

Company: Southwestern Energy Production Company

Well: Diamond T Sheep 7 92 1 26

Field: Sand Wash Basin Niobrara

County: Moffat State: Colorado

Spectral Gamma Ray

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

Location:		SHL: 660' FNL & 930' FWL	Elev.:	K.B. 6702.00 ft
Permanent Datum:	Ground Level		G.L. 6680.00 ft	
Log Measured From:	Kelly Bushing		D.F. 6702.00 ft	
Drilling Measured From:	Kelly Bushing			
API Serial No. 05-081-07804	Section: 26	Township: 7N	Range: 92W	

Logging Date	28-Sep-2014		
Run Number	ONE		
Depth Driller	9900.00 ft		
Schlumberger Depth	9900.00 ft		
Bottom Log Interval	9900.00 ft		
Top Log Interval	5682.00 ft		
Casing Driller Size @ Depth	9.625 in @ 5681.00 ft		
Casing Schlumberger	5682 ft		
Bit Size	8.75 in		
Type Fluid In Hole	Oil		
Density	11.7 lbm/gal	48 s	
Fluid Loss	4.2 cm3		
Source of Sample	N/A		
RM @ Meas Temp	N/A		
RMF @ Meas Temp	N/A		
RMC @ Meas Temp	N/A		
Source RMF	N/A	N/A	
RM @ BHT	N/A	N/A	
Max Recorded Temperatures	229 degF		
Circulation Stopped	Time 27-Sep-2014	08:00:00	
Logger on Bottom	Time 28-Sep-2014	12:00:39	
Unit Number	Location: 9108	Fort Morgan	
Recorded By	E Meadows/M Pace		
Witnessed By	Sweeta Bose		

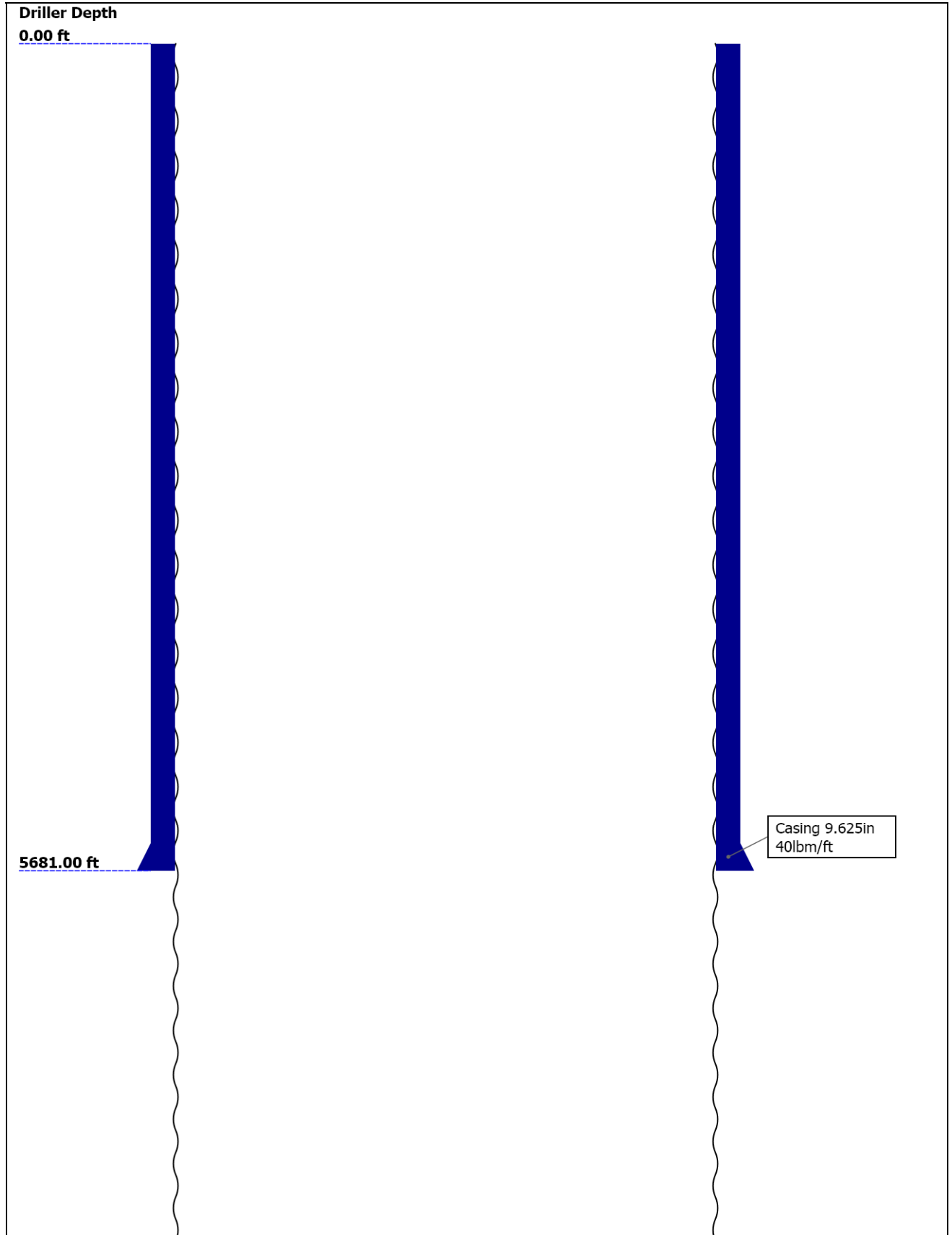
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Well Sketch



9900.00 ft

Open Hole 8.75in

Borehole Size/Casing/Tubing Record

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

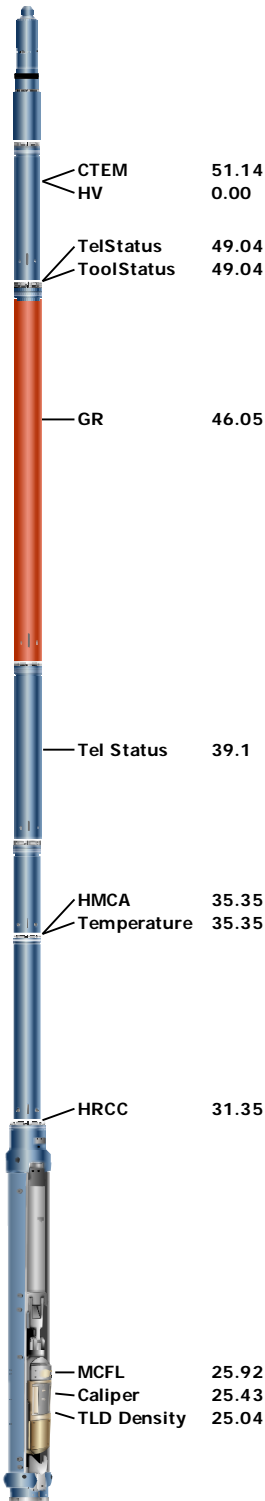
Borehole Fluids

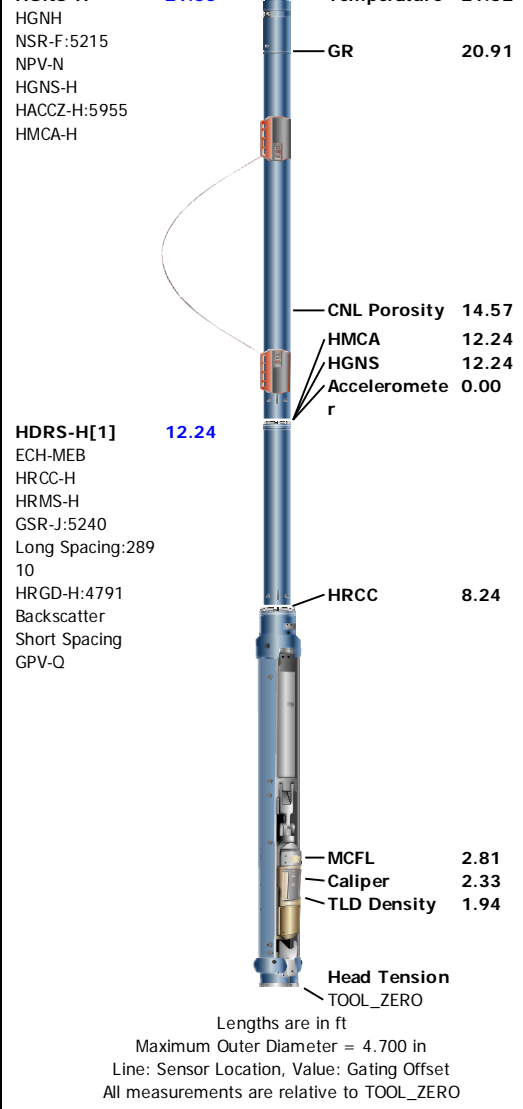
Parameter(unit)	ONE					
Fluid Type	Oil					
Max Recorded Temperatures (degF)	229					
Source of Sample	Active Tank					
Salinity (ppm)	30000					
Density (lbm/gal)	11.7					
Funnel Viscosity (s)	48					
Fluid Loss (cm3)	4.2					
PH						
Date/Time Circulation Stopped	27-Sep-2014 08:00:00					
Date Logger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

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

Remarks and Equipment Summary

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





Depth Summary			
	ONE		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		
Logging Cable			
Type	7-46A-XS		
Serial Number			
Length	21000.00 ft		
Conveyance Type	Wireline		
Rig Type	Triple		
ONE:Depth Control Parameters		Depth Control Remarks	
Log Sequence	First Log In the Well	1. ALL SCHLUMBERGER DEPTH CONTROL PROCEDURES WERE FOLLOWED DURING LOGGING OPERATIONS	
Rig Up Length At Surface		2. IDW USED AS PRIMARY DEPTH CONTROL MEASURE.	

Rig Up Length At Bottom
 Rig Up Length Correction
 Stretch Correction
 Tool Zero Check At Surface

3. Z CHART USED AS SECONDARY DEPTH CONTROL MEASURE.
 4. TD: 9,692'
 CSG: 2,335'
 5. STRETCH CORRECTION: 8.6'

Composite 1

Software Version

Acquisition System		Version	
MaxWell		4.0.9163.3000	
Application Patch		Patch-SP-10767_22480-4.0.9163.3001	
Computation	Description	Version	
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	4.0.9469.3000	
Tool Elements	Description	Software Version	Firmware Version
HNGS-BA	HNGS Sonde Element	4.0.9469.3000	

