

**299-E26-74 (A6667)  
Log Data Report**

**Borehole Information:**

<b>Borehole:</b> 299-E26-74 (A6667)		<b>Site:</b> 216-A-24 Crib			
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b> None		<b>GWL Date:</b> 08/15/05	
<b>North (m)</b>	<b>East (m)</b>	<b>Drill Date</b>	<b>Ground Level Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
136366.096	575690.872	08/83	651.58	44	Cable

**Casing Information:**

<b>Casing Type</b>	<b>Stickup (ft)</b>	<b>Outer Diameter (in.)</b>	<b>Inside Diameter (in.)</b>	<b>Thickness (in.)</b>	<b>Top (ft)</b>	<b>Bottom (ft)</b>
Welded steel	2	6 5/8	6 1/8	1/4	2	44

**Borehole Notes:**

The logging engineer measured the casing diameter using a caliper and steel tape. Logging data acquisition is referenced to the top of casing.

**Spectral Gamma Logging System (SGLS) Equipment Information:**

<b>Logging System:</b>	Gamma 1E	<b>Type:</b>	SGLS (70%) SN: 34TP40587A
<b>Effective Calibration Date:</b>	03/04/05	<b>Calibration Reference:</b>	DOE-EM/GJ864-2005
		<b>Logging Procedure:</b>	MAC-HGLP 1.6.5, Rev. 0

**High Rate Logging System (HRLS) Equipment Information:**

<b>Logging System:</b>	Gamma 1C	<b>Type:</b>	HRLS SN: 39-A314
<b>Effective Calibration Date:</b>	04/06/05	<b>Calibration Reference:</b>	DOE-EM/GJ865-2005
		<b>Logging Procedure:</b>	MAC-HGLP 1.6.5, Rev. 0

**Spectral Gamma Logging System (SGLS) Log Run Information:**

<b>Log Run</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 Repeat</b>
Date	09/01/05	09/01/05	09/01/05	09/01/05	09/01/05
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	44.0	37.0	13.0	28.0	10.0
Finish Depth (ft)	37.0	13.0	2.0	23.0	3.0
Count Time (sec)	100	20	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N

Log Run	1	2	3	4	5 Repeat
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	N/A <sup>2</sup>	N/A	N/A	N/A	N/A
Pre-Verification	AE103CAB	AE103CAB	AE103CAB	AE103CAB	AE103CAB
Start File	AE104000	AE104008	AE104033	AE104045	AE104051
Finish File	AE104007	AE104032	AE104044	AE104050	AE104058
Post-Verification	AE105CAA	AE105CAA	AE105CAA	AE105CAA	AE105CAA
Depth Return Error (in.)	N/A	N/A	0	N/A	0
Comments	No fine-gain adjustment	High dead time interval	No fine-gain adjustment	No fine-gain adjustment	No fine-gain adjustment

### **High Rate Logging System (HRLS) Log Run Information:**

Log Run	6	7	8	9 Repeat	
Date	09/27/05	09/27/05	09/27/05	09/27/05	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	38.0	24.0	22.0	20.5	
Finish Depth (ft)	27.0	13.0	16.0	16.5	
Count Time (sec)	300	300	300	300	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	Y (internal)	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	AC143CAB	AC143CAB	AC143CAB	AC143CAB	
Start File	AC143000	AC143012	AC143024	AC143031	
Finish File	AC143011	AC143023	AC143030	AC143039	
Post-Verification	AC143CAA	AC143CAA	AC143CAA	AC143CAA	
Depth Return Error (in.)	N/A	0	N/A	0	
Comments	No fine gain adjustment				

### **Logging Operation Notes:**

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.

### **Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	10/31/05	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging systems were performed before and after data acquisition. Acceptance criteria were met.

A casing correction for 1/4-in.-thick casing was applied to the spectral log data (SGLS and HRLS).

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 G1EMar05.xls for the SGLS and G1CApr05.xls for the HRLS using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. Dead time corrections are applied where dead times exceed approximately 11 percent for both the SGLS and HRLS. Where SGLS dead time exceeds 50 percent, HRLS data are substituted. No correction for water was necessary.

