

**C4554**  
**Log Data Report**  
**Revised**

**Borehole Information:**

<b>Borehole:</b> C4554		<b>Site:</b> 216-U-8 Crib			
<b>Coordinates (WA State Plane)</b>		<b>GWL (ft)<sup>1</sup>:</b> Dry		<b>GWL Date:</b> 05/13/04	
<b>North</b> Not Available	<b>East</b> Not Available	<b>Drill Date</b> May 2004	<b>TOC<sup>2</sup> Elevation</b> Not Available	<b>Total Depth (ft)</b> 60	<b>Type</b> Push Hole

**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>
Threaded steel	0	6 5/8	5 1/2	9/16	0	60

**Borehole Notes:**

Zero reference is the ground surface. Casing information was provided by the Fluor Hanford Field Team Leader.

**Logging Equipment Information:**

<b>Logging System:</b> Gamma 2A	<b>Type:</b> SGLS (35%) 34TP20893A
<b>Calibration Date:</b> 03/04	<b>Calibration Reference:</b> DOE-EM/GJ642-2004
<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 Repeat</b>		
Date	05/14/04	05/14/04	05/26/04		
Logging Engineer	Pearson	Pearson	Pearson		
Start Depth (ft)	59.57	22.0	55.0		
Finish Depth (ft)	0.0	16.0	45.0		
Count Time (sec)	200	200	400		
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		
Pre-Verification	BA335CAB	BA335CAB	BA339CAB		
Start File	BA335000	BA335061	BA340000		
Finish File	BA335060	BA335067	BA340010		
Post-Verification	BA335CAA	BA335CAA	BA340CAA		

Log Run	1	2 Repeat	3 Repeat		
Depth Return Error (in.)	0	0	- 1/4		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

**Logging Operation Notes:**

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (<sup>40</sup>K, <sup>238</sup>U, and <sup>232</sup>Th) verifier with serial number 118. A repeat log section was acquired at 400 seconds between 45 and 55 ft on May 26, 2004. The purpose of the repeat log was to investigate this interval using a longer counting time to effectively lower the minimum detection limit (MDL).

**Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	05/27/04	<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. All of the verification spectra were within the acceptance criteria. Examination of spectra indicates that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The post-run 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: G2AMar04.xls). The casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 59.57 ft (total logging depth). Dead time and water corrections were not required.

**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. A plot of the repeat log versus the original log is 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 1764 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 609 keV because it exhibited slightly higher net counts per second.

**Results and Interpretations:**

<sup>137</sup>Cs was detected at the ground surface and 46 ft near the MDL of 0.2 pCi/g. No other man-made radionuclides were detected in this borehole.

The repeat section acquired between 16 and 22 ft (log run 2) indicated good agreement of the naturally occurring KUT when compared to data acquired during log run 1.

The repeat log data collected between 45 and 55 ft on May 26, 2004 (log run 3) were acquired at counting times of 400 sec versus 200 sec for the other log runs. The repeat section indicated good agreement of the naturally occurring KUT. This agreement suggests the 200 sec counting time is adequate to quantify the naturally occurring radionuclides. The longer counting time did not result in identification of any man-

made radionuclides not identified in log run 1. The existence of  $^{137}\text{Cs}$  detected near its MDL at 46 ft in log run 1 was not corroborated by the longer counting time. The MDLs for  $^{238}\text{U}$  and  $^{235}\text{U}$  in the repeat section (400 sec counting time, log run 3) were approximately 15.3 and 1.4 pCi/g, respectively. The MDLs in the same interval using a 200 sec counting time (log run 1) were approximately 22.2 and 2.1 for  $^{238}\text{U}$  and  $^{235}\text{U}$ , respectively.

