Stoller
Grand Junction Office established 1959

299-E17-51 (A5886)
Log Data Report

Borehole Information:

Borehole: 299-E17-51 (A5886)			**Site:** 216-A-36B Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not deep enough		**GWL Date:** 4/03/2003	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
135,230.5 m	575,109.36 m	July 1982	220.393 m	150	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	0.55	6 13/16	6 3/16	5/16	0	150
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. The casing is bent at the surface.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS[3], and Chamness and Merz (1993). Approximately 4 in. of stagnant water is present in the bottom of the borehole. Zero reference is the top of the 6-in. casing. No reference point survey "X" is located at the top of the casing stick up. The borehole was grouted (Chamness and Merz 1993).

Logging Equipment Information:

Logging System:	Gamma 2E		**Type:** 70% HPGe
Calibration Date:	10/2002	**Calibration Reference:**	GJO-2003-430-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C		**Type:** High Rate Detector
Calibration Date:	02/07/02	**Calibration Reference:**	GJO-2003-429-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	**1**	**2/Repeat**			
Date	4/04/03	4/04/03			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	1.0	115.0			
Finish Depth (ft)	147.0	100.0			
Count Time (sec)	50	50			
Live/Real	R	R			

Log Run	1	2/Repeat			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A[4]	N/A			
Pre-Verification	BE013CAB	BE013CAB			
Start File	BE013000	BE013147			
Finish File	BE013146	BE013162			
Post-Verification	BE013CAA	BE013CAA			
Depth Return Error (in.)	N/A	1 high			
Comments	No fine-gain adjustments.	No fine-gain adjustments.			

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2	3/Repeat		
Date	4/7/03	4/7/03	4/7/03		
Logging Engineer	Pearson	Pearson	Pearson		
Start Depth (ft)	55.0	43.0	43.0		
Finish Depth (ft)	51.0	29.0	37.0		
Count Time (sec)	300	300	300		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A	N/A	N/A		
Pre-Verification	AC060CAB	AC060CAB	AC060CAB		
Start File	AC061000	AC061005	AC061020		
Finish File	AC061004	AC061019	AC061026		
Post-Verification	AC061CAA	AC061CAA	AC061CAA		
Depth Return Error (in.)	N/A	N/A	0		
Comments	Fine-gain adjustment after file AC061004.	No fine-gain adjustment.	Repeat section.		

Logging Operation Notes:

Zero reference was top of the 6-in. casing.

For SGLS logging, a centralizer was not installed on the sonde, because the casing was bent in at the surface. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 082.

HRLS logging was performed with a centralizer installed on the sonde. HRLS data were collected using Gamma 1C. Pre- and post-survey verification measurements employed the ^{137}Cs verifier with serial number 1013.

Analysis Notes:

Analyst:	Sobczyk	Date:	04/21/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day and compared to the control limits established on 4/10/2003. The post-run verification spectrum was within the control limits. The pre-run verification spectrum was slightly below the lower control limit for the 609- and 1461-keV full-width at half-maximum values. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum for the day were within 2 percent at the end of the day. Examinations of spectra indicate that the detector functioned normally during all of the logging runs, and the spectra are accepted.

HRLS pre-run and post-run verification spectra were collected at the beginning and end of the day. The spectra were within the acceptance criteria for the field verification of the Gamma 1C logging system (HRLS).

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run 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: G2EMar03.xls and G1CApr03.xls). Zero reference was the top of the 6-in. casing. On the basis of Chamness and Merz (1993), the casing configuration was assumed to be one string of 6-in. casing to the maximum depth of the logging (147 ft). The casing correction factor was calculated assuming a casing thickness of 0.3125 in. This casing thickness is based upon the field measurement. A water correction was not required.

Using the SGLS, dead time greater than 40 percent was encountered in the intervals from 30 to 33 ft, 38 to 42 ft, and 52 to 54 ft. The HRLS was utilized to obtain data where the SGLS dead time exceeded 40 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 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 much better counting statistics and there was less interference from ^{137}Cs.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected in the interval at log depths between 29 and 147 ft. The range of concentrations was from 1.5 pCi/g to 44,400 pCi/g, which was measured at 31 ft. ^{137}Cs was also detected near the MDL (0.2 pCi/g) at 6 ft. ^{60}Co was detected in the intervals at log depths between 34 to 37 ft and 43 to 45 ft. The range of concentrations was from near the MDL (0.1 pCi/g) to 0.5 pCi/g, which was measured at 37 ft.

Recognizable changes in the KUT logs occurred in this borehole. Changes of about 5 pCi/g in apparent ^{40}K concentrations occur at about 3 and 74 ft. Both ^{40}K and ^{232}Th concentrations decrease at about 3 ft. The increase in ^{40}K activities at about 74 ft may represent the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The plots of the repeat logs demonstrate reasonable repeatability of the HRLS and SGLS data for ^{137}Cs (662 keV) and natural radionuclides (609, 1461, 1764, and 2614 keV).

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

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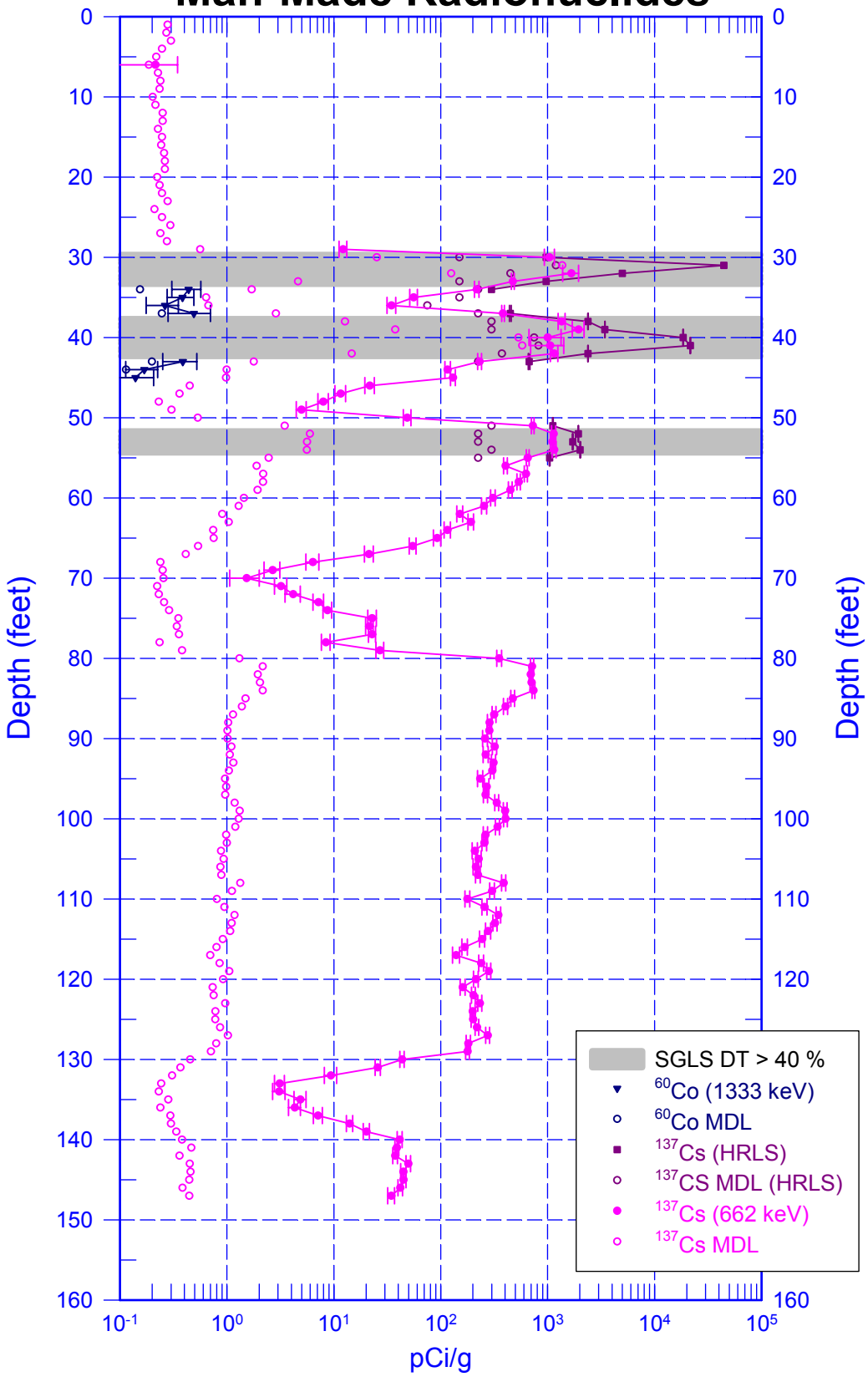
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
4/07/2003

