

Company: St. Croix Operating, Inc.

Well: ROCKY 1

Field: Wildcat

County: Washington

State:

Colorado

## Platform Express

Array Induction with 5" Linear  
with Linear CorrelationCounty: Washington  
Field: Wildcat  
Location: NWNW  
Well: ROCKY 1  
Company: St. Croix Operating, Inc.

Location:	NWNW	Elev.:	K.B.	4538.00 ft
	600 FNL & 1100 FWL		G.L.	4533.00 ft
	Lat/Long: 39.81414/-103.00625		D.F.	4538.00 ft
	Permanent Datum:	Ground Level	Elev.:	4533.00 f
Log Measured From:		Kelly Bushing	5.00 ft	above Perm.Datum
Drilling Measured From:		Kelly Bushing		
API Serial No.	Section:	Township:	Range:	
05-121-11085	8	3S	50W	

Logging Date 16-Jun-2019

Run Number 1A

Depth Driller 4100.00 ft

Schlumberger Depth 4102.00 ft

Bottom Log Interval 4102.00 ft

Top Log Interval 0.00 ft

Casing Driller Size @ Depth 8.625 in @ 491.00 ft

Casing Schlumberger 491 ft

Bit Size 7.875 in

Type Fluid In Hole Water

Density 8.8 lbm/gal

Fluid Loss PH 8.5

MUD Source of Sample Active Tank

RM @ Meas Temp 0.2 ohm.m @ 68 degF

RMF @ Meas Temp 0.15 ohm.m @ 68 degF

RMC @ Meas Temp

Source RMF RMC

RM @ BHT 0.07 @ 212 0.05 @ 212

Max Recorded Temperatures

Circulation Stopped 126 degF

Logger on Bottom 16-Jun-2019 14:30:00

Unit Number 16-Jun-2019 20:15:00

Recorded By 9115

Witnessed By Evan Grzecki

Tom Thomas

## Disclaimer

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

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## Well Sketch

**Driller Depth**

**0.00 ft**

**491.00 ft**

Casing 8.625in  
24lbm/ft

Open Hole 12.25in

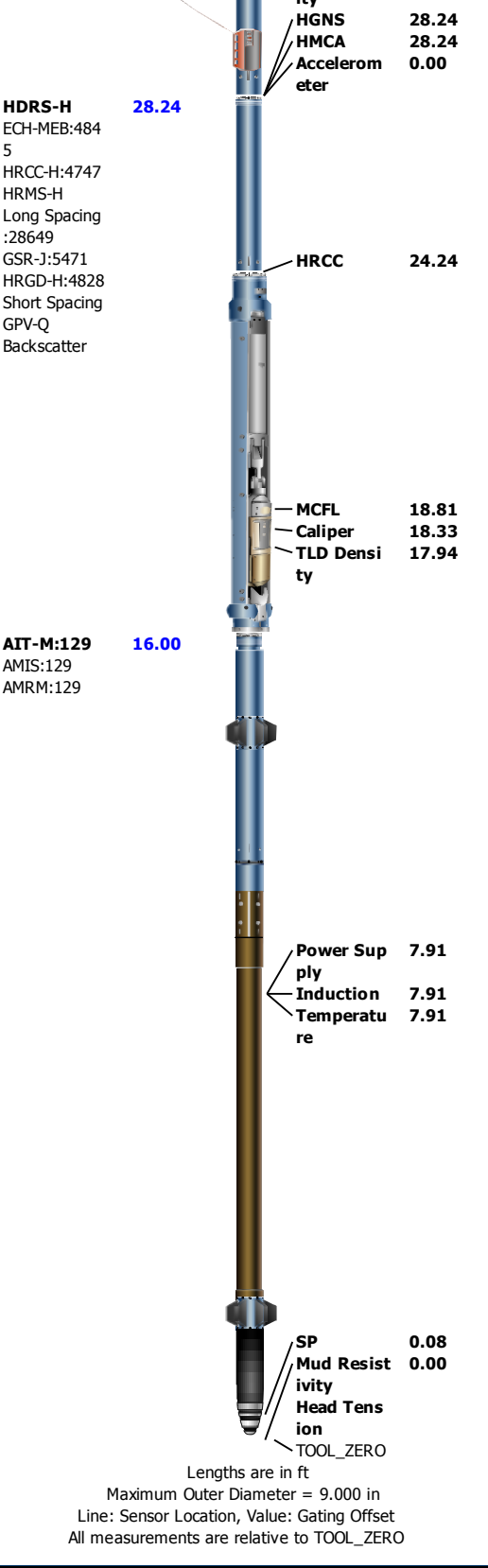


Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	12.25	7.875				
Top Driller ( ft )	0	491				
Top Logger ( ft )	0	492				
Bottom Driller ( ft )	491	4100				
Bottom Logger ( ft )	492	4102				
Casing						
Size ( in )	8.625					
Weight ( lbm/ft )	24					
Inner Diameter ( in )	8.097					
Grade	N/A					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	491					
Bottom Logger ( ft )	491					

Remarks and Equipment Summary

1A: Toolstring				1A: Remarks
<div><div><div>Equip name</div><div>LEH-QT</div><div>LEH-QT</div></div><div><div>Length</div><div>47.64</div></div><div><div>MP name</div><div></div></div><div><div>Offset</div><div></div></div></div>	<p>The diagram shows a vertical toolstring with various sensors. The sensors and their depths are: CTEM (40.65), ACCZ (0.00), HV (0.00), Gamma Ra (38.78), y (37.65), TelStatus (37.62), and GR (36.91). The toolstring is labeled with "HGNS-B:185 5" and "CNL Porosity".</p>			Thank you for choosing Schlumberger!
				Log run for formation evaluation
				Toolstring run slick as per client request
				TD-3700ft -> MATRIX: Sandstone; MDEN: 2.71g/cc
				3700ft-Surface -> MATRIX: Limestone; MDEN: 2.71 g/cc
				Logs correlated to down log
				Crew: Jon Wallis
<div><div><div>HGNH:1870</div><div>NPV-N</div><div>NSR-F:5070</div><div>HMCA-B</div><div>HACCZ-B:659</div><div>HGNS-B:1855</div></div><div><div>CNL Porosity</div><div>30.57</div></div></div>				



1A

2" Induction

Integration Summary				
Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	956.4	ft3

Software Version	
Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100
Application Patch	Wireline_Hotfix-Mandatory-2018 2 8 2 108371

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[3]:Up	Up	101.38 ft	4108.30 ft	16-Jun-2019 8:15:40 PM	16-Jun-2019 9:28:48 PM	ON	2.93 ft	Yes

All depths are referenced to toolstring zero

## Log

Company: St. Croix Operating, Inc. Well: ROCKY 1

1A: Log[3]:Up:S002

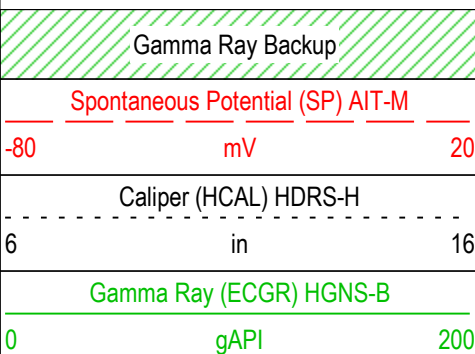
Description: AIT Basic Log Two Format: Log ( EMD 1in Induction ) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 16-Jun-2019 22:04:20

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

TIME\_1900 - Time Marked every 60.00 (s)

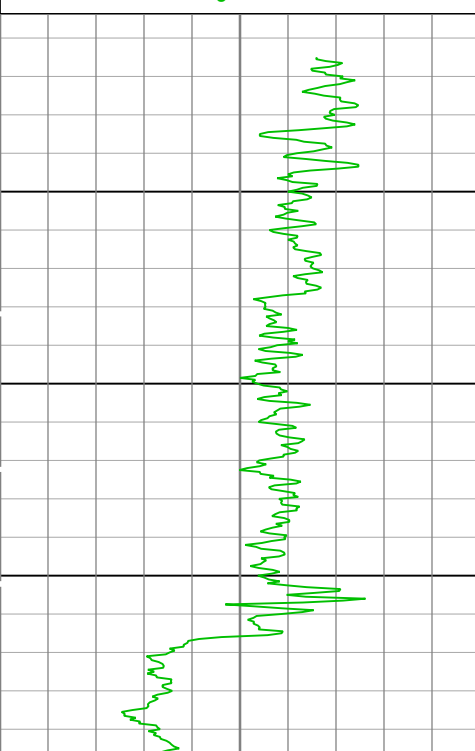
└─ ICV - Integrated Cement Volume every 10.00 (ft3)

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



Array Induction Two Foot Resistivity A10 (AT10) AIT-M		
0	ohm.m	50
Array Induction Two Foot Resistivity A10 (AT10) AIT-M		
0	ohm.m	10
Array Induction Two Foot Resistivity A60 (AT60) AIT-M		
0	ohm.m	50

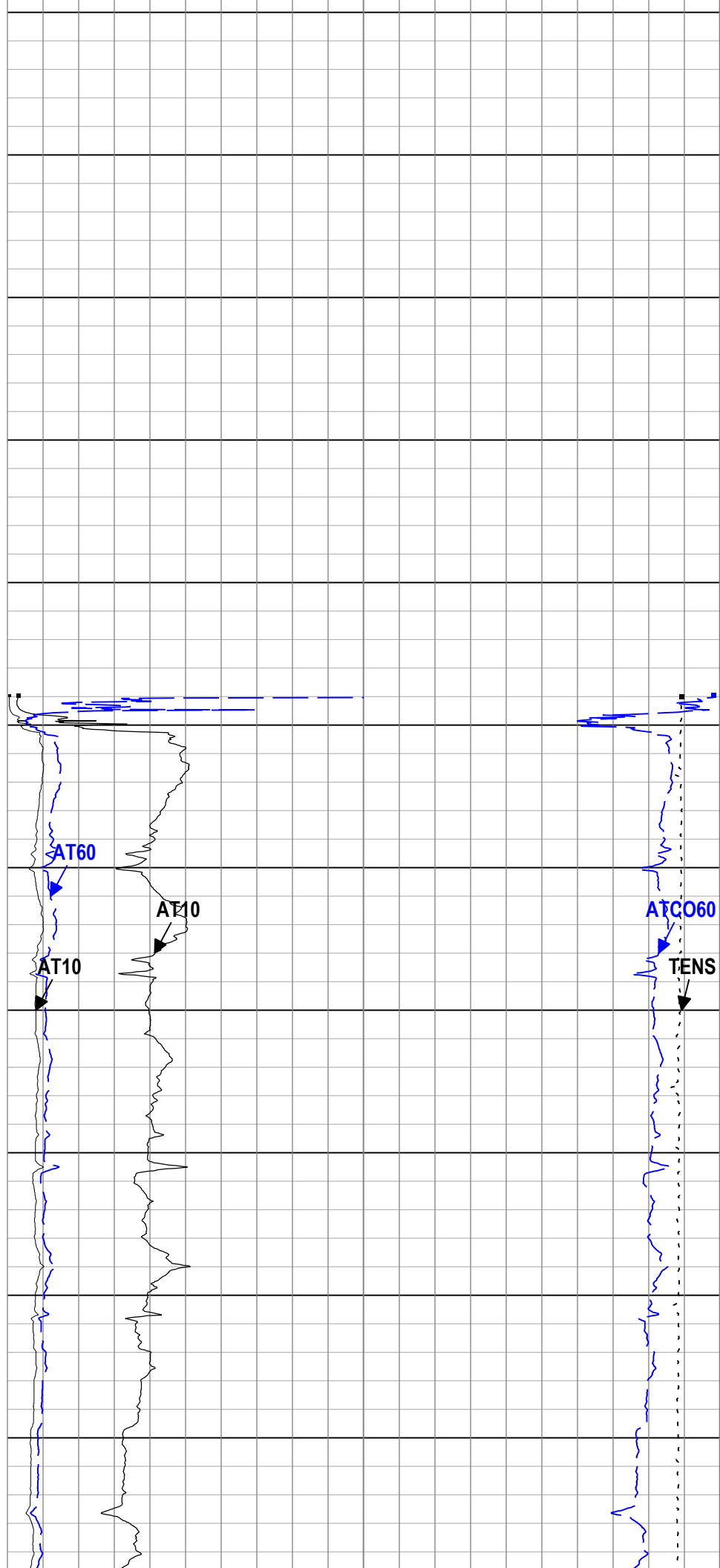
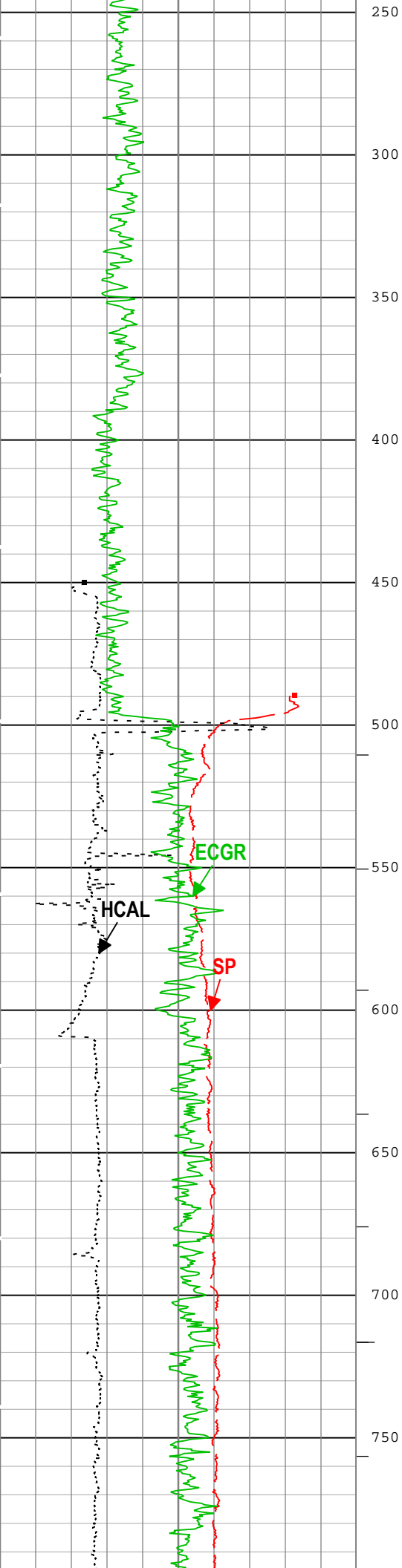
Cable Tension (TENS)		
10000	lbf	0
Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M		
1000	mS/m	0

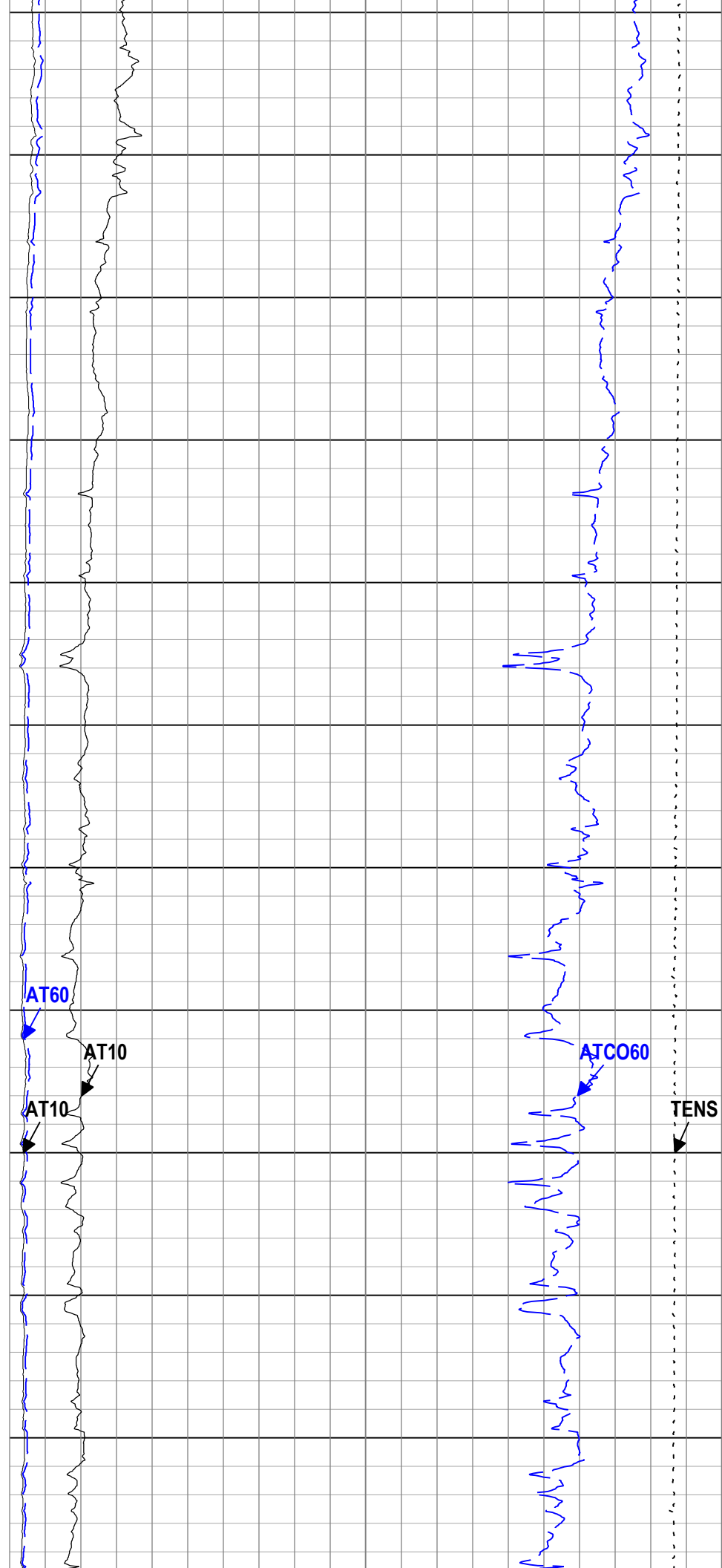
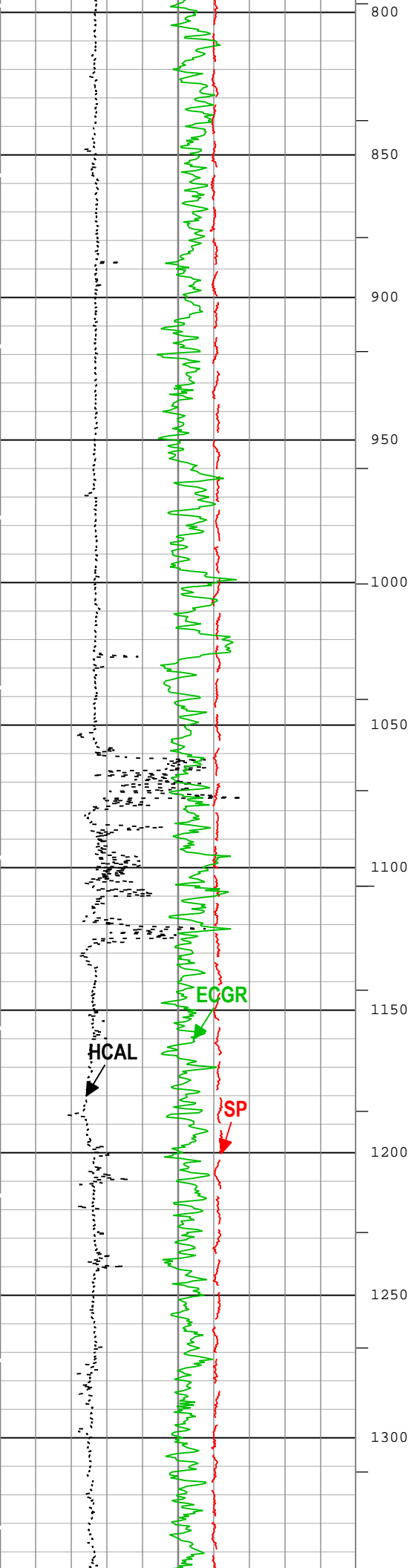


