Schlumberger

Company: Anadarko E&P Onshore LLC

Well: Murphy 1-31 M

Field: Greenwood

County: Morton State: Kansas

PLATFORM EXPRESS

ARRAY INDUCTION

GAMMA RAY - SP

County: Morton
Field: Greenwood
Location: 497.46' FEL & 1335.13' FSL
Well: Murphy 1-31 M
Company: Anadarko E&P Onshore LLC

Location:			
497.46' FEL & 1335.13' FSL		Elev. K.B.	
SW.SE.NE.SW		G.L.	3538.19 ft
SE/4 SEC.31, T32S-R42W		D.F.	3545.19 ft
Permanent Datum:	Mean Sea Level	Elev.:	0.00 ft
Log Measured From:	Ground Level	3538.19 ft	above Perm.Datum
Drilling Measured From:	Ground Level		

API Serial No.	Section:	Township:	Range:
15-129-21957	31	32S	42W

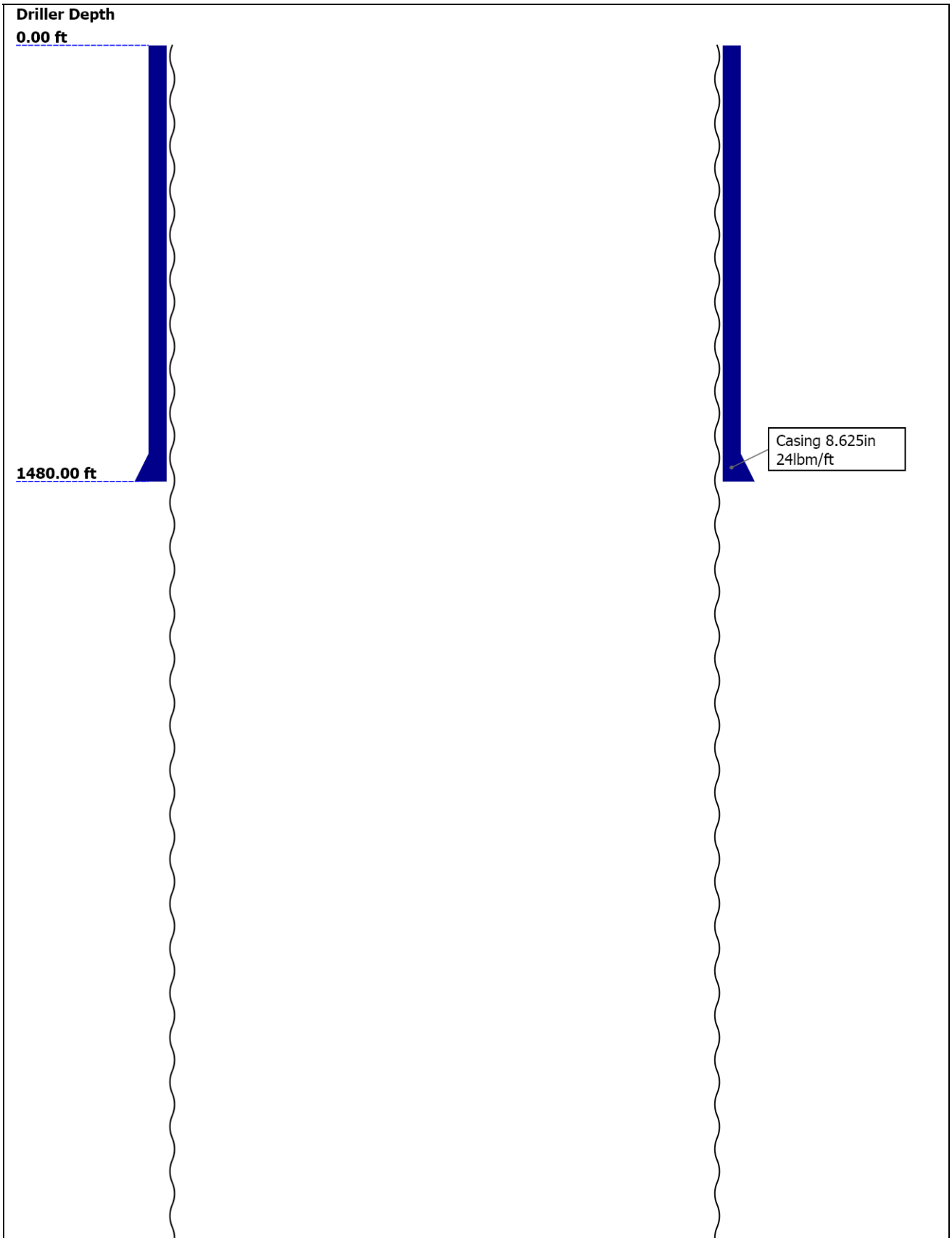
Logging Date			12-Dec-2013			
Run Number			One			
Depth Driller			5250.00 ft			
Schlumberger Depth			5255.00 ft			
Bottom Log Interval			5255.00 ft			
Top Log Interval			1494.00 ft			
Casing Driller Size @ Depth			8.625 in @ 1480.00 ft			
Casing Schlumberger			1494 ft			
Bit Size			7.875 in			
Type Fluid In Hole			Fresh Water			
MUD	Density	Viscosity	8.8 lbm/gal	60 s		
	Fluid Loss	PH	6.2 cm3	10.5		
	Source of Sample		Active Tank			
RM @ Meas Temp			0.72 ohm.m @ 55 degF			
RMF @ Meas Temp			0.62 ohm.m @ 55 degF			
RMC @ Meas Temp			1.01 ohm.m @ 55 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.34 @ 123.4	0.29 @ 123.4		
Max Recorded Temperatures			123.4 degF	123		
Circulation Stopped	Time		12-Dec-2013	07:15:00		
Logger on Bottom	Time		12-Dec-2013	12:02:29		
Unit Number	Location:		2367	Elk City, OK		
Recorded By			Matt Cramer			
Witnessed By			Tom Bingel			

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.

Contents

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	7.875					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	5250					
Bottom Logger (ft)	5255					
Casing						
Size (in)	8.625					
Weight (lbm/ft)	24					
Inner Diameter (in)	8.099					
Grade	J55					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	1480					
Bottom Logger (ft)	1494					

Remarks and Equipment Summary

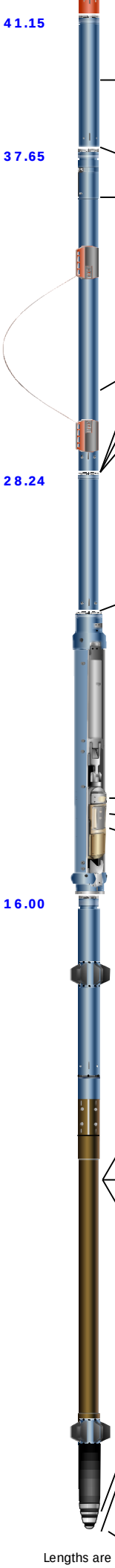
One: Toolstring

Equip name	Length
LEH-QT	**58.76**
LEH-QT	
EDTC-B	**55.84**
EDTH-B	
EDTG-A	
EDTC-B	
HNGS-BA:328	**49.34**
HEH-K:328	
HNGS-BA:328	

MP name	Offset
CTEM	**52.34**
ACCZ	**0.00**
HV	**0.00**
Gamma Ray	**50.47**
TelStatus	**49.34**
GR	**46.35**

One: Remarks

Thank you for choosing Schlumberger of Elk City, OK- 580-339-6535
Tools ran as per toolsketch.
All logs and presentations as per client's request.
Logging measured from ground level as per client's request. Drilling measured from drill floor at 7' above ground level.
Your crew today: Kojo, Arona, Johnathan and Andrew.
Thank you for choosing Schlumberger of Elk City, OK.
580-339-6535
Logged on limestone matrix (MDEN=2.56,DTM=47.6)
Standoff correction & Hole size correction were applied.
Caliper check inside casing within tolerance.
Source of maximum recorded temperature is HNGS temperature sensor.



Lengths are in ft

Maximum Outer Diameter = 9.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

Depth Control Parameters	One		
Conveyance Type	Wireline		
Log Sequence	ONE		
Depth Remark Parameters	**One**		
Depth Remark 1	First run in hole, All Schlumberger Depth control procedures were followed.		
Depth Remark 2	IDW used as primary depth control & Z-Chart used as secondary.		
Depth Remark 3	Main Log was correlated to the Down log.		
Depth Remark 4	Logging measured from ground level as per client's request. Drilling measured from drill floor at 7' above ground level.		
Depth Measuring Device	**One**		
Type	IDW-JA		
Serial Number	6650		
Calibration Date	25-Apr-2013		
Calibrator Serial Number	33		
Calibration Cable Type	7-39P-LXS		
Wheel Correction 1	-6		
Wheel Correction 2	-3		
Tension Device	**One**		
Type	CMTD-B/A		
Serial Number	2549		
Calibration Date	25-Sep-2013		
Calibrator Serial Number	1018		
Calibration Points	10		
Calibration RMS	12		
Calibration Peak Error	19		
Logging Cable	**One**		
Type	7-39P-LXS		
Serial Number	U712016		
Logging Cable Length (ft)	16100.00		

One

Main Pass 2" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799

Tool Elements	Description	Software Version	Firmware Version

Tool Elements	Description	Software Version	Firmware Version
AMIS	Array Induction Sonde - M	3.1.9755.1799	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	
All depths are referenced to toolstring zero								

Log

One: Log[4]:Up

Description: AIT Basic Log Two Format: Log (AIT Basic Log Two) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:36

Channel	Source	Sampling
AF20	AIT-M:AMIS:AMIS	3in
AF60	AIT-M:AMIS:AMIS	3in
AFCO60	AIT-M:AMIS:AMIS	3in
ICV	Borehole	6in
IHV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TIME_1900	WLWorkflow	0.1in

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Array Induction Four Foot Resistivity A60 (AF60) AIT-M

0 ohm.m 50

Array Induction Four Foot Resistivity A20 (AF20) AIT-M

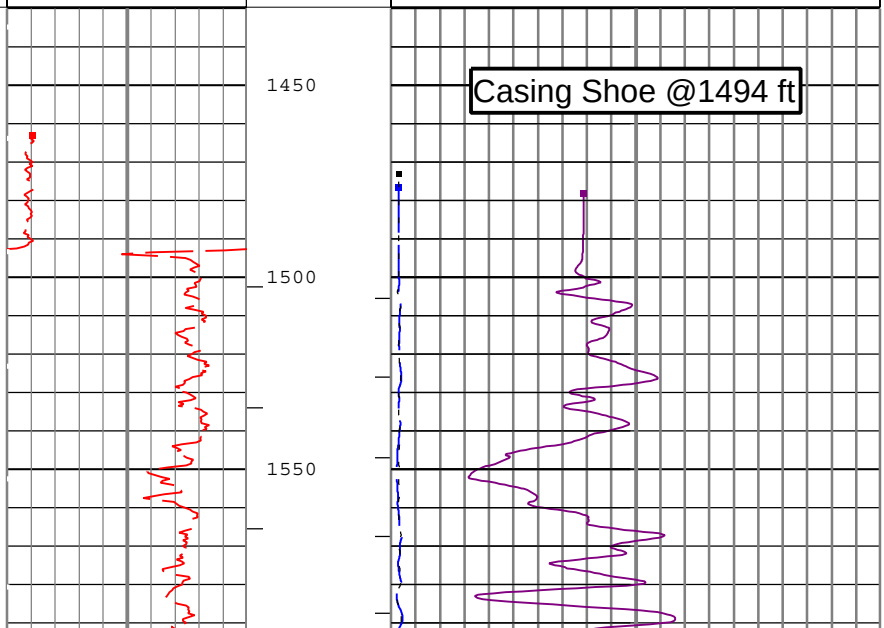
0 ohm.m 50

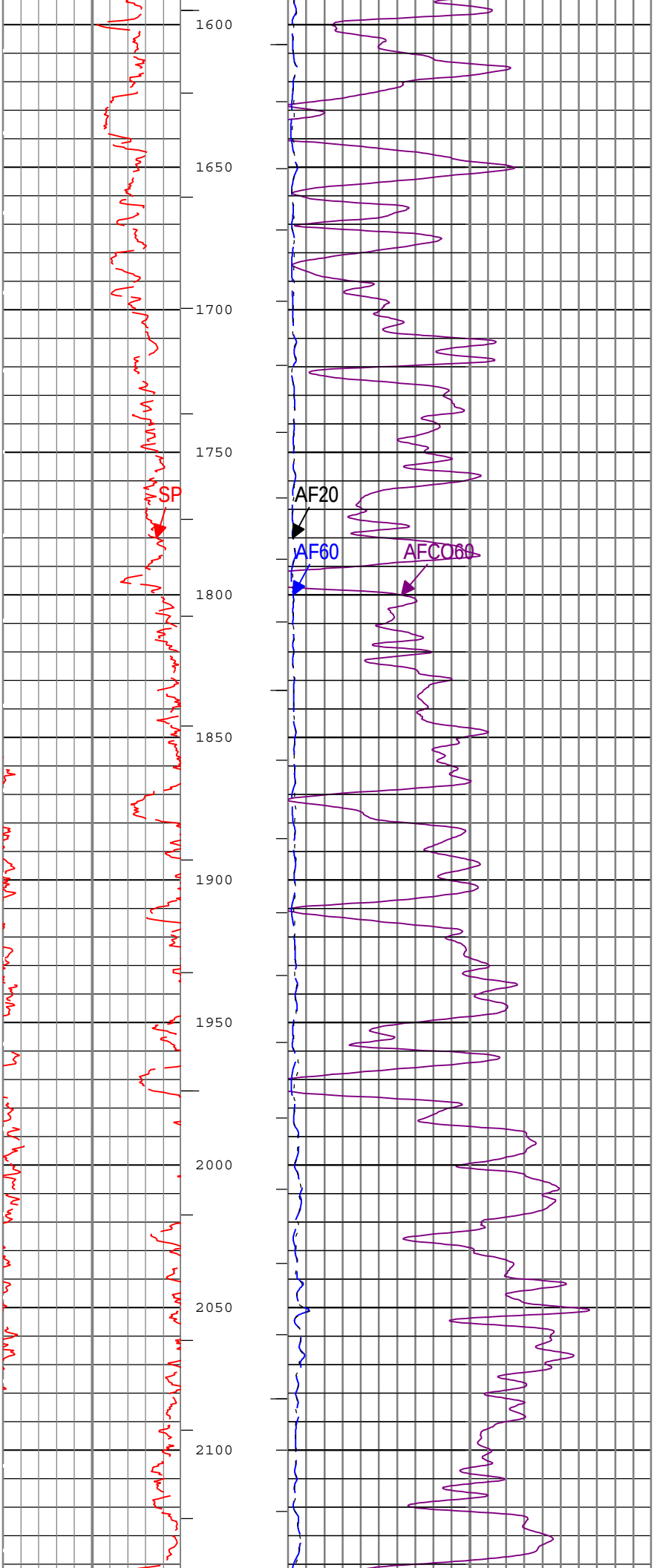
Spontaneous Potential (SP) AIT-M

-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M

1000 mS/m 0

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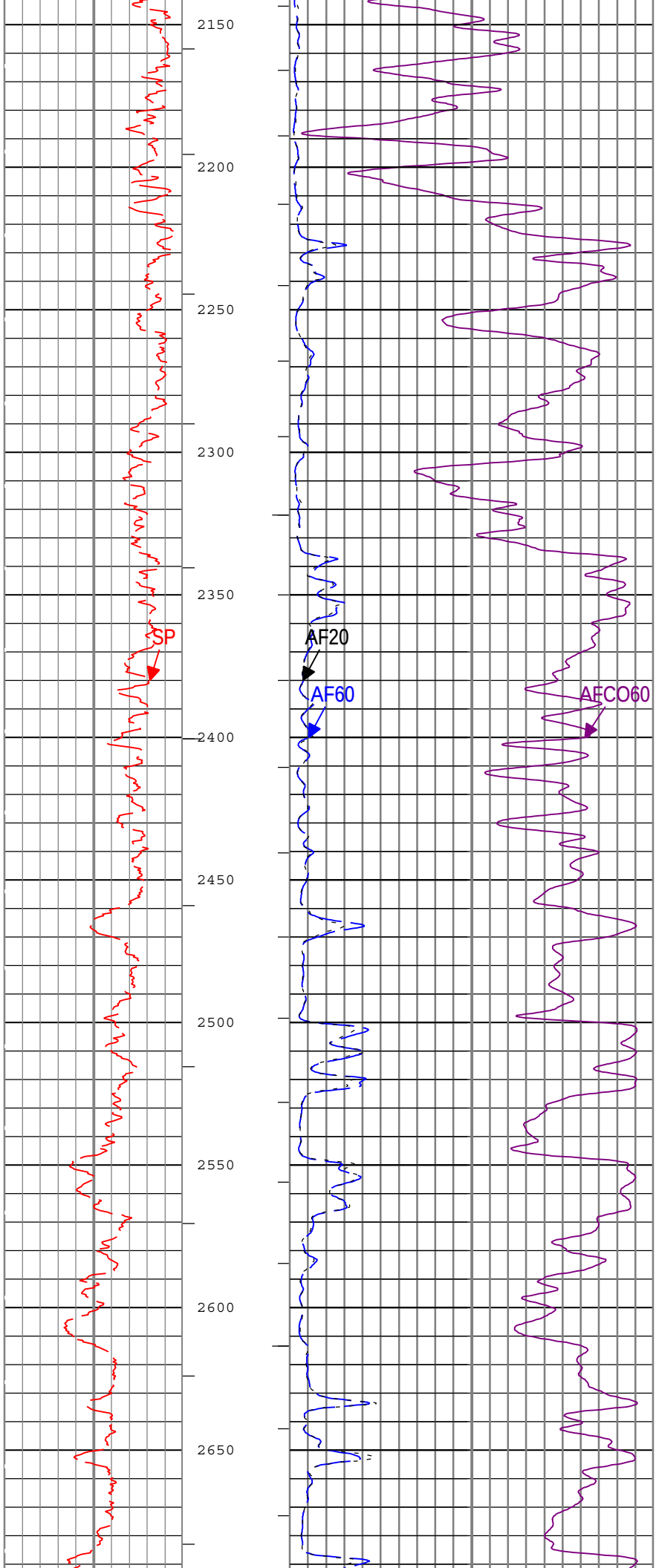
AF60
AFC060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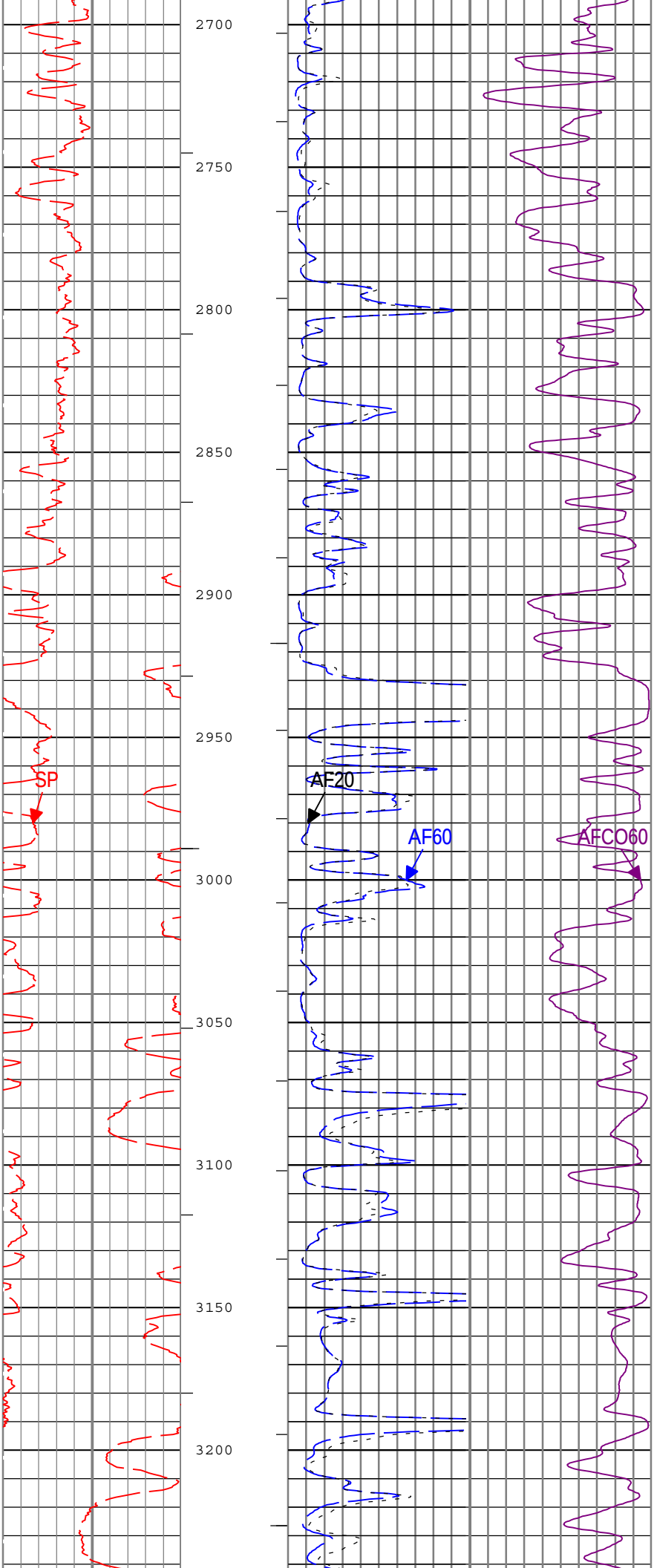
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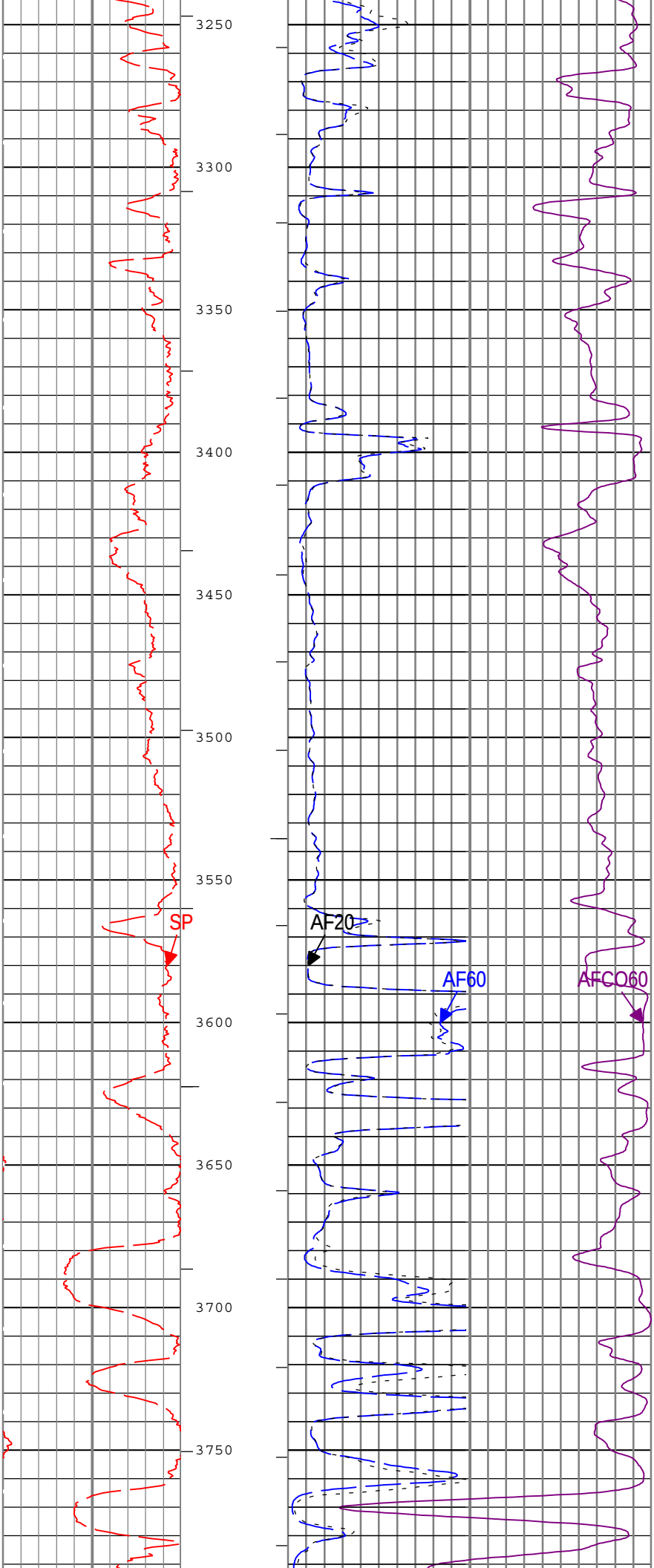
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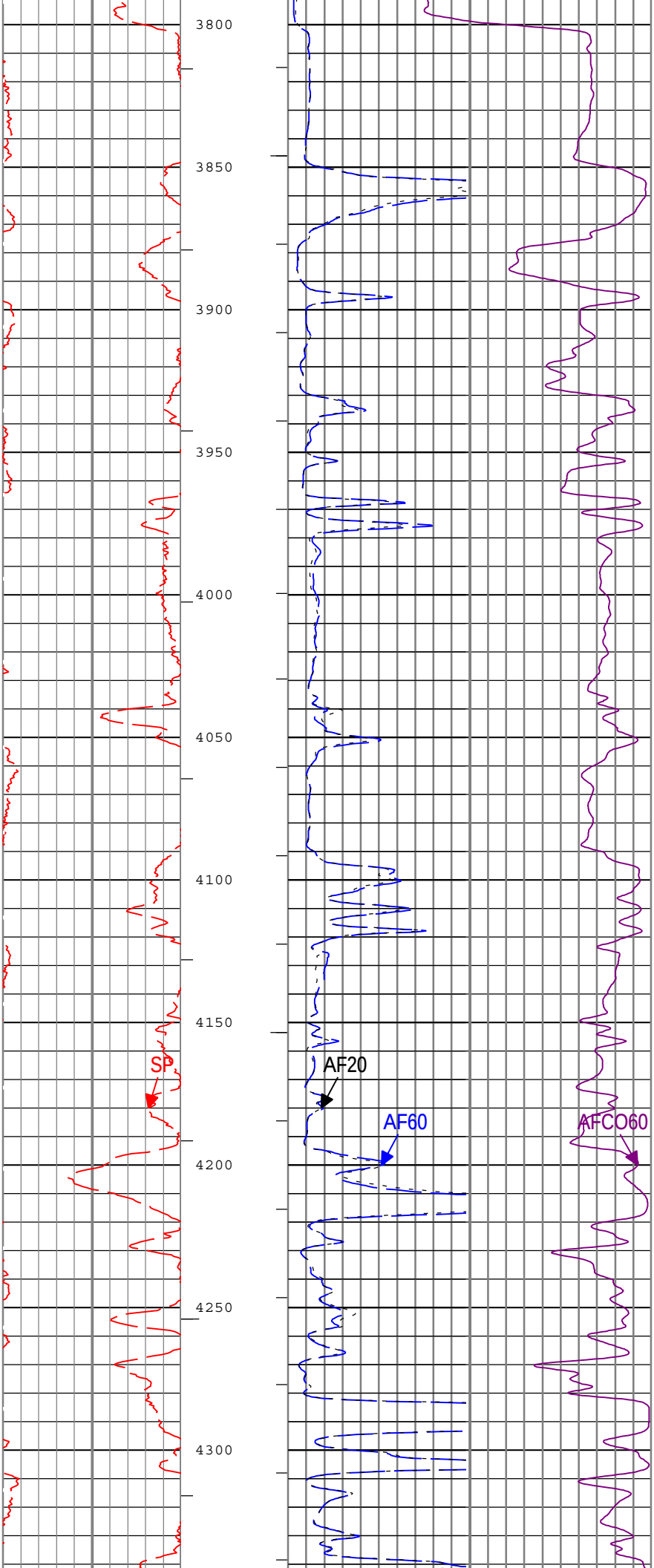
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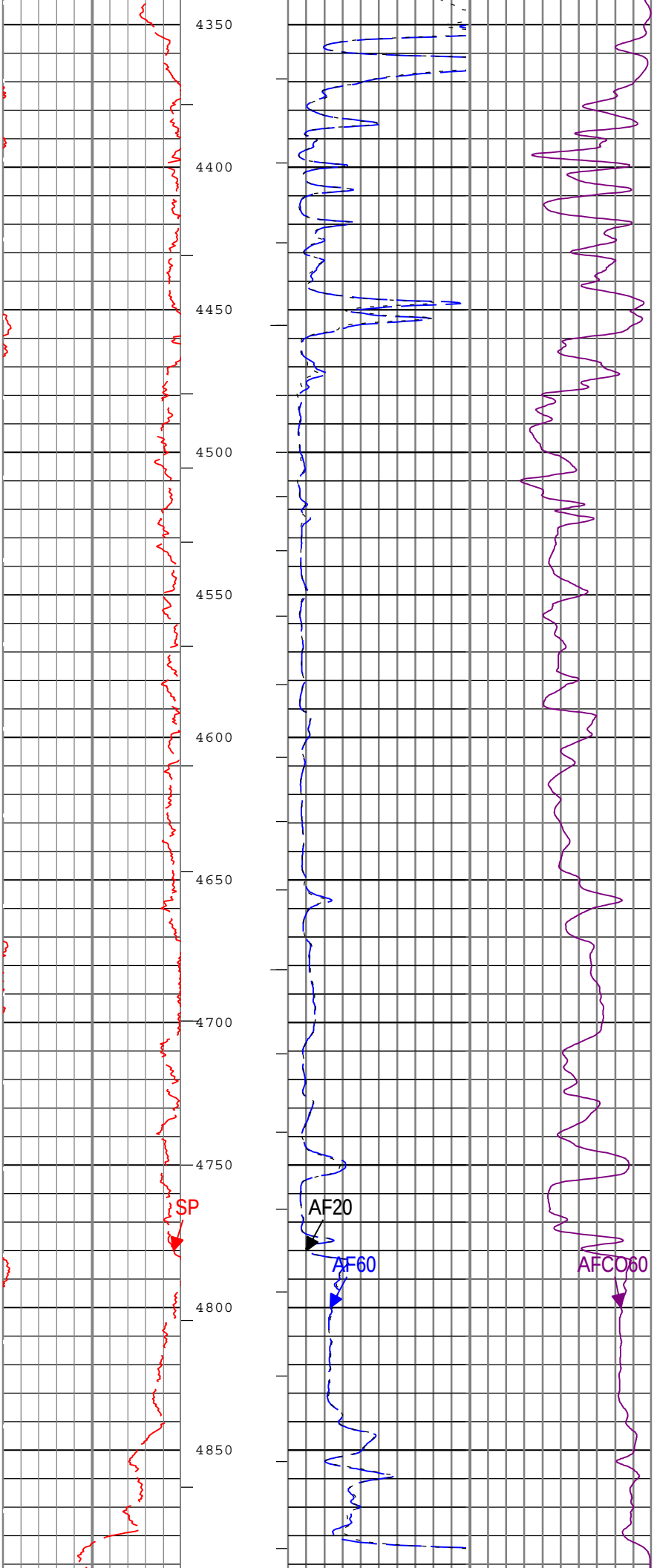
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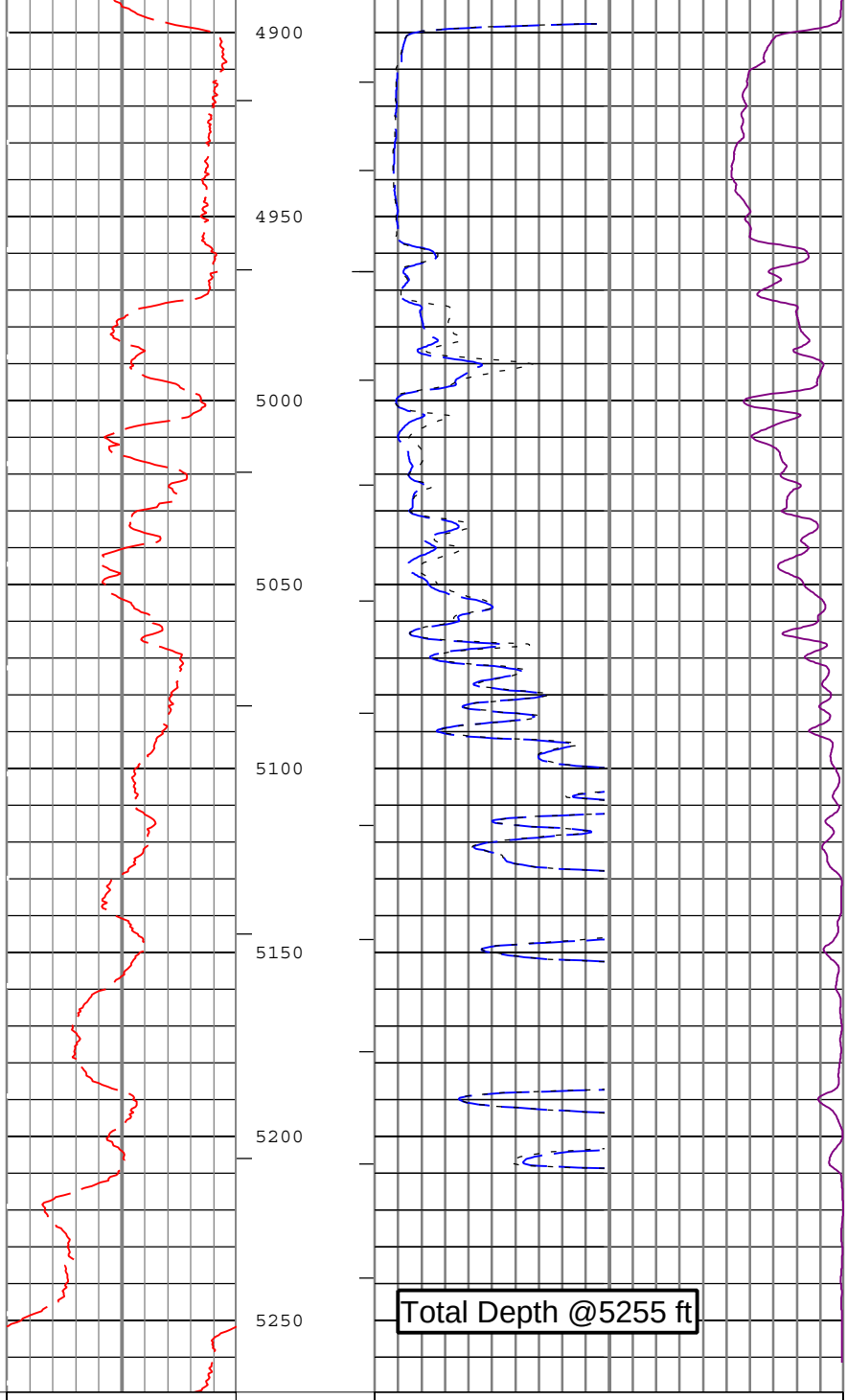

Spontaneous Potential (SP) AIT-M

-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M

1000 mS/m 0

Array Induction Four Foot Resistivity A60 (AF60) AIT-M

0 ohm.m 50

Array Induction Four Foot Resistivity A20 (AF20) AIT-M

0 ohm.m 50

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 (AIT Basic Log Two) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:36

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	1.625	in
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
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	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Tool Control Parameters

One

Main Pass 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799

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	3.1.9755.1799	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: AIT Basic Log One Format: Log (AIT 5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:39

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)

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-M

-160 mV 40

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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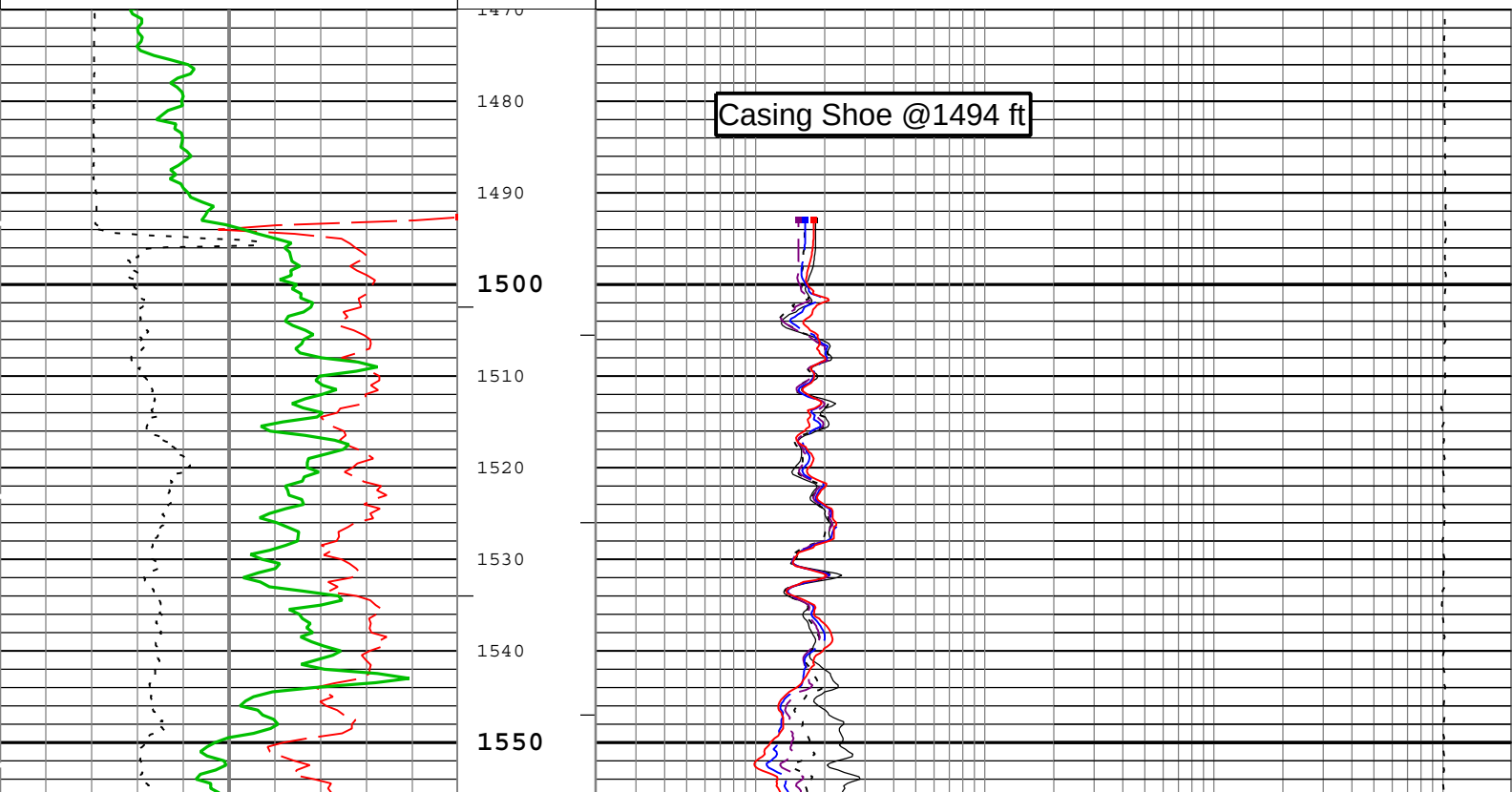
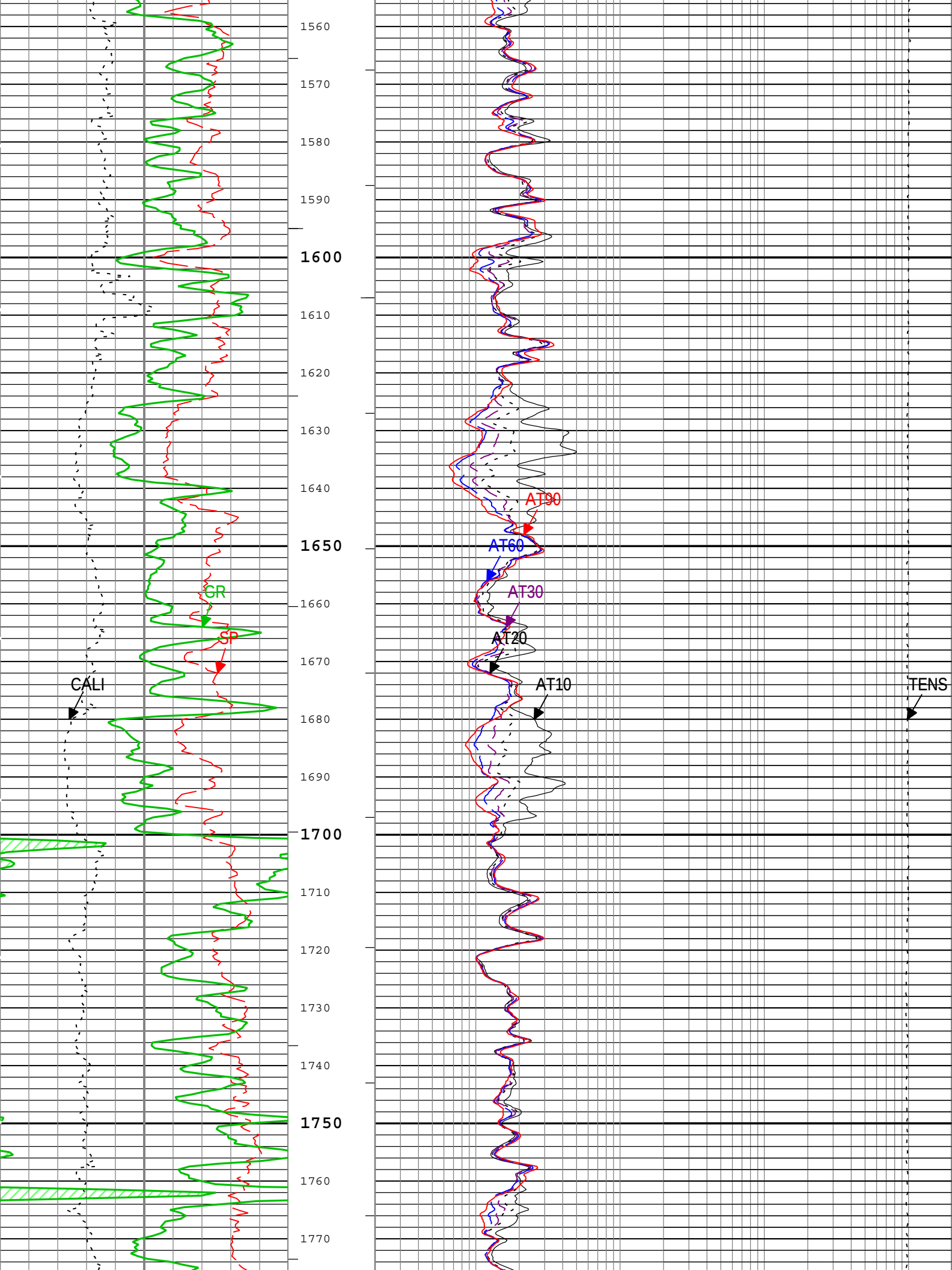
0.2 ohm.m 2000

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

0.2 ohm.m 2000

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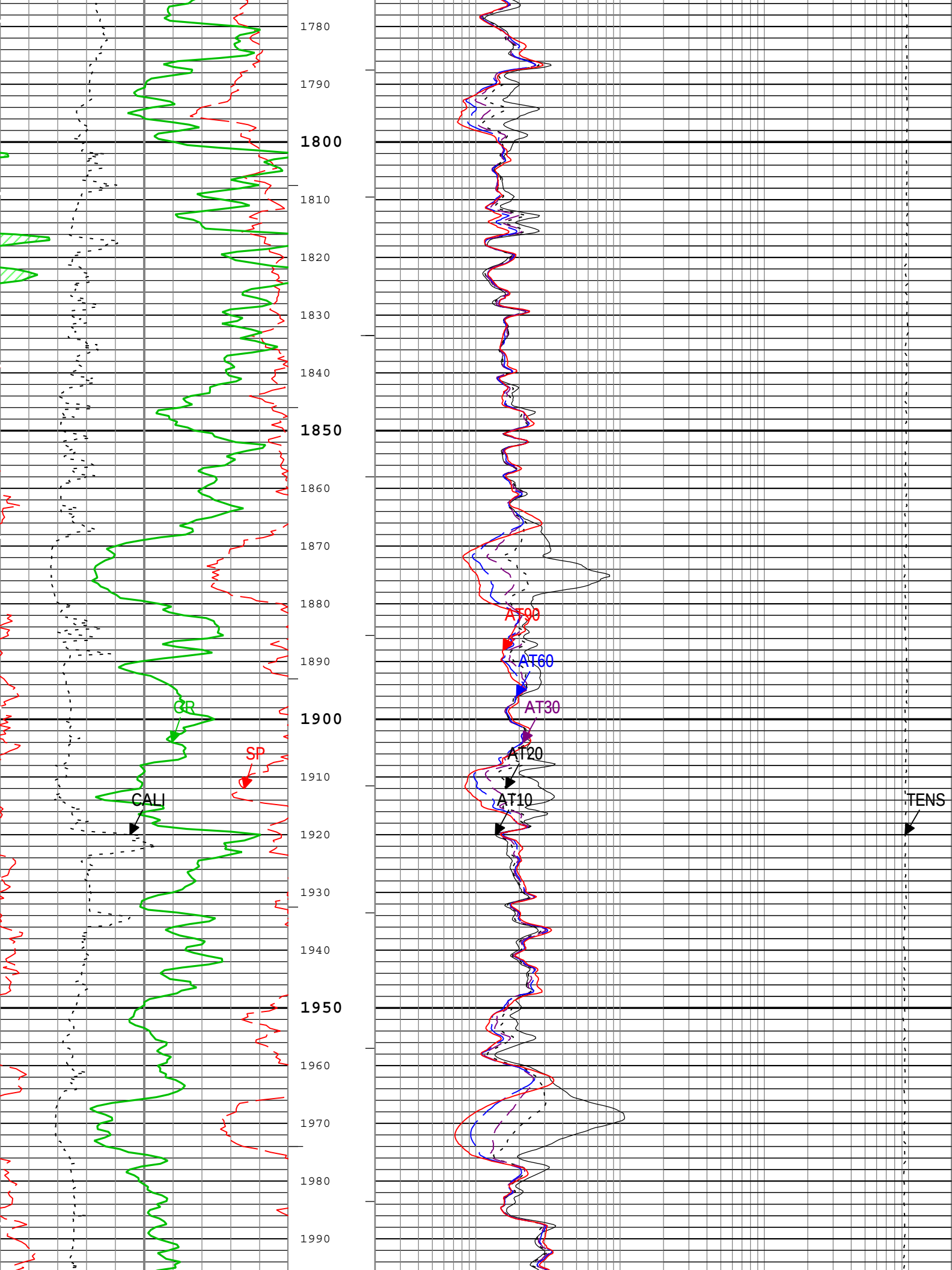
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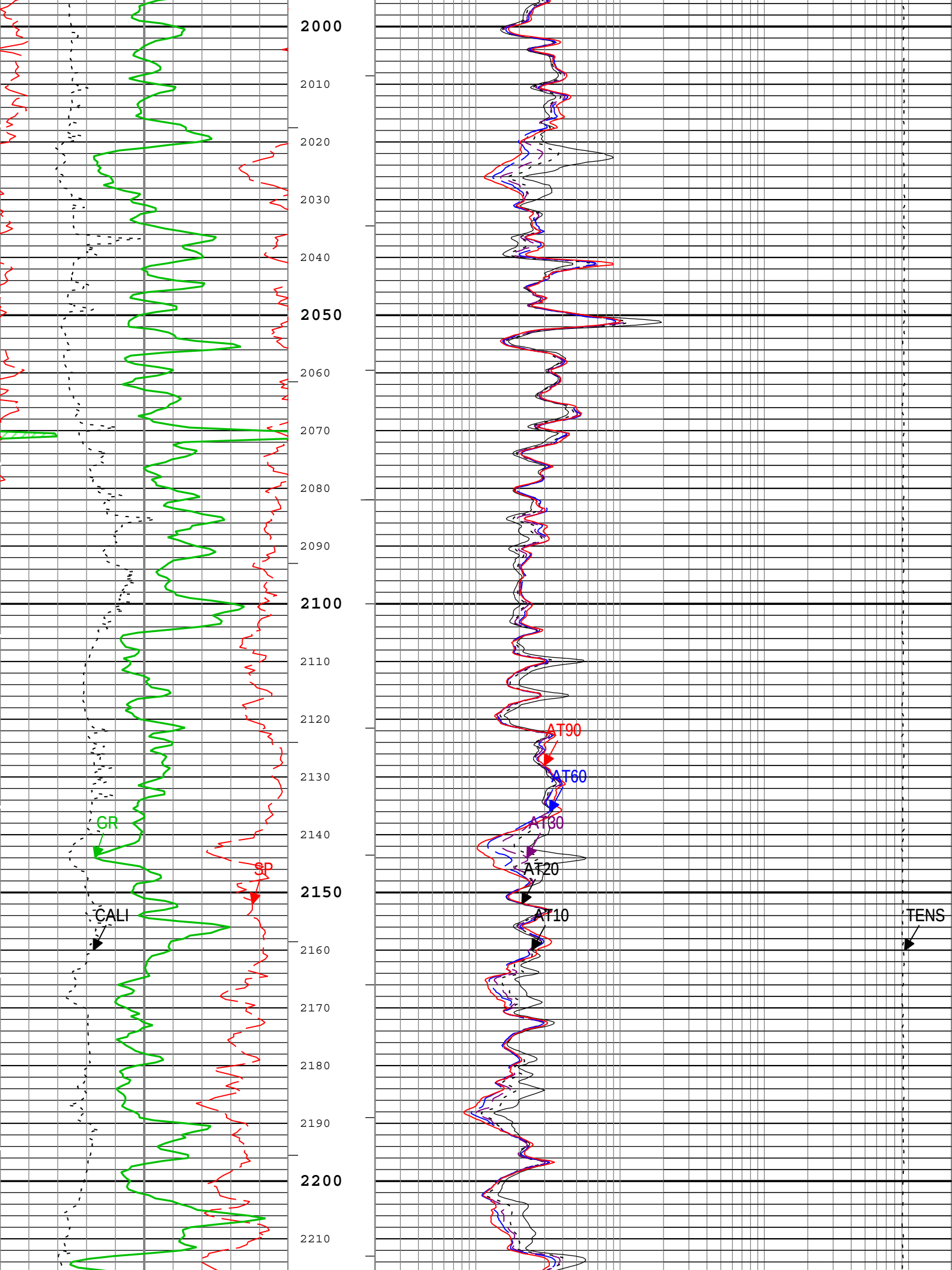
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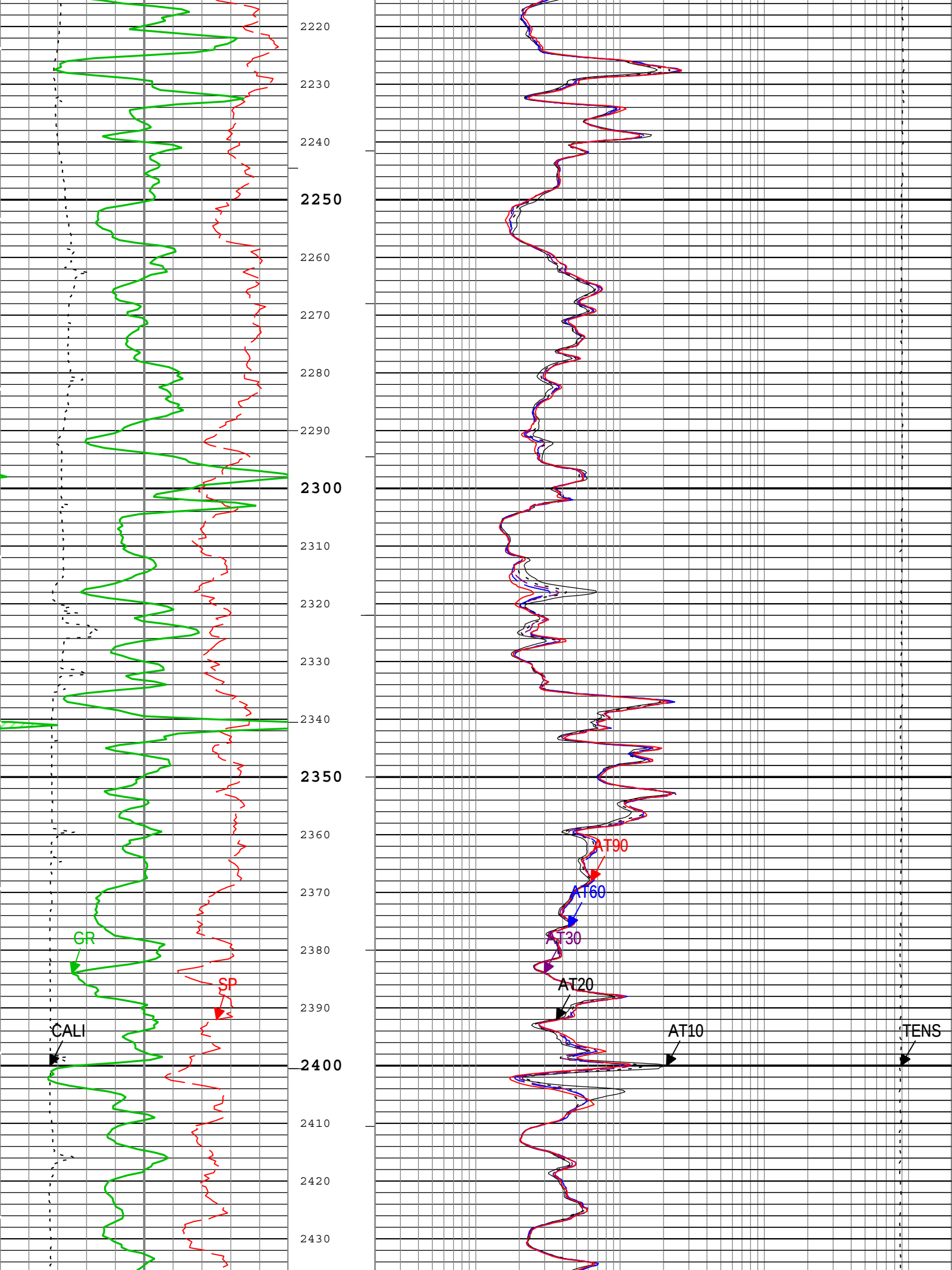
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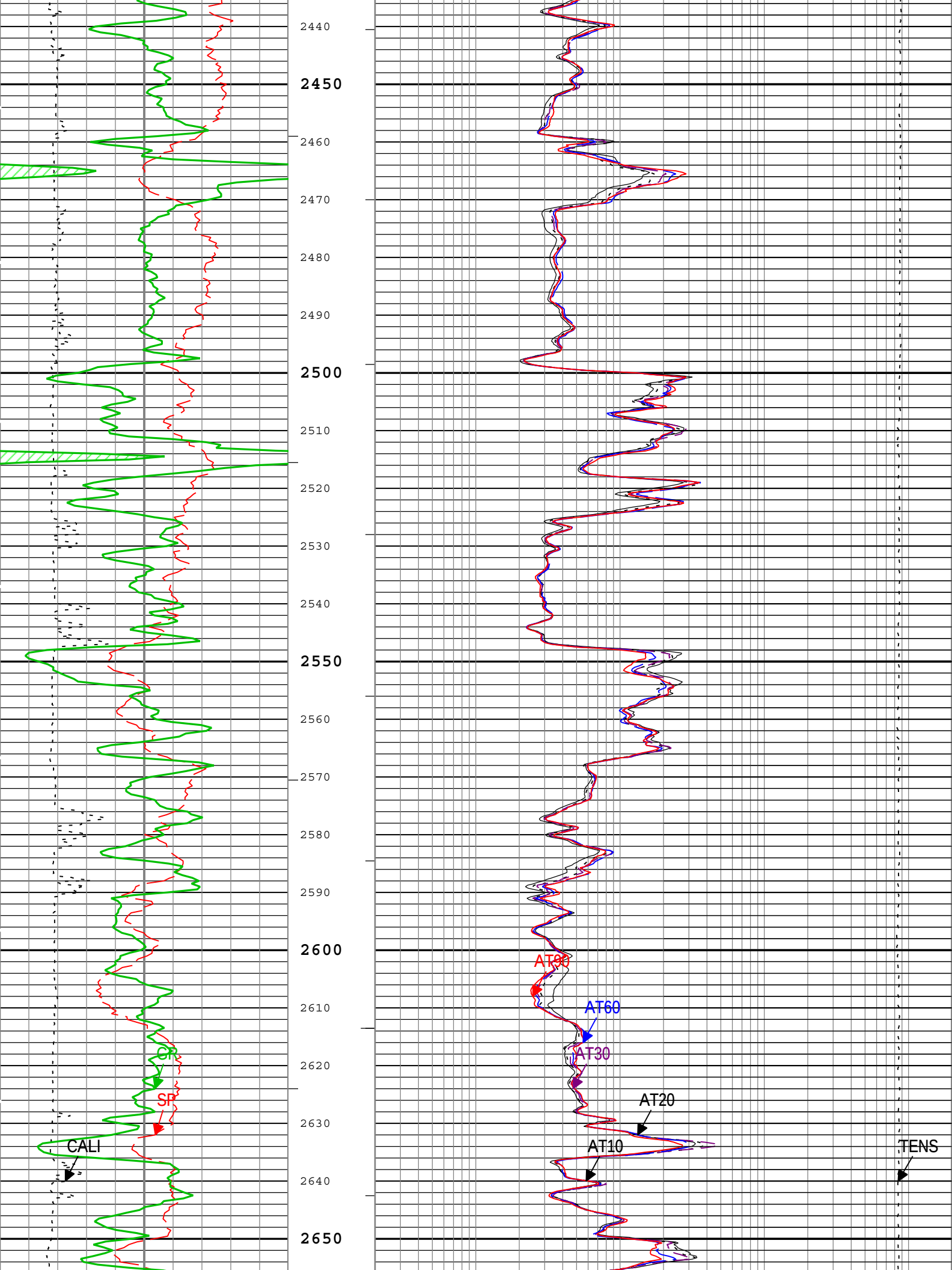
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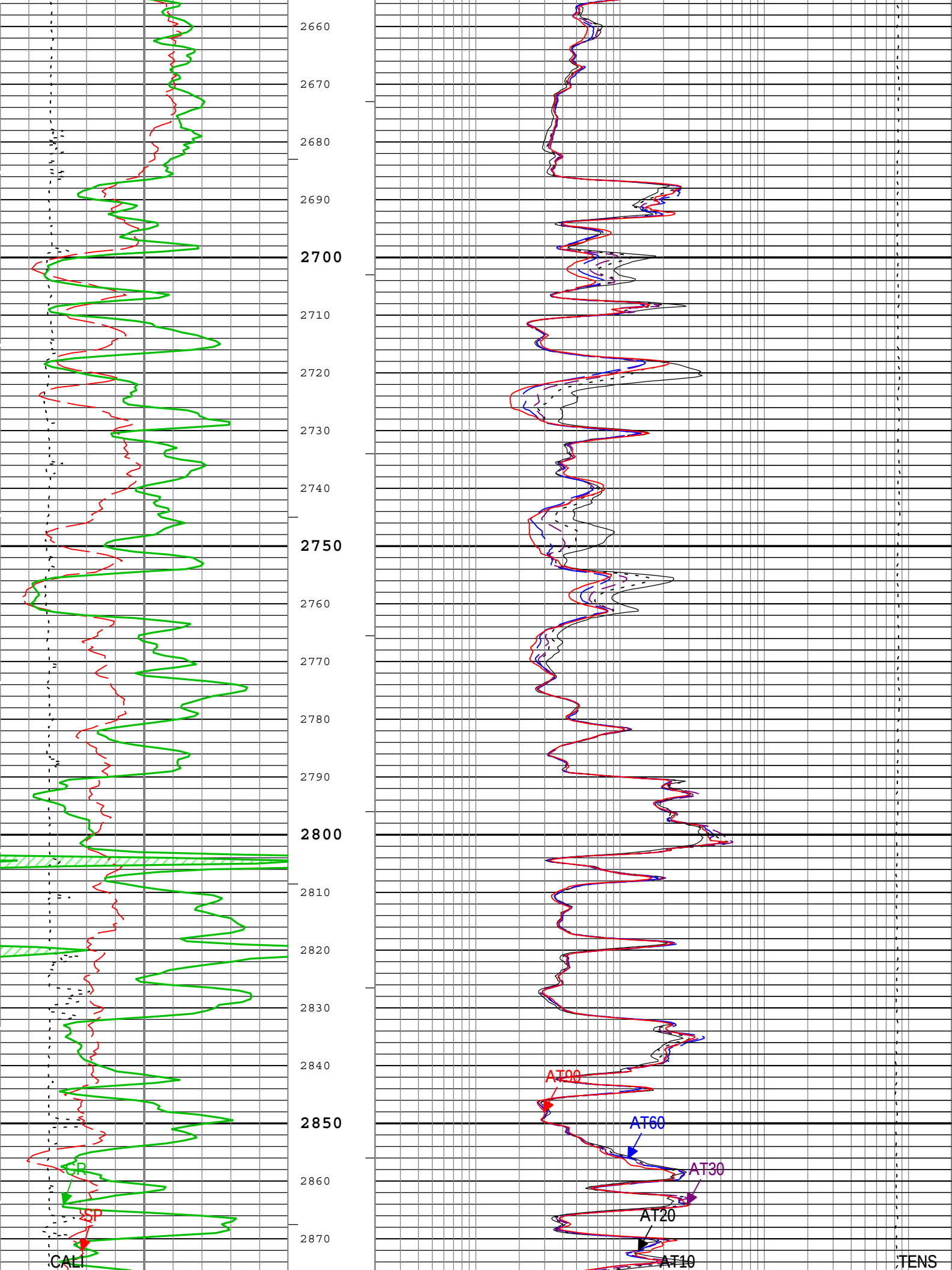
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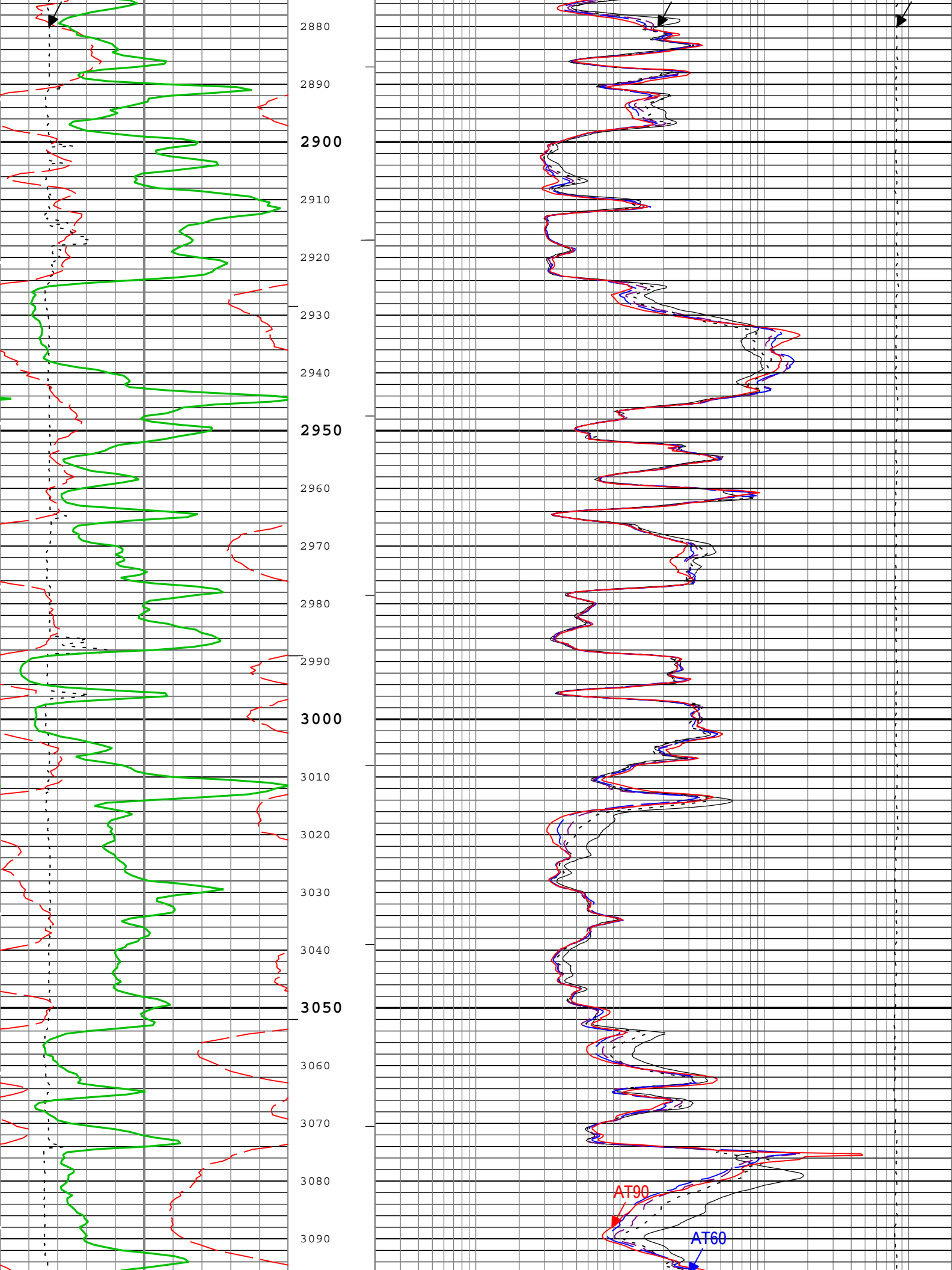
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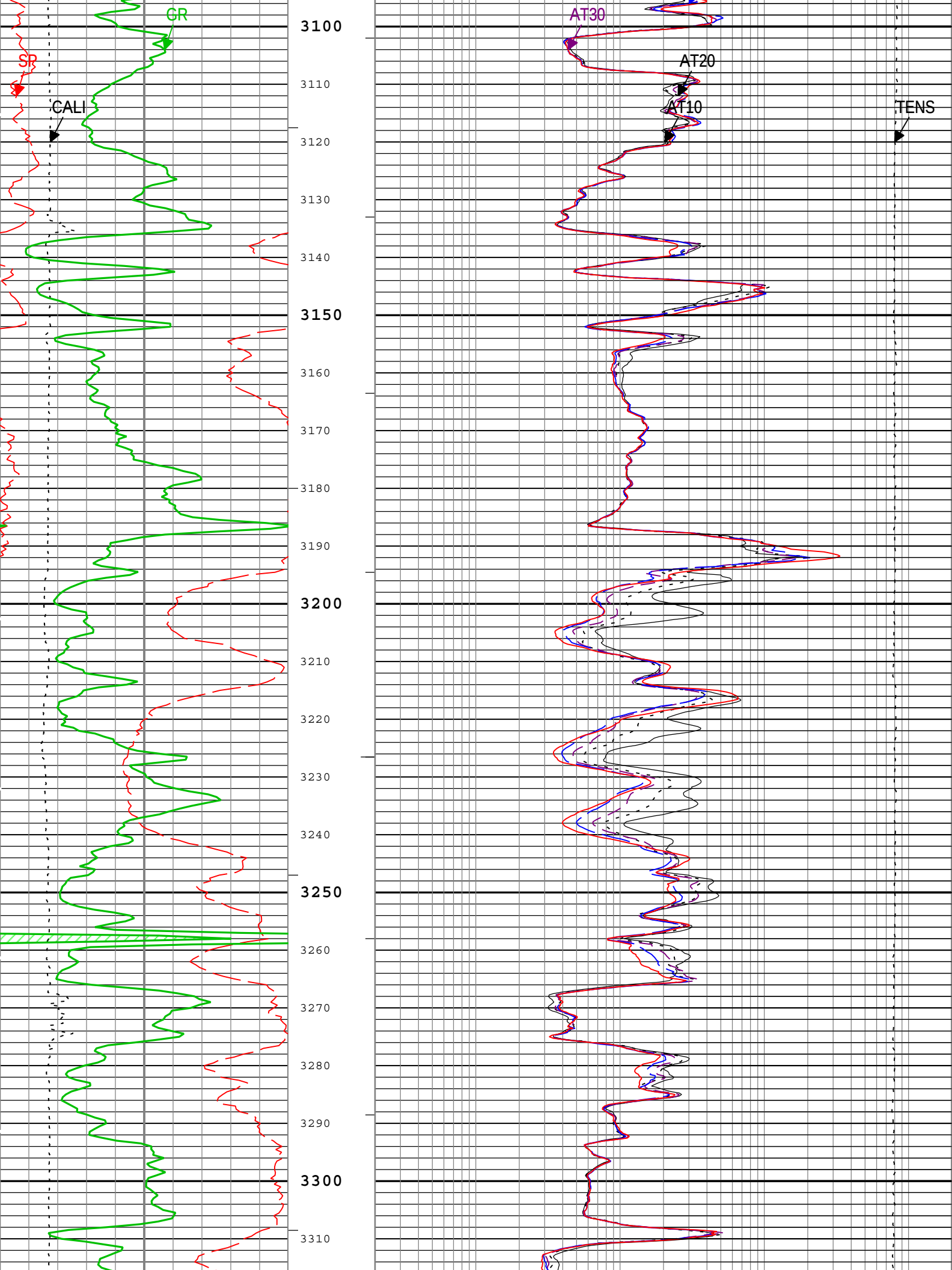
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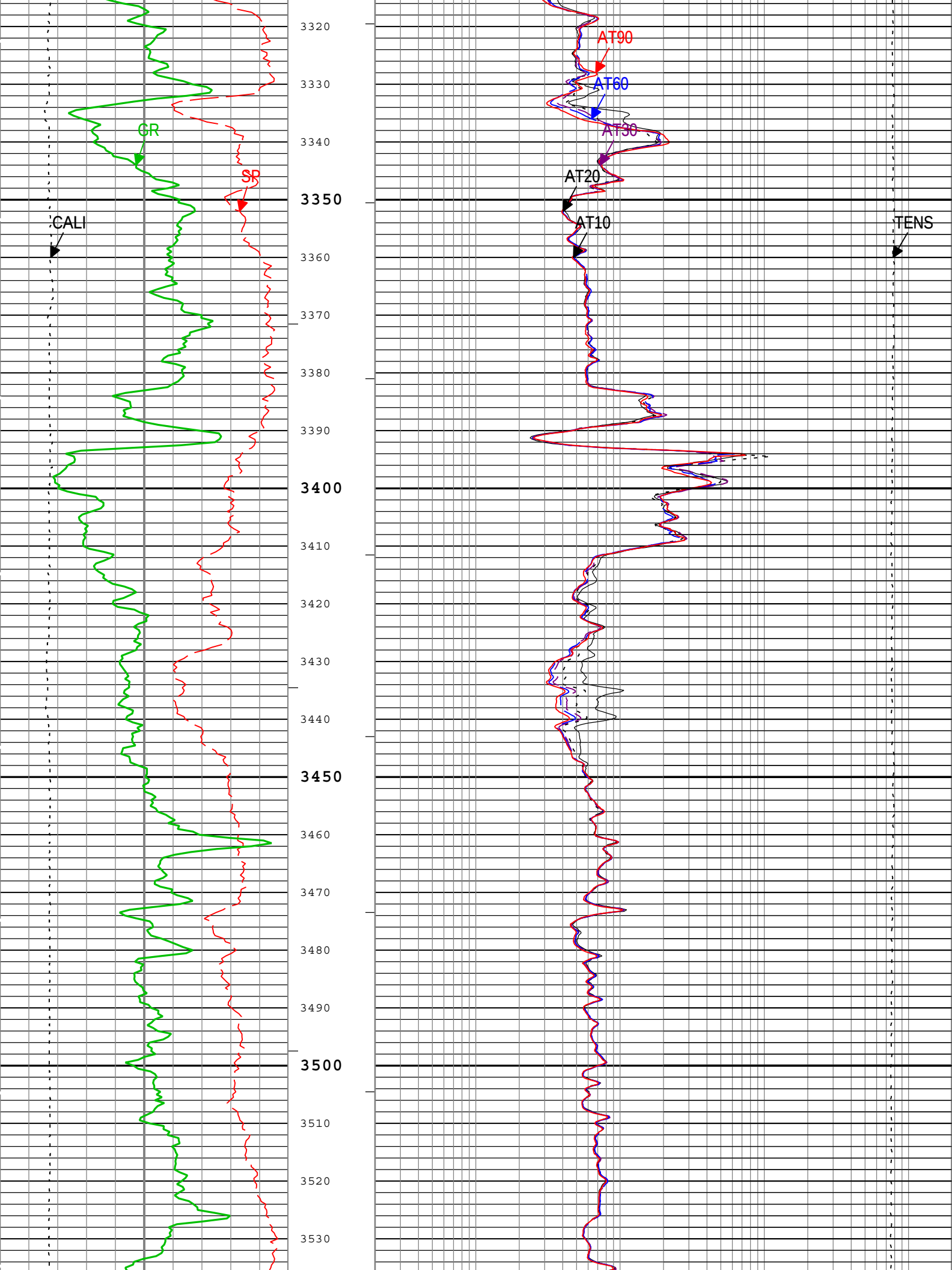
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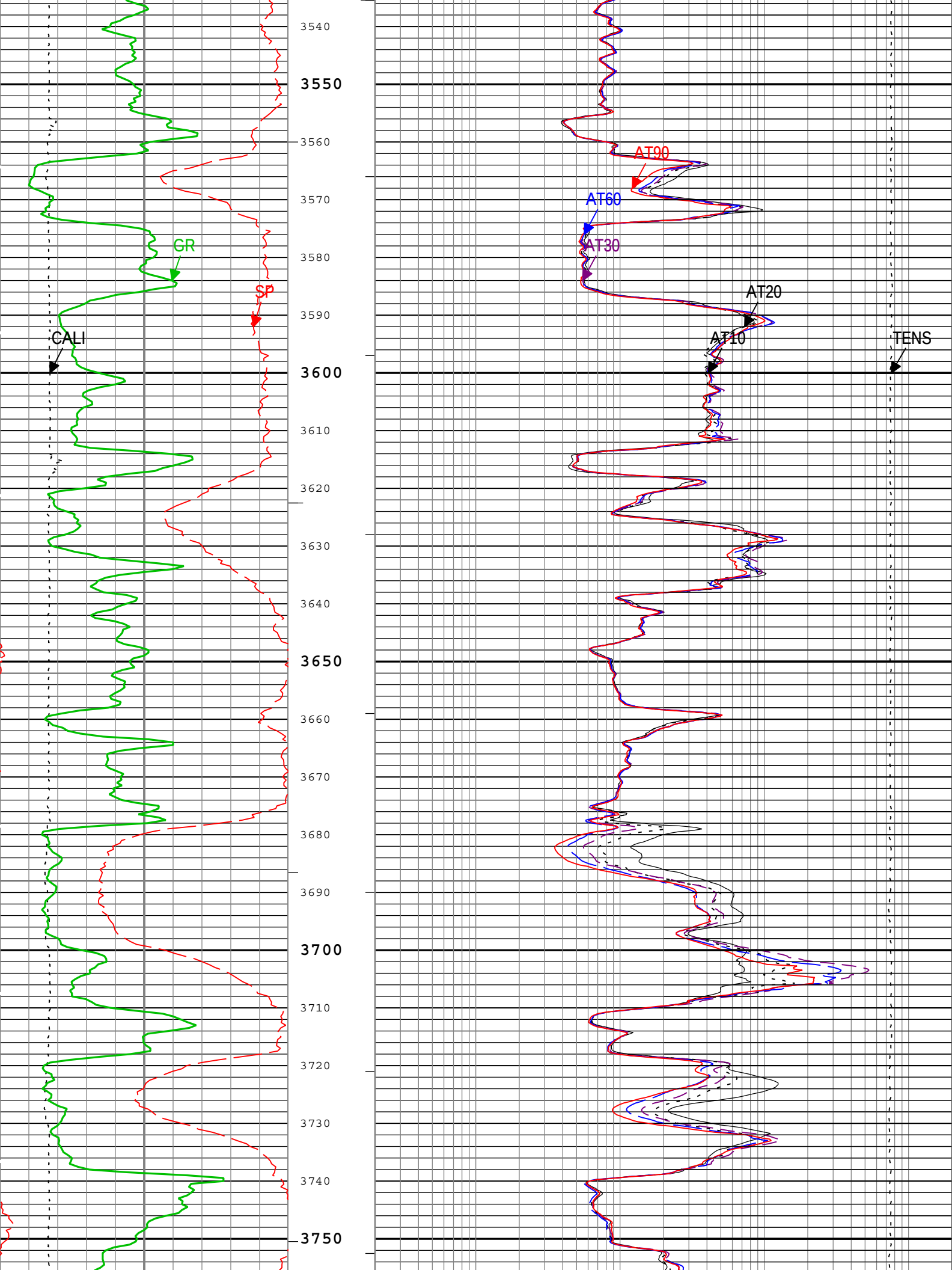
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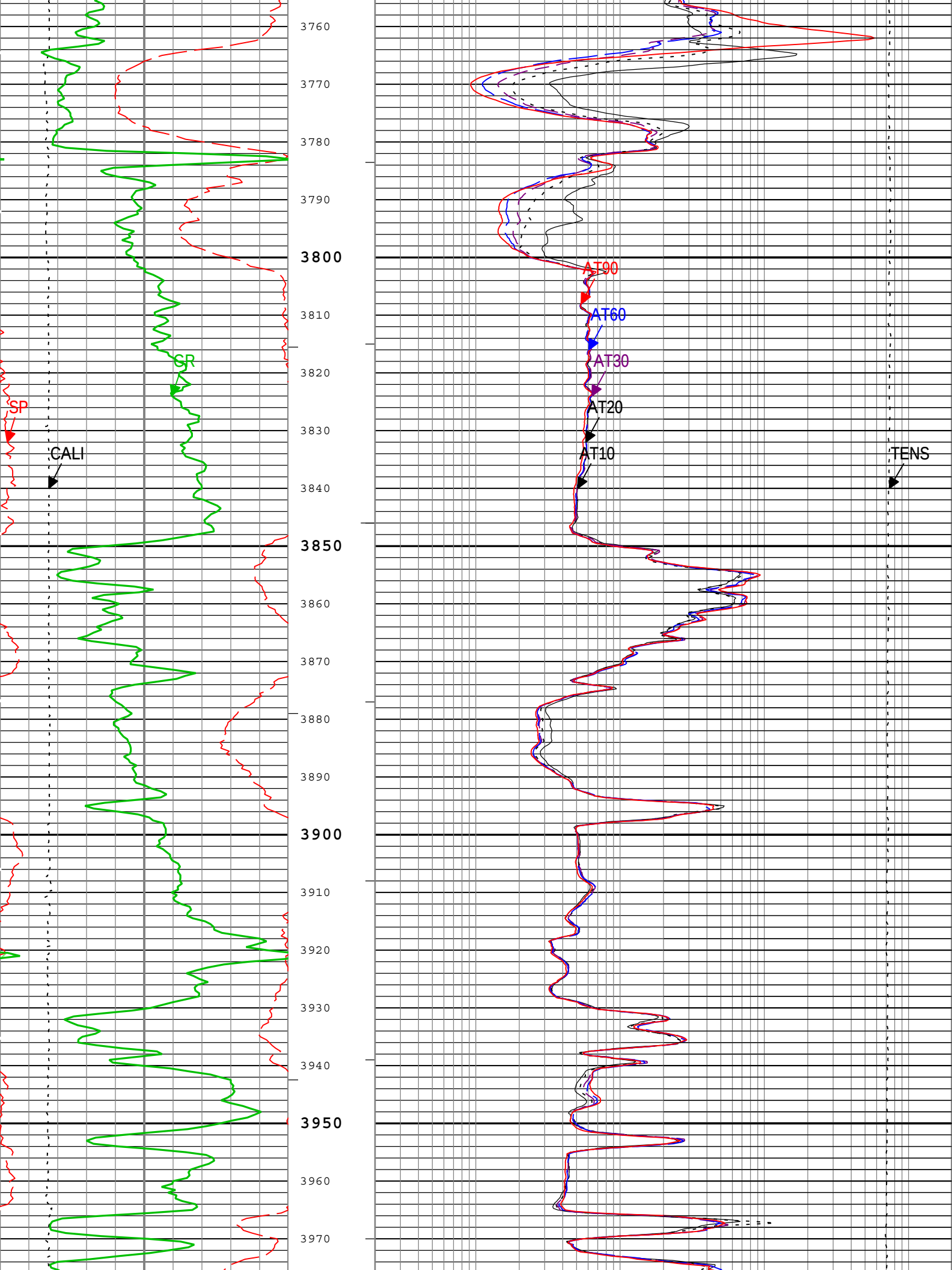
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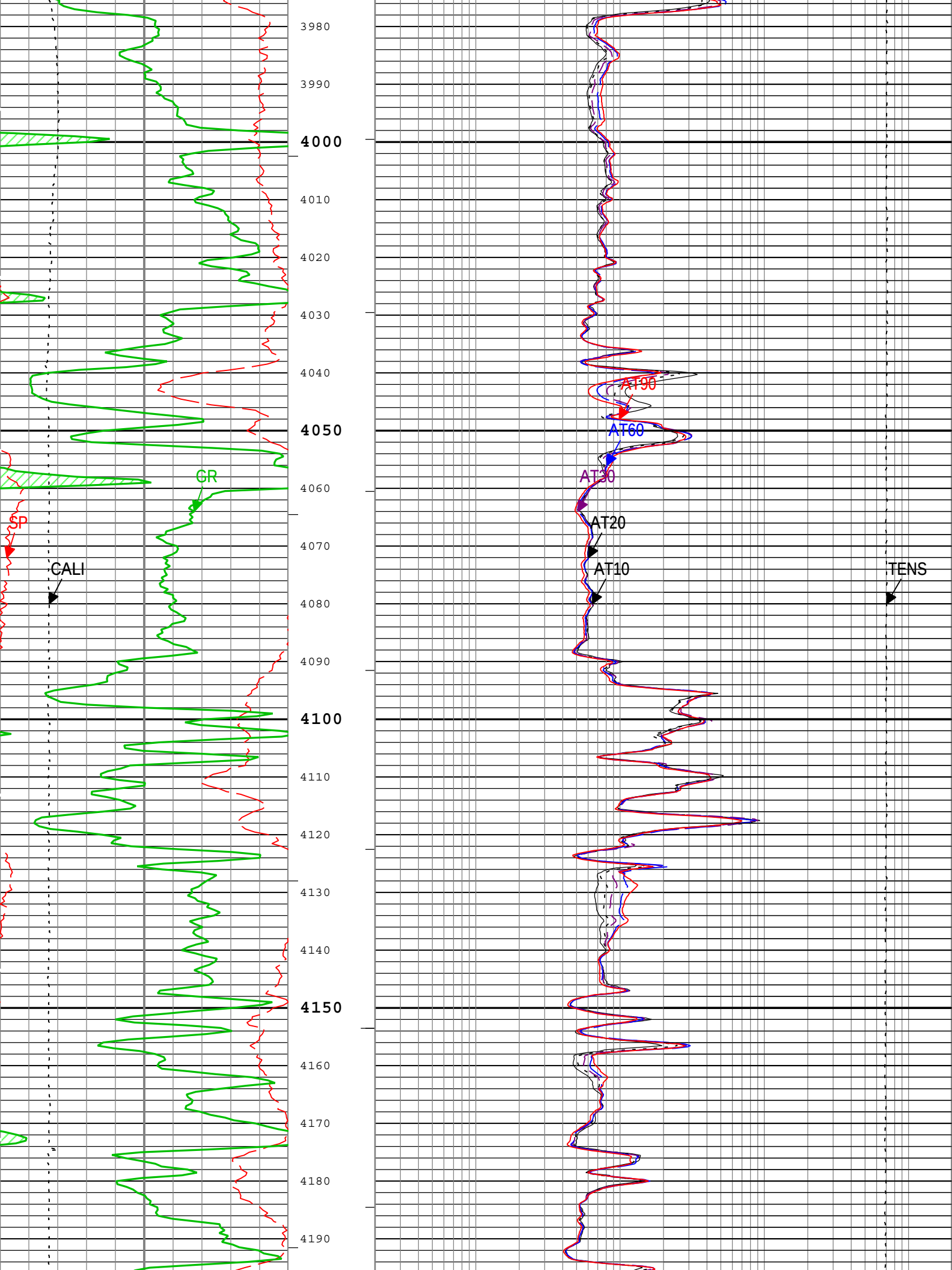
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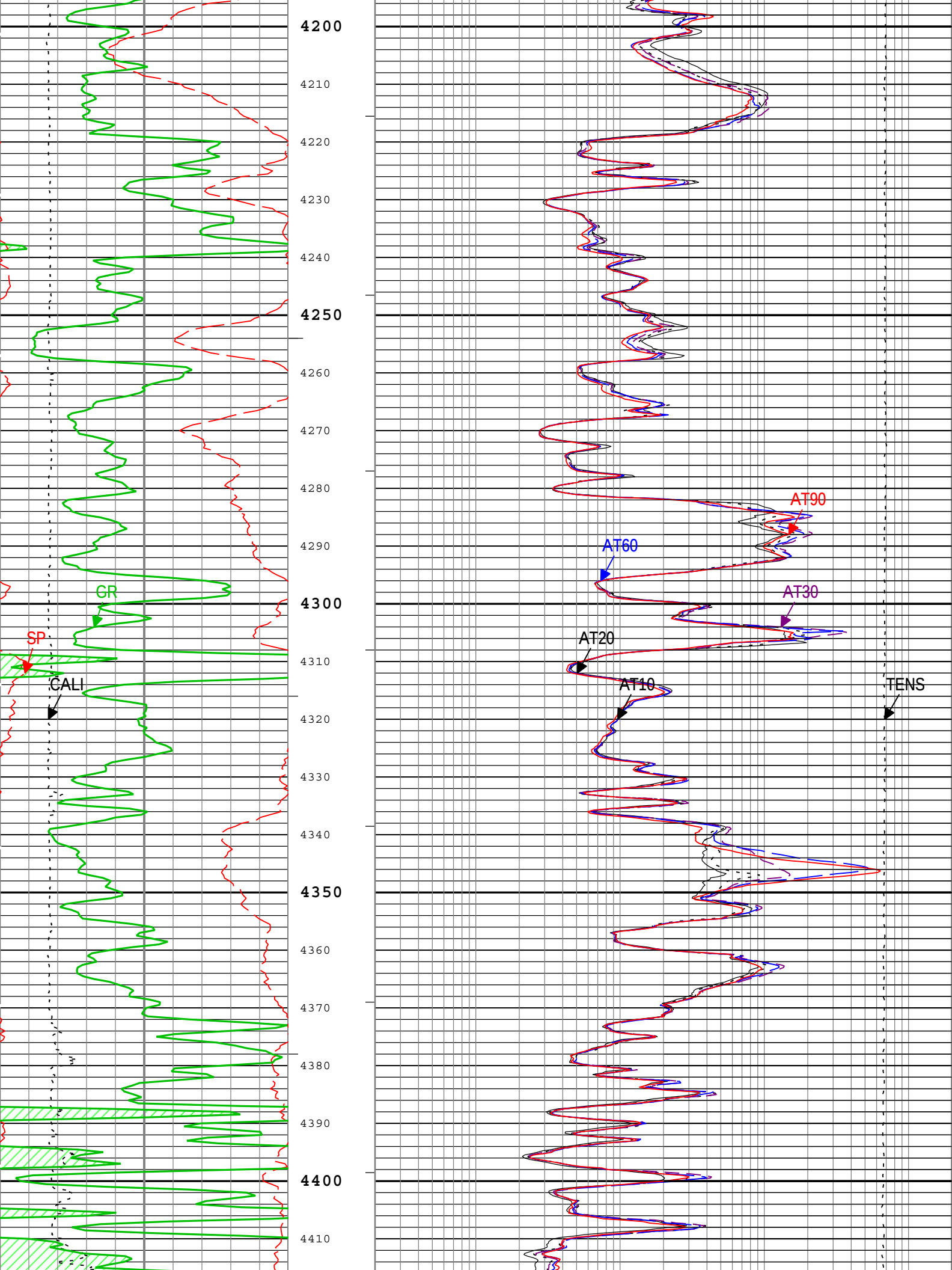
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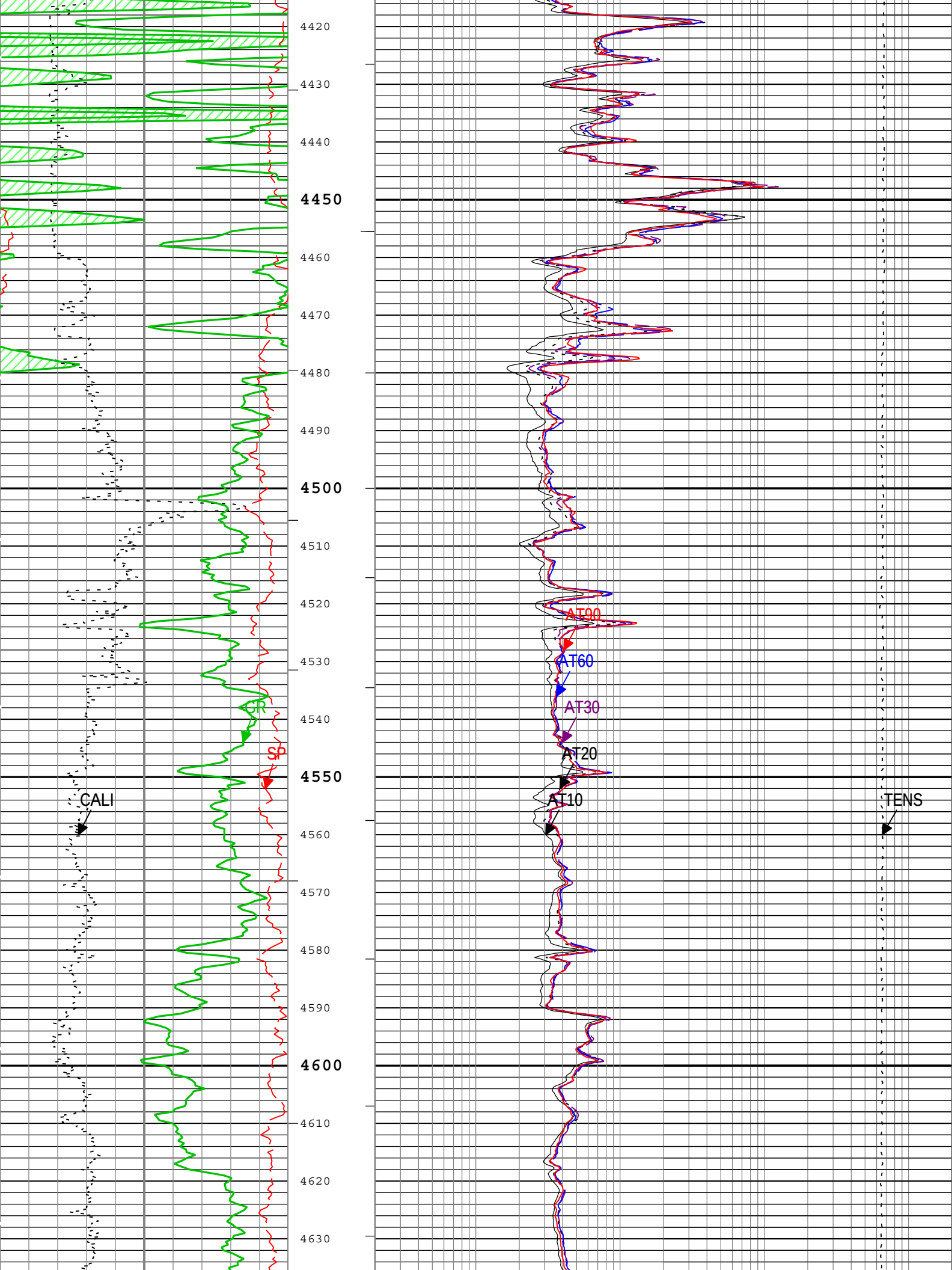
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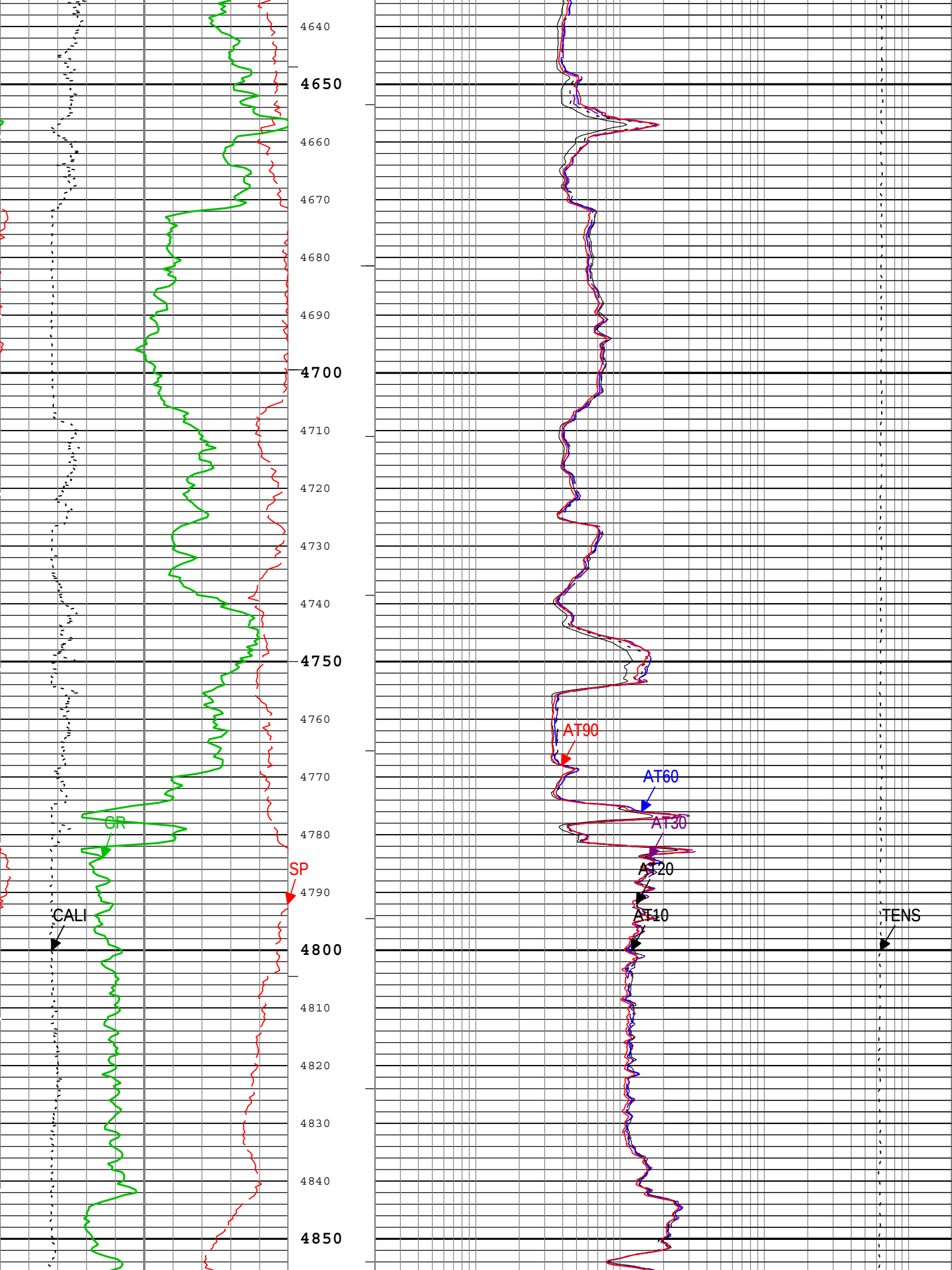
TENS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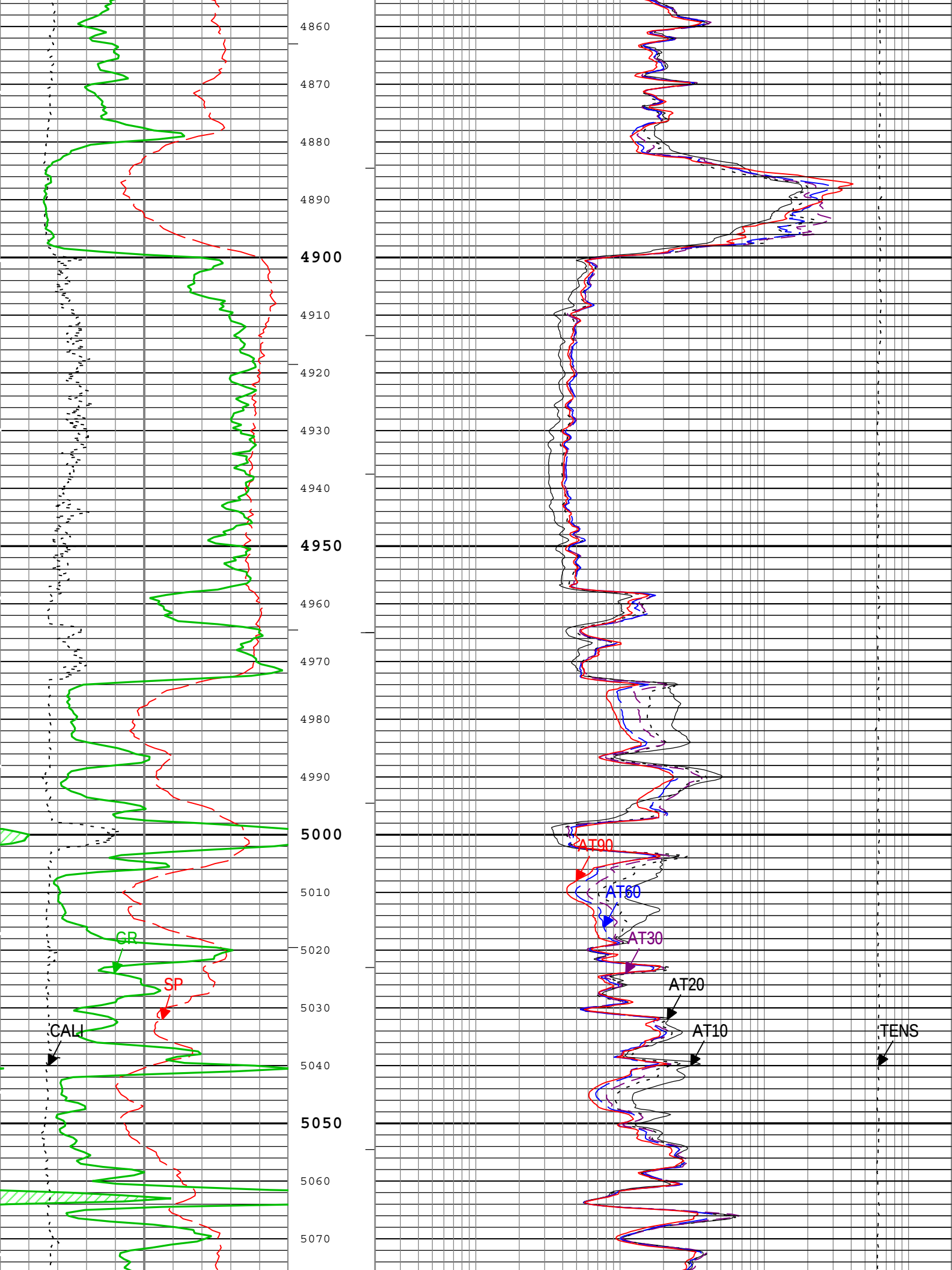
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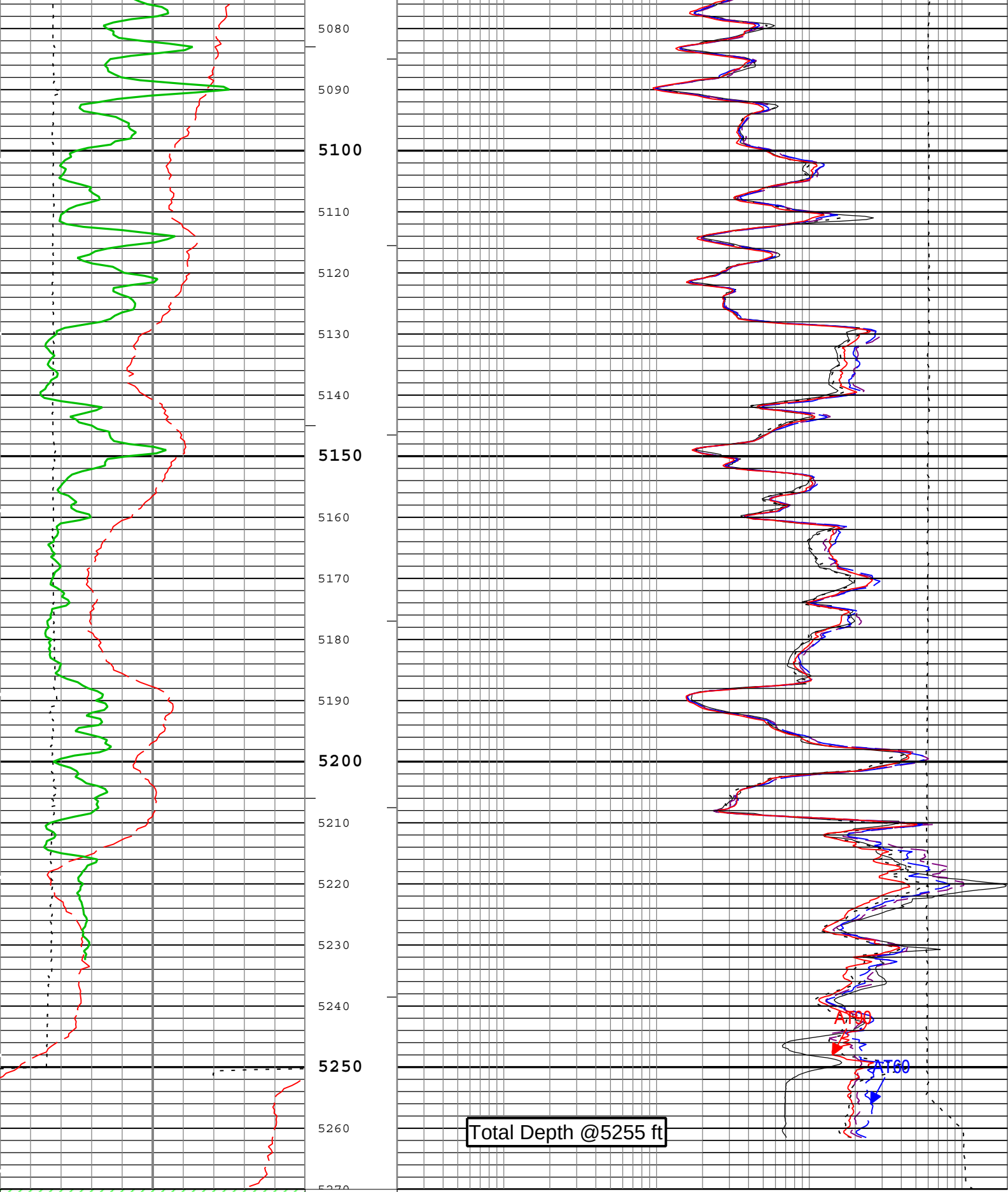


Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-M

-160 mV 40

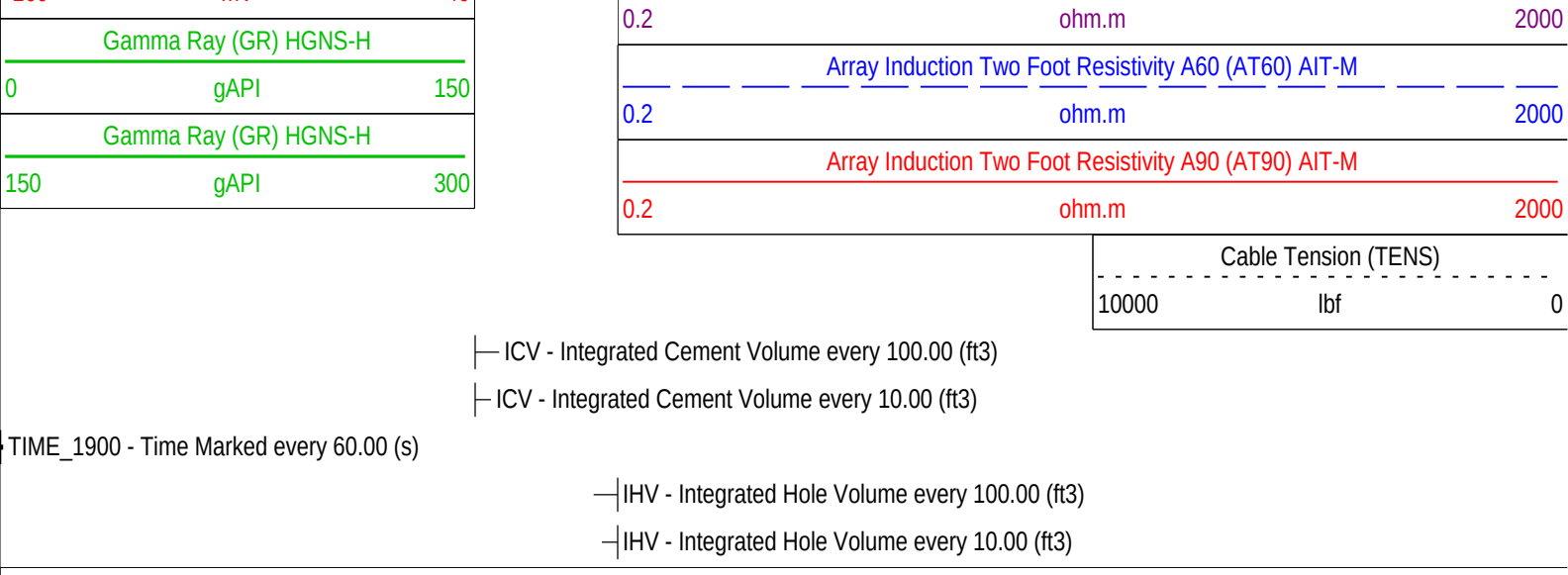
Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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



Description: AIT Basic Log One Format: Log (AIT 5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:39

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	1.625	in
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	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	8.8	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

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

One

Repeat Pass 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	52.57	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	105.37	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.0755.0

MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799

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	3.1.9755.1799	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	4943.37 ft	5270.48 ft	12-Dec-2013 12:03:16 PM	12-Dec-2013 12:14:57 PM	9.80 ft	
All depths are referenced to toolstring zero								

Log

One: Log[3]:Up

Description: AIT Basic Log One Format: Log (AIT 5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:43

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)

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-M

-160 mV 40

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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

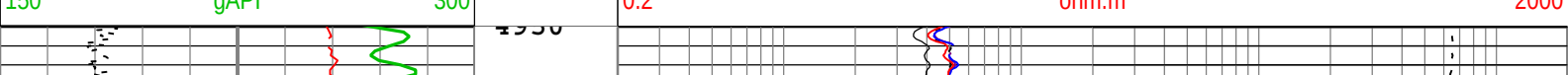
0.2 ohm.m 2000

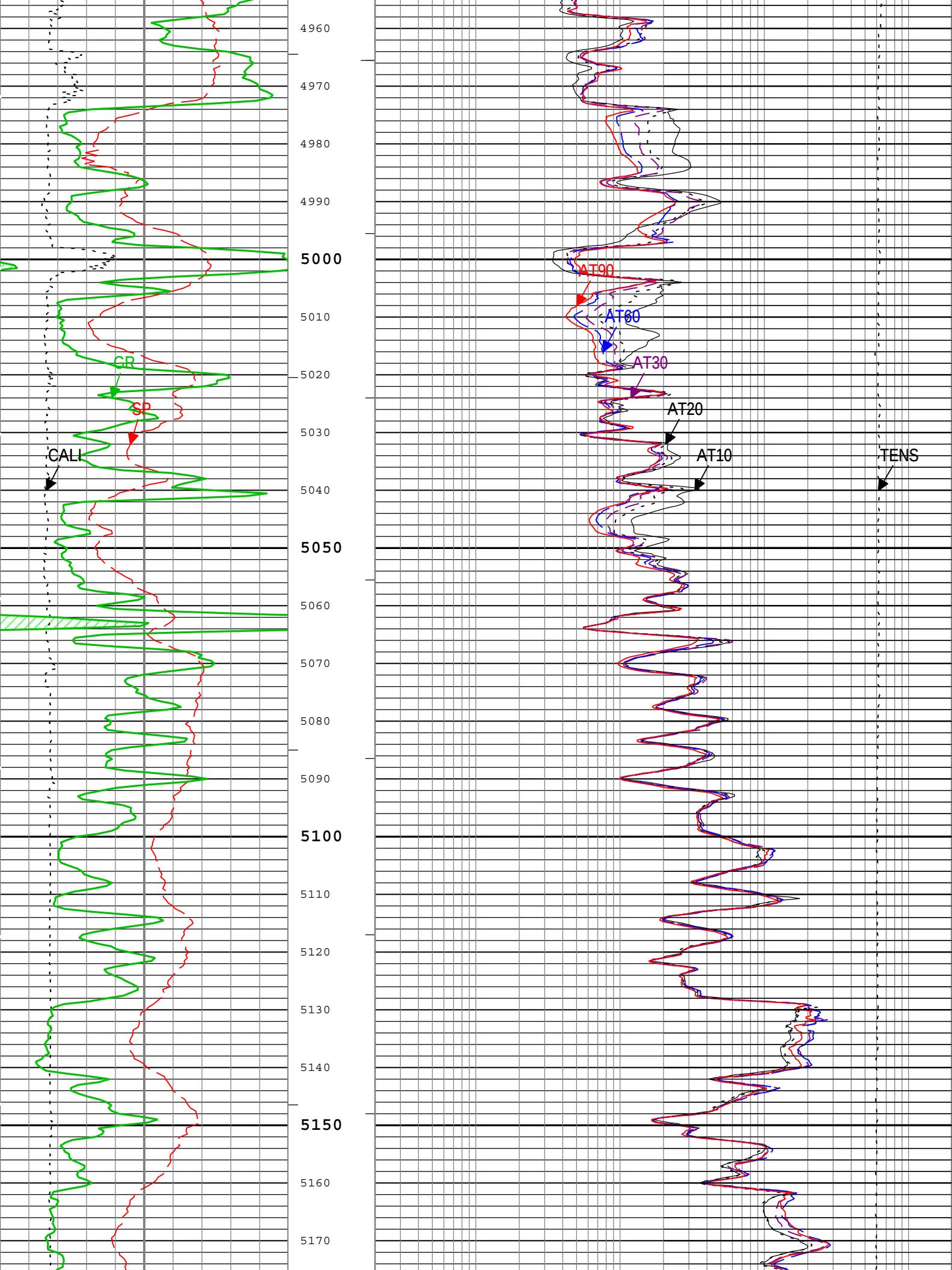
Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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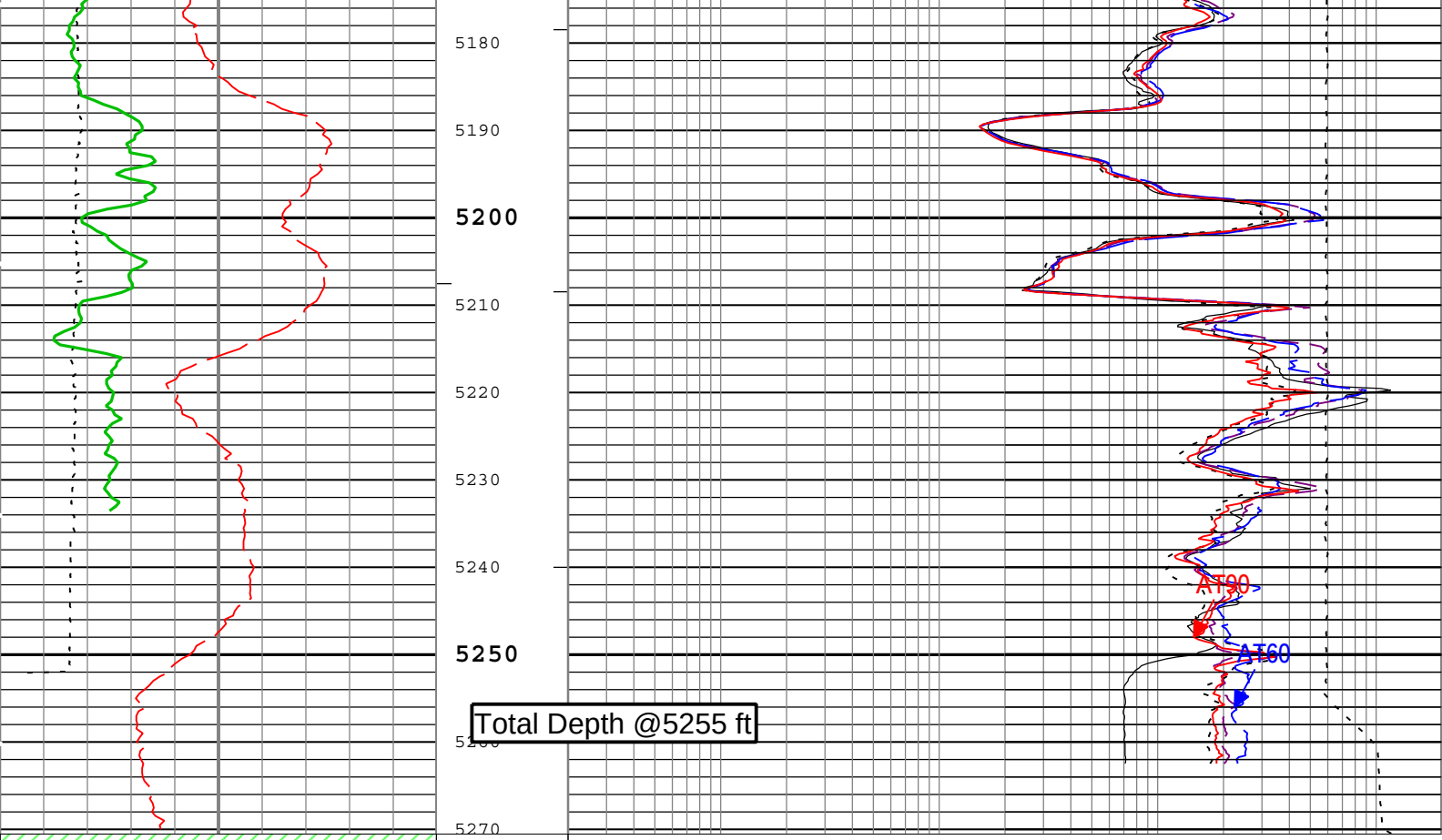
AT10
TENS



Gamma Ray Back-up

Caliper (CALI) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-M

-160 mV 40

Gamma Ray (GR) HGNS-H

0 gAPI 150

Gamma Ray (GR) HGNS-H

150 gAPI 300

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

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

0.2 ohm.m 2000

Cable Tension (TENS)

10000 lbf 0

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 One Format: Log (AIT 5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:43

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	1.625	in
BARI	Barite Mud Presence Flag	Borehole	No	

BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	8.8	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

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

One

Repeat Analysis

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	4943.37 ft	5270.48 ft	12-Dec-2013 12:03:16 PM	12-Dec-2013 12:14:57 PM	9.80 ft	
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: AIT Basic Log One Format: Log (AIT 5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:45

