Schlumberger

Company: St. Croix Operating, Inc.

Well: State 3-16

Field: Wildcat

County: Washington State: Colorado

Platform Expres

Array Induction

with Linear Correlation

Location:	NENW Sec. 16, T3S, R52W		Elev.:	K.B.	4827.00 ft
	SHL: 1100' FNL & 1700' FWL			G.L.	4821.00 ft
	Lat/Long: 39.796480 / -103.212730			D.F.	4827.00 ft
	Permanent Datum:	Ground Level	Elev.:		4821.00 f
	Log Measured From:	Kelly Bushing	6.00 ft		above Perm.Datum
	Drilling Measured From:	Kelly Bushing			

County:	Field:	Location:	Well:	Company:
Washington	Wildcat	NENW Sec. 16, T3S, R52W	State 3-16	St. Croix Operating, Inc.

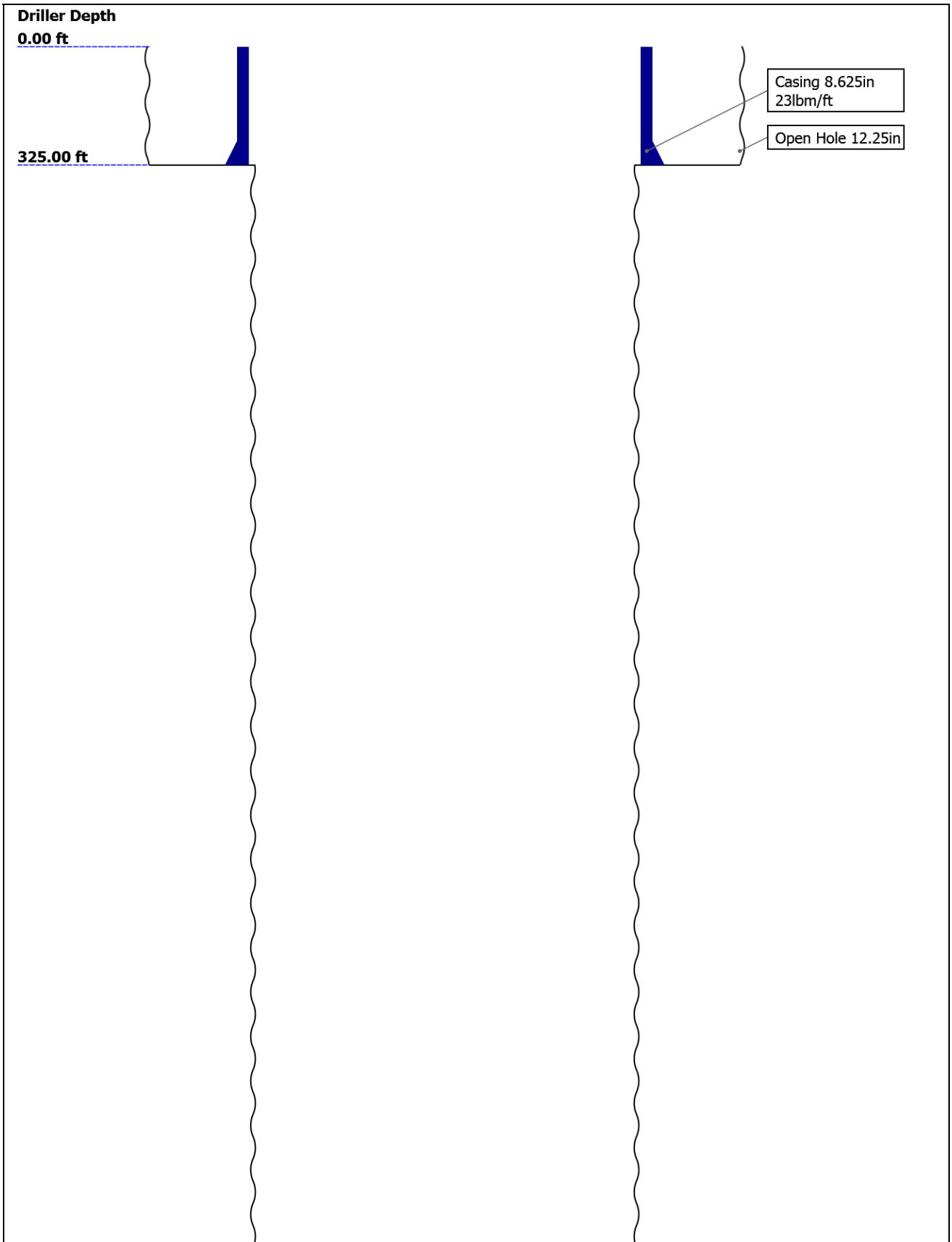
API Serial No.	Section:	Township:	Range:
05-121-11073	16	3S	52W

Logging Date			10-Jun-2018			
Run Number			ONE			
Depth Driller			4500.00 ft			
Schlumberger Depth			4504.00 ft			
Bottom Log Interval			3500.00 ft			
Top Log Interval			100.00 ft			
Casing Driller Size @ Depth			8.625 in @ 325.00 ft			
Casing Schlumberger			326.5 ft			
Bit Size			7.875 in			
Type Fluid In Hole			WBM			
MUD	Density	Viscosity	9.1 lbm/gal	67 s		
	Fluid Loss	PH	7.2 cm3	8.5		
	Source of Sample		Active Tank			
RM @ Meas Temp			0.2 ohm.m @ 68 degF			
RMF @ Meas Temp			0.15 ohm.m @ 68 degF			
RMC @ Meas Temp						
Source RMF	RMC			Pressed		
RM @ BHT	RMF @ BHT		0.11 @ 125.11	0.09 @ 125.11		
Max Recorded Temperatures						
Circulation Stopped	Time		09-Jun-2018	14:30:00		
Logger on Bottom	Time		10-Jun-2018	01:56:00		
Unit Number	Location:		9102	Fort Morgan		
Recorded By			Ashley Rosacker			
Witnessed By			Gary Doke			

Disclaimer

Contents

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	7.875				
Top Driller (ft)	0	325				
Top Logger (ft)	0	325				
Bottom Driller (ft)	325	4500				
Bottom Logger (ft)	325	4504				
Casing						
Size (in)	8.625					
Weight (lbm/ft)	23					
Inner Diameter (in)	8.122					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	325					
Bottom Logger (ft)	326.5					

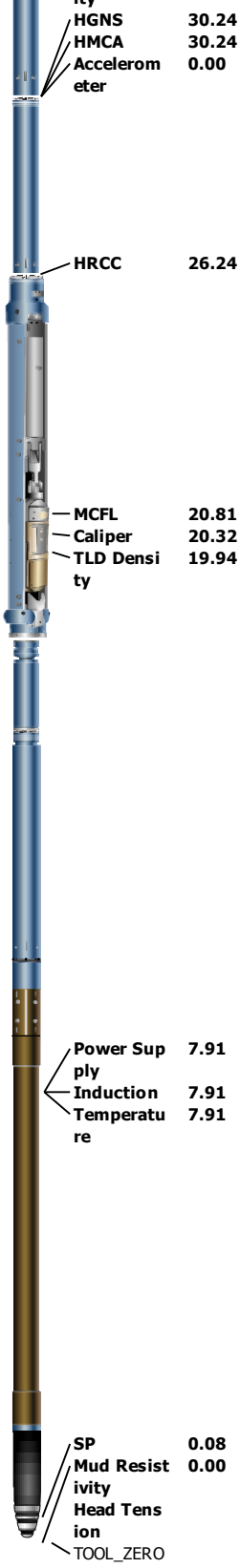
Remarks and Equipment Summary

ONE: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	49.64		
LEH-QT			
EDTC-B:8473M	46.15		
EDTH-B:8624			
EDTG-A:77434			
EDTC-B:8473M			
		CTEM	**42.65**
		ACCZ	**0.00**
		HV	**0.00**
		Gamma Ray	**40.78**
		TelStatus	**39.65**
HGNS-H:3912	39.65	**Temperature**	**39.62**
HGNH:3875			
NPV-N			
NSR-F:5070			
HMCA-H			
HACCZ-H:4264			
HGNS-H:3912			
		GR	**38.91**
		CNL Porosity	**32.58**

ONE: Remarks

Thank you for choosing Schlumberger!
This is the first log in the well.
Toolstring run as per tool sketch and client logging program.
Requested to run the tool slick with no bowspring or standoffs.
Matrix: Sandstone, Density:2.65
BHT: 125 degF
TD: 4504, Casing Shoe: 326.5



Lengths are in ft
Maximum Outer Diameter = 4.770 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	ONE		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			

Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		

Tension Device

Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		

Logging Cable

Type	7-46A-XS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

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

ONE

2" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	986.99	ft3

Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[3]:Up	Up	78.30 ft	4514.15 ft	10-Jun-2018 2:09:34 AM	10-Jun-2018 3:27:37 AM	ON	2.93 ft	No

All depths are referenced to toolstring zero

Log

Company:St. Croix Operating, Inc. Well:State 3-16

ONE: Log[3]:Up:S004

Description: AIT Basic Log Two Format: Log (Induction-2) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:27

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
ATCO60	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	EDTC-B:EDTC-B:EDTC-B	6in

ICV	Borehole	6in - RT
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-80 mV 20

Caliper (HCAL) HDRS-H

6 in 16

Gamma Ray (ECGR_EDTC) EDTC-B

0 gAPI 200

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

1 ohm.m 100

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

1 ohm.m 100

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

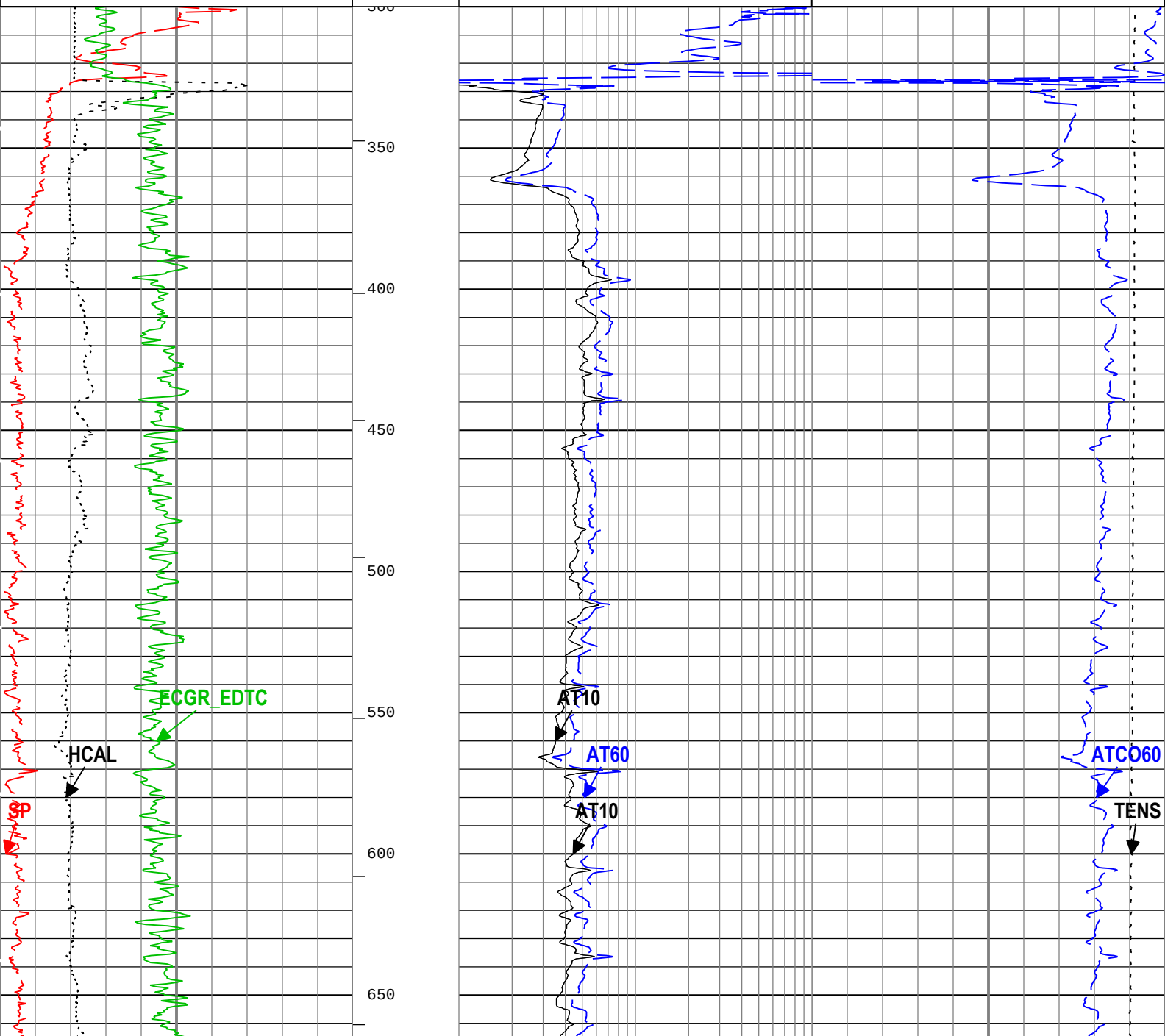
1 ohm.m 100

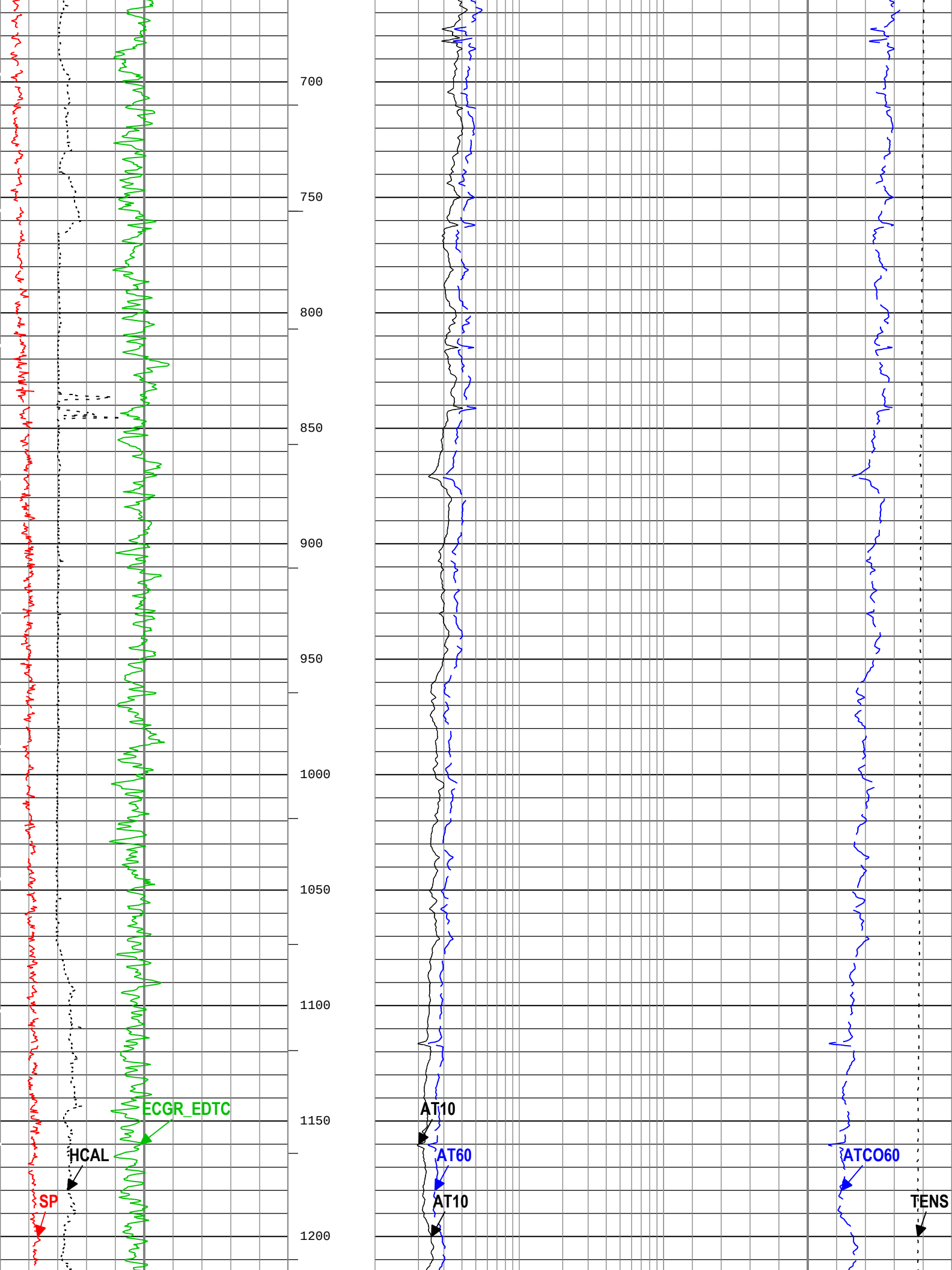
Cable Tension (TENS)

