

299-E13-09 (A5857)
Log Data Report

Borehole Information:

Borehole: 299-E13-09 (A5857)			Site: South of 216-B-22 Trench			
Coordinates (WA St Plane)		GWL¹ (ft): 346.3		GWL Date: 10/30/03		
North (m)	East (m)	Drill Date	Ground Level Elevation (ft)	Total Depth (ft)	Type	
134421.205	573347.153	08/56	747.58	364.0	Cable	

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter	Inside Diameter	Thickness	Top (ft)	Bottom (ft)
		(in.)	(in.)	(in.)		
Welded Steel	2.55	6 5/8	6 1/8	1/4	+2.55	98.0
Threaded Steel	0.0	unknown	8	unknown	0.0	364.0

Borehole Notes:

The logging engineer measured the 6-in. outside casing diameter with a caliper. Inside diameter for the 6-in. casing and the caliper were measured using a steel tape; measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. The existence of the 8-in. casing is based on Ledgerwood (1993) because it was not visible at the ground surface. Casing stickup was measured using a steel tape. Groundwater level was measured by the logging engineer.

Ledgerwood (1993) reported the 6-in. casing was set to 98 ft on a packer in 1984. The 8-in. casing was perforated from 0 to 20 and 30 to 93 ft. Grout was placed in the annular space between the 6- and 8-in. casings and through the perforations into the formation. The 8-in. casing was also perforated between 323 and 363 ft, although no grout is reported as having been used in this interval. Casing depths and total depth of the borehole were derived from Ledgerwood (1993). Depth to the bottom of the borehole was reported at 357.6 ft in January 1992. Total logging depth was 345 ft, approximately 1 ft above groundwater. Stoller is not permitted to log below groundwater due to waste management issues.

Logging Equipment Information:

Logging System: Gamma 1E	Type: SGLS (70%) SN: 34TP40587A
Calibration Date: 03/03	Calibration Reference: GJO-2003-468-TAR
	Logging Procedure: MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat	4	5
Date	10/30/03	10/31/03	11/03/03	11/03/03	11/03/03
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	69.0	345.0	231.0	195.0	99.0

Log Run	1	2	3 Repeat	4	5
Finish Depth (ft)	3.0	196.0	196.0	99.0	68.0
Count Time (sec)	150	100	100	100	150
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 ²	N/A	N/A	N/A	N/A
Pre-Verification	BE062CAB	BE063CAB	BE064CAB	BE064CAB	BE064CAB
Start File	BE062000	BE063000	BE064000	BE064036	BE064133
Finish File	BE062066	BE063149	BE064035	BE064132	BE064164
Post-Verification	BE062CAA	BE063CAA	BE064CAA	BE064CAA	BE064CAA
Depth Return Error (in.)	-1	-2	N/A	N/A	N/A
Comments	No fine-gain adjustment.				

Logging Operation Notes:

Spectral gamma logging was performed in this borehole from October 30 to November 3, 2003. Logging was conducted with a centralizer on the sonde only for log run 1 between 3 and 69 ft. Because this interval contained two casings and grout, a counting time of 150 seconds was used. Below 69 ft a centralizer was not used and counting time was 100 seconds for all data collected below 99 ft in depth. Logging data acquisition is referenced to the top of casing. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	11/13/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A combined casing correction for 0.572-in.-thick casing was applied to the log data between 3 and 98 ft. Below 98 ft a correction for 0.322-in.-thick casing was applied.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EJul03.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. Dead time corrections were applied where dead times exceeded 10.5 percent; no dead times in excess of 10.5 percent were encountered. No correction for water was necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (¹³⁷Cs) detected in the borehole, naturally occurring radionuclides (⁴⁰K, ²³⁸U, ²³²Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with 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, casing corrections, or water corrections. Historical gross gamma logs from Fecht et al. (1977) collected in 1959 and 1976 are included. A repeat log section is also included.

Results and Interpretations:

¹³⁷Cs was the only man-made radionuclide detected in this borehole. ¹³⁷Cs was detected at a few sporadic locations throughout the borehole near its MDL of approximately 0.2 pCi/g.

Historical gross gamma logs showed elevated gamma activity in this borehole in 1959 at a depth of approximately 13 m (43 ft). By April 1968, this elevated activity had diminished to near background levels.

The most notable change in the KUT and total gamma occurs between 270 and 282 ft. The driller's log identified an interval from 266 to 279 ft as a "fine sand and some silt."

The interval from 68 to 99 ft (log run 5) exhibits elevated naturally occurring ²³⁸U and is likely the result of enhanced radon in the borehole.

The repeat section indicates good agreement of the naturally occurring KUT.

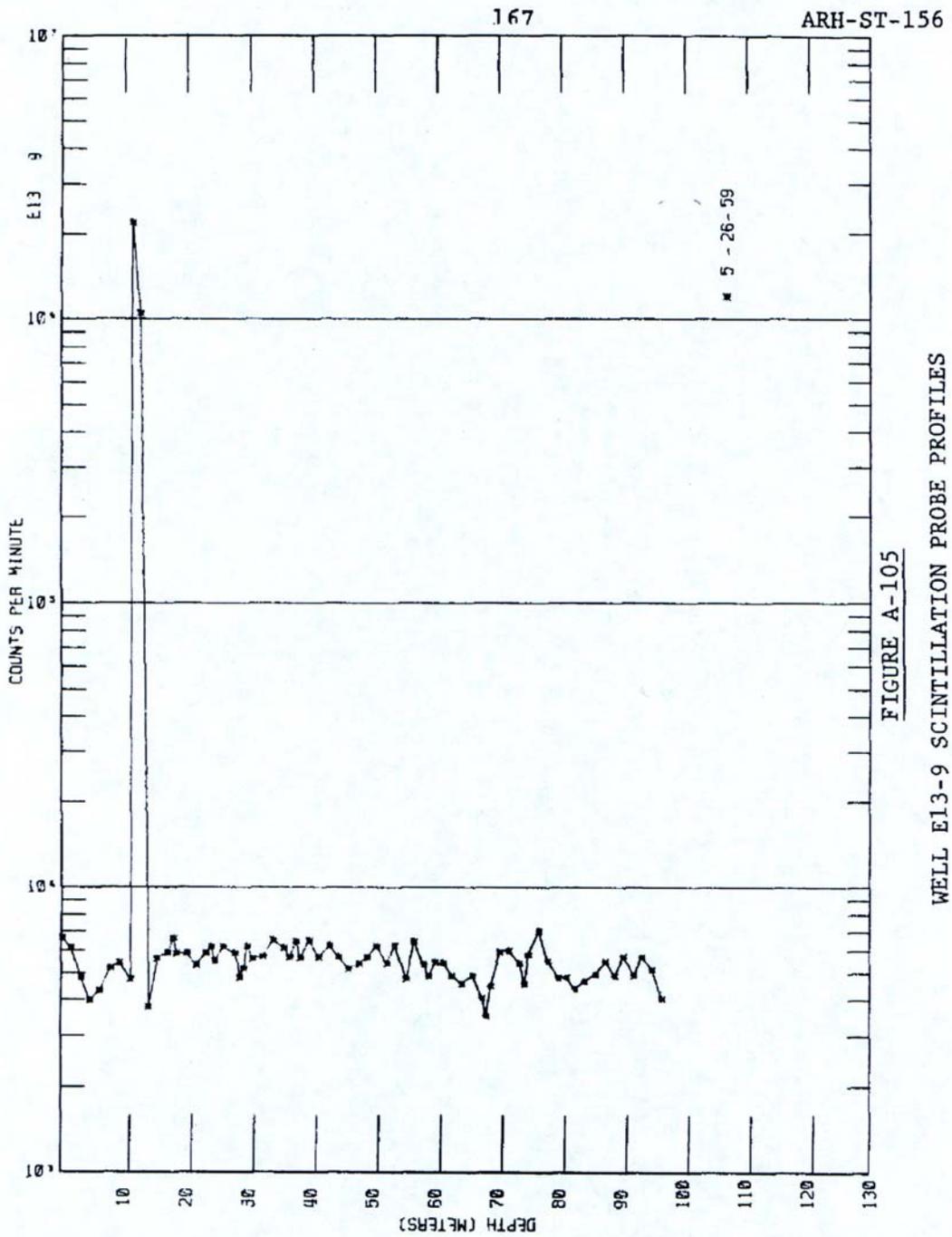
References:

