299-E27-07 (A4816)
Log Data Report

Borehole Information:

Borehole:		299-E27-07 (A4816)		Site:	East of 241-C Tank Farm
Coordinates (WA St Plane)		GWL[1] (ft):	237.75	GWL Date:	01/03/08
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
136619.403	575220.59	01/08	638.24 ft	281	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	0	8		0.322	0	150
Welded Steel	0.4	6 5/8	6	9/32	0.4	281

Borehole Notes:

The logging engineer measured the 6-in.-casing diameter with a caliper and steel tape. The 8-in. casing is known to exist from the driller's log but is not visible at the ground surface. The 8-in. casing exists to 150 ft and was perforated from 20 to 140 ft. Grout was introduced into the borehole from the ground surface to 20 ft where a 10-in. temporary casing was removed from the borehole. Grout also exists in the annular space between the 6- and 8-in. casings. Between 234 ft and the bottom of the borehole, a 6-in. 20 slot screen is in place.

Logging Equipment Information:

Logging System:	Gamma 1L		Type: Serial No.:	SGLS HPGe (60%) 45TP22010A
Effective Calibration Date:	07/09/07	Calibration Reference:	HGLP-CC-019	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4H (with AmBe source)		Type: Serial No.:	NMLS H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	01/03/08	01/04/08	01/07/08	01/08/08	01/14/08
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	56.0	120.0	175.0	174.0	214.0
Finish Depth (ft)	0.0	55.0	119.0	215.0	262.0
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
Pre-Verification	AL010CAB	AL011CAB	AL012CAB	AL013CAB	AL016CAB
Start File	AL010000	AL011000	AL012000	AL013000	AL016000
Finish File	AL010056	AL011065	AL012056	AL013041	AL016048
Post-Verification	AL010CAA	AL011CAA	AL012CAA	AL013CAA	AL016CAA
Depth Return Error (in.)	- 1.0	0	0	0	0
Comments	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment

Log Run	6 Repeat				
Date	01/03/08				
Logging Engineer	Spatz				
Start Depth (ft)	171.0				
Finish Depth (ft)	45.0				
Count Time (sec)	200				
Live/Real	R				
Shield (Y/N)	N				
MSA Interval (ft)	1.0				
Pre-Verification	AL017CAB				
Start File	AL017000				
Finish File	AL017027				
Post-Verification	AL017CAA				
Depth Return Error (in.)	0				
Comments	No fine gain adjustment				

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	7	8 Repeat			
Date	01/23/08	01/23/08			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	140.0	150.0			
Finish Depth (ft)	237.5	160.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Pre-Verification	DHA32CAB	DHA32CAB			
Start File	DHA32000	DHA32391			
Finish File	DHA32390	DHA32431			
Post-Verification	DHA32CAA	DHA32CAA			
Depth Return Error (in.)	N/A	- 2.0			
Comments	None	None			

Logging Operation Notes:

Logging was conducted with a centralizer on the sondes. All measurements are referenced to top of casing.

Analysis Notes:

Analyst:	Henwood	**Date:**	02/19/08	**Reference:**	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-run verifications for the logging systems were performed before and after each day's data acquisition. The acceptance criteria were met.

A combined casing correction of 0.60325 (0.2813 + 0.322 for the 6- and 8-in. casings, respectively) thick casing was applied to the SGLS data to 150 ft. Below 150 ft, a correction for 0.28125-in. thick casing was applied for the single 6-in. casing. Data acquired below the 237.75 ft water level were also corrected for water inside the casing.

The moisture data are reported in percent volumetric moisture according to calibration for a 6-in. borehole. The data acquired from 140 to 150 ft can be used qualitatively, only, as this interval contains double casing and grout for which there is no calibration.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet template identified as G1Ljuly07.xls using efficiency functions and corrections for casing, dead time, and water as determined from annual calibrations.

Results and Interpretations:

Cs-137 was detected near the ground surface (0 to 3 ft) at concentrations less than 1 pCi/g.

Co-60 was detected from 133 to 136 ft, from 150 to 158 ft, and at several isolated depth intervals. Concentrations are all below 1 pCi/g. The Co-60 is probably related to plumes originating in C Farm. Co-60 may be important as a tracer for other contaminants such as Tc-99.

Evidence of processed uranium (U-238 and U-235) exists between 93 and 108 ft. U-238 concentrations are determined by the Pa-234m energy peak at 1001 keV. U-235 is directly measured by the 185.72 keV energy peak. The maximum concentrations for U-238 and U-235 are approximately 21and 2 pCi/g. U-235 is not detected at every depth location where U-238 is identified because it is very near its MDL. It is possible the concentrations are significantly underestimated because this depth interval is double cased and grouted.

The detection of processed uranium at 100 ft is significant, as it has not been previously detected in any of the approximately 70 boreholes in C Farm. The nearest tank to this borehole (C-201) is approximately 110 ft away. All four of the 200 series tanks in C Farm were designated assumed leakers, but there are no drywells in that area. It is recommended one or more boreholes be drilled in the vicinity of these 200 series tanks to investigate the source of uranium. Note that Co-60 and Pa-234m do not contribute detectable amounts to the total gamma activity; high resolution spectral gamma logging is required to detect and assay these contaminants.

Moisture data indicate some variability. Between 140 and 150 ft, the log profile likely reflects the non-standard borehole condition of double casing and grout and should be used qualitatively.

Repeat sections acquired for each logging system indicate good repeatability.

List of Log Plots:

Depth Reference is top of casing

Manmade Radionuclides (2 pages)
Natural Gamma Logs (2 pages)
Combination Plot (3 pages)
Combination Plot (0 to 280 ft)
Total Gamma & Moisture
Repeat Section for Manmade Radionuclides
Repeat Section of Natural Gamma Logs
Repeat Section for Total Gamma & Moisture

