

Company: Nighthawk Production LLC

Well: Pikes Peak Williams 4-30

Field: Wildcat

County: Lincoln Country: United States

Platform Express

Array Induction

with Linear Correlation

County:	Lincoln			
Field:	Wildcat			
Location:	NWNW Sec 30, T13S, R55W			
Well:	Pikes Peak Williams 4-30			
Company:	Nighthawk Production LLC			
Location:	NWNW Sec 30, T13S, R55W		Elev. K.B. 5155.00 ft	
	SHL: 660' FNL x 660' FWL		G.L. 5143.00 ft	
	Lat/Long: 38.892850/-103.605630		D.F. 5154.00 ft	
	Permanent Datum:	Ground Level	Elev.:	5143.00 f
	Log Measured From:	Kelly Bushing	12.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing			
API Serial No.	Max.Hole Deviation	Longitude:	Latitude:	
05-073-06478-0000	0 deg	-103.60563 degrees	38.892850 degrees	

Logging Date	26-Sep-2012			
Run Number	Run 1			
Depth Driller	7896.00 ft			
Schlumberger Depth	7884.00 ft			
Bottom Log Interval	7884.00 ft			
Top Log Interval	342.00 ft			
Casing Driller Size @ Depth	8.625 in @ 328.00 ft			
Casing Schlumberger	342 ft			
Bit Size	7.875 in			
Type Fluid In Hole	Fresh Water			
Density	Viscosity	44 s		
Fluid Loss	PH	8.4 cm3	7.6	
MUD				
Source of Sample	Flowline			
RM @ Meas Temp	1.74 ohm.m	@	64.02 degF	
RMF @ Meas Temp	1.3 ohm.m	@	75 degF	
RMC @ Meas Temp	2.17 ohm.m	@	75 degF	
Source RMF	RMC	Calculated	Calculated	
RM @ BHT	RMF @ BHT	0.72 @ 163.67	0.63 @ 163.67	
Max Recorded Temperatures				
Circulation Stopped	Time	26-Sep-2012	01:30:00	
Logger on Bottom	Time	26-Sep-2012	09:25:00	
Unit Number	Location:	2135	Fort Morgan, Colora	
Recorded By	Keri Lonng			
Witnessed By	Jim Weir / Andy Elgerd			

Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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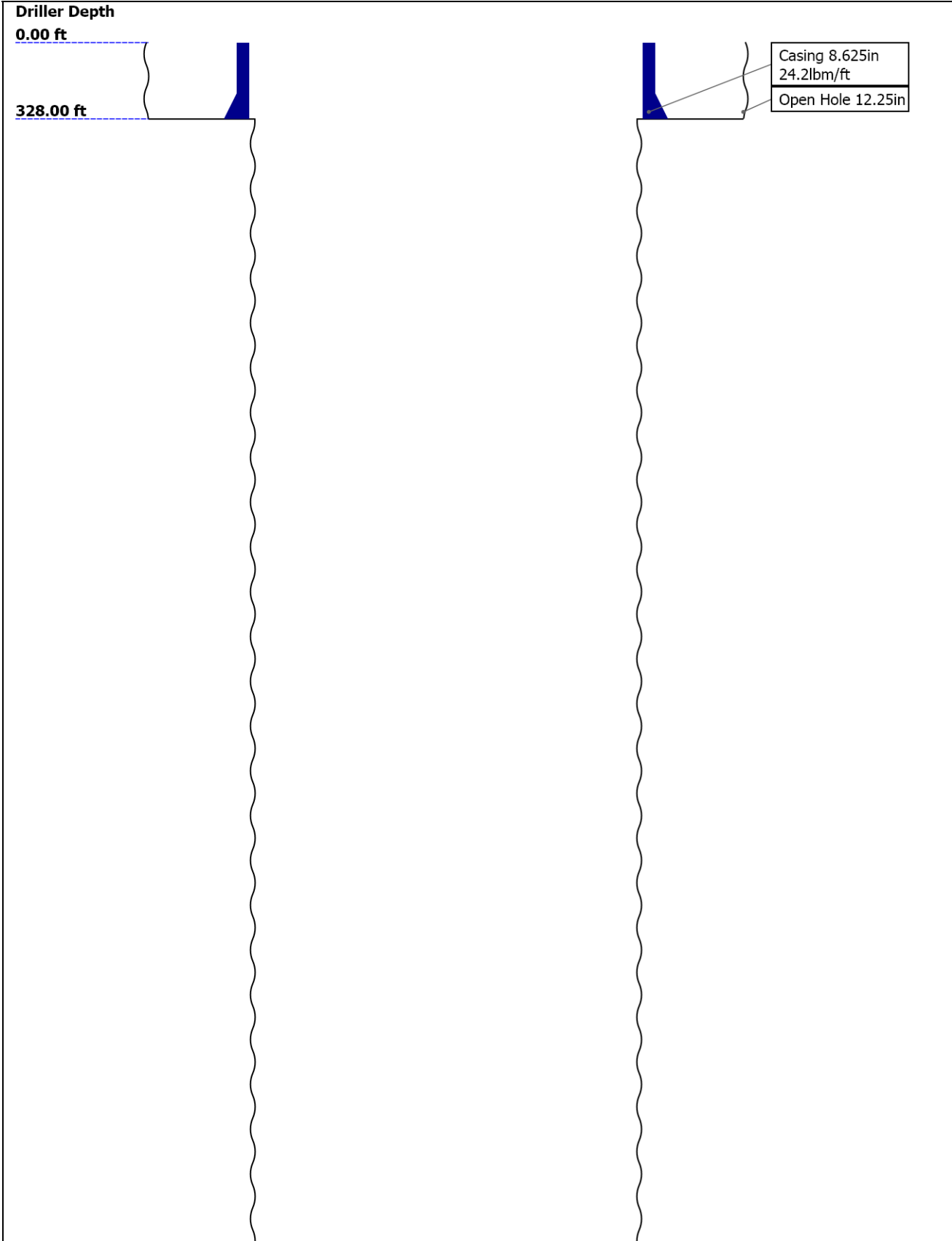
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Well Sketch



7896.00 ft

Open Hole 7.875in

Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	7.875				
Top Driller (ft)	0	328				
Top Logger (ft)	0	342				
Bottom Driller (ft)	328	7896				
Bottom Logger (ft)	342	7884				
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24.2					
Inner Diameter (in)	8.095					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	328					
Bottom Logger (ft)	342					

Operational Run Summary

Parameter (unit)	Run 1					
Date Log Started	26-Sep-2012					
Time Log Started	08:13:59					
Date Log Finished	26-Sep-2012					
Time Log Finished	11:49:15					
Top Log Interval (ft)	342.00					
Bottom Log Interval (ft)	7884.00					
Total Depth (ft)	7884.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	7.875					
Logging Unit Number	2135					
Logging Unit Location	Fort Morgan, Colorado					
Recorded By	Keri Loring					
Witnessed By	Jim Weir / Andy Elgerd					
Service Order Number	BX19-00056					

HRC C-H:5705
HRMS-H:4706
GPV-Q
GSR-J:5240
Short Spacing:27
634
Backscatter
HRGD-H:3816
Long Spacing:28
732

HRCC 46.88

MCFL 41.45
Caliper 40.96
TLD Density 40.57

AH-184:909 38.64

DSLT-H:8339 36.64
ECH-KH:8401
DSLC-H:8339
SLS-E:165

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:1270 16.00
AMIS:1270
AMRM:1270

Temperature 7.91
Power Supply 7.91
Induction 7.91



Depth Summary

Depth Control Parameters	Run 1		
Conveyance Type	Wireline		
Rig Type	Land		
Depth Remark Parameters	Run 1		
Depth Remark 1	All Schlumberger depth procedures followed.		
Depth Remark 2	IDW used as primary depth control device.		
Depth Remark 3	Z-chart used as secondary depth control device.		
Depth Measuring Device	Run 1		
Type	IDW-B		
Serial Number	4938		
Calibration Date	11-Apr-2012		
Calibration Cable Type	7-46P XS		
Wheel Correction 1	-6		
Wheel Correction 2	-6		
Tension Device	Run 1		
Type	CMTD-B/A		
Serial Number	1919		
Calibration Date	10-Sep-2012		
Calibrator Serial Number	78135a		
Calibration Points	10		
Calibration RMS	12		
Calibration Peak Error	24		
Logging Cable	Run 1		
Type	7-46P-XS		
Serial Number	U711057		
Logging Cable Length (ft)	24600.00		

Run 1

2" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1790.7	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0

Computation	Description	Version	
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.0	
Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0
AMIS	Array Induction Sonde - M	3.1.9755.1038	1

Pass Summary								
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run 1	Main[4]:Up	Up	31.88 ft	7892.18 ft	26-Sep-2012 9:23:43 AM	26-Sep-2012 11:48:38 AM	6.25 ft	true
All depths are referenced to toolstring zero								

Log	Run 1: Main[4]:Up
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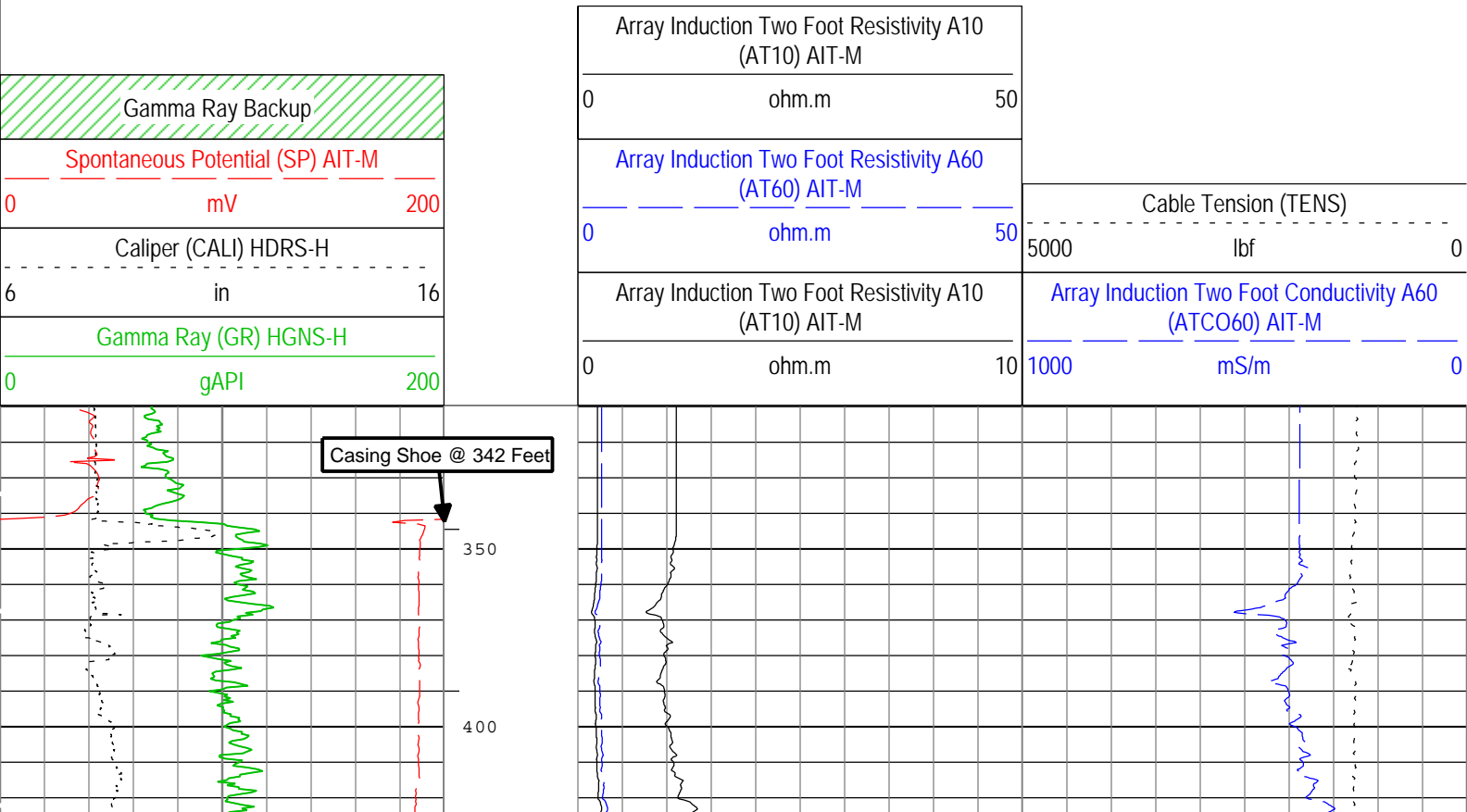
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Depth Creation Date: 26-Sep-2012 12:29:05

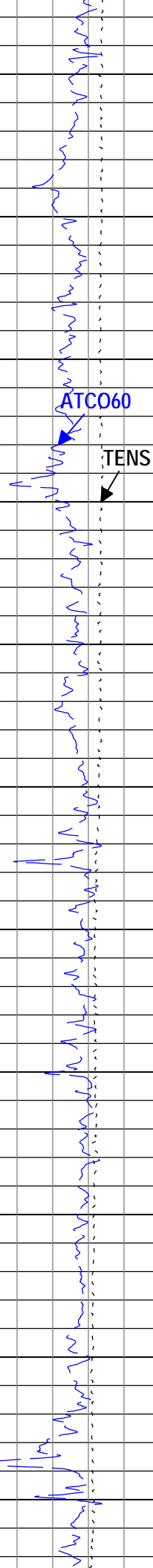
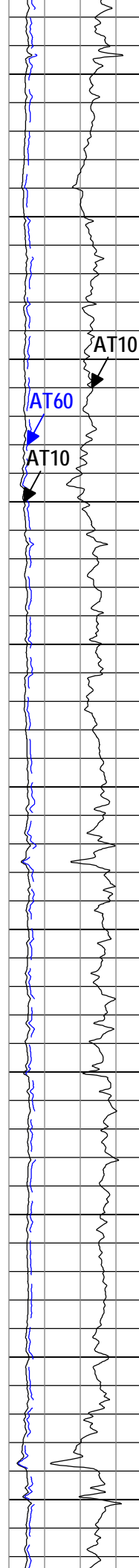
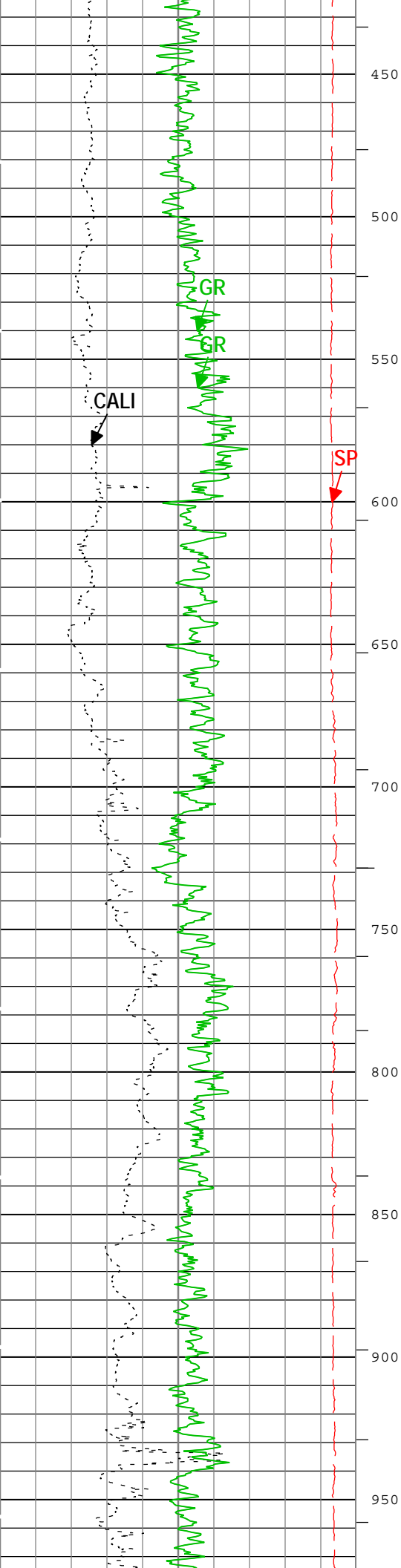
Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
ATCO60	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

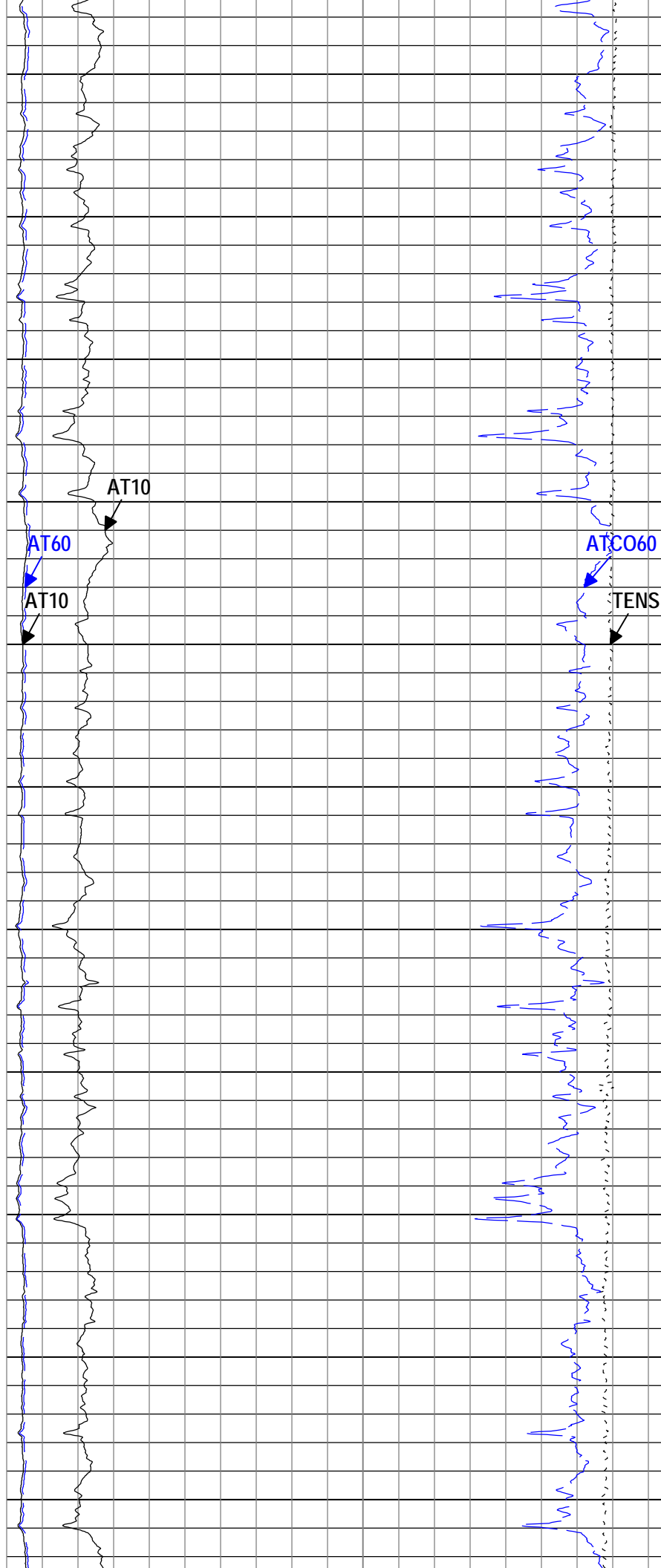
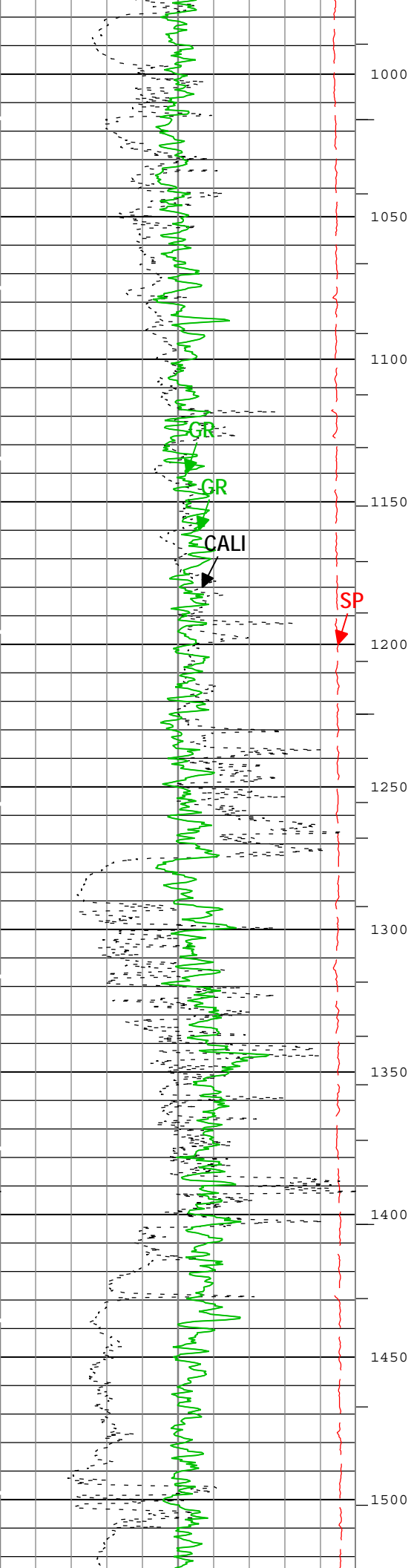
TIME_1900 - Time Marked every 60.00 (s)

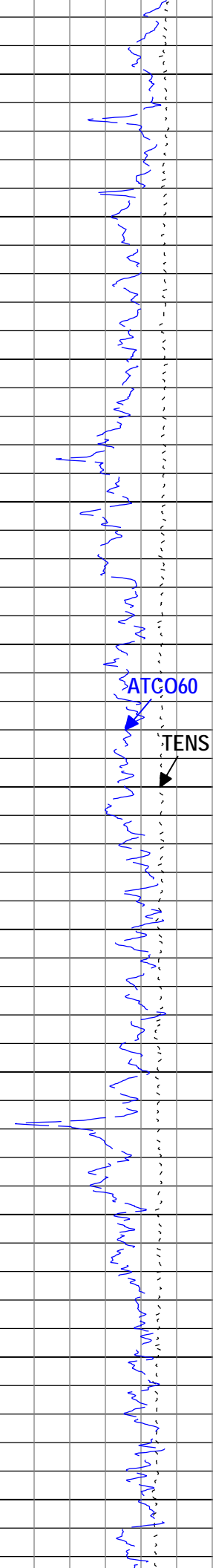
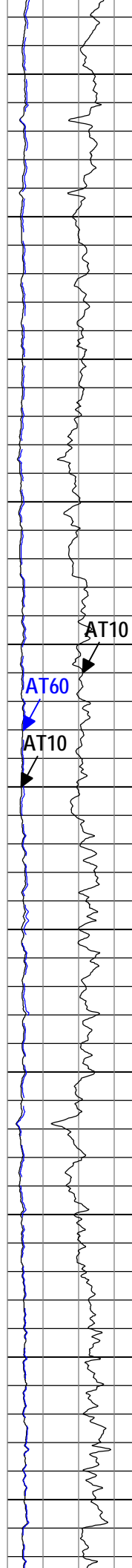
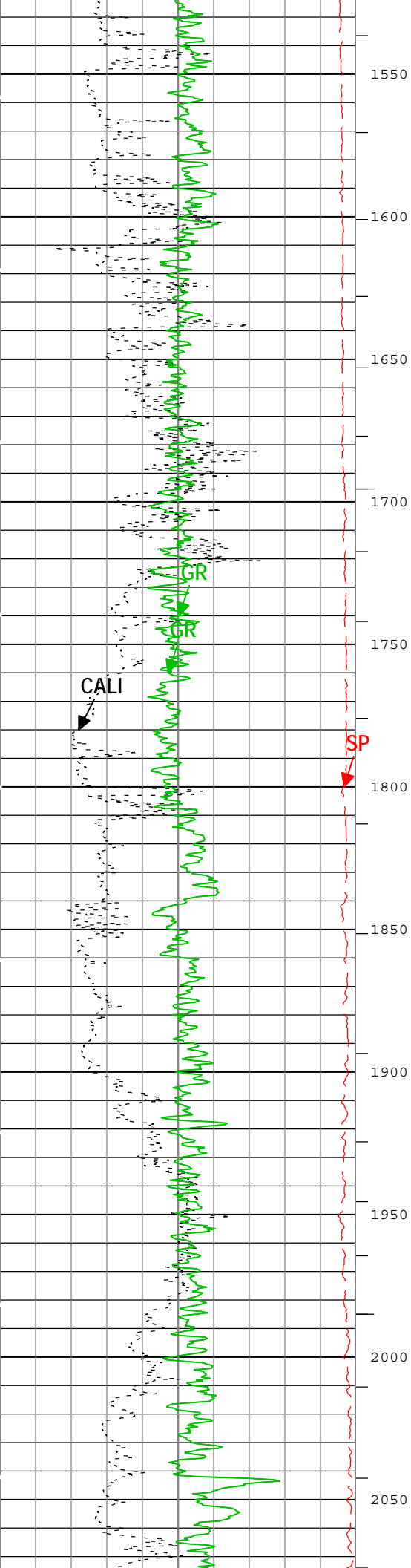
ICV - Integrated Cement Volume every 10.00 (ft3)

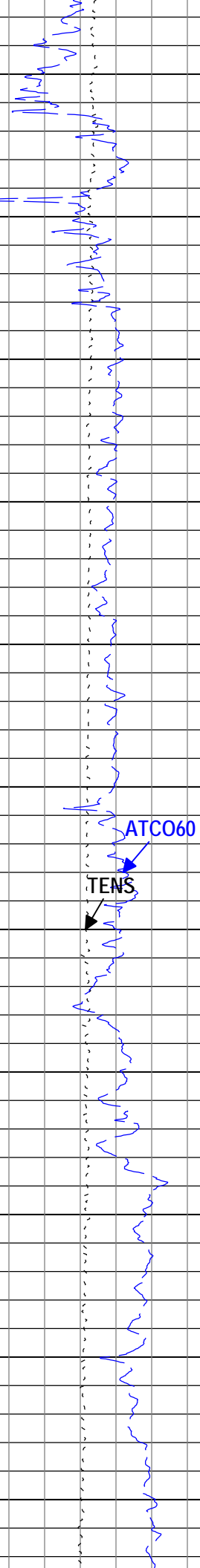
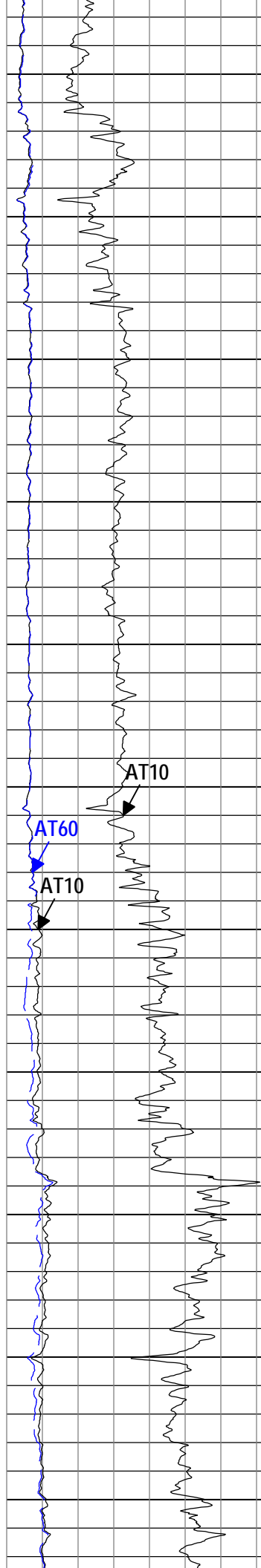
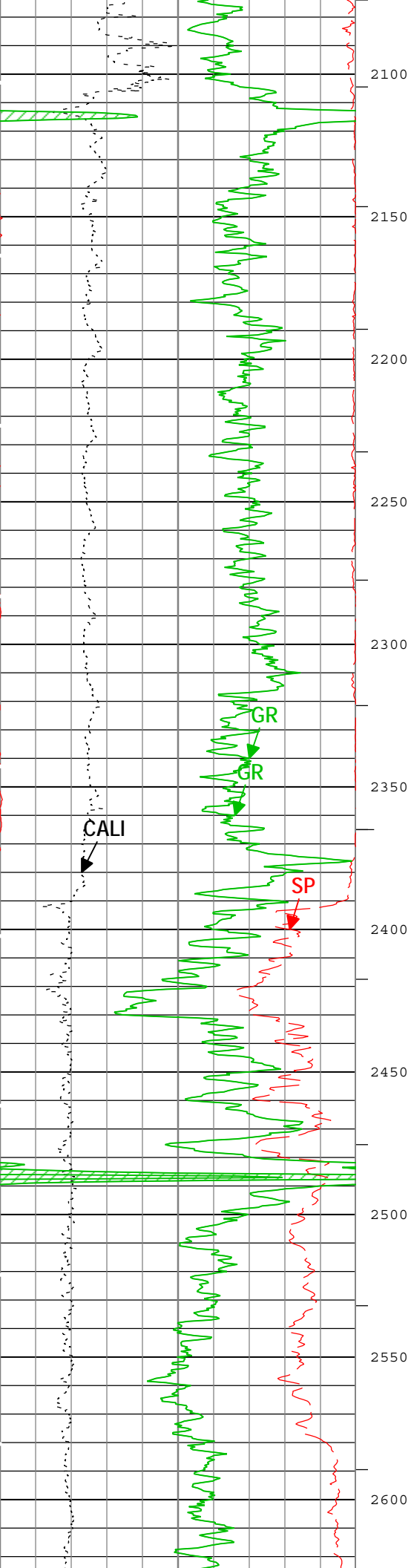
ICV - Integrated Cement Volume every 100.00 (ft3)

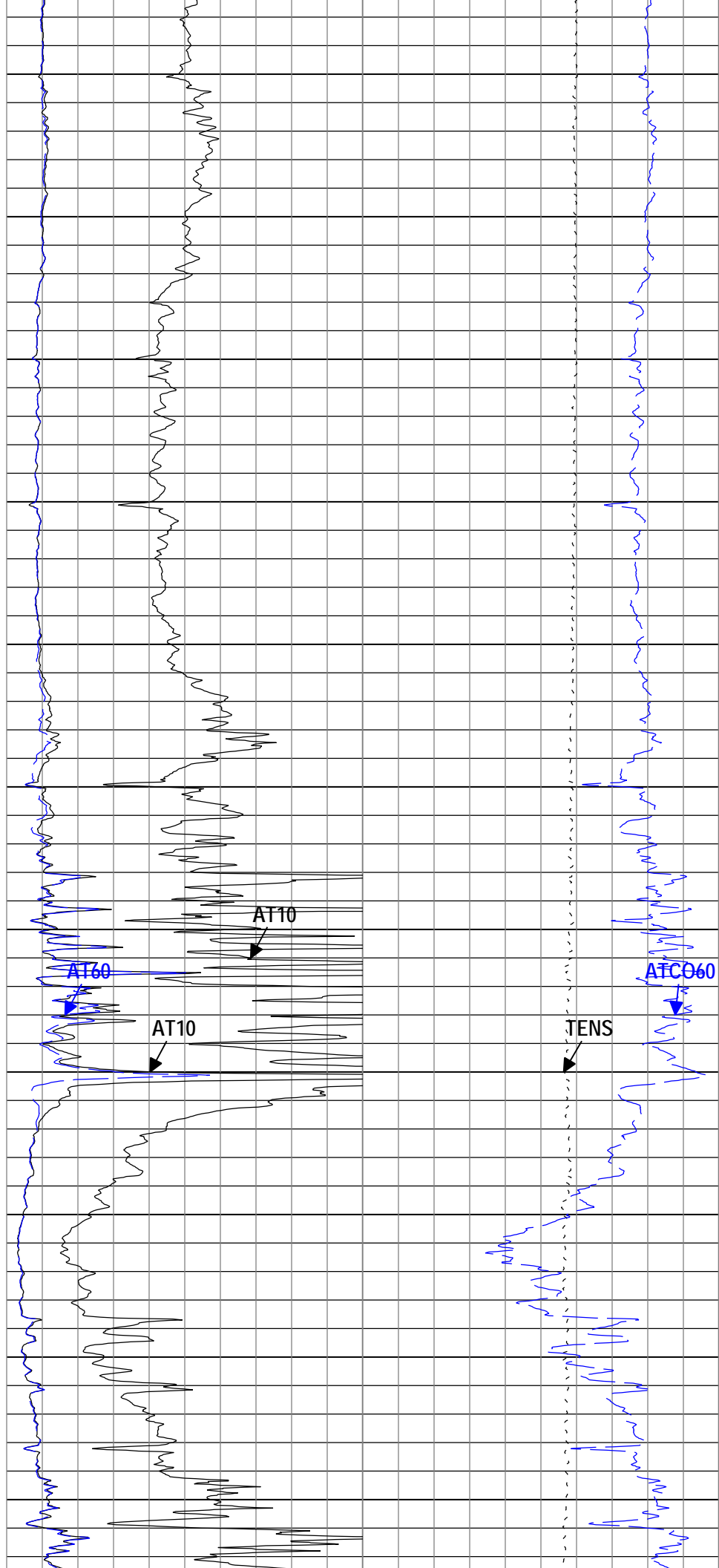
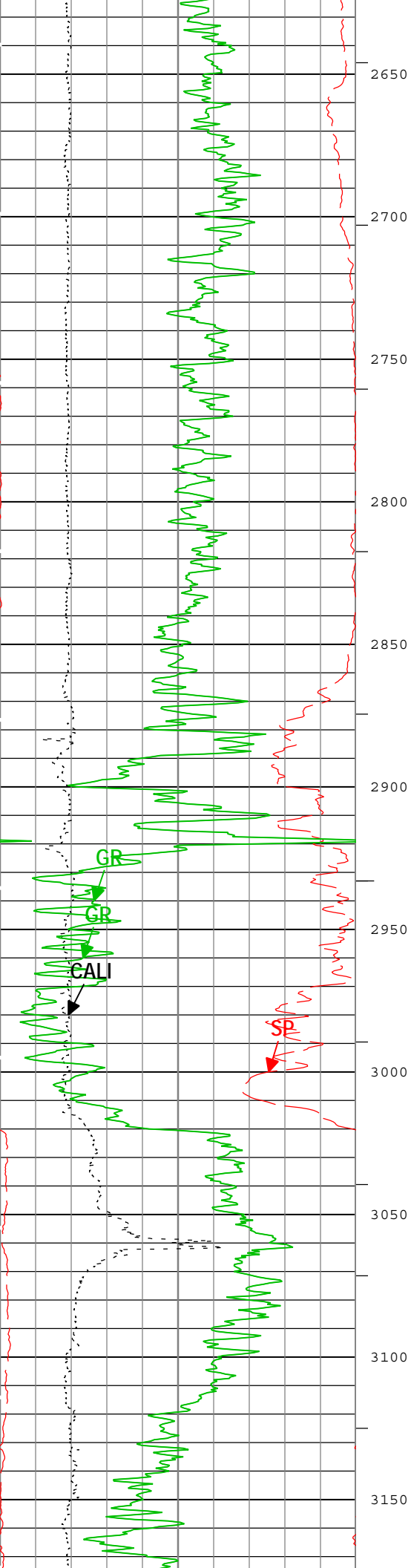