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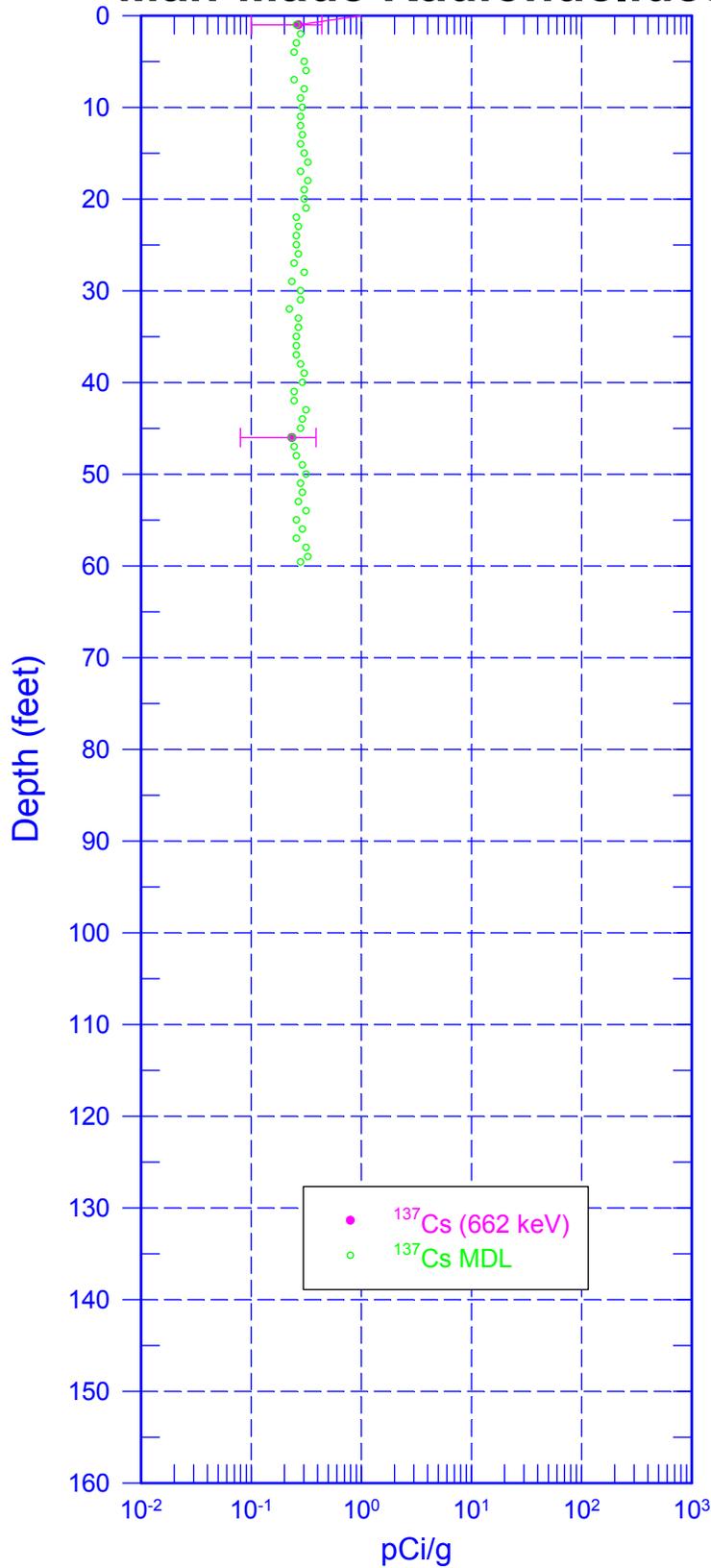
<sup>1</sup> GWL – groundwater level

