

**299-E24-54 (A5911)**  
**Log Data Report**

**Borehole Information:**

<b>Borehole:</b> 299-E24-54 (A5911)		<b>Site:</b> 216-A-4 Crib			
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b> None		<b>GWL Date:</b> 04/07/05	
<b>North (m)</b>	<b>East (m)</b>	<b>Drill Date</b>	<b>Ground Level Elevation (ft)</b>	<b>Total Depth (ft)</b>	<b>Type</b>
135536.193	575224.407	01/55	716.0	102	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	2.05	6 5/8	6 1/8	1/4	2.05	102
Welded Steel	0	8 5/8	8	unknown	0	50

**Borehole Notes:**

The logging engineer measured the 6-in. casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in. The 8-in. casing was not visible at the ground surface. Casing depths are derived from HWIS<sup>2</sup>, which reports the borehole was originally drilled in 1955 to a depth of 50 ft. In 1982, the borehole was deepened to 102 ft with a 6-in. casing placed to total depth. The annulus between the 6-in. and 8-in. casings was grouted from 0 to 50 ft. The bottom 2 ft (100-102 ft) of the borehole was plugged with grout.

**Logging Equipment Information:**

<b>Logging System:</b> Gamma 1E	<b>Type:</b> SGLS (70%) SN: 34TP40587A
<b>Calibration Date:</b> 04/05	<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 Repeat</b>	<b>3</b>		
Date	04/07/05	04/11/05	04/11/05		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	99.5	50.5	38.5		
Finish Depth (ft)	39.5	39.5	2.5		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A <sup>3</sup>	N/A	N/A		

Log Run	1	2 Repeat	3		
Pre-Verification	AE048CAB	AE049CAB	AE049CAB		
Start File	AE048000	AE049000	AE049012		
Finish File	AE048060	AE049011	AE049048		
Post-Verification	None	AE049CAA	AE049CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.		

### **Logging Operation Notes:**

Logging was conducted with a centralizer on the sonde. Logging data acquisition is referenced to the top of casing. Before logging the borehole was swabbed by the Health Physics Technician (HPT); no contamination was detected. An industrial hygiene technician checked for organic vapors at the well head and reported no hazardous vapors. A repeat section was collected in this borehole to evaluate system performance.

### **Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	04/21/05	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met. On April 7, 2005, the post-run verification spectra were collected but inadvertently not saved to a disk.

A combined casing correction for 0.572-in.-thick casing was applied to the log data between the ground surface and 50 ft. Below 50 ft a correction for 0.322-in.-thick casing was applied.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EOct04.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. No corrections for dead time or water were necessary.

### **Log Plot Notes:**

Separate log plots are provided for the man-made radionuclides ( $^{137}\text{Cs}$  and  $^{60}\text{Co}$ ) detected in the borehole, naturally occurring radionuclides ( $^{40}\text{K}$ ,  $^{238}\text{U}$ ,  $^{232}\text{Th}$  [KUT]), a combination of man-made, KUT, 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.

A plot of data acquired by Waste Management Federal Services Northwest in 1999, using the Radionuclide Logging System (RLS), is shown that provides a comparison to the current SGLS data. An historical gross gamma log acquired in 1963 (Additon et al. 1978) was re-digitized and included for comparison with the current total gamma log data.

Repeat log sections for the naturally occurring and man-made radionuclides are also included.

## **Results and Interpretations:**

<sup>137</sup>Cs and <sup>60</sup>Co were the man-made radionuclides detected in this borehole. <sup>137</sup>Cs was detected in two primary depth intervals between approximately 29 and 36 ft and between 64 and 91 ft. <sup>137</sup>Cs was also detected at approximately 1 pCi/g and below at a few other locations in the borehole. The maximum concentration was measured at approximately 55 pCi/g at 65.5 ft.

<sup>60</sup>Co was detected between 29 and 54 ft and between 65 and 69 ft. The maximum concentration was measured at 2 pCi/g at 45.5 ft.

The comparison of RLS and SGLS data indicates good agreement and suggests no contaminant movement has occurred since 1999.

The historical gross gamma log showed elevated gamma activity between 28 and 45 ft. At the time of logging in 1963, the borehole was only 50 ft deep. <sup>137</sup>Cs and <sup>60</sup>Co were detected in this interval in 2005.

The repeat sections generally indicate good agreement of the naturally occurring KUT and man-made radionuclides.