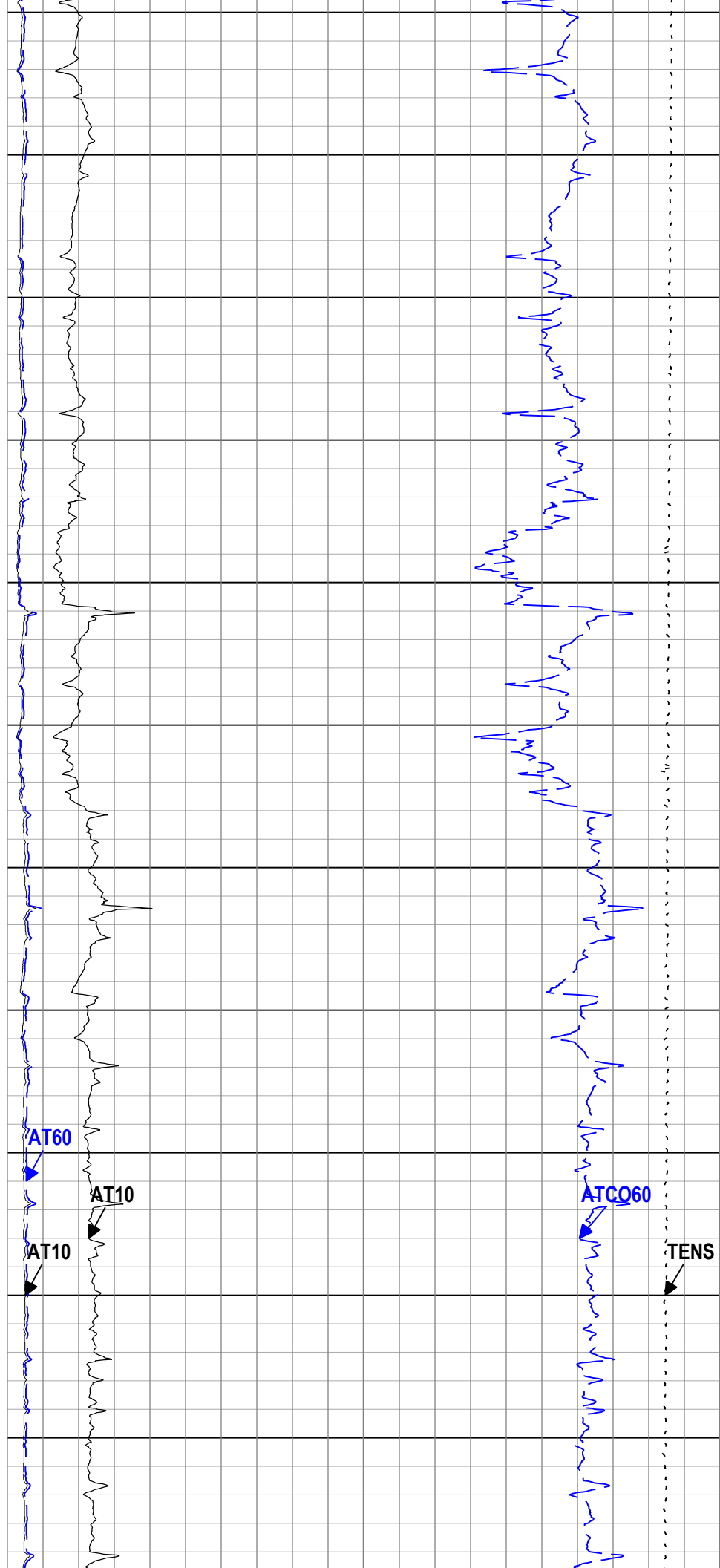
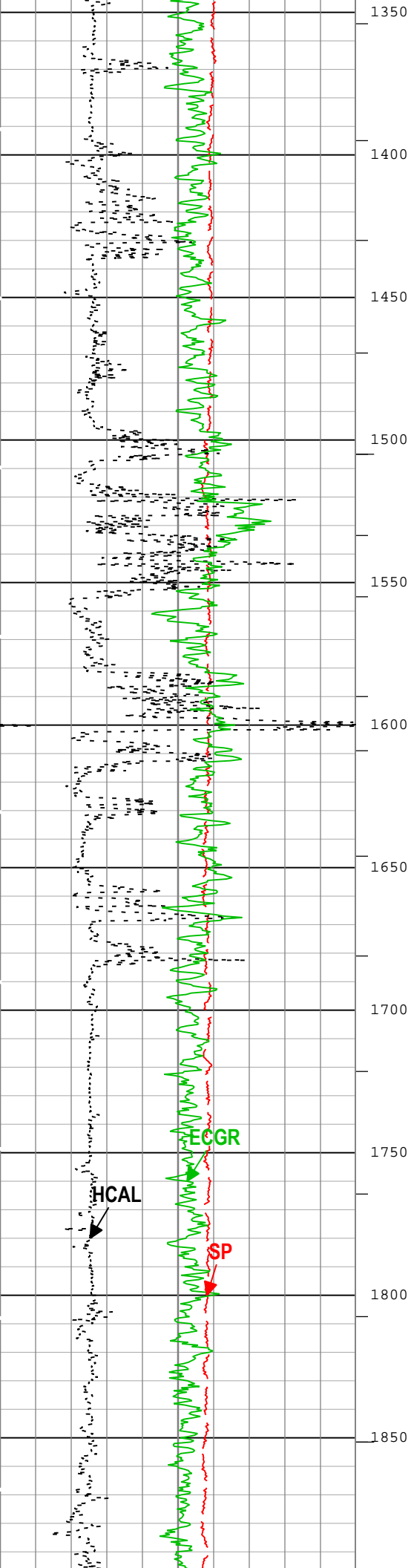
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150

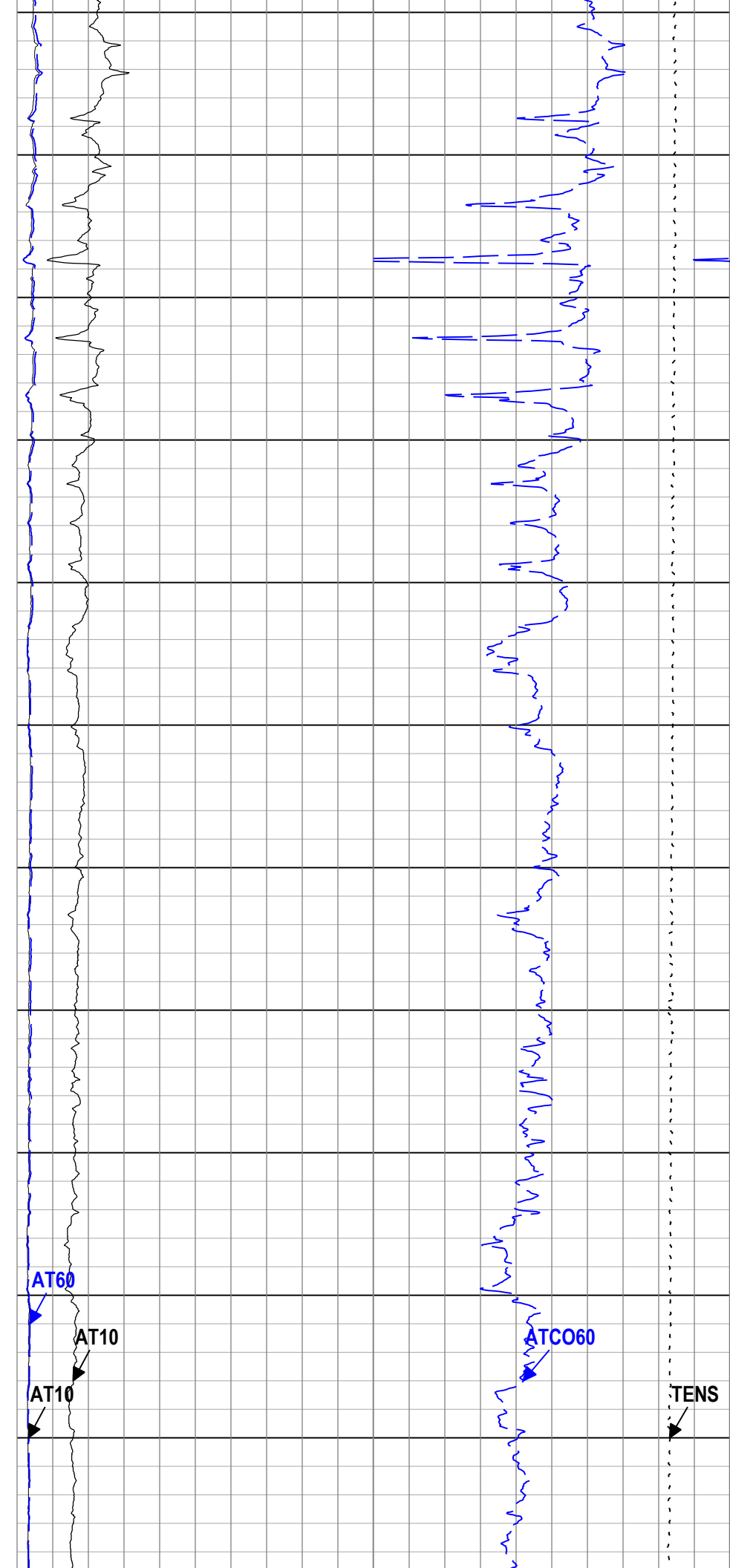
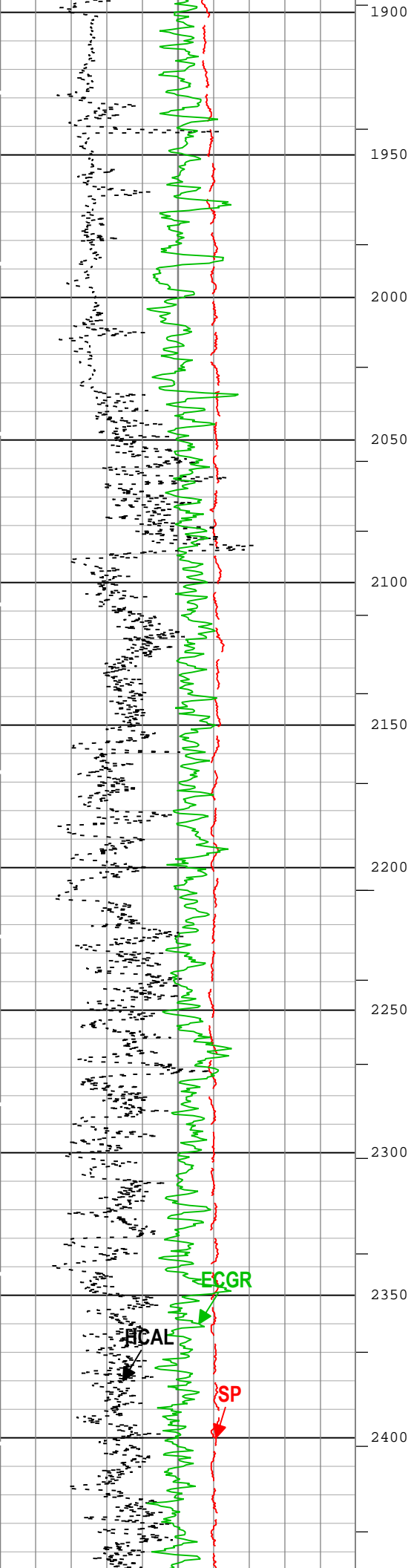
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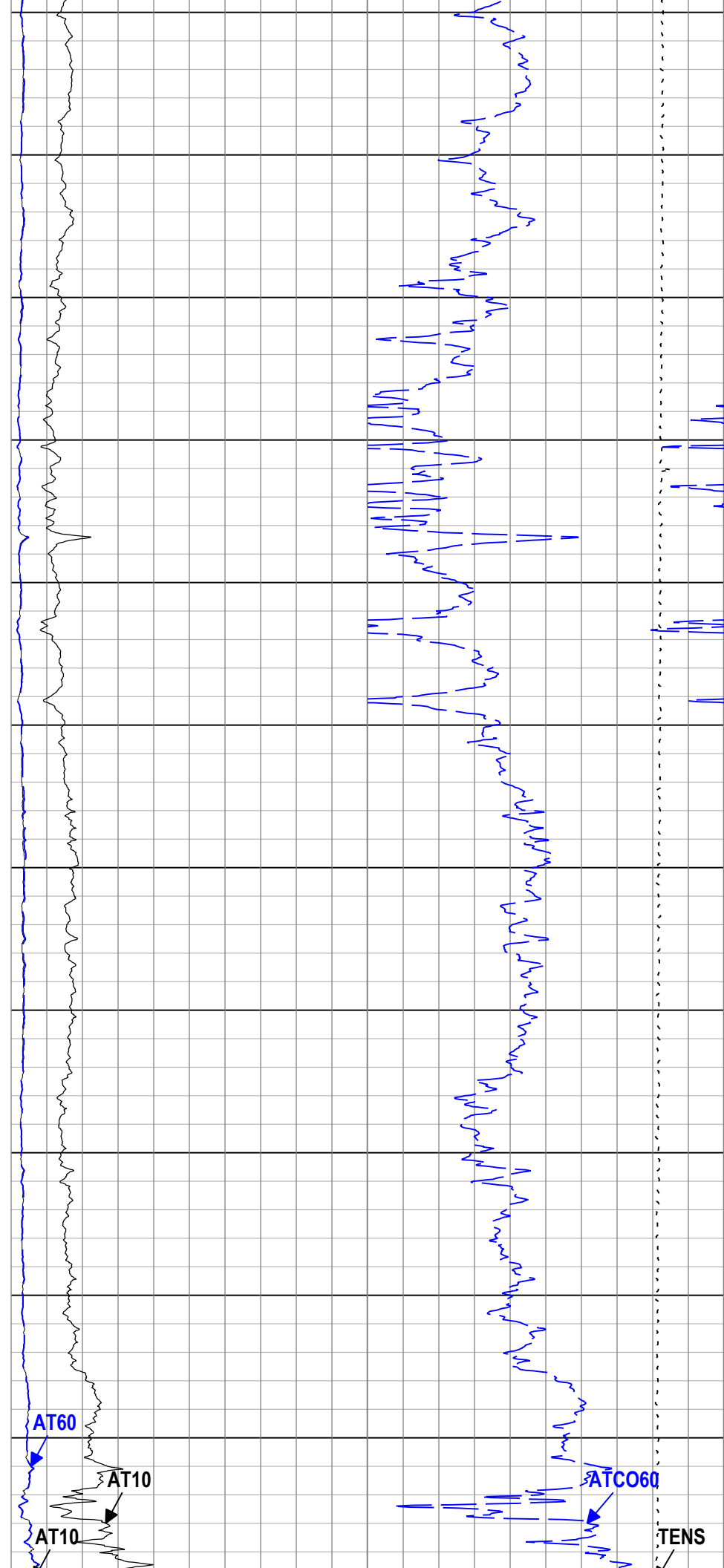
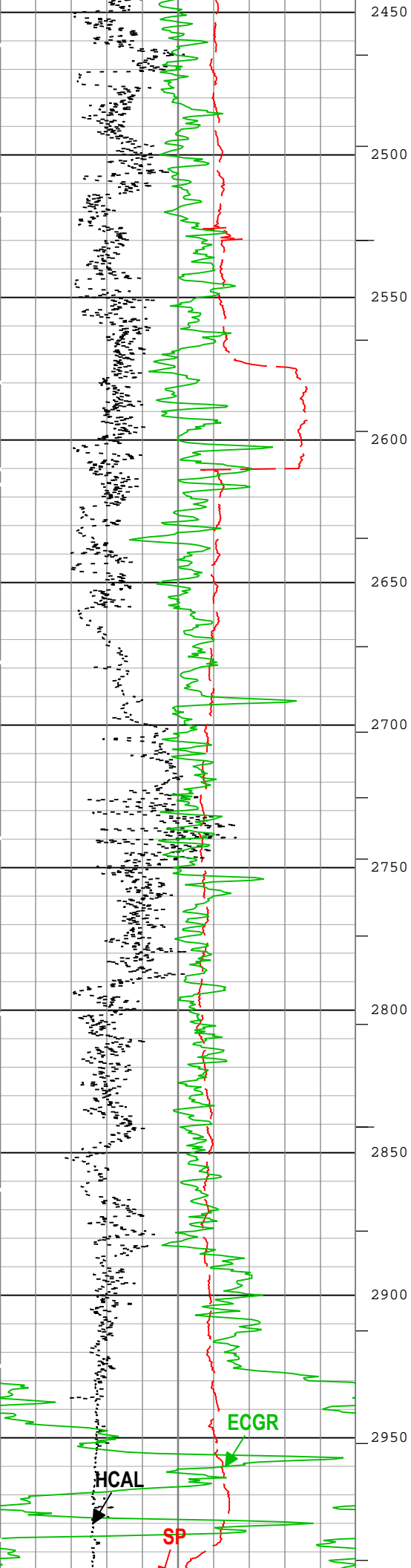


