

Company: Encana Oil & Gas

Well: State 23-16

Field: Wattenberg

County: Weld State: Colorado

Platform Express	
Array Induction	
with Linear Correlation	
County: Weld	
Field: Wattenberg	
Location: SHL: SENW 2441' FNL & 1461' FWL	
Well: State 23-16	
Company: Encana Oil & Gas	
Location:	
SHL: SENW 2441' FNL & 1461' FWL	Elev.: K.B. 5086.00 ft
Sec: 16, T:3N, R:68W	G.L. 5073.00 ft
Lat: 40.226410, Long: -105.012120	D.F. 5085.00 ft
Permanent Datum:	Ground Level
Log Measured From:	Kelly Bushing
Drilling Measured From:	Kelly Bushing
API Serial No. 051233680600	Section: 16
	Township: 3N
	Range: 68W

Logging Date	08-Apr-2013
Run Number	Run One
Depth Driller	8028.00 ft
Schlumberger Depth	8032.50 ft
Bottom Log Interval	8032.50 ft
Top Log Interval	632.00 ft
Casing Driller Size @ Depth	8.625 in @ 633.50 ft
Casing Schlumberger	632 ft
Bit Size	7.875 in
Type Fluid In Hole	Water
Density	9.7 lbm/gal
Fluid Loss	PH 8
Source of Sample	Active Tank
RM @ Meas Temp	0.25 ohm.m @ 53.4 degF
RMF @ Meas Temp	0.19 ohm.m @ 53.4 degF
RMC @ Meas Temp	0.31 ohm.m @ 53.4 degF
Source RMF	Calculated
RM @ BHT	0.07 @ 204 0.05 @ 204
Max Recorded Temperatures	204 degF
Circulation Stopped	08-Apr-2013 18:00:00
Logger on Bottom	09-Apr-2013 01:45:58
Unit Number	3030
Recorded By	Max Pace
Witnessed By	Roy Hunt/Wess Harrison

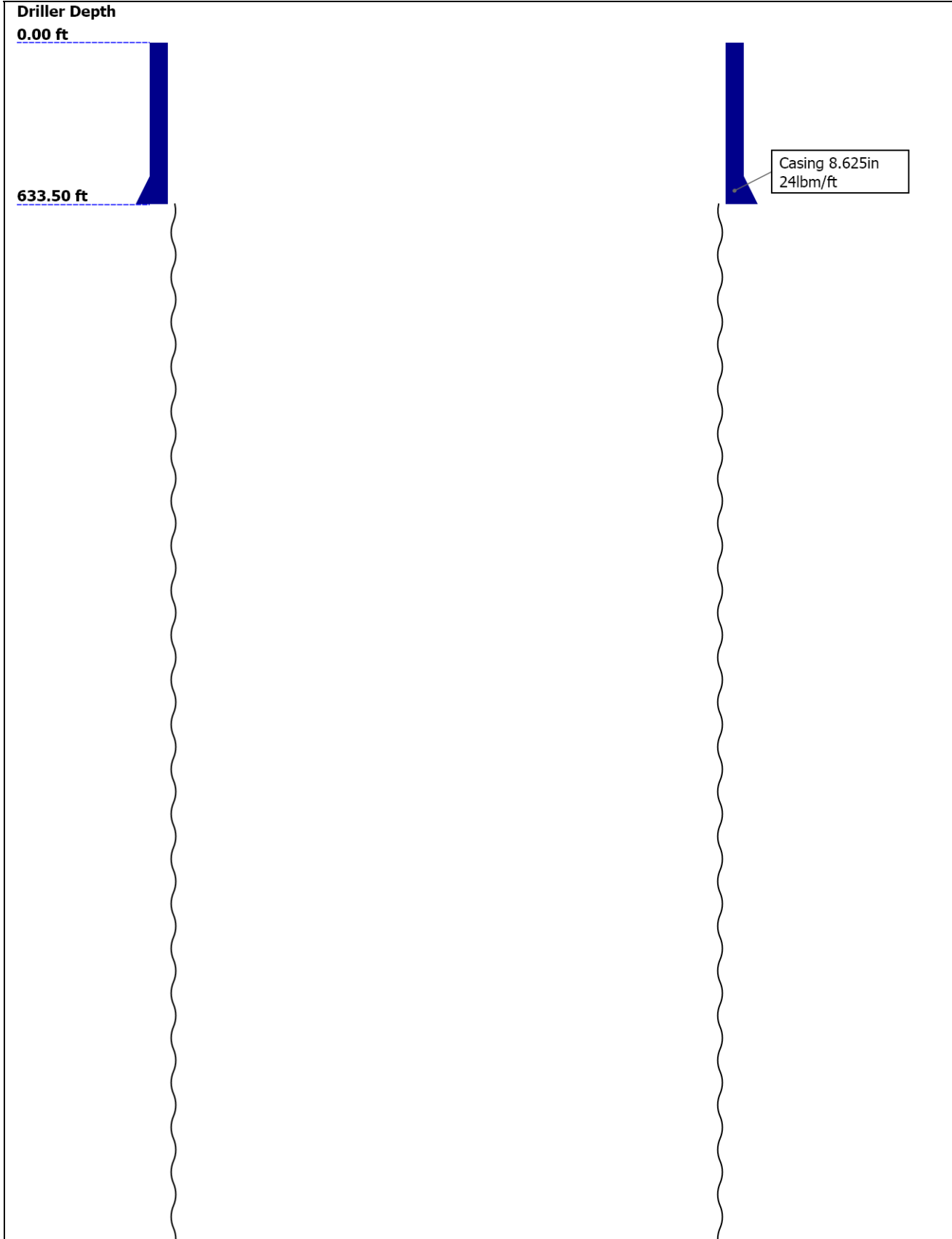
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Well Sketch



8028.00 ft

Open Hole 7.875in

## Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	7.875					
Top Driller ( ft )	633.5					
Top Logger ( ft )	633.5					
Bottom Driller ( ft )	8028					
Bottom Logger ( ft )	8032.5					
Casing						
Size ( in )	8.625					
Weight ( lbm/ft )	24					
Inner Diameter ( in )	8.099					
Grade	N/A					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	633.5					
Bottom Logger ( ft )	632					

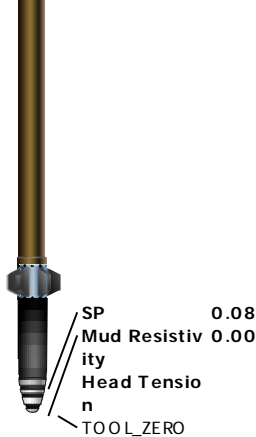
## Borehole Fluids

Parameter( unit )	Run One					
Fluid Type	Water					
Max Recorded Temperatures ( degF )	204					
Source of Sample	Active Tank					
Salinity ( ppm )	34058.5					
Density ( lbm/gal )	9.7					
Funnel Viscosity ( s )	50					
Fluid Loss ( cm3 )						
PH	8					
Date/Time Circulation Stopped	08-Apr-2013 18:00:00					
Date Logger on Bottom	09-Apr-2013					
Time Logger on Bottom	01:45:58					
Source RMF	Calculated					
RMC	Calculated					
RM @ Meas Temp ( ohm.m@degF )	0.25 @ 53.4					
RMF @ Meas Temp ( ohm.m@degF )	0.19 @ 53.4					
RMC @ Meas Temp ( ohm.m@degF )	0.31 @ 53.4					

RM @ BHT ( ohm.m@degF )	0.07 @ 204					
RMF @ BHT ( ohm.m@degF )	0.05 @ 204					
RMC @ BHT ( ohm.m@degF )	0.09 @ 204					
Total Solid ( % )	10.3					
High Gravity Solids ( % )						

## Remarks and Equipment Summary

Run One: Toolstring				Run One: Remarks
Equip name	Length	MP name	Offset	All Schlumberger depth control procedures followed.
LEH-QT	43.57			IDW used as primary depth reference.
LEH-QT				Z Chart used as secondarty depth reference.
DTC-H:9469	40.65			Crew: Derrick Hunter, Tyler Riter, Max Pace
ECH-KC:10530		CTEM	39.75	
DTC-H:9469		HV	0.00	
		TelStatus	37.65	
		ToolStatus	37.65	
		Temperature	37.62	
HGNS-B:863	37.65			
HGNH:2883				
NPV-N		GR	36.91	
NSR-F:5069				
HACCZ-B:452				
HGNS-B:863				
HMCA-B				
		CNL Porosit	30.57	
		y		
		HGNS	28.24	
		HMCA	28.24	
		Accelerometer	0.00	
HDRS-B:1754	28.24			
ECH-MEB				
HRCC-B:791				
HRMS-B:1754				
Backscatter				
Long Spacing				
Short Spacing				
HRGD-B:1849		HRCC	24.24	
GPV-Q				
GSR-J:5094				
		MCFL	18.81	
		Caliper	18.33	
		TLD Density	17.94	
AIT-H:398	16.00			
AHIS:398				
AHRM:398				
		Power Supply	7.91	
		Induction	7.91	
		Temperature	7.91	



Lengths are in ft  
Maximum Outer Diameter = 5.000 in  
Line: Sensor Location, V value: Gating Offset  
All measurements are relative to TOOL\_ZERO

## Depth Summary

Depth Control Parameters			
Conveyance Type	Wireline		
Rig Type	Land		
Depth Measuring Device			
Type	IDW-B		
Calibration Cable Type	7-39PLXS		
Wheel Correction 1	1		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		
Serial Number	2858		
Calibration Date	01-Apr-2013		
Calibrator Serial Number	78135A		
Calibration Points	10		
Calibration RMS	8		
Calibration Peak Error	17		
Logging Cable			
Type	7-39P-LXS		
Serial Number	U710242		
Logging Cable Length ( ft )	16200.00		

## Run One

## 2" Induction

## Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1898.51	ft3

## Software Version

Acquisition System		Version
MaxWell		3.1.9755.0
Application Patch		SP-20120723-3.1.9755.1112
		EXP_APL-MASTAXIS-3.1.9755.1221

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

Tool Elements	Description	Software Version	Firmware Version
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AHIS	Array Induction Sonde - H	3.1.9755.1112	
HGNS-B	HILT Gamma-Ray and Neutron Sonde, 125 degC	3.1.9755.0	2.0
HRCC-B	HILT High-Resolution Control Cartridge, 125 degC	3.1.9755.0	2.0

Pass Summary								
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run One	Log[3]:Up	Up	543.79 ft	8046.71 ft	08-Apr-2013 2:05:52 AM	08-Apr-2013 4:40:32 AM	1.25 ft	true

All depths are referenced to toolstring zero

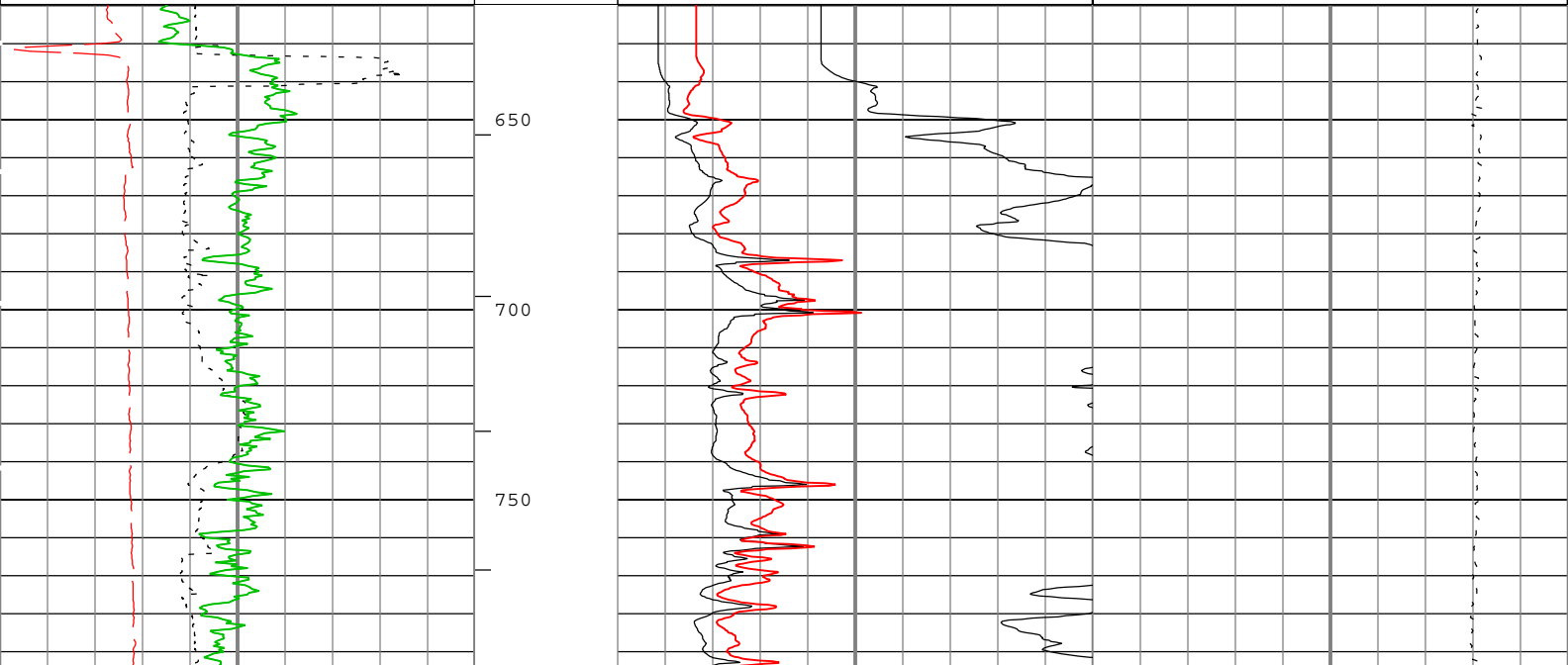
Log	Run One: Log[3]:Up
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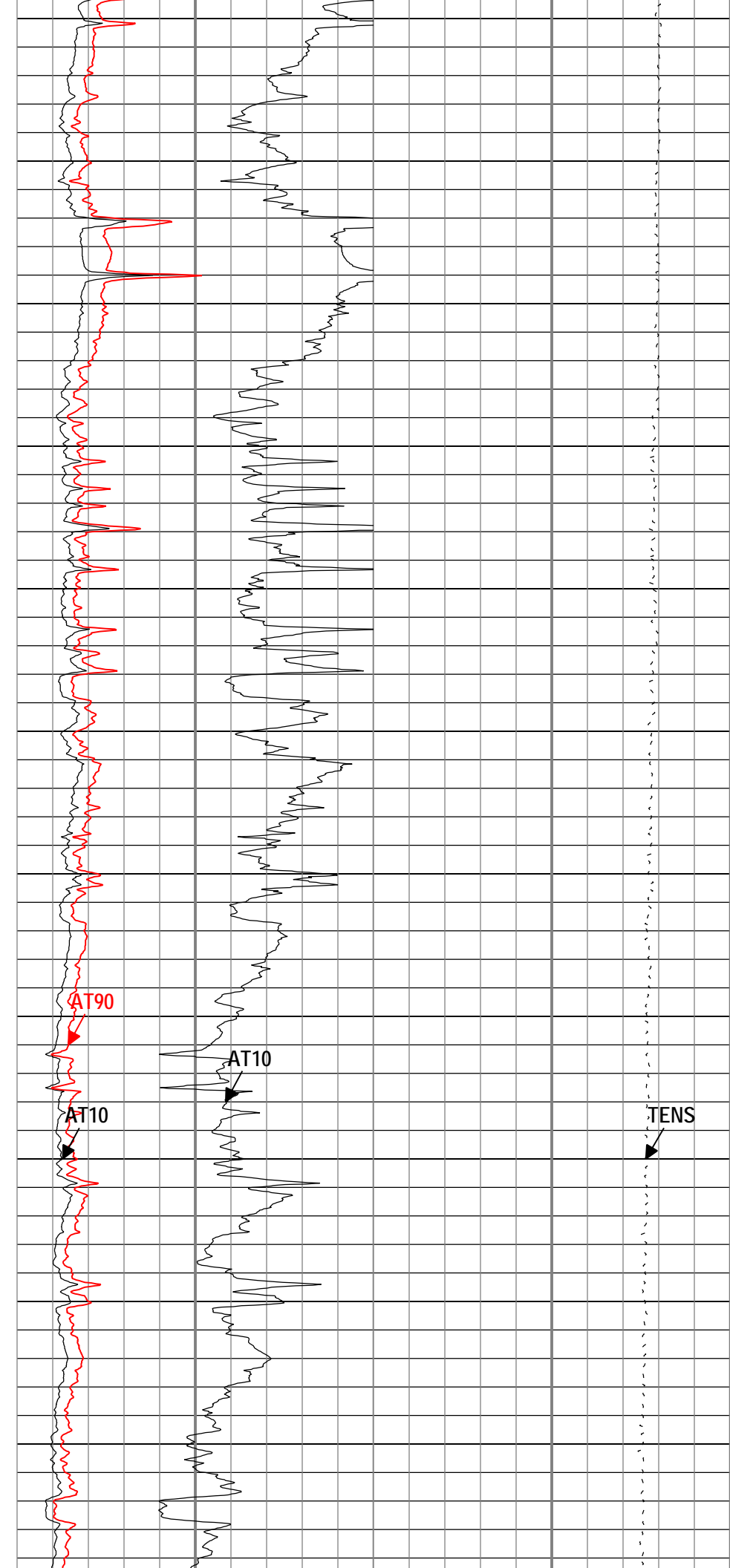
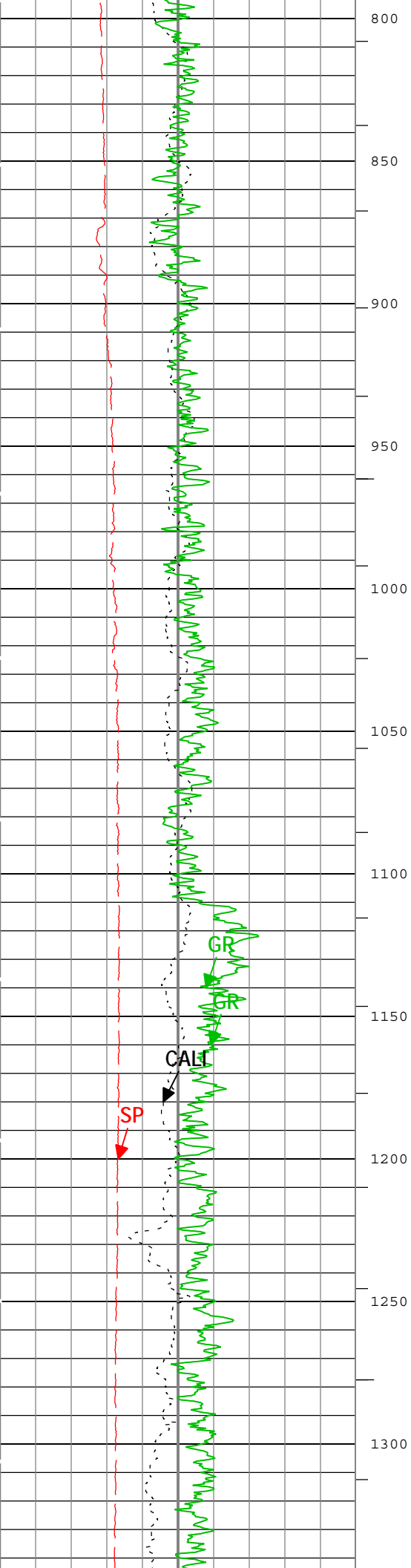
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Depth    Creation Date: 08-Apr-2013 09:56:33

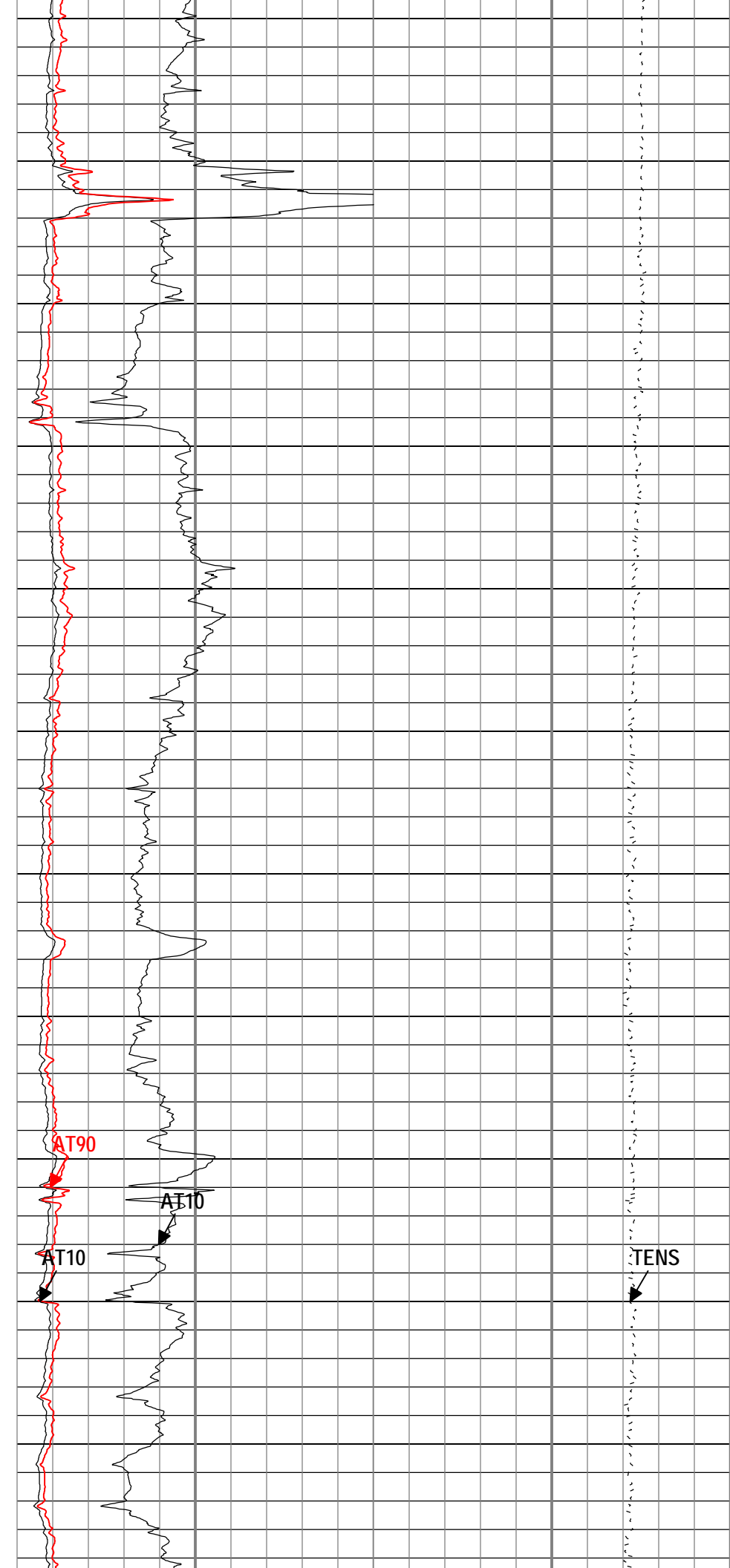
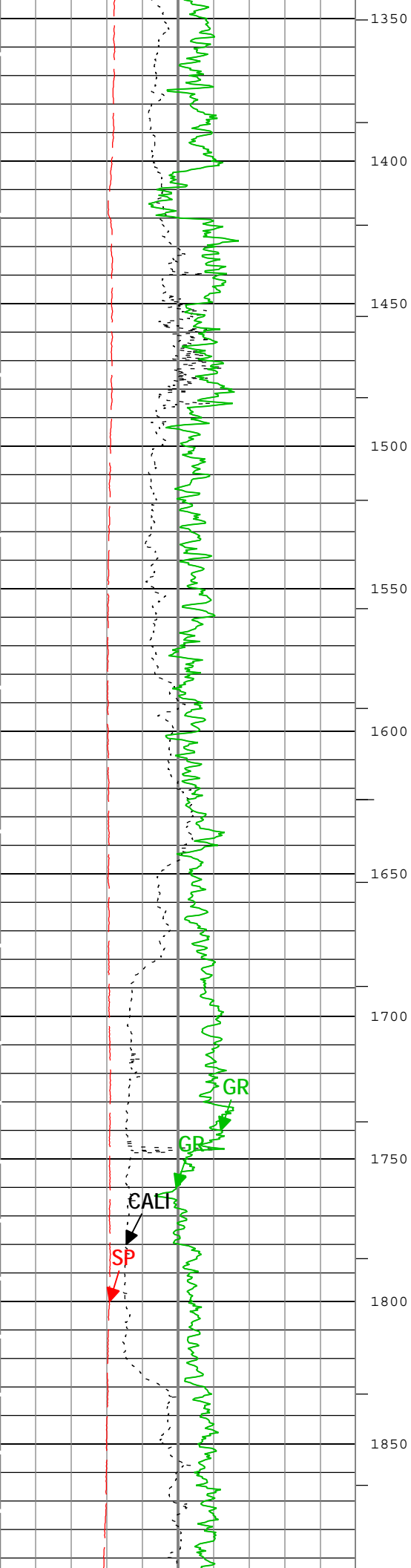
Channel	Source	Sampling
AT10	AIT-H:AHIS:AHIS	3in
AT90	AIT-H:AHIS:AHIS	3in
CALI	HDRS-B:HRCC-B:HRCC-B	1in
GR	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in
SP	AIT-H:AHIS:AHIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

ICV - Integrated Cement Volume every 10.00 (ft3)  
ICV - Integrated Cement Volume every 100.00 (ft3)  
TIME\_1900 - Time Marked every 60.00 (s)

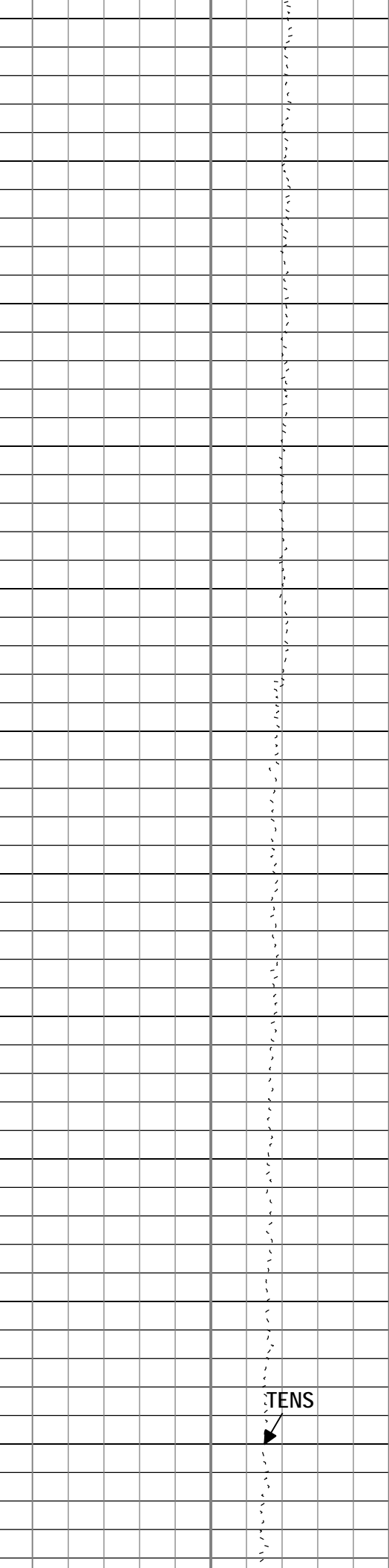
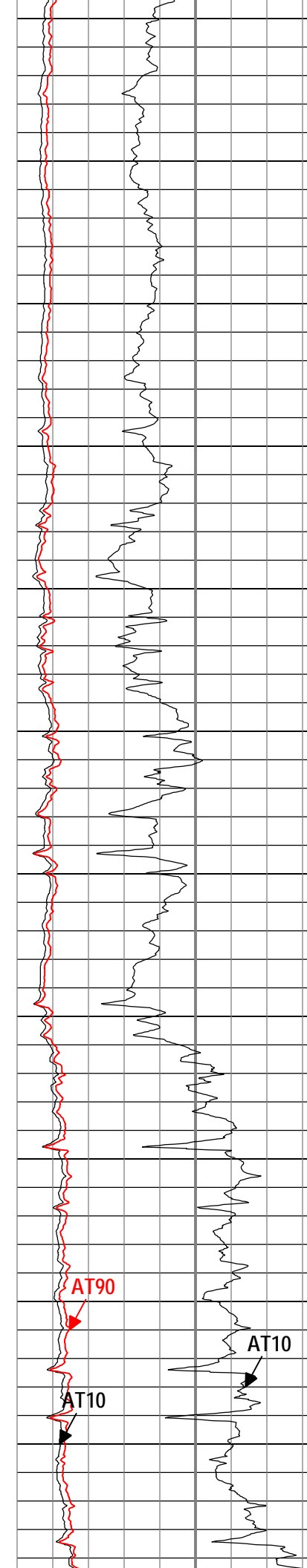
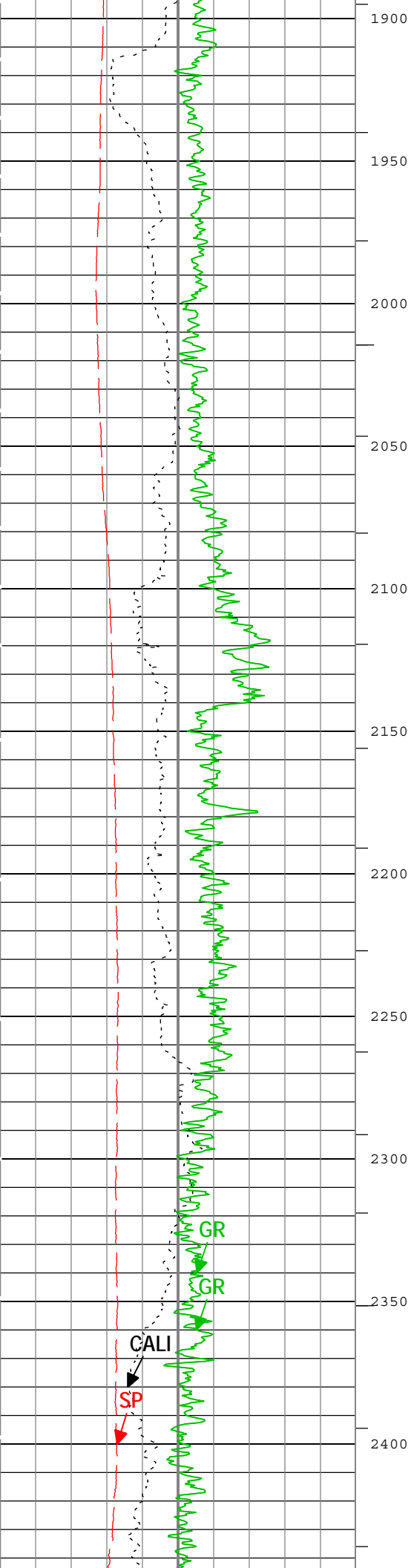
Gamma Ray Backup	Array Induction Two Foot Resistivity A10 (AT10) AIT-H	0	ohm.m	50
Spontaneous Potential (SP) AIT-H	Array Induction Two Foot Resistivity A10 (AT10) AIT-H	0	ohm.m	10
Caliper (CALI) HDRS-B	Array Induction Two Foot Resistivity A90 (AT90) AIT-H	0	ohm.m	50
Gamma Ray (GR) HGNS-B	Cable Tension (TENS)	5000	lbf	0
gAPI				

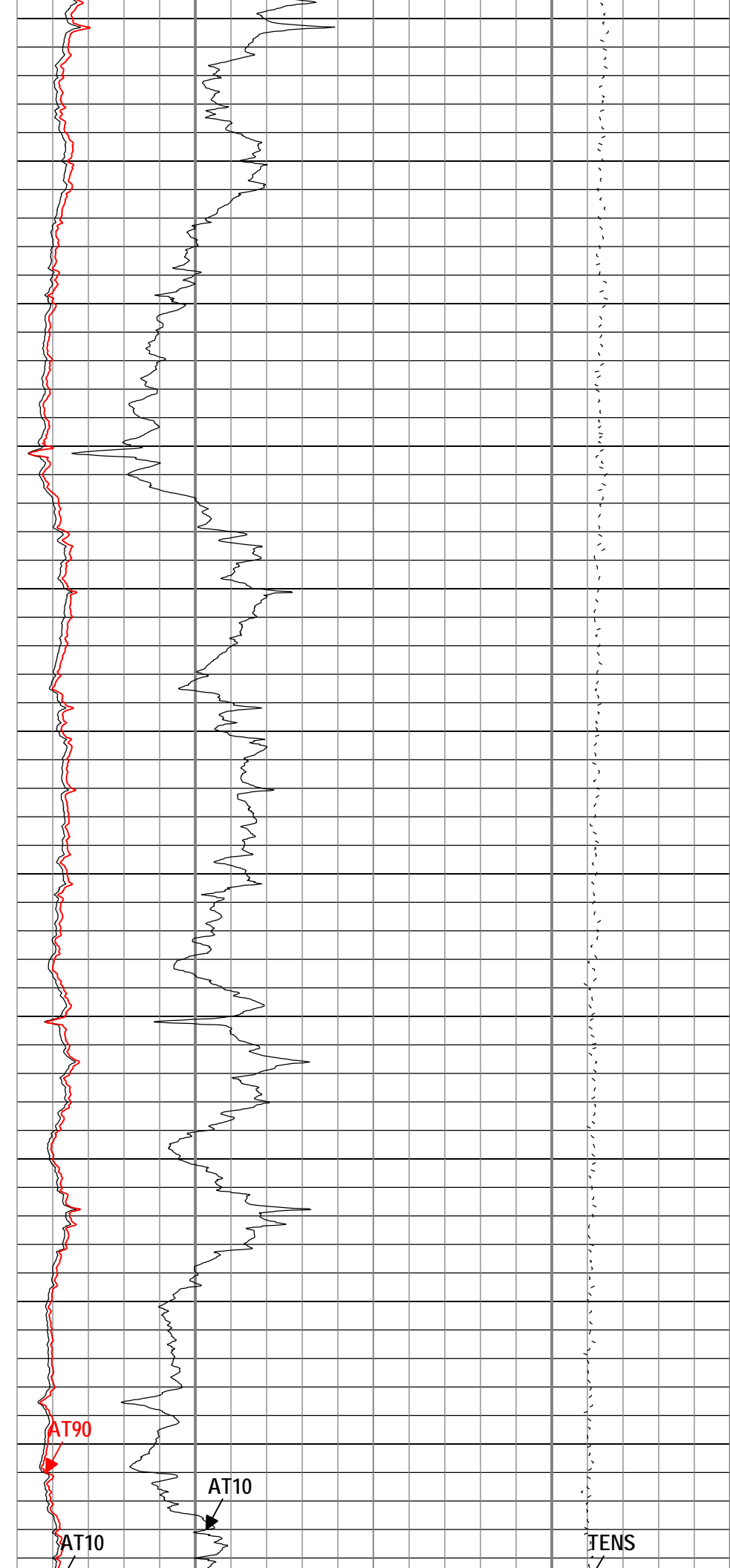
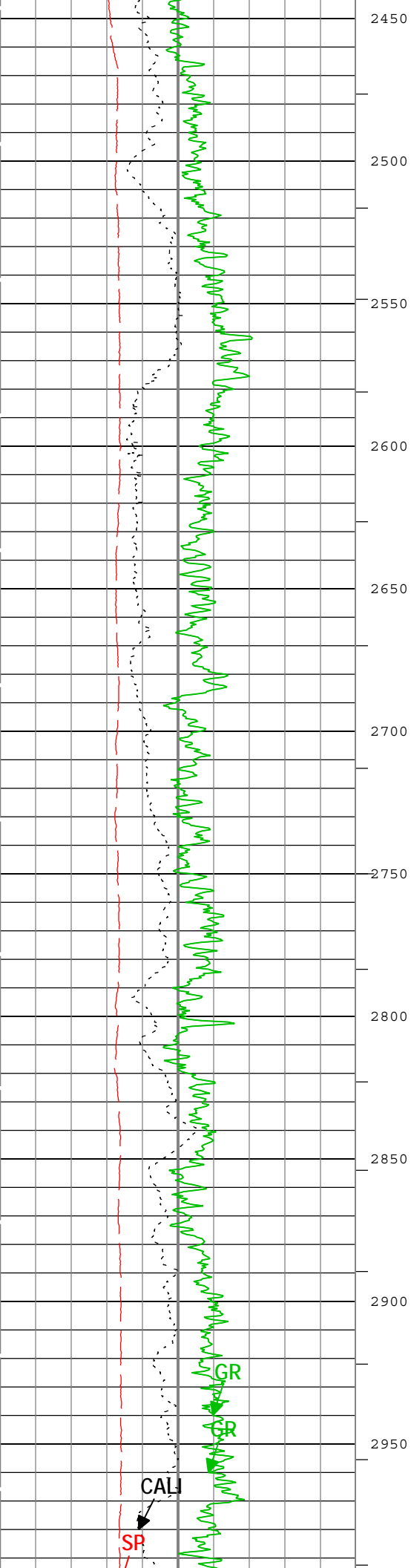