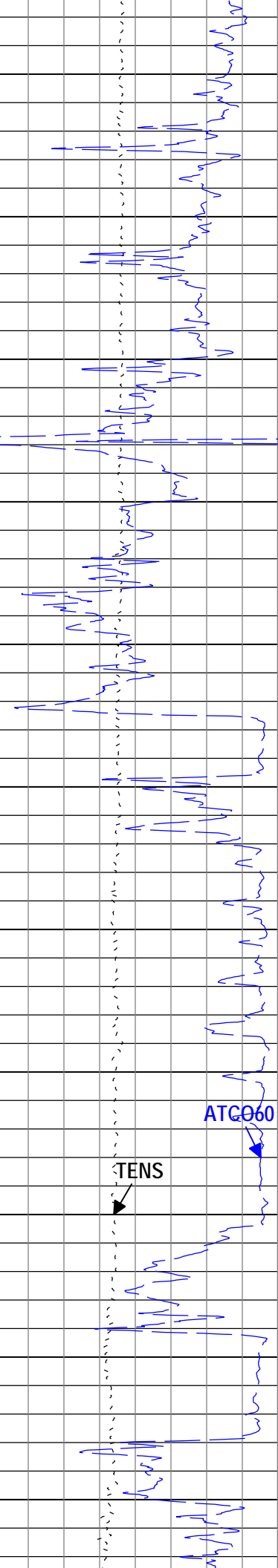
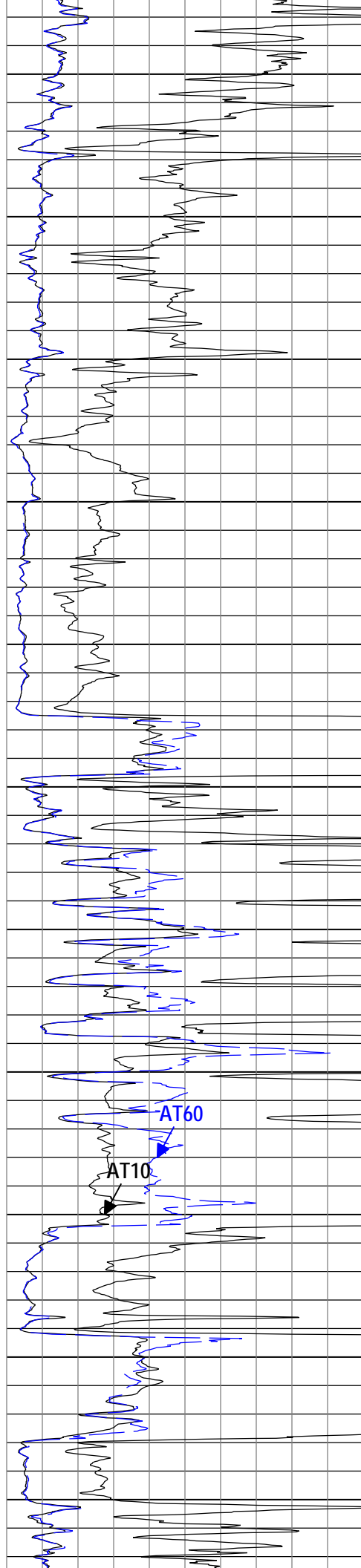
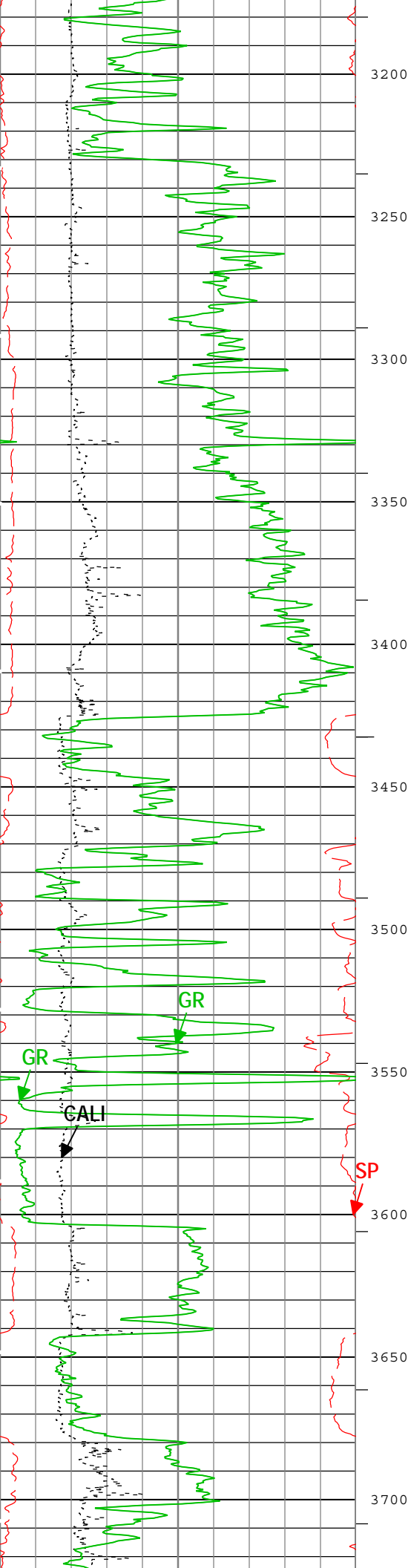


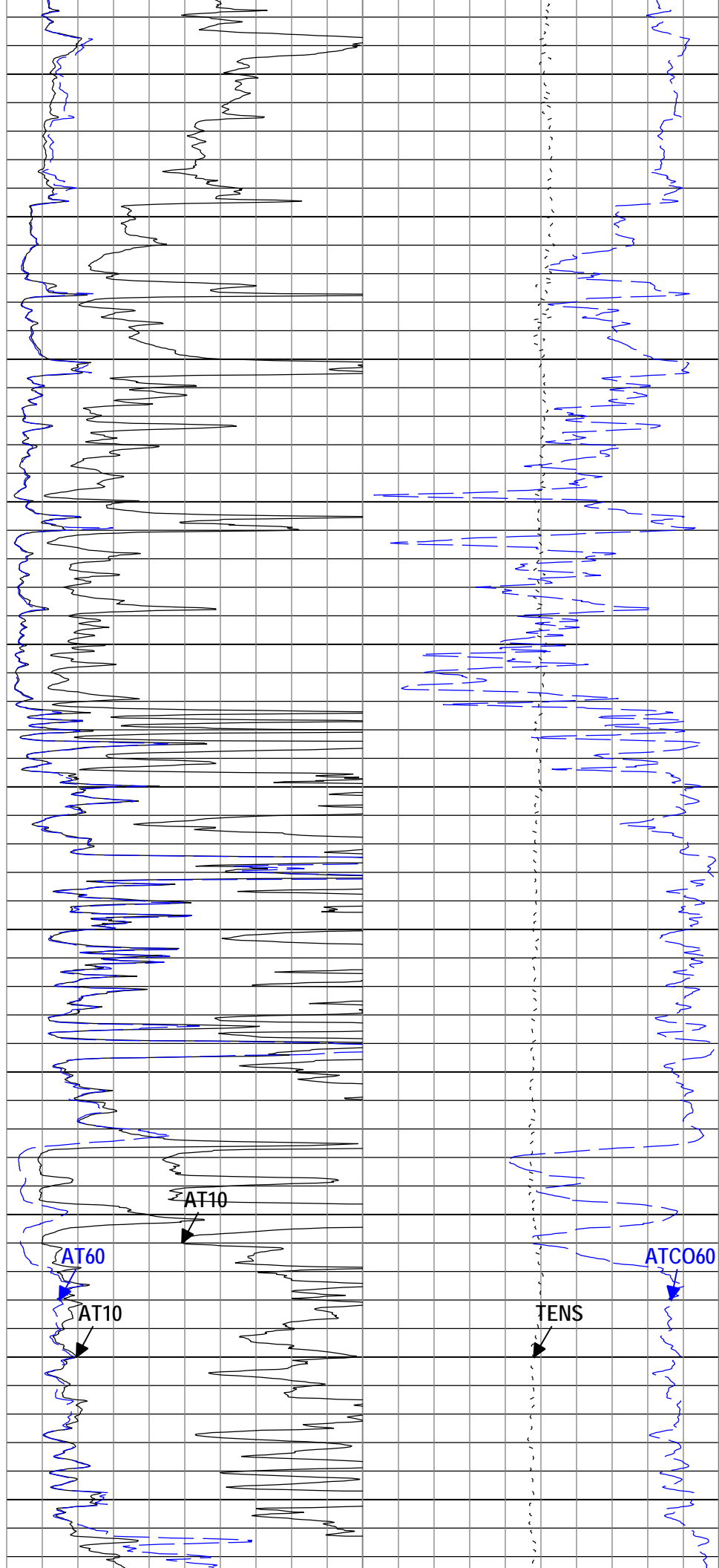
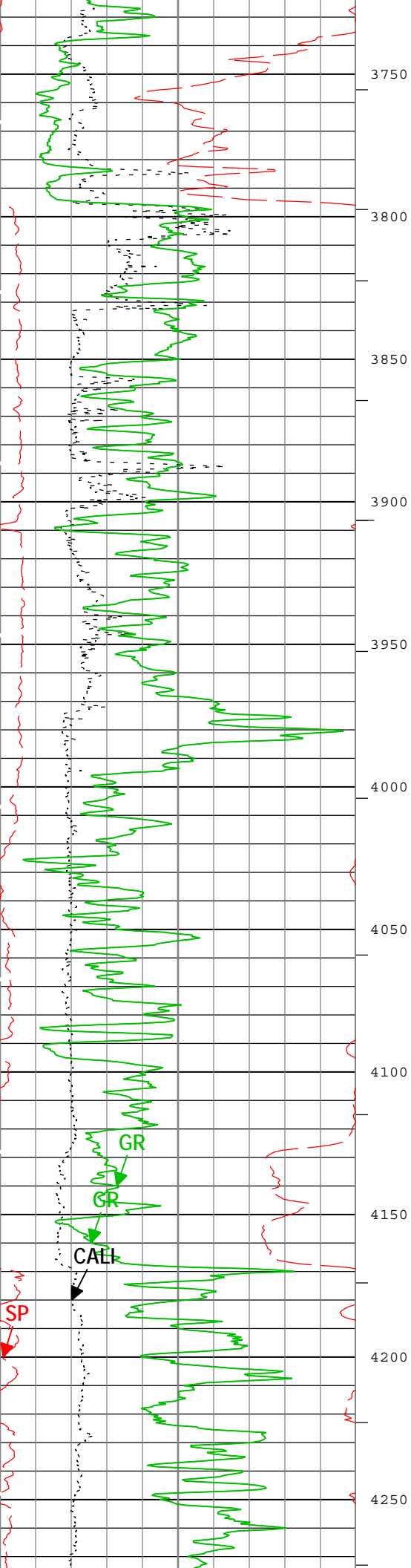


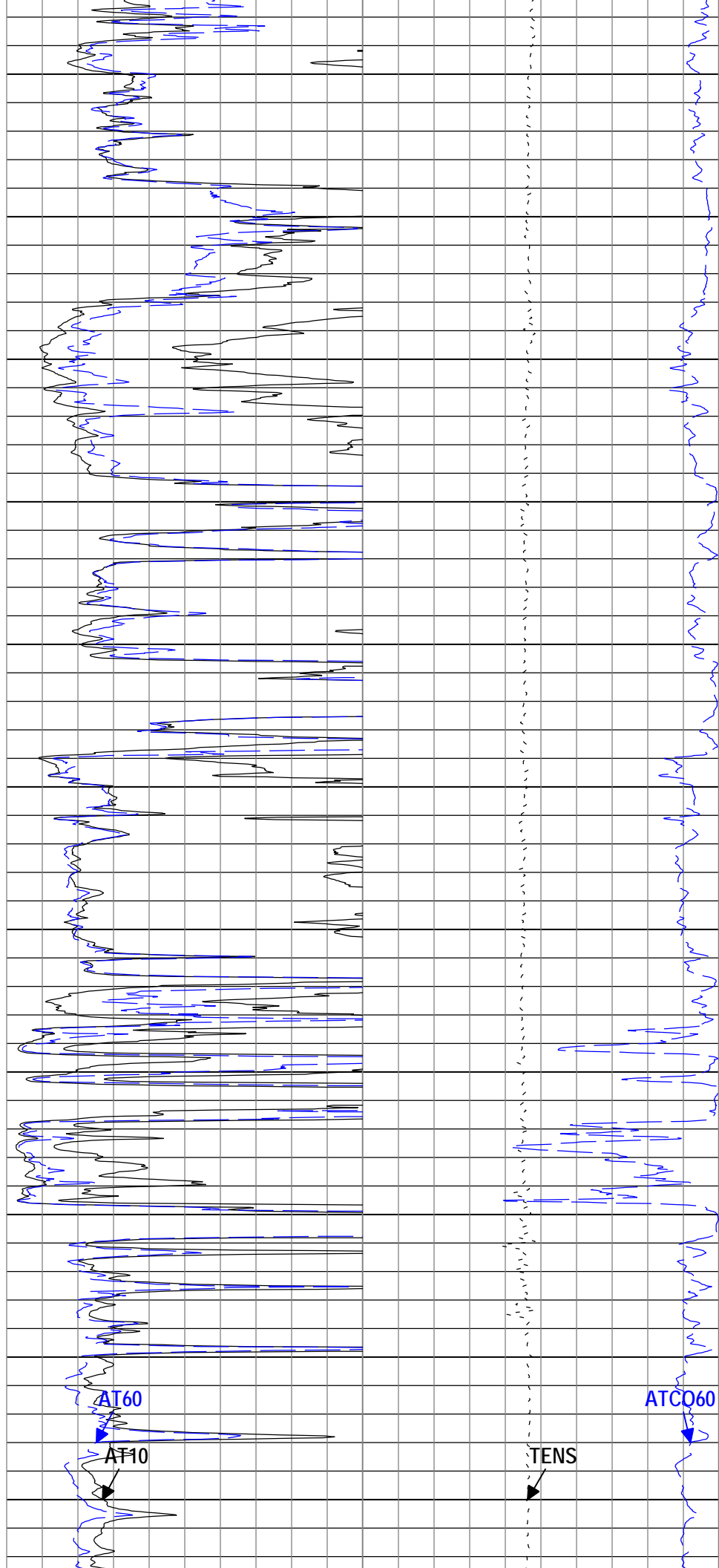
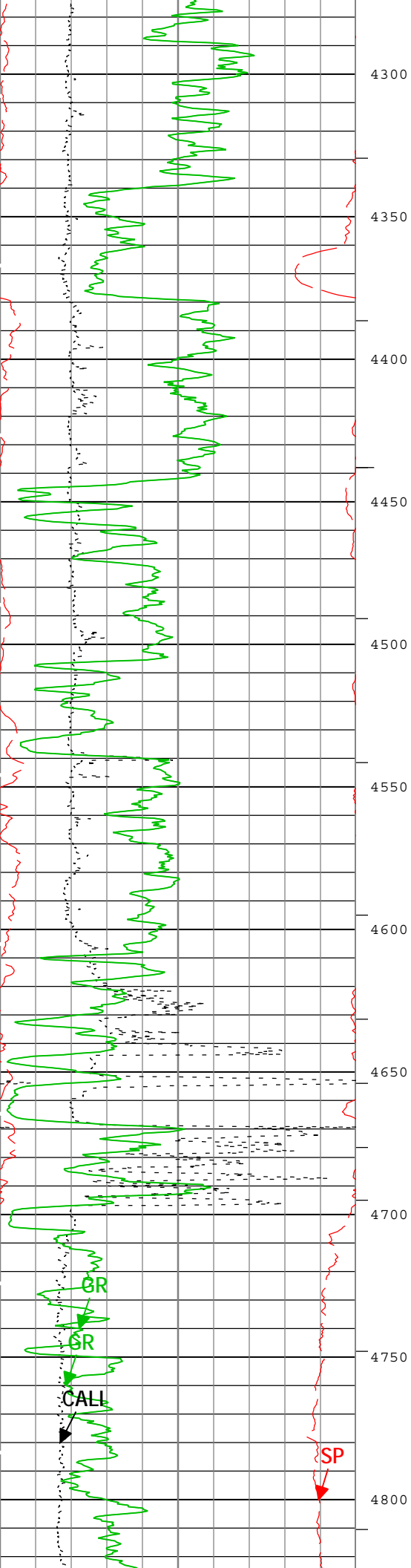


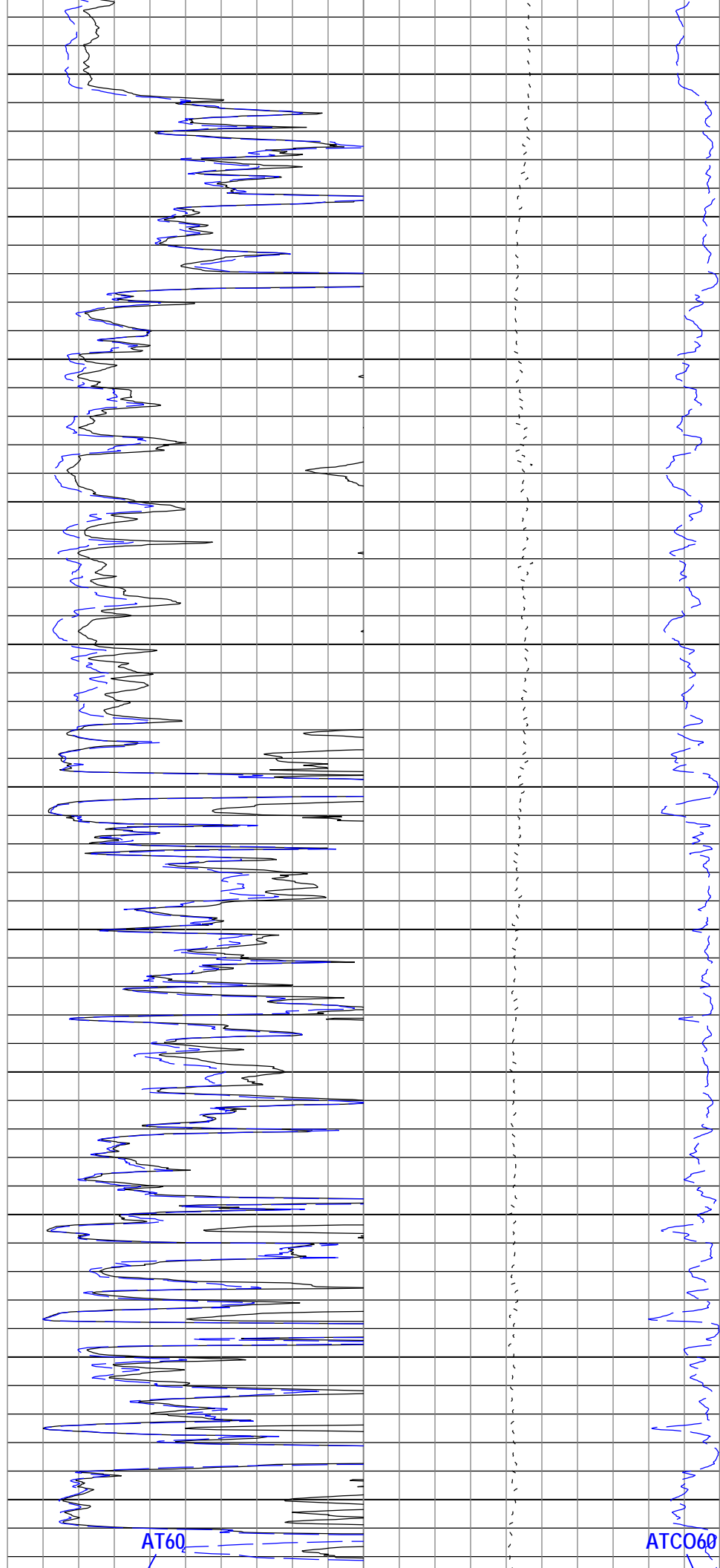
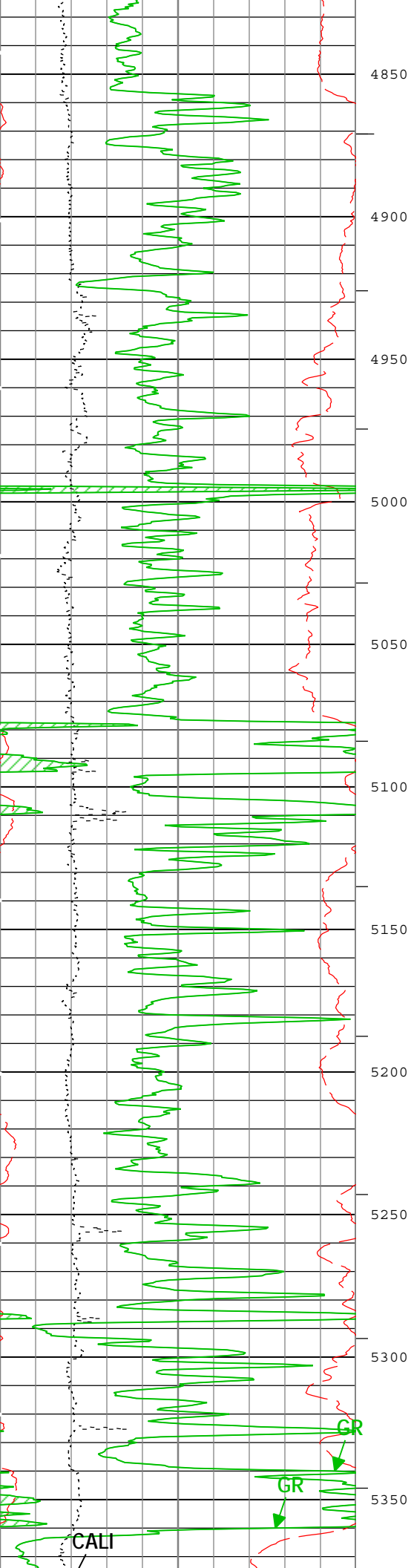


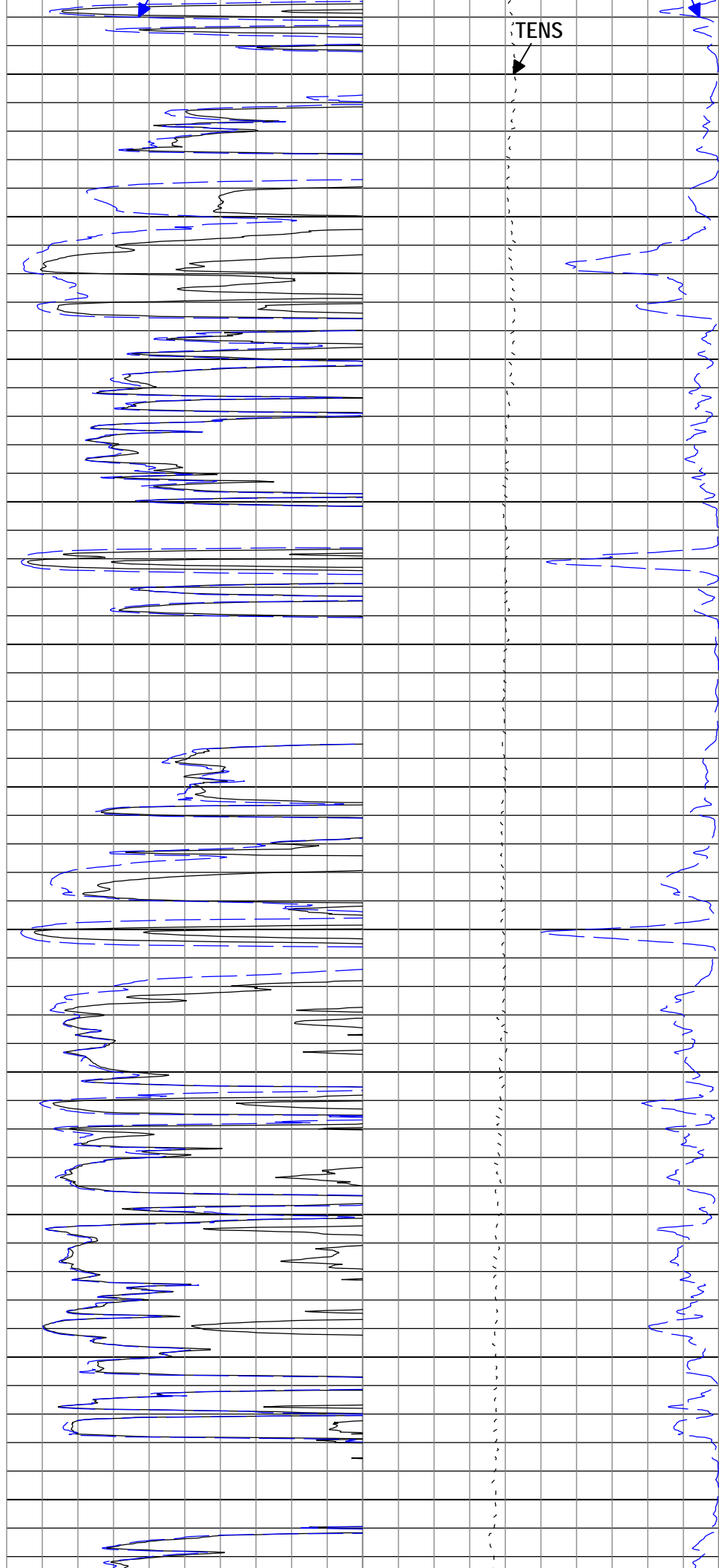
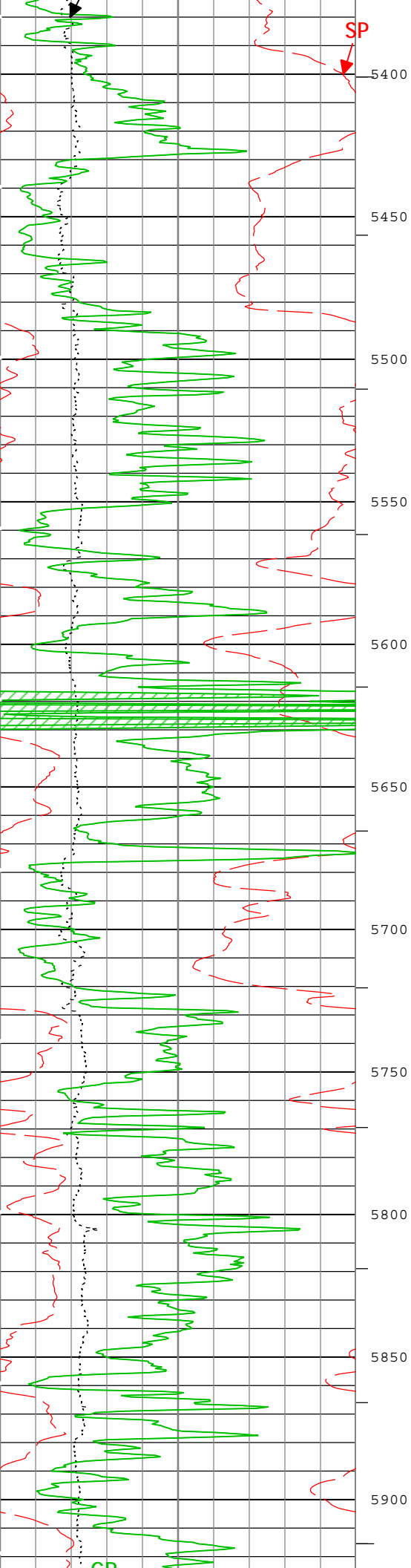


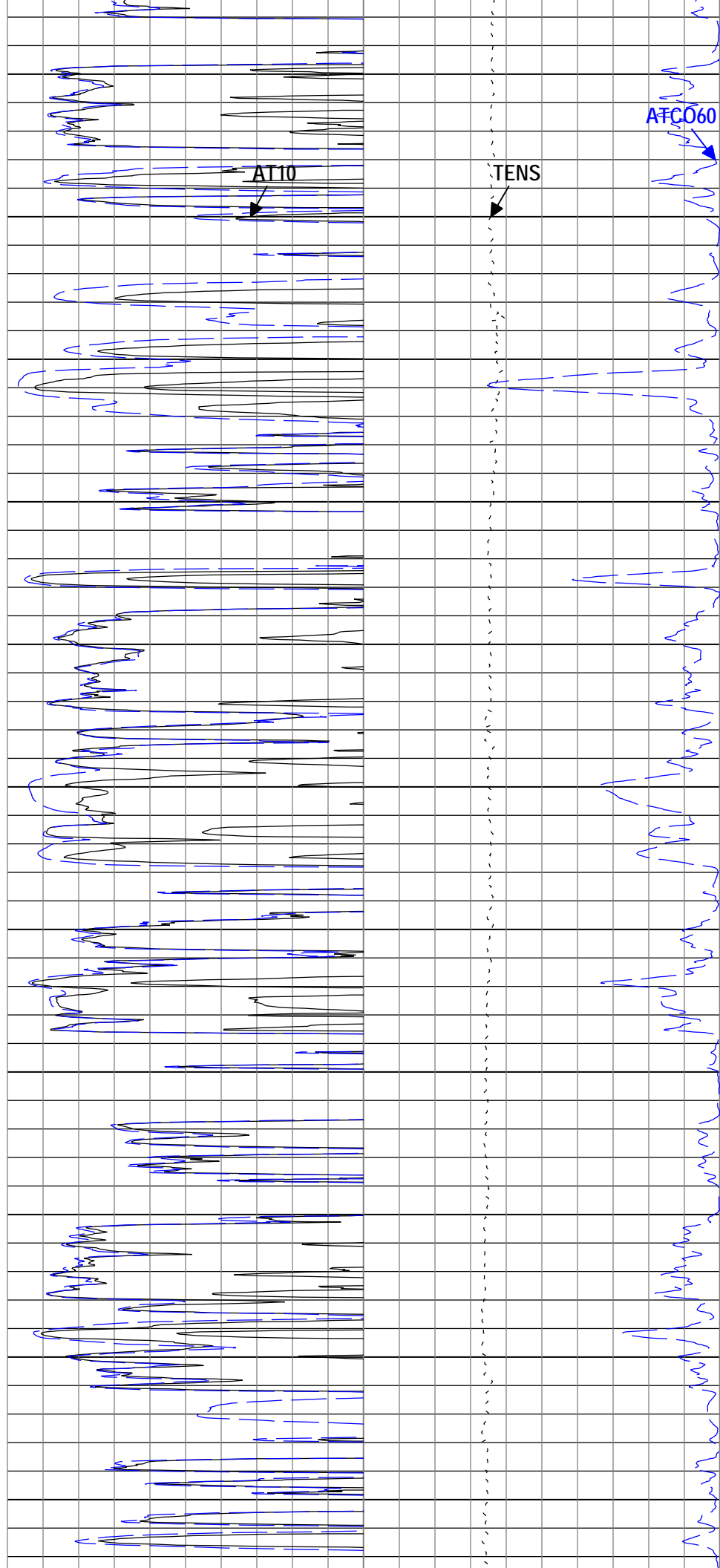
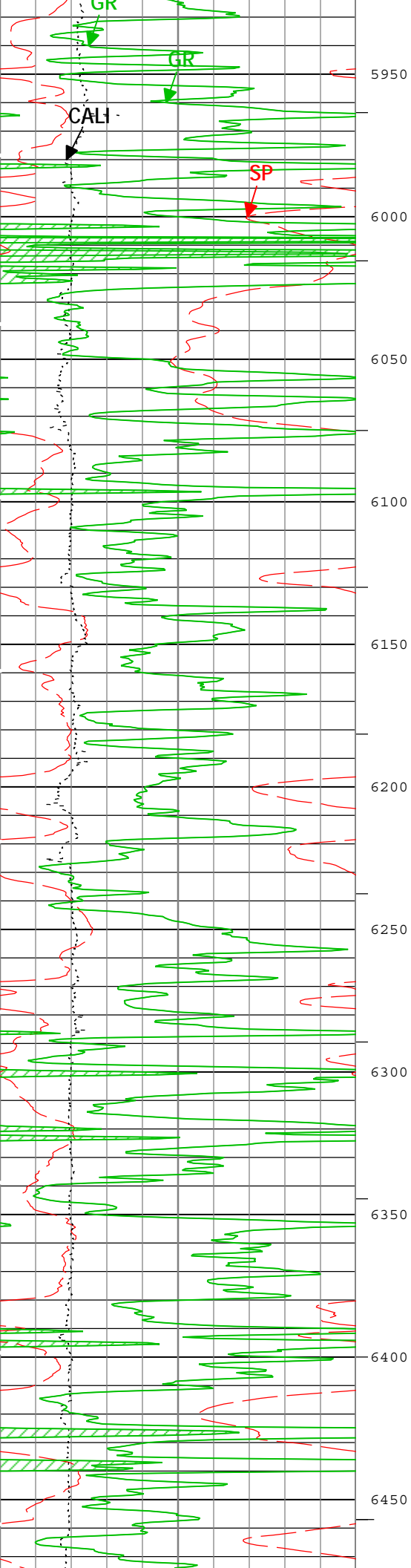


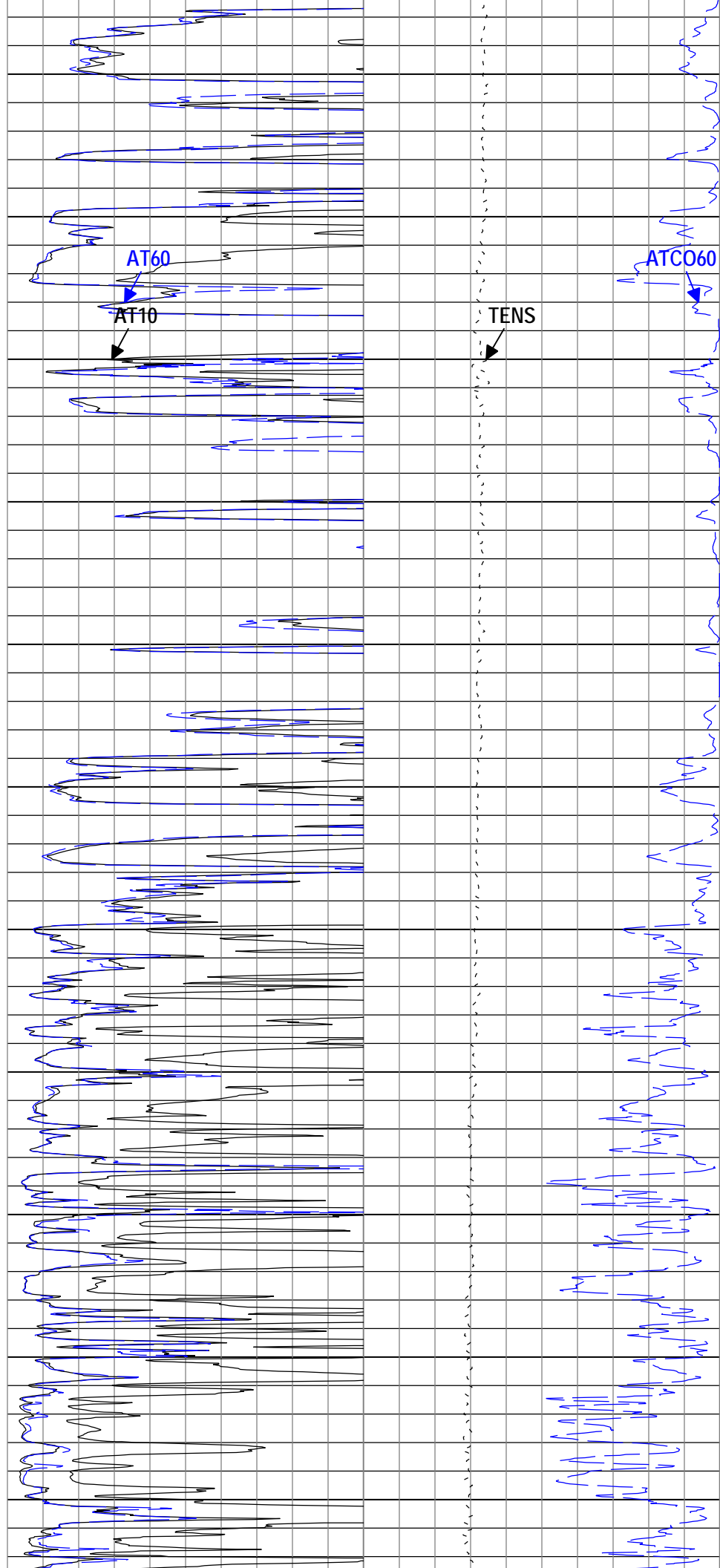
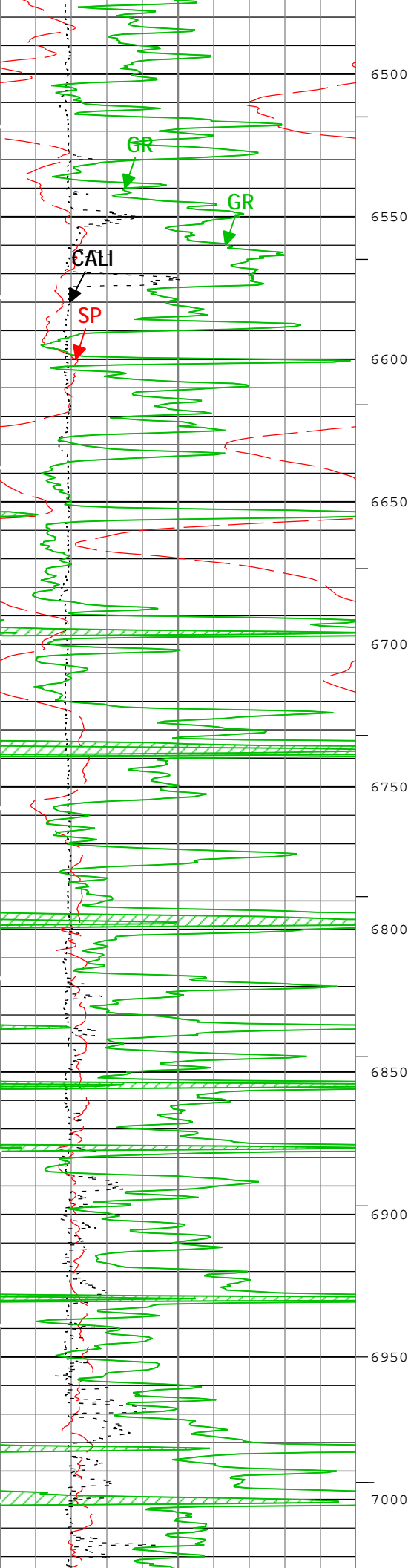


