

C4224
Log Data Report

Borehole Information:

Borehole: C4224		Site: 216-U-8 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Dry		GWL Date: 03/16/2004	
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
Not Available	Not Available	March 2004	Not Available	55	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	+0.3	6 5/8	5 1/2	9/16	+0.0	55

Borehole Notes:

Zero reference is the ground surface. The logging engineer used a caliper to determine the outside casing diameter. The caliper and casing stickup were both measured using a steel tape. Inside casing diameter was measured with a steel tape. All measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System: Gamma 1G	Type: SGLS (35%) 34TP10967A
Calibration Date: 01/2004	Calibration Reference: GJO-2004-597-TAC
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 / Repeat	4	
Date	03/16/04	03/16/04	03/17/04	03/17/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	54.62	54.5	50.5	9.5	
Finish Depth (ft)	54.62	8.5	45.5	0.5	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	N/A ³	1.0	1.0	1.0	
ft/min	N/A	N/A	N/A	N/A	
Pre-Verification	AG049CAB	AG049CAB	AG051CAB	AG051CAB	
Start File	AG050000	AG050001	AG051000	AG051006	
Finish File	AG050000	AG050047	AG051005	AG051015	
Post-Verification	AG050CAA	AG050CAA	AG051CAA	AG051CAA	
Depth Return	N/A	-1	N/A	0	

Log Run	1	2	3 / Repeat	4	
Error (in.)					
Comments	Sonde tip is just touching bottom of borehole.	No fine-gain adjustment.	Repeat section.	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 (⁴⁰K, ²³⁸U, and ²³²Th) verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	3/22/04	Reference:	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. 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 between 3.8 percent lower and 3.6 percent higher at the end of each day. Examinations of spectra indicate 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: G1GJan04.xls). Zero reference was the ground surface. Based on the field measurements, the casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 54.62 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 (⁴⁰K, ²³⁸U, and ²³²Th), 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 ²¹⁴Bi peak at 1764 keV was used to determine the naturally occurring ²³⁸U concentrations on the combination plot rather than the ²¹⁴Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

²³⁸U and ¹³⁷Cs were the man-made radionuclides detected in this borehole. ¹³⁷Cs was detected in the interval between 40.5 and 44.5 ft with concentrations ranging from 1.1 to 84 pCi/g, which was measured at 41.5 ft. ¹³⁷Cs was detected at 0.5 ft with a concentration of 0.5 pCi/g. ²³⁸U, based on the 100-keV photopeak, was detected at 50.5 ft with a concentration of 18 pCi/g.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV. Apparent ⁴⁰K (1461 keV) concentrations were approximately 1 pCi/g higher on the original log than the repeat log. ²³⁸U, based on the 1001-keV

photopeak, was not detected at 50.5 ft on the repeat log run while it was detected at 50.5 ft on the original log run. Photopeaks at 1001 keV were apparent at these depths on both the repeat and original logs. However, the APTEC software did not identify the 1001-keV photopeak at 50.5 ft on the repeat log run as being statistically significant.