Composite Summary

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

All depths are referenced to toolstring zero

Log

Company:Southwestern Energy Production Company























Well:Diamond T Sheep 7 92 1 26

Composite 1:S013

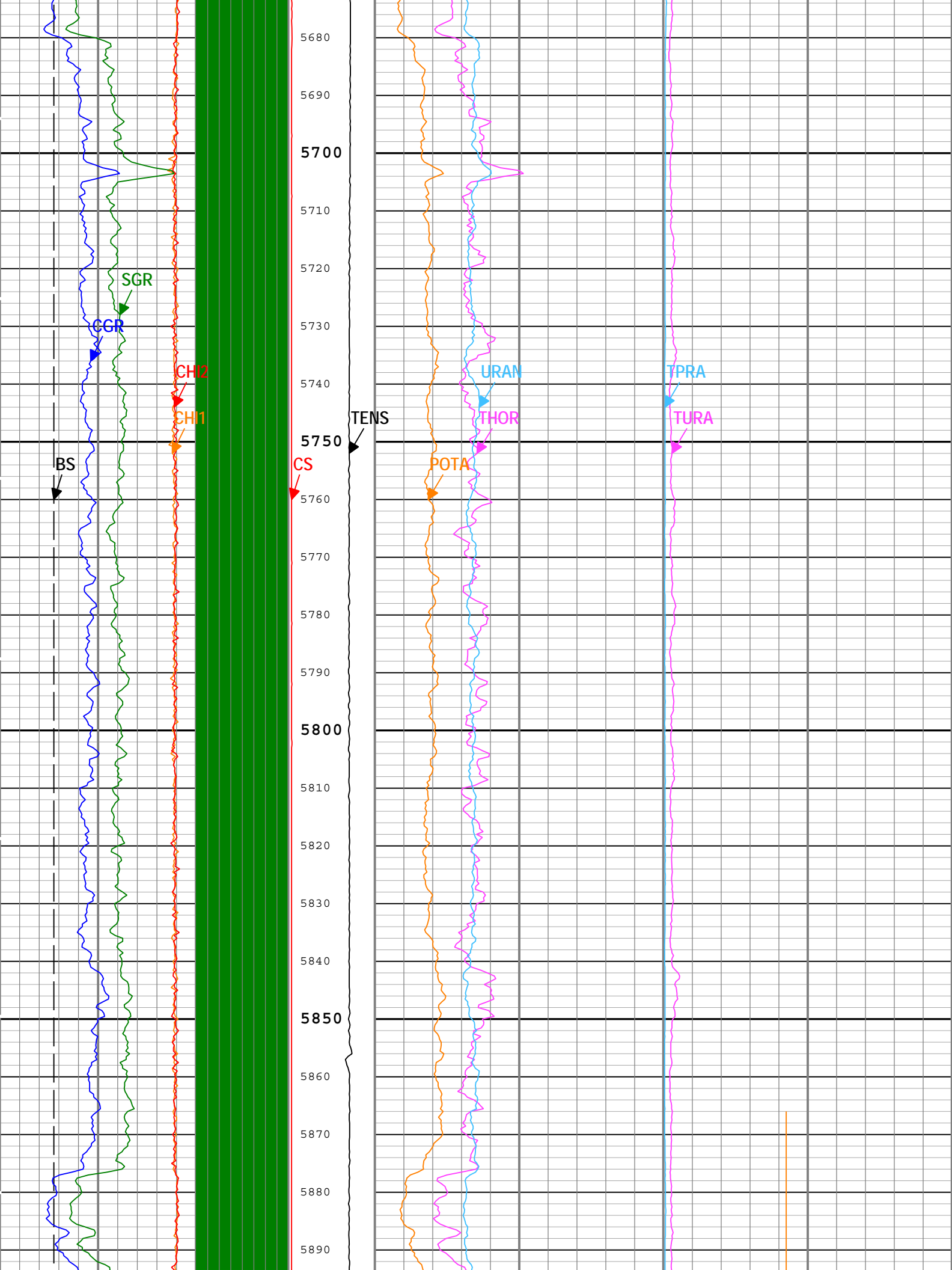
Description: HNGS Basic Format: Log (HNGS Basic) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Sep-2014 18:41:20

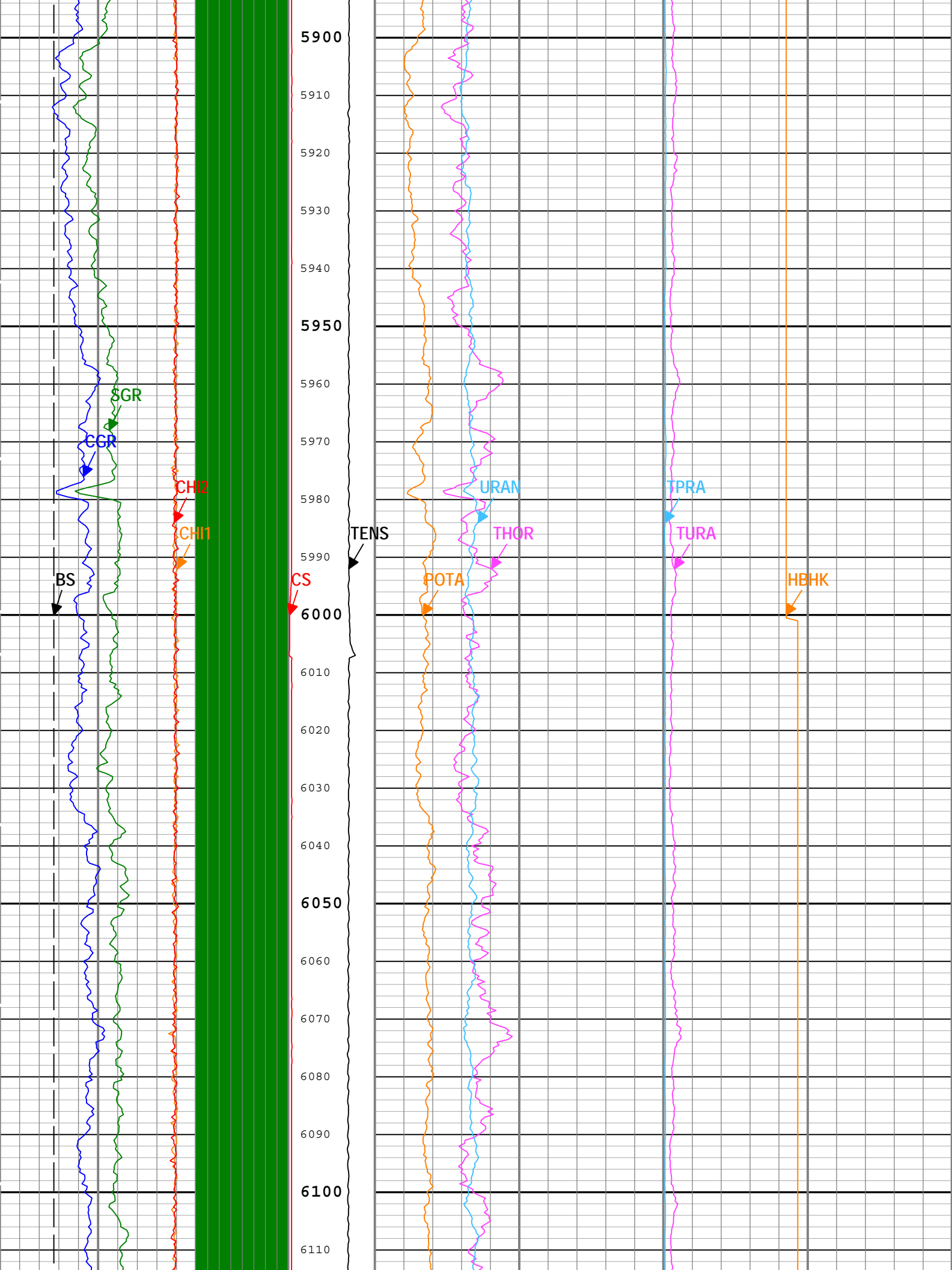
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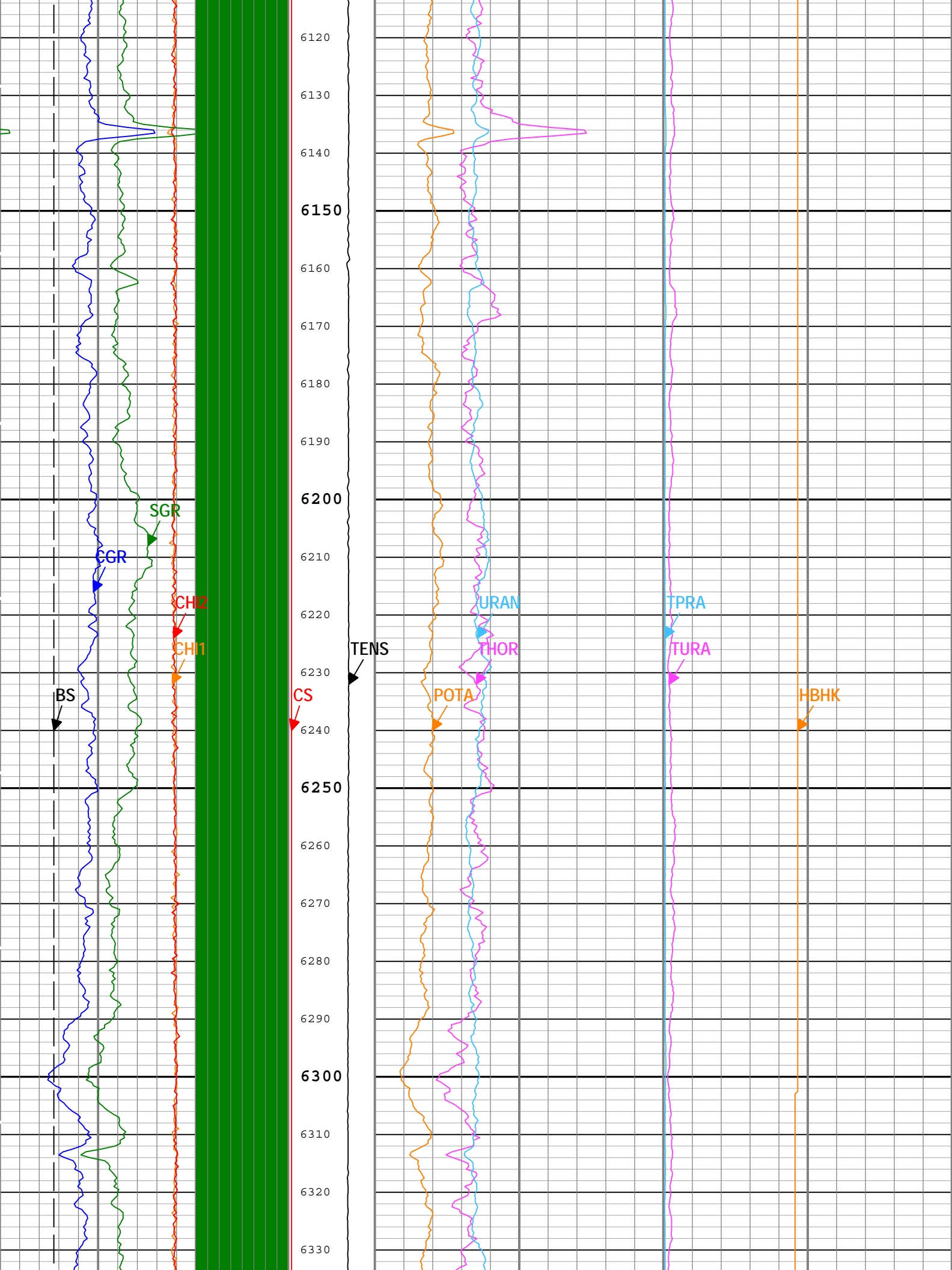
Log Quality Control Gamma Ray Status (LQC_GR) HNGS-BA[1]

