## MAGILL HALL FIRST FLOOR CORRIDORS

## (SURVEY UNITS 1 THROUGH 5)

The Magill Hall First Floor Corridors include Corridor 100B, Foyer 100C, Office 142, Corridor 100C, Corridor 100E, Office 130, Corridor 100G, and Room 134A (as a result of renovations, Room 134A has been incorporated into Corridor 100G). The floors and walls within these areas were classified as MARSSIM Class 2 and Class 3 areas, respectively (see Table A1.1). Figures (including sample locations) are included in Attachment A-1-1. Radiologically impacted areas were divided into SUs based on MARSSIM-recommended size constraints, resulting in a total of 5 SUs (SU-1 through SU-5) in the area identified herein as Magill Hall First Floor Corridors. Survey data from the floors and walls are located in Tables A1.2 through A1.6.

**Overview of Surveys Performed.** Ludlum Model 43-89 dual phosphor ZnS detectors coupled with Ludlum Model 2360 scalers were used for the collection of quantitative alpha/beta scan surveys and fixed-point (i.e., static) measurements. The alpha/beta static measurements were performed at systematic locations for MARSSIM Class 2 areas and at randomly generated locations for Class 3 areas. Given that scan surveys did not detect the presence of activity that was elevated with respect to the investigation level, biased fixed-point measurements were not necessary. Removable contamination measurements (i.e., swipes) were also collected at each static location to quantify residual removable activity. The swipes were counted using a Ludlum Model 43-10-1 alpha/beta sample counter. QA/QC information relative to the instruments used is contained in Section 5.0 of the main text and in Appendix C.

**Table A1.1. Magill Hall Corridor Summary Table[a]**

| Room Number / Description | Floor Area ($m^2$) | Walls | | Floors | |
|---|---|---|---|---|---|
| | | Included (Yes/No) | MARSSIM Classification | Included (Yes/No) | MARSSIM Classification |
| Corridor 100B | 98 | Yes | Class 2[b] | Yes | Class 2 |
| Foyer 100C | 21 | | | Yes | Class 2 |
| Office 142 | 20 | | | Yes | Class 2 |
| Corridor 100C | 67 | | | Yes | Class 2 |
| Corridor 100E | 124 | | | Yes | Class 2 |
| Office 130 | 17 | | | Yes | Class 2 |
| Corridor 100G/Room 134A[c] | 75 | | | Yes | Class 2 |

[a] The ceiling tiles were removed and disposed of as radiological waste prior to the FSS.

[b] Areas were combined for the MARSSIM Class 2 Wall Survey.

[c] These rooms were combined after building renovations in 2005. Building figures have not been updated to reflect this.

**Fixed-Point Measurements.** Fixed-point measurements were obtained from MARSSIM Class 2 (systematic - random start triangular grid) or MARSSIM Class 3 (random) locations. Class 3 fixed point measurements were obtained from random locations with emphasis on areas with a greater likelihood of residual activity. Results of the static measurements are listed in Tables A1.2 through A1.6, and locations are shown on Figures A1.1 through A1.6. All alpha results were below the site-specific alpha DCGL of 1,160 dpm/100 $cm^2$ for Am-241. Residual beta activity was compliant with both the Cs-137 surface contamination level of 5,000 dpm/100 $cm^2$ specified in AEC Regulatory Guide 1.86 (AEC 1974) and the NRC screening level DCGL of 28,000 dpm/100 $cm^2$ cited in Table 5.19 of NUREG-5512 (NRC 1999) for Cs-137 on structures.

## Table A1.2. SU-1 Corridor 100B, Foyer 100C, and Office 142 Class 2 Floor Measurements

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 1 | Linoleum | 100c foyer | -5 | 537 | 3 | -13 |
| 2 | Linoleum | 100c foyer | 8 | 186 | 3 | 6 |
| 3 | Linoleum | 100b | 46 | 416 | 0 | 12 |
| 4 | Linoleum | 100b | 8 | 712 | 0 | -10 |
| 5 | Linoleum | 100b | 20 | 307 | 3 | -24 |
| 6 | Linoleum | 100b | 20 | 460 | 0 | -2 |
| 7 | Linoleum | 100b | 8 | 208 | 0 | -27 |
| 8 | Linoleum | 100b | 8 | 526 | 3 | -16 |
| 9 | Linoleum | 100b | 8 | 351 | 3 | -19 |
| 10 | Linoleum | 142 | -5 | 340 | 0 | 9 |

The MDC is the minimum detectable concentration on a surface that an instrument is expected to detect (e.g., activity expected to be detected with 95 percent confidence).

The instrument MDCs for fixed samples 1-10 are 21 (alpha) and 257 dpm/100 cm$^2$ (beta); the MDCs for removable samples 1-10 are 18 (alpha) and 212 dpm/100 cm$^2$ (beta); and the MDCs for QC sample #5 are 53.8 (alpha) and 223.4 dpm/100cm$^2$ (beta).

Negative results indicate results that are below background for the respective building material.

N/A – Not Applicable

## Table A1.3. SU-2 Corridor 100C Class 2 Floor Measurements

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 1 | Linoleum | 100c | -5 | 844 | 0 | -5 |
| 2 | Linoleum | 100c | -5 | 548 | 3 | -8 |
| 3 | Linoleum | 100c | -5 | 99 | 0 | 29 |
| 4 | Linoleum | 100c | -5 | 625 | 0 | -2 |
| 5 | Linoleum | 100c | -5 | 449 | 0 | -8 |
| 6 | Linoleum | 100c | -5 | 515 | 0 | -8 |
| 7 | Linoleum | 100c | -5 | 373 | 0 | -5 |
| 8 | Linoleum | 100c | 8 | 537 | 0 | -13 |
| 9 | Linoleum | 100c | -5 | 471 | 0 | -27 |
| 10 | Linoleum | 100c | 20 | 953 | 3 | -38 |
| 11 | Linoleum | 100c | 8 | 603 | 0 | -33 |
| 12 | Linoleum | 100c | 8 | 581 | 0 | -19 |

The MDC is the minimum detectable concentration on a surface that an instrument is expected to detect with 95 percent confidence.

The instrument MDCs for fixed measurements 1-12 are 21 dpm/100 cm$^2$ (alpha) and 257 dpm/100 cm$^2$ (beta); the MDCs for removable samples 1-12 are 18 dpm/100 cm$^2$ (alpha) and 212 dpm/100 cm$^2$ (beta); and the MDCs for QC measurement #8 are 53.8 dpm/100 cm$^2$ (alpha) and 223.4 dpm/100cm$^2$ (beta).

Negative results indicate results that are below background for the respective building material.

N/A – Not Applicable

## Table A1.4. SU-3 Corridor 100E and Office 130 Class 2 Floor Measurements

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 1 | Linoleum | 100e | -5 | 581 | 0 | -2 |
| 2 | Linoleum | 100e | -5 | 493 | 0 | 9 |
| 3 | Linoleum | 100e | -5 | 975 | 0 | -16 |
| 4 | Linoleum | 100e | -5 | 274 | 0 | -49 |
| 5 | Linoleum | 100e | -5 | 658 | 0 | -35 |
| 6 | Linoleum | 100e | -5 | 460 | 0 | -13 |
| 7 | Linoleum | 100e | -5 | 581 | 3 | -10 |
| 8 | Linoleum | 100e | 8 | 395 | 3 | -27 |

## Table A1.4. SU-3 Corridor 100E and Office 130 Class 2 Floor Measurements (Continued)

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 9 | Linoleum | 100e | -5 | 723 | 0 | -5 |
| 10 | Linoleum | 130 | 20 | 559 | 0 | -5 |

The MDC is the minimum detectable concentration on a surface that an instrument is expected to detect with 95 percent confidence.

The instrument MDCs for fixed measurements 1-10 are 21 dpm/100 cm$^2$ (alpha) and 257 dpm/100 cm$^2$ (beta); the MDCs for removable samples 1-10 are 18 dpm/100 cm$^2$ (alpha) and 212 dpm/100 cm$^2$ (beta); and the MDCs for QC sample #6 are 53.8 dpm/100 cm$^2$ (alpha) and 223.4 dpm/100cm$^2$ (beta).

Negative results indicate results that are below background for the respective building material.

N/A – Not Applicable

## Table A1.5. SU-4 Corridor 100G Class 2 Floor Measurements

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 1 | Linoleum | 100g | -5 | 405 | 3 | -8 |
| 2 | Linoleum | 100g | -5 | 756 | 0 | 1 |
| 3 | Linoleum | 100g | 8 | 482 | 0 | -16 |
| 4 | Linoleum | 100g | -5 | 679 | 0 | -13 |
| 5 | Linoleum | 100g | 20 | 603 | 0 | -5 |
| 6 | Linoleum | 100g | -5 | 219 | 0 | -10 |
| 7 | Linoleum | 100g | 8 | 526 | 0 | 4 |
| 8 | Linoleum | 100g | 8 | 625 | 3 | -19 |
| 9 | Linoleum | 100g | -5 | 438 | 0 | -10 |
| 10 | Linoleum | 100g | 8 | 975 | 3 | -5 |
| 11 | Linoleum | 100g | -5 | 548 | 0 | -10 |
| 12 | Linoleum | 100g | -5 | 559 | 6 | -16 |

The MDC is the minimum detectable concentration on a surface that an instrument is expected to detect with 95 percent confidence.

The instrument MDCs for fixed measurements 1-12 are 21 dpm/100 cm$^2$ (alpha) and 257 dpm/100 cm$^2$ (beta); the MDCs for removable samples 1-12 are 18 dpm/100 cm$^2$ (alpha) and 212 dpm/100 cm$^2$ (beta); and the MDCs for QC sample #6 are 53.8 dpm/100 cm$^2$ (alpha) and 223.4 dpm/100cm$^2$ (beta).

Negative results indicate results that are below background for the respective building material.

N/A – Not Applicable

The wall area (from the floor to 3 m [10 ft] in height) for the first floor corridors is 970 m$^2$. This area excludes windows and ventilation openings that were present within the walls of the corridors.

## Table A1.6. SU-5 First Floor Corridor Class 2 Wall Measurements

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 1 | Concrete | 100c Foyer | 90 | 334 | 3 | 43 |
| 2 | Concrete | 100c Foyer | 80 | 577 | 3 | 12 |
| 3 | Concrete | 100b | 38 | 451 | 0 | -5 |
| 4 | Concrete | 100b | 59 | 518 | 0 | 29 |
| 5 | Concrete | 100b | 27 | 292 | 0 | -16 |
| 6 | Concrete | 100b | 38 | 276 | 0 | 15 |
| 7[a] | Concrete | 100h | 48 | 1,746 | 3 | -13 |
| 8[a] | Concrete | 100h | 90 | 2,131 | 0 | 12 |
| 9[a] | Concrete | 100h | 69 | 1,571 | 0 | -2 |
| 10[a] | Concrete | 100h | 69 | 1,688 | 3 | -19 |
| 11 | Concrete | 100c | 90 | 819 | 0 | 6 |
| 12 | Concrete | 100c | 80 | 969 | 0 | 29 |
| 13 | Concrete | 100c | 27 | 827 | 0 | -16 |

## Table A1.6. SU-5 First Floor Corridor Class 2 Wall Measurements (Continued)

| Sample Number | Survey Surface | Location | Total Alpha Activity (dpm/100 cm$^2$) | Total Beta Activity (dpm/100 cm$^2$) | Removable Alpha Activity (dpm/100 cm$^2$) | Removable Beta Activity (dpm/100 cm$^2$) |
|---|---|---|---|---|---|---|
| 14 | Concrete | 100c | 48 | 936 | 0 | -19 |
| 15 | Concrete | 100c | 27 | 585 | 6 | 18 |
| 16 | Concrete | 100c | 27 | 710 | 0 | 15 |
| 17 | Concrete | 100e | 38 | 551 | 0 | 34 |
| 18 | Concrete | 100e | 69 | 635 | 0 | 4 |
| 19 | Concrete | 100e | 38 | 735 | 0 | -10 |
| 20 | Concrete | 100e | 27 | 209 | 3 | 23 |
| 21 | Concrete | 100e | 17 | 384 | 0 | 6 |
| 22 | Concrete | 100e | 6 | -150 | 0 | -35 |
| 23 | Concrete | 100e | 59 | 627 | 0 | 4 |
| 26 | Concrete | 100e | 69 | 618 | 0 | -5 |
| 27 | Concrete | 100e | 48 | 543 | 0 | -8 |
| 28 | Concrete | 100e | 27 | 409 | 0 | -10 |
| 29 | Concrete | 100e | 6 | 251 | 0 | -30 |
| 30 | Concrete | 100g | 38 | 535 | 0 | 6 |
| 31 | Concrete | 100g | 48 | 802 | 3 | -16 |
| 32 | Concrete | 100g | 38 | 292 | 0 | -16 |
| 33 | Concrete | 100g | 27 | 568 | 3 | -13 |
| 34 | Concrete | 100b | 48 | 627 | 0 | -16 |
| 35 | Concrete | 100b | 27 | 301 | 3 | -19 |
| 36 | Concrete | 100b | 38 | 409 | 0 | 4 |
| 37 | Concrete | 100b | 27 | 217 | 0 | -5 |
| 38 | Concrete | 100g | 38 | 618 | 0 | 12 |
| 39 | Drywall | 142 | 7 | 482 | -1 | 12 |
| 40 | Drywall | 130 | -7 | 92 | -1 | 20 |

[a] The walls of Room 100H were collected and evaluated with this SU (i.e., SU-5 of the First Floor Corridor). The floors for Room 100H are included in SU-23 in Attachment 4.

The MDC is the minimum detectable concentration on a surface that an instrument is expected to detect with 95 percent confidence.

The instrument MDCs for fixed measurements 1-12 are 21 dpm/100 cm$^2$ (alpha) and 257 dpm/100 cm$^2$ (beta); the MDCs for removable samples 1-12 are 18 dpm/100 cm$^2$ (alpha) and 212 dpm/100 cm$^2$ (beta); and the MDCs for QC sample #6 are 53.8 dpm/100 cm$^2$ (alpha) and 223.4 dpm/100cm$^2$ (beta).

Negative results indicate results that are below background for the respective building material.

N/A – Not Applicable

**Summary.** Residual levels of radioactivity in the Magill Hall First Floor Corridors clearly demonstrate that residual concentrations of radionuclide COPCs achieve the site-specific Am-241 (alpha) DCGL of 1,160 dpm/100 cm$^2$ and the most restrictive beta DCGL of 5,000 dpm/100 cm$^2$ for Cs-137. In addition, the actual percentage of removable activity was determined to be approximately 3 percent.

Given these results, it is clearly demonstrated that the null hypothesis (i.e., that the Magill Hall First Floor Corridors exceeds DCGLs) is rejected. Review of survey data supports the conclusion that the Magill Hall First Floor Corridors contain an adequate number of samples; a sufficient percentage has been scanned; and they have been appropriately classified consistent with MARSSIM requirements using the process noted in Section 4.0 of the main text of this document. All scan and fixed measurement results collected from the Magill Hall First Floor Corridors at Southeast were below the DCGL. As such, formal assessment using the Sign Test is not required.

**Conclusion.** Levels of radioactivity in the Magill Hall First Floor Corridors achieve criteria for unrestricted release consistent with the provisions of 10 *CFR* 20, Subpart E.

# ATTACHMENT A-1-1

# FIGURES

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