<sup>2</sup> TOC – top of casing

<sup>3</sup> N/A – not applicable

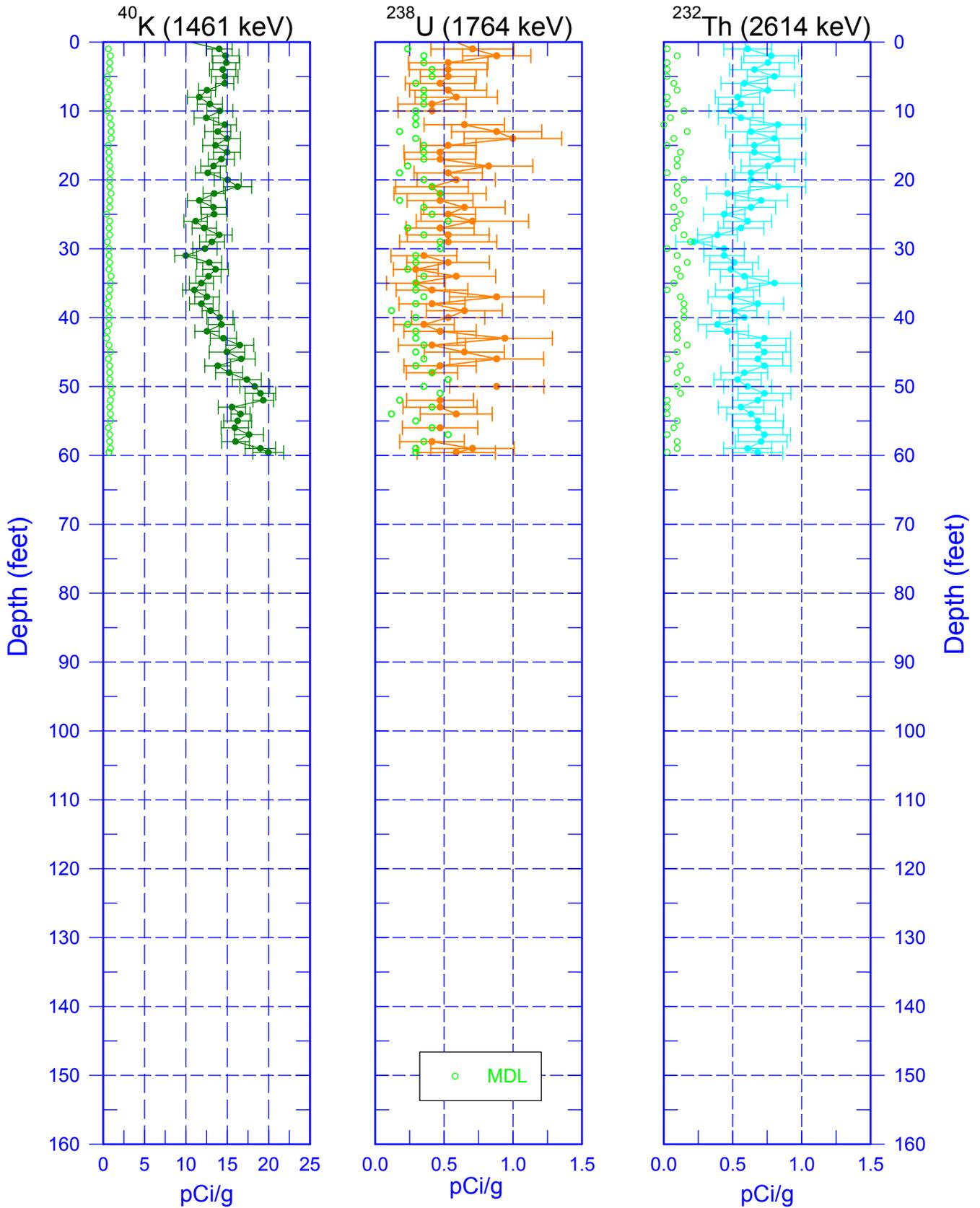
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## Man-Made Radionuclides



