Schlumberger

Company: Nighthawk Production LLC

Well: Big Sky 5-11

Field: Arikaree Creek

County: Lincoln State: Colorado

Platform Express

Triple Combo

Linear

County: Lincoln
Field: Arikaree Creek
Location: SHL: 1922' FNL & 621' FWL
Well: Big Sky 5-11
Company: Nighthawk Production LLC

Location:	SHL: 1922' FNL & 621' FWL SWNW	Elev.:	K.B.	5234.00 ft
			G.L.	5217.00 ft
			D.F.	5233.00 ft
	Permanent Datum:	Ground Level	Elev.:	5217.00 f
	Log Measured From:	Kelly Bushing	17.00 ft	above Perm.Datum
	Drilling Measured From:	Kelly Bushing		

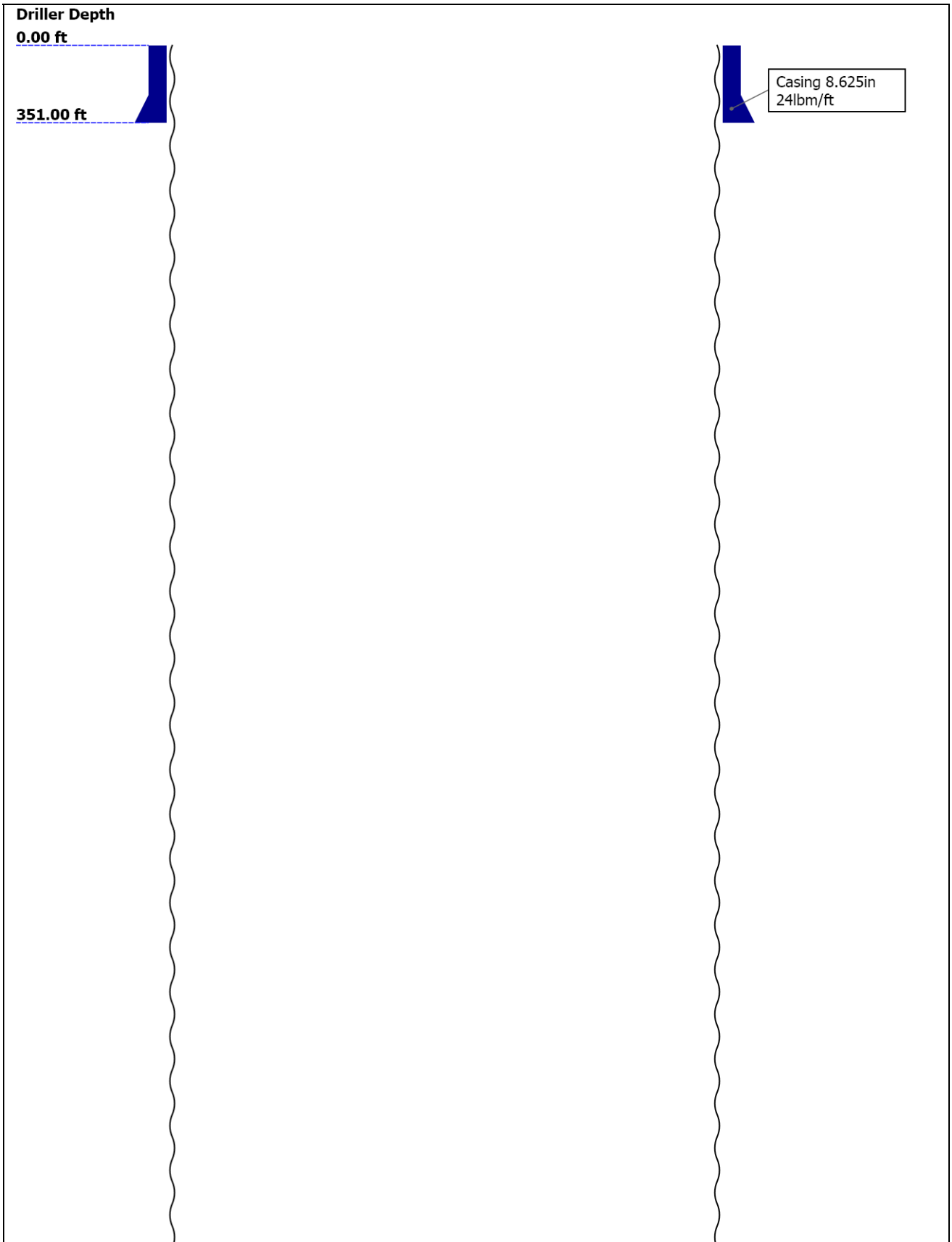
API Serial No.	Section:	Township:	Range:
05-073-06552	11	6S	54W

Logging Date			13-Feb-2014			
Run Number			1			
Depth Driller			8284.00 ft			
Schlumberger Depth			8288.00 ft			
Bottom Log Interval			8280.00 ft			
Top Log Interval			350.00 ft			
Casing Driller Size @ Depth			8.625 in @ 351.00 ft			
Casing Schlumberger			350 ft			
Bit Size			7.875 in			
Type Fluid In Hole			Water			
MUD	Density	Viscosity	9.05 lbm/gal	55 s		
	Fluid Loss	PH	5.6 cm3	7.9		
	Source of Sample		Active Tank			
RM @ Meas Temp			1.06 ohm.m @ 81.63 degF			
RMF @ Meas Temp			0.8 ohm.m @ 81.63 degF			
RMC @ Meas Temp			1.6 ohm.m @ 81.63 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.5 @ 180	0.38 @ 180		
Max Recorded Temperatures			180 degF			
Circulation Stopped	Time		13-Feb-2014	05:00:00		
Logger on Bottom	Time		13-Feb-2014	14:25:24		
Unit Number	Location:		3022	Fort Morgan		
Recorded By			Daniil Kholin			
Witnessed By			Jim Wier			

Disclaimer

Contents

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	7.875					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	8284					
Bottom Logger (ft)	8288					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24					
Inner Diameter (in)	8.097					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	351					
Bottom Logger (ft)	350					

Remarks and Equipment Summary

1: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	**43.57**		
LEH-QT			
DTC-H:9463	**40.65**		
ECH-KC:10530		**CTEM**	**39.75**
DTC-H:9463		**HV**	**0.00**
		ToolStatus	**37.65**
		TelStatus	**37.65**
HGNS-H:4810	**37.65**	**Temperature**	**37.62**
HGNH:3912			
NSR-F:5215		**GR**	**36.91**
NPV-N			
HMCA-H			
HACCZ-H:5955			
HGNS-H:4810			
		CNL Porosity	**30.57**
		HGNS	**28.24**
		HMCA	**28.24**
		Accelerometer	**0.00**
HDRS-H:4826	**28.24**		
ECH-MEB:4711			

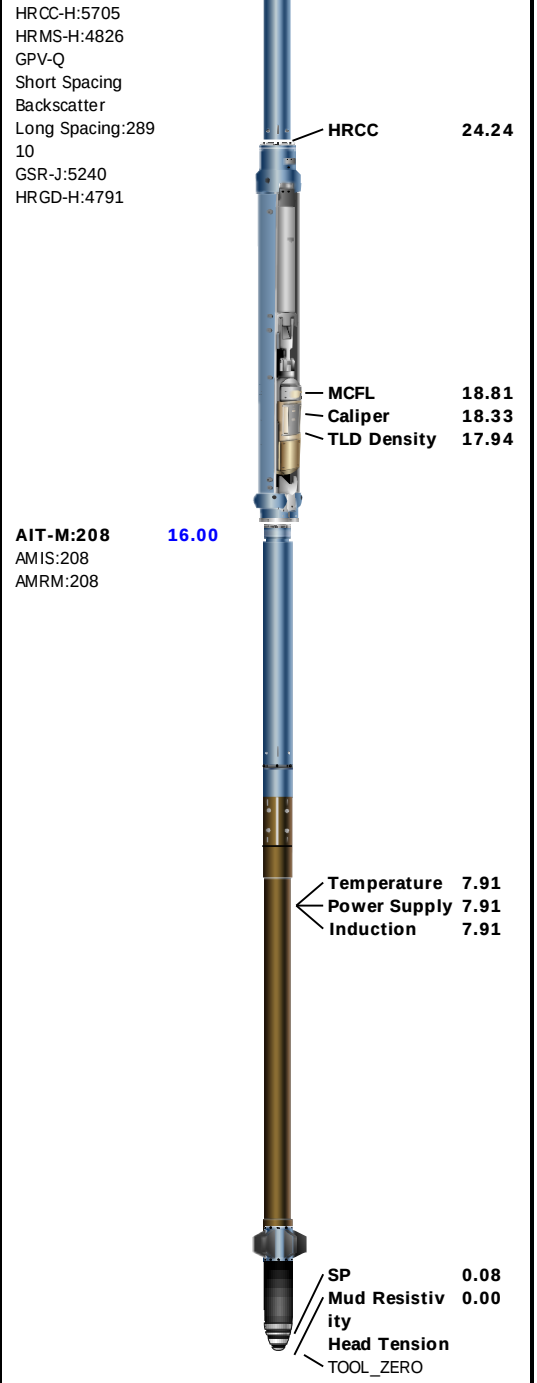
1: Remarks

Toolstring run as per toolsketch

No bowsprin run as per client request due to hole conditions

Matrix: Limestone, 2.71 g/cc

Crew: Troy Ocanas, Aaron Weber



Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	1		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6239		
Calibration Date	10-Jan-2014		
Calibrator Serial Number			
Calibration Cable Type	7-39 PLXS		
Wheel Correction 1	-4		
Wheel Correction 2	2		
Tension Device			
Type	CMTD-B/A		
Serial Number	1109		
Calibration Date	08-FEB-2014		
Calibrator Serial Number	78135A		
Number of Calibration Points	10		

Calibration Root Mean Square Error	6		
Calibration Peak Error	12		

Logging Cable

Type	7-39P-LXS		
Serial Number	U711136		
Length	21000.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

1:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger Depth Control Procedures followed
Rig Up Length At Surface		IDW used as Primary Depth Control
Rig Up Length At Bottom		Z-chart used as Secondary Depth Control
Rig Up Length Correction		Logs correlated to downlog using GR
Stretch Correction	4.80 ft	
Tool Zero Check At Surface		

1

1" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1903.3	ft3

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_13393-4.0.9163.3001

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	4.0.9213.3000

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	4.0.9231.3000	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9231.3000	2.0
AMIS	Array Induction Sonde - M	4.0.9247.3000	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Main[3]:Up	Up	14.54 ft	8302.86 ft	13-Feb-2014 2:29:40 PM	13-Feb-2014 4:59:53 PM	ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Nighthawk Production LLC Well:Big Sky 5-11

1: Main[3]:Up:S006

Description: AIT Basic Log Two Format: Log (EMD 1in Induction) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:15

Channel	Source	Sampling
AFCO90	AIT-M:AMIS:AMIS	3in
AT10	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-100 mV 200

Caliper (CALI) HDRS-H

4 in 14

Gamma Ray (GR) HGNS-H

0 gAPI 200

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 10

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

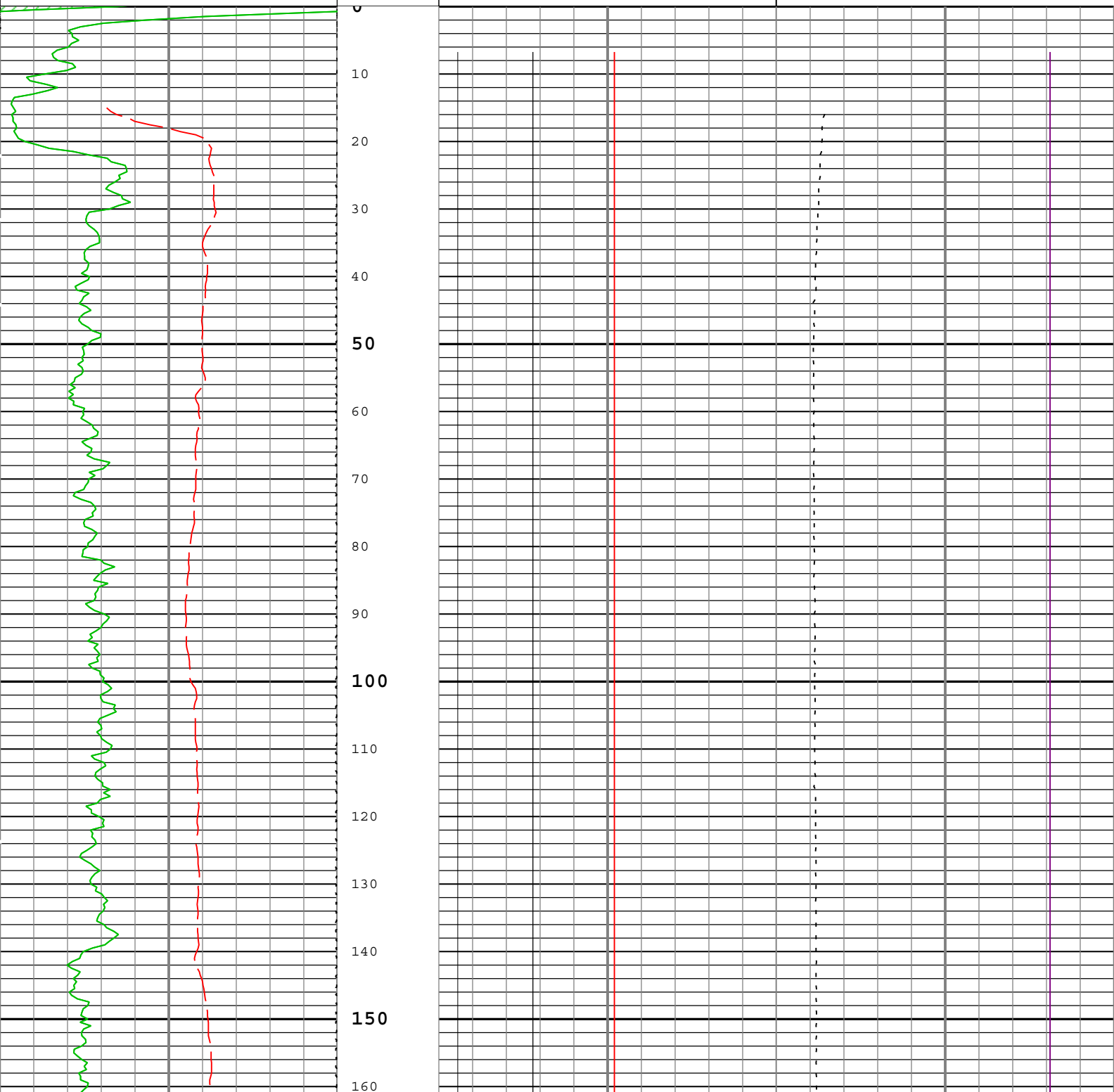
0 ohm.m 10

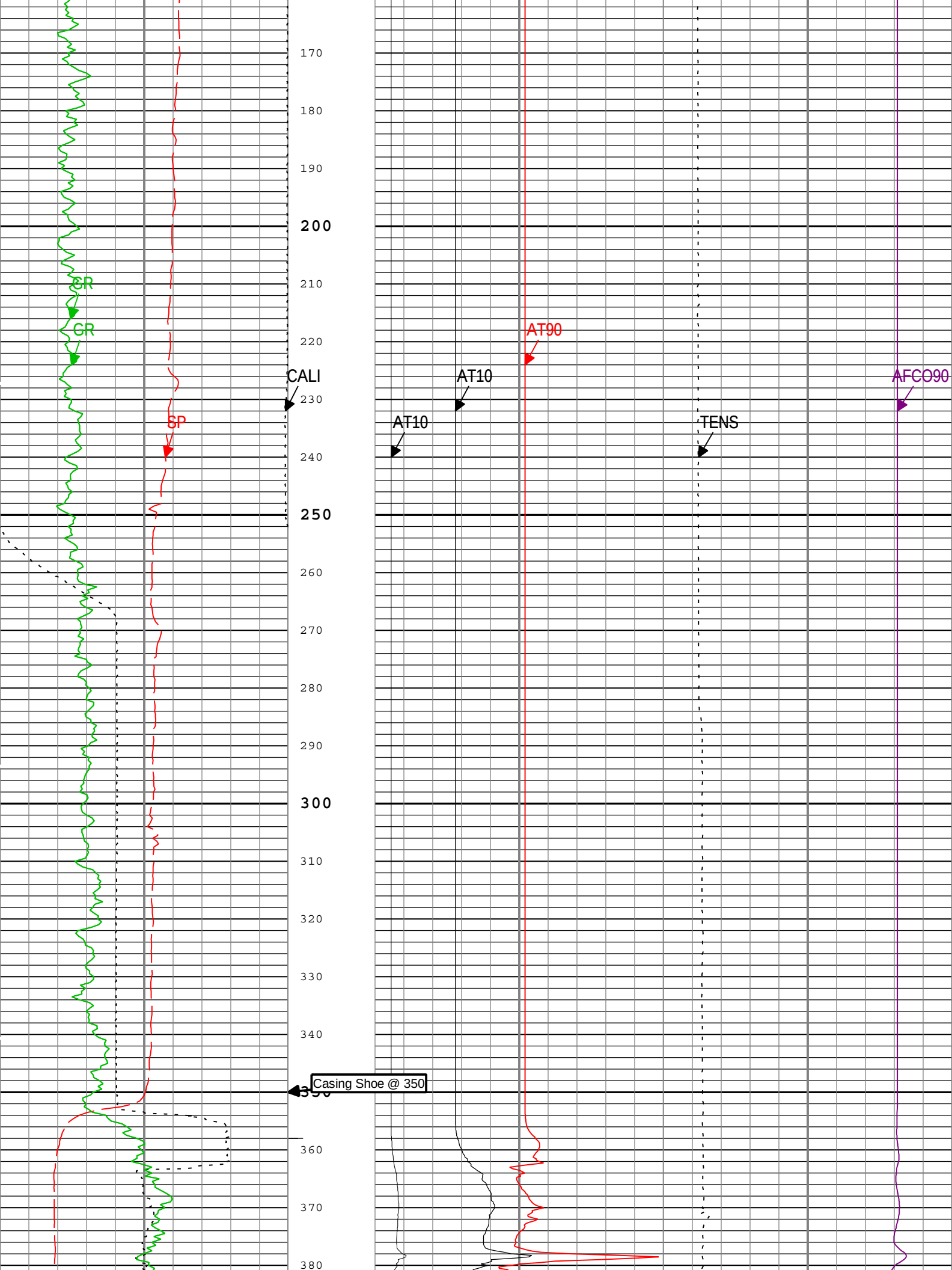
Cable Tension (TENS)