10000 lbf 0

Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M

1000 mS/m 0

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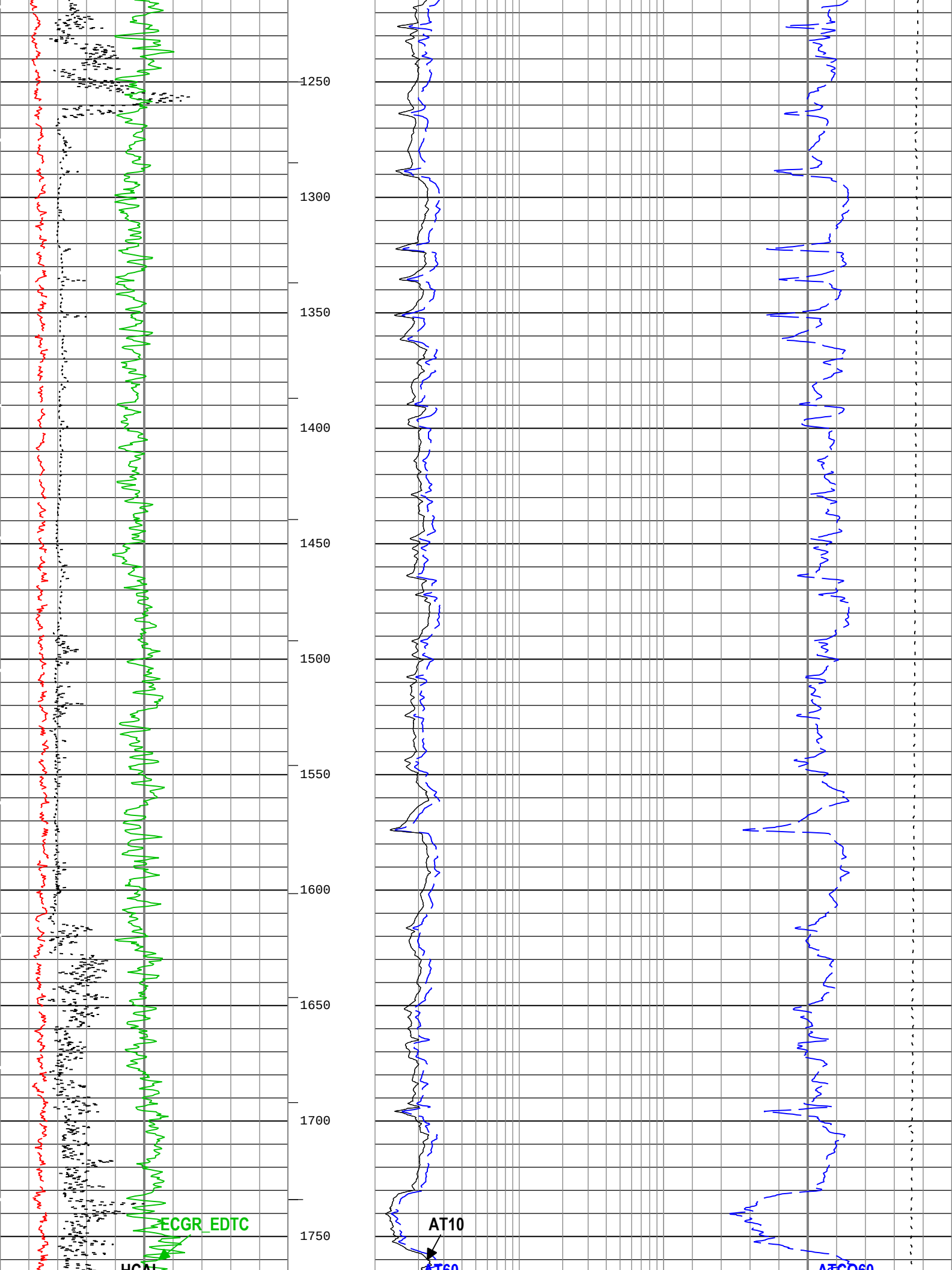
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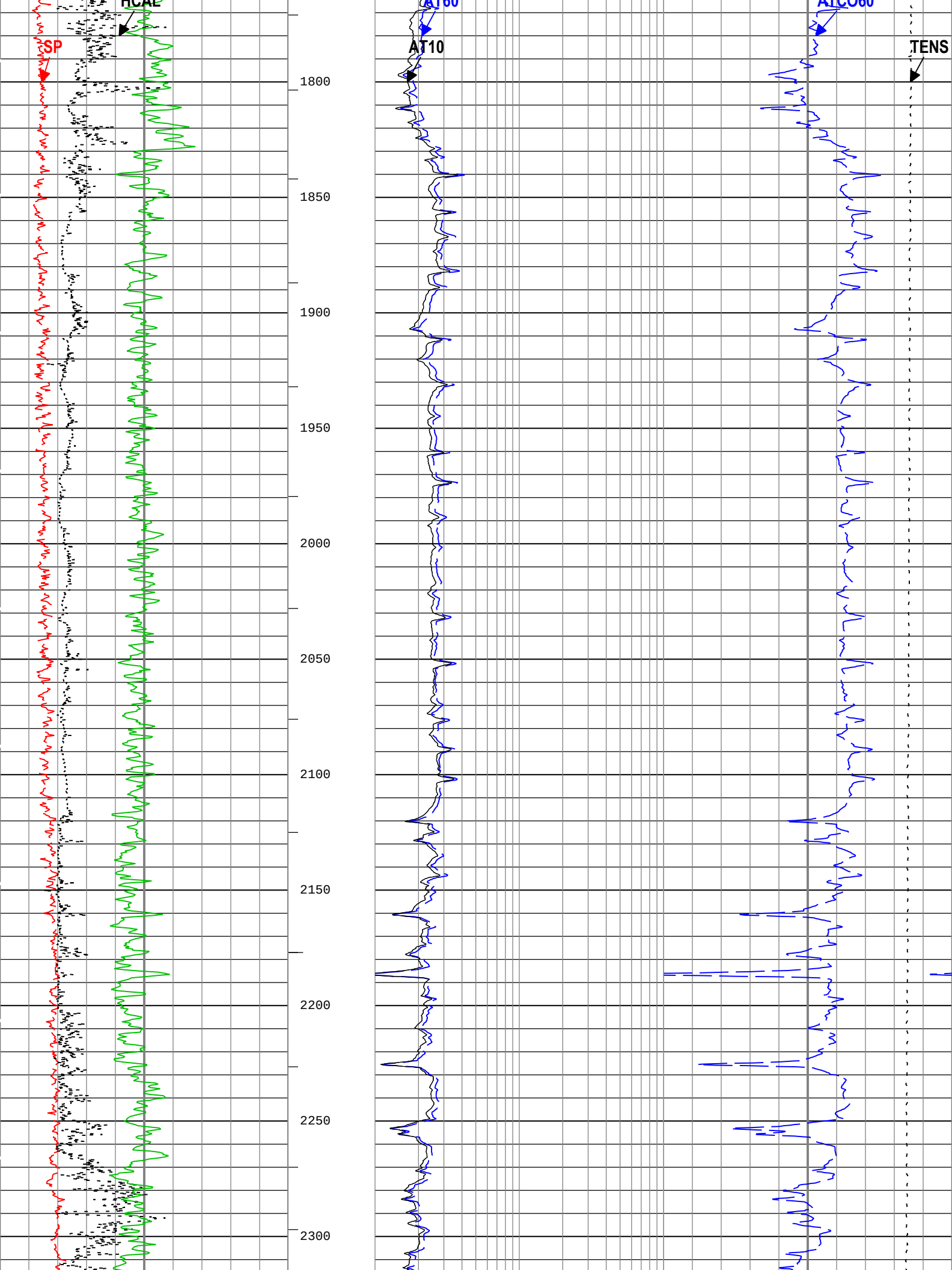
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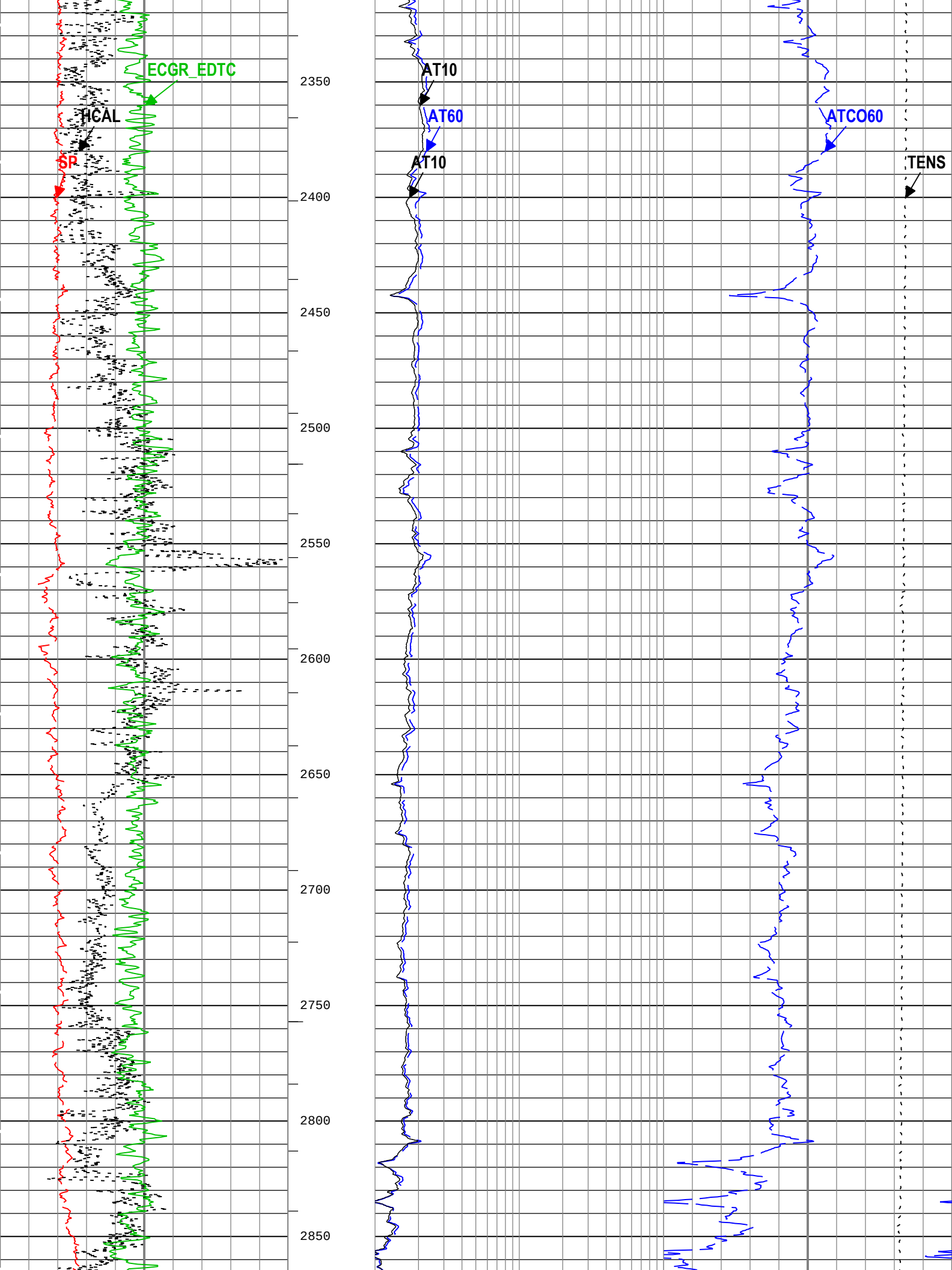
