Stoller
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HGLP-LDR-058

299-W23-63 (A7899)
Log Data Report

Borehole Information:

Borehole:	299-W23-63 (A7899)		Site:	216-S-21	
Coordinates (WA St Plane)		GWL[1] (ft) :	None	GWL Date:	12/27/06
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
133916.389	567559.096	Not available	684.52 ft	51	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0	8 5/8	8	5/16	0	51

Borehole Notes:

Casing diameter and stickup measurements were acquired using a caliper and steel tape. Measurements are rounded to the nearest 1/16 inch. Logging data acquisition is referenced to the top of casing (TOC).

Logging Equipment Information:

Logging System:	Gamma 1E		Type:	SGLS (70%) SN: 34-TP40587A
Effective Calibration Date:	05/02/06	Calibration Reference:	DOE-EM/GJ1200-2006	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1C		Type:	HRLS (planar) SN: 39A314
Effective Calibration Date:	11/22/06	Calibration Reference:	HGLP-CC-04	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 2H		Type:	Neutron Moisture SN: H310700352
Effective Calibration Date:	11/28/06	Calibration Reference:	HGLP-CC-06	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 2H		Type:	Passive Neutron SN: H310700352
Effective Calibration Date:	None required	Calibration Reference:	None required	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	
Date	12/27/06	12/27/06	12/27/06	12/27/06	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	0.0	14.0	44.0	44.0	
Finish Depth (ft)	15.0	45.0	51.0	51.0	
Count Time (sec)	100	20	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N/A	N/A	N/A	N/A	
MSA Interval (ft)	1.0	1.0	1.0	1.0	

Log Run	1	2	3	4 Repeat	
ft/min	N/A	N/A	N/A	N/A	
Pre-Verification	AE217CAB	AE217CAB	AE217CAB	AE217CAB	
Start File	AE217000	AE217016	AE217048	AE217056	
Finish File	AE217015	AE217047	AE217055	AE217063	
Post-Verification	AE217CAA	AE217CAA	AE217CAA	AE217CAA	
Depth Return Error (in.)	N/A	N/A	N/A	- 0.5	
Comments	No fine gain adjustment	Dead Time > 40 percent	No fine gain adjustment	No fine gain adjustment	

High Rate Logging System (HRLS) Log Run Information:

Log Run	5	6	7	8	
Date	01/02/07	01/02/07	01/02/07	01/03/07	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	13.0	18.0	27.0	18.0	
Finish Depth (ft)	20.0	28.0	44.0	27.0	
Count Time (sec)	300	100	300	300	
Live/Real	R	R	R	R	
Shield (Y/N)	N/A	N/A	N/A	Y (internal)	
MSA Interval (ft)	1.0	1.0	1.0	0.5	
ft/min	N/A	N/A	N/A	N/A	
Pre-Verification	AC170CAB	AC170CAB	AC170CAB	AC171CAB	
Start File	AC170000	AC170008	AC170019	AC171037	
Finish File	AC170007	AC170018	AC170036	AC171055	
Post-Verification	AC170CAA	AC170CAA	AC170CAA	AC171CAA	
Depth Return Error (in.)	N/A	N/A	0	0	
Comments	No fine gain adjustment	Dead Time > 40 percent	No fine gain adjustment	No fine gain adjustment	

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	9	10	11 Repeat		
Date	01/03/07	01/04/07	01/04/07		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	0.0	34.0	12.0		
Finish Depth (ft)	35.0	51.0	23.5		
Count Time (sec)	15	15	15		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
Sample Interval (ft)	0.25	0.25	0.25		
ft/min	1.0	1.0	1.0		
Pre-Verification	BH001CAB	BH002CAB	BH002CAB		
Start File	BH001000	BH002000	BH002069		
Finish File	BH001140	BH002068	BH002115		
Post-Verification	BH001CAA	BH002CAA	BH002CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	None	None	None		

Passive Neutron Logging System (PNLS) Log Run Information:

Log Run	12	13 Repeat			
Date	01/04/07	01/04/07			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	0.0	17.0			
Finish Depth (ft)	51.0	28.0			
Count Time (sec)	60	15			

Log Run	12	13 Repeat			
Live/Real	R	R			
Shield (Y/N)	N	N			
Sample Interval (ft)	1.0	1.0			
ft/min	N/A	N/A			
Pre-Verification	BH003CAB	BH003CAB			
Start File	BH003000	BH003052			
Finish File	BH003051	BH003096			
Post-Verification	BH003CAA	BH003CAA			
Depth Return Error (in.)	N/A	0			
Comments	None	None			

Logging Operation Notes:

Logging was performed in this borehole with the SGLS, HRLS, NMLS and PNLS. Logging was conducted with a centralizer on each sonde. Measurements are referenced to the top of casing. Repeat sections were collected in this borehole to evaluate the logging systems' performance.

