Stoller
Grand Junction Office established 1959

299-E17-23 (C3827)
Log Data Report

Borehole Information:

Borehole: 299-E17-23 (C3827)			**Site:** Southwest of Purex		
Coordinates (WA State Plane)		**GWL (ft)[1]:** 335.85		**GWL Date:** 8/09/2002	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
134,842.44 m	574,694.48 m	April 2002	224.66 m (737 ft)	373	Percussion

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Stainless-steel surface casing	2.65	6 5/8	6 3/8	1/8	0	12.6
304 schedule-5 stainless steel	1.65	N/A[3]	4 1/4	1/8	1.0	335.63
304L stainless-steel screen	None	N/A	4 1/4	1/8	335.6	370.8
304/304L schedule-5 stainless-steel sump	None	N/A	4 1/4	1/8	370.8	372.8

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from Walker and Wright (2002) and from measurements by Stoller field personnel. The depths have been adjusted to TOC. The well is grouted from ground surface to 12.6 ft with Portland cement. Below the grout, the borehole is sealed with granular bentonite to 318.8 ft and 1/4-in. bentonite pellets from 318.8 to 325.7 ft. Below the bentonite pellets, the screen is surrounded by Colorado silica sand to 373 ft.

The logging engineer measured the casing stickup between the concrete pad and the top of the casing using a steel tape. A caliper was used to determine the 6-in. surface casing outside diameter. The caliper was measured using a steel tape and rounded to the nearest 1/16 in. Inside casing diameter was measured using a steel tape and also rounded to the nearest 1/16 in. Surface casing thickness was calculated. Zero reference is the top of 6-in.-casing stickup. Top of casing stickup is evenly cut. One reference point survey "X" is located on the casing stickup. Crushed gravel, 2 to 3 ft thick, levels the ground surface. A 4-ft by 4-ft by 6-in. concrete surface pad surrounds the well. The Washington Department of Ecology identifies this borehole as "Unique Well #AFK639."

Logging Equipment Information:

Logging System:	Gamma 1D		**Type:** SGLS (35%)
Calibration Date:	07/01/01	**Calibration Reference:**	GJO-2002-243-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	08/07/02	08/08/02	08/08/02	08/21/02	08/22/02
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	100.0	138.0	150.0	234.0	373.0
Finish Depth (ft)	3.0	99.0	137.0	149.0	277.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	n/a[4]	n/a	n/a	n/a	n/a
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	AD016CAB	AD017CAB	AD017CAB	AD021CAB	AD022CAB
Start File	AD016000	AD017000	AD017040	AD021000	AD022000
Finish File	AD016097	AD017039	AD017053	AD021085	AD022096
Post-Verification	AD016CAA	AD017CAA	AD017CAA	AD021CAA	AD022CAA
Depth Return Error (in.)	0	n/a	0	0	0
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.

Log Run	6	7			
Date	08/23/02	08/23/02			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	278.0	232.0			
Finish Depth (ft)	233.0	195.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	n/a	n/a			
MSA Interval (ft)	1.0	1.0			
ft/min	n/a	n/a			
Pre-Verification	AD023CAB	AD023CAB			
Start File	AD023000	AD023046			
Finish File	AD023045	AD023083			
Post-Verification	AD023CAA	AD023CAA			
Depth Return Error (in.)	n/a	0			
Comments	No fine-gain adjustment.	Repeat section. No fine-gain adjustment.			

Logging Operation Notes:

Zero reference was the top of casing. Logging was performed without a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	08/27/02	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. The pre-run verification spectra were all within the control limits. Four of five post-run verification spectra

were not within the control limits. Post-run verification spectrum AD016CAA was within the control limits. 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 lower and generally within 10 percent of one another. Examination of spectra suggests that the detector appears to have functioned with reduced sensitivity during the log runs, and the log data are provisionally accepted, subject to further review and analysis.

Log spectra for the SGLS 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 file: G1DJul01.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the casing. On the basis of Walker and Wright (2002) and the gross gamma response, the casing configuration was assumed to be one string of 6-in. surface casing to a log depth of 13 ft and one string of 4-in. casing to the maximum depth of the log. Casing correction factors were calculated assuming a total casing thickness of 0.25 in. from 0 to 13 ft and 0.125 in. from 14 ft to 373 ft. The value of 0.125 in. for the surface casing was measured in the field by the logging engineer. The reported measured thickness of 304 schedule-5 stainless steel is 0.125 in. Where more than one casing exists at a depth, the casing correction is additive (e.g., 0.125 + 0.125 = 0.25 would be the combined thickness for the 6-in. and 4-in. casings). A water correction was applied to the SGLS data below 335.9 ft. Dead time corrections were not needed because dead time did not exceed 10.5 percent.

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 609 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at 107.0-ft log depth at an activity near its MDL of approximately 0.2 pCi/g. After examination of the individual spectrum, it was determined that there is no evidence of a photopeak at 662 keV. The reported peak is probably the result of statistical fluctuation.

Recognizable changes in the KUT logs occurred in this borehole. However, these changes are more indicative of the well completion materials than the surrounding formation. For example, the geologist's log (Walker and Wright 2002) indicates only sand from 31 ft through 235 ft (TOC reference) while the KUT logs show significant changes at 61, 93, 125, and 177 ft. The changes on the KUT logs that are attributed to completion materials are the change from cement grout to granular bentonite at 13 ft, granular bentonite to bentonite pellets at 320 ft, and to Colorado silica sand at 329 ft.

The plot of the repeat logs demonstrates reasonable repeatability of the SGLS data at the KUT 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 2002.

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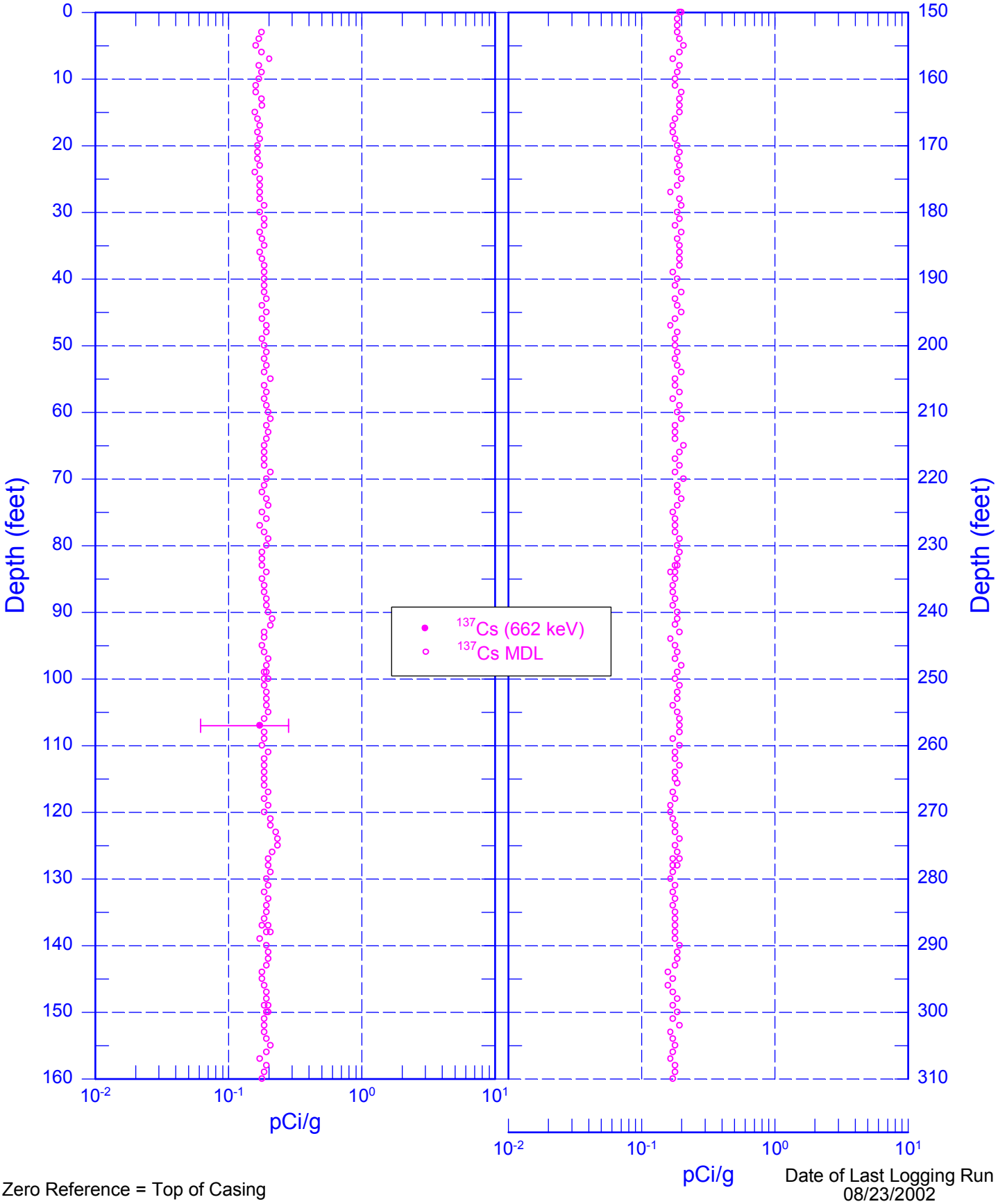
[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable
[4] n/a – not applicable

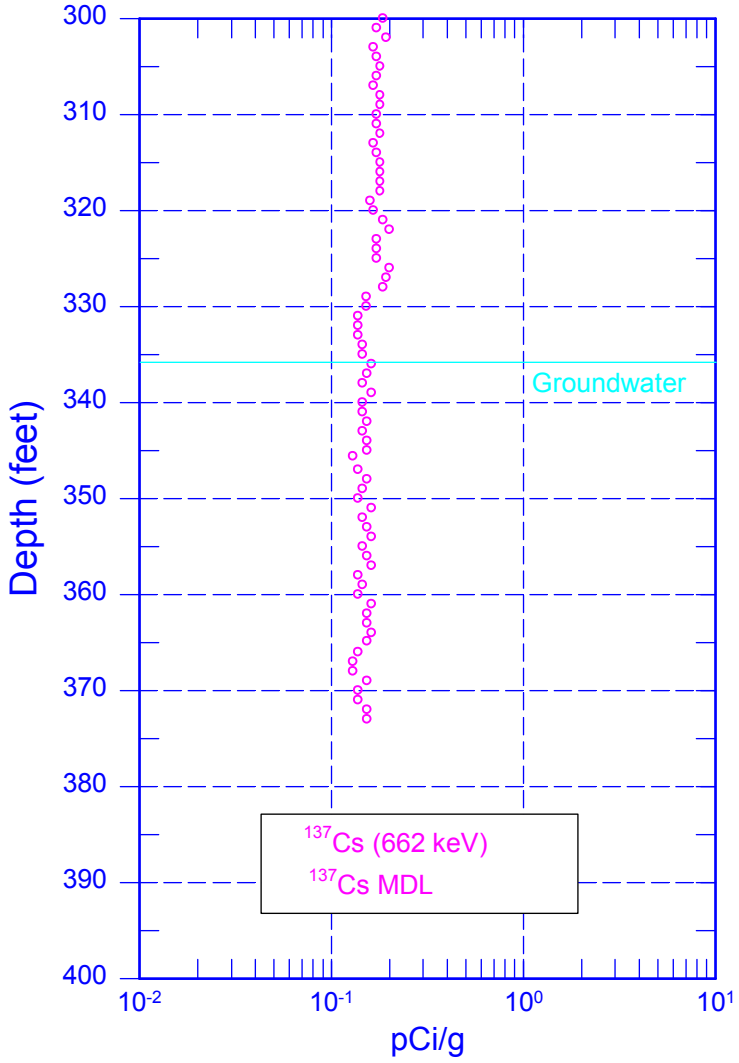
299-E17-23 (C3827)
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
08/23/2002

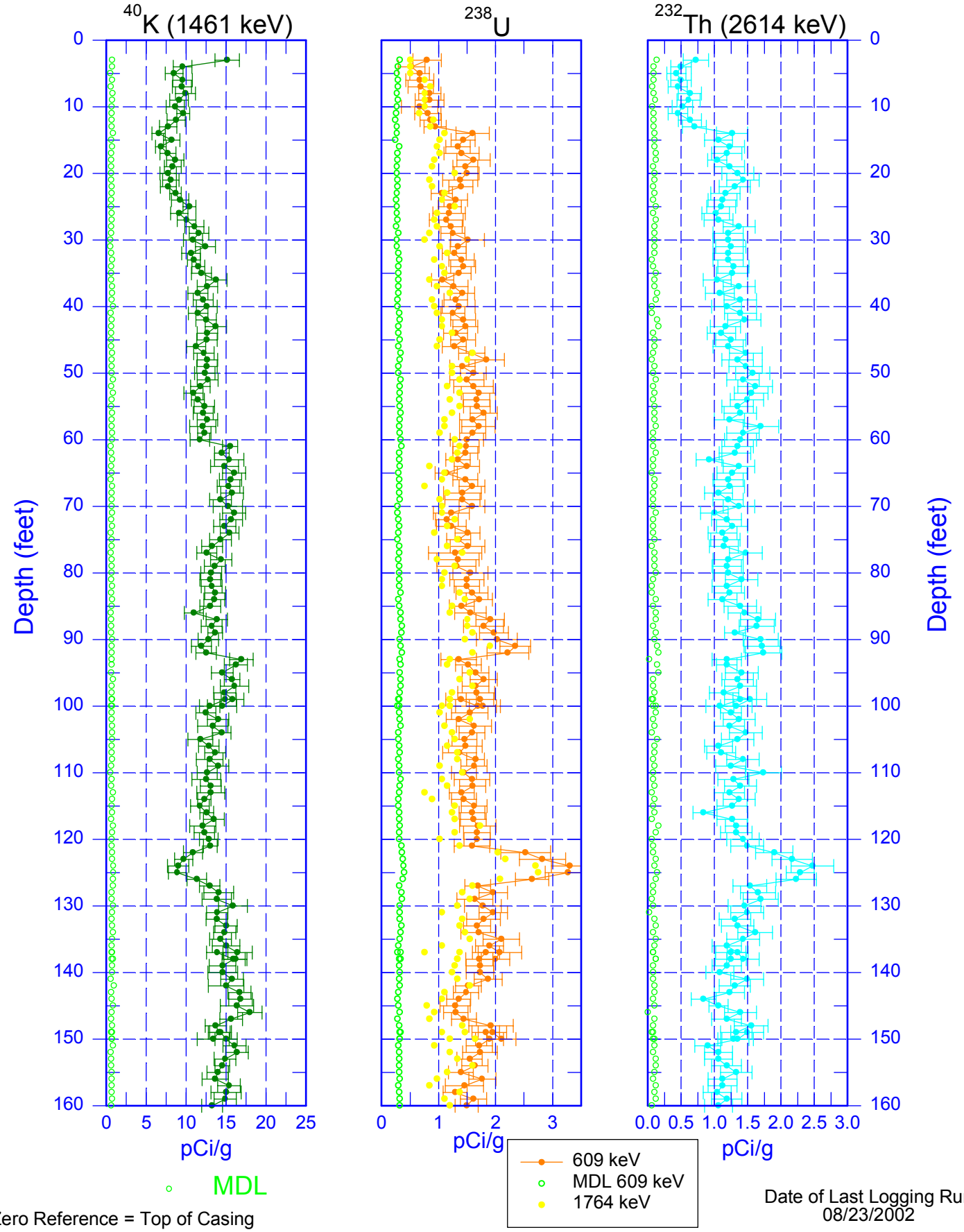
299-E17-23 (C3827)
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
08/23/2002

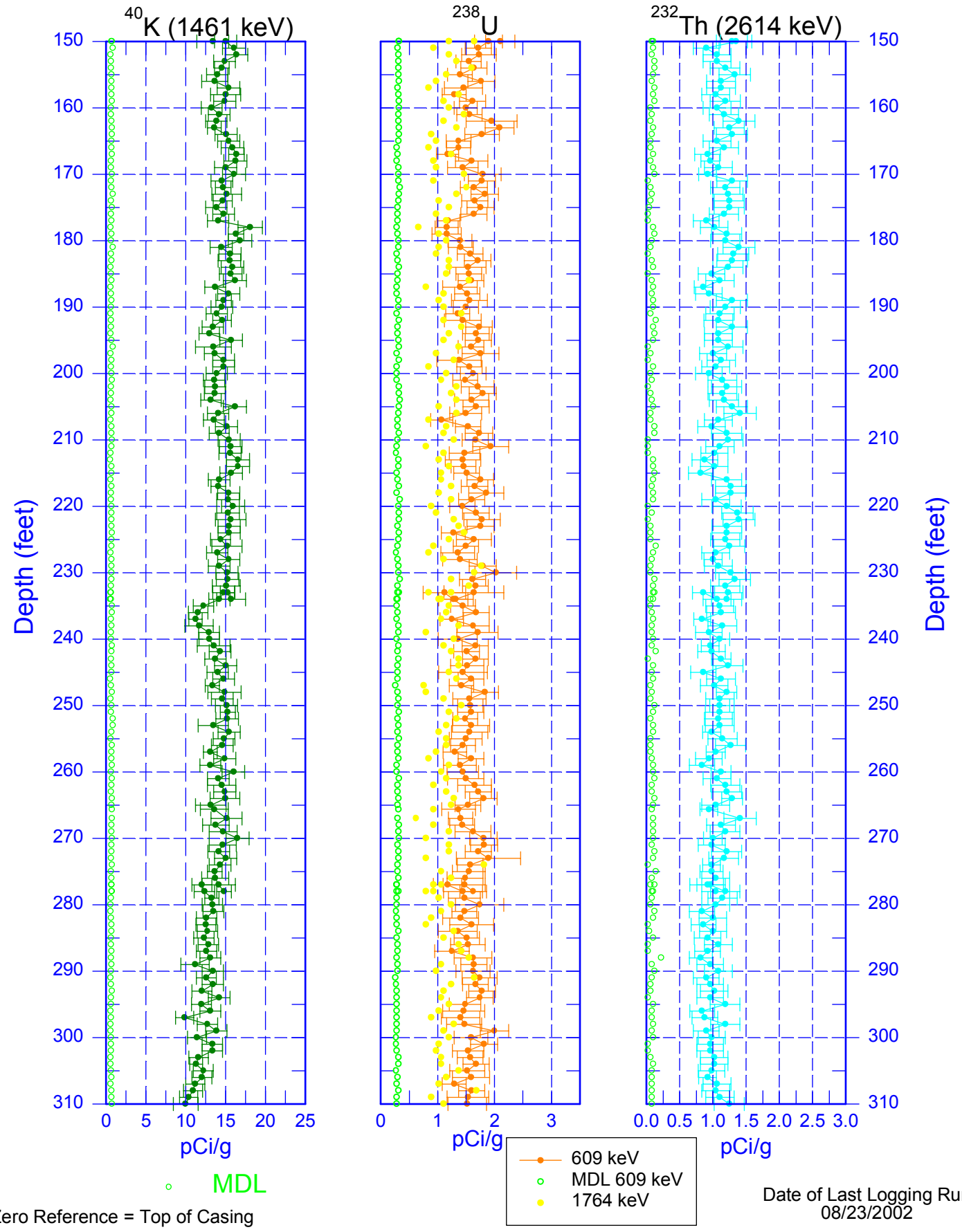
299-E17-23 (C3827)
Natural Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run
08/23/2002

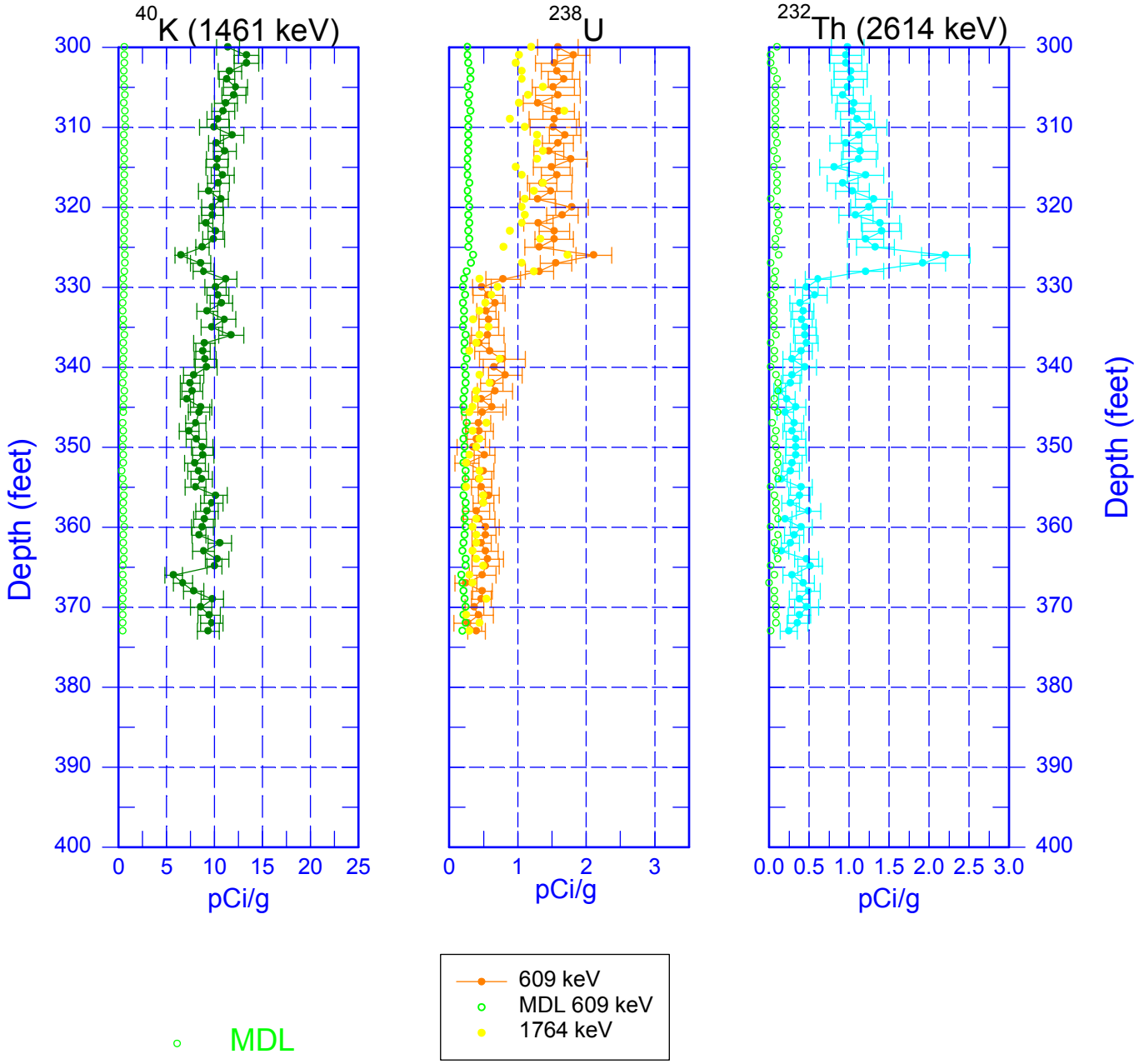
299-E17-23 (C3827)
Natural Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run
08/23/2002

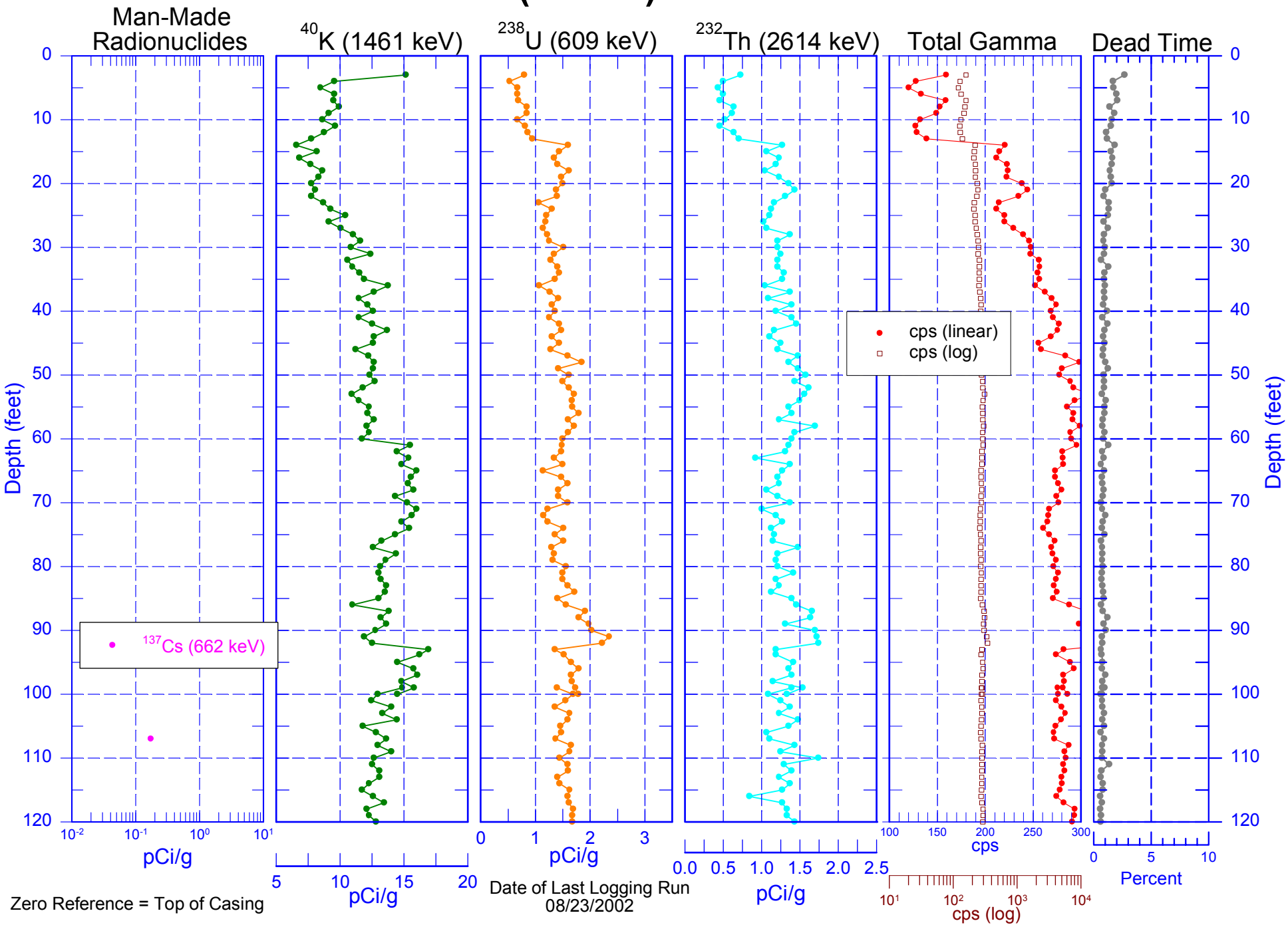
299-E17-23 (C3827)
Natural Gamma Logs



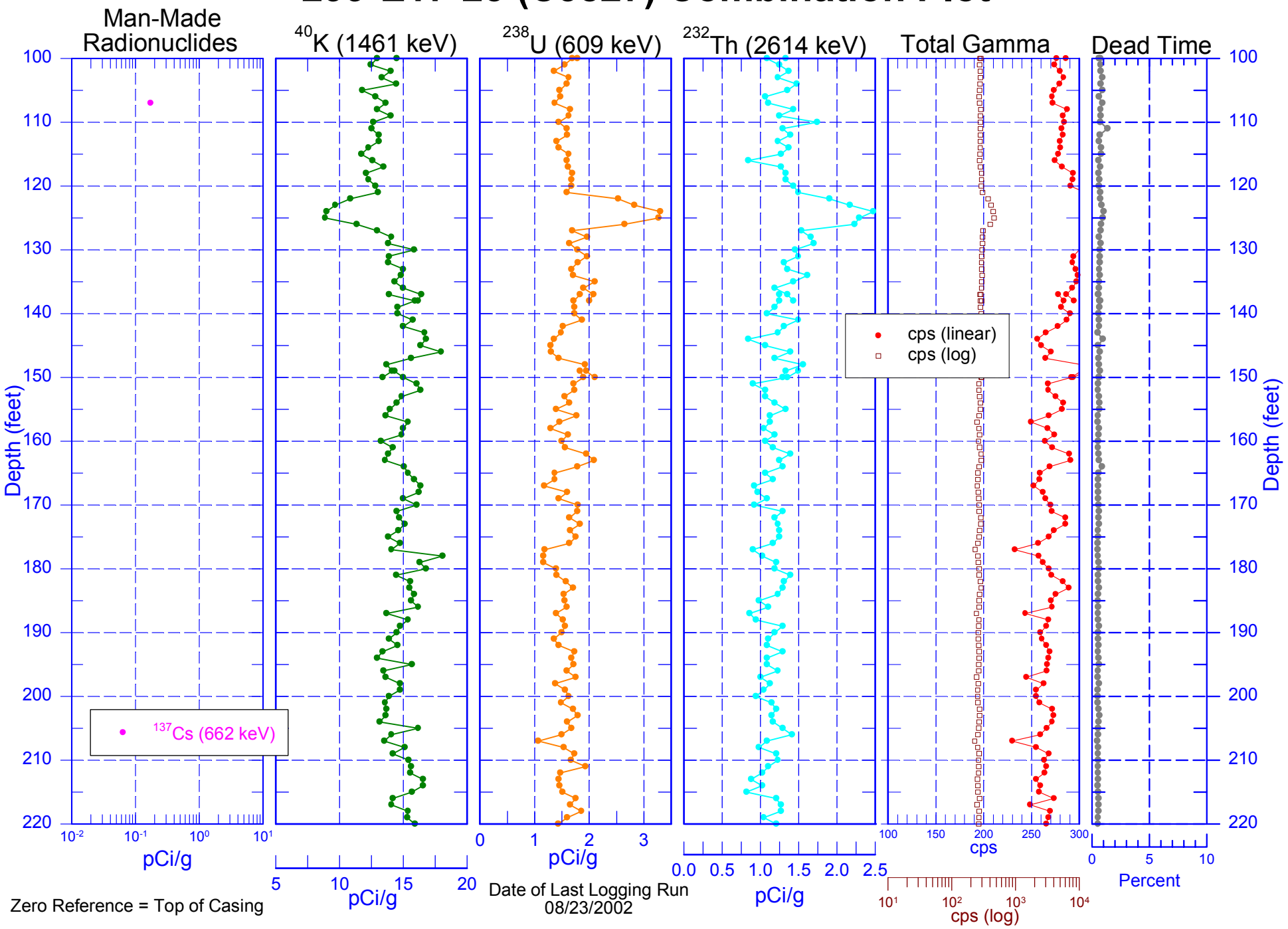
Zero Reference = Top of Casing

Date of Last Logging Run
08/23/2002

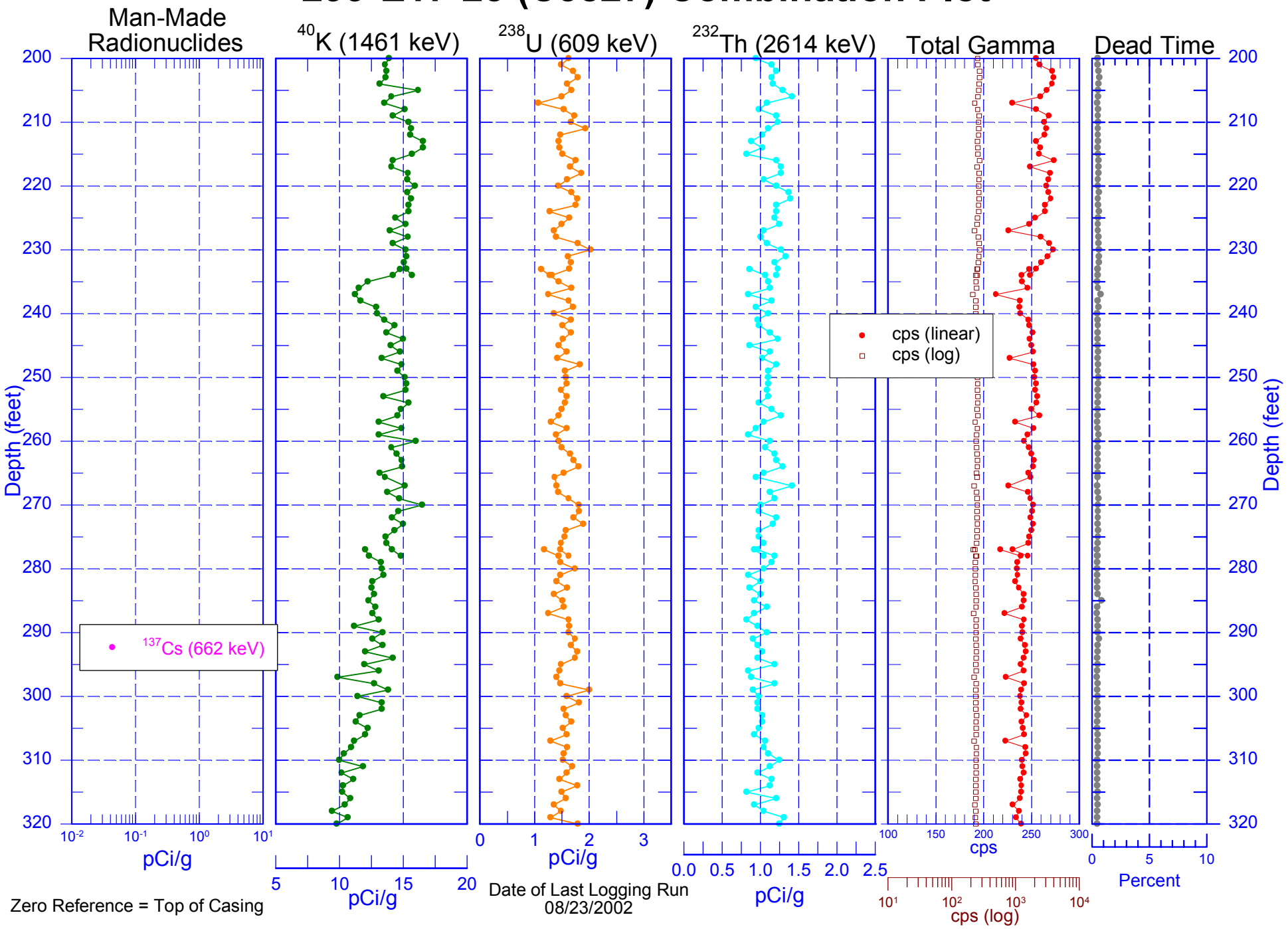
299-E17-23 (C3827) Combination Plot



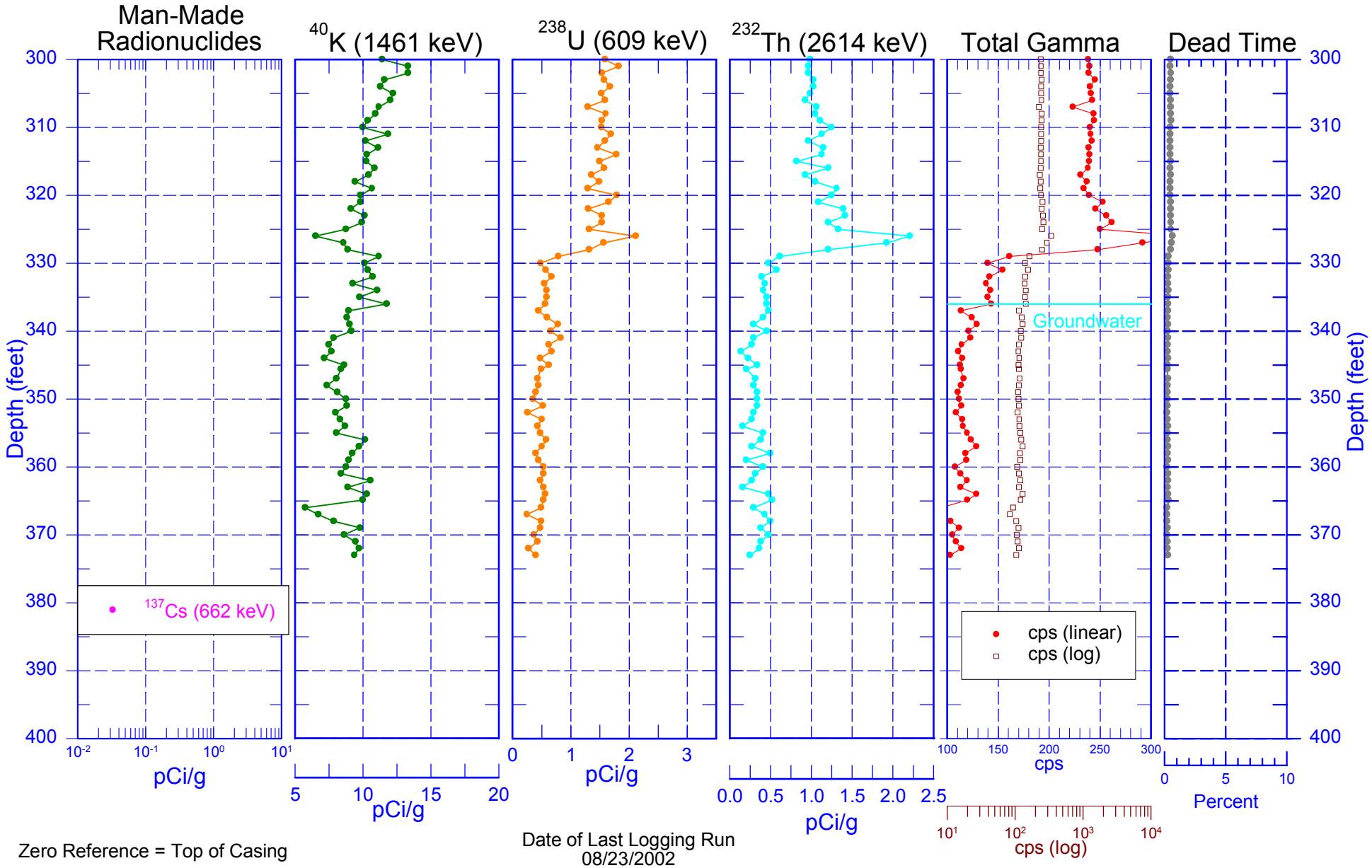
299-E17-23 (C3827) Combination Plot



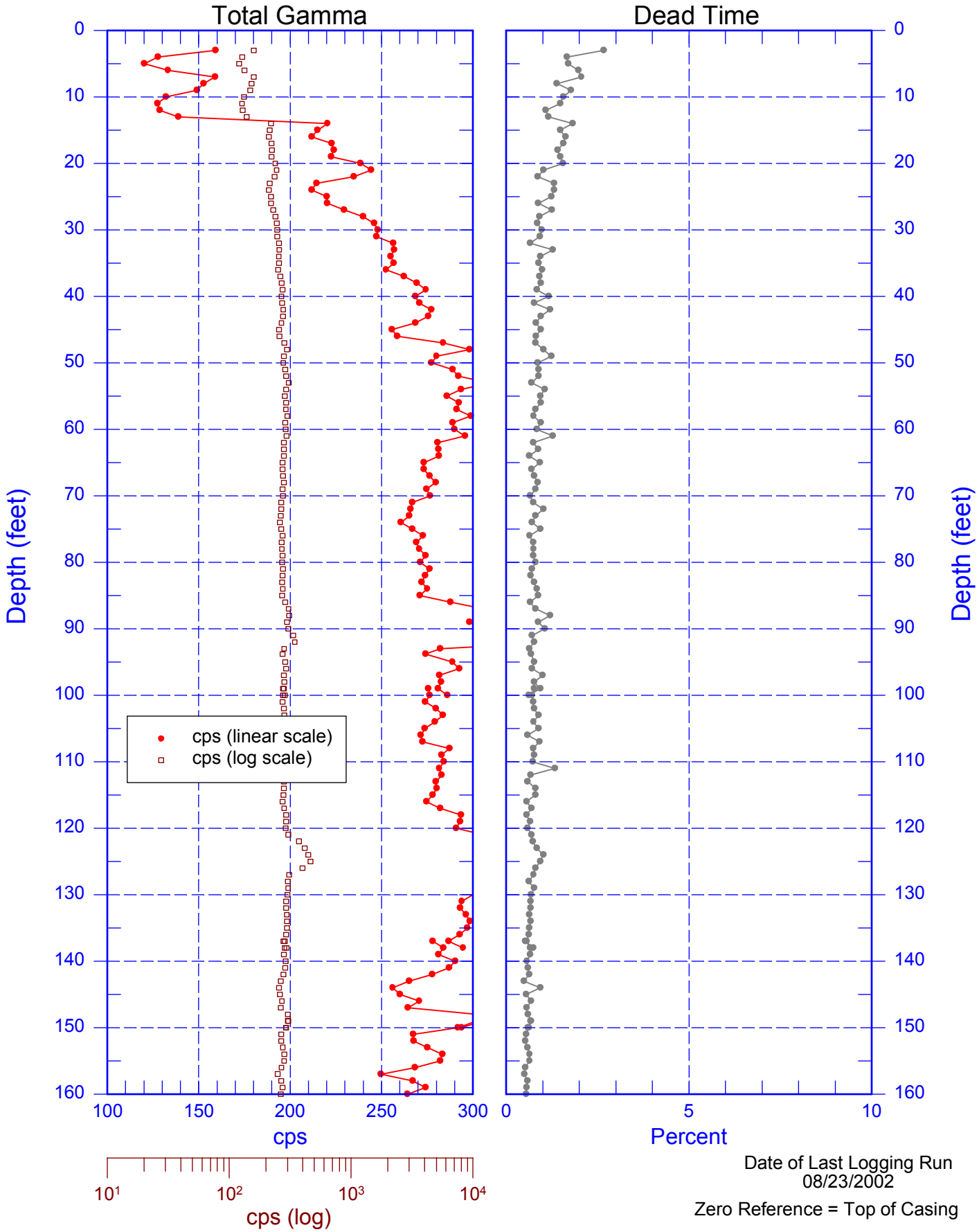
299-E17-23 (C3827) Combination Plot



299-E17-23 (C3827) Combination Plot



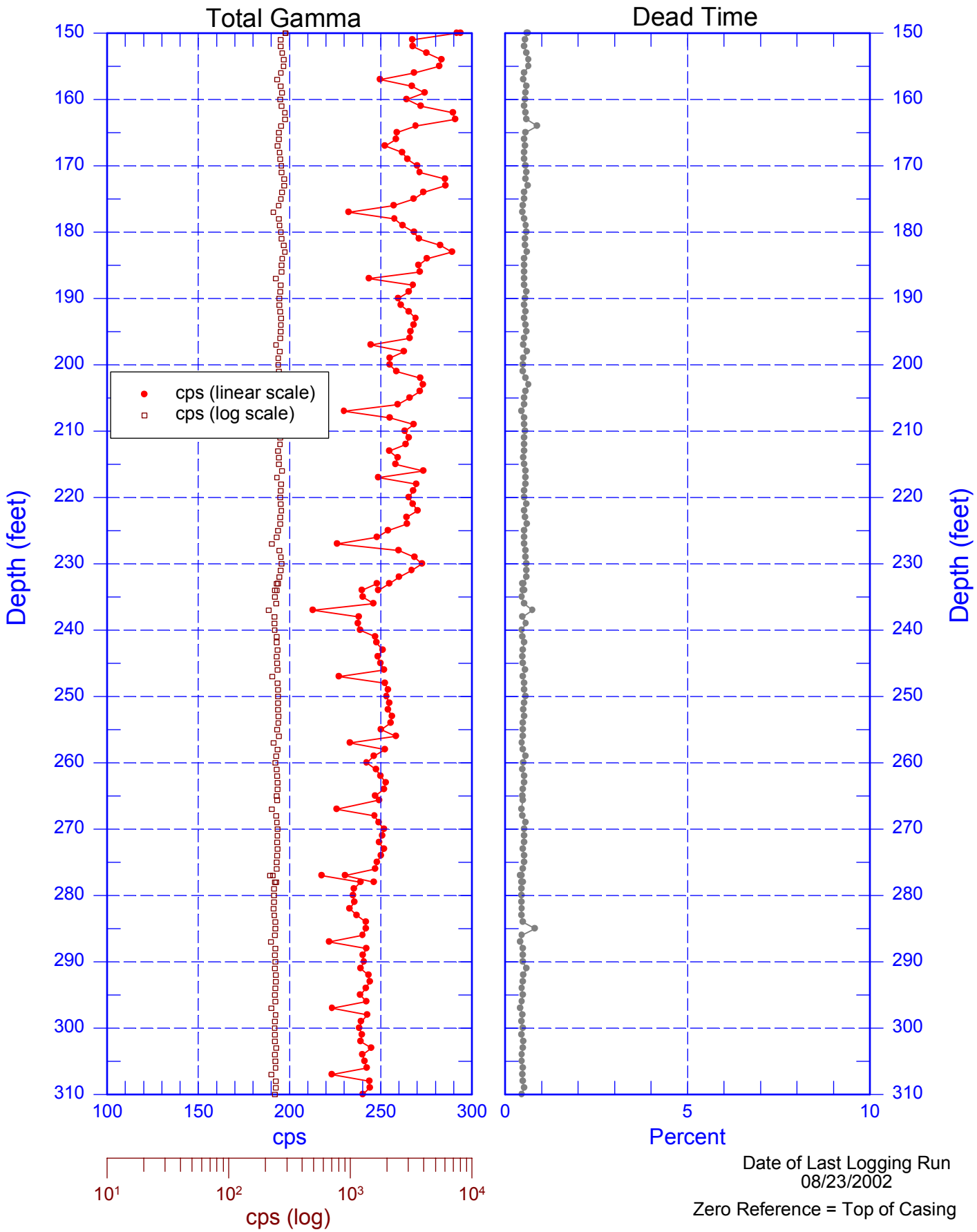
299-E17-23 (C3827)
Total Gamma & Dead Time



Date of Last Logging Run
08/23/2002

Zero Reference = Top of Casing

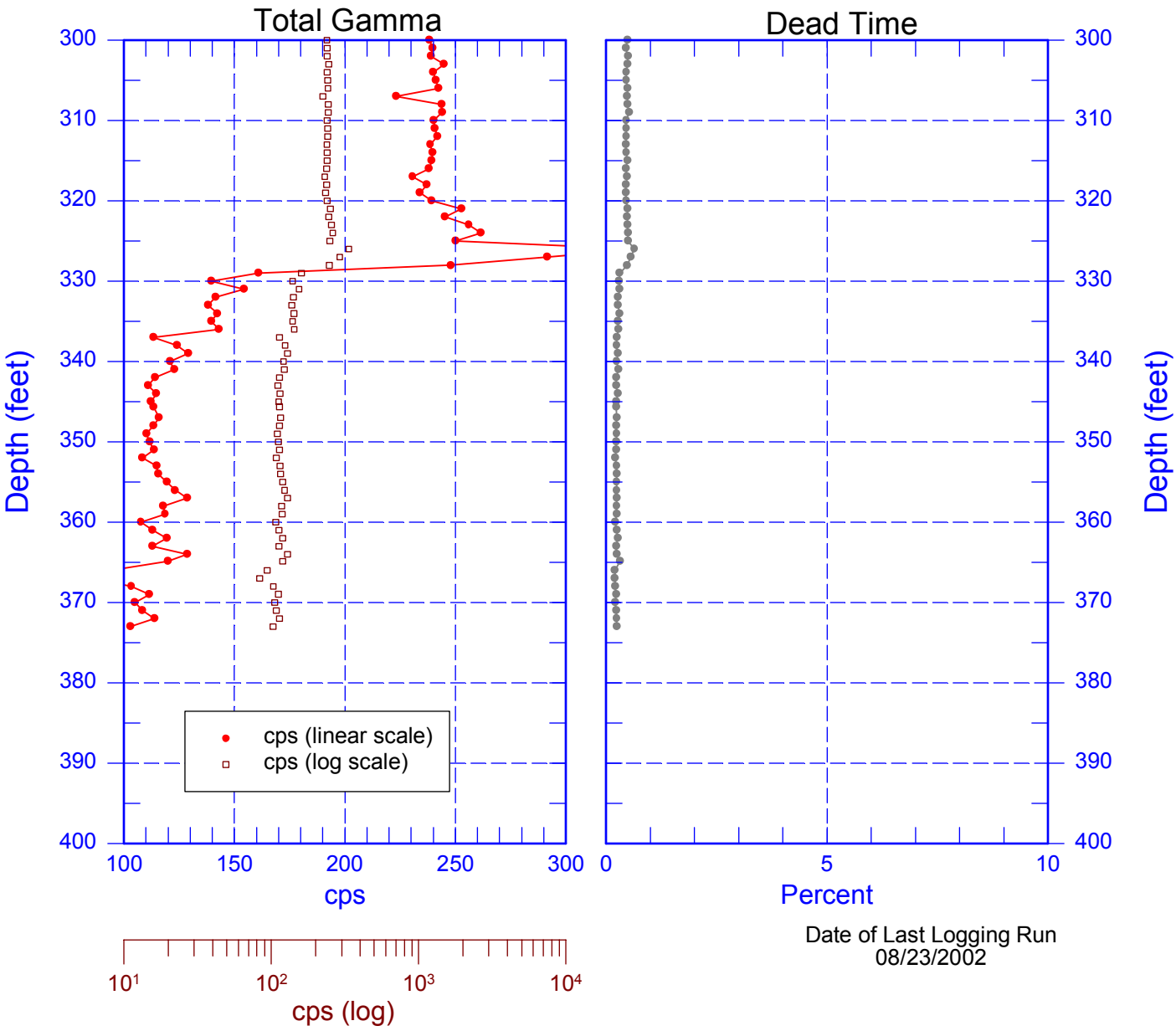
299-E17-23 (C3827)
Total Gamma & Dead Time



Date of Last Logging Run
08/23/2002

Zero Reference = Top of Casing

299-E17-23 (C3827)
Total Gamma & Dead Time



Date of Last Logging Run
08/23/2002

Zero Reference = Top of Casing

299-E17-23 (C3827)

Rerun of Natural Gamma Logs (232.0 to 195.0 ft)