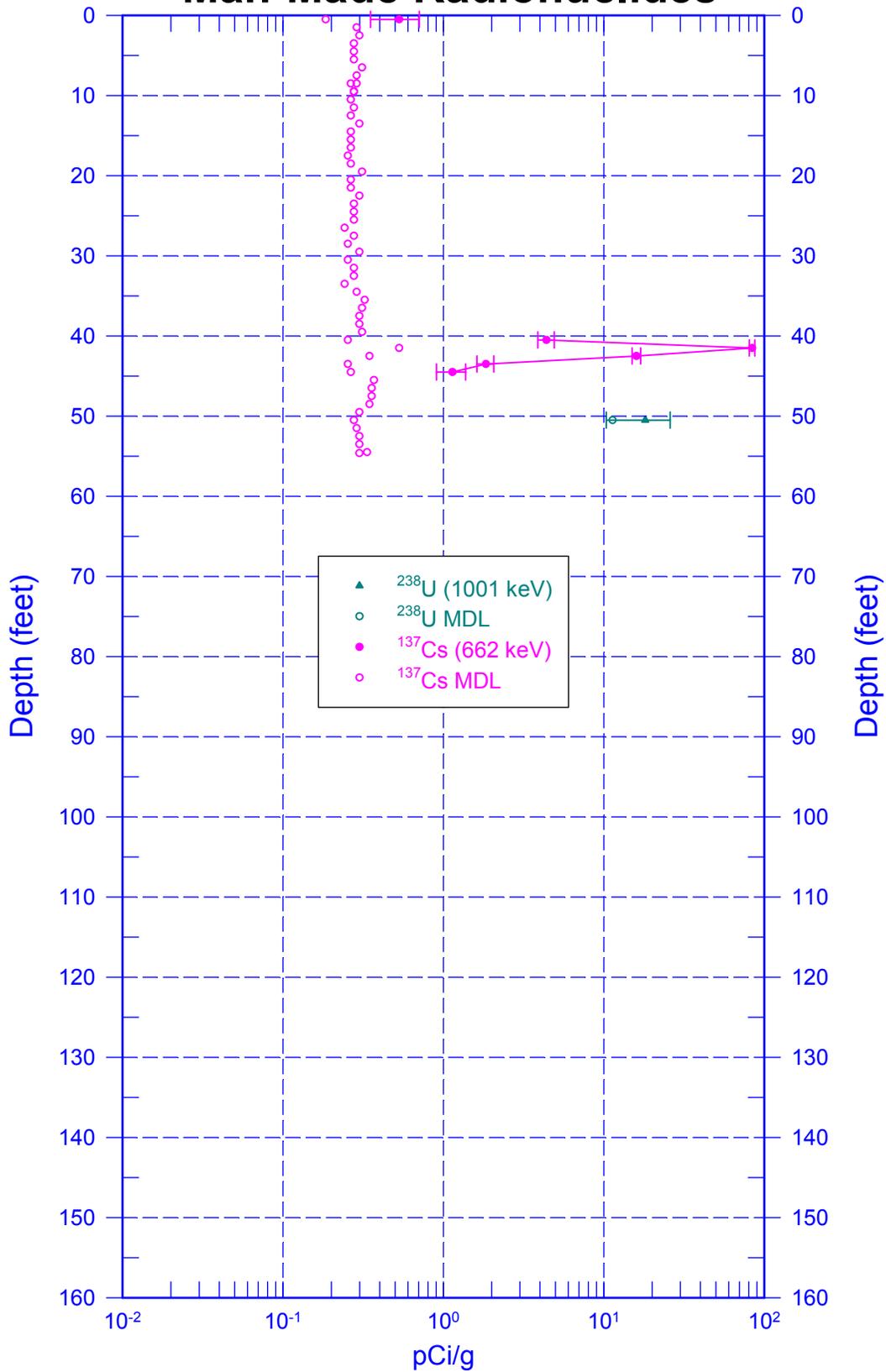
¹ GWL– groundwater level

² TOC – top of casing

³ N/A – not applicable

