

## 299-E33-336 (B8908) Log Data Report

### Borehole Information:

<b>Borehole:</b> 299-E33-336 (B8908)		<b>Site:</b> Southeast of 216-B-45 Crib			
<b>Coordinates</b> (WA State Plane)		<b>GWL (ft)<sup>1</sup>:</b> Not Reached		<b>GWL Date:</b> 8/29/2002	
<b>North</b>	<b>East</b>	<b>Drill Date</b>	<b>TOC<sup>2</sup> Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
137,653.04 m	573,637.14 m	Unknown	~ 627 ft	143.8	Unknown

### Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	3.85	6 5/8	6	5/16	0	N/A <sup>3</sup>

The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper was measured using a steel tape and rounded to the nearest 1/16 in. Inside casing diameter was measured using a steel tape and also rounded to the nearest 1/16 in. Casing thickness was calculated. Casing bottom is unknown.

### Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from measurements by Stoller field personnel and HWIS<sup>4</sup>. The depths have been adjusted to TOC. A borehole profile is not found in Chamness and Merz (1993) nor is a well summary sheet available for review. Borehole elevation and drill date are unknown. TOC elevation is estimated at 627 ft. Zero reference = top of casing. Top of casing stickup is cut evenly. A reference point survey "X" is not located on top of the casing stickup.

### Logging Equipment Information:

<b>Logging System:</b> Gamma 1D	<b>Type:</b> SGLS (35%)
<b>Calibration Date:</b> 07/01/01	<b>Calibration Reference:</b> GJO-2002-243-TAR
<b>Logging Procedure:</b> MAC-HGLP 1.6.5, Rev. 0	

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

Log Run	1	2	3	4	5
Date	09/03/02	09/04/02	09/04/02		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	140.0	59.0	42.0		
Finish Depth (ft)	43.5	42.5	0		
Count Time (sec)	100	100	100		
Live/Real	L	L	L		
Shield (Y/N)	N/A	N/A	N/A		
MSA Interval (ft)	0.5	0.5	0.5		
ft/min	N/A	N/A	N/A		

Log Run	1	2	3	4	5
Pre-Verification	AD028CAB	AD029CAB	AD029CAB		
Start File	AD028000	AD029000	AD029034		
Finish File	AD028193	AD029033	AD029118		
Post-Verification	AD028CAA	AD030CAA	AD030CAA		
Depth Return Error (in.)	-1	N/A	-1		
Comments	No fine-gain adjustment.	Repeat section. No fine-gain adjustment.	No fine-gain adjustment.		

### **Logging Operation Notes:**

Zero reference was ground surface; the casing stickup (3.85 ft) should be added to all spectra depths to adjust the log depths to a TOC reference. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT verifier with serial number 118.

### **Analysis Notes:**

<b>Analyst:</b>	Sobczyk	<b>Date:</b>	09/16/02	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The pre-run verification spectra were all within the control limits. Both of the post-run verification spectra were not within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were lower and between 10 and 20 percent of one another. Examinations of spectra suggest that the detector appears to have functioned with reduced sensitivity during the log runs. The log data are provisionally accepted, subject to further review and analysis.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1DJul01.xls), using parameters determined from analysis of recent calibration data. Due to a zero reference error during logging, the data were shifted by +3.85 ft to adjust to a TOC reference. The casing configuration was assumed to be one string of 6-in. casing with a thickness of 0.280 in. to a log depth of 144 ft. A casing thickness of 0.280 in. is the published value for ASTM schedule-40 steel pipe (a commonly used casing material at Hanford). This casing thickness is within the range of measurement error associated with the logging engineer's measurements. A water correction was not needed or applied to the SGLS data. Dead time corrections were applied when dead time reached 10.5 percent.