## **References:**

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Wells*, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

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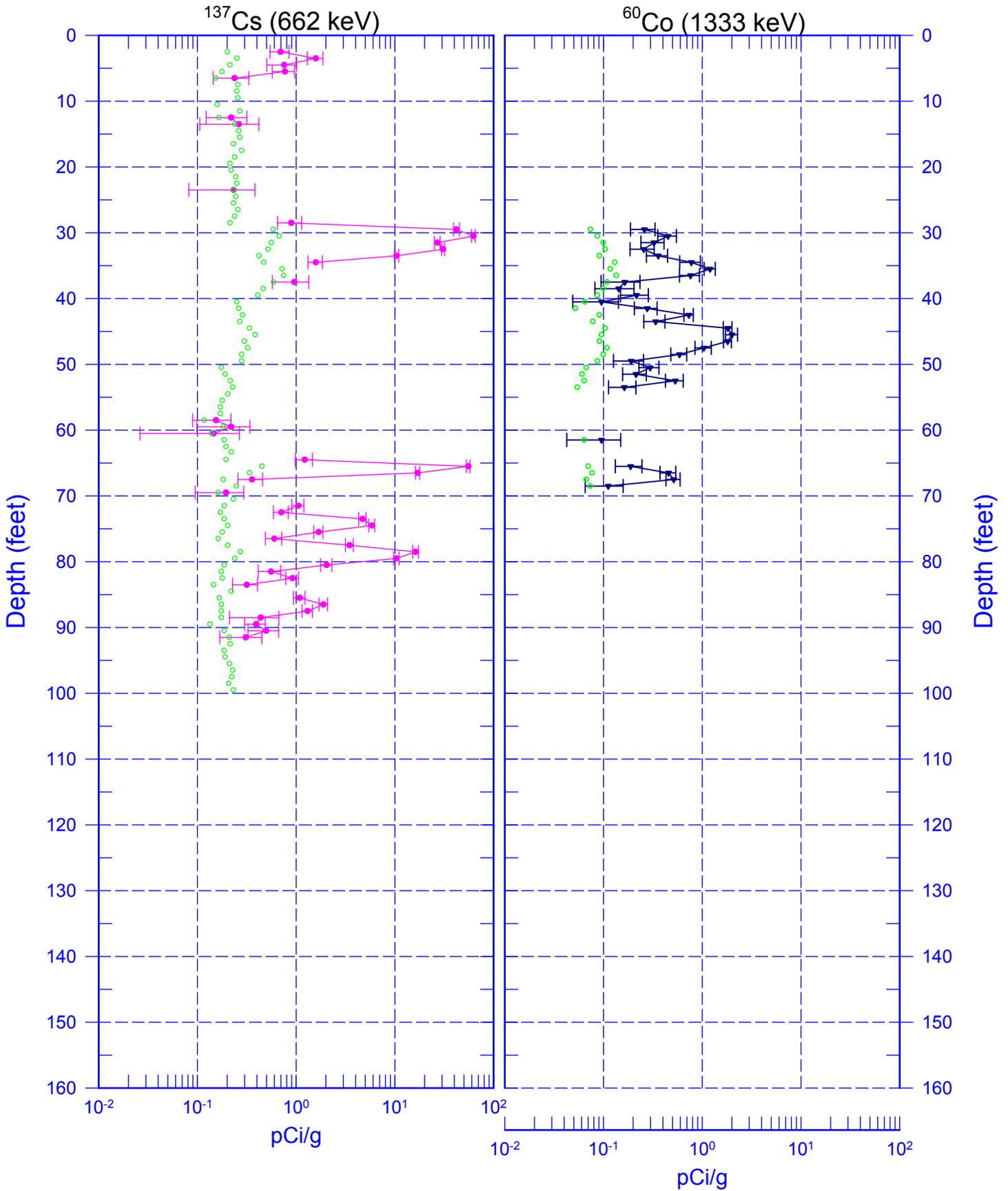
<sup>1</sup> GWL – groundwater level

