

299-E17-22 (C3826) Log Data Report

Borehole Information:

Borehole: 299-E17-22 (C3826)		Site: 90 ft NW of NW corner of the 216-A-45 Crib			
Coordinates (WA St Plane)		GWL¹ (ft): 325.4 (TOC ²)		GWL Date: 07/02	
North (m) 135195.9	East (m) 574841.1	Drill Date 03/02	TOC Elevation 221.5 m (726.6 ft)	Total Depth (ft) 365.8	Type Percussion

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
6-in. schedule-10 stainless steel	3.2	6.5	6.25	0.125	0	12.6
304 schedule-5 stainless steel	2.2	N/A ³	4	0.125	1	324.8
304 wire wrap stainless-steel 0.02 slotted screen	None	N/A	4	0.125	324.8	359.9
304 stainless-steel sump	None	N/A	4	0.125	359.9	361.9

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above table, are derived from Walker and Wright (2002). The depths have been adjusted to reflect depths from the top of casing that is marked by an "X"; all logging measurements are referenced to the top of the 6-in. casing. For example, the reported depth of the surface casing in Walker and Wright was 9.4 ft, which has been adjusted downward by the amount of casing stickup (3.2 ft) to 12.6 ft. The borehole is grouted from the ground surface to 12.6 ft with Portland cement. Below the grout, the borehole is sealed with granular bentonite to 300.2 ft, and with 1/4 -in. bentonite pellets from 300.2 to 309.5 ft. Colorado silica sand was placed from 309.5 to 365.9 ft.

Stoller personnel used calipers to measure the 6-in. casing wall thickness and the outside diameter; the inside diameter is calculated. The 4-in. casing and screen were not measured and the casing thickness is estimated.

Groundwater level is derived from Stoller measurements from the top of casing prior to logging.

Logging Equipment Information:

Logging System: Gamma 1D	Type: SGLS (35%)
Calibration Date: 07/01	Calibration Reference: GJO-2001-243-TAR
	Logging Procedure: MAC-HGLP 1.6.5, Rev. 0

Logging System: Gamma 2B	Type: SGLS (35%)
Calibration Date: 11/01	Calibration Reference: GJO-2002-287-TAR
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	06/28/02	07/01/02	07/02/02	07/03/02	07/09/02
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	3.0	139.0	218.0	277.0	327.0
Finish Depth (ft)	38.0	37.0	138.0	217.0	276.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	n/a ⁴	n/a	n/a	n/a	n/a
Pre-Verification	BB127CAB	BB129CAB	BB130CAB	BB131CAB	BB132CAB
Start File	BB128000	BB129000	BB130000	BB131000	BB132000
Finish File	BB128035	BB129102	BB130080	BB131060	BB132051
Post-Verification	BB128CAA	BB129CAA	BB130CAA	BB131CAA	BB132CAA

Log Run	6 Repeat	7 Repeat	8 Repeat	9	10 Repeat
Date	07/11/02	07/11/02	07/11/02	08/06/02	08/06/02
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	28.0	231.0	276.0	362.0	325.0
Finish Depth (ft)	46.0	249.0	289.0	326.0	295.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	n/a	n/a	n/a	n/a	n/a
Pre-Verification	BB133CAB	BB133CAB	BB133CAB	AD015CAB	AD015CAB
Start File	BB133000	BB133019	BB133000	AD015000	AD015037
Finish File	BB133018	BB133037	BB133018	AD015036	AD015067
Post-Verification	BB133CAA	BB133CAA	BB133CAA	AD015CAA	AD015CAA

Logging Operation Notes:

Spectral gamma logging was performed in this borehole during June, July, and August 2002 on seven separate days. Log runs 1-8 were conducted with the Gamma 2B logging system and log runs 9 and 10 with the Gamma 1D system. Data repeat sections using Gamma 2B were collected between 28 and 46 ft, 231 and 249 ft, and between 276 and 289 ft; a repeat section was acquired between 295 and 325 ft with logging system Gamma 1D.

Analysis Notes:

Analyst: Henwood	Date: 08/22/02	Reference: GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications of the logging systems were performed for each day's log event. The verification spectra were all within control limits. The efficiency (peak counts per second) of the Gamma 2B logging system was consistently lower (between 5 and 8 percent) each day in the post-run verification as compared to the pre-run verification; the efficiency of the Gamma 1D system was lower by 13 to 19 percent. A review of repeat logs suggests a loss of sensitivity in the high-energy range, and ²³²Th values for log runs 5, 7, and 8 for the Gamma 2B system and log run 10 for the Gamma 1D system may be too low. The cause of this discrepancy is being investigated. Evaluation of the spectra indicates the detector is

functioning normally at lower energies (below about 1500 keV) and the log data are provisionally accepted, subject to further review and analysis.

A casing correction for 0.25-in.-thick casing is applied for the 6-in. and 4-in. casings (i.e., 0.125 + 0.125) from 0 to 12.6 ft. The correction for a 0.125-in. casing is applied for the remainder of the borehole (12.6 to 361.9 ft). A water correction is applied to data from 325.4 ft to the total depth of the borehole.

Each spectrum collected during a log run was processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine net count rates. Concentrations were calculated with EXCEL (source files G2BNOV01.xls and G1DJUL01.xls for logging systems Gamma 2B and Gamma 1D, respectively) using efficiency functions and corrections for casing and water as appropriate; dead time did not exceed 10.5 percent and no corrections were required. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations rather than the ^{214}Bi peak at 1764 keV. The 609-keV energy peak exhibited slightly better count rates than the 1764-keV peak.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (^{137}Cs) detected in the borehole, naturally occurring radionuclides (^{40}K , ^{238}U , ^{232}Th [KUT]), a combination of man-made, KUT, total gamma and dead time), and four repeat section plots. 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, casing corrections, or water corrections. These errors are discussed in the calibration report.

Results and Interpretations:

The man-made radionuclide detected in this borehole was ^{137}Cs . ^{137}Cs was detected during routine processing at 35, 140, and 179 ft near its MDL of approximately 0.15 pCi/g. Further evaluation of individual spectra showed no evidence of a distinct photopeak at 662 keV. It is likely these marginal detections are the result of statistical fluctuations or particulate contamination adhering to the casing (e.g., from windblown contamination).

The KUT concentrations do not appear to reflect the formation sediments. Construction materials and completion methods may preclude accurate measurement. Any detailed lithologic correlations between boreholes would be questionable.

The plots of three repeat logs demonstrate a loss in sensitivity in the high-energy range (above 1500 keV) of the SGLS data. The plots of the repeat logs at 609 keV and 1461 keV demonstrate good repeatability of the SGLS at these energy levels. However at 2615 keV, the original logs are about 1/4 pCi/g lower than the repeat logs; the repeat section between 28 and 46 ft is acceptable at all energy levels.

References:

Walker, L.D., and C.S. Wright, 2002. *Well Summary Report: 2002 Immobilized Low-Activity Waste Well Installation*, BHI-01647, Rev. 0, Bechtel Hanford, Inc., Richland, Washington, June.

¹ GWL – groundwater level

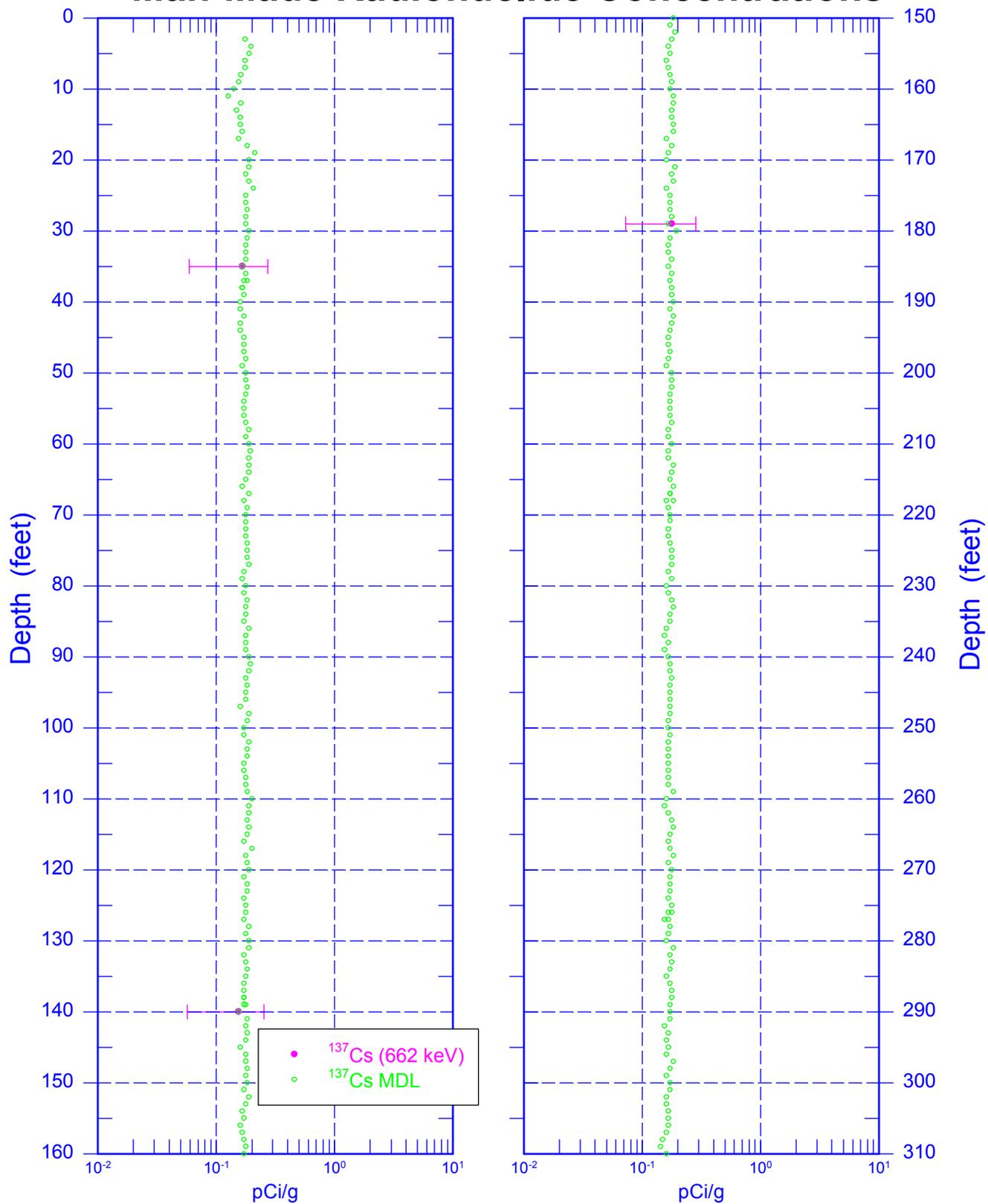
² TOC – top of casing

³ N/A – not available

⁴ n/a – not applicable

299-E17-22 (C3826)

Man-Made Radionuclide Concentrations

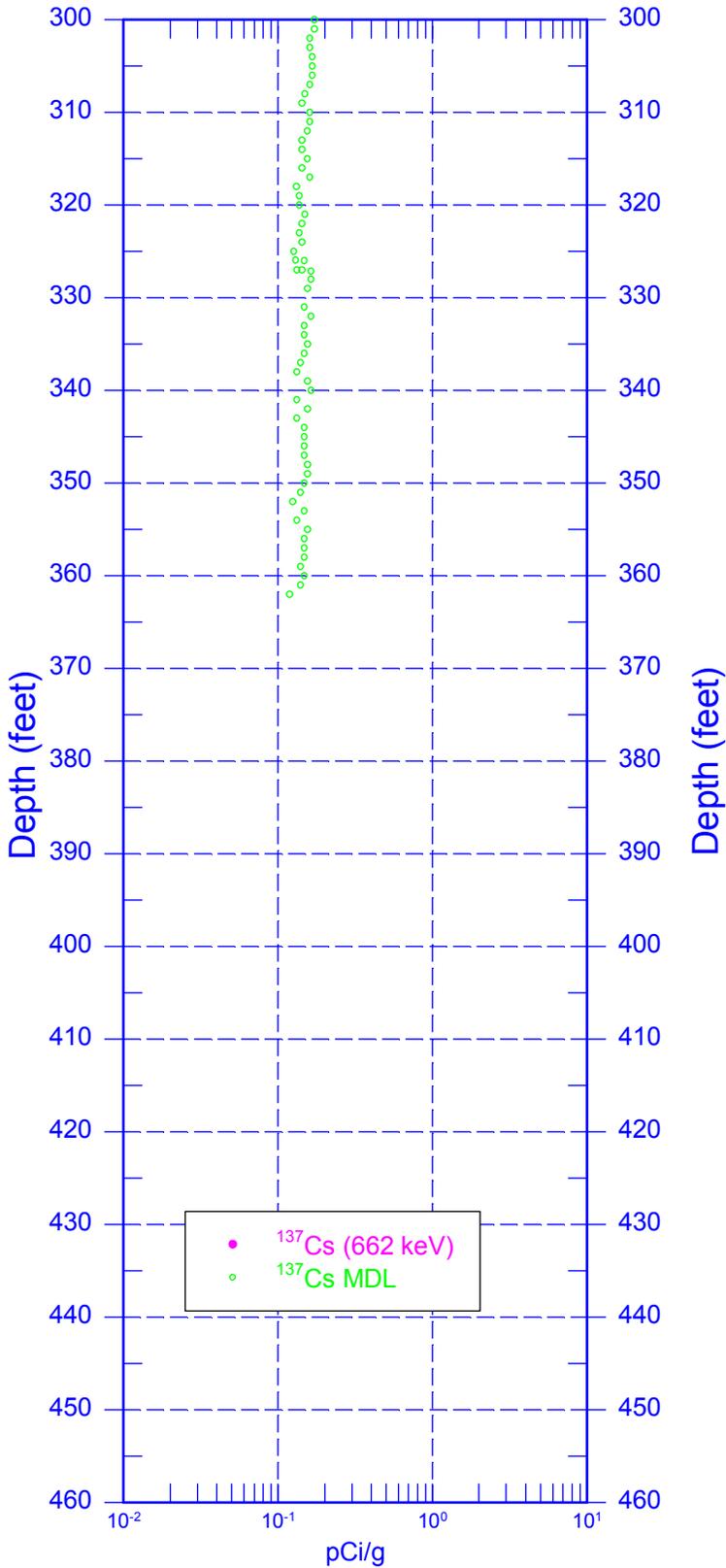


Depth Reference - top of casing

Last Logging date - 08/06/02

299-E17-22 (C3826)

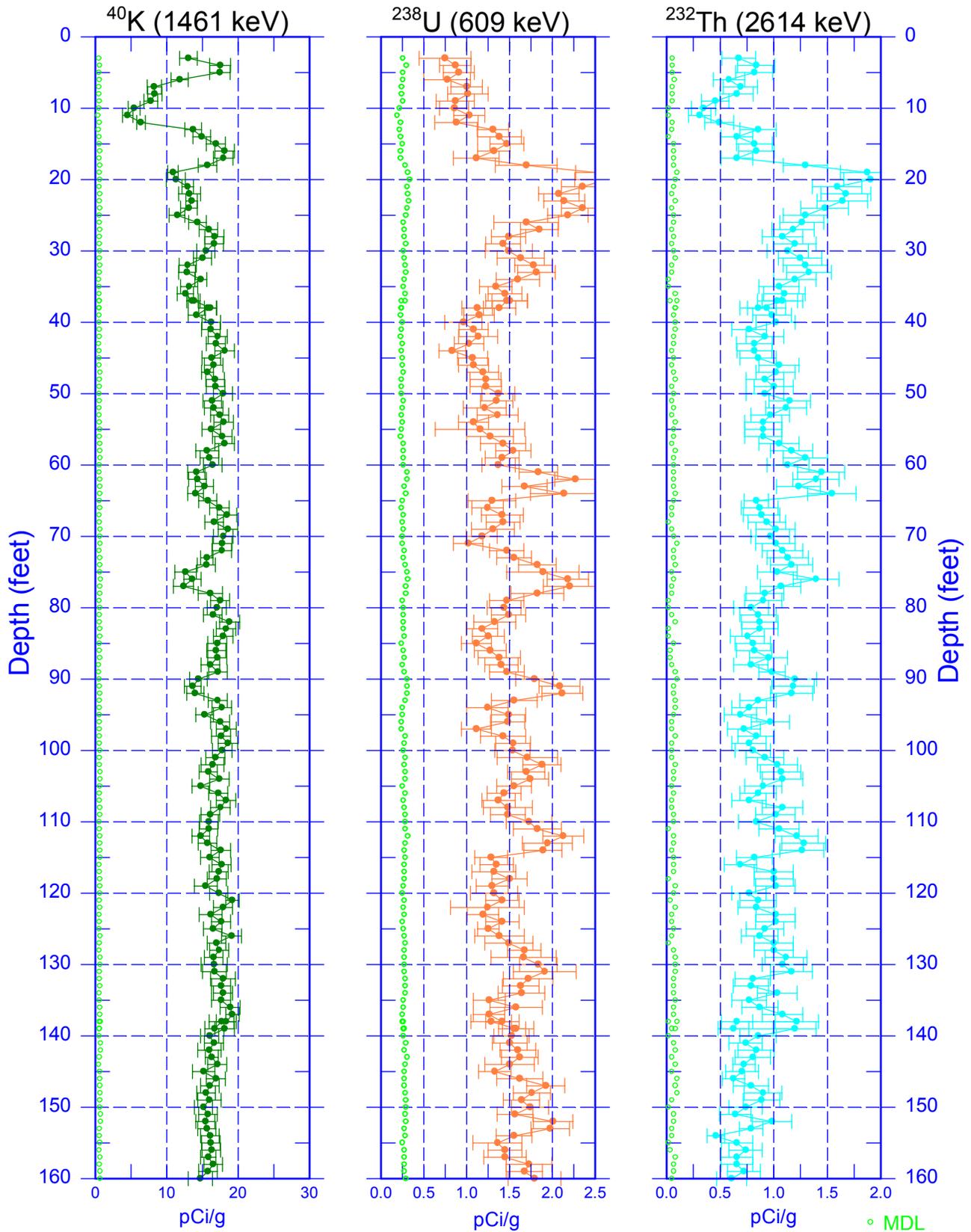
Man-Made Radionuclide Concentrations



Depth Reference - top of casing

Last Logging date - 08/06/02

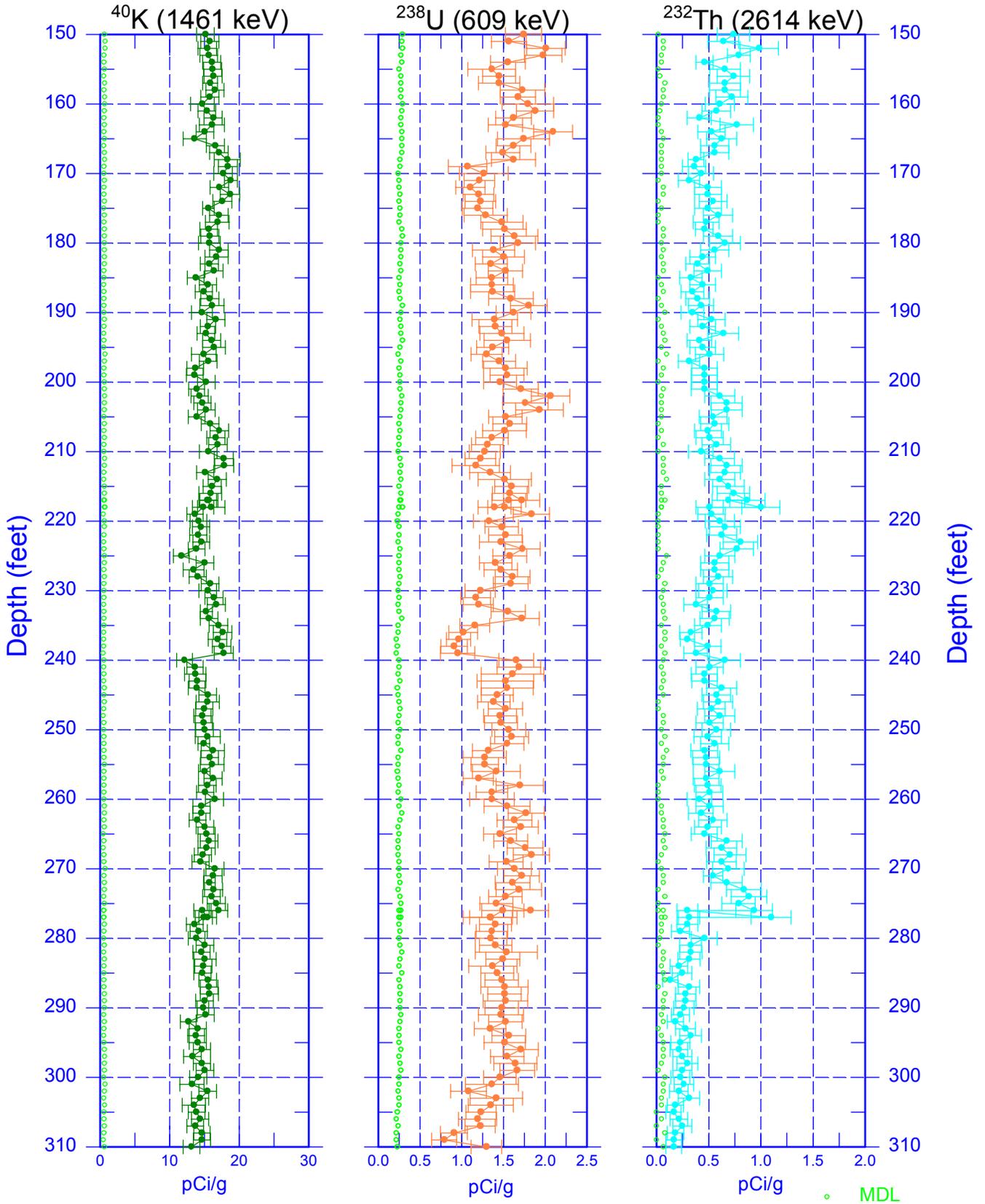
299-E17-22 (C3826) Natural Gamma Logs



Depth Reference - top of casing

Last logging date - 08/06/02

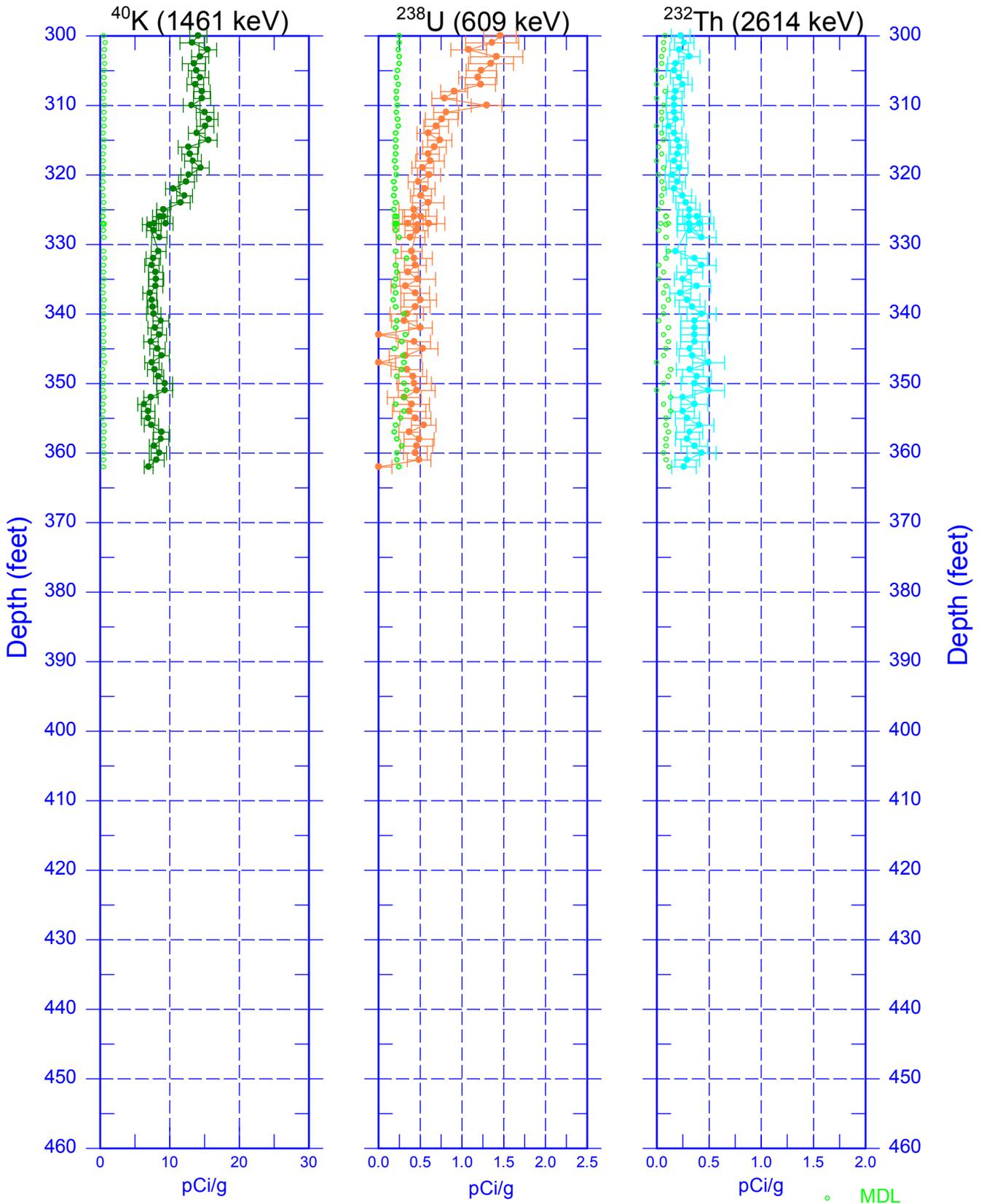
299-E17-22 (C3826) Natural Gamma Logs



Depth Reference - top of casing

Last logging date - 08/06/02

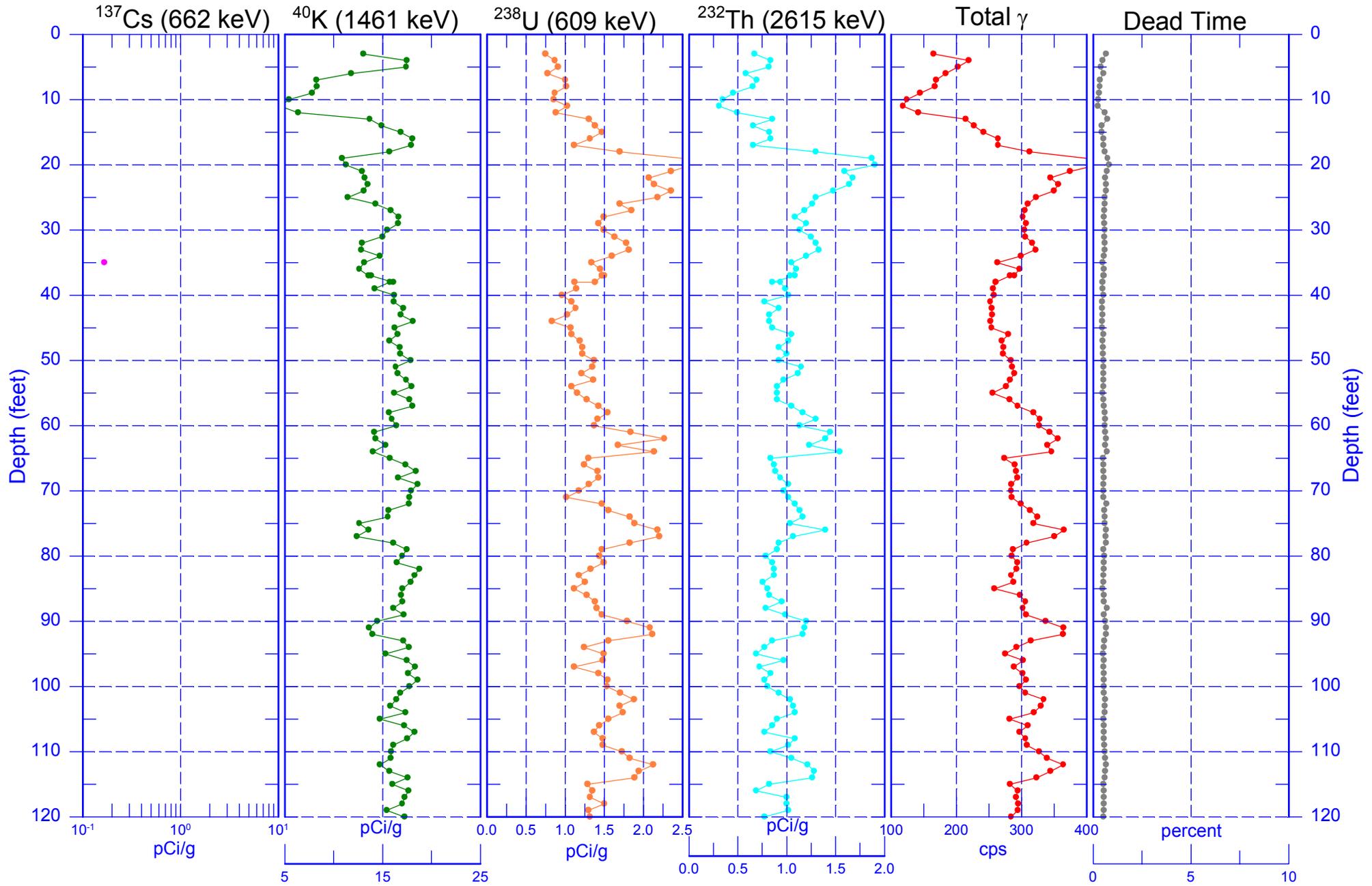
299-E17-22 (C3826) Natural Gamma Logs



Depth Reference - top of casing

Last logging date - 08/06/02

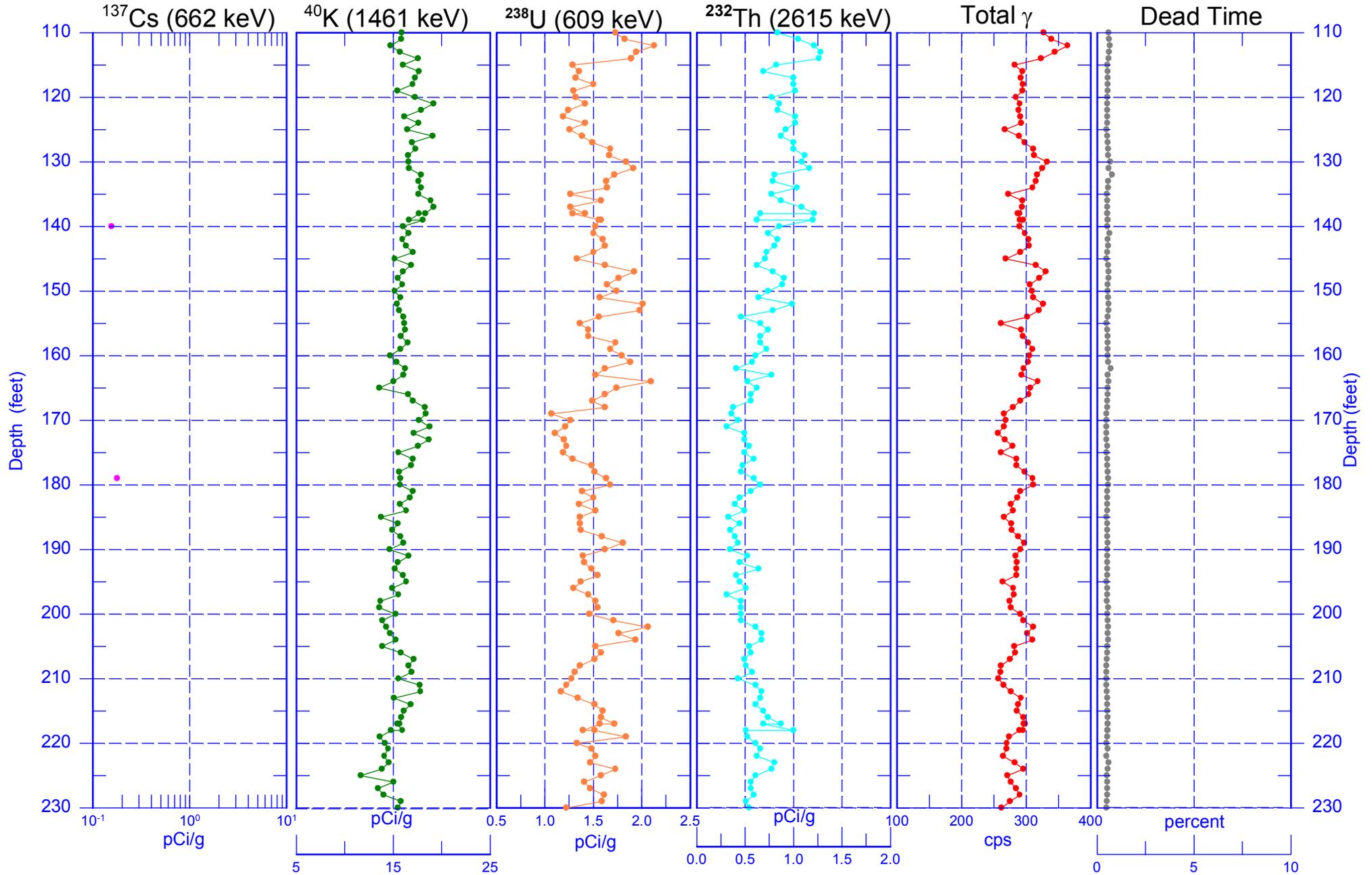
299-E17-22 (C3826) Combination Plot



Depth Reference - top of casing

Last logging date - 08/06/02

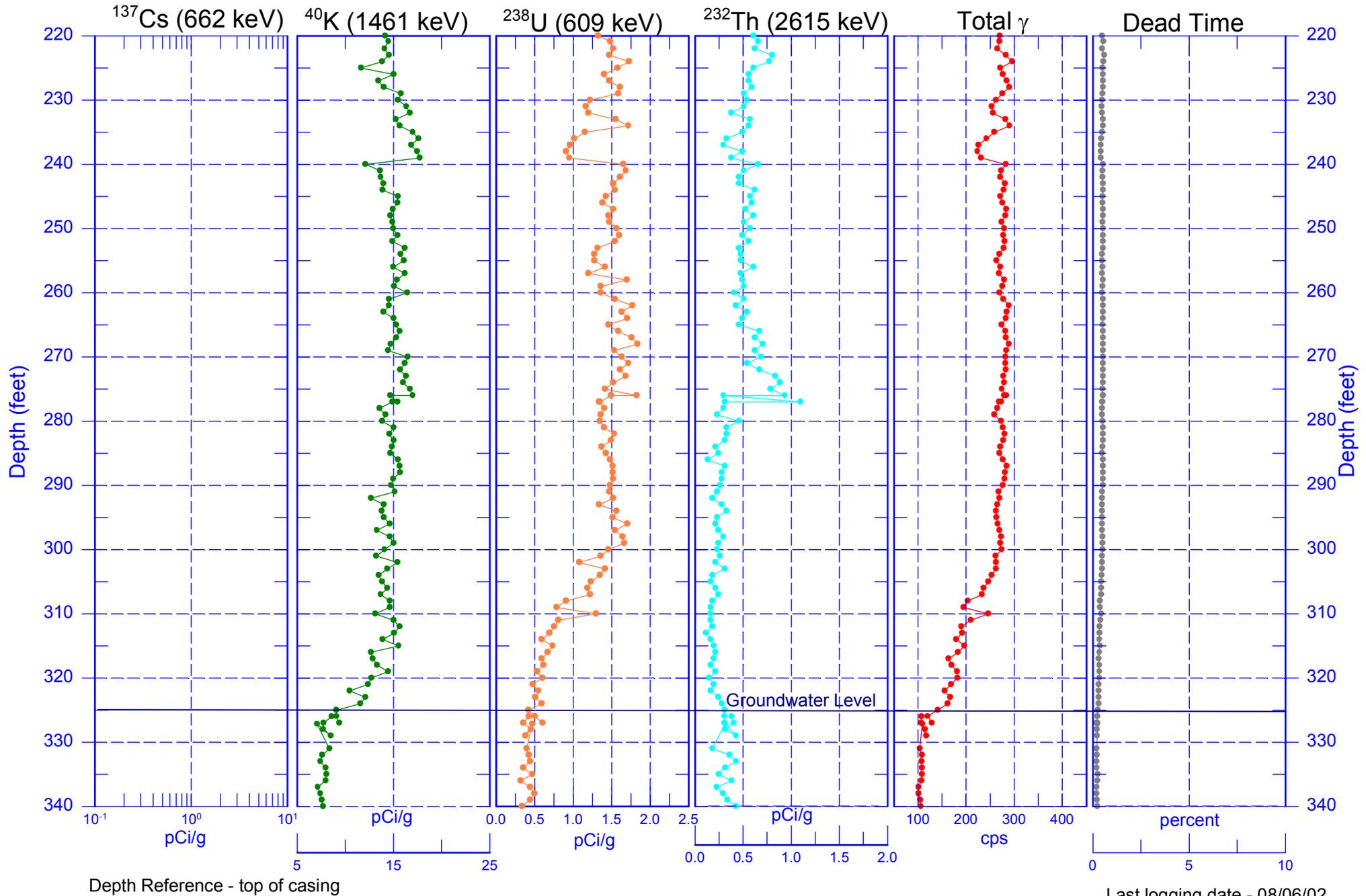
299-E17-22 (C3826) Combination Plot (continued)



Depth Reference - top of casing

Last logging date - 08/06/02

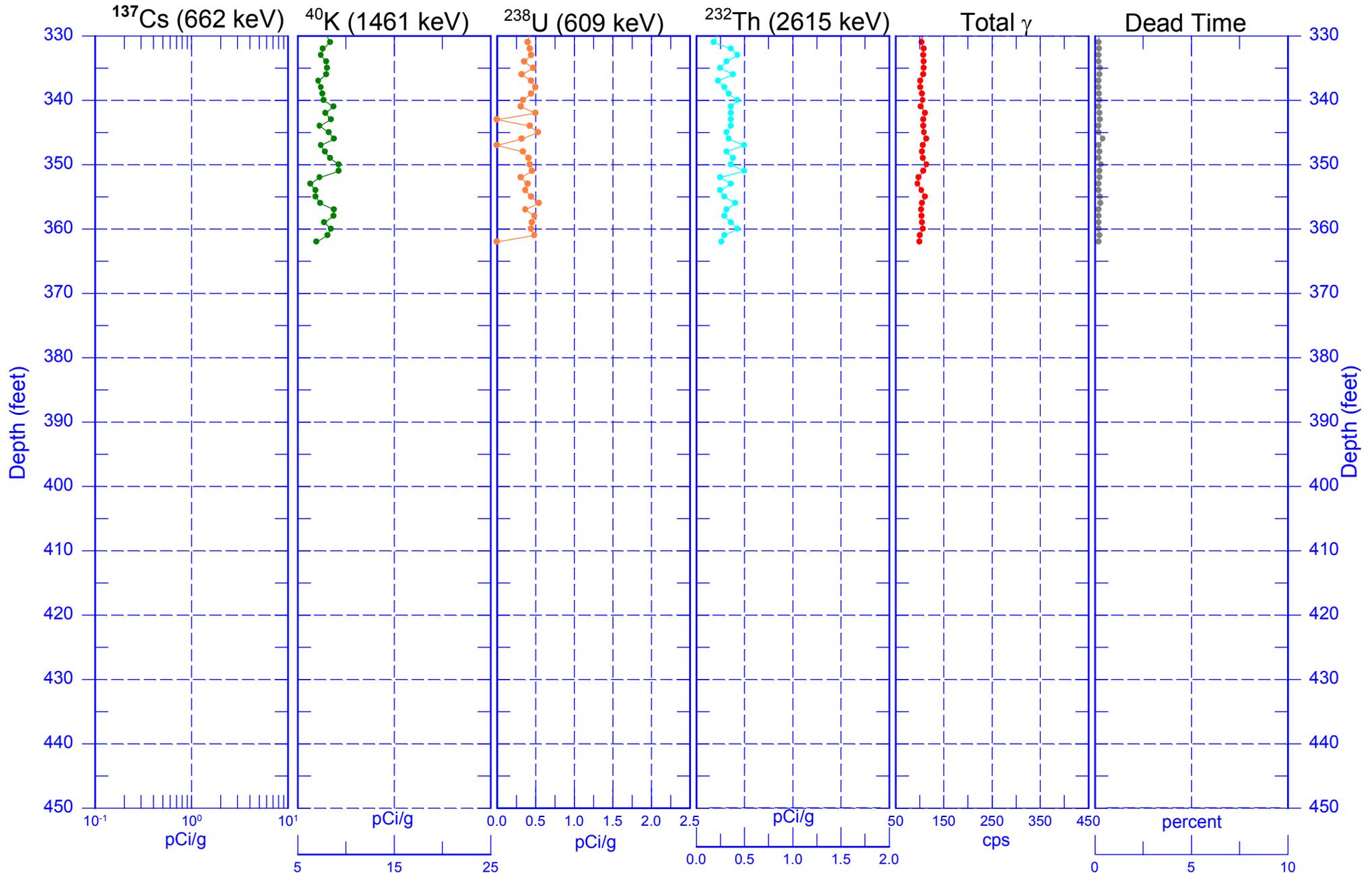
299-E17-22 (C3826) Combination Plot (continued)



Depth Reference - top of casing

Last logging date - 08/06/02

299-E17-22 (C3826) Combination Plot (continued)

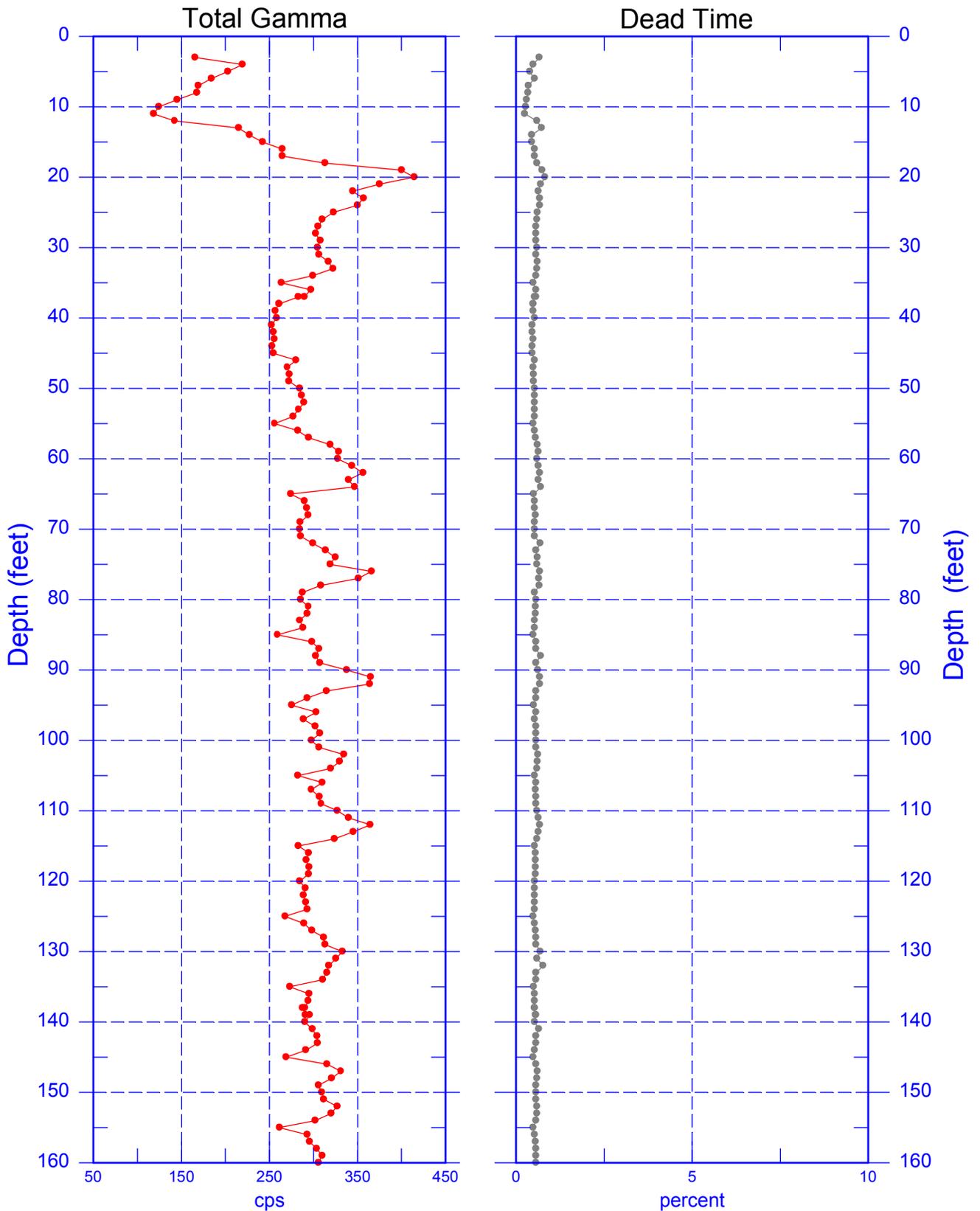


Depth Reference - top of casing

Last logging date - 08/06/02

299-E17-22 (C3826)

Total Gamma & Dead Time

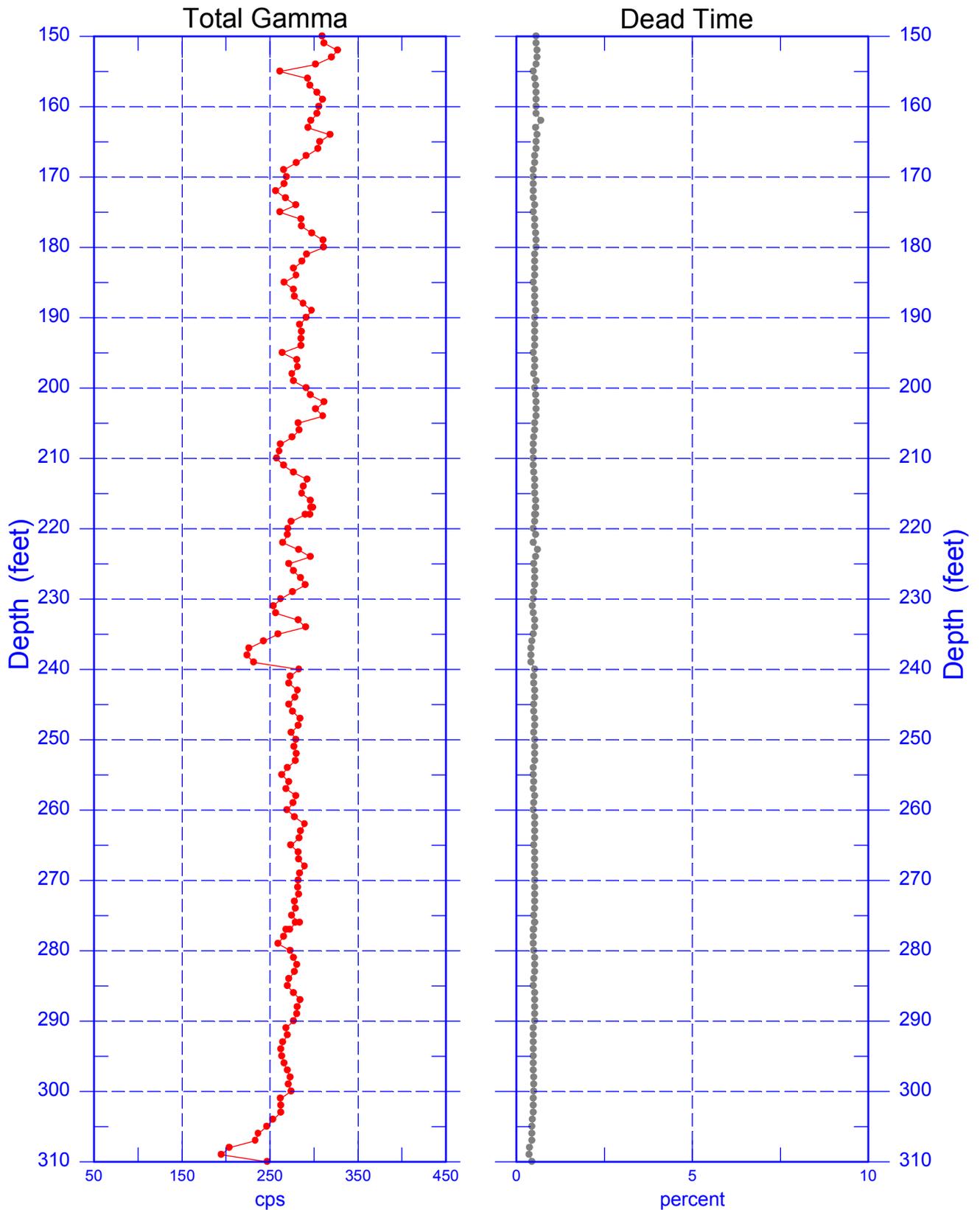


Depth Reference - top of casing

Last logging date - 08/06/02

299-E17-22 (C3826)

Total Gamma & Dead Time

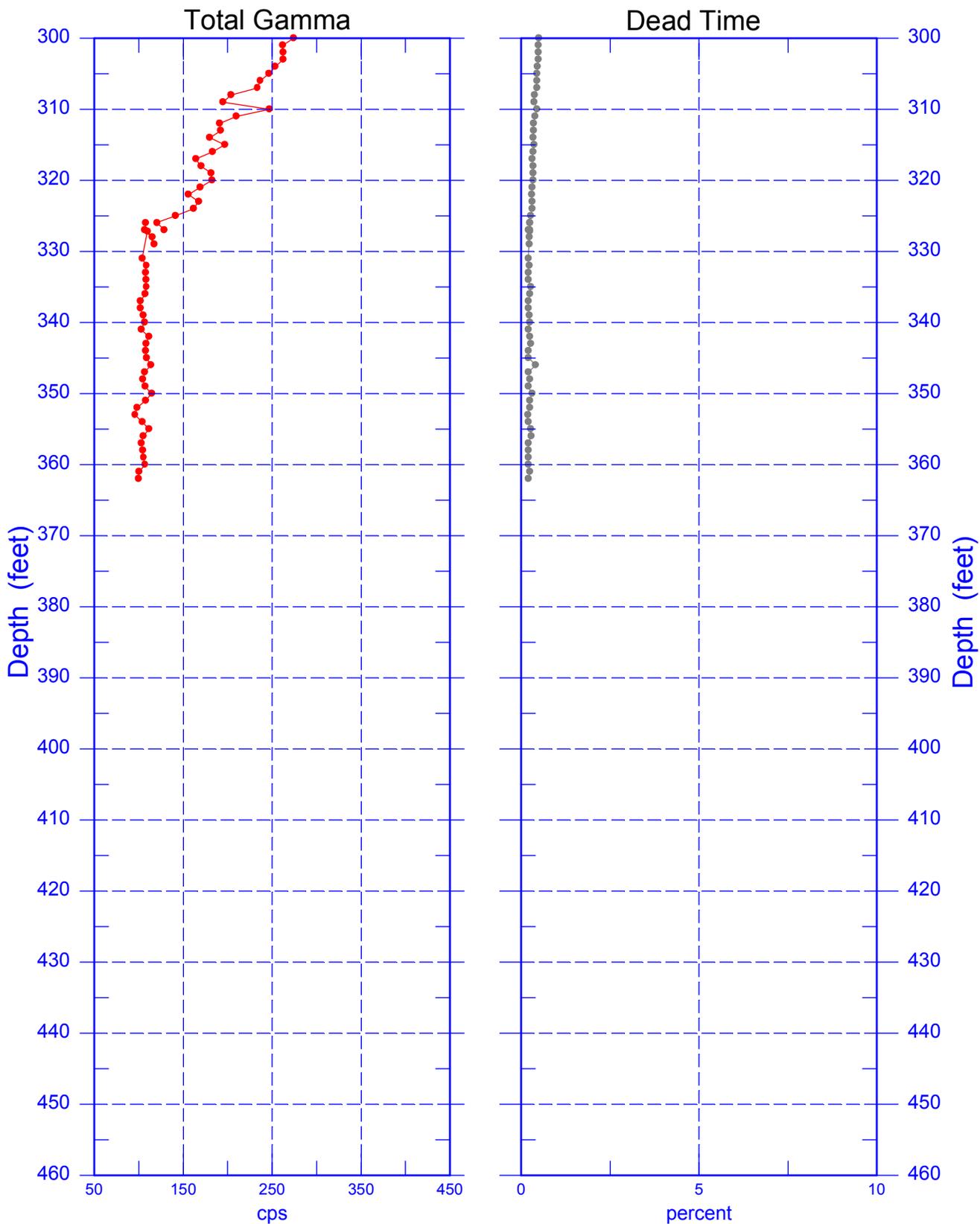


Depth Reference - top of casing

Last logging date - 08/06/02

299-E17-22 (C3826)

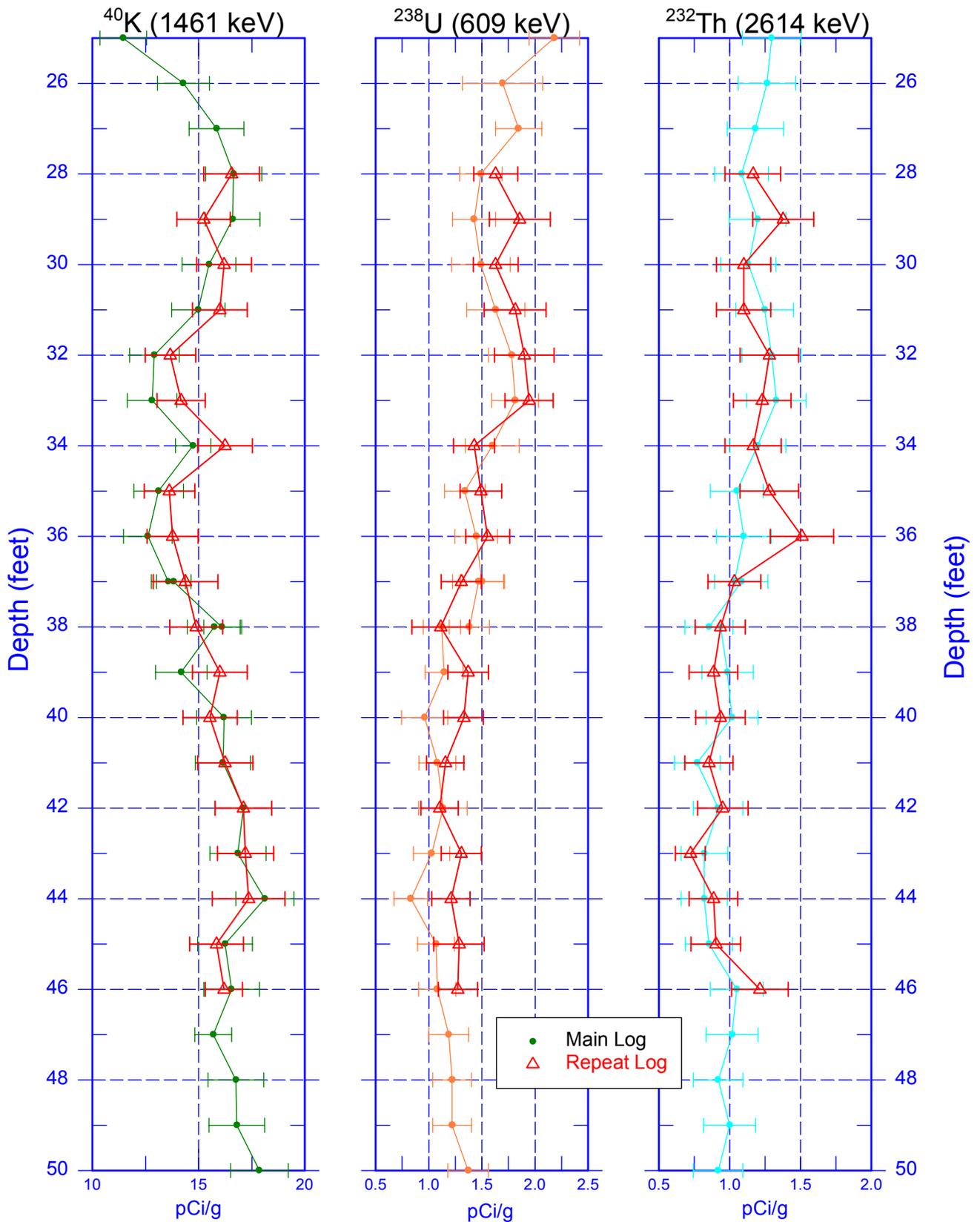
Total Gamma & Dead Time



Depth Reference - top of casing

Last logging date - 08/06/02

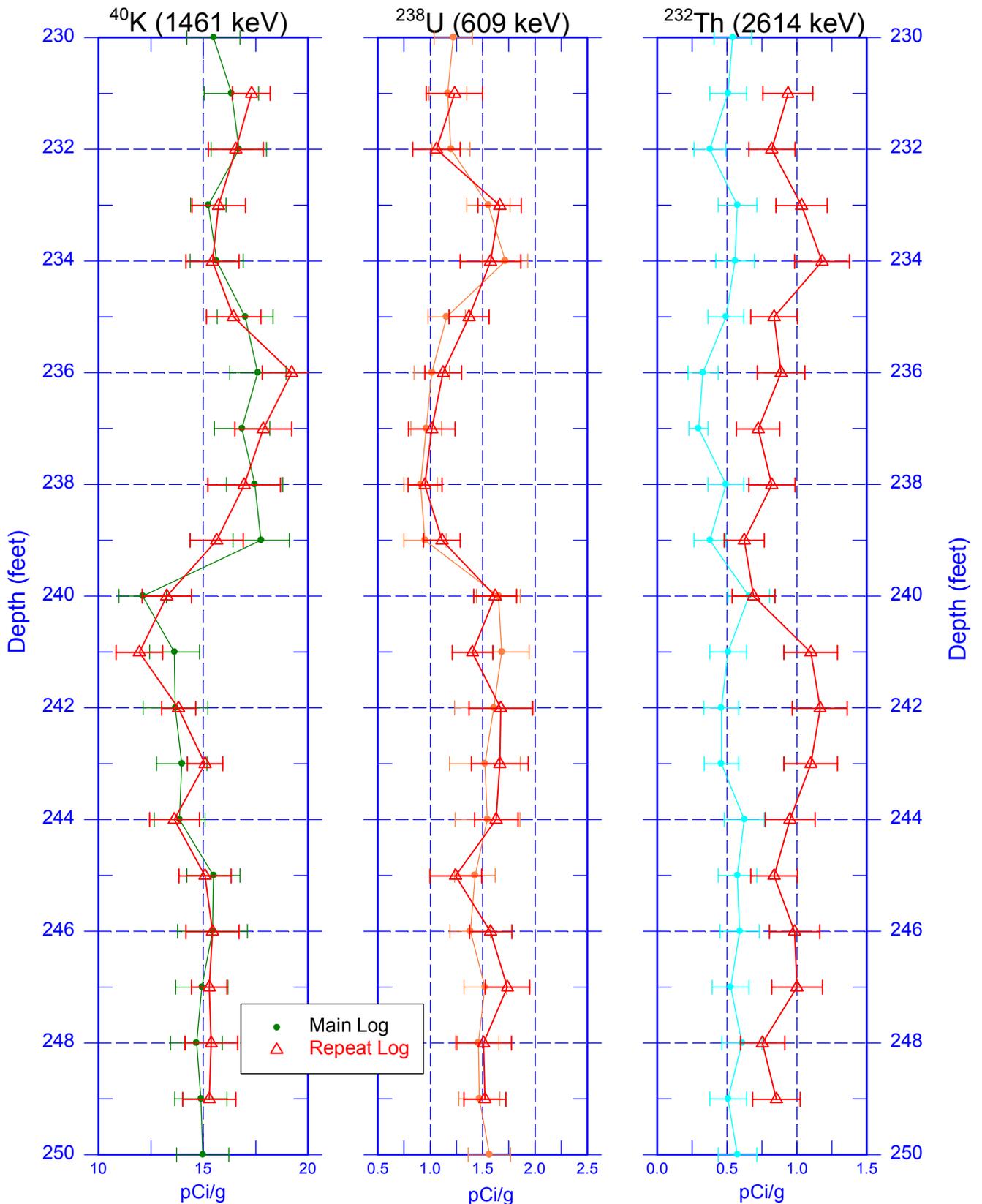
299-E17-22 Natural Gamma Logs Repeat Section



Depth Reference - top of casing

Last logging date - 08/06/02

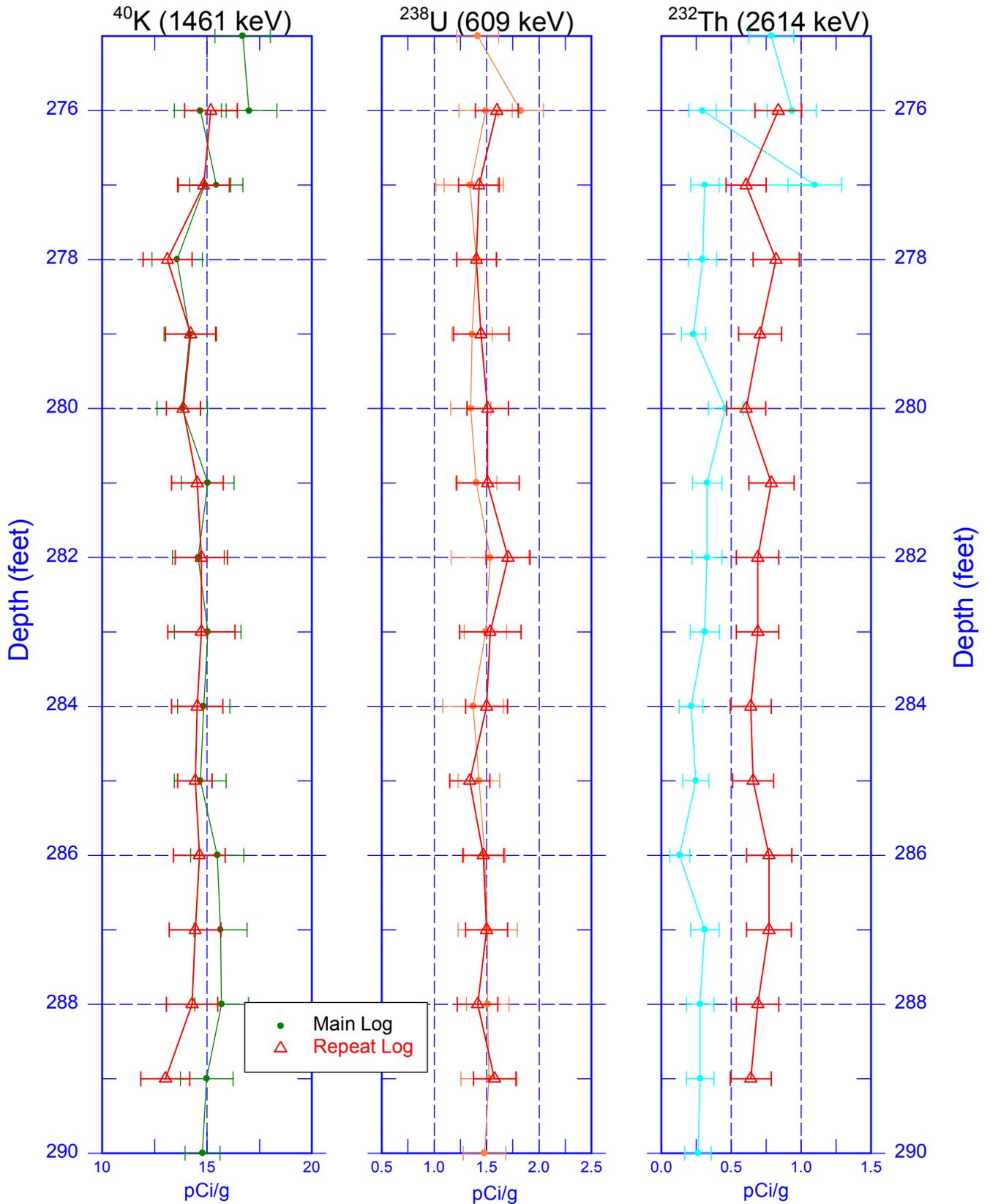
299-E17-22 Natural Gamma Logs Repeat Section



Depth Reference - top of casing

Last logging date - 08/06/02

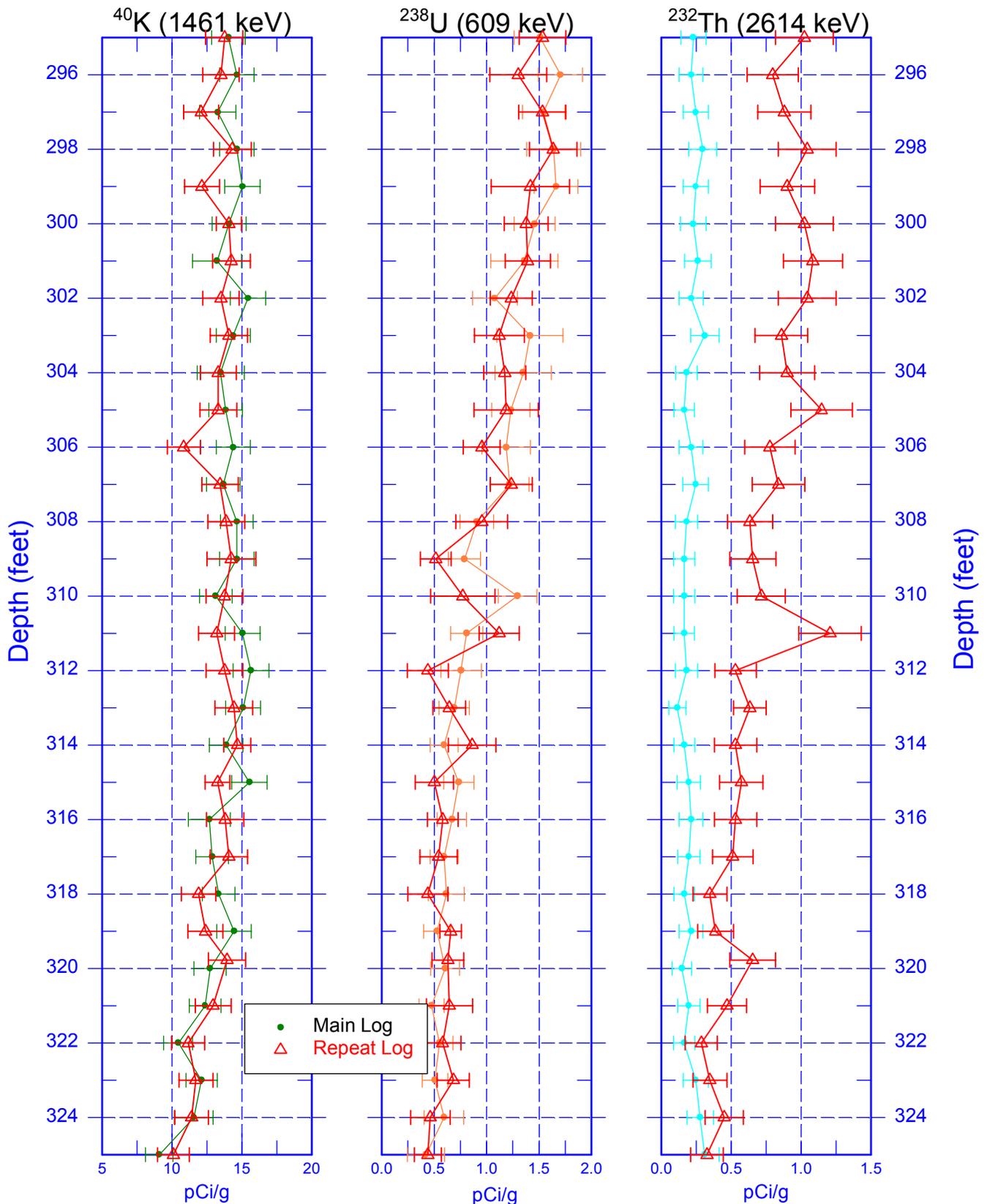
299-E17-22 Natural Gamma Logs Repeat Section



Depth Reference - top of casing

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