

Company: Noble Energy Inc

Well: Longs AC 02-15

Field: Wattenberg

County: Weld

State: Colorado

Natural Gamma-Ray Spectroscopy

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.

D.F.

4837.00 ft

4850.00 ft

Permanent Datum:

Ground Level

Elev.: 4837.00 f

Log Measured From:

Drill Floor

13.00 ft

above Perm.Datum

Drilling Measured From:

Drill Floor

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	
Type Fluid In Hole	Fresh Water	
Density	9.05 lbm/gal	11 s
Fluid Loss	9.6 cm3	10
MUD		
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	
RM @ BHT	RMF @ BHT	
Max Recorded Temperatures	0.67 @ 227.1 0.65 @ 227.1	
Circulation Stopped	227.1 degF	
Logger on Bottom	31-Jul-2012 22:00:00	
Unit Number	01-Aug-2012 08:15:00	
Recorded By	3030	
	Philip Grant	
Witnessed By	Bob Lieber, Roger Foster	

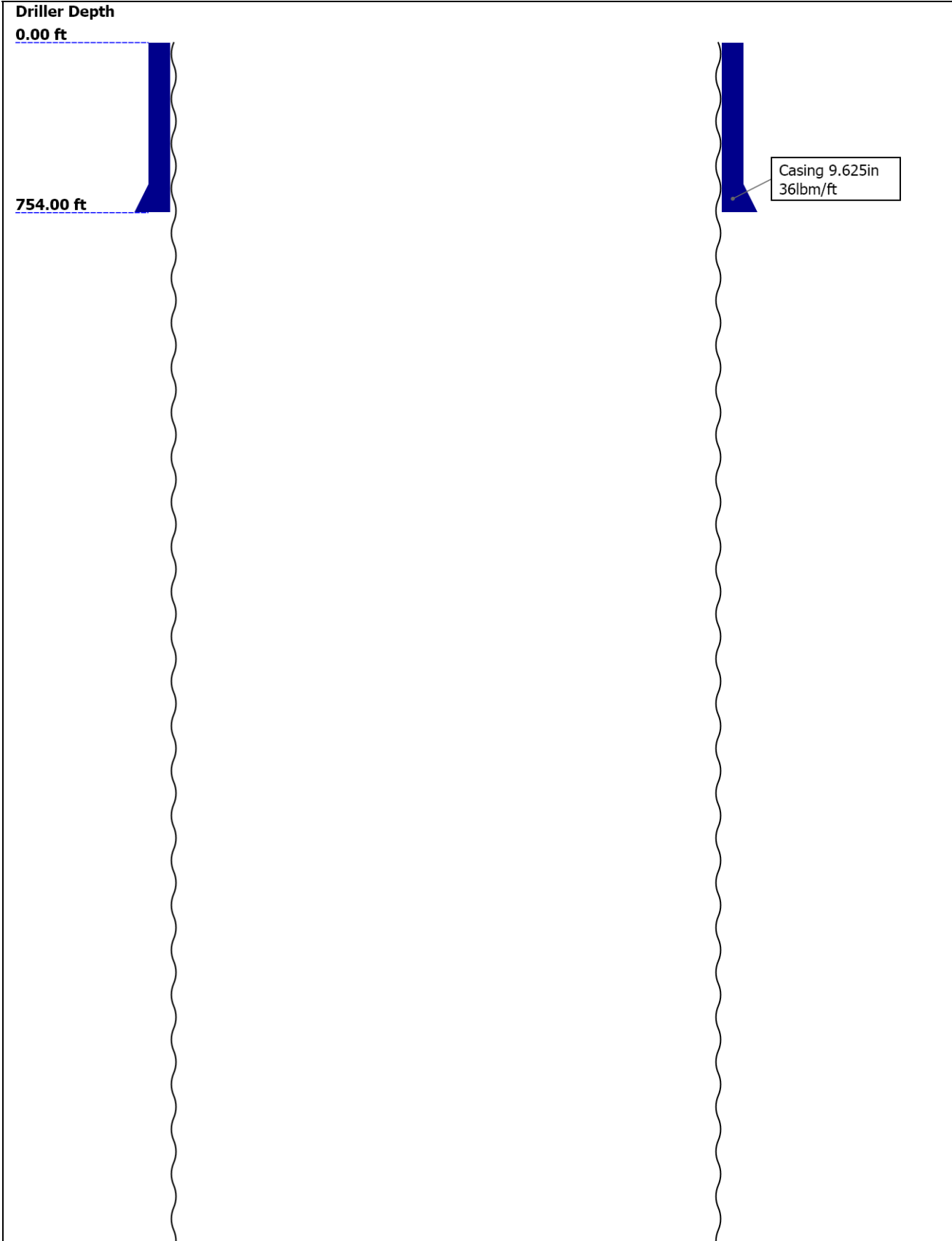
Disclaimer

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



8910.00 ft

Open Hole 8.75in

## Borehole Size/Casing/Tubing Record

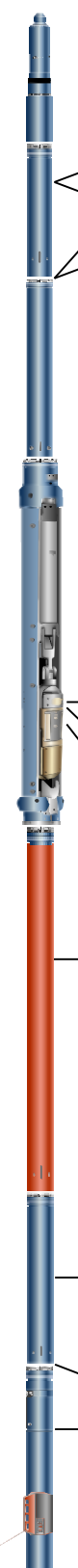





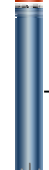



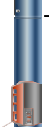
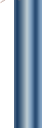
Bit						
Bit Size ( in )	8.75					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	8910					
Bottom Logger ( ft )	8912					
Casing						
Size ( in )	9.625					
Weight ( lbm/ft )	36					
Inner Diameter ( in )	8.914					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	754					
Bottom Logger ( ft )	754					

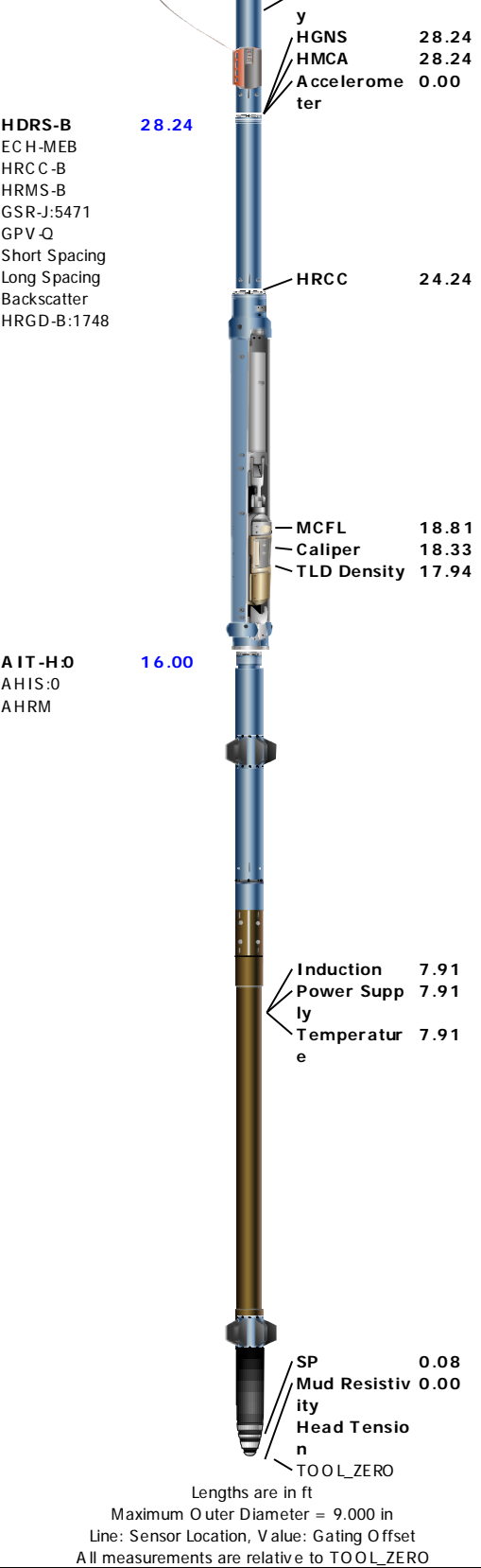
## Borehole Fluids

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

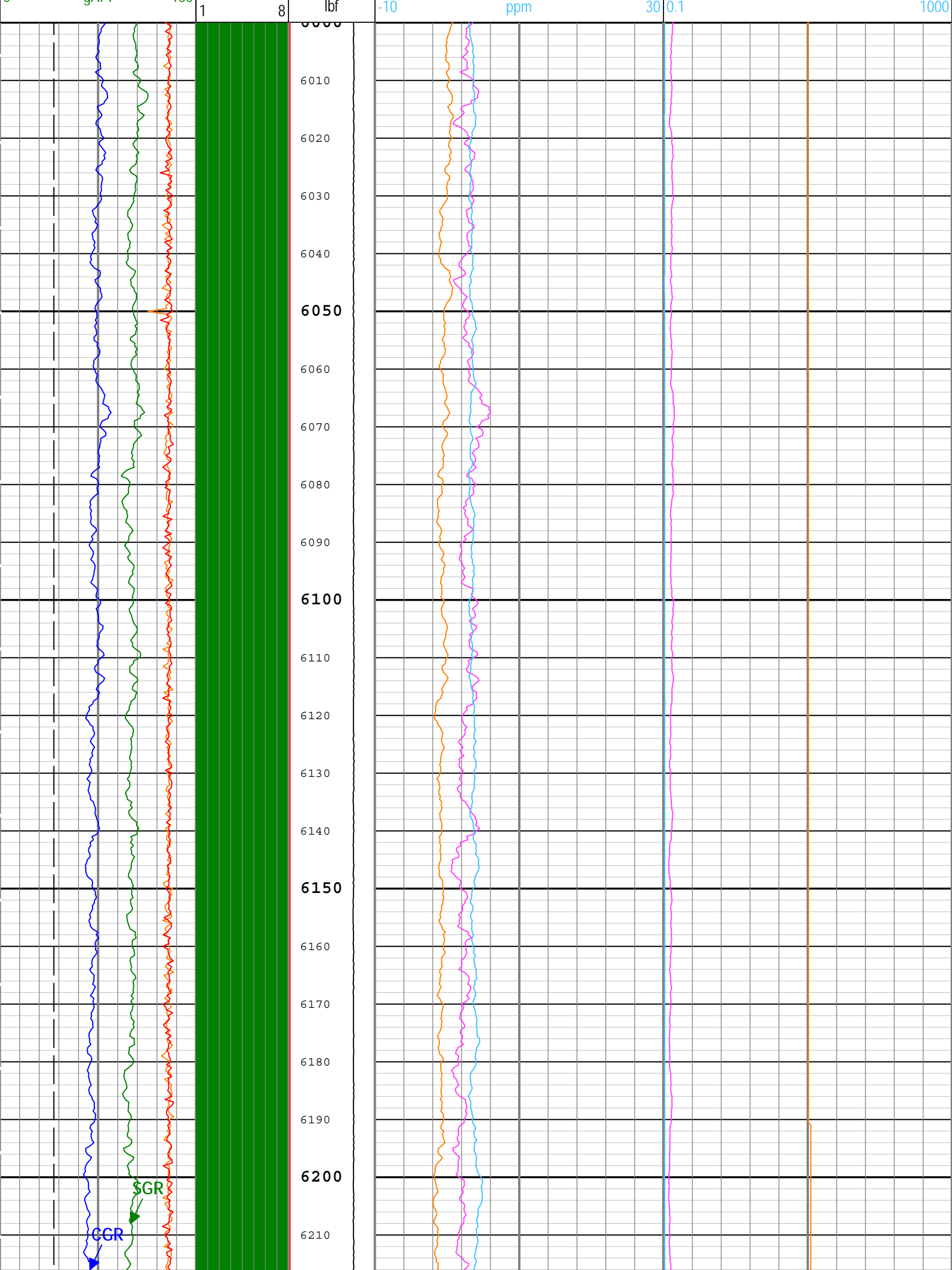
1: Toolstring				1: Remarks
<div> <div> <div>Equip name</div> <div>LEH-QT</div> <div>LEH-QT</div> </div> <div> <div>Length</div> <div>66.79</div> </div> <div> <div>MP name</div> <div></div> </div> <div> <div>Offset</div> <div></div> </div> </div>		<div> <div>CTEM</div> <div>HV</div> </div>	<div> <div>62.97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

