Schlumberger

Company: Texas American Resources Company

Well: Roth 44-30

Field: Wattenberg

County: Weld Country: USA

Platform Express

Array Induction

with Linear Correlation

County:	Weld
Field:	Wattenberg
Location:	SESE Sec 30, T5N, R63W
Well:	Roth 44-30
Company:	Texas American Resources Co

Location:				
SESE Sec 30, T5N, R63W		Elev.	K.B.	4590.00 ft
SHL: 641 FSL / 655 FEL			G.L.	4576.00 ft
LatLong: 40.365020 / -104.47196			D.F.	4589.00 ft
Permanent Datum:	Ground Level	Elev.:	4576.00 f	
Log Measured From:	Kelly Bushing	14.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

API Serial No.	Max.Hole Deviation	Longitude:	Latitude:
05-123-32101-0000	0 deg	-104.47190 degrees	40.365000 degrees

Logging Date			03-Nov-2011			
Run Number			1_PEx-BHC			
Depth Driller			6767.00 ft			
Schlumberger Depth			6767.00 ft			
Bottom Log Interval			6763.00 ft			
Top Log Interval			708.00 ft			
Casing Driller Size @ Depth			8.625 in @ 714.00 ft			
Casing Schlumberger			714 ft			
Bit Size			7.875 in			
Type Fluid In Hole			Fresh Water			
MUD	Density	Viscosity	9.5 lbm/gal	50 s		
	Fluid Loss	PH				
	Source of Sample		Flowline			
RM @ Meas Temp			1.18 ohm.m @ 56 degF			
RMF @ Meas Temp			0.15 ohm.m @ 68 degF			
RMC @ Meas Temp			N/A @ 68 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.39 @ 185	0.06 @ 185		
Max Recorded Temperatures			185 degF			
Circulation Stopped	Time		03-Nov-2011	08:00:00		
Logger on Bottom	Time		03-Nov-2011	13:18:16		
Unit Number	Location:		2153	Fort Morgan, Co		
Recorded By			Keri Loring, Jared R. Hoskins			
Witnessed By			Jim Boyd			

Disclaimer

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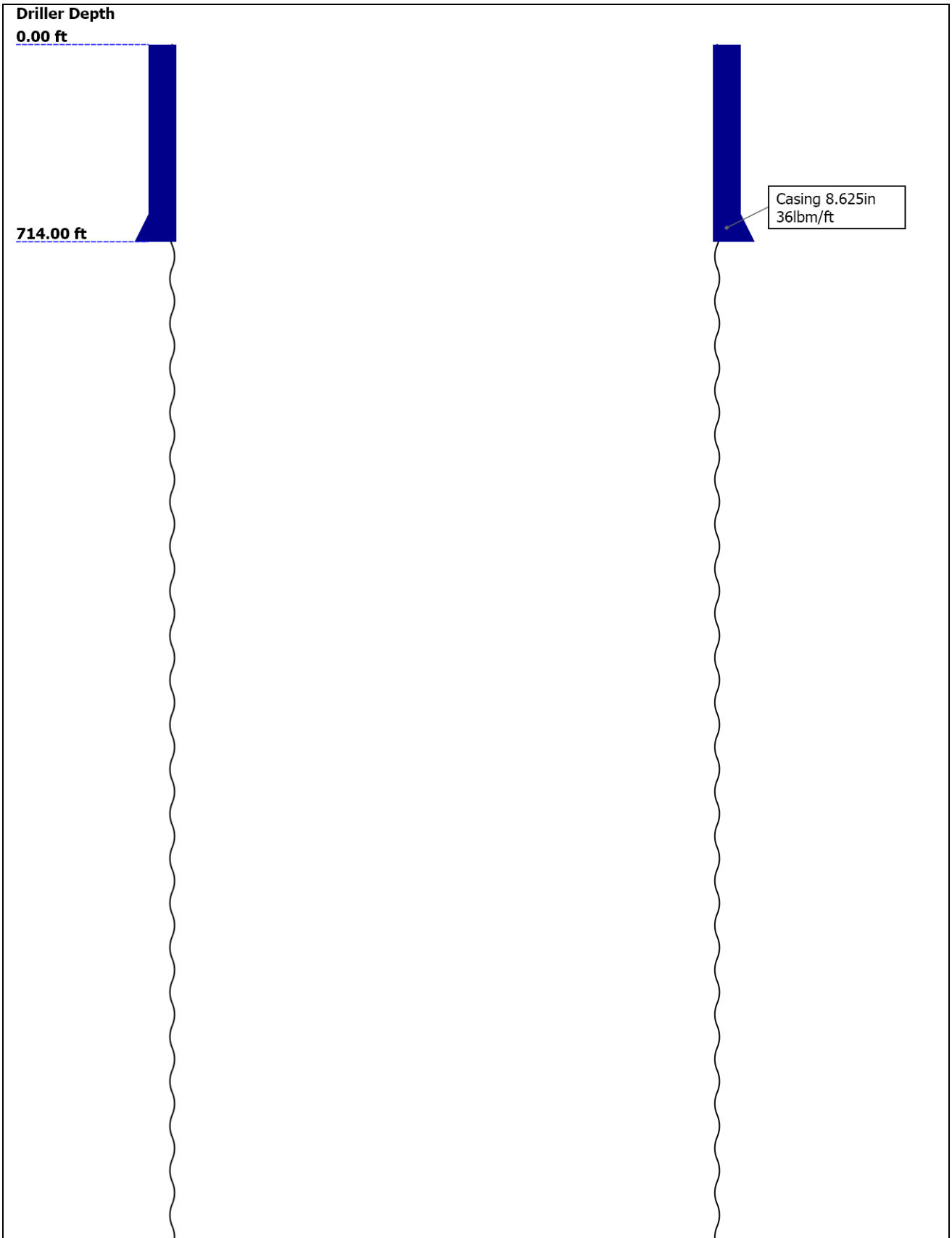
Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	7.875					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	6767					
Bottom Logger (ft)	6767					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	36					
Inner Diameter (in)	7.823					
Grade	N80					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	714					
Bottom Logger (ft)	714					

Operational Run Summary

Parameter (unit)	**1_PEx-BHC**					
Date Log Started	03-Nov-2011					
Time Log Started	15:37:21					
Date Log Finished	03-Nov-2011					
Time Log Finished	17:35:15					
Top Log Interval (ft)	708.00					
Bottom Log Interval (ft)	6763.00					
Total Depth (ft)	6767.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	7.875					
Logging Unit Number	2153					
Logging Unit Location	Fort Morgan, Co					
Recorded By	Keri Loring, Jared R. Hoskins					
Witnessed By	Jim Boyd					

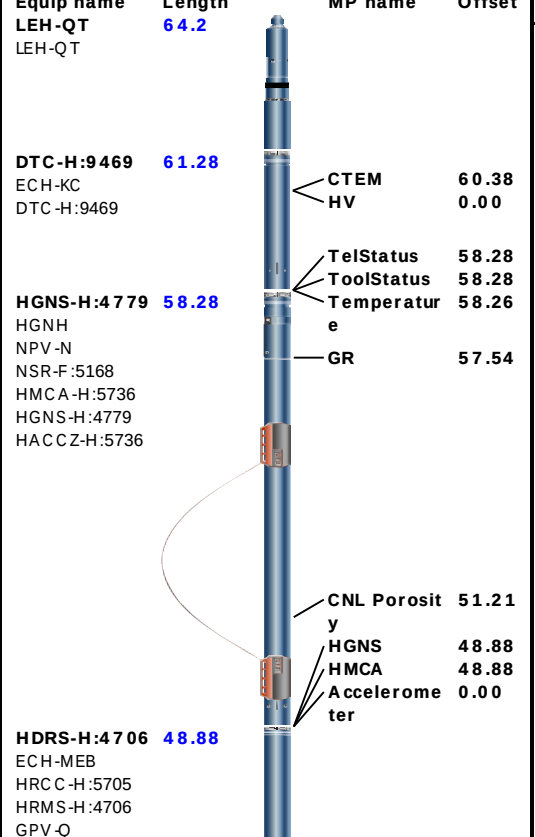
Service Order Number	BSS4-00132					

Borehole Fluids

Parameter(unit)	1_PEx-BHC
Fluid Type	Water
Fluid Name	Fresh Water
Max Recorded Temperatures (degF)	185
Source of Sample	Flowline
Salinity (ppm)	6101.52
Density (lbm/gal)	9.5
Viscosity (s)	50
Fluid Loss (cm3)	
PH	
Date/Time Circulation Stopped	03-Nov-2011 08:00:00
Date Logger on Bottom	03-Nov-2011
Time Logger on Bottom	13:18:16
Source RMF	Calculated
RMC	Calculated
RM @ Meas Temp (ohm.m@degF)	1.18 @ 56
RMF @ Meas Temp (ohm.m@degF)	0.15 @ 68
RMC @ Meas Temp (ohm.m@degF)	
RM @ BHT (ohm.m@degF)	0.39 @ 185
RMF @ BHT (ohm.m@degF)	0.06 @ 185
RMC @ BHT (ohm.m@degF)	NaN @ 185

Remarks and Equipment Summary

1_PEx-BHC: Toolstring



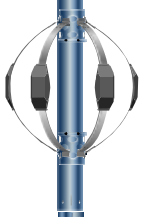
1_PEx-BHC: Remarks

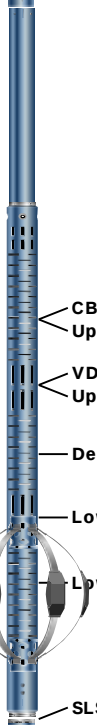
Tool ran as per tool sketch.

GSR-J:5363
Short Spacing:27
634
HRGD-H:3816
Backscatter
Long Spacing:28
732

HRCC 44.88
MCFL 39.44
Caliper 38.96
TLD Density 38.57

DSLT-H 36.63
ECH-KH
DSLC-H
SLS-E

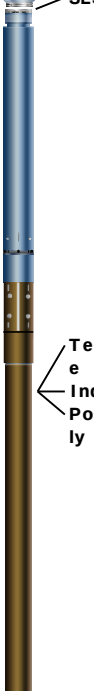




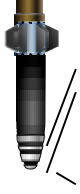
CBL 3ft 24.17
Upper-Near 24.17
VDL 5ft 23.17
Upper-Far 23.17
Delta-T 21.79
Lower-Far 20.42
Lower-Near 19.42

SLS-E 16.00

AIT-M:1372 16.00
AMIS:1372
AMRM



Temperatur e 7.91
Induction 7.91
Power Supp ly 7.91



Lengths are in ft
Maximum Outer Diameter = 6.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

Depth Control Parameters	1_PEx-BHC		
Conveyance Type	Wireline		
Rig Type	Land		
Depth Remark Parameters	1_PEx-BHC		
Depth Remark 1	First run in hole.		
Depth Measuring Device	1_PEx-BHC		
Type	IDW-B		
Serial Number	6380		
Calibration Date	17-Sep-2011		
Calibration Cable Type	7-46A-XS		
Wheel Correction 1	-9		
Wheel Correction 2	-8		
Tension Device	1_PEx-BHC		
Type	CMTD-B/A		
Serial Number	1433		
Calibration Date	27-Oct-2011		
Calibrator Serial Number	100513		
Calibration Points	10		
Calibration RMS	11		
Calibration Peak Error	20		
Logging Cable	1_PEx-BHC		
Type	7-46A-XS		
Serial Number	4		
Logging Cable Length (ft)	13300.00		

Survey Record

Survey Calculation

Method :	Minimum Radius of Curvature	DLS Method :	Lubinski
North Reference :	True North	Total Correction Formula :	Magnetic Dec

Rig Location

Latitude :	40.365000 degrees	Longitude :	-104.47190 degrees

Tie In Point

Measured Depth:	0.00 ft	Inclination:	0.00 deg	Azimuth:	0.00 deg
True Vertical Depth:	0.00 ft	North Displacement:	0.00 ft	East Displacement:	0.00 ft

Survey Quality Index

28 : Tie-In Point

Survey Correction Index

0 : No correction

Survey Description Index

0 : Not Flagged Survey

Seq	MD (ft)	Incl (deg)	Azim (deg)	Course (ft)	TVD (ft)	V Sec (ft)	N/ -S (ft)	E/ -W (ft)	Closure (ft)	at Azim (deg)	DLS deg/100ft	Tool Type	QI	CI	DI
1	0.00	0.00	0.00	- - - -	0.00	0.00	0.00	0.00	0.00	90.00	0.00	TIP	28	0	0

2" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1628.7	ft3

Software Version

Acquisition System	Version
MaxWell	3.0.9609.0

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.0.9609.0

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.0.9609.0	
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.0.9609.0	
AMIS	Array Induction Sonde - M	3.0.9609.0	

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift
1_PEx-BHC	Main[3]:Up	Up	625.56 ft	6788.41 ft	03-Nov-2011 4:27:22 PM	03-Nov-2011 5:31:43 PM	4.43 ft

All depths are referenced to toolstring zero

Log

1_PEx-BHC: Main[3]:Up 856C951F-172C-4A89-BF1B-E6F55FDFB74E

Description: AIT Basic Log Two Format: Log (Import of Kerr McGee 2in Induction) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:03

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	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

-160 mV 40

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 200

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

0.2 ohm.m 10

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

0 ohm.m 50

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

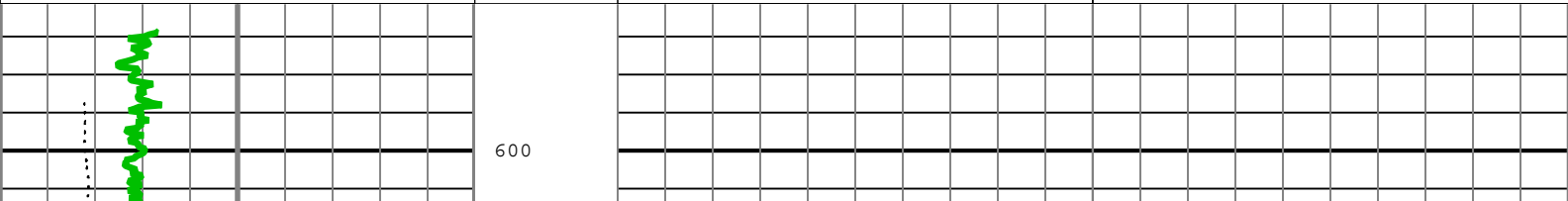
0 ohm.m 10

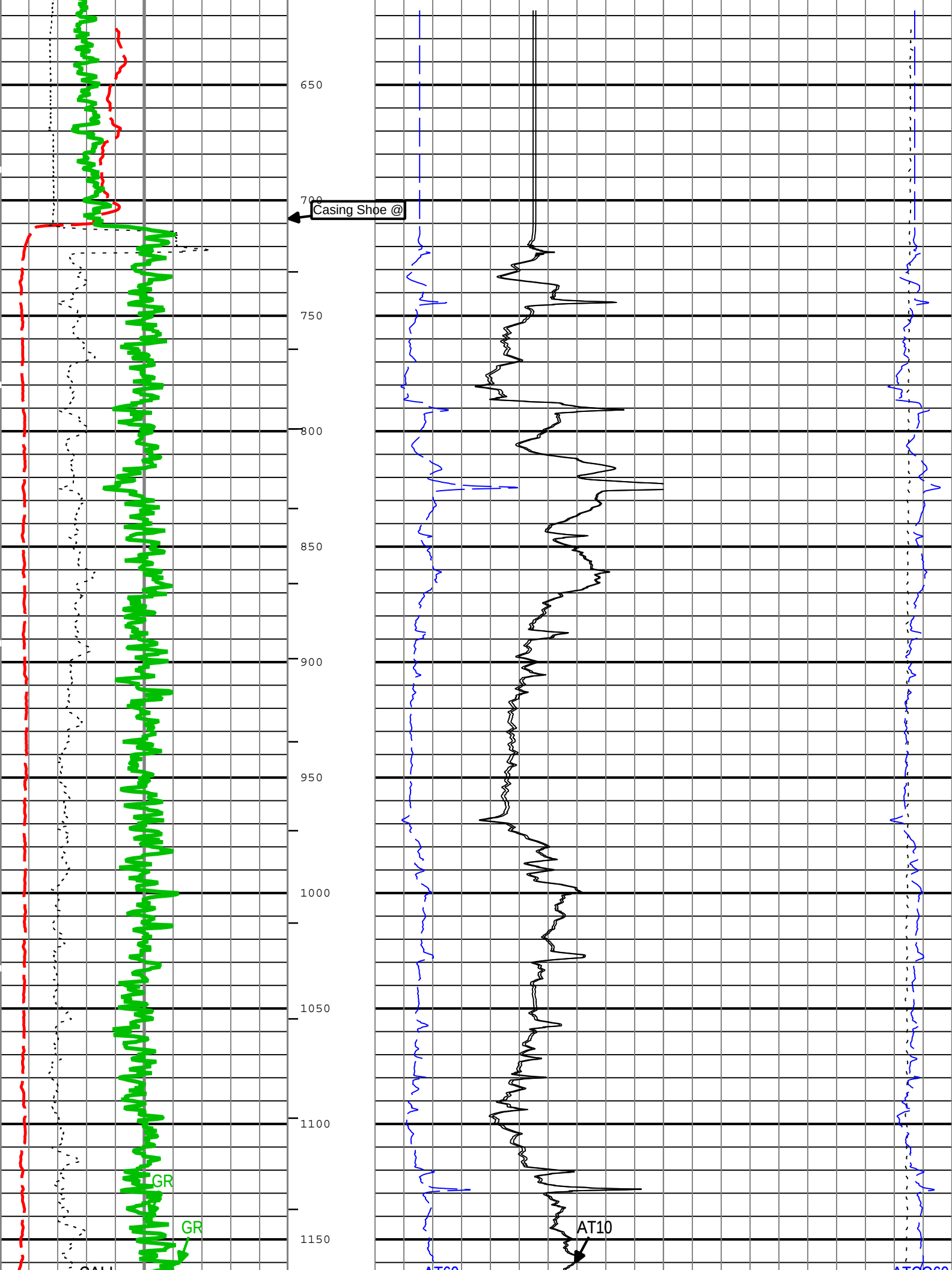
Cable Tension (TENS)

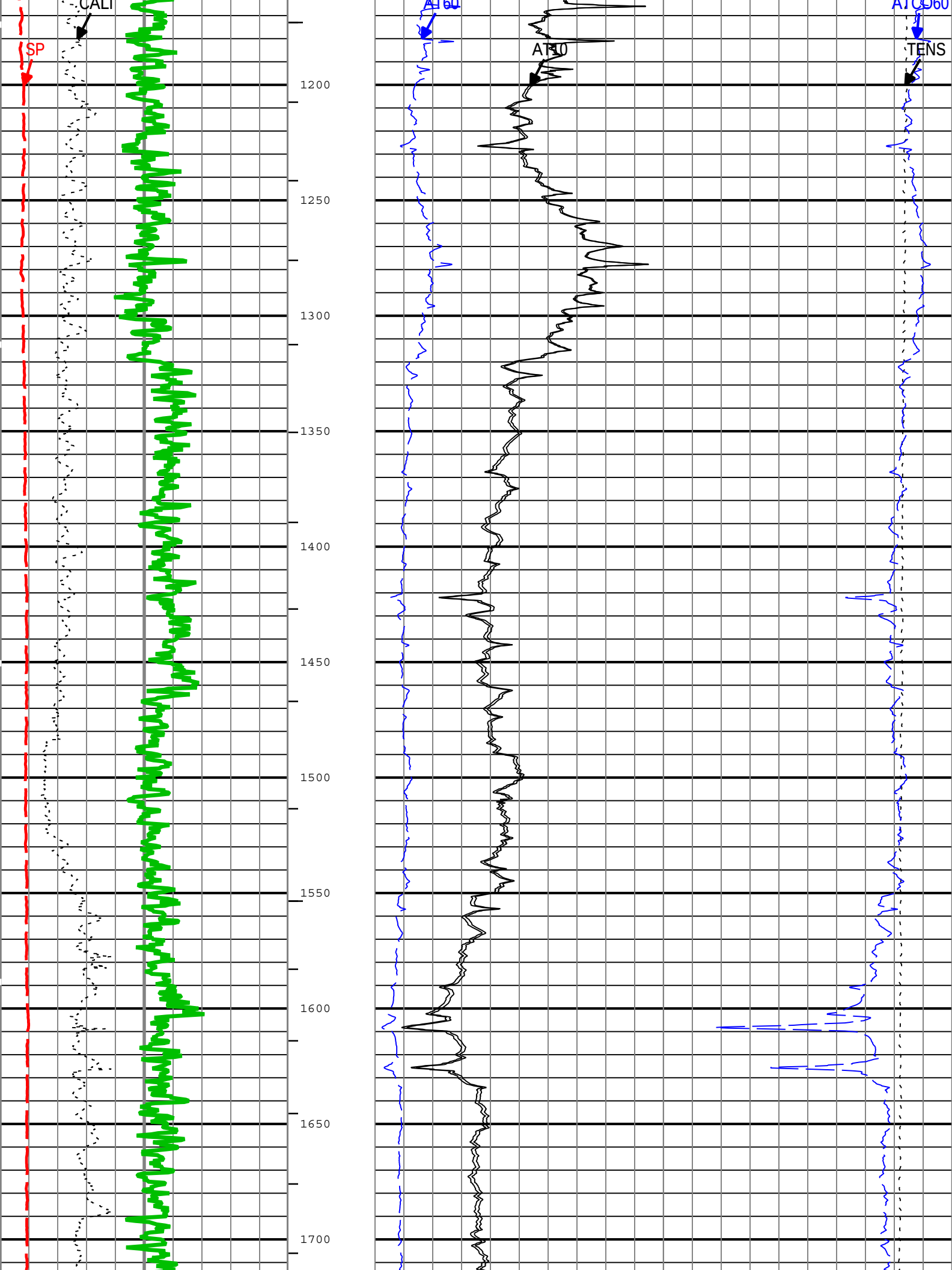
10000 lbf 0

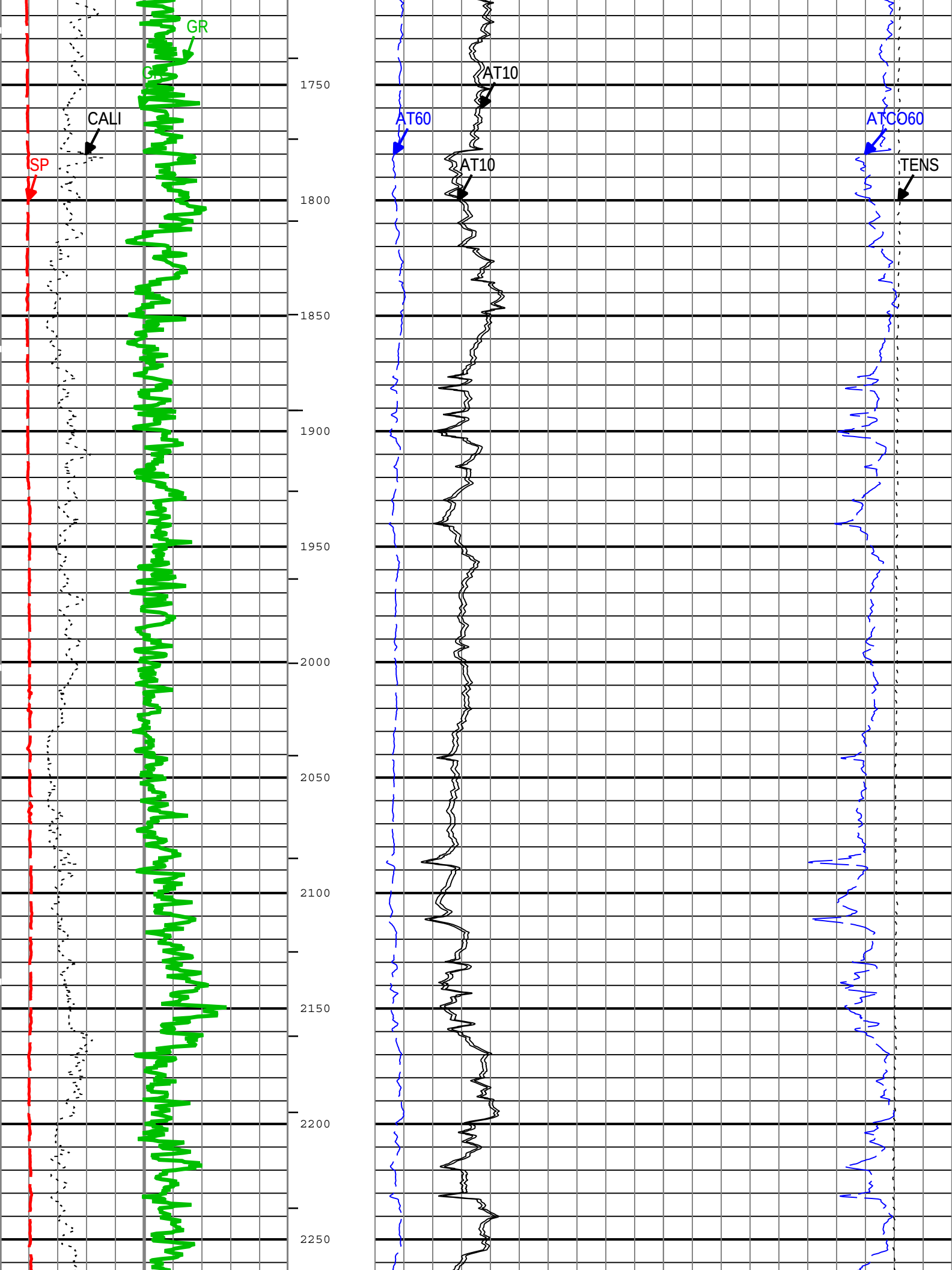
Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M

