

10-03-07, 299-E25-82 (A6521), Log Data Report

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-08RV14800



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10-03-07
299-E25-82 (A6521)
Log Data Report

Borehole Information:

Log Date:	2015-06-22	Filename:	A6521_HG_2015-06-22	Site:	A Farm
Coordinates (WA St Plane)		DTW¹ (ft) :	Dry	GWL Date:	04/30/15
North (m)	East (m)	Drill Date	TOC² Elevation	Total Depth (ft)	Type
N/A	N/A	04/30/1962	N/A	125	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Diameter (in.)		Thickness (in.)	Top (ft)	Bottom (ft)
		Outer	Inside			
Welded Steel	0.0	N/A	6	0.280	0.0	125

Borehole Notes:

A re-baseline of selected boreholes in A Farm was conducted in 2015 for comparison with the initial baseline data acquired in 1996. This Log Data Report includes SGLS³ data acquired in 1996 and 2015. Temperature data were also collected in 2015.

Borehole information and casing data are as reported in the original log data report contained in the *Tank Summary Data Report for Tank A-102* (DOE 1998). Casing thicknesses are derived from published values for schedule 40-steel pipe.

This borehole was deepened to 130 ft in 1978 and a grout plug emplaced to about 125 ft. Grout may have been emplaced around the 6-in. casing from 0 to 18 ft.

The zero reference is the TOC.

Logging Equipment Information:

Logging System:	Gamma 2	Type:	DHMCA ⁴ SGLS BR
Effective Calibration Date:	03/17/15	Serial No.:	48-TP50478A
Calibration Reference:	HGLP-CC-117, Rev. 0	Logging Procedure:	HGLP-MAN-002, Rev. 2a

Logging System:	BCTLS ⁵	Type:	Infrared Temperature
Effective Calibration Date:	N/A	Serial No.:	OS136-1 MV-F
Calibration Reference:	Manufacturer	Logging Procedure:	HGLP-PRO-009 Rev 0a

SGLS Log Run Information:

Log Run	4	5	6	7 Repeat	
HEIS Number	1016270	1016271	1016272	1016273	
Date	05/20/15	06/01/15	06/03/15	06/22/15	

¹ Depth to water inside casing

² top of casing

³ Spectral Gamma Logging System

⁴ Down-Hole Multi-Channel Analyzer

⁵ Borehole Casing Temperature Logging System



Stoller Newport News Nuclear

Log Run	4	5	6	7 Repeat	
Logging Engineer	Spatz, Felt, McClellan	Spatz, Felt	Spatz, Meisner	Spatz, Felt, McClellan	
Start Depth (ft)	0.0	59.0	66.0	20.0	
Finish Depth (ft)	59.98	67.01	123.01	32.02	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
Log Speed (ft/min)	N/A	N/A	N/A	N/A	
Pre-Verification	_B_15520	_B_1561	_B_1563	_B_15622	
Start File	D_000000	D_005900	D_006600	D_002000	
Finish File	D_005998	D_006701	D_012301	D_003202	
Post-Verification	_A_15520	Not collected	_A_1563	1016274_A_15622	
Depth Return Error (in.)	1.0 low	0.0	6.0 low	0.0 low	
Comments	No fine gain adjustments made	No fine gain adjustments made	No fine gain adjustments made	No fine gain adjustments made	

Borehole Temperature Information:

Log Run	1	2 Repeat	3		
Date	04/30/15	04/30/15	04/30/15		
Logging Engineer	Spatz, McClellan	Spatz, McClellan	Spatz, McClellan		
Start Depth (ft)	110.0	123.4	109.0		
Finish Depth (ft)	123.4	110.0	0.0		
MSA Interval (ft)	1.0	1.0	1.0		
Comments	Sensor stabilized at 109 ft before logging	None	None		

Logging Operation Notes:

Data were collected using Gamma 2, HO 68B-3572. Pre- and post-survey verification measurements were acquired in the KUTh-082 field verifier. A centralizer was not installed on the sonde. During logging, the boom was extended over the A Farm perimeter fence boundary using the remote standoff.