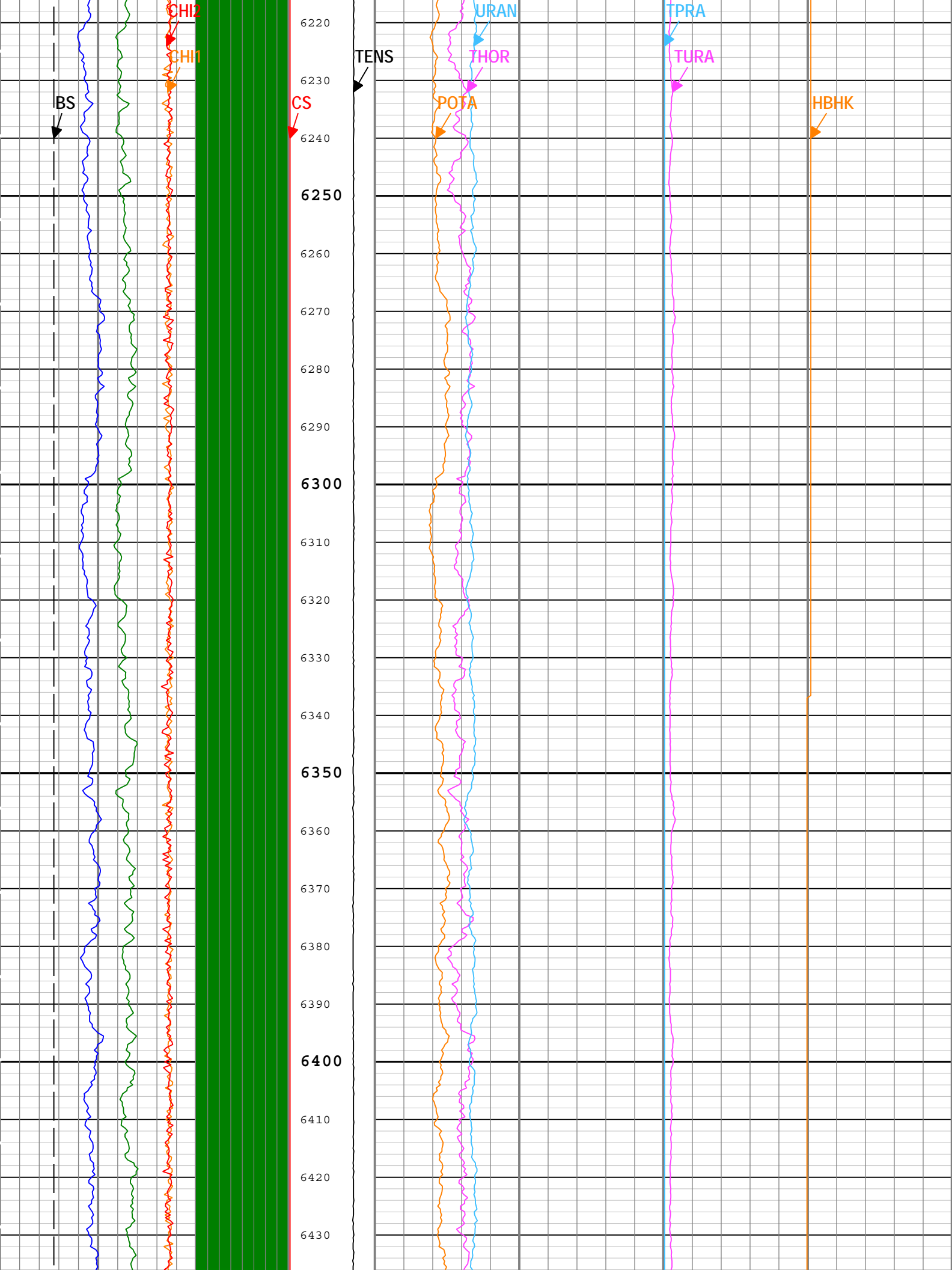


## Depth Summary

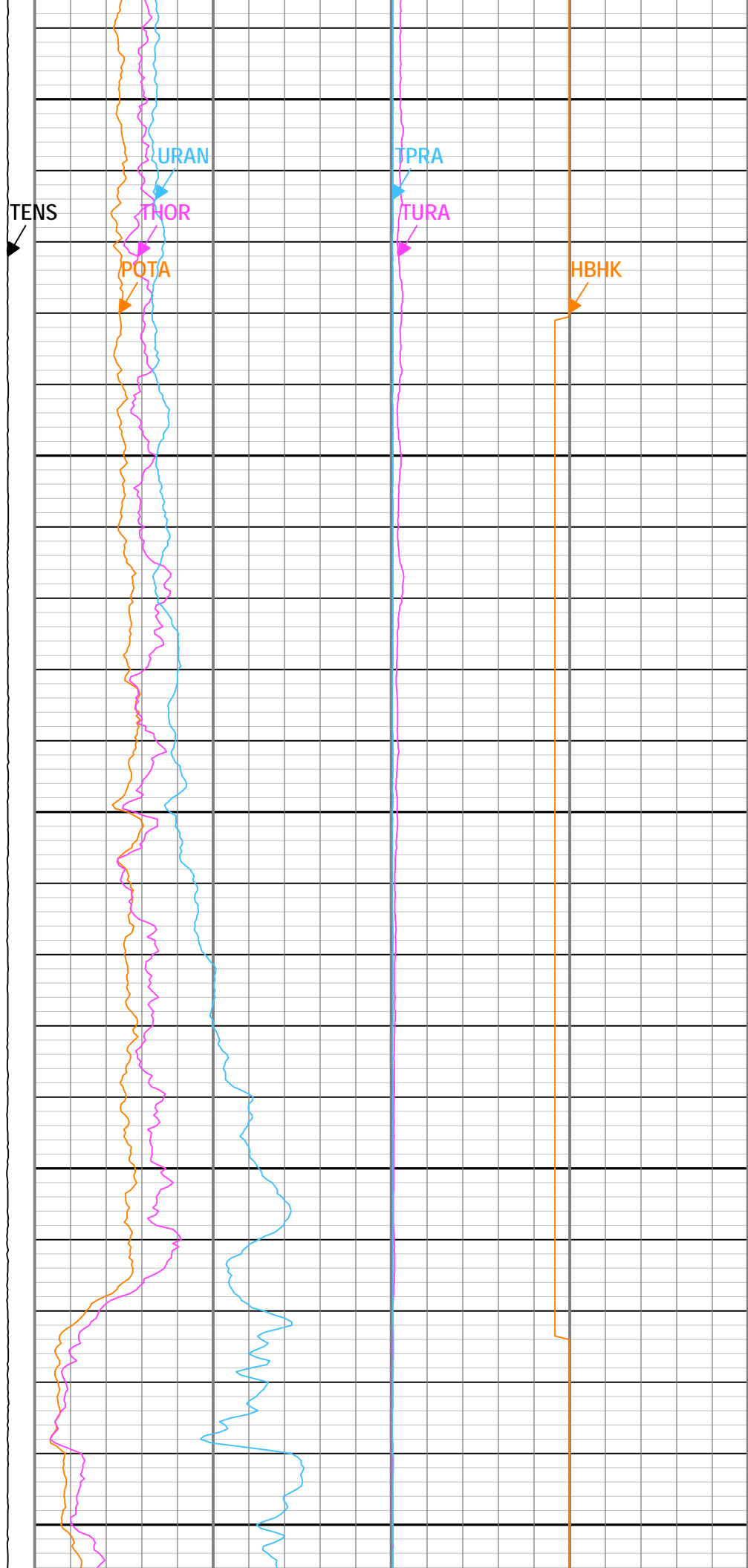
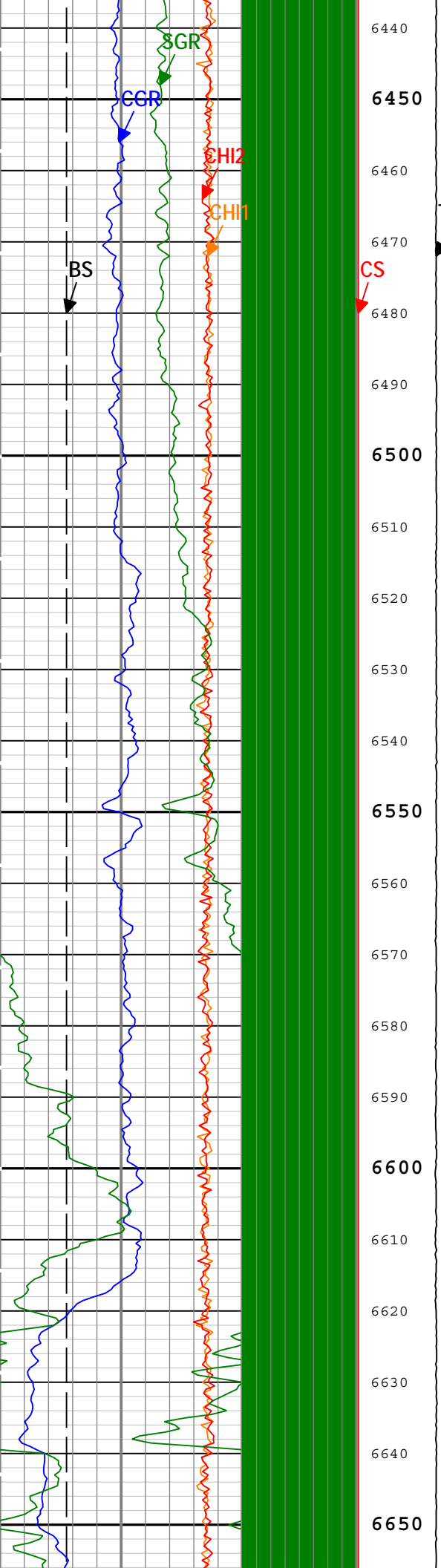
Depth Summary			
Depth Control Parameters	1		
Conveyance Type	Wireline		
Rig Type	Top Drive		
Depth Measuring Device	1		
Type	IDW-B		
Wheel Correction 1	1		
Wheel Correction 2	0		
Tension Device	1		
Type	CMTD-B/A		