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

¹ GWL – groundwater level

² N/A – not applicable



from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-E13-9, Logged on 5/26/59

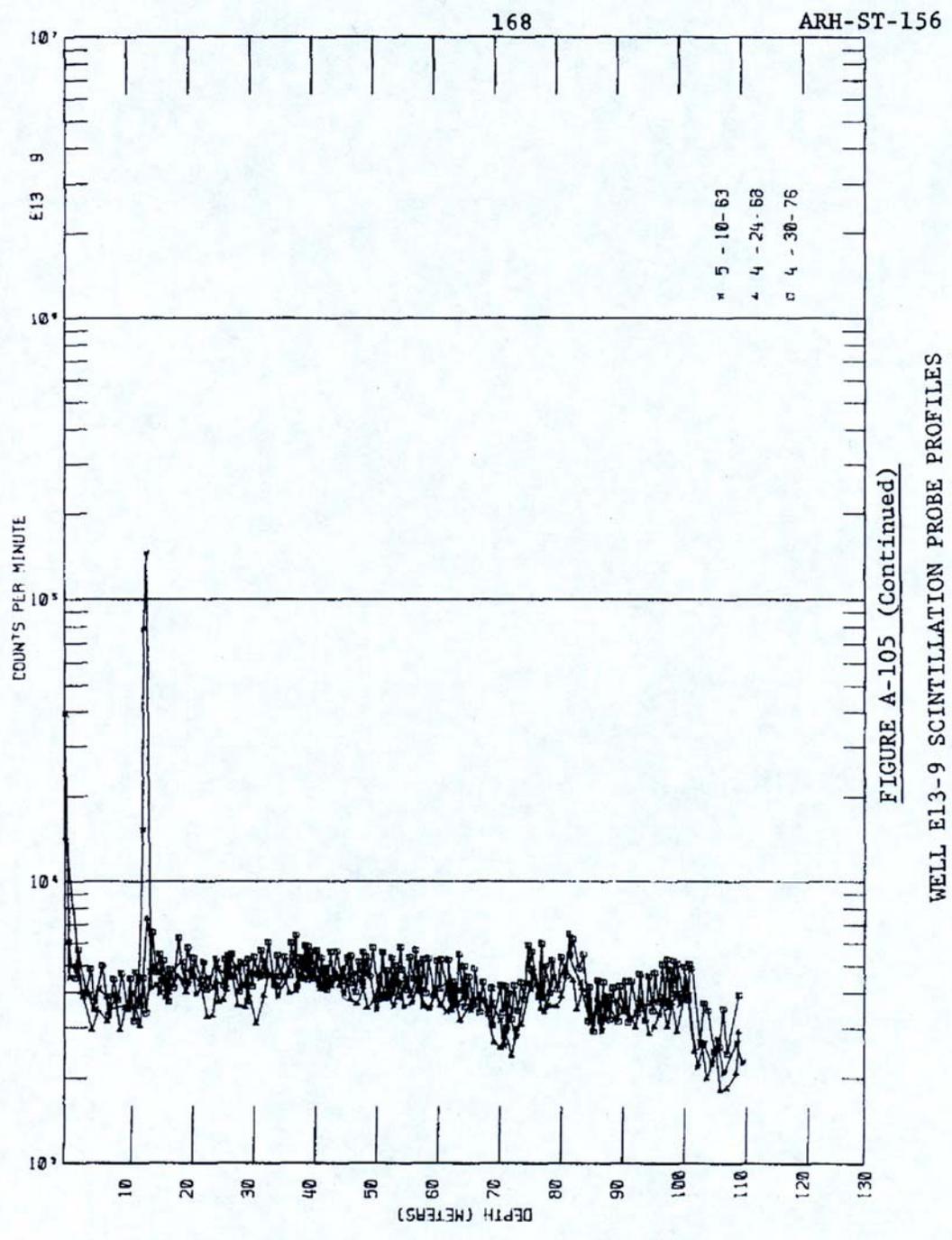