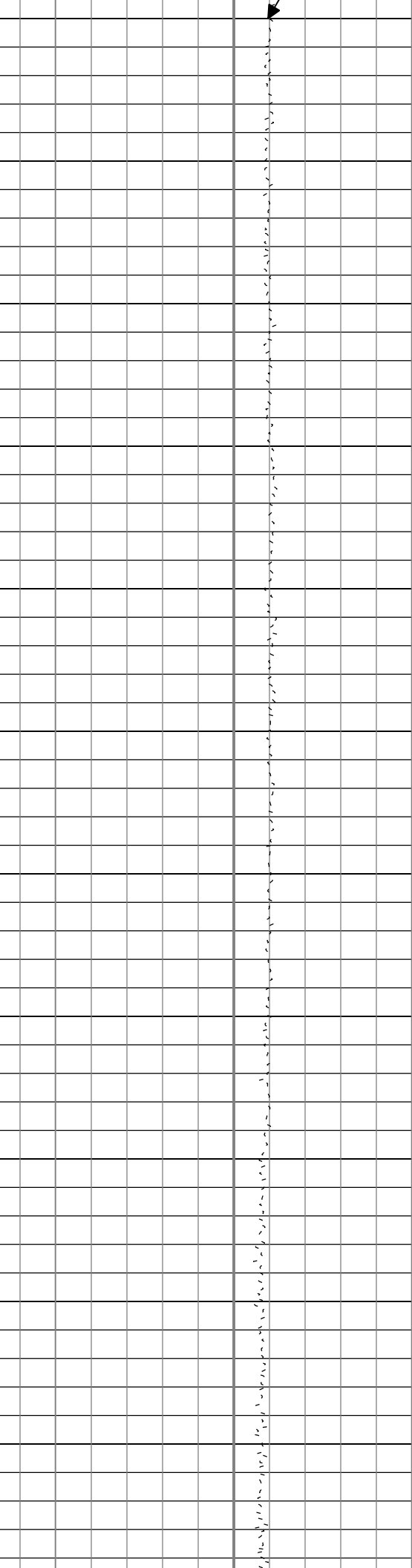
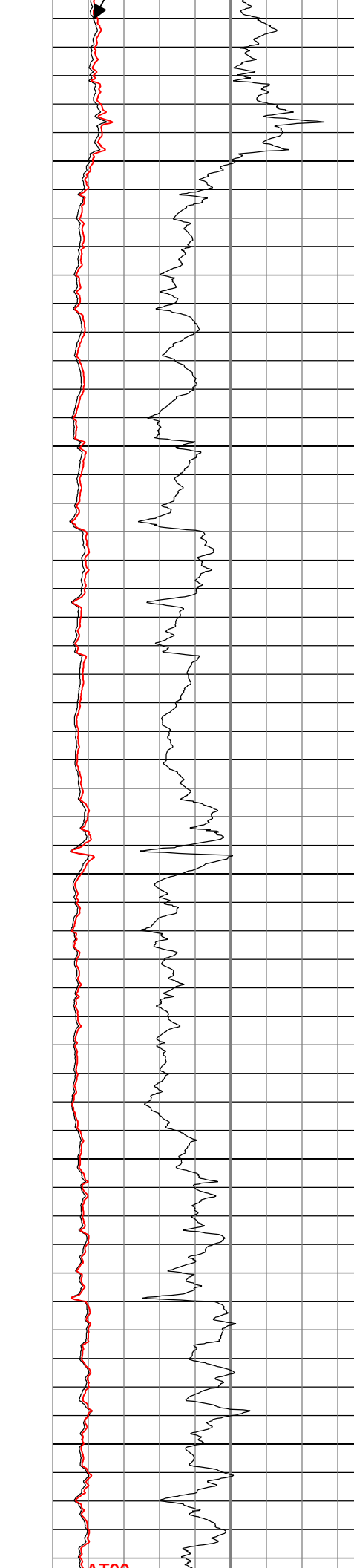
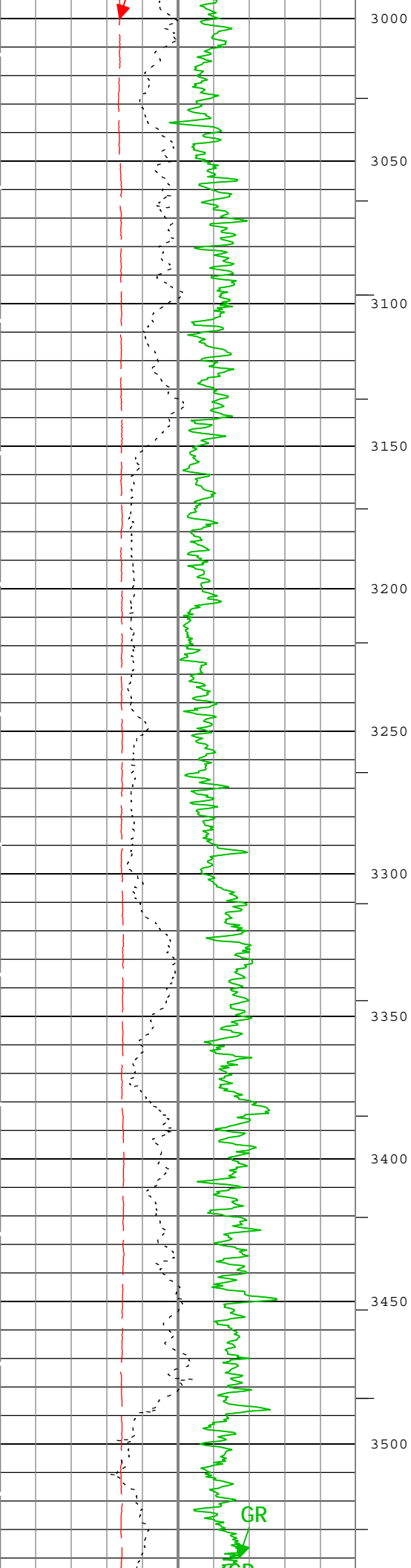


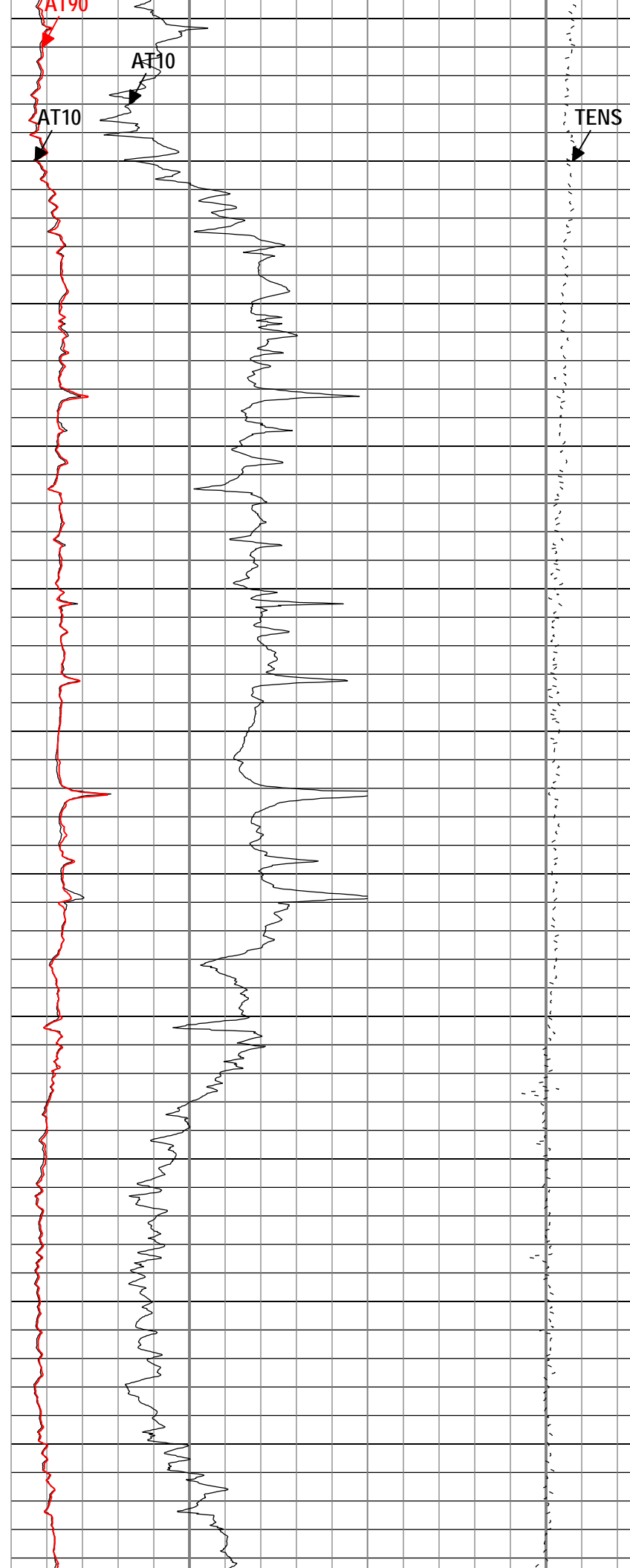
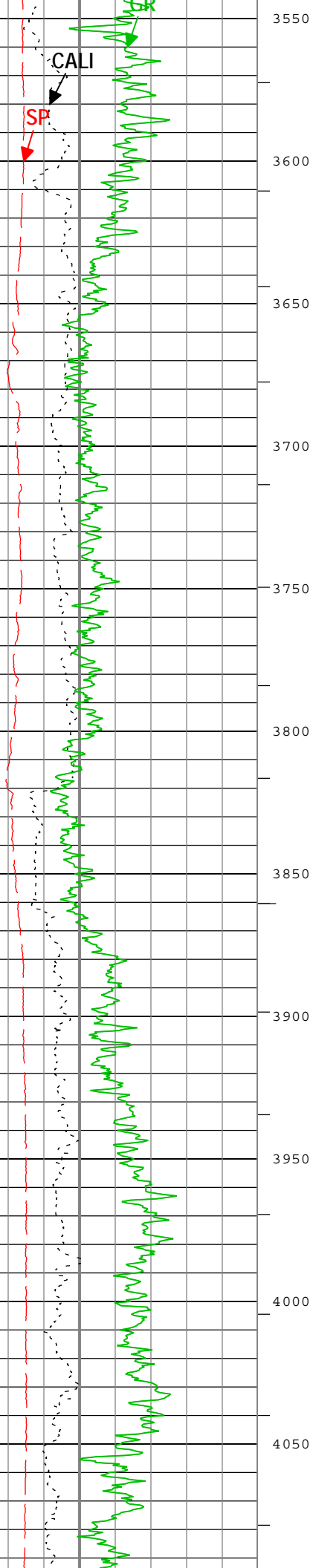


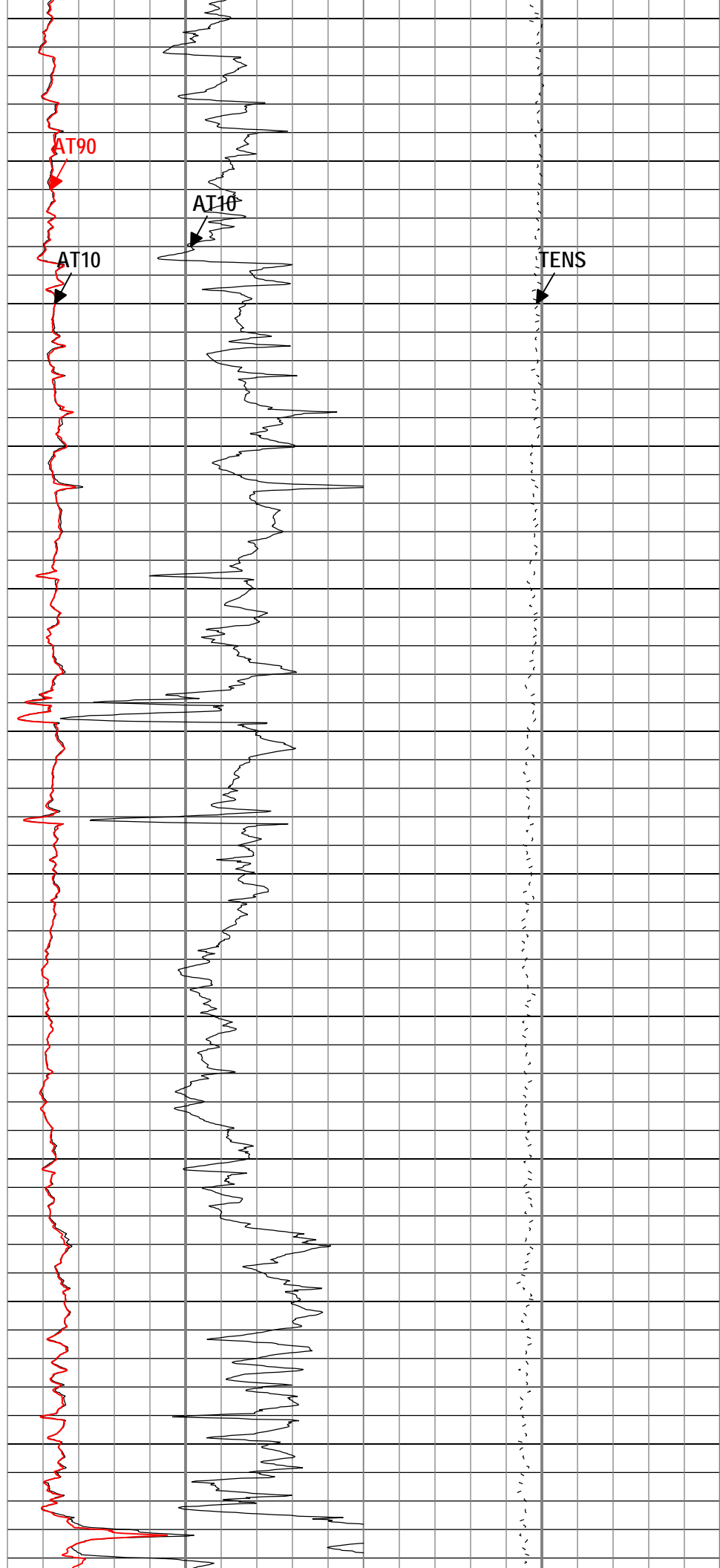
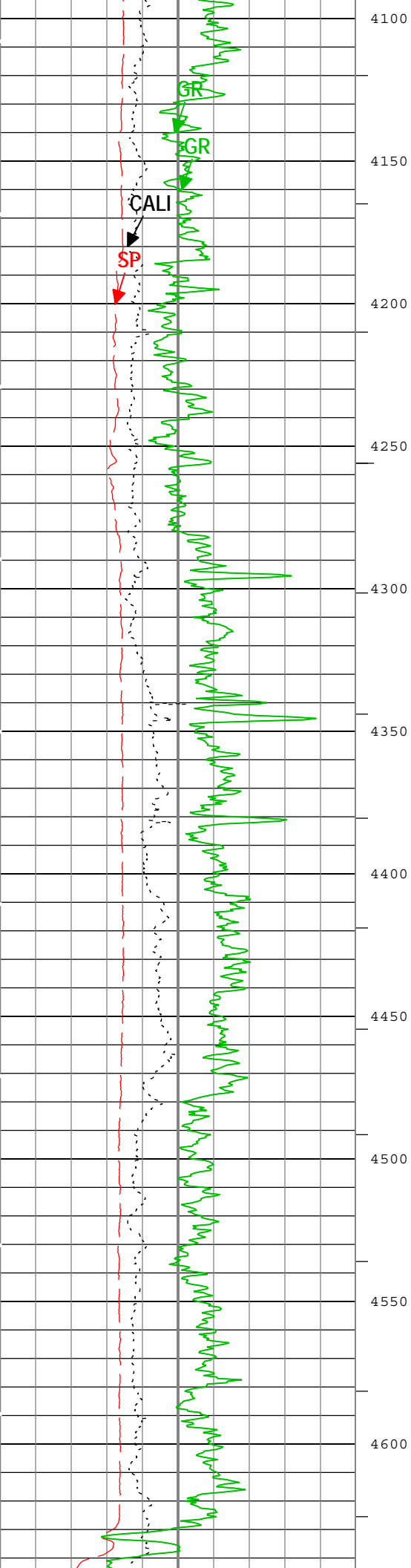


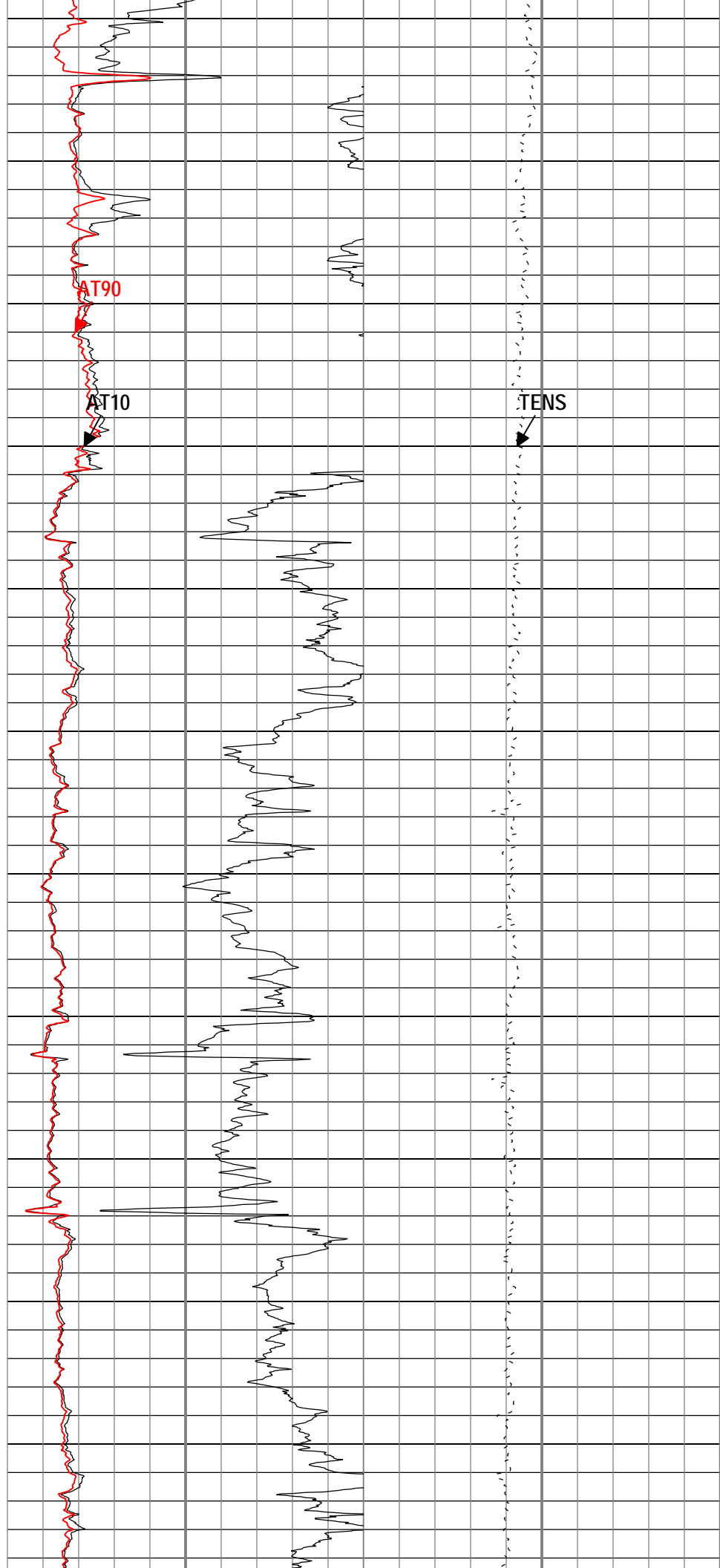
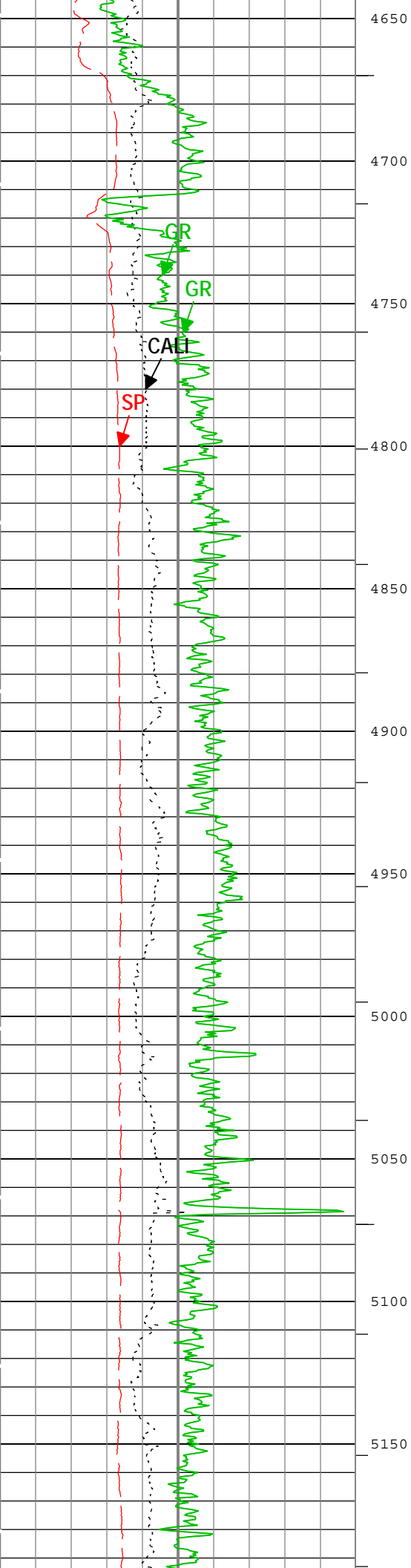


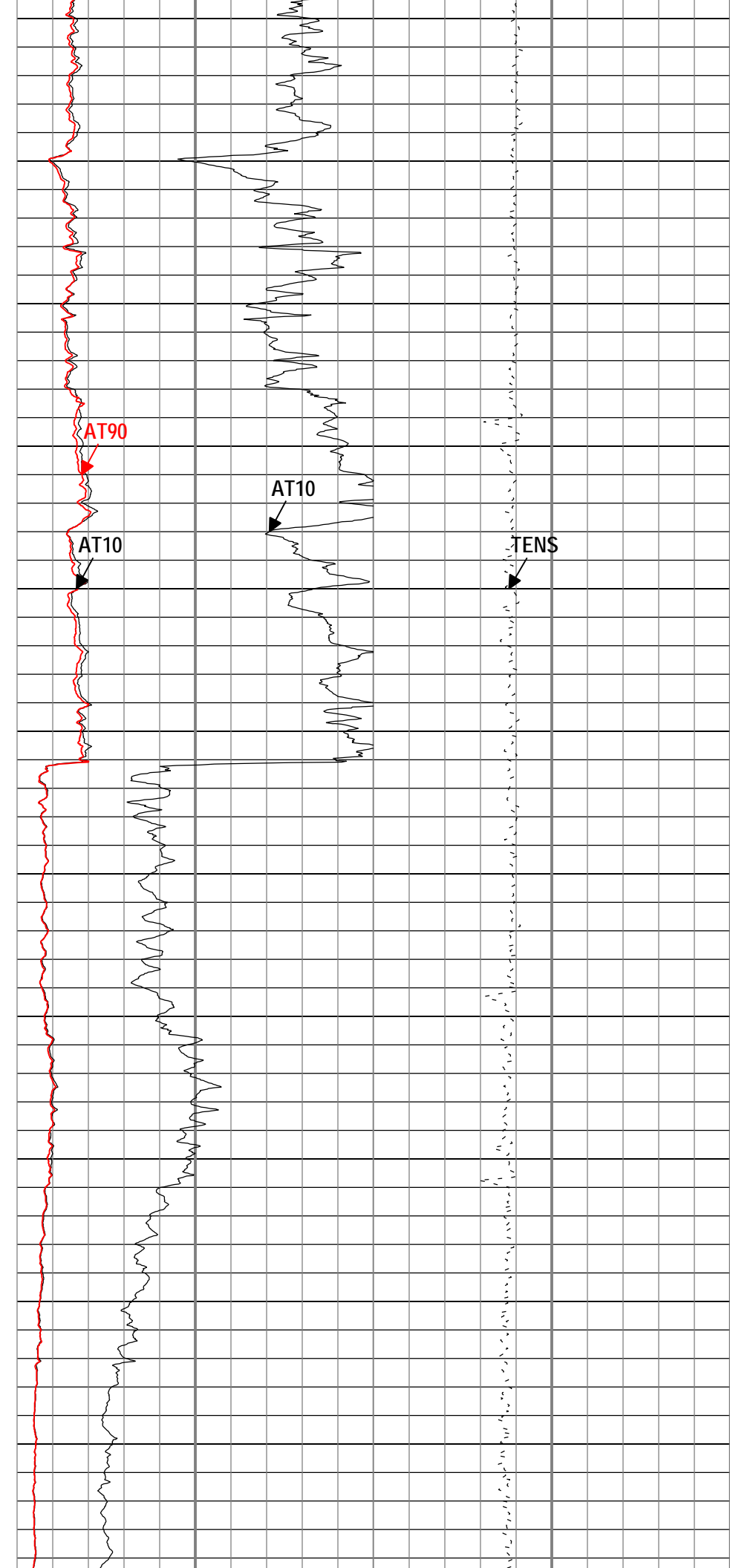
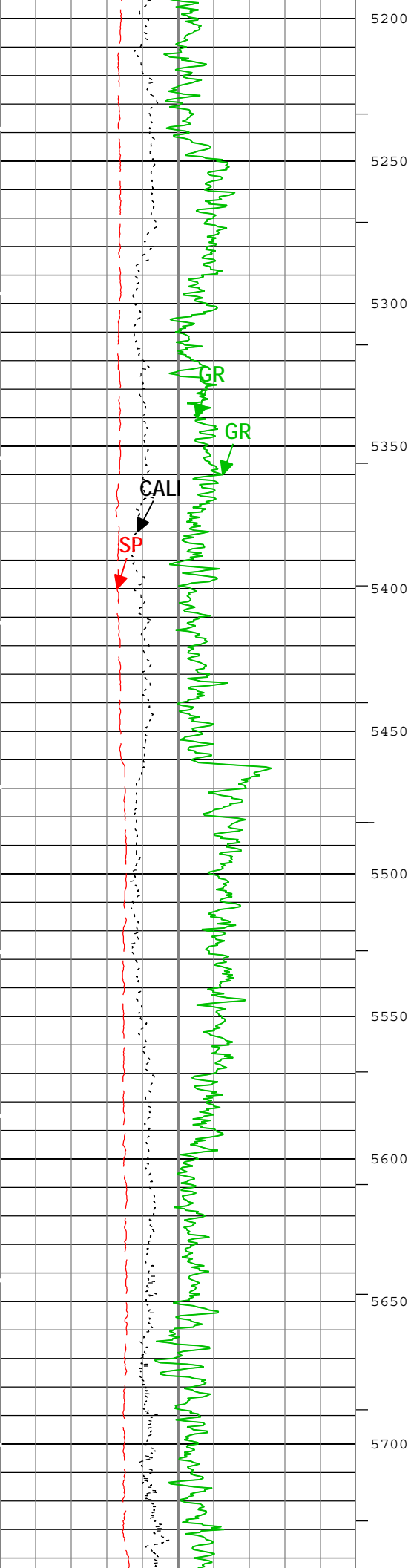


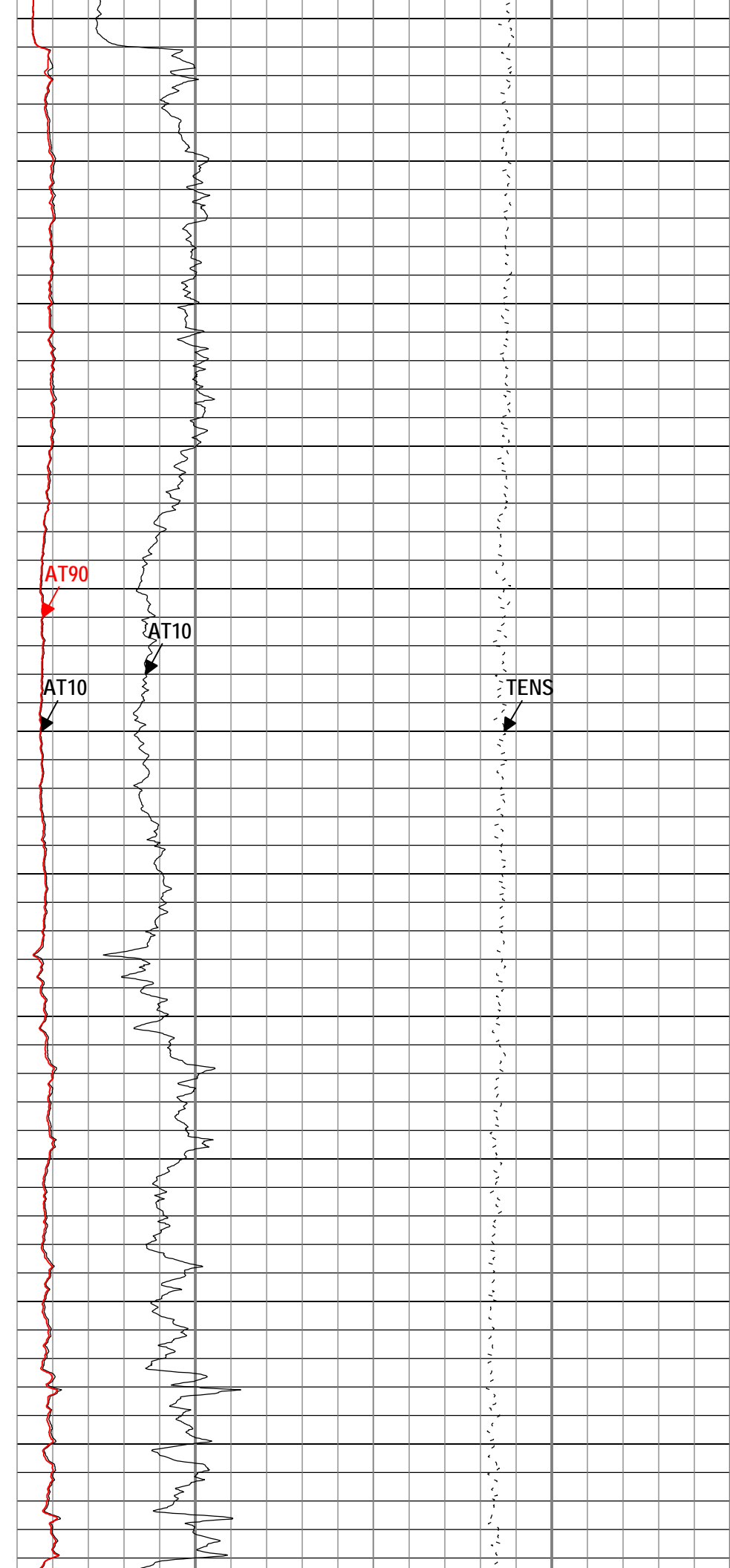
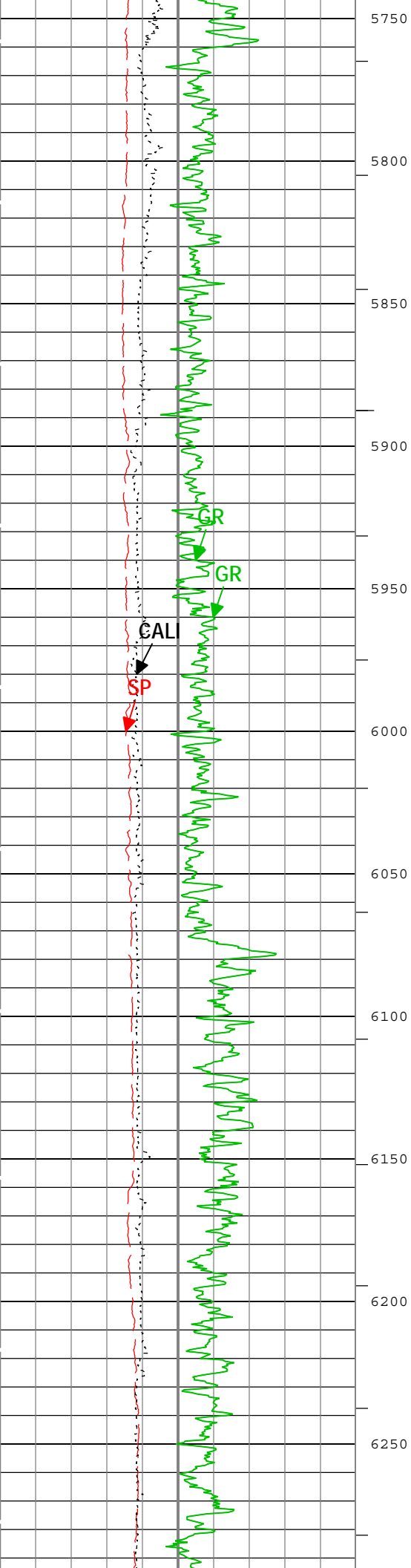




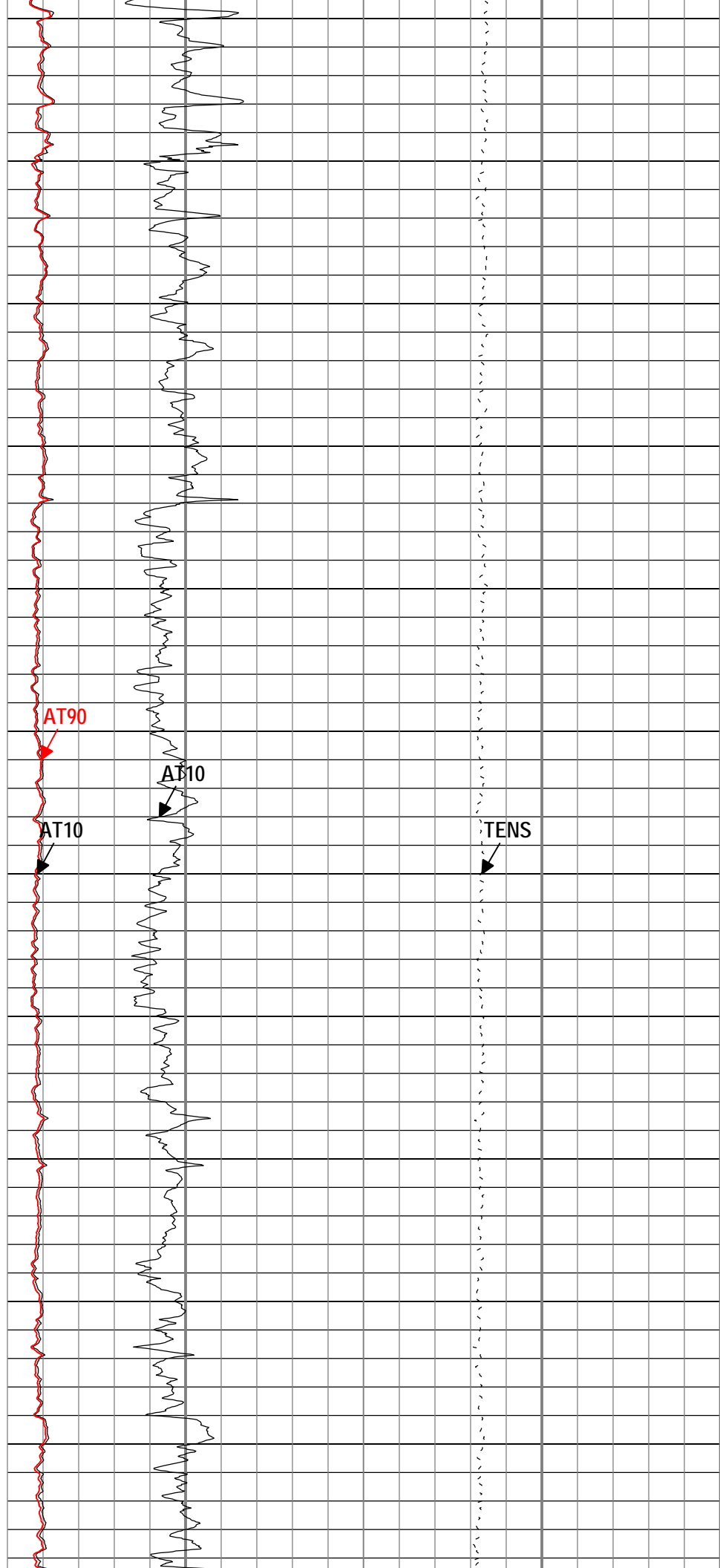
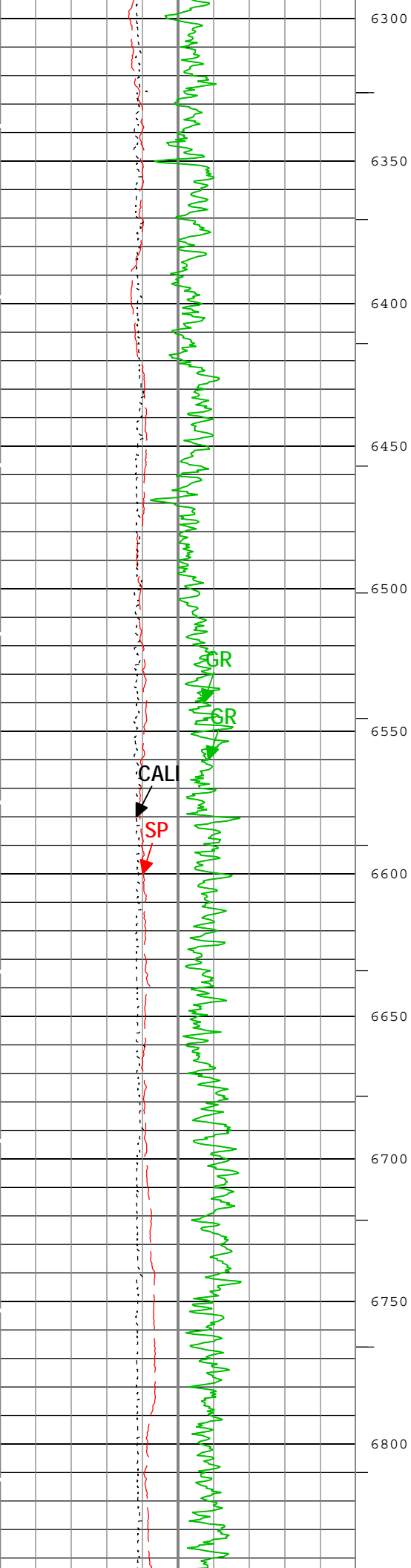


