

Company: Noble Energy Inc

Well: Longs AC 02-15

Field: Wattenberg

County: Weld

State: Colorado

Dielectric Scanner

County: Weld

Field: Wattenberg

Location: Sec 2, T 7N, R 63W

Well: Longs AC 02-15

Company: Noble Energy Inc

Location:

Sec 2, T 7N, R 63W

SHL: 660' FSL X 1920' FEL SWSE

Lat/Long: 40.597590/-104.401130

Elev. K.B.

G.L. 4837.00 ft

D.F. 4850.00 ft

Permanent Datum:

Ground Level

Elev.: 4837.00 f

Log Measured From:

Drill Floor

13.00 ft

Drilling Measured From:

Drill Floor

above Perm.Datum

API Serial No.

Section:

Township:

Range:

05-123-35817-0000

2

7N

63W

Logging Date	01-Aug-2012				
Run Number	1				
Depth Driller	8910.00 ft				
Schlumberger Depth	8912.00 ft				
Bottom Log Interval	8906.00 ft				
Top Log Interval	754.00 ft				
Casing Driller Size @ Depth	9.625 in @ 754.00 ft				
Casing Schlumberger	754 ft				
Bit Size	8.75 in				
MUD	Type Fluid In Hole		Fresh Water		
	Density	Viscosity	9.05 lbm/gal	11 s	
	Fluid Loss	PH	9.6 cm3	10	
	Source of Sample		Active Tank		
RM @ Meas Temp	1.94 ohm.m		@	73.6 degF	
RMF @ Meas Temp	1.89 ohm.m		@	73.7 degF	
RMC @ Meas Temp	2.43 ohm.m		@	73.6 degF	
Source RMF	RMC	Pressed	Calculated		
RM @ BHT	RMF @ BHT	0.67 @ 227.1	0.65 @ 227.1		
Max Recorded Temperatures			227.1 degF		
Circulation Stopped		Time	31-Jul-2012	22:00:00	
Logger on Bottom		Time	01-Aug-2012	08:15:00	
Unit Number	Location:	3030	Fort Morgan, CO		
Recorded By	Philip Grant				
Witnessed By	Bob Lieber, Roger Foster				

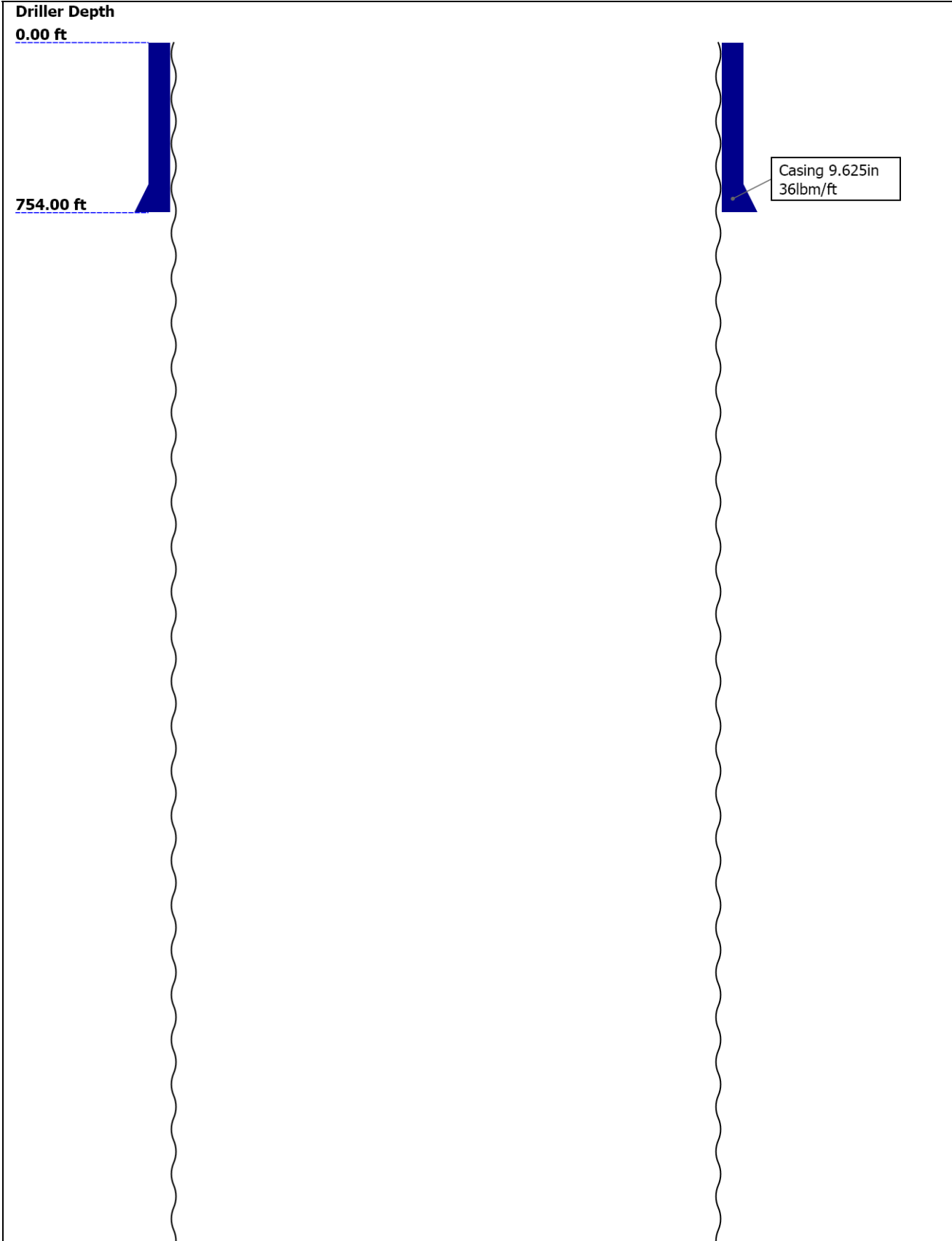
Disclaimer

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Well Sketch



8910.00 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)	8910					
Bottom Logger (ft)	8912					
Casing						
Size (in)	9.625					
Weight (lbm/ft)	36					
Inner Diameter (in)	8.914					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	754					
Bottom Logger (ft)	754					

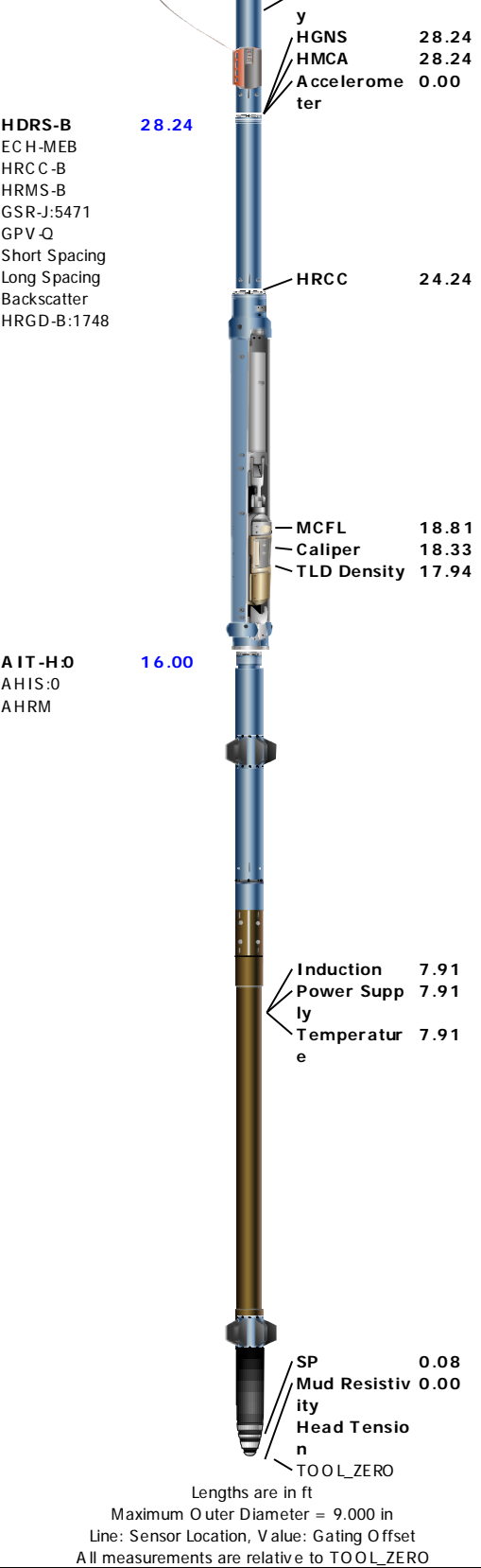
Borehole Fluids

Parameter(unit)	1					
Fluid Type	Water					
Fluid Name	Fresh Water					
Max Recorded Temperatures (degF)	227.1					
Source of Sample	Active Tank					
Salinity (ppm)	1000					
Density (lbm/gal)	9.05					
Funnel Viscosity (s)	11					
Fluid Loss (cm3)	9.6					
PH	10					
Date/Time Circulation Stopped	31-Jul-2012 22:00:00					
Date Logger on Bottom	01-Aug-2012					
Time Logger on Bottom	08:15:00					
Source RMF	Pressed					
RMC	Calculated					
RM @ Meas Temp (ohm.m@degF)	1.94 @ 73.6					
RMF @ Meas Temp (ohm.m@degF)	1.89 @ 73.7					
RMC @ Meas Temp (ohm.m@degF)	2.43 @ 73.6					

RM @ BHT (ohm.m@degF)	0.67 @ 227.1					
RMF @ BHT (ohm.m@degF)	0.65 @ 227.1					
RMC @ BHT (ohm.m@degF)	0.84 @ 227.1					
Total Solid (%)						
High Gravity Solids (%)						

Remarks and Equipment Summary

1: Toolstring				1: Remarks
Equip name LEH-QT LEH-QT	Length 66.79	MP name	Offset	This is the first run in hole and primary depth reference.
				Tool run as per tool sketch.
				Data may be affected by hole rugosity.
DTC-H ECH-KC DTC-H	63.87	CTEM HV	62.97 0.00	Matrix: Limestone 2.71
		TelStatus ToolStatus	60.87 60.87	Crew: Derrick Hunter, Jake Jump
A DT-C HECH-KDB ADC-C ADSC ADP-C	60.87			
		S11 Probe Pad Caliper	52.01 51.91 51.53	
HNGS-BA :347 HEH-K:347 HNGS-BA :347	49.34			
		GR	46.35	
HNGC-B:605 HNGH-A :4089 HNGC-B:605	41.15			
		Tel Status	39.4	
HGNS-B HGNH NSR-F :2554 NPV-N HMCA-B HGNS-B HACCZ-B:452	37.65	Temperatur e GR	37.62 36.91	
		CNL Porosit	30.57	



Depth Summary

Depth Control Parameters	1		
Conveyance Type	Wireline		
Rig Type	Top Drive		
Depth Measuring Device	1		
Type	IDW-B		
Wheel Correction 1	1		
Wheel Correction 2	0		
Tension Device	1		
Type	CMTD-B/A		