### **Log Plot Notes:**

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (<sup>40</sup>K, <sup>238</sup>U, and <sup>232</sup>Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. 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, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The <sup>214</sup>Bi peak at 609 keV was used to determine the naturally occurring <sup>238</sup>U concentrations on the combination plot rather than the <sup>214</sup>Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

## **Results and Interpretations:**

<sup>137</sup>Cs, <sup>60</sup>Co, <sup>125</sup>Sb, and <sup>154</sup>Eu were the man-made radionuclides detected in this borehole. <sup>137</sup>Cs was detected extensively in the borehole from the ground surface to 140 ft with a maximum activity of 480 pCi/g at a log depth of 63.4 ft. <sup>60</sup>Co was detected in two intervals, from 11.9 through 19.4 ft and from 61.4 ft through total depth. The range of activities was from the MDL (0.1 pCi/g) to 7.0 pCi/g, which was detected at 114.4 ft. <sup>125</sup>Sb was detected between 65.4 and 66.4 ft with activities ranging from 3.0 to 4.7 pCi/g. Confirming photopeaks for <sup>125</sup>Sb were apparent in this interval, and the MDL for <sup>125</sup>Sb was 1.6 pCi/g. <sup>154</sup>Eu was detected with an activity of 1.2 pCi/g at 63.4 ft where the maximum activity of <sup>137</sup>Cs was also encountered.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for both the man-made and natural radionuclides (609, 1461, 1764, and 2614 keV).

## **References:**

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

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<sup>1</sup> GWL – groundwater depth