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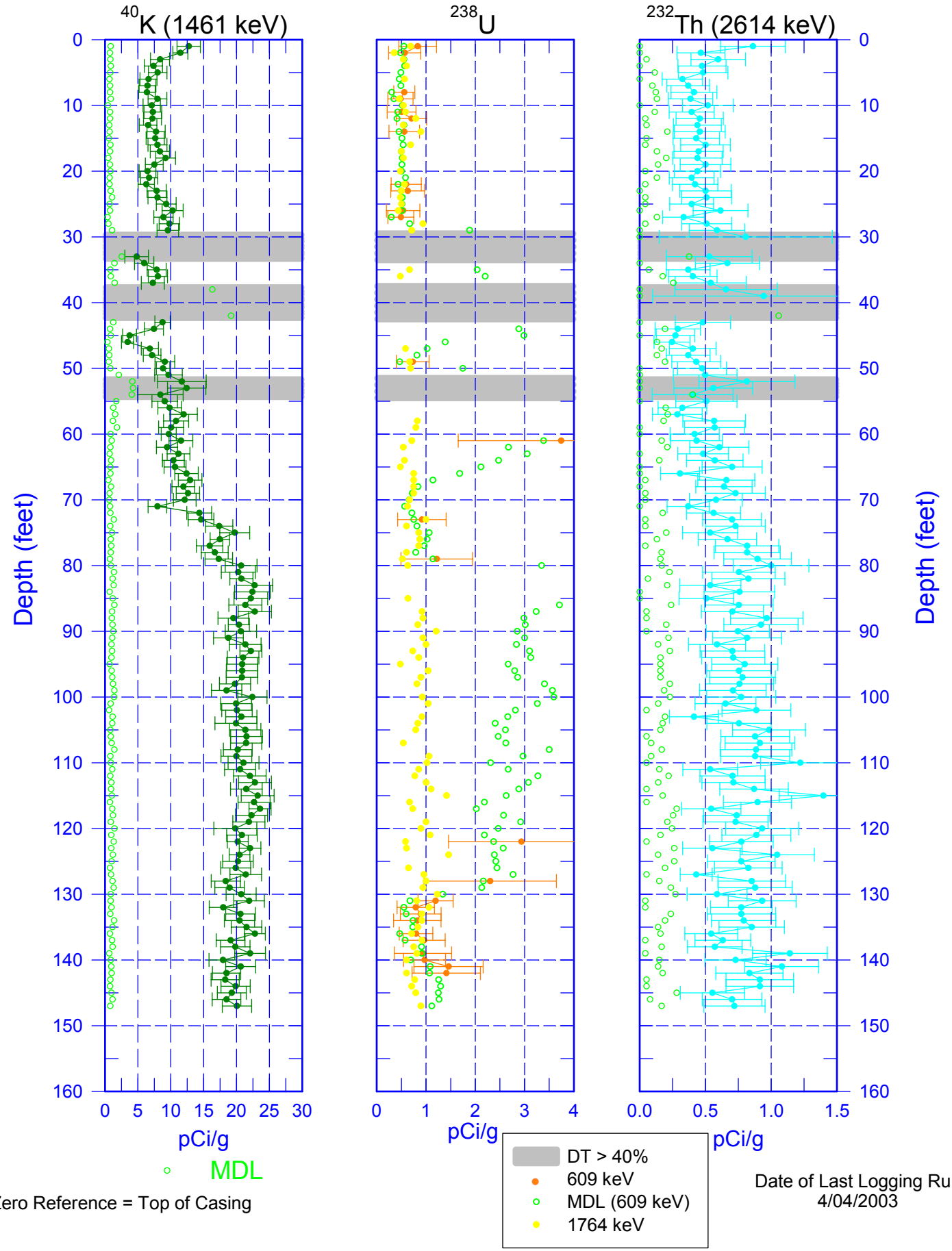