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## Natural Gamma Logs

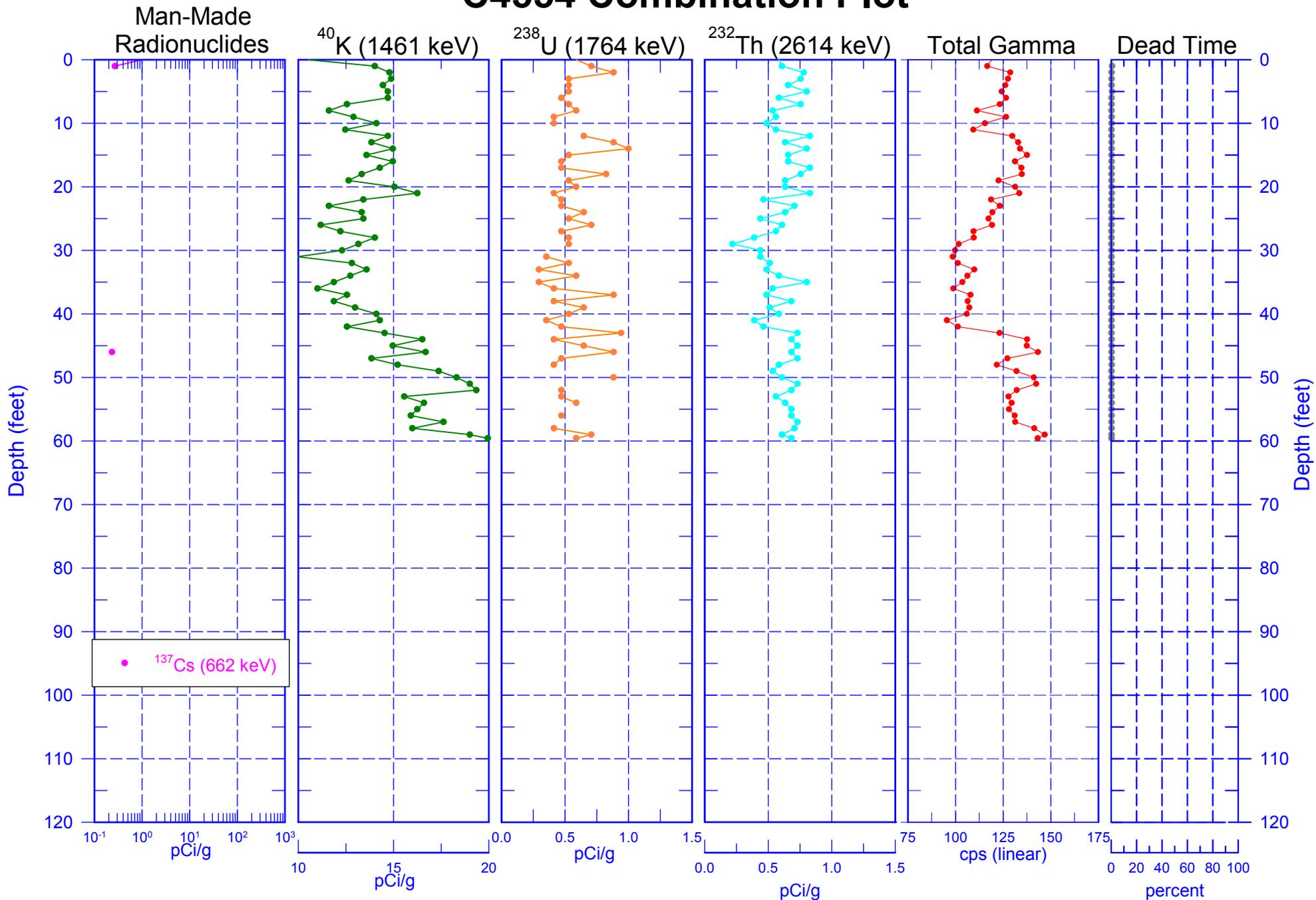


Zero Reference = Ground Surface

Depth Scale = 1" = 20 ft

Last Log Date - 05/26/04

