



299-E33-338 (C3391)

Log Data Report

Borehole Information:

Borehole: 299-E33-338 (C3391)		Site: B Farm Monitoring Well			
Coordinates (Plant)		GWL (ft)¹: 250.0	GWL Date: 08/13/01		
North N/A ³	East N/A	Drill Date 08/01	TOC² Elevation N/A	Total Depth (ft) 275.0	Type cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel (threaded)	0.25	11.875	10.375	0.75	0	50.0
Steel (threaded)	2.13	10.6875	9.8125	0.4375	0	271.0

Borehole Notes:

The borehole information provided above is derived from personal communication with T. Hottle, Bechtel Hanford Incorporated site representative. The casing information is derived from caliper measurements collected in the field by MACTEC-ERS personnel. Logging measurements are referenced to ground surface.

Logging Equipment Information:

Logging System: Gamma 2B	Type: SGLS (35%)
Calibration Date: 09/00	Calibration Reference: GJO-2001-245-TAR
	Logging Procedure: MAC-HGLP 1.6.5

Logging System: Gamma 2E	Type: NMLS
Calibration Date: 05/01	Calibration Reference: GJO-2001-247-TAR
	Logging Procedure: MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 (Repeat)	4	5 (Repeat)
Date	08/13/01	08/13/01	08/13/01	08/14/01	08/14/01
Logging Engineer	Musial	Musial	Musial	Musial	Musial
Start Depth (ft)	0.0	125.0	207.0	206.0	225.0
Finish Depth (ft)	126.0	207.0	186.0	275.0	218.0
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	B0034CAB	B0034CAB	B0034CAB	B0035CAB	B0035CAB
Start File	B0034000	B0034127	B0034210	B0035000	B0035070
Finish File	B0034126	B0034209	B0034231	B0035069	B0035077
Post-Verification	B0034CAA	B0034CAA	B0034CAA	B0035CAA	B0035CAA

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 (Repeat)			
Date	08/14/01	08/14/01			
Logging Engineer	Musial	Musial			
Start Depth (ft)	48.0	60.0			
Finish Depth (ft)	256.0	81.0			
Count Time (sec)	n/a	n/a			
Live/Real	n/a	n/a			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
ft/min	1.0	1.0			
Pre-Verification	C0011CAB	C0011CAB			
Start File	C0011000	C0011832			
Finish File	C0011831	C0011916			
Post-Verification	C0011CAA	C0011CAA			

Logging Operation Notes:

SGLS and NMLS logging were performed over two separate days. The SGLS logging occurred inside double casing between 0 and 50 ft and through single casing from 50 to 271 ft; the bottom 4 ft of the borehole did not have casing. A longer count time (200 sec) was required with the SGLS because of the relatively thick casing. To obtain reliable spectra while minimizing overall logging time, the depth interval was increased from 0.5 to 1.0 ft. Repeat sections for the SGLS logging were collected from 186 to 207 ft and from 218 to 225 ft.

The NMLS logging occurred from 48 to 256 ft in depth through a single casing except between 48 and 50 ft. The neutron moisture tool was run centralized. A single NMLS logging repeat section was collected between 60 and 81 ft.

Analysis Notes:

Analyst:	Henwood	Date:	08/28/01	Reference:	MAC-VZCP 1.7.9 Rev. 2
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Pre-run and post-run verification of the logging tool were performed for each day's log event. The post-run verification for log runs 4 and 5 failed the acceptance criteria. The peak counts per second for the 609- and 1461-keV energy peaks were below the lower control limit. Examination of spectra indicates the detector appears to be functioning normally and the log data are provisionally accepted. The pre-verification spectra collected during log runs 4 and 5 and the post-verification for log runs 1, 2, and 3 were used for the energy and resolution calibration for the data processing.

Each SGLS 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 and water as appropriate. No dead time corrections were necessary in this borehole as it ranged below 10 percent.

Verification measurements were also collected for the NMLS. Acceptance criteria have not yet been established for the newly deployed logging system. However, the pre- and post-run total count measurements agree within about 5 percent, suggesting the logging system was operating properly.

Moisture calibration models at Hanford for the borehole diameter and casing used in this borehole have not been established. Thus, the neutron log was not processed to estimate volumetric moisture content because the relatively large borehole diameter and casing thickness are beyond the range of conditions for which the tool was calibrated. Borehole diameter is a major factor in neutron response. Neutron data are presented as

gross counts. In general, an increase in neutron count is indicative of an increase in moisture content, but a quantitative calculation of volumetric moisture cannot be made at this time.

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 lower energy 609-keV peak could not be distinguished in many of the spectra within the double-cased interval from 0 to 50 ft.

Repeat log plots at selected depth intervals for KUT concentrations and neutron count rate measurements were evaluated. The plots indicate good agreement between successive log runs, demonstrating repeatability in both depth and concentration measurement.

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]), a combination of man-made, KUT, total gamma and neutron, total gamma plotted with dead time, and repeat section plots for KUT and neutron. 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 limit (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, casing corrections, or water corrections. These errors are discussed in the calibration report.

Results and Interpretations:

The only man-made radionuclide detected in this borehole was ^{137}Cs . This radionuclide was measured near the ground surface at less than 1 pCi/g.

