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299-E33-205 (C5989)
Log Data Report

Borehole Information:

Borehole:		299-E33-205 (C5989)		Site:	Between BX and BY Farms
Coordinates (WA St Plane)		GWL[1] (ft):	259.7	GWL Date:	07/21/08
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
Not available	Not available	07/08	Not available	268	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.75	13 3/8	12 1/2	7/8	0.75	108
Threaded steel	1.2	10 3/4	9 1/2	5/8	1.2	234.8
Threaded Steel	2.25	8 5/8	7 7/8	3/8	2.25	267.2

Borehole Notes:

The logging engineer measured the casing diameters with a caliper and steel tape. The onsite geologist reported the casing depths.

Spectral Gamma Logging System (SGLS) Log Run Information:

Logging System:	Gamma 4L		Type: Serial No.:	SGLS 60% HpGe 47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1N		Type: Serial No.:	SGLS 60% HpGe 45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

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

Logging System:	Gamma 1M		Type: Serial No.:	NMLS H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	5	6 Repeat	7 Repeat
Date	05/19/08	05/19/08	07/02/08	07/02/08	07/02/08
Logging Engineer	Spatz	Spatz	Pearson	Pearson	Pearson
Start Depth (ft)	0.0	25.0	235.0	231.0	222.0
Finish Depth (ft)	109.0	36.0	108.0	219.0	222.0
Count Time (sec)	100	100	100	200	1000
Live/Real	R	R	R	R	R

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Log Run	1	2 Repeat	5	6 Repeat	7 Repeat
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	0.5	0.5
Pre-Verification	DL381CAB	DL381CAB	AN089CAB	AN089CAB	AN089CAB
Start File	DL381000	DL381110	AN089000	AN089128	AN089153
Finish File	DL381109	DL381121	AN089127	AN089152	AN089153
Post-Verification	DL381CAA	DL381CAA	AN089CAA	AN089CAA	AN089CAA
Depth Return Error (in.)	N/A	0	N/A	N/A	- 2.5
Comments	Fine gain adjustment after file -105	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment

Log Run	10	11 Repeat
Date	07/21/08	07/21/08
Logging Engineer	Spatz	Spatz
Start Depth (ft)	268.0	238.0
Finish Depth (ft)	233.0	233.0
Count Time (sec)	100	100
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	1.0	1.0
Pre-Verification	AN094CAB	AN094CAB
Start File	AN094000	AN094036
Finish File	AN094035	AN094041
Post-Verification	AN094CAA	AN094CAA
Depth Return Error (in.)	N/A	- 2
Comments	No fine gain adjustment	No fine gain adjustment

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat	8	9 Repeat	12
Date	05/19/08	05/19/08	07/02/08	07/02/08	07/21/08
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	0.0	50.0	108.0	219.0	233.0
Finish Depth (ft)	108.75	61.0	235.0	231.0	259.5
Count Time (sec)	15	15	15	15	15
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	0.25	0.25	0.25	0.25	0.25
Pre-Verification	DHE12CAB	DHE12CAB	AM014CAB	AM014CAB	AM018CAB
Start File	DHE12000	DHE12436	AM014000	AM014509	AM018000
Finish File	DHE12435	DHE12480	AM014508	AM014557	AM018106
Post-Verification	DHE12CAA	DHE12CAA	AM014CAA	AM014CAA	AM018CAA
Depth Return Error (in.)	N/A	0	N/A	-1	N/A
Comments	None	None	None	None	None

Log Run	13				
Date	07/21/08				
Logging Engineer	Spatz				
Start Depth (ft)	233.0				
Finish Depth (ft)	238.0				

Log Run	13				
Count Time (sec)	15				
Live/Real	R				
Shield (Y/N)	N				
MSA Interval (ft)	0.25				
Pre-Verification	AM018CAB				
Start File	AM018107				
Finish File	AM018127				
Post-Verification	AM018CAA				
Depth Return Error (in.)	- 1				
Comments	None				

Logging Operation Notes:

Logging was conducted with a centralizer on the sondes. Data were mostly acquired in a single casing. Exceptions include depth intervals below the bottom of each casing where the sonde entered an open hole. All measurements are referenced to ground surface.

Analysis Notes:

Analyst:	Henwood	Date:	08/13/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

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

Three different sized casings were used in drilling this borehole. A casing correction for a 7/8-in.-thick casing was applied to the SGLS data (log run 1) to 108 ft.; no casing correction was applied at 109 ft. For log run 5, a casing correction for 5/8 in. thick casing was applied from 108 to 234 ft.; no correction was applied at 235 ft. For log run 10, a casing correction for 3/8-in. thick casing was applied from 233 to 267 ft.; no correction was applied at 268 ft. Data acquired below 259.7 ft. were corrected for water.

The moisture data are reported in counts per second (cps) as there is no valid calibration available for the casings used in this borehole. The data reflect relative moisture content.

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 templates identified as G4LDec07.xls and G1NMar08.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 2 ft.) at a maximum concentration of approximately 1.5 pCi/g. Other detections in the borehole were determined to be the result of statistical fluctuations from the routine processing software and full energy peaks did not exist.

MDLs for processed uranium (U-238 and U-235) are plotted because uranium exists in the groundwater in the area and a vadose zone source for this contamination is being investigated. No uranium was detected in the vadose zone. Several detections from the routine processing software were determined to be invalid as no full energy peak existed in the spectra.

The neutron moisture data log indicates an abrupt increase in relative moisture content between 220 and 237 ft. The increased moisture content appears to occur between two silty layers, which are seen as increases in Th-232 concentration. Similar zones have been observed in boreholes 299-E33-18, -343, -344, and –345 that exist in the same geographical area.

Repeat sections acquired for each logging system indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides (2 pages)
Natural Gamma Logs (2 pages)
Combination Plot (3 pages)
Combination Plot (0 to 280 ft.)
Total Gamma & Moisture (0 to 280 ft.)
Repeat Sections for Moisture
Repeat Section of Natural Gamma Logs (25 to 36 ft.)
Repeat Section of Natural Gamma Logs (219 to 231 ft.)
Repeat Section of Natural Gamma Logs (233 to 238 ft.)

