299-E33-60 (A6868)

Log Data Report

Borehole Information:

Borehole: 299-E33-60 (A6868)			Site: 216-B-7A Crib		
Coordinates (WA State Plane)		GWL (ft)[1]: n/a[2]		GWL Date: n/a	
North	East	Drill Date	TOC[3] Elevation	Total Depth (ft)	Type
137380	573802	05/47	643.67	156.7	Cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel (welded)	1.1	8.625	7.981	0.322	0	156.7

Borehole Notes:

The borehole coordinates and drilling date were derived from *Hanford Wells* (Chamness and Merz 1993). Casing dimensions are based on published values for 8-in. schedule-40 steel pipe.

Logging Equipment Information:

Logging System: Gamma 1D		Type: SGLS
Calibration Date: 07/01	Calibration Reference:	GJO-2001-243-TAR
	Logging Procedure:	MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	
Date	12/05/01	12/06/01	12/10/01	12/11/01	
Logging Engineer	Musial	Musial	Musial	Musial	
Start Depth	1.5	40.0	65.0	156.5	
Finish Depth	41.0	66.0	153.0	149.5	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	n/a	n/a	n/a	n/a	
Pre-Verification	A0051CAB	A0053CAB	A0054CAB	A0055CAB	
Start File	A0052000	A0053000	A0054000	A0055000	
Finish File	A0052079	A0053052	A0054177	A0055014	
Post-Verification	A0052CAA	A0053CAA	A0054CAA	A0056CAA	

Logging Operation Notes:

SGLS logging was performed in this borehole during December 2001. The reference depth for logging measurements is the top of casing. A depth error of 0.12 ft was introduced by the operator to the data file

numbers A0054175 to A0054177 that correspond to the depths of 150 to 153 ft near the end of log run 3. This depth interval was re-logged (log run 4). No repeat sections were collected in this borehole.

Analysis Notes:

Analyst:	Henwood	Date:	12/20/01	Reference:	MAC-VZCP 1.7.9 Rev. 2

Pre-run and post-run verifications of the logging tools were performed for each day's log event. The efficiency (peak counts per second) of the logging system was consistently lower each day in the post-run verification as compared to the pre-run verification. Evaluation of the spectra indicates the detector is functioning normally and the log data are provisionally accepted, subject to further review and analysis. Post-run verifications were used for the energy and resolution calibration necessary to process the data except for the final log run where the pre-run verification was used.

A casing correction for 0.322-in.-thick casing was applied to the log data. This value represents the published thickness for ASTM schedule-40 steel pipe, a common borehole casing at Hanford.

Each spectrum collected during a log run was processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL using an efficiency function and corrections for casing as appropriate. Dead time corrections are applied to log data, including the total gamma data, where the dead time is in excess of 10 percent. In zones of high dead time (> 40%) gross count rates and radionuclide concentrations become increasingly less reliable, and may be significantly higher than the reported values. The High Rate Logging System (HRLS) is recommended when high dead times are encountered. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations rather than the ^{214}Bi peak at 609 keV. The 609-keV energy peak cannot be distinguished as a result of interference from the ^{137}Cs peak at 662 keV in higher concentration zones.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (^{137}Cs), naturally occurring radionuclides (^{40}K, ^{232}Th, ^{238}U [KUT]), and a combination of man-made, KUT, total gamma and 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, or casing corrections.

Results and Interpretations:

The man-made radionuclide detected in this borehole was ^{137}Cs. ^{137}Cs is detected in a depth interval from 5 to 8 ft and continuously from about 24 to 80 ft. The highest concentrations exist between about 32 and 62 ft and are in excess of 5,000 pCi/g. Concentrations reported in the high dead time interval are not reliable and probably underestimate the true radionuclide concentration.

The KUT logs do not delineate any definitive lithologic units. Changes in the ^{40}K concentrations from near 12 pCi/g at 30 ft to 18 pCi/g at about 62 ft suggest a lithologic change occurs in the high rate interval.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, prepared by Pacific Northwest Laboratory for the U.S. Department of Energy.

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

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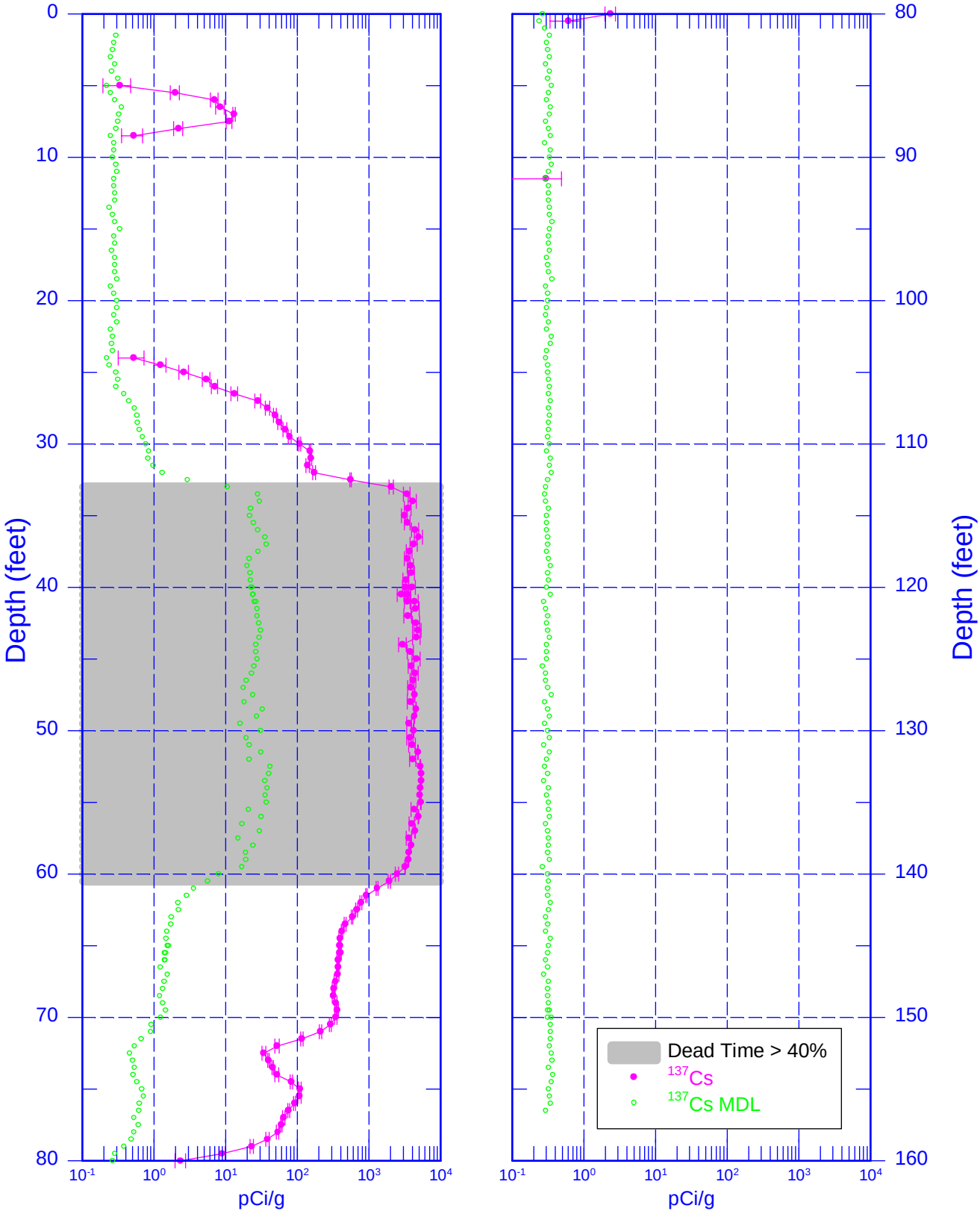
Man-Made Radionuclide Concentrations