1000 mS/m 0




650
700
Casing Shoe @
750
800
850
900
950
1000
1050
1100
1150
GR
GR
AT10


CALI
SP
AT60
AT10
ATCO60
TENS
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
1700


GR
CALI
SP
AT10
AT60
AT10
ATCO60
TENS
1750
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1850
1900
1950
2000
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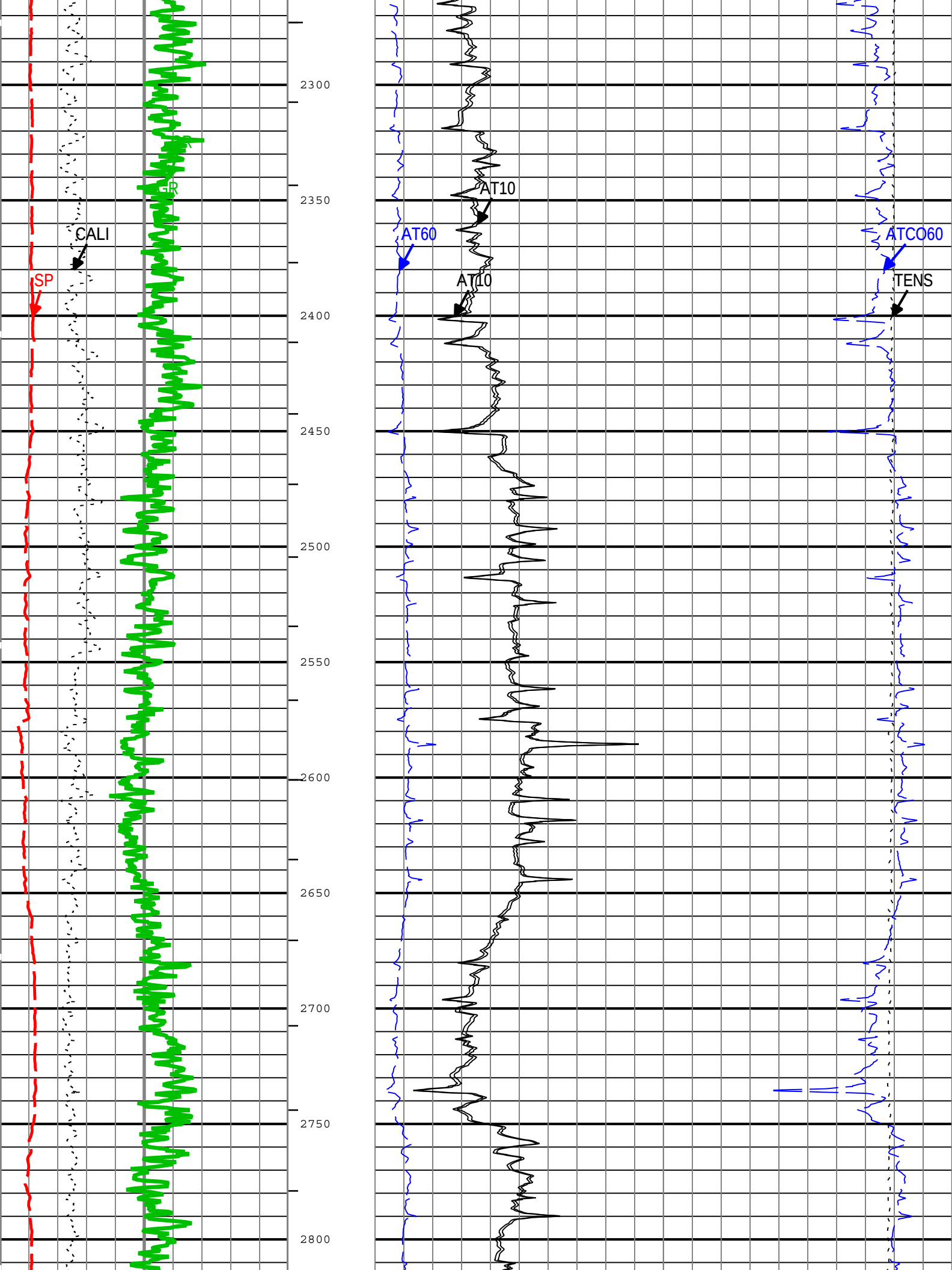
2100
2150
2200
2250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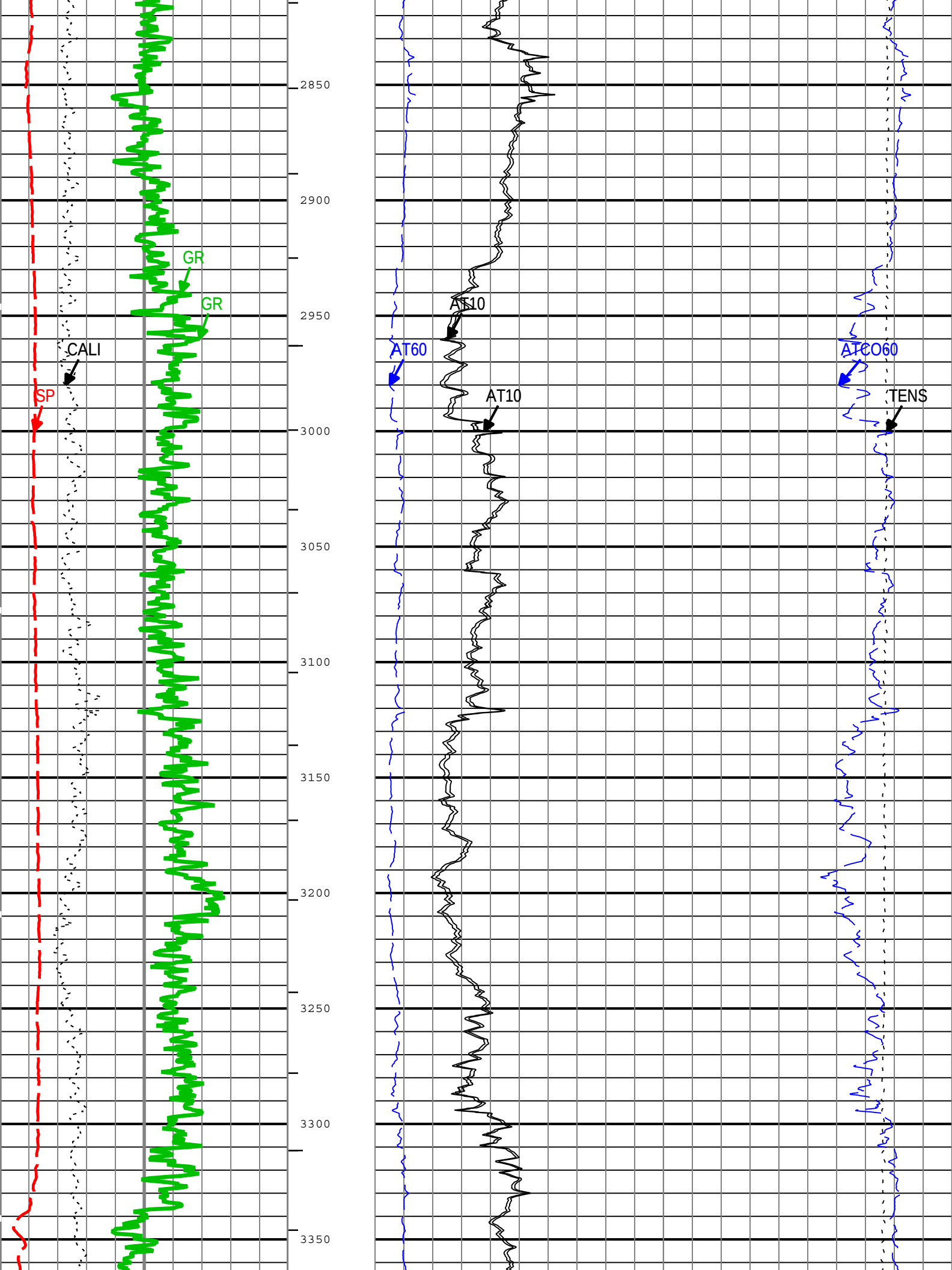
ATCO60
TENS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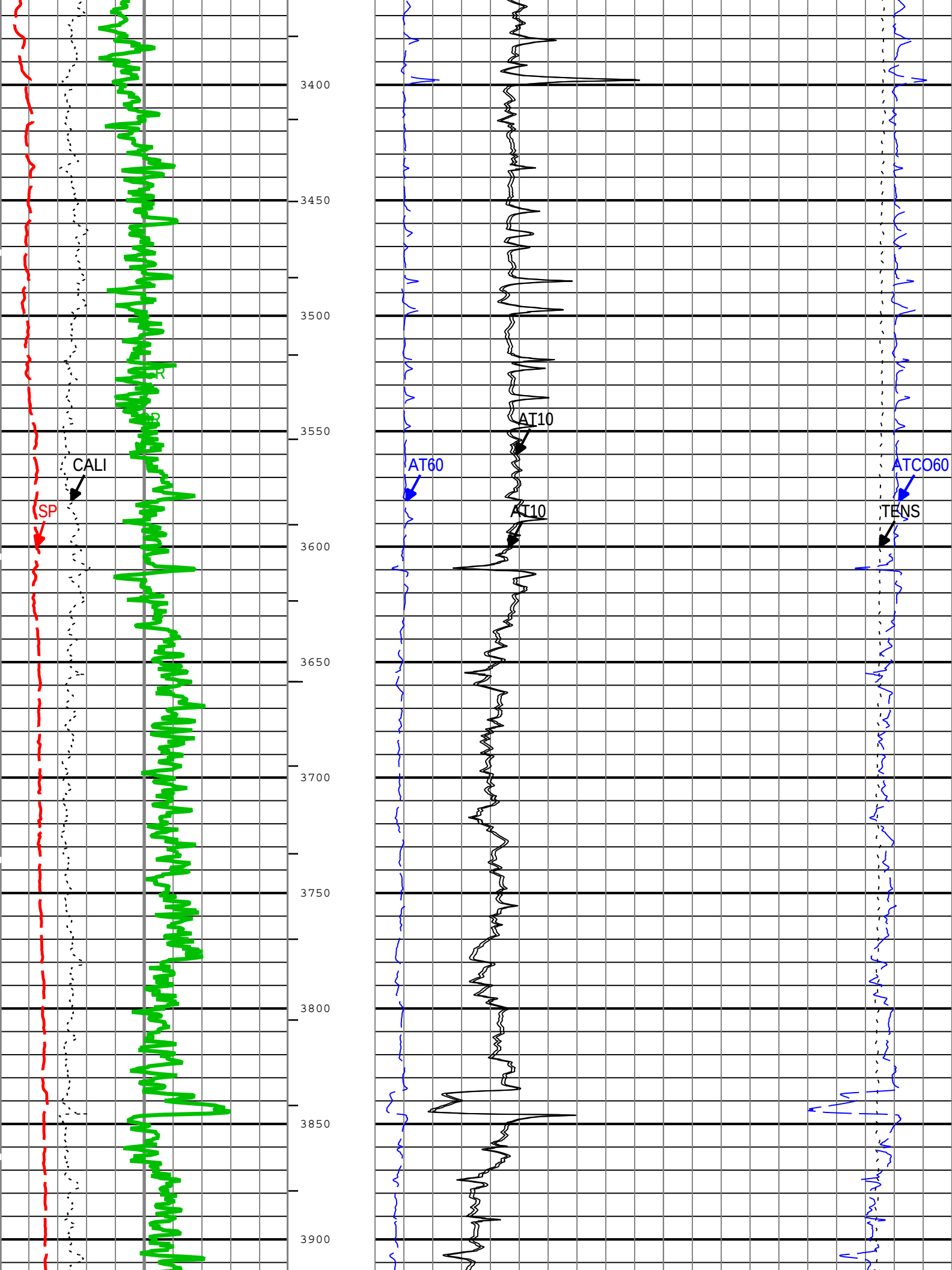
AT10
ATCO60
TENS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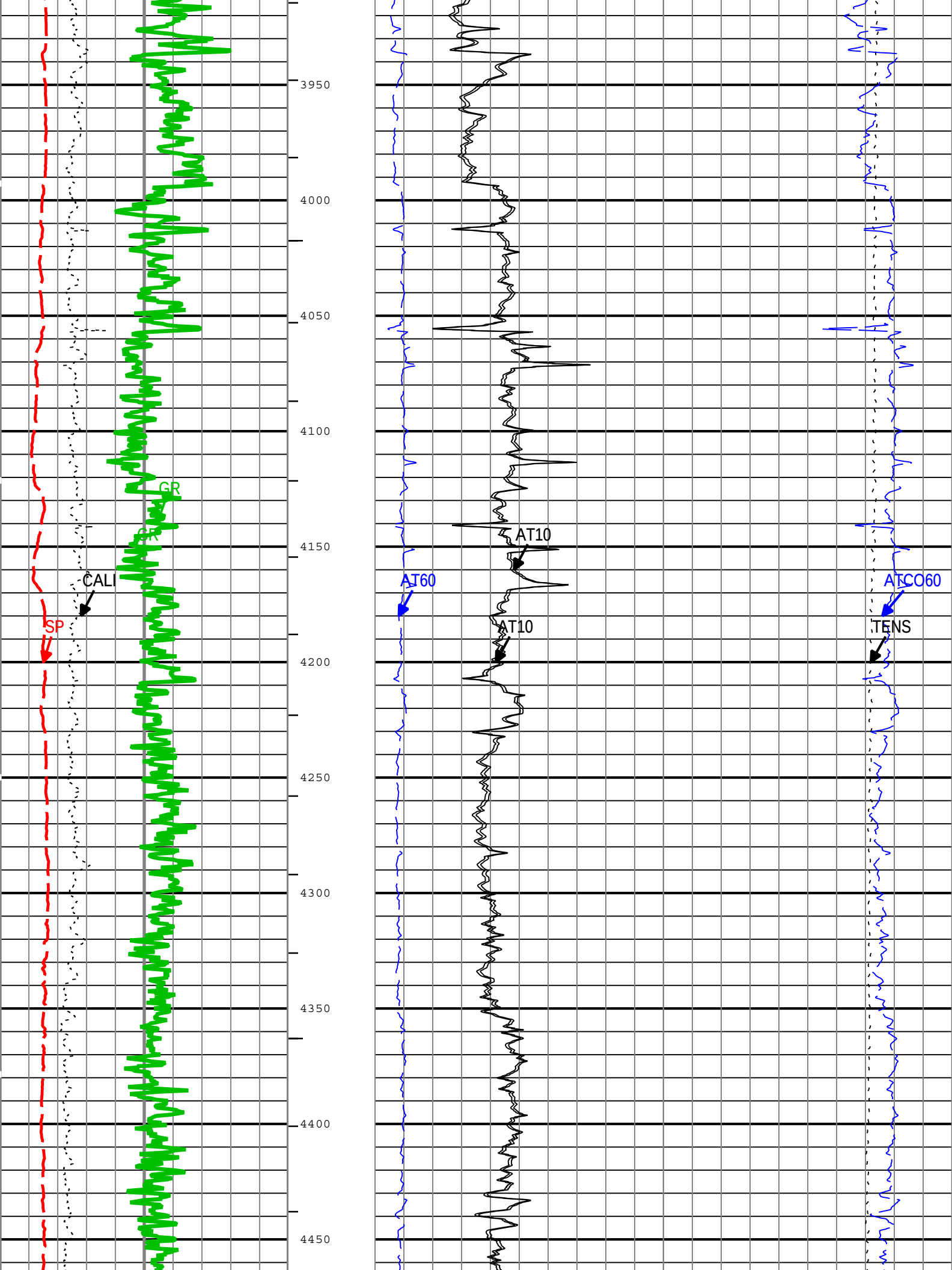
AT10
ATCO60
TENS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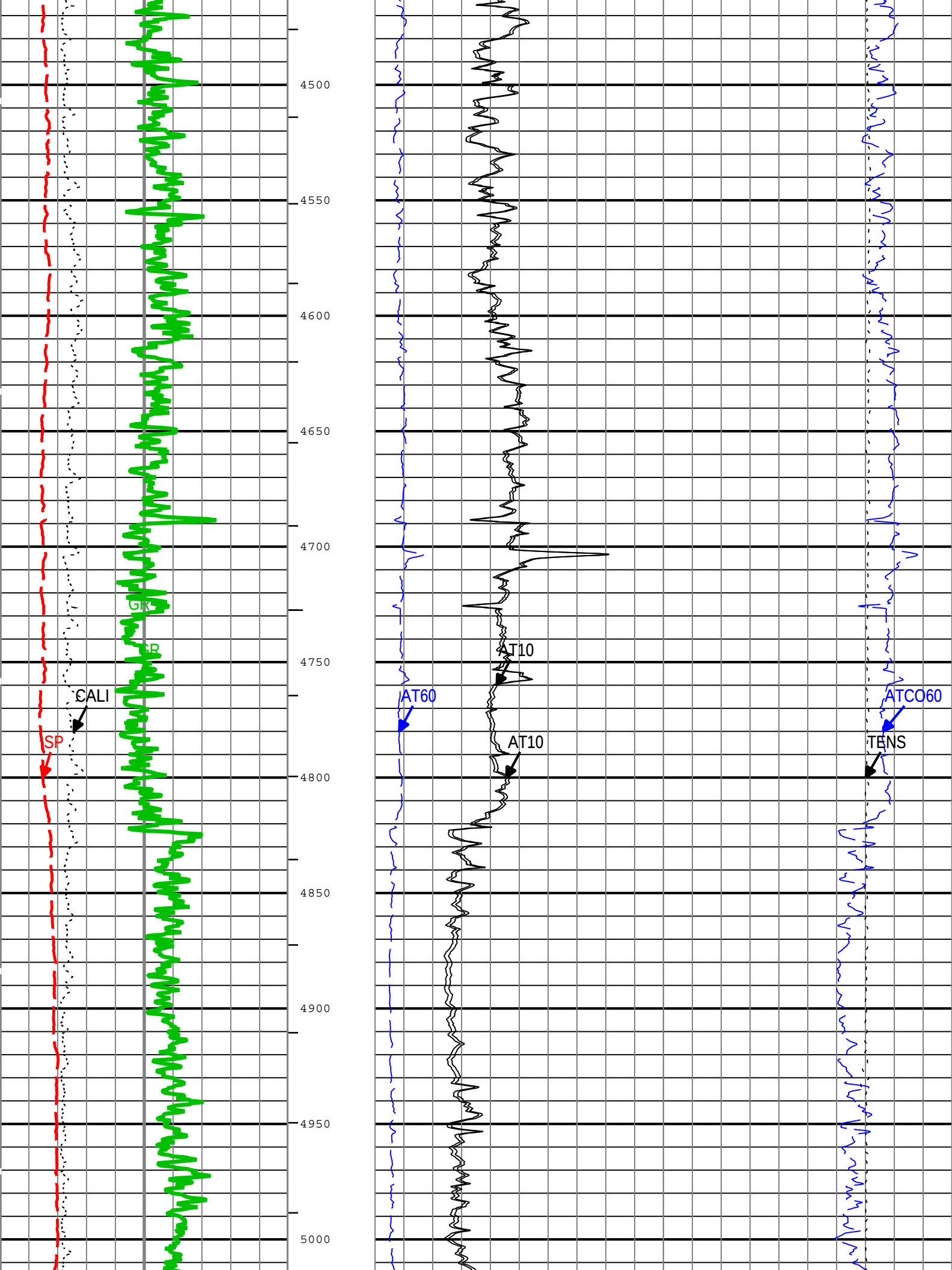
AT10
ATCO60
TENS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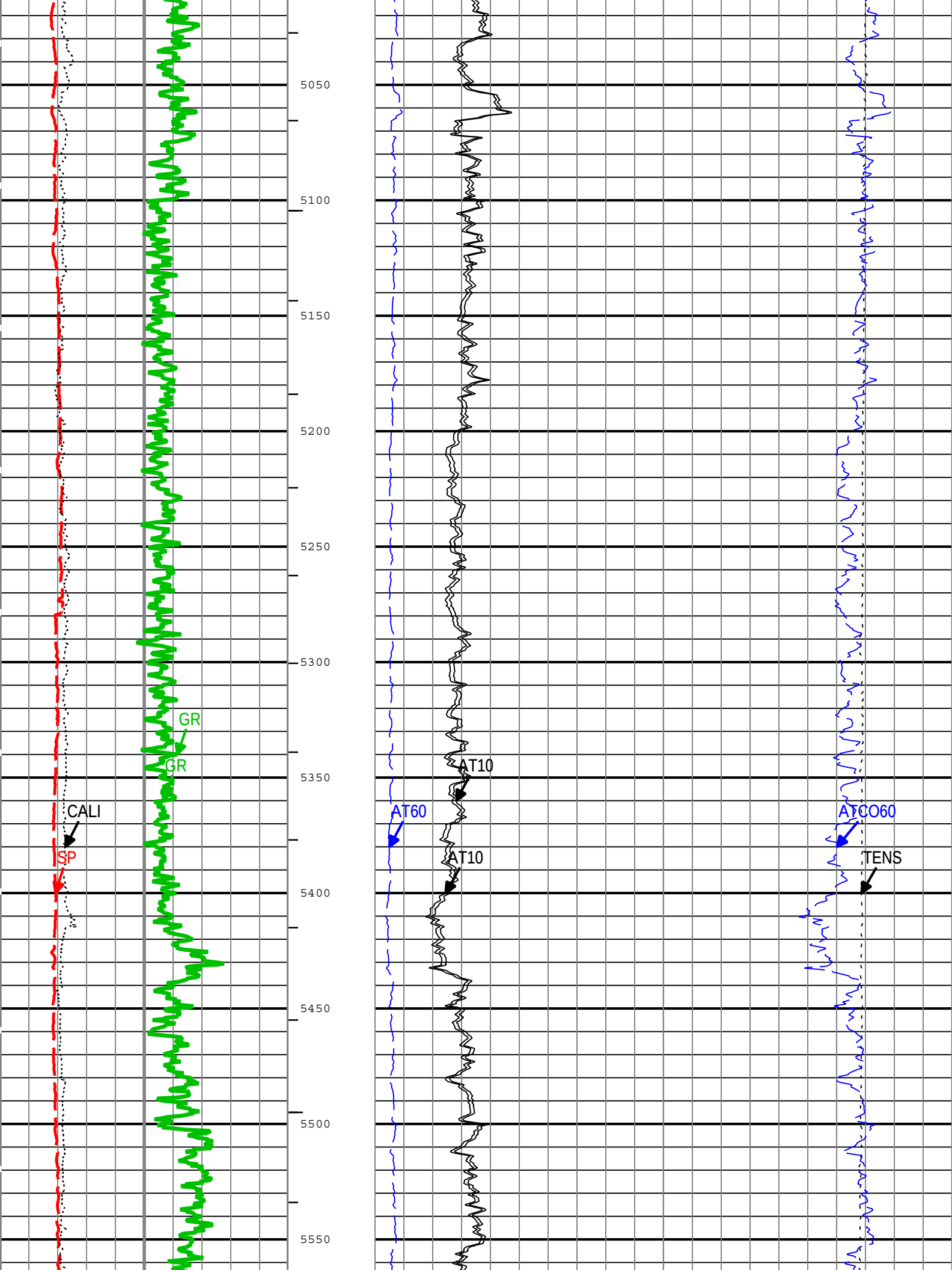
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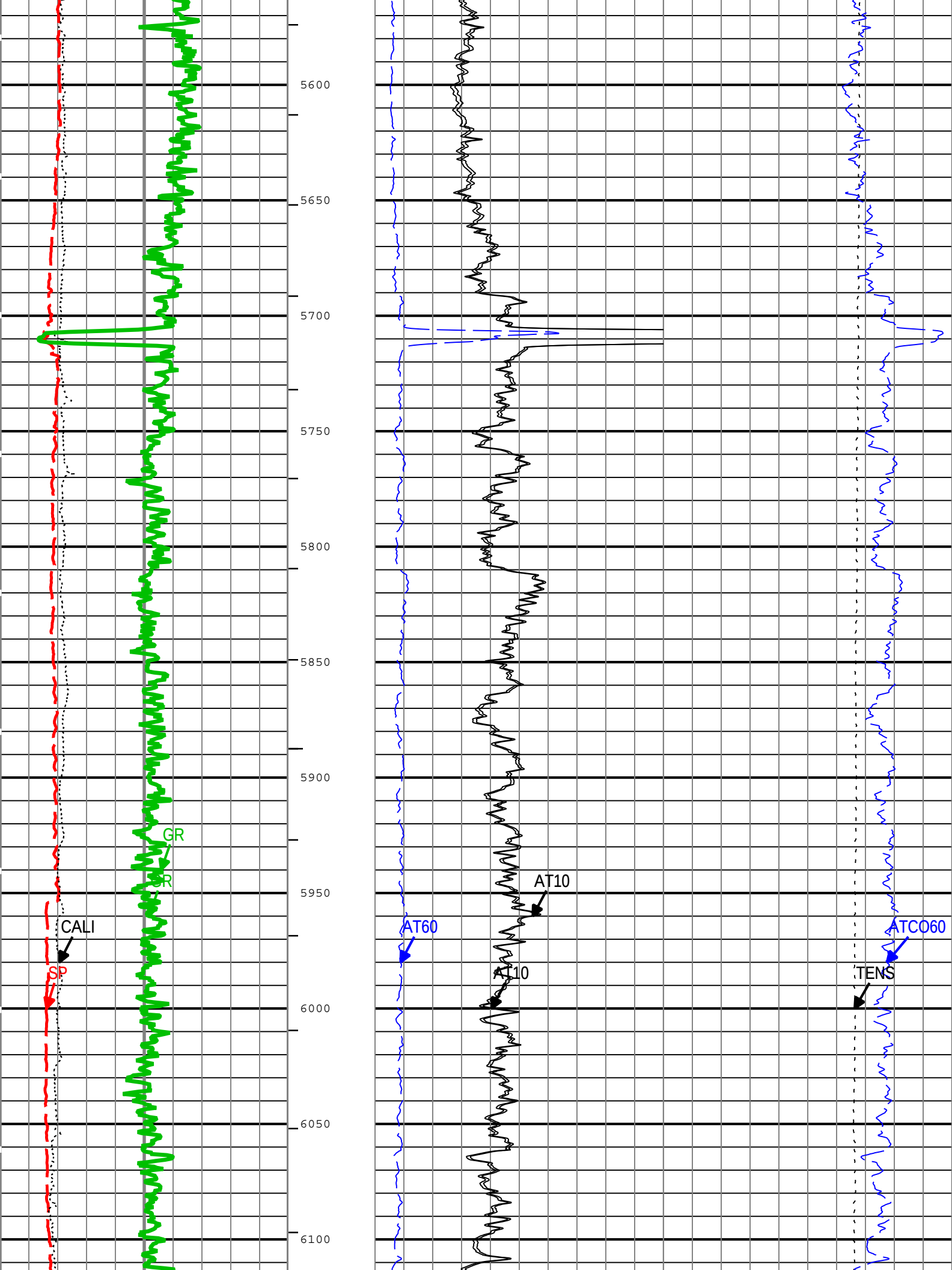
AT10
ATCO60
TENS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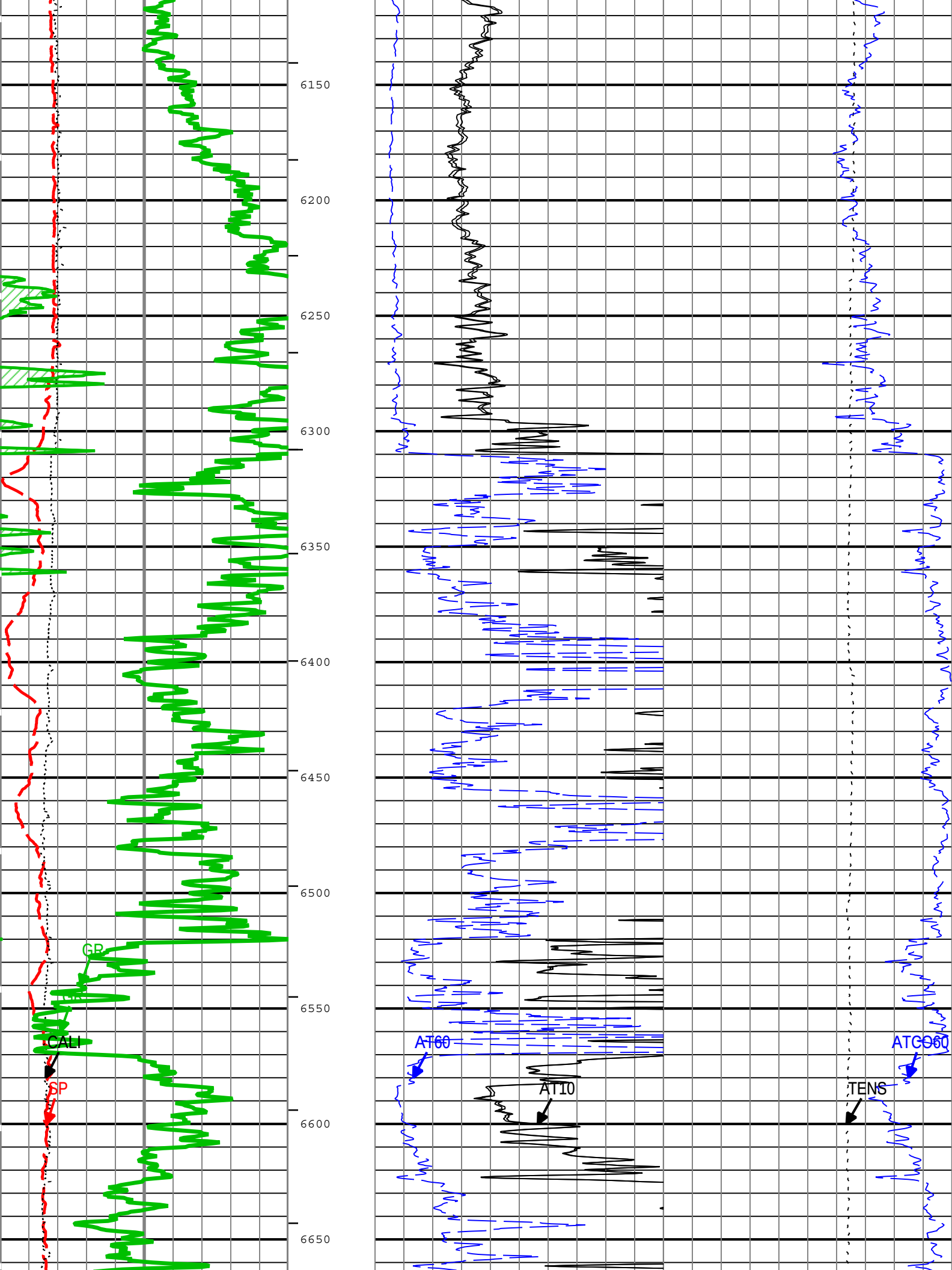
TENS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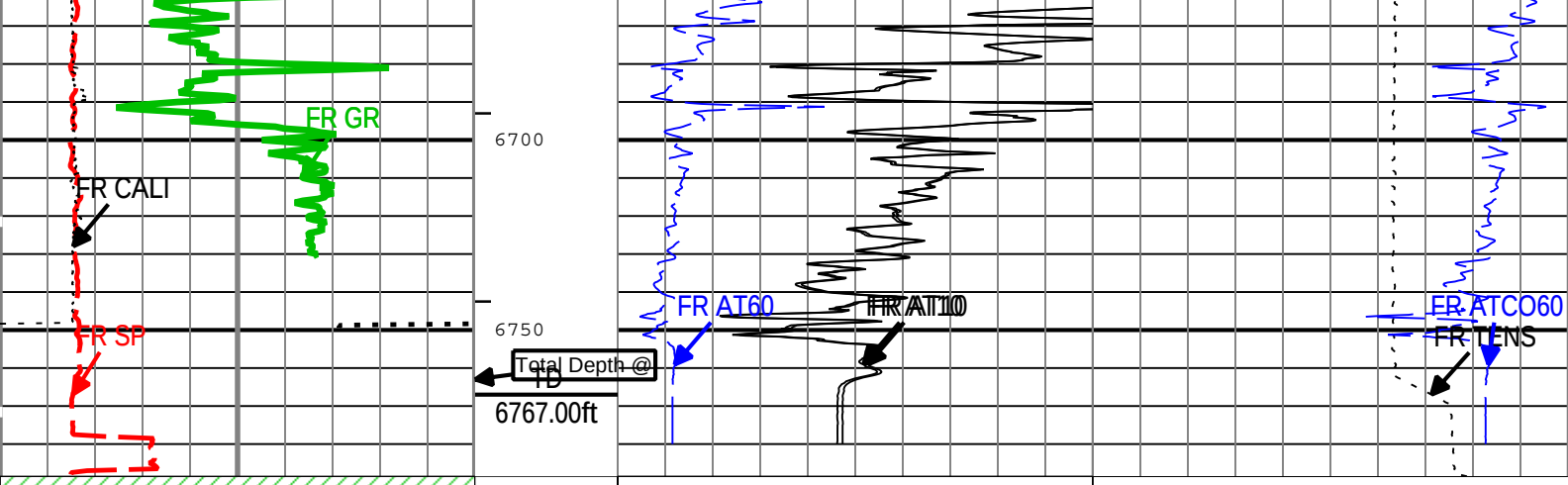
TENS
ATC060