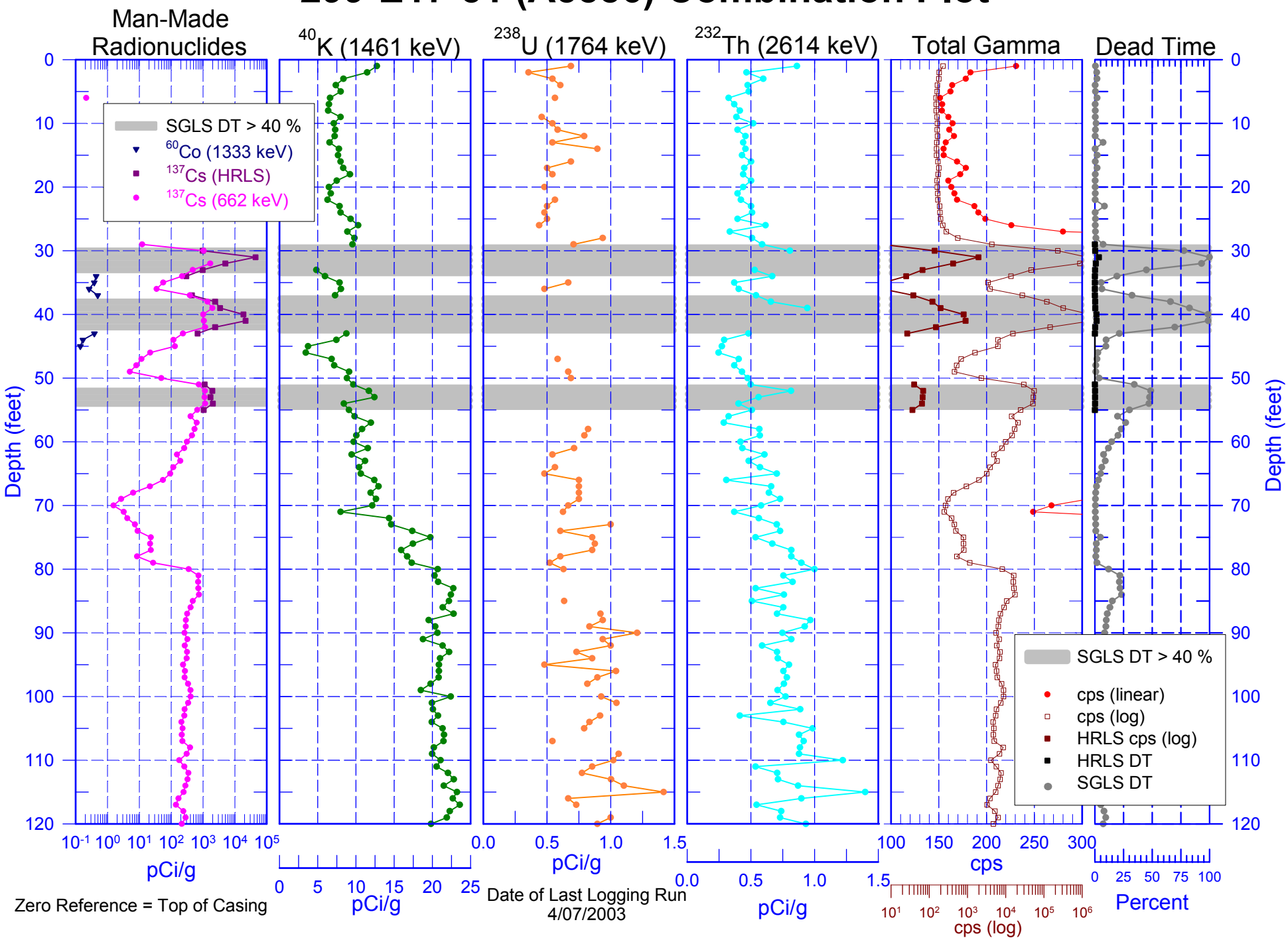
Natural Gamma Logs