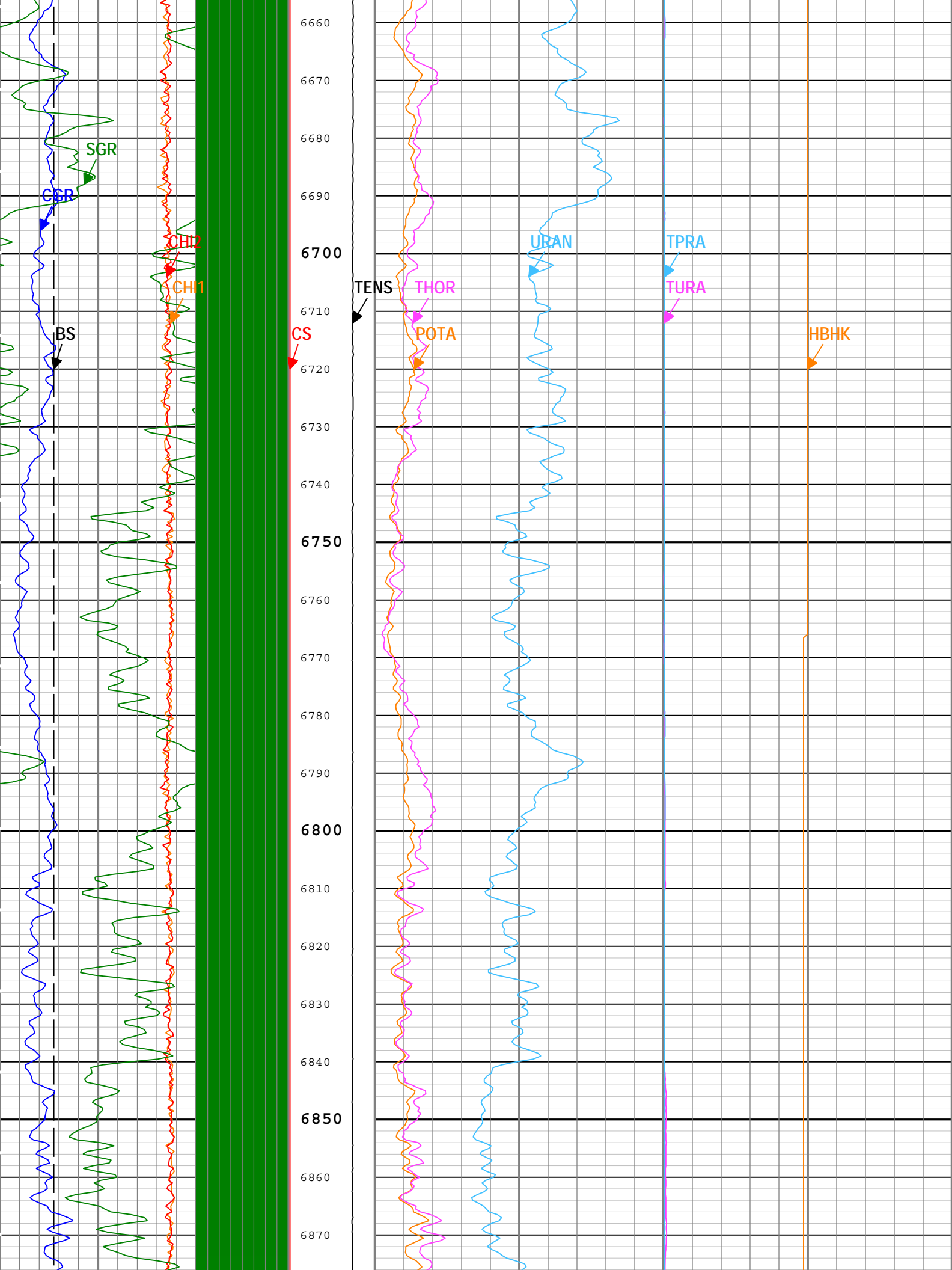
Calibration Points	0							
Logging Cable	1							
Type	7-46NT-XS							
Logging Cable Length ( ft )	24000.00							
1								
Integration Summary								
Output Channel(s)	Output Description	Input Parameter	Output Value	Unit				
Pass Summary								
Run Name	Pass Objective	Direction	Top	Bottom	Start	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	
All depths are referenced to toolstring zero								
Log	1: Log[3]:Up							
Description: HNGS Basic   Format: Log ( HNGS Basic )   Index Scale: 5 in per 100 ft   Index Unit: ft   Index Type: Measured Depth   Creation Date: 01-Aug-2012 16:08:36								
TIME_1900 - Time Marked every 60.00 (s)								
Log Quality Control Gamma Ray Status (LQC_GR) HNGS-BA								
1 - CarthwStatus - Cartridge Hardware Status :			<div></div> Cartridge Hardware: Normal	<div></div> Cartridge Hardware: Warning				
2 - CartTempStatus - Cartridge Temperature Status :			<div></div> Cartridge Temperature < 150 °C	<div></div> Cartridge Temperature >= 175 °C				
3 - Det1TempStatus - Detector 1 Temperature Status :			<div></div> 150 °C <= Cartridge Temperature < 175 °C	<div></div> 50 °C <= Detector 1 Temperature < 80 °C				
4 - Det2TempStatus - Detector 2 Temperature Status :			<div></div> Detector 1 Temperature < 50 °C	<div></div> 50 °C <= Detector 2 Temperature < 80 °C				
5 - Det1CtrlLoopStatus - Detector 1 Control Loop Status :			<div></div> Detector 1 Temperature >= 80 °C	<div></div> Detector 1 Control Loop: Warning				
6 - Det2CtrlLoopStatus - Detector 2 Control Loop Status :			<div></div> Detector 2 Temperature < 50 °C	<div></div> Detector 2 Control Loop: Warning				
7 - Det1ChiSqrStatus - Detector 1 Chi Squared Status :			<div></div> Detector 2 Temperature >= 80 °C	<div></div> Detector 1 Control Loop: Error				
8 - Det2ChiSqrStatus - Detector 2 Chi Squared Status :			<div></div> Detector 1 Control Loop: Normal	<div></div> Detector 2 Control Loop: Error				
			<div></div> Detector 2 Control Loop: Normal	<div></div> Detector 1 Chi Squared > 3.0				
			<div></div> Detector 2 Control Loop: Error	<div></div> Detector 2 Chi Squared > 3.0				
			<div></div> Detector 2 Control Loop: Error					
			<div></div> Detector 2 Control Loop: Normal					
			<div></div> Detector 2 Control Loop: Error					
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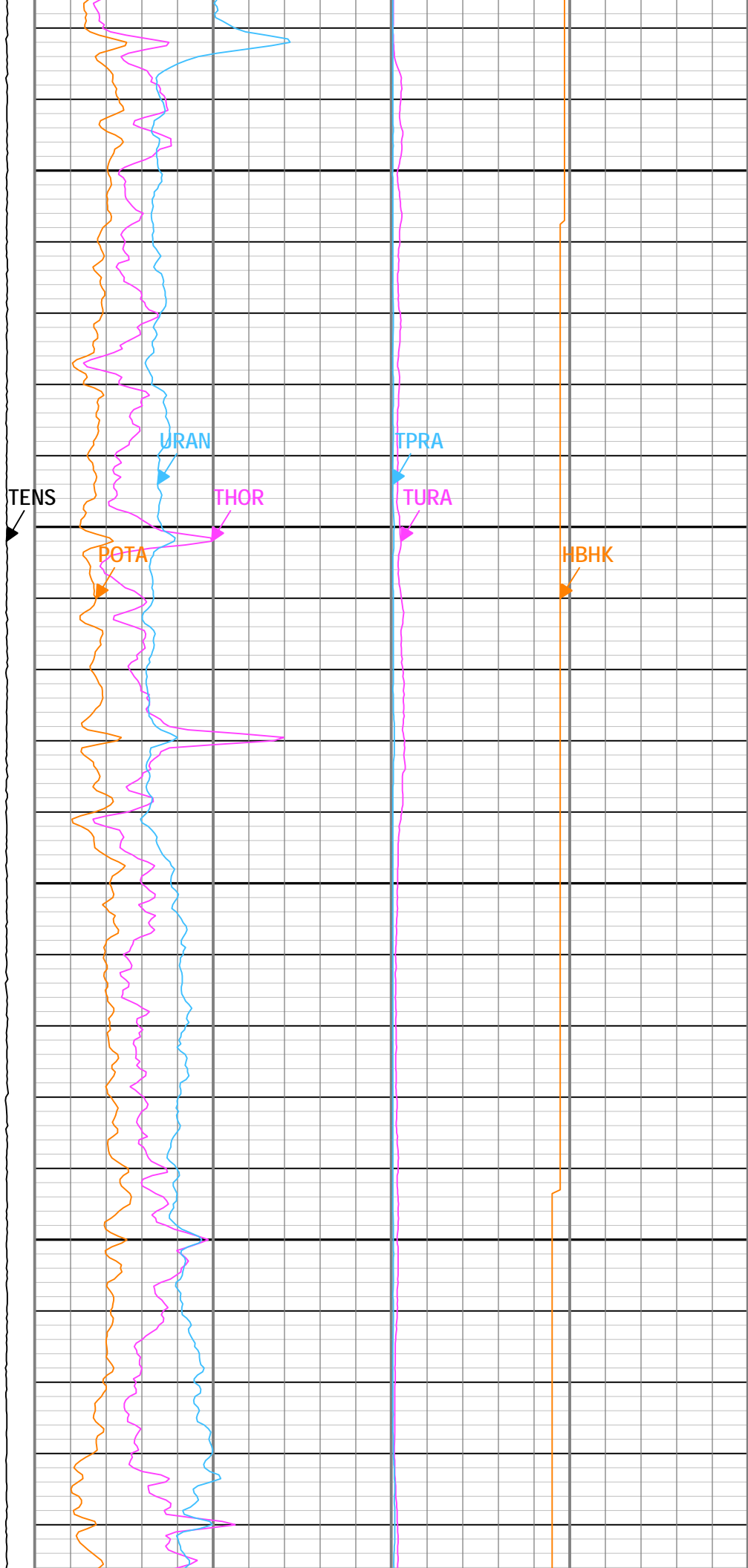
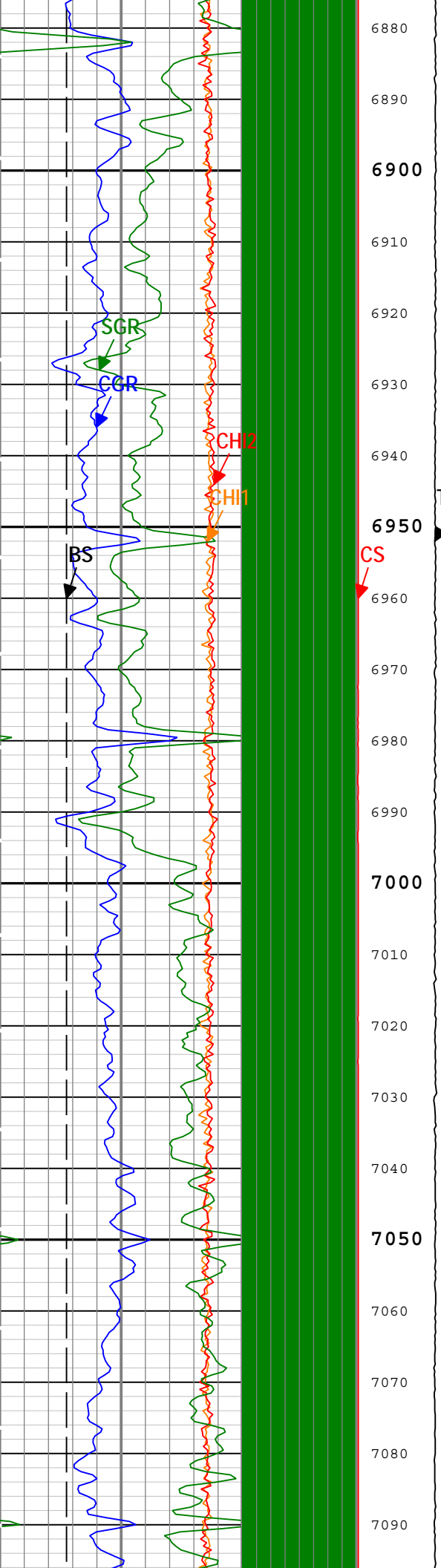


