

Company: Southwestern Energy Production Company

Well: Diamond T Sheep 7 92 1 26

Field: Sand Wash Basin Niobrara

County: Moffat Country: US

Density-Neutron-Gamma Ray

Lower Density

County: Moffat
Field: Sand Wash Basin Niobrara
Location: SHL: 660' FNL & 930' FWL
Well: Diamond T Sheep 7 92 1 26
Company: Southwestern Energy Production Company

Location:		SHL: 660' FNL & 930' FWL		Elev.:		K.B. 6702.00 ft		G.L. 6680.00 ft		D.F. 6702.00 ft	
Permanent Datum:		Ground Level		Elev.:		6680.00 f		above Perm.Datum			
Log Measured From:		Kelly Bushing		22.00 ft							
Drilling Measured From:		Kelly Bushing									
API Serial No. 05-081-07804		Max.Hole Deviation 0 deg		Longitude: -107.69303 degrees		Latitude: 40.534283 degrees					

Logging Date 28-Sep-2014

Run Number ONE

Depth Driller 9900.00 ft

Schlumberger Depth 9900.00 ft

Bottom Log Interval

Top Log Interval

Casing Driller Size @ Depth 9.625 in @ 5681.00 ft

Casing Schlumberger 5682 ft

Bit Size 8.75 in

Type Fluid In Hole Oil

Density 11.7 lbm/gal

Fluid Loss PH 4.2 cm3

Source of Sample N/A

RM @ Meas Temp N/A

RMF @ Meas Temp N/A

RMC @ Meas Temp N/A

Source RMF N/A

RM @ BHT N/A

Max Recorded Temperatures 229 degF

Circulation Stopped 27-Sep-2014 08:00:00

Logger on Bottom 28-Sep-2014 12:00:39

Unit Number 9108

Recorded By E Meadows/M Pace

Witnessed By Sweeta Bose

Disclaimer

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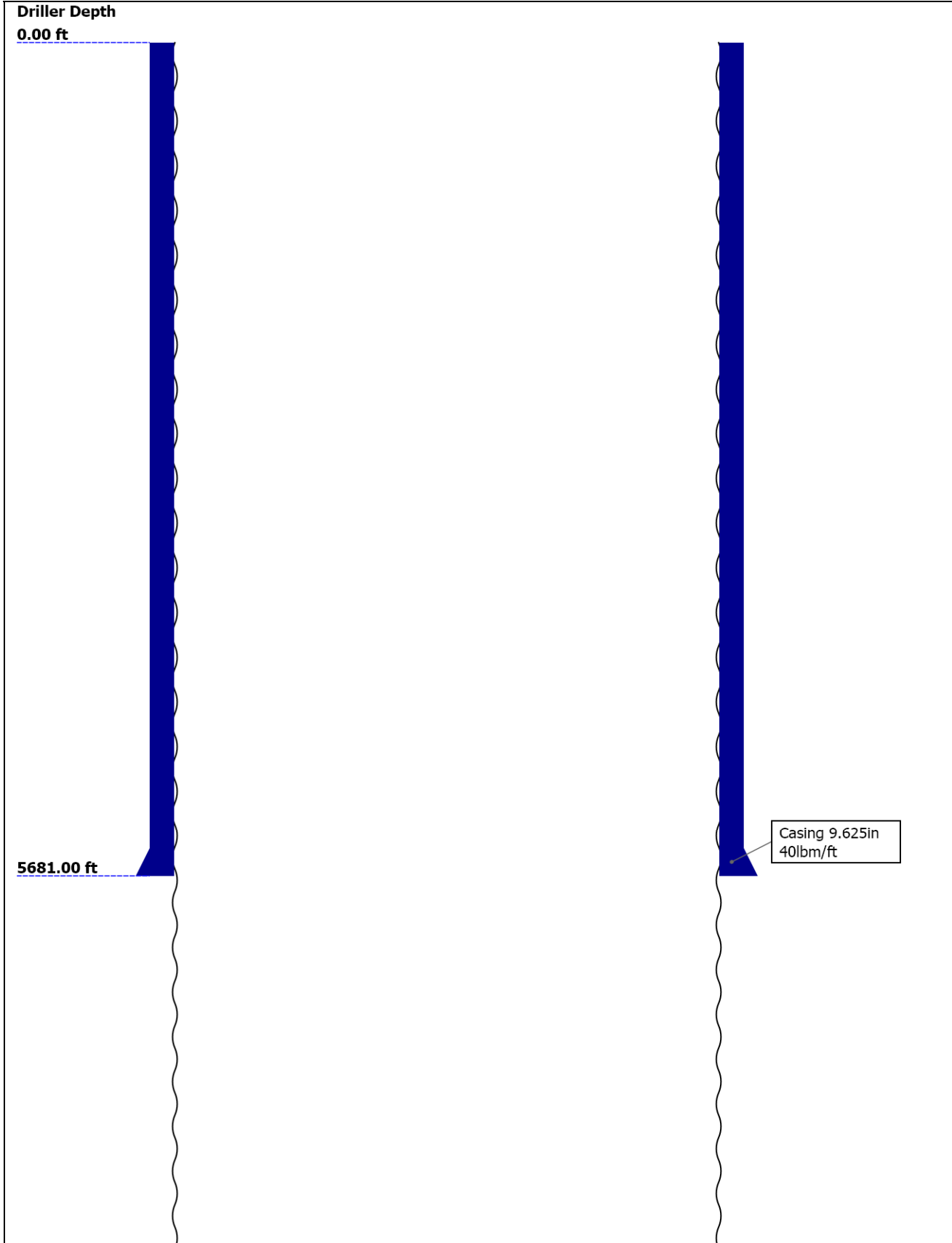
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Well Sketch



9900.00 ft

Open Hole 8.75in

Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	8.75					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	9900					
Bottom Logger (ft)	9900					
Casing						
Size (in)	9.625					
Weight (lbm/ft)	40					
Inner Diameter (in)	8.835					
Grade	J55					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	5681					
Bottom Logger (ft)	5682					

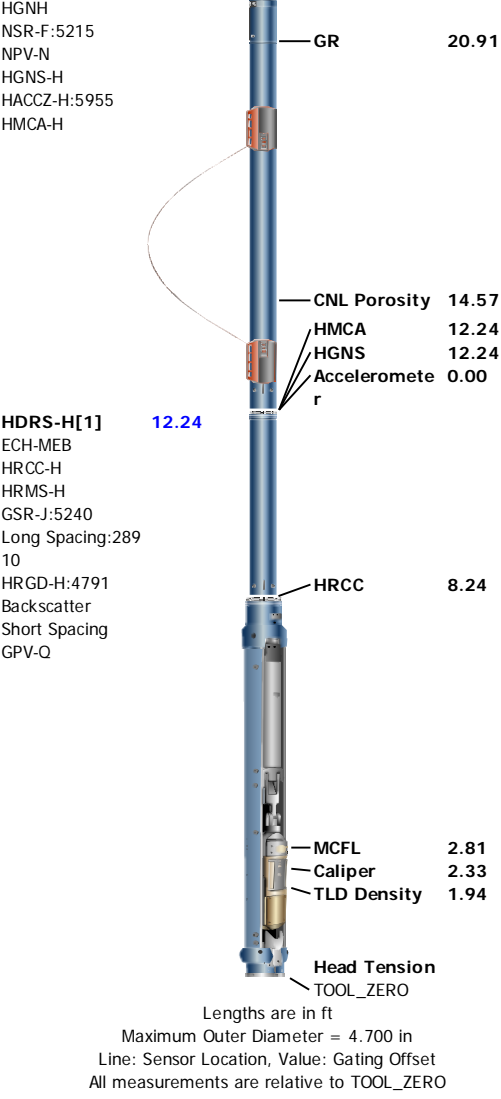
Borehole Fluids

Parameter(unit)	ONE					
Fluid Type	Oil					
Max Recorded Temperatures (degF)	229					
Source of Sample	Active Tank					
Salinity (ppm)	30000					
Density (lbm/gal)	11.7					
Funnel Viscosity (s)	48					
Fluid Loss (cm3)	4.2					
PH						
Date/Time Circulation Stopped	27-Sep-2014 08:00:00					
Date Logger on Bottom	28-Sep-2014					
Time Logger on Bottom	12:00:39					
Source RMF						
RMC	Pressed					
RM @ Meas Temp (ohm.m@degF)	N/A					
RMF @ Meas Temp (ohm.m@degF)	N/A					
RMC @ Meas Temp (ohm.m@degF)	N/A					

RM @ BHT (ohm.m@degF)	N/A					
RMF @ BHT (ohm.m@degF)	N/A					
RMC @ BHT (ohm.m@degF)	N/A					
Electricity Stability (V)						
Oil/Water	82/18 (4.50)					
Total Solid (%)	16					
High Gravity Solids (%)	13.8					

Remarks and Equipment Summary

ONE: Toolstring				ONE: Remarks
Equip name LEH-QT LEH-QT	Length 54.96	MP name	Offset	1. THIS IS THE FIRST RUN IN THE WELL.
				2. TOOL RAN AS PER TOOL SKETCH.
				3. MATRIX: LIMESTONE MDEN: 2.71 G/ML
DTC-H ECH-KC DTC-H	52.04	CTEM HV	51.14 0.00	4. NEUTRON CORRECTIONS: BOREHOLE (BS), STANDOFF (0.125"), PRESSURE/TEMPERATURE
HNGS-BA:392 HEH-K:1007 HNGS-BA:392	49.04	TelStatus ToolStatus	49.04 49.04	5. WASHOUTS MAY ADVERSELY AFFECT LOGS.
				6. TD: 9,692' CSG: 2,335'
		GR	46.05	7. DUAL CALIPERS READ 8.921" IN CASING
HNGC-B:657 HNGH-A:4144 HNGC-B:657	40.85	Tel Status	39.1	
HTBC-H ECH-TAA HMCA-H	37.35	HMCA Temperature	35.35 35.35	
HDRS-H[2] ECH-MEB HRCC-H HRMS-H Short Spacing:27 860 GPV-Q Backscatter HRGD-H:3714 Long Spacing GSR-J:5416	35.35	HRCC	31.35	
		MCFL Caliper TLD Density	25.92 25.43 25.04	
AH-255(+45D) [2]	23.11			
AH-255(+45D) [1]	22.38			
HGNS-H	21.65	Temperature	21.62	



Depth Summary

ONE

Depth Measuring Device

Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		

Tension Device

Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		

Logging Cable

Type	7-46A-XS		
Serial Number			
Length	21000.00 ft		
Conveyance Type	Wireline		
Rig Type	Triple		

ONE:Depth Control Parameters

Depth Control Remarks

Log Sequence	First Log In the Well	1. ALL SCHLUMBERGER DEPTH CONTROL PROCEDURES WERE FOLLOWED DURING LOGGING OPERATIONS
Rig Up Length At Surface		2. IDW USED AS PRIMARY DEPTH CONTROL MEASURE.

Rig Up Length At Bottom	3. Z CHART USED AS SECONDARY DEPTH CONTROL MEASURE.
Rig Up Length Correction	4. TD: 9,692' CSG: 2,335'
Stretch Correction	5. STRETCH CORRECTION: 8.6'
Tool Zero Check At Surface	

Composite 1

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_22480-4.0.9163.3001

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	4.0.9469.3000
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	4.0.9469.3000
DepthCorrection	DepthCorrection	4.0.9469.3000

Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	4.0.9486.3000	
LEH-QT	Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor	4.0.9469.3000	
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9486.3000	
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	4.0.9486.3000	

Composite Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Main[5]:Up	Up	5547.46 ft	9919.53 ft	28-Sep-2014 2:01:51 PM	28-Sep-2014 4:30:27 PM	ON	1.82 ft	Yes
ONE	Repeat[6]:Up	Up	5587.93 ft	6006.83 ft	28-Sep-2014 4:34:33 PM	28-Sep-2014 4:49:22 PM	ON	1.30 ft	Yes

All depths are referenced to toolstring zero

Log	Company:Southwestern Energy Production Company	Well:Diamond T Sheep 7 92 1 26
		Composite 1:S013

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:24

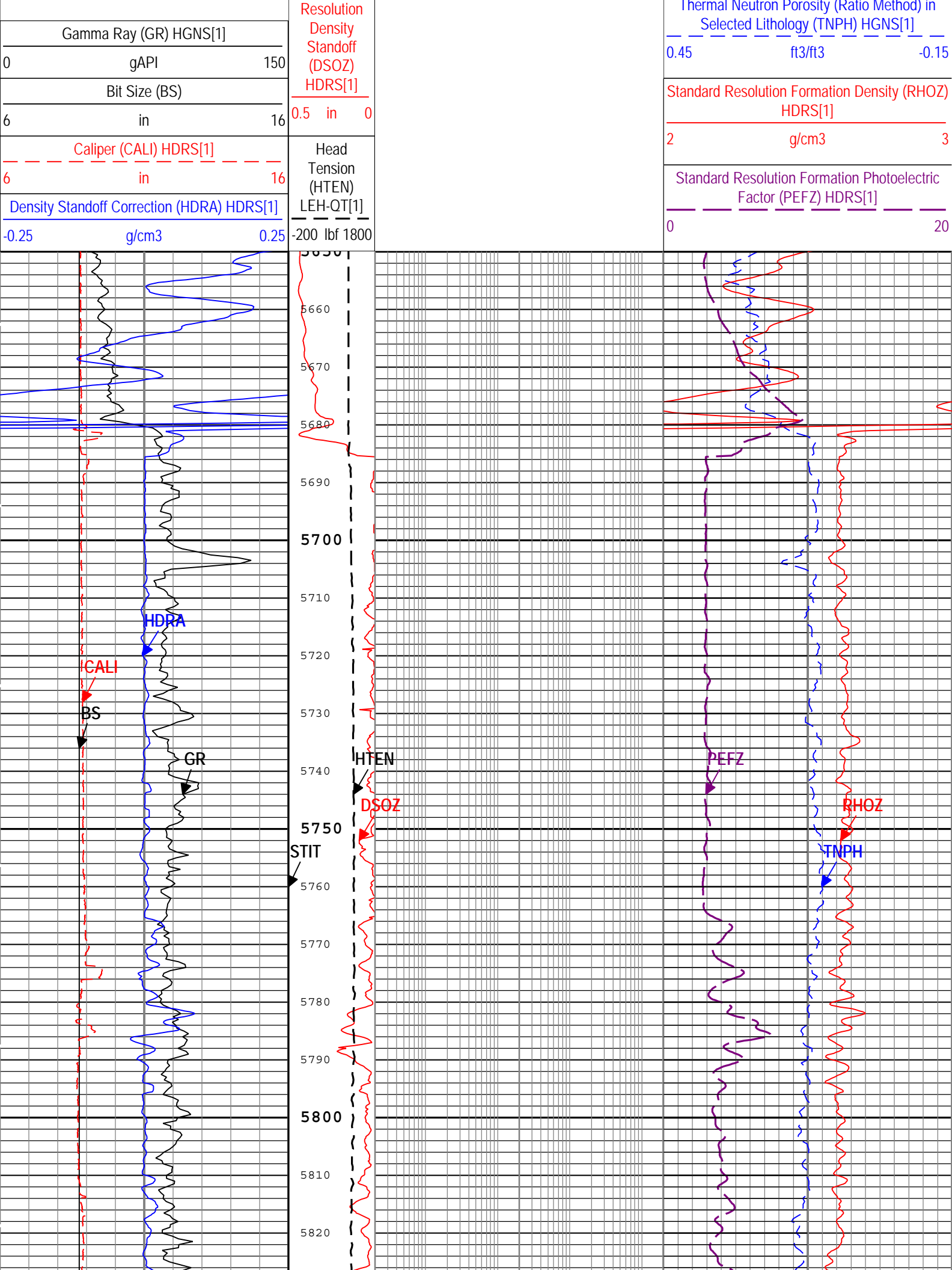
Channel	Source	Sampling
BS	Borehole	6in
CALI	HDRS[1]:HRCC-H[1]:HRCC-H[1]	1in
DSOZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
GR	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in
HDRA	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
HTEN	LEH-QT[1]:LEH-QT[1]:LEH-QT[1]	6in
PEFZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
RHOZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
STIT	DepthCorrection	6in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in

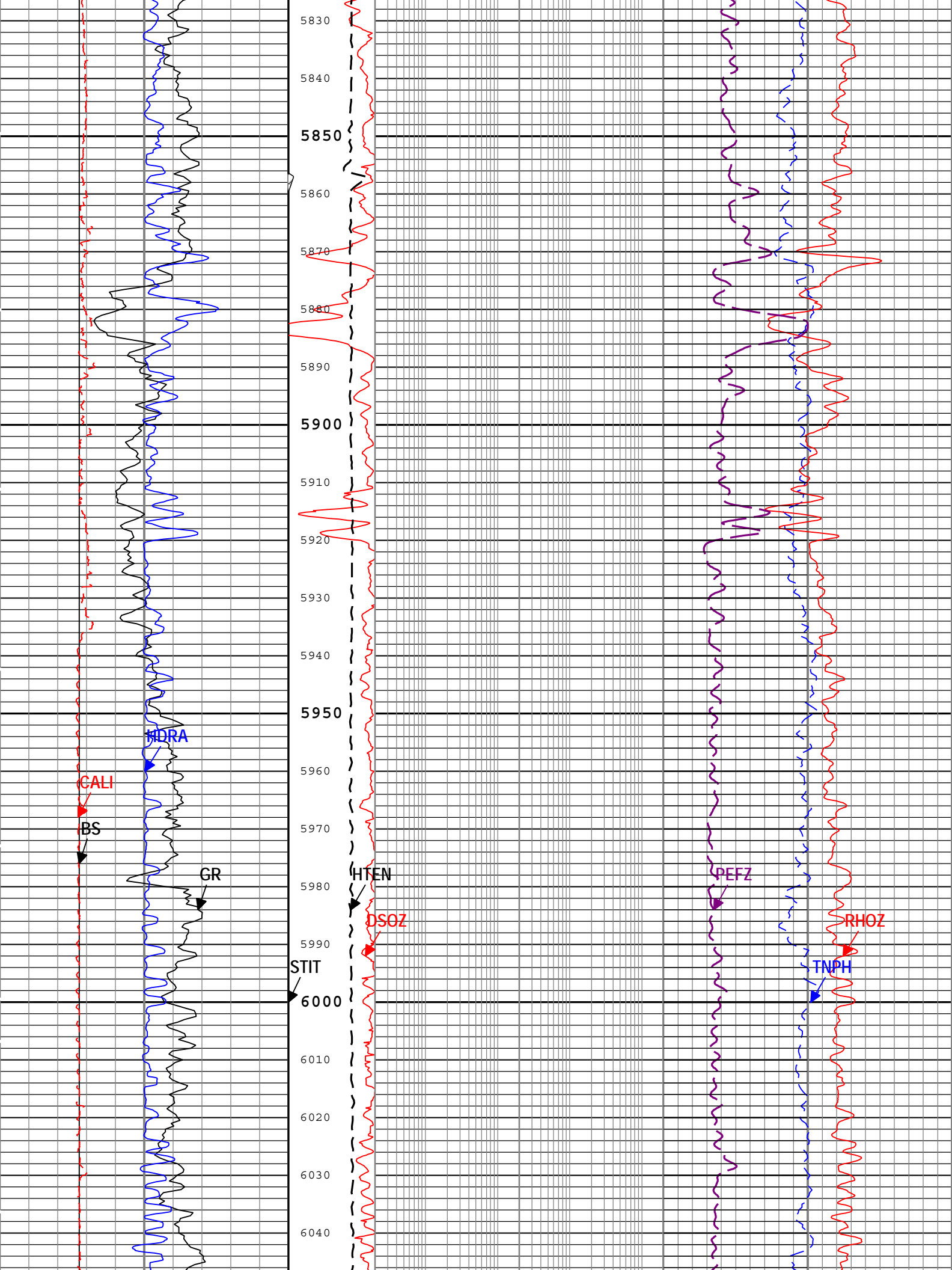
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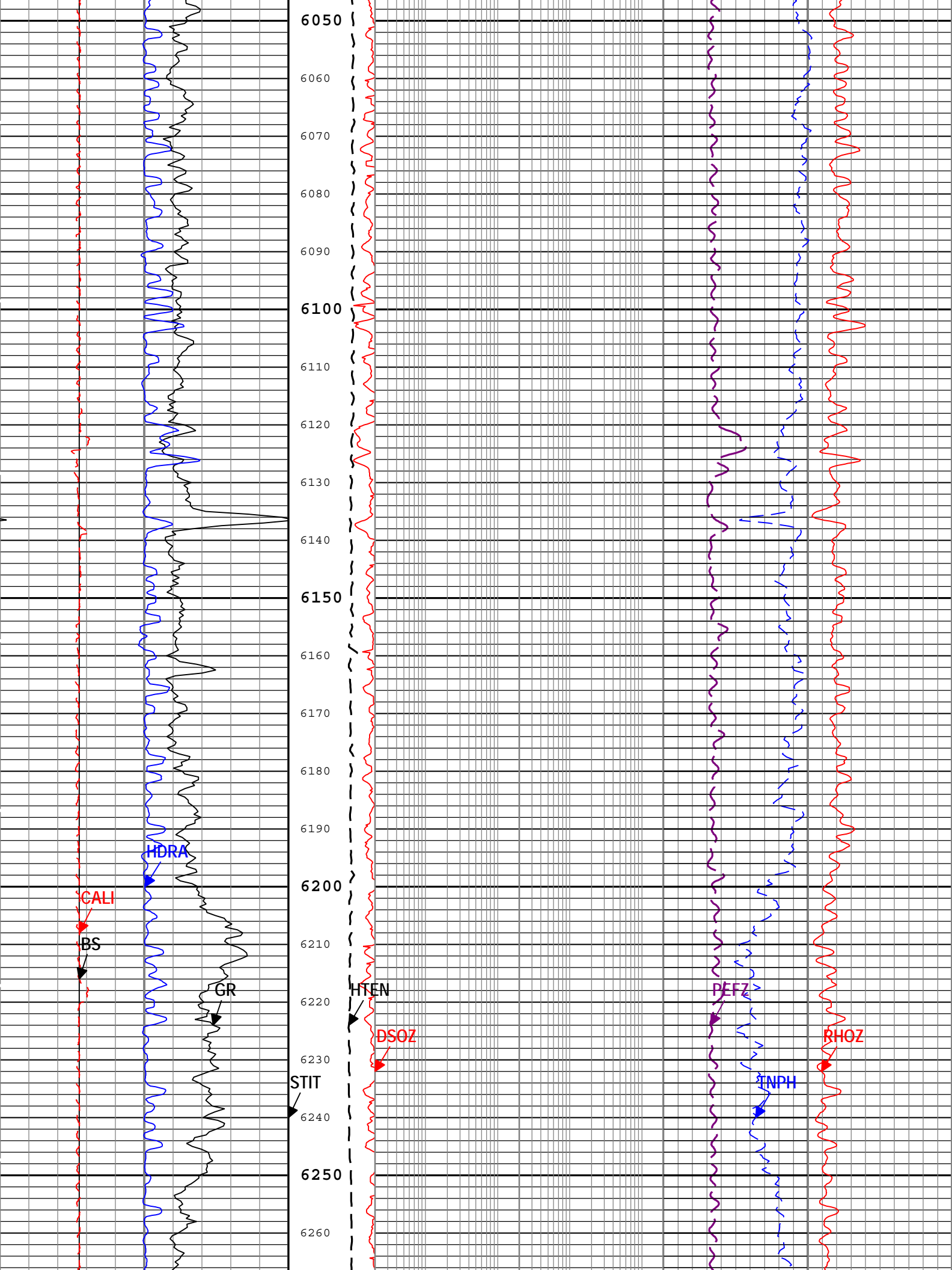
Stuck Tool Indicator, Total (STIT)
0 ft 50

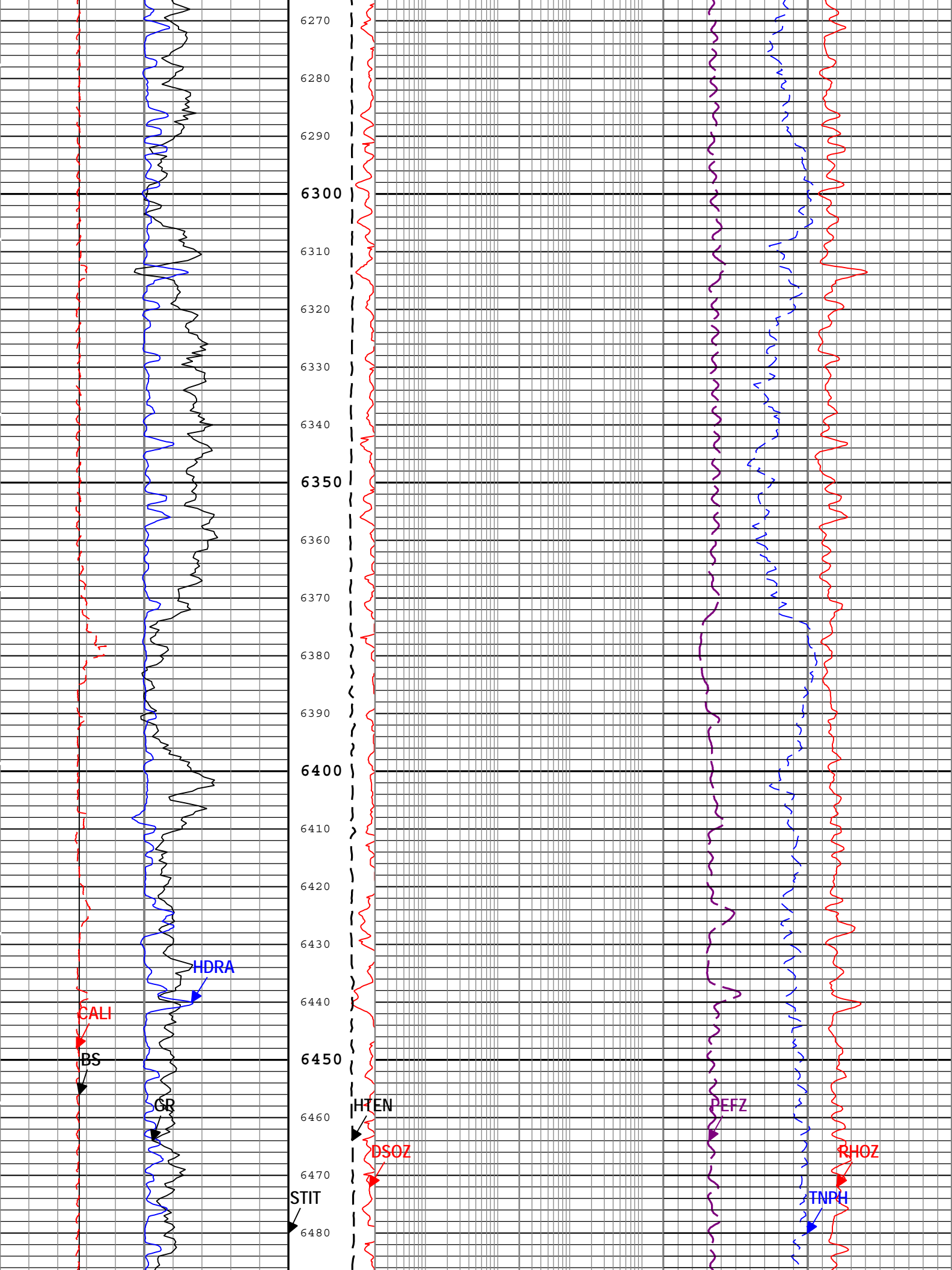
Standard

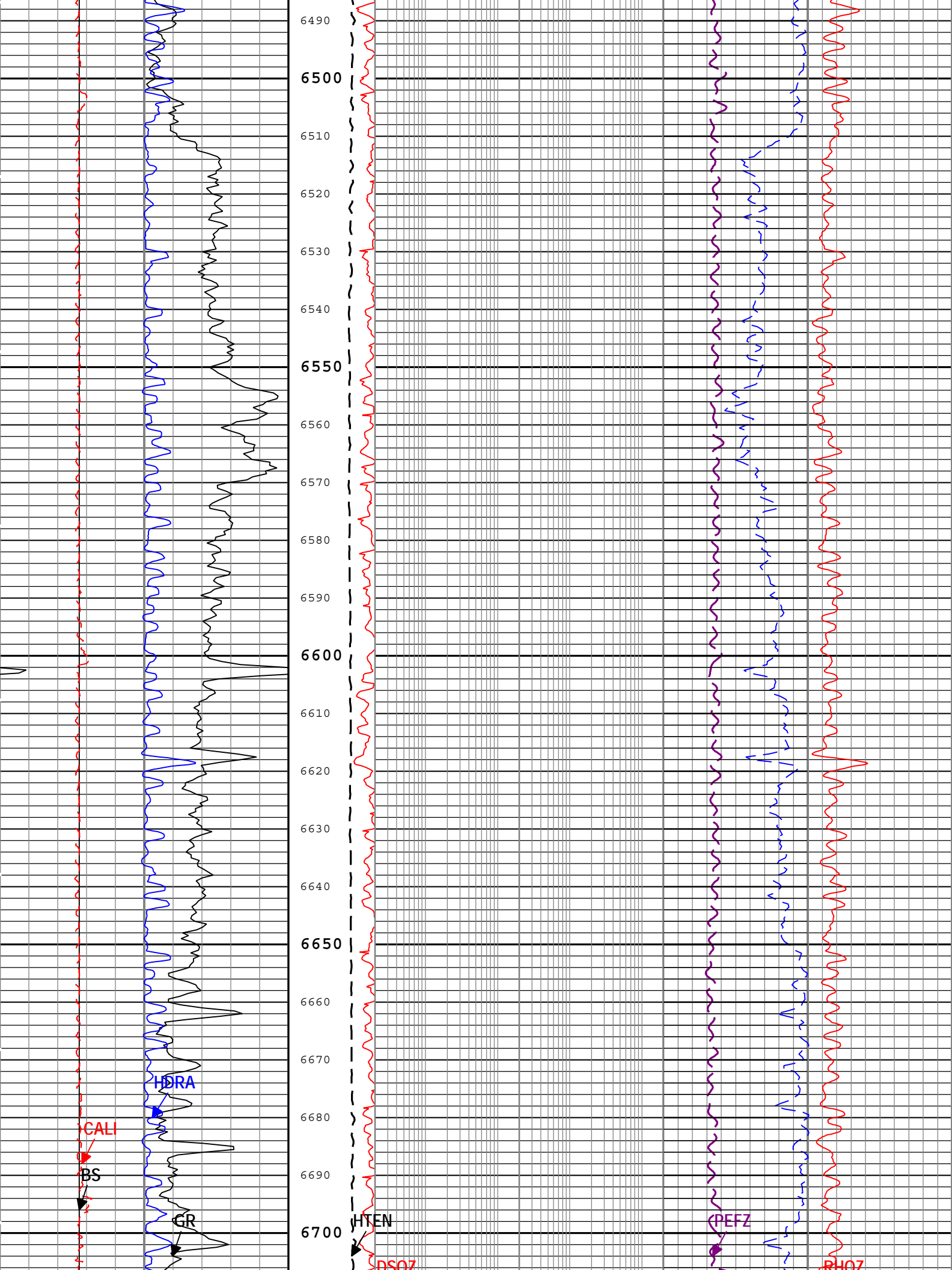
Estimated Neutron Porosity (Estimated Neutron Porosity)

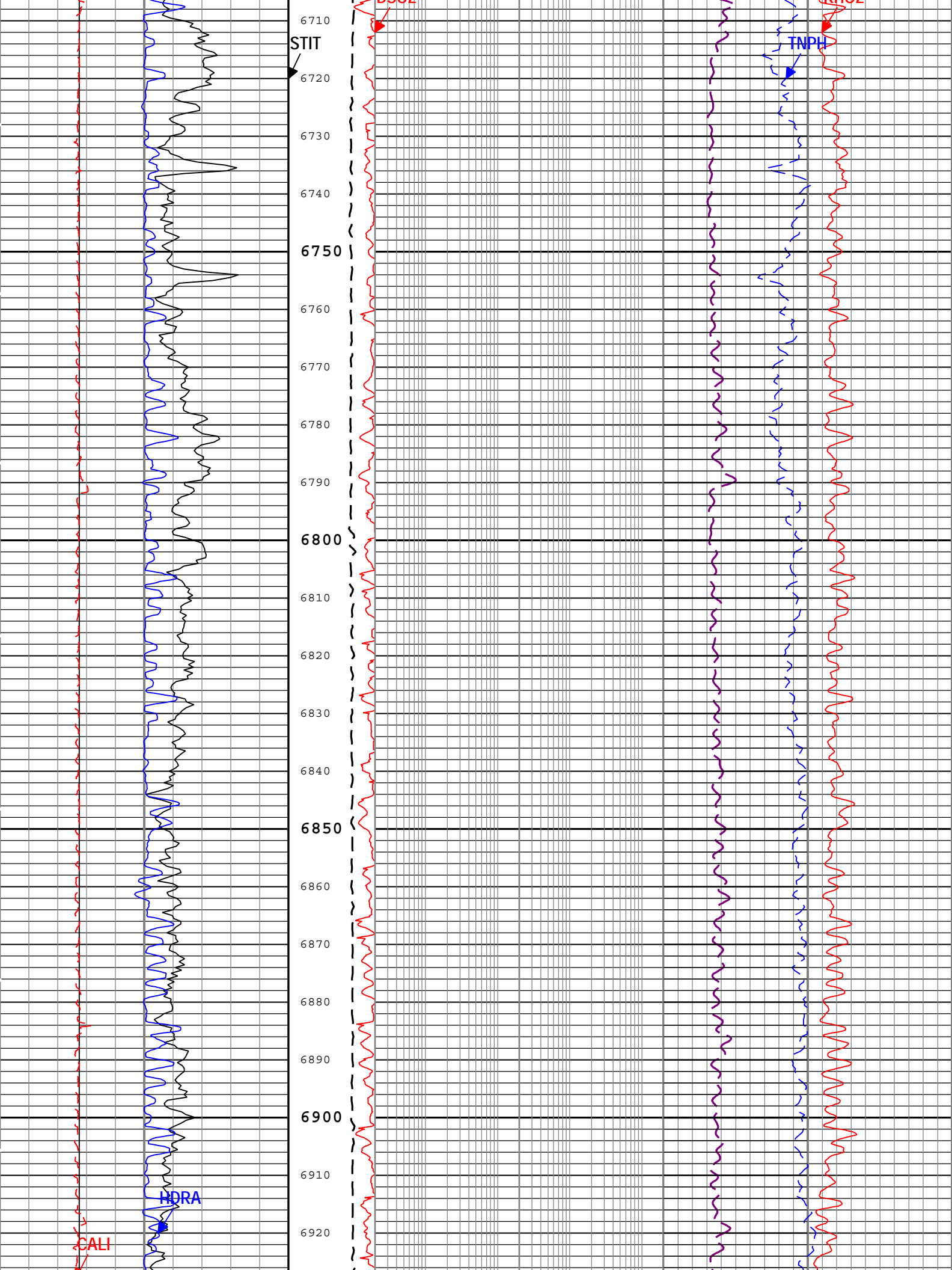


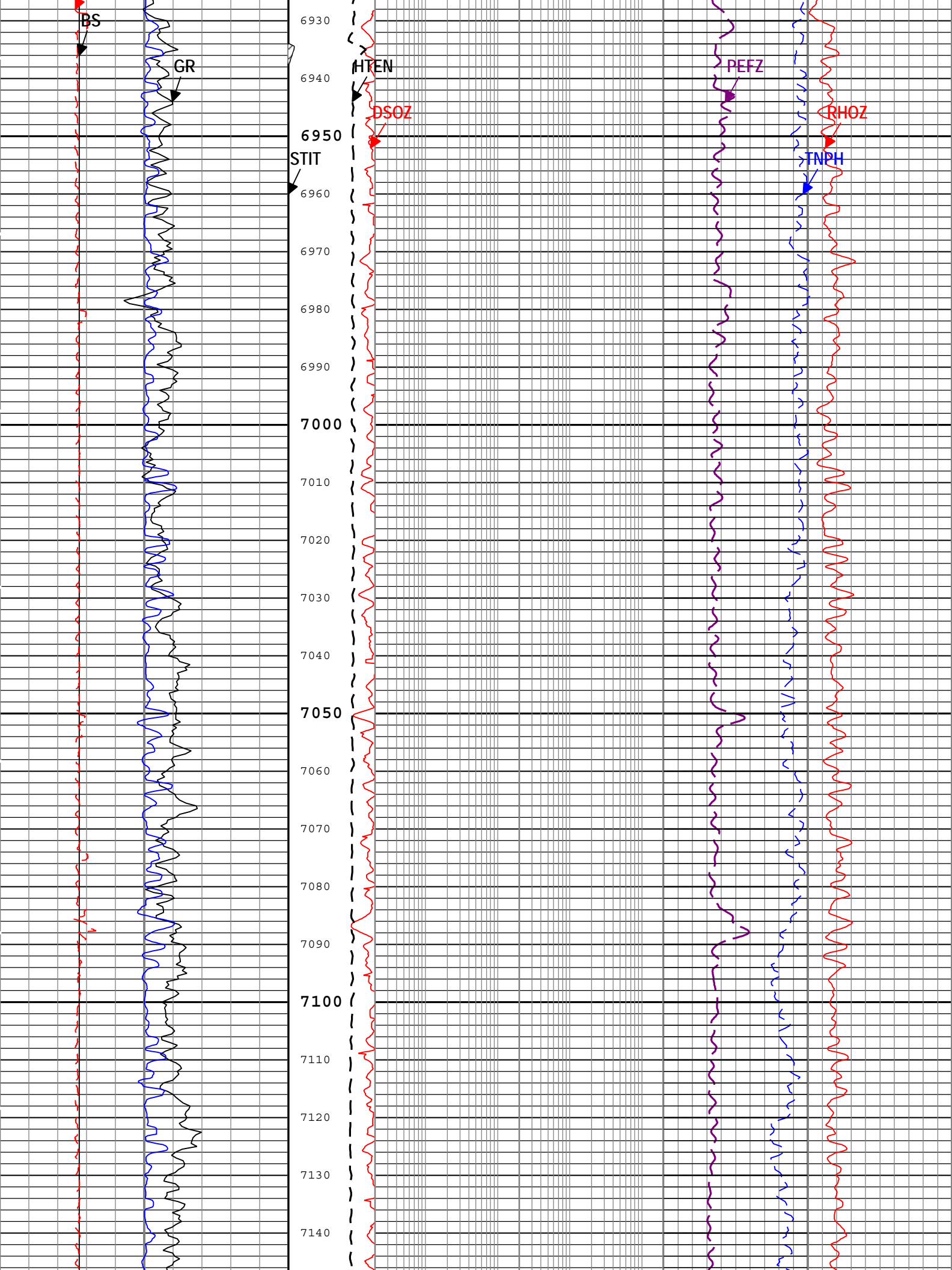


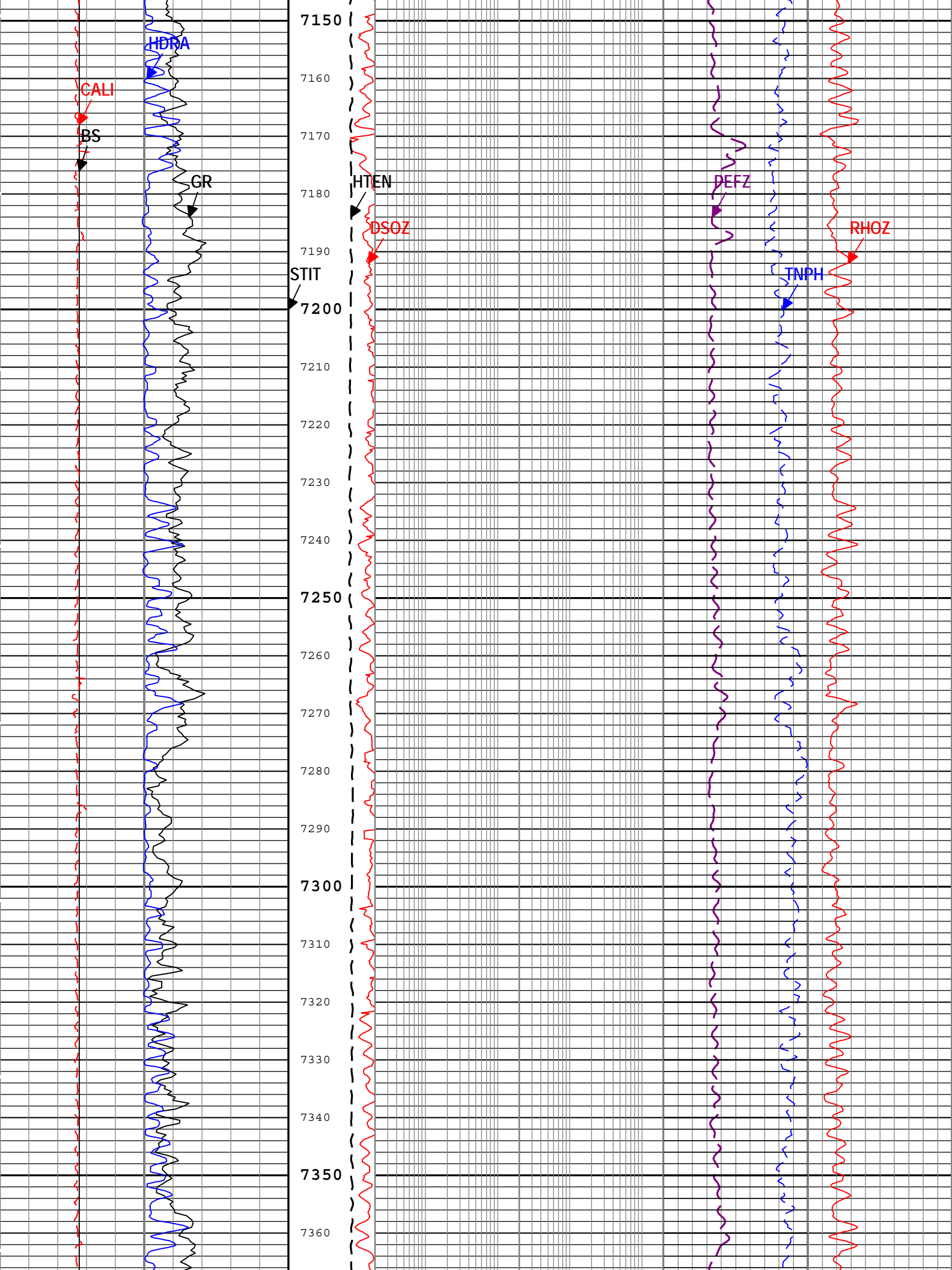


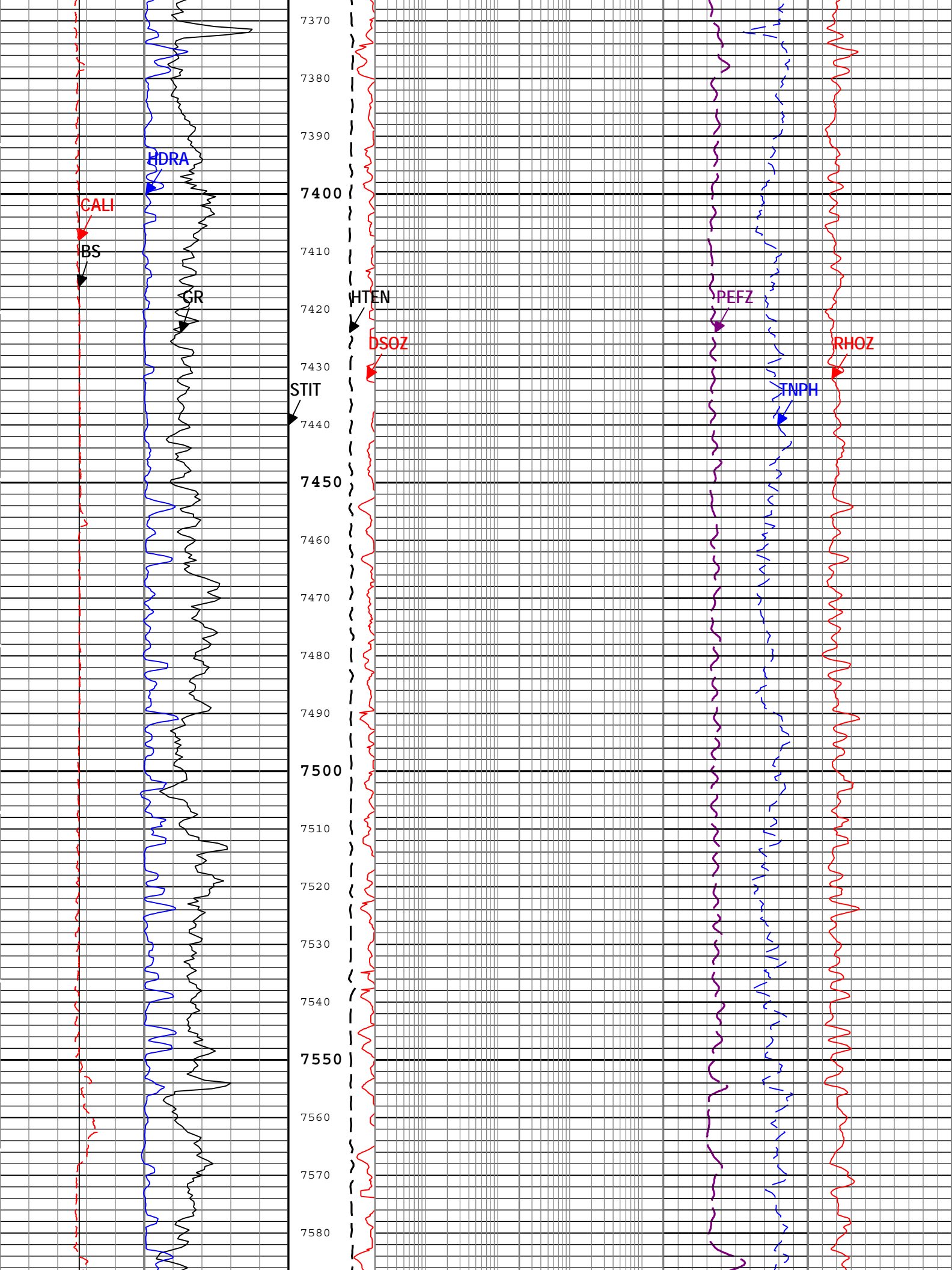


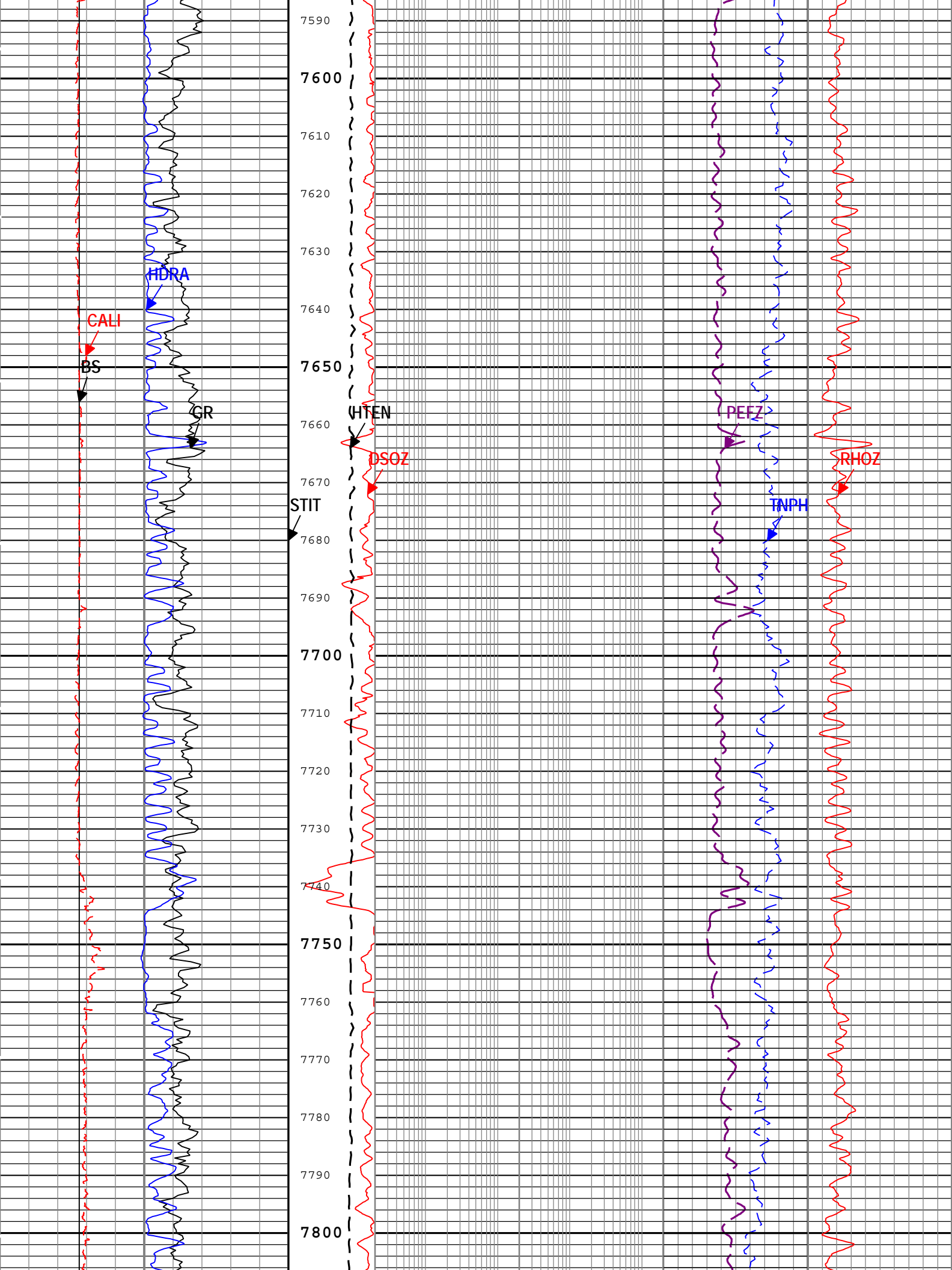


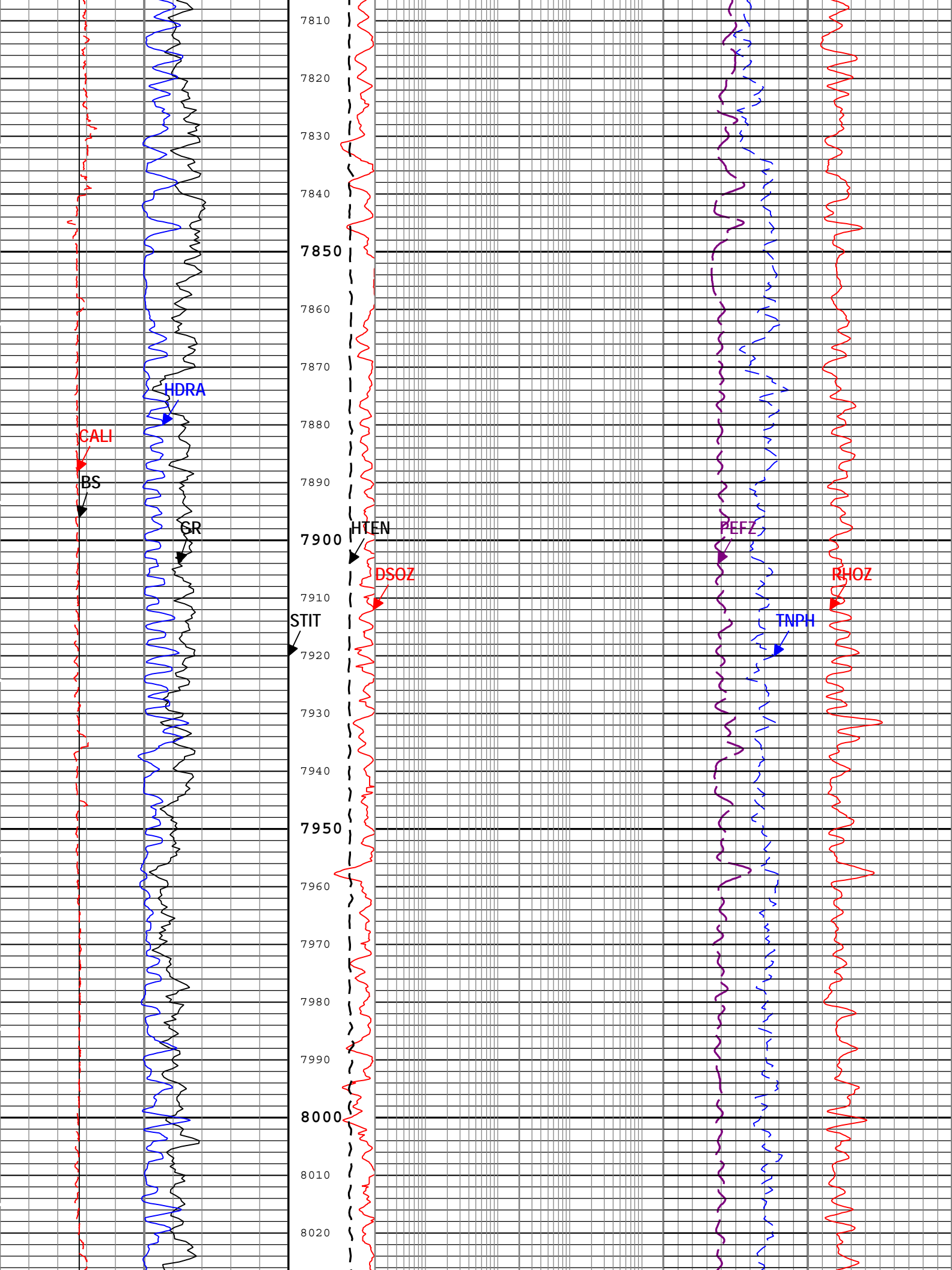


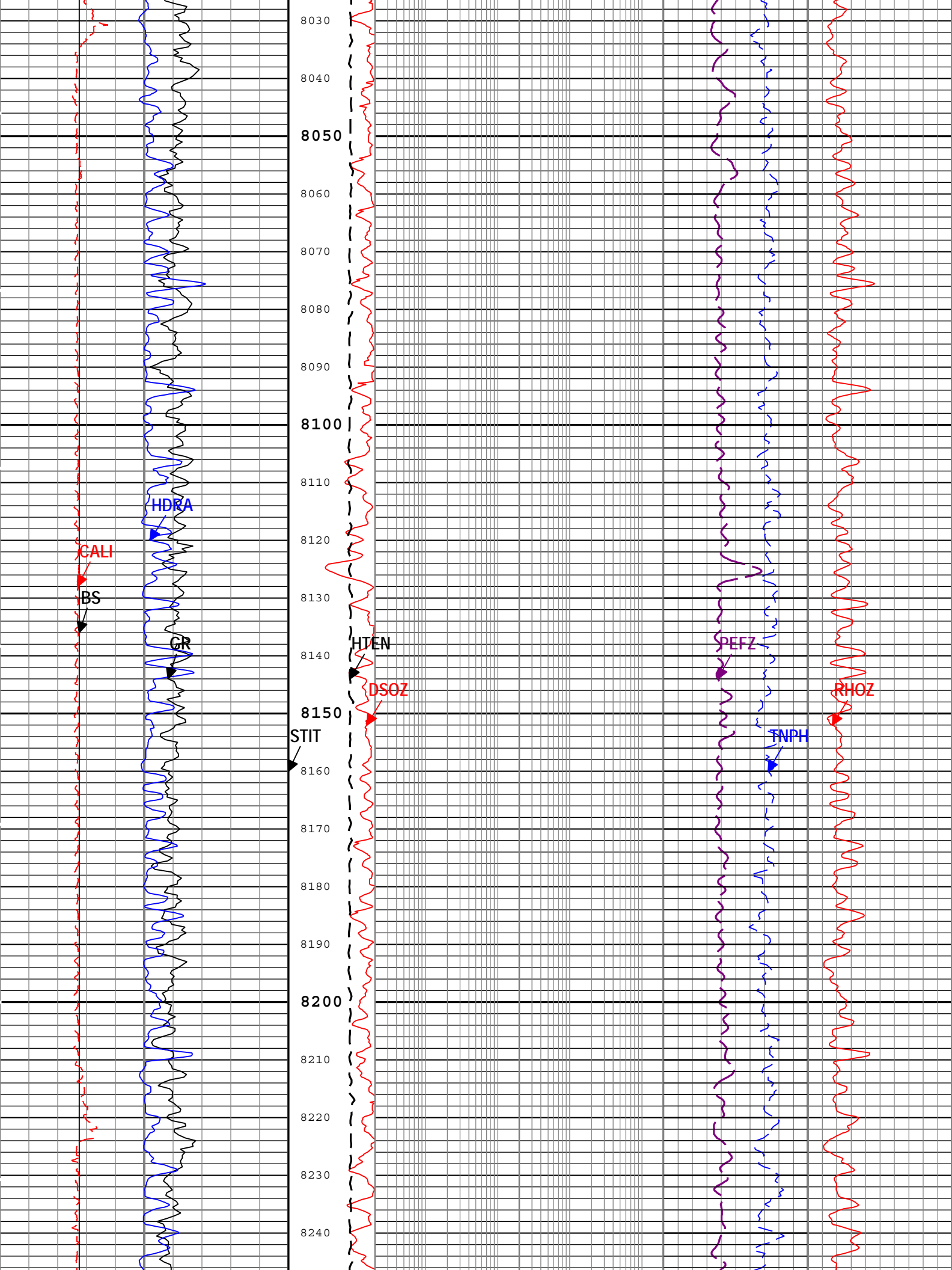


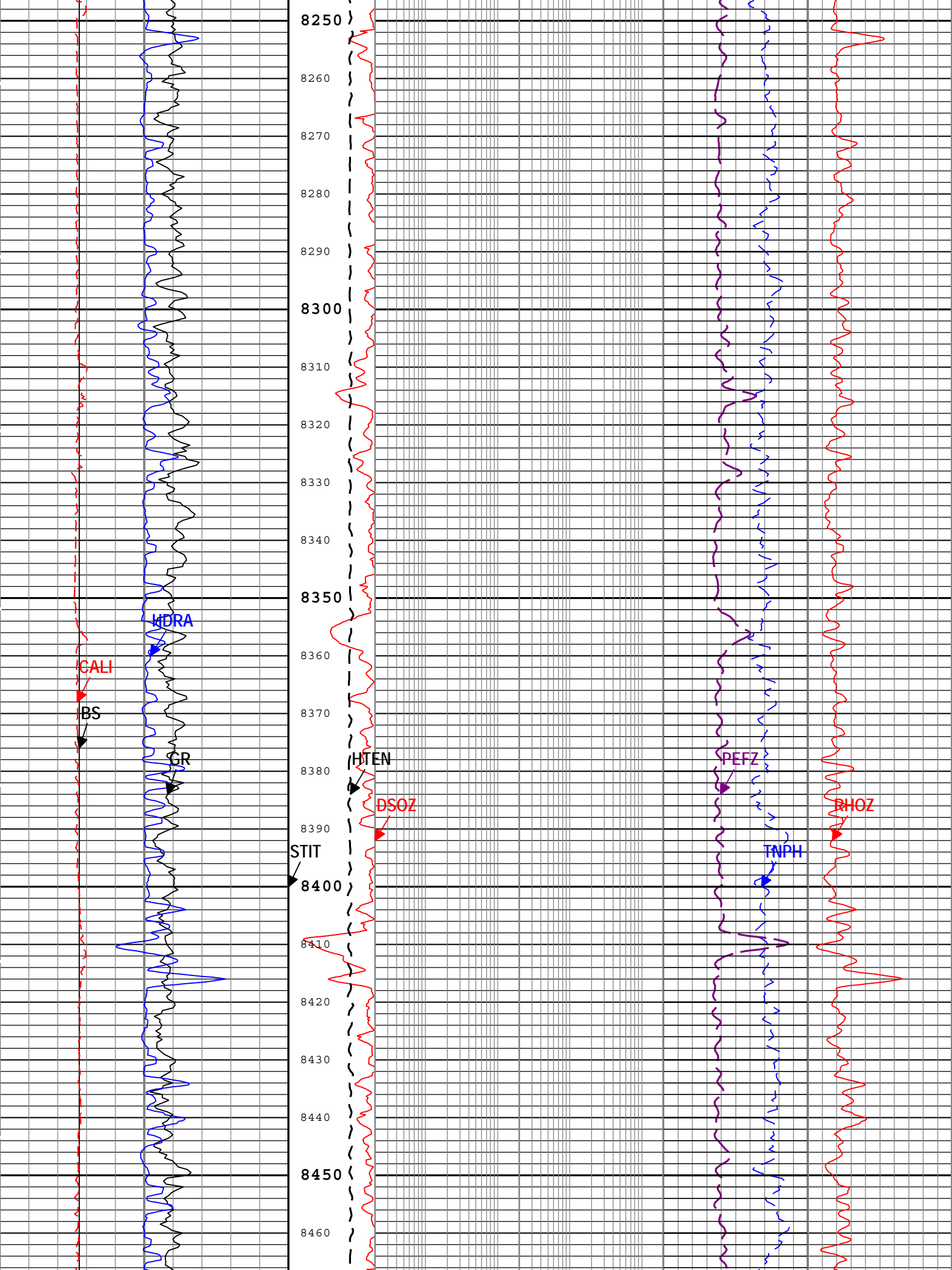


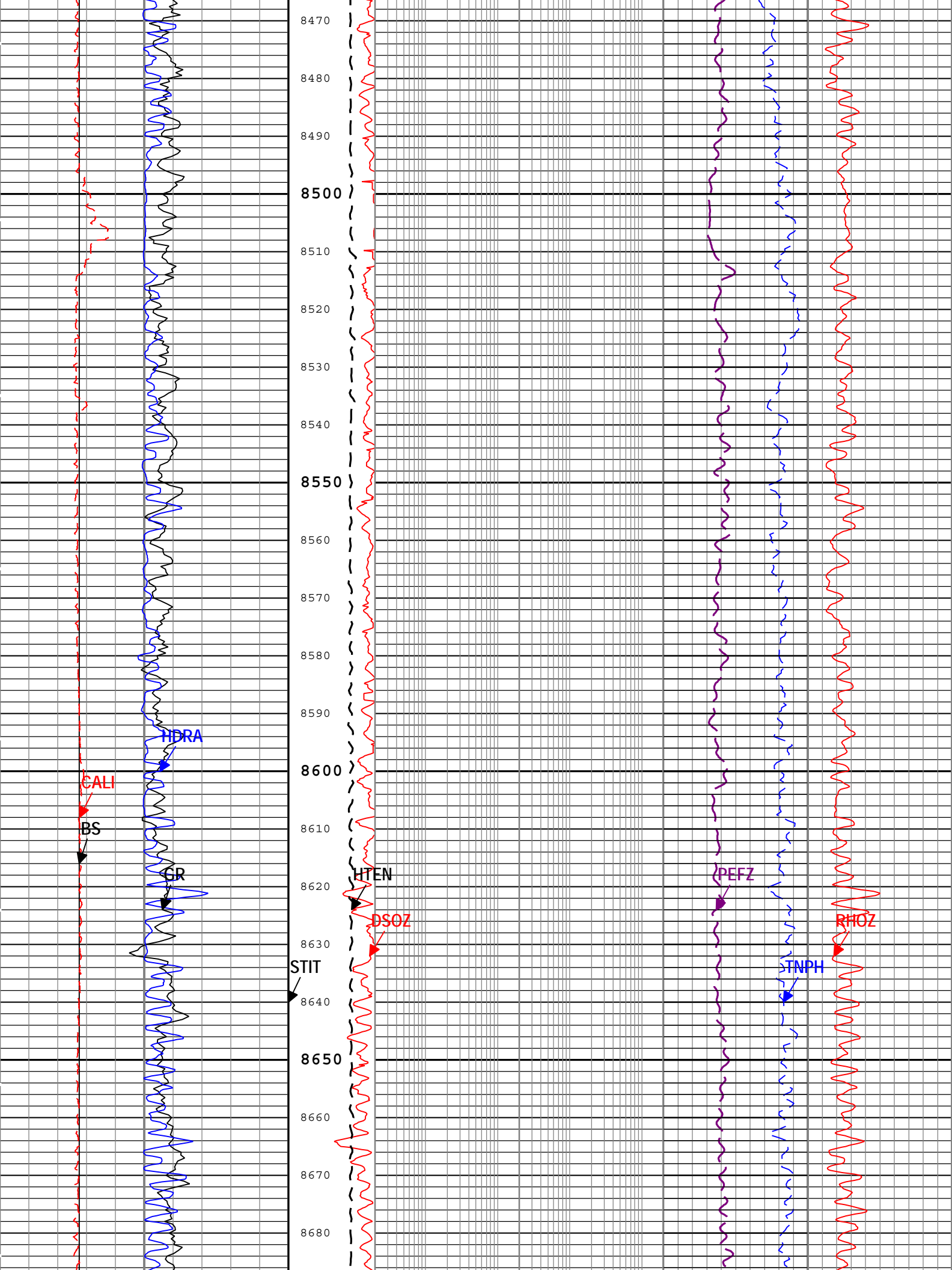


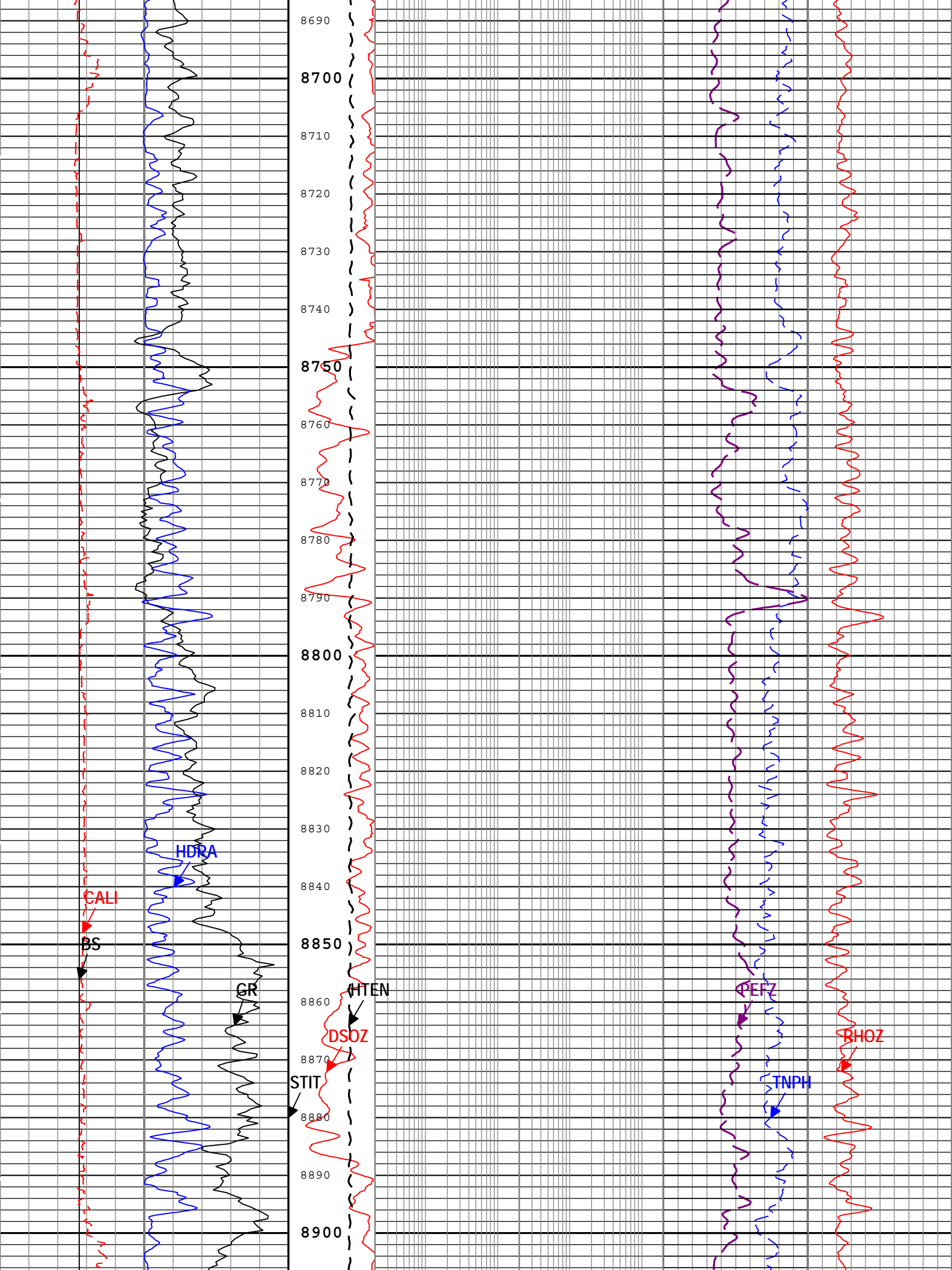


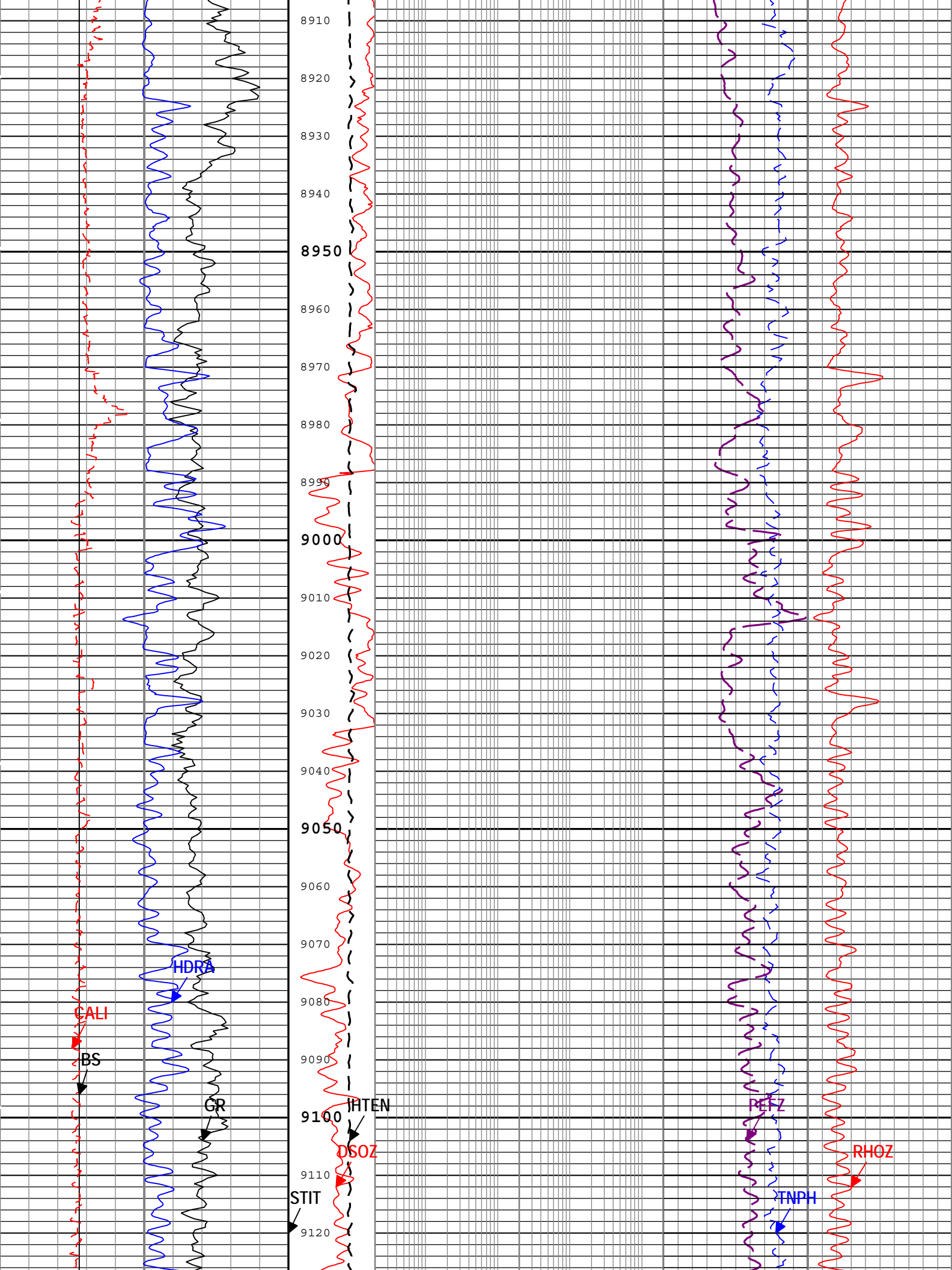


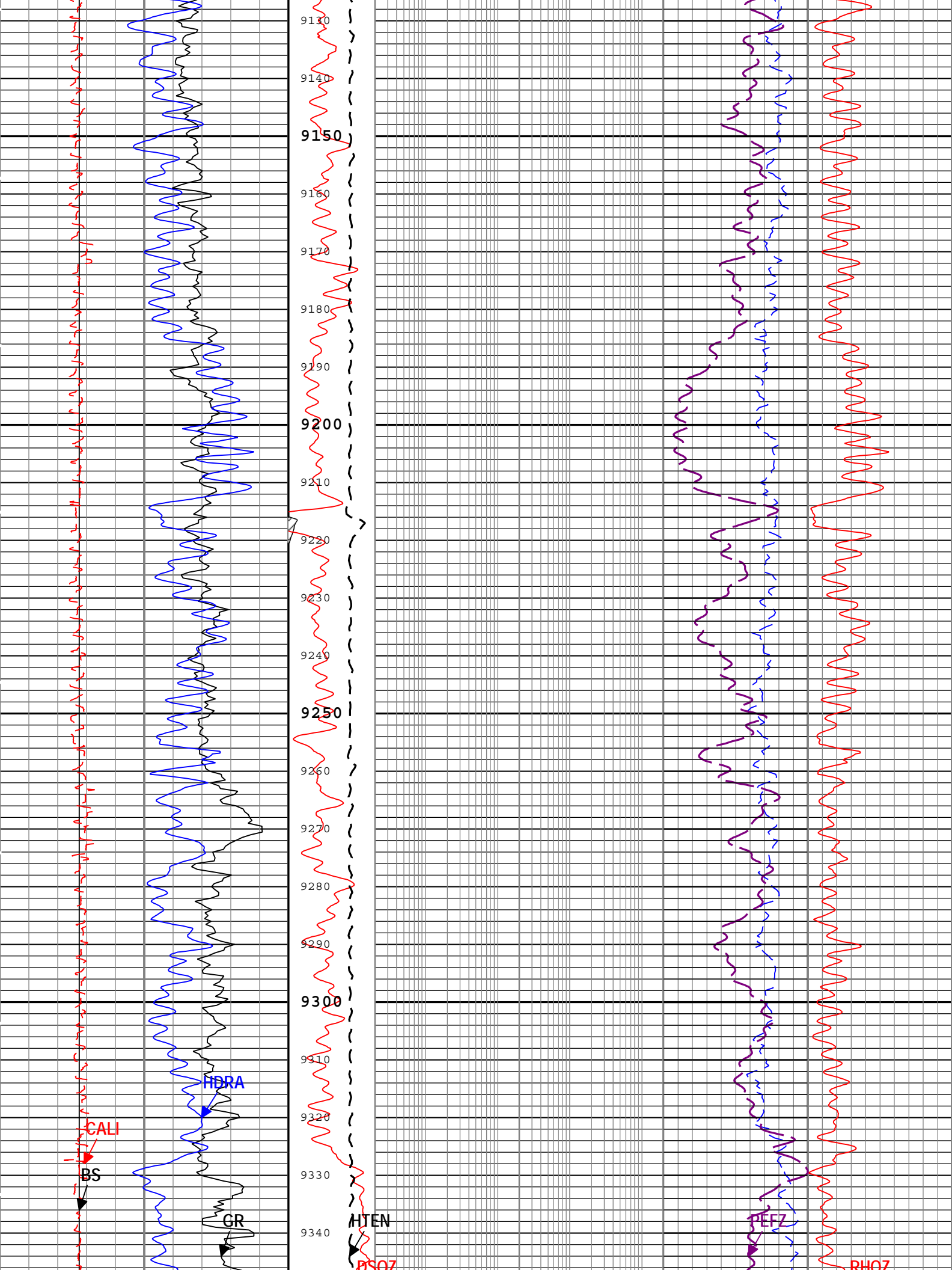


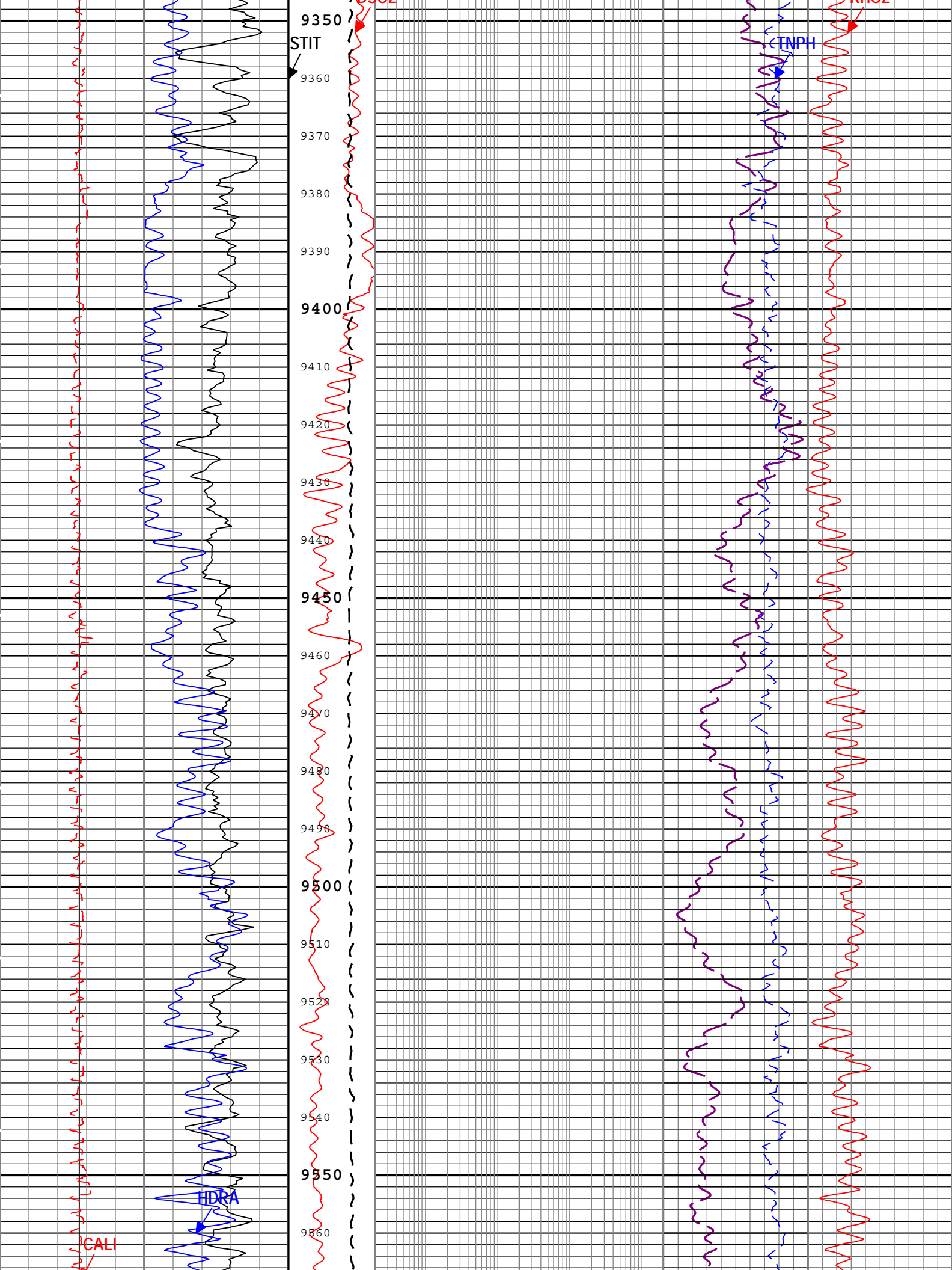


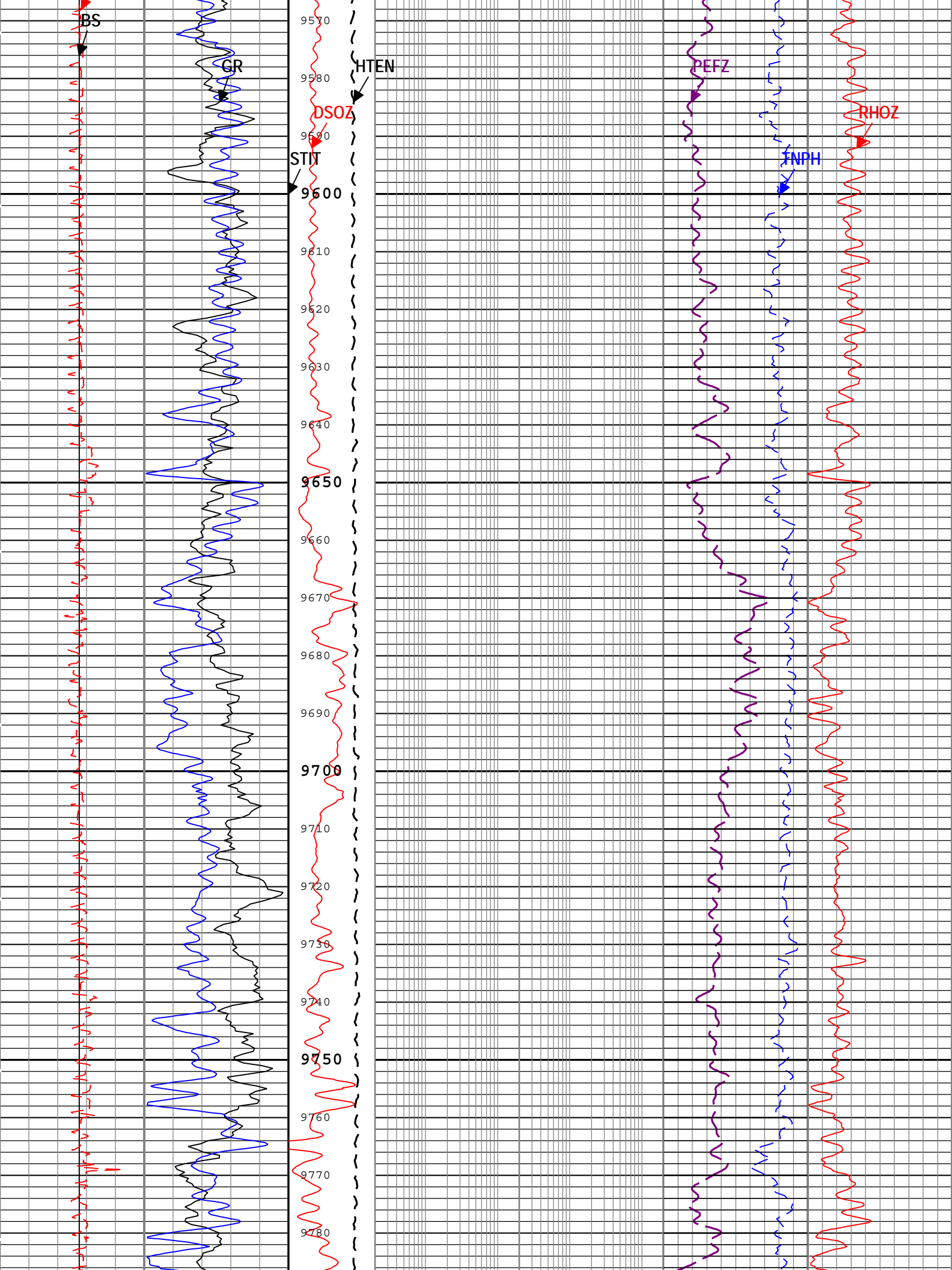