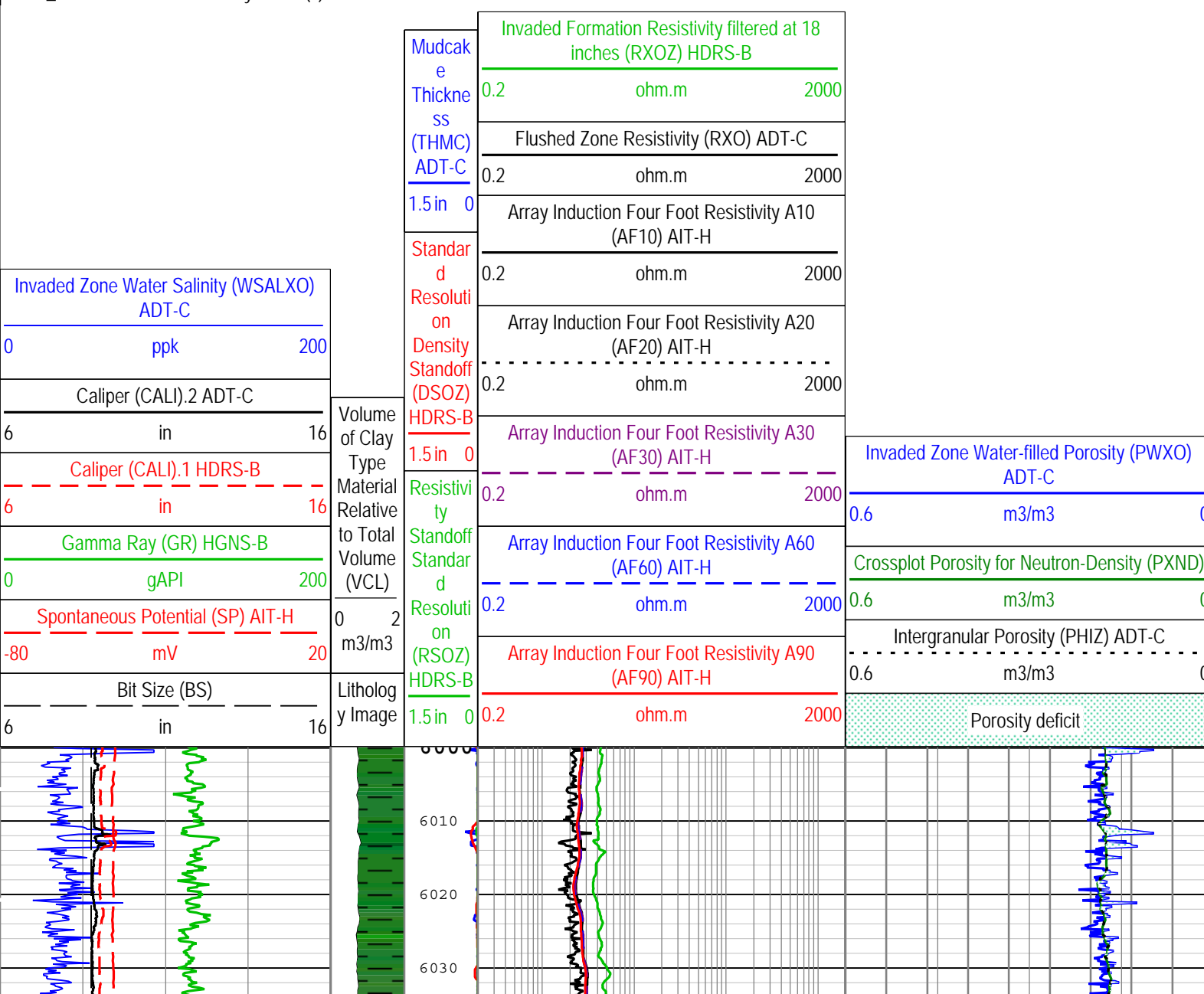
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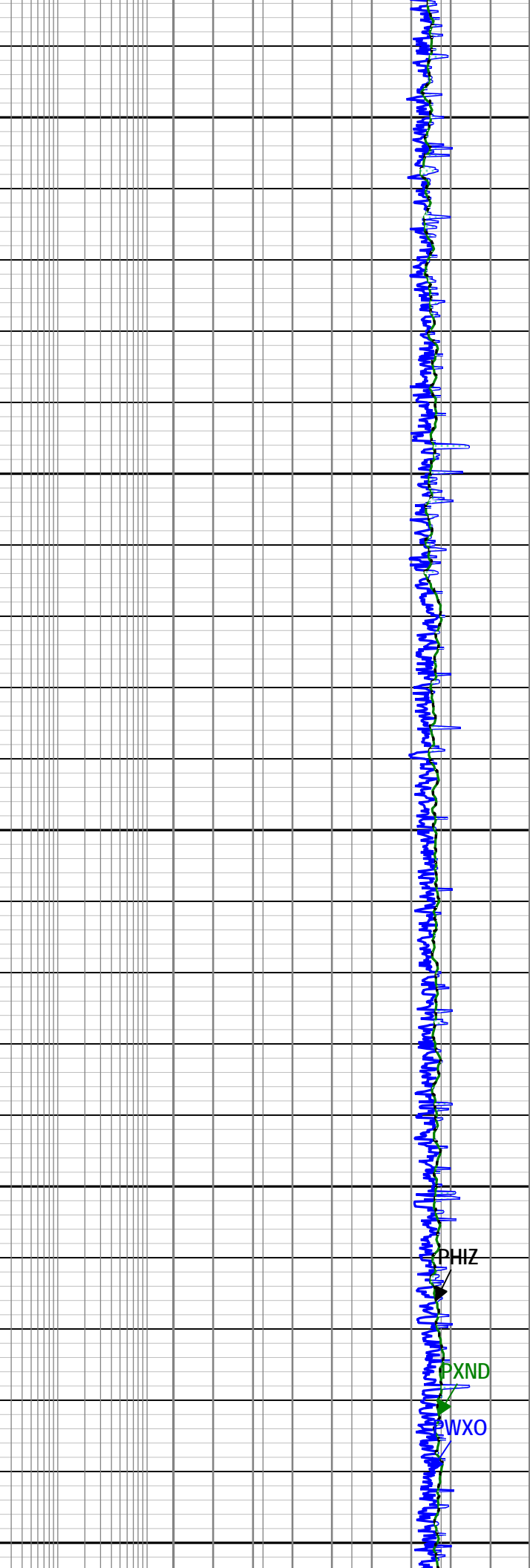
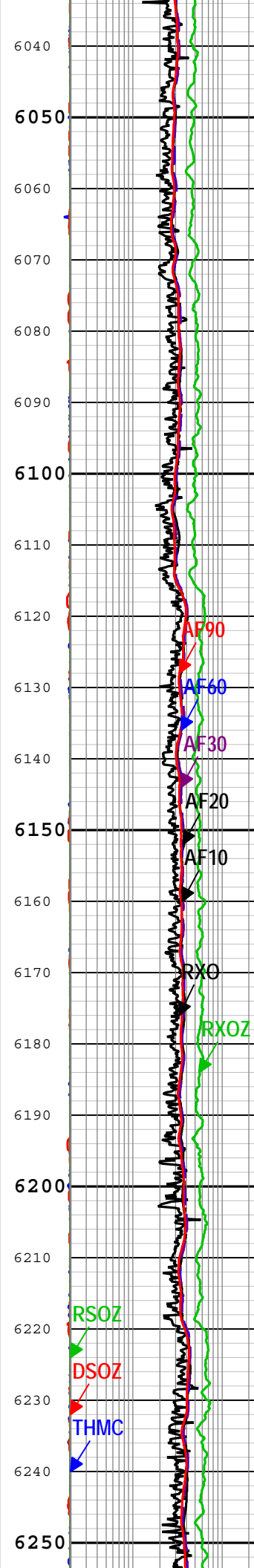
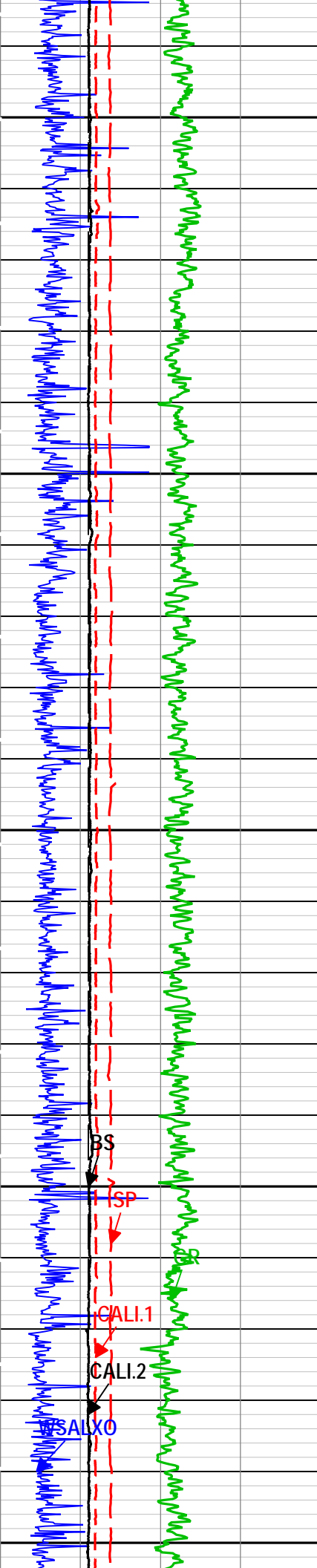
Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
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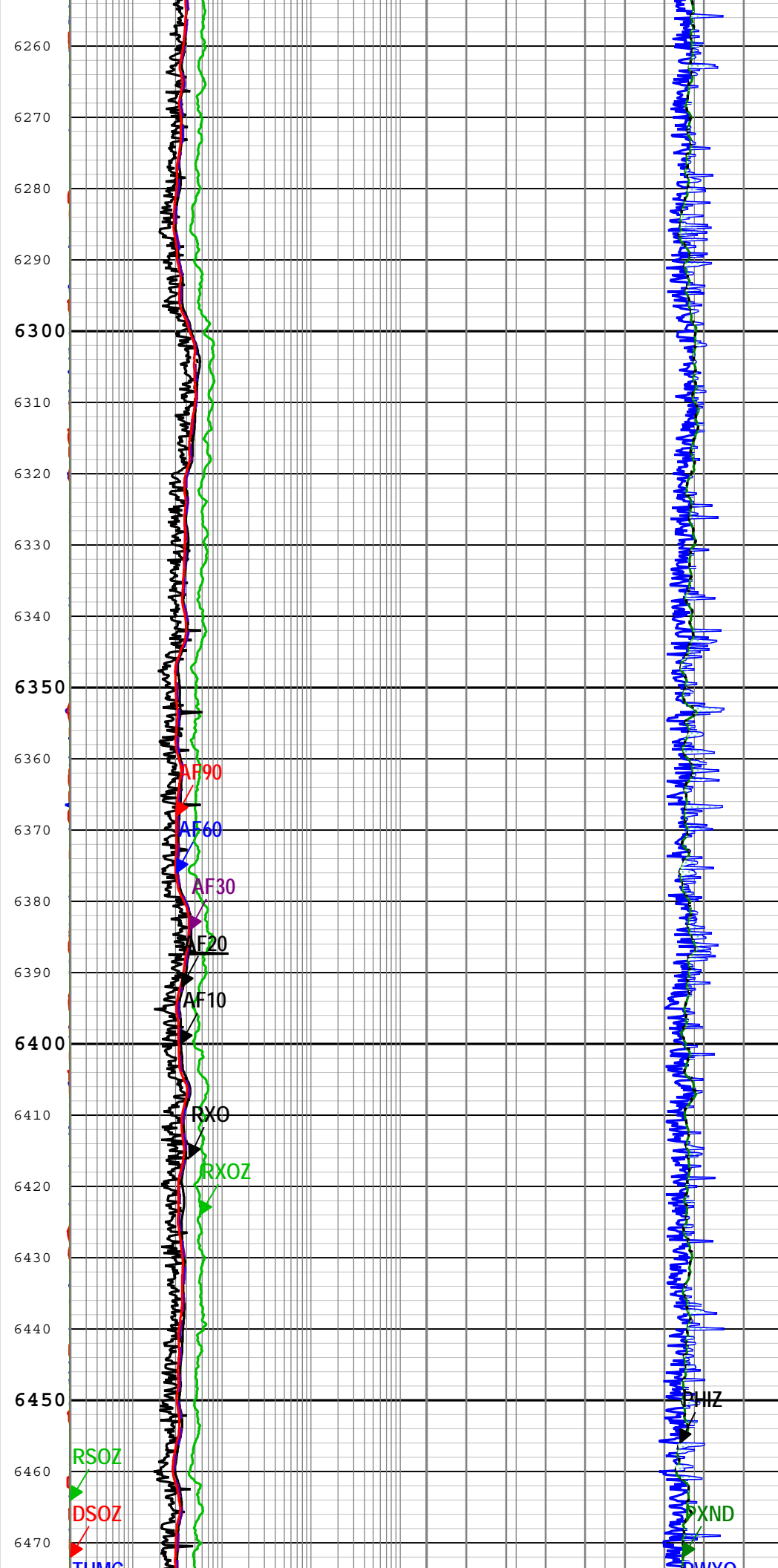
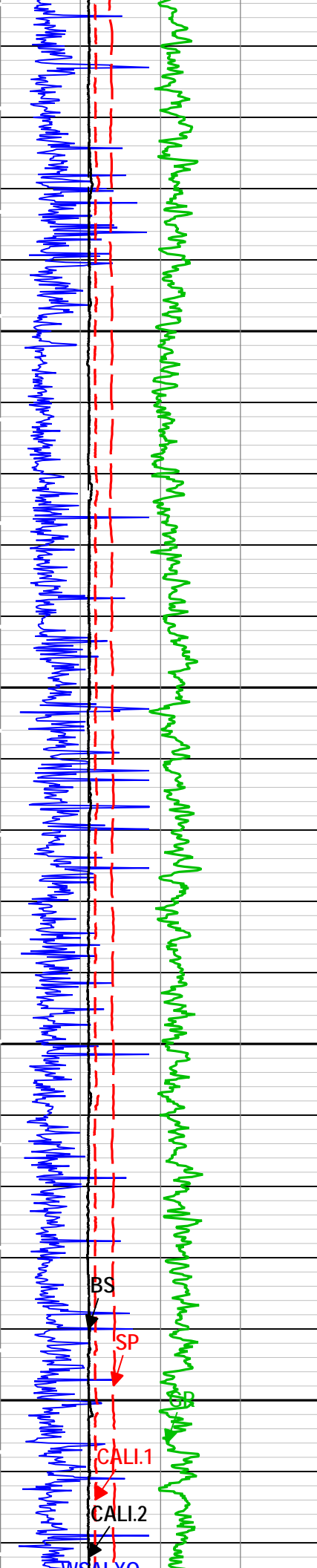
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
1	Log[3]:Up	Up	58.08 ft	8930.71 ft	01-Aug-2012 8:13:39 AM	01-Aug-2012 1:23:11 PM	0.00 ft	

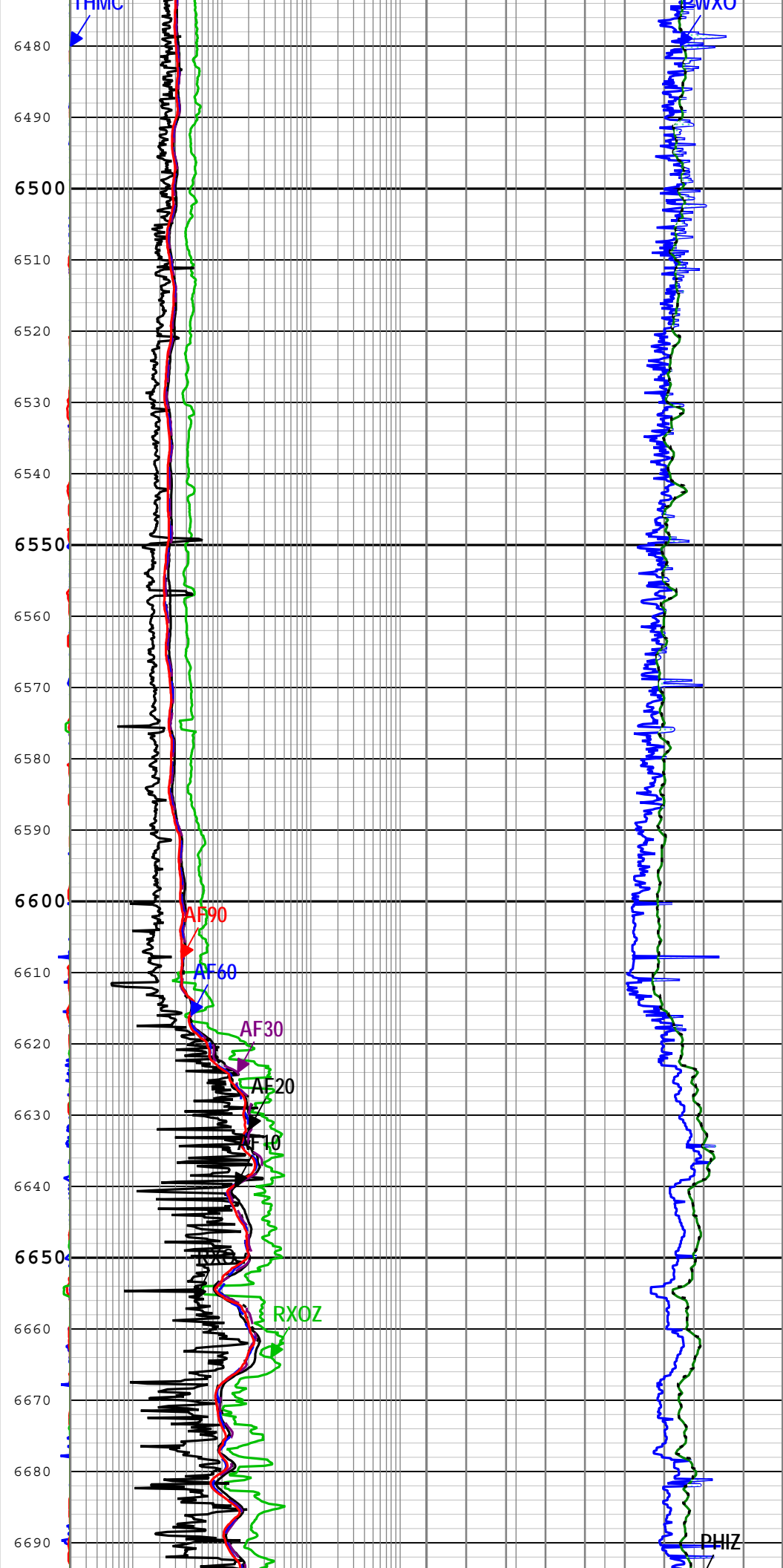
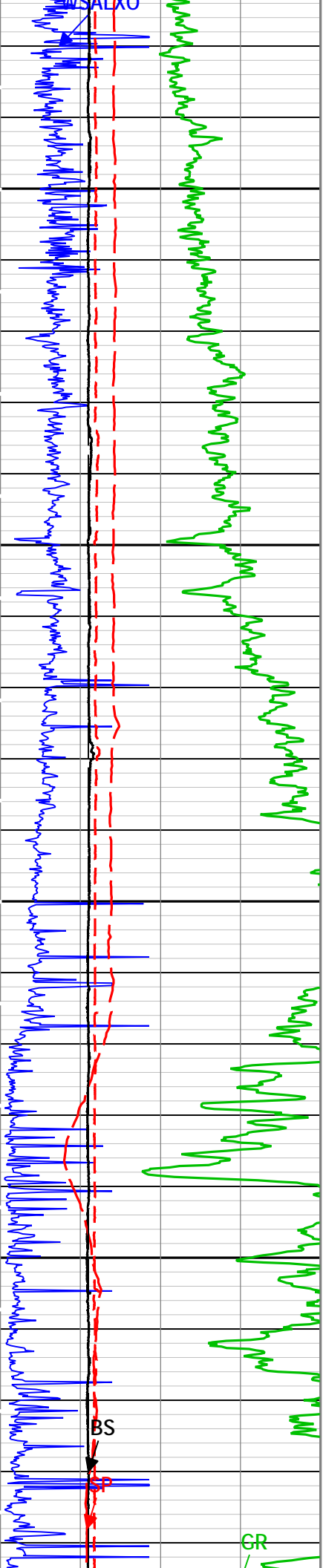
Log 1: Log[3]:Up

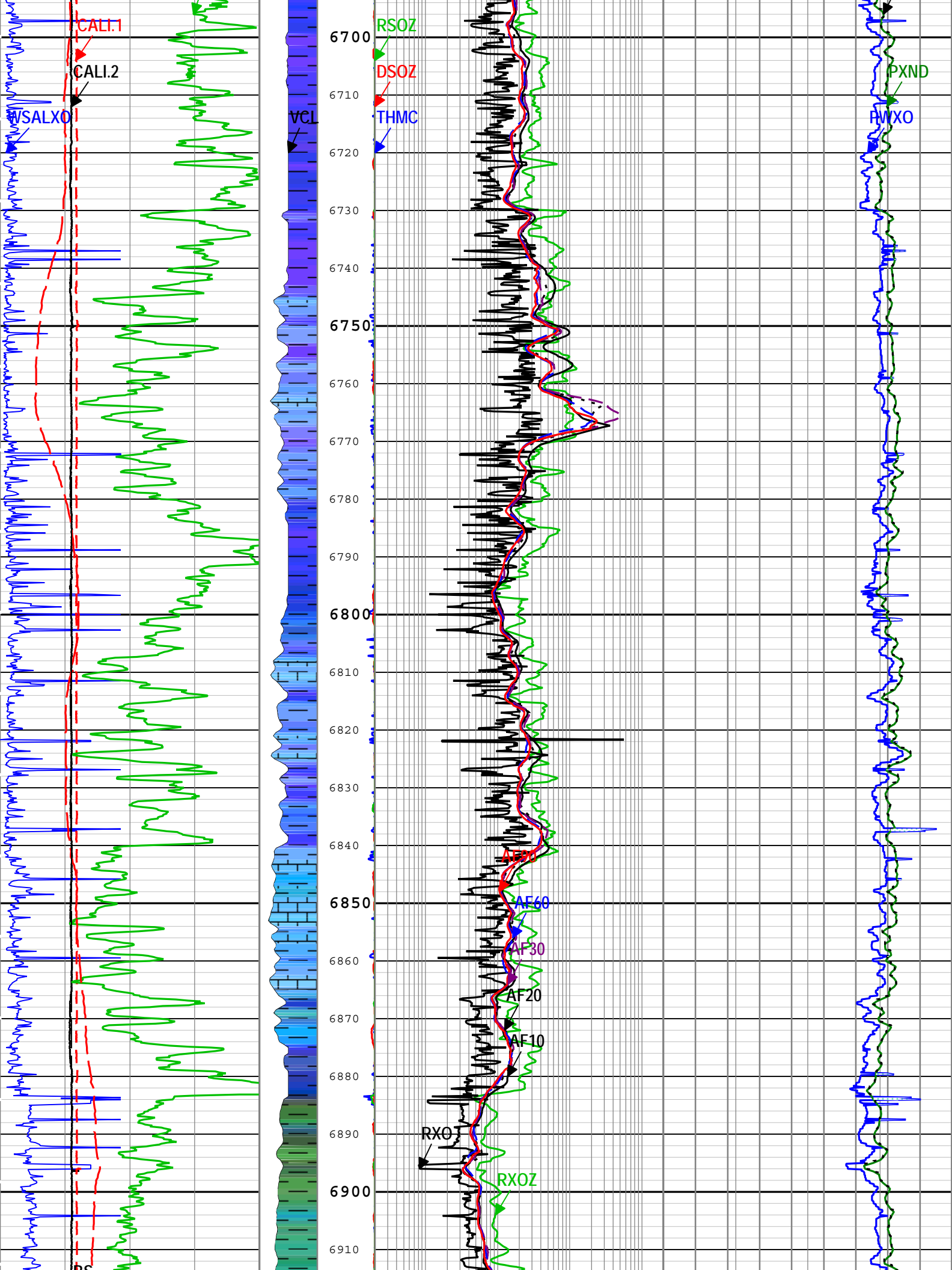
TIME_1900 - Time Marked every 60.00 (s)

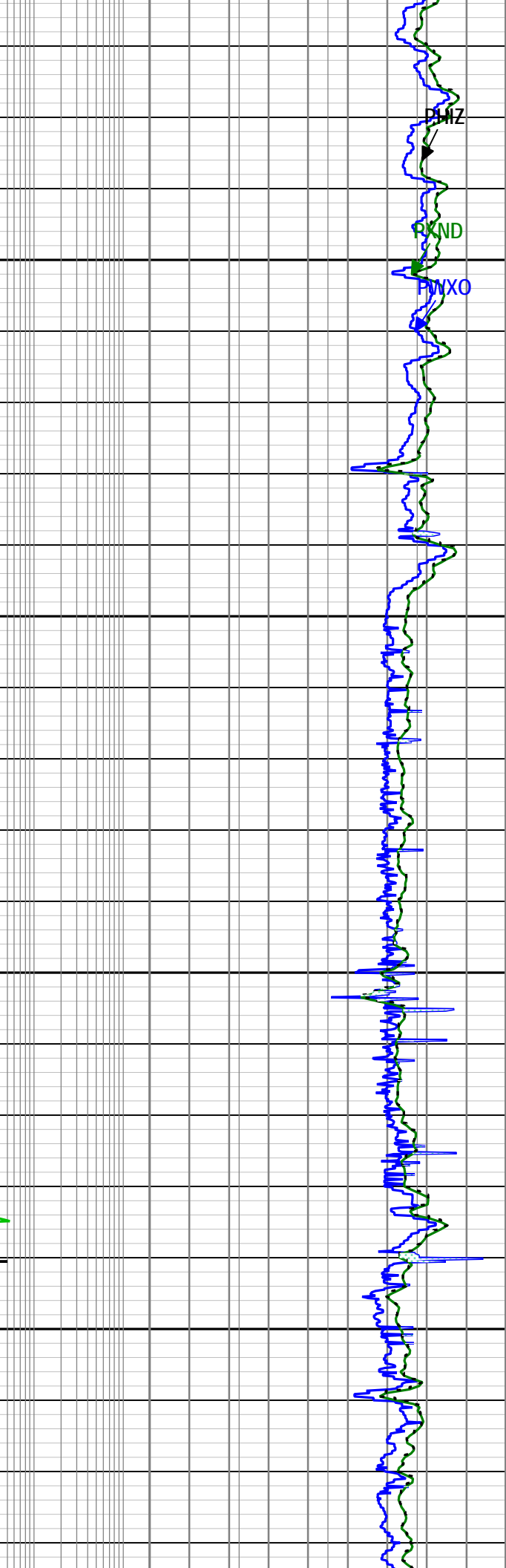
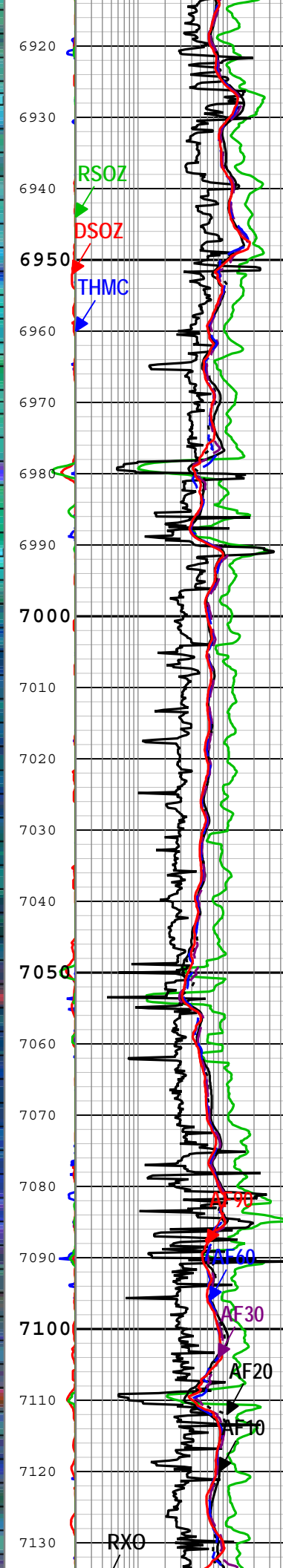
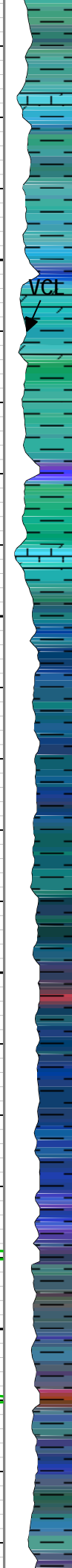
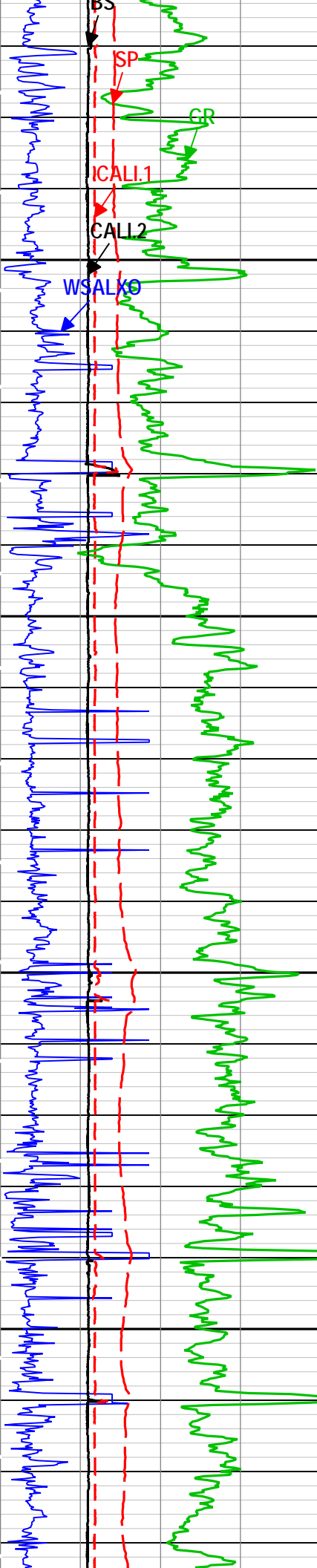


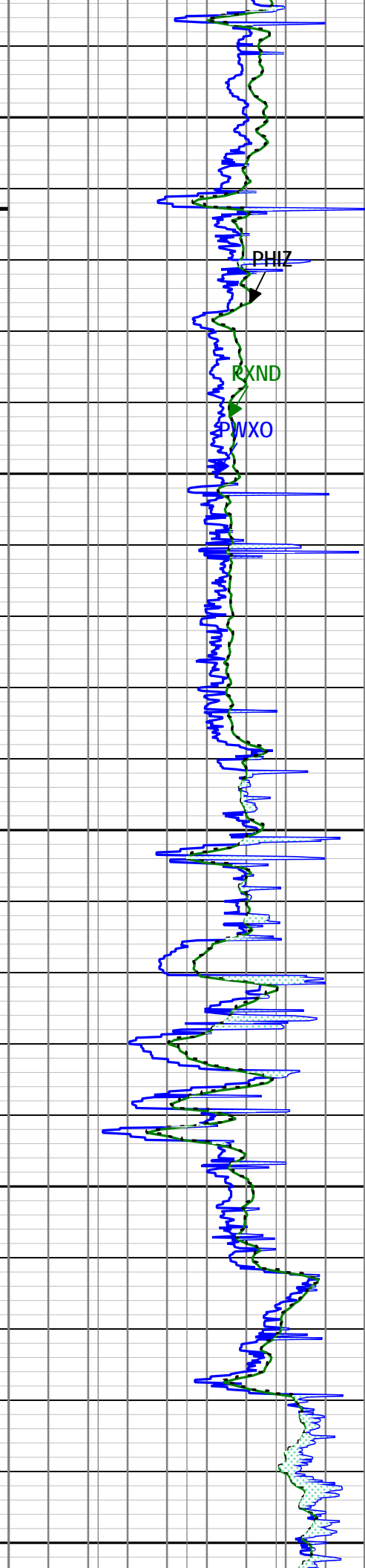
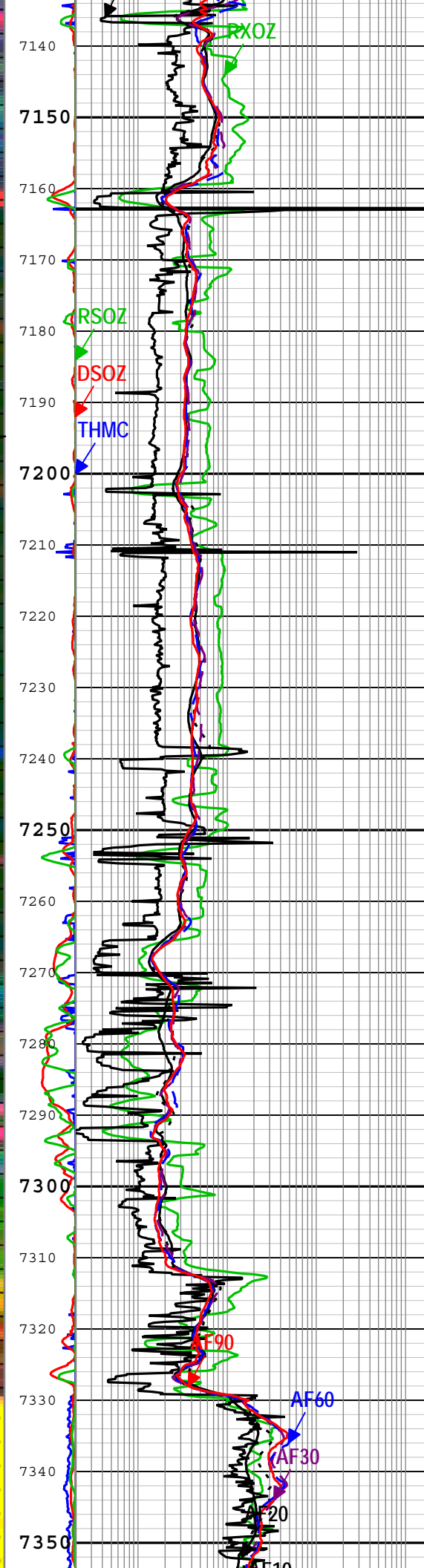
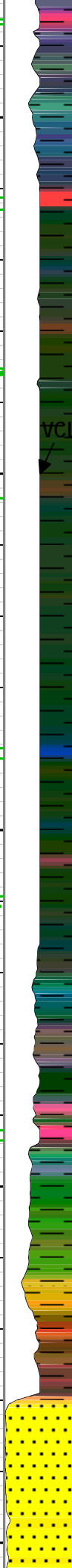
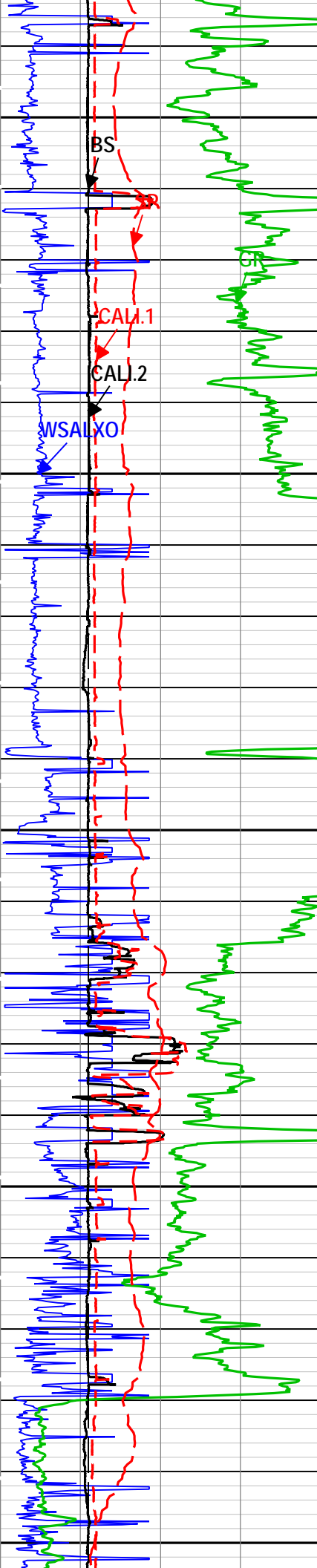


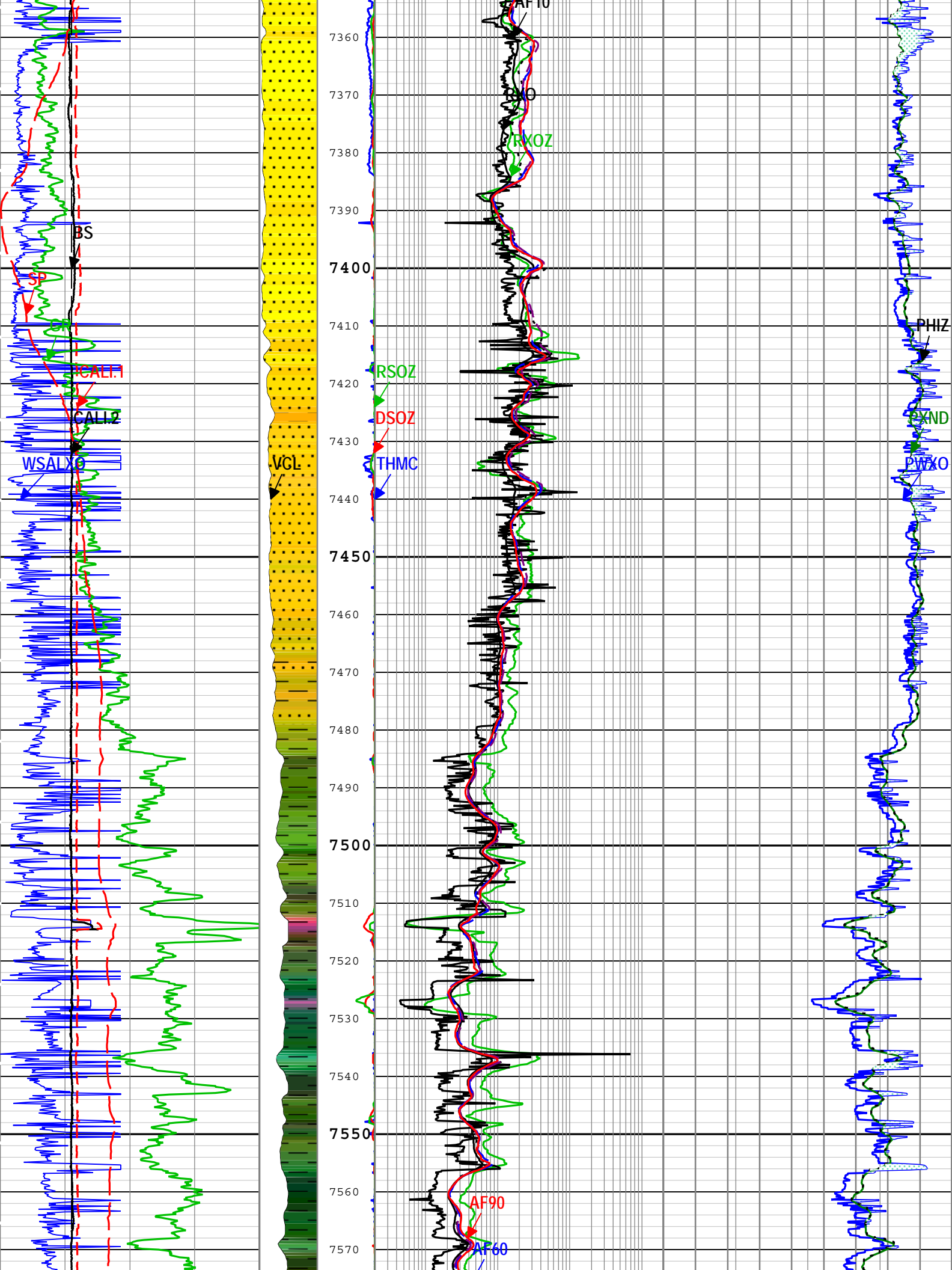


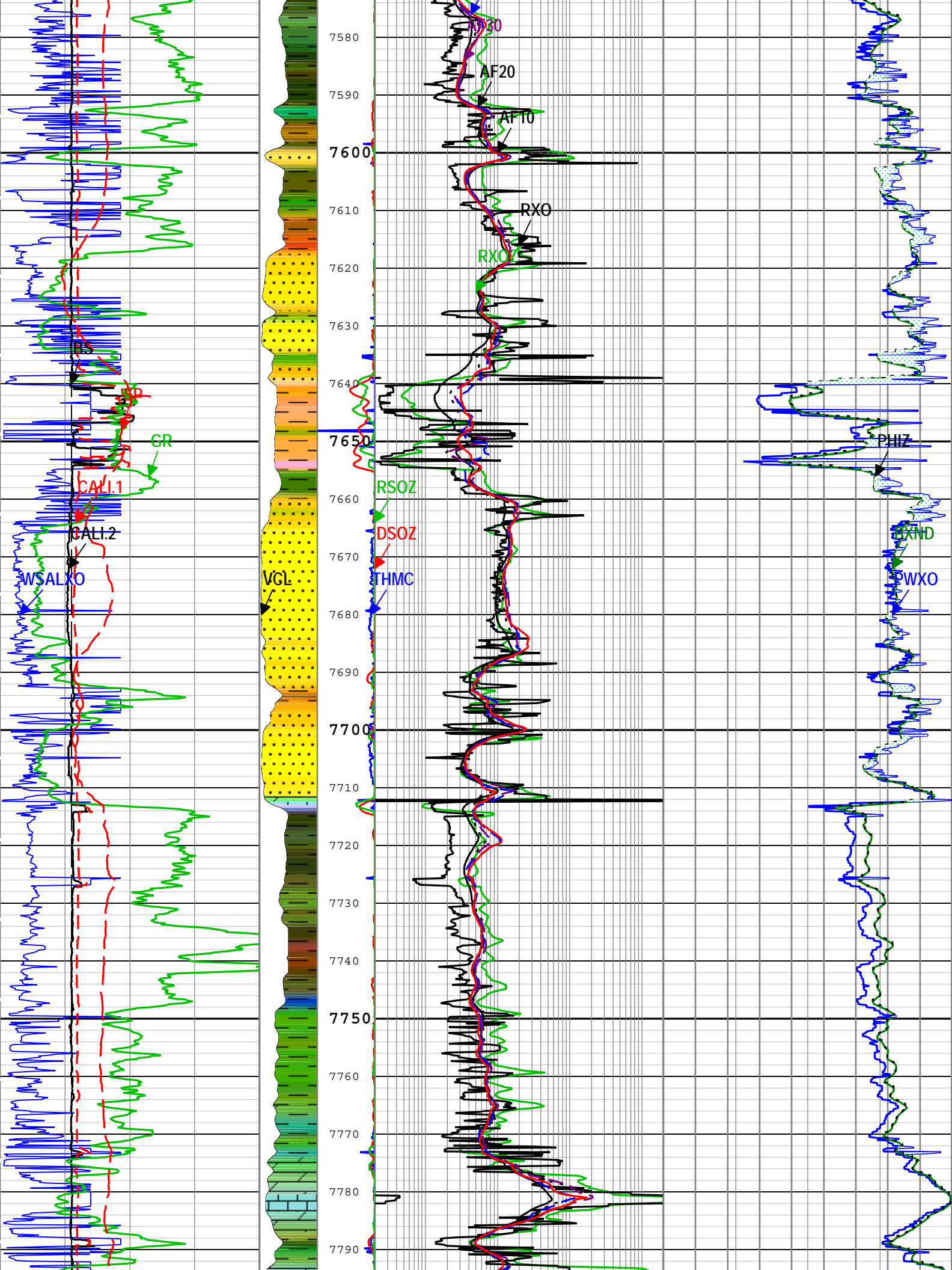


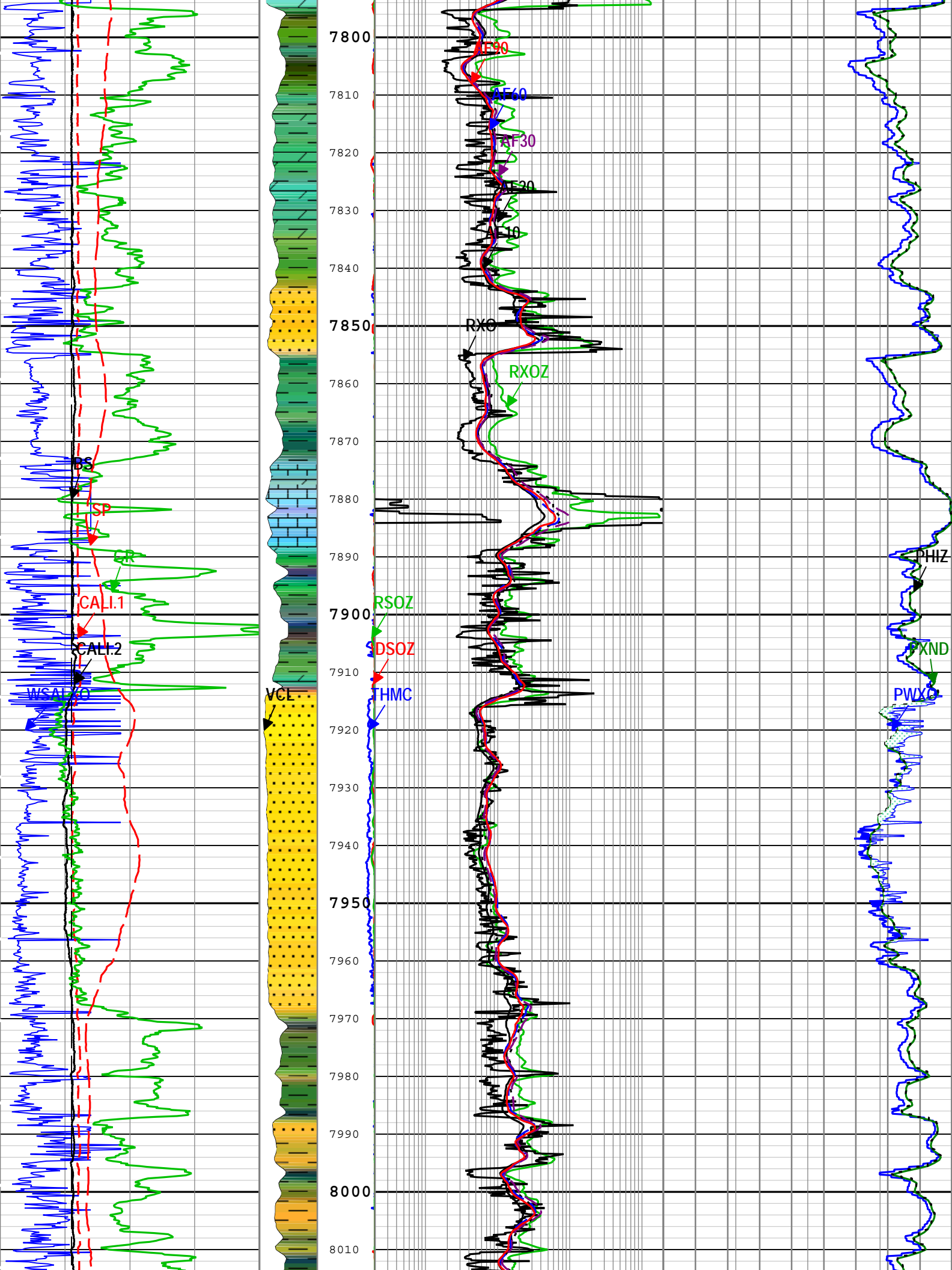


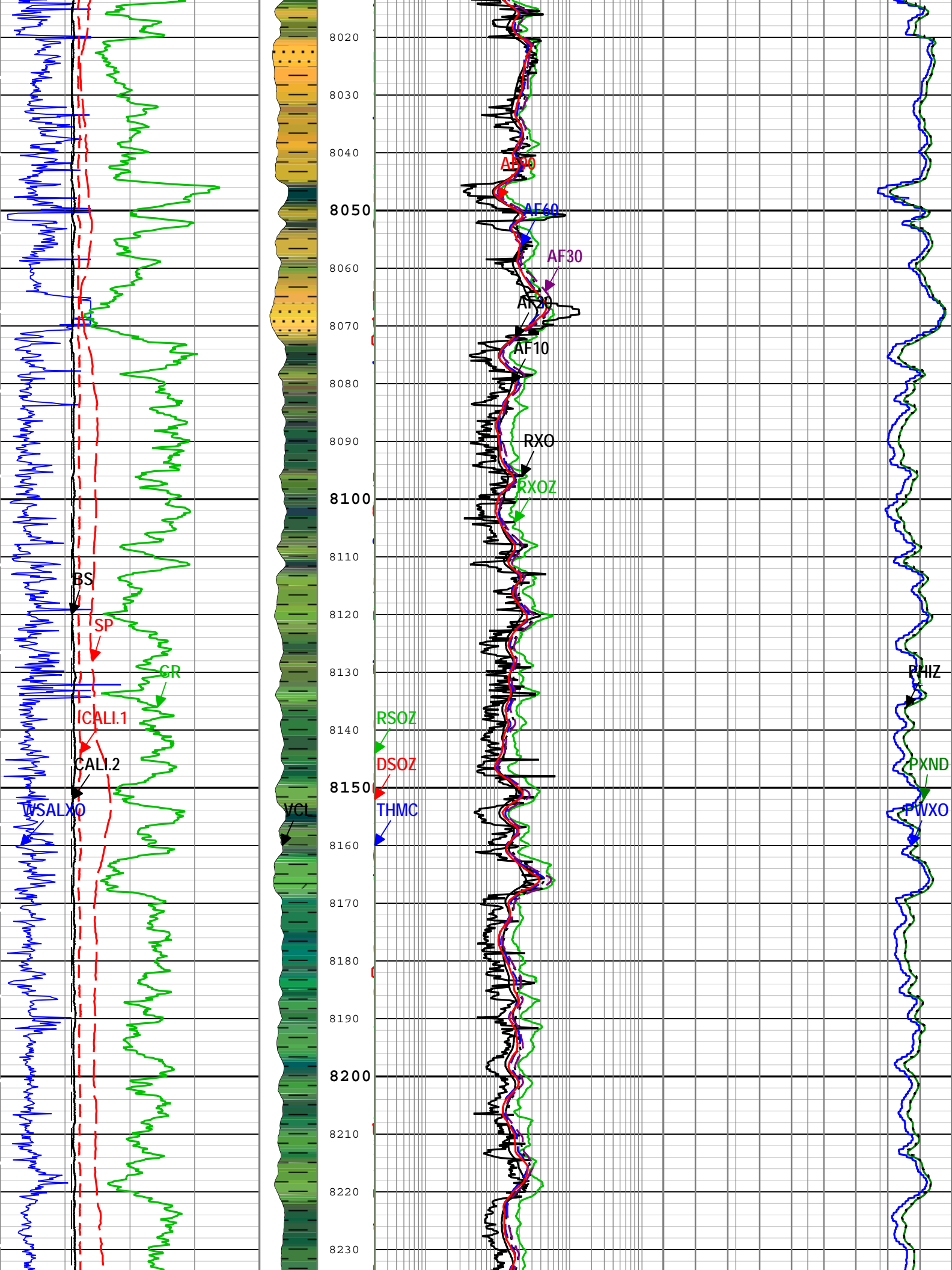


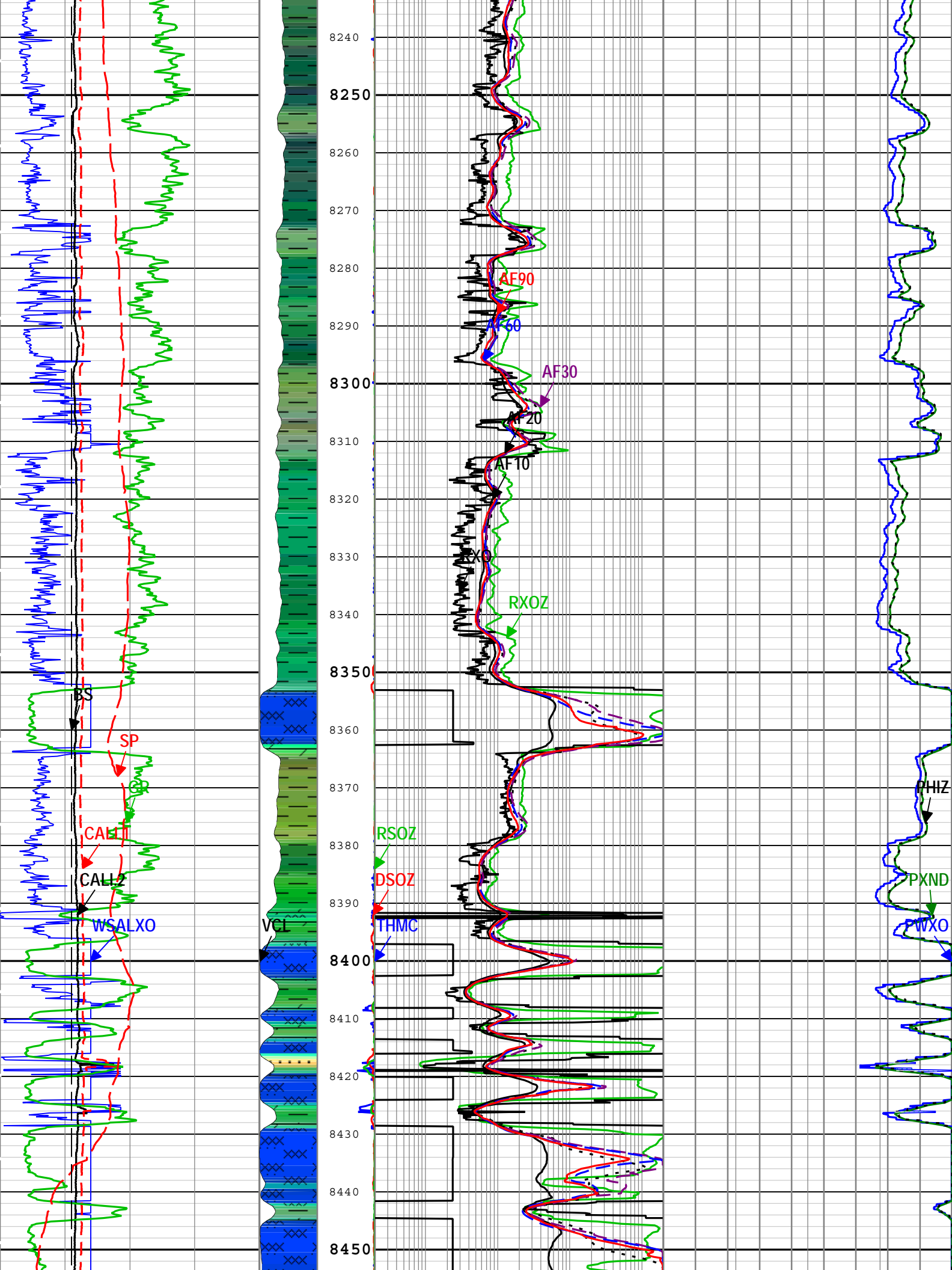


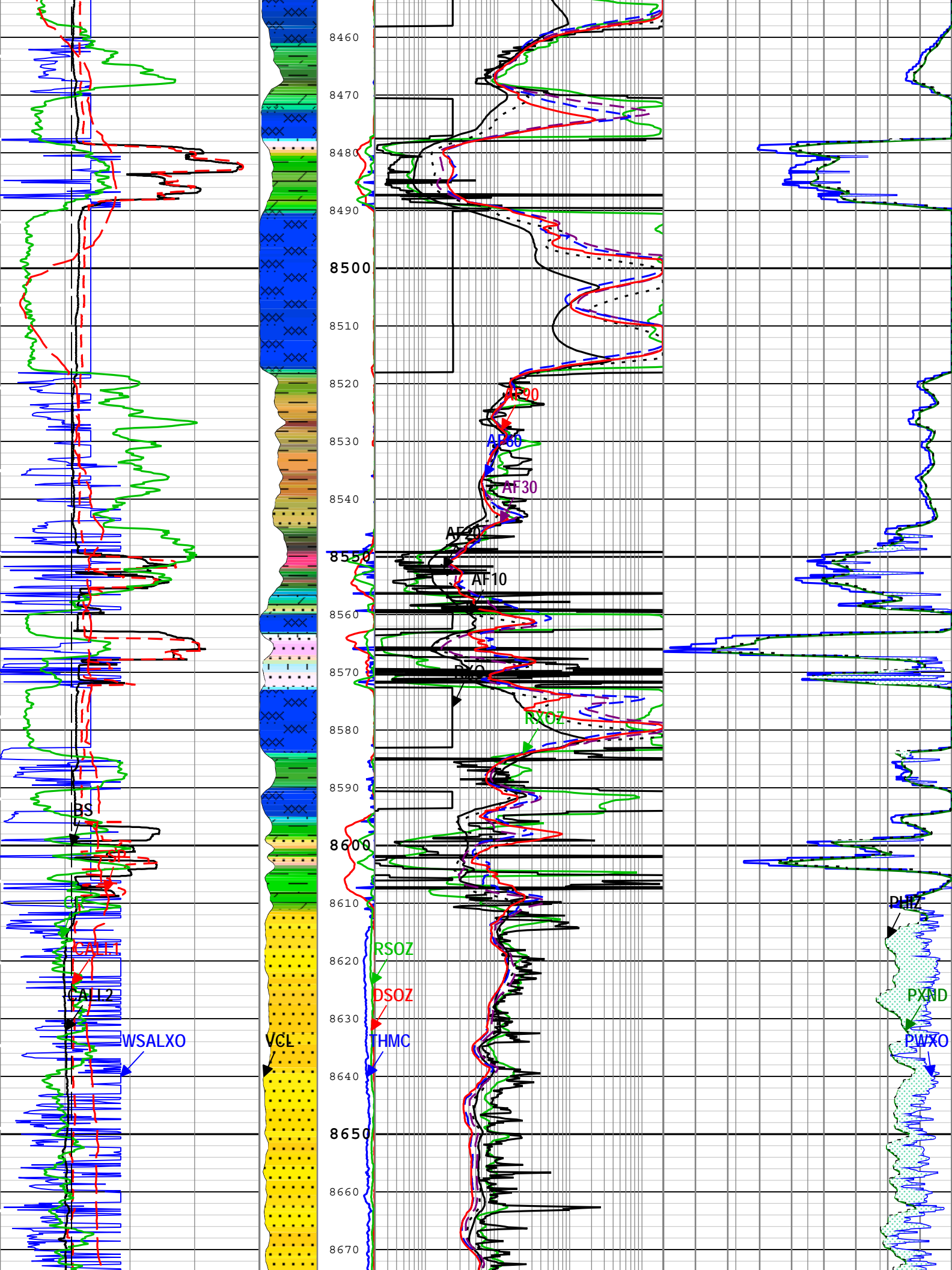


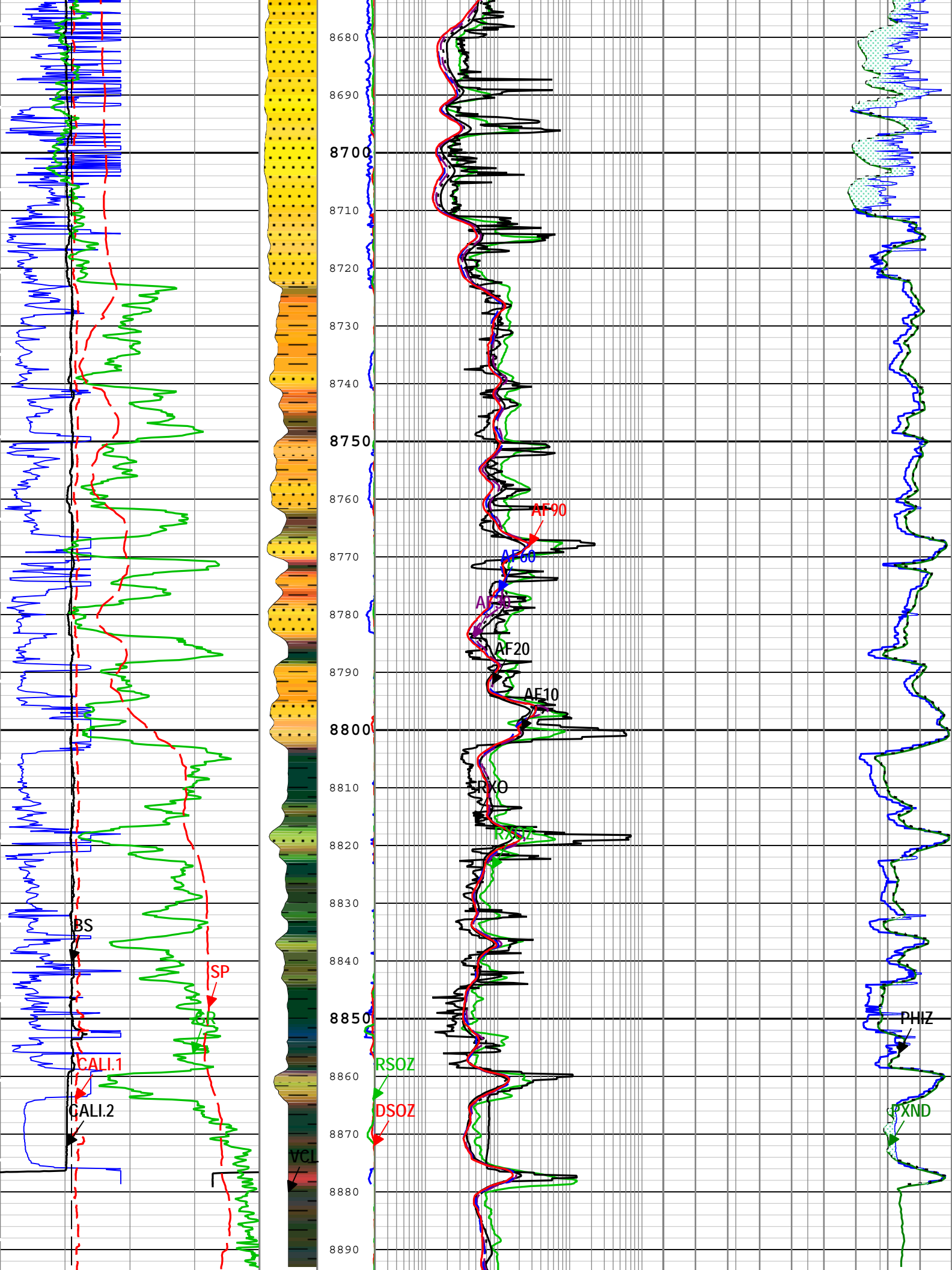


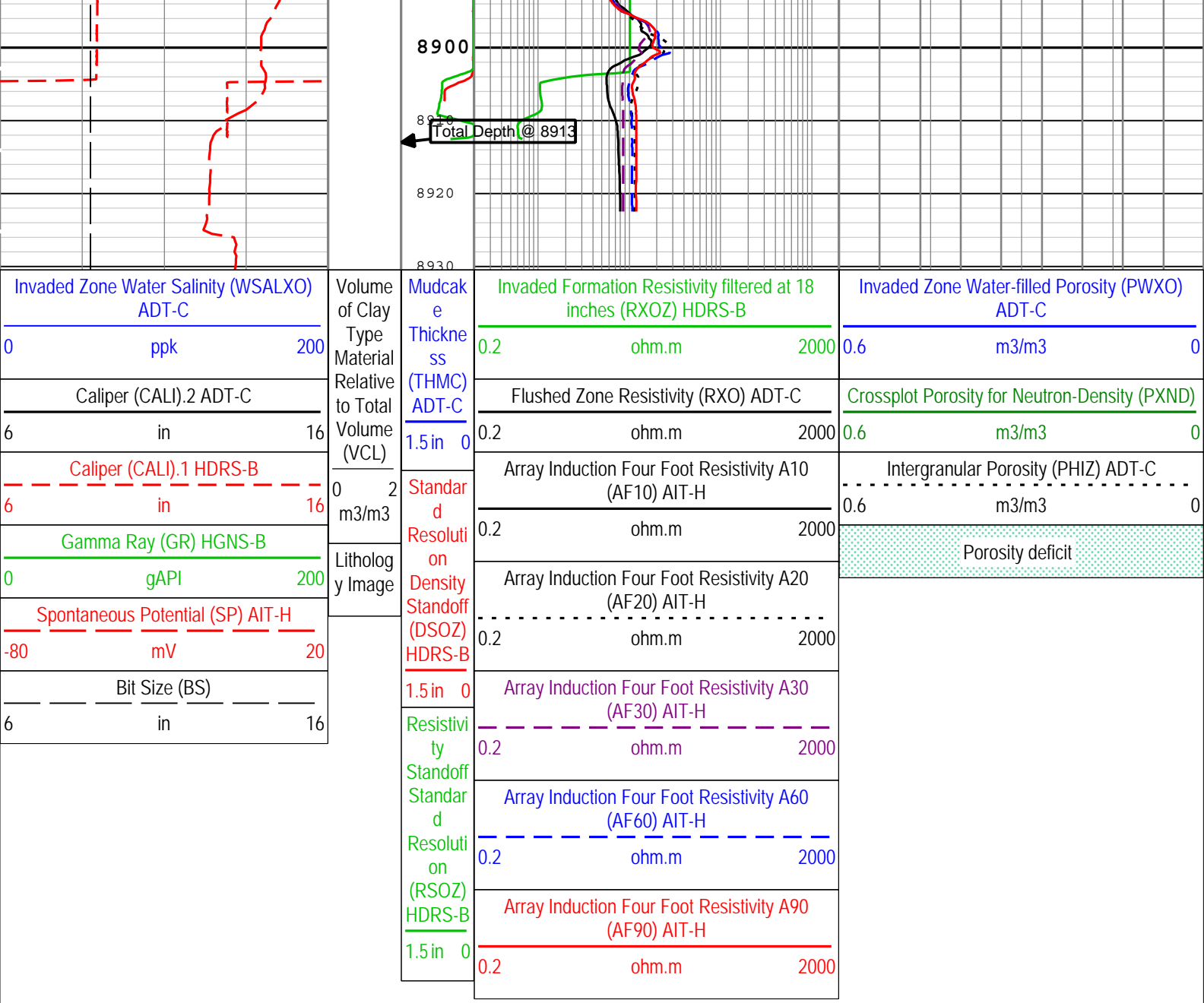












TIME_1900 - Time Marked every 60.00 (s)

Description: ADT Answer Products Presentation Format: Log (ADT Answer_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 01-Aug-2012 16:08:25

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
ABLM	Array Induction Basic Logs Mode	AIT-H	Normal	
ACDE	Array Induction Casing Detection Enable	AIT-H	No	
ASTA	Array Induction Tool Standoff	AIT-H	1	in
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	1000	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-B	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	754	ft
CDEN	Cement Density	HGNS-B	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Fresh Water	

DHC	Density Hole Correction	HDRS-B	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-B	Yes	
M	Exponent M of the Archie Formation Factor - Porosity Equation	Borehole	2	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	73.7	degF
N	N Exponent in SW Formula	Borehole	2	
NPRM	HRDD Nuclear Processing Mode	HDRS-B	High Resolution	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	1.89	ohm.m
RW	Connate Water Resistivity	Borehole	1	ohm.m
SOCO	Standoff Correction Option	HGNS-B	Yes	
SPDR	SP Drift Per Foot	AIT-H	0	mV/ft
TWS	Connate Water Temperature	Borehole	68	degF


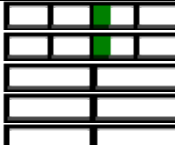


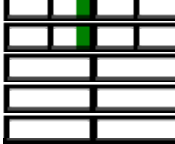
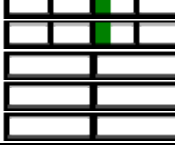

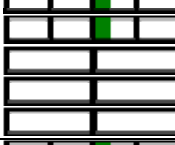



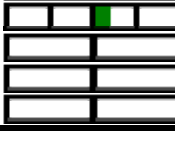
Tool Control Parameters				
Parameter	Description	Tool	Value	Unit
ACQRESOLUTION	Acquisition Depth Resolution	ADT-C	ZP2_INCH_OPTIMIZED_FO R_0900_FPH	
HMCA_BRD_TYPE	HMCA Board Type	HGNS-B	0	
HRGD_BRD_TYPE	HRGD Board Type	HDRS-B	WITHOUT_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	900	ft/h
STSO_HRDD	Temperature Source for the Density Algorithm	HDRS-B	Decaytime algorithm	

Calibration Report			
AIT-H (Array Induction Tool - H) Calibration - Run 1			
Primary Equipment :			
Array Induction Sonde - H	AHIS	0	
Auxiliary Equipment :			
AITH Rm/SP Bottom Nose	AHRM		

AIT Sonde Calibration - Test Loop Gain							
Master (EEPROM):		00:19:39 12-May-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Test Loop Gain - 0		Master	1.000	0.950	1.033	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 0	deg	Master	0	-3.000	-2.386	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 1		Master	1.000	0.950	1.015	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 1	deg	Master	0	-3.000	-2.995	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 2		Master	1.000	0.950	1.025	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 2	deg	Master	0	-3.000	-0.471	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 3		Master	1.000	0.950	1.017	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 3	deg	Master	0	-3.000	1.700	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 4		Master	1.000	0.950	1.000	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 4	deg	Master	0	-3.000	1.712	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 5		Master	1.000	0.950	0.988	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 5	deg	Master	0	-3.000	0.302	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 6		Master	1.000	0.950	0.995	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 6	deg	Master	0	-3.000	0.488	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Gain - 7		Master	1.000	0.950	0.991	1.050	<div><div></div><div></div><div></div><div></div><div></div></div>
Test Loop Phase - 7	deg	Master	0	-3.000	-0.138	3.000	<div><div></div><div></div><div></div><div></div><div></div></div>

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		00:19:39 12-May-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-103.990	119.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-400.437	2250.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	179.469	204.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 1		Master	-----	-625.000	-101.430	625.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	105.845	156.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 2		Master	-----	-350.000	-125.620	350.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	60.290	89.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 3		Master	-----	-250.000	69.692	250.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	25.327	35.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 4		Master	-----	-63.000	-41.419	63.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	11.614	24.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 5		Master	-----	-50.000	5.348	50.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	8.715	15.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 6		Master	-----	-30.000	-7.499	30.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-2.017	5.000	<div><div></div><div></div><div></div><div></div></div>
Sonde Error Correction Quad - 7		Master	-----	-30.000	-6.156	30.000	<div><div></div><div></div><div></div><div></div></div>
AIT Mud Calibration - Mud Calibration Gain							
Master (EEPROM):		00:19:39 12-May-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Coarse Gain		Master	1.000	0.800	0.940	1.200	<div><div></div><div></div><div></div><div></div></div>
Fine Gain		Master	1.000	0.800	0.928	1.200	<div><div></div><div></div><div></div><div></div></div>
AIT Electronics Check - Thru Calibration Check							
Master (EEPROM):		00:19:39 12-May-2012	Before (Measured):	20:51:38 31-Jul-2012	After:		
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Thru Cal Mag - 0	V	Master	-----	0.363	0.616	0.847	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.363	0.624	0.847	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.008	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 0	deg	Master	-----	11.000	72.849	131.000	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	11.000	72.922	131.000	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.073	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 1	V	Master	-----	0.762	1.260	1.778	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.762	1.276	1.778	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.016	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 1	deg	Master	-----	10.000	71.746	130.000	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	10.000	71.805	130.000	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.059	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 2	V	Master	-----	0.374	0.629	0.872	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.374	0.637	0.872	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.008	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	-----	6.000	68.021	126.000	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	6.000	68.054	126.000	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.033	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 3	V	Master	-----	0.422	0.711	0.986	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	0.422	0.720	0.986	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.009	-----	<div><div></div><div></div><div></div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master	-----	5.000	67.233	125.000	<div><div></div><div></div><div></div><div></div></div>
		Before	-----	5.000	67.264	125.000	<div><div></div><div></div><div></div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div><div></div><div></div><div></div></div>
		Before-Master	-----	-----	0.031	-----	<div><div></div><div></div><div></div><div></div></div>

Thru Cal Mag - 4	V	After-Before	----	----	----	----	
		Master	----	0.802	1.324	1.872	
		Before	----	0.802	1.341	1.872	
		After	----	----	----	----	
		Before-Master	----	----	0.017	----	
Thru Cal Phase - 4	deg	After-Before	----	----	----	----	
		Master	----	-1.000	60.986	119.000	
		Before	----	-1.000	60.963	119.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.023	----	
Thru Cal Mag - 5	V	After-Before	----	----	----	----	
		Master	----	1.173	1.929	2.737	
		Before	----	1.173	1.953	2.737	
		After	----	----	----	----	
		Before-Master	----	----	0.024	----	
Thru Cal Phase - 5	deg	After-Before	----	----	----	----	
		Master	----	-3.000	59.101	117.000	
		Before	----	-3.000	59.042	117.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.059	----	
Thru Cal Mag - 6	V	After-Before	----	----	----	----	
		Master	----	1.173	1.928	2.737	
		Before	----	1.173	1.952	2.737	
		After	----	----	----	----	
		Before-Master	----	----	0.024	----	
Thru Cal Phase - 6	deg	After-Before	----	----	----	----	
		Master	----	-3.000	59.114	117.000	
		Before	----	-3.000	59.055	117.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.059	----	
Thru Cal Mag - 7	V	After-Before	----	----	----	----	
		Master	----	0.849	1.379	1.981	
		Before	----	0.849	1.393	1.981	
		After	----	----	----	----	
		Before-Master	----	----	0.014	----	
Thru Cal Phase - 7	deg	After-Before	----	----	----	----	
		Master	----	-7.000	55.741	113.000	
		Before	----	-7.000	55.363	113.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.378	----	
SPA Zero	mV	After-Before	----	----	----	----	
		Master		-50.000	0.052	50.000	
		Before		-50.000	0.095	50.000	
		After	----	----	----	----	
		Before-Master	----	----	0.043	----	
SPA Plus	mV	After-Before	----	----	----	----	
		Master		941.000	993.937	1040.000	
		Before		941.000	993.050	1040.000	
		After	----	----	----	----	
		Before-Master	----	----	-0.887	----	
Temperature Zero	V	After-Before	----	----	----	----	
		Master		-0.050	0.000	0.050	
		Before		-0.050	0.000	0.050	
		After	----	----	----	----	
		Before-Master	----	----	0.000	----	
Temperature Plus	V	After-Before	----	----	----	----	
		Master		0.870	0.921	0.960	
		Before		0.870	0.920	0.960	
		After	----	----	----	----	
		Before-Master	----	----	-0.001	----	

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5471
HILT High-Resolution Control Cartridge, 125 degC	HRCC-B	
HILT High-Resolution Mechanical Sonde, 125 degC	HRMS-B	

Calibration Parameter :

Small Ring Size (Caliper Calibration Small Ring)	6.00
Large Ring Size (Caliper Calibration Large Ring)	12.00

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 21:09:42 31-Jul-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	6.00	4.50	7.09	7.50	
Large Ring	in	Before	12.00	9.00	13.50	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 16:10:40 12-Jul-2012

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	2.561	2.670	
Pe Magnesium		Master	2.650	2.550	2.636	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 16:10:40 12-Jul-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Average Deviation	%	Master	0	-0.6000	0.4249	0.6000	
BS Max Deviation	%	Master	0	-1.6000	0.9113	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.1710	1.0000	
SS Max Deviation	%	Master	0	-2.5000	0.7045	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.4102	1.5000	
LS Max Deviation	%	Master	0	-3.5000	1.0564	3.5000	

HDRS Density Calibration - Background Summary

Master (EEPROM): 16:10:40 12-Jul-2012 Before (Measured): 20:53:02 31-Jul-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master Before Before-Master	1.0000 0.7304 -----	 0.6939 -----	0.7304 0.7301 -0.0003	 0.7669 -----	
BS Window Sum	1/s	Master Before Before-Master	1 9378 -----	 8909 -----	9378 9359 -19	 9847 -----	
SS Window Ratio		Master Before Before-Master	1.0000 0.4771 -----	 0.4532 -----	0.4771 0.4756 -0.0015	 0.5009 -----	
SS Window Sum	1/s	Master Before Before-Master	1 9280 -----	 8816 -----	9280 9257 -23	 9744 -----	
LS Window Ratio		Master Before Before-Master	1.0000 0.2922 -----	 0.2776 -----	0.2922 0.2888 -0.0034	 0.3068 -----	
LS Window Sum	1/s	Master Before Before-Master	1 1025 -----	 973 -----	1025 1016 -9	 1076 -----	

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 16:10:40 12-Jul-2012 Before (Measured): 20:53:02 31-Jul-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master Before Before-Master	 -----	1000 1000 -100	1687 1688 1	2400 2400 100	
SS PM High Voltage	V	Master Before	 	1000 1000	1448 1454	2400 2400	

		Before-Master	-----	-100	6	100	
LS PM High Voltage	V	Master		1000	1529	2400	
		Before		1000	1528	2400	
		Before-Master	-----	-100	-1	100	

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM):		16:10:40 12-Jul-2012		Before (Measured):		20:53:02 31-Jul-2012	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crystal Resolution	%	Master		5.00	11.73	25.00	
		Before		5.00	11.74	25.00	
		Before-Master	-----	-1.00	0.01	1.00	
SS Crystal Resolution	%	Master		5.00	9.92	20.00	
		Before		5.00	10.01	20.00	
		Before-Master	-----	-1.00	0.09	1.00	
LS Crystal Resolution	%	Master		5.00	8.86	20.00	
		Before		5.00	9.00	20.00	
		Before-Master	-----	-1.00	0.14	1.00	

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured):		20:53:31 31-Jul-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	3804	4136	
Shallow Resistivity	ohm.m	Before	3830	3524	3800	4136	

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

Primary Equipment :			
HILT Gamma-Ray and Neutron Sonde, 125 degC		HGNS-B	
Auxiliary Equipment :			
HGNS Accelerometer, 125 degC		HACCZ-B	452
AmBe Neutron Logging Source		NSR-F	2554
Calibration Parameter :			
Water Temperature			
Housing Size			
JIG-BKG (Jig minus background reference)		165	

HGNS Accelerometer Calibration - Accelerometer Accumulations

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

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM):		00:00:00 15-Dec-1996					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Accelerometer Manufacturer		Master			Sunstrand		
Accelerometer Reference Temperature	degF	Master		30.2	68.0	122.0	
Accelerometer Coefficients - 0		Master	-----	-----	51.000	-----	
Accelerometer Coefficients - 1		Master	-----	-----	11.800	-----	
Accelerometer Coefficients - 2		Master	-----	-----	0.011	-----	
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 4		Master	-----	-----	2.182	-----	
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----	
Accelerometer Coefficients - 8		Master	-----	-----	293.400	-----	
Accelerometer Coefficients - 9		Master	-----	-----	0.997	-----	

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM):		13:39:40 31-May-2012		Before (Measured):		20:51:23 31-Jul-2012		After:	
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit			
Near Zero Measurement	1/s	Master	0	5.0	28.8	40.0			
		Before	0	5.0	28.4	40.0			
		After	-----	-----	-----	-----			

		Before-Master After-Before	----- -----	-4.3 -----	-0.4 -----	4.3 -----	<div><div></div></div>
Far Zero Measurement	1/s	Master	0	5.0	30.4	40.0	<div><div></div></div>
		Before	0	5.0	31.6	40.0	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-4.6	1.2	4.6	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5681.0	6900.0	<div><div></div></div>
		Before	-----	-----	-----	-----	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2423.0	2900.0	<div><div></div></div>
		Before	-----	-----	-----	-----	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
Near Corrected Plus Measurement - 0	1/s	Master		4700.0	5618.0	6900.0	<div><div></div></div>
		Before	-----	-----	-----	-----	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
Far Corrected Plus Measurement - 0	1/s	Master		1900.0	2366.0	2900.0	<div><div></div></div>
		Before	-----	-----	-----	-----	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 20:57:32 31-Jul-2012		After:					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
RGR Zero Measurement	gAPI	Before	30.0	0	78.5	120.0	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
RGR Plus Measurement	gAPI	Before	185.4	157.1	176.2	206.3	<div><div></div></div>
		After	-----	-----	NOT DONE	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
GR Calibration Gain		Before	0.89	0.80	0.94	1.05	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>

HNGS-BA (Hostile-environment Natural Gamma-ray Sonde) Calibration - Run 1

Primary Equipment :					
	HNGS Sonde Element		HNGS-BA		347
Auxiliary Equipment :					
	Hostile Natural Gamma Ray Cartridge		HNGC-B		605
	HNGS Housing Element		HEH-K		347
					0
	Housing for the HNGC		HNGH-A		4089

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Na 511 Peak Location		Master			39.565		<div><div></div></div>
		Before	40.000	37.500	39.720	42.500	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	0.155	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
Na 511 Peak Resolution	%	Master			14.403		<div><div></div></div>
		Before	15.500	12.000	15.532	19.000	<div><div></div></div>
		After	-----	-----	-----	-----	<div><div></div></div>
		Before-Master	-----	-----	1.129	-----	<div><div></div></div>
		After-Before	-----	-----	-----	-----	<div><div></div></div>
High Voltage DAC Value	V	Master			0.000		<div><div></div></div>
		Before	1150.000	850.000	963.461	1600.000	<div><div></div></div>

		After Before-Master After-Before	----- ----- -----	----- ----- -----	----- 963.461 -----	----- ----- -----	<div><div></div></div>
Na 1785 Peak Location		Master Before After Before-Master After-Before	142.650 ----- ----- ----- -----	135.000 ----- ----- ----- -----	142.444 142.289 ----- -0.155 -----	150.300 ----- ----- ----- -----	<div><div></div></div>
Na 1785 Peak Resolution	%	Master Before After Before-Master After-Before	8.500 ----- ----- ----- -----	7.000 ----- ----- ----- -----	8.351 7.915 ----- -0.436 -----	11.000 ----- ----- ----- -----	<div><div></div></div>
Temperature	degF	Master Before After Before-Master After-Before	----- 59.900 ----- ----- -----	----- -20.002 ----- ----- -----	----- 114.401 ----- ----- -----	----- 140.000 ----- ----- -----	<div><div></div></div>
Na Count Rate	CPS	Master Before After Before-Master After-Before	45.000 45.000 ----- ----- -----	10.000 10.000 ----- ----- -----	42.745 43.524 ----- 0.779 -----	100.000 100.000 ----- ----- -----	<div><div></div></div>

HNGS Background and Na22 Set Point Determination - Detector 2 Check							
Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Na 511 Peak Location		Master Before After Before-Master After-Before	40.000 ----- ----- ----- -----	37.500 ----- ----- ----- -----	39.707 39.627 ----- -0.080 -----	42.500 ----- ----- ----- -----	<div><div></div></div>
Na 511 Peak Resolution	%	Master Before After Before-Master After-Before	15.500 ----- ----- ----- -----	12.000 ----- ----- ----- -----	15.736 16.984 ----- 1.248 -----	19.000 ----- ----- ----- -----	<div><div></div></div>
High Voltage DAC Value	V	Master Before After Before-Master After-Before	1150.000 ----- ----- ----- -----	850.000 ----- ----- ----- -----	0.000 1020.215 ----- 1020.215 -----	1600.000 ----- ----- ----- -----	<div><div></div></div>
Na 1785 Peak Location		Master Before After Before-Master After-Before	142.650 ----- ----- ----- -----	135.000 ----- ----- ----- -----	142.447 142.736 ----- 0.289 -----	150.300 ----- ----- ----- -----	<div><div></div></div>
Na 1785 Peak Resolution	%	Master Before After Before-Master After-Before	8.500 ----- ----- ----- -----	7.000 ----- ----- ----- -----	8.632 9.602 ----- 0.970 -----	11.000 ----- ----- ----- -----	<div><div></div></div>
Temperature	degF	Master Before After Before-Master After-Before	----- 59.900 ----- ----- -----	----- -20.002 ----- ----- -----	----- 114.558 ----- ----- -----	----- 140.000 ----- ----- -----	<div><div></div></div>
Na Count Rate	CPS	Master Before After Before-Master After-Before	45.000 45.000 ----- ----- -----	10.000 10.000 ----- ----- -----	42.671 43.605 ----- 0.934 -----	100.000 100.000 ----- ----- -----	<div><div></div></div>

HNGS Background and Na22 Set Point Determination - Ratio of Detector 1 to Detector 2							
Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Coincidence Count Rate Ratio		Master Before	1.000	0.950	0.000 0.999	1.050	<div><div></div></div>

		After	-----	-----	0.999	-----	
		Before-Master	-----	-----		-----	
		After-Before	-----	-----	-----	-----	

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location - 0		Master	209.630	201.000	207.865	218.250	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
Th Peak Resolution - 0	%	Master	7.000	5.000	6.840	9.000	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
Background Count Rate	CPS	Master			0.000		
		Before	142.500	10.000	216.812	265.000	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	216.812	-----	
		After-Before	-----	-----	-----	-----	
Gain Ratio - 0		Master	1.000	0.940	0.999	1.060	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location - 0		Master	209.630	201.000	211.143	218.250	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
Th Peak Resolution - 0	%	Master	7.000	5.000	7.890	9.000	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	
Background Count Rate	CPS	Master			0.000		
		Before	142.500	10.000	208.687	265.000	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	208.687	-----	
		After-Before	-----	-----	-----	-----	
Gain Ratio - 0		Master	1.000	0.940	1.012	1.060	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point - 0		Master	40.000	38.000	41.000	43.500	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 23:07:53 16-Jul-2012		Before (Measured): 20:59:40 31-Jul-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point - 0		Master	40.000	38.000	41.000	43.500	
		Before	-----	-----	-----	-----	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

ADT-C (Dielectric Scanner) Calibration - Run 1

Primary Equipment :		
ADT Pad Element		ADP-C
Calibration Parameter :		
Small Ring Size (Caliper Calibration Small Ring)		8.00
Large Ring Size (Caliper Calibration Large Ring)		12.00

ADT Caliper Calibration - Caliper Accumulations

Before (Measured):		20:56:56 31-Jul-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring RCAL	in	Before	8.00	4.00	8.15	12.00	
Large Ring RCAL	in	Before	12.00	6.00	12.32	18.00	

Company:

Noble Energy Inc

Schlumberger

Well:

Longs AC 02-15

Field:

Wattenberg

County:

Weld

State:

Colorado

Dielectric Scanner