[1] GWL – groundwater level

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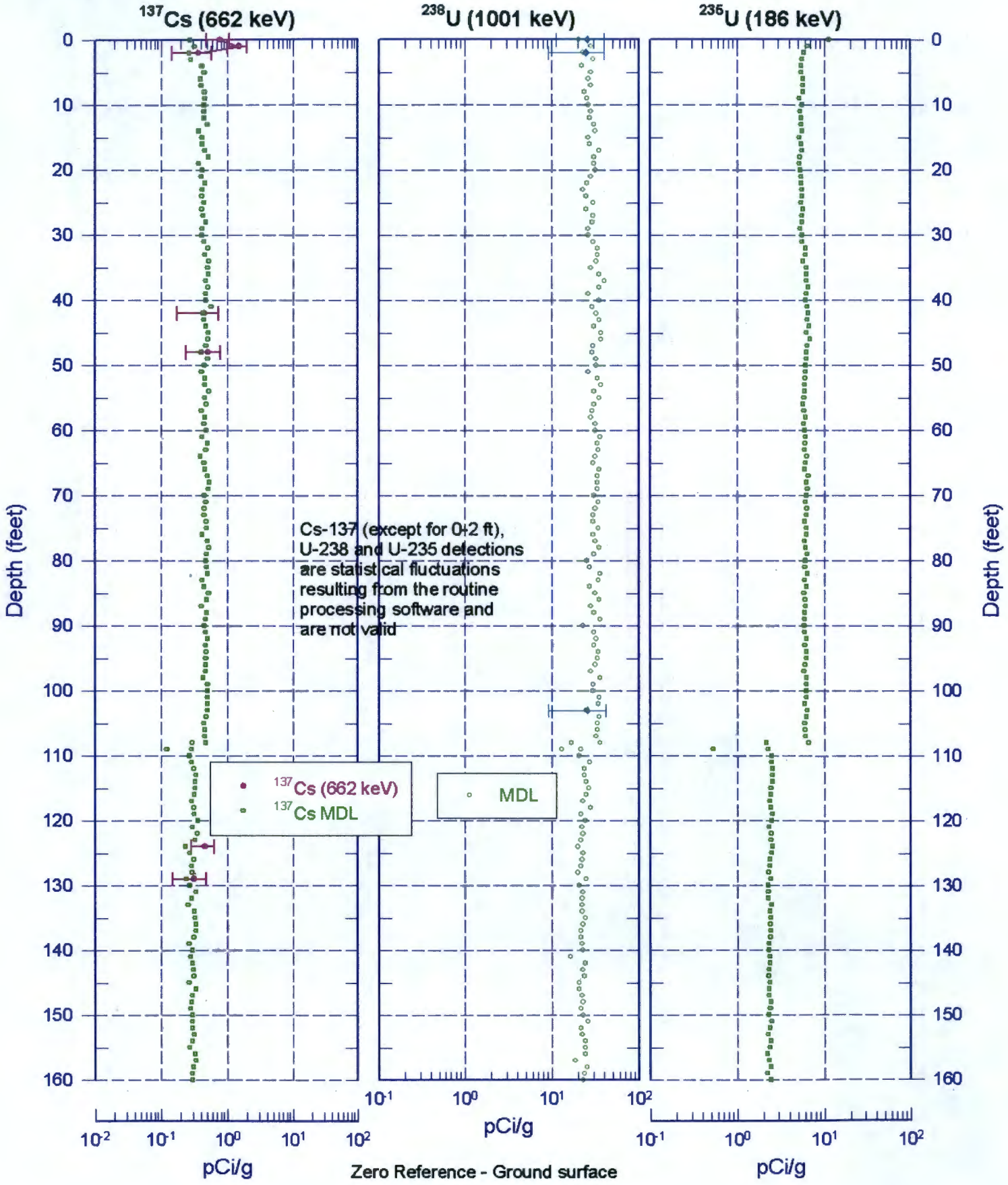
299-E33-205 (C5989)
Man-Made Radionuclides



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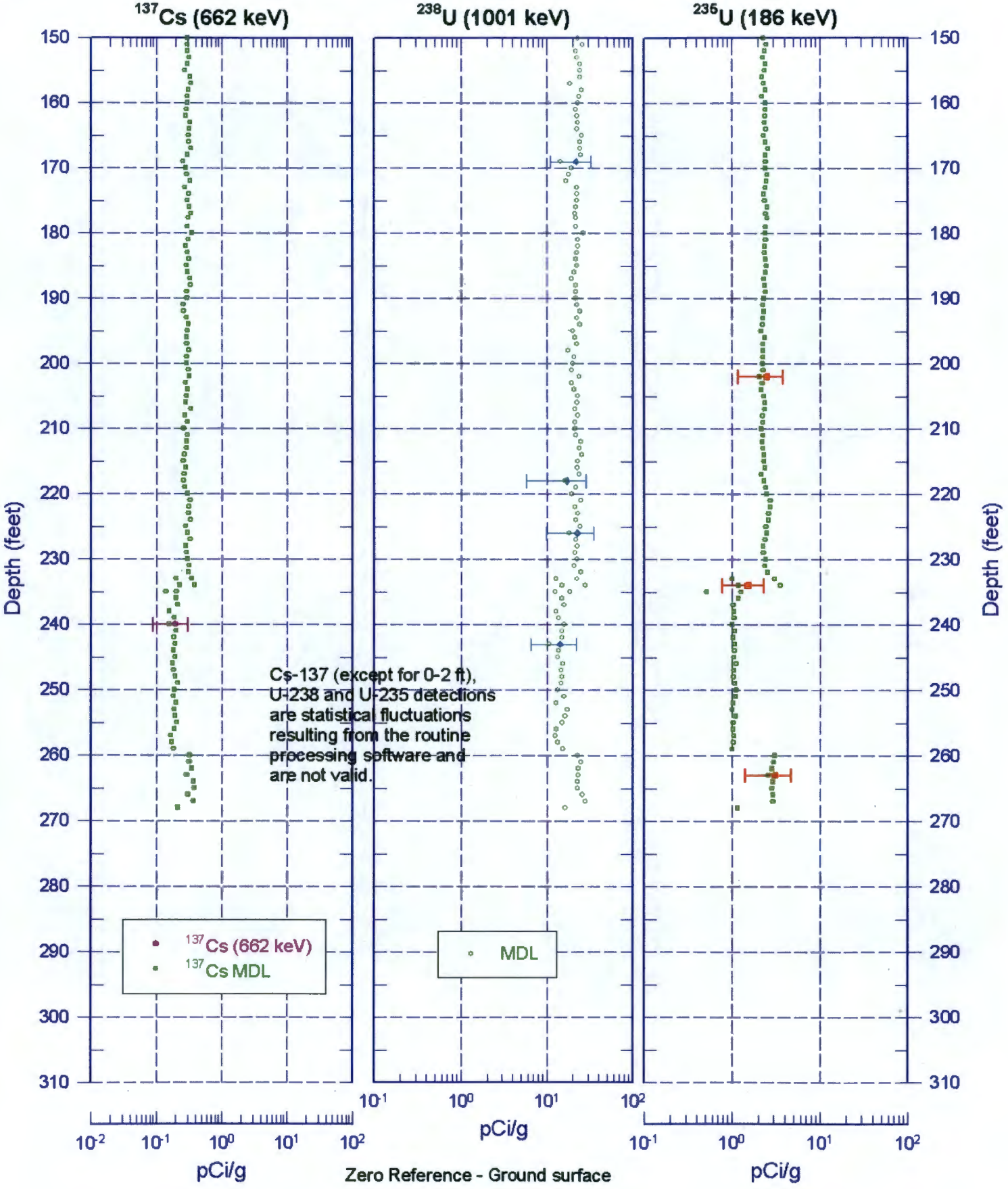
299-E33-205 (C5989)
Man-Made Radionuclides