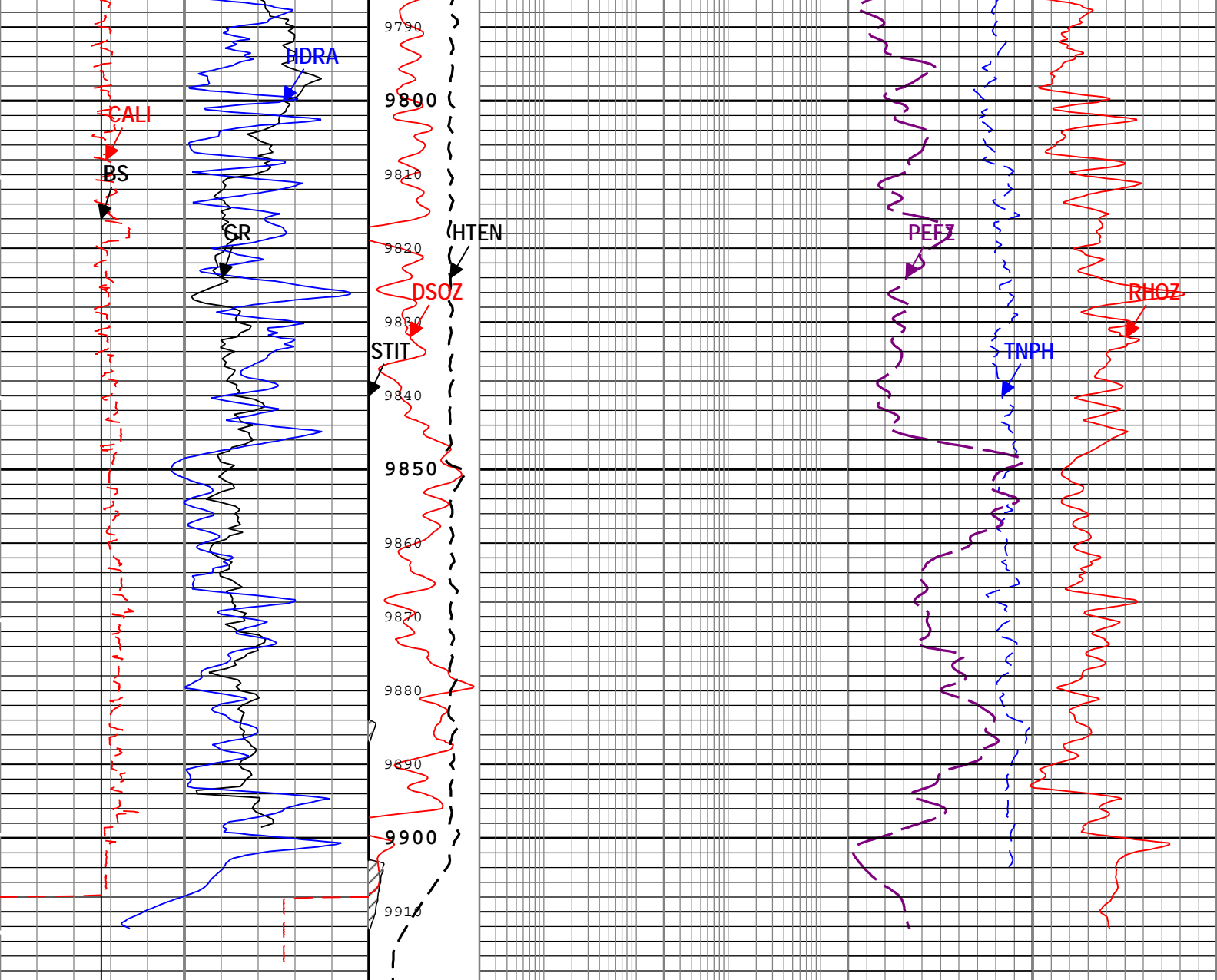












Gamma Ray (GR) HGNS[1]	
0	150
gAPI	
Bit Size (BS)	
6	16
in	
Caliper (CALI) HDRS[1]	
6	16
in	
Density Standoff Correction (HDRA) HDRS[1]	
-0.25	0.25
g/cm3	
Stuck Tool Indicator, Total (STIT)	
0	50
ft	
Standard Resolution Density Standoff (DSOZ) HDRS[1]	
0.5	0
in	
Head Tension (HTEN) LEH-QT[1]	
-200	1800
lbf	

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS[1]		
0.45	ft3/ft3	-0.15
Standard Resolution Formation Density (RHOZ) HDRS[1]		
2	g/cm3	3
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS[1]		
0		20