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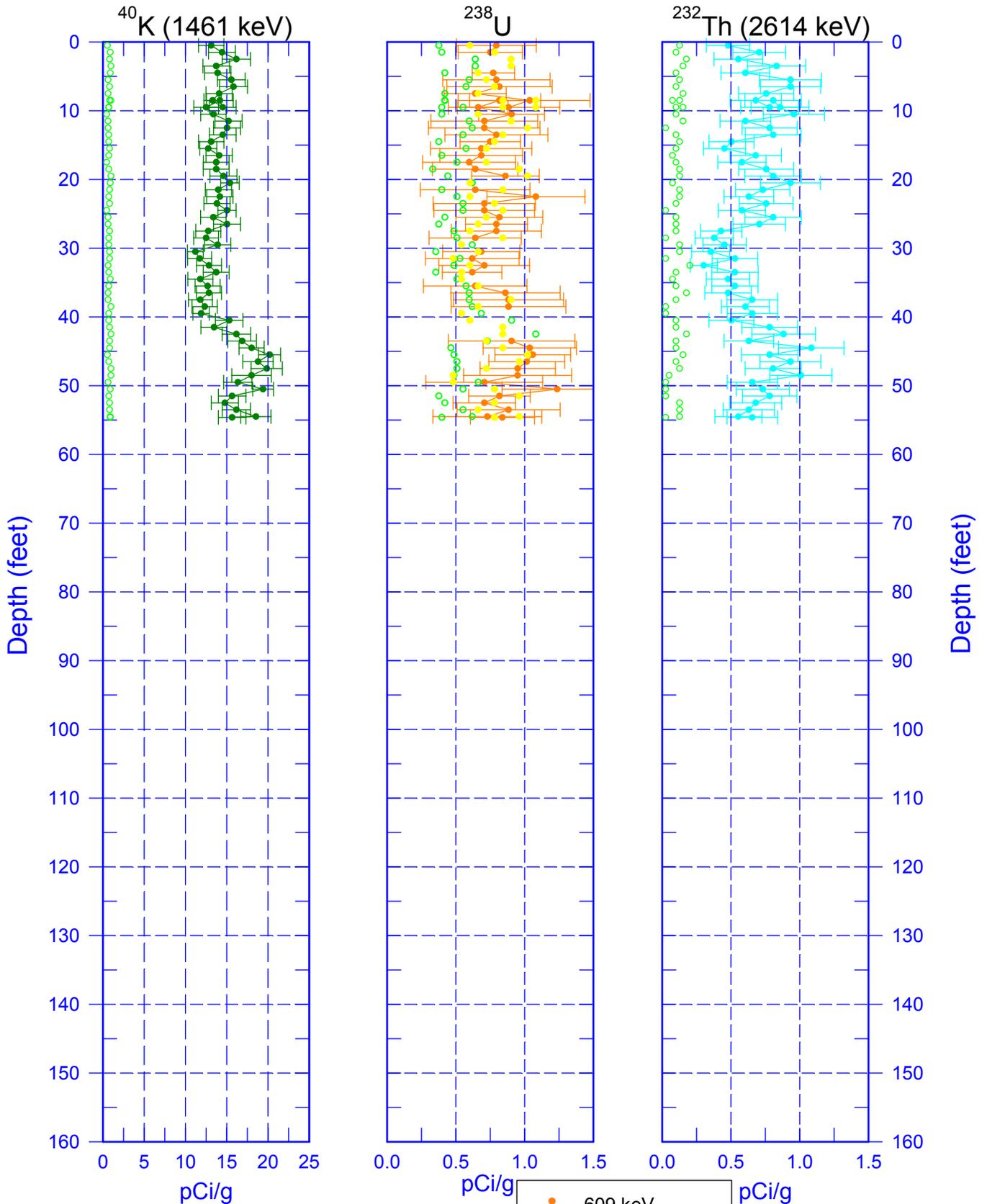
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
3/17/2004

C4224 Natural Gamma Logs



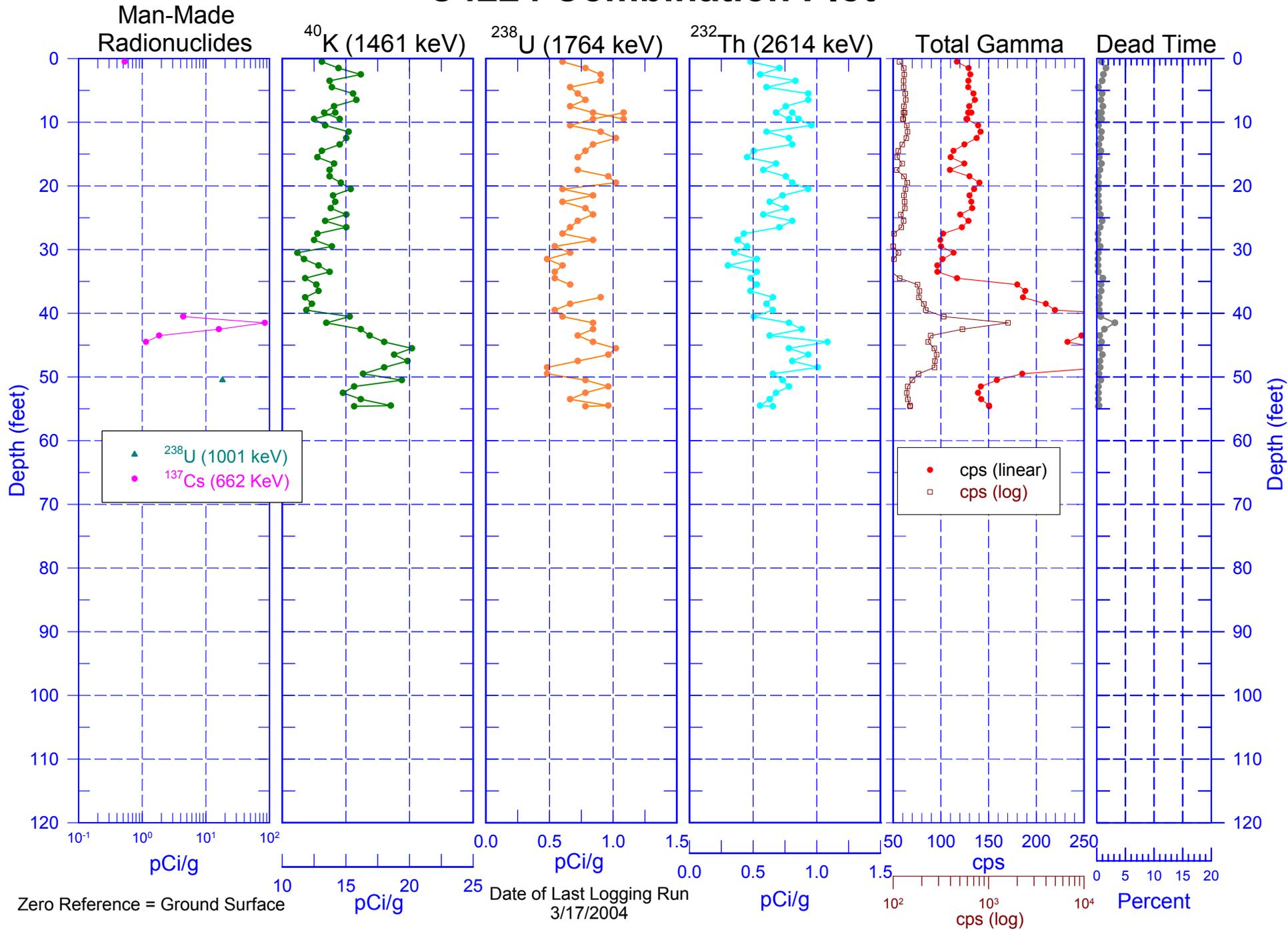
Zero Reference = Ground Surface

○ MDL

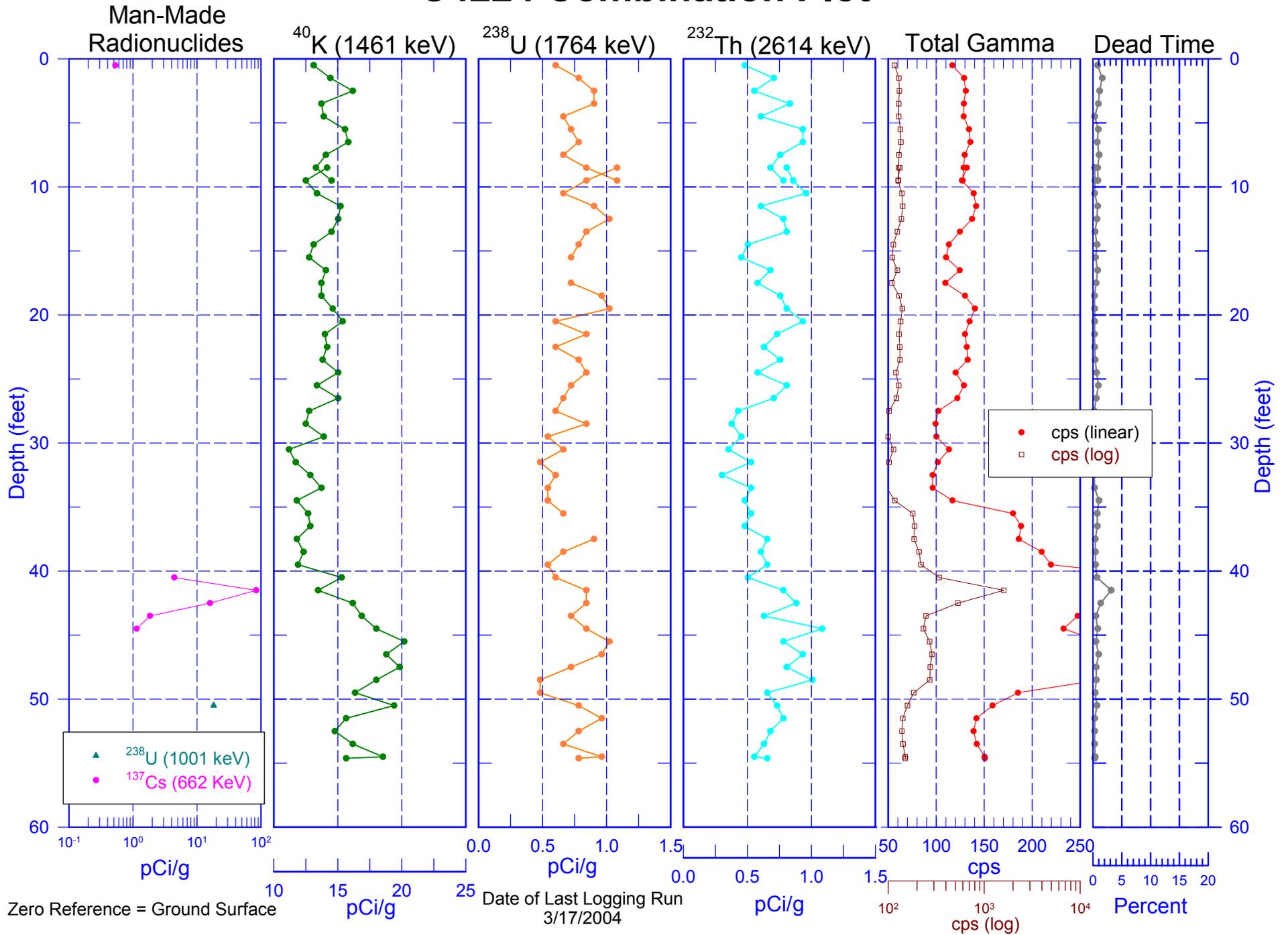
- 609 keV
- MDL (609 keV)
- 1764 keV

Date of Last Logging Run
3/17/2004

C4224 Combination Plot

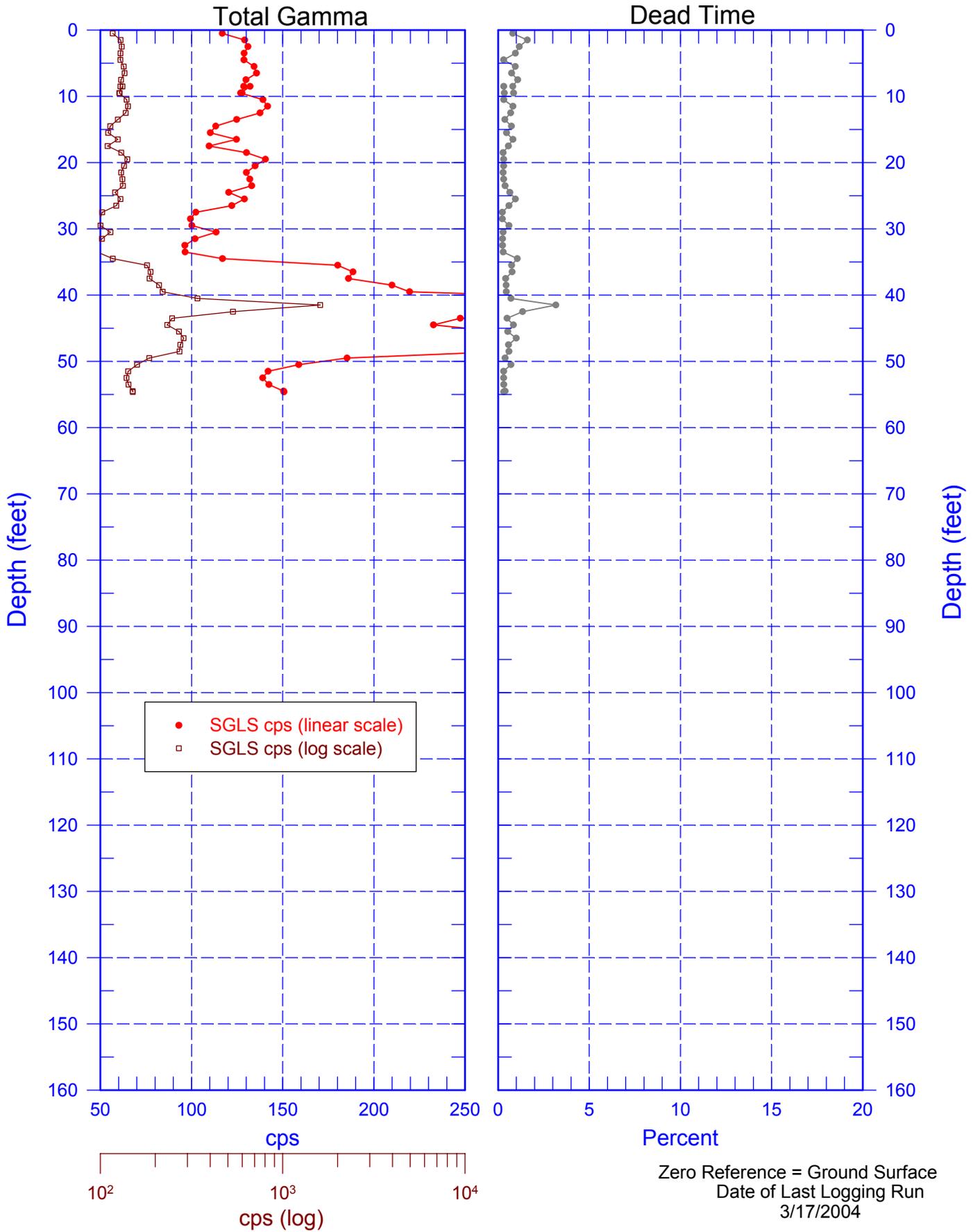


C4224 Combination Plot



