

Company: EnCana Oil & Gas (USA)

Well: DV08B-23 (H23 4101)

Field: East Douglas Creek

County: Rio Blanco State: Colorado

CEMENT / HOLE VOLUME

County: Rio Blanco  
Field: East Douglas Creek  
Location: SHL: 1850 FNL 1235 FEL  
Well: DV08B-23 (H23 4101)  
Company: EnCana Oil & Gas (USA)

Location:		Elev.		K.B.	
SHL: 1850 FNL 1235 FEL		BHL: 1850 FNL 1235 FEL		G.L.	
Permanent Datum:		Ground Level		Elev.: 6753.00 f	
Log Measured From:		Kelly Bushing		30.00 ft	
Drilling Measured From:		Kelly Bushing		above Perm. Datum	
API Serial No.		Section:		Township:	
05-103-11919-00		23		4S	
				Range:	
				101	

Logging Date	04-Jun-2012		
Run Number	1		
Depth Driller	6090.00 ft		
Schlumberger Depth	6090.00 ft		
Bottom Log Interval	6098.00 ft		
Top Log Interval	200.00 ft		
Casing Driller Size @ Depth	9.625 in @ 882.00 ft		
Casing Schlumberger	882 ft		
Bit Size	8.75 in		
Type Fluid In Hole	Water		
Density	10.2 lbm/gal	53 s	
Fluid Loss	4.8 cm3	9.2	
Source of Sample	Active Tank		
RM @ Meas Temp	1.64 ohm.m @ 75 degF		
RMF @ Meas Temp	1.44 ohm.m @ 75 degF		
RMC @ Meas Temp	1.4 ohm.m @ 68 degF		
Source RMF	Calculated	Calculated	
RM @ BHT	0.47 @ 165	0.37 @ 165	
Max Recorded Temperatures	165 degF		
Circulation Stopped	04-Jun-2012	09:00:00	
Logger on Bottom	04-Jun-2012	11:31:05	
Unit Number	9102		
Recorded By	Curtis Schaaf	Vernal	
Witnessed By	Joe Beer		

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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## Operational Run Summary

Parameter ( unit )	1					
Date Log Started	04-Jun-2012					
Time Log Started	11:32:45					
Date Log Finished	04-Jun-2012					
Time Log Finished	16:08:31					
Top Log Interval ( ft )	200.00					
Bottom Log Interval ( ft )	6098.00					
Total Depth ( ft )	6098.00					
Max Hole Deviation ( deg )	9.50					
Azimuth of Max Deviation ( deg )	0.00					
Bit Size ( in )	8.750					
Logging Unit Number	9102					
Logging Unit Location	Vernal					
Recorded By	Curtis Schaaf					
Witnessed By	Joe Beer					
Service Order Number	BY8P-00035					

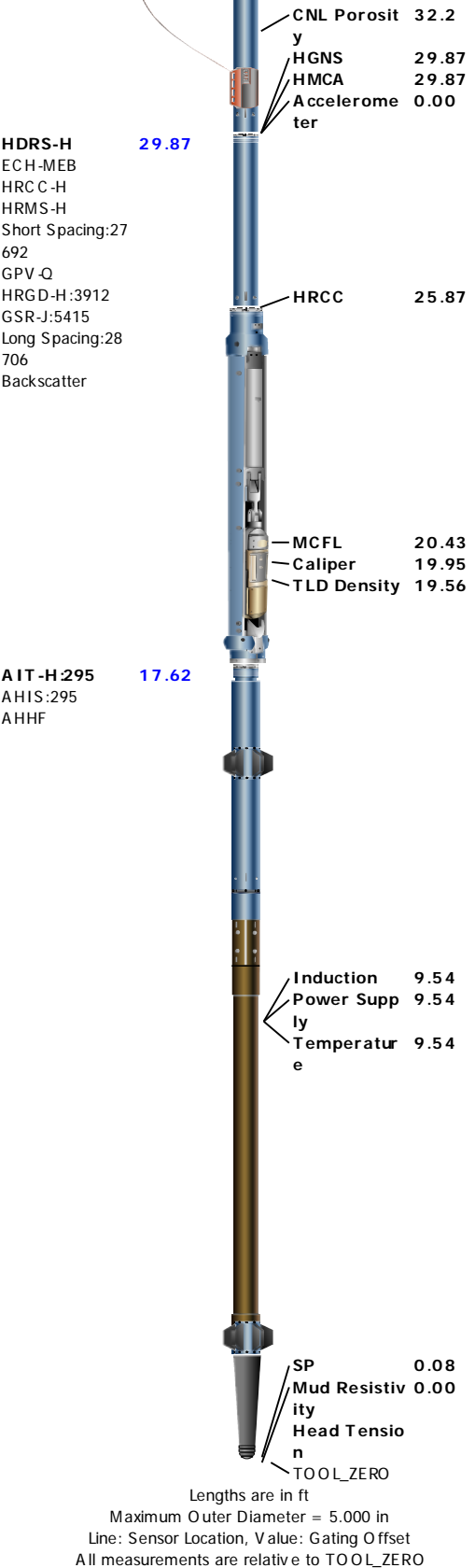
## Borehole Fluids

Parameter( unit )	1					
Fluid Type	Water					
Max Recorded Temperatures ( degF )	165					
Source of Sample	Active Tank					
Salinity ( ppm )	1100					
Density ( lbm/gal )	10.2					
Funnel Viscosity ( s )	53					
Fluid Loss ( cm3 )	4.8					
PH	9.2					
Date/Time Circulation Stopped	04-Jun-2012 09:00:00					
Date Logger on Bottom	04-Jun-2012					
Time Logger on Bottom	11:31:05					
Source RMF	Calculated					
RMC	Calculated					
RM @ Meas Temp ( ohm.m@degF )	1.64 @ 75					
RMF @ Meas Temp ( ohm.m@degF )	1.44 @ 75					
RMC @ Meas Temp ( ohm.m@degF )	1.4 @ 68					

RM @ BHT ( ohm.m@degF )	0.47 @ 165					
RMF @ BHT ( ohm.m@degF )	0.37 @ 165					
RMC @ BHT ( ohm.m@degF )	0.46 @ 165					
Total Solid ( % )	6					
High Gravity Solids ( % )						

Remarks and Equipment Summary

1: Toolstring				1: Remarks
Equip name	Length	MP name	Offset	<div> <div> <div>Tool string run as per Tool Sketch</div> <div>Tool run eccentralized using 2 x 1" standoffs and bowspring</div> <div>First run in hole, full depth procedures followed (see Depth Summary)</div> <div>Maximum temperature of 165F recorded by HGNS cartridge</div> <div>Maximum hole deviation 9.5deg</div> <div>MATRIX: Sandstone, DENSITY: 2.68 g/cc</div> <div>Hole size correction applied to neutron tool</div> <div>Cement hole volume calculated using future casing diameter of 4.5"</div> <div>Tool string required maximum logging speed of 1800 ft/hr</div> </div> </div>
LEH-QT LEH-QT	70.53			
EDTC-B:8054 EDTH-B:8054 EDTG-A EDTC-B:8054	67.62			
		CTEM	64.12	
		ACCZ	0.00	
		HV	0.00	
		Gamma Ray	62.25	
		TelStatus	61.12	
HNGS-BA HEH-K:186 HNGS-BA	61.12			
		GR	58.13	
HNGC-A HNGH-A:313 HNGC-A	52.93			
		Tel Status	51.17	
LDSC-B LDSC-A:18 LDSC-B	49.43			
		Tel Status	47.67	
ECS-A:130 ECSHA ECS-A:130 ECSDA NSR-F	45.93			
		Detector	44.64	
HGNS-H:4748 HGNH NPV-N NSR-F:1260 HMCA-H HGNS-H:4748 HACCZ-H:2594	39.28	Temperatur e	39.25	
		GR	38.53	



Depth Summary			
Depth Control Parameters	1		
Conveyance Type	Wireline		
Log Sequence	First Run in Hole		
Stretch Correction ( ft )	4.88		
Rig Type	Land		
Depth Remark Parameters	1		
Depth Remark 1	All Schlumberger Depth procedures followed		
Depth Remark 2	IDW used as primary depth measurement device		

