Stoller
Hanford Office

DOE-EM/GJ895-2005

299-W15-06 (A7349)
Log Data Report

Borehole Information:

Borehole: 299-W15-06 (A7349)			**Site:** 216-Z-9 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not measured		**GWL Date:** N/A	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
135654.395	566801.511	03/59	664.91	410	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.0	6	Unknown	Unknown	2.0	178
Welded steel	0	8	Unknown	Unknown	0	307
Welded steel	0	10	Unknown	Unknown	0	164

Borehole Notes:

The 8- and 10-in. casings are not visible at the ground surface. A 3 by 3 ft concrete pad is in place at the ground surface that surrounds the 6-in. casing. For the purpose of vapor extraction, the 6-in. casing has been modified. A flat, 8-bolt flange has been welded to the top of casing. Grout was emplaced between the 6- and 8-in. casings to 175 ft.

Prior to logging on 04/21/05, the borehole was swabbed by a Radiological Control Technician (RCT) who found no activity above background. All logging measurements are referenced to the top of casing (TOC).

Logging Equipment Information:

Logging System:	Gamma 1E		**Type:** SGLS (70%) 34TP40587A
Calibration Date:	04/05	**Calibration Reference:**	DOE-EM/GJ864-2005
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 4I		**Type:** Passive Neutron U1754
Calibration Date:	None	**Calibration Reference:**	None
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	3	4	5 - Repeat		
Date	04/25/05	04/26/05	04/26/05		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	80.0	175.0	80.0		
Finish Depth (ft)	2.0	81.0	63.0		

Log Run	3	4	5 - Repeat		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[3]	N/A	N/A		
Pre-Verification	AE056CAB	AE057CAB	AE057CAB		
Start File	AE056000	AE057000	AE057095		
Finish File	AE056078	AE057094	AE057112		
Post-Verification	AE056CAA	AE057CAA	AE057CAA		
Depth Return Error (in.)	0	N/A	N/A		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

Passive Neutron Logging System (PNLS) Log Run Information:

Log Run	1	2 - Repeat			
Date	04/21/05	04/21/05			
Logging Engineer	Pope	Pope			
Start Depth (ft)	3.0	135.0			
Finish Depth (ft)	150.0	150.0			
Count Time (sec)	N/A	N/A			
Live/Real	R	R			
Shield (Y/N)	N	N			
Sample Interval (ft)	0.25	0.25			
ft/min	1	1			
Pre-Verification	DI092CAB	DI092CAB			
Start File	DI092000	DI092588			
Finish File	DI092587	DI092647			
Post-Verification	DI092CAA	DI092CAA			
Depth Return Error (in.)	N/A	- 0.5			
Comments	None	None			

Logging Operation Notes:

Pre- and post-survey verification measurements for the SGLS were acquired using the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. A centralizer was installed on the sonde. Maximum logging depth was chosen to be 175 ft, approximately 3 ft above the level where the 8-in. casing apparently separated during drilling operations.

Passive neutron logging was also performed in the borehole. This logging method has been shown to be effective in qualitatively detecting zones of alpha-emitting contaminants from secondary neutron flux generated by the (α,n) reaction, and may indicate the presence of transuranic radionuclides.

Analysis Notes:

Analyst:	Henwood	Date:	05/04/05	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 of logging. All of the SGLS verification spectra were within the acceptance criteria. Data examination indicates that the detectors functioned normally during logging, and the data are accepted.

Verification spectra using an AmBe neutron source were acquired for the passive neutron logging system. Currently there are no verification criteria established for this system. The counts obtained from the pre and post verifications were within 1 percent.

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 file: G1EMar05.xls). A combined casing correction for a 0.967-in.-thick casing (0.28+0.322+0.365) for the 6-, 8-, and 10-in. casings was applied to the data from 0 to 164 ft. Between 164 and 175 ft, a combined correction for 0.602-in.-thick casing (0.28+0.322) for the 6- and 8-in. casings was applied. No corrections for dead time or water were required.

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 also 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 is 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. PNLS data plotted with total gamma data are also provided.

Total gamma data acquired in 1963, 1968, and 1976 are plotted with the current SGLS total gamma data to provide a further comparison of activity levels in the borehole.

Results and Interpretations:

^{137}Cs was detected near the surface at 2 and 3 ft at a maximum concentration of approximately 1 pCi/g. The remainder of the logged interval to 175 ft showed no gamma-emitting contaminants.

The passive neutron detector indicated no significant neutron flux in the survey depth interval of 3 to 150 ft. Slight elevation in count rate (0.3 cps) is observed between 3 and 5 ft but is not believed to be related to any influence from alpha-emitting contaminants.

Interpretation of the KUT for lithology changes is complicated by grout placed between the 6- and 8-in. casings to 175 ft. The relatively low ^{40}K and ^{232}Th values at approximately 111 ft as well as the relatively high ^{238}U values are characteristic of the carbonate palesols of the Cold Creek Interval. Elevated ^{238}U and ^{232}Th indicated at 160 ft may be related to borehole construction. A 10-in. casing was originally placed to 164 ft and the diameter of the drilled borehole changed from 11- to 9-in. at this depth.

Westinghouse Hanford Company acquired spectral gamma data in 1992 in this borehole using the Radionuclide Logging System (RLS). There were no man-made radionuclides detected in survey data acquired to 186 ft. Additional stationary measurements acquired for 300 seconds at depth intervals of 182, 200, 250, and 300 ft also indicated no contamination.