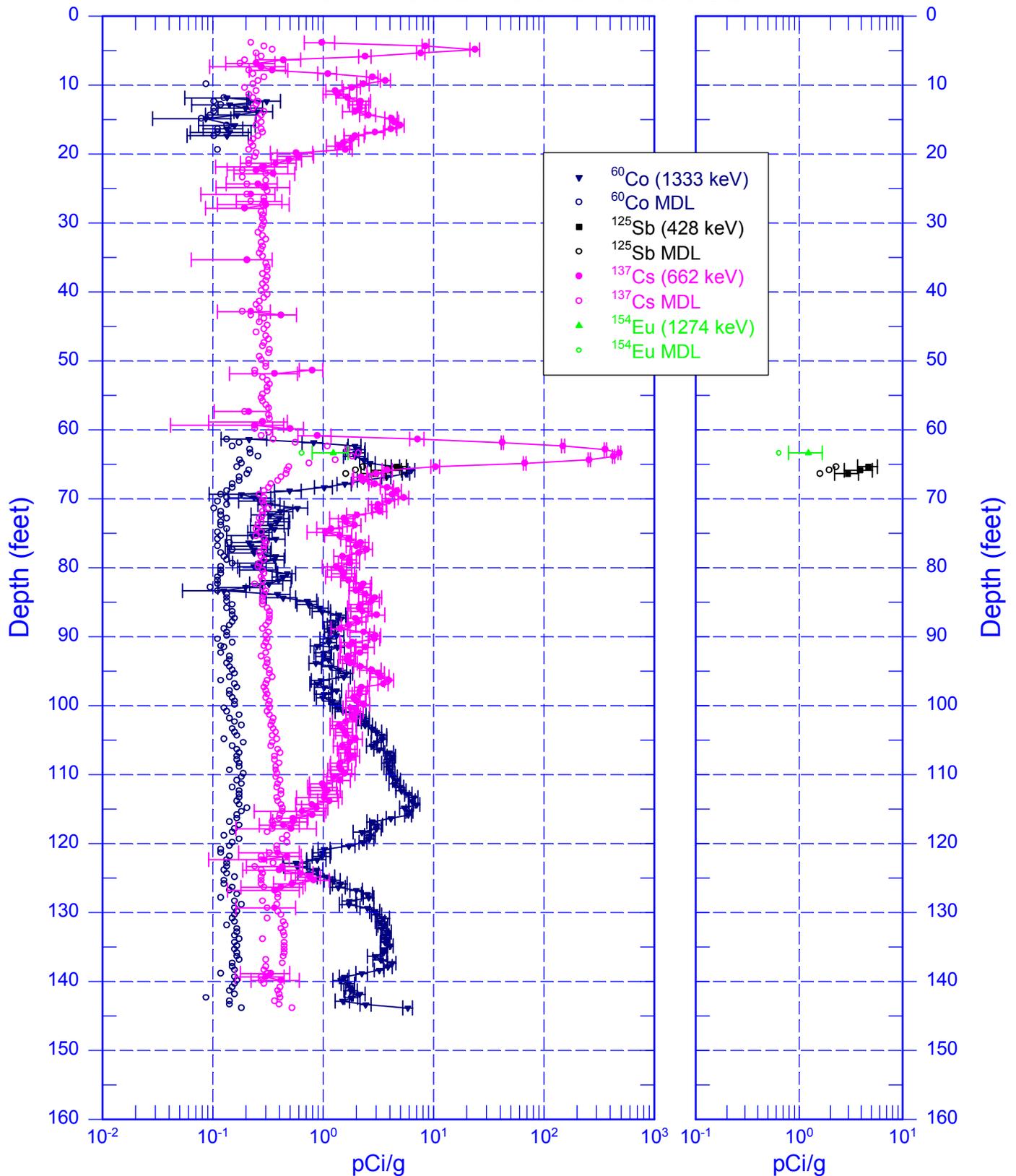
<sup>2</sup> TOC – top of casing

<sup>3</sup> N/A – not applicable

<sup>4</sup> HWIS – Hanford Well Information System

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## Man-Made Radionuclides

