

## C6554 Log Data Report

### Borehole Information:

<b>Borehole:</b> C6554		<b>Site:</b> 216-S-1 Crib			
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b> None		<b>GWL Date:</b> None	
<b>North (m)</b>	<b>East (m)</b>	<b>Drill Date</b>	<b>TOC<sup>2</sup> Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
Unknown	Unknown	06/12/08	Unknown	63	Percussion

### Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.1	7	5 7/8	9/16	2.1	63
Threaded PVC	2.9	4 1/2	4	1/4	2.9	63

### Borehole Notes:

The well site geologist reported both depth to bottom and depth of casing. A logging engineer measured casing diameter employing a steel tape and rounding to the nearest 1/16-in. A PVC casing was introduced into the borehole to prevent contamination of equipment. Internal contamination was reported inside the steel casing. The zero reference is the ground surface.

### Logging Equipment Information:

<b>Logging System:</b>	Gamma 1N	<b>Type:</b>	SGLS HPGe (60%)
<b>Effective Calibration Date:</b>	03/28/08	<b>Serial No.:</b>	H45TP22010A
	<b>Calibration Reference:</b>	HGLP-CC-031	
	<b>Logging Procedure:</b>	HGLP-MAN-002, Rev. 0	

<b>Logging System:</b>	Gamma 1C	<b>Type:</b>	HRLS HPGe Planar
<b>Effective Calibration Date:</b>	11/22/07	<b>Serial No.:</b>	39A314
	<b>Calibration Reference:</b>	HGLP-CC-024	
	<b>Logging Procedure:</b>	HGLP-MAN-002, Rev. 0	

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

<b>Logging System:</b>	Gamma 1M without AmBe source	<b>Type:</b>	PMLS
<b>Effective Calibration Date:</b>	Not required	<b>Serial No.:</b>	H340207279
	<b>Calibration Reference:</b>	Not required	
	<b>Logging Procedure:</b>	HGLP-MAN-002, Rev. 0	

### Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat
Date	06/13/08	06/13/08	06/13/08
Logging Engineer	Pearson	Pearson	Pearson
Start Depth (ft)	62.0	31.0	25.0
Finish Depth (ft)	31.0	0.0	31.0
Count Time (sec)	20	100	100

Log Run	1	2	3 Repeat	
Live/Real	R	R	R	
Shield (Y/N)	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	
Log Speed (ft/min)	N/A	N/A	N/A	
Pre-Verification	AN085CAB	AN085CAB	AN085CAB	
Start File	AN085000	AN085032	AN085064	
Finish File	AN085031	AN085063	AN085070	
Post-Verification	AN085CAA	AN085CAA	AN085CAA	
Depth Return Error (in.)	N/A	- 0.25	0	
Comments	No fine gain adjustment made	Fine gain adjustment after file -037	No fine gain adjustment made	

**High Rate Logging System (HRLS) Log Run Information:**

Log Run	8	9	10	11 Repeat
Date	06/13/08	06/13/08	06/13/08	06/13/08
Logging Engineer	Pearson	Pearson	Pearson	Pearson
Start Depth (ft)	31.0	36.0	35.0	39.0
Finish Depth (ft)	35.0	62.0	62.0	36.0
Count Time (sec)	300	20	300	300
Live/Real	R	R	R	R
Shield (Y/N)	N	N	Internal	Internal
MSA Interval (ft)	1.0	1.0	1.0	1.0
Log Speed (ft/min)	N/A	N/A	N/A	N/A
Pre-Verification	AC191CAB	AC191CAB	AC191CAB	AC191CAB
Start File	AC191000	AC191005	AC191032	AC191060
Finish File	AC191004	AC191031	AC191059	AC191063
Post-Verification	AC191CAA	AC191CAA	AC191CAA	AC191CAA
Depth Return Error (in.)	N/A	0	N/A	- 0.5
Comments	No fine gain adjustment made			

**Neutron Moisture Logging System (NMLS) Log Run Information:**

Log Run	4	5 Repeat		
Date	06/13/08	06/13/08		
Logging Engineer	Pearson	Pearson		
Start Depth (ft)	0.0	34.0		
Finish Depth (ft)	62.0	40.0		
Count Time (sec)	15	15		
Live/Real	R	R		
Shield (Y/N)	N	N		
MSA Interval (ft)	0.25	0.25		
Log Speed (ft/min)	N/A	N/A		
Pre-Verification	AM010CAB	AM010CAB		
Start File	AM010000	AM010249		
Finish File	AM010248	AM010273		
Post-Verification	AM010CAA	AM010CAA		
Depth Return Error (in.)	N/A	- 0.25		
Comments	None	None		

**Passive Neutron Logging System (PNLS) Log Run Information:**

Log Run	6	7 Repeat		
Date	06/13/08	06/13/08		
Logging Engineer	Pearson	Pearson		
Start Depth (ft)	0.0	35.0		
Finish Depth (ft)	62.0	62.0		
Count Time (sec)	60	15		
Live/Real	R	R		
Shield (Y/N)	N	N		
MSA Interval (ft)	1.0	0.25		
Log Speed (ft/min)	N/A	N/A		
Pre-Verification	AM011CAB	AM011CAB		
Start File	AM011000	AM011063		
Finish File	AM011062	AM011171		
Post-Verification	AM011CAA	AM011CAA		
Depth Return Error (in.)	N/A	0		
Comments	None	None		

**Logging Operation Notes:**

Measurements are referenced to the ground surface.

**Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	06/17/08	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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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 for a 9/16-in.-thick steel casing and a 0.237-in. thick PVC casing was applied to the SGLS and HRLS data. Because of the borehole size and PVC casing, NMLS data are not corrected to volumetric moisture and are reported in counts per second (cps). PNLs data are used qualitatively and are also reported in cps.

SGLS and HRLS 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 G1NMar08.xls and G1cNov07 for the SGLS and HRLS, respectively, using efficiency functions and corrections for casing, dead time, and shielding as determined from annual calibrations.

In areas where dead time is greater than 40 percent, HRLS data are substituted for the SGLS data. Where HRLS data exceed 40 percent dead time, HRLS data acquired with an internal tungsten shield are substituted.

**Results and Interpretations:**

Cs-137 was detected throughout the borehole. It is reported that contamination may reside on the inside of the steel casing in unknown amounts and activity. However, the high rate interval from approximately 30 to 62 ft exhibits a dominance of Cs-137 from the sediments. The maximum concentration is measured at approximately 20 million pCi/g at 37 ft. Logging experience at Hanford suggests that casing related contamination is unlikely to exhibit Cs-137 contamination in excess of 1000 to 10,000 pCi/g, although this cannot be quantified.

NMLS and PNLs data appear to be influenced by the highest gamma activity at approximately 37 and 44 ft. It is known this detector can be influenced by high gamma activity at a Cs-137 concentration in excess of 100,000 pCi/g. Therefore, it is interpreted that the relatively high neutron flux at these depths is neither representative of enhanced moisture nor an indicator of alpha emitting radionuclides such as Pu-239.

All repeat data indicate good repeatability.

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**List of Log Plots:**

Depth Reference is ground surface

Manmade Radionuclides

Natural Gamma Logs

Combination Plot

Total Gamma & Dead Time

Passive Neutron & Moisture

Cs-137 Repeat Section

Repeat Section of Natural Gamma Logs

Repeat of Passive Neutron & Moisture

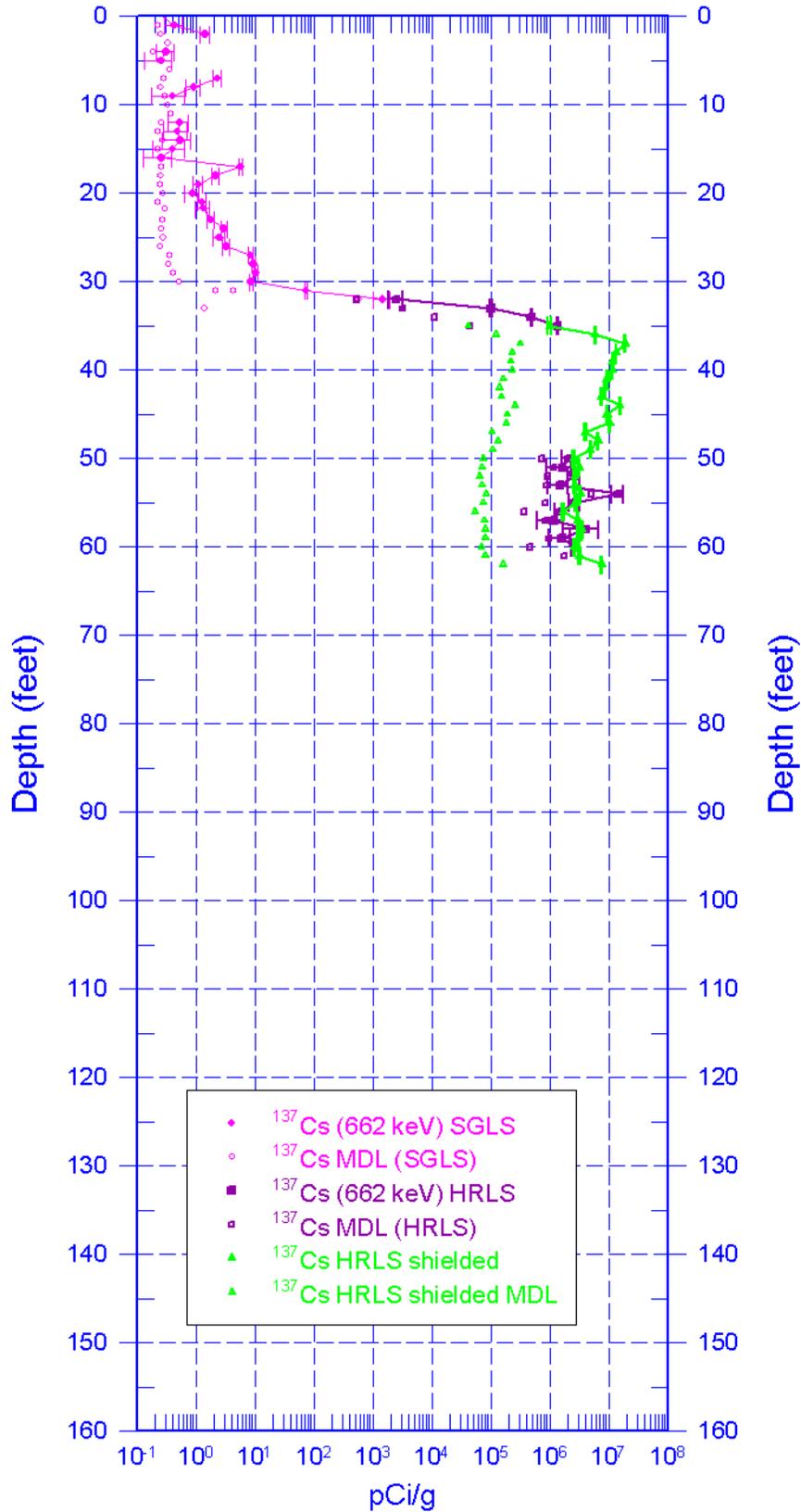
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<sup>1</sup> GWL – groundwater level