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:24

ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	229	degF
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	30000	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.575	in
CBLO	Casing Bottom (Logger)	WLSESSION	5682	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	11.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Oil	
FSAL	Formation Salinity	Borehole	0	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 Computed Mud Resistivity	Borehole	REMS	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
SOCO	Standoff Correction Option	HGNS-H	Yes	

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H	1	
HTEN_CALI	Head Tension Calibration Method	LEH-QT	Calibration	
HTEN_MULTIPL	Head Tension Multiplier or Manual Gain	LEH-QT	1	
HTEN_SHIFT	Head Tension Shift or Manual Offset	LEH-QT	0	lbf
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

Composite 1

5" Triple Combo

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_22480-4.0.9163.3001

Computation	Description	Version
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	4.0.9469.3000
DepthCorrection	DepthCorrection	4.0.9469.3000

Tool Elements	Description	Software Version	Firmware Version
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9486.3000	
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	4.0.9486.3000	

Composite Summary

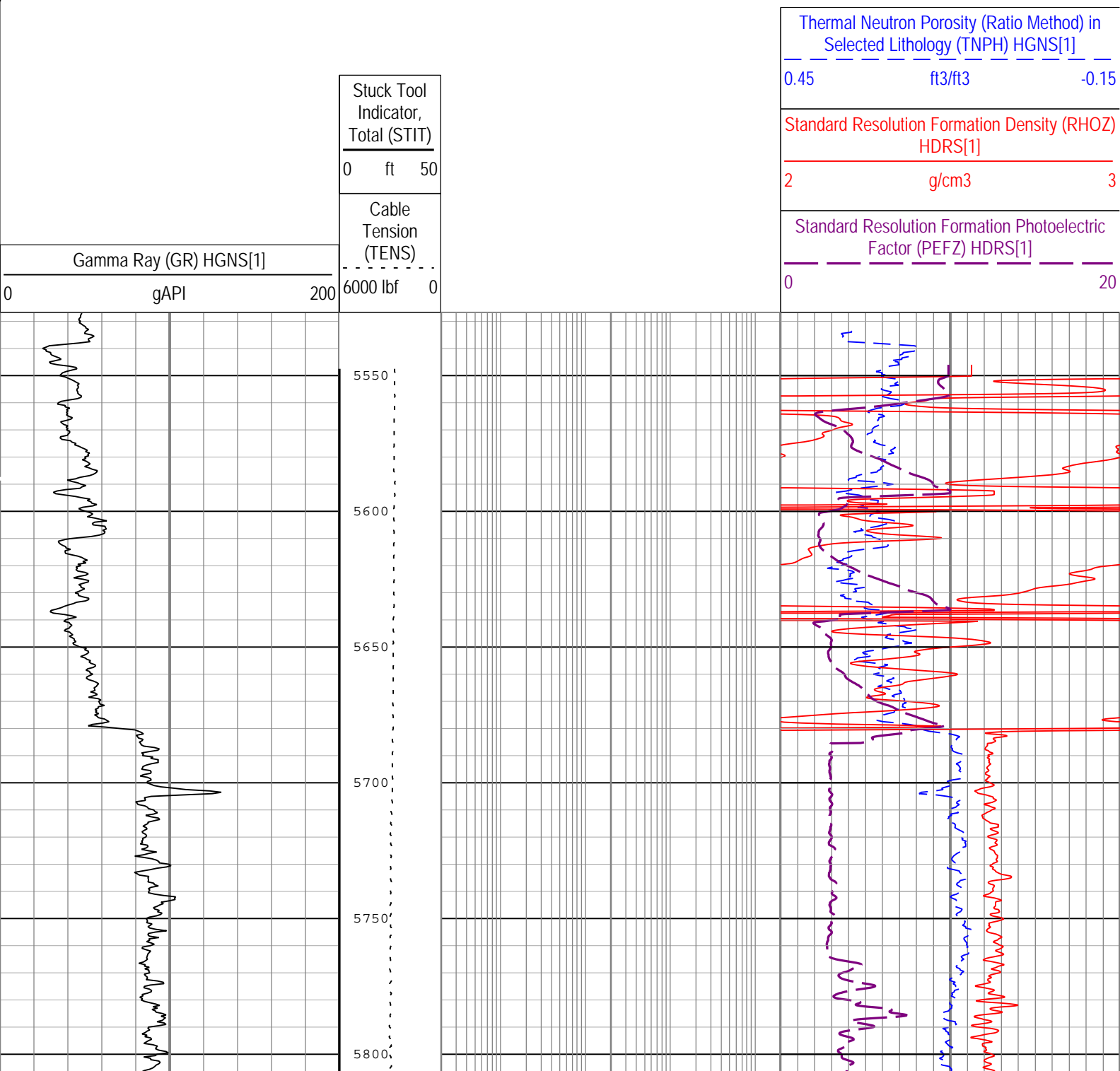
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Main[5]:Up	Up	5547.46 ft	9919.53 ft	28-Sep-2014 2:01:51 PM	28-Sep-2014 4:30:27 PM	ON	1.82 ft	Yes
ONE	Repeat[6]:Up	Up	5587.93 ft	6006.83 ft	28-Sep-2014	28-Sep-2014	ON	1.30 ft	Yes

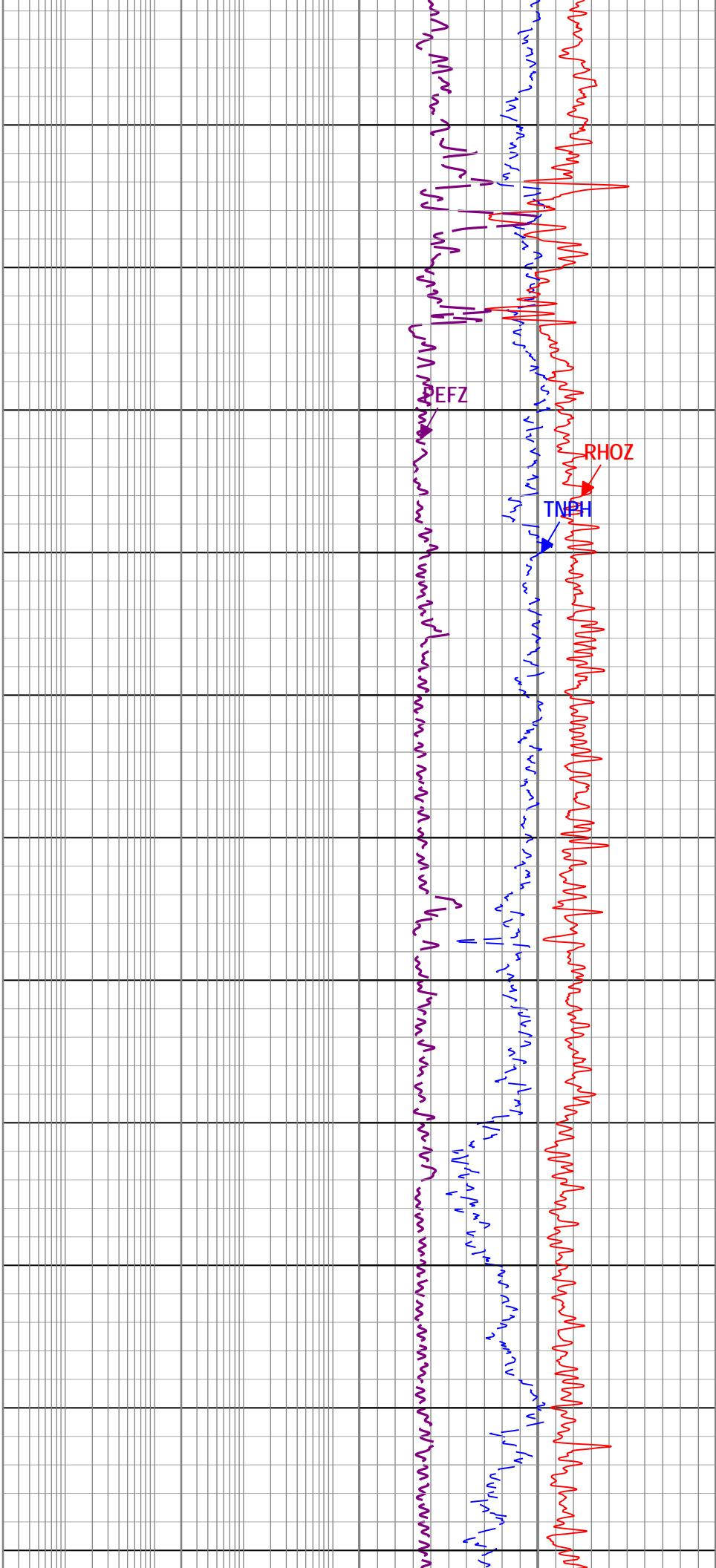
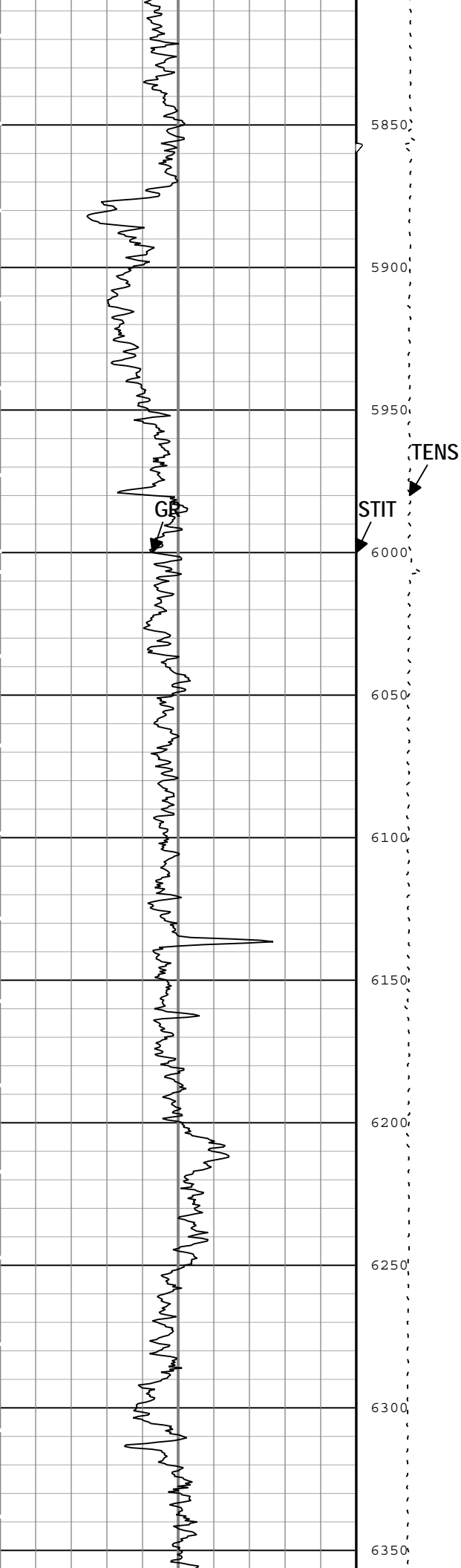
All depths are referenced to toolstring zero

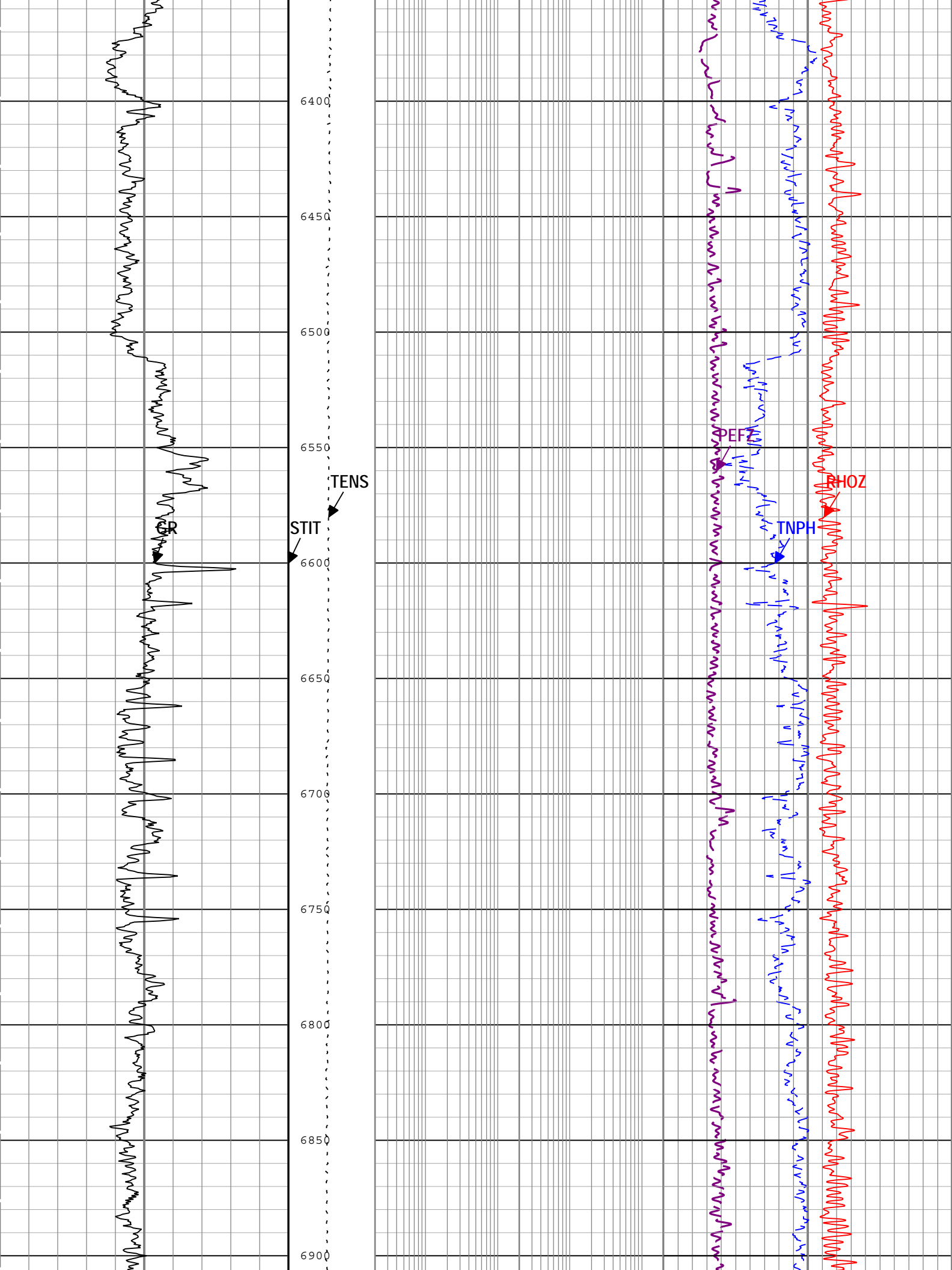
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Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:26

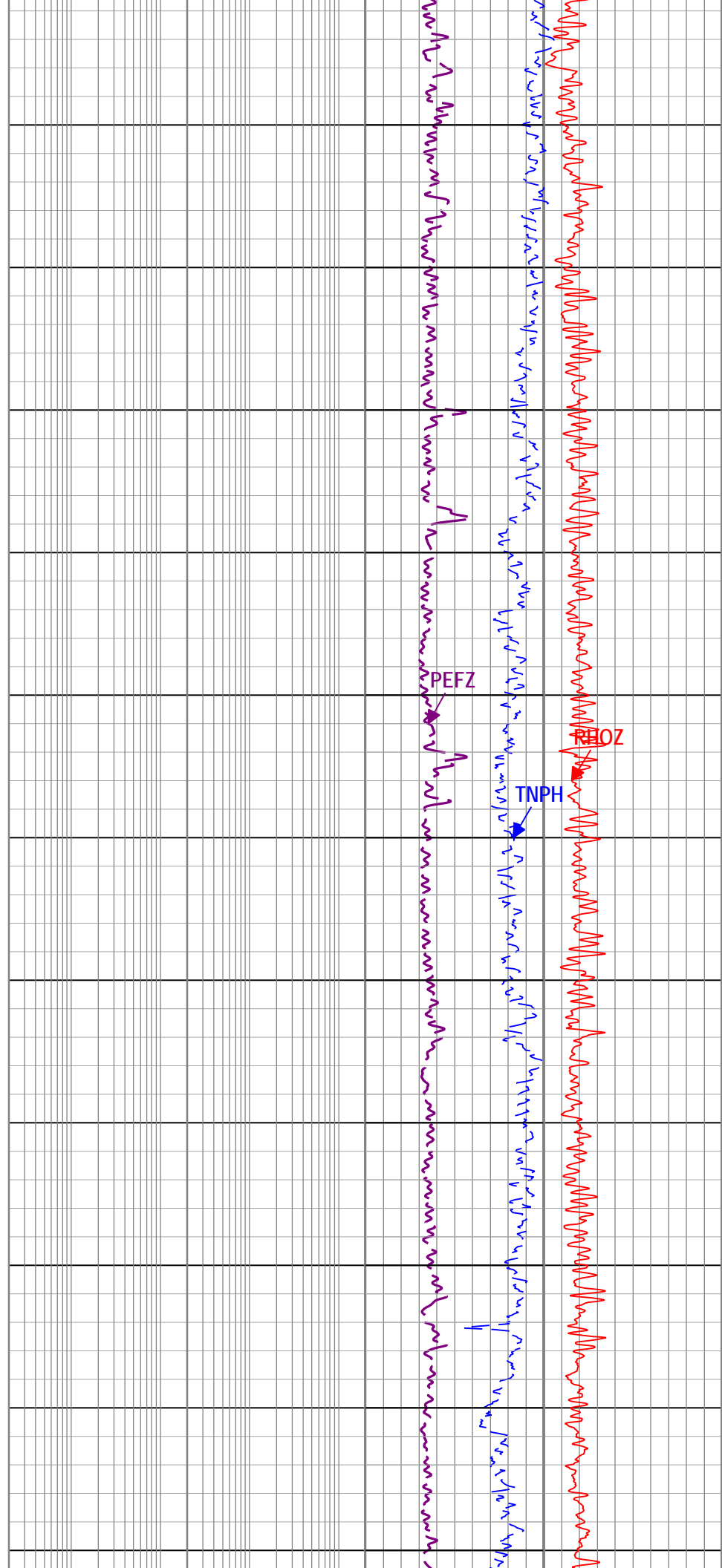
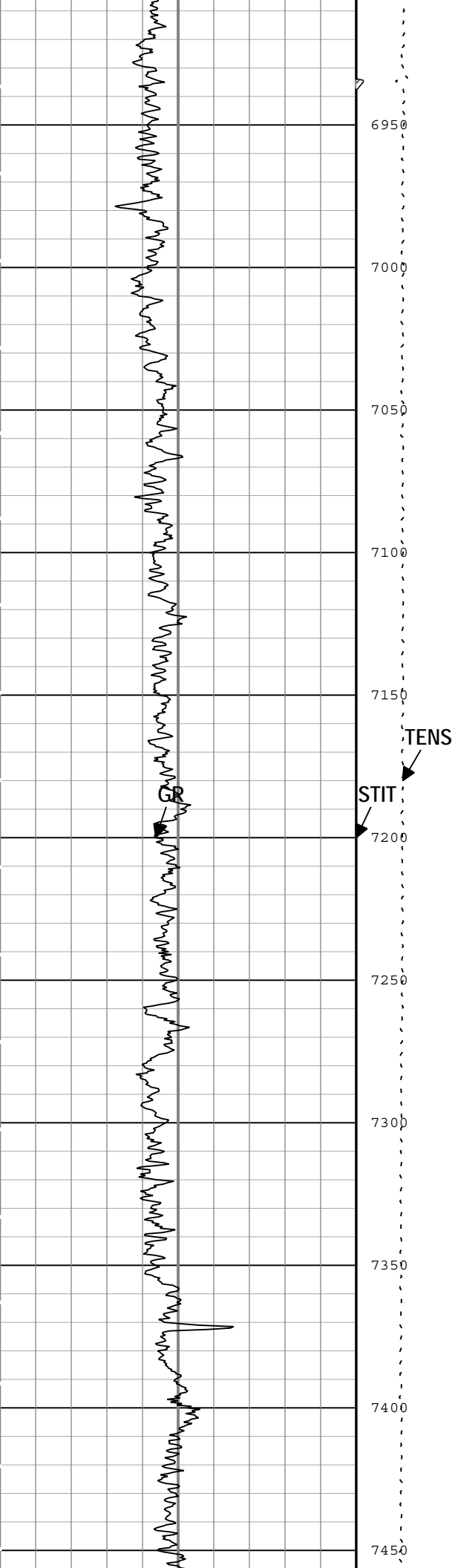
Channel	Source	Sampling
GR	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in
PEFZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
RHOZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in

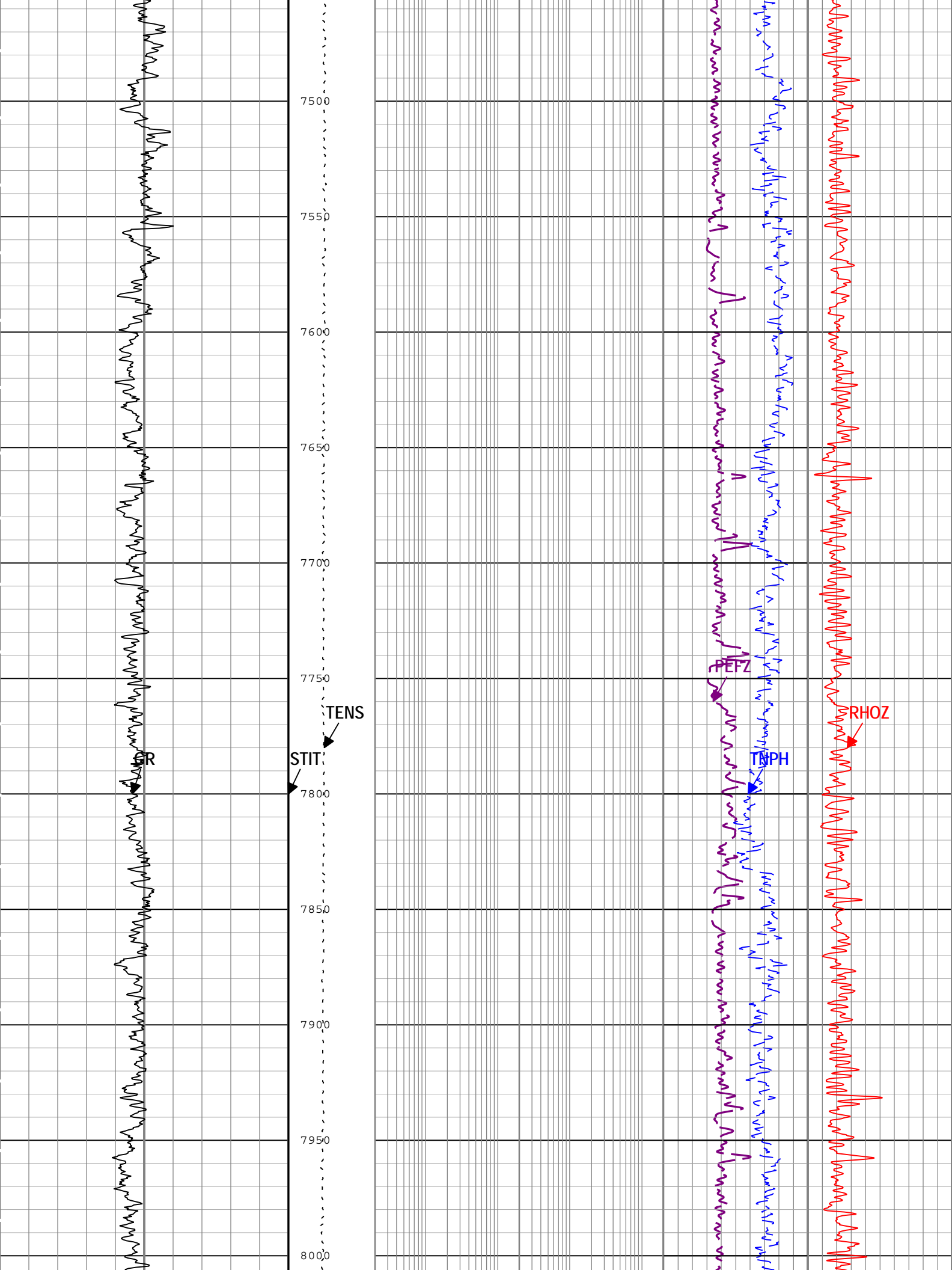
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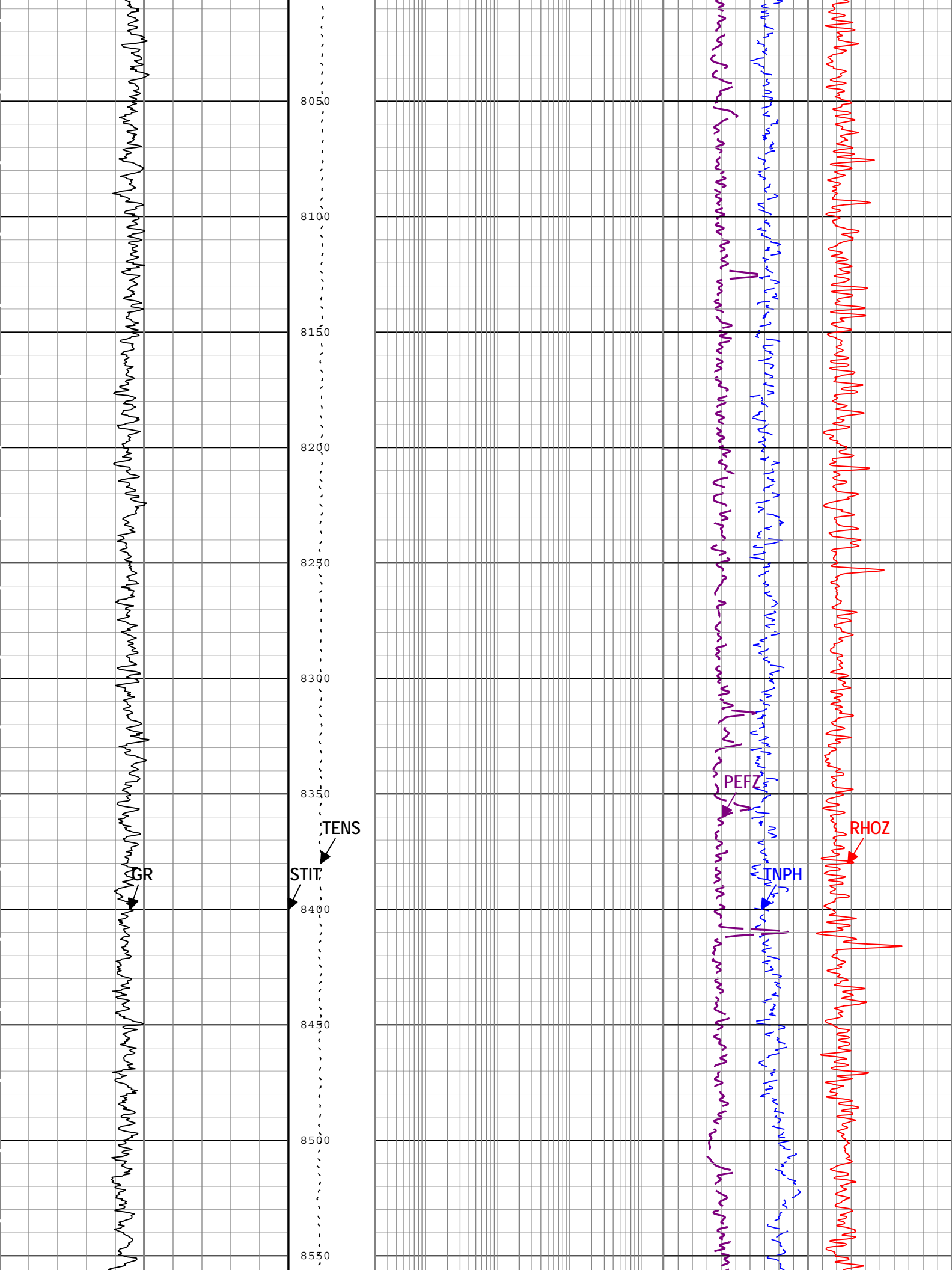


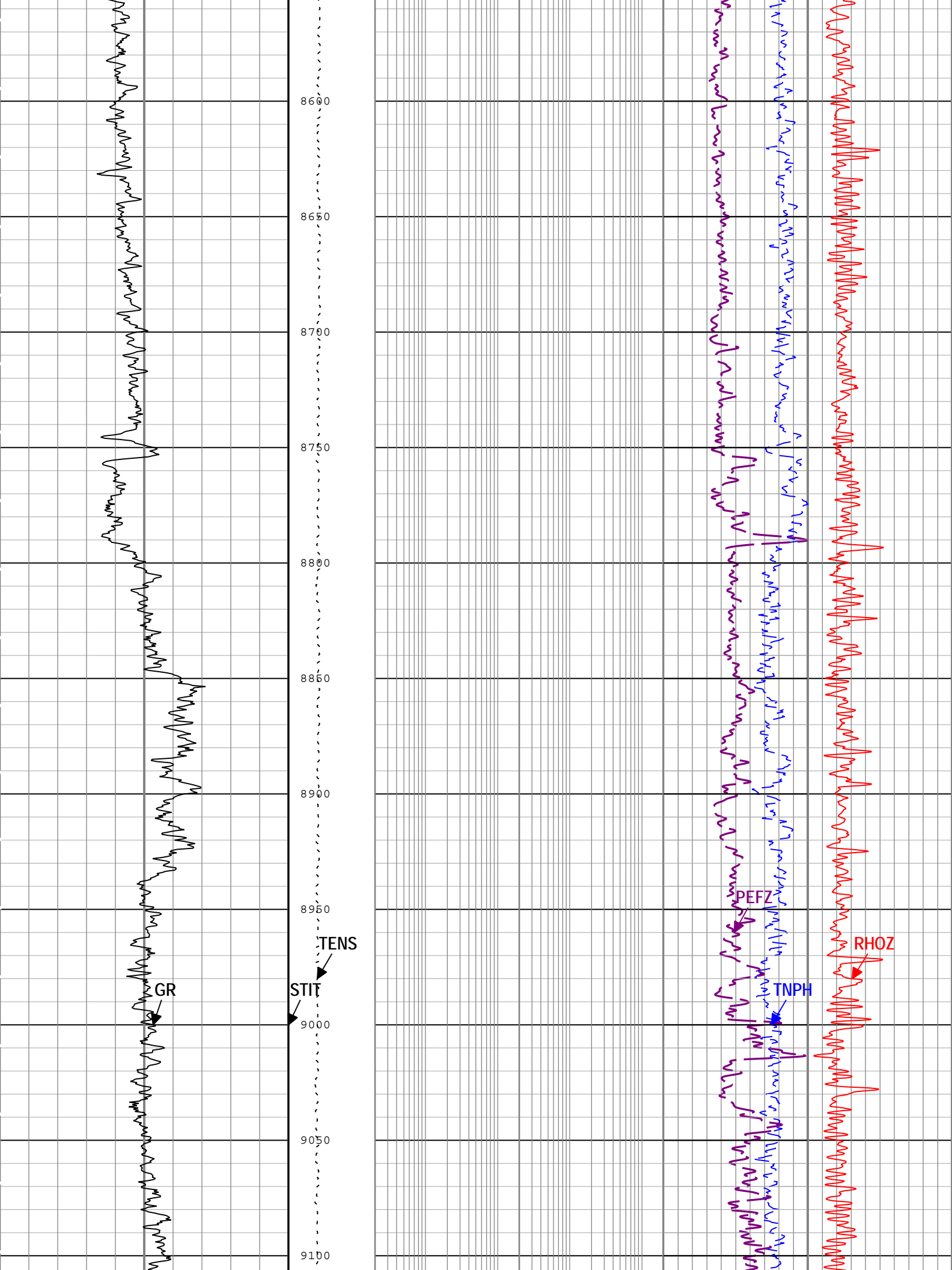


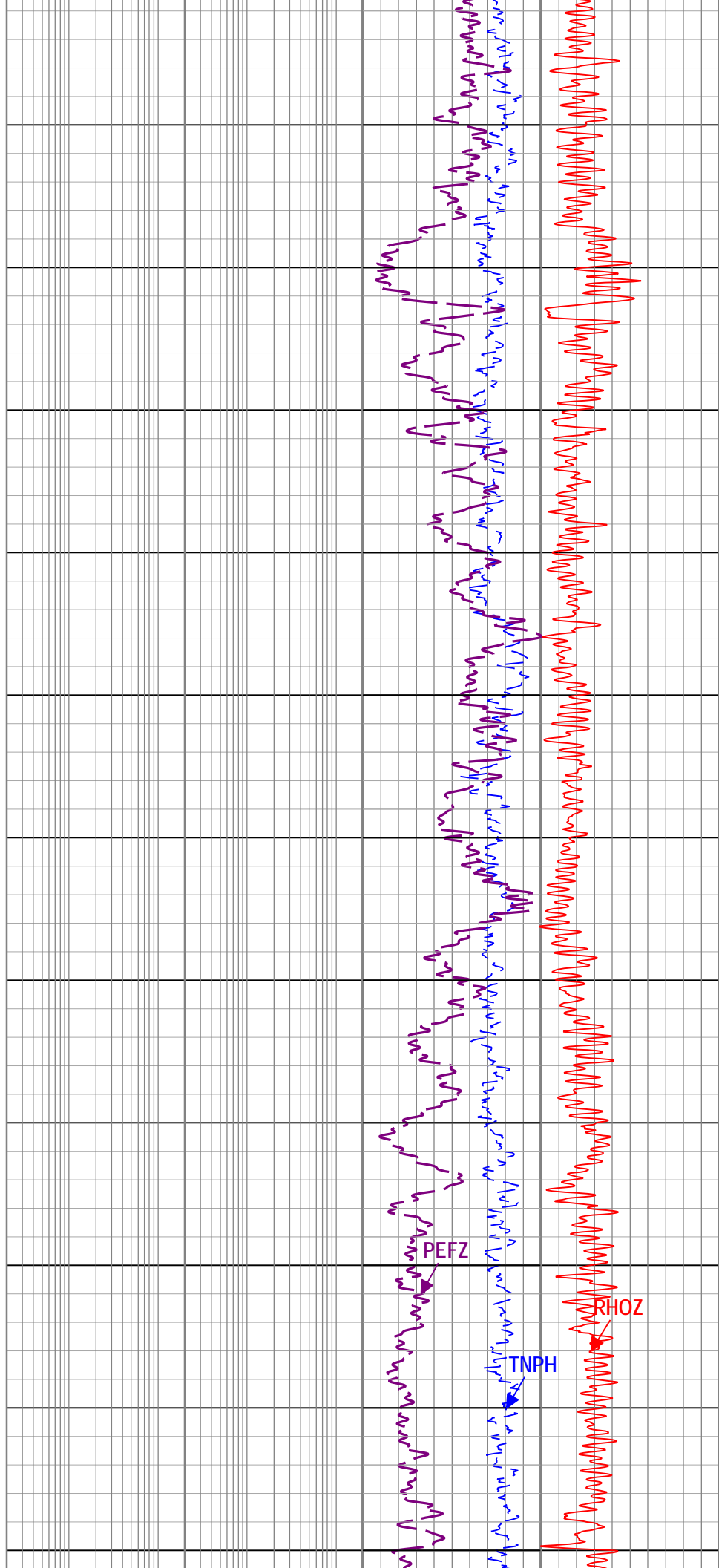
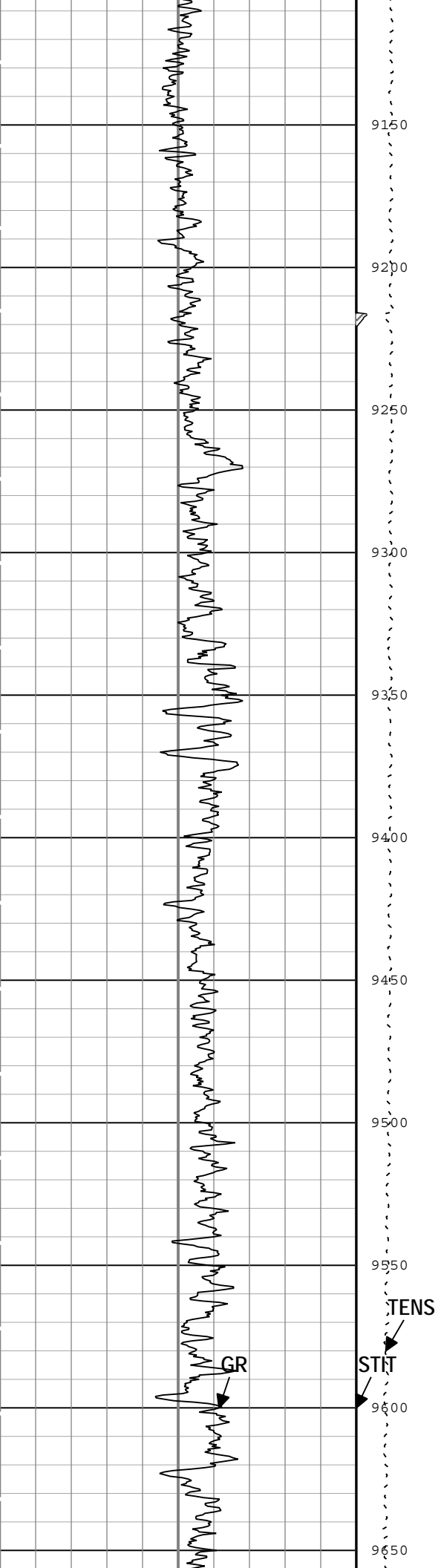


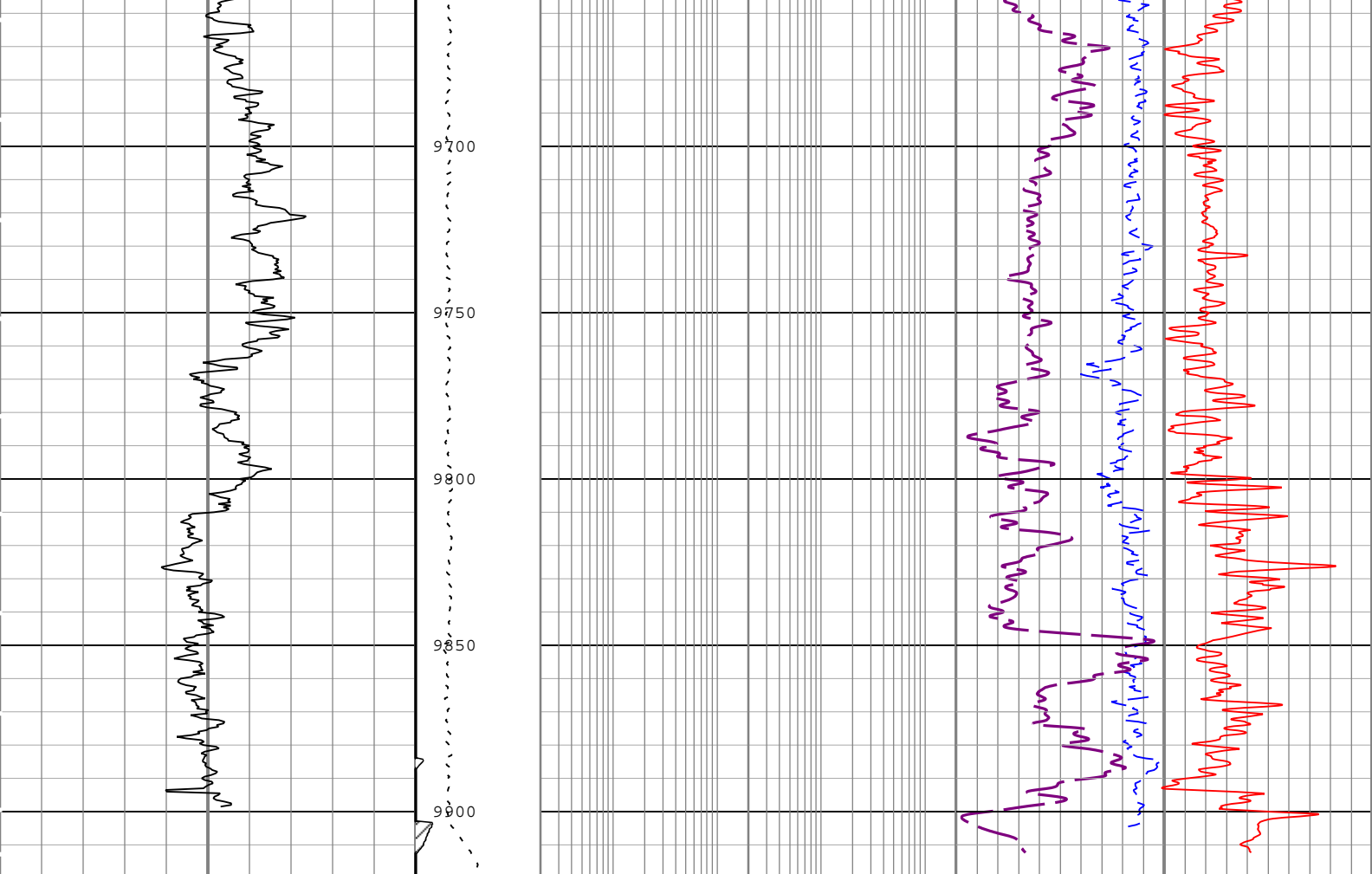












Gamma Ray (GR) HGNS[1]		Stuck Tool Indicator, Total (STIT)	Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS[1]			
0	gAPI		200	0.45	ft3/ft3	-0.15
		0 ft 50	Standard Resolution Formation Density (RHOZ) HDRS[1]			
		Cable Tension (TENS)	2	g/cm3	3	
		6000 lbf 0	Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS[1]			
			0		20	

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo) Index Scale: 2 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:26

Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	229	degF
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	30000	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.575	in
CBLO	Casing Bottom (Logger)	WLSESSION	5682	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	

DFT	Drilling Fluid Density	Borehole	11.7	lbm/gal
FSAL	Formation Salinity	Borehole	0	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 Computed Mud Resistivity	Borehole	REMS	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
SOCO	Standoff Correction Option	HGNS-H	Yes	

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BRD_TYPE	HMCA Board Type	HGNS-H	1	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

Composite 1

5" Triple Combo

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_22480-4.0.9163.3001

Computation	Description	Version
HENVIR	Computation Ensemble for the HGNS Neutron environmental corrections	4.0.9469.3000
DepthCorrection	DepthCorrection	4.0.9469.3000

Tool Elements	Description	Software Version	Firmware Version
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	4.0.9486.3000	
HRGD-H	HILT Resistivity Gamma-Ray Density Device, 150 degC	4.0.9486.3000	

Composite Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Main[5]:Up	Up	5547.46 ft	9919.53 ft	28-Sep-2014 2:01:51 PM	28-Sep-2014 4:30:27 PM	ON	1.82 ft	Yes
ONE	Repeat[6]:Up	Up	5587.93 ft	6006.83 ft	28-Sep-2014 4:34:33 PM	28-Sep-2014 4:49:22 PM	ON	1.30 ft	Yes

All depths are referenced to toolstring zero

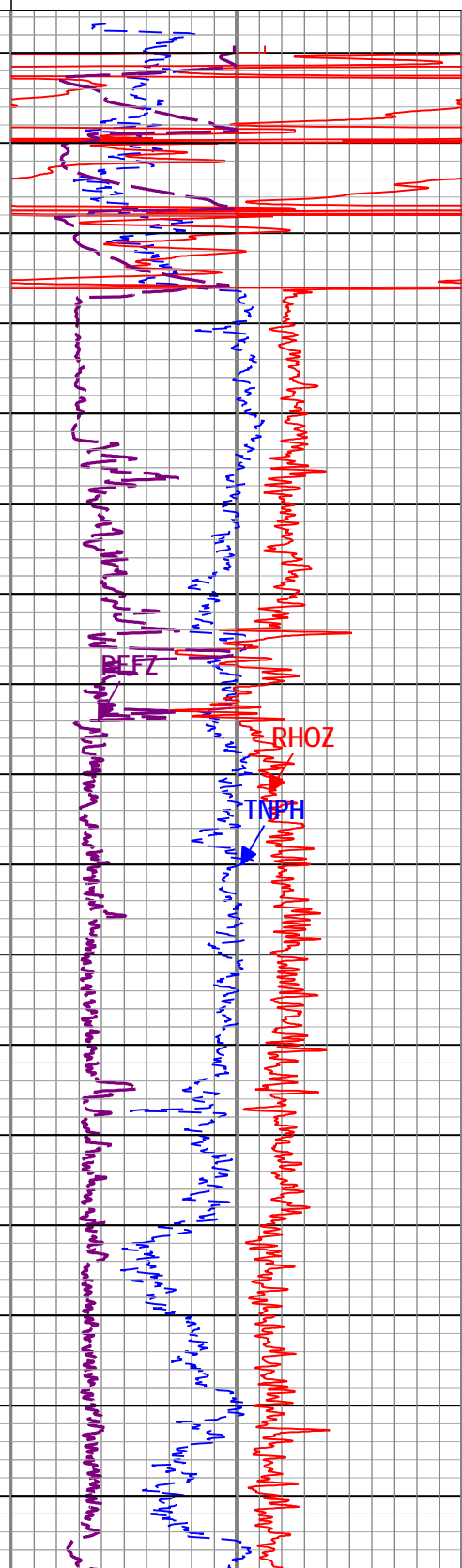
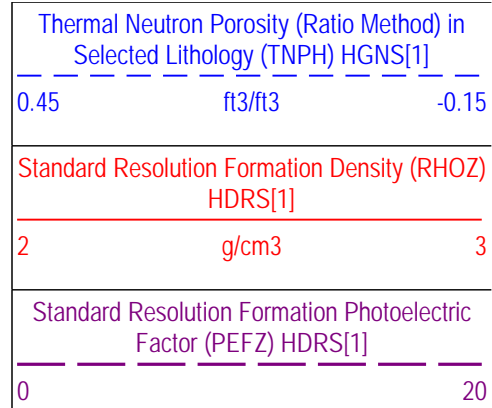
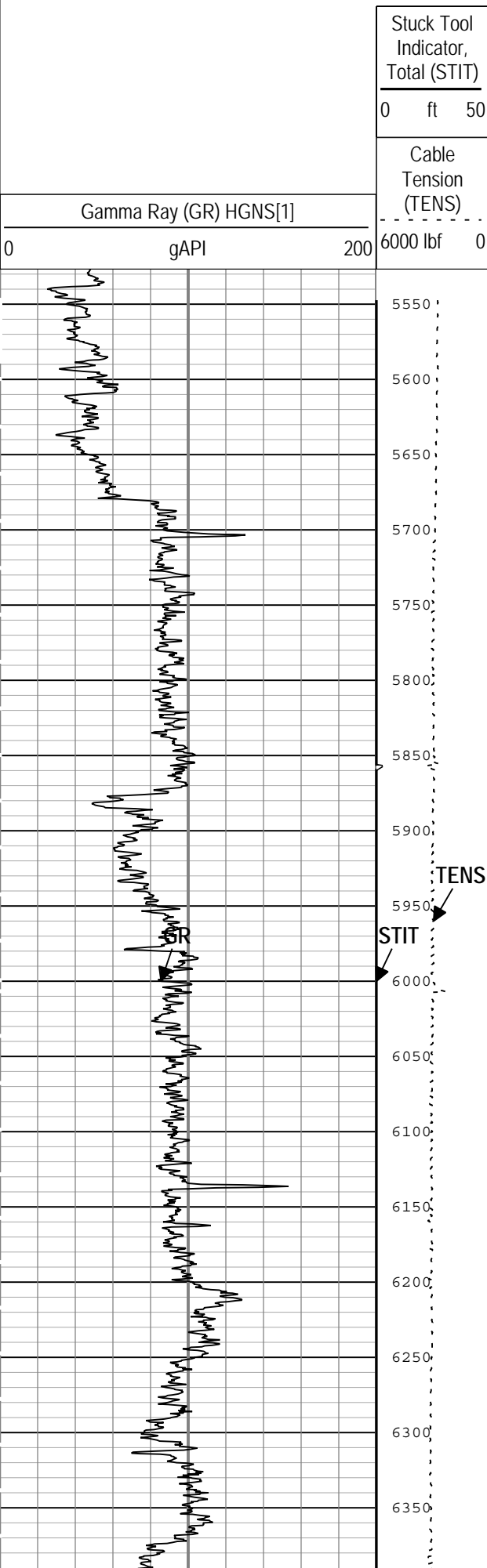
Log	Company:Southwestern Energy Production Company	Well:Diamond T Sheep 7 92 1 26
		Composite 1:S013

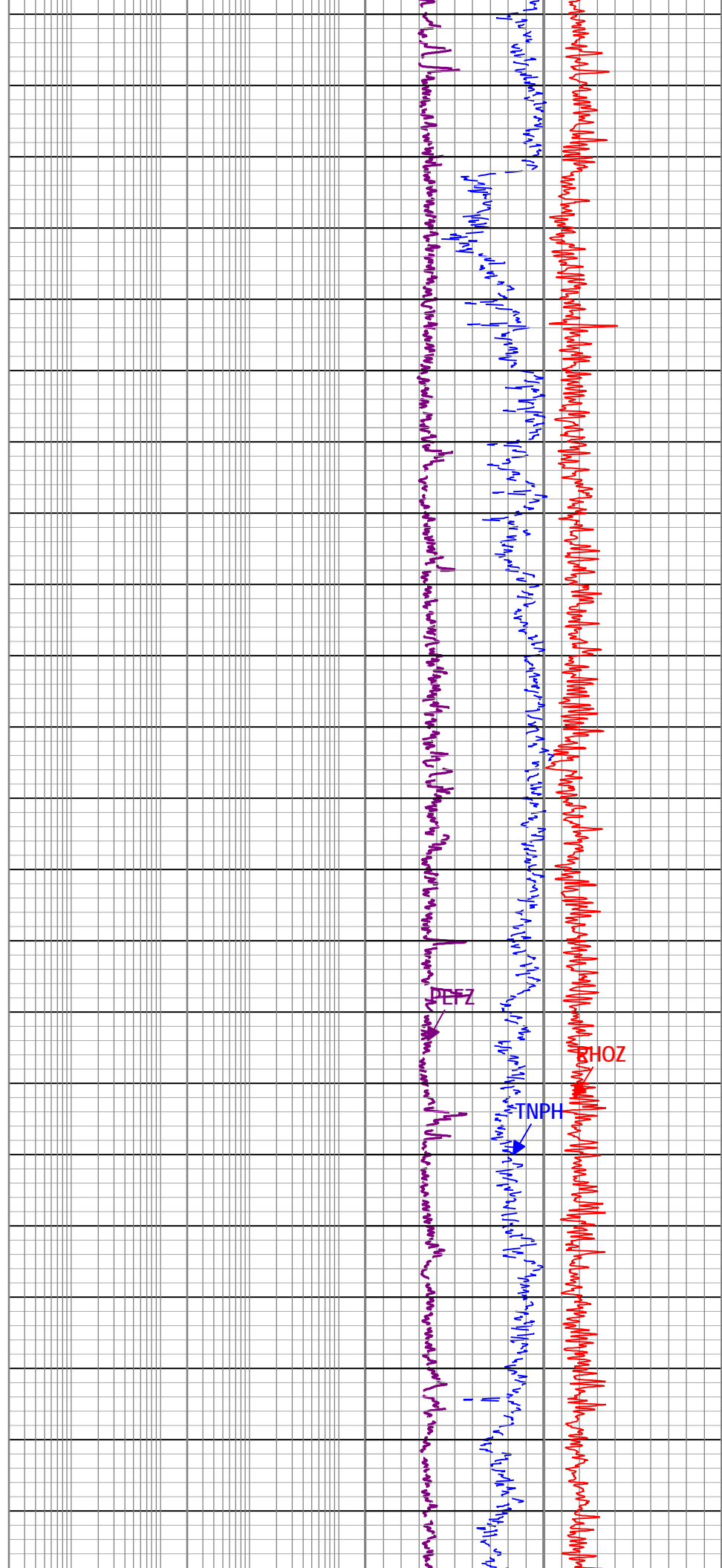
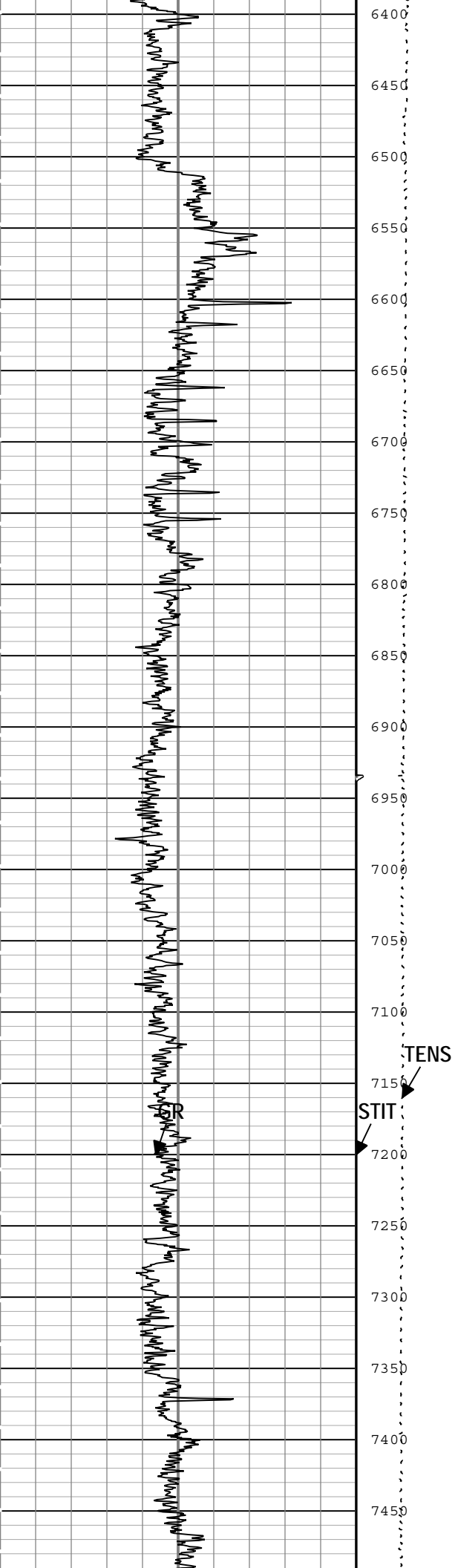
Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo) Index Scale: 1 in per 100 ft Index Unit: ft

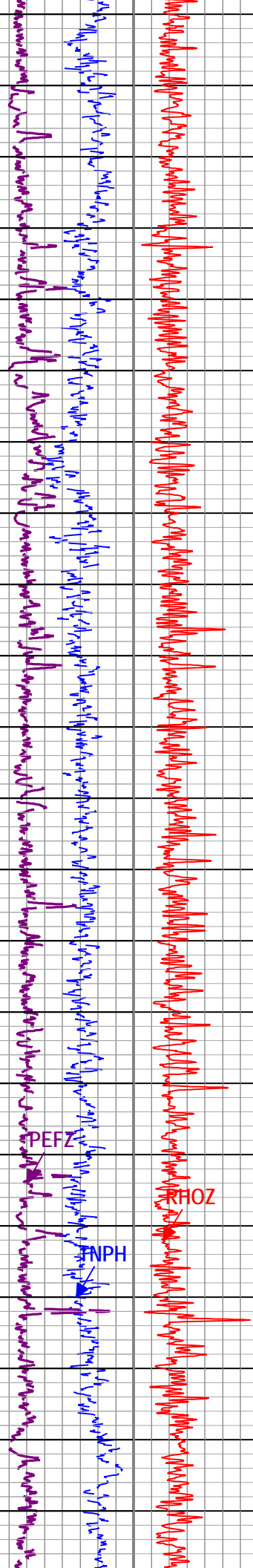
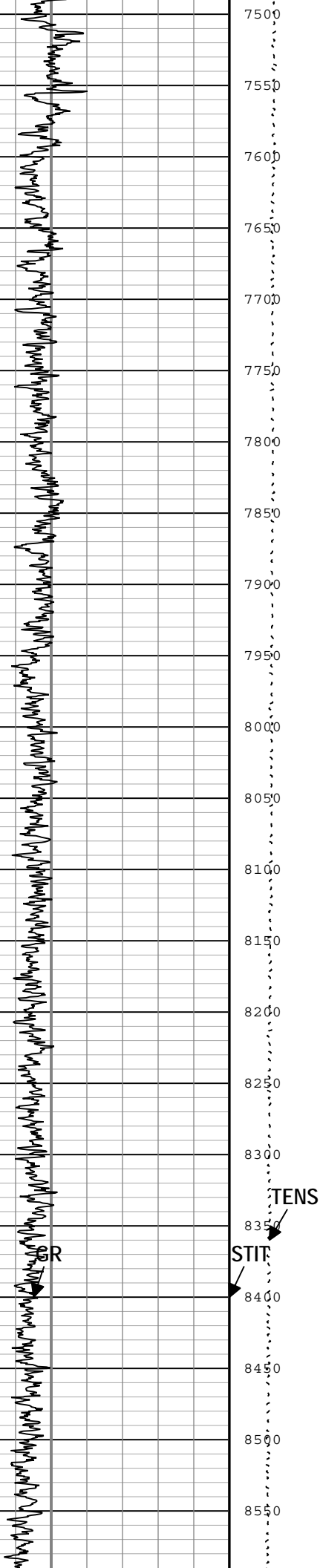
Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:28

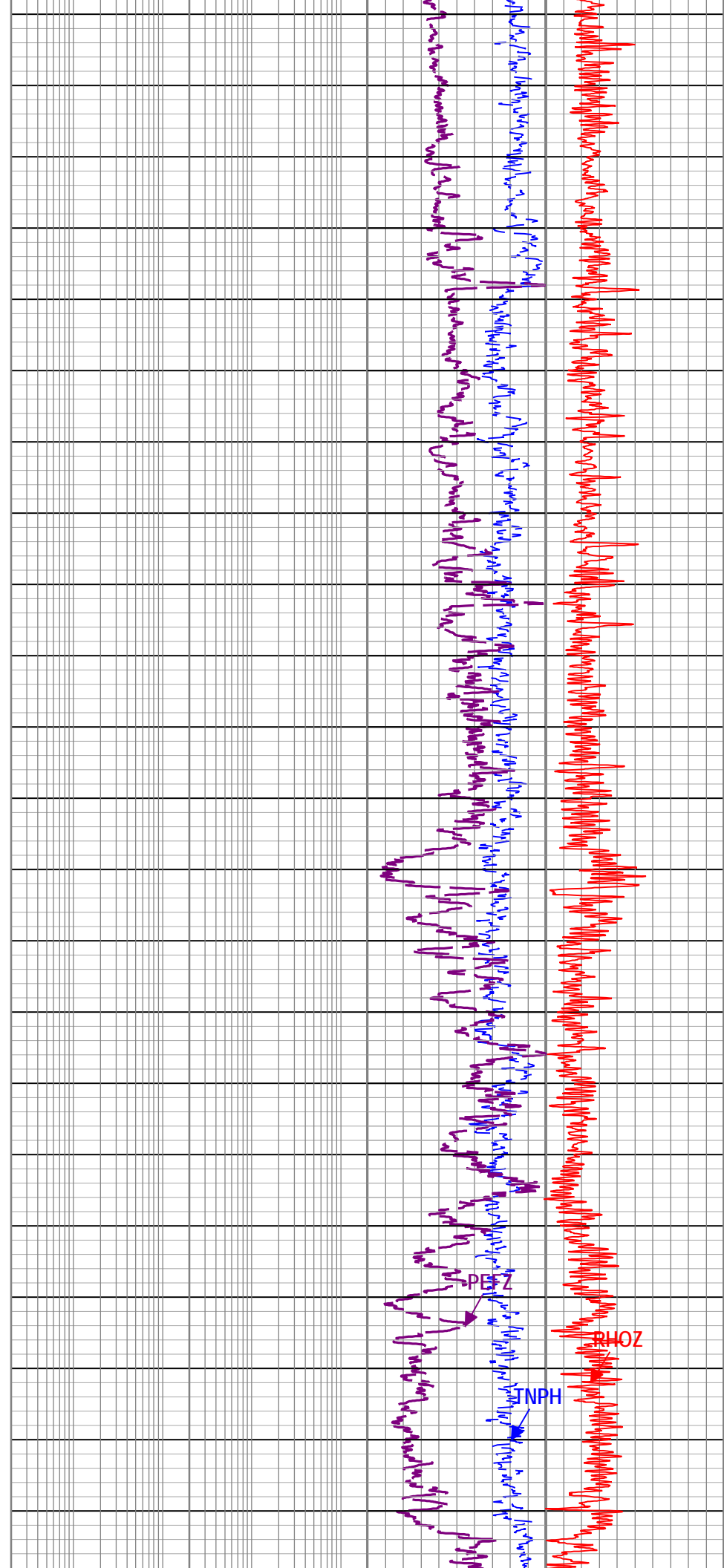
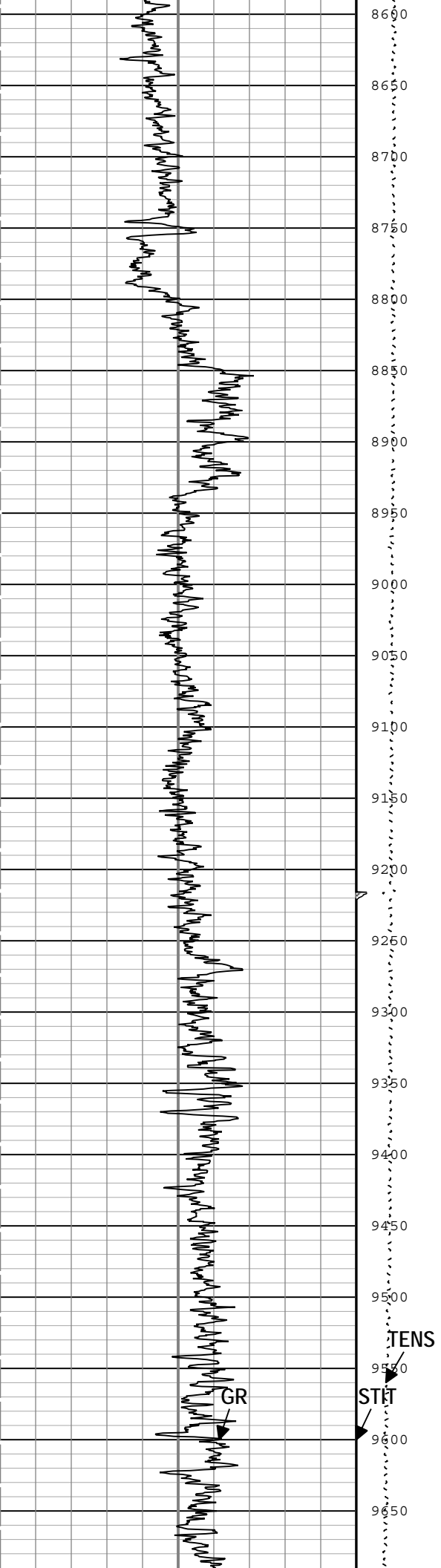
Channel	Source	Sampling
GR	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in
PEFZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
RHOZ	HDRS[1]:HRMS-H[1]:HRGD-H[1]	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS[1]:HGNS-H[1]:HGNS-H[1]	6in

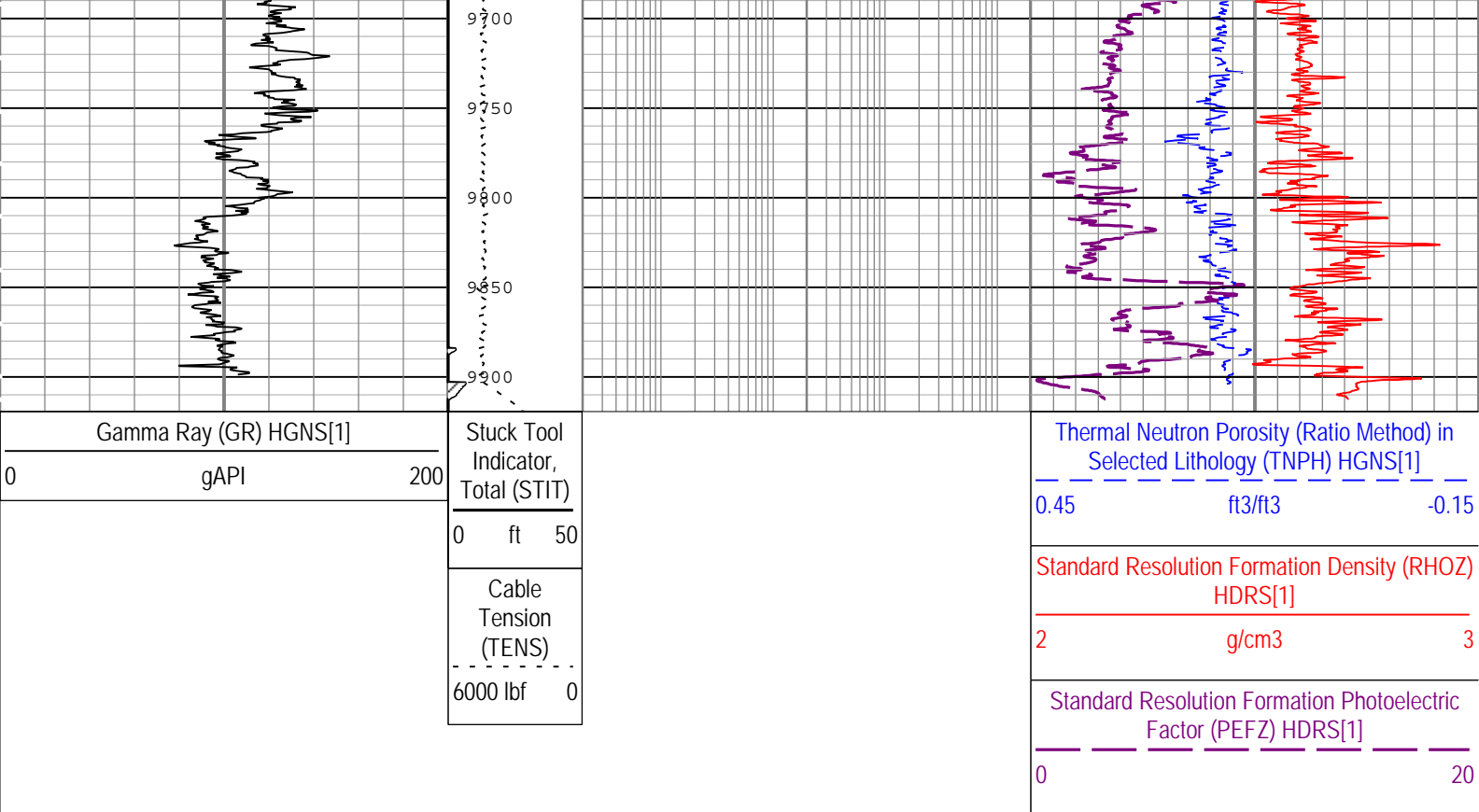
TIME 1900 - Time Marked every 60.00 (s)











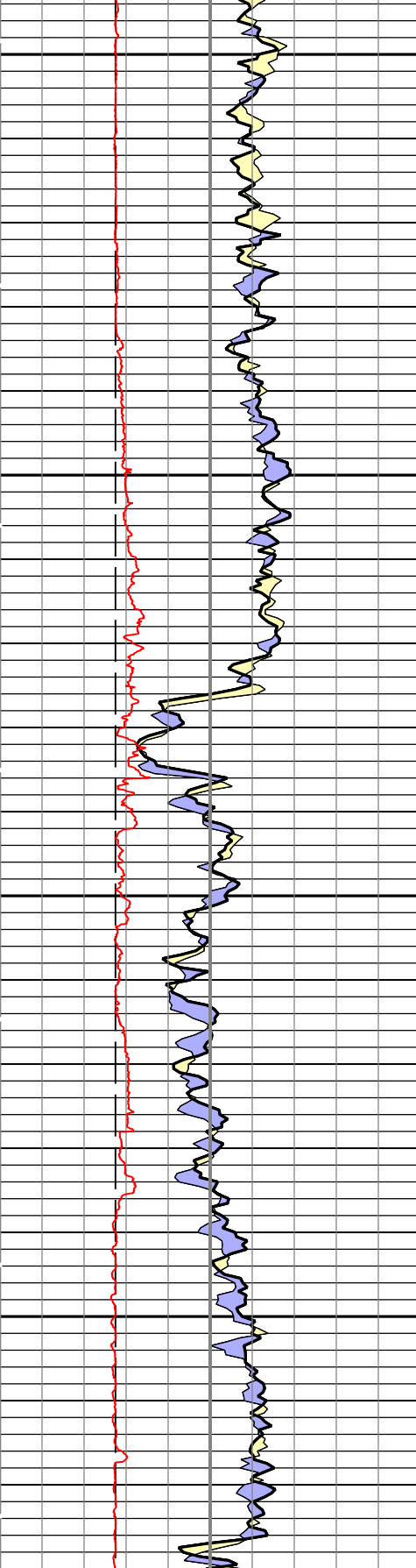
TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo) Index Scale: 1 in per 100 ft Index Unit: ft

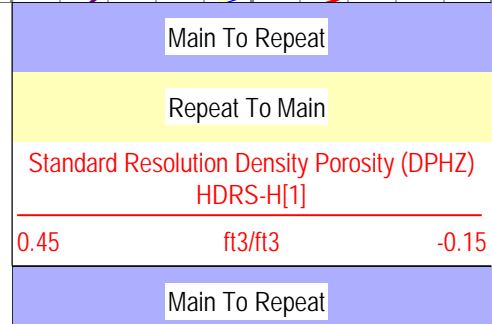
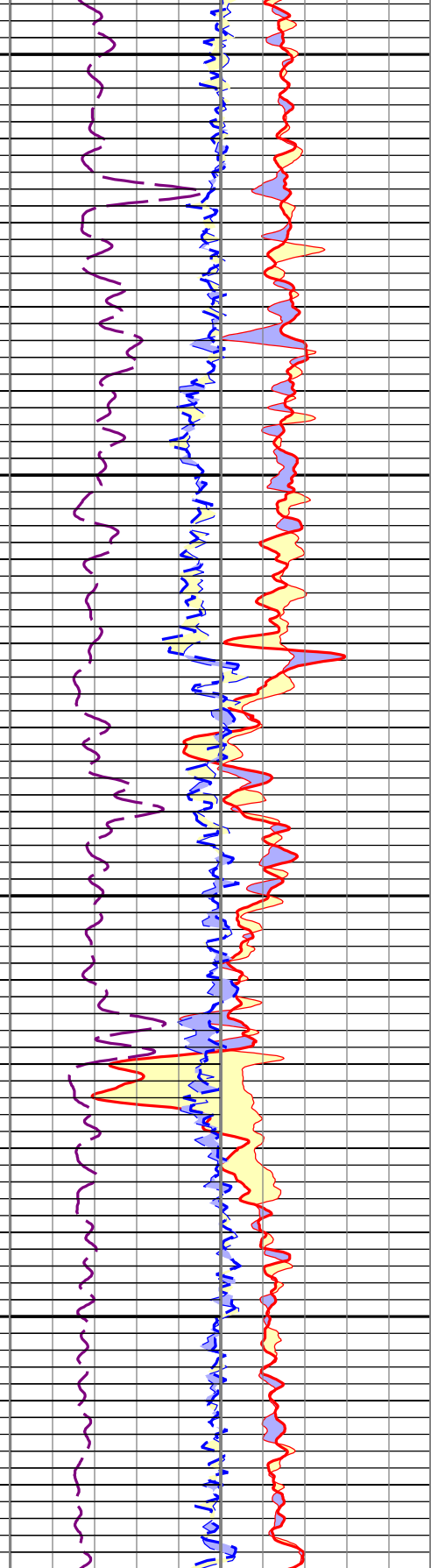
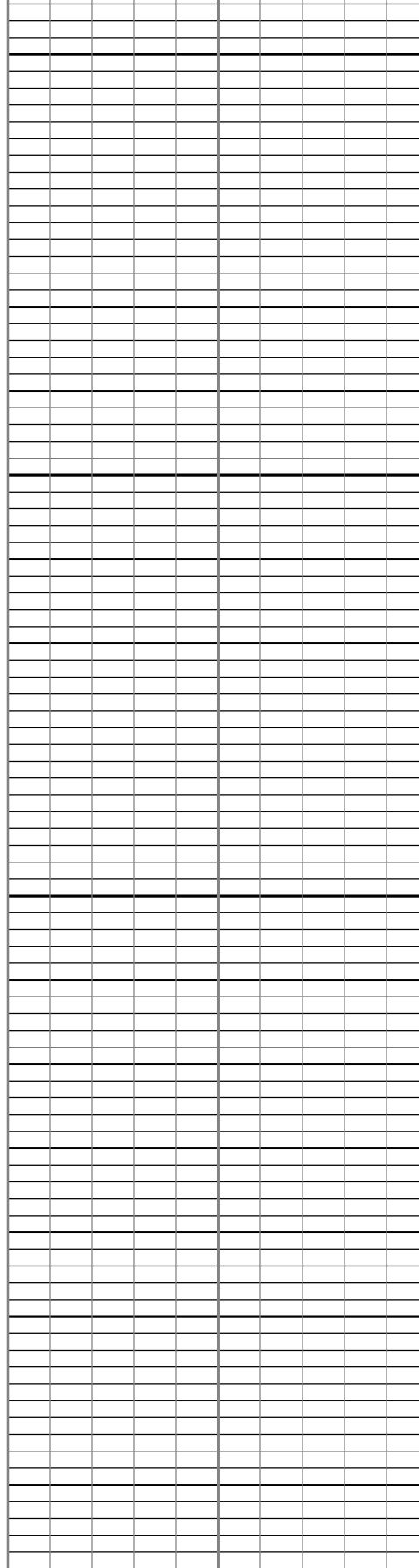
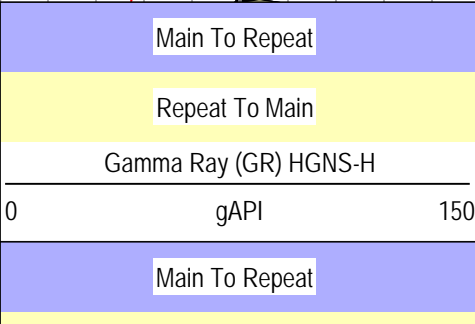
Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:28

Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	229	degF
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	30000	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.575	in
CBLO	Casing Bottom (Logger)	WLSESSION	5682	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	11.7	lbm/gal
DFT	Drilling Fluid Type	Borehole	Oil	
FSAL	Formation Salinity	Borehole	0	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 Computed Mud Resistivity	Borehole	REMS	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
SOCO	Standoff Correction Option	HGNS-H	Yes	

Tool Control Parameters				
ONE: Parameters				



5800
5810
5820
5830
5840
5850
5860
5870
5880
5890
5900
5910
5920
5930
5940
5950
5960
5970



Repeat To Main		
Gamma Ray (GR) HGNS-H		
0	gAPI	150
Main To Repeat		
Repeat To Main		
Gamma Ray (GR) HGNS-H		
0	gAPI	150
Bit Size (BS)		
6	in	16
Caliper (CALI) HDRS-H[1]		
6	in	16

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (EMD 5in Triple Combo Linear RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Sep-2014 18:29:29

Calibration Report

HDRS-H[1] (HILT Density and Rxo Sonde, 150 degC) Calibration - Run ONE

Primary Equipment :		
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	4791
Auxiliary Equipment :		
HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	28910
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5240
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
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 Caliper Calibration - Caliper Accumulations

Before (Measured): 17:39:33 25-Sep-2014 Expired by 1 days							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	8.32	10.00	
Large Ring	in	Before	12.00	9.00	12.61	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 20:22:40 17-Sep-2014							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.599	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.686	1.696	
Pe Aluminum		Master	2.570	2.470	2.570	2.670	
Pe Magnesium		Master	2.650	2.550	2.620	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 20:22:40 17-Sep-2014							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.3884	0.6000	
BS Max Deviation	%	Master	0	-1.6000	0.8830	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.2821	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.3142	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.6295	1.5000	
LS Max Deviation	%	Master	0	-3.5000	1.9500	3.5000	

Repeat To Main		
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H		
0.45	m3/m3	-0.15
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H[1]		
0		20

HDRS Density Calibration - Background Summary

Master (EEPROM):		20:22:40 17-Sep-2014		Before (Measured):		17:45:28 25-Sep-2014		Expired by 1 days	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit			
BS Window Ratio		Master	1.0000		0.7372				
		Before	0.7372	0.7003	0.7353	0.7740			
		Before-Master	----	----	-0.0019	----			
BS Window Sum	1/s	Master	1		25196				
		Before	25196	23936	25076	26456			
		Before-Master	----	----	-120	----			
SS Window Ratio		Master	1.0000		0.4824				
		Before	0.4824	0.4583	0.4822	0.5065			
		Before-Master	----	----	-0.0002	----			
SS Window Sum	1/s	Master	1		11251				
		Before	11251	10689	11238	11814			
		Before-Master	----	----	-13	----			
LS Window Ratio		Master	1.0000		0.2989				
		Before	0.2989	0.2839	0.2976	0.3138			
		Before-Master	----	----	-0.0013	----			
LS Window Sum	1/s	Master	1		1317				
		Before	1317	1251	1306	1383			
		Before-Master	----	----	-11	----			

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM):		20:22:40 17-Sep-2014		Before (Measured):		17:45:28 25-Sep-2014		Expired by 1 days	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>		
BS PM High Voltage	V	Master		1000	1343	2400	<div><div></div><div></div></div>		
		Before		1000	1346	2400	<div><div></div><div></div></div>		
		Before-Master	-----	-100	3	100	<div><div></div><div></div></div>		
SS PM High Voltage	V	Master		1000	2001	2400	<div><div></div><div></div></div>		
		Before		1000	2006	2400	<div><div></div><div></div></div>		
		Before-Master	-----	-100	5	100	<div><div></div><div></div></div>		
LS PM High Voltage	V	Master		1000	1312	2400	<div><div></div><div></div></div>		
		Before		1000	1313	2400	<div><div></div><div></div></div>		
		Before-Master	-----	-100	1	100	<div><div></div><div></div></div>		

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM):		20:22:40 17-Sep-2014		Before (Measured):		17:45:28 25-Sep-2014		Expired by 1 days	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>		
BS Crystal Resolution	%	Master		5.00	11.92	25.00	<div><div></div><div></div></div>		
		Before		5.00	12.07	25.00	<div><div></div><div></div></div>		
		Before-Master	----	-1.00	0.15	1.00	<div><div></div><div></div></div>		
SS Crystal Resolution	%	Master		5.00	10.54	20.00	<div><div></div><div></div></div>		
		Before		5.00	10.45	20.00	<div><div></div><div></div></div>		
		Before-Master	----	-1.00	-0.09	1.00	<div><div></div><div></div></div>		
LS Crystal Resolution	%	Master		5.00	8.37	20.00	<div><div></div><div></div></div>		
		Before		5.00	8.53	20.00	<div><div></div><div></div></div>		
		Before-Master	----	-1.00	0.16	1.00	<div><div></div><div></div></div>		

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured):								17:34:49 25-Sep-2014		Expired by 1 days	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>				
Main Resistivity	ohm.m	Before	3875	3565	3856	4185	<div><div></div></div>				
Deep Resistivity	ohm.m	Before	3830	3524	3788	4136	<div><div></div></div>				
Shallow Resistivity	ohm.m	Before	3830	3524	3807	4136	<div><div></div></div>				

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

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	
Auxiliary Equipment :			
HGNS Accelerometer, 150 degC		HACCZ-H	5955
AmBe Neutron Logging Source		NSR-F	5215
Calibration Parameter :			
Water Temperature			

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 00:36:56 28-Sep-2014

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-Jan-2007

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	----	----	1155.700	----	
Accelerometer Coefficients - 1		Master	----	----	26.890	----	
Accelerometer Coefficients - 2		Master	----	----	-0.008	----	
Accelerometer Coefficients - 3		Master	----	----	0.000	----	
Accelerometer Coefficients - 4		Master	----	----	2.748	----	
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	----	----	0.983	----	

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 14:22:08 24-Jul-2014

Before (Measured):

17:43:47 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	24.9	40.0	
		Before	0	5.0	25.4	40.0	
		Before-Master	----	-3.7	0.5	3.7	
Far Zero Measurement	1/s	Master	0	5.0	28.9	40.0	
		Before	0	5.0	29.2	40.0	
		Before-Master	----	-4.3	0.3	4.3	
Near Plus Measurement	1/s	Master	6031.0	4700.0	5342.0	6900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Far Plus Measurement	1/s	Master	2793.0	1900.0	2232.0	2900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Near Corrected Plus Measurement	1/s	Master		4700.0	5311.0	6900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Far Corrected Plus Measurement	1/s	Master		1900.0	2200.0	2900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 17:45:49 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	83.1	120.0	
RGR Plus Measurement	gAPI	Before	185.4	157.1	169.0	206.3	
GR Calibration Gain		Before	0.89	0.80	0.98	1.05	

HDRS-H[2] (HILT Density and Rxo Sonde, 150 degC) Calibration - Run ONE**Primary Equipment :**

HILT High-Resolution Control Cartridge, 150 degC

HRCC-H

HILT Resistivity Gamma-Ray Density Device, 150 degC

HRGD-H

3714

Auxiliary Equipment :

HRDD Backscatter Detector

Backscatter

HRDD Long Spacing Detector

Long Spacing

HRDD Short Spacing Detector

Short Spacing

27860

Cesium 137 Gamma-Ray Logging Source

GSR-J

5416

HILT High-Resolution Control Cartridge, 150 degC

HRCC-H

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): 17:40:58 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	7.21	10.00	
Large Ring	in	Before	12.00	9.00	11.54	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 16:47:40 14-Sep-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.600	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.687	1.696	
Pe Aluminum		Master	2.570	2.470	2.546	2.670	
Pe Magnesium		Master	2.650	2.550	2.618	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 16:47:40 14-Sep-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.3606	0.6000	
BS Max Deviation	%	Master	0	-1.6000	0.7014	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.4095	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.3920	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.6086	1.5000	
LS Max Deviation	%	Master	0	-3.5000	1.3228	3.5000	

HDRS Density Calibration - Background Summary

Master (EEPROM): 16:47:40 14-Sep-2014 Before (Measured): 17:45:17 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master	1.0000		0.7333		
		Before	0.7333	0.6966	0.7333	0.7699	
		Before-Master	-----	-----	0.0000	-----	
BS Window Sum	1/s	Master	1		25108		
		Before	25108	23853	25140	26364	
		Before-Master	-----	-----	32	-----	
SS Window Ratio		Master	1.0000		0.4829		
		Before	0.4829	0.4587	0.4816	0.5070	
		Before-Master	-----	-----	-0.0013	-----	
SS Window Sum	1/s	Master	1		13441		
		Before	13441	12769	13430	14113	
		Before-Master	-----	-----	-11	-----	
LS Window Ratio		Master	1.0000		0.2969		
		Before	0.2969	0.2820	0.2978	0.3117	
		Before-Master	-----	-----	0.0009	-----	
LS Window Sum	1/s	Master	1		1521		
		Before	1521	1445	1516	1597	
		Before-Master	-----	-----	-5	-----	

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 16:47:40 14-Sep-2014 Before (Measured): 17:45:17 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master		1000	1556	2400	
		Before		1000	1532	2400	
		Before-Master	-----	-100	-24	100	
SS PM High Voltage	V	Master		1000	1534	2400	
		Before		1000	1533	2400	
		Before-Master	-----	-100	-1	100	
LS PM High Voltage	V	Master		1000	1404	2400	
		Before		1000	1404	2400	
		Before-Master	-----	-100	0	100	

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 16:47:40 14-Sep-2014 Before (Measured): 17:45:17 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crvstal Resolution	%	Master		5.00	10.63	25.00	

Crystal Resolution	%	Master Before Before-Master	-----	5.00 5.00 -1.00	10.77 9.49 0.14	25.00 20.00 1.00	
SS Crystal Resolution	%	Master Before Before-Master	-----	5.00 5.00 -1.00	9.60 9.49 -0.11	20.00 20.00 1.00	
LS Crystal Resolution	%	Master Before Before-Master	-----	5.00 5.00 -1.00	8.75 8.96 0.21	20.00 20.00 1.00	

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 17:48:03 25-Sep-2014 Expired by 1 days							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Main Resistivity	ohm.m	Before	3875	3565	3858	4185	
Deep Resistivity	ohm.m	Before	3830	3524	3801	4136	
Shallow Resistivity	ohm.m	Before	3830	3524	3824	4136	

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

Primary Equipment :			
HNGS Sonde Element	HNGS-BA	392	
Auxiliary Equipment :			
Hostile Natural Gamma Ray Cartridge	HNGC-B	657	
HNGS Housing Element	HEH-K	1007	
		7992	
Housing for the HNGC	HNGH-A	4144	

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	38.608	42.500	
		Before	40.000	37.500	38.594	42.500	
		Before-Master	-----	-----	-0.014	-----	
Na 511 Peak Resolution	%	Master	15.500	12.000	14.753	19.000	
		Before	15.500	12.000	13.315	19.000	
		Before-Master	-----	-----	-1.438	-----	
High Voltage DAC Value	V	Master			896.211		
		Before	1150.000	850.000	894.547	1600.000	
		Before-Master	-----	-----	-1.664	-----	
Na 1785 Peak Location		Master	142.650	135.000	139.188	150.300	
		Before	142.650	135.000	138.839	150.300	
		Before-Master	-----	-----	-0.349	-----	
Na 1785 Peak Resolution	%	Master	8.500	7.000	9.981	11.000	
		Before	8.500	7.000	10.015	11.000	
		Before-Master	-----	-----	0.034	-----	
Temperature - 0	degF	Master	-----	-----	-----	-----	
		Before	59.900	-20.002	75.185	140.000	
		Before-Master	-----	-----	-----	-----	
Na Count Rate	CPS	Master	45.000	10.000	33.214	100.000	
		Before	45.000	10.000	35.171	100.000	
		Before-Master	-----	-----	1.957	-----	

HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	39.685	42.500	
		Before	40.000	37.500	39.657	42.500	
		Before-Master	-----	-----	-0.028	-----	
Na 511 Peak Resolution	%	Master	15.500	12.000	14.789	19.000	
		Before	15.500	12.000	14.793	19.000	
		Before-Master	-----	-----	0.004	-----	
High Voltage DAC Value	V	Master			966.377		
		Before	1150.000	850.000	964.799	1600.000	
		Before-Master	-----	-----	-1.578	-----	
Na 1785 Peak Location		Master	142.650	135.000	142.051	150.300	
		Before	142.650	135.000	140.762	150.300	
		Before-Master	-----	-----	-1.289	-----	

Na 1785 Peak Resolution	%	Before-Master	-----	-----	-1.289	-----	
		Master	8.500	7.000	8.072	11.000	
		Before	8.500	7.000	8.430	11.000	
Temperature - 0	degF	Before-Master	-----	-----	0.358	-----	
		Master	-----	-----	-----	-----	
		Before	59.900	-20.002	74.195	140.000	
Na Count Rate	CPS	Before-Master	-----	-----	-----	-----	
		Master	45.000	10.000	33.451	100.000	
		Before	45.000	10.000	35.206	100.000	
		Before-Master	-----	-----	1.755	-----	

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

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coincidence Count Rate Ratio		Master			0.990		
		Before	1.000	0.950	0.995	1.050	
		Before-Master	-----	-----	0.005	-----	

HNCS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	208.061	218.250	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Th Peak Resolution	%	Master	7.000	5.000	7.609	9.000	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Background Count Rate	CPS	Master			131.714		
		Before	142.500	10.000	266.600	265.000	
		Before-Master	-----	-----	134.886	-----	
Gain Ratio		Master	1.000	0.940	1.025	1.060	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	

HNCS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	210.810	218.250	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Th Peak Resolution	%	Master	7.000	5.000	7.093	9.000	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Background Count Rate	CPS	Master			134.754		
		Before	142.500	10.000	251.000	265.000	
		Before-Master	-----	-----	116.246	-----	
Gain Ratio		Master	1.000	0.940	1.011	1.060	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	

HNCS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	40.000	43.500	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	

HNCS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014		Before (Measured): 17:51:14 25-Sep-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	41.000	43.500	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	

Company:	Southwestern Energy Production Company	Schlumberger
Well:	Diamond T Sheep 7 92 1 26	
Field:	Sand Wash Basin Niobrara	
County:	Moffat	
State:	WY	

Country: US

Density-Neutron-Gamma Ray

Lower Density