

C-4123 Log Data Report

Borehole Information:

Borehole: C-4123		Site: West of A Tank Farm			
Coordinates (WA St Plane)		GWL¹ (ft): 288		GWL Date: 07/11/03	
North (estimated) 136140	East (estimated) 572265	Drill Date 07/03	Ground Level Elevation Not available	Total Depth (ft) 328.0	Type Becker

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.65	9.0	8.0	0.50	+2.65	328.0
Steel Tubing	3.1	6.24	6.0	0.125	+3.1	328.0

Borehole Notes:

The casing dimensions are derived from published values for Becker drill casing. Casing thicknesses at the joints are 0.875 in. and 0.240 in. for the 8-in. and 6-in. casings, respectively. The total depth of the borehole was provided by the driller. The well site geologist provided the depth to water. Borehole coordinates were provided by Fluor Hanford's person in charge and are estimates. Ground level elevation was not available. Logging data acquisition is referenced to the ground surface.

Logging Equipment Information:

Logging System: Gamma 2A	Type: SGLS (35%) SN: 34TP11019B
Calibration Date: 01/03	Calibration Reference: GJO-2003-418-TAC
	Logging Procedure: MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	
Date	07/12/03	07/14/03	07/15/03	07/15/03	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	105.0	328.0	163.0	105.0	
Finish Depth (ft)	0.0	162.0	104.0	72.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A ²	N/A	N/A	N/A	
Pre-Verification	BA209CAA	BA210CAB	BA211CAB	BA211CAB	
Start File	BA209000	BA210000	BA211000	BA211058	

Log Run	1	2	3	4 Repeat	
Finish File	BA209105	BA210166	BA211059	BA211091	
Post-Verification	BA209CAA	BA210AA	BA211CAA	BA211CAA	
Depth Return Error (in.)	0	0	Not applicable	+1	
Comments	Fine-gain adjustment made after files -076 and -095.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

Logging Operation Notes:

Spectral gamma logging was performed in this borehole between July 12 and 15, 2003. Logging was conducted with a centralizer on the sonde and measurements are referenced to ground surface. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	07/21/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
-----------------	---------	--------------	----------	-------------------	------------------------

Pre-run and post-run verifications for the logging system were performed before and after data acquisition. Acceptance criteria were met except for file numbers BA209CAB and BA210CAB. The total counts per second (cps) were exceeded for the 2614- and 1461-keV energy peaks for files BA209CAB and BA210CAB, respectively. The percent change between the before and after verification (i.e., files BA211CAB and BA211CAA, log runs 3 and 4) for the 2614-keV energy peak was 22 percent, which exceeds the criterion of 10 percent. After examination of individual spectra, the logging sonde appeared to have functioned normally and the data are provisionally accepted.

A combined casing correction for 0.625-in.-thick casing was applied throughout the borehole for both casings. The combined thickness at casing joints is 1.115 in. This thickness results in a significant reduction in gamma activity detection as the detector passes by a casing joint. However, it is not practical to correct individual data points for the effect of casing joints. The influence of the thick joints is apparent on the total gamma and ⁴⁰K logs where reduced count rates and concentrations are exhibited at approximately 10-ft depth intervals.

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 G2AFEB03.xls 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 10.5 percent; no dead times in excess of 10.5 percent were encountered. Correction for water was applied to the data below 288 ft.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (¹³⁷Cs) detected in the borehole, naturally occurring radionuclides (⁴⁰K, ²³⁸U, ²³²Th [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 repeat log section is also included.

Results and Interpretations:

¹³⁷Cs was the only man-made radionuclide detected in this borehole. ¹³⁷Cs was detected at a few sporadic locations throughout the borehole near its MDL of approximately 0.2 pCi/g.

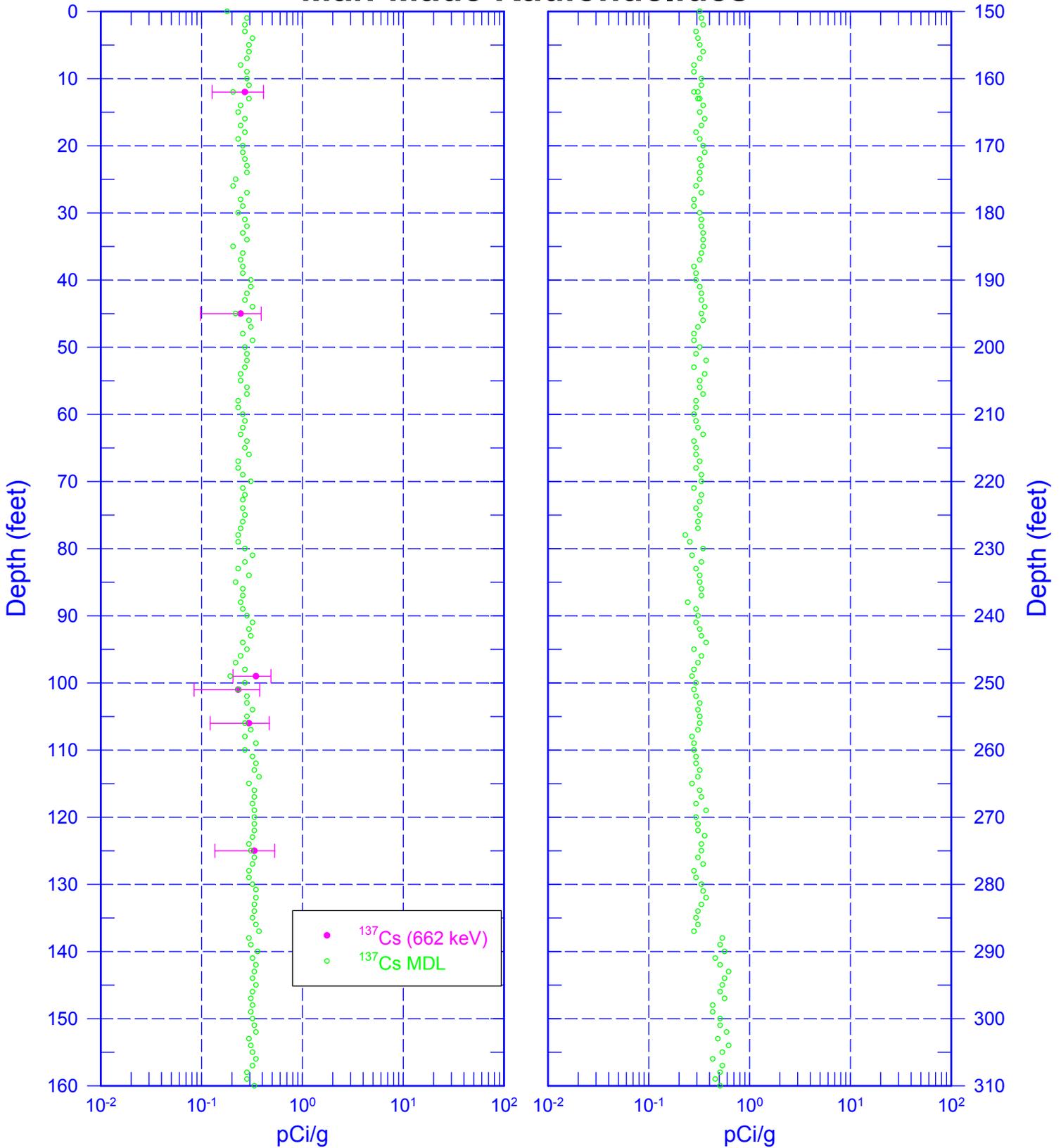
The repeat sections indicated good agreement of the naturally occurring KUT.