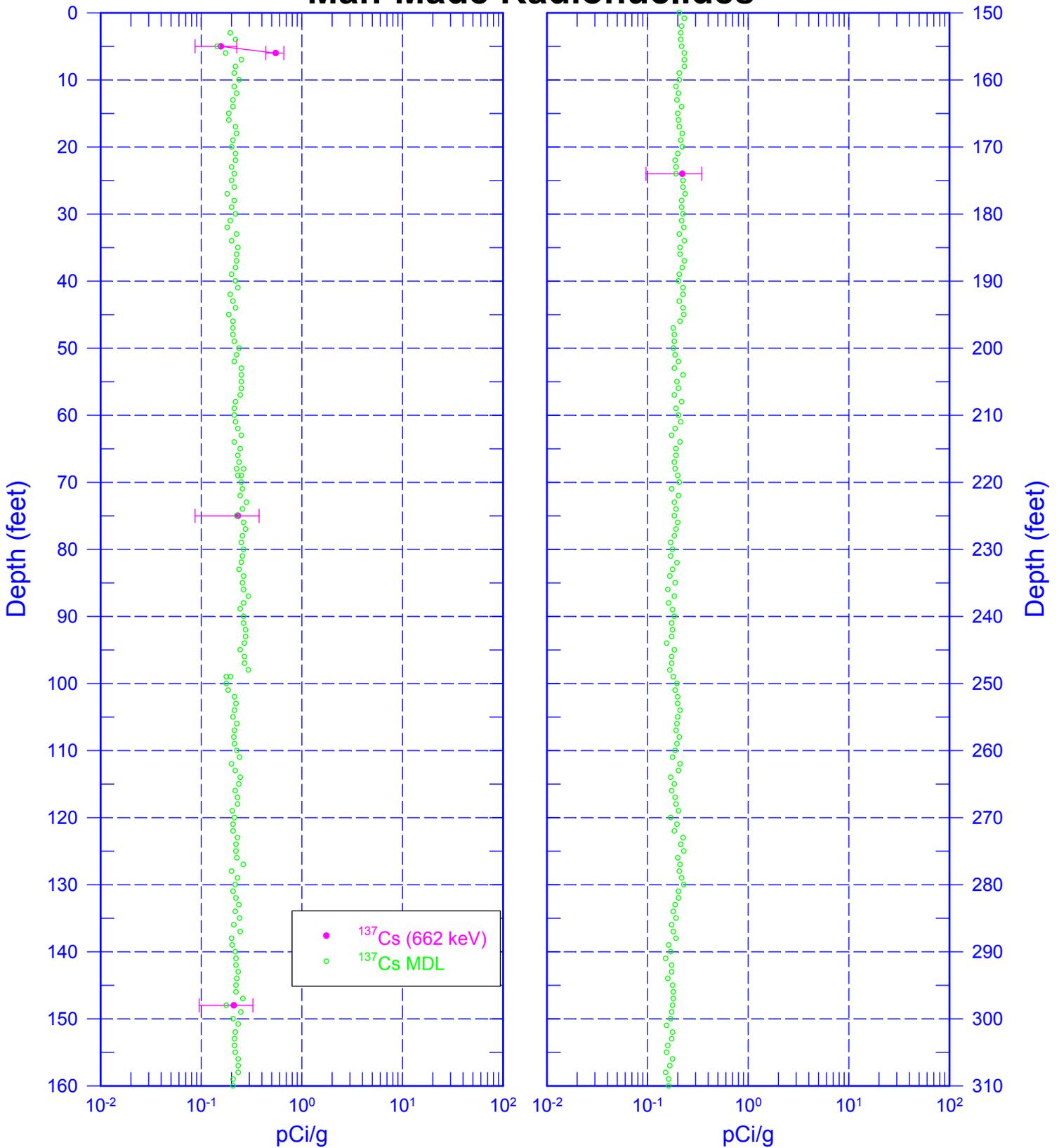
FIGURE A-105 (Continued)
 WELL E13-9 SCINTILLATION PROBE PROFILES

from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-E13-9, Logged on 5/10/63, 4/24/68, and 4/30/76

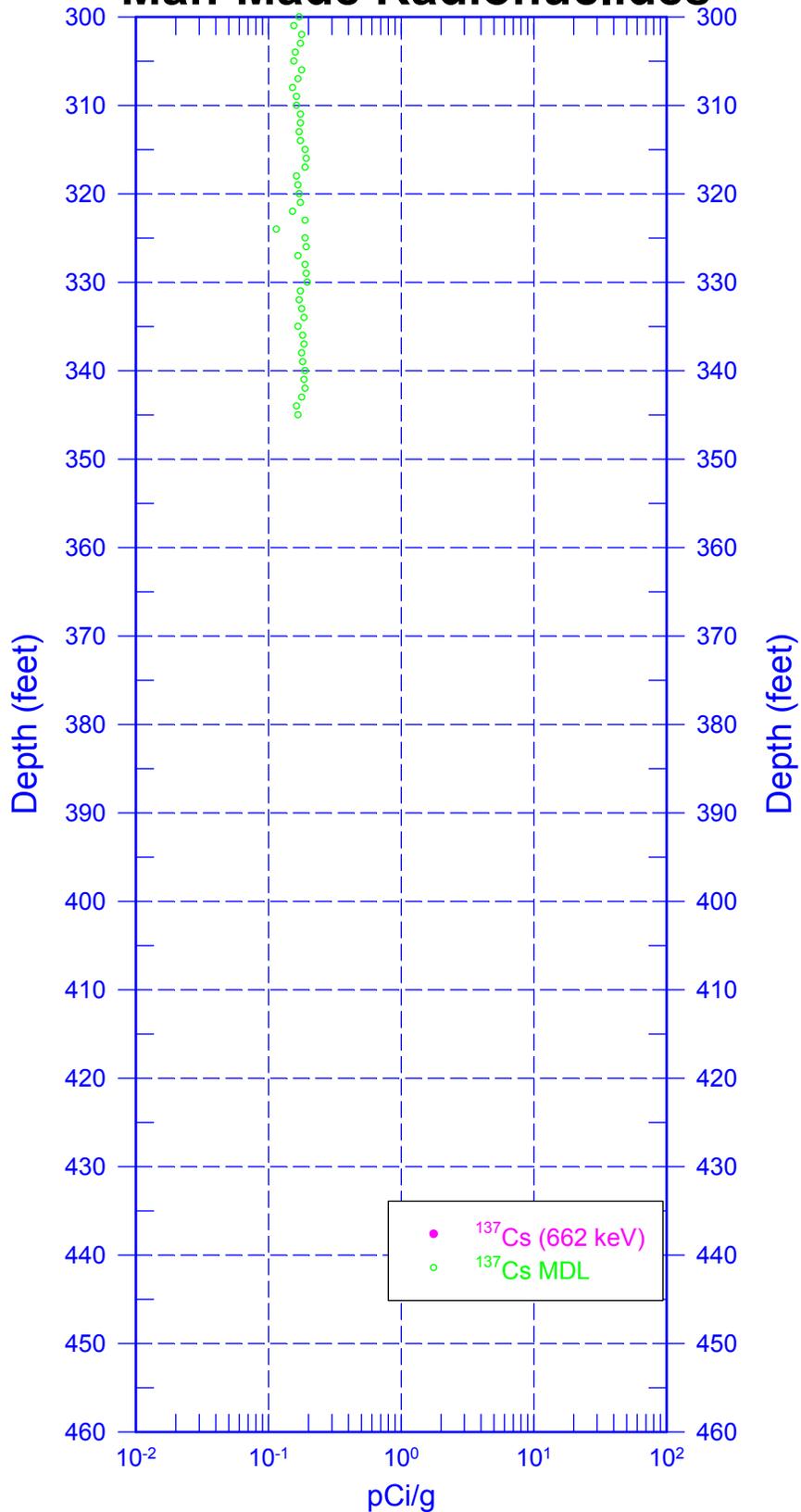
299-E13-09 (A5857)