0 lbf 5000

Array Induction Four Foot Conductivity A90 (AFCO90) AIT-M

1000 mS/m 0

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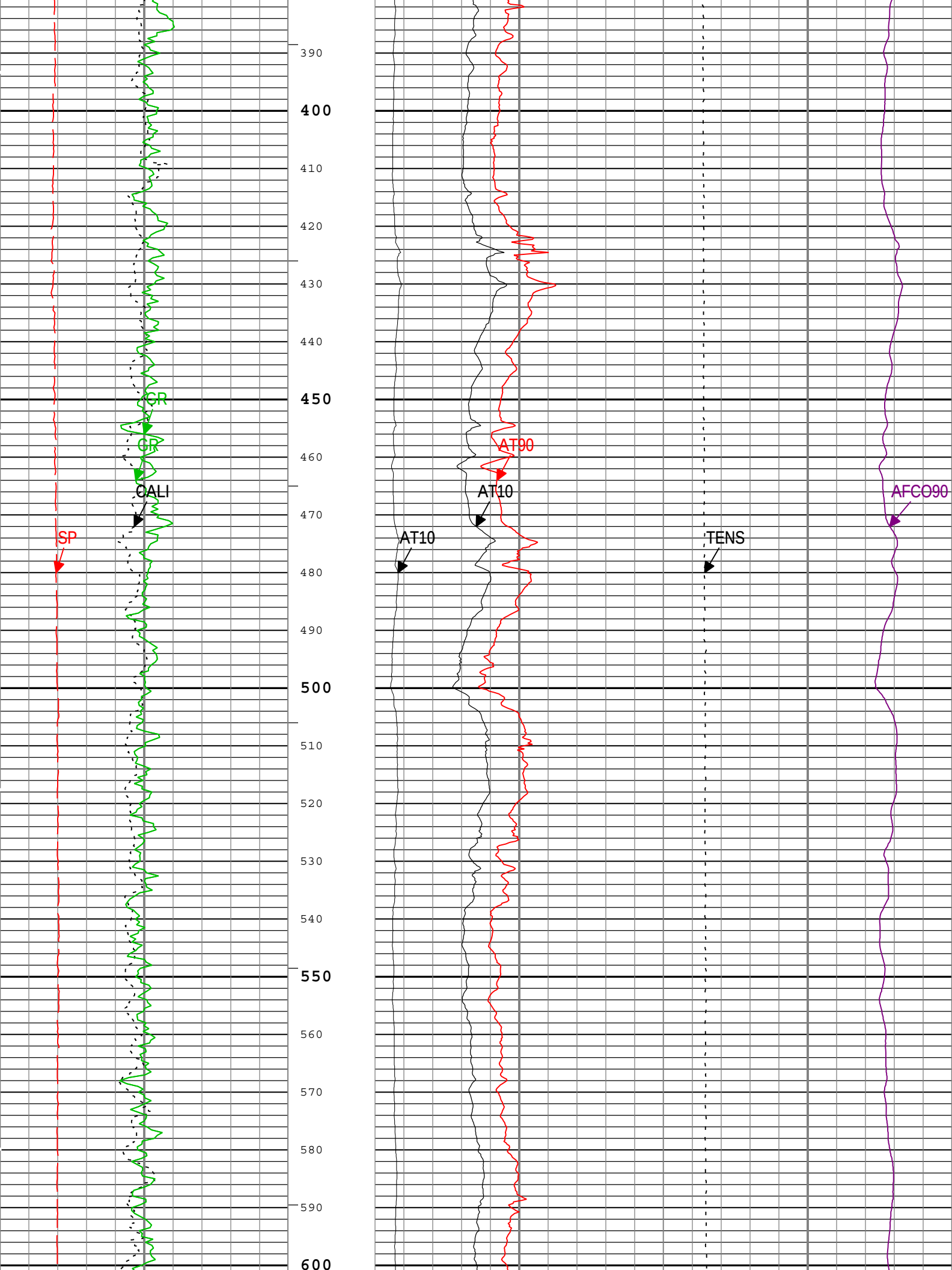
AFCO90
Casing Shoe @ 350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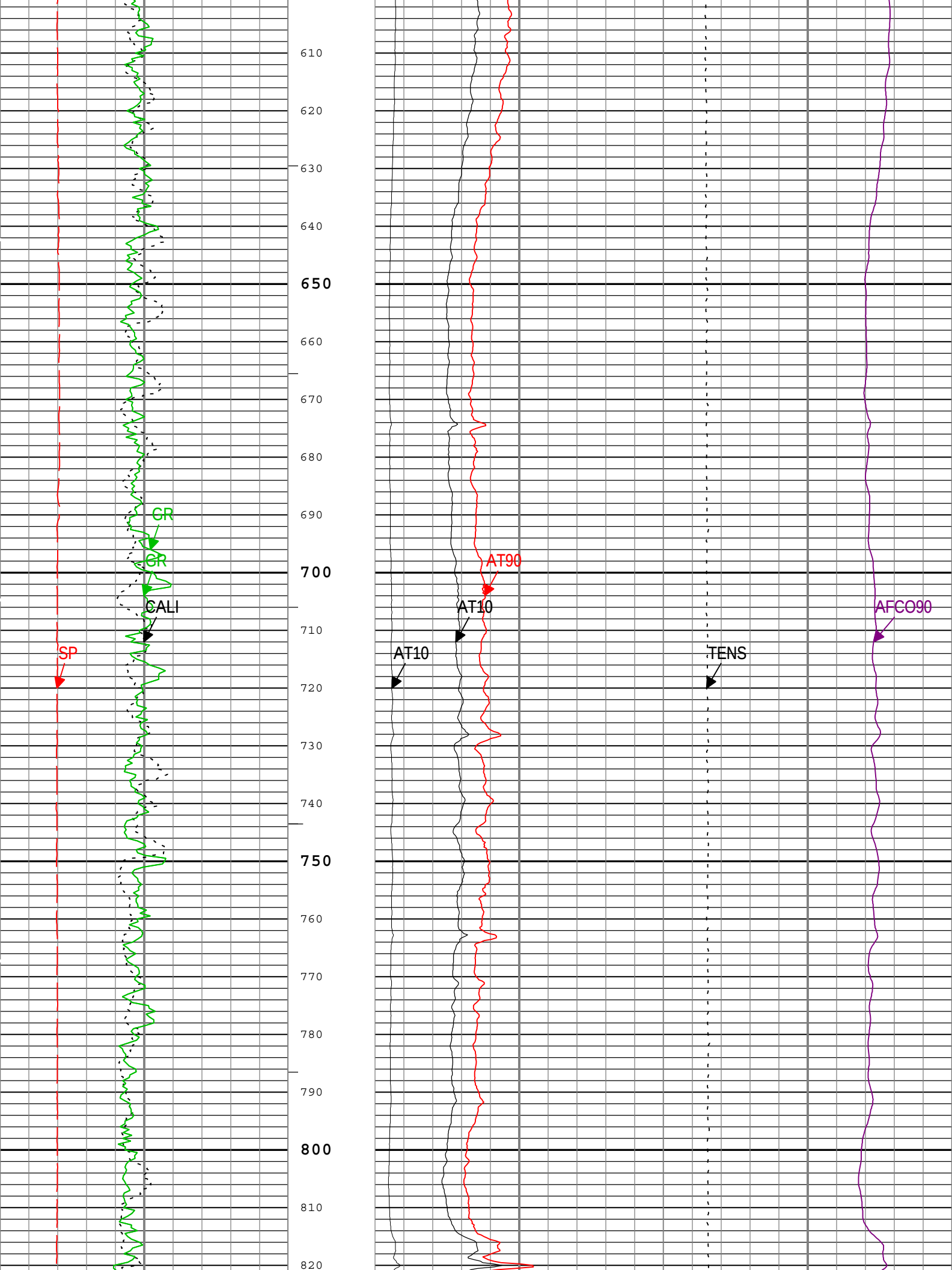
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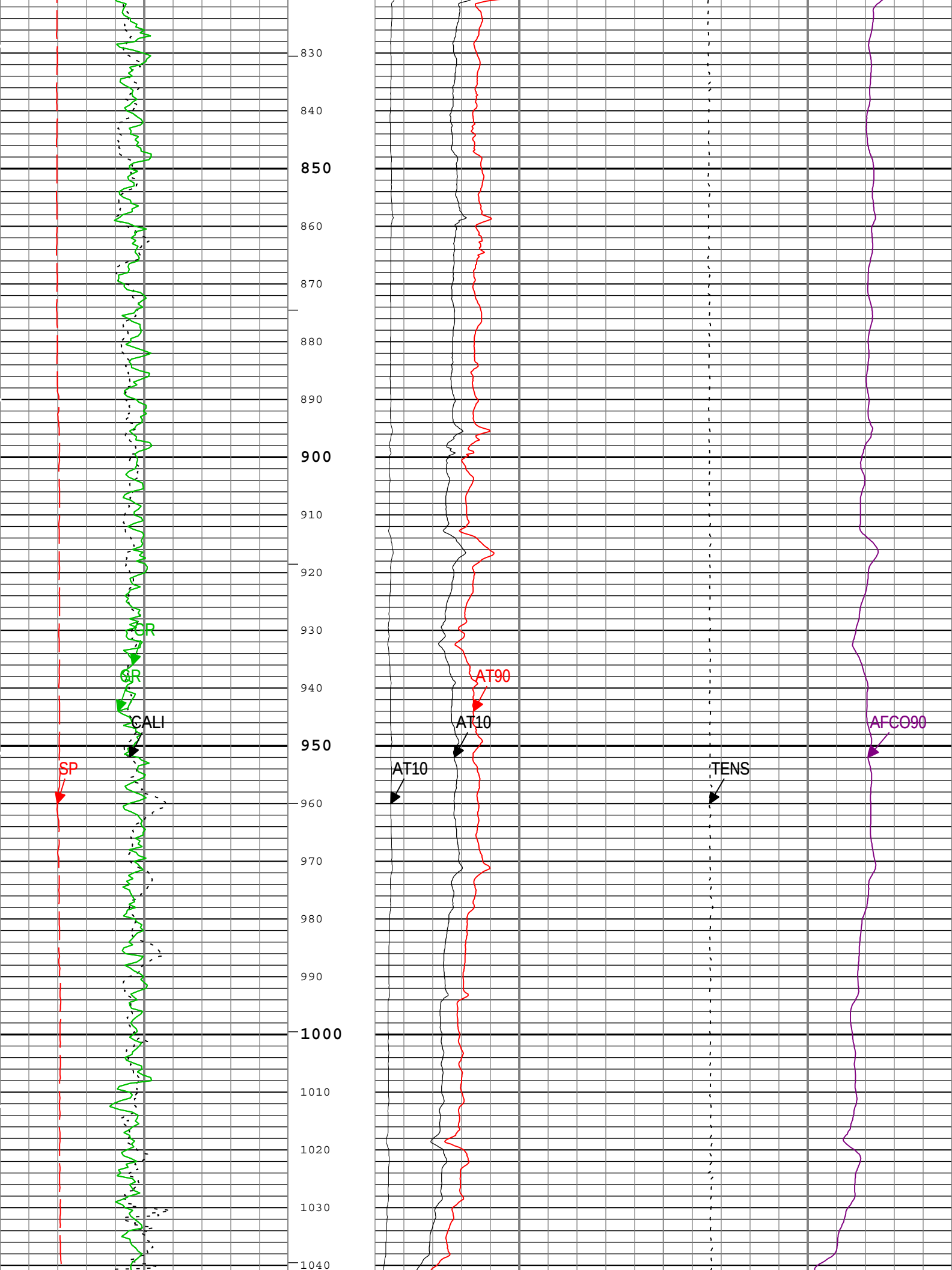
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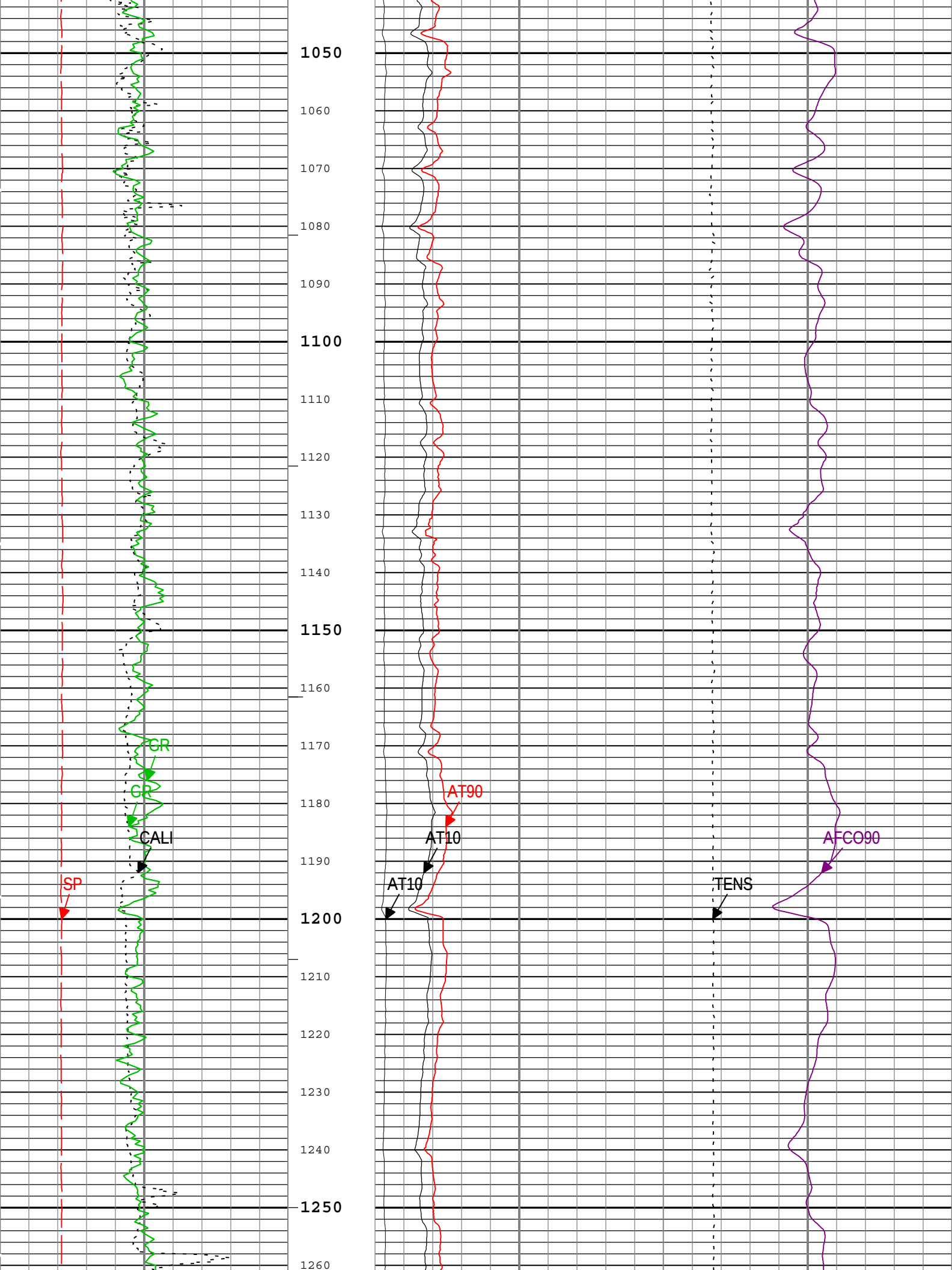
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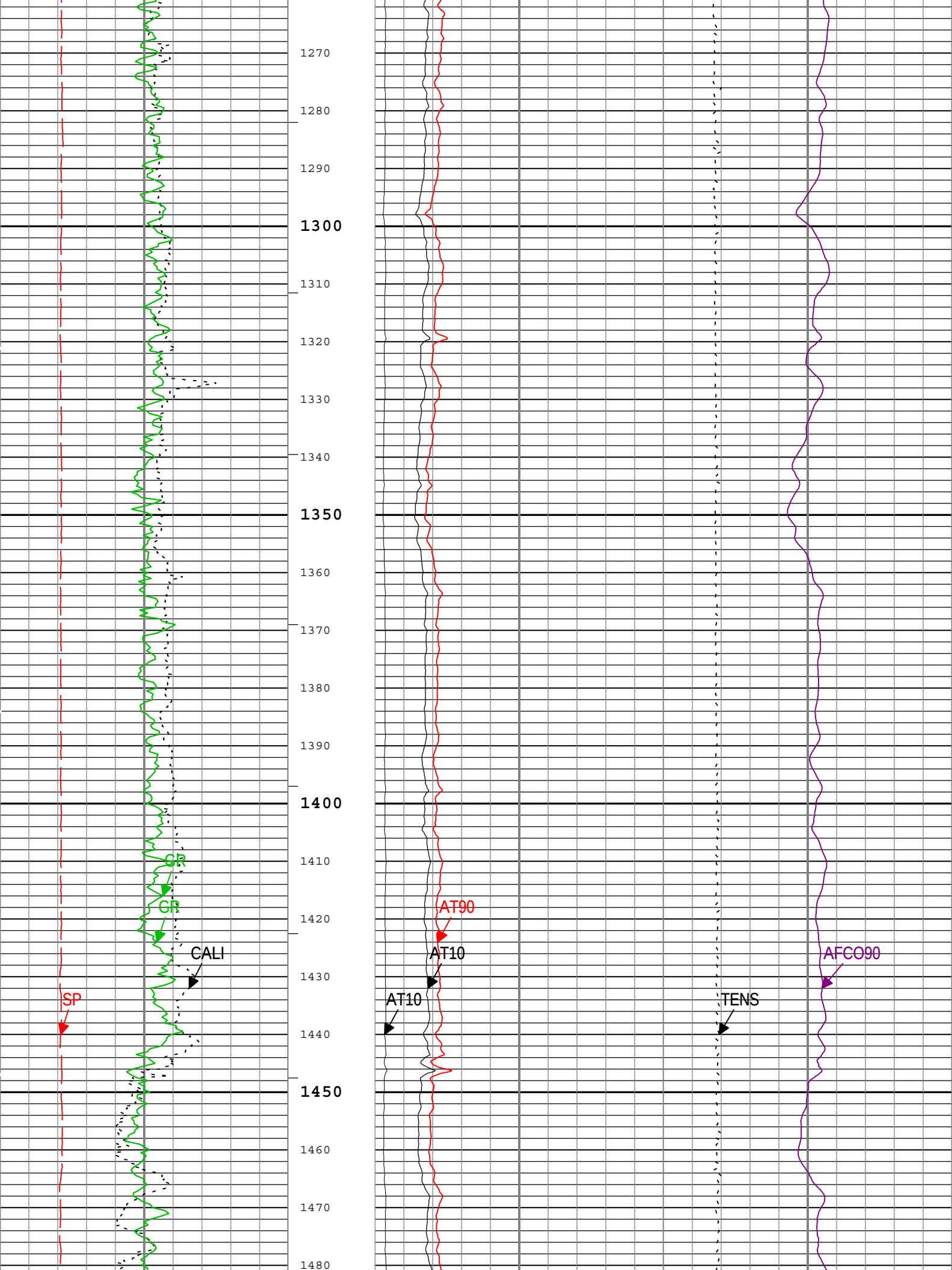
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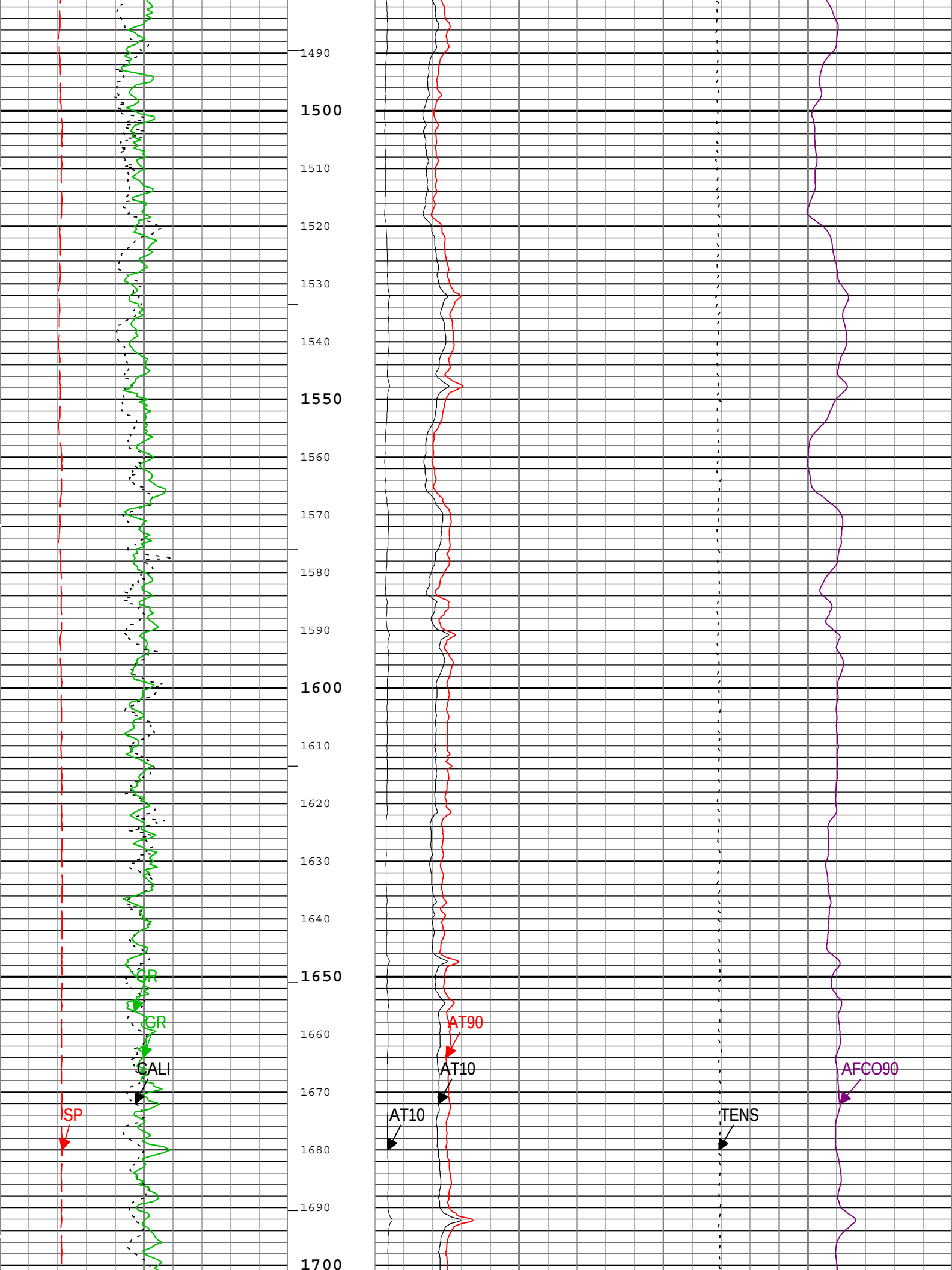
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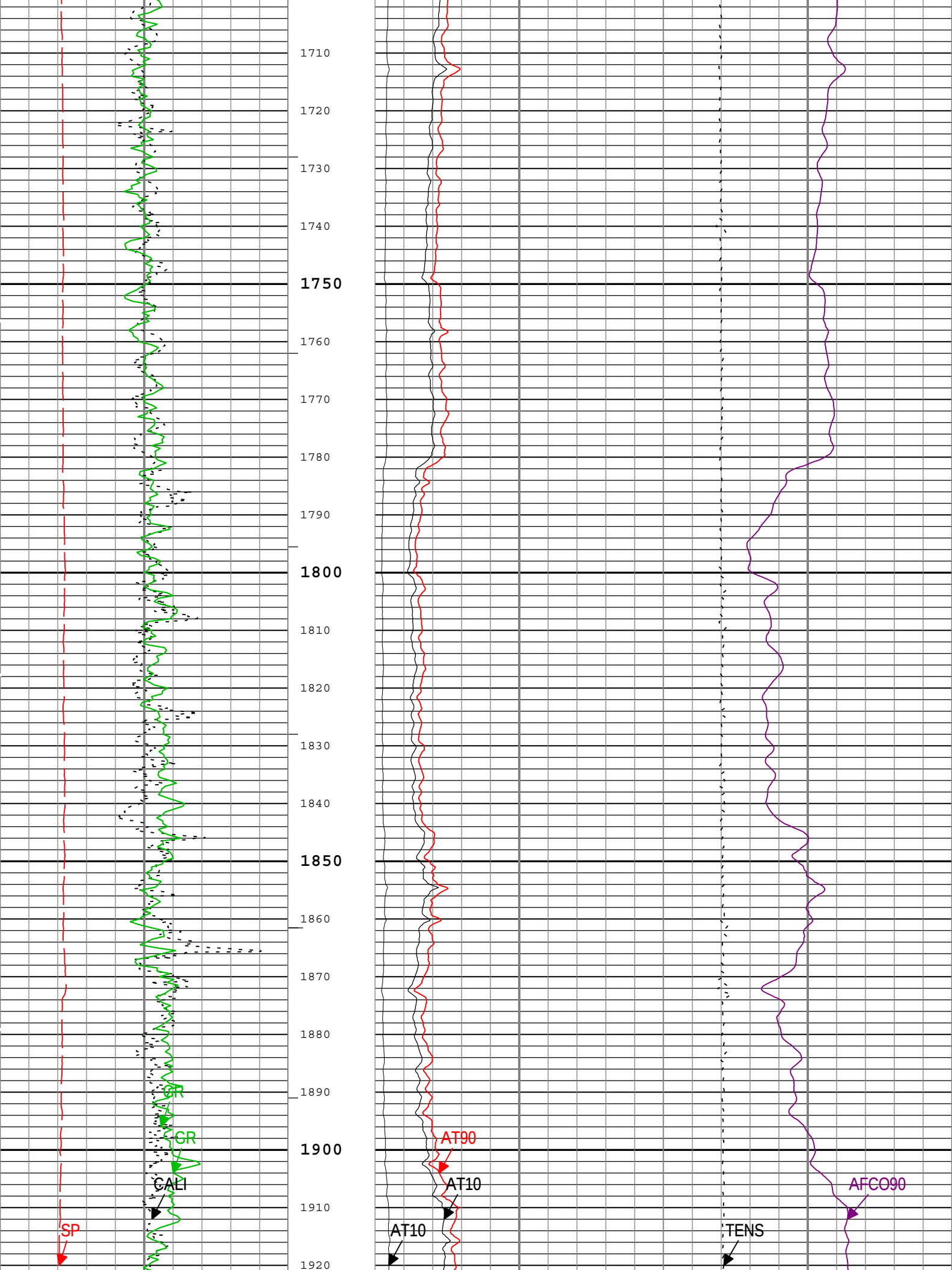
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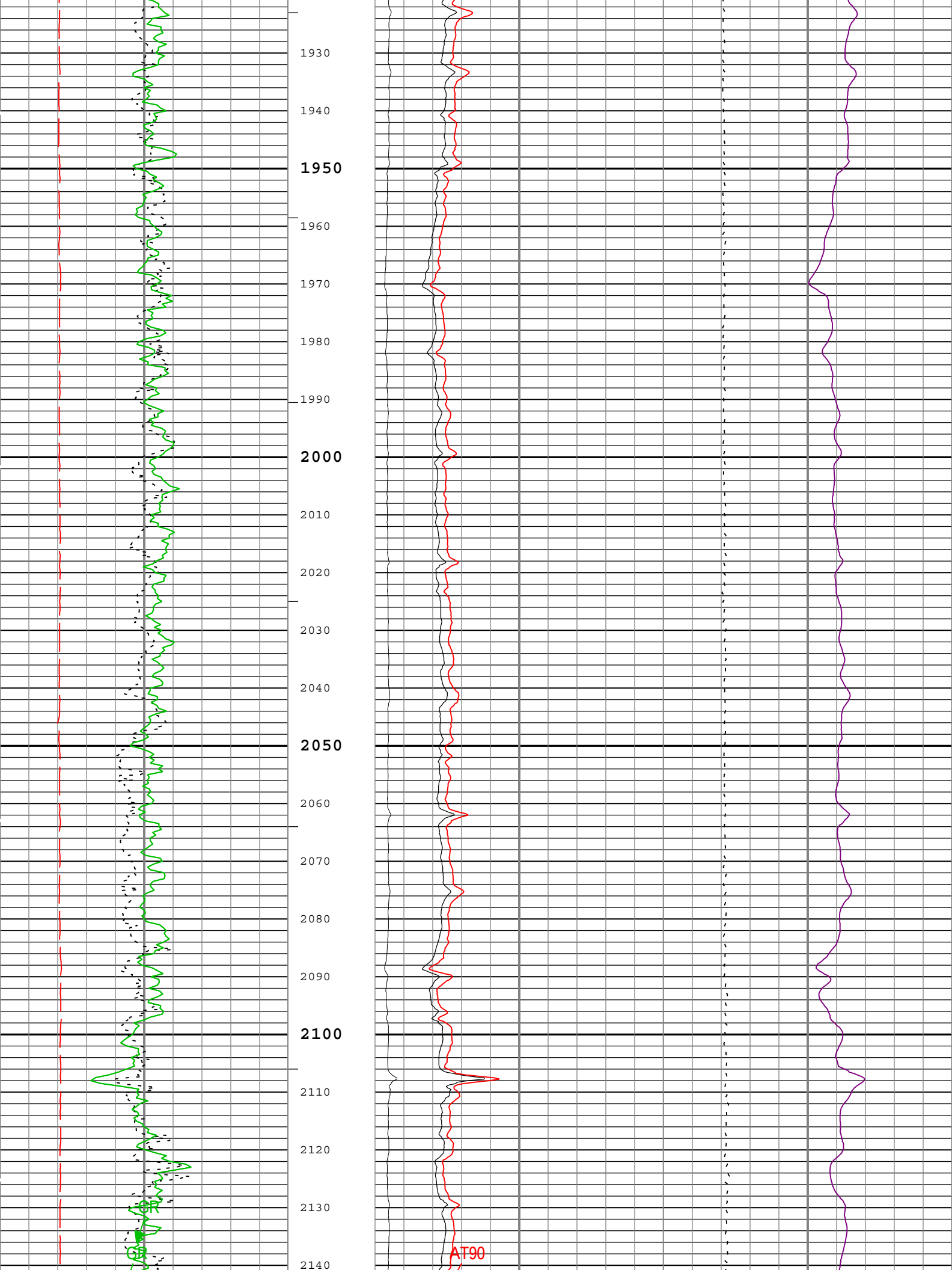
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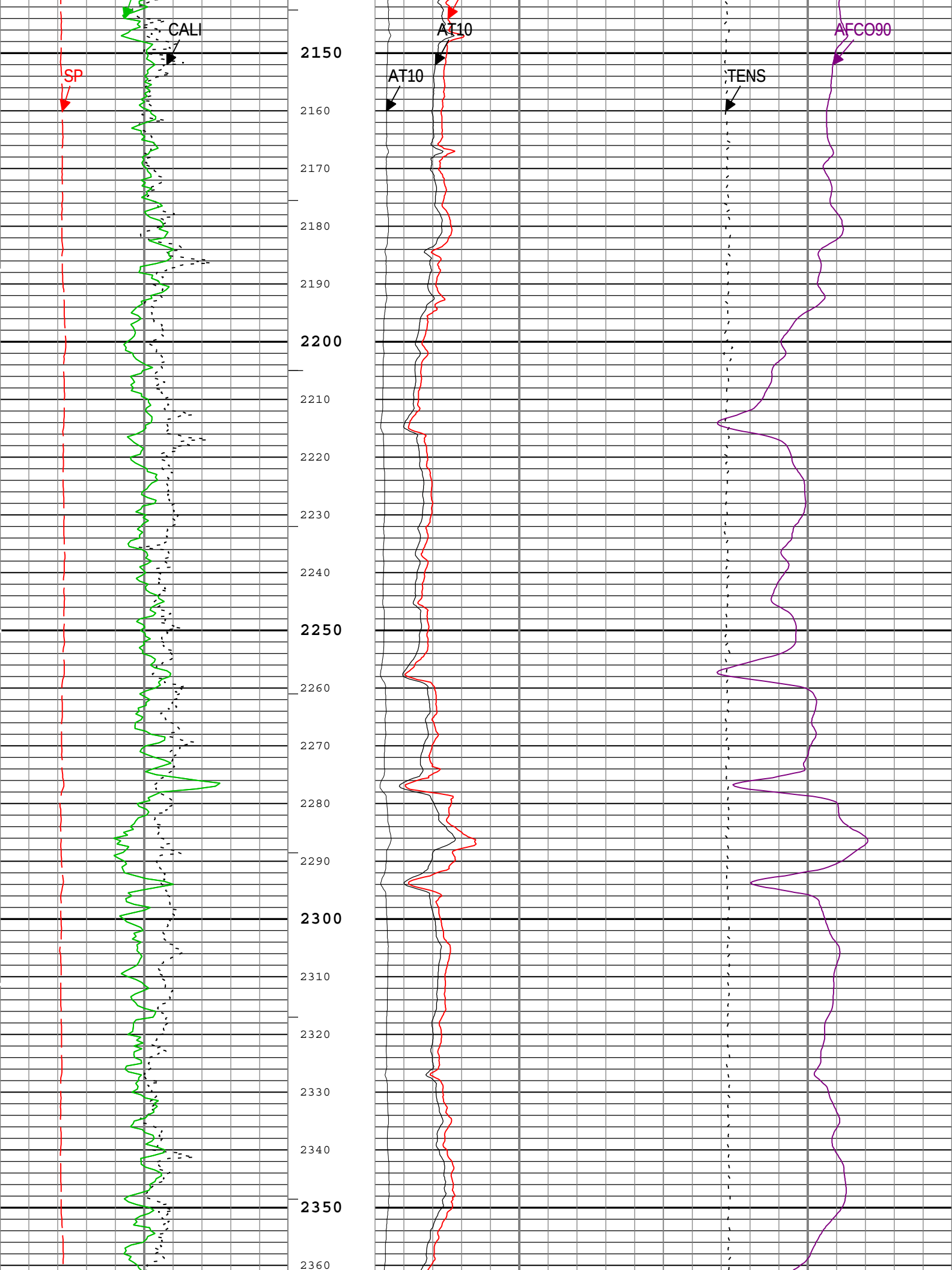
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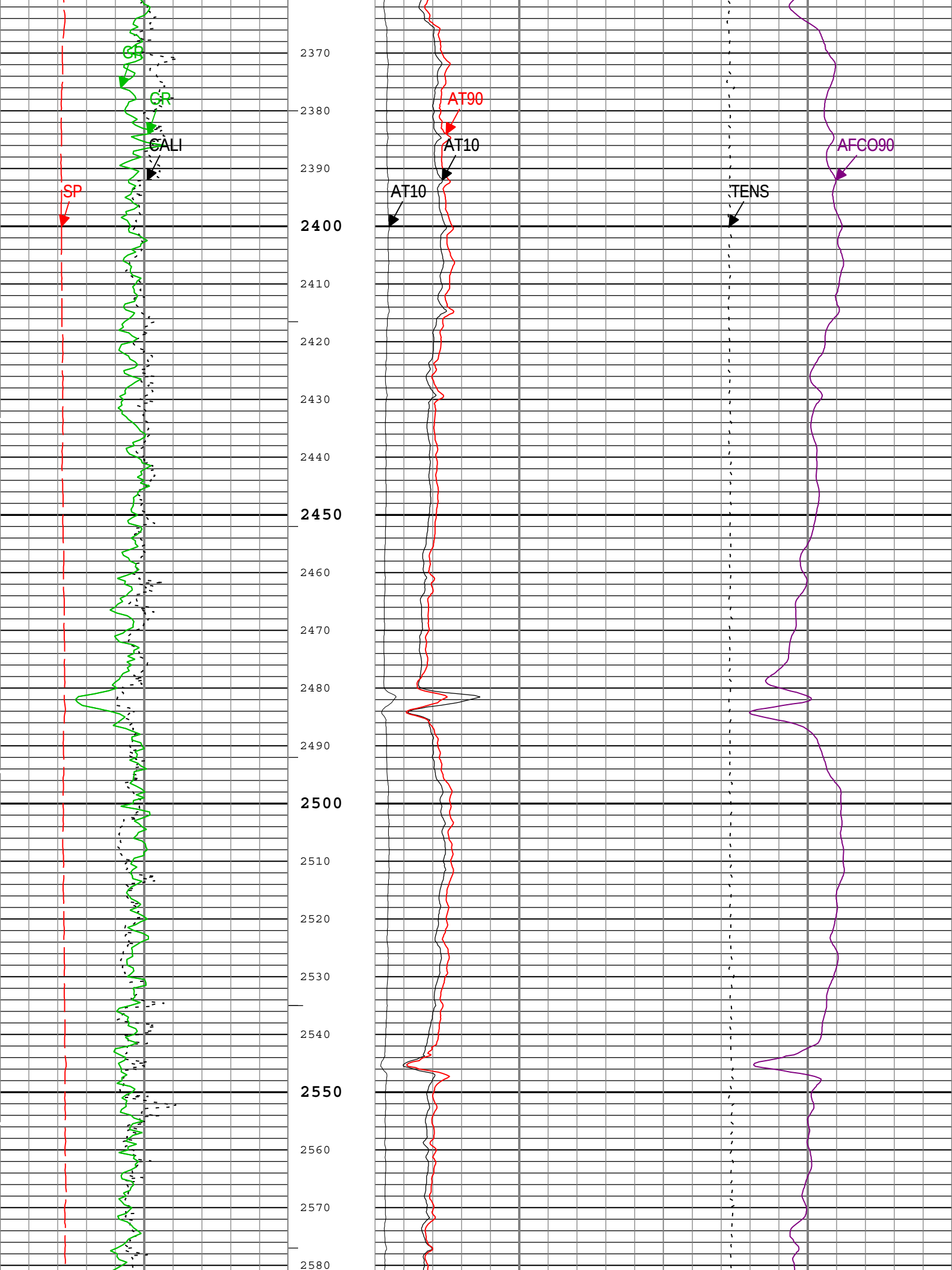
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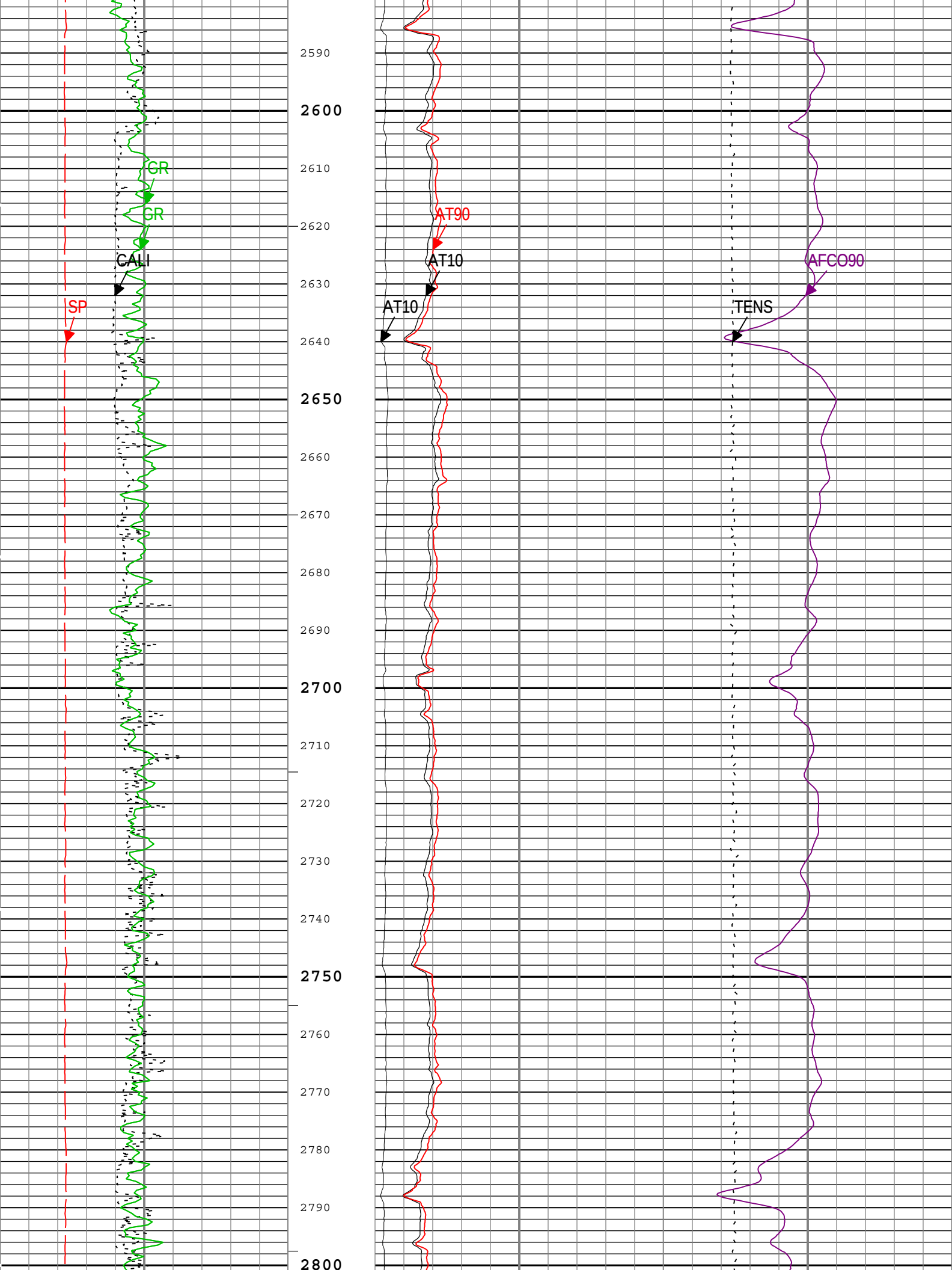
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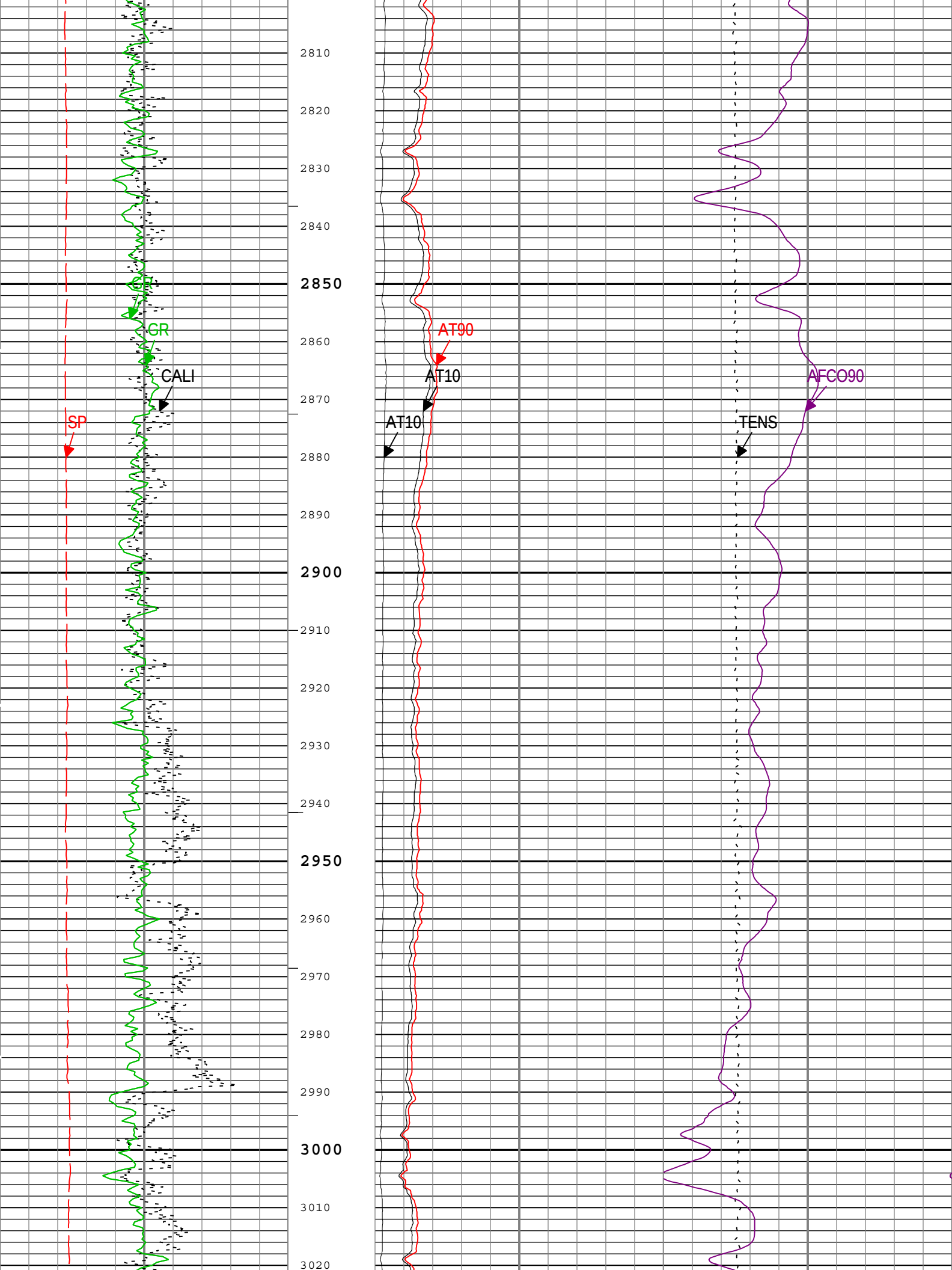
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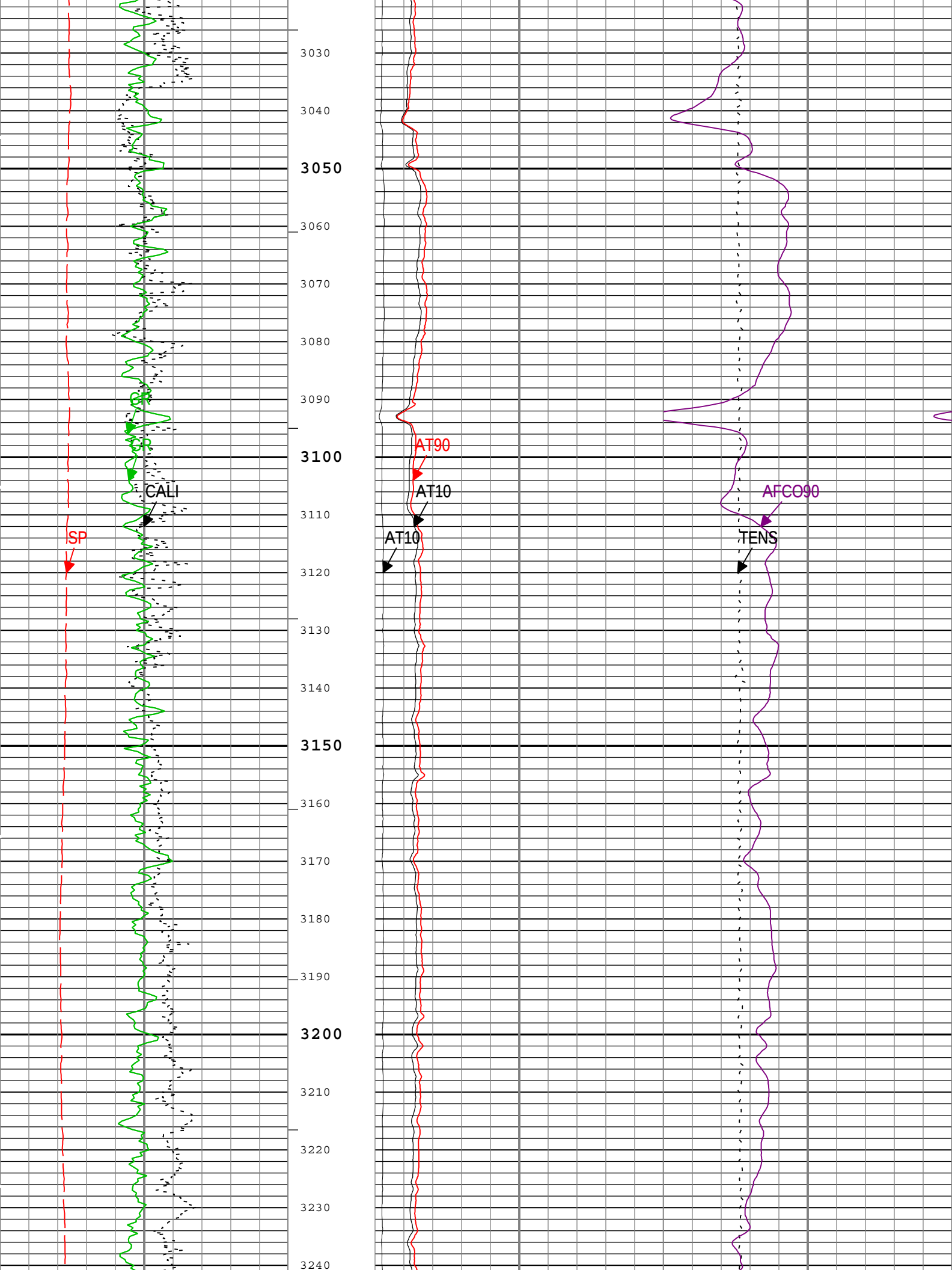
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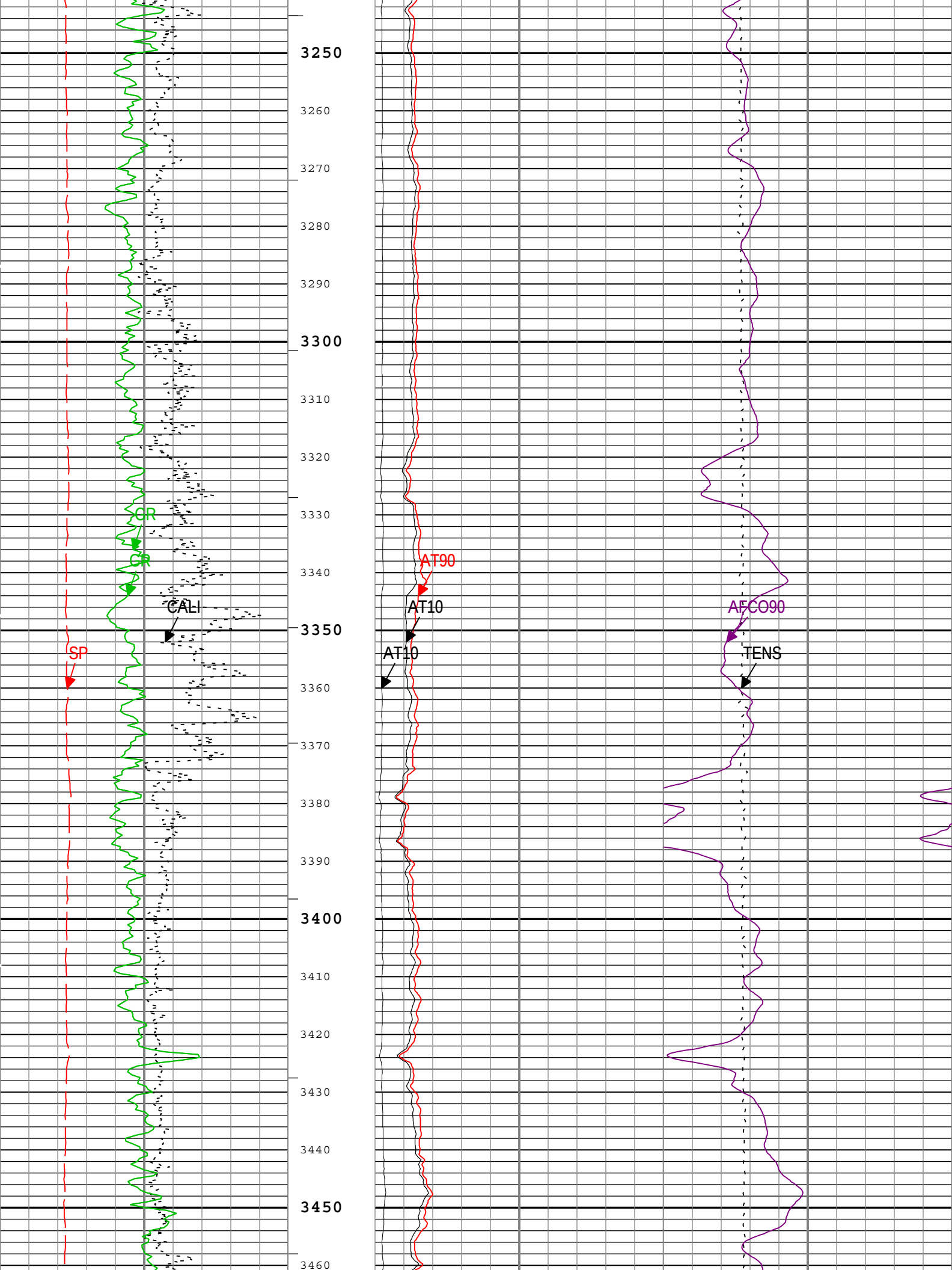
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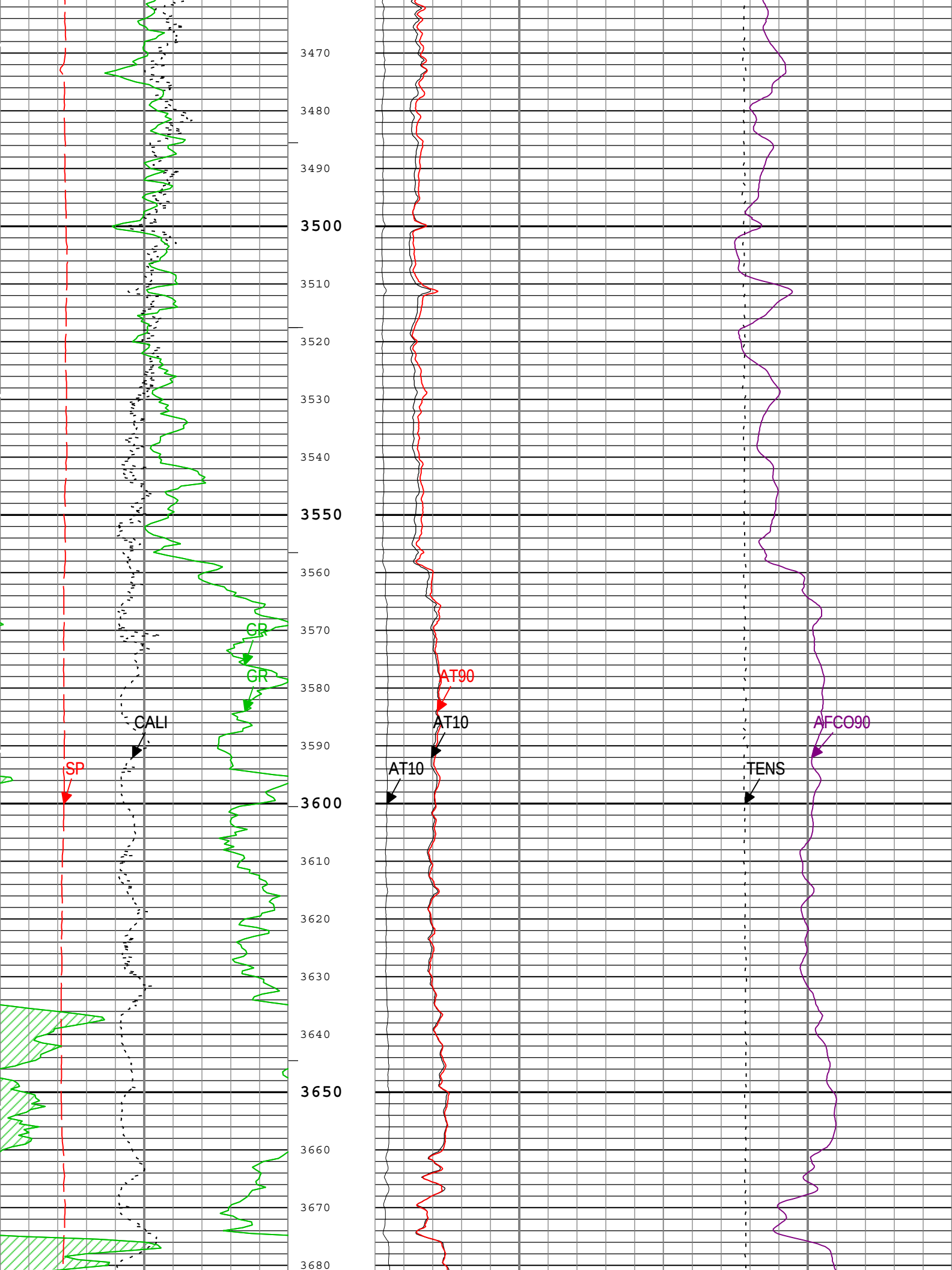
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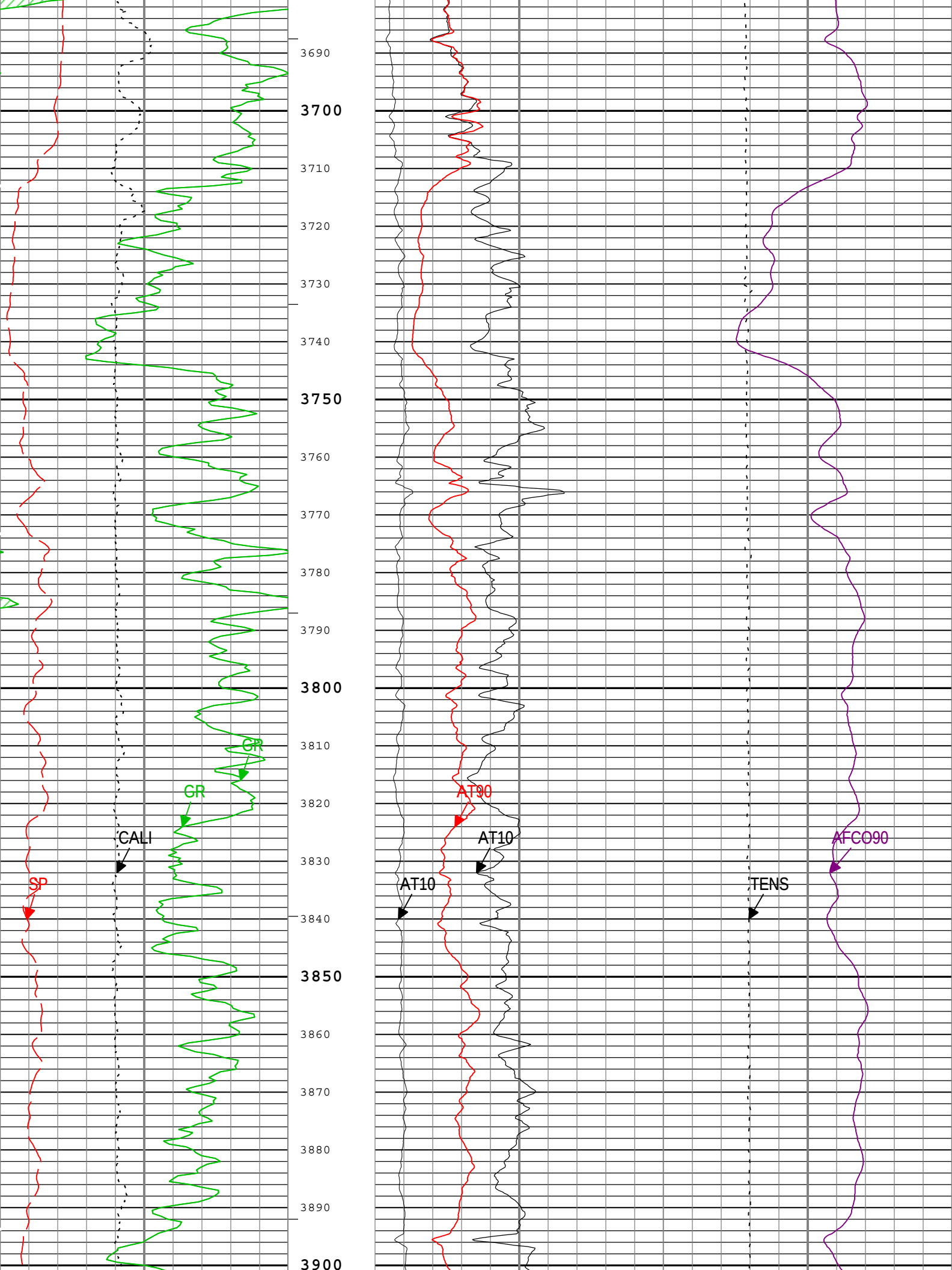
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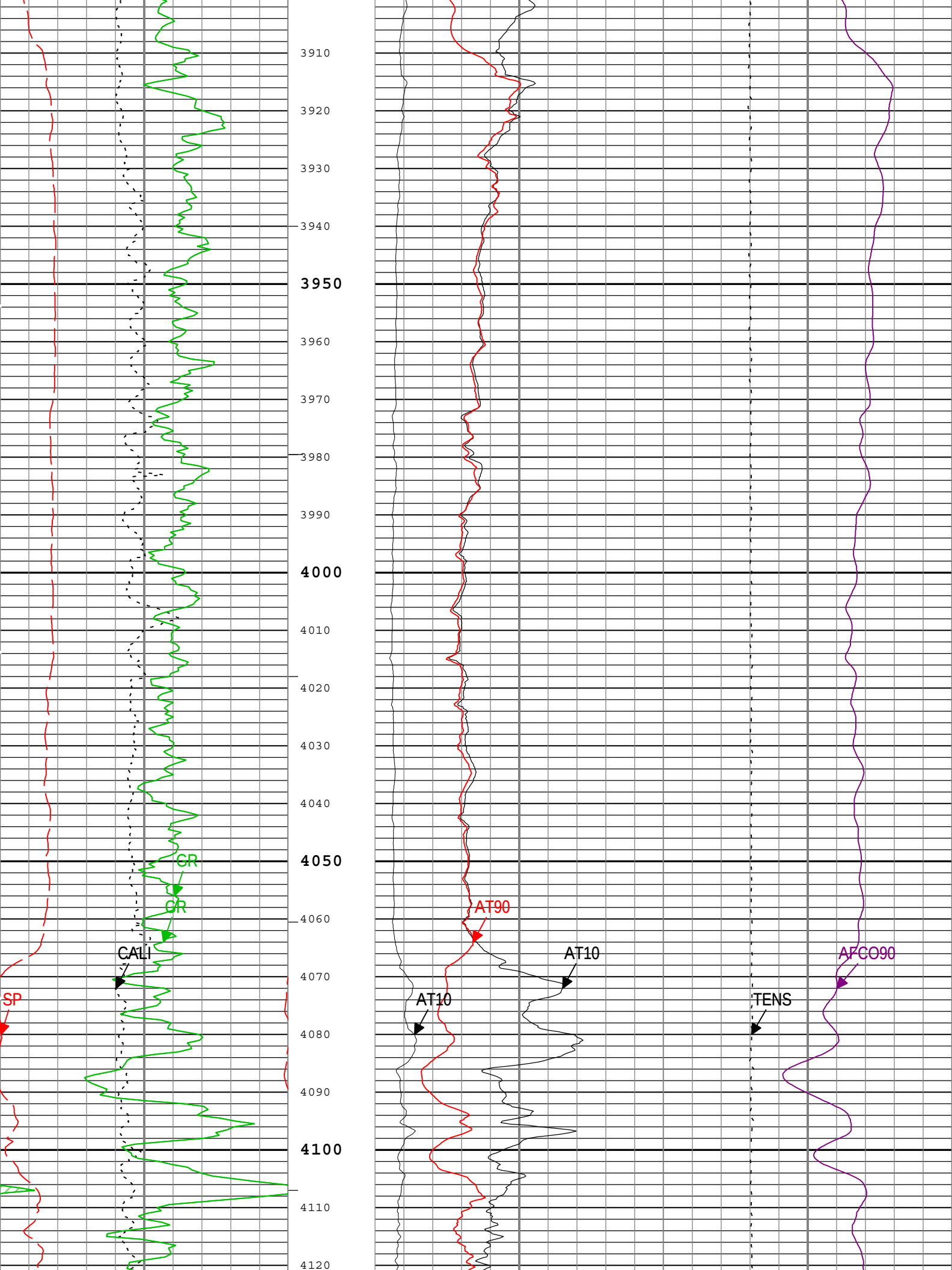
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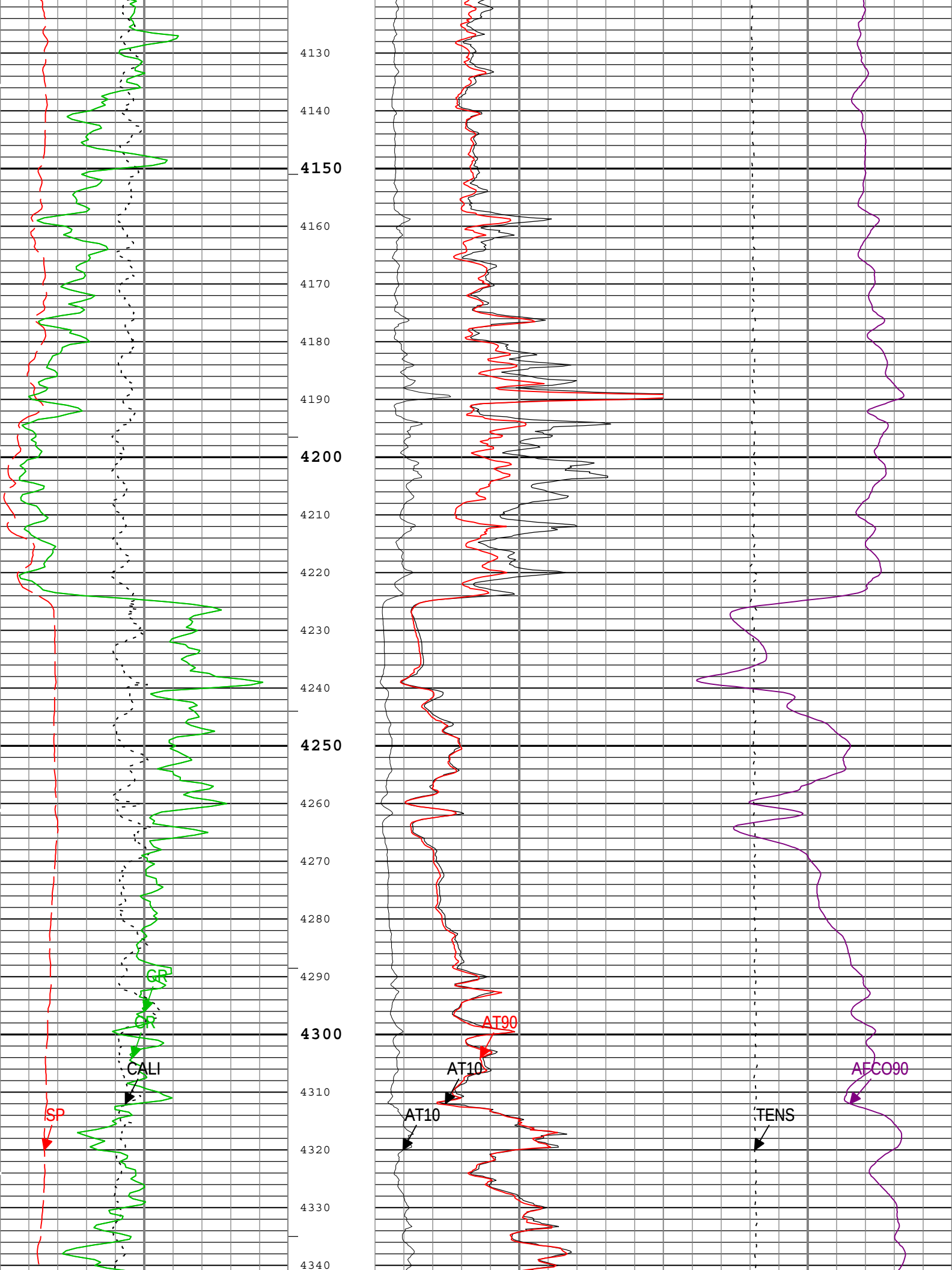
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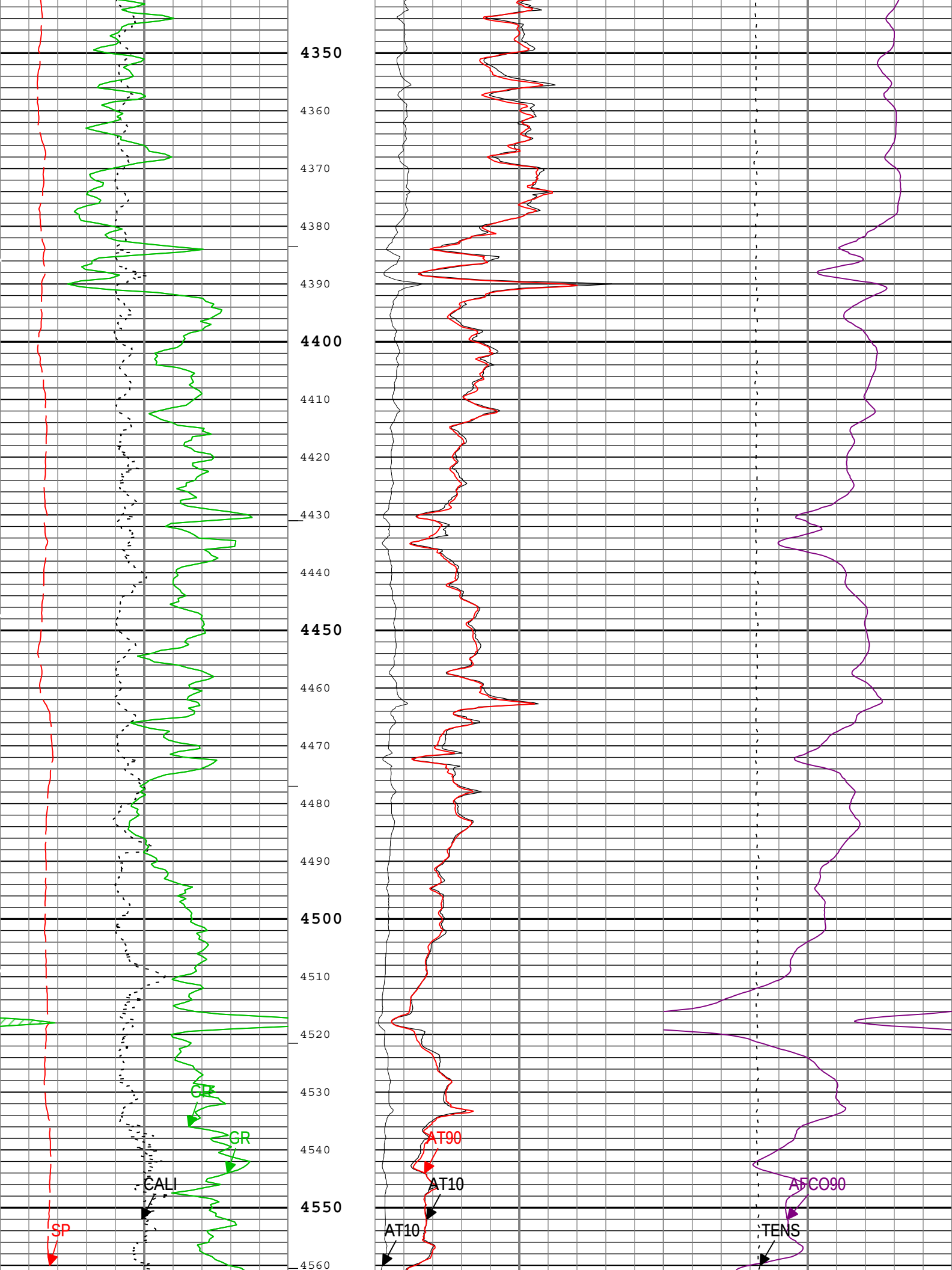
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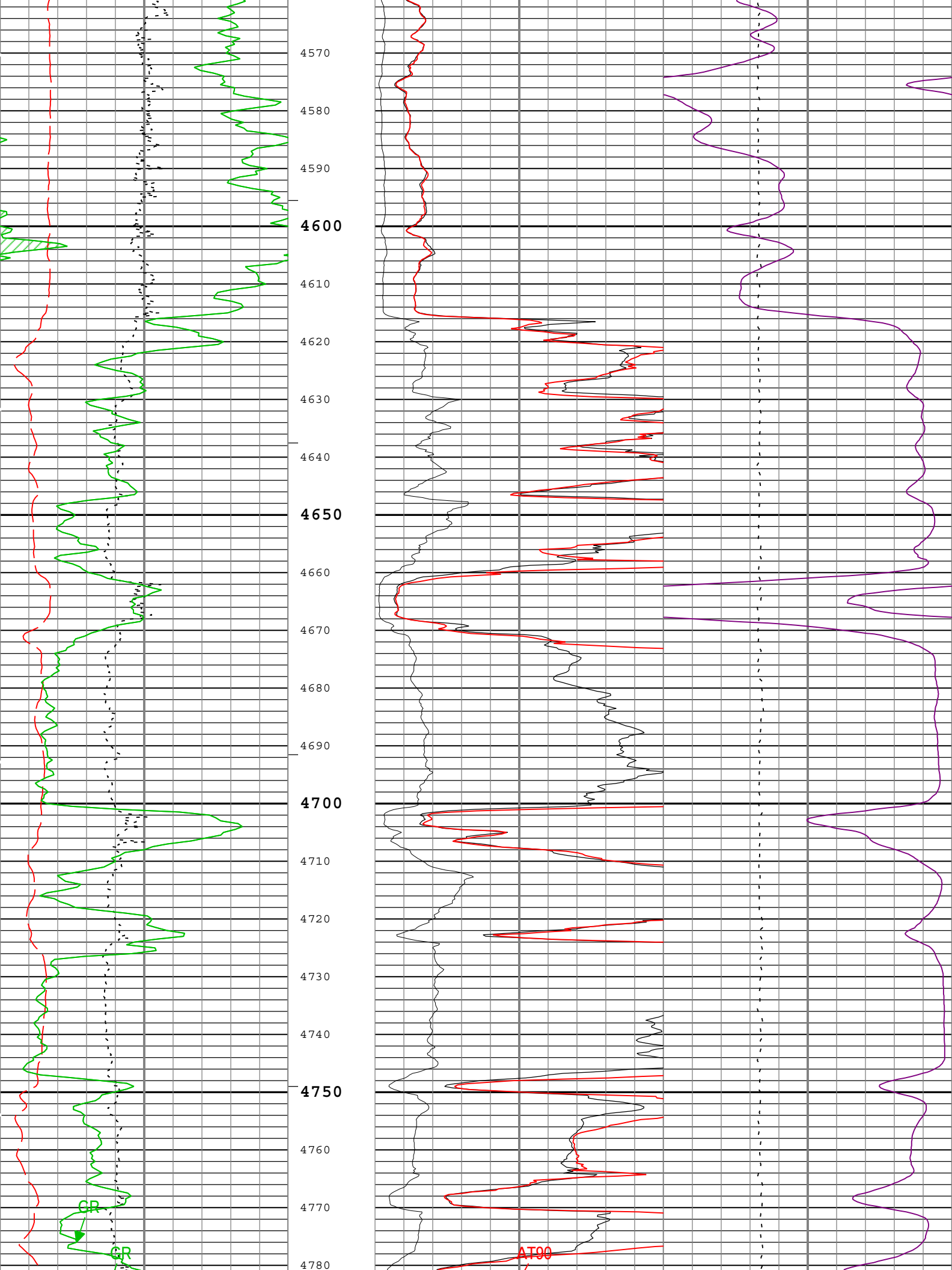
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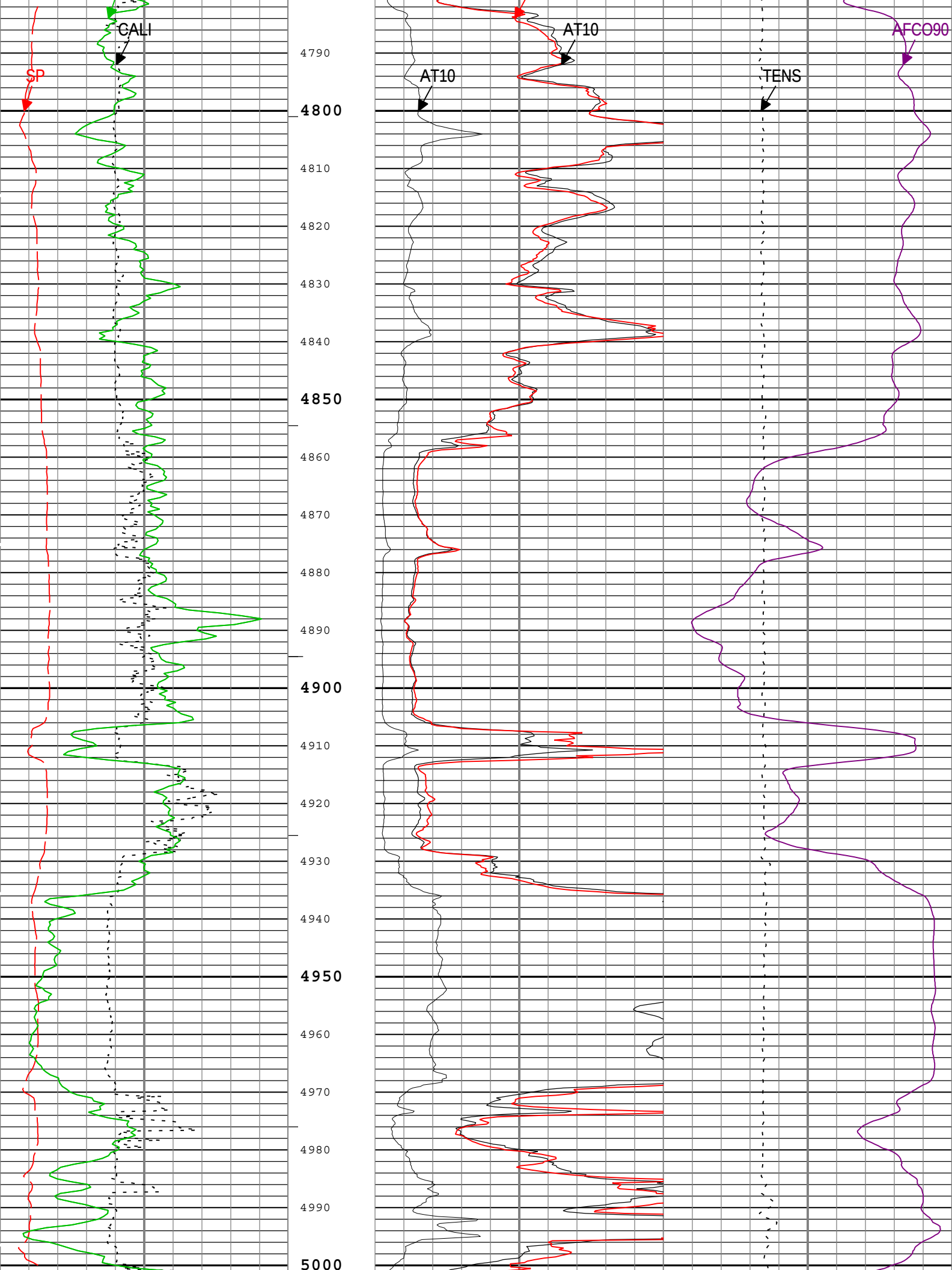
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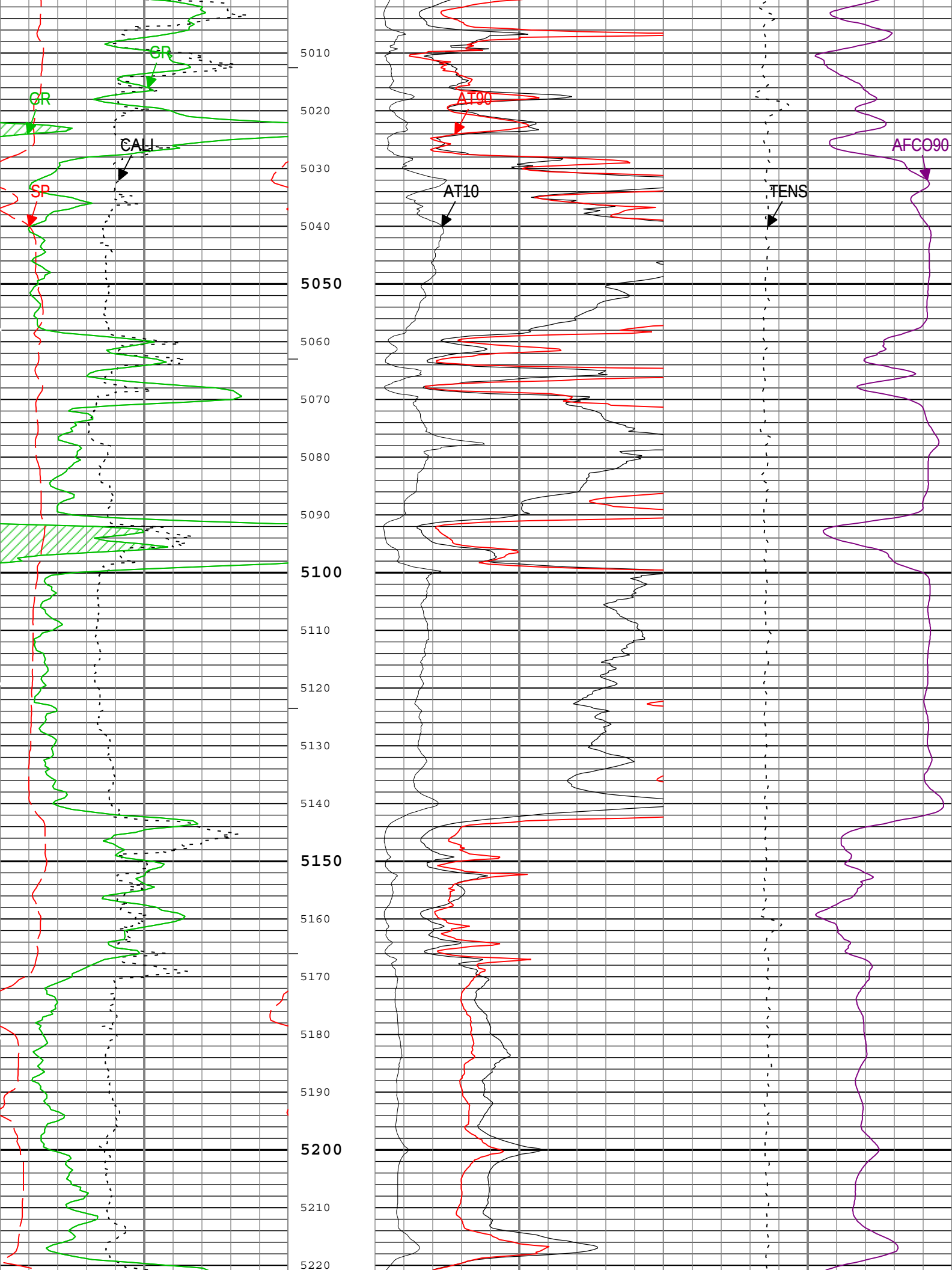
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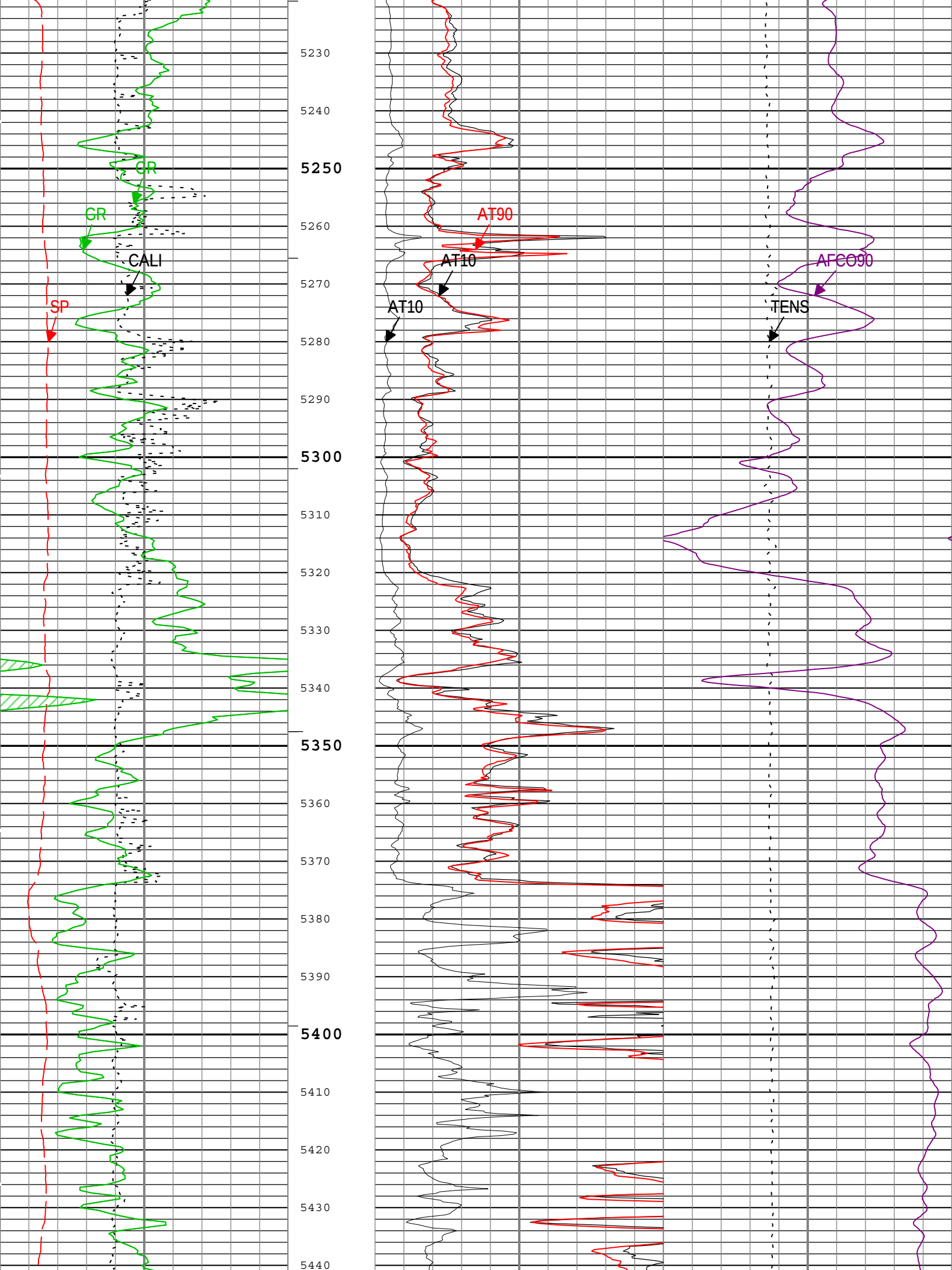
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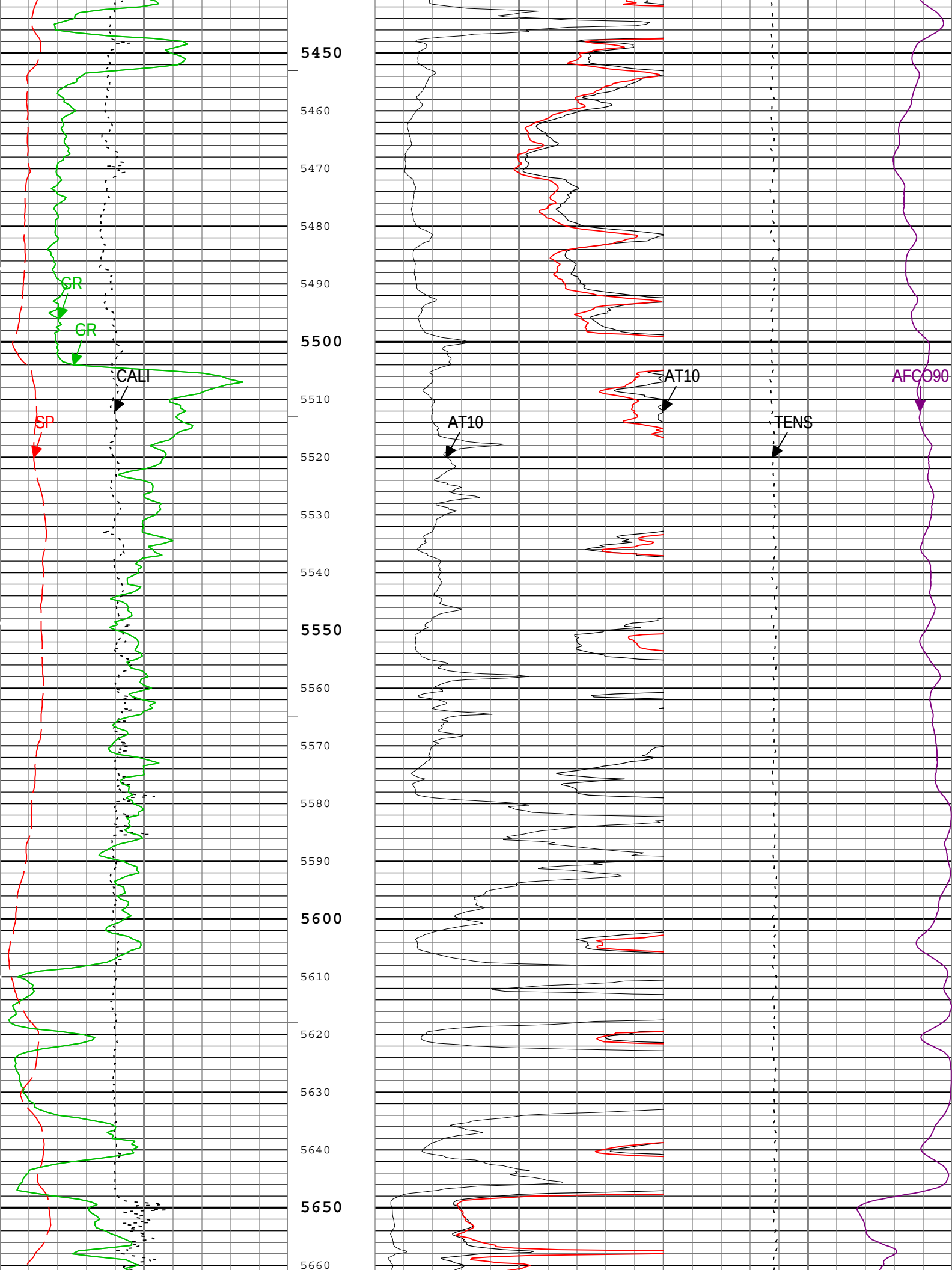
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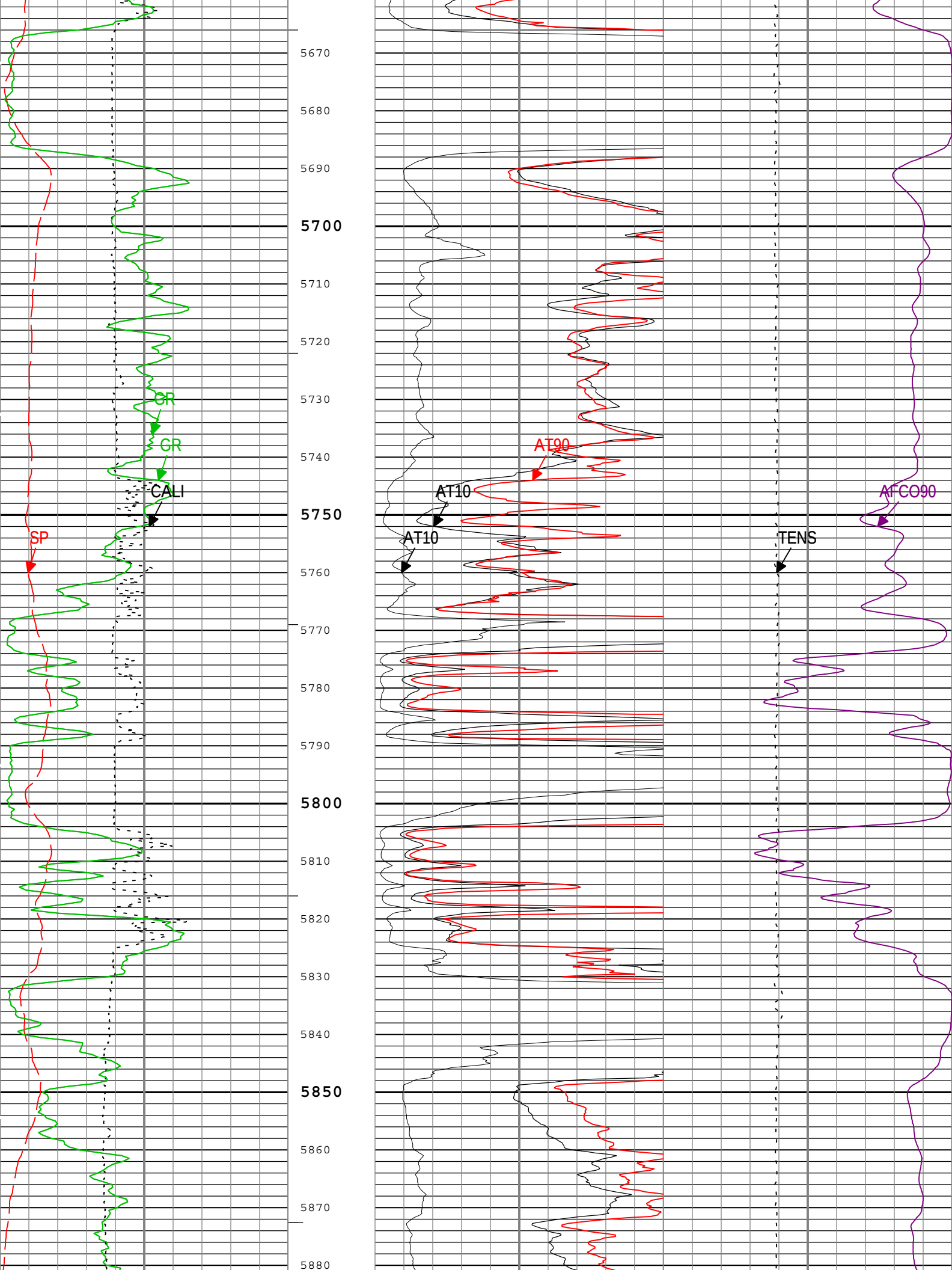
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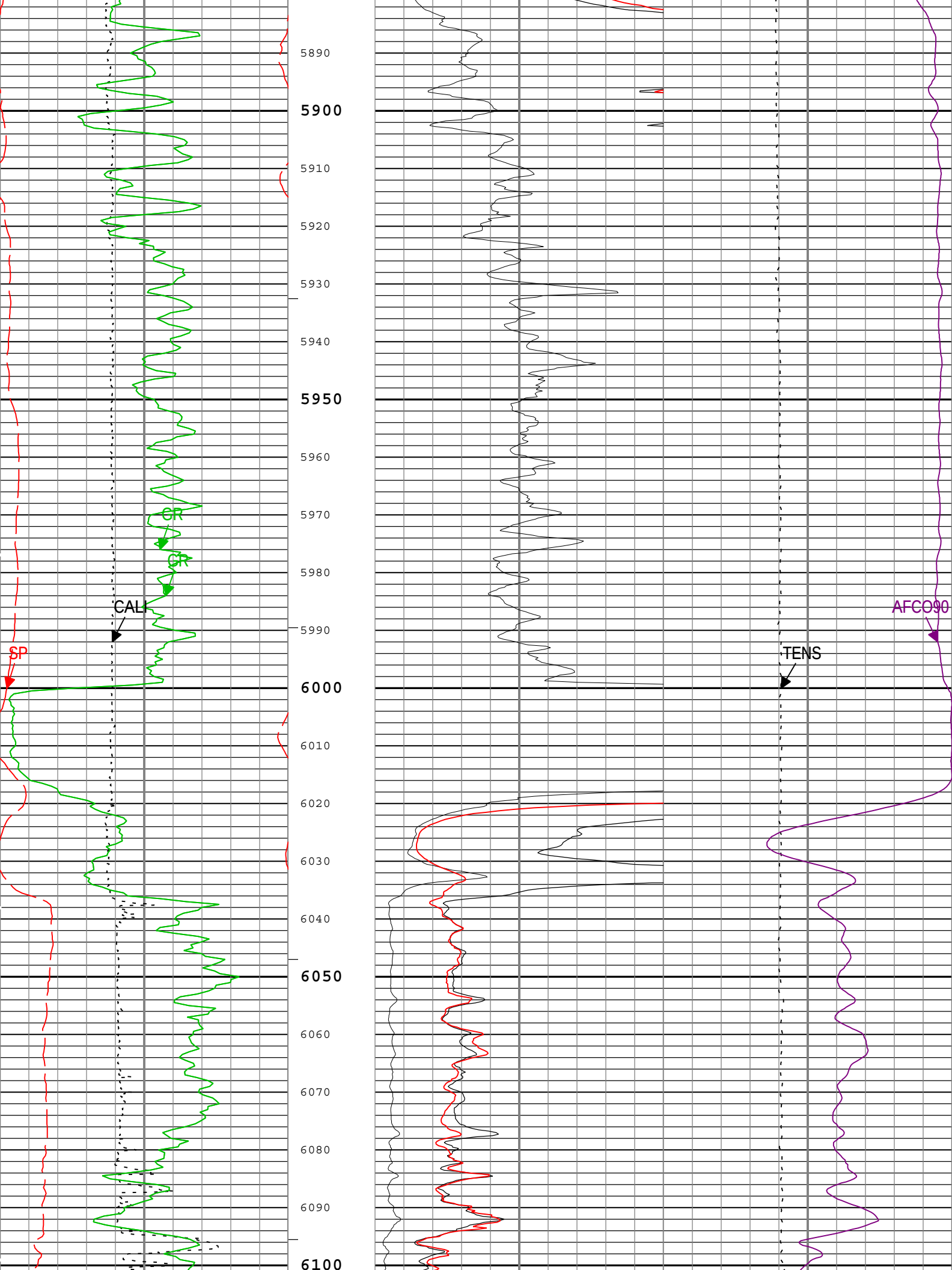
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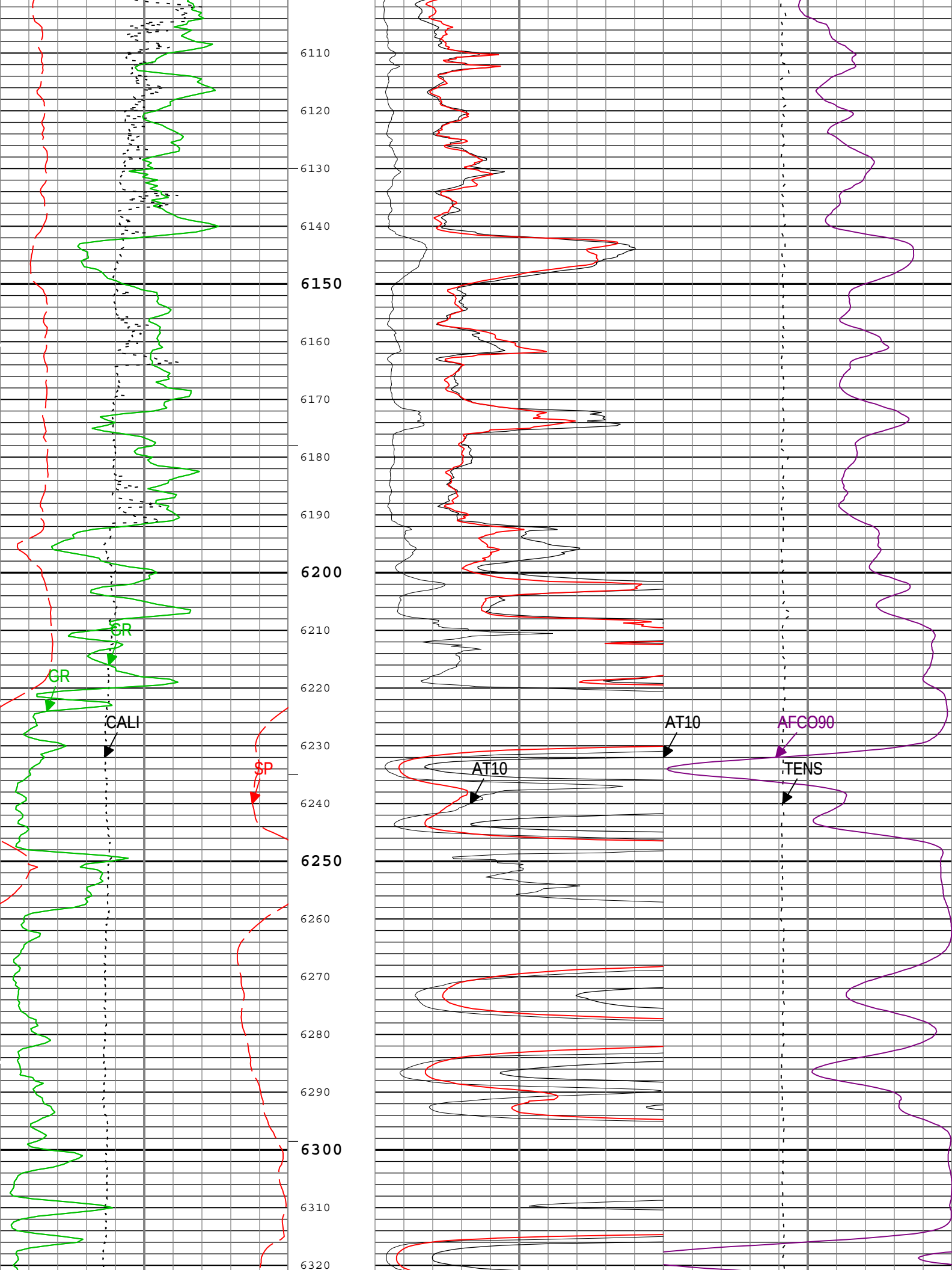
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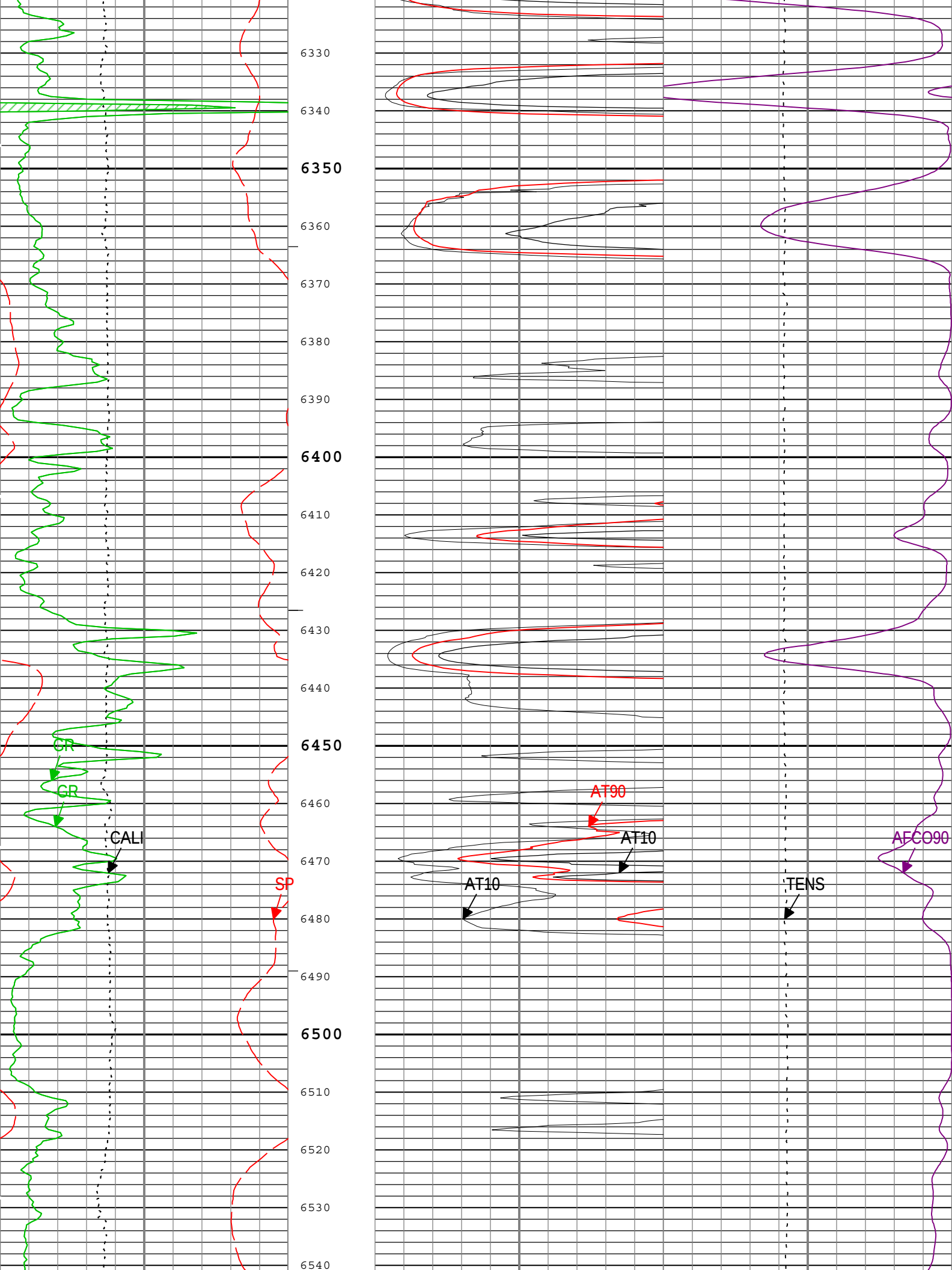
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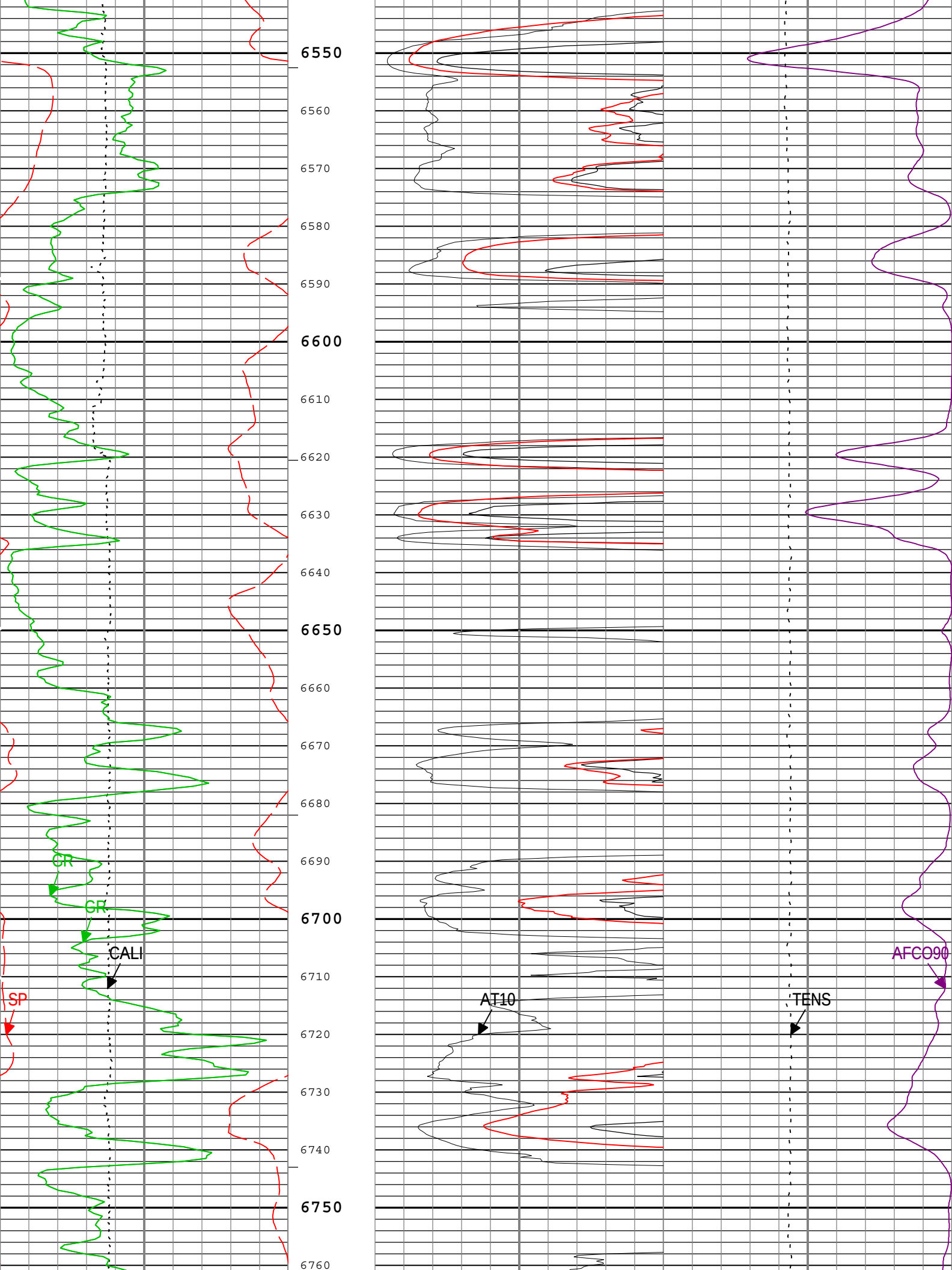
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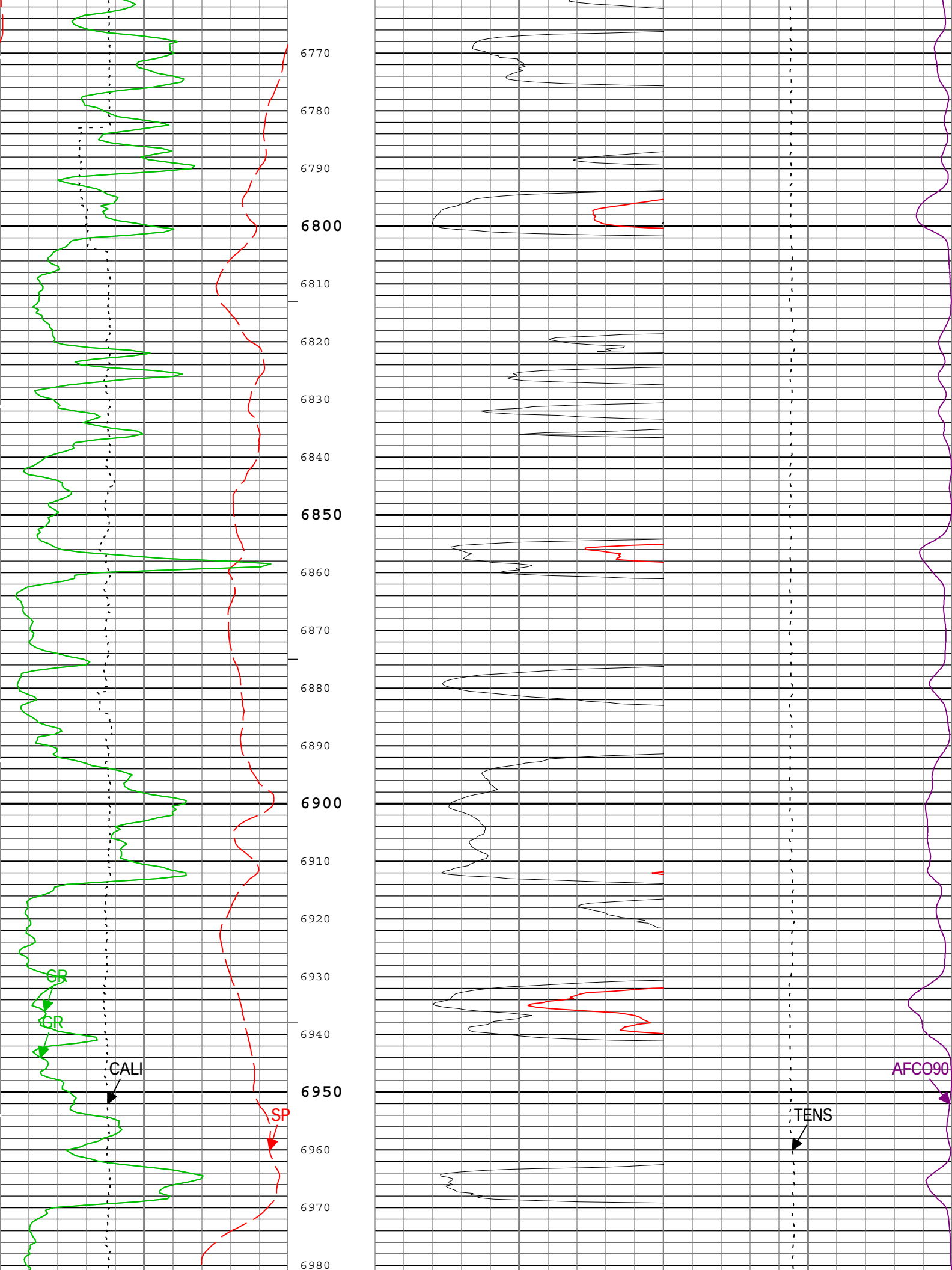
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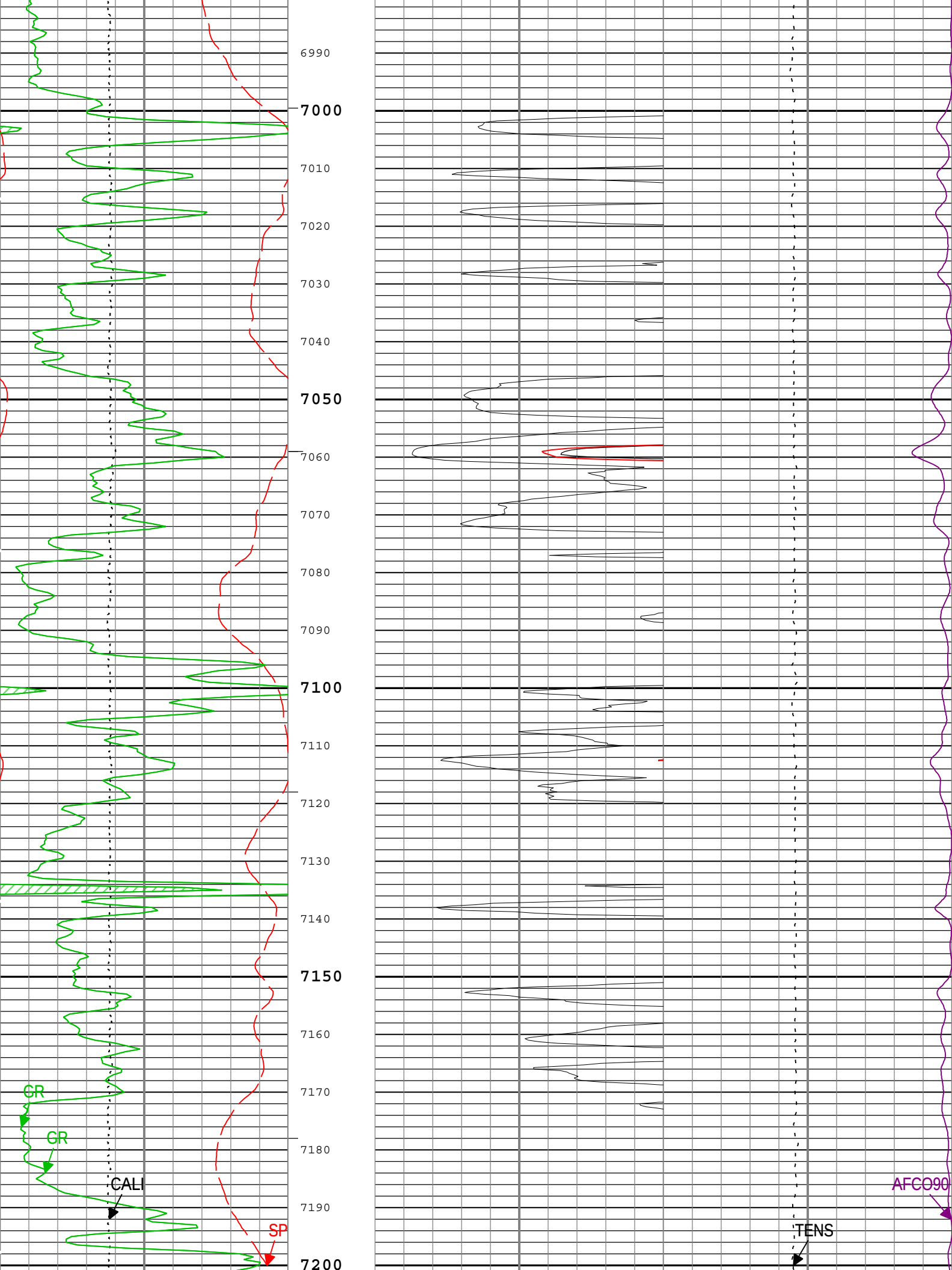
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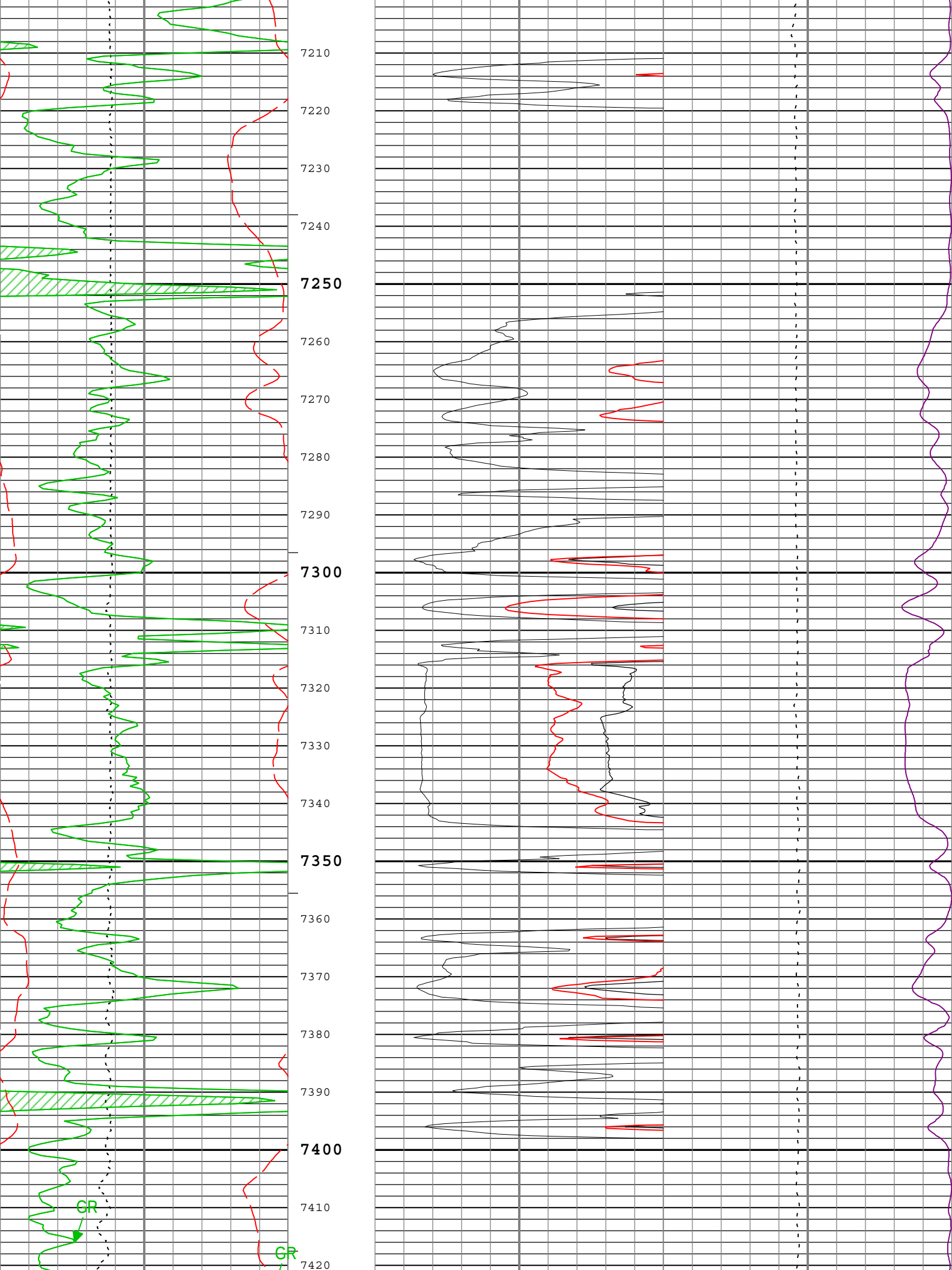
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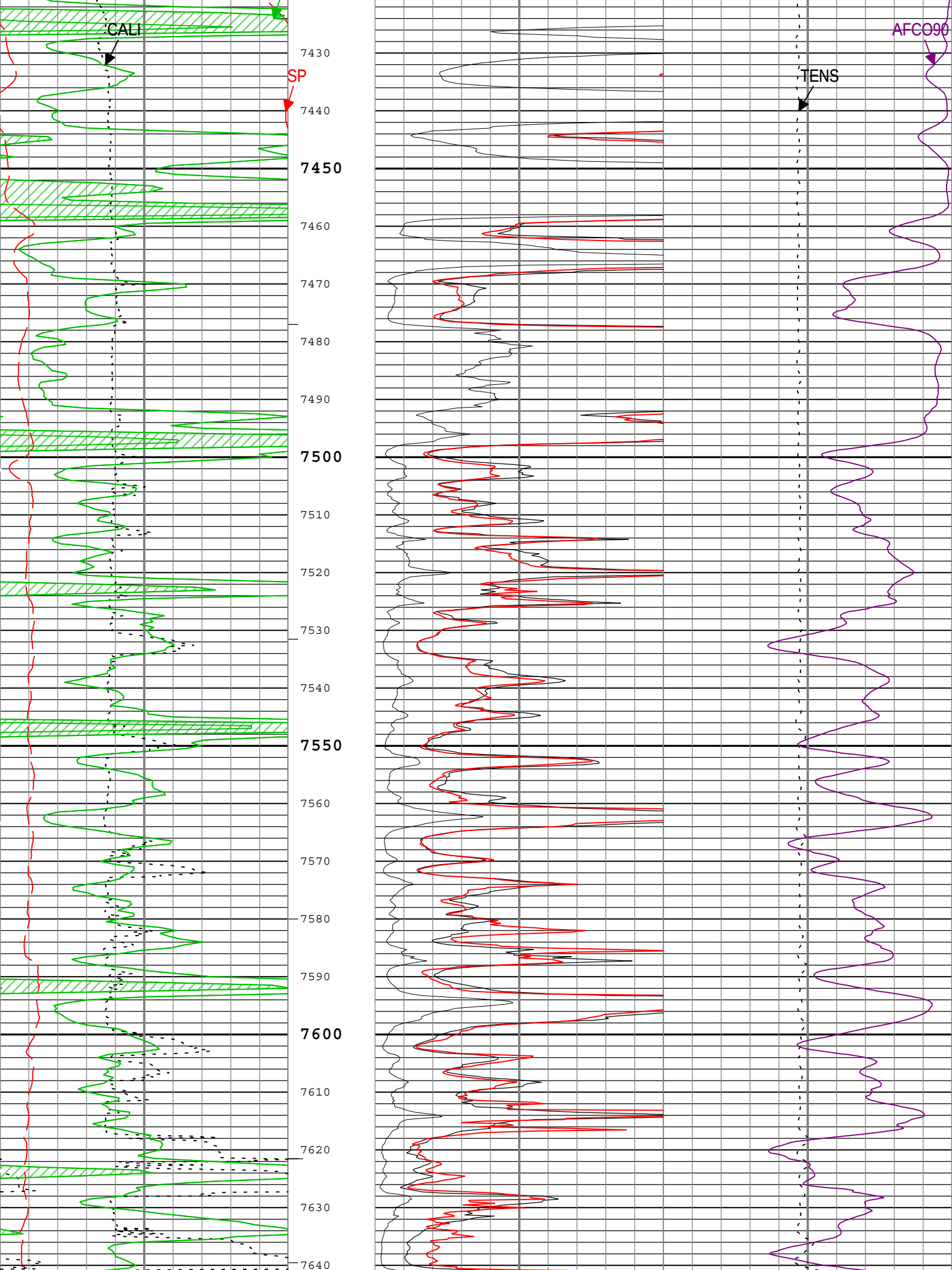
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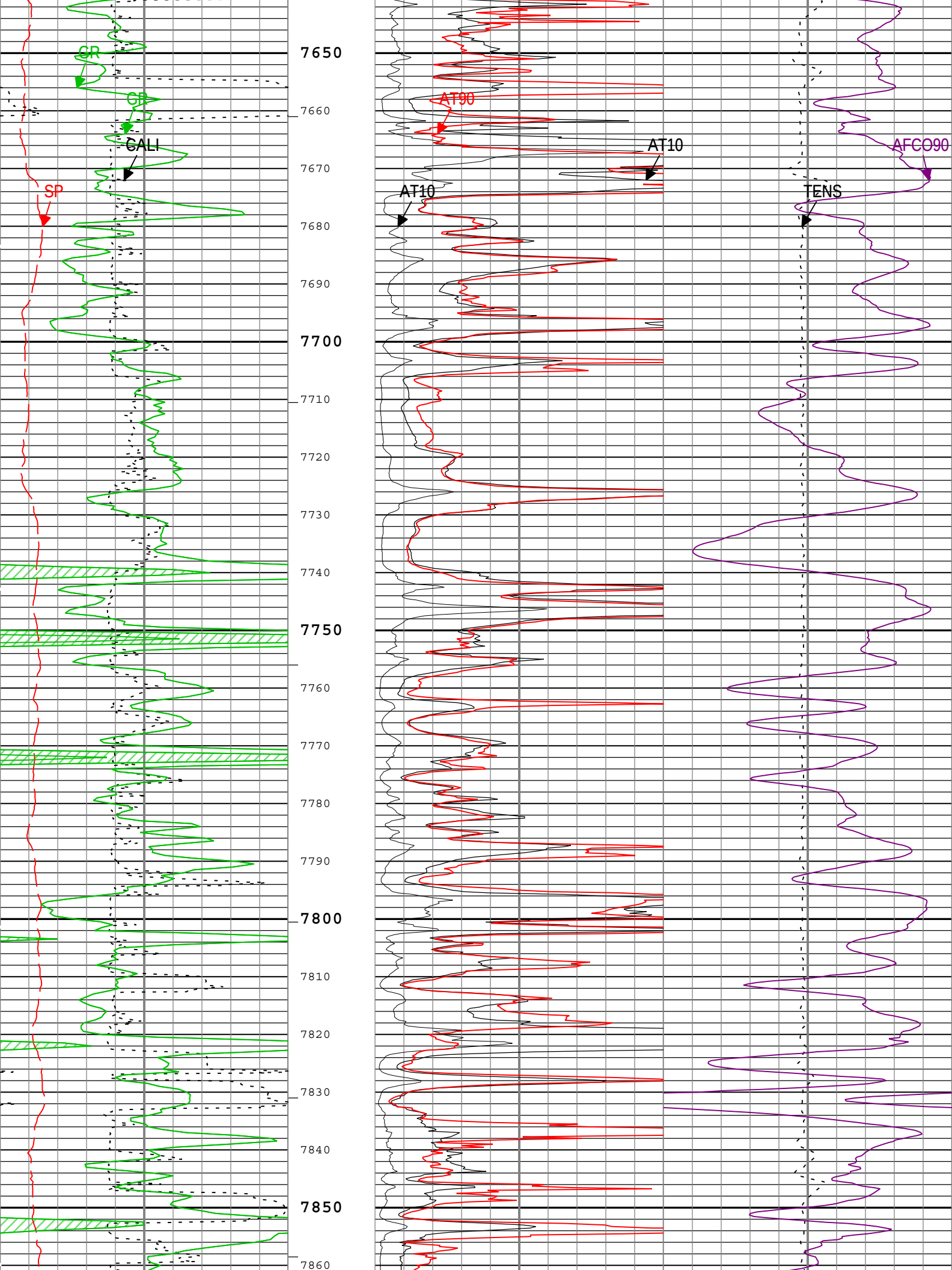
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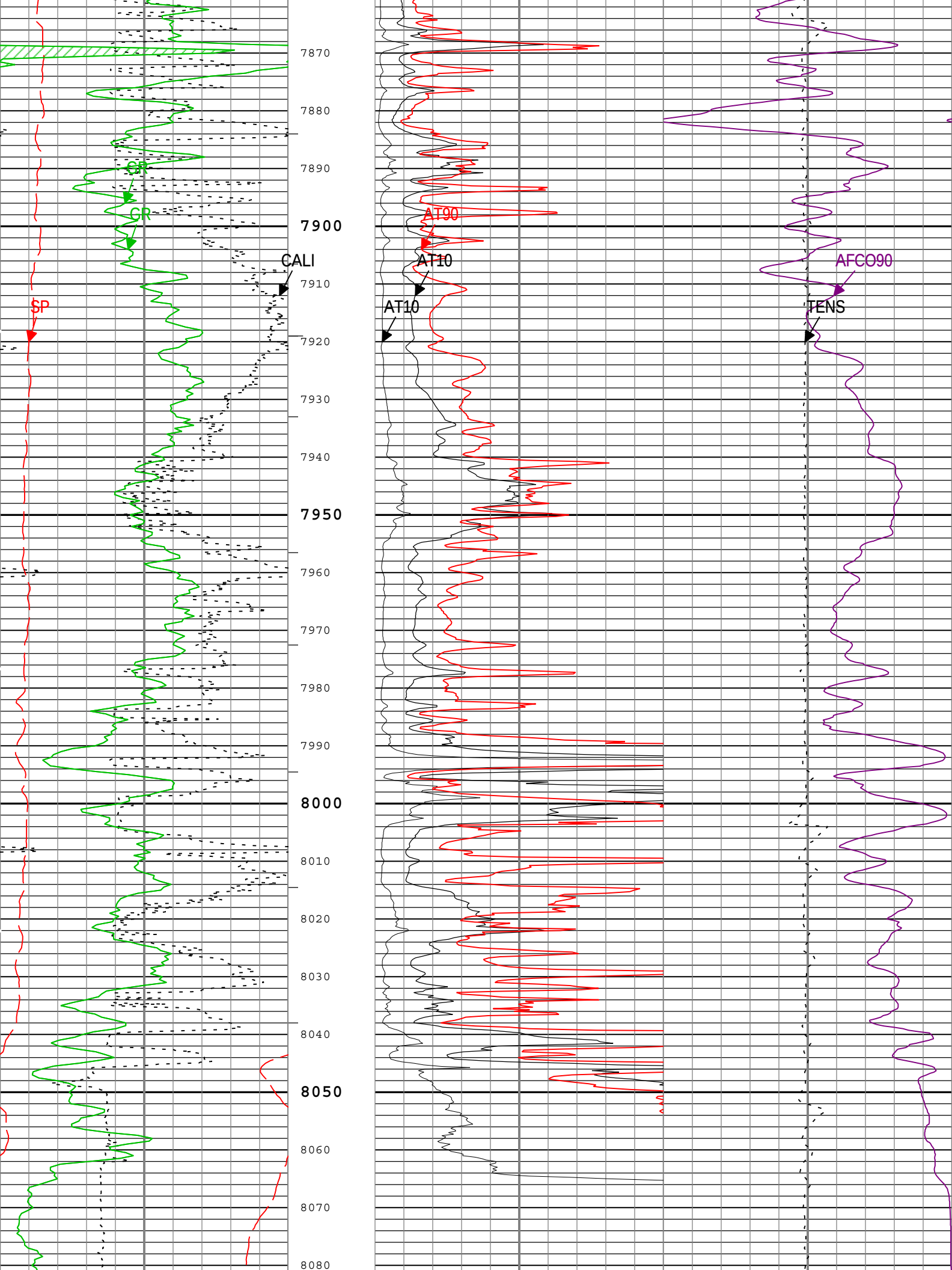
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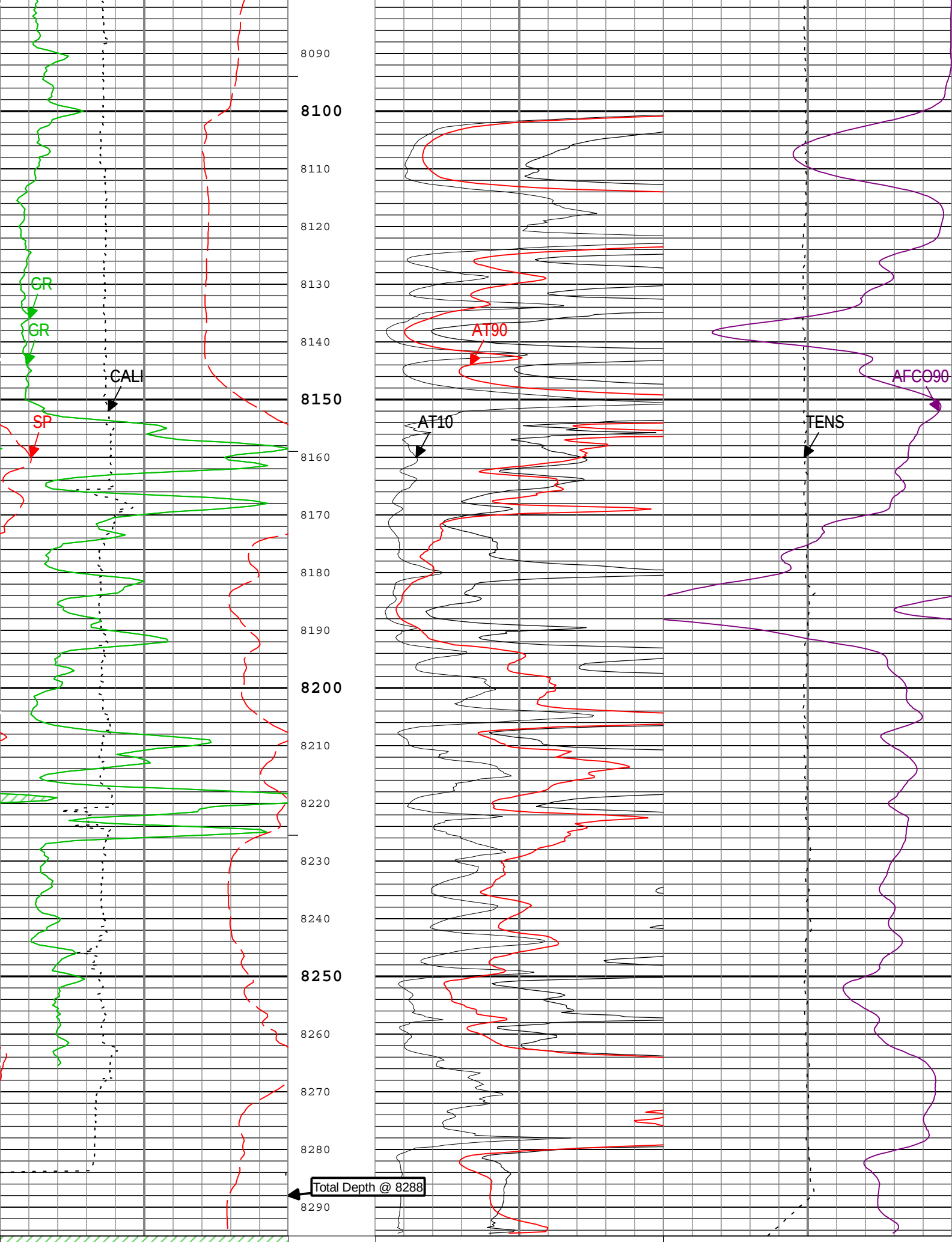
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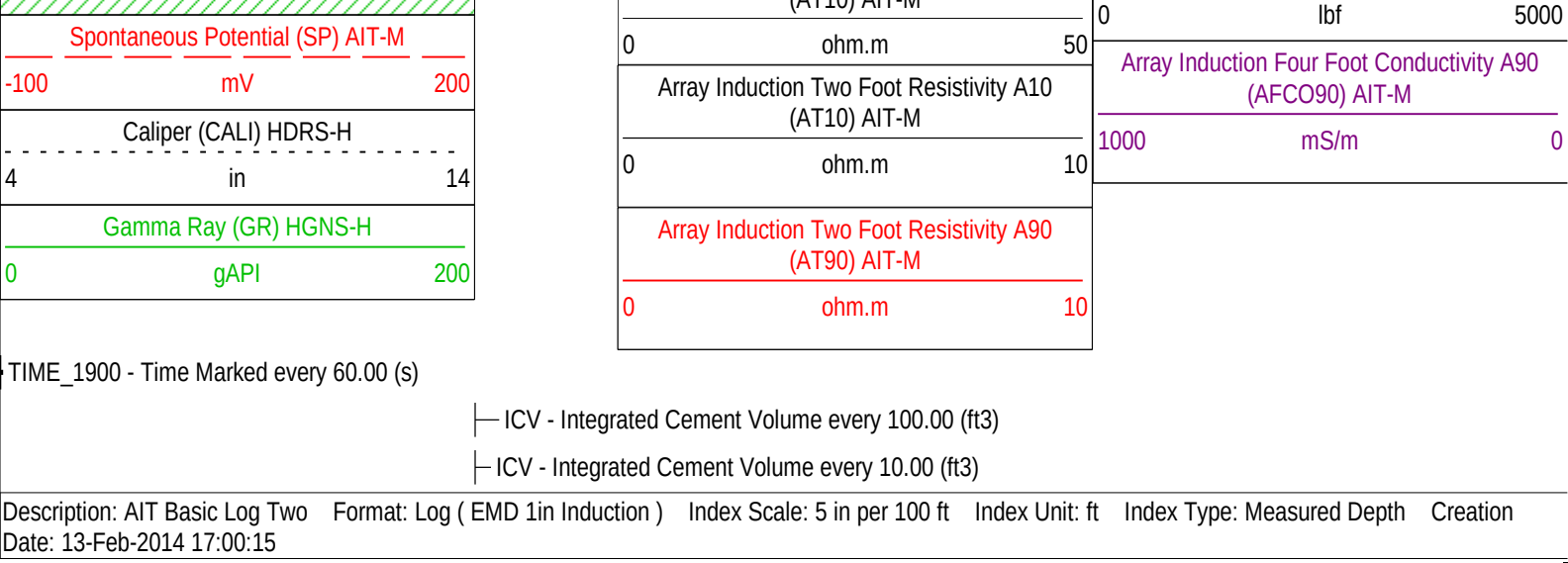
Total Depth @ 8288
Gamma Ray Backup
Array Induction Two Foot Resistivity A10
(AT10) AIT-M
Cable Tension (TENS)