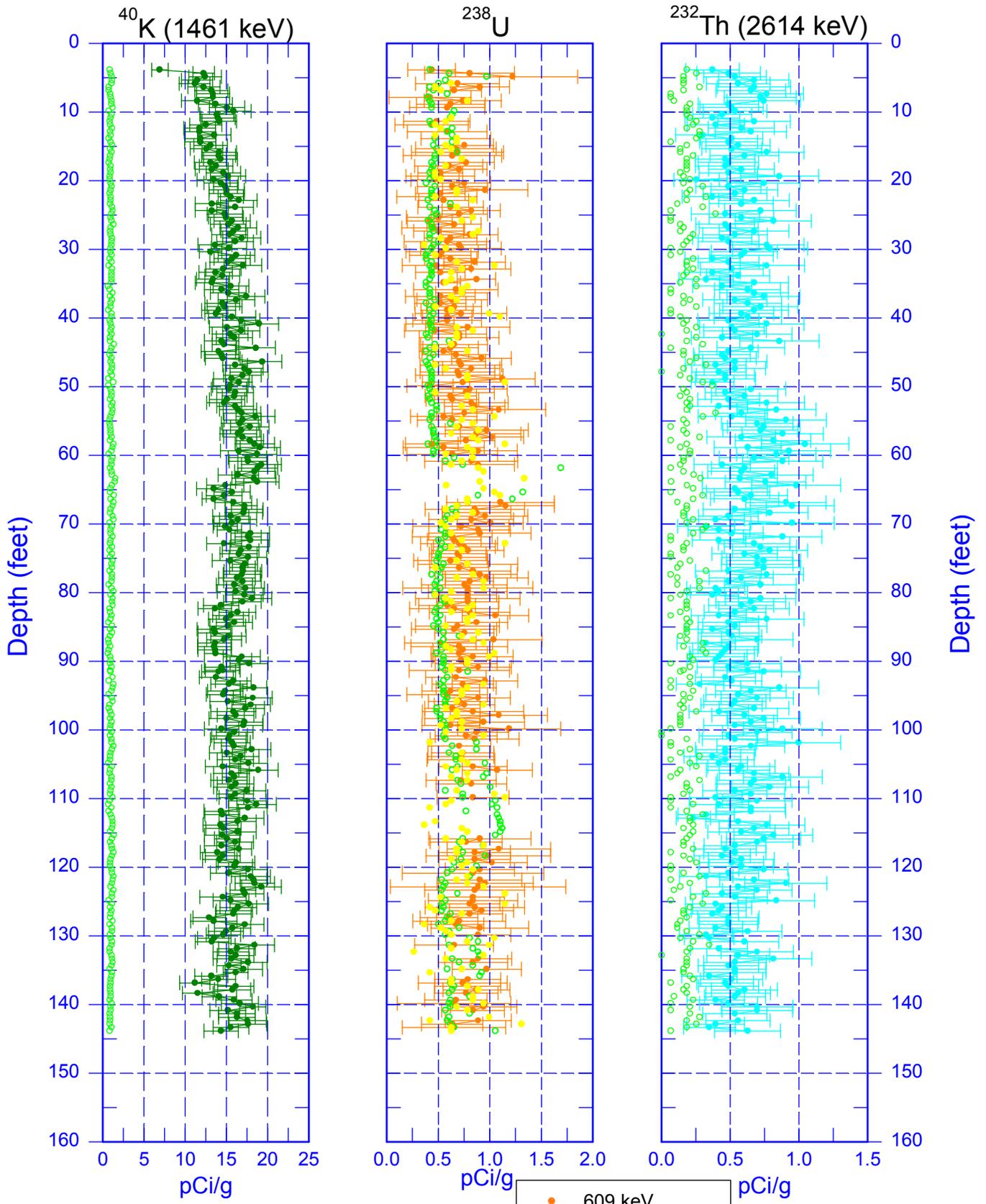


Zero Reference = Top of Casing

Date of Last Logging Run  
09/04/2002

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## Natural Gamma Logs



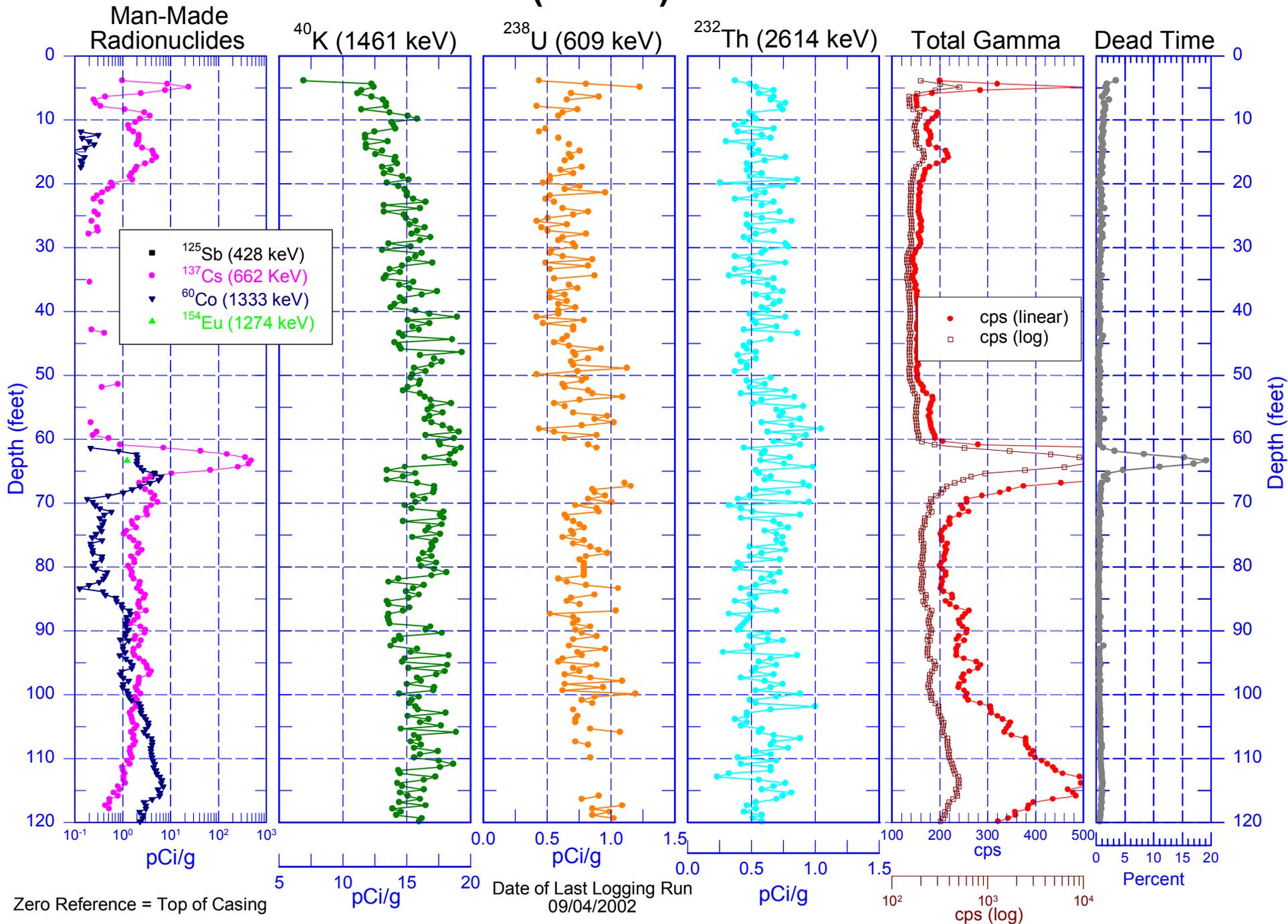
○ MDL

- 609 keV
- MDL (609 keV)
- 1764 keV

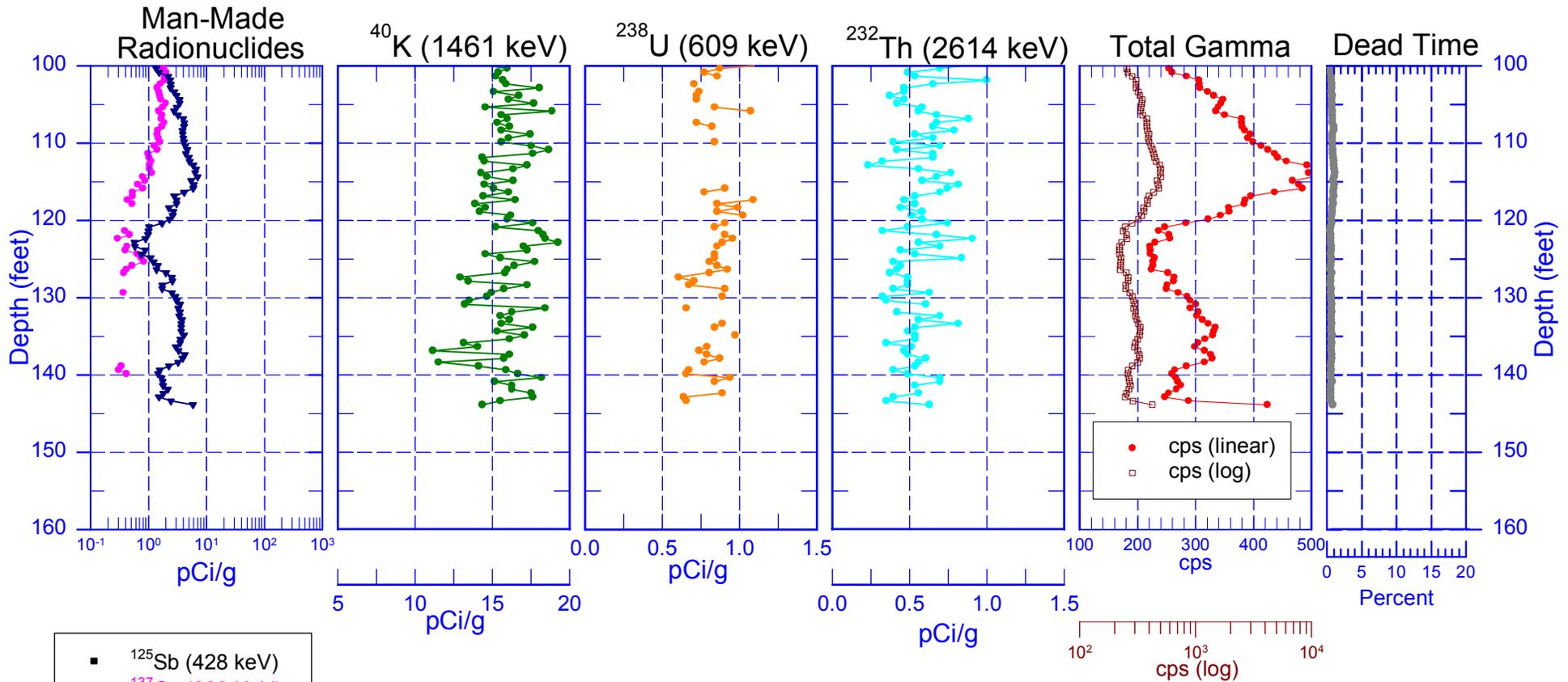
Zero Reference = Top of Casing

Date of Last Logging Run  
09/04/2002

# 299-E33-336 (B8908) Combination Plot



# 299-E33-336 (B8908) Combination Plot



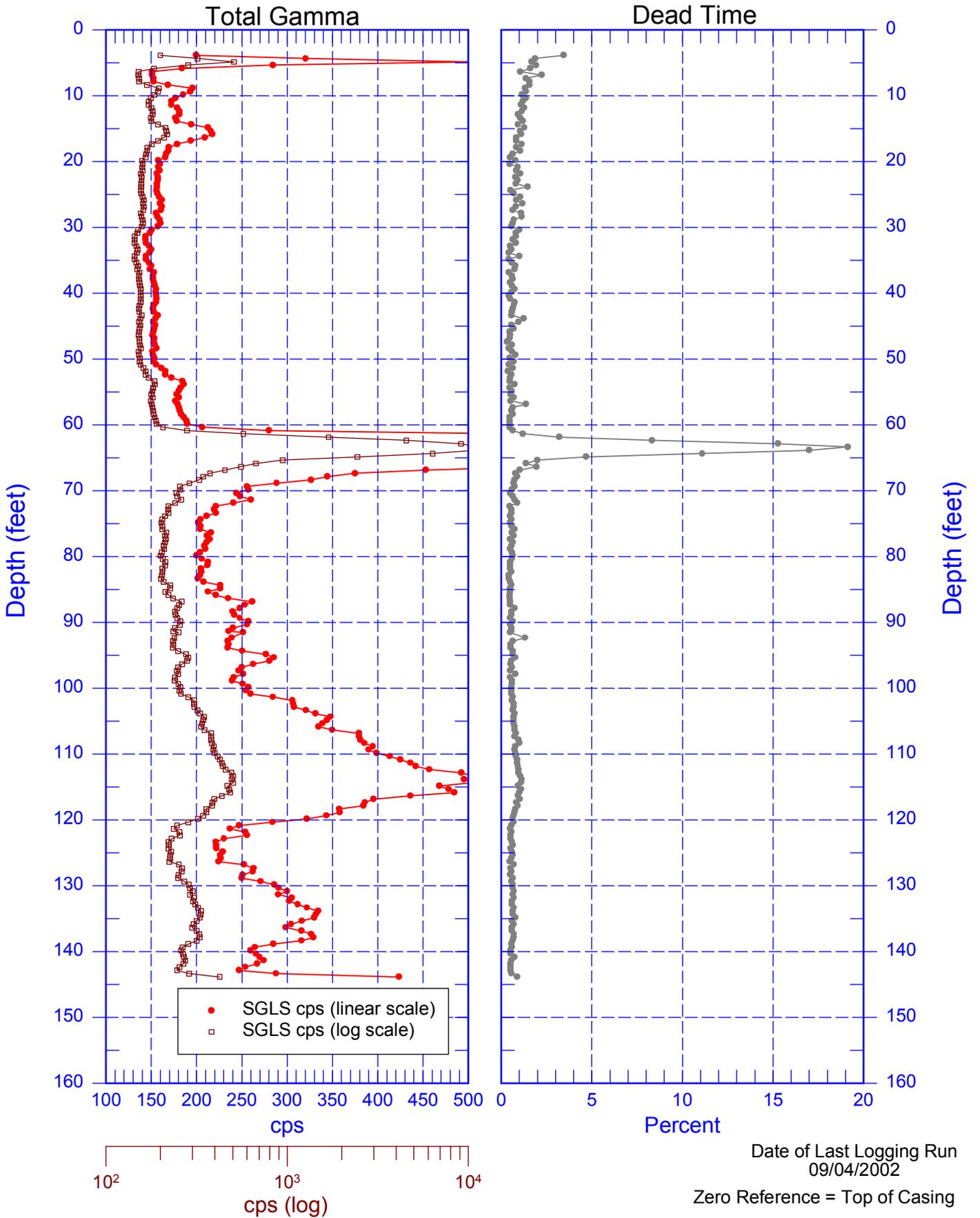
- $^{125}\text{Sb}$  (428 keV)
- $^{137}\text{Cs}$  (662 KeV)
- ▼  $^{60}\text{Co}$  (1333 keV)
- ▲  $^{154}\text{Eu}$  (1274 keV)

Zero Reference = Top of Casing

Date of Last Logging Run  
09/04/2002

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## Total Gamma & Dead Time

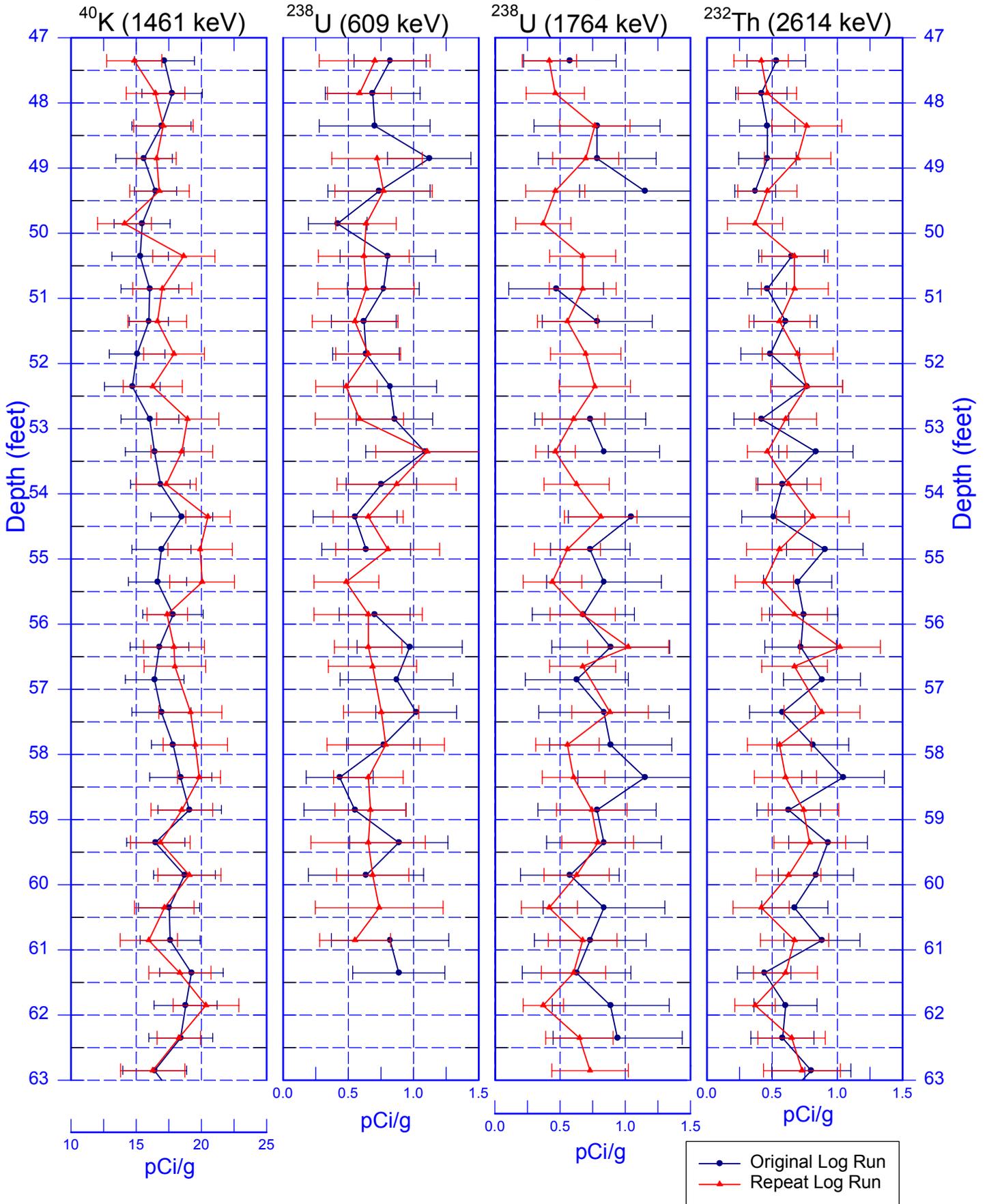


Date of Last Logging Run  
09/04/2002

Zero Reference = Top of Casing

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## Rerun of Natural Gamma Logs (47.4 to 62.9 ft)



# 299-E33-336 (B8908)

## Rerun of Man-Made Radionuclides (47.4 to 62.9 ft)