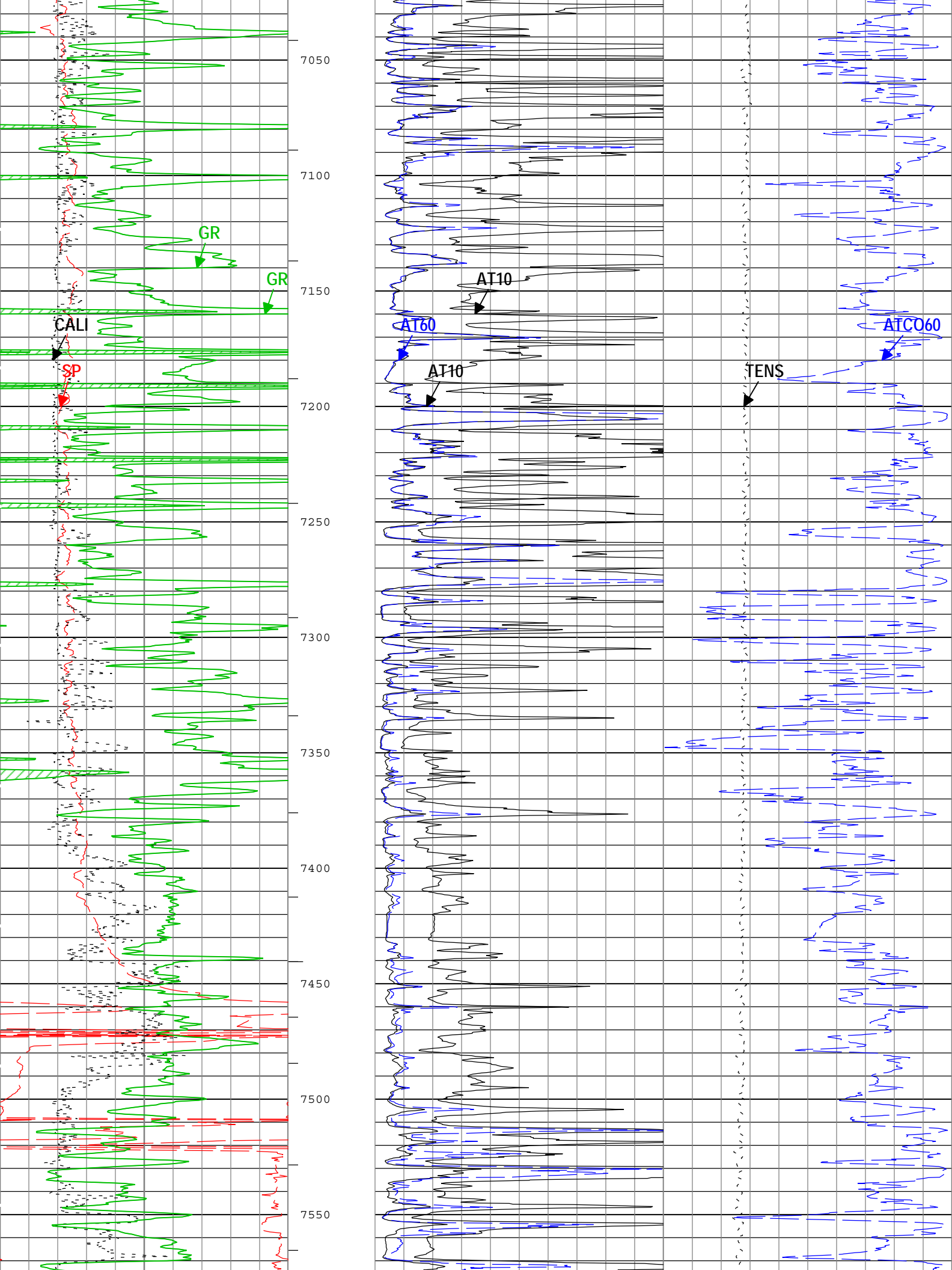


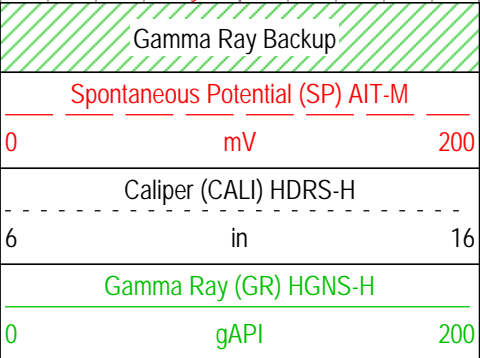
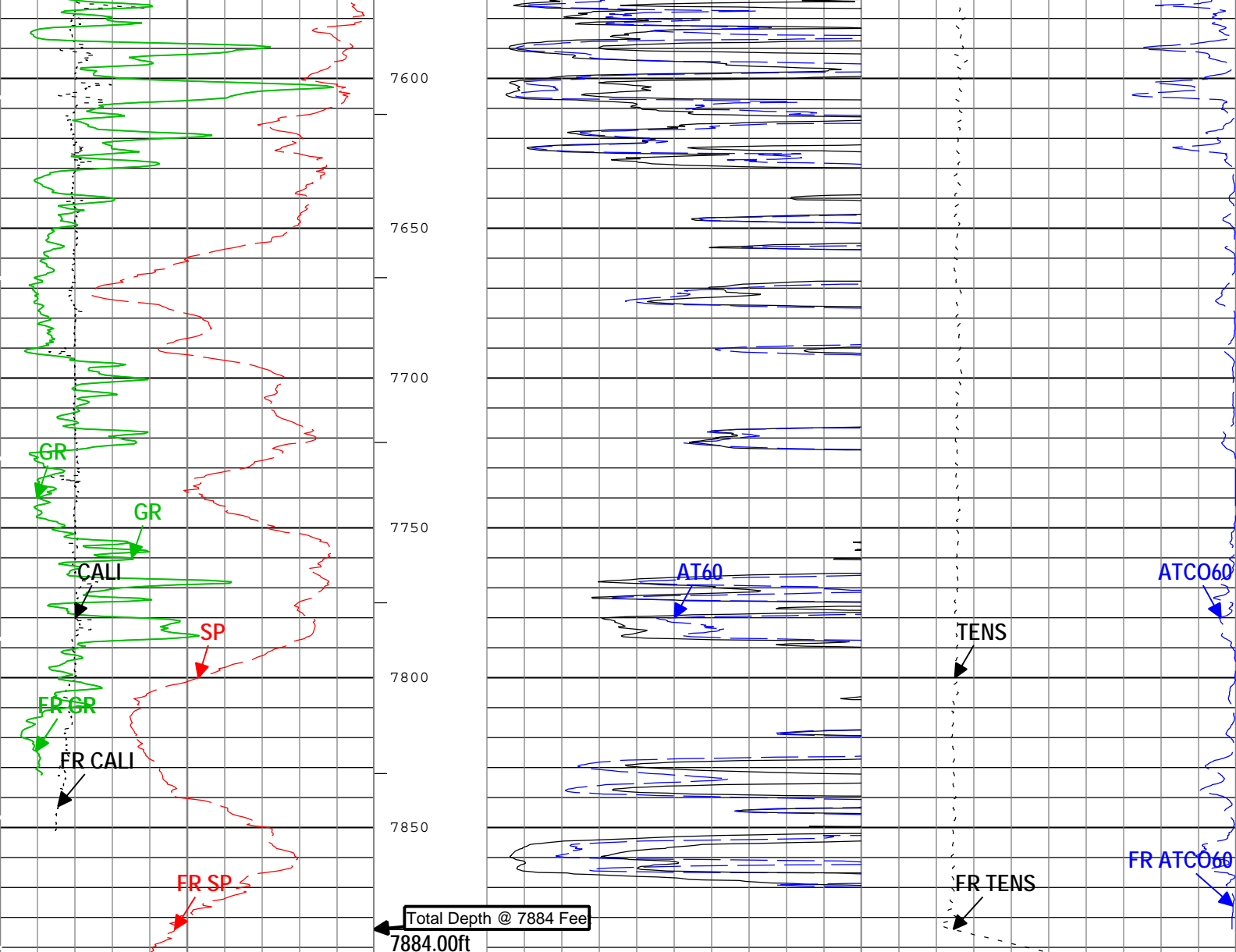












Total Depth @ 7884 Feet
7884.00ft

Array Induction Two Foot Resistivity A10 (AT10) AIT-M		
0	ohm.m	50
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)		
5000	lbf	0
Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M		
1000	mS/m	0

ICV - Integrated Cement Volume every 100.00 (ft3)
ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

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: 26-Sep-2012 12:29:05

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ABLM	Array Induction Basic Logs Mode	AIT-M	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
ASTA	Array Induction Tool Standoff	AIT-M	1	in

ASTA	Array Induction Tool Standoff	AIT-M	1	in
BARI	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	0.273	in
CBLO	Casing Bottom (Logger)	WLSESSION	342	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	8.4	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	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25	310	342
BS	7.875	342	7892

All depth are actual.

Tool Control Parameters

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

Run 1

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1790.7	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	3036.35	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20120614-3.1.9755.1038

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.0

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.1.9755.0	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.1.9755.0	2.0
AMIS	Array Induction Sonde - M	3.1.9755.1038	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run 1	Main[4]:Up	Up	31.88 ft	7892.18 ft	26-Sep-2012 9:23:43 AM	26-Sep-2012 11:48:38 AM	6.25 ft	true

All depths are referenced to toolstring zero

LogRun 1: Main[4]:Up

Description: AIT Basic Log Two Format: Log (KM 5in Induction Upper) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation:

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

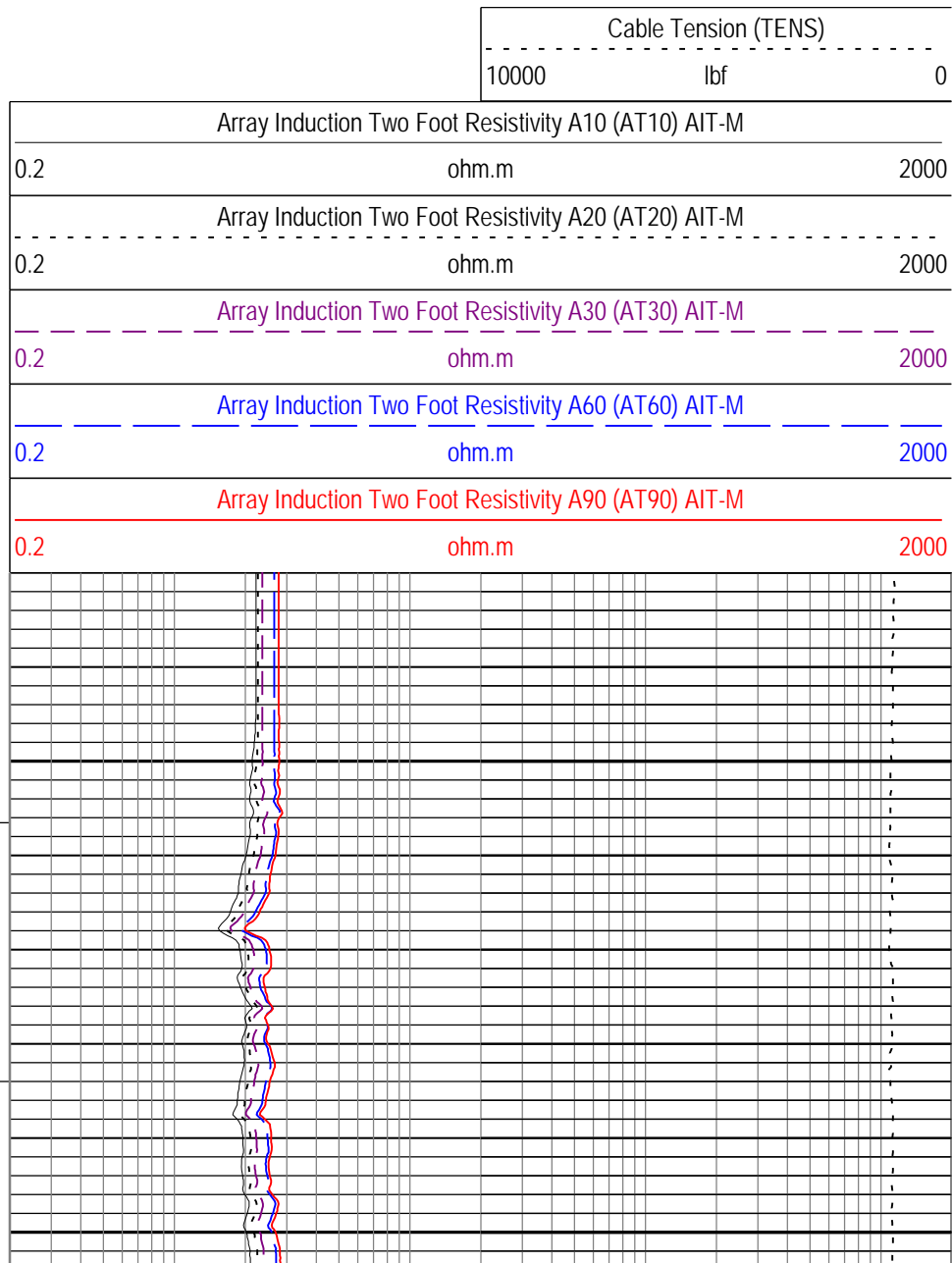
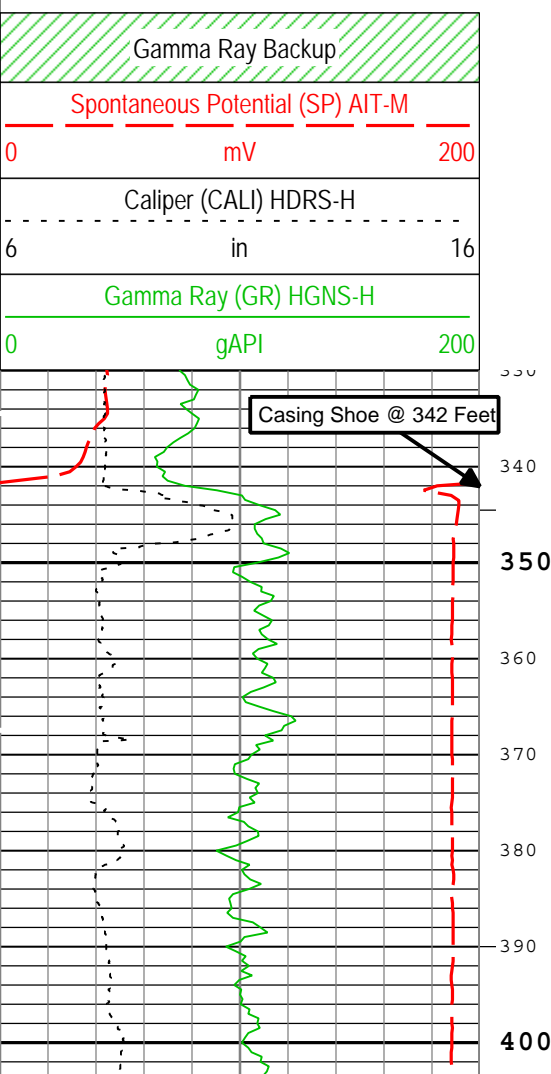
—IHV - Integrated Hole Volume every 10.00 (ft3)

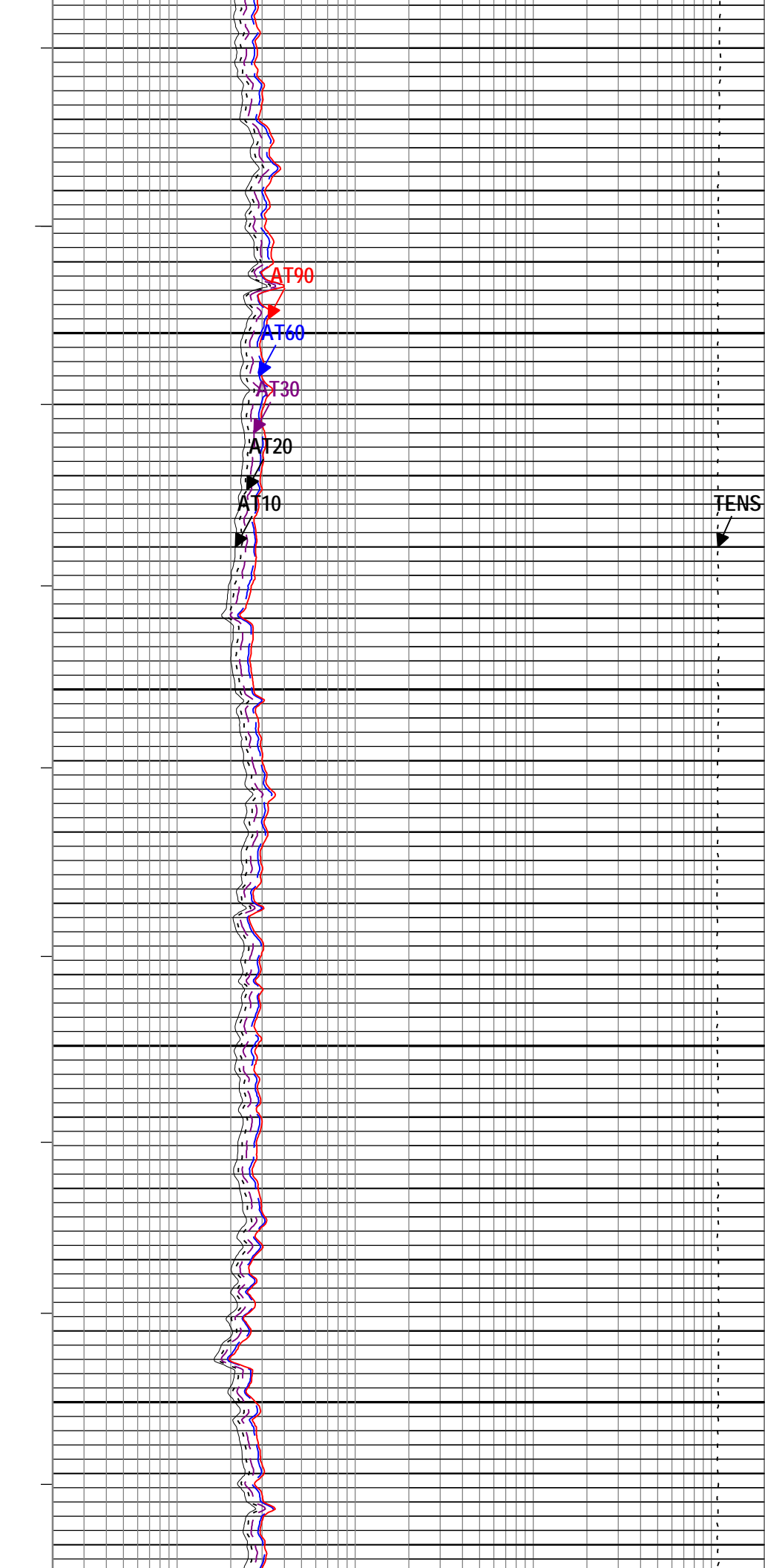
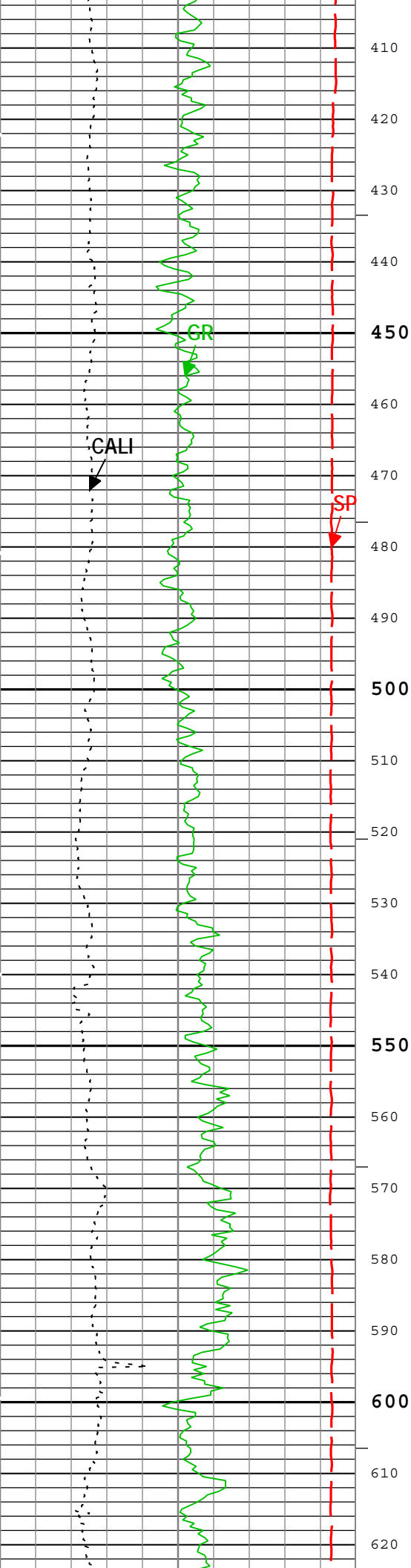
—IHV - Integrated Hole Volume every 100.00 (ft3)

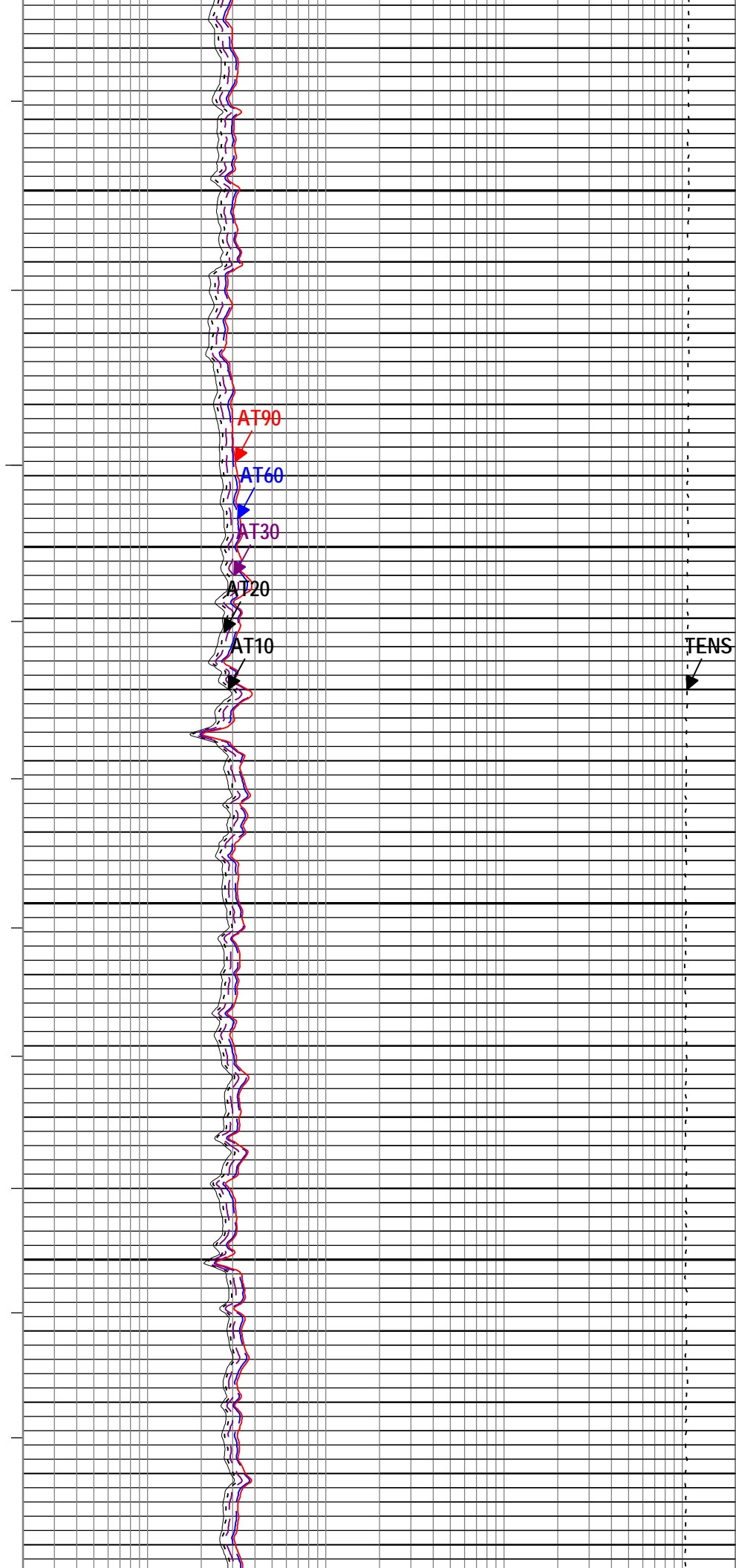
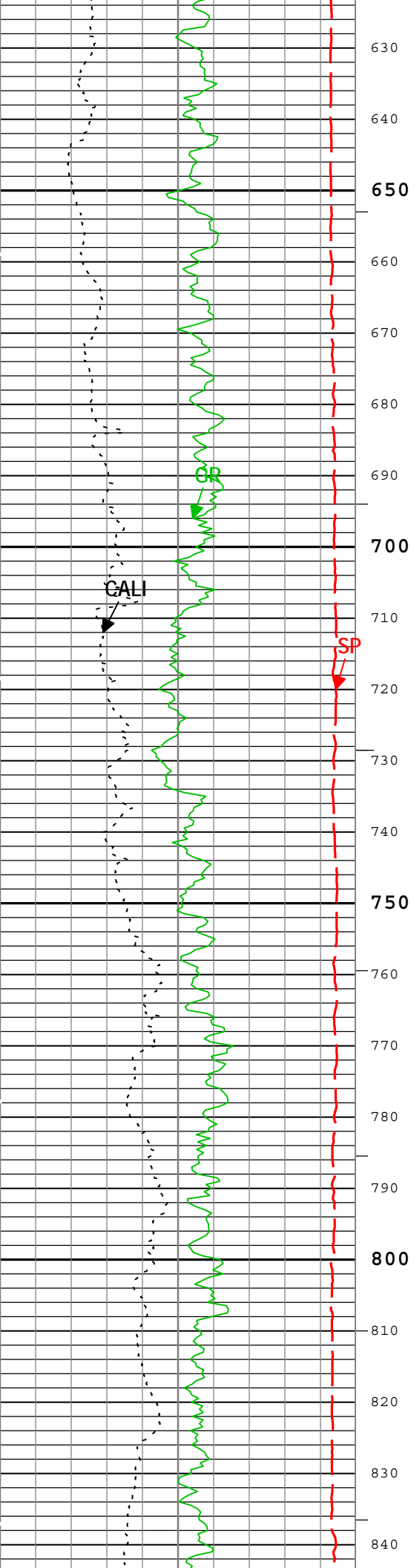
└ ICV - Integrated Cement Volume every 10.00 (ft3)

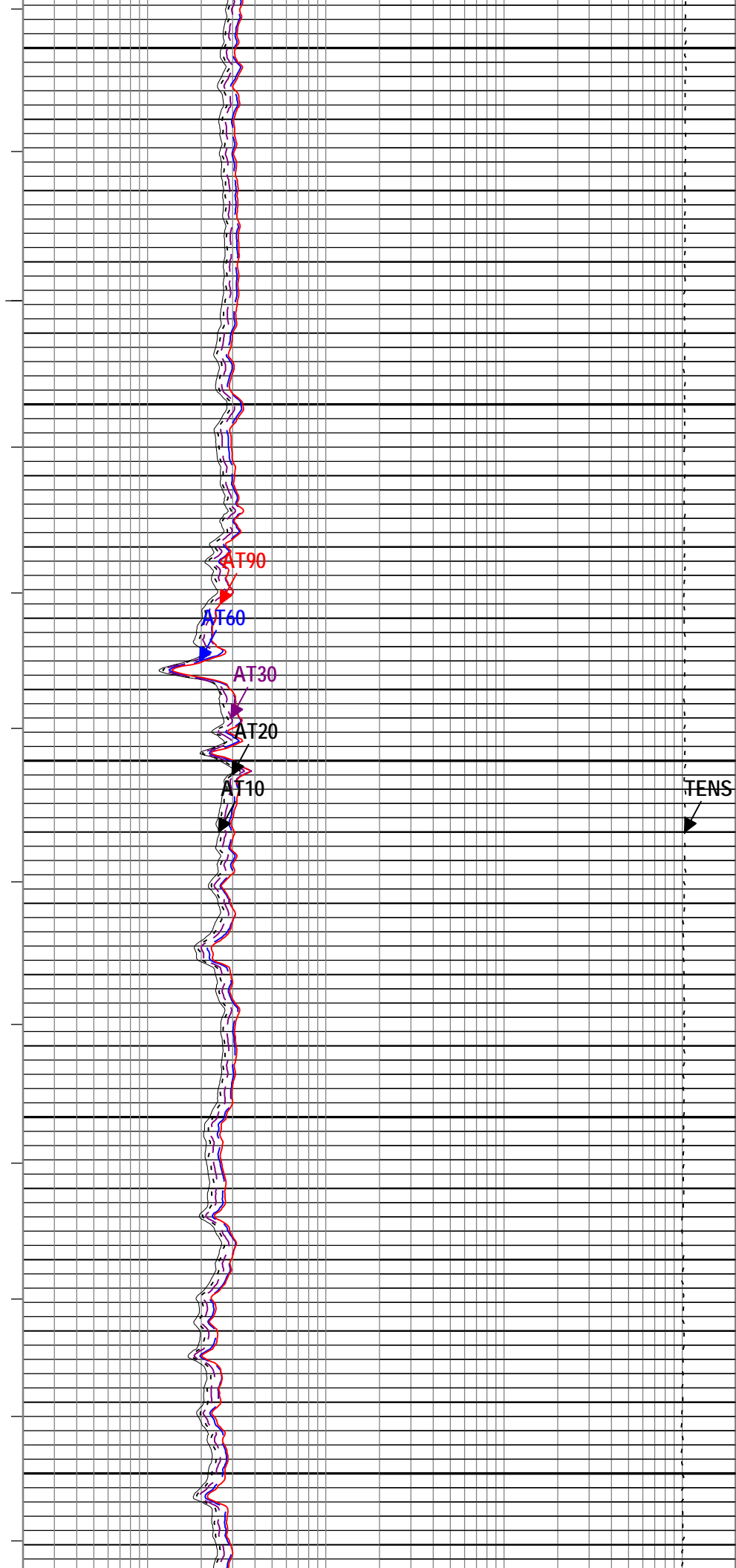
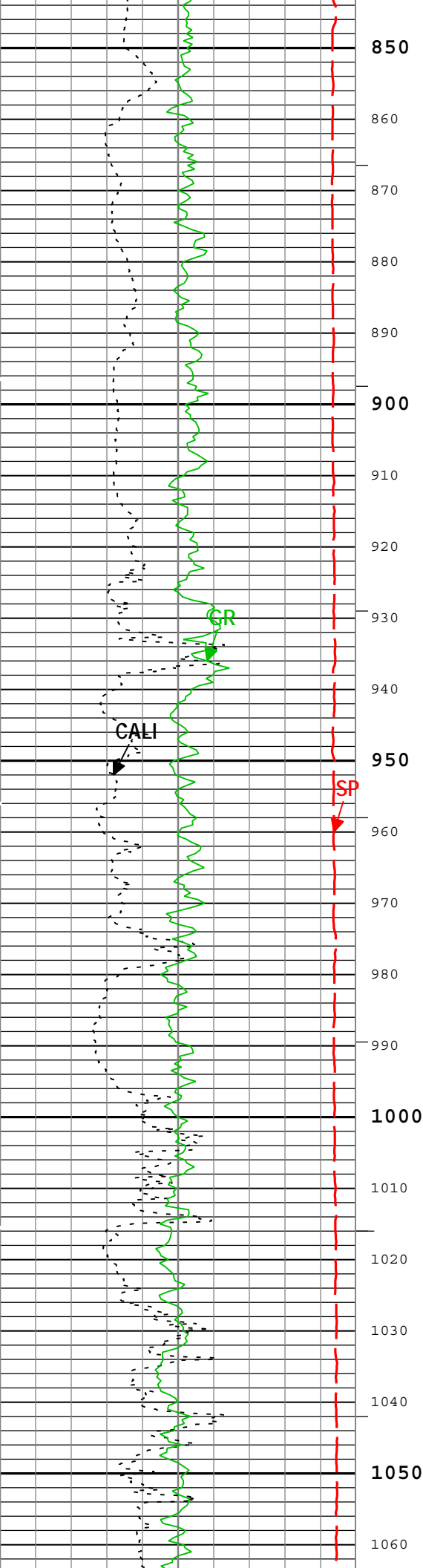
— ICV - Integrated Cement Volume every 100.00 (ft3)