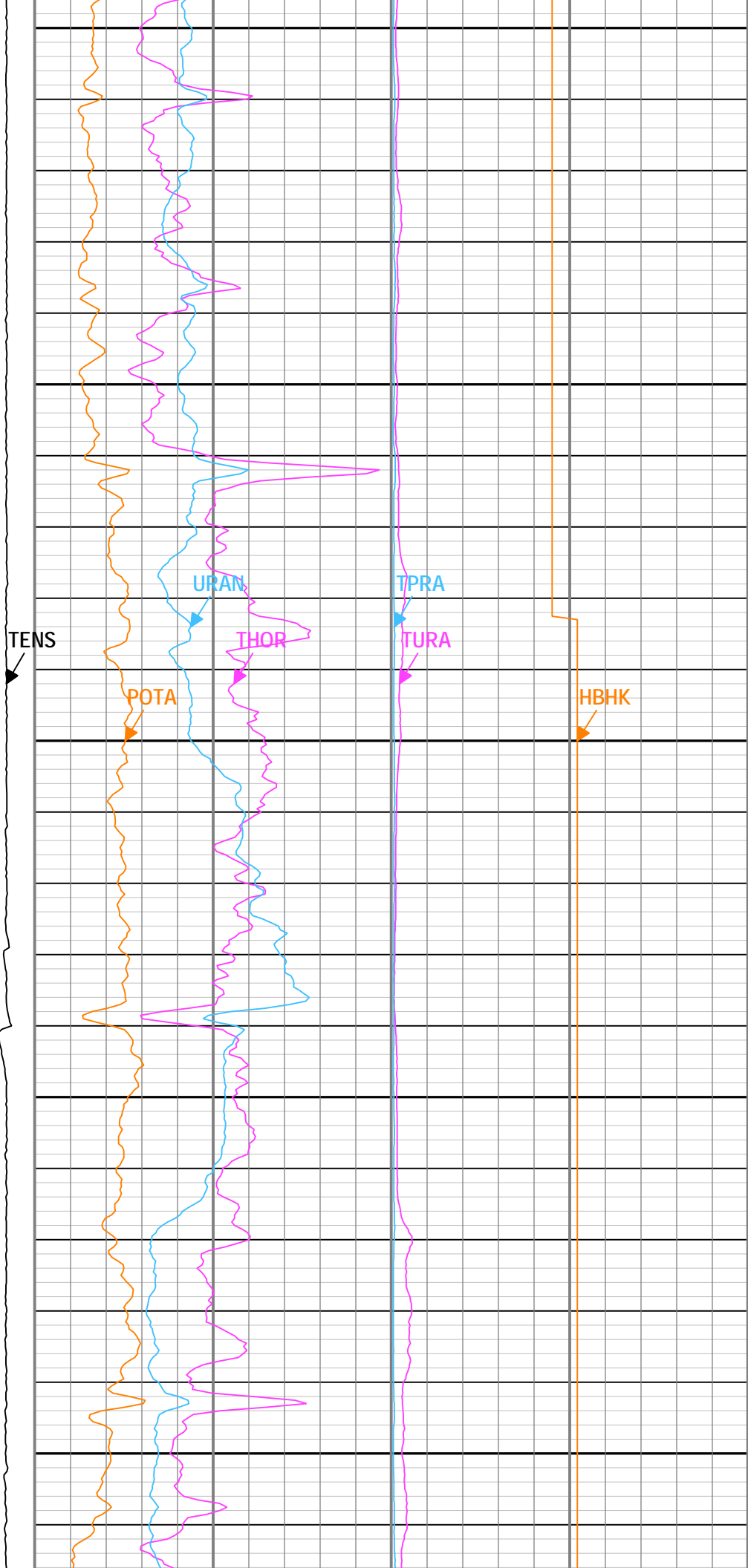
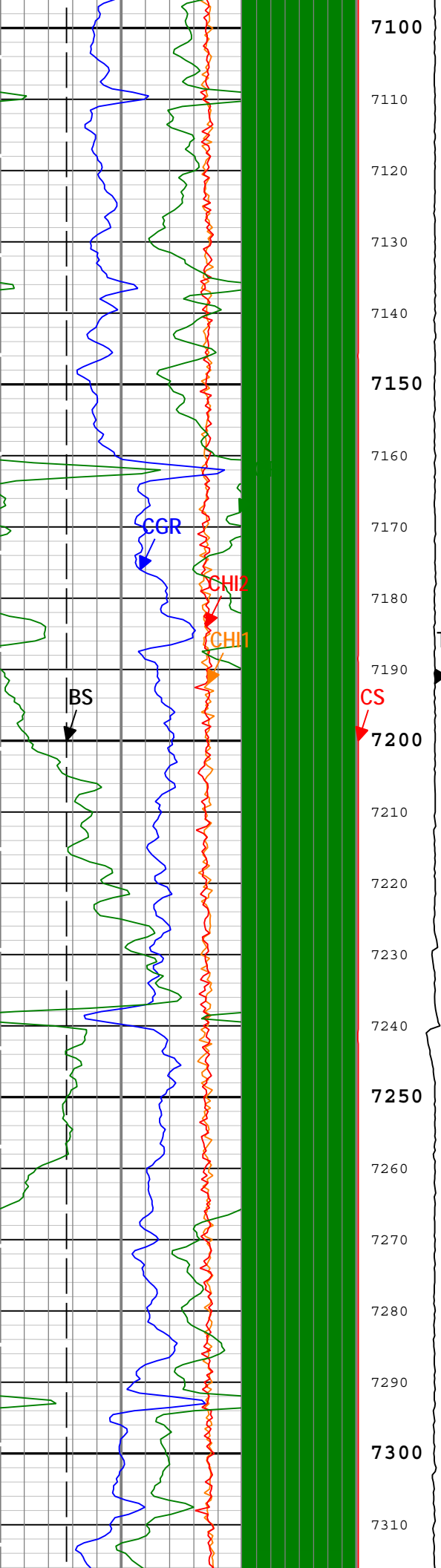


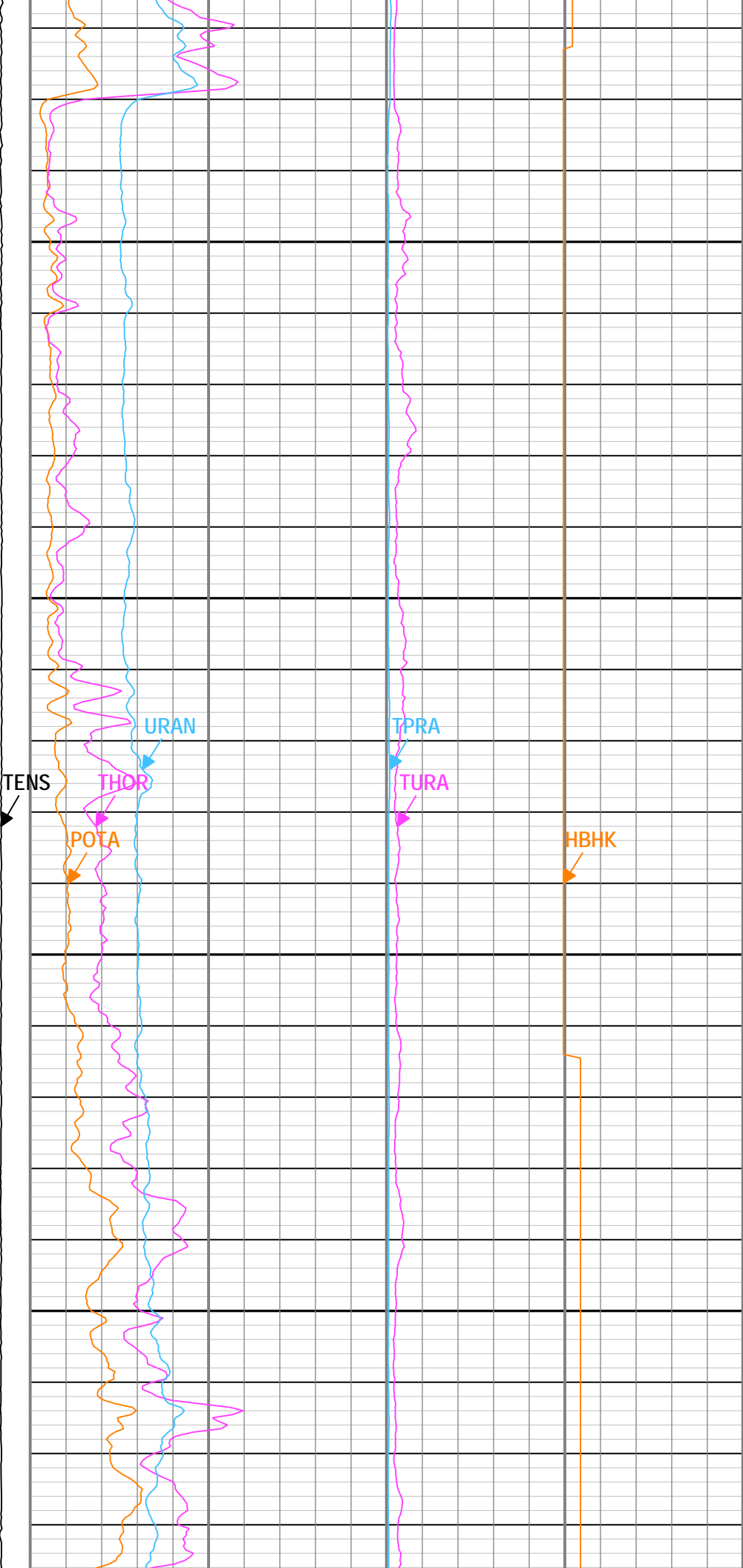
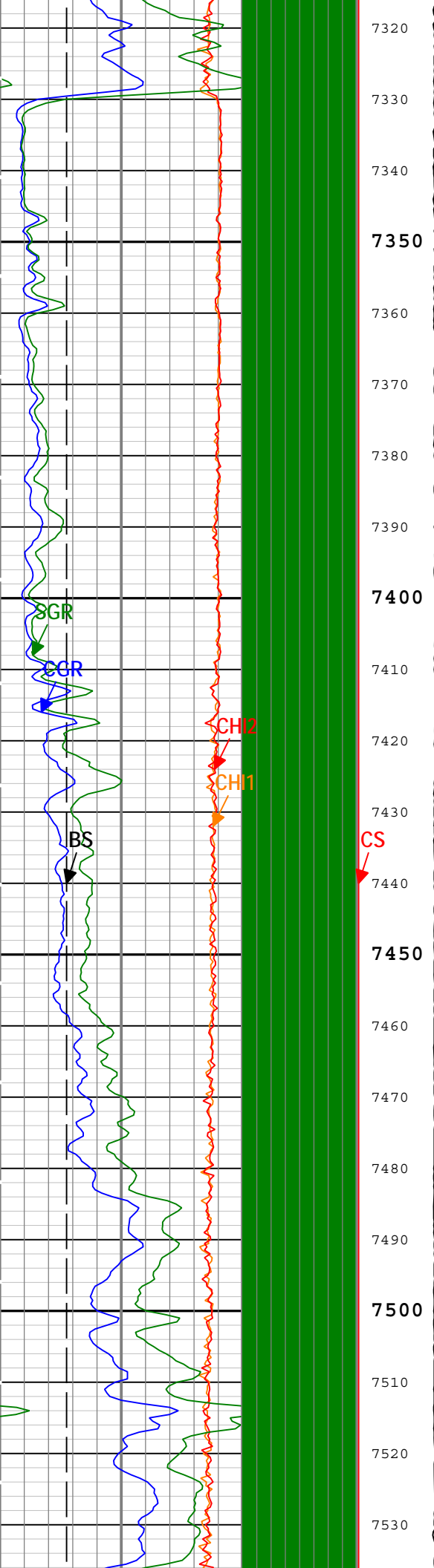