# C4554 Combination Plot

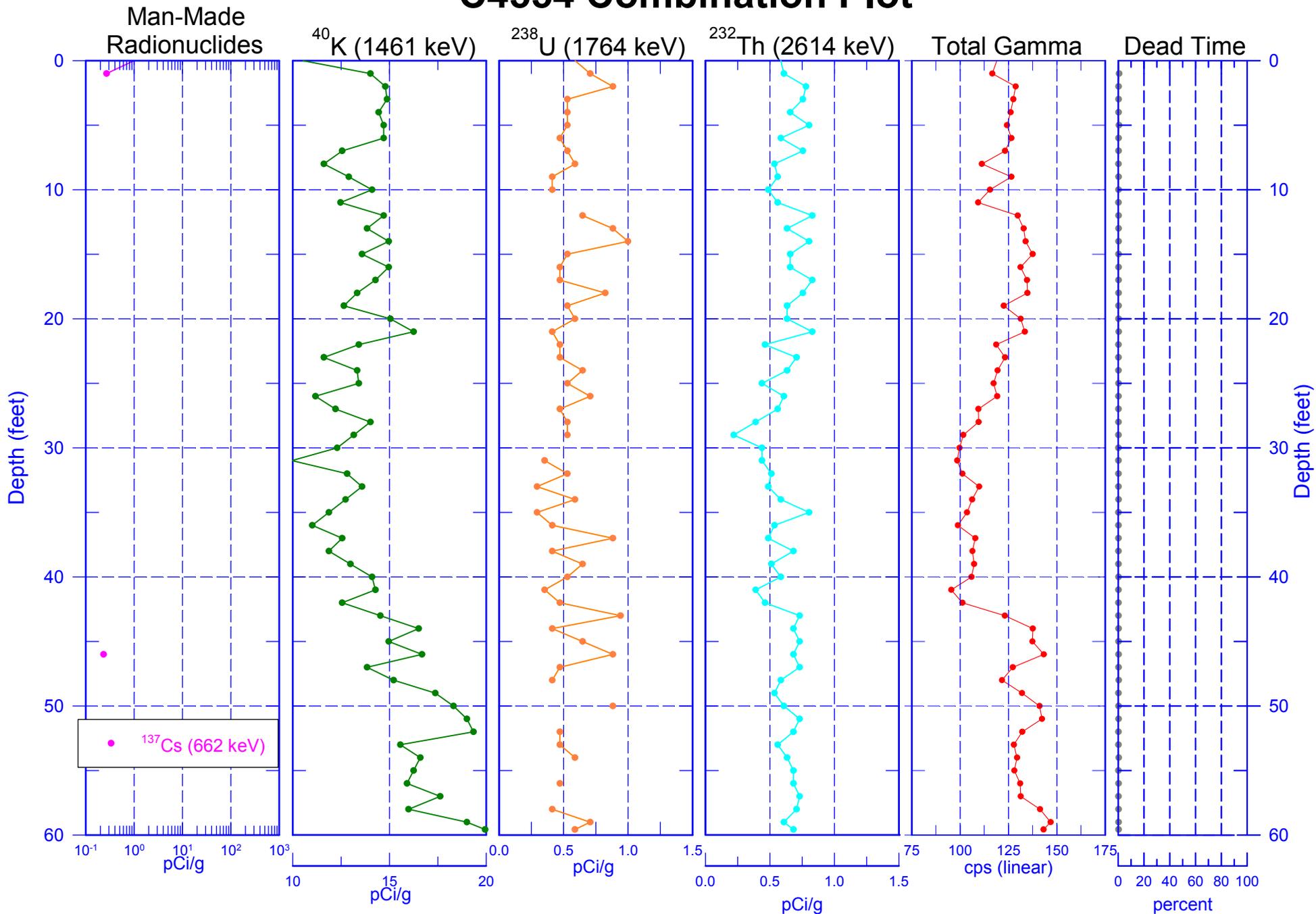


Zero Reference = Ground Surface

Depth scale: 1"=20 ft

Last Logging Date - 05/26/04

# C4554 Combination Plot



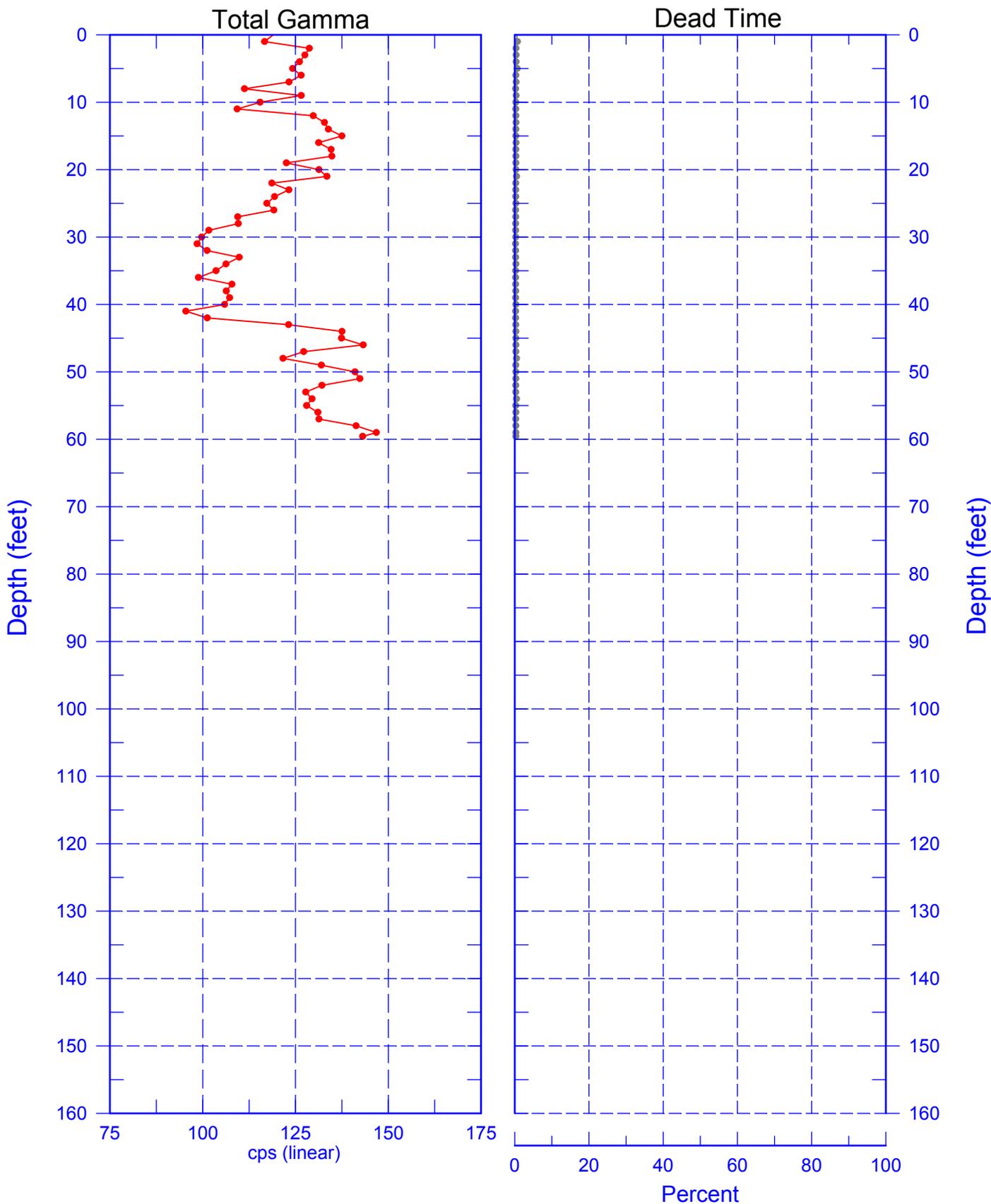