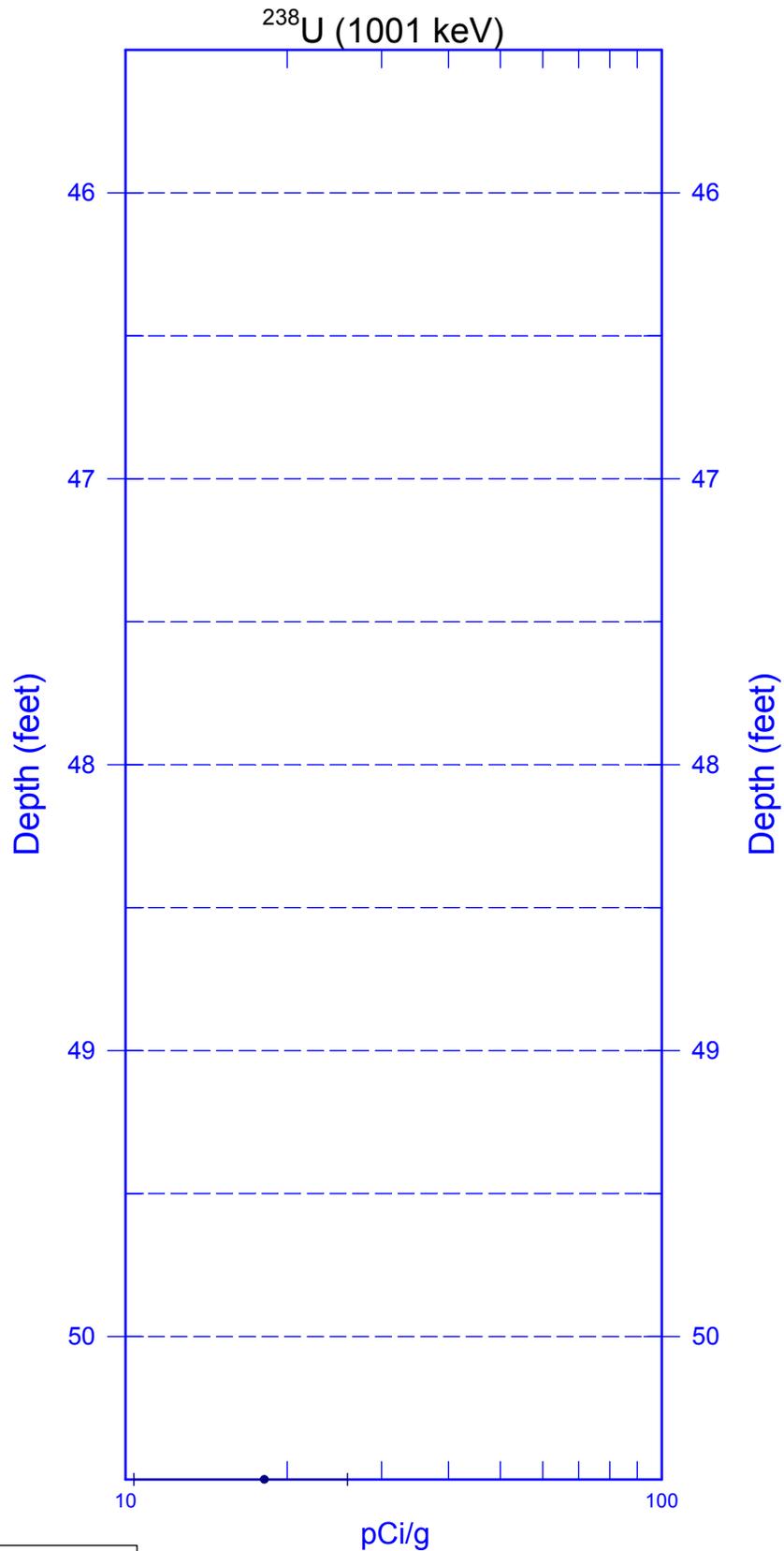
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Total Gamma & Dead Time



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Rerun of Man-Made Radionuclides



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Rerun of Natural Gamma Logs (50.5 to 45.5 ft)