<sup>2</sup> HWIS – Hanford Wells Information System

<sup>3</sup> N/A – not applicable

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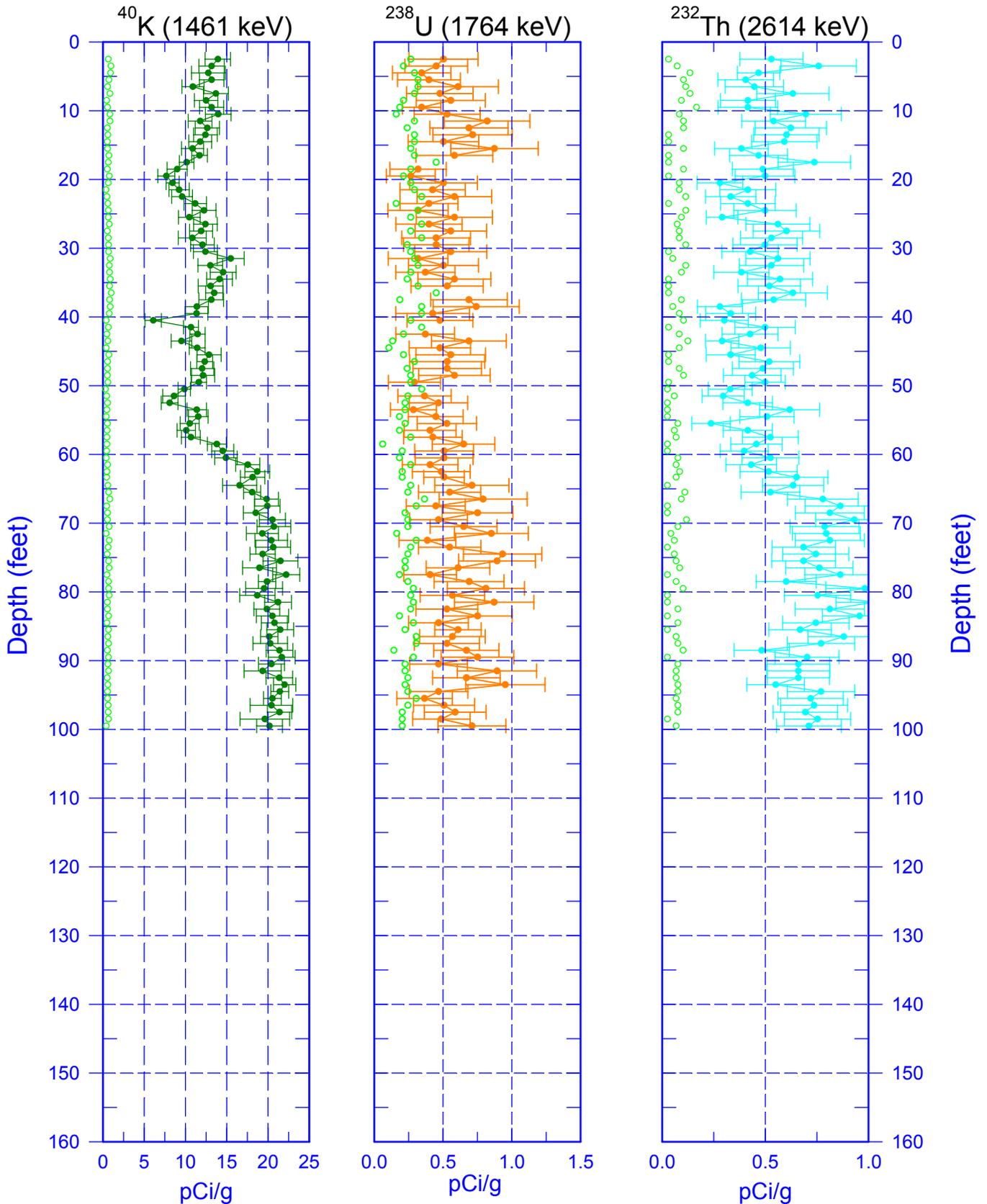
## Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 04/11/05