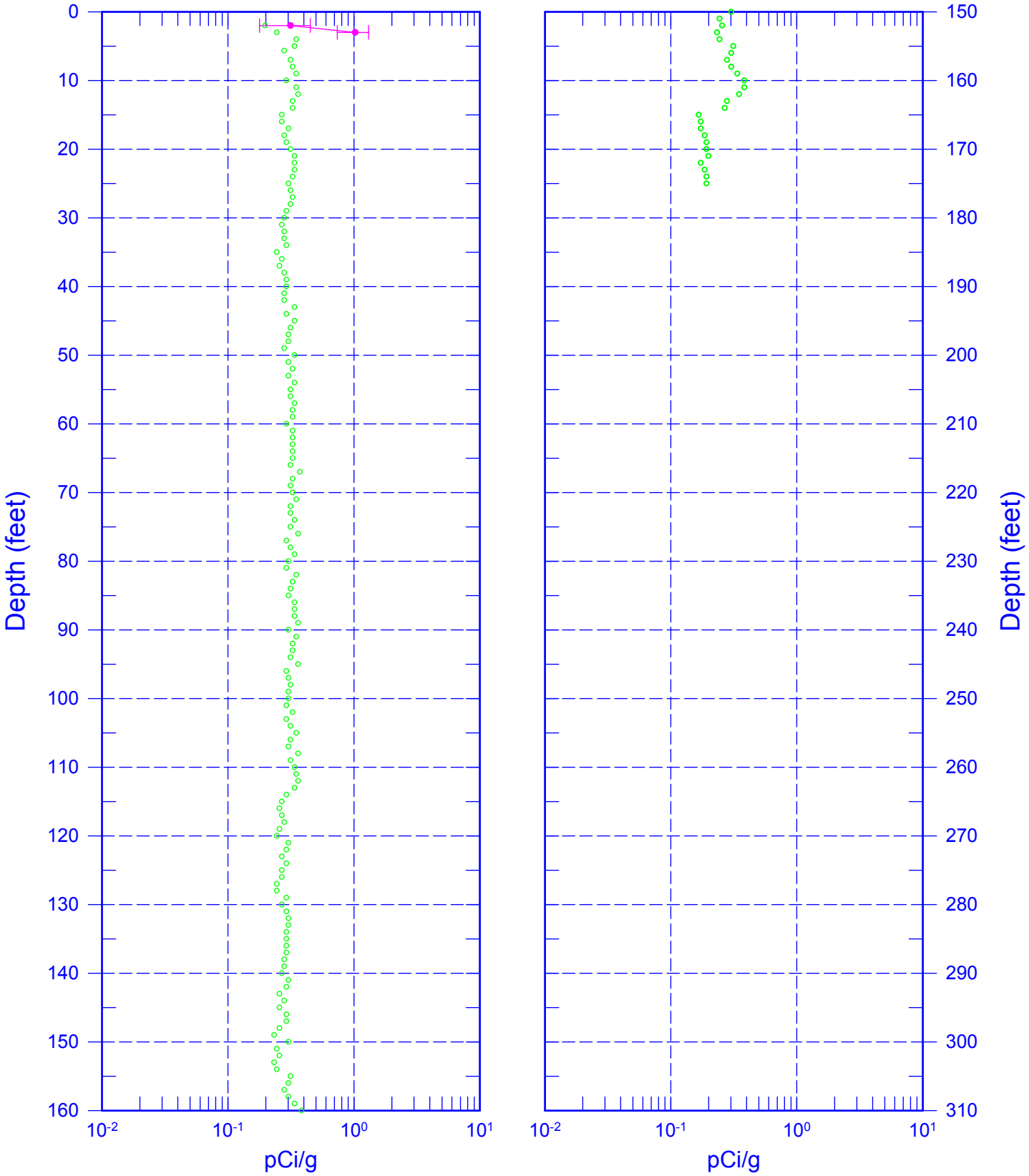
The historical total count log data acquired in 1963, 1968, and 1976 are consistent with the current SGLS total count data such that no contamination appears to have existed in the vicinity of this borehole.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the naturally occurring radionuclides and the passive neutron.

---

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

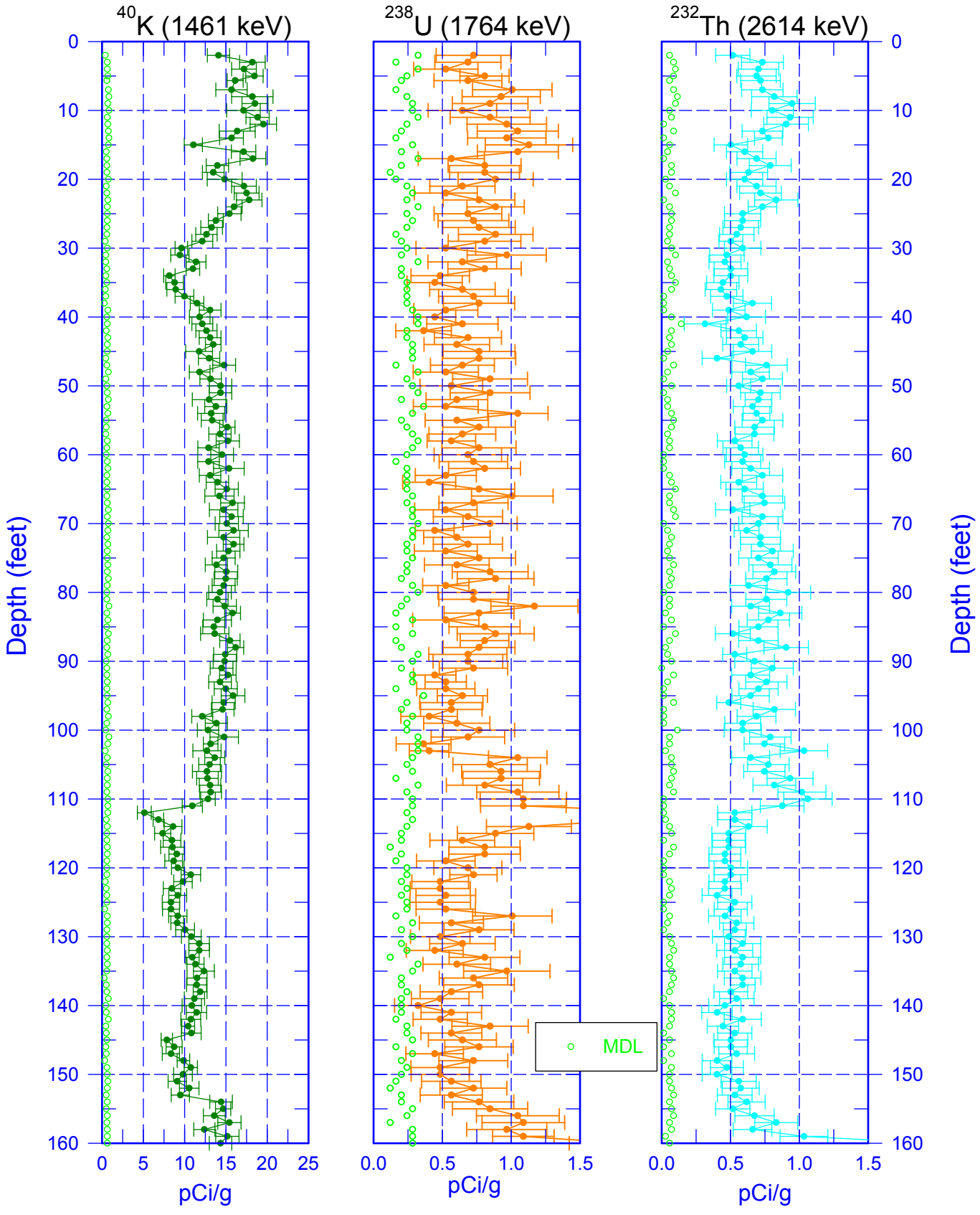
299-W15-06 (A7349)
Man-Made Radionuclides



Zero Reference = Top of Casing

Last Log Date - 04/26/05

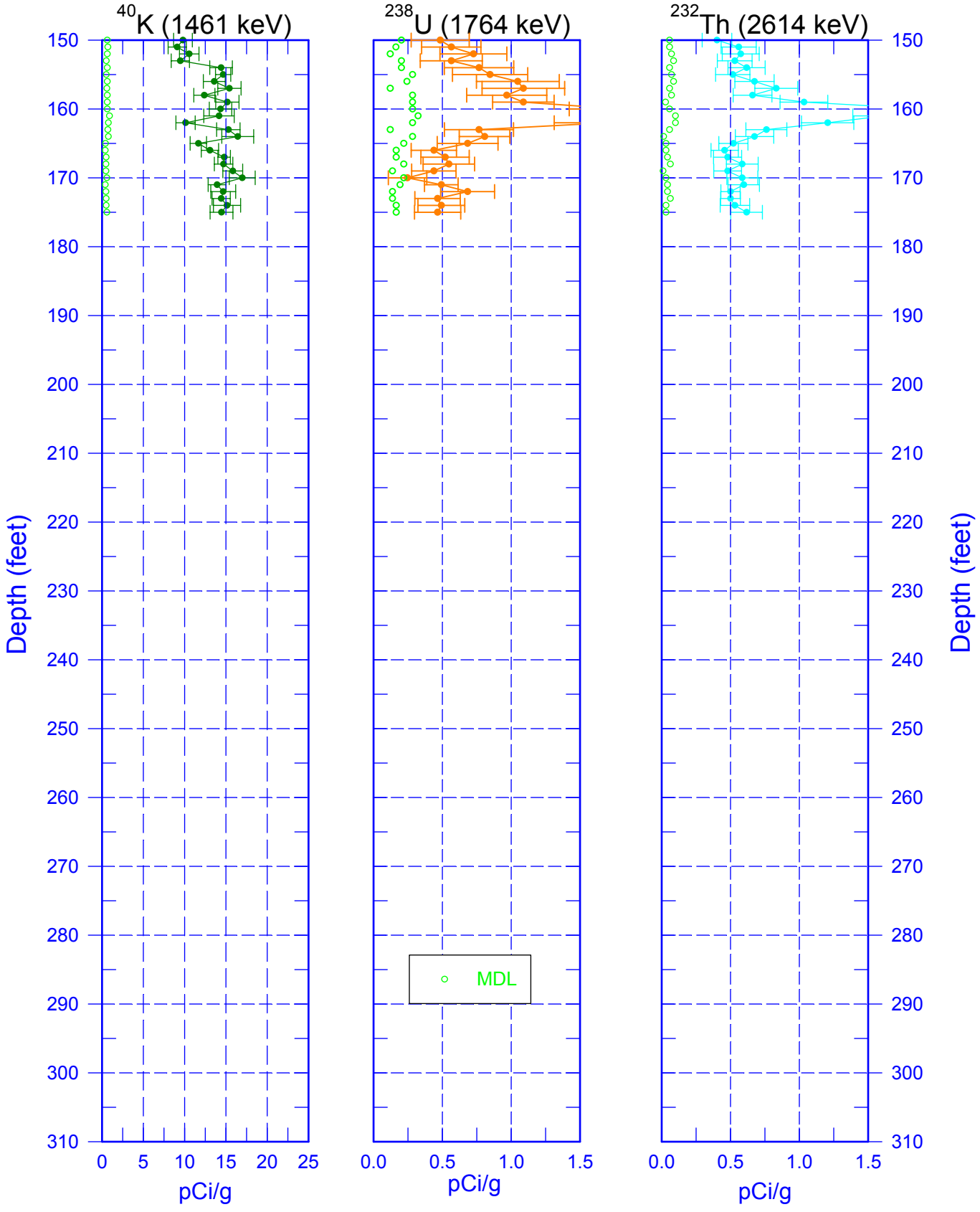
299-W15-06 (A7349)
Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 04/26/05

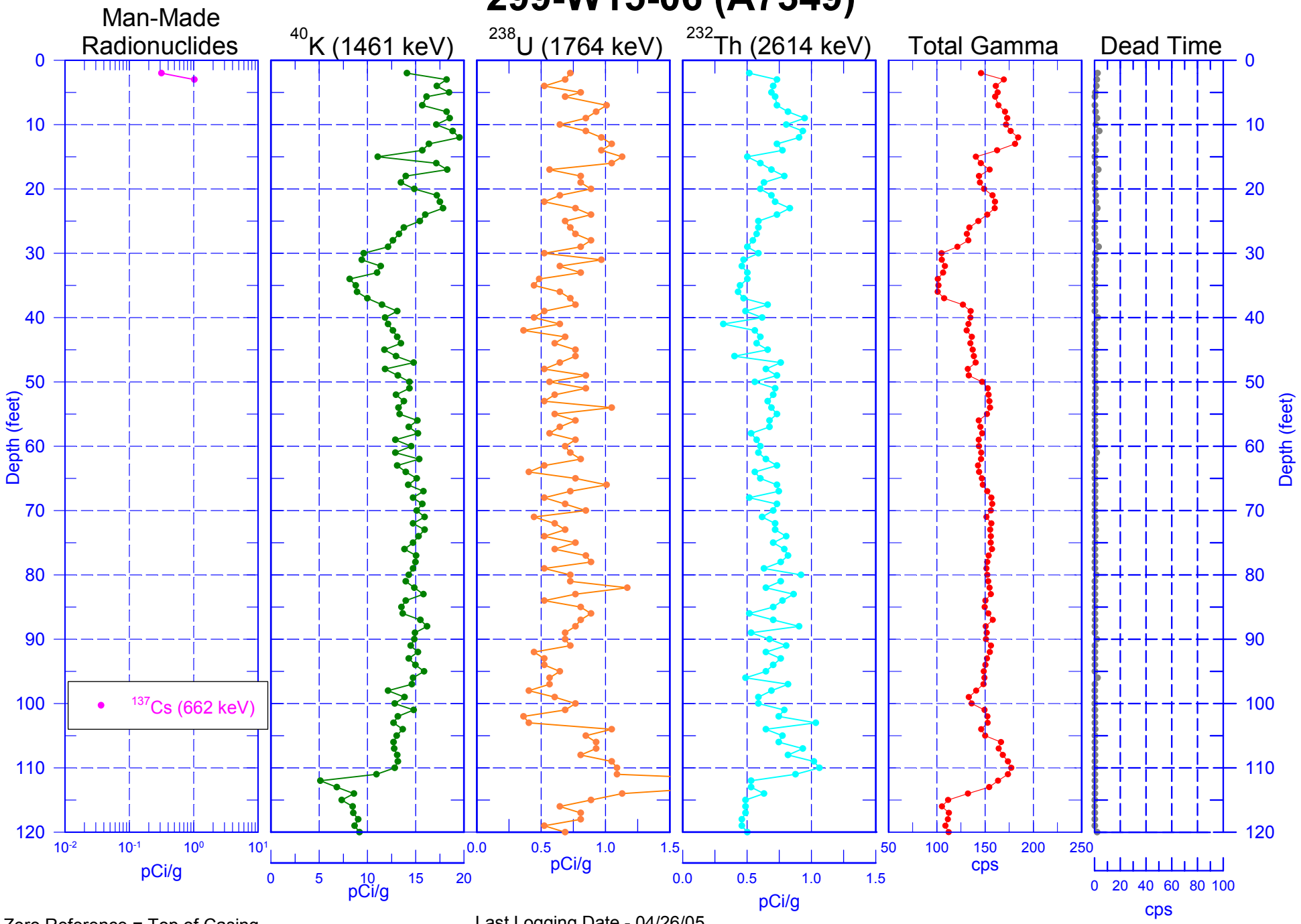
299-W15-06 (A7349)
Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 04/26/05

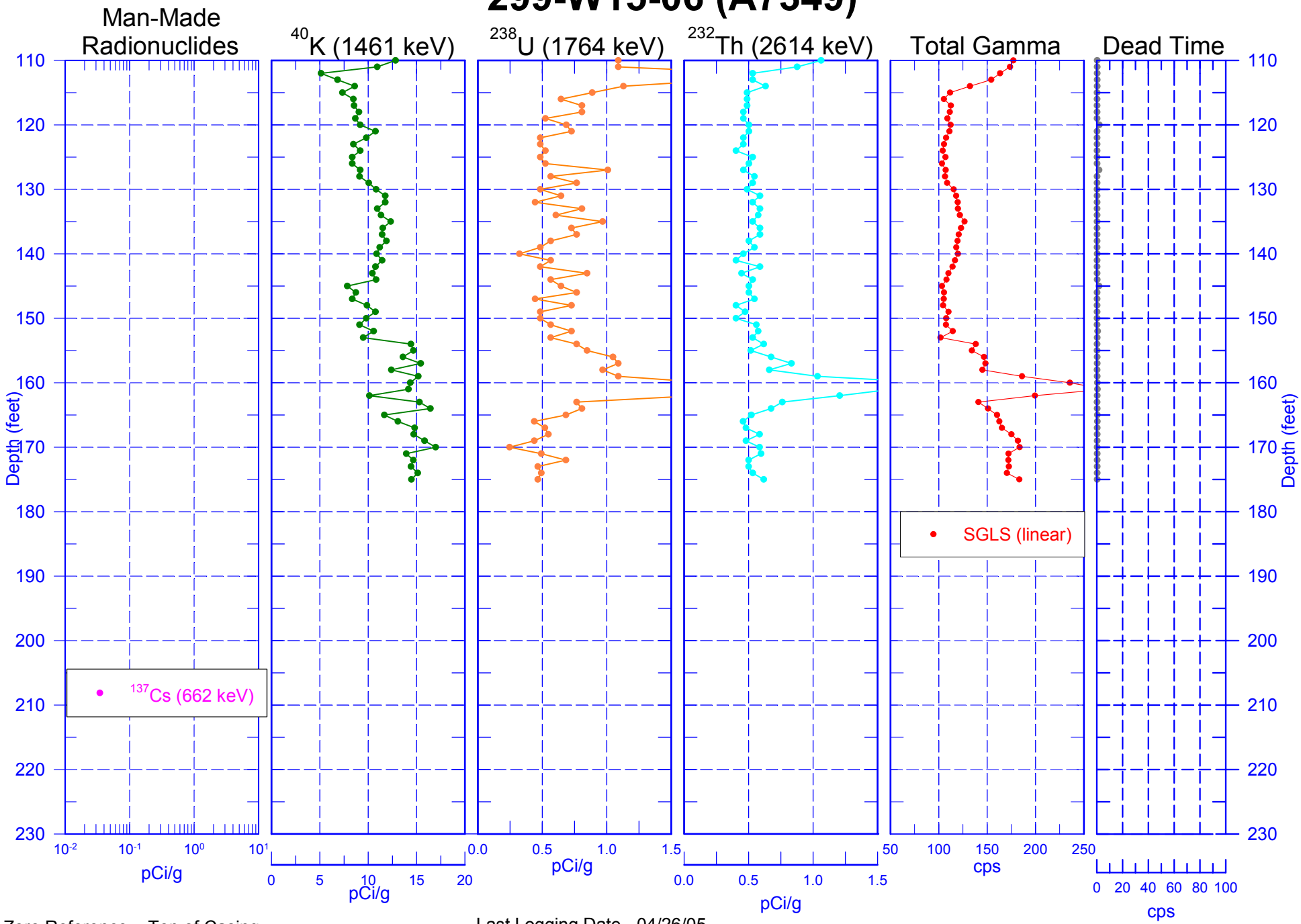
299-W15-06 (A7349)