The KUT logs do not have sufficient character in most of the borehole to delineate any definitive lithologic units. Changes in the KUT and total gamma at about 50 ft are the result of a change in the casing configuration. The casing corrections for the interval from 0 to 50 ft are based on a combined thickness for two casings of about 1.25 in. The uncertainty of the casing correction for this thickness is significant and it appears the concentrations have been slightly underestimated in this depth interval.

Notable intervals of apparent higher moisture content exist at about 105, 172, and 222 ft. It appears these intervals are associated with finer grained material on the basis of slightly elevated concentrations of ^{232}Th . At the time of neutron logging, groundwater was encountered at about 255 ft.

¹ GWL – groundwater level

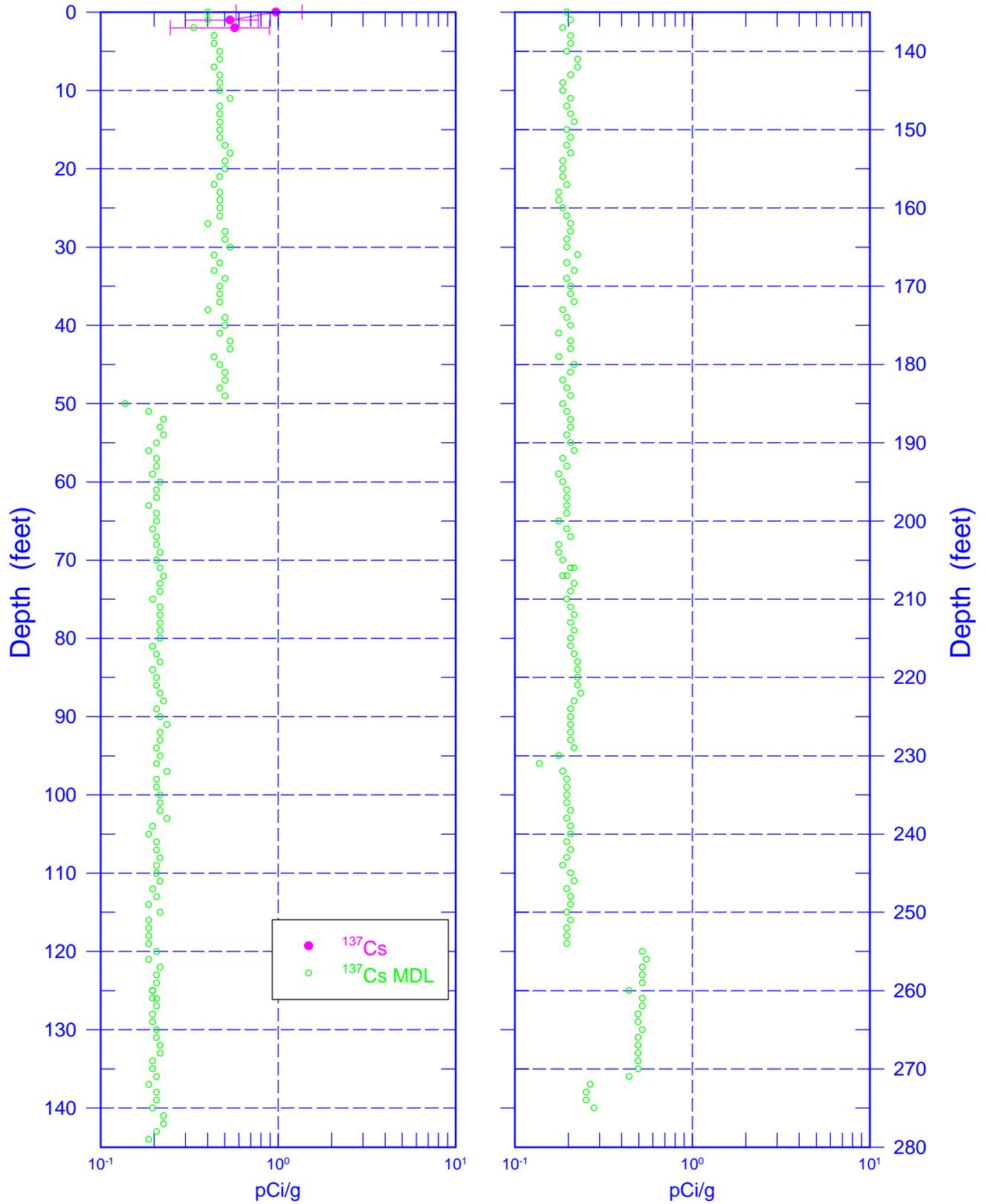
² TOC – top of casing

³ N/A – not available

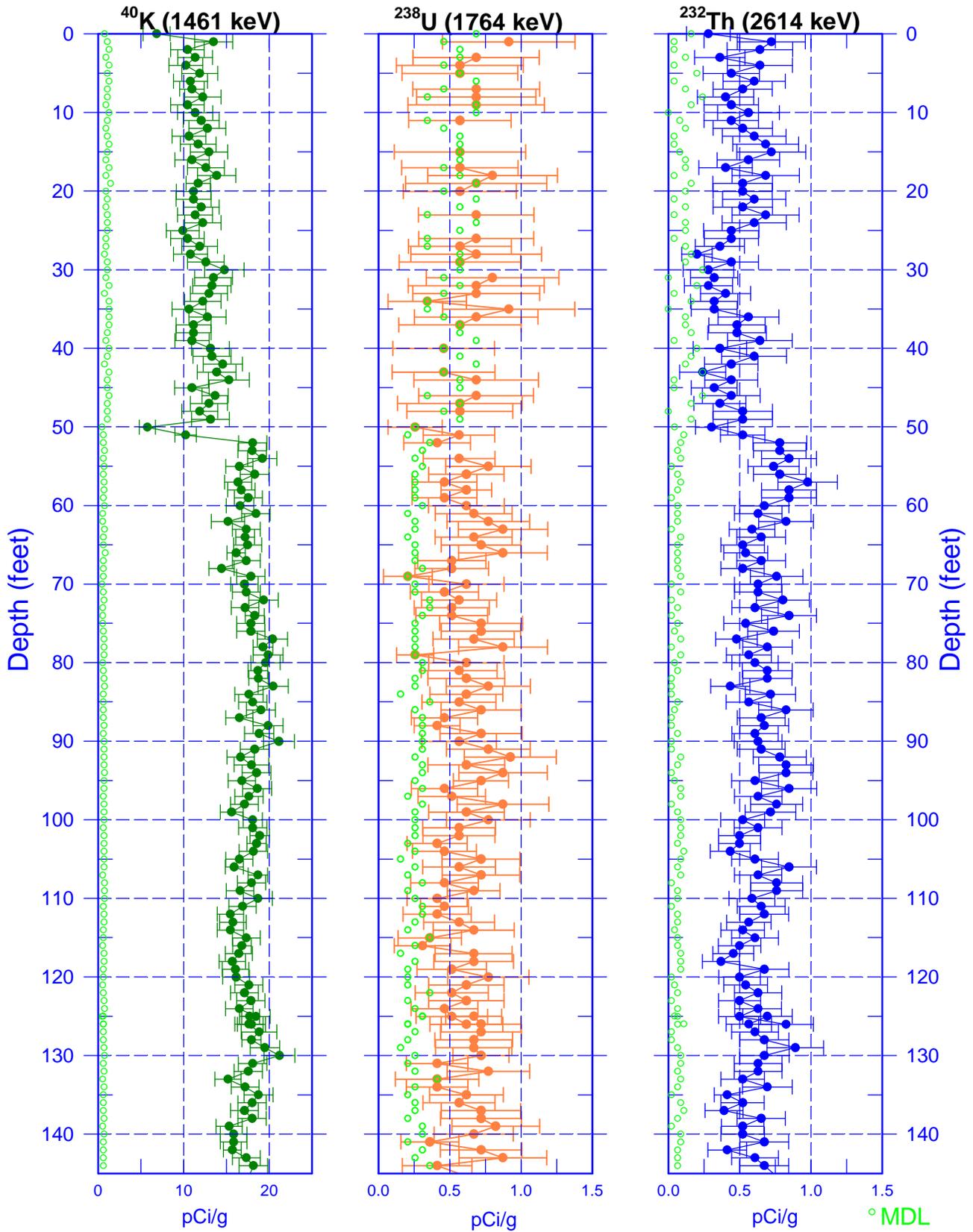
⁴ n/a – not applicable

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Man-Made Radionuclide Concentrations