# 299-E24-54 (A5911) Natural Gamma Logs

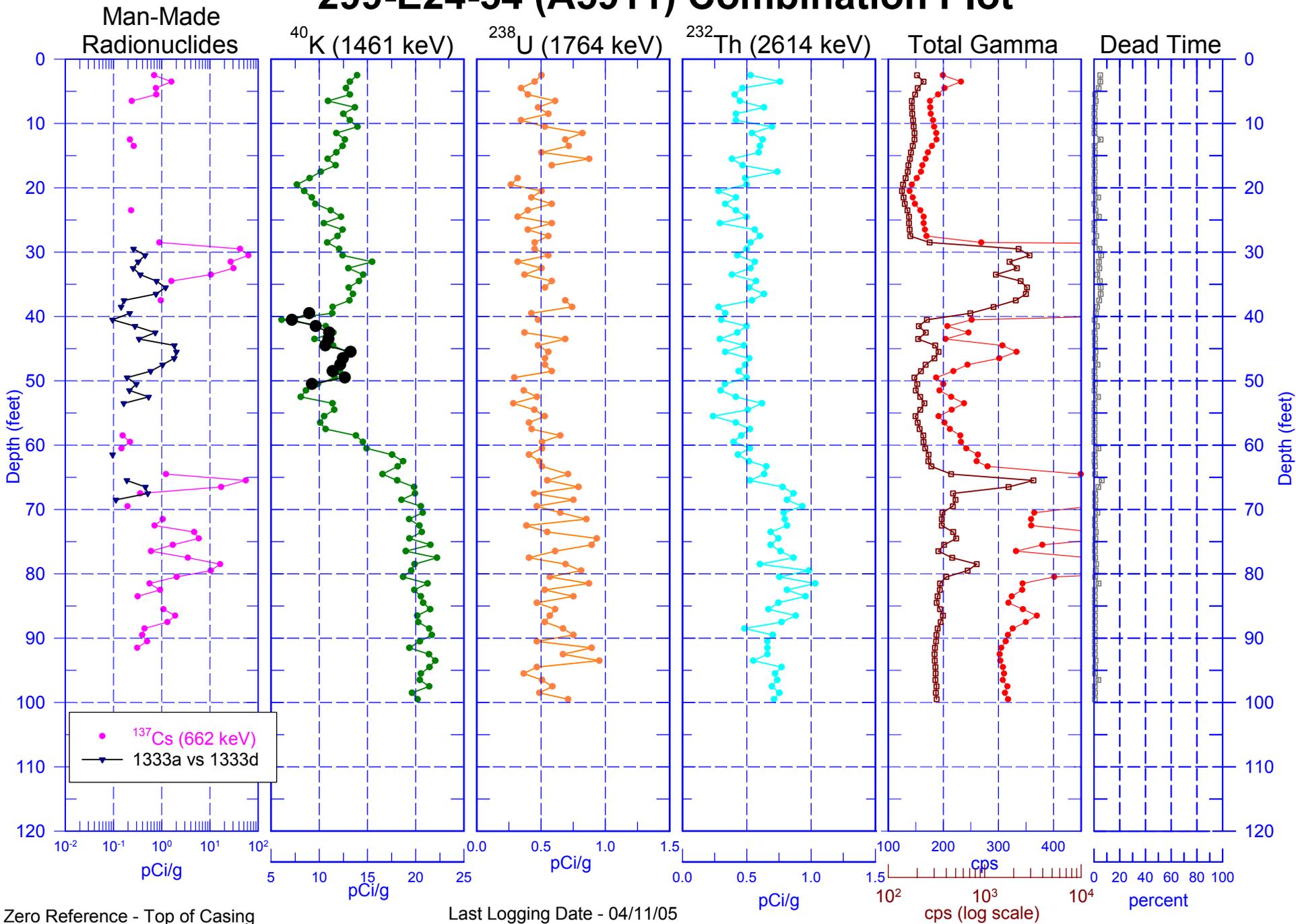


Zero Reference = Top of Casing

○ MDL

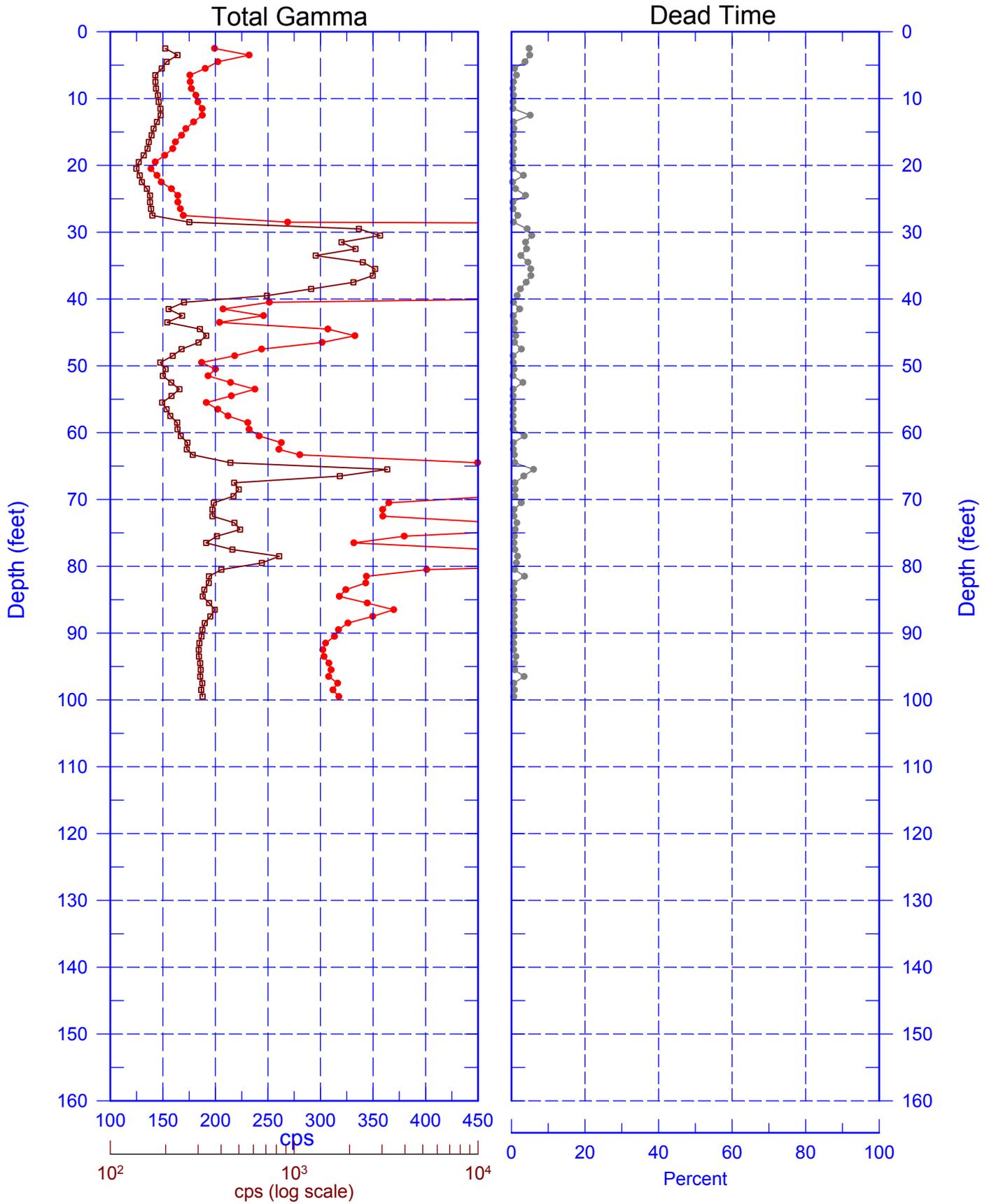