The same logging sonde was used for both neutron moisture (with a 50 mCi AmBe source) and passive neutron (without source) measurements.

Analysis Notes:

Analyst:	Henwood	Date:	03/06/07	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging systems were performed before and after data acquisition. Acceptance criteria were met for all systems.

A casing correction for 5/16-in.-thick casing (8-in. casing) was applied to the spectral log data (SGLS and HRLS). The neutron moisture and passive neutron logging data were adversely affected by the very high gamma activity in this borehole. Therefore, data from both systems are reported in counts per second and should be considered qualitative.

SGLS and HRLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet templates identified as G1Emay06.xls and G1CNov06.xls for the SGLS and HRLS, respectively, using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations.

Very high gamma activity in the borehole required data to be acquired with the HRLS without a shield and with an internal shield. Where full energy photo peaks from a logging system are not exhibited in the spectra, data are substituted to provide the best representation of the contaminant profile.

Results and Interpretations:

Cs-137, Eu-154, Co-60, and Sn-126 are manmade contaminants detected in this borehole.

Cs-137 is detected from the ground surface to 45 ft in depth. The maximum concentration is approximately 45 million pCi/g at 24.5 ft in depth.

Eu-154 is detected from 41 to 47 ft. The maximum concentration detected is approximately 20 pCi/g at 41 ft. It is probable Eu-154 also exists in the high rate interval from 15 to 40 ft at higher concentrations.

Co-60 is detected from 43 to 51 ft. The maximum concentration is approximately 6 pCi/g at 44 ft. It is probable Co-60 also exists in the high rate interval from 15 to 40 ft at higher concentrations.

Sn-126 as measured from its decay product Sb-126 at 695 keV is detected from 40 to 45 ft. The maximum concentration is approximately 45 pCi/g at 44 ft. It is probable Sn-126 also exists in the high rate interval from 15 to 40 ft at higher concentrations.

Neutron measurements are affected by the high gamma activity. To derive a moisture count rate, the counts from the passive neutron are subtracted from the neutron moisture measurements. The residual count rate provides a reasonable profile of likely moisture in the vadose zone. Using this method, elevated moisture appears to exist in the highest gamma activity interval at about 24 ft.

The repeat sections for the SGLS indicate good agreement for the naturally occurring and manmade radionuclides.