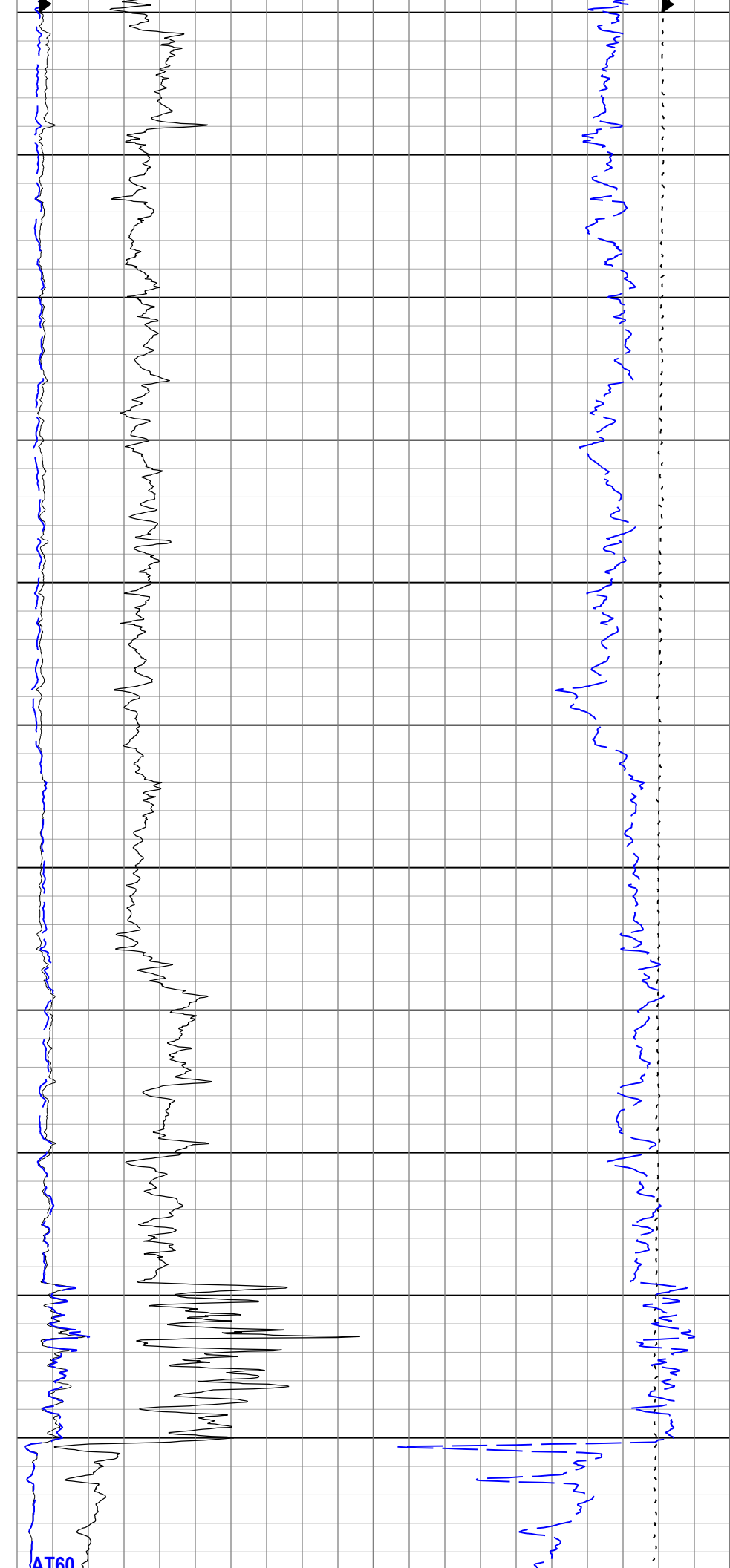
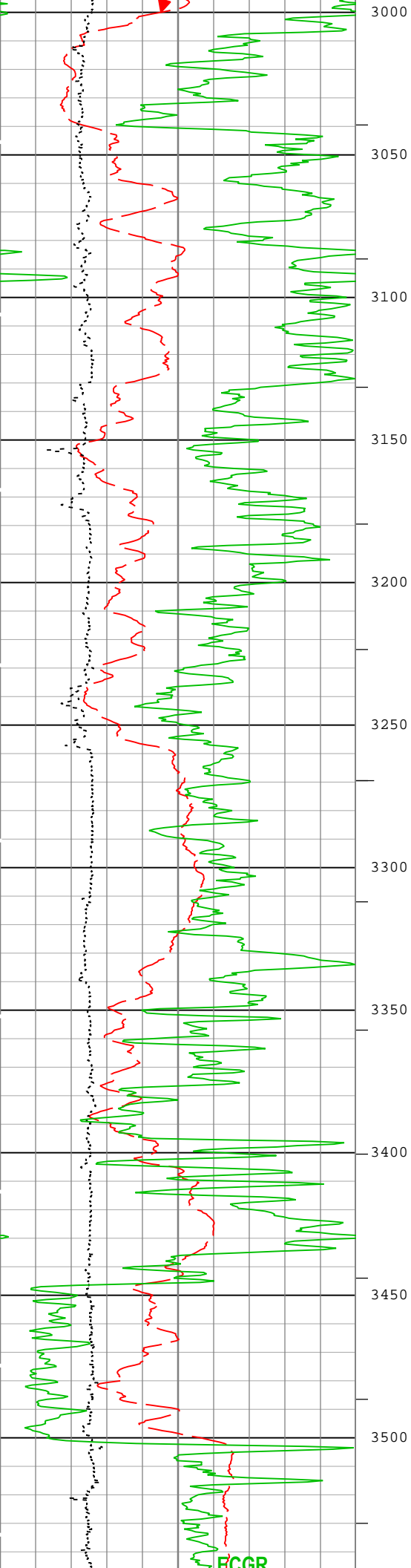


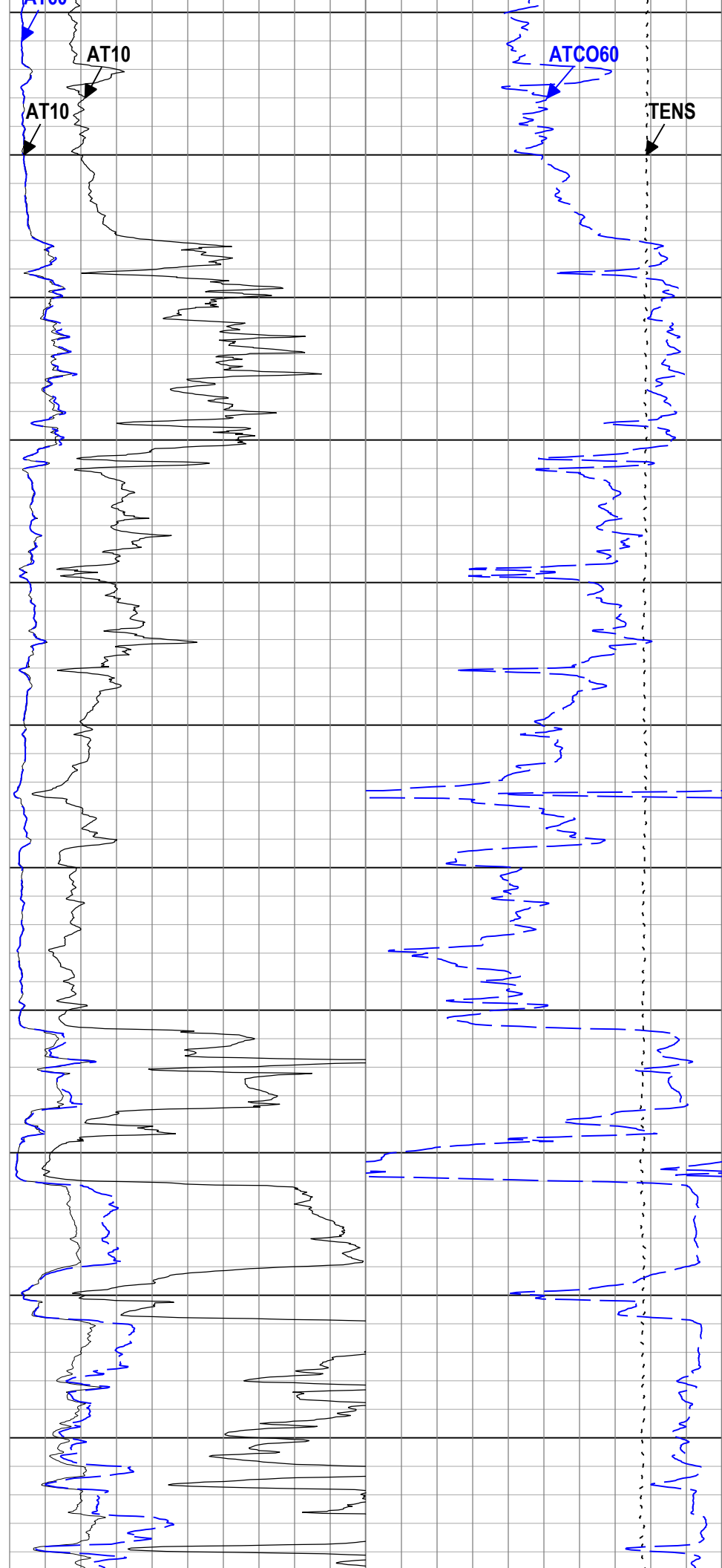
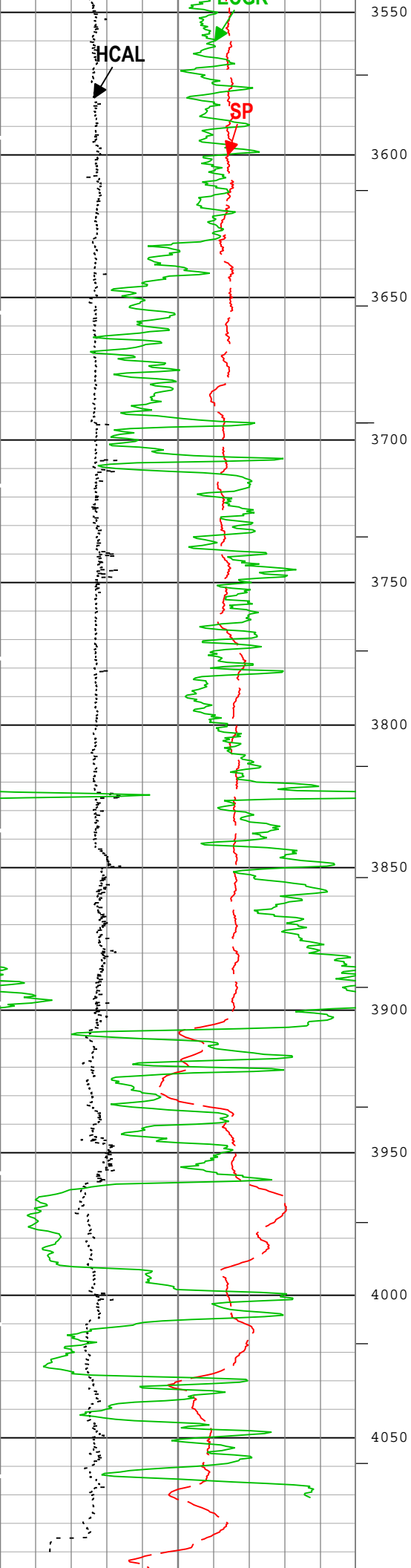












Channel Processing Parameters				
1A: Parameters				
Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Mud Resistivity	
ASTA	Array Induction Tool Standoff	AIT-M	0.125	in
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	491	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	8.8	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
SP_SHIFT	SP Shift	AIT-M	40	mV
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
Depth Zone Parameters				
Parameter	Value	Start ( ft )	Stop ( ft )	
BS	12.25	54	492	
BS	7.875	492	4102	
All depth are actual.				
Tool Control Parameters				
1A: Parameters				
Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
1A				
5" Induction				
Interval 1				

# Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	956.4	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1553.16	ft3

## Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100
Application Patch	Wireline_Hotfix-Mandatory-2018.2_8.2.108371

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[3]:Up	Up	101.38 ft	4108.30 ft	16-Jun-2019 8:15:40 PM	16-Jun-2019 9:28:48 PM	ON	2.93 ft	Yes

All depths are referenced to toolstring zero

Log	Company:St. Croix Operating, Inc.      Well:ROCKY 1 1A: Log[3]:Up:S002
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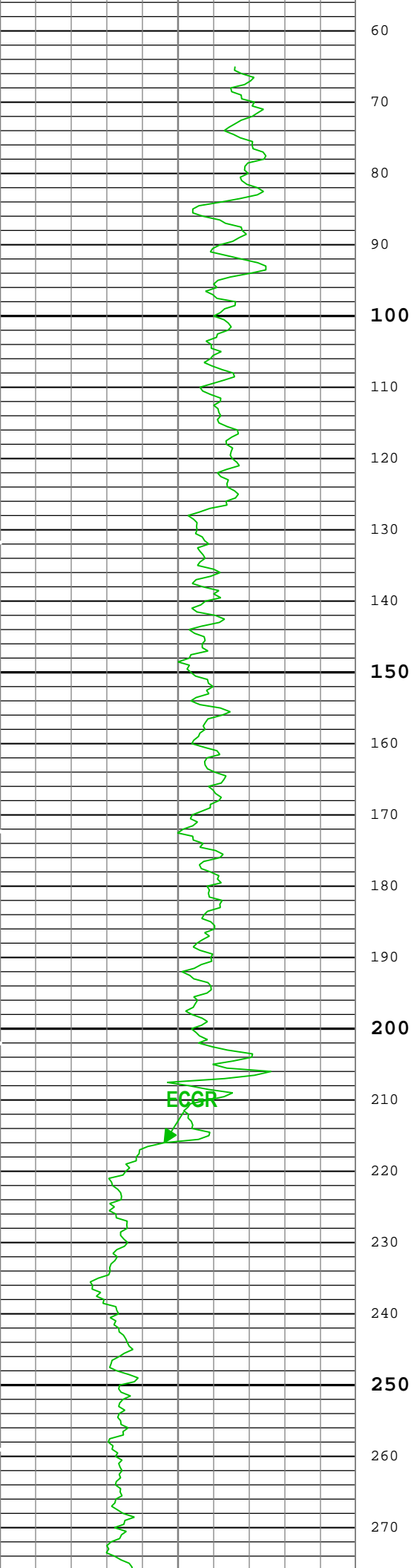
Description: AIT Basic Log Two    Format: Log ( EMD 5in Induction Upper )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth  
Creation Date: 16-Jun-2019 22:04:23

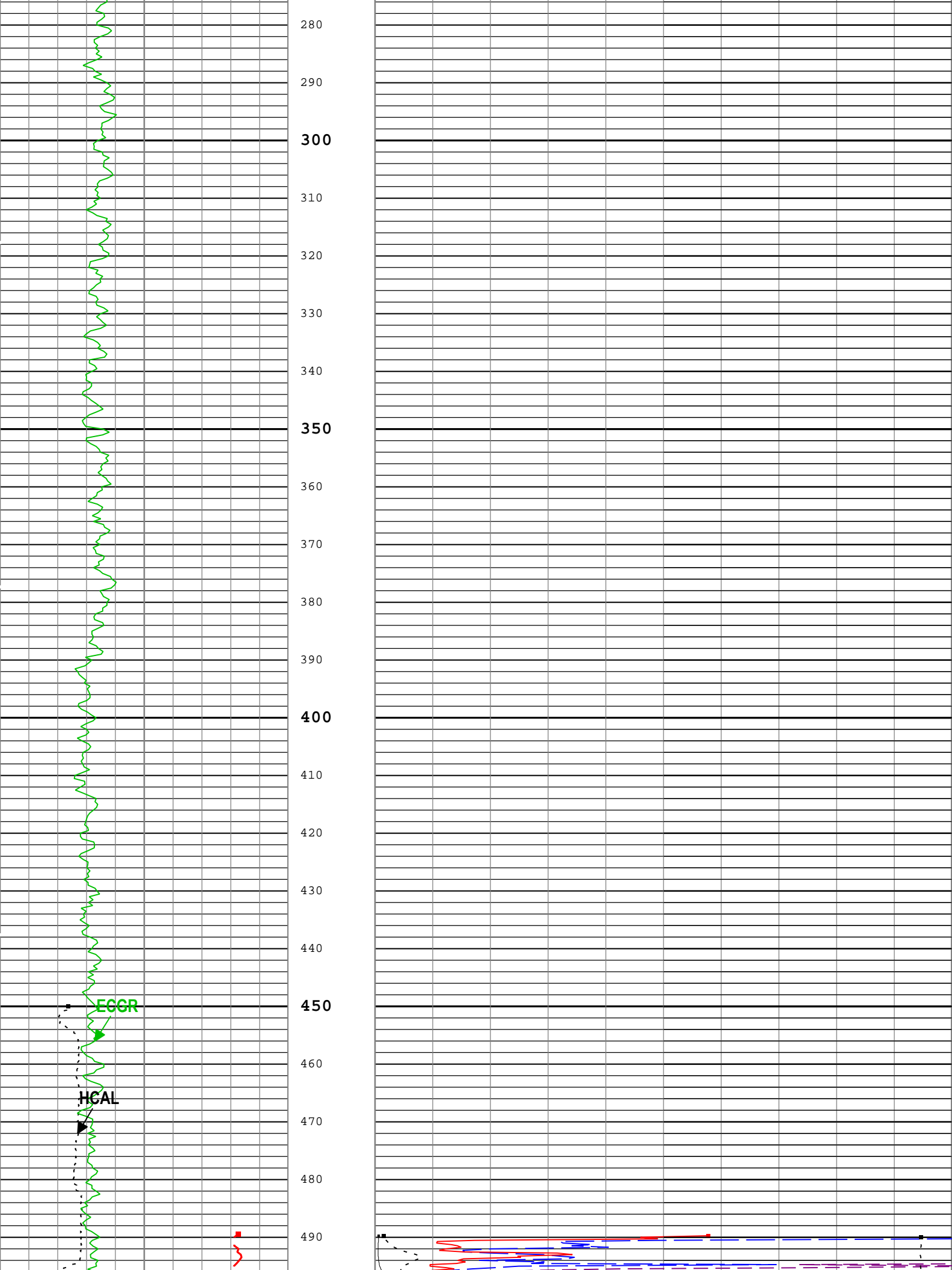
Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT20	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

—IHV - Integrated Hole Volume every 10.00 (ft3)  
—IHV - Integrated Hole Volume every 100.00 (ft3)  
—ICV - Integrated Cement Volume every 10.00 (ft3)  
—ICV - Integrated Cement Volume every 100.00 (ft3)

