

# 10-02-05, 299-E25-85 (A6524), 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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# 10-02-05, 299-E25-85 (A6524), Log Data Report

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**APPROVED**  
*By Lynn M Ayers at 7:00 am, Apr 13, 2022*

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Date

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**10-02-05**  
**299-E25-85 (A6524)**  
**Log Data Report**

**Borehole Information:**

|                                  |                 |                               |                                  |                         |             |
|----------------------------------|-----------------|-------------------------------|----------------------------------|-------------------------|-------------|
| <b>Log Date:</b>                 | 2015-04-23      | <b>Filename:</b>              | A6524_HG_2015-04-23              | <b>Site:</b>            | A Farm      |
| <b>Coordinates (WA St Plane)</b> |                 | <b>DTW<sup>1</sup> (ft) :</b> | 121.4                            | <b>GWL Date:</b>        | 02/25/15    |
| <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> |
| 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          | N/A            | 6      | 0.280           | 0.0      | 130         |

**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<sup>3</sup> 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.

Water was inside the casing at 121.4 ft that precluded logging to the depth of 123.5 ft achieved in 1996.

The zero reference is the TOC.

**Logging Equipment Information:**

|                                    |                     |                           |                            |
|------------------------------------|---------------------|---------------------------|----------------------------|
| <b>Logging System:</b>             | Gamma 2             | <b>Type:</b>              | DHMCA <sup>4</sup> SGLS BR |
| <b>Effective Calibration Date:</b> | 03/20/14            | <b>Serial No.:</b>        | 48-TP50478A                |
| <b>Calibration Reference:</b>      | HGLP-CC-103, Rev. 1 | <b>Logging Procedure:</b> | HGLP-MAN-002, Rev. 2a      |

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

**SGLS Log Run Information:**

| Log Run     | 1        | 2        | 3 Repeat |  |  |
|-------------|----------|----------|----------|--|--|
| HEIS Number | 1016231  | 1016232  | 1016233  |  |  |
| Date        | 03/02/15 | 03/03/15 | 03/03/15 |  |  |

<sup>1</sup> Depth to water inside casing

<sup>2</sup> top of casing

<sup>3</sup> Spectral Gamma Logging System

<sup>4</sup> Down-Hole Multi-Channel Analyzer

<sup>5</sup> Borehole Casing Temperature Logging System



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| Log Run                  | 1                             | 2                             | 3 Repeat                      |  |  |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|--|--|
| Logging Engineer         | Spatz/Pope/Felt               | Spatz/Pope/Felt               | Spatz/Pope/Felt               |  |  |
| Start Depth (ft)         | 0.0                           | 63.0                          | 109.0                         |  |  |
| Finish Depth (ft)        | 64.02                         | 121.01                        | 120.5                         |  |  |
| Count Time (sec)         | 100                           | 100                           | 100                           |  |  |
| Live/Real                | R                             | R                             | R                             |  |  |
| Shield (Y/N)             | N                             | N                             | N                             |  |  |
| MSA Interval (ft)        | 0.5                           | 0.5                           | 0.5                           |  |  |
| Log Speed (ft/min)       | N/A                           | N/A                           | N/A                           |  |  |
| Pre-Verification         | _B_1532                       | _B_1533                       | _B_1533                       |  |  |
| Start File               | D_000000                      | D_006300                      | D_010900                      |  |  |
| Finish File              | D_006402                      | D_012101                      | D_012050                      |  |  |
| Post-Verification        | _A_1532                       | _A_1533                       | _A_1533                       |  |  |
| Depth Return Error (in.) | 3.0 low                       | N/A                           | 1.0 low                       |  |  |
| Comments                 | No fine gain adjustments made | No fine gain adjustments made | No fine gain adjustments made |  |  |

**Borehole Temperature Information:**

| Log Run           | 5  | 6        |  |  |  |
|-------------------|--|----------|--|--|--|
| Date              | 04/23/15                                   | 04/23/15 |  |  |  |
| Logging Engineer  | Spatz/Felt                                 | Felt     |  |  |  |
| Start Depth (ft)  | 121.0                                      | 52.0     |  |  |  |
| Finish Depth (ft) | 1.0  | 40.0     |  |  |  |
| MSA Interval (ft) | 1.0  | 1.0      |  |  |  |
| Comments          | Sensor stabilized at bottom before logging | 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:**

|                 |              |              |          |                   |                       |
|-----------------|--------------|--------------|----------|-------------------|-----------------------|
| <b>Analyst:</b> | P.D. Henwood | <b>Date:</b> | 09/17/15 | <b>Reference:</b> | 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



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results in an isolated “detection” near the MDL<sup>6</sup> 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 March 3, 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 from ground surface to approximately 15 ft and intermittently throughout the borehole. A maximum concentration of approximately 5 pCi/g was measured at 1.5 ft. Comparisons with the 1996 SGLS data indicate no significant changes.

No other radionuclides were detected. MDLs for Co-60 and Eu-154 that are common contaminants in A Farm are plotted with the 1996 data on the “Comparison of Manmade Radionuclides (2015 & 1996)” plot for the entire borehole.

Temperature measurements are plotted on the Combination Plot and range from approximately 60.3 degrees F at 6 ft to 75.8 degrees F beginning at 60 ft. The temperature remained static from 60 to 90 ft at 75.8 degrees F. 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 10-02-05 is approximately 9.9 ft from the steel liner of tank A-102. The tank currently contains no sludge, 37,000 gal salt cake, and 3,000 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-102 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 (109-120 ft)  
Repeat Section of Natural Gamma Logs (109-120 ft)  
Temperature Repeat Section (40-52 ft)

### **References:**

U.S. Department of Energy (DOE). 1998. *Hanford Tank Farms Vadose Zone, Tank Summary Data Report for Tank A-102*. GJ-HAN-107. Prepared by MACTEC-ERS for the Grand Junction Office. Grand Junction, Colorado.

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.

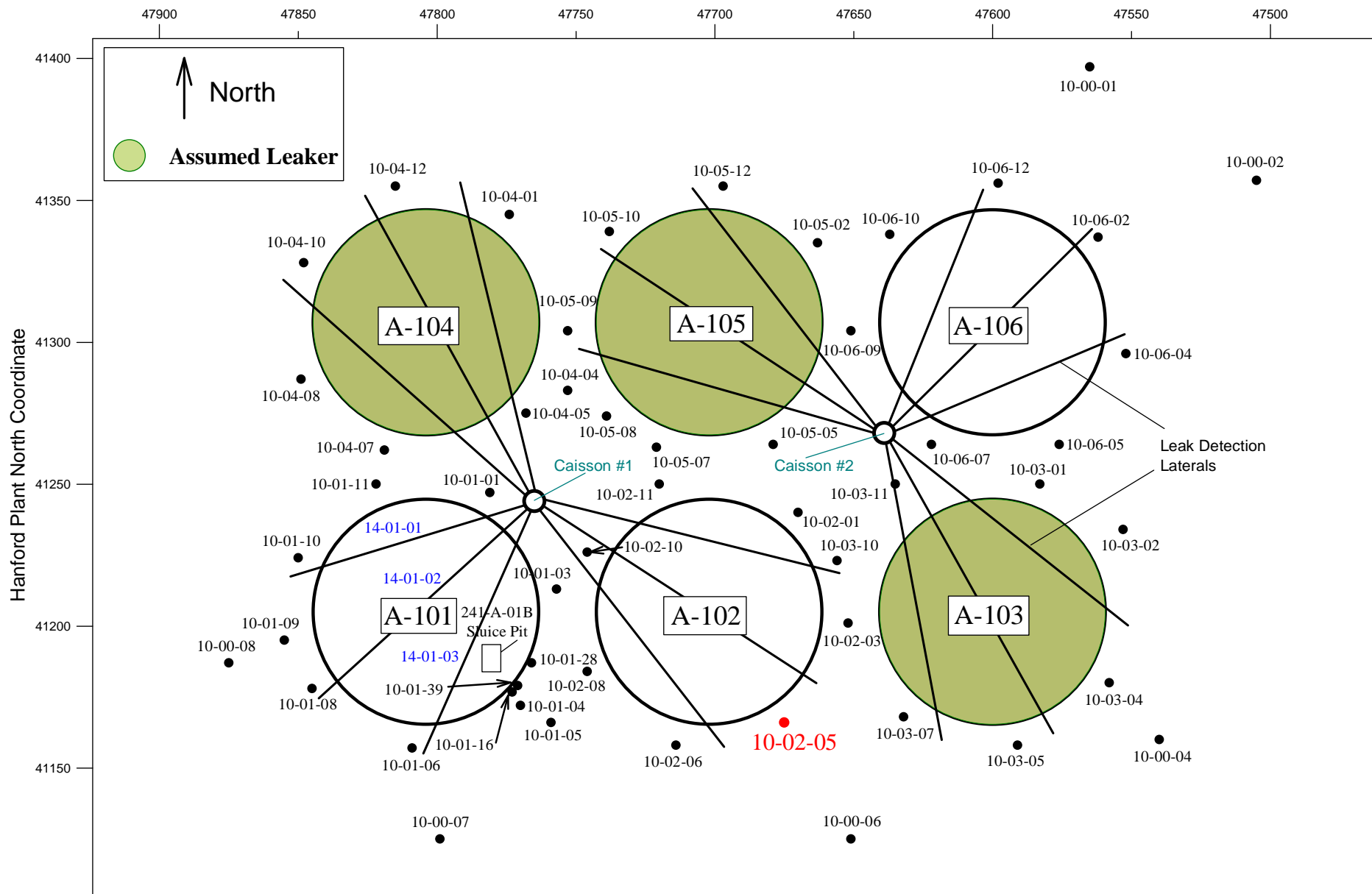
Stoller Newport News Nuclear (SN3). 2015. *Borehole Casing Temperature Logging System Operating Procedure*. HGLP-PRO-009, Revision 0a. Richland, Washington.

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<sup>6</sup> minimum detectable level

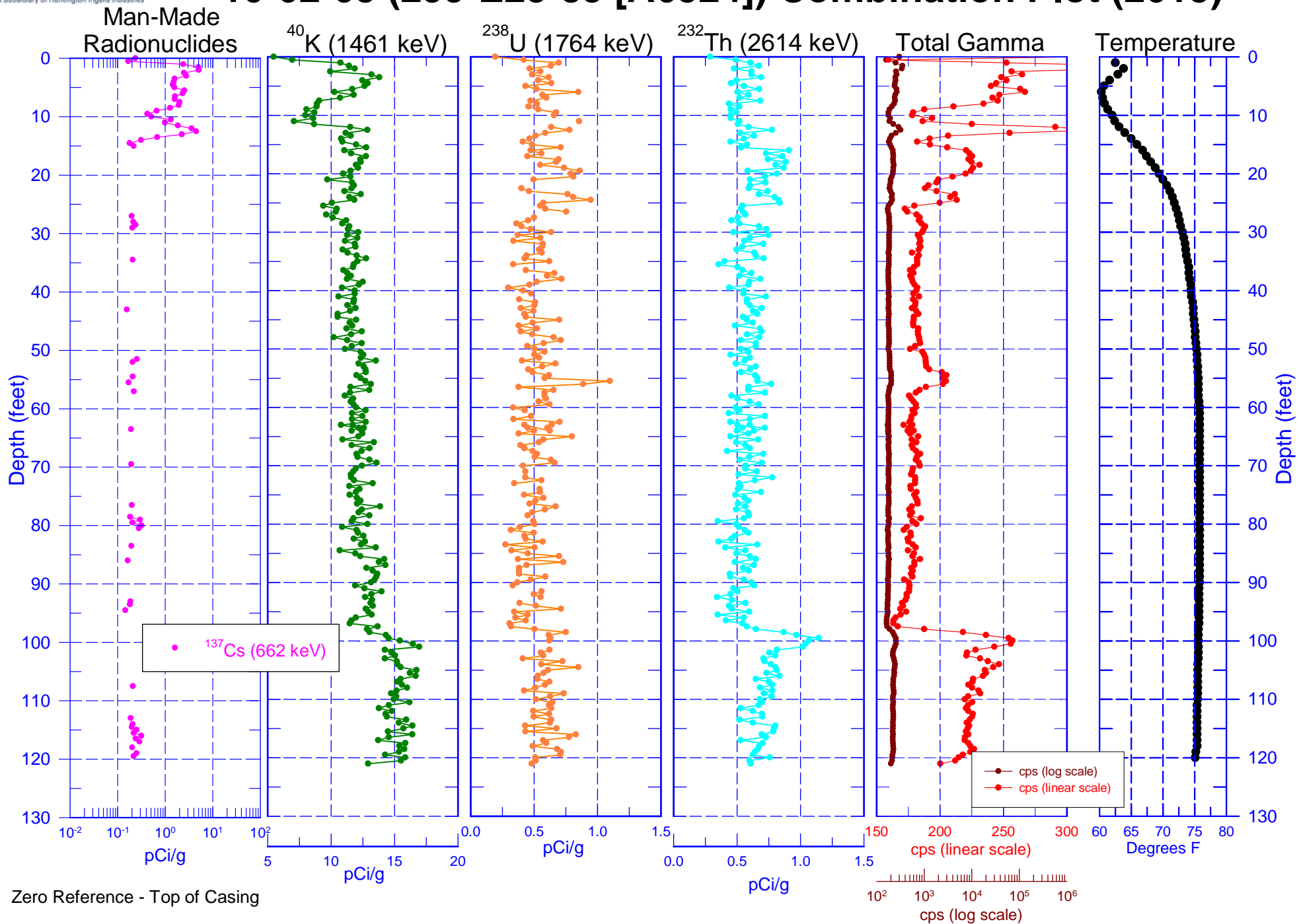
# Borehole Location Map for A Farm

Hanford Plant West Coordinate





# 10-02-05 (299-E25-85 [A6524]) Combination Plot (2015)

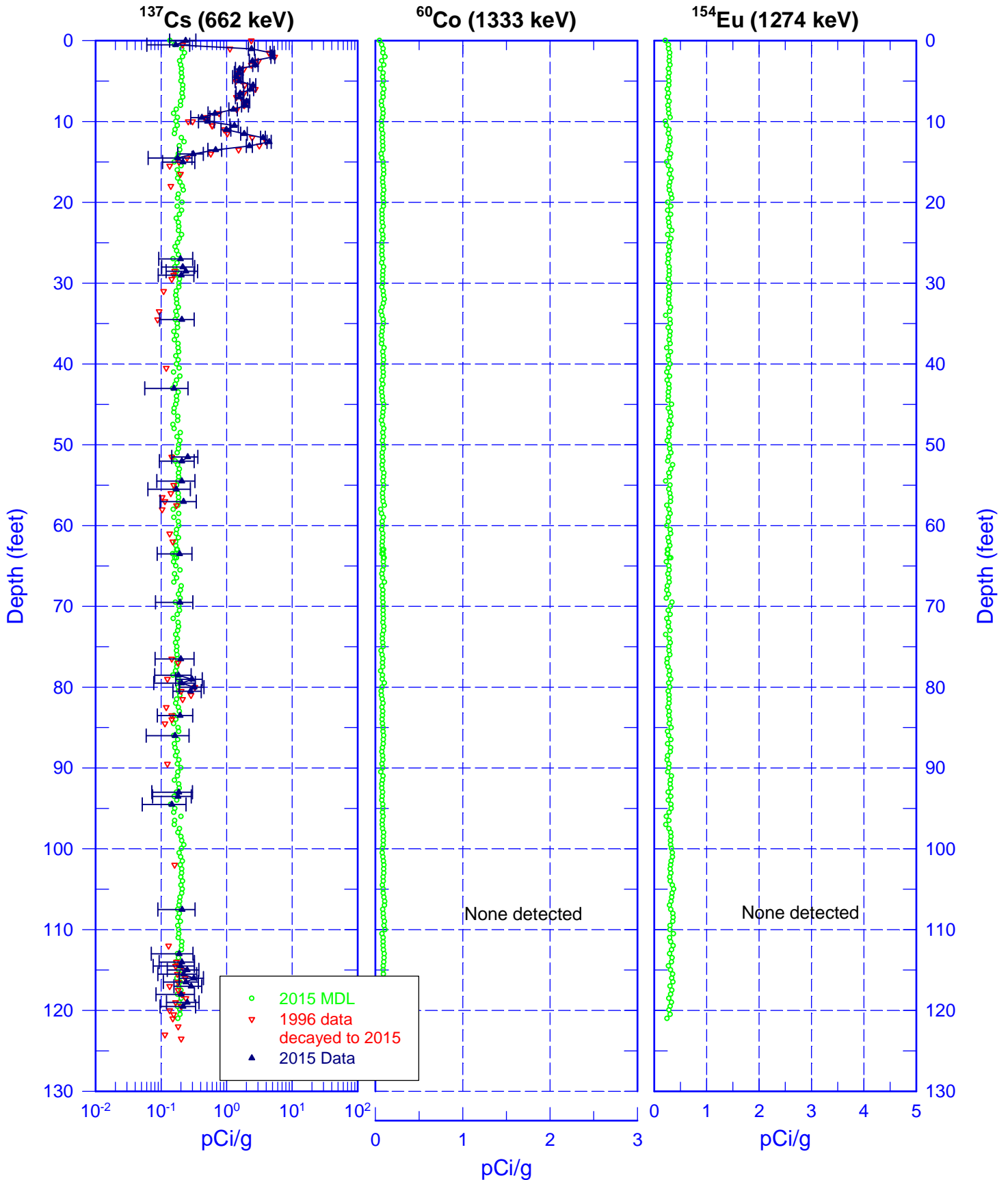






# 10-02-05 (299-E25-85 [A6524])

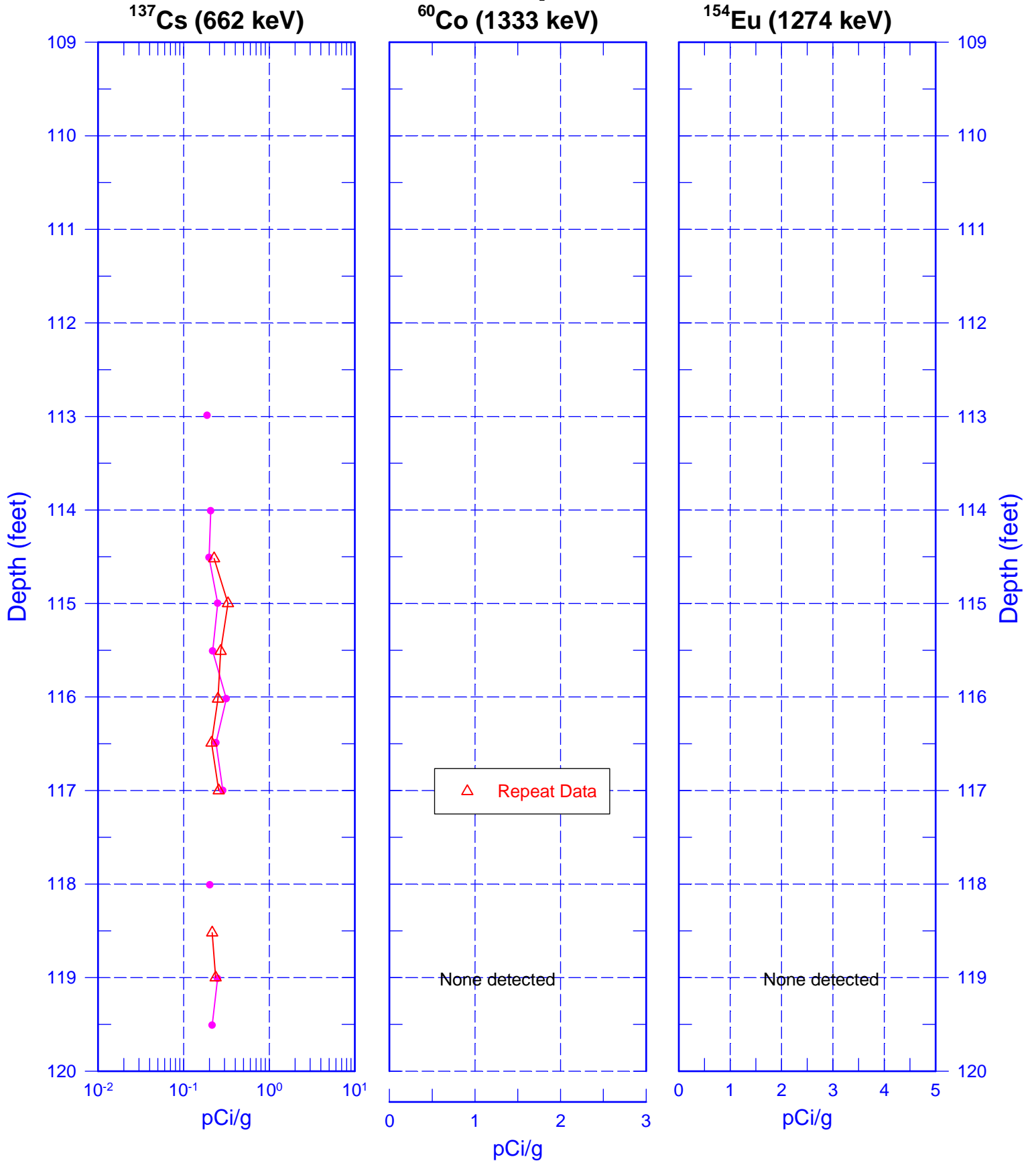
## Comparison of Manmade Radionuclides (2015 & 1996)



Zero Reference - Top of Casing



# 10-02-05 (299-E25-85 [A6524]) Manmade Repeat Section

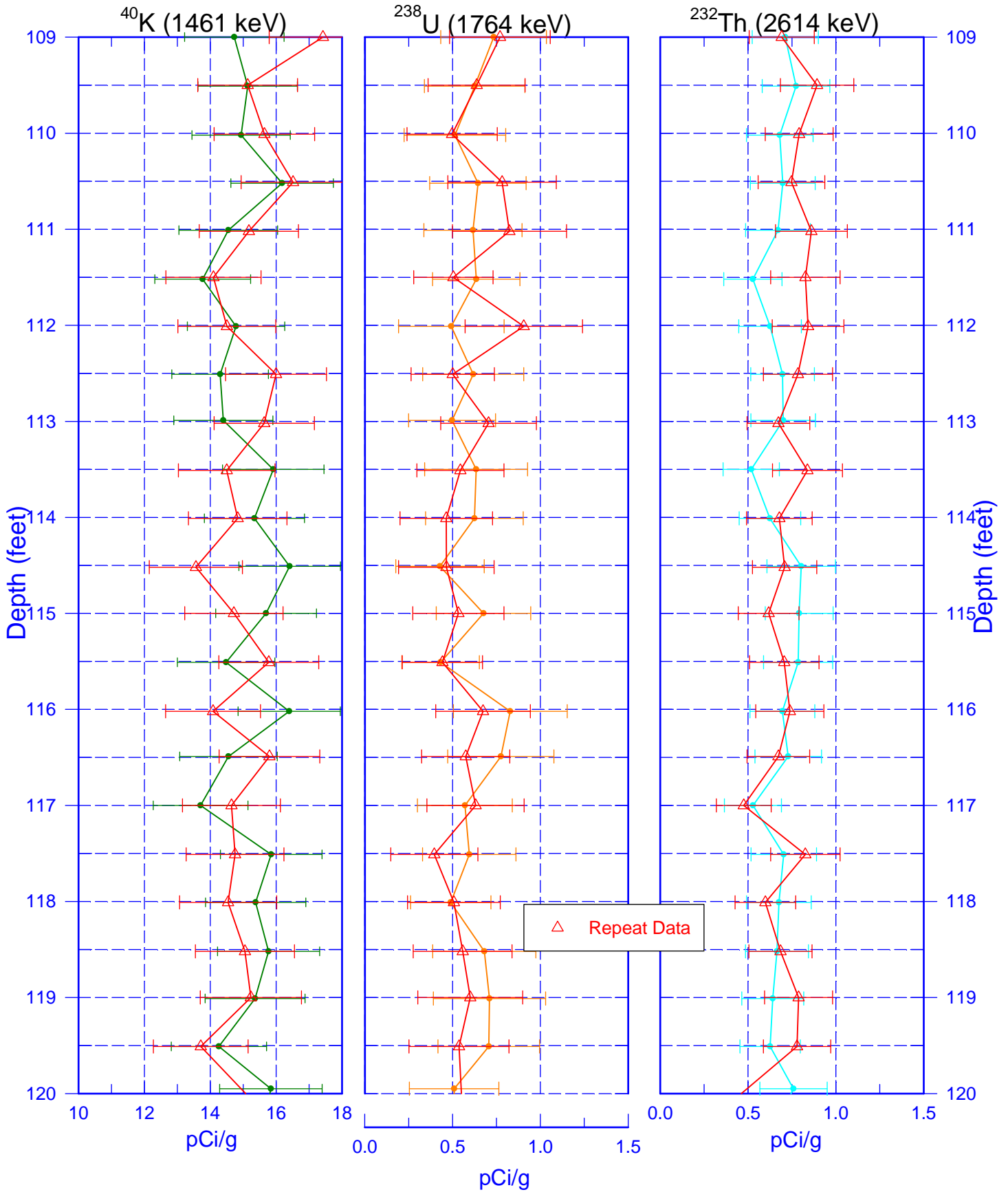


Zero Reference - Top of Casing



# 10-02-05 (299-E25-85 [A6524])

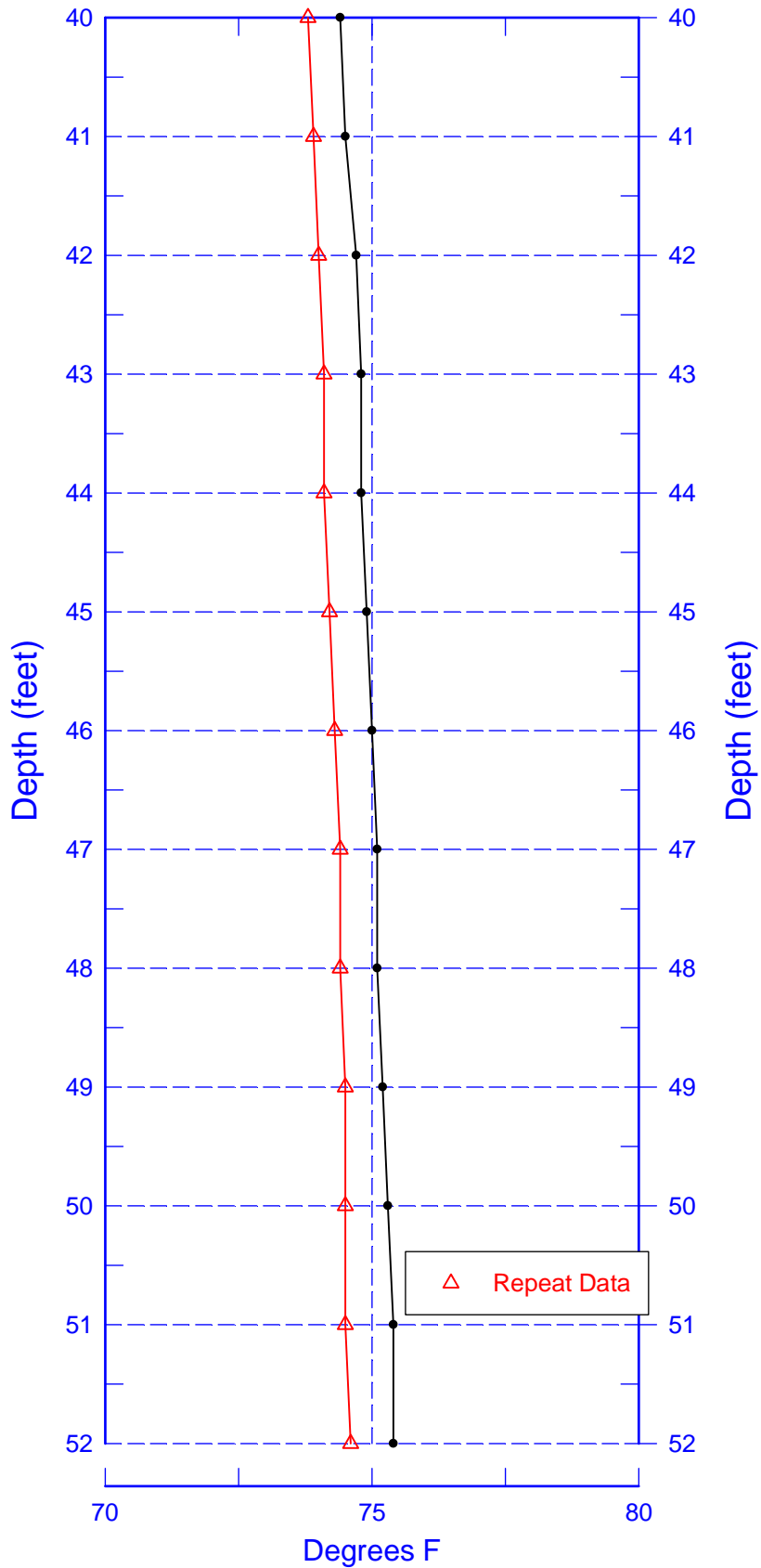
## Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing



# 10-02-05 (299-E25-85 [A6524]) Temperature Repeat Section



Zero Reference - Top of Casing