¹ GWL – groundwater level

² N/A – not applicable

C-4123

Man-Made Radionuclides

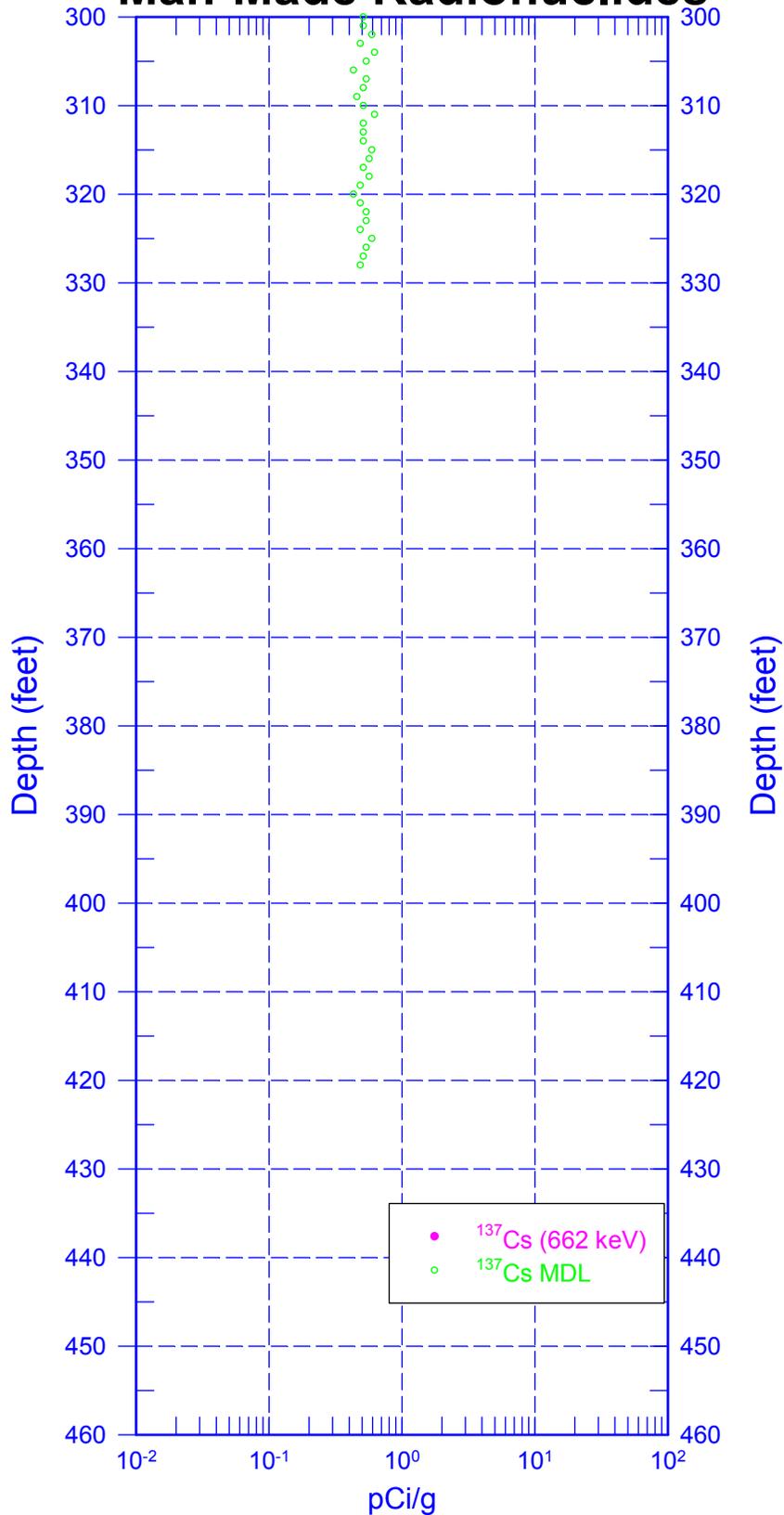


Zero Reference = Ground Surface

Last Log Date - 07/15/03

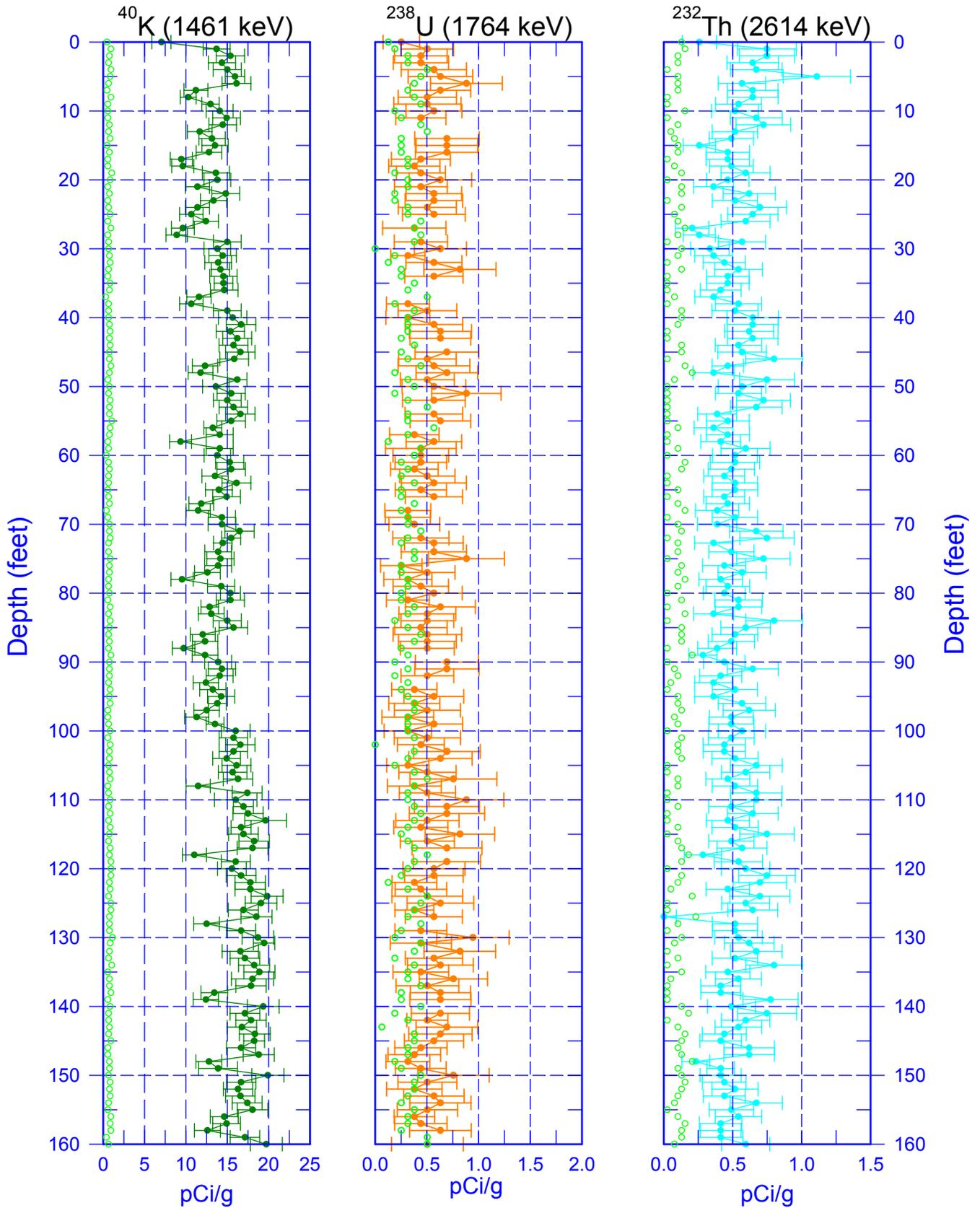