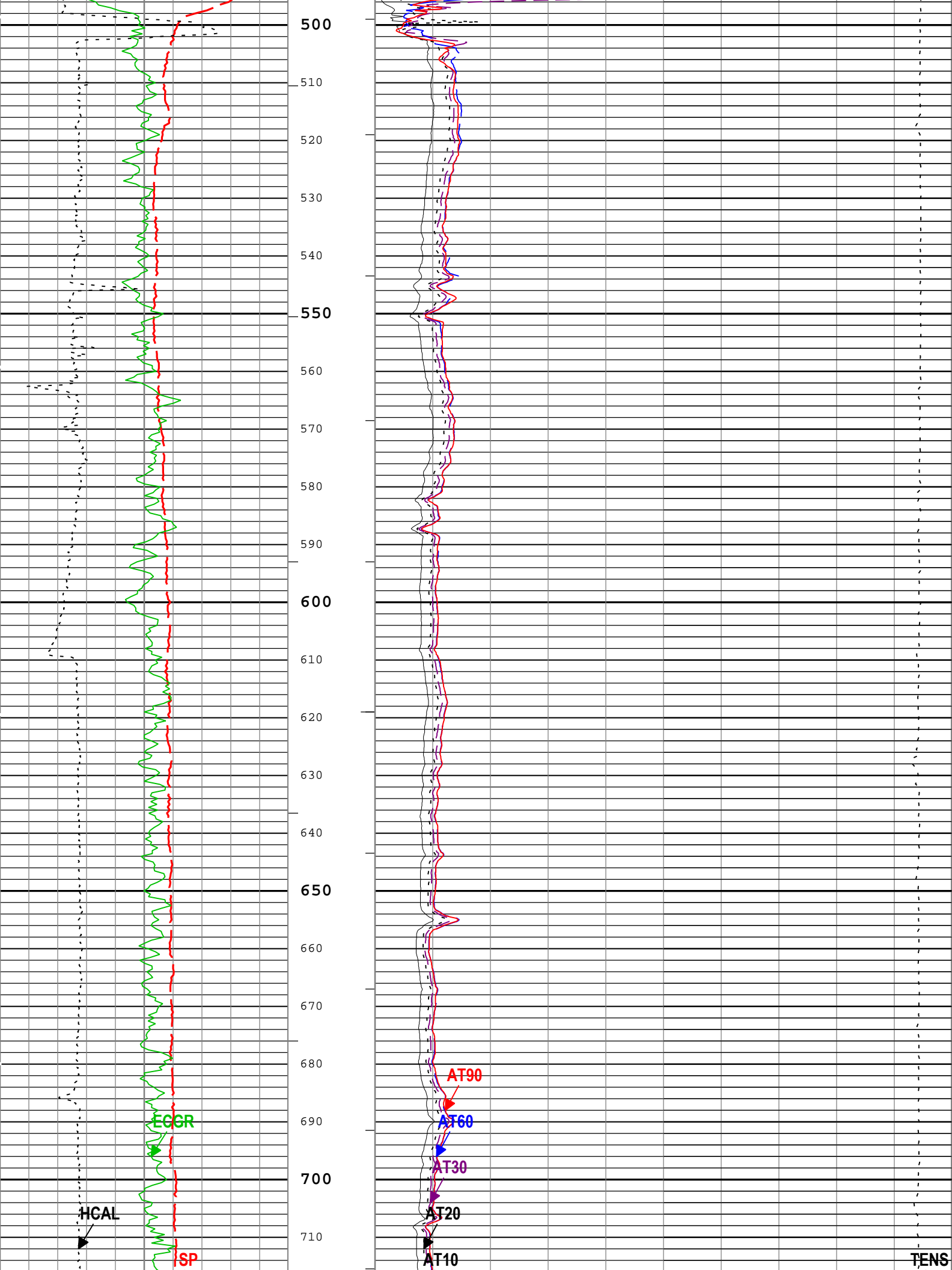
TIME\_1900 - Time Marked every 60.00 (s)

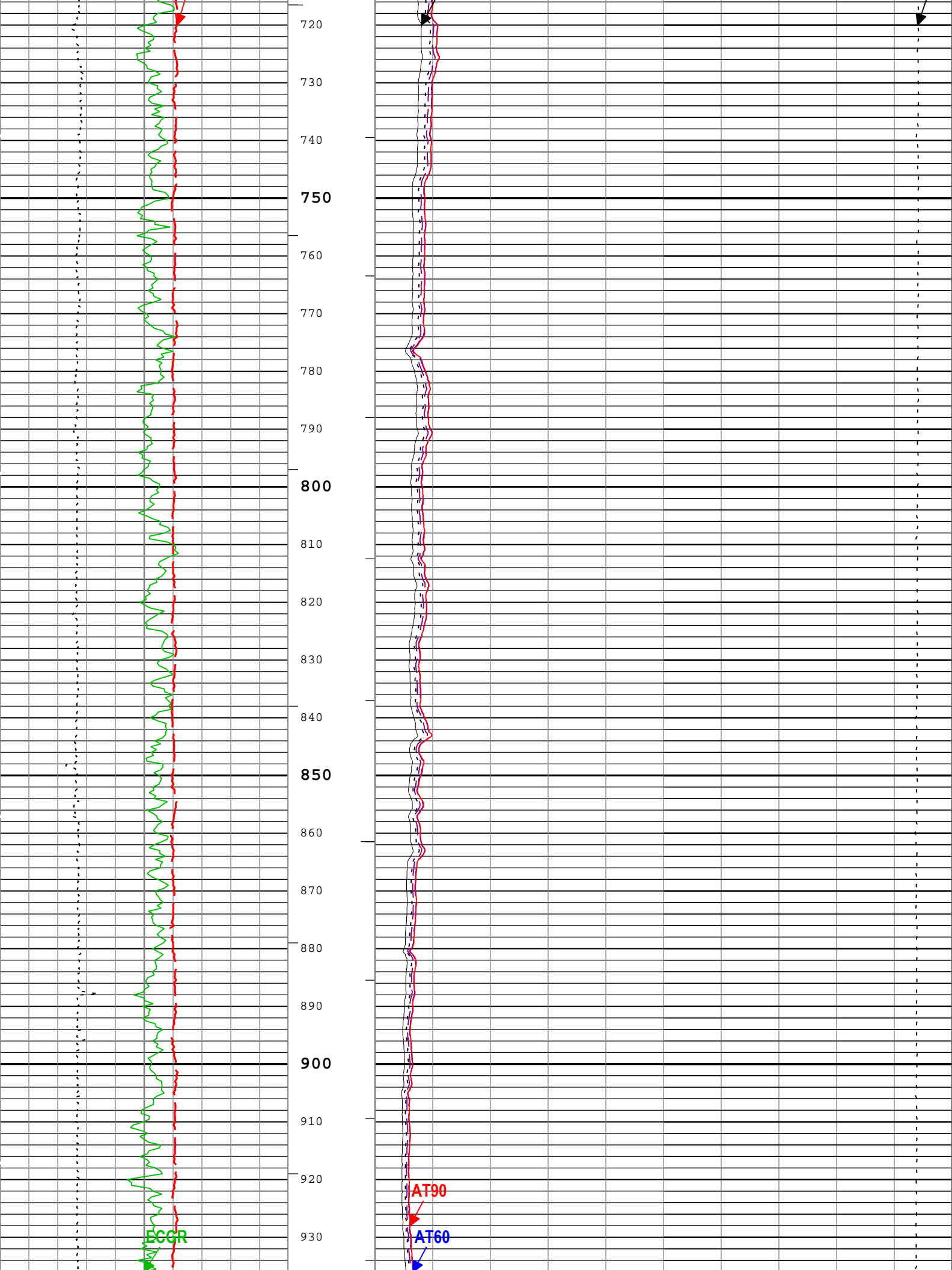
<div>Gamma Ray Backup</div> <div>Spontaneous Potential (SP) AIT-M</div> <div>-80mV20</div> <div>Caliper (HCAL) HDRS-H</div> <div>6in16</div> <div>Gamma Ray (ECGR) HGNS-B</div> <div>0gAPI200</div>		Cable Tension (TENS)	
		10000	lbf0
		Array Induction Two Foot Resistivity A10 (AT10) AIT-M	
		0	ohm.m50
		Array Induction Two Foot Resistivity A20 (AT20) AIT-M	
		0	ohm.m50
		Array Induction Two Foot Resistivity A30 (AT30) AIT-M	
		0	ohm.m50
		Array Induction Two Foot Resistivity A60 (AT60) AIT-M	
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		Array Induction Two Foot Resistivity A90 (AT90) AIT-M	
		0	ohm.m50

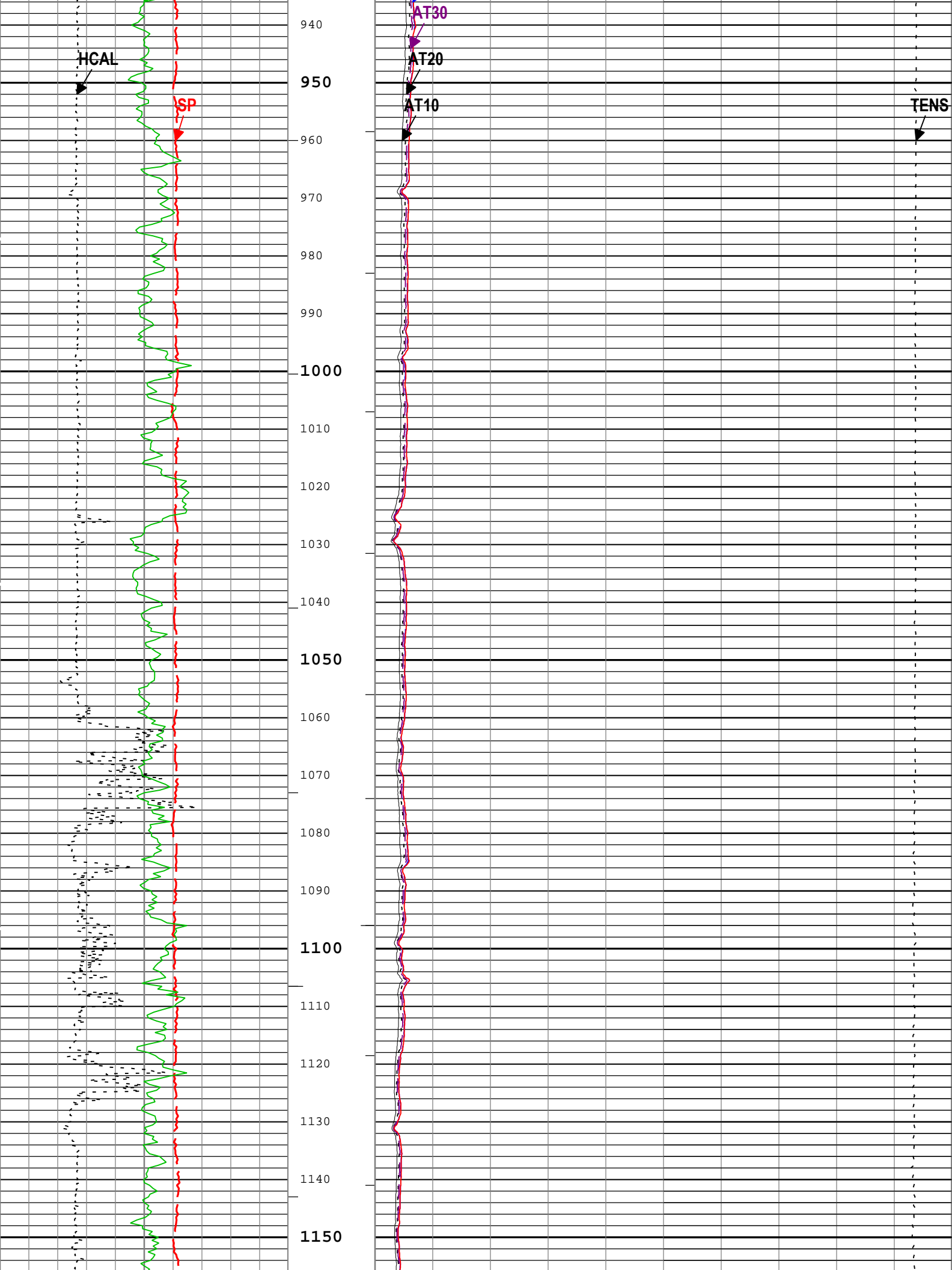


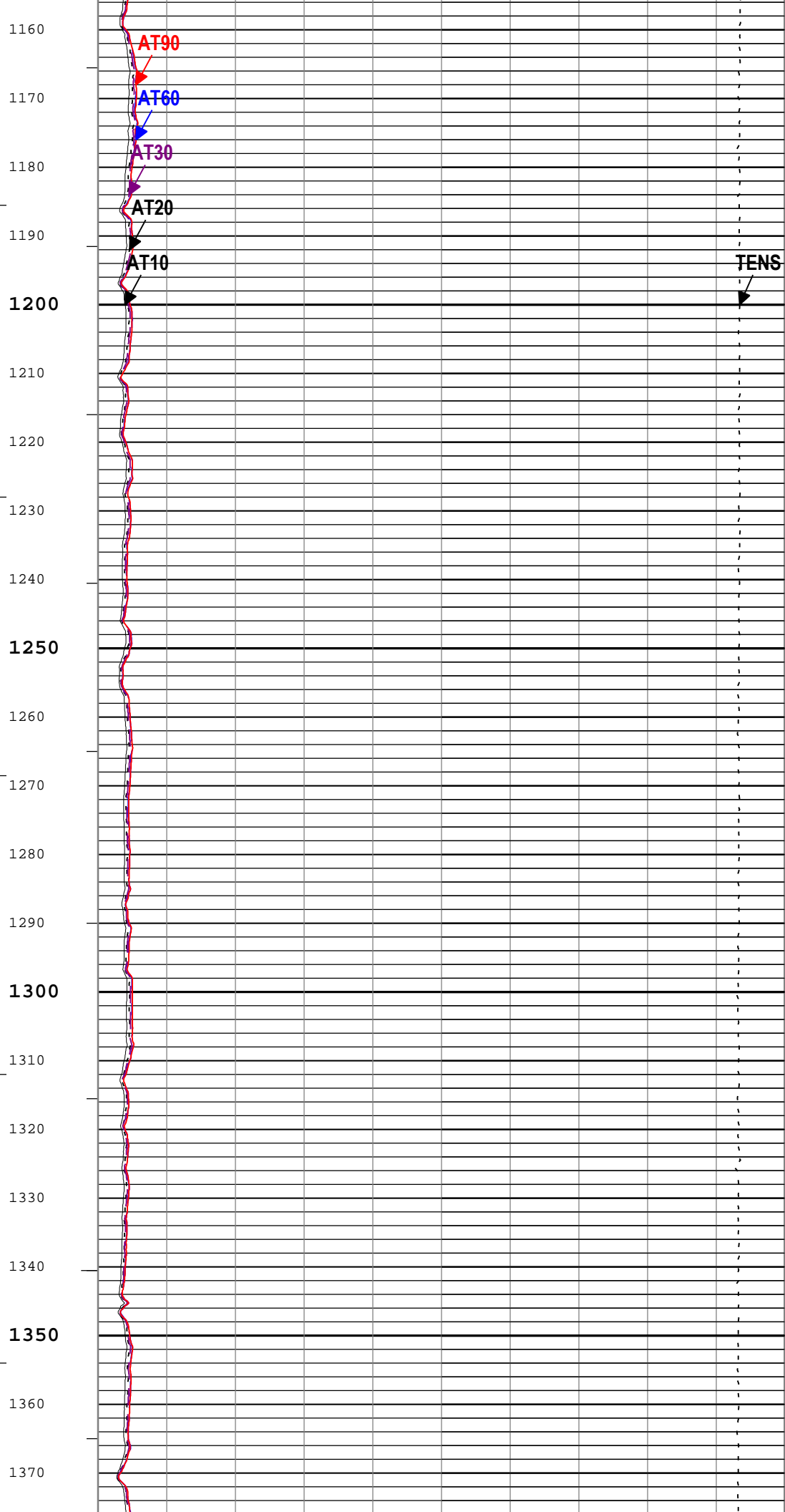
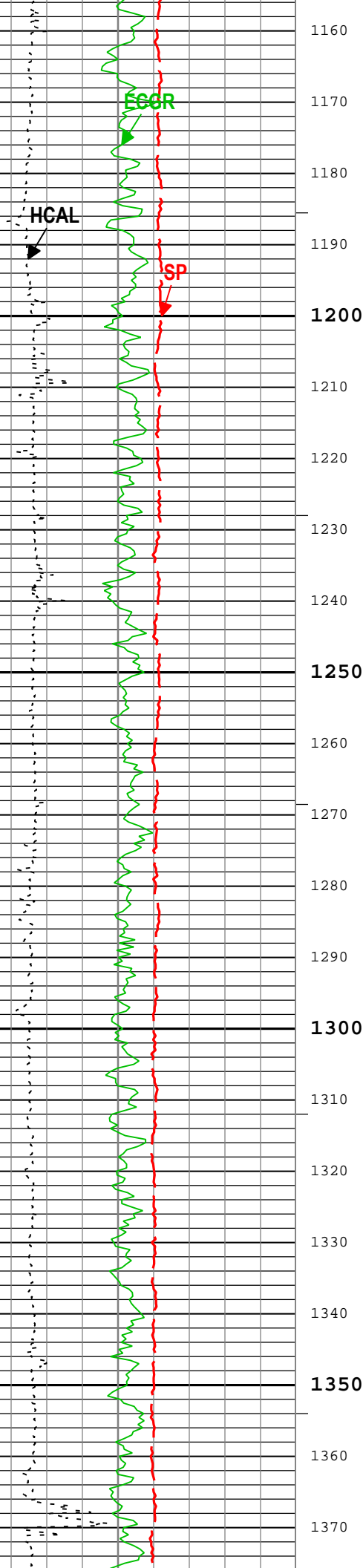


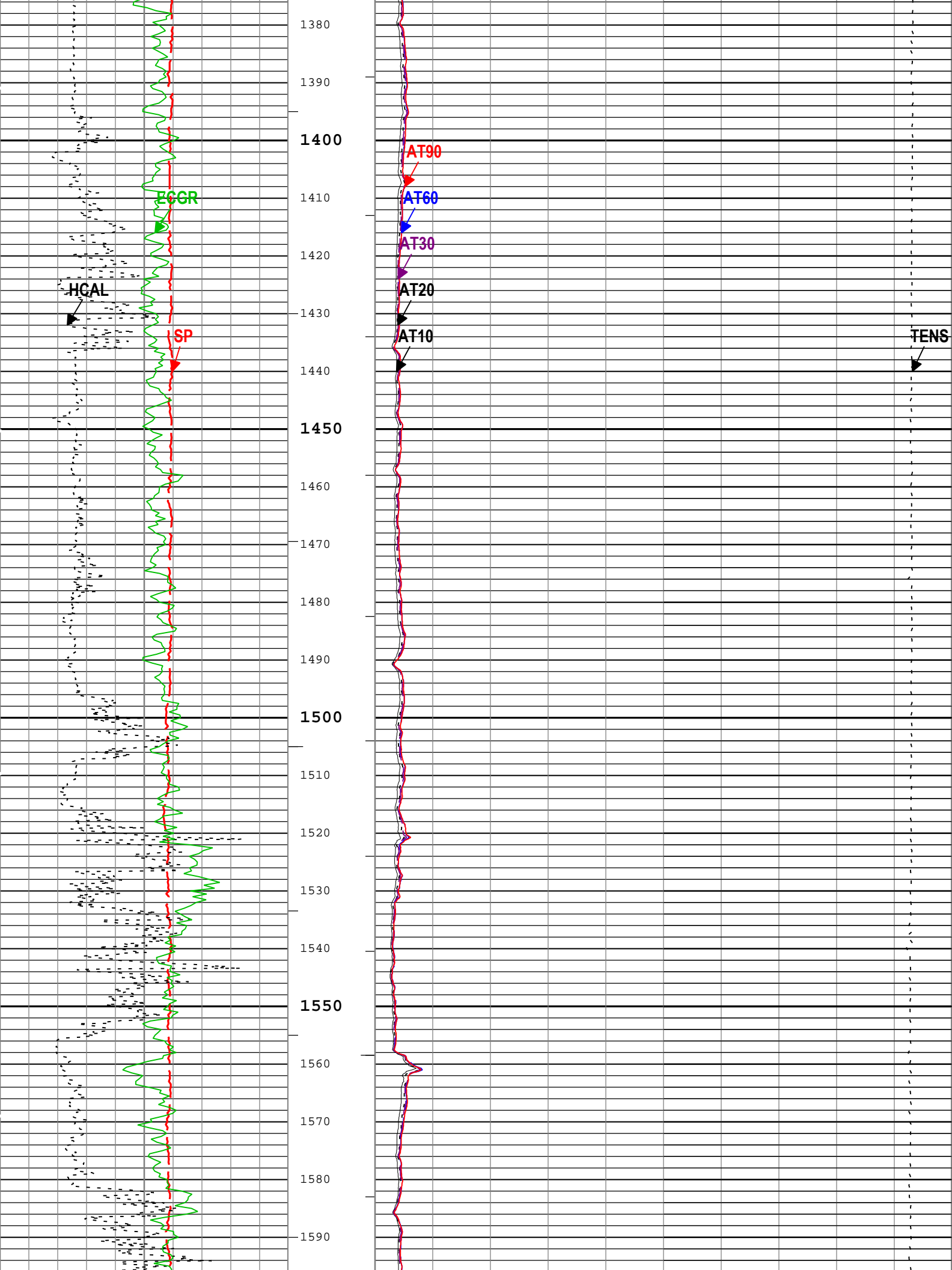


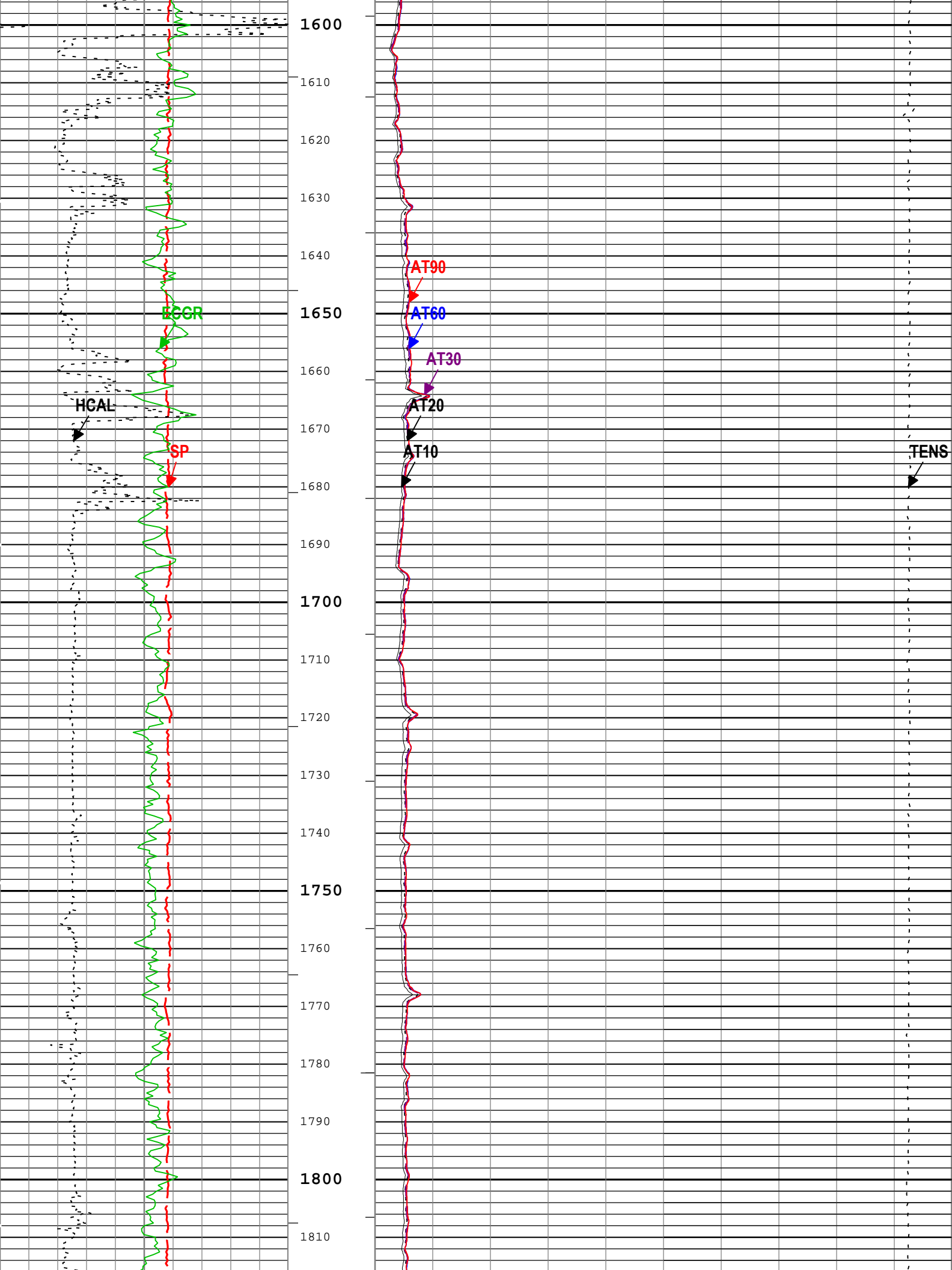


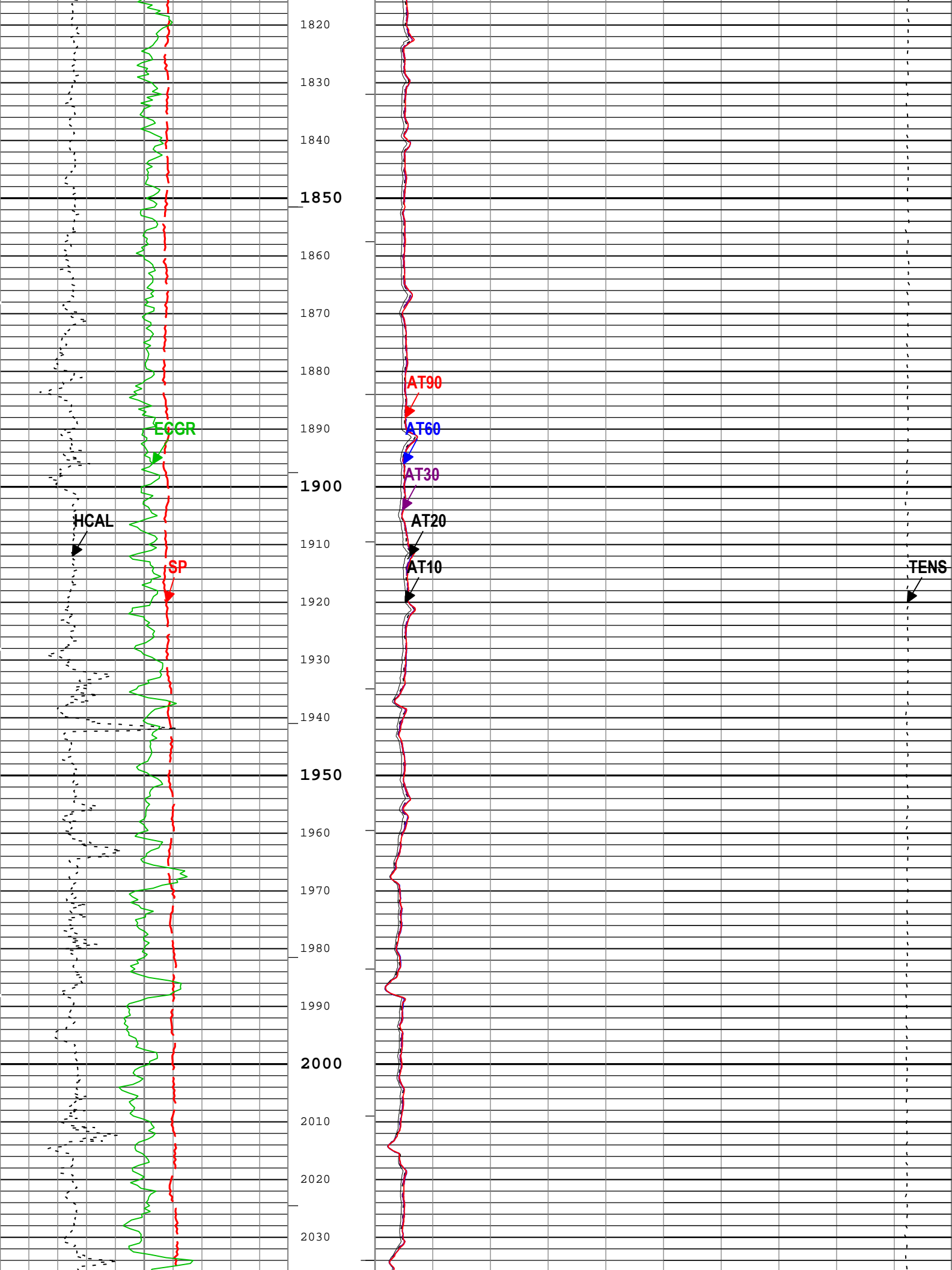


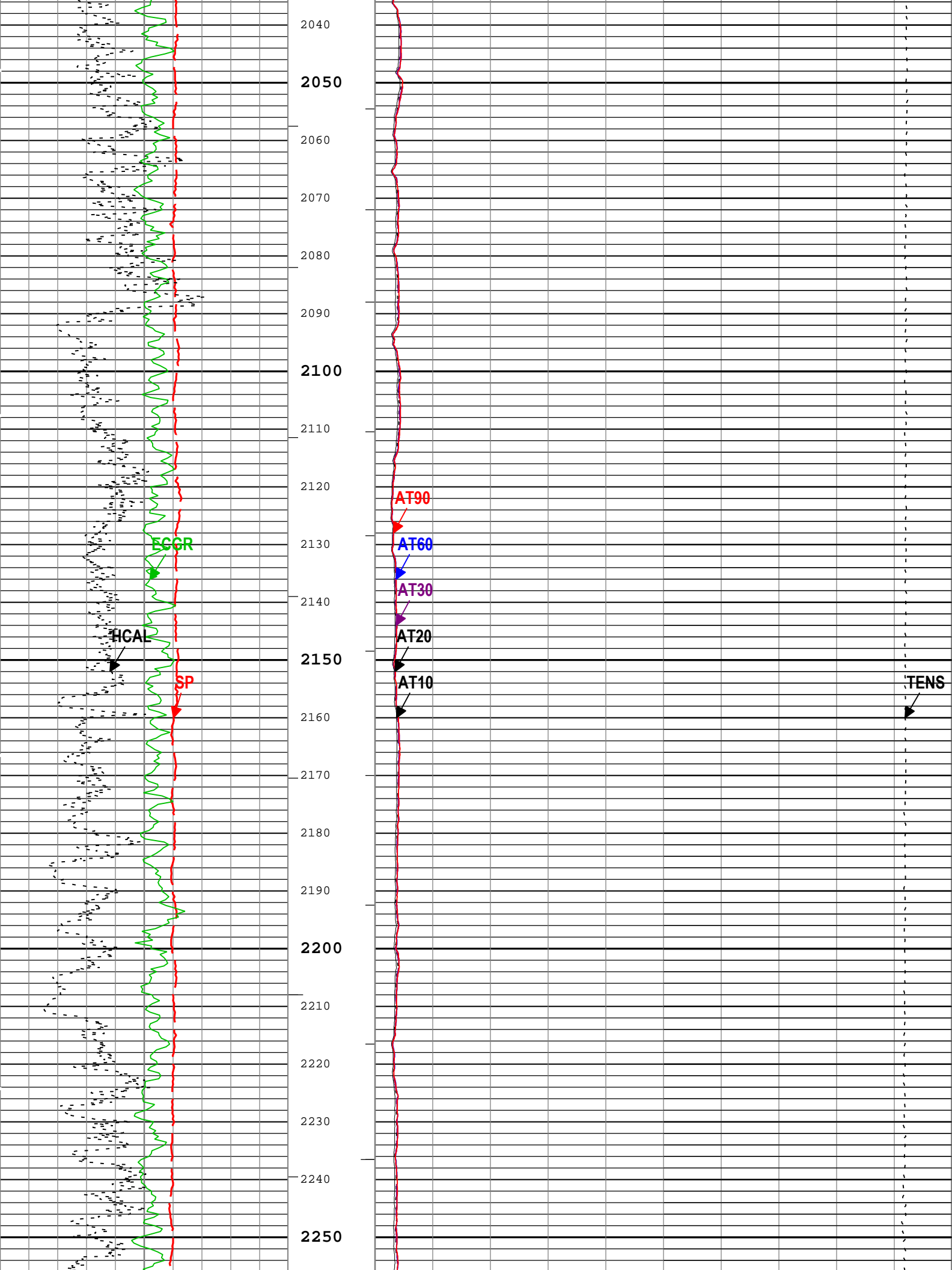




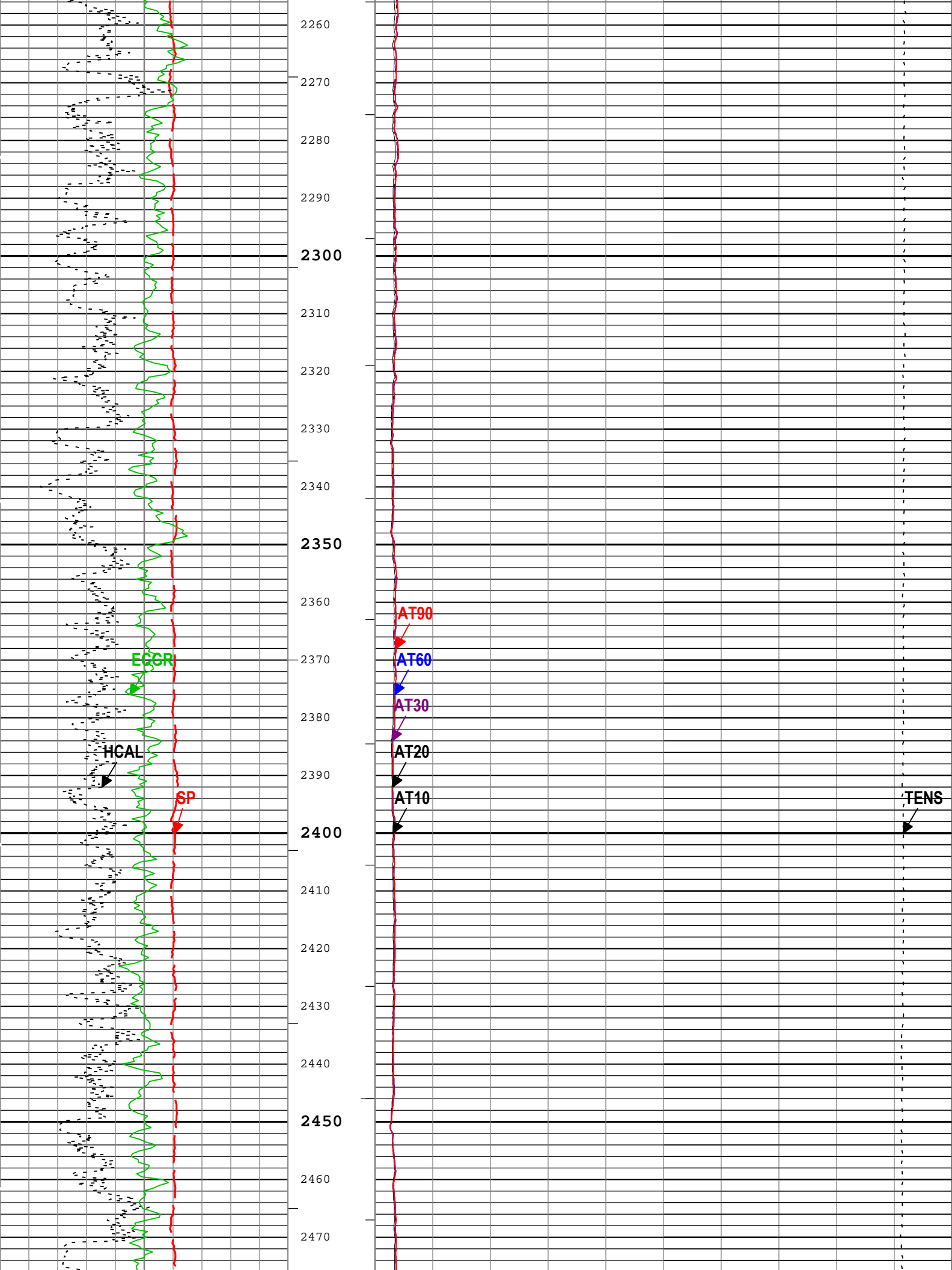