Gamma Ray Backup

Spontaneous Potential (SP) AIT-M
-160 mV 40

Caliper (CALI) HDRS-H
6 in 16

Gamma Ray (GR) HGNS-H
0 gAPI 200

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

Array Induction Two Foot Resistivity A60 (AT60) AIT-M
0 ohm.m 50

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

Cable Tension (TENS)
10000 lbf 0

Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M
1000 mS/m 0

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log (Import of Kerr McGee 2in Induction) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:03

Channel Processing Parameters

Parameter	Description	ToolPath	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M:AMIS:AMIS	Compute Standoff	
ABLM	Array Induction Basic Logs Mode	AIT-M:AMIS:AMIS	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-M:AMIS:AMIS	Yes	
ASTA	Array Induction Tool Standoff	AIT-M:AMIS:AMIS	1	in
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	COMPLETION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H:HRCC-H:HRCC-H	0	in
CBLO	Casing Bottom (Logger)	COMPLETION	714	ft
CDEN	Cement Density	HGNS-H:HGNS-H:HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	COMPLETION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	9.5	lbm/gal
FCD	Future Casing (Outer) Diameter	COMPLETION	4.5	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	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SPDR	SP Drift Per Foot	AIT-M:AMIS:AMIS	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
CSODDRL	[8.625]	561.5	714
CSODDRL	[0]	714	6788.5

All depth are actual.

Tool Control Parameters

Parameter	Description	ToolPath	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLWorkflow	3600	ft/h

1_PEx-BHC

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1628.7	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	2299.55	ft3

Software Version

Acquisition System	Version
MaxWell	3.0.9609.0

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.0.9609.0

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.0.9609.0	
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.0.9609.0	
AMIS	Array Induction Sonde - M	3.0.9609.0	

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift
1_PEx-BHC	Main[3]:Up	Up	625.56 ft	6788.41 ft	03-Nov-2011 4:27:22 PM	03-Nov-2011 5:31:43 PM	4.43 ft

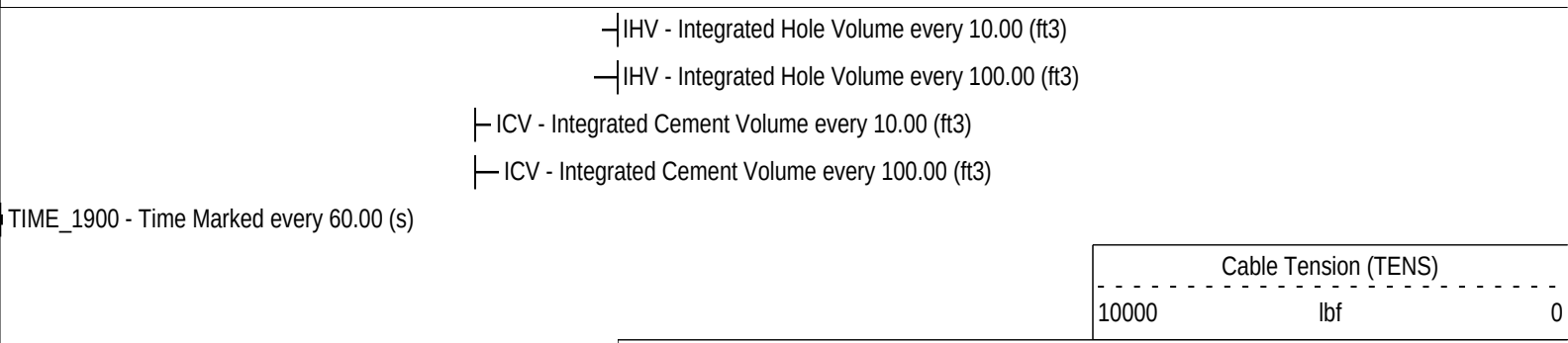
All depths are referenced to toolstring zero

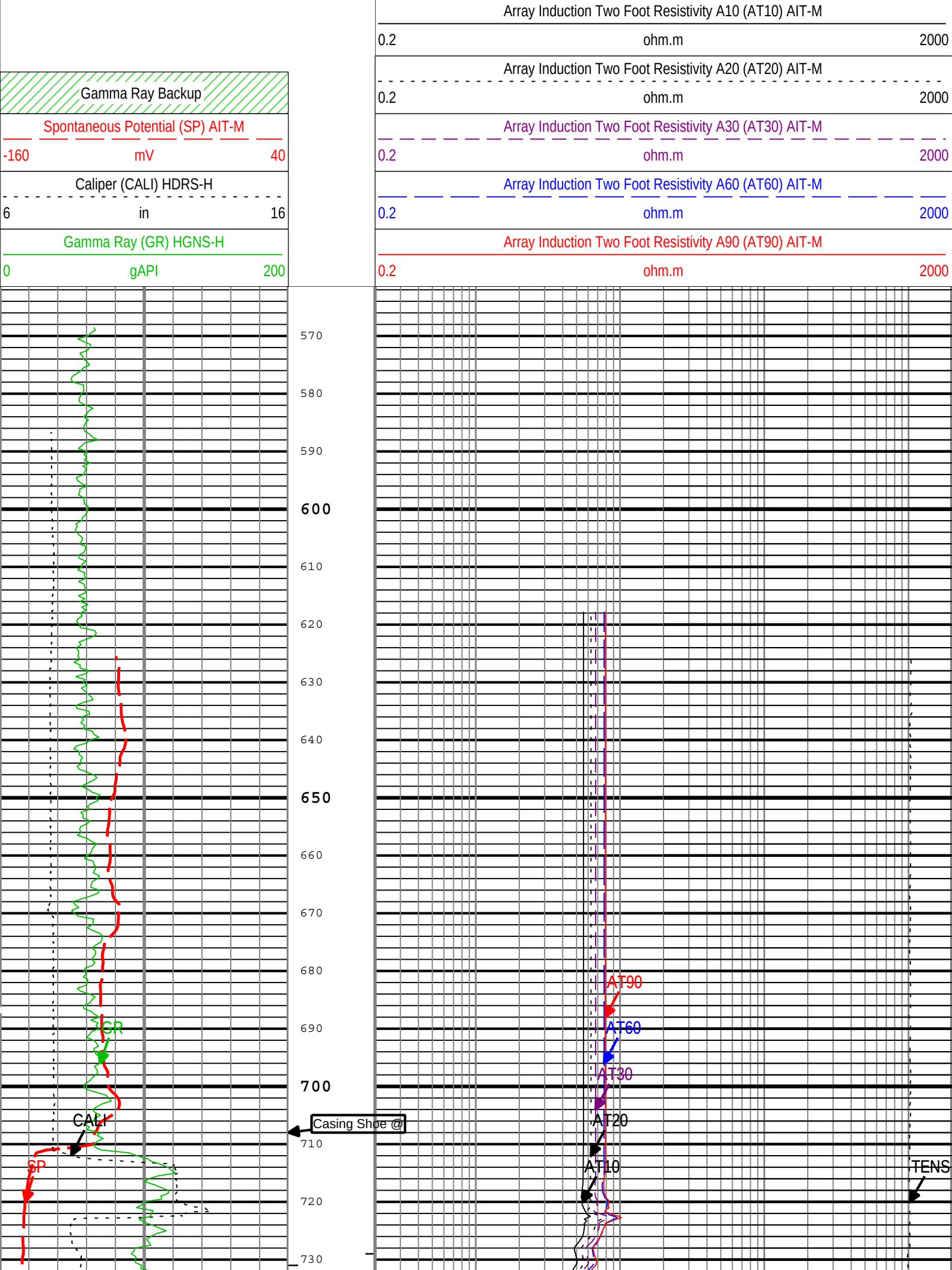
Log

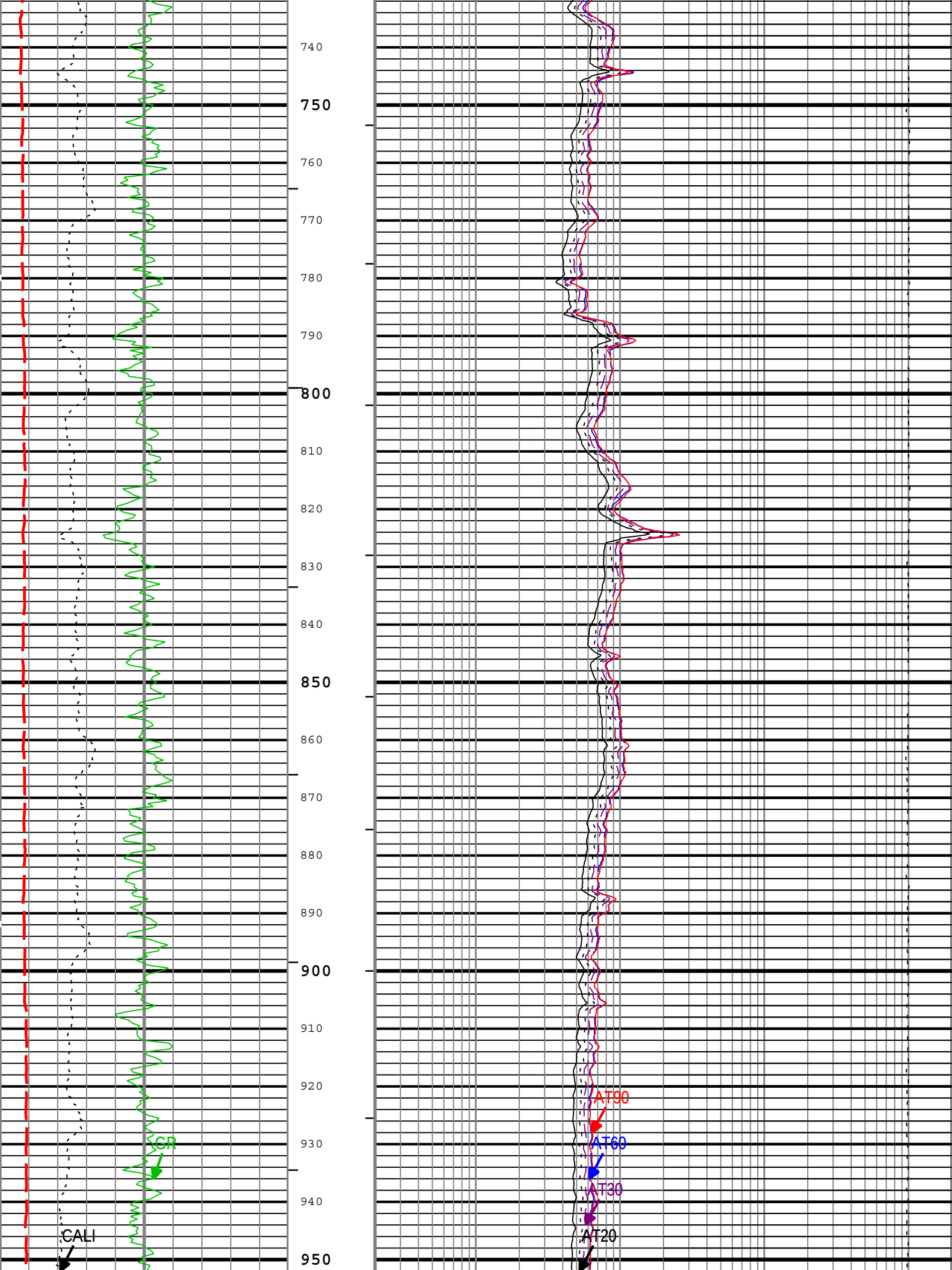
1_PEx-BHC: Main[3]:Up 856C951F-172C-4A89-BF1B-E6F55FDFB74E

Description: AIT Basic Log Two Format: Log (Kerr McGee 5in Induction Upper) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:08

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	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in
IHV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in




Gamma Ray Backup
Spontaneous Potential (SP) AIT-M
-160
mV
40
Caliper (CALI) HDRS-H
6
in
16
Gamma Ray (GR) HGNS-H
0
gAPI
200
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
570
580
590
600
610
620
630
640
650
660
670
680
690
700
710
720
730
GR
CALI
SP
Casing Shoe @
AT90
AT60
AT30
AT20
AT10
TENS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750
760
770
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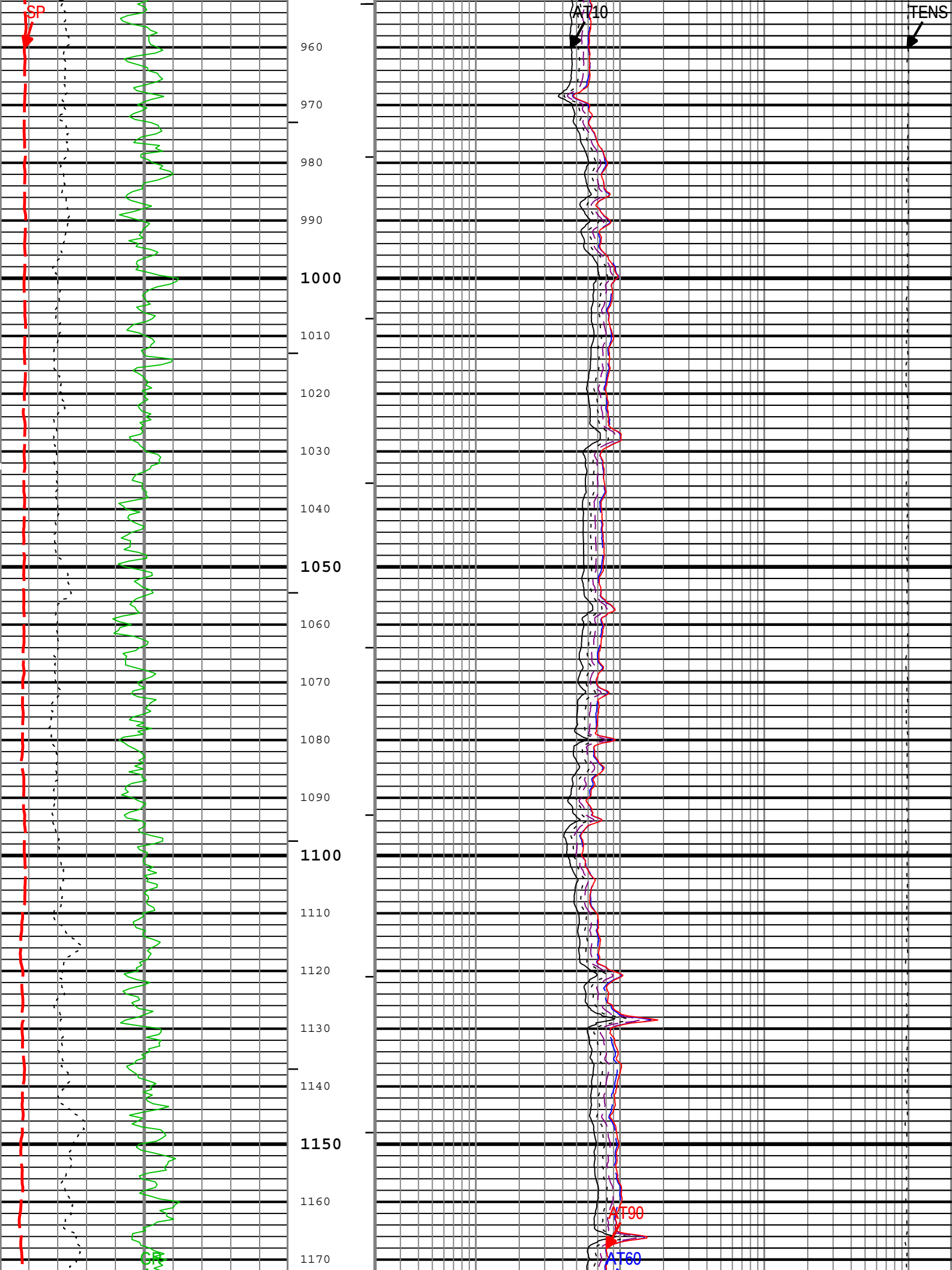
930
940
950
AT90
AT60
AT30
AT20
GR
CALI