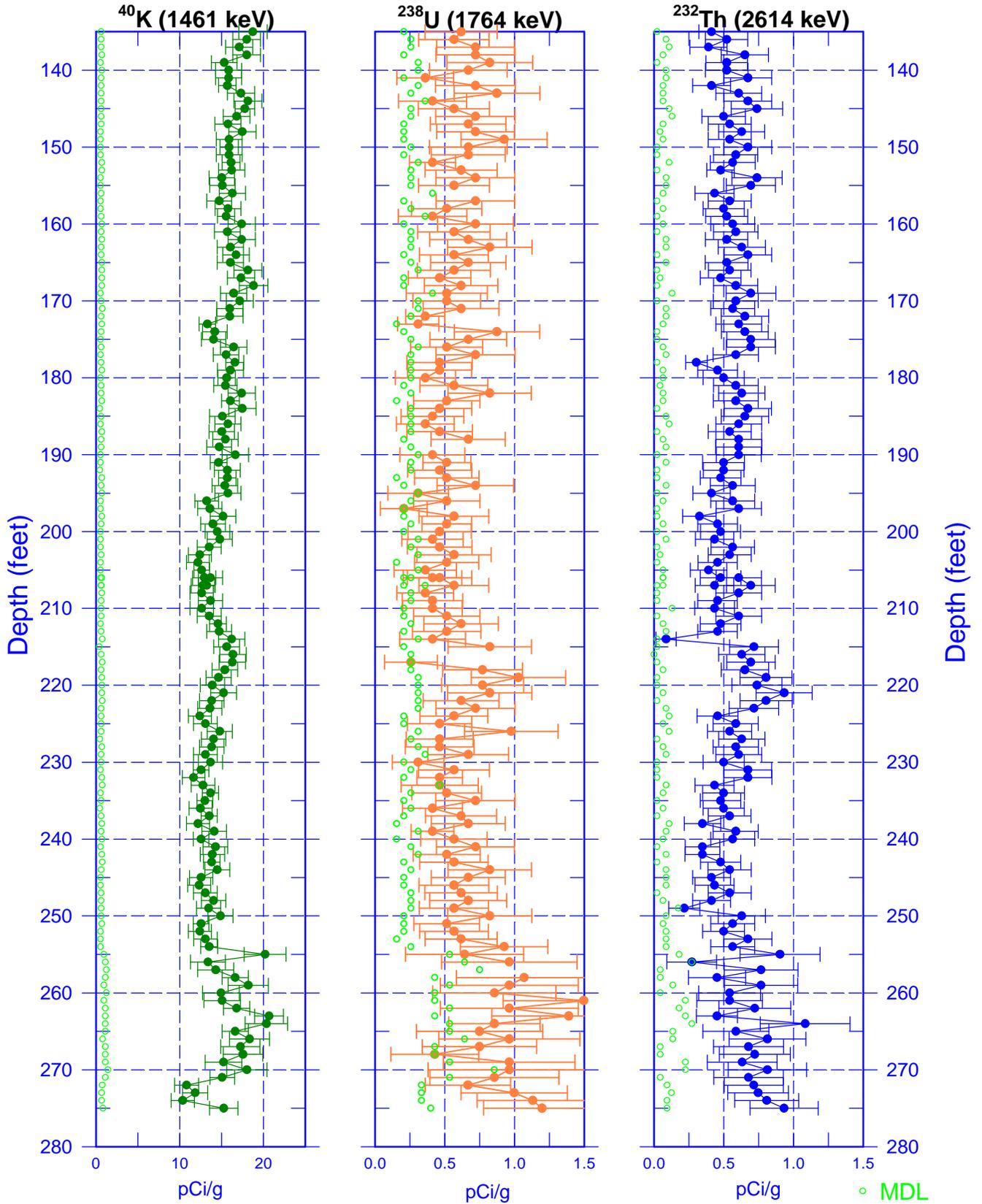


299-E33-338 (C-3391) Natural Gamma Logs

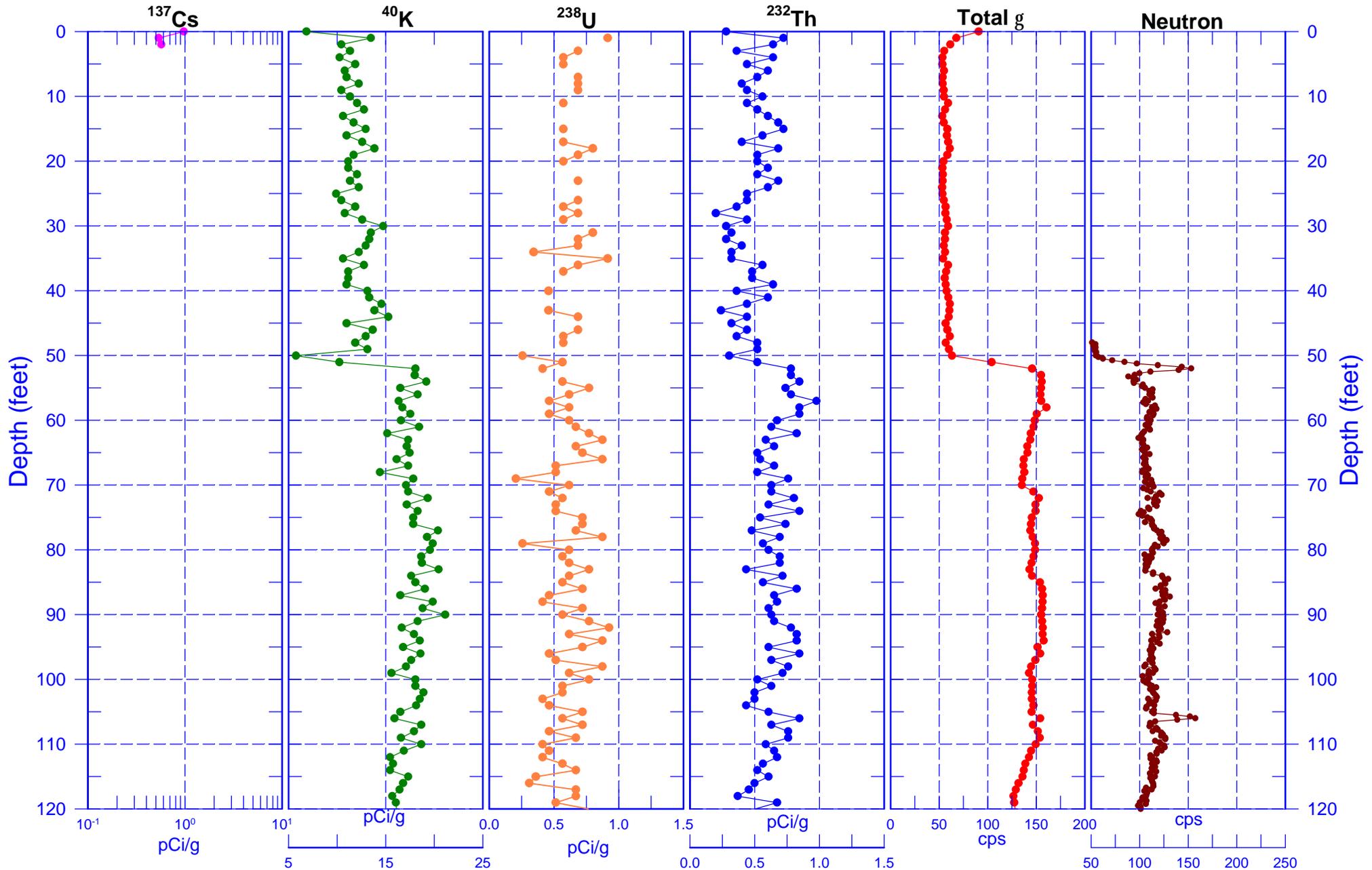


299-E33-338 (C-3391)

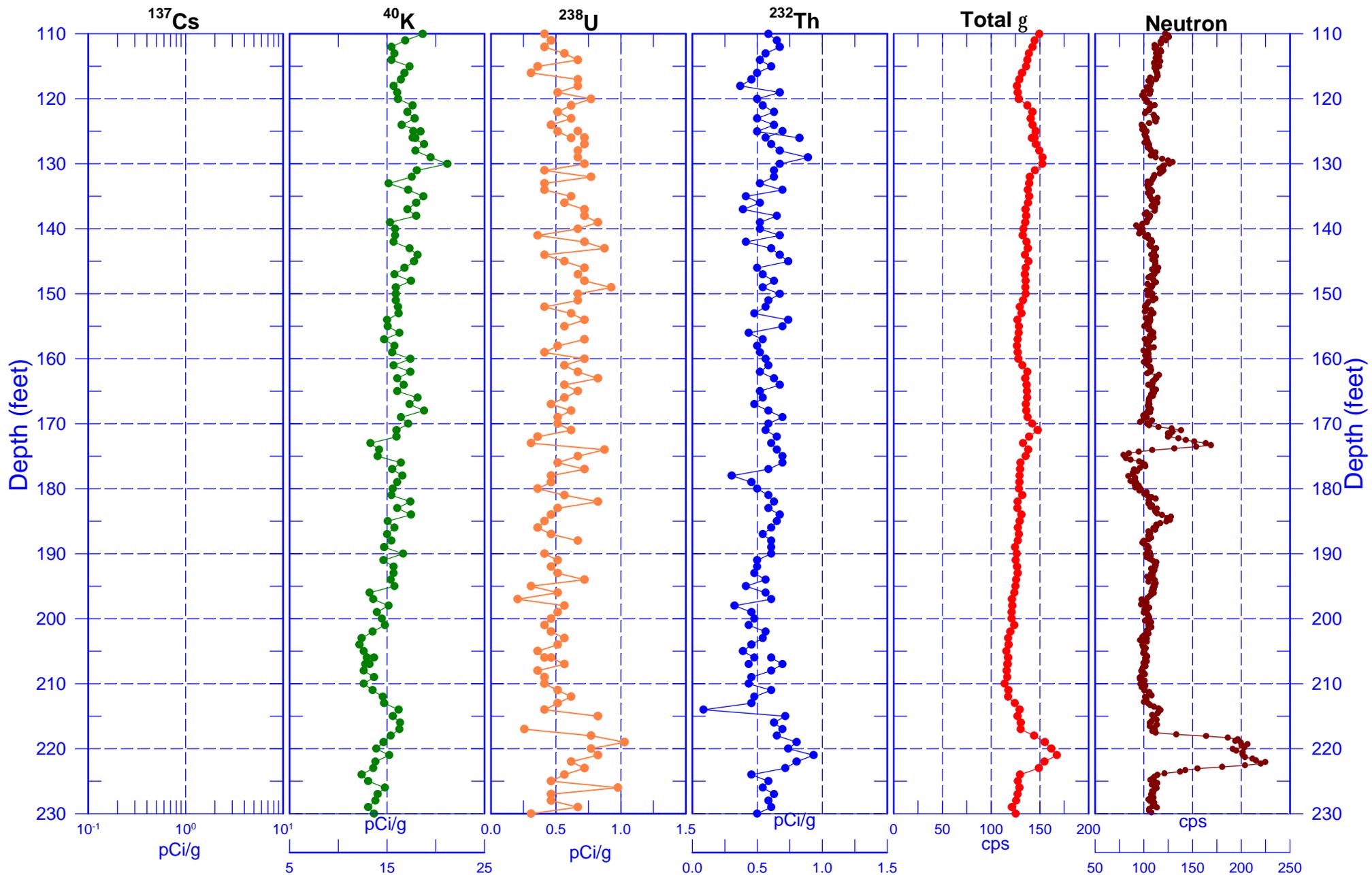
Natural Gamma Logs



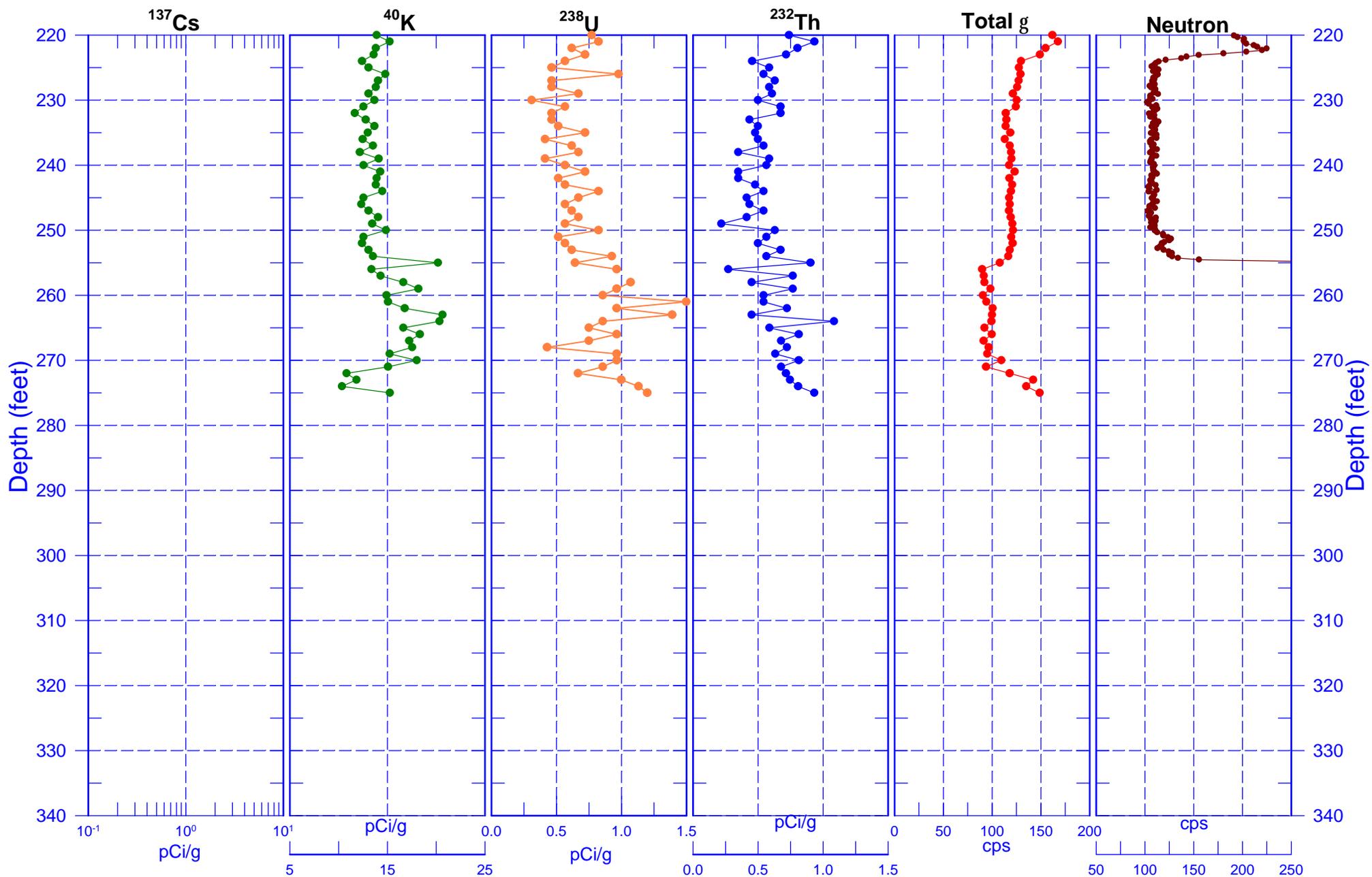
299-E33-338 (C-3391) Combination Plot



