Stoller
Hanford Office

DOE-EM/GJ756-2004

699-30-66 (C4298)
Log Data Report

Borehole Information:

Borehole: 699-30-66 (C4298)			**Site:** ~ 1 mile SW of U.S. Ecology disposal site		
Coordinates (WA State Plane)		**GWL (ft)[1]:**	254.6	**GWL Date:**	10/18/04
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
Not Available	Not Available	10/04	Not Available	399	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.1	13 3/8	12 3/8	1/2	0.1	145.9
Threaded steel	4.9	11 3/4	10 3/4	11/16	4.9	285
Threaded steel	None	11 3/4	10 3/4	1/2	285	399

Borehole Notes:

Casing information for the first and second drill strings was provided by the Fluor Hanford drilling supervisor. For the second string of casing, the logging engineer measured casing diameter and stickup using a steel tape and rounding the measurements to the nearest 1/16 in. Logging measurements are referenced to the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4E	**Type:**	SGLS (70%) 34TP40587A
Calibration Date:	05/2004	**Calibration Reference:**	DOE-EM/GJ692-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1E	**Type:**	SGLS (70%) 34TP40587A
Calibration Date:	01/2004	**Calibration Reference:**	GJO-2003-438-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	3	4	5 Repeat
Date	08/19/04	08/19/04	10/18/04	10/19/04	10/19/04
Logging Engineer	Pearson	Pearson	Spatz	Spatz	Spatz
Start Depth (ft)	144.0	85.0	230.0	400.0	230.0
Finish Depth (ft)	0.0	70.0	140.0	231.0	200.0
Count Time (sec)	100	100	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N

Log Run	1	2 Repeat	3	4	5 Repeat
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	N/A[3]	N/A	N/A	N/A	N/A
Pre-Verification	DE271CAB	DE271CAB	AE009CAB	AE010CAB	AE010CAB
Start File	DE271000	DE271145	AE009000	AE010000	AE010170
Finish File	DE271144	DE271160	AE009090	AE010169	AE010200
Post-Verification	DE271CAA	DE271CAA	AE009CAA	AE010CAA	AE010CAA
Depth Return Error (in.)	+ 1/4	+ 1/2	- 1	N/A	- 2
Comments	No fine-gain adjustment.	No fine-gain adjustment.	Fine-gain adjustment after file -021.	No fine-gain adjustment.	No fine-gain adjustment.

Logging Operation Notes:

Logging was performed through a single 1/2-in.-thick casing (log runs 1 and 2) August 19. After the borehole was deepened, further logging was conducted October 19 through a single 11/16-in.-thick casing to 285 ft and through a single 1/2-in.-thick casing to approximately 400 ft. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. Zero reference is the ground surface.

Analysis Notes:

Analyst:	Henwood	Date:	10/26/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

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. 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. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source files: G4EJul04.xls and G1EJan04.xls for data acquired by logging systems Gamma 4E and 1E, respectively). The casing configuration was assumed as one string of 12-in. casing with a thickness of 1/2 in. to 146 ft, one string of 10-in. casing with a thickness of 11/16 in. to 285 ft, and 10-in. casing with a thickness of 1/2 in. to 399 ft. No dead time corrections were required. A correction for water in the 10-in. borehole was applied to the data below 254 ft.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}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 ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

The routine processing software identified ^{137}Cs at a few sporadic depth intervals throughout the borehole near its MDL of approximately 0.2 pCi/g. These identifications are the result of statistical fluctuations and are likely not actual detections.

The KUT logs showed variations that may be used for correlation among boreholes in the area.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides.

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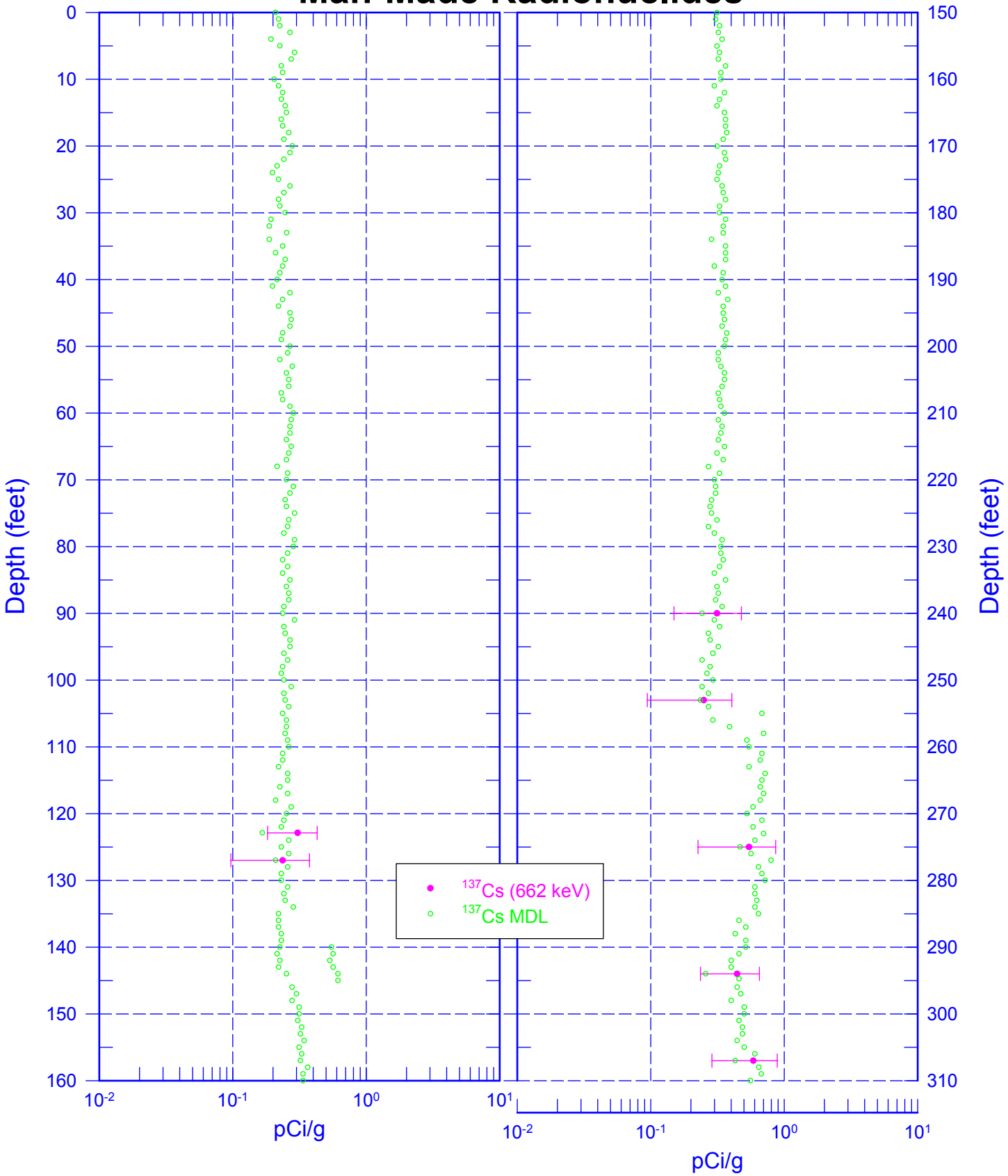
[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

699-30-66 (C4298)
Man-Made Radionuclides



Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Log Date - 10/19/04

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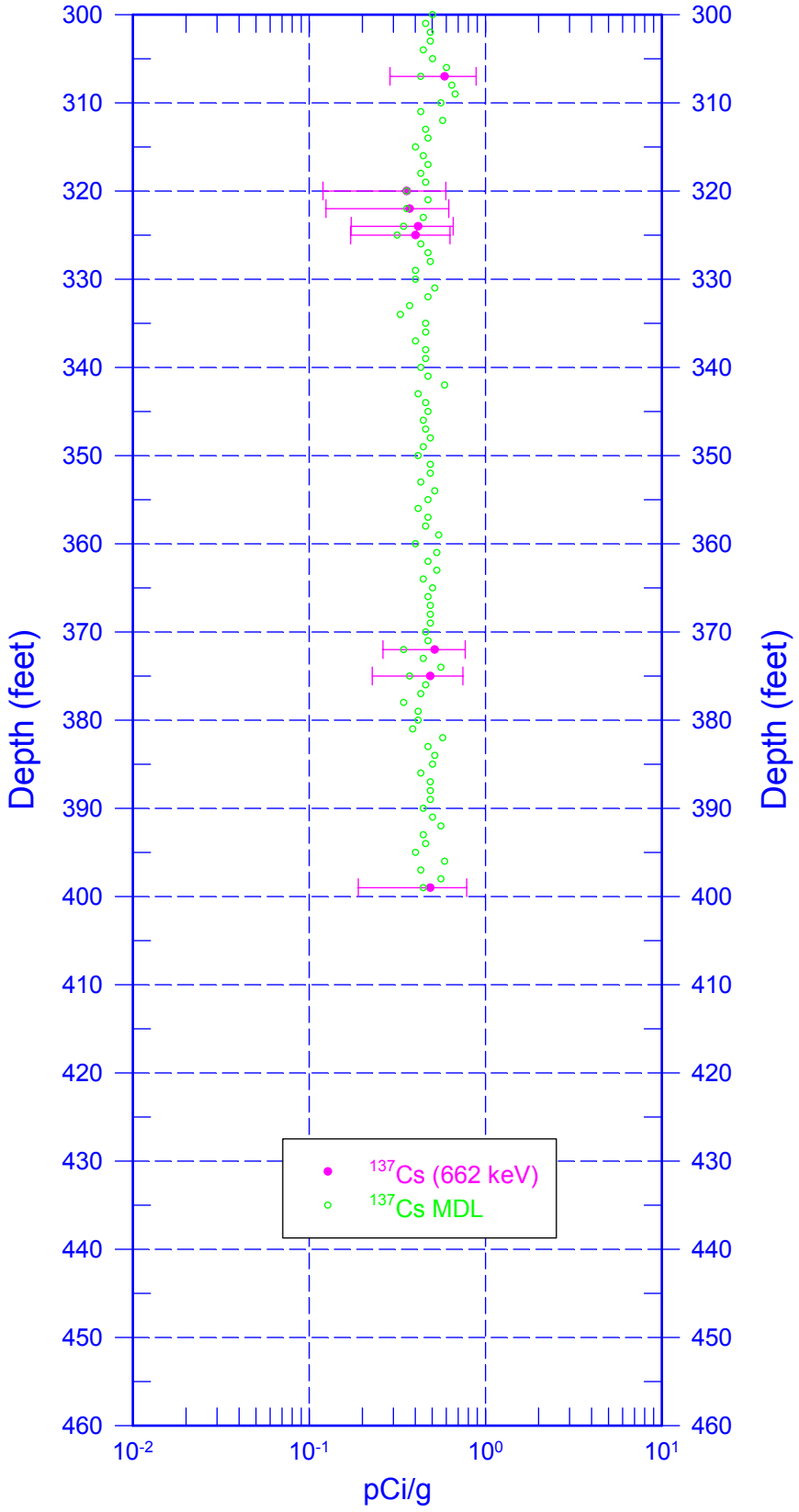
Man-Made Radionuclides



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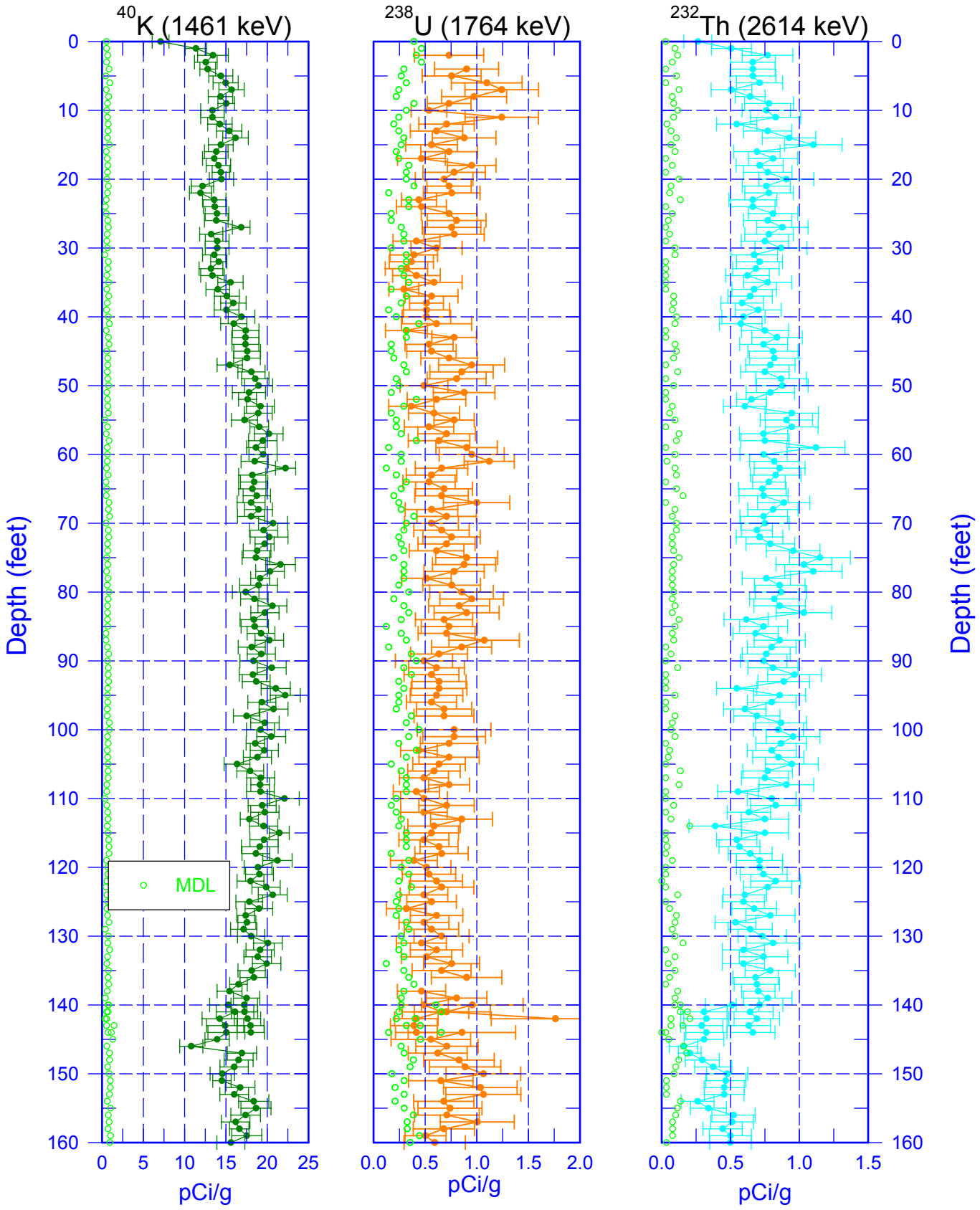
699-30-66 (C4298)
Natural Gamma Logs



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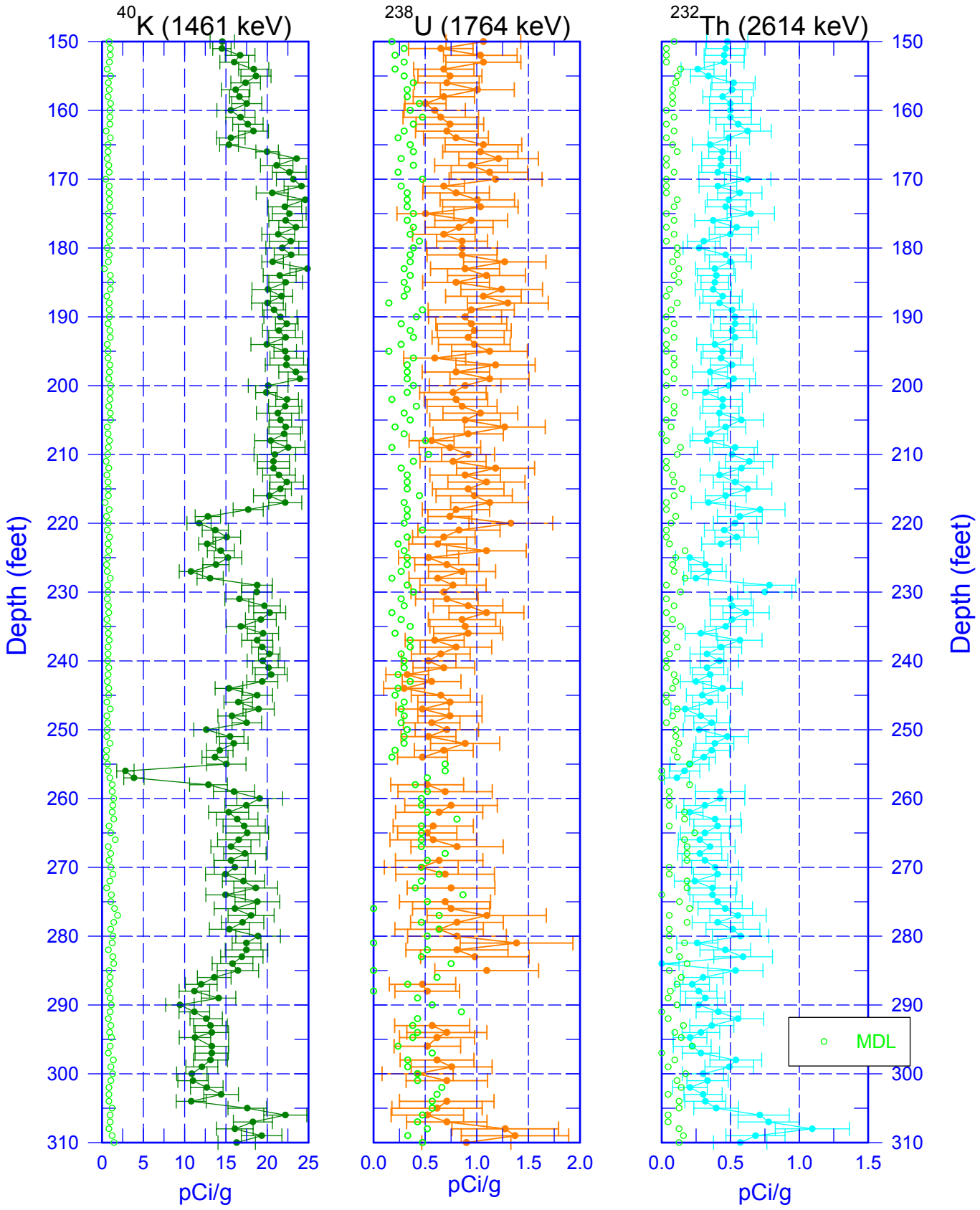
Natural Gamma Logs



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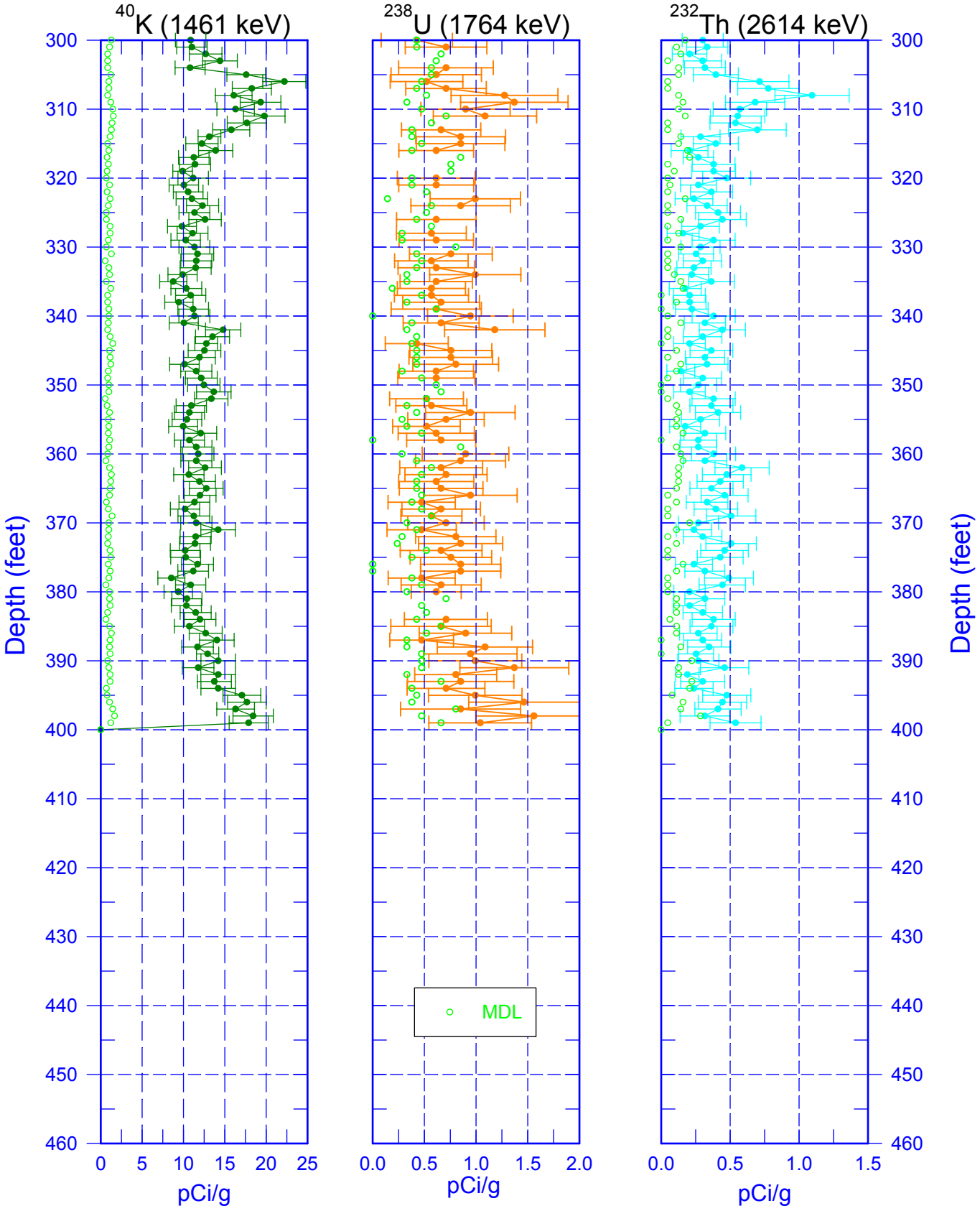
Natural Gamma Logs

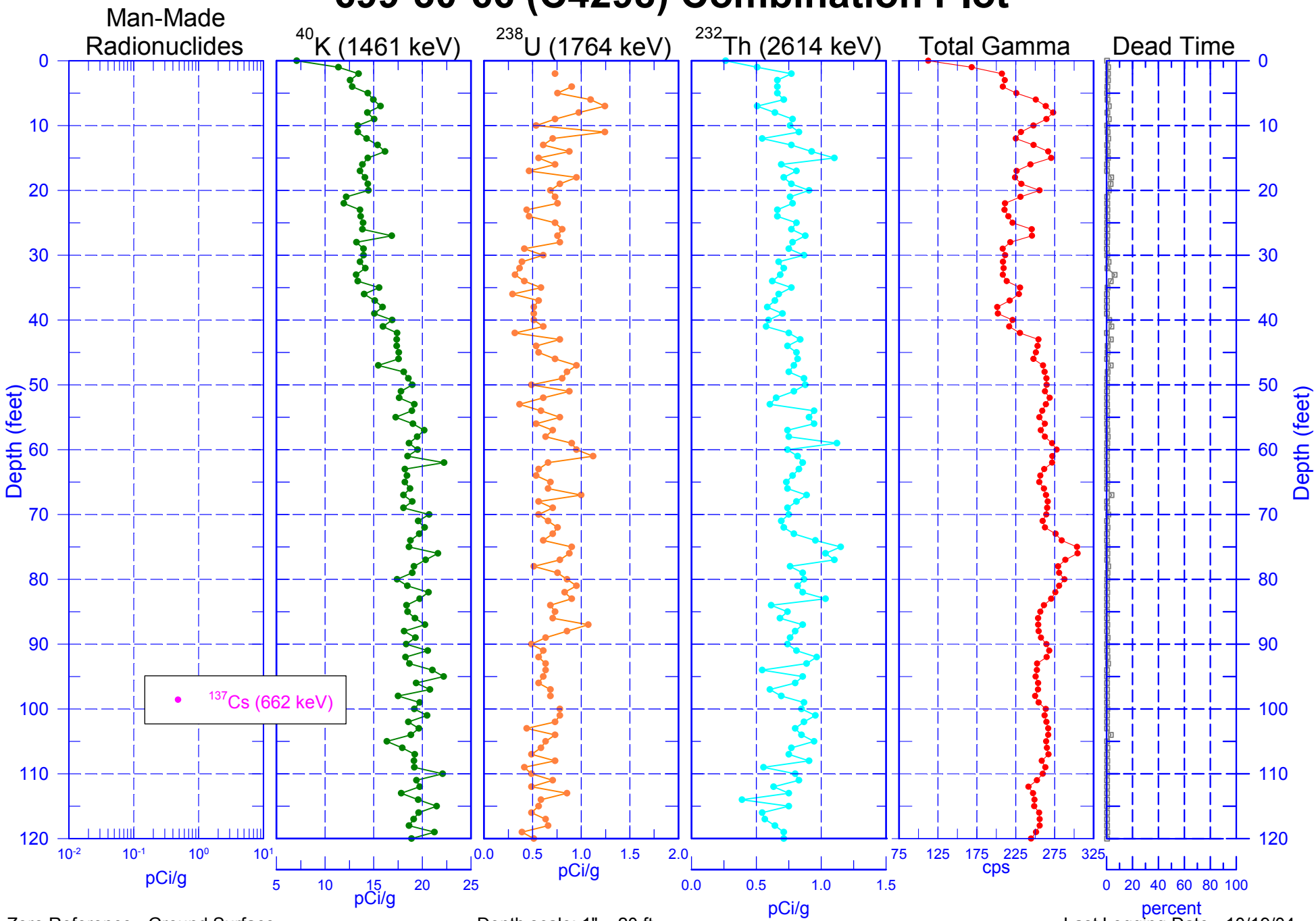


Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Log Date - 10/19/04

699-30-66 (C4298) Combination Plot



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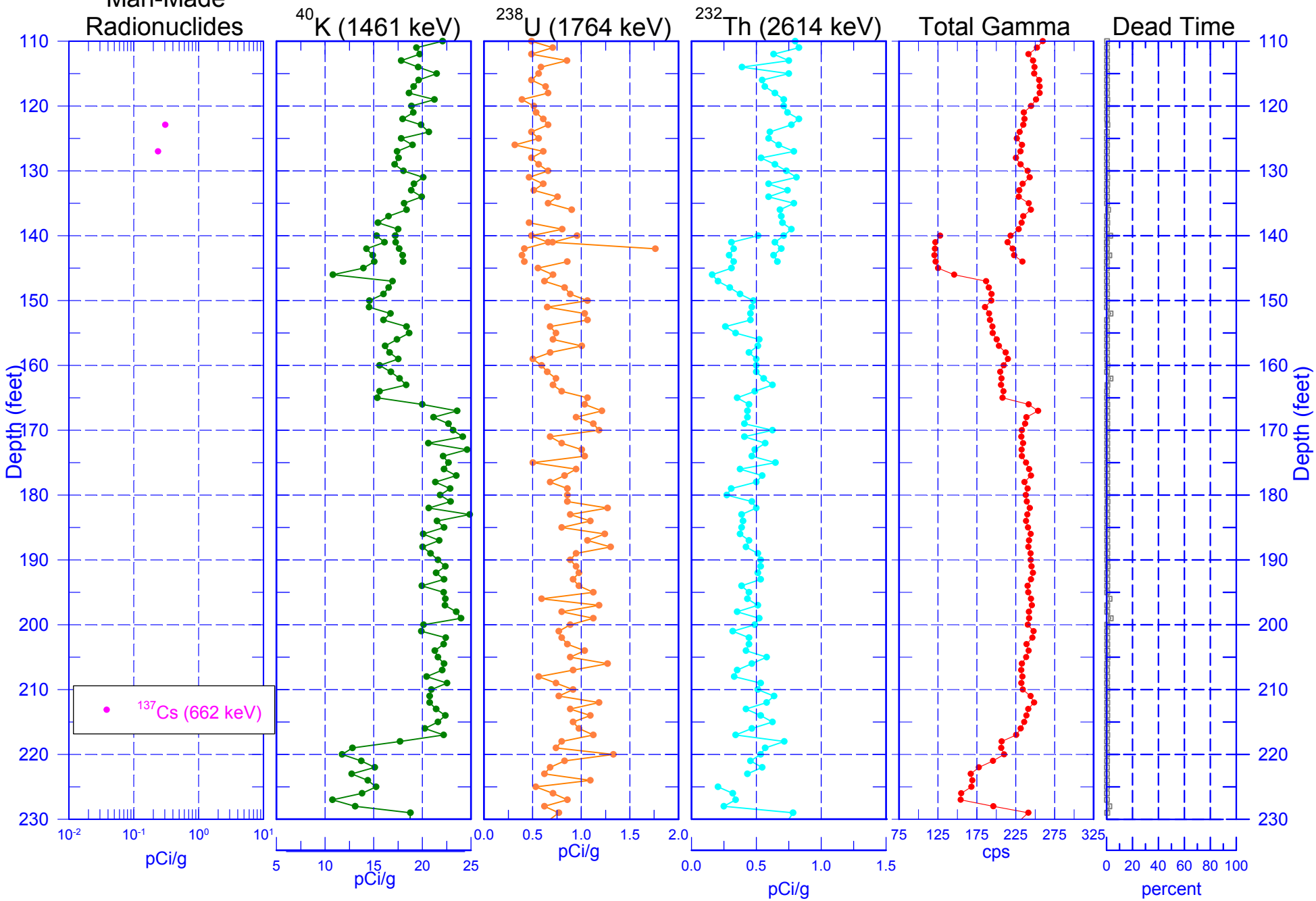