Analysis Notes:

Analyst:	P.D. Henwood	Date:	09/29/15	Reference:	HGLP-MAN-003, Rev. 1a
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Pre- and post-survey verification measurements met the acceptance criteria for the established systems. The post-verification measurement for June 1, 2015 was not collected due to the sonde being depleted in liquid nitrogen.

A casing correction for 0.280-in. thick casing was applied during analysis.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated in an EXCEL template identified as 20150317_BR_117_0DT, using an efficiency function and corrections for casing and dead time as determined by annual calibrations.

During routine processing of gamma spectra, regions of interest are forced at specific energy levels associated with natural and manmade radionuclides that can be anticipated to be present. This processing approach sometimes

results in an isolated “detection” near the MDL⁶ resulting in a false positive. Where these detections occur, the individual spectrum is scrutinized and a determination is made regarding the validity of the detection. If the detection is deemed not representative of a full energy peak, or if confirming peaks are not detected, it is removed from the data set. The integrity of the raw data files and the processed files are maintained should questions arise in the future regarding these determinations.

To assure comparability, the same casing correction used for the 2015 data was applied to the original 1996 processed files. The efficiency function and dead time correction in place in 1996 was applied during reprocessing. For purposes of comparison with the 2015 data, the Cs-137 concentrations were decayed to a common date of June 22, 2015.

A borehole temperature logging system was deployed that uses an infrared sensor to measure casing temperature. The measurement should be considered qualitative and is described in *Borehole Casing Temperature Logging System Operating Procedure* (HGLP-PRO-009, Rev. 0a). Measurements are made at discrete 1 ft depth intervals. The sensor is factory calibrated such that 10 mV is equivalent to 1 degree Fahrenheit. Readings were recorded with a digital voltmeter.

Results and Interpretations:

Cs-137 was detected almost continuously from the ground surface to approximately 29.5 ft and from 46 to 123.5 ft. A maximum concentration of approximately 87 pCi/g was measured at 8.5 ft. Comparisons with the 1996 SGLS data indicate no significant changes.

Although not detected in 1996 or 2015, MDLs for Co-60 and Eu-154 are plotted on the comparison plot of manmade radionuclides.

Temperature measurements are plotted on the Combination Plot and range from approximately 61.3 degrees F at 7 ft to 76.1 degrees F beginning at 59 ft. The temperature remained static from 59 to 68 ft at 76.1 degrees F before falling slightly below 68 ft. The temperature log records the temperature of the inside surface of a steel pipe, which is surrounded by soil in which heat may be generated by radioactive decay of contaminants such as Sr-90. It is also possible that the log may be responding to soil heated by waste inside the tanks. Borehole 10-03-07 is approximately 11.4 ft from the steel liner of tank A-103. The tank currently contains approximately 2,000 gal sludge, 372,000 gal salt cake, and 9,000 gal supernate (*Waste Tank Summary Report for Month Ending June 30, 2015*, HNF-EP-0182, Revision 330). Temperature measurements should be qualitatively compared with other boreholes around tank A-103 and with boreholes associated with other tanks to determine relative differences that may indicate subsurface heat sources.

List of Log Plots:

Depth Reference is top of casing:

Borehole Location Map for A Farm
Combination Plot (2015) (0-130 ft)
Comparison of Manmade Radionuclides (2015 & 1996) (0-130 ft)
Manmade Repeat Section (20-32 ft)
Repeat Section of Natural Gamma Logs (20-32 ft)
Temperature Repeat Section (110-122 ft)

References:

Rogers, M.J. 2015. *Waste Tank Summary Report for Month Ending June 30, 2015*. HNF-EP-0182, Revision 330. Washington River Protection Solutions. Richland, Washington.