SP
AT10
TENS
960
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1100
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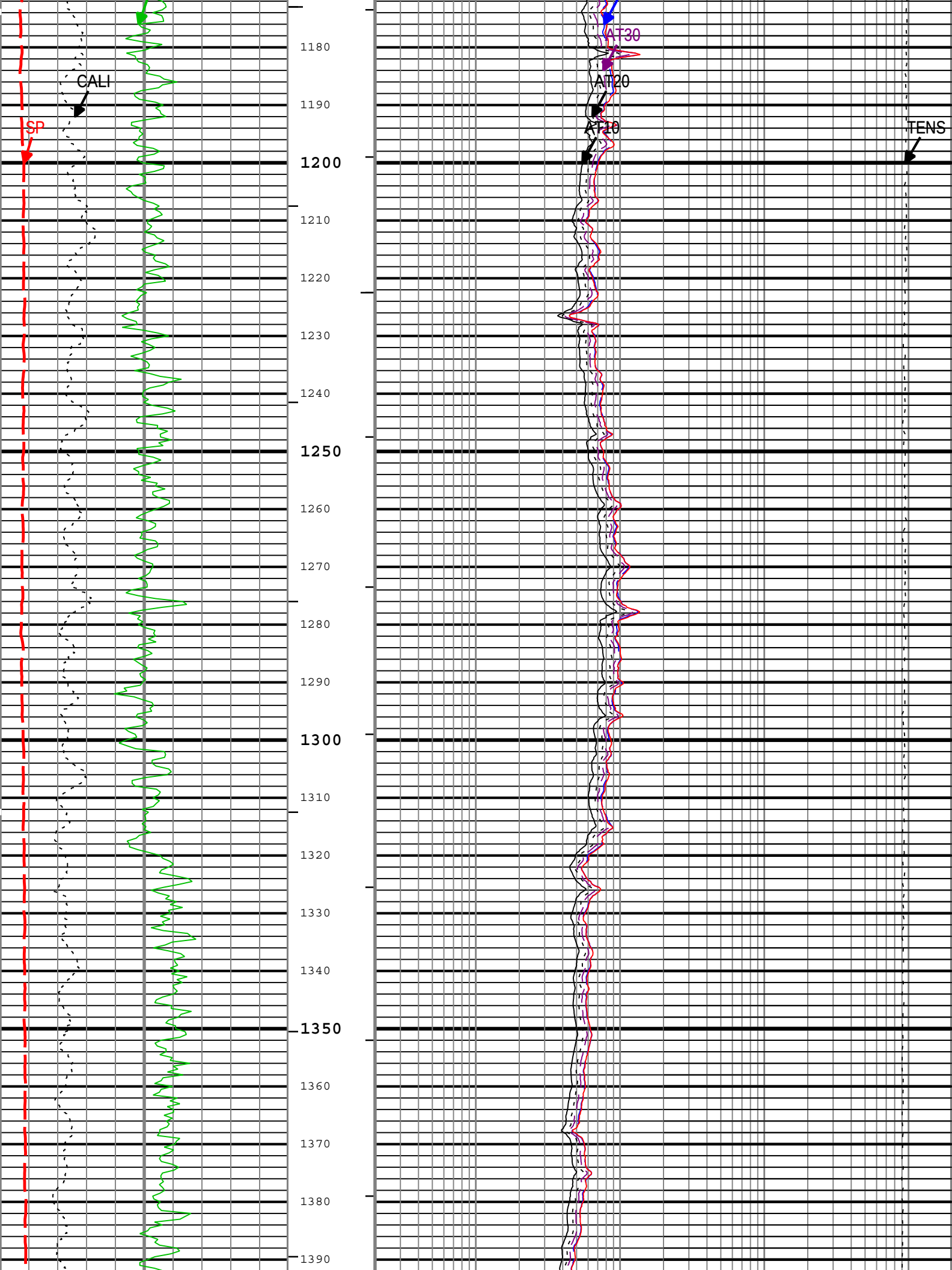
AT90
AT60
GR


CALI
SP
AT30
AT20
AT10
TENS
1180
1190
1200
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1240
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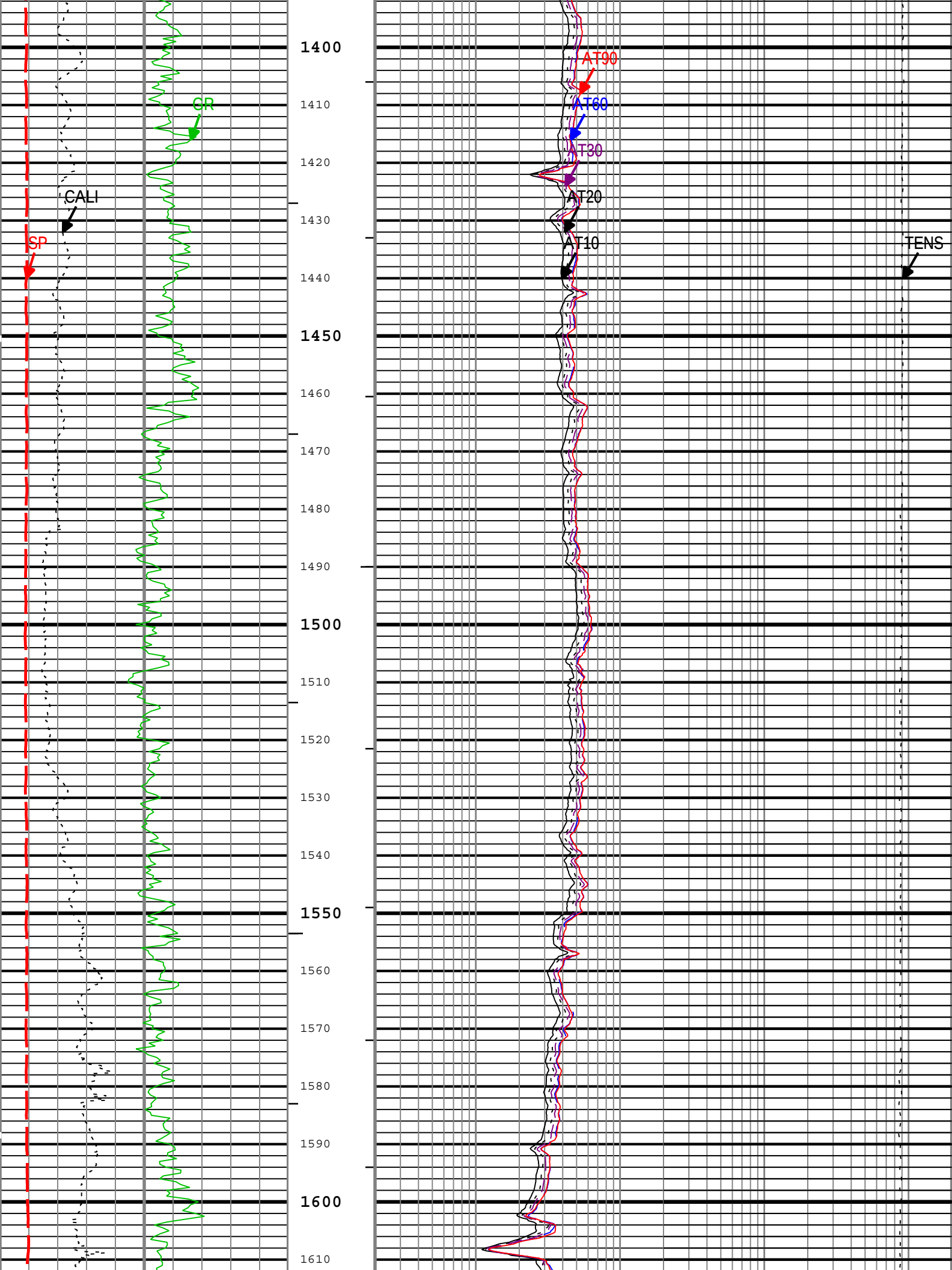
CALI
SP
GR
AT90
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AT10
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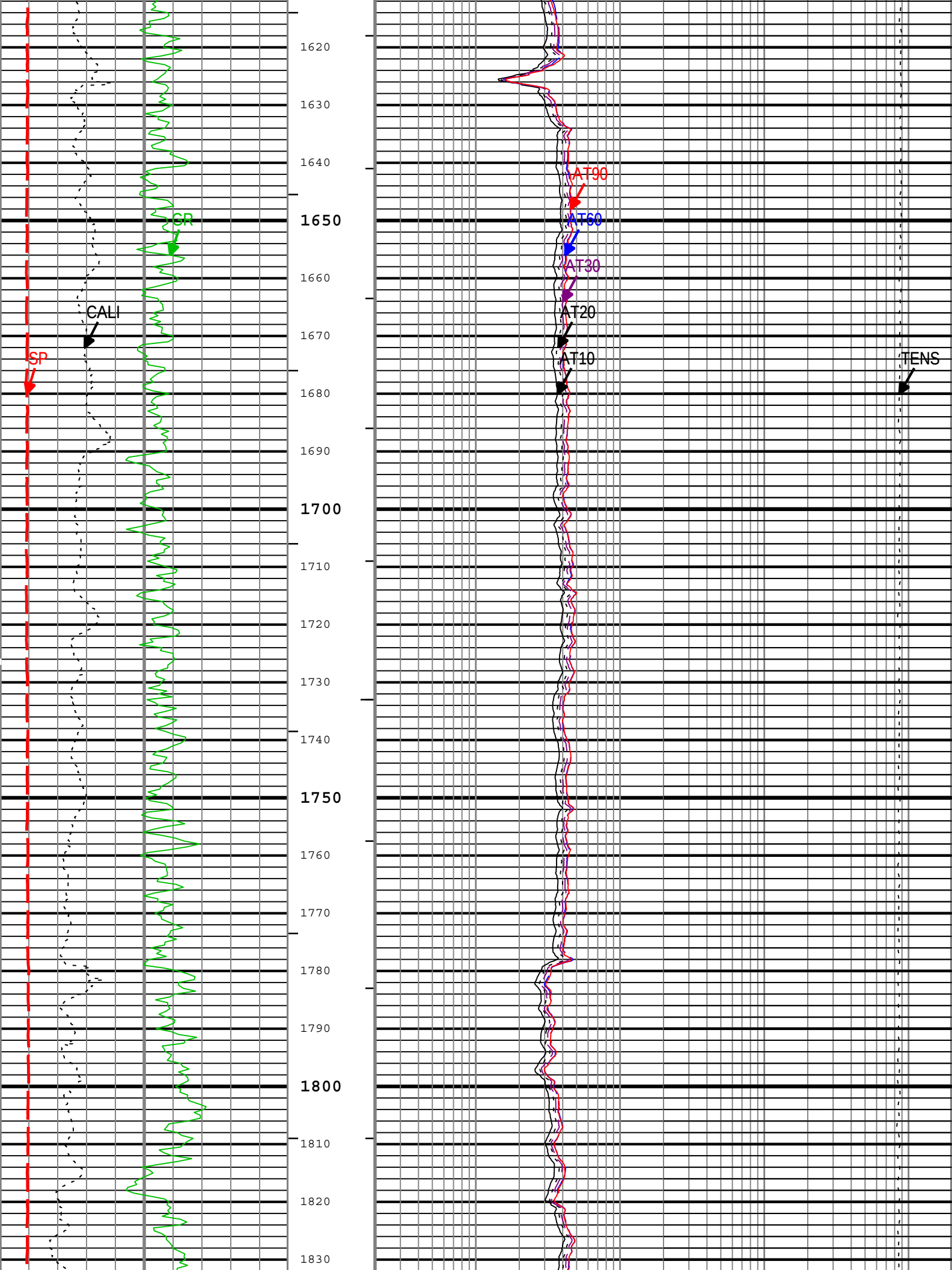
1600
1610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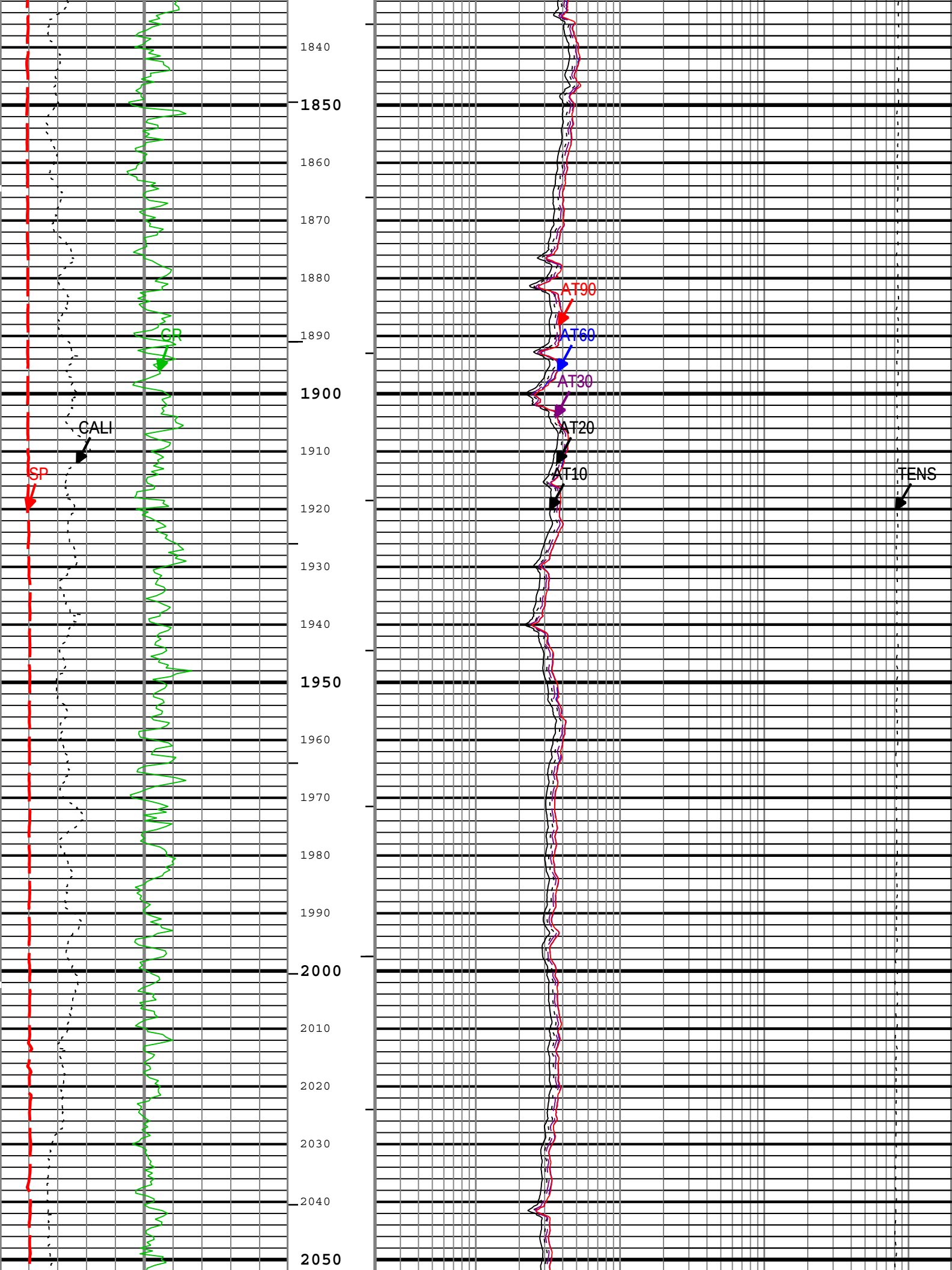
1830
SP
CALI
GR
AT90
AT60
AT30
AT20
AT10
TENS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1940
1950
1960
1970
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2020
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2050
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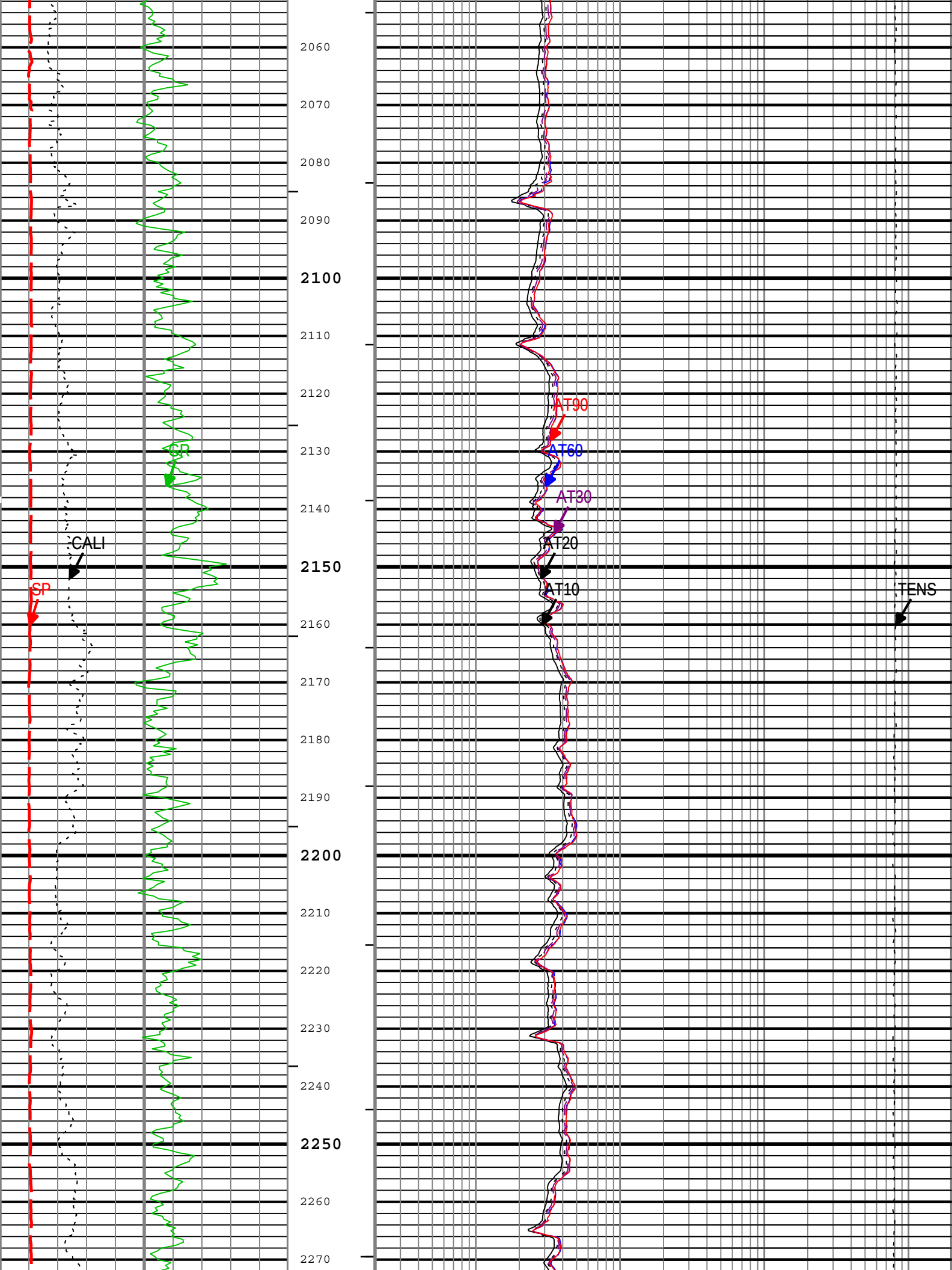
CALI
SP
AT90
AT60
AT30
AT20
AT10
TENS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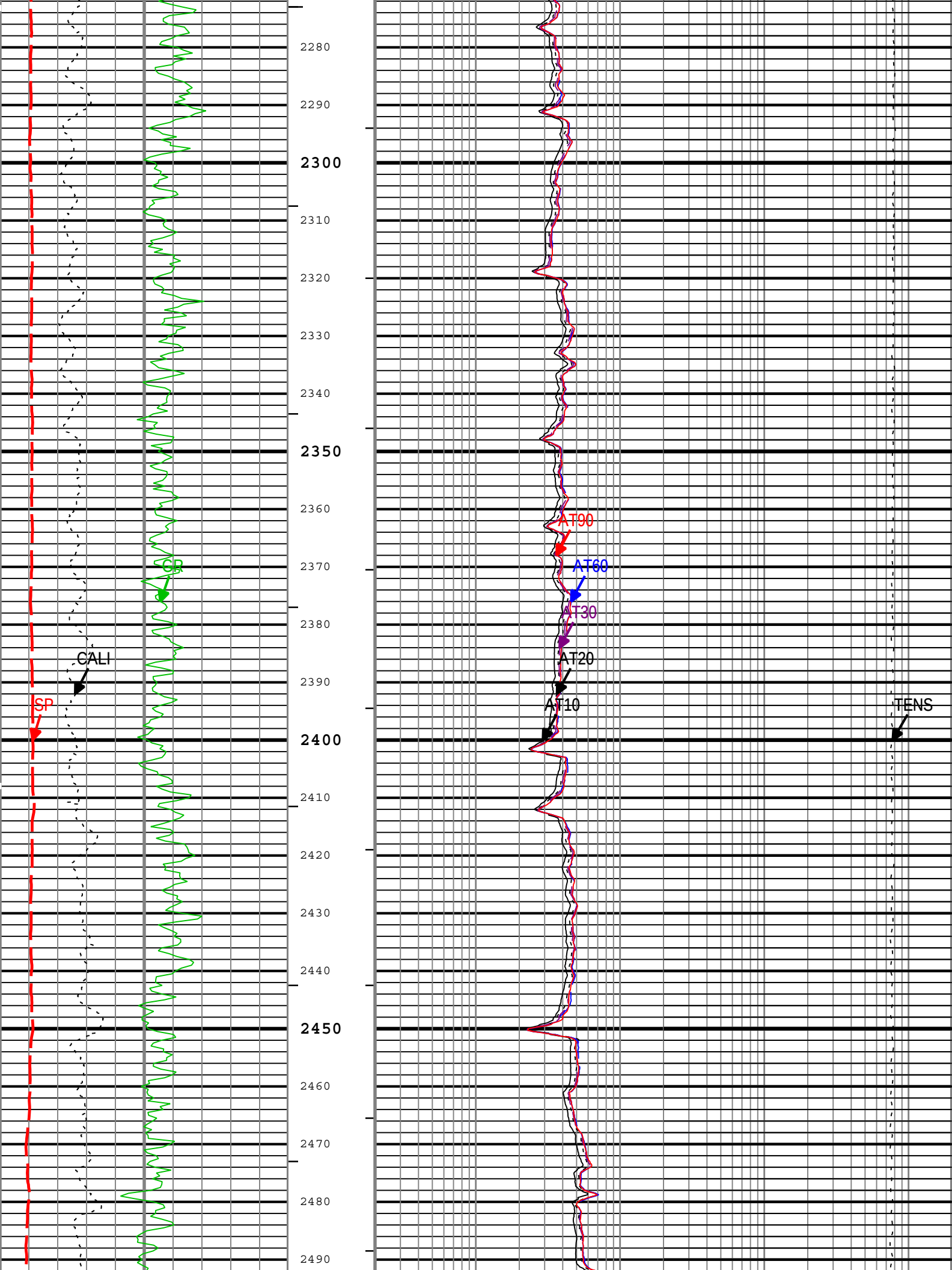
2270
AT90
AT60
AT30
AT20
AT10
GR
CALI
SP
TENS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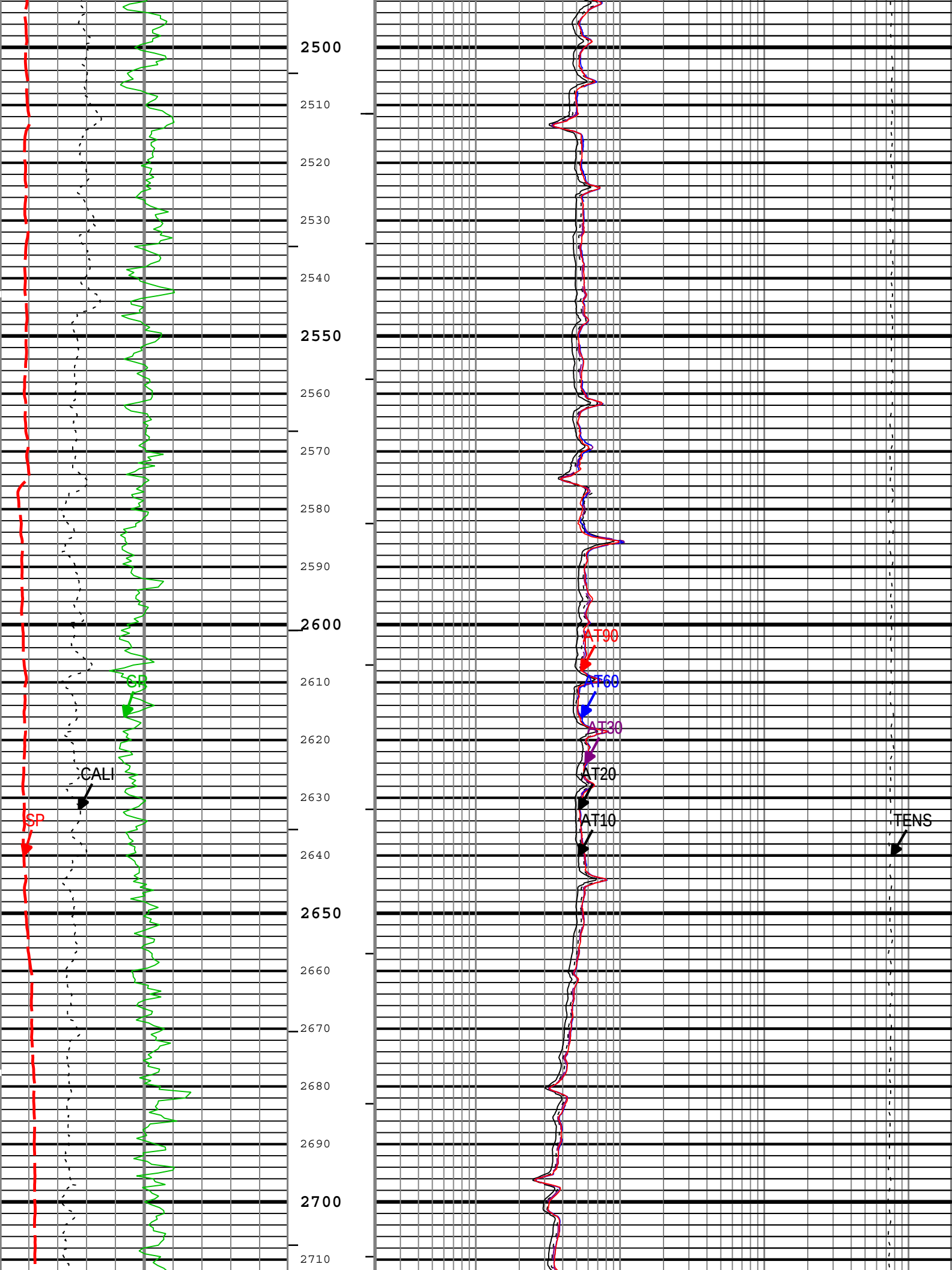
2490
CALI
SP
GR
AT90
AT60
AT30
AT20
AT10
TENS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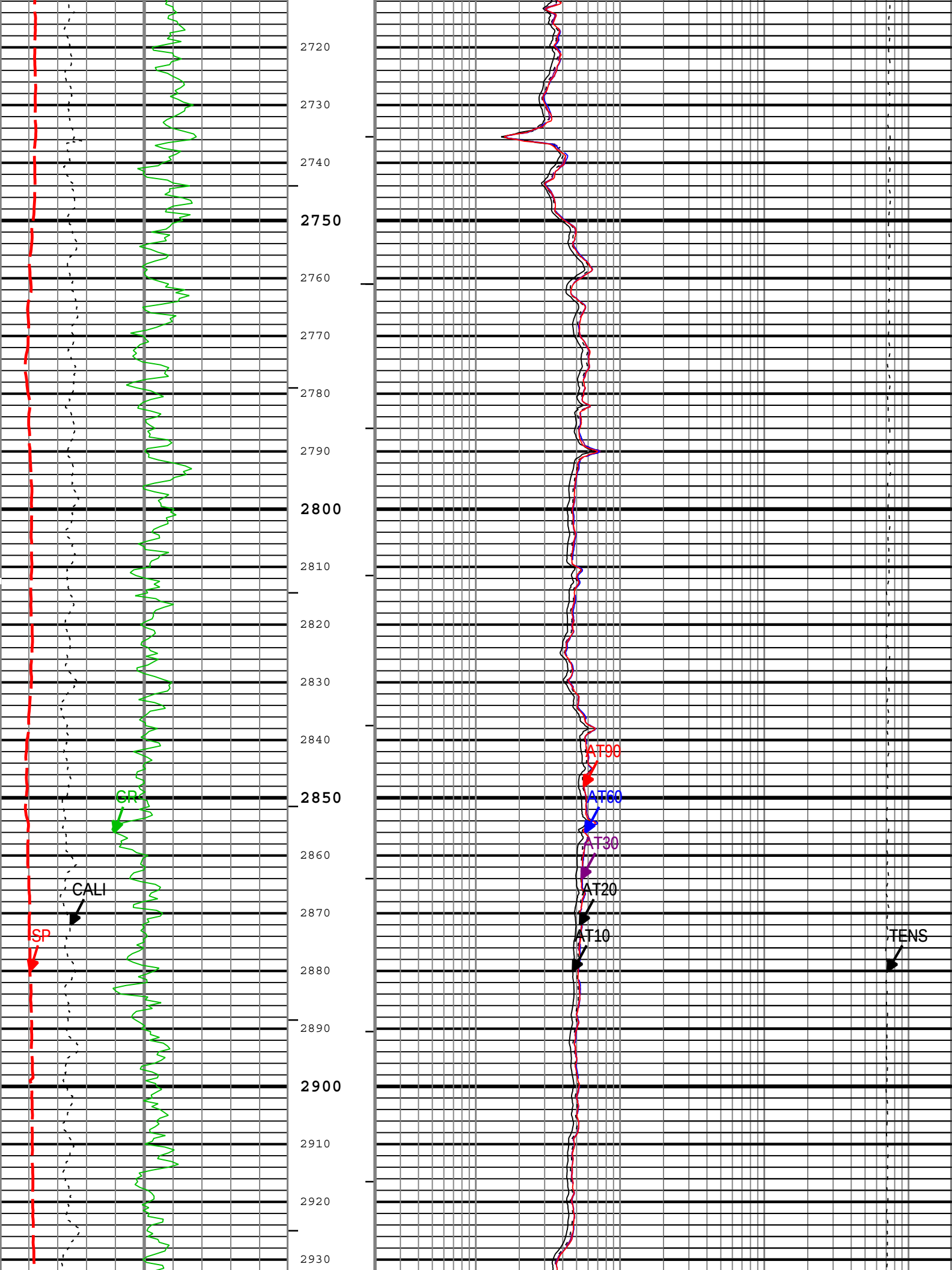
2710
SP
CALI
GR
AT90
AT60
AT30
AT20
AT10
TENS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2930
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CALI
GR
AT90
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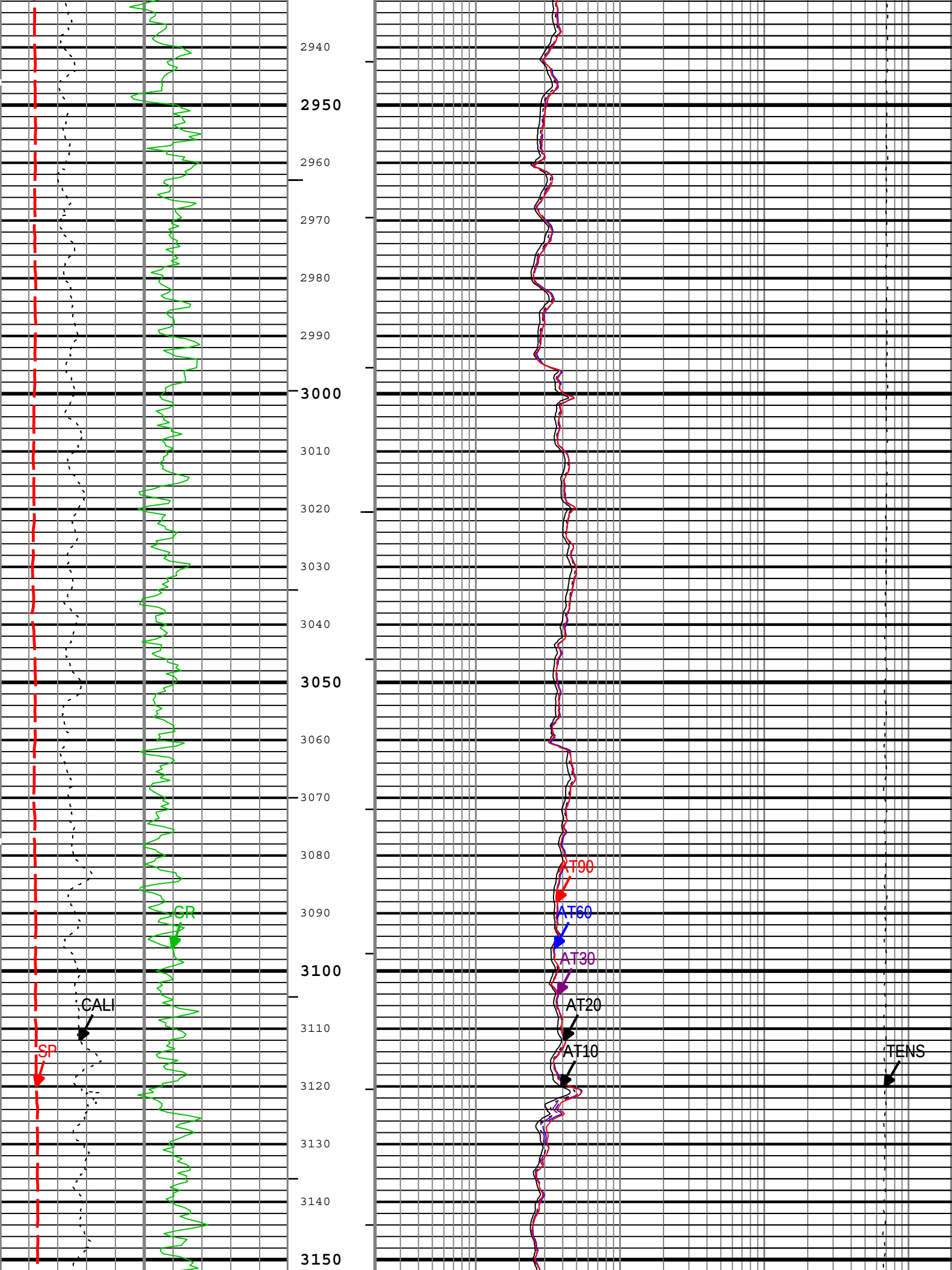
AT20
AT10
TENS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CALI
SP
AT90
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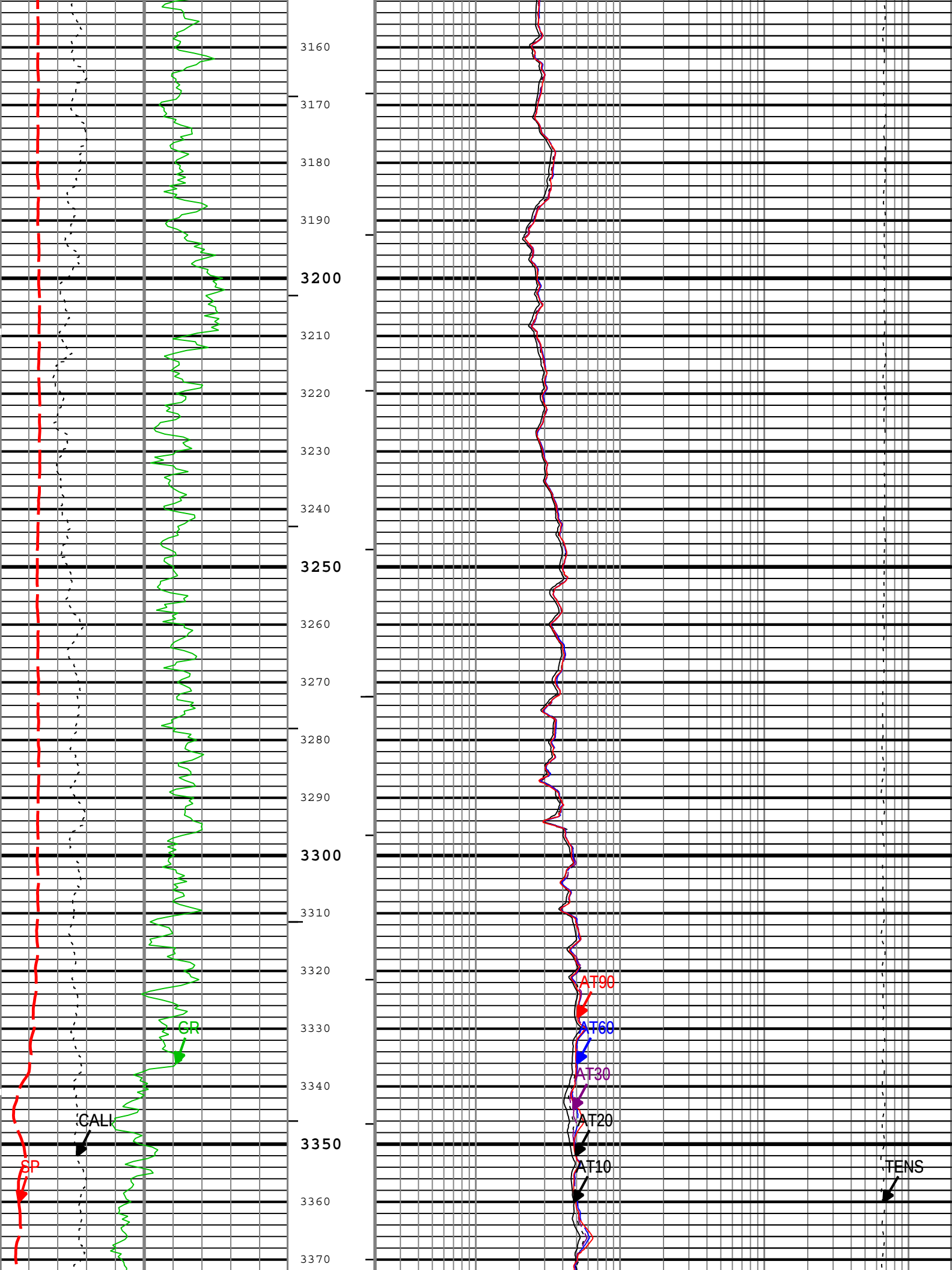
AT20
AT10
TENS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GR
AT90
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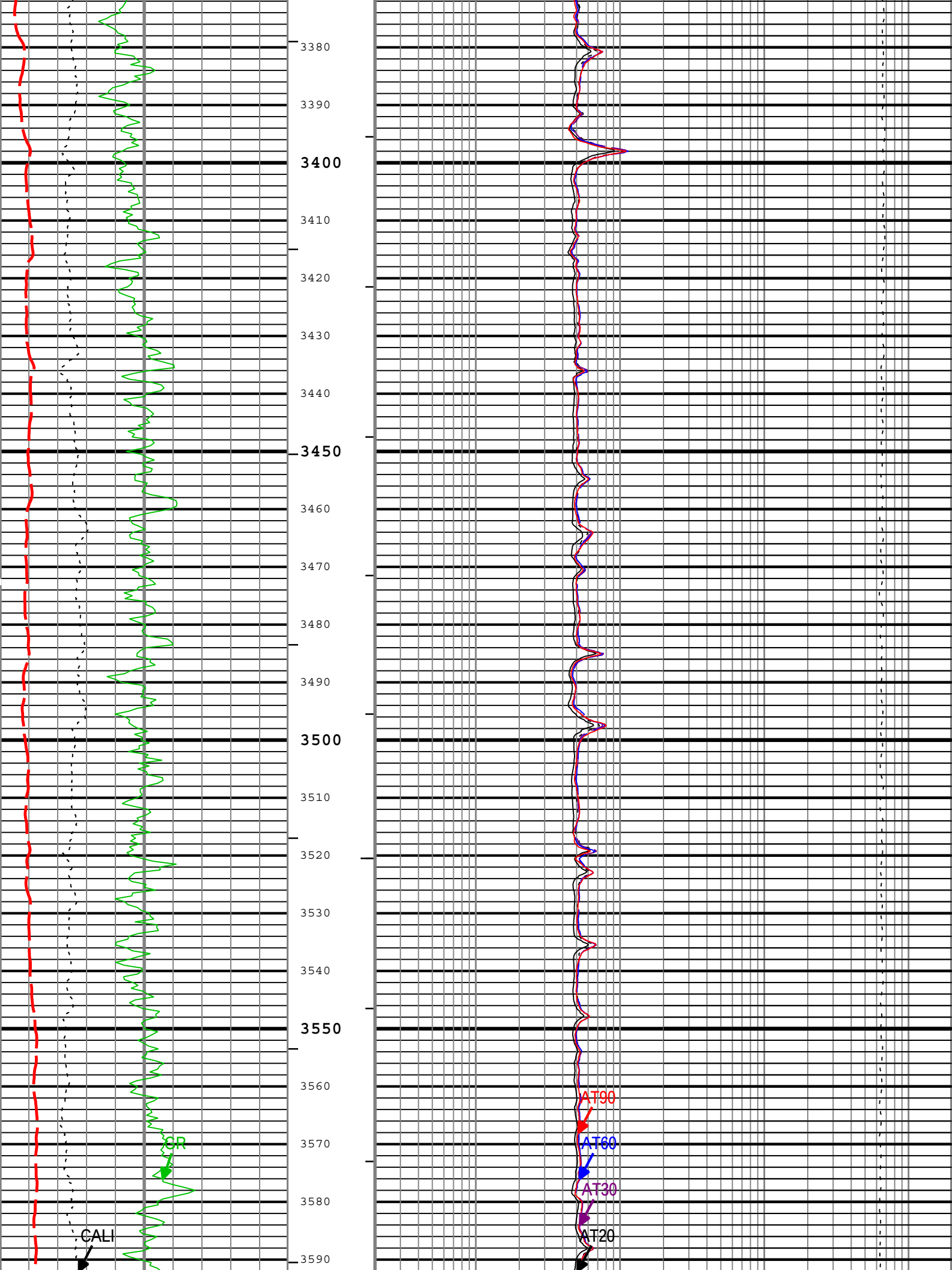
AT20
AT10
TENS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CALI
AT90
AT60
AT30
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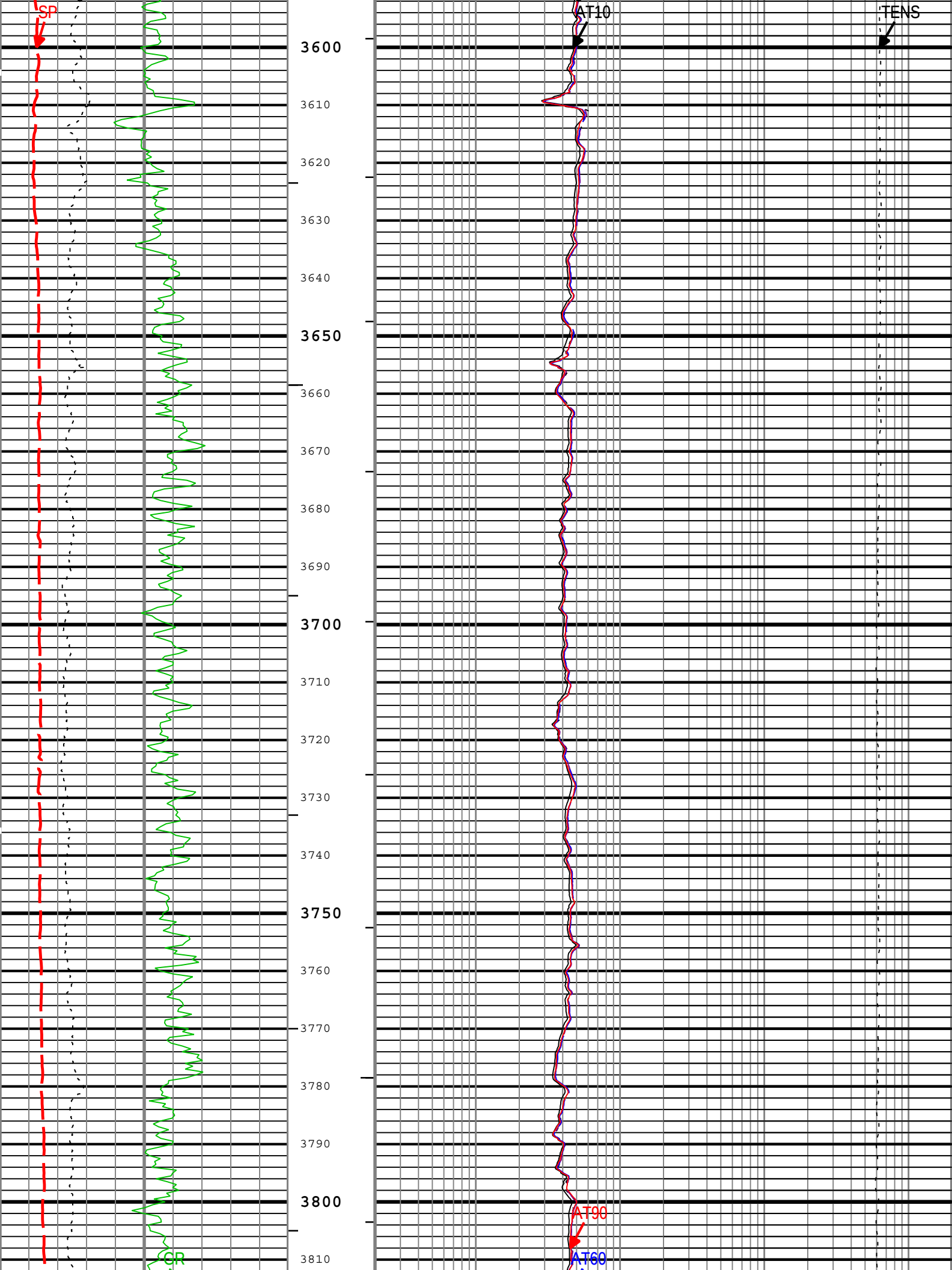
SP
AT10
TENS
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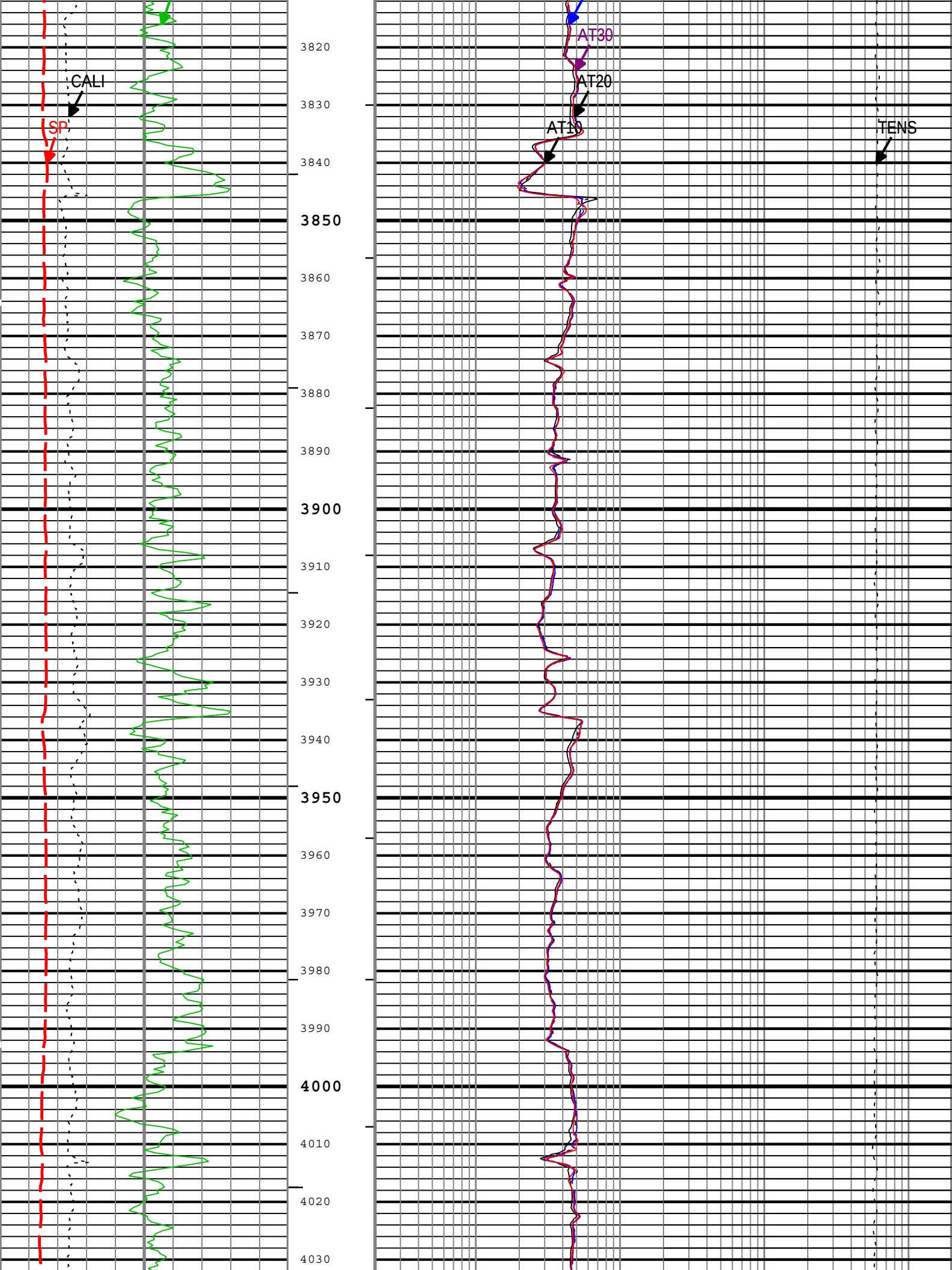
AT90
AT60
GR
3810