Depth Remark 3	Z-chart used as secondary depth reference		
Depth Remark 4	Depth correction applied to main pass via WFDD		
Depth Measuring Device	1		
Type	IDW-B		
Serial Number	6122		
Calibration Date	11-Oct-2011		
Calibrator Serial Number	33		
Calibration Cable Type	7-46 AXS		
Wheel Correction 1	-6		
Wheel Correction 2	-5		
Tension Device	1		
Type	CMTD-B/A		
Serial Number	119		
Calibration Date	26-May-2012		
Calibrator Serial Number	1002518		
Calibration Points	10		
Calibration RMS	14		
Calibration Peak Error	20		
Logging Cable	1		
Type	7-46A-XS		
Serial Number	71425		
Logging Cable Length ( ft )	24000.00		

1
MAIN PASS

Integration Summary				
Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	1662.71	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	2240.35	ft3

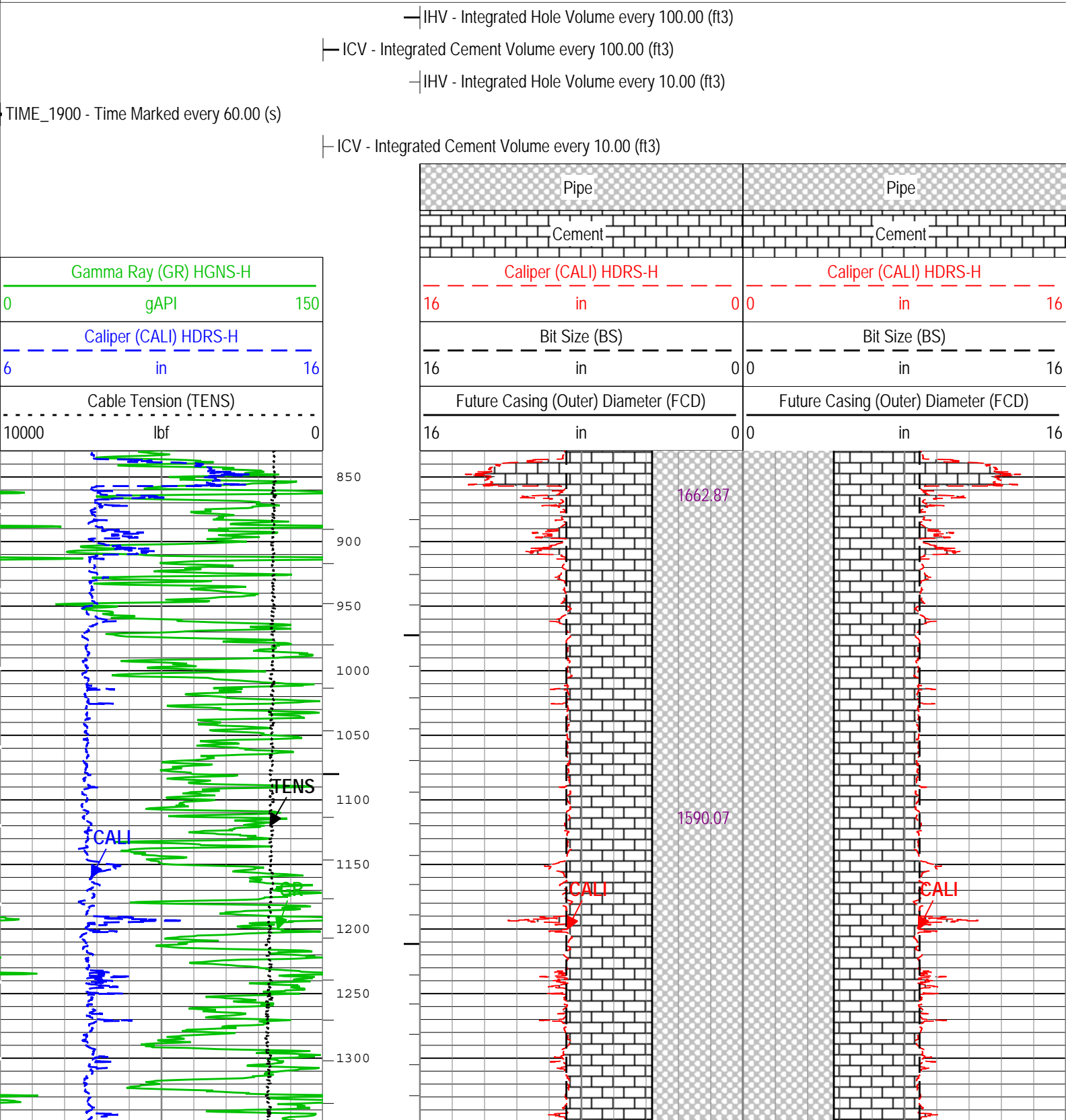
Software Version	
Acquisition System	Version
MaxWell	3.0.9609.0
Application Patch	SP-20120409-3.0.9609.1919
	EXP_APL-ADT-3.0.9609.1558
	EXP_APL-OPElevation-3.0.9609.1966

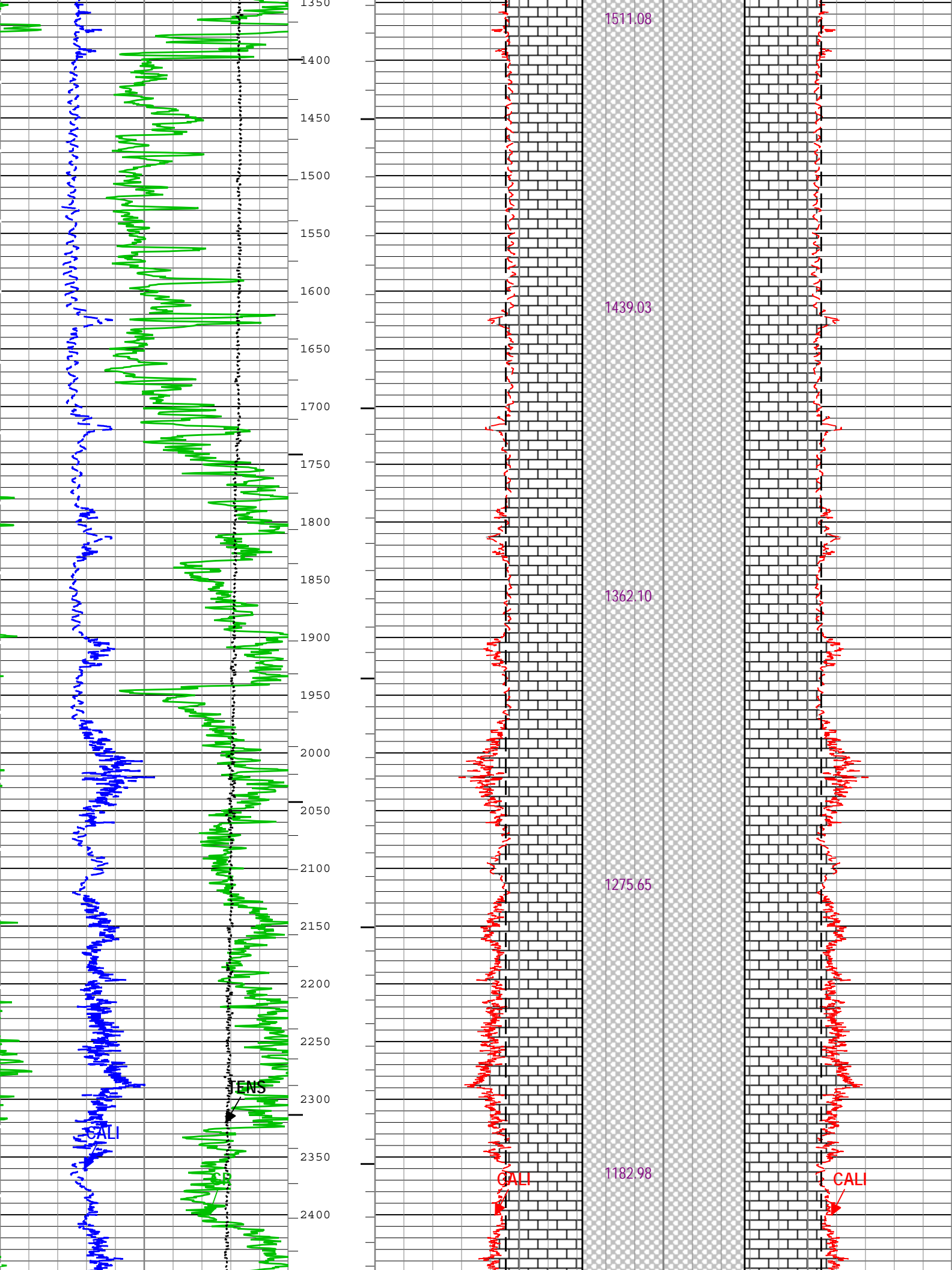
Computation	Description		Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels		3.0.9609.1919
Tool Elements	Description	Software Version	Firmware Version
HRCC-H	HILT High-Resolution Control Cartridge, 150 degC	3.0.9609.1919	2.0
HGNS-H	HILT Gamma-Ray and Neutron Sonde, 150 degC	3.0.9609.1919	2.0