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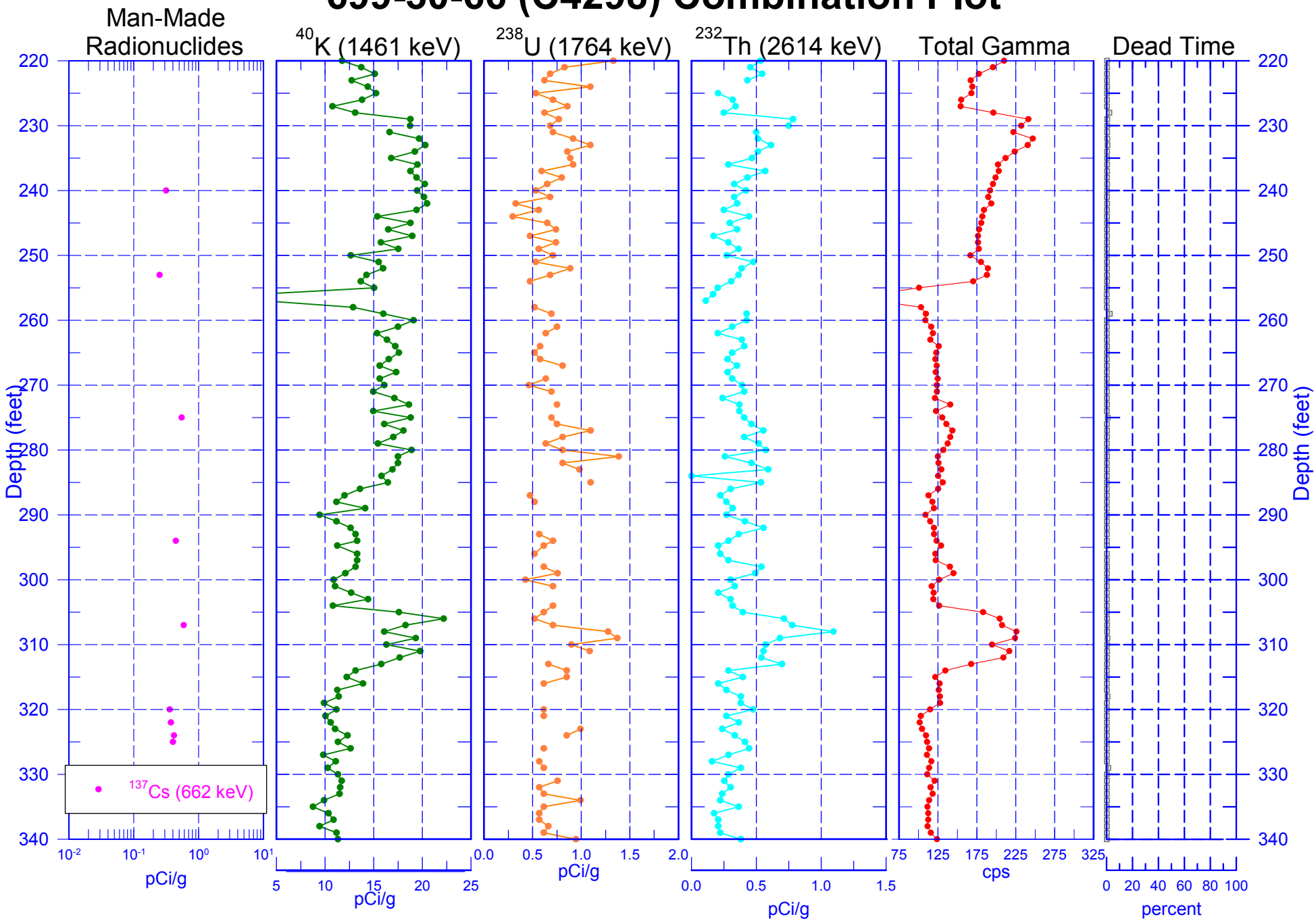