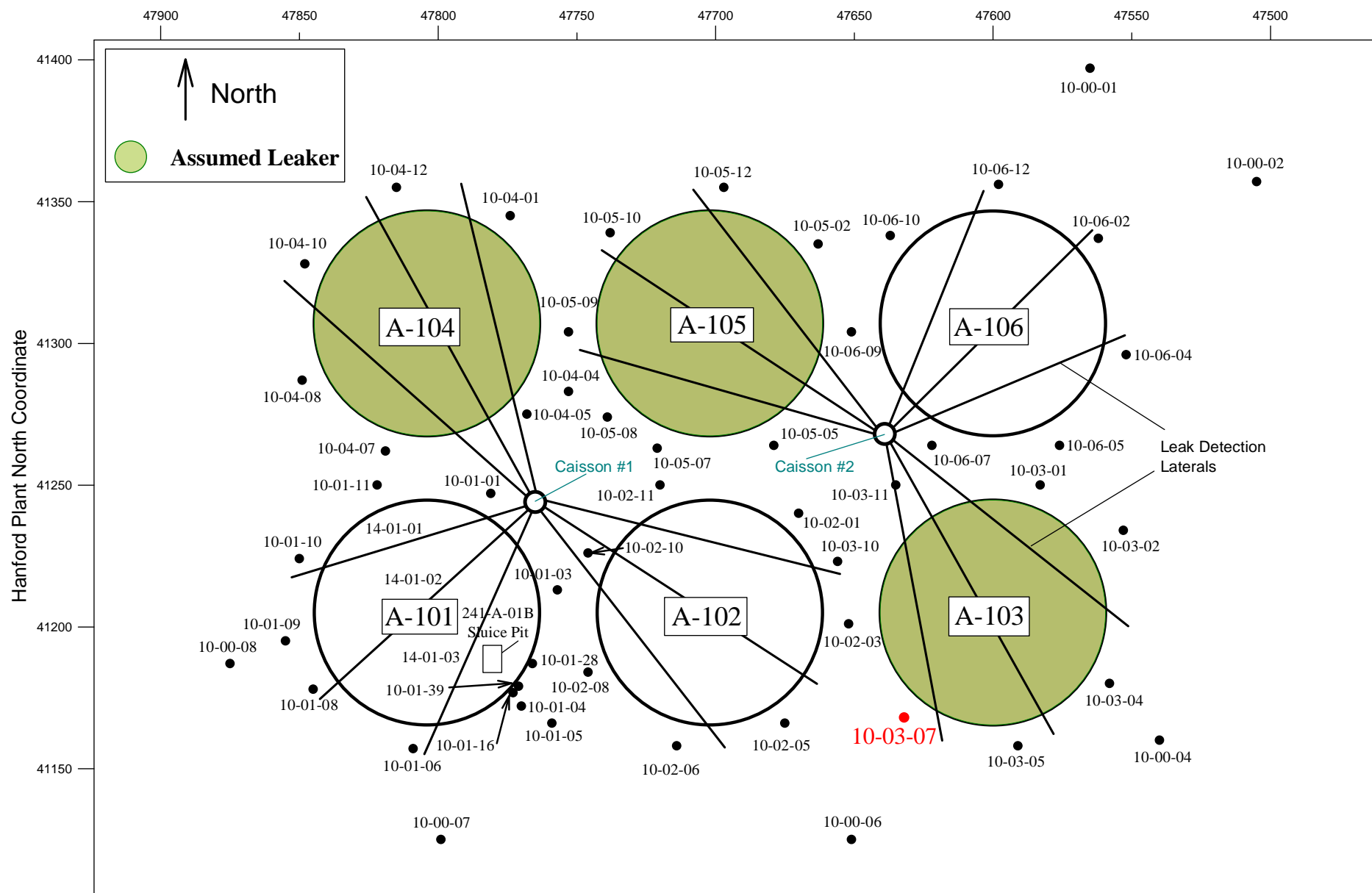
Stoller Newport News Nuclear (SN3). 2015. *Borehole Casing Temperature Logging System Operating Procedure*. HGLP-PRO-009, Revision 0a. Richland, Washington.

U.S. Department of Energy (DOE). 1998. *Hanford Tank Farms Vadose Zone, Tank Summary Data Report for Tank A-103*. GJ-HAN-108. Prepared by MACTEC-ERS for the Grand Junction Office. Grand Junction, Colorado.

⁶ minimum detectable level

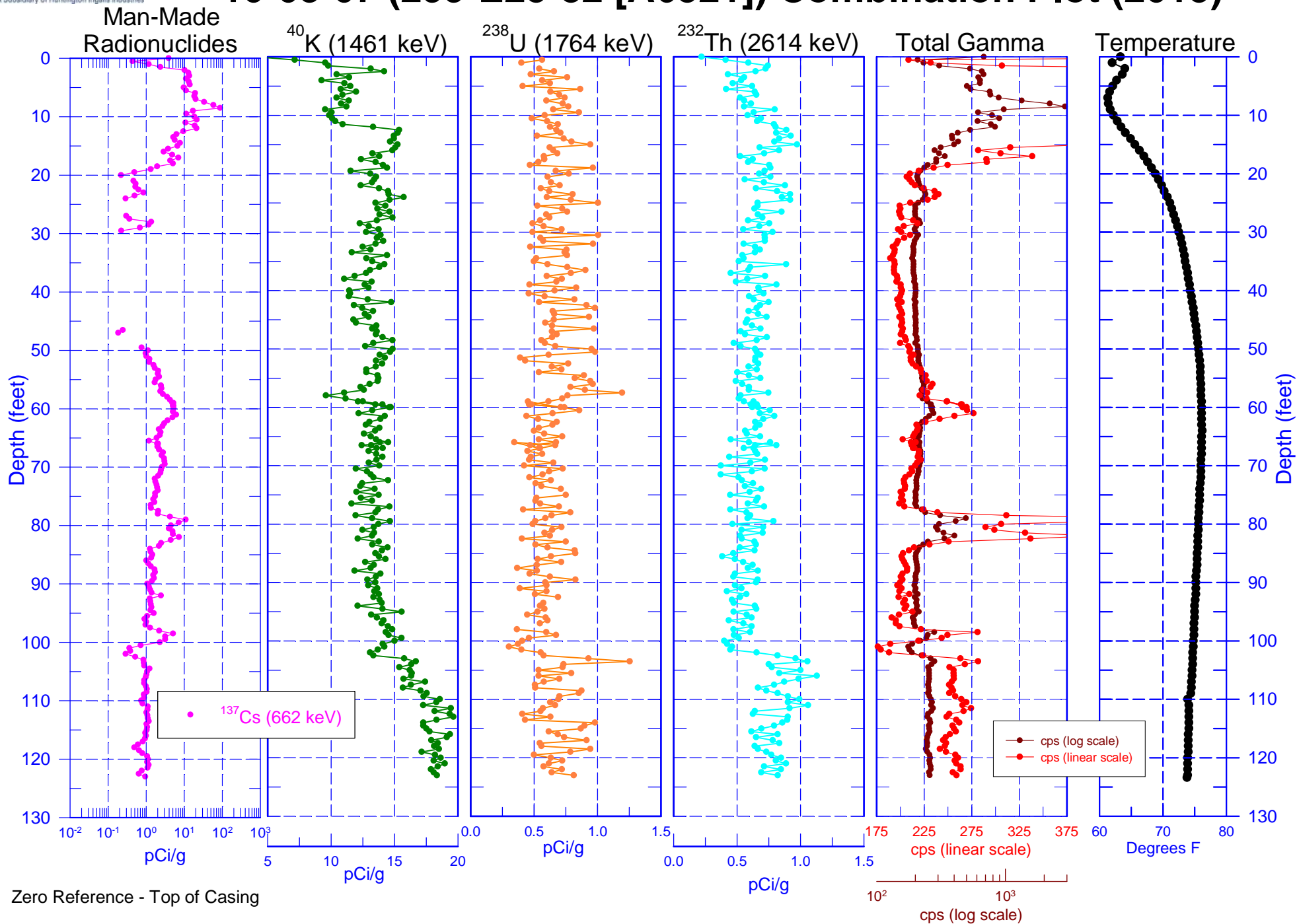
Borehole Location Map for A Farm

Hanford Plant West Coordinate





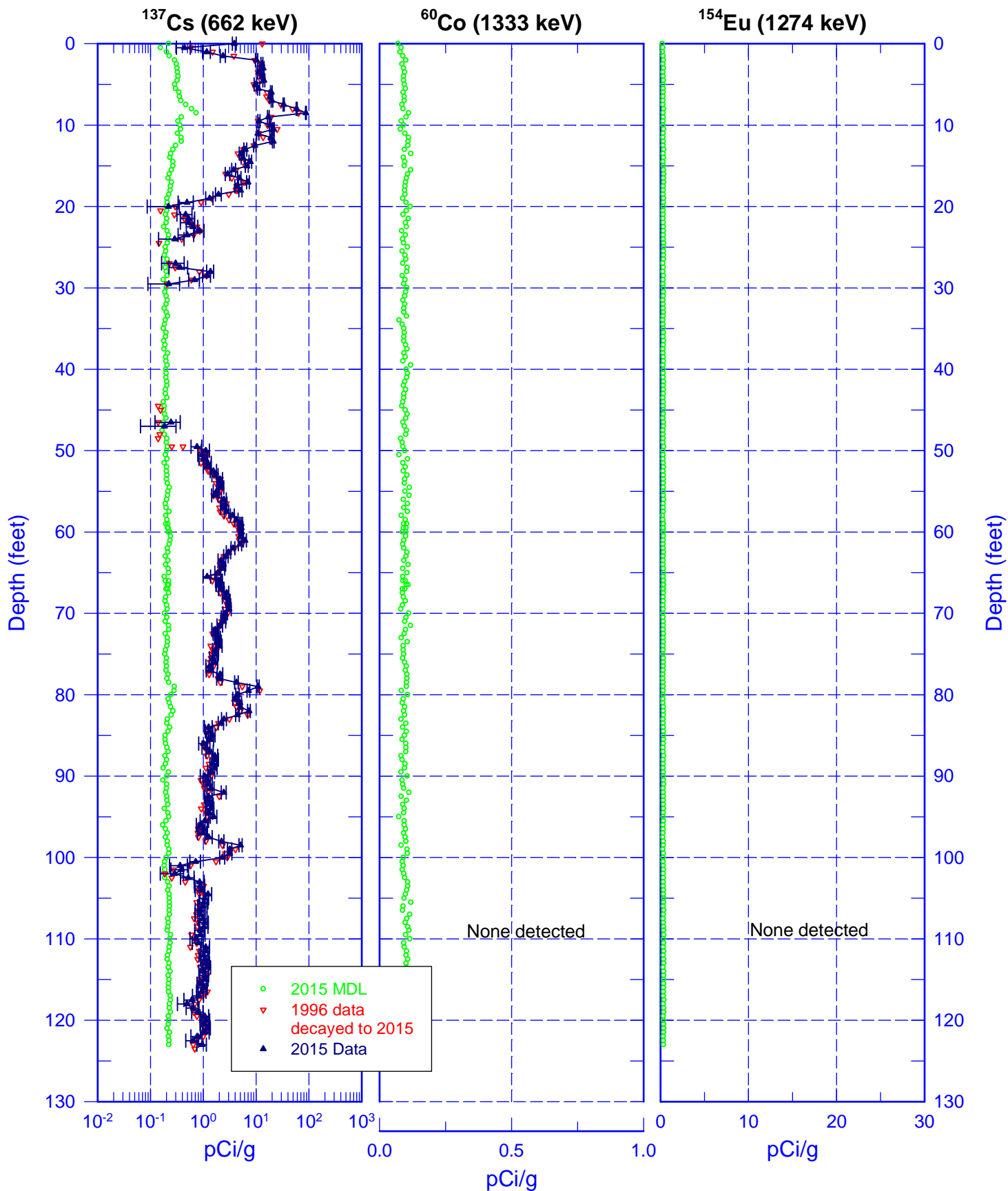
10-03-07 (299-E25-82 [A6521]) Combination Plot (2015)





10-03-07 (299-E25-82 [A6521])

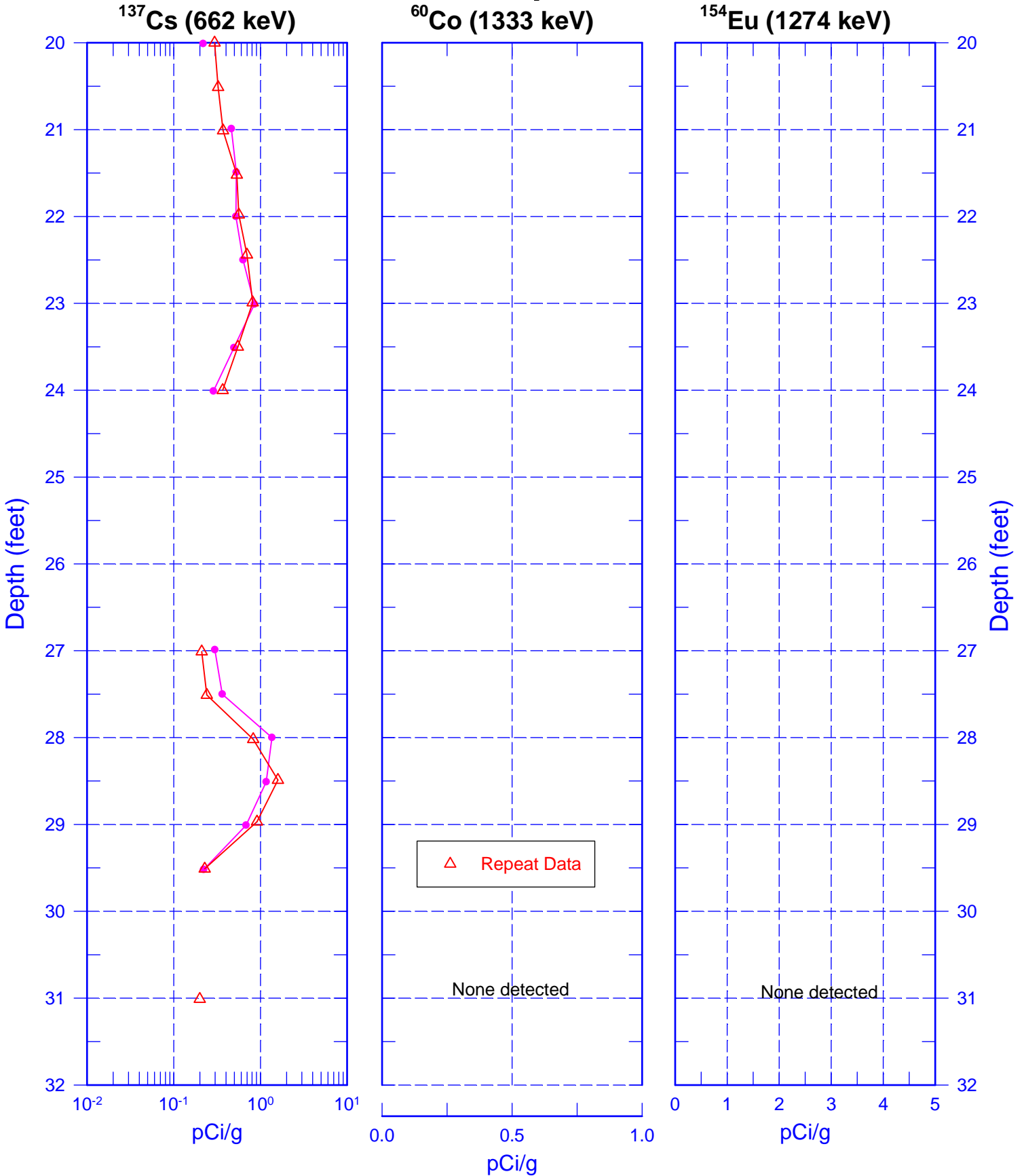
Comparison of Manmade Radionuclides (2015 & 1996)



Zero Reference - Top of Casing



10-03-07 (299-E25-82 [A6521]) Manmade Repeat Section

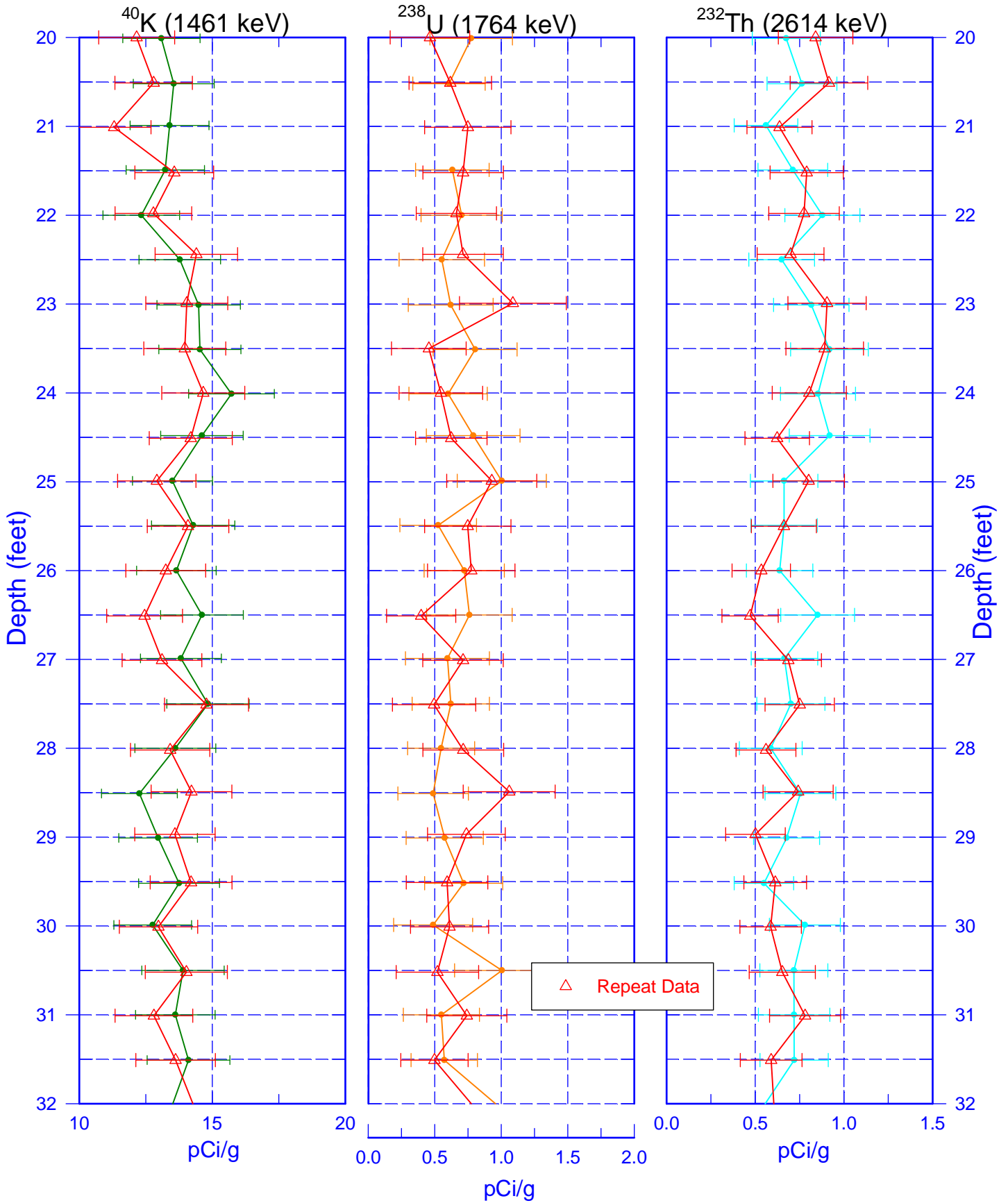


Zero Reference - Top of Casing



10-03-07 (299-E25-82 [A6521])

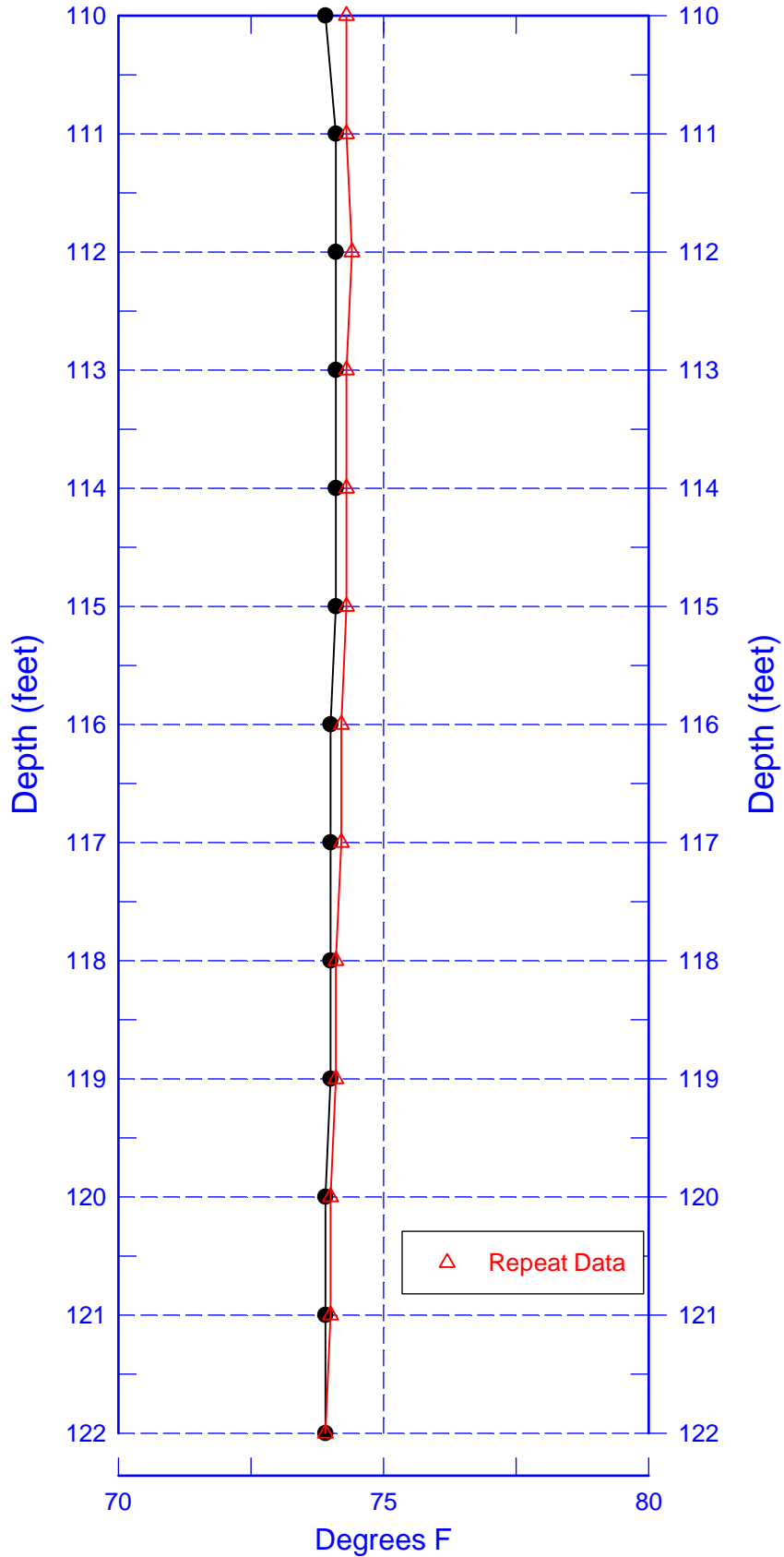
Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing



10-03-07 (299-E25-82 [A6521]) Temperature Repeat Section



Zero Reference - Top of Casing