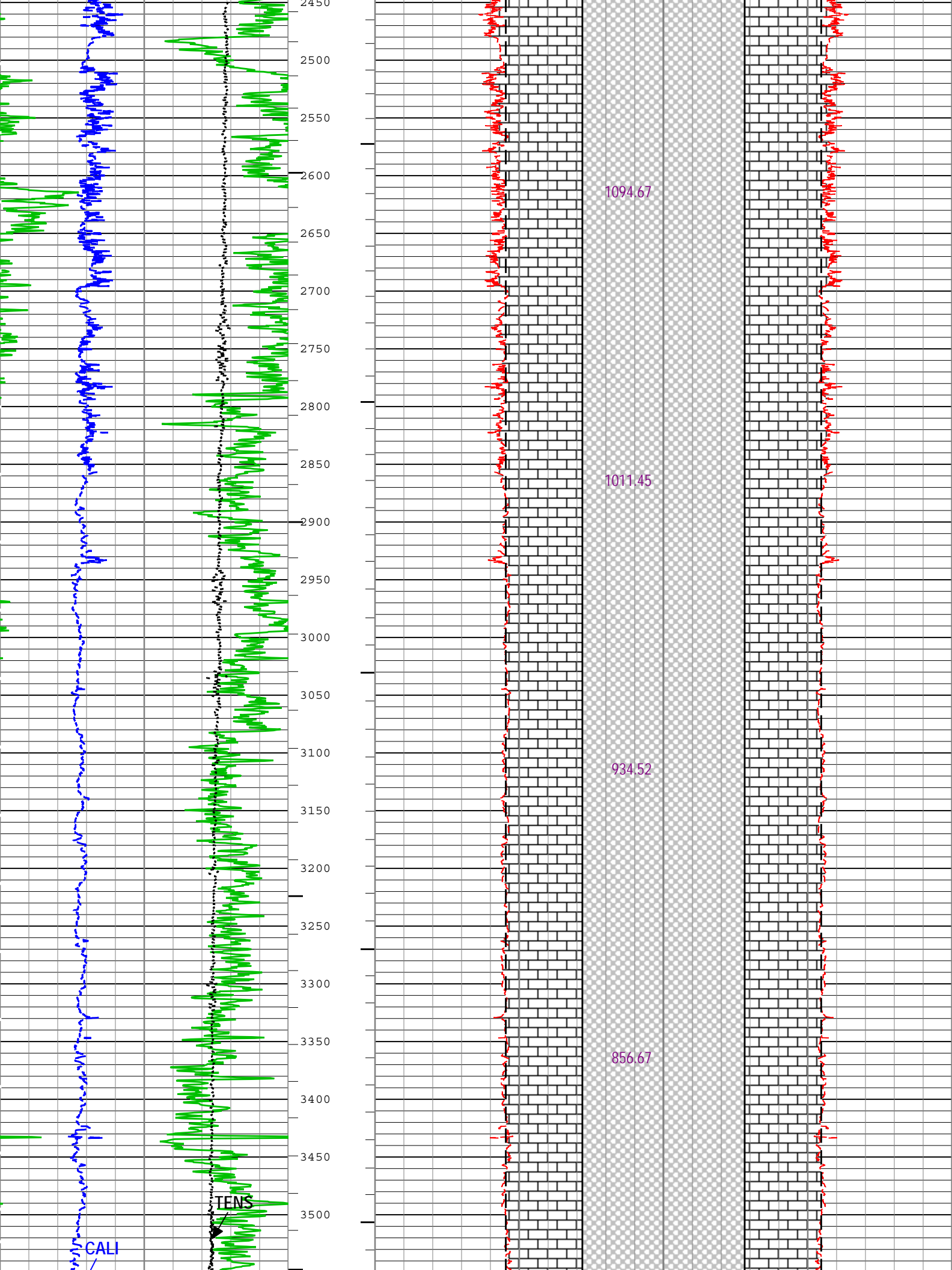
Pass Summary								
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Depth Shift	Include Parallel Data
1	Log[4]:Up	Up	234.78 ft	6113.73 ft	04-Jun-2012 1:10:46 PM	04-Jun-2012 3:37:35 PM	0.00 ft	
All depths are referenced to toolstring zero								

Log	1: Log[4]:Up  0E1519BF-BEC1-43BD-A001-C00B950669B8
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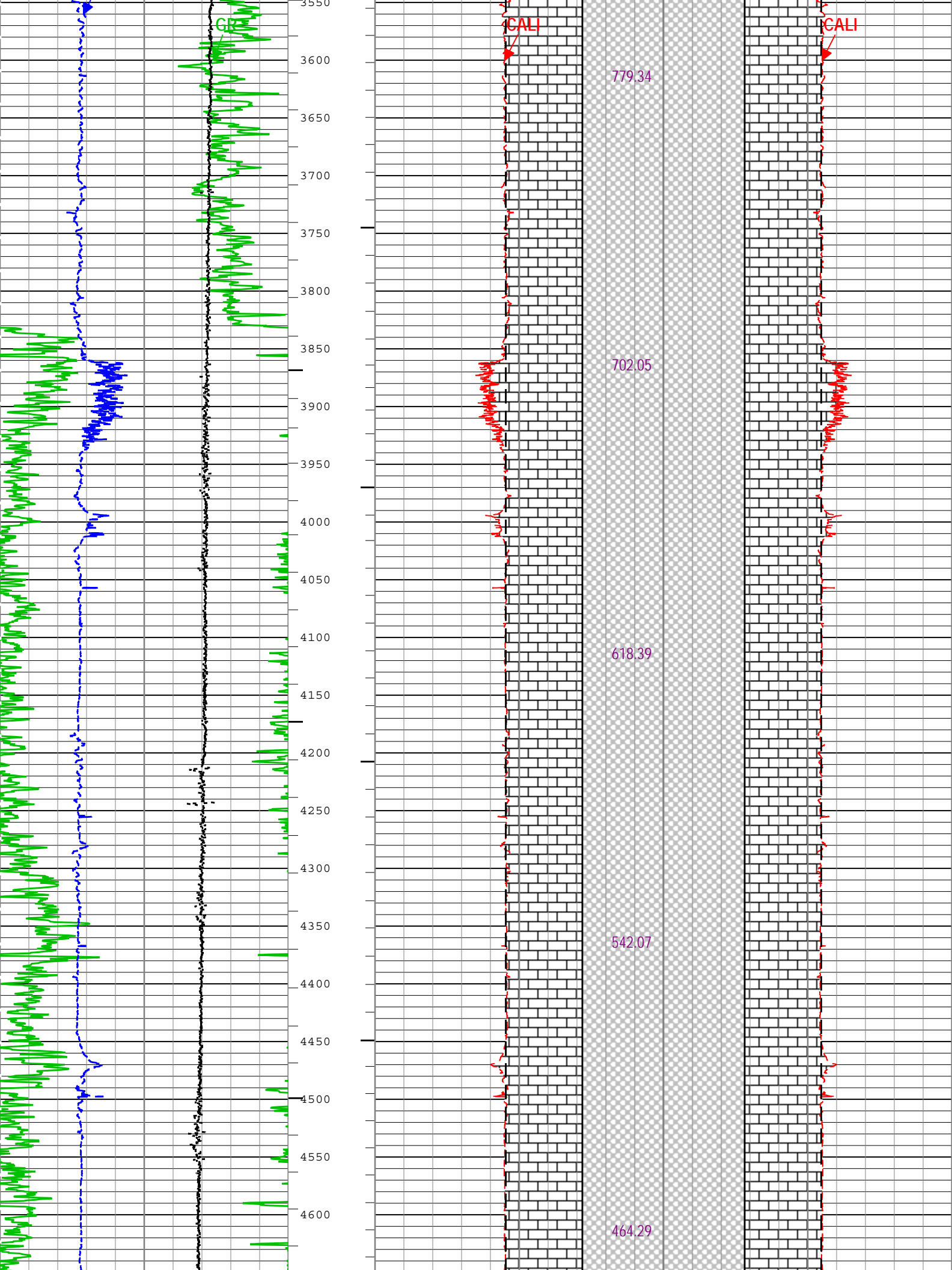
Channel	Source	Sampling
ICV	Borehole	6in
ICV	Borehole	6in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in
IHV	Borehole	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in