Zero Reference = Top of Casing

Last Logging Date - 04/26/05

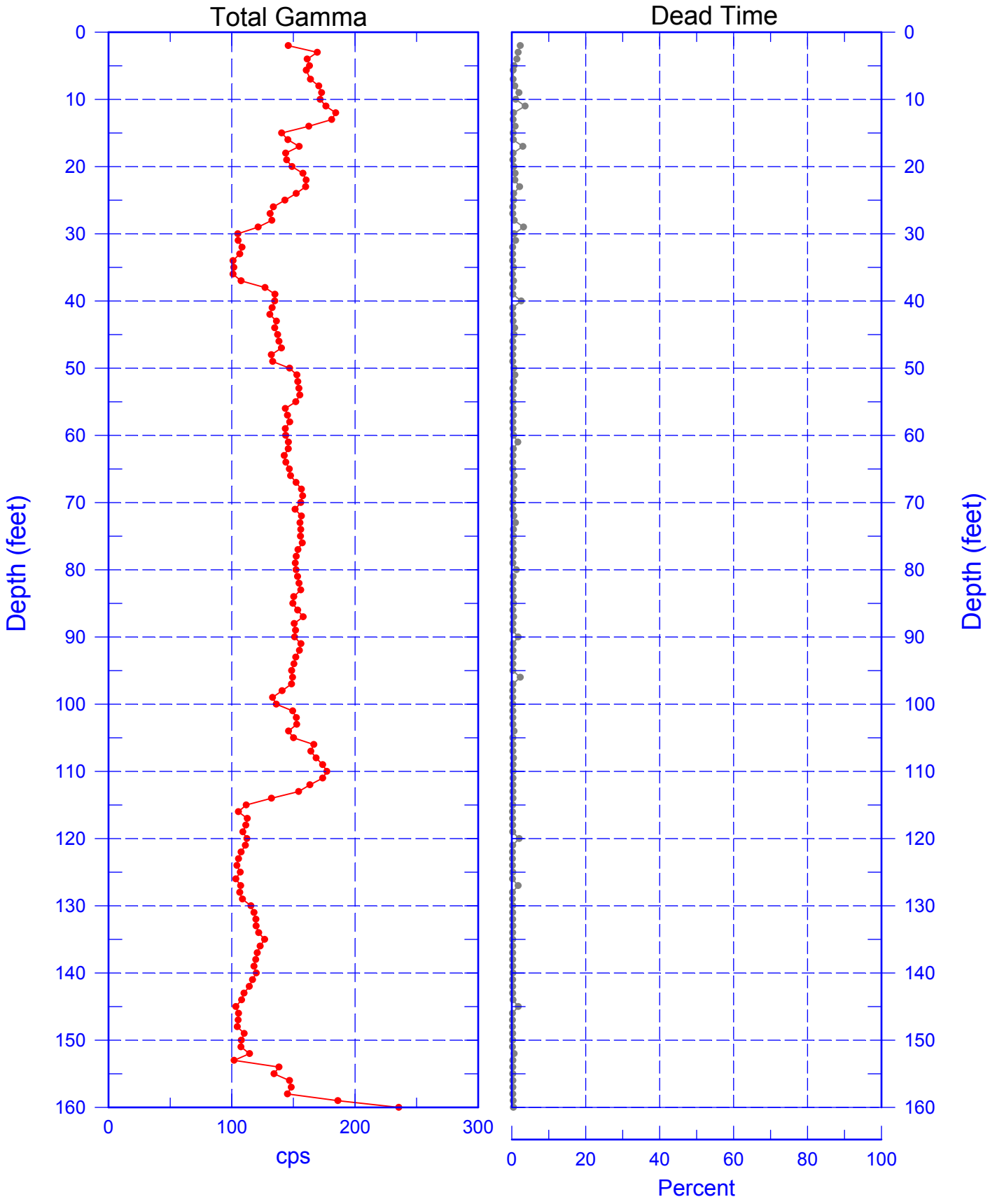
299-W15-06 (A7349)



Zero Reference = Top of Casing

Last Logging Date - 04/26/05

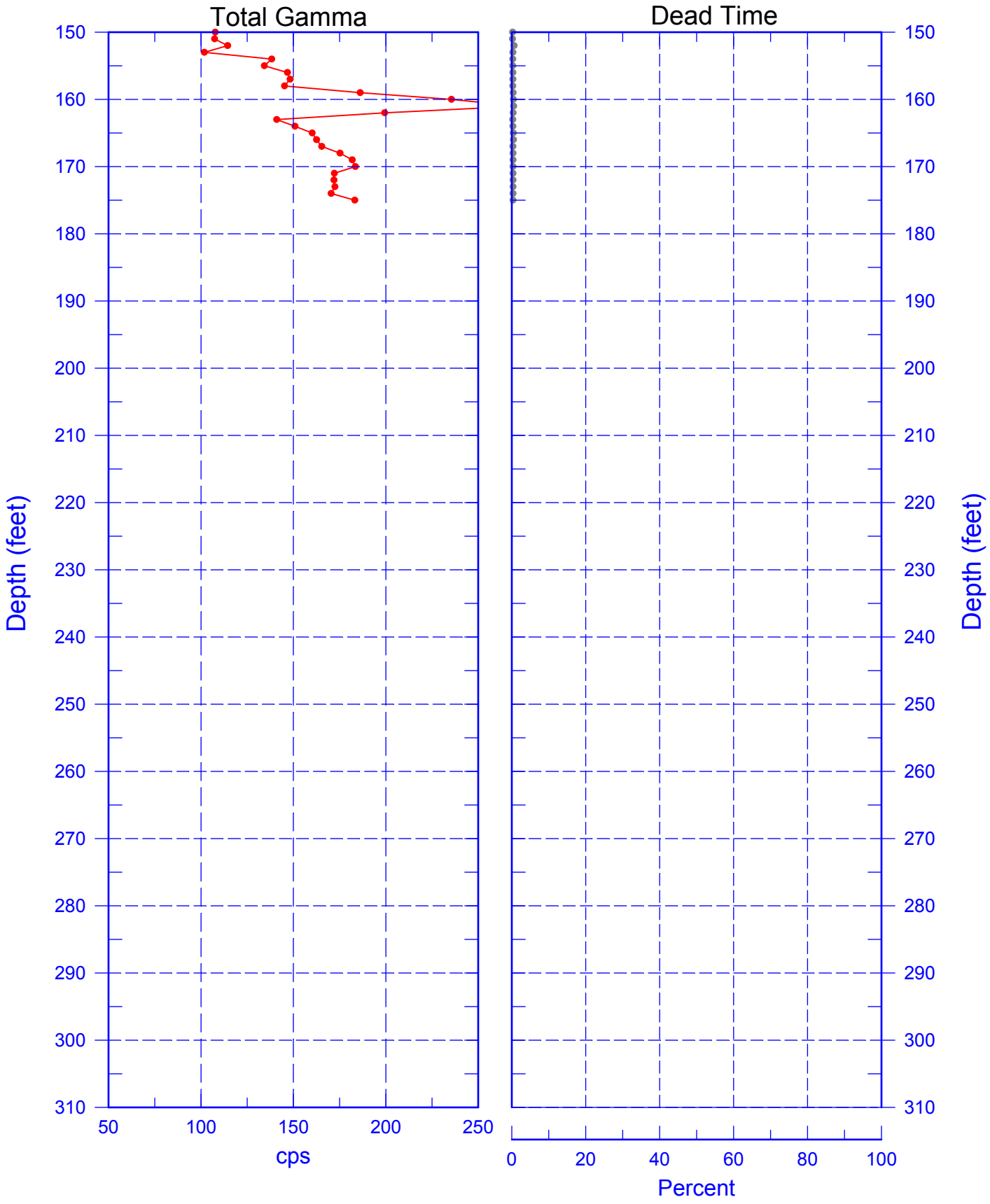
299-W15-06 (A7349)
Total Gamma & Dead Time