Channel	Source	Sampling
ICV	Borehole	6in
IHV	Borehole	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)

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A90 (AO90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A10 (AO10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A60 (AO60) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A30 (AO30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Caliper (CALI) HDRS-H

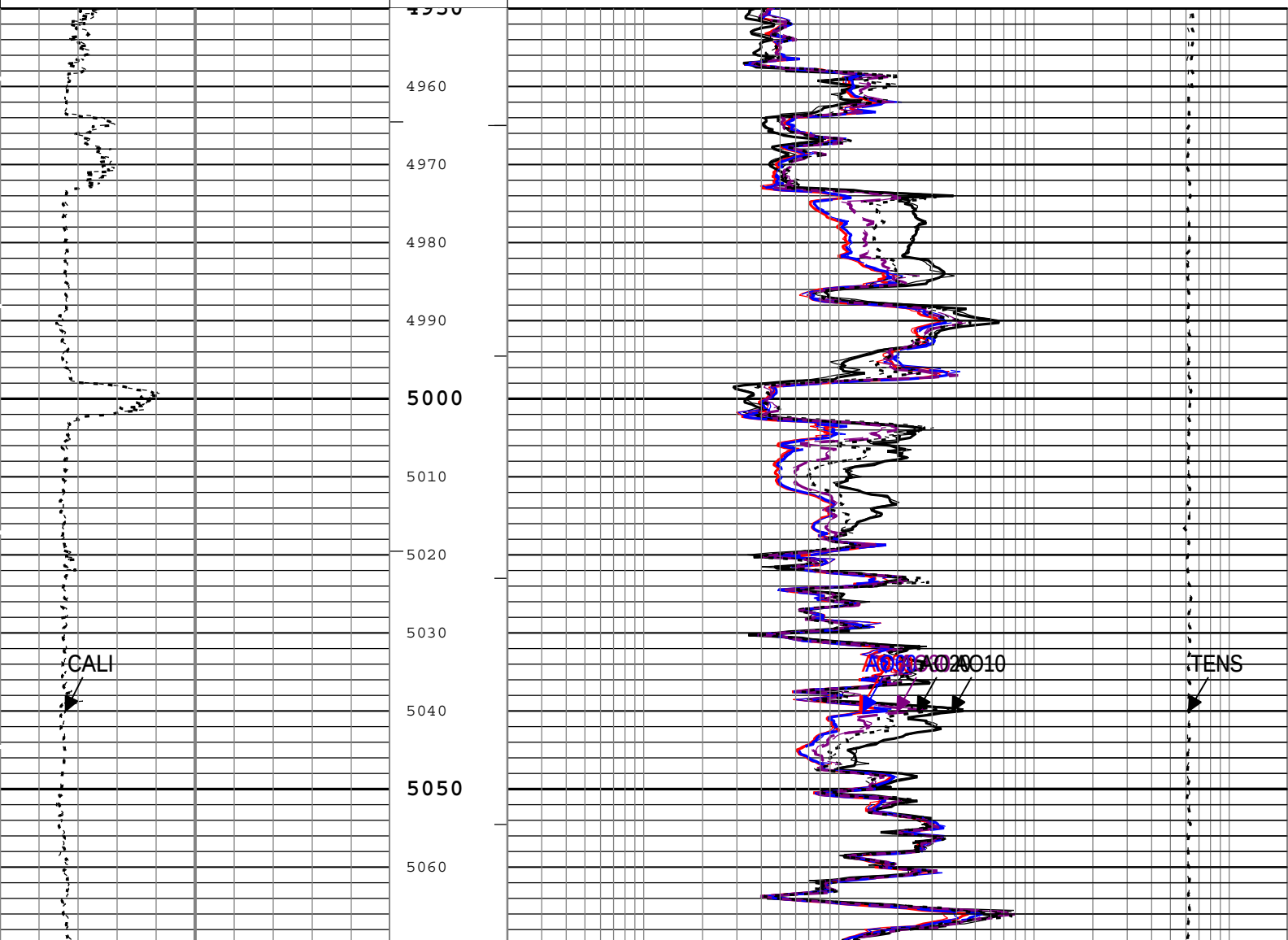
6 in 16

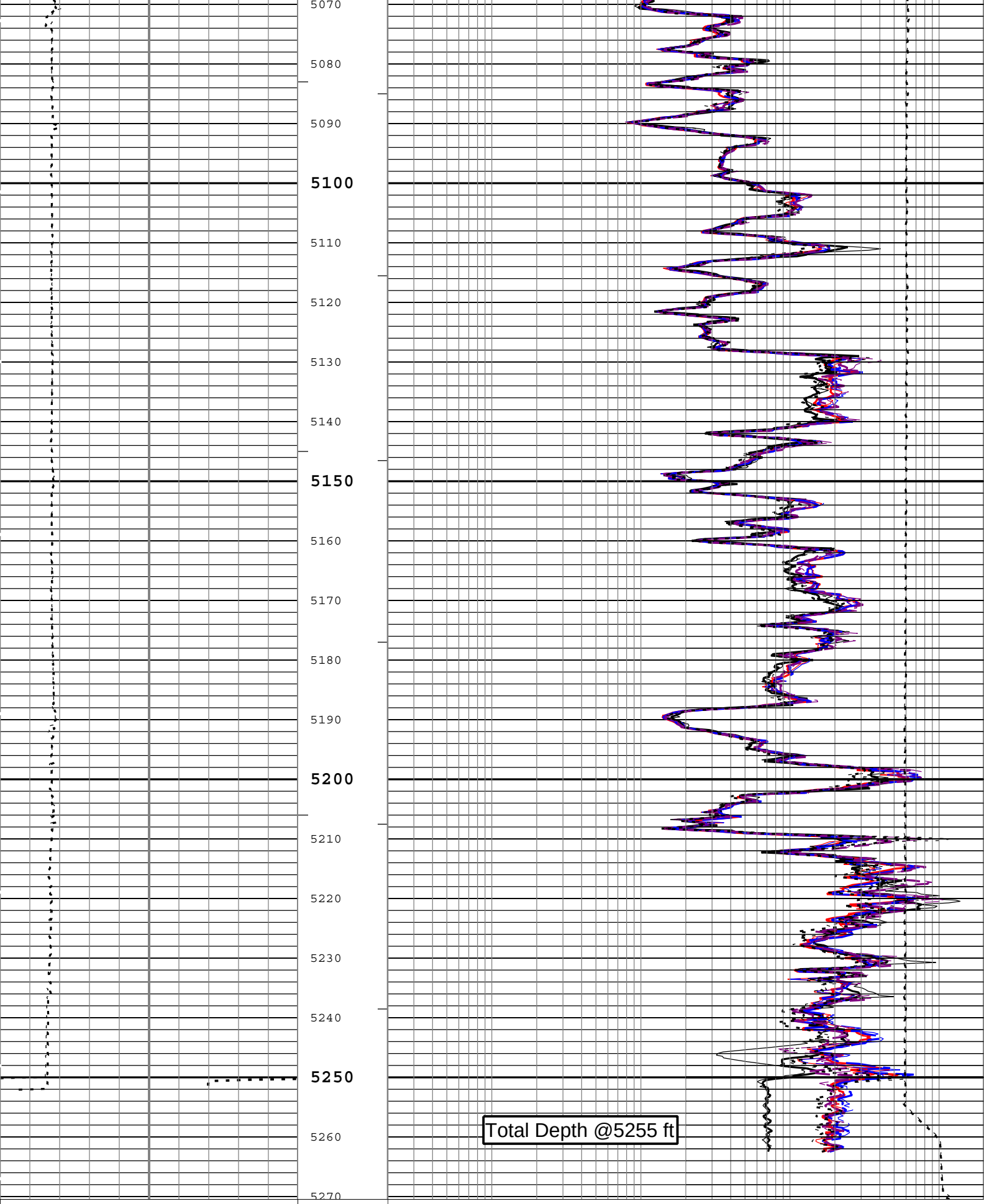
Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A20 (AO20) AIT-M

0.2 ohm.m 2000





Main To Repeat

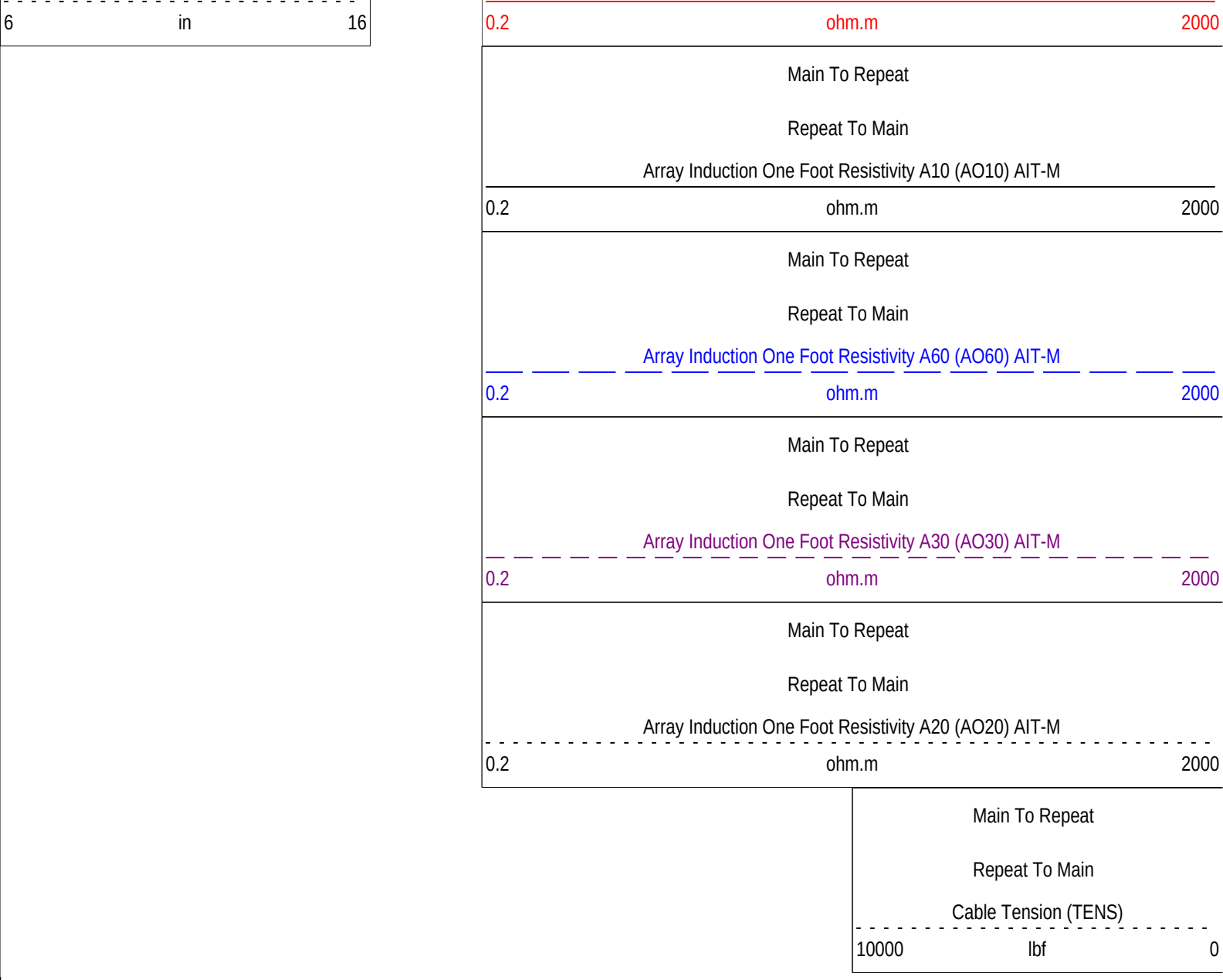
Repeat To Main

Caliper (CALI) HDRS-H

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A90 (AO90) AIT-M



Description: AIT Basic Log One Format: Log (AIT 5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:41:45

Calibration Report

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

Primary Equipment :

Array Induction Sonde - M	AMIS	154

Auxiliary Equipment :

AITM Rm/SP Bottom Nose	AMRM	154

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 13:53:29 16-Oct-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	0.598	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.017	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.750	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.013	1.050

Test Loop Phase - 2	deg	Master	0	-3.000	0.051	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.007	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.149	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.992	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.095	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.983	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.119	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.290	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.008	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.060	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 13:53:29 16-Oct-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-102.514	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-165.193	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	152.862	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	156.352	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	105.127	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	-67.600	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	58.910	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	92.322	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	24.933	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	47.414	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	12.207	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	-25.021	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.503	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	0.642	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.991	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	-0.082	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 13:53:29 16-Oct-2013

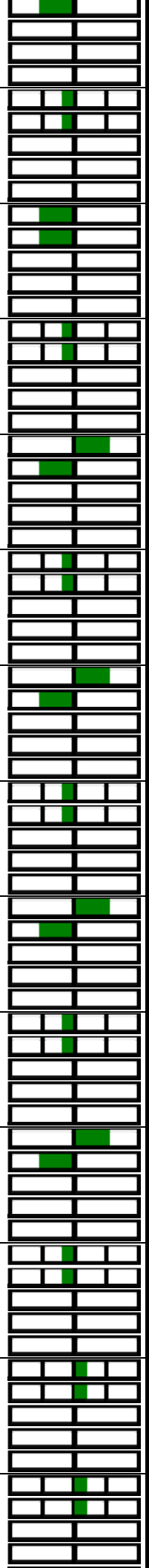
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	1.023	1.200
Fine Gain		Master	1.000	0.800	1.023	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 13:53:29 16-Oct-2013 Before (Measured): 21:00:04 03-Feb-2014 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.597	0.854
		Before	-----	0.366	0.596	0.854
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 0	deg	Master	-----	137.000	-170.441	-103.000
		Before	-----	137.000	-164.390	-103.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.051	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.222	1.778
		Before	-----	0.762	1.222	1.778
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 1	deg	Master	-----	136.000	-171.517	-104.000
		Before	-----	136.000	-165.460	-104.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.057	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 2	V	Master	-----	0.372	0.607	0.868
		Before	-----	0.372	0.606	0.868
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 2	deg	Master	-----	132.000	-175.054	-108.000

		Before	-----	132.000	-169.001	-108.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.053	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 3	V	Master	-----	0.420	0.684	0.980
		Before	-----	0.420	0.684	0.980
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 3	deg	Master	-----	131.000	-175.807	-109.000
		Before	-----	131.000	-169.753	-109.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	6.054	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 4	V	Master	-----	0.804	1.280	1.876
		Before	-----	0.804	1.279	1.876
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 4	deg	Master	-----	125.000	178.088	-115.000
		Before	-----	125.000	-175.853	-115.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.941	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 5	V	Master	-----	1.176	1.864	2.744
		Before	-----	1.176	1.863	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 5	deg	Master	-----	122.000	176.493	-118.000
		Before	-----	122.000	-177.445	-118.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.938	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 6	V	Master	-----	1.176	1.865	2.744
		Before	-----	1.176	1.864	2.744
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.001	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 6	deg	Master	-----	121.000	176.477	-119.000
		Before	-----	121.000	-177.461	-119.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.938	-----
		After-Before	-----	-----	-----	-----
Thru Cal Mag - 7	V	Master	-----	0.846	1.340	1.974
		Before	-----	0.846	1.340	1.974
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----
Thru Cal Phase - 7	deg	Master	-----	115.000	175.810	-125.000
		Before	-----	115.000	-178.098	-125.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-353.908	-----
		After-Before	-----	-----	-----	-----
SPA Zero	mV	Master		-50.000	-0.427	50.000
		Before		-50.000	-0.421	50.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.006	-----
		After-Before	-----	-----	-----	-----
SPA Plus	mV	Master		941.000	991.321	1040.000
		Before		941.000	991.149	1040.000
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-0.172	-----
		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	0.918	0.960
		Before		0.870	0.918	0.960
		After	-----	-----	-----	-----
		Before-Master	-----	-----	0.000	-----
		After-Before	-----	-----	-----	-----

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

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3928
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3832

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	5398
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3928
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	3966

Calibration Parameter :

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

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 14:20:14 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Small Ring	in	Before	8.00	6.00	8.97	10.00
Large Ring	in	Before	12.00	9.00	13.11	15.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 11:31:16 04-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.596	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696
Pe Aluminum		Master	2.570	2.470	2.528	2.670
Pe Magnesium		Master	2.650	2.550	2.646	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 11:31:16 04-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.2377	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.4897	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.4242	1.0000
SS Max Deviation	%	Master	0	-2.5000	1.3410	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.7557	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.4046	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7399	
		Before	0.7399	0.7029	0.7422	0.7769
		Before-Master	-----	-----	0.0023	-----
BS Window Sum	1/s	Master	1		22878	
		Before	22878	21734	22904	24022
		Before-Master	-----	-----	26	-----
SS Window Ratio		Master	1.0000		0.4864	
		Before	0.4864	0.4621	0.4838	0.5108
		Before-Master	-----	-----	-0.0026	-----
SS Window Sum	1/s	Master	1		10252	
		Before	10252	9739	10234	10764
		Before-Master	-----	-----	-18	-----
LS Window Ratio		Master	1.0000		0.2987	
		Before	0.2987	0.2838	0.2963	0.3137

		Before-Master	-----	-----	-0.0024	-----
LS Window Sum	1/s	Master	1		1154	
		Before	1154	1096	1147	1212
		Before-Master	-----	-----	-7	-----

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1374	2400
		Before		1000	1381	2400
		Before-Master	-----	-100	7	100
SS PM High Voltage	V	Master		1000	1285	2400
		Before		1000	1297	2400
		Before-Master	-----	-100	12	100
LS PM High Voltage	V	Master		1000	1316	2400
		Before		1000	1324	2400
		Before-Master	-----	-100	8	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 11:31:16 04-Dec-2013 Before (Measured): 11:44:43 05-Dec-2013 Expired by 5 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	10.38	25.00
		Before		5.00	10.41	25.00
		Before-Master	-----	-1.00	0.03	1.00
SS Crystal Resolution	%	Master		5.00	8.54	20.00
		Before		5.00	8.56	20.00
		Before-Master	-----	-1.00	0.02	1.00
LS Crystal Resolution	%	Master		5.00	8.98	20.00
		Before		5.00	8.89	20.00
		Before-Master	-----	-1.00	-0.09	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 11:15:31 12-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3868	4185
Deep Resistivity	ohm.m	Before	3830	3524	3799	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3816	4136

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

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC	HGNS-H	3819

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	5120
AmBe Neutron Logging Source	NSR-F	5075

Calibration Parameter :

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

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 11:16:03 12-Dec-2013

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.1	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-May-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	-----	-----	519.600	-----
Accelerometer Coefficients - 1		Master	-----	-----	33.360	-----
Accelerometer Coefficients - 2		Master	-----	-----	-0.009	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----

Accelerometer Coefficients - 4		Master	-----	-----	2.719	-----
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 8		Master	-----	-----	298.600	-----
Accelerometer Coefficients - 9		Master	-----	-----	0.997	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 11:02:48 16-Oct-2013 Before (Measured): 14:56:08 05-Dec-2013 Expired by 5 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	26.3	40.0
		Before	0	5.0	27.7	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-3.9	1.4	3.9
		After-Before	-----	-----	-----	-----
Far Zero Measurement	1/s	Master	0	5.0	29.2	40.0
		Before	0	5.0	28.1	40.0
		After	-----	-----	-----	-----
		Before-Master	-----	-4.4	-1.1	4.4
		After-Before	-----	-----	-----	-----
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5447.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2281.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Near Corrected Plus Measurement - 0	1/s	Master		4700.0	5553.0	6900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Far Corrected Plus Measurement - 0	1/s	Master		1900.0	2338.0	2900.0
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 14:53:52 05-Dec-2013 Expired by 5 days After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	22.6	120.0
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
RGR Plus Measurement	gAPI	Before	185.4	157.1	176.1	206.3
		After			NOT DONE	
		After-Before	-----	-----	-----	-----
GR Calibration Gain		Before	0.89	0.80	0.94	1.05
		After	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS-BA (Hostile-environment Natural Gamma-ray Sonde) Calibration - Run One