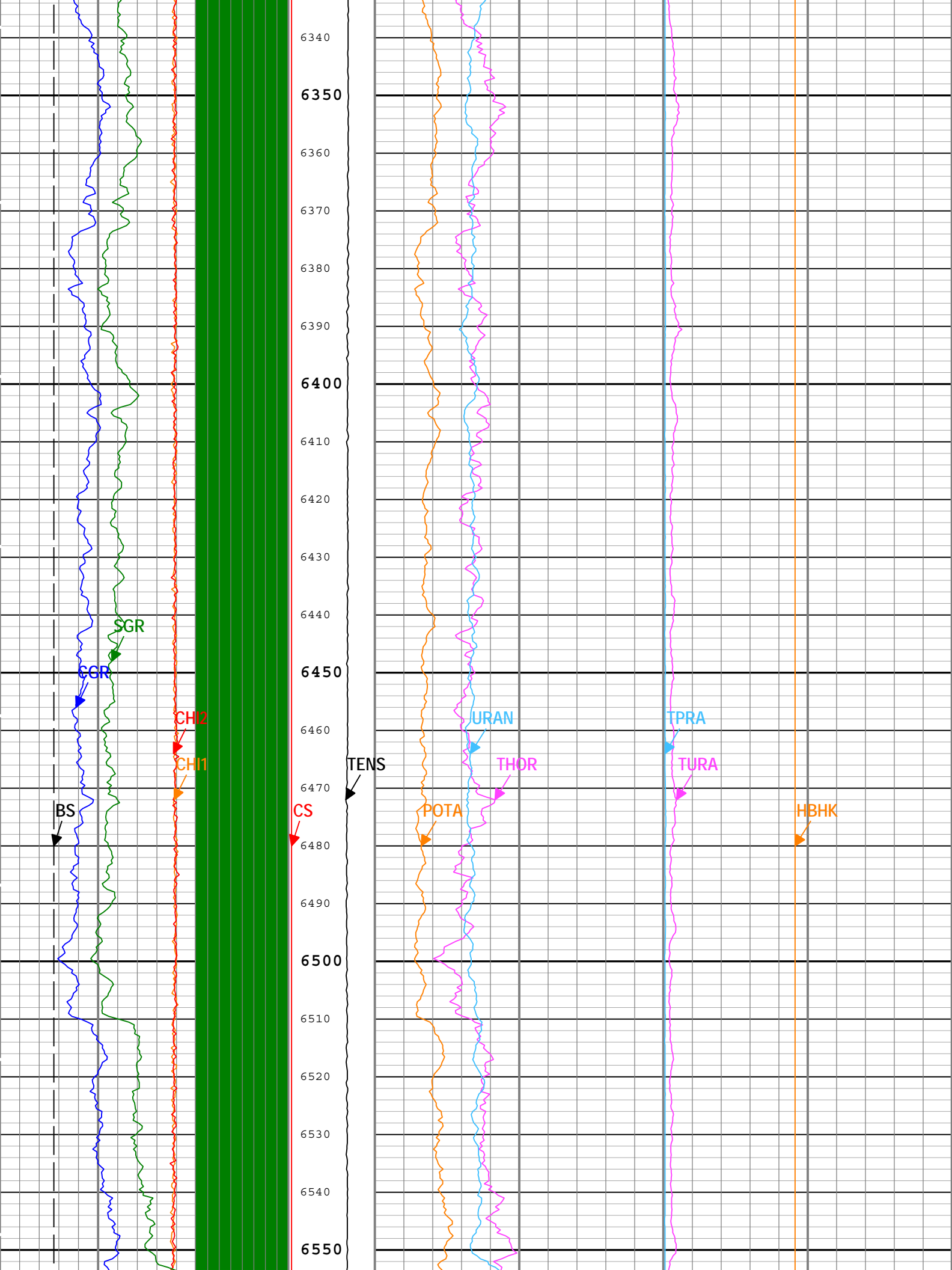
1 - CartHwStatus - Cartridge Hardware Status :	 Cartridge Hardware: Normal	 Cartridge Hardware: Warning
	 Cartridge Hardware: Error	
2 - CartTempStatus - Cartridge Temperature Status :	 Cartridge Temperature < 150 °C	 Cartridge Temperature >= 175 °C
	 150 °C <= Cartridge Temperature < 175 °C	
3 - Det1TempStatus - Detector 1 Temperature Status :	 Detector 1 Temperature < 50 °C	 50 °C <= Detector 1 Temperature < 80 °C
	 Detector 1 Temperature >= 80 °C	
4 - Det2TempStatus - Detector 2 Temperature Status :	 Detector 2 Temperature < 50 °C	 50 °C <= Detector 2 Temperature < 80 °C
	 Detector 2 Temperature >= 80 °C	
5 - Det1CtrlLoopStatus - Detector 1 Control Loop Status :	 Detector 1 Control Loop: Normal	 Detector 1 Control Loop: Warning
	 Detector 1 Control Loop: Error	
6 - Det2CtrlLoopStatus - Detector 2 Control Loop Status :	 Detector 2 Control Loop: Normal	 Detector 2 Control Loop: Warning
	 Detector 2 Control Loop: Error	
7 - Det1ChiSqrStatus - Detector 1 Chi Squared Status :	 Detector 1 Chi Squared <= 3.0	 Detector 1 Chi Squared > 3.0
8 - Det2ChiSqrStatus - Detector 2 Chi Squared Status :	 Detector 2 Chi Squared <= 3.0	 Detector 2 Chi Squared > 3.0

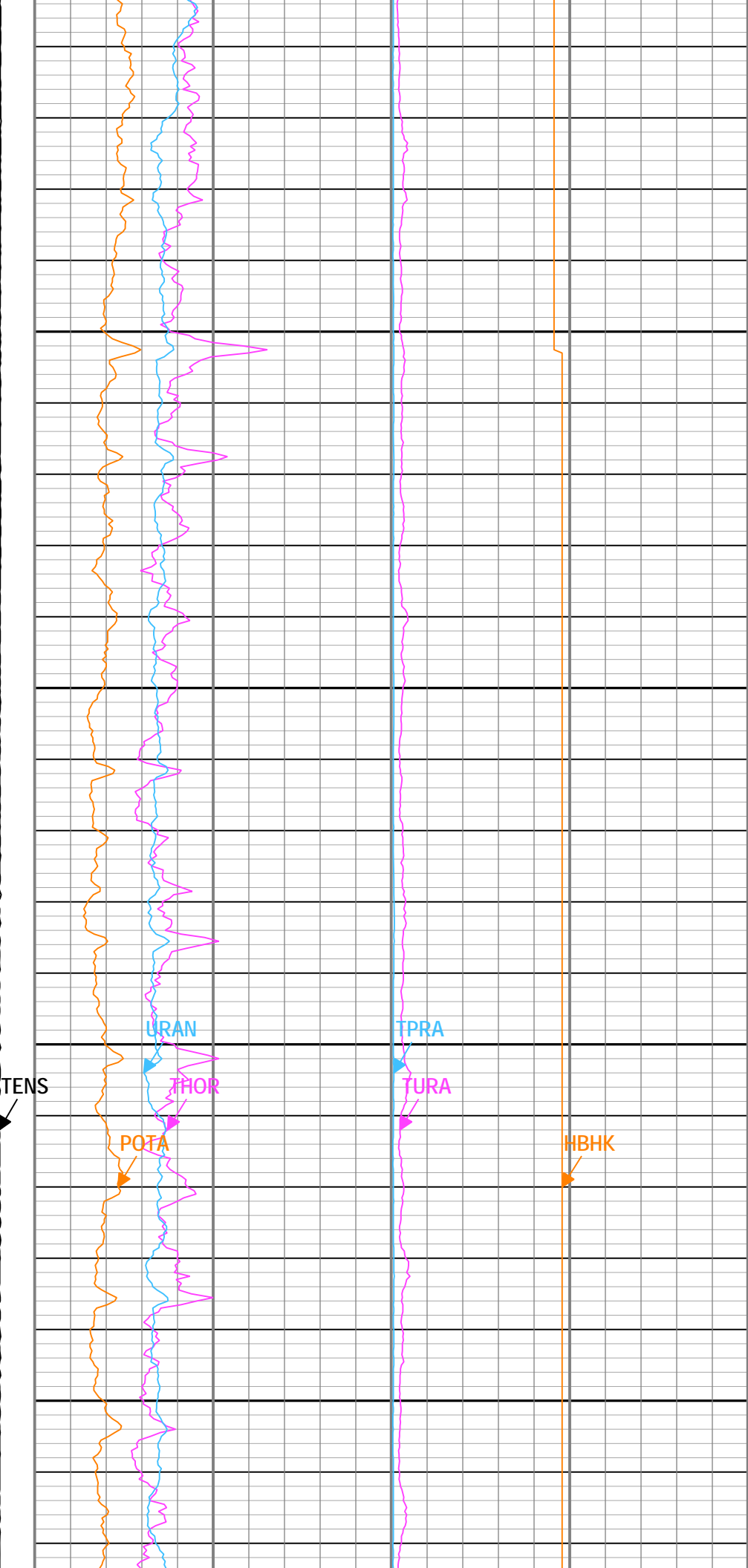
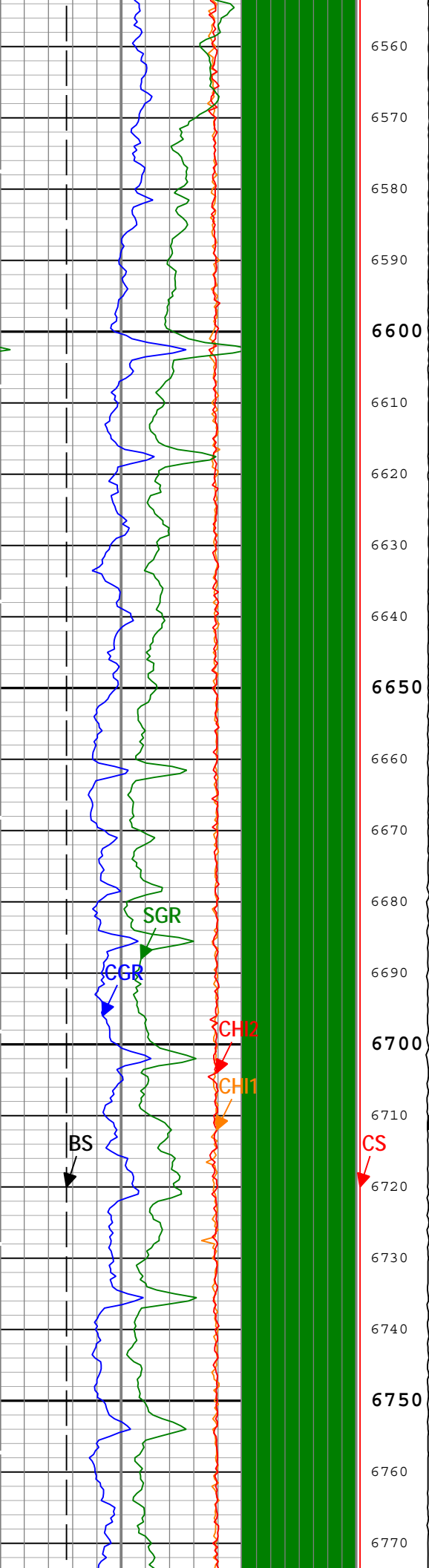
Bit Size (BS)	
6	16
in	
Detector 1 Chi-Squared (CHI1) HNGS-BA[1]	
10	0
Detector 2 Chi-Squared (CHI2) HNGS-BA[1]	