Last Log Date - 04/11/05

# 299-E24-54 (A5911) Combination Plot



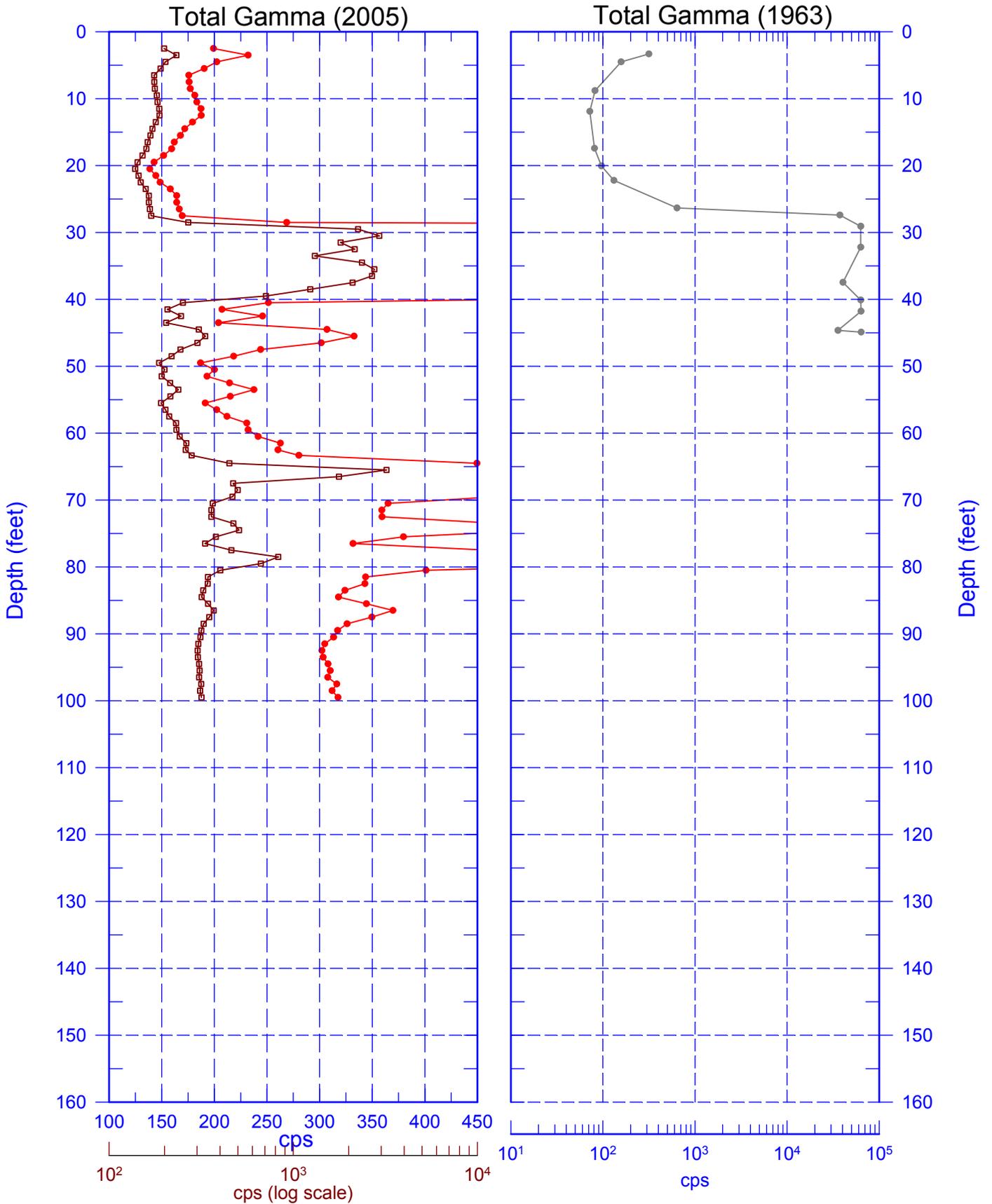
# 299-E24-54 (A5911)