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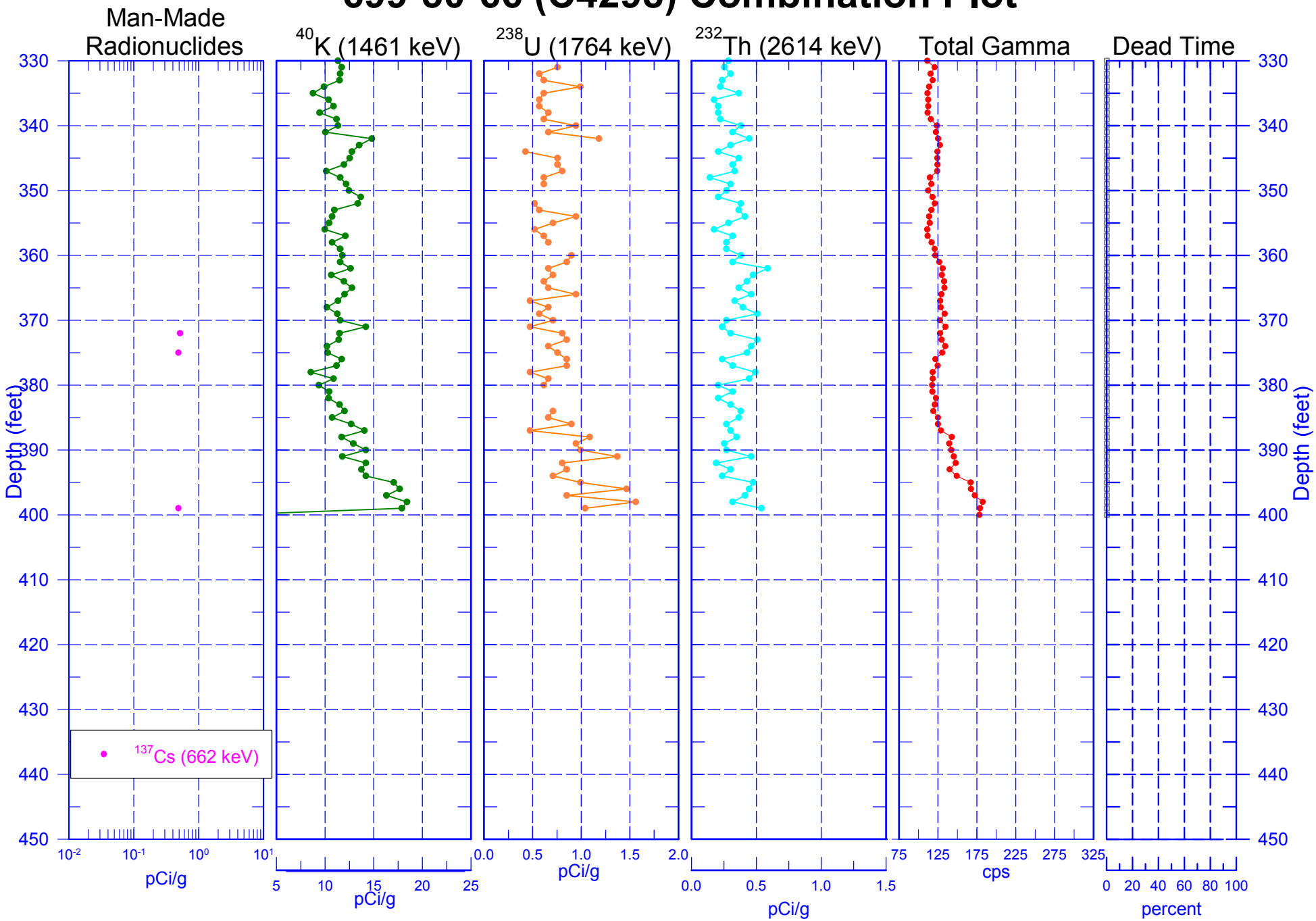
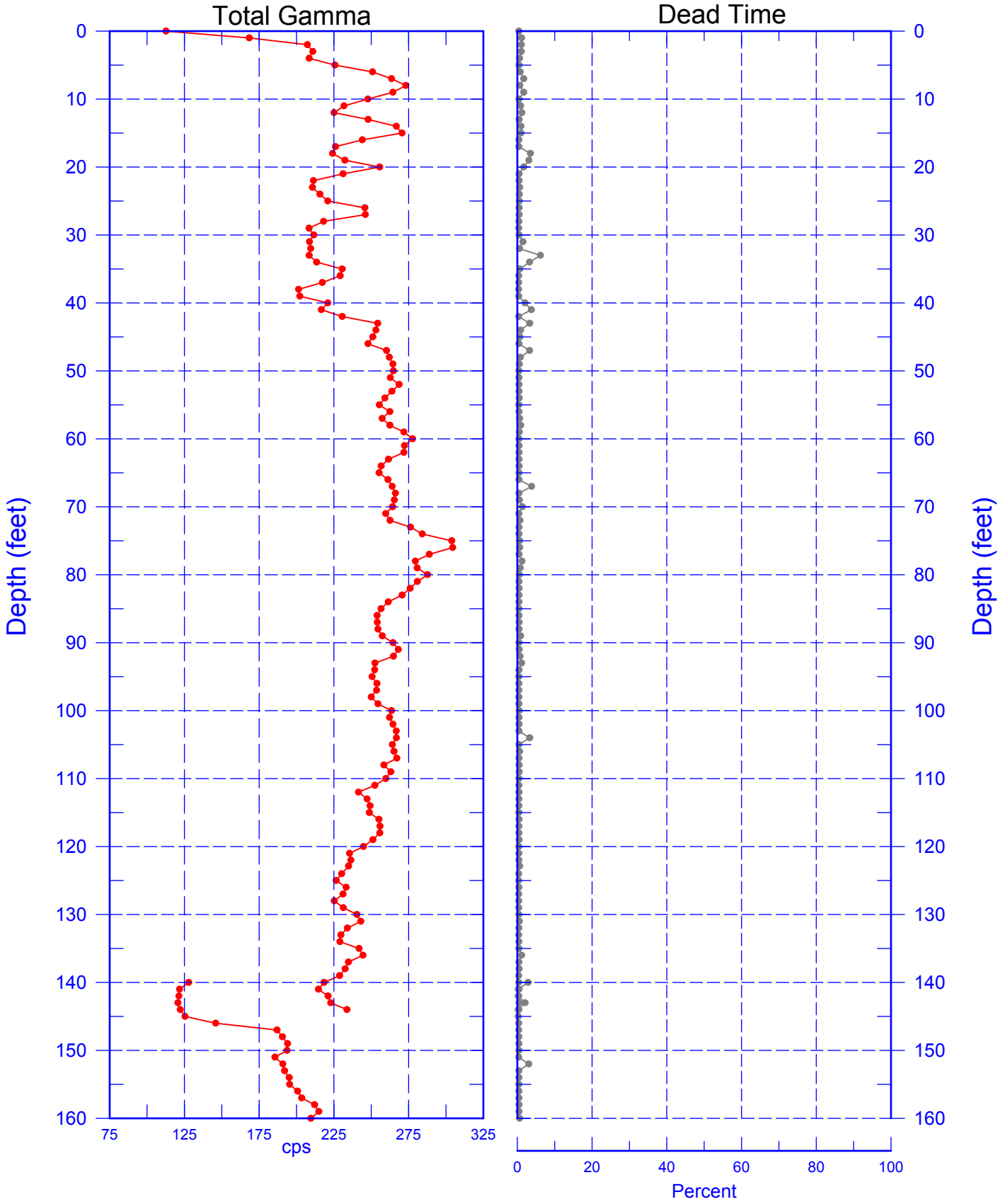


Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Logging Date - 10/19/04

699-30-66 (C4298)
Total Gamma & Dead Time



Reference - Ground Surface

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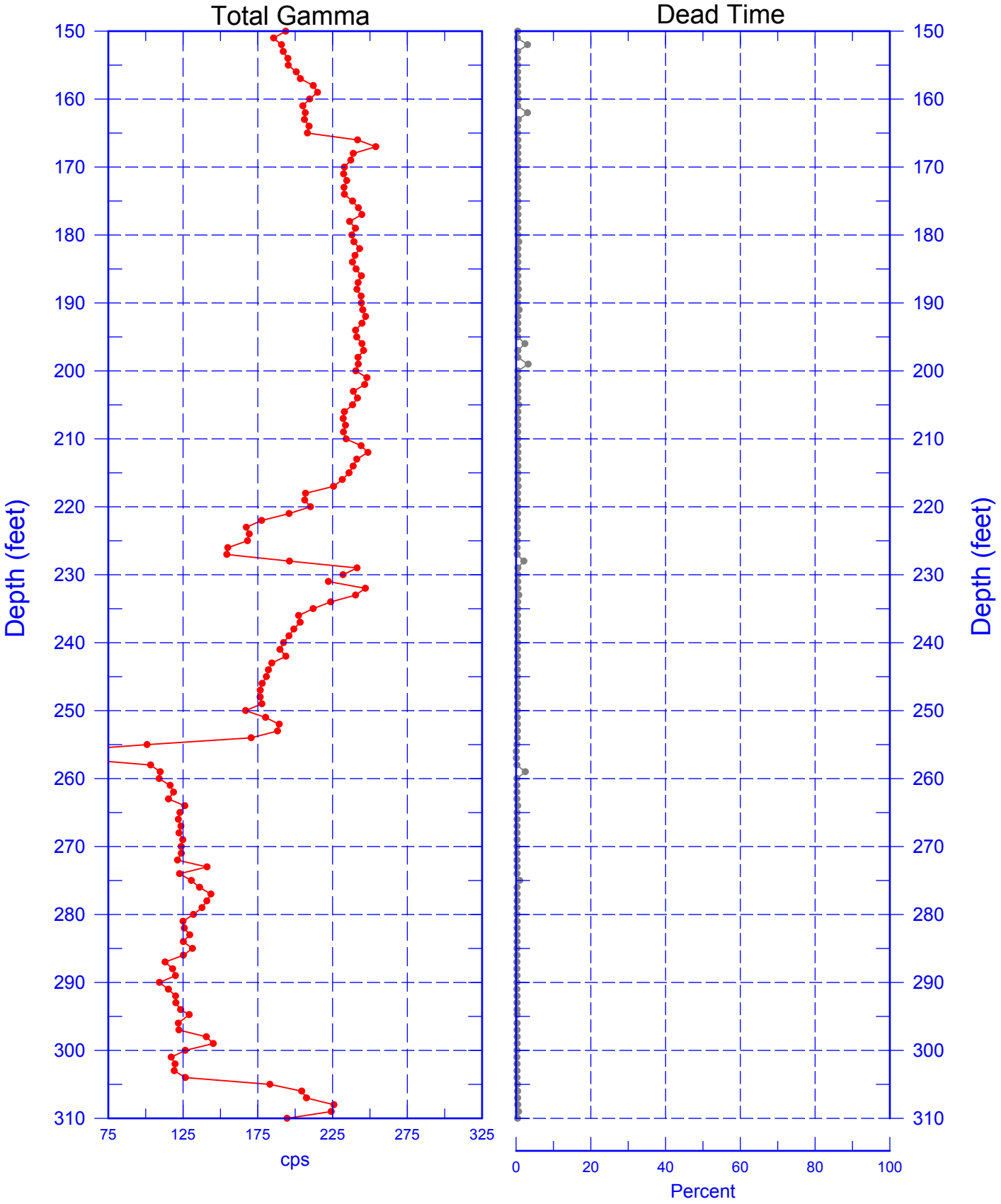
Total Gamma & Dead Time



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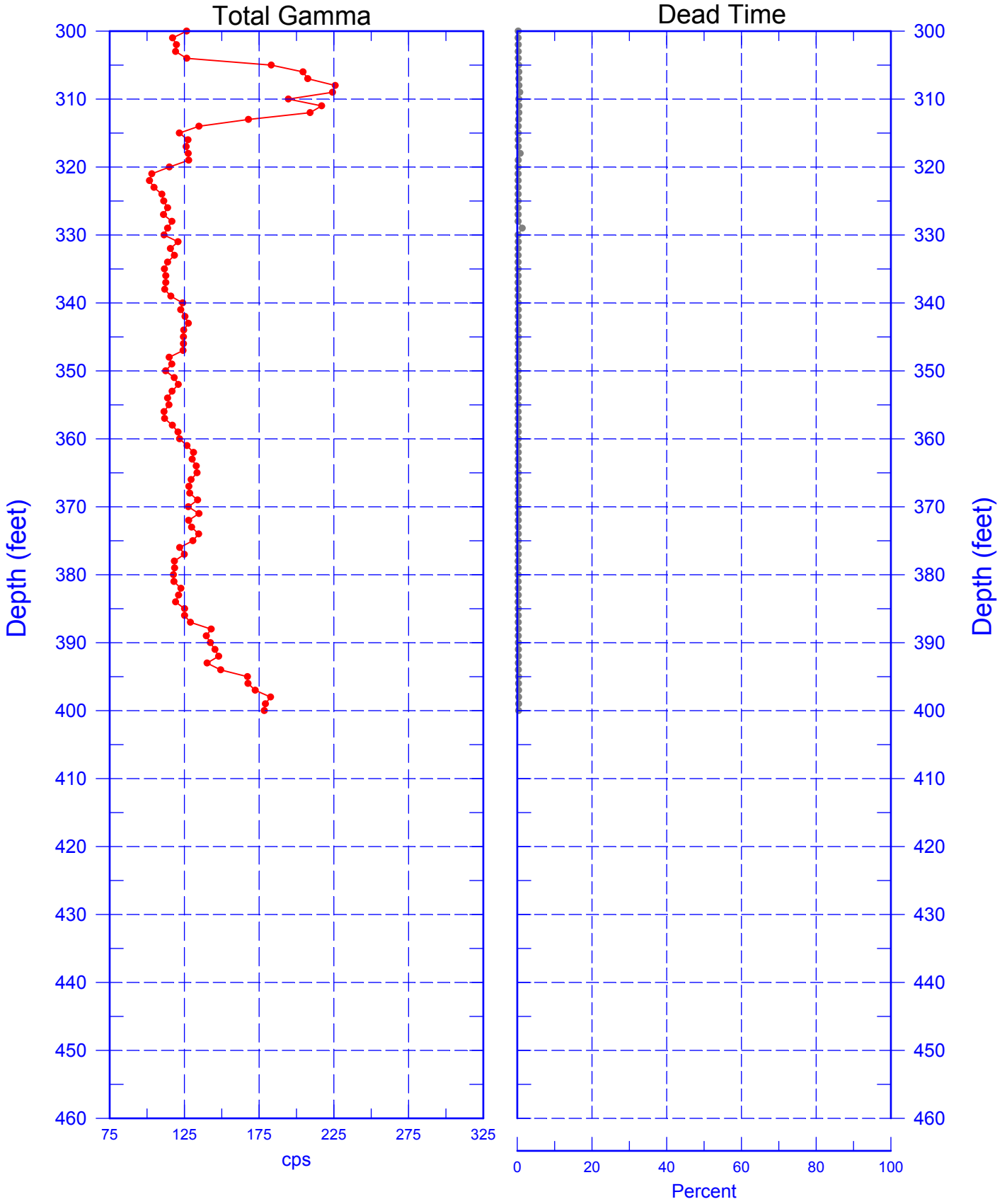