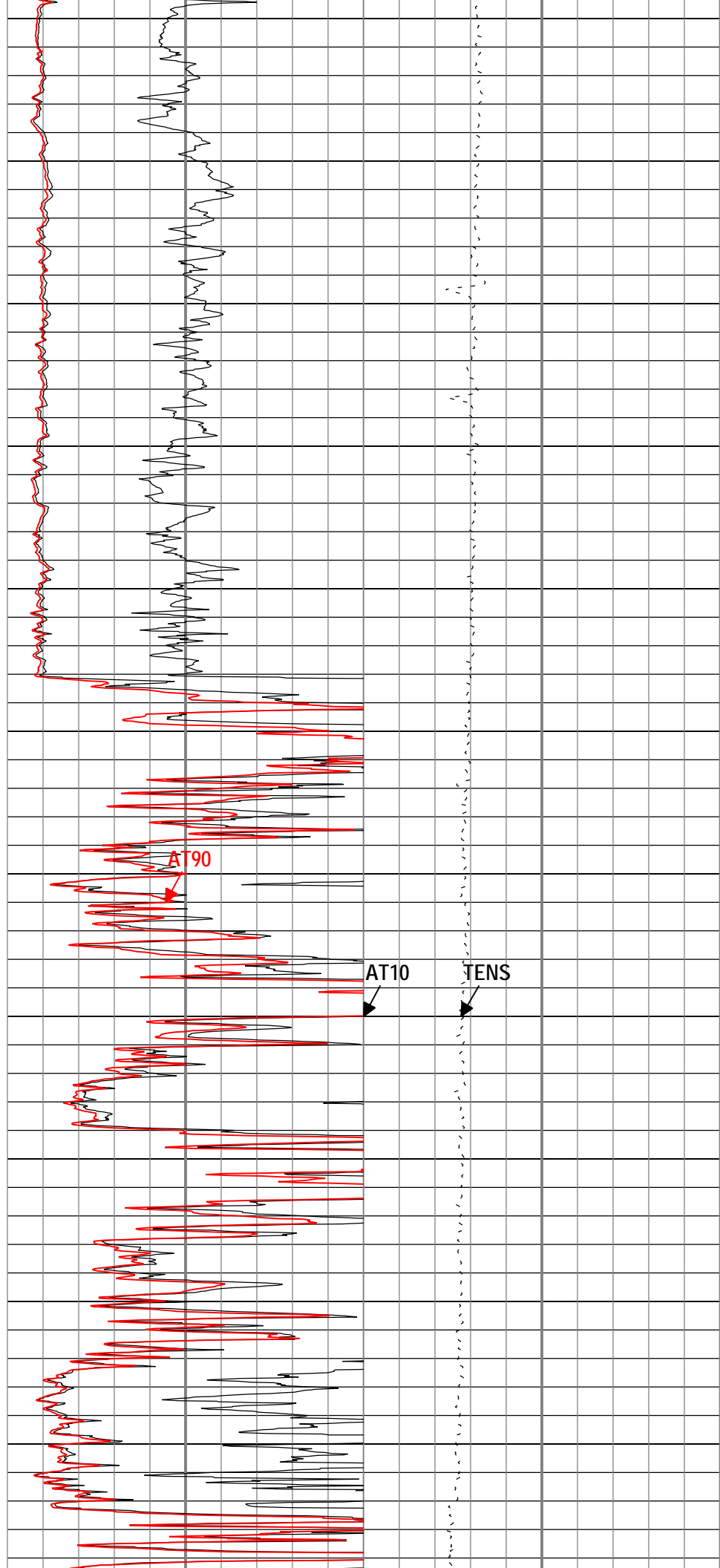
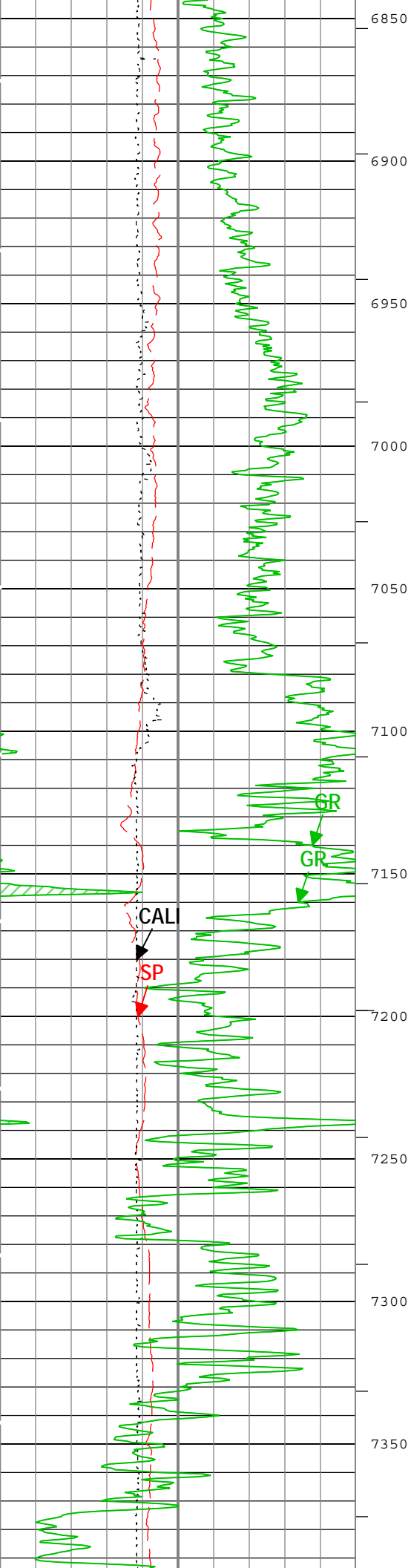


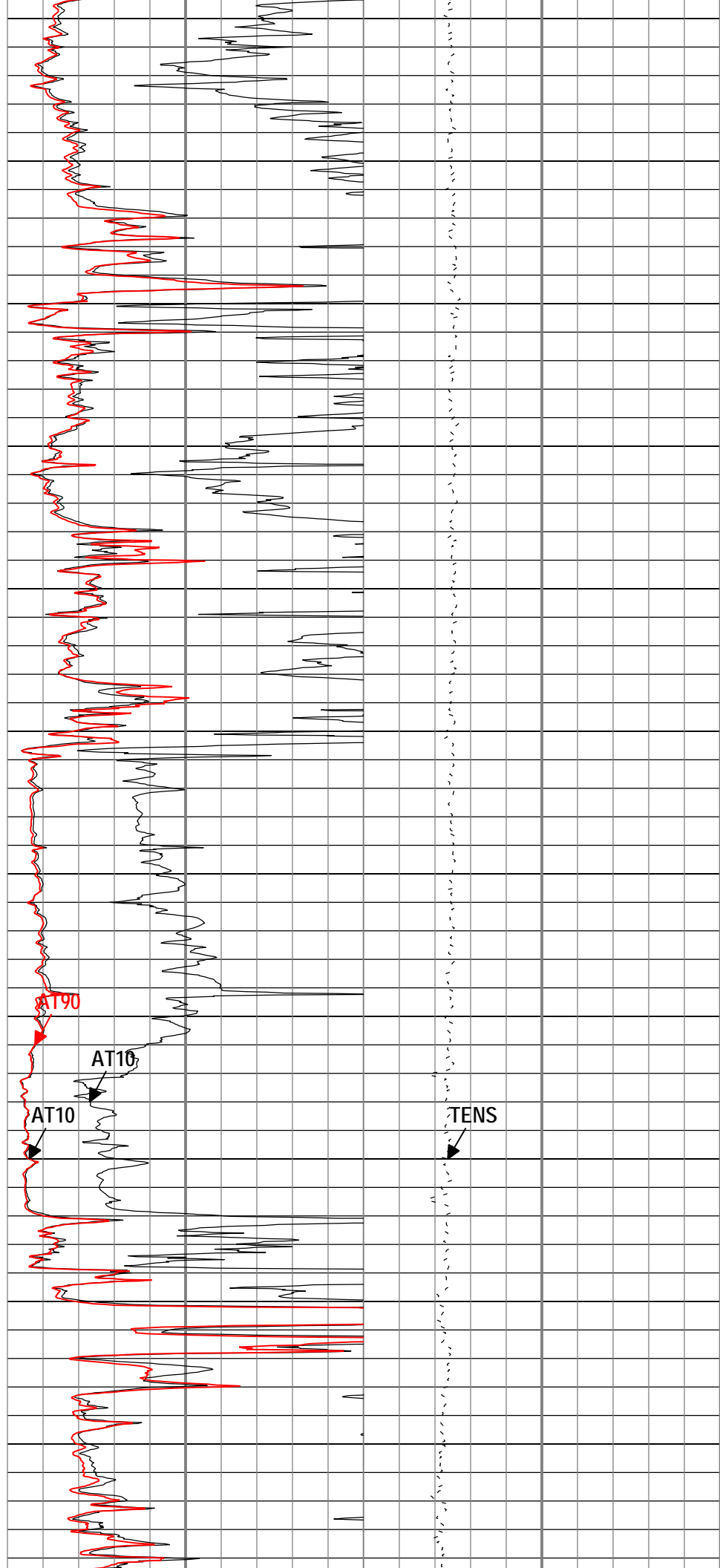
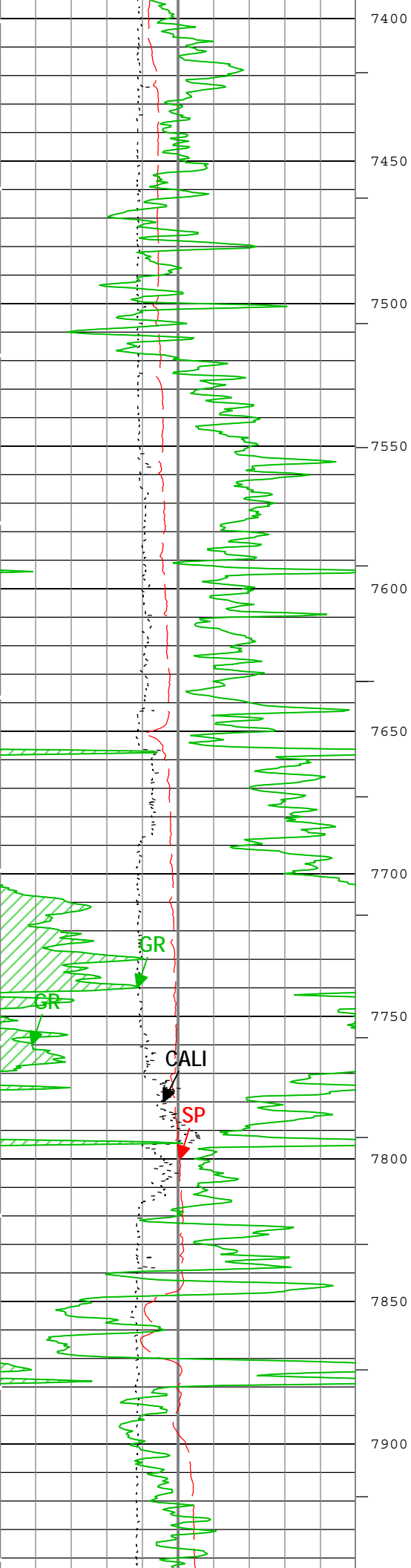


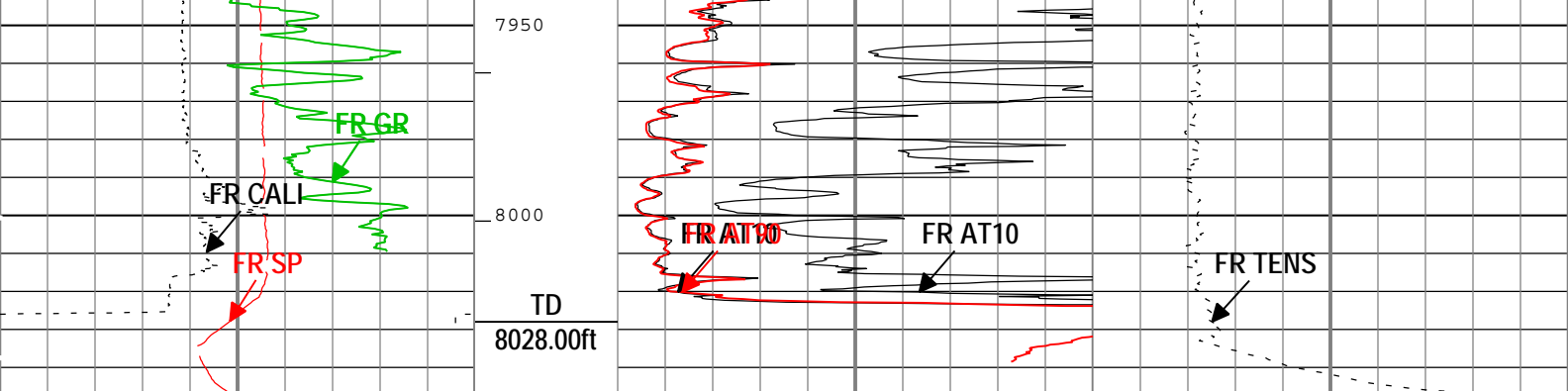












Gamma Ray Backup		
Spontaneous Potential (SP) AIT-H		
-100	mV	200
Caliper (CALI) HDRS-B		
4	in	14
Gamma Ray (GR) HGNS-B		
0	gAPI	200

Array Induction Two Foot Resistivity A10 (AT10) AIT-H		
0	ohm.m	50
Array Induction Two Foot Resistivity A10 (AT10) AIT-H		
0	ohm.m	10
Array Induction Two Foot Resistivity A90 (AT90) AIT-H		
0	ohm.m	50

Cable Tension (TENS)		
5000	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)

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: 08-Apr-2013 09:56:33

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
AAPL	Array Induction Answer Product Level(Depth Log/View only)	AIT-H	Basic	
ABHM	Array Induction Borehole Correction Mode	AIT-H	Compute Mud Resistivity	
ABLM	Array Induction Basic Logs Mode	AIT-H	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-H	Yes	
ASTA	Array Induction Tool Standoff	AIT-H	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-B	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	632	ft
CDEN	Cement Density	HGNS-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.7	lbm/gal
FCD	Future Casing (Outer) Diameter	WLSESSION	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	REMS	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
MST	Mud Sample Temperature	Borehole	53.4	degF
RMS	Resistivity of Mud Sample	Borehole	0.25	ohm.m
SOCO	Standoff Correction Option	HGNS-B	Yes	
SPDR	SP Drift Per Foot	AIT-H	0	mV/ft

## Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	0	620	633.5
BS	7.875	633.5	8046.5

All depth are actual.

## Tool Control Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-B	0	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

## Run One

## 5" Induction

## Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1898.51	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	2717.3	ft3

## Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20120723-3.1.9755.1112 EXP_APL-MASTAXIS-3.1.9755.1221

Computation	Description		Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels		3.1.9755.0
Tool Elements	Description	Software Version	Firmware Version
AHIS	Array Induction Sonde - H	3.1.9755.1112	
HGNS-B	HILT Gamma-Ray and Neutron Sonde, 125 degC	3.1.9755.0	2.0
HRCC-B	HILT High-Resolution Control Cartridge, 125 degC	3.1.9755.0	2.0

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run One	Log[3]:Up	Up	543.79 ft	8046.71 ft	08-Apr-2013 2:05:52 AM	08-Apr-2013 4:40:32 AM	1.25 ft	true

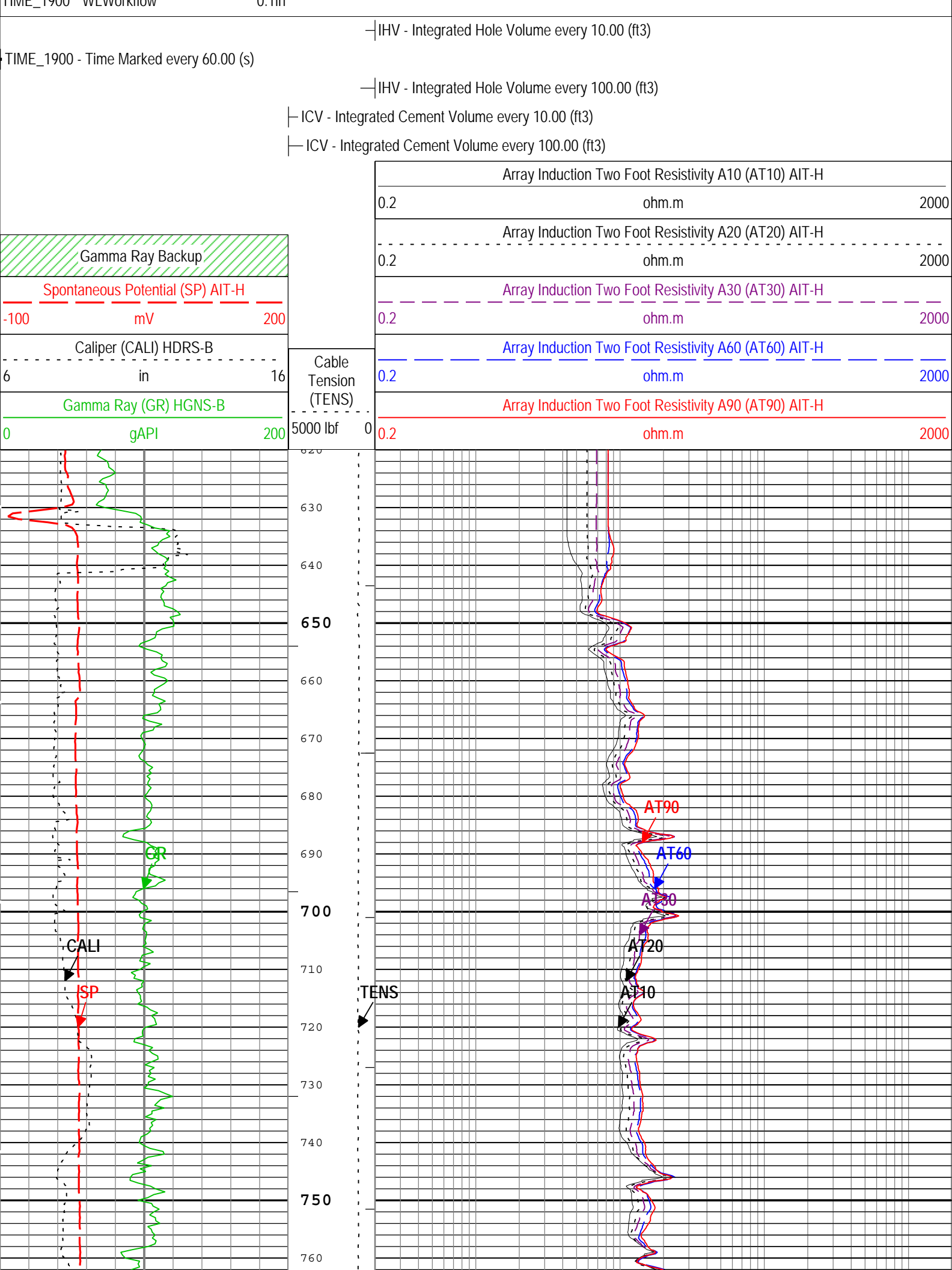
All depths are referenced to toolstring zero

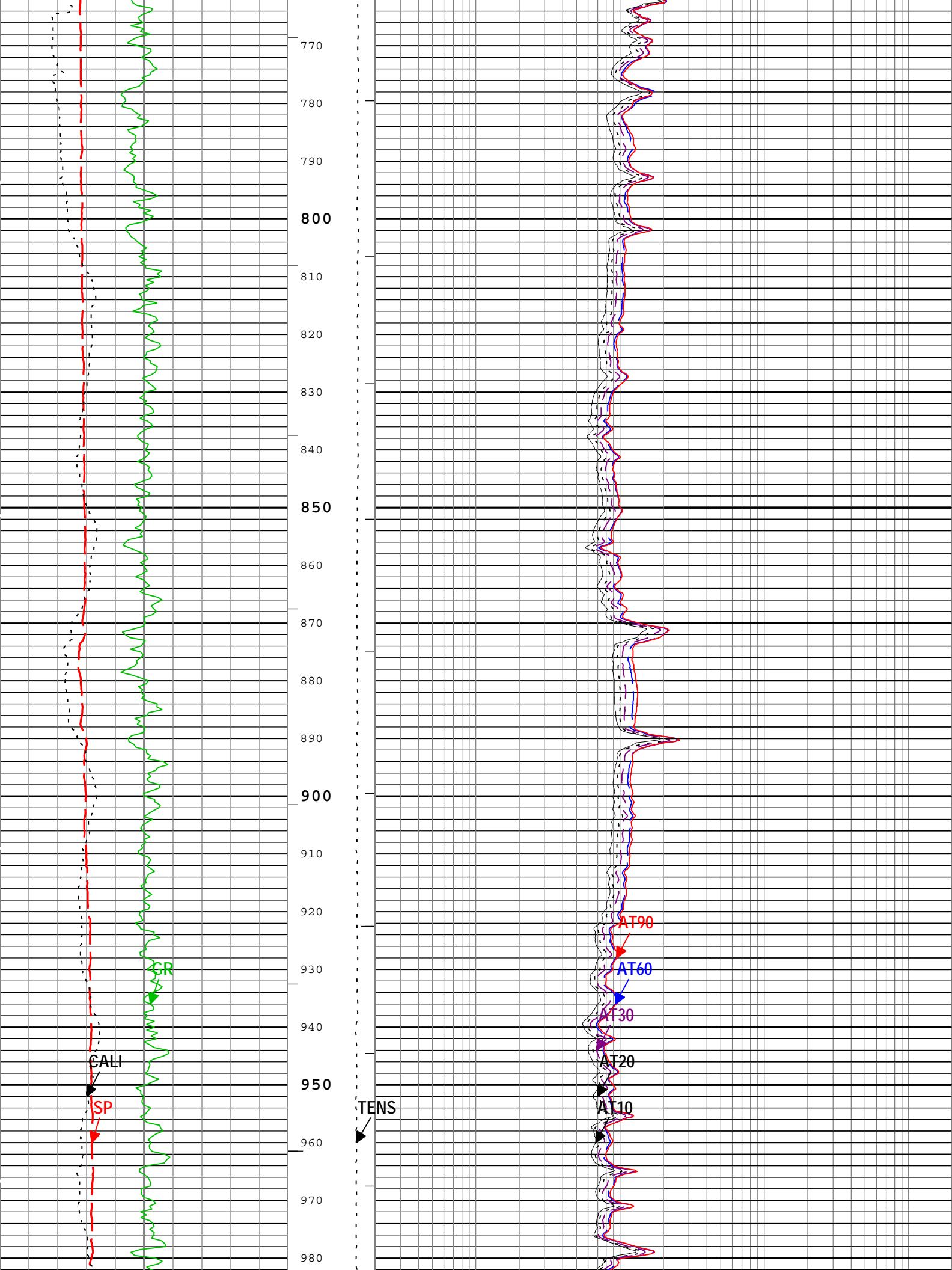
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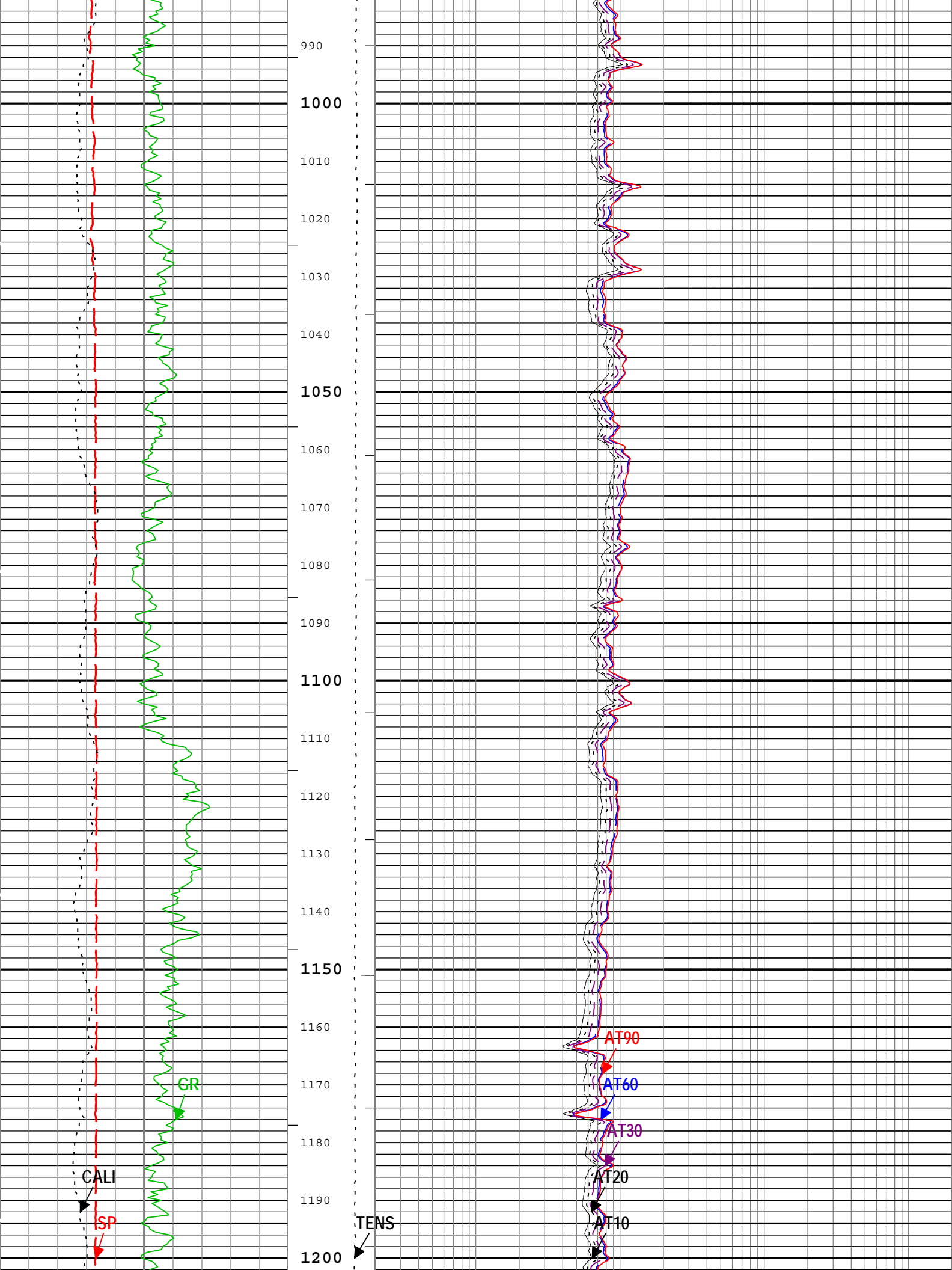
Run One: Log[3]:Up

Description: AIT Basic Log Two    Format: Log ( EMD 5in Induction )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 08-Apr-2013 09:56:44

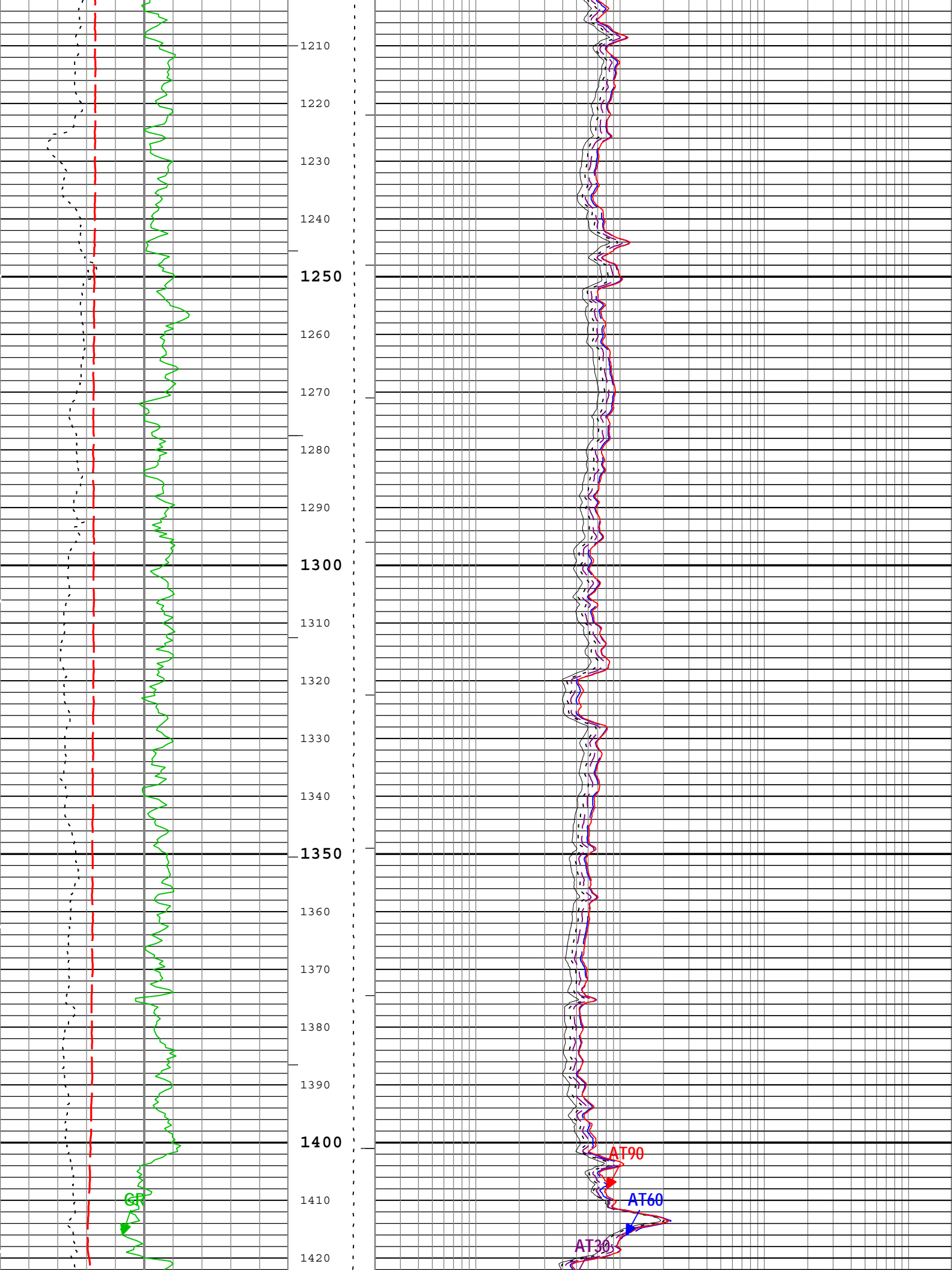
Channel	Source	Sampling
AT10	AIT-H:AHIS:AHIS	3in
AT20	AIT-H:AHIS:AHIS	3in
AT30	AIT-H:AHIS:AHIS	3in
AT60	AIT-H:AHIS:AHIS	3in
AT90	AIT-H:AHIS:AHIS	3in
CALI	HDRS-B:HRCC-B:HRCC-B	1in
GR	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in
IHV	Borehole	6in
SP	AIT-H:AHIS:AHIS	6in
TENS	WLWorkflow	6in
TIME_1000	WLWorkflow	0.1in