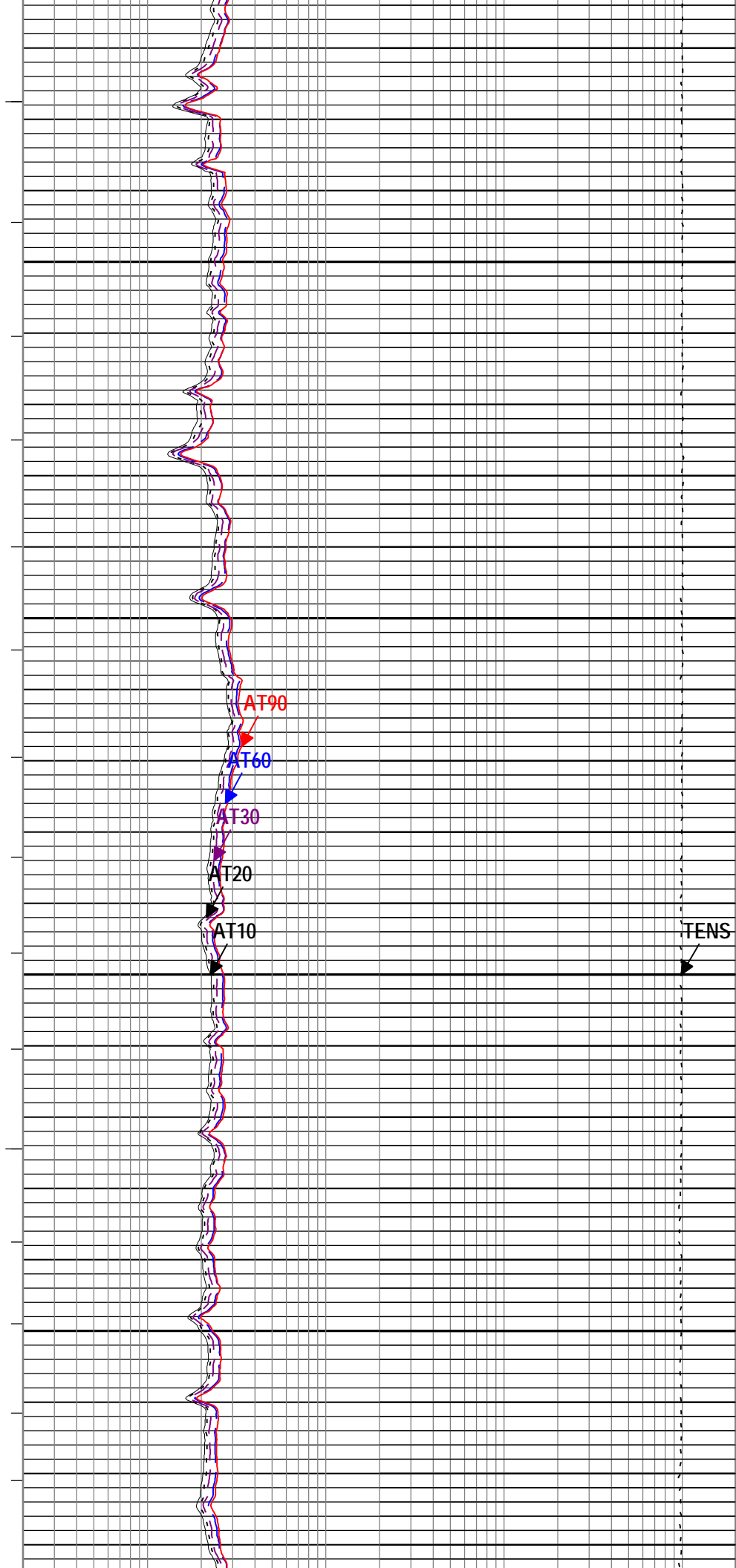
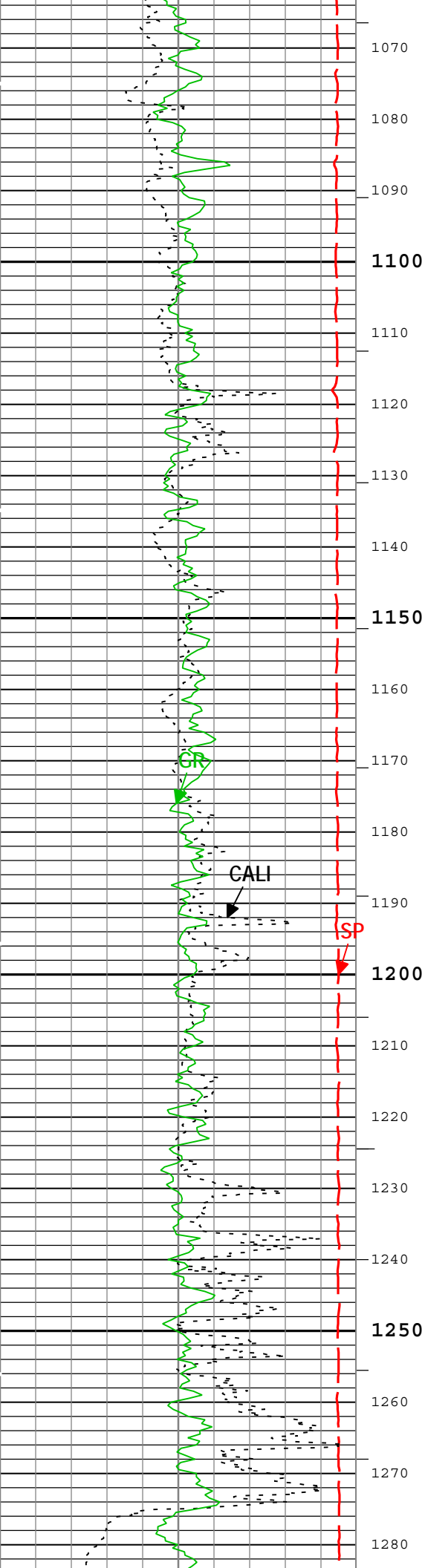
TIME_1900 - Time Marked every 60.00 (s)

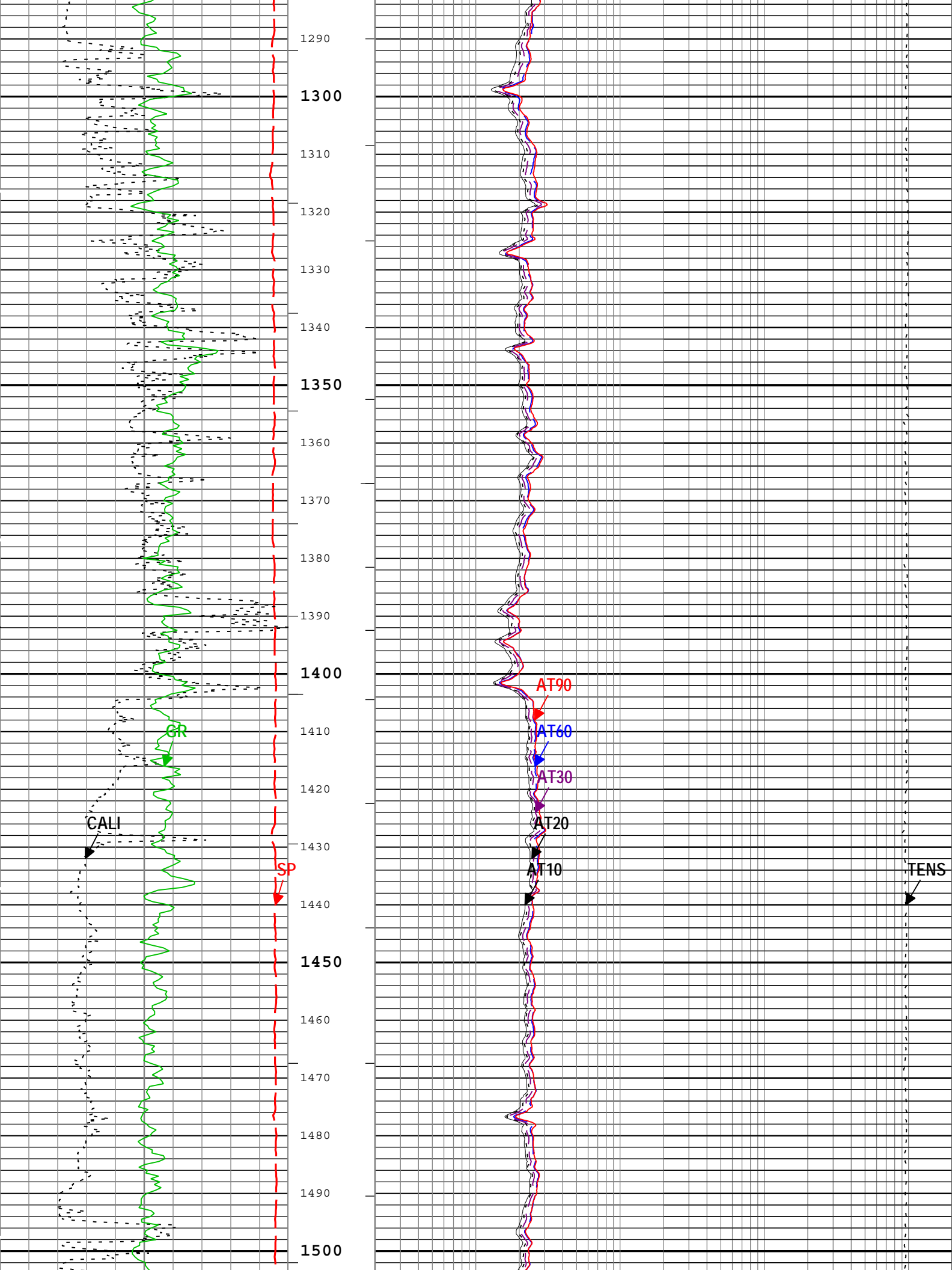


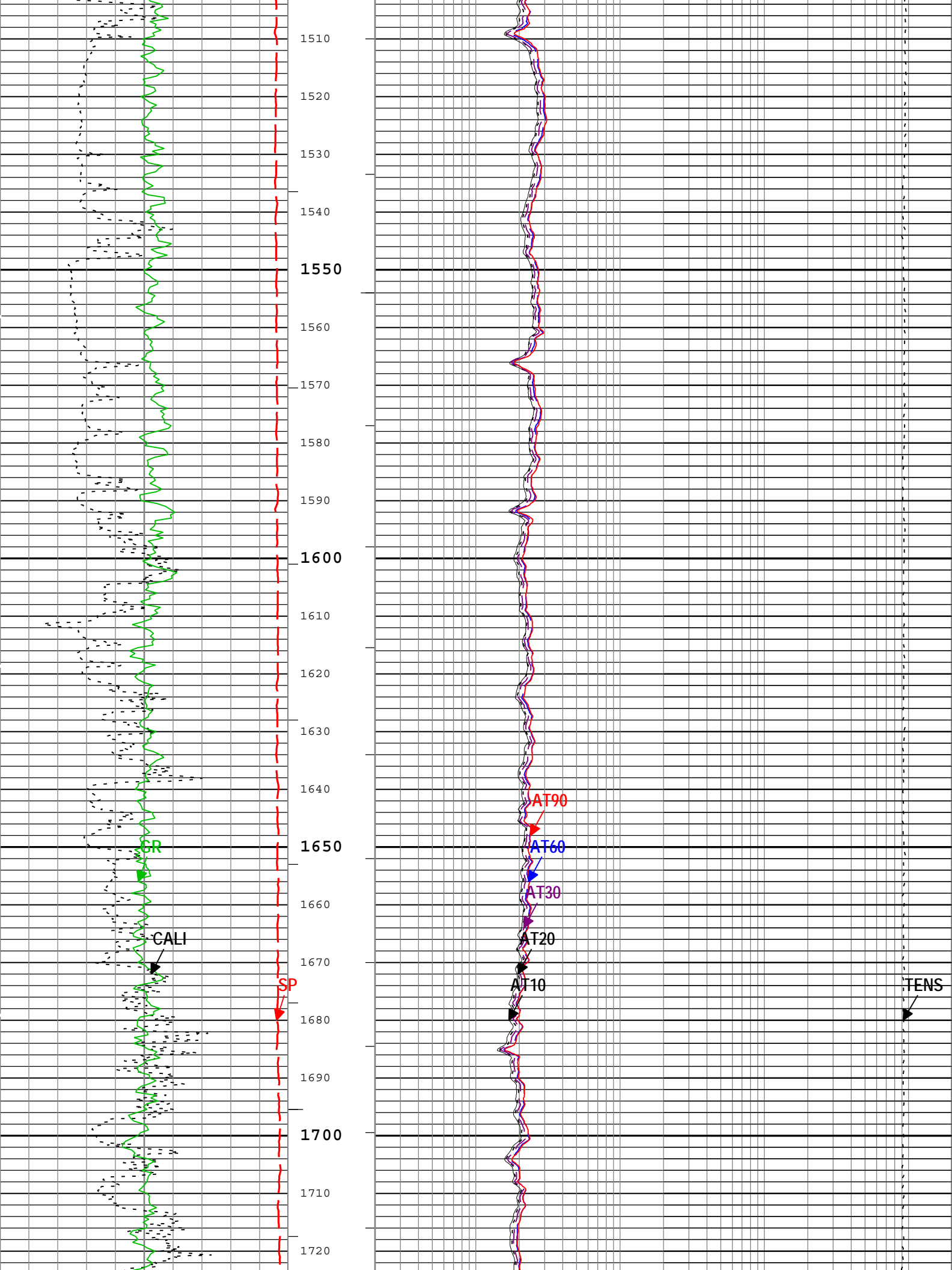


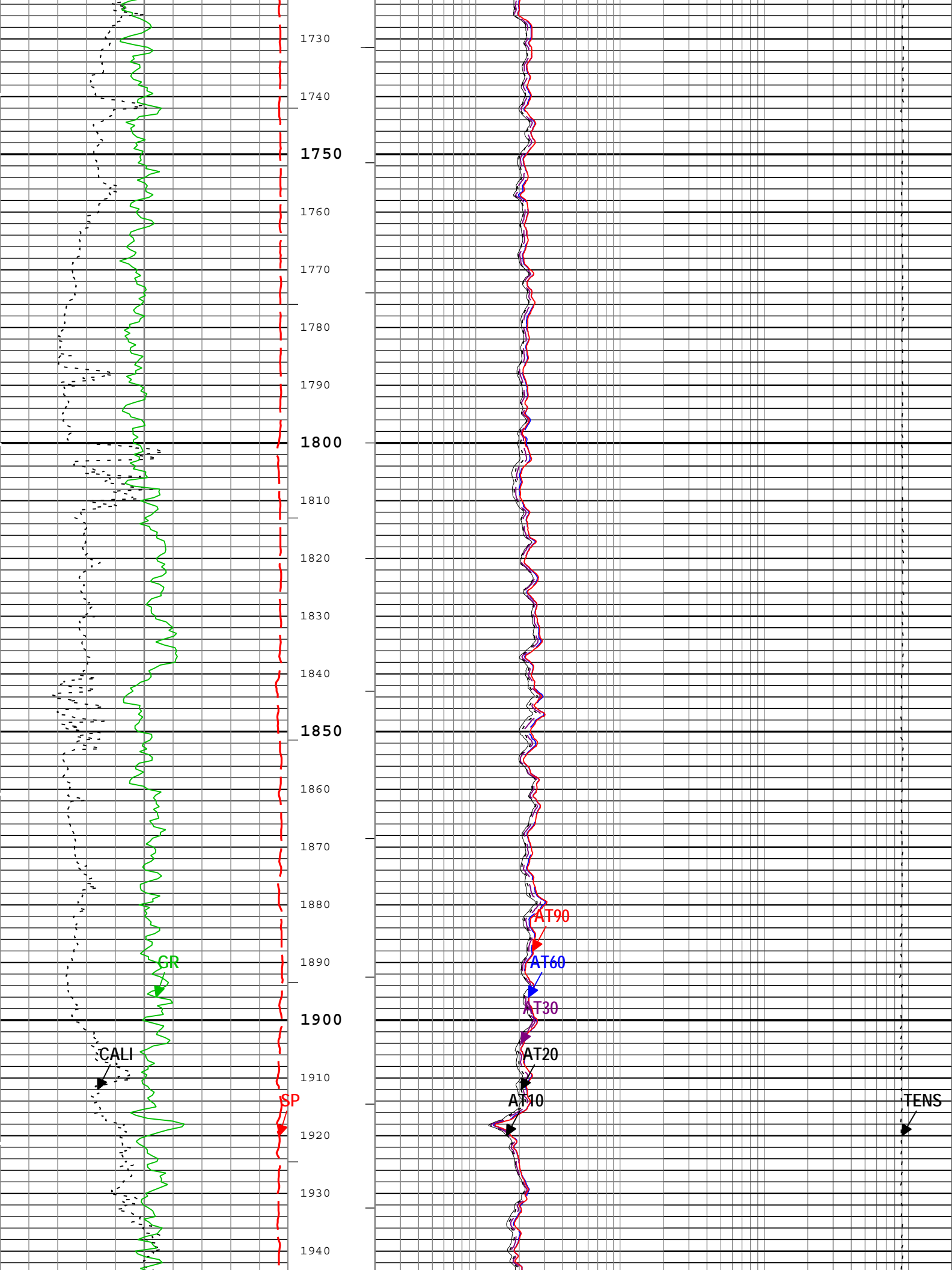


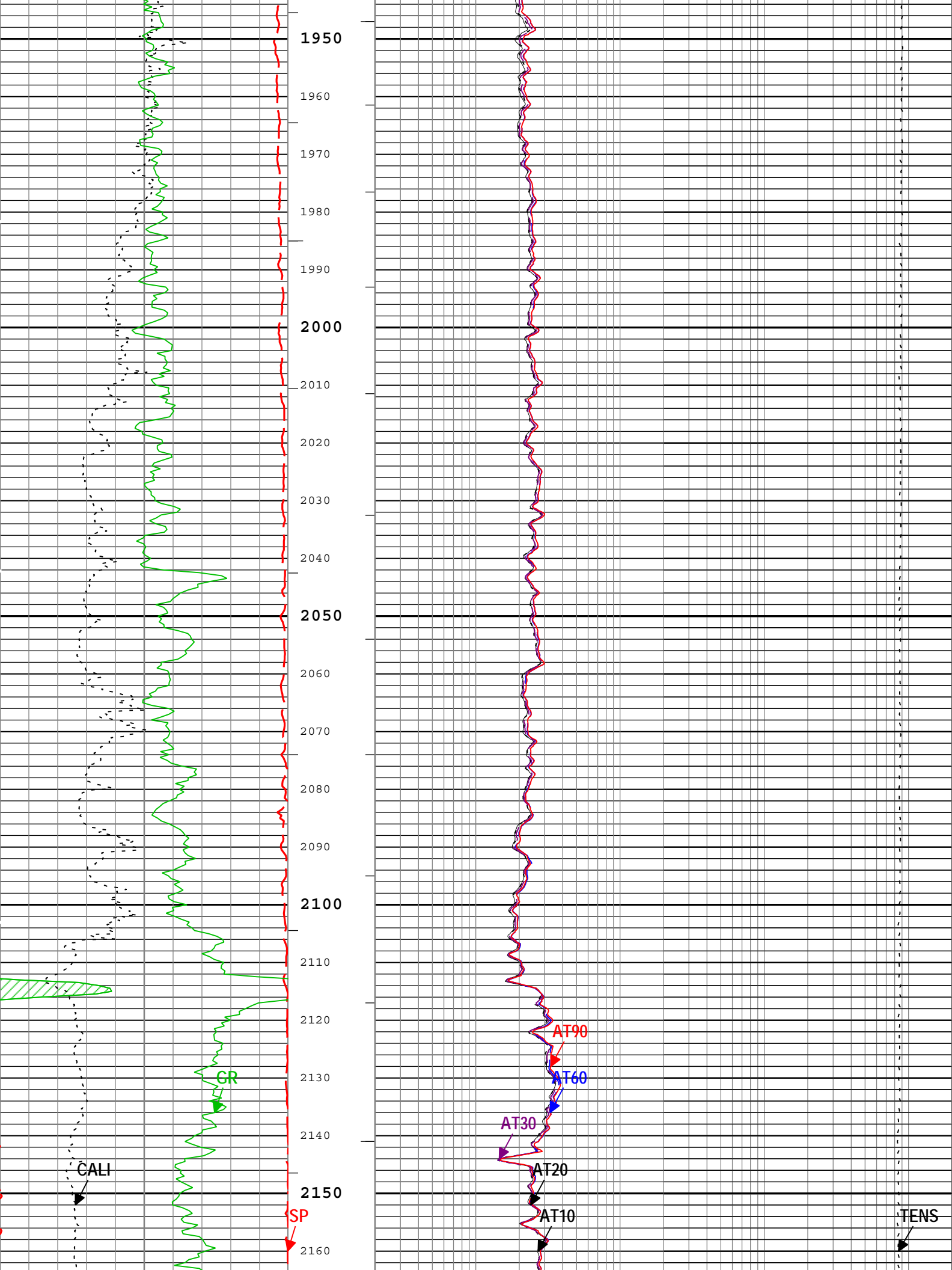


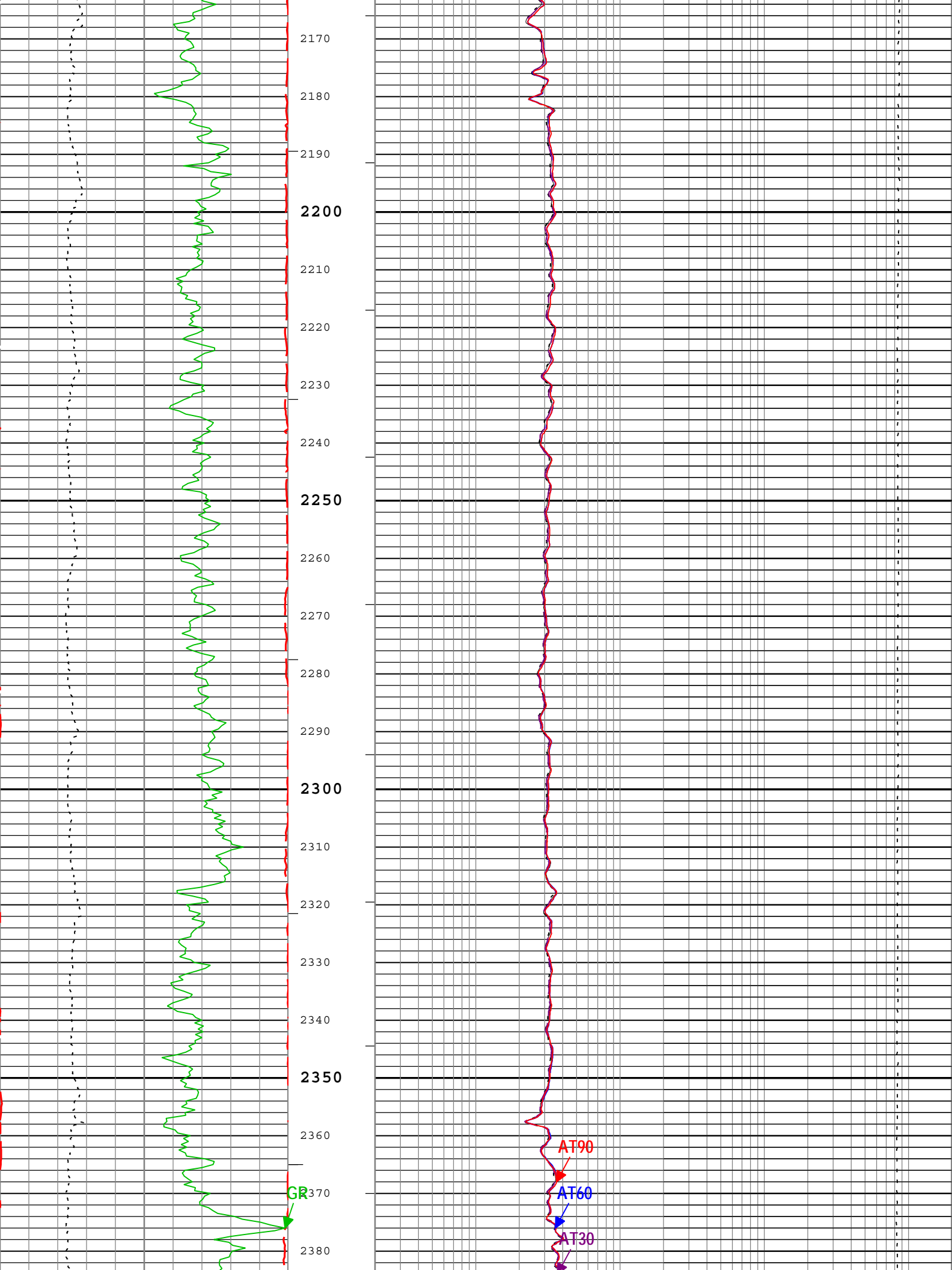


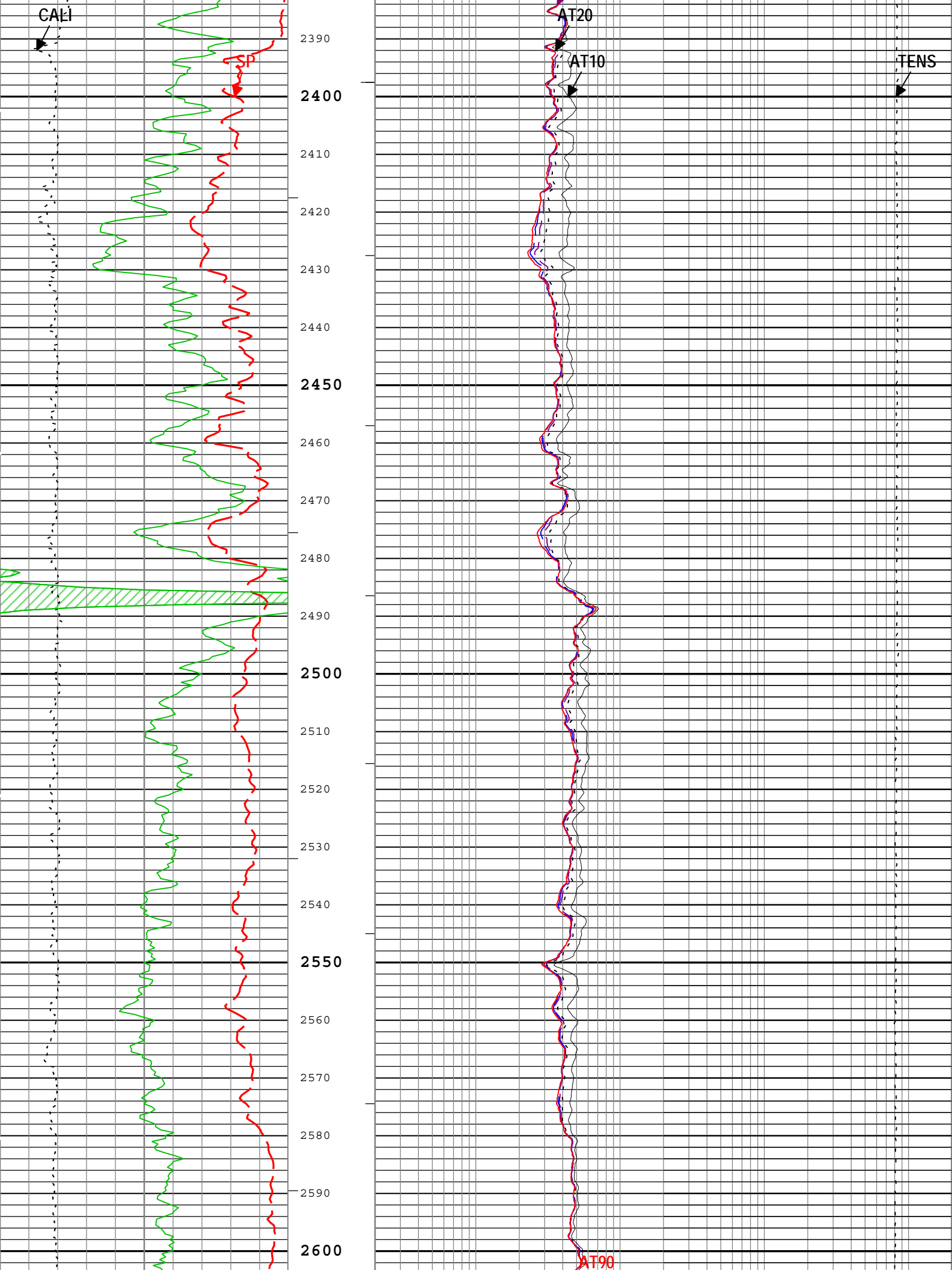


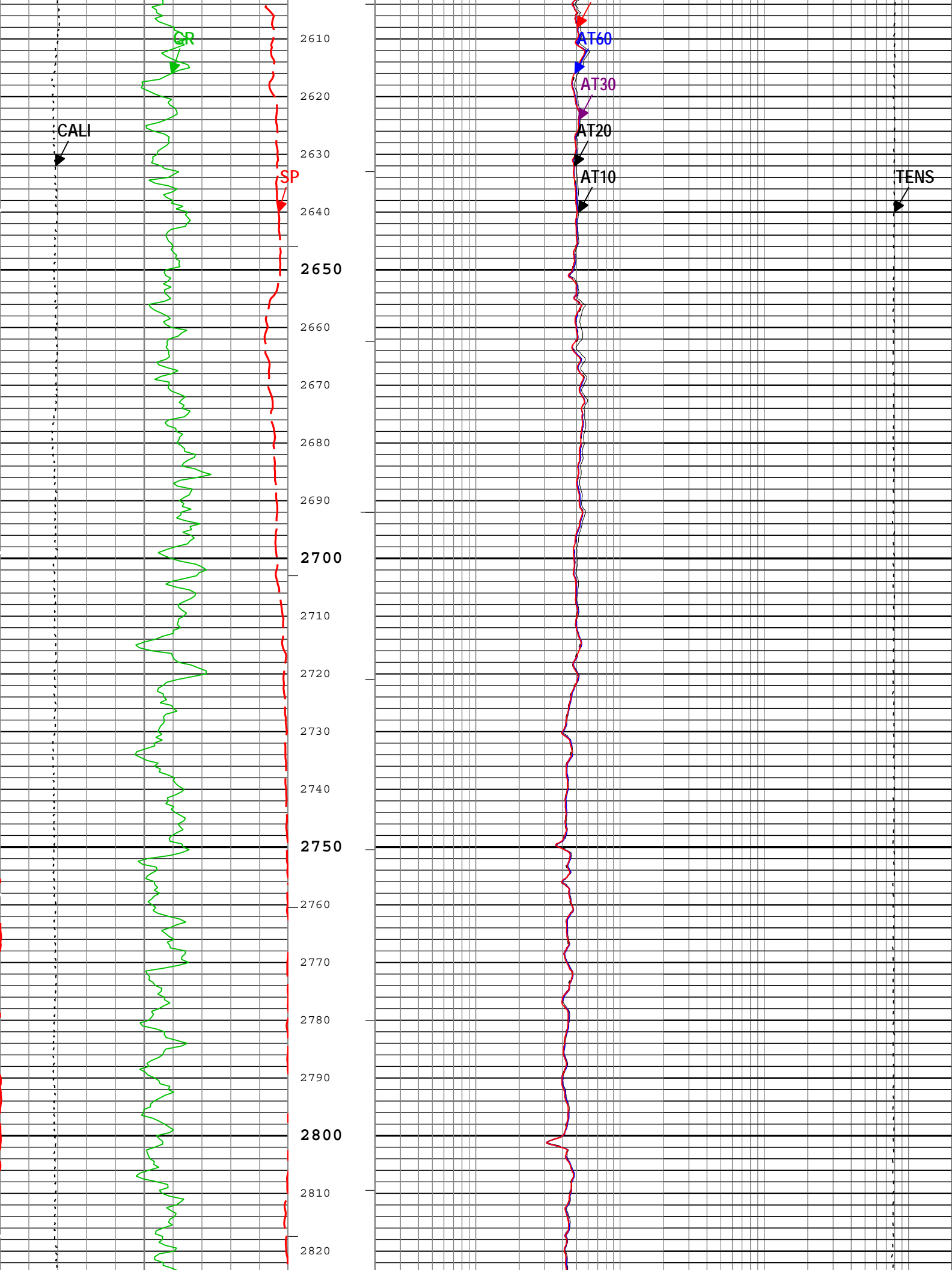


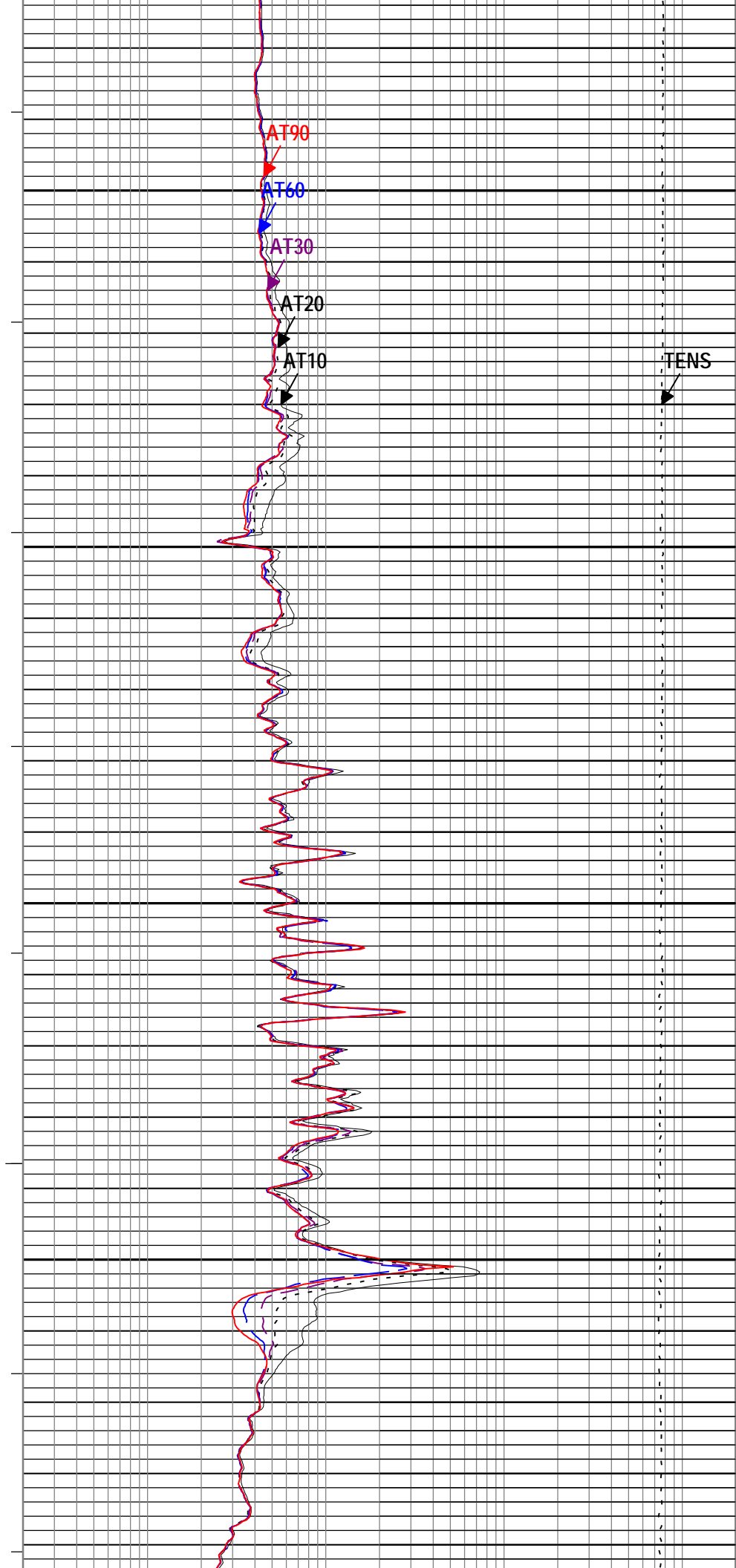
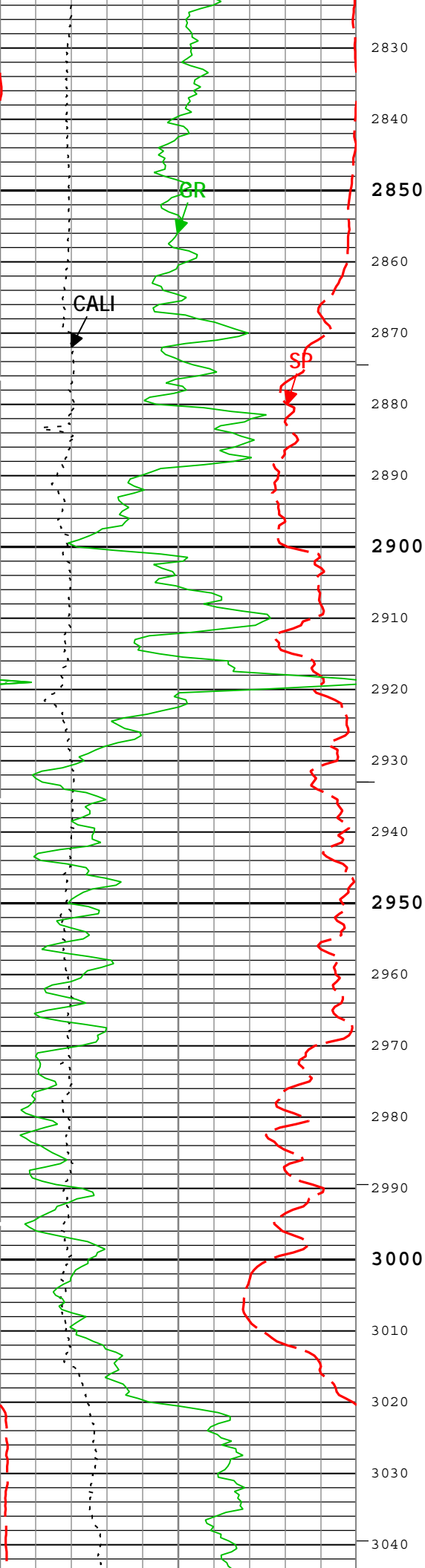