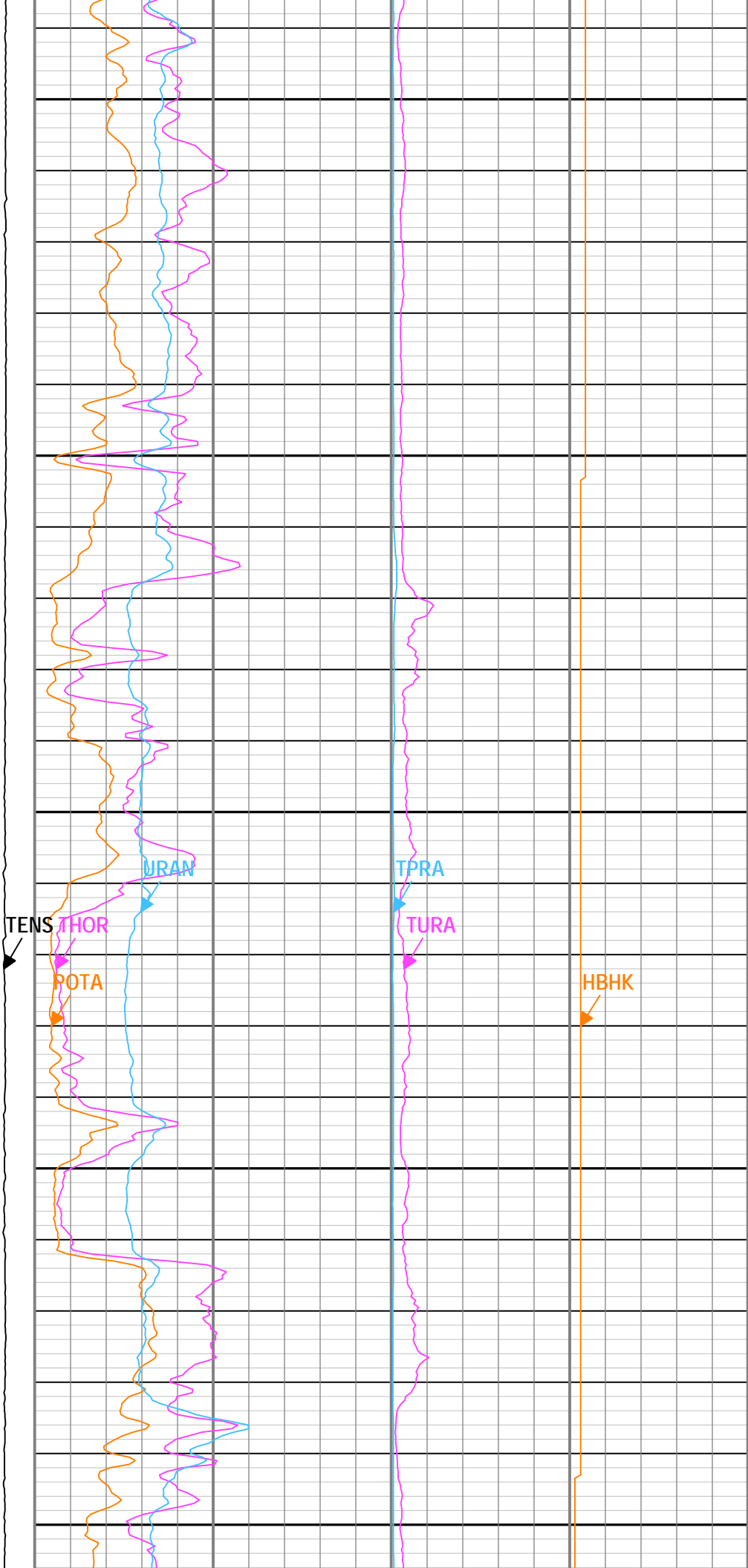
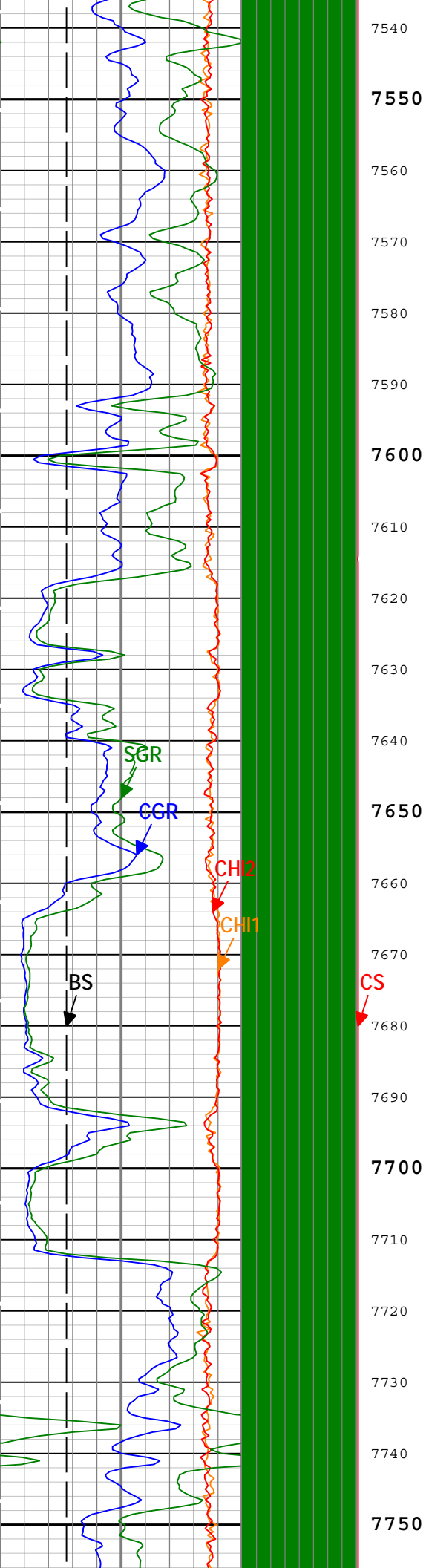


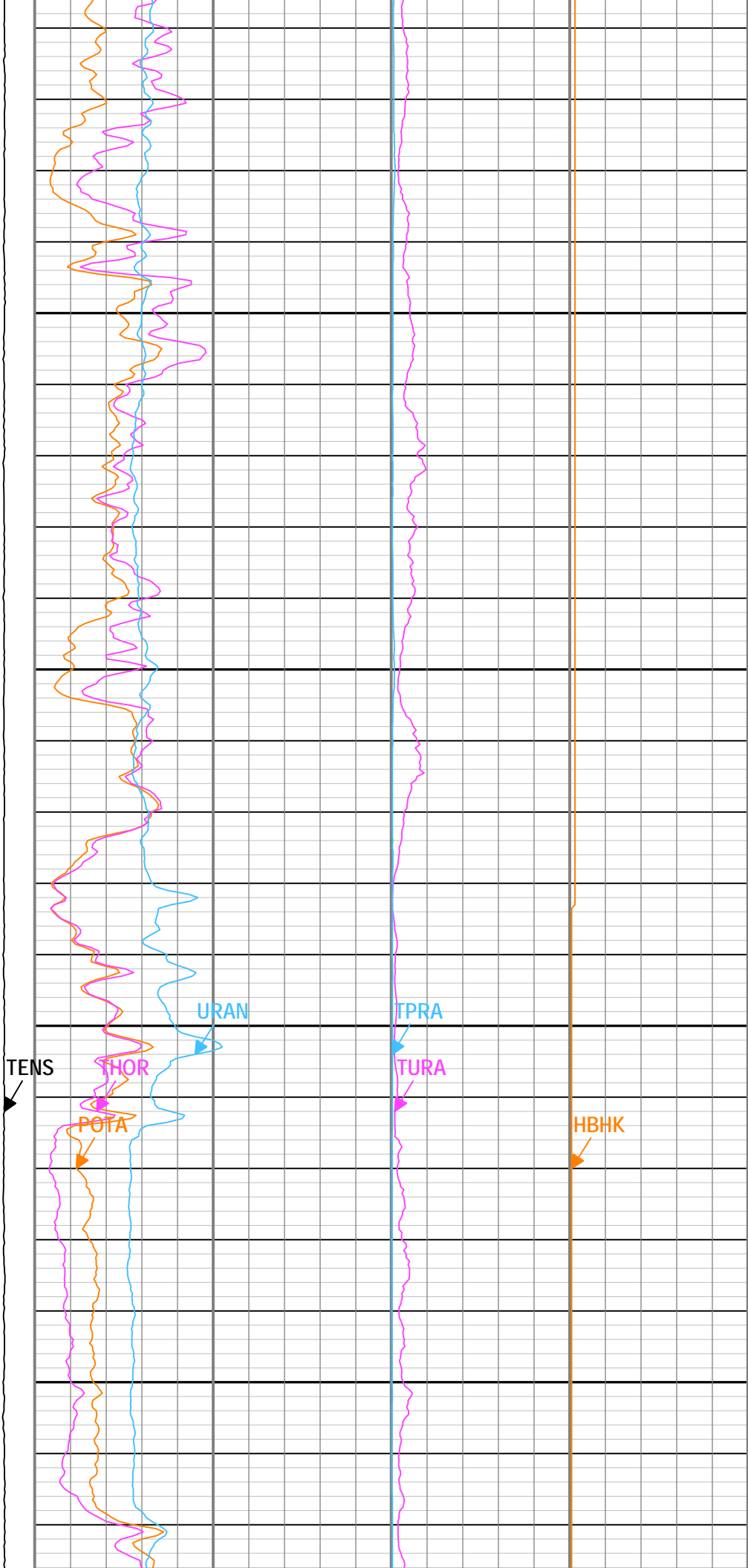
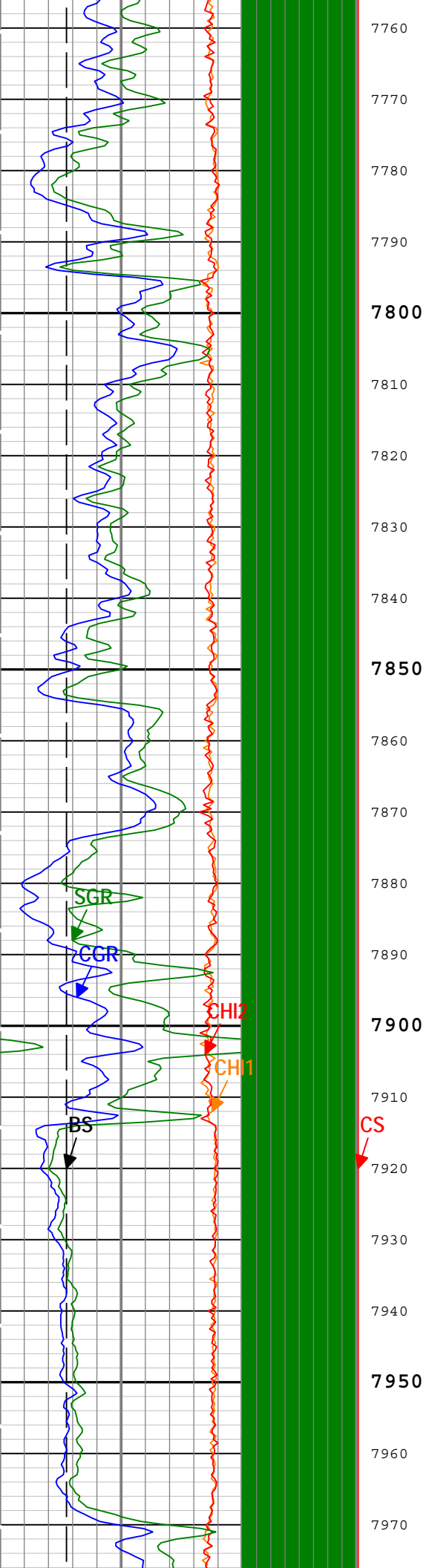


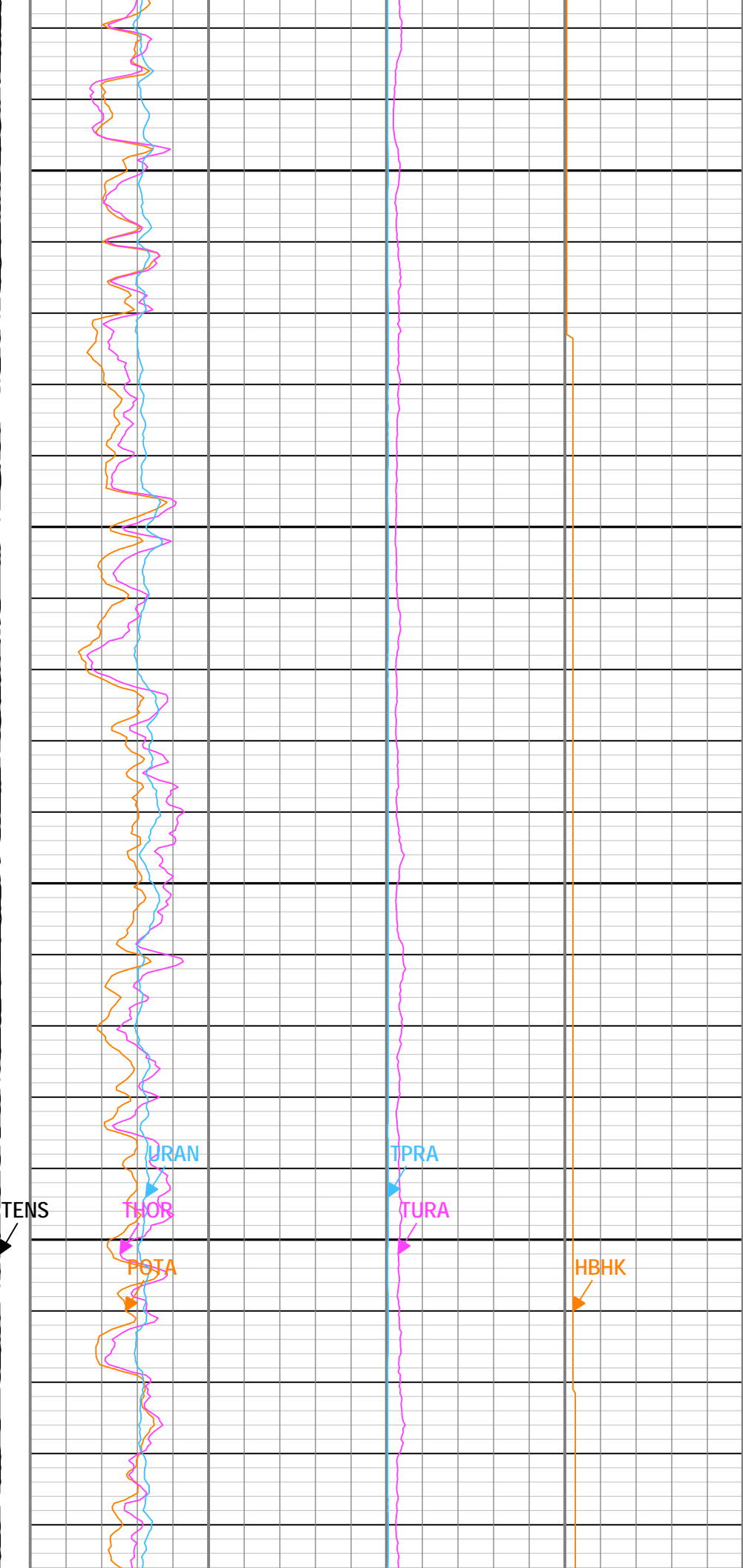
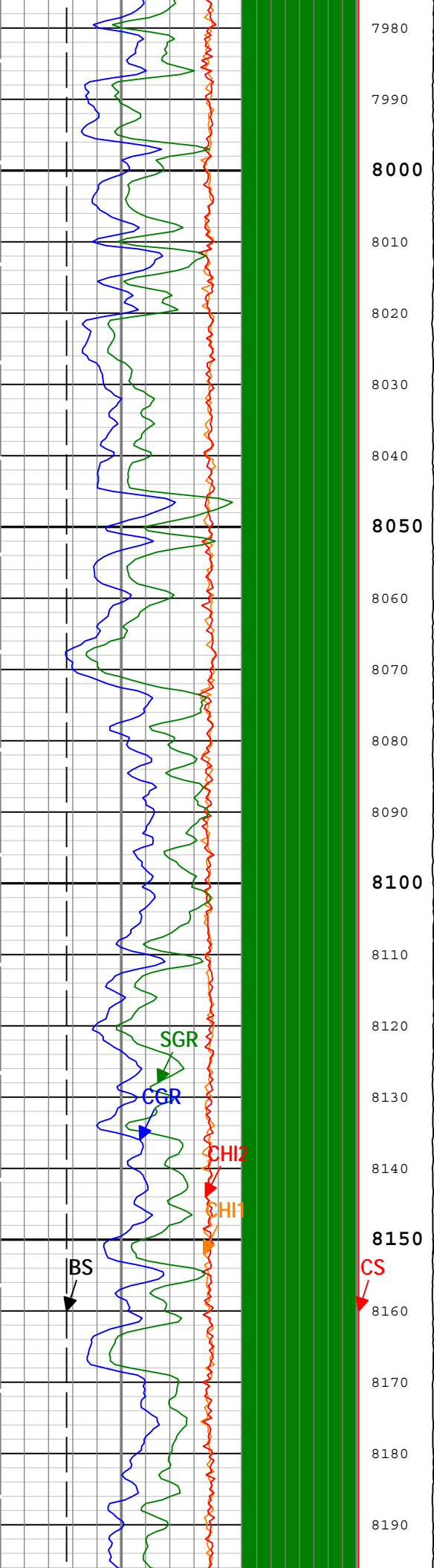




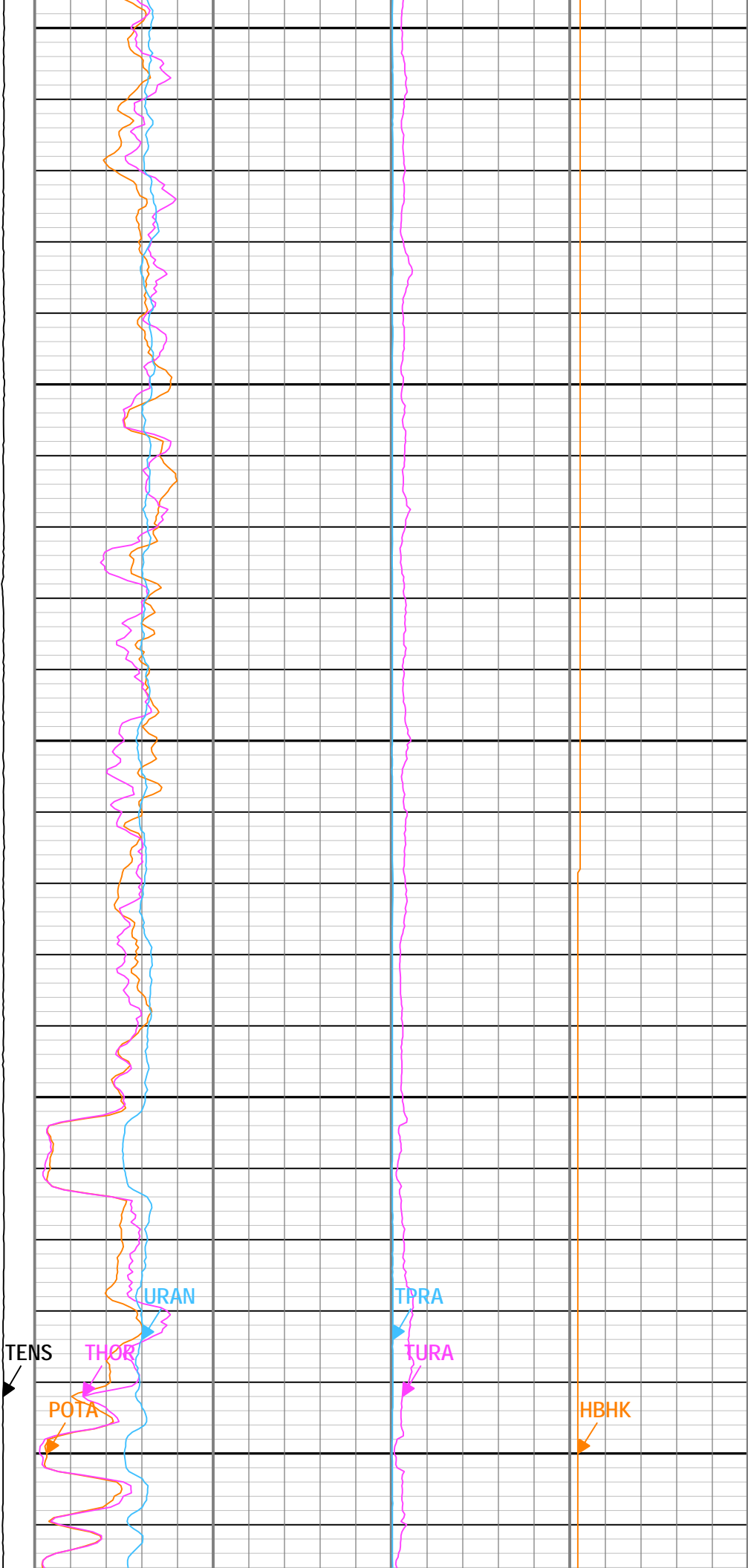
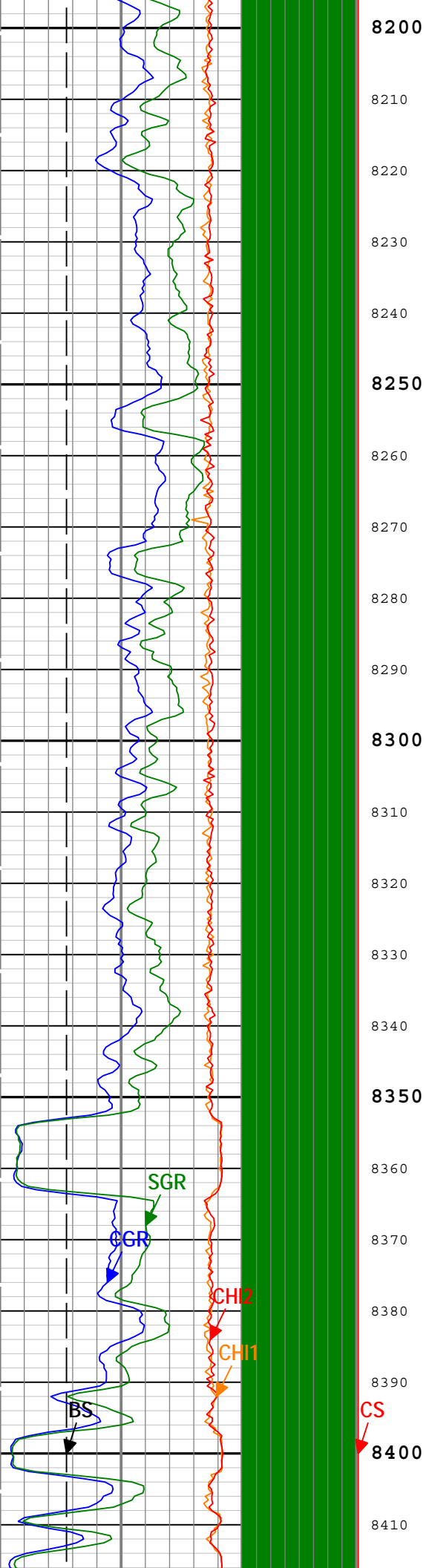