Zero Reference = Top of Casing

Last Logging Date - 04/26/05

299-W15-06 (A7349)
Total Gamma & Dead Time

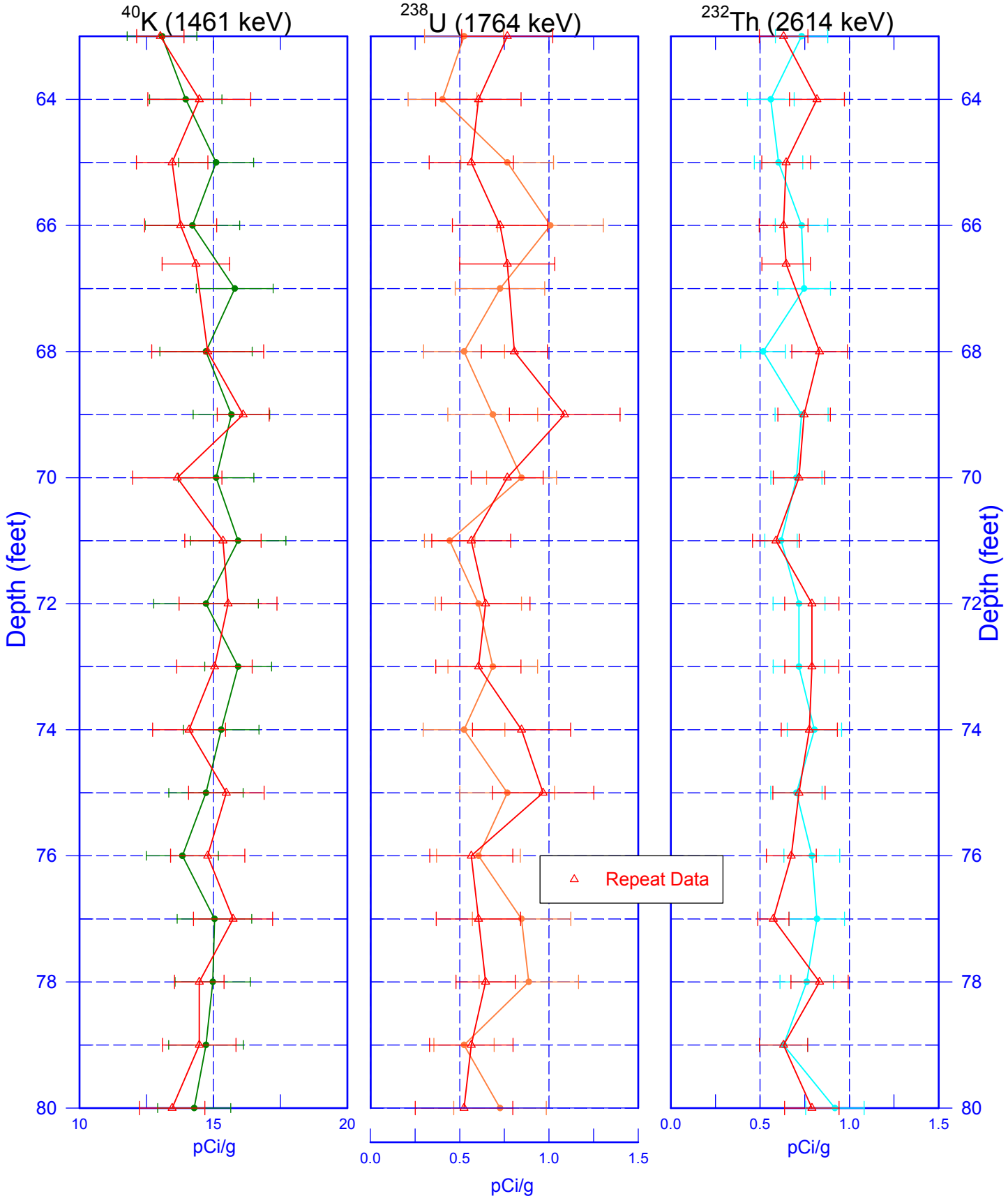


Zero Reference = Top of Casing

Last Logging Date - 04/26/05

299-W15-06 (A7349)

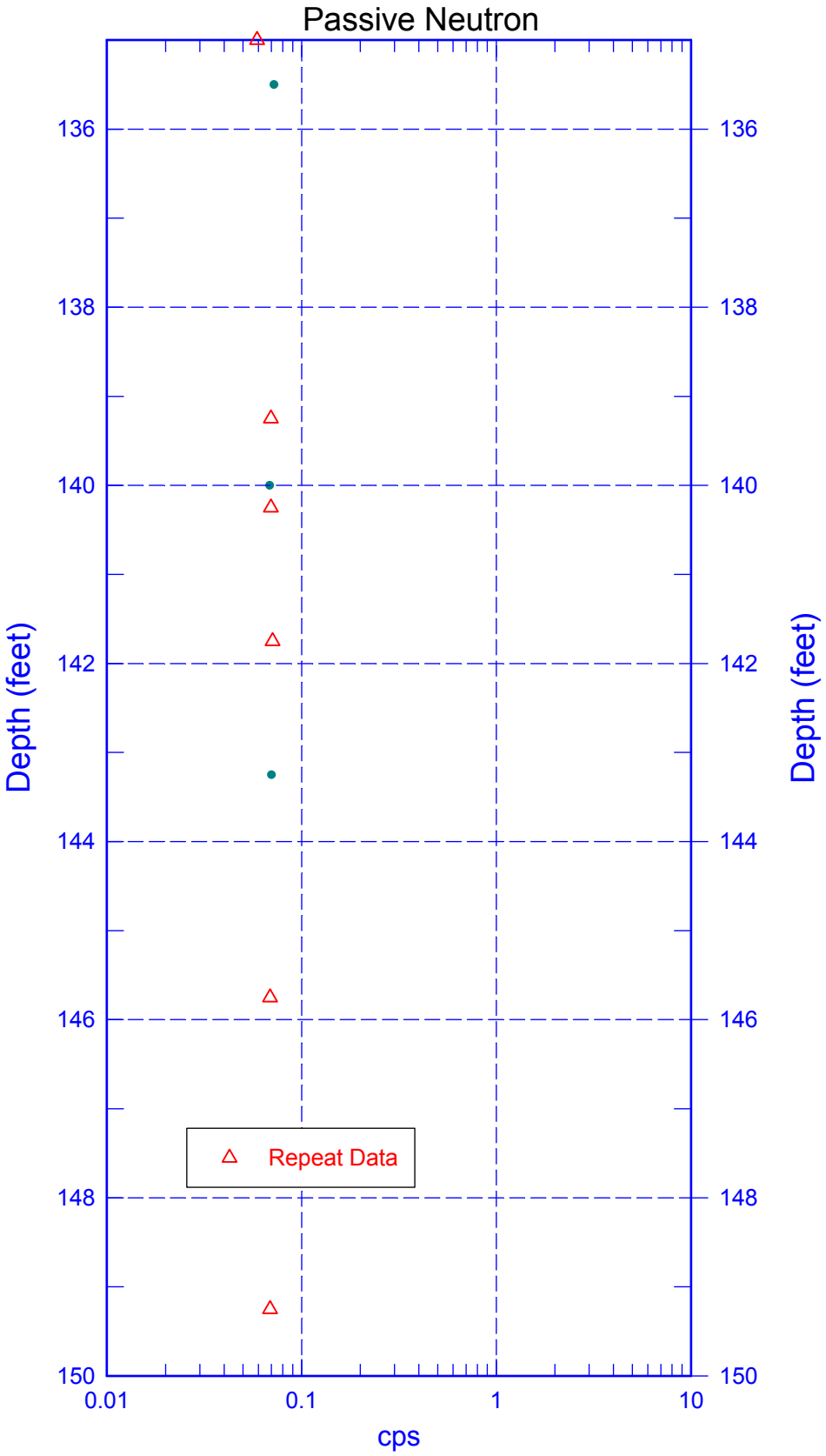
Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 04/26/05

299-W15-06 (A7349)
Repeat Section for Passive Neutron

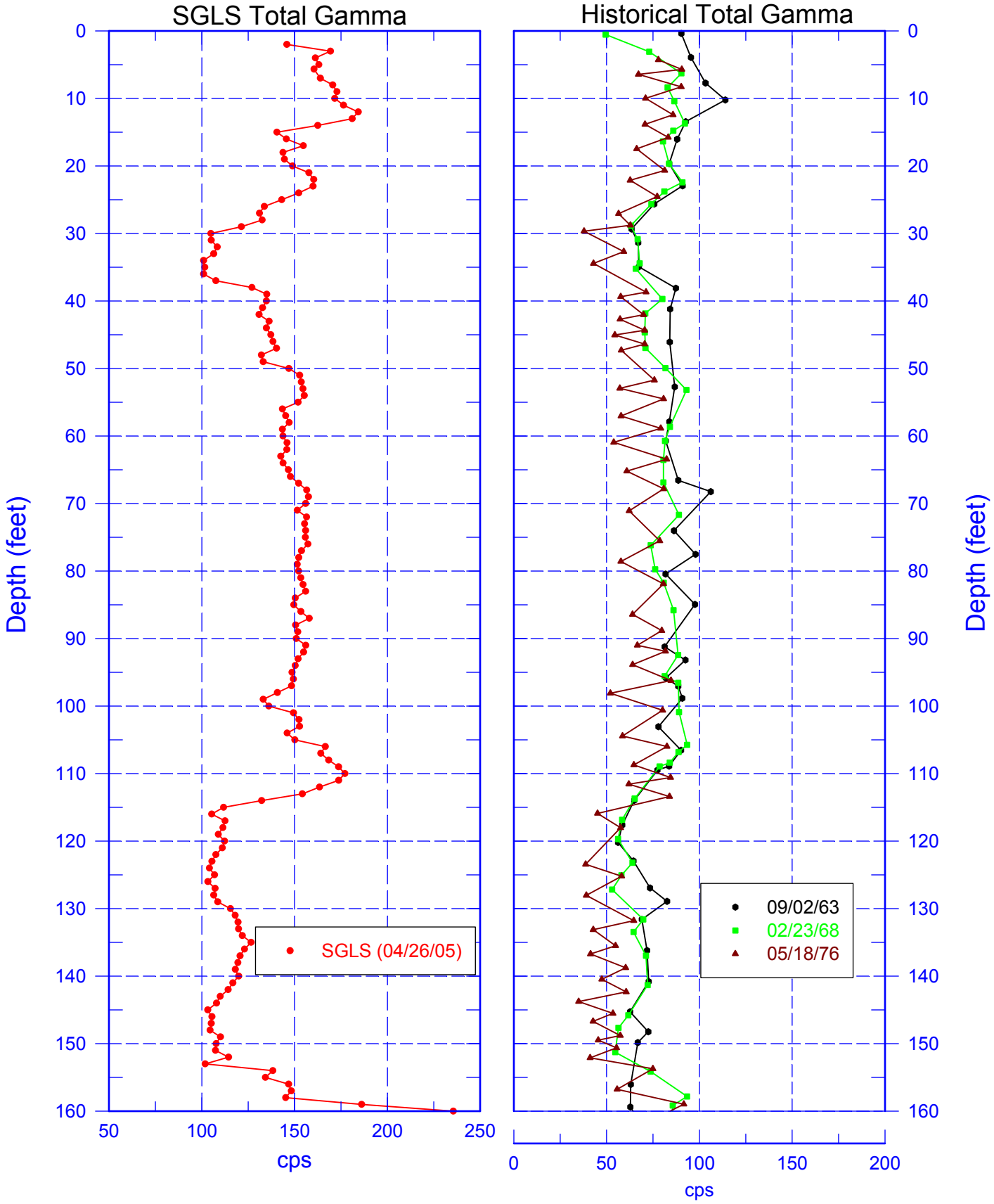


Zero Reference = Top of Casing

Last Logging Date - 04/26/05

299-W15-06 (A7349)

Total Gamma

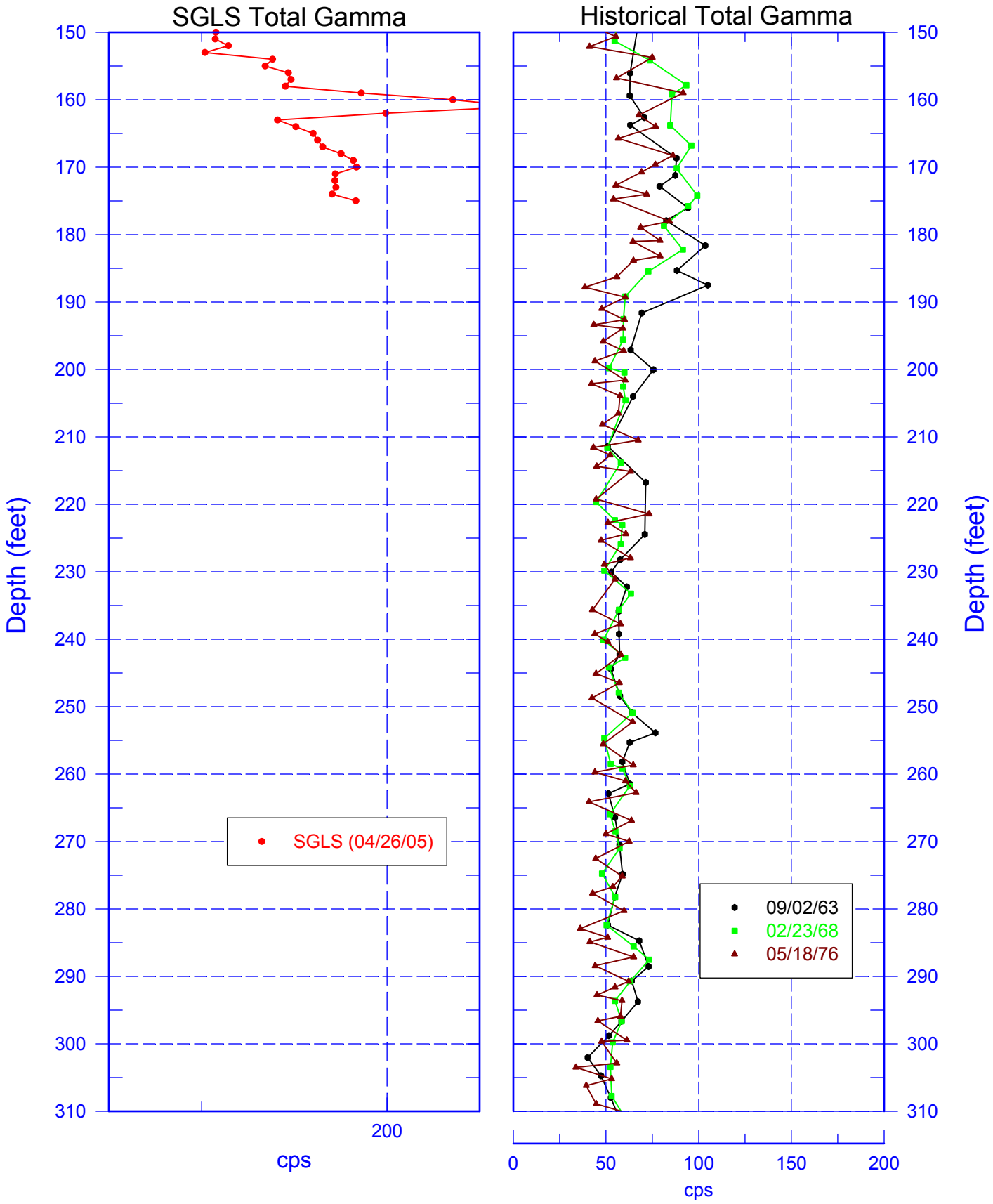


Zero Reference = Top of Casing

Last Logging Date - 04/26/05

299-W15-06 (A7349)

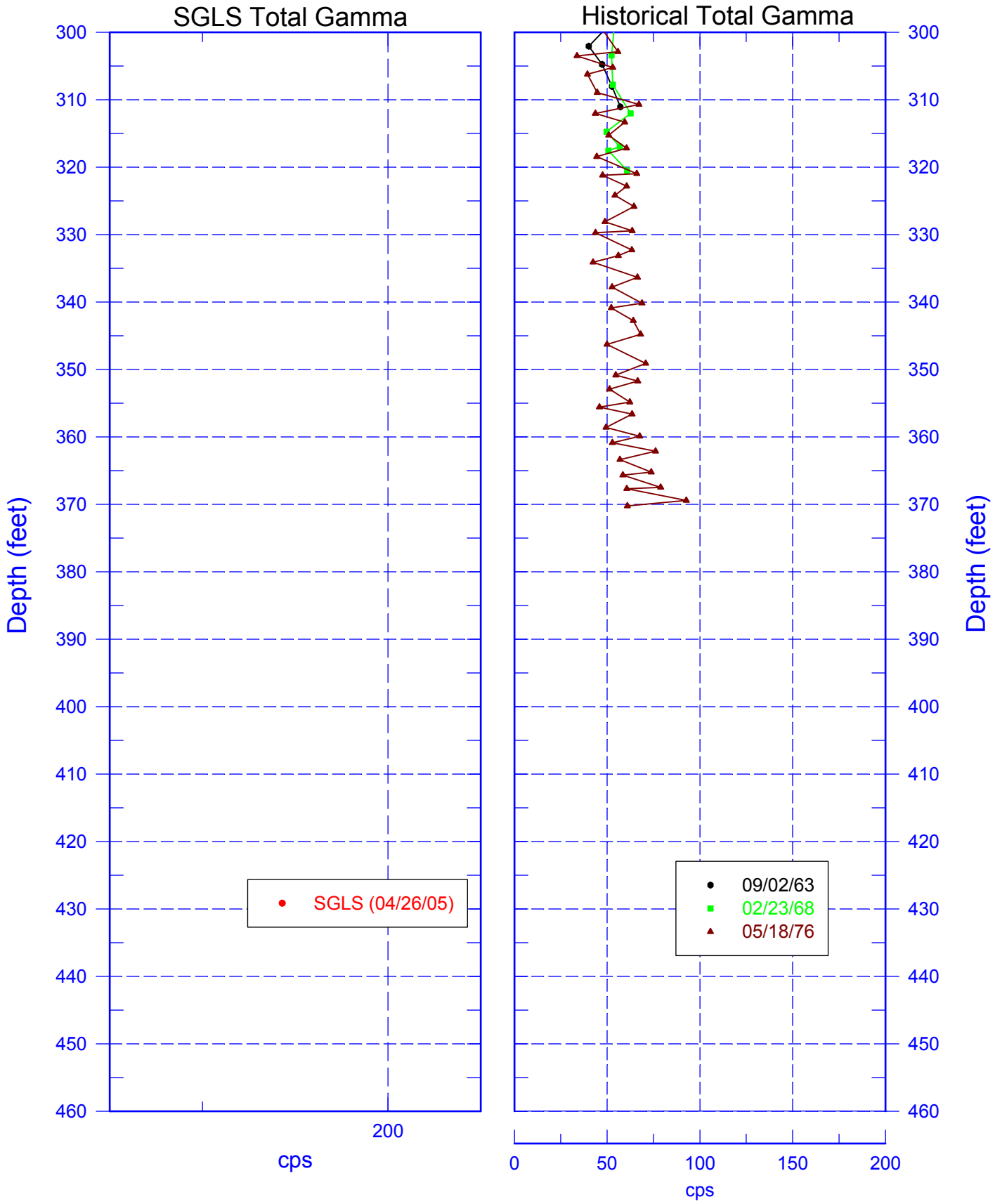
Total Gamma



Zero Reference = Top of Casing

Last Logging Date - 04/26/05

299-W15-06 (A7349)
Total Gamma



Zero Reference = Top of Casing

Last Logging Date - 04/26/05