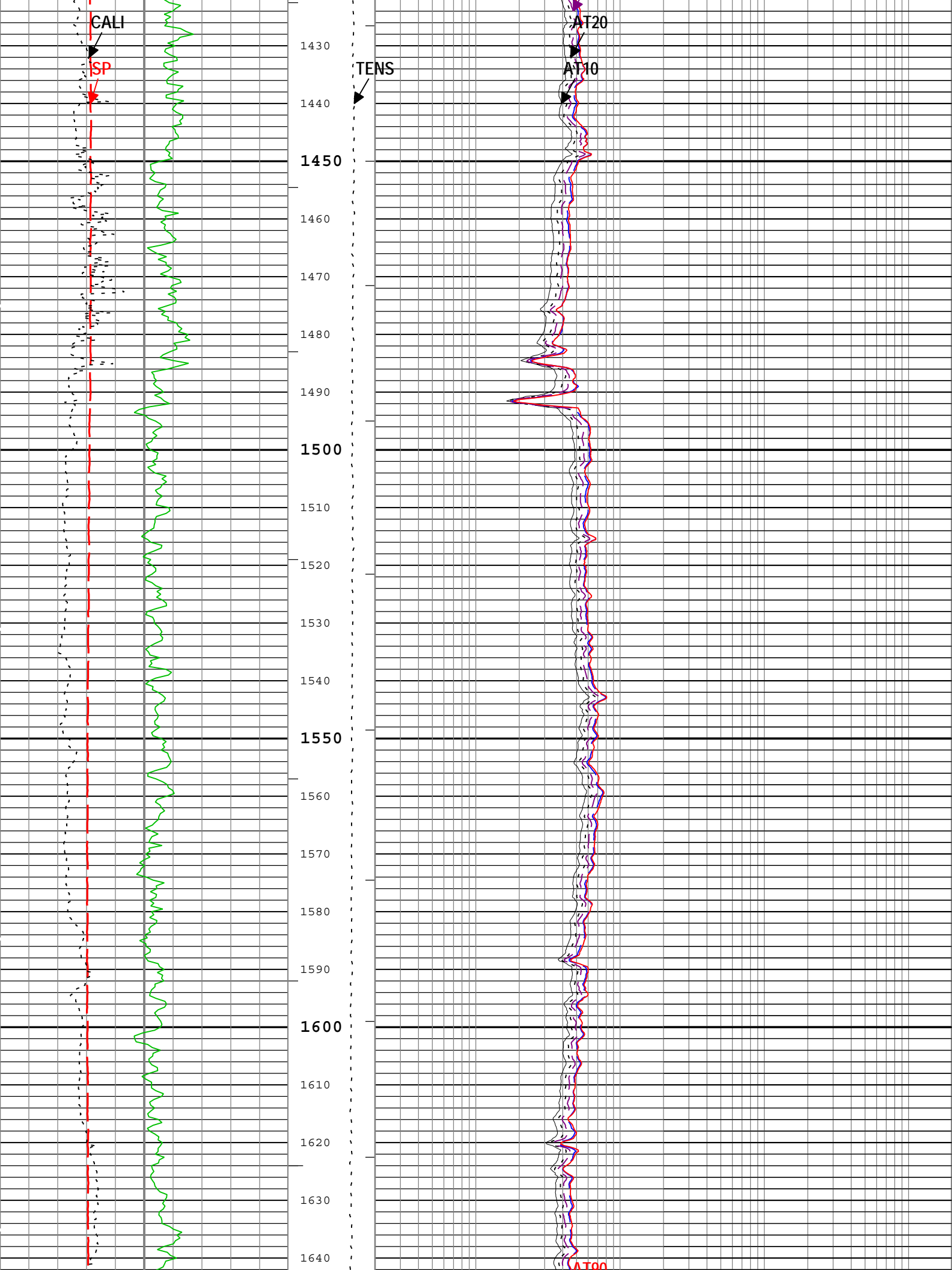


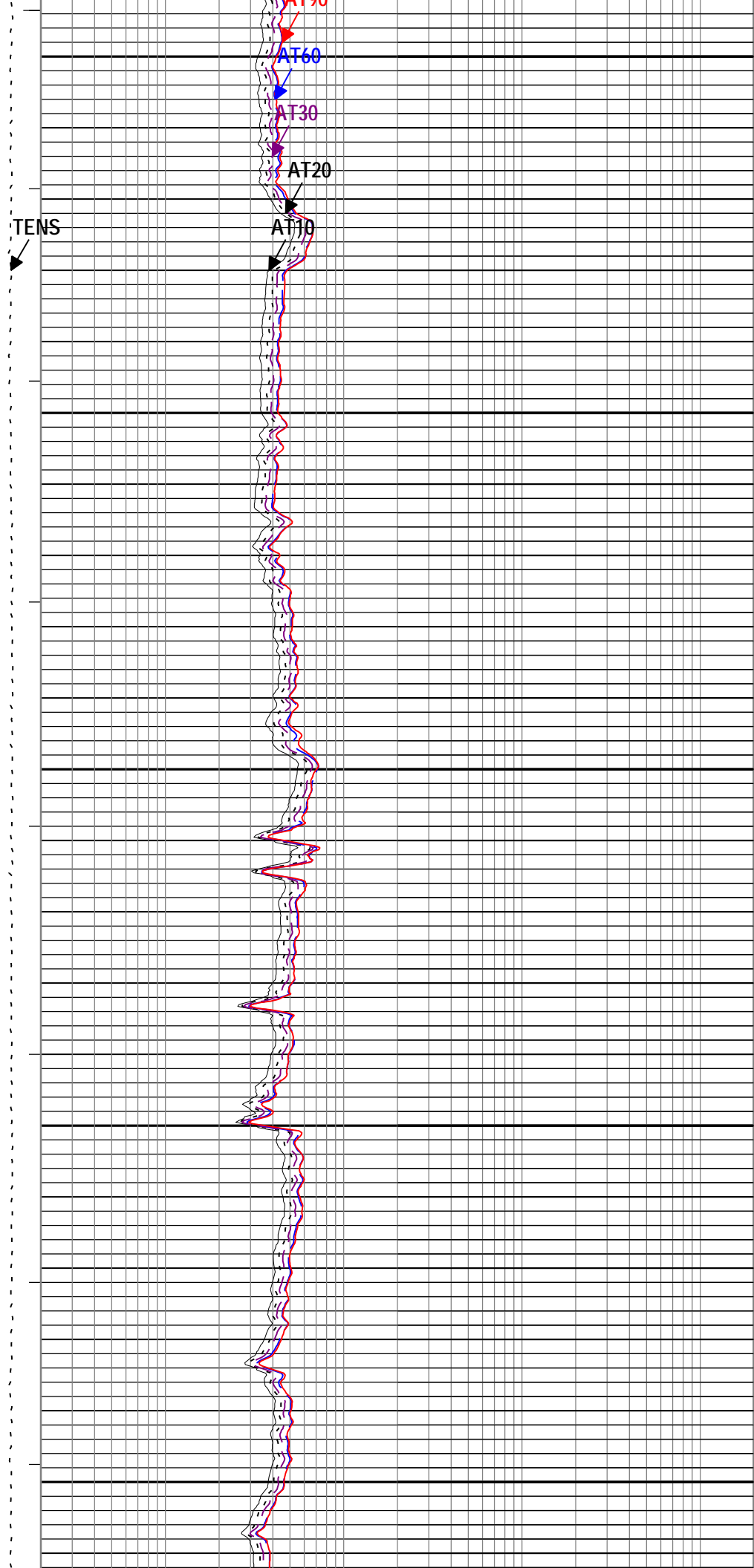
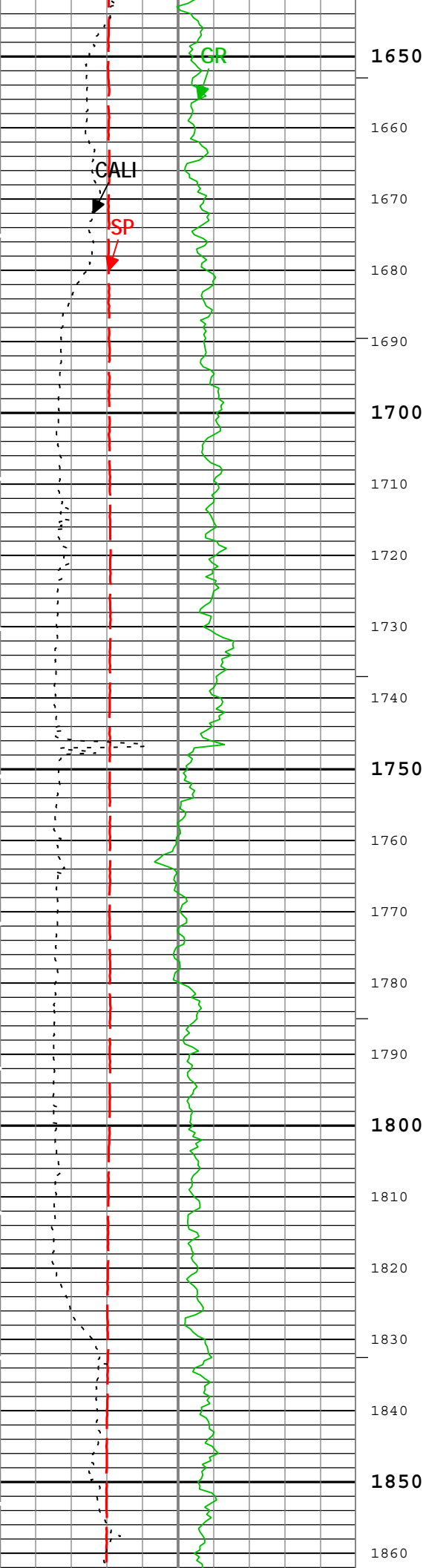


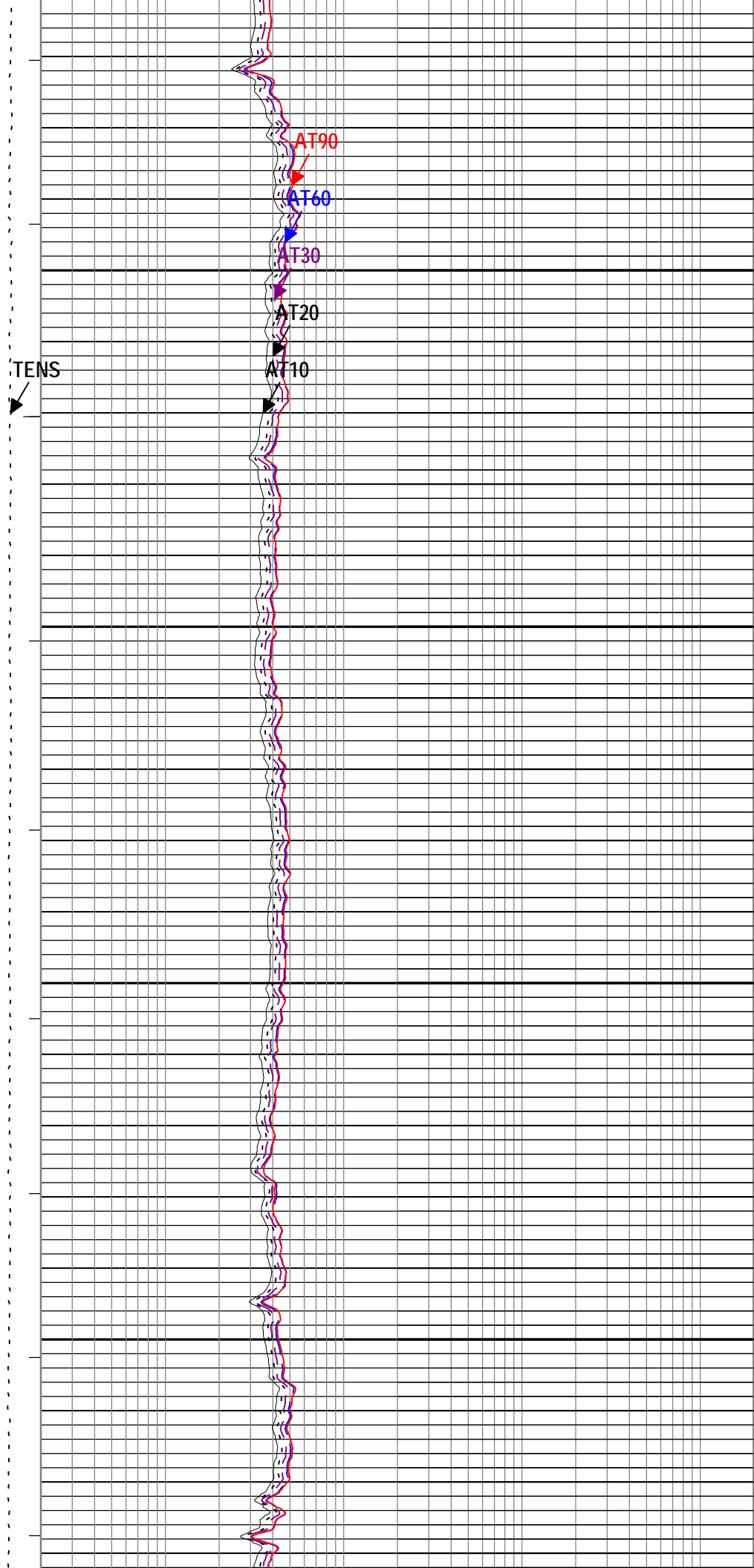
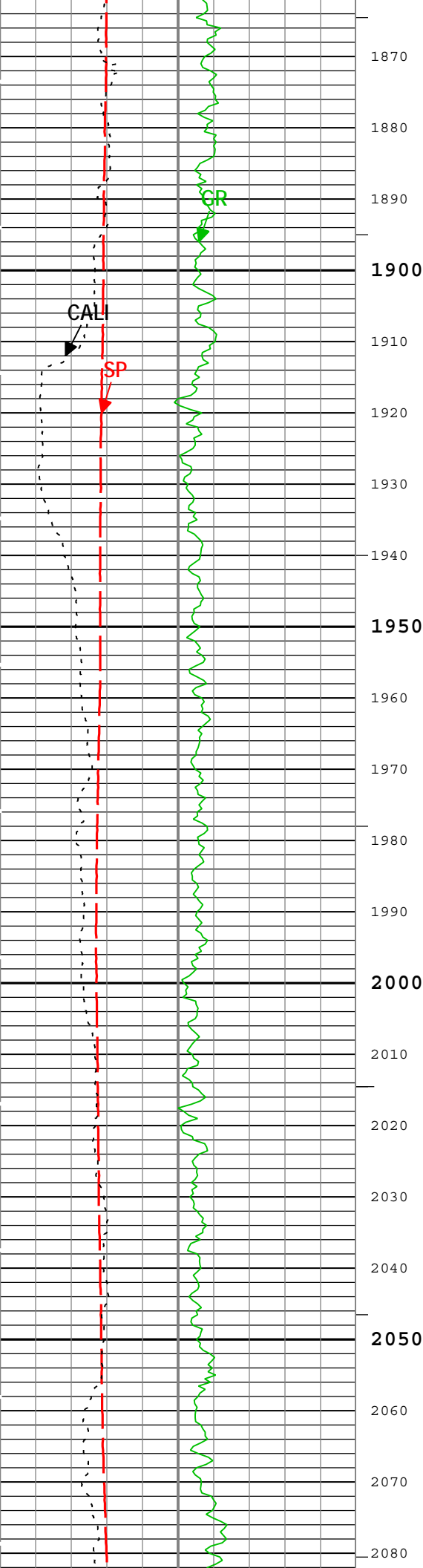


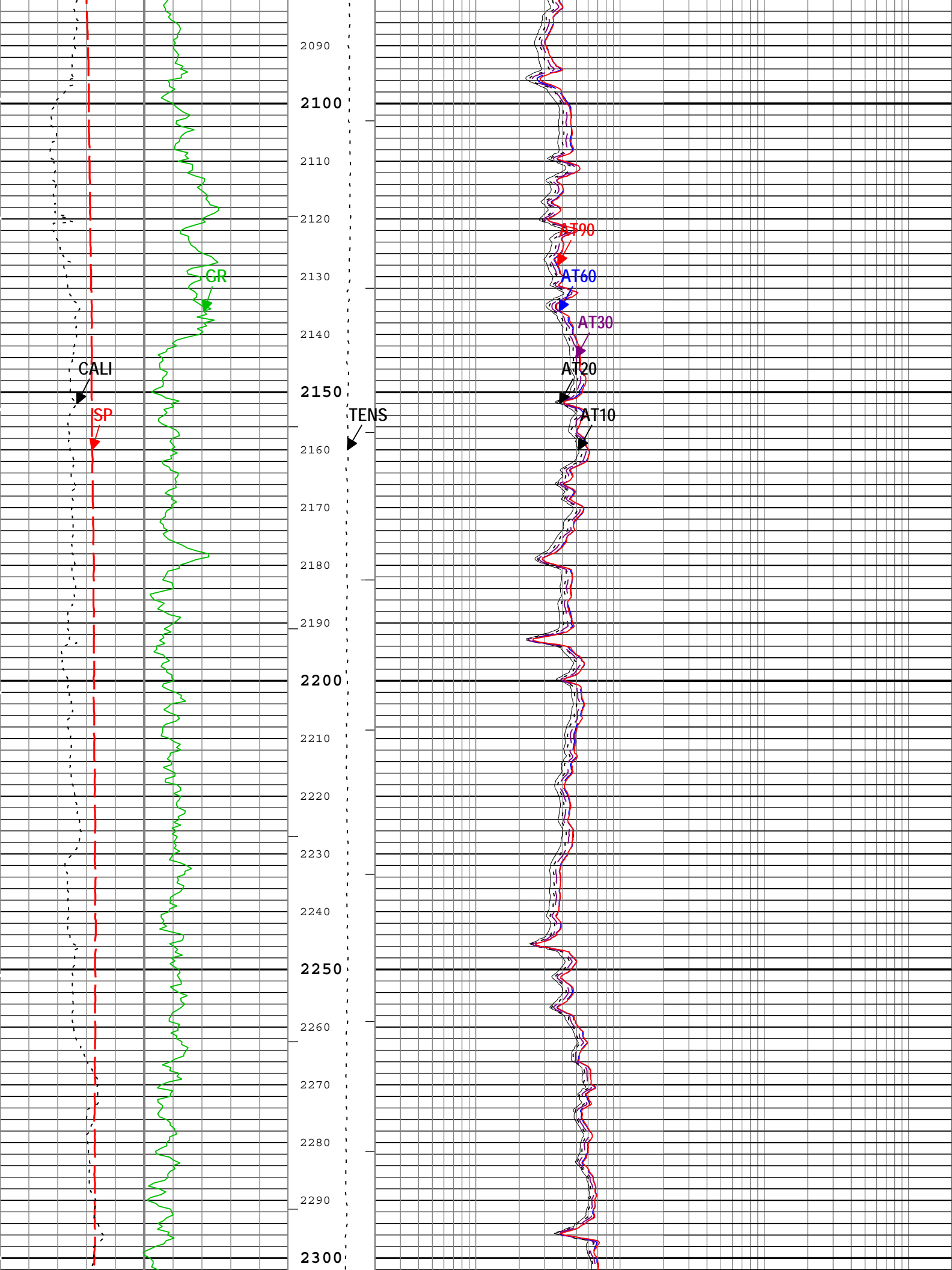


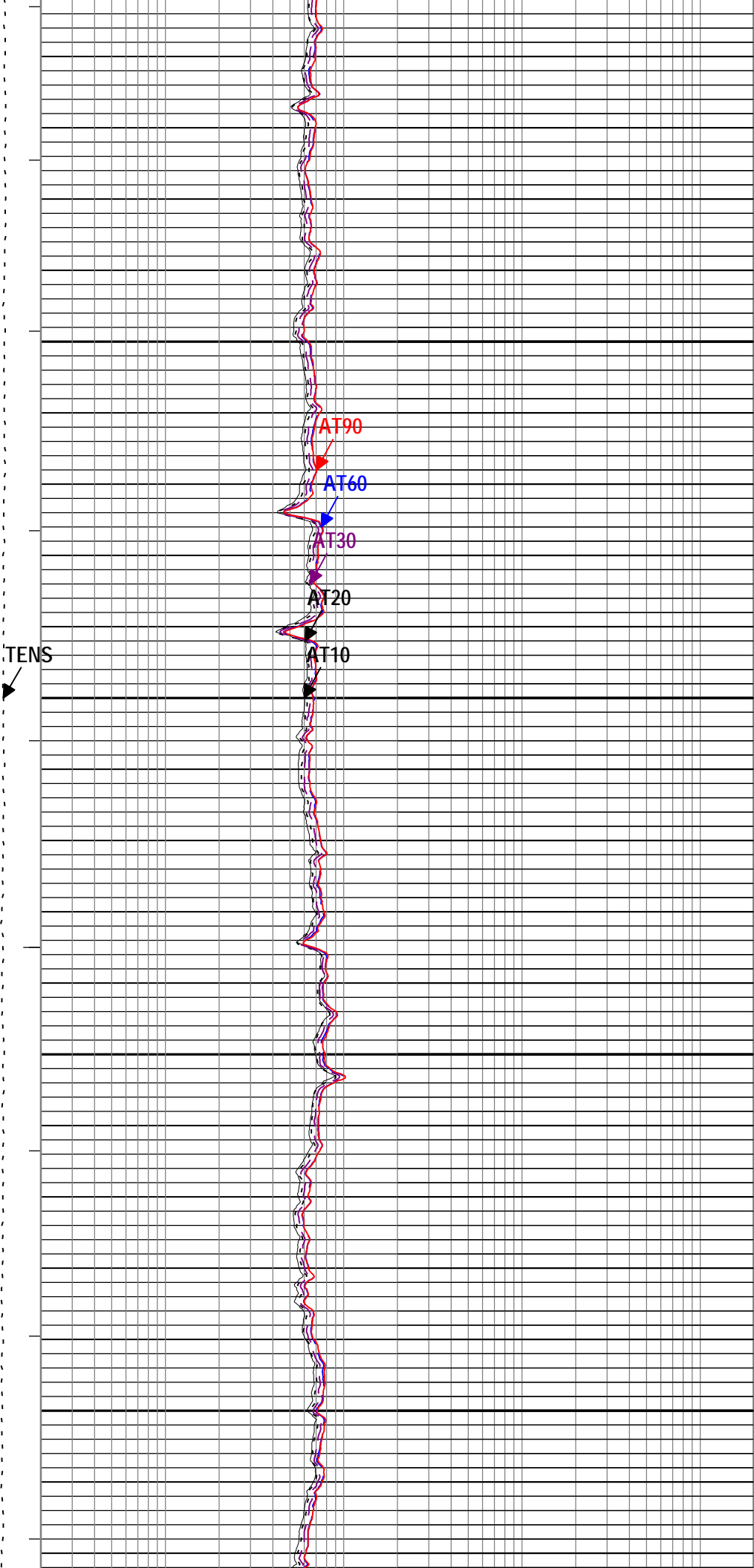
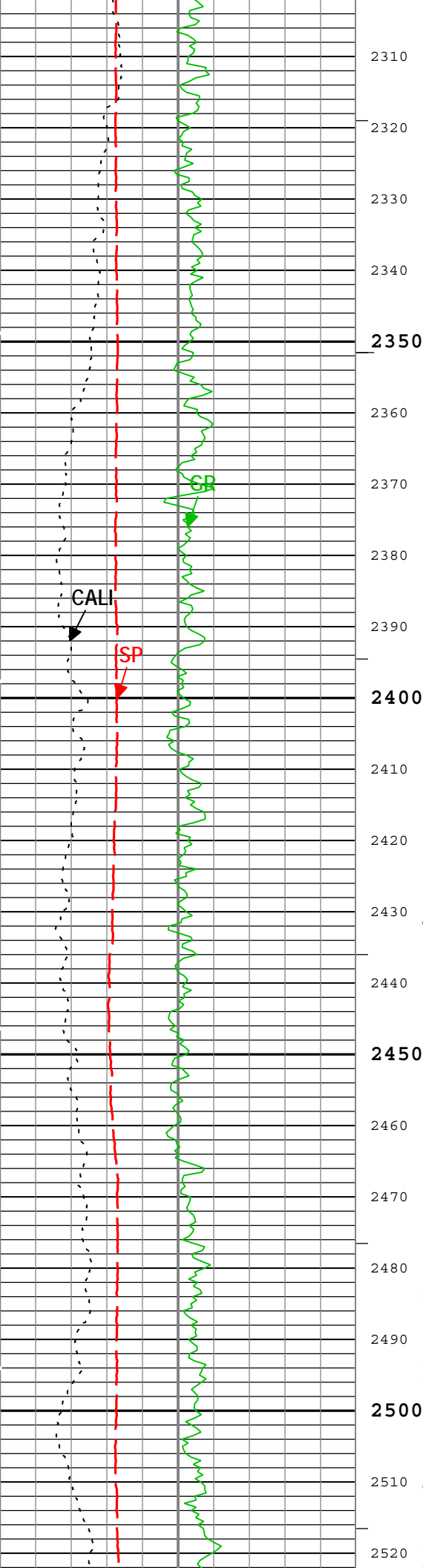


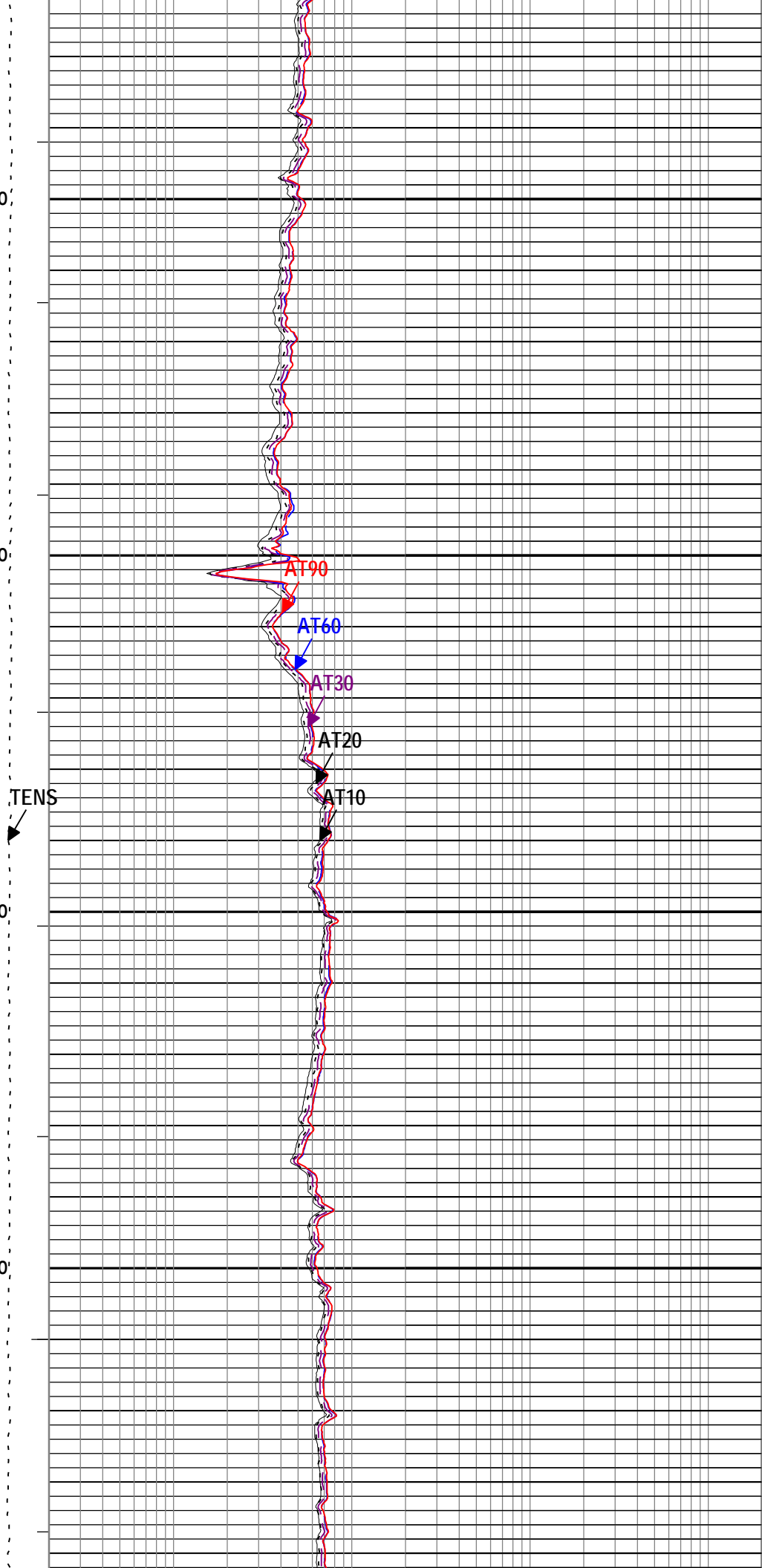
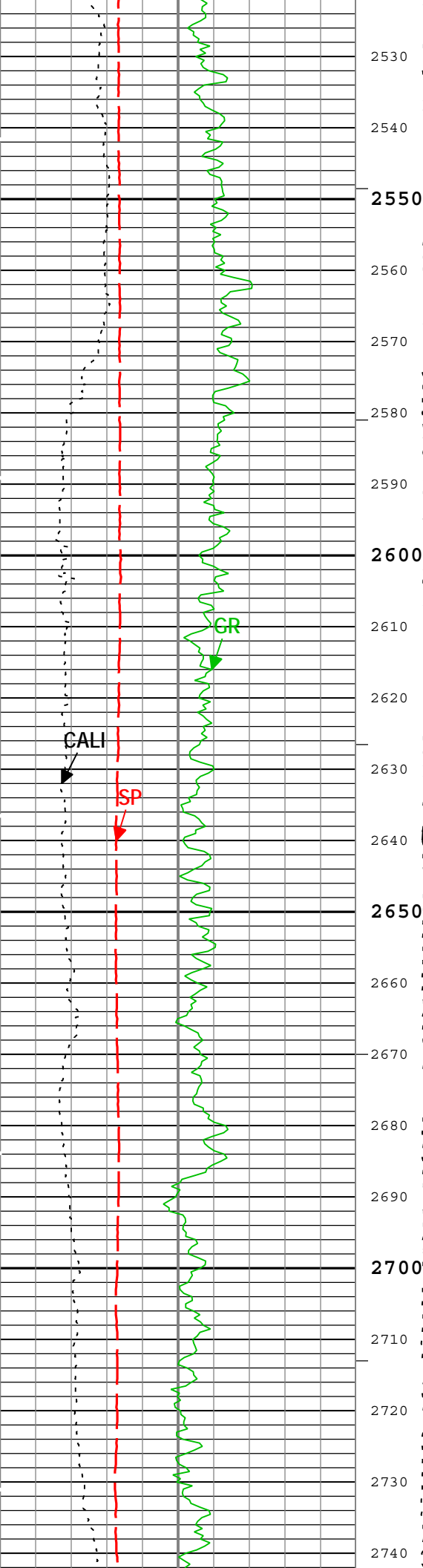


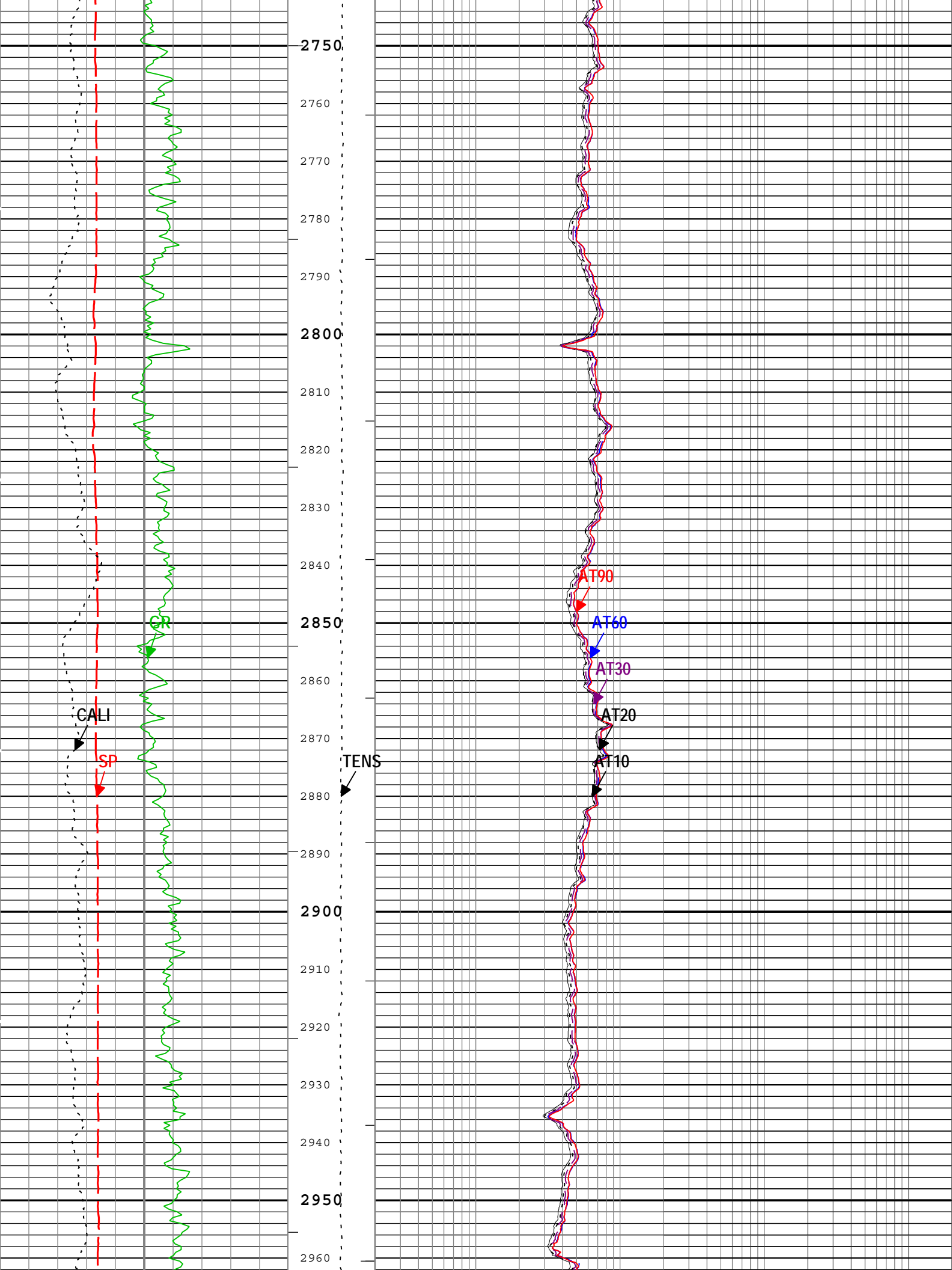




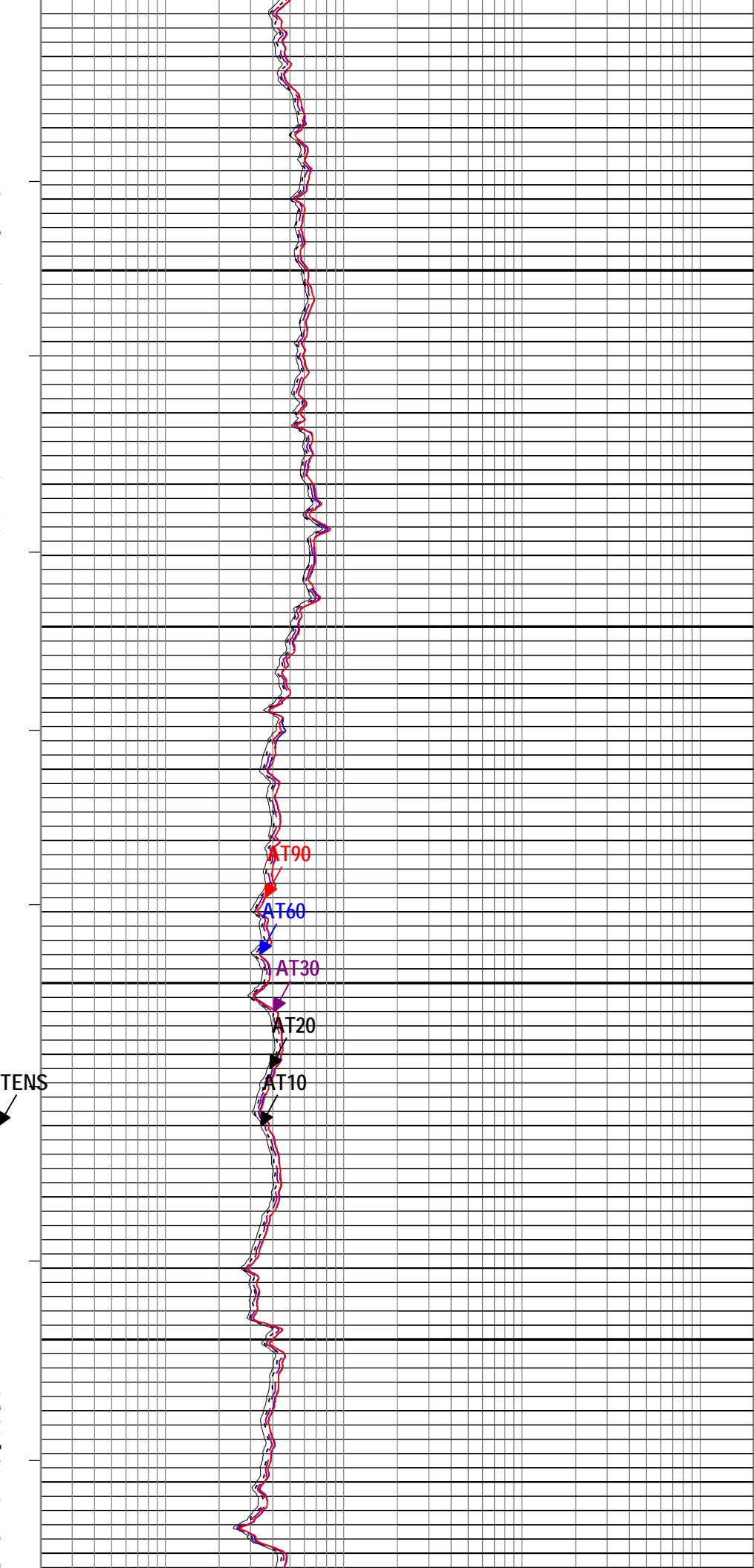
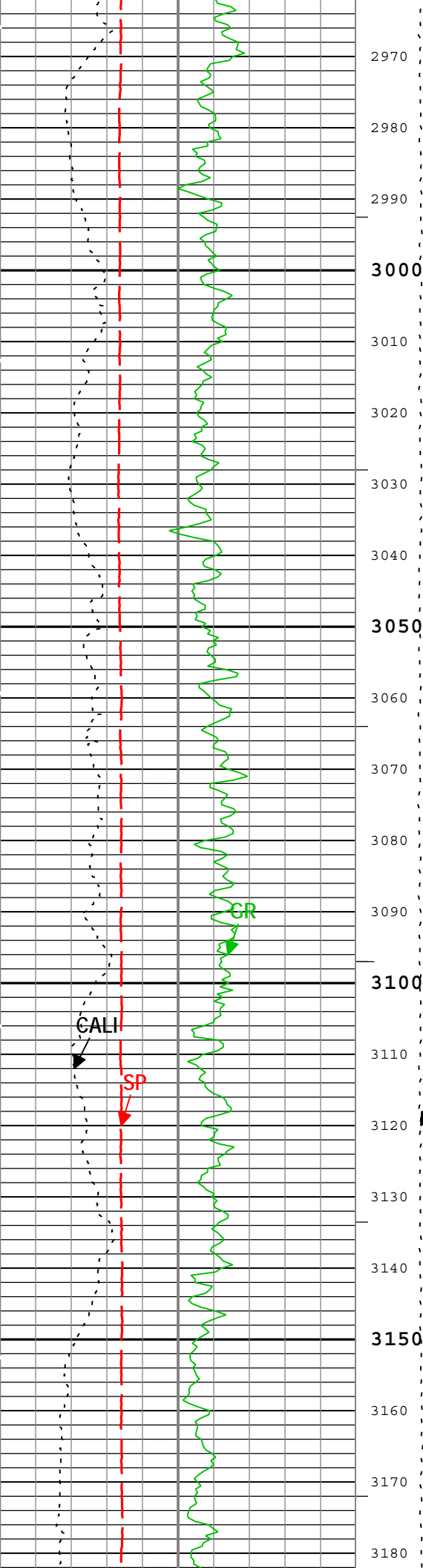