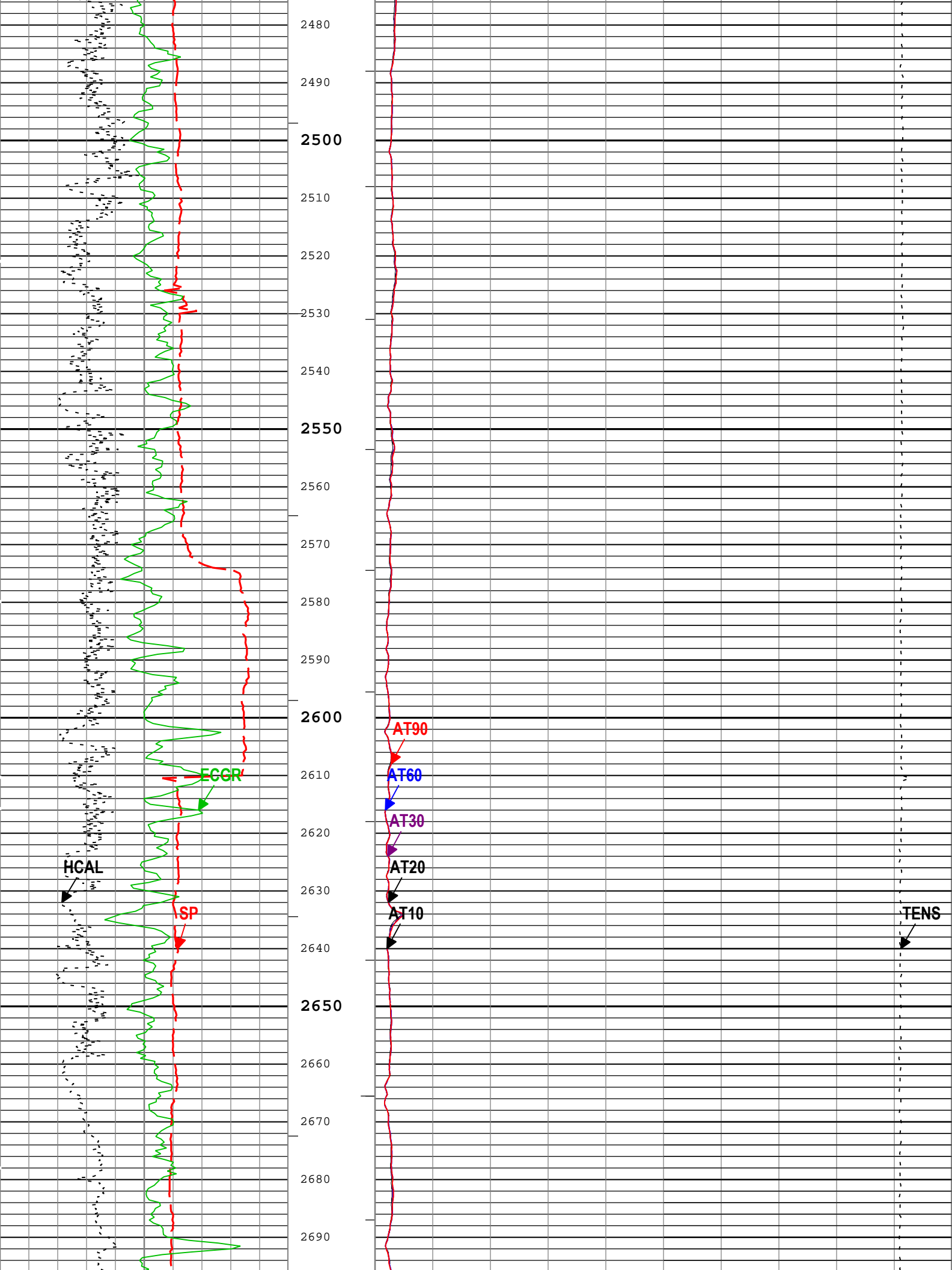


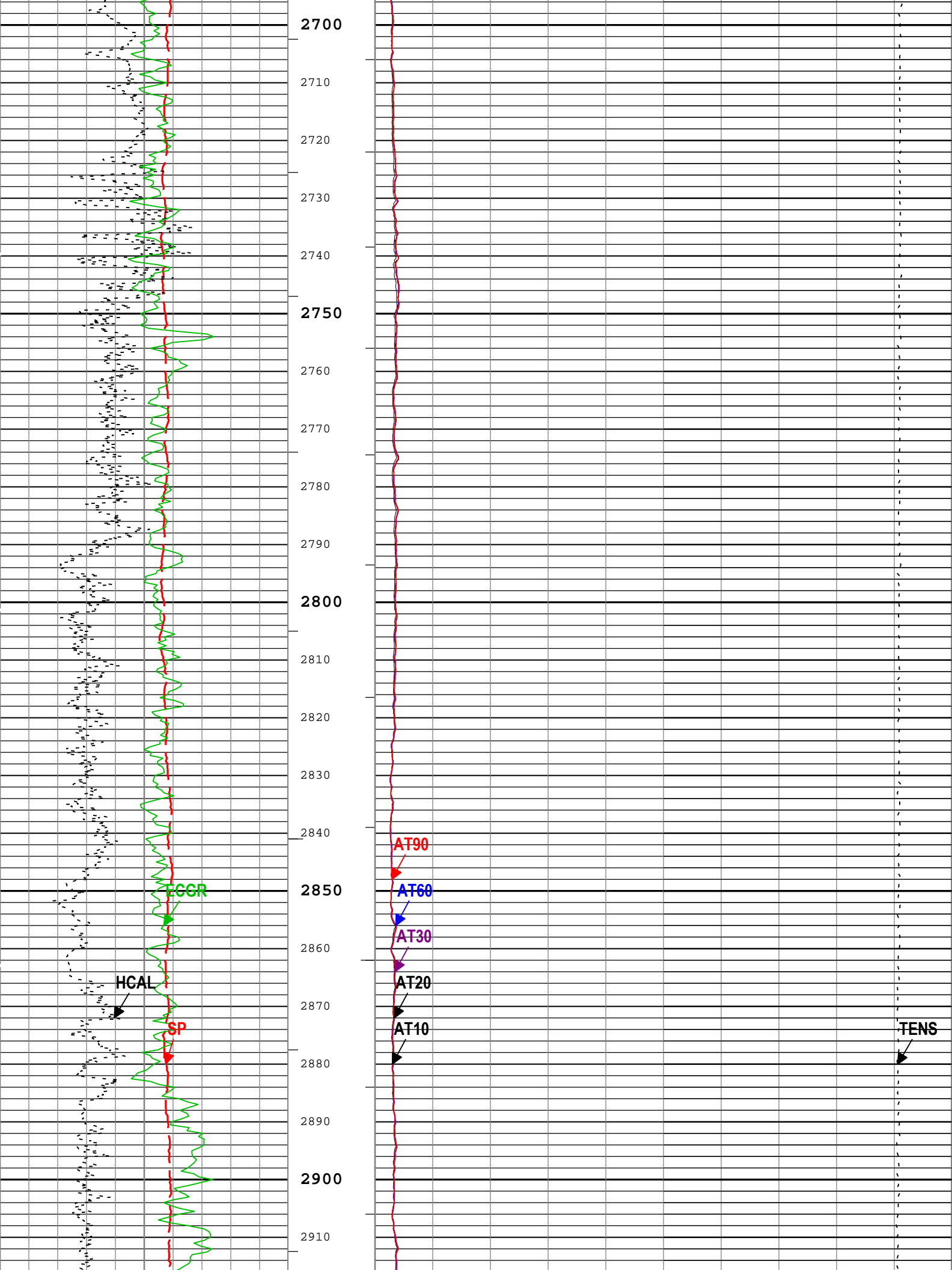


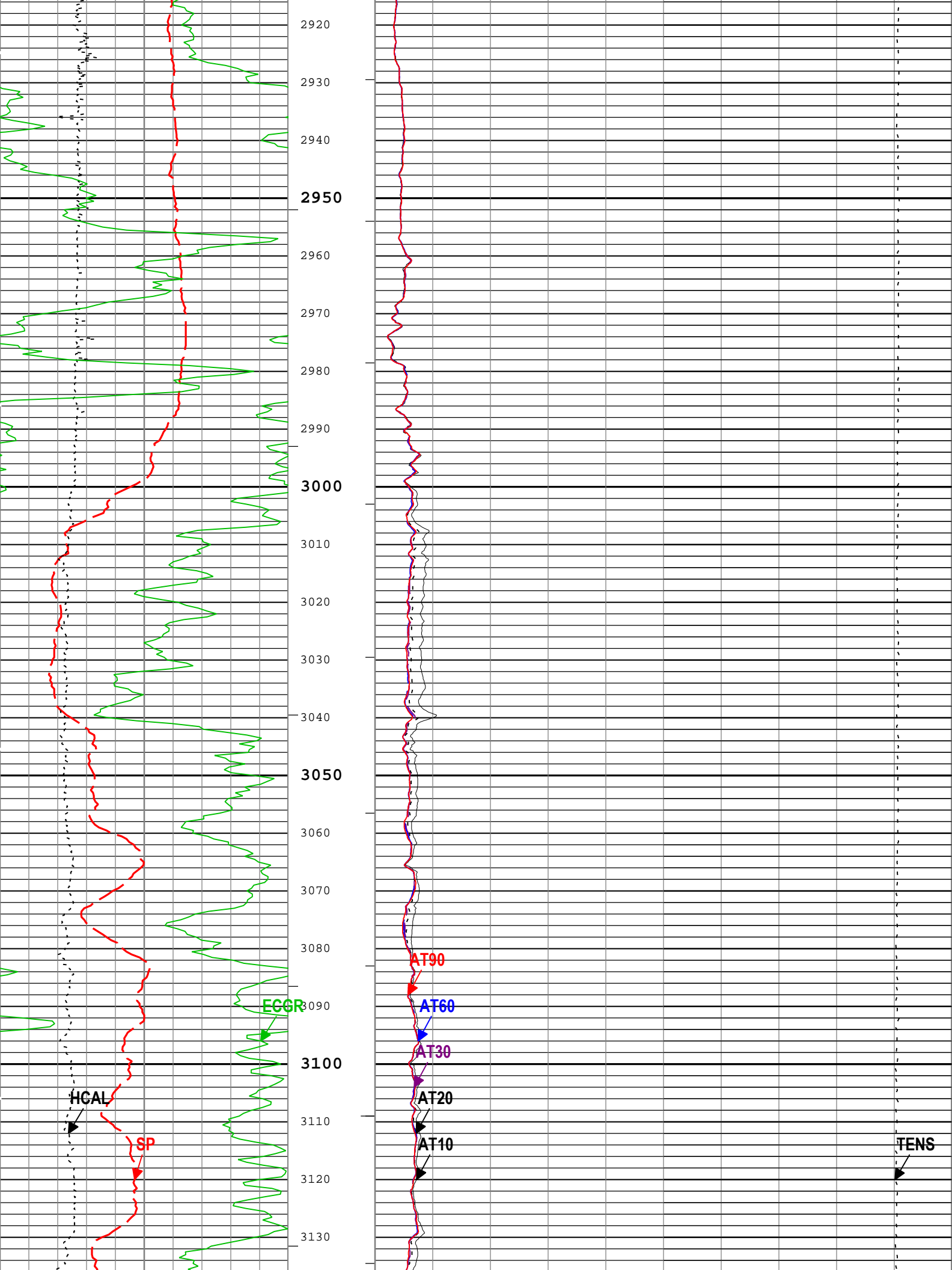


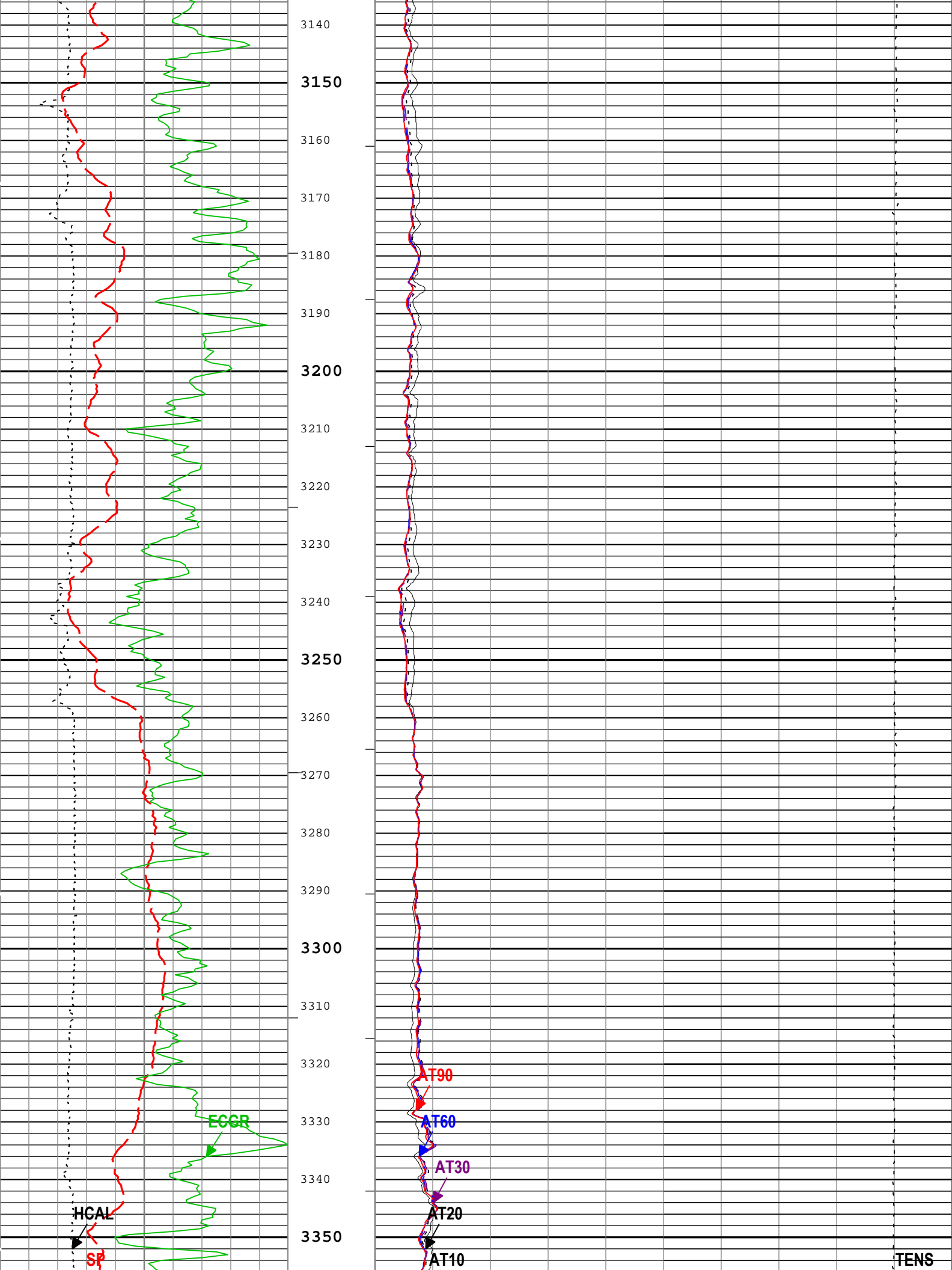


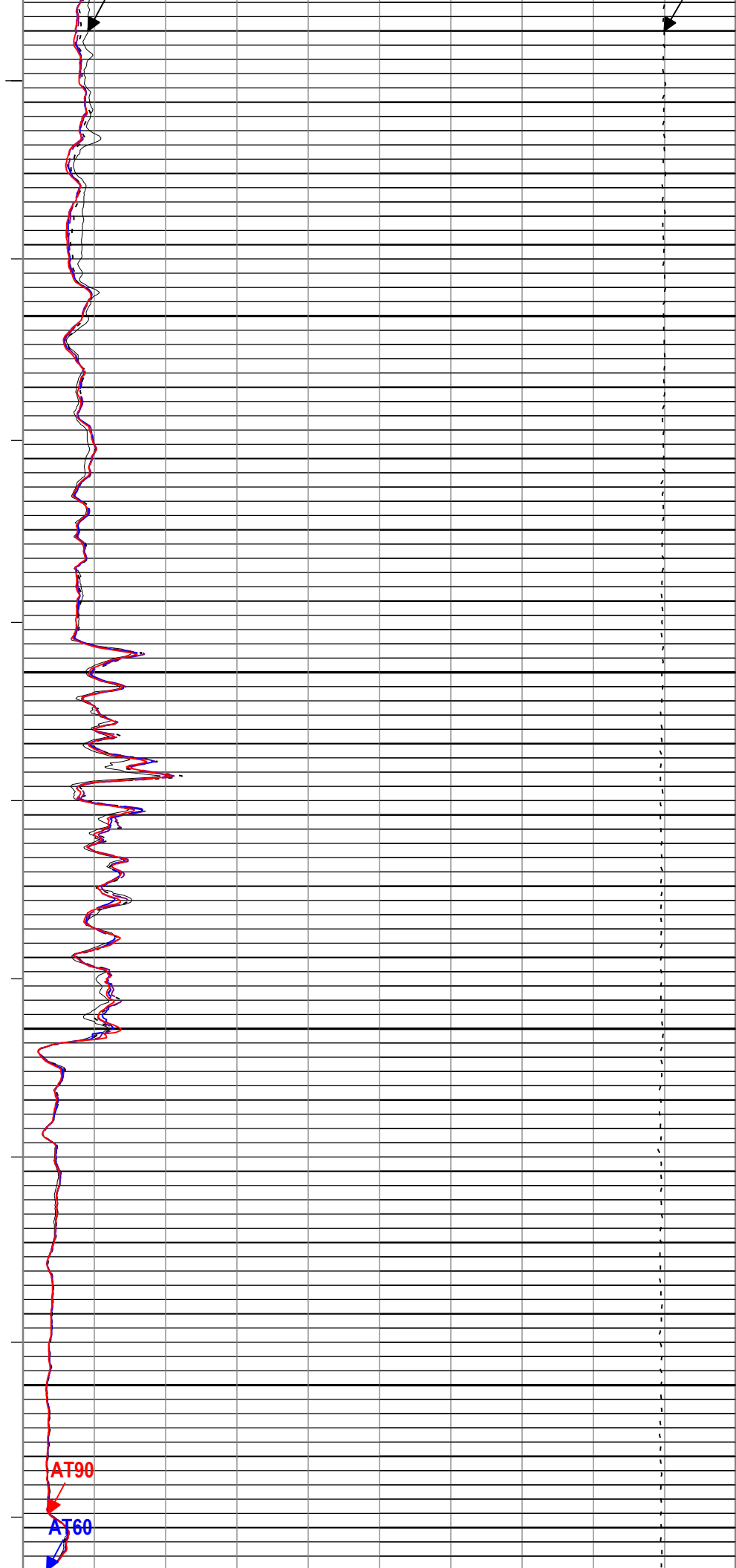
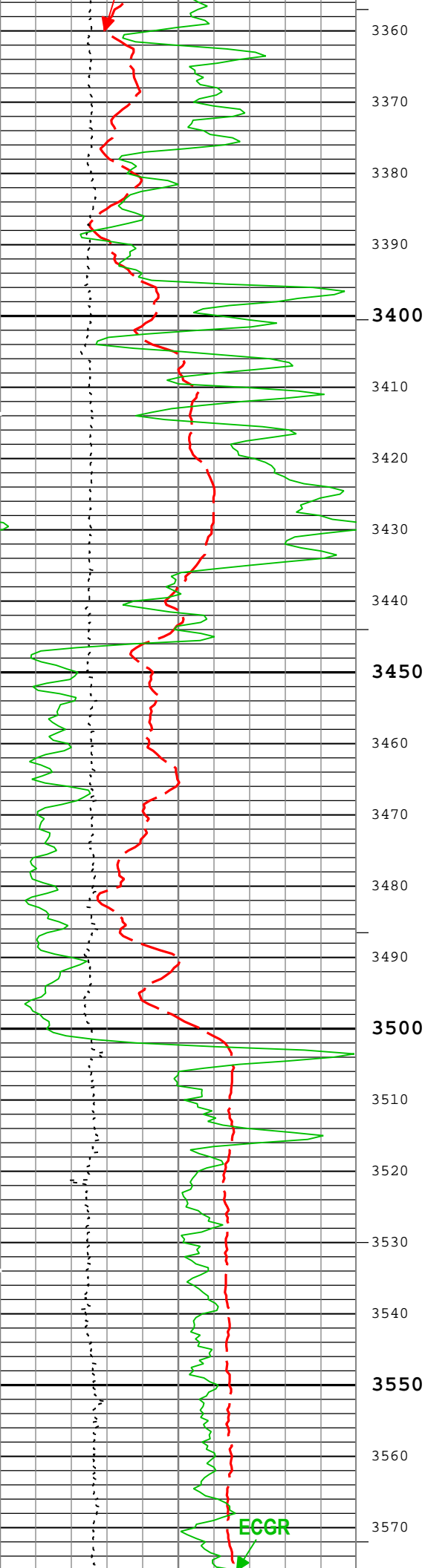