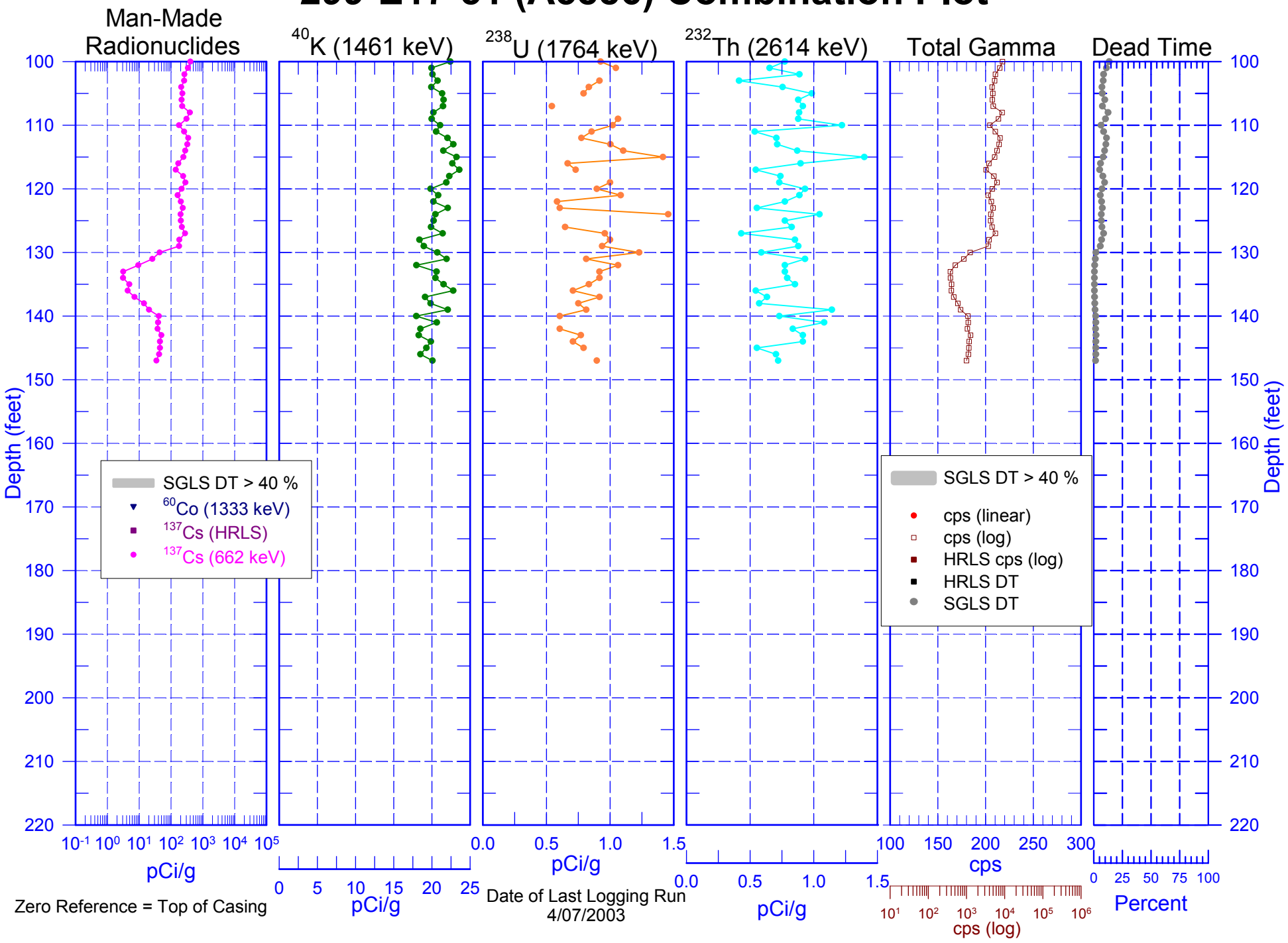


Zero Reference = Top of Casing

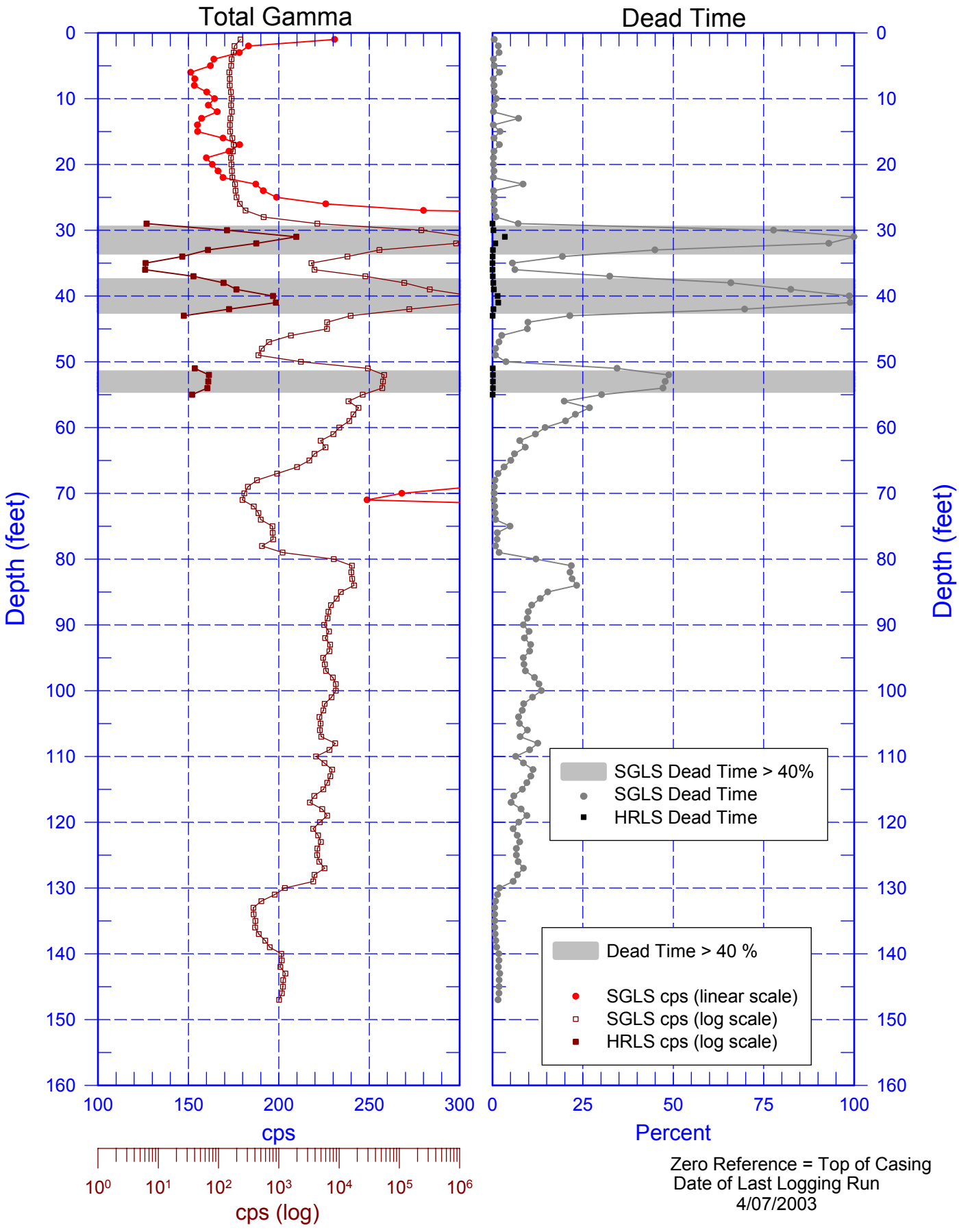
Date of Last Logging Run
4/04/2003


299-E17-51 (A5886) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
SGLS DT > 40 %
60Co (1333 keV)
137Cs (HRLS)
137Cs (662 keV)
Depth (feet)
pCi/g
cps
cps (log)
Percent
Zero Reference = Top of Casing
Date of Last Logging Run
4/07/2003
cps (linear)
HRLS cps (log)
HRLS DT
SGLS DT

299-E17-51 (A5886) Combination Plot



299-E17-51 (A5886)
Total Gamma & Dead Time



Zero Reference = Top of Casing
Date of Last Logging Run
4/07/2003

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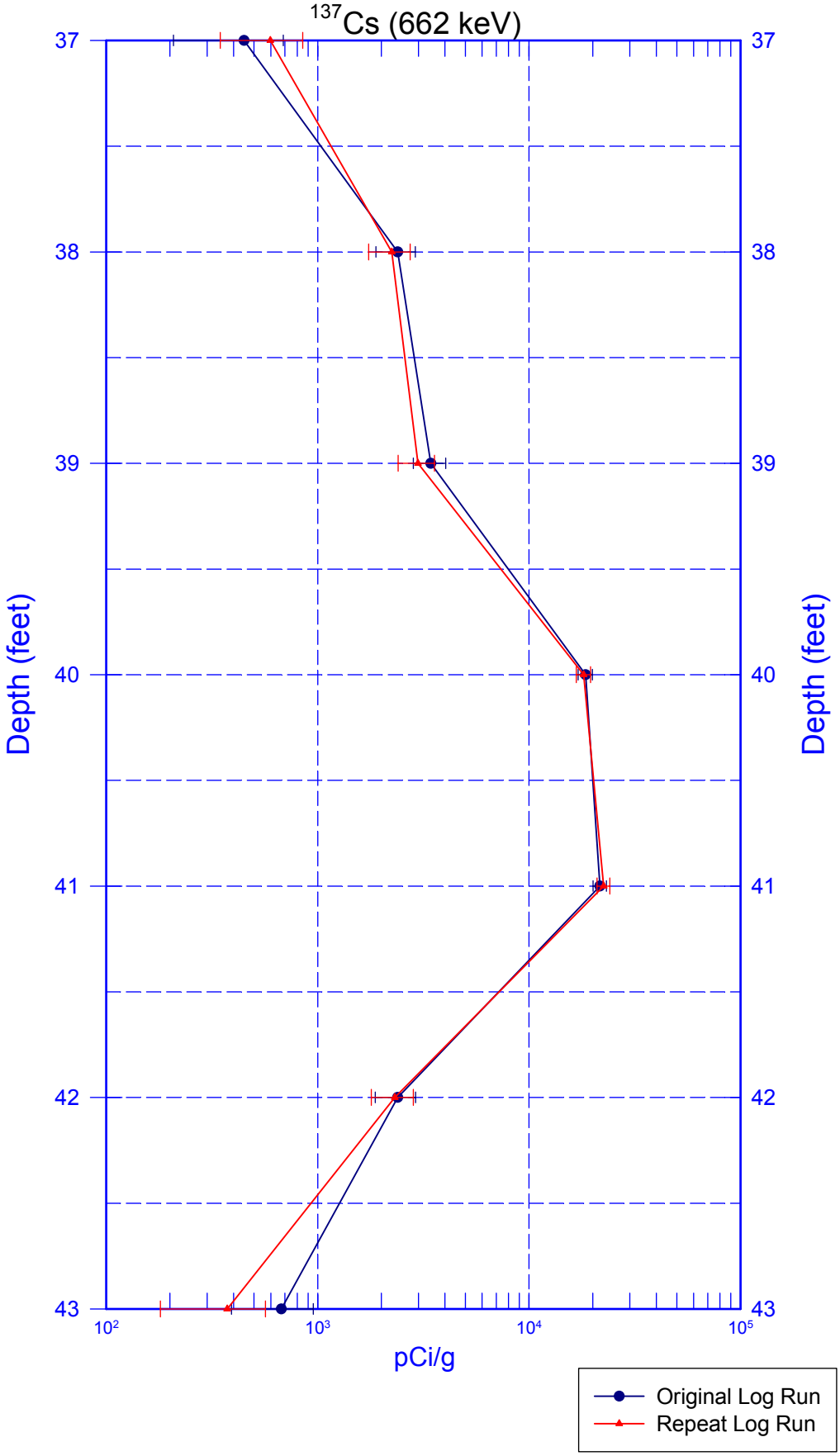
Rerun of High Rate Logging (43.0 to 37.0 ft)



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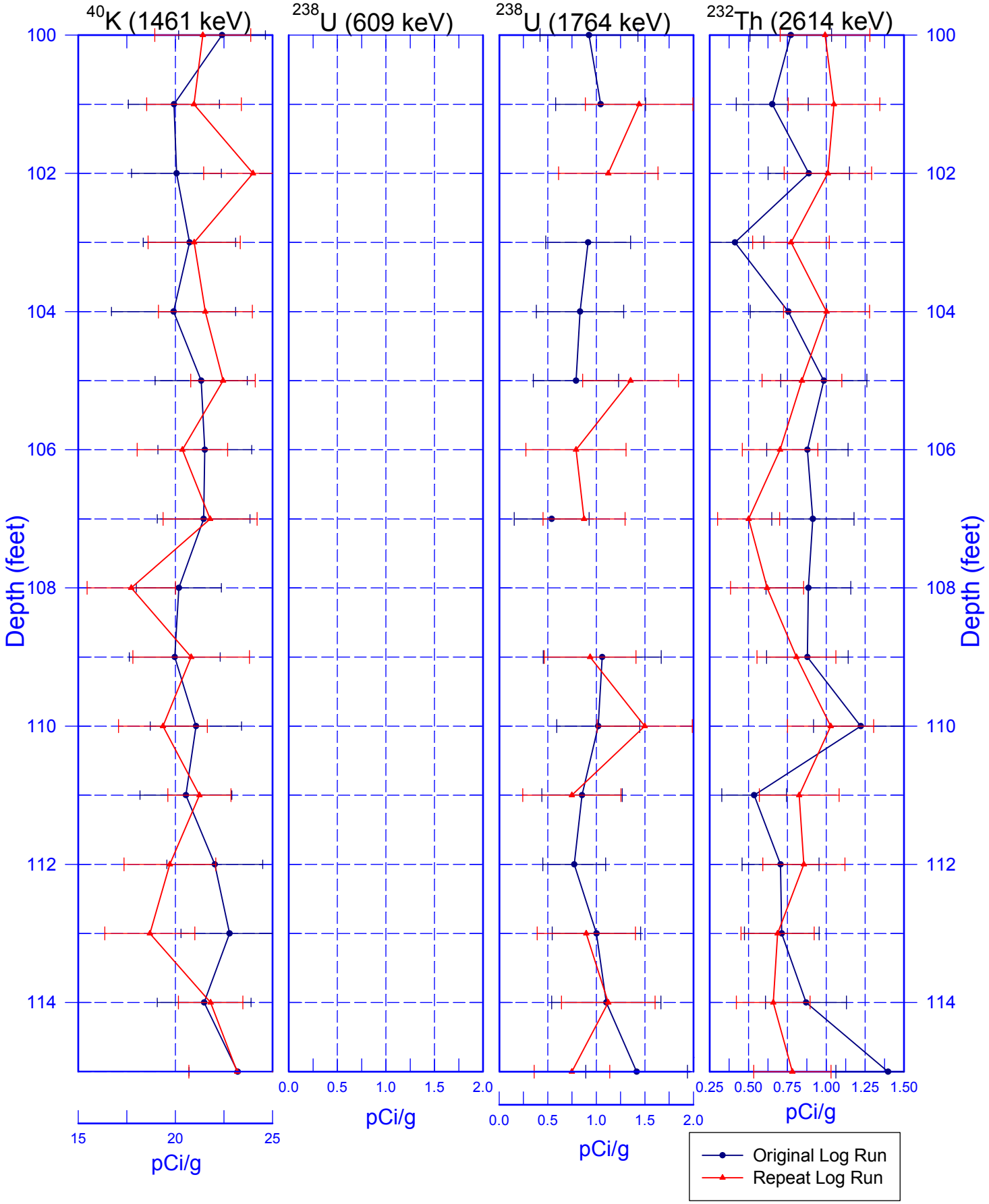
Rerun of Natural Gamma Logs (115.0 to 100.0 ft)



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Rerun of Man-Made Radionuclides (100.0 to 115.0 ft)