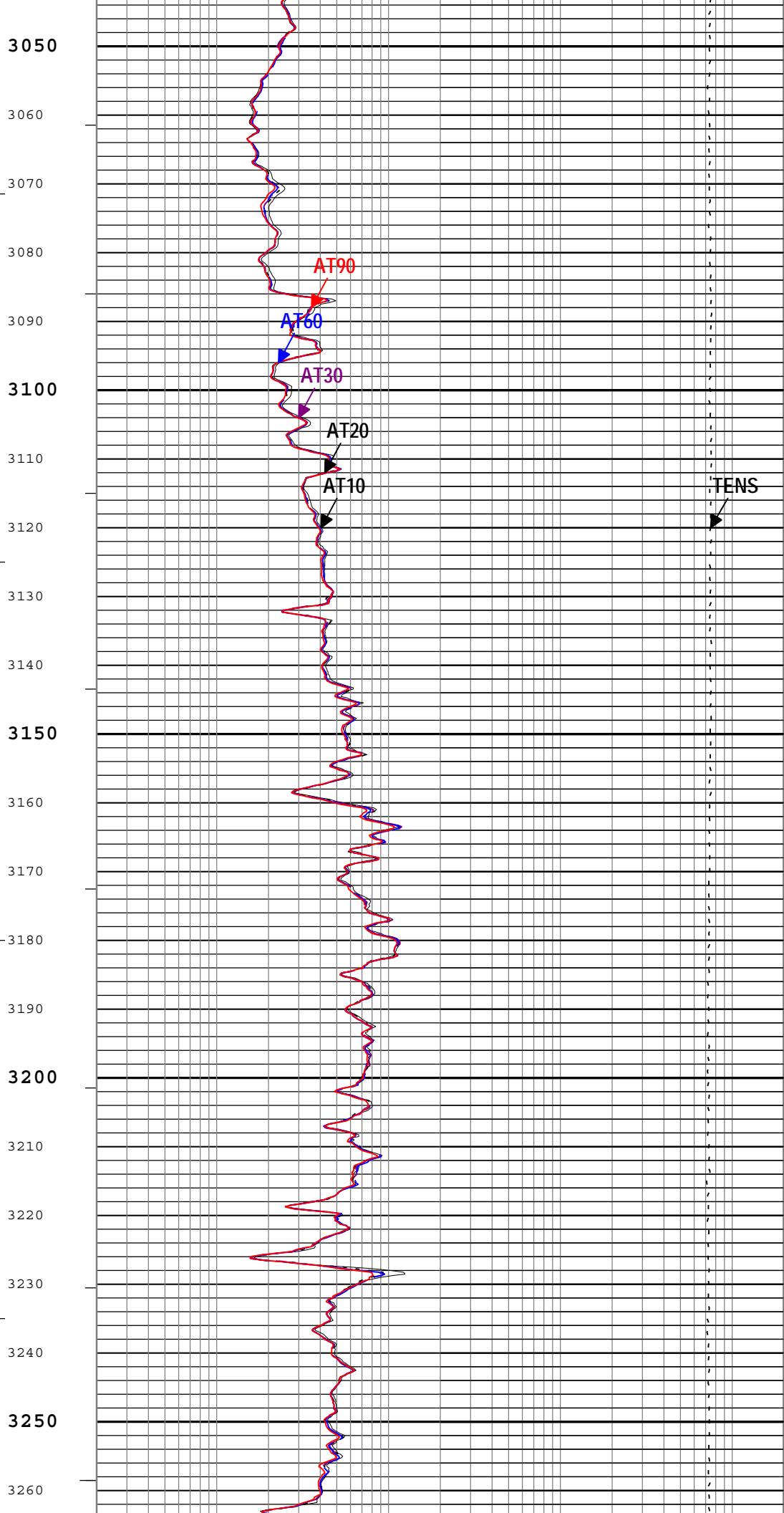
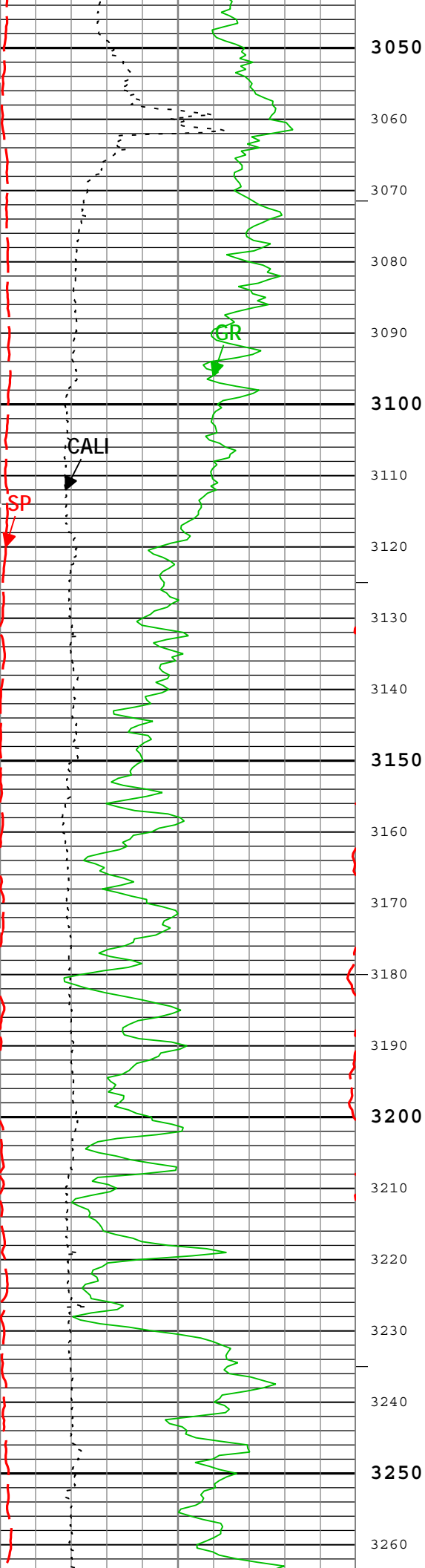


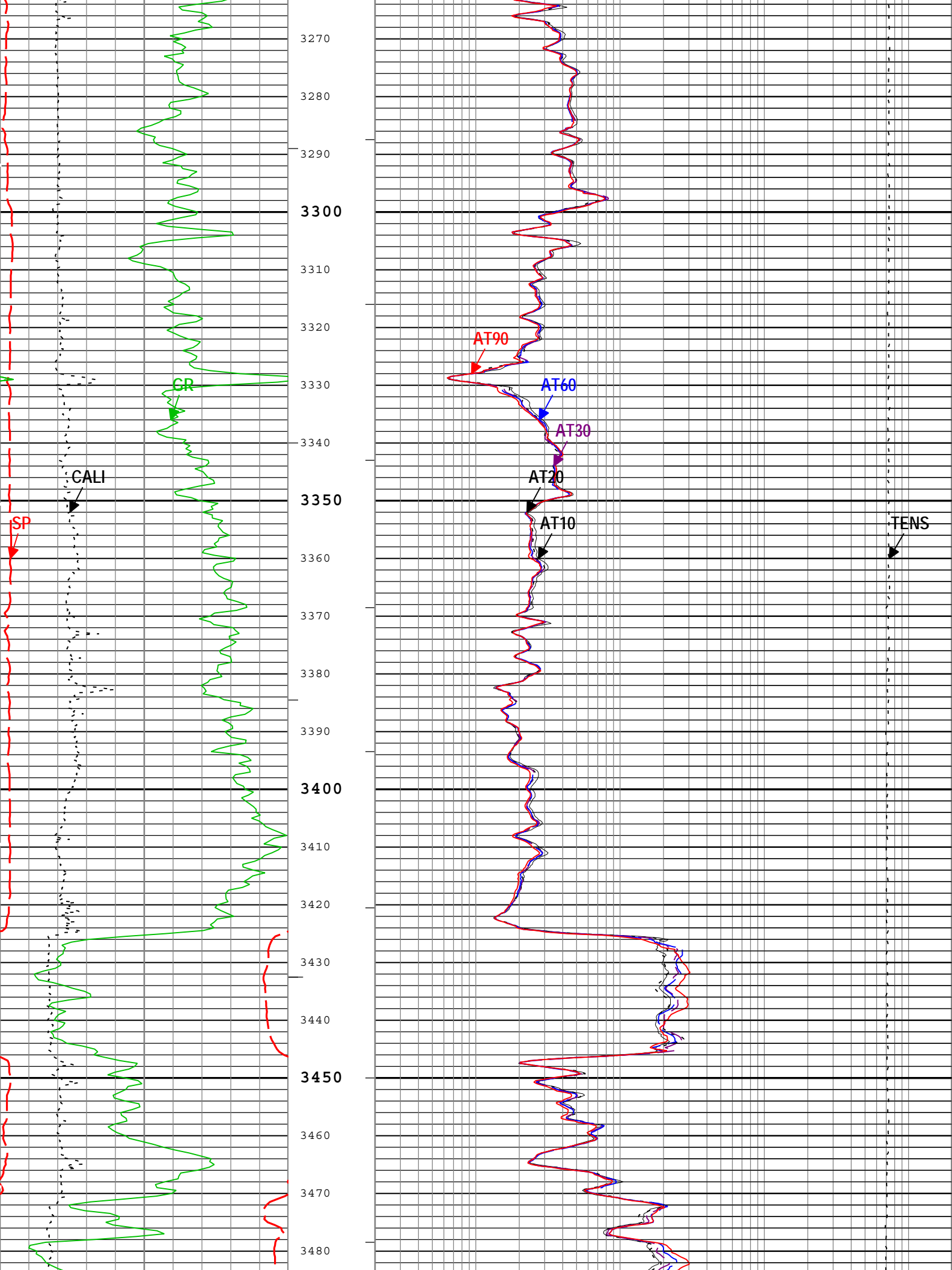


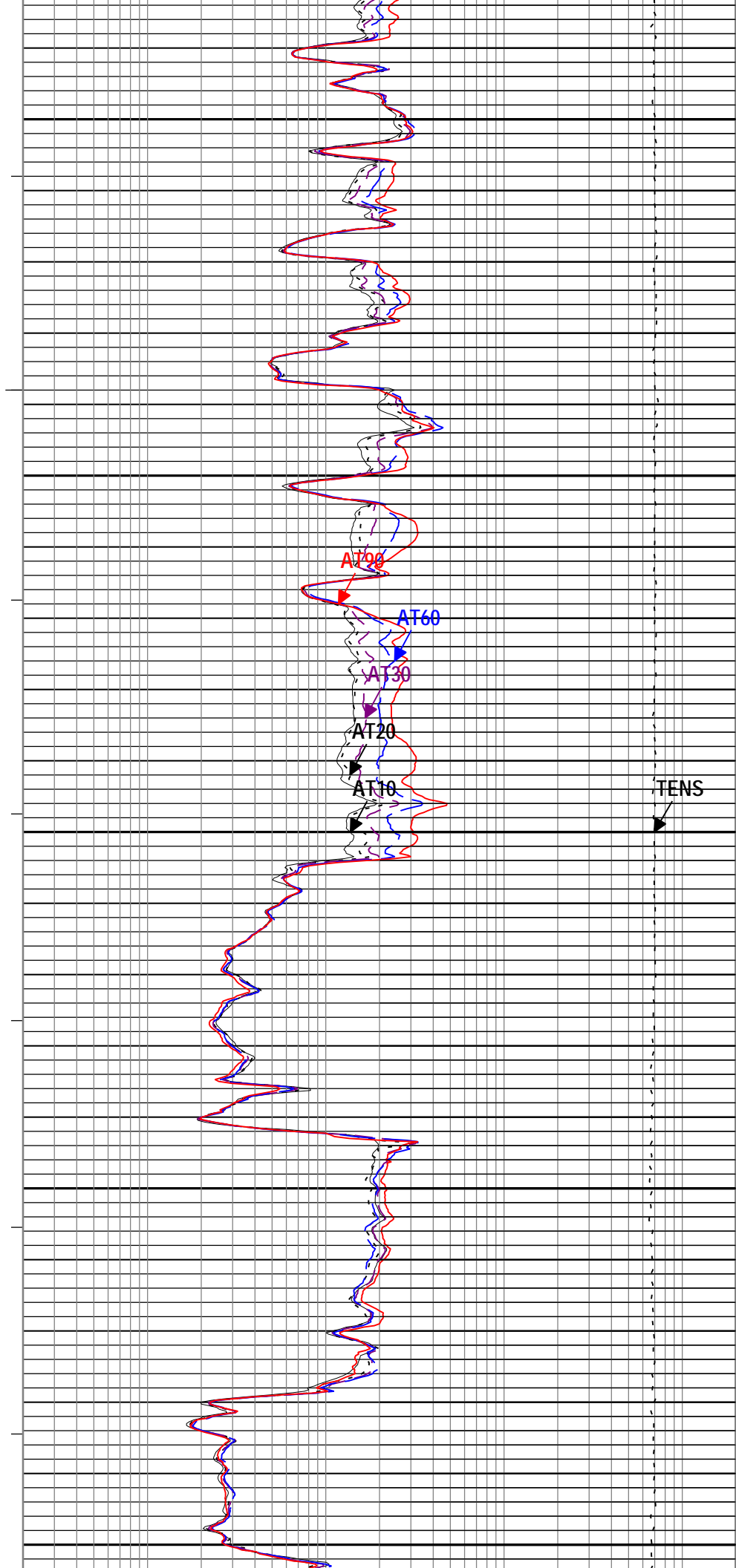
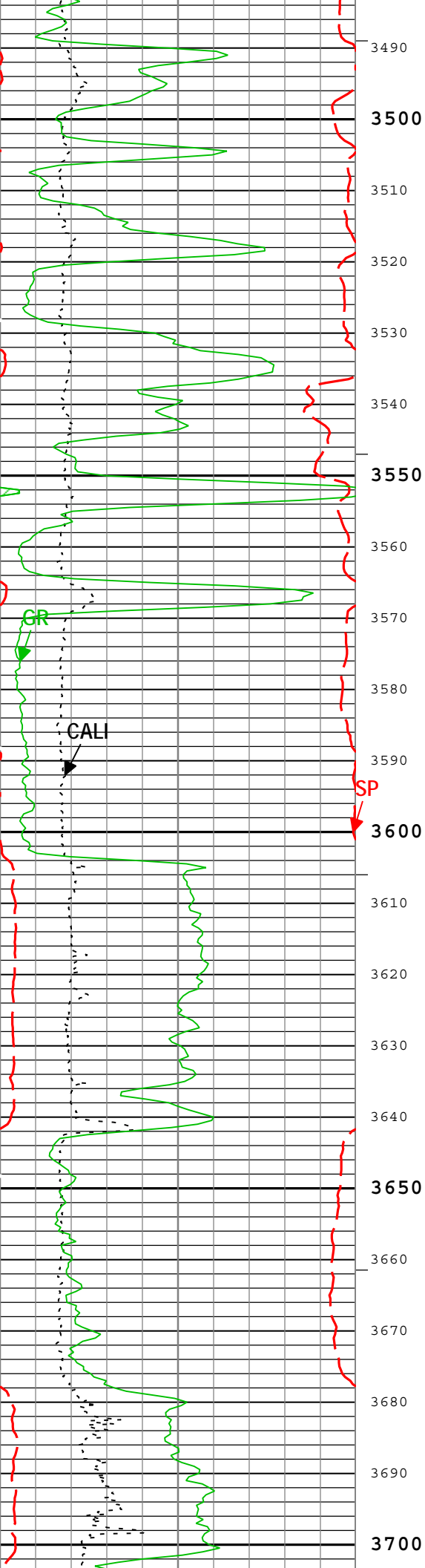


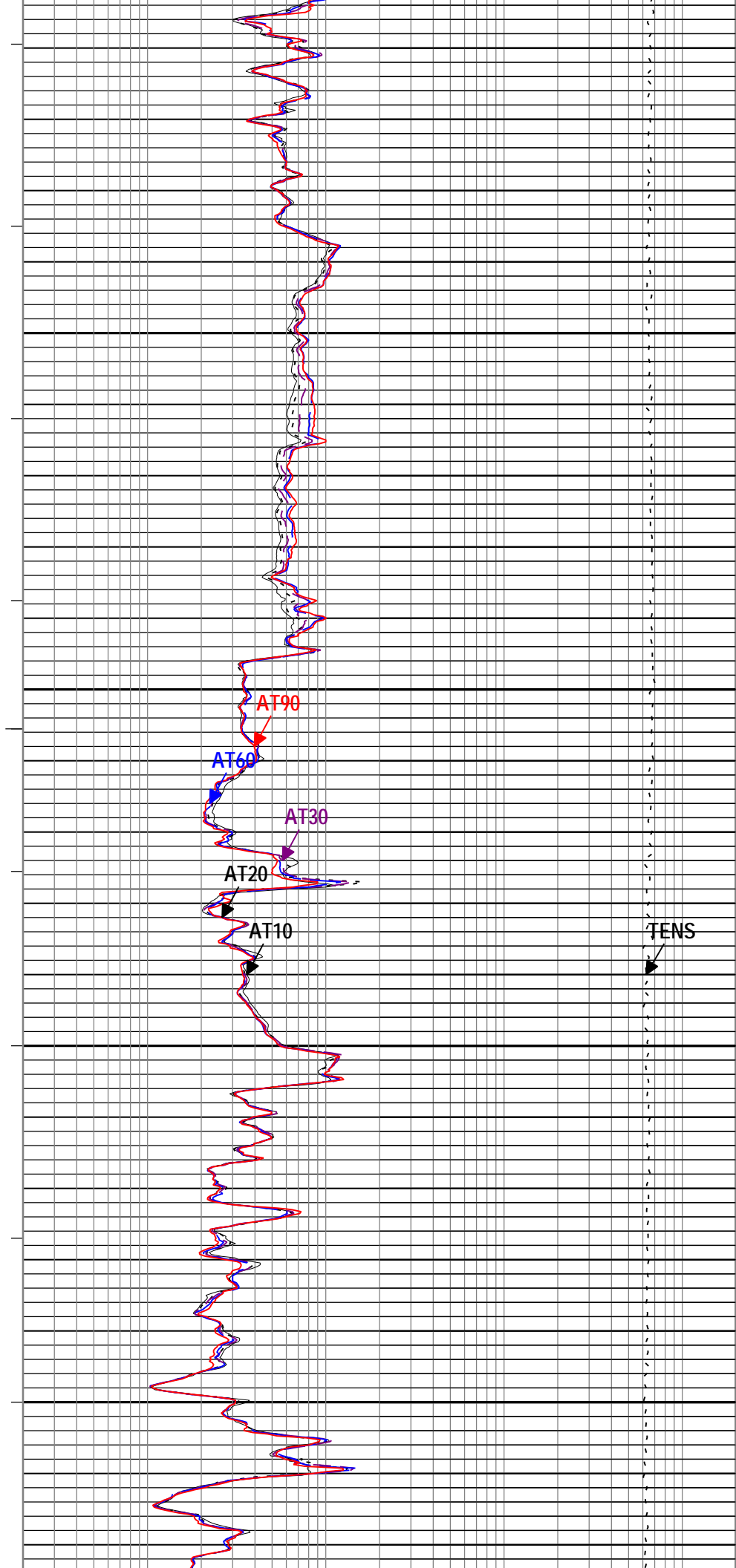
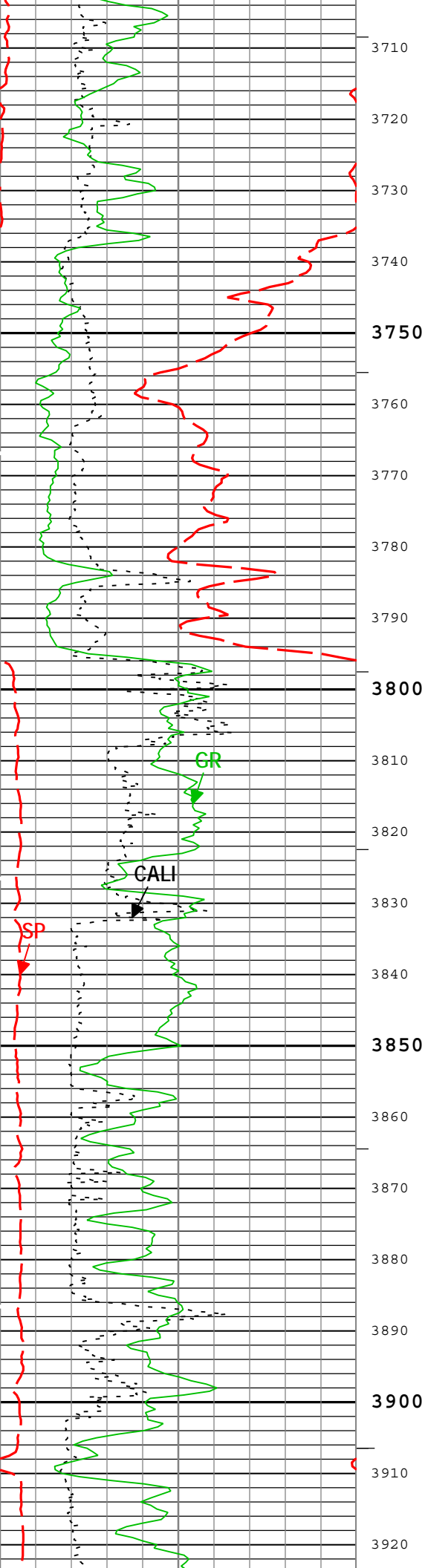


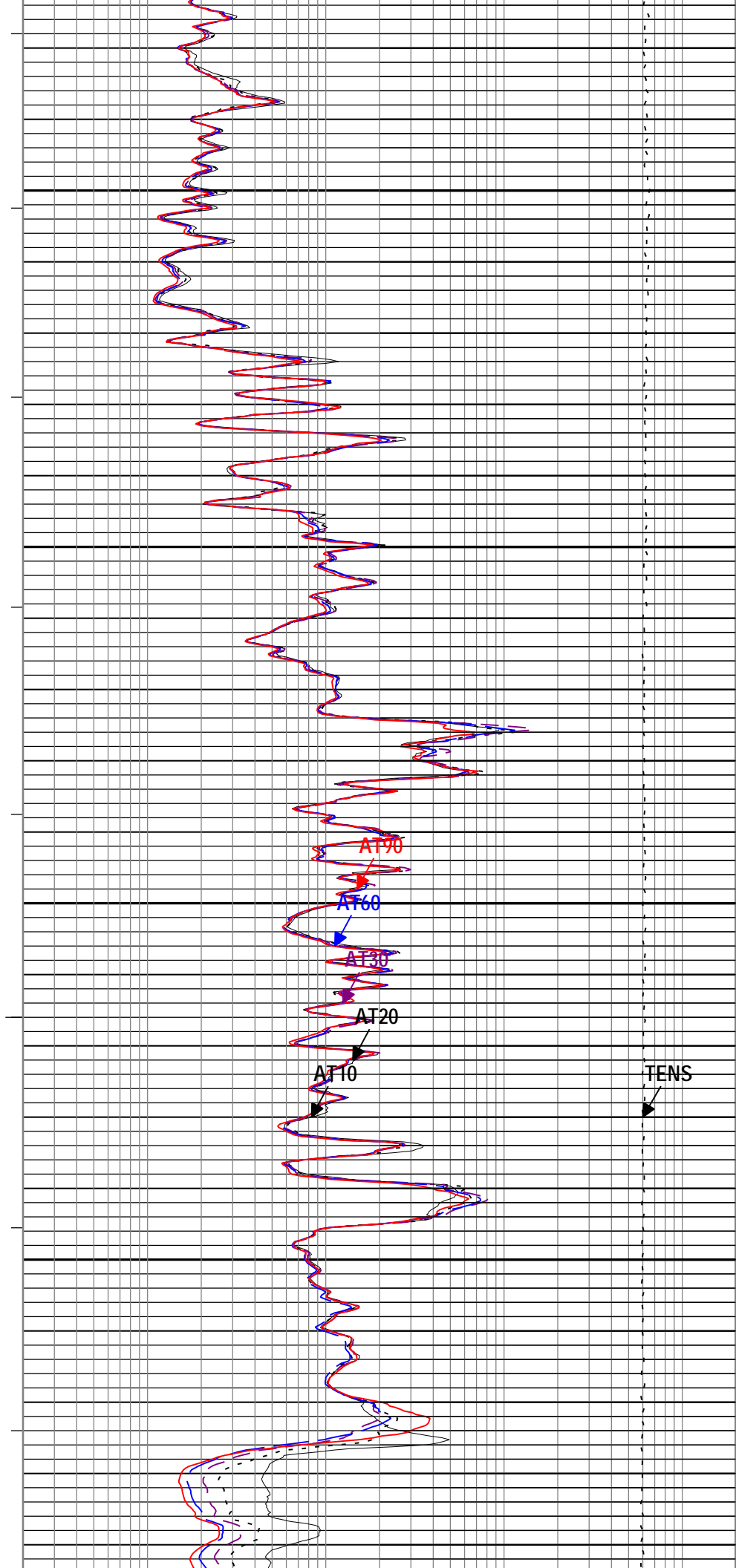
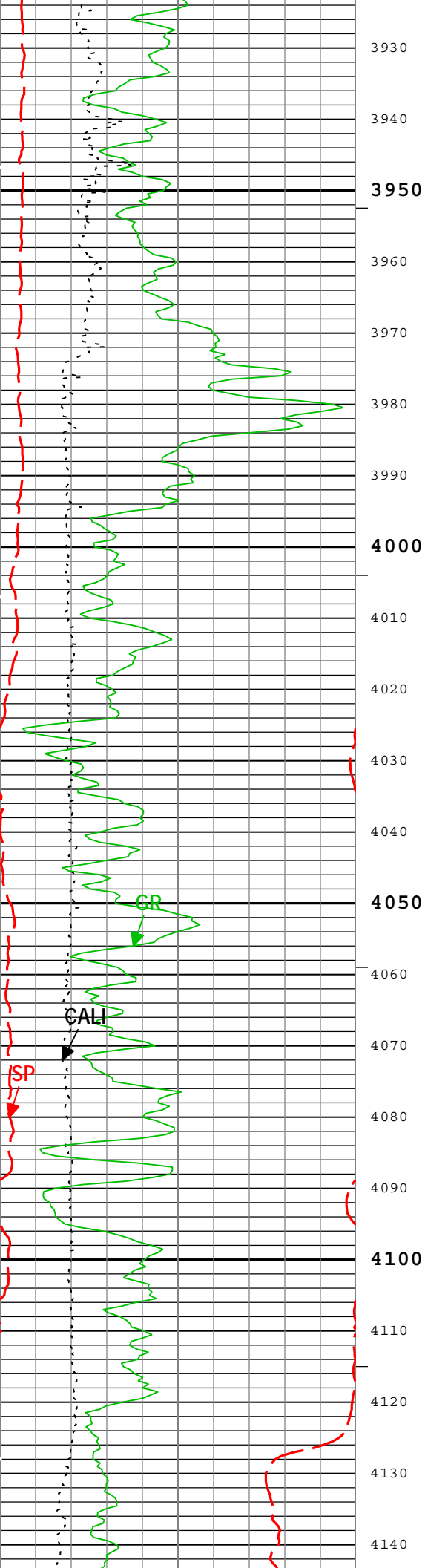


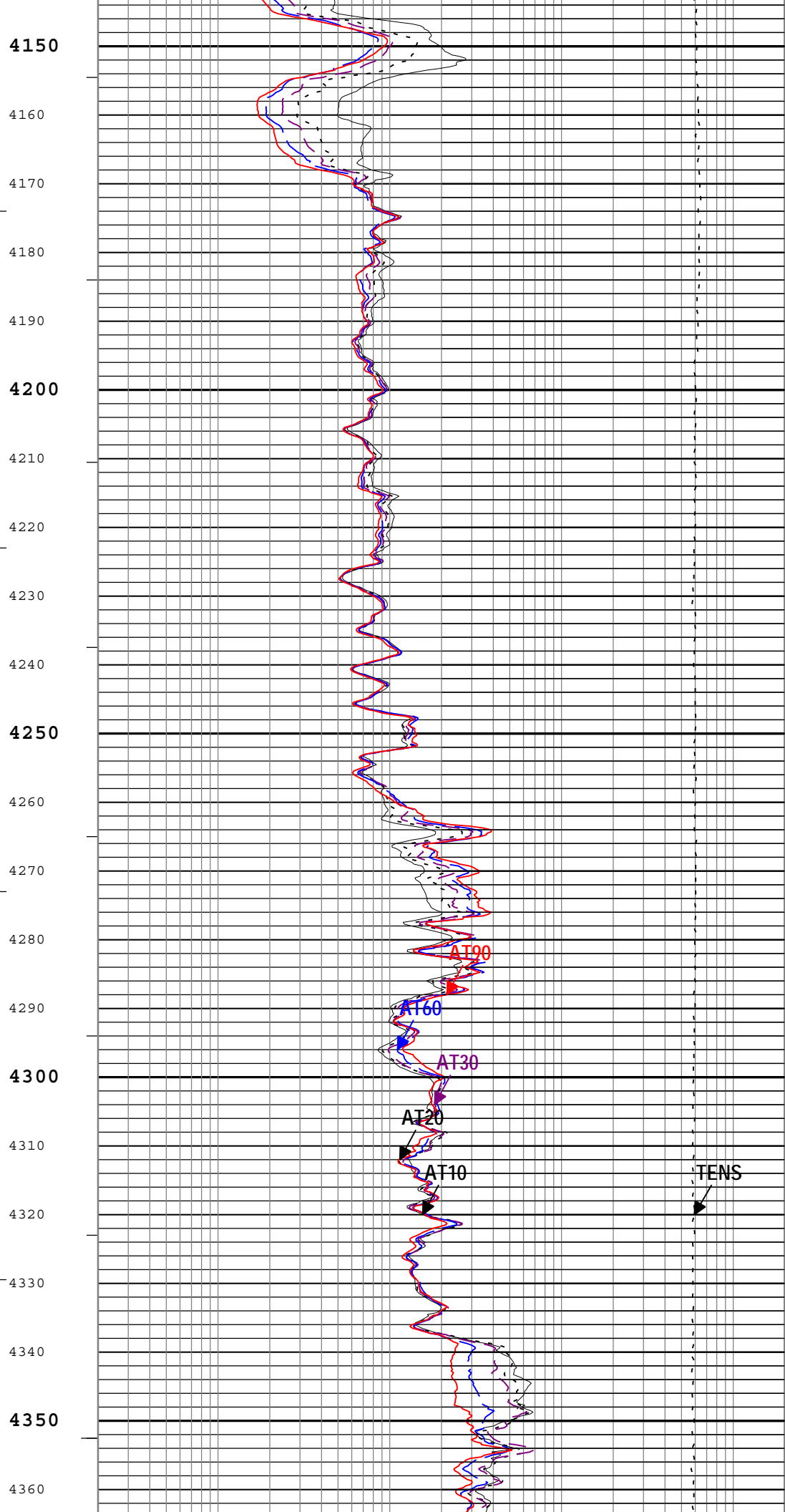
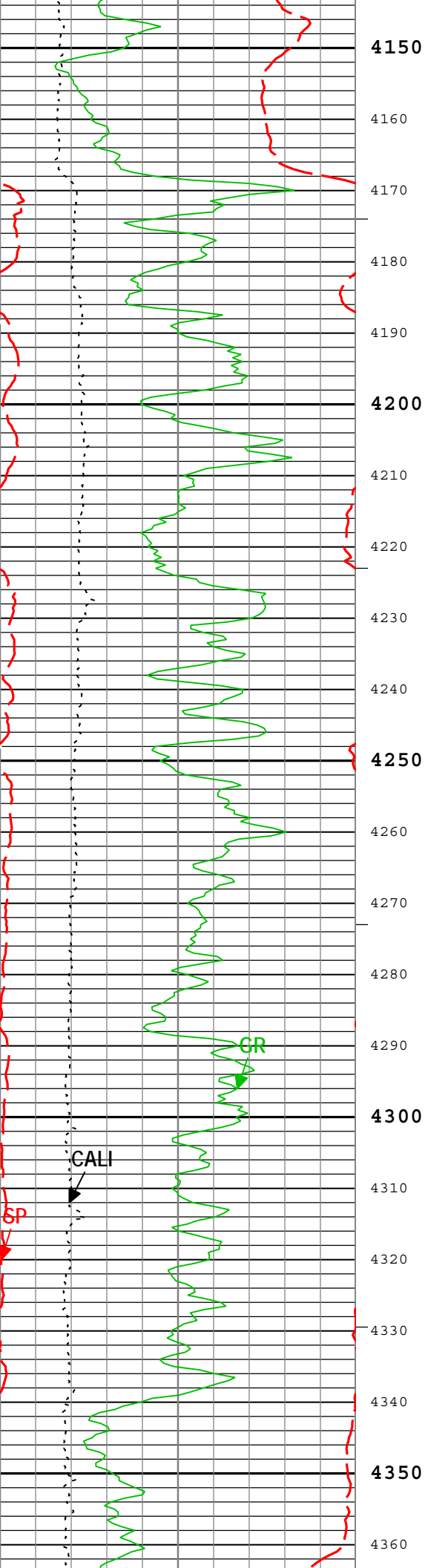


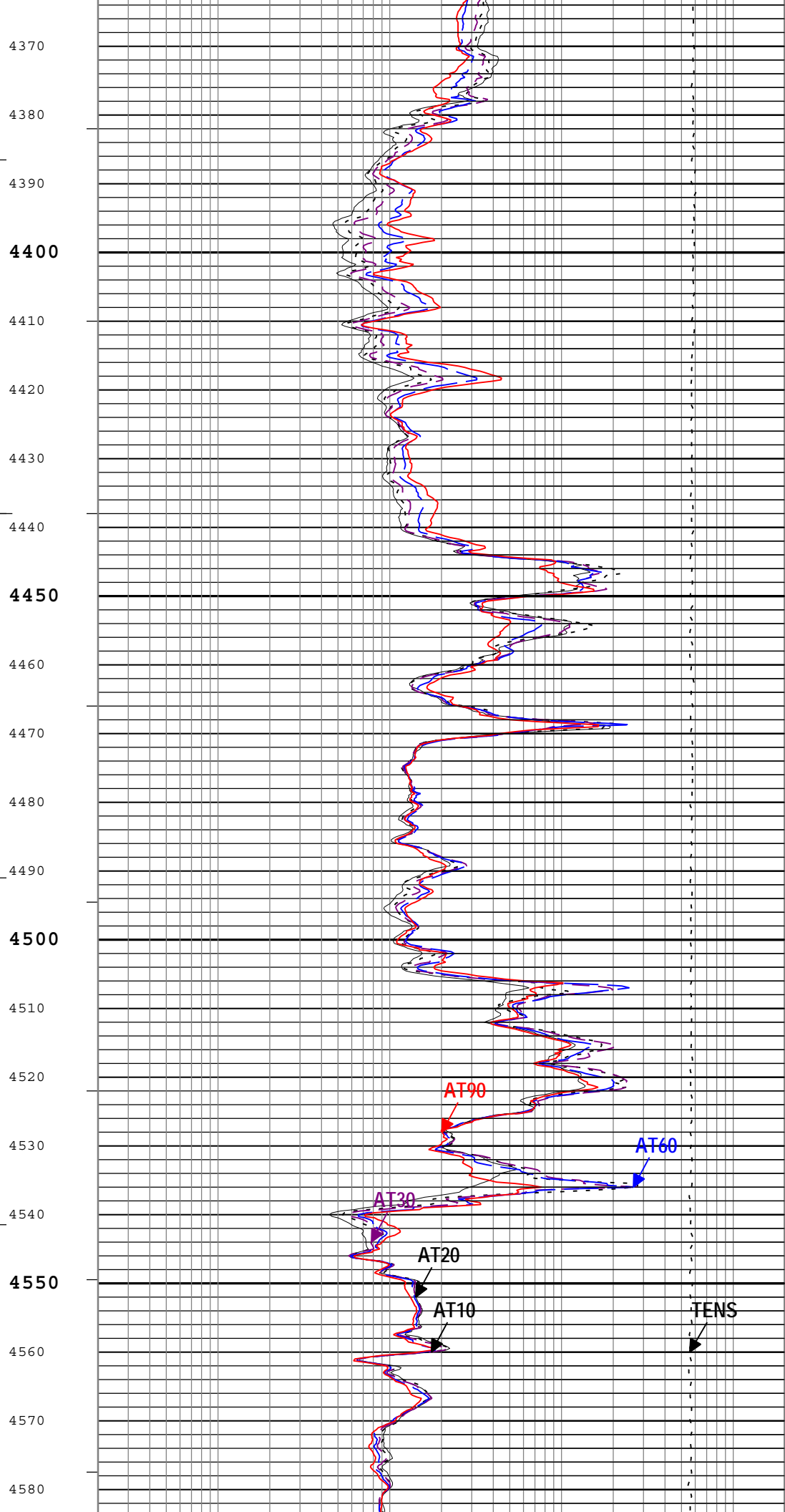
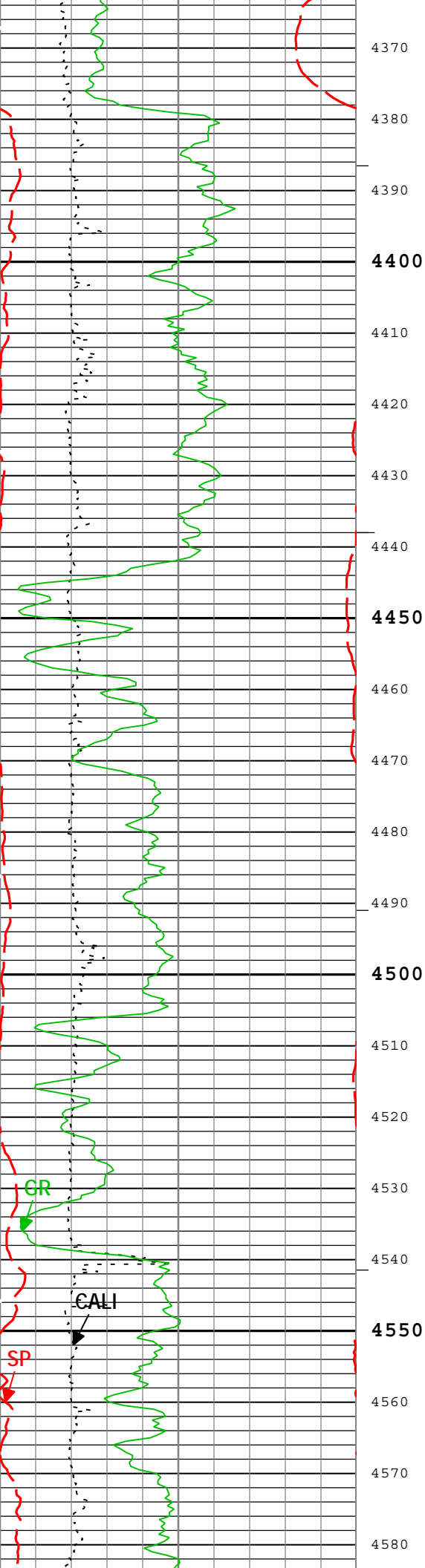


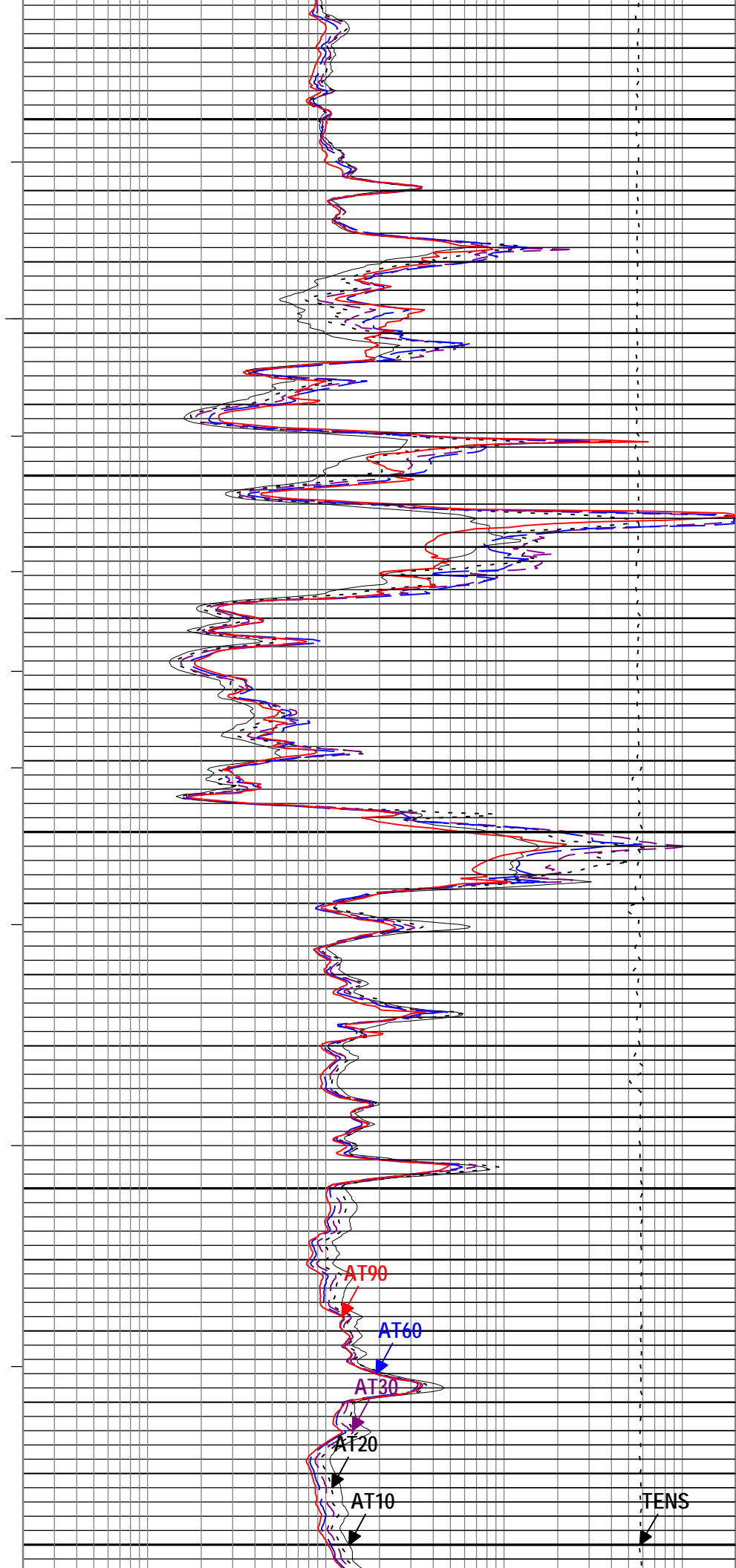
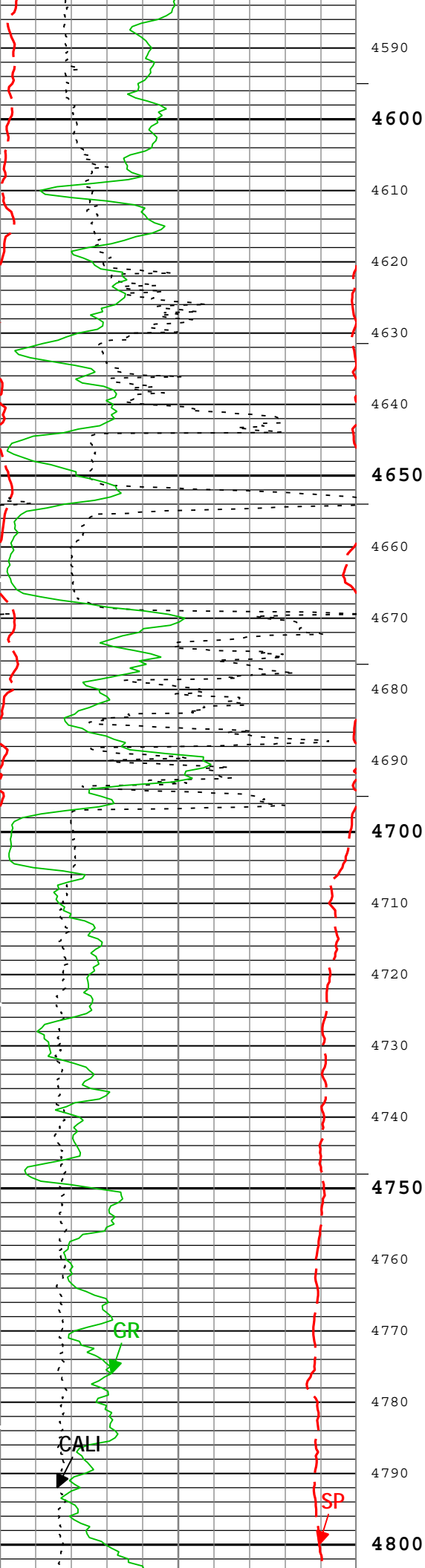


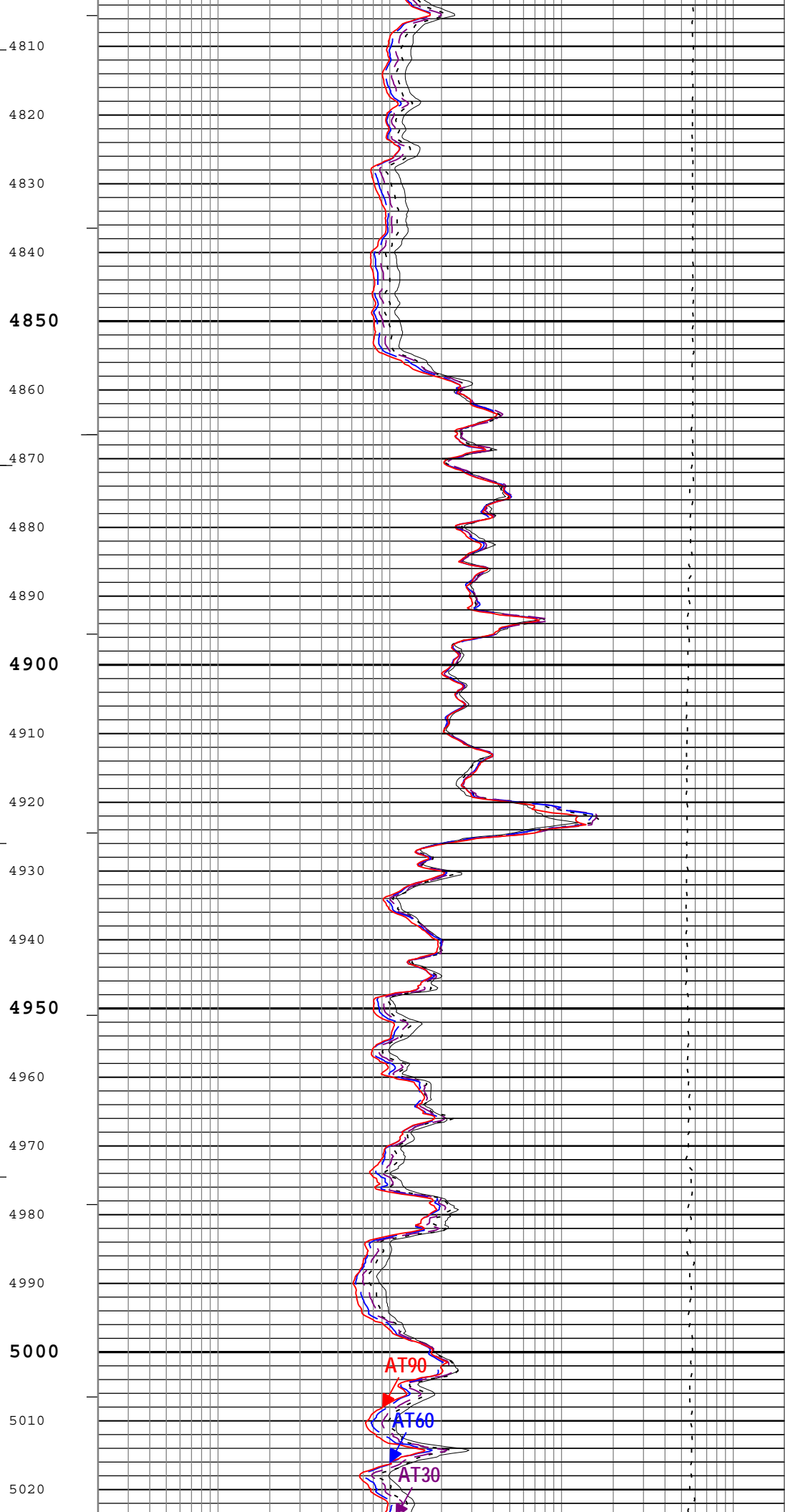
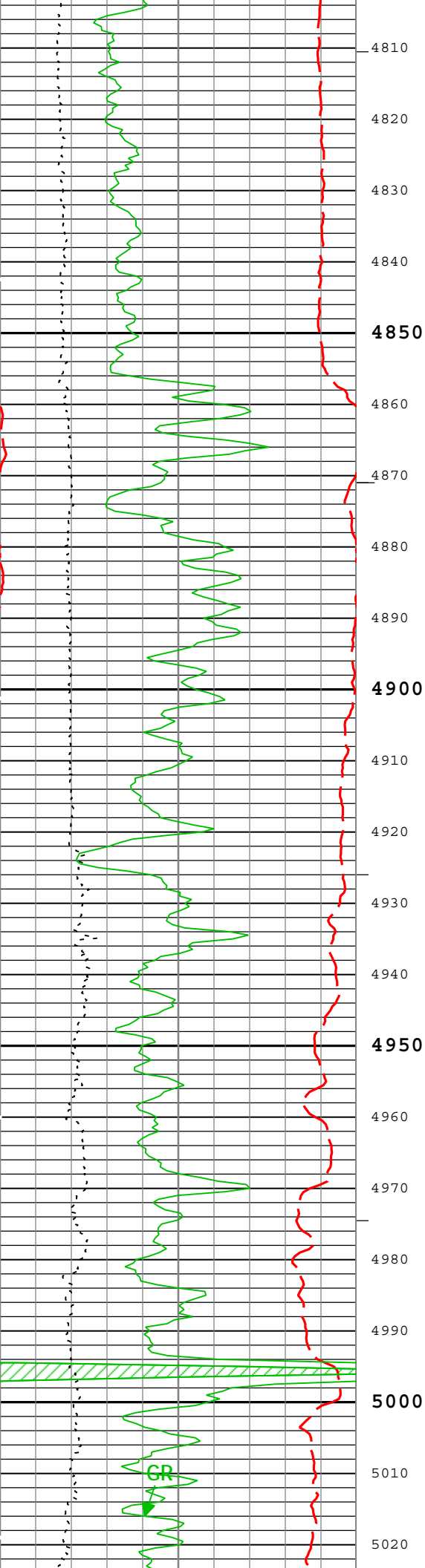


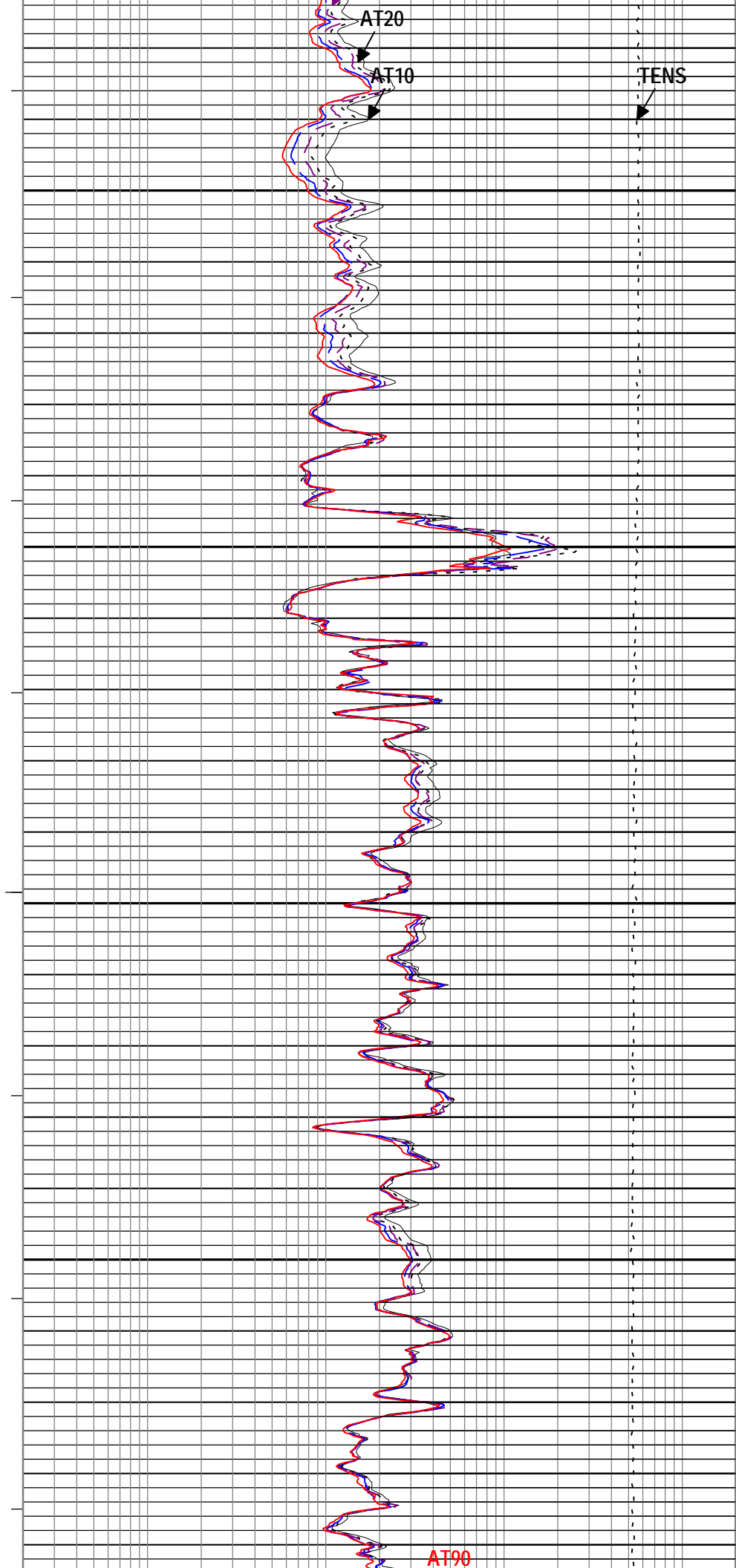
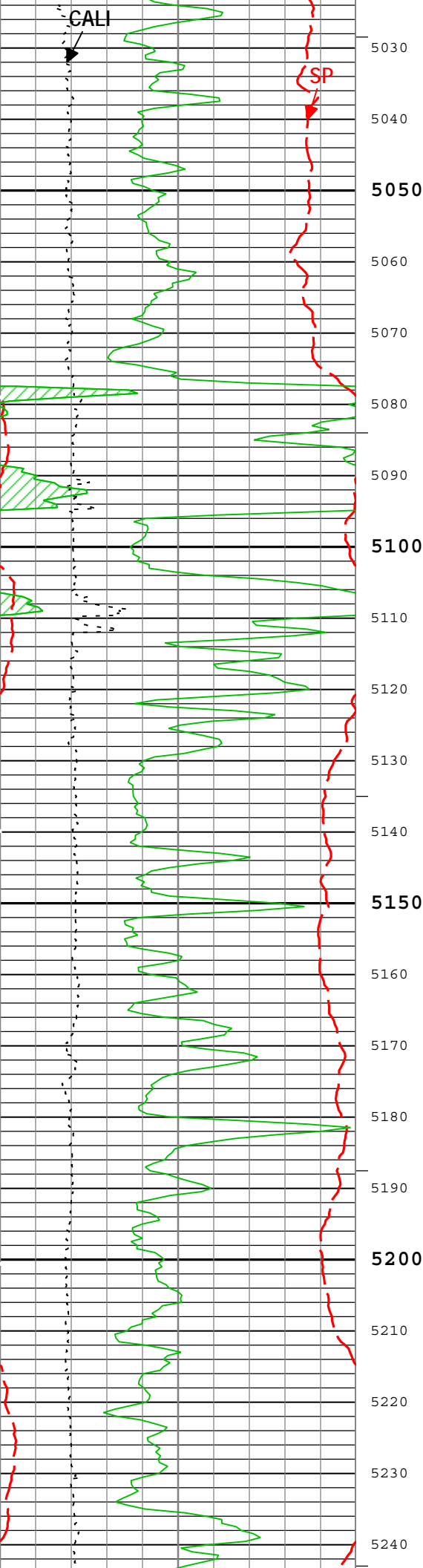


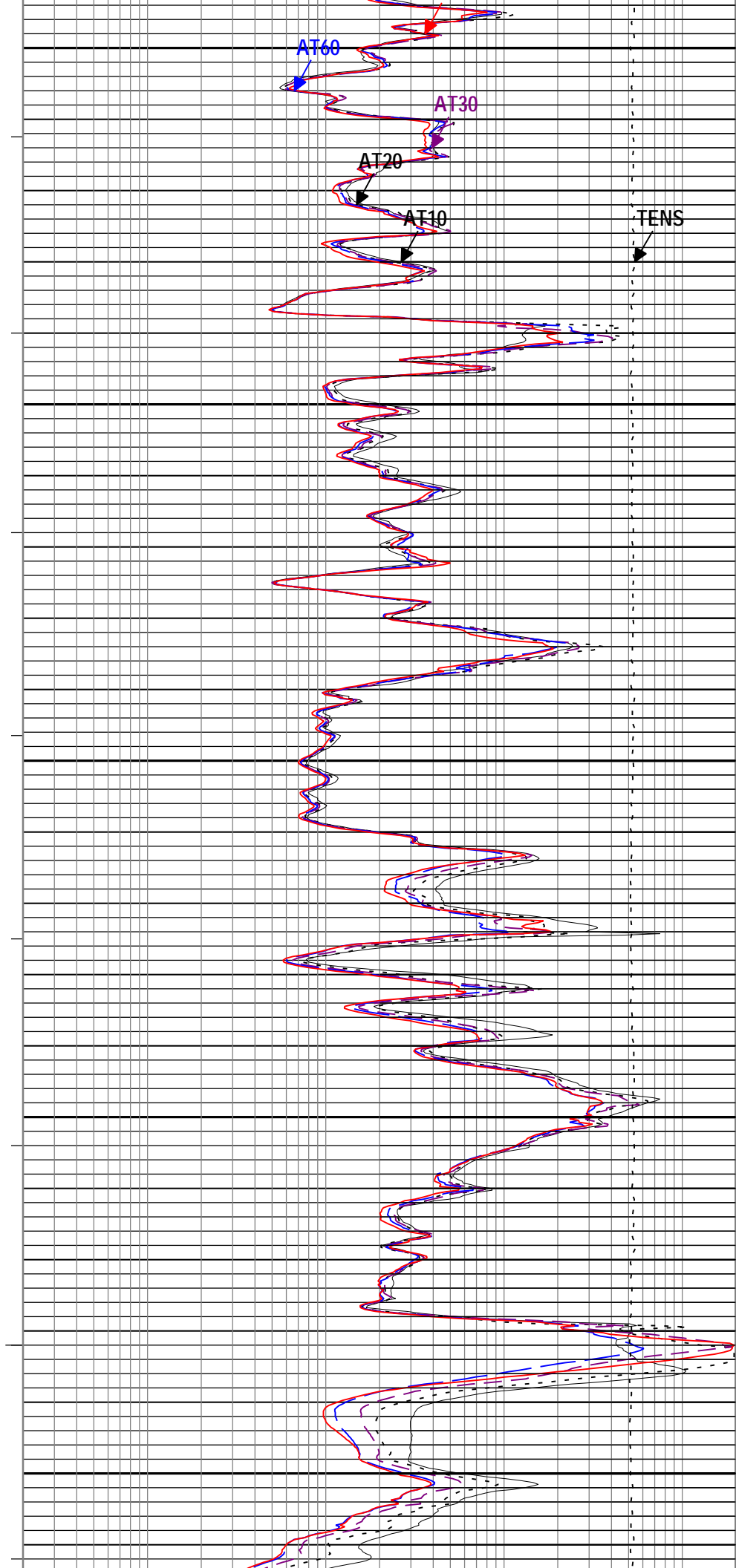
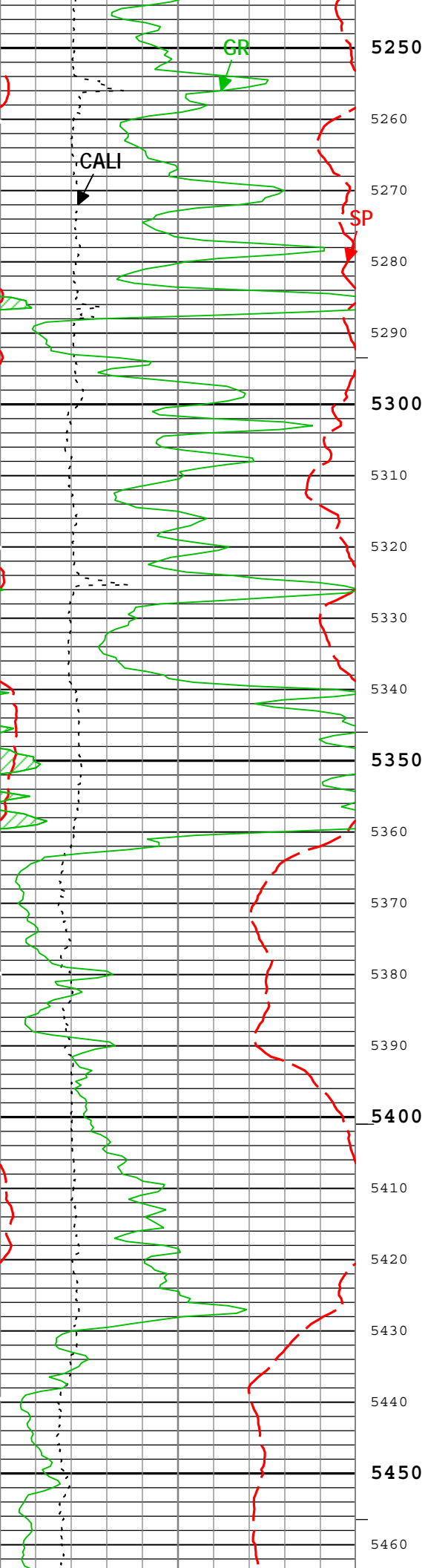


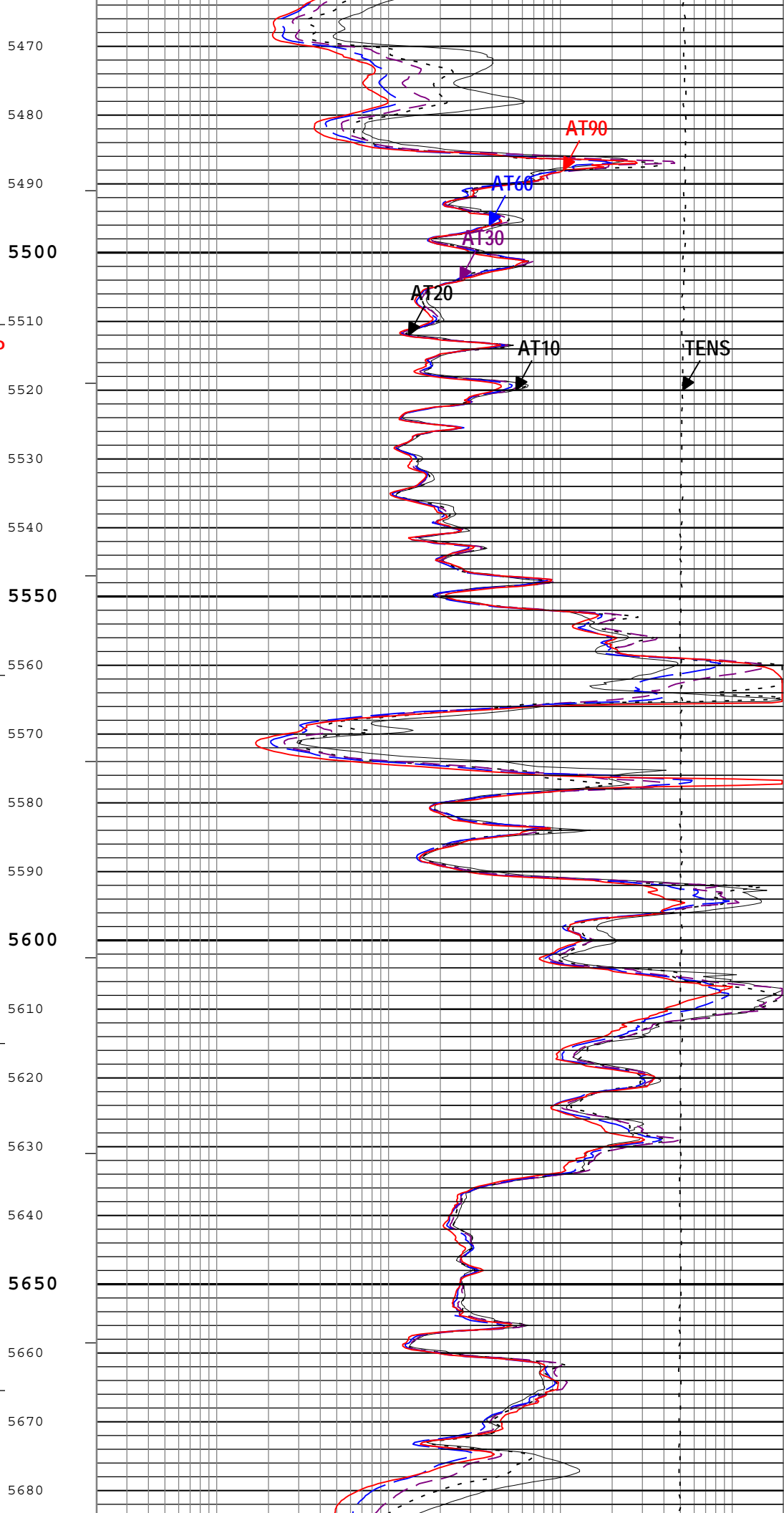
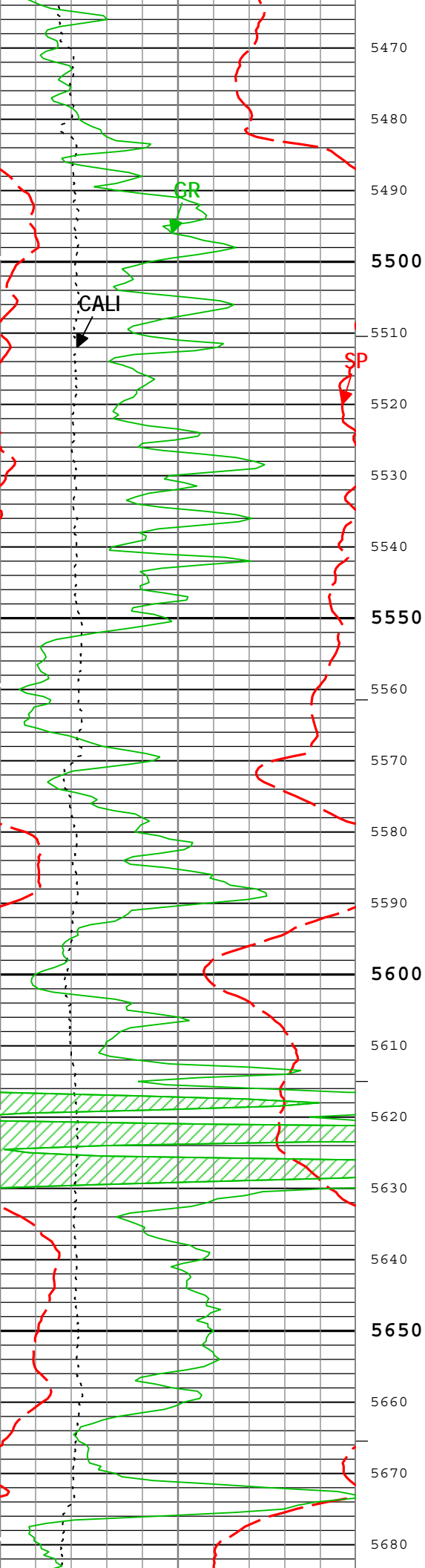


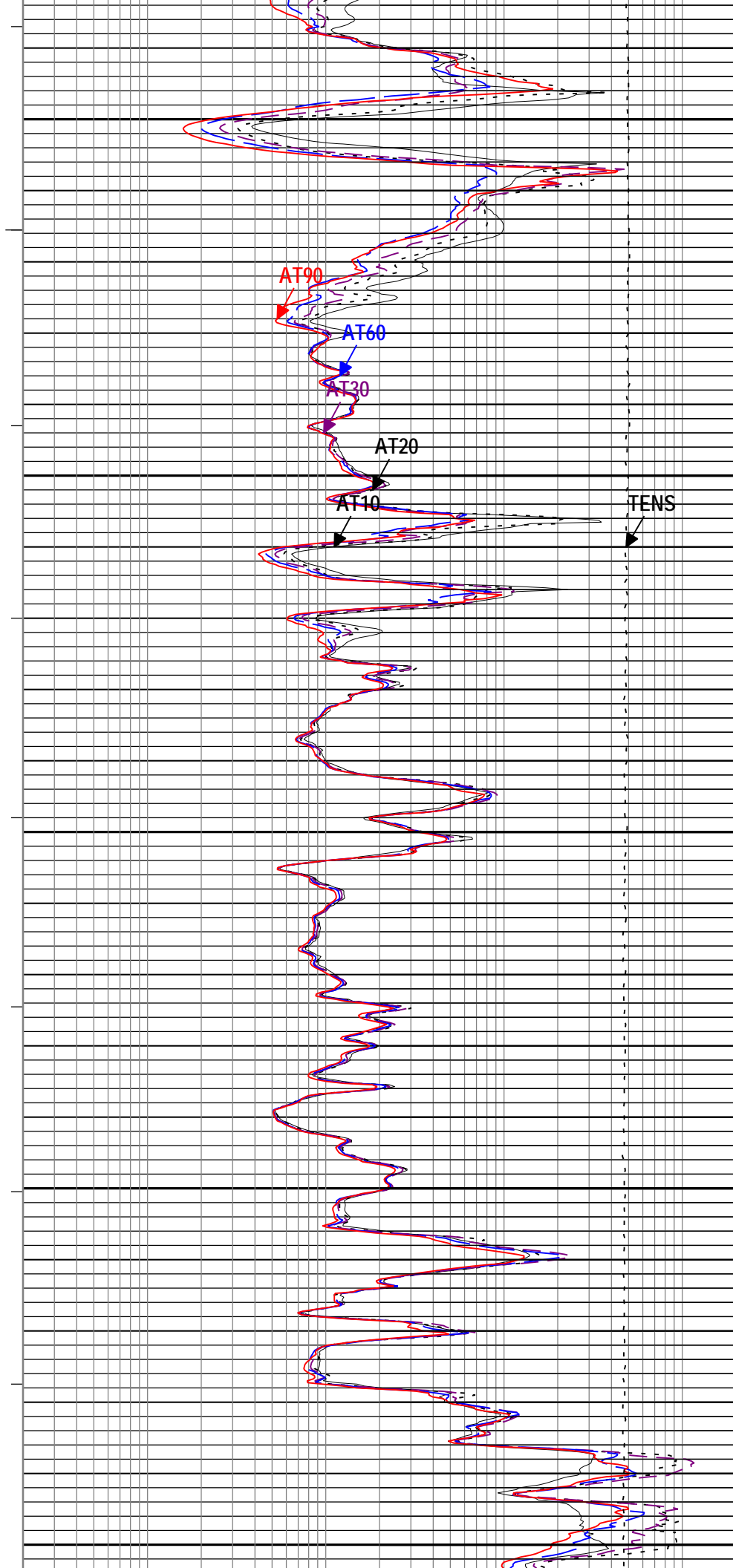
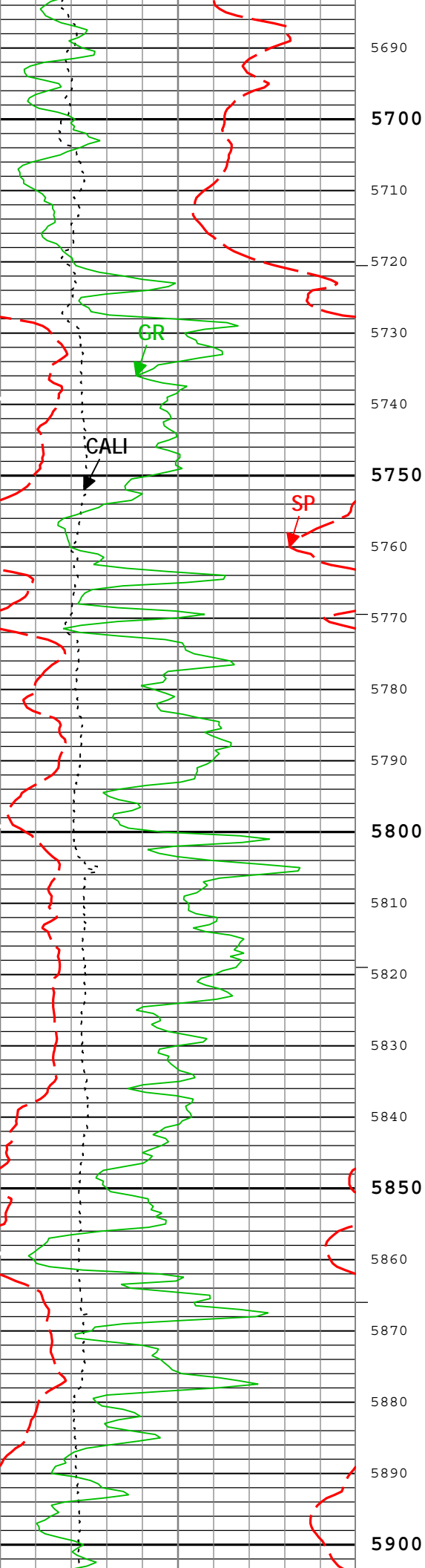