C-4123

Man-Made Radionuclides



C-4123

Natural Gamma Logs



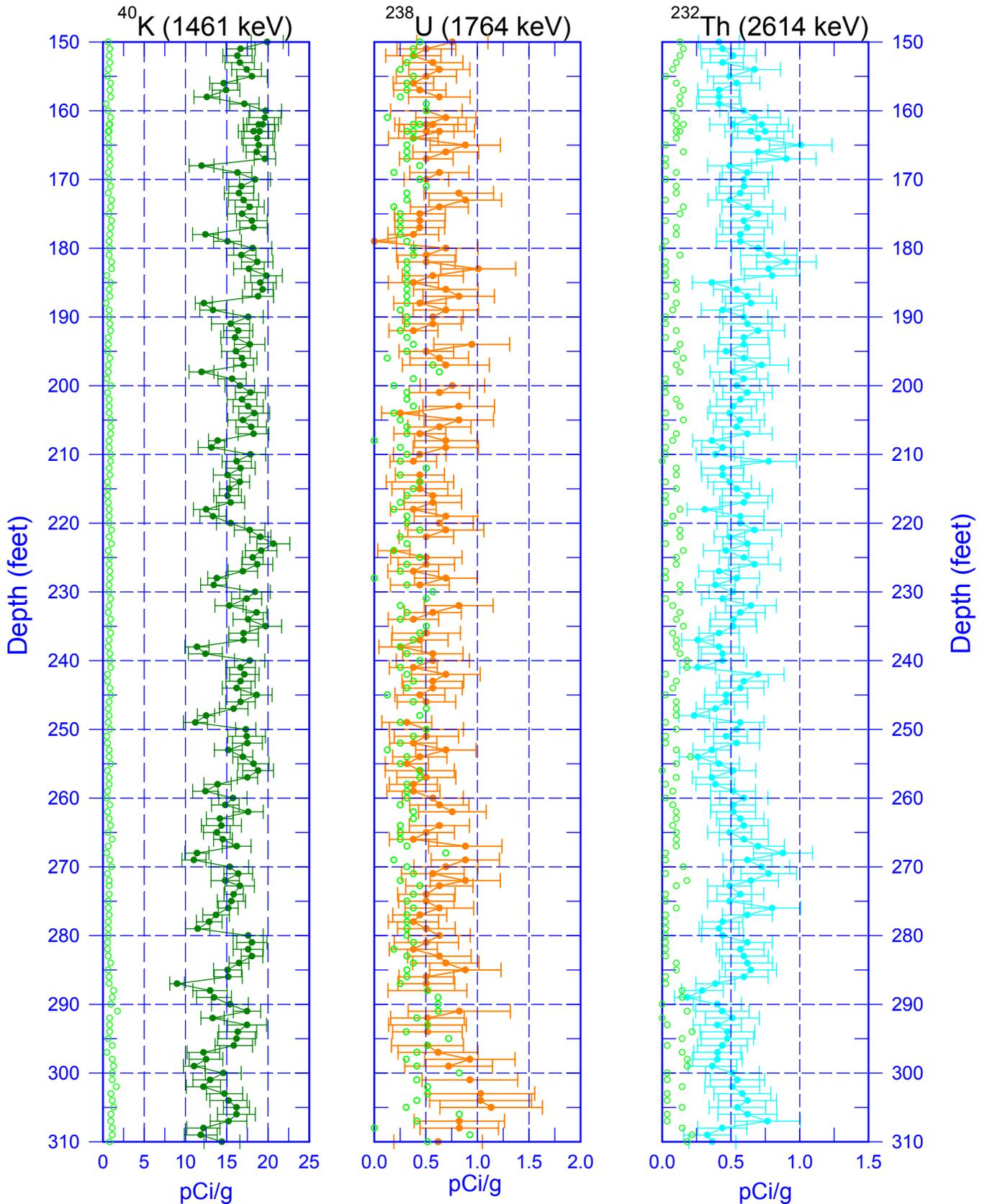
Zero Reference = Ground Surface

○ MDL

Last Log Date - 07/15/03

C-4123

Natural Gamma Logs



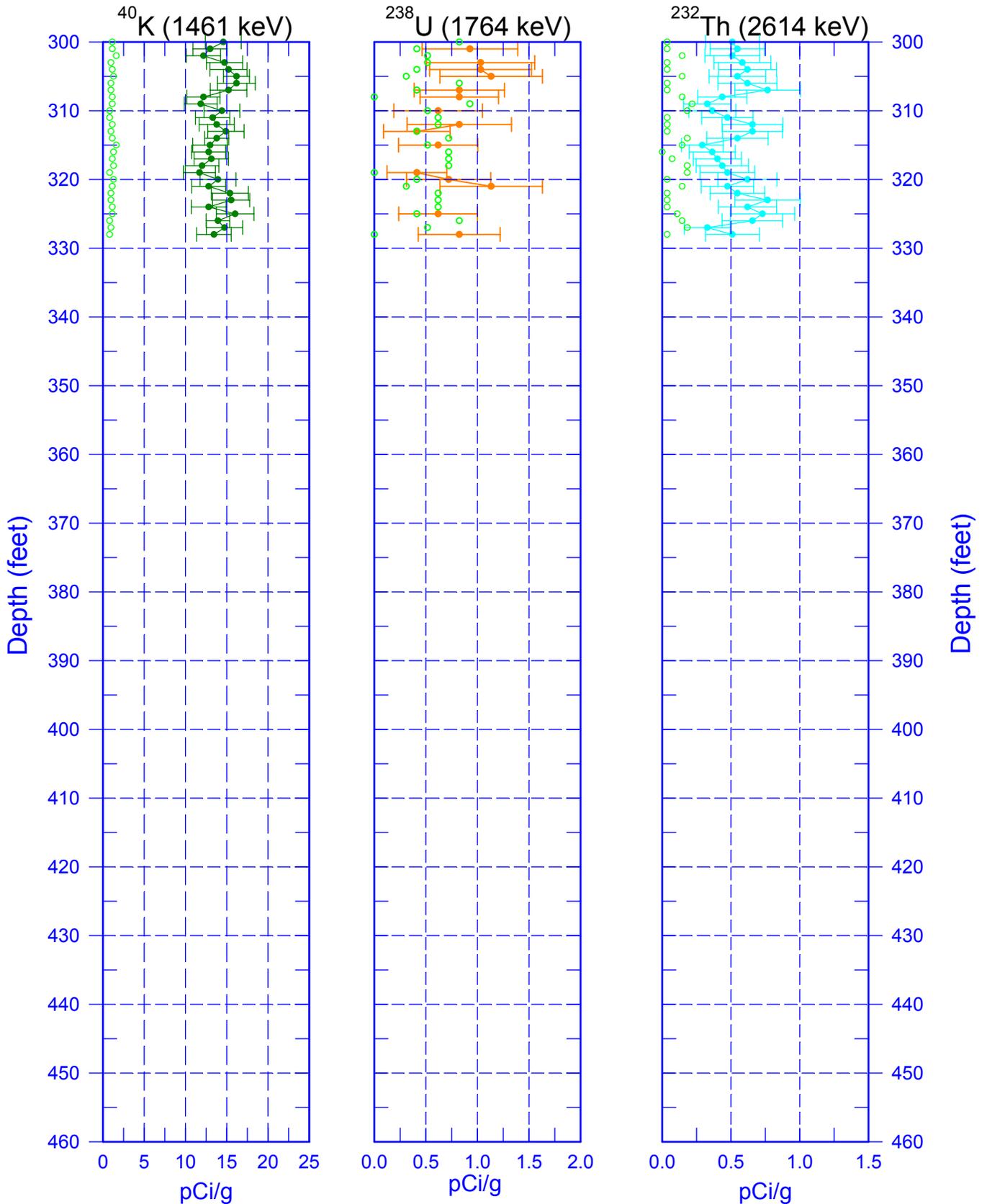
Zero Reference = Ground Surface

○ MDL

Last Log Date - 07/15/03

C-4123

Natural Gamma Logs

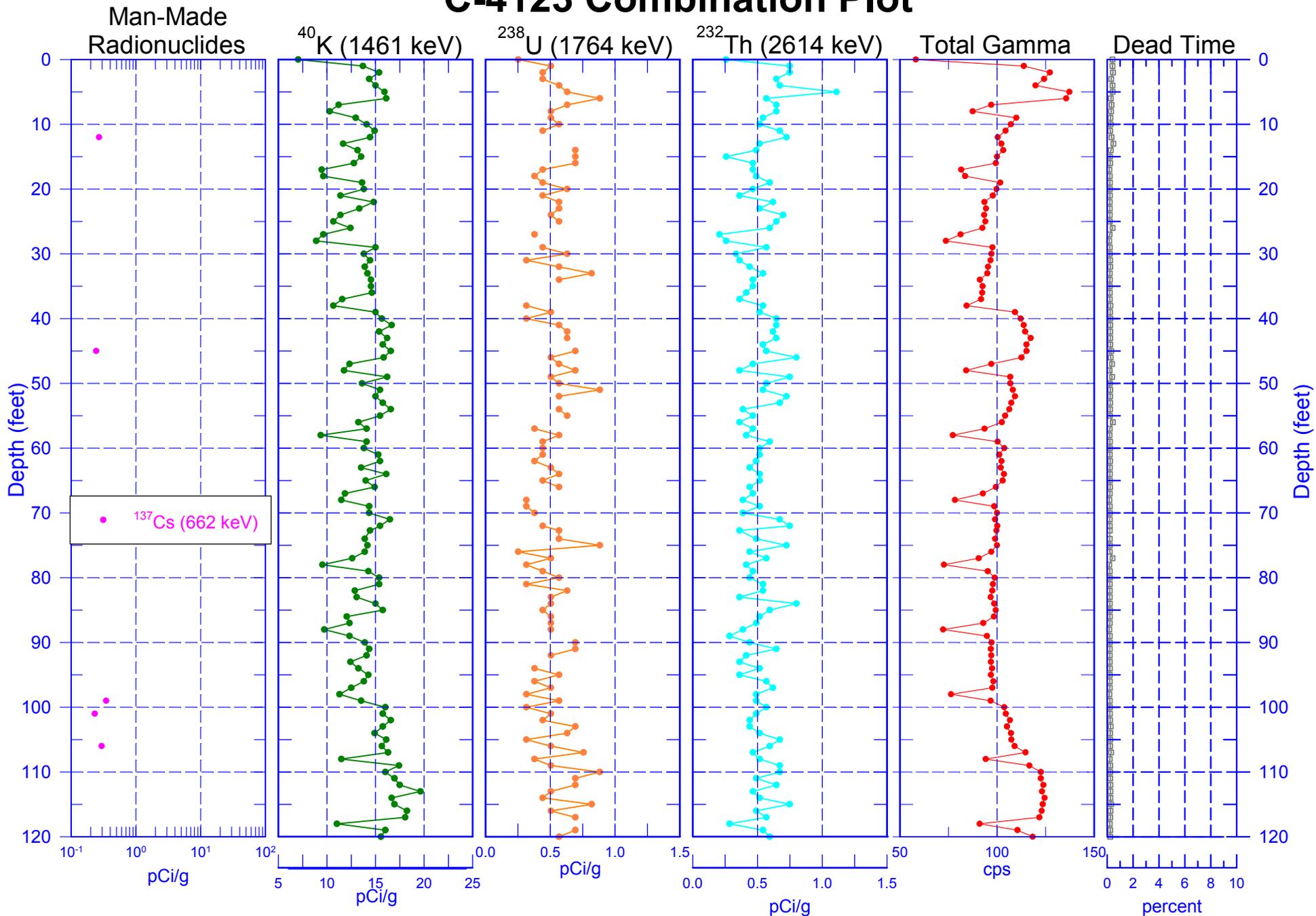


Zero Reference = Ground Surface

○ MDL

Last Log Date - 07/15/03

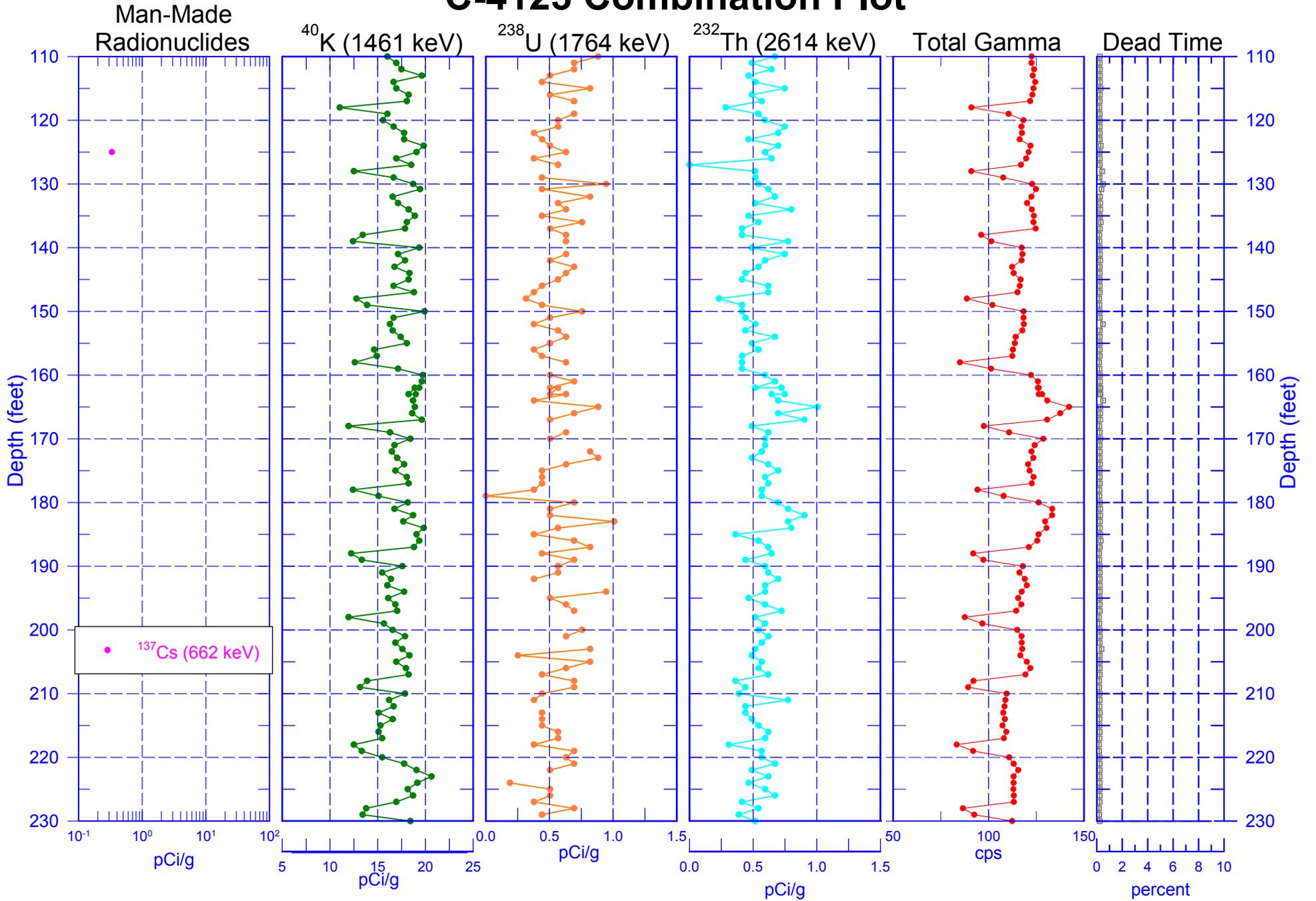
C-4123 Combination Plot



Zero Reference = Ground Surface

Last Logging Date - 07/15/03

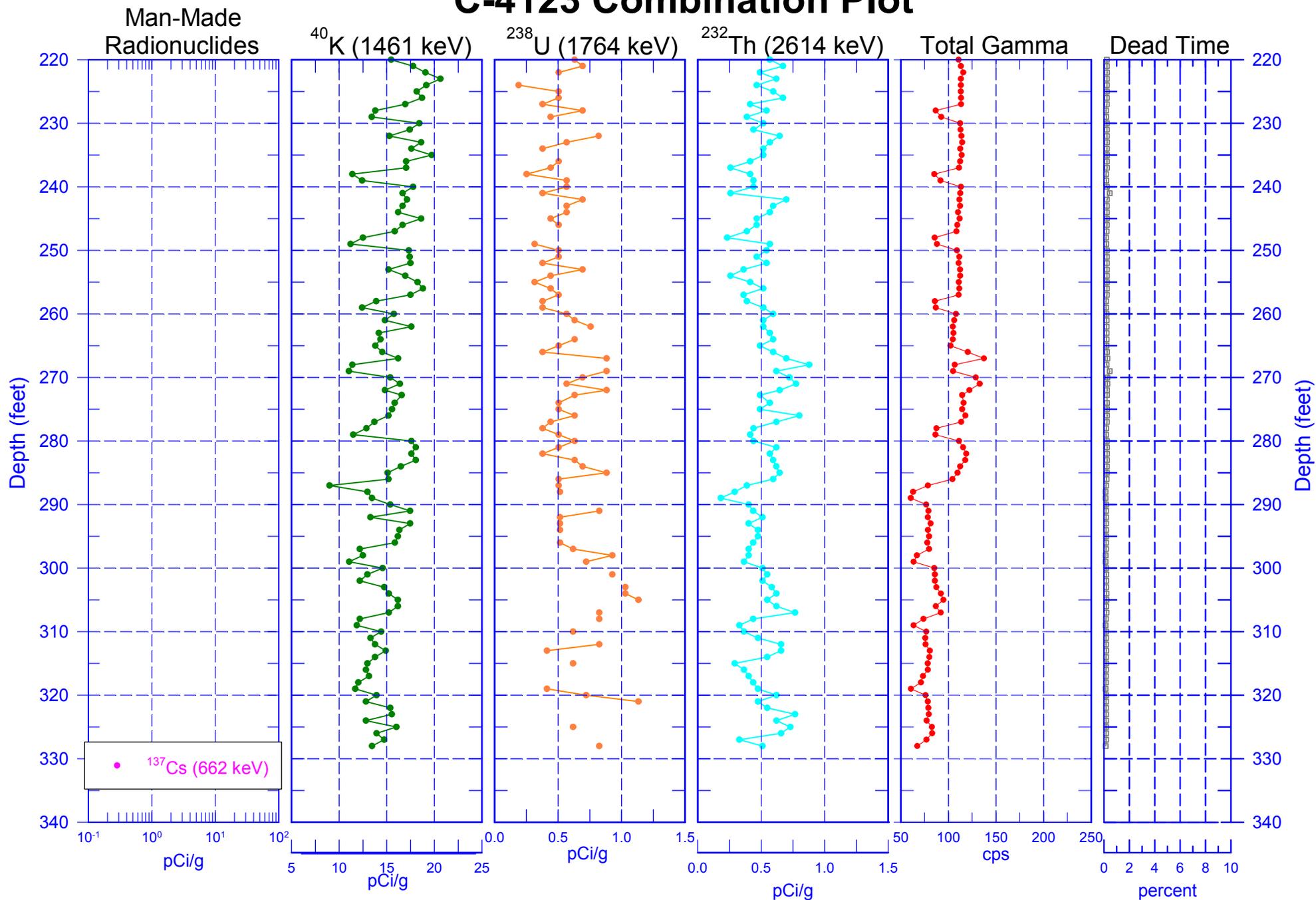
C-4123 Combination Plot



Zero Reference = Ground Surface

Last Logging Date - 07/15/03

C-4123 Combination Plot

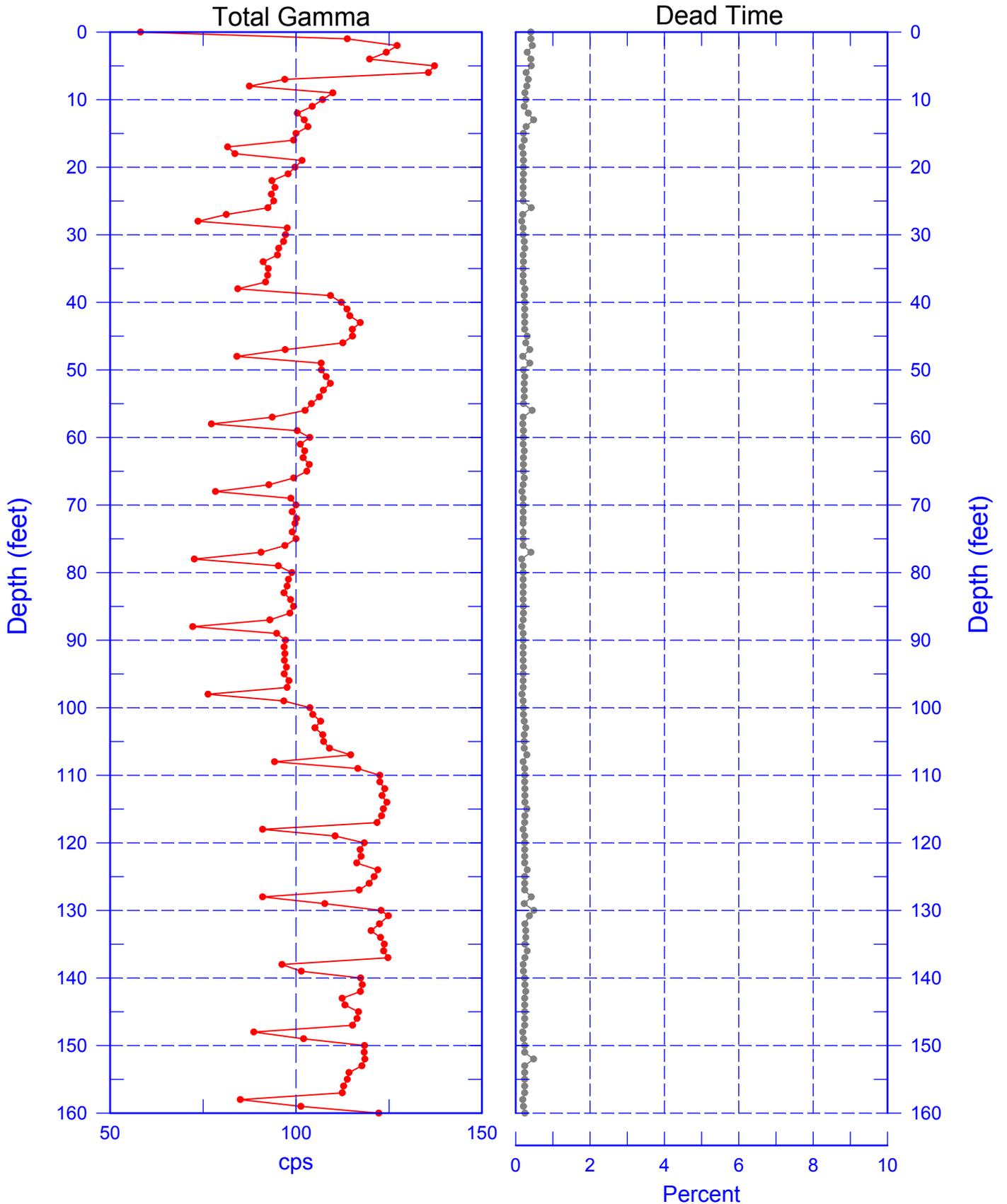


Zero Reference = Ground Surface

Last Logging Date - 07/15/03

C-4123

Total Gamma & Dead Time

