

Company: ENCANA OIL & GAS

Well: Twin Creek 12-5D1 (F12E)

Field: MAMM CREEK

County: GARFIELD State: COLORADO

\*\*PLATFORM EXPRESS\*\*

COMPENSATED NEUTRON, LITHO-DENSITY

INDUCTION RESISTIVITY, GR, SP

County:	GARFIELD		Elev.:	6144.80 f
Field:	MAMM CREEK		K.B.:	6166.80 ft
Location:	SHL: 2560' FNL & 1566' FWL		G.L.:	6144.80 ft
Well:	Twin Creek 12-5D1 (F12E)		D.F.:	6165.80 ft
Company:	ENCANA OIL & GAS			
Location:				
Permanent Datum:		Ground Level	6144.80 f	
Log Measured From:		Kelly Bushing	22.00 ft above Perm. Datum	
Drilling Measured From:		Kelly Bushing		
API Serial No.	Section:	Township:	Range:	
05-045-20388-00	12	7S	92W	
Logging Date	07-Feb-2012			
Run Number	Run 1, PEX-AIT			
Depth Driller	5532.00 ft			
Schlumberger Depth	5528.00 ft			
Bottom Log Interval	5528.00 ft			
Top Log Interval	1144.00 ft			
Casing Driller Size @ Depth	9.625 in @ 1200.00 ft			
Casing Schlumberger	1144 ft			
Bit Size	8.75 in			
Type Fluid In Hole	Water			
MUD		Viscosity	38 s	
Density		PH	8.8	
Fluid Loss				
Source of Sample		Active Tank		
RM @ Meas Temp	1.86 ohm.m	@	43 degF	
RMF @ Meas Temp	1.57 ohm.m	@	43 degF	
RMC @ Meas Temp	2.59 ohm.m	@	43 degF	
Source RMF	Calculated	Calculated		
RM @ BHT	0.61 @ 146	0.51 @	146	
RMF @ BHT				
Max Recorded Temperatures				
Circulation Stopped	Time	20:00:00		
Logger on Bottom	Time	05:27:30		
Unit Number	Location:	VERNAL		
Recorded By	Josh Rosner/Curtis Schaaft			
Witnessed By	Richard			

## Disclaimer

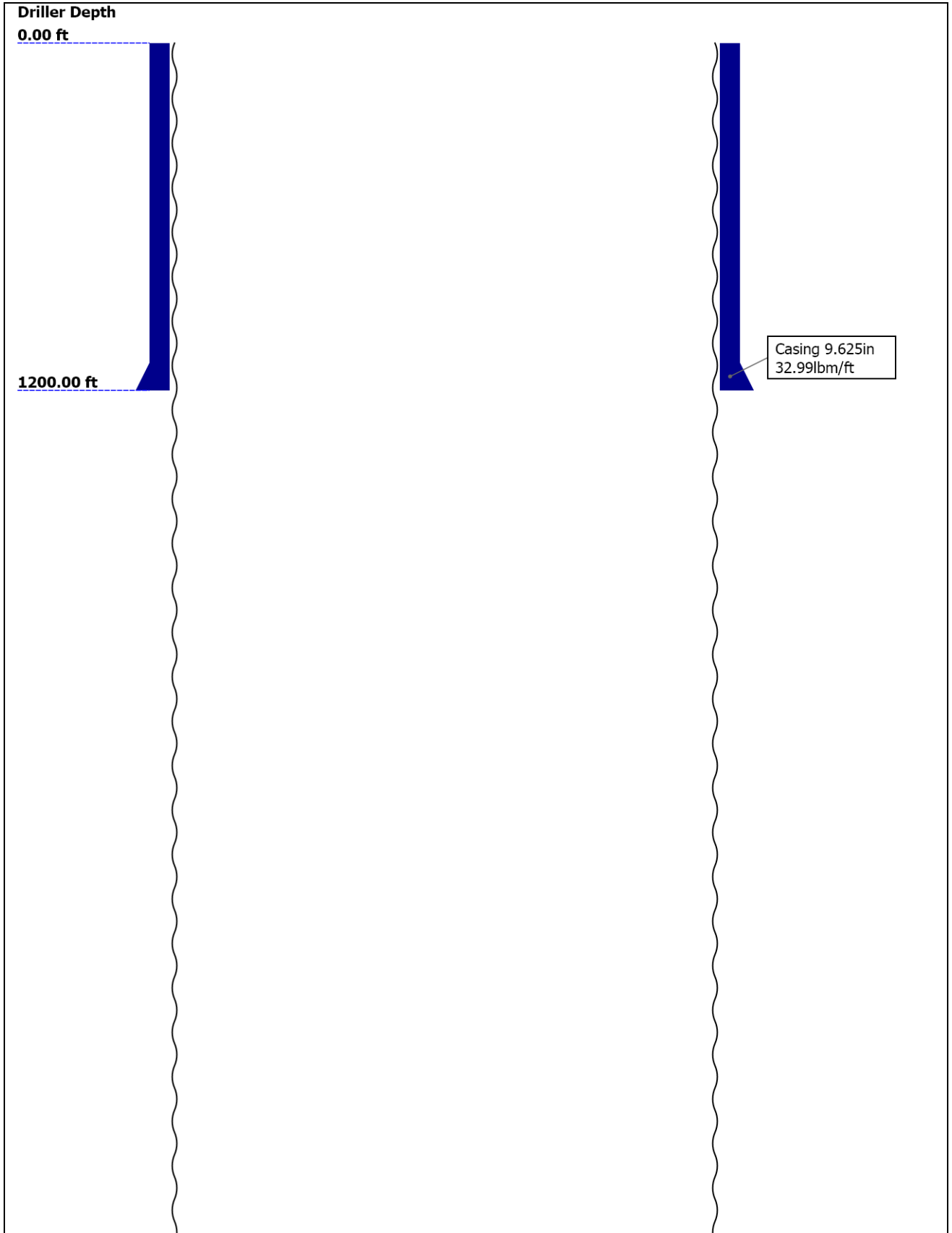
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (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





### Borehole Size/Casing/Tubing Record

<b>Bit</b>						
Bit Size ( in )	8.75					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	5532					
Bottom Logger ( ft )	5528					
<b>Casing</b>						
Size ( in )	9.625					
Weight ( lbm/ft )	32.99					
Inner Diameter ( in )	8.975					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	1200					
Bottom Logger ( ft )	1144					

### Borehole Fluids

<b>Parameter( unit )</b>	Run 1, PEX-AIT					
Fluid Type	Water					
Max Recorded Temperatures ( degF )	147					
Source of Sample	Active Tank					
Salinity ( ppm )	1100					
Density ( lbm/gal )	12.3					
Viscosity ( s )	38					
Fluid Loss ( cm3 )						
PH	8.8					
Date/Time Circulation Stopped	06-Feb-2012 20:00:00					
Date Logger on Bottom	07-Feb-2012					
Time Logger on Bottom	05:27:30					
Source RMF	Calculated					
RMC	Calculated					
RM @ Meas Temp ( ohm.m@degF )	1.86 @ 43					
RMF @ Meas Temp ( ohm.m@degF )	1.57 @ 43					
RMC @ Meas Temp ( ohm.m@degF )	2.59 @ 43					

RM @ BHT ( ohm.m@degF )	0.61 @ 146				
RMF @ BHT ( ohm.m@degF )	0.51 @ 146				
RMC @ BHT ( ohm.m@degF )	0.84 @ 146				
Total Solid ( % )					
High Gravity Solids ( % )					

## Remarks and Equipment Summary

Run 1, PEX-AIT: Toolstring	Run 1, PEX-AIT: Remarks																												
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Equip name</th> <th style="width: 15%;">Length</th> <th style="width: 15%;">MP name</th> <th style="width: 15%;">Offset</th> </tr> </thead> <tbody> <tr> <td>LEH-QT:2603 LEH-QT:2603</td> <td style="color: blue;">43.57</td> <td></td> <td></td> </tr> <tr> <td>DTC-H:9466 ECH-KC DTC-H:9466</td> <td style="color: blue;">40.65</td> <td>CTEM HV</td> <td>39.75 0.00</td> </tr> <tr> <td>HGNS-H:3799 HGNS-H:3799 NPV-N NSR-F:5138 HMCA-H HGNS-H:3799 HAC CZ-H:1614</td> <td style="color: blue;">37.65</td> <td>ToolStatus TelStatus Temperature GR</td> <td>37.65 37.65 37.62 36.91</td> </tr> <tr> <td>HDRS-H:3867 ECH-MEB HRC-H:3889 HRMS-H:3867 Backscatter GPV-Q Short Spacing:27 692 Long Spacing:28 706 HRGD-H:3912 GSR-J:5415</td> <td style="color: blue;">28.24</td> <td>CNL Porosity HGNS HMCA Accelerometer HRCC</td> <td>30.57 28.24 28.24 0.00 24.24</td> </tr> <tr> <td>AIT-H:295 AHIS:295 AHRM:295</td> <td style="color: blue;">16.00</td> <td>MCFL Caliper TLD Density</td> <td>18.81 18.33 17.94</td> </tr> <tr> <td></td> <td></td> <td>Power Supply Induction Temperature</td> <td>7.91 7.91 7.91</td> </tr> </tbody> </table>	Equip name	Length	MP name	Offset	LEH-QT:2603 LEH-QT:2603	43.57			DTC-H:9466 ECH-KC DTC-H:9466	40.65	CTEM HV	39.75 0.00	HGNS-H:3799 HGNS-H:3799 NPV-N NSR-F:5138 HMCA-H HGNS-H:3799 HAC CZ-H:1614	37.65	ToolStatus TelStatus Temperature GR	37.65 37.65 37.62 36.91	HDRS-H:3867 ECH-MEB HRC-H:3889 HRMS-H:3867 Backscatter GPV-Q Short Spacing:27 692 Long Spacing:28 706 HRGD-H:3912 GSR-J:5415	28.24	CNL Porosity HGNS HMCA Accelerometer HRCC	30.57 28.24 28.24 0.00 24.24	AIT-H:295 AHIS:295 AHRM:295	16.00	MCFL Caliper TLD Density	18.81 18.33 17.94			Power Supply Induction Temperature	7.91 7.91 7.91	<p>TOOL RAN AS PER TOOL SKETCH</p> <p>HGNS RAN ECCENTERED WITH BOWSPRING</p> <p>AIT RAN ECCENTERED WITH TWO 1.5" STANDOFFS</p> <p>MATRIX: SANDSTONE (2.68 G/CC)</p> <p>LOG CORRELATED TO E&amp;P CBL LOG (30-JAN-2012)</p> <p>RIG: NABORS M15</p> <p>THANK YOU FOR CHOOSING SCHLUMBERGER!</p>
Equip name	Length	MP name	Offset																										
LEH-QT:2603 LEH-QT:2603	43.57																												
DTC-H:9466 ECH-KC DTC-H:9466	40.65	CTEM HV	39.75 0.00																										
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		Power Supply Induction Temperature	7.91 7.91 7.91																										



SP 0.08  
 Mud Resistivity 0.00  
 Head Tension  
 TOOL\_ZERO

Lengths are in ft

Maximum Outer Diameter = 6.125 in

Line: Sensor Location, Value: Gating Offset

All measurements are relative to TOOL\_ZERO

## Depth Summary

<b>Depth Control Parameters</b>	Run 1, PEX-AIT		
Conveyance Type	Wireline		
Reference Log Date	30-Jan-2012		
Reference Log Name	CEMENT BOND - E&P WIRELINE		
Reference Log Run Number	1		
Rig Type	LAND		
<b>Depth Remark Parameters</b>	Run 1, PEX-AIT		
Depth Remark 1	ALL SCHLUMBERGER DEPTH PROCEDURES FOLLOWED		
Depth Remark 2	IDW USED AS PRIMARY DEPTH CONTROL DEVICE, Z-CHART USED AS SECONDARY DEPTH CONTROL		
<b>Depth Measuring Device</b>	Run 1, PEX-AIT		
Type	IDW-B		
Serial Number	6122		
Calibration Date	11-JAN-2012		
Calibrator Serial Number	100518		
Calibration Cable Type	7-46AXS		
Wheel Correction 1	-6		
Wheel Correction 2	-5		
<b>Tension Device</b>	Run 1, PEX-AIT		
Type	CMTD-B/A		
Serial Number	2054		
Calibration Date	04-FEB-2012		
Calibrator Serial Number	100518		
Calibration Points	10		
Calibration RMS	15		
Calibration Peak Error	32		
<b>Logging Cable</b>	Run 1, PEX-AIT		
Type	7-46A-XS		
Serial Number	710065		
Logging Cable Length ( ft )	16700.00		

Run 1, PEX-AIT

MAIN PASS

## Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
IHV	Integrated Hole Volume	GCSE_UP_PASS	2006.02	ft3
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1520.8	ft3

## Software Version

Acquisition System	Version
MaxWell	3.0.9609.0
Application Patch	SP-20111012-3.0.9609.1274 EXP_APL-SEC-3.0.9609.1645

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	3.0.9609.1274
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	3.0.9609.0

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.0.9609.0	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.0.9609.0	2.0
AHIS	Array Induction Sonde - H	3.0.9609.1274	
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	3.0.9609.0	3.0

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run 1, PEX-AIT	Log[3]:Up	Up	127.50 ft	5537.17 ft	07-Feb-2012 8:42:34 AM	07-Feb-2012 10:15:31 AM	0.00 ft	true

All depths are referenced to toolstring zero

## Log

Run 1, PEX-AIT: Log[3]:Up E767917D-B2A7-44B9-B85F-C0BCA404EA9B

Description: Triple Combo standard resolution template for Platform Express Format: Log ( PEX Triple Combo StdRes ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Feb-2012 10:39:19

Channel	Source	Sampling
AT10	AIT-H:AHIS:AHIS	3in
AT20	AIT-H:AHIS:AHIS	3in
AT30	AIT-H:AHIS:AHIS	3in
AT60	AIT-H:AHIS:AHIS	3in
AT90	AIT-H:AHIS:AHIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in
IHV	Borehole	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
RXOZ	HDRS-H:HRMS-H:HRGD-H	2in
SP	AIT-H:AHIS:AHIS	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in

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

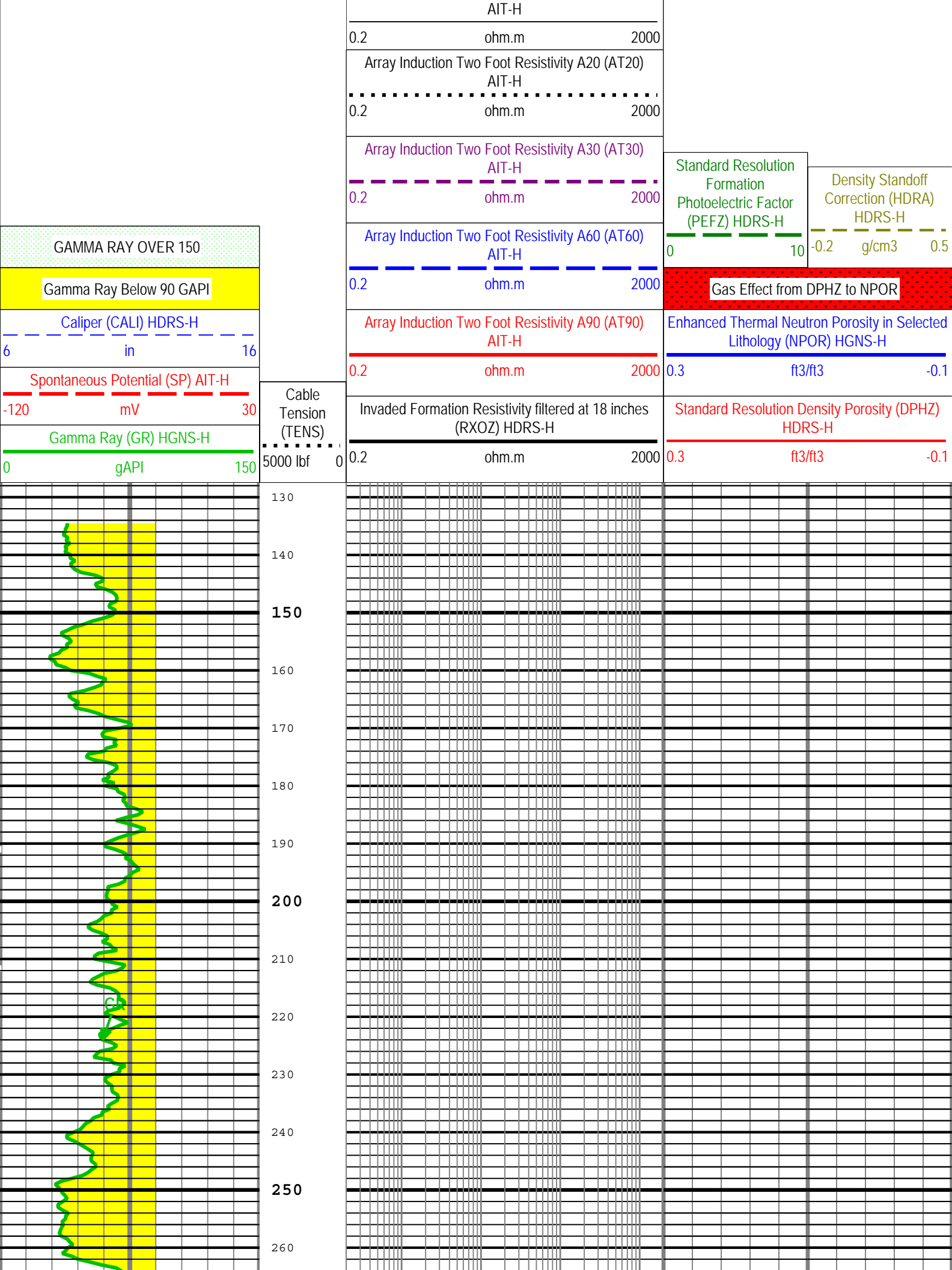
└─ICV - Integrated Cement Volume every 100.00 (ft3)

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

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

TIME\_1900 - Time Marked every 60.00 (s)

Array Induction Two Foot Resistivity A10 (AT10)