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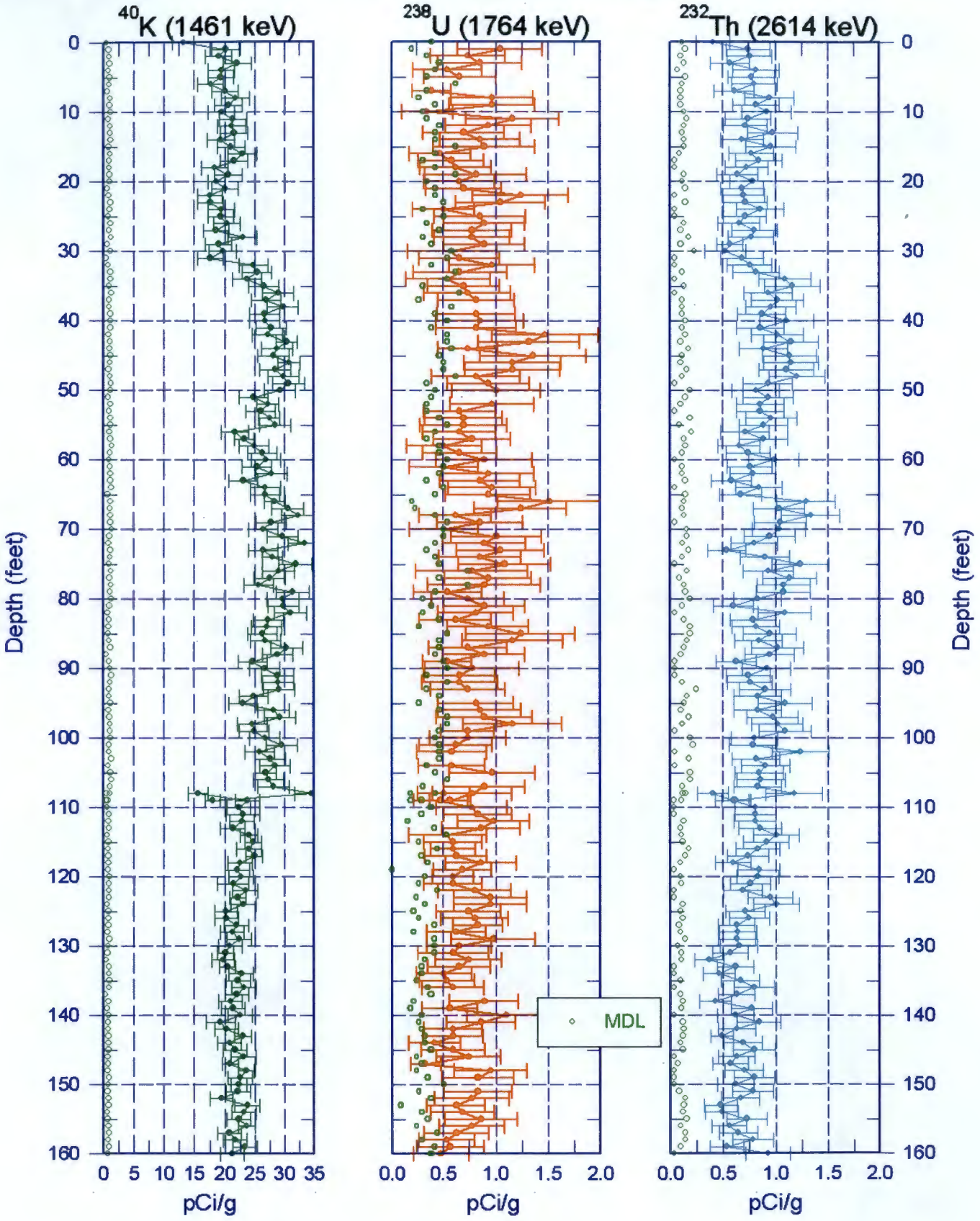
299-E33-205 (C5989)
Natural Gamma Logs



Zero Reference - Ground surface

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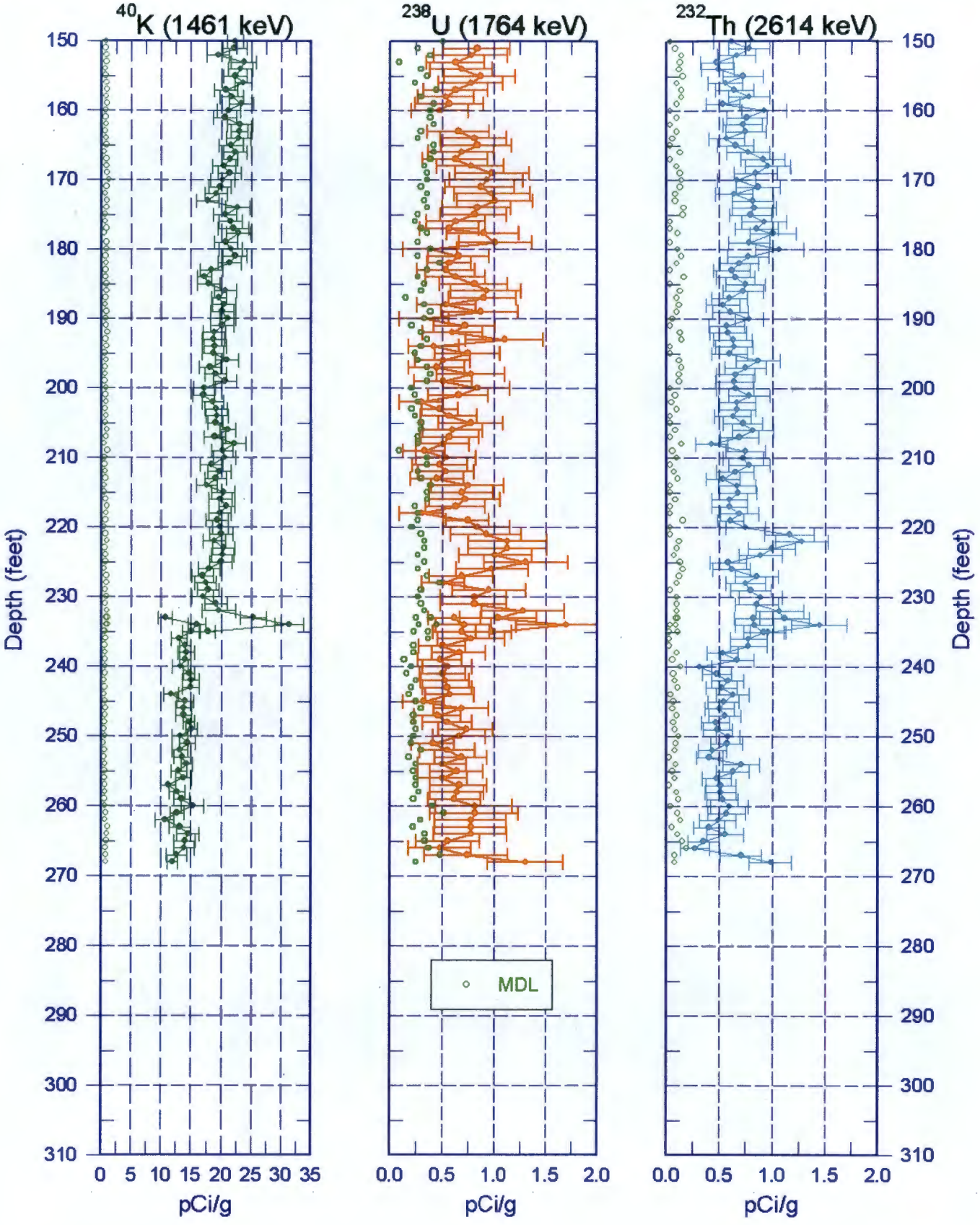
299-E33-205 (C5989)
Natural Gamma Logs