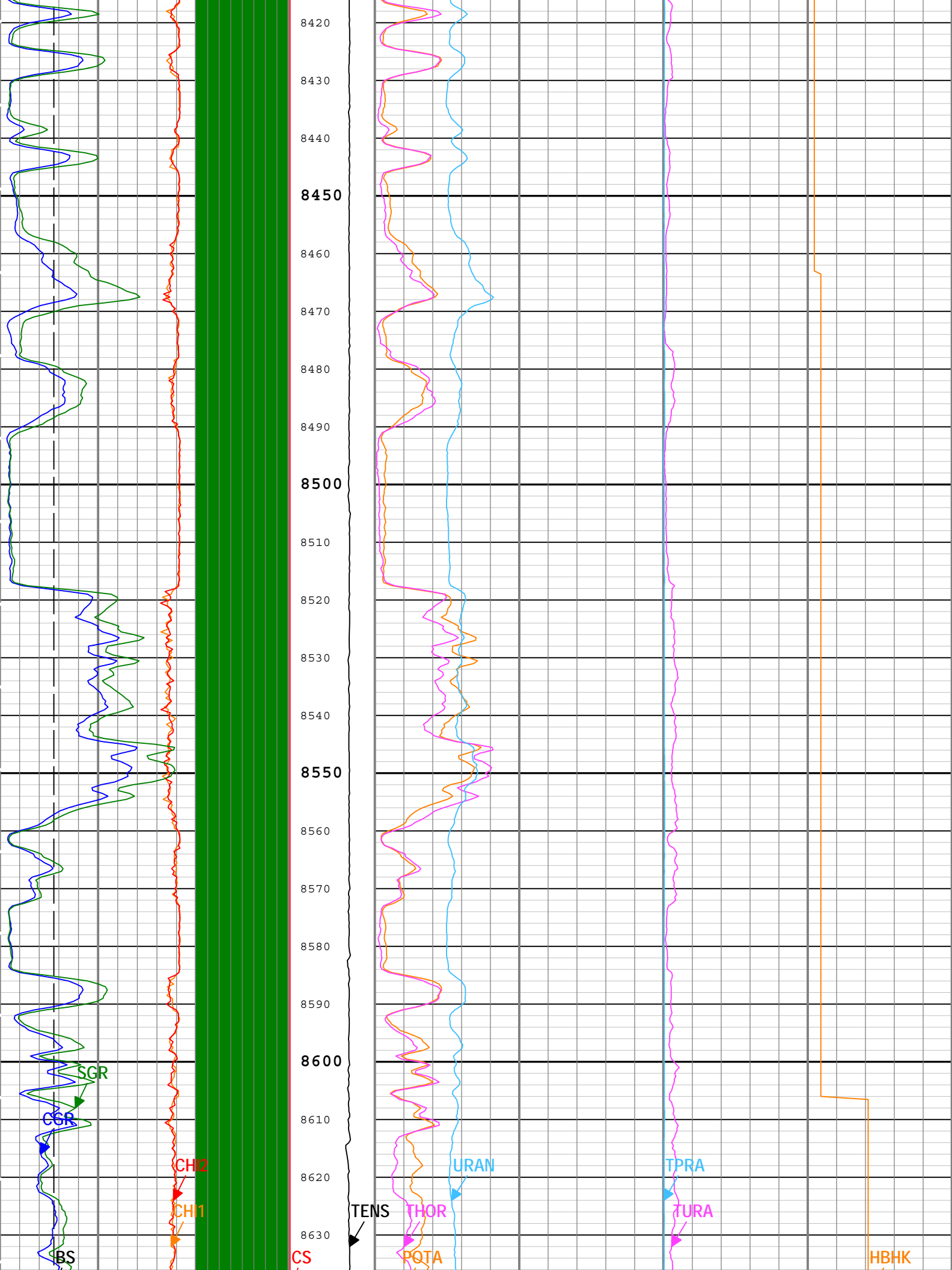


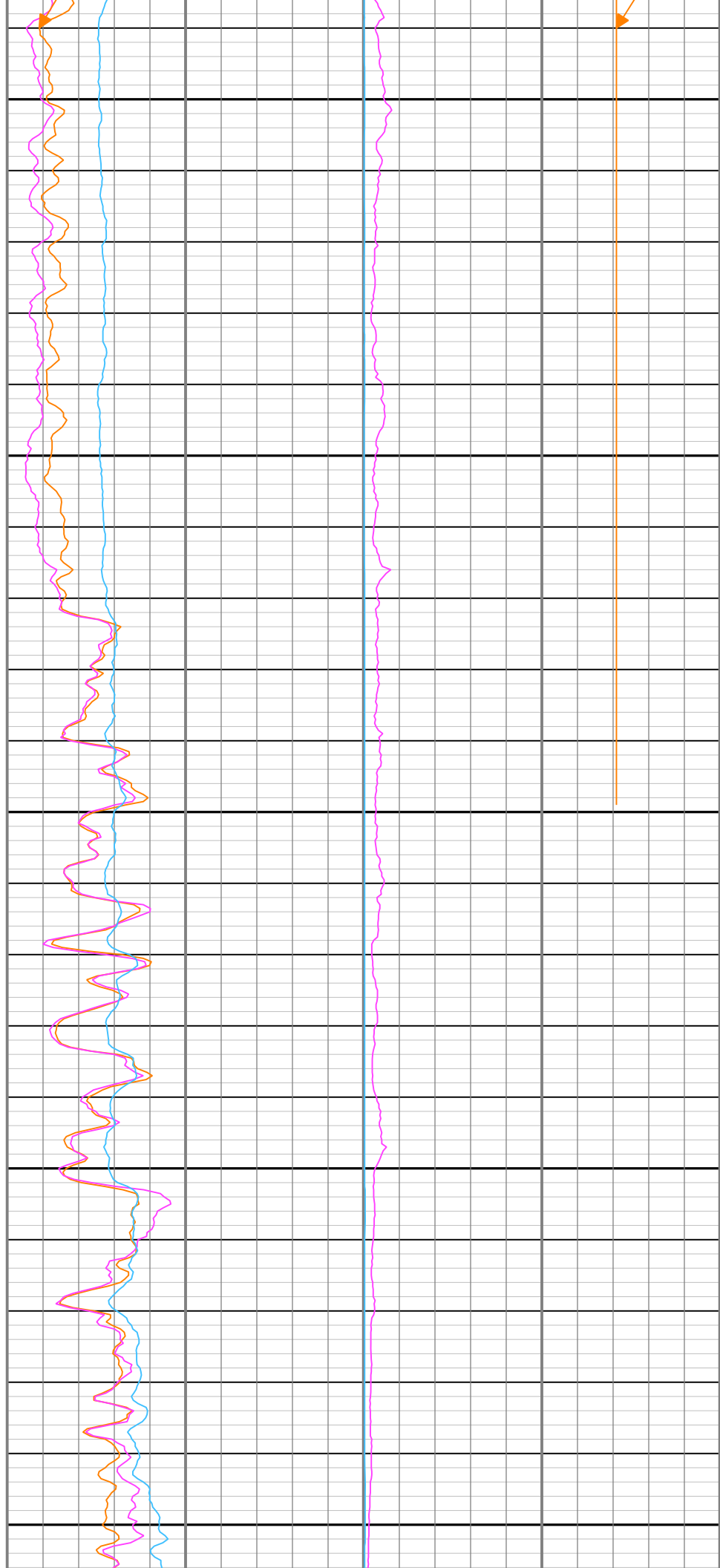
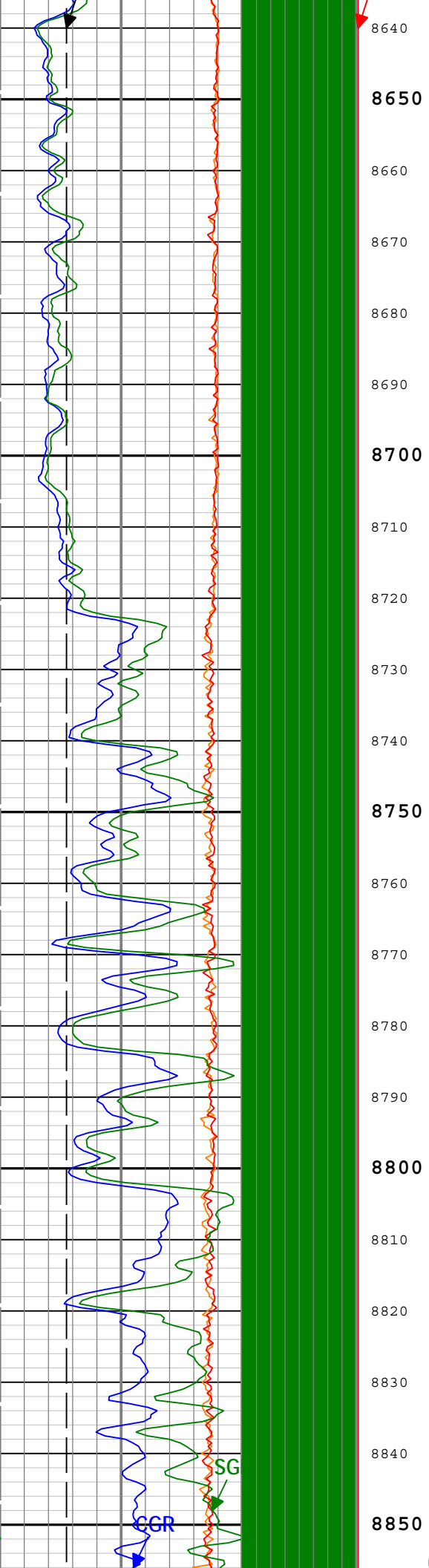


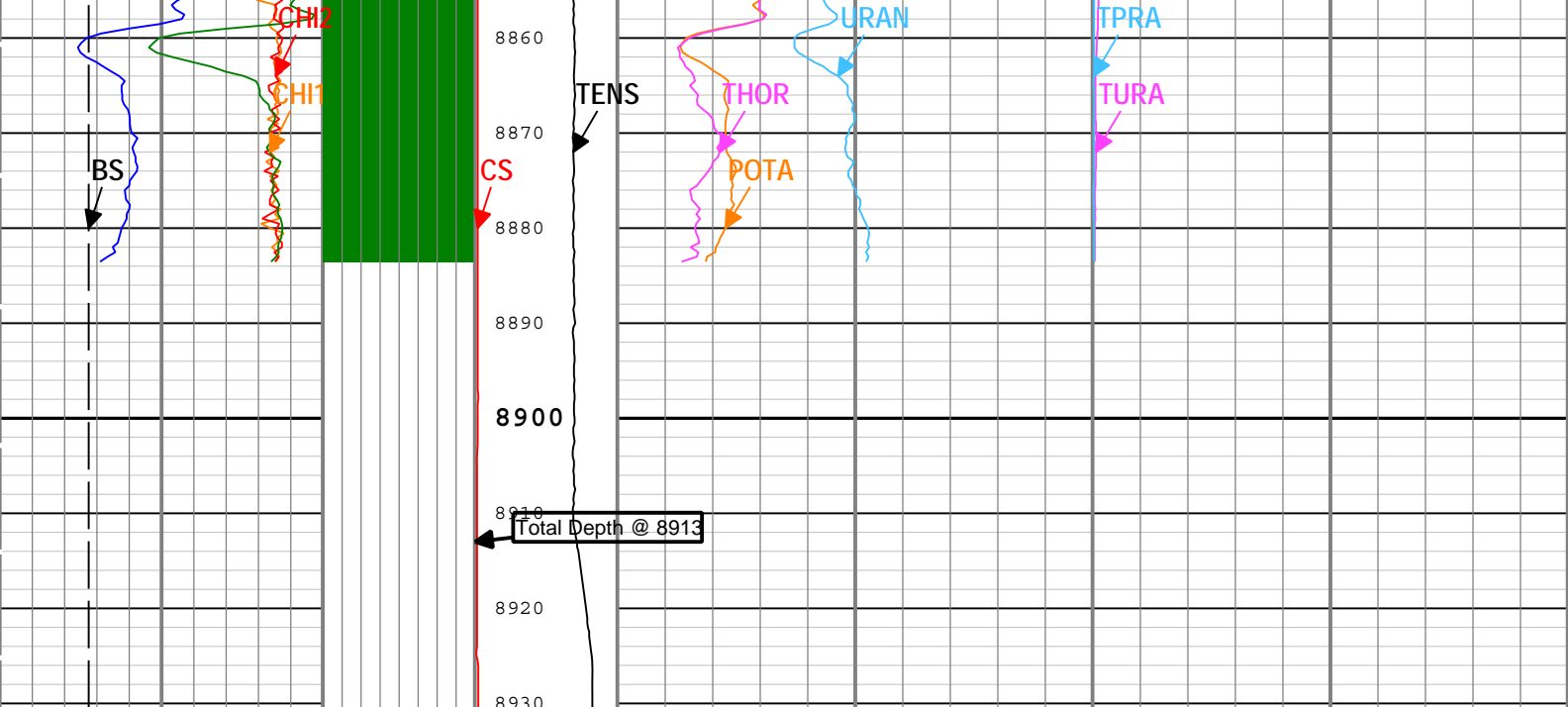












Bit Size (BS) 6 in 16	Log Quality Control Gamma Ray Status (LQC_GR) HNGS-BA  18	Cable Speed (CS) 0 50000 ft/h	Potassium Concentration (POTA) HNGS-BA 0 % 10	Borehole Potassium Concentration (HBHK) HNGS-BA -5 % 5
Detector 1 Chi-Squared (CHI1) HNGS-BA 10 0		Cable Tension (TENS) 10000 lbf 0	Thorium Concentration (THOR) HNGS-BA 0 ppm 30	Thorium/Uranium Ratio (TURA) HNGS-BA 0.01 100
Detector 2 Chi-Squared (CHI2) HNGS-BA 10 0			Uranium Concentration (URAN) HNGS-BA -10 ppm 30	Thorium/Potassium Ratio (TPRA) HNGS-BA 0.1 1000
Gamma Ray Contribution from Thorium and Potassium (CGR) HNGS-BA 0 gAPI 150				
Spectroscopy Gamma Ray (SGR) HNGS-BA 0 gAPI 150				

Log Quality Control Gamma Ray Status (LQC_GR) HNGS-BA		
1 - CarthwStatus - Cartridge Hardware Status :	<div></div> Cartridge Hardware: Normal	<div></div> Cartridge Hardware: Warning
	<div></div> Cartridge Hardware: Error	
2 - CartTempStatus - Cartridge Temperature Status :	<div></div> Cartridge Temperature < 150 °C	
	<div></div> 150 °C <= Cartridge Temperature < 175 °C	<div></div> Cartridge Temperature >= 175 °C
3 - Det1TempStatus - Detector 1 Temperature Status :	<div></div> Detector 1 Temperature < 50 °C	<div></div> 50 °C <= Detector 1 Temperature < 80 °C
	<div></div> Detector 1 Temperature >= 80 °C	
4 - Det2TempStatus - Detector 2 Temperature Status :	<div></div> Detector 2 Temperature < 50 °C	<div></div> 50 °C <= Detector 2 Temperature < 80 °C
	<div></div> Detector 2 Temperature >= 80 °C	
5 - Det1CtrlLoopStatus - Detector 1 Control Loop Status :	<div></div> Detector 1 Control Loop: Normal	<div></div> Detector 1 Control Loop: Warning
	<div></div> Detector 1 Control Loop: Error	
6 - Det2CtrlLoopStatus - Detector 2 Control Loop Status :	<div></div> Detector 2 Control Loop: Normal	<div></div> Detector 2 Control Loop: Warning
	<div></div> Detector 2 Control Loop: Error	
7 - Det1ChiSqrdStatus - Detector 1 Chi Squared Status :	<div></div> Detector 1 Chi Squared <= 3.0	<div></div> Detector 1 Chi Squared > 3.0
8 - Det2ChiSqrdStatus - Detector 2 Chi Squared Status :	<div></div> Detector 2 Chi Squared <= 3.0	<div></div> Detector 2 Chi Squared > 3.0

TIME\_1900 - Time Marked every 60.00 (s)

## Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	No	
BHK	Drilling Fluid Potassium Concentration	Borehole	0	%
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	8.75	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-B	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	754	ft
DBCC	Barite Constant Correction Flag	HNGS-BA	None	
DFD	Drilling Fluid Density	Borehole	9.05	lbm/gal
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	
HCRB	Apply Borehole Potassium Correction	HNGS-BA	None	
HEMA	Hematite Presence Flag	Borehole	No	
SGRC	Standard Gamma Ray Correction Flag	HNGS-BA	Yes	

## Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	900	ft/h

## Calibration Report

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

Primary Equipment :		AHIS		0
Array Induction Sonde - H				
Auxiliary Equipment :		AHRM		
AITH Rm/SP Bottom Nose				

### 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	
Test Loop Phase - 0	deg	Master	0	-3.000	-2.386	3.000	
Test Loop Gain - 1		Master	1.000	0.950	1.015	1.050	
Test Loop Phase - 1	deg	Master	0	-3.000	-2.995	3.000	
Test Loop Gain - 2		Master	1.000	0.950	1.025	1.050	
Test Loop Phase - 2	deg	Master	0	-3.000	-0.471	3.000	
Test Loop Gain - 3		Master	1.000	0.950	1.017	1.050	
Test Loop Phase - 3	deg	Master	0	-3.000	1.700	3.000	
Test Loop Gain - 4		Master	1.000	0.950	1.000	1.050	
Test Loop Phase - 4	deg	Master	0	-3.000	1.712	3.000	
Test Loop Gain - 5		Master	1.000	0.950	0.988	1.050	
Test Loop Phase - 5	deg	Master	0	-3.000	0.302	3.000	
Test Loop Gain - 6		Master	1.000	0.950	0.995	1.050	
Test Loop Phase - 6	deg	Master	0	-3.000	0.488	3.000	
Test Loop Gain - 7		Master	1.000	0.950	0.991	1.050	
Test Loop Phase - 7	deg	Master	0	-3.000	-0.138	3.000	

### AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM):		00:19:39 12-May-2012					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-103.990	119.000	
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-400.437	2250.000	
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	179.469	204.000	
Sonde Error Correction Quad - 1		Master	-----	-625.000	-101.430	625.000	
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	105.845	156.000	
Sonde Error Correction Quad - 2		Master	-----	-350.000	-125.620	350.000	
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	60.290	89.000	
Sonde Error Correction Quad - 3		Master	-----	-250.000	69.692	250.000	



Thru Cal Mag - 5	V	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	1.173 1.173 ---- ---- ----	1.929 1.953 ---- 0.024 ----	2.737 2.737 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 5	deg	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	-3.000 -3.000 ---- ---- ----	59.101 59.042 ---- -0.059 ----	117.000 117.000 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 6	V	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	1.173 1.173 ---- ---- ----	1.928 1.952 ---- 0.024 ----	2.737 2.737 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 6	deg	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	-3.000 -3.000 ---- ---- ----	59.114 59.055 ---- -0.059 ----	117.000 117.000 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Mag - 7	V	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	0.849 0.849 ---- ---- ----	1.379 1.393 ---- 0.014 ----	1.981 1.981 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>
Thru Cal Phase - 7	deg	Master Before After Before-Master After-Before	---- ---- ---- ---- ----	-7.000 -7.000 ---- ---- ----	55.741 55.363 ---- -0.378 ----	113.000 113.000 ---- ---- ----	<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 ---- ---- ----	0.052 0.095 ---- 0.043 ----	50.000 50.000 ---- ---- ----	<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 ---- ---- ----	993.937 993.050 ---- -0.887 ----	1040.000 1040.000 ---- ---- ----	<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>
Temperature Plus	V	Master Before After Before-Master After-Before	   ---- ----	0.870 0.870 ---- ---- ----	0.921 0.920 ---- -0.001 ----	0.960 0.960 ---- ---- ----	<div><div></div><div></div><div></div><div></div><div></div></div>

## HDRS-B (HILT Density and Rxo Sonde, 125 degC) Calibration - Run 1

Primary Equipment :		
HILT High-Resolution Control Cartridge, 125 degC	HRCC-B	
HILT Resistivity Gamma-Ray Density Device, 125 degC	HRGD-B	1748
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	1.0000		0.7304		
		Before	0.7304	0.6939	0.7301	0.7669	
		Before-Master	-----	-----	-0.0003	-----	
BS Window Sum	1/s	Master	1		9378		
		Before	9378	8909	9359	9847	
		Before-Master	-----	-----	-19	-----	
SS Window Ratio		Master	1.0000		0.4771		
		Before	0.4771	0.4532	0.4756	0.5009	
		Before-Master	-----	-----	-0.0015	-----	
SS Window Sum	1/s	Master	1		9280		
		Before	9280	8816	9257	9744	
		Before-Master	-----	-----	-23	-----	
LS Window Ratio		Master	1.0000		0.2922		
		Before	0.2922	0.2776	0.2888	0.3068	
		Before-Master	-----	-----	-0.0034	-----	
LS Window Sum	1/s	Master	1		1025		
		Before	1025	973	1016	1076	
		Before-Master	-----	-----	-9	-----	

## 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		1000	1687	2400	
		Before		1000	1688	2400	
		Before-Master	-----	-100	1	100	
SS PM High Voltage	V	Master		1000	1448	2400	
		Before		1000	1454	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	





		Before-Master After-Before	----- -----	----- -----	----- -----	----- -----	<div></div>
Far Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	2793.0 ----- ----- ----- -----	1900.0 ----- ----- ----- -----	2423.0 ----- ----- ----- -----	2900.0 ----- ----- ----- -----	<div></div>
Near Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	4700.0 ----- ----- ----- -----	5618.0 ----- ----- ----- -----	6900.0 ----- ----- ----- -----	<div></div>
Far Corrected Plus Measurement - 0	1/s	Master Before After Before-Master After-Before	----- ----- ----- ----- -----	1900.0 ----- ----- ----- -----	2366.0 ----- ----- ----- -----	2900.0 ----- ----- ----- -----	<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>
RGR Zero Measurement	gAPI	Before After After-Before	30.0 ----- -----	0 ----- -----	78.5 ----- -----	120.0 ----- -----	<div></div>
RGR Plus Measurement	gAPI	Before After After-Before	185.4 ----- -----	157.1 ----- -----	176.2 NOT DONE -----	206.3 ----- -----	<div></div>
GR Calibration Gain		Before After After-Before	0.89 ----- -----	0.80 ----- -----	0.94 ----- -----	1.05 ----- -----	<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			
Na 511 Peak Location		Master			39.565				
		Before	40.000	37.500	39.720	42.500			
		After	----	----	----	----			
		Before-Master	----	----	0.155	----			
		After-Before	----	----	----	----			
Na 511 Peak Resolution	%	Master			14.403				
		Before	15.500	12.000	15.532	19.000			
		After	----	----	----	----			
		Before-Master	----	----	1.129	----			
		After-Before	----	----	----	----			
High Voltage DAC Value	V	Master			0.000				
		Before	1150.000	850.000	963.461	1600.000			
		After	----	----	----	----			
		Before-Master	----	----	963.461	----			
		After-Before	----	----	----	----			
Na 1785 Peak Location		Master			142.444				
		Before	142.650	135.000	142.289	150.300			
		After	----	----	----	----			
		Before-Master	----	----	-0.155	----			
		After-Before	----	----	----	----			
Na 1785 Peak Resolution	%	Master			8.351				
		Before	8.500	7.000	7.915	11.000			

		After Before-Master After-Before	----- ----- -----	----- ----- -----	-0.436 ----- -----	----- ----- -----	
Temperature	degF	Master Before After Before-Master After-Before	----- 59.900 ----- ----- -----	----- -20.002 ----- ----- -----	----- 114.401 ----- ----- -----	----- 140.000 ----- ----- -----	
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 ----- ----- -----	

## 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	
Na 511 Peak Location		Master Before After Before-Master After-Before	40.000 ----- ----- ----- -----	37.500 ----- ----- ----- -----	39.707 39.627 ----- -0.080 -----	42.500 ----- ----- ----- -----	
Na 511 Peak Resolution	%	Master Before After Before-Master After-Before	15.500 ----- ----- ----- -----	12.000 ----- ----- ----- -----	15.736 16.984 ----- 1.248 -----	19.000 ----- ----- ----- -----	
High Voltage DAC Value	V	Master Before After Before-Master After-Before	1150.000 ----- ----- ----- -----	850.000 ----- ----- ----- -----	0.000 1020.215 ----- 1020.215 -----	1600.000 ----- ----- ----- -----	
Na 1785 Peak Location		Master Before After Before-Master After-Before	142.650 ----- ----- ----- -----	135.000 ----- ----- ----- -----	142.447 142.736 ----- 0.289 -----	150.300 ----- ----- ----- -----	
Na 1785 Peak Resolution	%	Master Before After Before-Master After-Before	8.500 ----- ----- ----- -----	7.000 ----- ----- ----- -----	8.632 9.602 ----- 0.970 -----	11.000 ----- ----- ----- -----	
Temperature	degF	Master Before After Before-Master After-Before	----- 59.900 ----- ----- -----	----- -20.002 ----- ----- -----	----- 114.558 ----- ----- -----	----- 140.000 ----- ----- -----	
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 ----- ----- -----	

## 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	
Coincidence Count Rate Ratio		Master Before After Before-Master After-Before	1.000 ----- ----- ----- -----	0.950 ----- ----- ----- -----	0.000 0.999 ----- 0.999 -----	1.050 ----- ----- ----- -----	

## 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 Before After Before-Master	209.630 ----- ----- -----	201.000 ----- ----- -----	207.865 ----- ----- -----	218.250 ----- ----- -----	

		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

Well:

Longs AC 02-15

Field:

Wattenberg

County:

Weld

State:

Colorado

Schlumberger

Natural Gamma-Ray Spectroscopy