Zero Reference = Ground Surface

Depth scale: 1" = 10 ft

Last Logging Date - 05/26/04

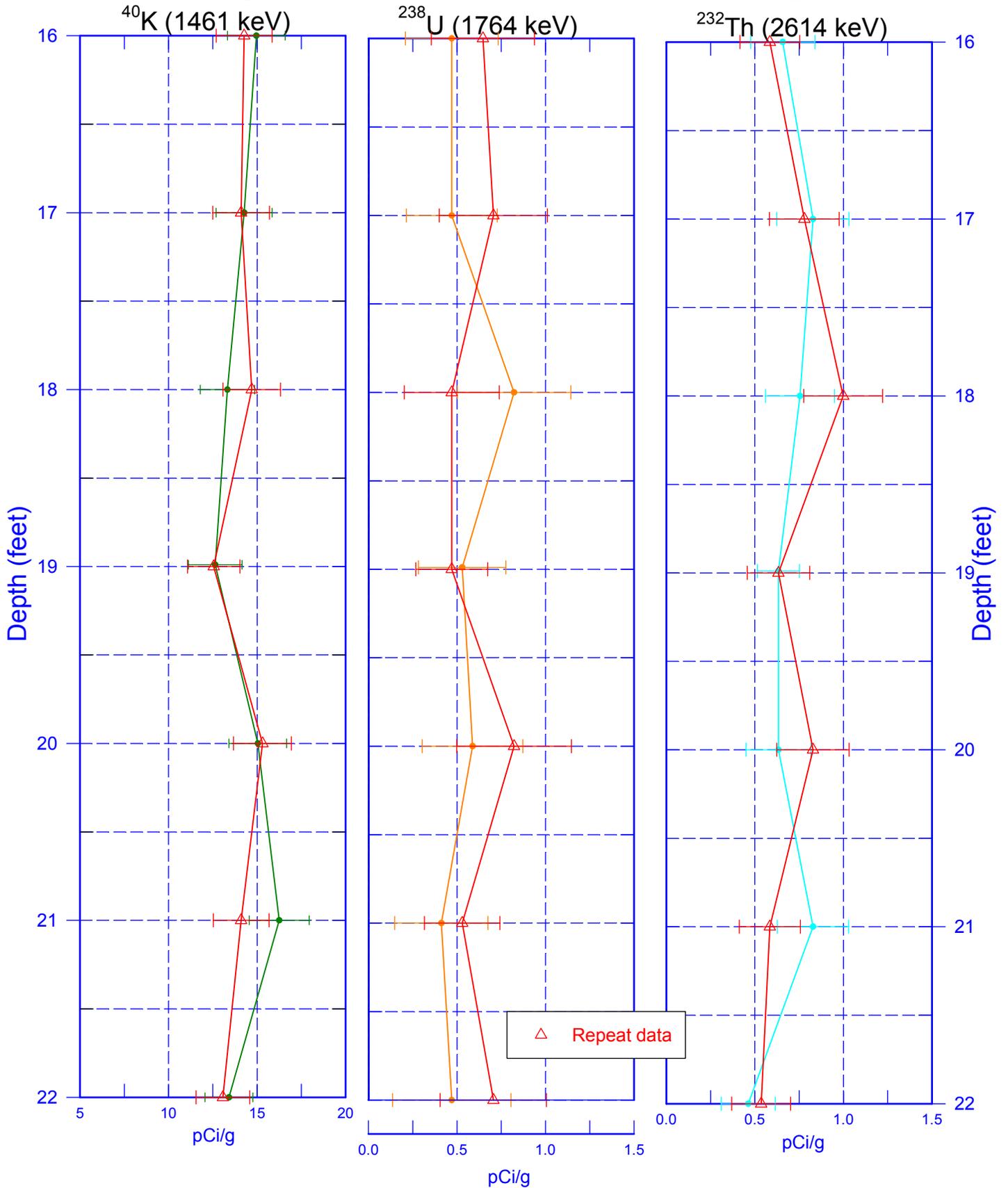
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## Total Gamma & Dead Time



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## Repeat Section of Natural Gamma Logs



Zero Reference = Ground Surface

Last Log Date - 05/26/04

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## Repeat Section of Natural Gamma Logs