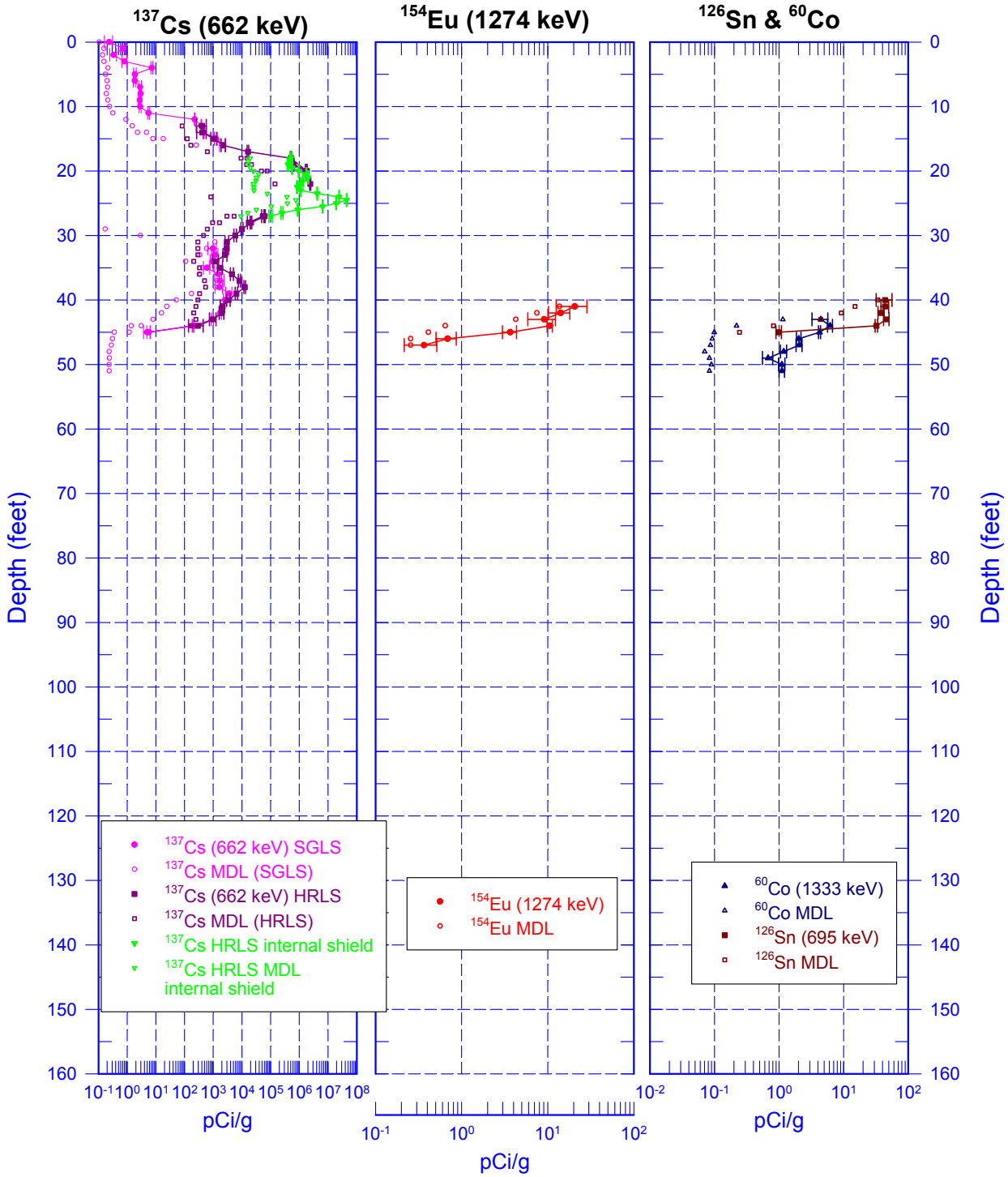
List of Log Plots:

Depth Reference is top of casing
Depth Scale - 20 ft/inch except for repeat logs

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Neutron Comparison
Repeat of Manmade Radionuclides
Repeat Section of Natural Gamma Logs