Description: AIT Basic Log Two Format: Log (EMD 1in Induction) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:15

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
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	350	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
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	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

1

2" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1903.3	ft3

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_13393-4.0.9163.3001

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	4.0.9213.3000

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	4.0.9231.3000	2.0

HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9231.3000	2.0
AMIS	Array Induction Sonde - M	4.0.9247.3000	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Main[3]:Up	Up	14.54 ft	8302.86 ft	13-Feb-2014 2:29:40 PM	13-Feb-2014 4:59:53 PM	ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Nighthawk Production LLC Well:Big Sky 5-11

1: Main[3]:Up:S006

Description: AIT Basic Log Two Format: Log (EMD 2in Induction) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:18

Channel	Source	Sampling
AFCO90	AIT-M:AMIS:AMIS	3in
AT10	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-100 mV 200

Caliper (CALI) HDRS-H

4 in 14

Gamma Ray (GR) HGNS-H

0 gAPI 200

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 10

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

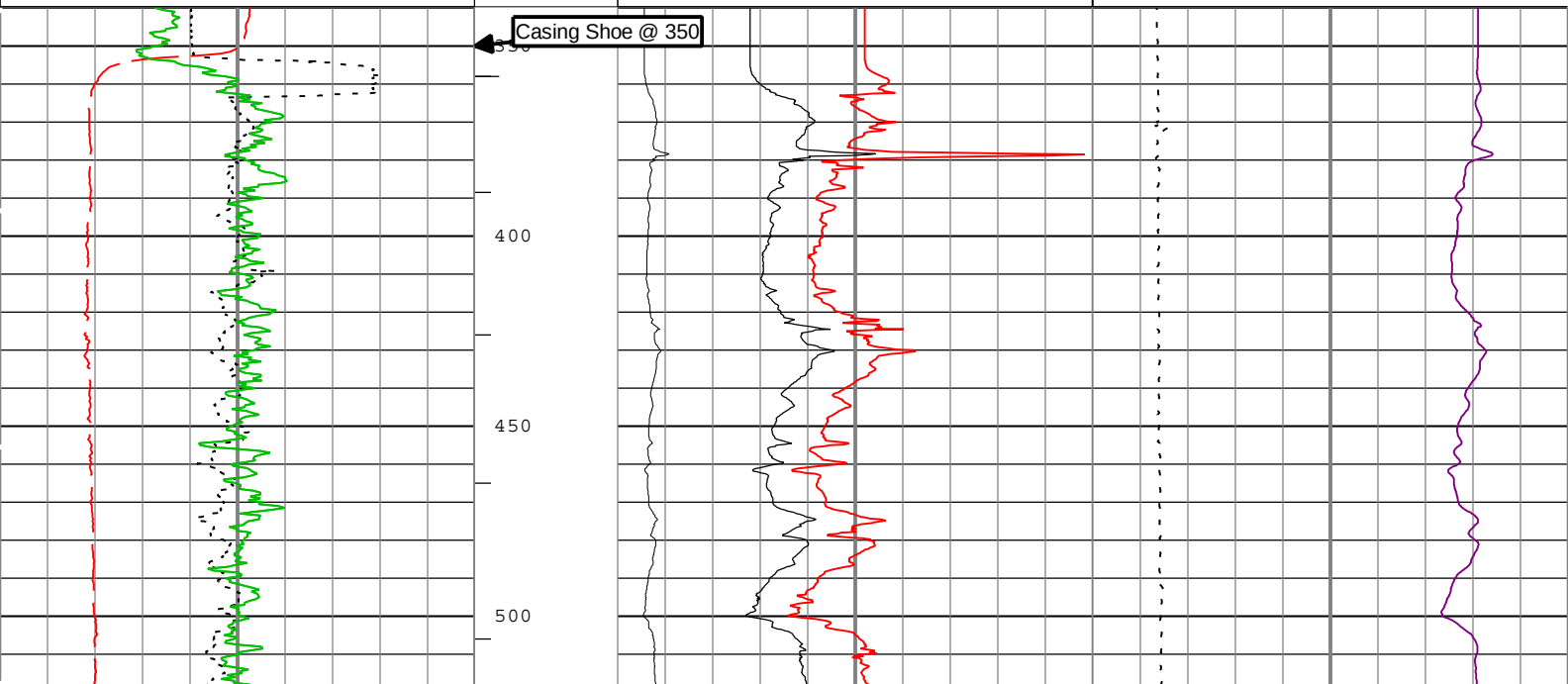
0 ohm.m 10

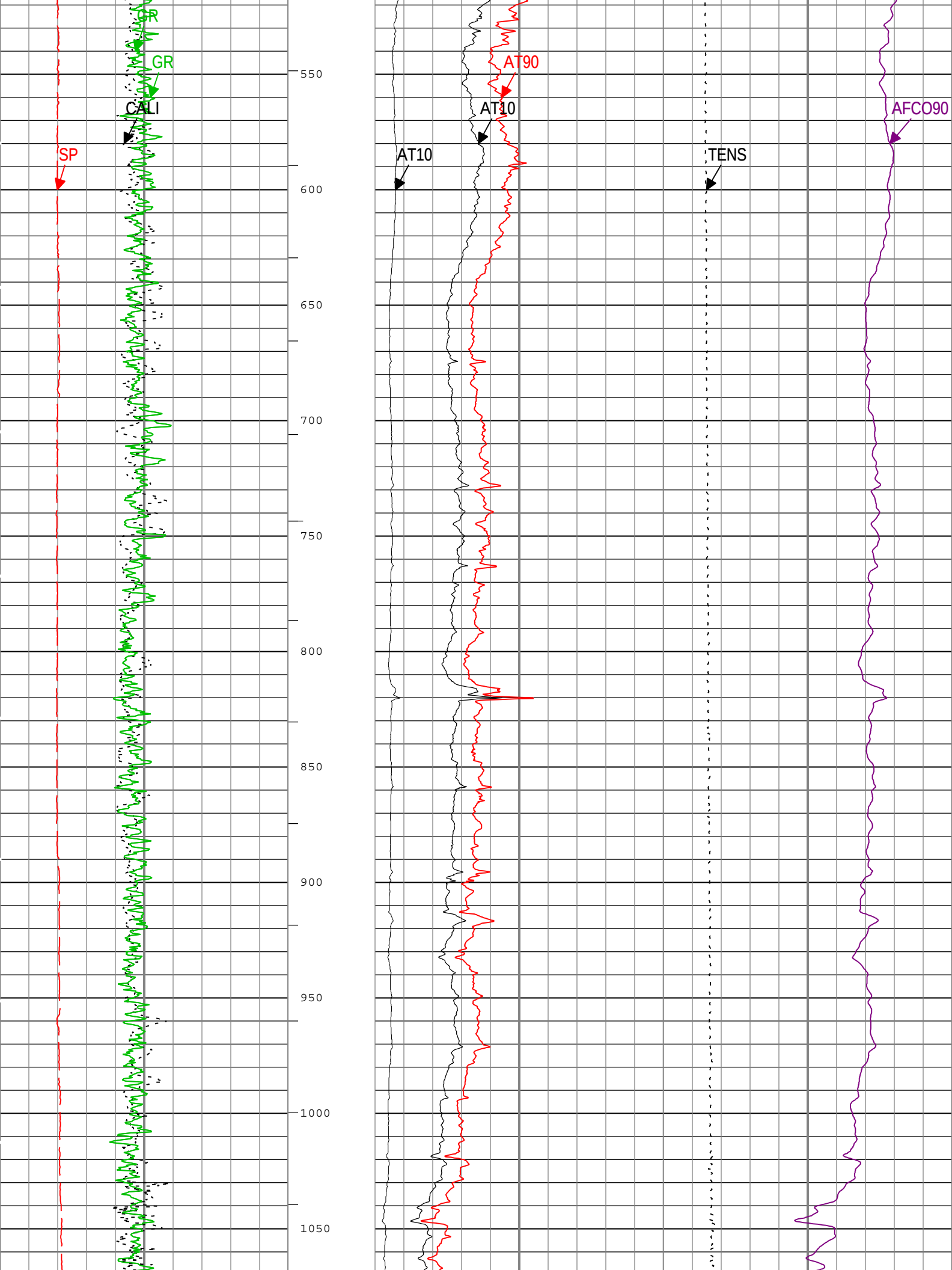
Cable Tension (TENS)

0 lbf 5000

Array Induction Four Foot Conductivity A90 (AFCO90) AIT-M

1000 mS/m 0

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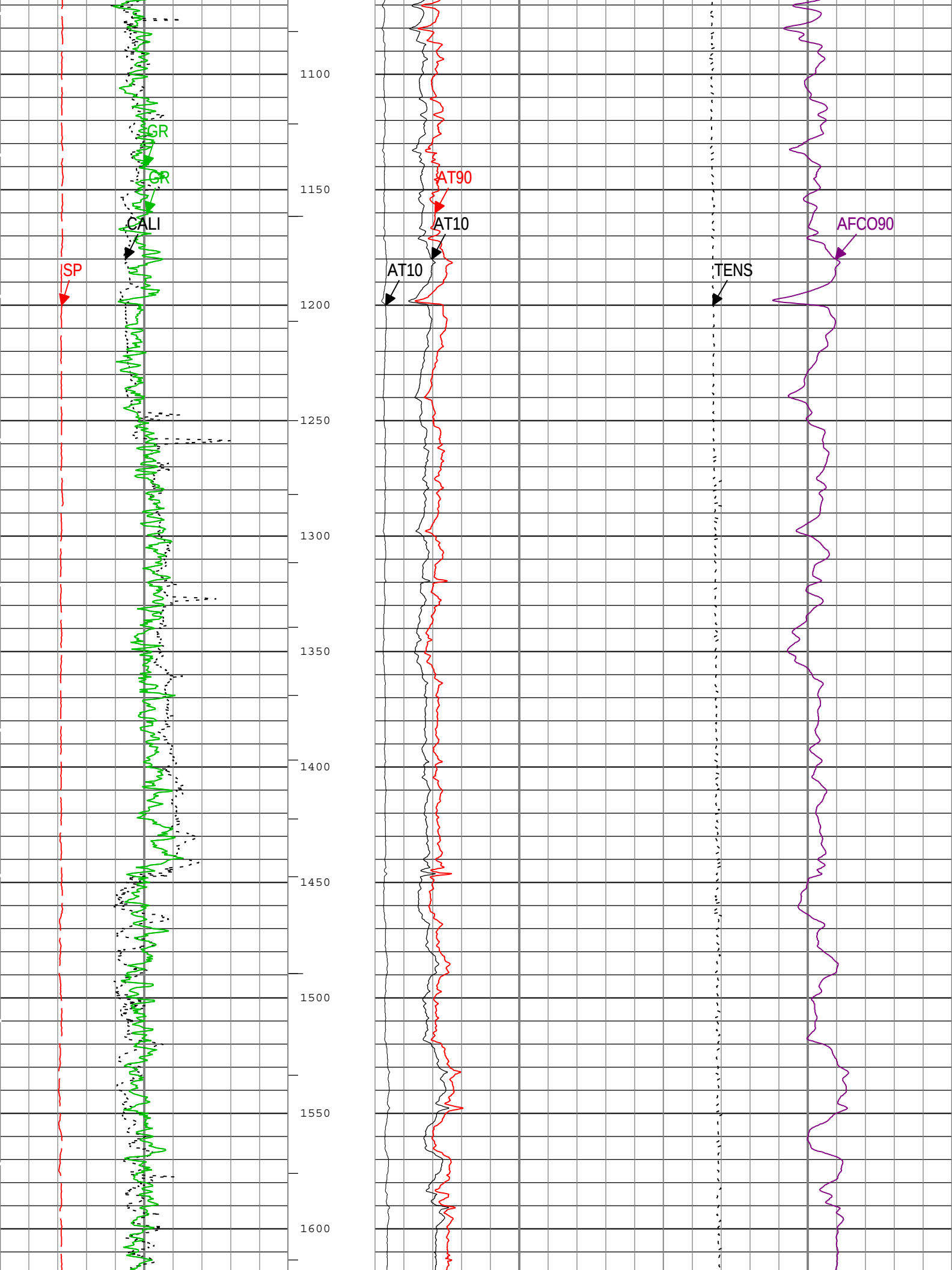
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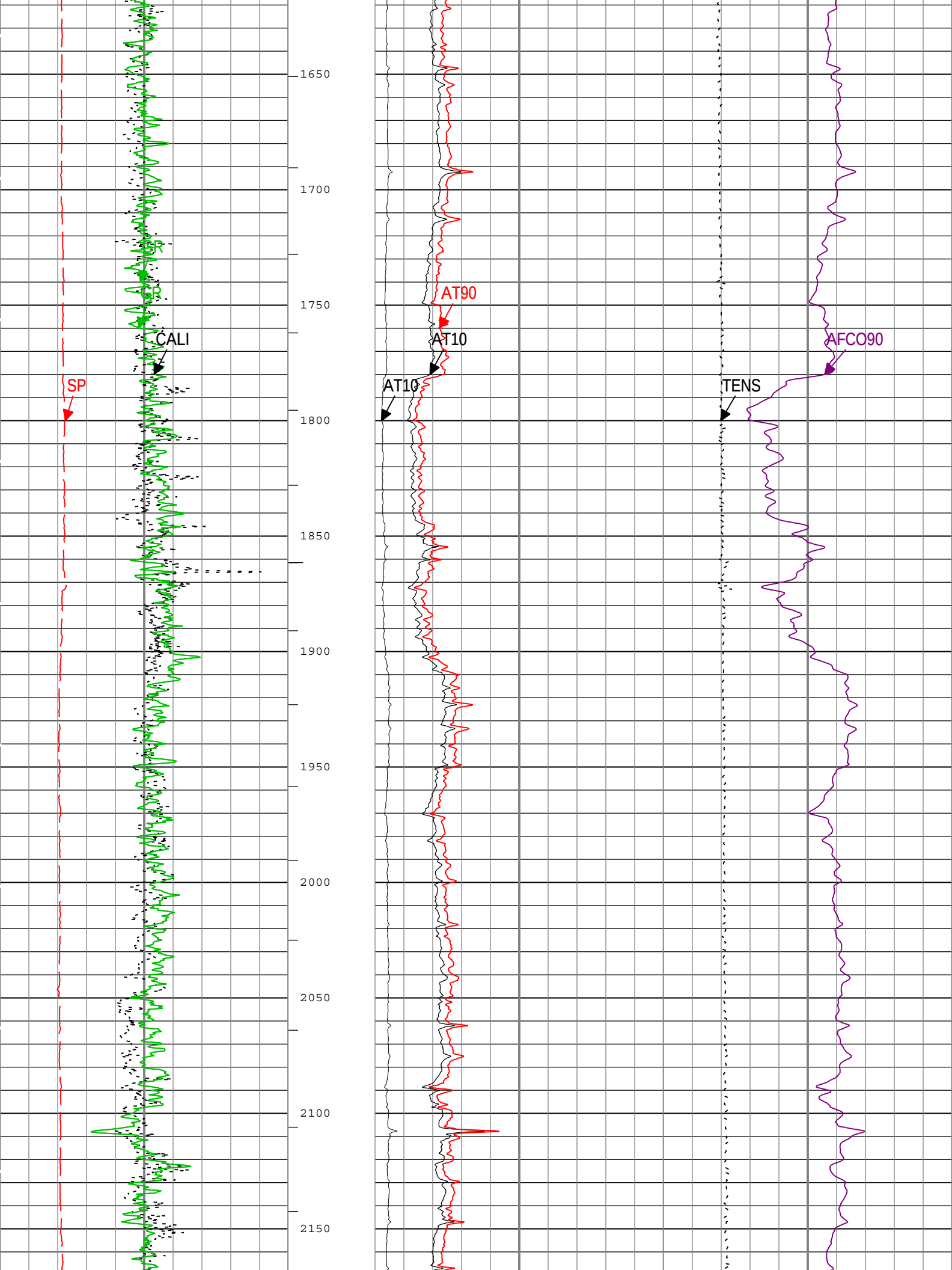
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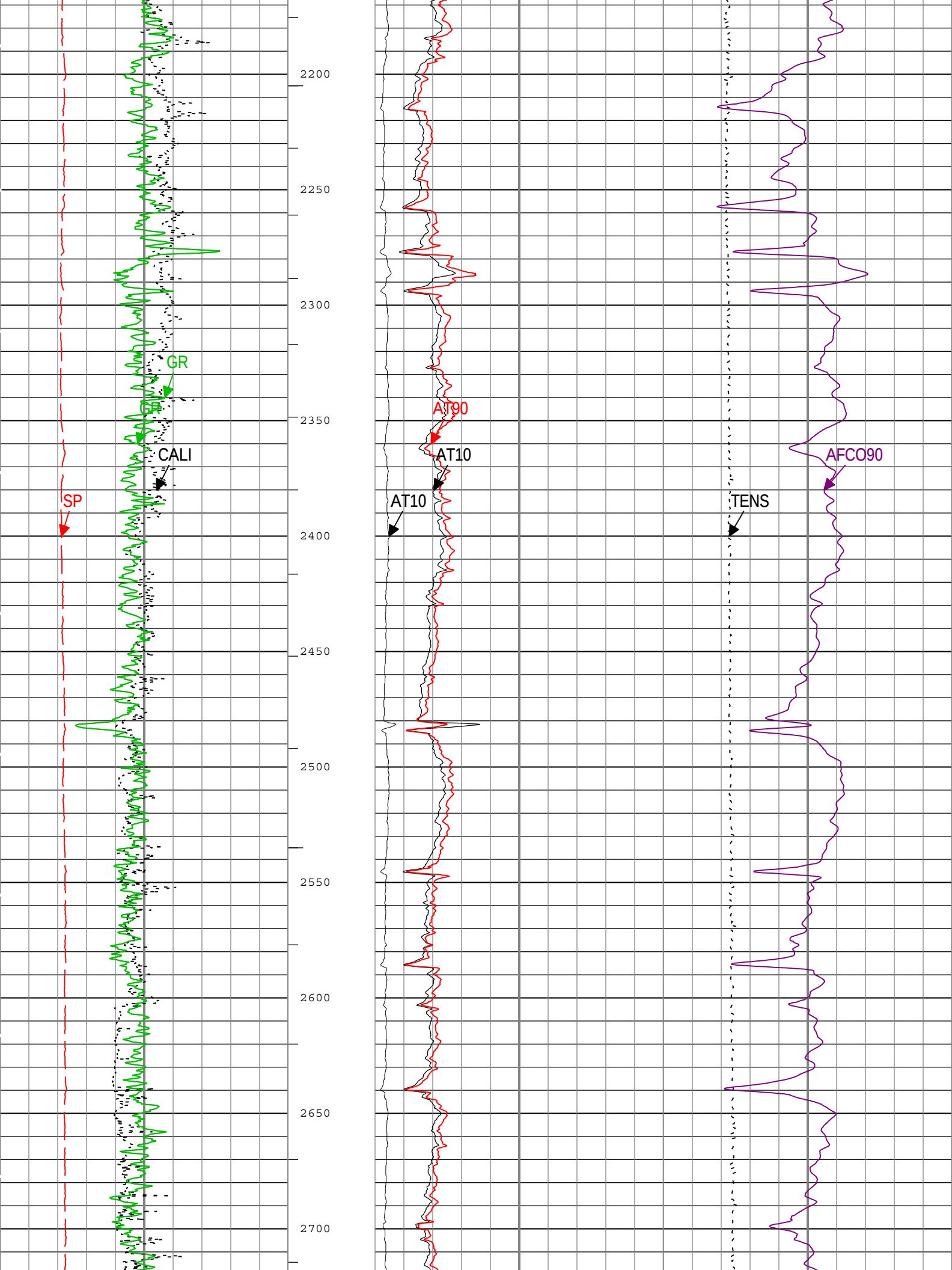
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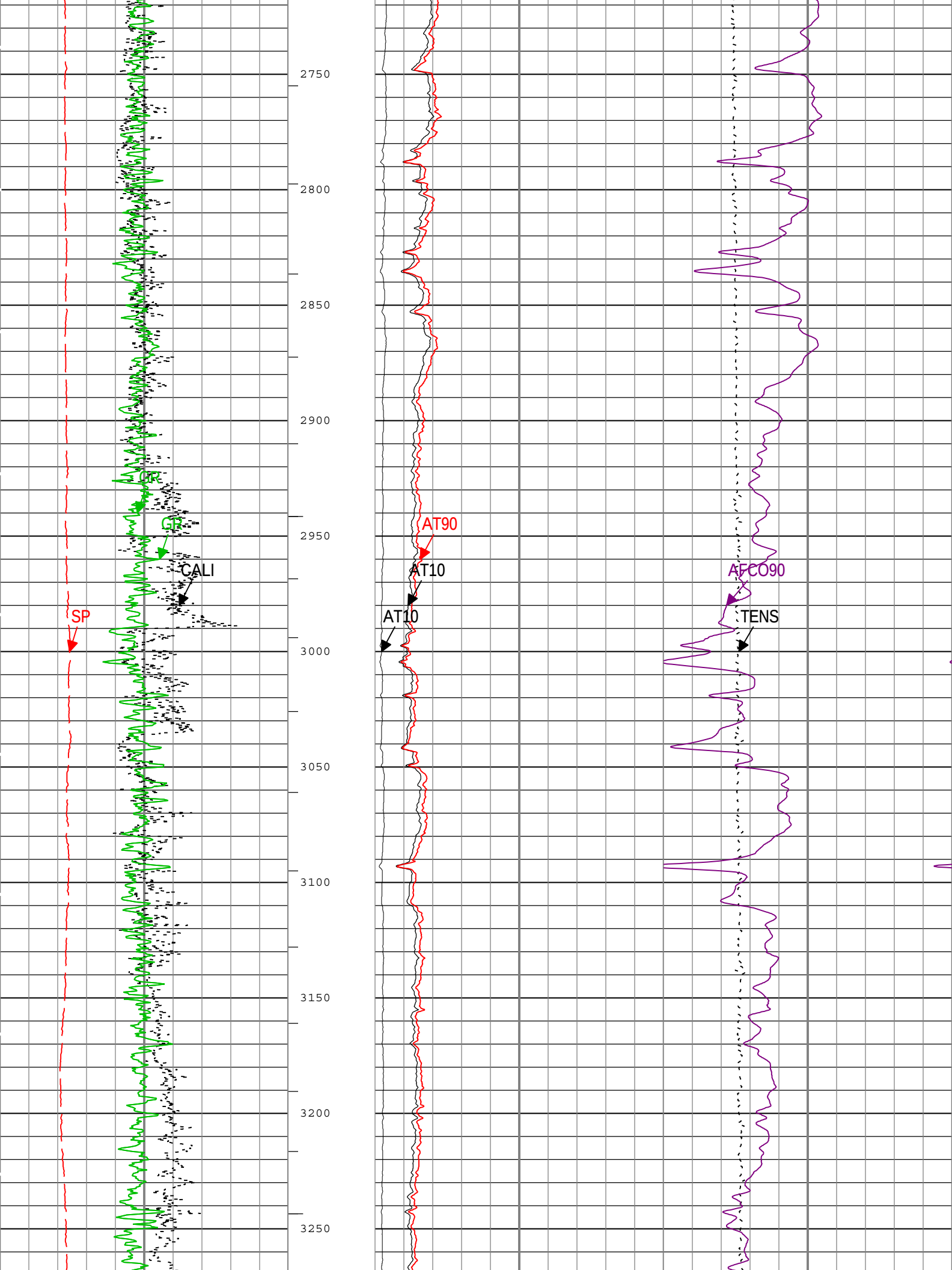
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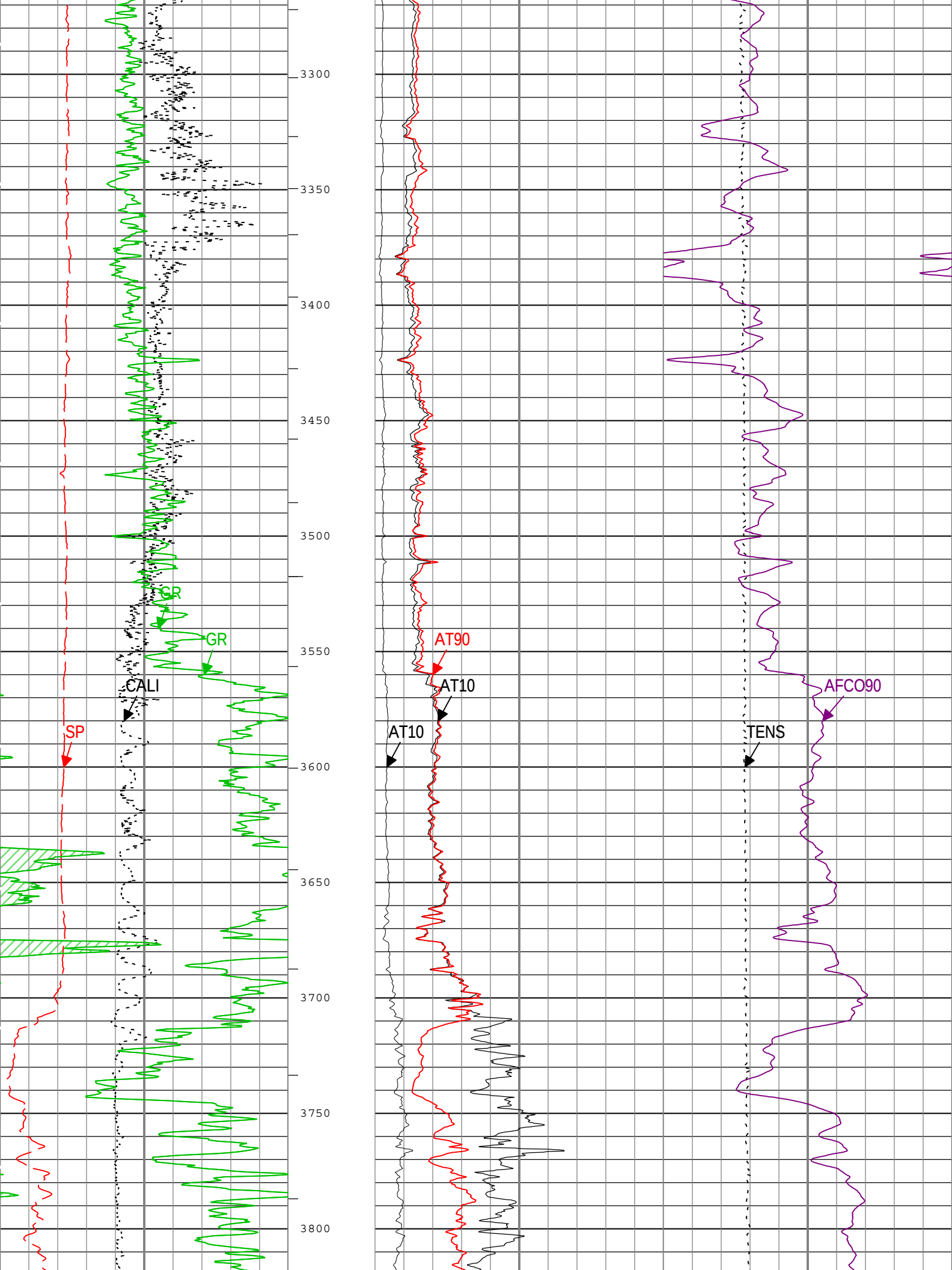
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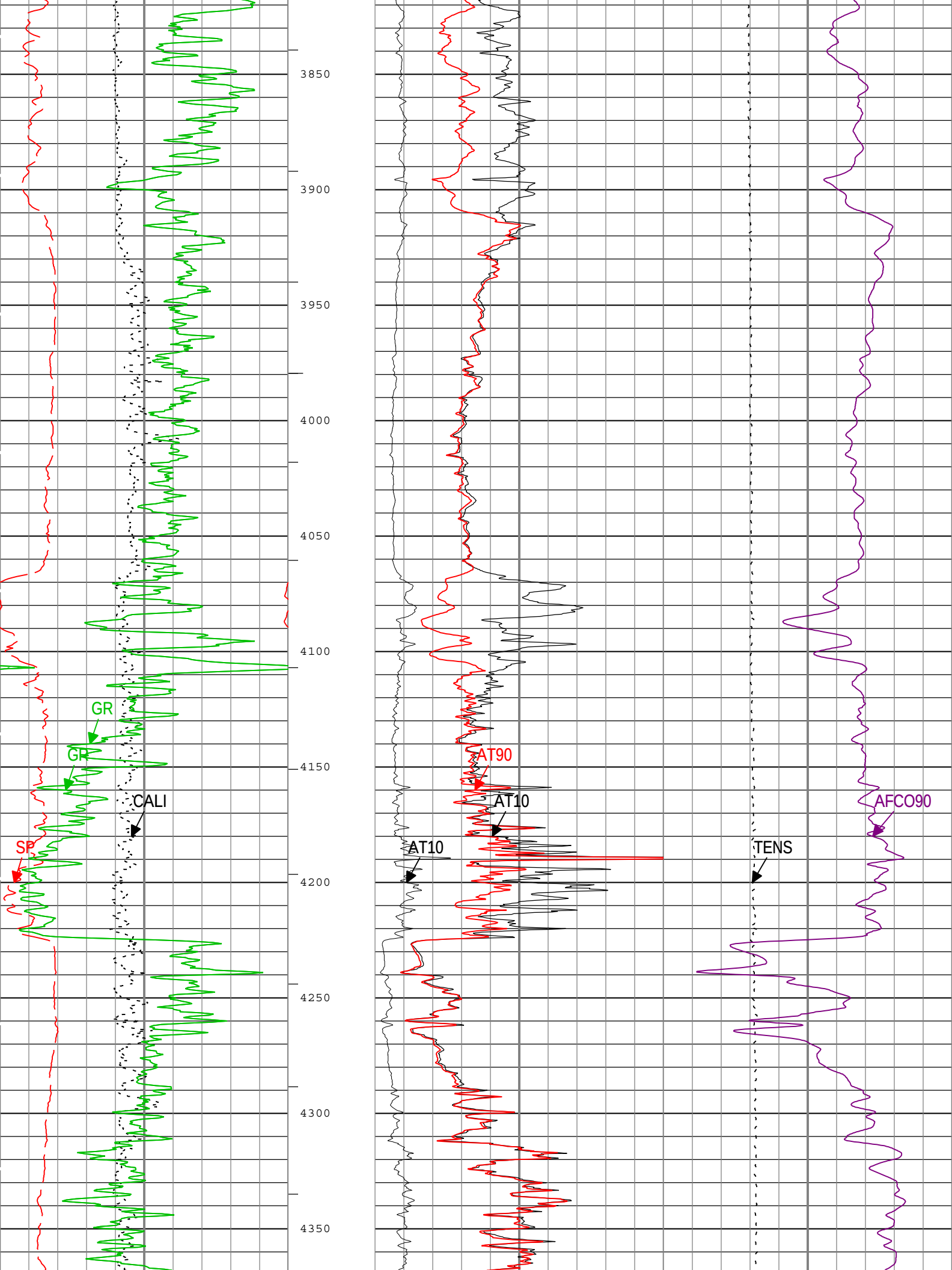
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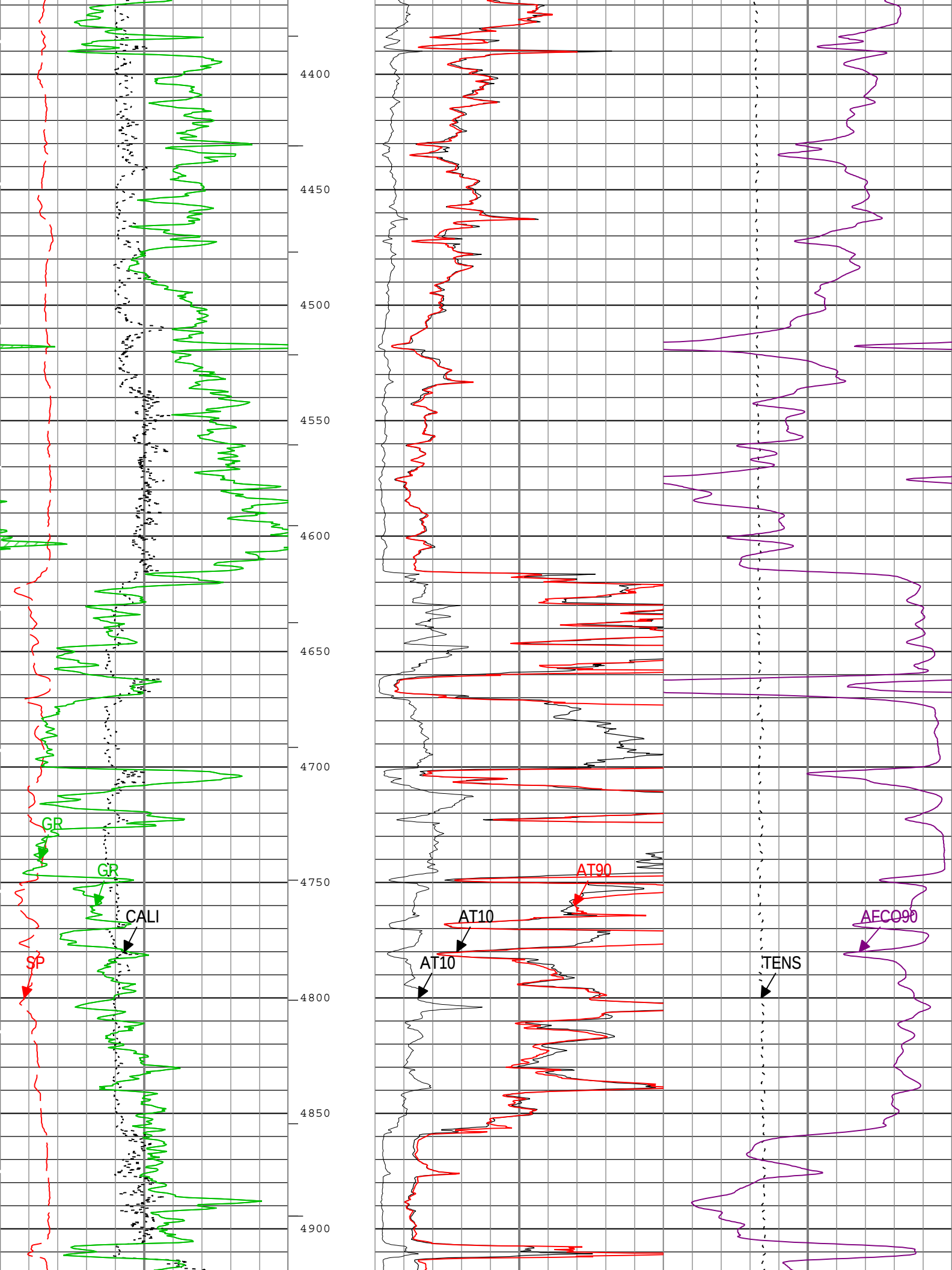
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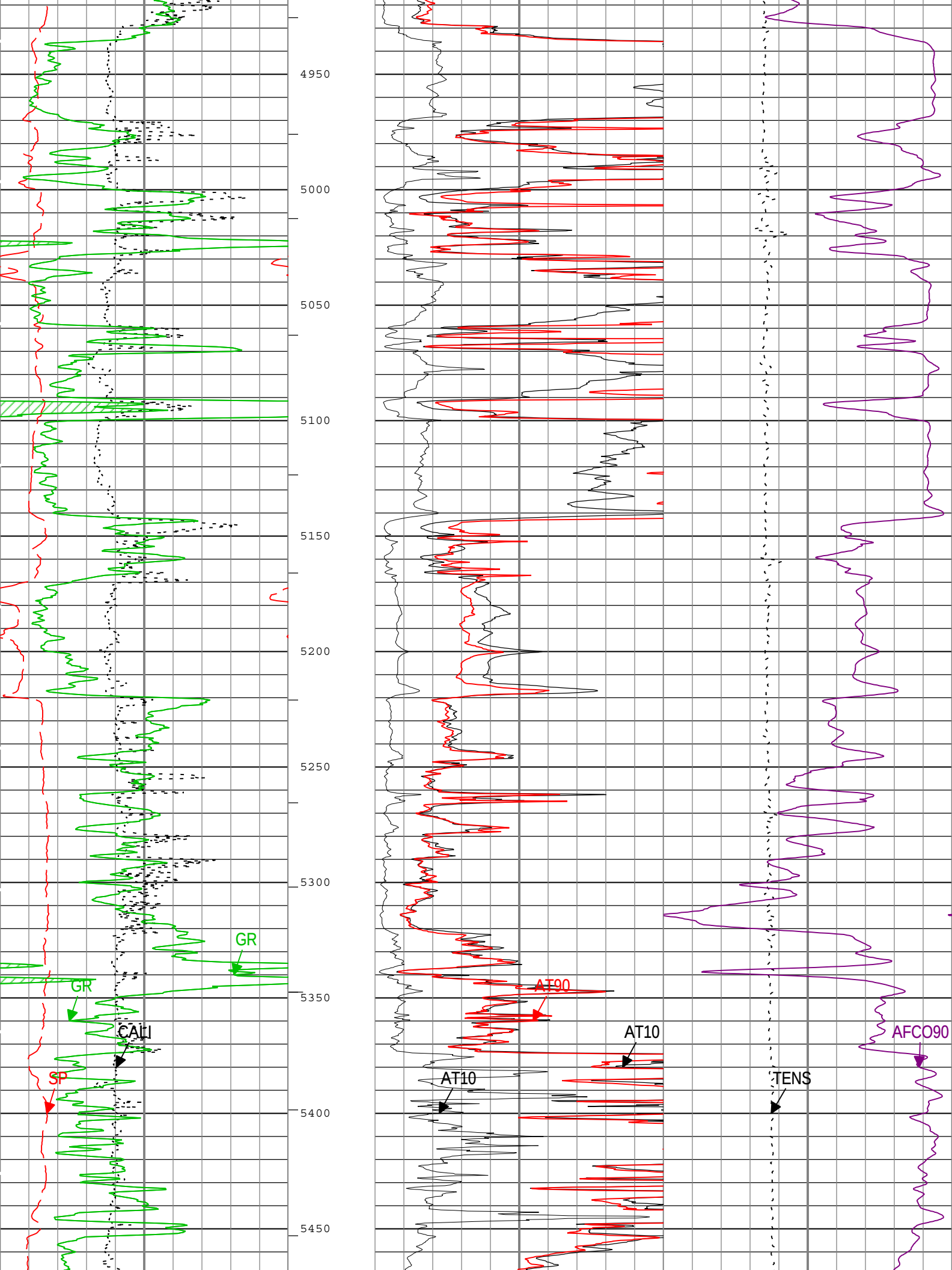
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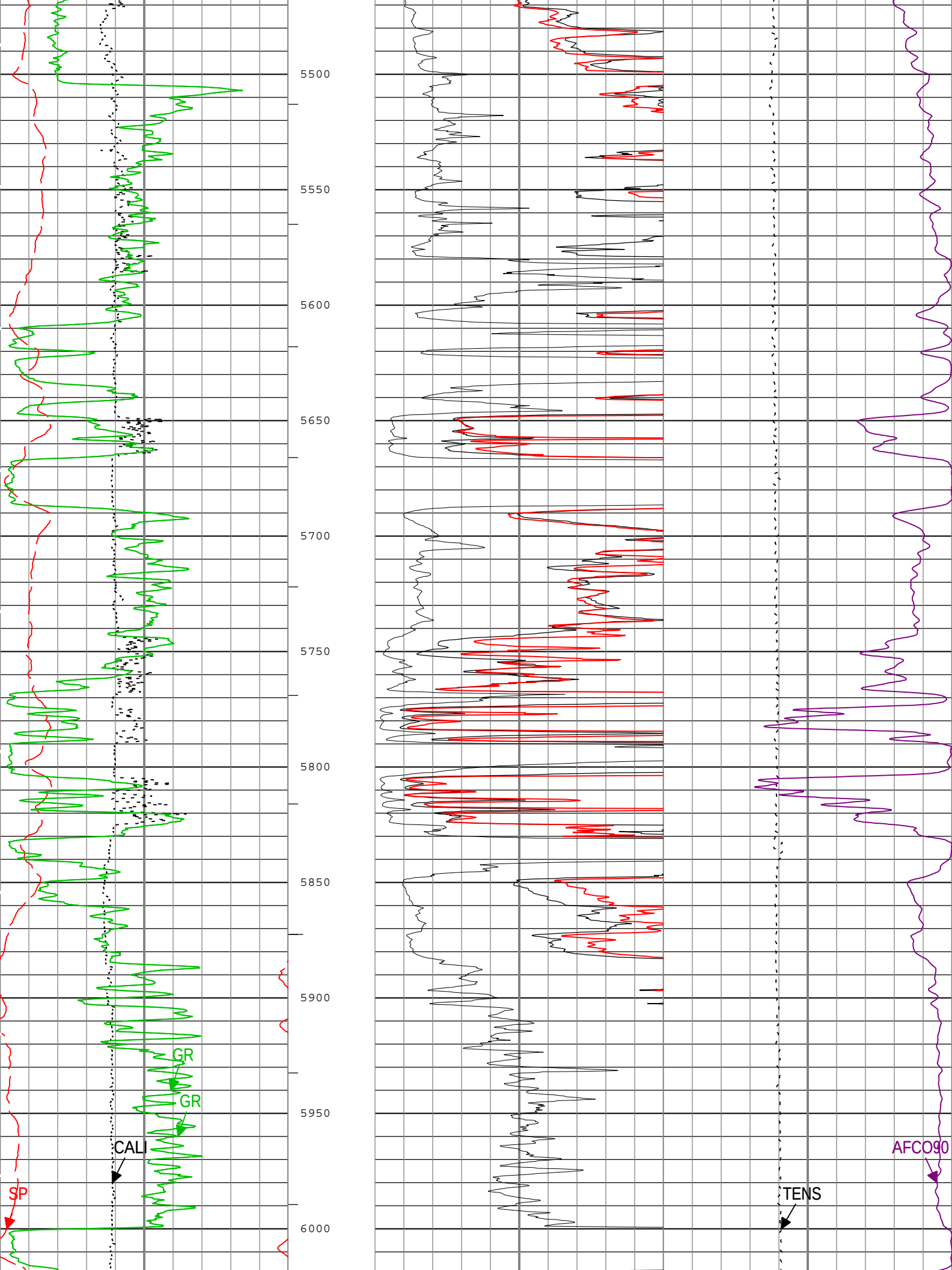
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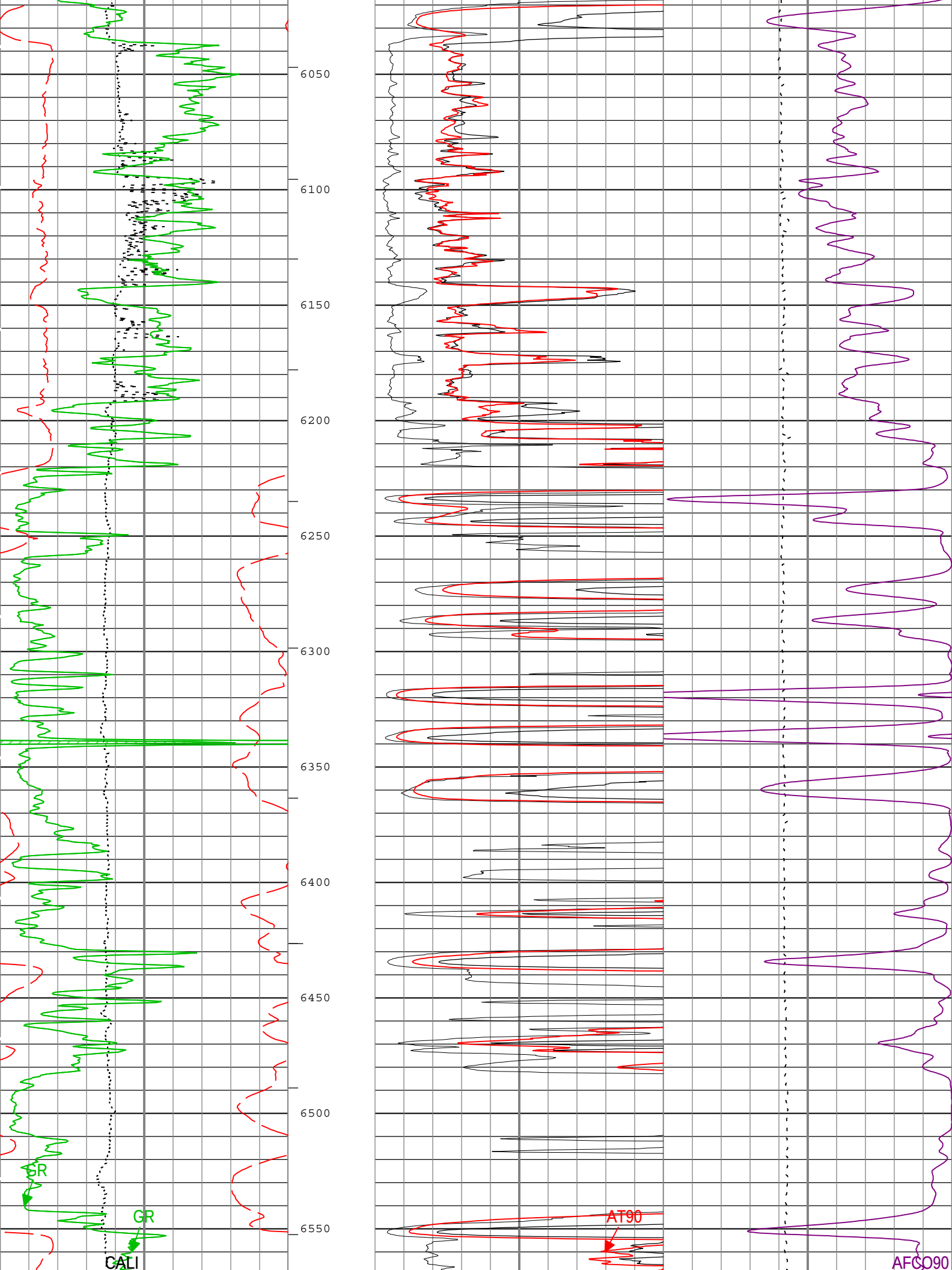
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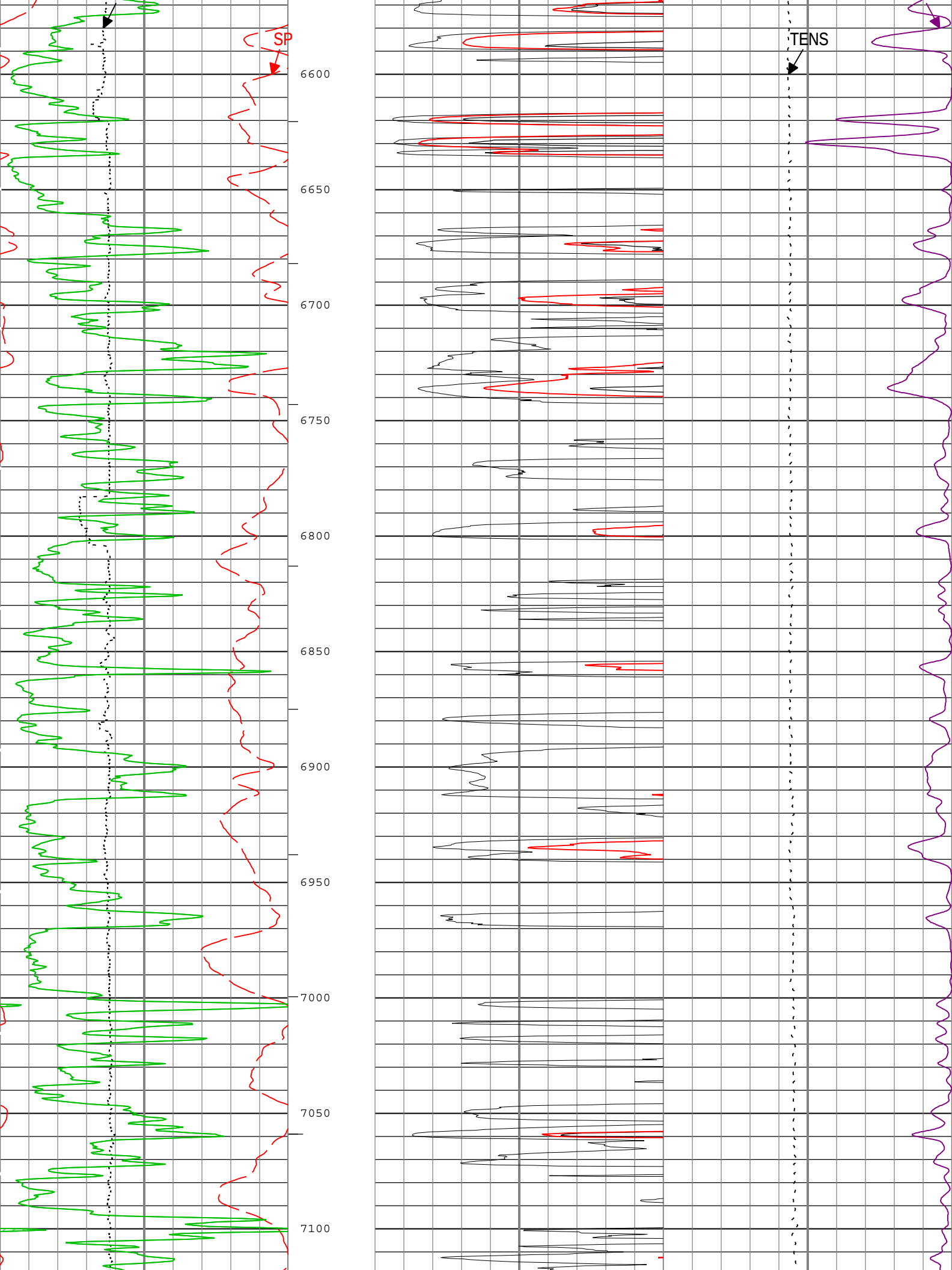
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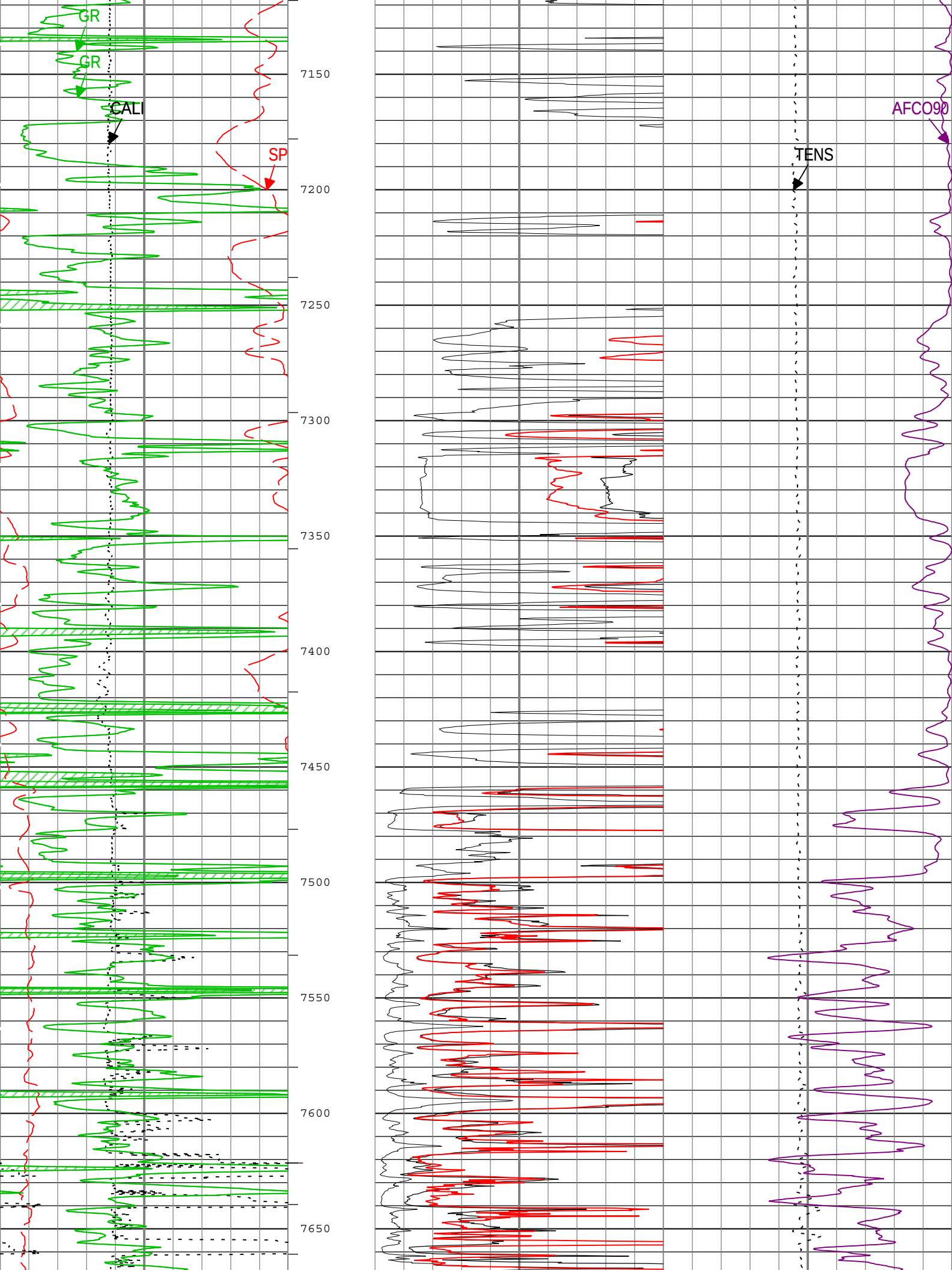
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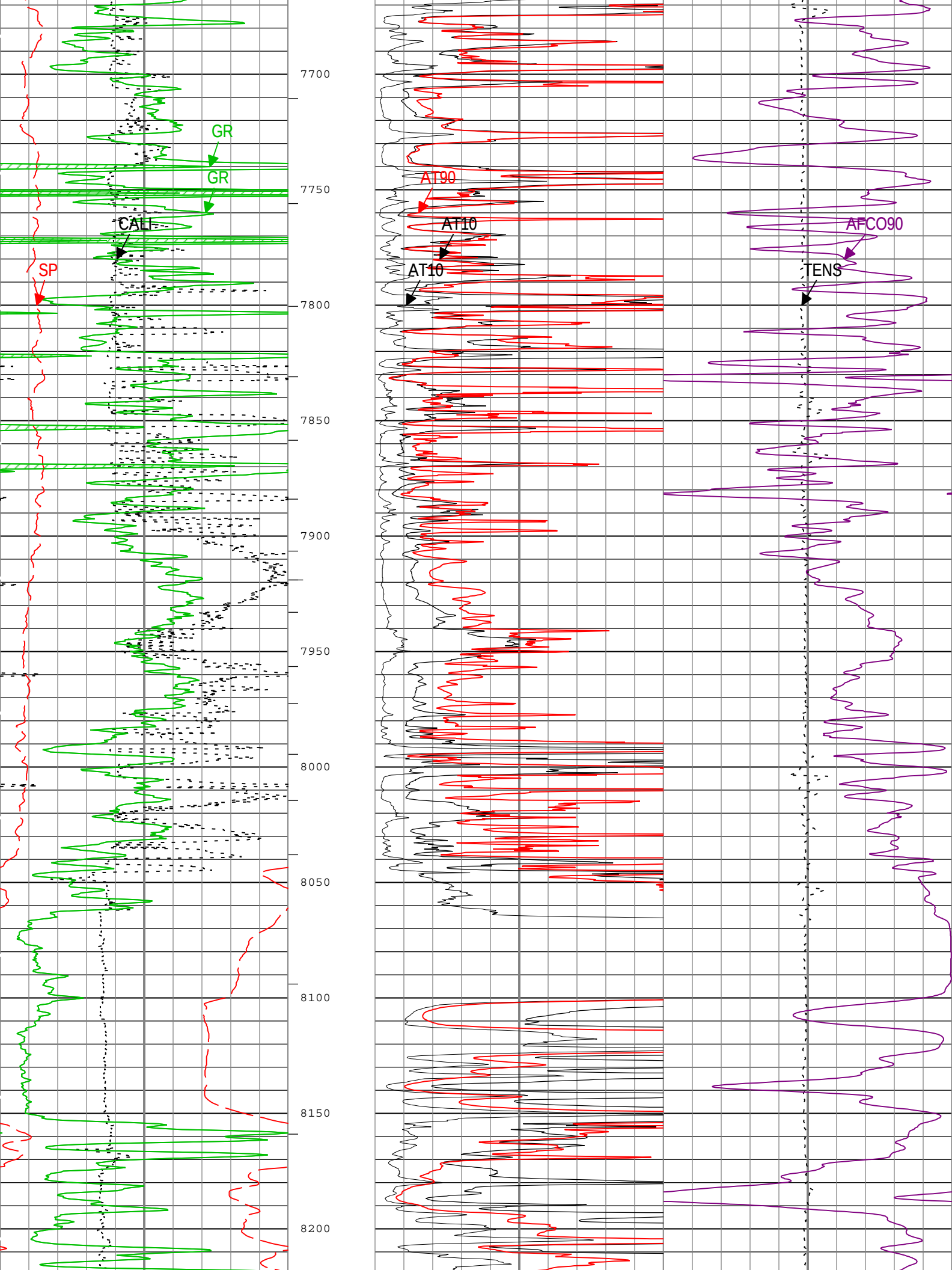
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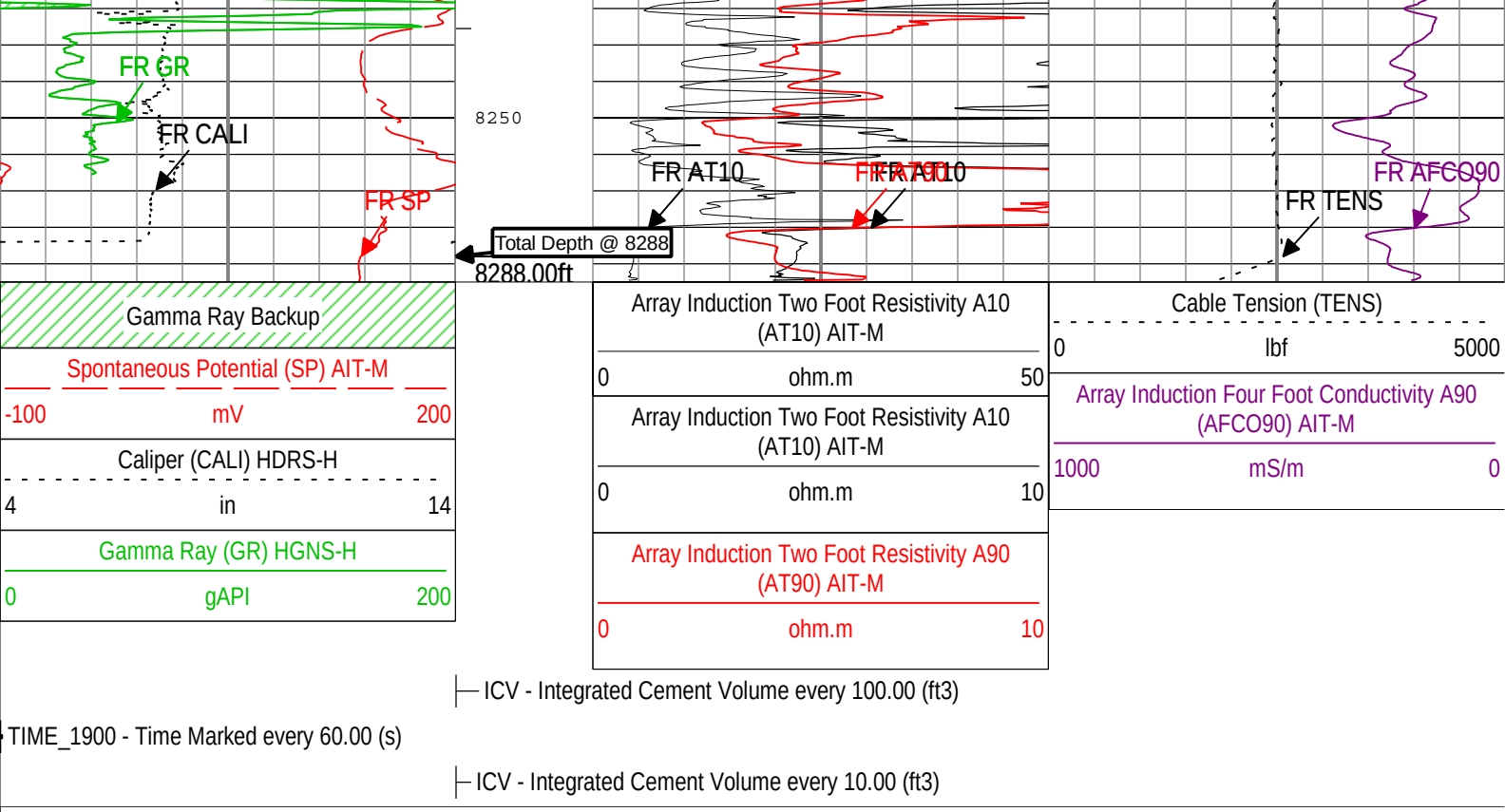