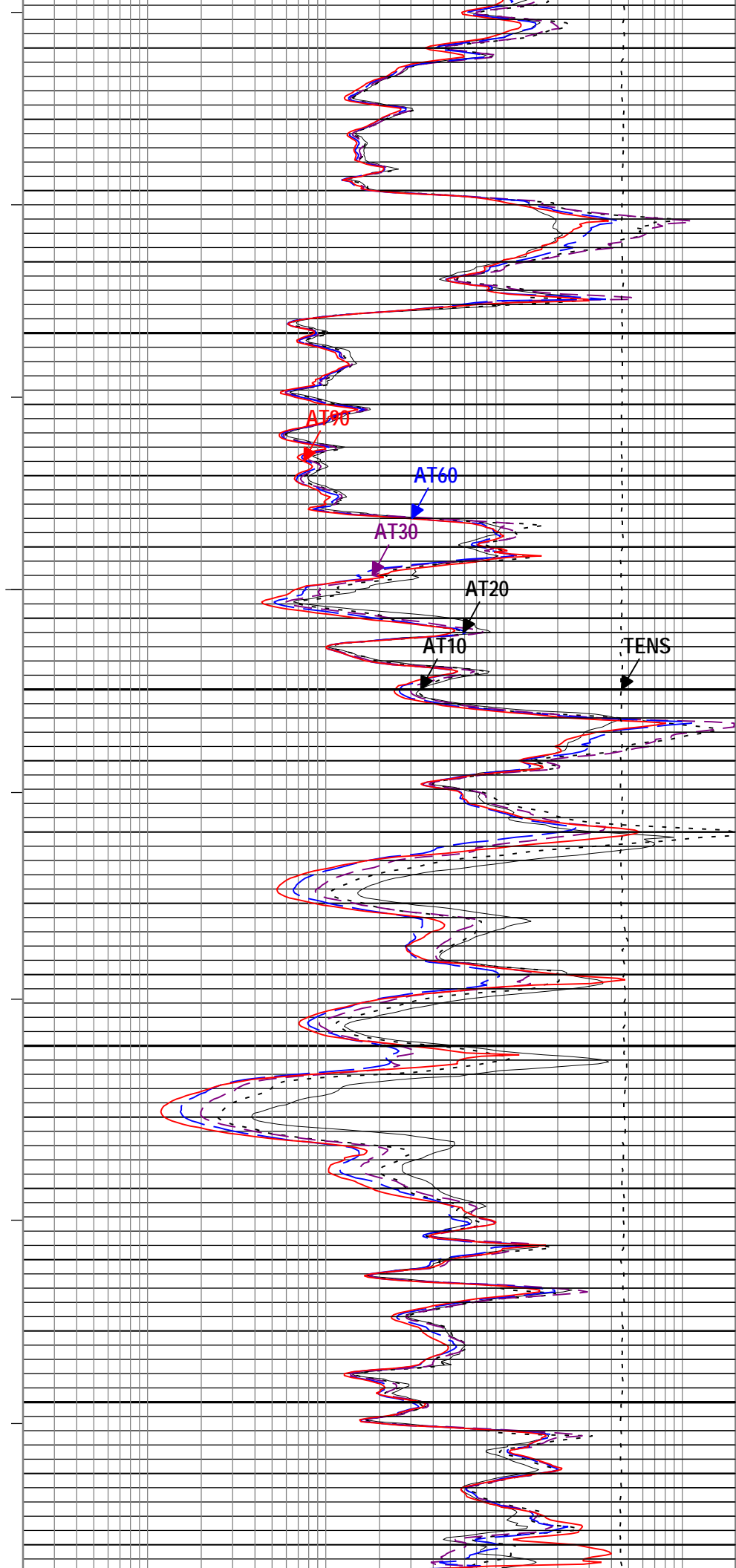
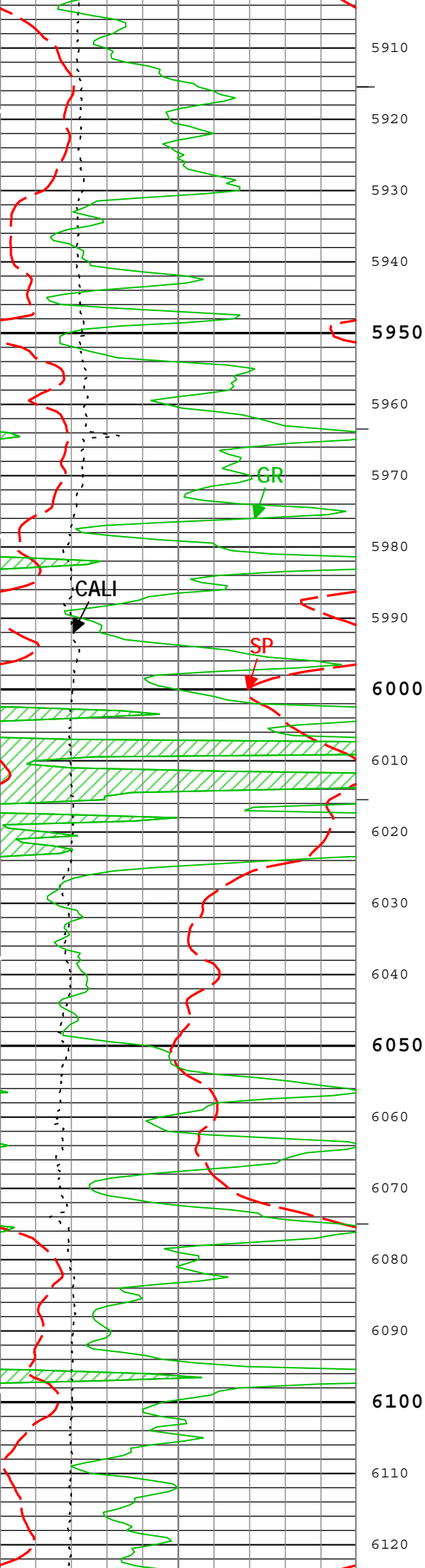


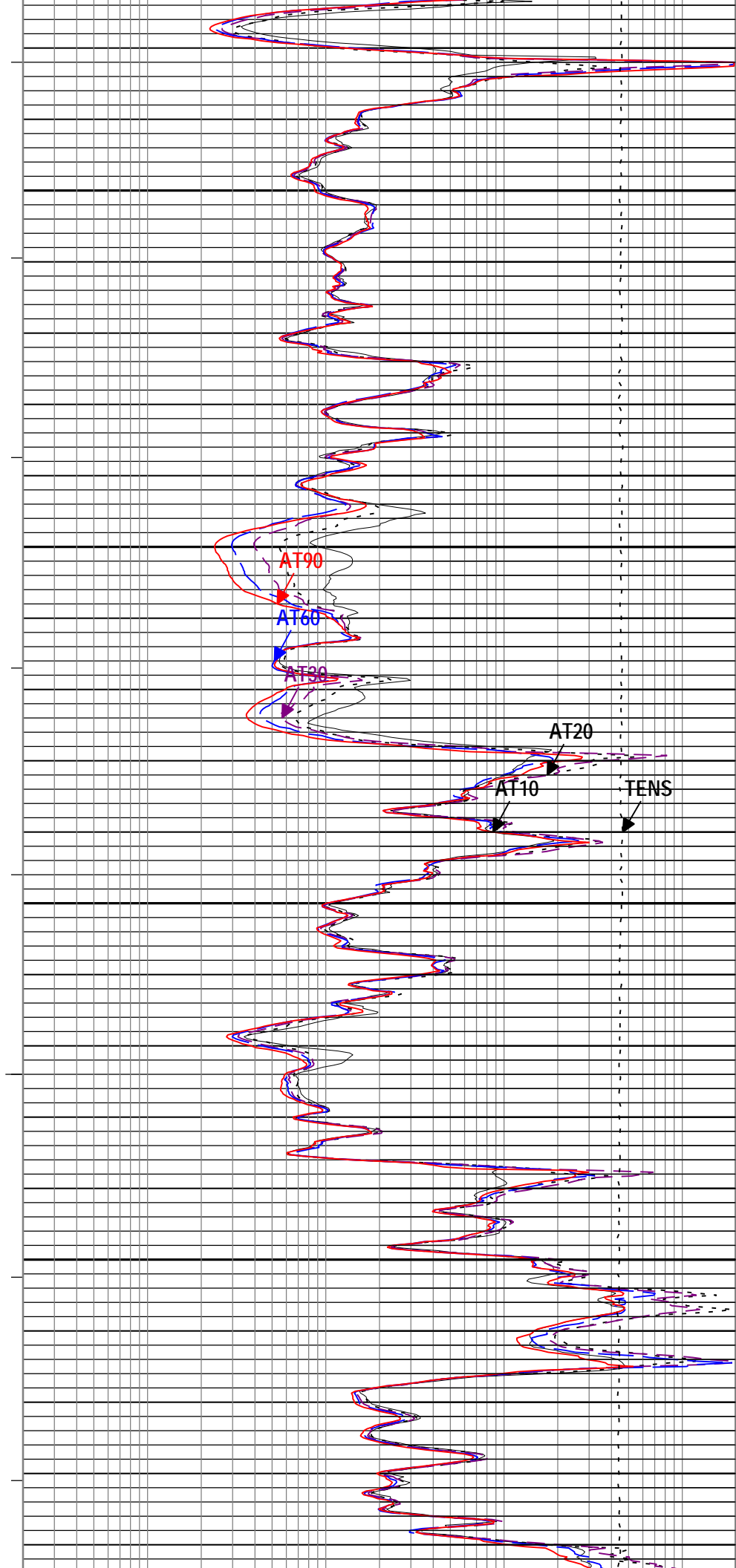
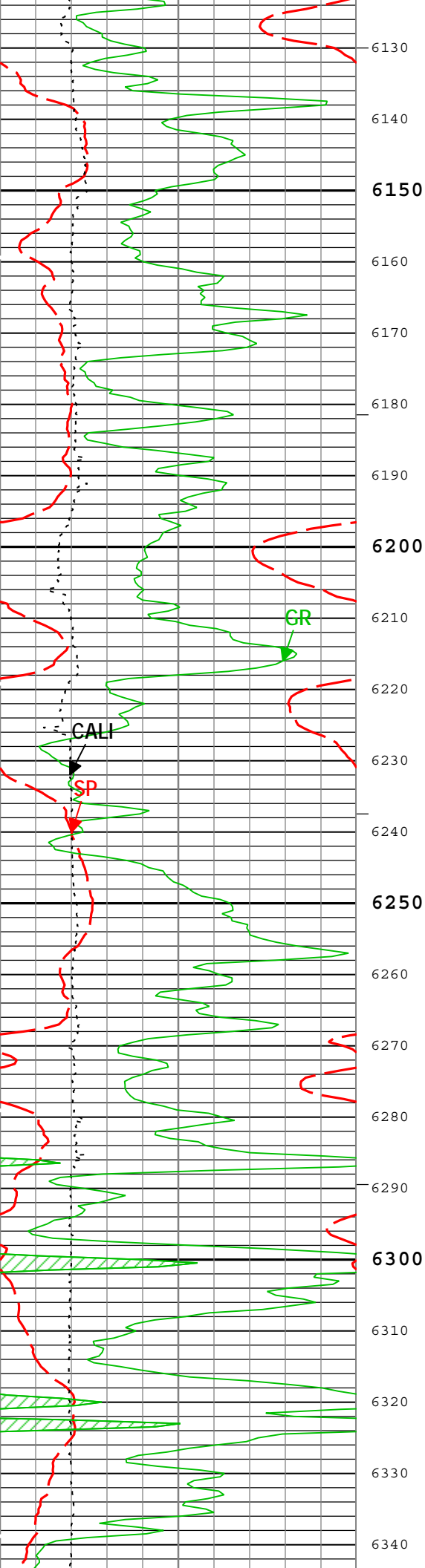


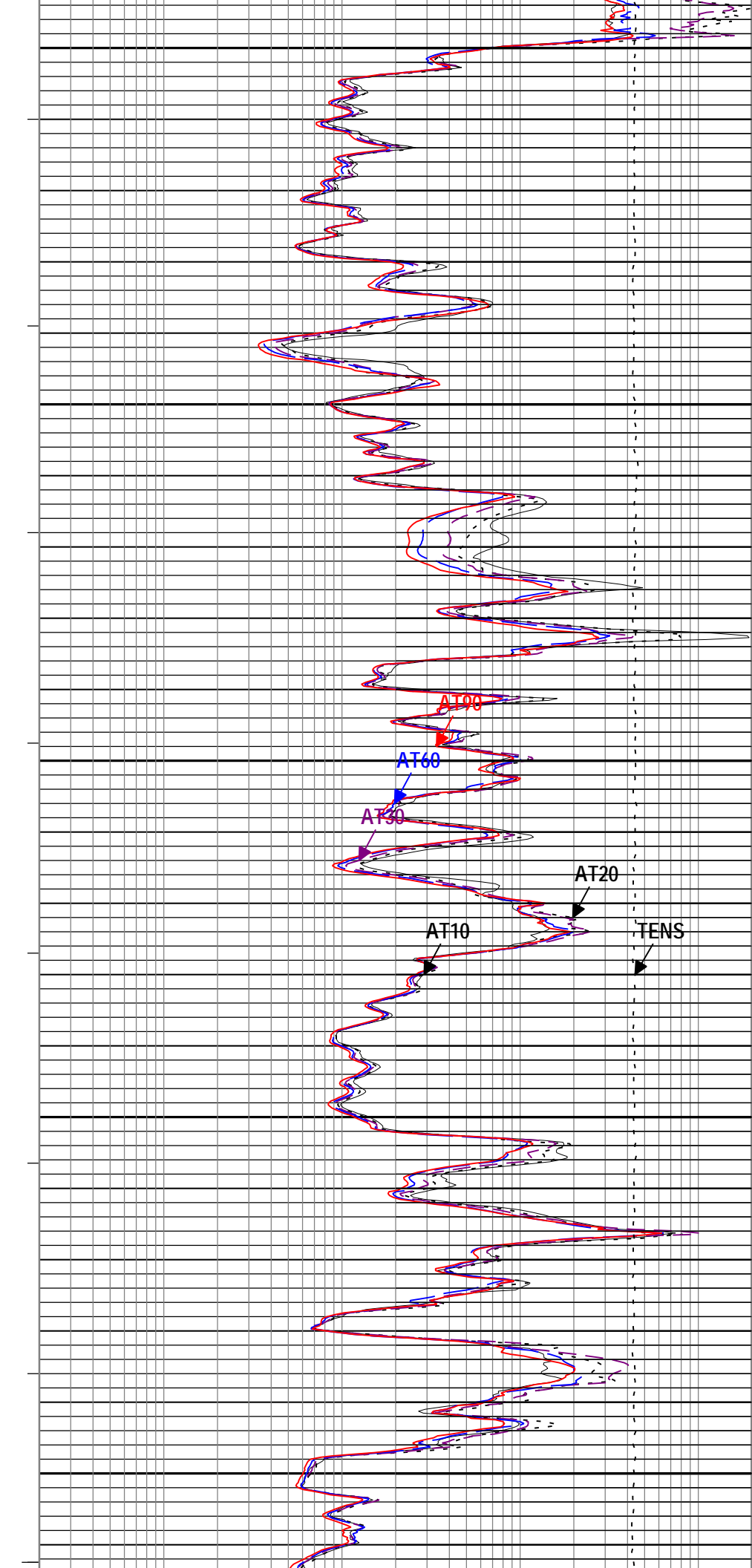
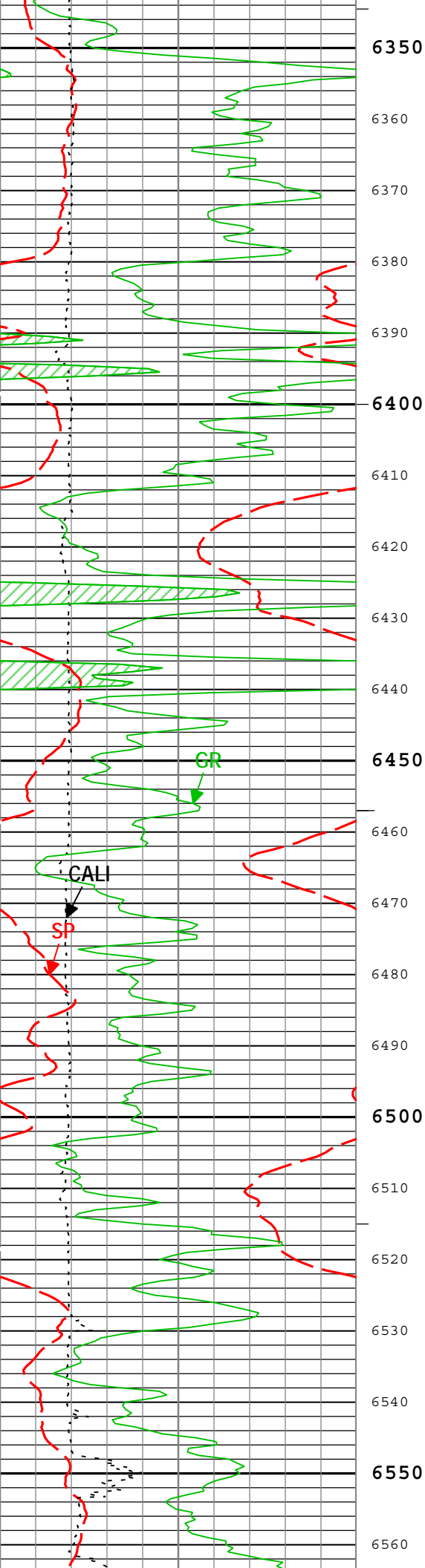


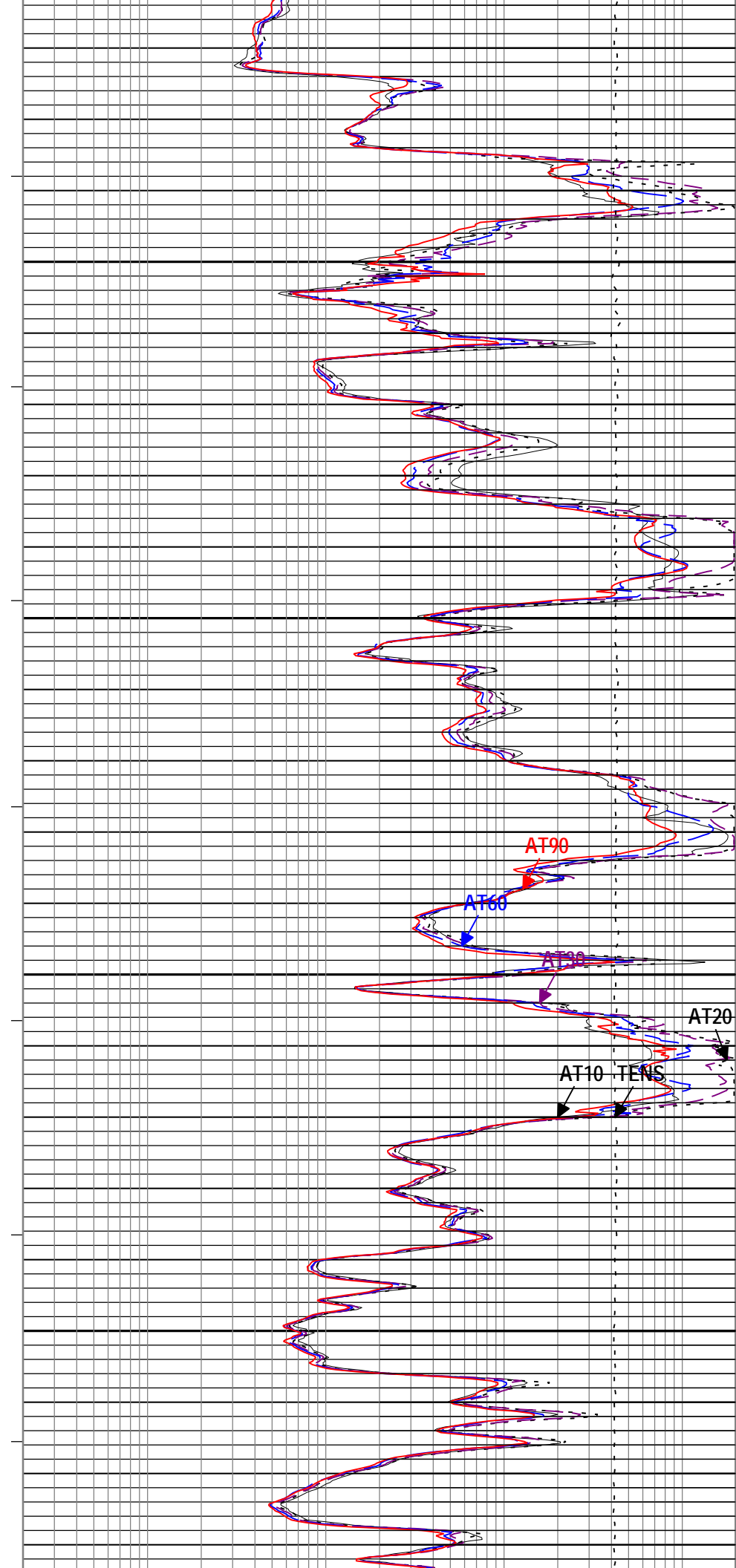
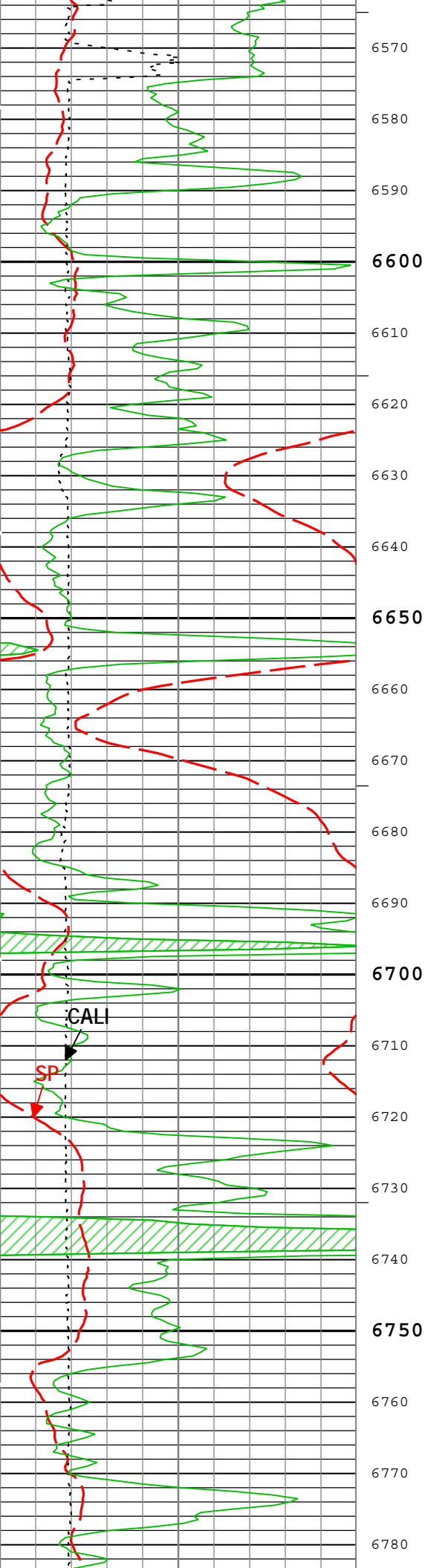


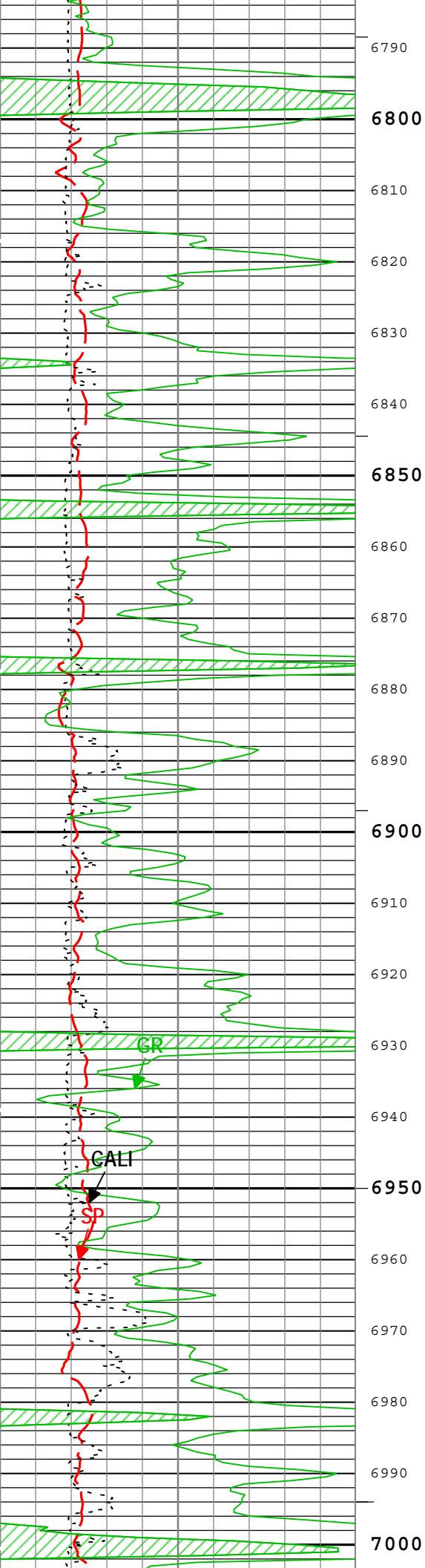












6790

6800

6810

6820

6830

6840

6850

6860

6870

6880

6890

6900

6910

6920

6930

6940

6950

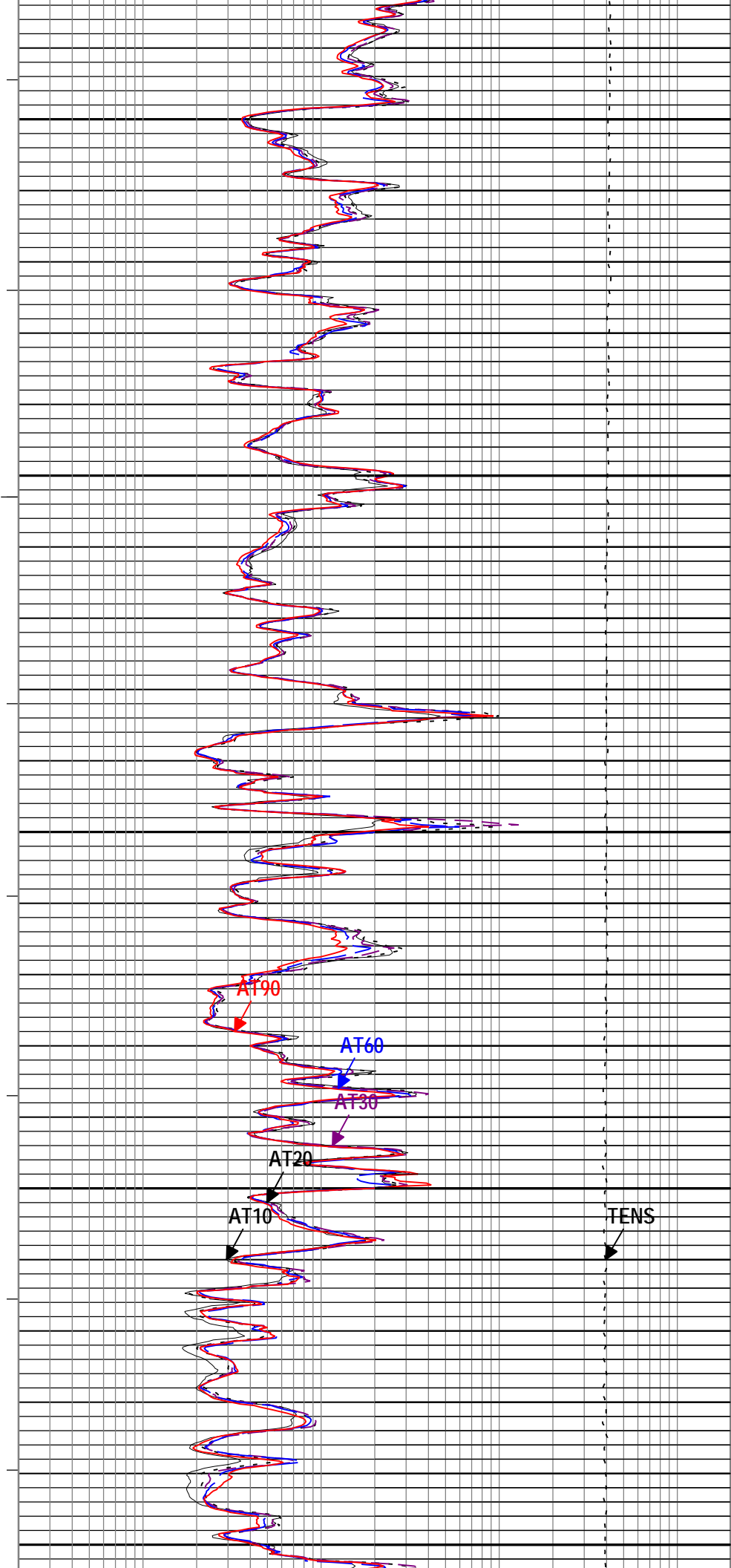
6960

6970

6980

6990

7000



AT90

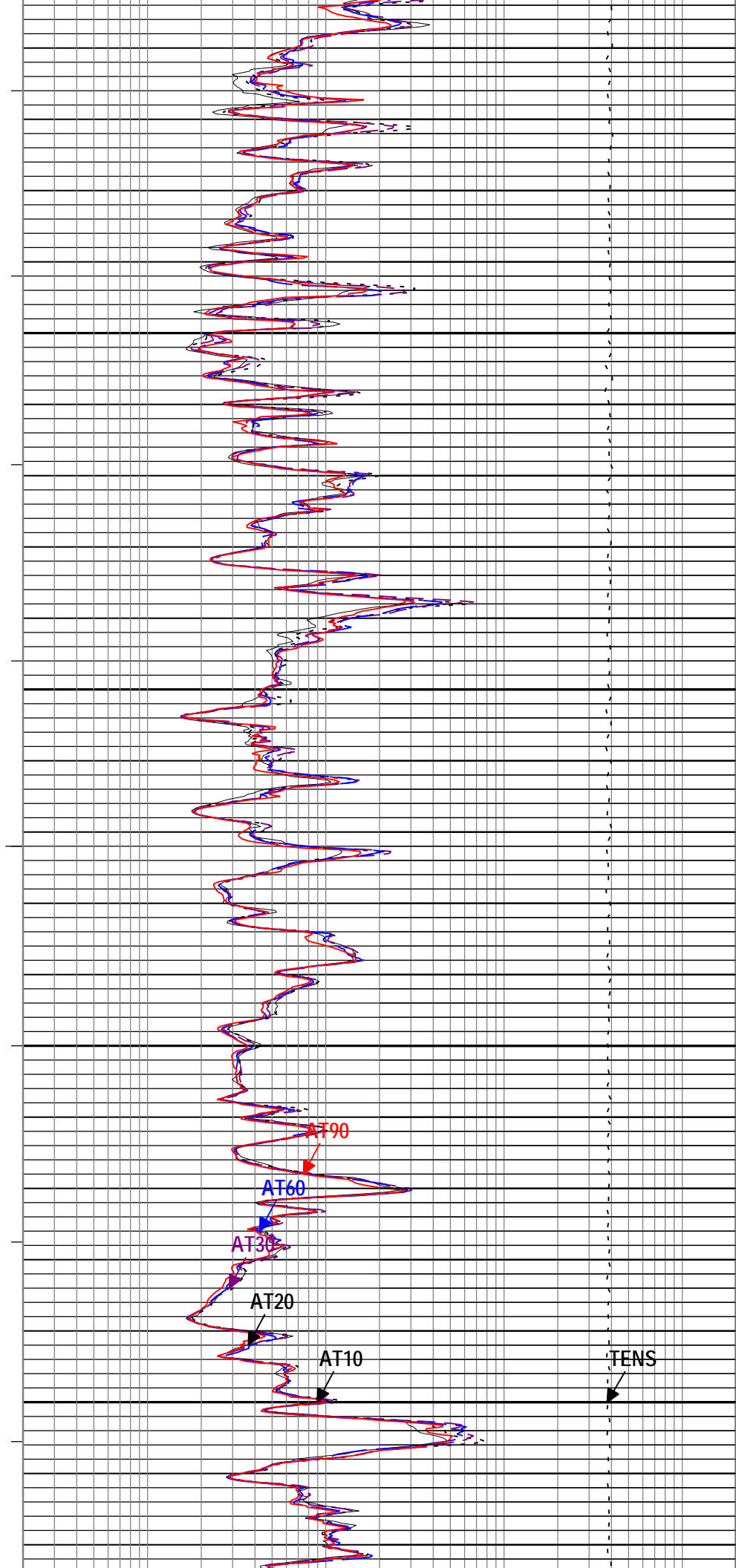
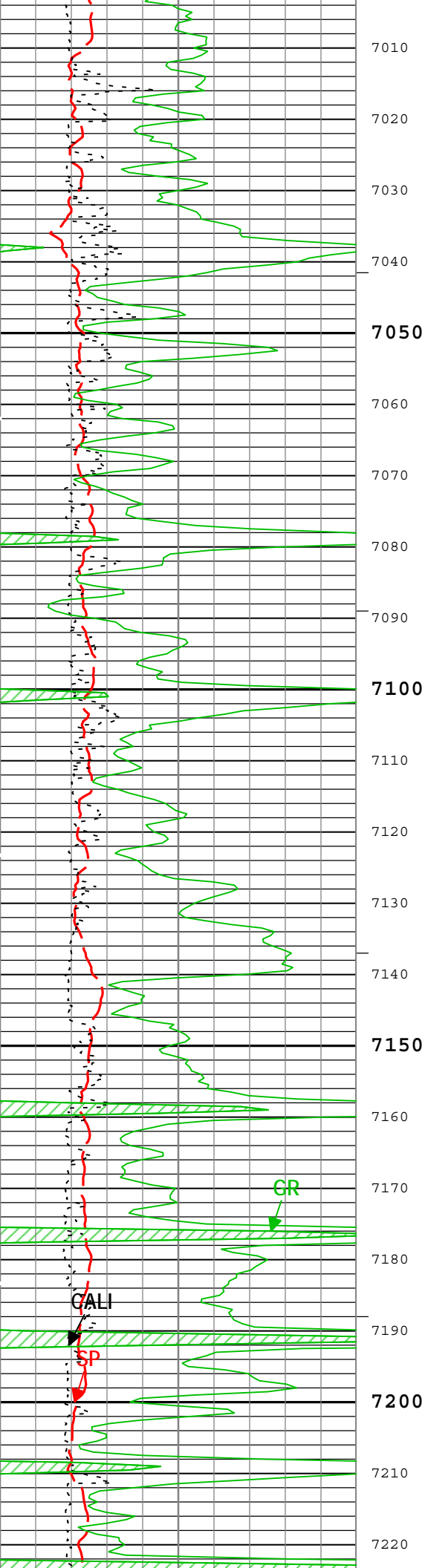
AT60