<sup>2</sup> TOC – top of casing

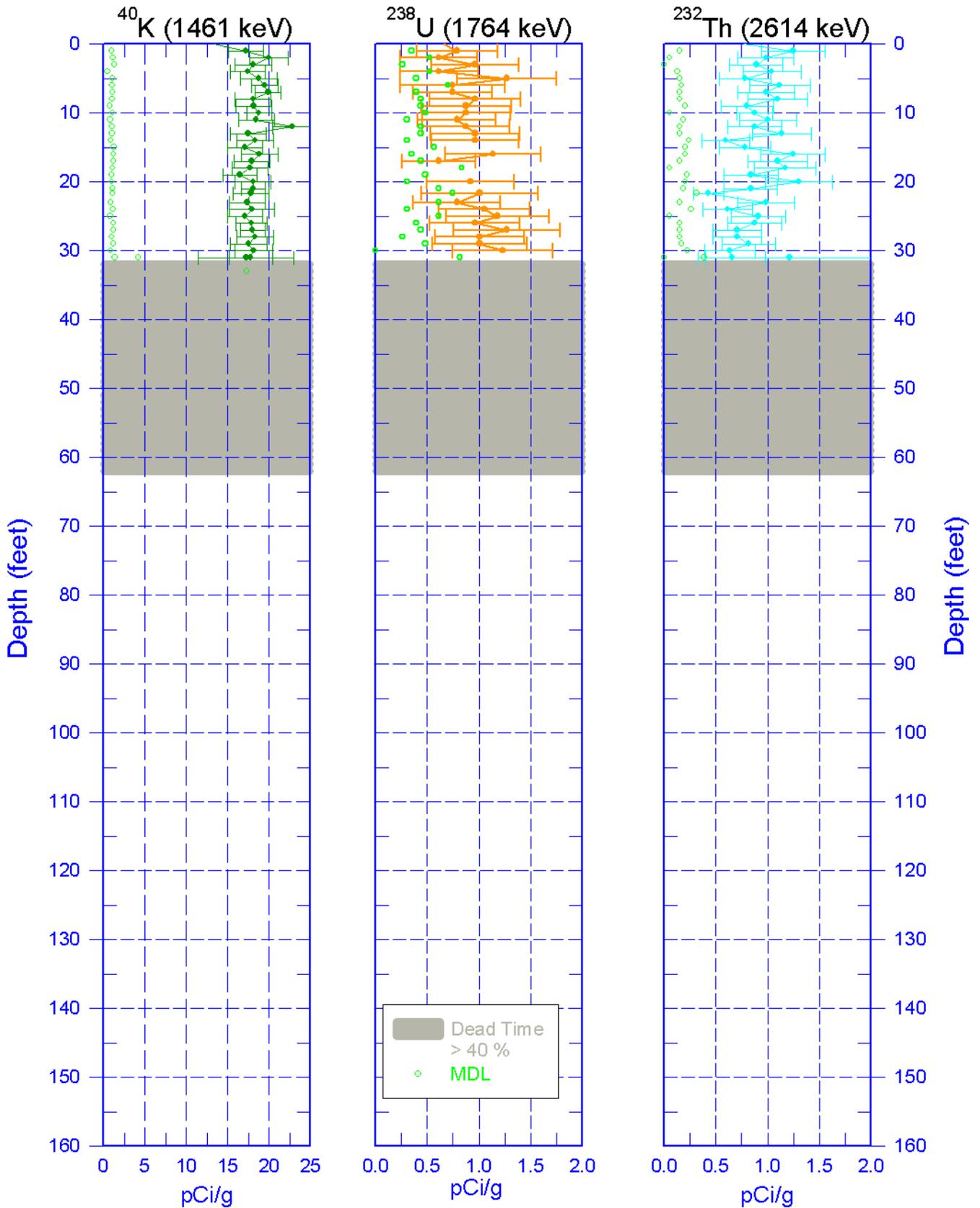
# C6554

## Manmade Radionuclides



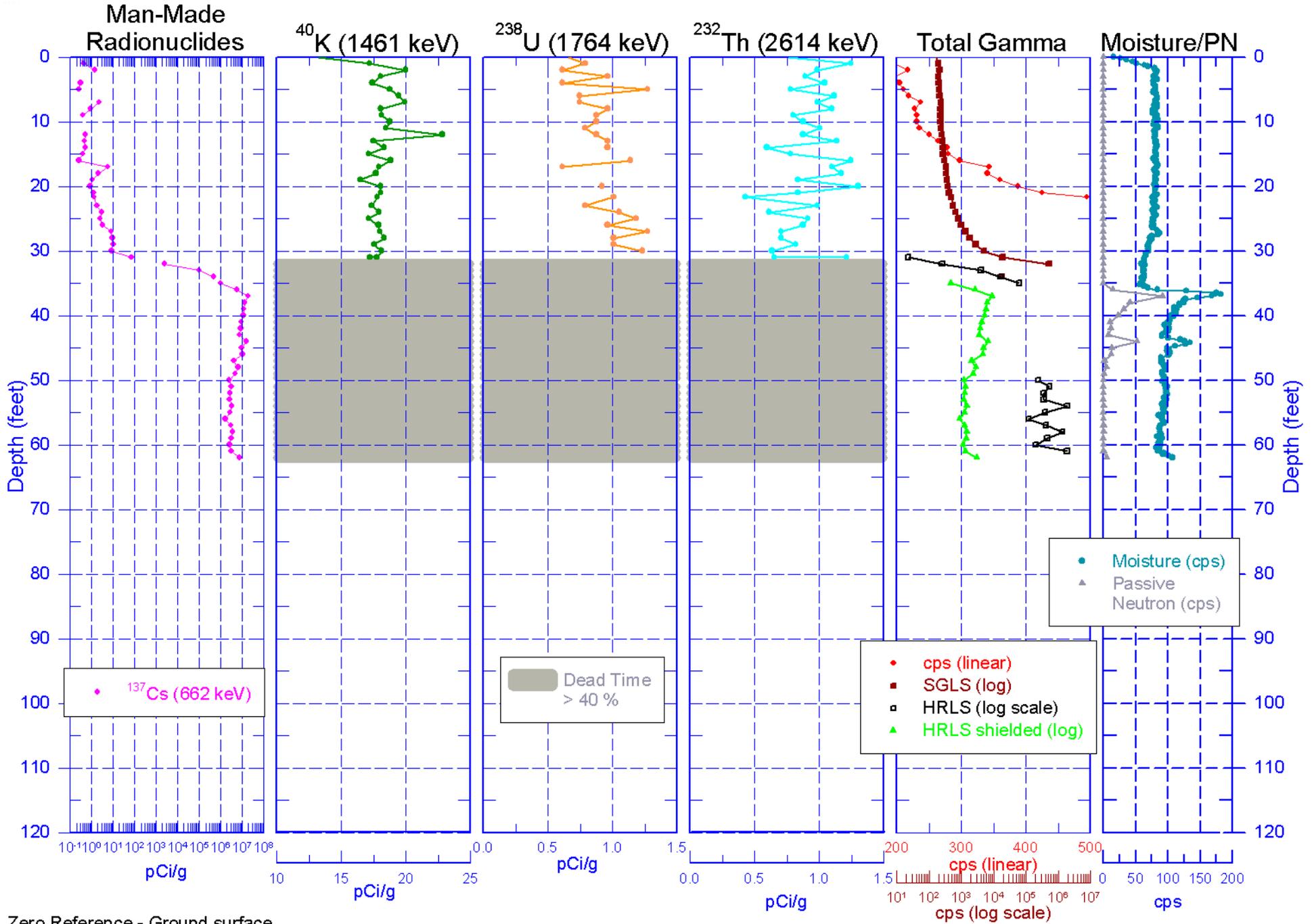
Zero Reference - Ground surface

# C6554 Natural Gamma Logs

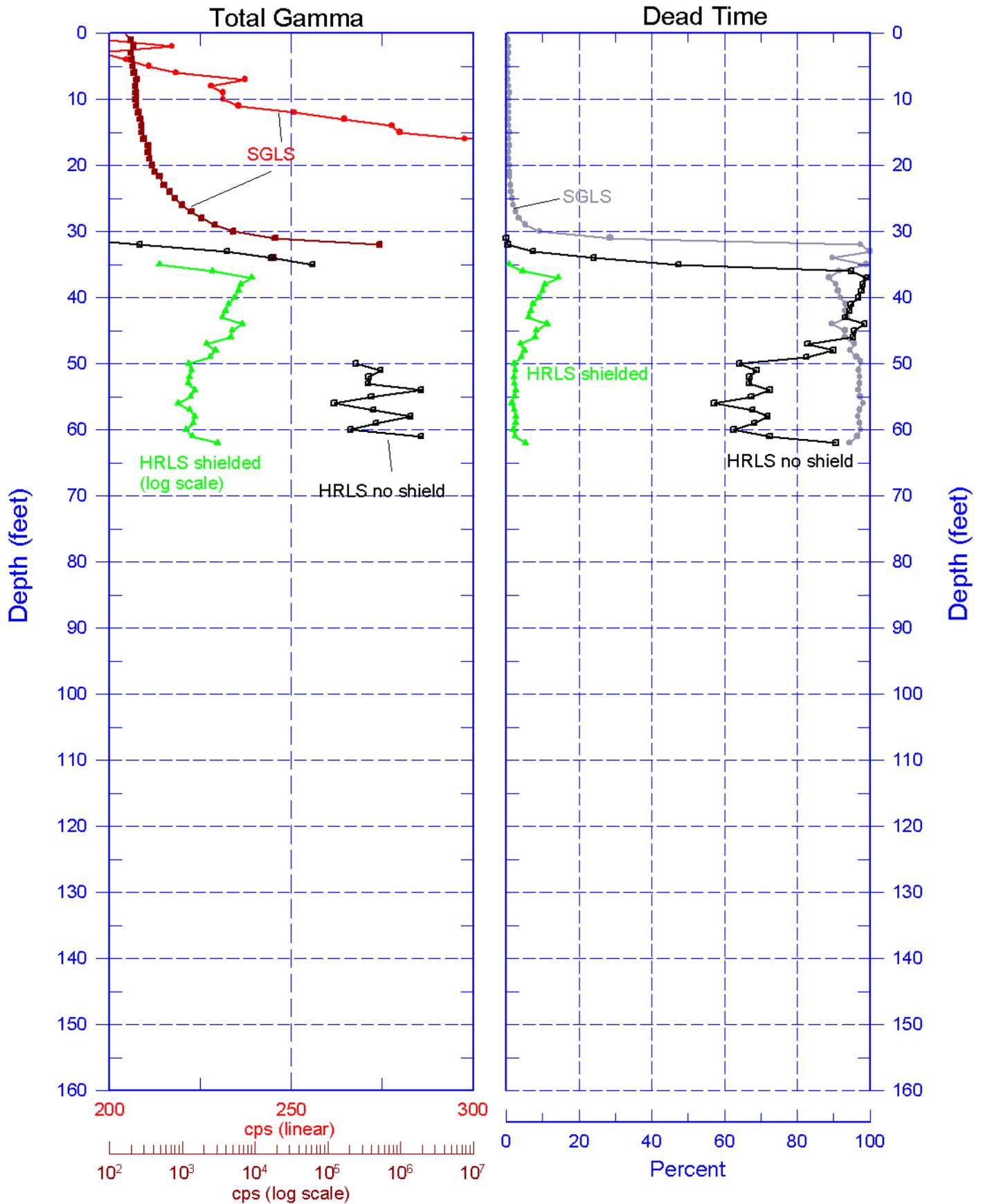


Zero Reference - Ground surface

# C6554 Combination Plot

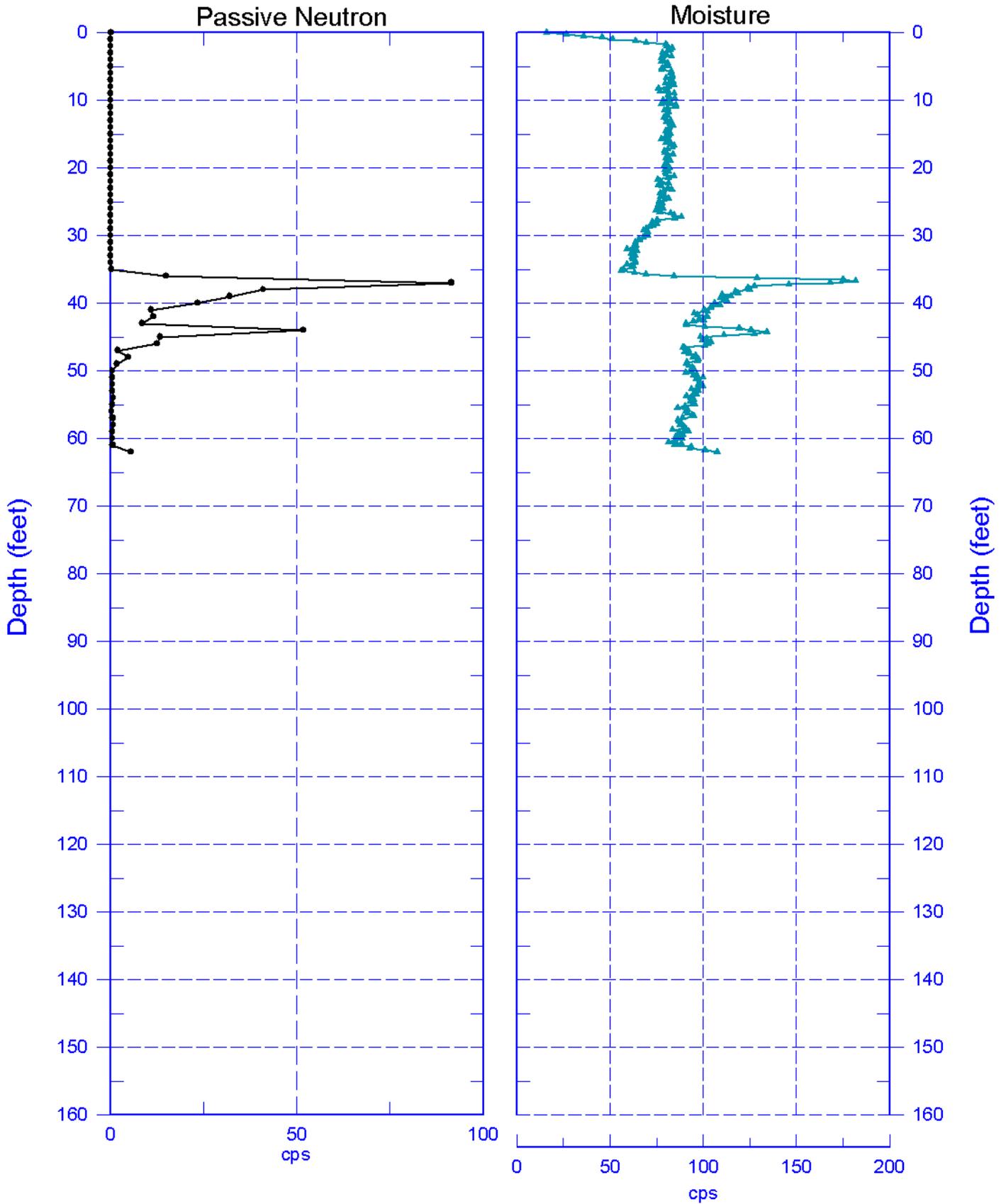


**Total Gamma & Dead Time**



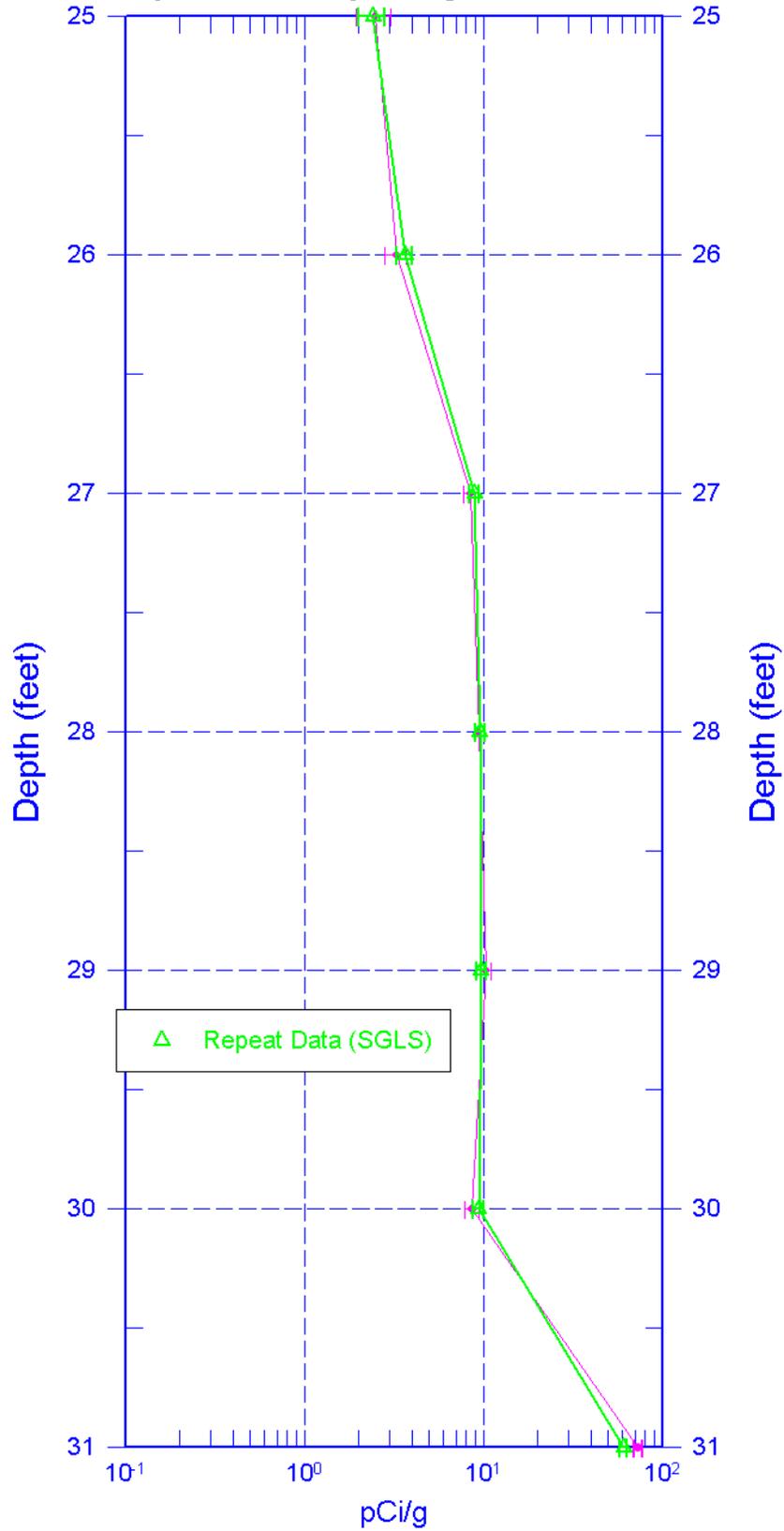
Reference - Ground surface

Passive Neutron & Moisture



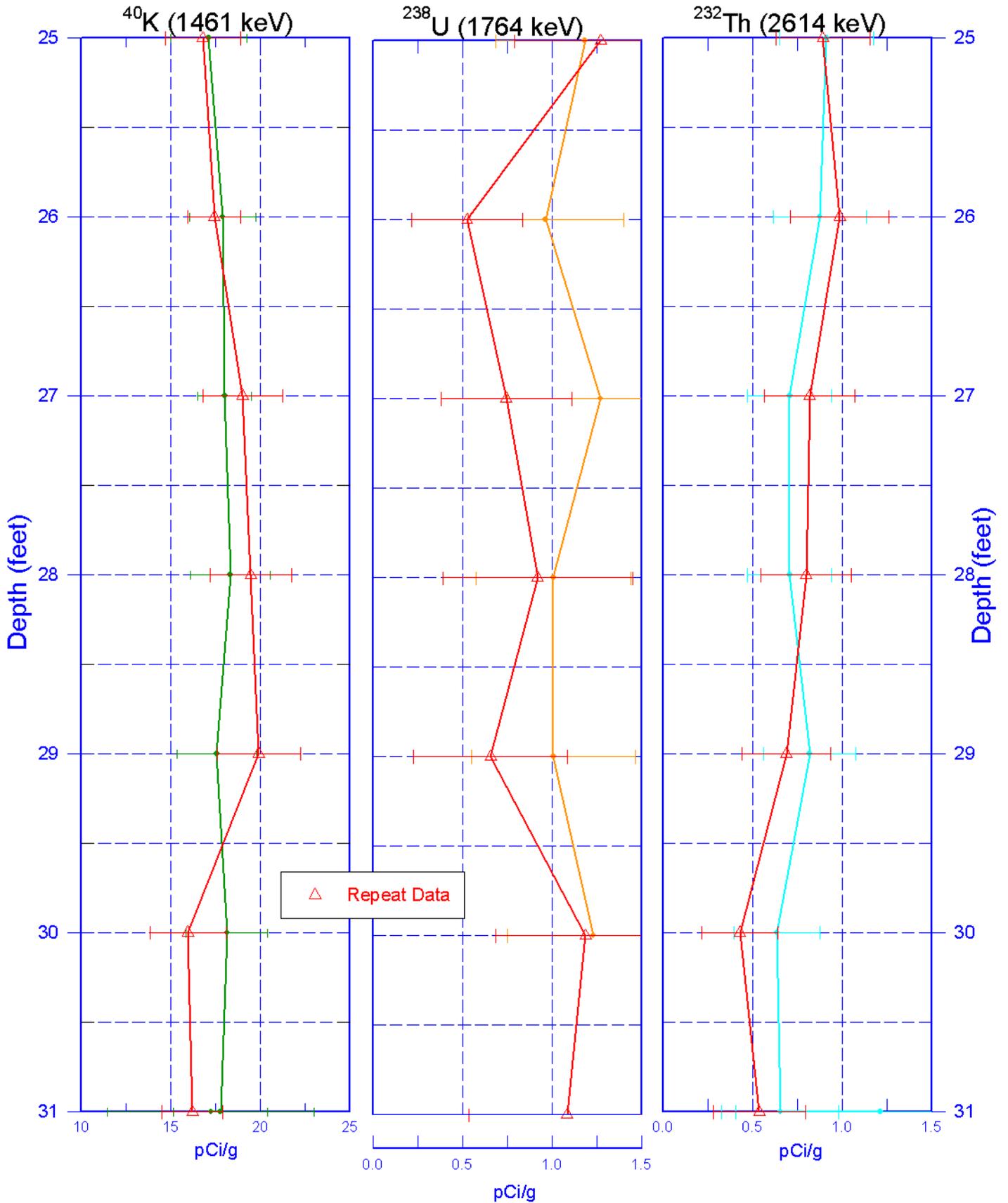
# C6554

## <sup>137</sup>Cs (662 keV) Repeat Section



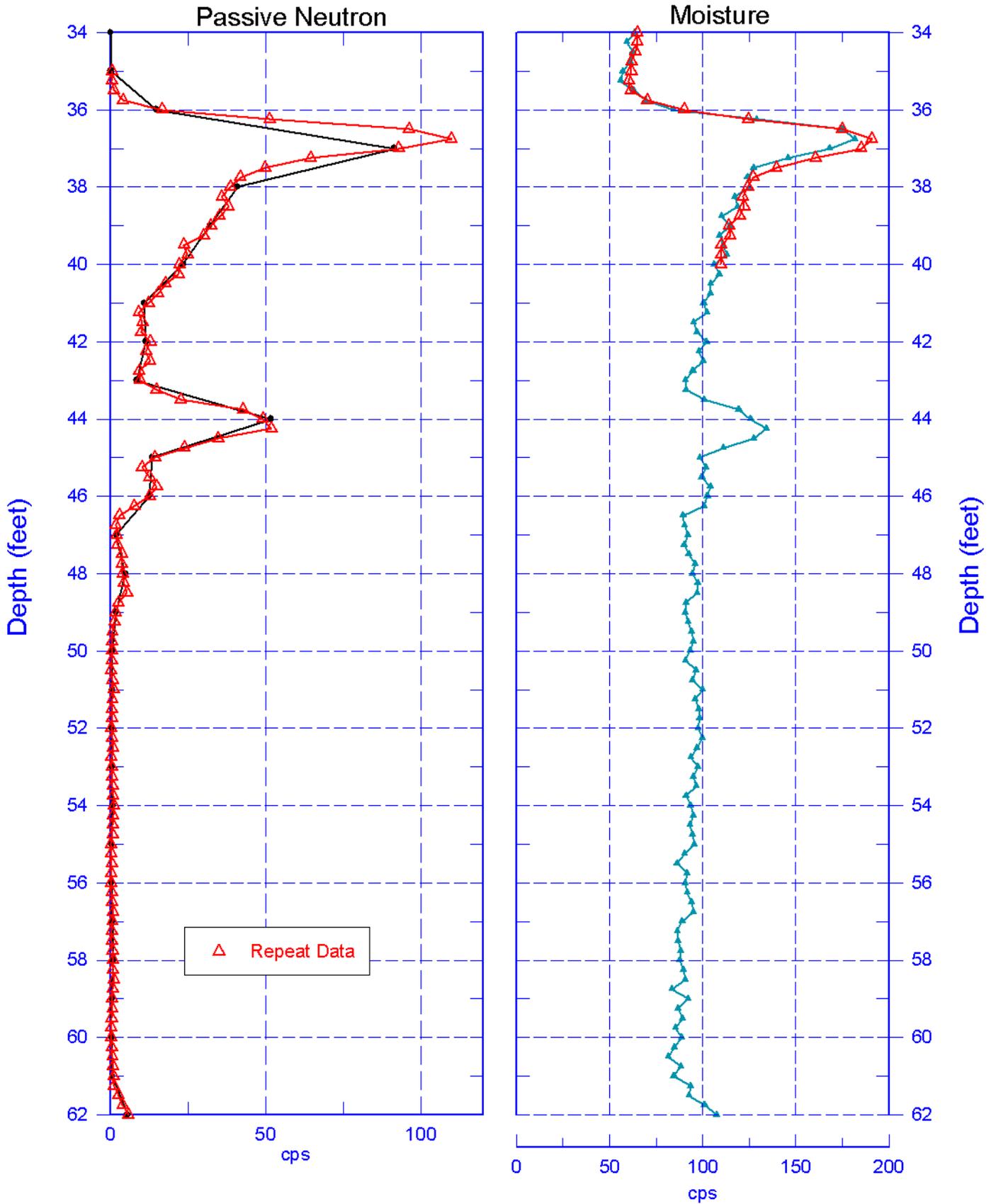
Zero Reference - Ground surface

## Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface

# C6554 Repeat of Passive Neutron & Moisture



Reference - Ground surface