[1] GWL – groundwater level

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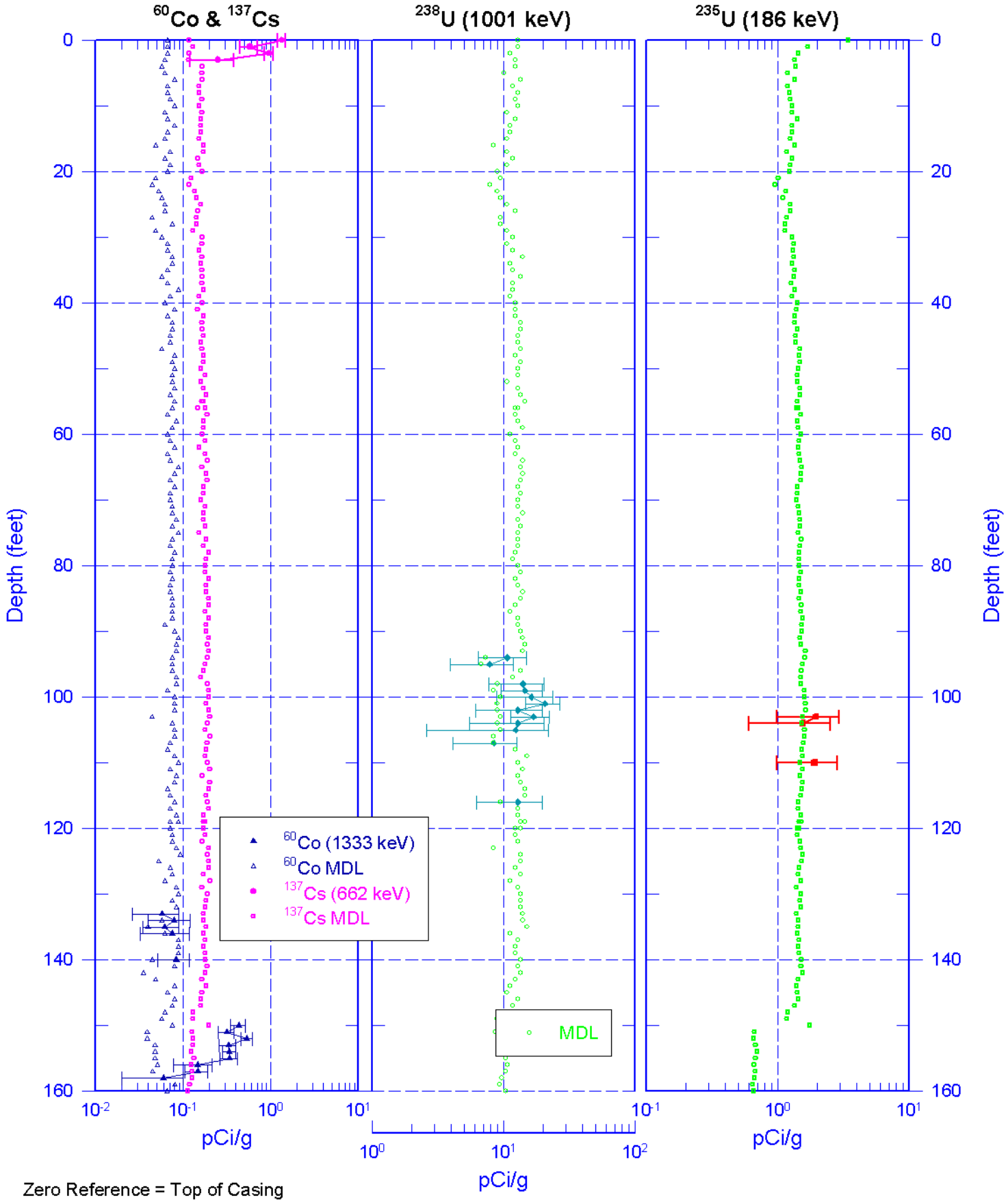
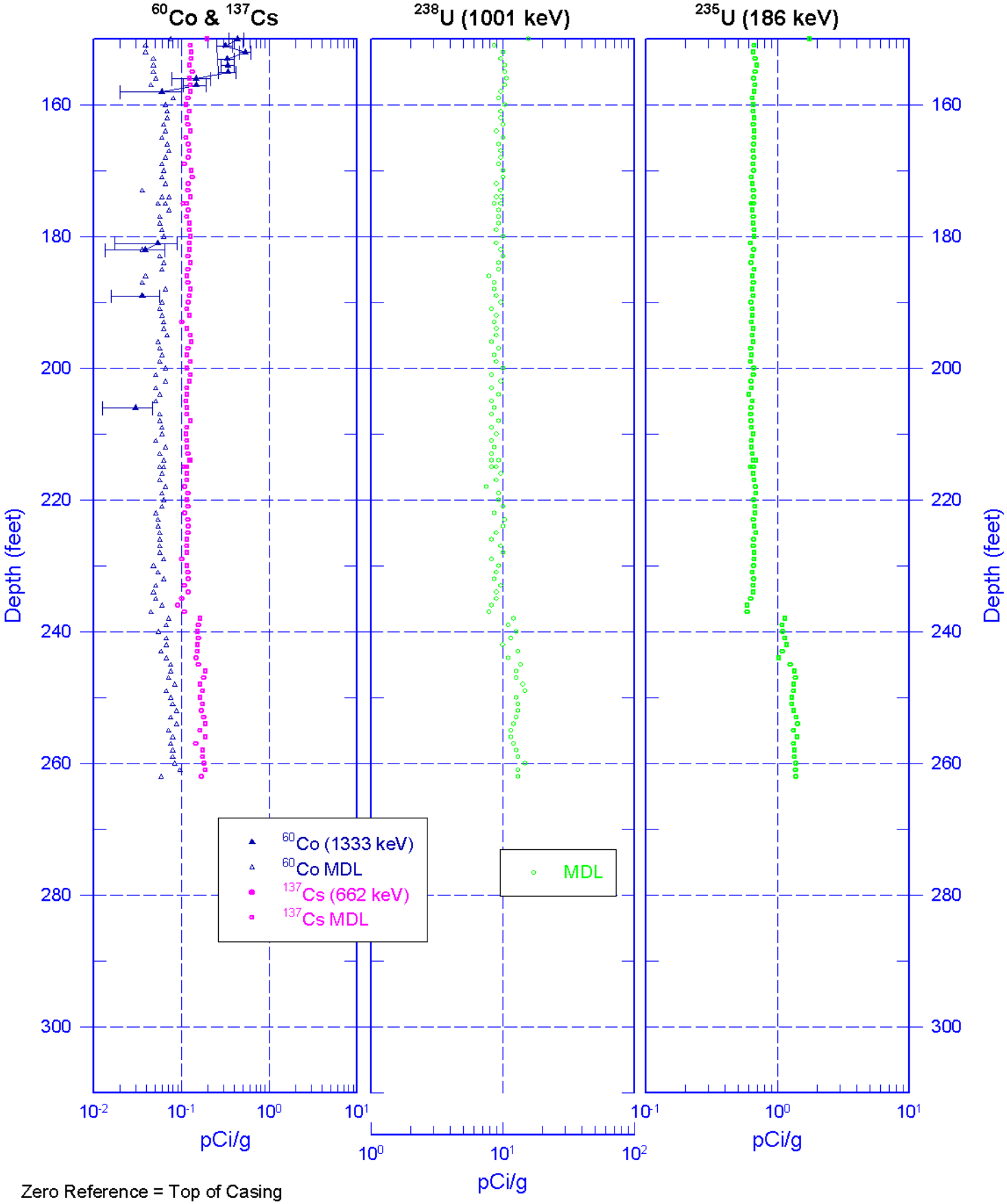
299-E27-07 (A4816)
Man-Made Radionuclides



Zero Reference = Top of Casing

299-E27-07 (A4816)

Man-Made Radionuclides



Zero Reference = Top of Casing

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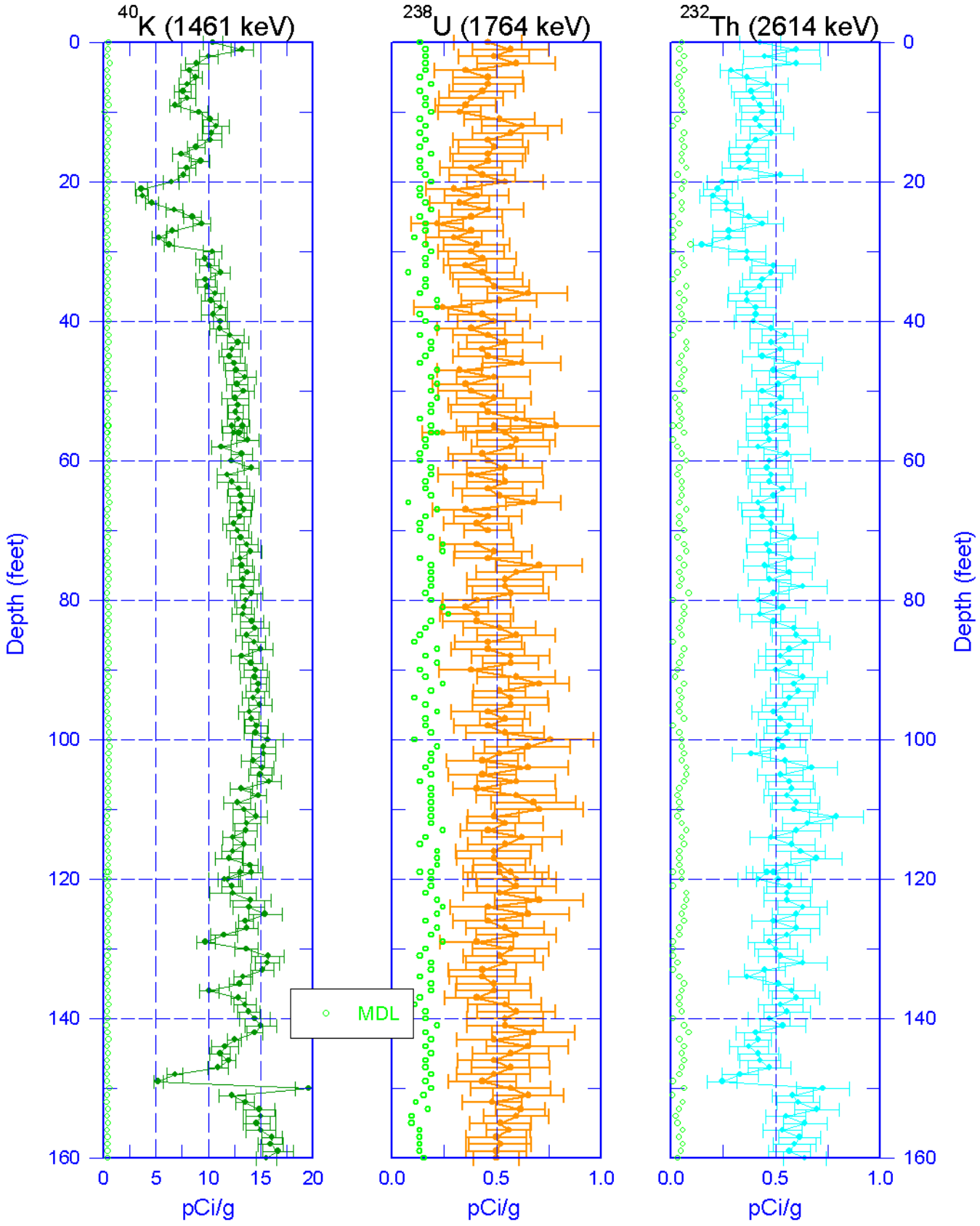
299-E27-07 (A4816)
Natural Gamma Logs



Zero Reference = Top of Casing

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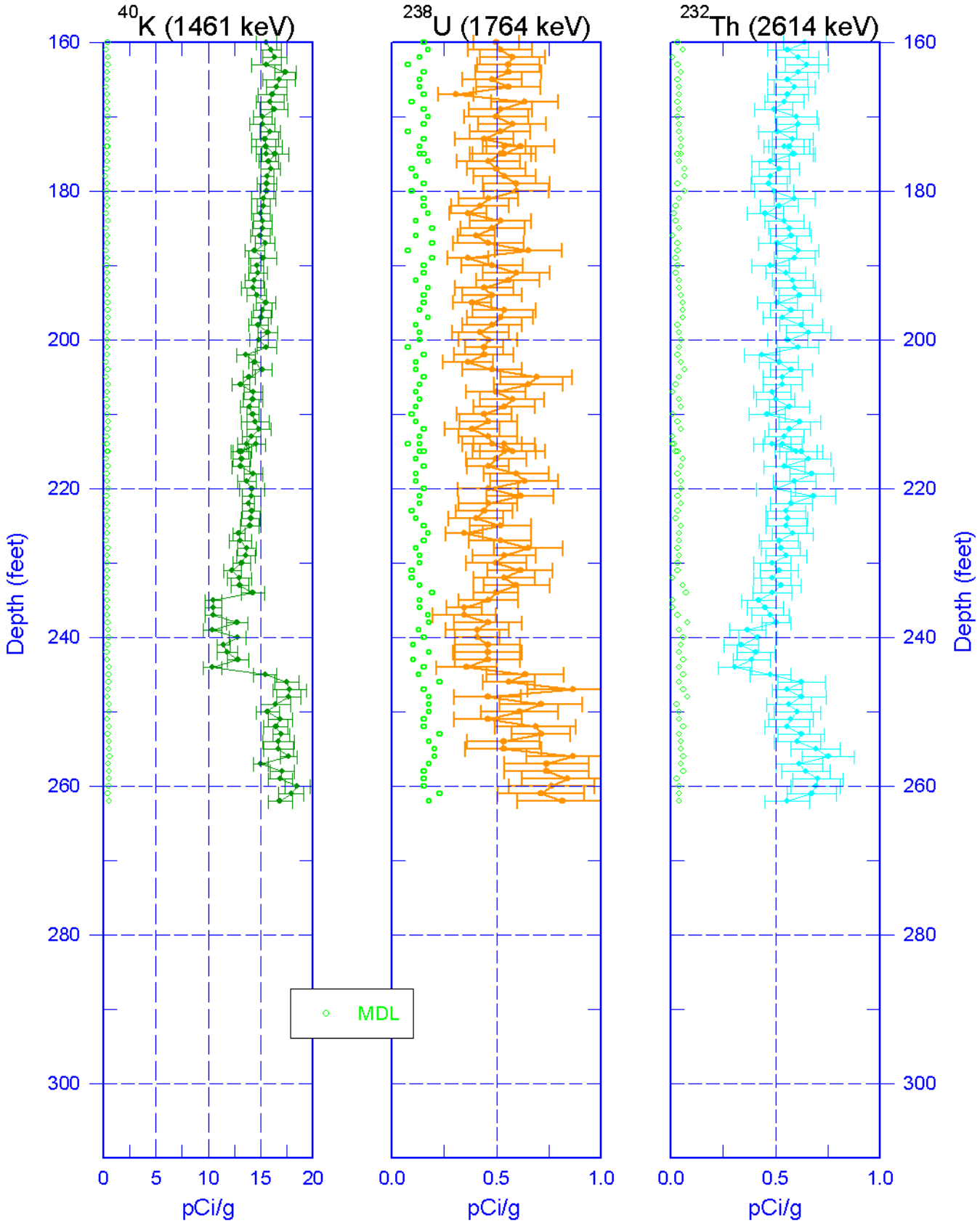
299-E27-07 (A4816)
Natural Gamma Logs



Zero Reference = Top of Casing

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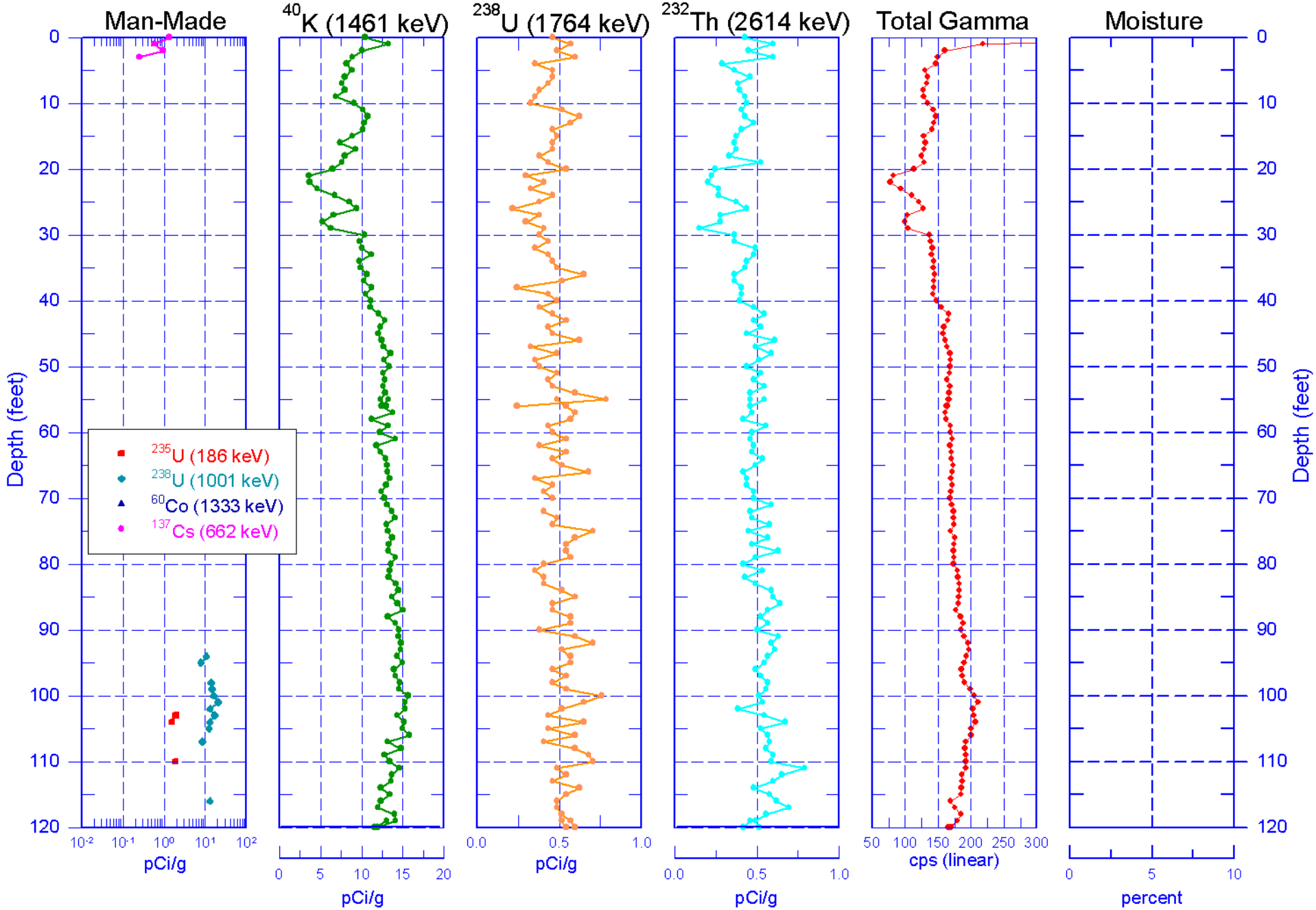
299-E27-07 (A4816) Combination Plot



Zero Reference = Top of Casing

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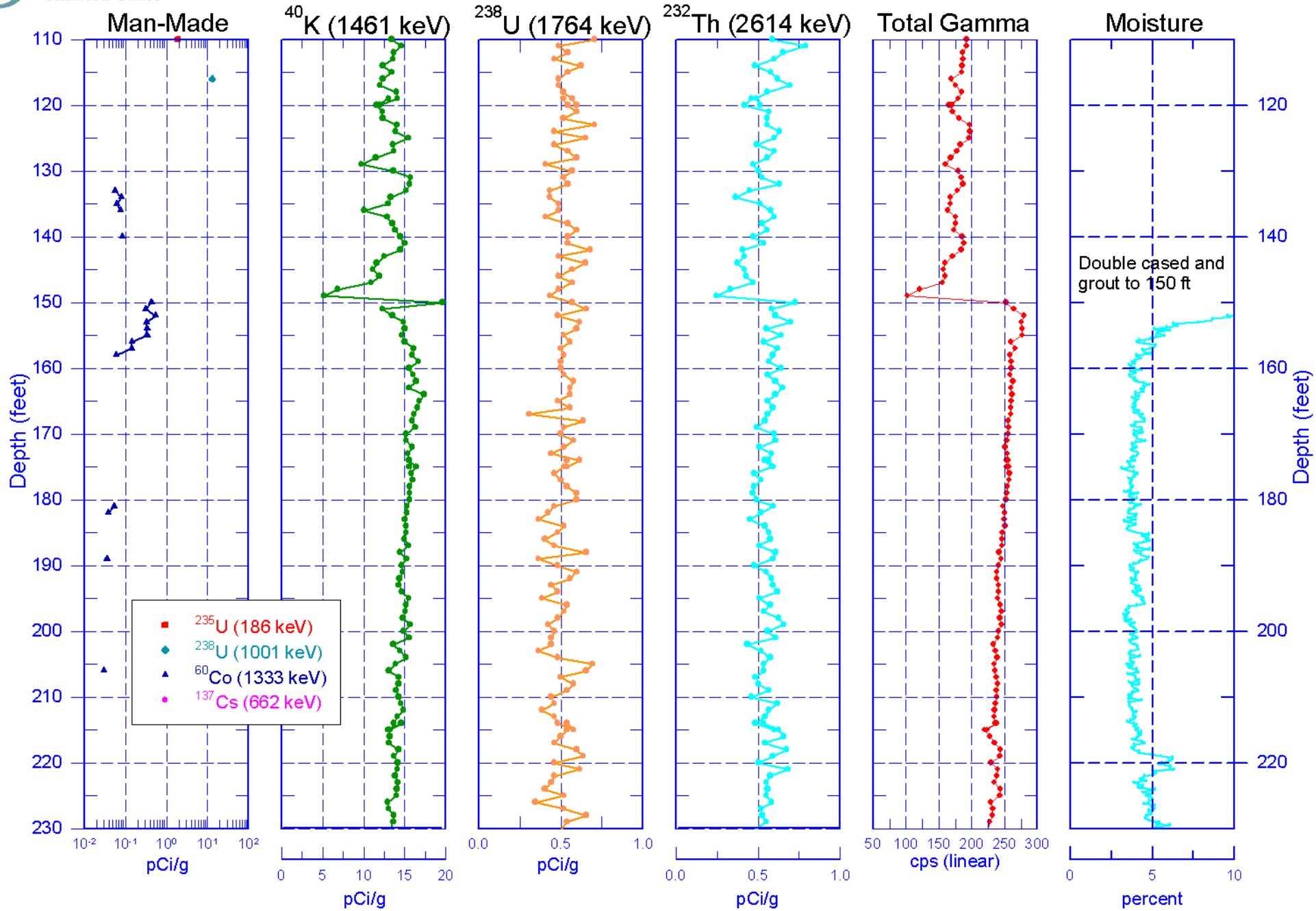
299-E27-07 (A4816) Combination Plot



Zero Reference = Top of Casing

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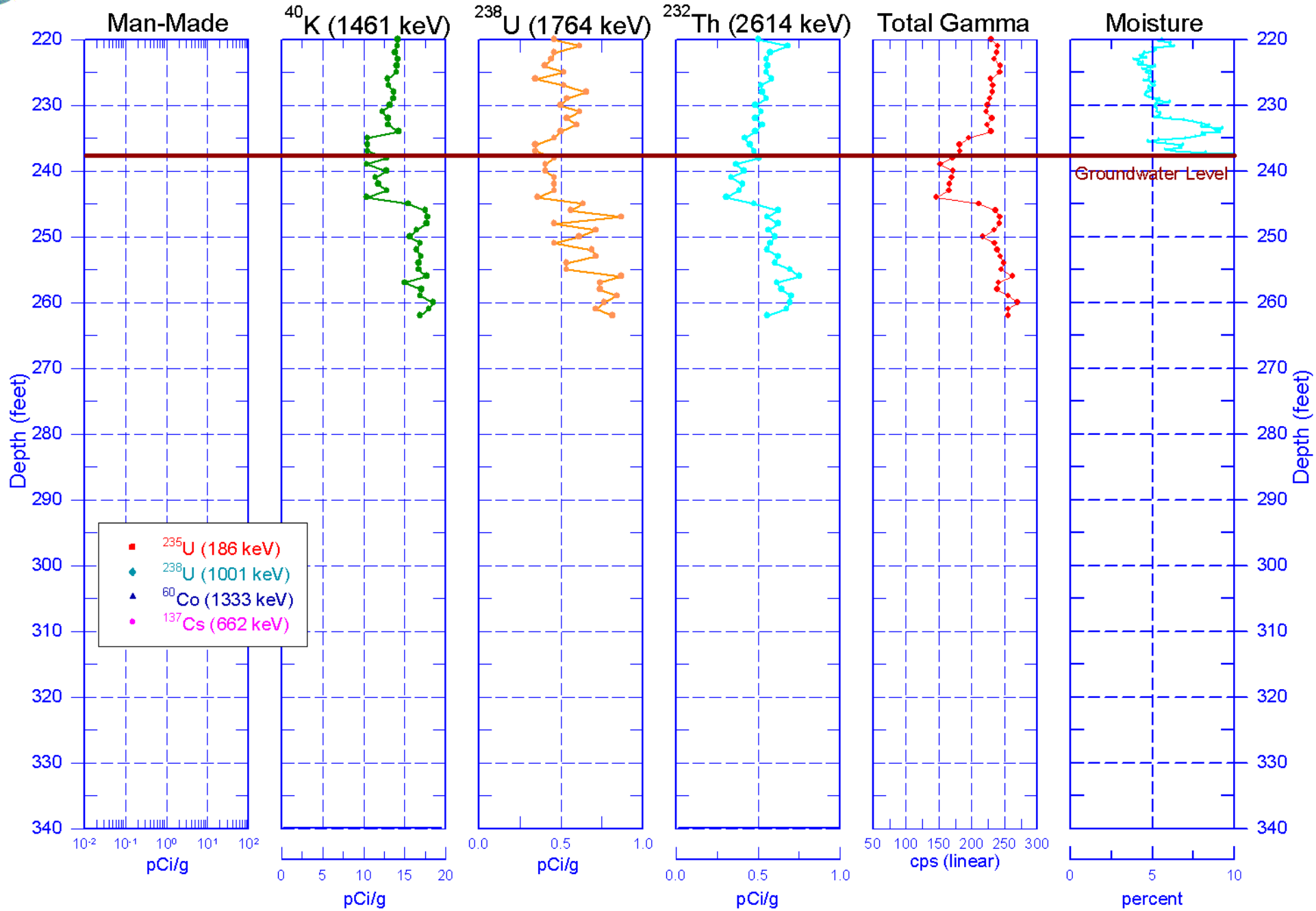
299-E27-07 (A4816) Combination Plot



Zero Reference = Top of Casing

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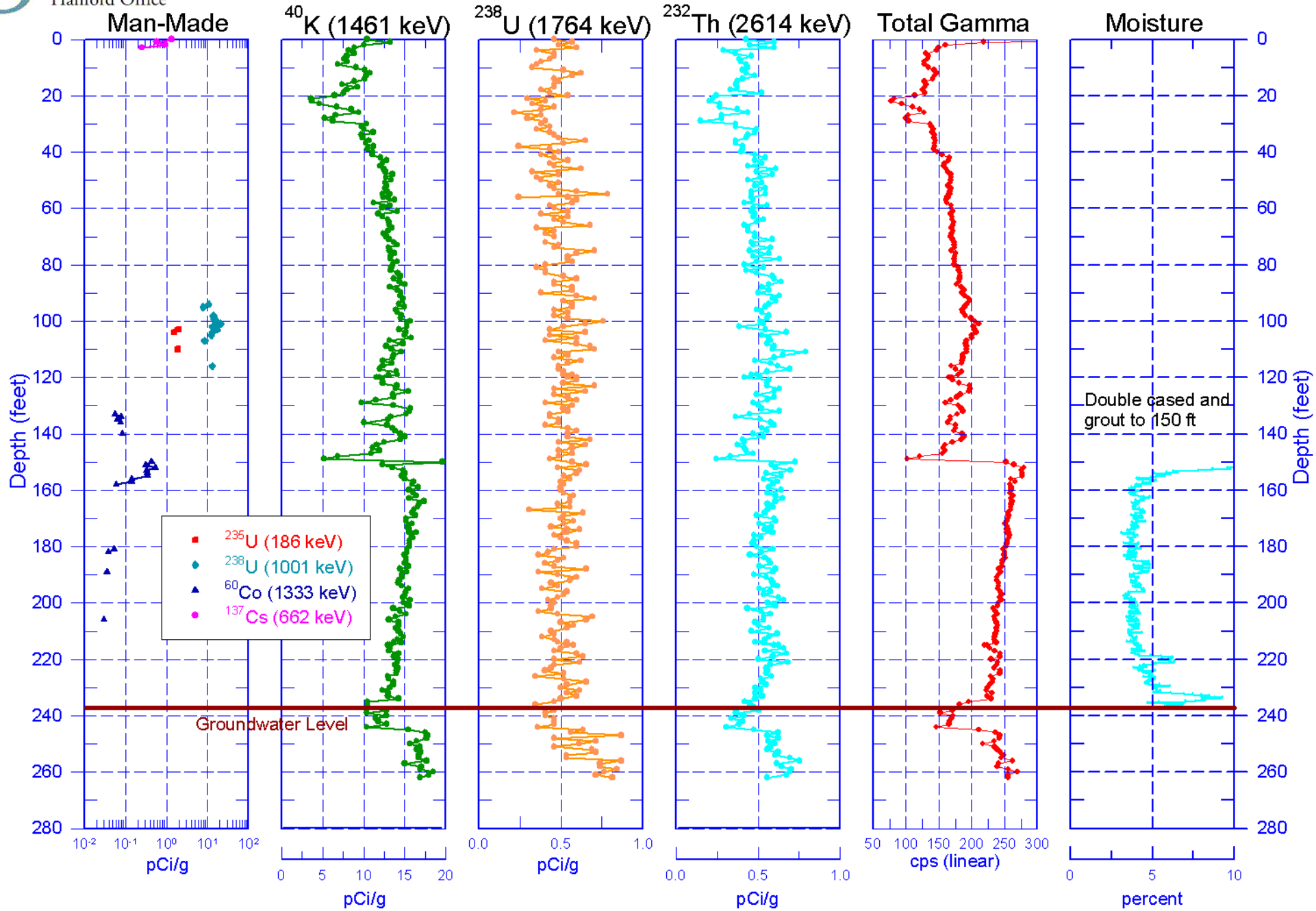
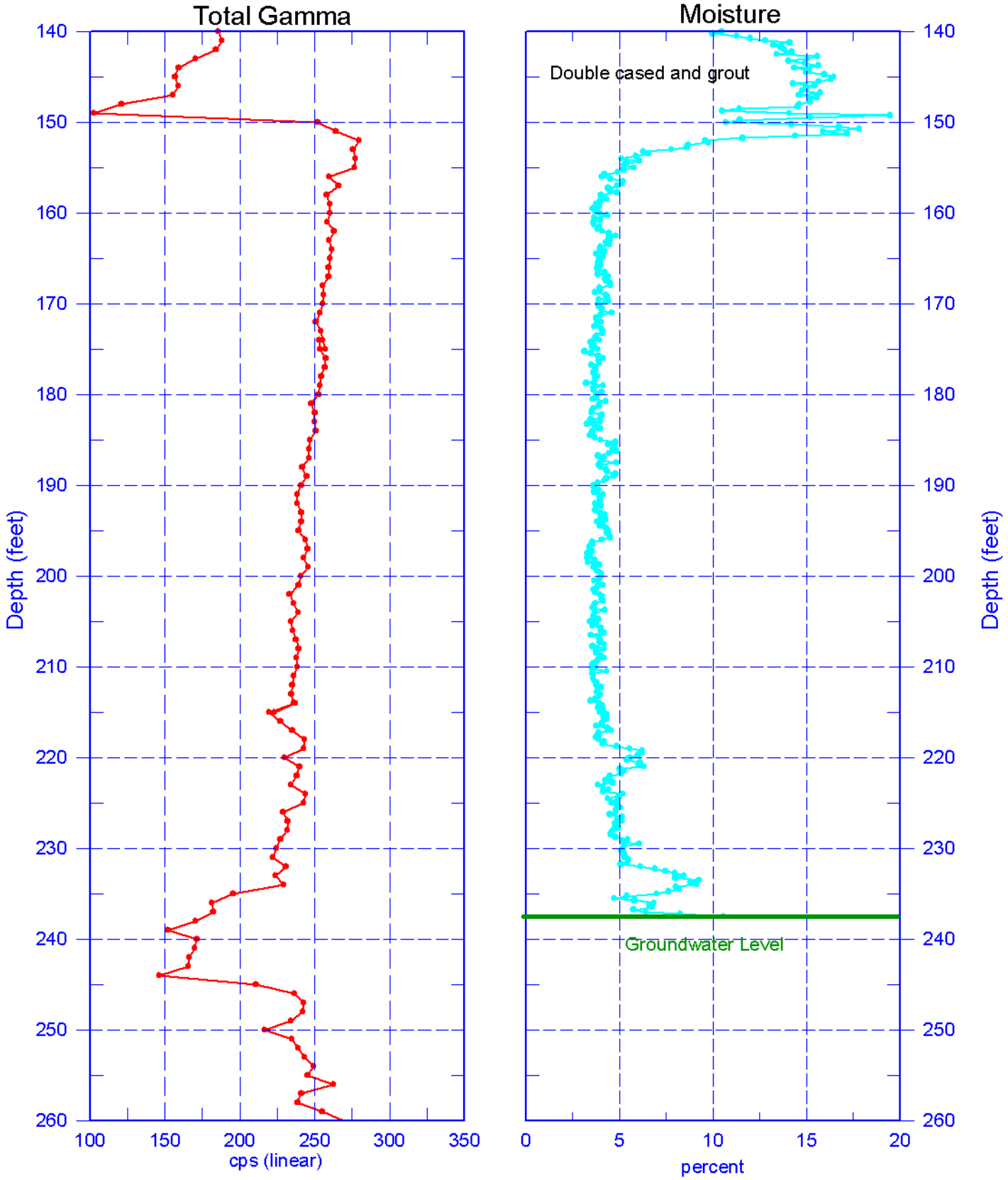
299-E27-07 (A4816) Combination Plot



Zero Reference = Top of Casing

299-E27-07 (A4816)
Total Gamma & Moisture



Reference - Top of Casing

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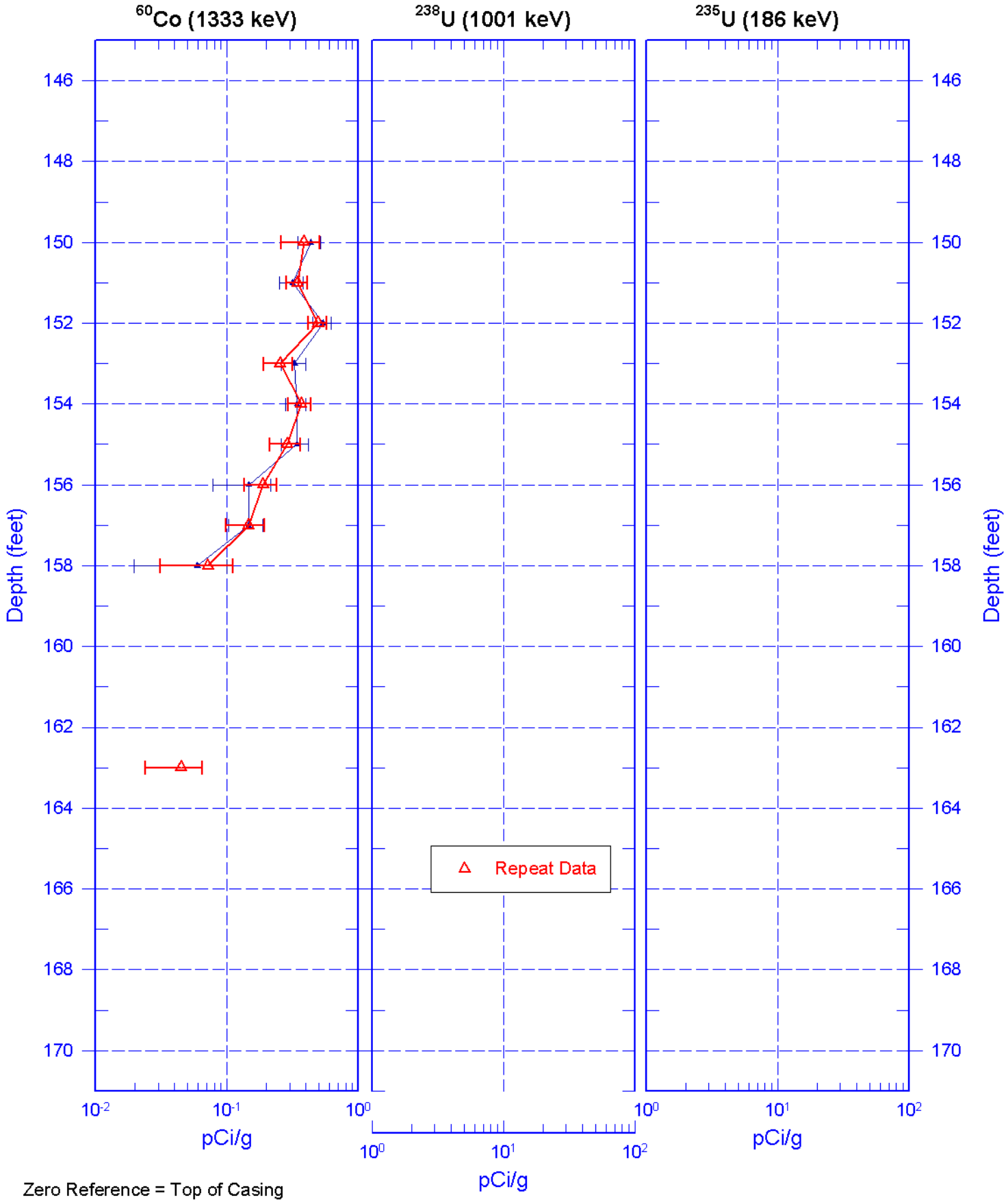
299-E27-07 (A4816)

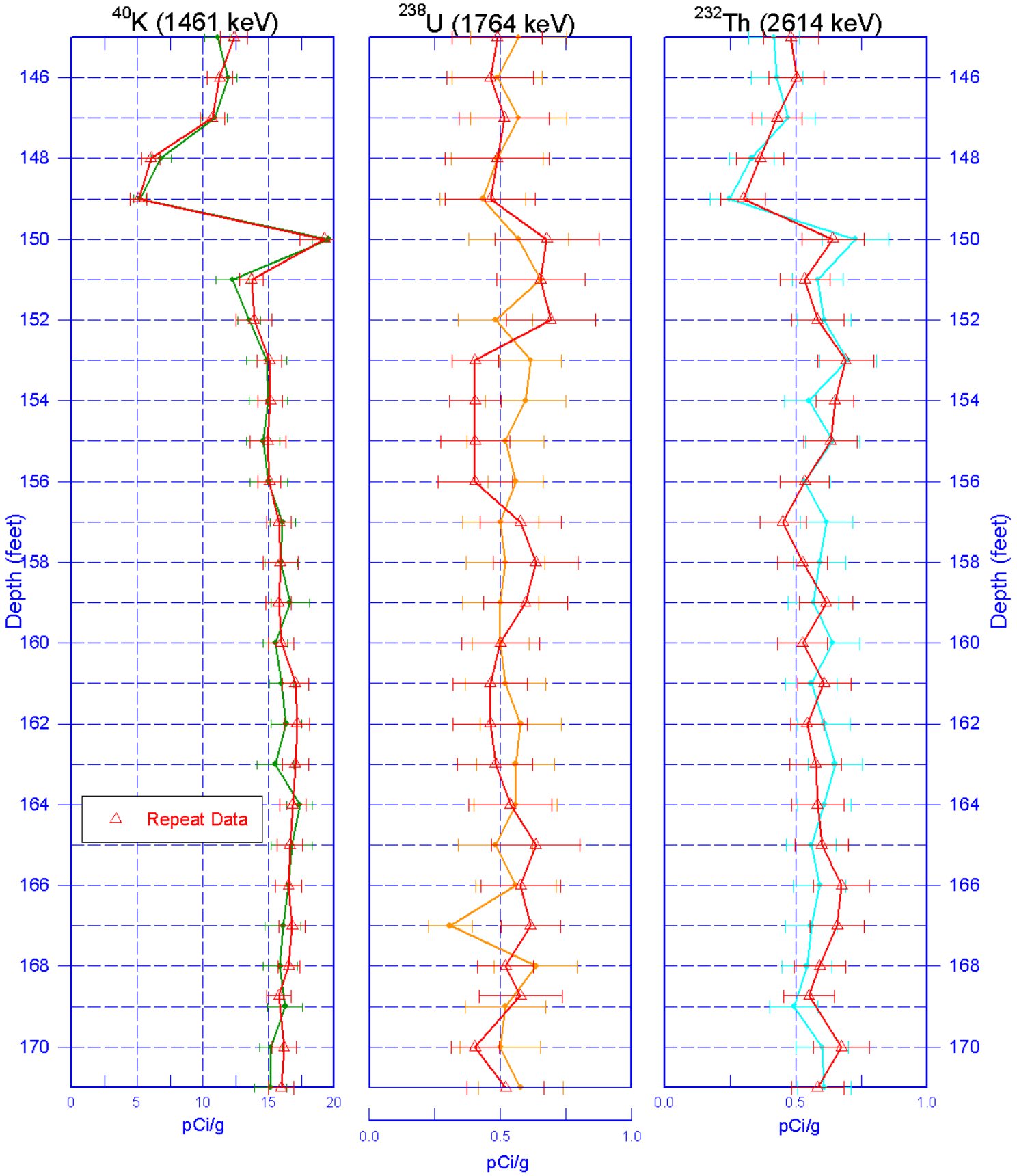
Repeat Section for Man-Made Radionuclides



Zero Reference = Top of Casing

299-E27-07 (A4816)

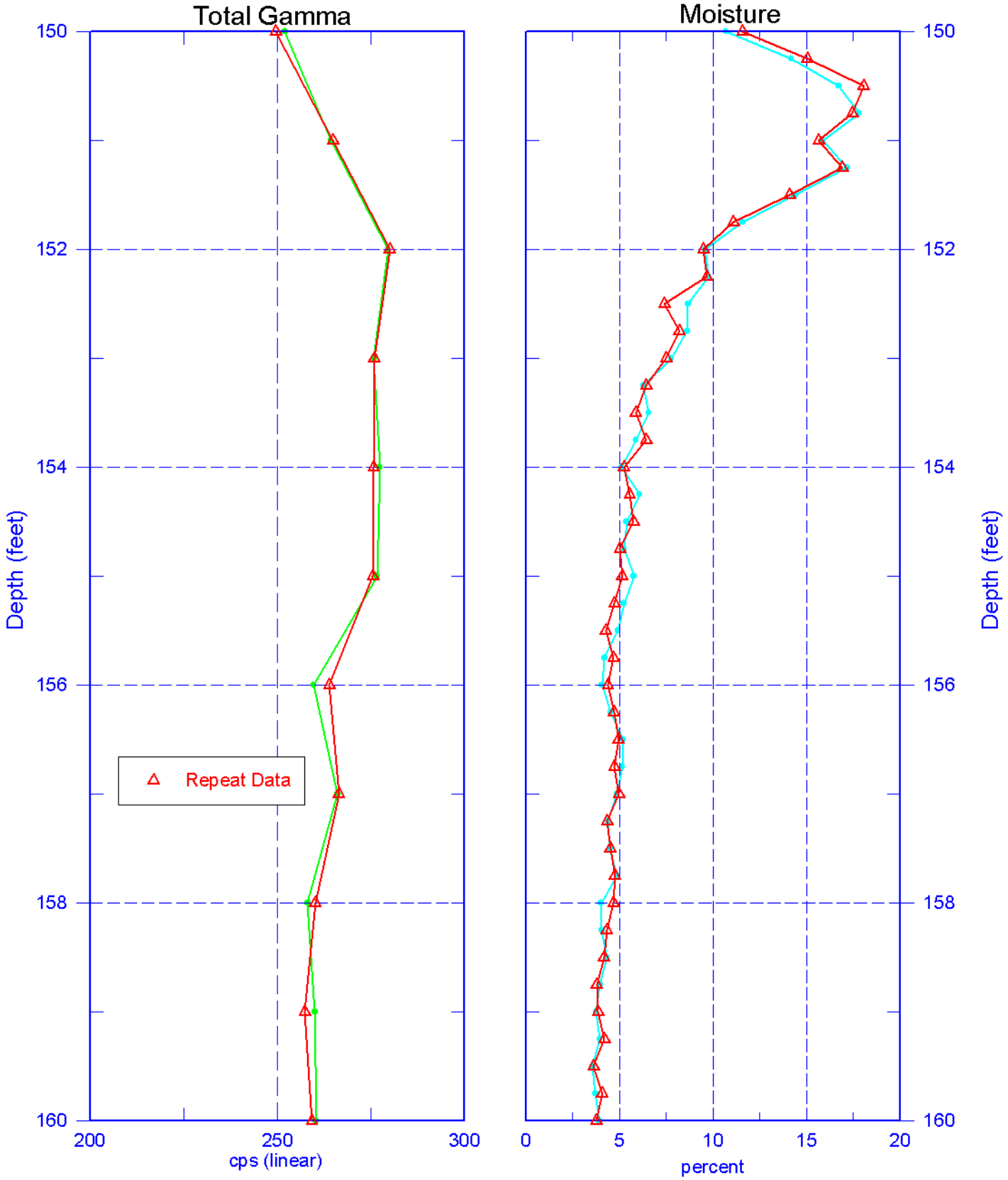
Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

299-E27-07 (A4816)

Repeat Section for Total Gamma & Moisture



Reference - Top of Casing