Zero Reference - Ground surface

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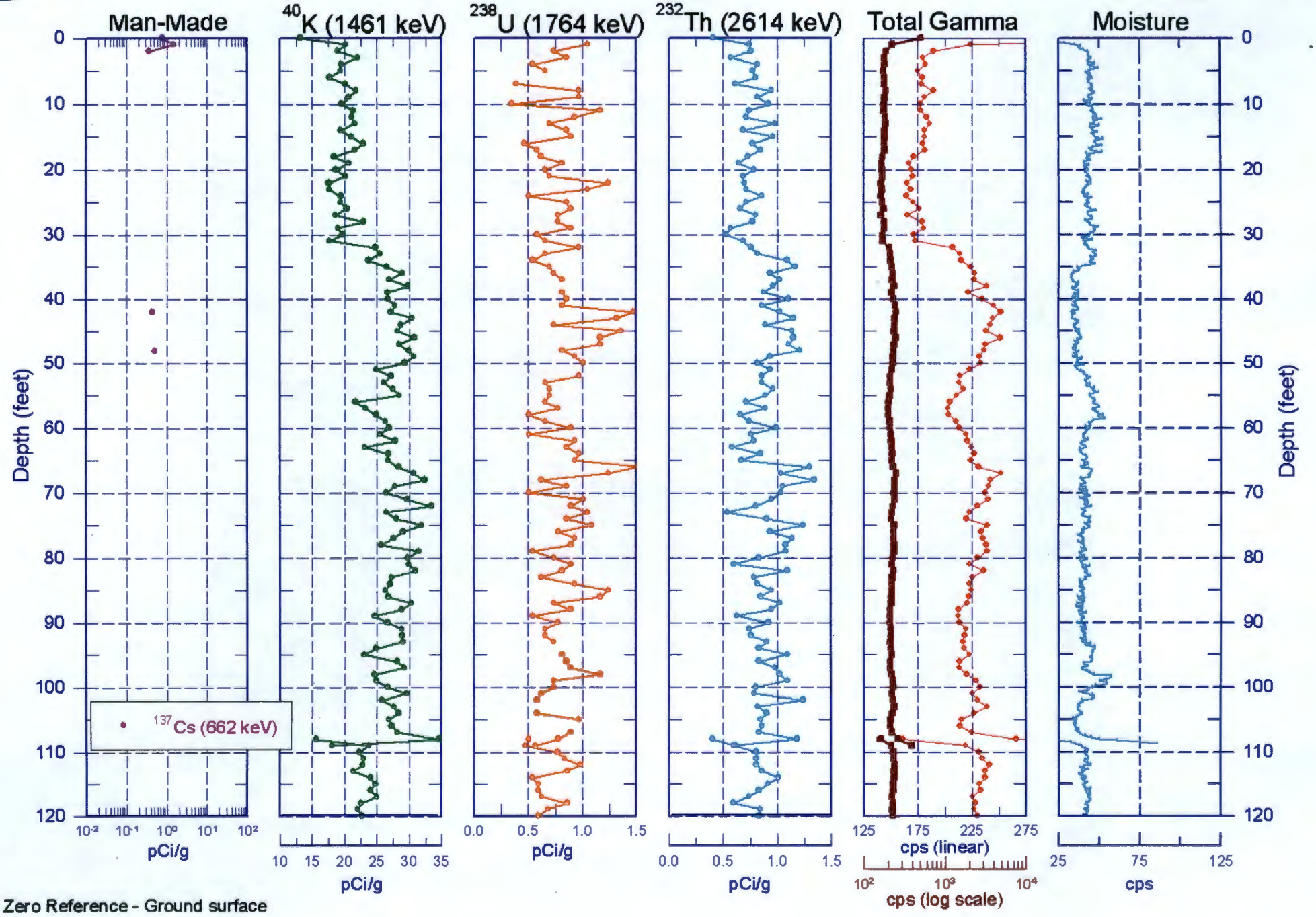
299-E33-205 (C5989) Combination Plot



Zero Reference - Ground surface

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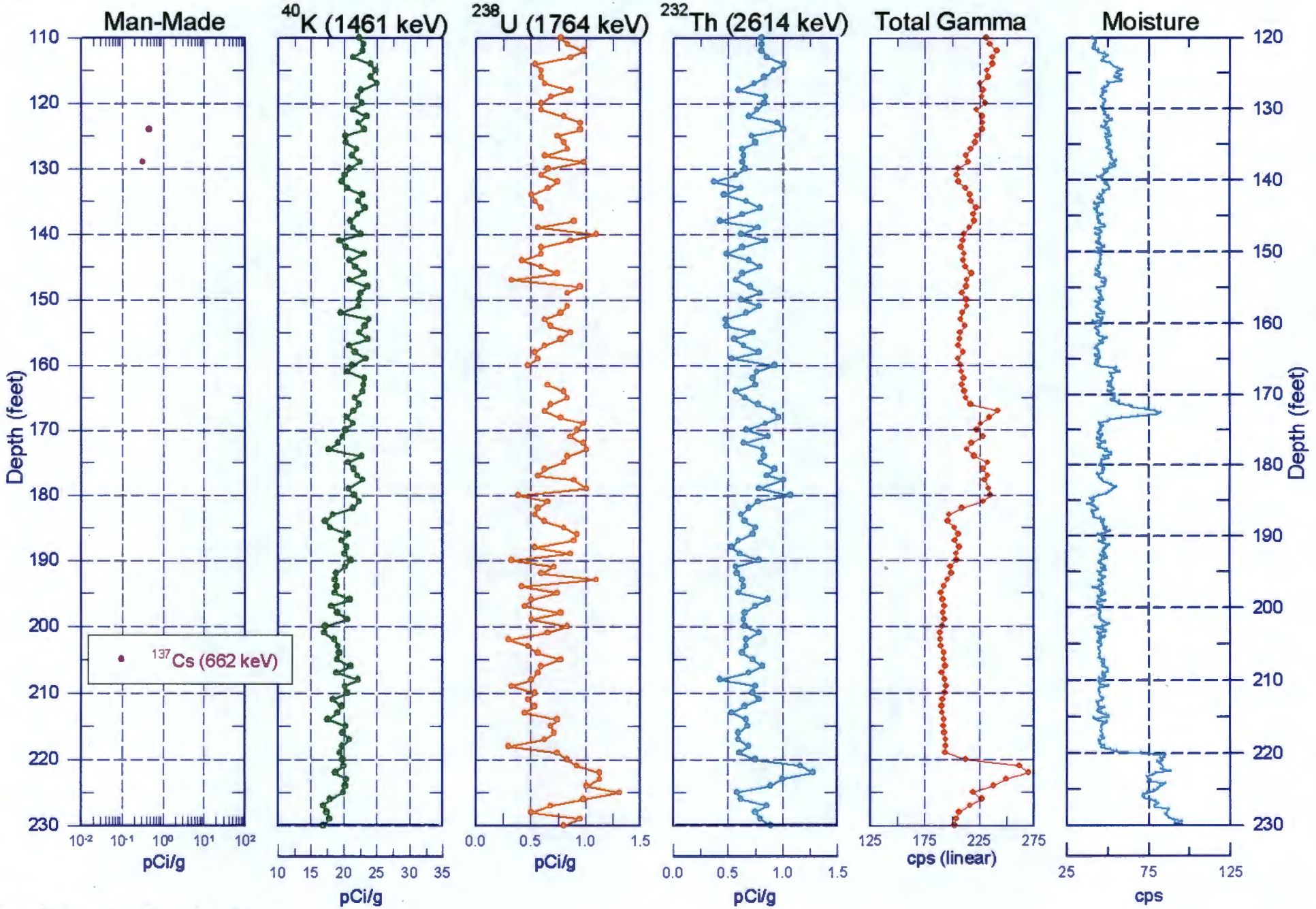
299-E33-205 (C5989) Combination Plot



Zero Reference - Ground surface

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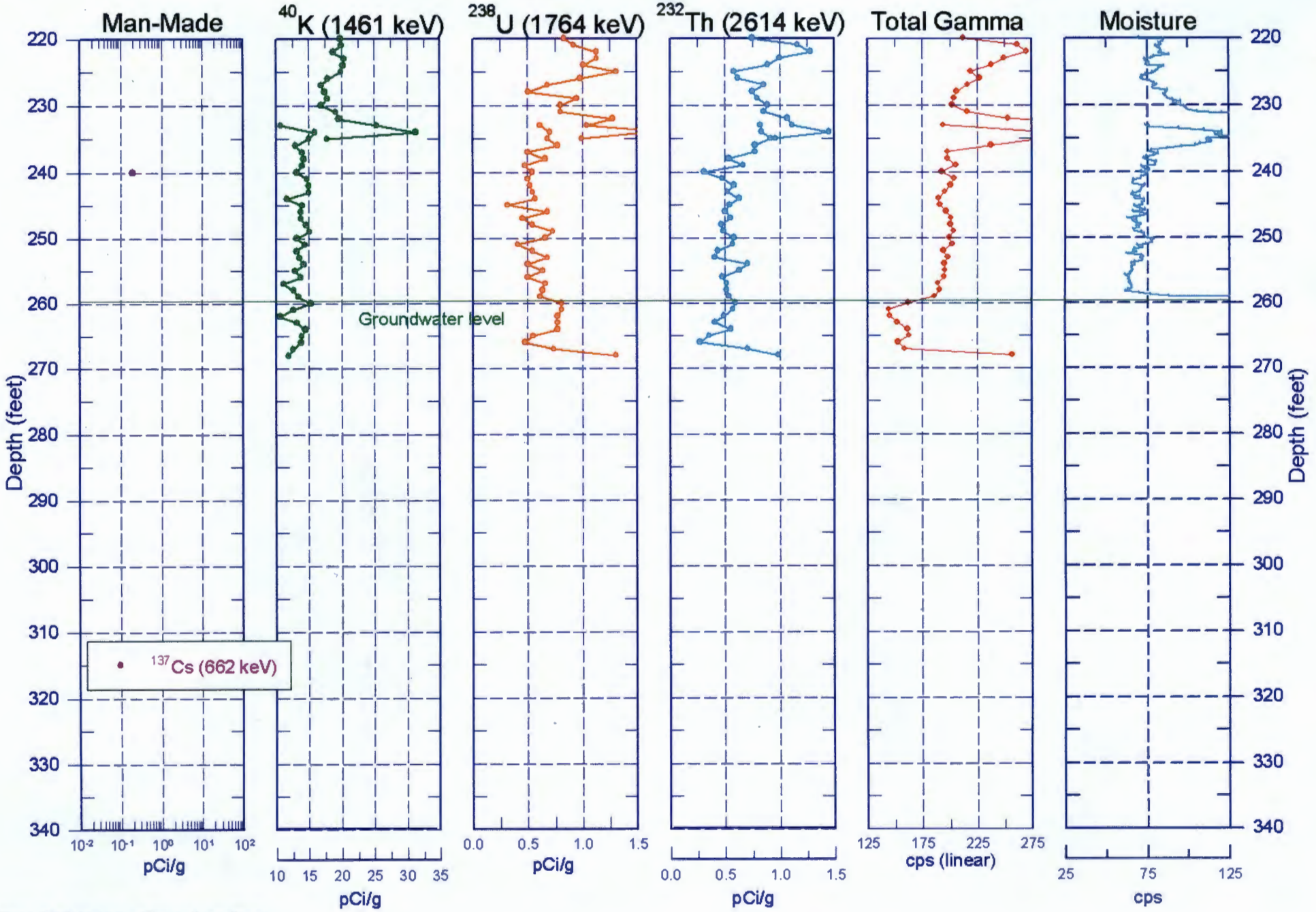
299-E33-205 (C5989) Combination Plot



Zero Reference - Ground surface

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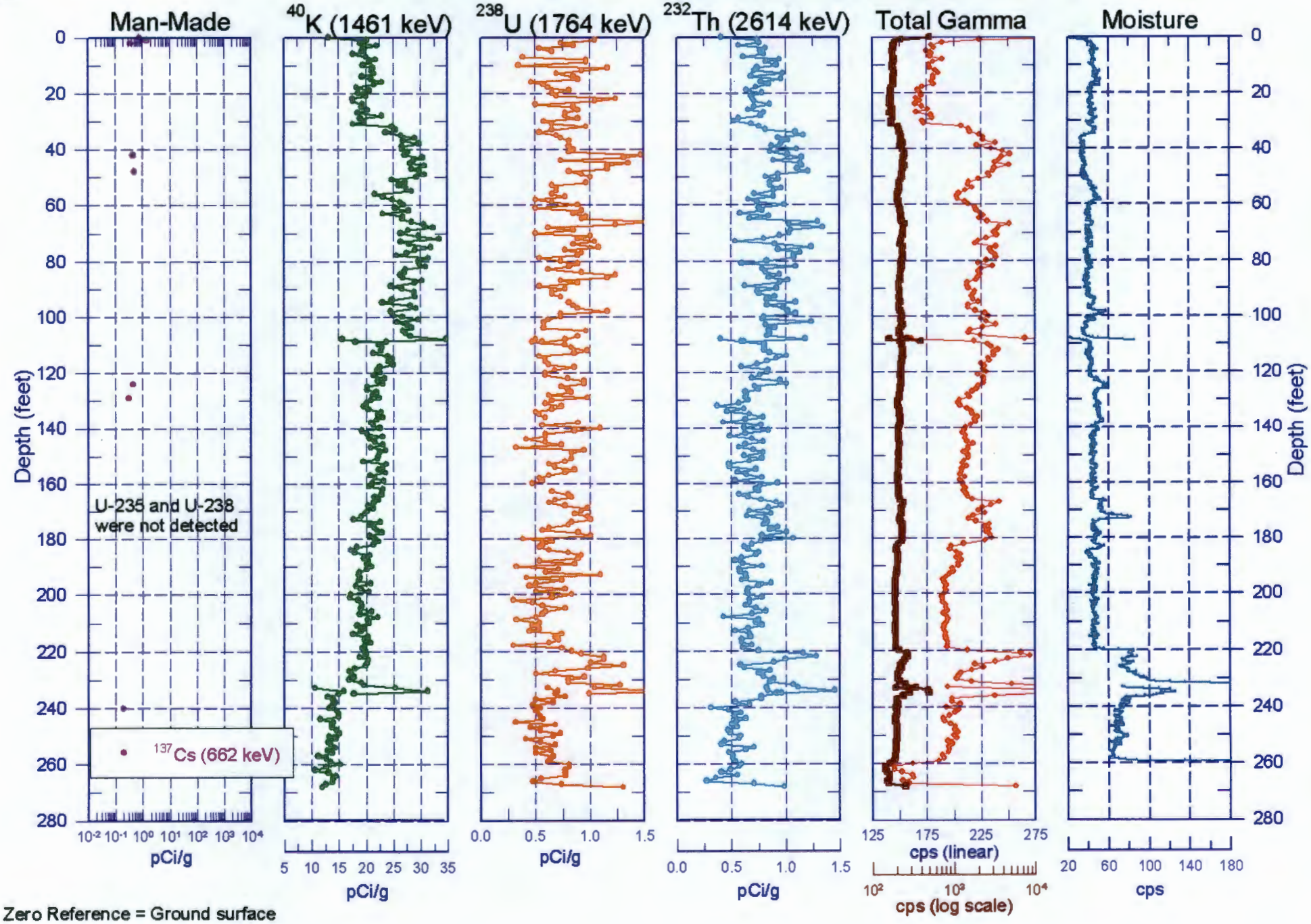
299-E33-205 (C5989) Combination Plot



Zero Reference = Ground surface

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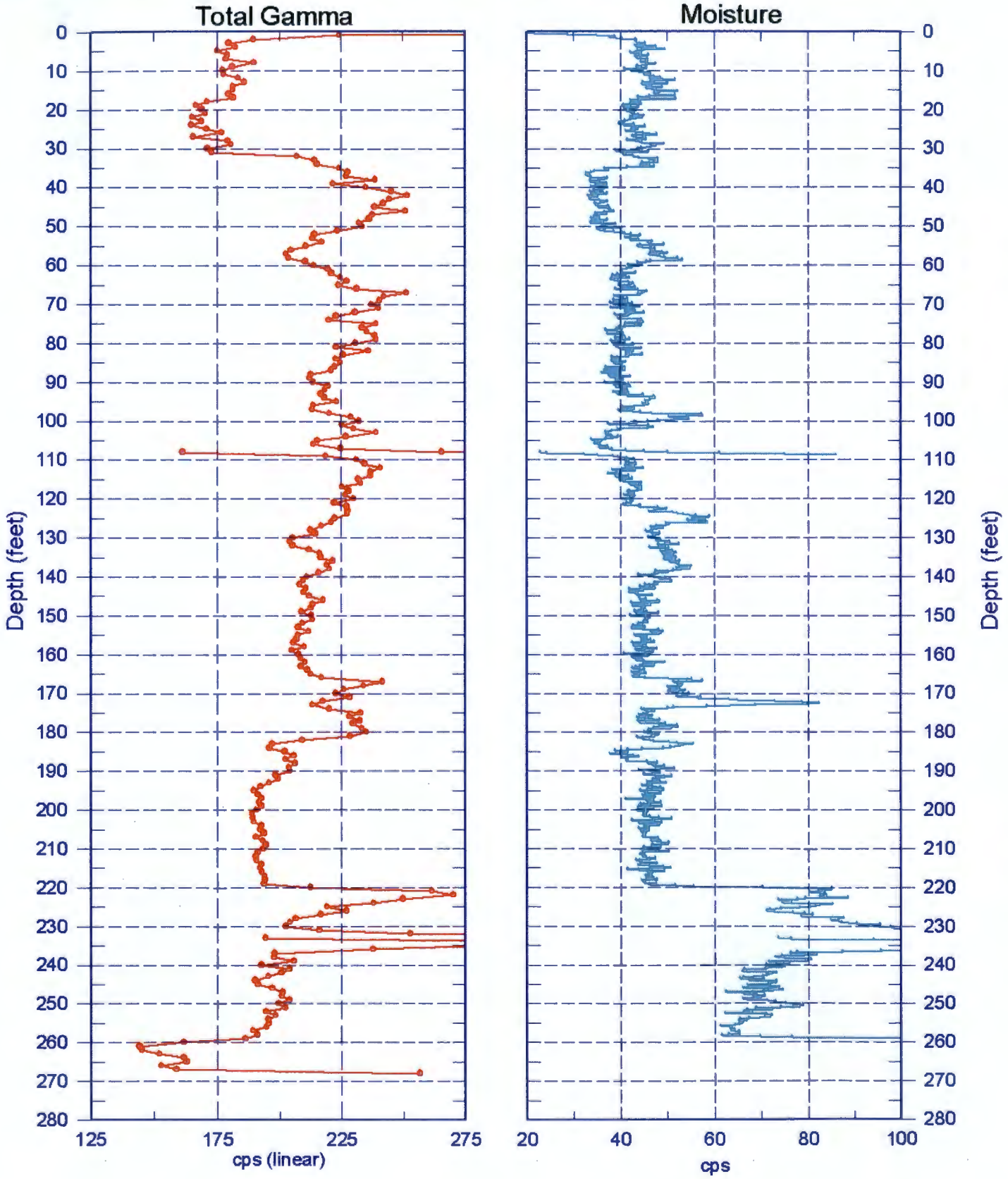
299-E33-205 (C5989)
Total Gamma & Moisture



Reference - Ground Surface

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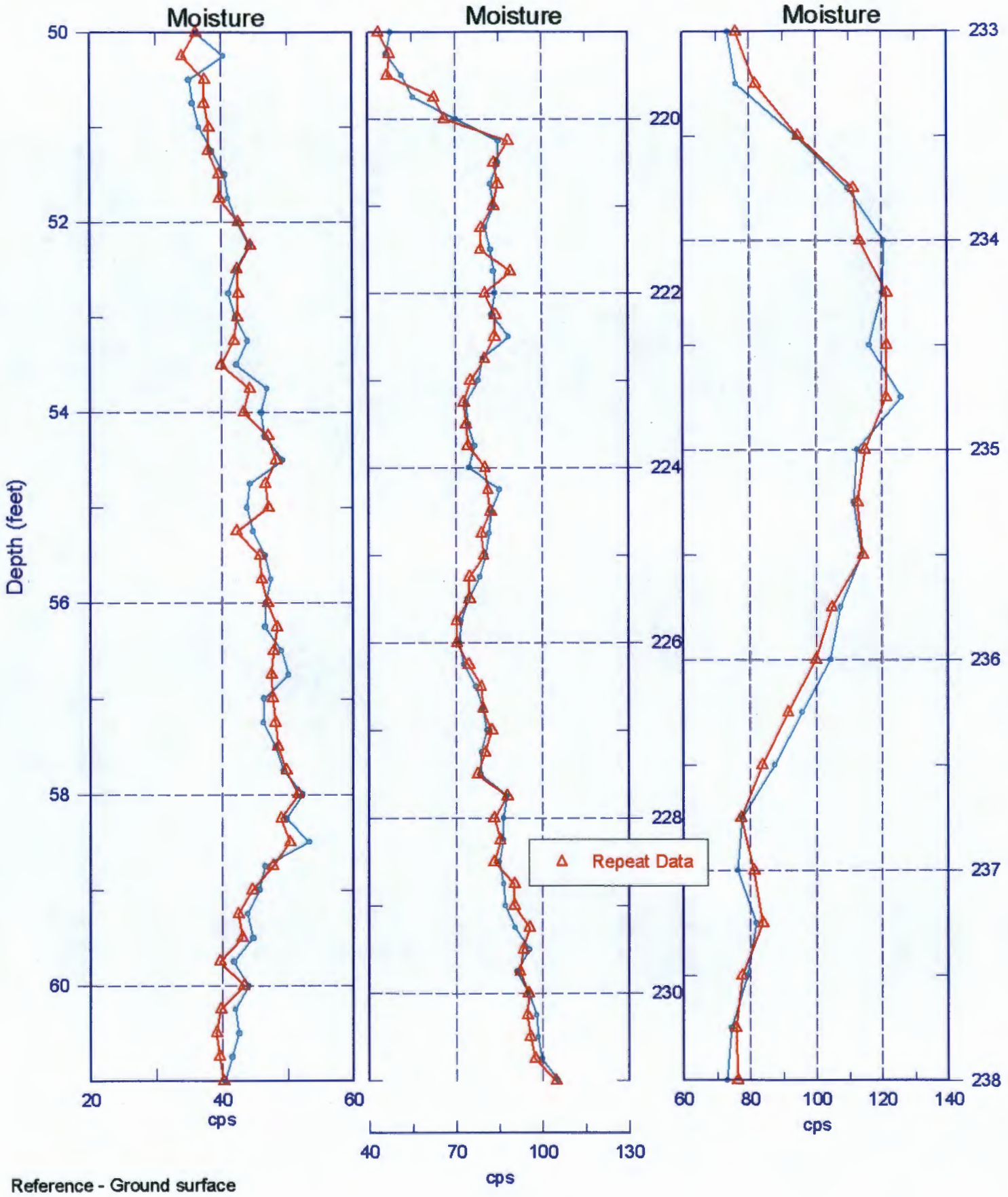
299-E33-205 (C5989)
Repeat Sections for Moisture



Reference - Ground surface

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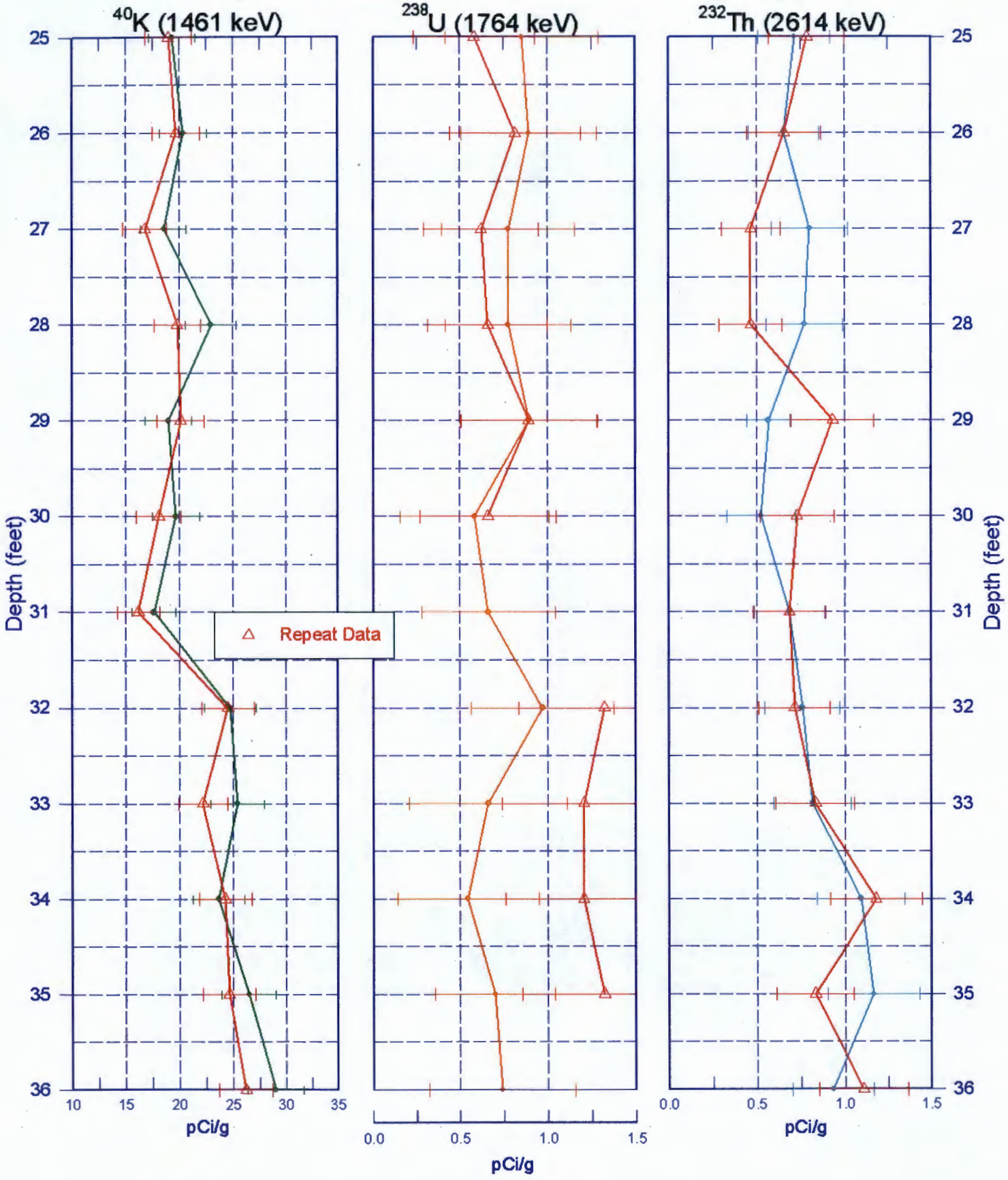
299-E33-205 (C5989)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface

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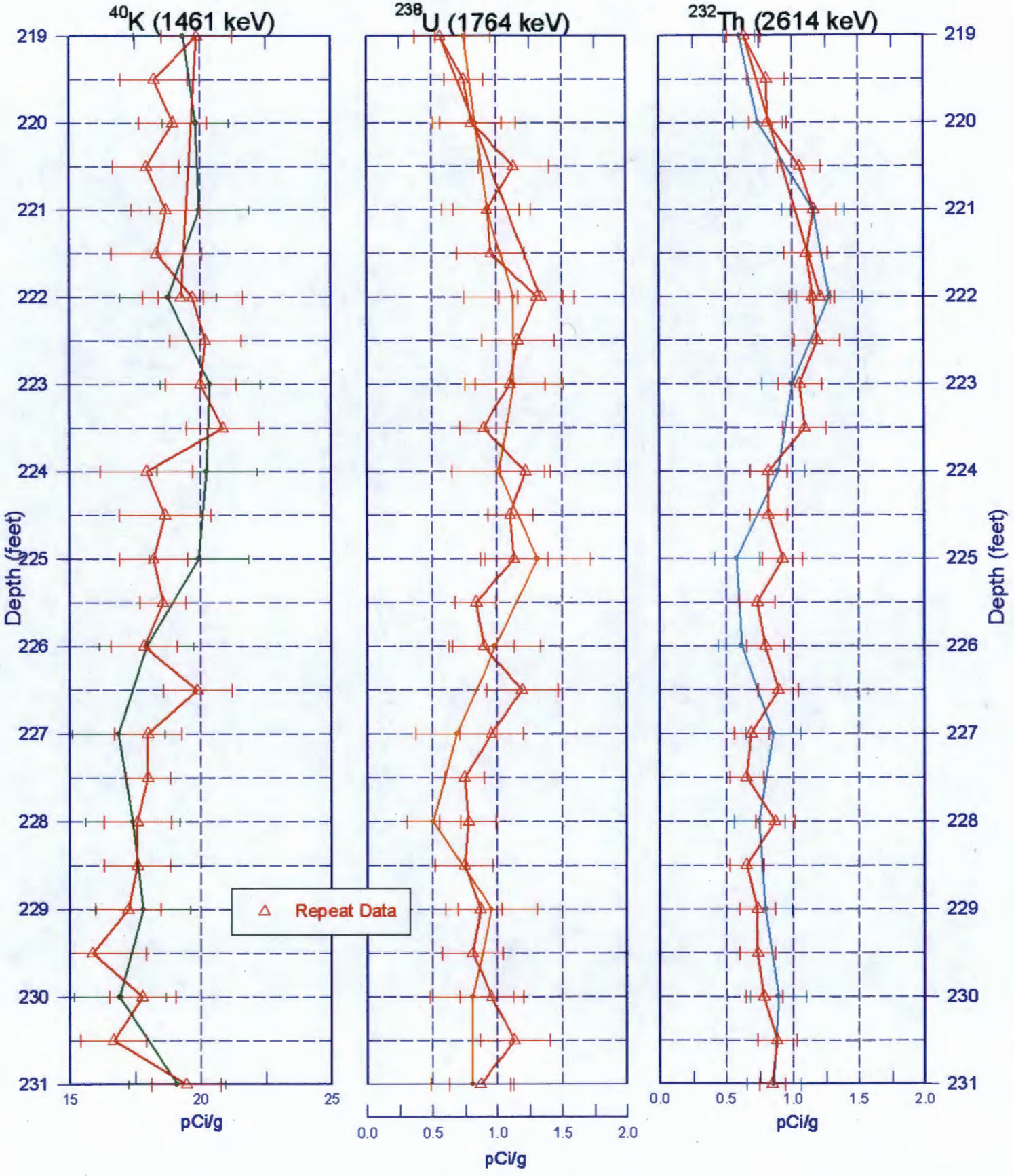
299-E33-205 (C5989)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface

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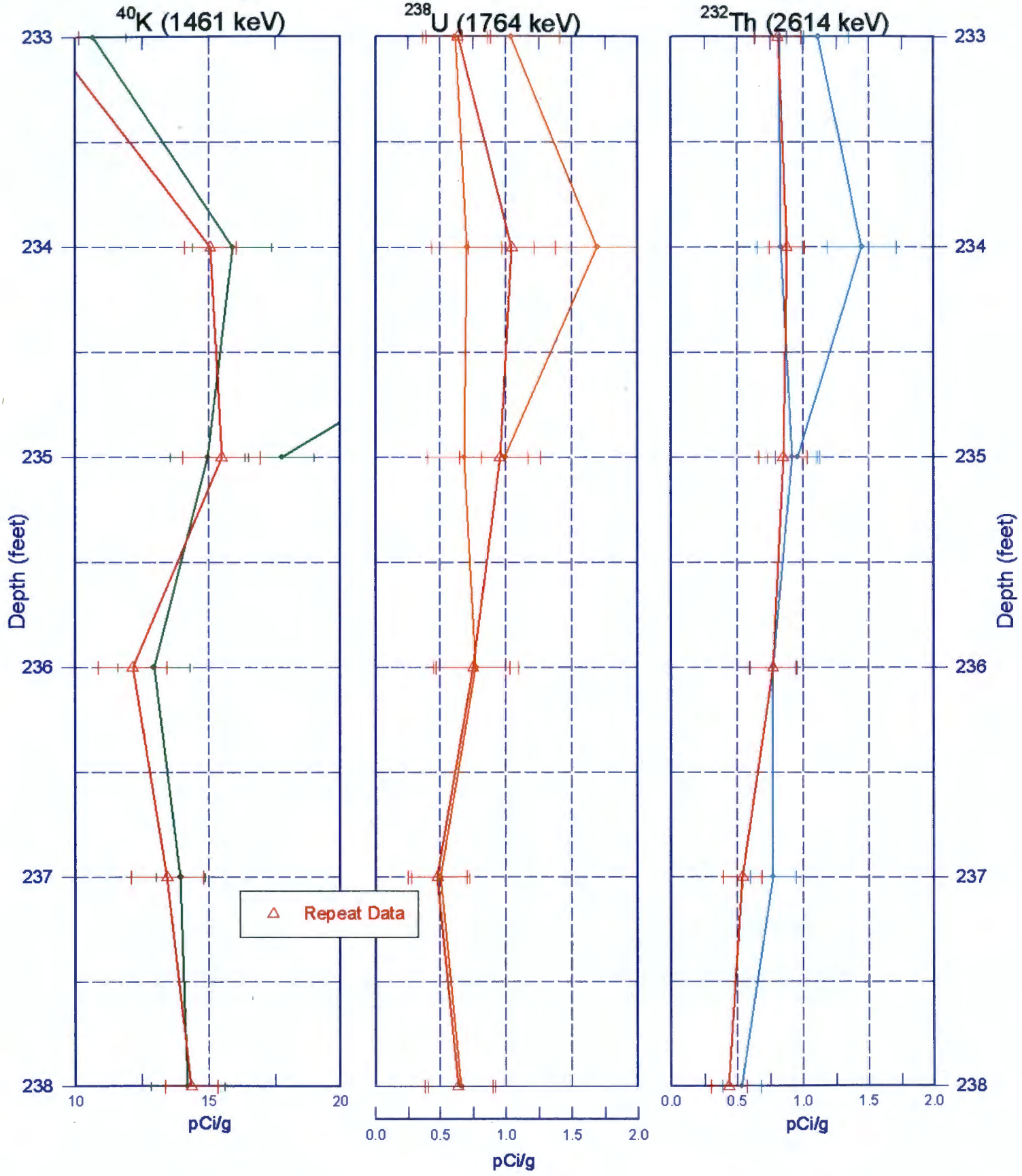
299-E33-205 (C5989)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface