

Company: NGL WATER SOLUTIONS DJ LLC

Well: NGL APOLLO 11

Field: WATTENBERG

County: WELD State: COLORADO

Platform Express

Triple Combo

County:	WELD			
Field:	WATTENBERG			
Location:	1446 FNL 699 FEL			
Well:	NGL APOLLO 11			
Company:	NGL WATER SOLUTIONS DJ LLC			
Location:		SHL: 1446' FNL & 699' FEL	Elev.:	K.B. 4679.00 ft
		Sec. 18 T6N R63W		G.L. 4663.00 ft
		Permanent Datum:	Ground Level	4663.00 f
		Log Measured From:	Kelly Bushing	16.00 ft above Perm.Datum
Drilling Measured From:		Kelly Bushing		
		API Serial No.	Section:	Township:
05-123-42210			18	6N
				Range: 63W
Logging Date	28-Oct-2015			

Run Number	Run 1		
Depth Driller	9873.00 ft		
Schlumberger Depth	9897.00 ft		
Bottom Log Interval	9897.00 ft		
Top Log Interval	8200.00 ft		
Casing Driller Size @ Depth	7 in @ 8539.00 ft		
Casing Schlumberger	8550 ft		
Bit Size	6.125 in		
Type Fluid In Hole	Water		
Density	9 lbm/gal	32 s	
Fluid Loss	9 cm3	8	
MUD	Active Tank		
RM @ Meas Temp	1.1 ohm.m @ 50 degF		
RMF @ Meas Temp	0.82 ohm.m @ 68 degF		
RMC @ Meas Temp	1.65 ohm.m @ 68 degF		
Source RMF	RMC	Pressed	
RM @ BHT	0.25 @ 243	0.25 @ 243	
Max Recorded Temperatures			
Circulation Stopped	28-Oct-2015 03:00:00		
Logger on Bottom	28-Oct-2015 09:39:00		
Unit Number	9115	FORT MORGAN, C	
Recorded By	Benjamin Carson / Benjamin Marmon		
Witnessed By	Chris Montoya		

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

Casing 7in  
26lbm/ft

8539.00 ft

26lbm/ft

Open Hole 6.125in

9873.00 ft

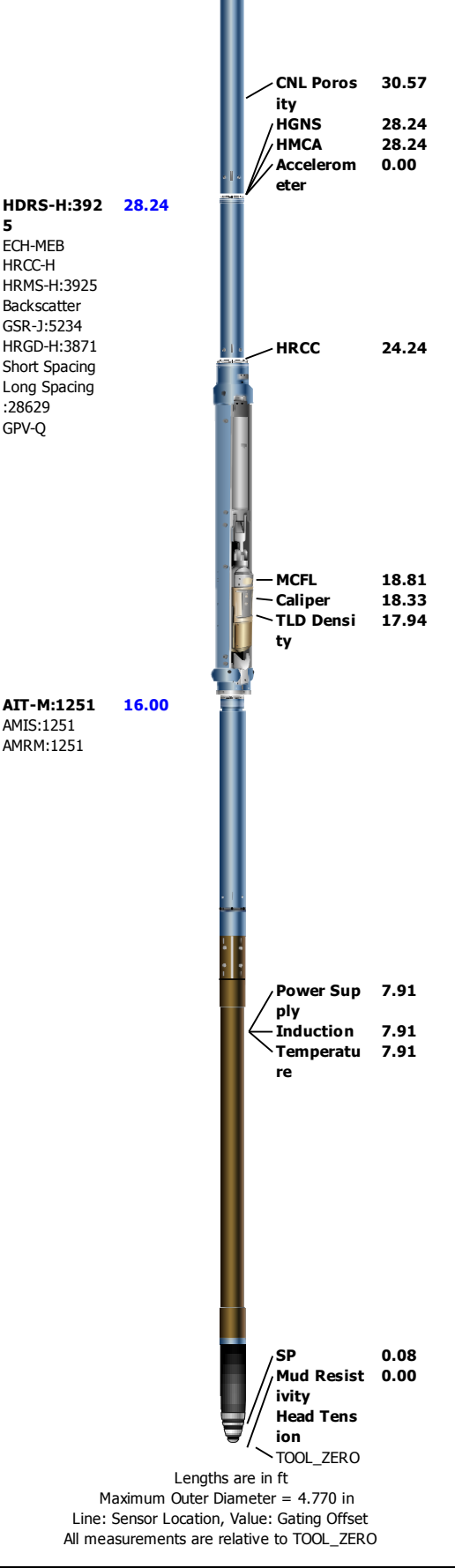
Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	6.125					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	9873					
Bottom Logger ( ft )	9897					
Casing						
Size ( in )	7					
Weight ( lbm/ft )	26					
Inner Diameter ( in )	6.276					
Grade	L80					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	8539					
Bottom Logger ( ft )	8550					

Operational Run Summary

Parameter ( unit )	Run 1					
Date Log Started	28-Oct-2015					
Time Log Started	09:32:54					
Date Log Finished	28-Oct-2015					
Time Log Finished	12:08:06					
Top Log Interval ( ft )						
Bottom Log Interval ( ft )						
Total Depth ( ft )	9897.00					
Max Hole Deviation ( deg )						
Azimuth of Max Deviation ( deg )						
Bit Size ( in )	6.125					
Logging Unit Number	9115					
Logging Unit Location	FORT MORGAN, CO					
Recorded By	Benjamin					

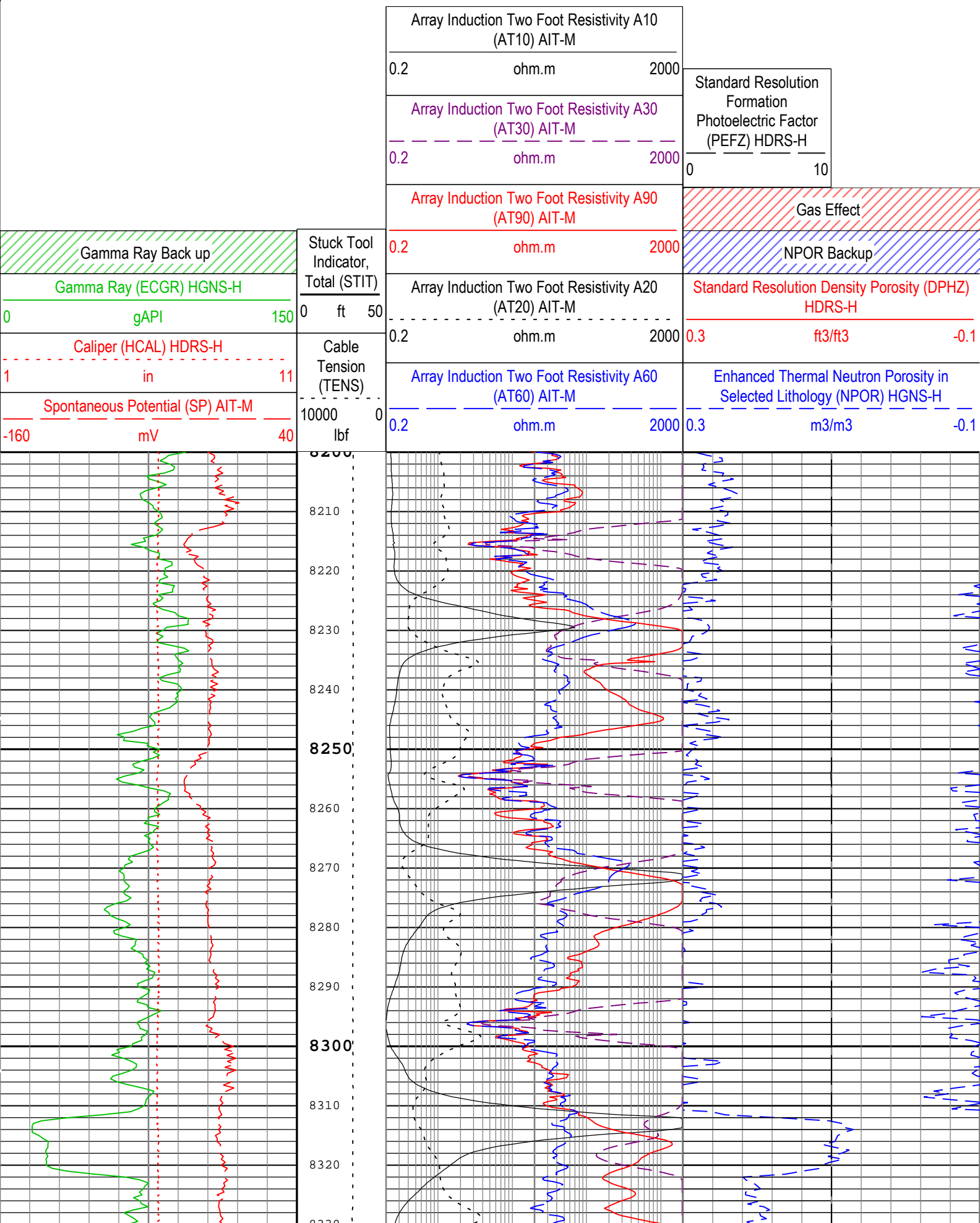
	Carson / Benjamin Marmon					
Witnessed By	Chris Montoya					
Service Order Number	D5ND-00091					
Borehole Fluids						
Parameter( unit )	Run 1					
Fluid Type	Water					
Max Recorded Temperatures ( degF )	NaN					
Source of Sample	Active Tank					
Salinity ( ppm )	900					
Density ( lbm/gal )	9					
Funnel Viscosity ( s )	32					
Fluid Loss ( cm3 )	9					
PH	8					
Date/Time Circulation Stopped	28-Oct-2015 03:00:00					
Date Logger on Bottom	28-Oct-2015					
Time Logger on Bottom	09:39:00					
Source RMF						
RMC	Pressed					
RM @ Meas Temp ( ohm.m@degF )	1.1 @ 50					
RMF @ Meas Temp ( ohm.m@degF )	0.82 @ 68					
RMC @ Meas Temp ( ohm.m@degF )	1.65 @ 68					
RM @ BHT ( ohm.m@degF )	0.25 @ 243					
RMF @ BHT ( ohm.m@degF )	0.25 @ 243					
RMC @ BHT ( ohm.m@degF )	0.49 @ 243					
Total Solid ( % )						
High Gravity Solids ( % )	0					
Remarks and Equipment Summary						
Run 1: Toolstring		Run 1: Remarks				
Equip name	Length	MP name	Offset	Tool run as shown in tool string diagram.		
LEH-QT	47.07			Production Casing (TD) : 9897		
LEH-QT				Intermediate Casing: 8550'		
EDTC-B	44.15			Surface Casing: 886.1'		
EDTH-B				BHT: 243 deg F		
EDTG-A				Matrix zoned as per client request.		
EDTC-B				Deep resistivity curves effected by environmental factors.		
		CTEM	40.65			
		ACCZ	0.00			
		HV	0.00			
		Gamma Ray	38.78			
		TelStatus	37.65			
HGNS-H:3985	37.65	Temperature	37.62			
HGNH		GR	36.91			
NSR-F:5138						
NPV-N						
HACCZ-H:4269						
HGNS-H:3985						
HMCA-H						

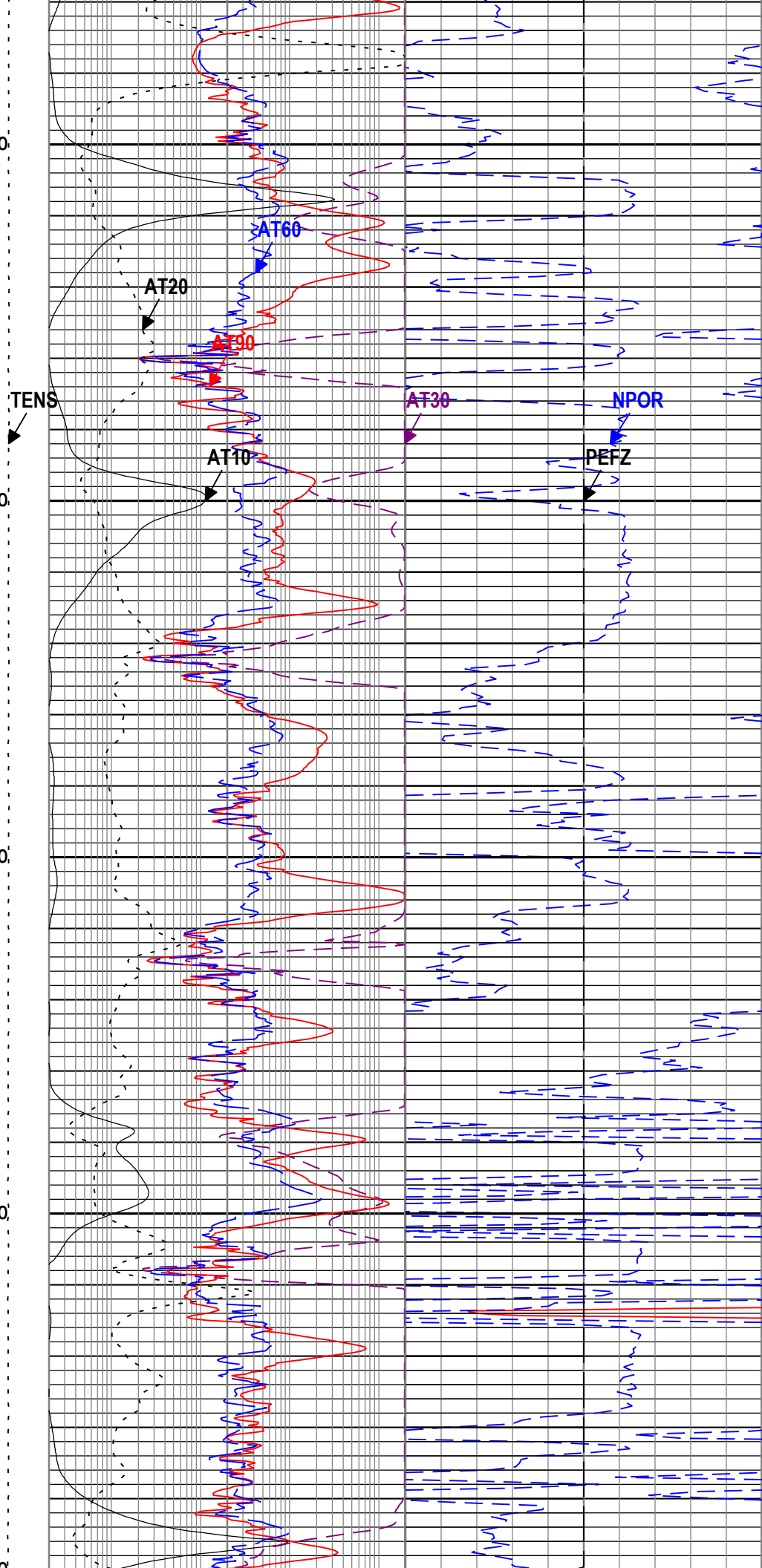
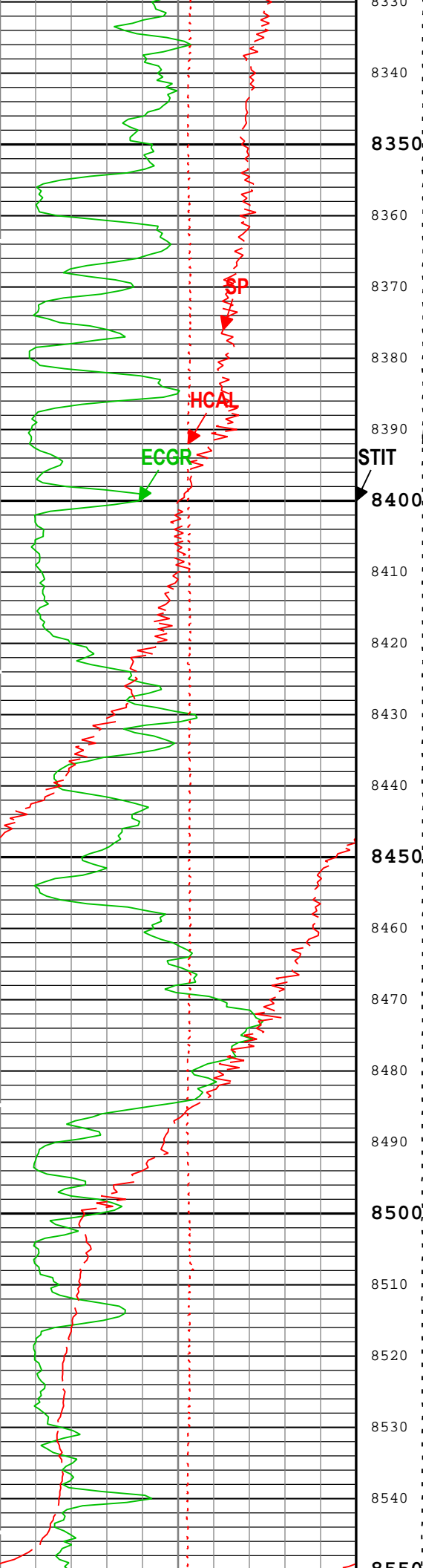


Depth Summary			
		Run 1	
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			

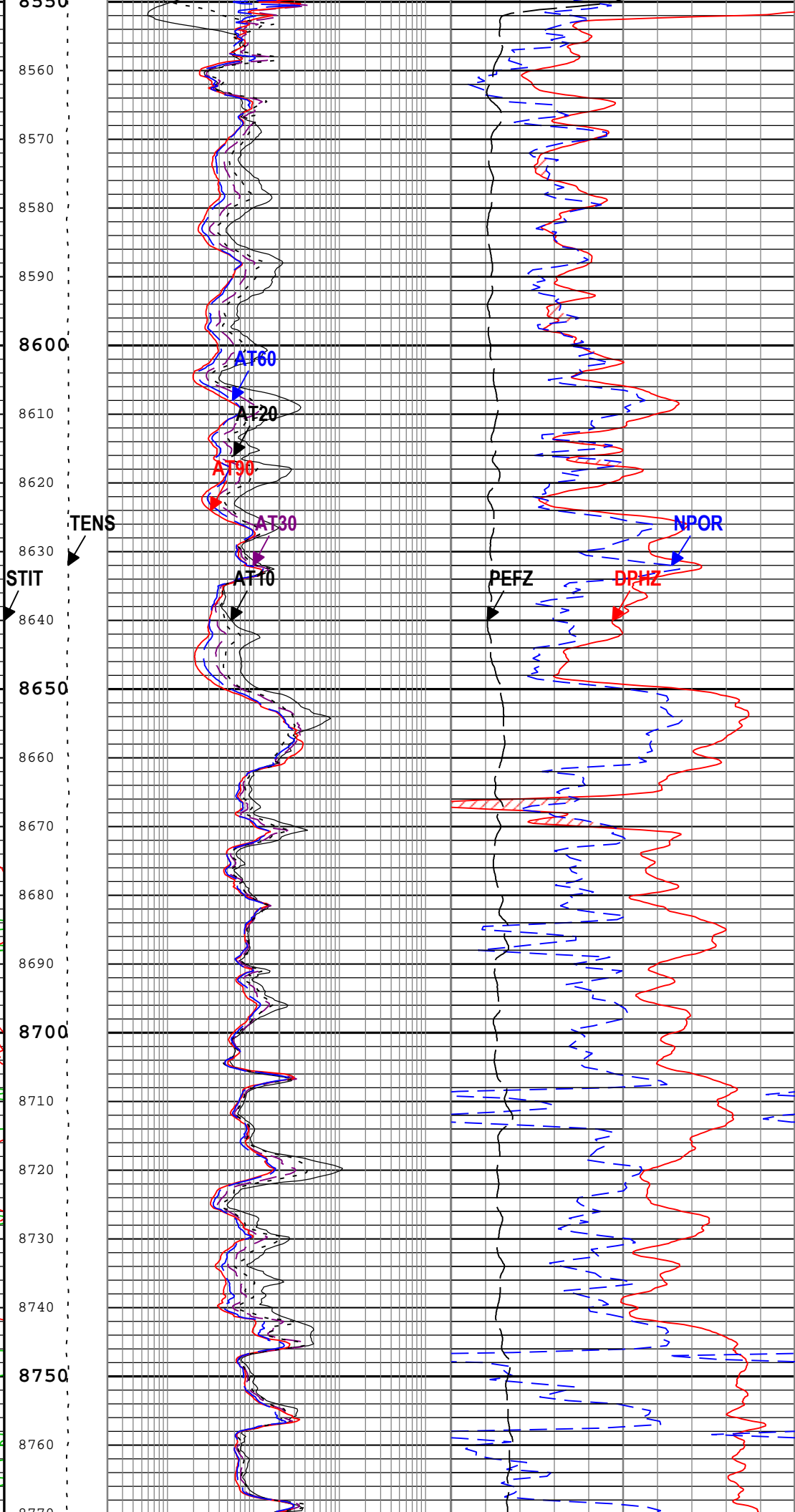
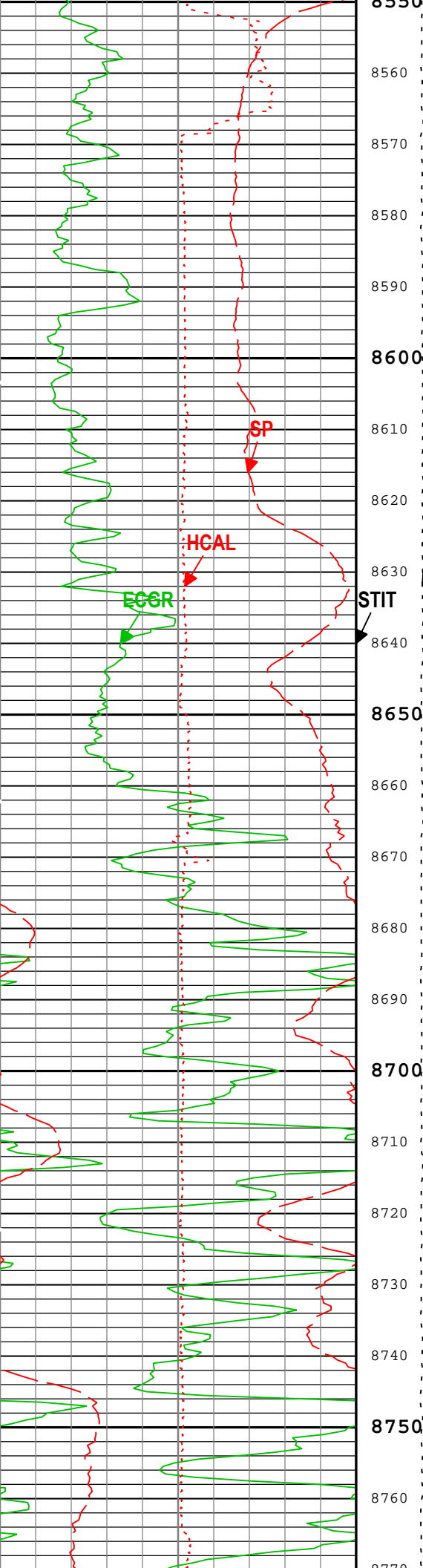
Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT20	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
SP	AIT-M:AMIS:AMIS	6in
STIT	DepthCorrection	6in