### **Log Plot Notes:**

Separate log plots are provided for the man-made radionuclide ( $^{137}\text{Cs}$ ) detected in the borehole, naturally occurring radionuclides ( $^{40}\text{K}$ ,  $^{238}\text{U}$ ,  $^{232}\text{Th}$  [KUT]), a combination of man-made, KUT, total gamma, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. Repeat log sections are also included where appropriate.

### **Results and Interpretations:**

$^{137}\text{Cs}$  was detected in this borehole from 3 ft to the bottom of the borehole (44ft). The maximum concentration was measured at approximately 1 million pCi/g at 18 ft in depth.

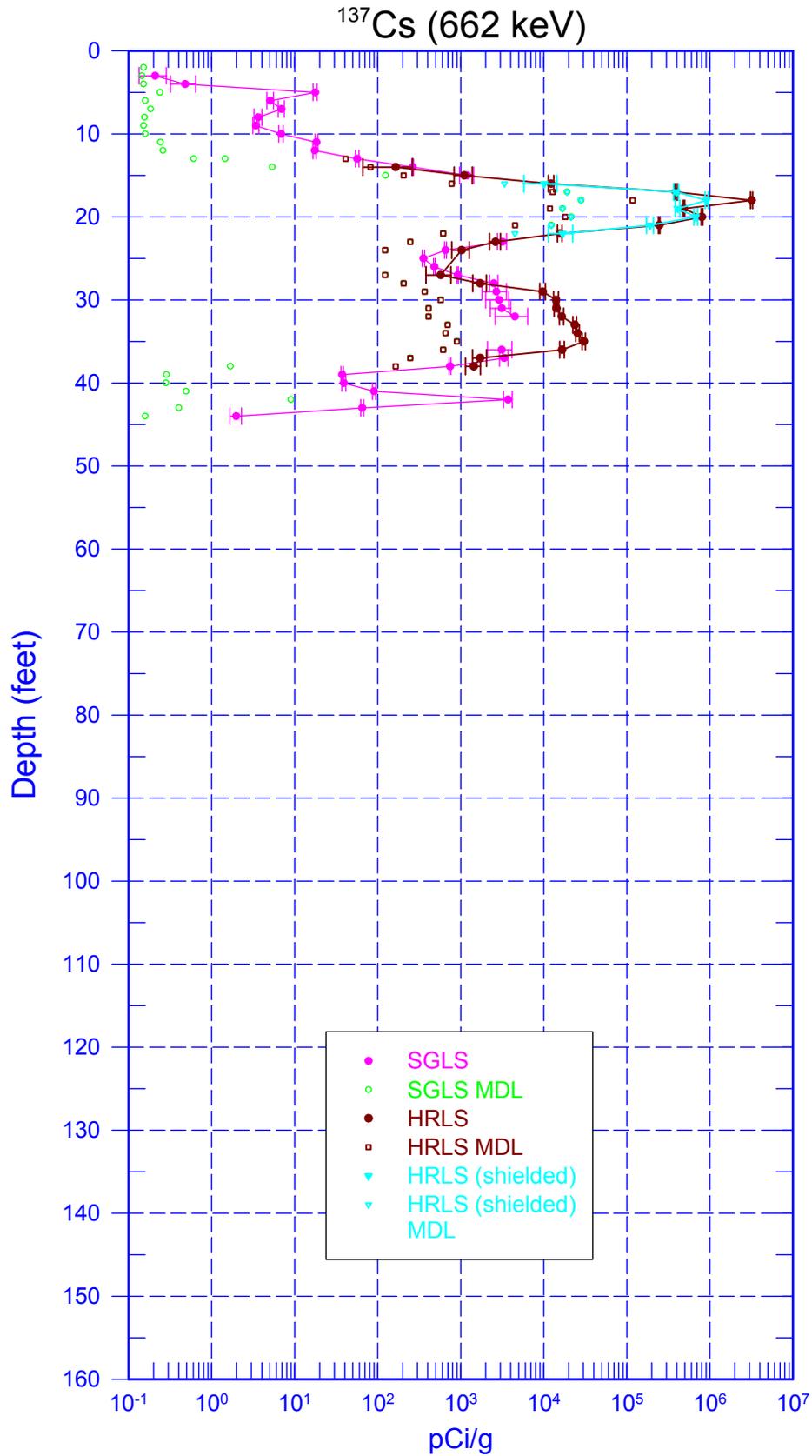
The repeat sections for the SGLS and HRLS indicate good agreement.