GAMMA RAY OVER 150

Gamma Ray Below 90 GAPI

Caliper (CALI) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-H

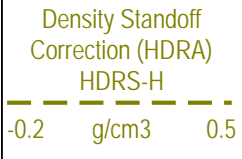
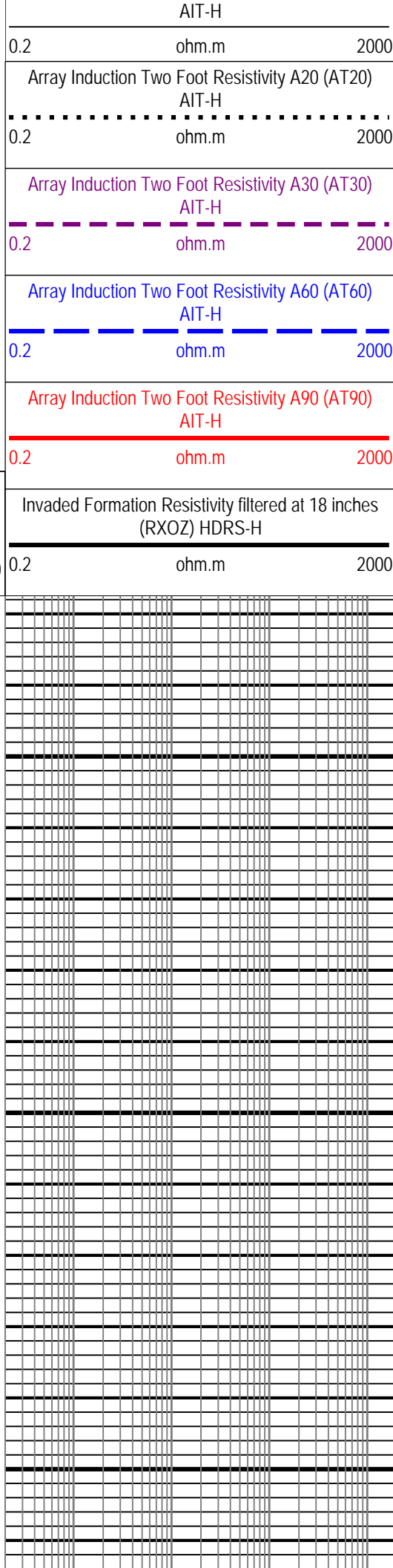
-120 mV 30

Gamma Ray (GR) HGNS-H

0 gAPI 150

Cable  
Tension  
(TENS)

5000 lbf 0



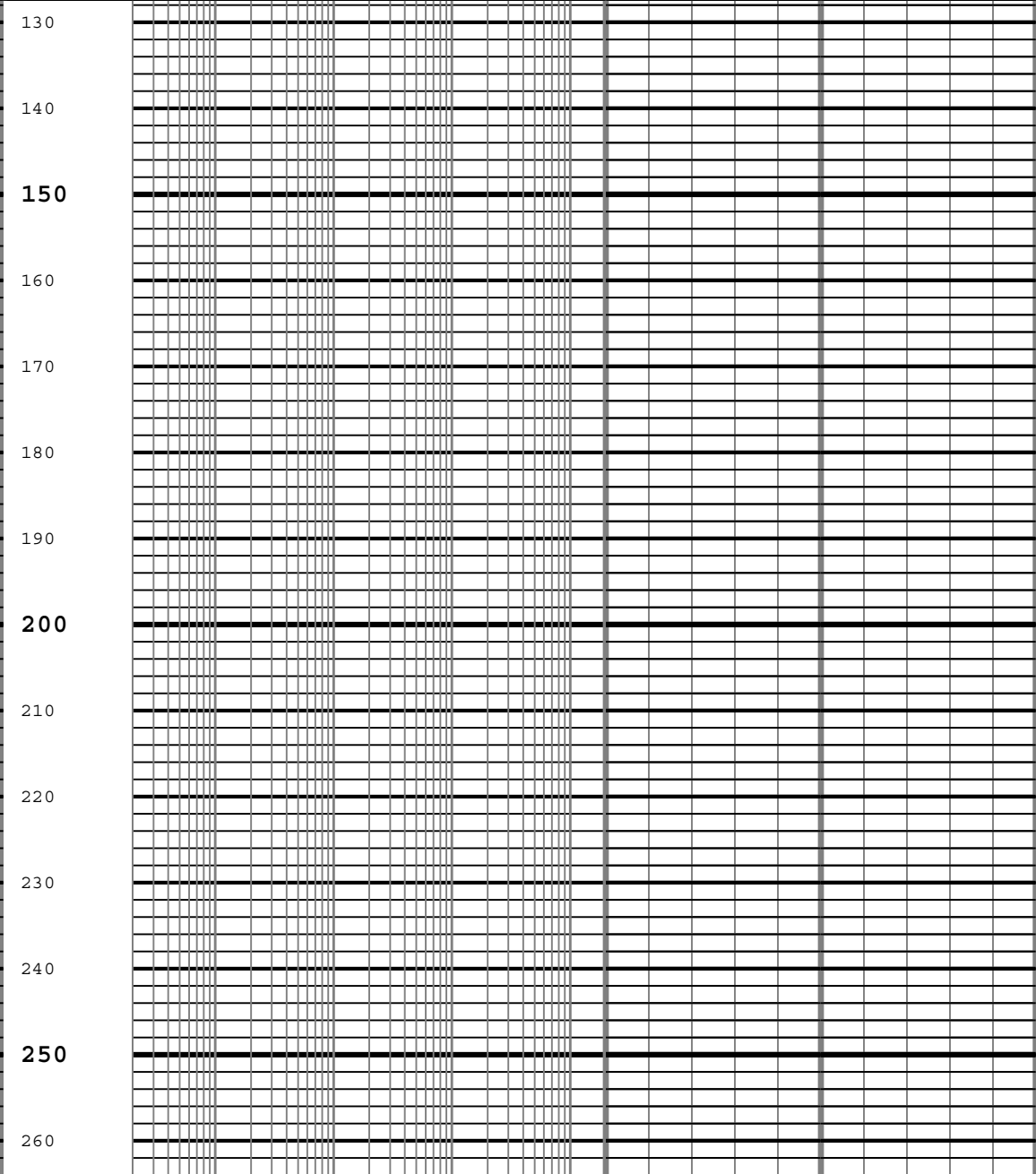
Gas Effect from DPHZ to NPOR

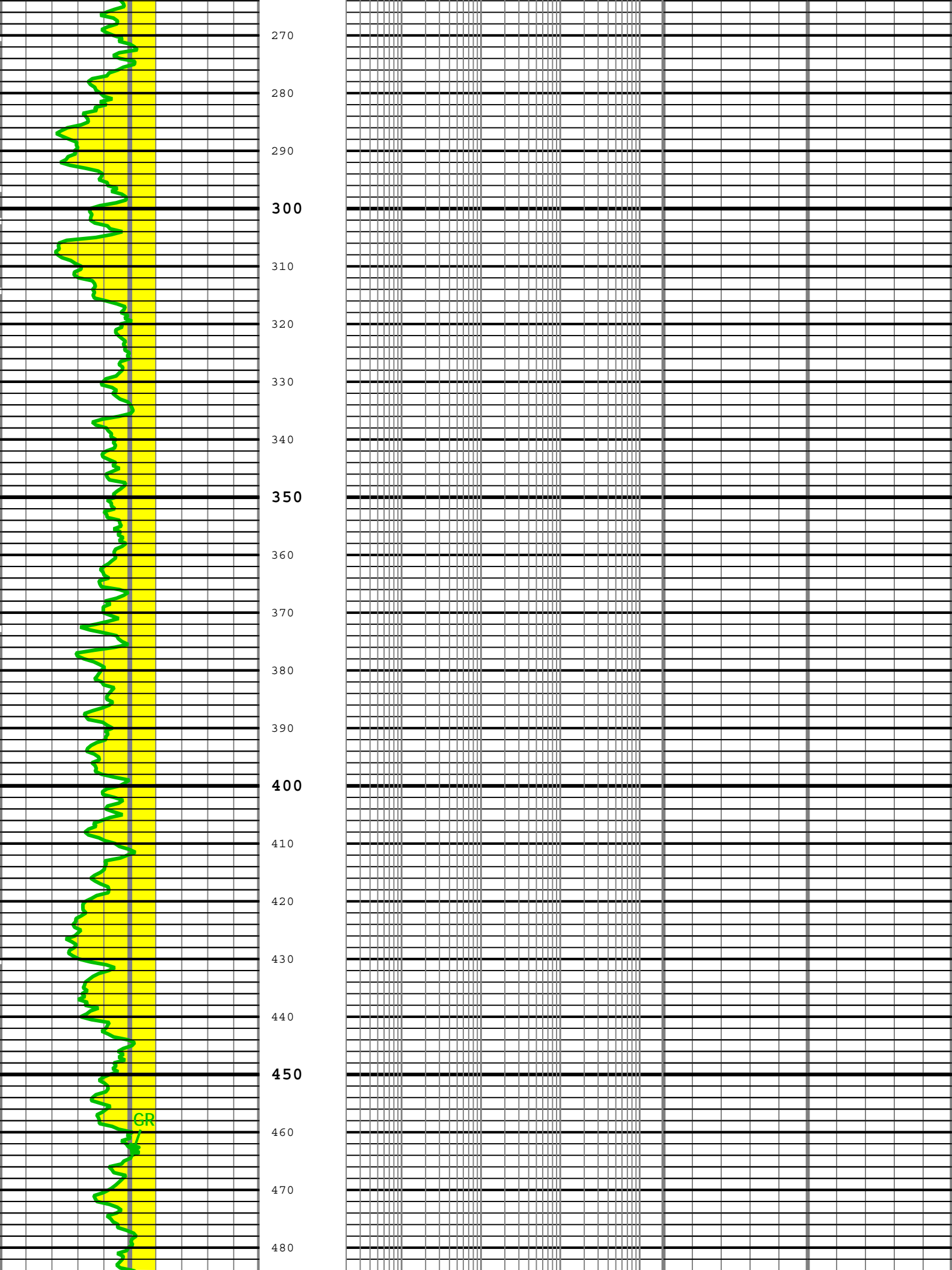
Enhanced Thermal Neutron Porosity in Selected  
Lithology (NPOR) HGNS-H

0.3 ft3/ft3 -0.1

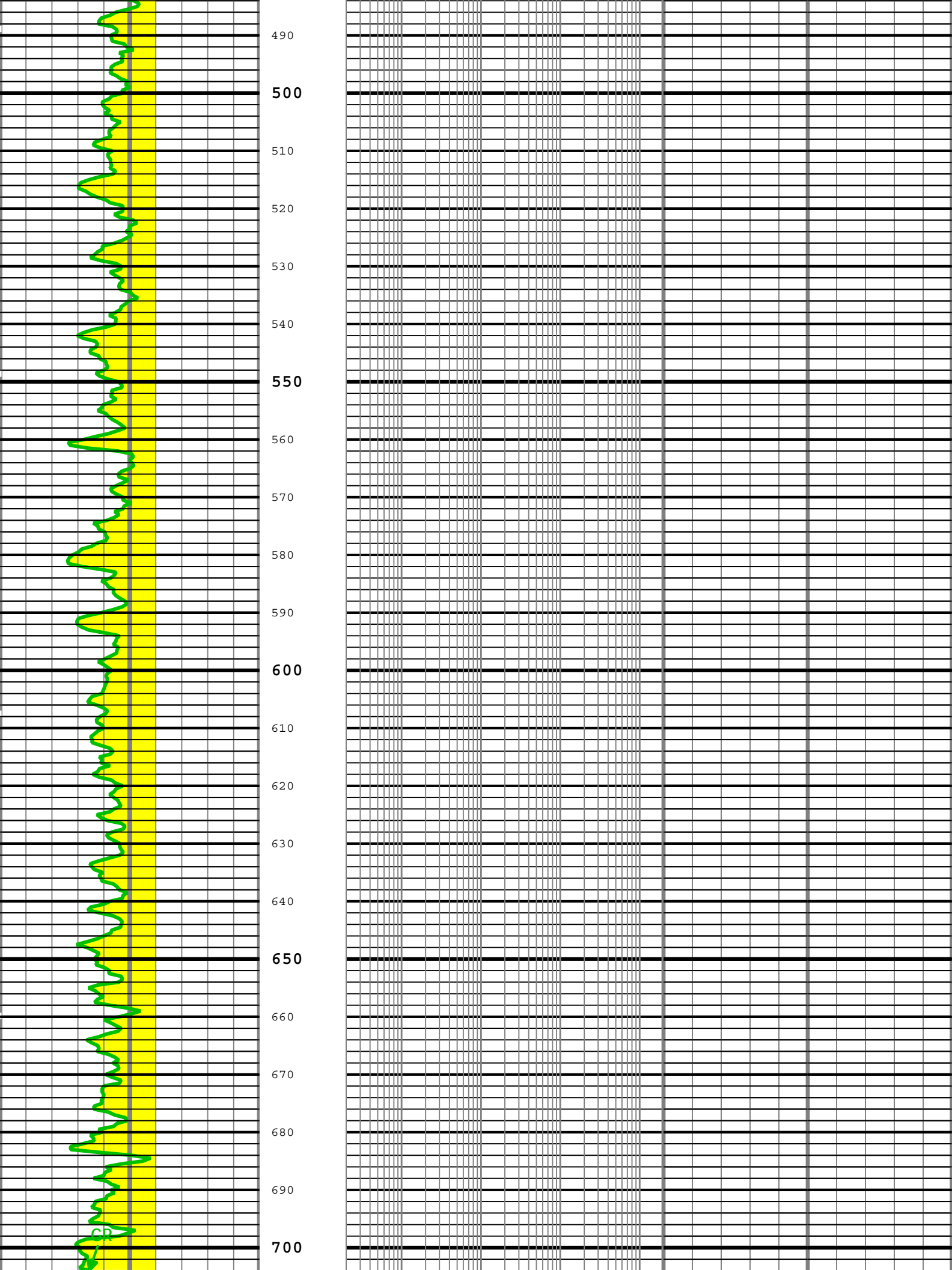
Standard Resolution Density Porosity (DPHZ)  
HDRS-H

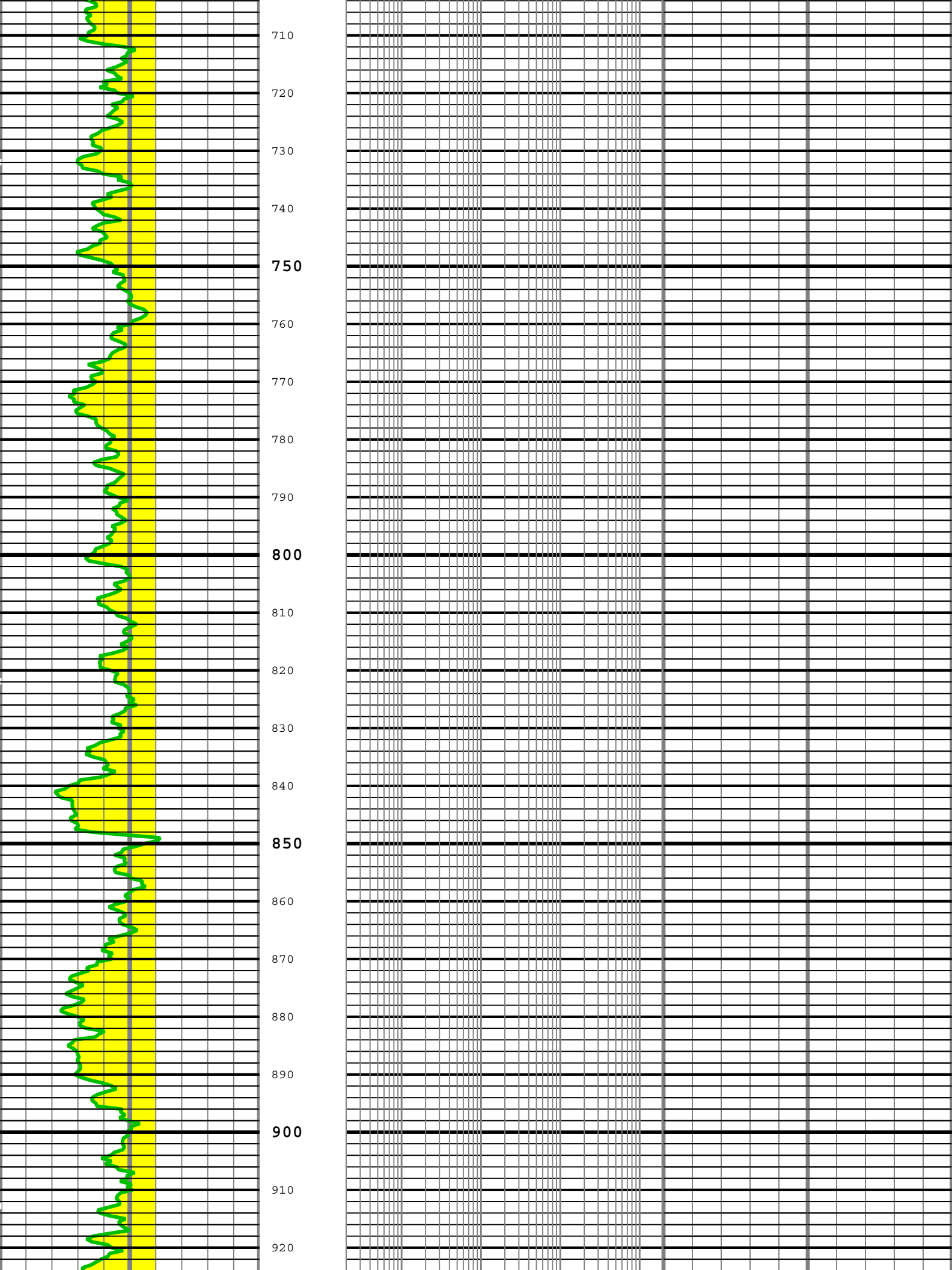
0.3 ft3/ft3 -0.1

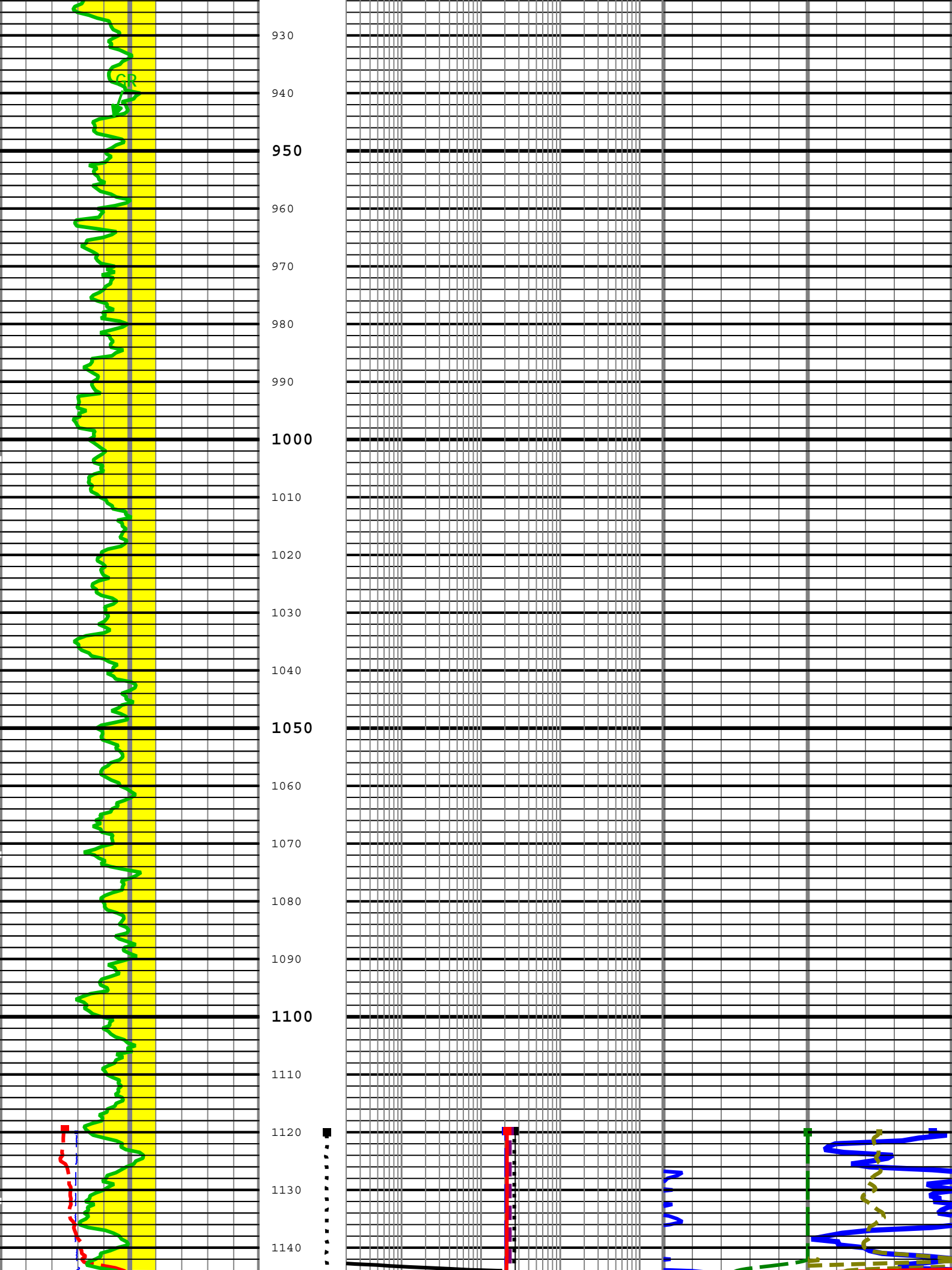


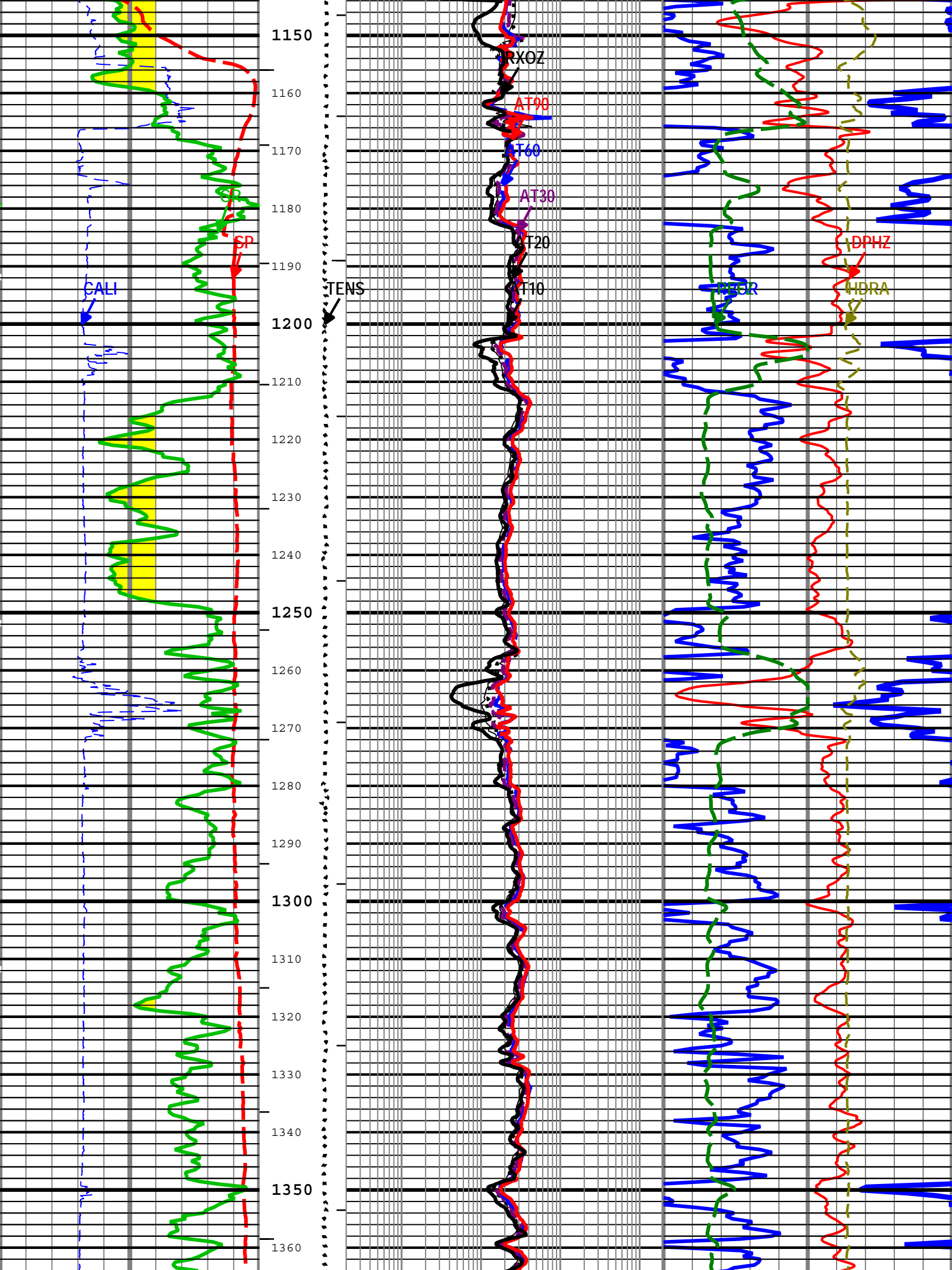


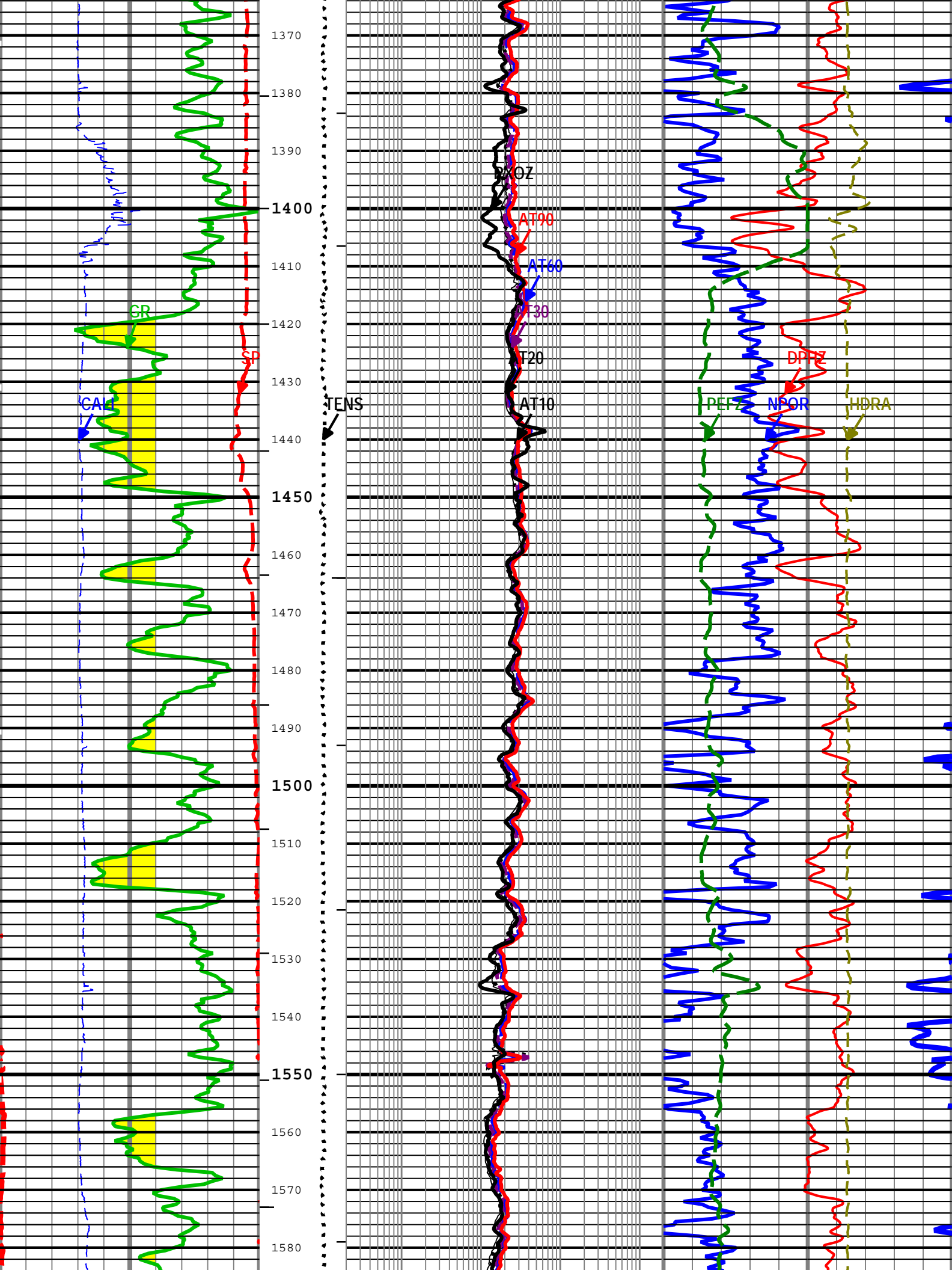


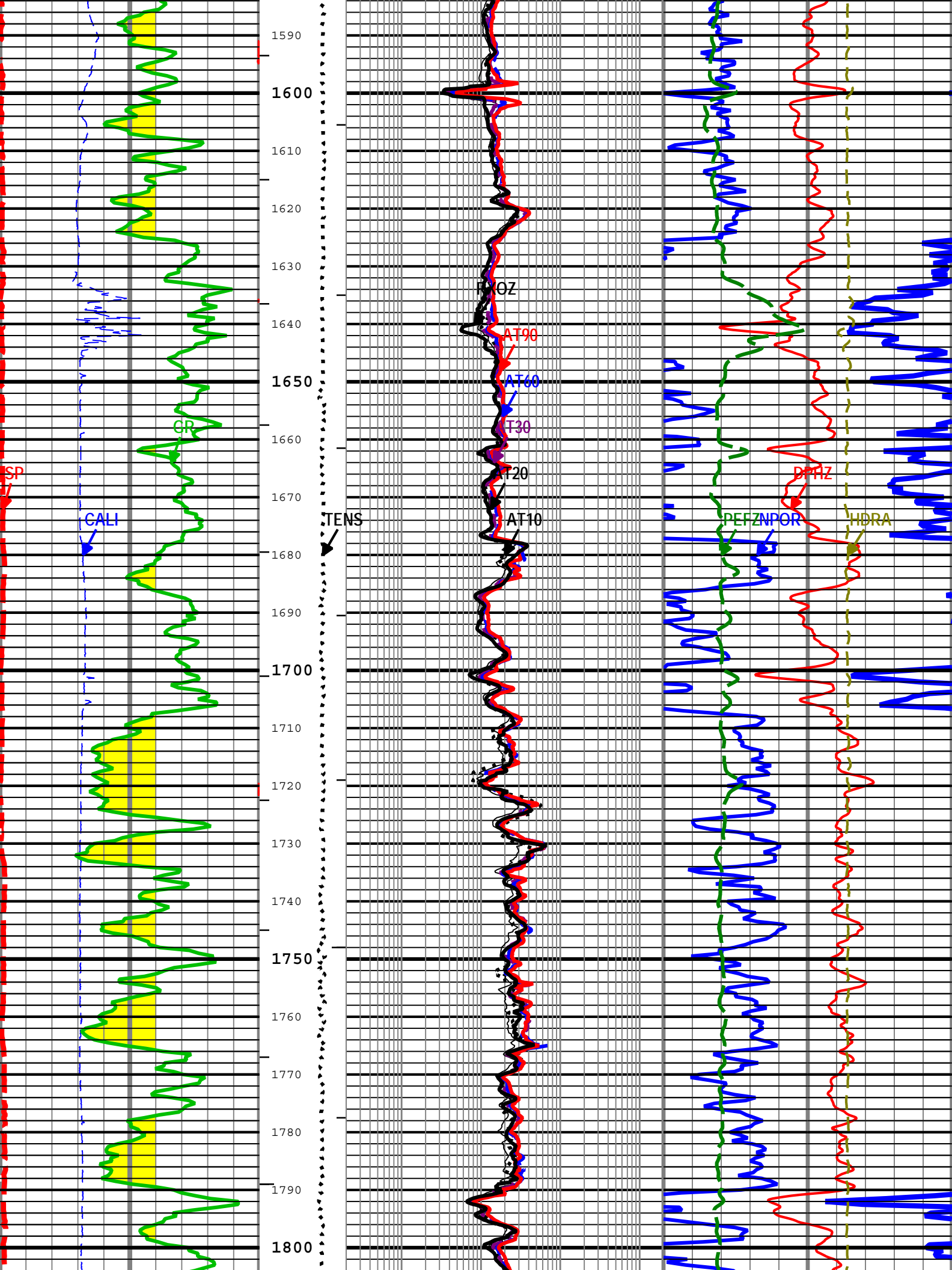


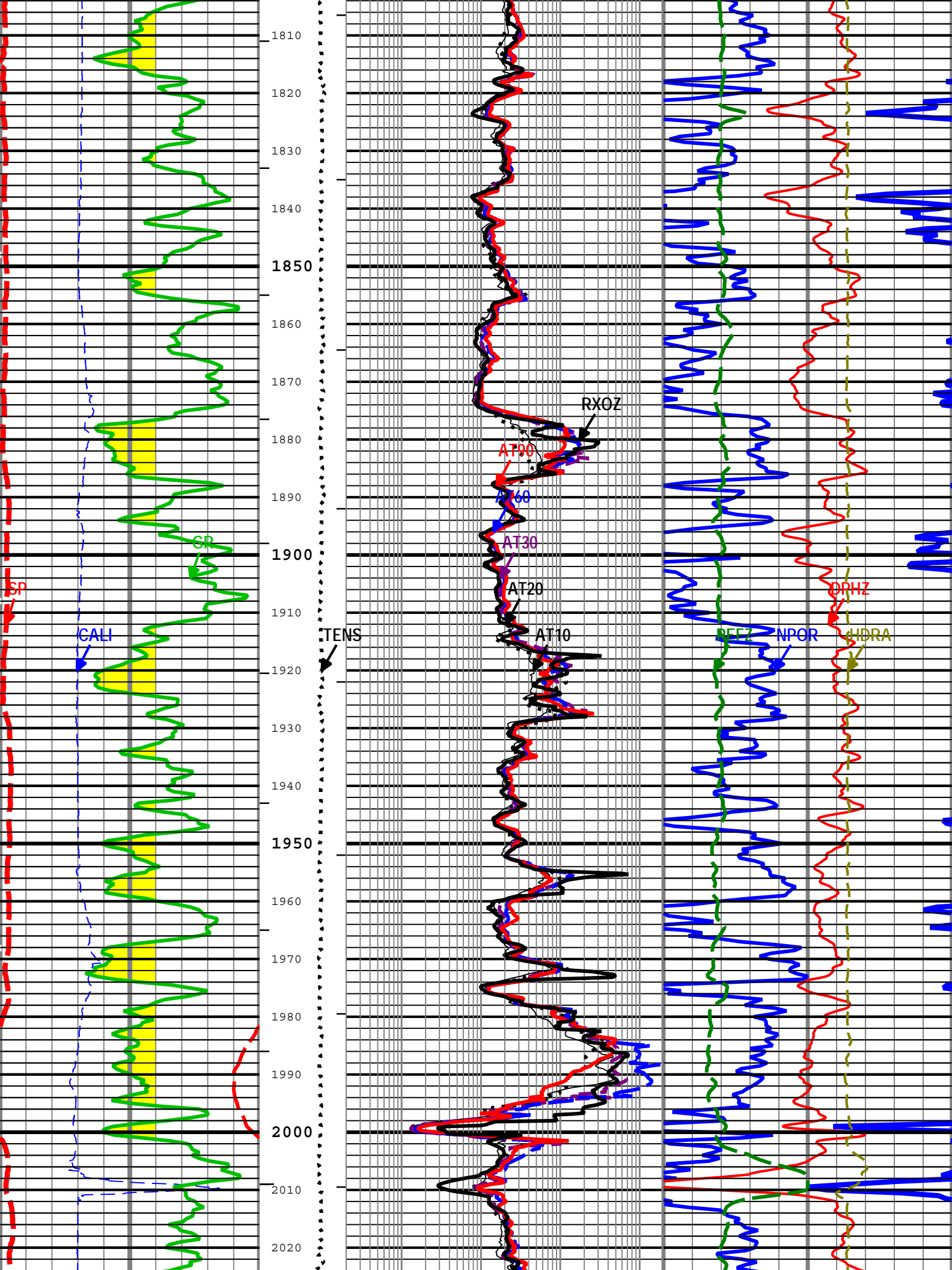


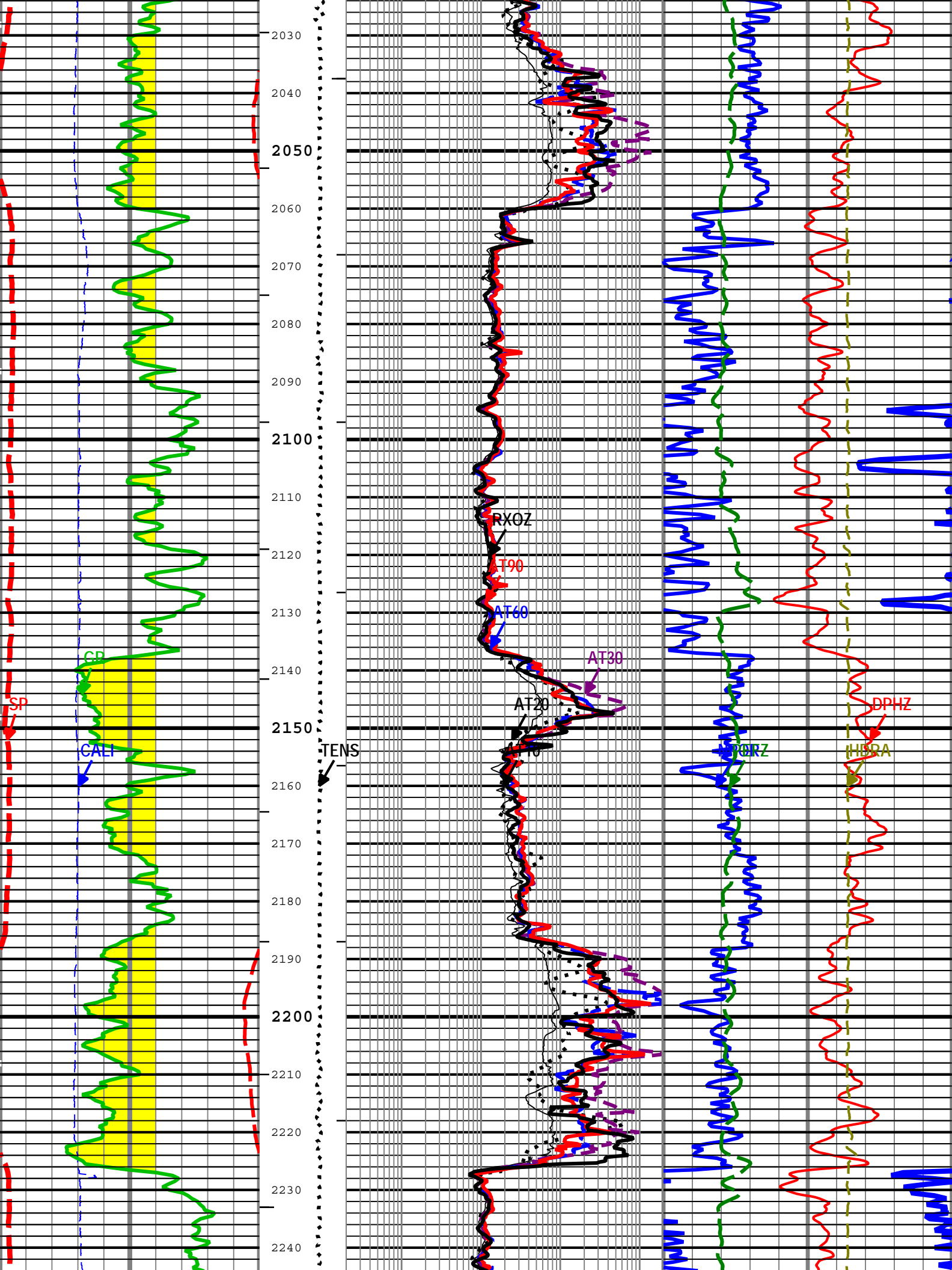




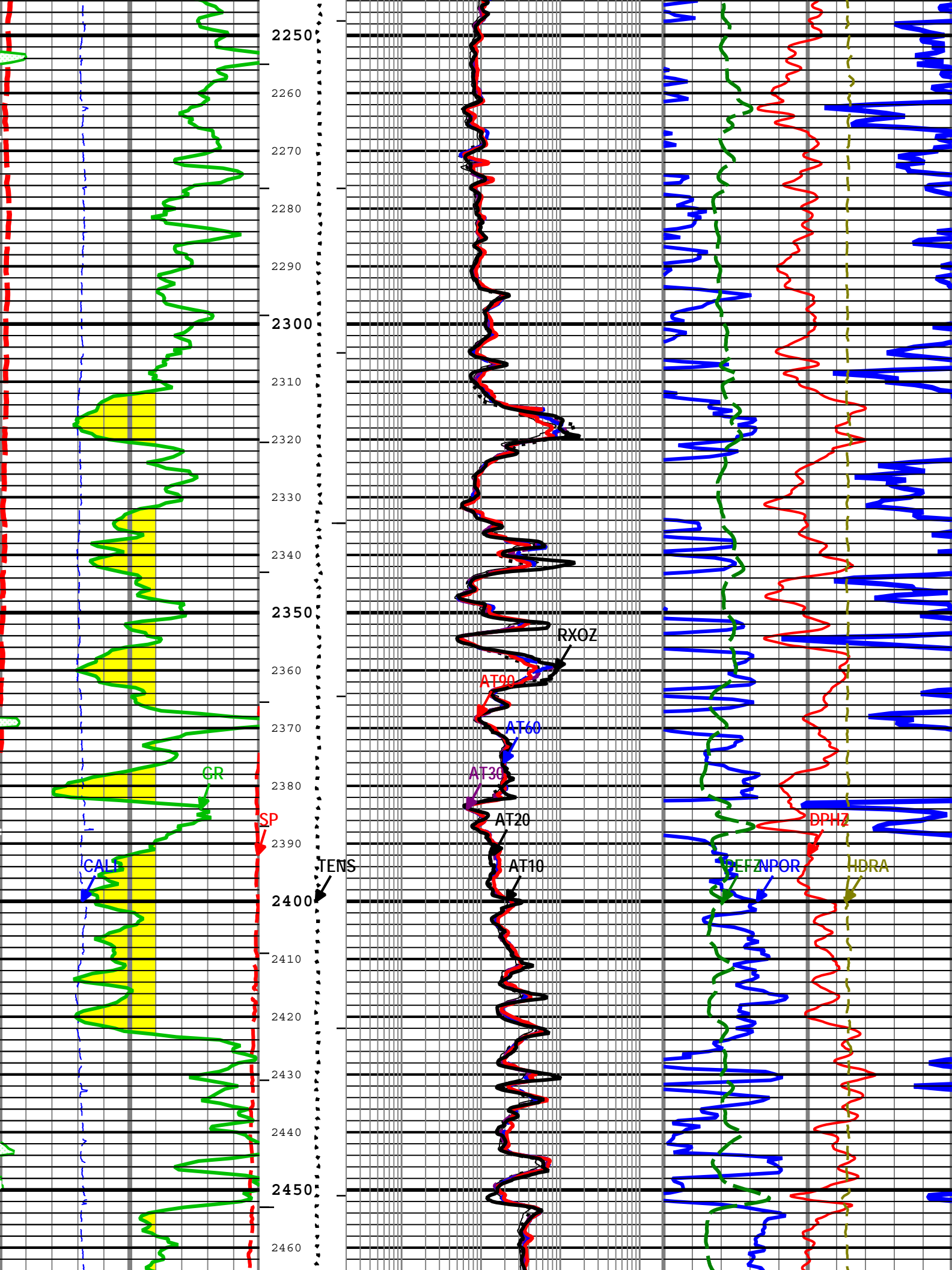


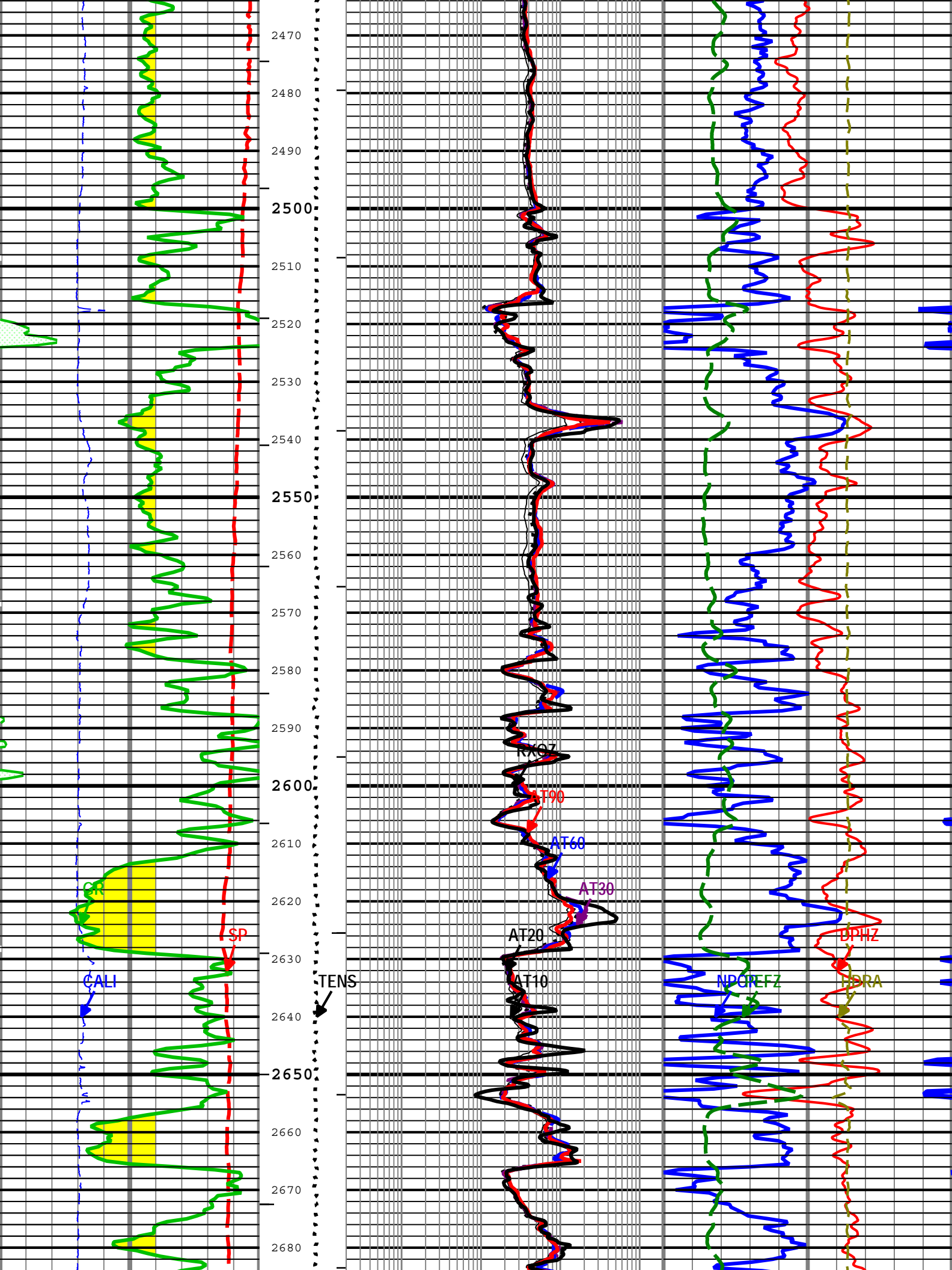


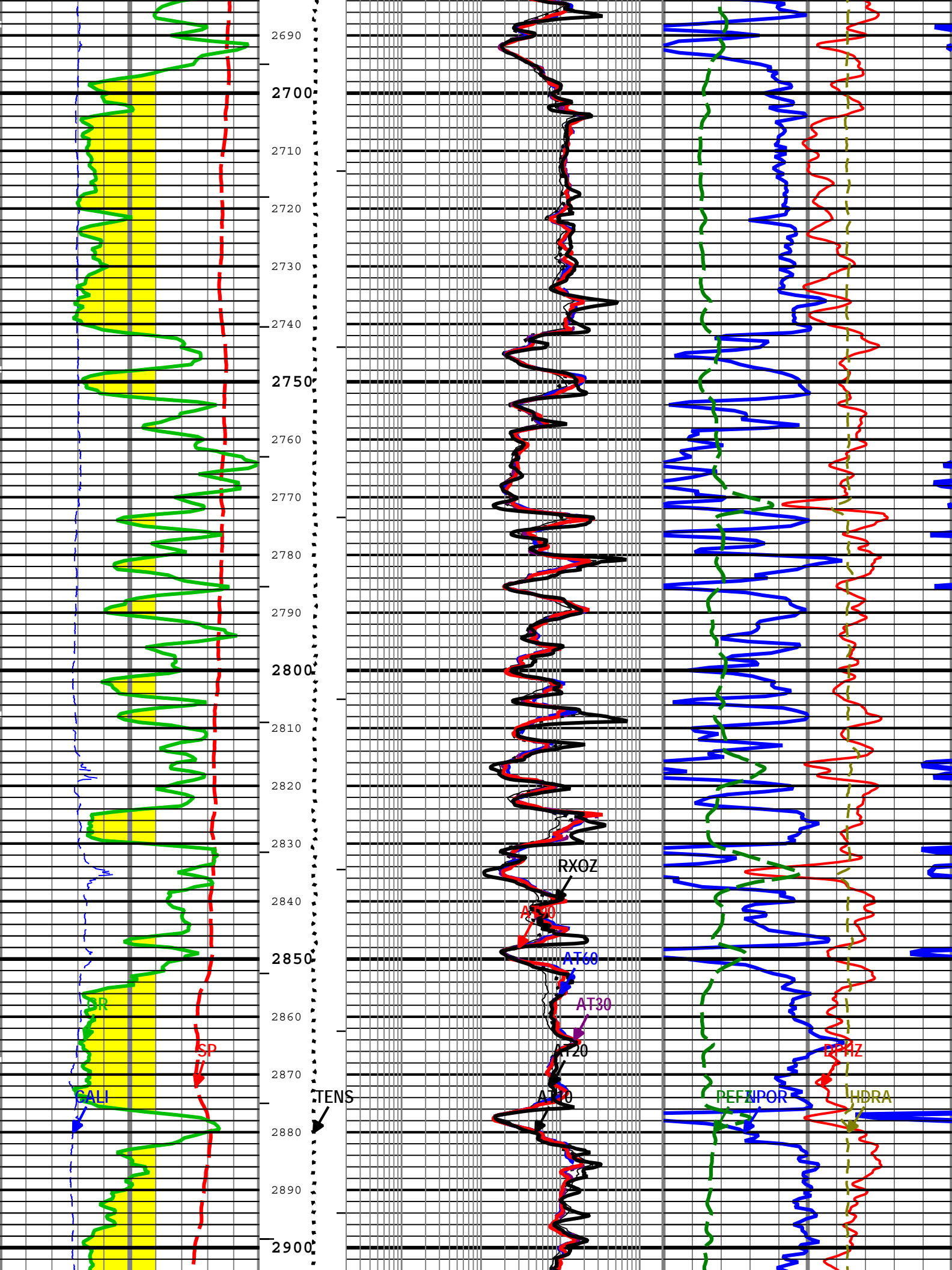




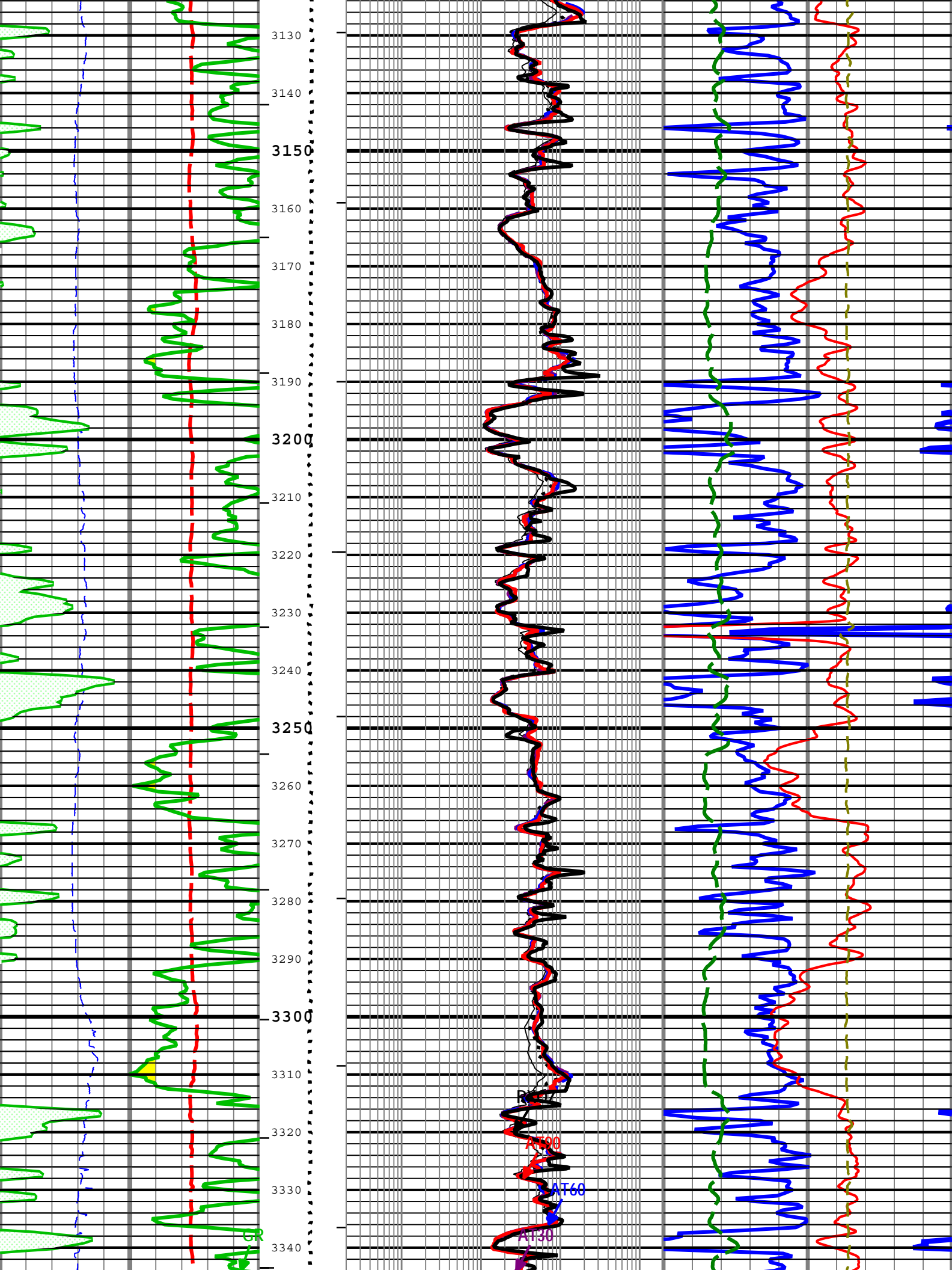


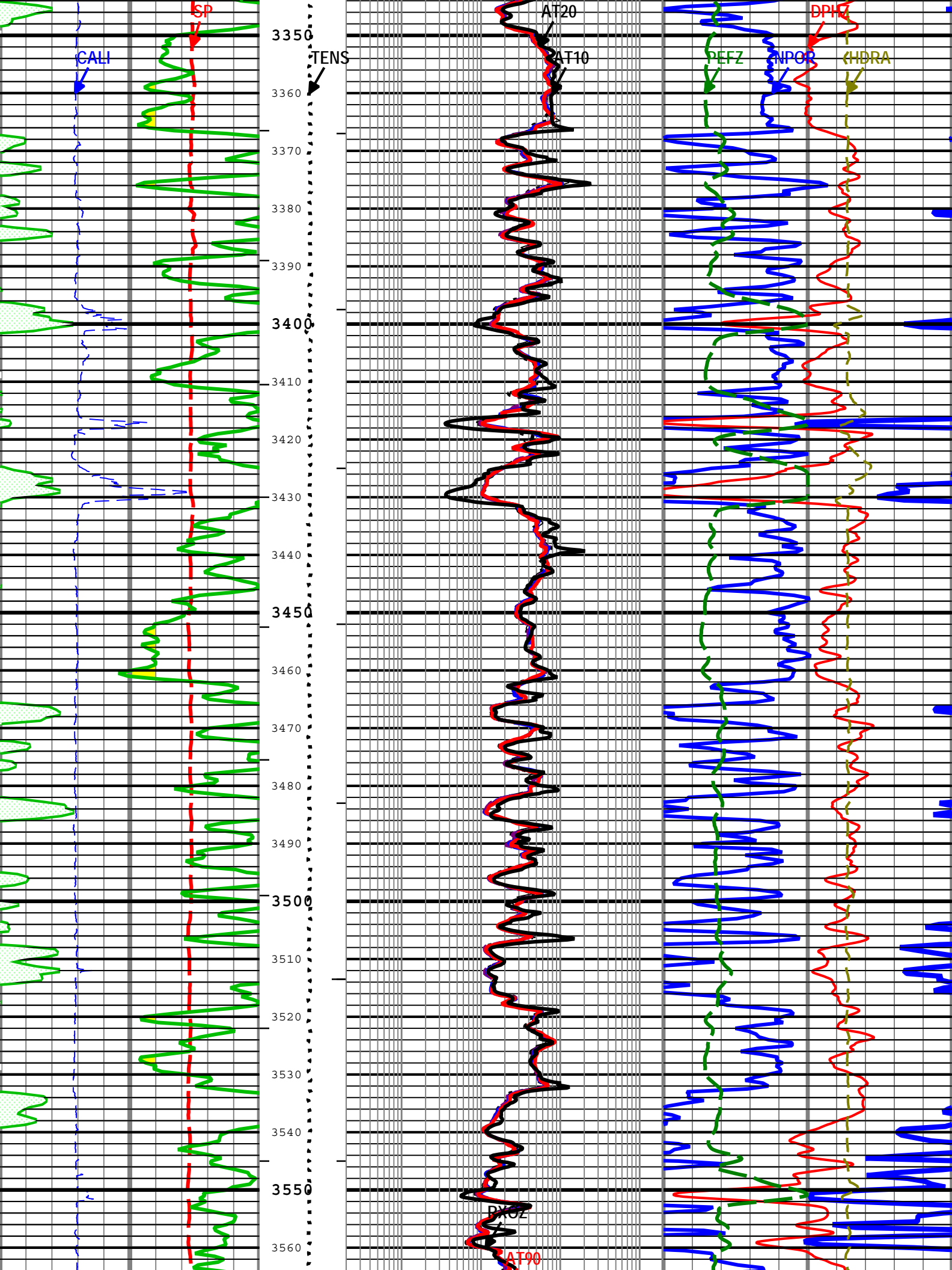


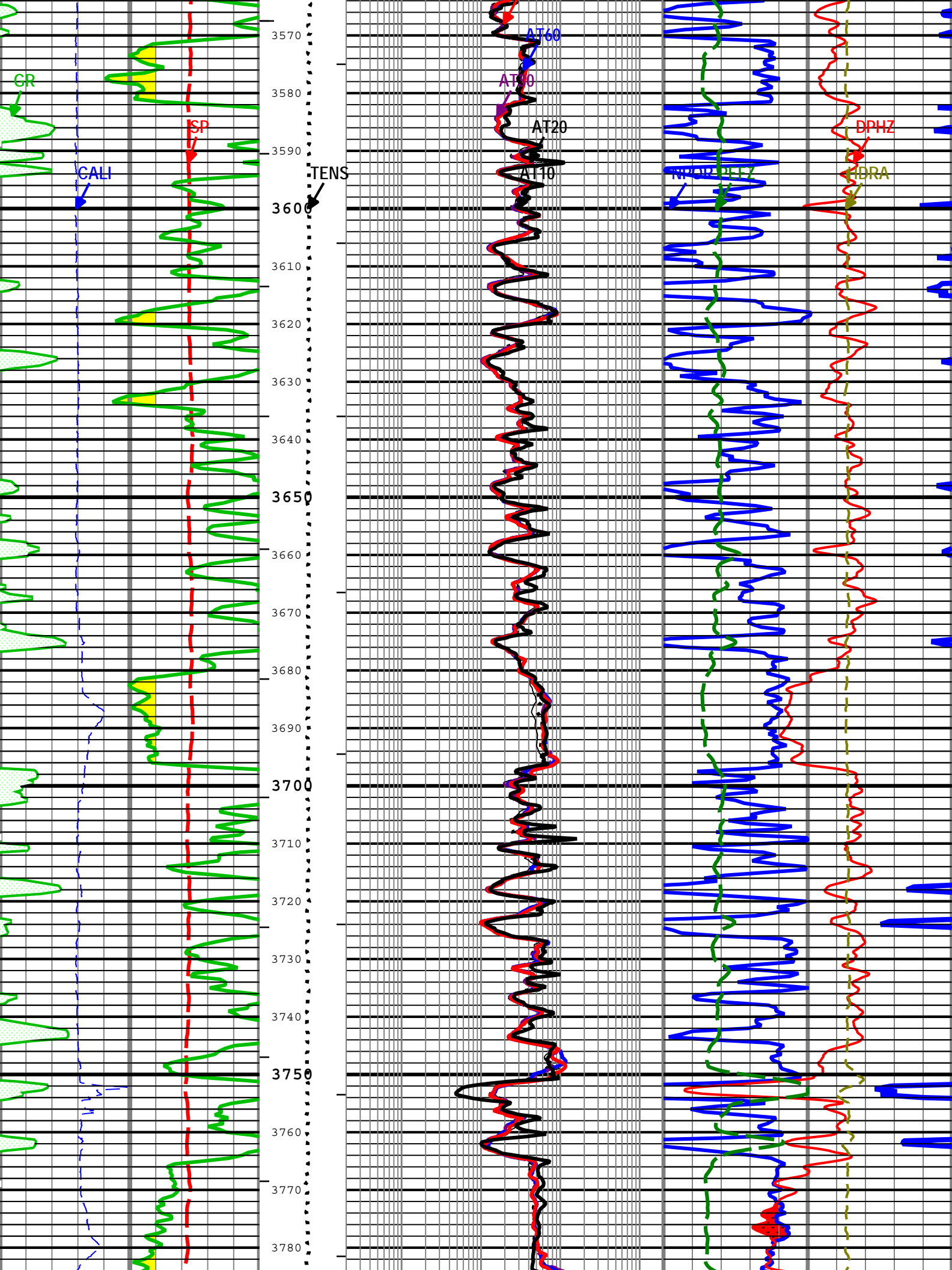


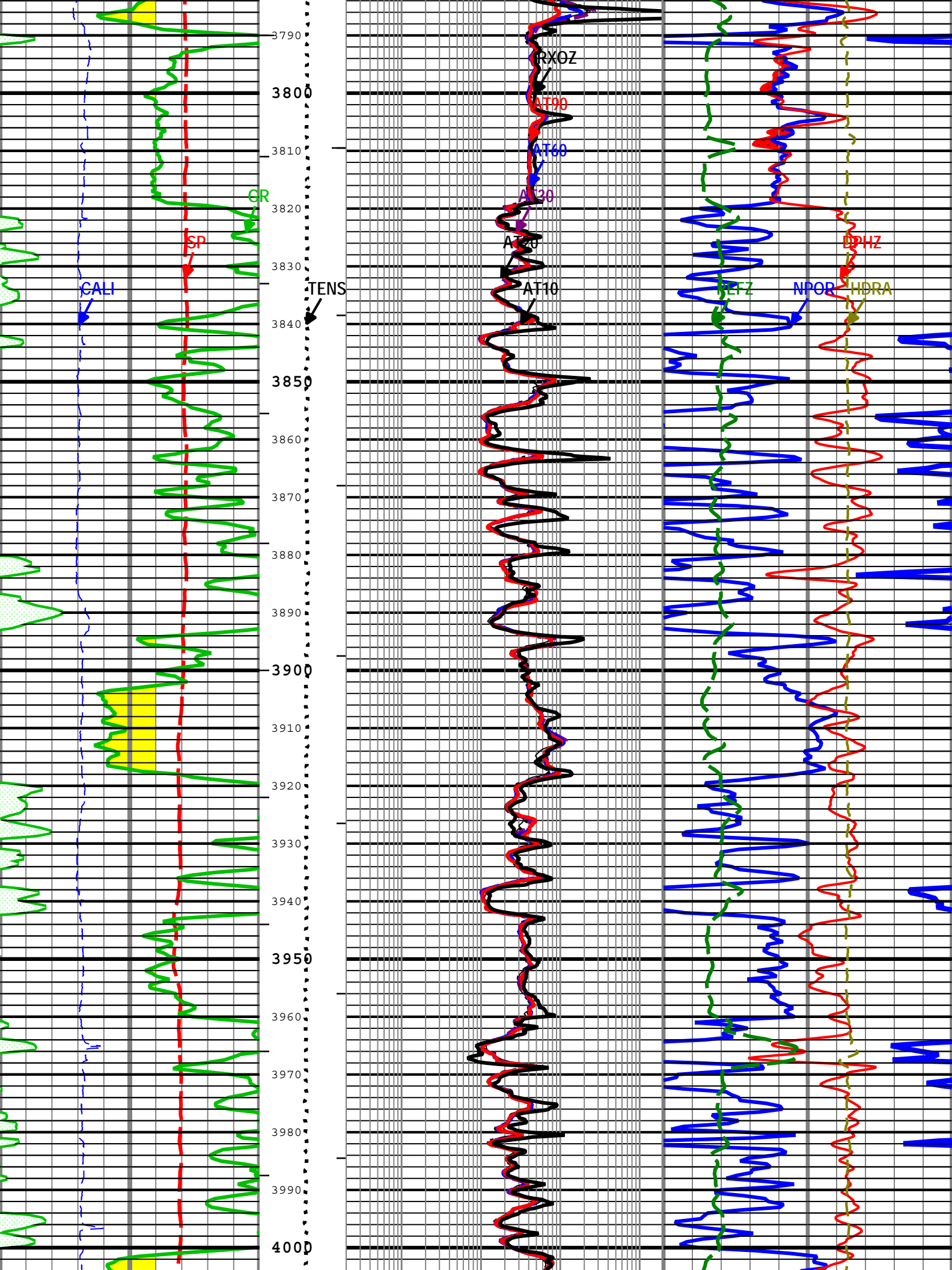




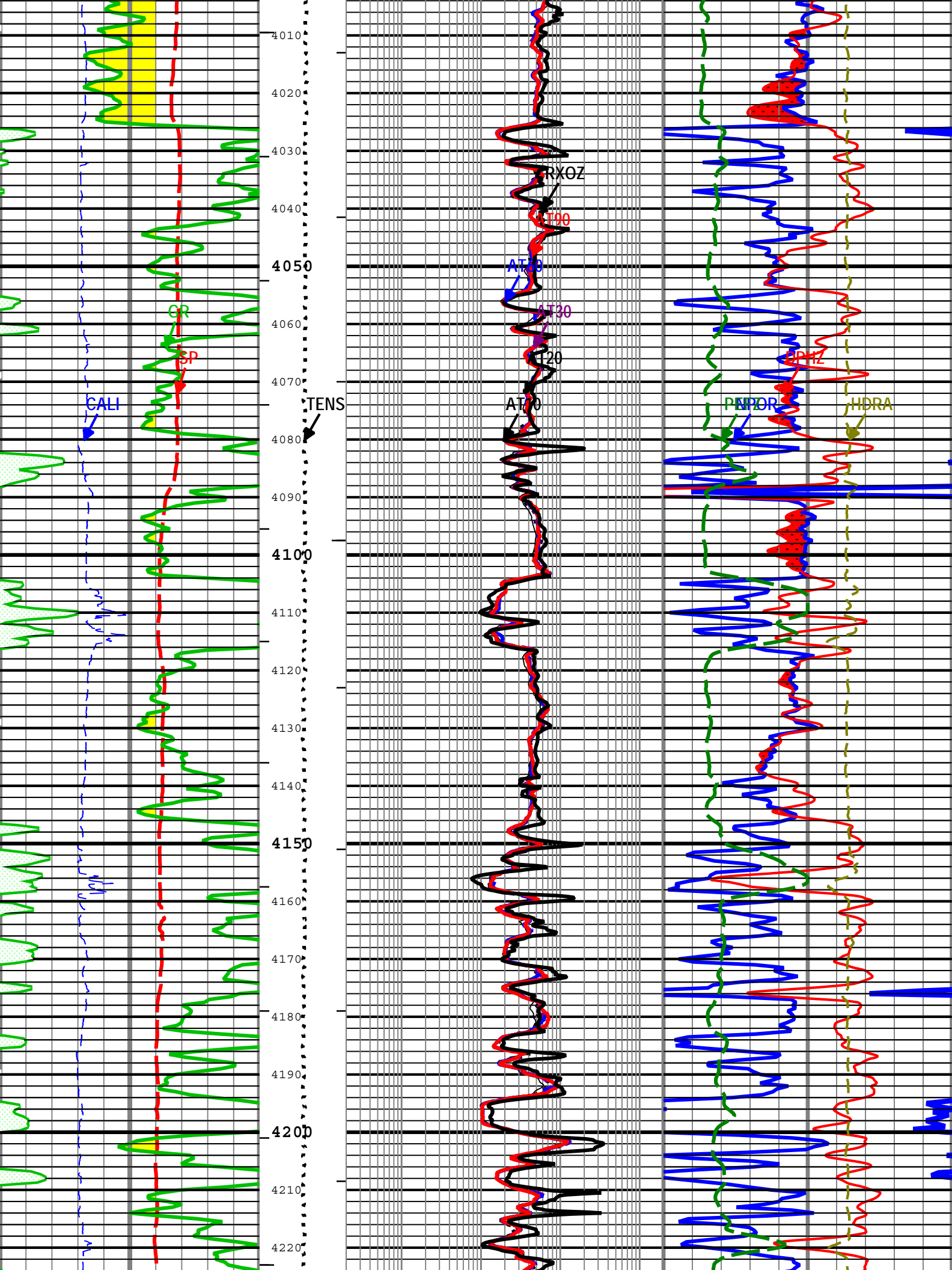


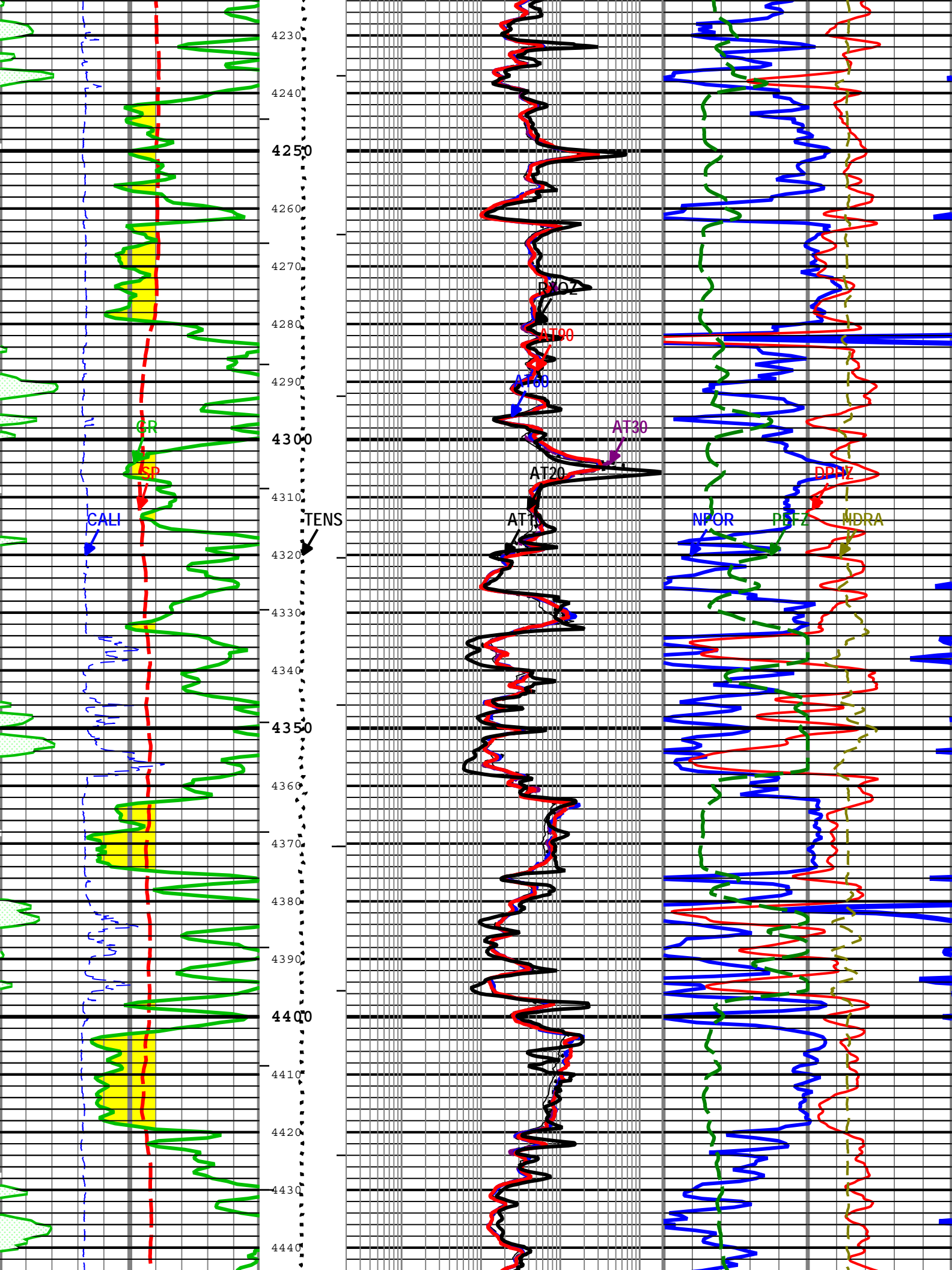


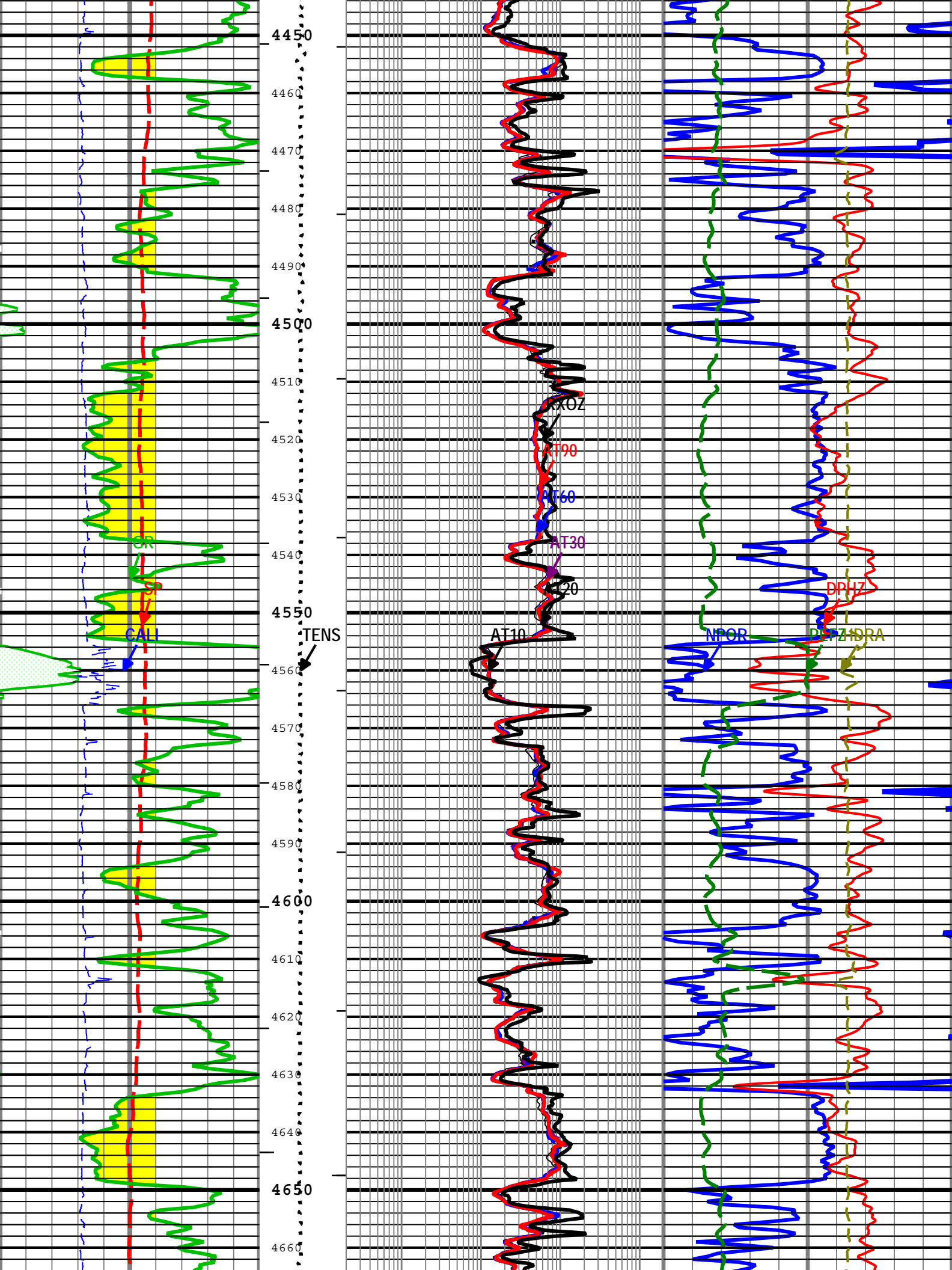


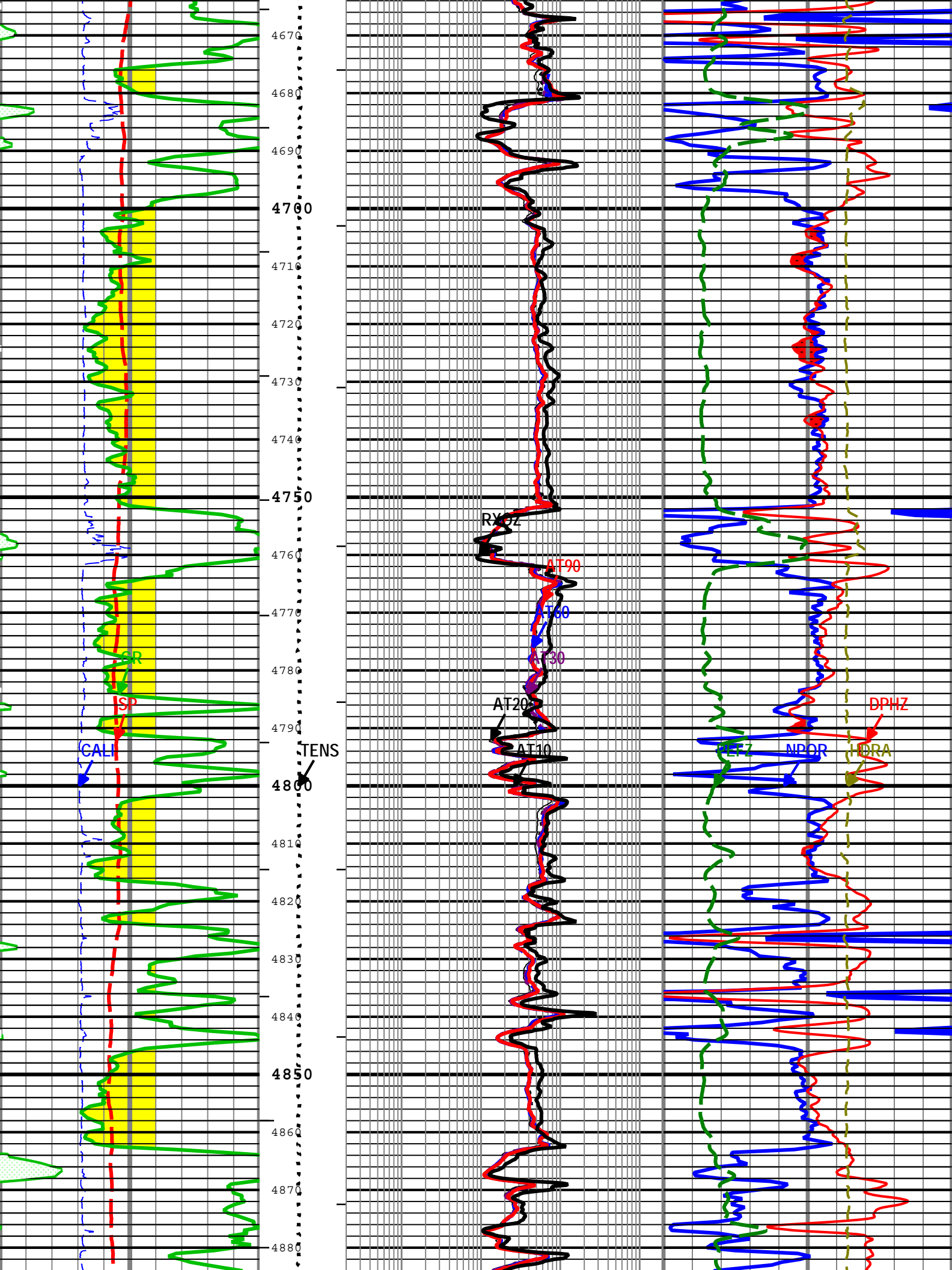


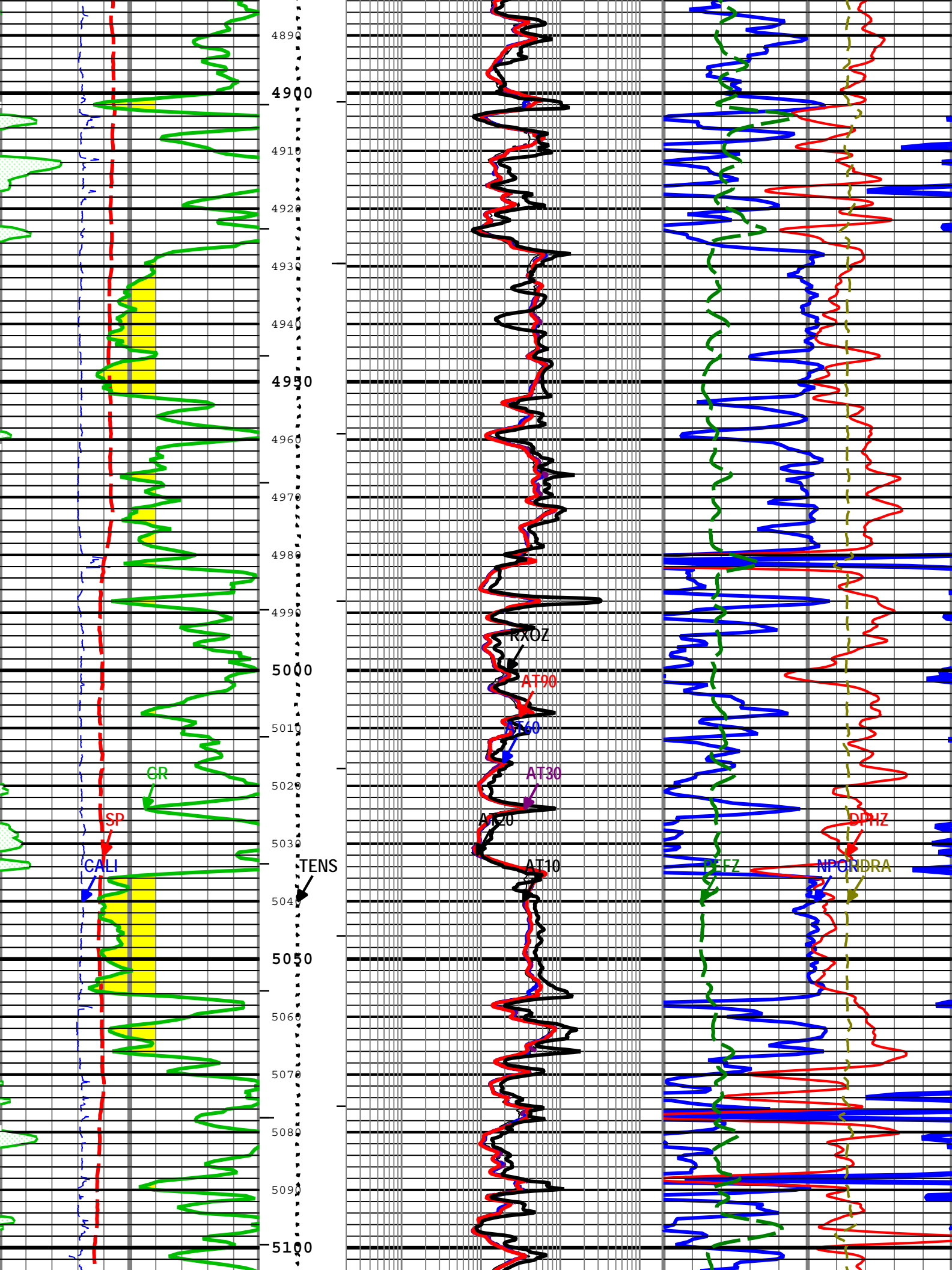