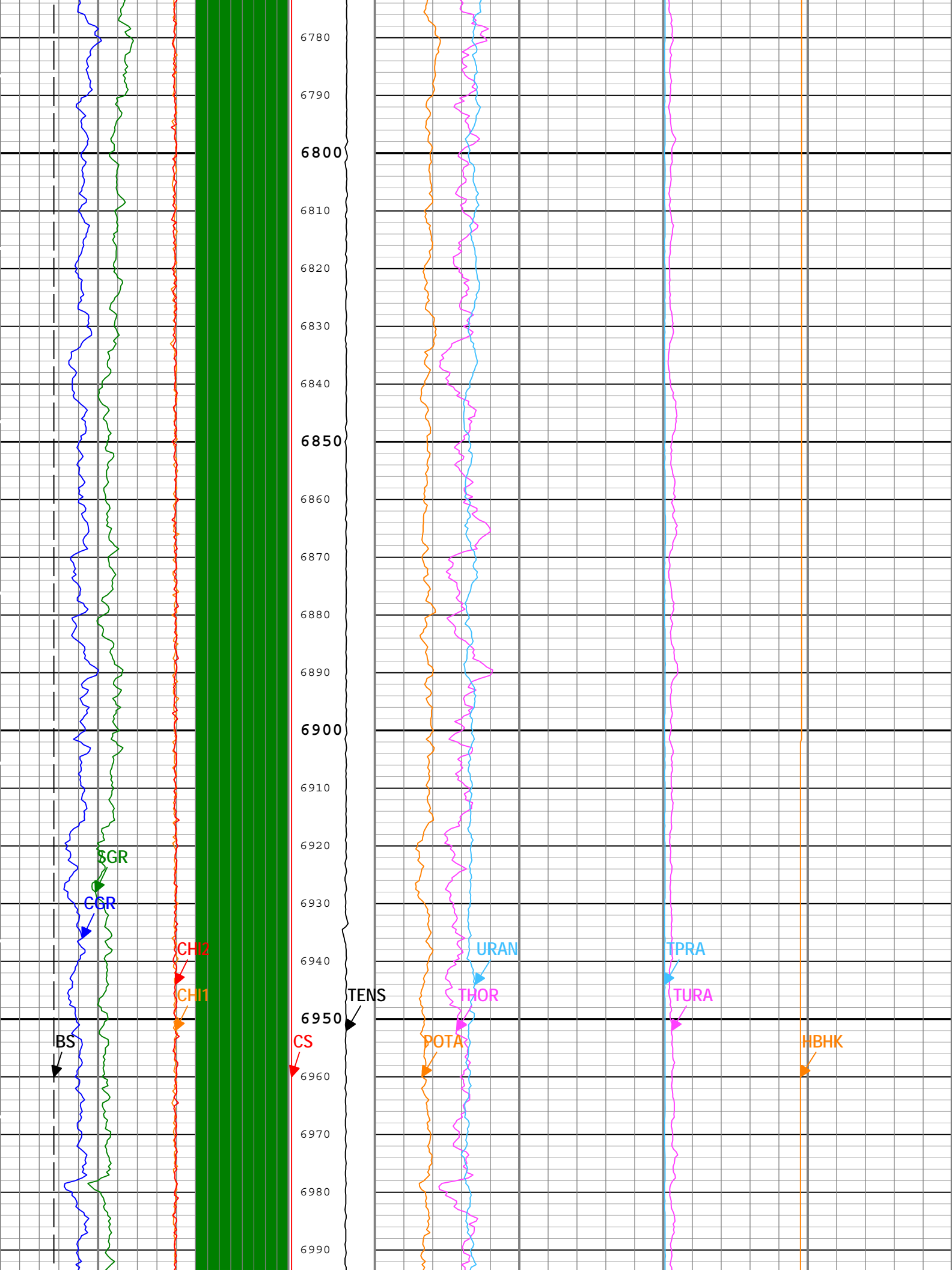


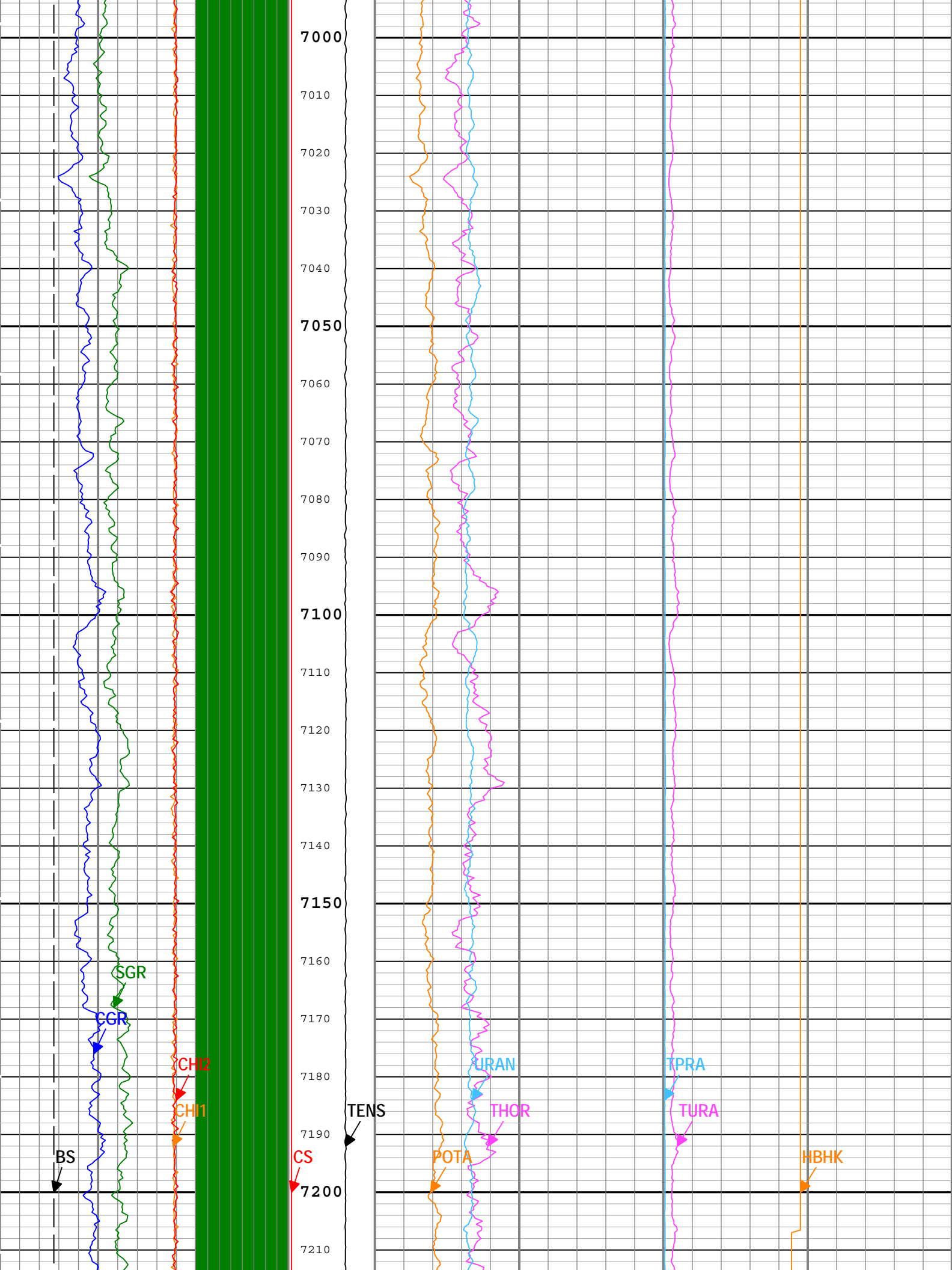


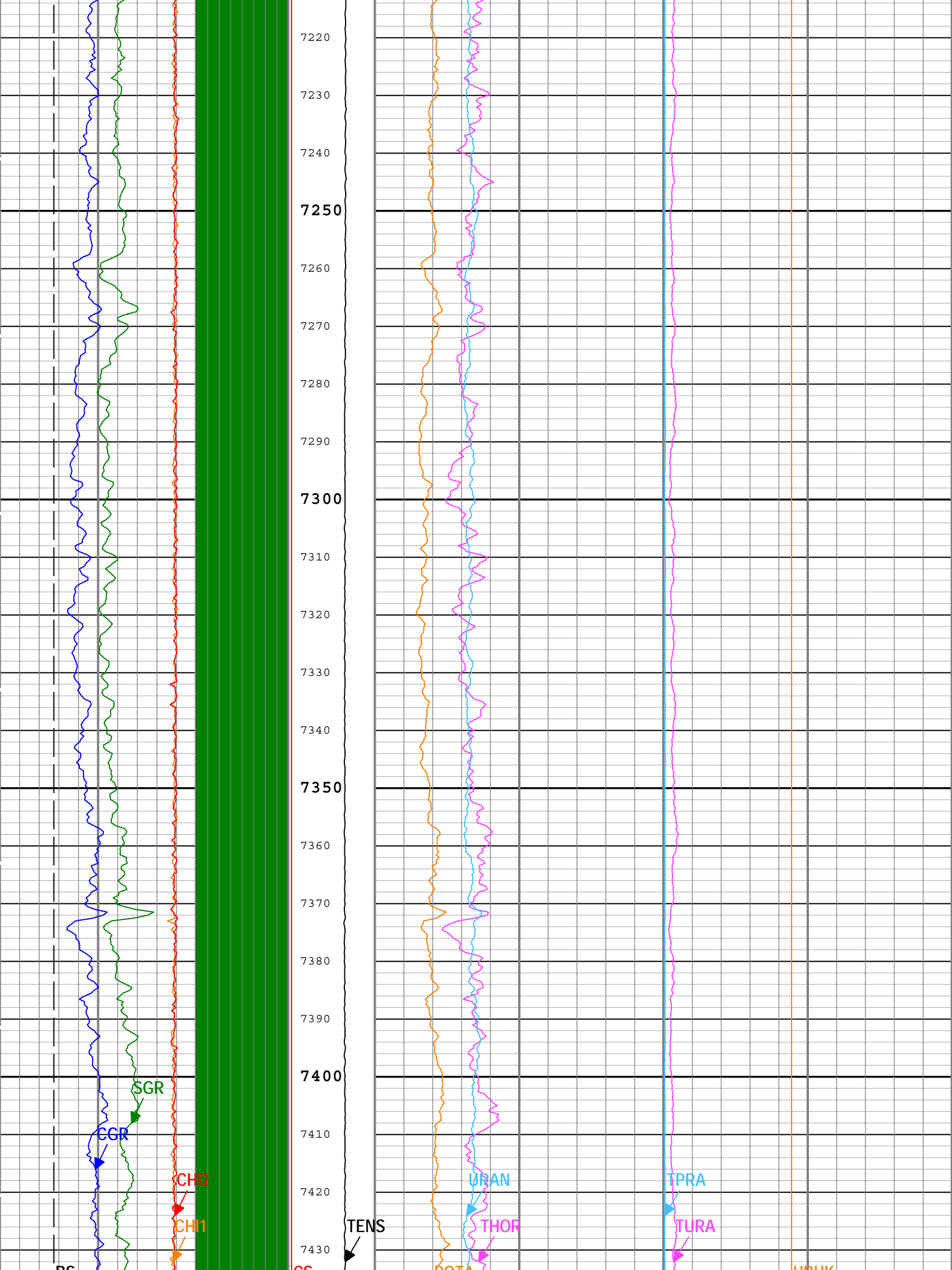


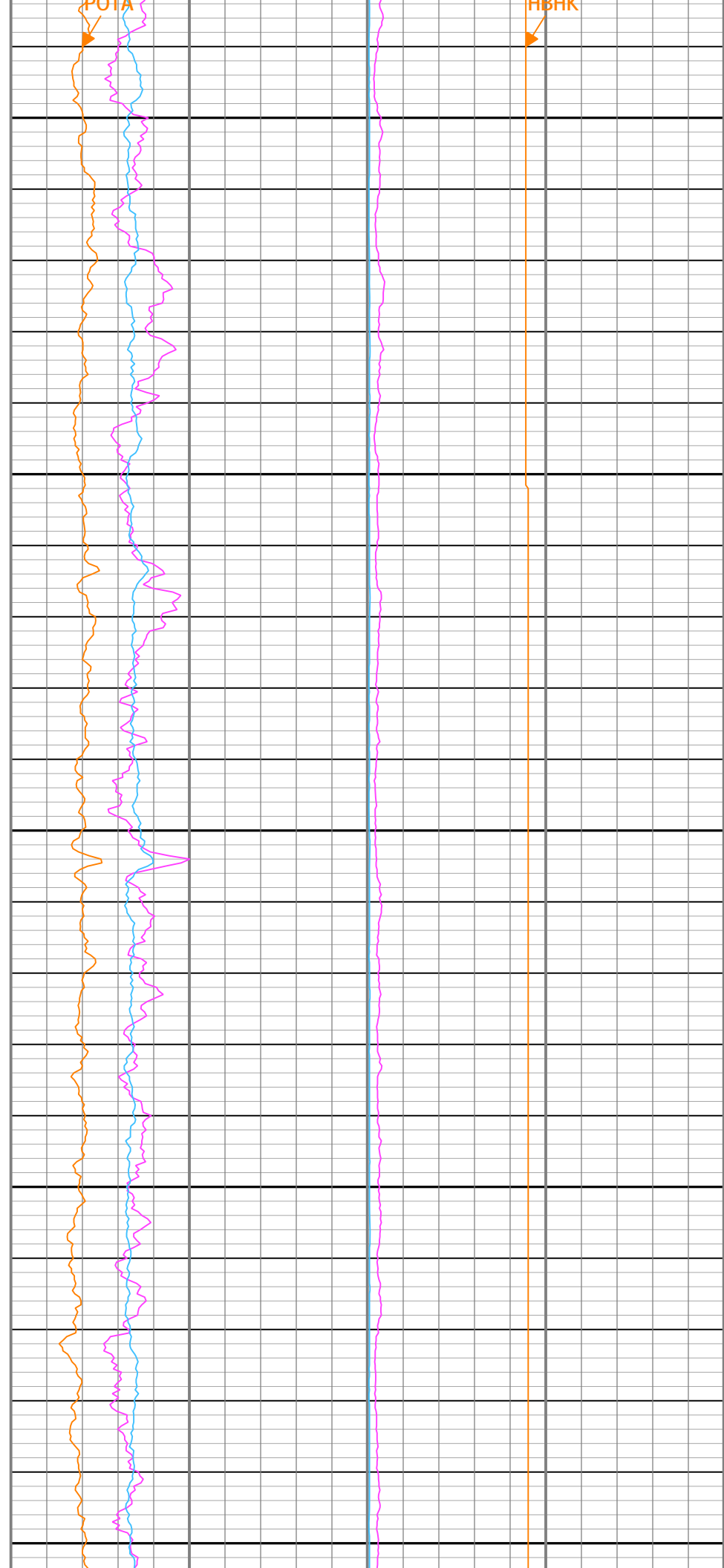
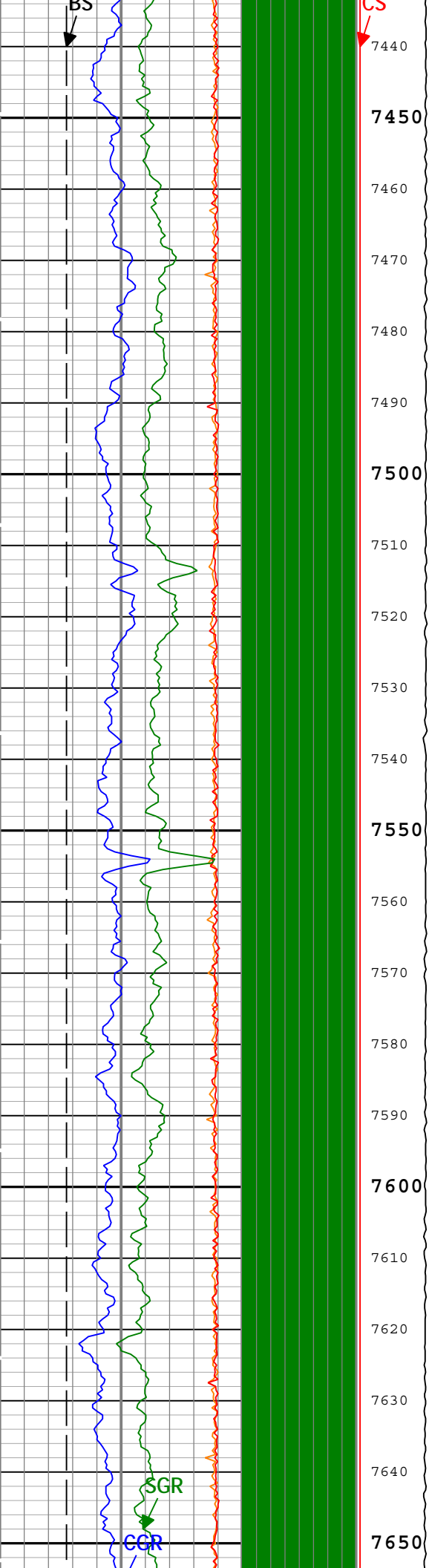


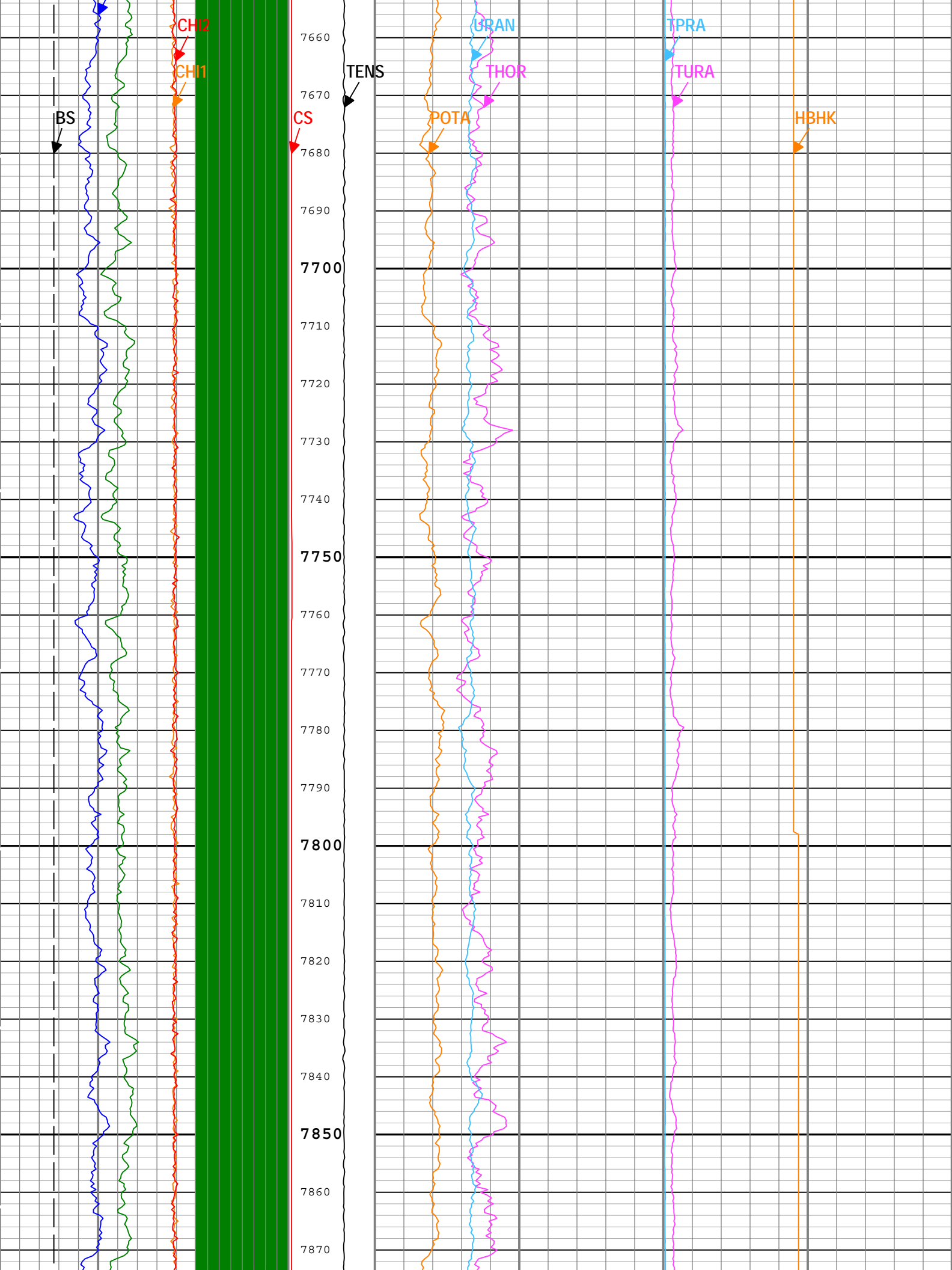


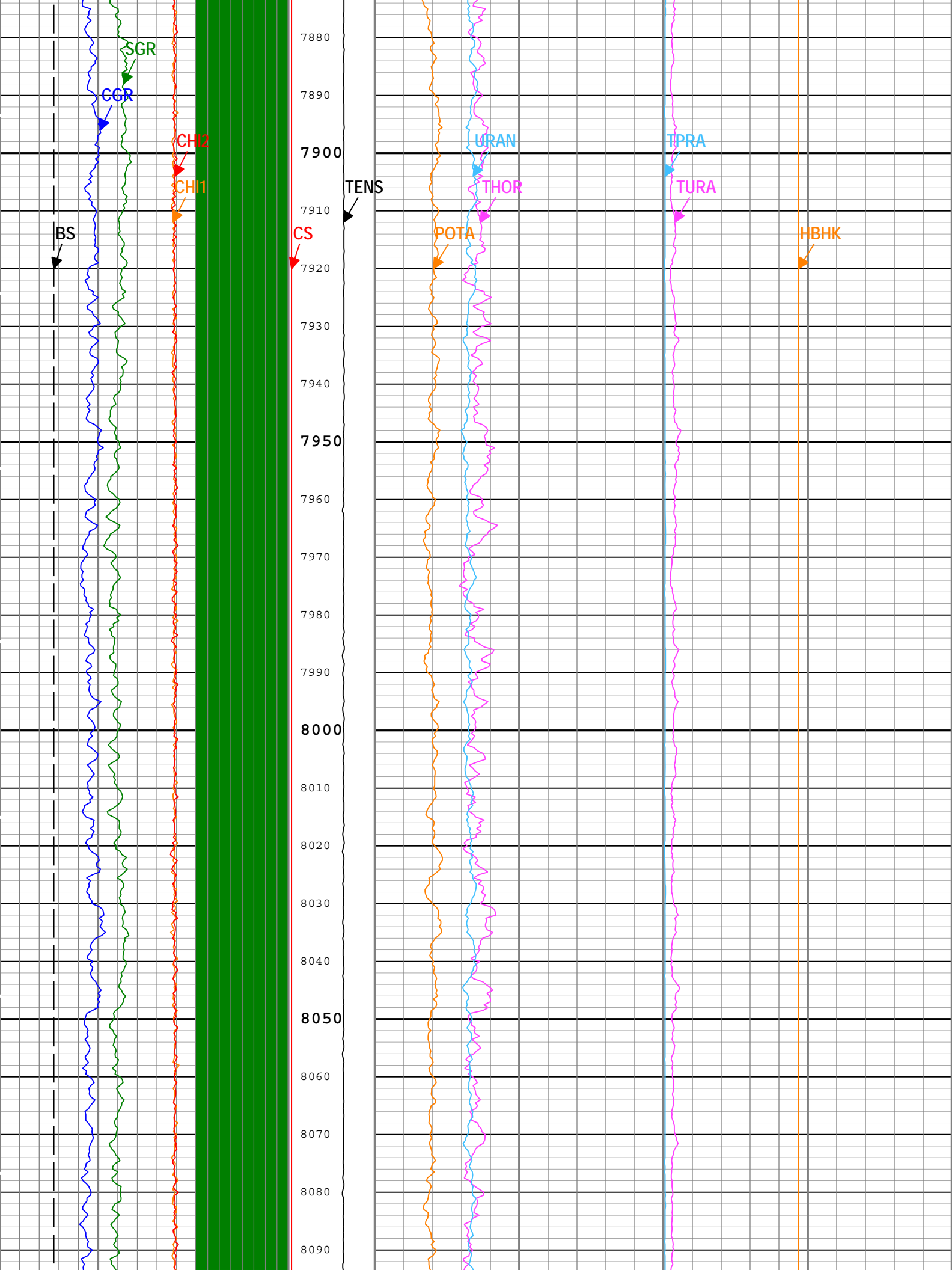


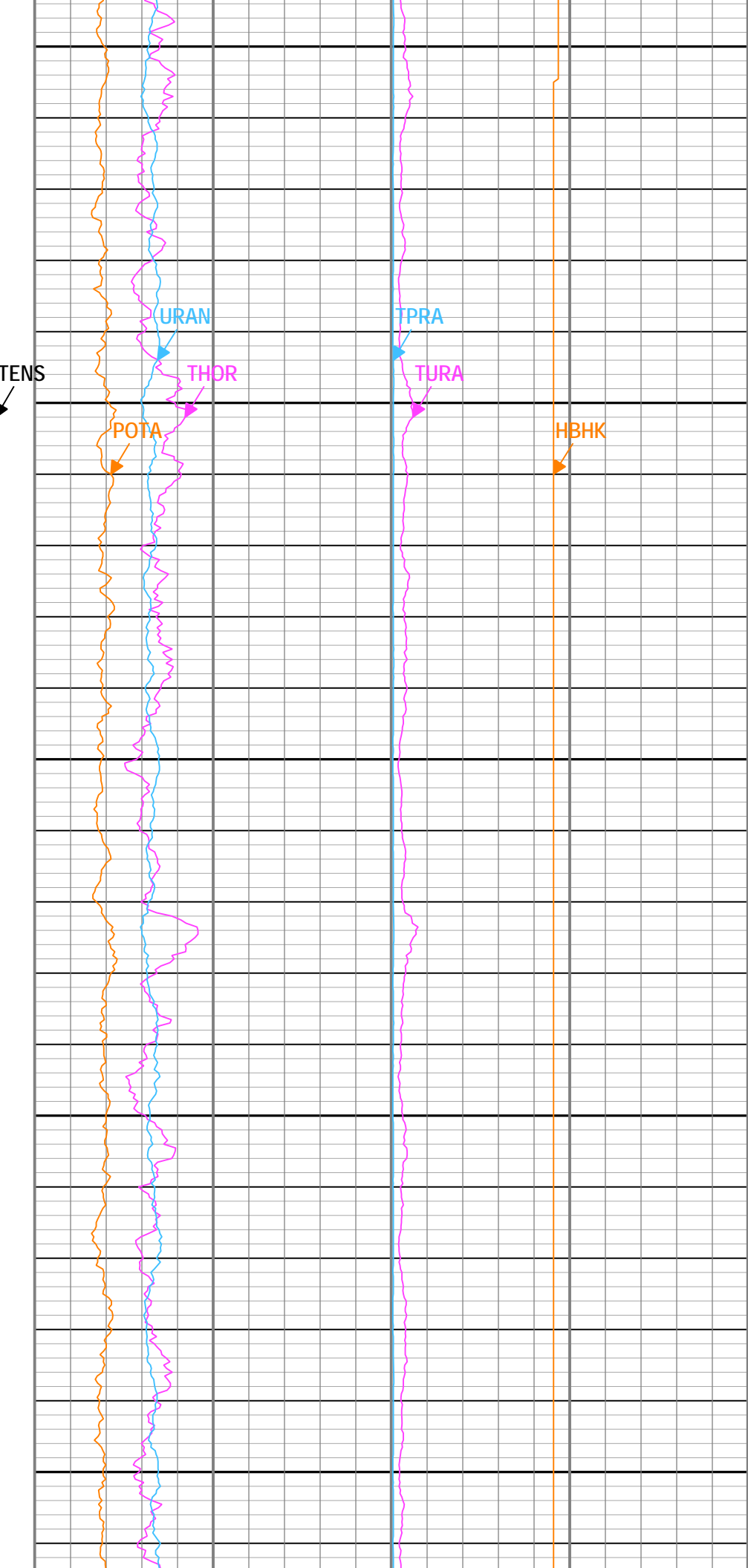
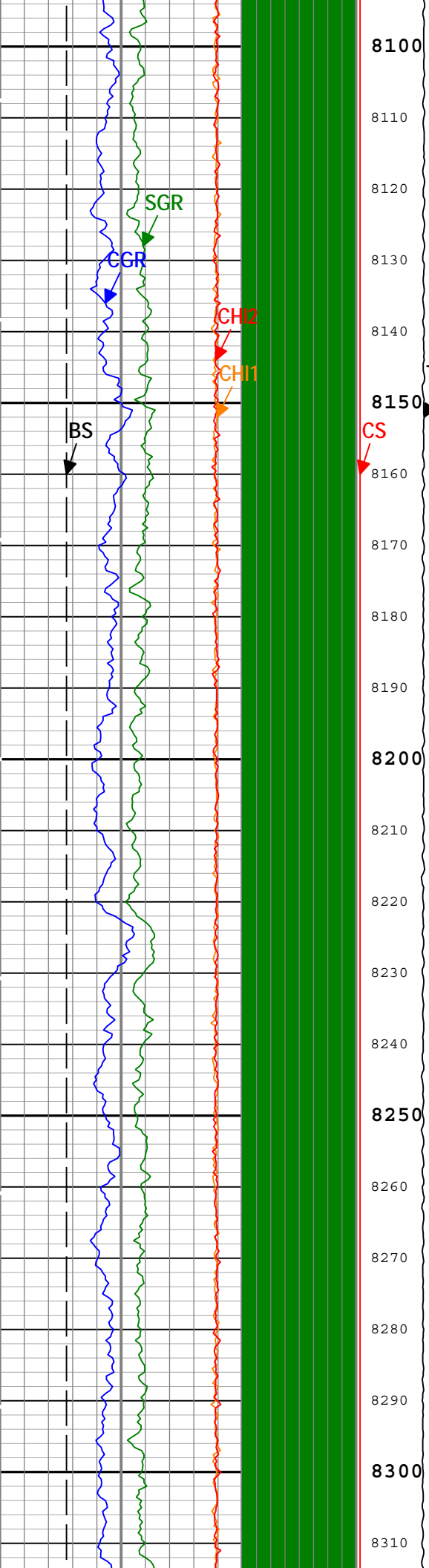


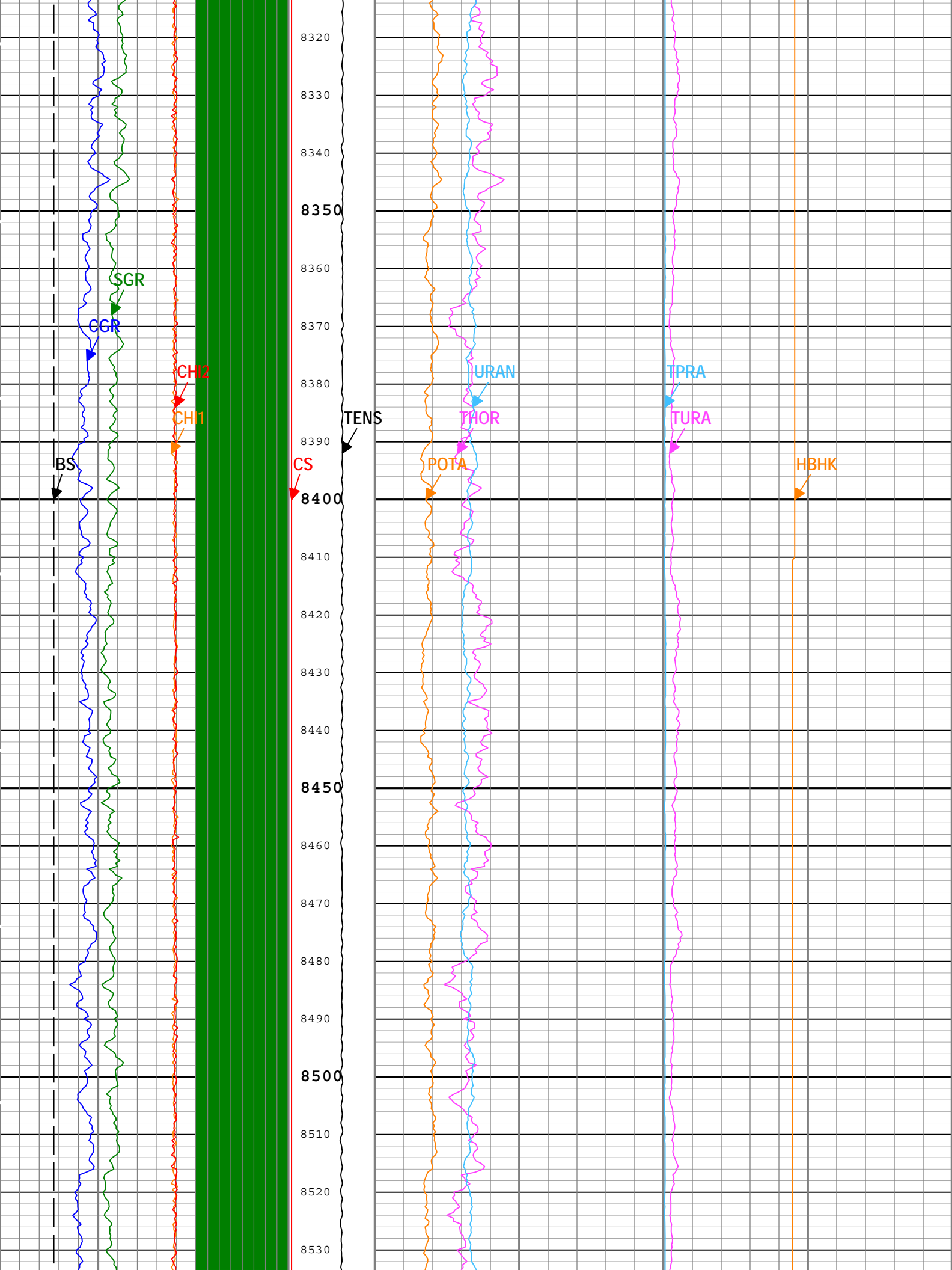


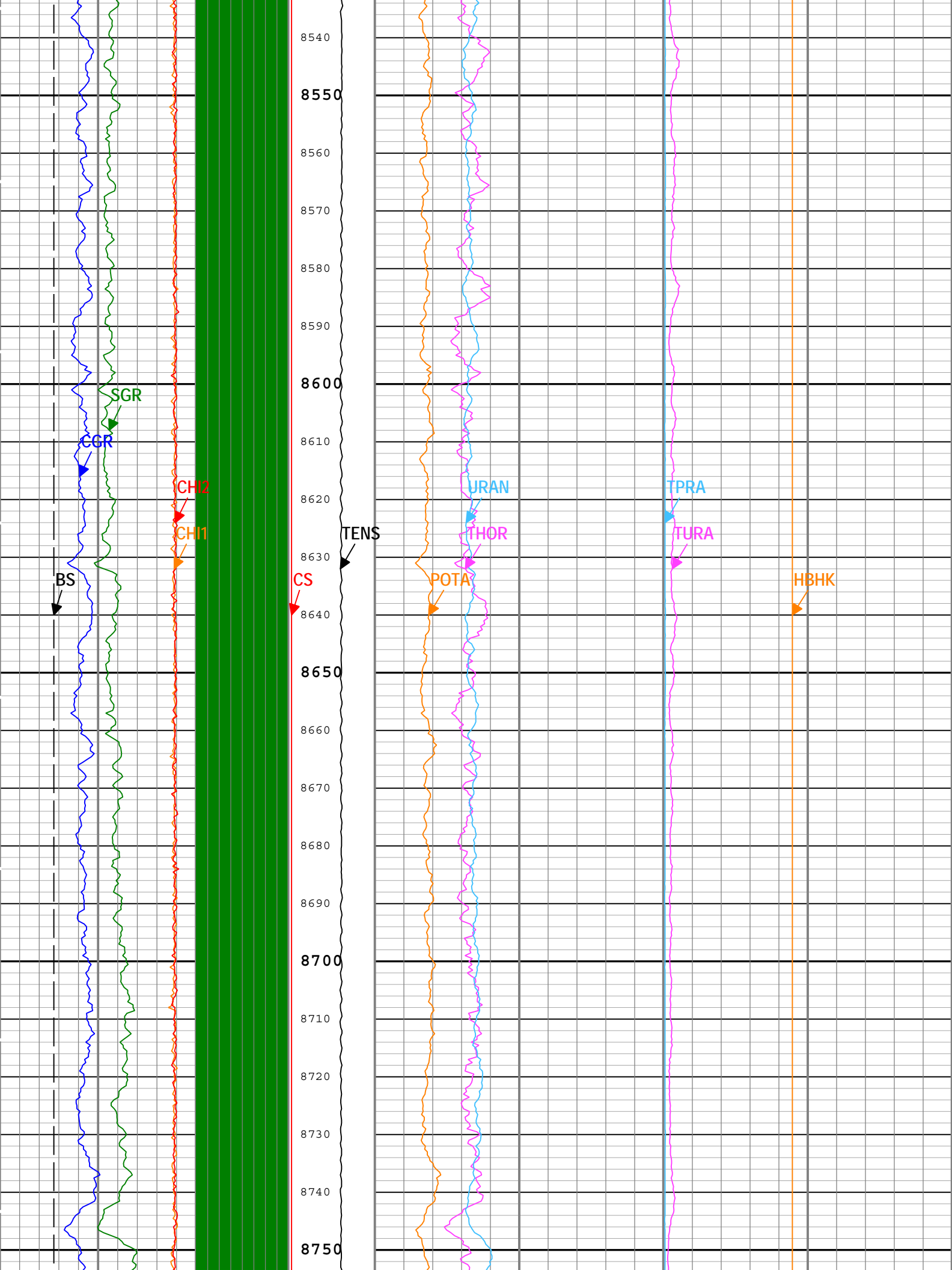


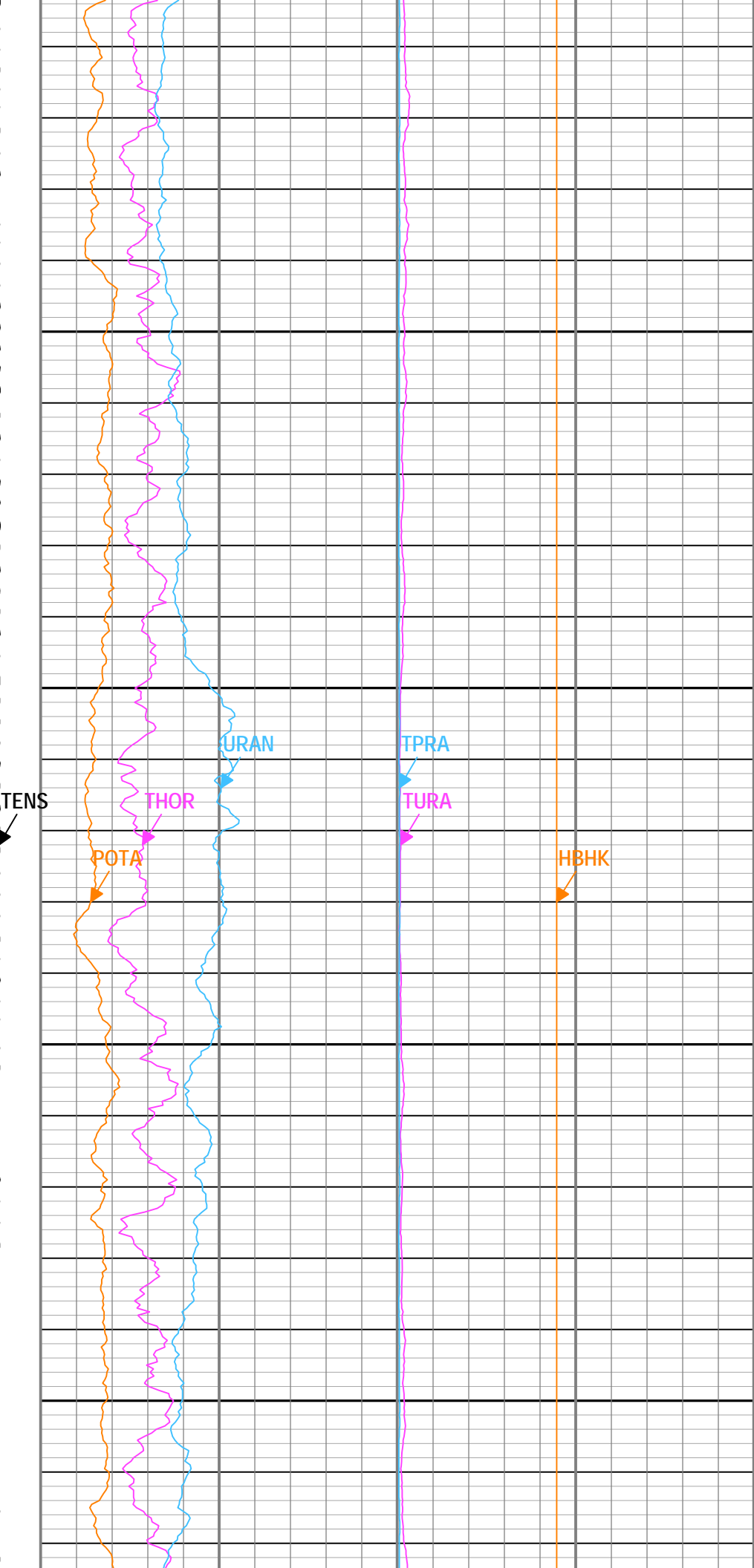
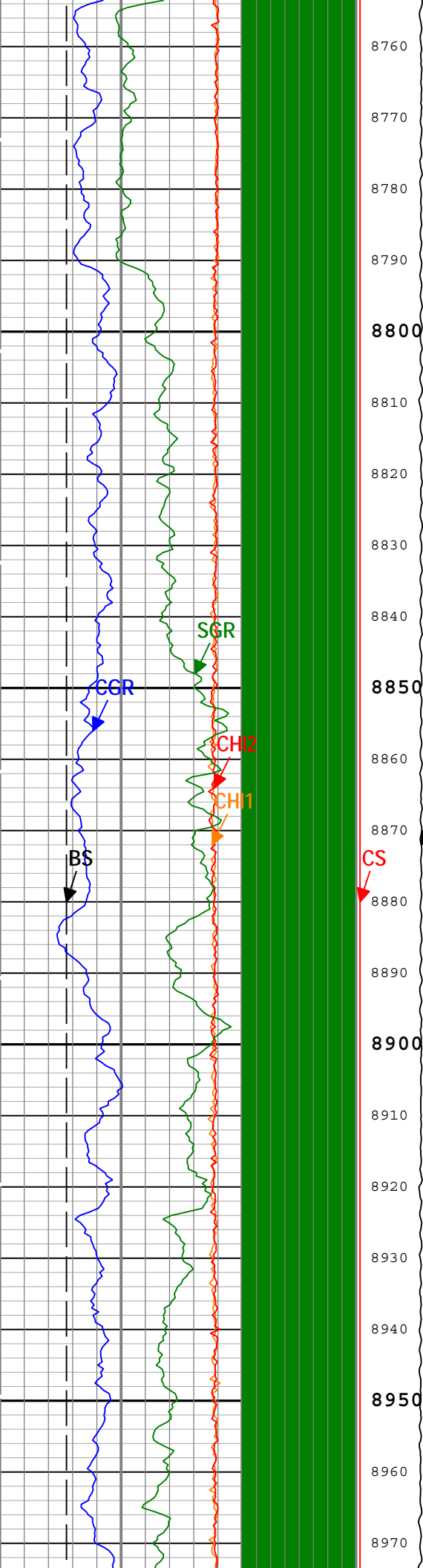


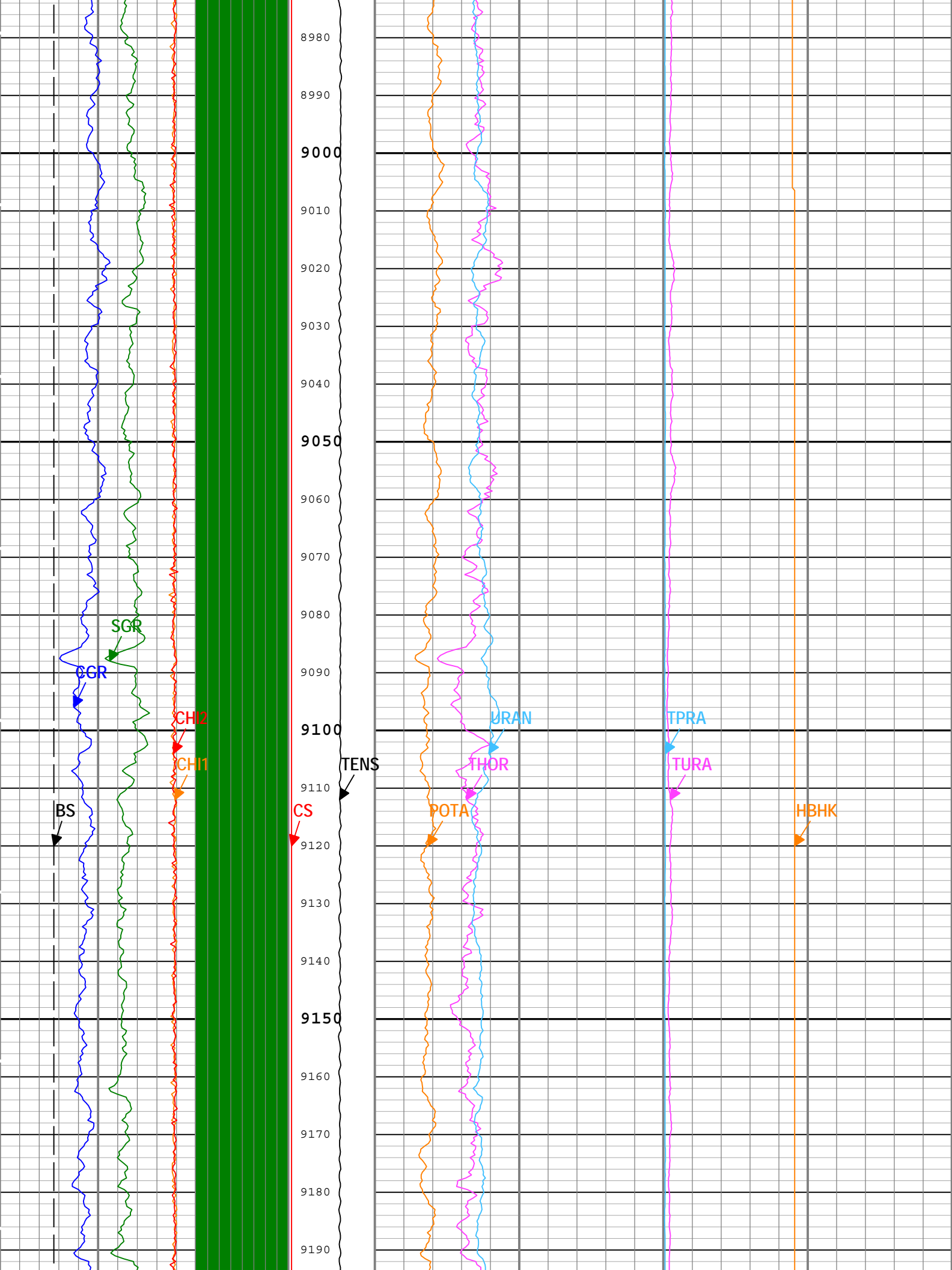


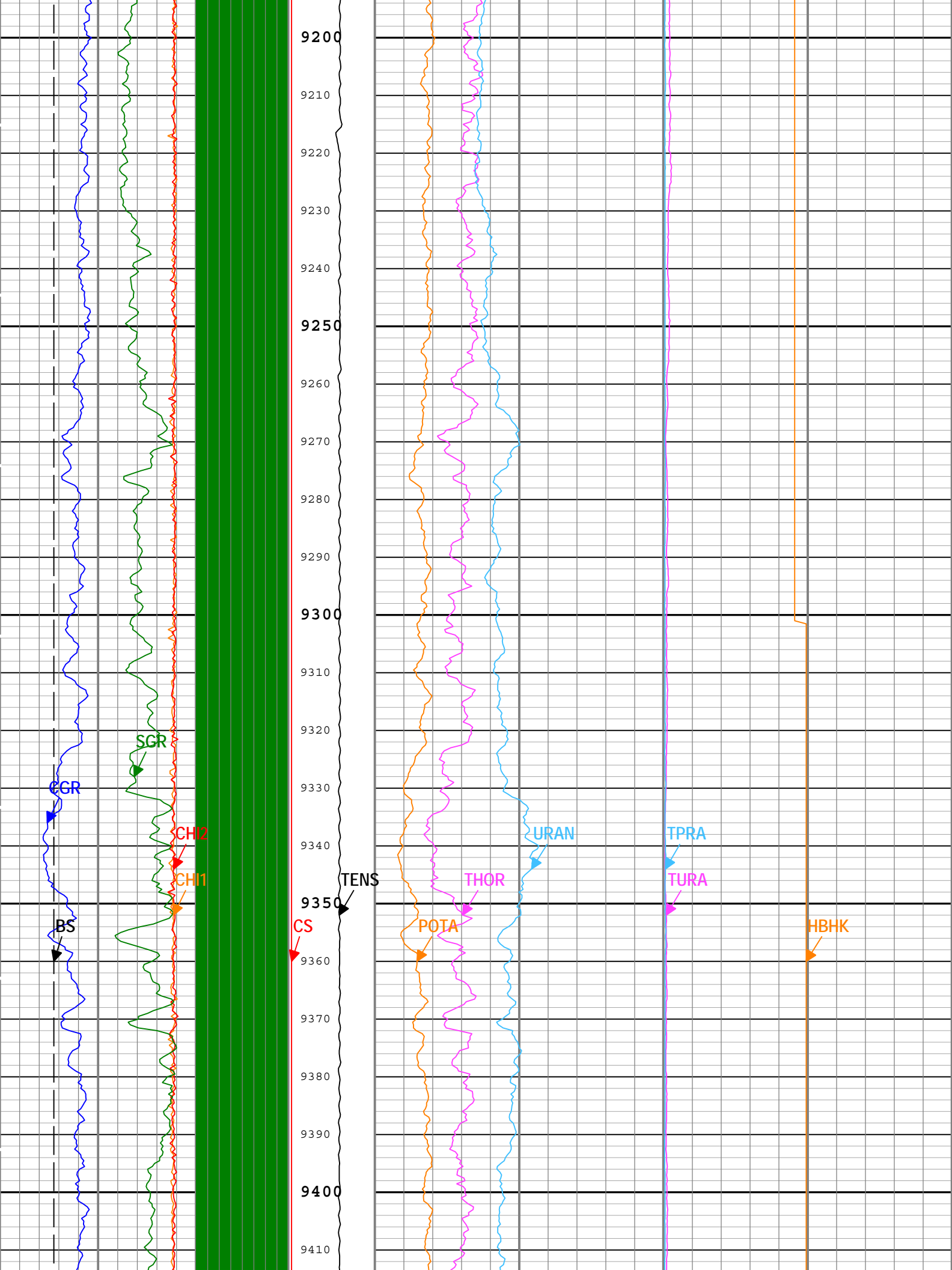


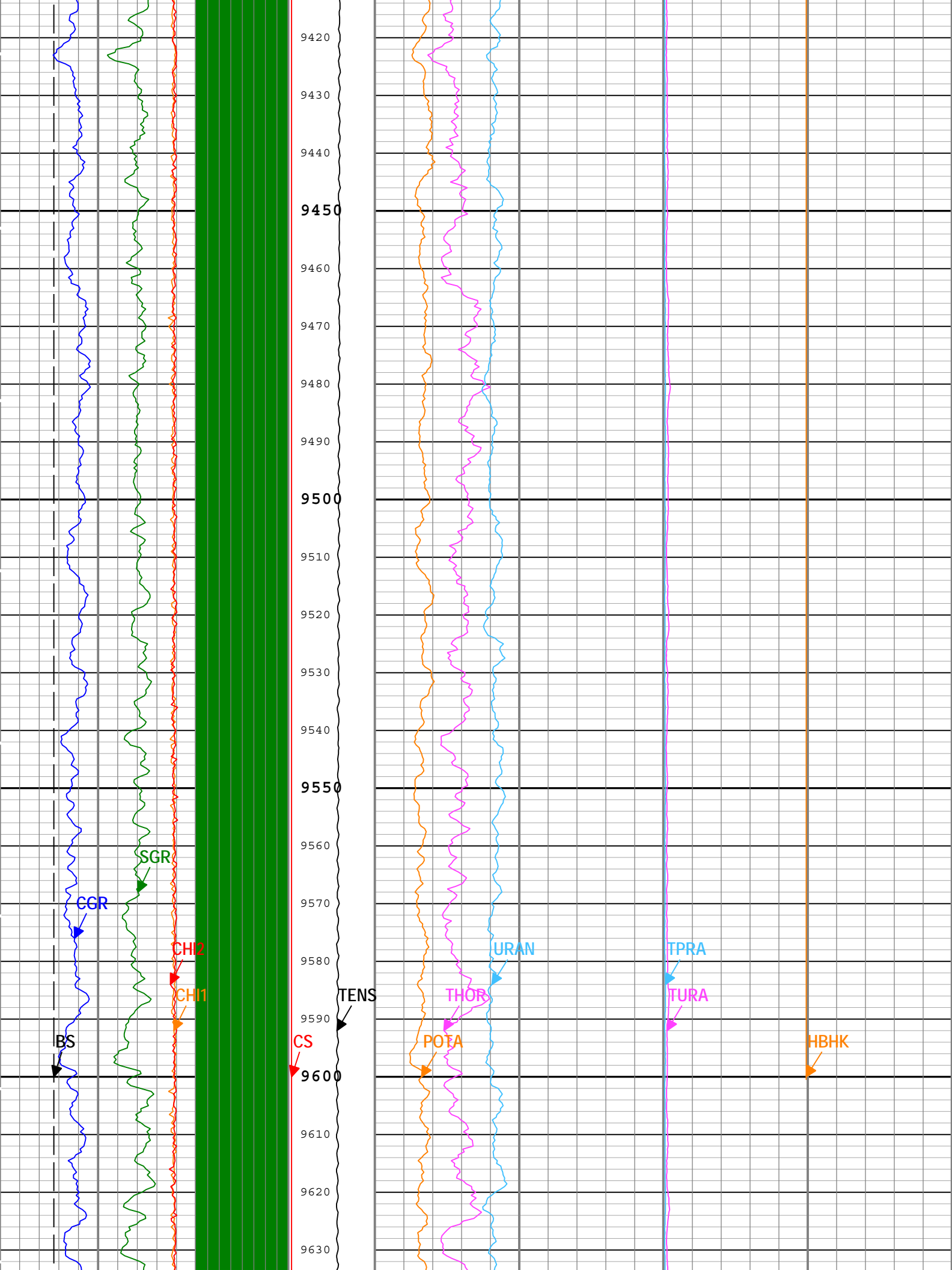


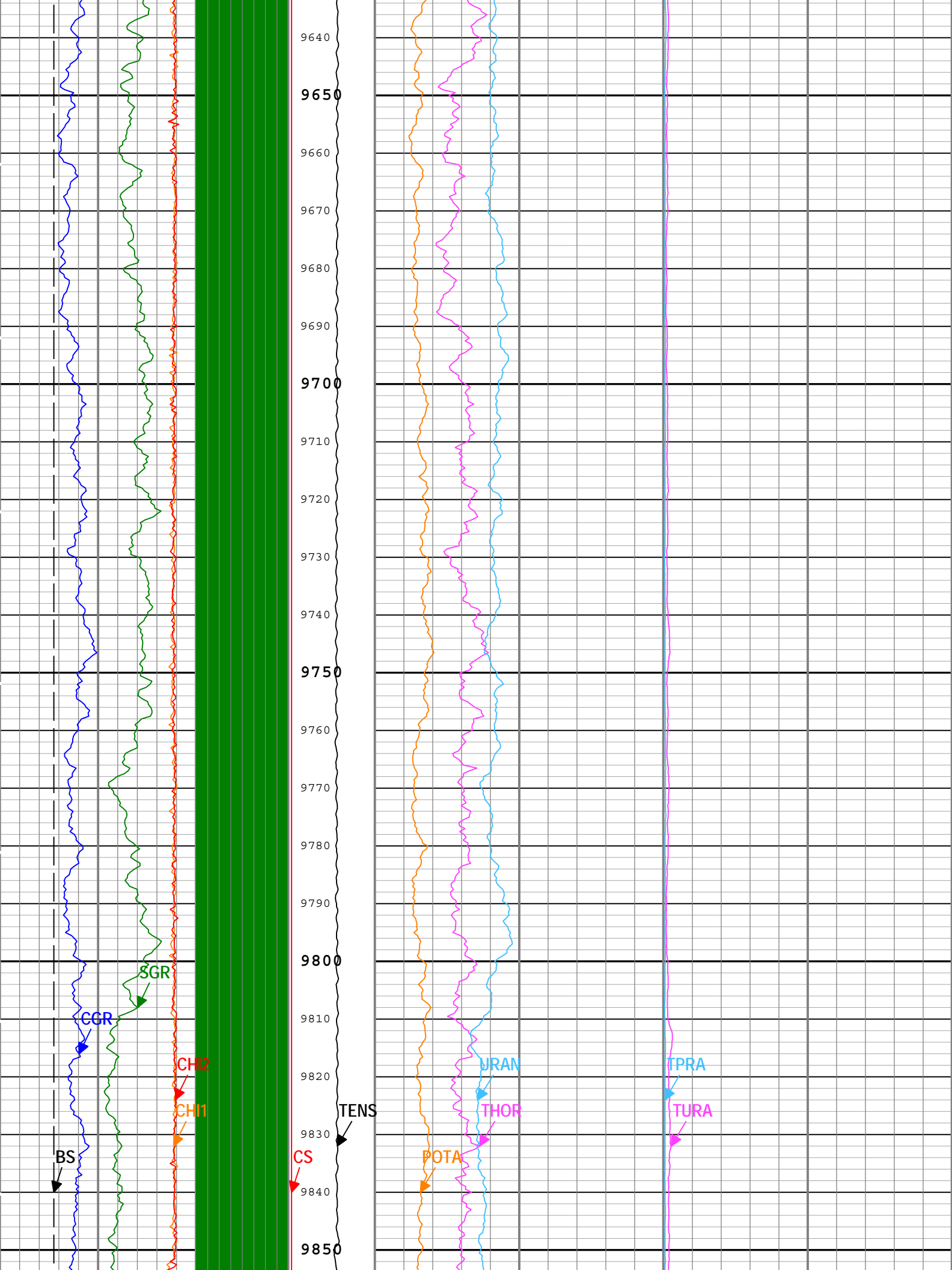














Bit Size (BS) 6 in 16	Log Quality Control Gamma Ray Status (LOC_GR) HNGS-BA[1] 1 8	Cable Speed (CS) 0 50000 ft/h	Potassium Concentration (POTA) HNGS-BA[1] 0 % 10	Borehole Potassium Concentration (HBHK) HNGS-BA[1] -5 % 5
Detector 1 Chi-Squared (CHI1) HNGS-BA[1] 10 0		Cable Tension (TENS) 10000 0 lbf	Thorium Concentration (THOR) HNGS-BA[1] 0 ppm 30	Thorium/Uranium Ratio (TURA) HNGS-BA[1] 0.01 100
Detector 2 Chi-Squared (CHI2) HNGS-BA[1] 10 0			Uranium Concentration (URAN) HNGS-BA[1] -10 ppm 30	Thorium/Potassium Ratio (TPRA) HNGS-BA[1] 0.1 1000
Gamma Ray Contribution from Thorium and Potassium (CGR) HNGS-BA[1] 0 gAPI 150				
Spectroscopy Gamma Ray (SGR) HNGS-BA[1] 0 gAPI 150				

Log Quality Control Gamma Ray Status (LOC_GR) HNGS-BA[1]

- 1 - CartHwStatus - Cartridge Hardware Status :
 - Cartridge Hardware: Normal
 - Cartridge Hardware: Error
 - Cartridge Hardware: Warning
- 2 - CartTempStatus - Cartridge Temperature Status :
 - Cartridge Temperature < 150 °C
 - 150 °C <= Cartridge Temperature < 175 °C
 - Cartridge Temperature >= 175 °C
- 3 - Det1TempStatus - Detector 1 Temperature Status :
 - Detector 1 Temperature < 50 °C
 - Detector 1 Temperature >= 80 °C
 - 50 °C <= Detector 1 Temperature < 80 °C
- 4 - Det2TempStatus - Detector 2 Temperature Status :
 - Detector 2 Temperature < 50 °C
 - Detector 2 Temperature >= 80 °C
 - 50 °C <= Detector 2 Temperature < 80 °C
- 5 - Det1CtrlLoopStatus - Detector 1 Control Loop Status :
 - Detector 1 Control Loop: Normal
 - Detector 1 Control Loop: Error
 - Detector 1 Control Loop: Warning
- 6 - Det2CtrlLoopStatus - Detector 2 Control Loop Status :
 - Detector 2 Control Loop: Normal
 - Detector 2 Control Loop: Error
 - Detector 2 Control Loop: Warning
- 7 - Det1ChiSqrdStatus - Detector 1 Chi Squared Status :
 - Detector 1 Chi Squared <= 3.0
 - Detector 1 Chi Squared > 3.0
- 8 - Det2ChiSqrdStatus - Detector 2 Chi Squared Status :
 - Detector 2 Chi Squared <= 3.0
 - Detector 2 Chi Squared > 3.0

TIME_1900 - Time Marked every 60.00 (s)

Description: HNGS Basic Format: Log (HNGS Basic) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Sep-2014 18:41:20

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	Yes	
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-H	0.575	in
CBLO	Casing Bottom (Logger)	WLSESSION	5682	ft
DBCC	Barite Constant Correction Flag	HNGS-BA	None	
DFD	Drilling Fluid Density	Borehole	11.7	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

ONE: Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

Calibration Report

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

Primary Equipment :
 HILT Gamma-Ray and Neutron Sonde, 150 degC HGNS-H

Auxiliary Equipment :

Calibration Parameter :
 Water Temperature