CALI
SP
AT30
AT20
AT10
TENS
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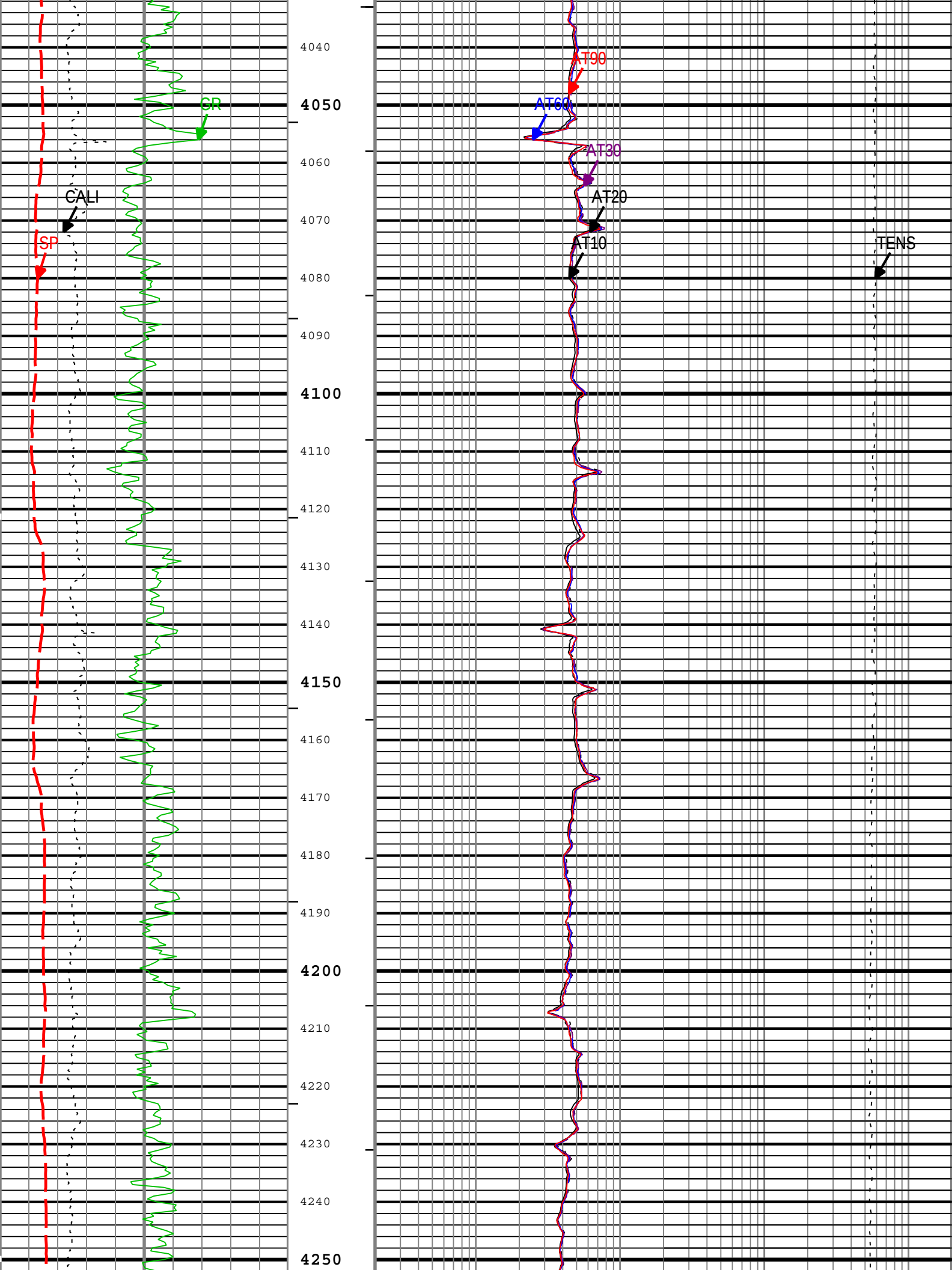
GR
CALI
SP
AT90
AT60
AT30
AT20
AT10
TENS
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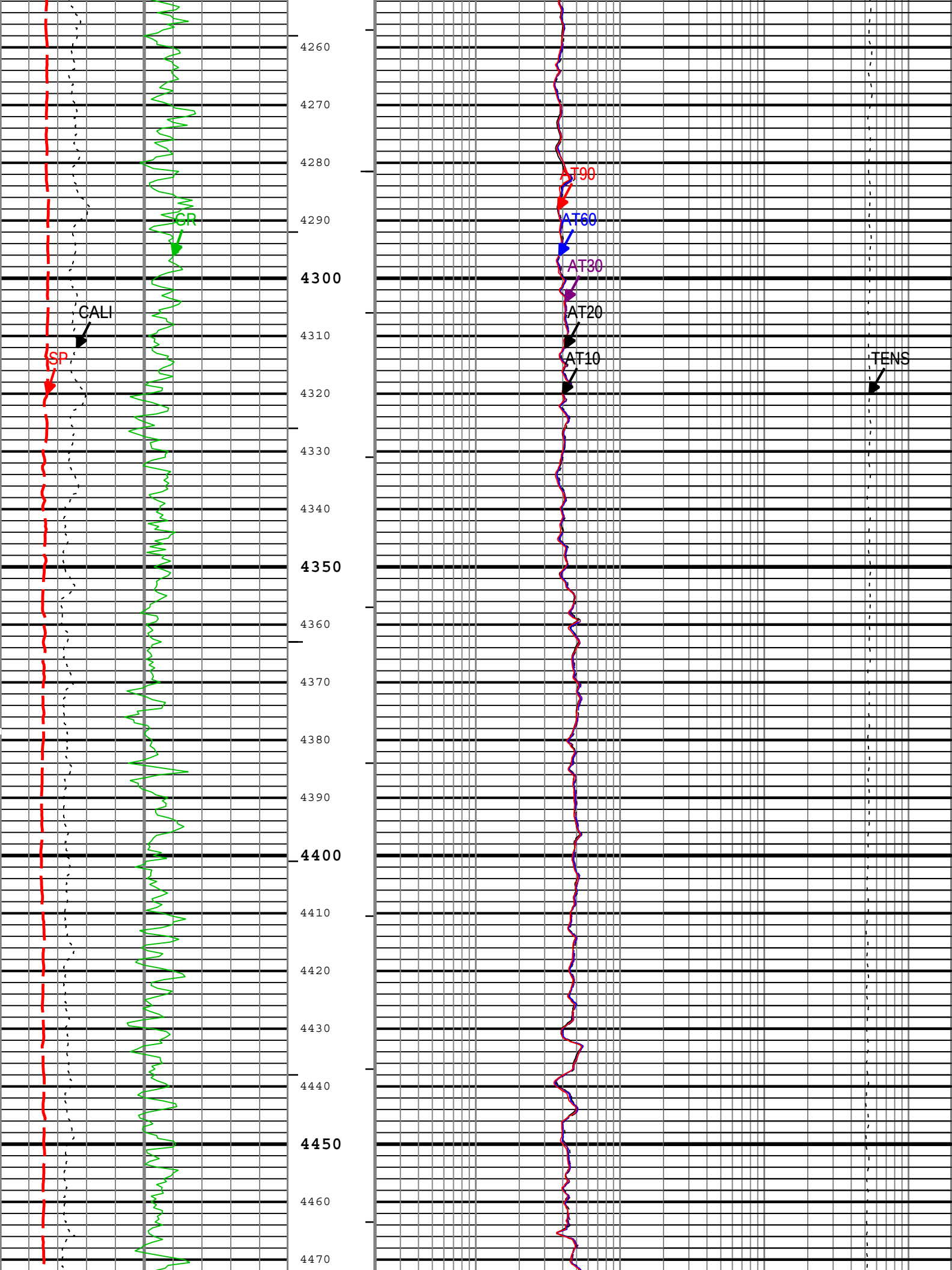
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CR
CALI
SP
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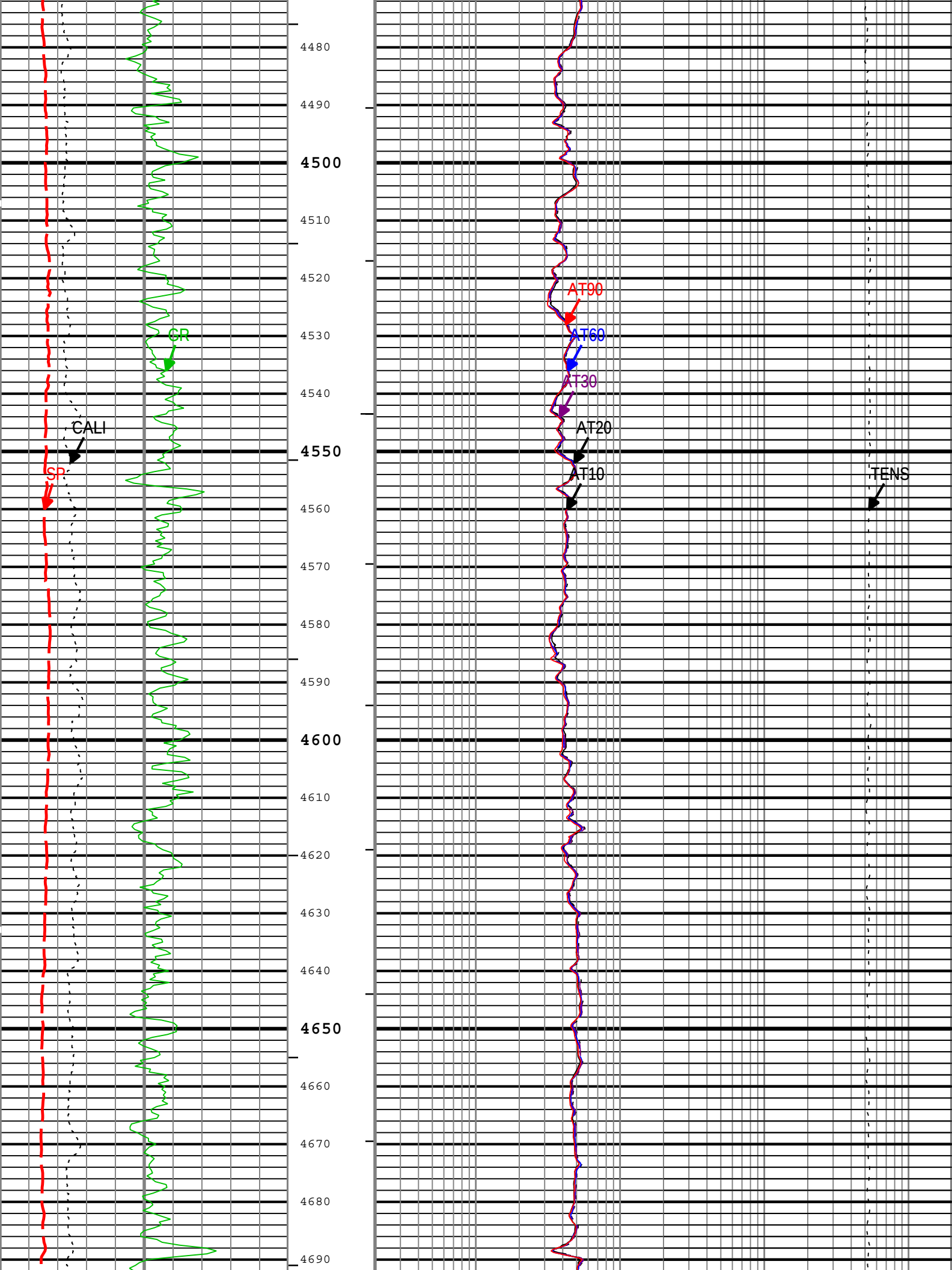
TENS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CALI
SP
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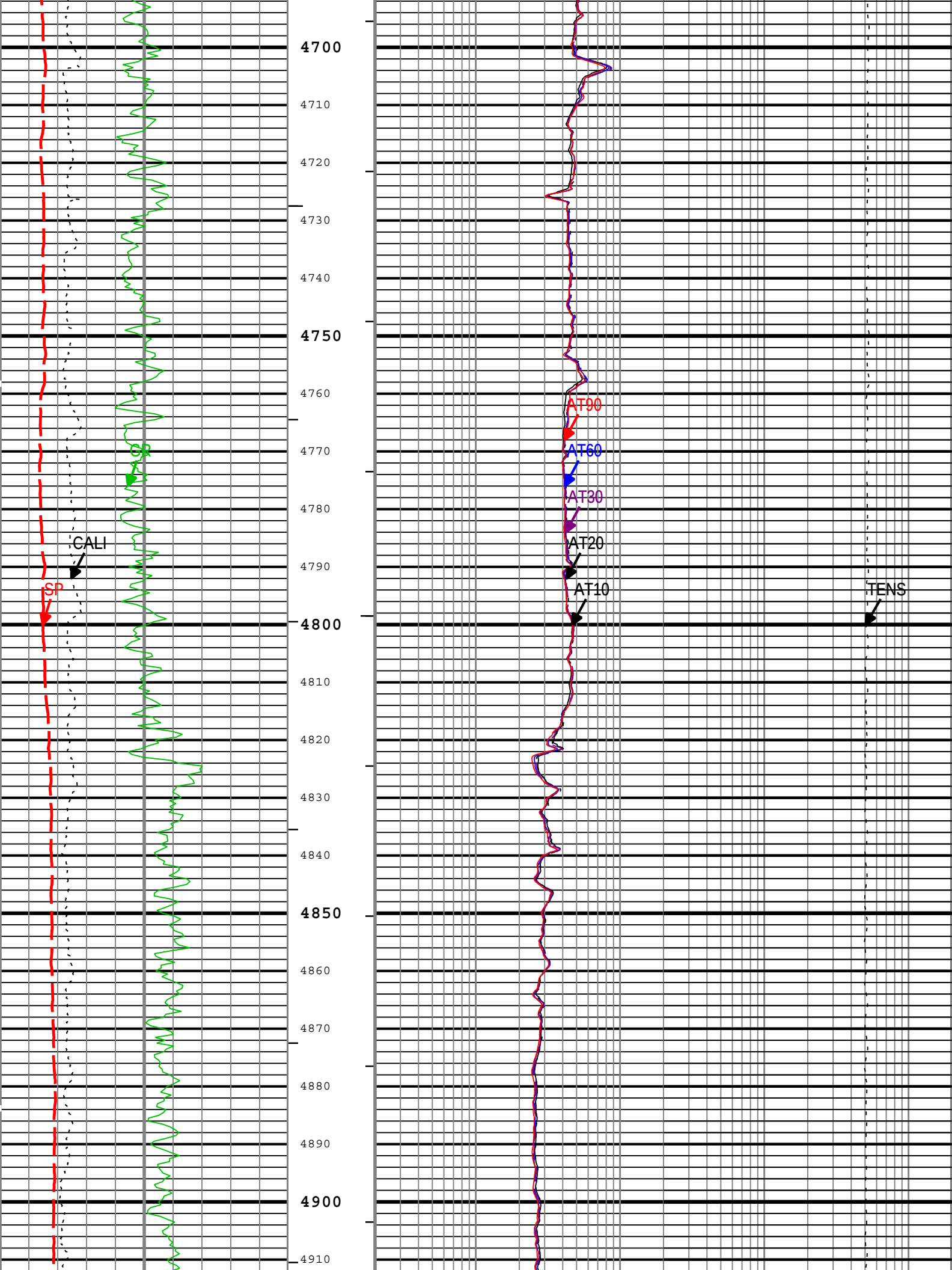
AT20
AT10
TENS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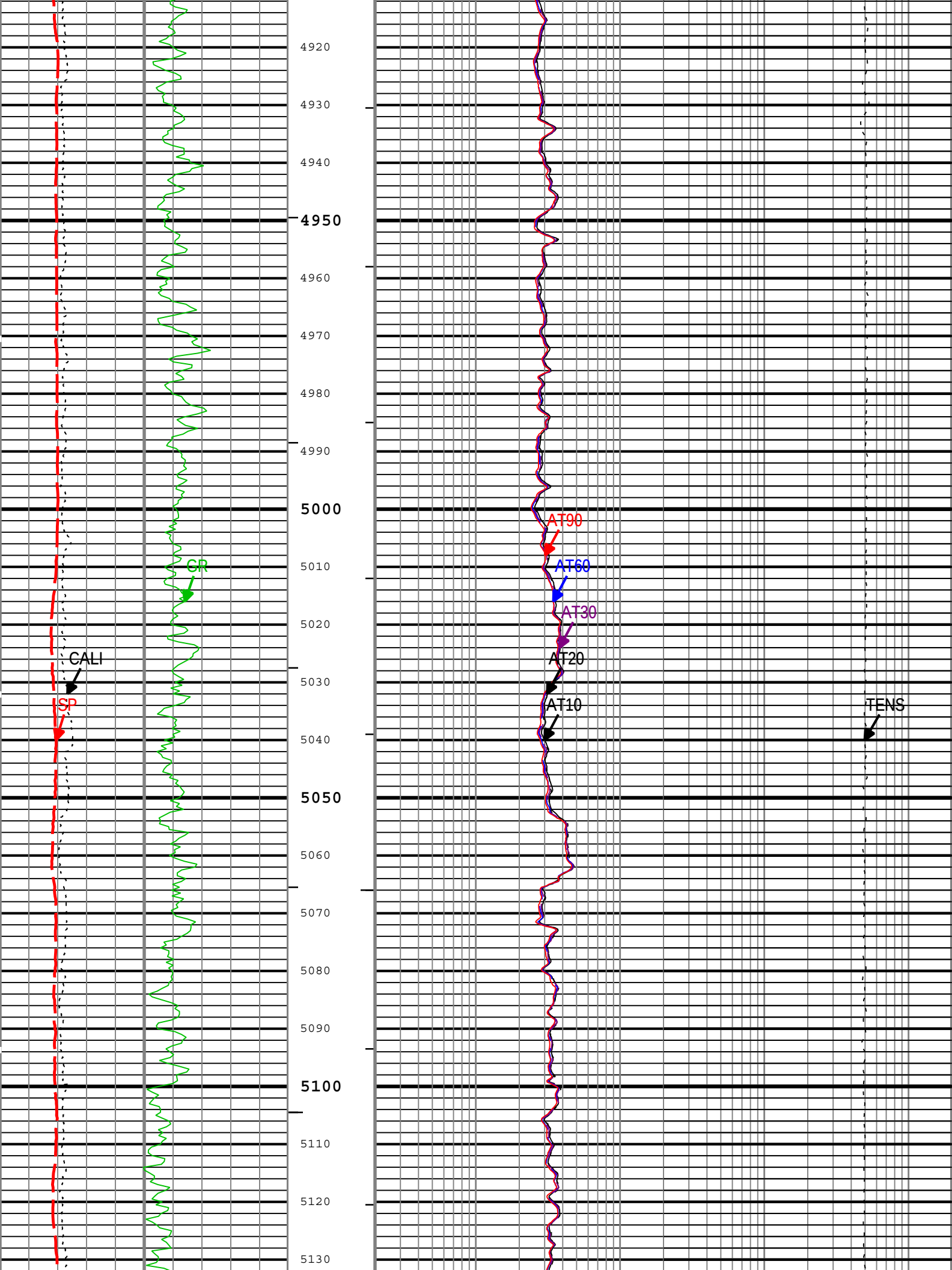
TENS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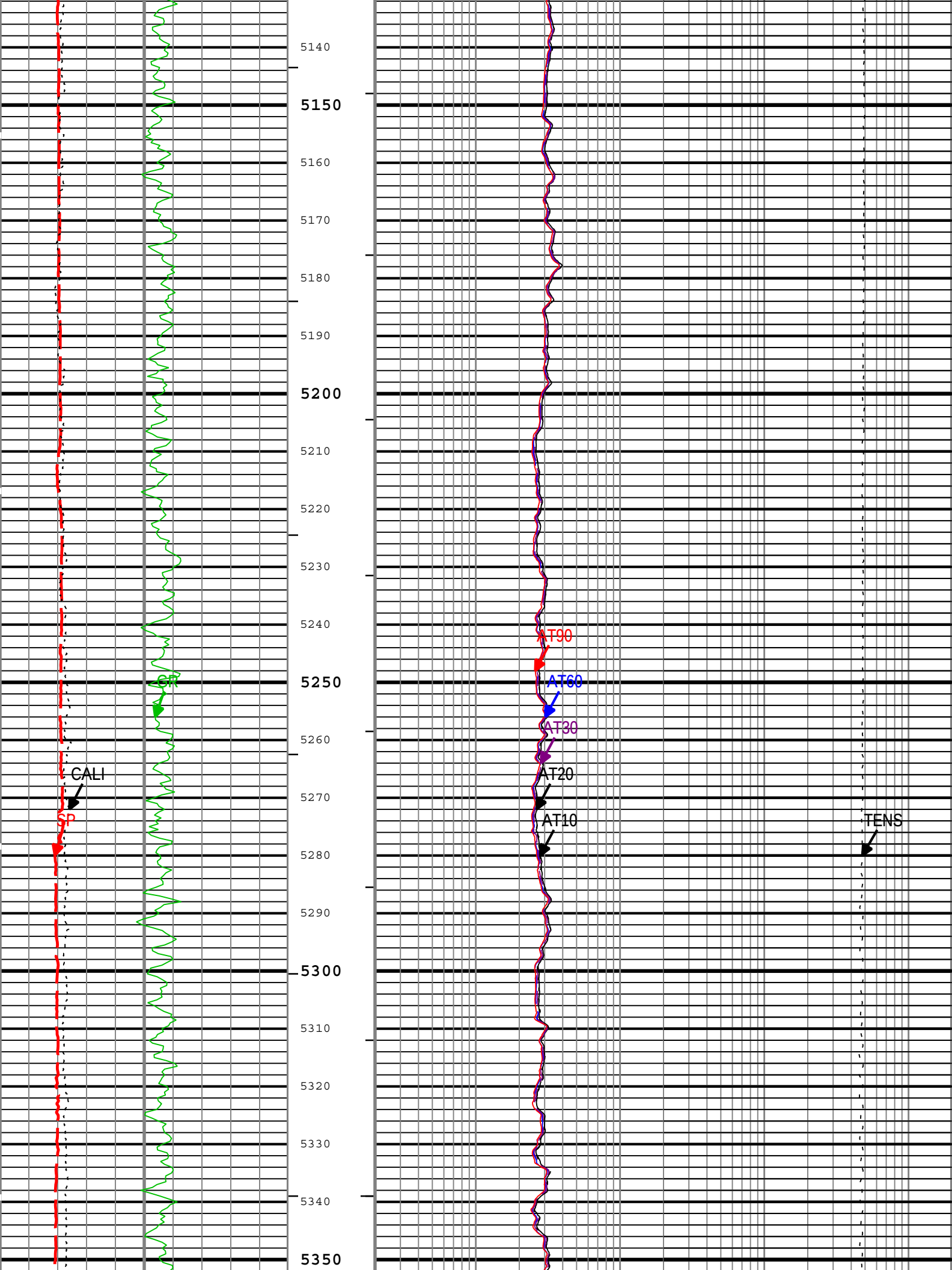
TENS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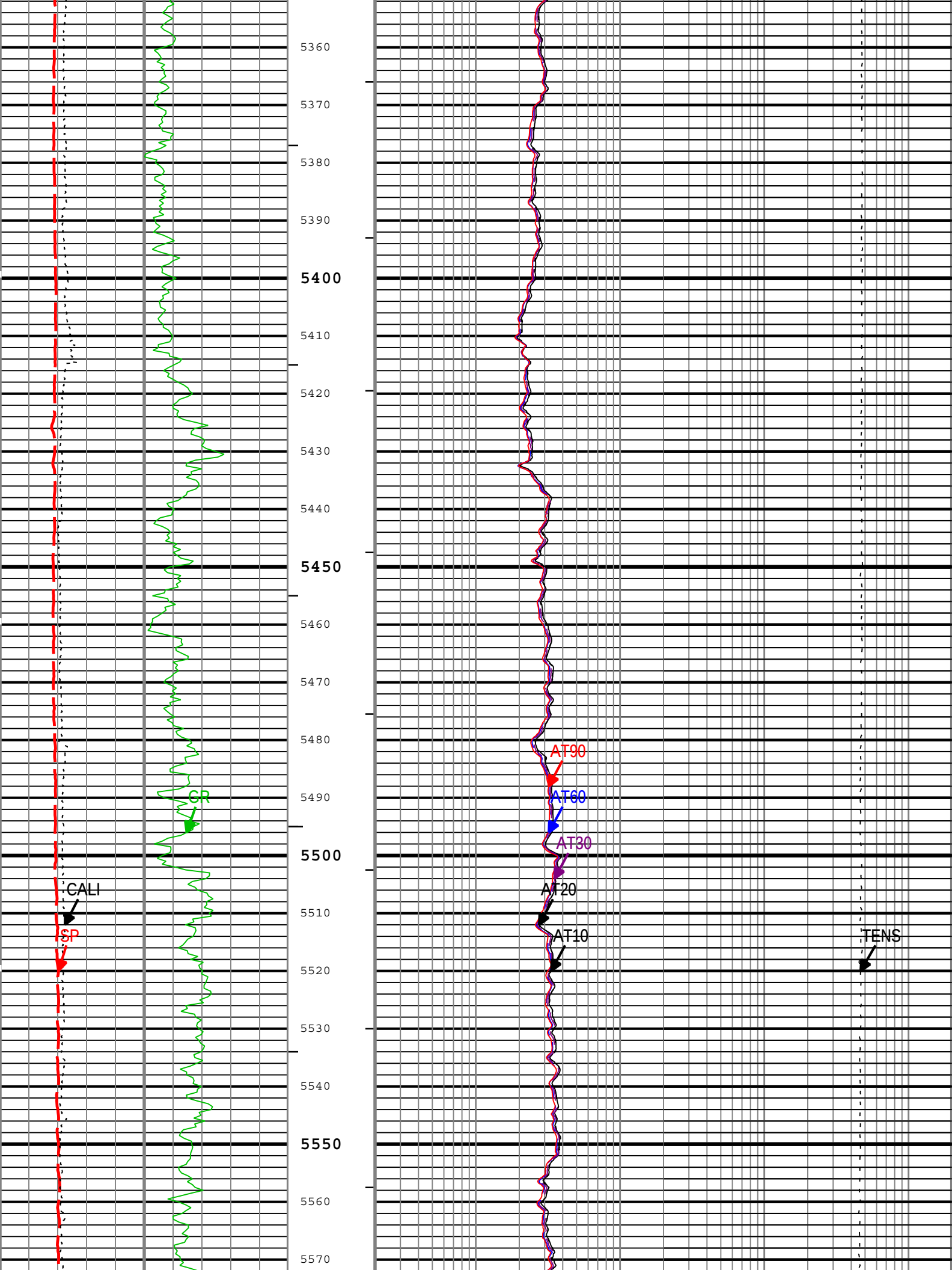
TENS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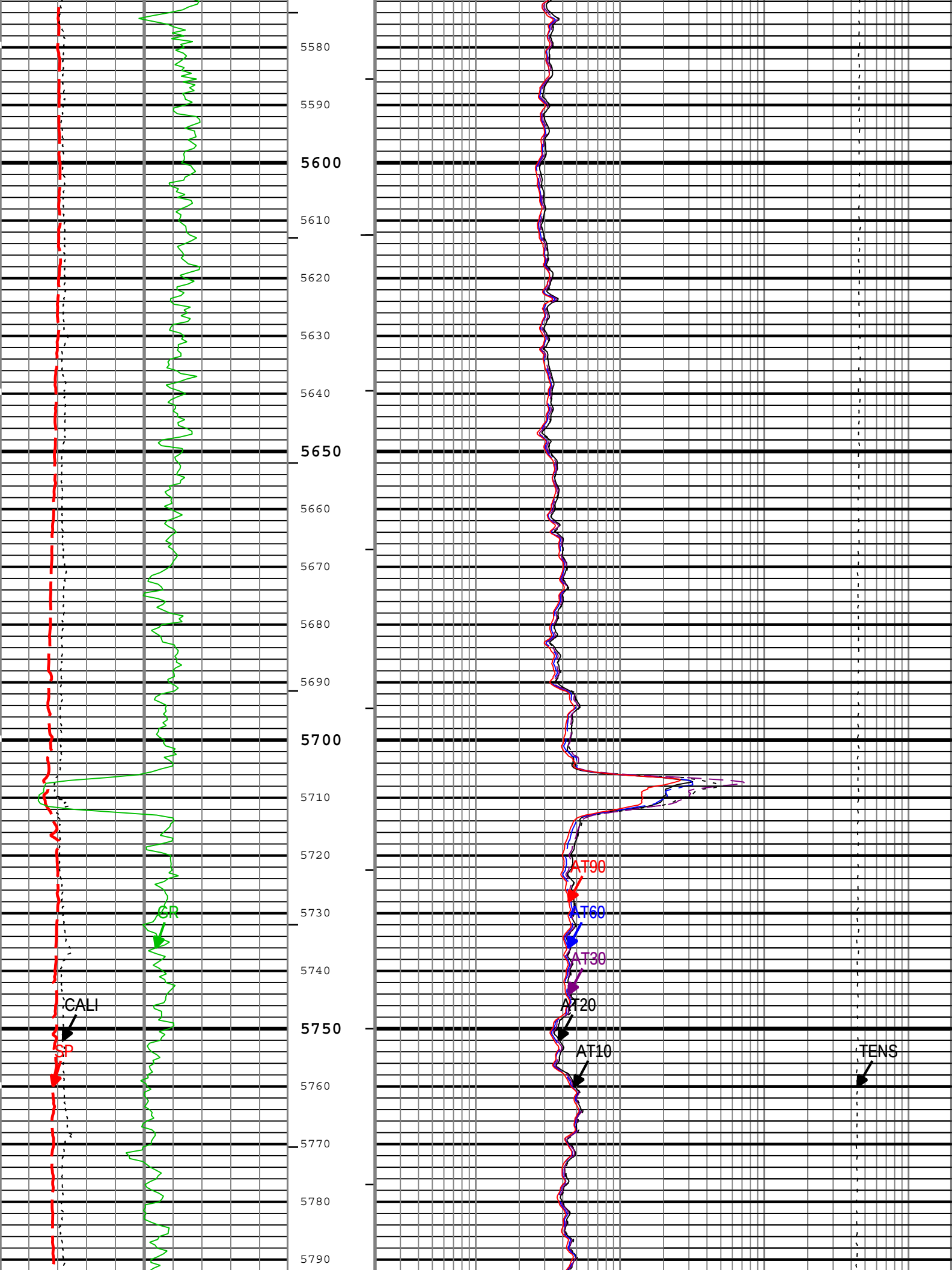
TENS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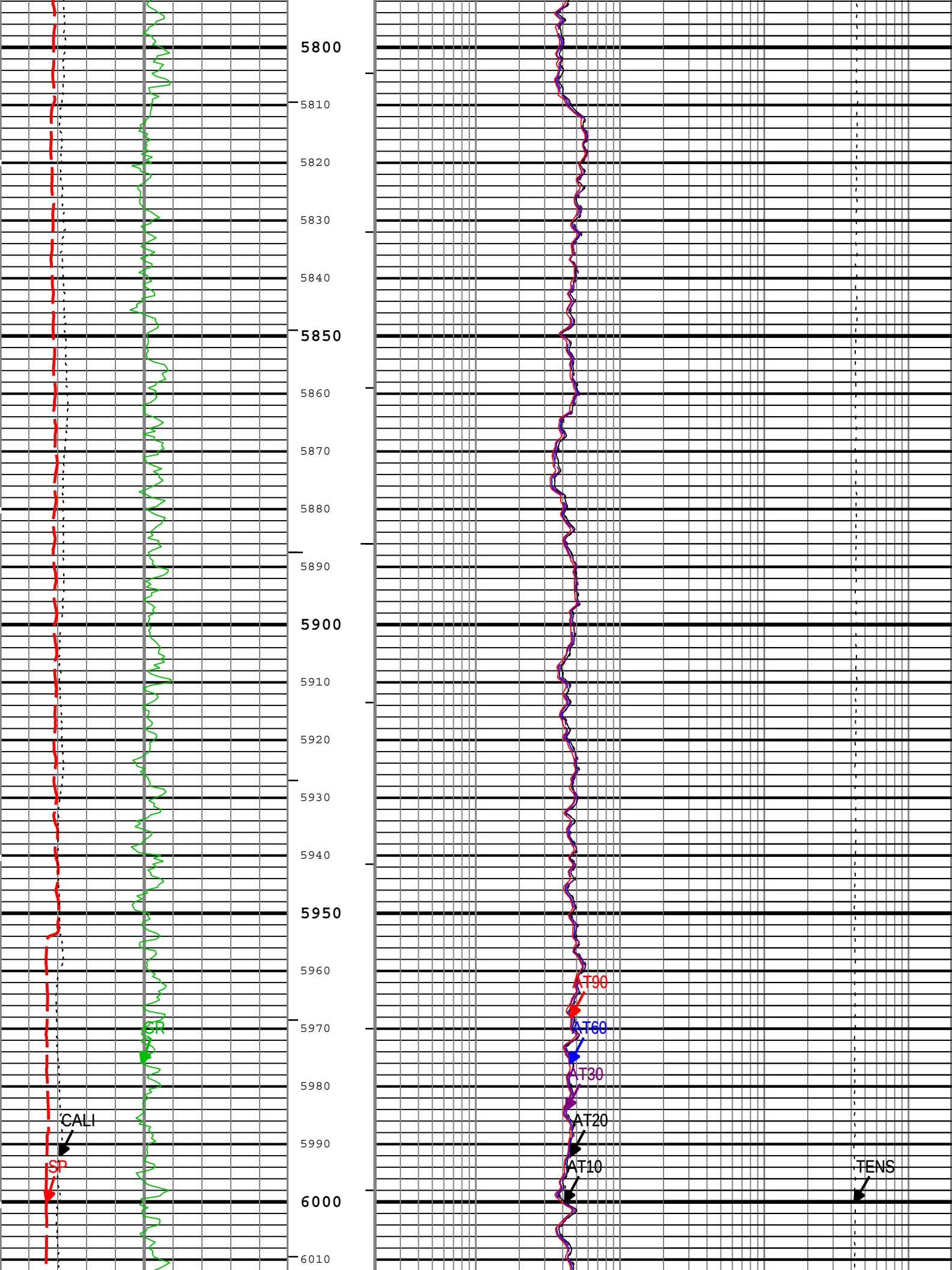
AT10
TENS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CALI
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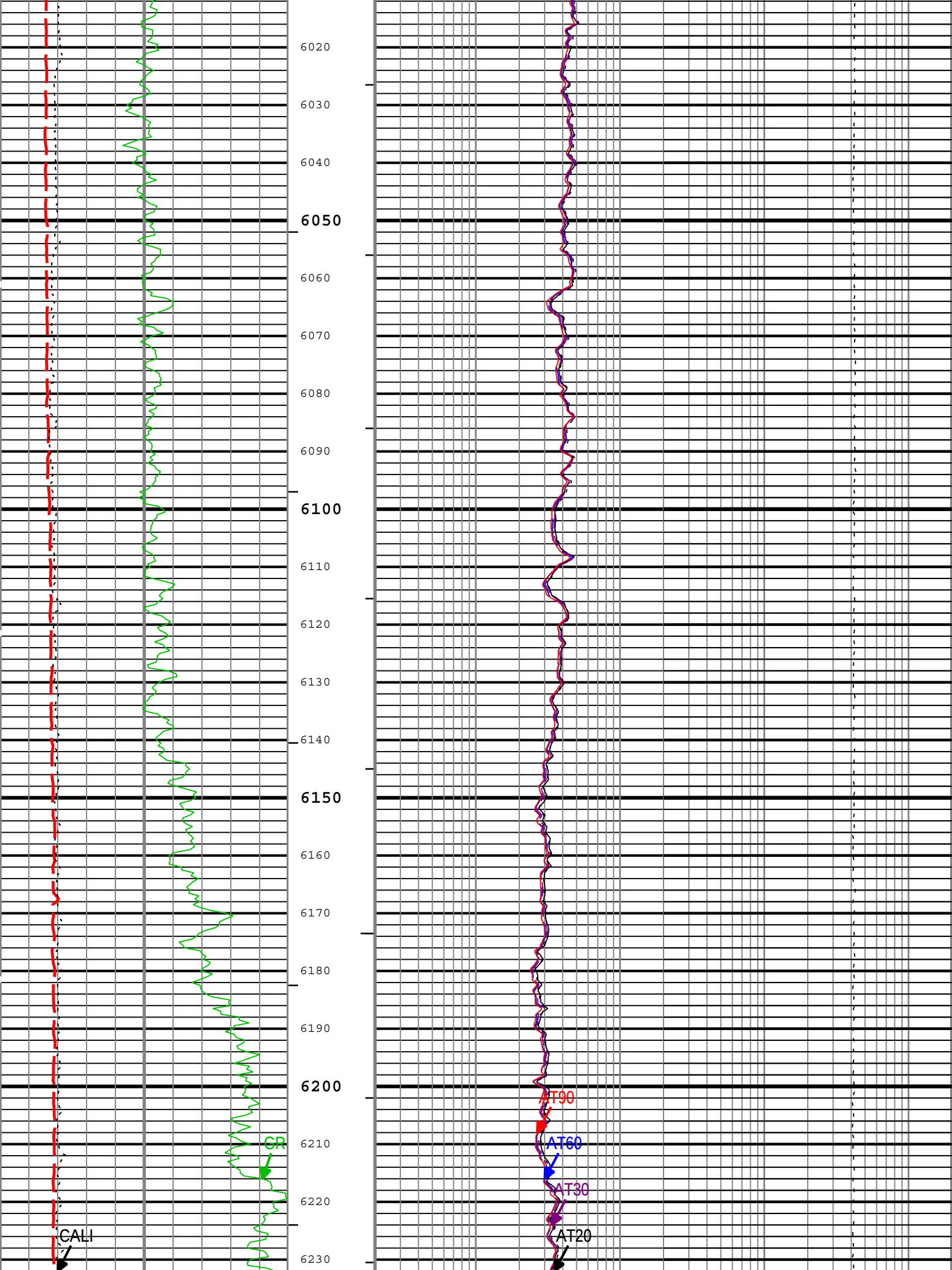
AT20
AT10
TENS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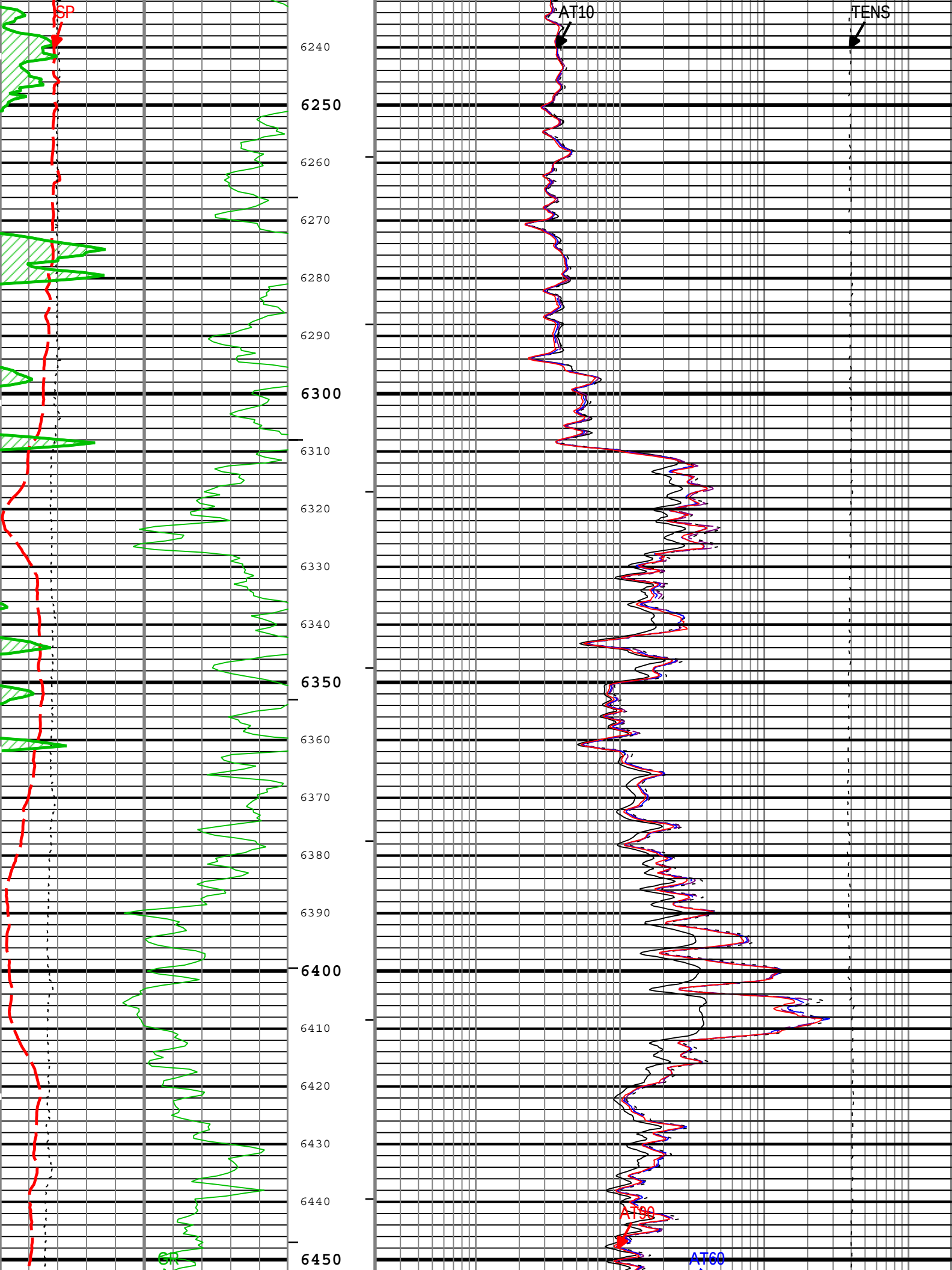
AT30
AT20