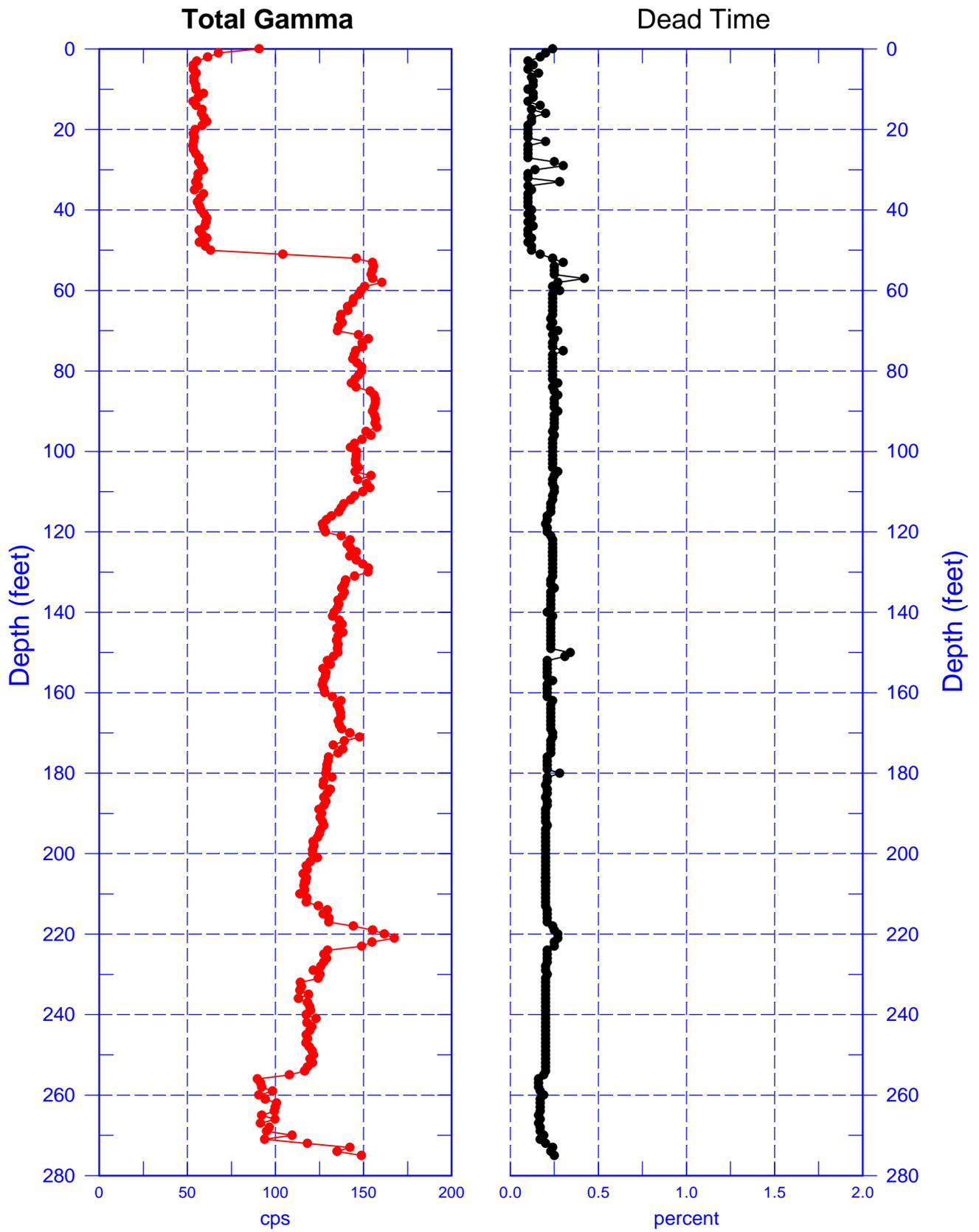
299-E33-338 (C-3391) Combination Plot



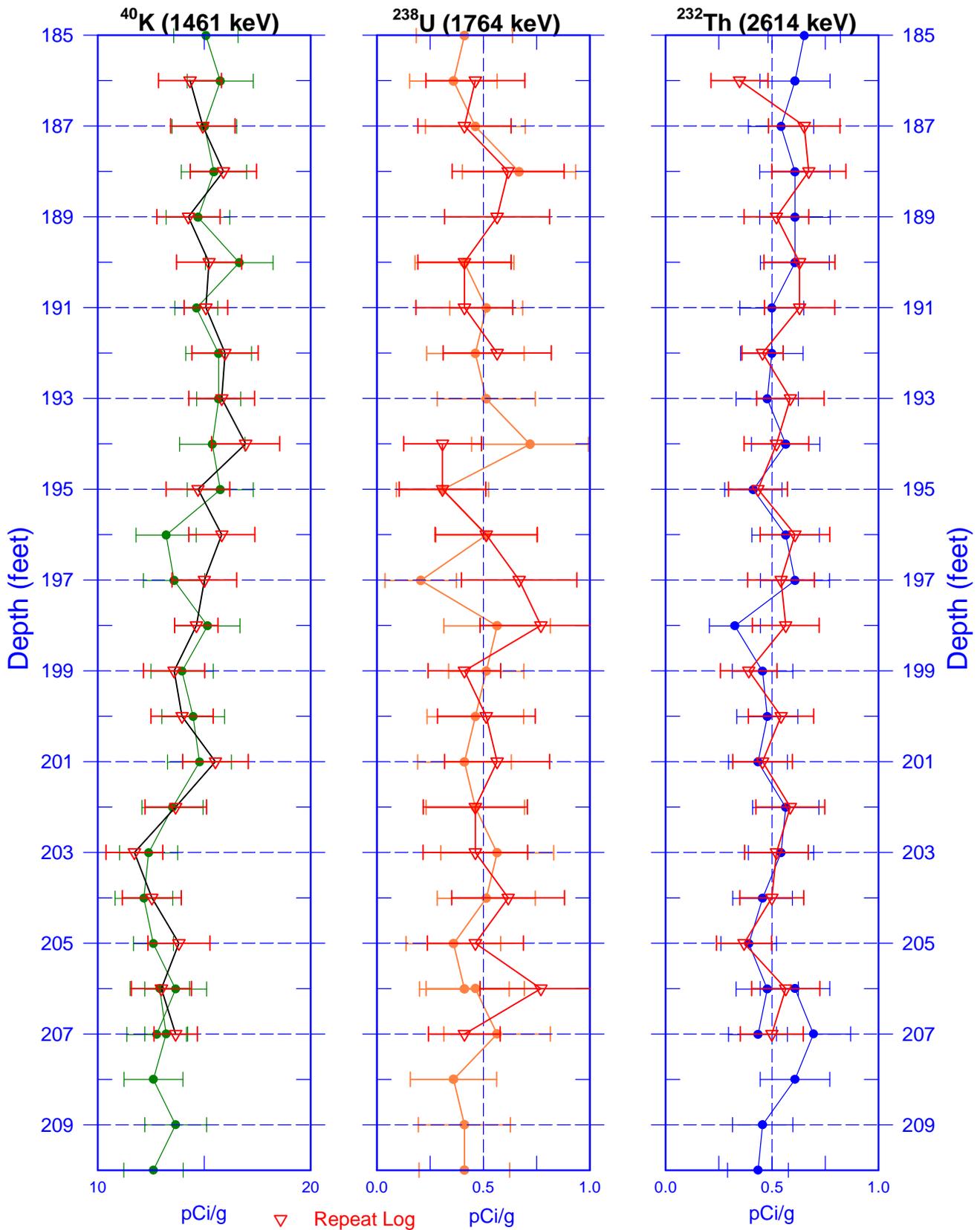
299-E33-338 (C-3391) Combination Plot



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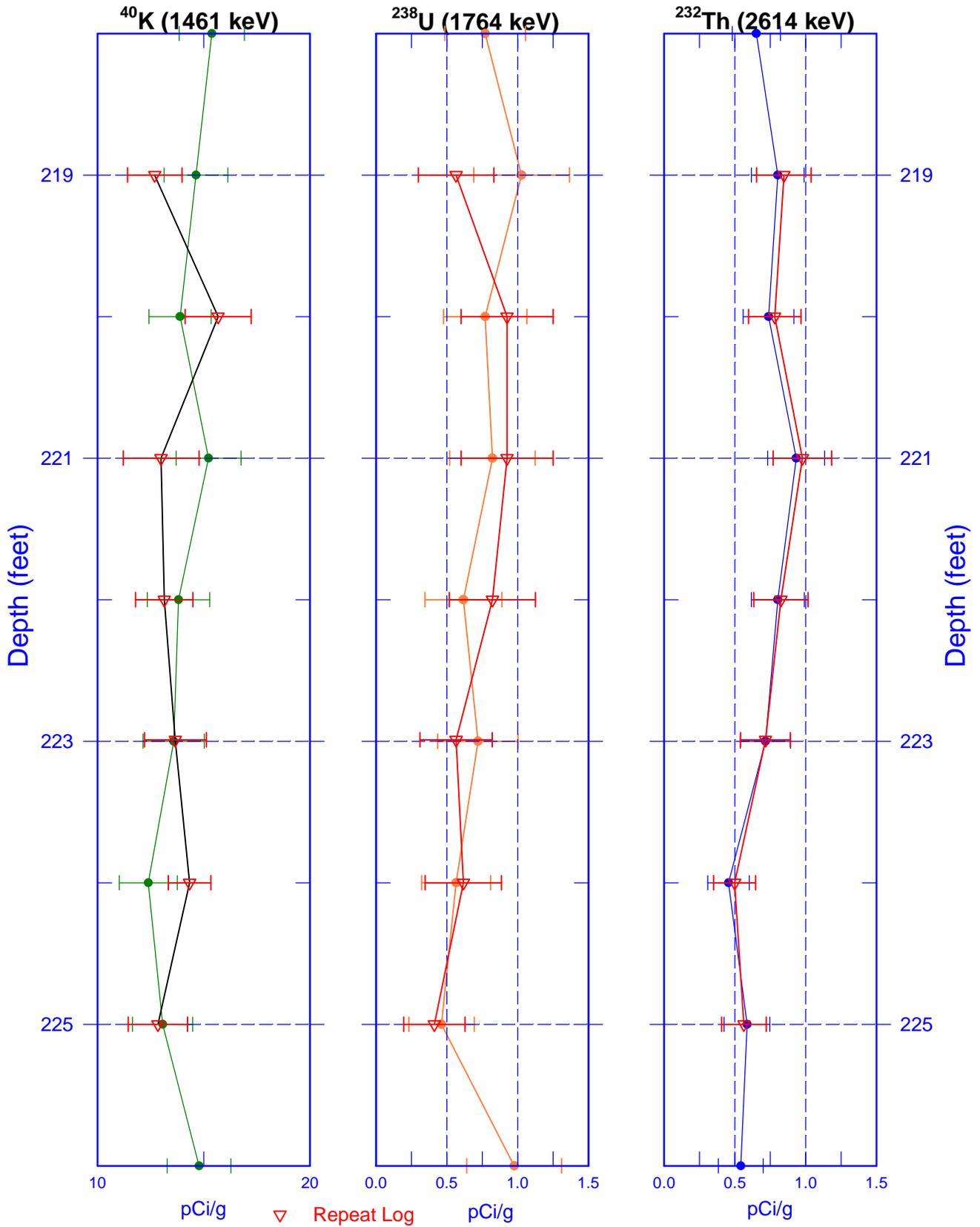


299-E33-338 (C-3391) Natural Gamma Logs (Repeat)



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Natural Gamma Logs (Repeat)



299-E33-338 (C-3391) Neutron Repeat Section