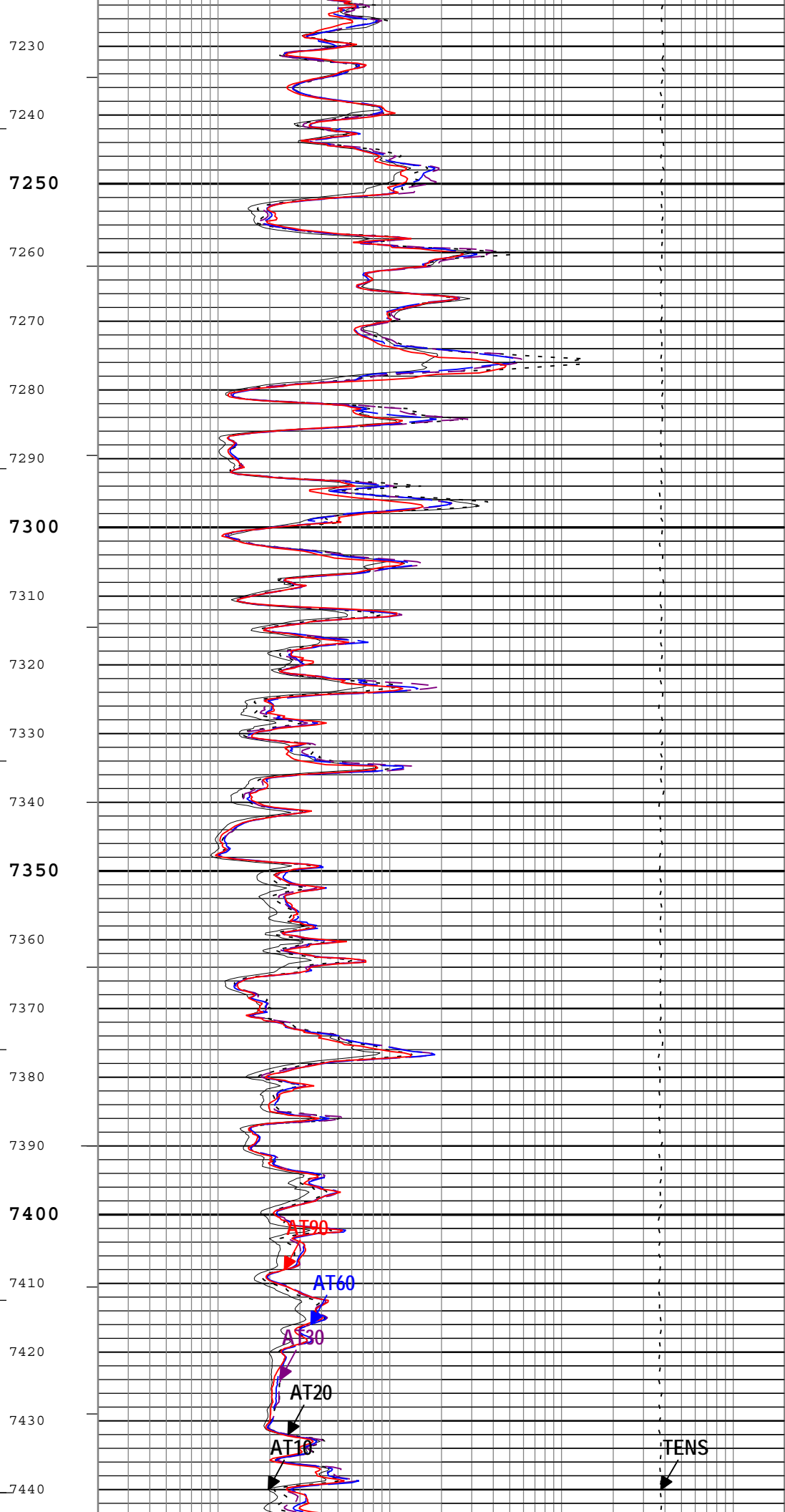
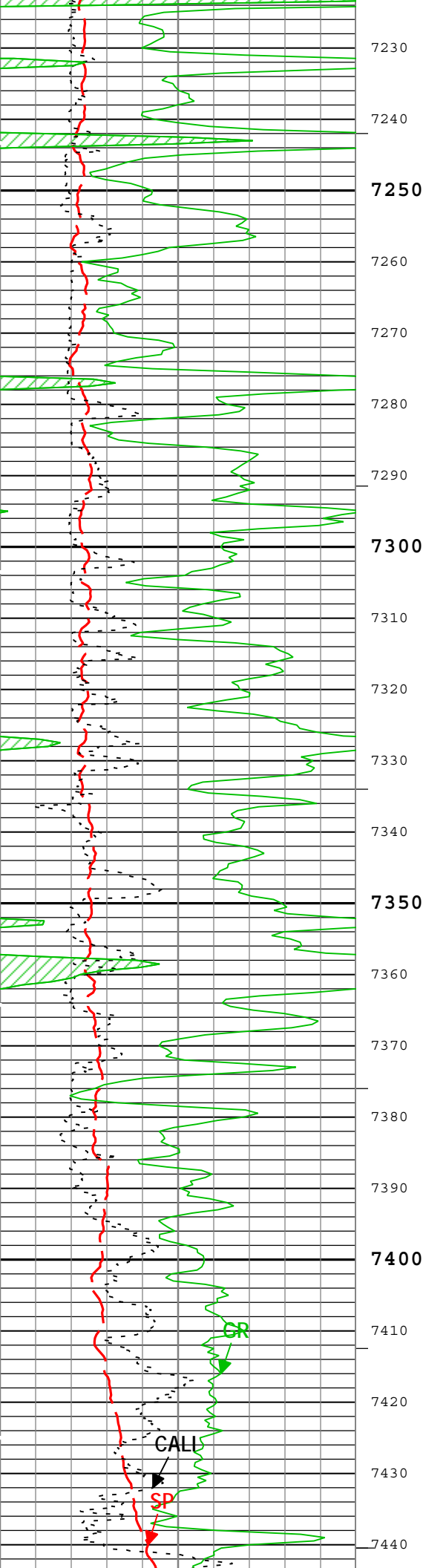
AT30

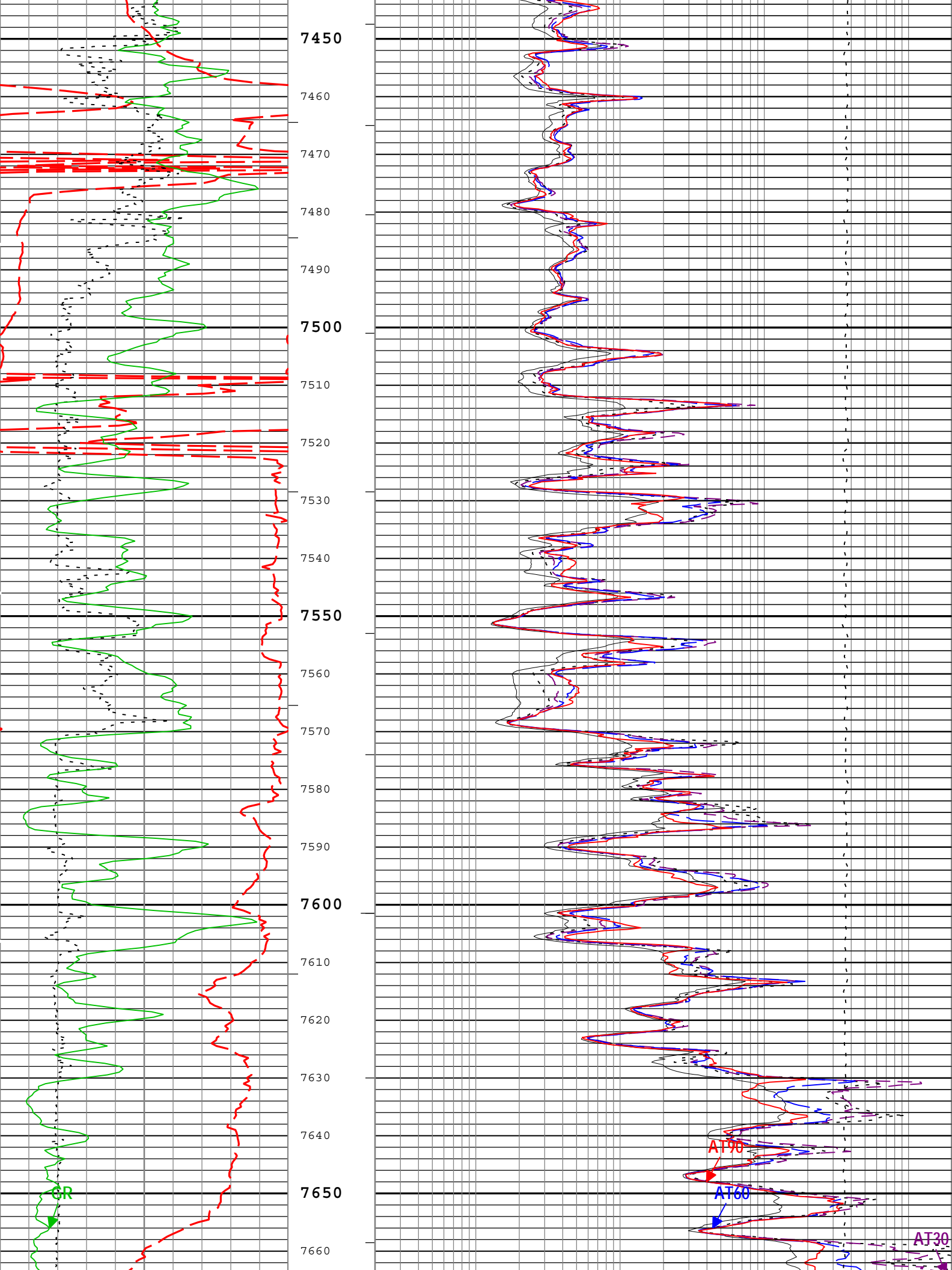
AT20

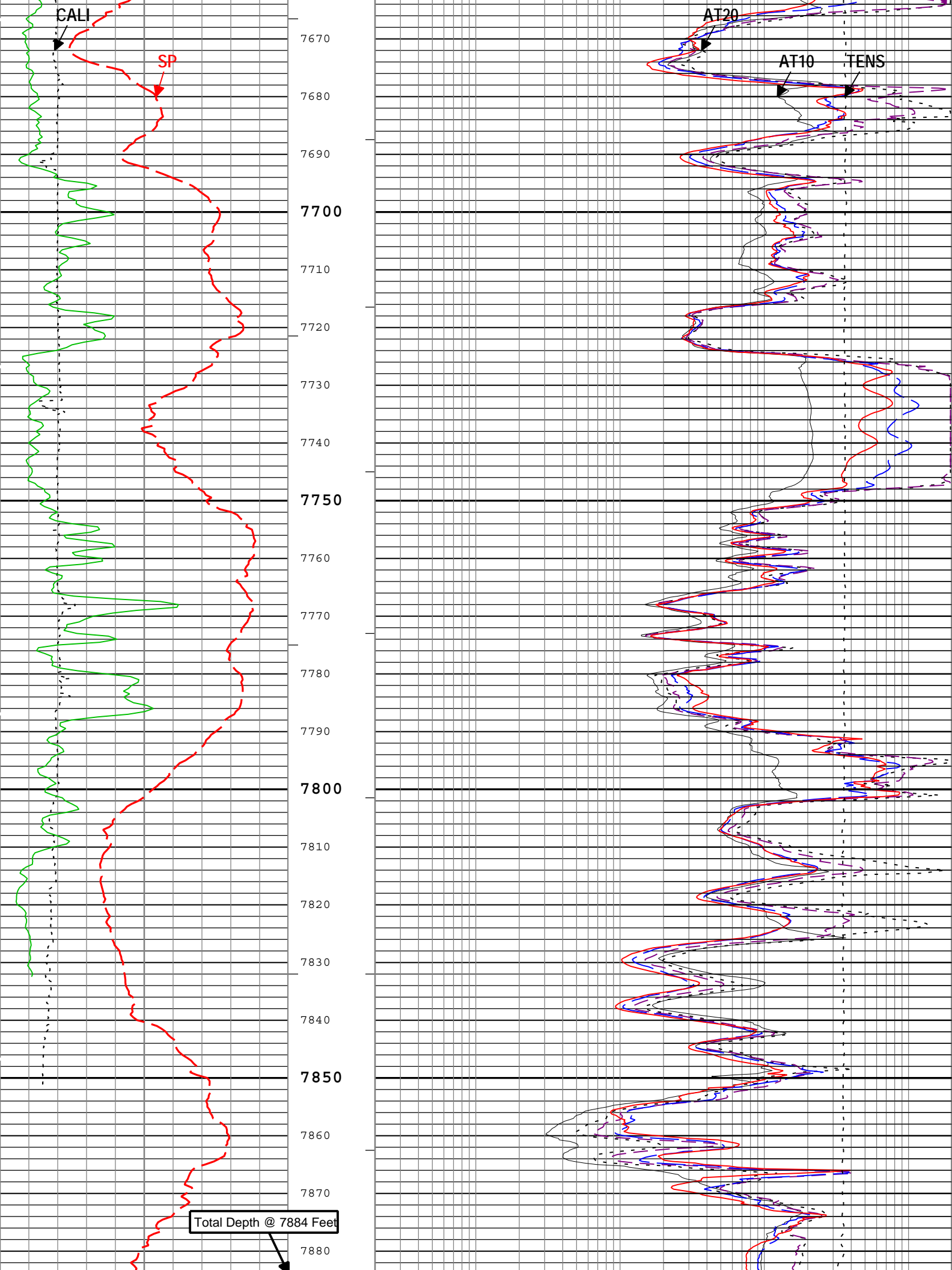
AT10

TENS









7890

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

0mV200

Caliper (CALI) HDRS-H

6in16

Gamma Ray (GR) HGNS-H

0gAPI200

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

0.2ohm.m2000

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

0.2ohm.m2000

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

0.2ohm.m2000

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

0.2ohm.m2000

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

0.2ohm.m2000

Cable Tension (TENS)

10000lbf0

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 (KM 5in Induction Upper) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 26-Sep-2012 12:29:08

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ABLM	Array Induction Basic Logs Mode	AIT-M	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-M	Yes	
ASTA	Array Induction Tool Standoff	AIT-M	1	in
BARI	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	0.273	in
CBLO	Casing Bottom (Logger)	WLSESSION	342	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	8.4	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	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
Depth Zone Parameters				
Parameter	Value	Start (ft)	Stop (ft)	
BS	12.25	330	342	
BS	7.875	342	7892	
All depth are actual.				
Tool Control Parameters				
Parameter	Description	Tool	Value	Unit

MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
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Run 1

5" Induction

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run 1	Log[3]:Up	Up	7391.00 ft	7891.79 ft	26-Sep-2012 9:11:55 AM	26-Sep-2012 9:21:03 AM	5.73 ft	true
Run 1	Main[4]:Up	Up	31.88 ft	7892.18 ft	26-Sep-2012 9:23:43 AM	26-Sep-2012 11:48:38 AM	6.25 ft	true

All depths are referenced to toolstring zero

Log

Run 1: Main[4]:Up

Description: AIT Basic Log Two Format: Log (KM 5in Induction RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 26-Sep-2012 12:29:11

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

TIME_1900 - Time Marked every 60.00 (s)

—|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)

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

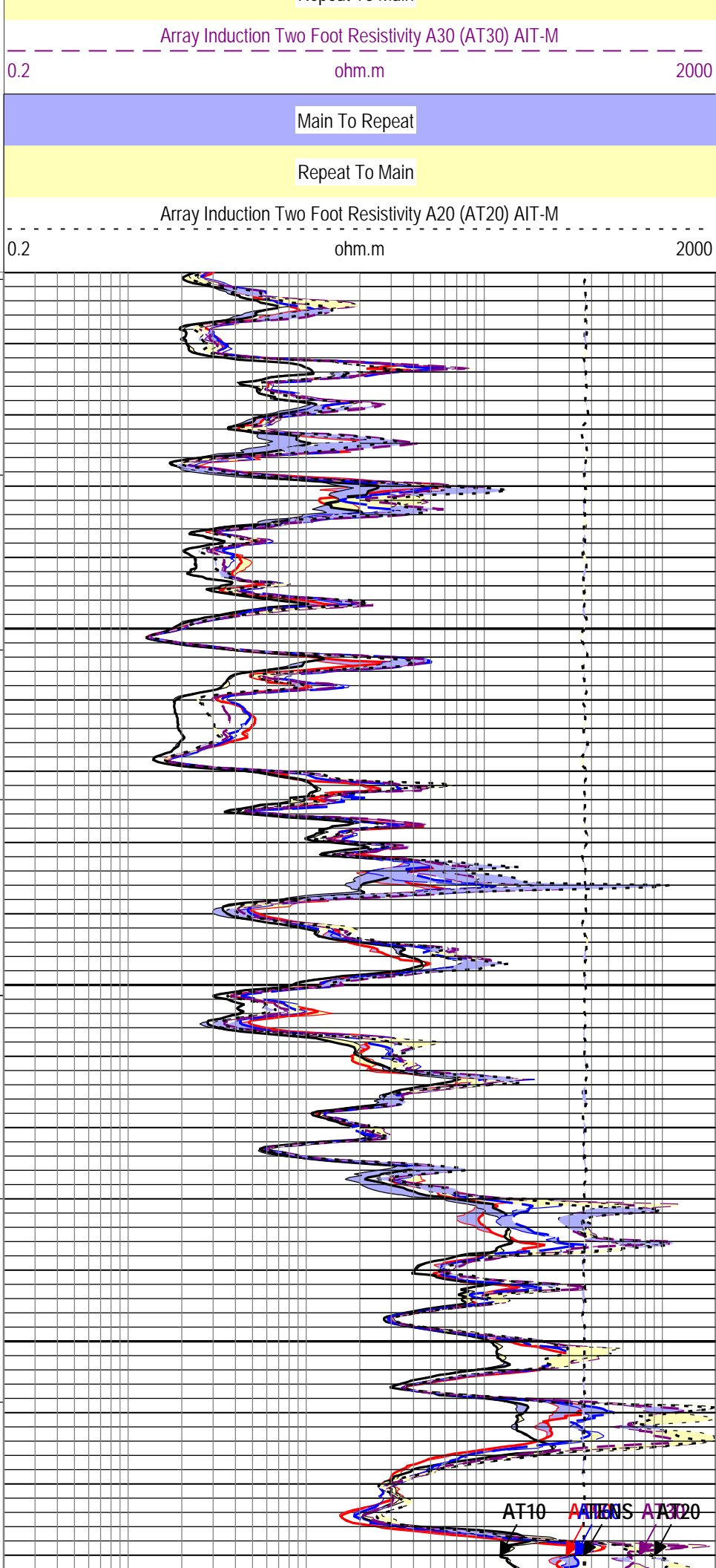
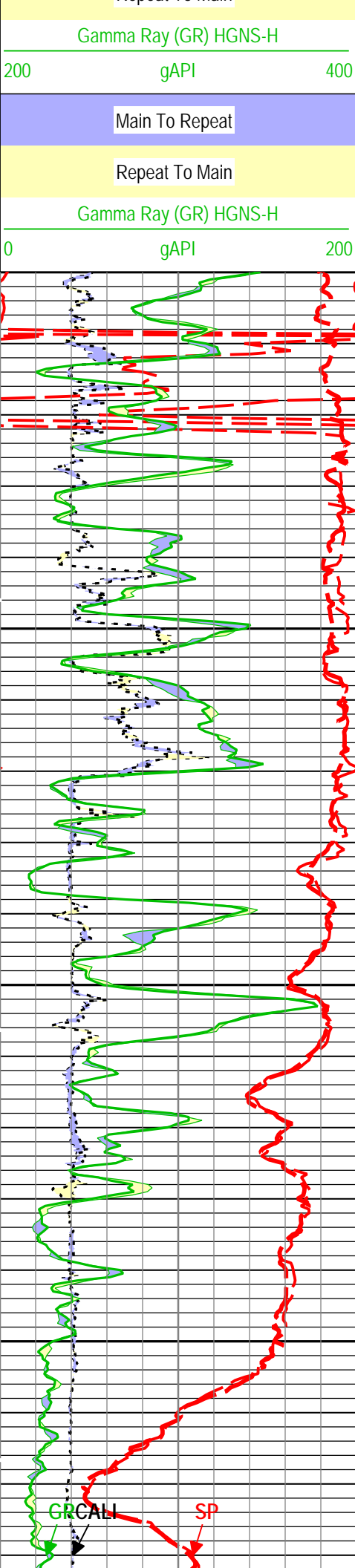
Main To Repeat
Repeat To Main
Caliper (CALI) HDRS-H
6 in 16

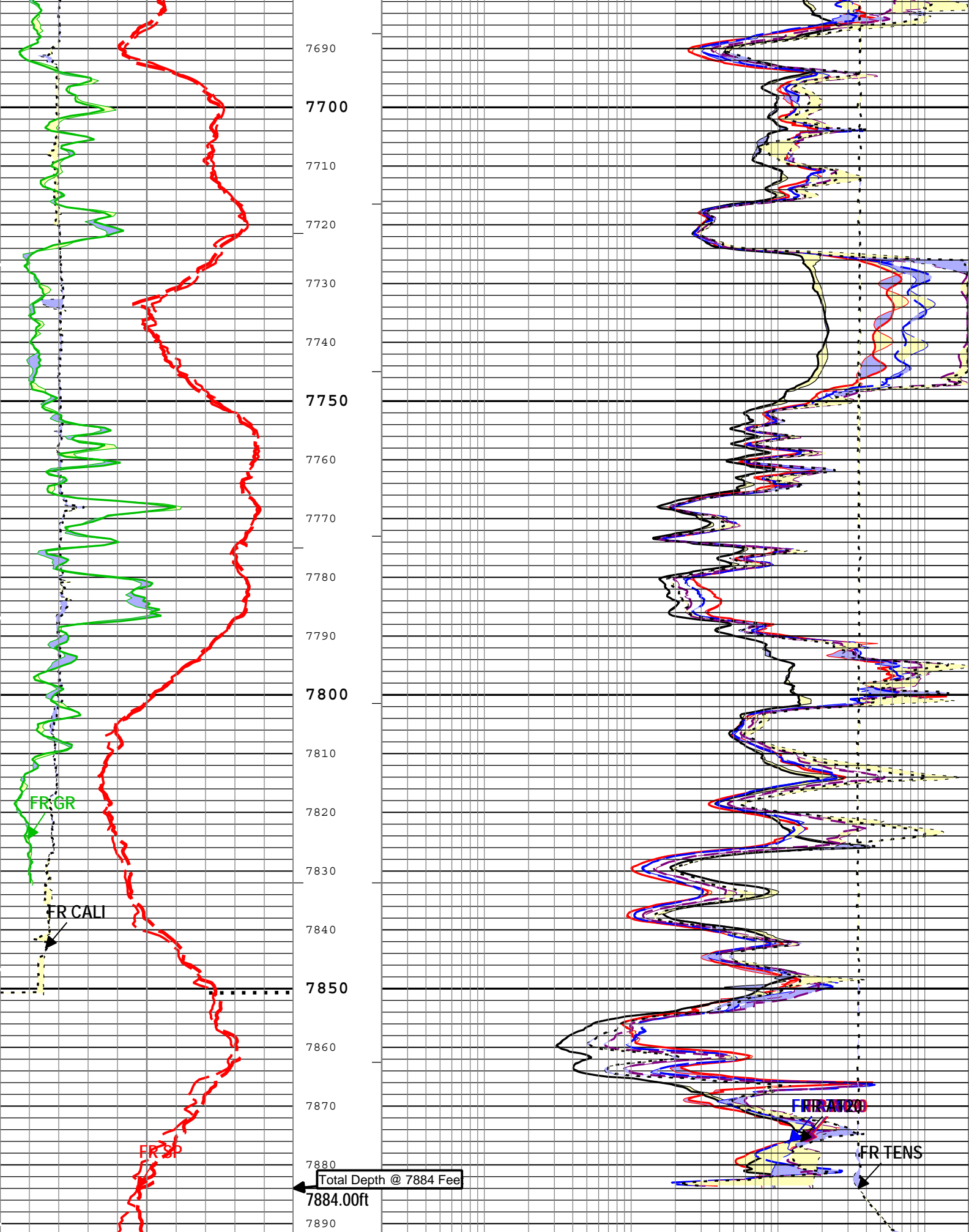
Main To Repeat
Repeat To Main
Spontaneous Potential (SP) AIT-M
0 mV 200

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

Main To Repeat
Repeat To Main





Repeat To Main		
Caliper (CALI) HDRS-H		
6	in	16
Main To Repeat		
Repeat To Main		
Spontaneous Potential (SP) AIT-M		
0	mV	200
Main To Repeat		
Repeat To Main		
Gamma Ray (GR) HGNS-H		
200	gAPI	400
Main To Repeat		
Repeat To Main		
Gamma Ray (GR) HGNS-H		
0	gAPI	200

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
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		
Array Induction Two Foot Resistivity A20 (AT20) AIT-M		
0.2	ohm.m	2000

Main To Repeat		
Repeat To Main		
Cable Tension (TENS)		
10000	lbf	0

└─ICV - Integrated Cement Volume every 100.00 (ft3)

└─ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

└─IHV - Integrated Hole Volume every 100.00 (ft3)

└─IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log (KM 5in Induction RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 26-Sep-2012 12:29:11

Calibration Report							
AIT-M (Array Induction Tool - M) Calibration - Run 1							
Primary Equipment :							
Array Induction Sonde - M		AMIS		1270			
Auxiliary Equipment :							
AITM Rm/SP Bottom Nose		AMRM		1270			
AIT Sonde Calibration - Test Loop Gain							
Master (EEPROM):		19:16:23 15-Jul-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Test Loop Gain - 0		Master	1.000	0.950	1.012	1.050	<div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 0	deg	Master	0	-3.000	0.560	3.000	<div><div></div><div></div><div></div><div></div></div>

Test Loop Gain - 1		Master	1.000	0.950	1.013	1.050	
Test Loop Phase - 1	deg	Master	0	-3.000	0.607	3.000	
Test Loop Gain - 2		Master	1.000	0.950	1.016	1.050	
Test Loop Phase - 2	deg	Master	0	-3.000	-0.014	3.000	
Test Loop Gain - 3		Master	1.000	0.950	1.009	1.050	
Test Loop Phase - 3	deg	Master	0	-3.000	0.166	3.000	
Test Loop Gain - 4		Master	1.000	0.950	1.002	1.050	
Test Loop Phase - 4	deg	Master	0	-3.000	0.075	3.000	
Test Loop Gain - 5		Master	1.000	0.950	0.988	1.050	
Test Loop Phase - 5	deg	Master	0	-3.000	-0.171	3.000	
Test Loop Gain - 6		Master	1.000	0.950	0.997	1.050	
Test Loop Phase - 6	deg	Master	0	-3.000	0.212	3.000	
Test Loop Gain - 7		Master	1.000	0.950	1.008	1.050	
Test Loop Phase - 7	deg	Master	0	-3.000	-0.127	3.000	

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		19:16:23 15-Jul-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Sonde Error Correction Real - 0	mS/m	Master	----	-231.000	-111.871	119.000	
Sonde Error Correction Quad - 0		Master	----	-2250.000	-133.029	2250.000	
Sonde Error Correction Real - 1	mS/m	Master	----	114.000	158.885	204.000	
Sonde Error Correction Quad - 1		Master	----	-625.000	-138.465	625.000	
Sonde Error Correction Real - 2	mS/m	Master	----	66.000	115.585	156.000	
Sonde Error Correction Quad - 2		Master	----	-350.000	-69.804	350.000	
Sonde Error Correction Real - 3	mS/m	Master	----	39.000	64.217	89.000	
Sonde Error Correction Quad - 3		Master	----	-250.000	-61.654	250.000	
Sonde Error Correction Real - 4	mS/m	Master	----	15.000	26.915	35.000	
Sonde Error Correction Quad - 4		Master	----	-63.000	2.367	63.000	
Sonde Error Correction Real - 5	mS/m	Master	----	4.000	13.317	24.000	
Sonde Error Correction Quad - 5		Master	----	-50.000	-2.232	50.000	
Sonde Error Correction Real - 6	mS/m	Master	----	5.000	9.680	15.000	
Sonde Error Correction Quad - 6		Master	----	-30.000	3.238	30.000	
Sonde Error Correction Real - 7	mS/m	Master	----	-5.000	-2.031	5.000	
Sonde Error Correction Quad - 7		Master	----	-30.000	-0.854	30.000	

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM):		19:16:23 15-Jul-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coarse Gain		Master	1.000	0.800	0.864	1.200	
Fine Gain		Master	1.000	0.800	0.872	1.200	

AIT Electronics Check - Thru Calibration Check

Master (EEPROM):		19:16:23 15-Jul-2012	Before (Measured):	11:55:37 25-Sep-2012	After:		
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Thru Cal Mag - 0	V	Master	----	0.366	0.603	0.854	
		Before	----	0.366	0.606	0.854	
		After	----	----	----	----	
		Before-Master	----	----	0.003	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 0	deg	Master	----	137.000	-165.749	-103.000	
		Before	----	137.000	-165.262	-103.000	
		After	----	----	----	----	
		Before-Master	----	----	0.487	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 1	V	Master	----	0.762	1.234	1.778	
		Before	----	0.762	1.241	1.778	
		After	----	----	----	----	
		Before-Master	----	----	0.007	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 1	deg	Master	----	136.000	-166.820	-104.000	
		Before	----	136.000	-166.332	-104.000	
		After	----	----	----	----	
		Before-Master	----	----	0.488	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 2	V	Master	----	0.372	0.615	0.868	
		Before	----	0.372	0.618	0.868	
		After	----	----	----	----	
		Before-Master	----	----	0.003	----	
		After-Before	----	----	----	----	

		Before-Master After-Before	-----	-----	0.003	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	-----	132.000	-170.365	-108.000	<div><div></div><div></div><div></div></div>
		Before	-----	132.000	-169.876	-108.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.489	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 3	V	Master	-----	0.420	0.693	0.980	<div><div></div><div></div><div></div></div>
		Before	-----	0.420	0.697	0.980	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.004	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master	-----	131.000	-171.117	-109.000	<div><div></div><div></div><div></div></div>
		Before	-----	131.000	-170.628	-109.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.489	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 4	V	Master	-----	0.804	1.300	1.876	<div><div></div><div></div><div></div></div>
		Before	-----	0.804	1.308	1.876	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.008	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 4	deg	Master	-----	125.000	-177.241	-115.000	<div><div></div><div></div><div></div></div>
		Before	-----	125.000	-176.748	-115.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.493	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 5	V	Master	-----	1.176	1.896	2.744	<div><div></div><div></div><div></div></div>
		Before	-----	1.176	1.907	2.744	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.011	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master	-----	122.000	-178.924	-118.000	<div><div></div><div></div><div></div></div>
		Before	-----	122.000	-178.427	-118.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.497	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master	-----	1.176	1.897	2.744	<div><div></div><div></div><div></div></div>
		Before	-----	1.176	1.907	2.744	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.010	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master	-----	121.000	-178.907	-119.000	<div><div></div><div></div><div></div></div>
		Before	-----	121.000	-178.409	-119.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.498	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master	-----	0.846	1.378	1.974	<div><div></div><div></div><div></div></div>
		Before	-----	0.846	1.387	1.974	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.009	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master	-----	115.000	-179.889	-125.000	<div><div></div><div></div><div></div></div>
		Before	-----	115.000	-179.351	-125.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.538	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
SPA Zero	mV	Master		-50.000	0.639	50.000	<div><div></div><div></div><div></div></div>
		Before		-50.000	0.651	50.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.012	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
SPA Plus	mV	Master		941.000	992.590	1040.000	<div><div></div><div></div><div></div></div>
		Before		941.000	992.685	1040.000	<div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.095	-----	<div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div></div>
Temperature Zero	V	Master		-0.050	0.001	0.050	<div><div></div><div></div><div></div></div>

		Before	----	----	0.001	0.050	
		Before-Master	----	----	0.000	----	
		After-Before	----	----	----	----	
Temperature Plus	V	Master		0.870	0.919	0.960	
		Before		0.870	0.920	0.960	
		After	----	----	----	----	
		Before-Master	----	----	0.001	----	
		After-Before	----	----	----	----	

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):		08:17:00 26-Sep-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.0	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):		11:55:48 10-Jul-2012		Before (Measured):		11:55:23 25-Sep-2012		After:	
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit		
Near Zero Measurement	1/s	Master	0	5.0		25.2	40.0		
		Before	0	5.0		25.2	40.0		
		After	----	----		----	----		
		Before-Master	----	-3.8		0.0	3.8		
		After-Before	----	----		----	----		
Far Zero Measurement	1/s	Master	0	5.0		28.4	40.0		
		Before	0	5.0		27.7	40.0		
		After	----	----		----	----		
		Before-Master	----	-4.3		-0.7	4.3		
		After-Before	----	----		----	----		
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0		5277.0	6900.0		
		Before	----	----		----	----		
		After	----	----		----	----		
		Before-Master	----	----		----	----		
		After-Before	----	----		----	----		
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0		2204.0	2900.0		
		Before	----	----		----	----		
		After	----	----		----	----		

		Before-Master After-Before	----- -----	----- -----	----- -----	----- -----	
Near Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	4700.0 ----- ----- ----- -----	5227.0 ----- ----- ----- -----	6900.0 ----- ----- ----- -----	
Far Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1900.0 ----- ----- ----- -----	2158.0 ----- ----- ----- -----	2900.0 ----- ----- ----- -----	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured):		12:01:46 25-Sep-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before After After-Before	30.0 ----- -----	0 ----- -----	82.6 ----- -----	120.0 ----- -----	
RGR Plus Measurement	gAPI	Before After After-Before	185.4 ----- -----	157.1 ----- -----	168.1 NOT DONE -----	206.3 ----- -----	
GR Calibration Gain		Before After After-Before	0.89 ----- -----	0.80 ----- -----	0.98 ----- -----	1.05 ----- -----	

Company:	Nighthawk Production LLC	Schlumberger
Well:	Pikes Peak Williams 4-30	
Field:	Wildcat	
County:	Lincoln	
Country:	United States	
Platform Express		
Array Induction		
with Linear Correlation		