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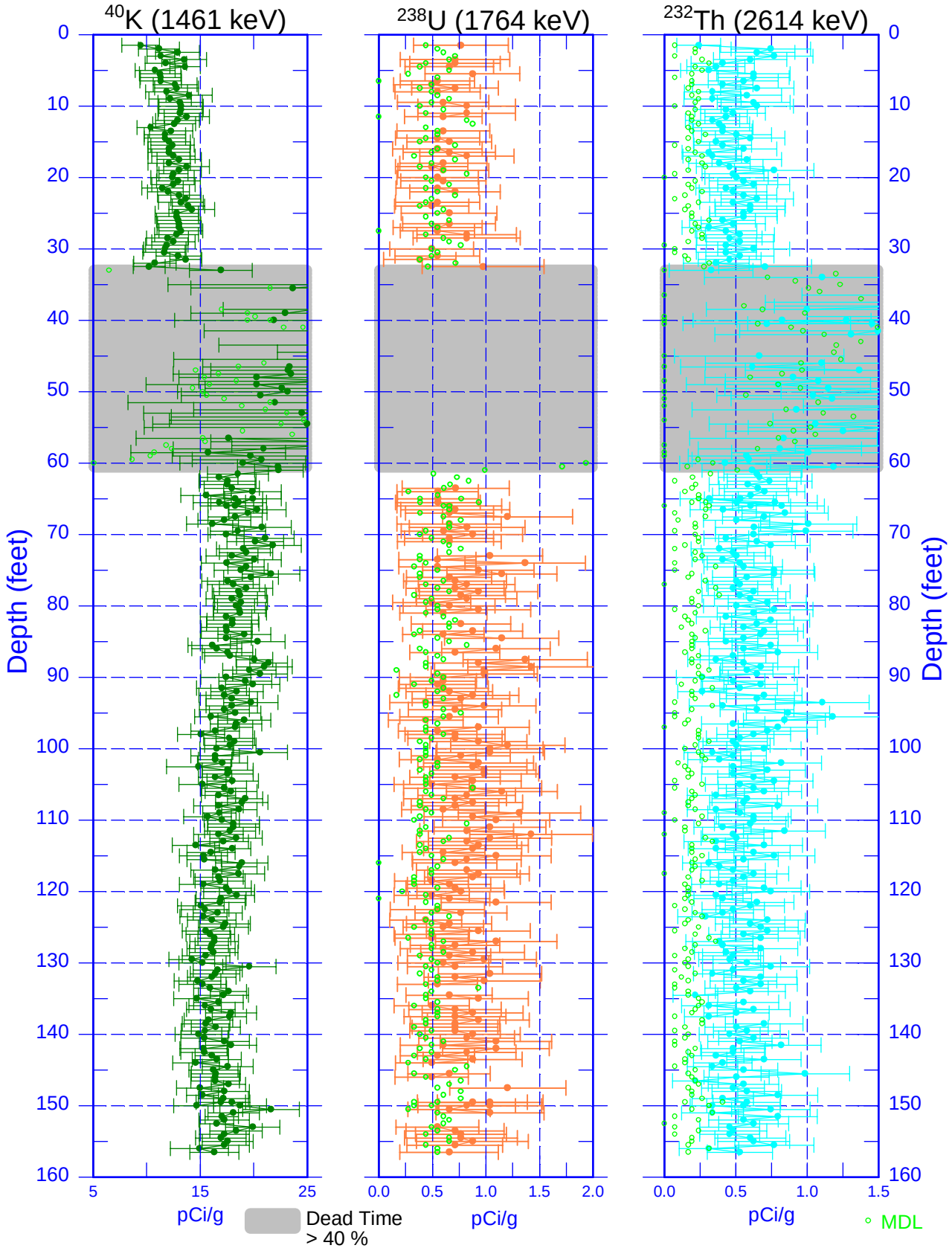
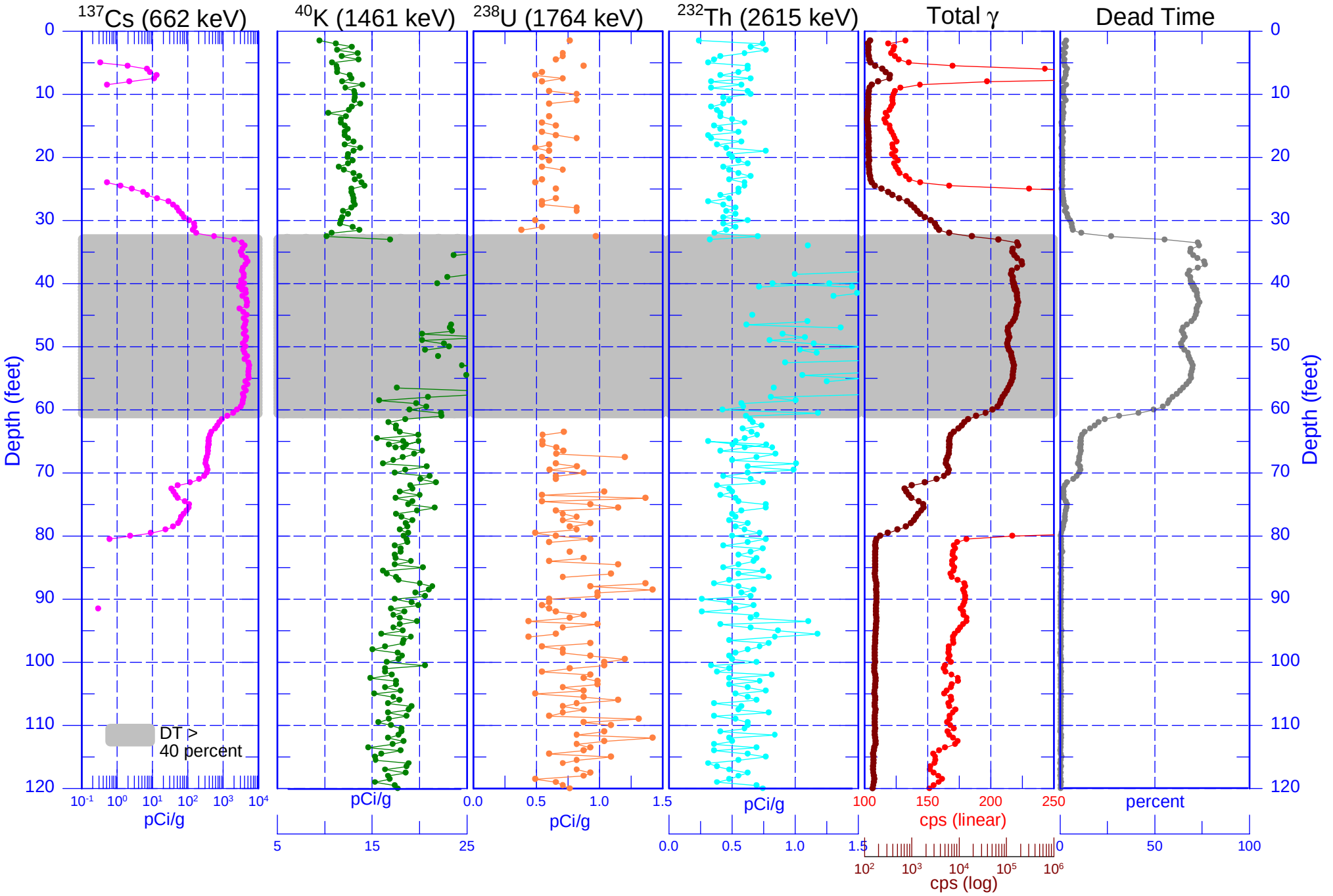
Natural Gamma Logs



299-E33-60 (A6868) Combination Plot



299-E33-60 (A6868) Combination Plot (continued)