Primary Equipment :

HNGS Sonde Element	HNGS-BA	328

Auxiliary Equipment :

Hostile Natural Gamma Ray Cartridge	HNGC-B	596
HNGS Housing Element	HEH-K	328
		0

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Location - 0		Master			39.685	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 511 Peak Resolution - 0	%	Master			14.671	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
High Voltage DAC Value - 0	V	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Location - 0		Master			142.226	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Resolution - 0	%	Master			8.213	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Temperature - 0	degF	Master	-----	-----	-----	-----
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na Count Rate - 0	CPS	Master	45.000	10.000	24.611	100.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Location - 0		Master			39.668	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 511 Peak Resolution - 0	%	Master			15.246	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
High Voltage DAC Value - 0	V	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Location - 0		Master			141.964	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Na 1785 Peak Resolution - 0	%	Master			8.671	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Temperature - 0	degF	Master	-----	-----	-----	-----
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----

		After-Before	-----	-----	-----	-----
Na Count Rate - 0	CPS	Master	45.000	10.000	24.616	100.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Ratio of Detector 1 to Detector 2

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coincidence Count Rate Ratio - 0		Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Th Peak Location - 0		Master	209.630	201.000	213.899	218.250
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Th Peak Resolution - 0	%	Master	7.000	5.000	6.729	9.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Background Count Rate - 0	CPS	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Gain Ratio - 0		Master	1.000	0.940	1.025	1.060
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Th Peak Location - 0		Master	209.630	201.000	214.368	218.250
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Th Peak Resolution - 0	%	Master	7.000	5.000	7.705	9.000
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Background Count Rate - 0	CPS	Master			0.000	
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----
Gain Ratio - 0		Master	1.000	0.940	1.028	1.060
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Set Point - 0		Master	40.000	38.000	40.000	43.500
		Before	-----	-----	-----	-----

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

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 16:37:03 16-Nov-2013 Before: After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Na 511 Peak Set Point - 0		Master	40.000	38.000	40.000	43.500
		Before	-----	-----	-----	-----
		After	-----	-----	-----	-----
		Before-Master	-----	-----	-----	-----
		After-Before	-----	-----	-----	-----

One

Main Pass 1" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	732.39	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1355.1	ft3

Software Version

Acquisition System	Version
MaxWell	3.1.9755.0
Application Patch	SP-20130325-3.1.9755.1799

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.1.9755.1799

Tool Elements	Description	Software Version	Firmware Version
AMIS	Array Induction Sonde - M	3.1.9755.1799	1

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	256.43 ft	5269.80 ft	12-Dec-2013 12:17:33 PM	12-Dec-2013 2:41:47 PM	9.93 ft	

All depths are referenced to toolstring zero

Log

One: Log[4]:Up

Description: AIT Basic Log Two Format: Log (AIT Basic Log Two) Index Scale: 1 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:42:04

Channel	Source	Sampling
AF20	AIT-M:AMIS:AMIS	3in
AF60	AIT-M:AMIS:AMIS	3in
AFCO60	AIT-M:AMIS:AMIS	3in
ICV	Borehole	6in
IHV	Borehole	6in
SP	AIT-M:AMIS:AMIS	6in
TIME_1900	WLWorkflow	0.1in

IHV - Integrated Hole Volume every 10.00 (ft3)

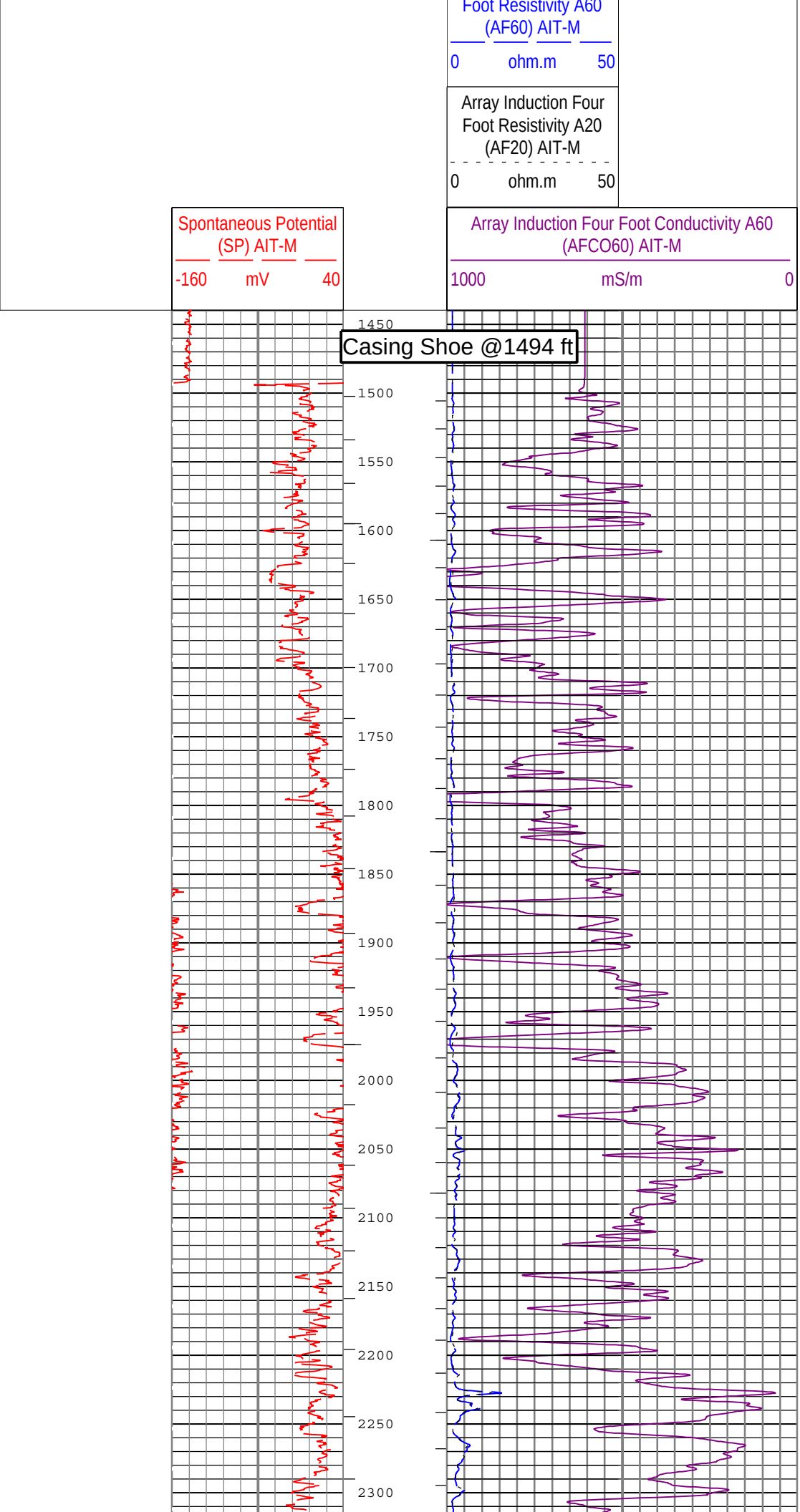
IHV - Integrated Hole Volume every 100.00 (ft3)

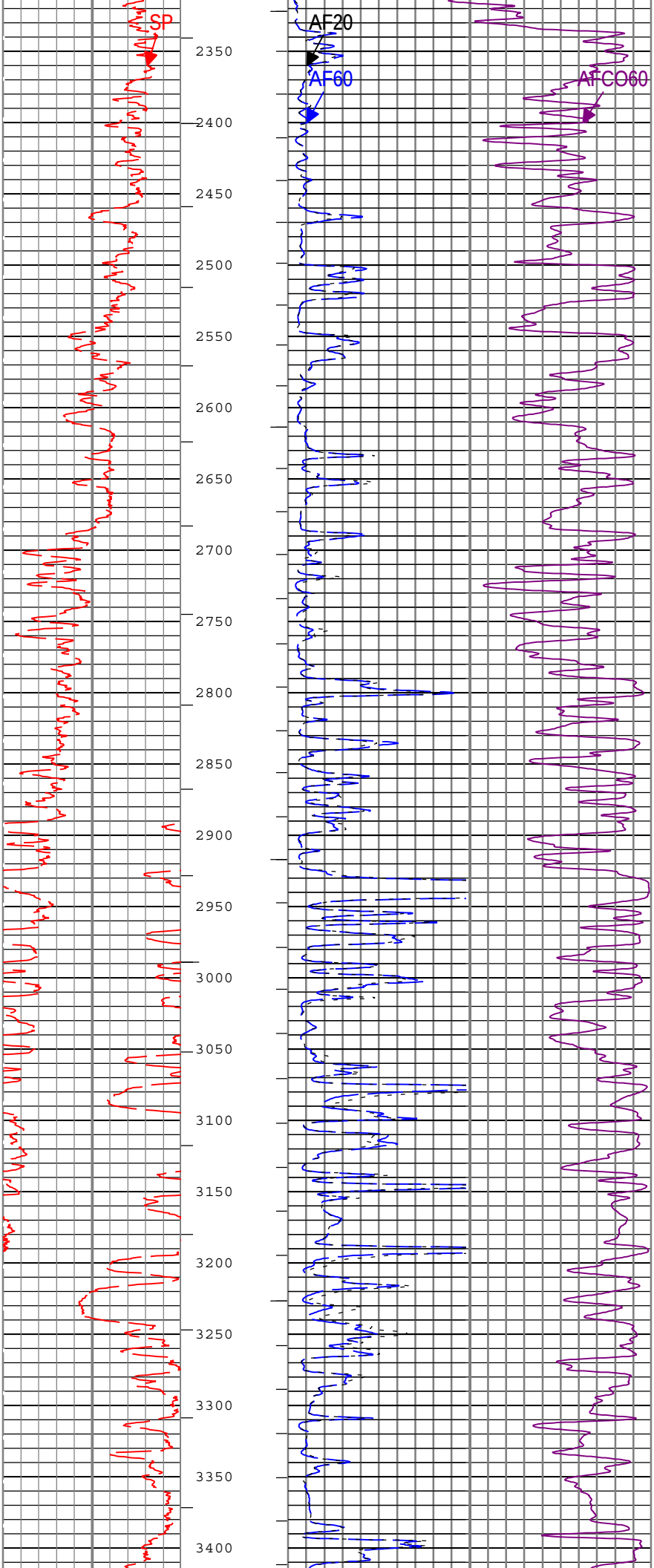
ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Array Induction Four


Foot Resistivity A60 (AF60) AIT-M
0 ohm.m 50
Array Induction Four Foot Resistivity A20 (AF20) AIT-M
0 ohm.m 50
Spontaneous Potential (SP) AIT-M
-160 mV 40
Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M
1000 mS/m 0
Casing Shoe @1494 ft
1450
1500
1550
1600
1650
1700
1750
1800
1850
1900
1950
2000
2050
2100
2150
2200
2250
2300


SP
AF20
AF60
AFCO60
2350
2400
2450
2500
2550
2600
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2700
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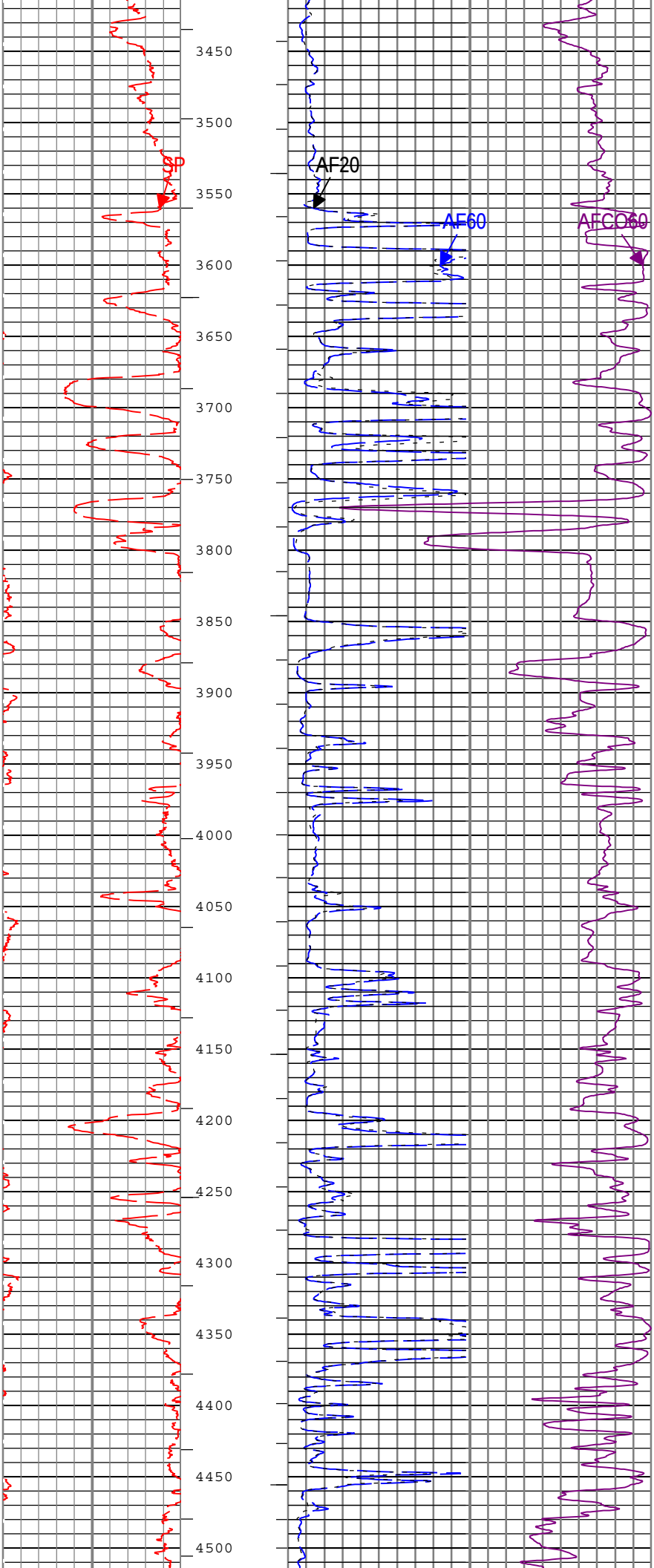
3100
3150
3200
3250
3300
3350
3400


SP
AF20
AF60
AFCO60
3450
3500
3550
3600
3650
3700
3750
3800
3850
3900
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4050
4100
4150
4200
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4300
4350
4400
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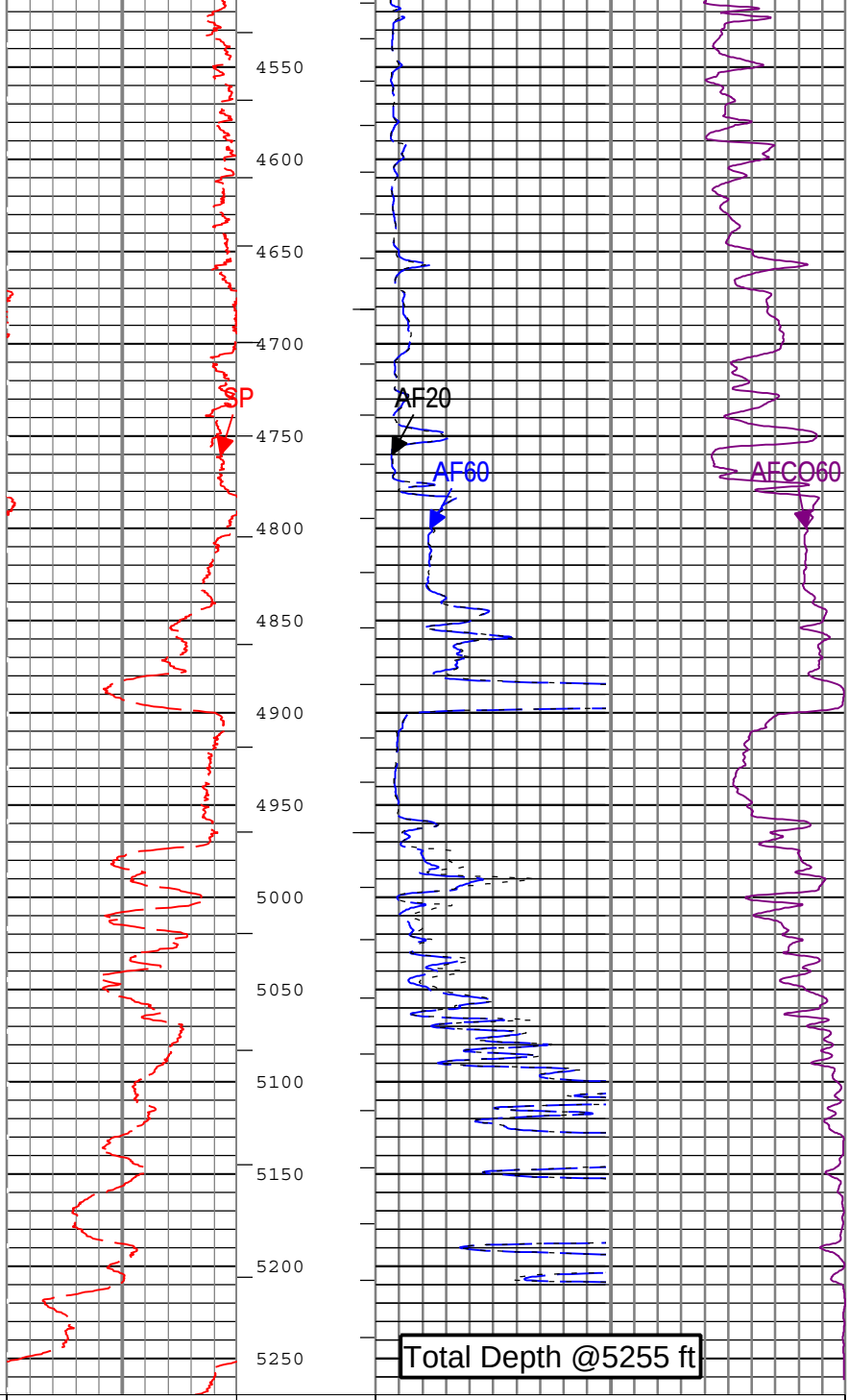

Spontaneous Potential (SP) AIT-M

-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M

1000 mS/m 0

Array Induction Four Foot Resistivity A60 (AF60) AIT-M

0 ohm.m 50

Array Induction Four Foot Resistivity A20 (AF20) AIT-M

0 ohm.m 50

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 (AIT Basic Log Two) Index Scale: 1 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 12-Dec-2013 15:42:04

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	1.625	in
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	7.875	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	1494	ft
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	8.625	in
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	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Tool Control Parameters

Company: Anadarko E&P Onshore LLC

Schlumberger

Well: Murphy 1-31 M

Field: Greenwood

County: Morton

State: Kansas

PLATFORM EXPRESS
ARRAY INDUCTION
GAMMA RAY - SP