## Total Gamma & Dead Time



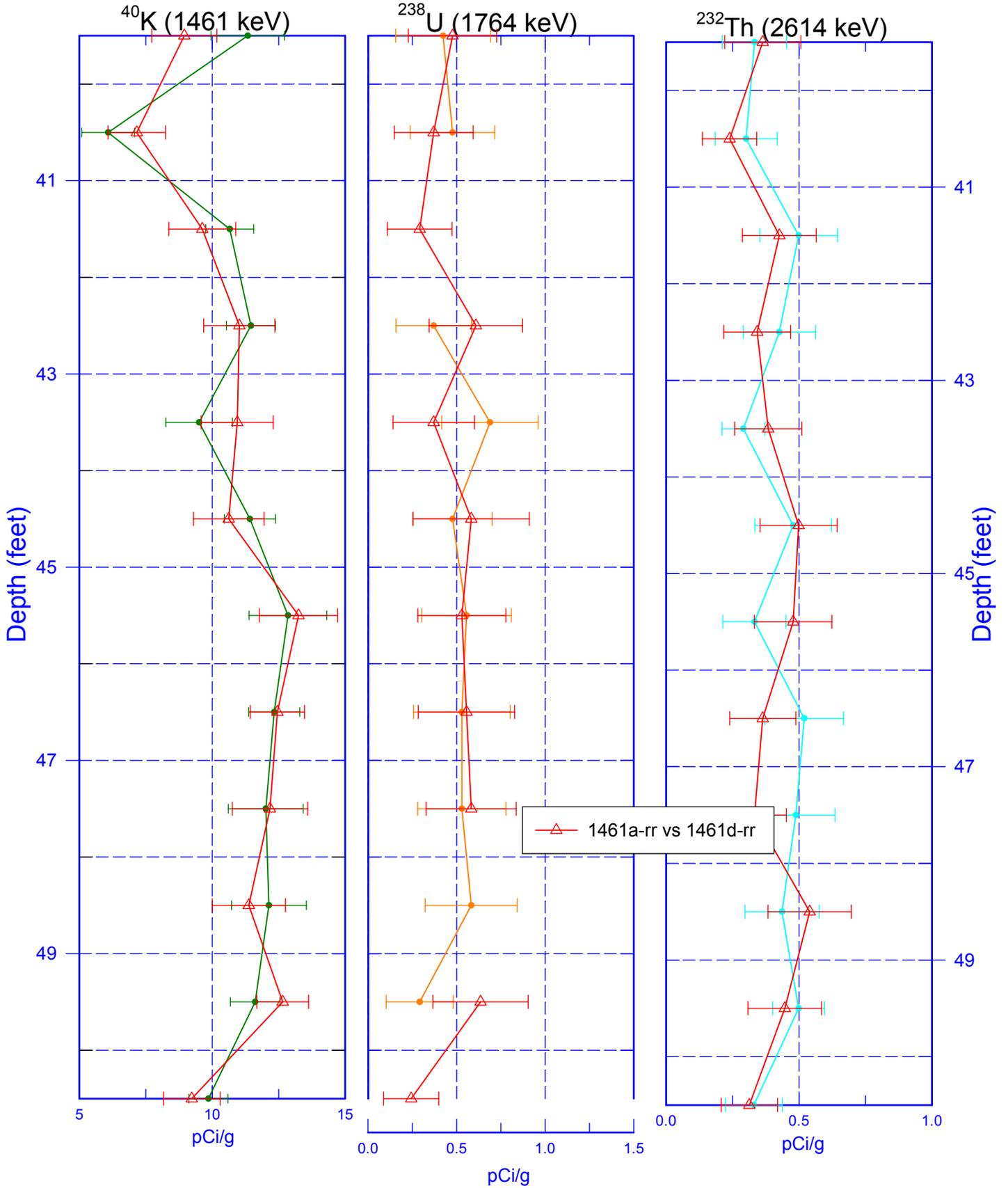
# 299-E24-54 (A5911)