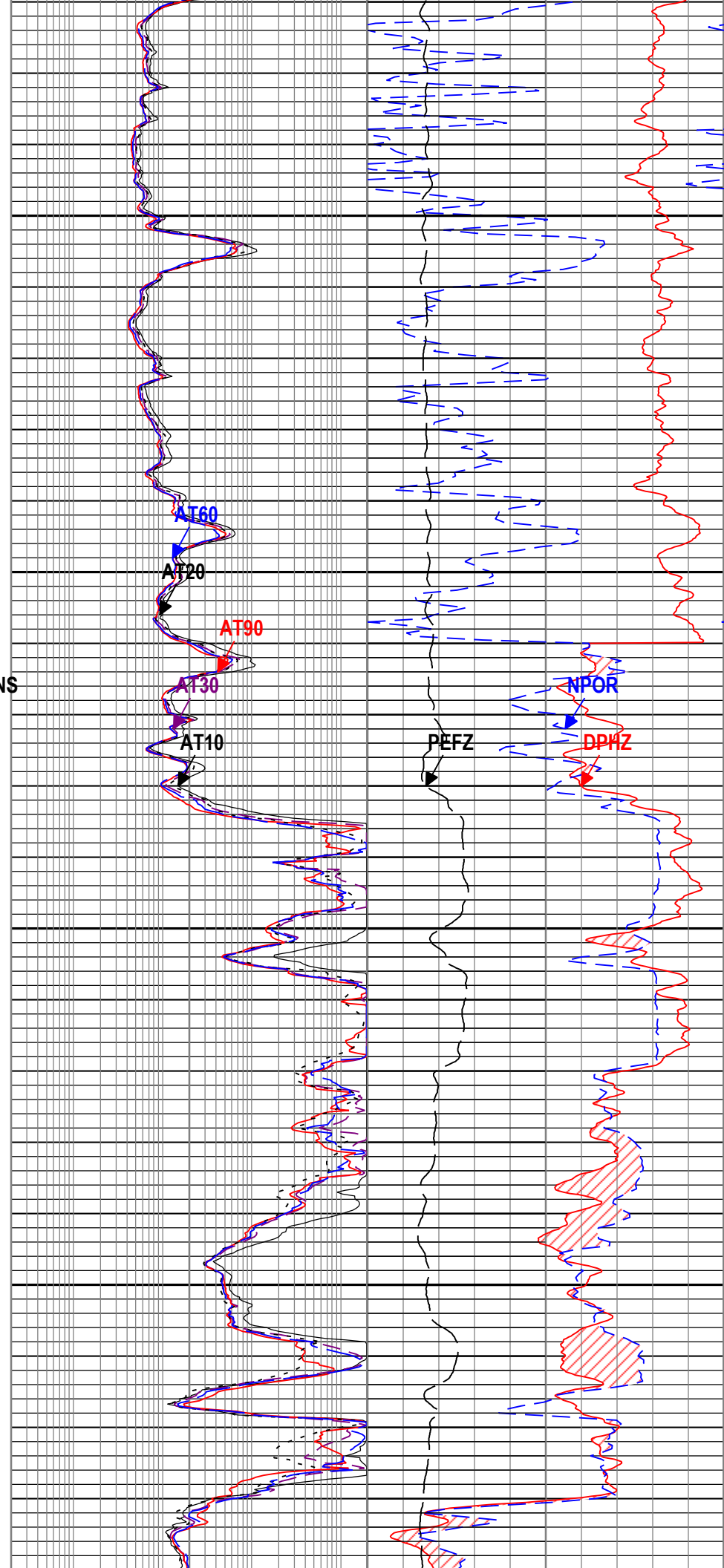
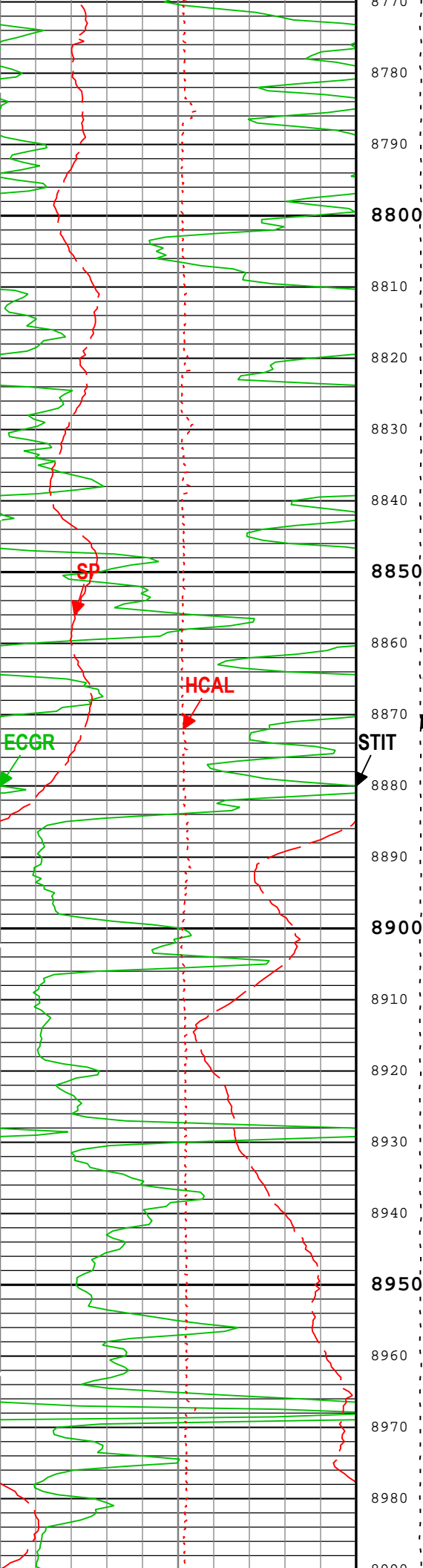
TENS WLWorkflow 6in  
TIME\_1900 WLWorkflow 0.1in  
TIME\_1900 - Time Marked every 60.00 (s)

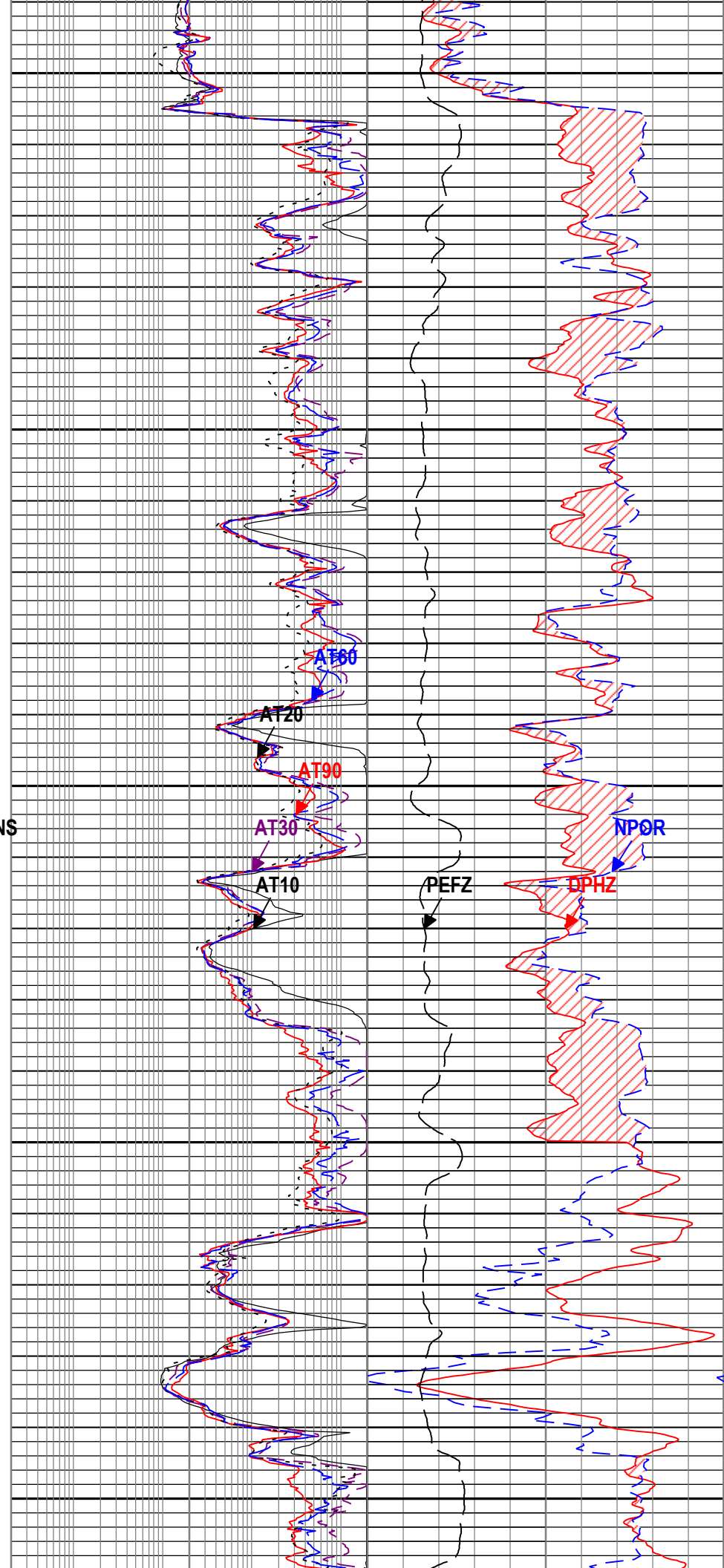
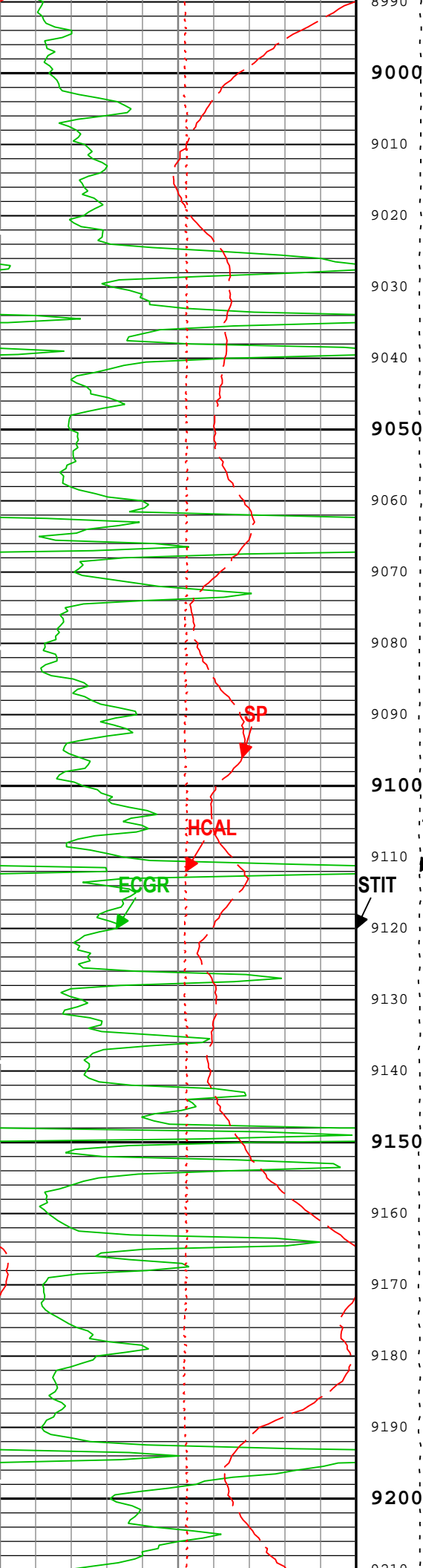


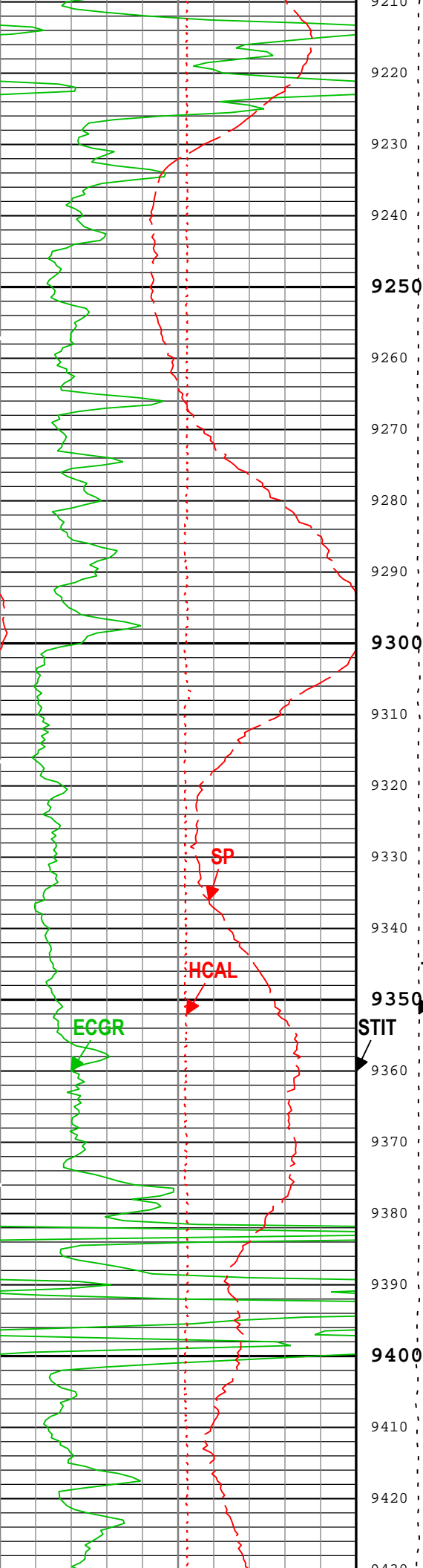












9250

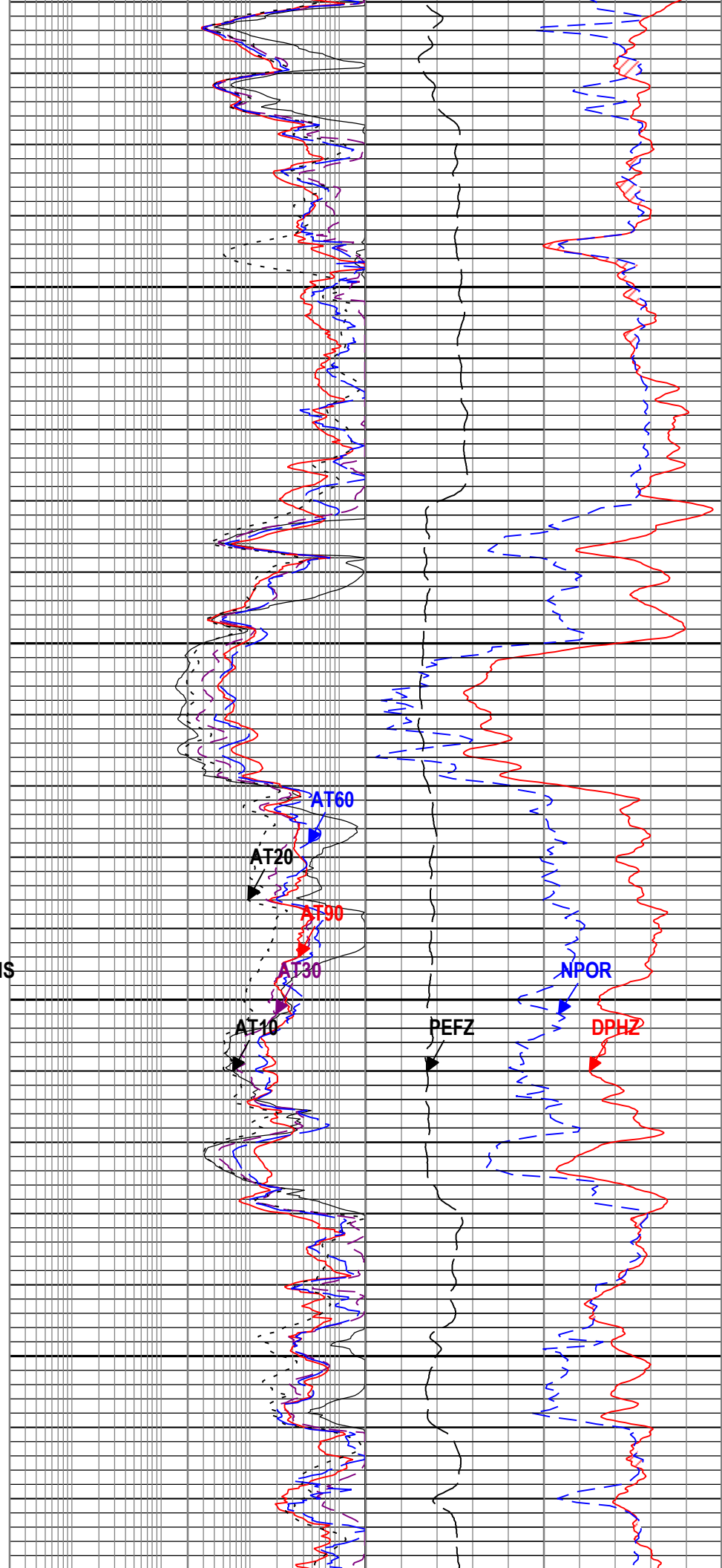
9300

9350

9400

STIT

TENS



AT60

AT20

AT90

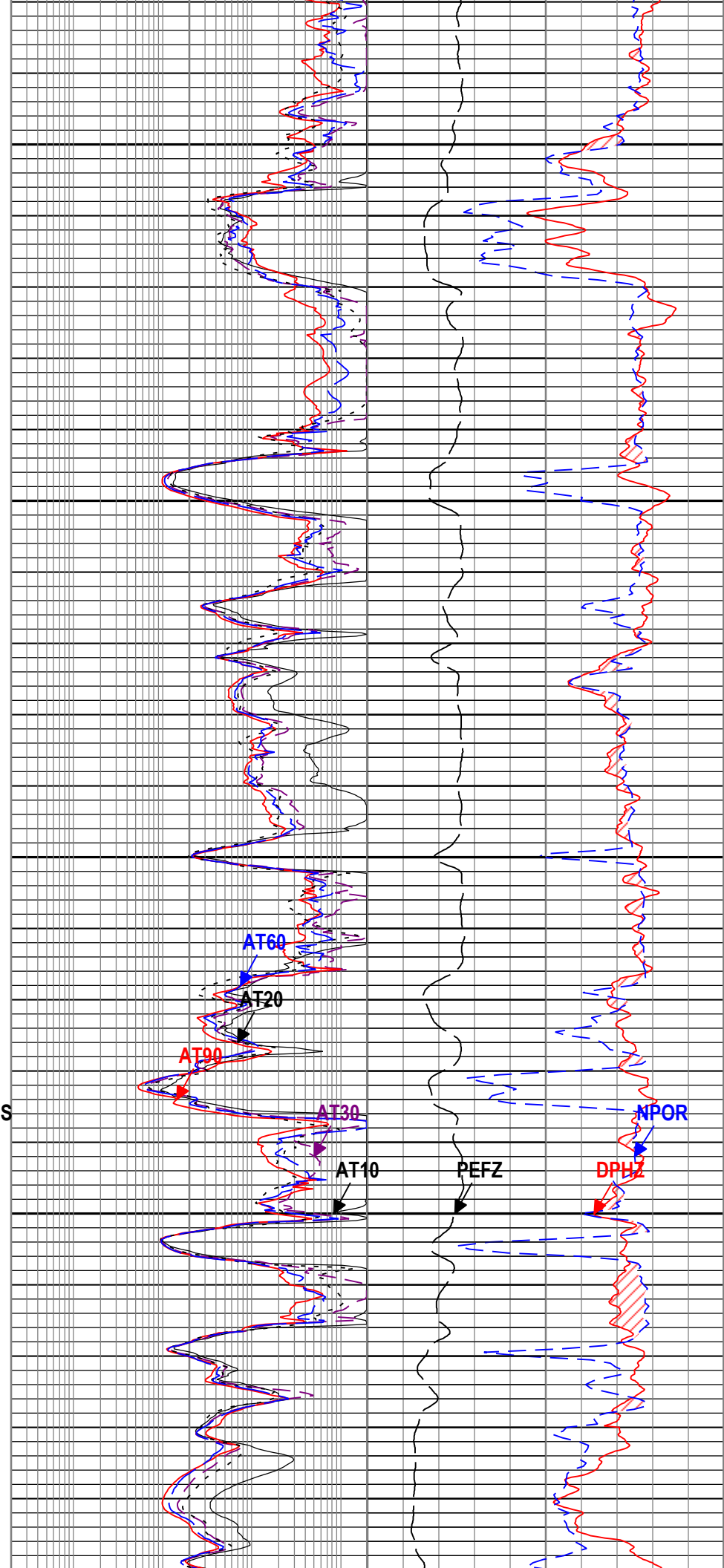
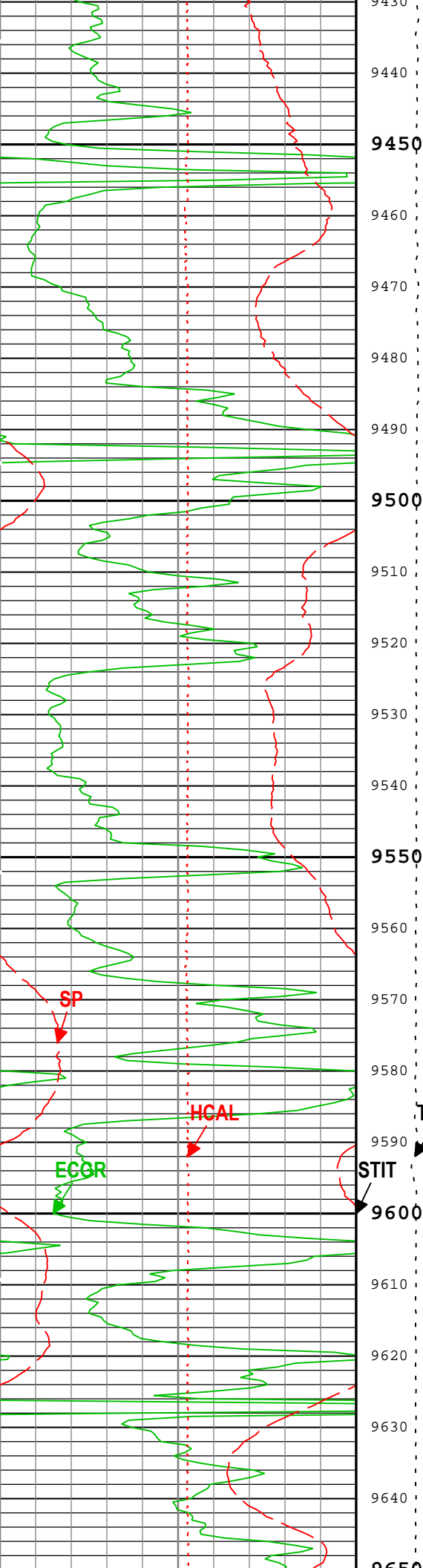
AT30

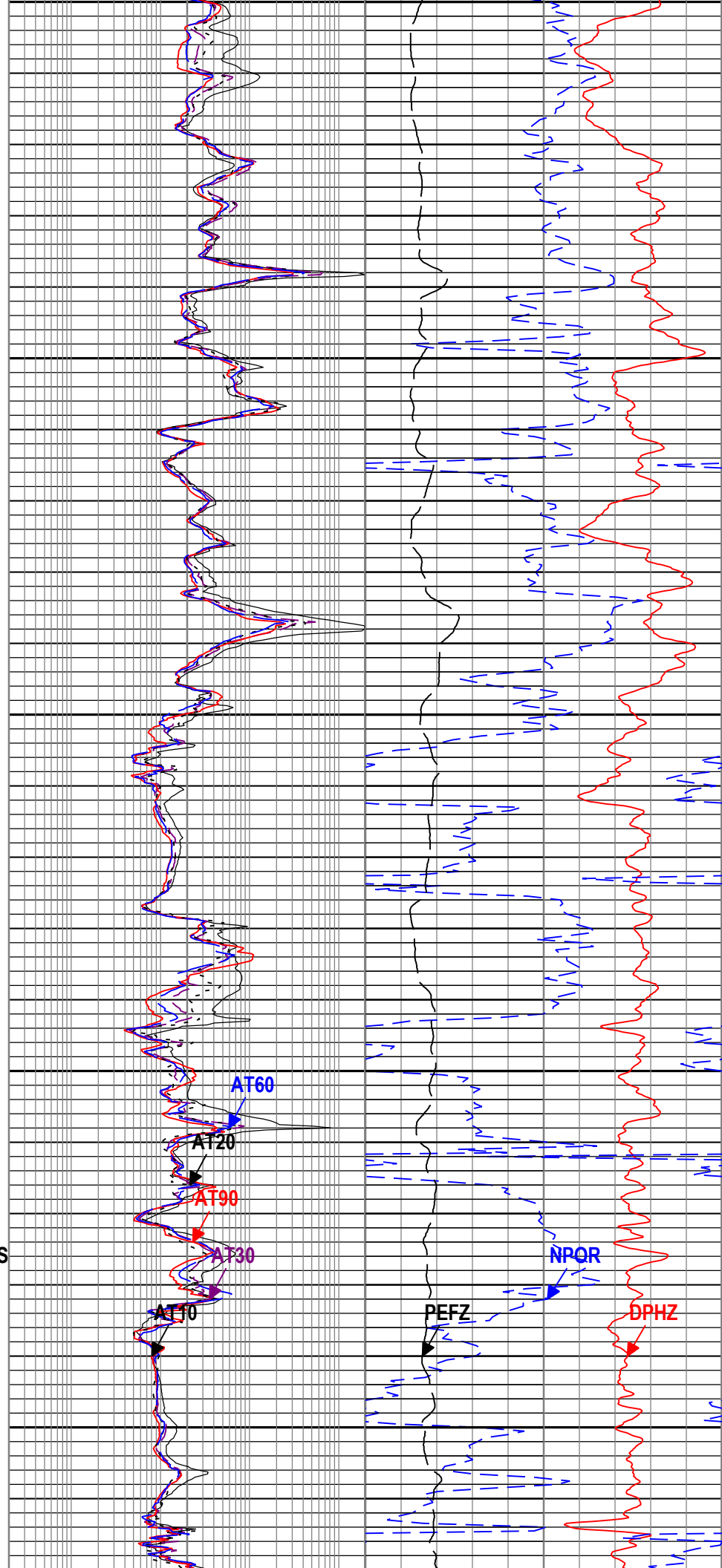
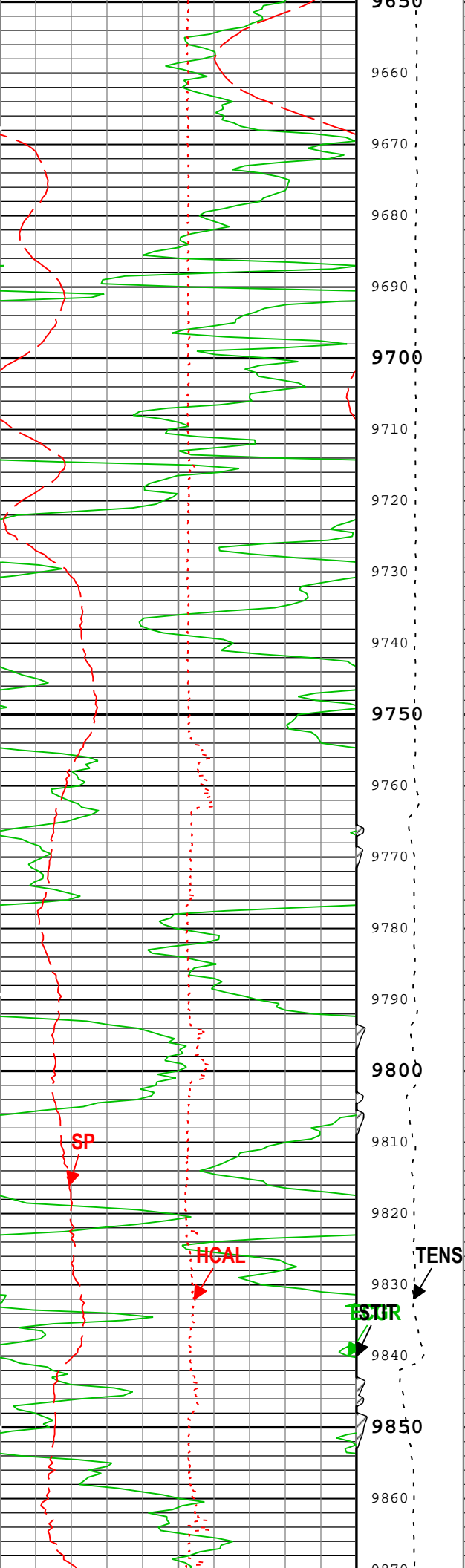
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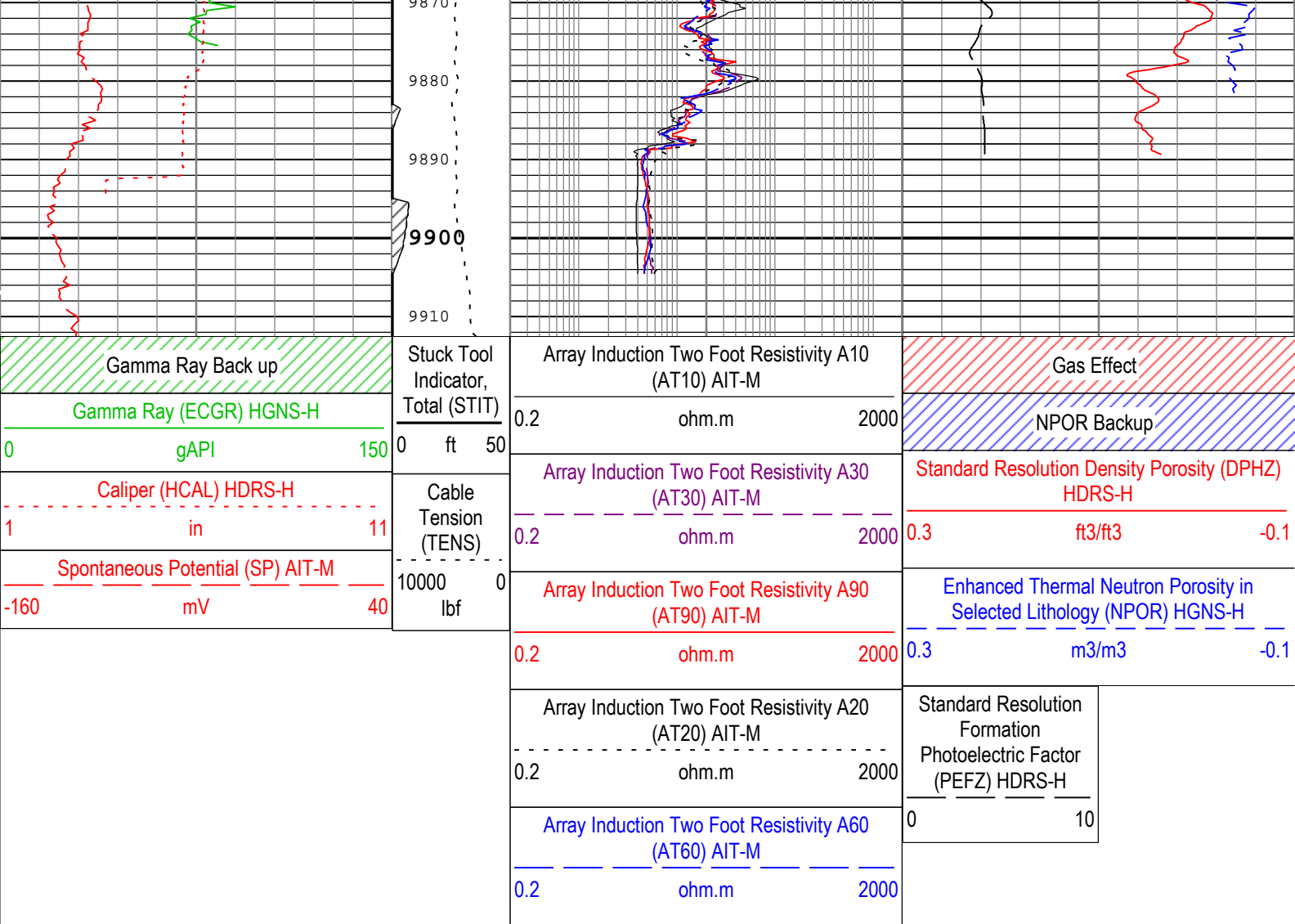
NPOR

PEFZ

DPHZ







TIME\_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express    Format: Log ( TripleCombo-5 )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 28-Oct-2015 13:32:53

Channel Processing Parameters				
Run 1: Parameters				
Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.5	in
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	243	degF
BS	Bit Size	WLSESSION	6.125	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.466	in
CBLO	Casing Bottom (Logger)	WLSESSION	8550	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FD	Fluid Density	Borehole	1	g/cm3
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	AMF	
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	Depth Zoned	
MDEN	Matrix Density for Density Porosity	Borehole	Depth Zoned	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.82	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	9897	ft

## Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
MATR	SANDSTONE	8200	8860
MATR	DOLOMITE	8860	9150
MATR	LIMESTONE	9150	9630
MATR	SANDSTONE	9630	9912.5
MDEN	2.65	8200	8860
MDEN	2.87	8860	9150
MDEN	2.71	9150	9630
MDEN	2.68	9630	9912.5

All depth are actual.

## Tool Control Parameters

### Run 1: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

## Run 1

## 5" Triple Combo

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run 1	Log[2]:Up	Up	9279.25 ft	9907.06 ft	28-Oct-2015 10:33:55 AM	28-Oct-2015 10:46:16 AM	ON	6.51 ft	No
Run 1	Log[3]:Up	Up	7305.55 ft	9912.71 ft	28-Oct-2015 10:53:44 AM	28-Oct-2015 11:32:51 AM	ON	0.00 ft	No

All depths are referenced to toolstring zero

Log	Company:NGL WATER SOLUTIONS DJ LLC	Well: NGL APOLLO 11
		Run 1: Log[3]:Up:S005

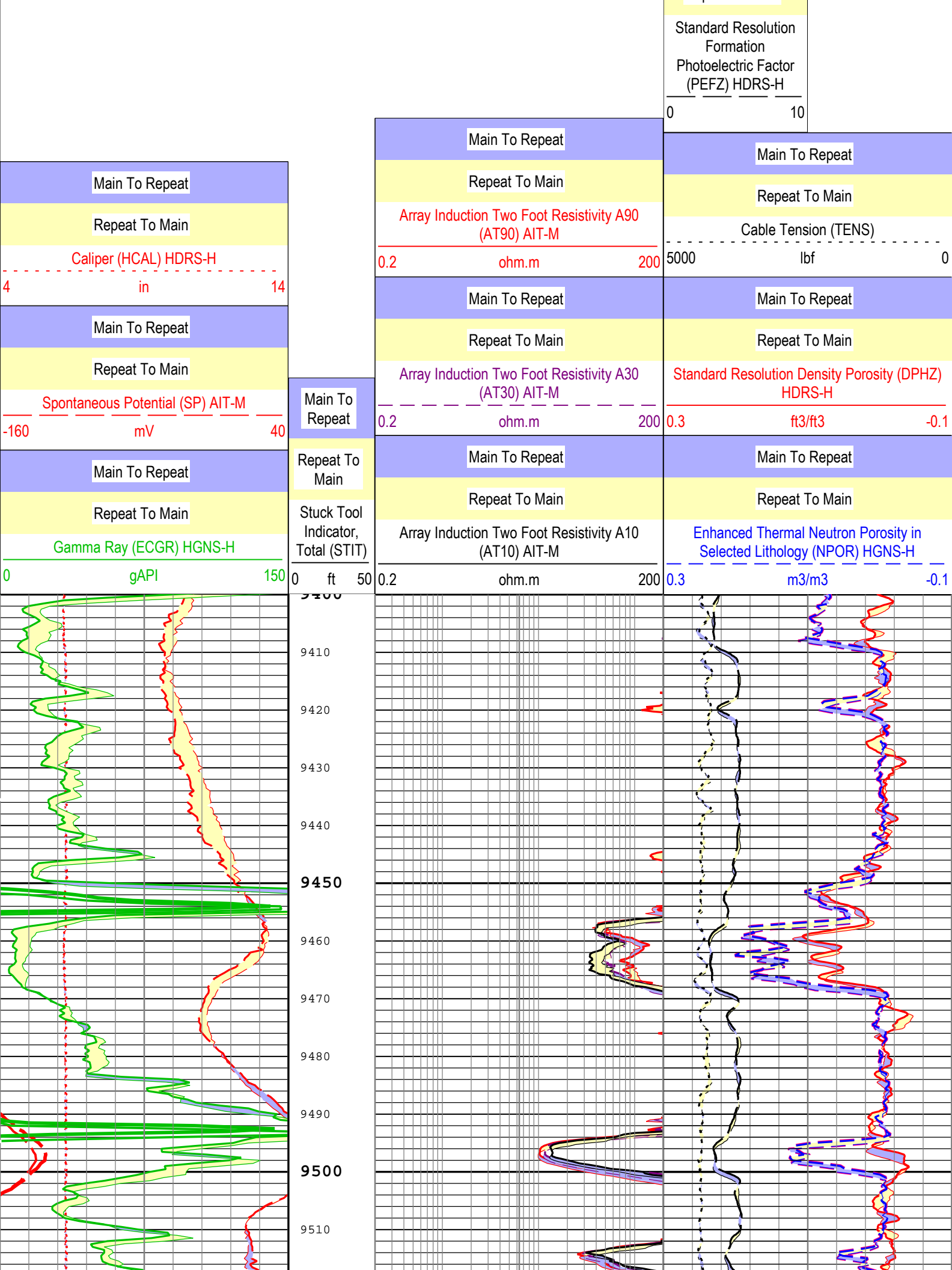
Description: HGNS standard resolution porosities for Platform Express    Format: Log ( TripleCombo-5 RA )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 28-Oct-2015 13:32:55

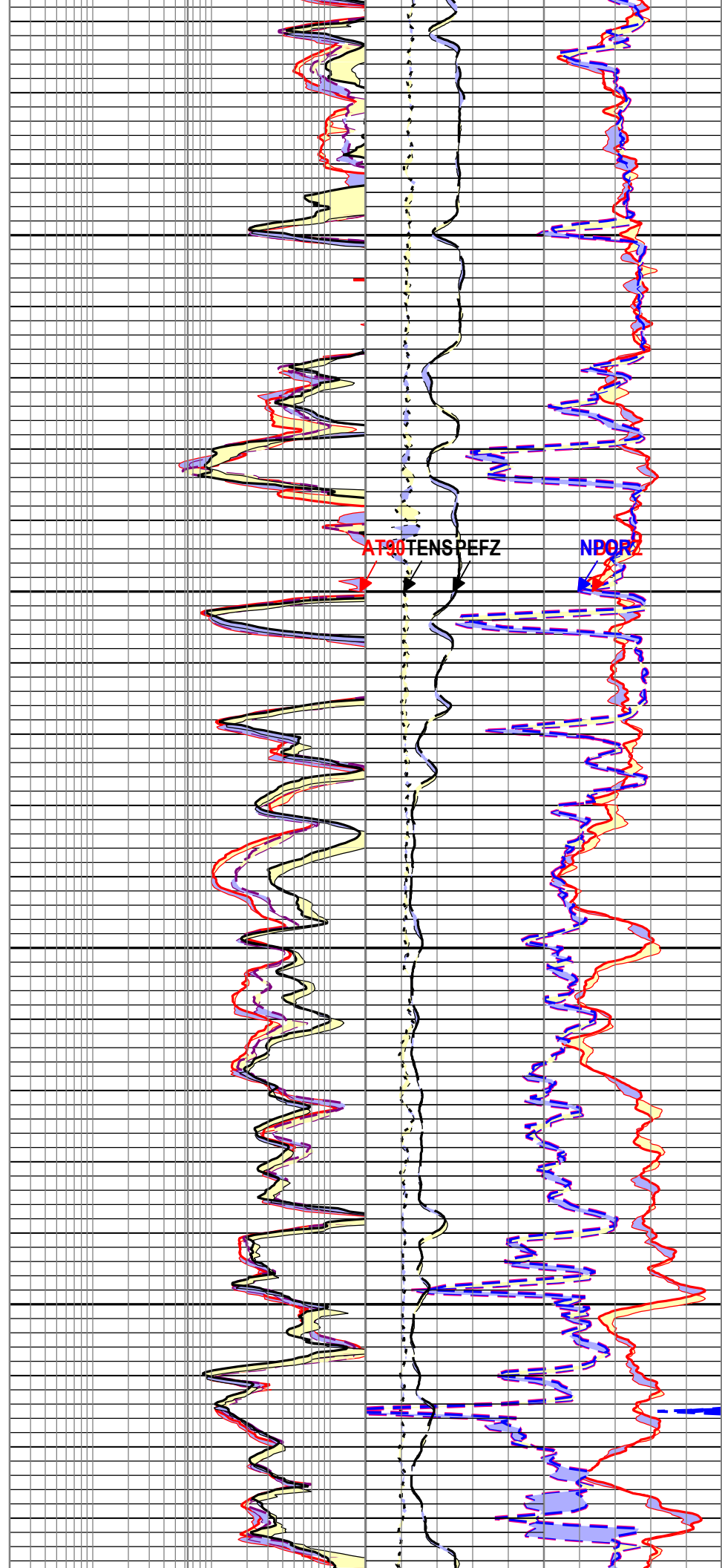
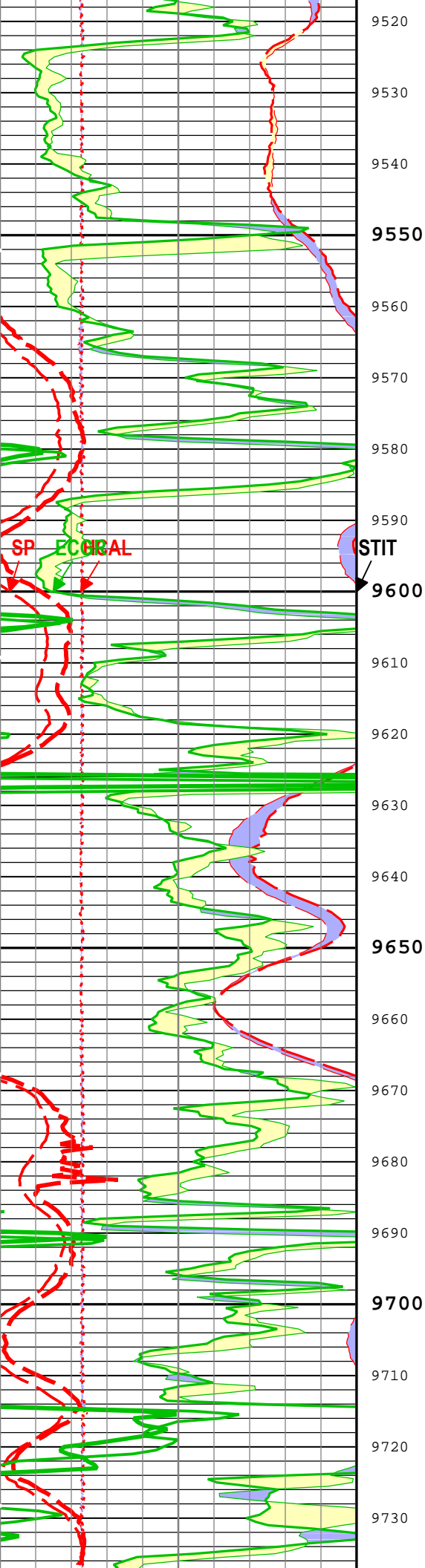
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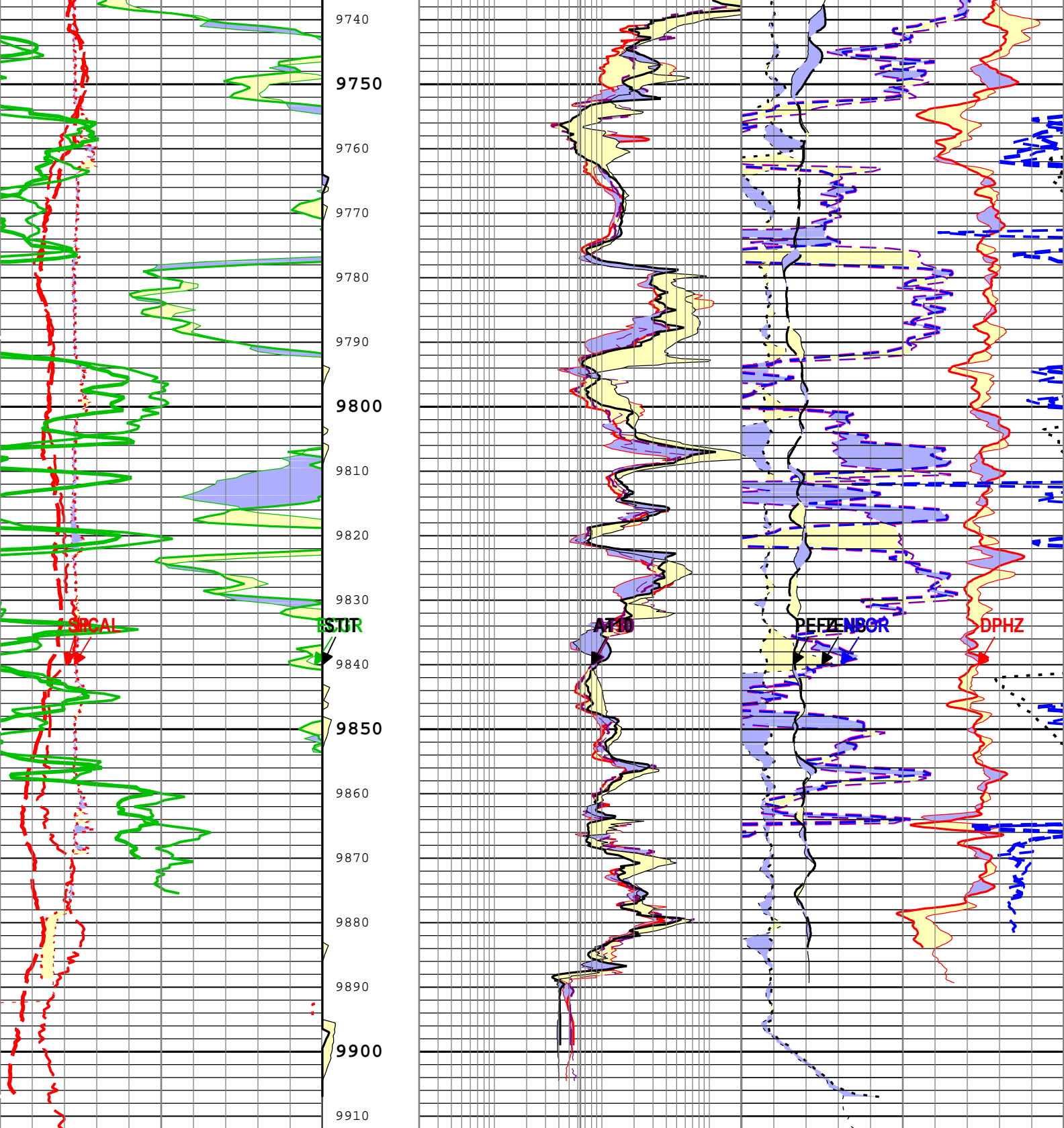
Main To Repeat

Repeat To Main









Main To Repeat		Main To Repeat		Main To Repeat	
Repeat To Main		Repeat To Main		Repeat To Main	
Caliper (HCAL) HDRS-H		Array Induction Two Foot Resistivity A90 (AT90) AIT-M		Cable Tension (TENS)	
4 in 14		0.2 ohm.m 200		5000 lbf 0	
Main To Repeat		Main To Repeat		Main To Repeat	
Repeat To Main		Repeat To Main		Repeat To Main	
Spontaneous Potential (SP) AIT-M		Array Induction Two Foot Resistivity A30		Standard Resolution Density Porosity (DPHZ)	

-160	mV	40
Main To Repeat		
Repeat To Main		
Gamma Ray (ECGR) HGNS-H		
0	gAPI	150

Array Induction Two Foot Resistivity A30 (AT30) AIT-M		
0.2	ohm.m	200
Main To Repeat		
Repeat To Main		
Array Induction Two Foot Resistivity A10 (AT10) AIT-M		
0.2	ohm.m	200

0.3	ft3/ft3	-0.1
Main To Repeat		
Repeat To Main		
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H		
0.3	m3/m3	-0.1
Main To Repeat		
Repeat To Main		
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H		
0		10

TIME\_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express    Format: Log ( TripleCombo-5 RA )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 28-Oct-2015 13:32:55

## Channel Processing Parameters

### Run 1: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.5	in
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	243	degF
BS	Bit Size	WLSESSION	6.125	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.466	in
CBLO	Casing Bottom (Logger)	WLSESSION	8550	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FD	Fluid Density	Borehole	1	g/cm3
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	AMF	
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	Depth Zoned	
MDEN	Matrix Density for Density Porosity	Borehole	Depth Zoned	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.82	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	

SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	9897	ft

Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
MATR	LIMESTONE	9400	9630
MATR	SANDSTONE	9630	9912.5
MDEN	2.71	9400	9630
MDEN	2.68	9630	9912.5

All depth are actual.

Tool Control Parameters

Run 1: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run 1

Primary Equipment :	File code for AIT-MA Sonde Tool Element	AMIS	1251
Auxiliary Equipment :	File code for AIT Bottom Nose Tool Element	AMRM	1251

AIT Sonde Calibration - Test Loop Gain

Master (Manual Entry):	11:28:18 30-Sep-2015						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 0		Master	1.000	0.950	1.045	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 0	deg	Master	0	-3.000	2.682	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 1		Master	1.000	0.950	1.012	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 1	deg	Master	0	-3.000	0.552	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 2		Master	1.000	0.950	1.021	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 2	deg	Master	0	-3.000	-0.213	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 3		Master	1.000	0.950	1.021	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 3	deg	Master	0	-3.000	0.022	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 4		Master	1.000	0.950	0.997	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 4	deg	Master	0	-3.000	0.035	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 5		Master	1.000	0.950	0.986	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 5	deg	Master	0	-3.000	-0.211	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 6		Master	1.000	0.950	1.033	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 6	deg	Master	0	-3.000	0.131	3.000	<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>
Test Loop Phase - 7	deg	Master	0	-3.000	-0.116	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>

AIT Sonde Calibration - Sonde Error Correction

Master (Manual Entry):	11:28:18 30-Sep-2015						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-18.541	119.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-1668.751	2250.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	140.266	204.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 1		Master	-----	-625.000	75.932	625.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	118.522	156.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 2		Master	-----	-350.000	19.765	350.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	60.864	89.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 3		Master	-----	-250.000	-9.553	250.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	25.191	35.000	<div><div></div><div></div><div></div><div></div><div></div></div>

Sonde Error Correction Quad - 4		Master	-----	-63.000	14.704	63.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	14.280	24.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 5		Master	-----	-50.000	3.489	50.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.725	15.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 6		Master	-----	-30.000	5.888	30.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-2.126	5.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 7		Master	-----	-30.000	0.045	30.000	<div><div></div><div></div><div></div><div></div><div></div></div>

## AIT Mud Calibration - Mud Calibration Gain

Master (Manual Entry):		11:28:18 30-Sep-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Coarse Gain		Master	1.000	0.800	1.055	1.200	<div><div></div><div></div><div></div><div></div><div></div></div>
Fine Gain		Master	1.000	0.800	1.054	1.200	<div><div></div><div></div><div></div><div></div><div></div></div>

## AIT Electronics Check - Thru Calibration Check

Master (Manual Entry):		11:28:18 30-Sep-2015		Before (Measured):		06:08:50 28-Oct-2015	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 0	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.366	0.617	0.854	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 0	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	137.000	-173.798	-103.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 1	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.762	1.264	1.778	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 1	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	136.000	-174.842	-104.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 2	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.372	0.627	0.868	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	132.000	-178.208	-108.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 3	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.420	0.708	0.980	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	131.000	-178.931	-109.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 4	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.804	1.330	1.876	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 4	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	125.000	175.200	-115.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 5	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	1.176	1.941	2.744	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	122.000	173.610	-118.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	1.176	1.934	2.744	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	121.000	173.675	-119.000	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	0.846	1.391	1.974	<div><div></div><div></div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master	----	----	----	----	<div><div></div><div></div><div></div></div>
		Before	----	115.000	172.783	-125.000	<div><div></div><div></div><div></div></div>

SPA Zero - 0	mV	Before-Master	----	----	----	----	<div><div></div></div>
		Master	----	----	----	----	<div><div></div></div>
		Before	----	-50.000	-0.072	50.000	<div><div></div></div>
SPA Plus - 0	mV	Before-Master	----	----	----	----	<div><div></div></div>
		Master	----	----	----	----	<div><div></div></div>
		Before	----	941.000	984.979	1040.000	<div><div></div></div>
Temperature Zero - 0	V	Before-Master	----	----	----	----	<div><div></div></div>
		Master	----	----	----	----	<div><div></div></div>
		Before	----	-0.050	0.000	0.050	<div><div></div></div>
Temperature Plus - 0	V	Before-Master	----	----	----	----	<div><div></div></div>
		Master	----	----	----	----	<div><div></div></div>
		Before	----	0.870	0.913	0.960	<div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div></div>
		Master	----	----	----	----	<div><div></div></div>
		Before	----	----	----	----	<div><div></div></div>

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

### Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3871

### Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	28629
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5234
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	3925

### 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): 06:09:17 28-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Small Ring	in	Before	8.00	6.00	7.55	10.00	<div><div></div></div>
Large Ring	in	Before	12.00	9.00	11.70	15.00	<div><div></div></div>

## HDRS Density Calibration - Inversion Results

Master (EEPROM): 12:12:40 23-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Rho Aluminum	g/cm3	Master	2.596	2.586	2.599	2.606	<div><div></div></div>
Rho Magnesium	g/cm3	Master	1.686	1.676	1.687	1.696	<div><div></div></div>
Pe Aluminum		Master	2.570	2.470	2.573	2.670	<div><div></div></div>
Pe Magnesium		Master	2.650	2.550	2.599	2.750	<div><div></div></div>

## HDRS Density Calibration - Deviation Summary

Master (EEPROM): 12:12:40 23-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
BS Average Deviation	%	Master	0	-0.6000	0.3337	0.6000	<div><div></div></div>
BS Max Deviation	%	Master	0	-1.6000	0.6768	1.6000	<div><div></div></div>
SS Average Deviation	%	Master	0	-1.0000	0.2820	1.0000	<div><div></div></div>
SS Max Deviation	%	Master	0	-2.5000	0.7992	2.5000	<div><div></div></div>
LS Average Deviation	%	Master	0	-1.5000	0.6769	1.5000	<div><div></div></div>
LS Max Deviation	%	Master	0	-3.5000	1.4884	3.5000	<div><div></div></div>

## HDRS Density Calibration - Background Summary

Master (EEPROM): 12:12:40 23-Oct-2015 Before (Measured): 06:11:49 28-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
BS Window Ratio		Master	1.0000		0.7427		<div><div></div></div>
		Before	0.7427	0.7056	0.7429	0.7799	<div><div></div></div>
		Before-Master	----	----	0.0002	----	<div><div></div></div>



BS Window Sum	1/s	Master Before Before-Master	1 22343 -----	21226 -----	22343 22344 1	23460 -----	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Window Ratio		Master Before Before-Master	1.0000 0.4873 -----	0.4630 -----	0.4873 0.4878 0.0005	0.5117 -----	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Window Sum	1/s	Master Before Before-Master	1 10265 -----	9751 -----	10265 10246 -19	10778 -----	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Window Ratio		Master Before Before-Master	1.0000 0.2983 -----	0.2834 -----	0.2983 0.2993 0.0010	0.3133 -----	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Window Sum	1/s	Master Before Before-Master	1 1185 -----	1126 -----	1185 1175 -10	1244 -----	<div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 12:12:40 23-Oct-2015		Before (Measured): 06:11:49 28-Oct-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
BS PM High Voltage	V	Master		1000	1394	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		1000	1408	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-100	14	100	<div><div></div><div></div><div></div><div></div><div></div></div>
SS PM High Voltage	V	Master		1000	1717	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		1000	1743	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-100	26	100	<div><div></div><div></div><div></div><div></div><div></div></div>
LS PM High Voltage	V	Master		1000	1377	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		1000	1386	2400	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-100	9	100	<div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 12:12:40 23-Oct-2015		Before (Measured): 06:11:49 28-Oct-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
BS Crystal Resolution	%	Master		5.00	10.43	25.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		5.00	10.41	25.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-1.00	-0.02	1.00	<div><div></div><div></div><div></div><div></div><div></div></div>
SS Crystal Resolution	%	Master		5.00	10.22	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		5.00	10.37	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-1.00	0.15	1.00	<div><div></div><div></div><div></div><div></div><div></div></div>
LS Crystal Resolution	%	Master		5.00	8.46	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before		5.00	8.45	20.00	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-1.00	-0.01	1.00	<div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 06:11:59 28-Oct-2015							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div></div>
Main Resistivity	ohm.m	Before	3875	3565	3870	4185	<div><div></div><div></div><div></div><div></div><div></div></div>
Deep Resistivity	ohm.m	Before	3830	3524	3811	4136	<div><div></div><div></div><div></div><div></div><div></div></div>
Shallow Resistivity	ohm.m	Before	3830	3524	3824	4136	<div><div></div><div></div><div></div><div></div><div></div></div>

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

Primary Equipment :			
HILT Gamma-Ray and Neutron Sonde, 150 degC		HGNS-H	3985
Auxiliary Equipment :			
HGNS Accelerometer, 150 degC		HACCZ-H	4269
AmBe Neutron Logging Source		NSR-F	5138
Calibration Parameter :			
Water Temperature			
Housing Size			
JIG-BKG (Jig minus background reference)		160	



## HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 09:34:56 28-Oct-2015

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-Aug-2005

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	----	----	336.900	----	
Accelerometer Coefficients - 1		Master	----	----	37.580	----	
Accelerometer Coefficients - 2		Master	----	----	-0.019	----	
Accelerometer Coefficients - 3		Master	----	----	0.000	----	
Accelerometer Coefficients - 4		Master	----	----	2.730	----	
Accelerometer Coefficients - 5		Master	----	----	0.000	----	
Accelerometer Coefficients - 6		Master	----	----	0.000	----	
Accelerometer Coefficients - 7		Master	----	----	0.000	----	
Accelerometer Coefficients - 8		Master	----	----	299.000	----	
Accelerometer Coefficients - 9		Master	----	----	1.007	----	

## HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 13:10:00 23-Oct-2015

Before (Measured):

06:07:51 28-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	28.0	40.0	
		Before	0	5.0	26.7	40.0	
		Before-Master	----	-4.2	-1.3	4.2	
Far Zero Measurement	1/s	Master	0	5.0	26.3	40.0	
		Before	0	5.0	28.7	40.0	
		Before-Master	----	-3.9	2.4	3.9	
Near Plus Measurement	1/s	Master	6031.0	4700.0	4945.0	6900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Far Plus Measurement	1/s	Master	2793.0	1900.0	2073.0	2900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Near Corrected Plus Measurement	1/s	Master		4700.0	4971.0	6900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	
Far Corrected Plus Measurement	1/s	Master		1900.0	2080.0	2900.0	
		Before	----	----	----	----	
		Before-Master	----	----	----	----	

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

Before (Measured): 06:10:48 28-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	79.9	120.0	
RGR Plus Measurement	gAPI	Before	179.8	152.4	160.2	200.0	
GR Calibration Gain		Before	0.89	0.80	1.00	1.05	

Company:	NGL WATER SOLUTIONS DJ LLC	
Well:	NGL APOLLO 11	
Field:	WATTENBERG	
County:	WELD	
State:	COLORADO	

Platform Express

Triple Combo