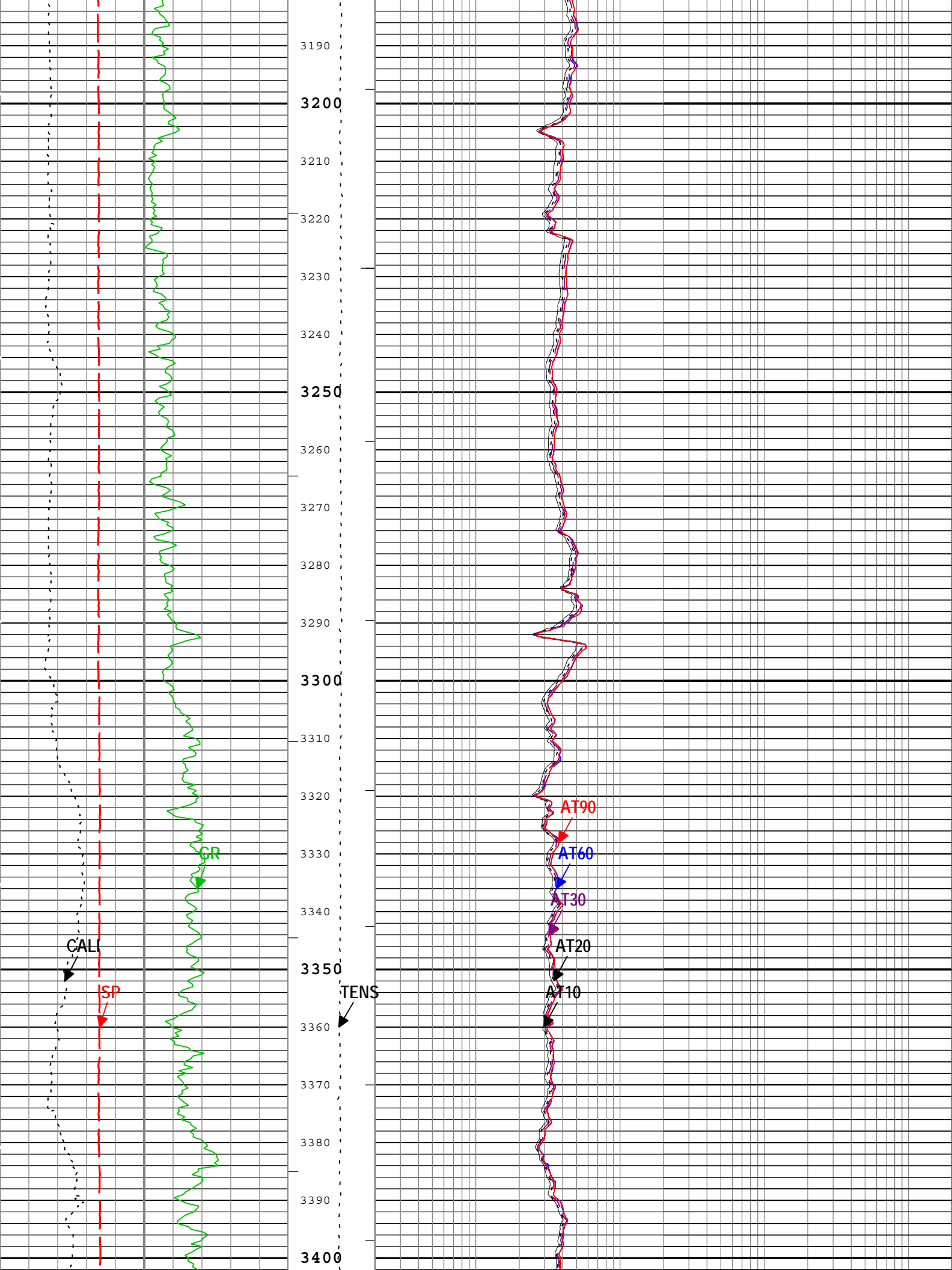


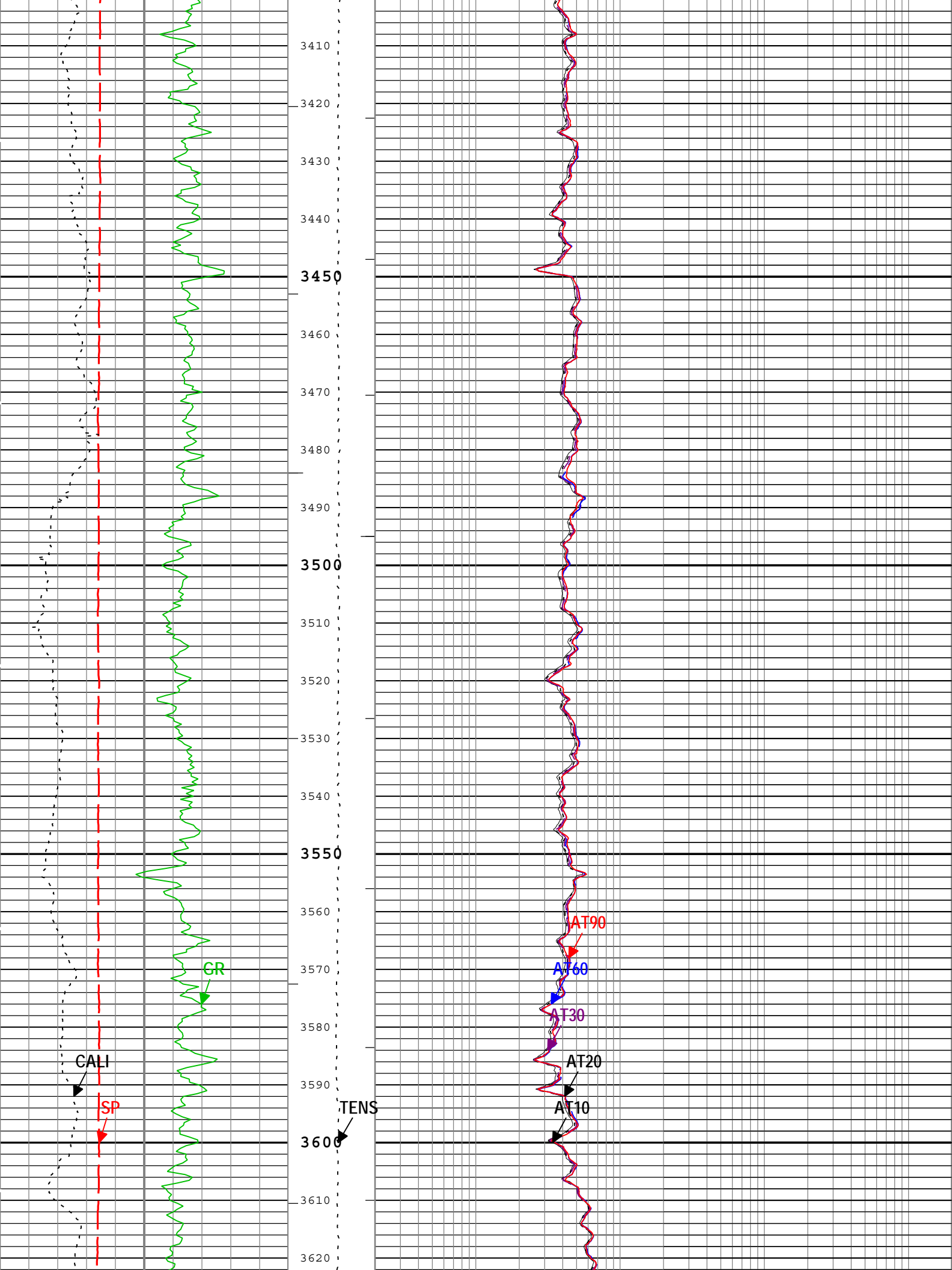


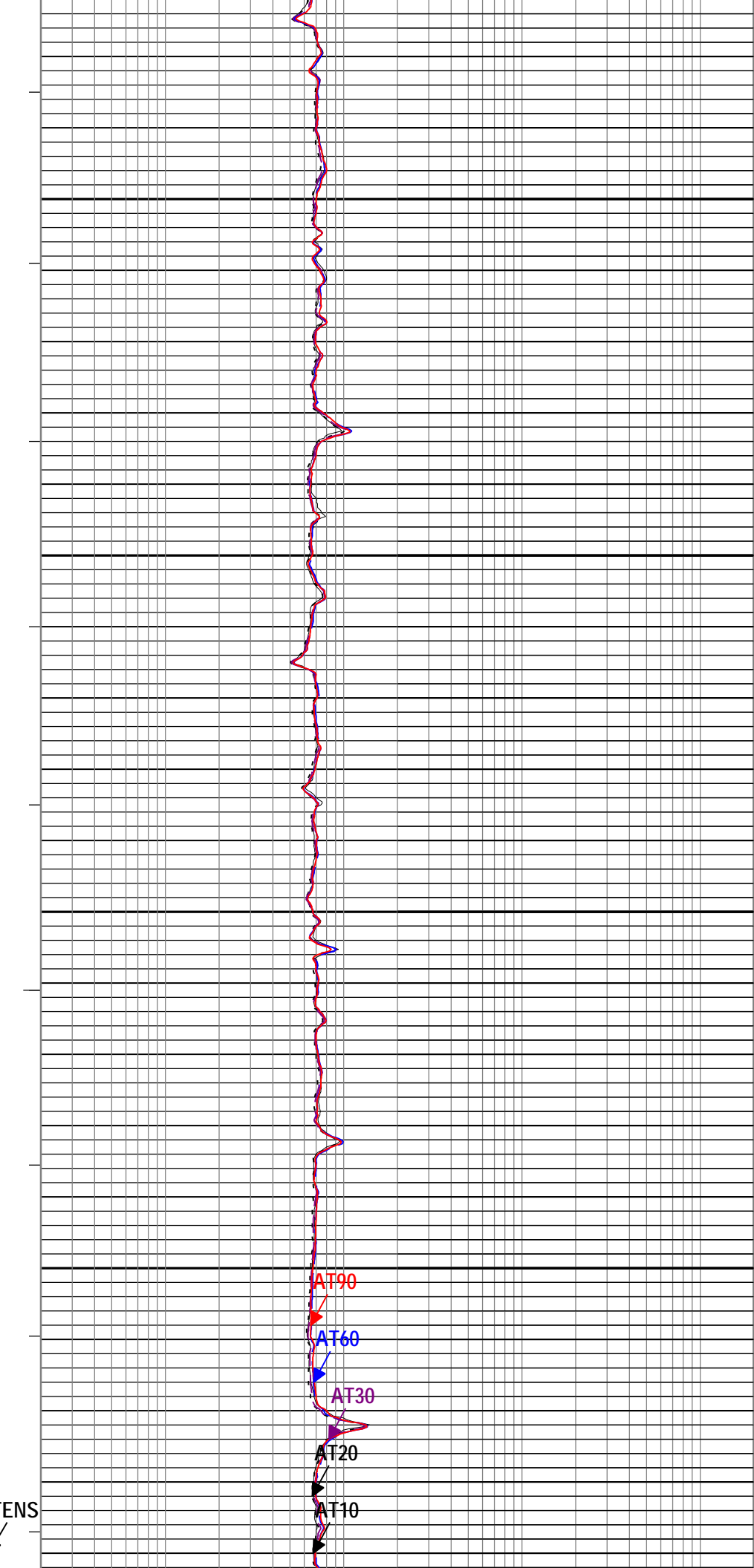
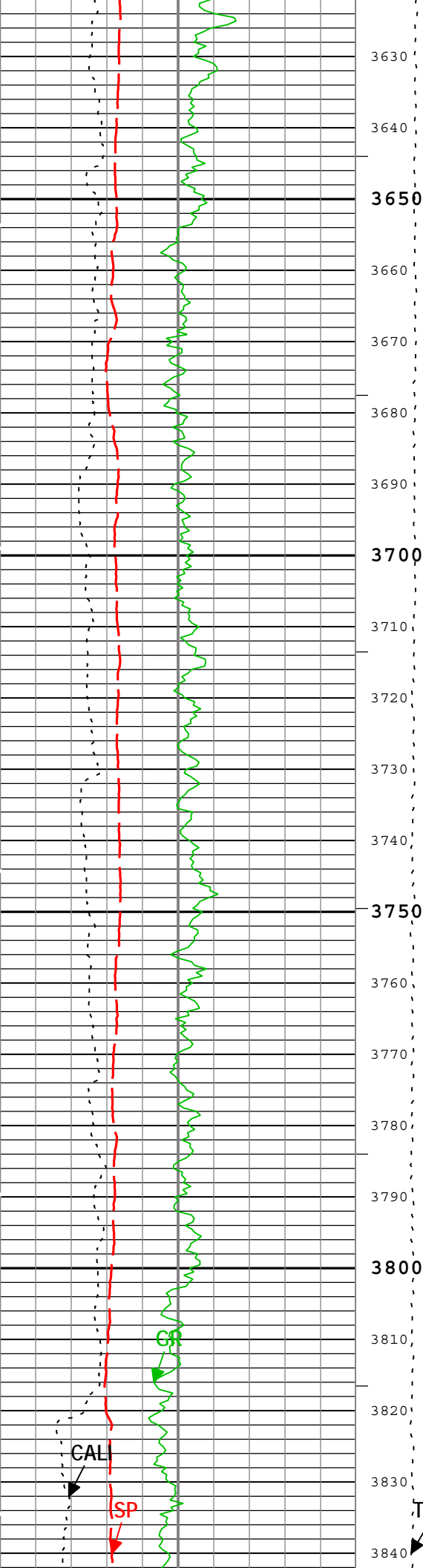


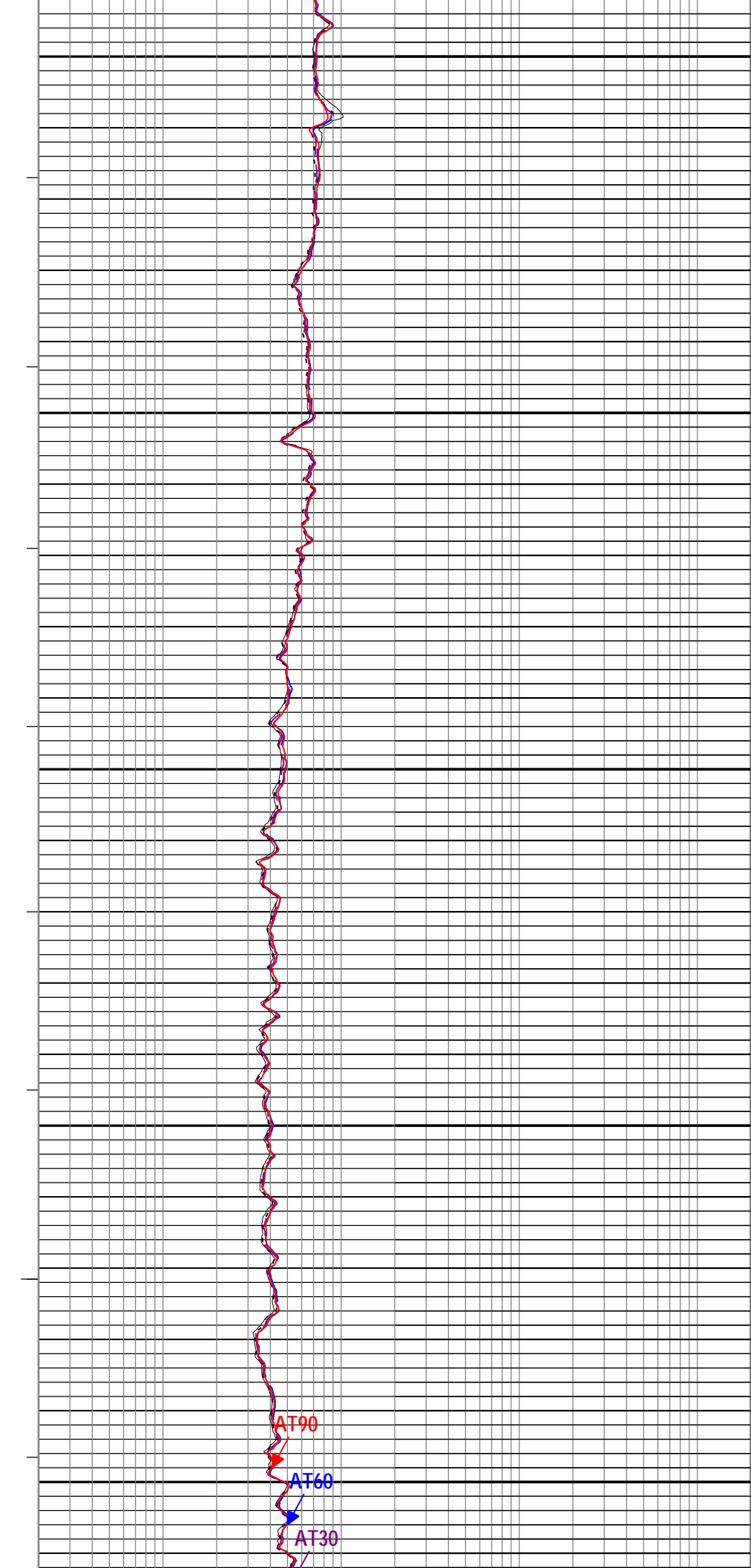
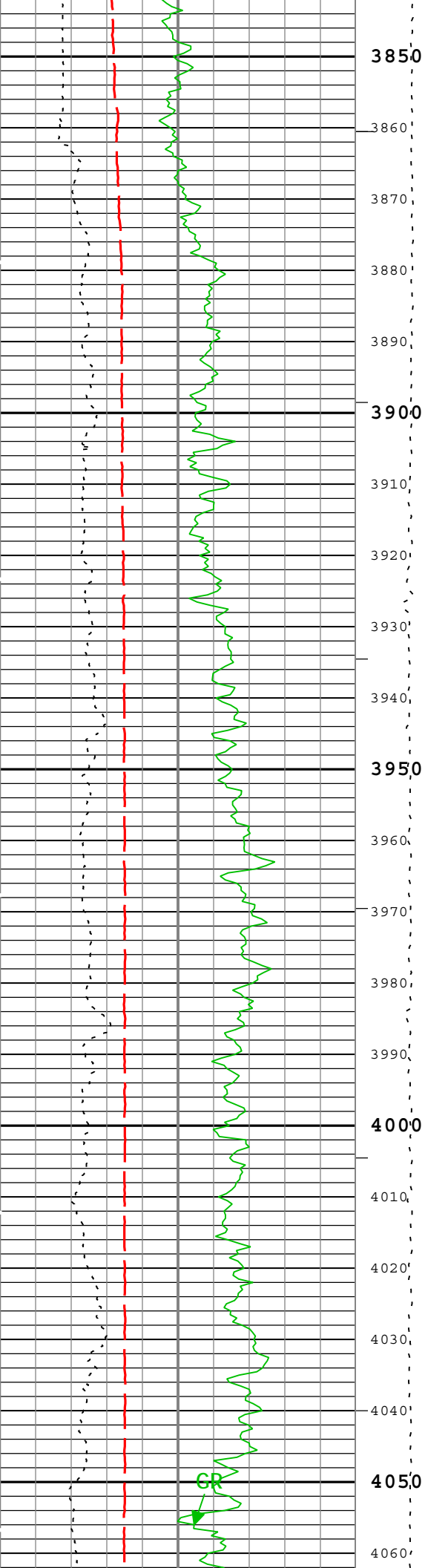


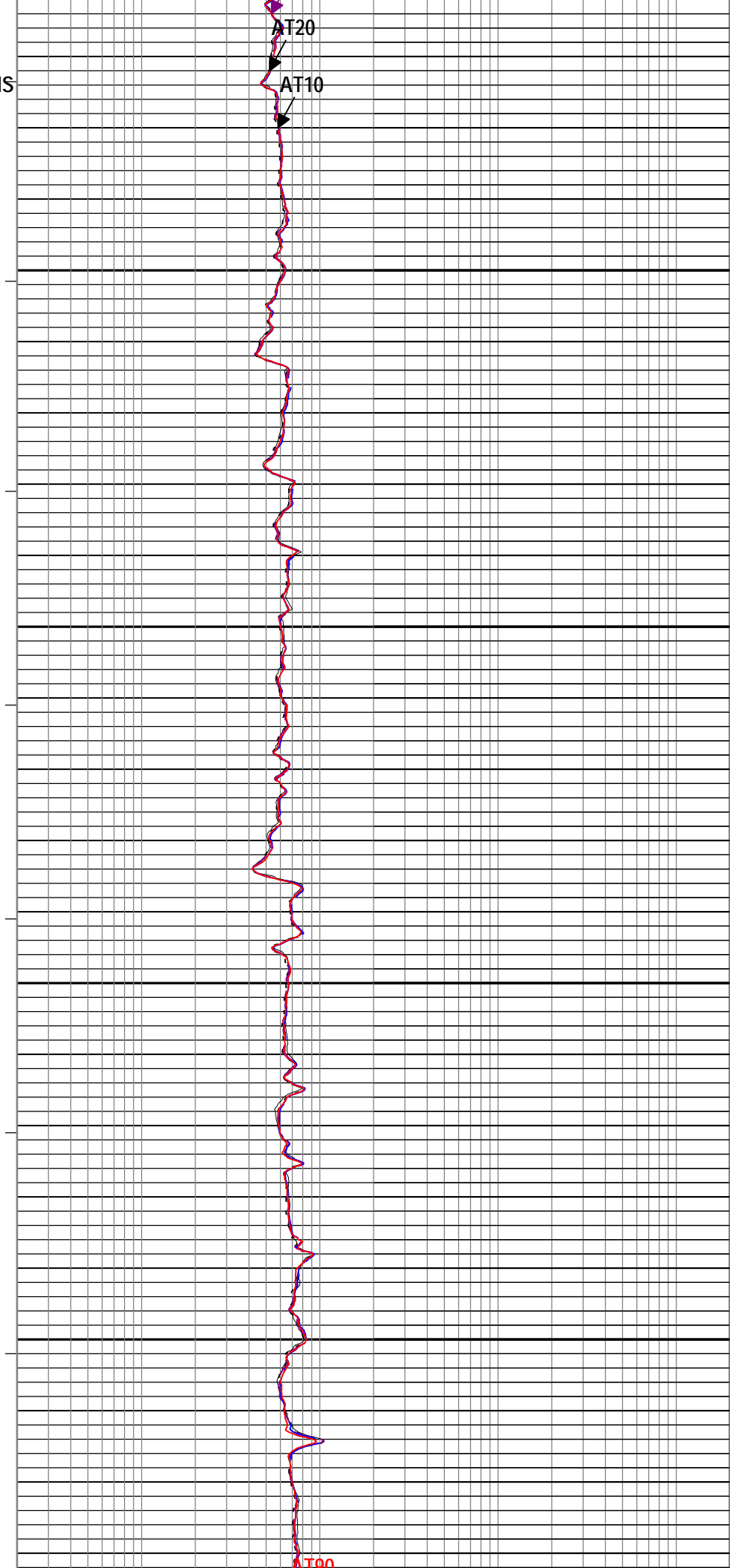
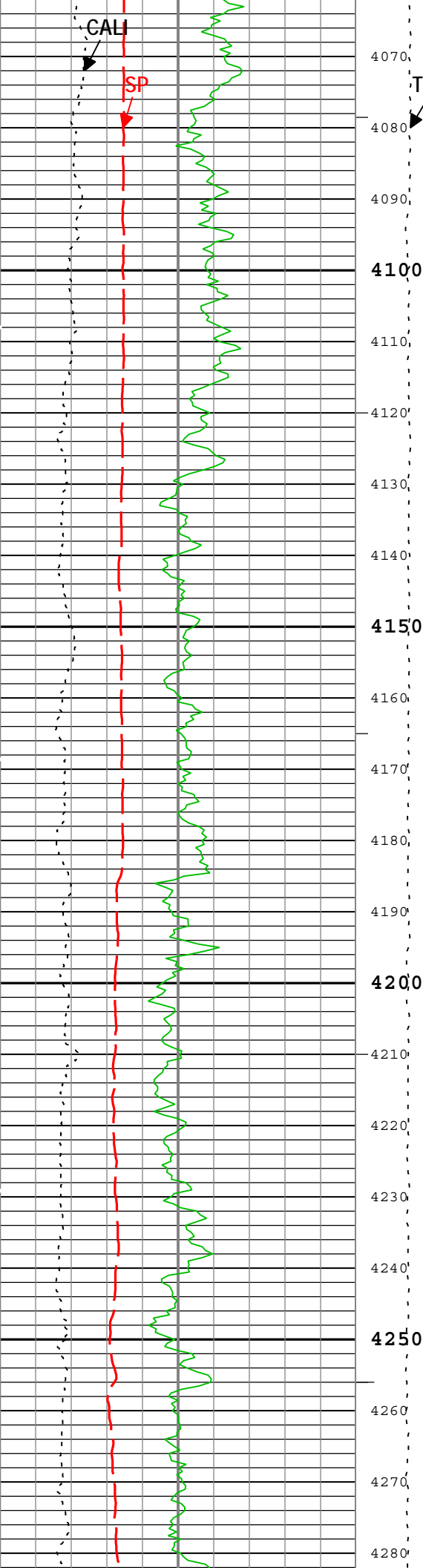


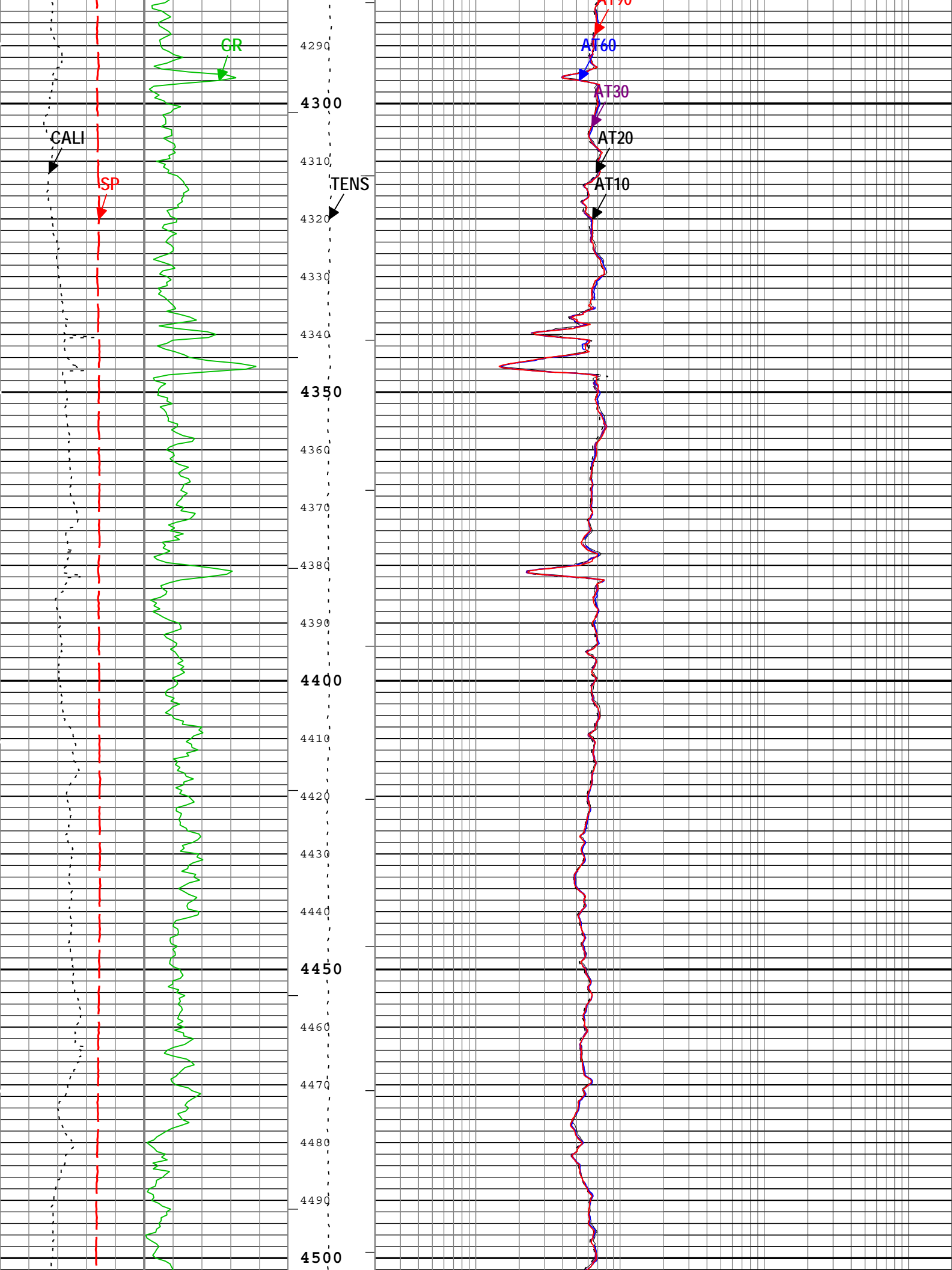


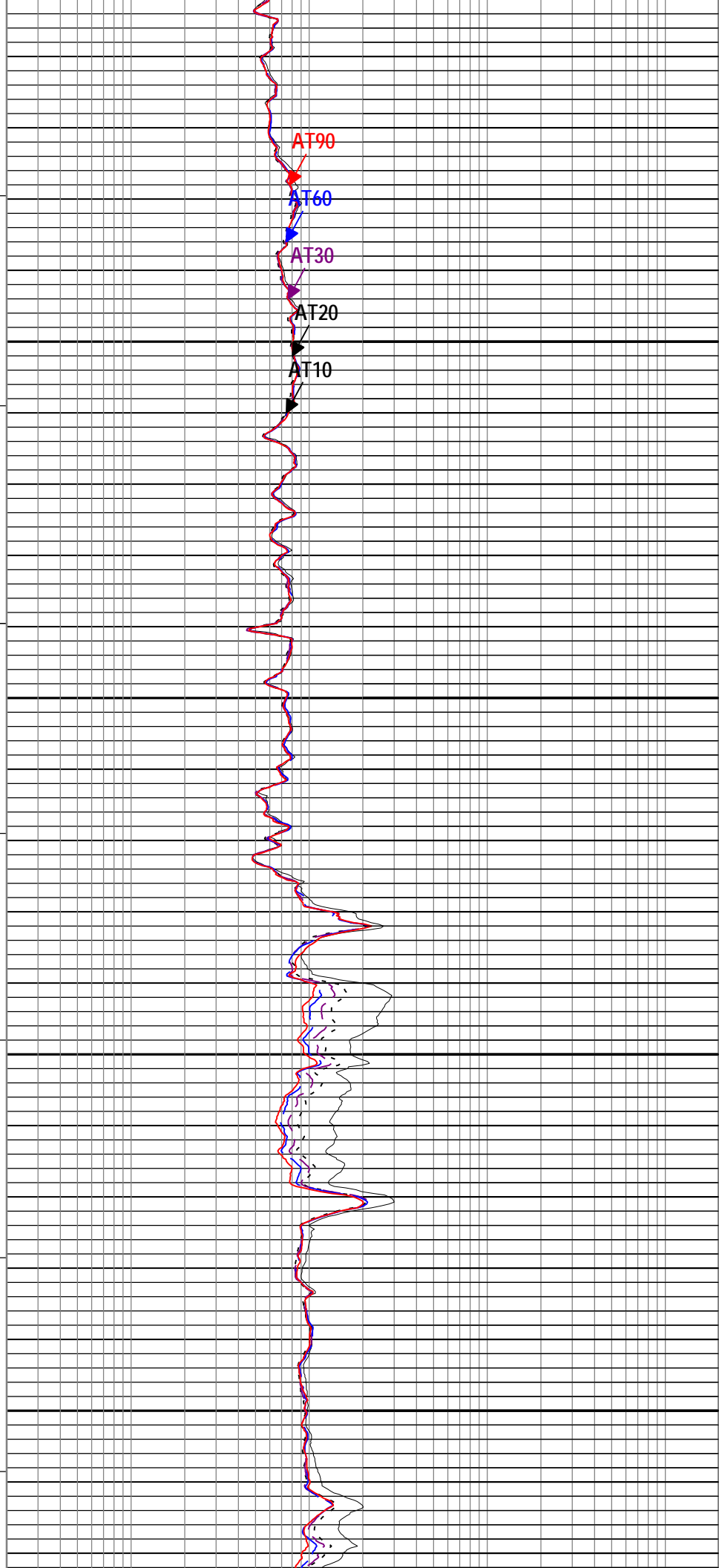
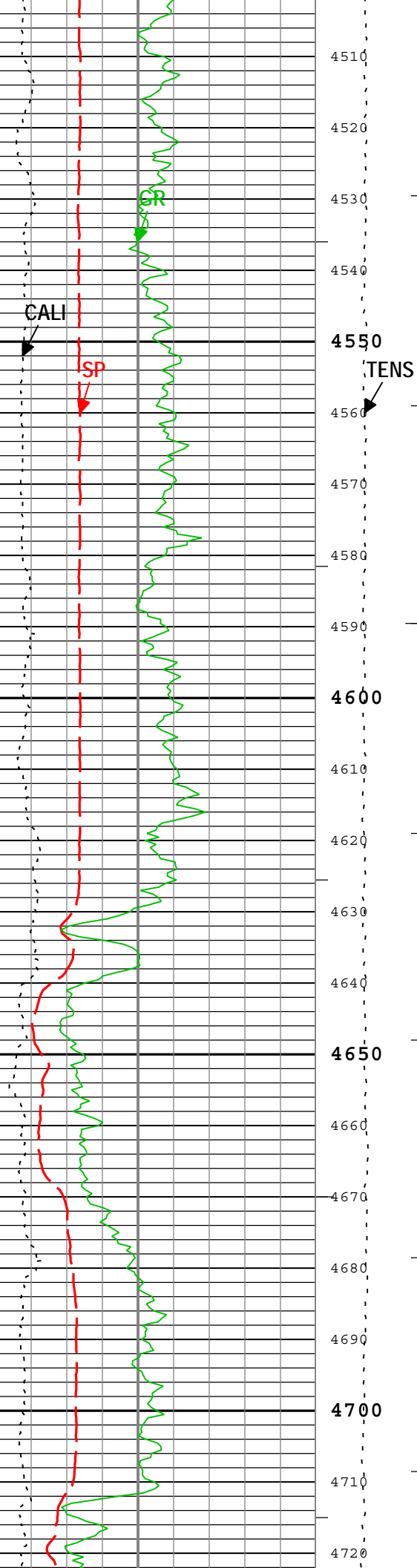




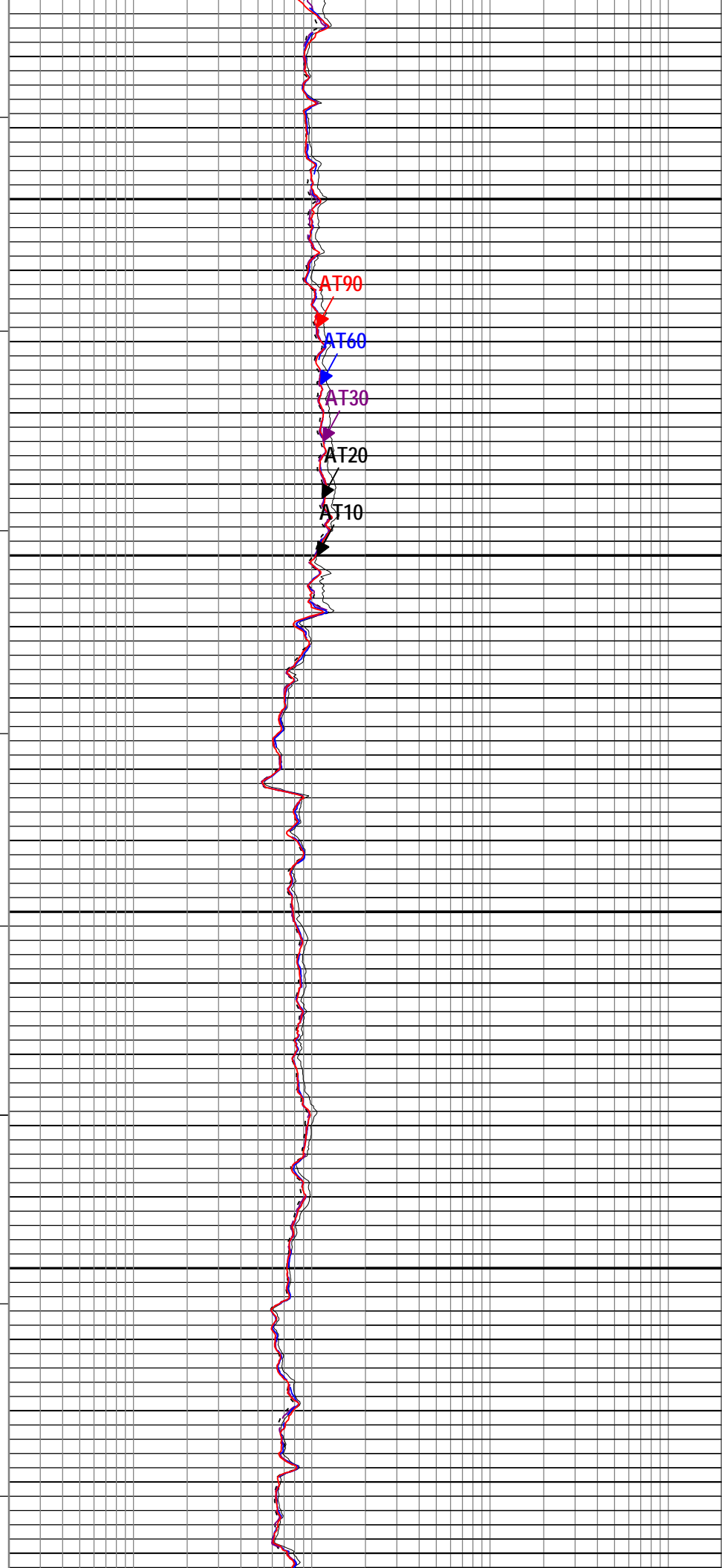
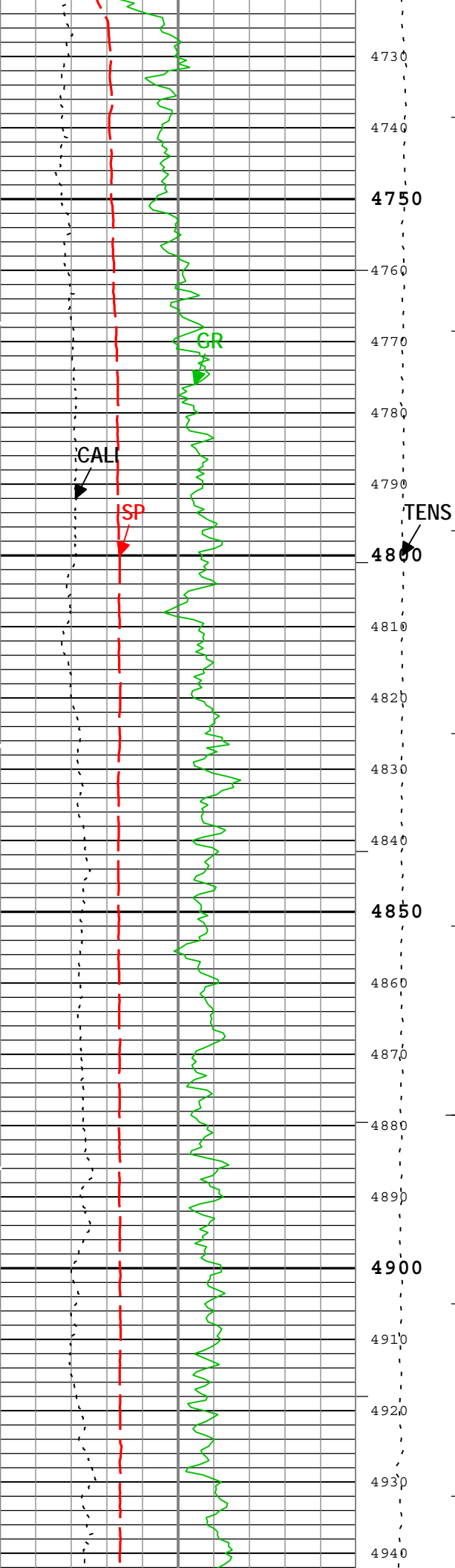


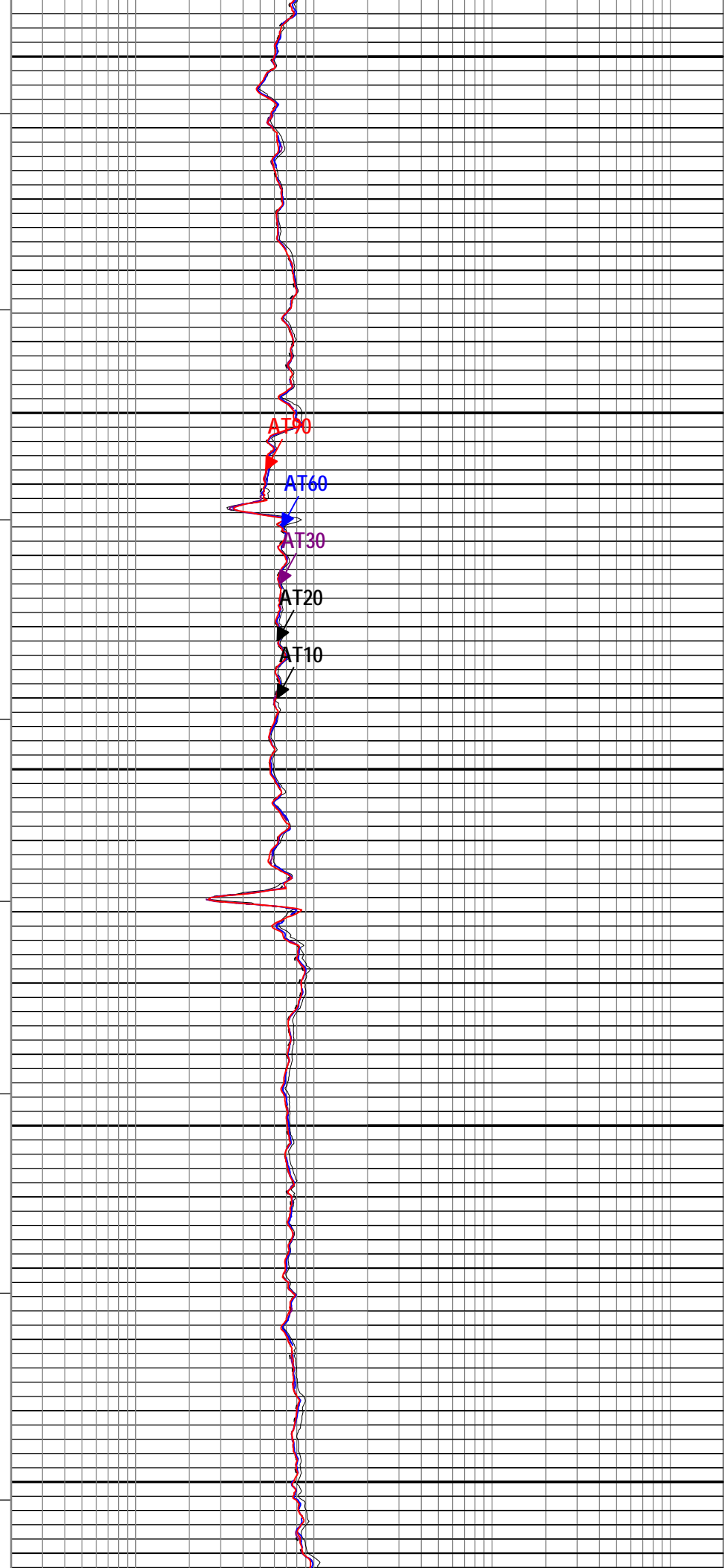
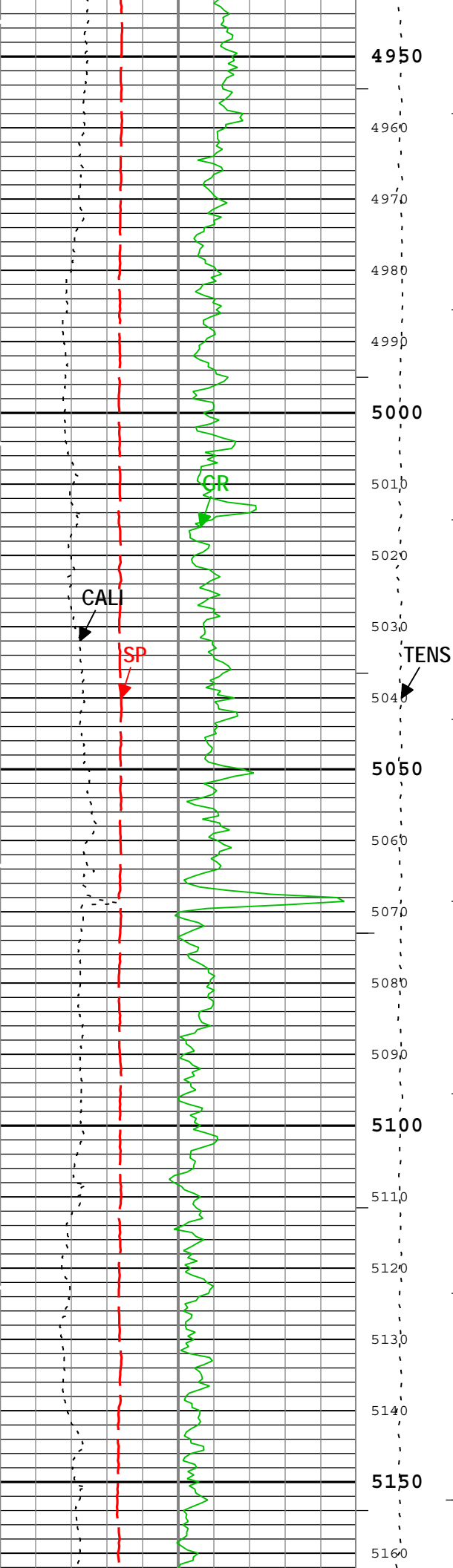


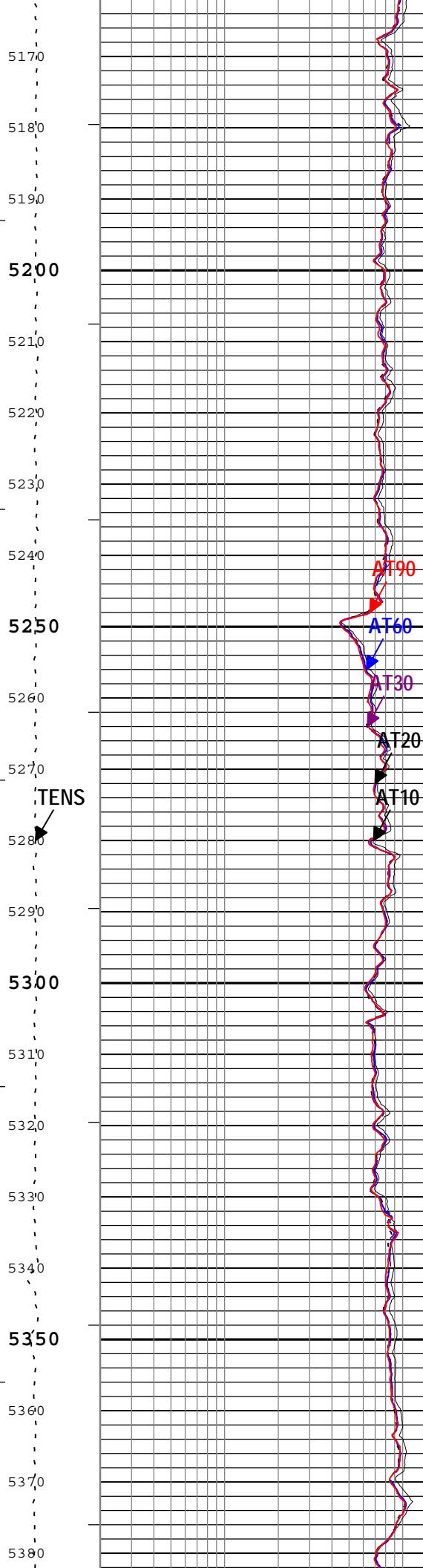
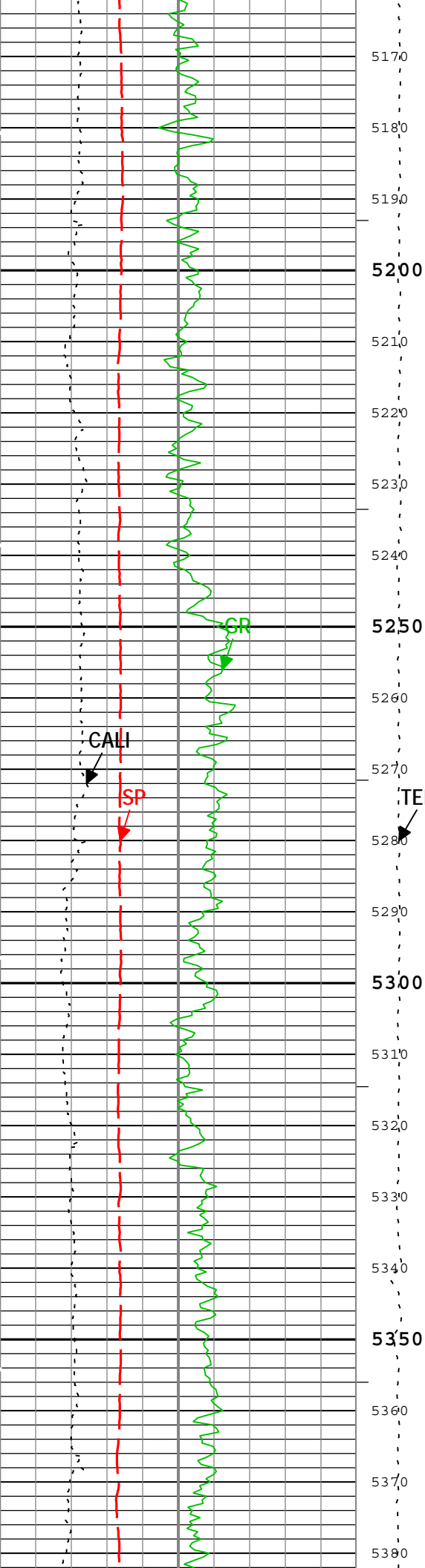


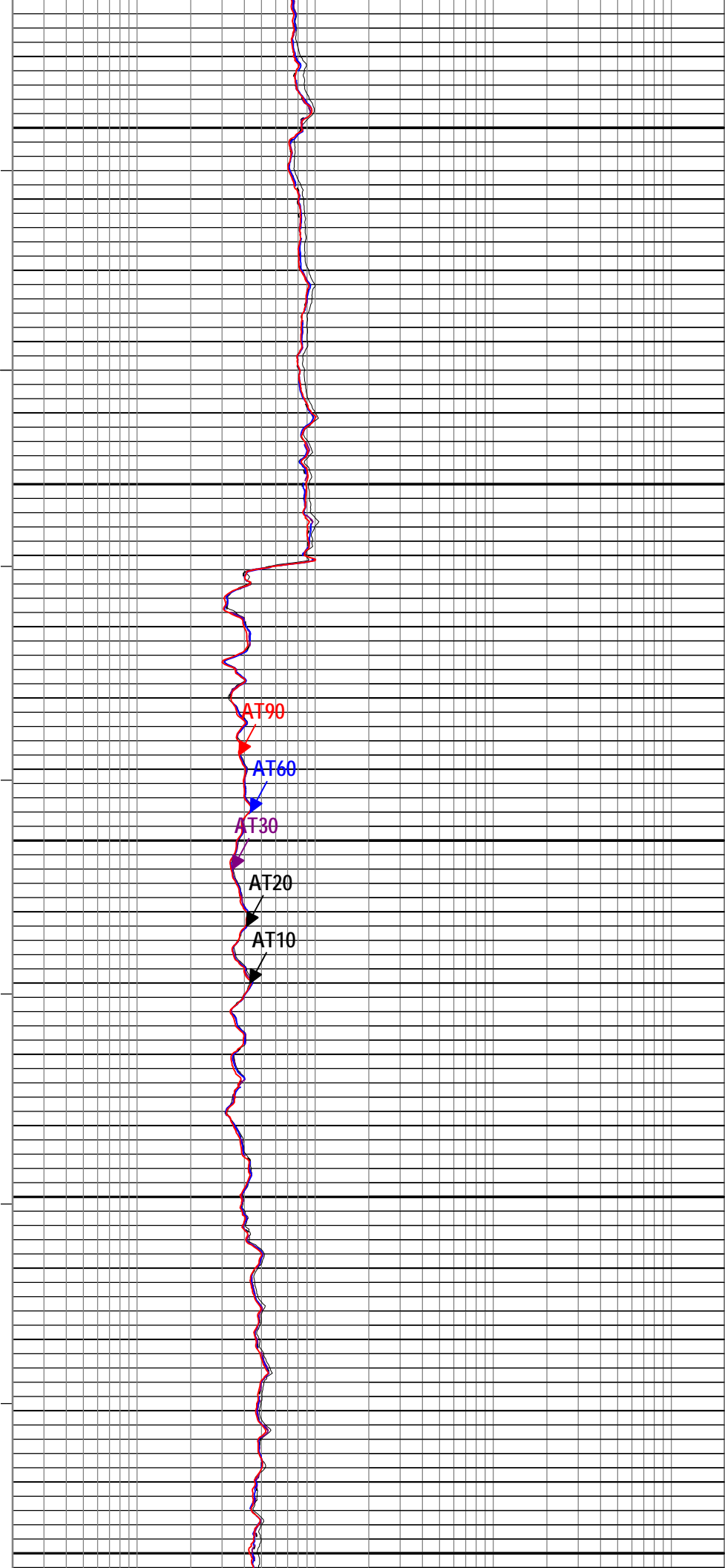
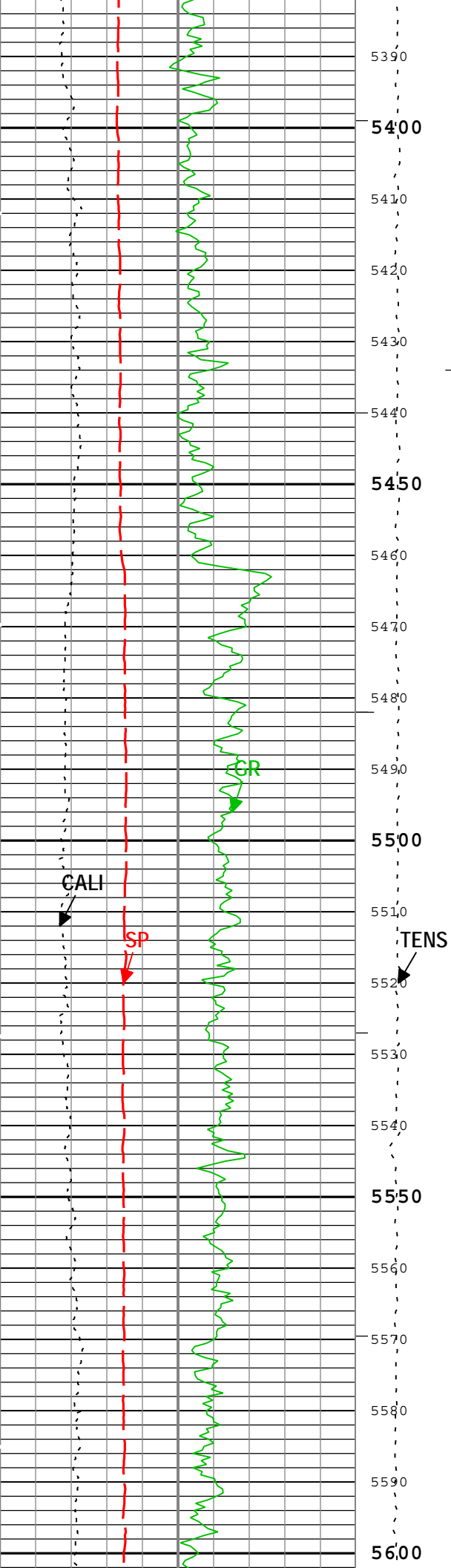


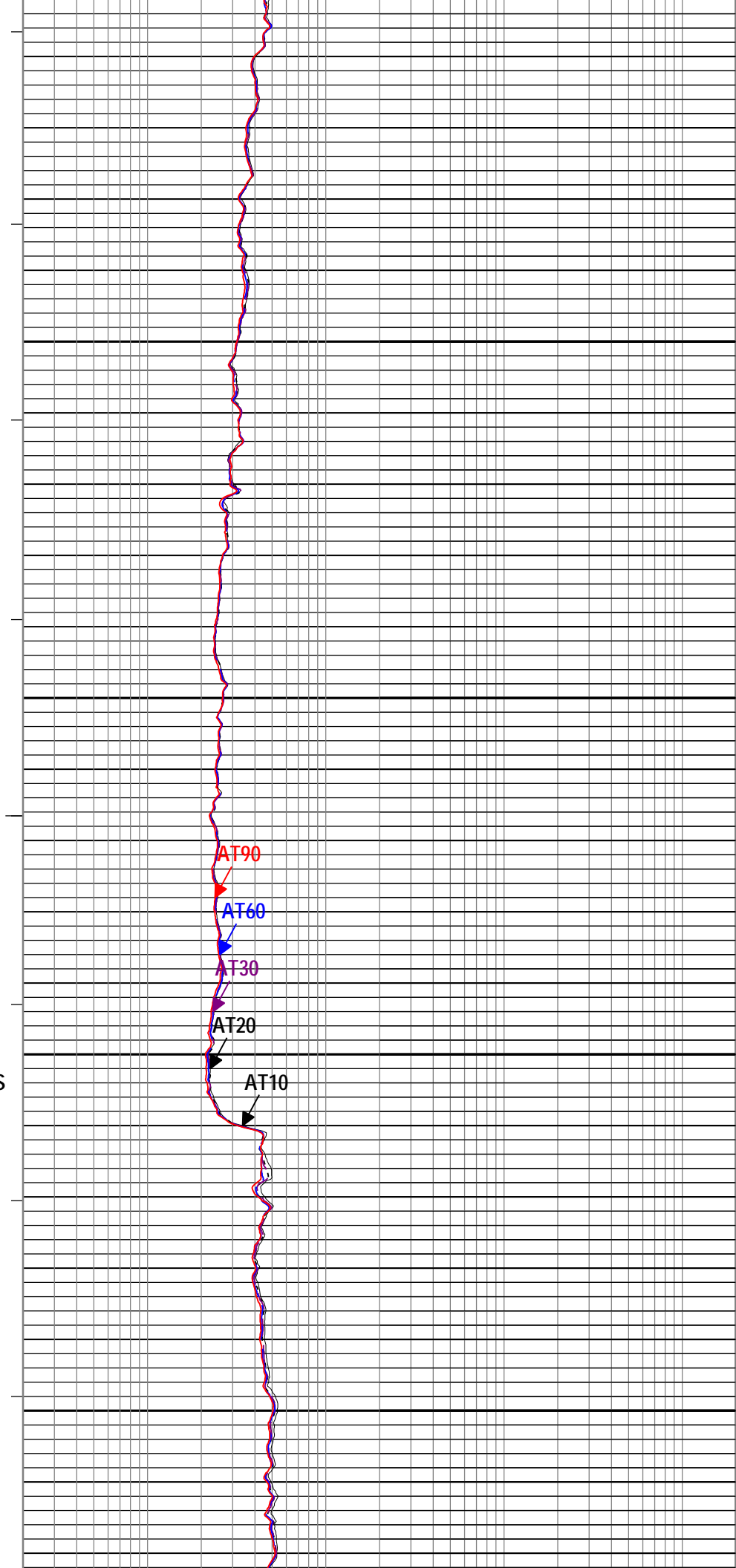
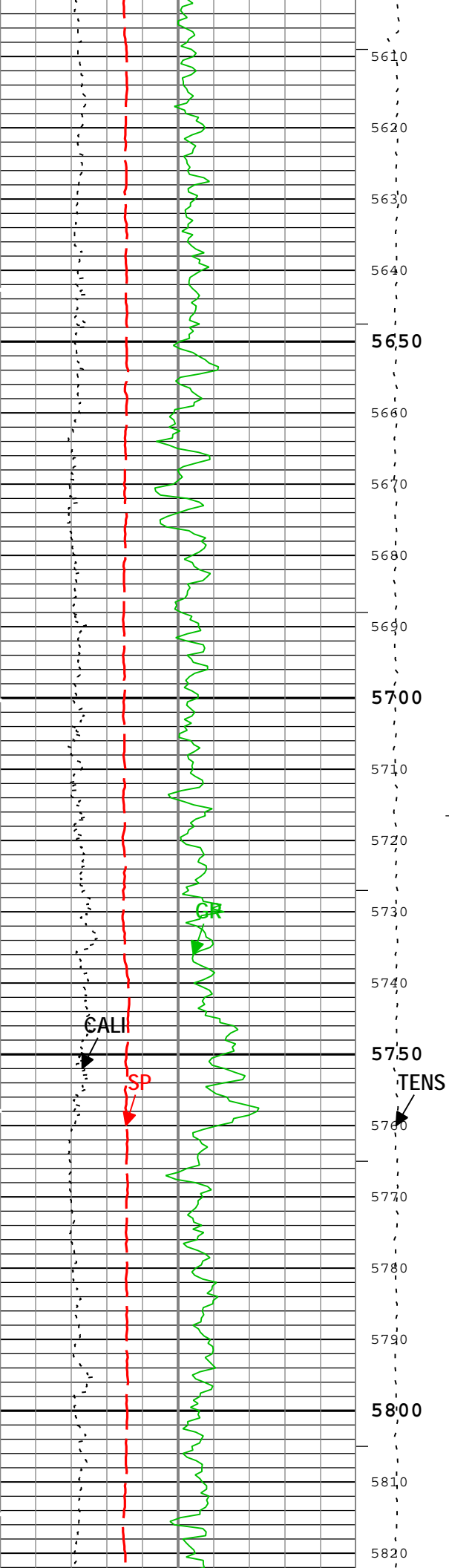


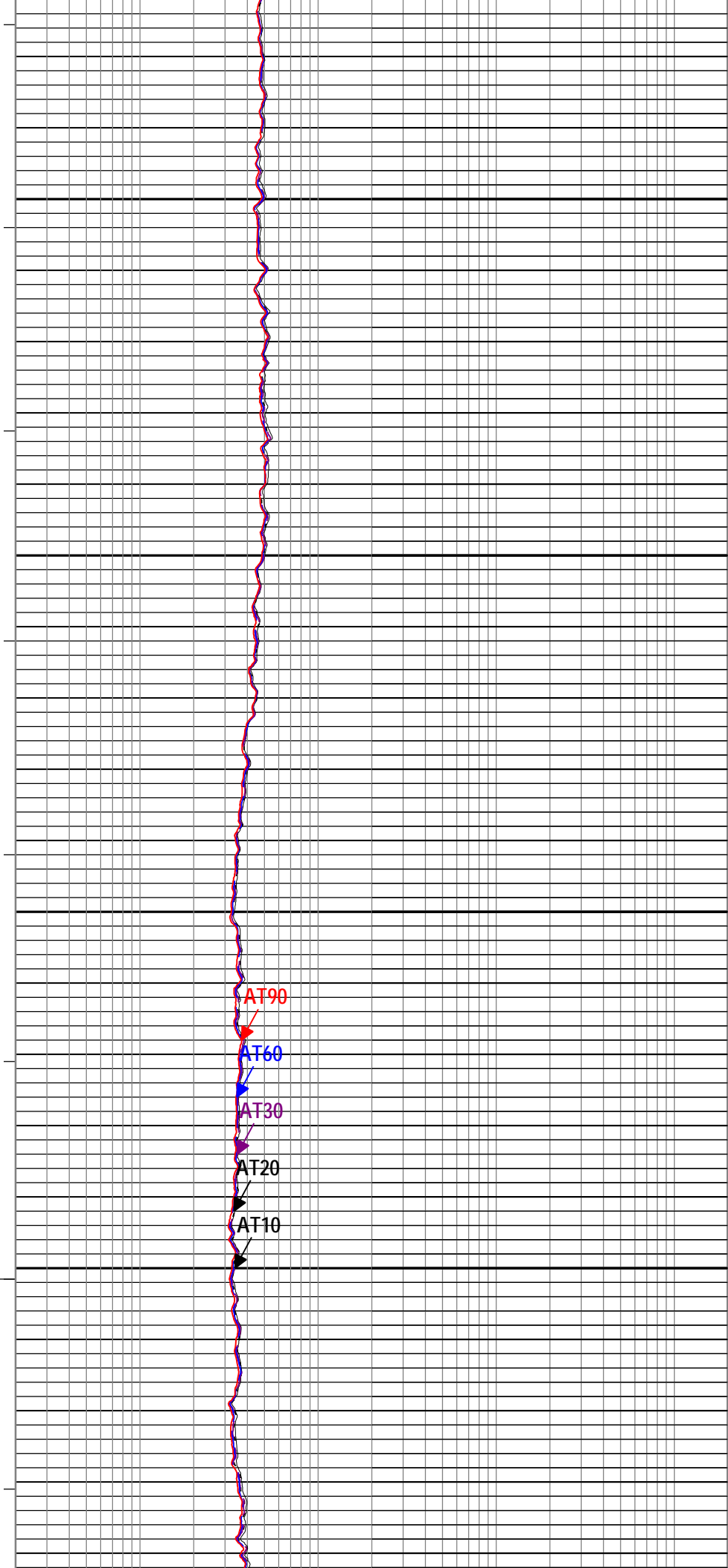
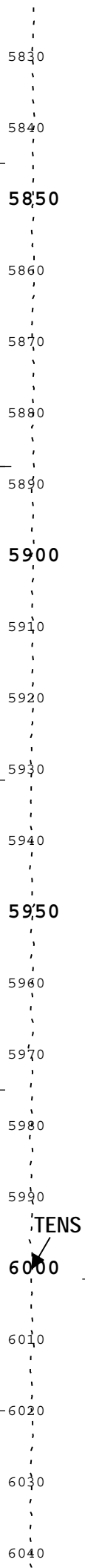
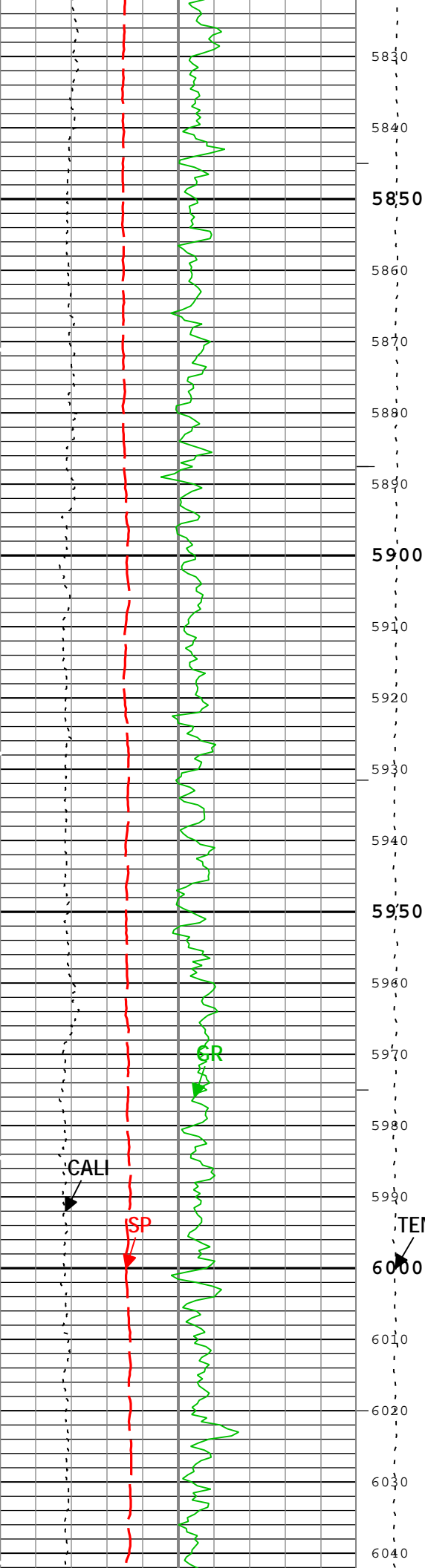


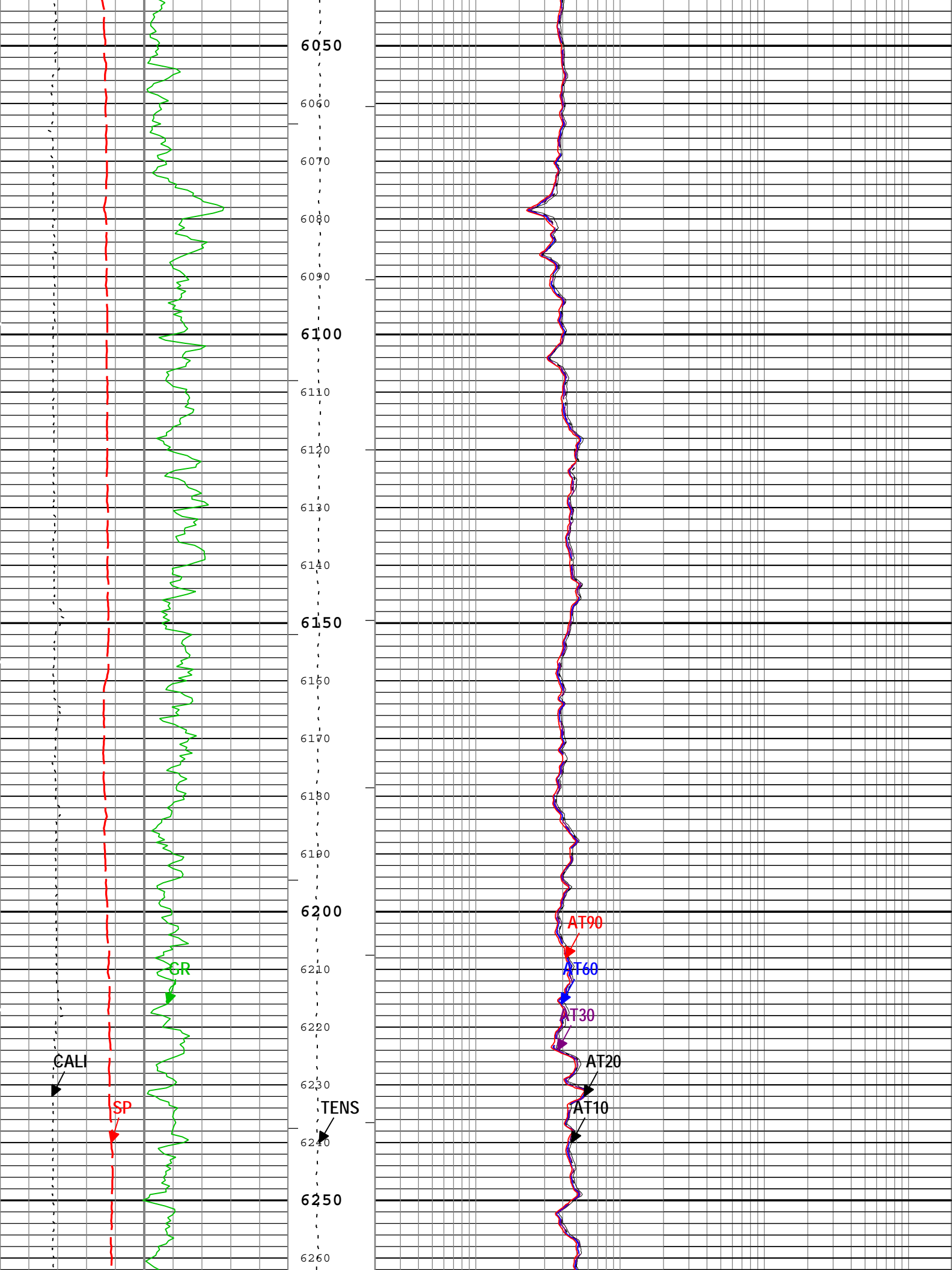


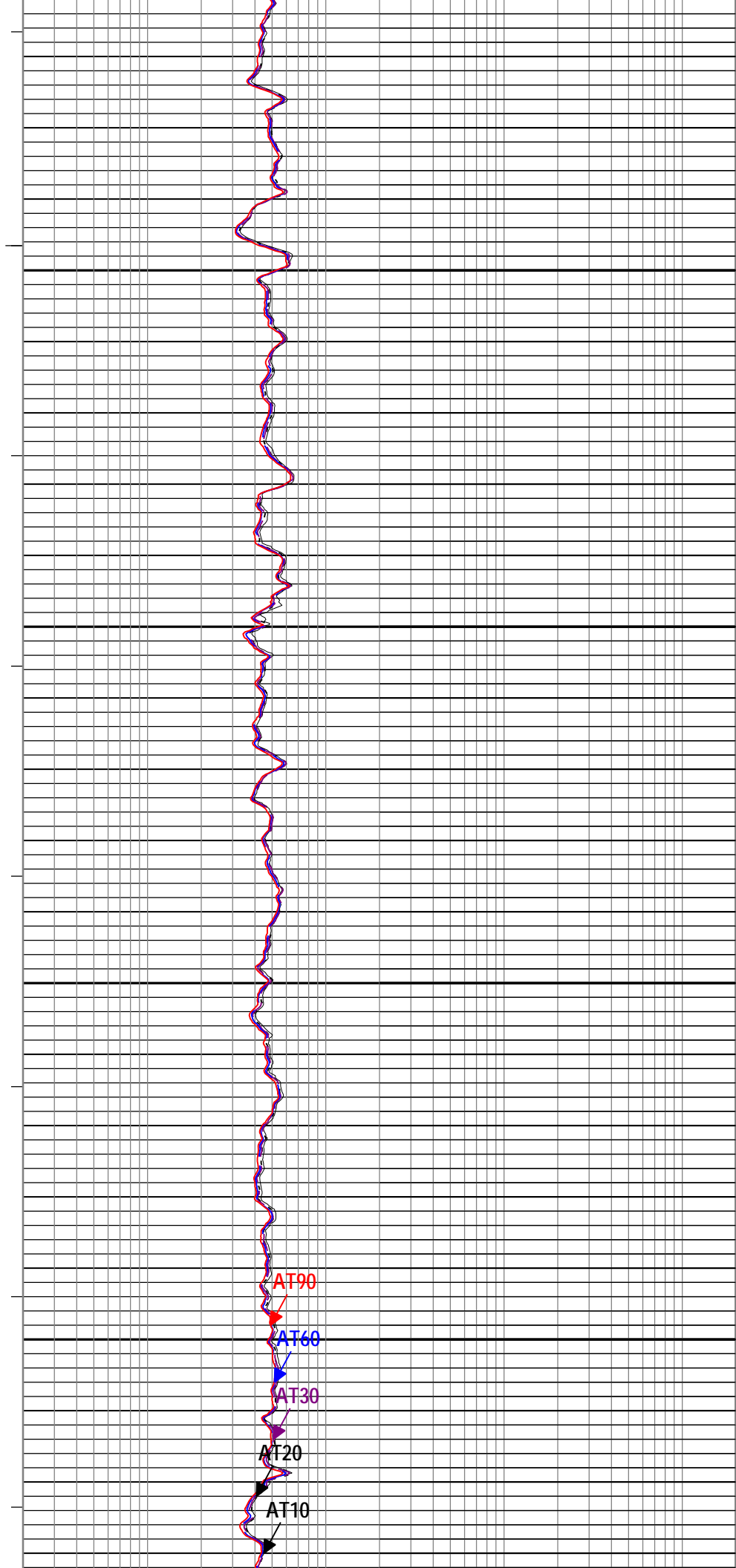
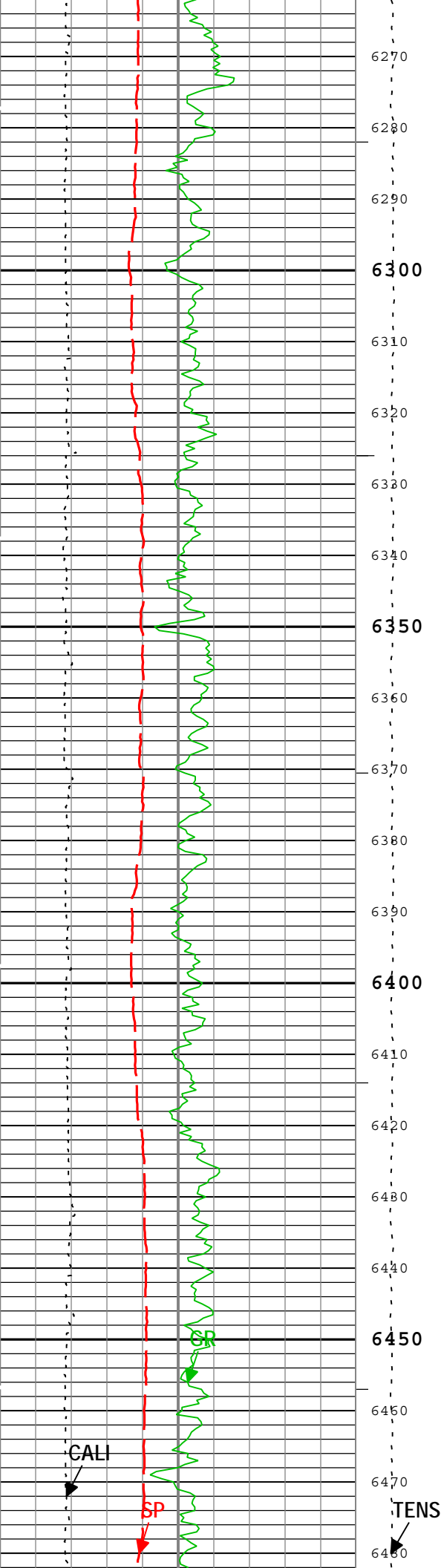




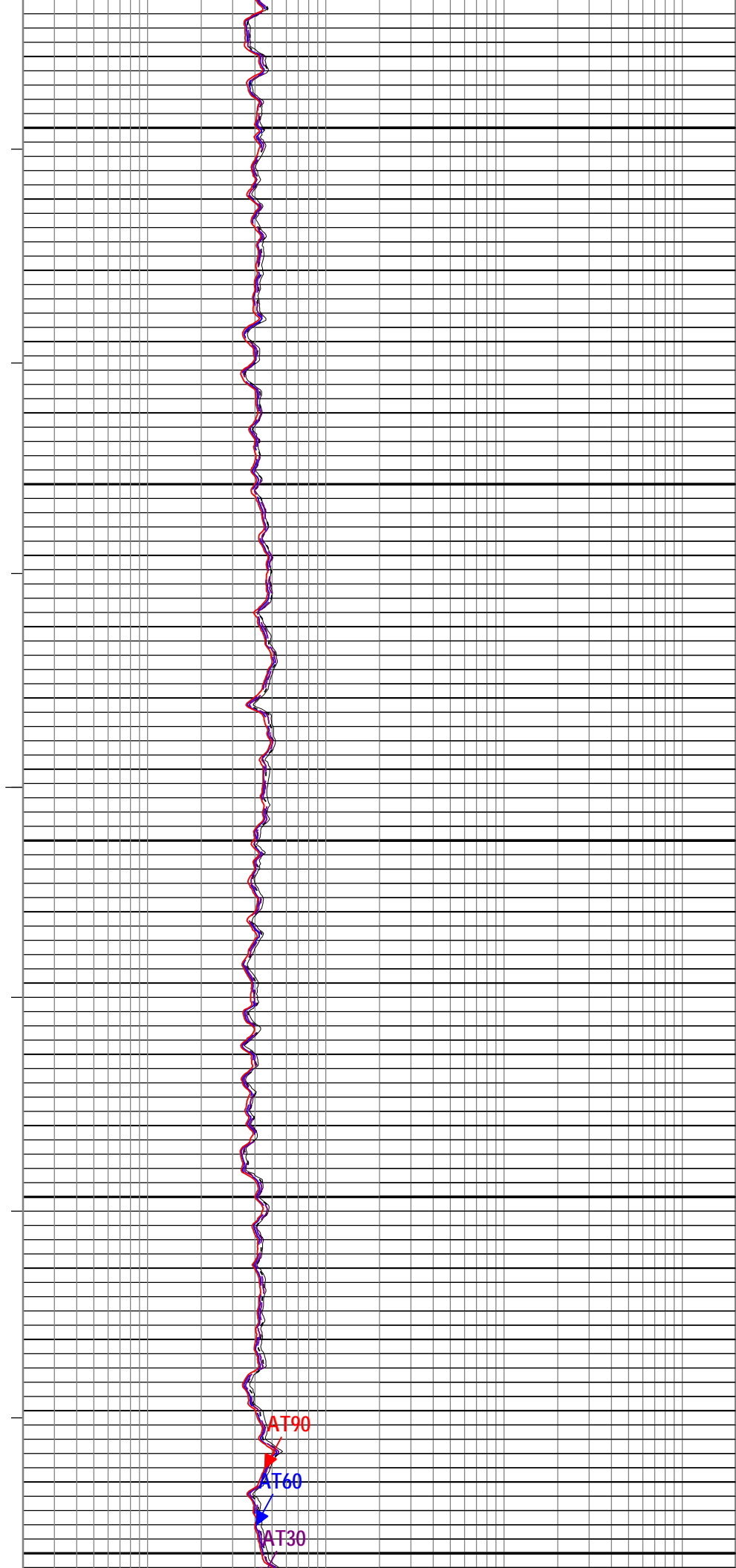
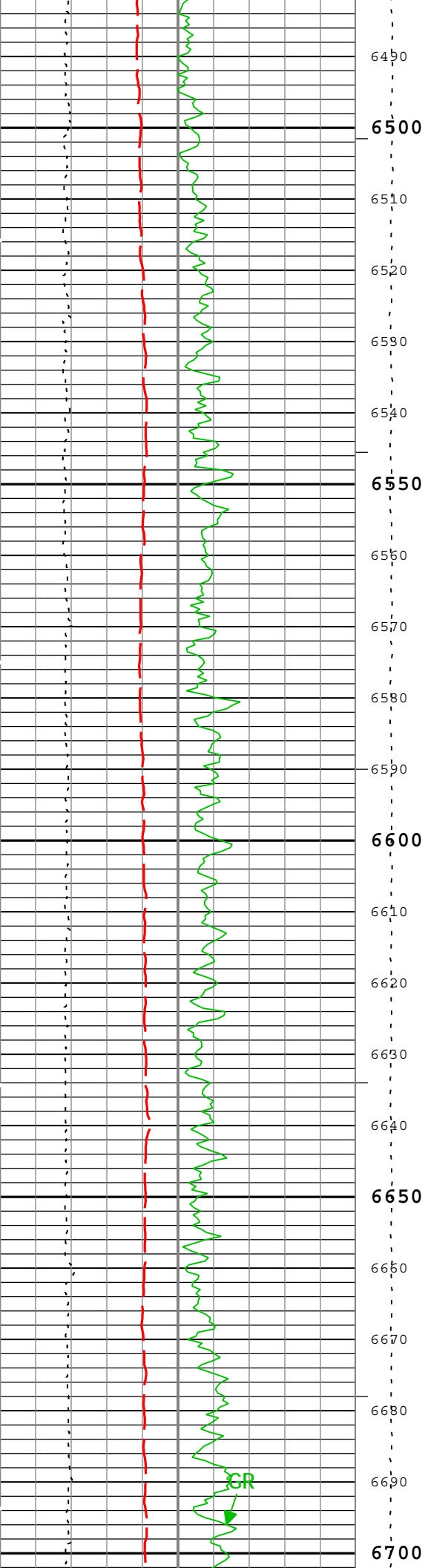


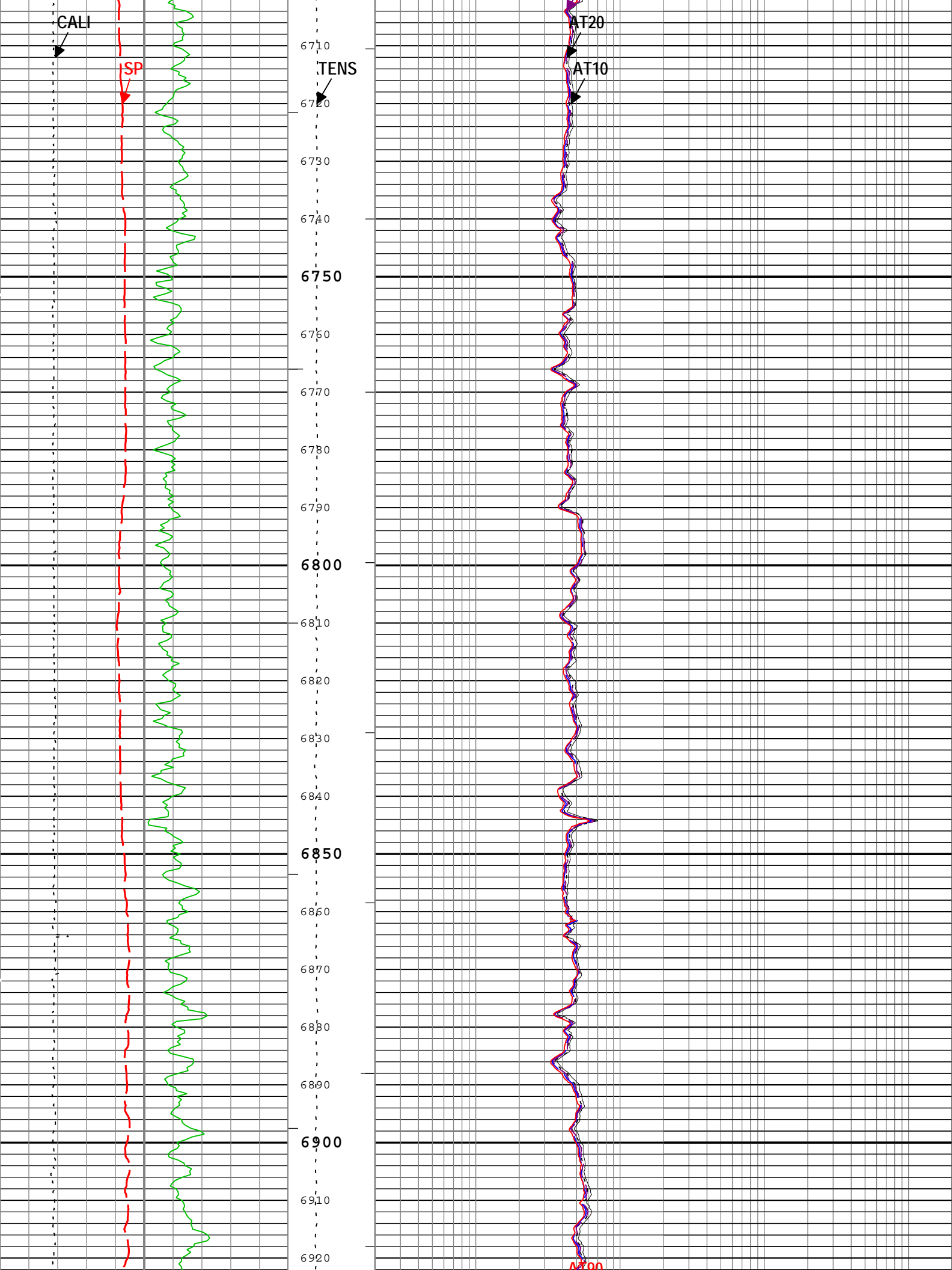


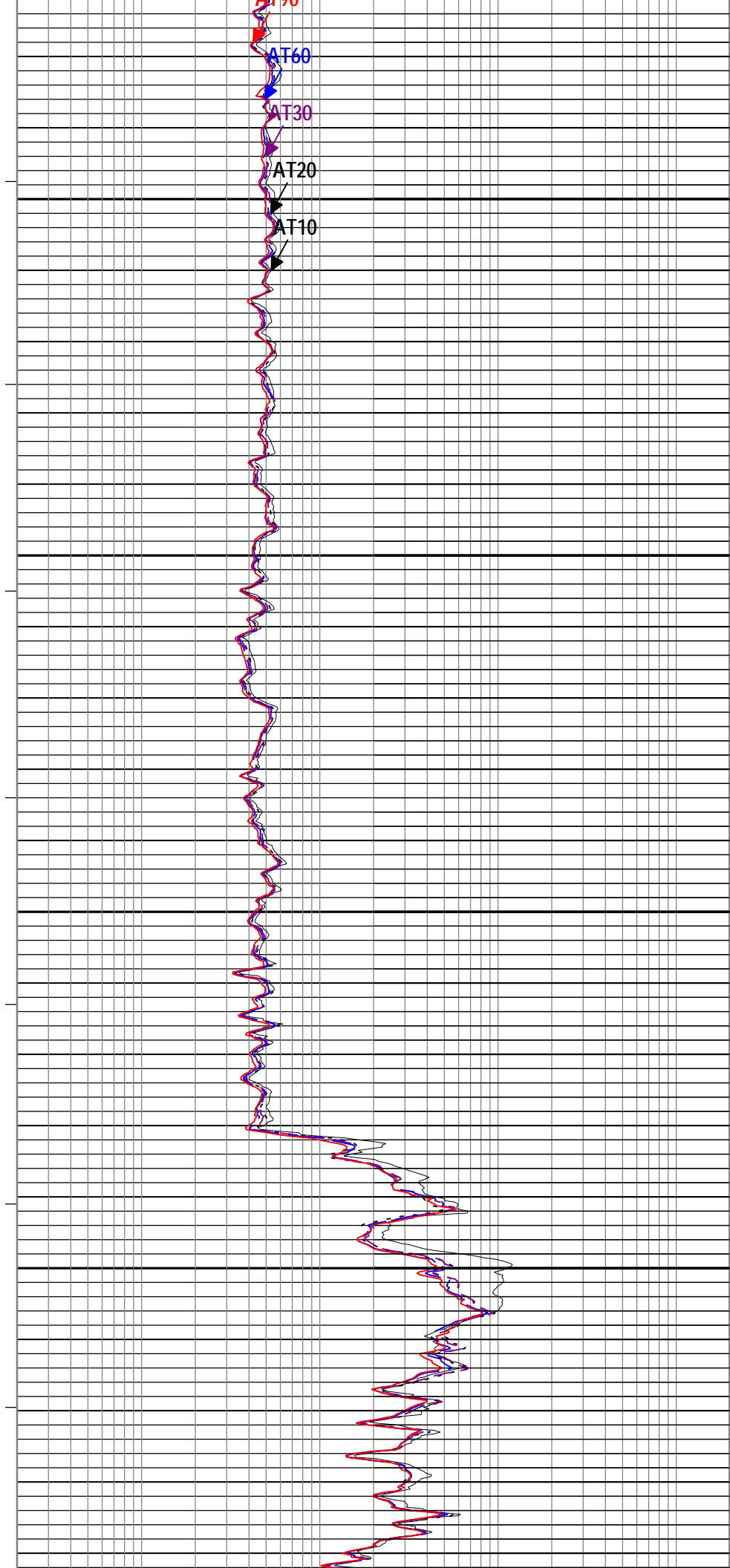
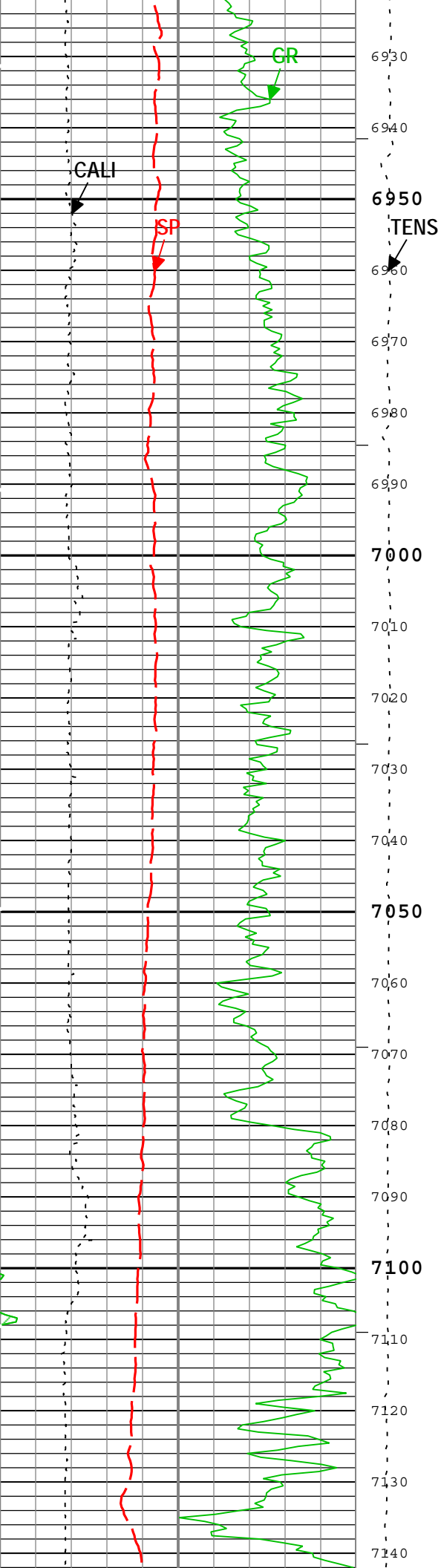


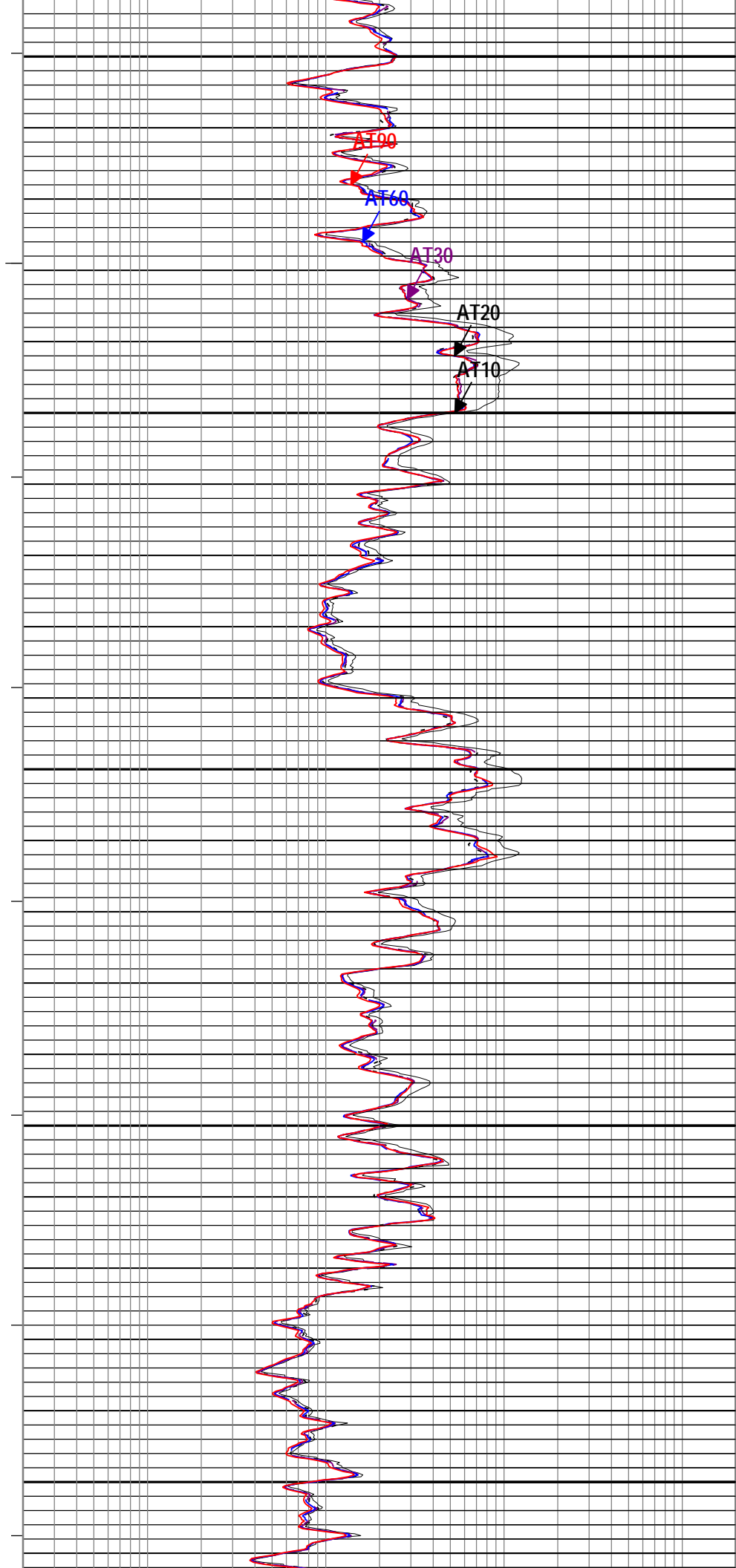
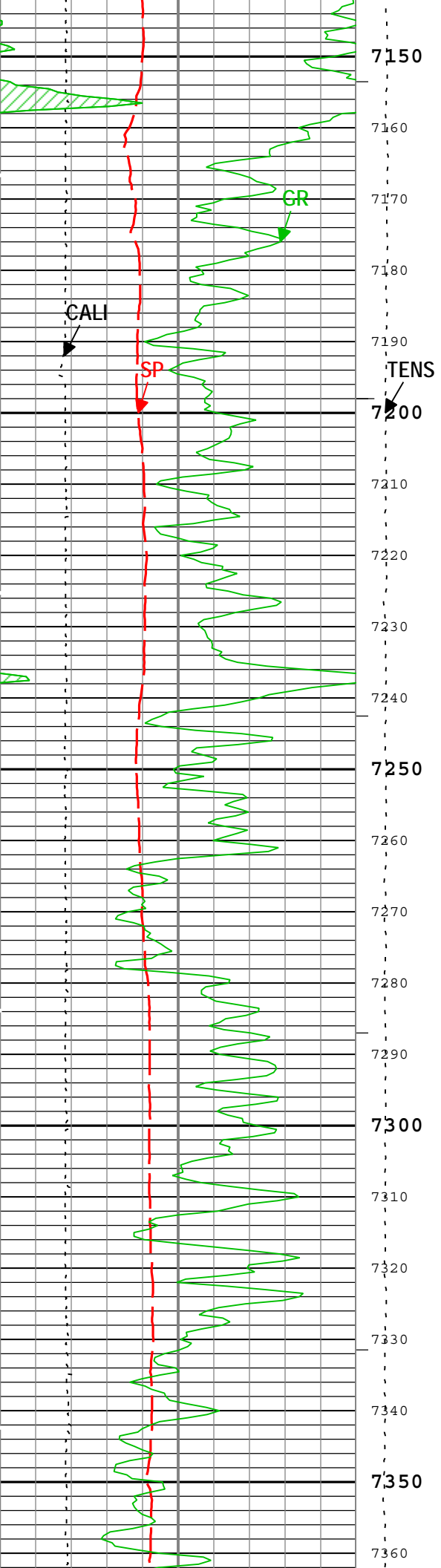


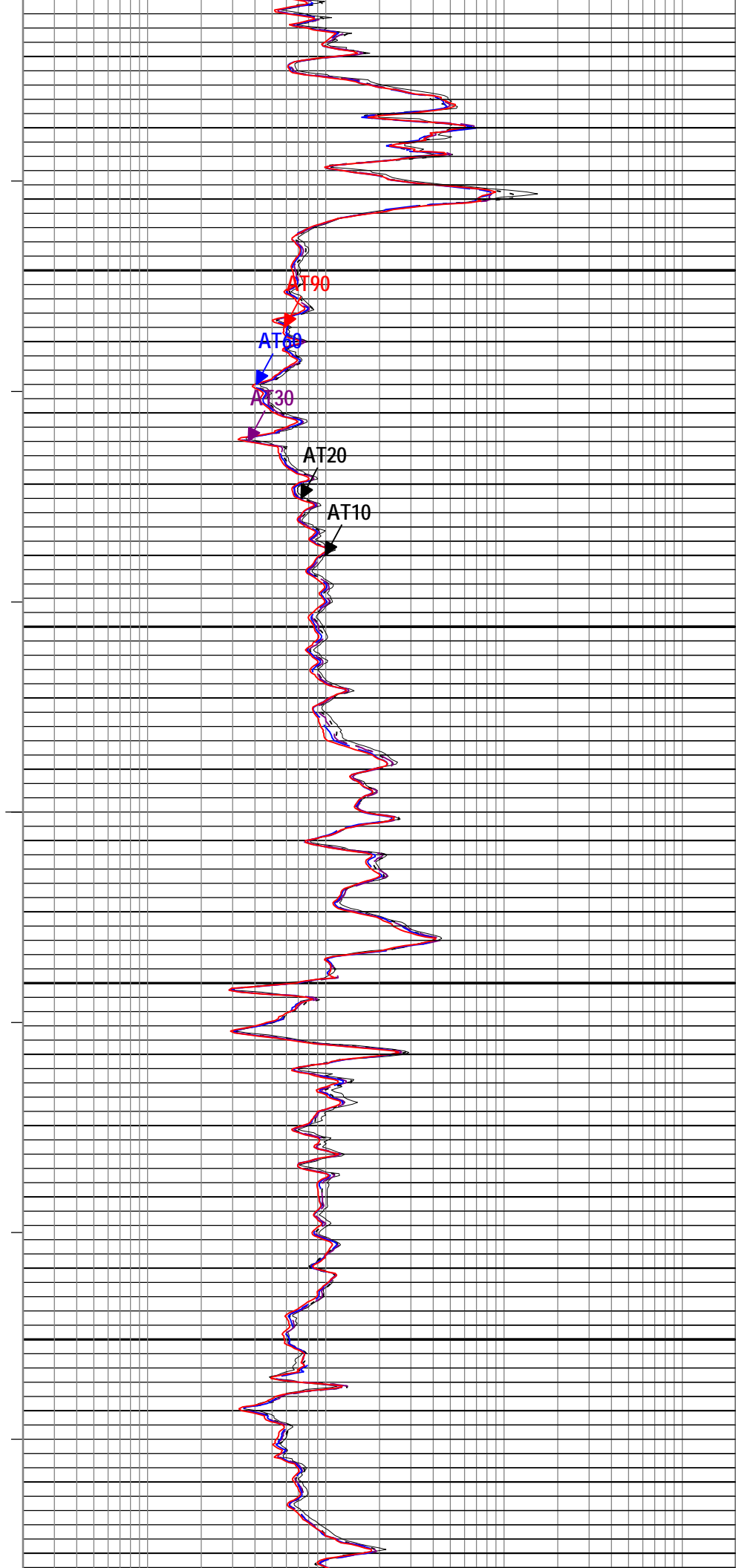
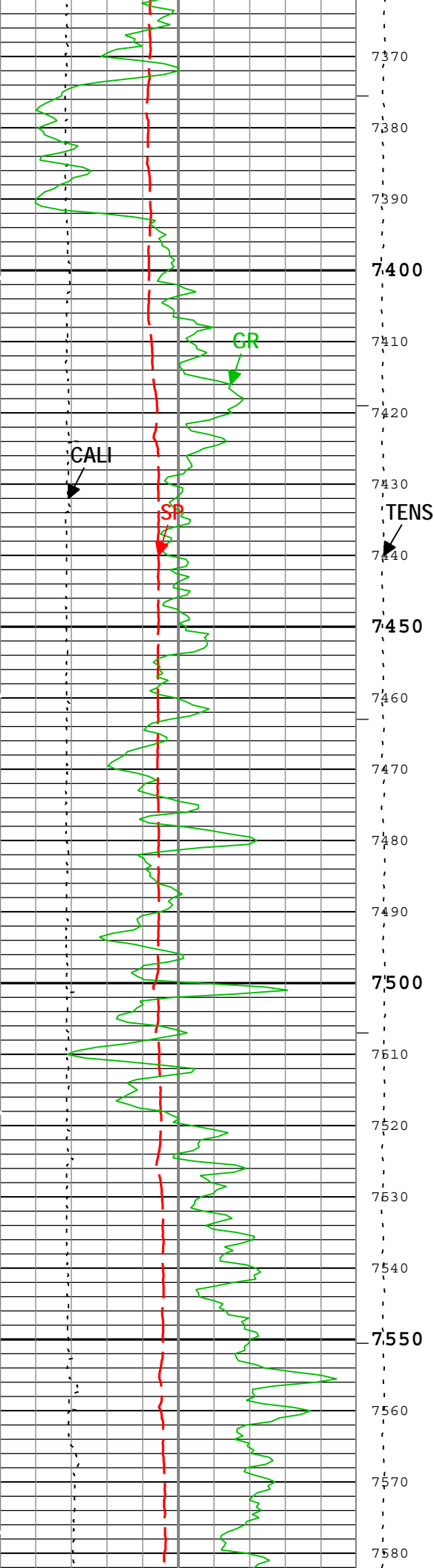


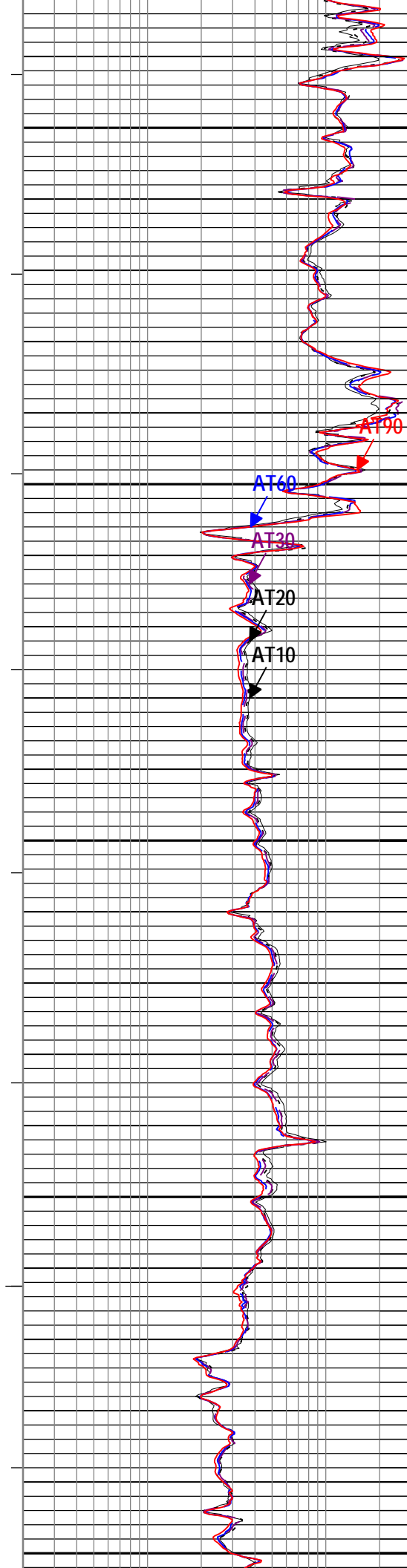
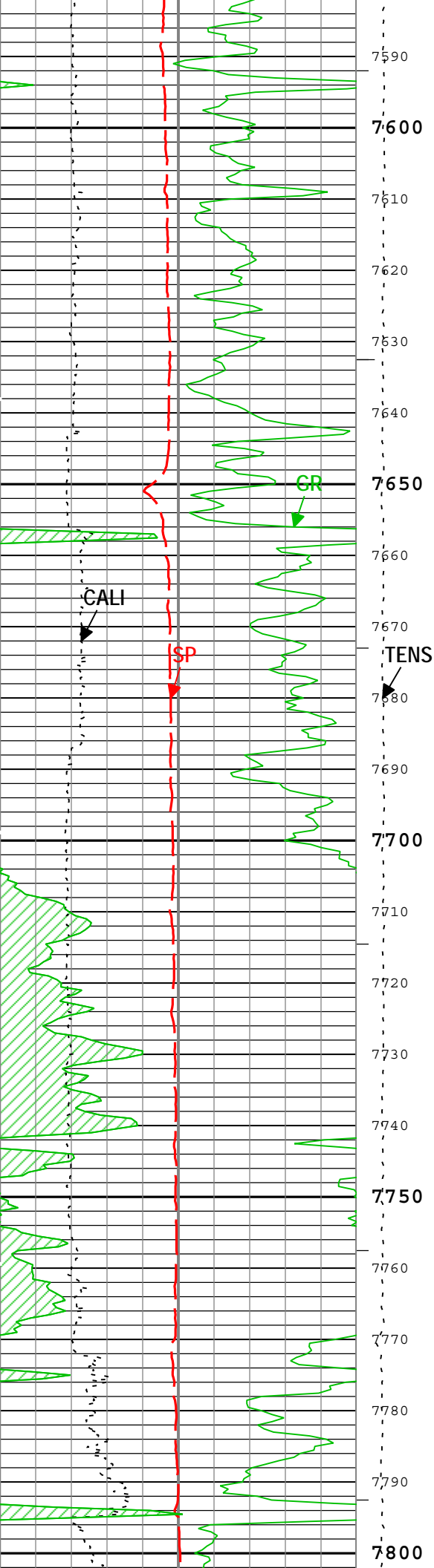


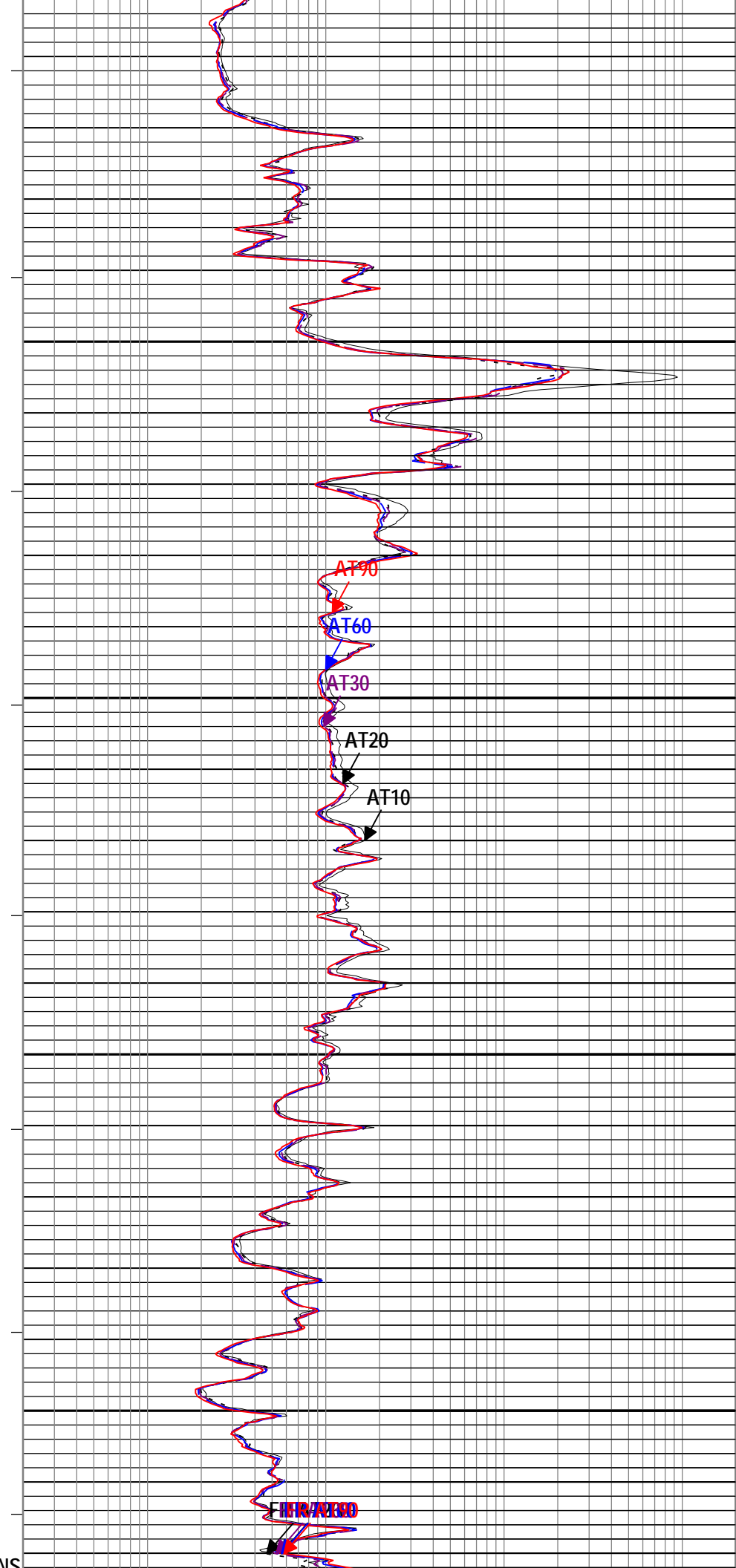
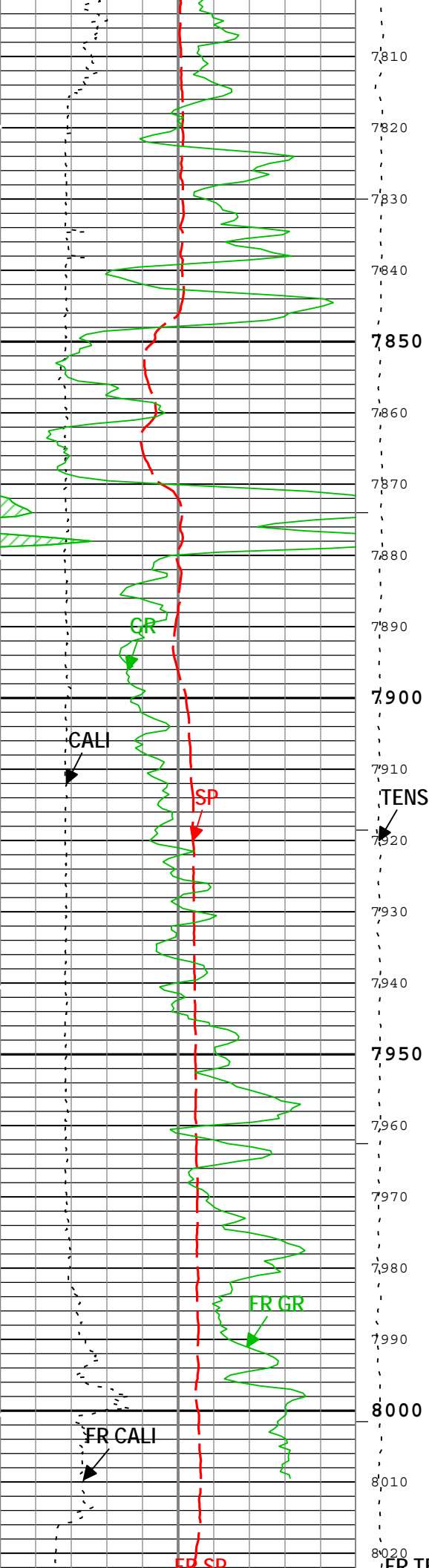


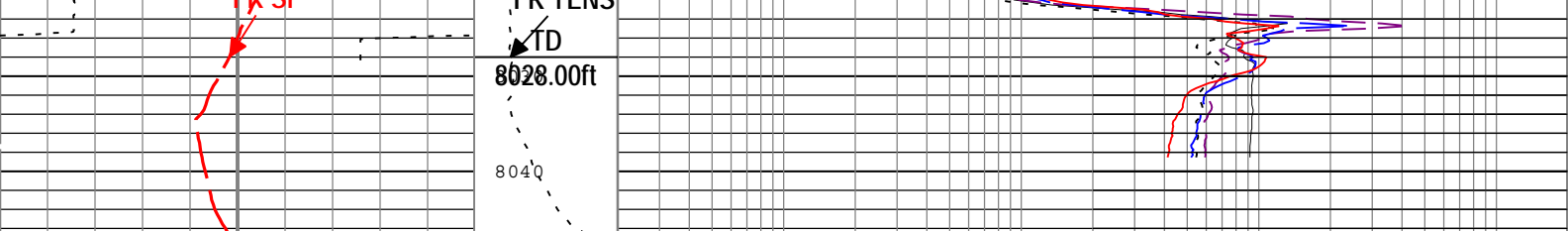












Gamma Ray Backup	Cable Tension (TENS)	Array Induction Two Foot Resistivity A10 (AT10) AIT-H
Spontaneous Potential (SP) AIT-H	5000 lbf	0.2 ohm.m 2000
-100 mV 200	0	Array Induction Two Foot Resistivity A20 (AT20) AIT-H
Caliper (CALI) HDRS-B		0.2 ohm.m 2000
6 in 16		Array Induction Two Foot Resistivity A30 (AT30) AIT-H
Gamma Ray (GR) HGNS-B		0.2 ohm.m 2000
0 gAPI 200		Array Induction Two Foot Resistivity A60 (AT60) AIT-H
		0.2 ohm.m 2000
		Array Induction Two Foot Resistivity A90 (AT90) AIT-H
		0.2 ohm.m 2000

ICV - Integrated Cement Volume every 100.00 (ft3)  
ICV - Integrated Cement Volume every 10.00 (ft3)  
IHV - Integrated Hole Volume every 100.00 (ft3)  
TIME\_1900 - Time Marked every 60.00 (s)  
IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log ( EMD 5in Induction ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 08-Apr-2013 09:56:44

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
AAPL	Array Induction Answer Product Level(Depth Log/View only)	AIT-H	Basic	
ABHM	Array Induction Borehole Correction Mode	AIT-H	Compute Mud Resistivity	
ABLM	Array Induction Basic Logs Mode	AIT-H	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-H	Yes	
ASTA	Array Induction Tool Standoff	AIT-H	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-B	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	632	ft
CDEN	Cement Density	HGNS-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
DFD	Drilling Fluid Density	Borehole	9.7	lbm/gal
FCD	Future Casing (Outer) Diameter	WLSESSION	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	REMS	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
MST	Mud Sample Temperature	Borehole	53.4	degF
RMS	Resistivity of Mud Sample	Borehole	0.25	ohm.m
SOCO	Standoff Correction Option	HGNS-B	Yes	
SPDR	SP Drift Per Foot	AIT-H	0	mV/ft

## Depth Zone Parameters



Parameter	Value	Start ( ft )	Stop ( ft )
BS	0	620	633.5
BS	7.875	633.5	8046.5

All depth are actual.

Tool Control Parameters	
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Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-B	0	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

## Run One

5" Induction

Pass Summary	
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Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run One	Log[2]:Up	Up	7596.28 ft	8060.64 ft	08-Apr-2013 1:36:51 AM	08-Apr-2013 1:49:16 AM	12.75 ft	true
Run One	Log[3]:Up	Up	543.79 ft	8046.71 ft	08-Apr-2013 2:05:52 AM	08-Apr-2013 4:40:32 AM	1.25 ft	true

All depths are referenced to toolstring zero

Log

Run One: Log[3]:Up

Log

Run One: Log[3]:Up

Description: AIT Basic Log Two	Format: EMD 5in Induction RA	Index Scale: 5 in per 100 ft	Index Unit: ft	Index Type: Measured Depth	Creation Date: 08-Apr-2013 09:56:48
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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-H

0.2	ohm.m	2000
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## Main To Repeat

Repeat To Main

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

0.2	ohm.m	2000
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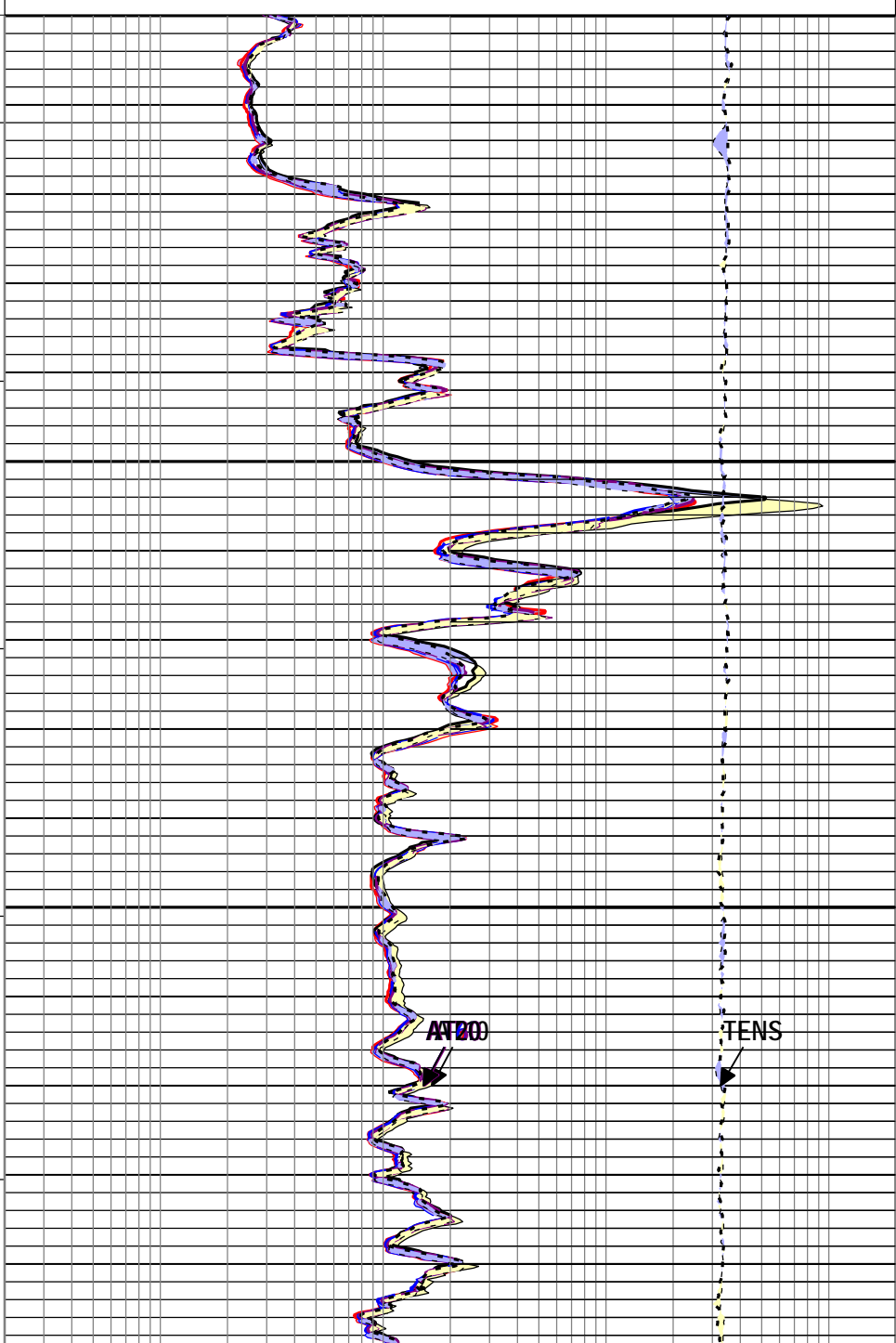
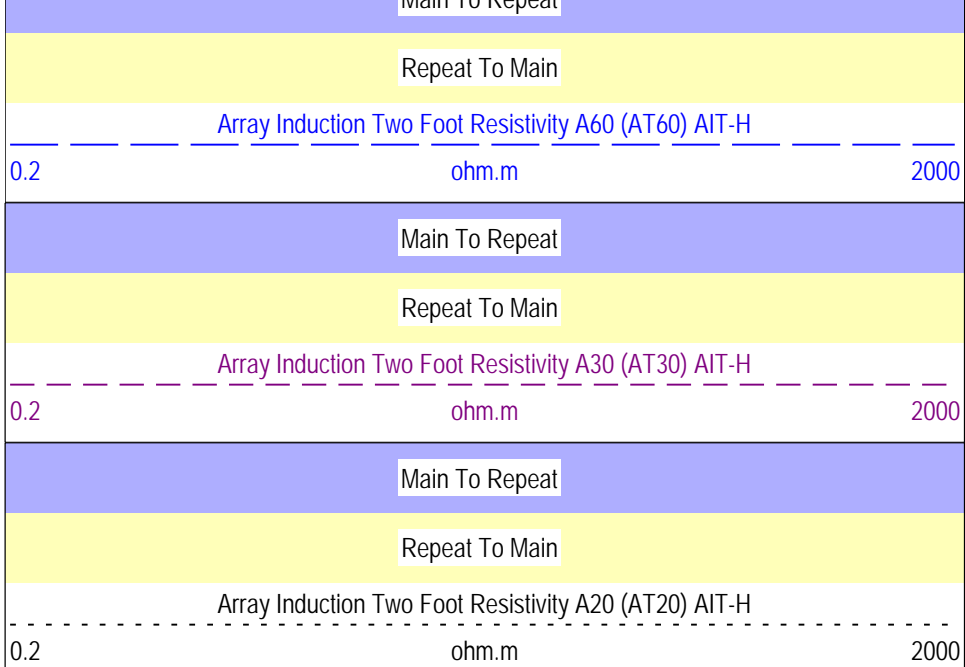
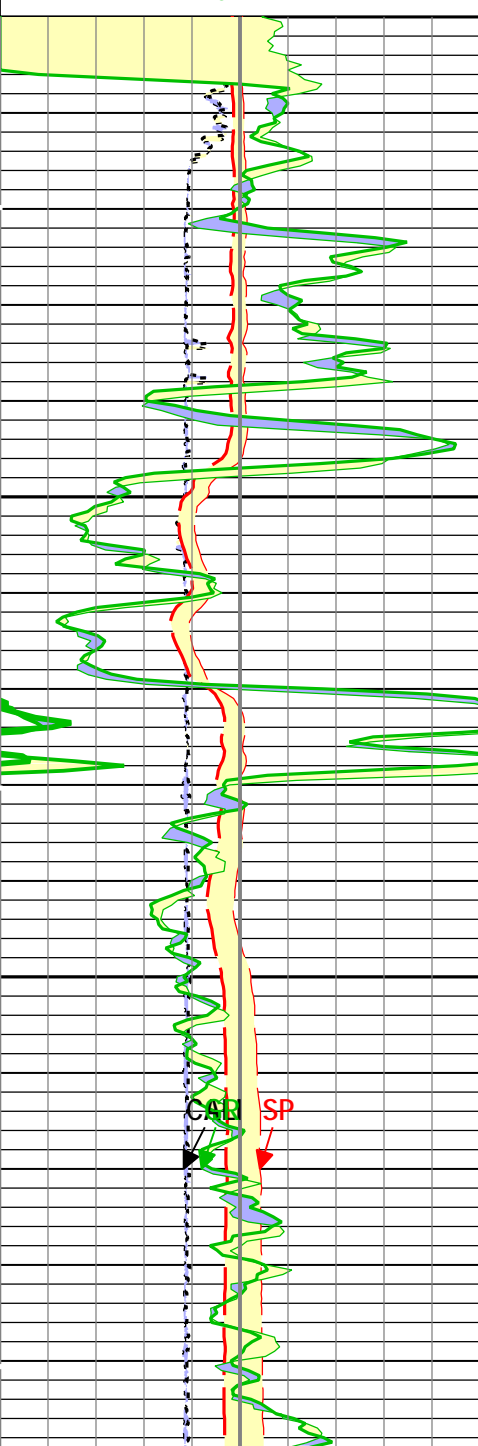
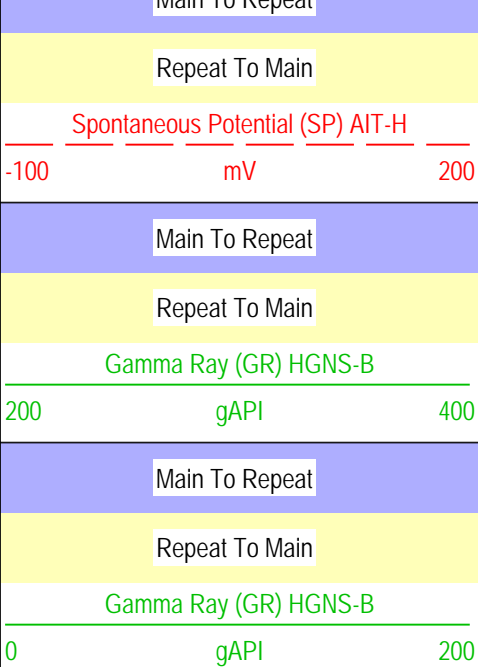
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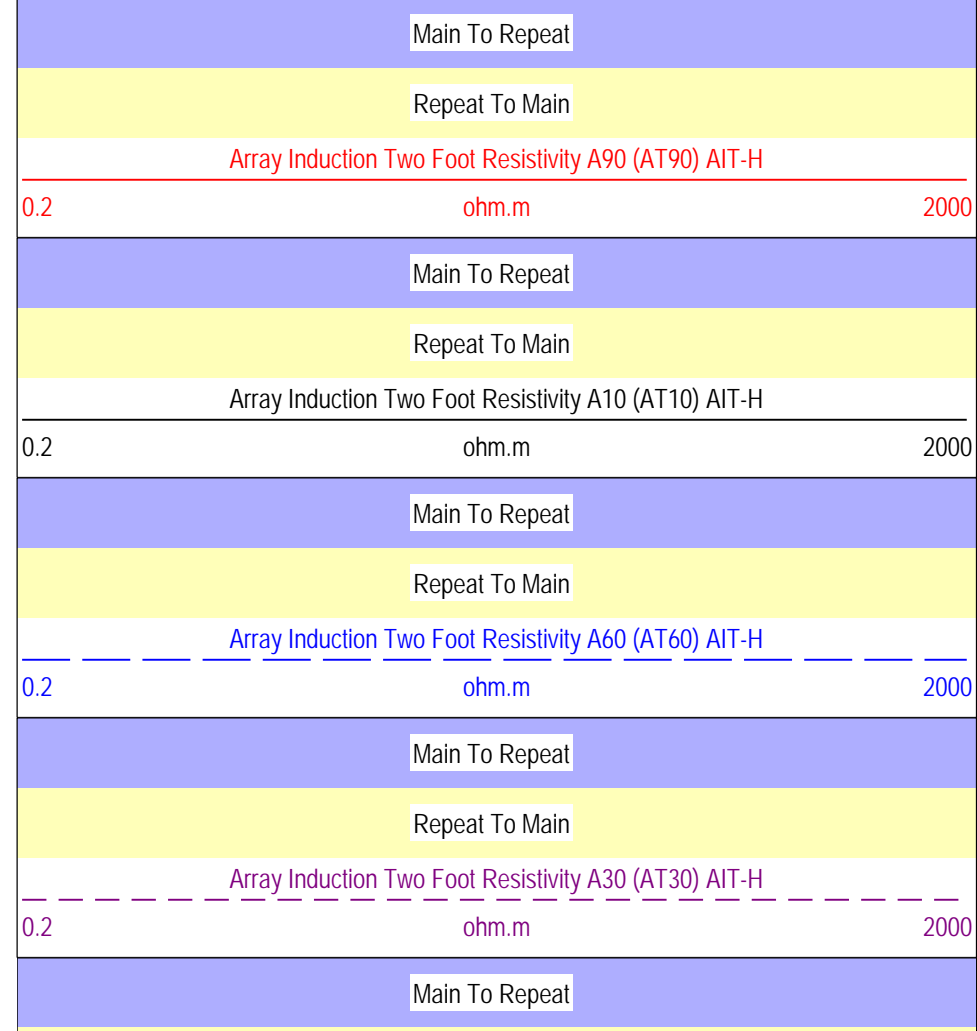
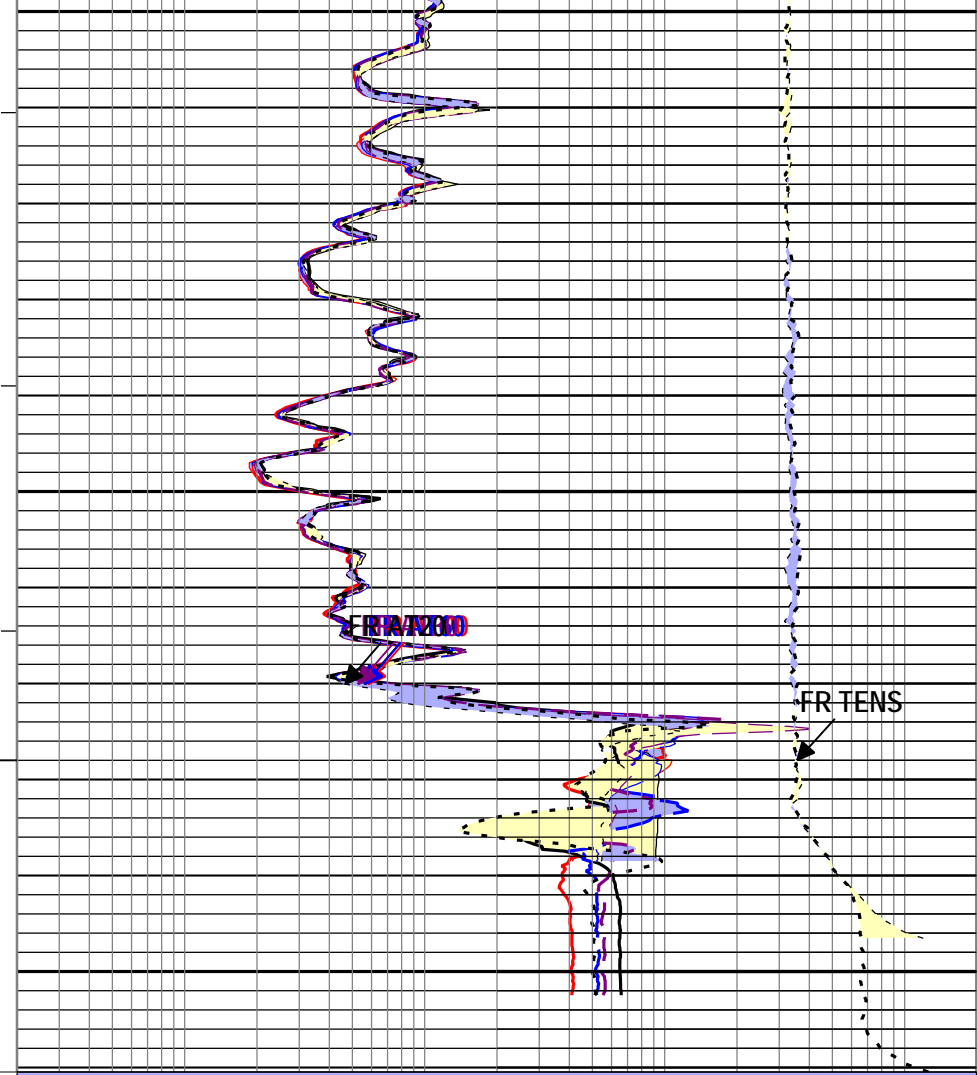
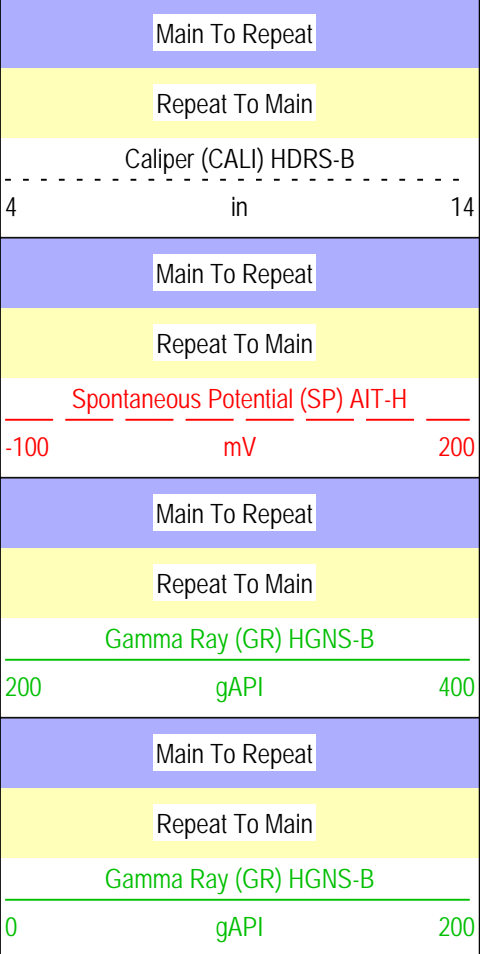
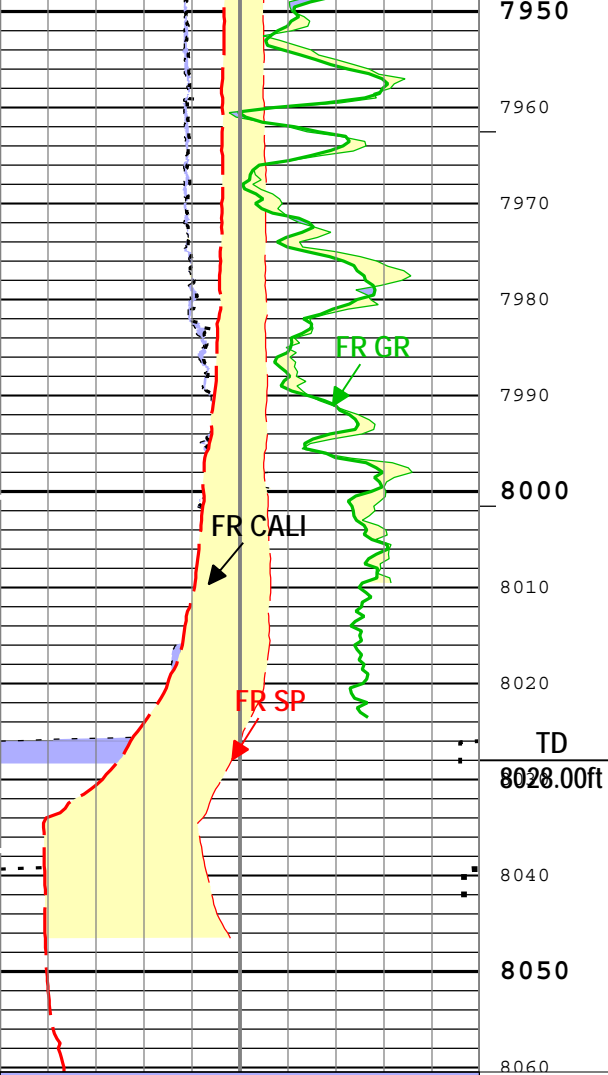
Repeat To Main

Caliper (CALI) HDRS-B

4 in 14

### Main To Repeat





		Repeat To Main	
		Array Induction Two Foot Resistivity A20 (AT20) AIT-H	
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)			
└─ IHV - Integrated Hole Volume every 100.00 (ft3)			
└─ IHV - Integrated Hole Volume every 10.00 (ft3)			
TIME_1900 - Time Marked every 60.00 (s)			
Description: AIT Basic Log Two    Format: EMD 5in Induction RA    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 08-Apr-2013 09:56:48			

Calibration Report

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

Primary Equipment :			
Array Induction Sonde - H	AHIS	398	
Auxiliary Equipment :			
AITH Rm/SP Bottom Nose	AHRM	398	

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM):		21:33:25 07-Mar-2013					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Test Loop Gain - 0		Master	1.000	0.950	1.016	1.050	
Test Loop Phase - 0	deg	Master	0	-3.000	0.420	3.000	
Test Loop Gain - 1		Master	1.000	0.950	1.015	1.050	
Test Loop Phase - 1	deg	Master	0	-3.000	0.591	3.000	
Test Loop Gain - 2		Master	1.000	0.950	1.018	1.050	
Test Loop Phase - 2	deg	Master	0	-3.000	0.001	3.000	
Test Loop Gain - 3		Master	1.000	0.950	1.016	1.050	
Test Loop Phase - 3	deg	Master	0	-3.000	0.047	3.000	
Test Loop Gain - 4		Master	1.000	0.950	0.998	1.050	
Test Loop Phase - 4	deg	Master	0	-3.000	-0.017	3.000	
Test Loop Gain - 5		Master	1.000	0.950	0.992	1.050	
Test Loop Phase - 5	deg	Master	0	-3.000	-0.183	3.000	
Test Loop Gain - 6		Master	1.000	0.950	1.000	1.050	
Test Loop Phase - 6	deg	Master	0	-3.000	0.156	3.000	
Test Loop Gain - 7		Master	1.000	0.950	1.014	1.050	
Test Loop Phase - 7	deg	Master	0	-3.000	-0.218	3.000	

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		21:33:25 07-Mar-2013					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-84.646	119.000	
Sonde Error Correction Quad - 0		Master	-----	-2250.000	116.355	2250.000	
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	169.146	204.000	
Sonde Error Correction Quad - 1		Master	-----	-625.000	151.070	625.000	
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	112.979	156.000	
Sonde Error Correction Quad - 2		Master	-----	-350.000	30.139	350.000	
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	59.570	89.000	
Sonde Error Correction Quad - 3		Master	-----	-250.000	41.303	250.000	
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	23.093	35.000	
Sonde Error Correction Quad - 4		Master	-----	-63.000	-12.430	63.000	
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	13.930	24.000	
Sonde Error Correction Quad - 5		Master	-----	-50.000	1.759	50.000	



		After-Before	----	----	----	----	
Thru Cal Phase - 5	deg	Master	----	-3.000	58.812	117.000	
		Before	----	-3.000	59.350	117.000	
		After	----	----	----	----	
		Before-Master	----	----	0.538	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 6	V	Master	----	1.173	1.941	2.737	
		Before	----	1.173	1.940	2.737	
		After	----	----	----	----	
		Before-Master	----	----	-0.001	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 6	deg	Master	----	-3.000	58.874	117.000	
		Before	----	-3.000	59.413	117.000	
		After	----	----	----	----	
		Before-Master	----	----	0.539	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 7	V	Master	----	0.849	1.378	1.981	
		Before	----	0.849	1.380	1.981	
		After	----	----	----	----	
		Before-Master	----	----	0.002	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 7	deg	Master	----	-7.000	53.154	113.000	
		Before	----	-7.000	53.850	113.000	
		After	----	----	----	----	
		Before-Master	----	----	0.696	----	
		After-Before	----	----	----	----	
SPA Zero	mV	Master		-50.000	-0.032	50.000	
		Before		-50.000	-0.042	50.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.010	----	
		After-Before	----	----	----	----	
SPA Plus	mV	Master		941.000	992.378	1040.000	
		Before		941.000	993.211	1040.000	
		After	----	----	----	----	
		Before-Master	----	----	0.833	----	
		After-Before	----	----	----	----	
Temperature Zero	V	Master		-0.050	0.000	0.050	
		Before		-0.050	0.000	0.050	
		After	----	----	----	----	
		Before-Master	----	----	0.000	----	
		After-Before	----	----	----	----	
Temperature Plus	V	Master		0.870	0.919	0.960	
		Before		0.870	0.920	0.960	
		After	----	----	----	----	
		Before-Master	----	----	0.001	----	
		After-Before	----	----	----	----	

## HDRS-B (HILT Density and Rxo Sonde, 125 degC) Calibration - Run Run One

Primary Equipment :		
HILT High-Resolution Control Cartridge, 125 degC	HRCC-B	791
HILT Resistivity Gamma-Ray Density Device, 125 degC	HRGD-B	1849
Auxiliary Equipment :		
HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5094
HILT High-Resolution Control Cartridge, 125 degC	HRCC-B	791
HILT High-Resolution Mechanical Sonde, 125 degC	HRMS-B	1754
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

# Calibration Summary

Before (Measured): 10:49:20 07-Apr-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	7.95	10.00	
Large Ring	in	Before	12.00	9.00	12.15	15.00	

## HDRS Density Calibration - Inversion Results

Master (EEPROM): 13:27:08 26-Mar-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.600	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.687	1.696	
Pe Aluminum		Master	2.570	2.470	2.548	2.670	
Pe Magnesium		Master	2.650	2.550	2.624	2.750	

## HDRS Density Calibration - Deviation Summary

Master (EEPROM): 13:27:08 26-Mar-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.5105	0.6000	
BS Max Deviation	%	Master	0	-1.6000	1.0204	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.3297	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.4755	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.3430	1.5000	
LS Max Deviation	%	Master	0	-3.5000	0.7854	3.5000	

## HDRS Density Calibration - Background Summary

Master (EEPROM): 13:27:08 26-Mar-2013

Before (Measured):

10:52:16 07-Apr-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master	1.0000		0.7337		
		Before	0.7337	0.6970	0.7378	0.7704	
		Before-Master	----	----	0.0041	----	
BS Window Sum	1/s	Master	1		9471		
		Before	9471	8998	9489	9945	
		Before-Master	----	----	18	----	
SS Window Ratio		Master	1.0000		0.4949		
		Before	0.4949	0.4701	0.4942	0.5196	
		Before-Master	----	----	-0.0007	----	
SS Window Sum	1/s	Master	1		9122		
		Before	9122	8666	9090	9578	
		Before-Master	----	----	-32	----	
LS Window Ratio		Master	1.0000		0.2973		
		Before	0.2973	0.2825	0.2927	0.3122	
		Before-Master	----	----	-0.0046	----	
LS Window Sum	1/s	Master	1		1064		
		Before	1064	1010	1062	1117	
		Before-Master	----	----	-2	----	

## HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 13:27:08 26-Mar-2013

Before (Measured):

10:52:16 07-Apr-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master		1000	1613	2400	
		Before		1000	1608	2400	
		Before-Master	----	-100	-5	100	
SS PM High Voltage	V	Master		1000	1636	2400	
		Before		1000	1675	2400	
		Before-Master	----	-100	39	100	
LS PM High Voltage	V	Master		1000	1577	2400	
		Before		1000	1585	2400	
		Before-Master	----	-100	8	100	

## HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 13:27:08 26-Mar-2013

Before (Measured):

10:52:16 07-Apr-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crystal Resolution	%	Master		5.00	11.98	25.00	
		Before		5.00	11.98	25.00	
		Before-Master	----	-1.00	0.00	1.00	
SS Crystal Resolution	%	Master		5.00	9.64	20.00	
		Before		5.00	10.28	20.00	
		Before-Master	----	-1.00	0.64	1.00	
LS Crystal Resolution	%	Master		5.00	9.66	20.00	

		Before		5.00	9.46	20.00	
		Before-Master	-----	-1.00	-0.20	1.00	

## HDRS MCFL Calibration - MCFL Accumulations

Before (Measured):		10:52:41 07-Apr-2013					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Main Resistivity	ohm.m	Before	3875	3565	3830	4185	
Deep Resistivity	ohm.m	Before	3830	3524	3793	4136	
Shallow Resistivity	ohm.m	Before	3830	3524	3817	4136	

## HGNS-B (HILT Gamma-Ray and Neutron Sonde, 125 degC) Calibration - Run Run One

Primary Equipment :							
	HILT Gamma-Ray and Neutron Sonde, 125 degC		HGNS-B		863		
Auxiliary Equipment :							
	HGNS Accelerometer, 125 degC		HACCZ-B		452		
	AmBe Neutron Logging Source		NSR-F		5069		
Calibration Parameter :							
	Water Temperature						
	Housing Size						
	JIG-BKG (Jig minus background reference)		165				

## HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured):		00:53:15 08-Apr-2013					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	31.8	32.8	

## HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM):		17:00:00 14-Dec-1996					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Accelerometer Manufacturer		Master			Sunstrand		
Accelerometer Reference Temperature	degF	Master		30.2	68.0	122.0	
Accelerometer Coefficients - 0		Master	-----	-----	51.000	-----	
Accelerometer Coefficients - 1		Master	-----	-----	11.800	-----	
Accelerometer Coefficients - 2		Master	-----	-----	0.011	-----	
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 4		Master	-----	-----	2.182	-----	
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 8		Master	-----	-----	293.400	-----	
Accelerometer Coefficients - 9		Master	-----	-----	0.997	-----	

## HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM):		03:38:08 25-Feb-2013	Before (Measured):		10:48:13 07-Apr-2013	After:	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	27.8	40.0	
		Before	0	5.0	27.6	40.0	
		After	-----	-----	-----	-----	
		Before-Master	-----	-4.2	-0.2	4.2	
		After-Before	-----	-----	-----	-----	
Far Zero Measurement	1/s	Master	0	5.0	31.8	40.0	
		Before	0	5.0	30.4	40.0	
		After	-----	-----	-----	-----	
		Before-Master	-----	-4.8	-1.4	4.8	
		After-Before	-----	-----	-----	-----	
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	4914.0	6900.0	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2076.0	2900.0	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	



		After Before-Master After-Before	----- ----- -----	----- ----- -----	----- ----- -----	----- ----- -----	
Near Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	4700.0 ----- ----- ----- -----	4881.0 ----- ----- ----- -----	6900.0 ----- ----- ----- -----	
Far Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1900.0 ----- ----- ----- -----	2041.0 ----- ----- ----- -----	2900.0 ----- ----- ----- -----	

## HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured):		10:49:56 07-Apr-2013		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before After After-Before	30.0 ----- -----	0 ----- -----	71.8 ----- -----	120.0 ----- -----	
RGR Plus Measurement	gAPI	Before After After-Before	185.4 ----- -----	157.1 ----- -----	171.0 NOT DONE -----	206.3 ----- -----	
GR Calibration Gain		Before After After-Before	0.89 ----- -----	0.80 ----- -----	0.97 ----- -----	1.05 ----- -----	

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

Primary Equipment :		Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor		LEH-QT			
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## HTEN Master Calibration - HTEN Master Calibration

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

## HTEN Before Calibration - HTEN Before Calibration

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

Company: Encana Oil & Gas

**Schlumberger**

Well: State 23-16

Field: Wattenberg

County: Weld

State: Colorado

Platform Express

Array Induction

with Linear Correlation