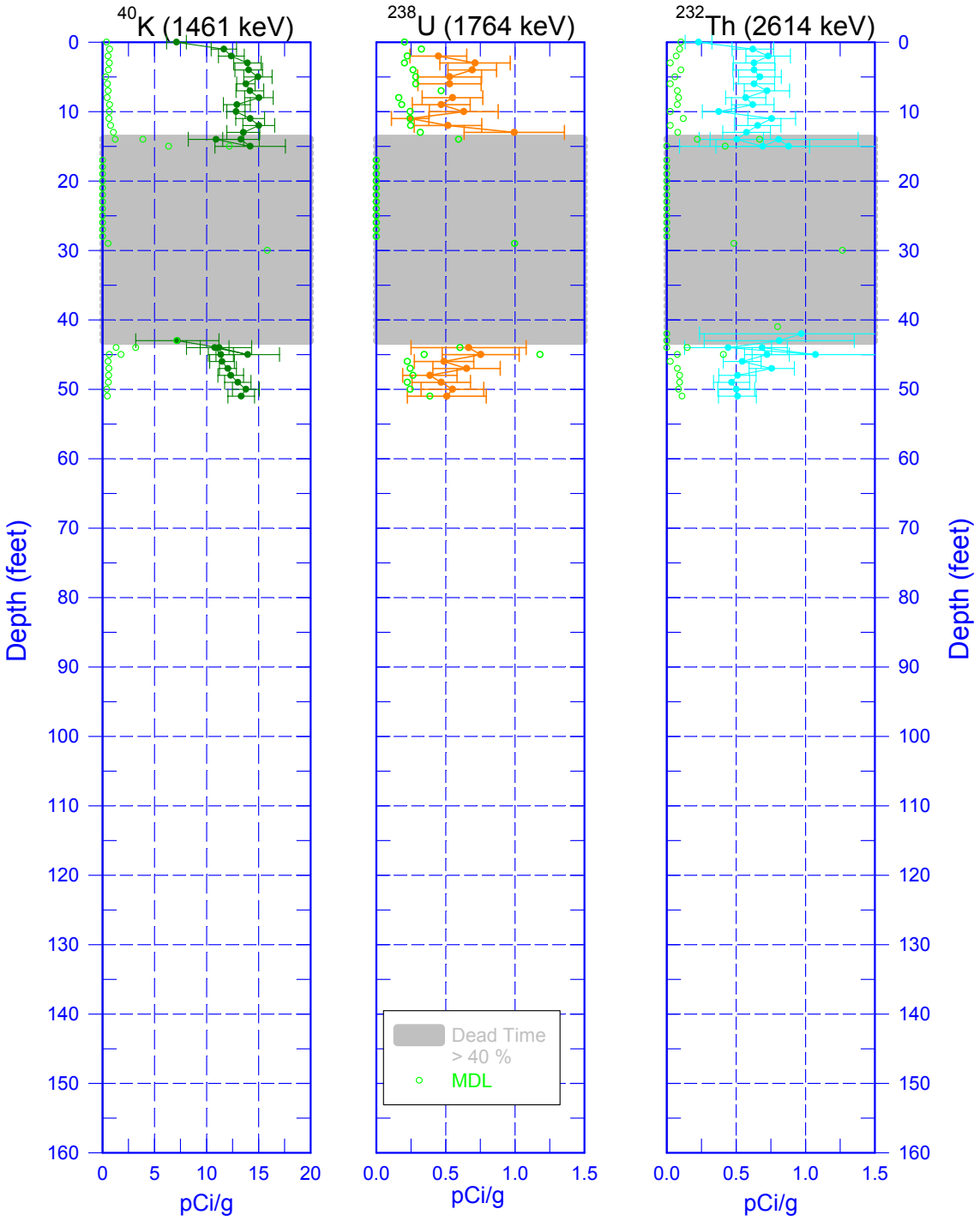
[1] GWL – groundwater level

299-W23-63 (A7899)
Manmade Radionuclides



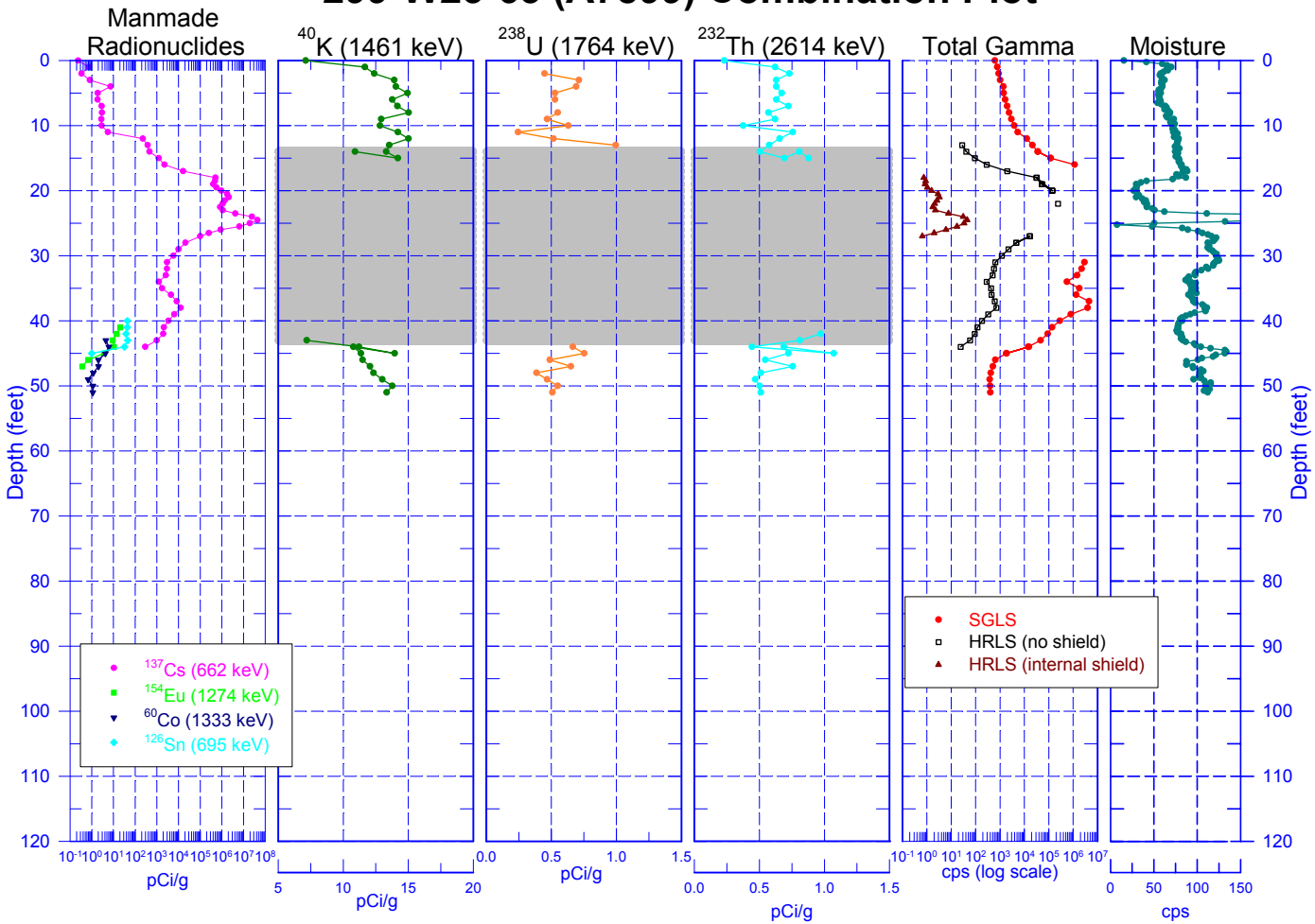