 Housing Size
 JIG-BKG (Jig minus background reference) 165

HGNS Accelerometer Calibration - Accelerometer Accumulations

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

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.1	32.8	

HGNS Neutron Calibration - HGNS Neutron Accumulations

Before (Measured): 17:43:47 25-Sep-2014 Expired by 1 days

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Near Zero Measurement	1/s	Before	0	5.0	25.4	40.0	
Far Zero Measurement	1/s	Before	0	5.0	29.2	40.0	
Near Plus Measurement - 0	1/s	Before	----	----	----	----	
Far Plus Measurement - 0	1/s	Before	----	----	----	----	
Near Corrected Plus Measurement - 0	1/s	Before	----	----	----	----	
Far Corrected Plus Measurement - 0	1/s	Before	----	----	----	----	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

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

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

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

Primary Equipment :

Auxiliary Equipment :

Hostile Natural Gamma Ray Cartridge

HNGC-B

657

HNGS Housing Element

HEH-K

1007

7992

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	38.608	42.500	
Na 511 Peak Resolution	%	Master	15.500	12.000	14.753	19.000	
High Voltage DAC Value	V	Master			896.211		
Na 1785 Peak Location		Master	142.650	135.000	139.188	150.300	
Na 1785 Peak Resolution	%	Master	8.500	7.000	9.981	11.000	
Temperature - 0	degF	Master	----	----	----	----	
Na Count Rate	CPS	Master	45.000	10.000	33.214	100.000	

HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	39.685	42.500	
Na 511 Peak Resolution	%	Master	15.500	12.000	14.789	19.000	
High Voltage DAC Value	V	Master			966.377		
Na 1785 Peak Location		Master	142.650	135.000	142.051	150.300	
Na 1785 Peak Resolution	%	Master	8.500	7.000	8.072	11.000	
Temperature - 0	degF	Master	----	----	----	----	
Na Count Rate	CPS	Master	45.000	10.000	33.451	100.000	

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

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coincidence Count Rate Ratio		Master			0.990		

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	208.061	218.250	
Th Peak Resolution	%	Master	7.000	5.000	7.609	9.000	
Background Count Rate	CPS	Master			131.714		
Gain Ratio		Master	1.000	0.940	1.025	1.060	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	210.810	218.250	
Th Peak Resolution	%	Master	7.000	5.000	7.093	9.000	
Background Count Rate	CPS	Master			134.754		
Gain Ratio		Master	1.000	0.940	1.011	1.060	

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	40.000	43.500	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 10:24:22 12-Aug-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	41.000	43.500	

Company: Southwestern Energy Production Company

Schlumberger

Well: Diamond T Sheep 7 92 1 26

Field: Sand Wash Basin Niobrara

County: Moffat

State: Colorado

Spectral Gamma Ray