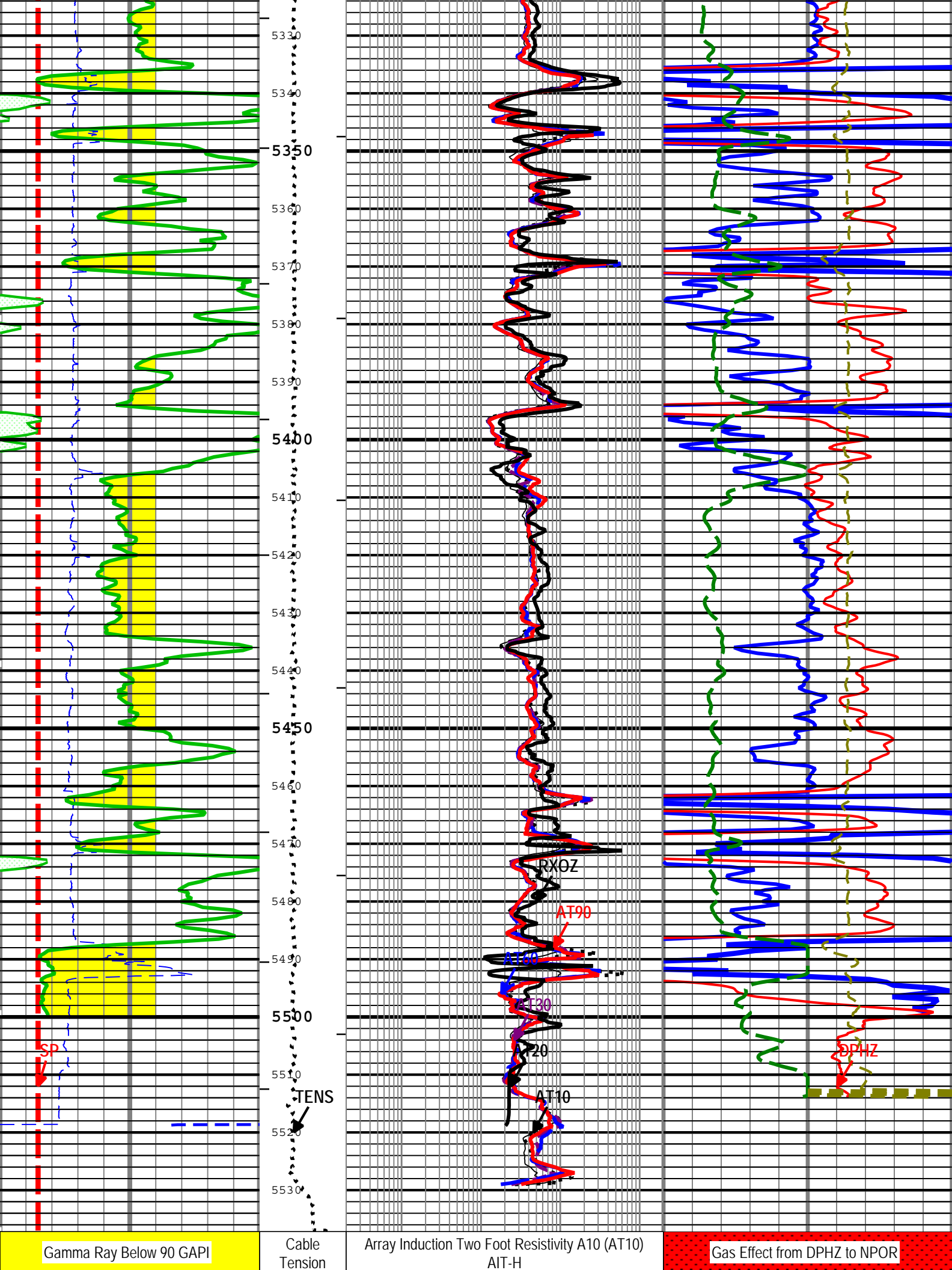










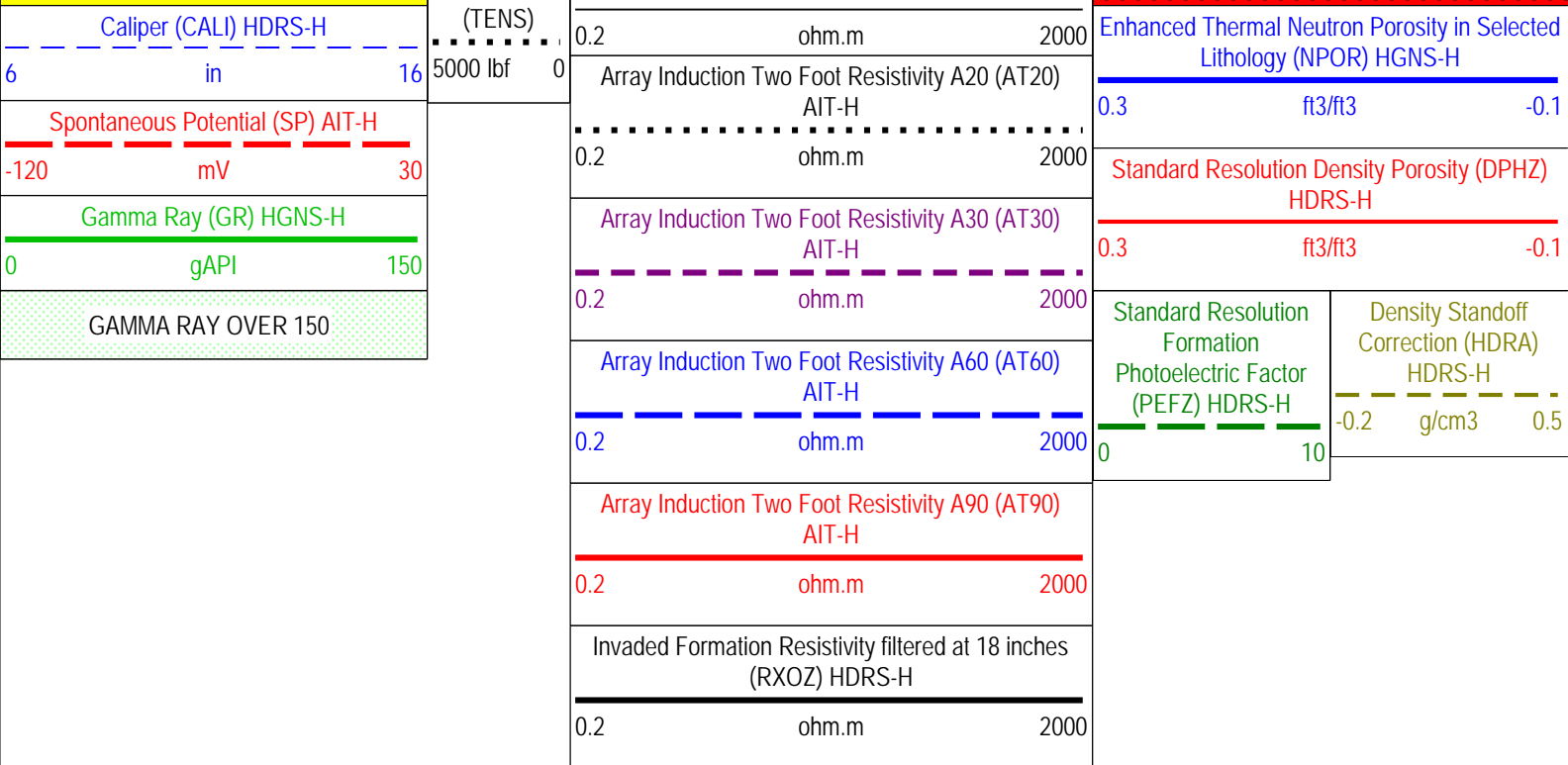


Gamma Ray Below 90 GAPI

Cable Tension

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

Gas Effect from DPHZ to NPOR



TIME\_1900 - Time Marked every 60.00 (s)

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

Description: Triple Combo standard resolution template for Platform Express Format: Log ( PEX Triple Combo StdRes ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Feb-2012 10:39:19

## Channel Processing Parameters

Parameter	Description	ToolPath	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-H:AHIS:AHIS	Compute Standoff	
ABLM	Array Induction Basic Logs Mode	AIT-H:AHIS:AHIS	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-H:AHIS:AHIS	Yes	
ASTA	Array Induction Tool Standoff	AIT-H:AHIS:AHIS	1.5	in
ATSE	Array Induction Temperature Selection(Sonde Error Correction)	AIT-H:AHIS:AHIS	External	
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	COMPLETION	8.75	in
BSAL	Borehole Salinity	Borehole	1100	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H:HRCC-H:HRCC-H	0	in
CBLO	Casing Bottom (Logger)	COMPLETION	1144	ft
CDEN	Cement Density	HGNS-H:HGNS-H:HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	COMPLETION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	12.3	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H:HRMS-H:HRGD-H	Bit Size	
FCD	Future Casing (Outer) Diameter	COMPLETION	4.5	in
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	6126.75	ppm
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	Borehole	AMF	



GTSE	Computed Mud Resistivity	Borehole	CTEM	
HSCO	Generalized Temperature Selection, from Measured or Computed Temperature	HGNS-H:HGNS-H:HGNS-H	Yes	
MATR	Hole Size Correction Option	Borehole	SANDSTONE	
MDEN	Rock Matrix for Neutron Porosity Corrections	Borehole	2.68	g/cm3
MFST	Matrix Density for Density Porosity	Borehole	43	degF
RMFS	Mud Filtrate Sample Temperature	Borehole	1.57	ohm.m
SPDR	Resistivity of Mud Filtrate Sample	AIT-H-AHIS-AHIS	0	mV/ft

### Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
CSODDRL	[9.625]	127.5	1200
CSODDRL	[0]	1200	5537.17

All depth are actual.

### Tool Control Parameters

Parameter	Description	ToolPath	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H:HGNS-H:HMCA-H	1	
HRGD_BRD_TYPE	HRGD Board Type	HDRS-H:HRMS-H:HRGD-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLWorkflow	3600	ft/h

### Run 1, PEX-AIT

### REPEAT ANALYSIS

### Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
Run 1, PEX-AIT	Log[2]:Up	Up	5050.00 ft	5538.17 ft	07-Feb-2012 8:27:04 AM	07-Feb-2012 8:36:19 AM	4.69 ft	true
Run 1, PEX-AIT	Log[3]:Up	Up	5050.00 ft	5538.17 ft	07-Feb-2012 8:42:34 AM	07-Feb-2012 10:15:31 AM	0.00 ft	true

All depths are referenced to toolstring zero

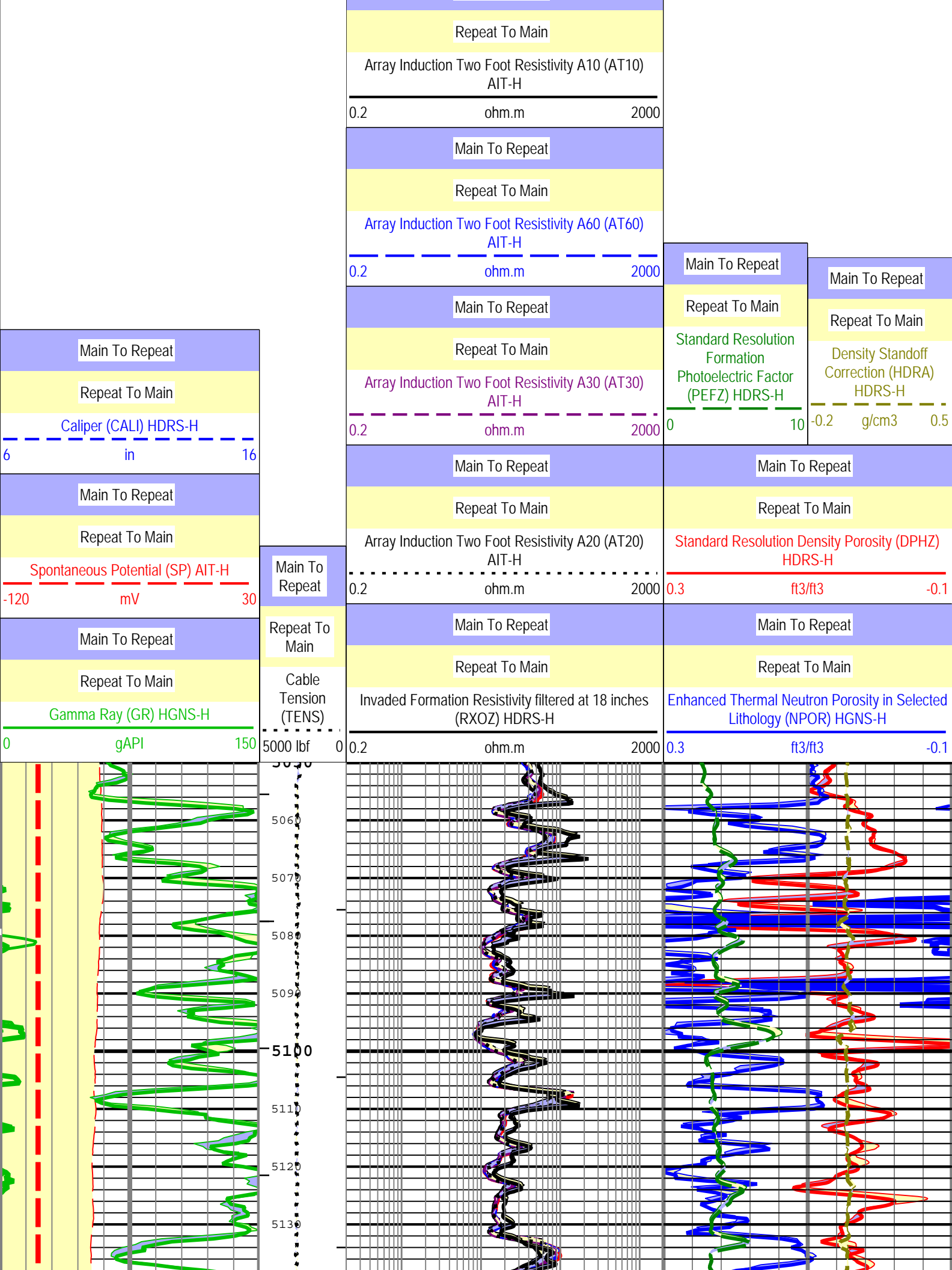
### Log Run 1, PEX-AIT: Log[3]:Up E767917D-B2A7-44B9-B85F-C0BCA404EA9B

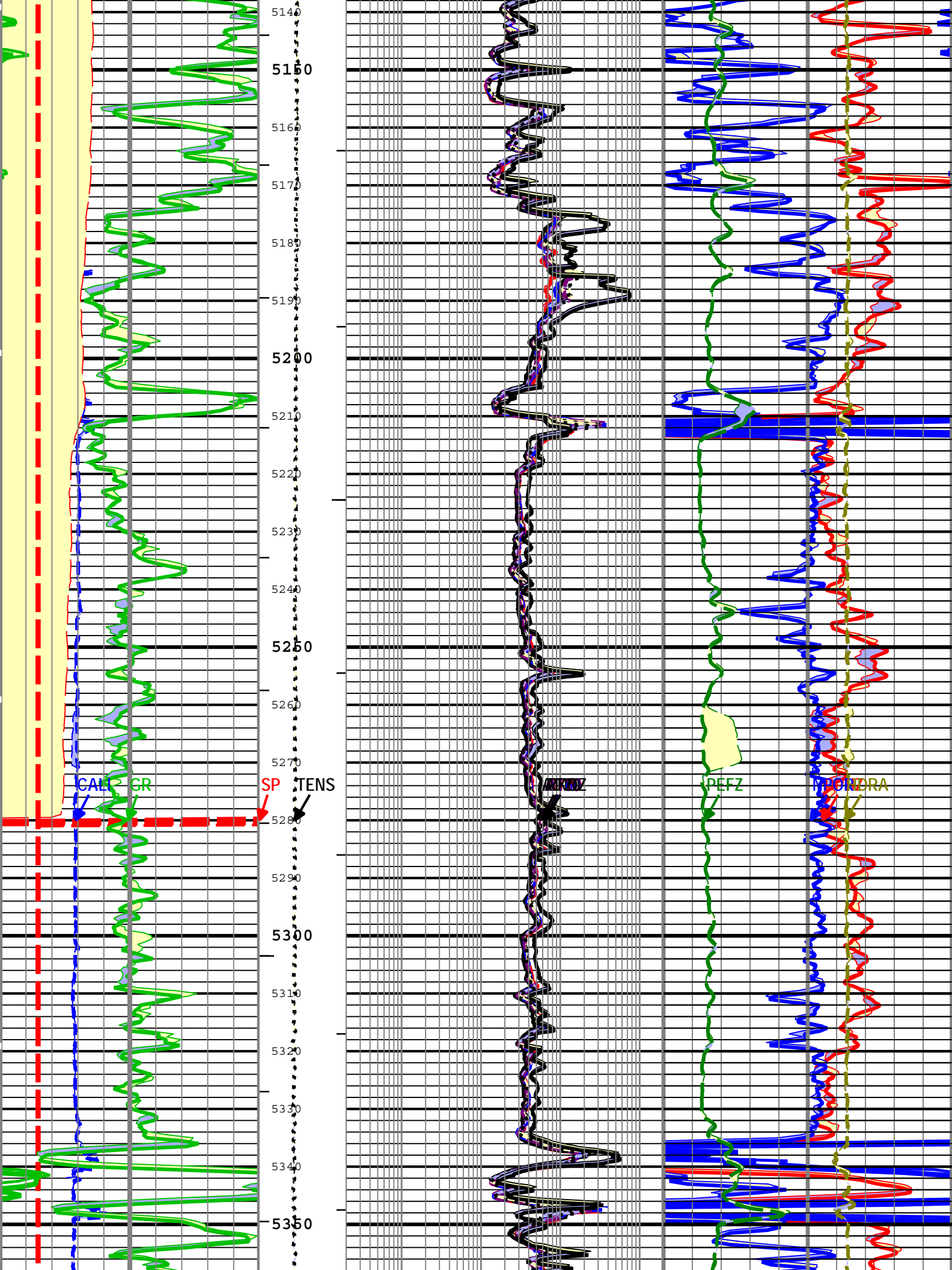
Description: Triple Combo standard resolution template for Platform Express Format: Log ( PEX Triple Combo StdRes RA ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Feb-2012 10:39:23

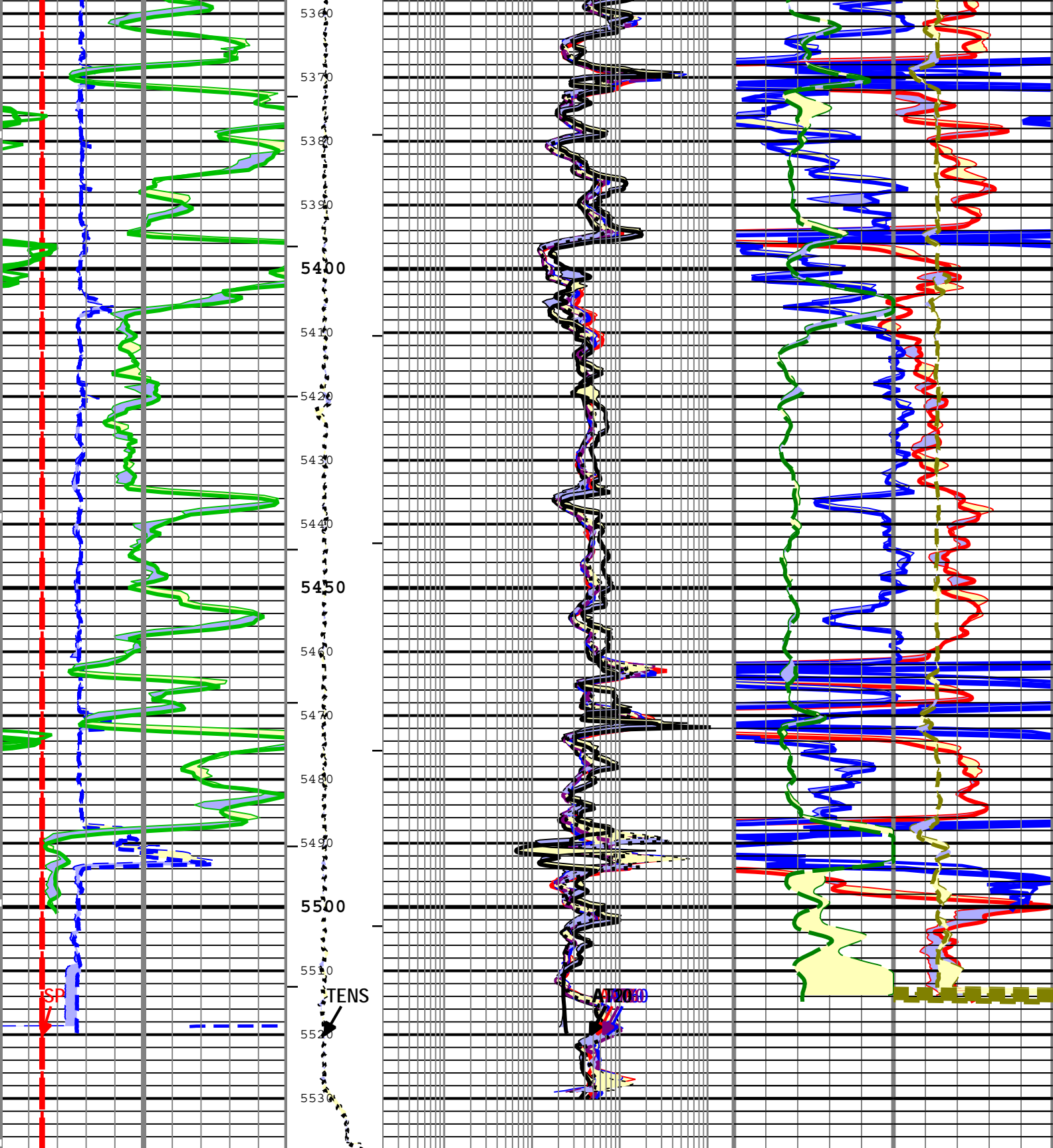
Channel	Source	Sampling
ICV	Borehole	6in
IHV	Borehole	6in
TIME_1900	WLWorkflow	0.1in

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

Main To Repeat		
Repeat To Main		
Array Induction Two Foot Resistivity A90 (AT90)		
AIT-H		
0.2	ohm.m	2000
Main To Repeat		







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

Main To Repeat	Cable Tension (TENS)
Repeat To Main	
Main To Repeat	5000 lbf 0
Repeat To Main	

Main To Repeat	Array Induction Two Foot Resistivity A90 (AT90) AIT-H
Repeat To Main	
Main To Repeat	ohm.m
Repeat To Main	
Main To Repeat	0.2 2000
Repeat To Main	

Main To Repeat	Standard Resolution Density Porosity (DPHZ) HDRS-H
Repeat To Main	
Main To Repeat	ft3/ft3
Repeat To Main	
Main To Repeat	0.3 -0.1
Repeat To Main	

Spontaneous Potential (SP) AIT-H		
-120	mV	30
Main To Repeat		
Repeat To Main		
Gamma Ray (GR) HGNS-H		
0	gAPI	150

Array Induction Two Foot Resistivity A10 (AT10) AIT-H		
0.2	ohm.m	2000
Main To Repeat		
Repeat To Main		
Array Induction Two Foot Resistivity A60 (AT60) AIT-H		
0.2	ohm.m	2000
Main To Repeat		
Repeat To Main		
Array Induction Two Foot Resistivity A30 (AT30) AIT-H		
0.2	ohm.m	2000
Main To Repeat		
Repeat To Main		
Array Induction Two Foot Resistivity A20 (AT20) AIT-H		
0.2	ohm.m	2000
Main To Repeat		
Repeat To Main		
Invaded Formation Resistivity filtered at 18 inches (RXOZ) HDRS-H		
0.2	ohm.m	2000

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H		
0.3	ft3/ft3	-0.1
Main To Repeat		Main To Repeat
Repeat To Main		Repeat To Main
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H		Density Standoff Correction (HDRA) HDRS-H
0	10	-0.2 g/cm3 0.5

TIME\_1900 - Time Marked every 60.00 (s)

┆ IHV - Integrated Hole Volume every 100.00 (ft3)

┆ IHV - Integrated Hole Volume every 10.00 (ft3)

┆ ICV - Integrated Cement Volume every 100.00 (ft3)

┆ ICV - Integrated Cement Volume every 10.00 (ft3)

Description: Triple Combo standard resolution template for Platform Express Format: Log ( PEX Triple Combo StdRes RA ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Feb-2012 10:39:23

## Calibration Report

### AIT-H (Array Induction Tool - H) Calibration - Run 1

#### Primary Equipment :

Array Induction Sonde - H AHIS 295

#### Auxiliary Equipment :

AITH Rm/SP Bottom Nose AHRM 295

### AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 07:48:42 25-Nov-2011

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Test Loop Gain - 0		Master	1.000	0.950	1.010	1.050	
Test Loop Phase - 0	deg	Master	0	-3.000	0.516	3.000	
Test Loop Gain - 1		Master	1.000	0.950	1.007	1.050	
Test Loop Phase - 1	deg	Master	0	-3.000	0.555	3.000	
Test Loop Gain - 2		Master	1.000	0.950	1.014	1.050	
Test Loop Phase - 2	deg	Master	0	-3.000	0.000	3.000	
Test Loop Gain - 3		Master	1.000	0.950	1.009	1.050	

Test Loop Phase - 3	deg	Master	0	-3.000	0.062	3.000	
Test Loop Gain - 4		Master	1.000	0.950	0.992	1.050	
Test Loop Phase - 4	deg	Master	0	-3.000	0.048	3.000	
Test Loop Gain - 5		Master	1.000	0.950	0.990	1.050	
Test Loop Phase - 5	deg	Master	0	-3.000	-0.164	3.000	
Test Loop Gain - 6		Master	1.000	0.950	0.999	1.050	
Test Loop Phase - 6	deg	Master	0	-3.000	0.191	3.000	
Test Loop Gain - 7		Master	1.000	0.950	1.005	1.050	
Test Loop Phase - 7	deg	Master	0	-3.000	-0.181	3.000	

### AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		07:48:42 25-Nov-2011					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Sonde Error Correction Real - 0	mS/m	Master	----	-231.000	-129.189	119.000	
Sonde Error Correction Quad - 0		Master	----	-2250.000	-558.390	2250.000	
Sonde Error Correction Real - 1	mS/m	Master	----	114.000	174.833	204.000	
Sonde Error Correction Quad - 1		Master	----	-625.000	-207.178	625.000	
Sonde Error Correction Real - 2	mS/m	Master	----	66.000	111.310	156.000	
Sonde Error Correction Quad - 2		Master	----	-350.000	-160.540	350.000	
Sonde Error Correction Real - 3	mS/m	Master	----	39.000	55.229	89.000	
Sonde Error Correction Quad - 3		Master	----	-250.000	17.863	250.000	
Sonde Error Correction Real - 4	mS/m	Master	----	15.000	25.794	35.000	
Sonde Error Correction Quad - 4		Master	----	-63.000	-8.950	63.000	
Sonde Error Correction Real - 5	mS/m	Master	----	4.000	13.811	24.000	
Sonde Error Correction Quad - 5		Master	----	-50.000	-7.063	50.000	
Sonde Error Correction Real - 6	mS/m	Master	----	5.000	8.943	15.000	
Sonde Error Correction Quad - 6		Master	----	-30.000	-10.938	30.000	
Sonde Error Correction Real - 7	mS/m	Master	----	-5.000	-2.596	5.000	
Sonde Error Correction Quad - 7		Master	----	-30.000	-9.622	30.000	

### AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM):		07:48:42 25-Nov-2011					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coarse Gain		Master	1.000	0.800	1.092	1.200	
Fine Gain		Master	1.000	0.800	1.200	1.200	

### AIT Electronics Check - Thru Calibration Check

Master (EEPROM):		07:48:42 25-Nov-2011		Before (Measured):		14:51:57 06-Feb-2012		After:	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit			
Thru Cal Mag - 0	V	Master	----	0.363	0.625	0.847			
		Before	----	0.363	0.625	0.847			
		After	----	----	----	----	----		
		Before-Master	----	----	----	0	----		
		After-Before	----	----	----	----	----		
Thru Cal Phase - 0	deg	Master	----	11.000	66.720	131.000			
		Before	----	11.000	66.822	131.000			
		After	----	----	----	----	----		
		Before-Master	----	----	----	0.102000000000004	----		
		After-Before	----	----	----	----	----		
Thru Cal Mag - 1	V	Master	----	0.762	1.281	1.778			
		Before	----	0.762	1.281	1.778			
		After	----	----	----	----	----		
		Before-Master	----	----	----	0	----		
		After-Before	----	----	----	----	----		
Thru Cal Phase - 1	deg	Master	----	10.000	65.702	130.000			
		Before	----	10.000	65.803	130.000			
		After	----	----	----	----	----		
		Before-Master	----	----	----	0.100999999999999	----		
		After-Before	----	----	----	----	----		
Thru Cal Mag - 2	V	Master	----	0.374	0.636	0.872			
		Before	----	0.374	0.636	0.872			
		After	----	----	----	----	----		
		Before-Master	----	----	----	0	----		
		After-Before	----	----	----	----	----		
Thru Cal Phase - 2	deg	Master	----	6.000	61.947	126.000			
		Before	----	6.000	62.050	126.000			

		After	----	----	----	----	
		Before-Master	----	----	0.1029999999999994	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 3	V	Master	----	0.422	0.717	0.986	
		Before	----	0.422	0.717	0.986	
		After	----	----	----	----	
		Before-Master	----	----	0	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 3	deg	Master	----	5.000	61.176	125.000	
		Before	----	5.000	61.280	125.000	
		After	----	----	----	----	
		Before-Master	----	----	0.1039999999999999	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 4	V	Master	----	0.802	1.344	1.872	
		Before	----	0.802	1.344	1.872	
		After	----	----	----	----	
		Before-Master	----	----	0	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 4	deg	Master	----	-1.000	54.819	119.000	
		Before	----	-1.000	54.922	119.000	
		After	----	----	----	----	
		Before-Master	----	----	0.1029999999999999	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 5	V	Master	----	1.173	1.954	2.737	
		Before	----	1.173	1.954	2.737	
		After	----	----	----	----	
		Before-Master	----	----	0	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 5	deg	Master	----	-3.000	52.950	117.000	
		Before	----	-3.000	53.053	117.000	
		After	----	----	----	----	
		Before-Master	----	----	0.1029999999999999	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 6	V	Master	----	1.173	1.953	2.737	
		Before	----	1.173	1.953	2.737	
		After	----	----	----	----	
		Before-Master	----	----	0	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 6	deg	Master	----	-3.000	52.957	117.000	
		Before	----	-3.000	53.060	117.000	
		After	----	----	----	----	
		Before-Master	----	----	0.1030000000000000	----	
		After-Before	----	----	----	----	
Thru Cal Mag - 7	V	Master	----	0.849	1.393	1.981	
		Before	----	0.849	1.393	1.981	
		After	----	----	----	----	
		Before-Master	----	----	0	----	
		After-Before	----	----	----	----	
Thru Cal Phase - 7	deg	Master	----	-7.000	49.496	113.000	
		Before	----	-7.000	49.599	113.000	
		After	----	----	----	----	
		Before-Master	----	----	0.1029999999999999	----	
		After-Before	----	----	----	----	
SPA Zero	mV	Master	----	-50.000	-0.176	50.000	
		Before	----	-50.000	-0.175	50.000	
		After	----	----	----	----	
		Before-Master	----	----	0.001	----	
		After-Before	----	----	----	----	
SPA Plus	mV	Master	----	941.000	991.627	1040.000	
		Before	----	941.000	991.542	1040.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.085	----	
		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 1

<b>Primary Equipment :</b>		
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3889
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3912
<b>Auxiliary Equipment :</b>		
HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	28706
HRDD Short Spacing Detector	Short Spacing	27692
Cesium 137 Gamma-Ray Logging Source	GSR-J	5415
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	3889
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	3867
<b>Calibration Parameter :</b>		
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):	14:51:57 06-Feb-2012
<b>Measurement</b>	<b>Unit</b> <b>Phase</b> <b>Nominal</b> <b>Low Limit</b> <b>Actual</b> <b>High Limit</b>
Small Ring	in    Before    8.00    6.00    9.17    10.00
Large Ring	in    Before    12.00    9.00    13.25    15.00

## HDRS Density Calibration - Inversion Results

Master (EEPROM):	15:17:32 16-Jan-2012
<b>Measurement</b>	<b>Unit</b> <b>Phase</b> <b>Nominal</b> <b>Low Limit</b> <b>Actual</b> <b>High Limit</b>
Rho Aluminum	g/cm3    Master    2.596    2.586    2.599    2.606
Rho Magnesium	g/cm3    Master    1.686    1.676    1.689    1.696
Pe Aluminum	Master    2.570    2.470    2.525    2.670
Pe Magnesium	Master    2.650    2.550    2.633    2.750

## HDRS Density Calibration - Deviation Summary

Master (EEPROM):	15:17:32 16-Jan-2012
<b>Measurement</b>	<b>Unit</b> <b>Phase</b> <b>Nominal</b> <b>Low Limit</b> <b>Actual</b> <b>High Limit</b>
BS Average Deviation	%    Master    0    -0.6000    0.3608    0.6000
BS Max Deviation	%    Master    0    -1.6000    0.7355    1.6000
SS Average Deviation	%    Master    0    -1.0000    0.2532    1.0000
SS Max Deviation	%    Master    0    -2.5000    0.7364    2.5000
LS Average Deviation	%    Master    0    -1.5000    0.4005    1.5000
LS Max Deviation	%    Master    0    -3.5000    1.5487    3.5000

## HDRS Density Calibration - Background Summary

Master (EEPROM):	15:17:32 16-Jan-2012	Before (Measured):	14:51:57 06-Feb-2012			
<b>Measurement</b>	<b>Unit</b> <b>Phase</b> <b>Nominal</b> <b>Low Limit</b> <b>Actual</b> <b>High Limit</b>					
BS Window Ratio		Master	1.0000	----	0.7466	----
		Before	0.7466	0.7093	0.7500	0.7839
		Before-Master	----	----	0.0034	----
BS Window Sum	1/s	Master	1	----	24651	----
		Before	24651	23418	24612	25883
		Before-Master	----	----	-39	----
SS Window Ratio		Master	1.0000	----	0.4787	----
		Before	0.4787	0.4548	0.4790	0.5027
		Before-Master	----	----	0.0003	----
SS Window Sum	1/s	Master	1	----	11656	----



		Before	11656	11074	11635	12239	
		Before-Master	----	----	-21	----	
LS Window Ratio		Master	1.0000	----	0.3023	----	
		Before	0.3023	0.2872	0.3001	0.3174	
		Before-Master	----	----	-0.0022	----	
LS Window Sum	1/s	Master	1	----	1264	----	
		Before	1264	1200	1257	1327	
		Before-Master	----	----	-7	----	

### HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM):		15:17:32 16-Jan-2012		Before (Measured):		14:51:57 06-Feb-2012	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master	----	1000	1862	2400	
		Before	----	1000	1894	2400	
		Before-Master	----	-100	32	100	
SS PM High Voltage	V	Master	----	1000	1872	2400	
		Before	----	1000	1899	2400	
		Before-Master	----	-100	27	100	
LS PM High Voltage	V	Master	----	1000	1581	2400	
		Before	----	1000	1608	2400	
		Before-Master	----	-100	27	100	

### HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM):		15:17:32 16-Jan-2012		Before (Measured):		14:51:57 06-Feb-2012	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crystal Resolution	%	Master	----	5.00	10.89	25.00	
		Before	----	5.00	10.89	25.00	
		Before-Master	----	-1.00	0.00	1.00	
SS Crystal Resolution	%	Master	----	5.00	10.03	20.00	
		Before	----	5.00	10.27	20.00	
		Before-Master	----	-1.00	0.24	1.00	
LS Crystal Resolution	%	Master	----	5.00	8.86	20.00	
		Before	----	5.00	8.76	20.00	
		Before-Master	----	-1.00	-0.10	1.00	

### HDRS MCFL Calibration - MCFL Accumulations

Before (Measured):		14:51:57 06-Feb-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Main Resistivity	ohm.m	Before	3875	3565	3869	4185	
Deep Resistivity	ohm.m	Before	3830	3524	3787	4136	
Shallow Resistivity	ohm.m	Before	3830	3524	3824	4136	

### HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run 1

<b>Primary Equipment :</b>			
HILT Gamma-Ray and Neutron Sonde, 150 degC		HGNS-H	3799
<b>Auxiliary Equipment :</b>			
HGNS Accelerometer, 150 degC		HACCZ-H	1614
AmBe Neutron Logging Source		NSR-F	5138
<b>Calibration Parameter :</b>			
Water Temperature			
Housing Size			
JIG-BKG (Jig minus background reference)		165	

### HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured):		07:16:18 07-Feb-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.2	32.8	

### HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM):		18:00:00 14-May-2002					
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	----	----	-3195.000	----	
Accelerometer Coefficients - 1		Master	----	----	3.177	----	
Accelerometer Coefficients - 2		Master	----	----	0.012	----	
Accelerometer Coefficients - 3		Master	----	----	0.000	----	
Accelerometer Coefficients - 4		Master	----	----	2.708	----	
Accelerometer Coefficients - 5		Master	----	----	0.000	----	
Accelerometer Coefficients - 6		Master	----	----	0.000	----	
Accelerometer Coefficients - 7		Master	----	----	0.000	----	
Accelerometer Coefficients - 8		Master	----	----	298.500	----	
Accelerometer Coefficients - 9		Master	----	----	1.005	----	

### HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM):		09:57:08 30-Nov-2011	Before (Measured):		14:51:57 06-Feb-2012	After:	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	27.9	40.0	
		Before	0	5.0	28.6	40.0	
		After	----	----	----	----	
		Before-Master	----	-4.2	0.7	4.2	
		After-Before	----	----	----	----	
Far Zero Measurement	1/s	Master	0	5.0	32.0	40.0	
		Before	0	5.0	29.1	40.0	
		After	----	----	----	----	
		Before-Master	----	-4.8	-2.9	4.8	
		After-Before	----	----	----	----	
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5453.0	6900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2227.0	2900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Near Corrected Plus Measurement - 0	1/s	Master	----	4700.0	5480.0	6900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Far Corrected Plus Measurement - 0	1/s	Master	----	1900.0	2230.0	2900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	

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

Before (Measured):		14:51:57 06-Feb-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	36.1	120.0	
		After	----	----	----	----	
		After-Before	----	----	----	----	
RGR Plus Measurement	gAPI	Before	185.4	157.1	165.8	206.3	
		After	----	----	NOT DONE	----	
		After-Before	----	----	----	----	
GR Calibration Gain		Before	0.89	0.80	0.99	1.05	
		After	----	----	----	----	
		After-Before	----	----	----	----	

### LEH-QT (Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor) Calibration - Run 1

<b>Primary Equipment :</b>			
Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor	LEH-QT	2603	

### HTEN Master Calibration - HTEN Master Calibration

Master:							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
HTEN Shop Gain		Master	1.000	0.800	NOT DONE	1.200	

HTEN Shop Offset	lbf	Master	0	-1000.000	NOT DONE	1000.000			
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## HTEN Before Calibration - HTEN Before Calibration

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

<b>Company:</b>	ENCANA OIL & GAS	<b>Schlumberger</b>
<b>Well:</b>	Twin Creek 12-5D1 (F12E)	
<b>Field:</b>	MAMM CREEK	
<b>County:</b>	GARFIELD	
<b>State:</b>	COLORADO	

**\*\*PLATFORM EXPRESS\*\***  
 COMPENSATED NEUTRON, LITHO-DENSITY  
 INDUCTION RESISTIVITY, GR, SP