SP
AT10
TENS
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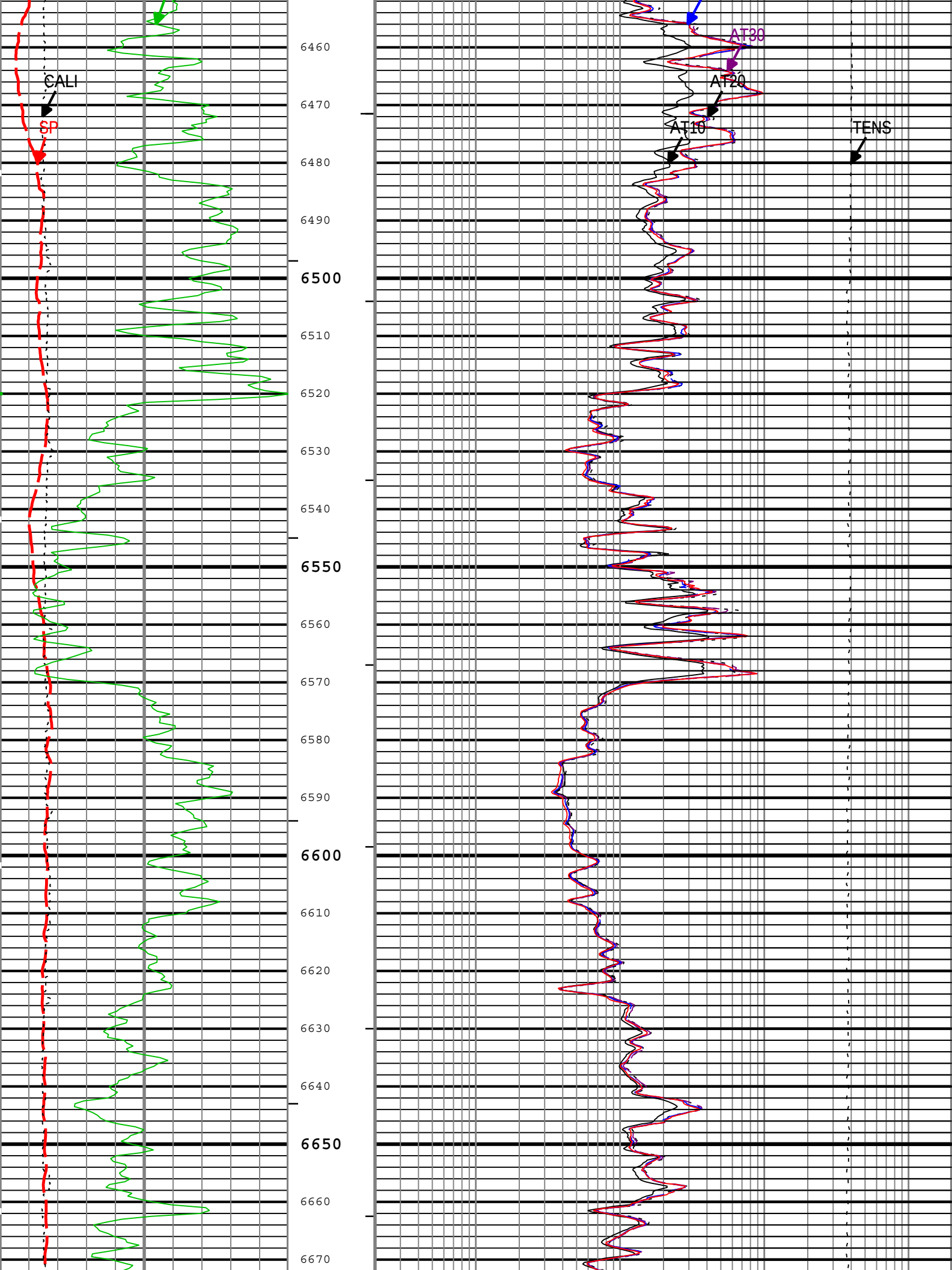
AT60


CALI
SP
AT30
AT20
AT10
TENS
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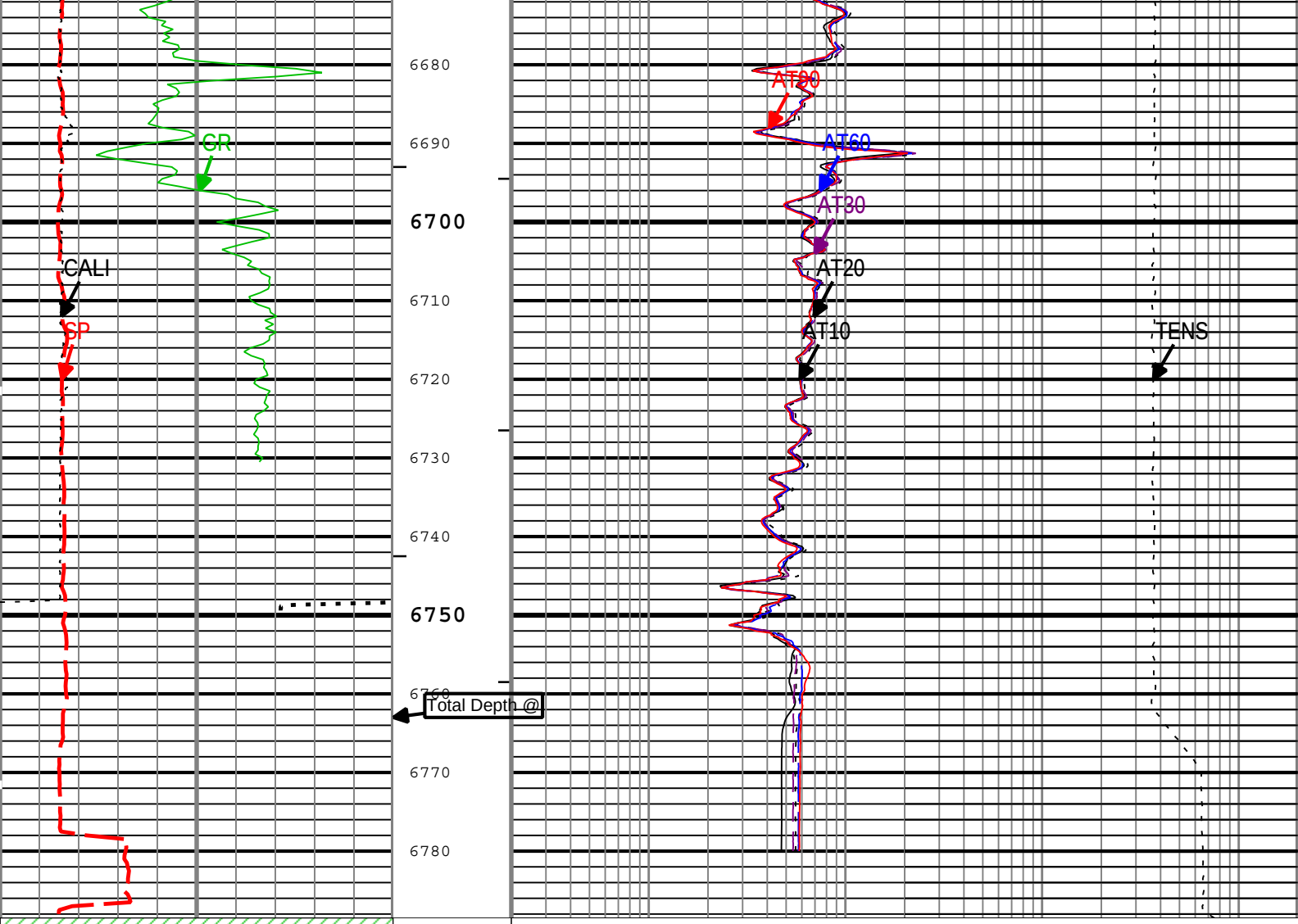
6670



Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-160 mV 40

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 200

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

Cable Tension (TENS)

10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log (Kerr McGee 5in Induction Upper) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:08

Channel Processing Parameters

Parameter	Description	ToolPath	Value	Unit

ABHM	Array Induction Borehole Correction Mode	AIT-M:AMIS:AMIS	Compute Standoff	
ABLM	Array Induction Basic Logs Mode	AIT-M:AMIS:AMIS	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-M:AMIS:AMIS	Yes	
ASTA	Array Induction Tool Standoff	AIT-M:AMIS:AMIS	1	in
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	COMPLETION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H:HRCC-H:HRCC-H	0	in
CBLO	Casing Bottom (Logger)	COMPLETION	714	ft
CDEN	Cement Density	HGNS-H:HGNS-H:HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	COMPLETION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	9.5	lbm/gal
FCD	Future Casing (Outer) Diameter	COMPLETION	4.5	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	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SPDR	SP Drift Per Foot	AIT-M:AMIS:AMIS	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
CSODDRL	[8.625]	561.5	714
CSODDRL	[0]	714	6788.5

All depth are actual.