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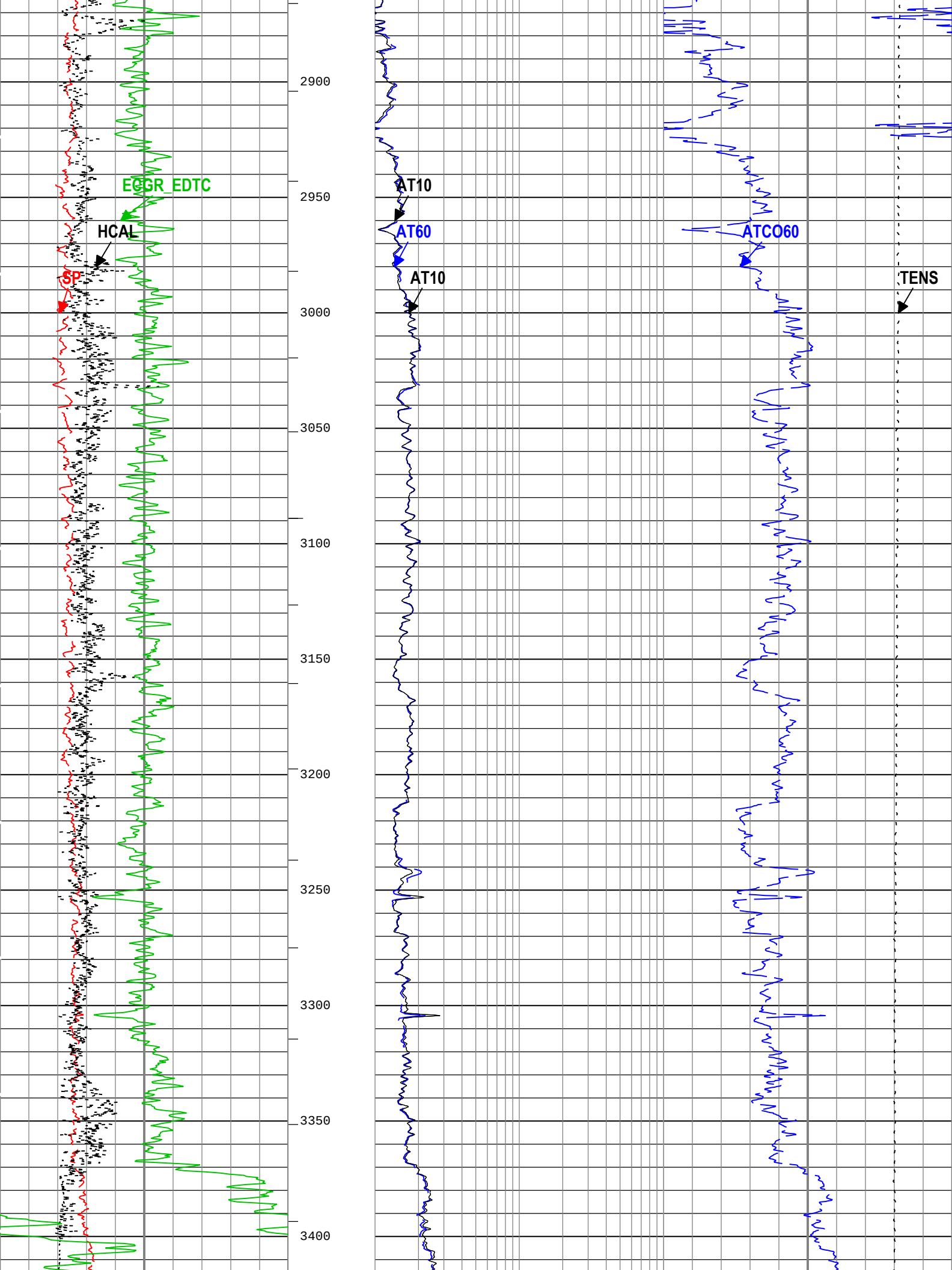
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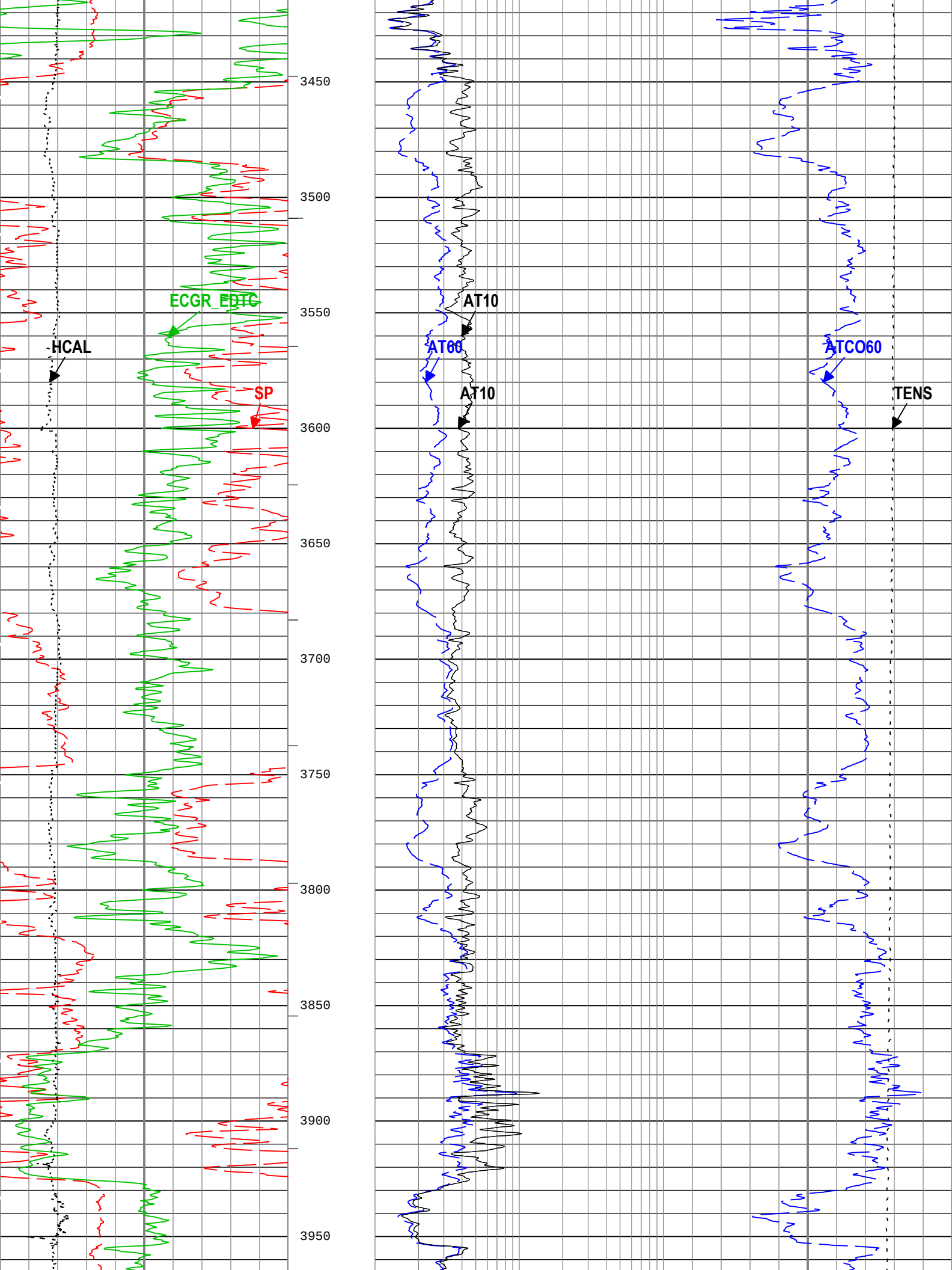
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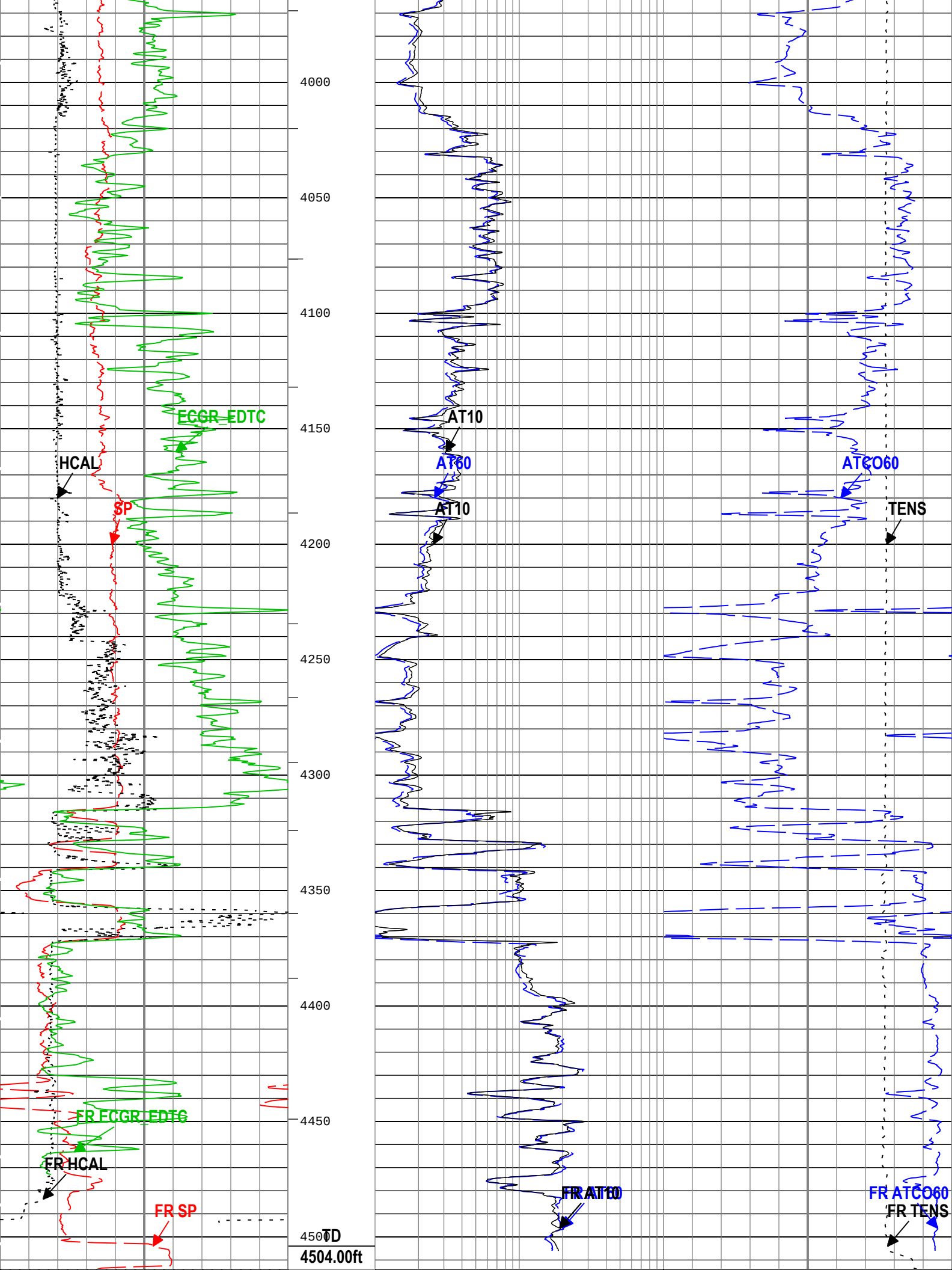
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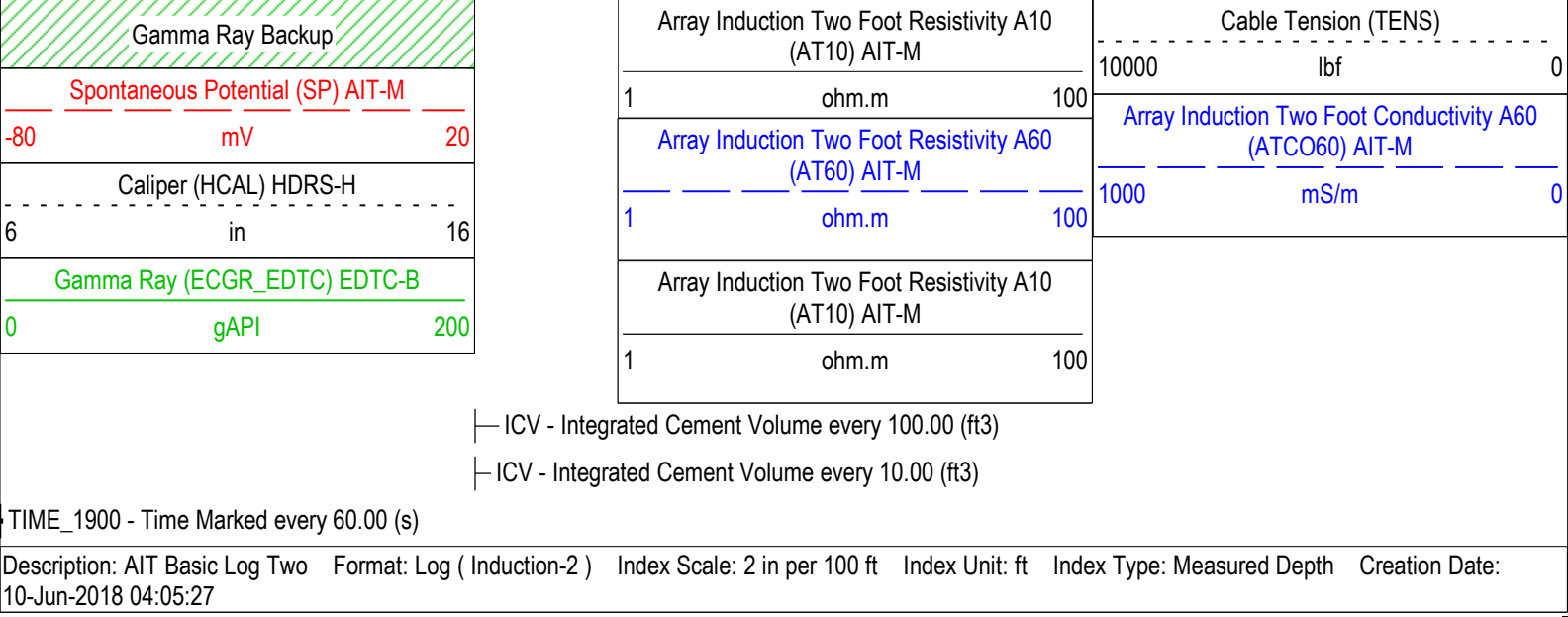
TD
4504.00ft