## Historical Total Gamma Comparison



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## Repeat Section of Natural Gamma Logs

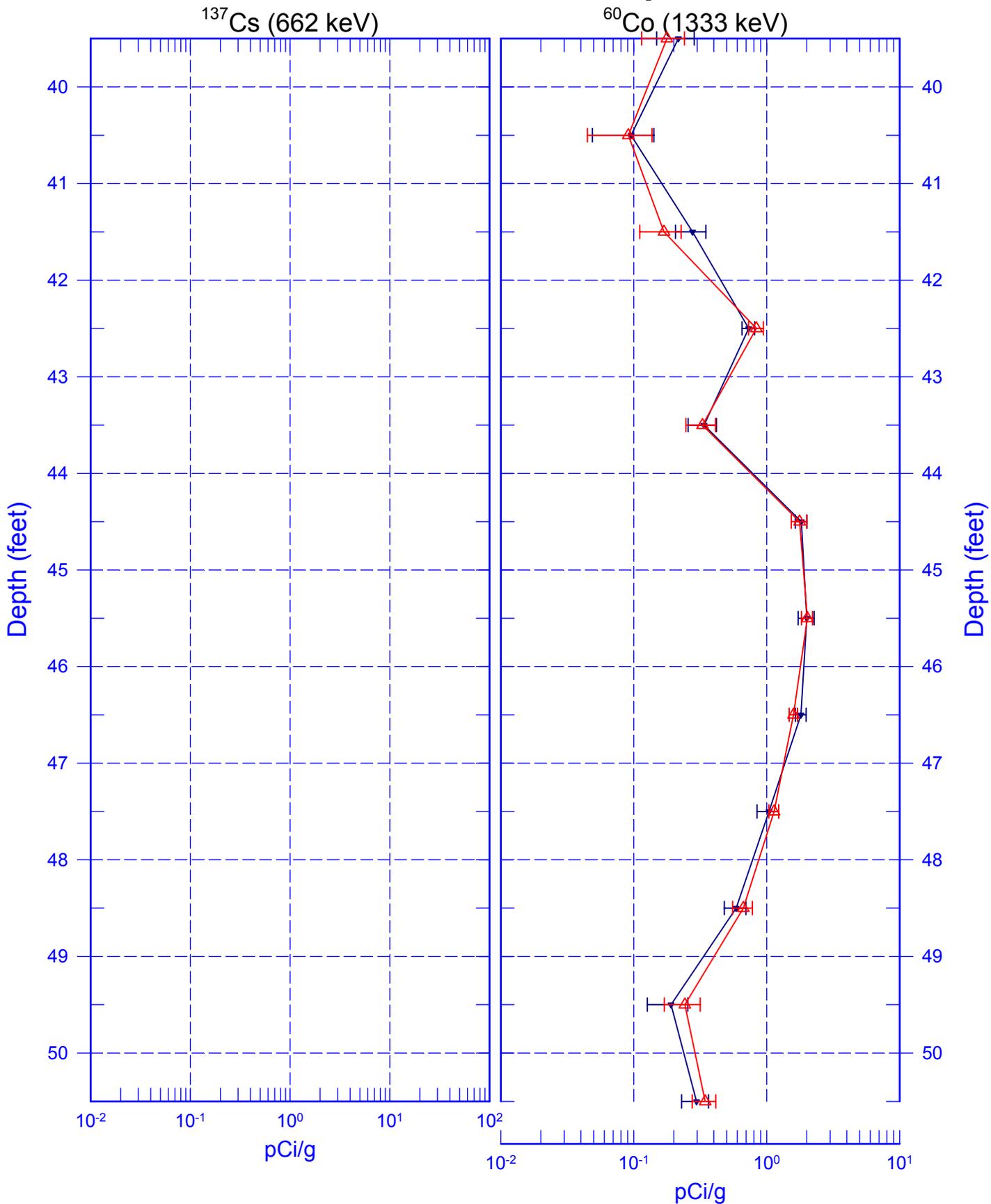


Zero Reference - Top of Casing

Last Log Date - 04/11/05

# 299-E24-54 (A5911)

## Man-Made Radionuclide Repeat Section

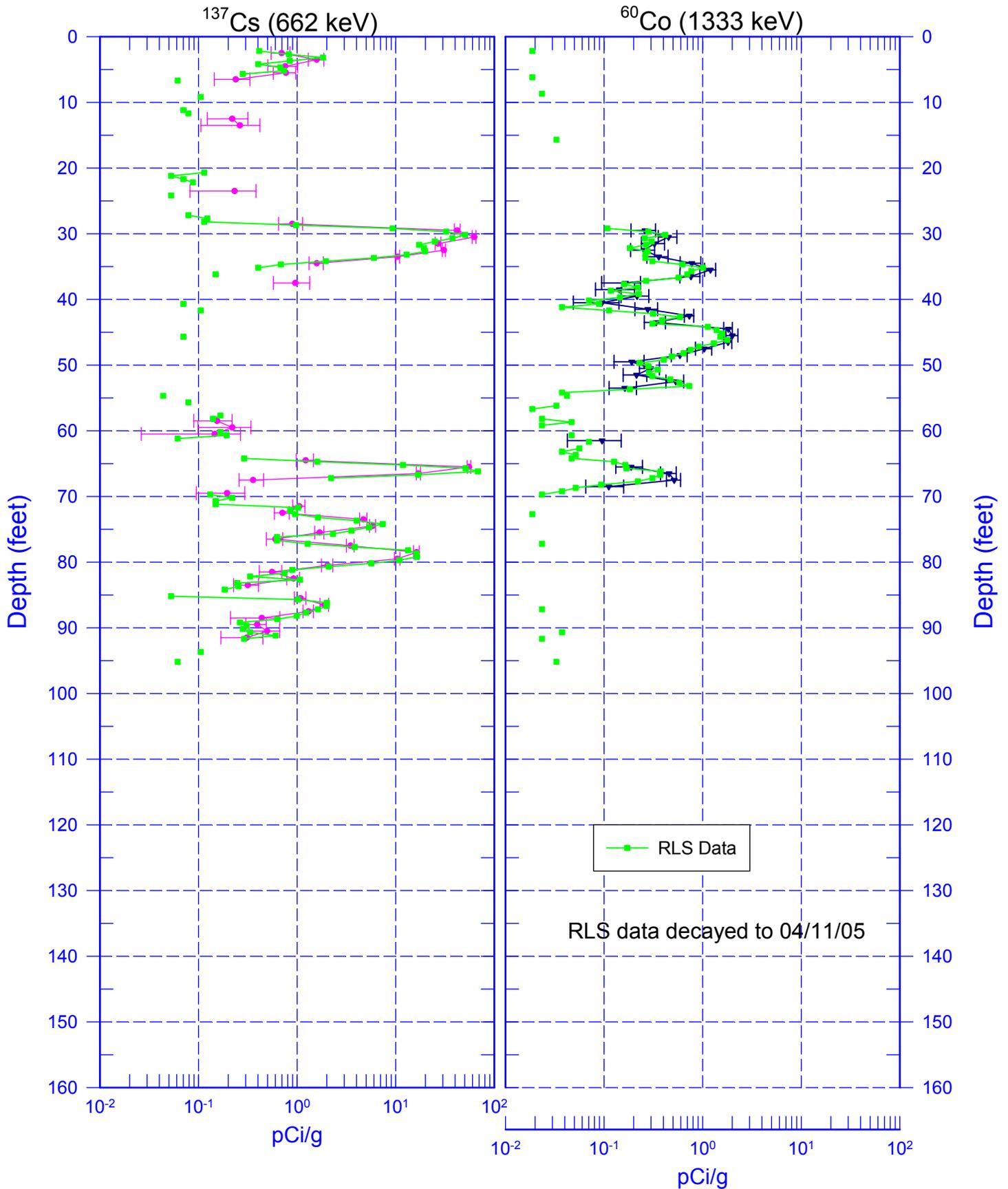


Zero Reference - Top of Casing

Last Log Date - 04/11/05

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## Comparison of RLS (1999) and SGLS (2005)



Zero Reference - Top of Casing

Last Log Date - 04/11/05