Description: AIT Basic Log Two Format: Log (EMD 2in Induction) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:18

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
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	350	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
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	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

1

5" Triple Combo Linear

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_13393-4.0.9163.3001

Computation	Description	Version
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	4.0.9033.3000
DepthCorrection	DepthCorrection	4.0.9213.3000

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	4.0.9231.3000	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9231.3000	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	4.0.9231.3000	3.0
AMIS	Array Induction Sonde - M	4.0.9247.3000	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Main[3]:Up	Up	14.54 ft	8302.86 ft	13-Feb-2014 2:29:40 PM	13-Feb-2014 4:59:53 PM	ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

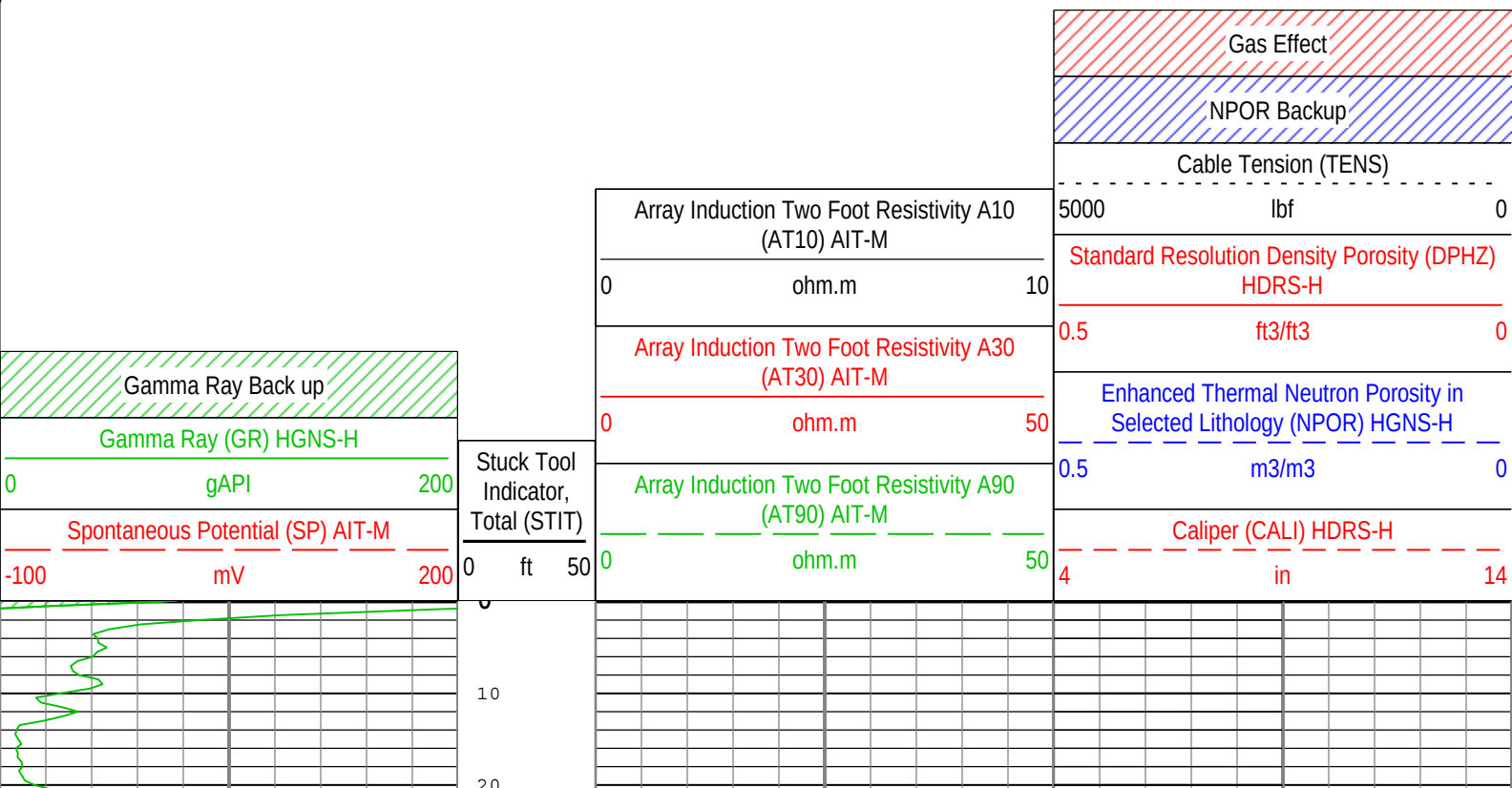
Company:Nighthawk Production LLC Well:Big Sky 5-11

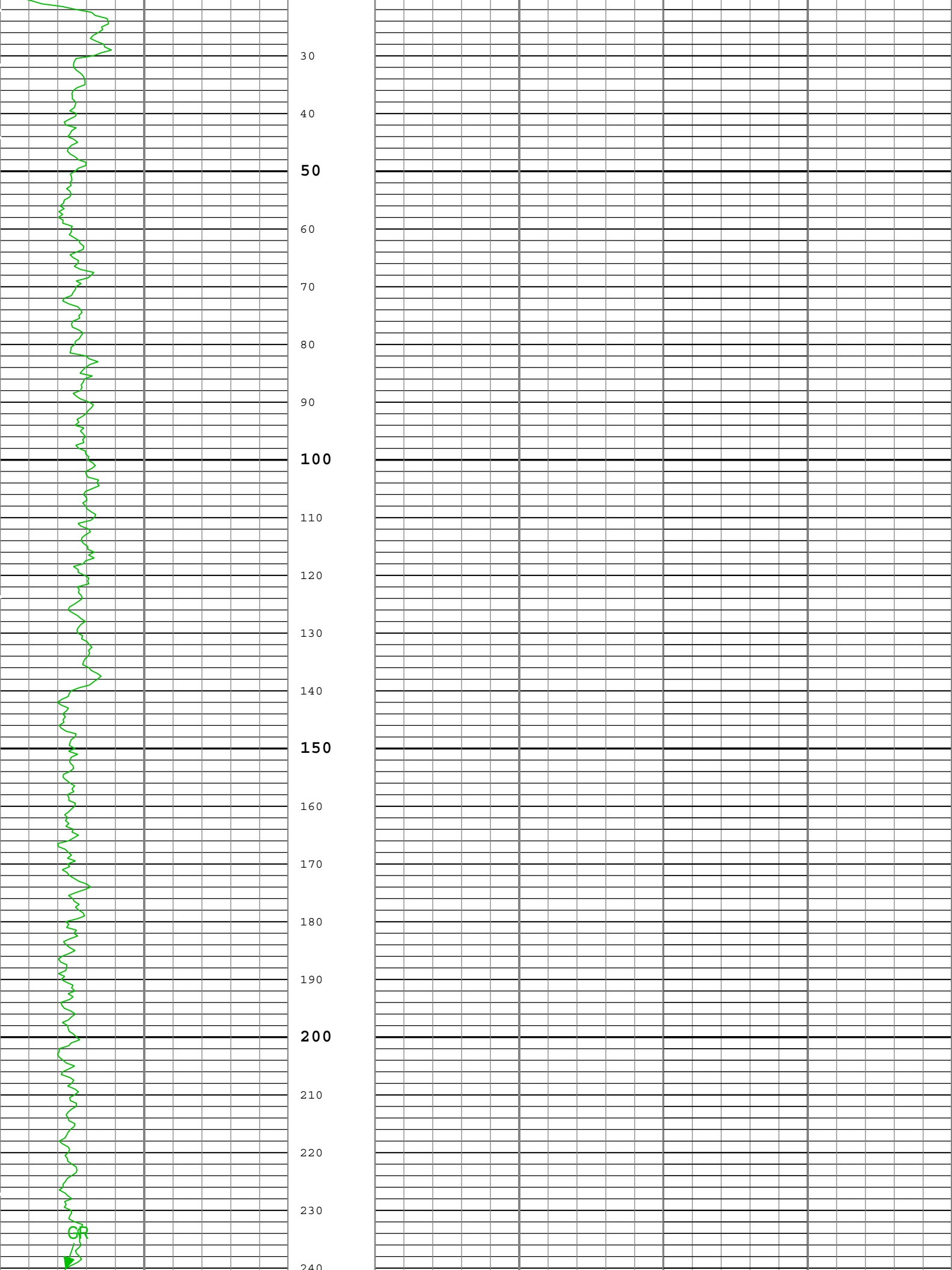
1: Main[3]:Up:S006

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:21

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
SP	AIT-M:AMIS:AMIS	6in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

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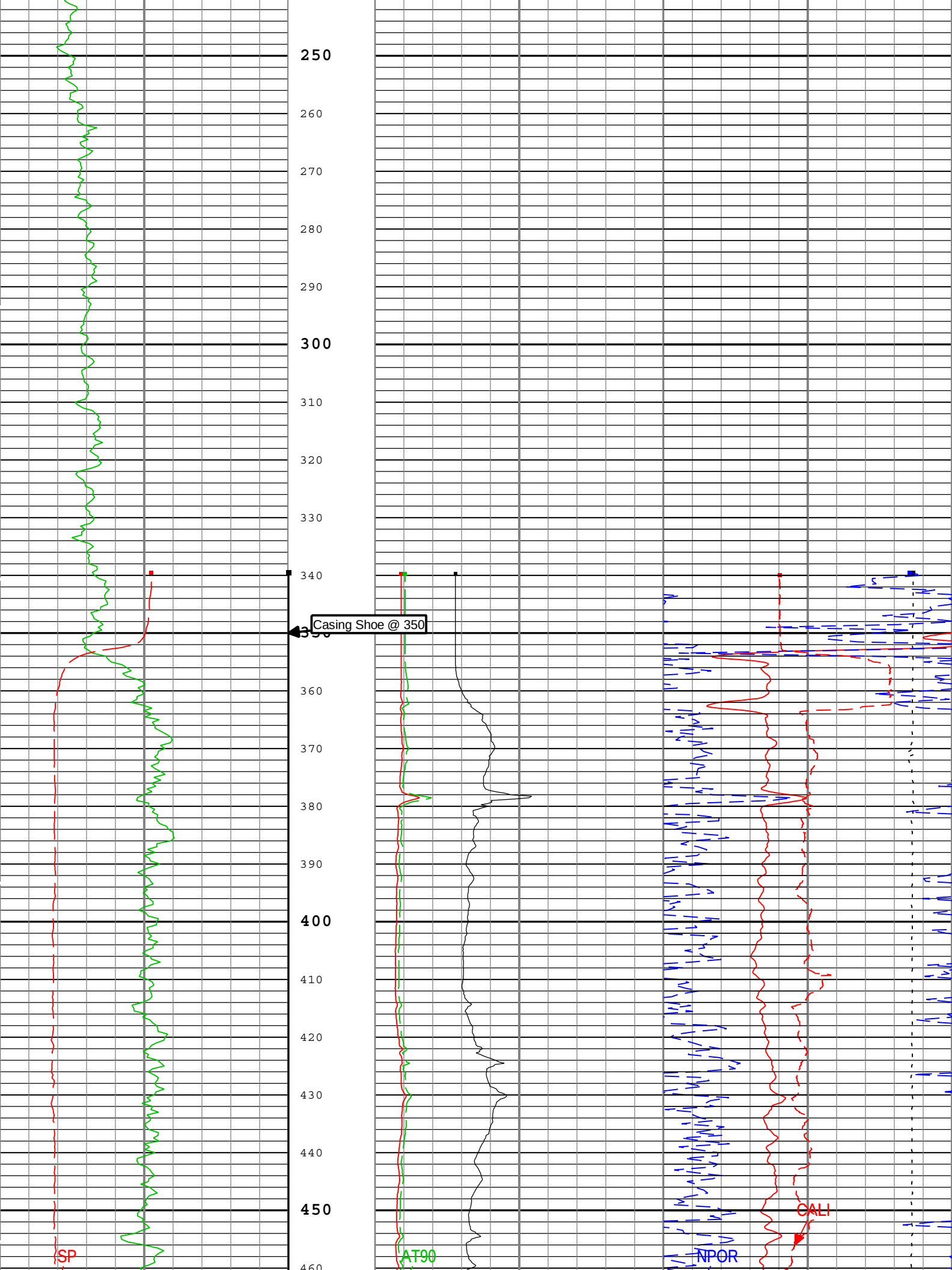
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Casing Shoe @ 350
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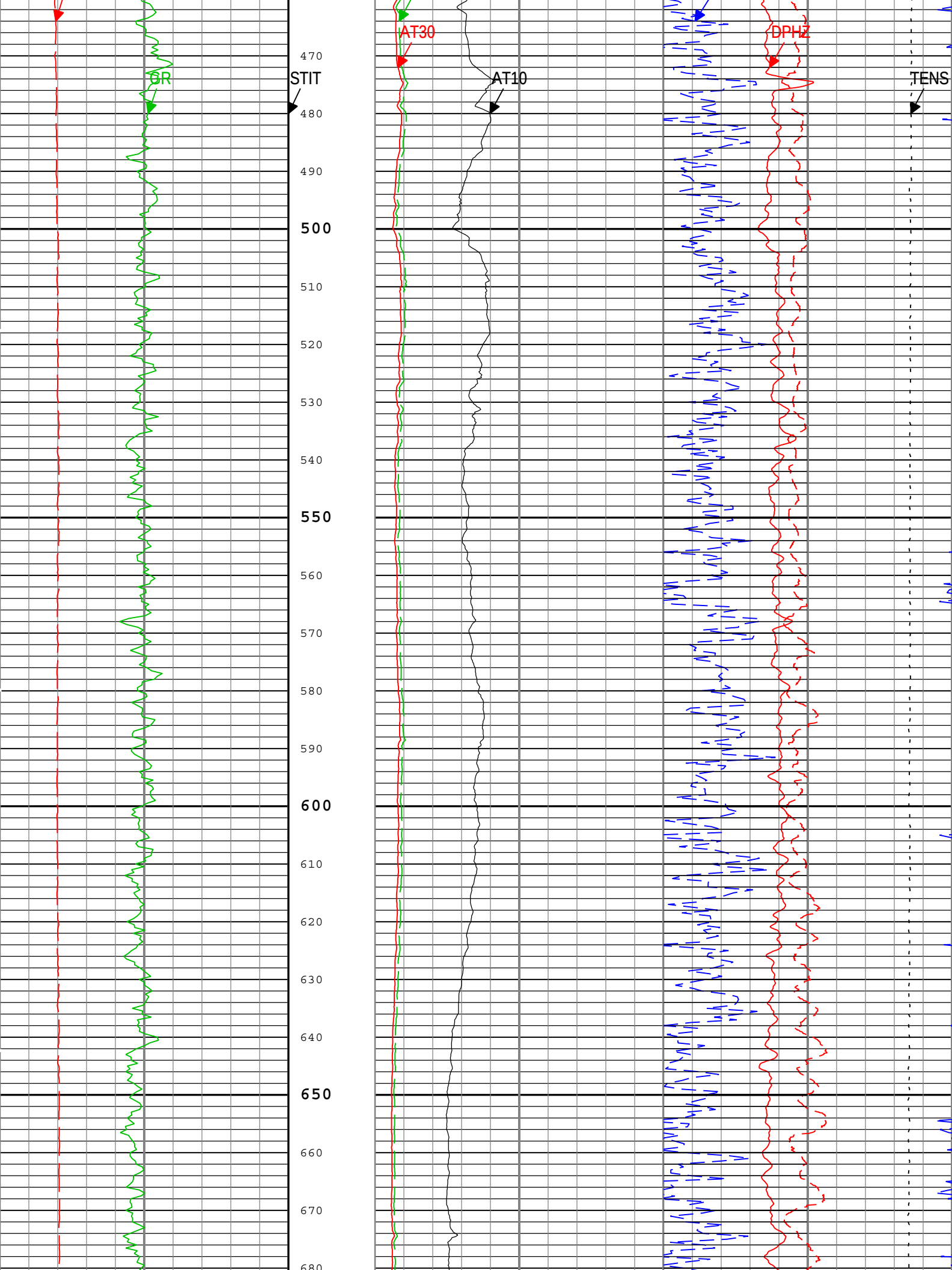
AT90
NPOR
CALI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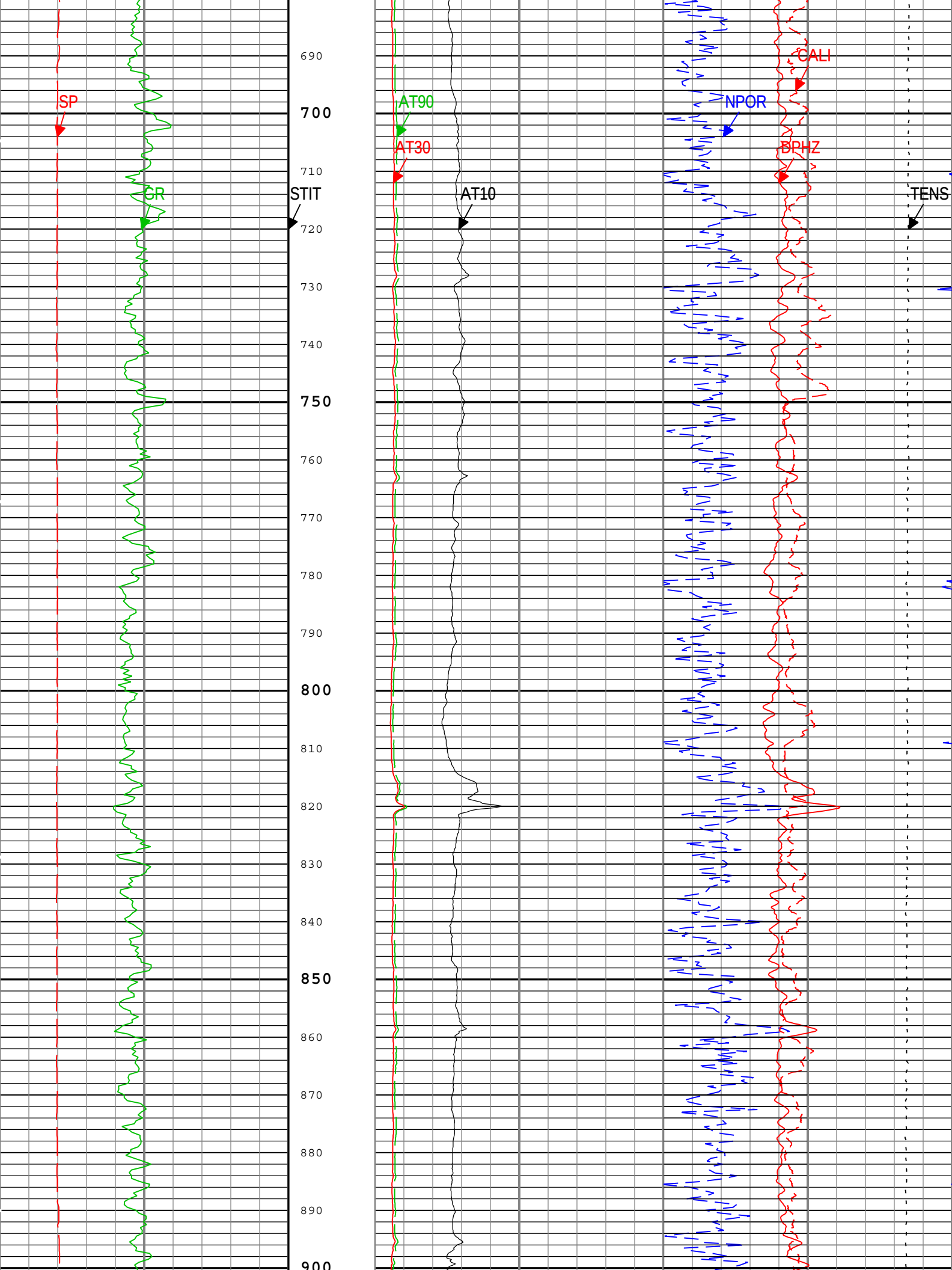
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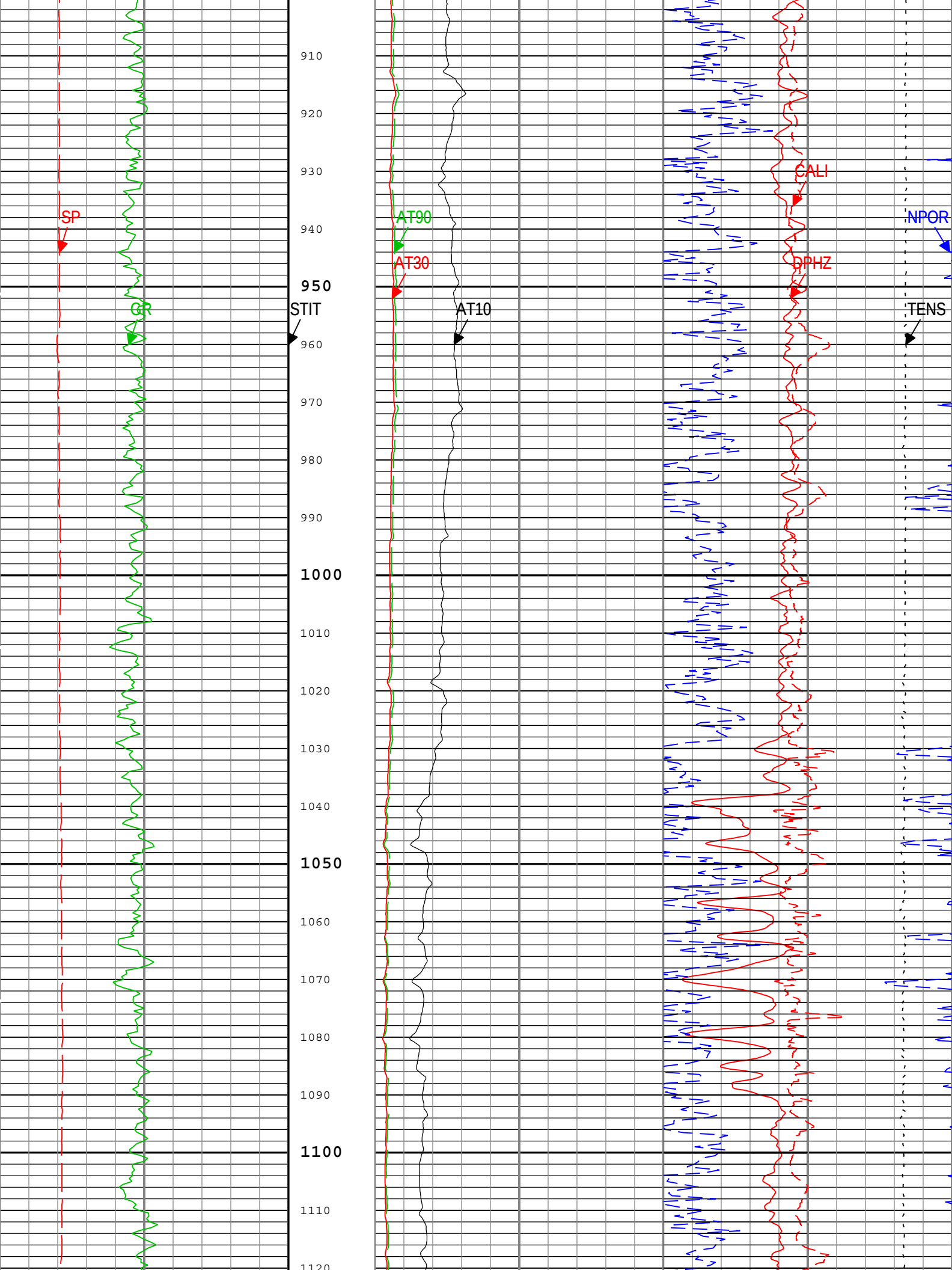
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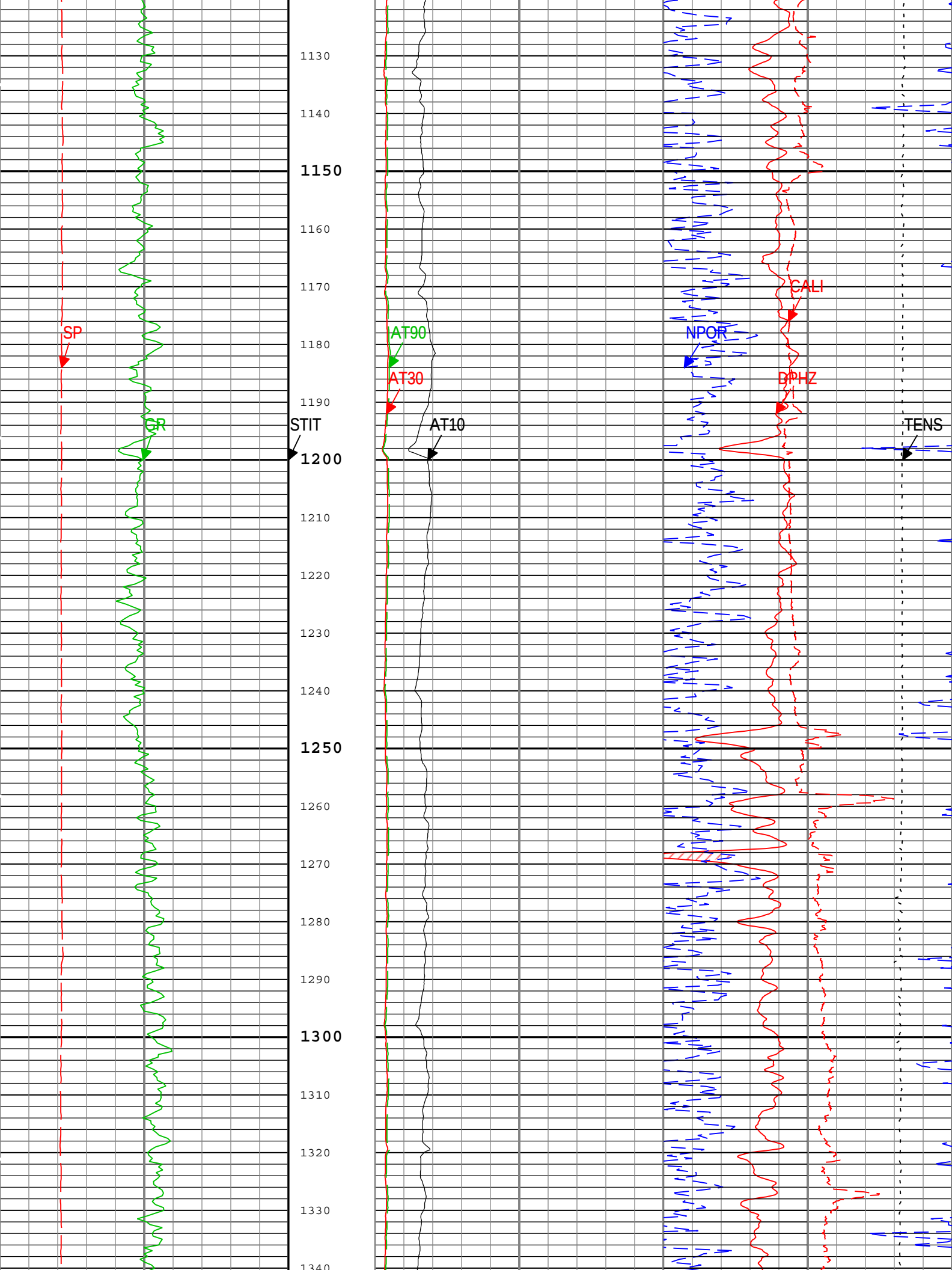
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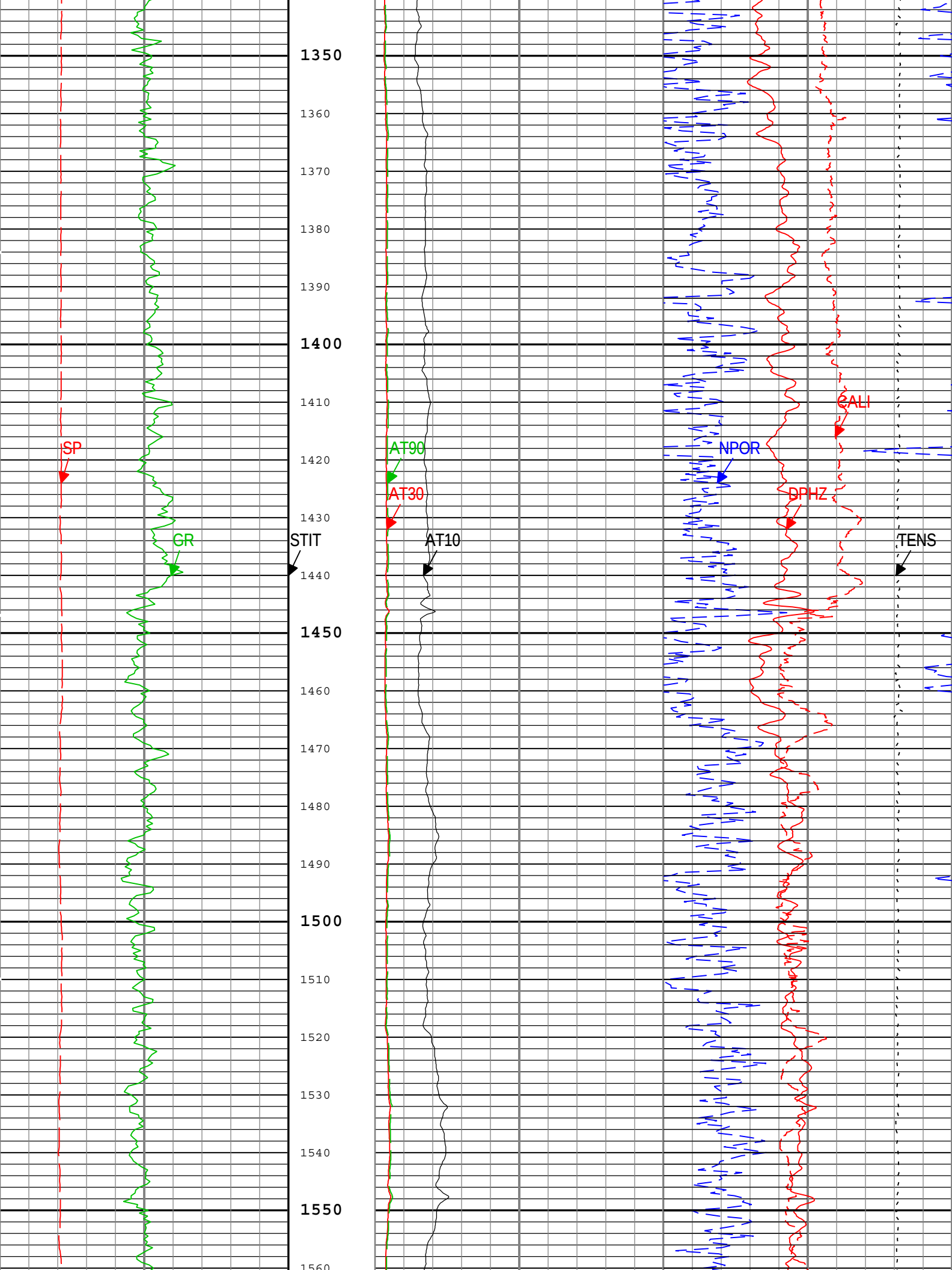
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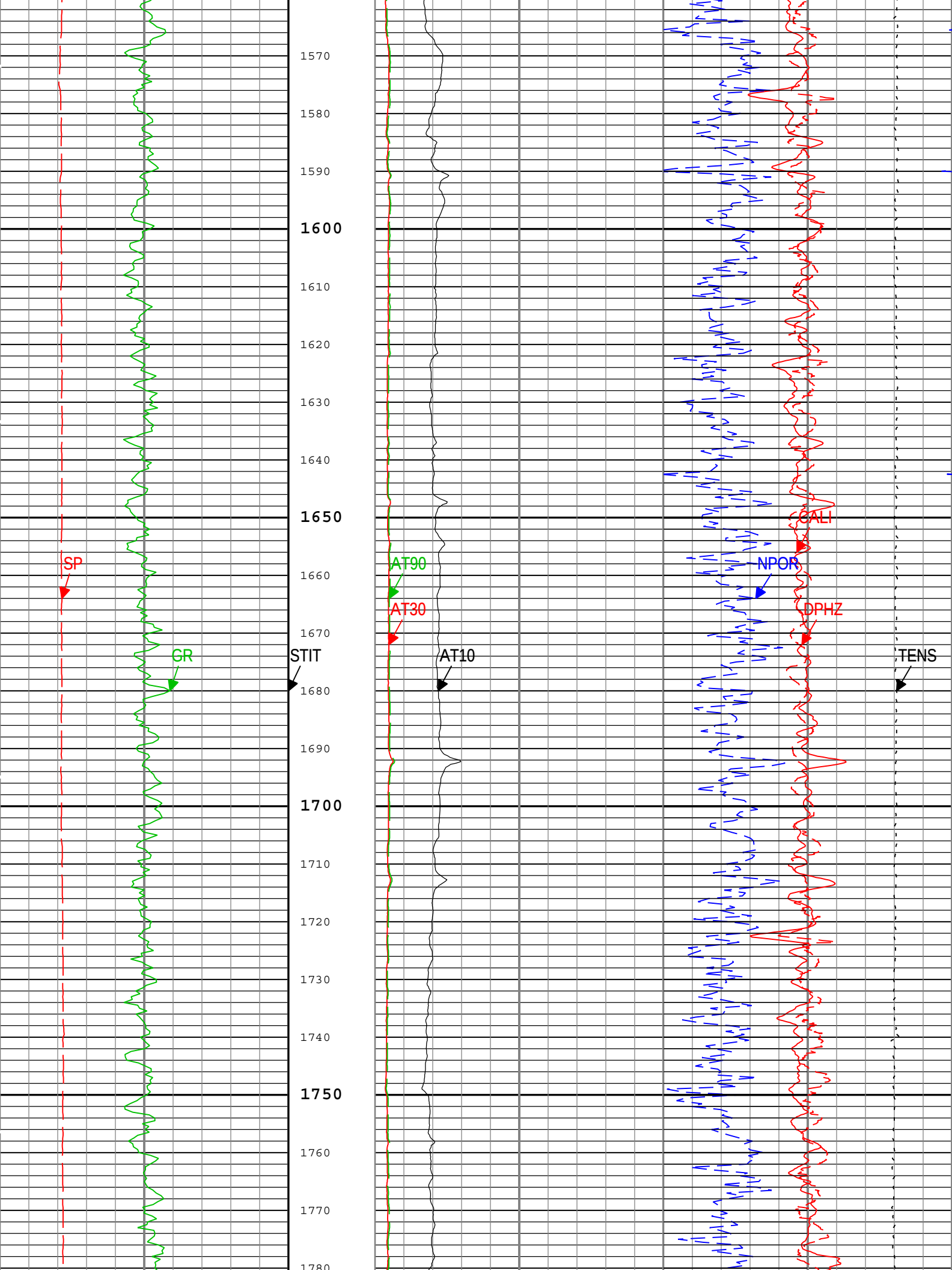
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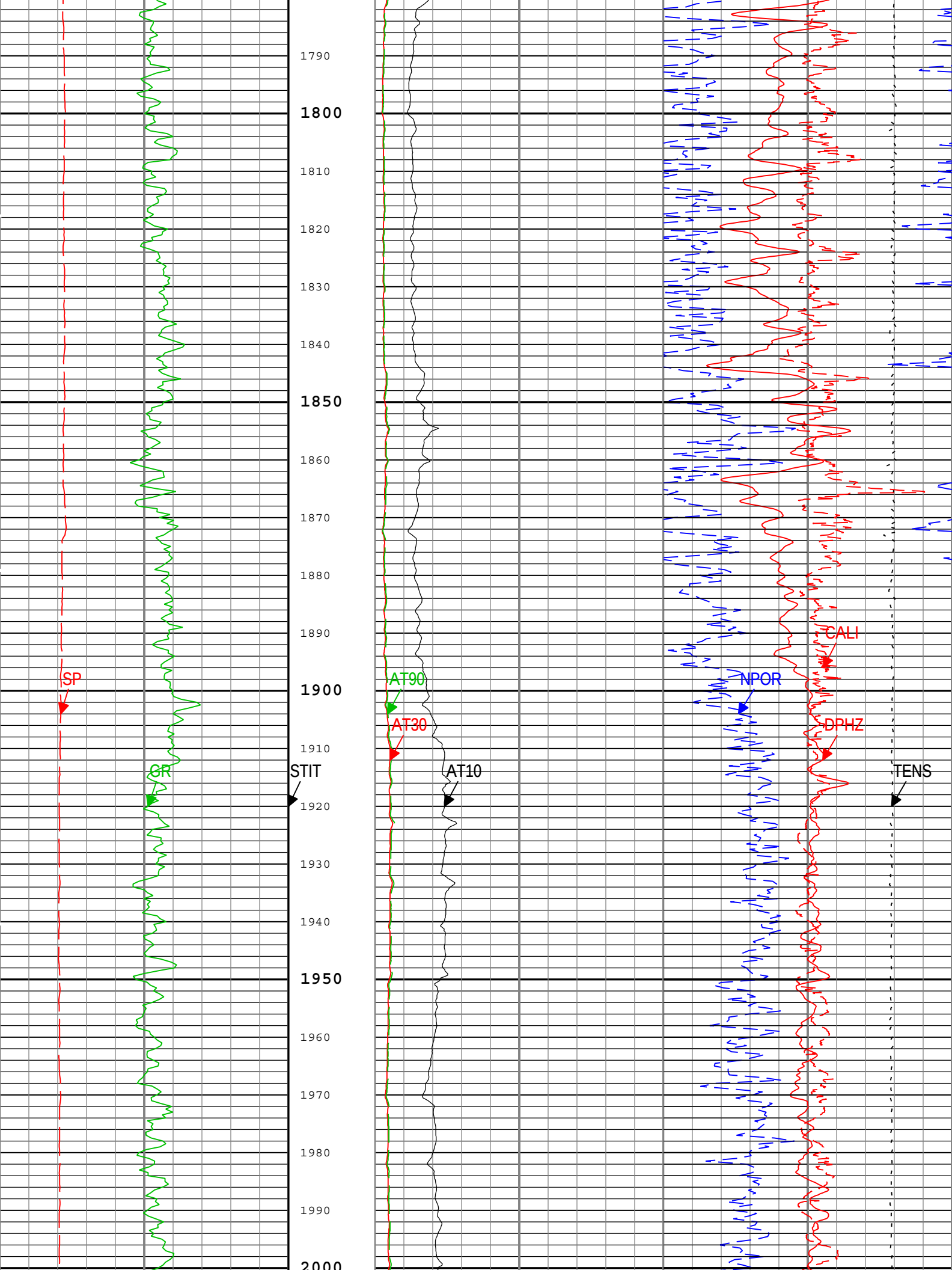
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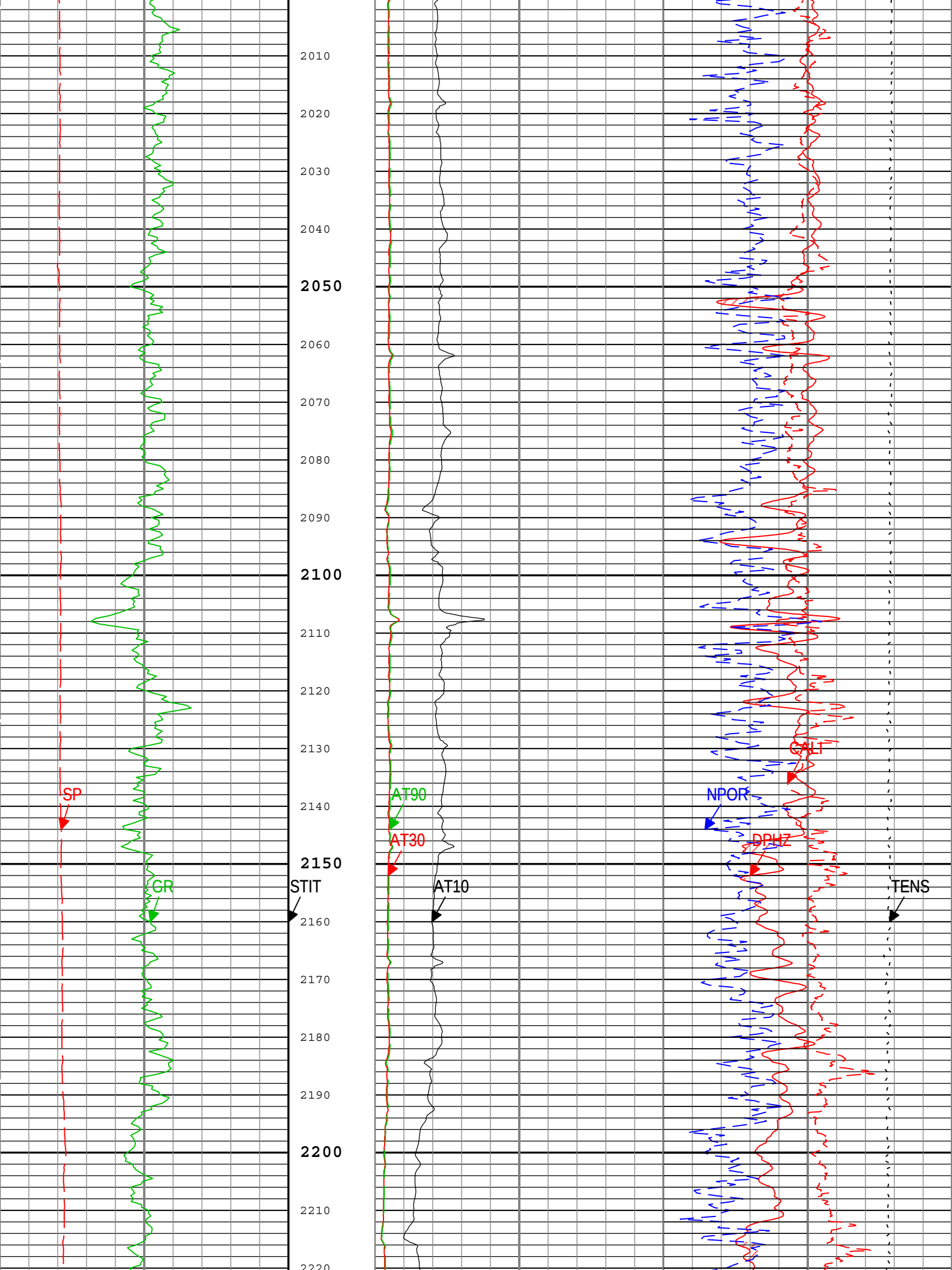
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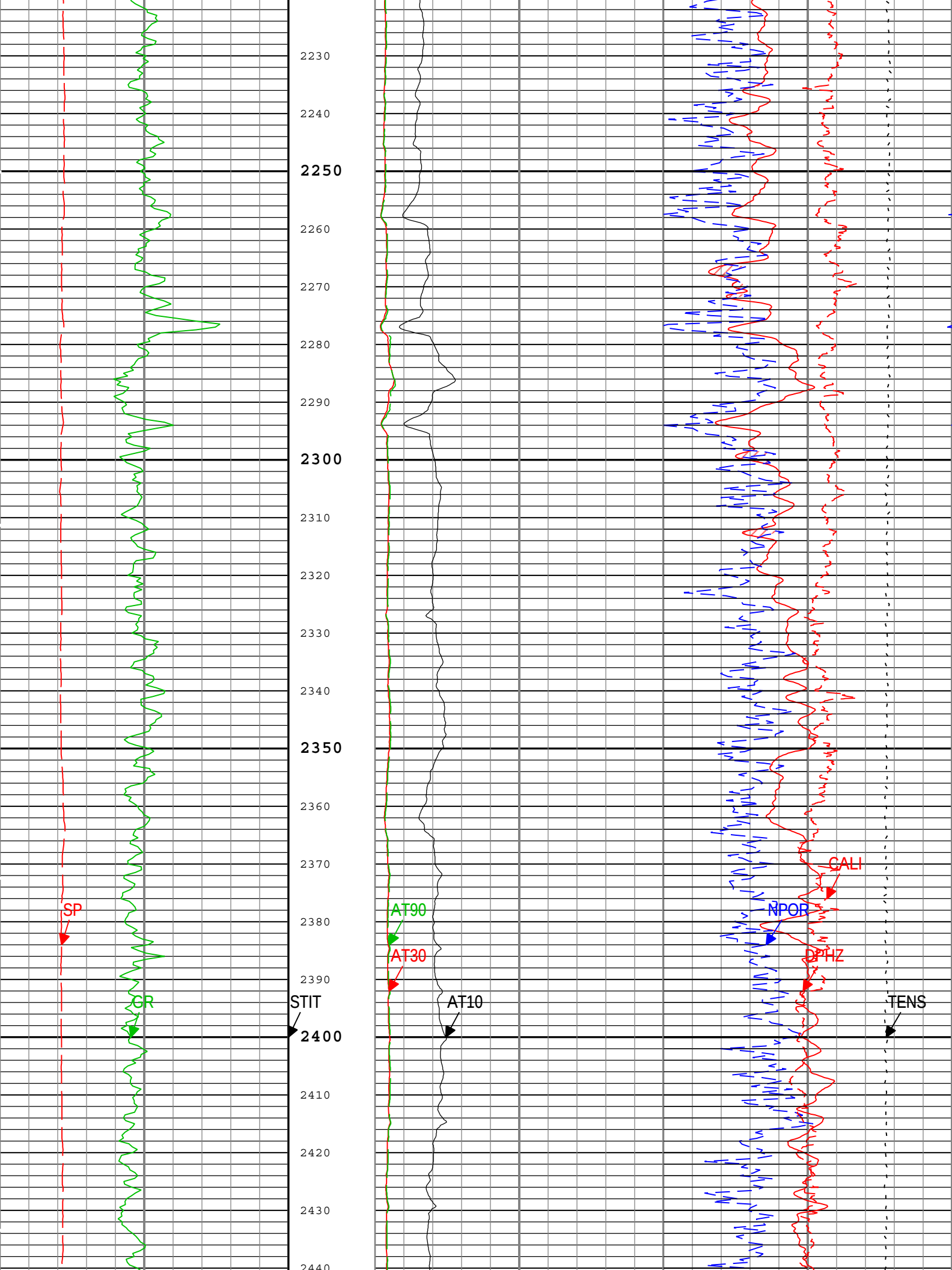
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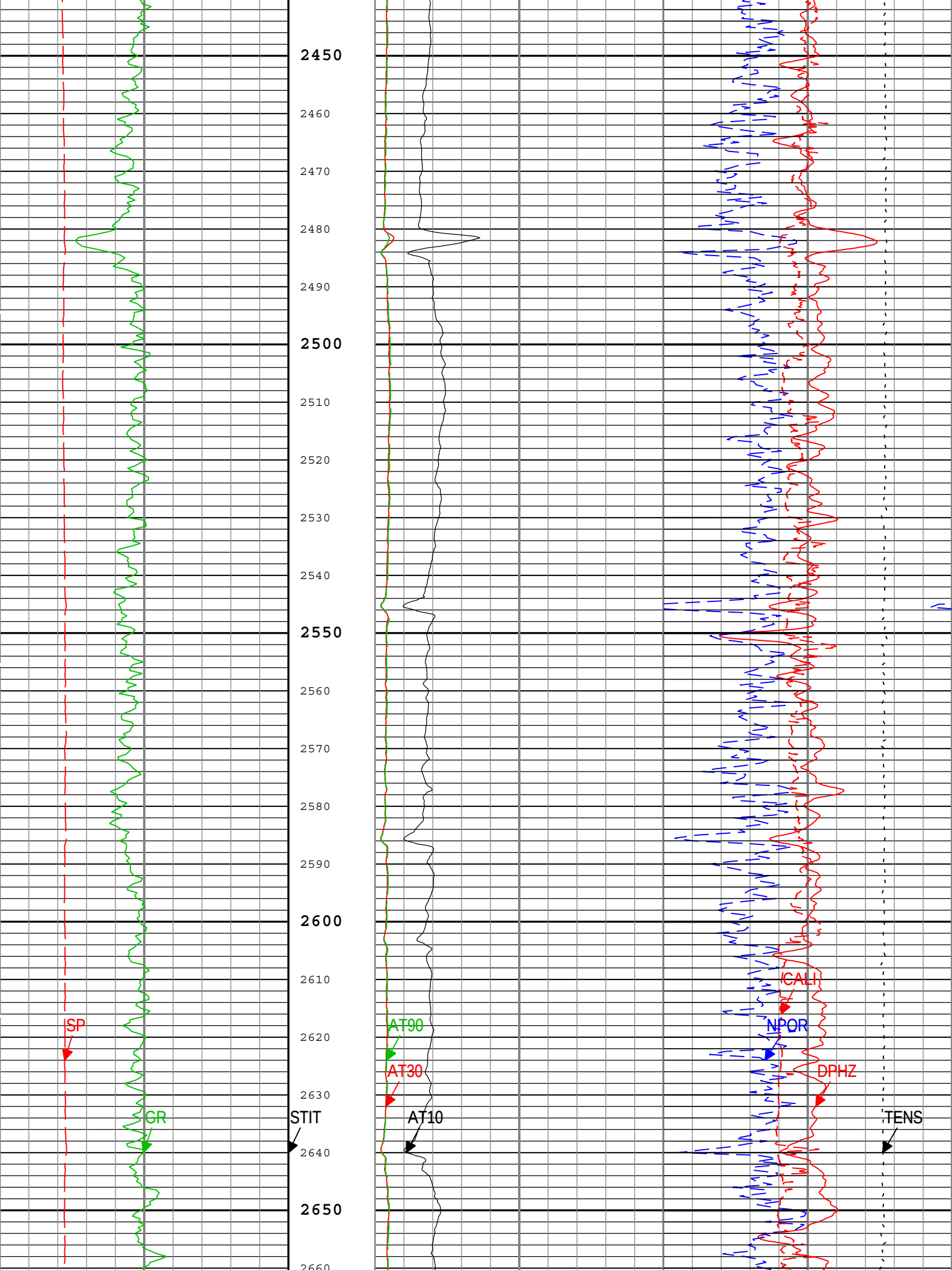
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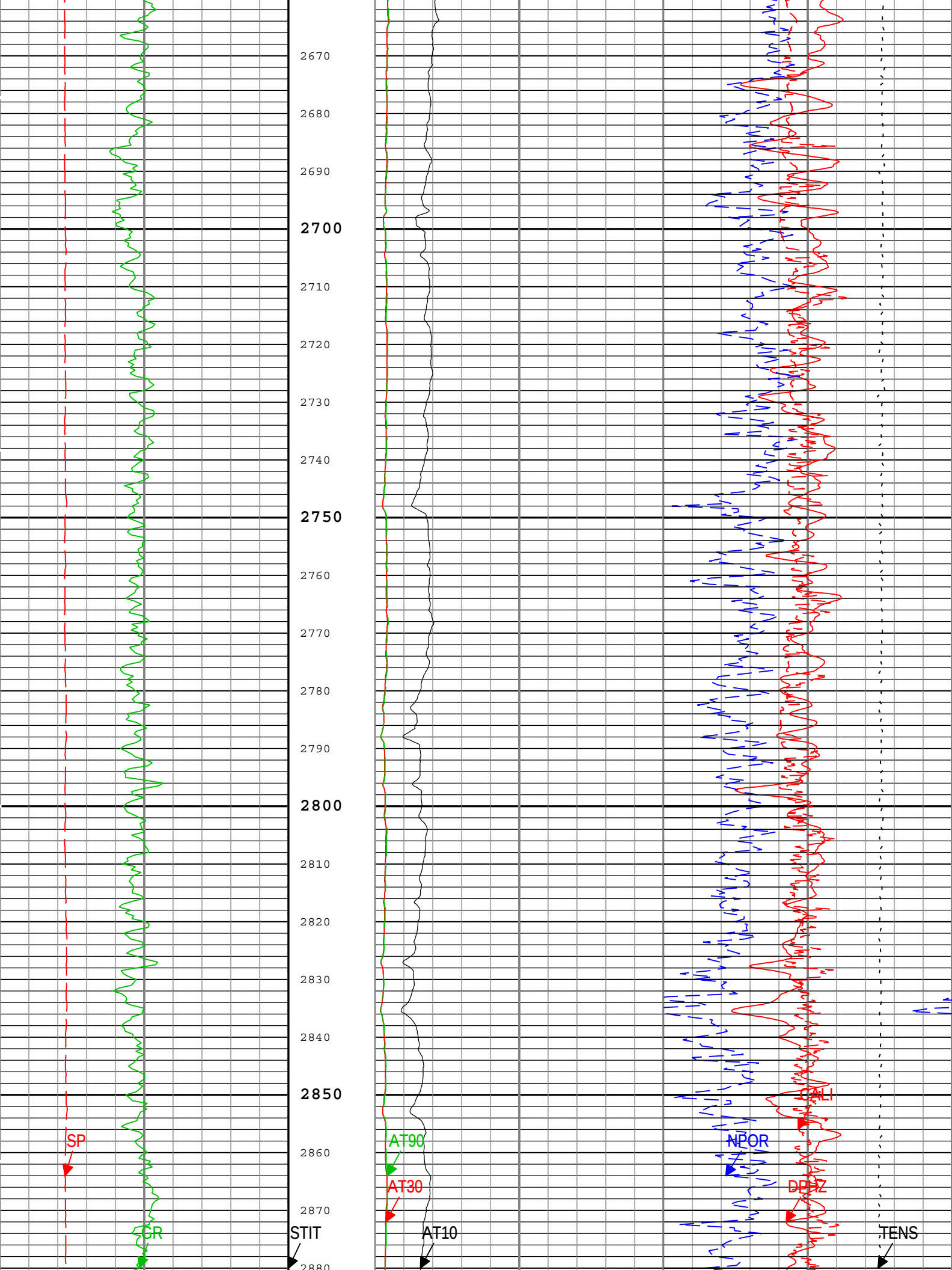
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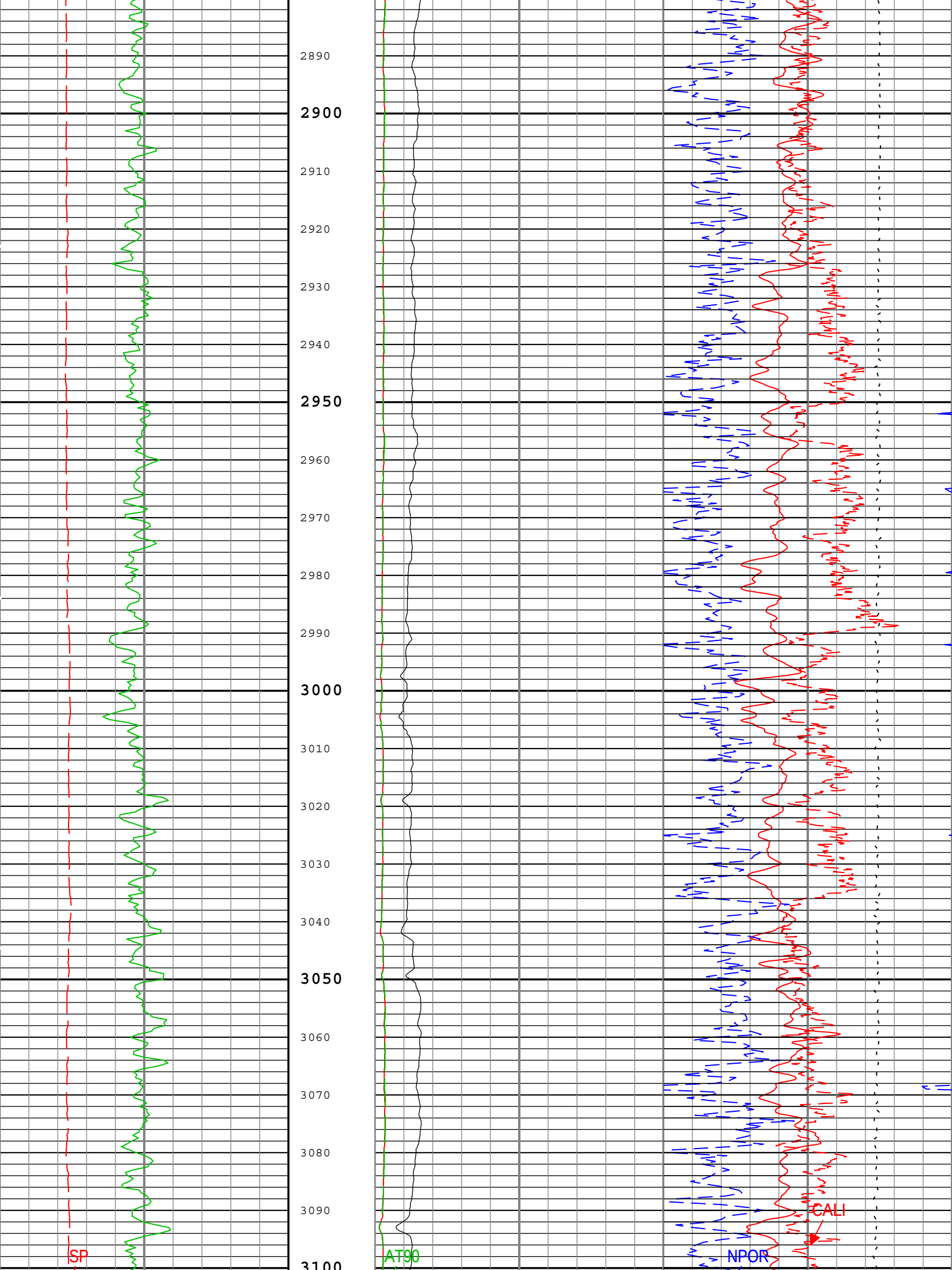
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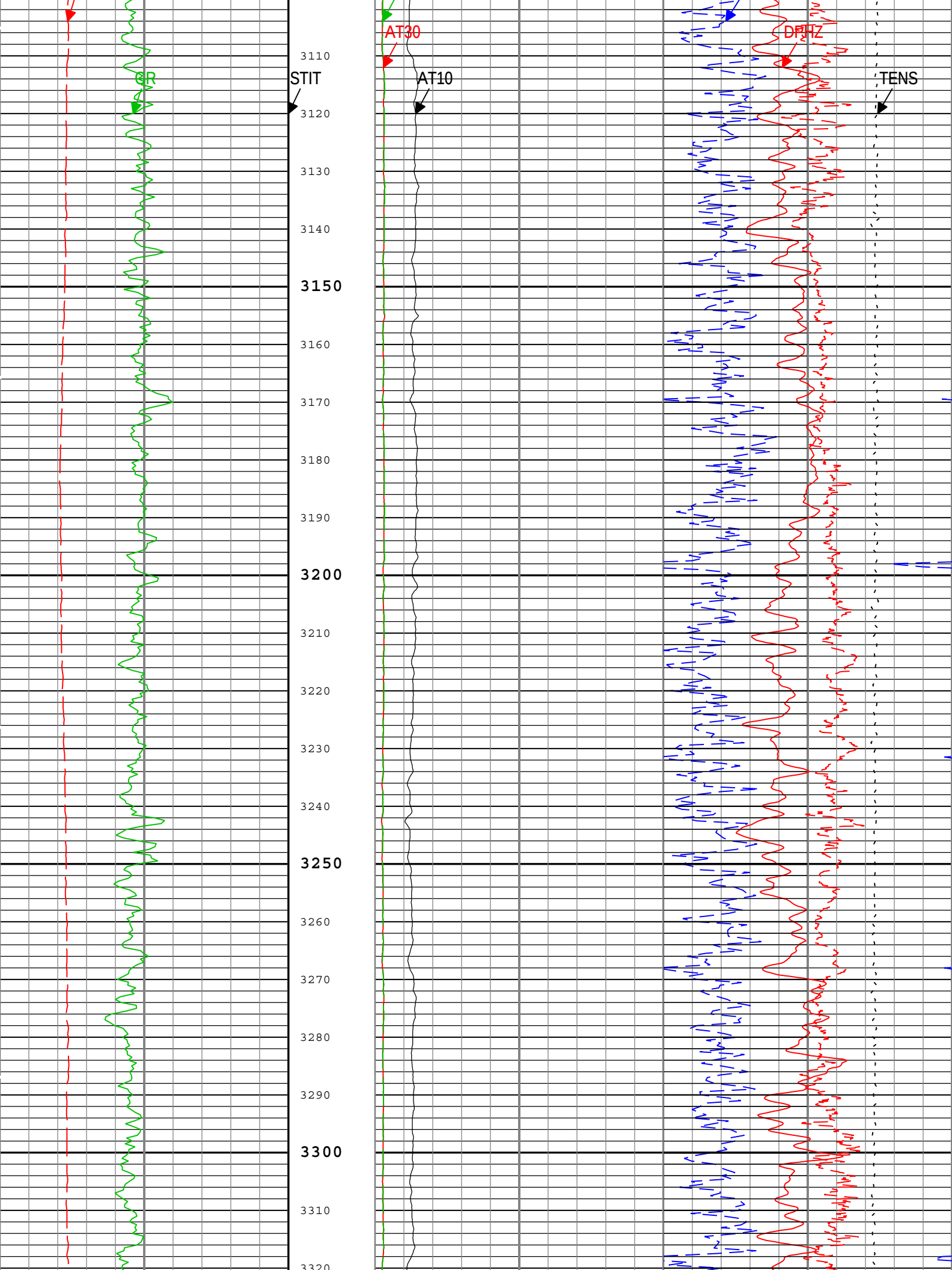
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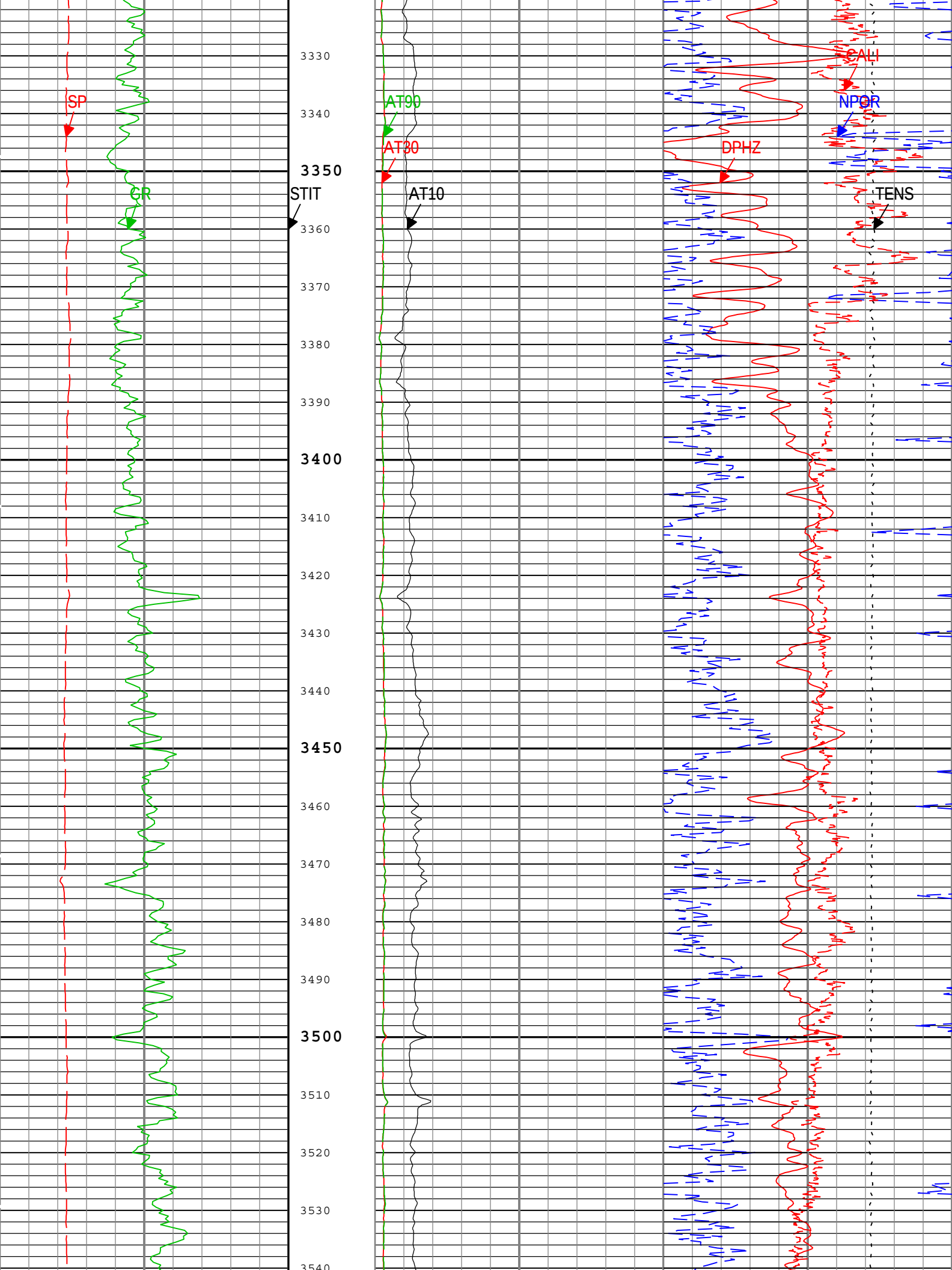
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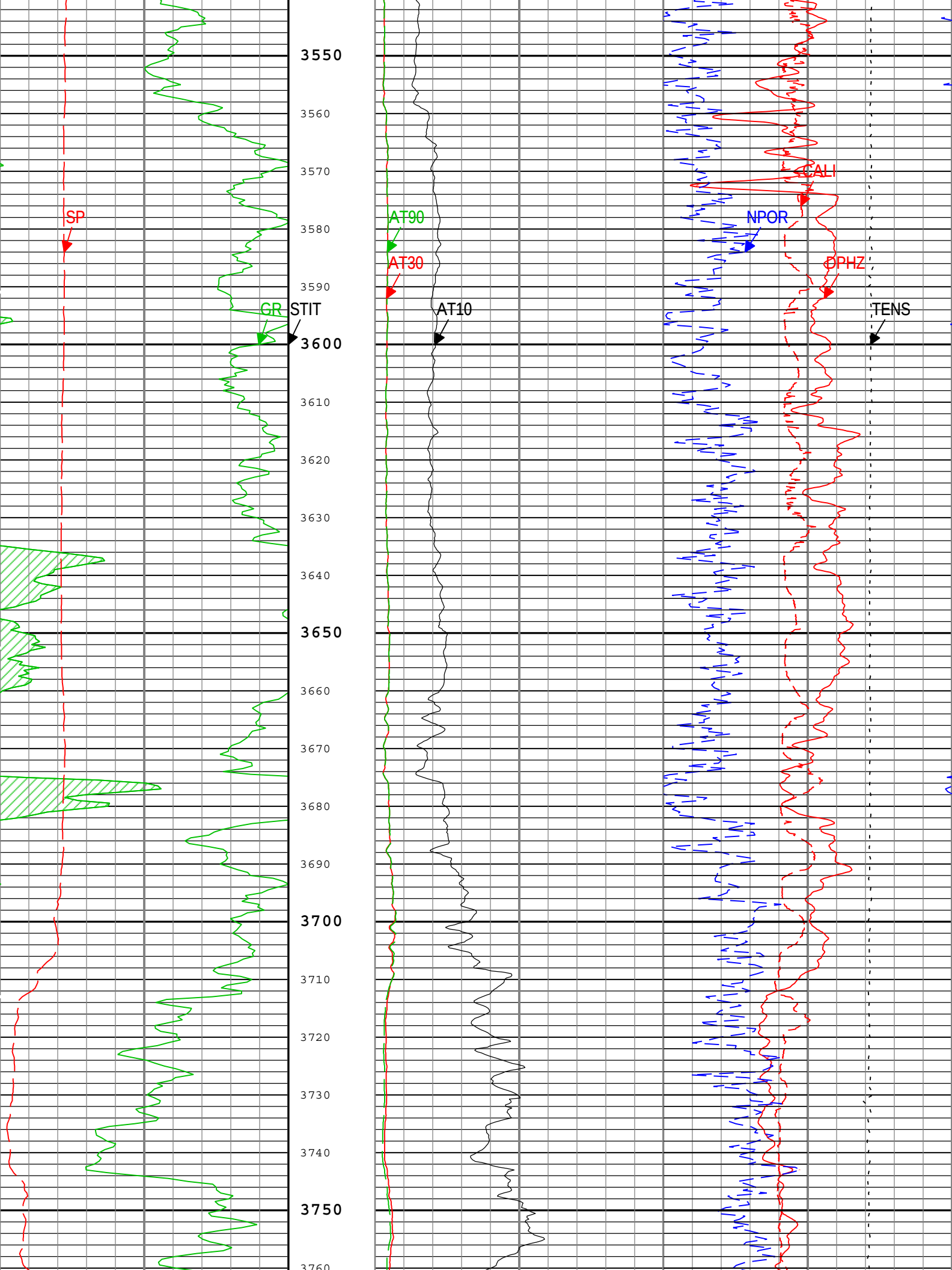
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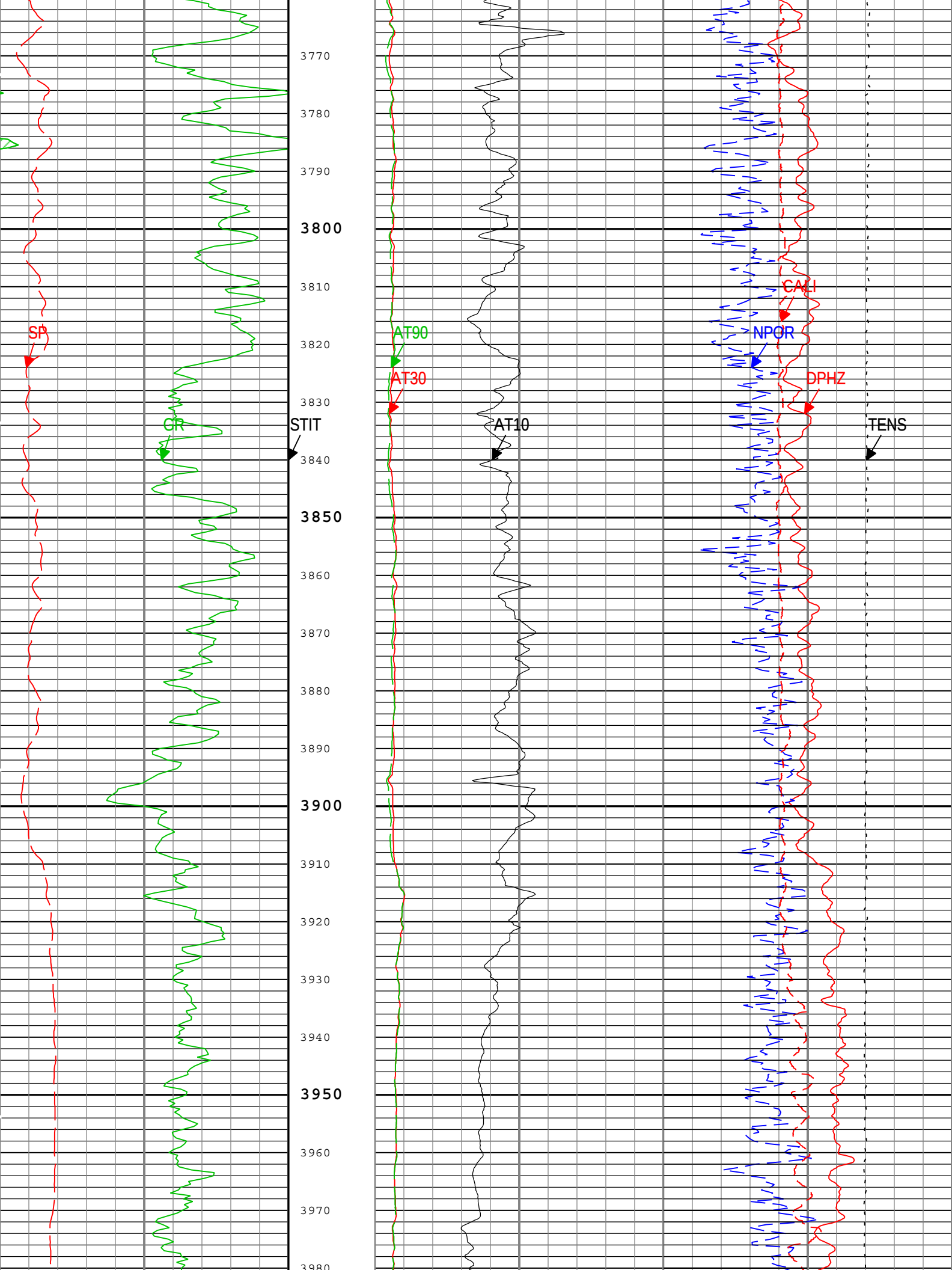
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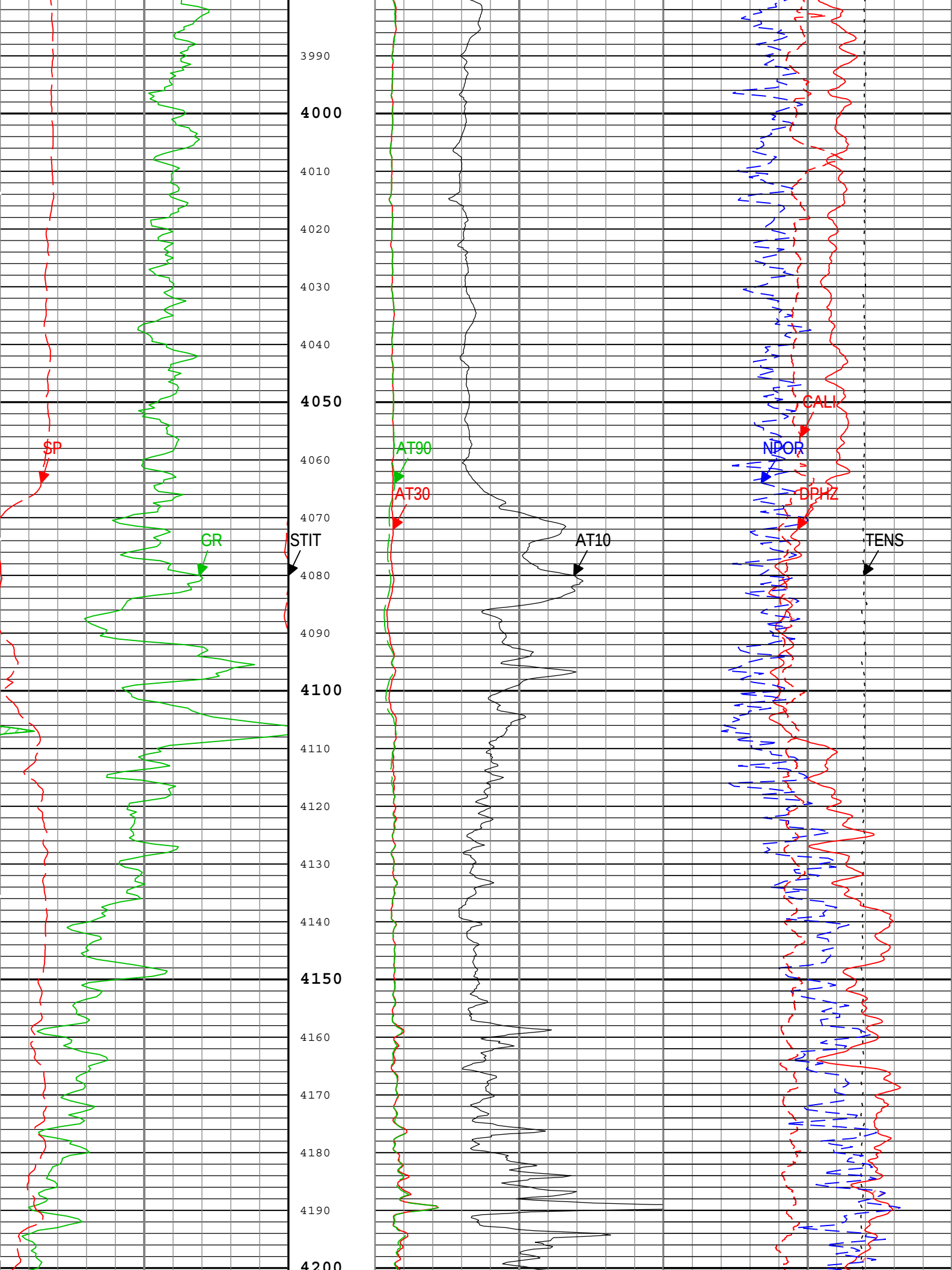
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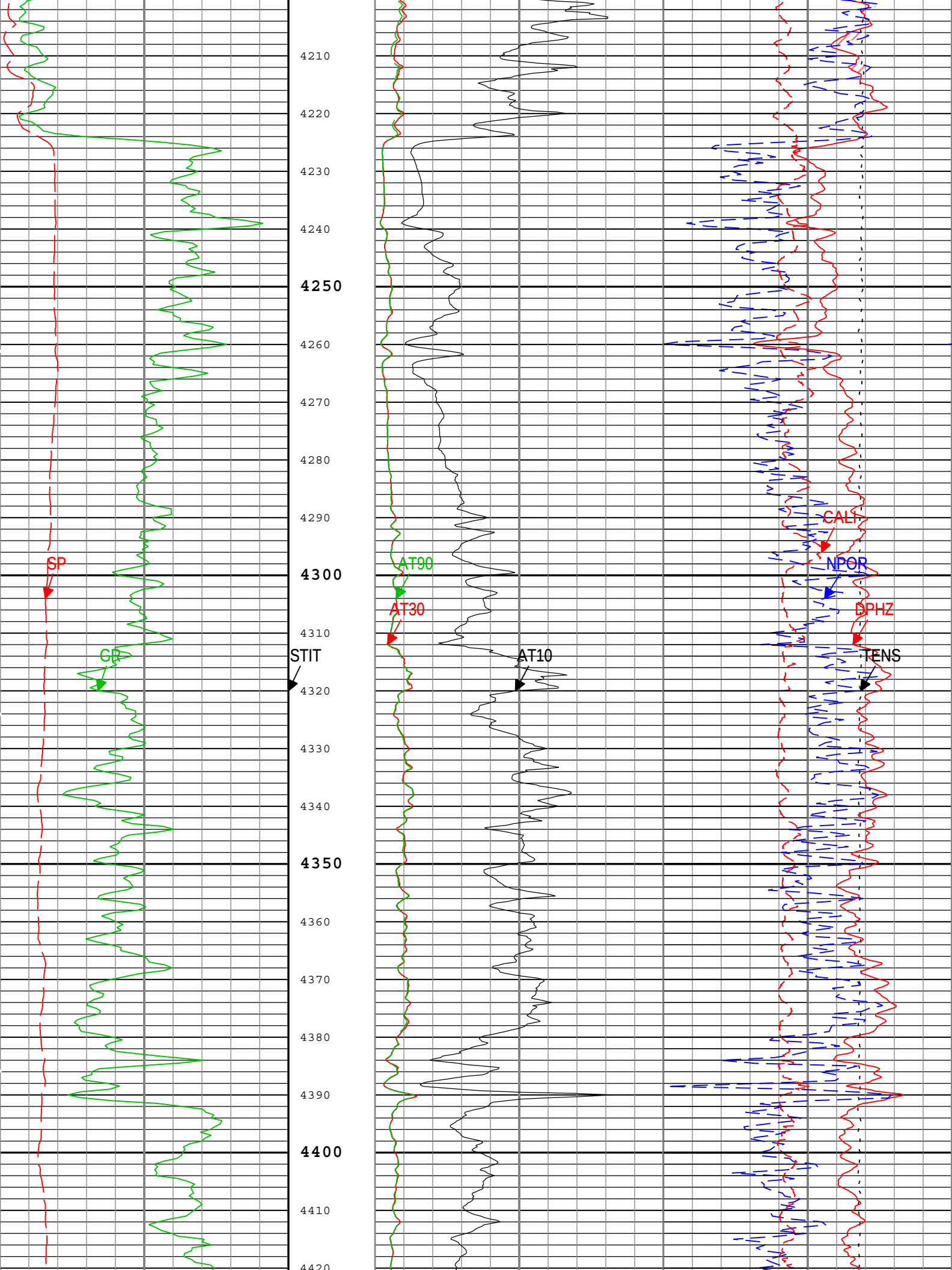
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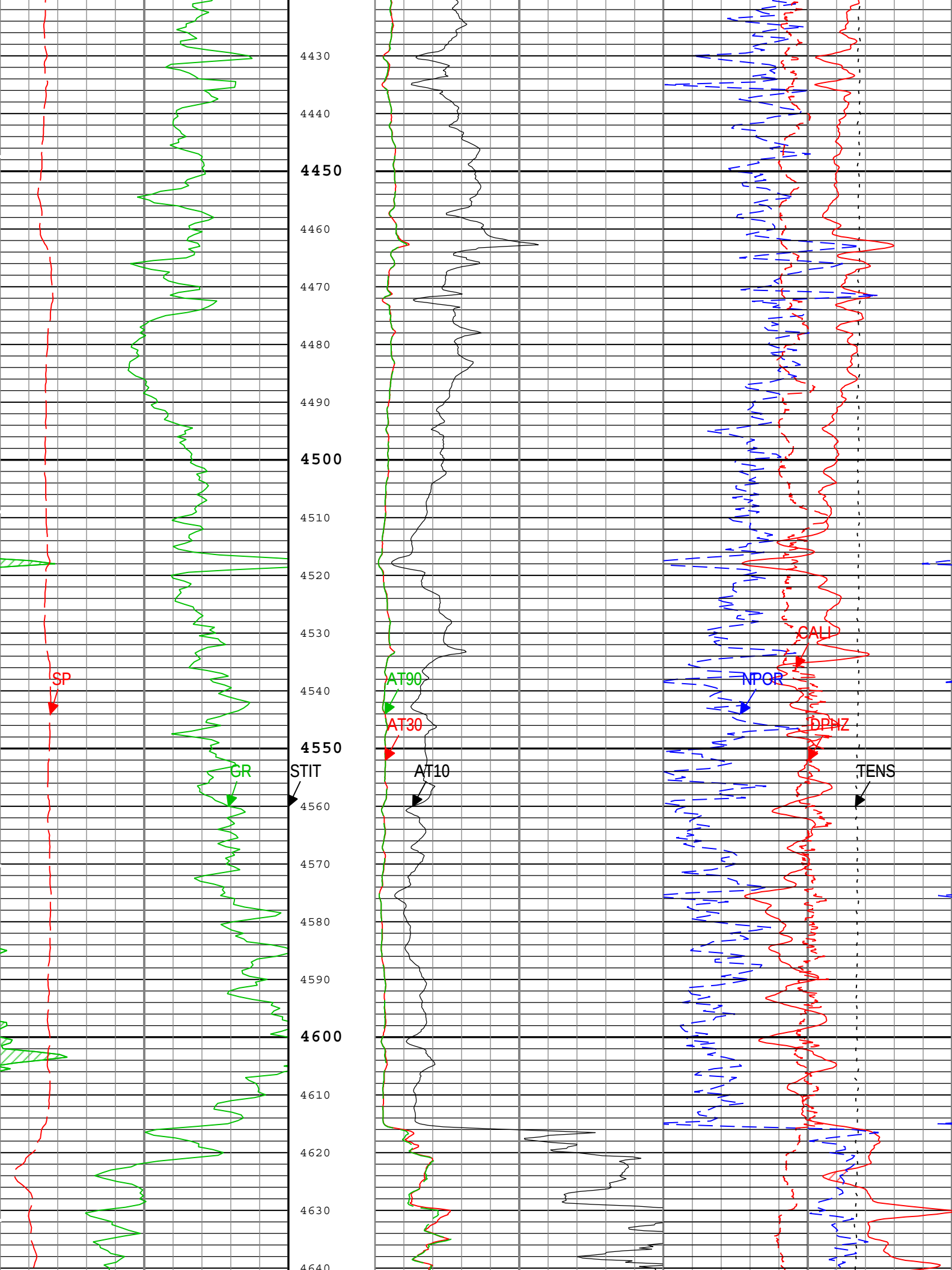
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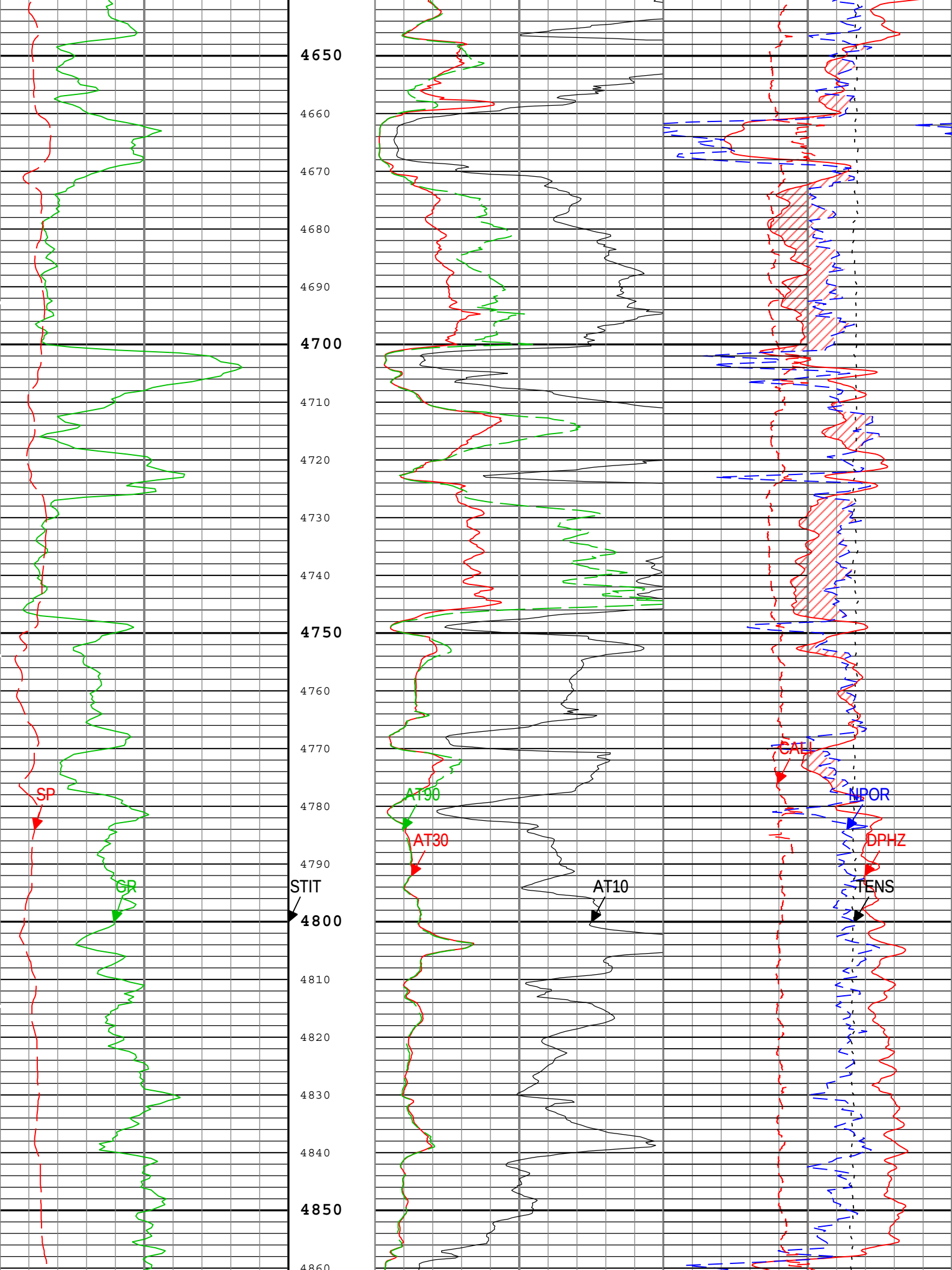
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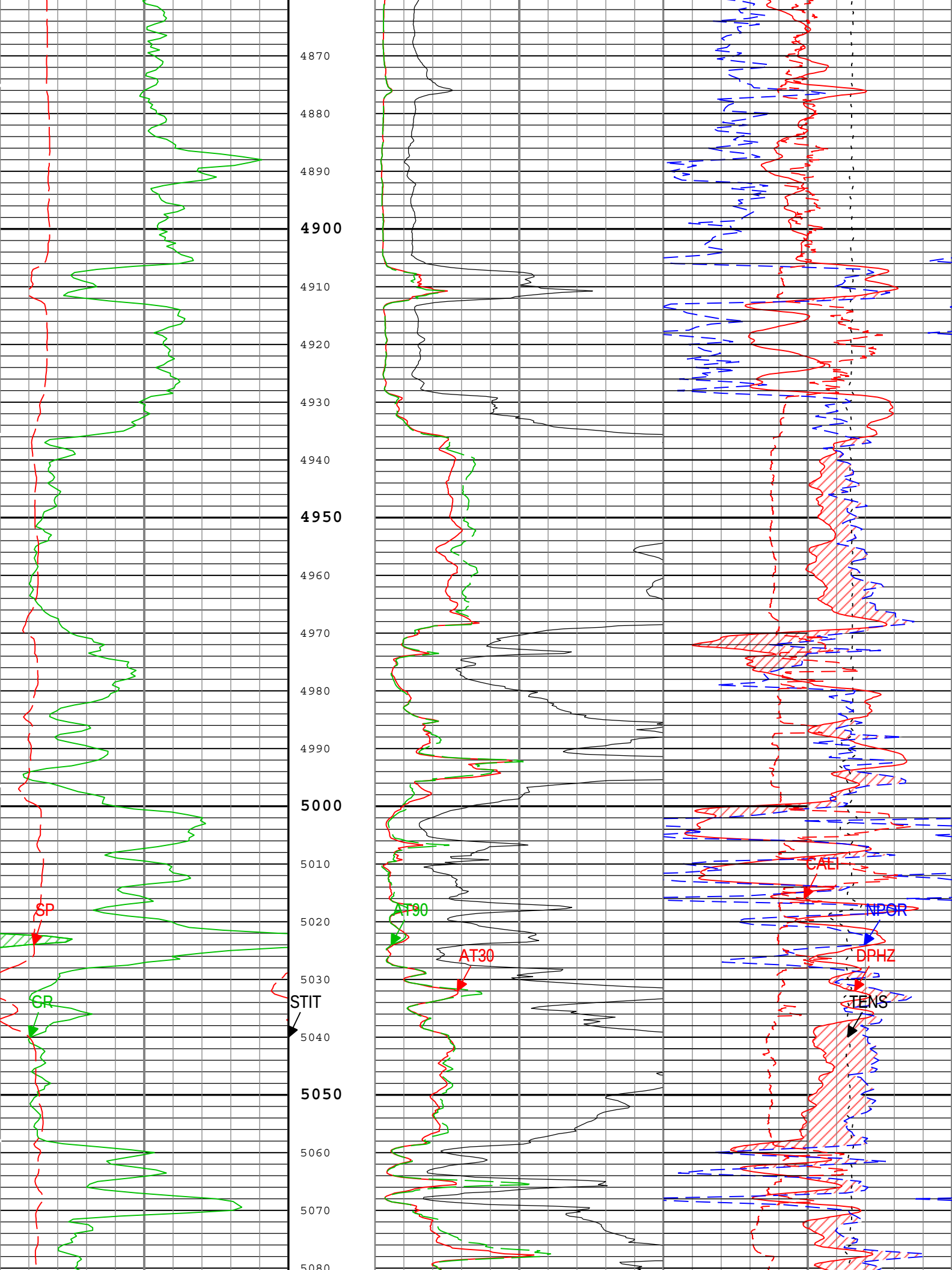
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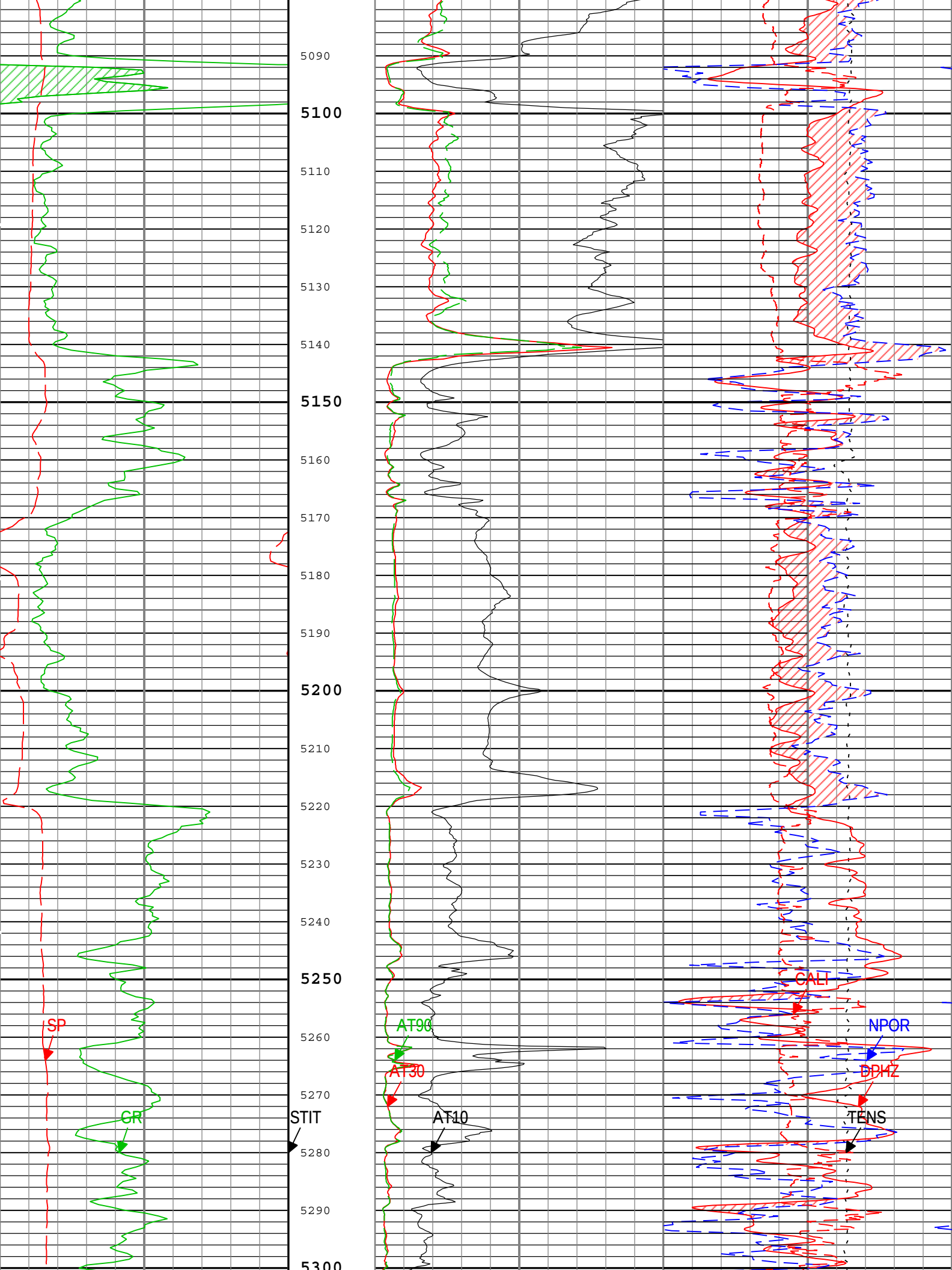
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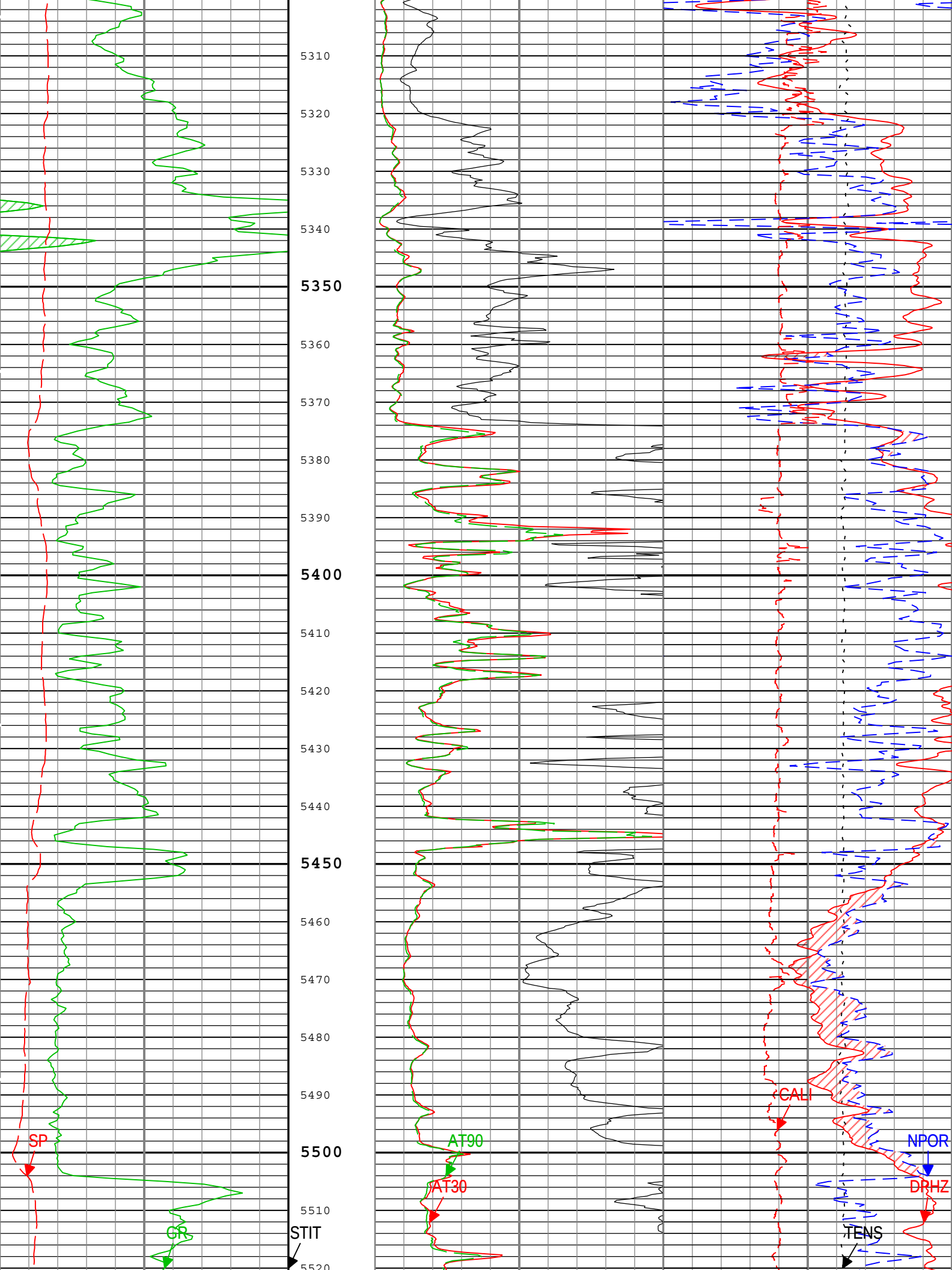
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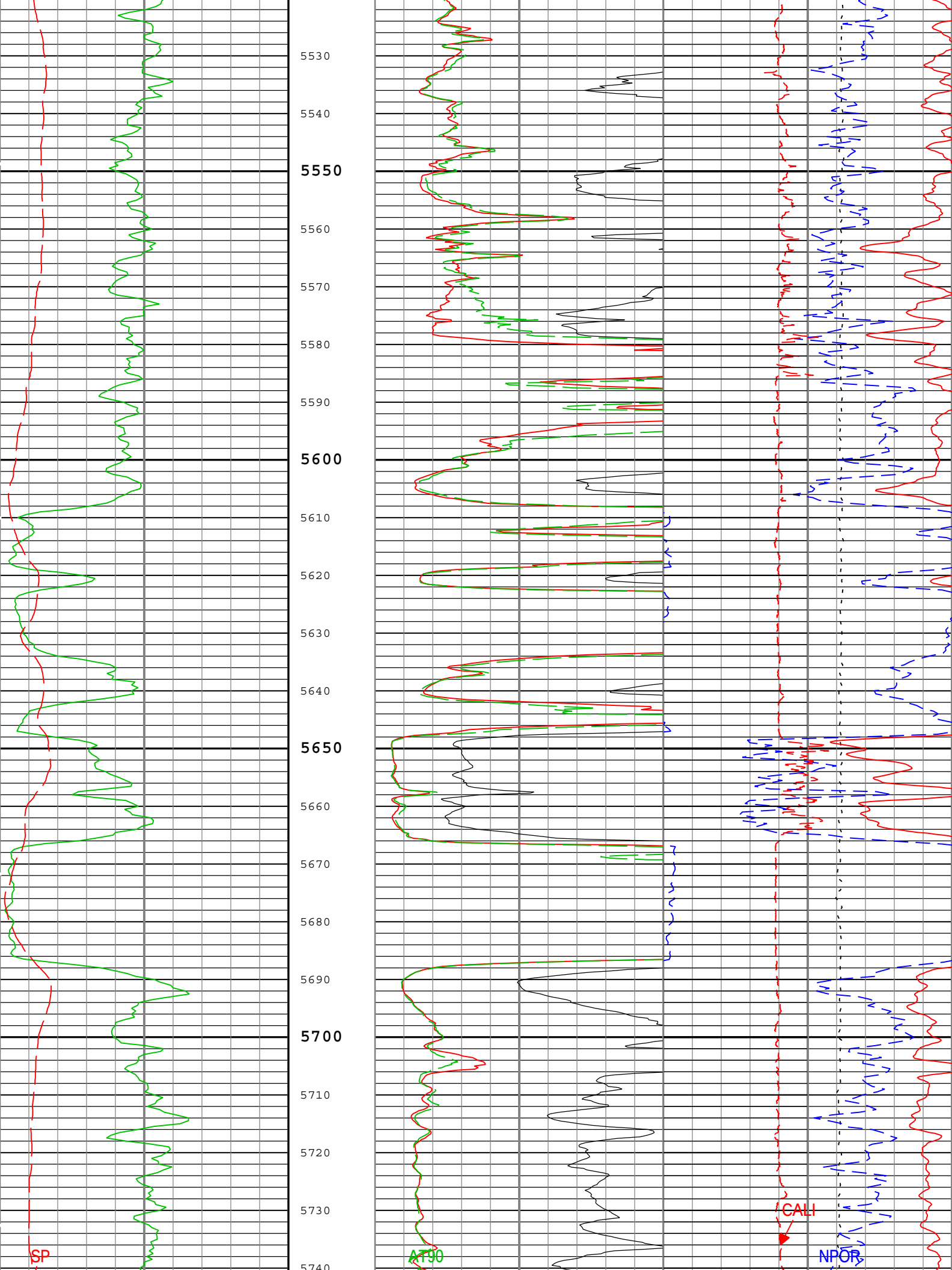
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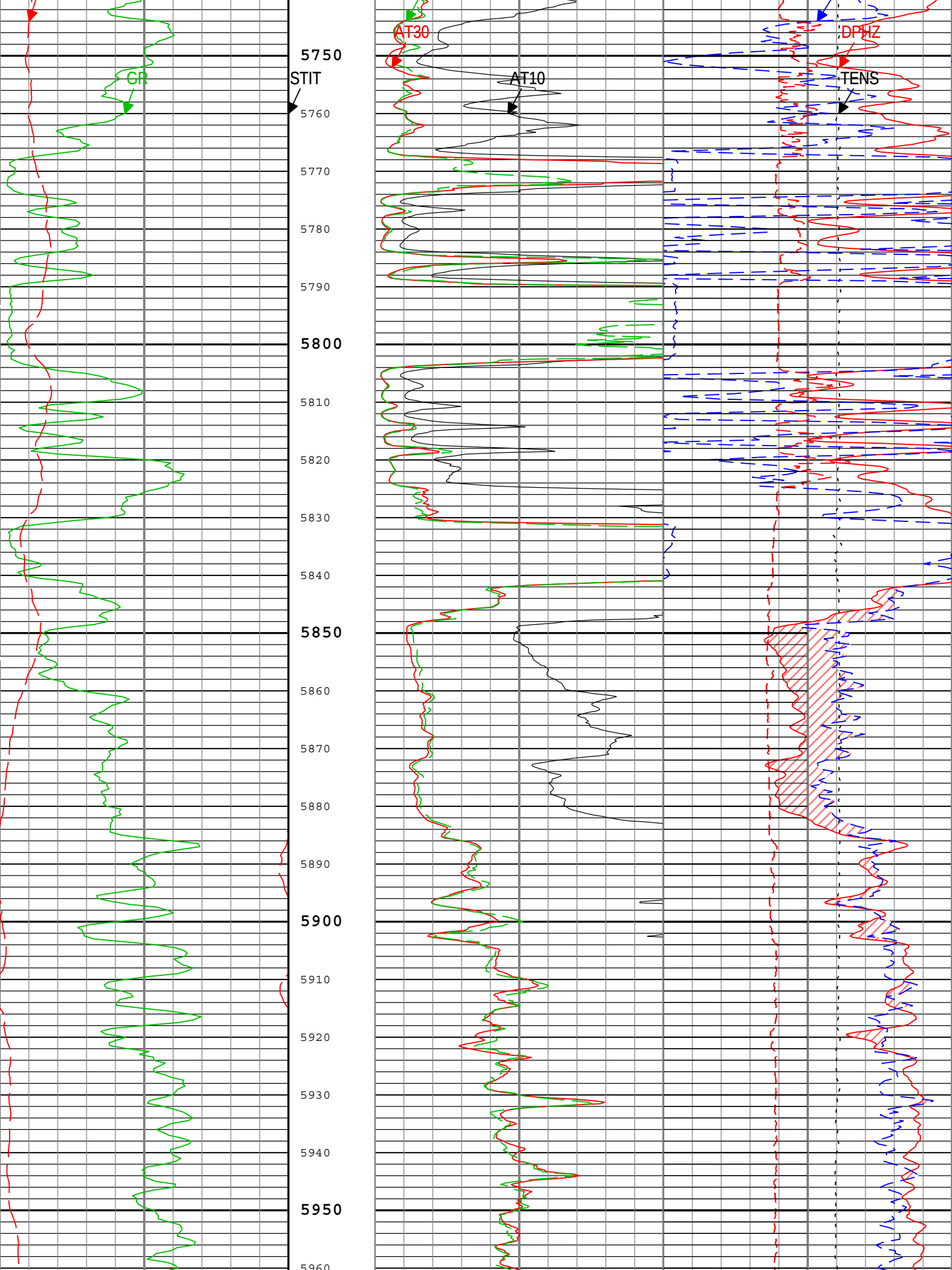
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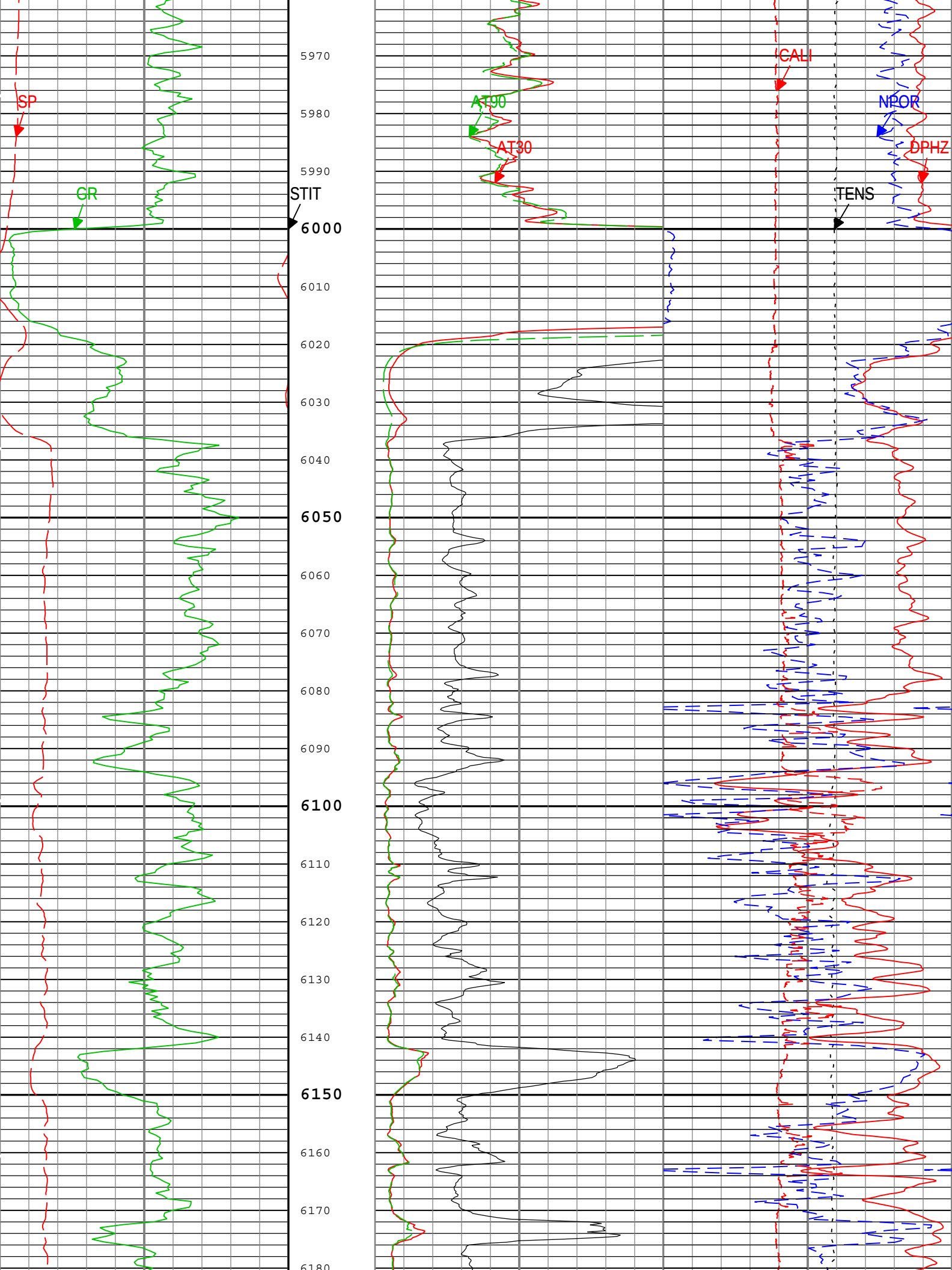
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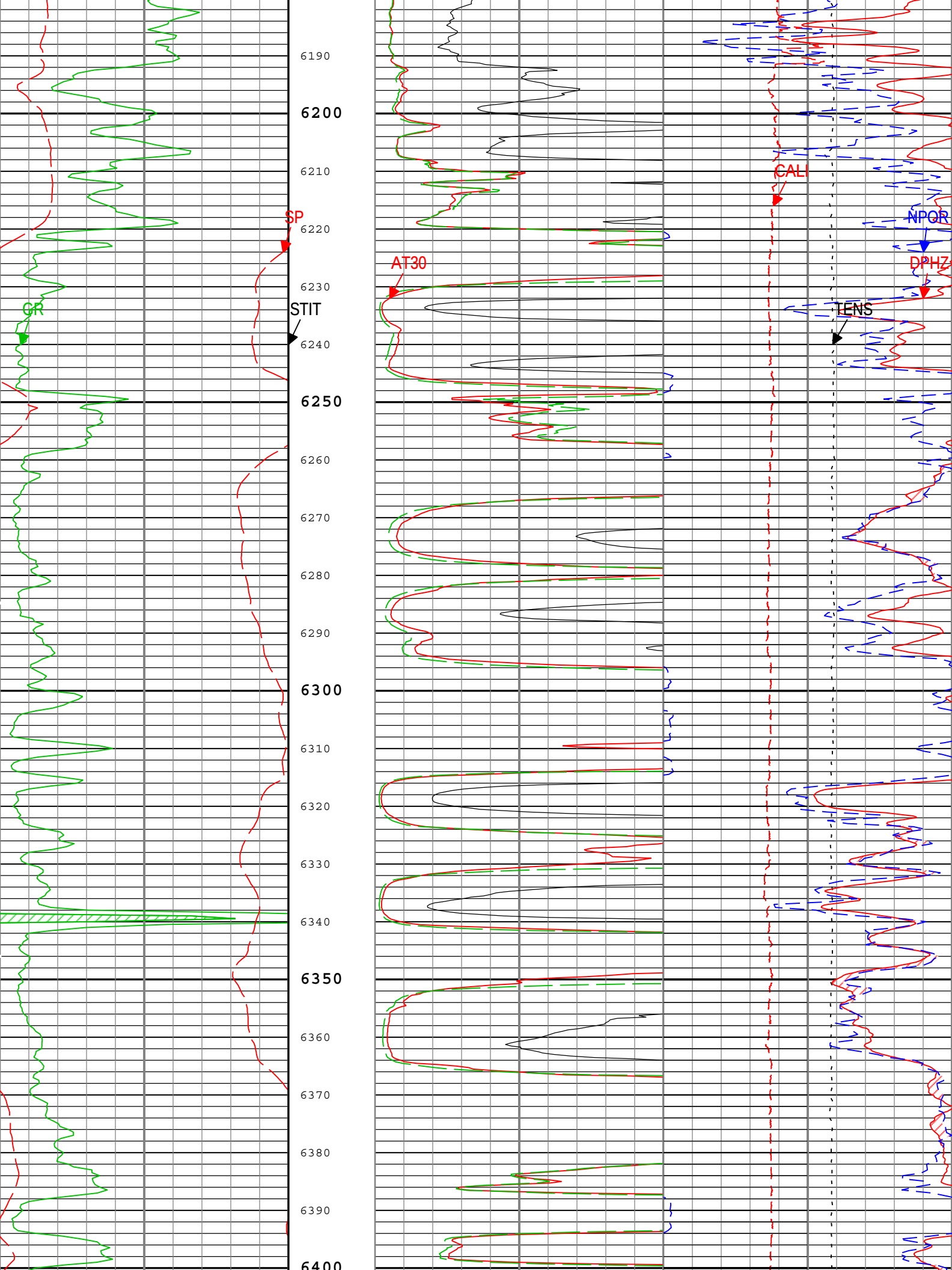
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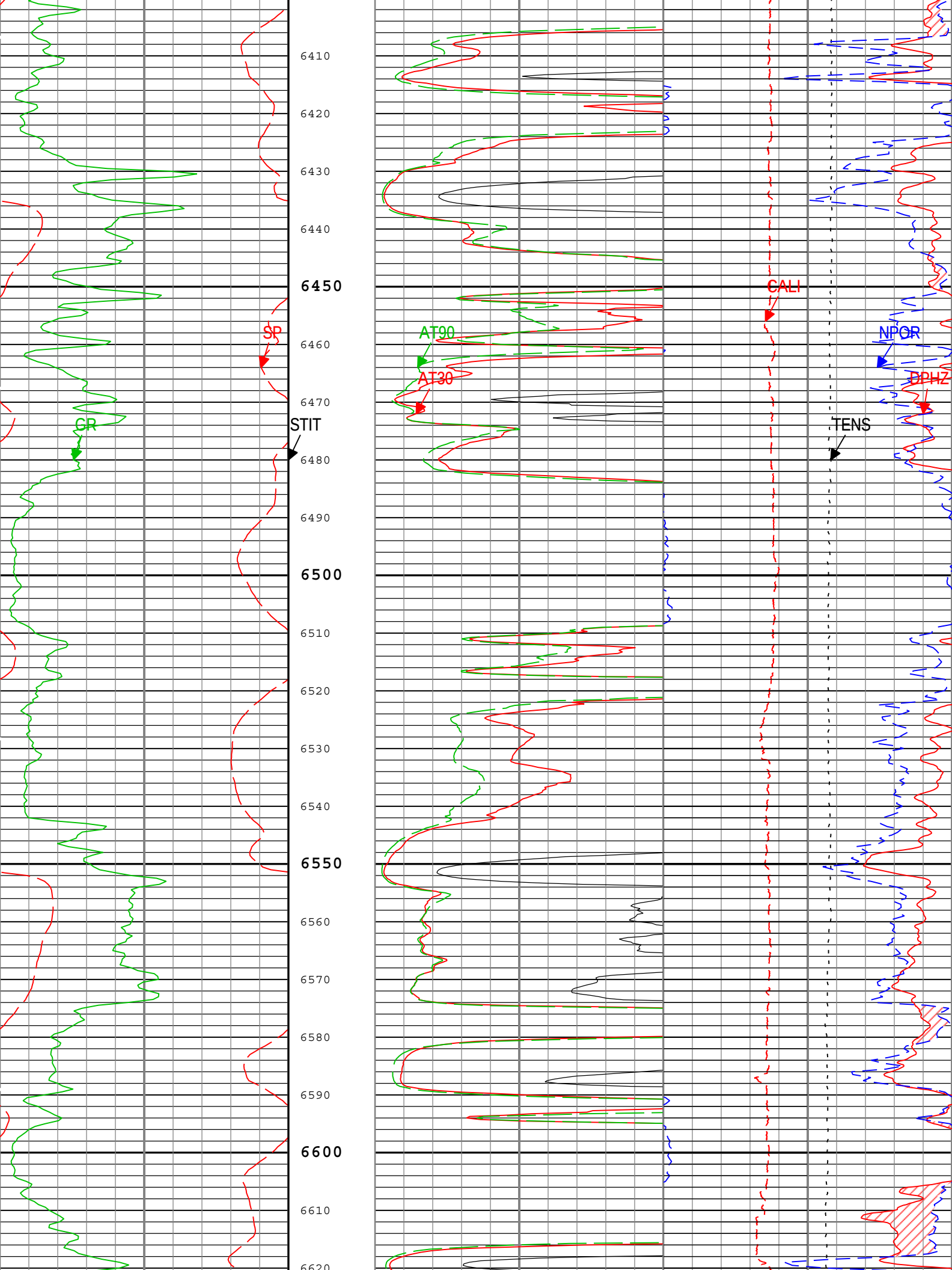
NPOR
DPHZ
TENS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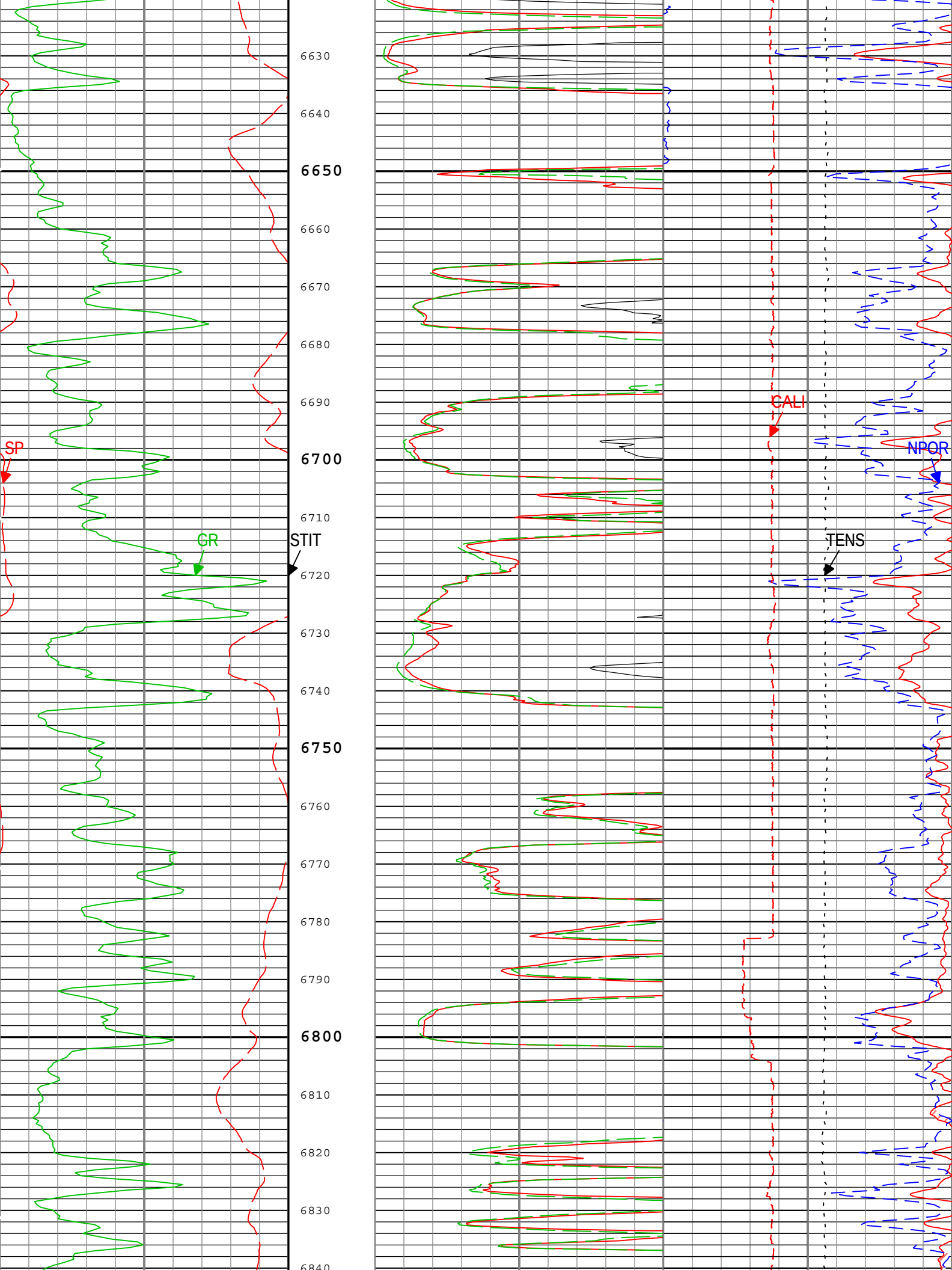
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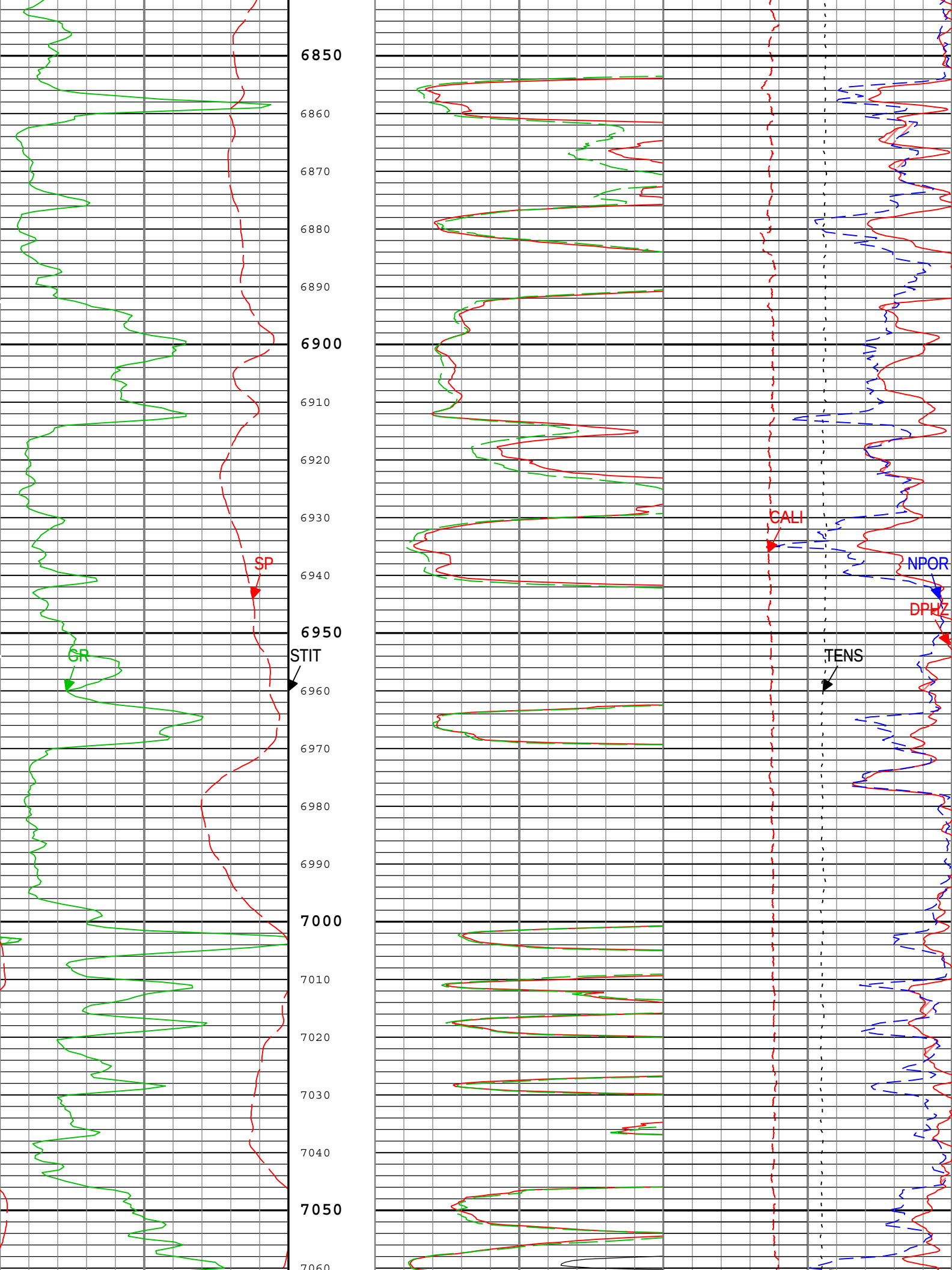
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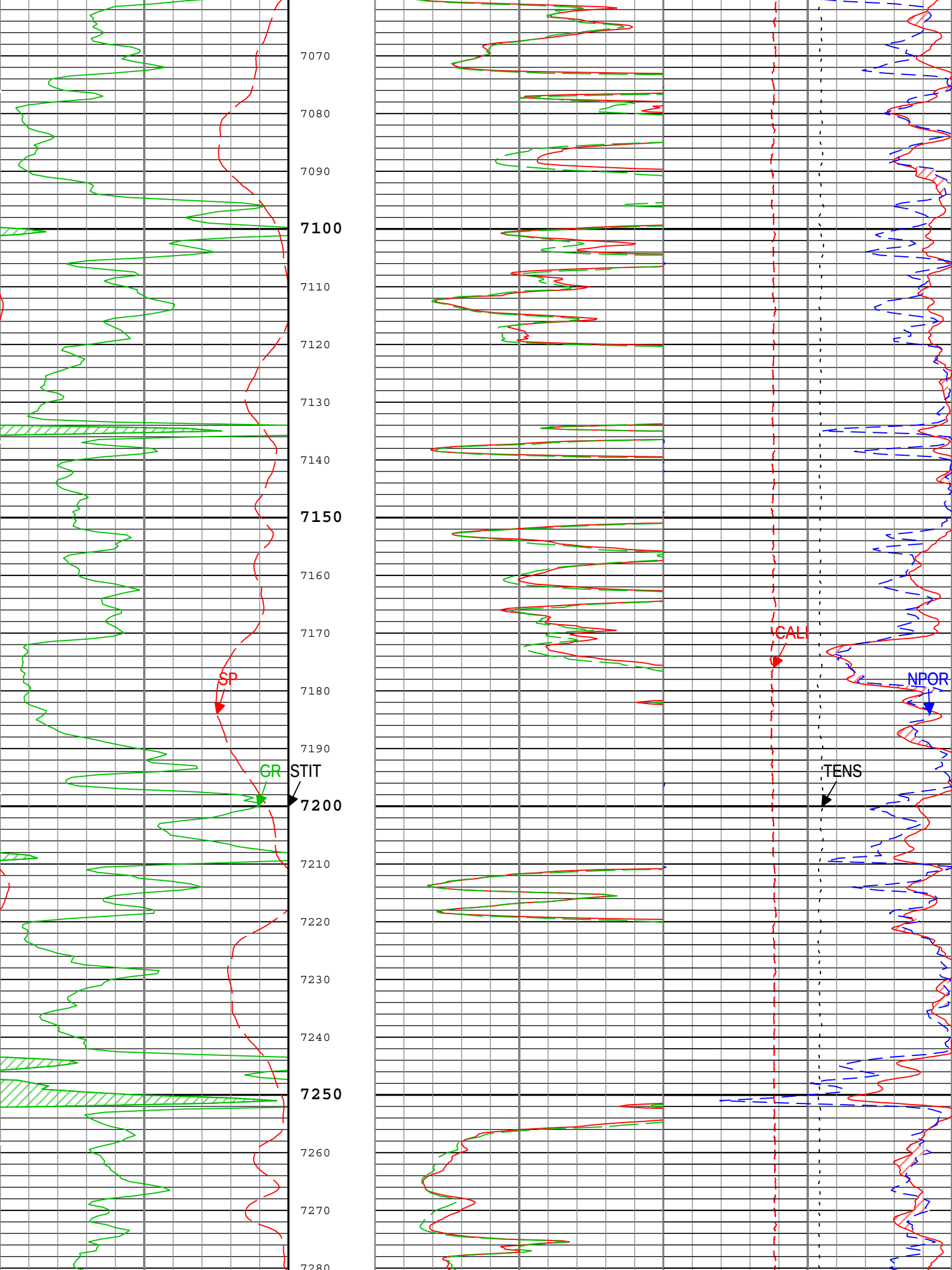
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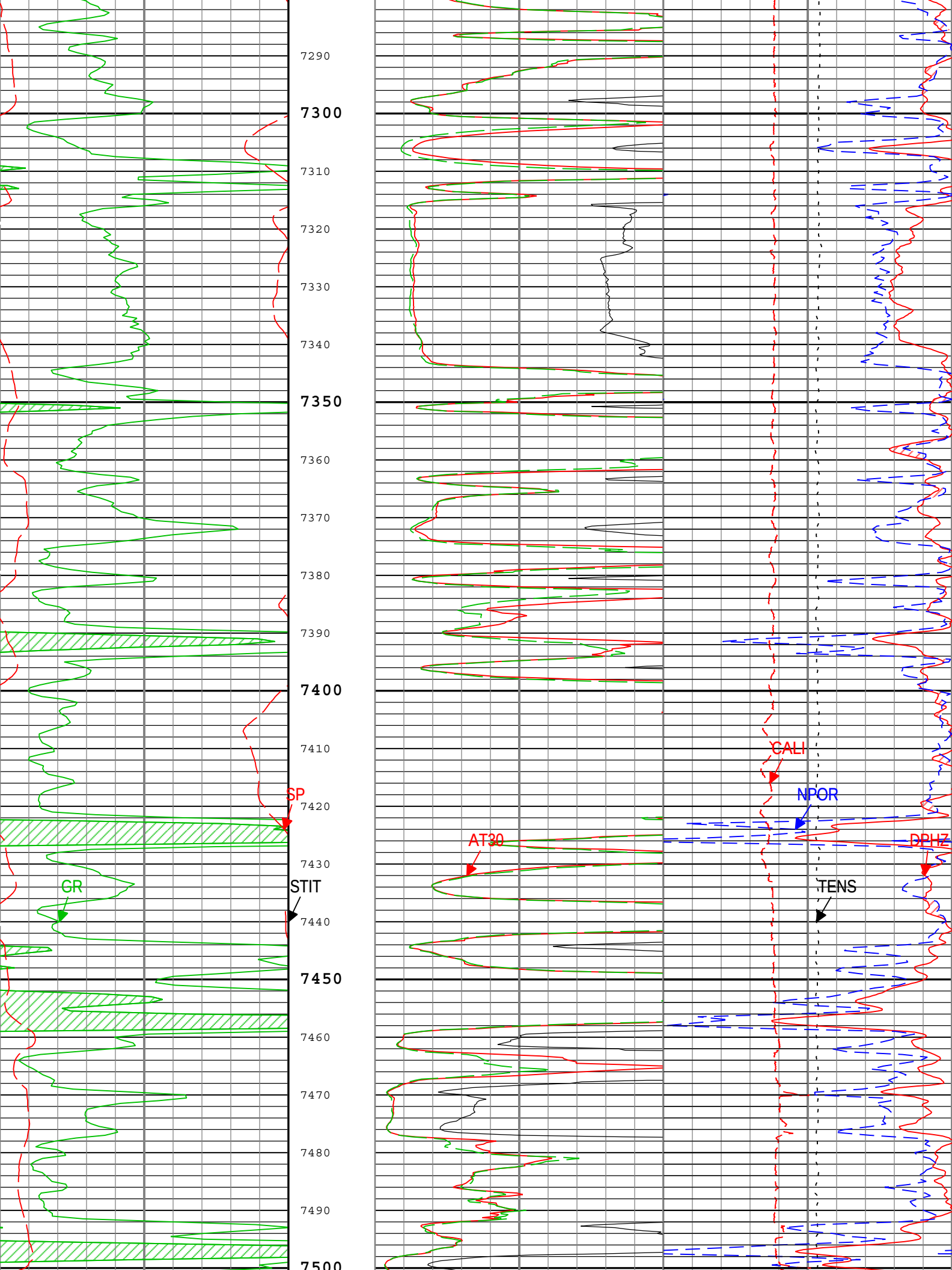
TENS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STIT
CALI
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AT30
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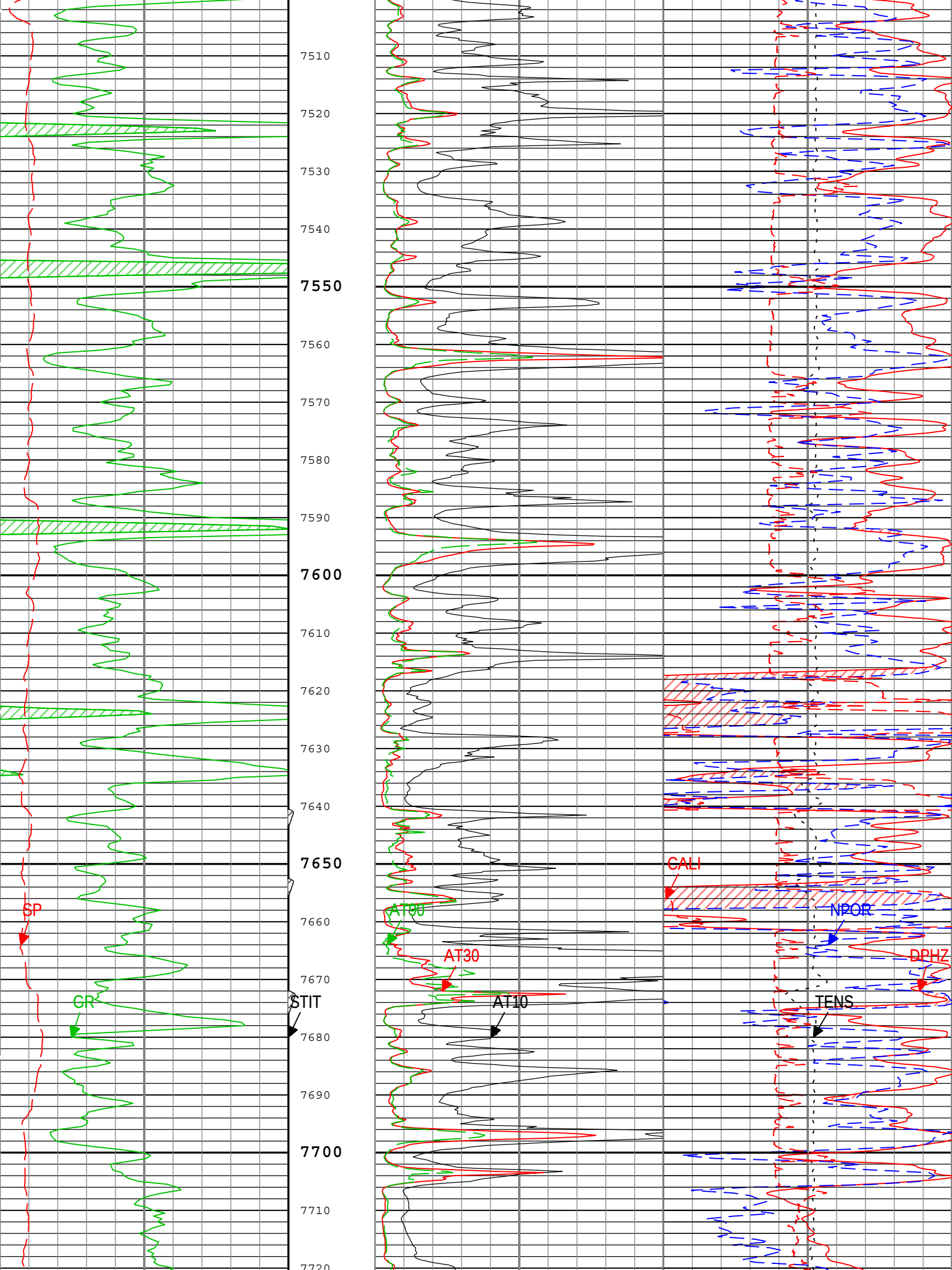
TENS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SP
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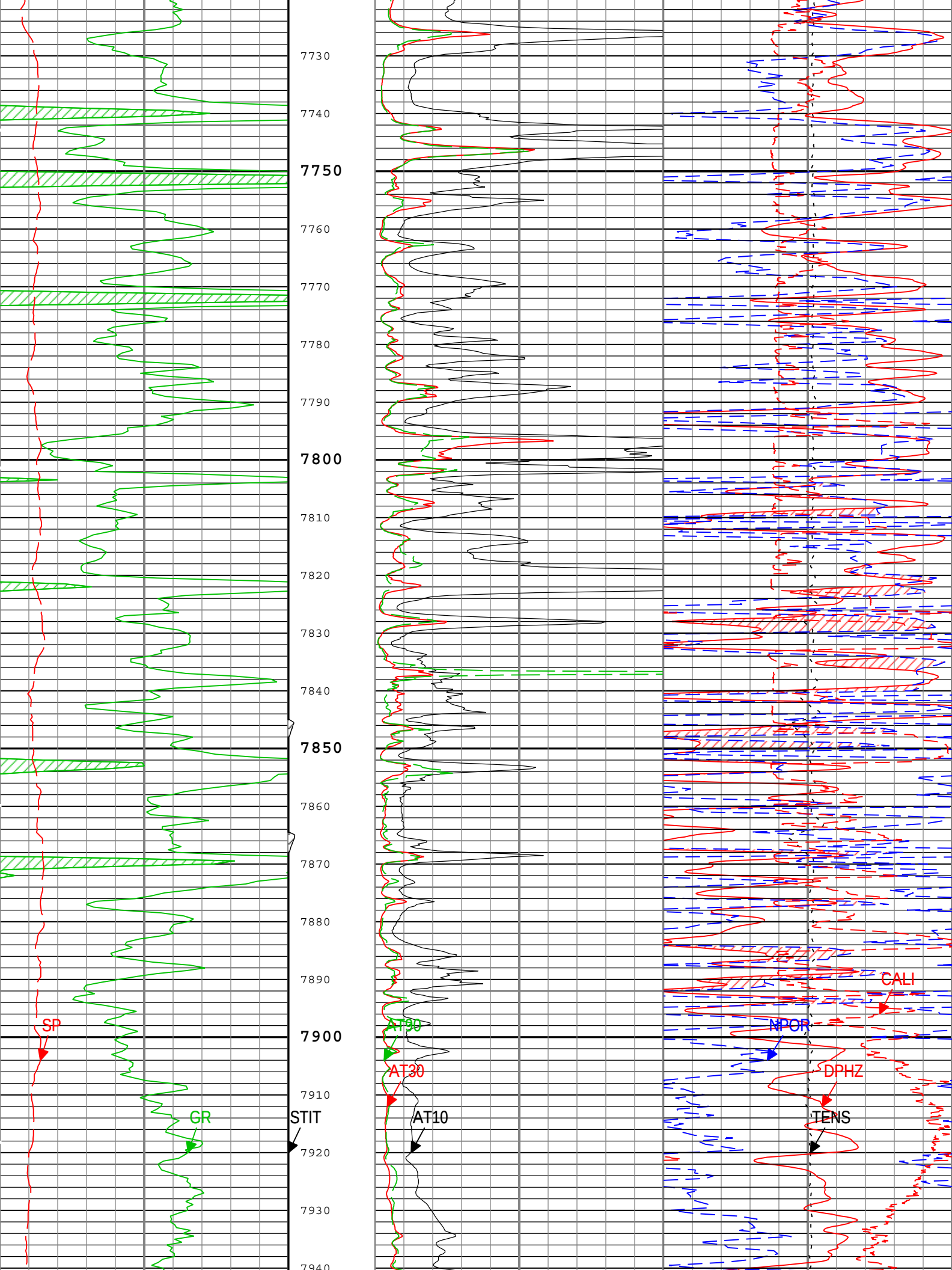
STIT
CALI
NPOR
DPHZ
TENS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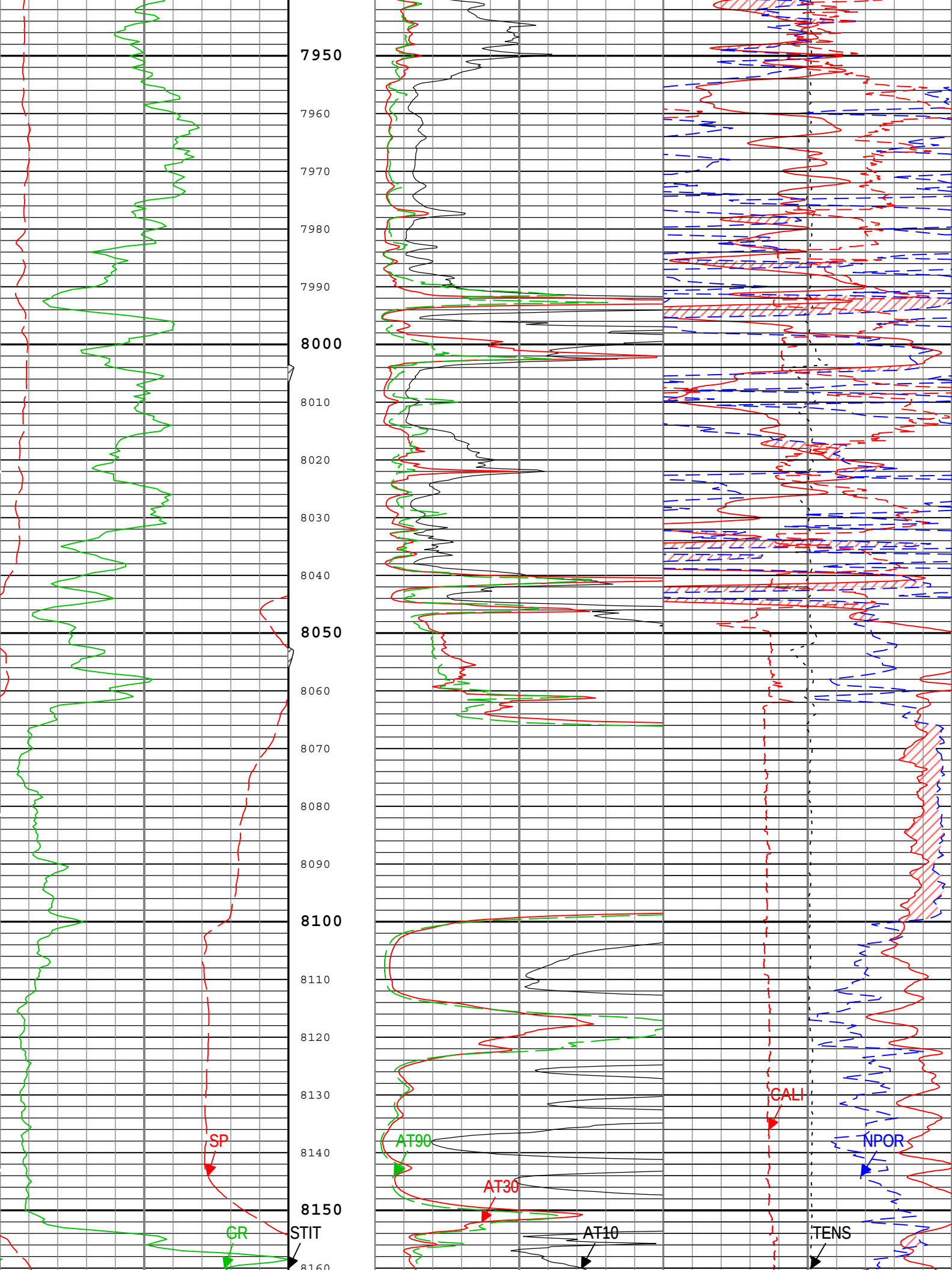
DPHZ
TENS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8080
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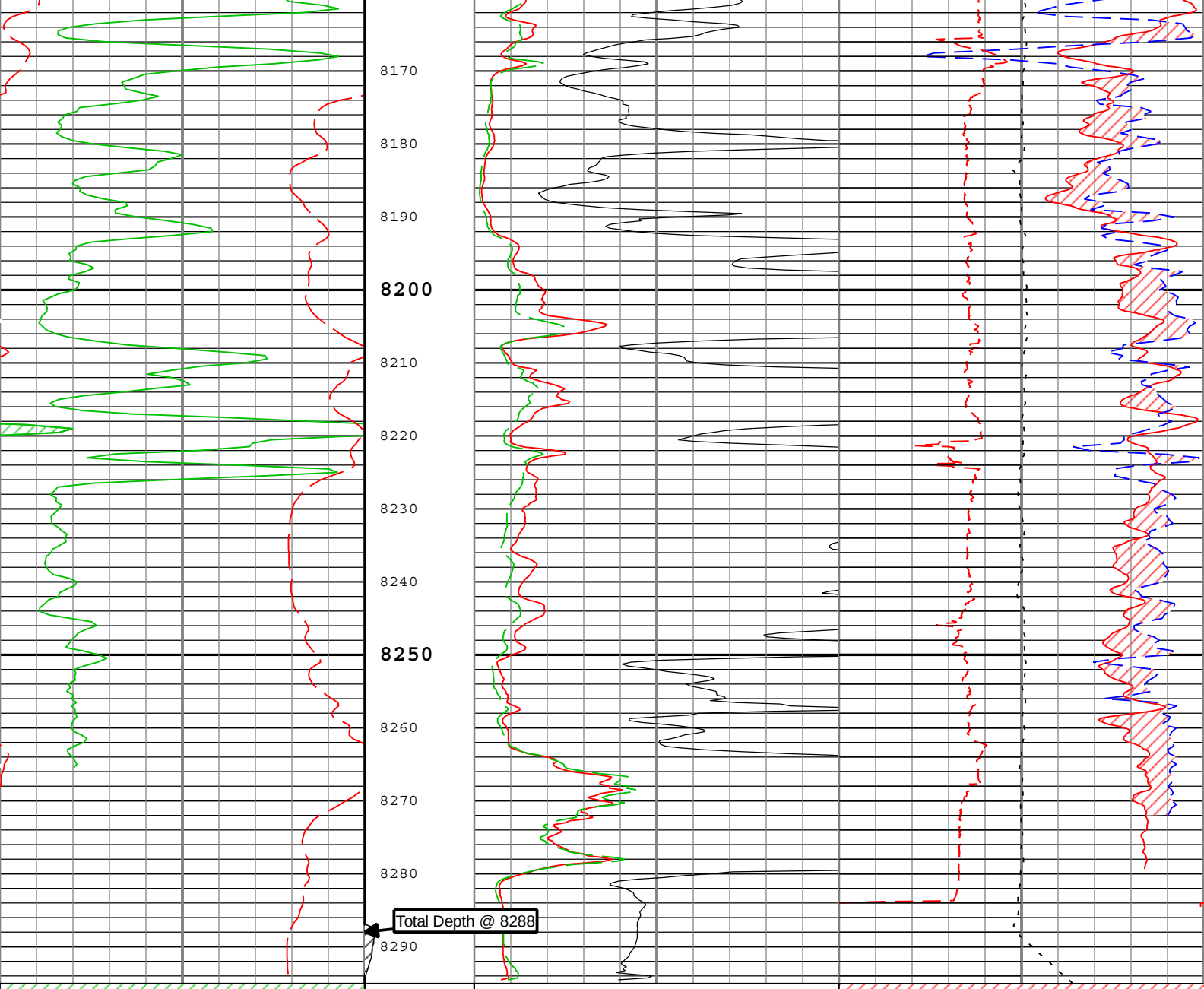


Gamma Ray Back up

Gamma Ray (GR) HGNS-H
0 gAPI 200

Spontaneous Potential (SP) AIT-M
-100 mV 200

Stuck Tool Indicator, Total (STIT)
0 ft 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0 ohm.m 10

Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0 ohm.m 50

Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0 ohm.m 50

Gas Effect

NPOR Backup

Cable Tension (TENS)
5000 lbf 0

Standard Resolution Density Porosity (DPHZ) HDRS-H
0.5 ft3/ft3 0

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.5 m3/m3 0

Caliper (CALI) HDRS-H
4 in 14

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:21

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit

ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	180	degF
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	0	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	350	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	81.63	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.8	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	8288	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	3600	ft/h

1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Repeat[2]:Up	Up	7884.30 ft	8306.82 ft	13-Feb-2014 2:18:03 PM	13-Feb-2014 2:26:21 PM	ON	4.83 ft	No
1	Main[3]:Up	Up	14.54 ft	8302.86 ft	13-Feb-2014 2:29:40 PM	13-Feb-2014 4:59:53 PM	ON	0.00 ft	No

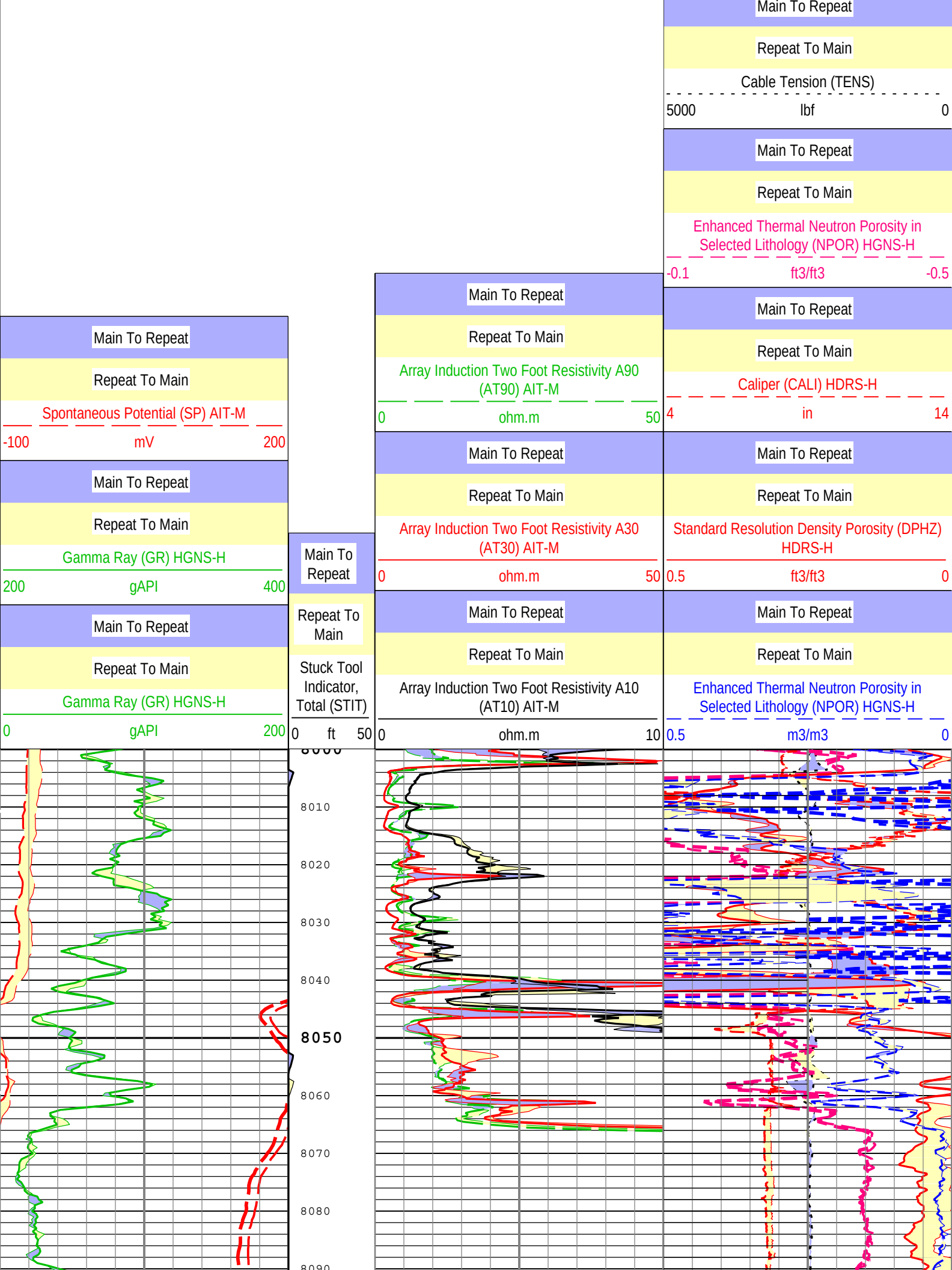
All depths are referenced to toolstring zero

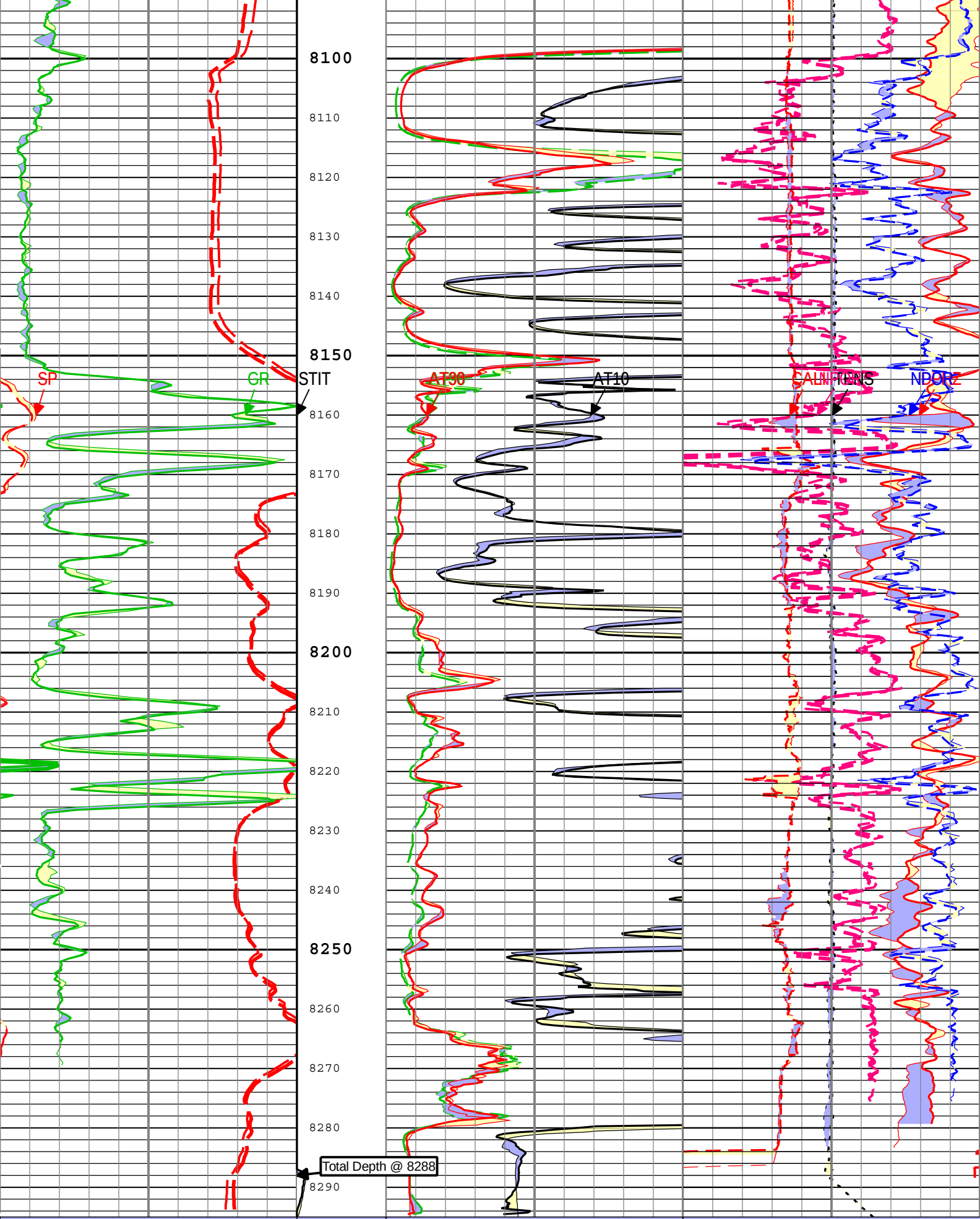
Log

Company:Nighthawk Production LLC Well:Big Sky 5-11 1: Repeat[2]:Up:S006

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:24

TIME_1900 - Time Marked every 60.00 (s)


Main To Repeat
Repeat To Main
Cable Tension (TENS)
5000 lbf 0
Main To Repeat
Repeat To Main
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
-0.1 ft3/ft3 -0.5
Main To Repeat
Repeat To Main
Caliper (CALI) HDRS-H
4 in 14
Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0 ohm.m 50
Main To Repeat
Repeat To Main
Spontaneous Potential (SP) AIT-M
-100 mV 200
Main To Repeat
Repeat To Main
Gamma Ray (GR) HGNS-H
200 gAPI 400
Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0 ohm.m 50
Main To Repeat
Repeat To Main
Standard Resolution Density Porosity (DPHZ) HDRS-H
0.5 ft3/ft3 0
Main To Repeat
Repeat To Main
Gamma Ray (GR) HGNS-H
0 gAPI 200
Main To Repeat
Repeat To Main
Stuck Tool Indicator, Total (STIT)
0 ft 50
Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0 ohm.m 10
Main To Repeat
Repeat To Main
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.5 m3/m3 0
8000
8010
8020
8030
8040
8050
8060
8070
8080
8090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8110
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8180
8190
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8210
8220
8230
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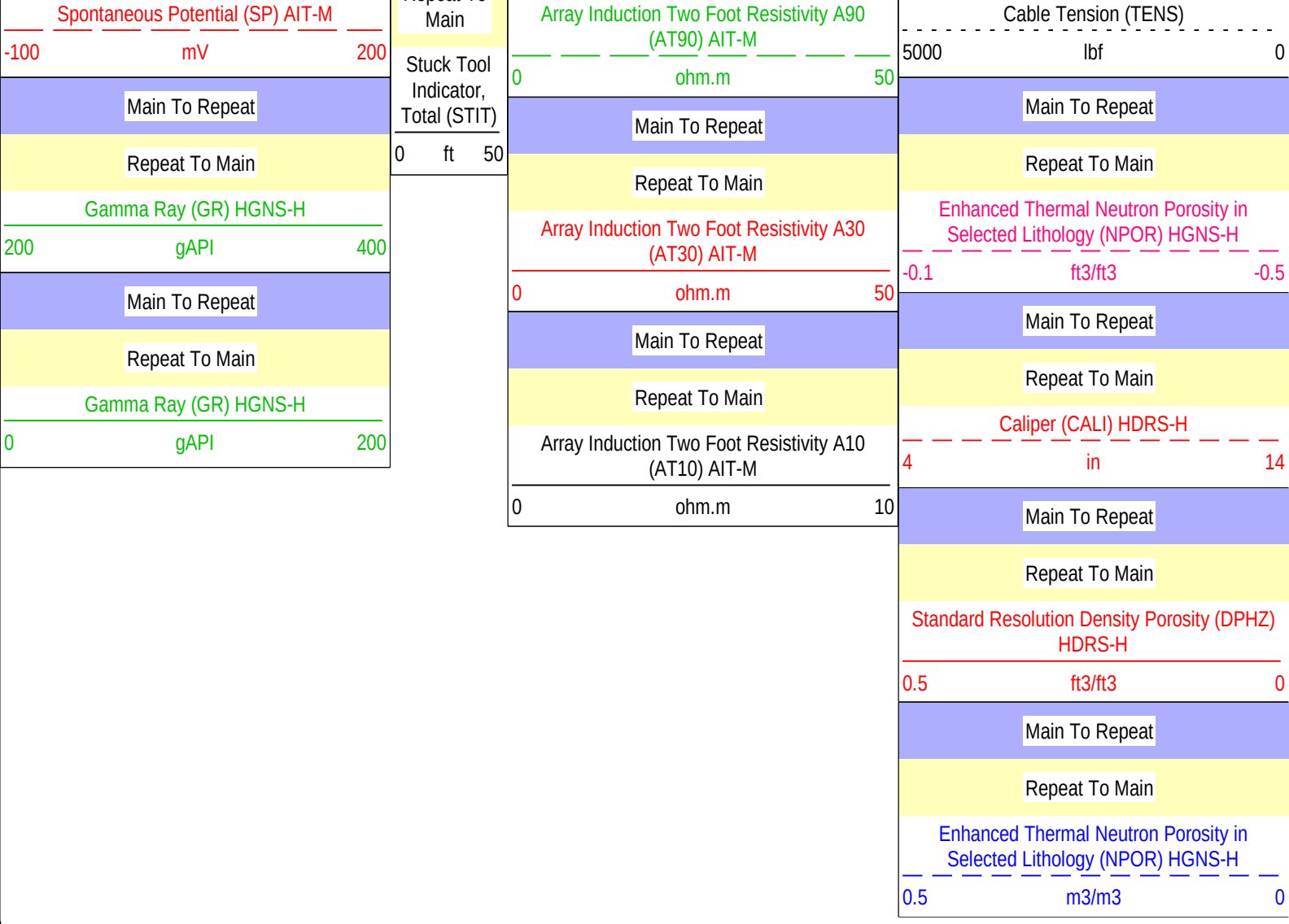
8250
8260
8270
8280
8290
SP
GR
STIT
AT30
AT10
CALI
TENS
NPORZ
Total Depth @ 8288
Main To Repeat
Repeat To Main
Main To Repeat
Repeat To
Main To Repeat
Repeat To Main
Main To Repeat
Repeat To Main



Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:24

1

5" Triple Combo

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_13393-4.0.9163.3001

Computation	Description	Version
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	4.0.9033.3000
DepthCorrection	DepthCorrection	4.0.9213.3000

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	4.0.9231.3000	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9231.3000	2.0
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	4.0.9231.3000	3.0
AMIS	Array Induction Sonde - M	4.0.9247.3000	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Main[3]:Up	Up	14.54 ft	8302.86 ft	13-Feb-2014 2:29:40 PM	13-Feb-2014 4:59:53 PM	ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Nighthawk Production LLC Well:Big Sky 5-11

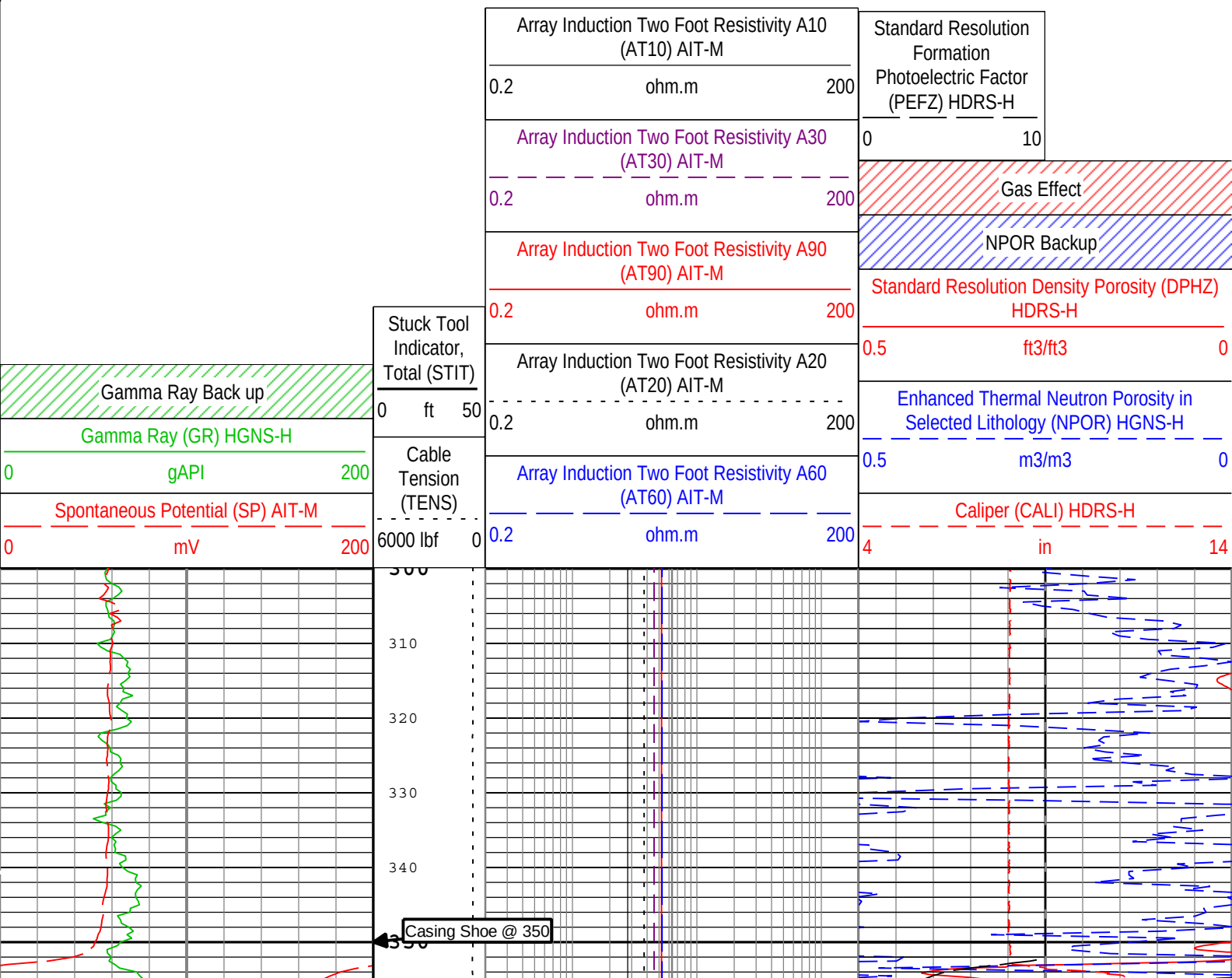
1: Main[3]:Up:S006

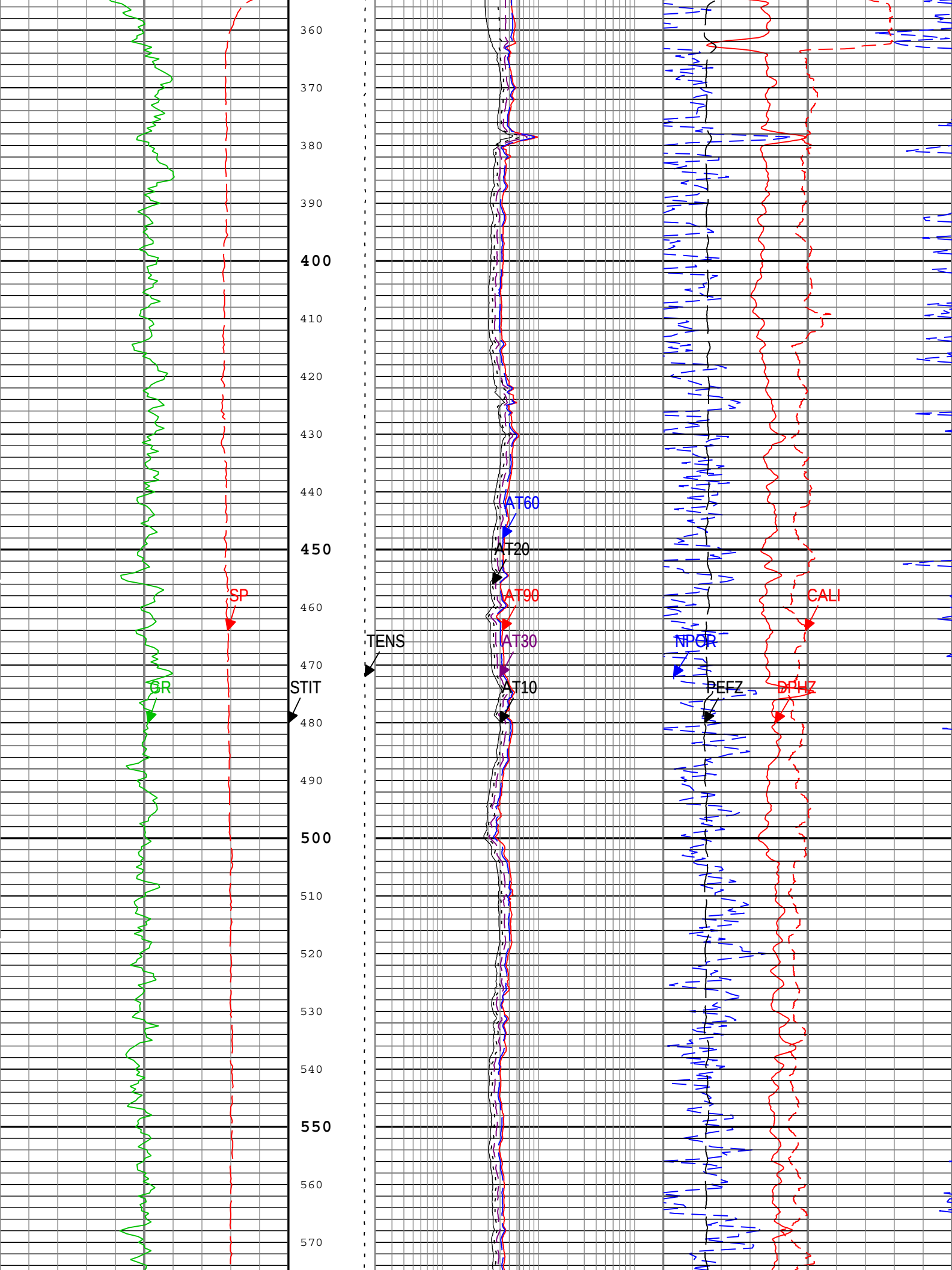
Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo) Index Scale: 5 in per 100 ft Index Unit: ft

Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:26

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT20	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
SP	AIT-M:AMIS:AMIS	6in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

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380
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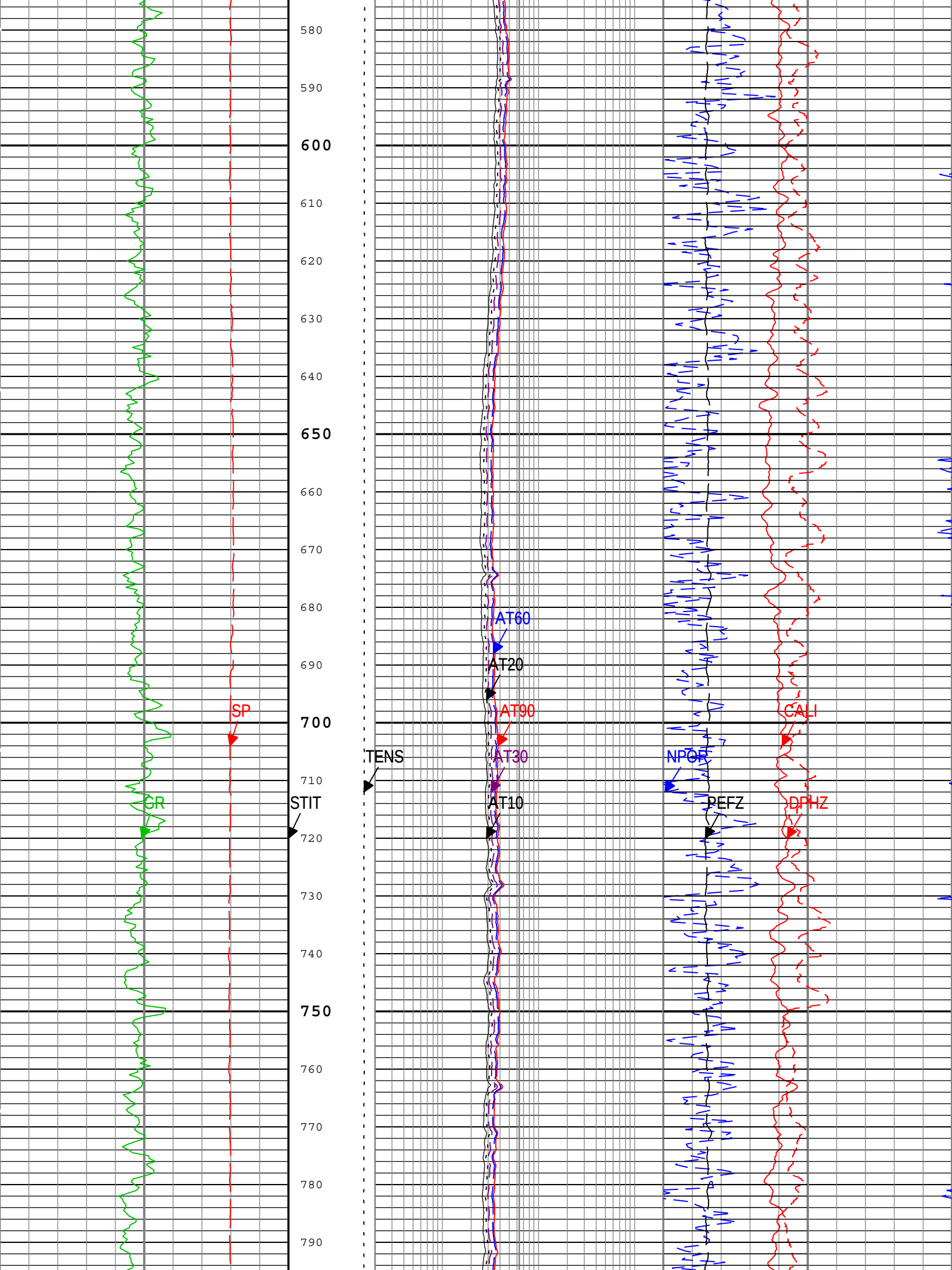
400
410
420
430
440
450
460
470
480
490
500
510
520
530
540
550
560
570
SP
GR
TENS
STIT
AT60
AT20
AT90
AT30
AT10
NPOR
CALI
PEFZ
DPHZ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590
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620
630
640
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660
670
680
690
700
710
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730
740
750
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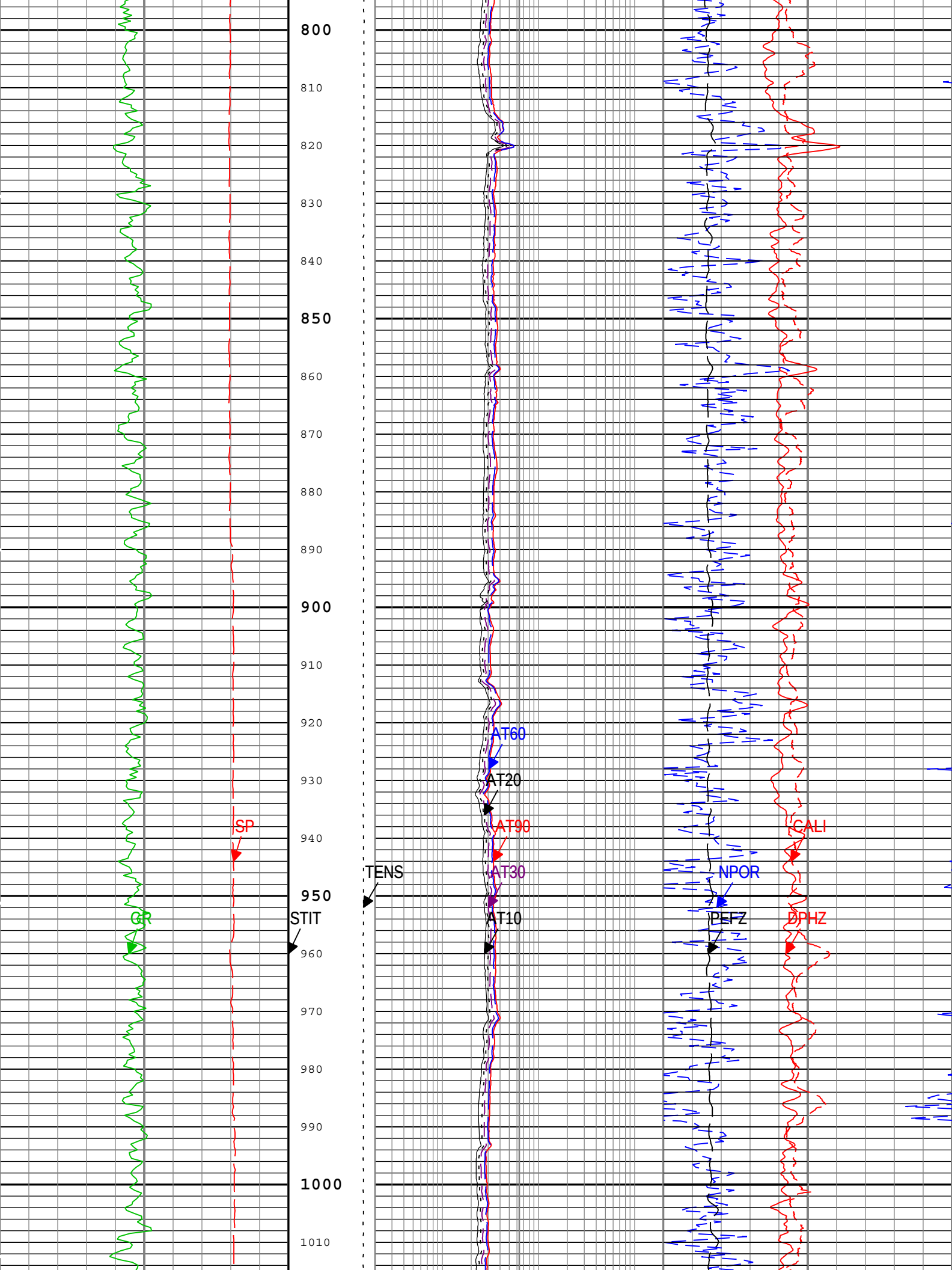
GR
TENS
STIT
AT60
AT20
AT90
AT30
AT10
NPOR
PEFZ
CALI
DPHZ


800
810
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830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
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1000
1010
SP
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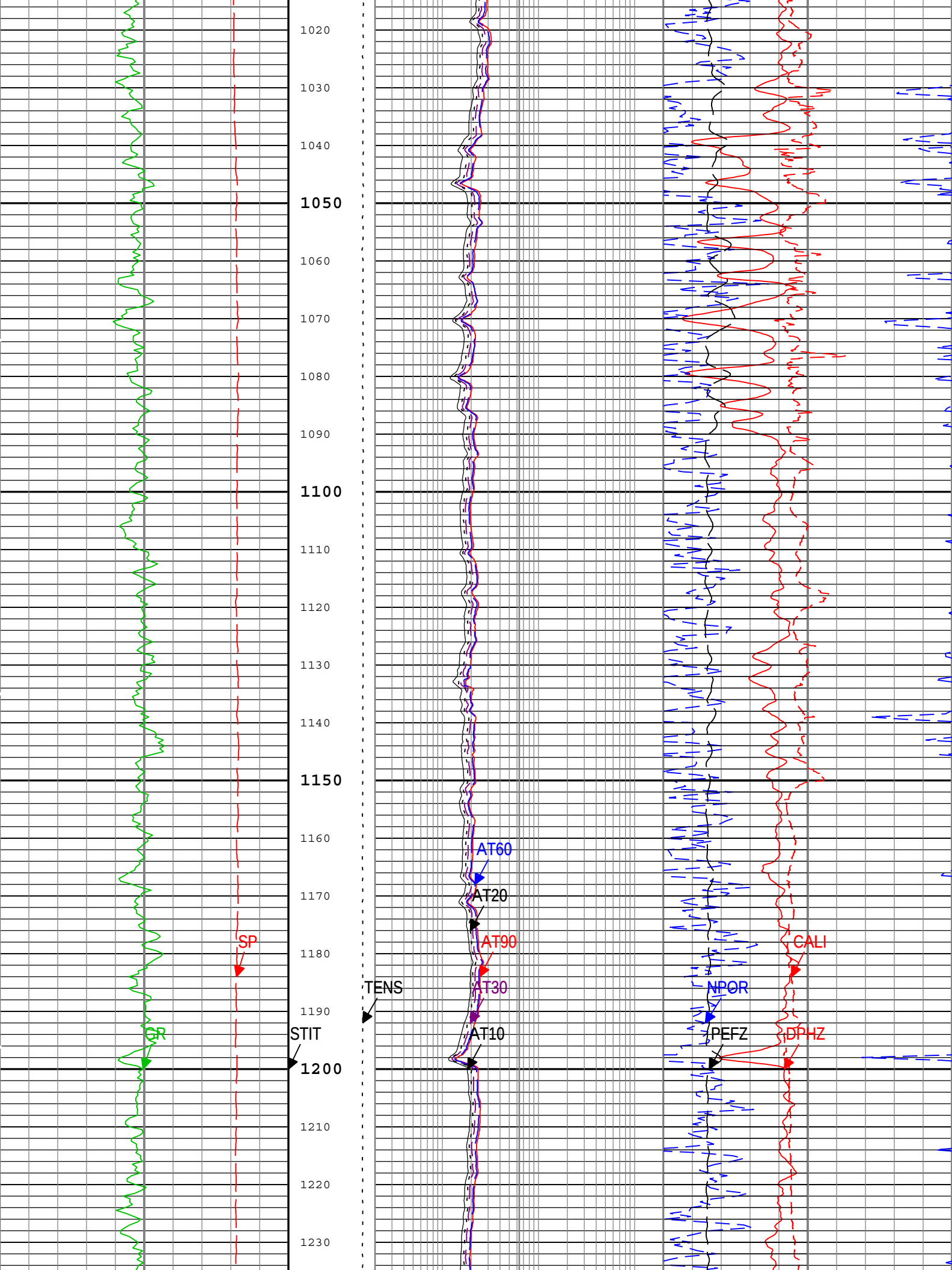
STIT
AT60
AT20
AT90
AT30
AT10
CALI
NPOR
PEFZ
DPHZ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1080
1090
1100
1110
1120
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1160
1170
1180
1190
1200
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1220
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AT20
AT90
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TENS
STIT
CALI
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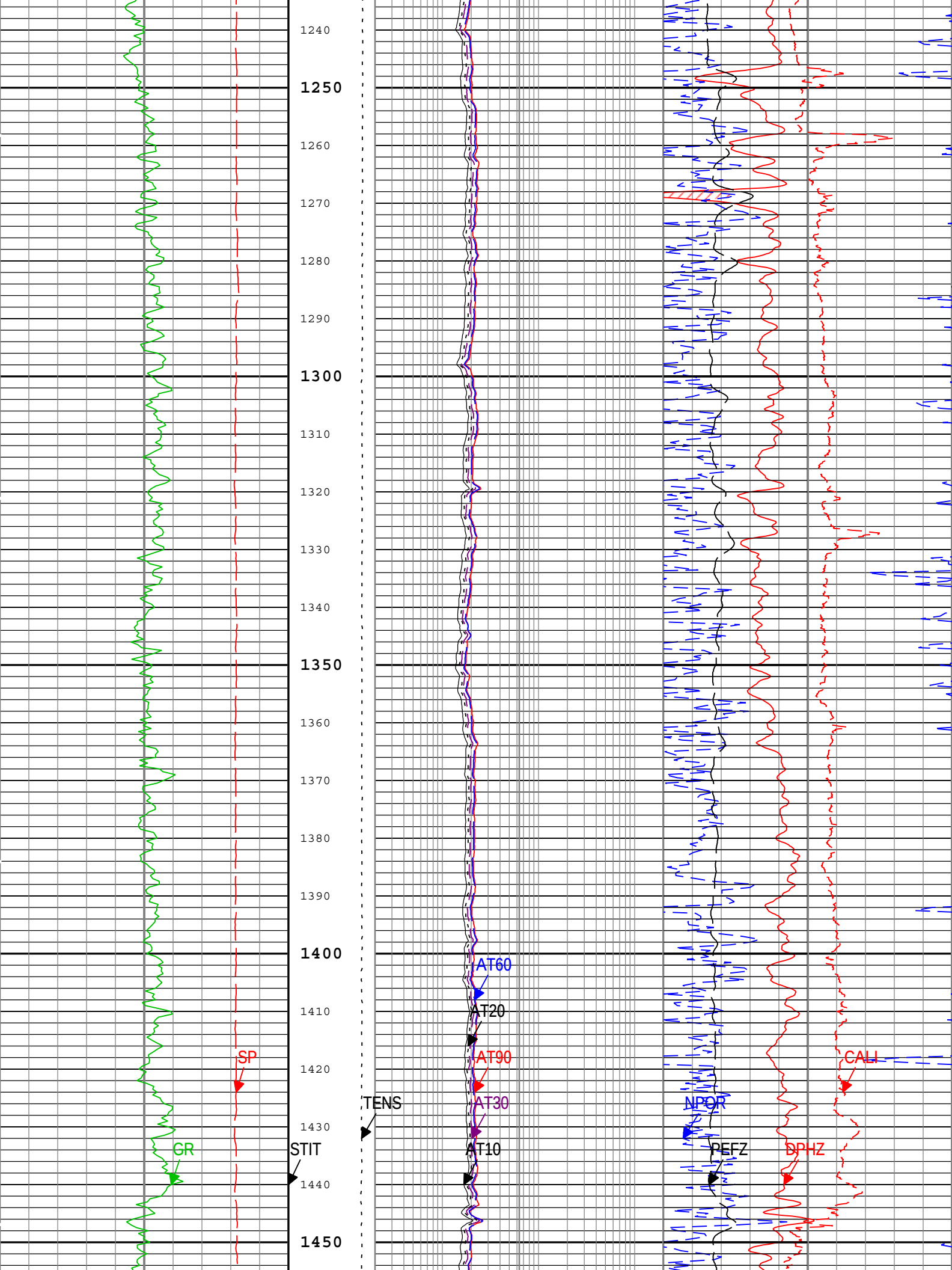
PEFZ
DPHZ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STIT
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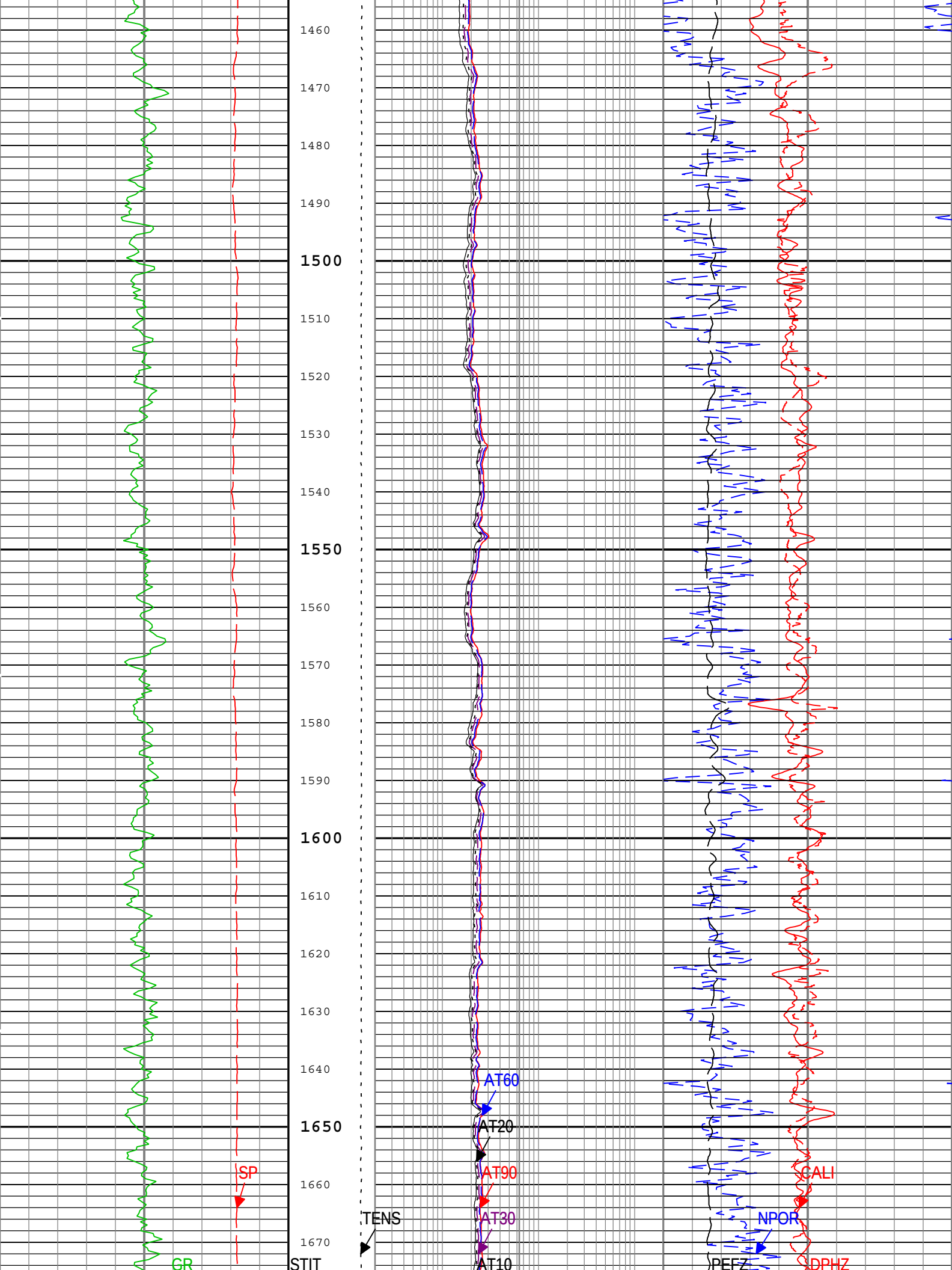
AT10
CALI
NPOR
PEFZ
DPHZ


1460
1470
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1600
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1620
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SP
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STIT
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AT20
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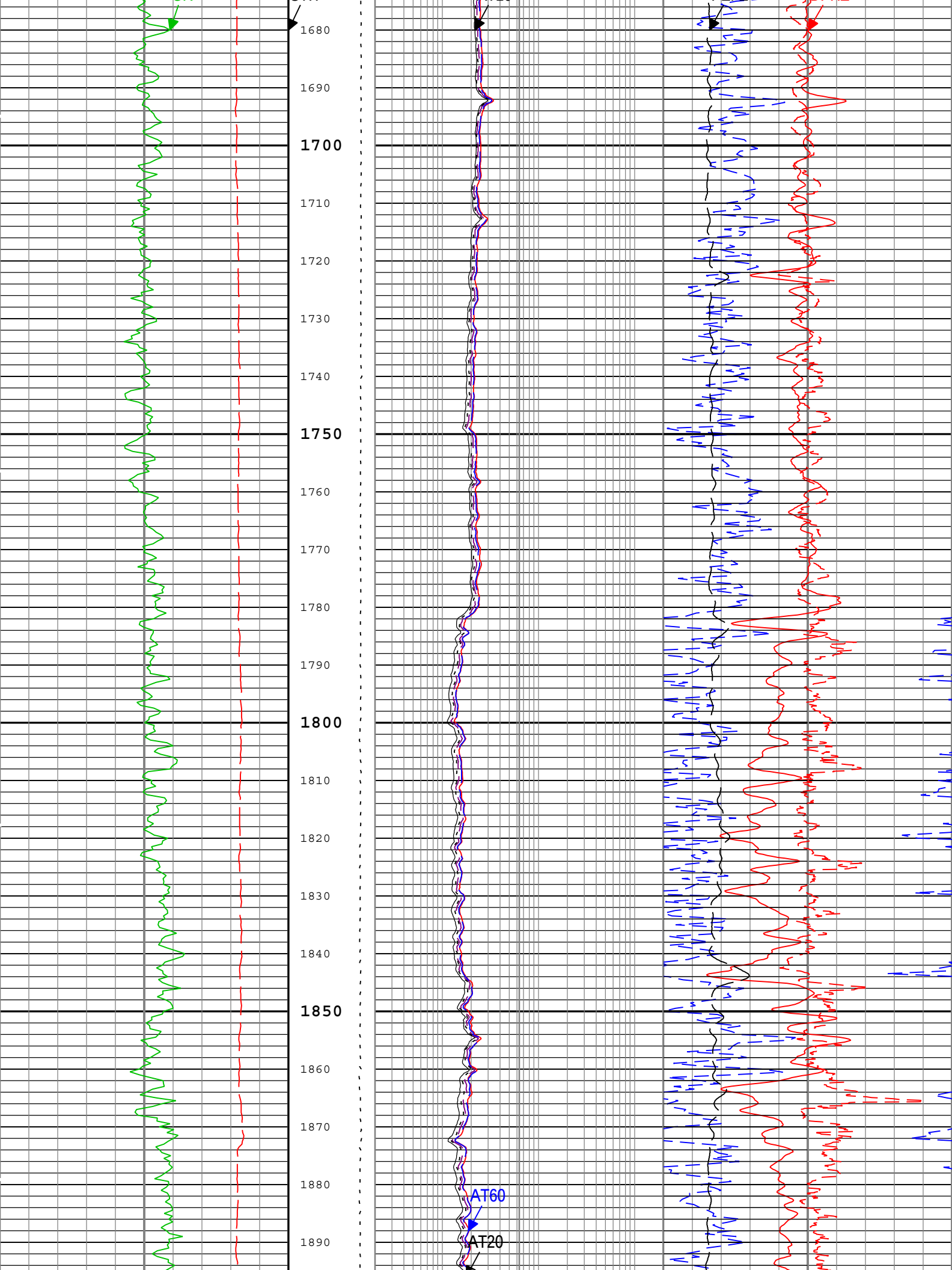
AT10
CALI
NPOR
PEFZ
DPHZ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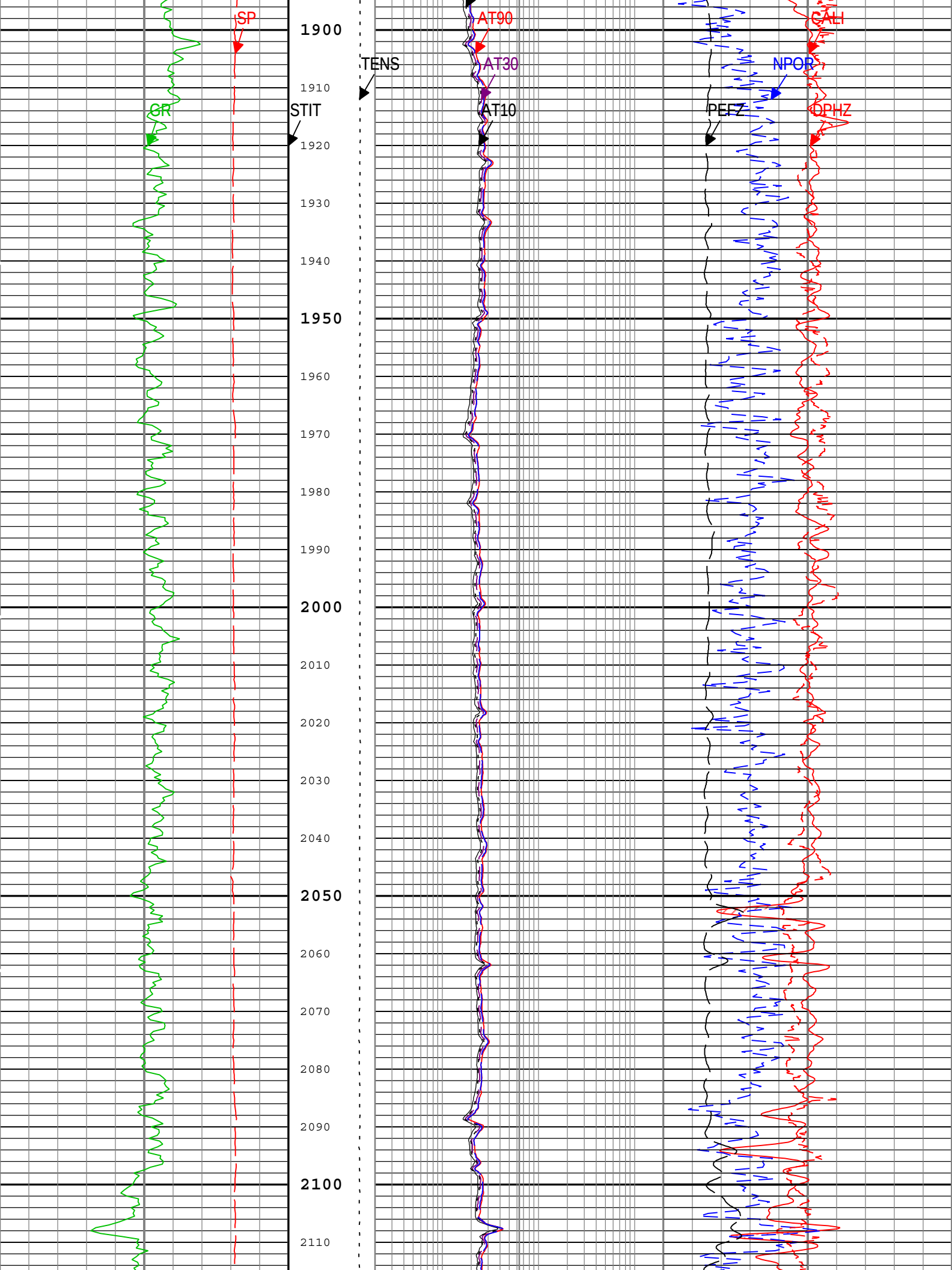
AT60
1890
AT20


SP
GR
1900
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2110
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NPOR
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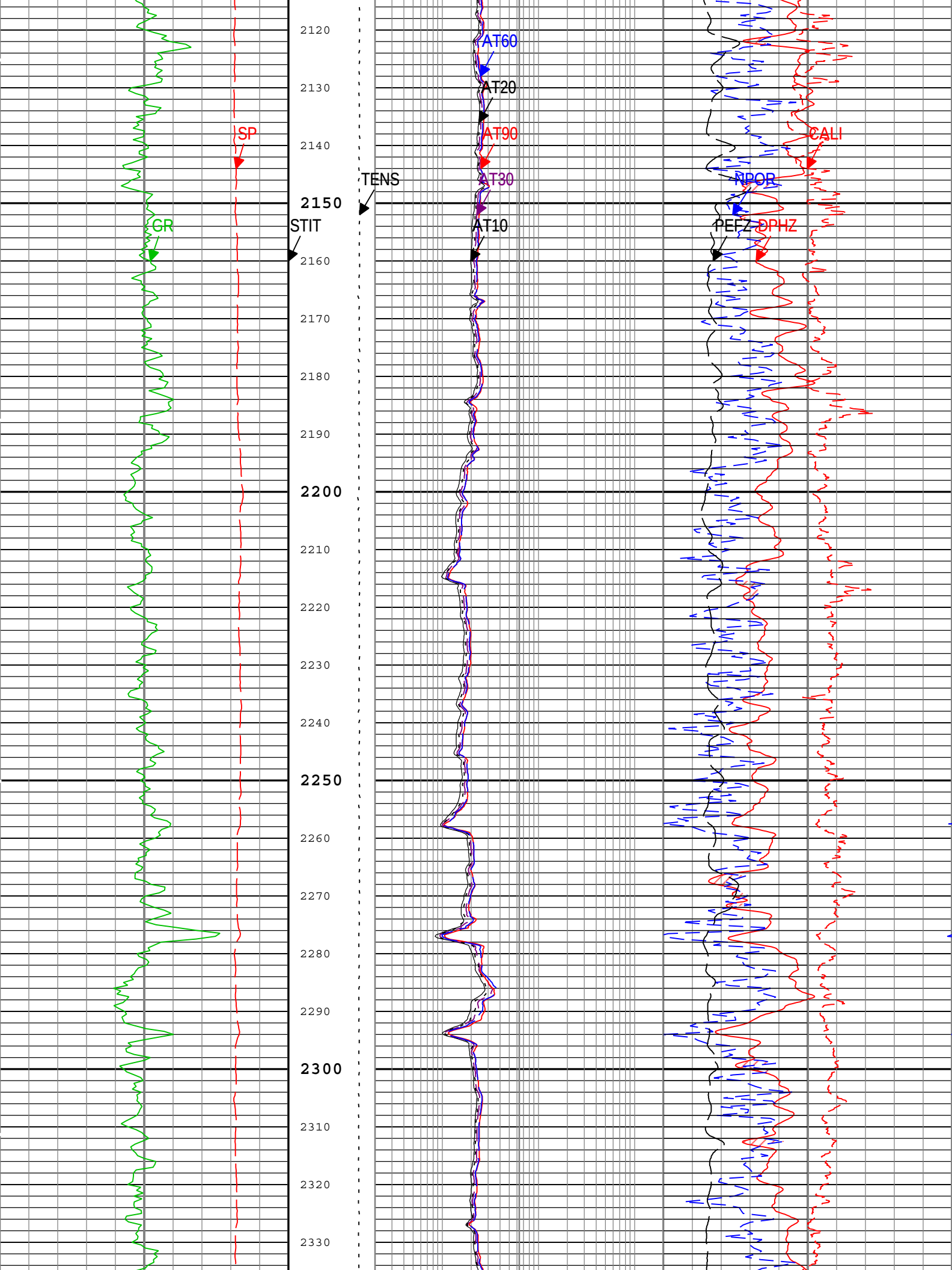
DPHZ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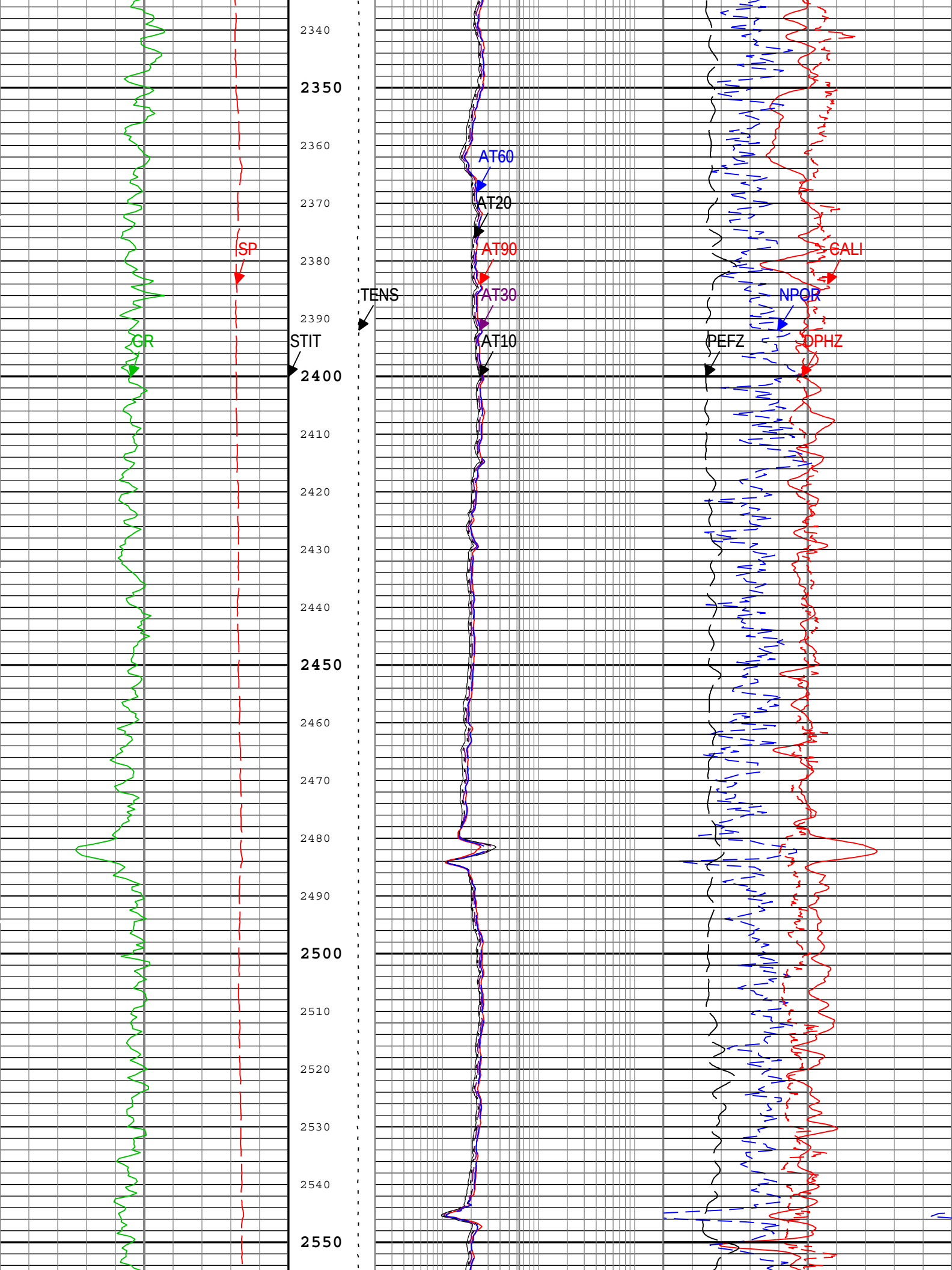
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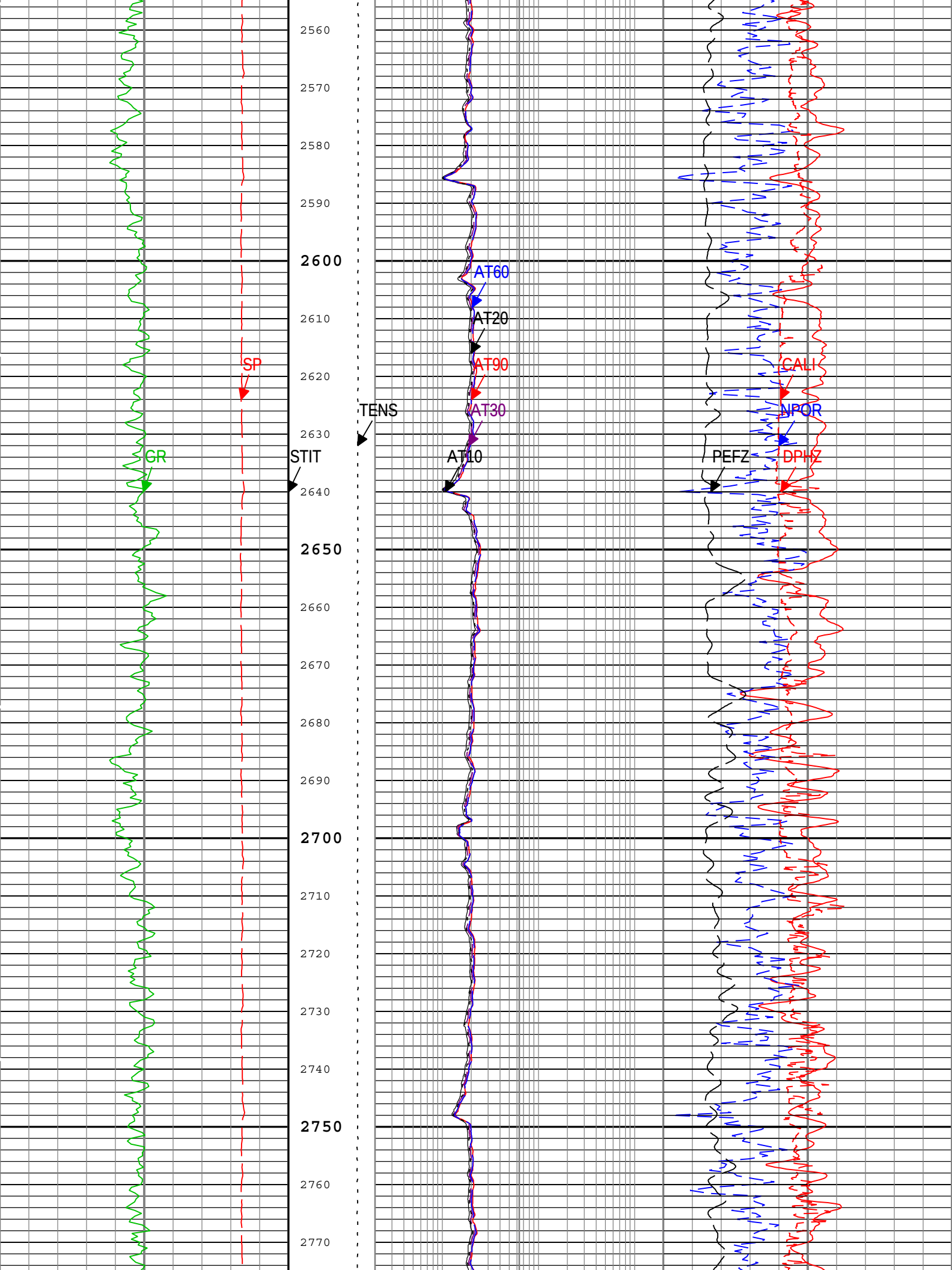
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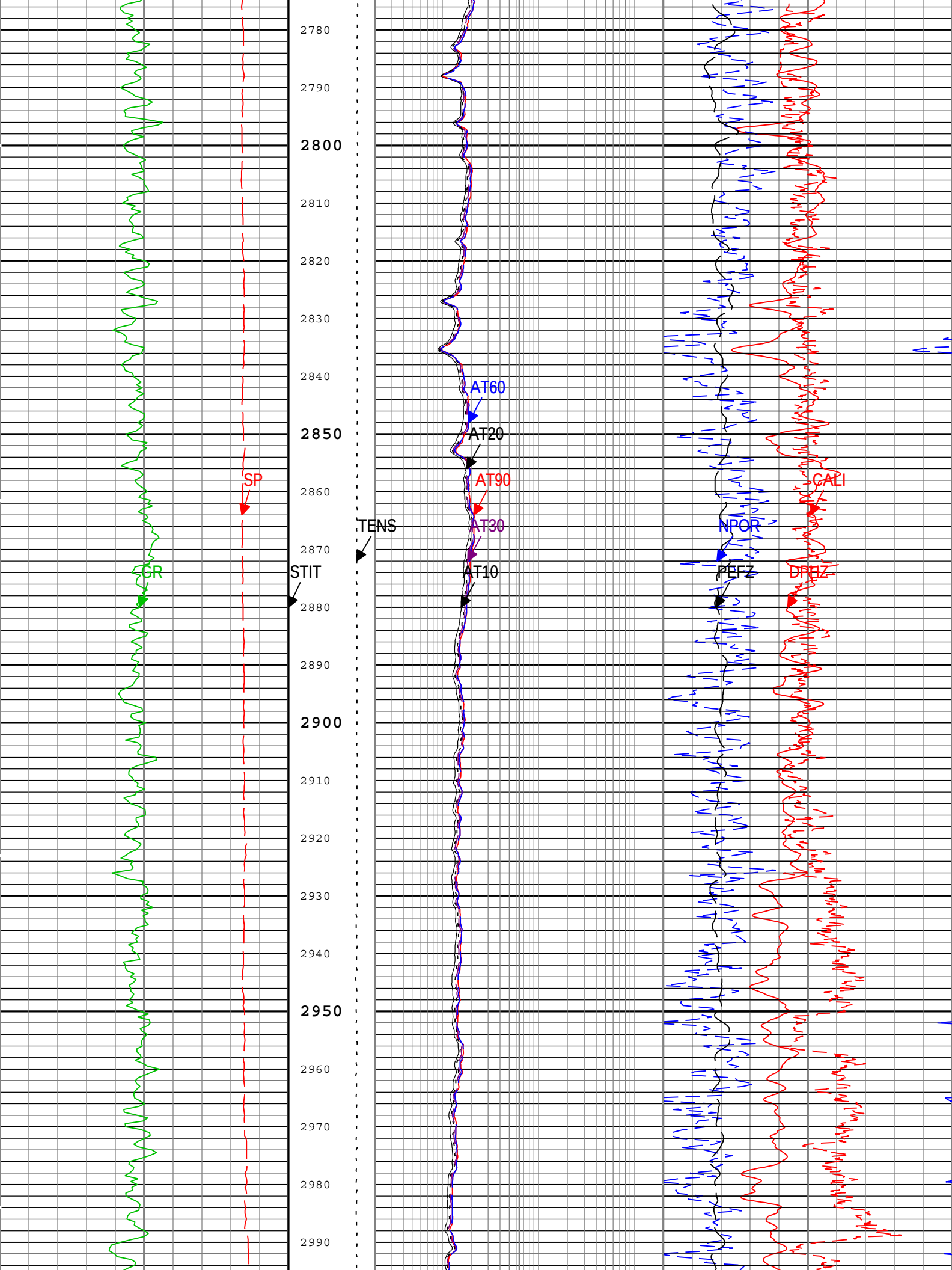
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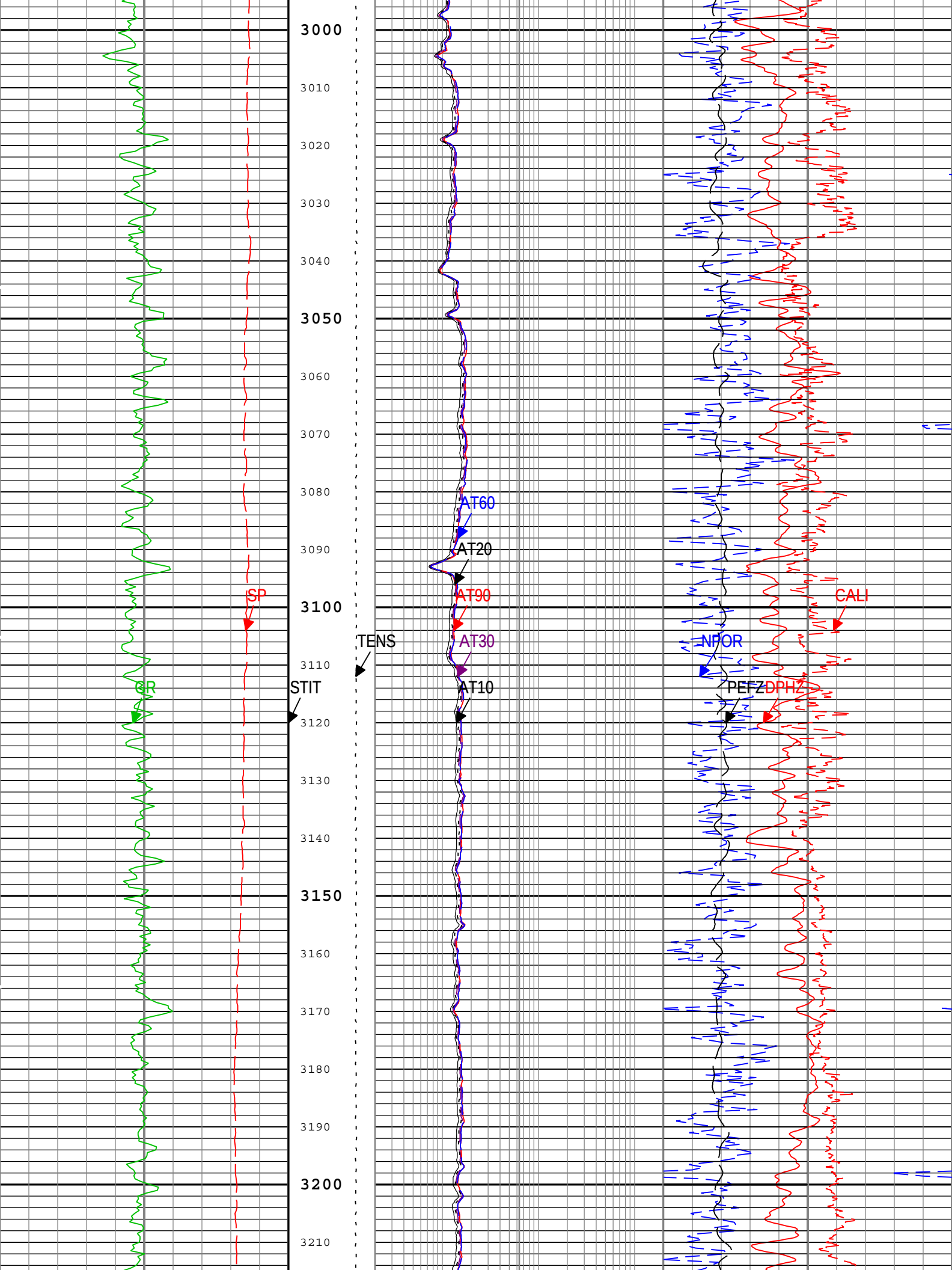
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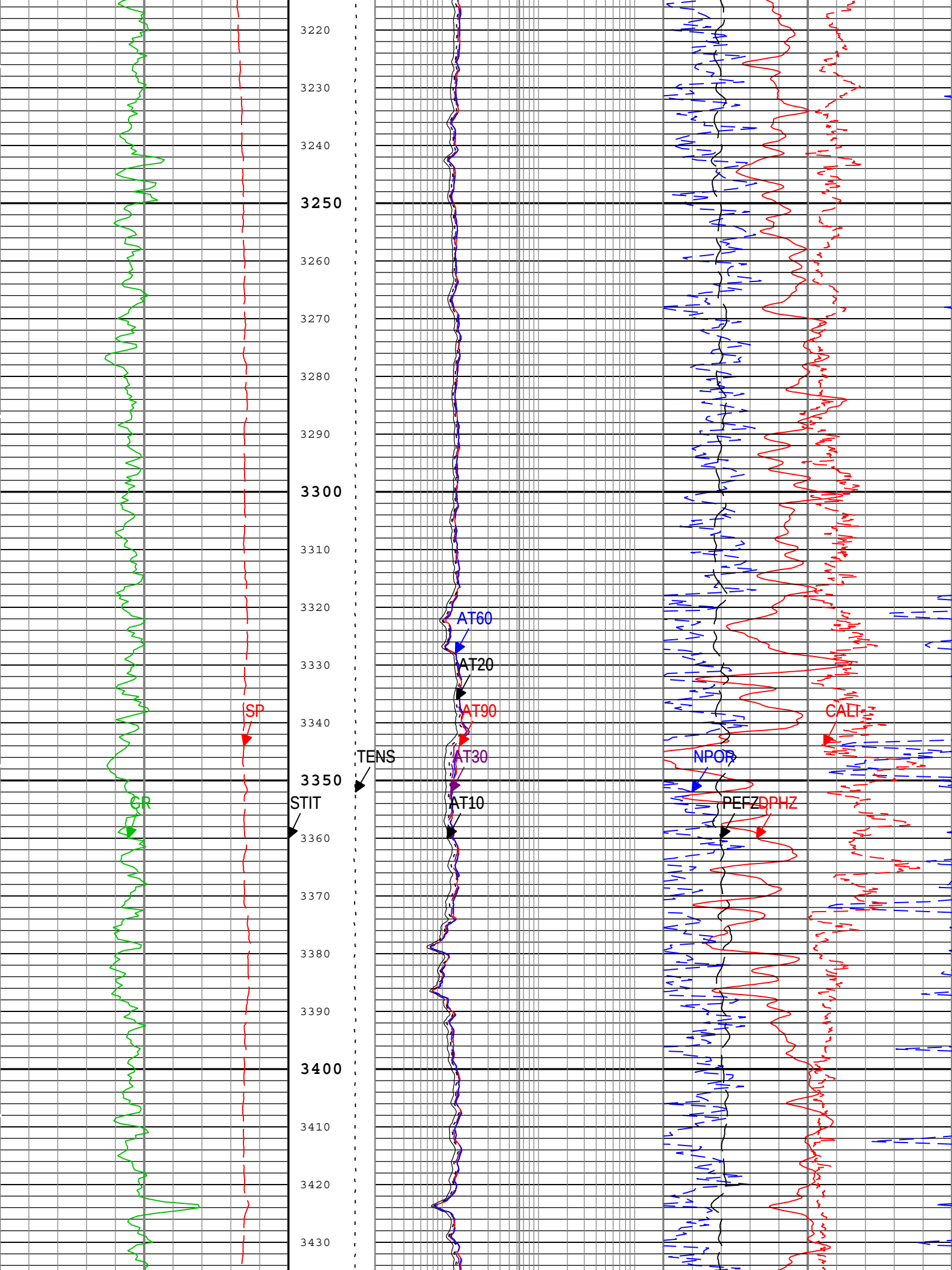
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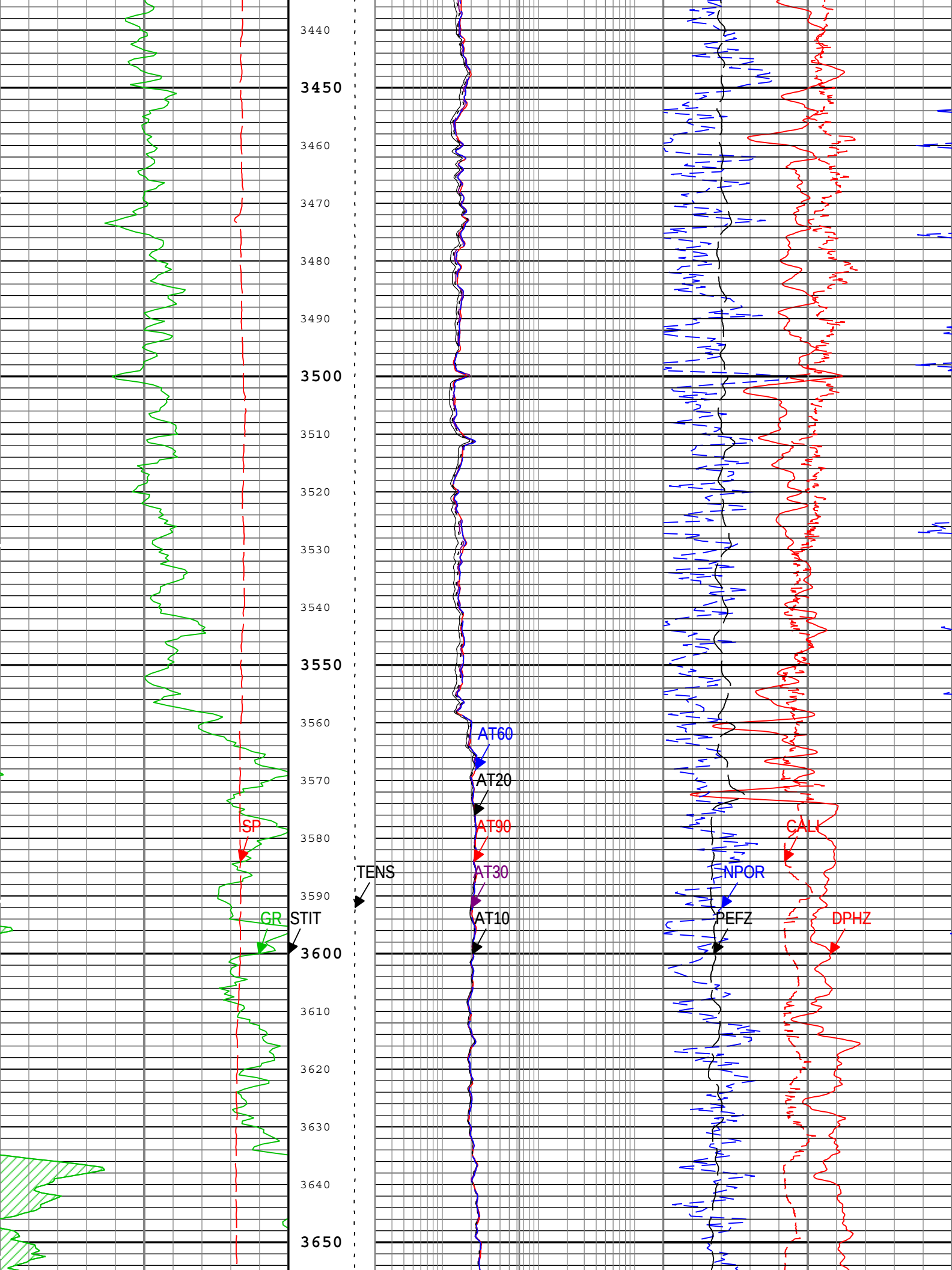
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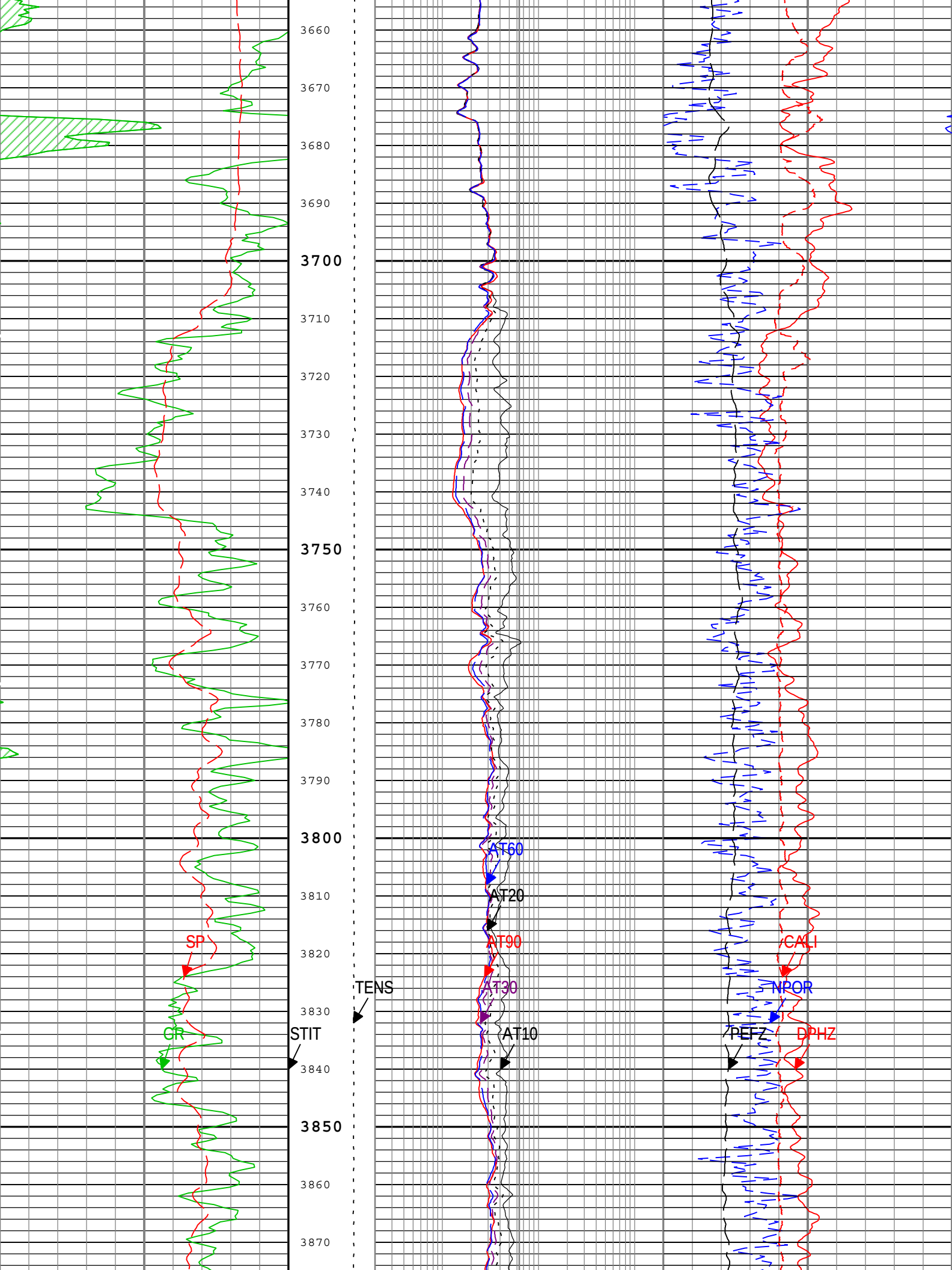
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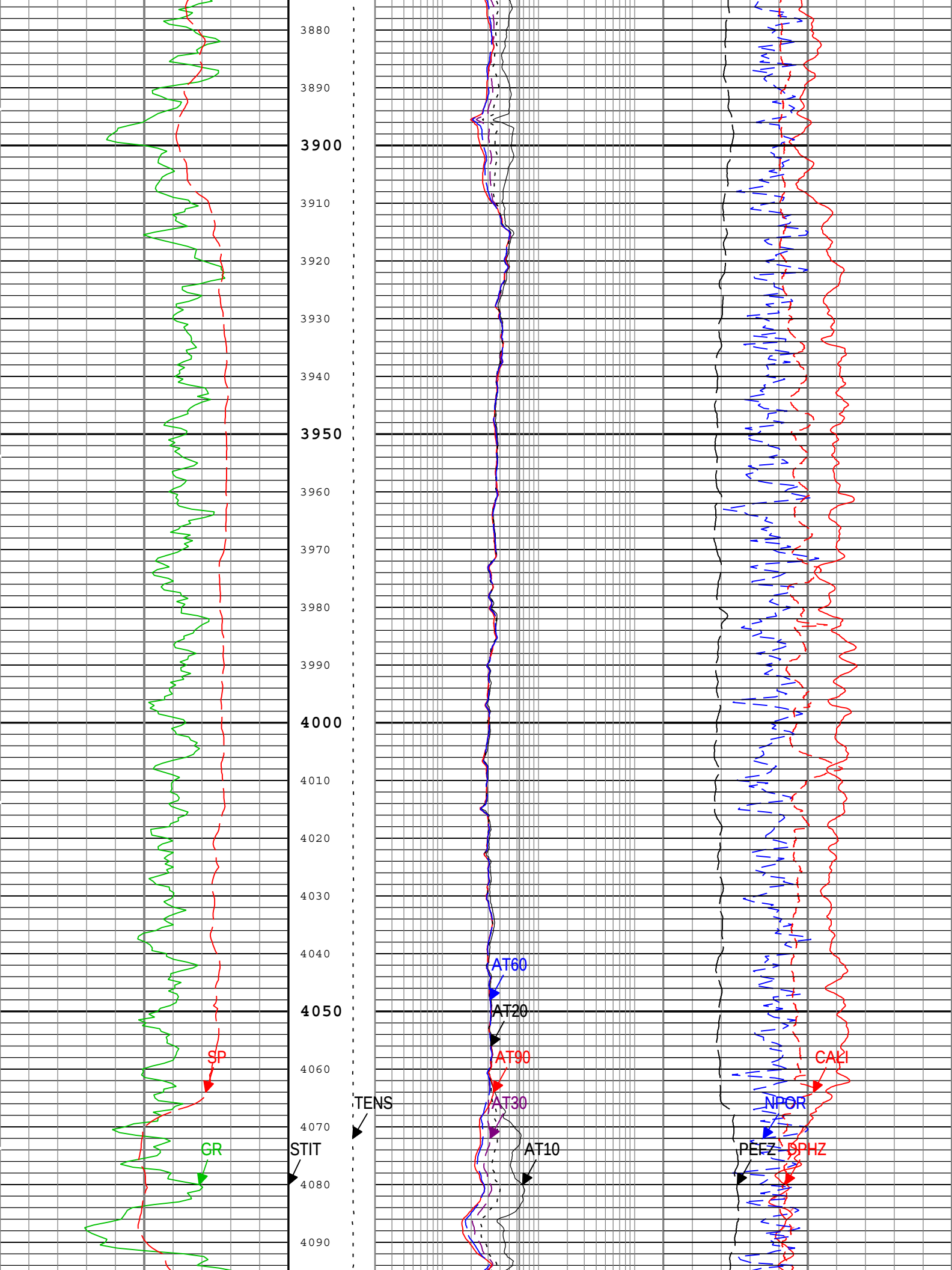
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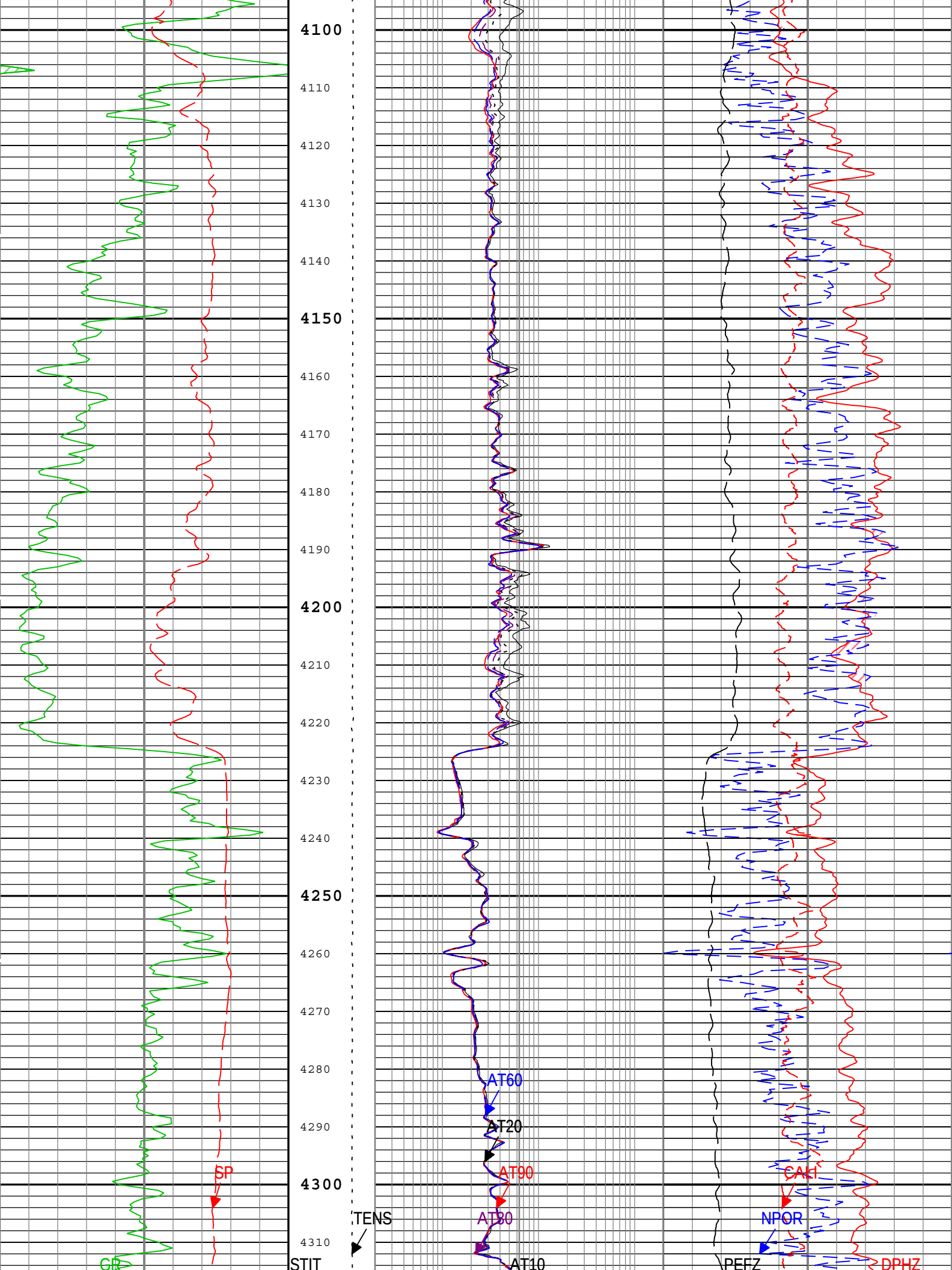
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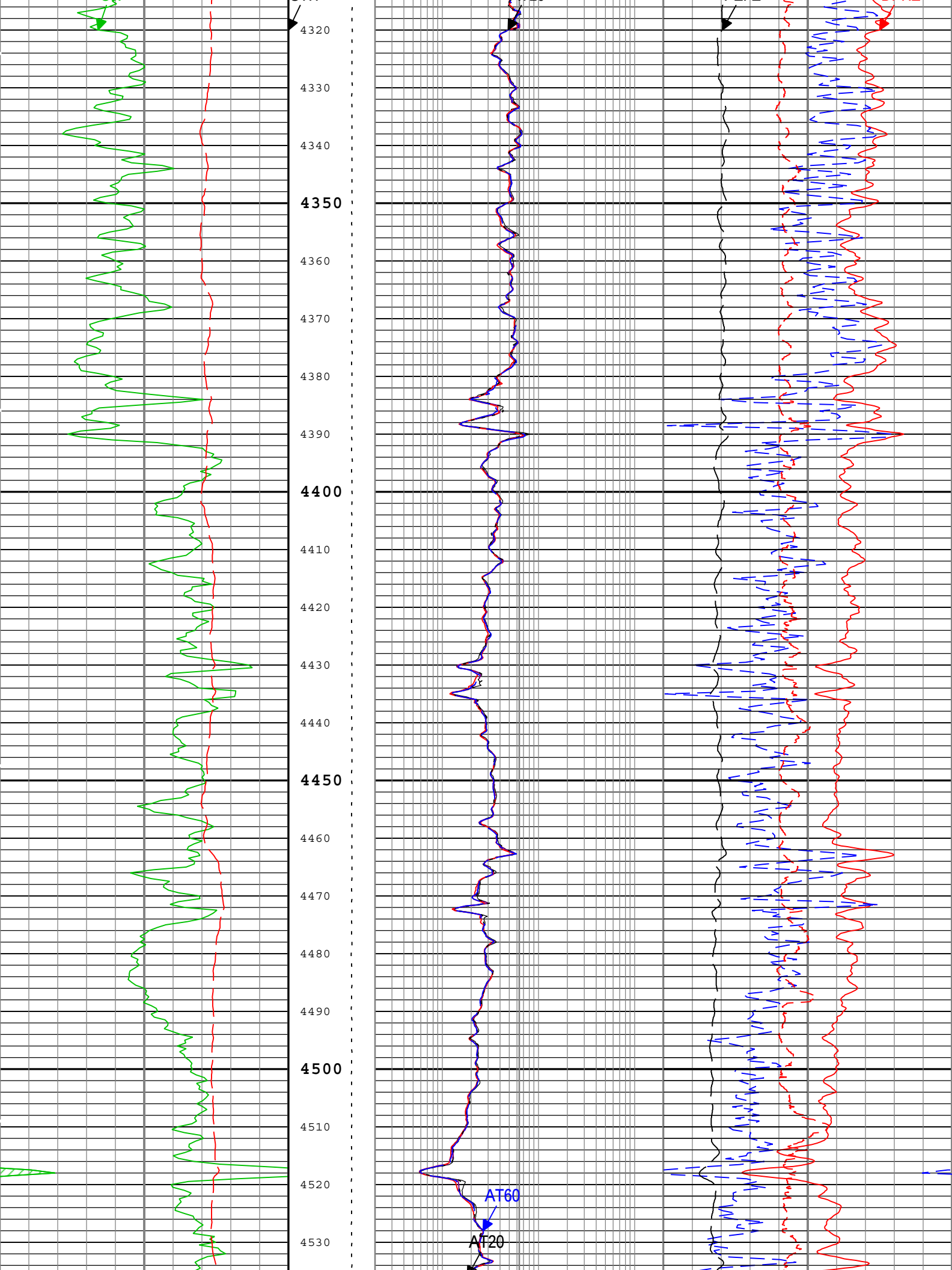
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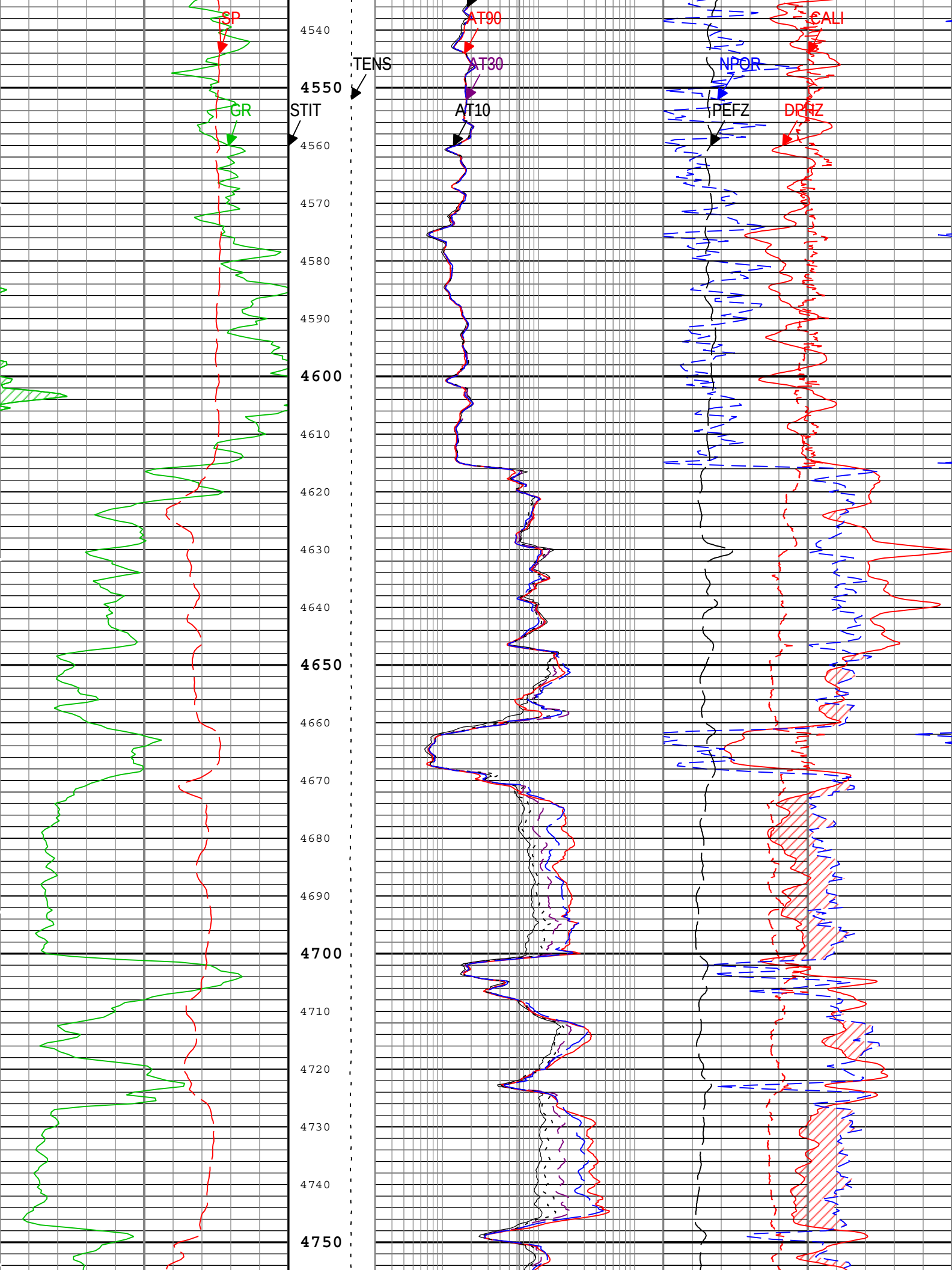
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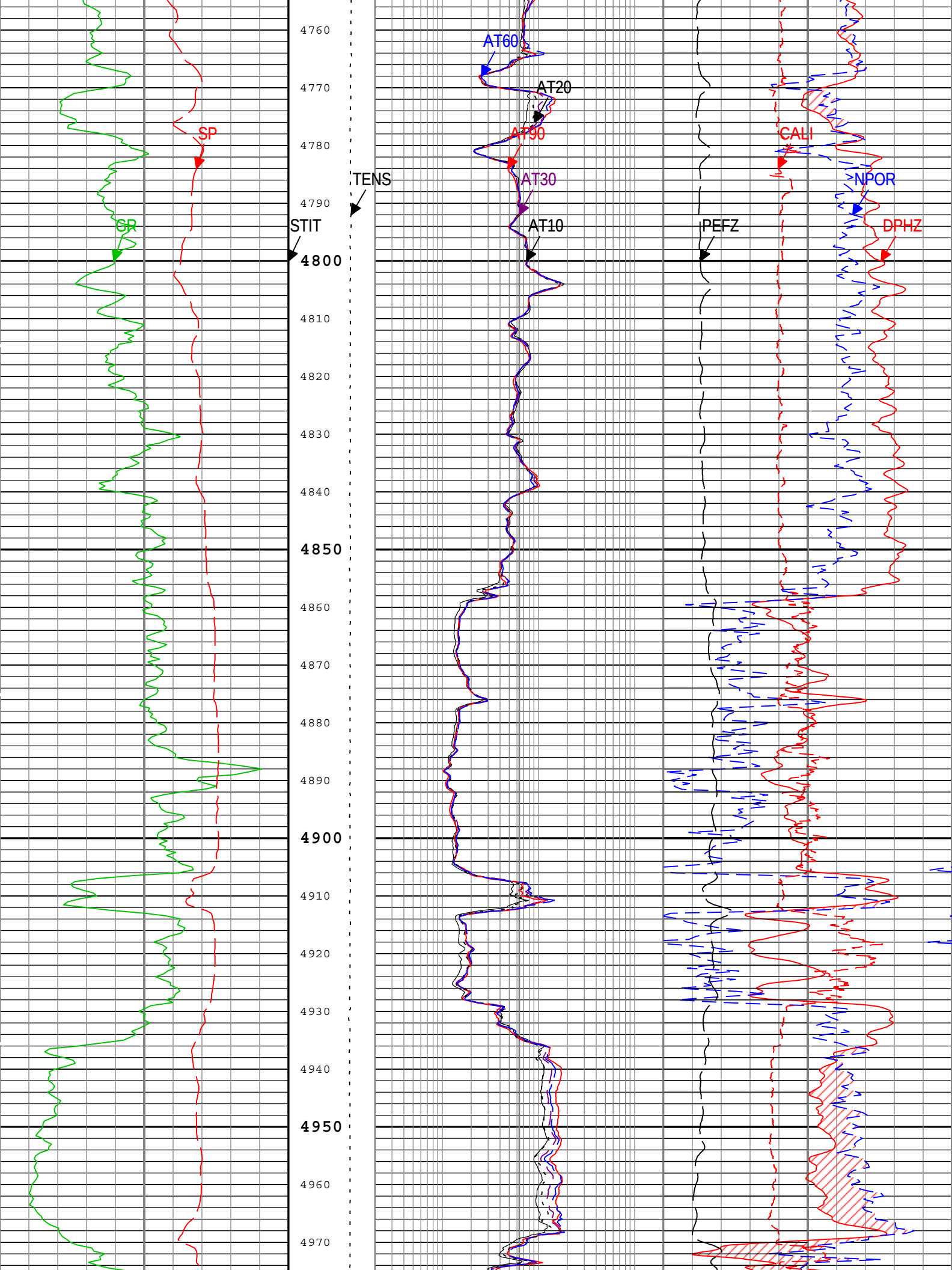
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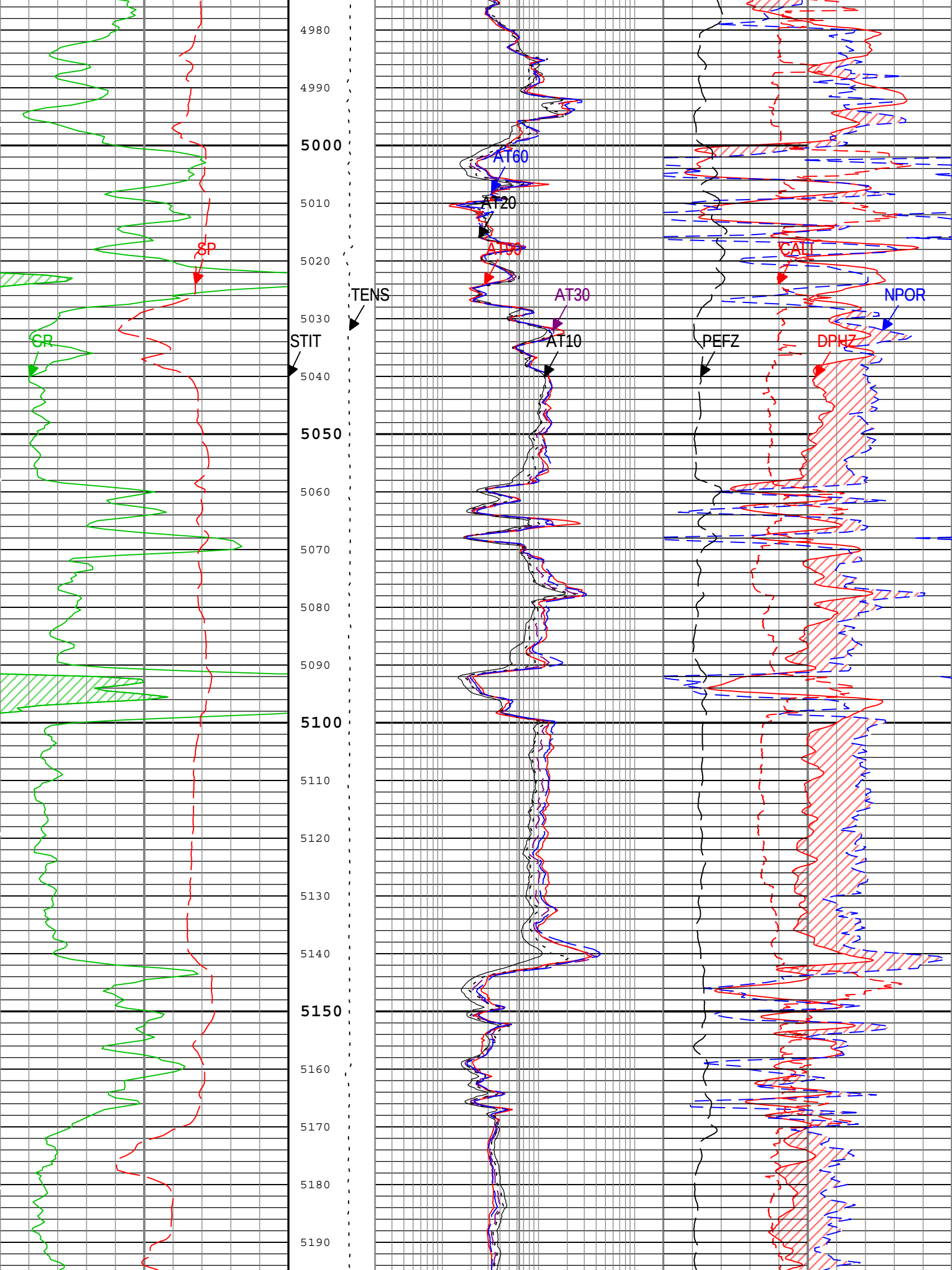
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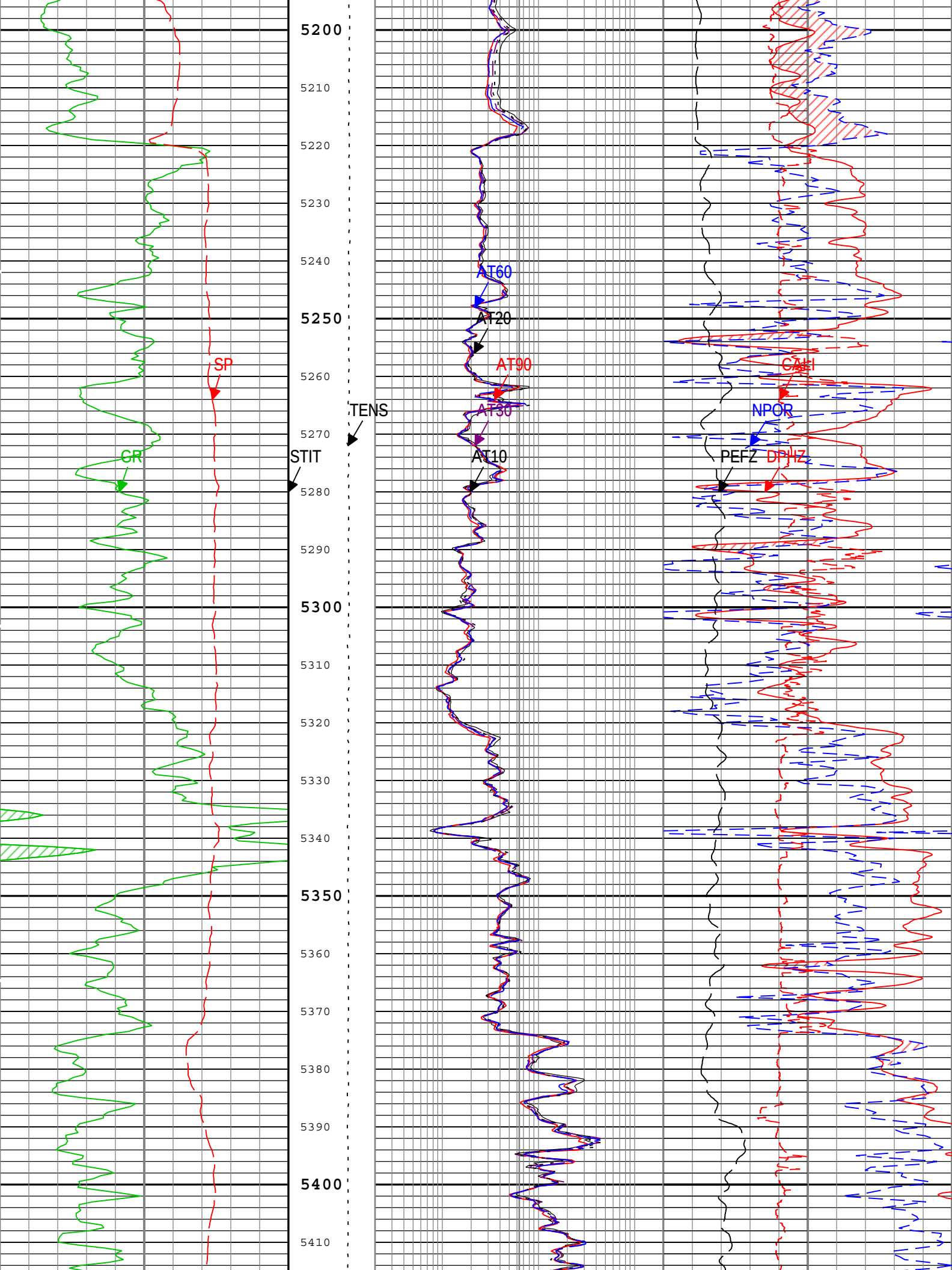
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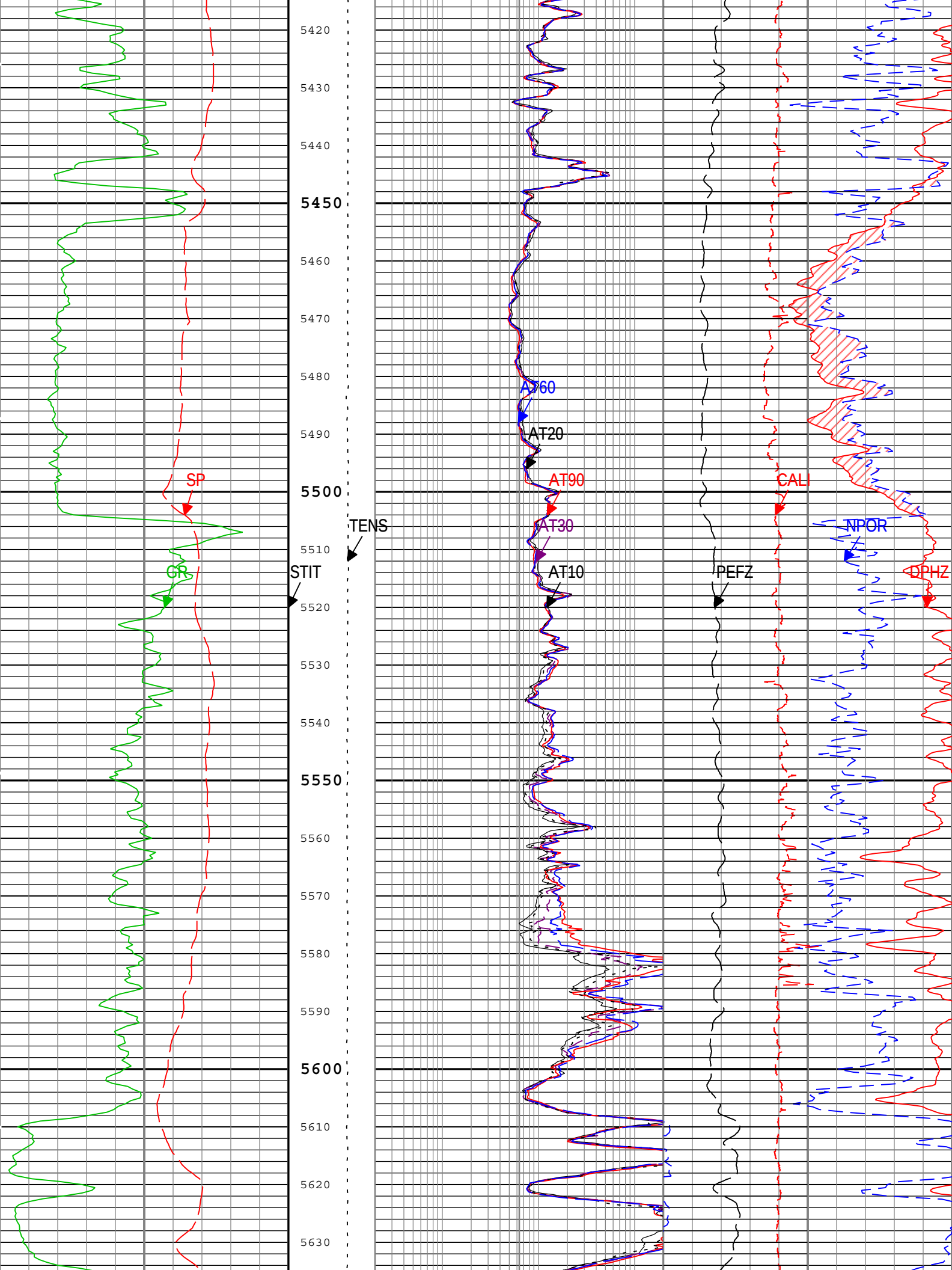
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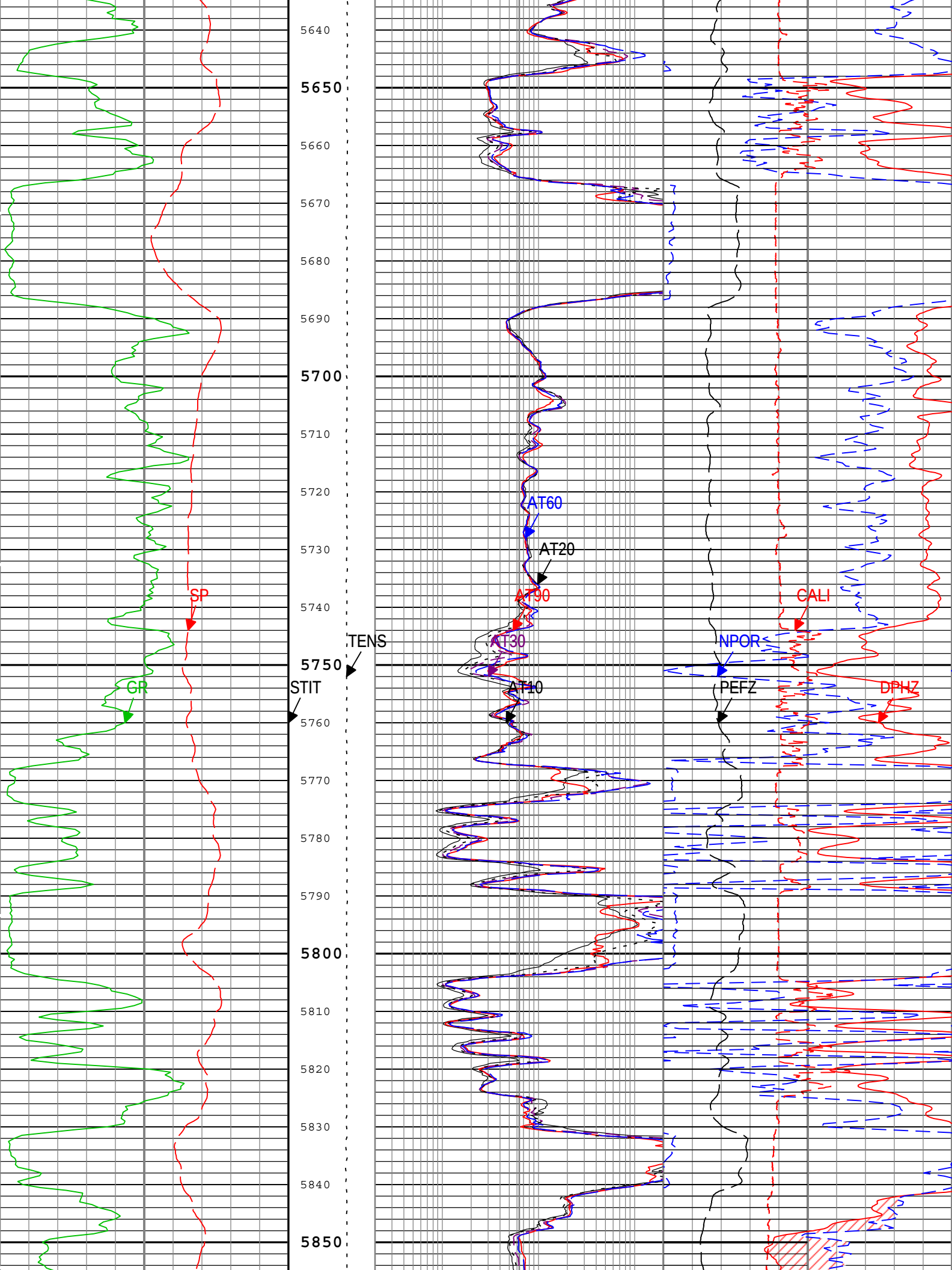
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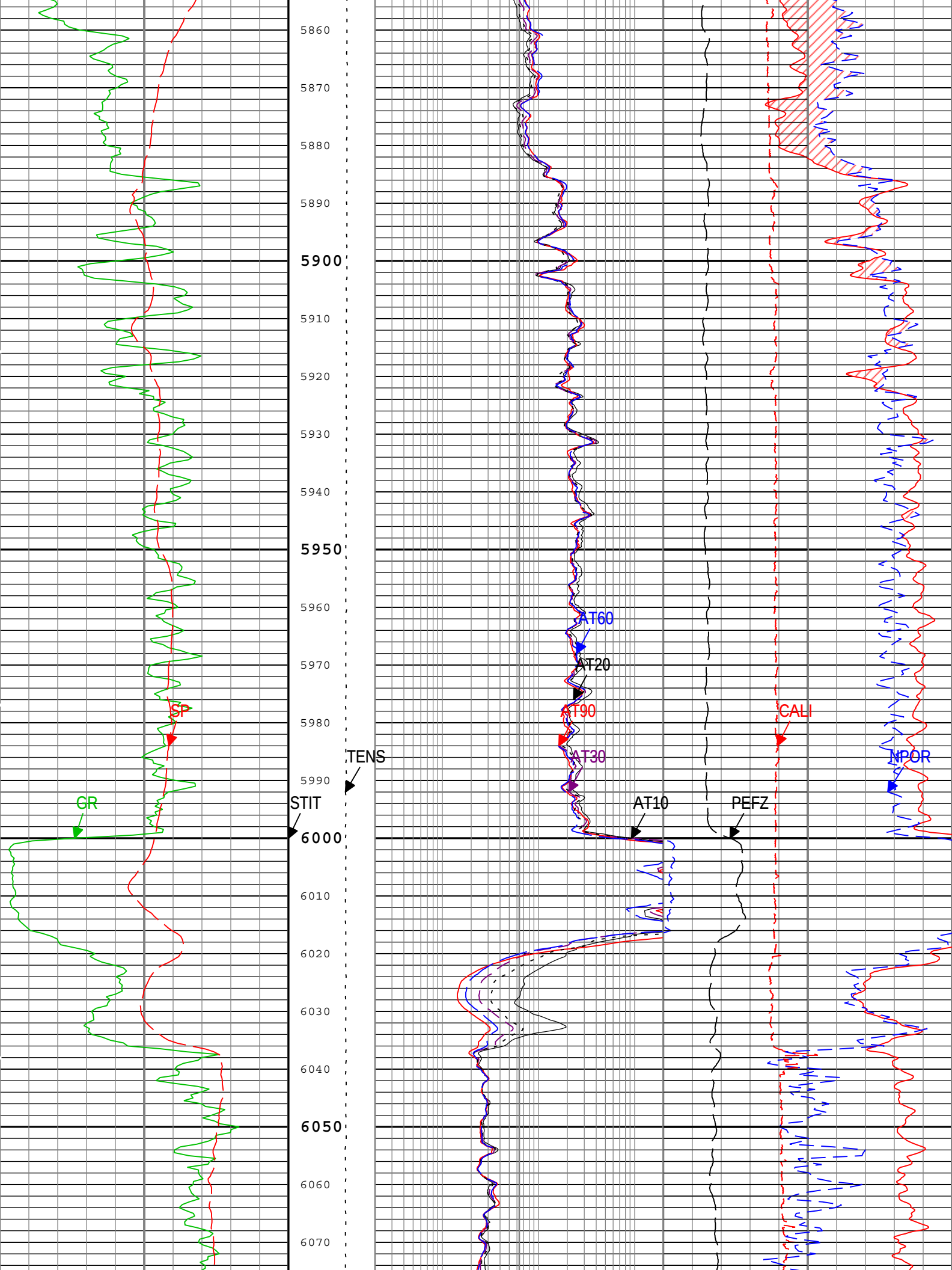
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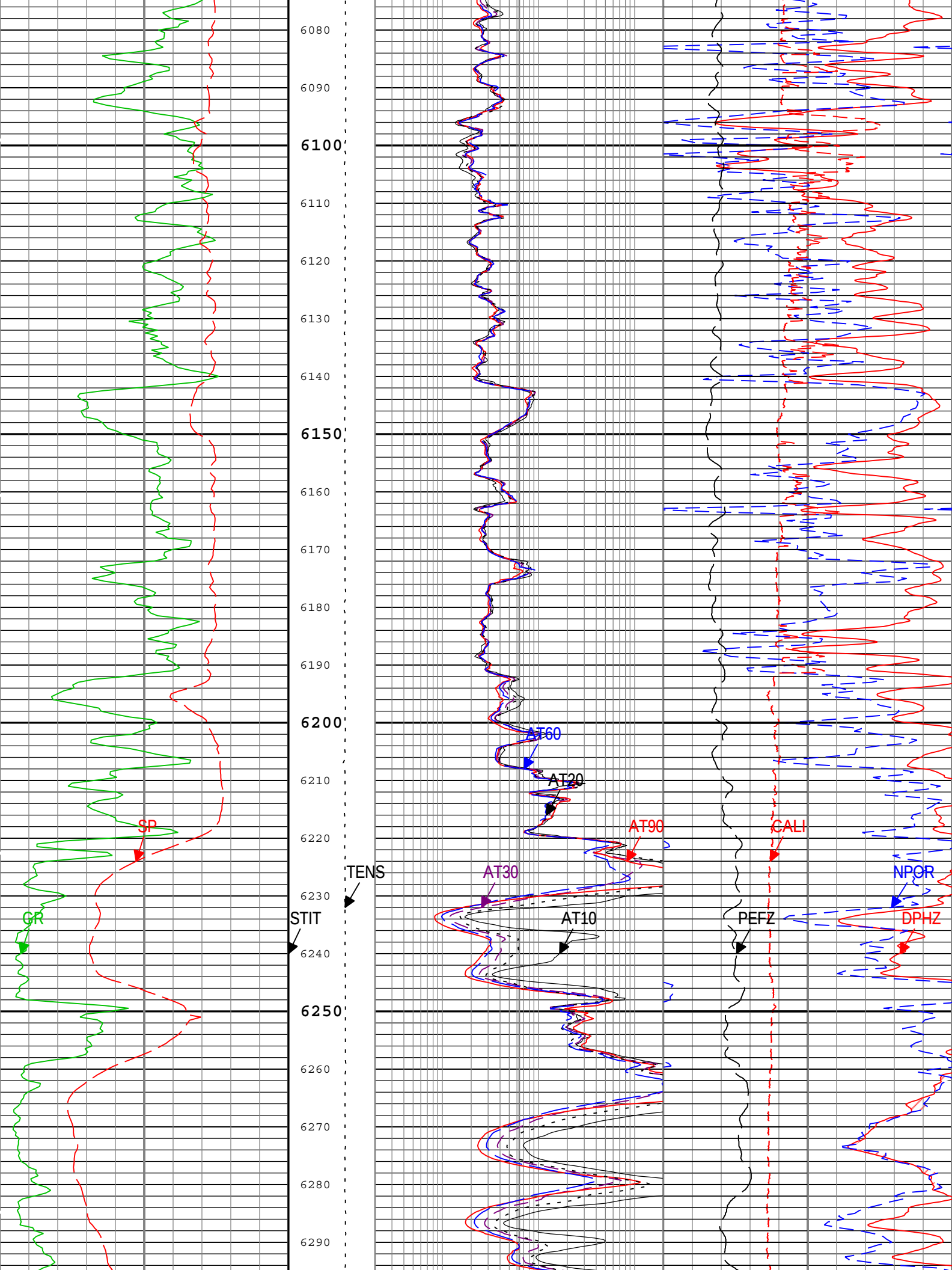
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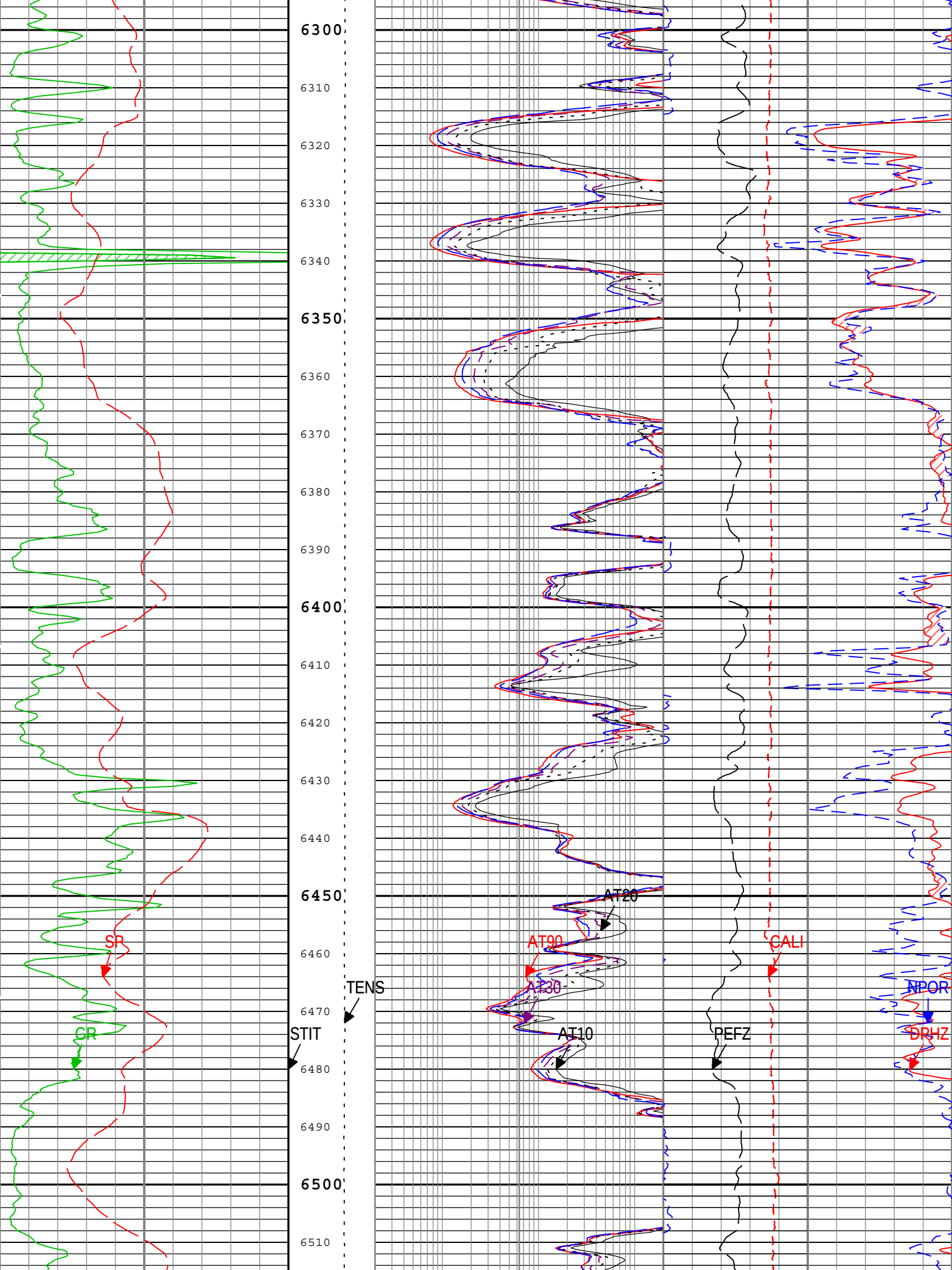
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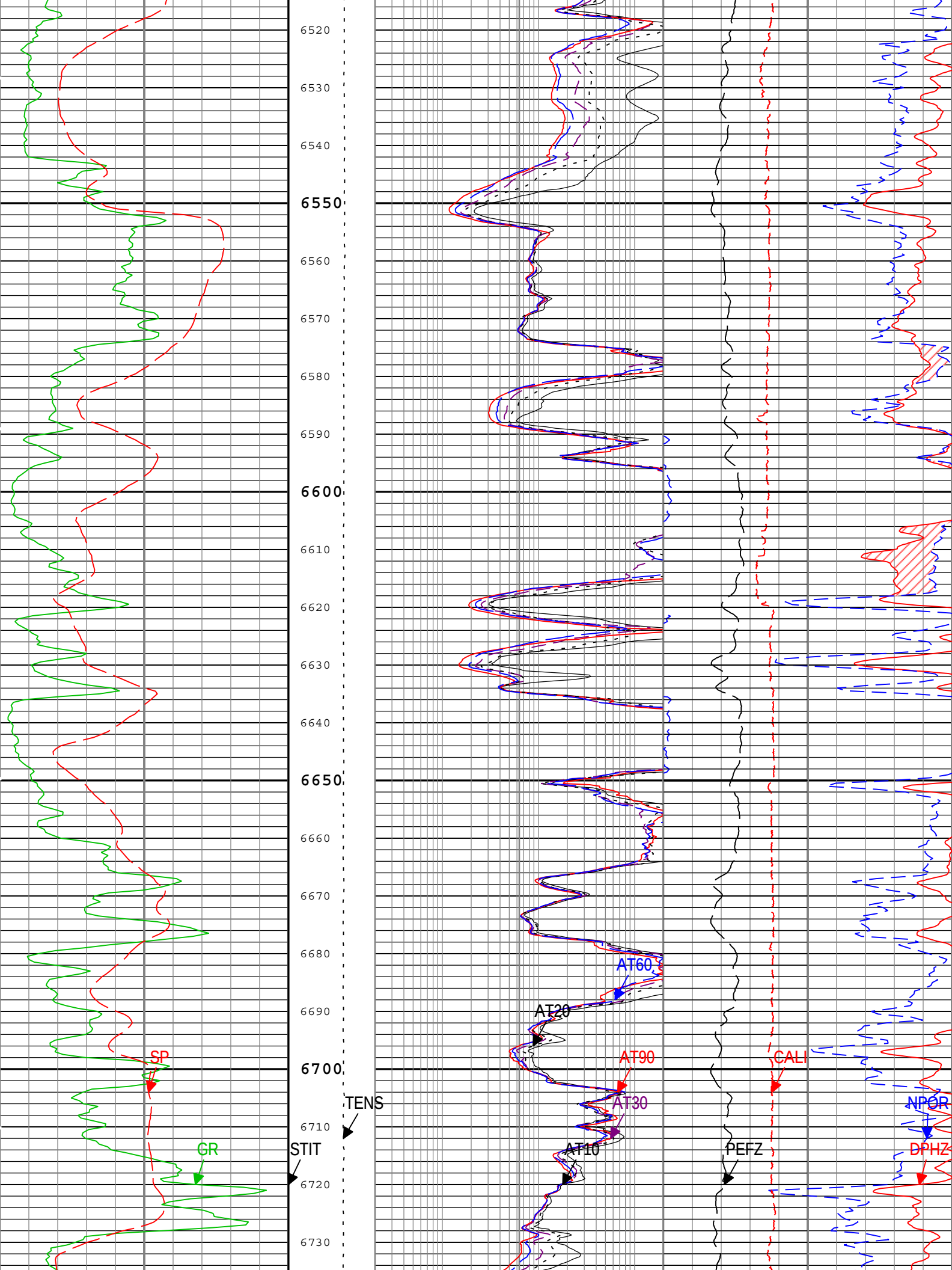
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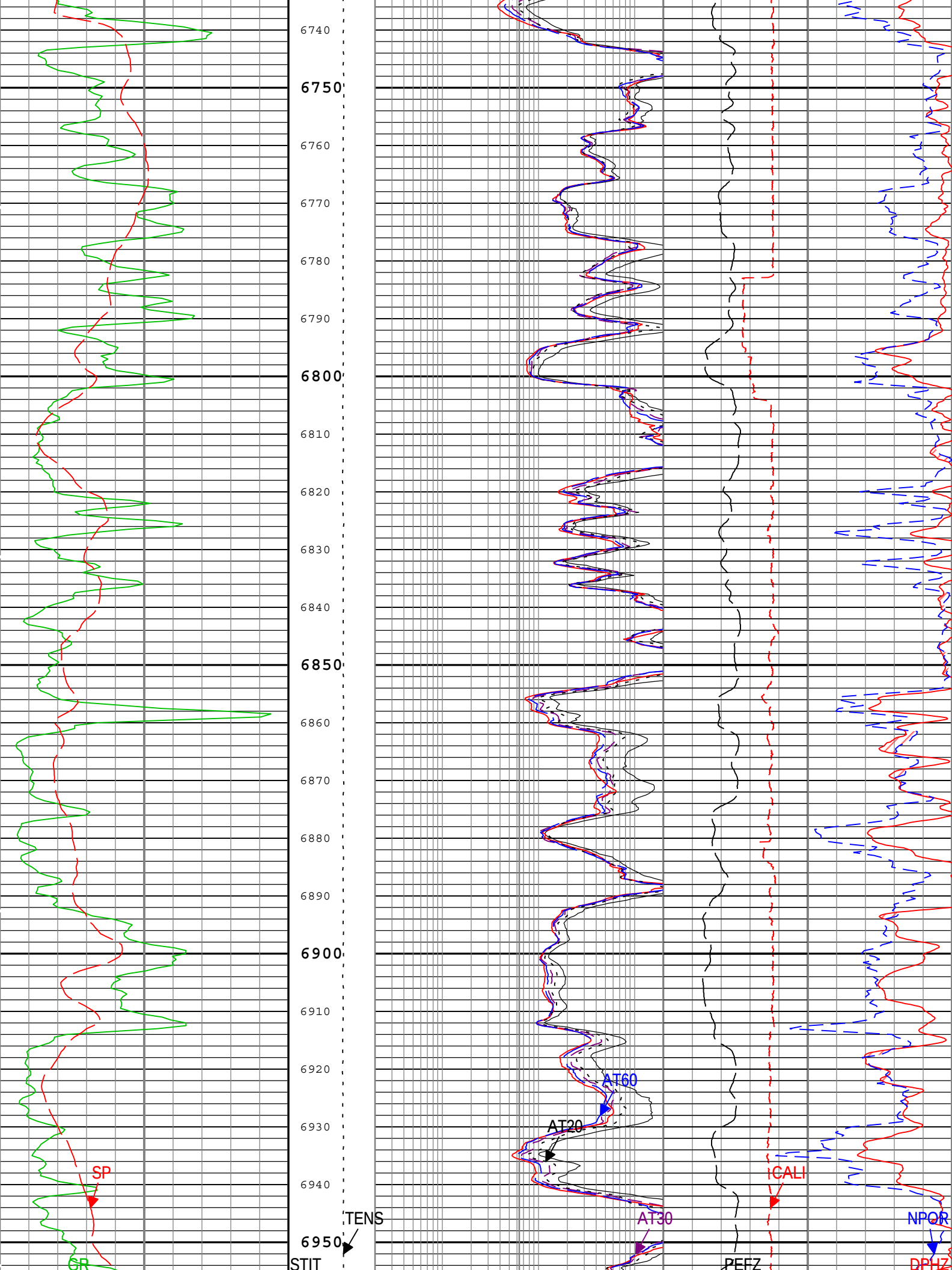
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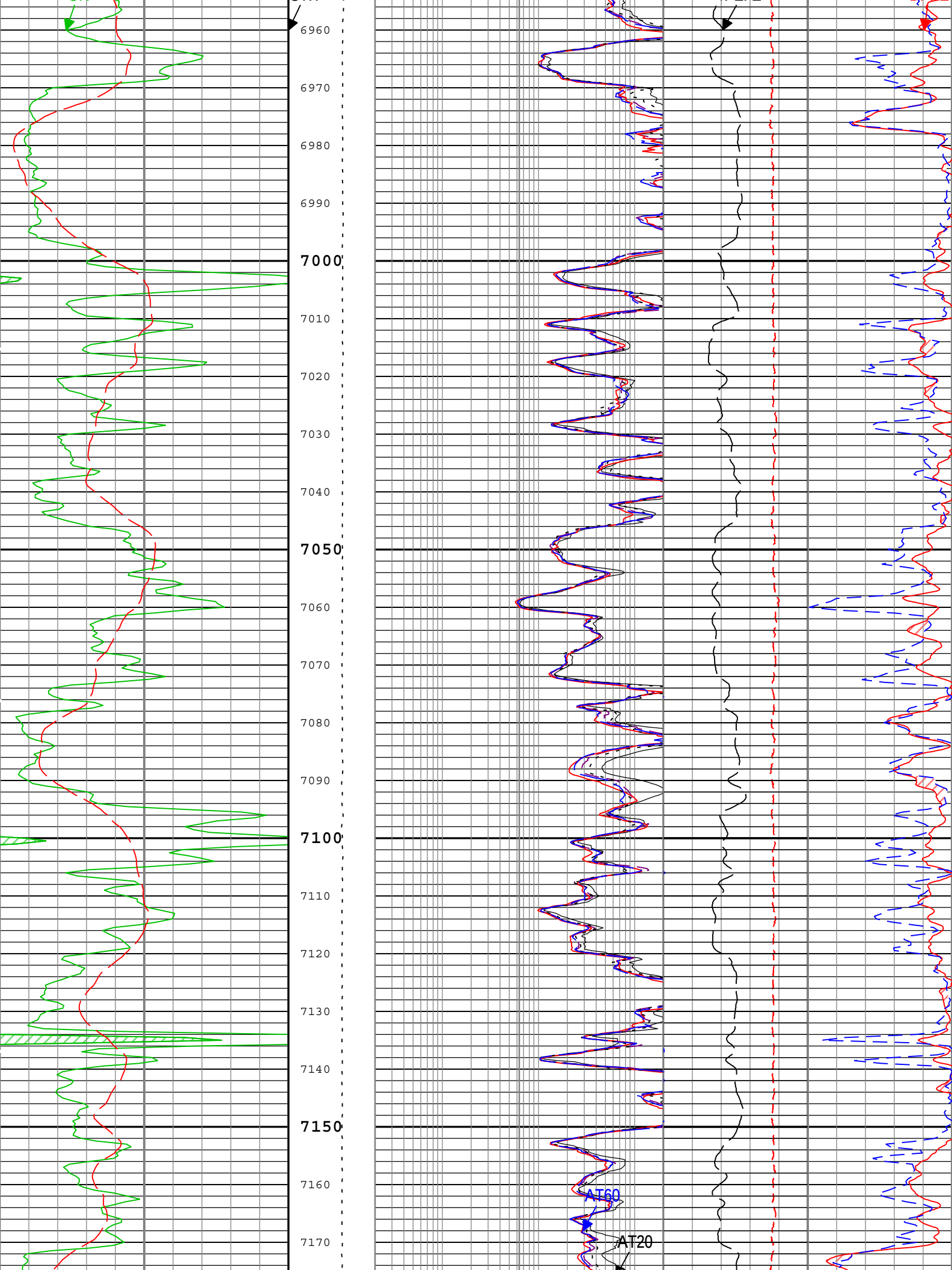
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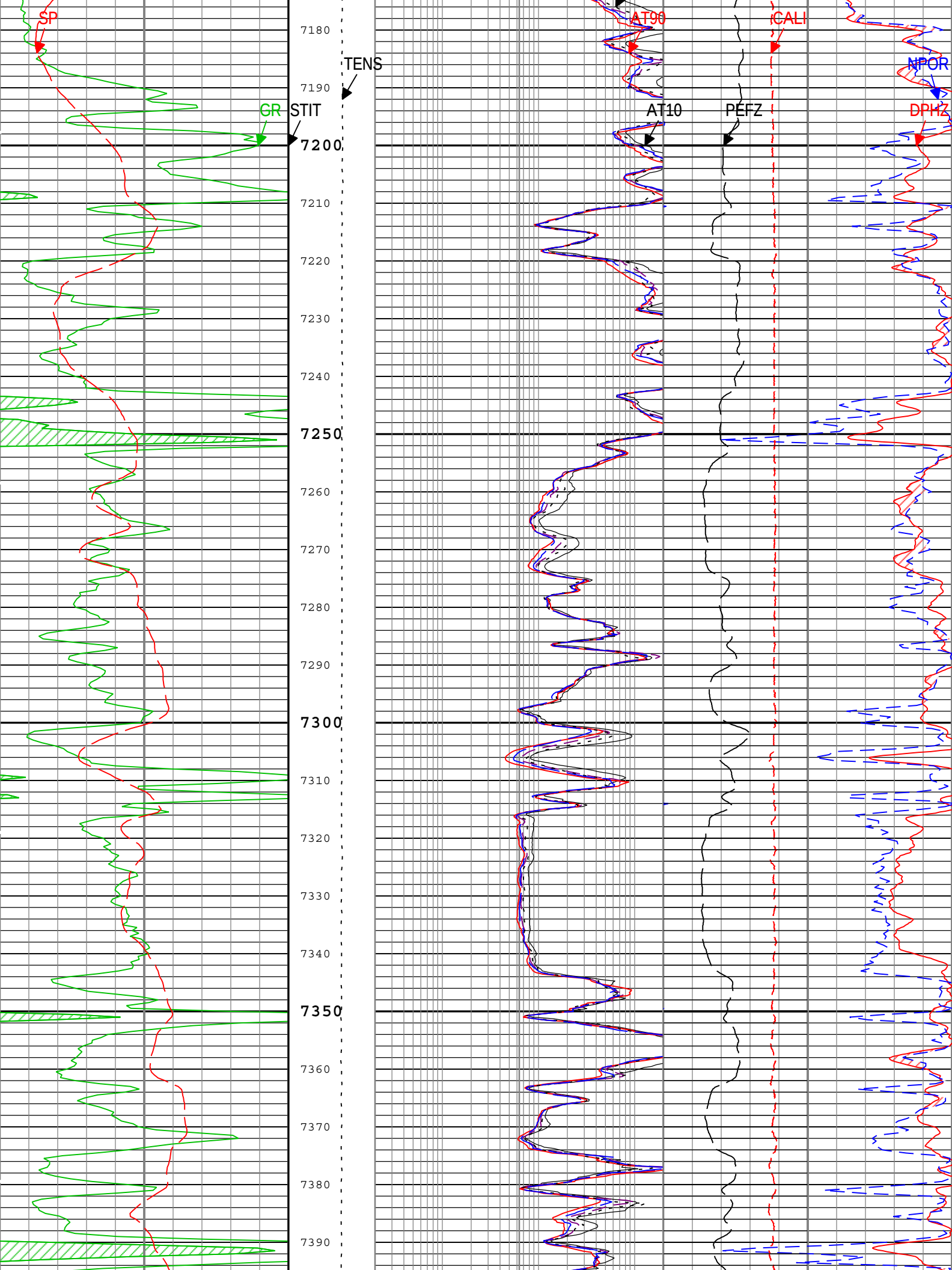
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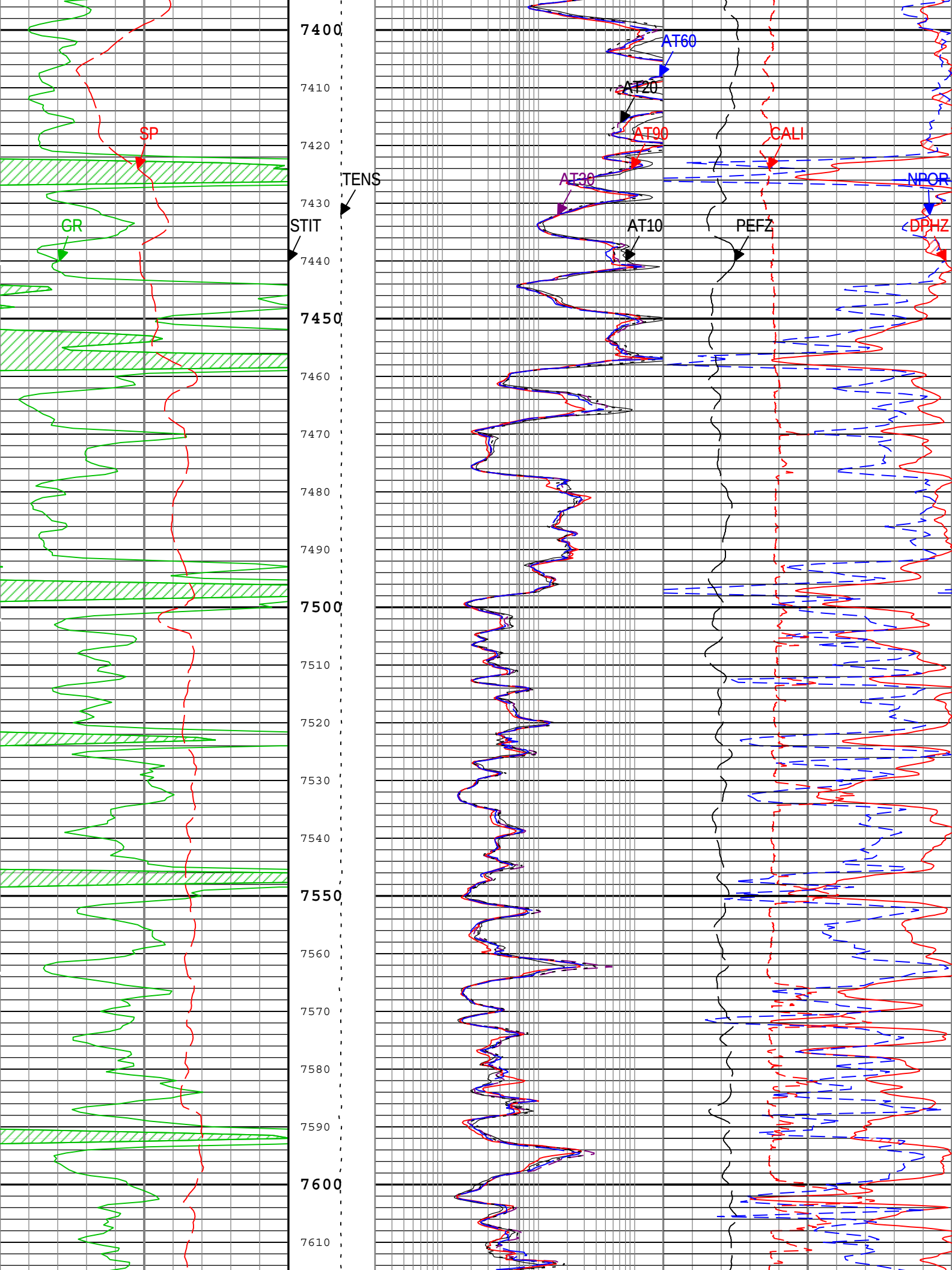
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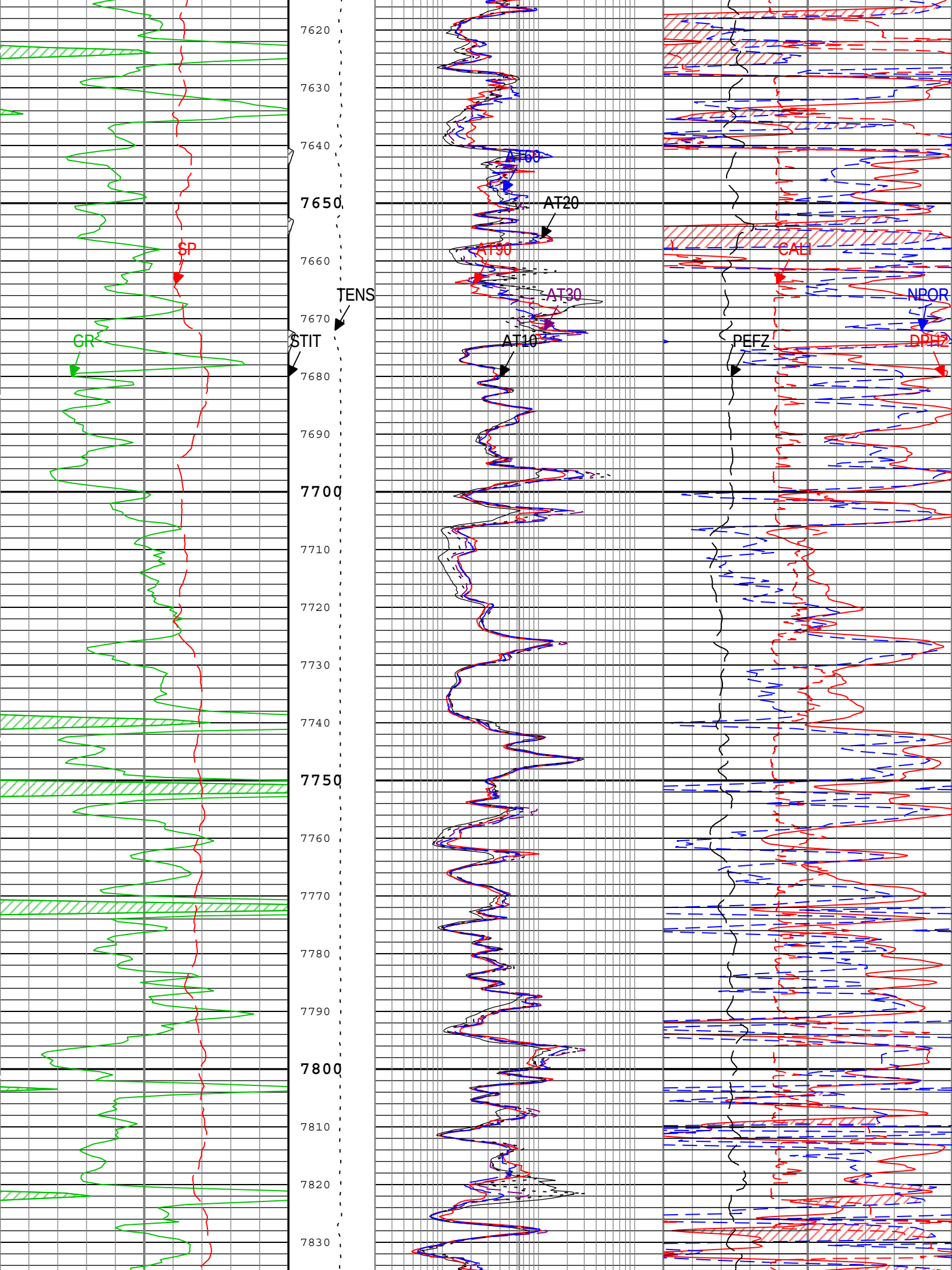
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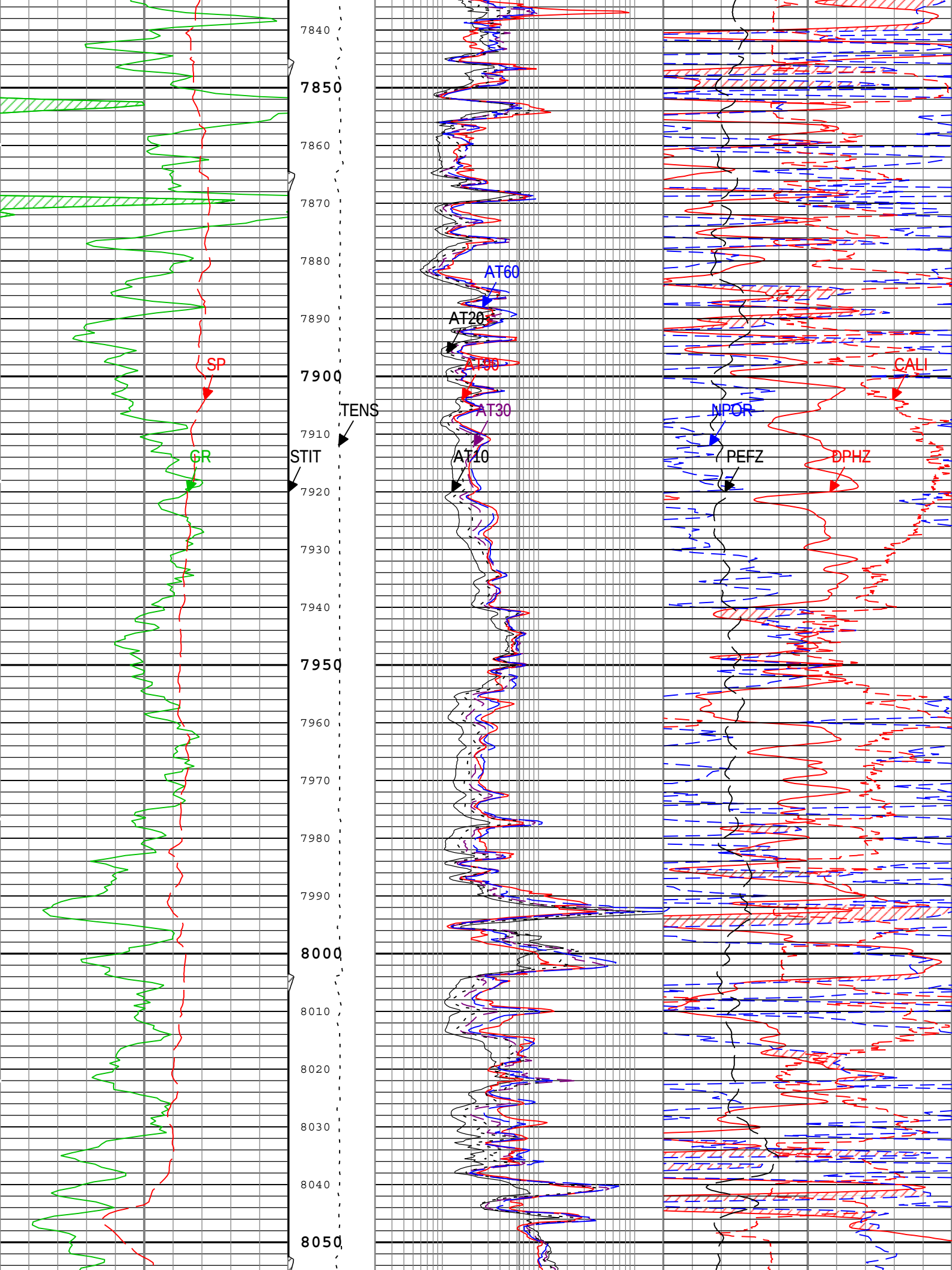
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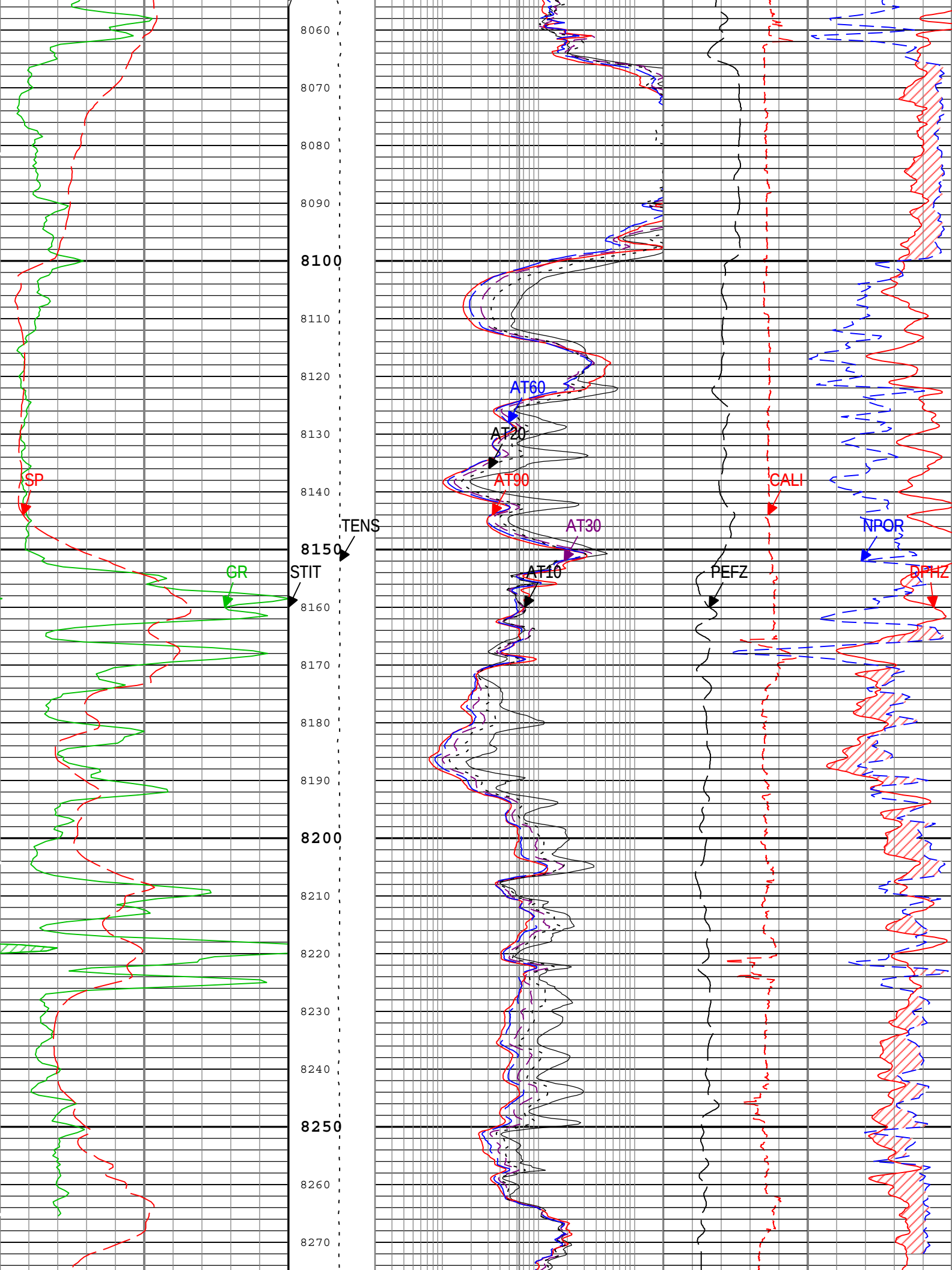
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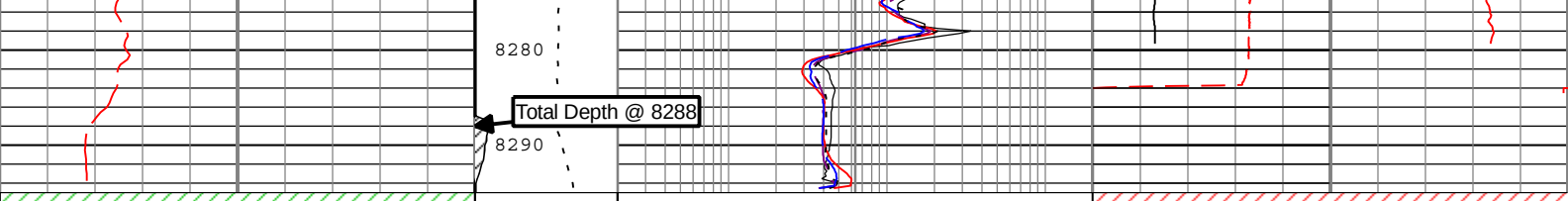

Gamma Ray Back up

Gamma Ray (GR) HGNS-H
0 gAPI 200

Spontaneous Potential (SP) AIT-M
0 mV 200

Stuck Tool Indicator, Total (STIT)
0 ft 50

Cable Tension (TENS)
6000 lbf 0

Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0.2 ohm.m 200

Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0.2 ohm.m 200

Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0.2 ohm.m 200

Array Induction Two Foot Resistivity A20 (AT20) AIT-M
0.2 ohm.m 200

Array Induction Two Foot Resistivity A60 (AT60) AIT-M
0.2 ohm.m 200

Gas Effect

NPOR Backup

Standard Resolution Density Porosity (DPHZ) HDRS-H
0.5 ft3/ft3 0

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.5 m3/m3 0

Caliper (CALI) HDRS-H
4 in 14

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

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo) Index Scale: 5 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 13-Feb-2014 17:00:26

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	180	degF
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	0	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	350	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	81.63	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.8	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	8288	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	3600	ft/h

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run 1

Primary Equipment :

File code for AIT-MA Sonde Tool Element	AMIS	208

Auxiliary Equipment :

AITM Rm/SP Bottom Nose	AMRM	208

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 12:32:54 20-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	0.568	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.015	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.671	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	0.158	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.014	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.192	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.996	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.148	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.987	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.037	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.248	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.005	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.054	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 12:32:54 20-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-61.425	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-110.616	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	156.631	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	-105.203	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	120.890	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	-97.021	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	52.953	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	-10.226	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	26.839	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	1.426	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	12.558	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	-8.037	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.608	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	6.854	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.791	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	2.572	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 12:32:54 20-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit

Coarse Gain		Master	1.000	0.800	1.078	1.200
Fine Gain		Master	1.000	0.800	1.070	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 12:32:54 20-Dec-2013 Before (Measured): 07:41:25 13-Feb-2014 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.562	0.854
		Before	-----	0.366	0.563	0.854
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 0	deg	Master	-----	137.000	-178.053	-103.000
		Before	-----	137.000	-177.744	-103.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.309	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.149	1.778
		Before	-----	0.762	1.151	1.778
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.002	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 1	deg	Master	-----	136.000	-176.857	-104.000
		Before	-----	136.000	-176.565	-104.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.292	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 2	V	Master	-----	0.372	0.613	0.868
		Before	-----	0.372	0.613	0.868
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 2	deg	Master	-----	132.000	-171.070	-108.000
		Before	-----	132.000	-170.827	-108.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.243	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 3	V	Master	-----	0.420	0.692	0.980
		Before	-----	0.420	0.693	0.980
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 3	deg	Master	-----	131.000	-171.091	-109.000
		Before	-----	131.000	-170.848	-109.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.243	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 4	V	Master	-----	0.804	1.316	1.876
		Before	-----	0.804	1.317	1.876
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 4	deg	Master	-----	125.000	-171.444	-115.000
		Before	-----	125.000	-171.204	-115.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.240	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 5	V	Master	-----	1.176	1.928	2.744
		Before	-----	1.176	1.929	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 5	deg	Master	-----	122.000	-171.926	-118.000
		Before	-----	122.000	-171.687	-118.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.239	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 6	V	Master	-----	1.176	1.931	2.744
		Before	-----	1.176	1.931	2.744

		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 6	deg	Master	-----	121.000	-171.918	-119.000
		Before	-----	121.000	-171.678	-119.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.240	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 7	V	Master	-----	0.846	1.377	1.974
		Before	-----	0.846	1.377	1.974
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 7	deg	Master	-----	115.000	-174.013	-125.000
		Before	-----	115.000	-173.779	-125.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.234	-----
		After-Before	-----	-----	-----	-----
SPA Zero	mV	Master		-50.000	-0.022	50.000
		Before		-50.000	-0.033	50.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.011	-----
		After-Before	-----	-----	-----	-----
SPA Plus	mV	Master		941.000	992.741	1040.000
		Before		941.000	992.653	1040.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.088	-----
		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	0.919	0.960
		Before		0.870	0.919	0.960
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----

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

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	5705
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	4791

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	28910
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5240
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	5705
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4826

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): 07:41:55 13-Feb-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Small Ring	in	Before	8.00	6.00	8.19	10.00
Large Ring	in	Before	12.00	9.00	12.44	15.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 16:56:32 29-Jan-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit

Rho Aluminum	g/cm3	Master	2.596	2.586	2.594	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696
Pe Aluminum		Master	2.570	2.470	2.551	2.670
Pe Magnesium		Master	2.650	2.550	2.632	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 16:56:32 29-Jan-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.2976	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.7496	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.6491	1.0000
SS Max Deviation	%	Master	0	-2.5000	1.1301	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.8230	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.9568	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 16:56:32 29-Jan-2014 Before (Measured): 07:44:58 13-Feb-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7422	
		Before	0.7422	0.7051	0.7375	0.7793
		Before-Master	-----	-----	-0.0047	-----
BS Window Sum	1/s	Master	1		25649	
		Before	25649	24366	25561	26931
		Before-Master	-----	-----	-88	-----
SS Window Ratio		Master	1.0000		0.4841	
		Before	0.4841	0.4599	0.4843	0.5083
		Before-Master	-----	-----	0.0002	-----
SS Window Sum	1/s	Master	1		11356	
		Before	11356	10788	11356	11923
		Before-Master	-----	-----	0	-----
LS Window Ratio		Master	1.0000		0.3002	
		Before	0.3002	0.2852	0.2990	0.3152
		Before-Master	-----	-----	-0.0012	-----
LS Window Sum	1/s	Master	1		1335	
		Before	1335	1268	1326	1401
		Before-Master	-----	-----	-9	-----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 16:56:32 29-Jan-2014 Before (Measured): 07:44:58 13-Feb-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1329	2400
		Before		1000	1324	2400
		Before-Master	-----	-100	-5	100
SS PM High Voltage	V	Master		1000	1977	2400
		Before		1000	1977	2400
		Before-Master	-----	-100	0	100
LS PM High Voltage	V	Master		1000	1304	2400
		Before		1000	1311	2400
		Before-Master	-----	-100	7	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 16:56:32 29-Jan-2014 Before (Measured): 07:44:58 13-Feb-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	11.80	25.00
		Before		5.00	11.91	25.00
		Before-Master	-----	-1.00	0.11	1.00
SS Crystal Resolution	%	Master		5.00	10.68	20.00
		Before		5.00	10.77	20.00
		Before-Master	-----	-1.00	0.09	1.00
LS Crystal Resolution	%	Master		5.00	8.55	20.00
		Before		5.00	8.40	20.00
		Before-Master	-----	-1.00	-0.15	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 07:45:32 13-Feb-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3852	4185
Deep Resistivity	ohm.m	Before	3830	3524	3792	4136

Shallow Resistivity	ohm.m	Before	3830	3524	3811	4136	

HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run 1

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC	HGNS-H	4810

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	5955
AmBe Neutron Logging Source	NSR-F	5215

Calibration Parameter :

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

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 13:42:00 13-Feb-2014

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-Jan-2007

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	-----	-----	1155.700	-----
Accelerometer Coefficients - 1		Master	-----	-----	26.890	-----
Accelerometer Coefficients - 2		Master	-----	-----	-0.008	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 4		Master	-----	-----	2.748	-----
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	-----	-----	0.983	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 09:53:16 07-Feb-2014 Before (Measured): 07:41:04 13-Feb-2014 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	25.8	40.0
		Before	0	5.0	24.7	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-3.9	-1.1	3.9
		After-Before	-----	-----	-----	-----
Far Zero Measurement	1/s	Master	0	5.0	27.0	40.0
		Before	0	5.0	27.6	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-4.1	0.6	4.1
		After-Before	-----	-----	-----	-----
Near Plus Measurement	1/s	Master	6031.0	4700.0	5360.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Plus Measurement	1/s	Master	2793.0	1900.0	2306.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Near Corrected Plus Measurement	1/s	Master		4700.0	5302.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Corrected Plus Measurement	1/s	Master		1900.0	2257.0	2900.0

		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 07:42:37 13-Feb-2014 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	66.0	120.0	
		After	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
RGR Plus Measurement	gAPI	Before	185.4	157.1	167.7	206.3	
		After			NOT DONE		
		After-Before	-----	-----	-----	-----	
GR Calibration Gain		Before	0.89	0.80	0.98	1.05	
		After	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

LEH-QT (Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor) Calibration - Run 1

Primary Equipment :

Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor LEH-QT

HTEN Master Calibration - HTEN Master Calibration

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
HTEN Shop Gain		Master	1.000	0.800	NOT DONE	4.500	
HTEN Shop Offset	lbf	Master	0	-1000.000	NOT DONE	1000.000	

HTEN Before Calibration - HTEN Before Calibration

Before:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RHTE Zero Measurement - 0	lbf	Before	-----	-----	-----	-----	
RHTE Plus Measurement - 0	lbf	Before	-----	-----	-----	-----	
HTEN Gain - 0		Before	-----	-----	-----	-----	
HTEN Offset - 0	lbf	Before	-----	-----	-----	-----	

Company:	Nighthawk Production LLC
Well:	Big Sky 5-11
Field:	Arikaree Creek
County:	Lincoln
State:	Colorado

Schlumberger

Platform Express
Triple Combo
Linear