Tool Control Parameters

Parameter	Description	ToolPath	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLWorkflow	3600	ft/h

1_PEx-BHC

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift
1_PEx-BHC	Repeat[2]:Up	Up	6343.53 ft	6789.44 ft	03-Nov-2011 4:13:48 PM	03-Nov-2011 4:23:23 PM	4.43 ft
1_PEx-BHC	Main[3]:Up	Up	625.56 ft	6788.41 ft	03-Nov-2011 4:27:22 PM	03-Nov-2011 5:31:43 PM	4.43 ft

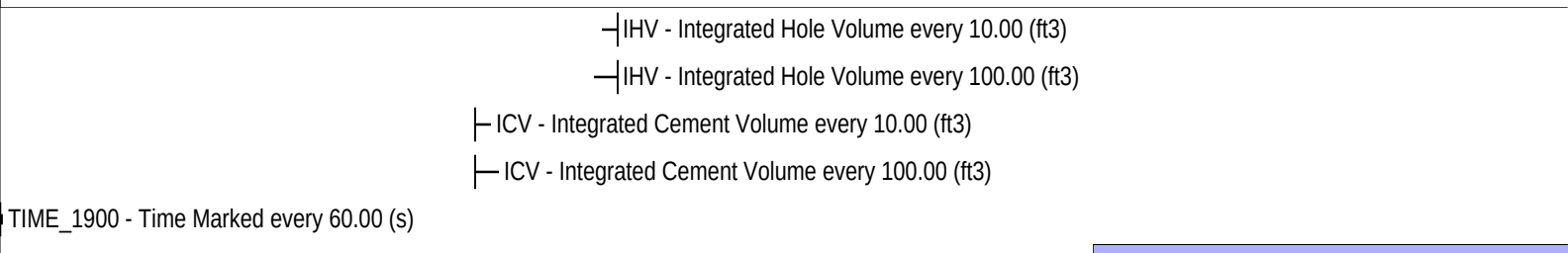
All depths are referenced to toolstring zero

Log

1_PEx-BHC: Main[3]:Up 856C951F-172C-4A89-BF1B-E6F55FDFB74E

Description: AIT Basic Log Two Format: Log (Kerr McGee 5in Induction Upper RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:14

Channel	Source	Sampling
ICV	Borehole	6in
IHV	Borehole	6in
TIME_1900	WLWorkflow	0.1in



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

Caliper (CALI) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

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

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-160 mV 40

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

Gamma Ray (GR) HGNS-H

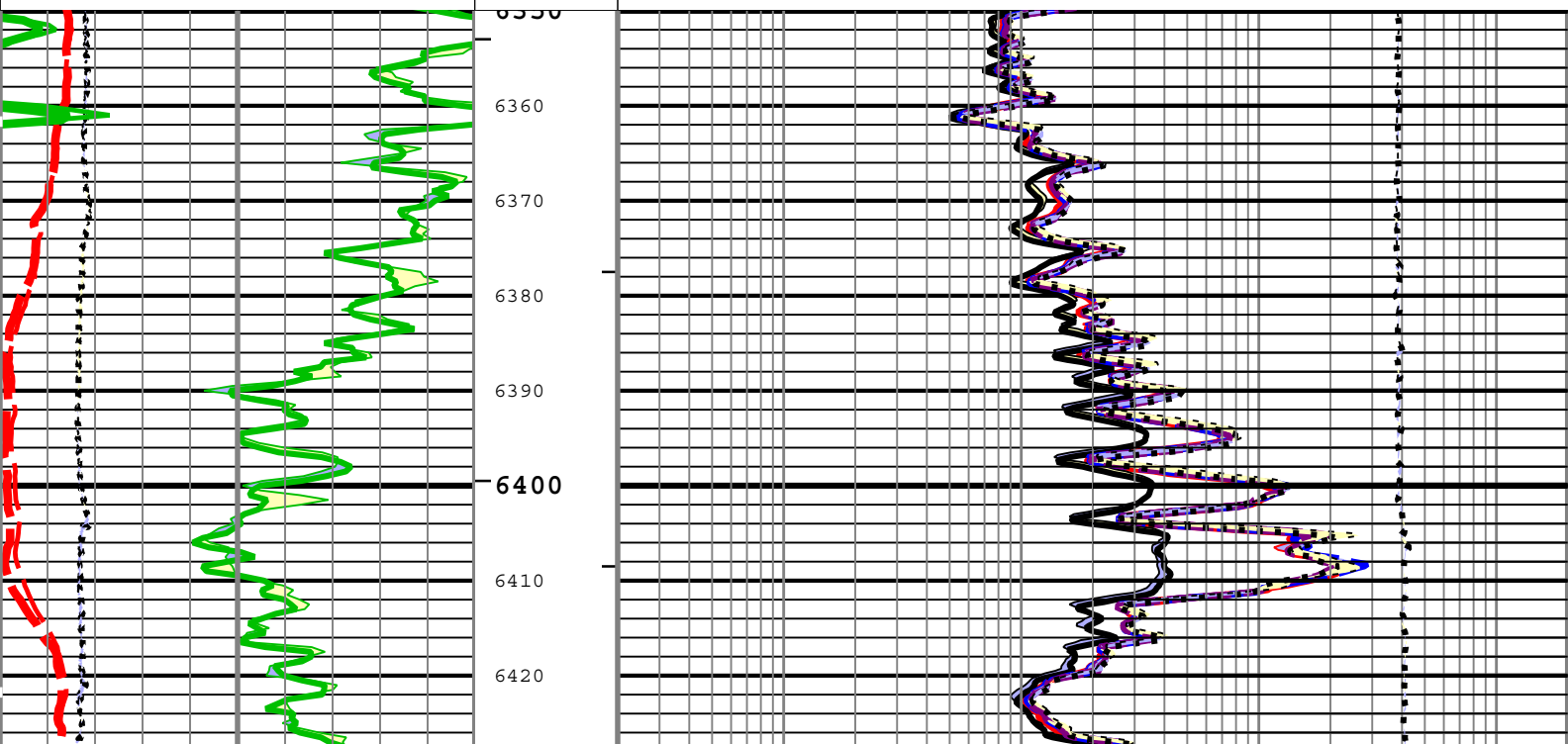
0 gAPI 200

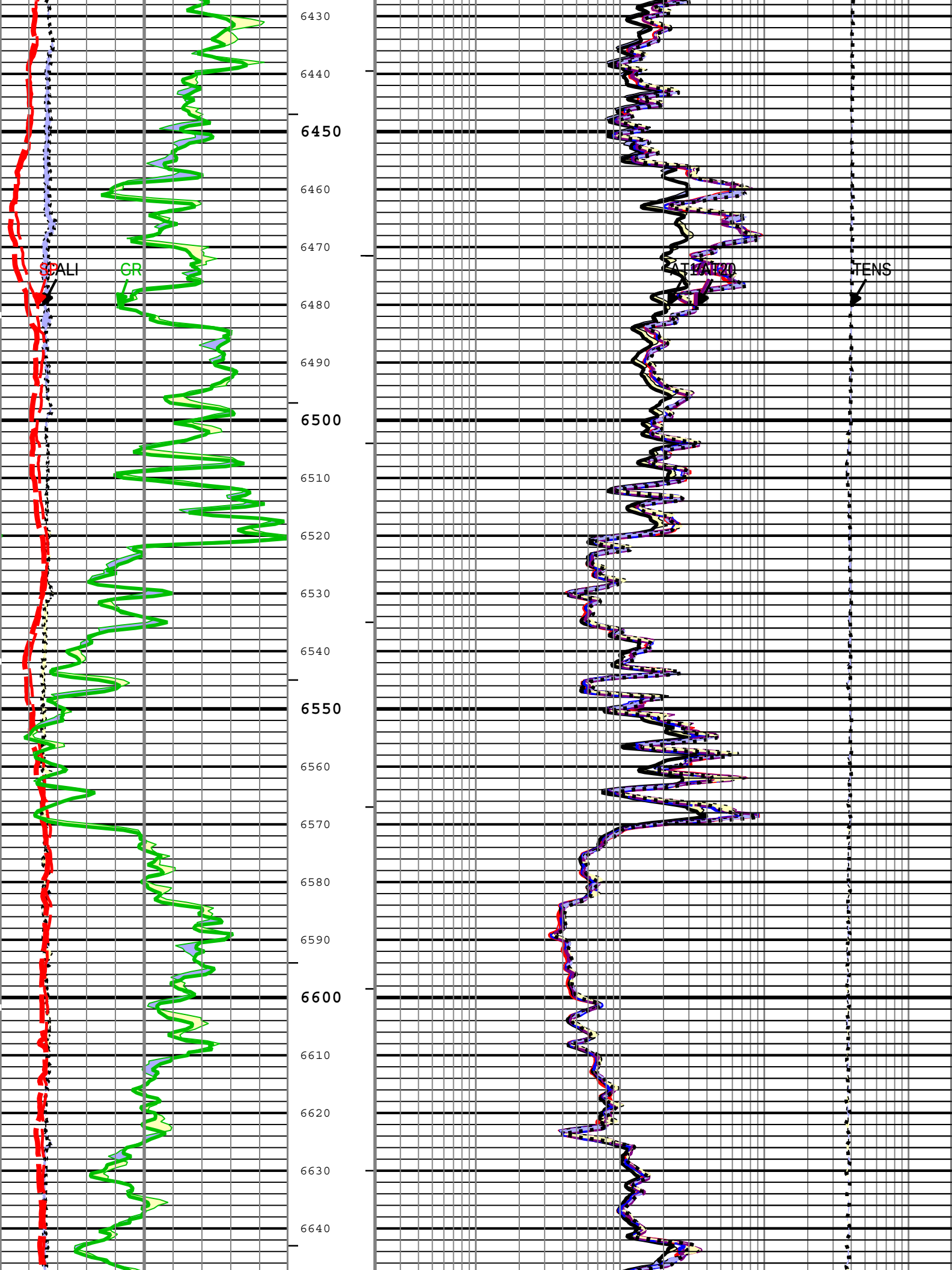
Main To Repeat

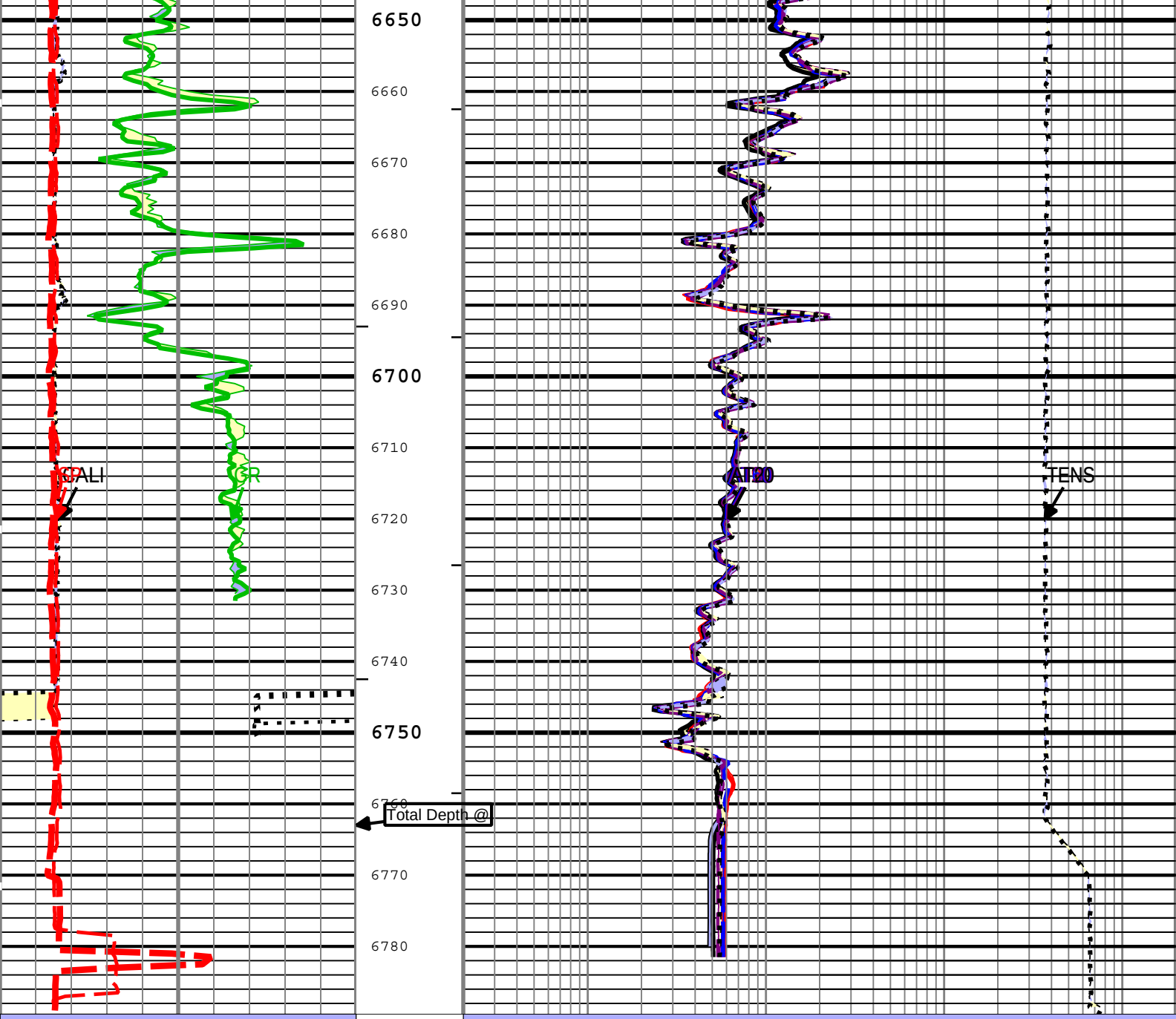
Repeat To Main

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

0.2 ohm.m 2000




6430
6440
6450
6460
6470
6480
6490
6500
6510
6520
6530
6540
6550
6560
6570
6580
6590
6600
6610
6620
6630
6640
SCALI
GR
TENS



Main To Repeat

Repeat To Main

Caliper (CALI) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-160 mV 40

Main To Repeat

Repeat To Main

Gamma Ray (GR) HGNS-H

0 gAPI 200

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

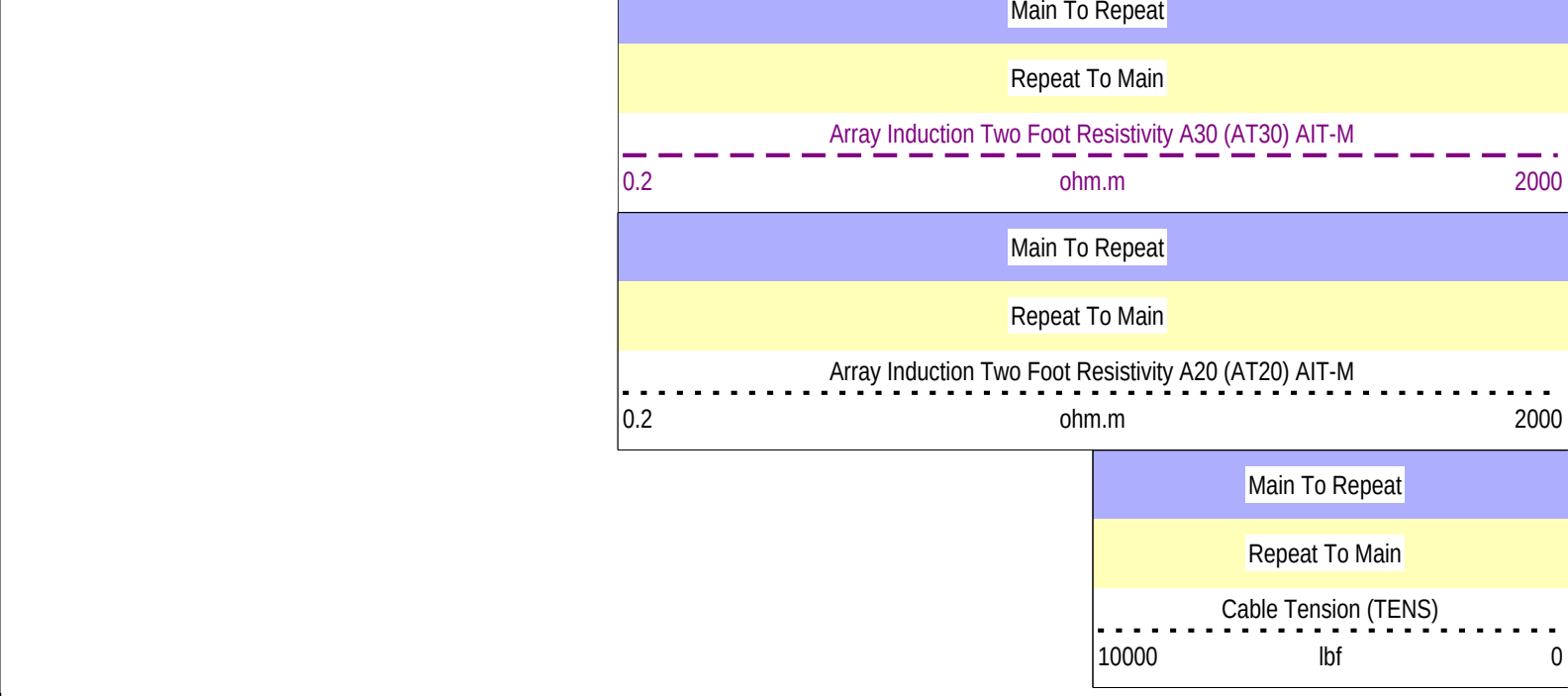
0.2 ohm.m 2000

Main To Repeat

Repeat To Main

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

0.2 ohm.m 2000



Description: AIT Basic Log Two Format: Log (Kerr McGee 5in Induction Upper RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 04-Nov-2011 02:24:14

Calibration Report

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

Primary Equipment :

Array Induction Sonde - M	AMIS	1372

Auxiliary Equipment :

AITM Rm/SP Bottom Nose	AMRM

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 18:53:08 10-Aug-2011

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	0.403	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.016	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.616	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.015	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	0.029	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.011	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.117	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.035	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.989	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.149	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.994	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.212	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.006	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.190	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 18:53:08 10-Aug-2011

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-65.663	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-635.734	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	172.526	204.000

Sonde Error Correction Quad - 1		Master	-----	-625.000	182.961	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	117.800	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	43.888	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	63.841	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	-64.676	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	26.623	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	18.539	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	11.882	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	-14.739	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.348	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	-5.042	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.492	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	-12.274	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 18:53:08 10-Aug-2011

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	0.922	1.200
Fine Gain		Master	1.000	0.800	0.928	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 18:53:08 10-Aug-2011 Before (Measured): 14:02:18 29-Oct-2011 Expired by 3 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.619	0.854
		Before	-----	0.366	0.619	0.854
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 0	deg	Master	-----	137.000	-179.825	-103.000
		Before	-----	137.000	179.822	-103.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	359.647	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.268	1.778
		Before	-----	0.762	1.269	1.778
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.000999999999 99989	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 1	deg	Master	-----	136.000	179.097	-104.000
		Before	-----	136.000	178.744	-104.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	- 0.353000000000 009	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 2	V	Master	-----	0.372	0.630	0.868
		Before	-----	0.372	0.631	0.868
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 2	deg	Master	-----	132.000	175.539	-108.000
		Before	-----	132.000	175.190	-108.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	- 0.348999999999 99	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 3	V	Master	-----	0.420	0.711	0.980
		Before	-----	0.420	0.712	0.980
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 3	deg	Master	-----	131.000	174.782	-109.000
		Before	-----	131.000	174.434	-109.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	- 0.348000000000 013	-----

		After-Before	-----	-----	-----	-----
Thru Cal Mag - 4	V	Master	-----	0.804	1.331	1.876
		Before	-----	0.804	1.332	1.876
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.00100000000000011	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 4	deg	Master	-----	125.000	168.627	-115.000
		Before	-----	125.000	168.292	-115.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.335000000000008	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 5	V	Master	-----	1.176	1.949	2.744
		Before	-----	1.176	1.951	2.744
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.002	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 5	deg	Master	-----	122.000	166.916	-118.000
		Before	-----	122.000	166.588	-118.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.328000000000003	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 6	V	Master	-----	1.176	1.945	2.744
		Before	-----	1.176	1.947	2.744
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.002	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 6	deg	Master	-----	121.000	166.946	-119.000
		Before	-----	121.000	166.616	-119.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.329999999999984	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 7	V	Master	-----	0.846	1.419	1.974
		Before	-----	0.846	1.420	1.974
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.000999999999999989	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 7	deg	Master	-----	115.000	166.055	-125.000
		Before	-----	115.000	165.802	-125.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.253000000000014	-----
		After-Before	-----	-----	-----	-----
SPA Zero	mV	Master	-----	-50.000	-0.193	50.000
		Before	-----	-50.000	-0.192	50.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.001	-----
		After-Before	-----	-----	-----	-----
SPA Plus	mV	Master	-----	941.000	983.866	1040.000
		Before	-----	941.000	983.587	1040.000
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.279	-----
		After-Before	-----	-----	-----	-----
Temperature Zero	V	Master	-----	-0.050	0.000	0.050
		Before	-----	-0.050	0.000	0.050
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Temperature Plus	V	Master	-----	0.870	0.912	0.960
		Before	-----	0.870	0.911	0.960
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before				

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

DSLT-H (Digitizing Sonic Logging Tool - H) Calibration - Run 1

Primary Equipment :

	Sonic Logging Sonde E supports 3'-5'BHC DT and CBL/VDL	SLS-E

CBL Normalization - CBL Accumulations

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Upper Far Amplitude - 0		Master	-----	-----	NOT DONE	-----	
Upper Near Raw Amplitude - 0	mV	Master	-----	-----	NOT DONE	-----	
Lower Far Amplitude - 0		Master	-----	-----	NOT DONE	-----	
Lower Near Raw Amplitude - 0	mV	Master	-----	-----	NOT DONE	-----	

CBL Normalization - CBL/VDL Coefficients

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Correction Factor for UT		Master	3.500	2.700	NOT DONE	4.300	
CBL Correction Factor for LT		Master	2.500	1.700	NOT DONE	4.300	
VDL Ratio between UT and LT for CBLB Mode		Master	1.000	-----	NOT DONE	-----	

CBL Free Pipe Adjustment - Free Pipe Measurement

Before:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Amplitude - 0	mV	Before	-----	-----	NOT DONE	-----	
CBL Reference Amplitude (CBRA) - 0	mV	Before	-----	-----	NOT DONE	-----	
Measurement Depth - 0	ft	Before	-----	-----	NOT DONE	-----	

CBL Free Pipe Adjustment - CBL Amplitude Coefficient

Before:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL Adjustment Factor		Before	-----	-----	NOT DONE	-----	
Depth of Before Calibration	ft	Before	-----	-----	NOT DONE	-----	

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	3816

Auxiliary Equipment :

	HRDD Backscatter Detector	Backscatter	
	HRDD Long Spacing Detector	Long Spacing	28732
	HRDD Short Spacing Detector	Short Spacing	27634
	Cesium 137 Gamma-Ray Logging Source	GSR-J	5363
	HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	5705
	HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4706

Calibration Parameter :

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

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 14:02:36 29-Oct-2011 Expired by 3 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	8.80	10.00	
Large Ring	in	Before	12.00	9.00	13.15	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 12:02:32 06-Oct-2011

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.597	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.686	1.696	
Pe Aluminum		Master	2.570	2.470	2.551	2.670	
Pe Magnesium		Master	2.650	2.550	2.628	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 12:02:32 06-Oct-2011

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.3594	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.7808	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.3948	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.8764	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.6879	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.7586	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 12:02:32 06-Oct-2011 Before (Measured): 13:59:36 29-Oct-2011 Expired by 3 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000	-----	0.7474	-----
		Before	0.7474	0.7100	0.7469	0.7847
		Before-Master	-----	-----	-0.0005	-----
BS Window Sum	1/s	Master	1	-----	26409	-----
		Before	26409	25088	26715	27729
		Before-Master	-----	-----	306	-----
SS Window Ratio		Master	1.0000	-----	0.4817	-----
		Before	0.4817	0.4577	0.4827	0.5058
		Before-Master	-----	-----	0.0010	-----
SS Window Sum	1/s	Master	1	-----	10560	-----
		Before	10560	10032	10555	11088
		Before-Master	-----	-----	-5	-----
LS Window Ratio		Master	1.0000	-----	0.3037	-----
		Before	0.3037	0.2885	0.3020	0.3189
		Before-Master	-----	-----	-0.0017	-----
LS Window Sum	1/s	Master	1	-----	1238	-----
		Before	1238	1176	1230	1300
		Before-Master	-----	-----	-8	-----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 12:02:32 06-Oct-2011 Before (Measured): 13:59:36 29-Oct-2011 Expired by 3 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master	-----	1000	1383	2400
		Before	-----	1000	1420	2400
		Before-Master	-----	-100	37	100
SS PM High Voltage	V	Master	-----	1000	1396	2400
		Before	-----	1000	1403	2400
		Before-Master	-----	-100	7	100
LS PM High Voltage	V	Master	-----	1000	1198	2400
		Before	-----	1000	1212	2400
		Before-Master	-----	-100	14	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 12:02:32 06-Oct-2011 Before (Measured): 13:59:36 29-Oct-2011 Expired by 3 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master	-----	5.00	10.81	25.00
		Before	-----	5.00	10.81	25.00
		Before-Master	-----	-1.00	0.00	1.00
SS Crystal Resolution	%	Master	-----	5.00	9.87	20.00
		Before	-----	5.00	10.04	20.00
		Before-Master	-----	-1.00	0.17	1.00
LS Crystal Resolution	%	Master	-----	5.00	8.00	20.00
		Before	-----	5.00	8.02	20.00
		Before-Master	-----	-1.00	0.02	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 14:01:20 29-Oct-2011 Expired by 3 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3878	4185
Deep Resistivity	ohm.m	Before	3830	3524	3826	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3824	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	4779

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	5736
AmBe Neutron Logging Source	NSR-F	5168

Calibration Parameter :

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

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 15:44:45 03-Nov-2011

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

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

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

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Accelerometer Manufacturer		Master	-----	-----	QAT_160	-----
Accelerometer Reference Temperature	degF	Master	-----	30.2	77.0	122.0
Accelerometer Coefficients - 0		Master	-----	-----	8084.000	-----
Accelerometer Coefficients - 1		Master	-----	-----	-8.467	-----
Accelerometer Coefficients - 2		Master	-----	-----	0.009	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 4		Master	-----	-----	2.722	-----
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 8		Master	-----	-----	298.700	-----
Accelerometer Coefficients - 9		Master	-----	-----	0.995	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 06:22:24 07-Oct-2011 Before (Measured): 13:55:47 29-Oct-2011 Expired by 3 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	24.1	40.0
		Before	0	5.0	24.7	40.0
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-3.6	0.6	3.6
		After-Before	-----	-----	-----	-----
Far Zero Measurement	1/s	Master	0	5.0	28.1	40.0
		Before	0	5.0	27.2	40.0
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-4.2	-0.9	4.2
		After-Before	-----	-----	-----	-----
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5352.0	6900.0
		Before	-----	-----	NOT DONE	-----
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2227.0	2900.0
		Before	-----	-----	NOT DONE	-----
		After	-----	-----	NOT DONE	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Near Corrected Plus Measurement - 0	1/s	Master	-----	4700.0	5354.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Corrected Plus Measurement - 0	1/s	Master	-----	1900.0	2215.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----

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

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 14:02:11 29-Oct-2011 Expired by 3 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	97.5	120.0
		After	-----	-----	NOT DONE	-----
		After-Before	-----	-----	-----	-----
RGR Plus Measurement	gAPI	Before	185.4	157.1	169.8	206.3
		After	-----	-----	NOT DONE	-----
		After-Before	-----	-----	-----	-----
GR Calibration Gain		Before	0.89	0.80	0.97	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	1.200
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: Texas American Resources Company

Schlumberger

Well: Roth 44-30

Field: Wattenberg

County: Weld

Country: USA

Platform Express
Array Induction
with Linear Correlation