Zero Reference = Top of Casing

299-W23-63 (A7899)
Natural Gamma Logs



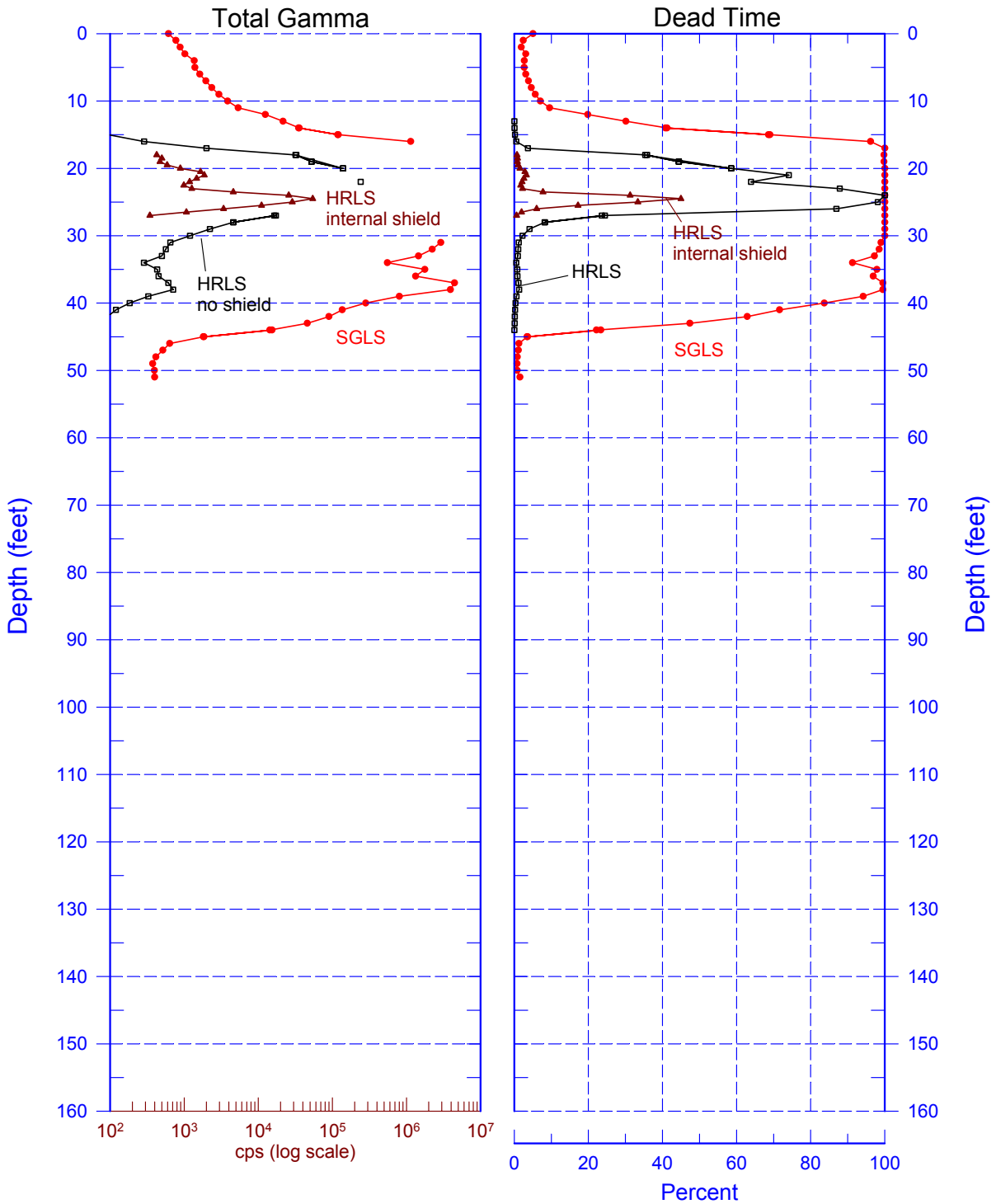
Zero Reference = Top of Casing