Man-Made Radionuclides

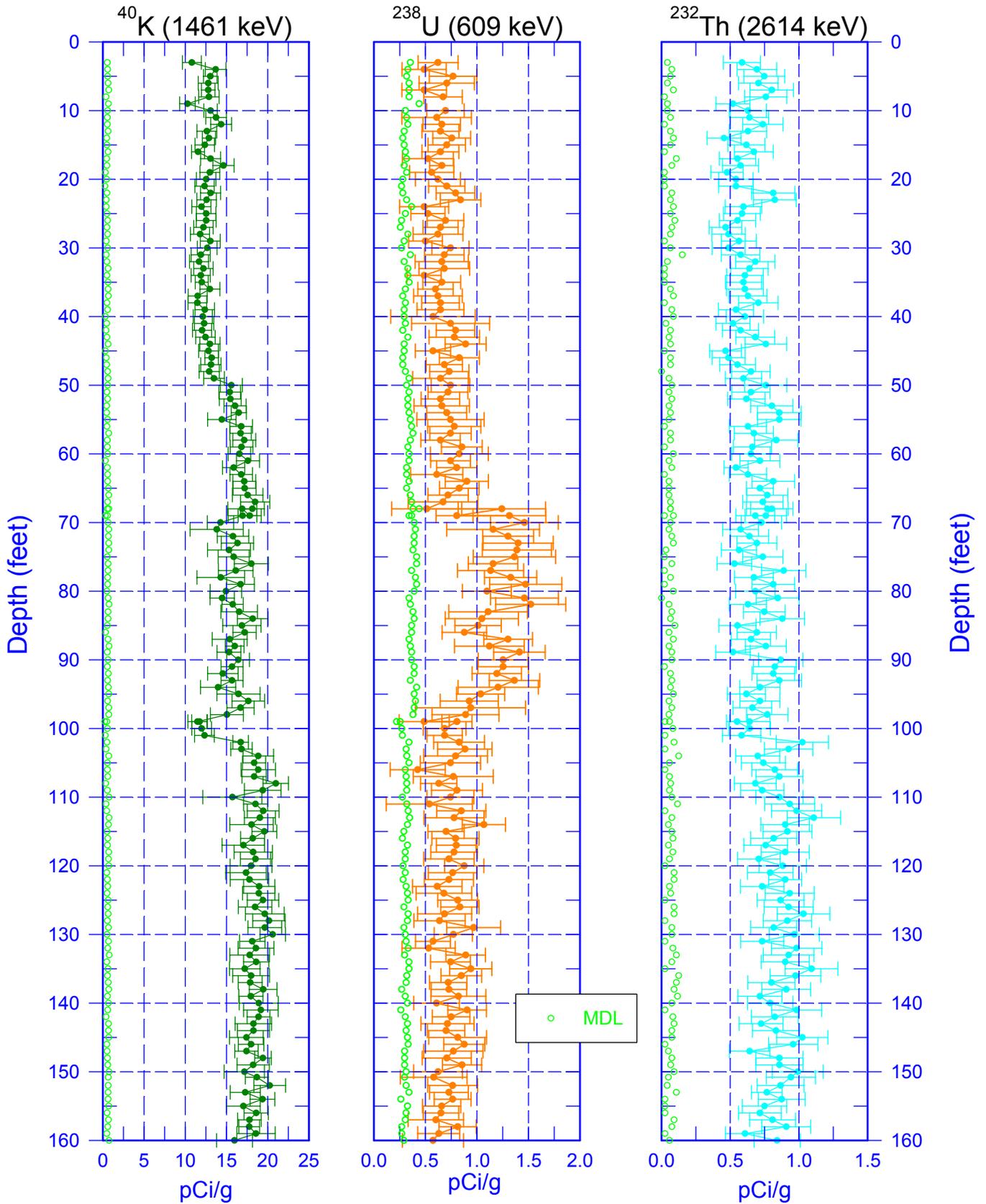


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Man-Made Radionuclides



299-E13-09 (A5857) Natural Gamma Logs



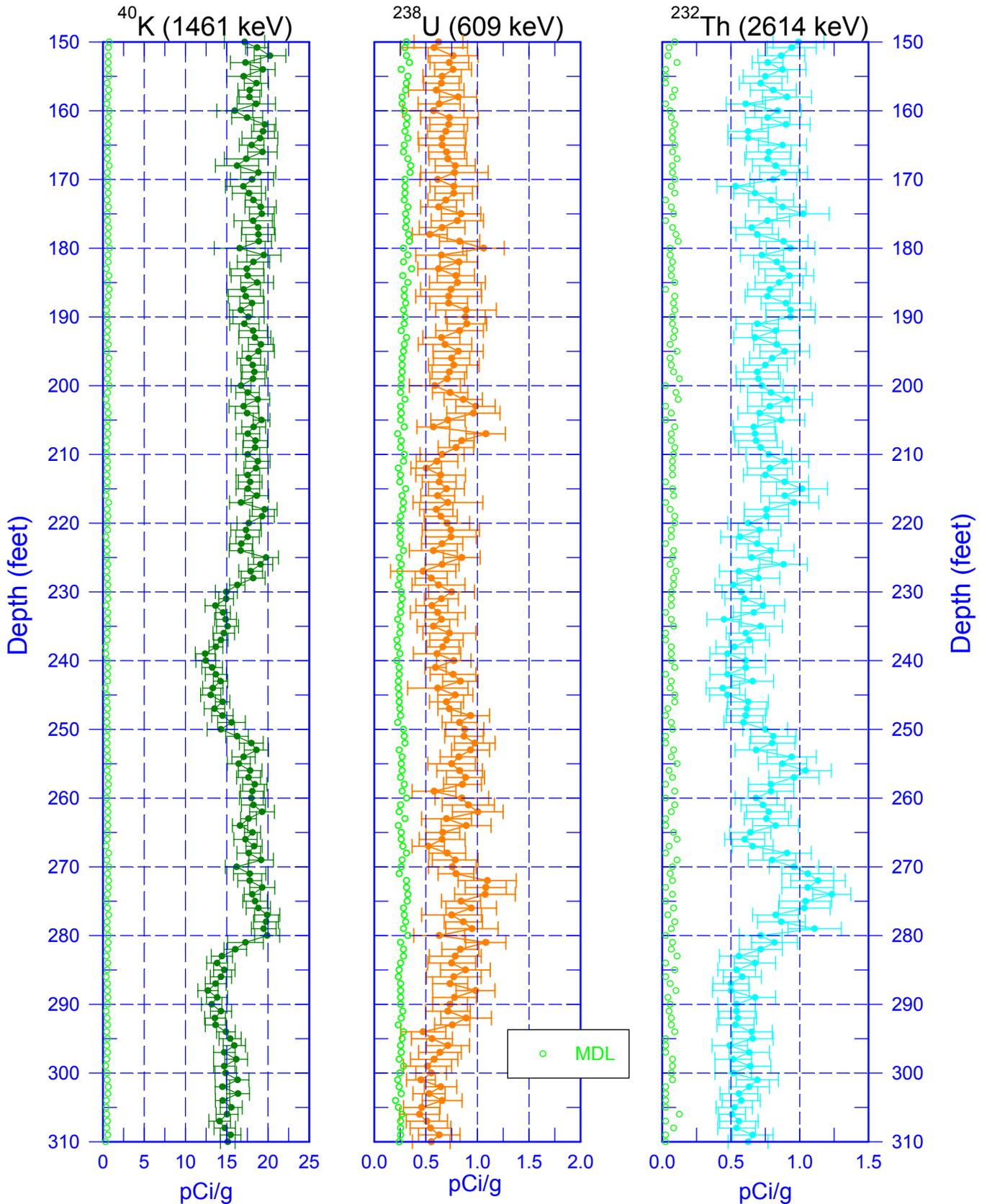
Zero Reference = Top of Casing

Depth scale: 1" = 20 ft

Last Log Date - 11/03/03

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Natural Gamma Logs



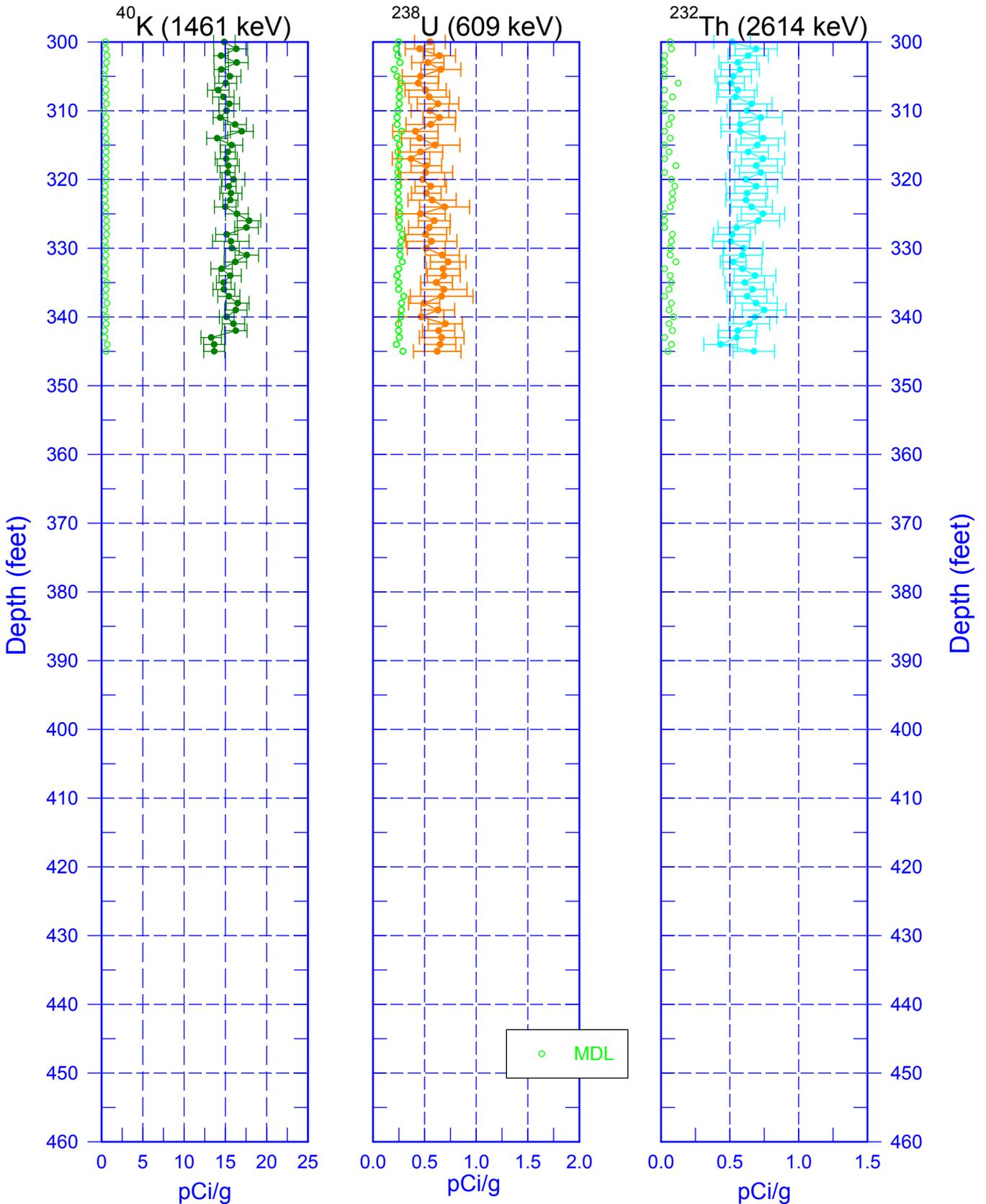
Zero Reference - Top of Casing

Depth scale: 1" = 20 ft

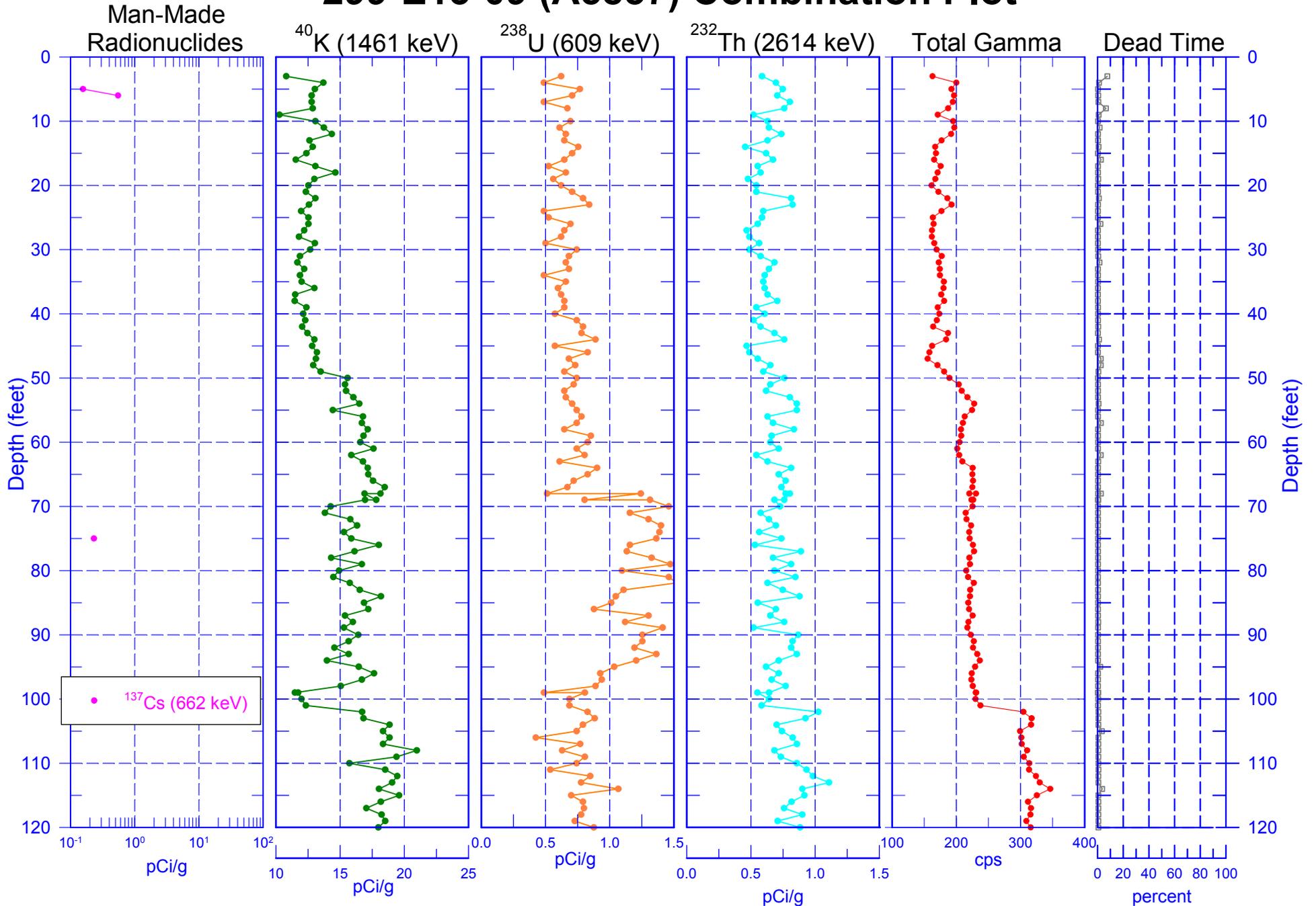
Last Log Date - 11/03/03

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Natural Gamma Logs



299-E13-09 (A5857) Combination Plot

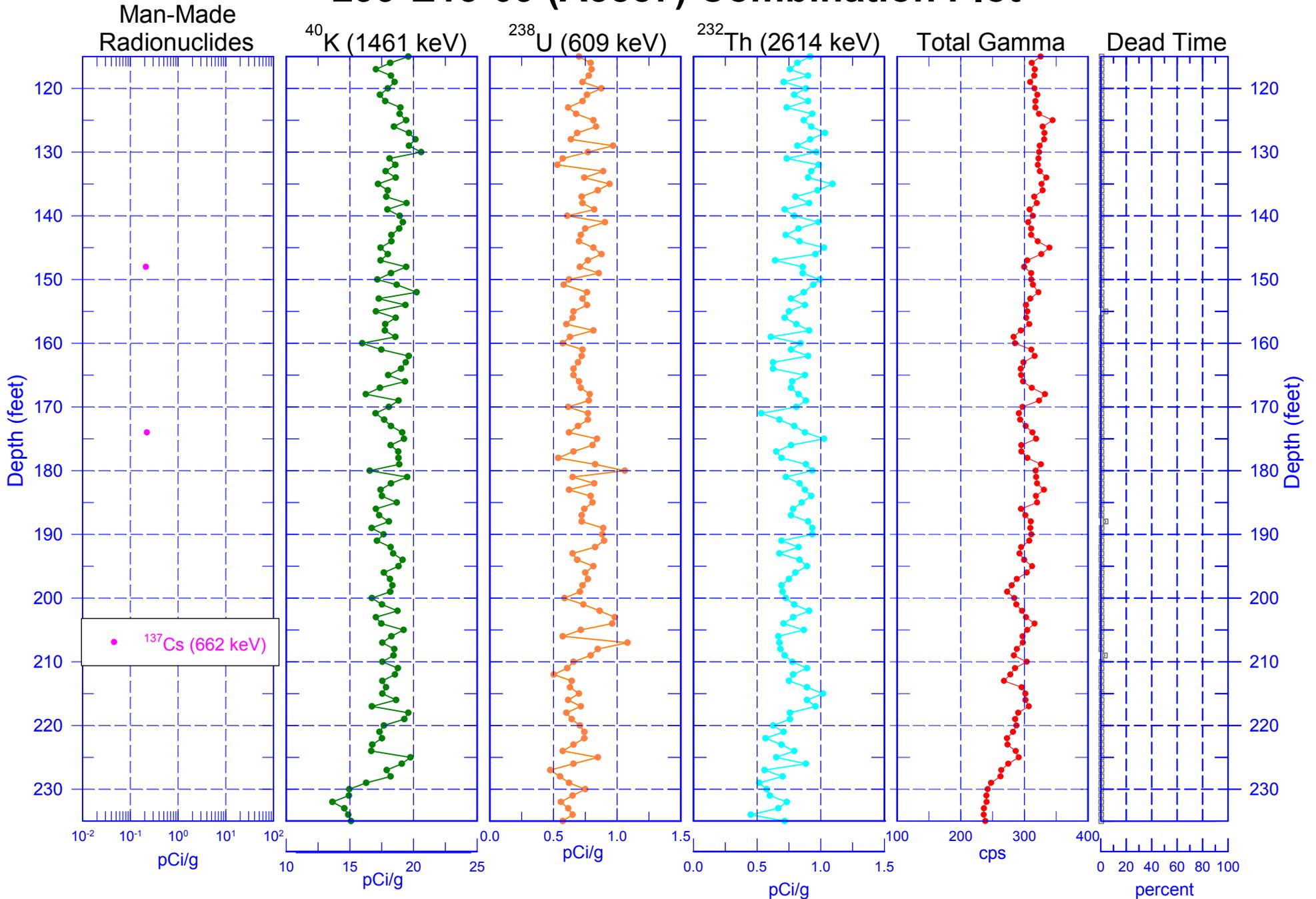


Zero Reference - Top of Casing

Depth scale: 1" = 20 ft

Last Logging Date - 11/03/03

299-E13-09 (A5857) Combination Plot

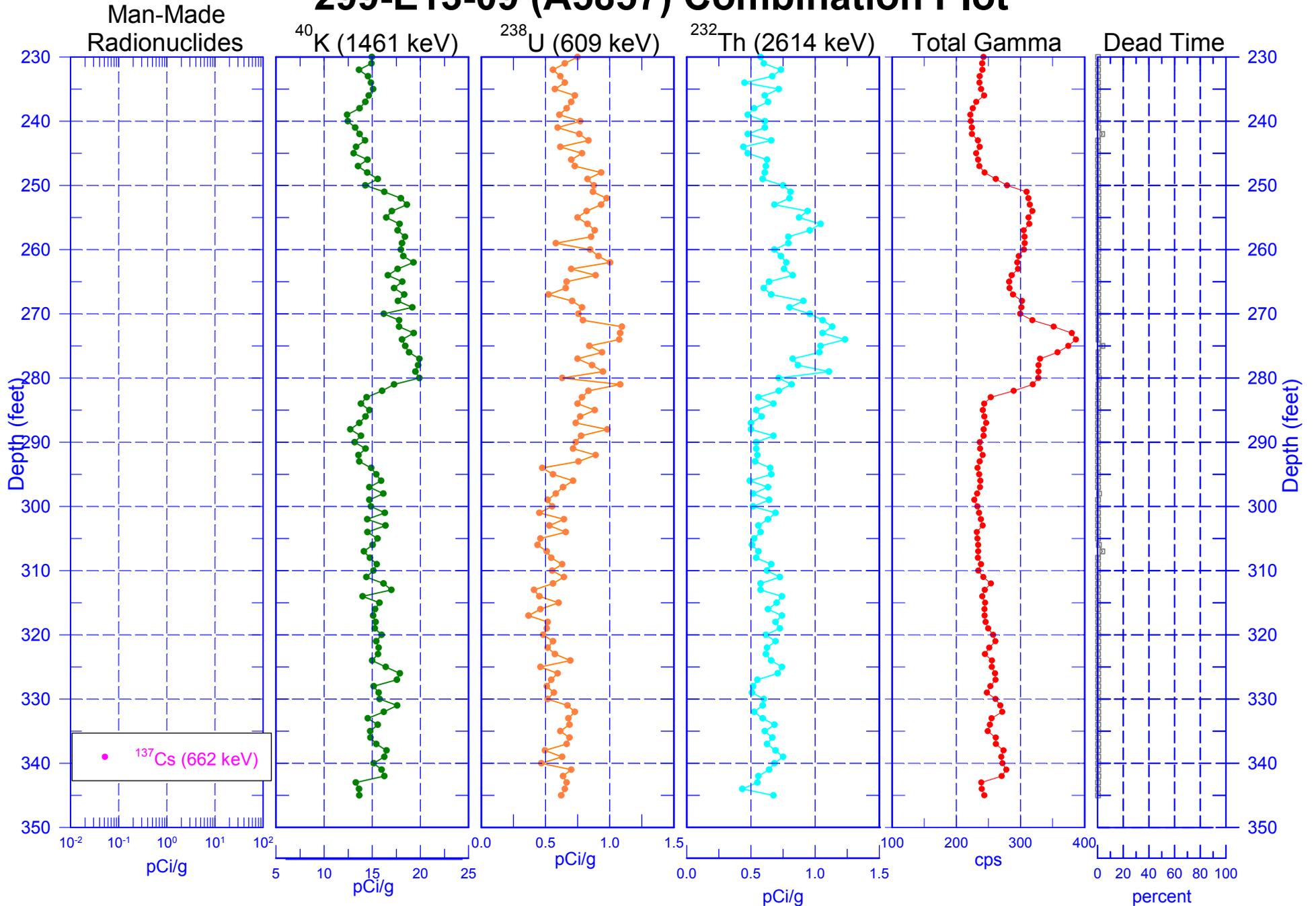


Zero Reference - Top of Casing

Depth scale: 1" = 20 ft

Last Logging Date - 11/03/03

299-E13-09 (A5857) Combination Plot



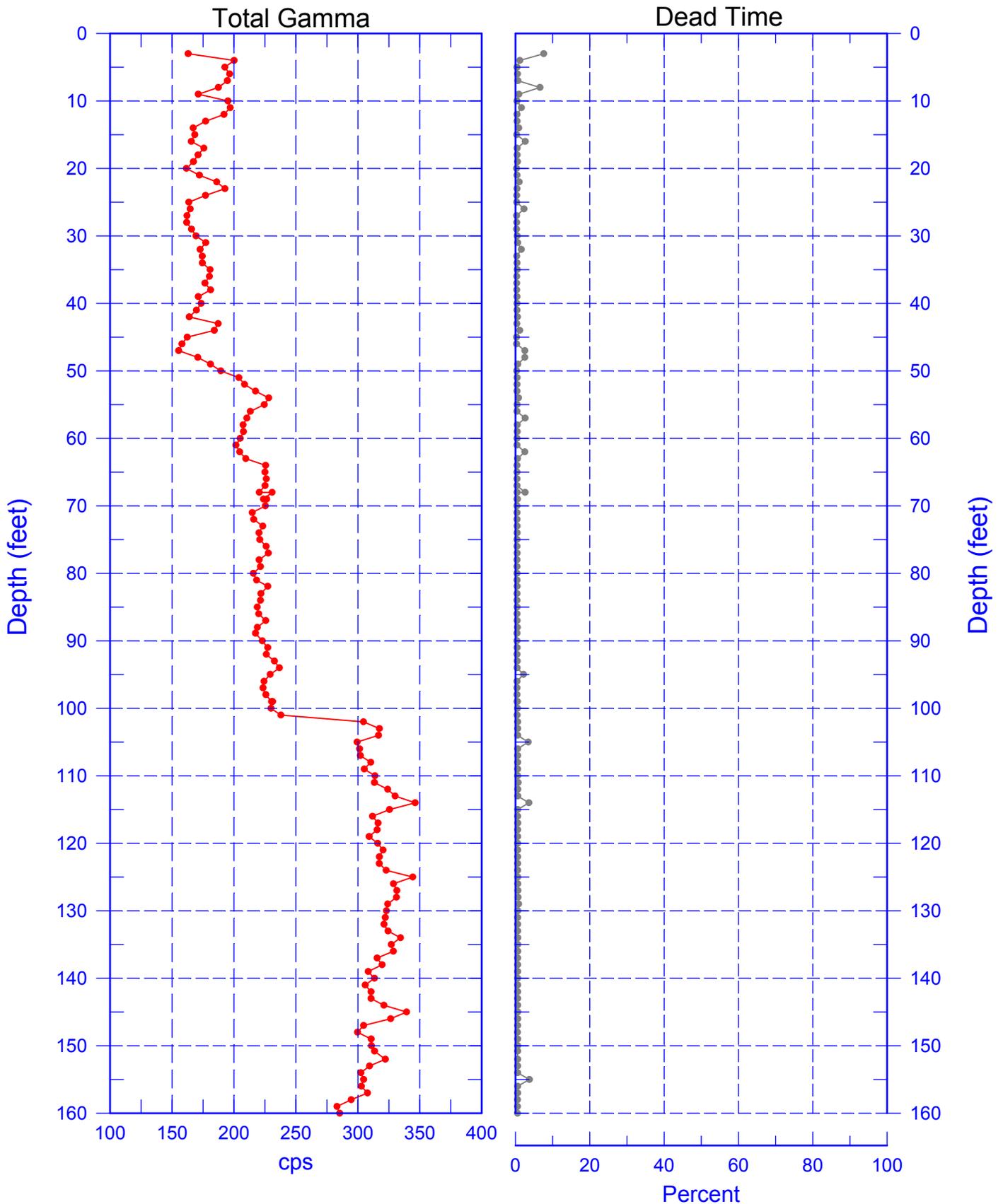
Zero Reference - Top of Casing

Depth scale: 1" = 20 ft

Last Logging Date - 11/03/03

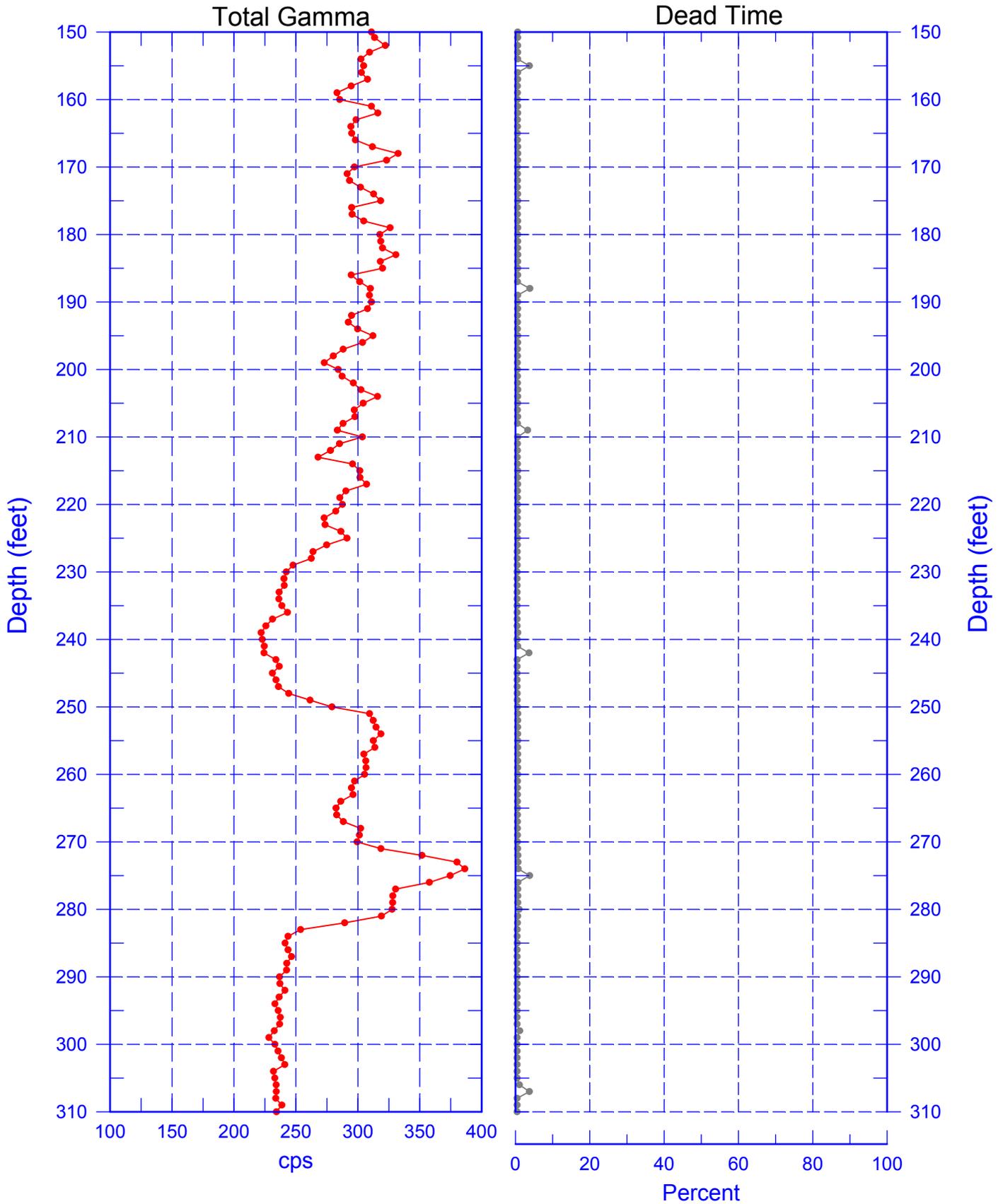
299-E13-09 (A5857)

Total Gamma & Dead Time



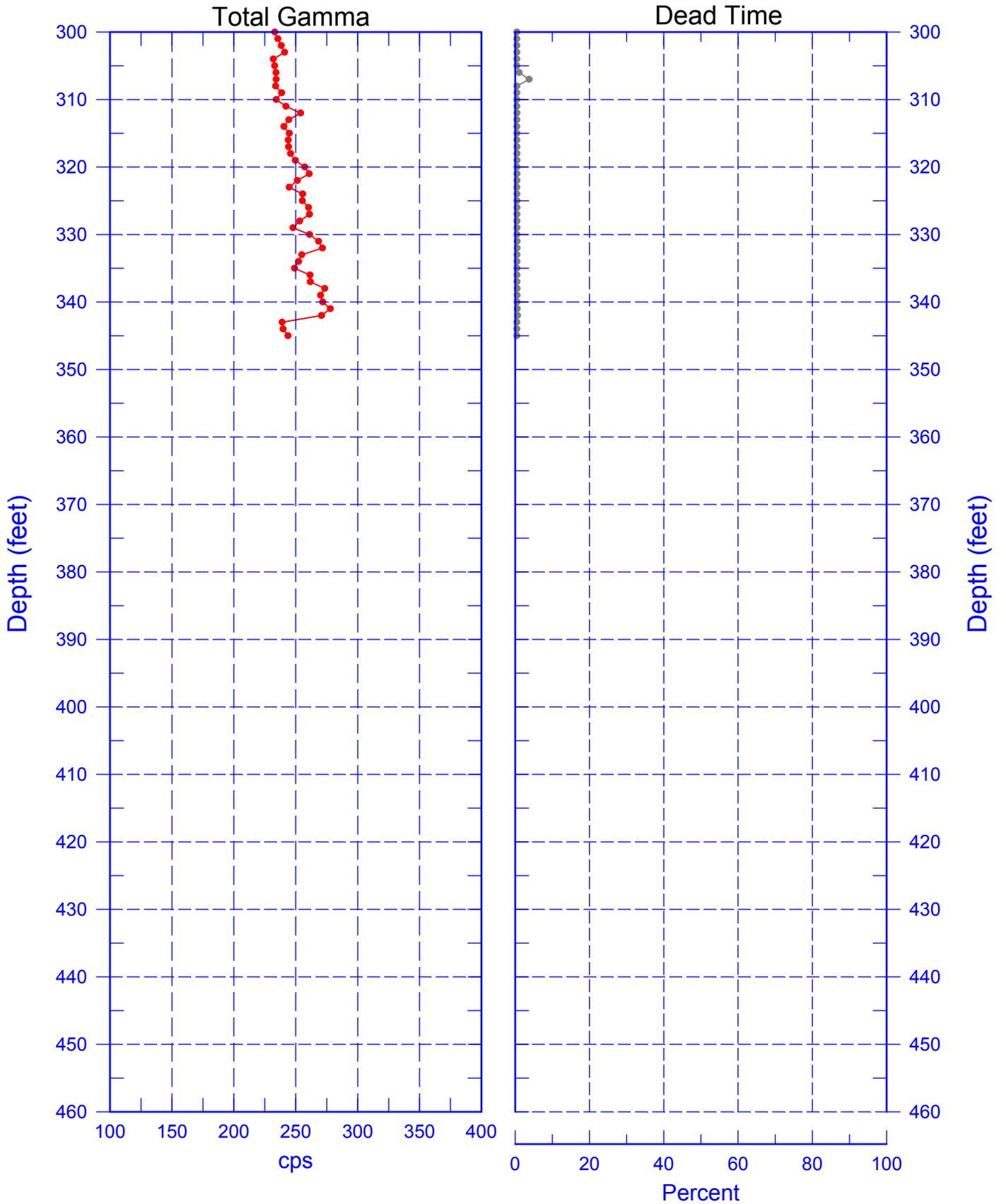
299-E13-09 (A5857)

Total Gamma & Dead Time



299-E13-09 (A5857)

Total Gamma & Dead Time



299-E13-09 (A5857)

Repeat Section of Natural Gamma Logs

