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Revision 00

10-01-04, 299-E25-92 (A6531), 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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APPROVED
By Sarah Harrison at 7:14 am, Apr 05, 2022

Release Approval Date

Stoller Newport News Nuclear

10-01-04
299-E25-92 (A6531)
Log Data Report

Borehole Information:

Log Date:	2015-03-31	Filename:	A6531_SG_2015-03-31	Site:	A Farm	
Coordinates (WA St Plane)		GWL[1] (ft) :	122.5	GWL Date:		02/09/15
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)		Type
N/A	N/A	04/30/1962	N/A	130		Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Diameter (in.)		Thickness (in.)	Top (ft)	Bottom (ft)
		Outer	Inside			
Welded Steel	0.0		6	0.280	0.0	130.0

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 SGLS[3] data acquired in 1996 and 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-101* (DOE 1998). Casing thicknesses are derived from published values for schedule 40-steel pipe.

The zero reference is the TOC.

Logging Equipment Information:

Logging System:	Gamma 2	Type:	DHMCA[4] SGLS BR
Effective Calibration Date:	03/20/14	Serial No.:	48-TP50478A
Calibration Reference:	HGLP-CC-103, Rev. 1	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	1	2	3	4 Repeat	
HEIS Number	1016218	1016219	1016220	1016221	
Date	02/09/15	02/12/15	02/17/15	02/17/15	
Logging Engineer	Spatz/Pope/Felt/ McClellan	Spatz/Pope/Felt/ McClellan	Spatz/Pope/Felt/ McClellan	Spatz/Pope/Felt/ McClellan	
Start Depth (ft)	0.0	22.0	81.0	35.0	

[1] ground water level
[2] top of casing
[3] Spectral Gamma Logging System
[4] Down-Hole Multi-Channel Analyzer
[5] Borehole Casing Temperature Logging System

Log Run	1	2	3	4 Repeat	
Finish Depth (ft)	23.0	82.5	122.5	47.0	
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_1529	_B_15212	_B_15217	_B_15217	
Start File	D_000000	D_002200	D_008100	D_003500	
Finish File	D_002300	D_008251	D_012250	D_004700	
Post-Verification	_A_1529	_A_15212	_A_15217	_A_15217	
Depth Return Error (in.)	1.0 low	0.5 low	N/A	N/A	
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	5	6			
Date	03/31/15	03/31/15			
Logging Engineer	Felt	Felt			
Start Depth (ft)	121.0	62.0			
Finish Depth (ft)	0.0	50.0			
MSA Interval (ft)	1.0	1.0			
Comments	Sonde stabilized for 20 min. at 121 ft	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.

Analysis Notes:

Analyst:	P.D. Henwood	Date:	07/20/15	Reference:	HGLP-MAN-003, Rev. 1a

Pre- and post-survey verification measurements met the acceptance criteria for the established systems.

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 20140320_BR, 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 MDL[6] 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

[6] minimum detectable level

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 Co-60 and Cs-137 were decayed to a common date of February 17, 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.

Results and Interpretations:

Cs-137 and Co-60 were detected in this borehole. Co-60 is not generally considered significant as a contaminant, but can be important for use as a "tracer" to track subsurface contamination movement involving other radionuclides which lack detectable gamma emissions (e.g., Tc-99).

Cs-137 was detected from ground surface to approximately 22 ft and intermittently in the remainder of the borehole. A maximum concentration of approximately 16 pCi/g was measured at 9.5 ft. Comparisons with the 1996 data indicate no significant change.

Co-60 was detected from 30 to 59 ft and from 63.5 to 70 ft in 2015 with a maximum concentration of approximately 1.9 pCi/g at approximately 40 ft. Comparisons with the 1996 data indicate no significant change.

Although not detected, MDLs for Eu-154 are plotted on the "Comparison of Manmade Radionuclides (2015 & 1996)" plot.

Temperature measurements are plotted on the Combination Plot and range from approximately 48 to 74 degrees F with the maximum recorded at 73 and 74 ft in depth. 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. These measurements should be qualitatively compared with other boreholes around tank A-101 and with boreholes associated with other tanks to determine relative differences that may indicate heat sources.

Moisture measurements are included from 1992 which are derived from the Tank Farms' digital database of moisture and gross gamma measurements acquired since the 1970s.

List of Log Plots:

Depth Reference is top of casing:

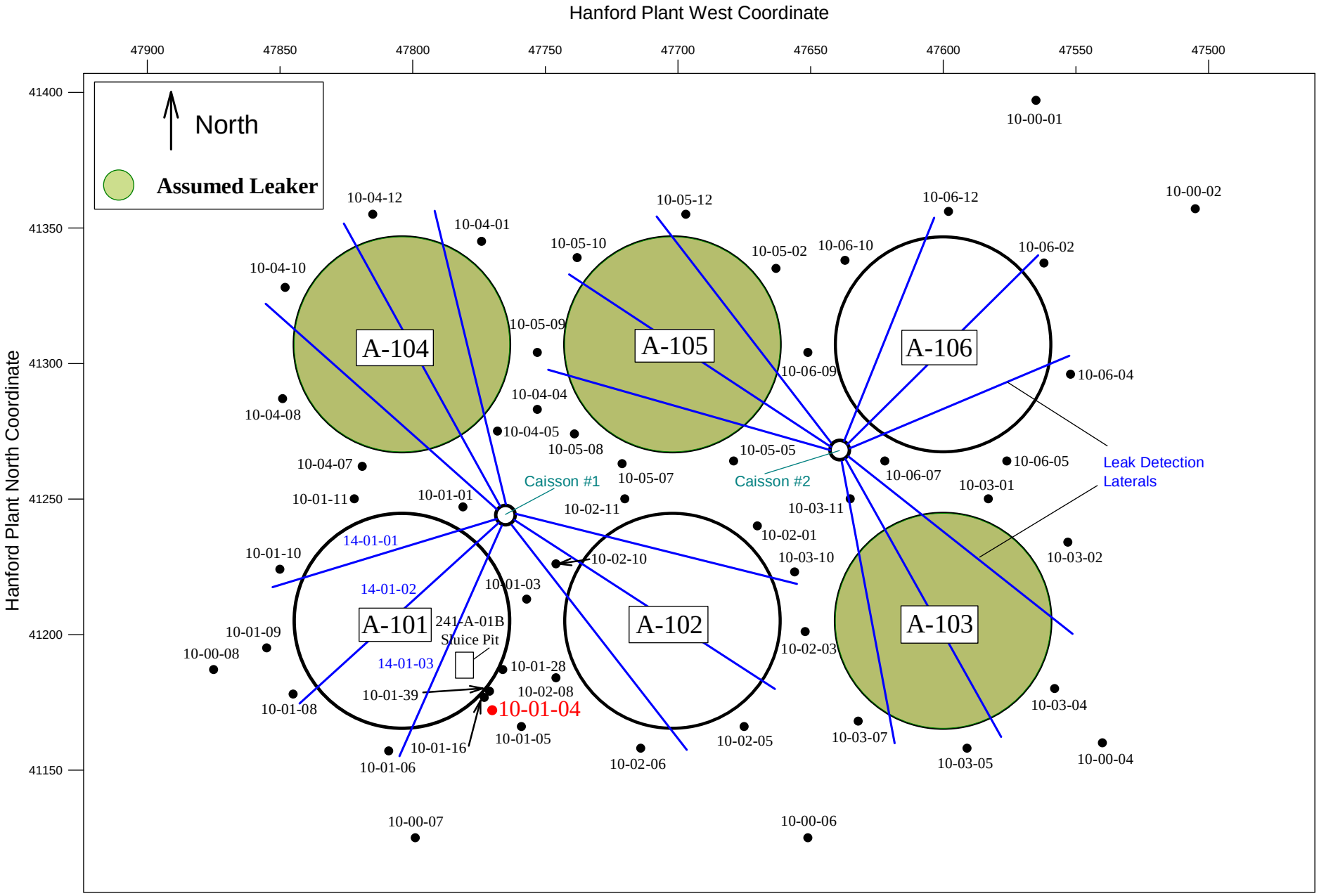
Borehole Location Map for A Farm
Combination Plot (2015)
Comparison of Manmade Radionuclides (2015 and 1996)
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Temperature Repeat Section

References:

U.S. Department of Energy (DOE). 1998. *Hanford Tank Farms Vadose Zone, Tank Summary Data Report for Tank A-101*. GJ-HAN-106. Prepared by MACTEC-ERS for the Grand Junction Office. Grand Junction, Colorado.

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

Borehole Location Map for A Farm



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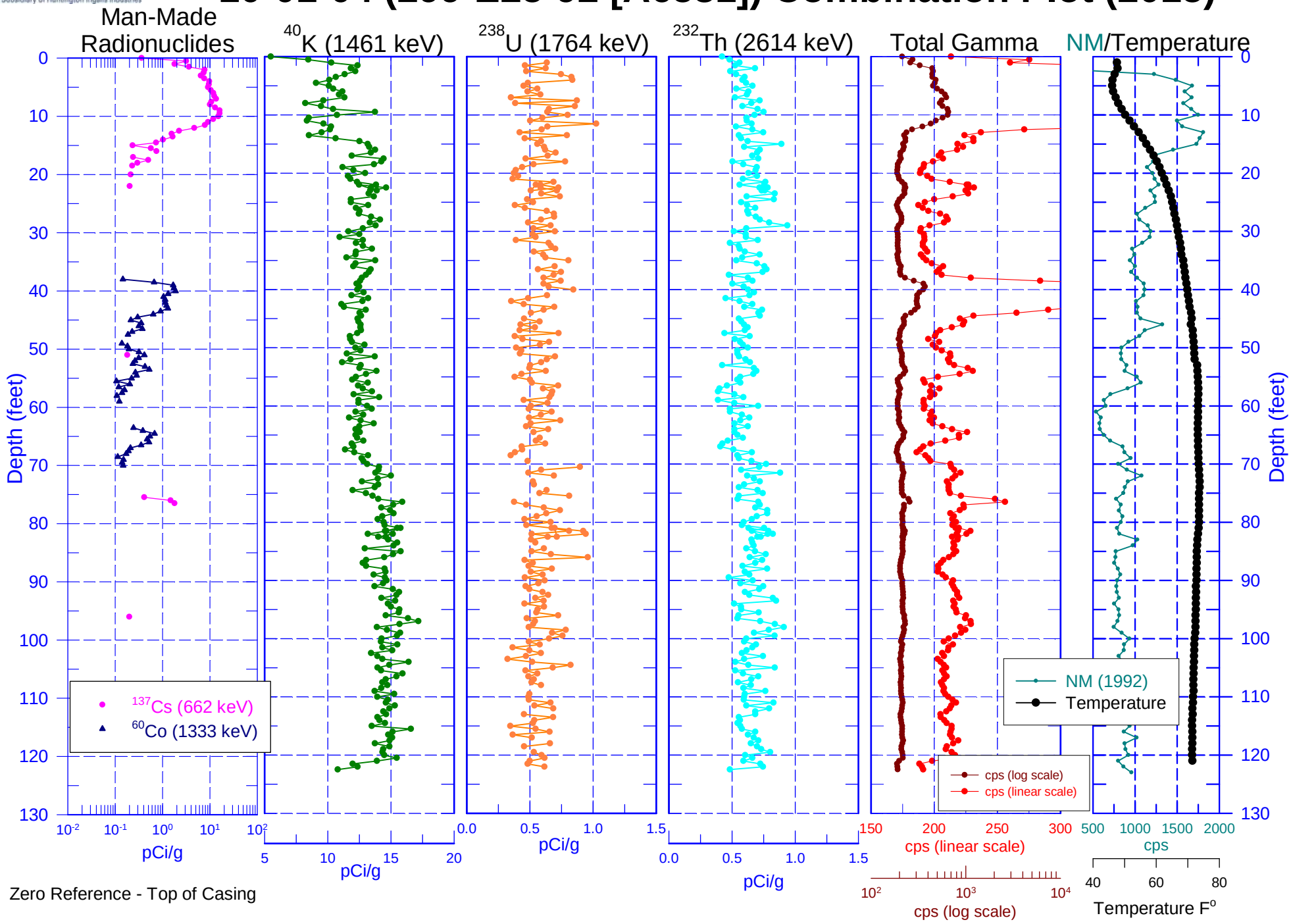
10-01-04 (299-E25-92 [A6531]) Combination Plot (2015)



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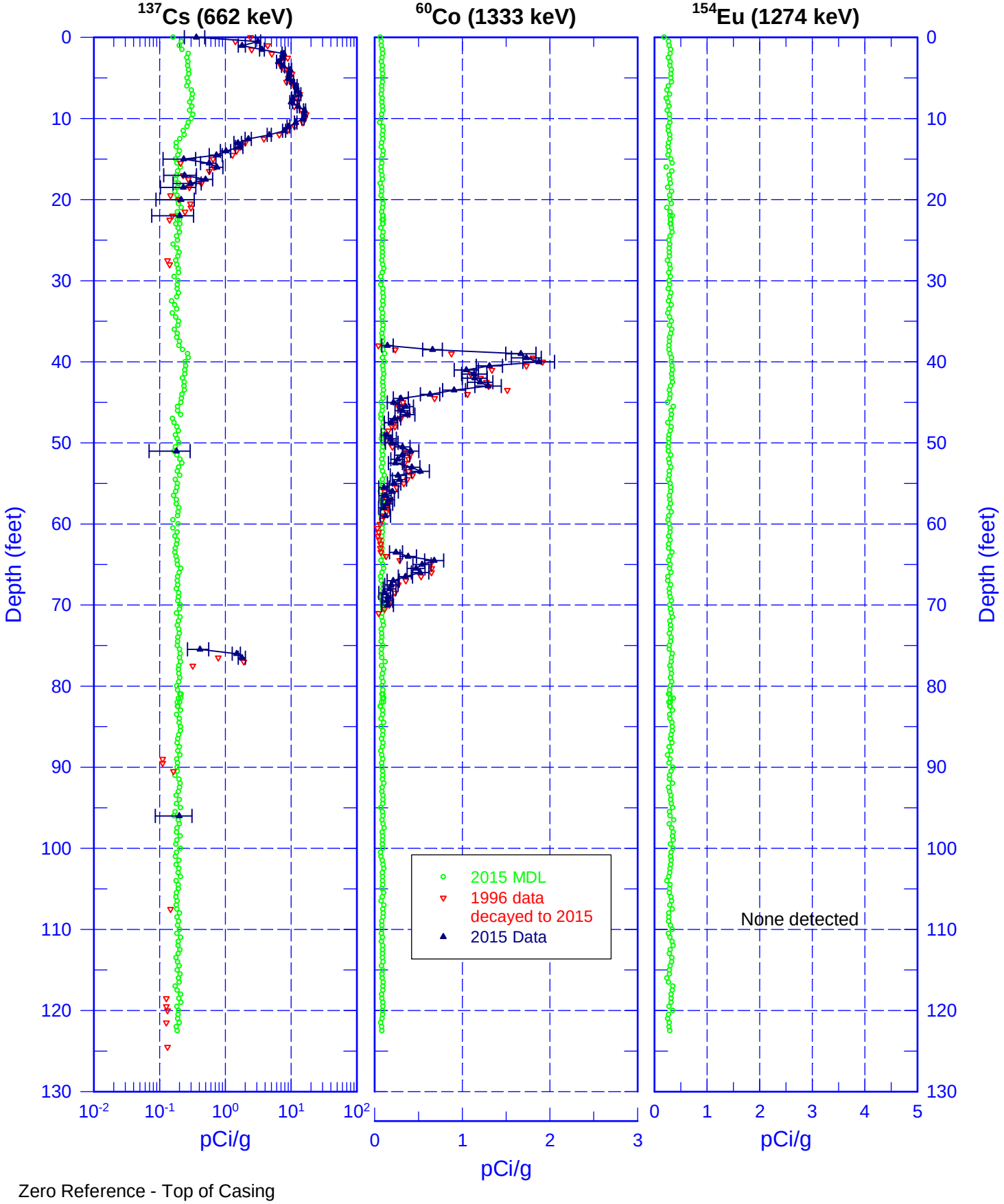
10-01-04 (299-E25-92 [A6531])

Comparison of Manmade Radionuclides (2015 &1996)



Zero Reference - Top of Casing

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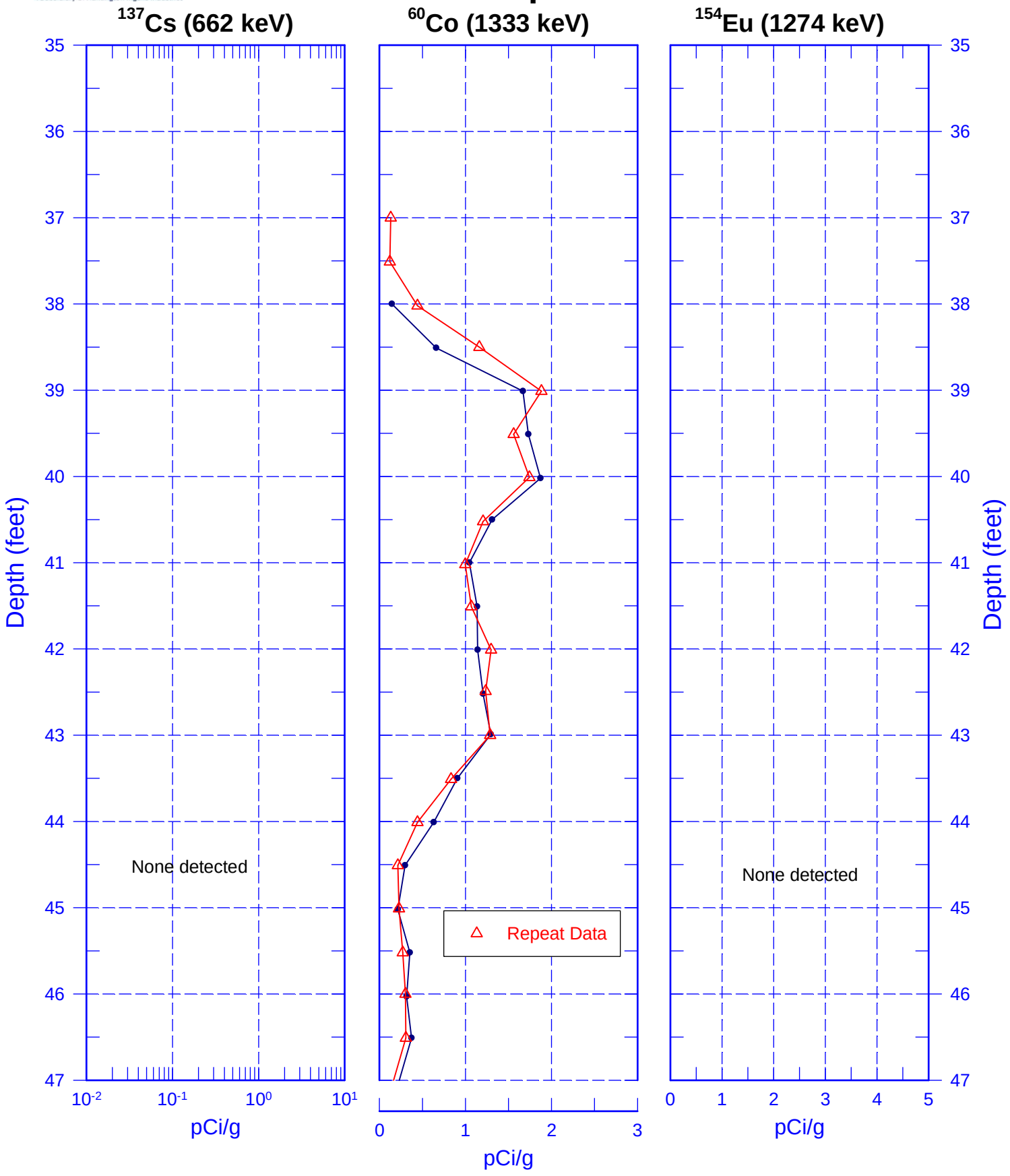
10-01-04 (299-E25-92 [A6531])
Manmade Repeat Section



Zero Reference - Top of Casing

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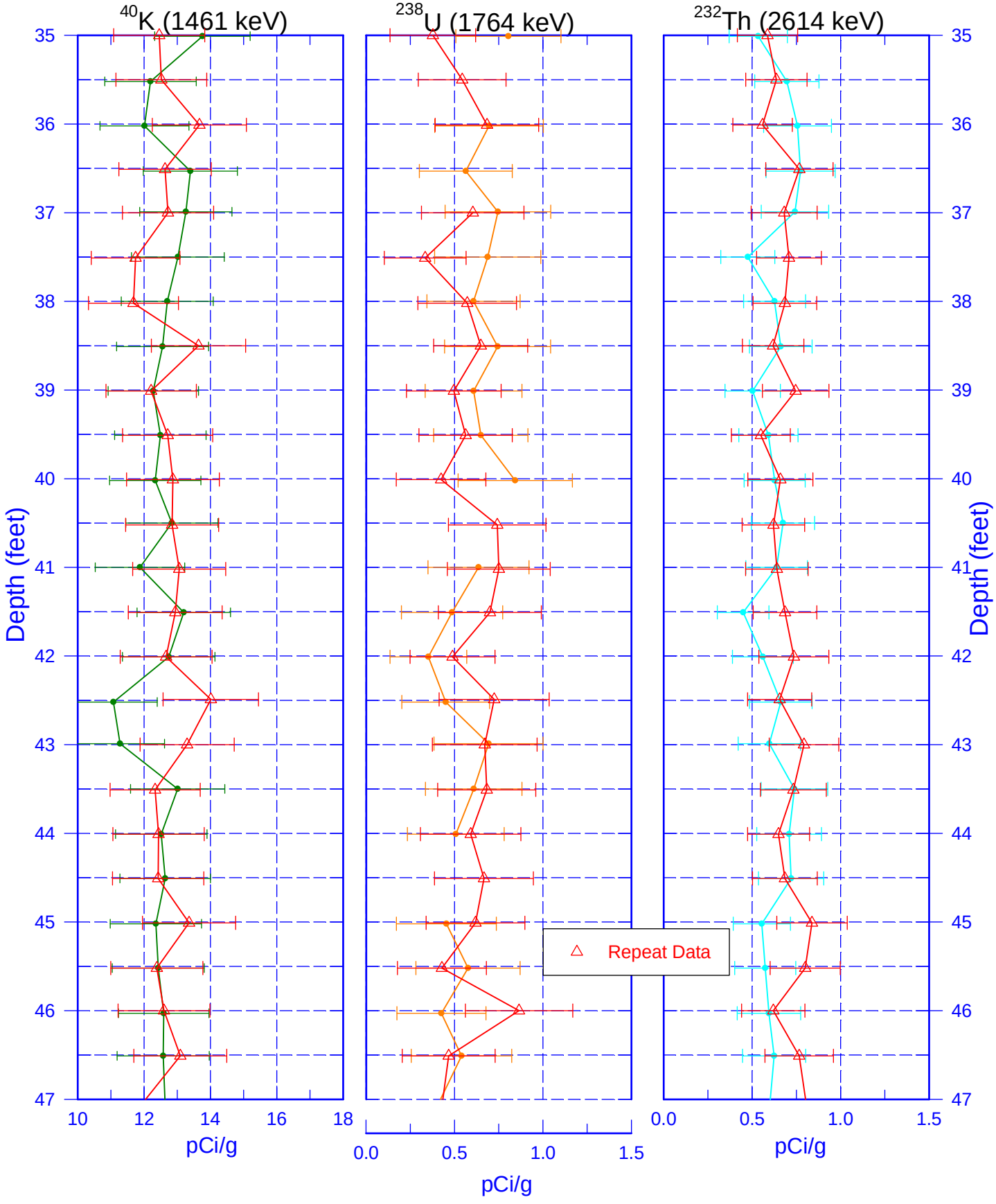
Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing

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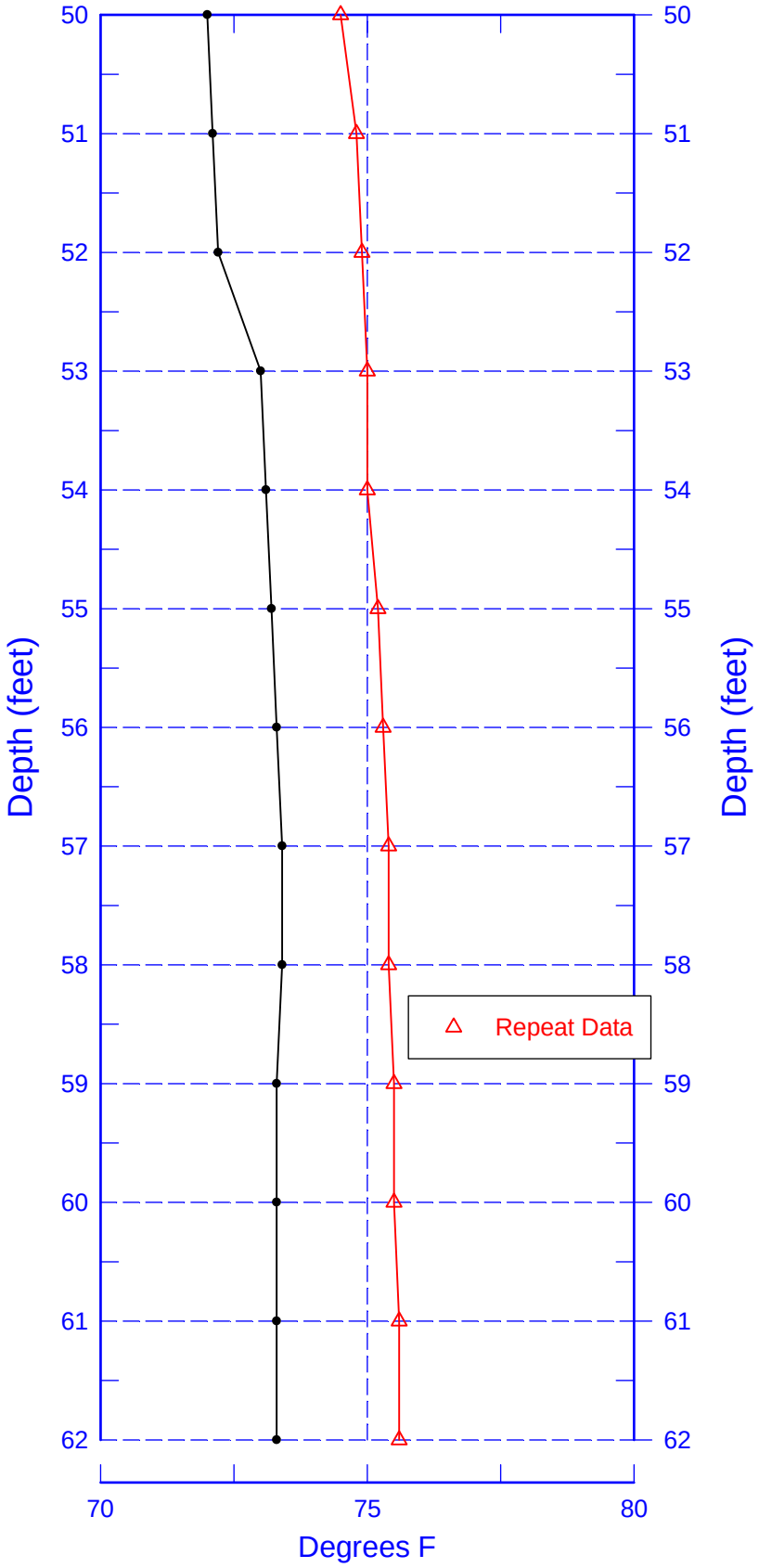
10-01-04 (299-E25-92 [A6531])
Temperature Repeat Section



Zero Reference - Top of Casing