299-W23-63 (A7899) Combination Plot



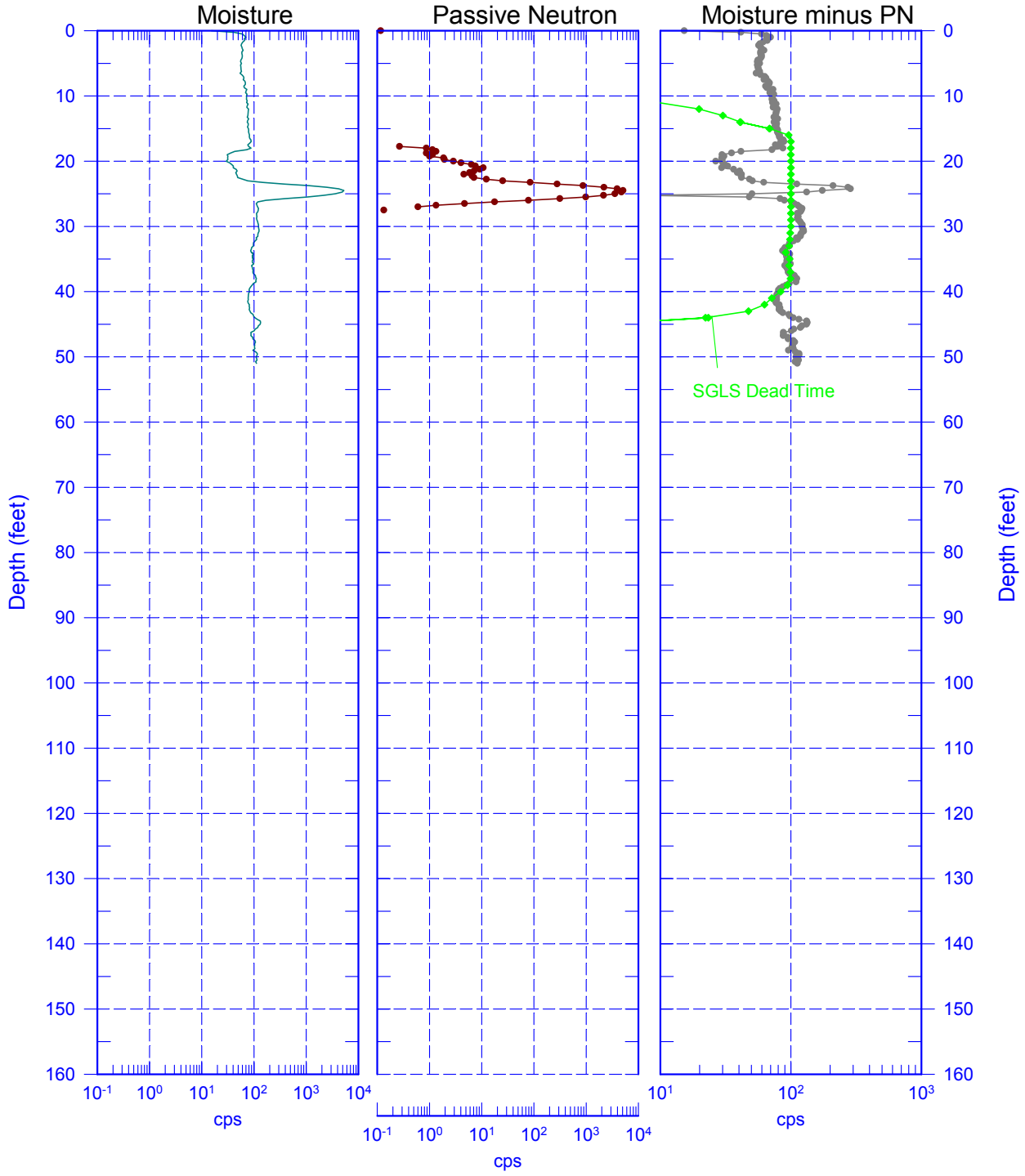
Zero Reference = Top of Casing

299-W23-63 (A7899)
Total Gamma & Dead Time