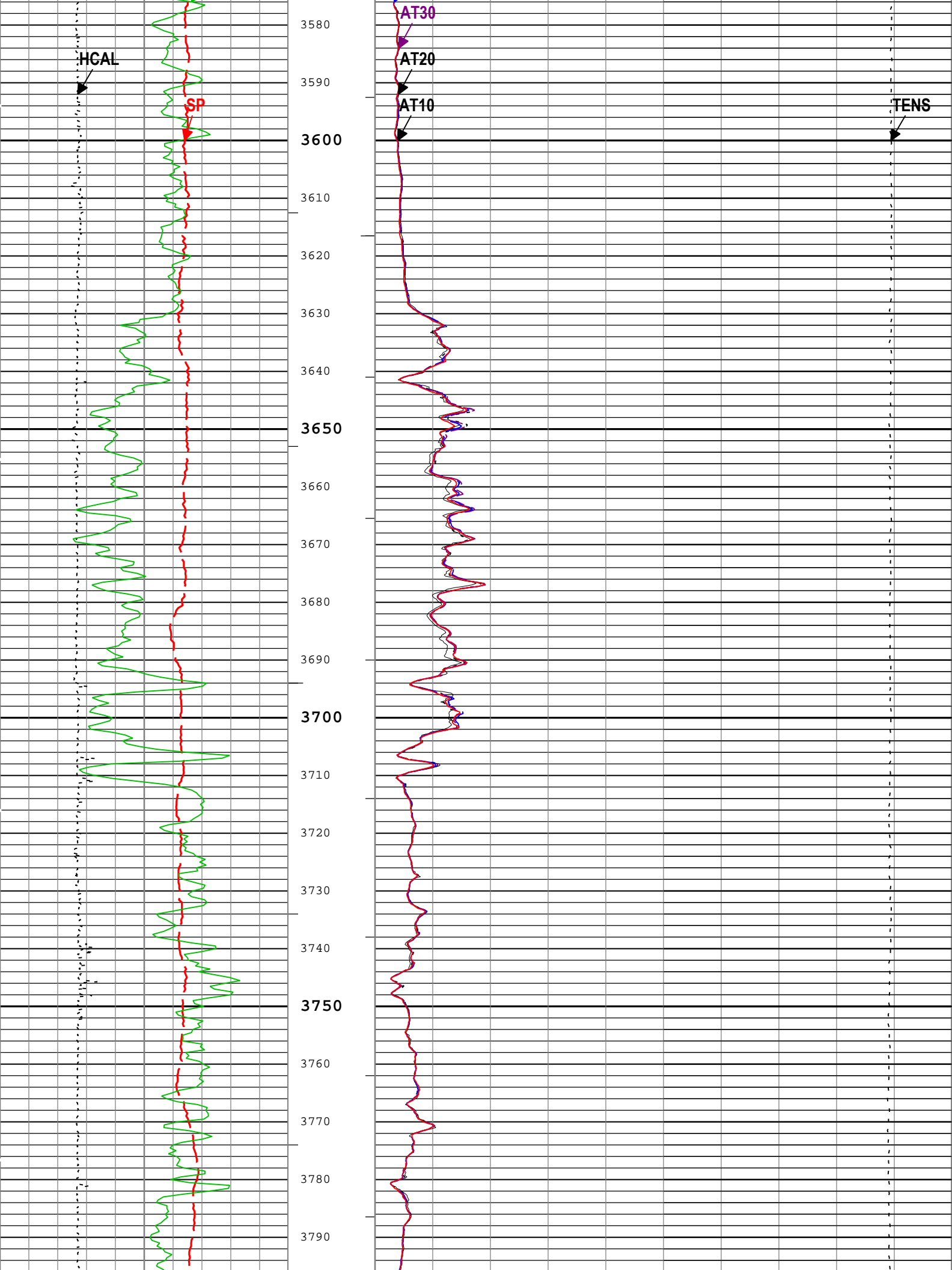


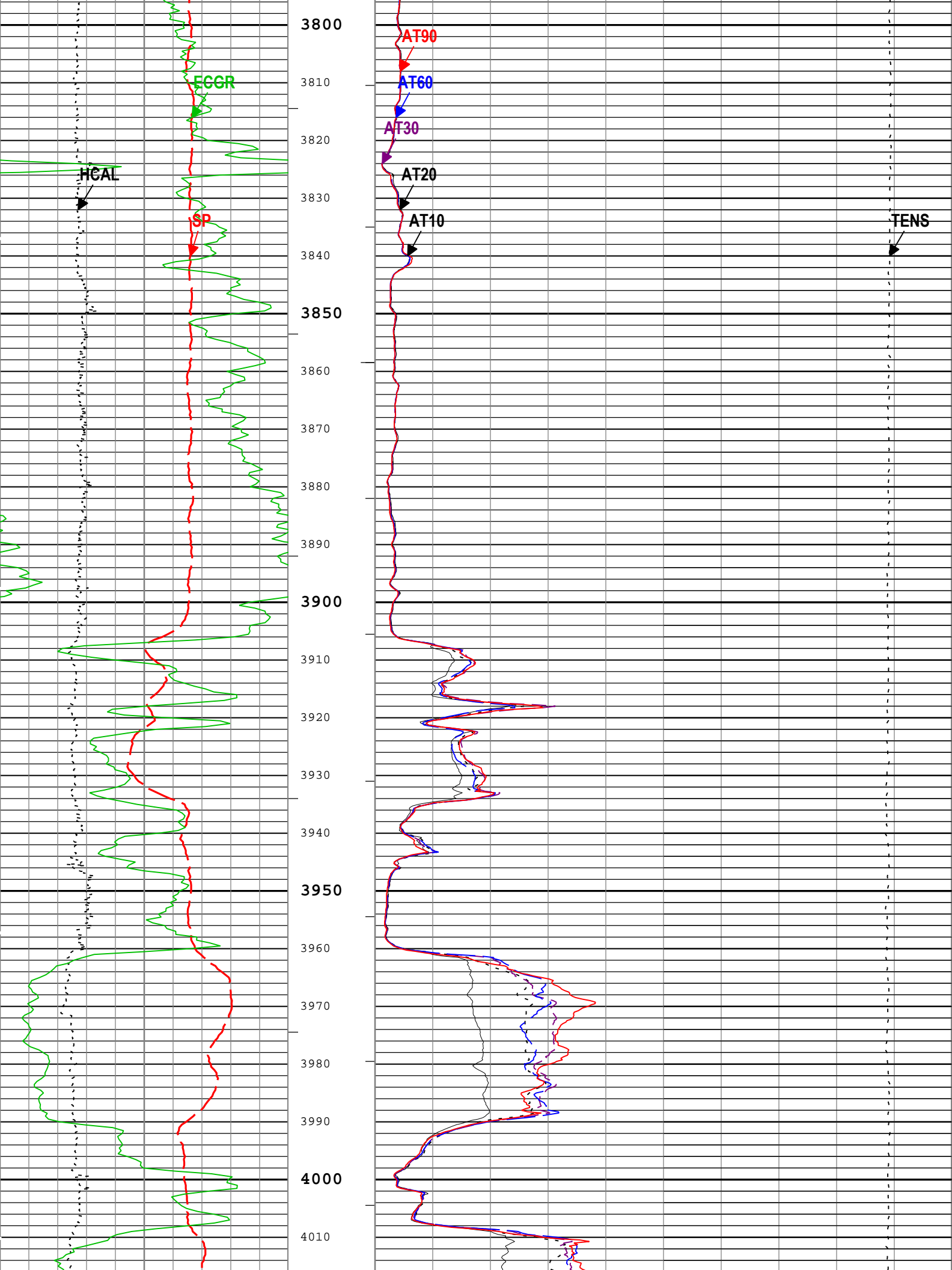




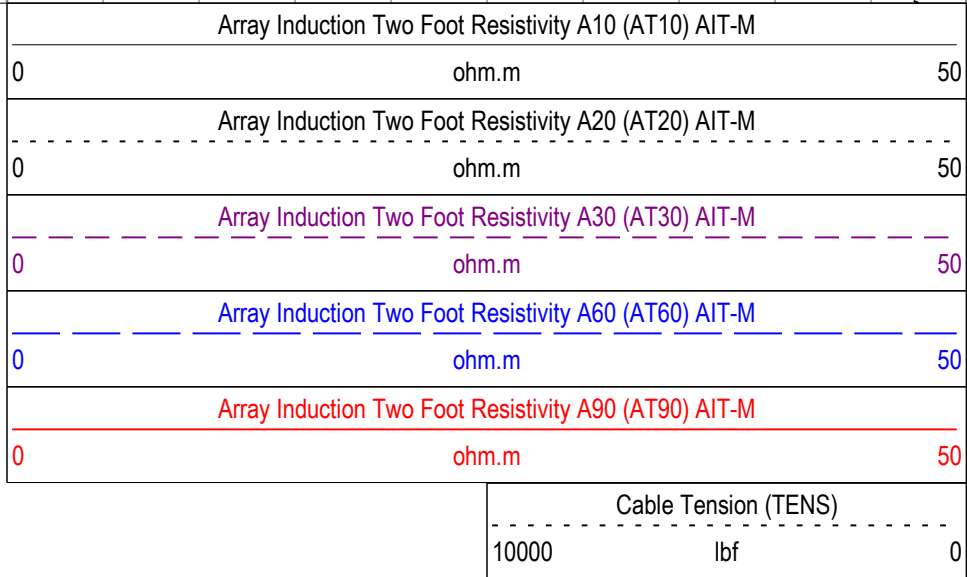
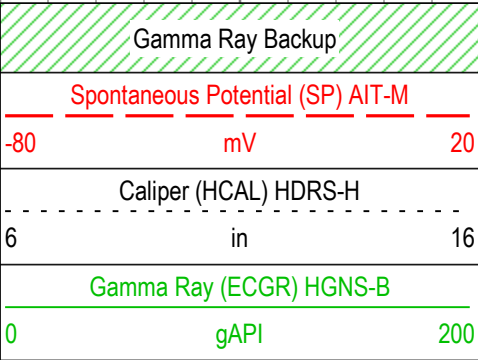
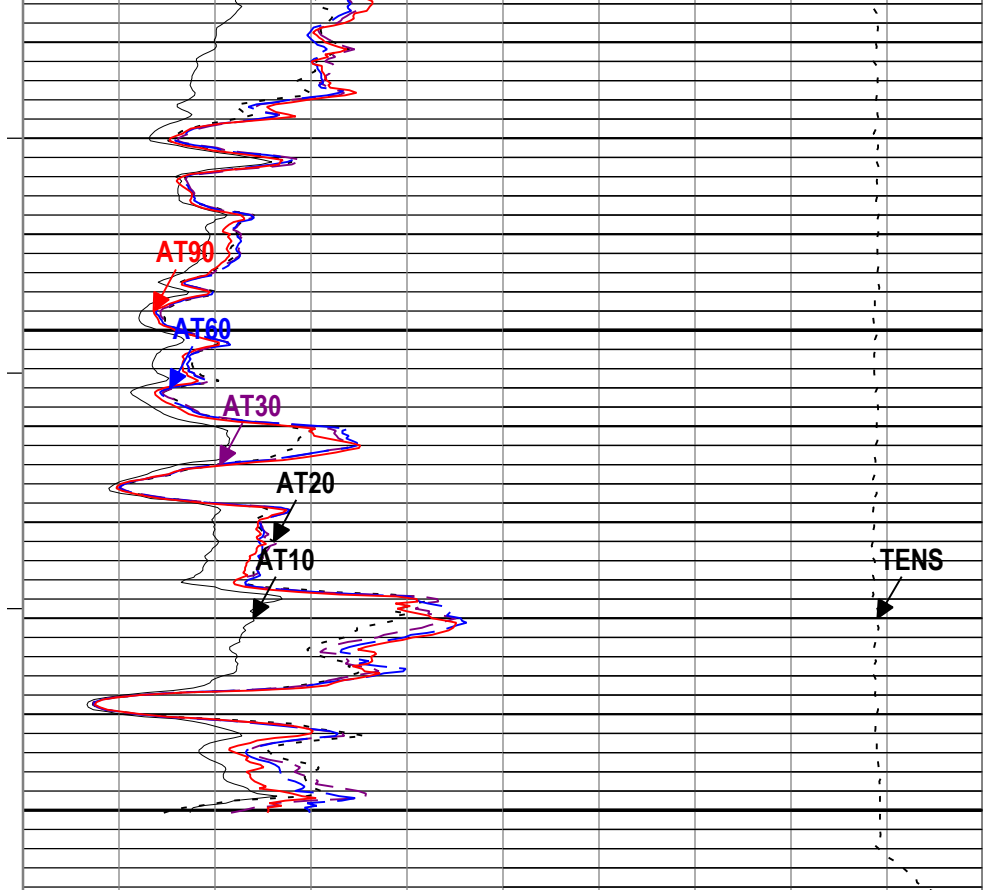
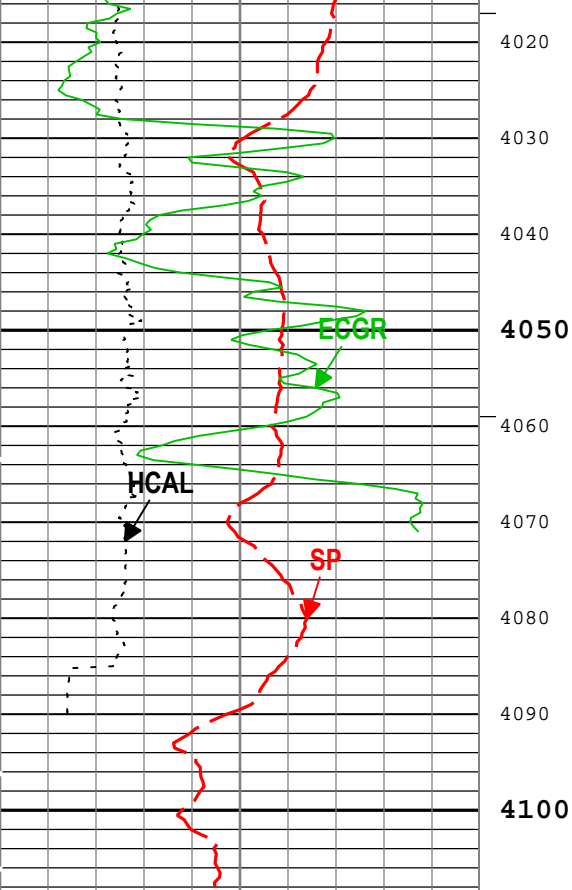












TIME\_1900 - Time Marked every 60.00 (s)

- 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 ( EMD 5in Induction Upper ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 16-Jun-2019 22:04:23

## Channel Processing Parameters

### 1A: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Mud Resistivity	
ASTA	Array Induction Tool Standoff	AIT-M	0.125	in
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	

BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	491	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	8.8	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	5.5	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
SP_SHIFT	SP Shift	AIT-M	40	mV
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	12.25	54	492
BS	7.875	492	4102

All depth are actual.