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<sup>1</sup> GWL – groundwater level

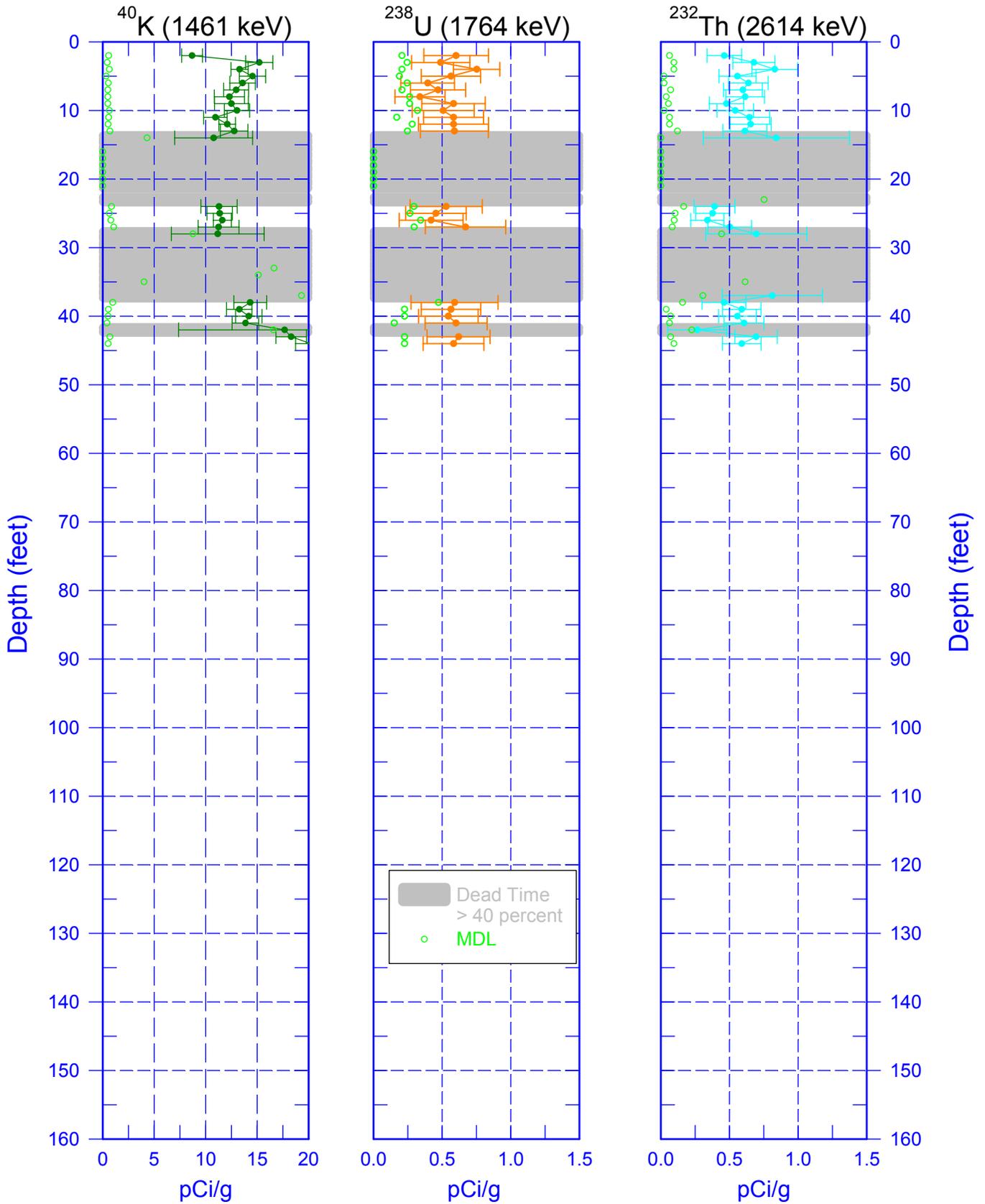
<sup>2</sup> N/A – not applicable

# 299-E26-74 (A6667) Man-Made Radionuclides



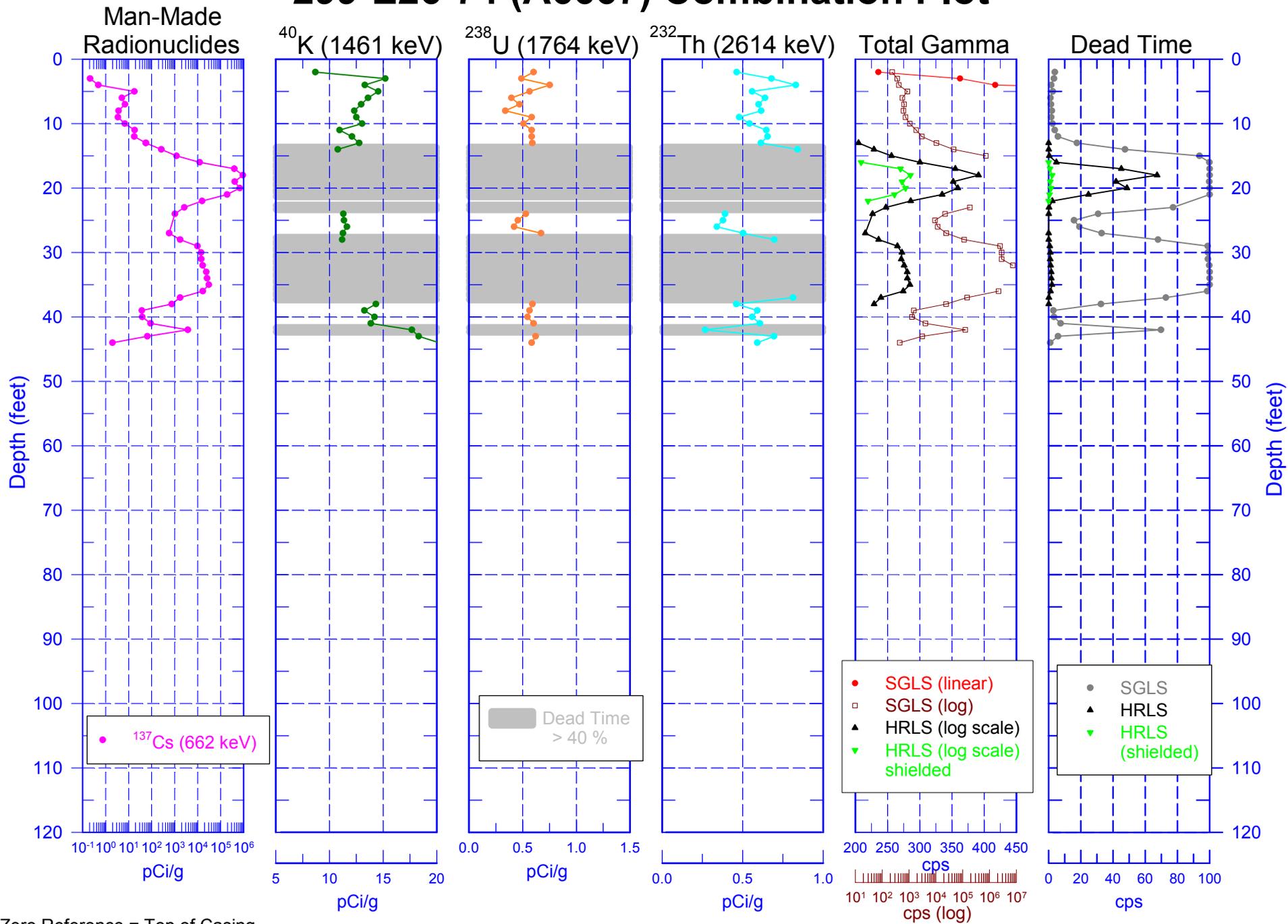
Zero Reference = Top of Casing

# 299-E26-74 (A6667) Natural Gamma Logs



Zero Reference = Top of Casing

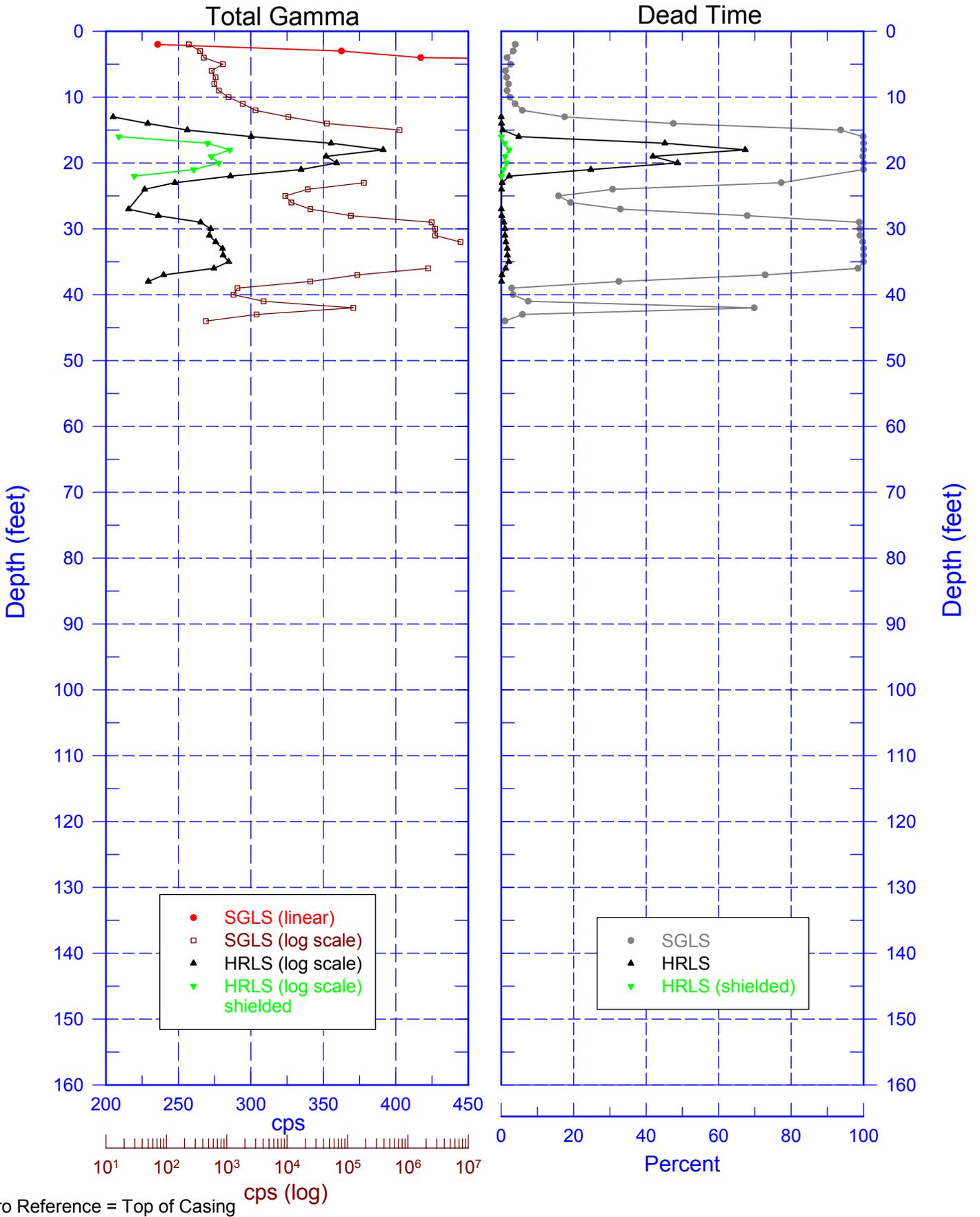