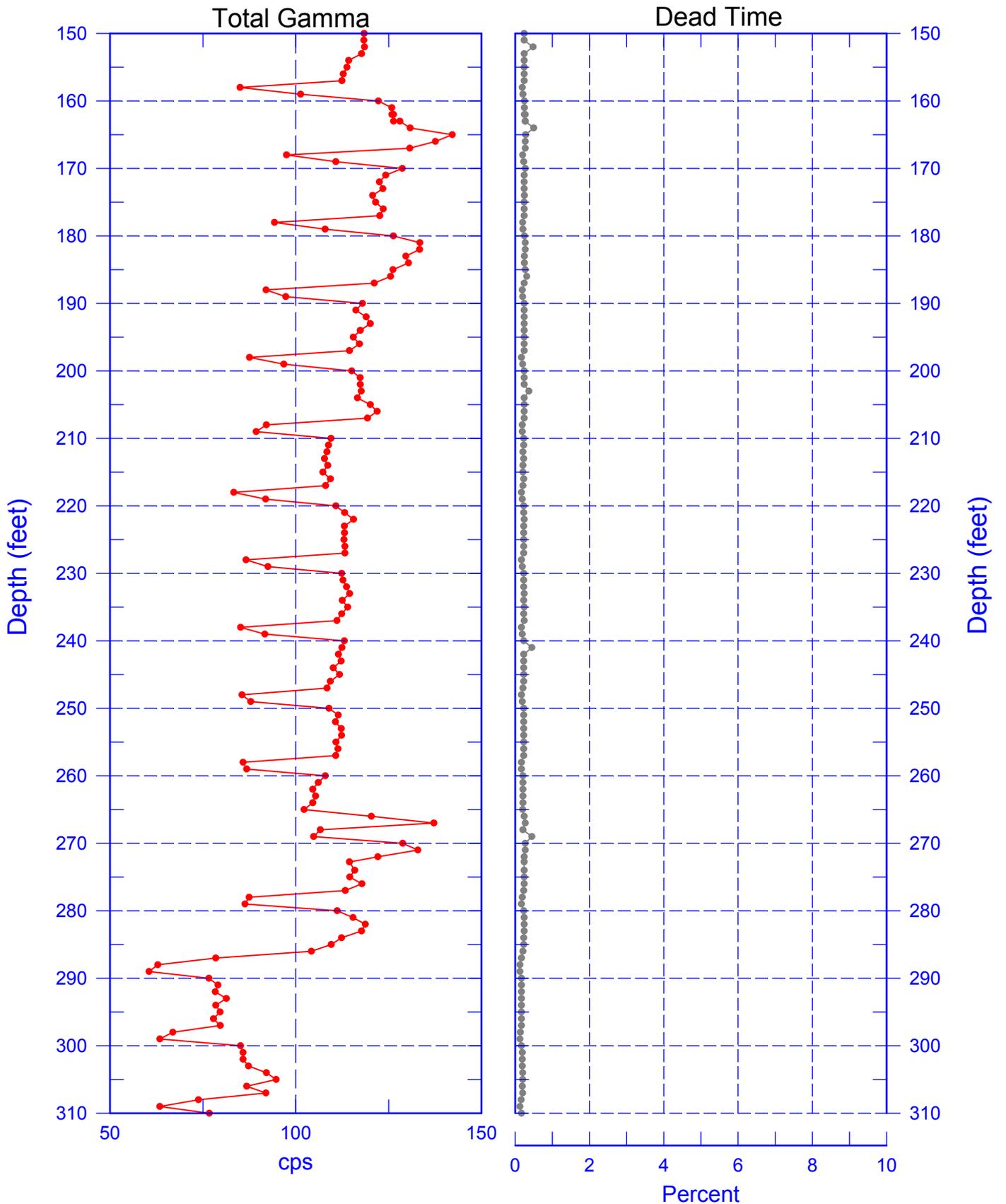


Reference - Ground Surface

Last Log Date - 07/15/03

C-4123

Total Gamma & Dead Time

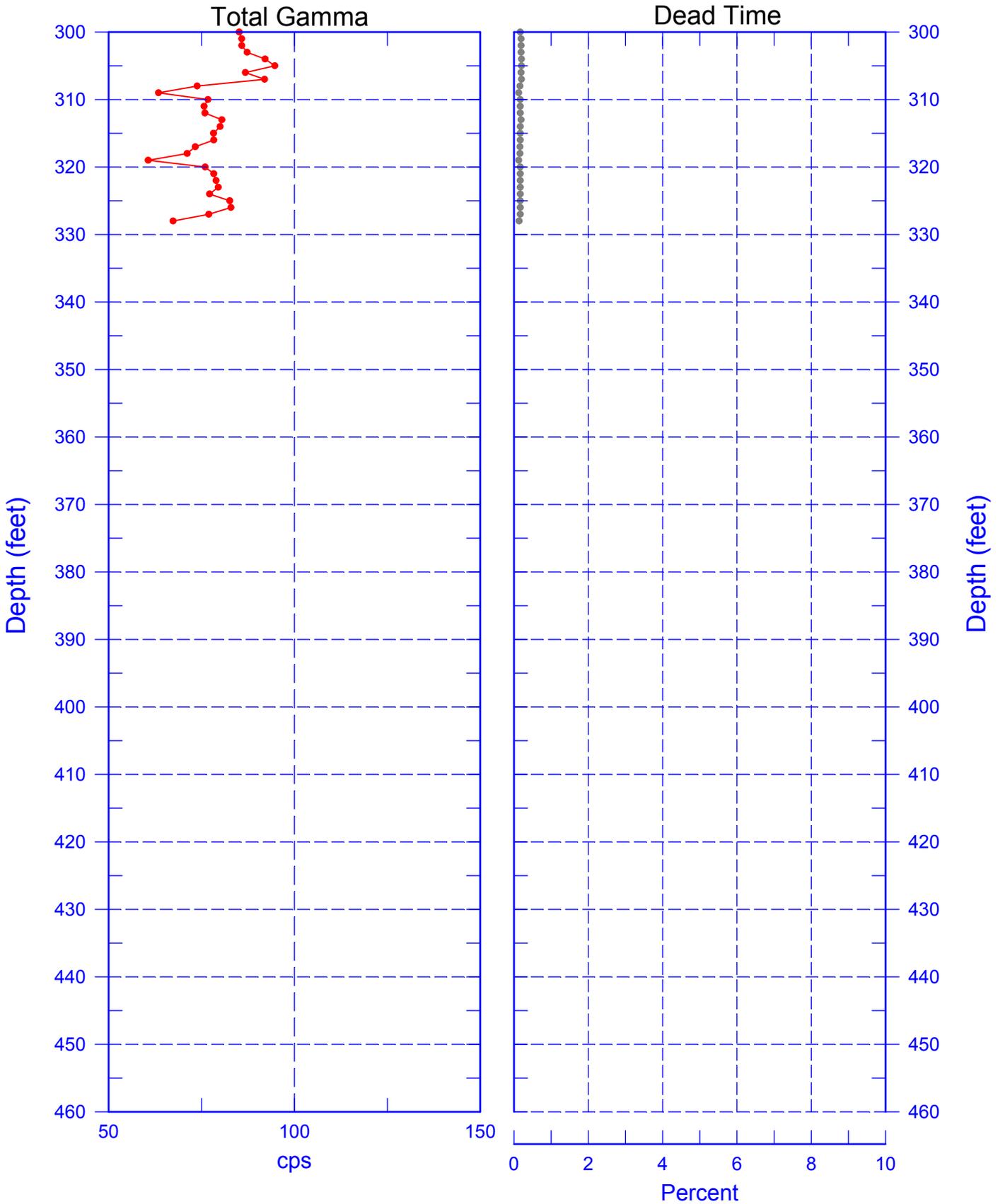


Reference - Ground Surface

Last Log Date - 07/15/03

C-4123

Total Gamma & Dead Time

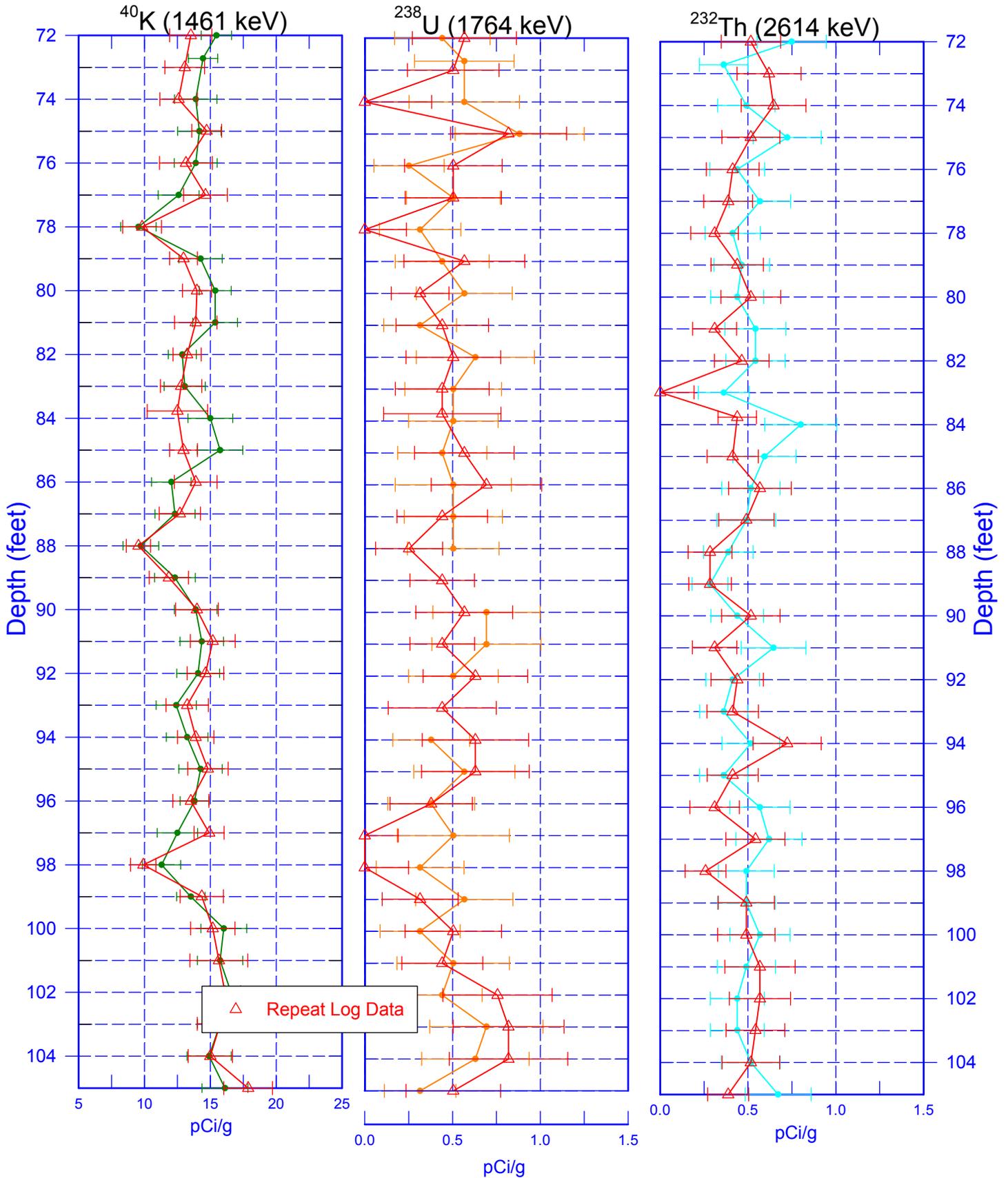


Reference - Ground Surface

Last Log Date - 07/15/03

C-4123

Repeat Section of Natural Gamma Logs



Zero Reference = Ground Surface

Last Log Date - 07/15/03