Tool Control Parameters

1A: Parameters

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

1A

5" Induction

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[2]:Up	Up	3850.94 ft	4107.85 ft	16-Jun-2019 8:05:26 PM	16-Jun-2019 8:10:48 PM	ON	2.47 ft	Yes
1A	Log[3]:Up	Up	101.38 ft	4108.30 ft	16-Jun-2019 8:15:40 PM	16-Jun-2019 9:28:48 PM	ON	2.93 ft	Yes

All depths are referenced to toolstring zero

Log	Company:St. Croix Operating, Inc.      Well:ROCKY 1 1A: Log[3]:Up:S002
-----	---

Description: AIT Basic Log Two    Format: Log ( EMD 5in Induction Upper RA )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth  
Creation Date: 16-Jun-2019 22:04:26

—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
--	----------------------------------

Repeat To Main

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

0ohm.m50

Main To Repeat

Repeat To Main

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

0ohm.m50

Main To Repeat

Repeat To Main

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

0ohm.m50

Main To Repeat

Repeat To Main

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

0ohm.m50

Main To Repeat

Repeat To Main

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

0ohm.m50

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

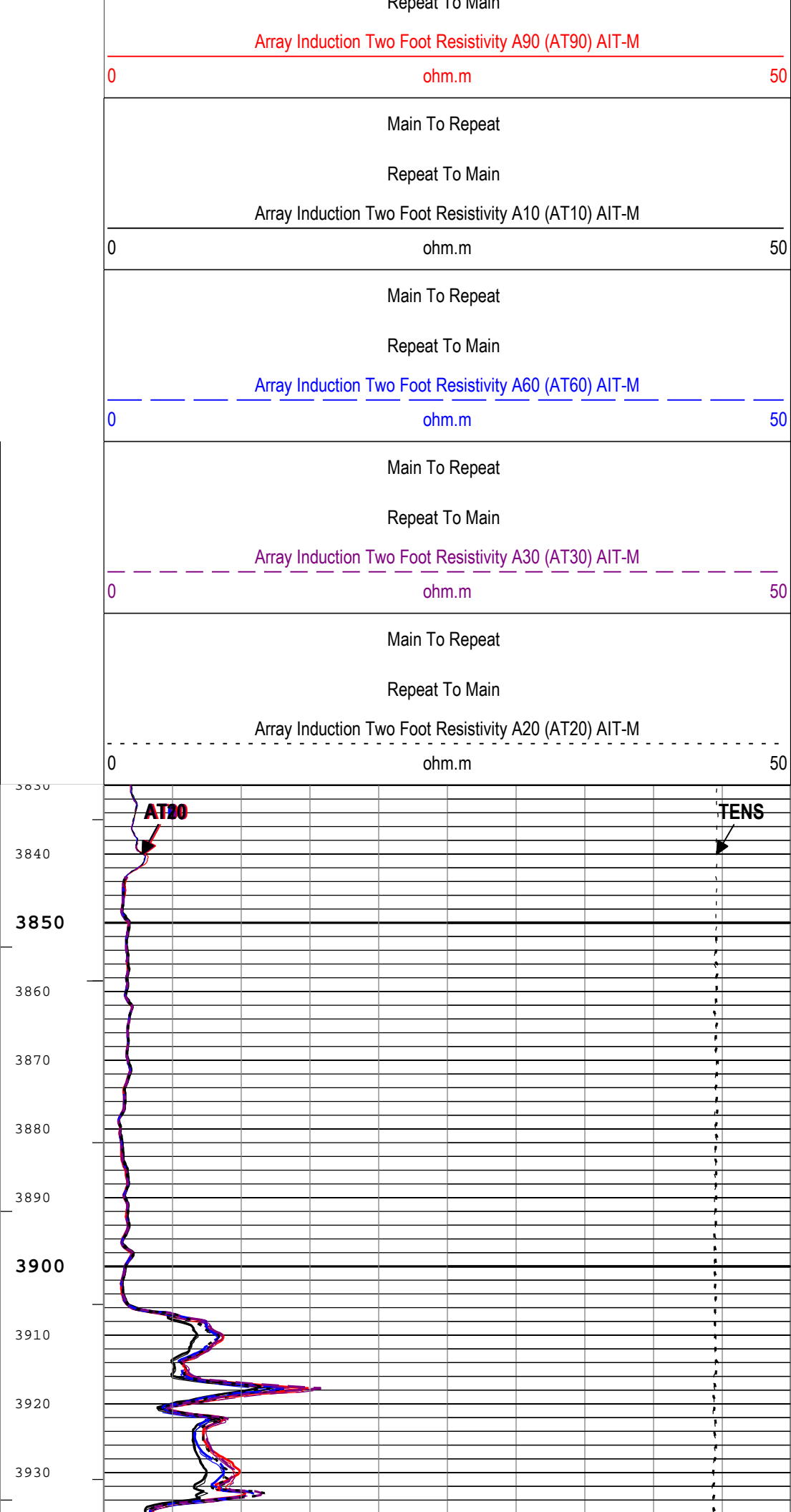
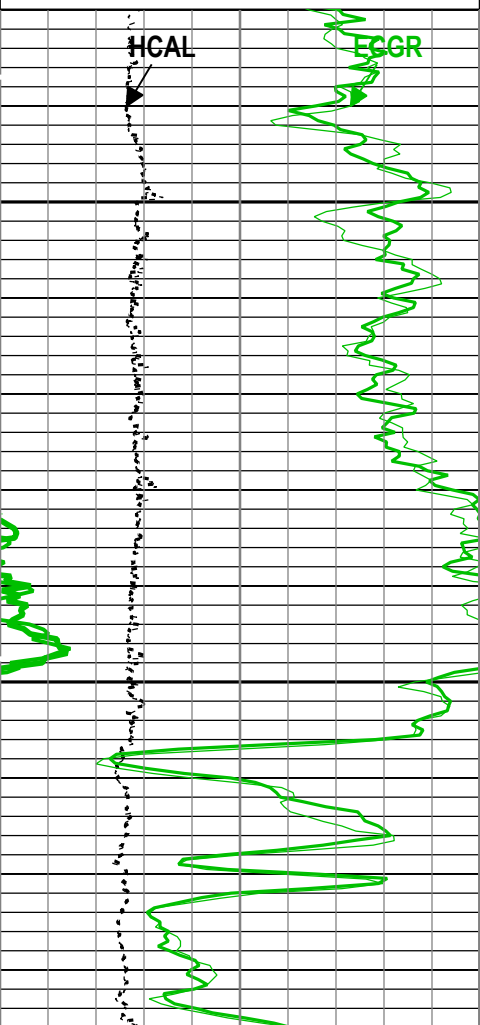
6in16

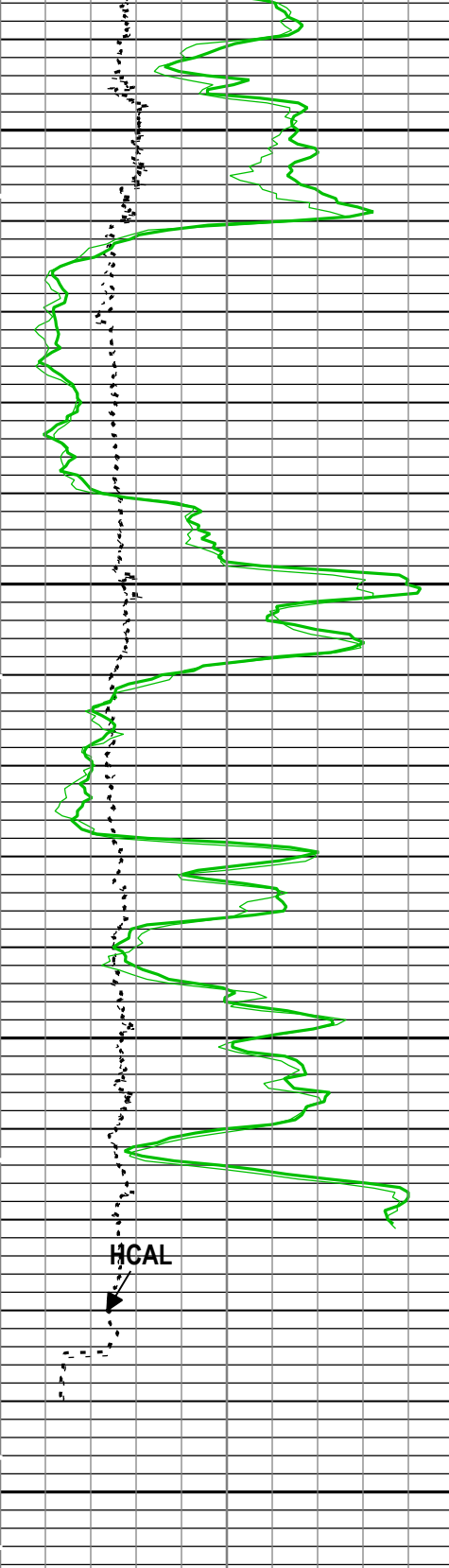
Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-B

0gAPI200



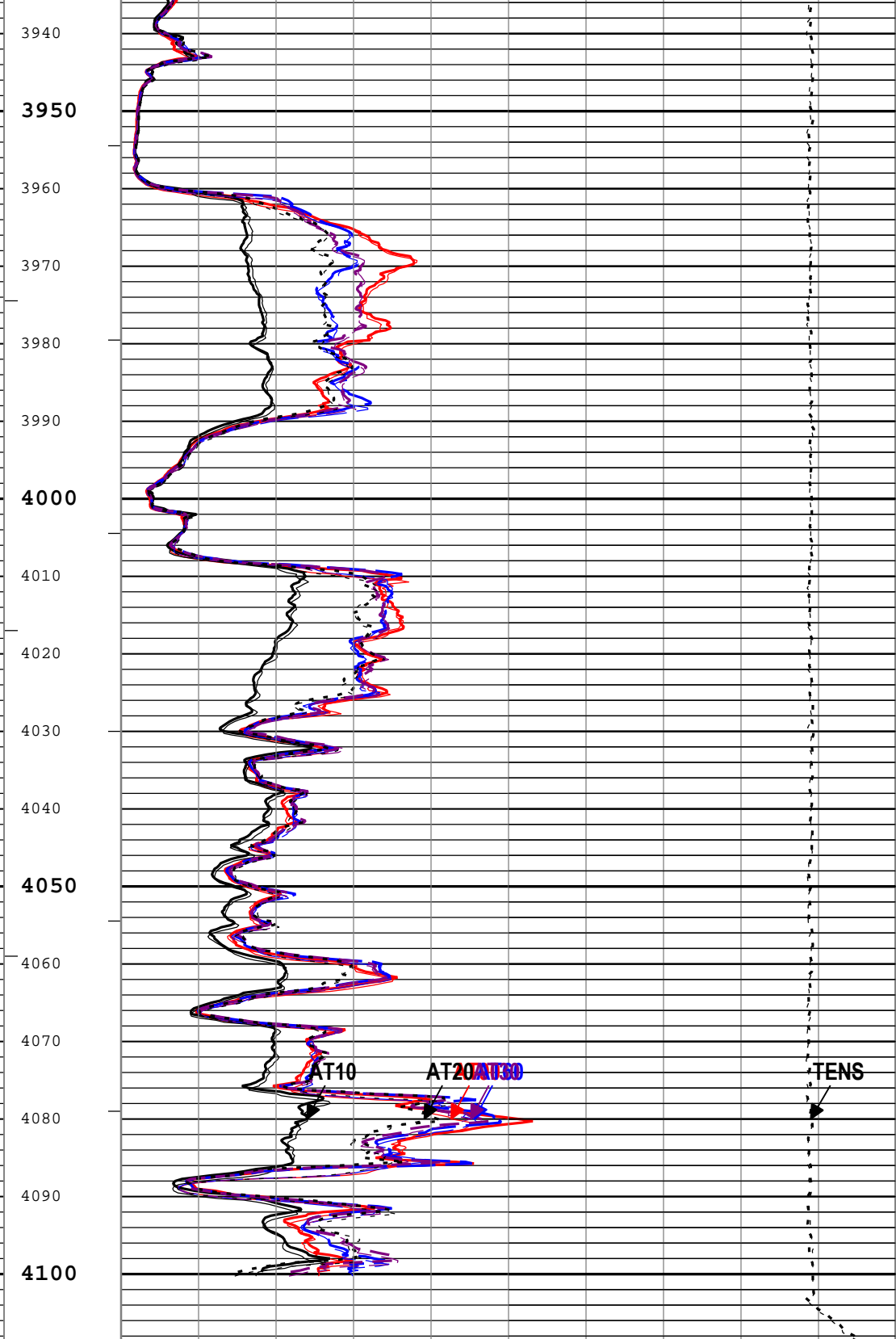


Main To Repeat  
Repeat To Main  
Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat  
Repeat To Main  
Gamma Ray (ECGR) HGNS-B

0 gAPI 200



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

0 ohm.m 50

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

0 ohm.m 50



Test Loop Gain - 6		Master	1.000	0.950	0.990	1.050	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 6	deg	Master	0	-3.000	0.284	3.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 7		Master	1.000	0.950	1.011	1.050	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 7	deg	Master	0	-3.000	-0.005	3.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		20:35:50 21-Jan-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-83.167	119.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-316.754	2250.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	167.806	204.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 1		Master	-----	-625.000	110.009	625.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	107.589	156.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 2		Master	-----	-350.000	-82.171	350.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	58.227	89.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 3		Master	-----	-250.000	20.054	250.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	25.302	35.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 4		Master	-----	-63.000	7.066	63.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	11.986	24.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 5		Master	-----	-50.000	10.548	50.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.775	15.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 6		Master	-----	-30.000	-2.755	30.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.574	5.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 7		Master	-----	-30.000	-10.719	30.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM):		20:35:50 21-Jan-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Coarse Gain		Master	1.000	0.800	0.815	1.200	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Fine Gain		Master	1.000	0.800	0.815	1.200	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## AIT Electronics Check - Thru Calibration Check

Master (EEPROM):		20:35:50 21-Jan-2019	Before (Measured):	20:50:55 13-Jun-2019	After:		
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 0	V	Master	-----	0.366	0.622	0.854	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.366	0.622	0.854	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.000	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 0	deg	Master	-----	137.000	-174.143	-103.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	137.000	-174.173	-103.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	-0.030	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 1	V	Master	-----	0.762	1.276	1.778	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.762	1.276	1.778	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.000	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 1	deg	Master	-----	136.000	-175.242	-104.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	136.000	-175.275	-104.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	-0.033	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 2	V	Master	-----	0.372	0.632	0.868	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.372	0.632	0.868	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.000	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	-----	132.000	-178.822	-108.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before	-----	132.000	-178.856	-108.000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	-0.034	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

Thru Cal Mag - 3	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	0.420 0.420   	0.715 0.715  0.000 -----	0.980 0.980   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	131.000 131.000   	-179.595 -179.631  -0.036 -----	-109.000 -109.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 4	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	0.804 0.804   	1.338 1.339  0.001 -----	1.876 1.876   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 4	deg	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	125.000 125.000   	174.179 174.136  -0.043 -----	-115.000 -115.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 5	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1.176 1.176   	1.945 1.946  0.001 -----	2.744 2.744   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	122.000 122.000   	172.534 172.485  -0.049 -----	-118.000 -118.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1.176 1.176   	1.942 1.943  0.001 -----	2.744 2.744   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	121.000 121.000   	172.576 172.529  -0.047 -----	-119.000 -119.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	0.846 0.846   	1.396 1.396  0.000 -----	1.974 1.974   	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	115.000 115.000   	171.775 171.699  -0.076 -----	-125.000 -125.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
SPA Zero	mV	Master Before After Before-Master After-Before	   ----- -----	-50.000 -50.000   	-0.117 -0.103  0.014 -----	50.000 50.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
SPA Plus	mV	Master Before After Before-Master After-Before	  ----- ----- -----	941.000 941.000   	990.569 990.827  0.258 -----	1040.000 1040.000   	<div><div></div><div></div><div></div><div></div><div></div></div>
Temperature Zero	V	Master Before After Before-Master	  ----- -----	-0.050 -0.050   	0.000 0.000  0.000 -----	0.050 0.050   	<div><div></div><div></div><div></div><div></div><div></div></div>

		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 1A

Primary Equipment :							
	HILT High-Resolution Control Cartridge, 150 degC	HRCC-H		4747			
	HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H		4828			
Auxiliary Equipment :							
	HRDD Backscatter Detector	Backscatter					
	HRDD Long Spacing Detector	Long Spacing		28649			
	HRDD Short Spacing Detector	Short Spacing					
	Cesium 137 Gamma-Ray Logging Source	GSR-J		5471			
	HILT High-Resolution Control Cartridge, 150 degC	HRCC-H		4747			
	HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H					
Calibration Parameter :							
	Small Ring Size (Caliper Calibration Small Ring)	8.00					
	Large Ring Size (Caliper Calibration Large Ring)	12.00					

## HDRS Density Calibration - Inversion Results

Master (EEPROM):		16:22:24 15-May-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.602	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696	
Pe Aluminum		Master	2.570	2.470	2.579	2.670	
Pe Magnesium		Master	2.650	2.550	2.581	2.750	

## HDRS Density Calibration - Deviation Summary

Master (EEPROM):		16:22:24 15-May-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.4477	0.6000	
BS Max Deviation	%	Master	0	-1.6000	1.4584	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.7723	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.2877	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.9001	1.5000	
LS Max Deviation	%	Master	0	-3.5000	2.4176	3.5000	

## HDRS Density Calibration - Background Summary

Master (EEPROM):		16:22:24 15-May-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master			0.7377		
BS Window Sum	1/s	Master			23866		
SS Window Ratio		Master			0.4853		
SS Window Sum	1/s	Master			9993		
LS Window Ratio		Master			0.3030		
LS Window Sum	1/s	Master			1174		

## HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM):		16:22:24 15-May-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master		1000	1553	2400	
SS PM High Voltage	V	Master		1000	1491	2400	
LS PM High Voltage	V	Master		1000	1279	2400	

## HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM):		16:22:24 15-May-2019					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	



Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crystal Resolution	%	Master		5.00	12.15	25.00	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Crystal Resolution	%	Master		5.00	9.39	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Crystal Resolution	%	Master		5.00	8.42	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>

## HGNS-B (HILT Gamma-Ray and Neutron Sonde, 125 degC) Calibration - Run 1A

### Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 125 degC HGNS-B 1855

### Auxiliary Equipment :

HGNS Accelerometer, 125 degC HACCZ-B 659

AmBe Neutron Logging Source NSR-F 5070

### Calibration Parameter :

Water Temperature (Calibration Tank Water Temperature) 70.0

Housing Size (Thermal Housing Size) 3.38

JIG-BKG (Jig minus background reference) 165

## HGNS Accelerometer Calibration - Accelerometer Accumulations

Before:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement - 0	ft/s2	Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>

## HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 18:00:00 14-Dec-1998

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Accelerometer Manufacturer		Master			Sunstrand		<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Reference Temperature	degF	Master		30.2	68.0	122.0	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 0		Master	----	----	3999.000	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 1		Master	----	----	1.550	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 2		Master	----	----	0.051	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 3		Master	----	----	0.000	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 4		Master	----	----	2.181	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 5		Master	----	----	0.000	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 6		Master	----	----	0.000	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 7		Master	----	----	0.000	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 8		Master	----	----	295.900	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Accelerometer Coefficients - 9		Master	----	----	0.998	----	<div><div></div><div></div><div></div><div></div><div></div></div>

## HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 15:19:00 20-Mar-2019 Before (Measured): 20:48:42 13-Jun-2019 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	27.4	40.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	0	5.0	27.9	40.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----	-4.1	0.5	4.1	<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Far Zero Measurement	1/s	Master	0	5.0	30.3	40.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	0	5.0	26.8	40.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----	-4.5	-3.5	4.5	<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Near Plus Measurement	1/s	Master	6031.0	4700.0	5058.0	6900.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
Far Plus Measurement	1/s	Master	2793.0	1900.0	2099.0	2900.0	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----	----	----	----	<div><div></div><div></div><div></div><div></div><div></div></div>

Near Corrected Plus Measurement	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	4700.0 ----- ----- ----- -----	5182.0 ----- ----- ----- -----	6900.0 ----- ----- ----- ----- -----	<div><div></div></div> <div><div></div></div> <div><div></div></div> <div><div></div></div> <div><div></div></div>
Far Corrected Plus Measurement	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1900.0 ----- ----- ----- -----	2165.0 ----- ----- ----- ----- -----	2900.0 ----- ----- ----- ----- -----	<div><div></div></div> <div><div></div></div> <div><div></div></div> <div><div></div></div> <div><div></div></div>

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

Before (Measured):		20:58:29 13-Jun-2019		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div> <div><div></div></div> <div><div></div></div>
RGR Zero Measurement	gAPI	Before	30.0	0	81.1	120.0	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After	----	----	----	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>
RGR Plus Measurement	gAPI	Before	185.4	157.1	164.0	206.3	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After	----	----	NOT DONE	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>
GR Calibration Gain		Before	0.89	0.80	1.01	1.05	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After	----	----	----	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div> <div><div></div></div> <div><div></div></div>

Company:	St. Croix Operating, Inc.	Schlumberger
Well:	ROCKY 1	
Field:	Wildcat	
County:	Washington	
State:	Colorado	

Platform Express

Array Induction with 5" Linear