Description: AIT Basic Log Two Format: Log (Induction-2) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:27

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.153	in
CBLO	Casing Bottom (Logger)	WLSESSION	326.5	ft
CDEN	Cement Density	EDTC-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.1	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SP_SHIFT	SP Shift	AIT-M	500	mV
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25	300	325
BS	7.875	325	4504

All depth are actual.

Tool Control Parameters

ONE: Parameters

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

ONE

5" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	986.99	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1677.76	ft3

Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[3]:Up	Up	78.30 ft	4514.15 ft	10-Jun-2018 2:09:34 AM	10-Jun-2018 3:27:37 AM	ON	2.93 ft	No

All depths are referenced to toolstring zero

Log

Company:St. Croix Operating, Inc. Well:State 3-16

ONE: Log[3]:Up:S004

Description: AIT Basic Log Two Format: Log (Induction-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:29

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
GR	EDTC-B:EDTC-B:EDTC-B	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Cable Tension (TENS)

10000 lbf 0

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

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

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

0.2 ohm.m 2000

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

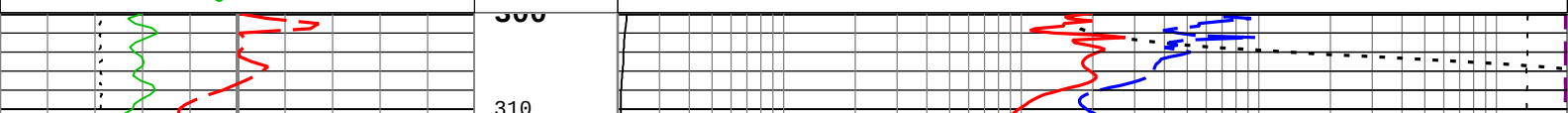
-80 mV 20

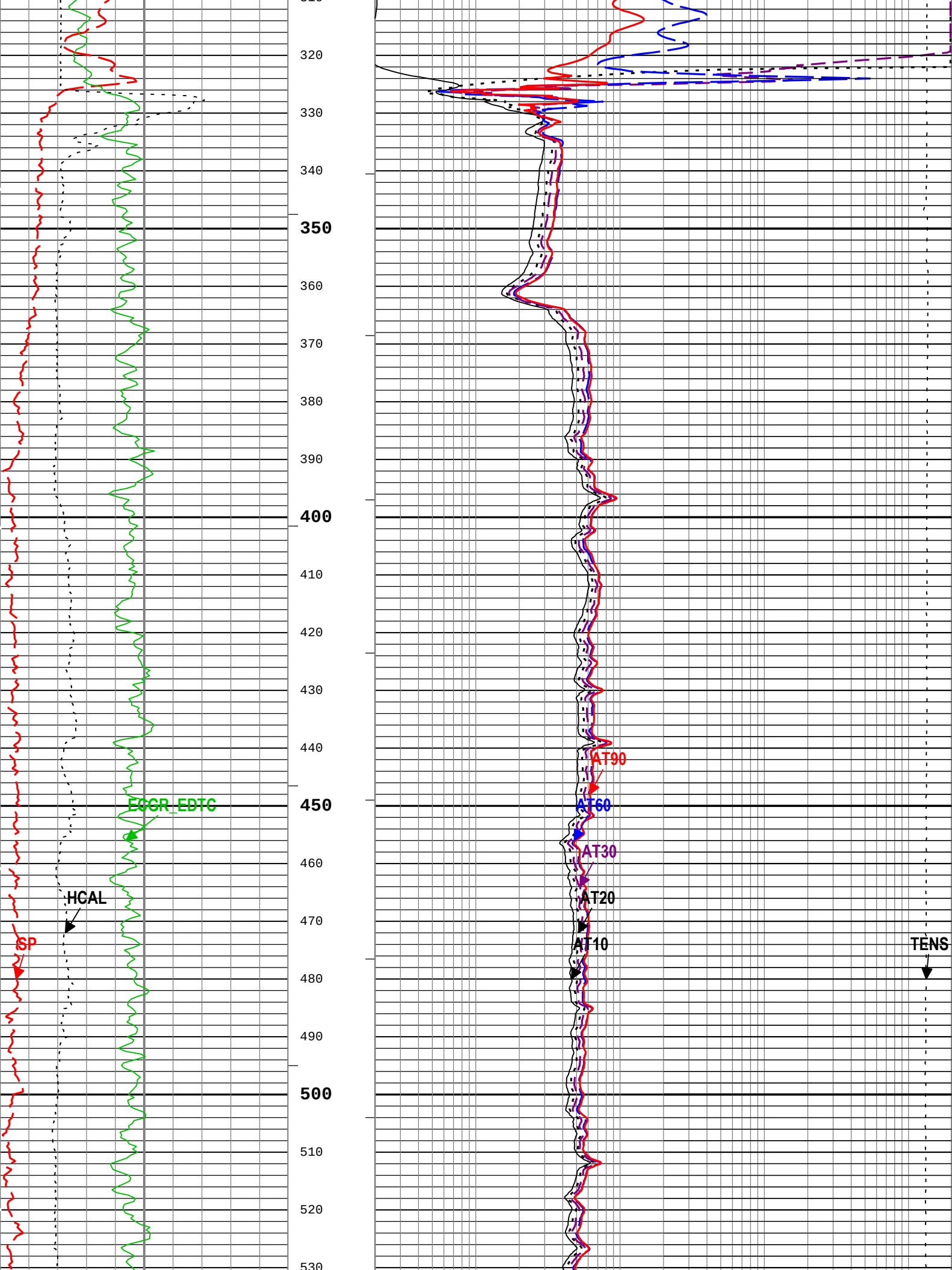
Caliper (HCAL) HDRS-H

6 in 16

Gamma Ray (ECGR_EDTC) EDTC-B

0 gAPI 200

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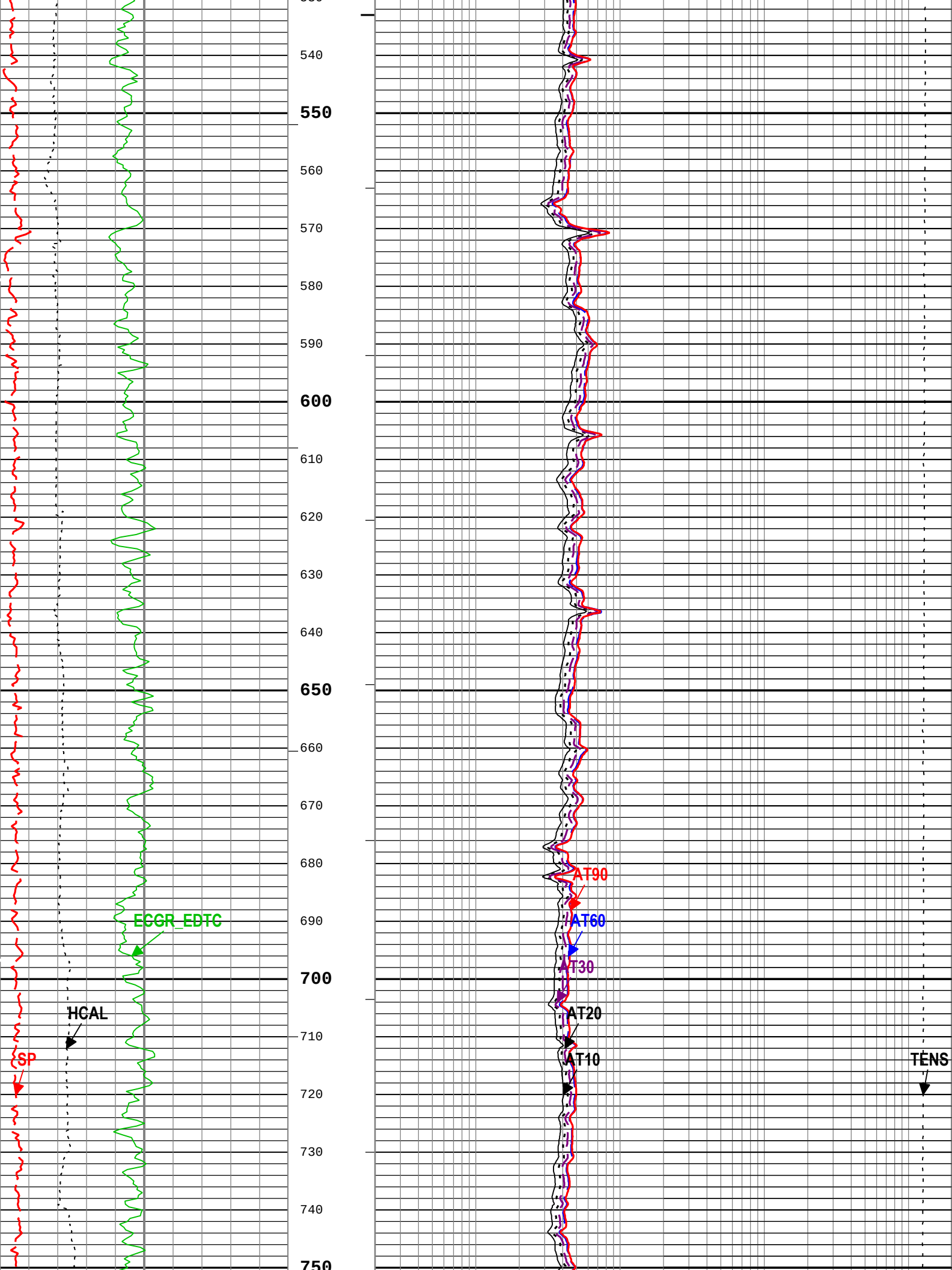
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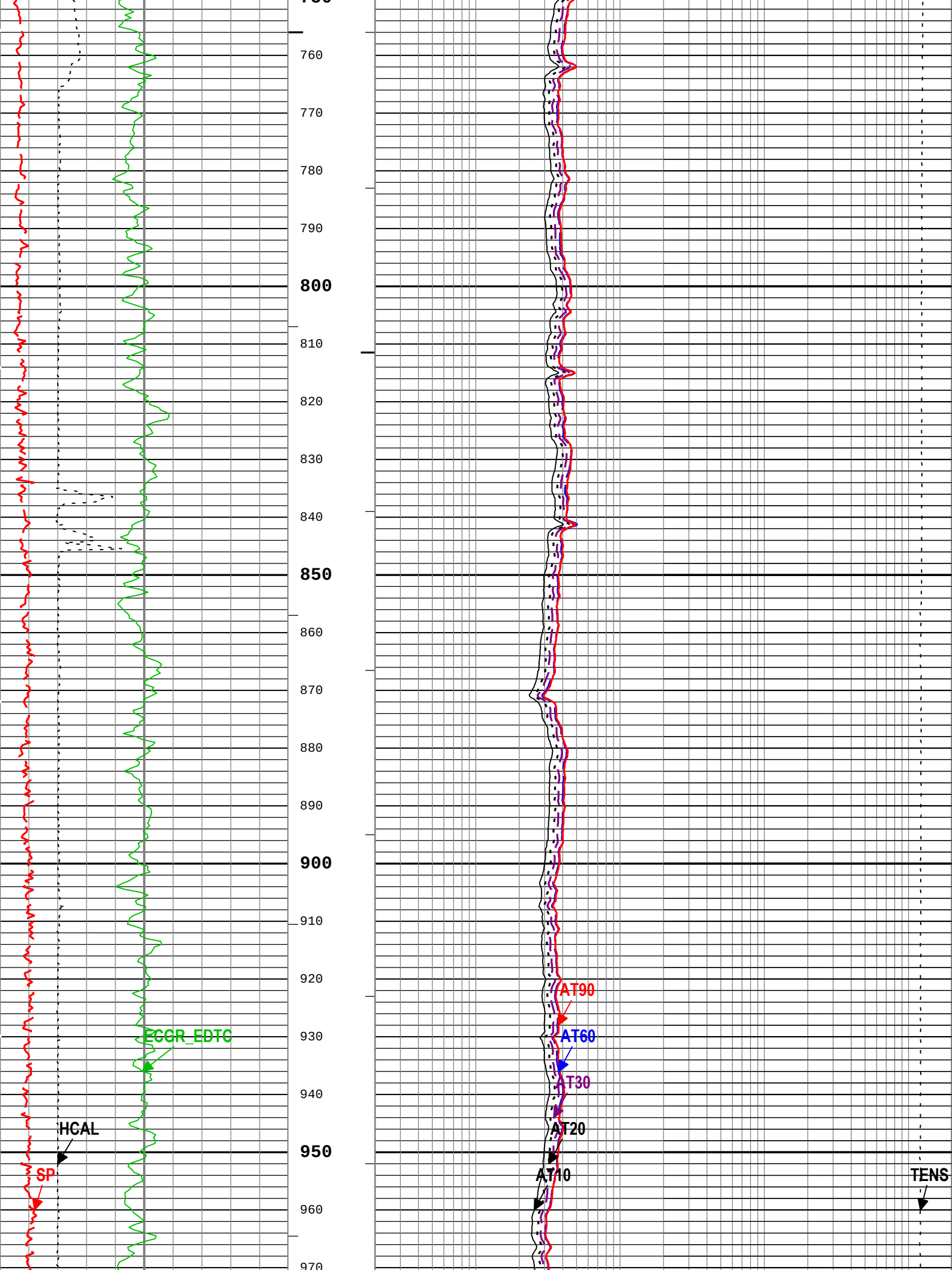
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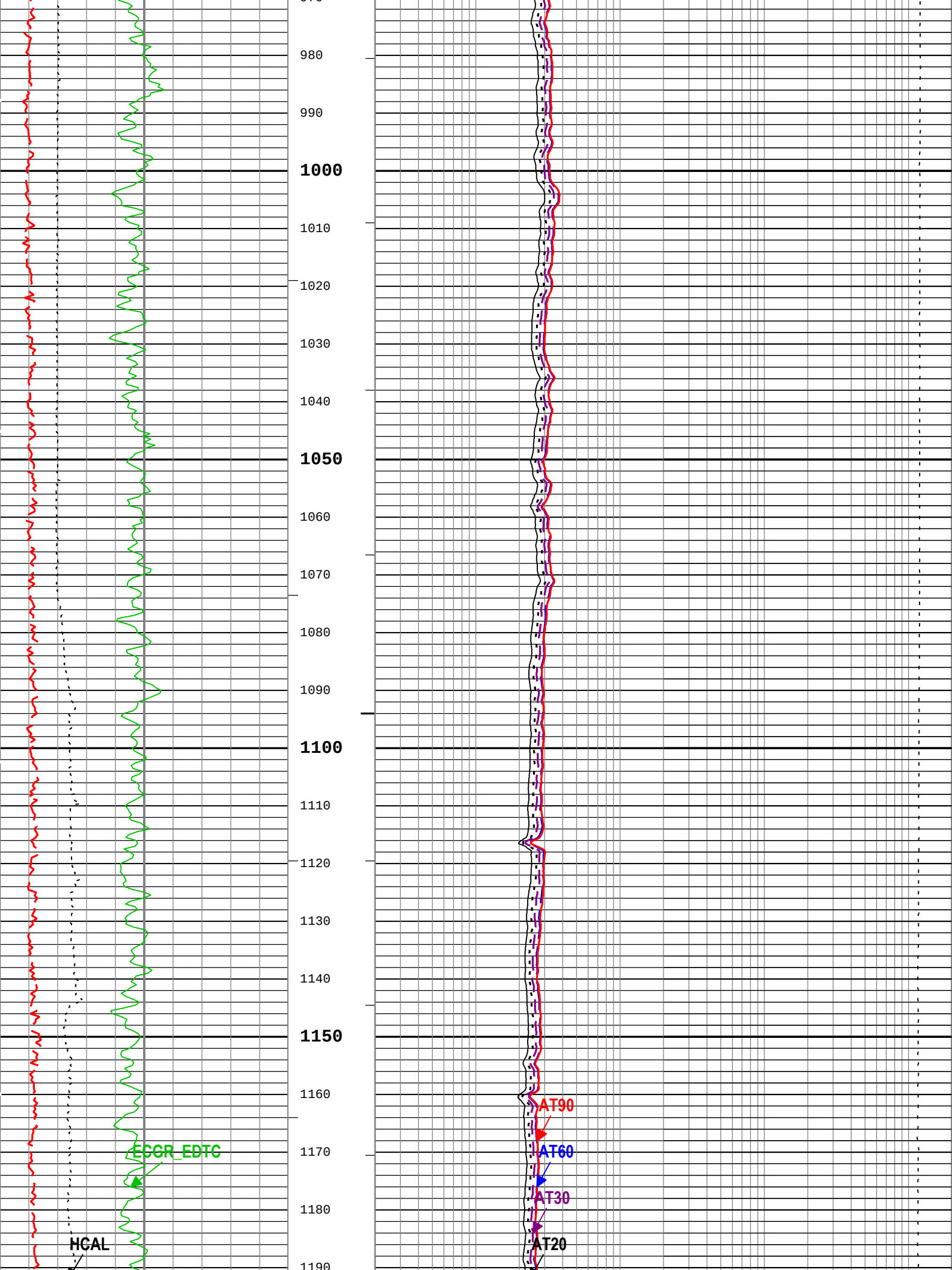
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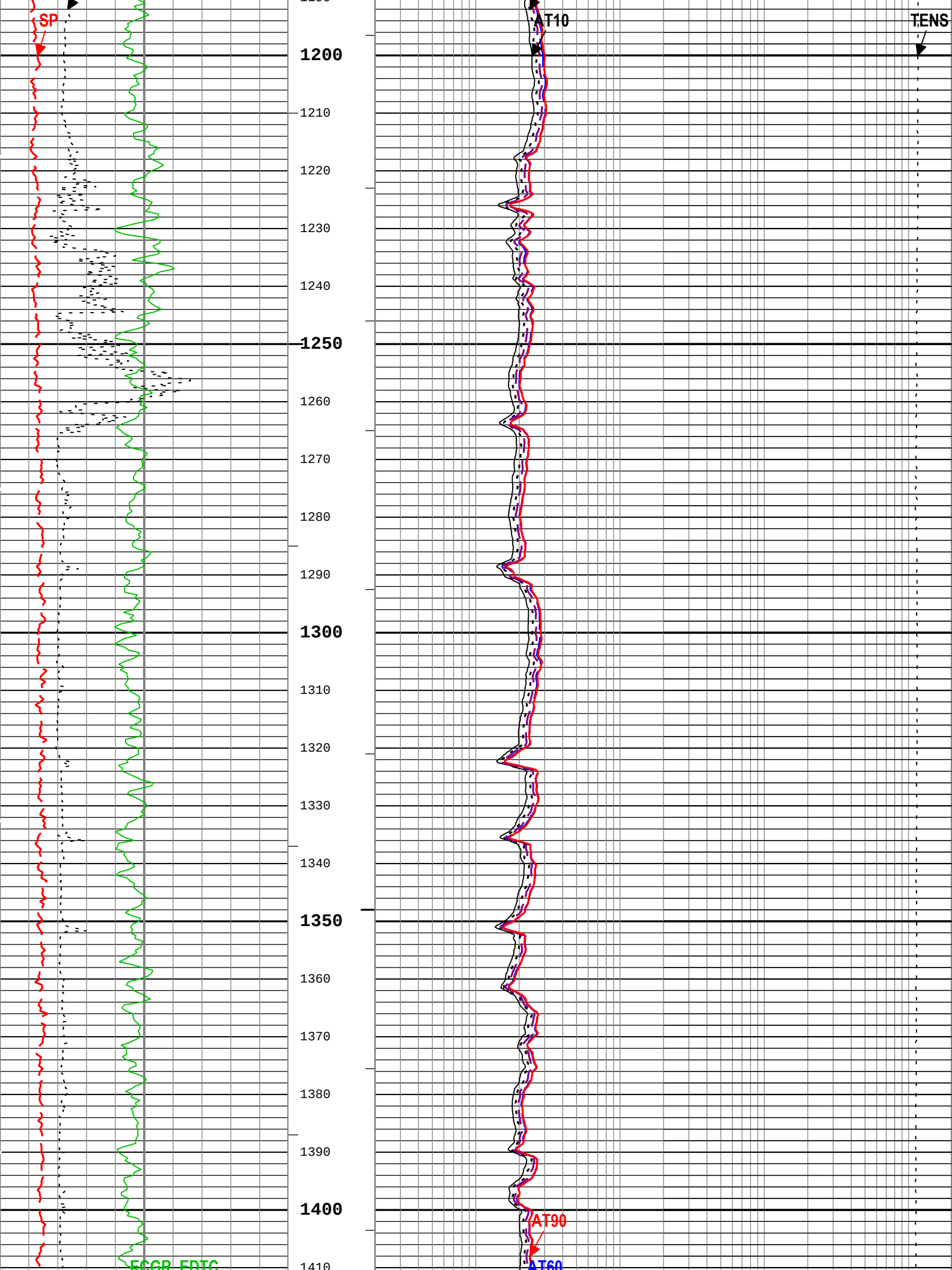
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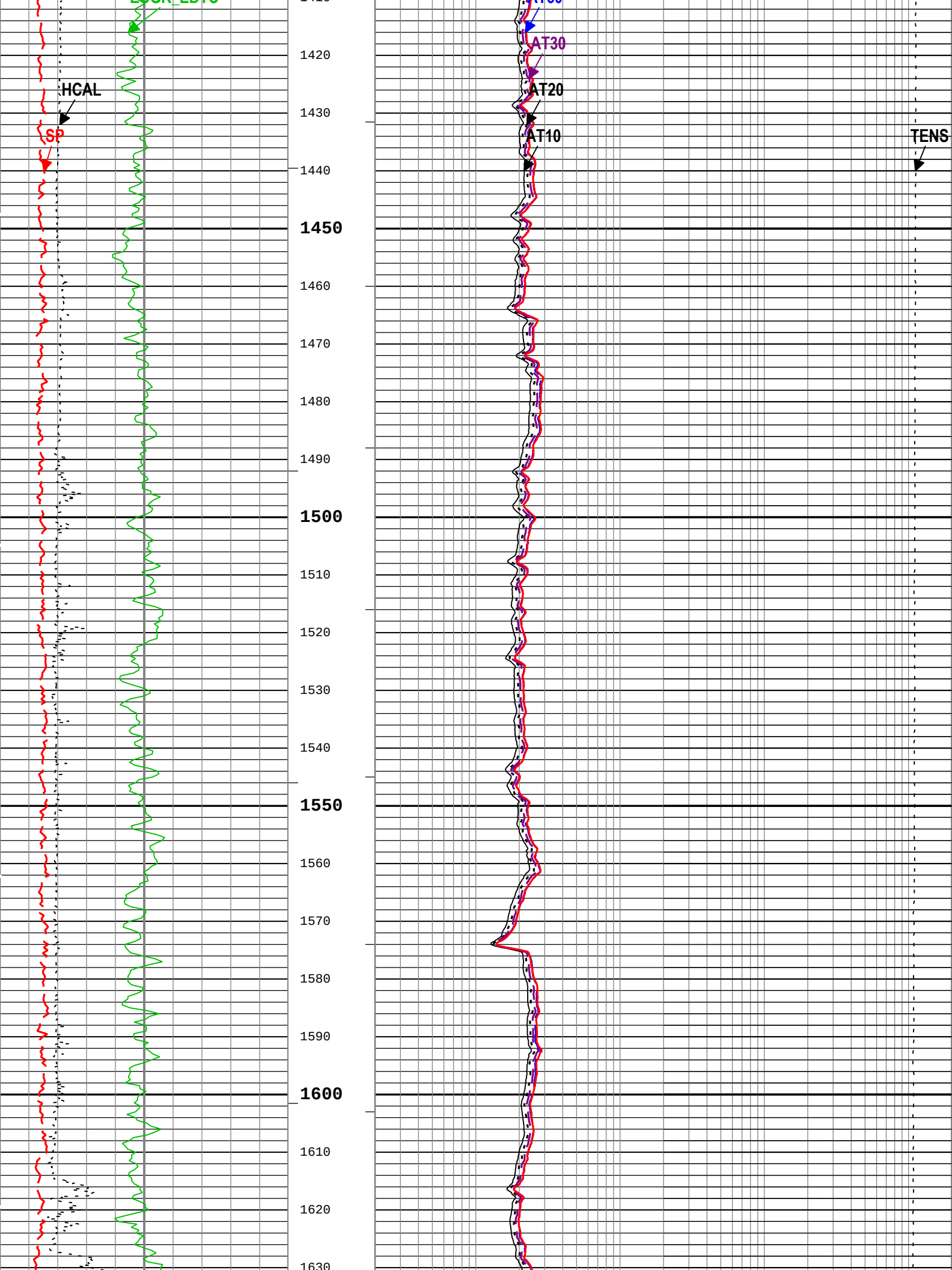
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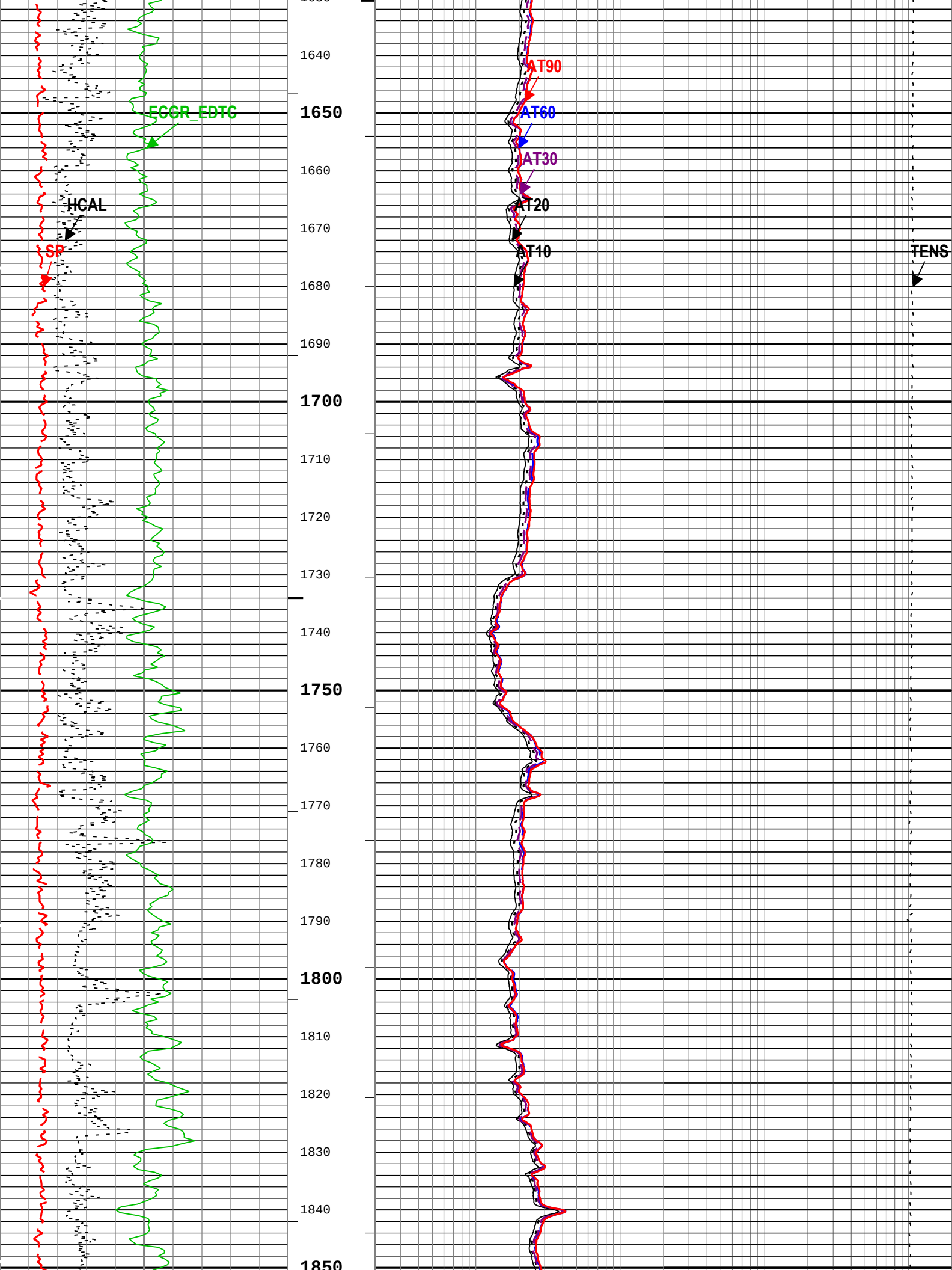
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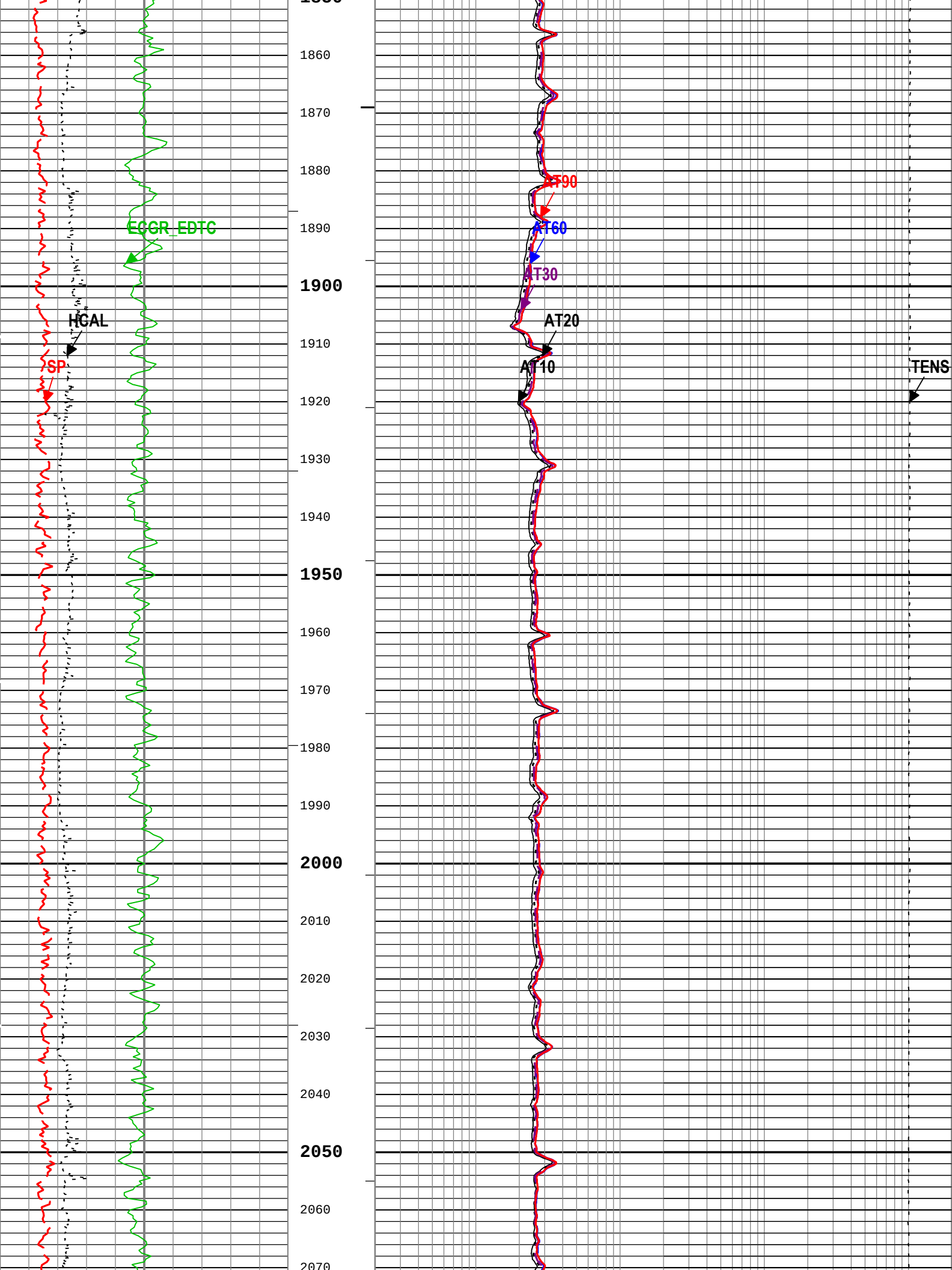
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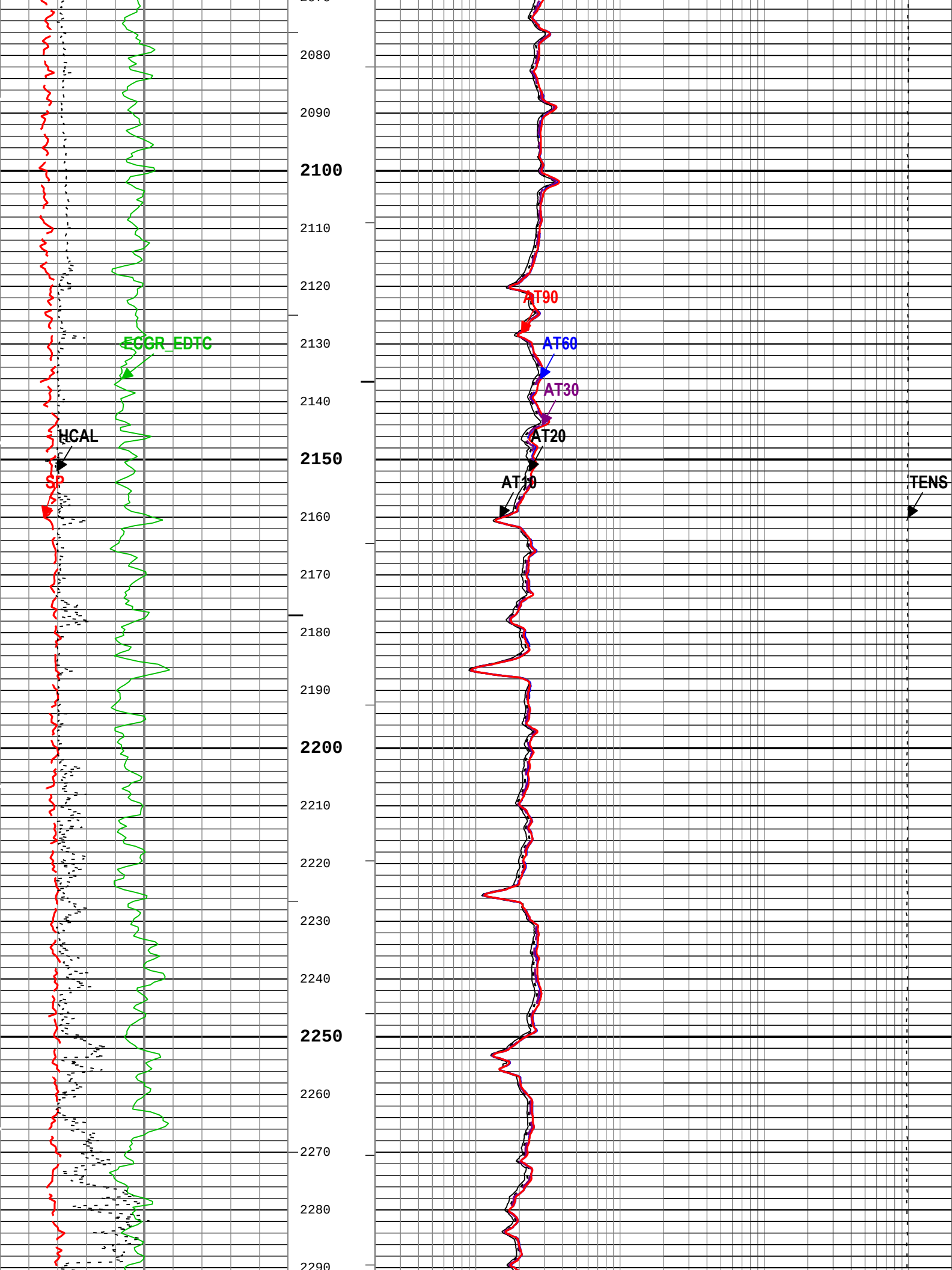
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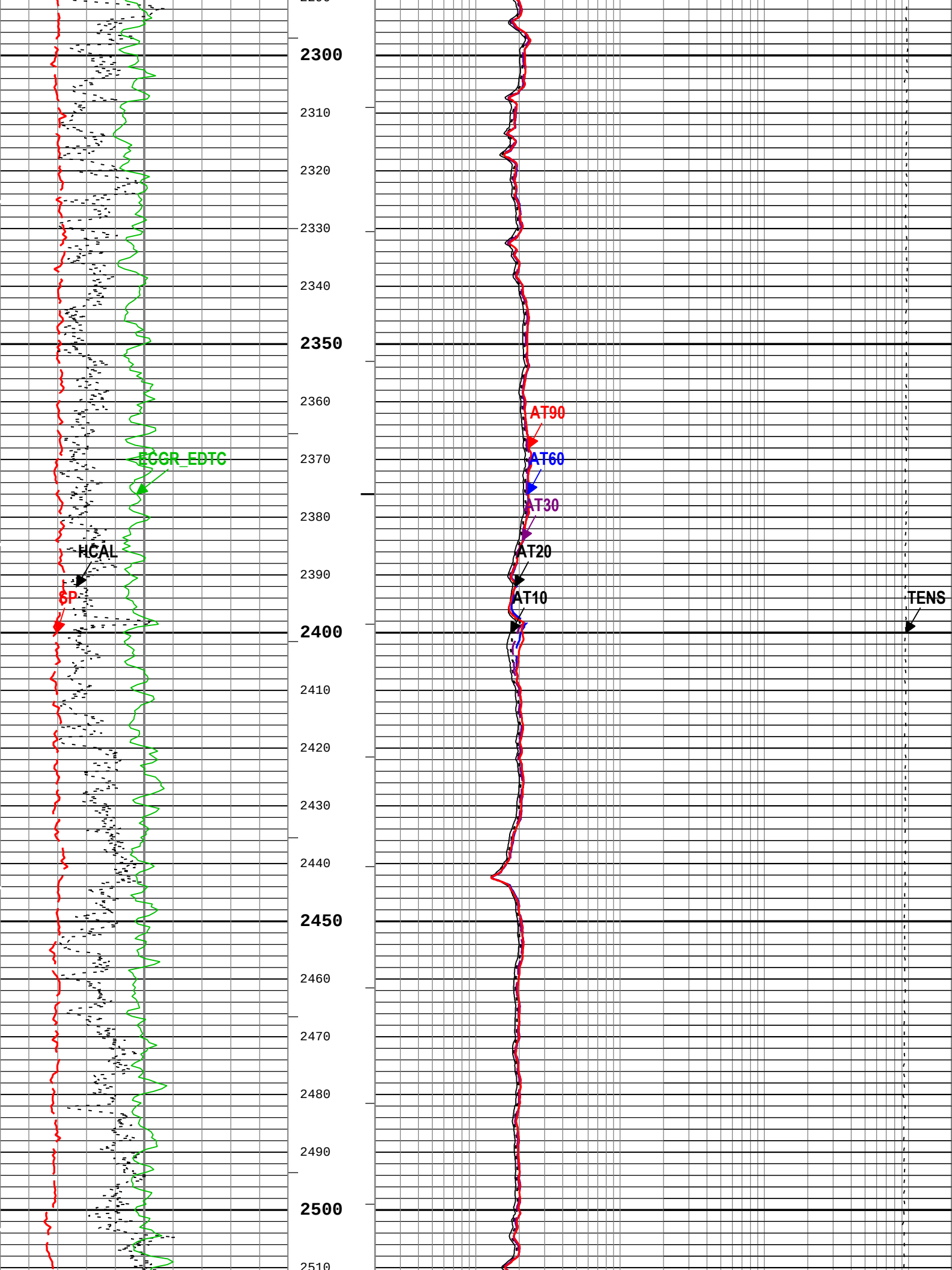
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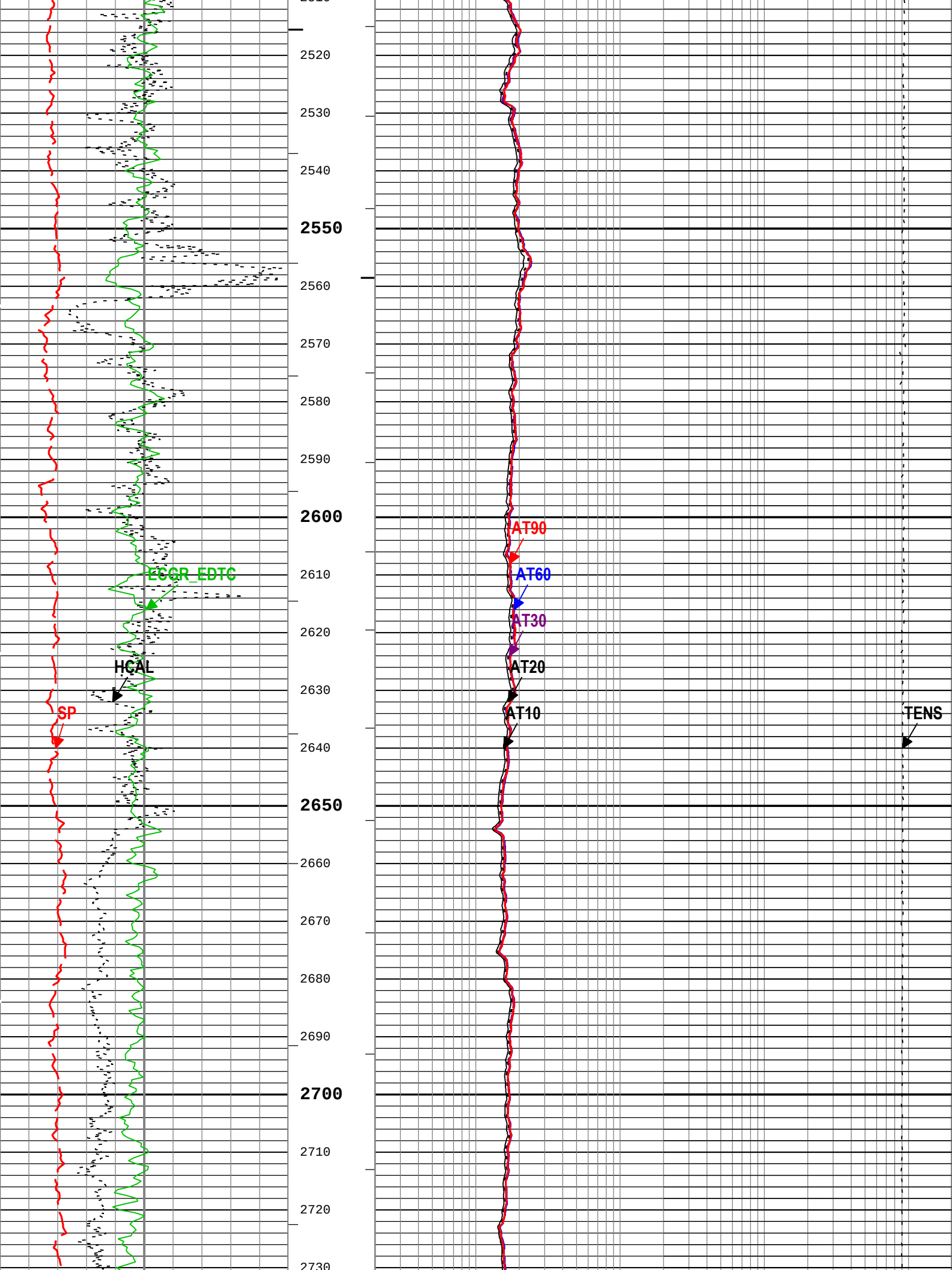
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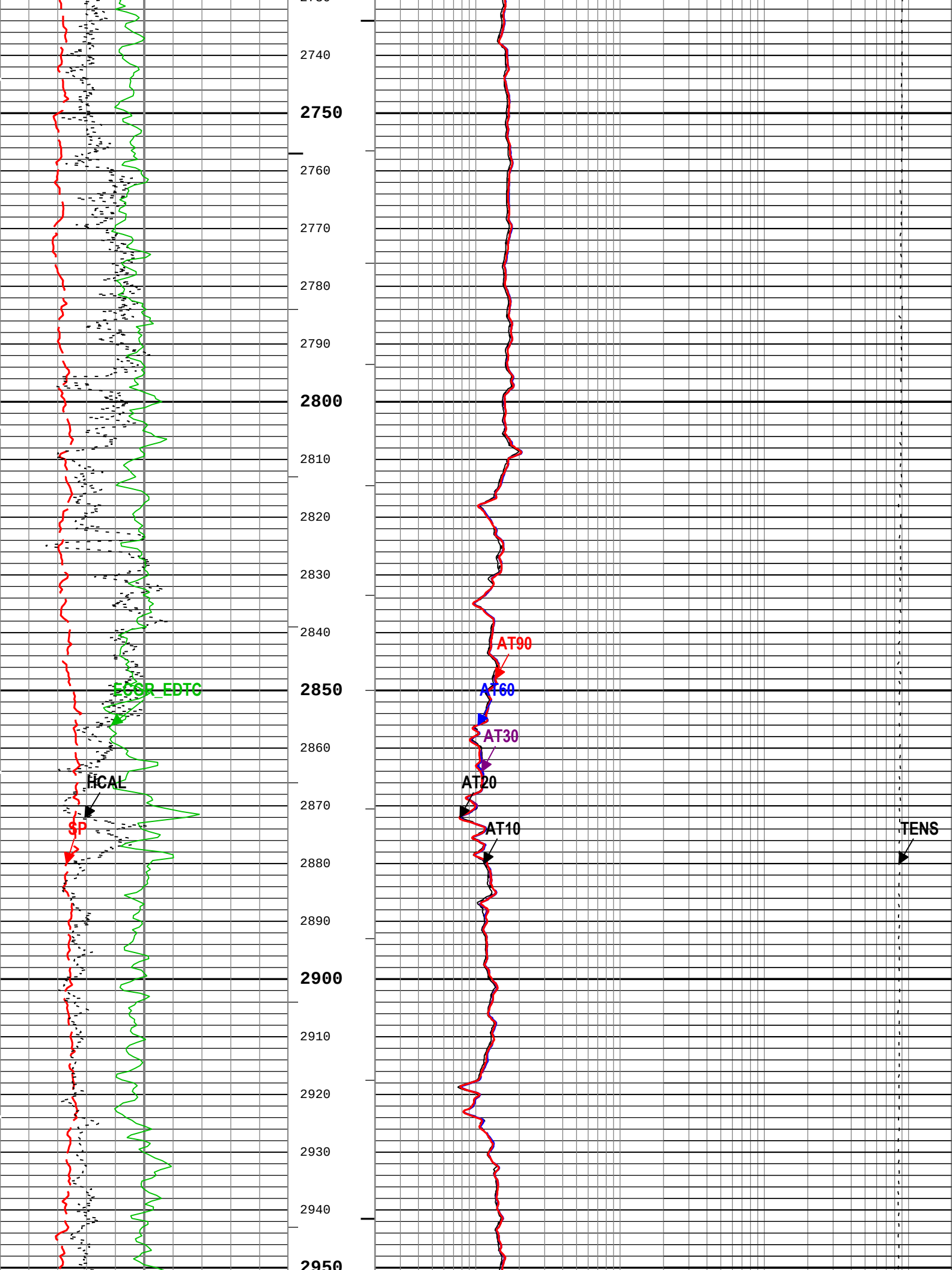
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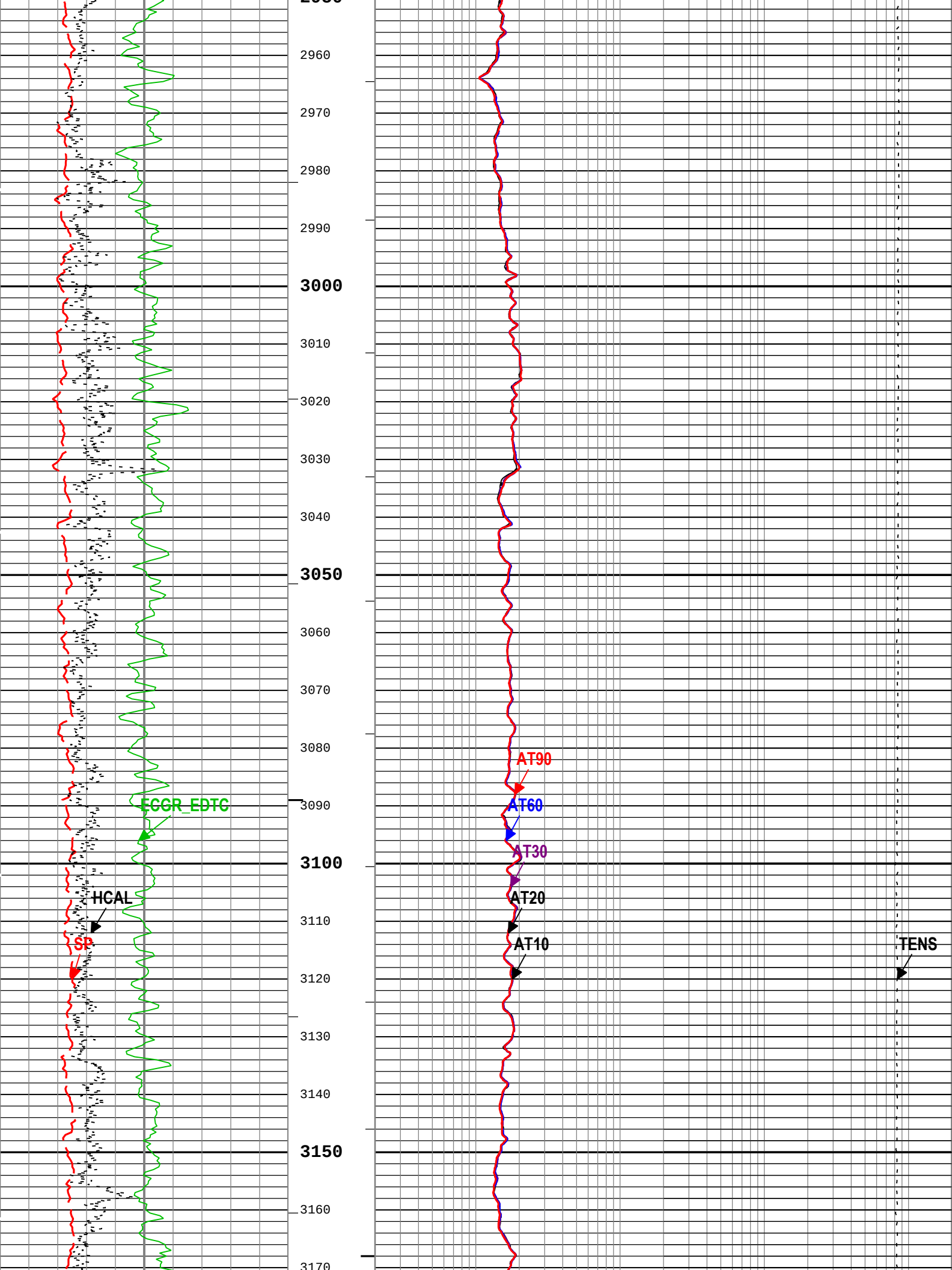
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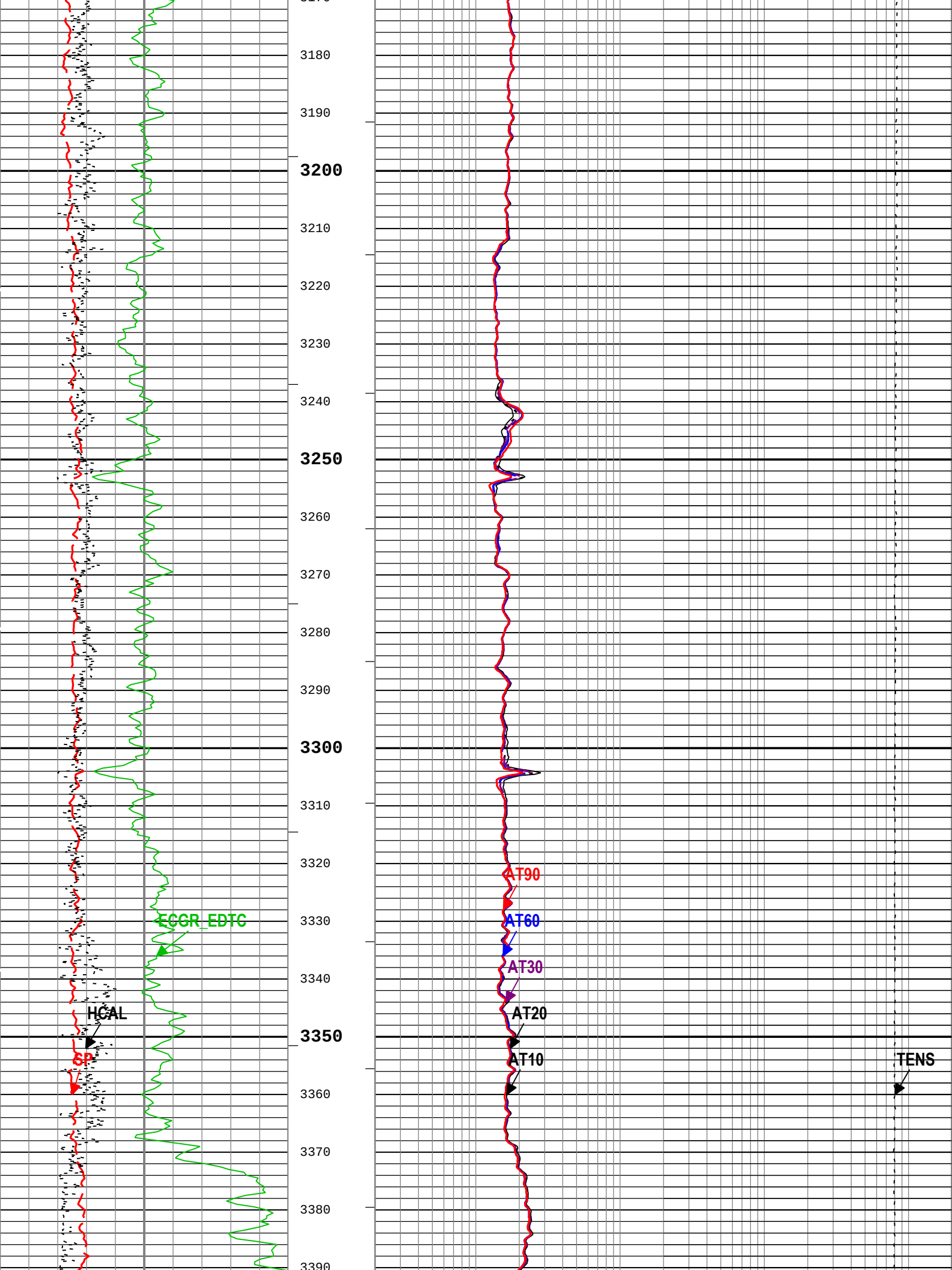
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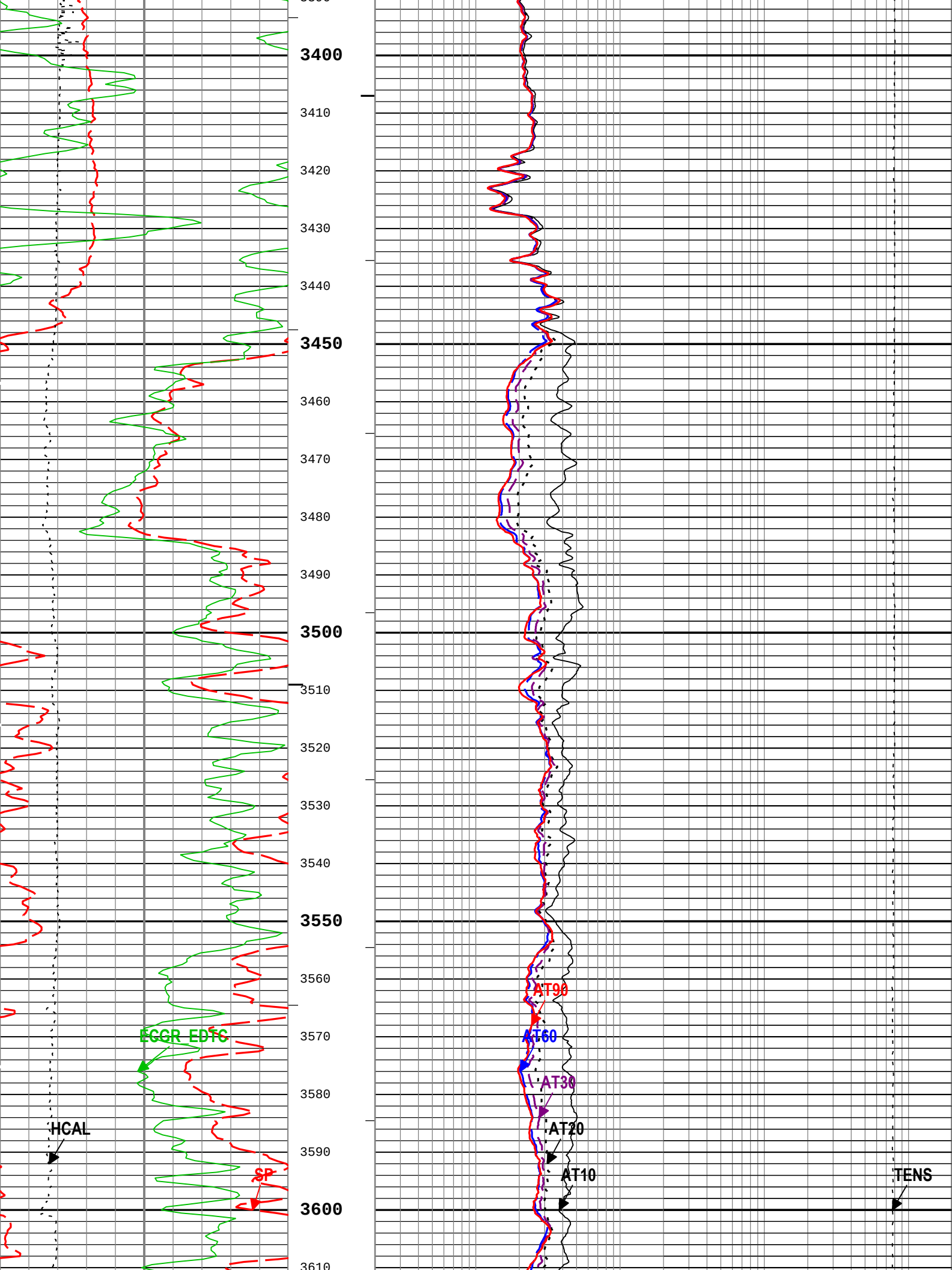
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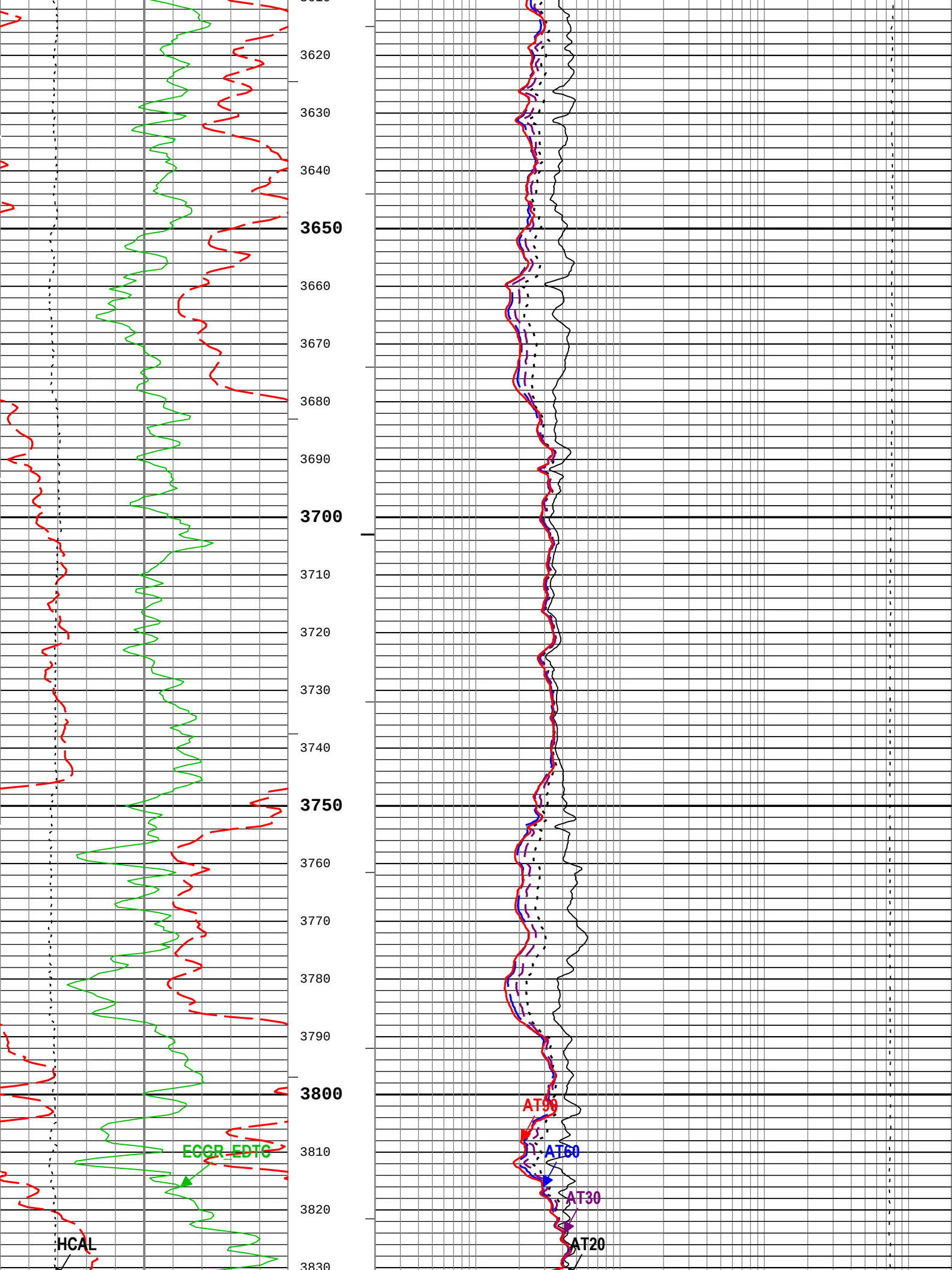
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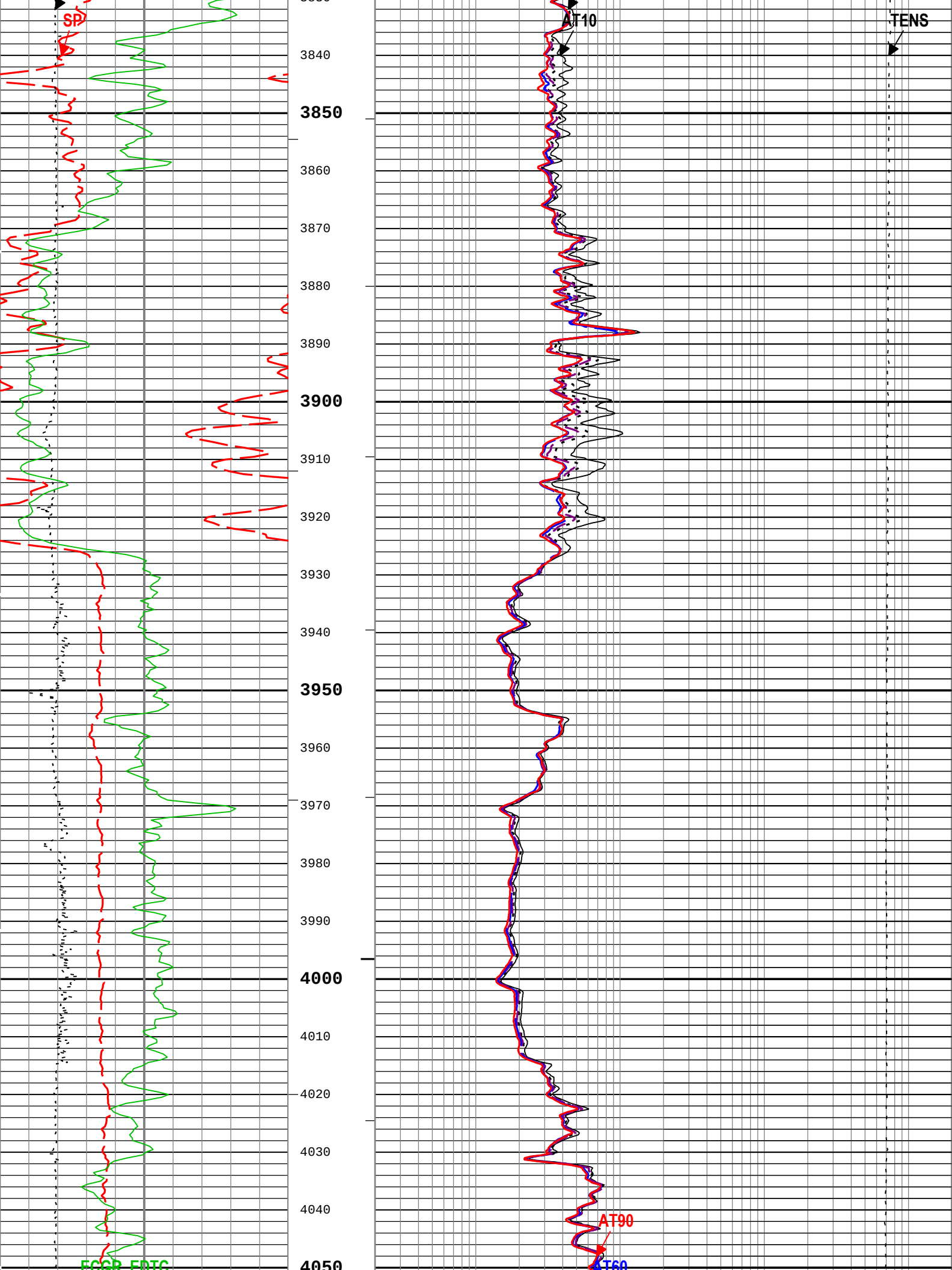
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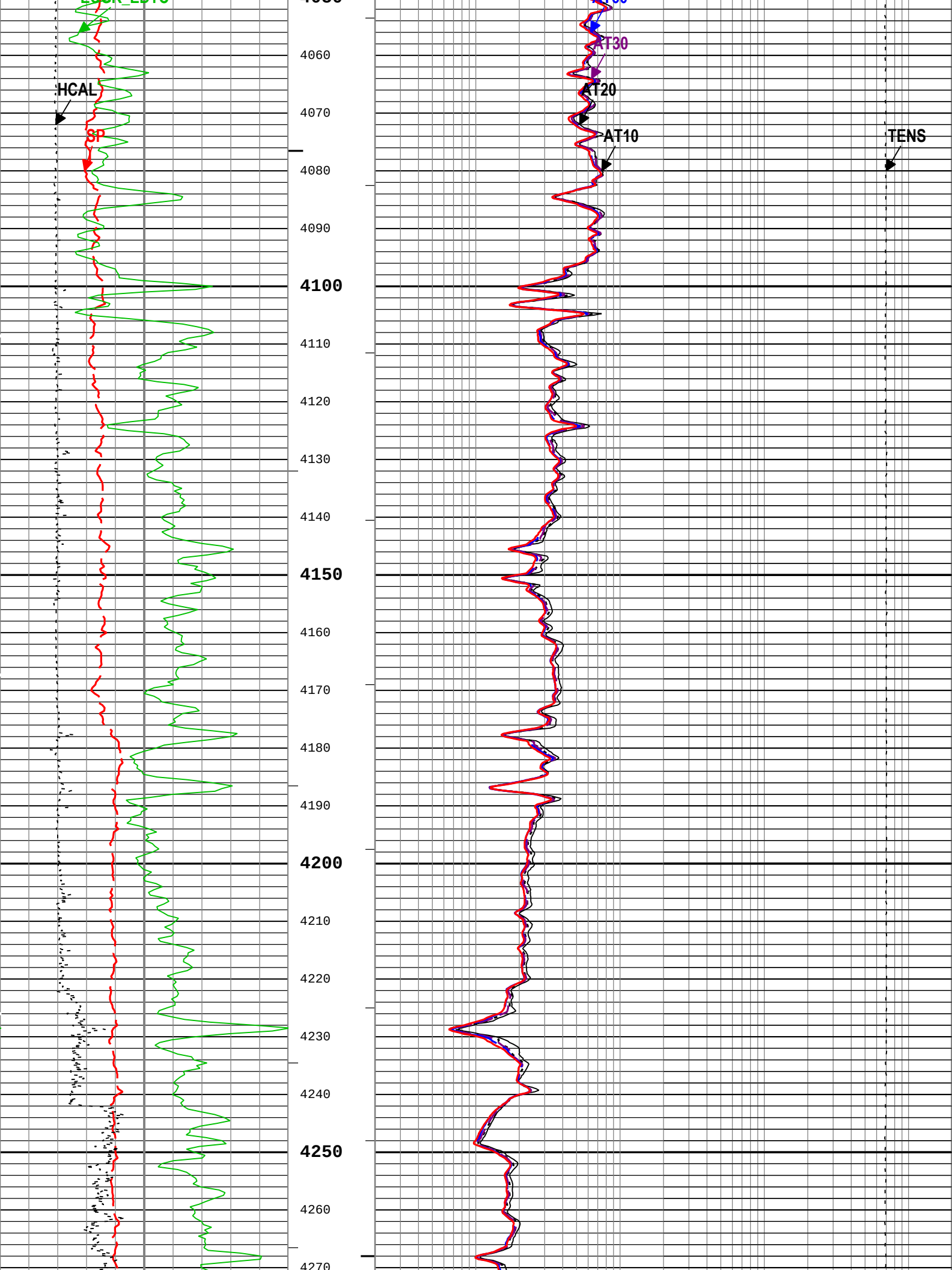
ECGR EDTC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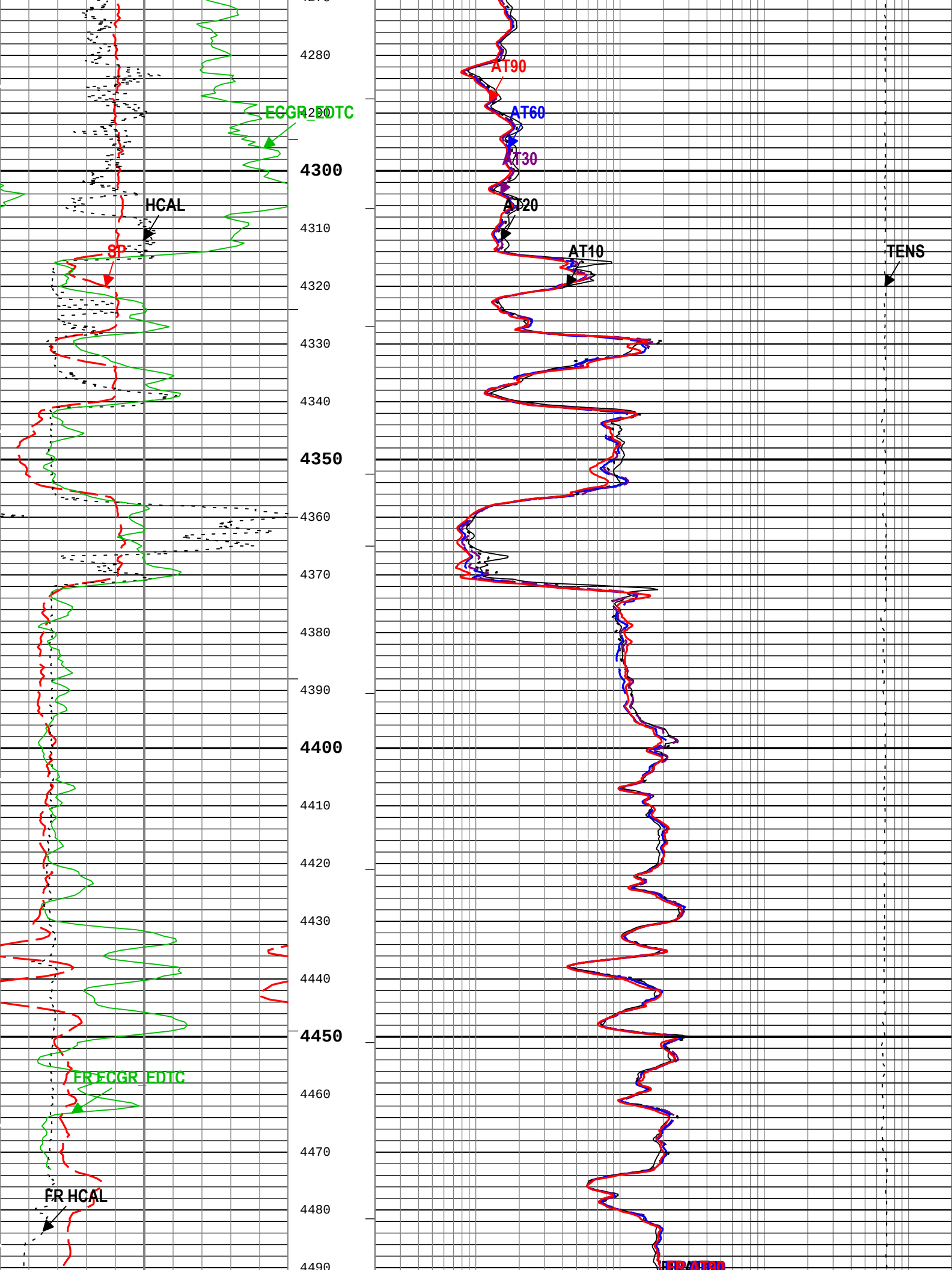
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AT10
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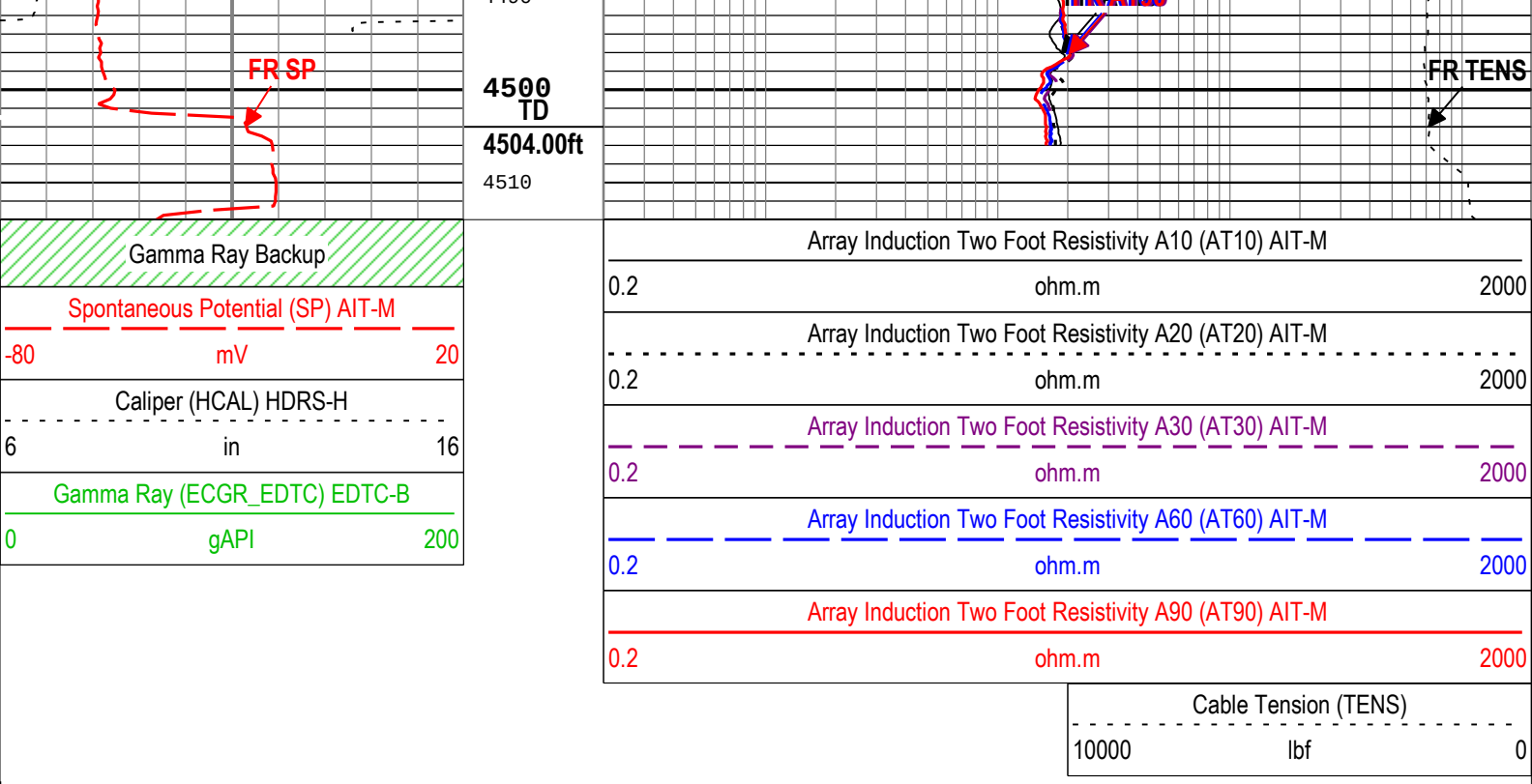


Description: AIT Basic Log Two Format: Log (Induction-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:29

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.153	in
CBLO	Casing Bottom (Logger)	WLSESSION	326.5	ft
CDEN	Cement Density	EDTC-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.1	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SP_SHIFT	SP Shift	AIT-M	500	mV
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25	300	325

BS	7.875	325	4504

All depth are actual.

Tool Control Parameters

ONE: Parameters

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

ONE

5" Induction

Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[2]:Up	Up	4186.13 ft	4513.38 ft	10-Jun-2018 1:56:57 AM	10-Jun-2018 2:04:41 AM	ON	2.99 ft	No
ONE	Log[3]:Up	Up	78.30 ft	4514.15 ft	10-Jun-2018 2:09:34 AM	10-Jun-2018 3:27:37 AM	ON	2.93 ft	No

All depths are referenced to toolstring zero

Log

Company:St. Croix Operating, Inc. Well:State 3-16

ONE: Log[3]:Up:S004

Description: AIT Basic Log Two Format: Log (Induction-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:31

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

Main To Repeat

Repeat To Main

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

0.2 ohm.m 2000

Main To Repeat

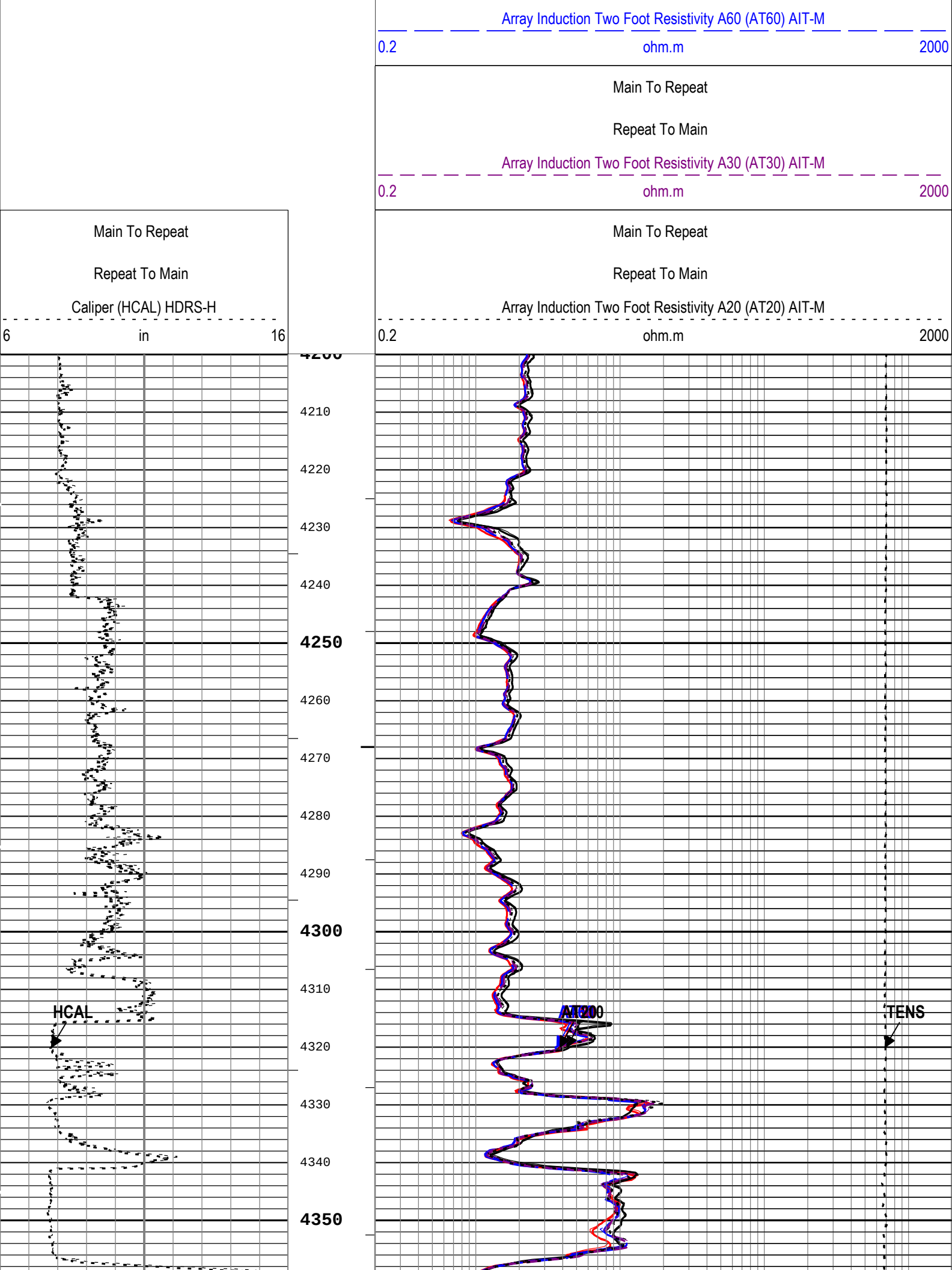
Repeat To Main

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

0.2 ohm.m 2000

Main To Repeat

Repeat To Main


Array Induction Two Foot Resistivity A60 (AT60) AIT-M
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ohm.m
2000
Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0.2
ohm.m
2000
Main To Repeat
Repeat To Main
Caliper (HCAL) HDRS-H
6
in
16
Main To Repeat
Repeat To Main
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0.2
ohm.m
2000
4200
4210
4220
4230
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4270
4280
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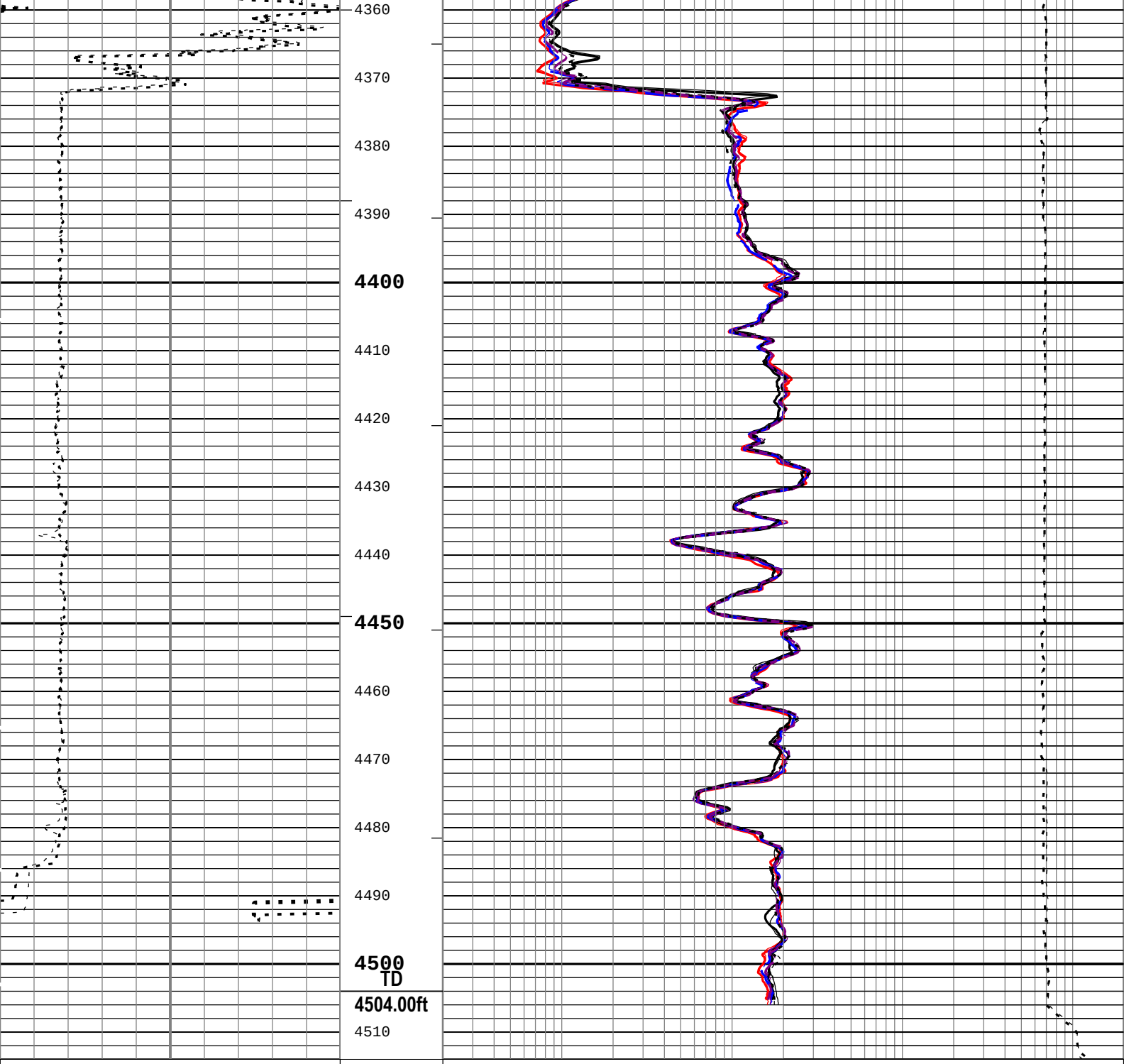
HCAL
AT20
TENS



Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

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

0.2 ohm.m 2000

Main To Repeat

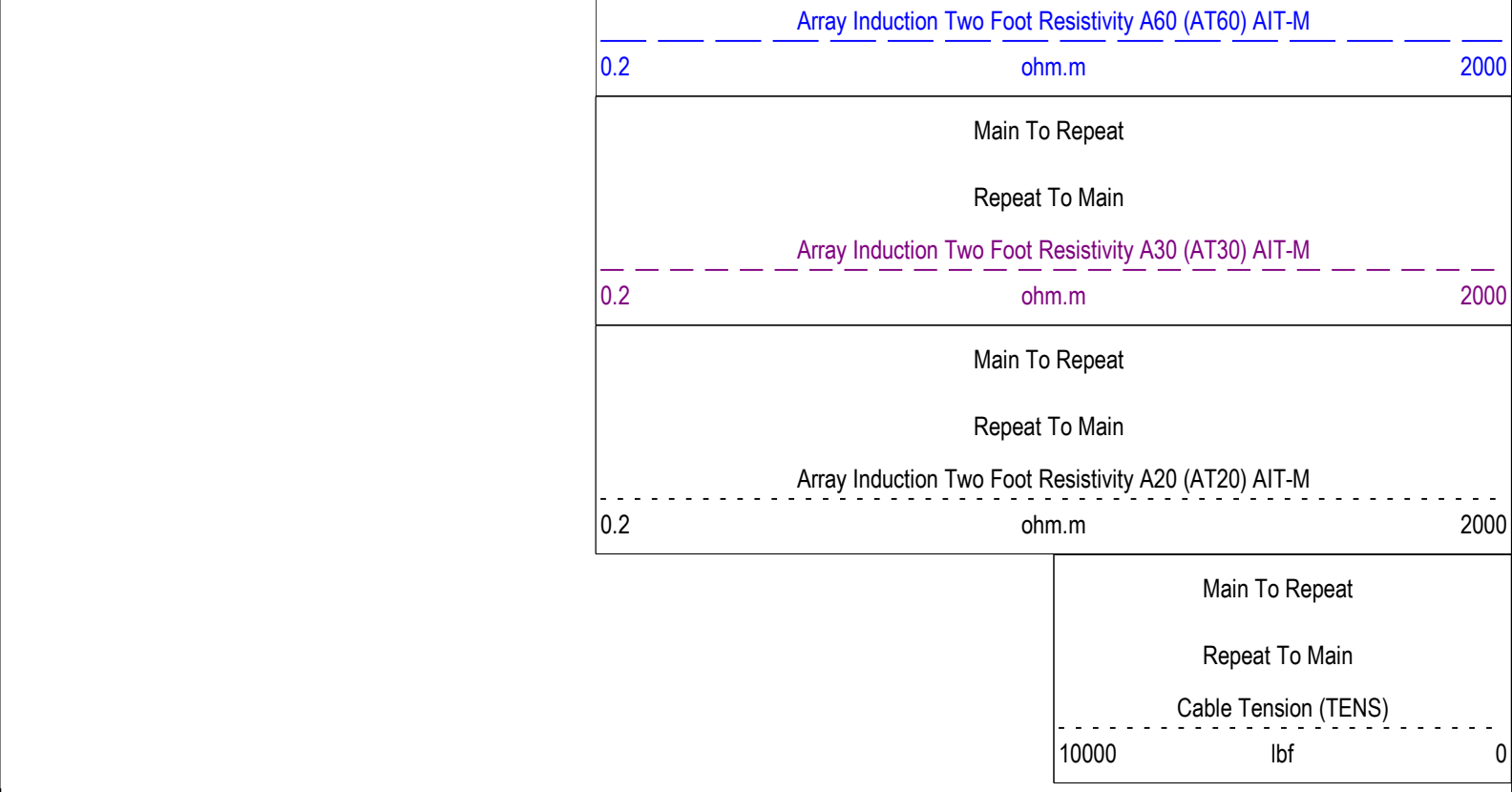
Repeat To Main

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

0.2 ohm.m 2000

Main To Repeat

Repeat To Main



Description: AIT Basic Log Two Format: Log (Induction-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Jun-2018 04:05:31

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.153	in
CBLO	Casing Bottom (Logger)	WLSESSION	326.5	ft
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	

Tool Control Parameters

ONE: Parameters

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

Calibration Report

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

Primary Equipment :

File code for AIT-MA Sonde Tool Element	AMIS	1305

Auxiliary Equipment :

AITM Rm/SP Bottom Nose | AMRM | 1305

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 19:47:51 02-Jan-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.018	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	0.466	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.016	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.592	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.018	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	-0.168	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.014	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	-0.081	3.000
Test Loop Gain - 4		Master	1.000	0.950	1.000	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.271	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.986	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	0.500	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.999	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.312	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.015	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.002	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 19:47:51 02-Jan-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-84.140	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-111.537	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	189.149	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	-132.092	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	96.476	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	-197.375	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	56.388	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	-3.688	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	26.947	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	-16.050	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	11.514	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	23.280	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	10.454	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	-5.840	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.634	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	3.752	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 19:47:51 02-Jan-2018

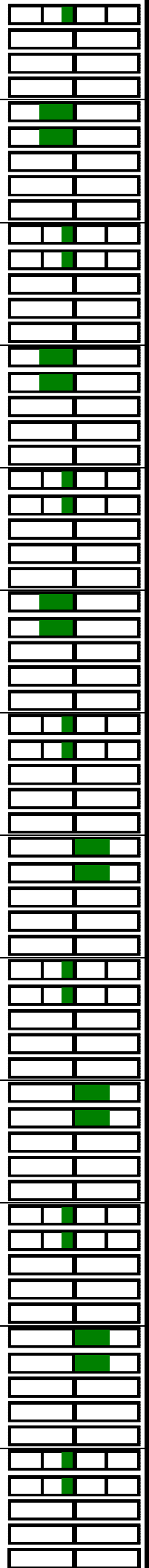
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	0.872	1.200
Fine Gain		Master	1.000	0.800	0.863	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 19:47:51 02-Jan-2018 Before (Measured): 01:21:46 10-Jun-2018 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.607	0.854
		Before	-----	0.366	0.607	0.854
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 0	deg	Master	-----	137.000	-172.033	-103.000
		Before	-----	137.000	-173.892	-103.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.859	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.245	1.778

		Before	-----	0.762	1.244	1.778
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 1	deg	Master	-----	136.000	-172.976	-104.000
		Before	-----	136.000	-174.837	-104.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.861	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 2	V	Master	-----	0.372	0.617	0.868
		Before	-----	0.372	0.616	0.868
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 2	deg	Master	-----	132.000	-176.357	-108.000
		Before	-----	132.000	-178.218	-108.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.861	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 3	V	Master	-----	0.420	0.699	0.980
		Before	-----	0.420	0.698	0.980
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 3	deg	Master	-----	131.000	-177.087	-109.000
		Before	-----	131.000	-178.952	-109.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.865	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 4	V	Master	-----	0.804	1.309	1.876
		Before	-----	0.804	1.307	1.876
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.002	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 4	deg	Master	-----	125.000	177.118	-115.000
		Before	-----	125.000	175.239	-115.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.879	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 5	V	Master	-----	1.176	1.905	2.744
		Before	-----	1.176	1.904	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 5	deg	Master	-----	122.000	175.565	-118.000
		Before	-----	122.000	173.679	-118.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.886	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 6	V	Master	-----	1.176	1.903	2.744
		Before	-----	1.176	1.901	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.002	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 6	deg	Master	-----	121.000	175.599	-119.000
		Before	-----	121.000	173.713	-119.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.886	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 7	V	Master	-----	0.846	1.375	1.974
		Before	-----	0.846	1.373	1.974
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.002	-----
		After-Before	-----	-----	-----	-----



Thru Cal Phase - 7	deg	Master	-----	115.000	174.690	-125.000
		Before	-----	115.000	172.726	-125.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-1.964	-----
		After-Before	-----	-----	-----	-----
SPA Zero	mV	Master		-50.000	-0.123	50.000
		Before		-50.000	-0.119	50.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.004	-----
		After-Before	-----	-----	-----	-----
SPA Plus	mV	Master		941.000	1002.225	1040.000
		Before		941.000	1003.250	1040.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	1.025	-----
		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	0.929	0.960
		Before		0.870	0.929	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	4709
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	4901

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	41150
HRDD Long Spacing Detector	Long Spacing	43095
HRDD Short Spacing Detector	Short Spacing	42161
Cesium 137 Gamma-Ray Logging Source	GSR-J	5534
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	4709
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4724

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): 12:55:32 09-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Small Ring	in	Before	8.00	6.00	8.42	10.00
Large Ring	in	Before	12.00	9.00	12.41	15.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 14:17:48 22-May-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.598	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.686	1.696
Pe Aluminum		Master	2.570	2.470	2.526	2.670
Pe Magnesium		Master	2.650	2.550	2.632	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 14:17:48 22-May-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.3972	0.6000

BS Max Deviation	%	Master	0	-1.6000	0.8287	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.2853	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.6042	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.6423	1.5000
LS Max Deviation	%	Master	0	-3.5000	2.6194	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 14:17:48 22-May-2018 Before (Measured): 12:52:21 09-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7383	
		Before	0.7383	0.7014	0.7379	0.7752
		Before-Master	-----	-----	-0.0004	-----
BS Window Sum	1/s	Master	1		23373	
		Before	23373	22205	23316	24542
		Before-Master	-----	-----	-57	-----
SS Window Ratio		Master	1.0000		0.4852	
		Before	0.4852	0.4610	0.4855	0.5095
		Before-Master	-----	-----	0.0003	-----
SS Window Sum	1/s	Master	1		10478	
		Before	10478	9954	10460	11002
		Before-Master	-----	-----	-18	-----
LS Window Ratio		Master	1.0000		0.2972	
		Before	0.2972	0.2824	0.2990	0.3121
		Before-Master	-----	-----	0.0018	-----
LS Window Sum	1/s	Master	1		1178	
		Before	1178	1119	1173	1237
		Before-Master	-----	-----	-5	-----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 14:17:48 22-May-2018 Before (Measured): 12:52:21 09-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1564	2400
		Before		1000	1592	2400
		Before-Master	-----	-100	28	100
SS PM High Voltage	V	Master		1000	1653	2400
		Before		1000	1651	2400
		Before-Master	-----	-100	-2	100
LS PM High Voltage	V	Master		1000	1570	2400
		Before		1000	1570	2400
		Before-Master	-----	-100	0	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 14:17:48 22-May-2018 Before (Measured): 12:52:21 09-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	12.12	25.00
		Before		5.00	12.31	25.00
		Before-Master	-----	-1.00	0.19	1.00
SS Crystal Resolution	%	Master		5.00	8.92	20.00
		Before		5.00	8.83	20.00
		Before-Master	-----	-1.00	-0.09	1.00
LS Crystal Resolution	%	Master		5.00	8.88	20.00
		Before		5.00	9.08	20.00
		Before-Master	-----	-1.00	0.20	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 01:21:05 10-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3850	4185
Deep Resistivity	ohm.m	Before	3830	3524	3798	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3798	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	3912

HILT Gamma-Ray and Neutron Sonde, 150 degC | HGNS-H | 3912

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	4264
AmBe Neutron Logging Source	NSR-F	5070

Calibration Parameter :

Water Temperature

Housing Size

JIG-BKG

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 01:21:40 10-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	31.7	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 18:00:00 14-Jun-2005

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	-----	-----	5359.000	-----
Accelerometer Coefficients - 1		Master	-----	-----	-15.426	-----
Accelerometer Coefficients - 2		Master	-----	-----	0.015	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 4		Master	-----	-----	2.742	-----
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 8		Master	-----	-----	299.400	-----
Accelerometer Coefficients - 9		Master	-----	-----	1.009	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 13:07:56 06-Apr-2018 Before (Measured): 12:46:54 09-Jun-2018 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	27.7	40.0
		Before	0	5.0	26.4	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-4.2	-1.3	4.2
		After-Before	-----	-----	-----	-----
Far Zero Measurement	1/s	Master	0	5.0	28.4	40.0
		Before	0	5.0	29.9	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-4.3	1.5	4.3
		After-Before	-----	-----	-----	-----
Near Plus Measurement	1/s	Master	6031.0	4700.0	4972.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Plus Measurement	1/s	Master	2793.0	1900.0	2078.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Near Corrected Plus Measurement	1/s	Master		4700.0	5044.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Corrected Plus Measurement	1/s	Master		1900.0	2114.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----

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

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement - 0	gAPI	Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
RGR Plus Measurement	gAPI	Before			NOT DONE	
		After			NOT DONE	
		After-Before	-----	-----	-----	-----
GR Calibration Gain		Before			NOT DONE	
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

EDTC-B (Enhanced Digital Telemetry Cartridge - Version B) Calibration - Run ONE

Primary Equipment :

EDTC-B EDTC-B 8473M

Calibration Parameter :

Plus Reference

EDTC-B Accelerometer Calibration - EDTC-B Accelerometer Calibration

Before (Measured): 01:21:00 10-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.19	31.53	32.37	32.84

EDTC-B Memory Data - EDTC-B Memory Data

Master (EEPROM): 01:18:17 10-Jun-2018

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Initial PMT HV	V	Master			1596.000	
Accelerometer Serial Number		Master			539	
Accelerometer Coefficients - 0		Master	-----	-----	3.014E+000	-----
Accelerometer Coefficients - 1		Master	-----	-----	2.800E-004	-----
Accelerometer Coefficients - 2		Master	-----	-----	3.524E-007	-----
Accelerometer Coefficients - 3		Master	-----	-----	-5.257E-008	-----
Accelerometer Coefficients - 4		Master	-----	-----	1.263E-009	-----
Accelerometer Coefficients - 5		Master	-----	-----	-9.535E-012	-----
Accelerometer Coefficients - 6		Master	-----	-----	2.442E-014	-----
Accelerometer Coefficients - 7		Master	-----	-----	-3.396E-003	-----
Accelerometer Coefficients - 8		Master	-----	-----	3.712E-005	-----
Accelerometer Coefficients - 9		Master	-----	-----	-5.869E-009	-----
Accelerometer Coefficients - 10		Master	-----	-----	1.195E-009	-----
Accelerometer Coefficients - 11		Master	-----	-----	-4.589E-012	-----
Gamma-Ray Detector Serial Number		Master			7434	

EDTC-B Gamma-Ray Calibration - Gamma Ray Coefficients

Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Gamma Ray Gain		Before	1.000	0.900	NOT DONE	1.100
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

EDTC-B Gamma-Ray Calibration - Gamma Ray Accumulations

Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement - 0	gAPI	Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
RGR Plus Measurement	gAPI	Before			NOT DONE	
		After			NOT DONE	
		After-Before	-----	-----	-----	-----

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

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:	St. Croix Operating, Inc.
Well:	State 3-16
Field:	Wildcat
County:	Washington
State:	Colorado

Schlumberger

Platform Expres
Array Induction
with Linear Correlation