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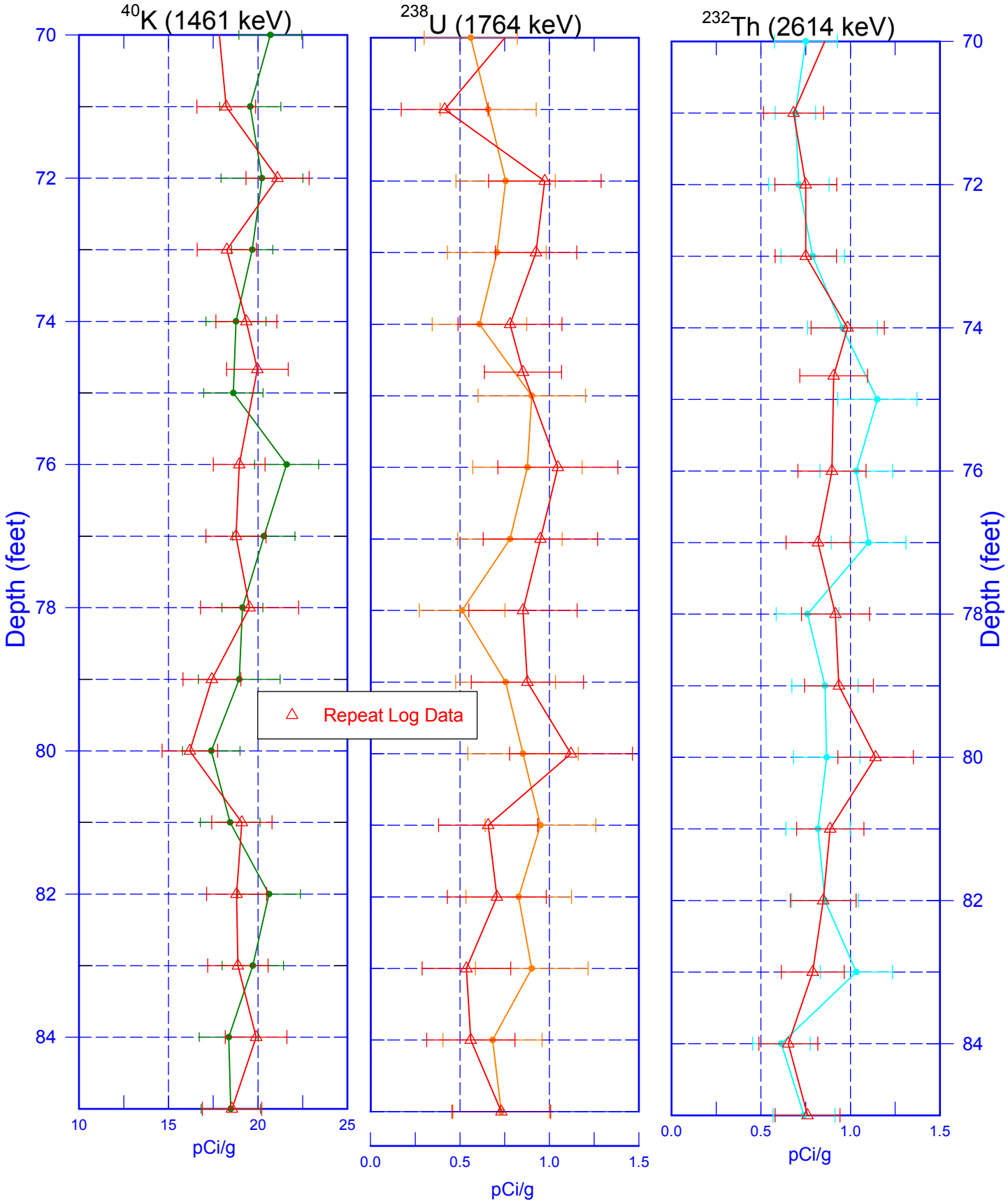
699-30-66 (C4298)

Repeat Section of Natural Gamma Logs



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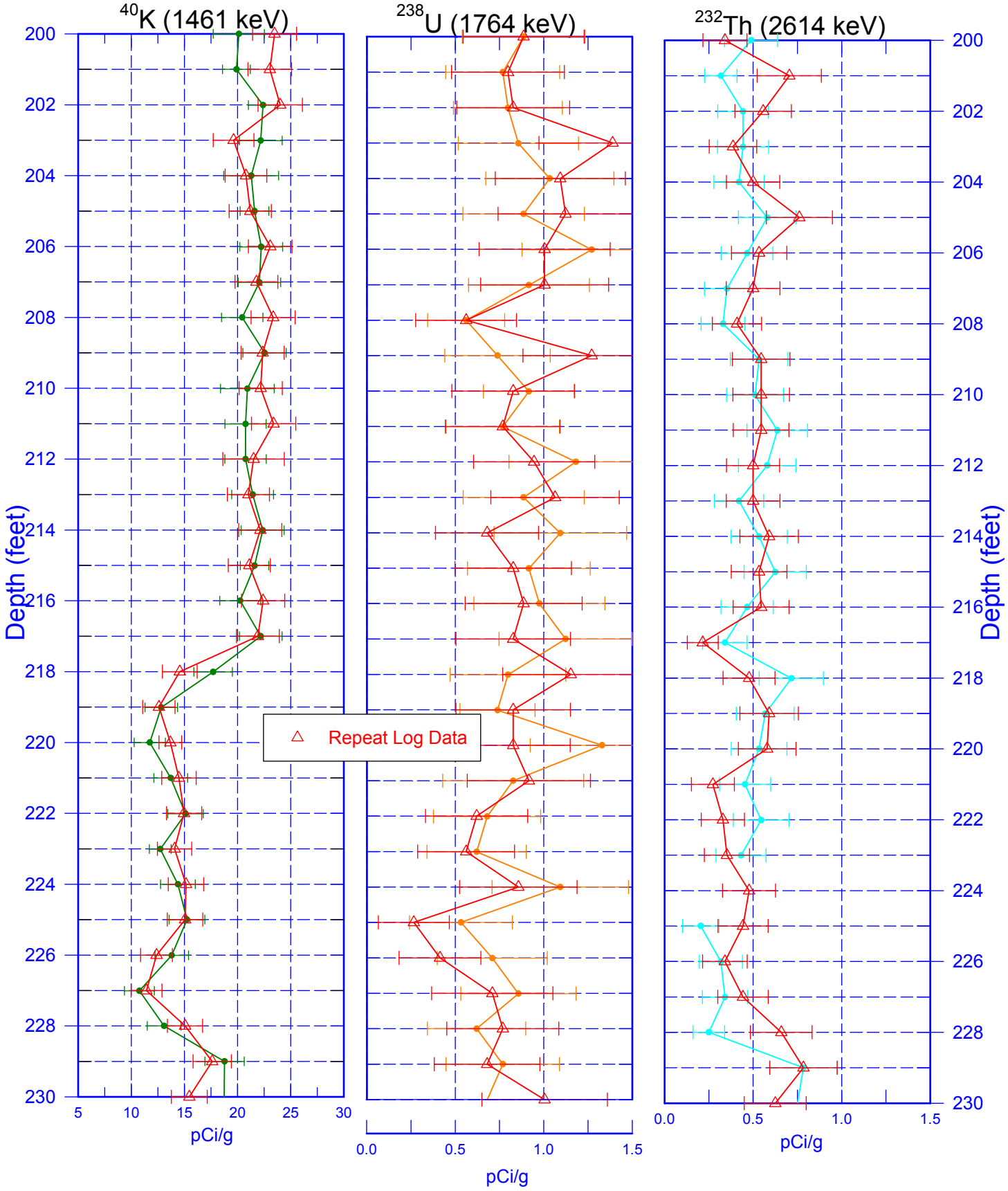
Repeat Section of Natural Gamma Logs



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