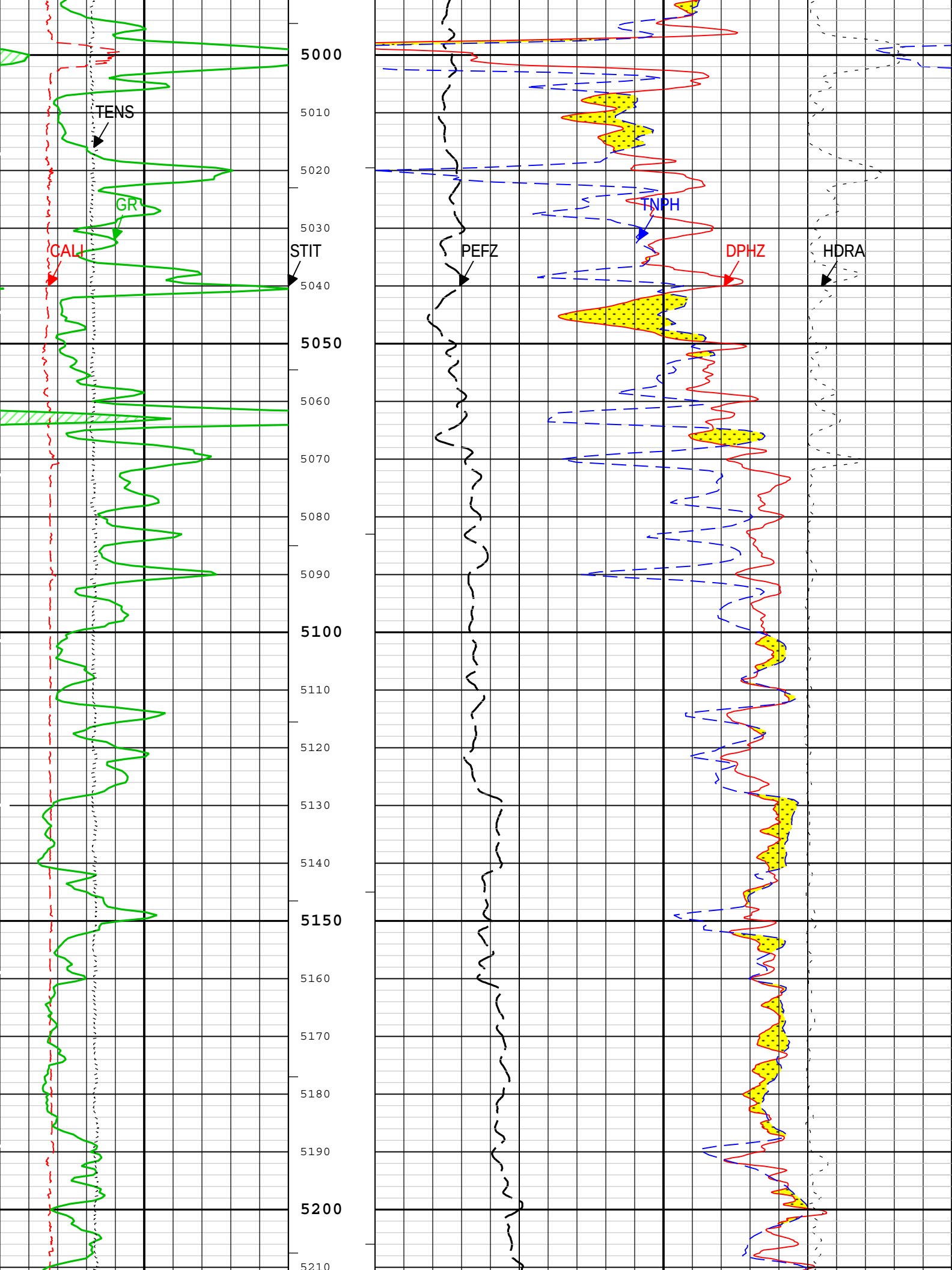
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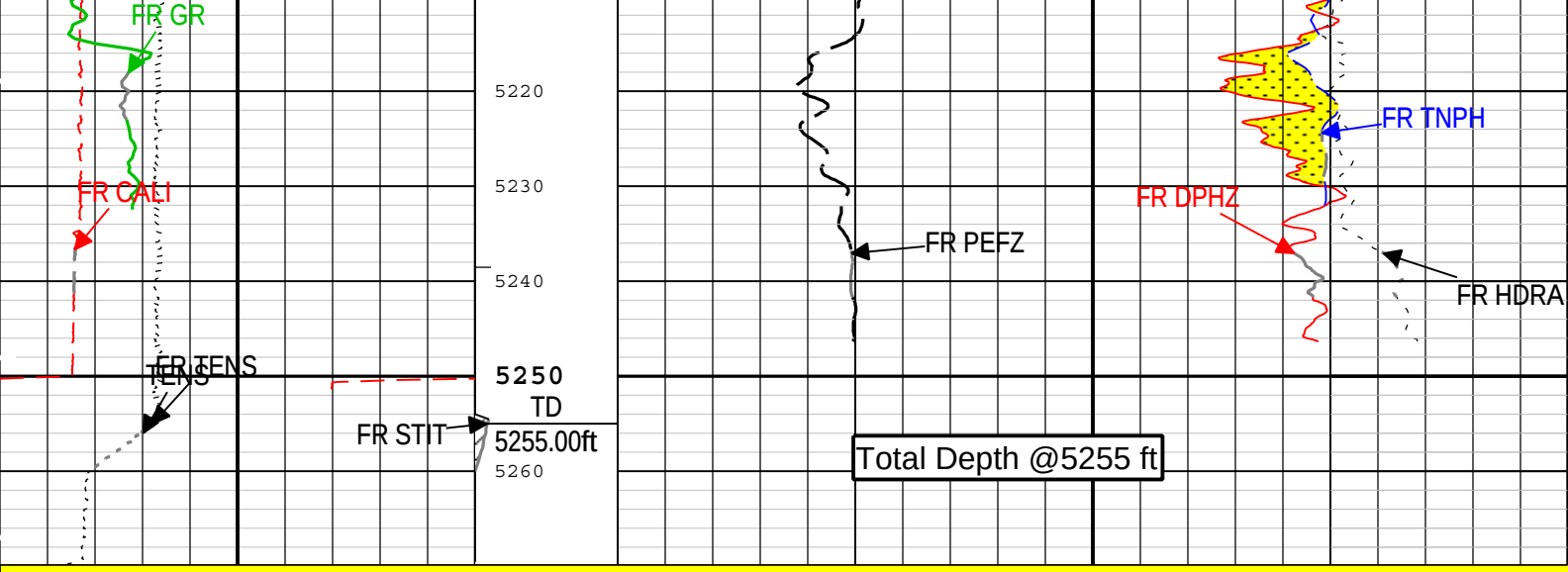


Porosity 2" per 100' Limestone Matrix, 2.71 g/cc

Gamma Ray Back-up | ToolDrag | CROSSOVER

Caliper (CALI) HDRS-H
6 in 16

Stuck Tool Indicator, Total (STIT)
0 ft 50

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

Gamma Ray (GR) HGNS-H
0 gAPI 150

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

Gamma Ray (GR) HGNS-H
150 gAPI 300

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

Density Standoff Correction (HDRA) HDRS-H
-0.25 g/cm3 0.25

Possible Perm

Cable Tension (TENS)
0 lbf 8000

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

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)

ICV - Integrated Cement Volume every 10.00 (ft3)

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:23

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	10443.66	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.8	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Fresh 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	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
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	55	degF
NPRM	HRDD Nuclear Processing Mode	HDRS-H	High Resolution	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.62	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	5255	ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BRD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

One

Repeat Pass Porosity 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	52.57	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	105.37	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	3.1.9755.0
DepthCorrection	DepthCorrection	3.1.9755.1799

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	3.1.9755.0	3.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	4943.37 ft	5270.48 ft	12-Dec-2013 12:03:16 PM	12-Dec-2013 12:14:57 PM	9.80 ft	
All depths are referenced to toolstring zero								

Log

One: Log[3]:Up

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 5 in per 100 ft Index Unit: ft Index

Type: Measured Depth Creation Date: 12-Dec-2013 15:41:28

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in
IHV	Borehole	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

Cable Tension (TENS)

0 lbf 8000

ToolDrag

Stuck Tool Indicator, Total (STIT)

0 ft 50

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Possible Perm

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

CROSSOVER

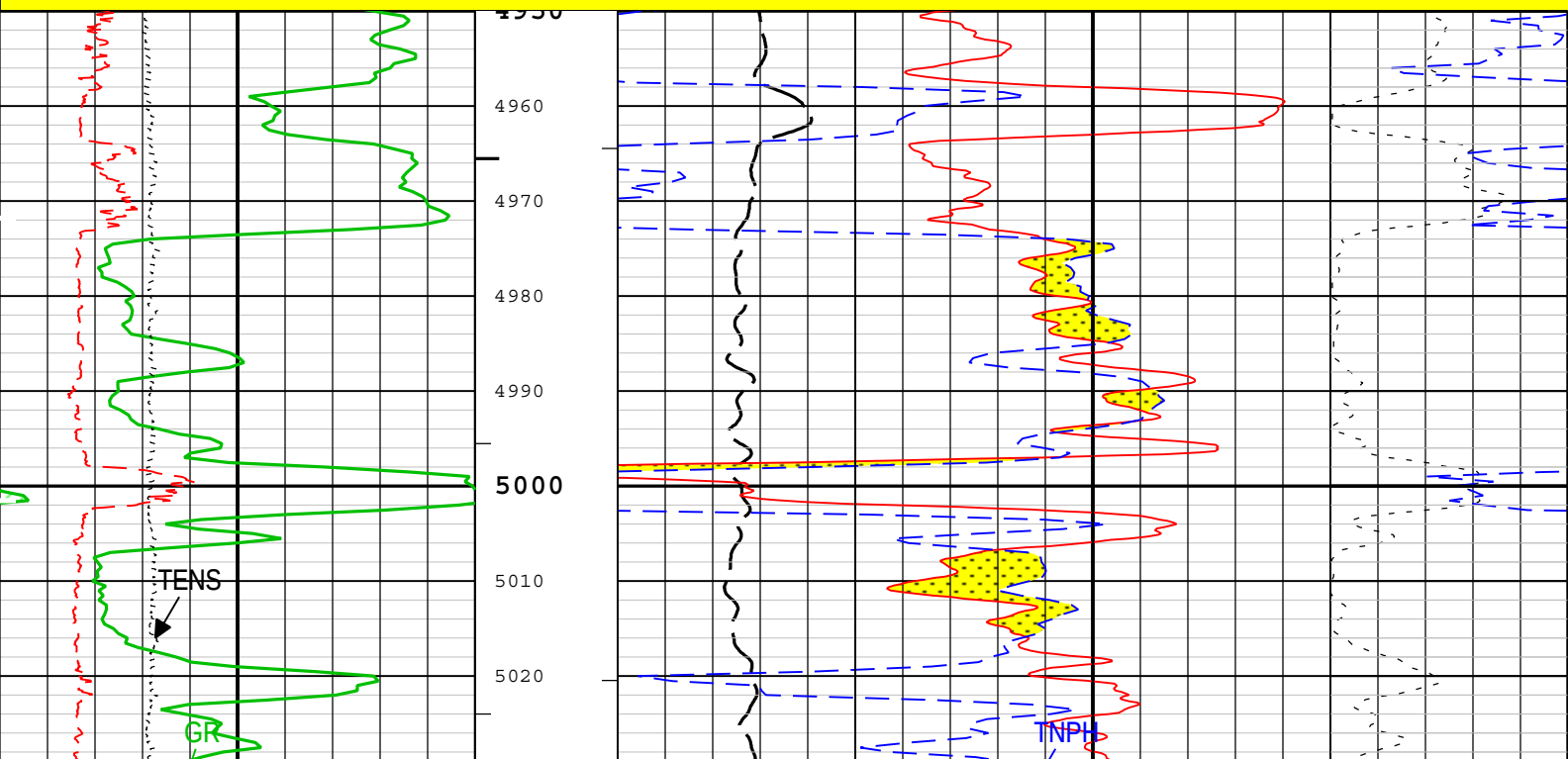
Standard Resolution Density Porosity (DPHZ) HDRS-H

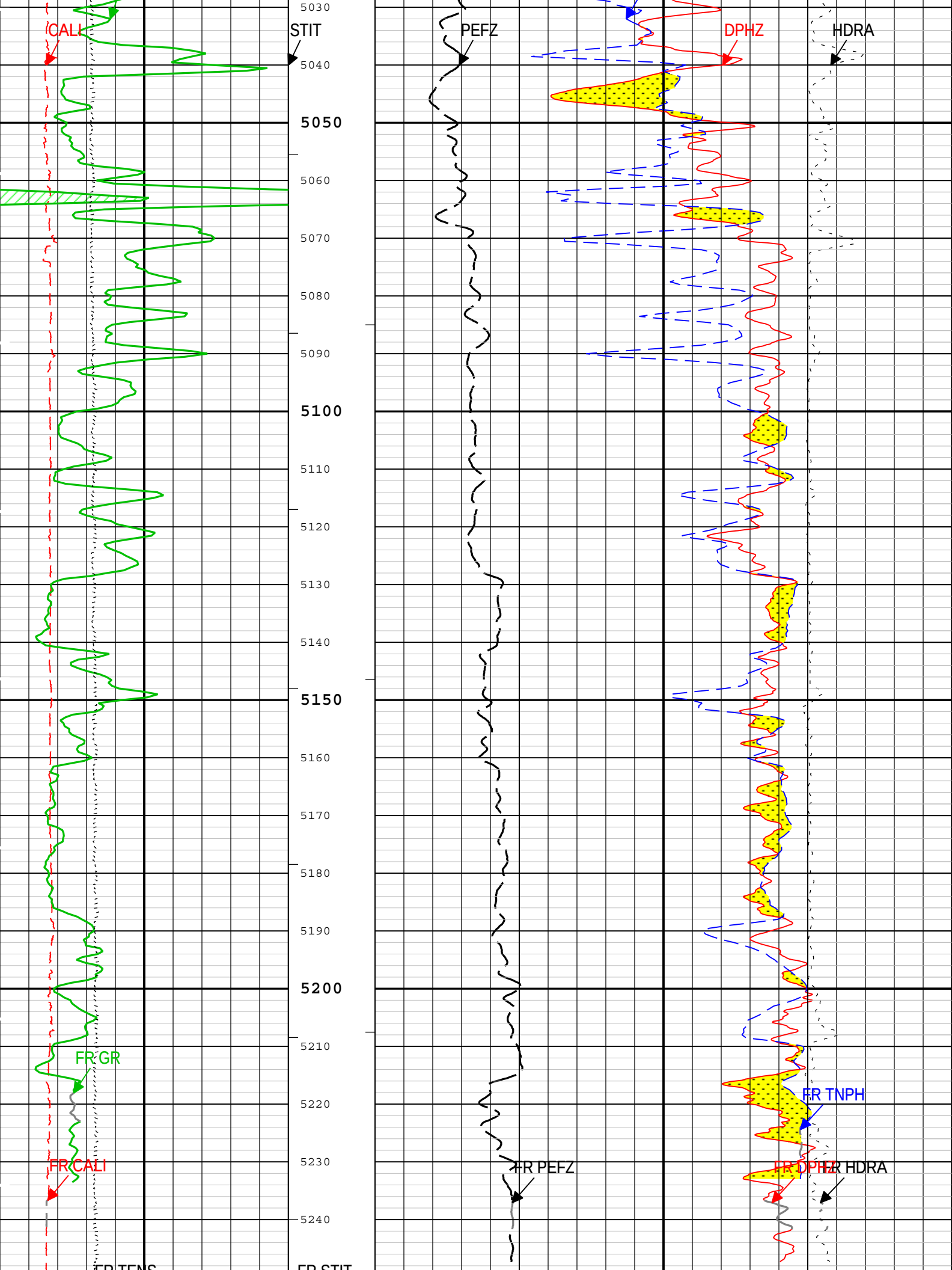
0.3 ft3/ft3 -0.1

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

0.3 ft3/ft3 -0.1

Porosity 2" per 100' Limestone Matrix, 2.71 g/cc




CALI
STIT
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DPHZ
HDRA
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FR TNPH
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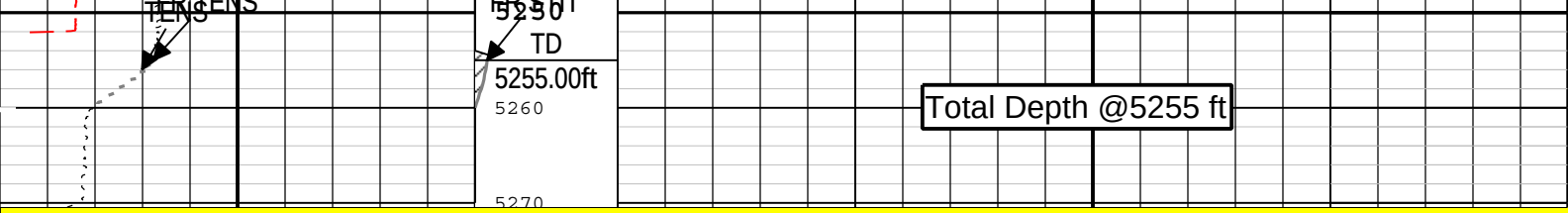
FR HDRA



Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:28

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	10443.66	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.8	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Fresh 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	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3

MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	55	degF
NPRM	HRDD Nuclear Processing Mode	HDRS-H	High Resolution	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.62	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	5255	ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BRD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

One

Repeat Analysis 5" = 100'

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	4943.37 ft	5270.48 ft	12-Dec-2013 12:03:16 PM	12-Dec-2013 12:14:57 PM	9.80 ft	
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[3]:Up

Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch RA_1) Index Scale: 5 in per 100 ft Index Unit: ft Index 15:41:29

Channel	Source	Sampling
ICV	Borehole	6in
IHV	Borehole	6in
STIT	DepthCorrection	6in

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Main To Repeat

Repeat To Main

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

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)

12000 lbf 2000

Main To Repeat

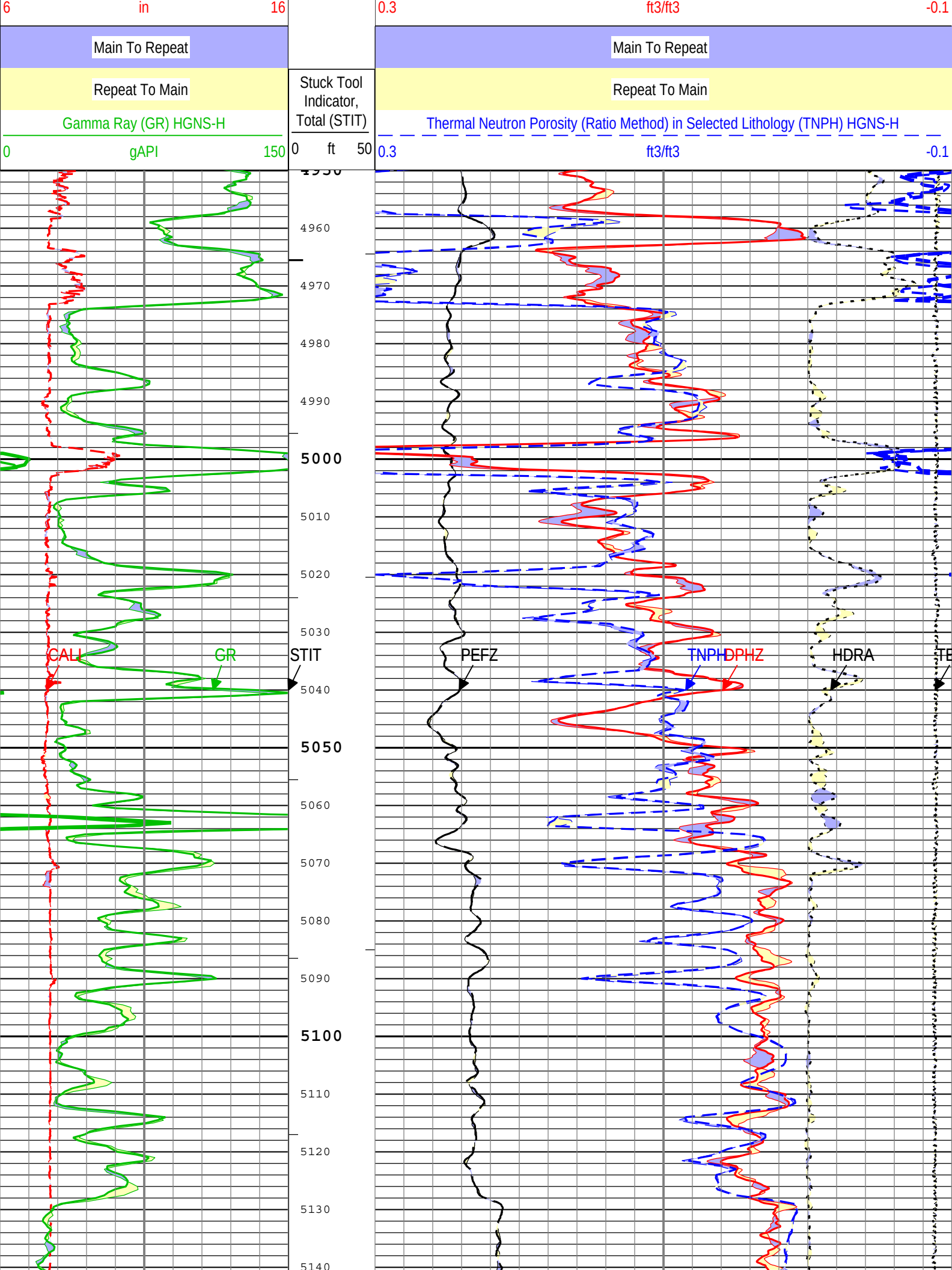
Repeat To Main

Caliper (CALI) HDRS-H

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H


6
in
16
Main To Repeat
Repeat To Main
Gamma Ray (GR) HGNS-H
0
gAPI
150
Stuck Tool Indicator, Total (STIT)
0
ft
50
0.3
ft3/ft3
-0.1
Main To Repeat
Repeat To Main
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H
0.3
ft3/ft3
-0.1
4960
4970
4980
4990
5000
5010
5020
5030
5040
5050
5060
5070
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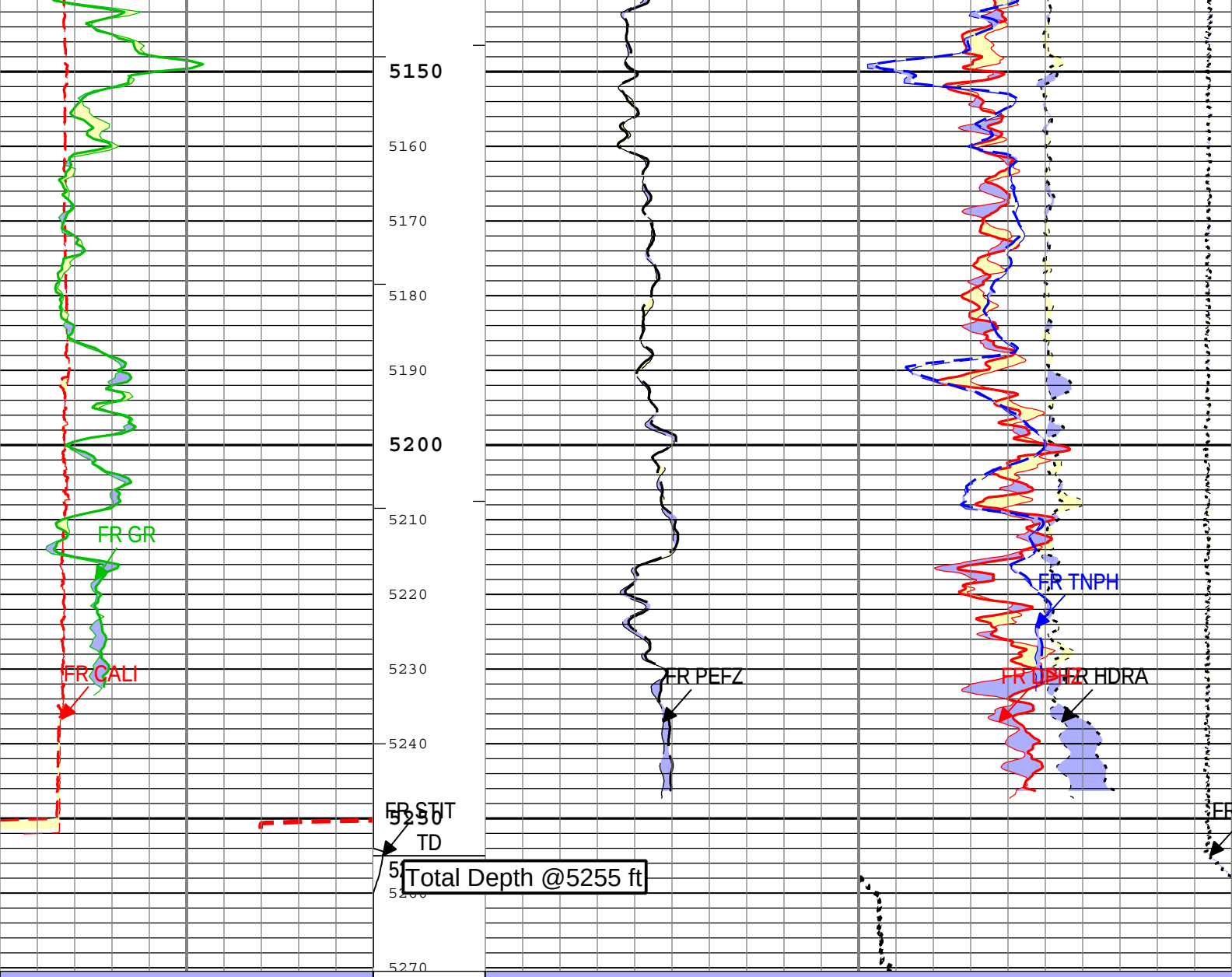
5140
CALI
GR
STIT
PEFZ
TNPH
DPHZ
HDRA



Main To Repeat

Repeat To Main

Caliper (CALI) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Gamma Ray (GR) HGNS-H

0 gAPI 150

Stuck Tool Indicator, Total (STIT)

0 ft 50

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

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

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Main To Repeat

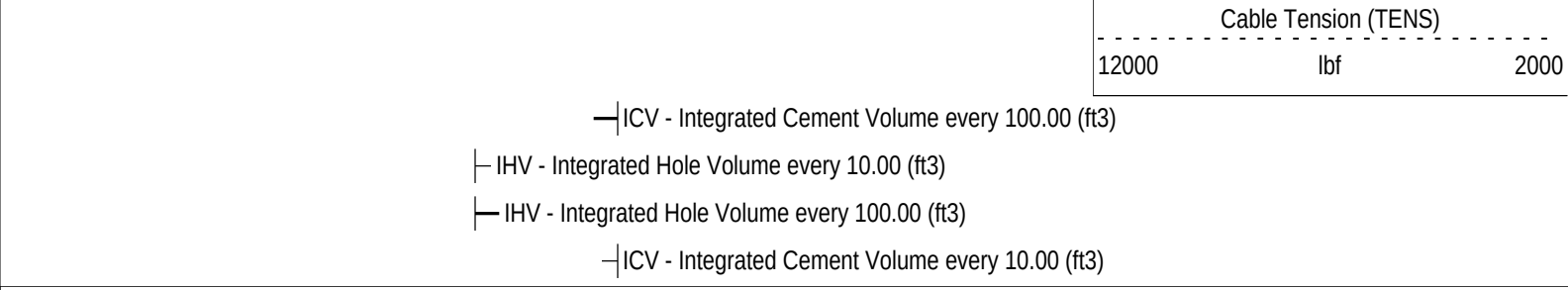
Repeat To Main

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

Main To Repeat

Repeat To Main



Description: Nuclear standard resolution template for Platform Express Format: Log (Porosity 5 inch RA_1) Index Scale: 5 in per 100 ft Index Unit: ft Index
15:41:29

One

Main Pass Density 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799
DepthCorrection	DepthCorrection	3.1.9755.1799

SoftwareVersion_Tool	SoftwareVersion_Run Version	SoftwareVersion_Build Version
WAFE-SEC	Synergy SV451EC version 8.10	Synergy SV451EC version 9.10
WAFE-FEC	Synergy SV451EC version 8.10	Synergy SV451EC version 9.10
WAFE-TMDI	Synergy SV451EC version 46.19	Synergy SV451EC version 44.19

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	3.1.9755.0	3.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: Nuclear standard resolution template for Platform Express Format: Log (Bulk Density_5 Inch) Index Scale: 5 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:32

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in
IHV	Borehole	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
RHOZ	HDRS-H:HRMS-H:HRGD-H	2in
STIT	DepthCorrection	6in

TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

ICV - Integrated Cement Volume every 100.00 (ft3)

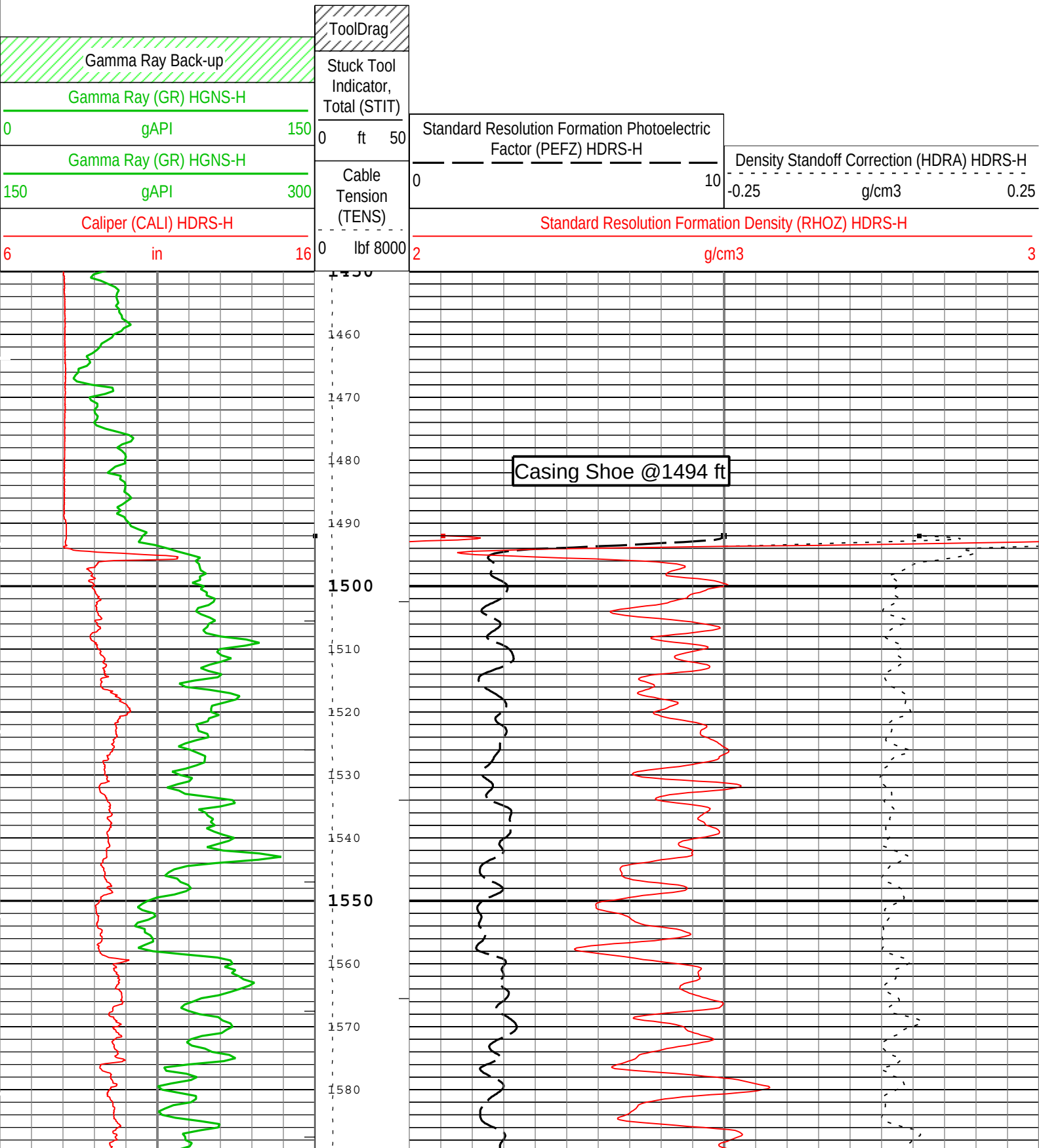
IHV - Integrated Hole Volume every 10.00 (ft3)

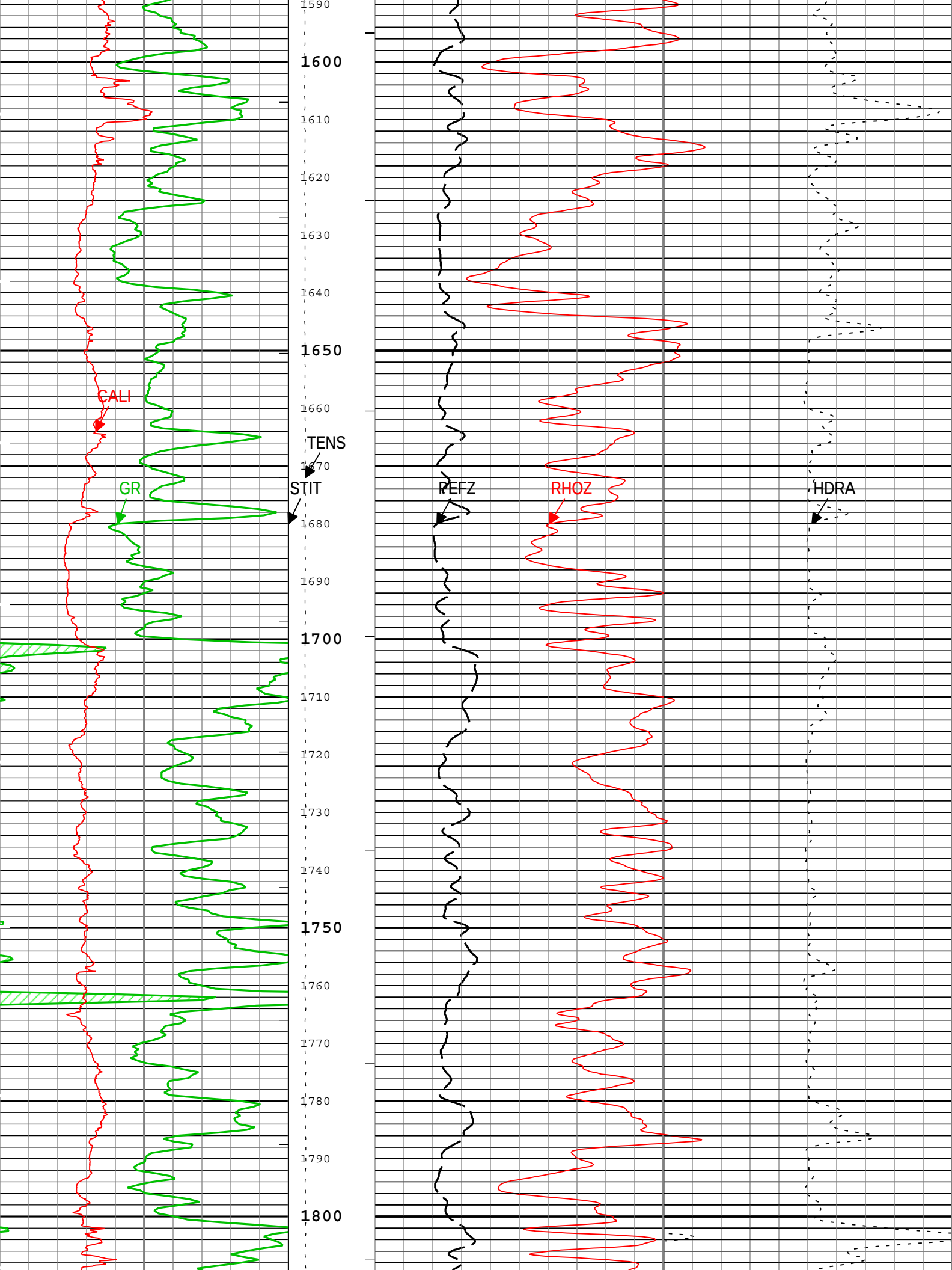
TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

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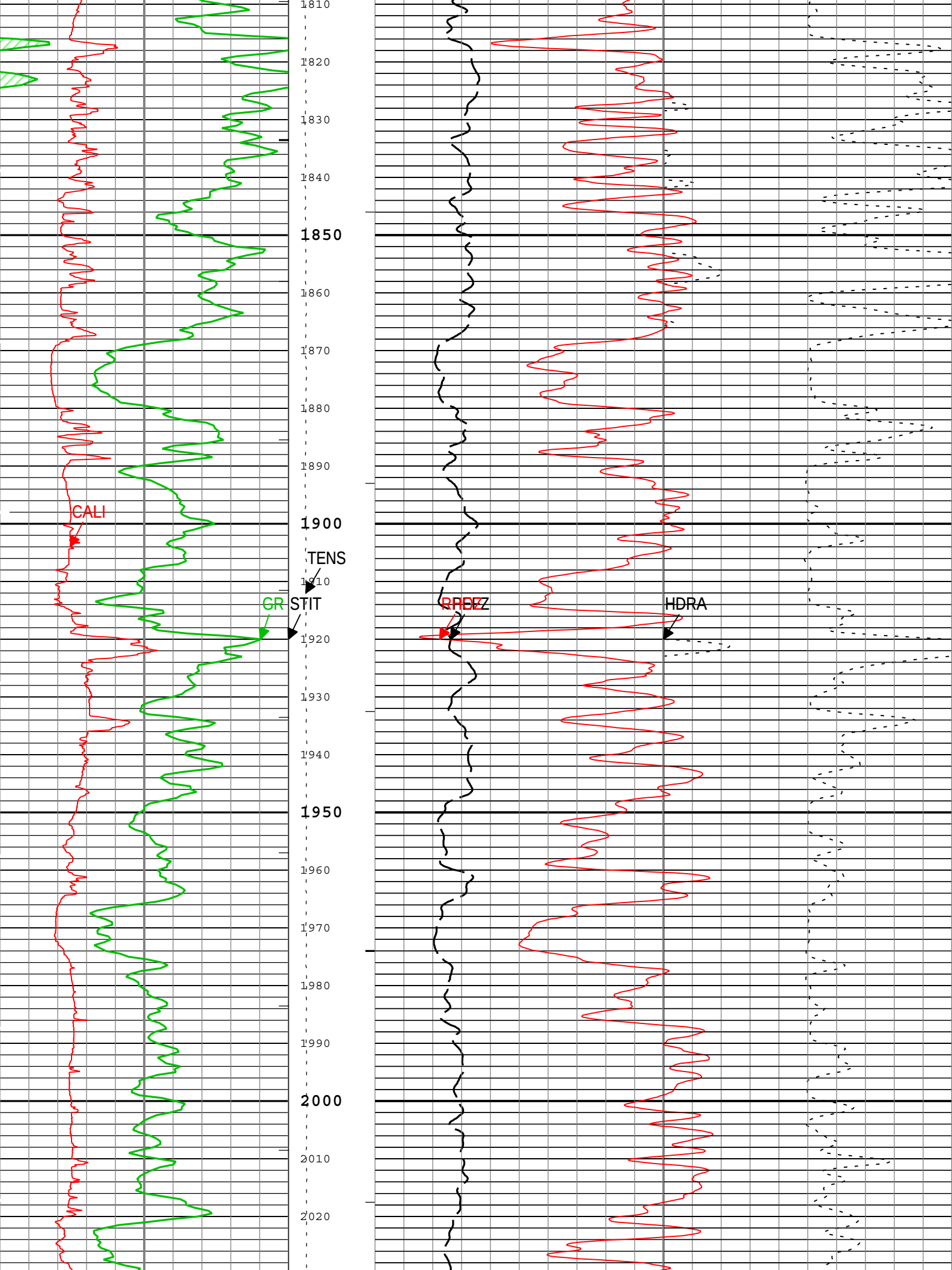
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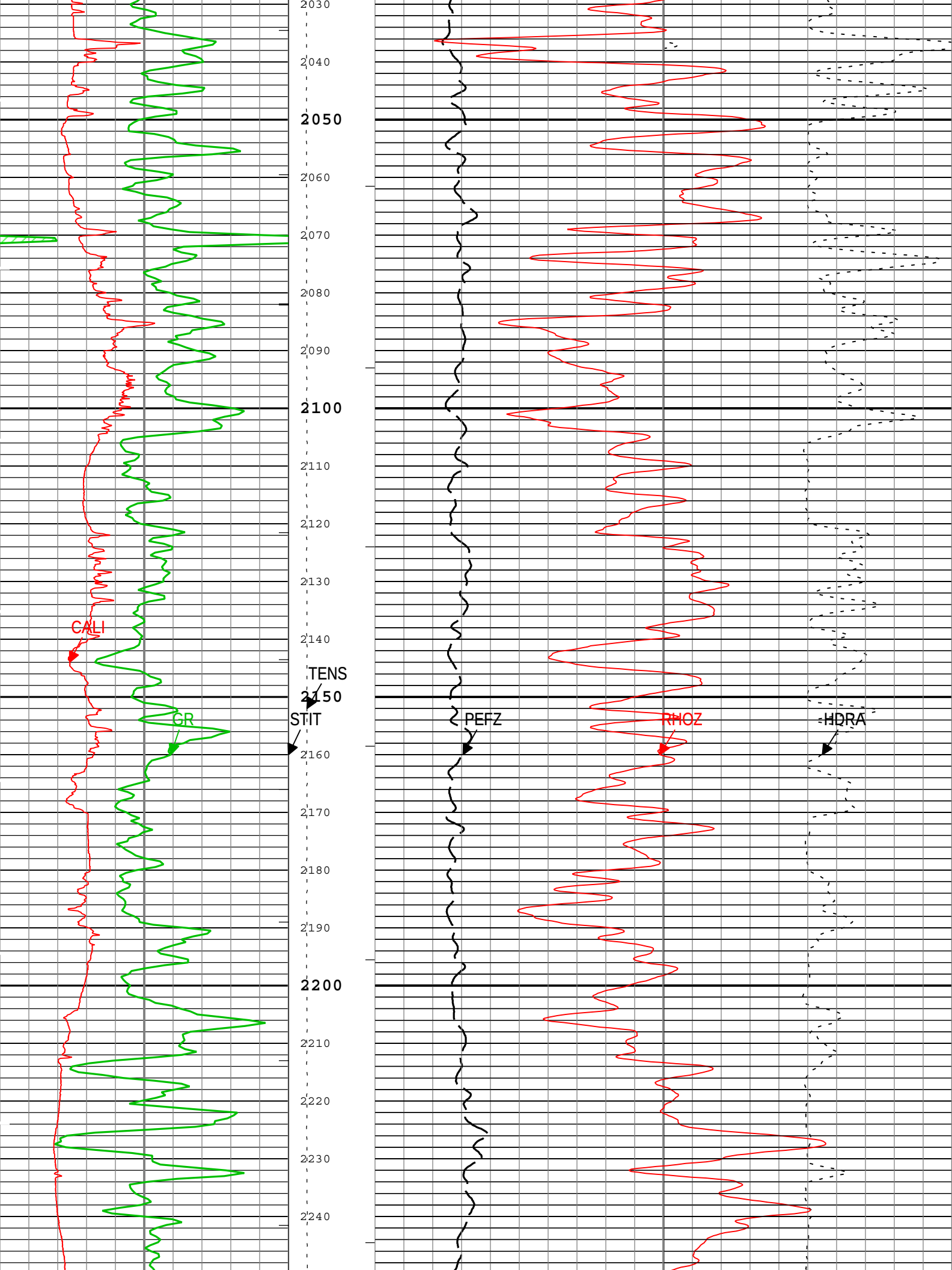
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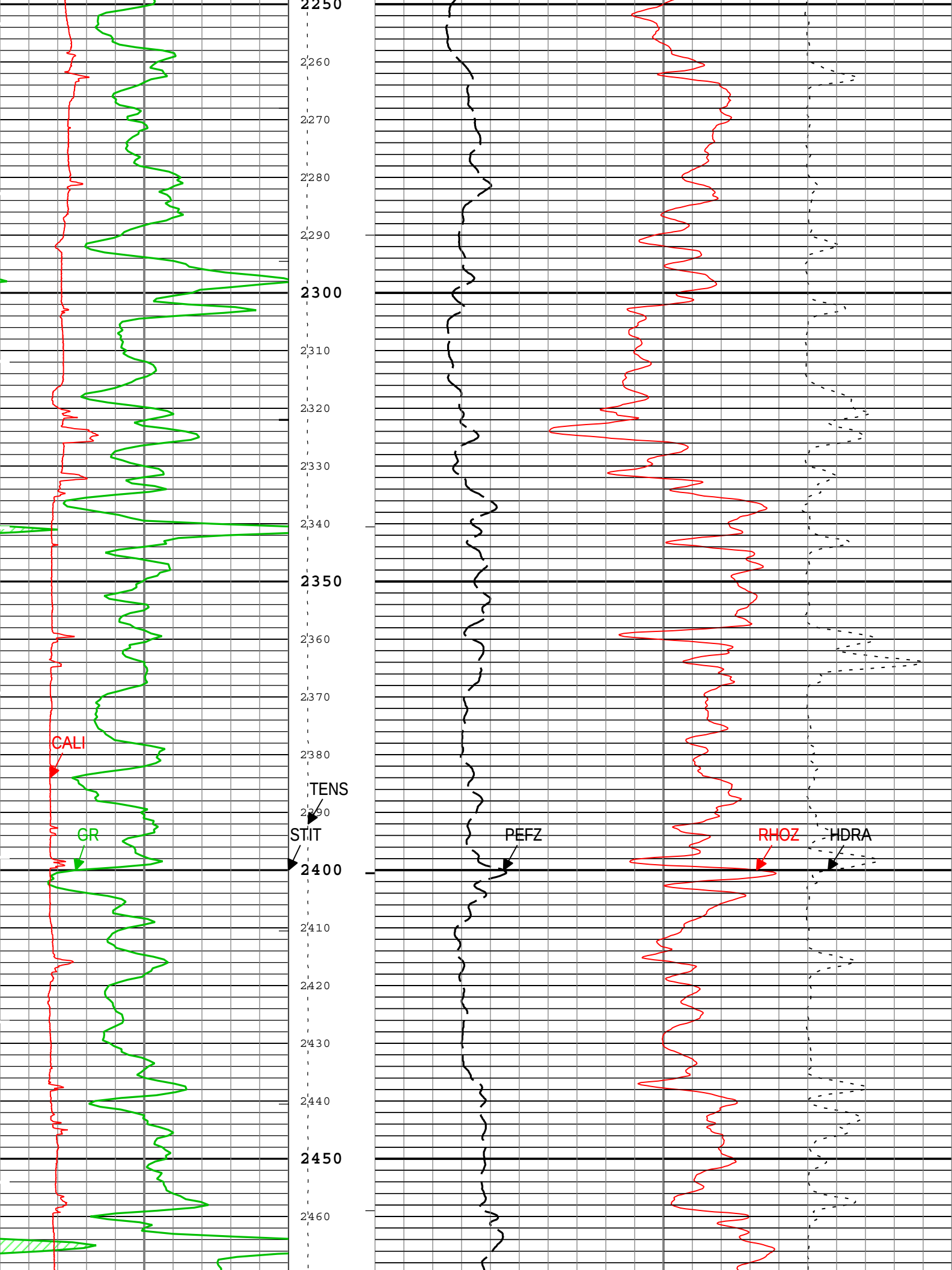
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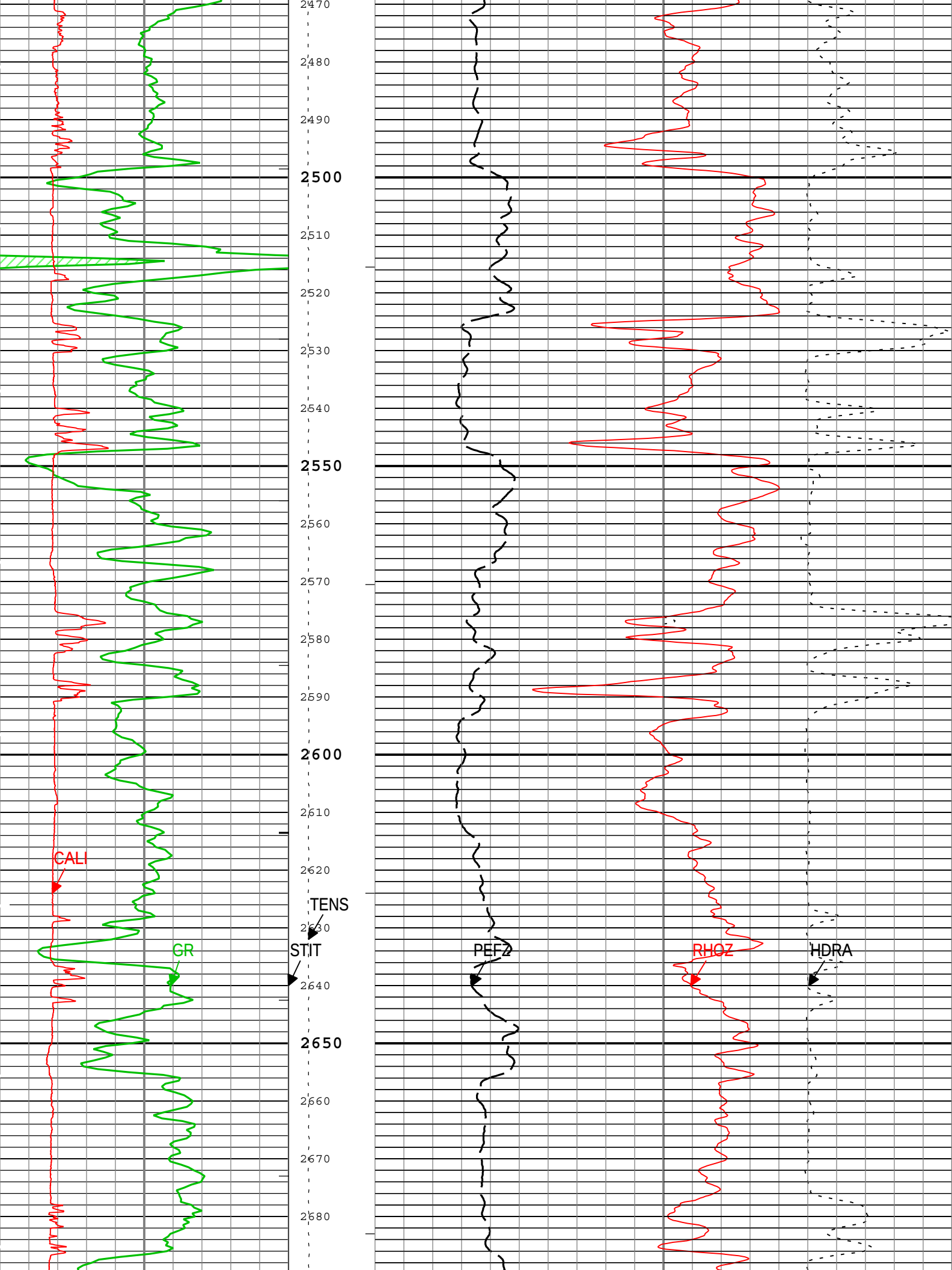
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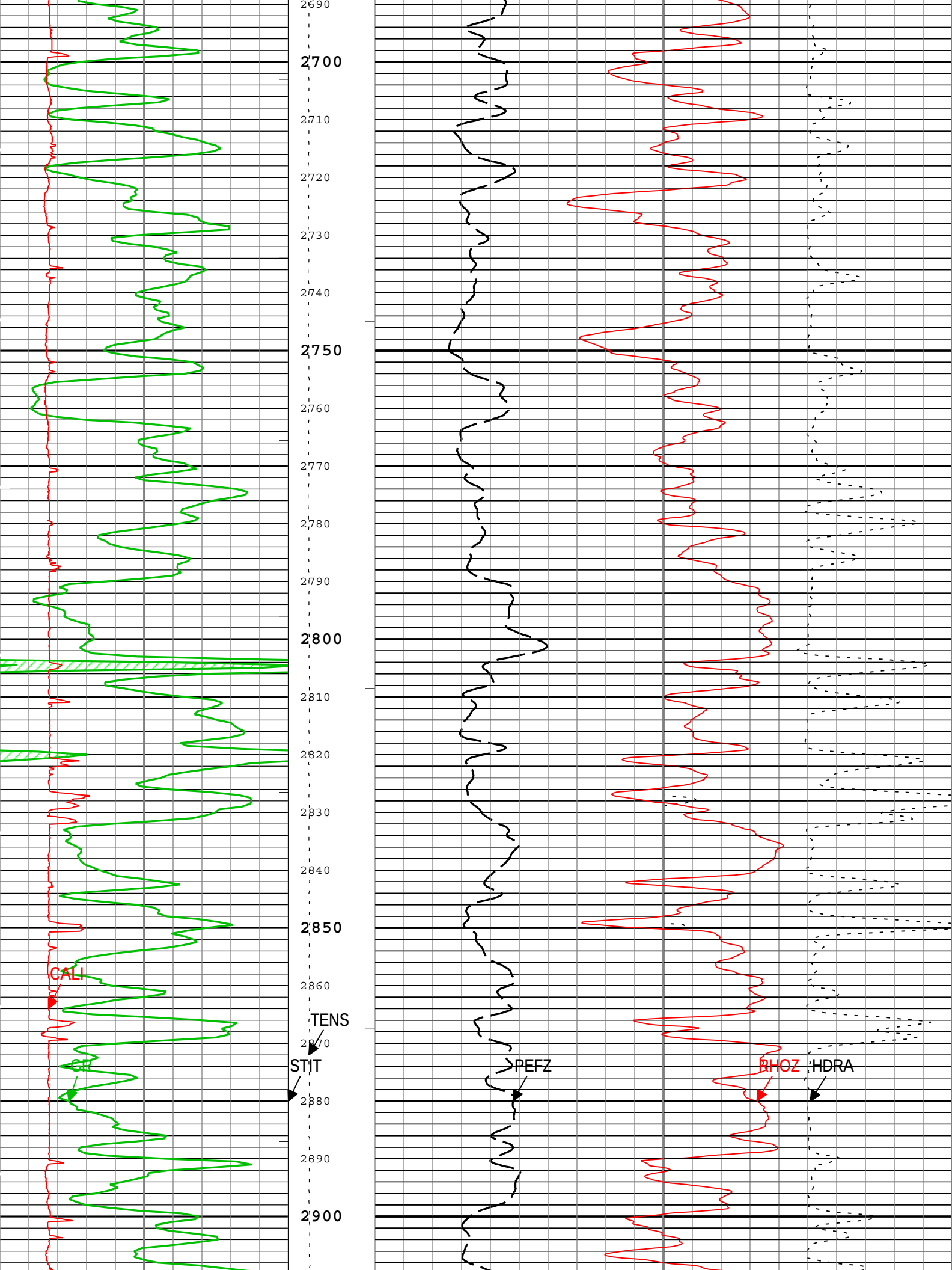
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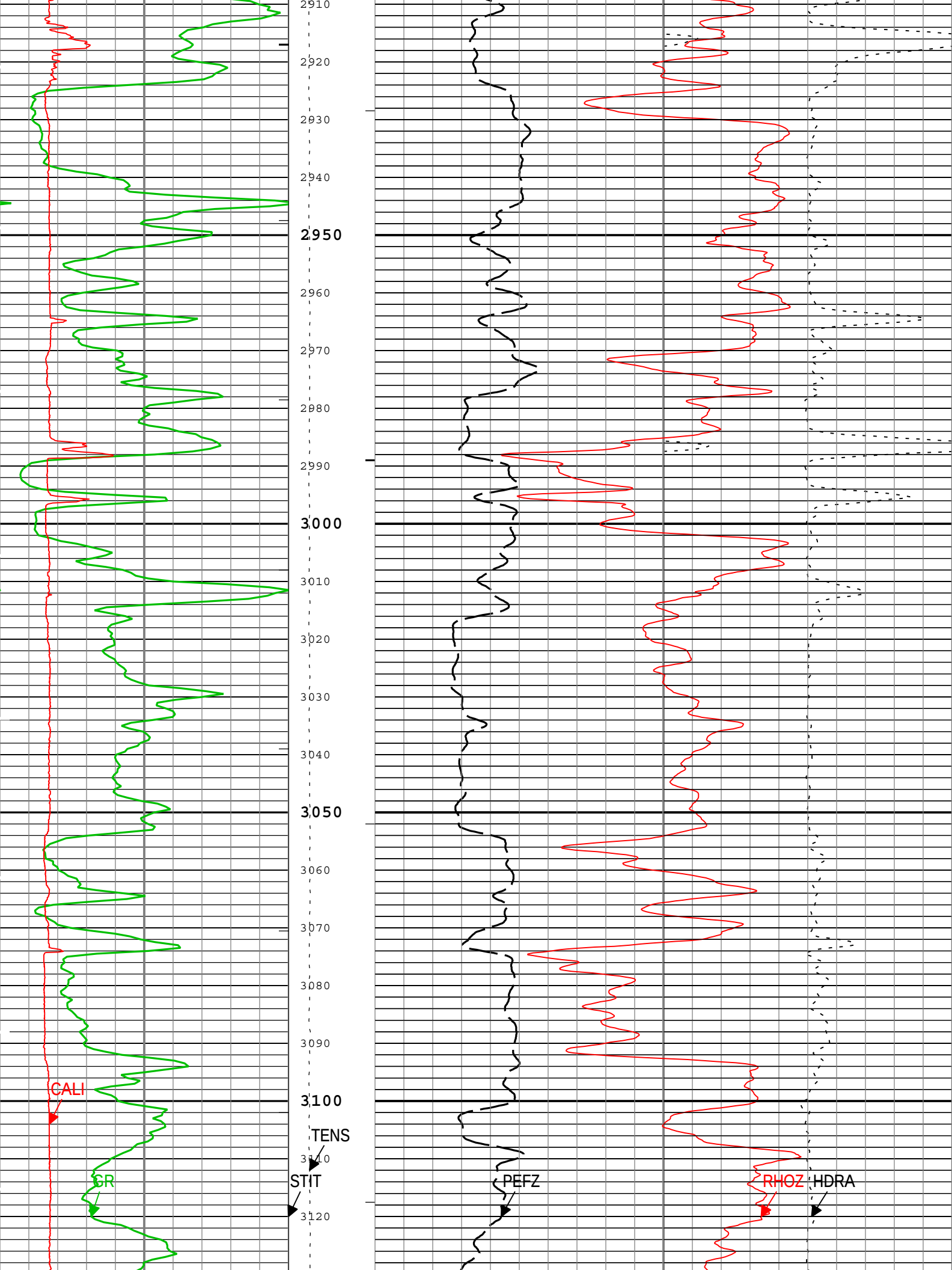
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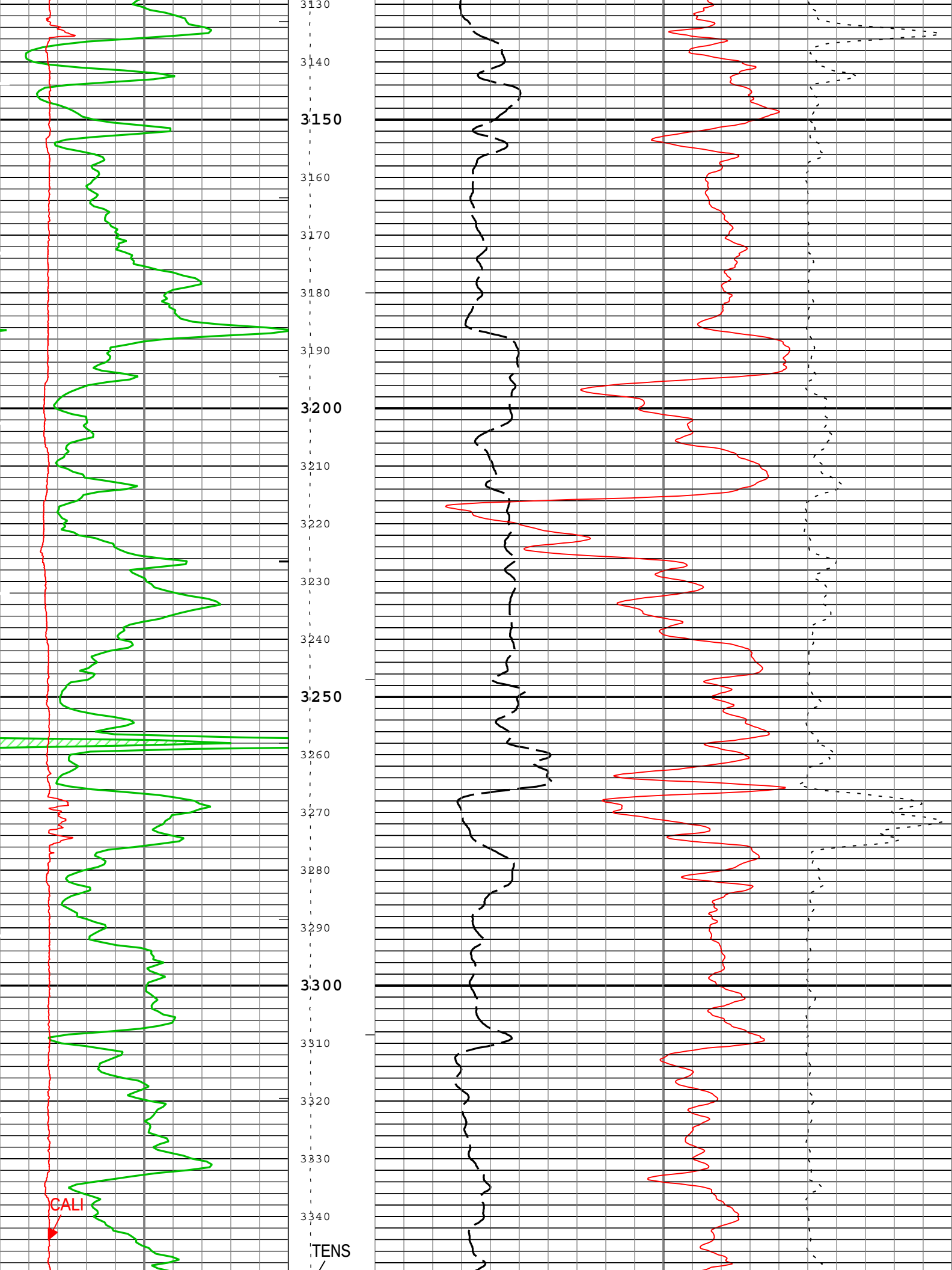
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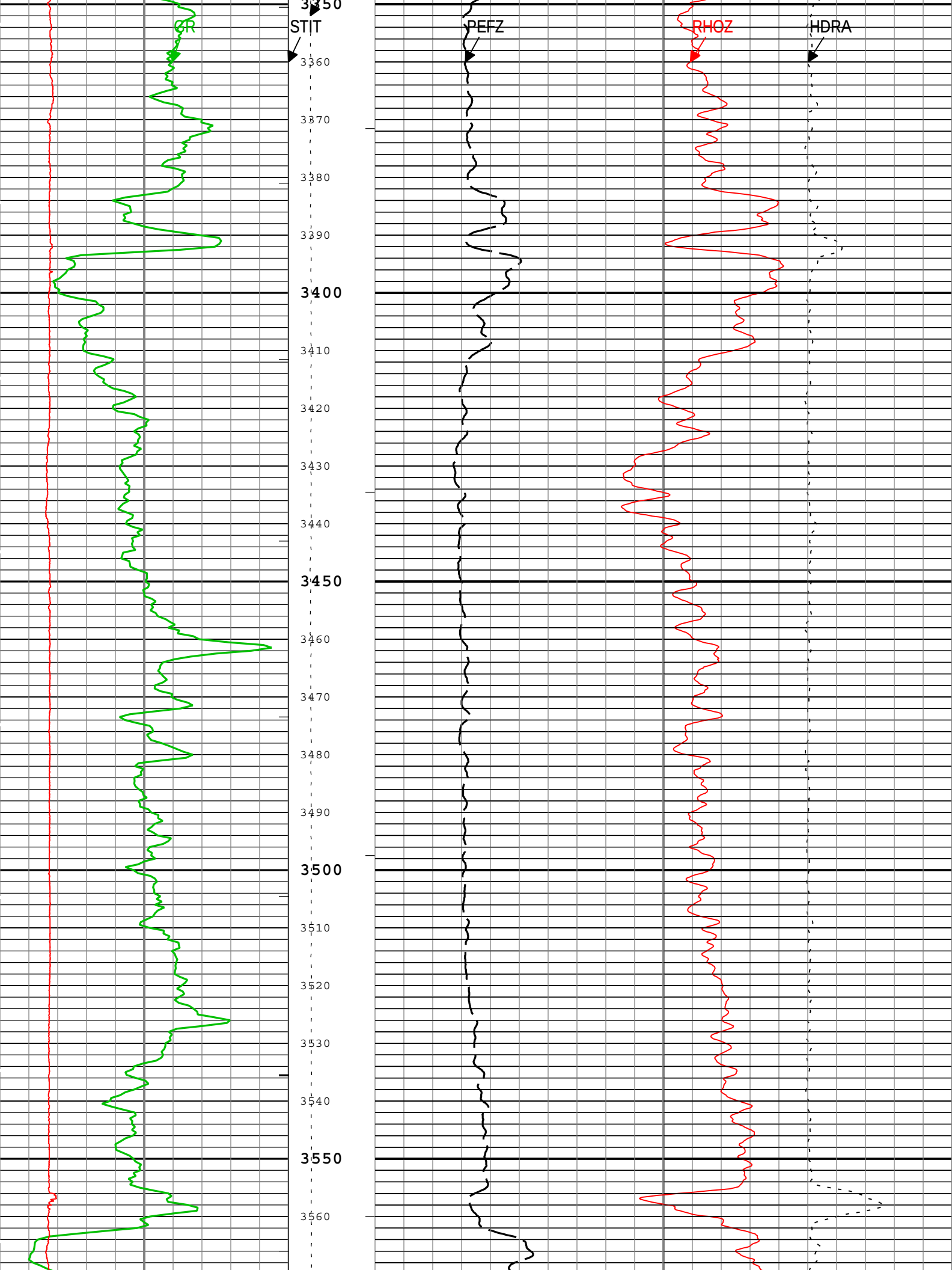
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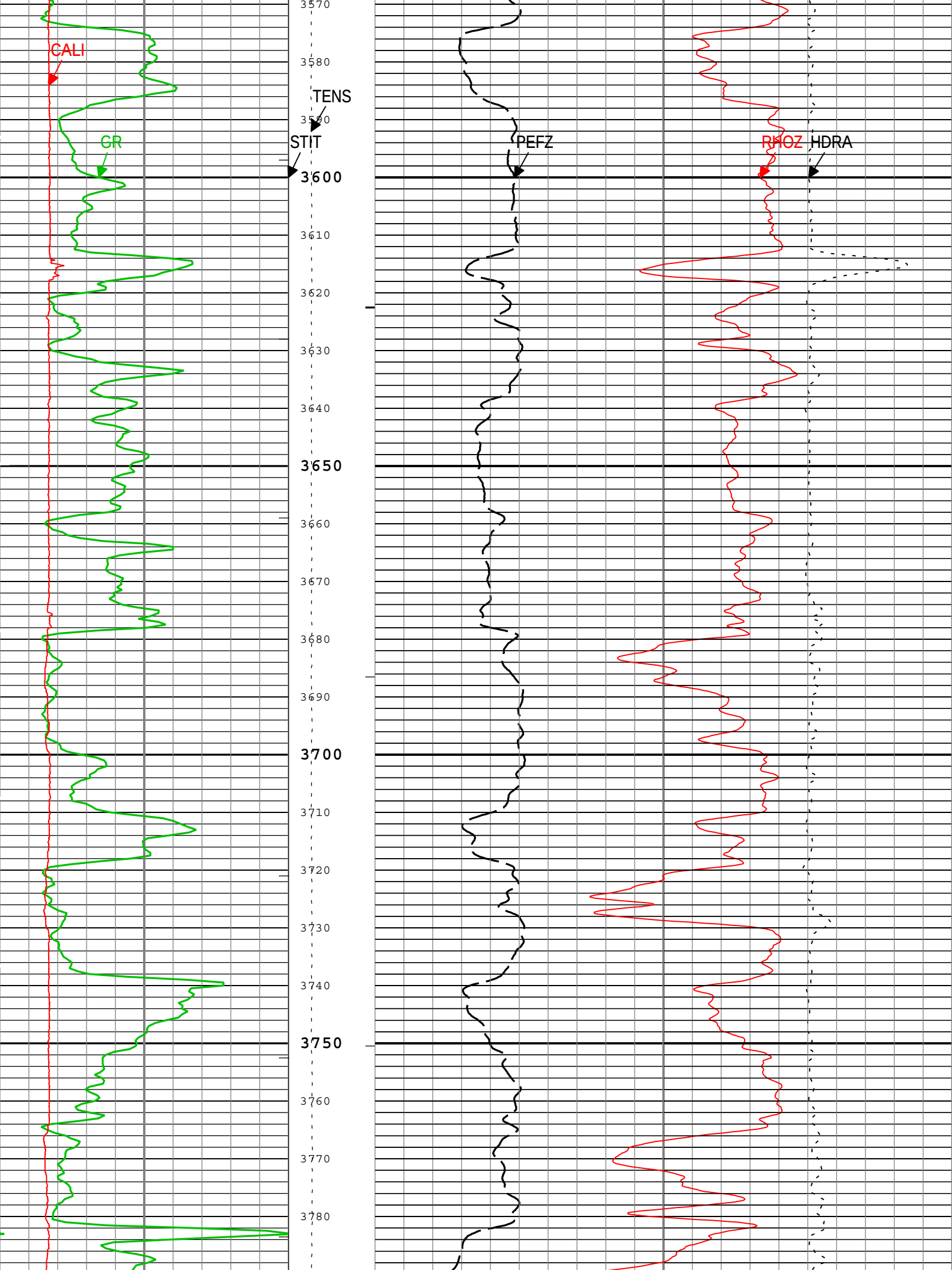
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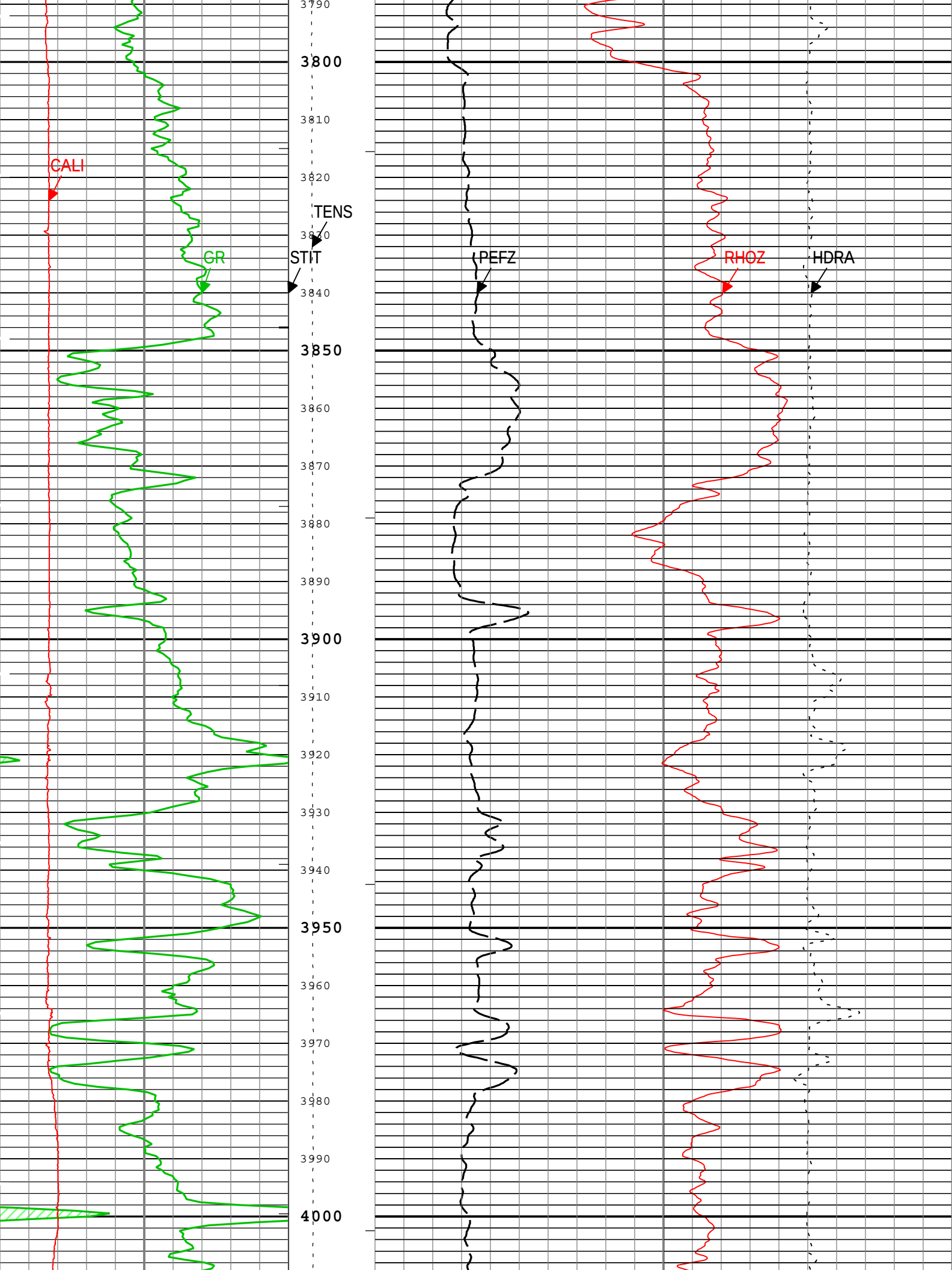
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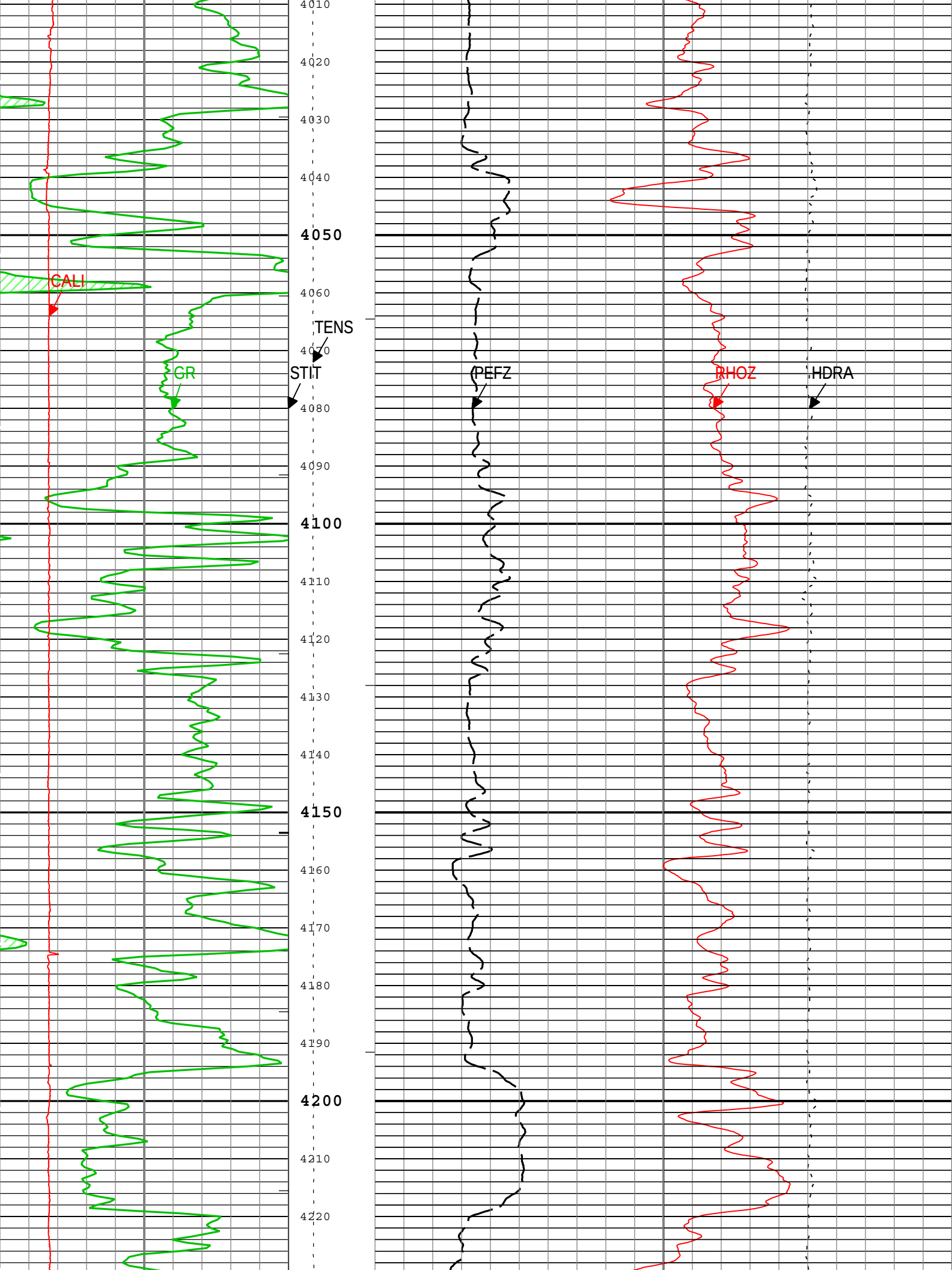
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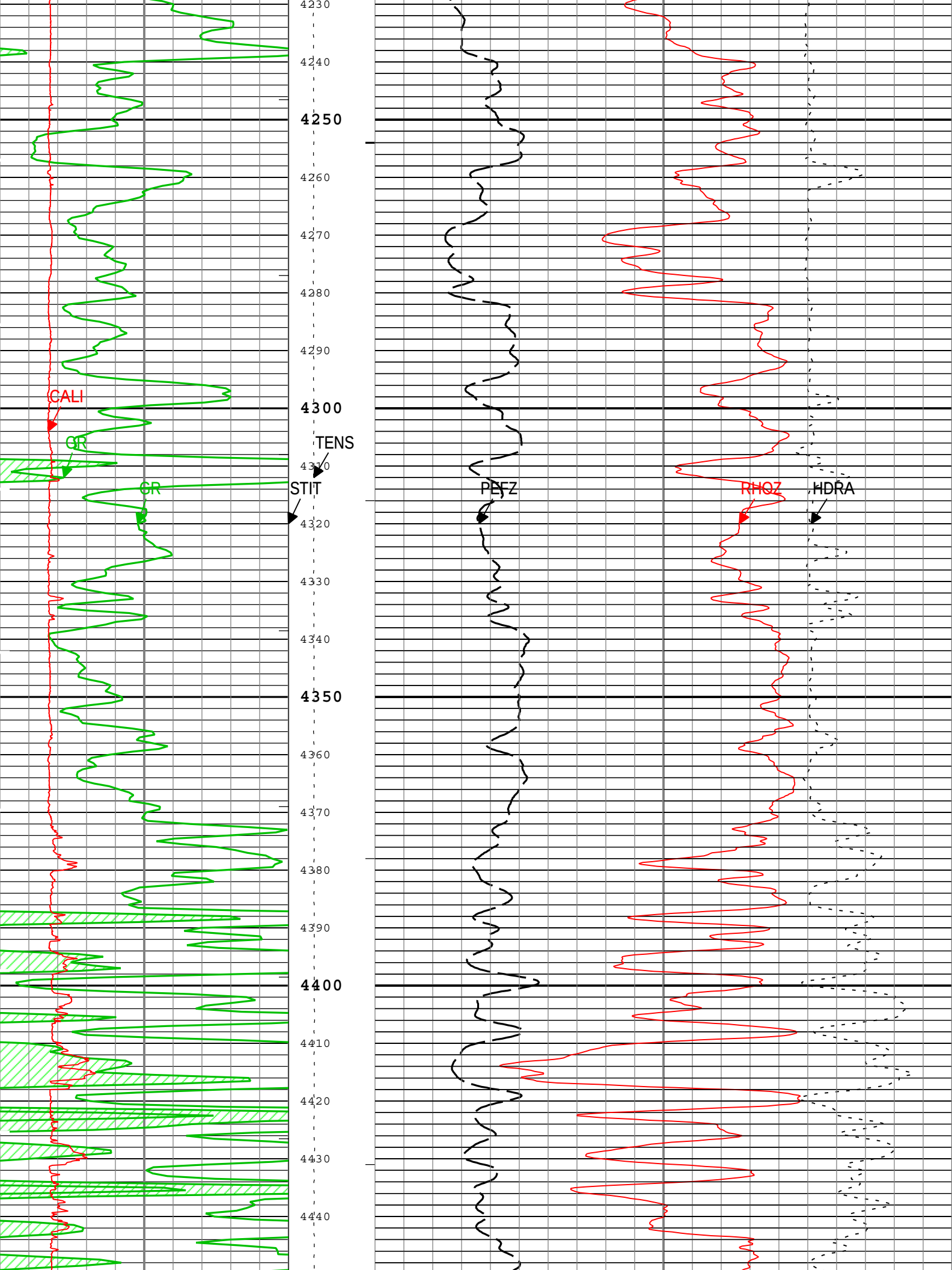
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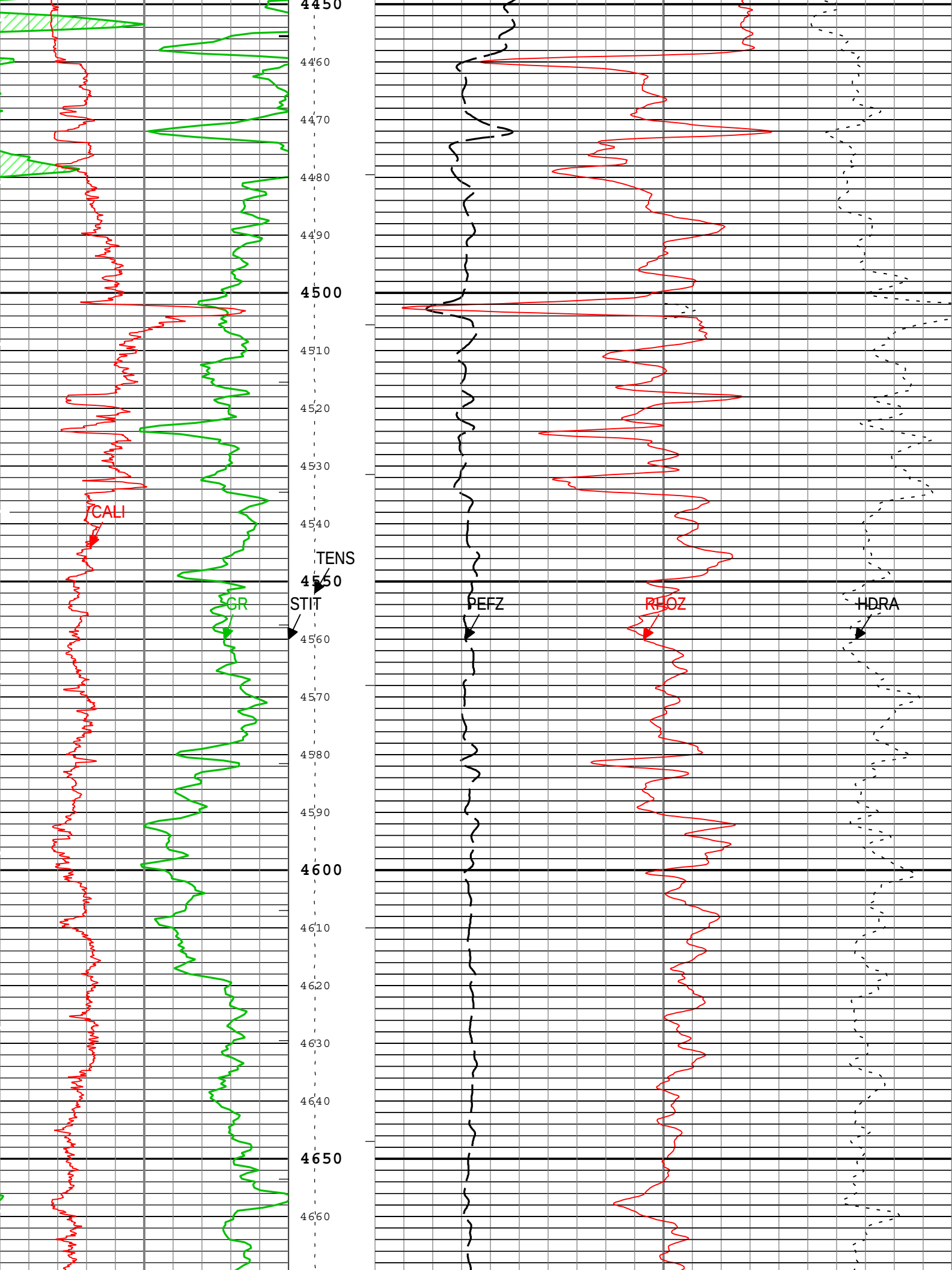
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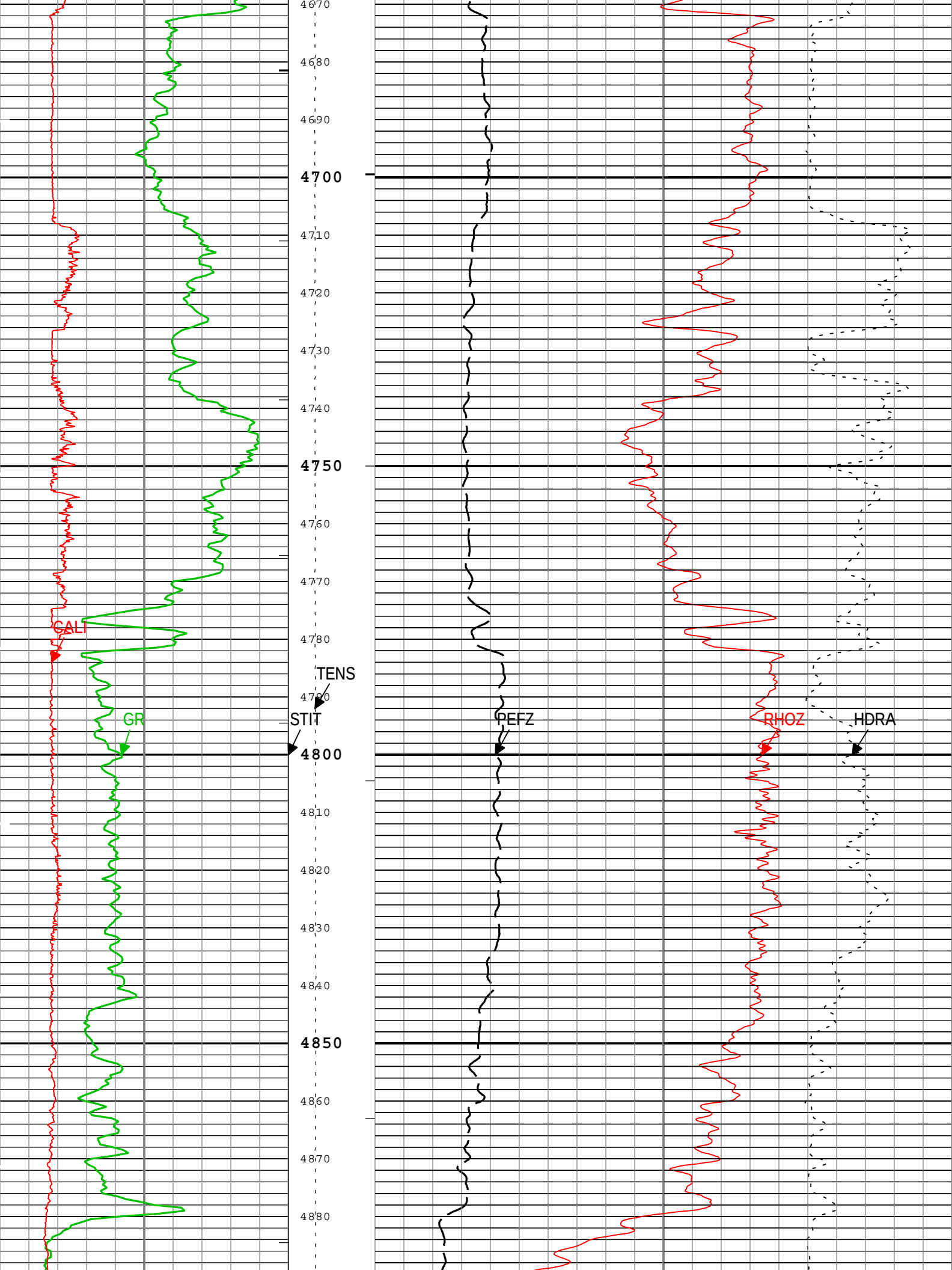
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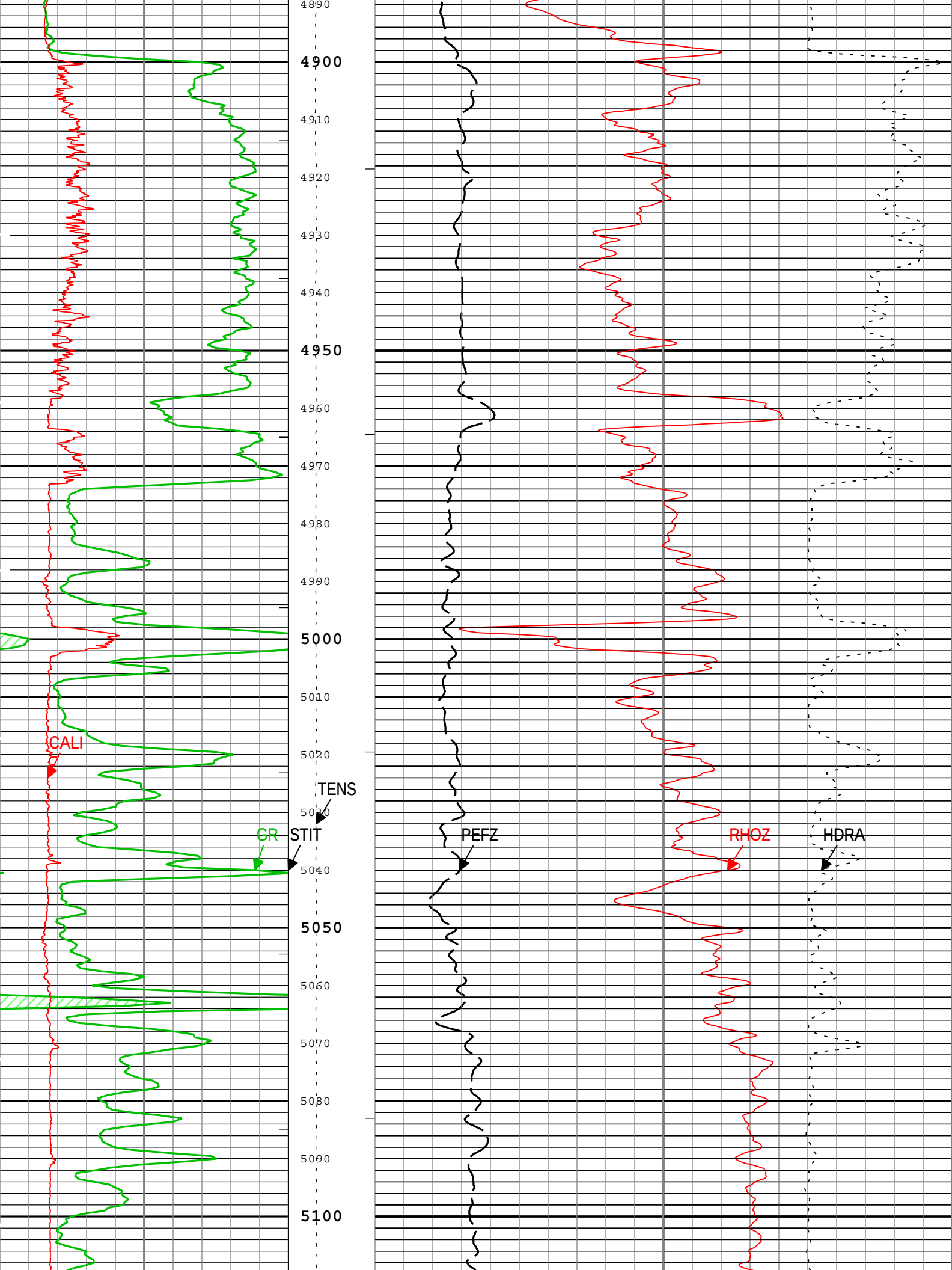
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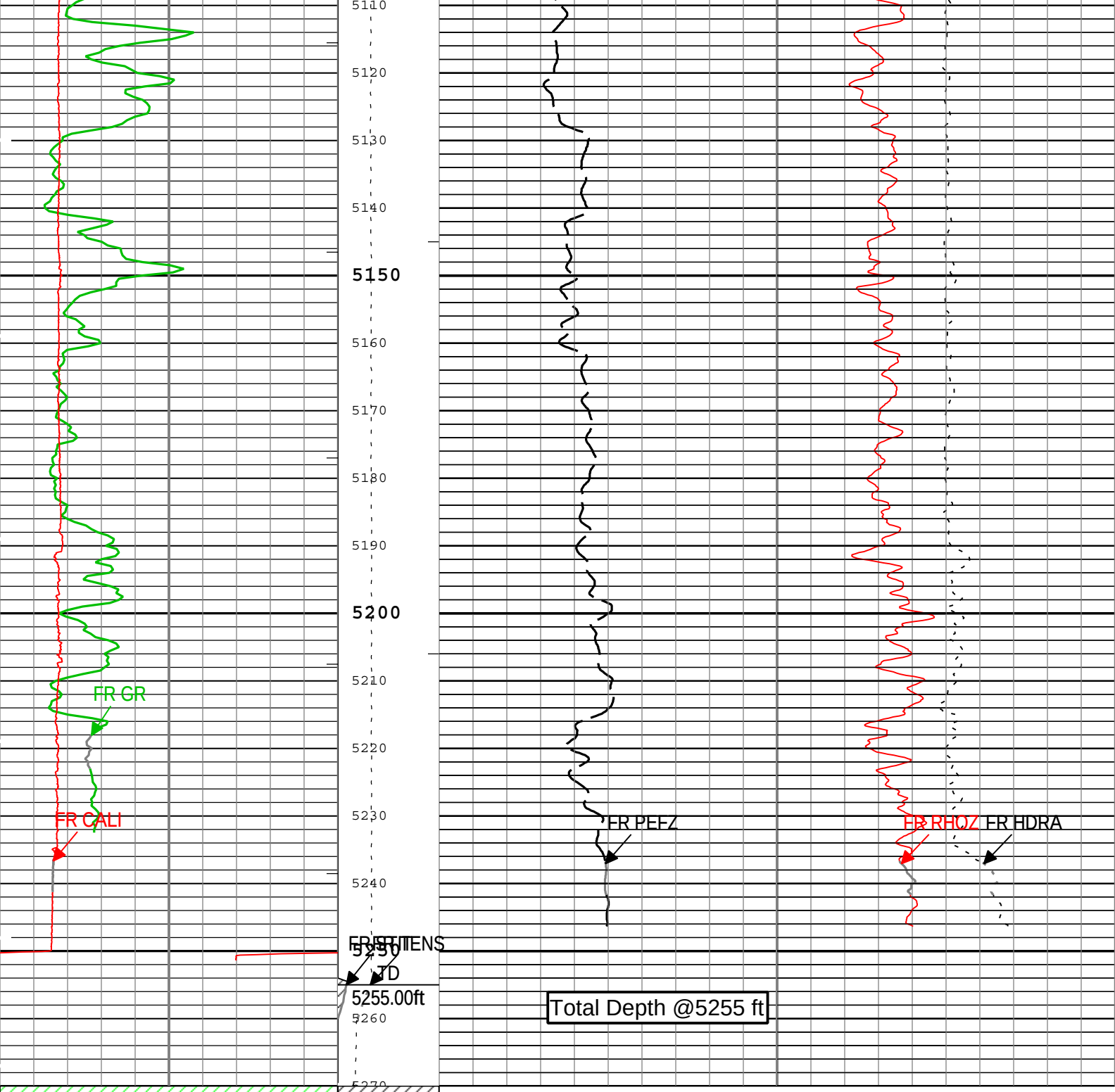


Gamma Ray Back-up

ToolDrag

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

Caliper (CALI) HDRS-H

6 in 16

Stuck Tool Indicator, Total (STIT)

0 ft 50

Cable Tension (TENS)

0 lbf 8000

Standard Resolution Formation Density (RHOZ) HDRS-H

2 g/cm3 3

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Density Standoff Correction (HDRA) HDRS-H

-0.25 g/cm3 0.25

TIME_1900 - Elapsed time since midnight, 30 December 1899 every 60.00 (s)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Description: Nuclear standard resolution template for Platform Express Format: Log (Bulk Density_5 Inch) Index Scale: 5 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:32

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
AZ_ENABLE	Z-Axis Acceleration Channel Enabled for Real-Time Depth Correction	DepthCorrection	No	
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DC_RT_ENABLE	Depth Correction Real-Time Enabled	DepthCorrection	No	
DFD	Drilling Fluid Density	Borehole	8.8	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
GCLF	Coal-Like Formation	HDRS-H	No	
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GR_MULTIPLIER	Gamma Ray Multiplier	HGNS-H	1	
HVCS	Integrated Hole Volume Caliper Selection	Borehole	Compute Area from GHD	
IHVC	Integrated Hole Volume Control	Borehole	Start	
NAAC	Switch for the correction of formation activation by the APS	HDRS-H	Off	
NPRM	HRDD Nuclear Processing Mode	HDRS-H	High Resolution	
NTCO	HRDD Nuclear Temperature Correction Option	HDRS-H	On	
SOCN	Standoff Distance	HGNS-H	0.125	in
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	5255	ft
TPOS	Tool Position: Centered or Eccentered	HGNS-H	Eccentered	

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
HRGD_BRD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h
NDTC	Nuclear Dead Time Correction	HDRS-H	On	
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	
STSO_HRDD	Temperature Source for the Density Algorithm	HDRS-H	HET data channel	

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run One

Primary Equipment :

Array Induction Sonde - M	AMIS	154

Auxiliary Equipment :

AITM Rm/SP Bottom Nose	AMRM	154

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 13:53:29 16-Oct-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.016	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	0.598	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.017	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.750	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	0.051	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.007	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.149	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.992	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.095	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.983	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.119	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.290	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.008	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.060	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 13:53:29 16-Oct-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-102.514	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-165.193	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	152.862	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	156.352	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	105.127	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	-67.600	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	58.910	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	92.322	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	24.933	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	47.414	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	12.207	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	-25.021	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.503	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	0.642	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.991	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	-0.082	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 13:53:29 16-Oct-2013

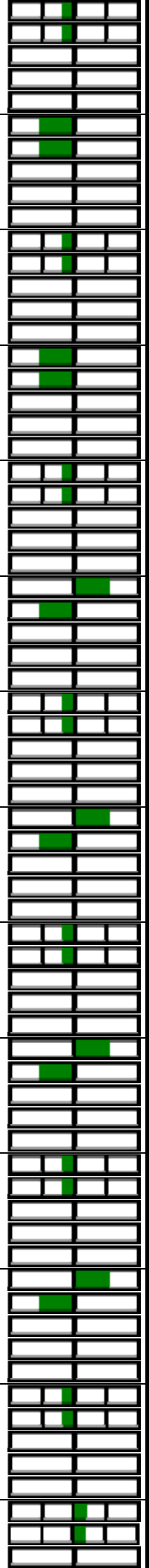
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	1.023	1.200
Fine Gain		Master	1.000	0.800	1.023	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 13:53:29 16-Oct-2013 Before (Measured): 21:00:04 03-Feb-2014 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.597	0.854
		Before	-----	0.366	0.596	0.854
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 0	deg	Master	-----	137.000	-170.441	-103.000
		Before	-----	137.000	-164.390	-103.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.051	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.222	1.778
		Before	-----	0.762	1.222	1.778
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 1	deg	Master	-----	136.000	-171.517	-104.000
		Before	-----	136.000	-165.460	-104.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.057	-----
		After-Before	-----	-----	-----	-----

Thru Cal Mag - 2	V	Master	-----	0.372	0.607	0.868
		Before	-----	0.372	0.606	0.868
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 2	deg	Master	-----	132.000	-175.054	-108.000
		Before	-----	132.000	-169.001	-108.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.053	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 3	V	Master	-----	0.420	0.684	0.980
		Before	-----	0.420	0.684	0.980
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 3	deg	Master	-----	131.000	-175.807	-109.000
		Before	-----	131.000	-169.753	-109.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.054	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 4	V	Master	-----	0.804	1.280	1.876
		Before	-----	0.804	1.279	1.876
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 4	deg	Master	-----	125.000	178.088	-115.000
		Before	-----	125.000	-175.853	-115.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.941	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 5	V	Master	-----	1.176	1.864	2.744
		Before	-----	1.176	1.863	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 5	deg	Master	-----	122.000	176.493	-118.000
		Before	-----	122.000	-177.445	-118.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.938	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 6	V	Master	-----	1.176	1.865	2.744
		Before	-----	1.176	1.864	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 6	deg	Master	-----	121.000	176.477	-119.000
		Before	-----	121.000	-177.461	-119.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.938	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 7	V	Master	-----	0.846	1.340	1.974
		Before	-----	0.846	1.340	1.974
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 7	deg	Master	-----	115.000	175.810	-125.000
		Before	-----	115.000	-178.098	-125.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.908	-----
		After-Before	-----	-----	-----	-----
SPA Zero	mV	Master		-50.000	-0.427	50.000
		Before		-50.000	-0.421	50.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.006	-----
		After-Before	-----	-----	-----	-----
SPA Plus	mV	Master		941.000	991.321	1040.000
		Before		941.000	991.149	1040.000
		After	-----	-----	-----	-----



		Before-Master	-----	-----	-0.172	-----	
		After-Before	-----	-----	-----	-----	
Temperature Zero	V	Master		-0.050	0.000	0.050	
		Before		-0.050	0.000	0.050	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	0.000	-----	
		After-Before	-----	-----	-----	-----	
Temperature Plus	V	Master		0.870	0.918	0.960	
		Before		0.870	0.918	0.960	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	0.000	-----	
		After-Before	-----	-----	-----	-----	

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

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3928
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3832

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5398
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3928
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	3966

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): 14:20:14 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	8.97	10.00	
Large Ring	in	Before	12.00	9.00	13.11	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 11:31:16 04-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.596	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696	
Pe Aluminum		Master	2.570	2.470	2.528	2.670	
Pe Magnesium		Master	2.650	2.550	2.646	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 11:31:16 04-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.2377	0.6000	
BS Max Deviation	%	Master	0	-1.6000	0.4897	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.4242	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.3410	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.7557	1.5000	
LS Max Deviation	%	Master	0	-3.5000	1.4046	3.5000	

HDRS Density Calibration - Background Summary

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master	1.0000		0.7399		
		Before	0.7399	0.7029	0.7422	0.7769	
		Before-Master	-----	-----	0.0023	-----	
BS Window Sum	1/s	Master	1		22878		
		Before	22878	21734	22904	24022	
		Before-Master	-----	-----	26	-----	
SS Window Ratio		Master	1.0000		0.4864		
		Before	0.4864	0.4621	0.4838	0.5108	

		Before-Master	-----	-----	-0.0026	-----
SS Window Sum	1/s	Master	1		10252	
		Before	10252	9739	10234	10764
		Before-Master	-----	-----	-18	-----
LS Window Ratio		Master	1.0000		0.2987	
		Before	0.2987	0.2838	0.2963	0.3137
		Before-Master	-----	-----	-0.0024	-----
LS Window Sum	1/s	Master	1		1154	
		Before	1154	1096	1147	1212
		Before-Master	-----	-----	-7	-----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1374	2400
		Before		1000	1381	2400
		Before-Master	-----	-100	7	100
SS PM High Voltage	V	Master		1000	1285	2400
		Before		1000	1297	2400
		Before-Master	-----	-100	12	100
LS PM High Voltage	V	Master		1000	1316	2400
		Before		1000	1324	2400
		Before-Master	-----	-100	8	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	10.38	25.00
		Before		5.00	10.41	25.00
		Before-Master	-----	-1.00	0.03	1.00
SS Crystal Resolution	%	Master		5.00	8.54	20.00
		Before		5.00	8.56	20.00
		Before-Master	-----	-1.00	0.02	1.00
LS Crystal Resolution	%	Master		5.00	8.98	20.00
		Before		5.00	8.89	20.00
		Before-Master	-----	-1.00	-0.09	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 11:15:31 12-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3868	4185
Deep Resistivity	ohm.m	Before	3830	3524	3799	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3816	4136

HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run One

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC	HGNS-H	3819

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	5120
AmBe Neutron Logging Source	NSR-F	5075

Calibration Parameter :

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

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 11:16:03 12-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.1	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-May-2006

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit

Accelerometer Manufacturer		Master			QAT_160	
Accelerometer Reference Temperature	degF	Master		30.2	77.0	122.0
Accelerometer Coefficients - 0		Master	-----	-----	519.600	-----
Accelerometer Coefficients - 1		Master	-----	-----	33.360	-----
Accelerometer Coefficients - 2		Master	-----	-----	-0.009	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 4		Master	-----	-----	2.719	-----
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 8		Master	-----	-----	298.600	-----
Accelerometer Coefficients - 9		Master	-----	-----	0.997	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 11:02:48 16-Oct-2013 Before (Measured): 14:56:08 05-Dec-2013 Expired by 5 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	26.3	40.0
		Before	0	5.0	27.7	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-3.9	1.4	3.9
		After-Before	-----	-----	-----	-----
Far Zero Measurement	1/s	Master	0	5.0	29.2	40.0
		Before	0	5.0	28.1	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-4.4	-1.1	4.4
		After-Before	-----	-----	-----	-----
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5447.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2281.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Near Corrected Plus Measurement - 0	1/s	Master		4700.0	5553.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Corrected Plus Measurement - 0	1/s	Master		1900.0	2338.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 14:53:52 05-Dec-2013 Expired by 5 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	22.6	120.0
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
RGR Plus Measurement	gAPI	Before	185.4	157.1	176.1	206.3
		After			NOT DONE	
		After-Before	-----	-----	-----	-----
GR Calibration Gain		Before	0.89	0.80	0.94	1.05
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS-BA (Hostile-environment Natural Gamma-ray Sonde) Calibration - Run One

Primary Equipment :

HNGS Sonde Element	HNGS-BA	328

Auxiliary Equipment :

Hostile Natural Gamma Ray Cartridge	HNGC-B	596

HNGS Housing Element	HEH-K	328
		0

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Location - 0		Master			39.685	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 511 Peak Resolution - 0	%	Master			14.671	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
High Voltage DAC Value - 0	V	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Location - 0		Master			142.226	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Resolution - 0	%	Master			8.213	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Temperature - 0	degF	Master	-----	-----	-----	-----
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na Count Rate - 0	CPS	Master	45.000	10.000	24.611	100.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Location - 0		Master			39.668	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 511 Peak Resolution - 0	%	Master			15.246	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
High Voltage DAC Value - 0	V	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Location - 0		Master			141.964	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Resolution - 0	%	Master			8.671	
		Before	-----	-----	-----	-----

		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Temperature - 0	degF	Master	-----	-----	-----	-----
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na Count Rate - 0	CPS	Master	45.000	10.000	24.616	100.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Ratio of Detector 1 to Detector 2

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coincidence Count Rate Ratio - 0		Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Th Peak Location - 0		Master	209.630	201.000	213.899	218.250
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Th Peak Resolution - 0	%	Master	7.000	5.000	6.729	9.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Background Count Rate - 0	CPS	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Gain Ratio - 0		Master	1.000	0.940	1.025	1.060
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Th Peak Location - 0		Master	209.630	201.000	214.368	218.250
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Th Peak Resolution - 0	%	Master	7.000	5.000	7.705	9.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Background Count Rate - 0	CPS	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Gain Ratio - 0		Master	1.000	0.940	1.028	1.060
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----

		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Set Point - 0		Master	40.000	38.000	40.000	43.500
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Set Point - 0		Master	40.000	38.000	40.000	43.500
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

Company: Anadarko E&P Onshore LLC

Schlumberger

Well: Murphy 1-31 M

Field: Greenwood

County: Morton

State: Kansas

PLATFORM EXPRESS
COMPENSATED NEUTRON
LITHOLOGY DENSITY