# 299-E26-74 (A6667) Combination Plot



Zero Reference = Top of Casing

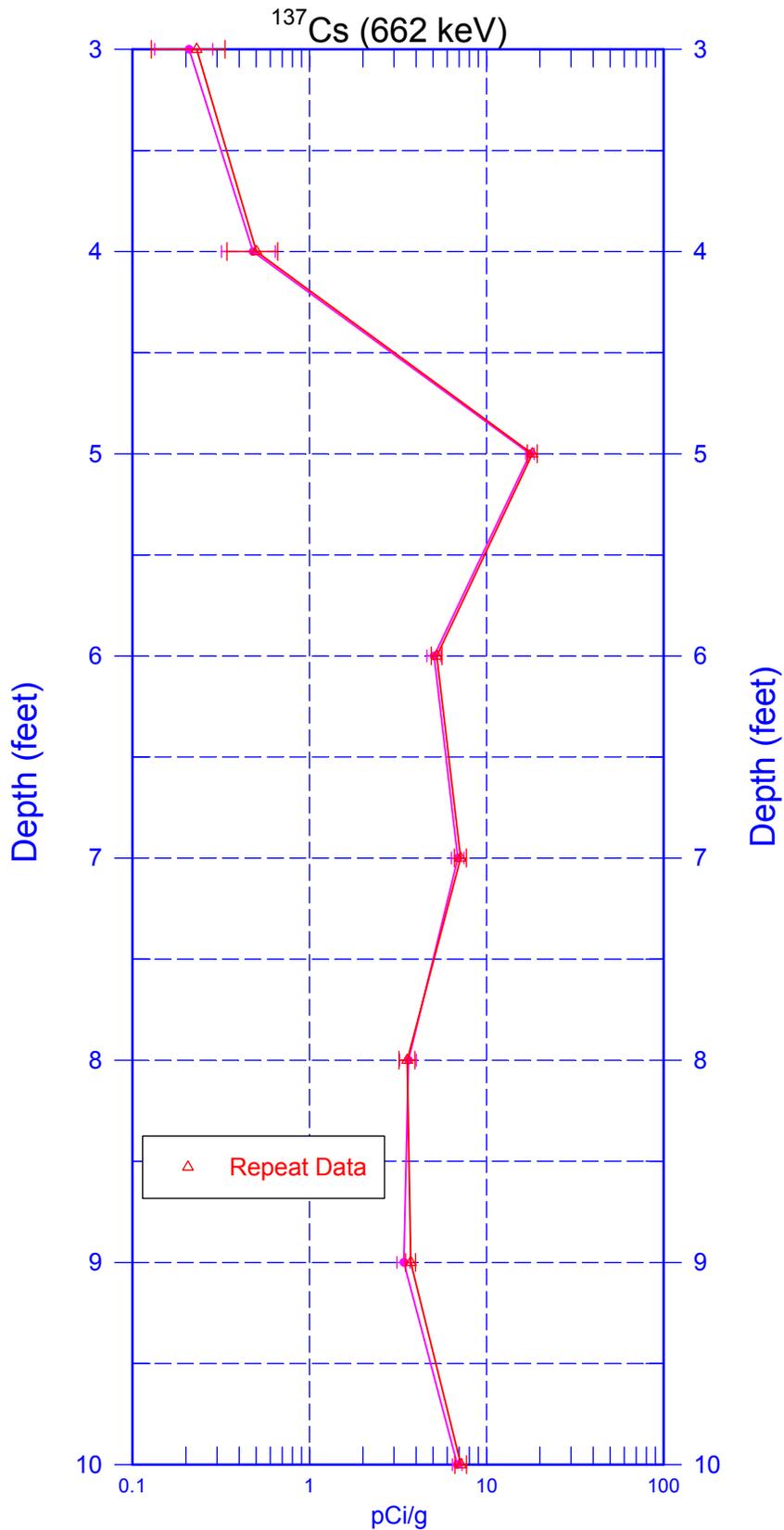
# 299-E26-74 (A6667)

## Total Gamma & Dead Time



# 299-E26-74 (A6667)

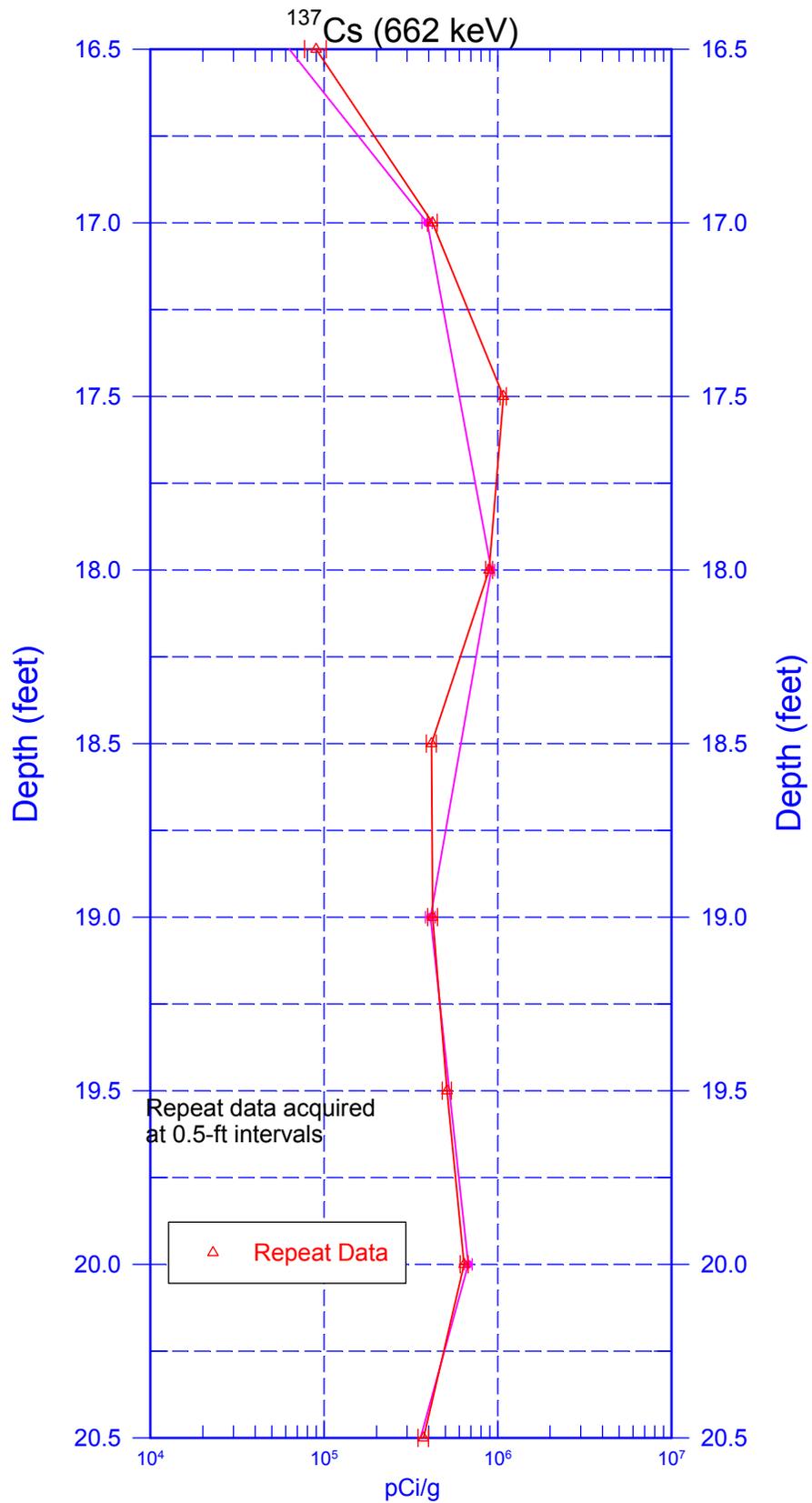
## Repeat Section of Man-Made Radionuclides



Zero Reference = Top of Casing

# 299-E26-74 (A6667)

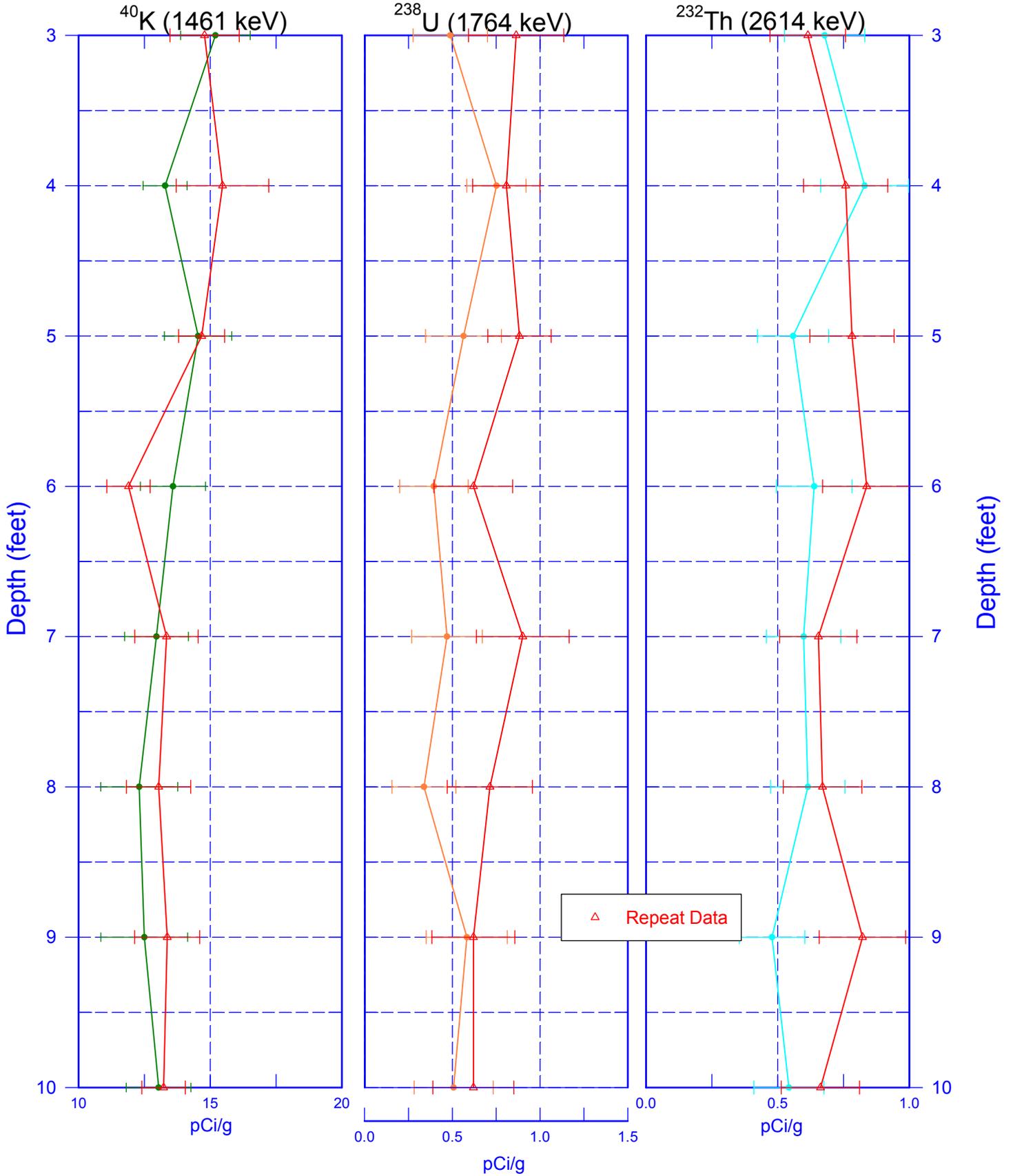
## Repeat Section of High Rate (shielded)



Zero Reference = Top of Casing

# 299-E26-74 (A6667)

## Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing