MAGILL HALL PENTHOUSE FOUNDATIONS

(SURVEY UNITS 103 THROUGH 106)

The Magill Hall Penthouse foundations, located on the Magill Hall roof, include the concrete bases on which the Magill Hall Penthouses were formerly constructed. The penthouses, including the applicable HVAC systems, were subject to demolition prior to the FSS (see Section 2.4 of the main text for additional details). The floors and the remaining walls within these areas were classified as MARSSIM Class 1 areas. Figures (including sample locations) are included in Attachment A-9-1. Radiologically impacted areas were divided into SUs based on MARSSIM-recommended size constraints, resulting in a total of 4 SUs (SU-103 through SU-106) in the area identified herein as Magill Hall Penthouses. Survey data from the floors and walls are located in Tables A9.1 through A9.4.

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. 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.

Fixed-Point Measurements. Fixed-point measurements were obtained from MARSSIM Class 1 (systematic - random start triangular grid) areas. Results of the static measurements are listed in Tables A9.1 through A9.4, and locations are shown on Figures A9.1 through A9.4. 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.

The floor of the Northeast (NE) Penthouse was surveyed as one MARSSIM Class 1 SU. The area of this SU is 600 m^2.

Table A9.1. SU-103 Northeast Penthouse Class 2 Floor Measurement Results

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	NE Penthouse	46	712	0	-13
2	Concrete	NE Penthouse	349	1,096	0	-26
3	Concrete	NE Penthouse	286	-208	0	-30
4	Concrete	NE Penthouse	261	997	0	-39
5	Concrete	NE Penthouse	96	132	0	-39
6	Concrete	NE Penthouse	210	-88	3	-16
7	Concrete	NE Penthouse	248	1,578	0	-30
8	Concrete	NE Penthouse	235	1,501	0	-23
9	Concrete	NE Penthouse	134	1,403	0	-52
10	Concrete	NE Penthouse	197	1,775	0	-26
11	Concrete	NE Penthouse	197	1,359	0	-39
12	Concrete	NE Penthouse	121	1,534	0	-43

Table A9.1. SU-103 Northeast Penthouse Class 2 Floor Measurement Results (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)
13	Concrete	NE Penthouse	8	1,129	0	-39
14	Concrete	NE Penthouse	33	1,403	3	-20
15	Concrete	NE Penthouse	134	1,545	0	-46
16	Concrete	NE Penthouse	235	2,027	0	-52
17	Concrete	NE Penthouse	46	1,118	0	-39
18	Concrete	NE Penthouse	96	1,425	0	-62
19	Concrete	NE Penthouse	20	1,600	0	-39
20	Concrete	NE Penthouse	159	1,348	0	-30
21	Concrete	NE Penthouse	185	1,545	6	-16
22	Concrete	NE Penthouse	109	1,348	3	-30
23	Concrete	NE Penthouse	185	1,512	0	-16
24	Concrete	NE Penthouse	210	1,545	0	-26

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 samples 1-24 are 21 dpm/100 cm^2 (alpha) and 257 dpm/100 cm^2 (beta); and the MDCs for removable samples 1-24 are 12 dpm/100 cm^2 (alpha) and 83 dpm/100 cm^2 (beta).

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

The walls of the NE Penthouse were surveyed as one MARSSIM Class 1 SU. The area of this SU is 500 m^2.

Table A9.2. SU-104 Northeast Penthouse Class 2 Wall Measurement Results

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	NE Penthouse	120	295	0	-10
2	Concrete	NE Penthouse	94	349	3	7
3	Concrete	NE Penthouse	120	437	0	52
4	Concrete	NE Penthouse	184	1,846	0	3
5	Concrete	NE Penthouse	94	1,977	0	-7
6	Concrete	NE Penthouse	132	437	3	-23
7	Concrete	NE Penthouse	120	120	0	-16
8	Concrete	NE Penthouse	81	666	0	10
9	Concrete	NE Penthouse	68	360	0	-20
10	Concrete	NE Penthouse	68	481	3	-43
11	Concrete	NE Penthouse	107	524	3	-43
12	Concrete	NE Penthouse	531	1,758	3	33
13	Concrete	NE Penthouse	145	1,944	6	0
14	Concrete	NE Penthouse	81	251	0	7
15	Concrete	NE Penthouse	184	262	0	-30
16	Concrete	NE Penthouse	132	1,431	3	13
17	Concrete	NE Penthouse	120	-87	3	3
18	Concrete	NE Penthouse	120	2,173	0	3
19	Concrete	NE Penthouse	120	535	0	-7
20	Concrete	NE Penthouse	81	1,868	0	3
21	Concrete	NE Penthouse	94	142	0	-33
22	Concrete	NE Penthouse	81	1,977	0	36
23	Concrete	NE Penthouse	120	240	0	-7
24	Concrete	NE Penthouse	81	208	0	23
25	Concrete	NE Penthouse	68	284	0	0
26	Concrete	NE Penthouse	248	426	0	-7
27	Concrete	NE Penthouse	107	109	0	13
28	Concrete	NE Penthouse	107	55	0	-10
29	Concrete	NE Penthouse	299	601	3	7
30	Concrete	NE Penthouse	145	251	3	3

Table A9.2. SU-104 Northeast Penthouse Class 2 Wall Measurement Results (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)
31	Concrete	NE Penthouse	81	306	3	43
32	Concrete	NE Penthouse	81	-66	0	-10
33	Concrete	NE Penthouse	55	-131	3	10

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 samples 1-33 are 74 dpm/100 cm^2 (alpha) and 289 dpm/100 cm^2 (beta); and the MDCs for removable samples 1-33 are 12 dpm/100 cm^2 (alpha) and 83 dpm/100 cm^2 (beta).

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

The floor of the Southwest (SW) Penthouse was surveyed as one MARSSIM Class 1 SU. The area of this SU is 600 m^2.

Table A9.3. SU-105 Southwest Penthouse Class 2 Floor Measurement Results

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	SW Penthouse	22	903	3	-28
2	Concrete	SW Penthouse	52	1,395	3	-25
3	Concrete	SW Penthouse	22	995	-1	-6
4	Concrete	SW Penthouse	22	1,231	-1	3
5	Concrete	SW Penthouse	37	1,508	-1	8
6	Concrete	SW Penthouse	22	1,456	-1	-23
7	Concrete	SW Penthouse	82	1,415	-1	-20
8	Concrete	SW Penthouse	52	1,087	3	8
9	Concrete	SW Penthouse	37	862	-1	-8
10	Concrete	SW Penthouse	37	1,149	-1	-14
11	Concrete	SW Penthouse	22	1,159	-1	17
12	Concrete	SW Penthouse	67	1,497	-1	-42
13	Concrete	SW Penthouse	67	1,538	3	-8
14	Concrete	SW Penthouse	67	1,354	-1	-31
15	Concrete	SW Penthouse	82	913	3	8
16	Concrete	SW Penthouse	142	964	-1	-23
17	Concrete	SW Penthouse	112	1,036	-1	3
18	Concrete	SW Penthouse	187	1,497	-1	23
19	Concrete	SW Penthouse	22	1,559	-1	-14
20	Concrete	SW Penthouse	82	1,026	-1	25
21	Concrete	SW Penthouse	97	1,251	-1	0
22	Concrete	SW Penthouse	67	1,405	-1	20
23	Concrete	SW Penthouse	97	1,415	-1	-51
24	Concrete	SW Penthouse	82	985	-1	6

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 samples 1-24 are 82 dpm/100 cm^2 (alpha) and 234 dpm/100 cm^2 (beta); and the MDCs for removable samples 1-24 are 14 dpm/100 cm^2 (alpha) and 74 dpm/100 cm^2 (beta).

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

The walls of the SW Penthouse were surveyed as one MARSSIM Class 1 SU. The area of this SU is 500 m^2.

Table A9.4. SU-106 Southwest Penthouse Class 2 Wall Measurement Results

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	SW Penthouse	7	605	6	-6
2	Concrete	SW Penthouse	67	790	-1	6
3	Concrete	SW Penthouse	52	656	-1	6
4	Concrete	SW Penthouse	22	2,041	-1	-28
5	Concrete	SW Penthouse	67	2,062	3	14
6	Concrete	SW Penthouse	52	574	3	-14
7	Concrete	SW Penthouse	7	615	-1	-3
8	Concrete	SW Penthouse	7	810	-1	-17
9	Concrete	SW Penthouse	67	1,046	-1	-45
10	Concrete	SW Penthouse	52	1,159	6	23
11	Concrete	SW Penthouse	97	882	3	-28
12	Concrete	SW Penthouse	37	2,985	3	-3
13	Concrete	SW Penthouse	37	2,974	-1	6
14	Concrete	SW Penthouse	7	974	-1	0
15	Concrete	SW Penthouse	82	759	6	-17
16	Concrete	SW Penthouse	67	2,523	-1	0
17	Concrete	SW Penthouse	97	779	3	48
18	Concrete	SW Penthouse	67	3,364	3	-14
19	Concrete	SW Penthouse	82	1,067	-1	0
20	Concrete	SW Penthouse	37	2,810	-1	20
21	Concrete	SW Penthouse	37	2,697	-1	8
22	Concrete	SW Penthouse	97	2,687	-1	0
23	Concrete	SW Penthouse	112	677	-1	17
24	Concrete	SW Penthouse	37	769	-1	-11
25	Concrete	SW Penthouse	37	462	-1	-11
26	Concrete	SW Penthouse	67	564	-1	-8
27	Concrete	SW Penthouse	142	923	3	-20
28	Concrete	SW Penthouse	52	872	-1	-23
29	Concrete	SW Penthouse	37	656	-1	-28
30	Concrete	SW Penthouse	67	892	6	17
31	Concrete	SW Penthouse	82	1,026	-1	-28
32	Concrete	SW Penthouse	67	831	-1	14
33	Concrete	SW Penthouse	67	697	-1	23

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 samples 1-24 are 82 dpm/100 cm^2 (alpha) and 234 dpm/100 cm^2 (beta); and the MDCs for removable samples 1-24 are 14 dpm/100 cm^2 (alpha) and 74 dpm/100 cm^2 (beta).

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

Summary. Residual levels of radioactivity in the Magill Hall Penthouses clearly demonstrate that residual concentrations of radionuclide COPCs achieve the site-specific 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 Penthouses exceeds DCGLs) is rejected. Review of survey data supports the conclusion that the Penthouses contain an adequate number of samples; a sufficient percentage have 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 Penthouses at Southeast were below the $DCGL_w$. As such, formal assessment using the Sign Test is not required.

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

ATTACHMENT A-9-1

FIGURES

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