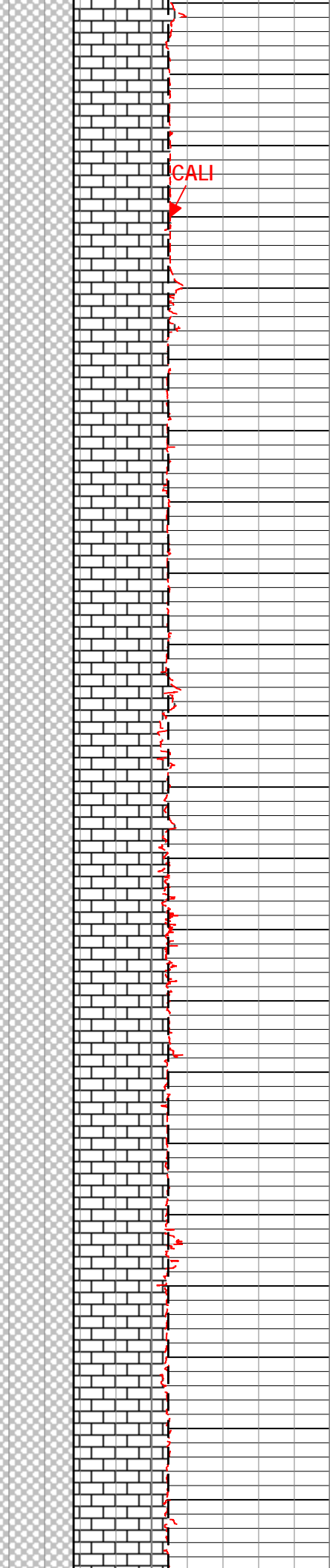
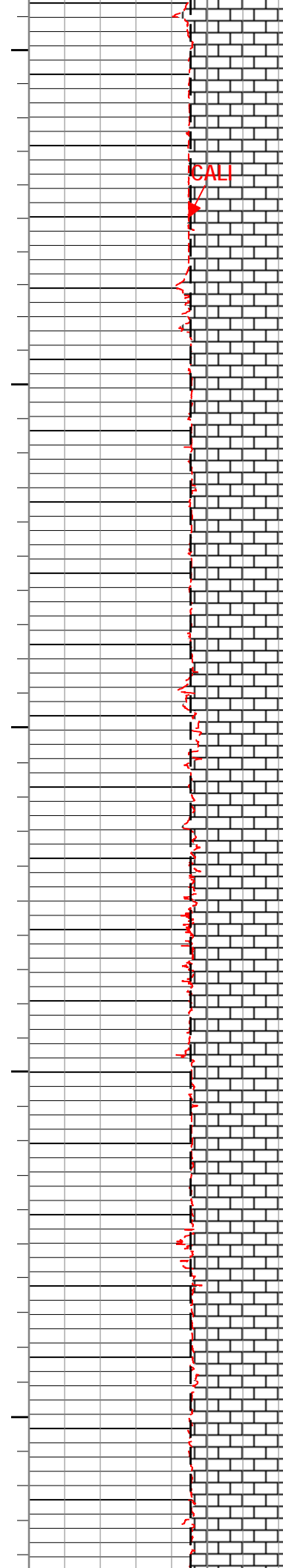
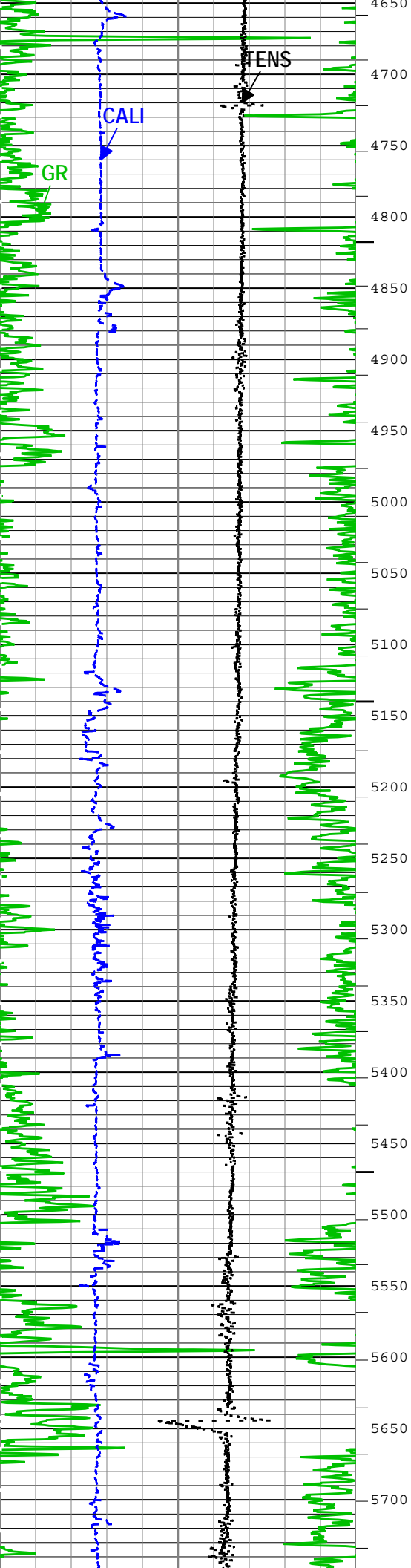


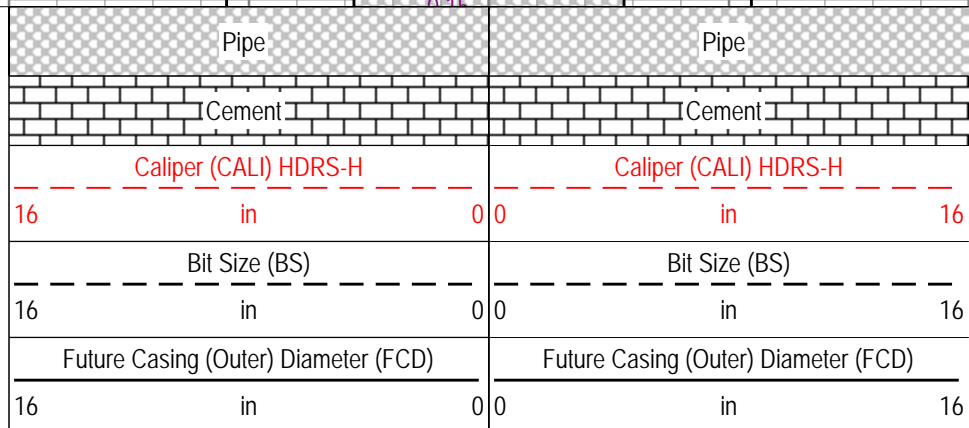
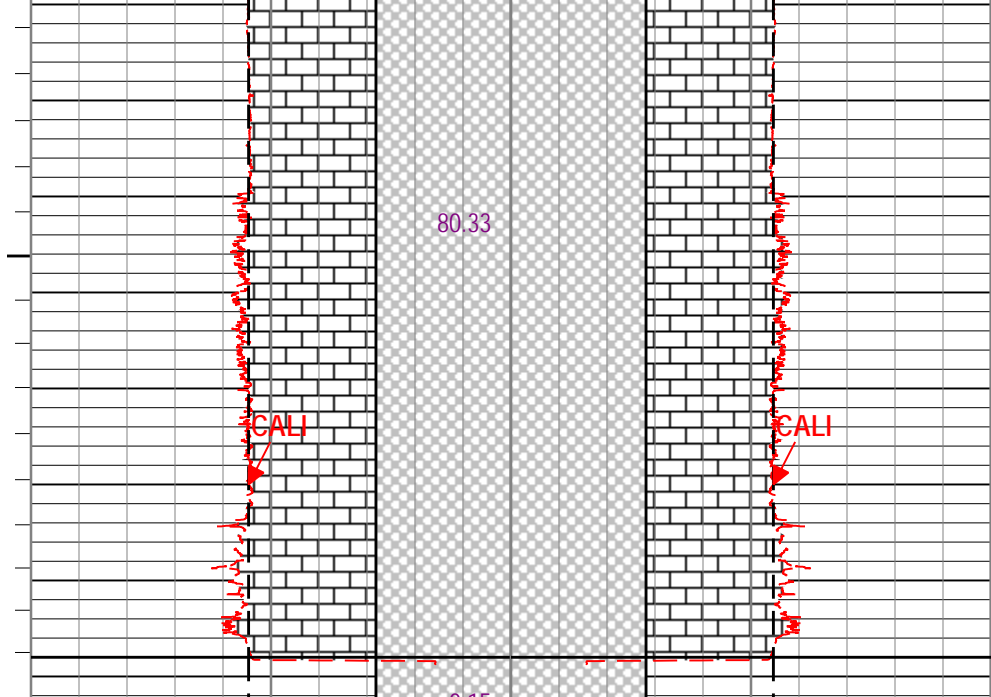
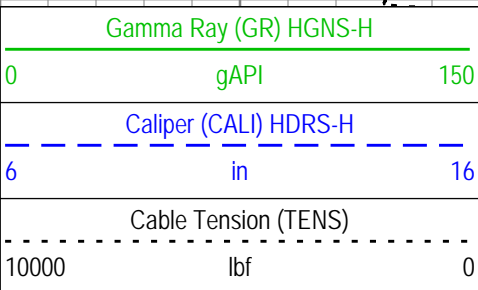
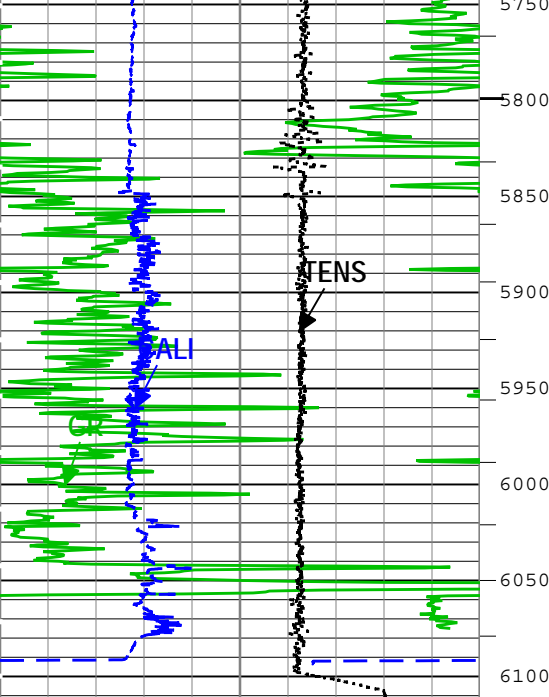












ICV - Integrated Cement Volume every 10.00 (ft3)

TIME\_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

Description: Density count rates for Platform Express Format: Log ( CALIPER 1IN ) Index Scale: 1 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 04-Jun-2012 18:27:51

Channel Processing Parameters				
Parameter	Description	ToolPath	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	COMPLETION	8.75	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H:HRCC-H:HRCC-H	0	in
CBLO	Casing Bottom (Logger)	COMPLETION	882	ft
CDEN	Cement Density	HGNS-H:HGNS-H:HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	COMPLETION	9.625	in
DFD	Drilling Fluid Density	Borehole	10.2	lbm/gal
FCD	Future Casing (Outer) Diameter	COMPLETION	4.5	in
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	

Tool Control Parameters				
Parameter	Description	ToolPath	Value	Unit

MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLWorkflow	1800	ft/h			
Calibration Report							
AIT-H (Array Induction Tool - H) Calibration - Run 1							
Primary Equipment :							
Array Induction Sonde - H		AHIS		295			
AIT Sonde Calibration - Test Loop Gain							
Master (EEPROM): 01:43:26 25-May-2012							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Test Loop Gain - 0		Master	1.000	0.950	1.009	1.050	
Test Loop Phase - 0	deg	Master	0	-3.000	0.230	3.000	
Test Loop Gain - 1		Master	1.000	0.950	1.007	1.050	
Test Loop Phase - 1	deg	Master	0	-3.000	0.173	3.000	
Test Loop Gain - 2		Master	1.000	0.950	1.013	1.050	
Test Loop Phase - 2	deg	Master	0	-3.000	-0.157	3.000	
Test Loop Gain - 3		Master	1.000	0.950	1.010	1.050	
Test Loop Phase - 3	deg	Master	0	-3.000	-0.065	3.000	
Test Loop Gain - 4		Master	1.000	0.950	0.990	1.050	
Test Loop Phase - 4	deg	Master	0	-3.000	-0.035	3.000	
Test Loop Gain - 5		Master	1.000	0.950	0.993	1.050	
Test Loop Phase - 5	deg	Master	0	-3.000	-0.366	3.000	
Test Loop Gain - 6		Master	1.000	0.950	0.999	1.050	
Test Loop Phase - 6	deg	Master	0	-3.000	-0.003	3.000	
Test Loop Gain - 7		Master	1.000	0.950	0.999	1.050	
Test Loop Phase - 7	deg	Master	0	-3.000	-0.363	3.000	
AIT Sonde Calibration - Sonde Error Correction							
Master (EEPROM): 01:43:26 25-May-2012							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-130.418	119.000	
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-831.779	2250.000	
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	173.637	204.000	
Sonde Error Correction Quad - 1		Master	-----	-625.000	-201.336	625.000	
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	110.614	156.000	
Sonde Error Correction Quad - 2		Master	-----	-350.000	-138.496	350.000	
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	54.418	89.000	
Sonde Error Correction Quad - 3		Master	-----	-250.000	22.859	250.000	
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	25.791	35.000	
Sonde Error Correction Quad - 4		Master	-----	-63.000	-3.777	63.000	
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	14.078	24.000	
Sonde Error Correction Quad - 5		Master	-----	-50.000	-6.595	50.000	
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	8.898	15.000	
Sonde Error Correction Quad - 6		Master	-----	-30.000	-10.209	30.000	
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-2.074	5.000	
Sonde Error Correction Quad - 7		Master	-----	-30.000	-9.017	30.000	
AIT Mud Calibration - Mud Calibration Gain							
Master (EEPROM): 01:43:26 25-May-2012							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coarse Gain		Master	0.650	0.500	1.092	0.800	
Fine Gain		Master	0.650	0.500	1.200	0.800	
AIT Electronics Check - Thru Calibration Check							
Master (EEPROM): 01:43:26 25-May-2012 Before (Measured): 11:55:19 04-Jun-2012 After:							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Thru Cal Mag - 0	V	Master	-----	0.363	0.625	0.847	
		Before	-----	0.363	0.631	0.847	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	0.006	-----	
		After-Before	-----	-----	-----	-----	
Thru Cal Phase - 0	deg	Master	-----	11.000	66.293	131.000	
		Before	-----	11.000	67.101	131.000	
		After	-----	-----	-----	-----	
		Before-Master	-----	-----	0.808	-----	
		After-Before	-----	-----	-----	-----	

Thru Cal Mag - 1	V	Master	----	0.762	1.283	1.778	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	0.762	1.295	1.778	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.012		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 1	deg	Master	----	10.000	65.262	130.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	10.000	66.065	130.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.803		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 2	V	Master	----	0.374	0.637	0.872	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	0.374	0.643	0.872	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.006		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 2	deg	Master	----	6.000	61.476	126.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	6.000	62.266	126.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.790		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 3	V	Master	----	0.422	0.718	0.986	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	0.422	0.725	0.986	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.007		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 3	deg	Master	----	5.000	60.703	125.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	5.000	61.491	125.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.788		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 4	V	Master	----	0.802	1.347	1.872	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	0.802	1.360	1.872	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.013		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 4	deg	Master	----	-1.000	54.289	119.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	-1.000	55.050	119.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.761		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 5	V	Master	----	1.173	1.955	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	1.173	1.973	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.018		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master	----	-3.000	52.388	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	-3.000	53.135	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.747		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master	----	1.173	1.955	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	1.173	1.973	2.737	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.018		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master	----	-3.000	52.394	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	-3.000	53.140	117.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.746		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master	----	0.849	1.390	1.981	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	0.849	1.401	1.981	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>
		Before-Master	----		0.011		<div><div></div><div></div><div></div><div></div><div></div></div>
		After-Before	----				<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master	----	-7.000	48.592	113.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		Before	----	-7.000	49.193	113.000	<div><div></div><div></div><div></div><div></div><div></div></div>
		After	----				<div><div></div><div></div><div></div><div></div><div></div></div>

		Before-Master After-Before	-----	-----	0.601 -----	-----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
SPA Zero	mV	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	-50.000 -50.000 ----- ----- -----	-0.168 -0.171 ----- -0.003 -----	50.000 50.000 ----- ----- -----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div>
SPA Plus	mV	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	941.000 941.000 ----- ----- -----	990.794 990.818 ----- 0.024 -----	1040.000 1040.000 ----- ----- -----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Temperature Zero	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	-0.050 -0.050 ----- ----- -----	0.000 0.000 ----- 0.000 -----	0.050 0.050 ----- ----- -----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Temperature Plus	V	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	0.870 0.870 ----- ----- -----	0.917 0.917 ----- 0.000 -----	0.960 0.960 ----- ----- -----	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div><div></div><div></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	3912

### Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	28706
HRDD Short Spacing Detector	Short Spacing	27692
Cesium 137 Gamma-Ray Logging Source	GSR-J	5415
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
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): 12:37:46 03-Jun-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Small Ring	in	Before	8.00	6.00	9.13	10.00	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Large Ring	in	Before	12.00	9.00	13.24	15.00	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS Density Calibration - Inversion Results

Master (EEPROM): 15:22:40 29-May-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Rho Aluminum	g/cm3	Master	2.596	2.586	2.599	2.606	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Rho Magnesium	g/cm3	Master	1.686	1.676	1.690	1.696	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Pe Aluminum		Master	2.570	2.470	2.537	2.670	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Pe Magnesium		Master	2.650	2.550	2.623	2.750	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS Density Calibration - Deviation Summary

Master (EEPROM): 15:22:40 29-May-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
BS Average Deviation	%	Master	0	-0.6000	0.3922	0.6000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
BS Max Deviation	%	Master	0	-1.6000	0.7681	1.6000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
SS Average Deviation	%	Master	0	-1.0000	0.2664	1.0000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
SS Max Deviation	%	Master	0	-2.5000	1.0208	2.5000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
LS Average Deviation	%	Master	0	-1.5000	0.5544	1.5000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
LS Max Deviation	%	Master	0	-3.5000	1.8506	3.5000	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS Density Calibration - Background Summary



**HGNS Accelerometer Calibration - Accelerometer Accumulations**

Before (Measured): 11:52:33 04-Jun-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.2	32.8	

**HGNS Accelerometer EEPROM - Accelerometer EEPROM Read**

Master (EEPROM): 00:00:00 15-Feb-2004

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	----	----	-236.900	----	
Accelerometer Coefficients - 1		Master	----	----	24.030	----	
Accelerometer Coefficients - 2		Master	----	----	0.001	----	
Accelerometer Coefficients - 3		Master	----	----	0.000	----	
Accelerometer Coefficients - 4		Master	----	----	2.751	----	
Accelerometer Coefficients - 5		Master	----	----	0.000	----	
Accelerometer Coefficients - 6		Master	----	----	0.000	----	
Accelerometer Coefficients - 7		Master	----	----	0.000	----	
Accelerometer Coefficients - 8		Master	----	----	299.600	----	
Accelerometer Coefficients - 9		Master	----	----	0.998	----	

**HGNS Neutron Calibration - HGNS Neutron Accumulations**

Master (EEPROM): 16:54:48 13-Apr-2012 Before (Measured): 12:28:14 03-Jun-2012 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Master	0	5.0	27.5	40.0	
		Before	0	5.0	28.8	40.0	
		After	----	----	----	----	
		Before-Master	----	-4.1	1.3	4.1	
		After-Before	----	----	----	----	
Far Zero Measurement	1/s	Master	0	5.0	29.7	40.0	
		Before	0	5.0	30.2	40.0	
		After	----	----	----	----	
		Before-Master	----	-4.5	0.5	4.5	
		After-Before	----	----	----	----	
Near Plus Measurement - 0	1/s	Master	6031.0	4700.0	5566.0	6900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Far Plus Measurement - 0	1/s	Master	2793.0	1900.0	2214.0	2900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Near Corrected Plus Measurement - 0	1/s	Master	----	4700.0	5601.0	6900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Far Corrected Plus Measurement - 0	1/s	Master	----	1900.0	2222.0	2900.0	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	

**HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations**

Before (Measured): 12:41:11 03-Jun-2012 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	45.2	120.0	
		After	----	----	----	----	
		After-Before	----	----	----	----	
RGR Plus Measurement	gAPI	Before	185.4	157.1	167.5	206.3	
		After	----	----	NOT DONE	----	
		After-Before	----	----	----	----	
GR Calibration Gain		Before	0.89	0.80	0.98	1.05	
		After	----	----	----	----	



## ECS-A (Elemental Capture Spectroscopy Tool) Calibration - Run 1

### Primary Equipment :

The ECS sonde is used to measure elemental concentrations. ECS-A 130

### Auxiliary Equipment :

Litho-Density Spectroscopy Cartridge LDSC-B

Housing for the LDSC LDSH-A 18

Housing to contain the ECS Sonde Assembly ECSH-A

The gamma ray BGO detector is used to detect prompt capture gamma rays for spectroscopy measurement. ECSD-A

The AmBe source provides neutrons for the prompt capture spectroscopy measurement. NSR-F

## ECS Background Measurement Check - ECS Calibration Check

Master: Before (Measured): 12:37:30 03-Jun-2012 After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Detector resolution (20 DegC)	%	Master	13.000	11.200	NOT DONE	14.000	
		Before	13.000	11.200	13.642	14.000	
		After	13.000	11.200	NOT DONE	14.000	
		Before-Master	-----	-----	-----	-----	
		After-Before	-----	-----	-----	-----	

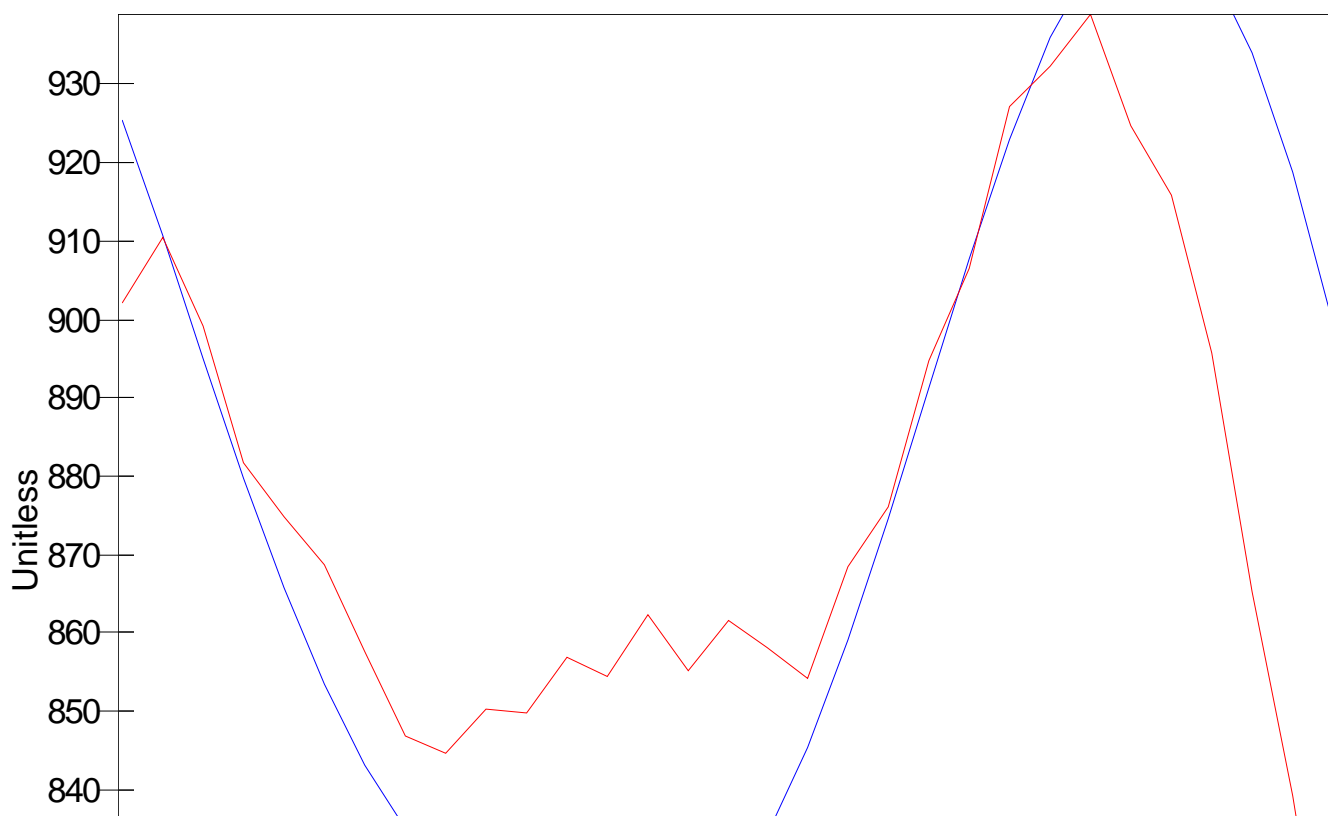
## ECS Spectral Calibration - ECS Spectral Calibration

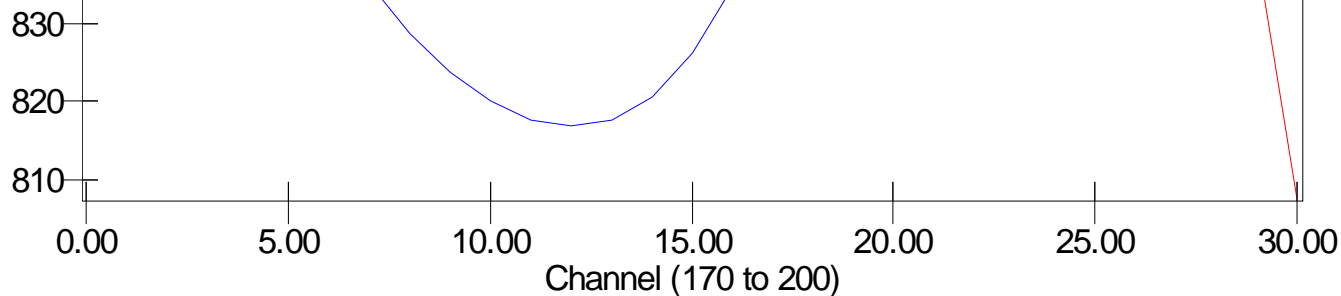
Master (EEPROM): 16:01:05 04-Jun-2012

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Spectral Shift Factor		Master	1.000	-0.500	-0.243	1.500	

## Spectrum Without Shift Plot SHOP

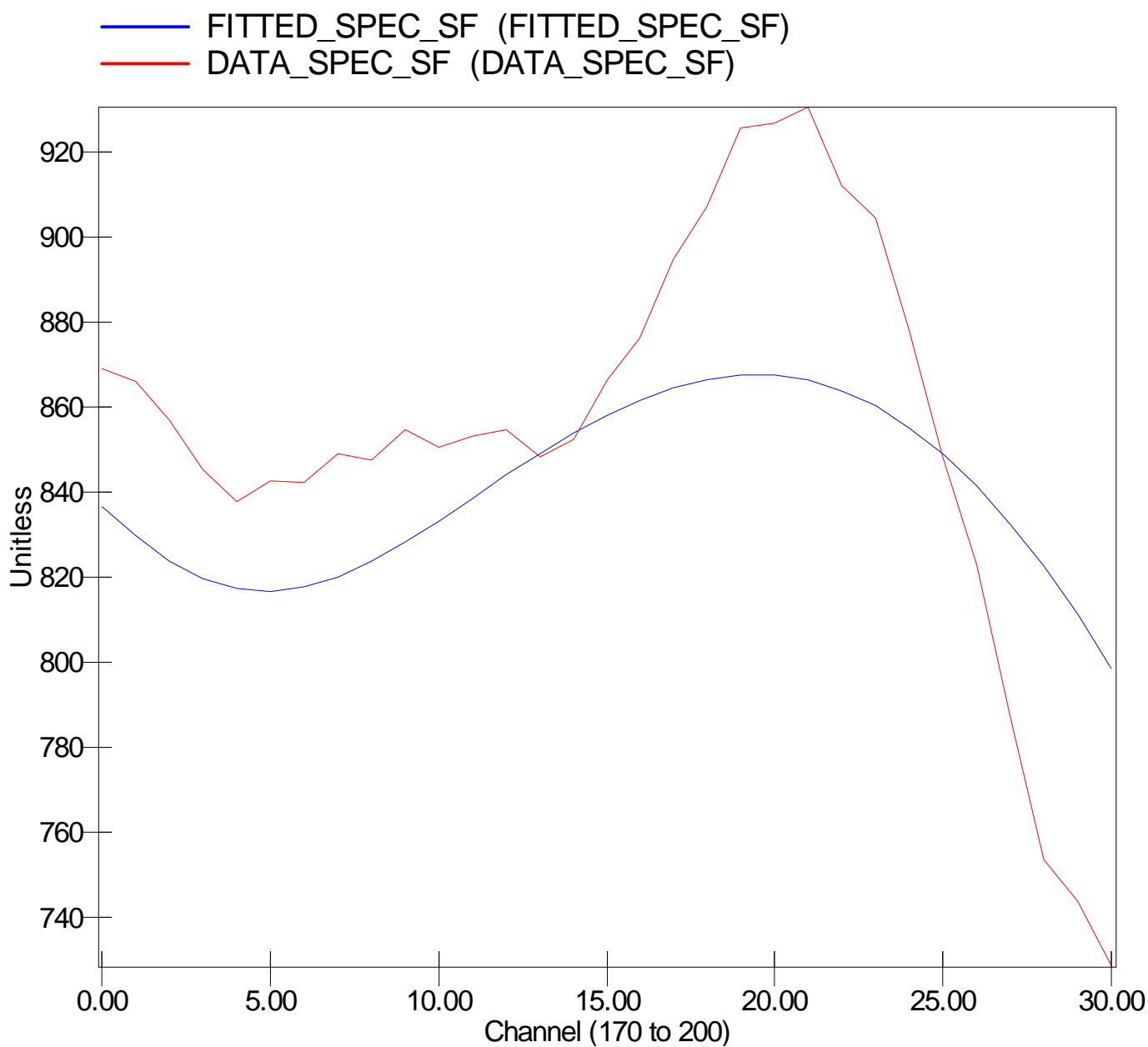
— FITTED\_SPEC (FITTED\_SPEC)  
— DATA\_SPEC (DATA\_SPEC)





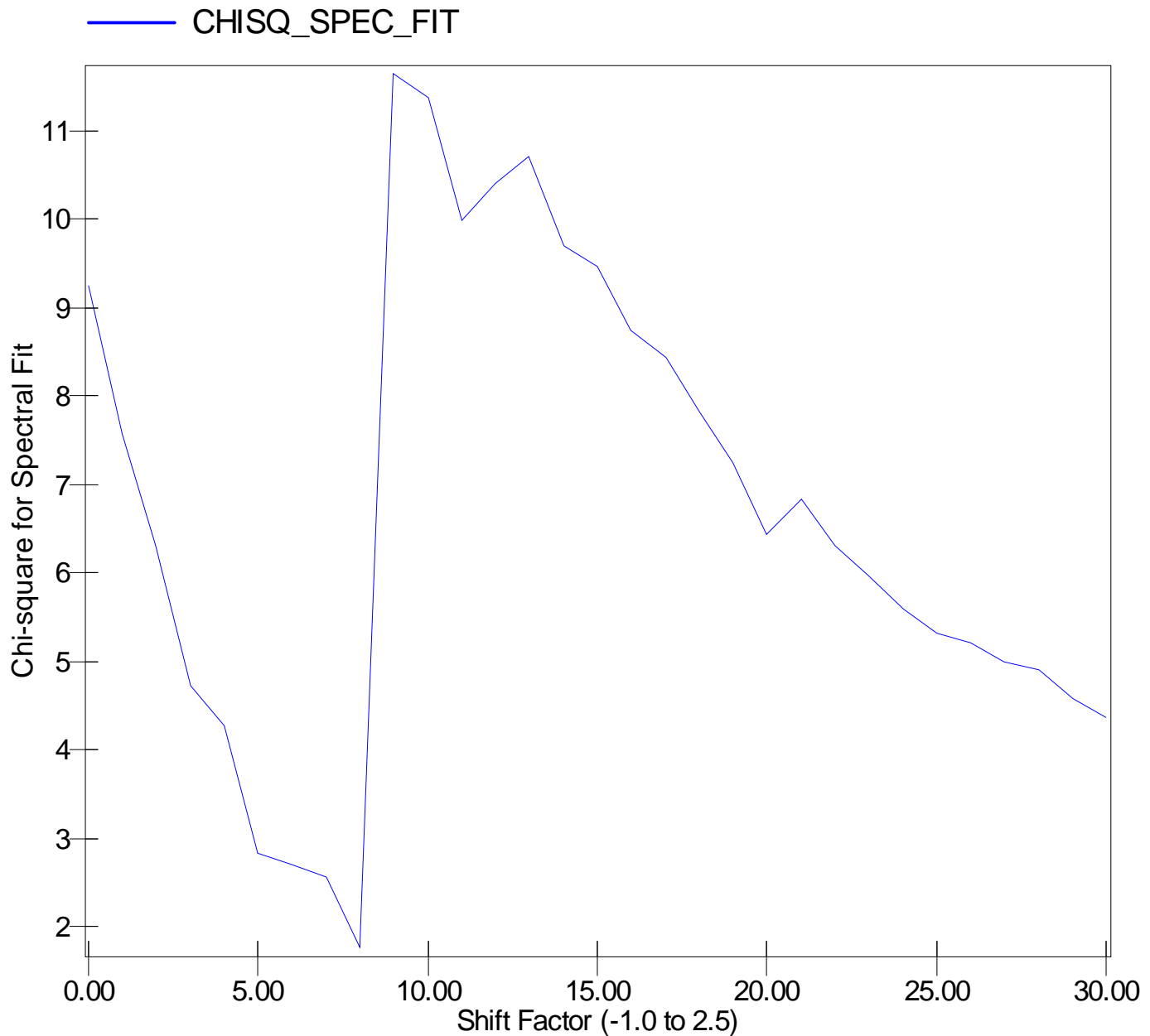
## Spectrum With Shift Plot

SHOP



# Chi Square for Spectral Fit Plot

SHOP



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

### Primary Equipment :

HNGS Sonde Element

HNGS-BA

### Auxiliary Equipment :

Hostile Natural Gamma Ray Cartridge

HNGC-A

Housing for the HNGC

HNGH-A

313

HNGS Housing Element

HEH-K

186

## HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (Manual Entry): 13:26:13 31-Mar-2012

Before (Measured):

12:29:22 03-Jun-2012

After:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
Na 511 Peak Location		Master	-----	-----	38.598	-----		

		Before	40.000	37.500	38.704	42.500	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	0.106	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 511 Peak Resolution	%	Master	----	----	14.537	----	<div><div></div></div>
		Before	15.500	12.000	16.149	19.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	1.612	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
High Voltage DAC Value	V	Master	----	----	----	----	<div><div></div></div>
		Before	1150.000	850.000	1047.088	1600.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 1785 Peak Location		Master	----	----	139.124	----	<div><div></div></div>
		Before	142.650	135.000	139.867	150.300	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	0.743	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 1785 Peak Resolution	%	Master	----	----	8.878	----	<div><div></div></div>
		Before	8.500	7.000	8.770	11.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	-0.108	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Temperature	degF	Master	----	----	----	----	<div><div></div></div>
		Before	59.900	-20.002	68.394	140.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na Count Rate	CPS	Master	45.000	10.000	14.879	100.000	<div><div></div></div>
		Before	45.000	10.000	46.109	100.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	31.230	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>

## HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (Manual Entry): 13:26:13 31-Mar-2012			Before (Measured): 12:29:22 03-Jun-2012		After:		
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Na 511 Peak Location		Master	----	----	39.760	----	<div><div></div></div>
		Before	40.000	37.500	39.624	42.500	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	-0.136	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 511 Peak Resolution	%	Master	----	----	15.230	----	<div><div></div></div>
		Before	15.500	12.000	16.459	19.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	1.229	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
High Voltage DAC Value	V	Master	----	----	----	----	<div><div></div></div>
		Before	1150.000	850.000	1084.917	1600.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 1785 Peak Location		Master	----	----	141.858	----	<div><div></div></div>
		Before	142.650	135.000	142.325	150.300	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	0.467	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na 1785 Peak Resolution	%	Master	----	----	9.375	----	<div><div></div></div>
		Before	8.500	7.000	9.387	11.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	0.012	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Temperature	degF	Master	----	----	----	----	<div><div></div></div>
		Before	59.900	-20.002	70.212	140.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	----	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>
Na Count Rate	CPS	Master	45.000	10.000	14.879	100.000	<div><div></div></div>
		Before	45.000	10.000	46.109	100.000	<div><div></div></div>
		After	----	----	----	----	<div><div></div></div>
		Before-Master	----	----	31.230	----	<div><div></div></div>
		After-Before	----	----	----	----	<div><div></div></div>

Na Count Rate	CPS	Master	45.000	10.000	14.937	100.000	
		Before	45.000	10.000	45.751	100.000	
		After	----	----	----	----	
		Before-Master	----	----	30.814	----	
		After-Before	----	----	----	----	

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

Master (Manual Entry): 13:26:13 31-Mar-2012		Before (Measured): 12:29:22 03-Jun-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coincidence Count Rate Ratio		Master	----	----	----	----	
		Before	1.000	0.950	1.003	1.050	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	

## HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (Manual Entry): 13:26:13 31-Mar-2012		Before (Measured): 12:29:22 03-Jun-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location - 0		Master	209.630	201.000	207.370	218.250	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Th Peak Resolution - 0	%	Master	7.000	5.000	7.063	9.000	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Background Count Rate	CPS	Master	----	----	----	----	
		Before	142.500	10.000	119.460	265.000	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Gain Ratio - 0		Master	1.000	0.940	1.022	1.060	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	

## HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (Manual Entry): 13:26:13 31-Mar-2012		Before (Measured): 12:29:22 03-Jun-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location - 0		Master	209.630	201.000	207.997	218.250	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Th Peak Resolution - 0	%	Master	7.000	5.000	6.932	9.000	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Background Count Rate	CPS	Master	----	----	----	----	
		Before	142.500	10.000	123.131	265.000	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	
Gain Ratio - 0		Master	1.000	0.940	0.995	1.060	
		Before	----	----	----	----	
		After	----	----	----	----	
		Before-Master	----	----	----	----	
		After-Before	----	----	----	----	

## HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (Manual Entry): 13:26:13 31-Mar-2012		Before (Measured): 12:29:22 03-Jun-2012		After:			
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point - 0		Master	40.000	38.000	40.000	43.500	
		Before	----	----	----	----	
		After	----	----	----	----	



Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
HTEN Shop Gain		Master	1.000	0.800	NOT DONE	1.200		
HTEN Shop Offset	lbf	Master	0	-1000.000	NOT DONE	1000.000		
HTEN Before Calibration - HTEN Before Calibration								
Before:								
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit		
RHTE Zero Measurement - 0	lbf	Before	-----	-----	-----	-----		
RHTE Plus Measurement - 0	lbf	Before	-----	-----	-----	-----		
HTEN Gain - 0		Before	-----	-----	-----	-----		
HTEN Offset - 0	lbf	Before	-----	-----	-----	-----		

Company:

EnCana Oil & Gas (USA)

Schlumberger

Well:

DV08B-23 (H23 4101)

Field:

East Douglas Creek

County:

Rio Blanco

State:

Colorado

CEMENT / HOLE VOLUME