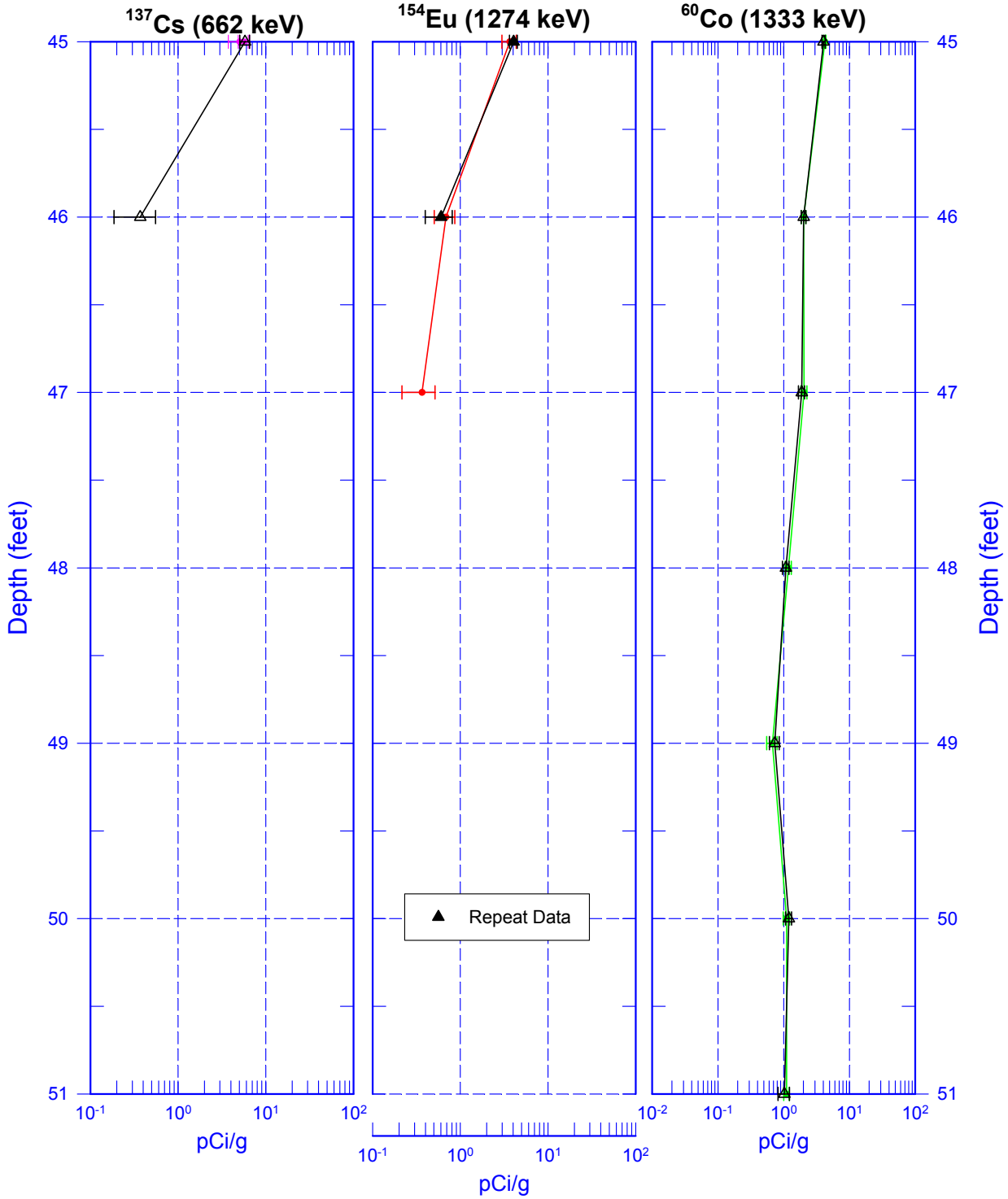
Reference - Top of Casing

299-W23-63 (A7899)
Neutron Comparison



Reference - Top of Casing

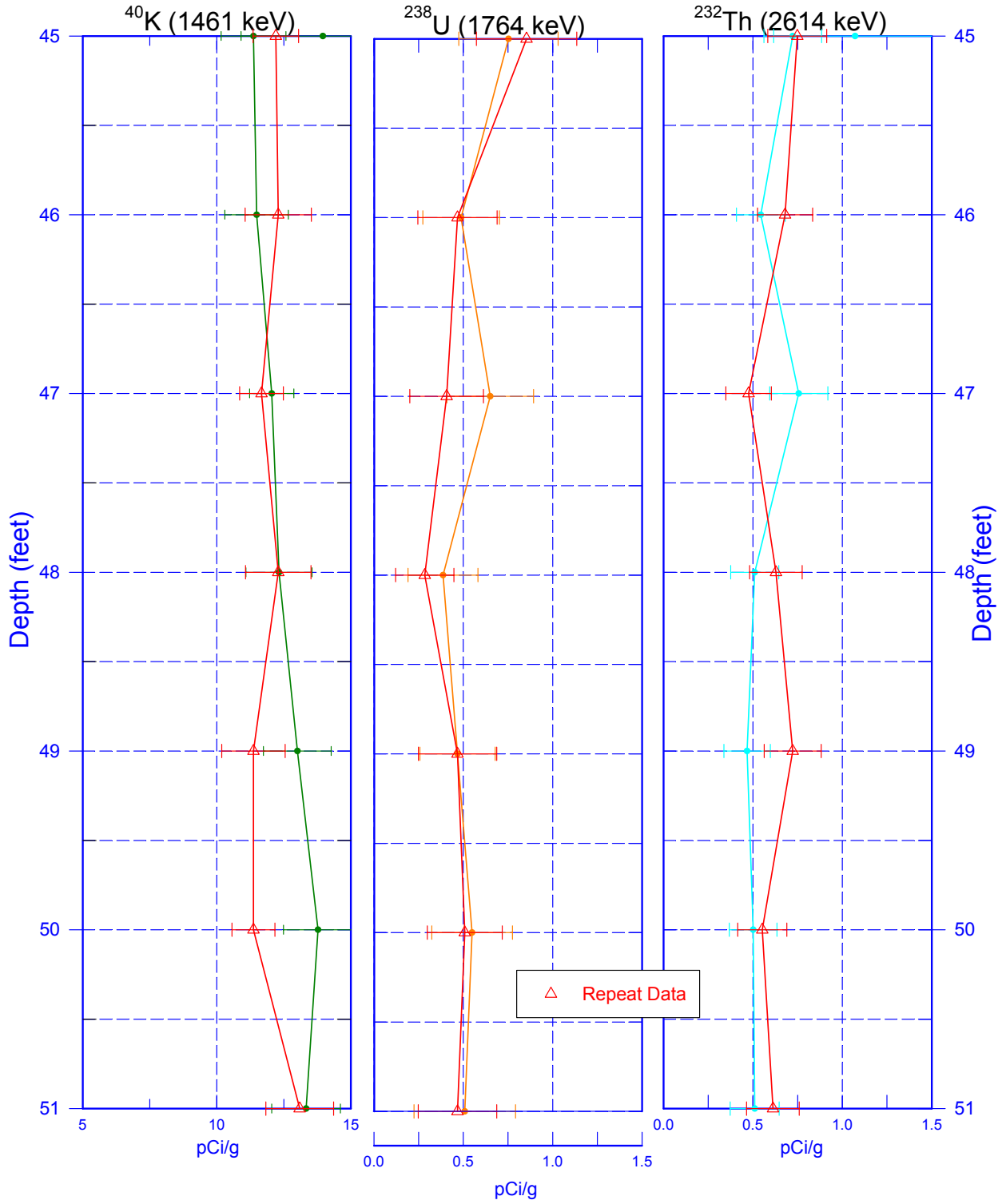
299-W23-63 (A7899)
Repeat of Manmade Radionuclides



Zero Reference = Top of Casing

299-W23-63 (A7899)

Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing