SAINT LOUIS
UNIVERSITY

1402 South Grand Blvd.
St. Louis, MO 63104-1085
Fax: 314-977-5560
www.slu.edu

Office of Environmental Safety & Services
Environmental Safety Office (C307)
314-977-8608

Radiation Safety Office (RB5)
314-977-8609

July 9, 2008

Mr. Mike McCann
U.S. Nuclear Regulatory Commission
Region III
2443 Warrenville Road
Lisle, IL 60532

SUBJECT: **NRC License Number 24-00196-07; Amendment Request to Remove the Institute for Molecular Virology Building and Authorize Free Release – PLEASE EXPEDITE**

Dear Mr. McCann:

This letter is to request an amendment to Saint Louis University's broad scope license, NRC License Number 24-00196-07, authorizing unrestricted release of the Institute for Molecular Virology (IMV) building to accommodate sale of the facility. The building is located at 3681 Park Avenue, St. Louis, MO 63110. ***Your expeditious review of this amendment request is very much appreciated in the interest of facilitating a property sale closing date expected to occur within the next 60 days.*** An electronic copy of this letter and the enclosed report is also being forwarded by email.

Licensed activities have ceased and the facility has undergone decommissioning, which was conducted under the provisions of the Saint Louis University radioactive materials license and in accordance with a MARSSIM-based Decommissioning Work Plan. Chase Environmental Group, Inc. was employed to assist the University with decommissioning efforts. The enclosed Final Status Report provides conclusive evidence that the facility meets the criteria for unrestricted use specified in 10 CFR 20 Subpart E. Additionally, each final status measurement indicates that residual licensed material at the facility is less than the ALARA goal of 5000 dpm/100cm^2 total activity, and 200 dpm/100cm^2 removable activity. Dose modeling indicates that the TEDE to an average member of the critical group under the building occupancy scenario of DandD Version 2.1 is < 0.005 mrem/year (0.02% of the NRC release criterion of 25 mrem/yr).

I have personally inspected the facility and verified that all licensed radioactive material and all radioactive markings have been removed from the facility. I appreciate your time and efforts with this matter and look forward to hearing back from you. If you have any questions or concerns, please contact me at 314-977-6885.

Sincerely,

Mark Haenchen, M.S., J.D.
Director, Office of Environmental Safety & Services
and Radiation Safety Officer

enclosure:
Institute for Molecular Virology – Decommissioning Final Status Report

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

MEMORANDUM TO: Michael T. Lesar, Chief
Rules Review and Directives Branch
Division of Administrative Services
Office of Administration

FROM: Christine Lipa, Chief
Decommissioning Branch
Division of Nuclear Materials Safety
Region III

SUBJECT: PUBLICATION OF ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT IN THE FEDERAL REGISTER FOR SAINT LOUIS UNIVERSITY IN ST. LOUIS, MISSOURI

Attached please find one signed original, four copies, and an electronic version on a CD-ROM of the subject *Federal Register* Notice for transmittal to the Office of the Federal Register for publication.

ADM/DAS/RDB has been given owner's rights to the Notice in ADAMS (ML082600141). Publicly available NRC documents referenced in the Notice have been finalized in ADAMS and profiled for public release. The ADAMS accession numbers for all such documents are provided in the text under **Further Information**.

Docket No.:	**030-11789**	Staff Contact:	**George M. McCann, RIII**
License No.:	**24-00196-07**	Phone No.:	**(630) 829-9856**

Enclosures:
1. One original and four copies
2. CD-ROM (electronic version)

Institute for Molecular Virology Decommissioning Final Status Report

Saint Louis University
3681 Park Avenue
St. Louis, MO 63110

NRC License Number 24-00196-07

June 24, 2008

Prepared:	Dave Culp	Radiological Engineer Chase Environmental	Date:	6/24/08
Technical Review:	Tom Hansen	Director, Field Services Chase Environmental	Date:	6/24/08
Approved:	Mark Haenchen	Radiation Safety Officer Saint Louis University	Date:	7/7/2008

Prepared by:
Chase Environmental Group, Inc.
109 Flint Road
Oak Ridge, TN 37830
865-481-8801

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ACRONYMS

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
$DCGL_{EMC}$	Derived Concentration Guideline Level – Elevated Measurement Comparison
$DCGL_W$	Derived Concentration Guideline Level – Wilcoxon Rank Sum
DWP	Decommissioning Work Plan
DQA	Data Quality Assessment
DQO	Data Quality Objective
DSV	Default Screening Value
FSS	Final Status Survey
FSSR	Final Status Survey Report
GSF	Gross Square Feet
HSA	Historical Site Assessment
LBGR	Lower Bound of the Gray Region
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
NRC	U.S. Nuclear Regulatory Commission
NIST	National Institute of Standards and Technology
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RSC	Radiation Safety Committee
RSO	Radiation Safety Officer
TEDE	Total Effective Dose Equivalent

1.0 Executive Summary

St. Louis University (SLU) has decided to permanently decommission the 25,000 square foot Institute for Molecular Virology (IMV) Building located on campus at 3681 Park Avenue, St. Louis, MO 63110. The facility includes research laboratories, offices, cold rooms, mechanical spaces and other support areas. The facility is being decommissioned for unrestricted use and offered for sale. This requires removal of the building as a location of authorized activities under SLU's NRC Broad Scope Byproduct Materials license number 24-00196-07.

Radioactive materials used at the facility consisted of a variety of radionuclides for research. Primarily these included H-3, C-14, P-32, P-33 and S-35. Based on an analysis of the default screening values, quantities used, physical forms, half-lives, and receipt and distribution records; H-3 and C-14 are the only nuclides of concern for decommissioning.

Over the past year, SLU closed out all laboratories, removed all radioactive materials, and removed all loose equipment and materials in preparation for decommissioning. Research activities using radioactive materials ceased in late 2007. All remaining licensed materials (radioactive waste resulting from remediation of low levels of residual activity) were removed from the facility on 6/20/08.

SLU procured Chase Environmental Group, Inc. (Chase) to perform decommissioning activities. Decommissioning was conducted under the provisions of the SLU radioactive materials license and in accordance with a project-specific Decommissioning Work Plan (DWP) and Quality Assurance Project Plan (QAPP). On-site decommissioning activities were performed from June 17 to June 20, 2008.

The DWP was developed using the guidance provided in NUREG 1757, "Consolidated NMSS Decommissioning Guidance"; and NUREG 1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM). It provided the approach, methods, and techniques for the radiological decommissioning of impacted areas of the facility. Final status surveys were designed to implement the protocols and guidance provided in MARSSIM to demonstrate compliance with the default screening values specified in NUREG 1757, Appendix B or generated using the default scenarios and parameters of the DandD code v.2.1. These methods ensured technically defensible data were generated to aid in determining whether or not the facility meets the release criteria for unrestricted use specified in 10 CFR 20 Subpart E.

SLU established conservative ALARA goals based on the release criteria for equipment and materials specified in FC 83-23, "Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source, or Special Nuclear Material Licenses." Specifically, the following surface contamination limits were used for decommissioning activities:

- 5,000 dpm/100cm^2 total surface contamination (averaged over 1m^2)
- 15,000 dpm/100cm^2 maximum total surface contamination (limited to 100 cm^2)
- 1,000 dpm/100cm^2 removable surface contamination

Facility characterization surveys identified several locations with detectable residual activity above ALARA goals. However, all measurements were a small fraction of the Default Screening Value (DSV). All surfaces with elevated residual activity above the ALARA goals were remediated.

This report presents sufficient data to support the conclusion that the facility meets the NRC release criteria. Final status surveys demonstrate that building structural surfaces and systems included in the scope of this report are orders of magnitude below release criteria and are suitable for unrestricted release. All final status surface contamination measurements were less than the ALARA goals. Based on the Building Occupancy Scenario of NRC DandD dose modeling software Version 2.1, **the Total Effective Dose Equivalent (TEDE) to an average member of the critical group is < 0.005 mrem/year (< 0.02 % of the release criterion of 25 mrem/yr)** using the results of the survey unit with the highest average activity.

2.0 Site Descriptions and History

2.1 Historical Site Assessment

The Institute for Molecular Virology was established in 1964 to provide a unique faculty and special facilities for research and teaching in molecular virology, viral oncology, and cancer biology.

Chase performed a Historical Site Assessment (HSA) in May and June of 2008. The purpose of the HSA was to determine the current status of the facility including potential, likely, or known sources of radioactive contamination by gathering data from various sources. This data included physical characteristics and location of the site as well as information determined from personnel interviews and found in site operating records, including radiological surveys.

Records that were reviewed included: radioactive materials licenses, license applications, amendment requests, meeting minutes, radiological surveys, radionuclide receipt and distribution records, incident reports, facility renovation records, blueprints, plans and design specifications. Personnel interviews included radiation safety, research, maintenance, operations, and facilities personnel. Current employees having knowledge of facility historical operations were interviewed. The interviewees' presence at the facility spanned the continuous period of facility operations involving radioactive materials.

2.2 Ownership

The facility is owned by SLU. After decommissioning, SLU plans to sell the facility.

2.3 Potential Contaminants

Potential contaminants were determined from license files, including survey and material receipt records. The nuclides and quantities were fairly consistent from year to year, and according to personnel interviewed, were consistent with laboratory research, development and waste operations since initial usage of radioactive materials.

Table 2-1 lists the nuclides used at the facility. This list was compiled through review of radionuclide receipt and distribution records, radioactive waste records, audit and survey records, and interviews with facility personnel.

Table 2-1 Radionuclides Used

Nuclide	Half Life	Dispersible Form?	Half Life >120 days?
H-3	12.3 y	YES	YES
C-14	5730 y	YES	YES
P-32	14.3 d	YES	NO
P-33	24.4 d	YES	NO
S-35	87.9 d	YES	NO
Ca-45	165 d	YES	YES
Cr-51	27.8 d	YES	NO
Hg-203	46.6 d	YES	NO
I-125	60.2 d	YES	NO
I-131	8.0 d	YES	NO
Zn-65	244 d	YES	YES

All short-lived nuclides ($t_{1/2}$ < 120 days) were eliminated from consideration as nuclides of concern. Additionally, Ca-45 and Zn-65 were eliminated because they have not been used in more than 12 years. All sealed sources were eliminated from consideration because there has never been any indication of leakage. After considering quantities of radionuclides used, the locations of use, and the impact of radioactive decay, the nuclides of concern are H-3 and C-14. Many of the short-lived nuclides had not been used at the facility in years (Cr-51, Hg-203 and I-125). P-32 and S-35 were the nuclides with the highest usage and residual activity is assumed to have decayed. However, these nuclides would be detected and controlled at a fraction of their DSV's during this decommissioning effort, even if they were present. Sealed sources used at the site include those found in analytical instruments. These instruments, along with the sources, were relocated to other SLU licensed facilities or disposed during the decommissioning process.

2.4 License History

The facility operated under Atomic Energy Commission authorizations from 1964 until the early 1970's when the NRC was formed. The facility currently operates under NRC license 24-00196-07 Broad Scope Type A. Radioactive materials license files were reviewed to identify historical operations, nuclides used and quantities used. Essentially, licensed operations for research and development did not change much over the history of the license. Because the SLU license is applicable to many facilities and buildings, radioactive materials receipt/distribution records and personnel interviews with research personnel offered the most insight regarding potential nuclides of concern and quantities used.

2.5 Operational and Closeout Radiological Surveys

During the HSA, the radiological status of the facility was determined by reviewing historical survey records and interviewing Radiation Safety personnel. During operation, facility surfaces were maintained <200 dpm/100cm^2 removable surface contamination. The facility conducted routine periodic surveys, which were performed by researchers and Radiation Safety personnel. Laboratory closeout procedures were used when researchers completed experiments involving radioactive materials. In addition to removable contamination measurements, laboratory closeout procedures involved scan surveys using a pancake GM detector.

2.6 Previous Decommissioning Activities

Over the years, laboratories were closed out using the SLU lab closeout procedure and checklists. Additionally, all laboratories were recently closed out to support decommissioning. The closeout procedures included documentation of disposal of all radioactive materials and surveys consisting of scans using a pancake GM detector as well as LSC smears. Additionally, there were several instances of spills of radioactive materials that were decontaminated. In most instances, these spills involved short-lived radionuclides, but there was one instance of a volatized H-3 resulting in surface contamination in Room 209.

3.0 Current/Future Use

The site is currently empty awaiting NRC release. Only maintenance personnel enter the building to keep the facility in good repair. After release, the site will be offered for sale.

4.0 Building Description

The 25,000 square foot building consists of several sections as a result of additions over the years. The original two-story brick section was built in 1880. Subsequent additions expanded the ground floor. In 1963-64, the building was renovated into research laboratory space and commenced using radioactive materials in 1964. In 1967, a garage area on the north end of the building was renovated into laboratory space. In 1968, an addition extending the north end of the building was completed. In 1971, offices and laboratories were added to the north and west sides of the building. In the early 1990's,

laboratory space in the center of the building was renovated into BSL-3 laboratory space. A map showing the facility layout and identifying the various building additions is presented in Appendix A.

Currently the facility consists of block, brick and sheetrock interior walls and concrete floors. Laboratory floor surfaces are covered in epoxy paint or vinyl tile and office areas are carpeted. The roof is covered with a membrane.

The exterior of the building includes a concrete dock area on the east side of the building where a 36' covered section was historically used to store radioactive waste awaiting shipment. The facility is surrounded by asphalt parking lots, except for a section on the west side of the 1971 addition where there is a narrow grassy area.

The ground floor contains offices, laboratories, storage areas, cold rooms, warm rooms, waste storage room, mechanical rooms, conference rooms and restrooms. A small second story contains four labs, support offices and a restroom.

Figure 4-1 South End of IMV Showing Original Section

Figure 4-2 East Side of IMV Building

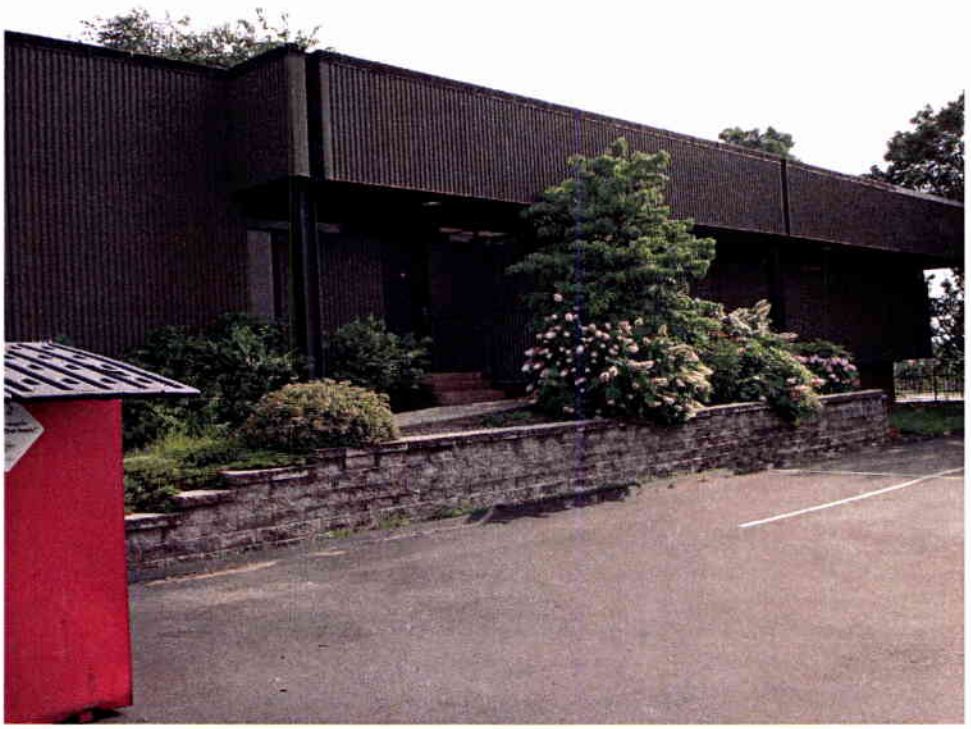


Figure 4-3 North End of IMV Building Showing 1971 Addition

Figure 4-4 West Side of IMV Building Showing 1971 Addition

Figure 4-5 West Side of IMV Building Showing Original Section

Figure 4-6 Aerial View of IMV Building Showing Roof

Figure 4-7 Typical Laboratory Layout

Figure 4-8 Typical Fume Hoods

4.1 Ventilation Systems

Conditioned air is introduced to building areas via air handling units in the mechanical rooms and on the roof. Laboratories are maintained at negative pressure relative to other areas via the fume hood exhaust ventilation systems. All fume hood exhaust fans are located on the roof, except the first floor labs in the original section of the building that exhaust out the east side of the building.

4.2 Vacuum Systems

There are two vacuum systems that serve separate sections of the building. Both systems consist of pumps mounted on accumulators and associated piping extending to nozzles located at benchtops and fume hoods throughout the facility. The first system has two pumps and accumulators located in mechanical room 144 that services areas built prior to 1971. The second system has three pumps and accumulators in mechanical room 184 that services laboratories included in the 1971 addition.

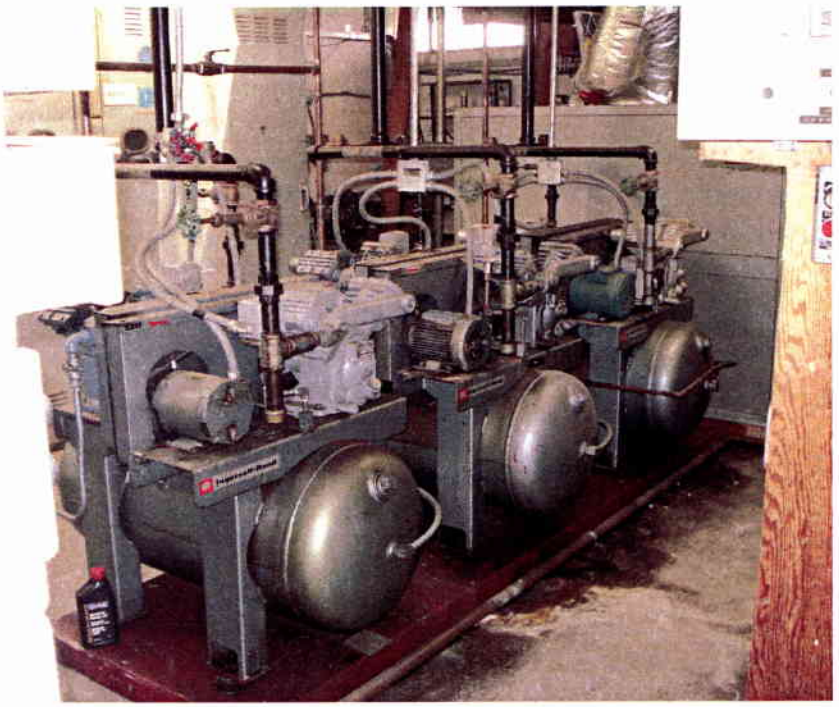


Figure 4-9 Vacuum Pumps and Accumulators

4.3 Drain Systems

Sewer disposal of licensed material was performed via laboratory sinks per license authorization and within regulatory limits. All building drains exit to the sanitary sewer system. In the 1990's a drain disposal program was initiated in which only one sink per licensed building was authorized for disposal of radioactive materials. For the IMV Building, the sink drain in waste room 186 was used to accomplish all drain disposal of radioactive materials. However, there is at least one incident report involving disposal of P-32 in an unauthorized sink. Consequently all laboratory drains were surveyed for decommissioning. Laboratory drains exit the building through a concrete pit that historically was a neutralization tank filled with limestone. The neutralizing tank is a 6' x 6' x 8' deep concrete vault accessed via a manhole on the floor in mechanical room 184. According to personnel interviews, the limestone was removed in the mid 1970's as a corrective action to oil being dumped in a laboratory sink. The manhole was opened during decommissioning and it was verified that the limestone media were not present. Direct and removable activity measurements were taken on accessible surfaces inside the vault as part of the FSS. There were also small acid traps associated with the original section of the building. These traps consisted of small receptacles in the drain lines used to hold limestone with brass access covers on the floor. These traps were accessed during decommissioning and no limestone media were present. Removable contamination measurements were performed inside each trap.

Figure 4-10 Waste Room Sink Used for Sewer Disposal

5.0 Facility Release Criteria

Facility release criteria for unrestricted use are that of NRC 10CFR20 Subpart E. Specifically, the facility was surveyed in accordance with the guidance contained in MARSSIM to demonstrate compliance with the criteria of 10CFR20.1402, "Radiological Criteria for Unrestricted Use." The criteria is that residual radioactivity results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

6.0 Nuclides of Concern

After considering results of the HSA and scoping surveys, quantities and locations of nuclides, and the impact of radioactive decay, the nuclides of concern are C-14 and H-3.

7.0 Derived Concentration Guideline Levels

The NRC has published default screening values in NUREG 1757 for commonly used radionuclides. The isotopes of concern screening values for surfaces under default conditions (generic screening levels) from NUREG 1757, Volume 1, Appendix B are provided in Table 7-1.

Table 7-1 Default Screening Values for Nuclides of Concern

Isotope	Half-life	Radiation Type	Default Screening Value ($dpm/100cm^2$)
H-3	12.3 years	Beta	1.2E8
C-14	5730 years	Beta	3.7E6

The default screening values (DSV) are the basis for developing the derived concentration guideline levels (DCGL's) for the project. The DCGL is the radionuclide specific surface activity concentration that could result in a dose equal to the release criterion. $DCGL_W$ is the concentration limit if the residual activity is essentially evenly distributed over a large area. For this project, $DCGL_W$ is equal to the DSV. In the case of non-uniform contamination, MARSSIM allows for evaluation of higher levels of activity over small areas using the $DCGL_{EMC}$. Due to the radiological cleanliness of the facility and SLU's conservative ALARA goal, small areas of elevated activity above the $DCGL_W$ are not considered. Additionally, application of the unity rule for multiple radionuclides is not required to demonstrate compliance with the release criteria. An important assumption of the dose model is that removable contamination is <10% of total contamination. Historical survey results as well as characterization, final status and QA survey results confirm that removable contamination levels are very low and meet this assumption. H-3 cannot be accurately detected directly by field instrumentation due to its low energy. Therefore, H-3 contamination was evaluated by removable contamination measurements only.

8.0 ALARA Goals

SLU established conservative ALARA goals based on the release criteria for equipment and materials specified in FC 83-23, "Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source, or Special Nuclear Material Licenses." Specifically, the following surface contamination limits were used for decommissioning activities:

- 5,000 $dpm/100cm^2$ total surface contamination (averaged over $1m^2$)
- 15,000 $dpm/100cm^2$ maximum total surface contamination (limited to 100 cm^2)
- 1,000 $dpm/100cm^2$ removable surface contamination

Because of the conservatism of the ALARA goals, these criteria were applied to gross beta measurements and the unity rule was not applied. The number of measurements required by MARSSIM to demonstrate compliance with the release criteria was calculated using the $DCGL_W$ and not the ALARA goal.

9.0 ALARA Analysis

Due to the extremely low doses associated with residual radioactivity at the facility, a quantitative ALARA analysis was not required. Default screening values were used to

establish DCGLs. Furthermore, SLU routinely maintained all laboratory areas of the facility at levels less than 200 dpm/100cm^2 removable activity and all final status removable contamination measurements are less than 200 dpm/100cm^2.

NUREG 1757, Volume 2, Appendix N states in part: "For ALARA during decommissioning, all licensees should use typical good-practice efforts such as floor and wall washing, removal of readily removable radioactivity in buildings or in soil areas, and other good housekeeping practices. In addition, licensees should provide a description in the FSSR [final status survey report] of how these practices were employed to achieve the final activity levels. In light of the conservatism in the building surface and surface soil generic screening levels developed by NRC, NRC staff presumes, absent information to the contrary, that licensee who remediate building surfaces or soil to the generic screening levels do not need to provide analyses to demonstrate that these screening levels are ALARA. In addition, if residual radioactivity cannot be detected, it may be assumed that it has been reduced to levels that are ALARA. Therefore, the licensee may not need to conduct an explicit analysis to meet the ALARA requirement."

10.0 Project Management and Organization

Due to the radiological cleanliness of the facility and the relative simplicity of the final status survey design, a complex management organization was not required. Decommissioning operations were conducted under the same SLU management structure as current licensed activities. Chase Environmental Group, Inc. (Chase), a licensed D&D services provider, was contracted to perform all decommissioning activities. Chase conducted activities under the direction of the SLU Radiation Safety Officer. A SLU Project Manager was assigned to coordinate activities between Chase and SLU management. Additional SLU oversight was provided in the areas of Industrial Safety and Industrial Hygiene. Decommissioning tasks were performed according to written plans and procedures approved by SLU management to ensure they provided adequate worker protection and complied with the facility radioactive materials license.

11.0 Training

SLU provided all contractors with radiation worker training required by the facility radioactive materials license. Chase provided training for D&D-specific programs, plans and procedures. Individuals performing D&D tasks were trained on all project procedures and plans.

12.0 Radiation Safety and Health Program

Radiological work was performed according to the SLU radioactive materials license Radiation Safety Program under the management and supervision of the facility Radiation Safety Officer.

13.0 Environmental Monitoring Program

Due to the simplicity of this project, a project-specific environmental monitoring program was not required.

14.0 Radioactive Waste Management

Approximately four cubic feet of radioactive waste was generated during decommissioning. All waste was wrapped in plastic bags, sealed, and stored in approved storage areas until removal from the building and incorporation into SLU's operational waste streams.

15.0 Quality Assurance Program

Chase operated under a project-specific Quality Assurance Project Plan (QAPP) utilizing the guidelines of MARSSIM Section 9. The QAPP was developed and organized with emphasis given to maximizing worker safety, minimizing/eliminating off-site releases and minimizing overall project costs.

16.0 Survey Instrumentation

16.1 Instrument Calibration

Laboratory and portable field instruments were calibrated within the previous year with National Institute of Standards and Technology (NIST) traceable sources of the nuclides of concern. Portable instrument calibration records are included as Appendix B. Liquid scintillation counter records are maintained in SLU license files.

16.2 Functional Checks

Functional checks were performed at least daily when in use. The background, source check, and field measurement count times for radiation detection instrumentation were specified by procedure to ensure measurements were statistically valid. Background readings were taken as part of the daily instrument check and compared with the acceptance range for instrument and site conditions.

16.3 Determination of Counting Times and Minimum Detectable Concentrations

Minimum counting times for background determinations and measurement of total and removable contamination were chosen to provide a minimum detectable concentration (MDC) that met the DQOs. MARSSIM equations relative to building surfaces have been modified to convert to units of dpm/100cm^2. Count times and scanning rates are determined using the following equations:

16.3.1 Static Counting

Static counting Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is an expansion of NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments

for Various Contaminants and Field Conditions", Table 3.1 (Strom & Stansbury, 1992):

Equation 1

$$MDC_{static} = \frac{3 + 3.29\sqrt{B_r \cdot t_s \cdot (1 + \frac{t_s}{t_b})}}{t_s \cdot E_{tot} \cdot \frac{A}{100cm^2}}$$

Where:

MDC_{static}	= minimum detectable concentration (dpm/100cm^2)
B_r	= background count rate (counts per minute)
t_b	= background count time (minutes)
t_s	= sample count time (minutes)
E_{tot}	= total detector efficiency for radionuclide emission of interest (cpm/dpm)
A	= detector probe area (cm^2)

A typical static MDC calculation for the Ludlum Model 43-68 gas flow proportional detector is shown below:

$$MDC_{STATIC} = \frac{3 + 3.29\sqrt{(500)(0.1)\left(1 + \frac{0.1}{1}\right)}}{(0.1)(0.13)\frac{126}{100}} = 1672 \text{ dpm/100cm}^2$$

16.3.2 Ratemeter Scanning

Scanning Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is a combination of MARSSIM equations 6-8, 6-9, and 6-10:

Equation 2

$$MDC_{scan} = \frac{d'\sqrt{b_i}\left(\frac{60}{i}\right)}{\sqrt{p} \cdot E_{tot} \cdot \frac{A}{100cm^2}}$$

Where:

MDC_{scan} = minimum detectable concentration (dpm/100 cm^2)
d' = desired performance variable (1.38)
b_i = background counts during the residence interval (counts)
i = residence interval (seconds)
p = surveyor efficiency (0.5)
E_{tot} = total detector efficiency for radionuclide emission of interest (cpm/dpm)
A = detector probe area (cm^2)

A typical MDC_{SCAN} calculation for the Ludlum 43-37 gas flow proportional detector is shown below:

$$i = 13.3\,\text{cm} \cdot \frac{\text{inch}}{2.54\,\text{cm}} \cdot \frac{\text{sec}}{80\,\text{inch}} \cdot = 0.065\,\text{sec}$$

$$b_i = 0.065\,\text{sec} \cdot \frac{1000\,\text{counts}}{\text{minute}} \cdot \frac{\text{minute}}{60\,\text{sec}} = 1.08\,\text{counts}$$

$$MDC_{SCAN} = \frac{1.38\sqrt{1.08}\left(\frac{60}{0.065}\right)}{\left(\sqrt{0.5}\right)(0.13)\left(\frac{582}{100}\right)} = 2474\,\text{dpm/100cm}^2$$

16.3.3 Smear Counting

Smear counting Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", Table 3.1 (Strom & Stansbury, 1992):

Equation 3

$$MDC_{smear} = \frac{3 + 3.29\sqrt{B_r \cdot t_s \cdot (1 + \frac{t_s}{t_b})}}{t_s \cdot E}$$

Where:

MDC_{smear} = minimum detectable concentration level (dpm/smear)
B_r = background count rate (counts per minute)
t_b = background count time (minutes)
t_s = sample count time (minutes)
E = instrument efficiency for radionuclide emission of interest (cpm/dpm)

Typical MDC calculations for H-3 and C-14 are shown below.

$$^{3}\text{H MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(12)(1)\left(1+\frac{1}{1}\right)}}{(1)(0.40)} = 48 \text{ dpm}$$

$$^{14}\text{C MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(13)(1)\left(1+\frac{1}{1}\right)}}{(1)(0.80)} = 25 \text{ dpm}$$

These a priori estimates of smear detection capabilities are assigned to each removable contamination measurement.

16.4 Determination of Uncertainty

The uncertainty for each measurement is calculated using equation 6-15 from MARSSIM:

Equation 4

$$\sigma = 1.96\sqrt{\frac{C_{s+b}}{T_{s+b}^{2}} + \frac{C_b}{T_b^{2}}}$$

where:

σ	=	uncertainty
1.96	=	multiplier to achieve a 95% confidence level
C_{s+b}	=	gross sample counts
T_{s+b}	=	sample count time (min.)
C_b	=	gross background counts
T_b	=	Background count time (min.)

16.5 Instrumentation Specifications

The instrumentation used for facility decommissioning surveys is summarized in the following tables. Table 16-1 lists the standard features of each instrument such as probe size and efficiency. Table 16-2 lists the typical operational parameters such as scan rate, count time, and the associated Minimum Detectable Concentrations (MDC).

Table 16-1 Instrumentation Specifications

Detector Model	Detector Type	Detector Area	Meter Model	Window Thickness	Typical 4π Efficiency
Ludlum 43-68	Gas Flow Proportional	126 cm^2	Ludlum 2221	0.4 mg/cm^2	13 % (C-14)
Ludlum 43-37 Floor Monitor	Gas Flow Proportional	582 cm^2	Ludlum 2221	0.4 mg/cm^2	13 % (C-14)
Packard TriCarb	Liquid Scintillation	N/A	N/A	N/A	40% (H-3) 80% (C-14)

Table 16-2 Typical Instrument Operating Parameters and Sensitivities

Measurement Type	Detector Model	Max. Scan Rate[1]	Count Time	Background (cpm)	MDC ($dpm/100cm^2$)
Surface Scans	Ludlum 43-68	20 in./sec.	N/A	500	4,958 (C-14)
Surface Scans	Ludlum 43-37	80 in./sec.	N/A	1000	2,474 (C-14)
Total Surface Activity	Ludlum 43-68	N/A	6 sec.	500 (60 sec.)	1672 (C-14)
Total Surface Activity	Ludlum 43-37	N/A	6 sec.	1000 (60 sec.)	496 (C-14)
Removable Activity	Packard TriCarb	N/A	60 sec.	12 (H-3) 13 (C-14)	48 (H-3) 25 (C-14)

16.6 Efficiency Determination

The ALARA goals are conservatively based on FC 83-23 criteria in which activities are determined using 4π instrument efficiency. MARSSIM protocols for building structures use ISO-7503-1 methodology that takes into account the texture of the surface and the 2π detector efficiency. Under MARSSIM, the default surface efficiency for beta emitters with maximum energies less than 400 KeV is conservatively set at 0.25, resulting in a total efficiency of approximately one half of the 4π efficiency. To reconcile this incongruity and to aid in data management, the 4π calibration efficiency was used to determine field measurement activities. However the calculated dose to demonstrate

[1] Maximum scan rates are based on achieving MDC objectives. Actual scan rates were much slower.

compliance with the facility release criteria for each survey unit was doubled to correct for the ISO 7503-1 surface efficiency. This methodology was chosen because:

- Application of the ISO-7503-1 surface efficiency would significantly impact final status survey time and data quality while providing no credible benefit. The impact would be in the form of slower scanning speeds, longer counting times and magnification of the variability of the natural background radioactivity present in some building materials.
- Structures being surveyed are primarily sheet metal, plastic, glass, vinyl, sheetrock and finished concrete that have smooth surfaces similar to the electroplated calibration source used to determine the 4π instrument efficiency.
- The MARSSIM default surface efficiency is conservatively based on structural surfaces usually encountered in decommissioning projects such as scabbled concrete and not on the structural surfaces usually encountered in a pristine laboratory environment.
- FC 83-23 criteria are not dose-based resulting in extreme conservatism for low energy beta emitters. For example, Co-60 would result in a modeled dose of 17.6 mrem/yr at the FC 83-23 criterion of 5,000 dpm/100 cm^2 (this is equivalent to 2.6E6 dpm/100cm^2 C-14).
- The higher efficiencies apply only to the self-imposed ALARA goals that are orders of magnitude less than the DCGL. All final status dose results presented in this report are corrected to account for the ISO-7503-1 methodology.

17.0 Data Quality Objectives (DQO)

- Static measurements were taken to achieve an MDC_{static} of less than the ALARA goal of 5,000 dpm/100cm^2.
- Scanning was conducted at a rate to achieve an MDC_{scan} of less than 5,000 dpm/100cm^2.
- Removable contamination measurements were counted to achieve an MDC_{smear} of less than 200 dpm/100cm^2.
- Individual measurements were made to a 95% confidence interval.
- Decision error probability rates were set at 0.05 for both α and β.
- The null hypothesis (H_0) and alternate null hypothesis (H_A) are that of NUREG 1505 scenario A:
  H_0 is that the survey unit does not meet the release criteria
  H_A is that the survey unit meets the release criteria
- Quality assurance surveys were conducted at a rate of 5%.
- Characterization and remedial action support surveys were conducted under the same quality assurance criteria as final status surveys such that the data may be used as final status survey data to the maximum extent possible.

18.0 Area Classifications

Based on the results of the historical site assessment and previous survey results, facility areas were classified as impacted or non-impacted.

18.1 Non-Impacted Area

Non-impacted areas are areas without residual radioactivity from licensed activities and were not surveyed during final status surveys. The following areas were classified as non-impacted:

- Structural surfaces above a two meter height
- Building exterior surfaces (except roof surfaces)
- Surface and subsurface soils of outside grounds
- Internal surfaces of positive pressure systems (air, nitrogen, gas, etc.)
- Inaccessible surfaces in renovated areas

Based on personnel interviews, prior to renovation, radiological surveys were performed and surfaces verified free of residual radioactivity prior to renovation. Additionally, the nuclides of concern present only an internal exposure concern and, even if present on surfaces removed or covered during renovation, do not present an exposure concern because there is no credible exposure pathway in the building occupancy scenario. However, SLU requested that floor coverings in one renovated area (Cold Room 111) be removed and the underlying original wooden floor surface surveyed during characterization. Six randomly-selected 12" x 12"ceramic tiles and the underlying material removed to the original wooden surface and a static measurement and smear taken. All results were less than the minimum detectable concentration.

Based on historical operations, a potential existed for residual contamination from spills or tracking on surfaces less than two meters in height. Thorough surveys of building entrances/exits and ventilation exhausts were conducted during characterization to provide adequate assurance that any residual contamination was contained within the building structure. Additionally, all building exhausts were surveyed.

18.2 Impacted Areas

Impacted areas are those areas that have potential residual radioactivity from licensed activities. Impacted areas are subdivided into Class 1, Class 2 or Class 3 areas. Class 1 areas have the greatest potential for contamination and therefore receive the highest degree of survey effort for the final status survey using a graded approach, followed by Class 2, and then by Class 3. Impacted sub-classifications are defined as follows:

18.2.1 Class 1 Area

Areas with the highest potential for contamination, and meet the following criteria: (1) impacted; (2) potential for delivering a dose above the release

criterion; (3) potential for small areas of elevated activity; and (4) insufficient evidence to support classification as Class 2 or Class 3.

18.2.2 Class 2 Area

Areas that meet the following criteria: (1) impacted; (2) low potential for delivering a dose above the release criterion; and (3) little or no potential for small areas of elevated activity.

18.2.3 Class 3 Area

Areas that meet the following criteria: (1) impacted; (2) little or no potential for delivering a dose above the release criterion; and (3) little or no potential for small areas of elevated activity.

18.3 Survey Units

Areas of similar construction and composition were grouped together as survey units and tested individually against the DCGLs and the null hypothesis to show compliance with the release criteria. Survey units are homogeneous in construction, contamination potential, and contamination distribution.

The number of discrete sampling locations needed to determine if a uniform level of residual radioactivity exists within a survey unit does not depend on the survey unit size. However, the sampling density should reflect the potential for small elevated areas of residual radioactivity. Survey units were sized according to the MARSSIM recommended maximum survey unit sizes for building structures, based on floor area of Class 2: 1000 m^2 and Class 3: no limit.

Survey Unit Numbering Protocol

Each survey unit was assigned a unique number consisting of a four digit identifier. The four digit identifier consists of one digit for the elevation, one digit for the classification and two digits as a numerical identifier. Elevation codes are: 1=1st Floor, 2=2nd Floor, R=Roof.

Example:
1201 is first floor, class 2 area number 1
1204 is first floor, class 2 area number 4
1301 is first floor, class 3 area number 1

Survey unit classifications and designations are listed in tabular format in Table 18-1. Survey unit designations are presented graphically on the building floor plans presented in Appendix C.

Table 18-1 Building Structural Survey Units

Survey Unit	Class	GSF
1301	3	8,412
1201	2	6,153
1202	2	2,722
1203	2	4,085
1204	2	300
1205	2	2,346
2201	2	2,590
R301	3	24,084

Building systems survey units were arranged by system type. There are three types of systems – ventilation, vacuum and drain. Each system survey unit encompasses all of a certain type within the building. The building system survey units are presented in Table 18-2.

Table 18-2 Building Systems Survey Units

System	Description	Survey Unit
Ventilation	Fume hood and general exhaust ventilation ducts, fans and stacks	VE01
Vacuum	Laboratory vacuum nozzles, piping, pumps and accumulators	VA01
Drain	Sink, fume hood and floor drains, piping and neutralization pit	DR01

19.0 Characterization Surveys

The survey protocol for building surfaces consisted of performing the scanning portion of the final status survey protocol, with judgmental smears and static measurements on the highest probability areas for residual radioactivity. Judgmental static measurements and smears were also taken on vertical surfaces as part of the Class 2 and Class 3 final status survey protocols described in section 21.3.5.

The purpose of scanning was to identify locations of elevated activity. The minimum scan percentages are presented in section 21.2. Scanning was performed by moving the probe over surfaces at a distance of approximately one centimeter and at a rate less than the maximum allowable scan rate necessary to achieve DQOs. Where elevated activity was identified, the surveyor stopped and re-scanned the suspect area at a slower rate to determine if the elevated activity was sustained. Where a sustained increase in the audible response was identified, a static measurement and smear were taken at the location of highest activity and the boundary of the elevated area was marked to aid in locating the area for remedial actions. Based on contamination potential, at least ten locations on

vertical surfaces in each survey unit were judgmentally selected to perform a static measurement and removable contamination measurement.

The survey protocol for building system surveys consisted of performing removable contamination measurements of internal surfaces of ventilation, vacuum and drain systems. The percentage of systems surveyed was consistent with the final status survey protocols contained in this report.

Each survey unit was surveyed under an independent survey package that contained specific survey instructions. The survey packages contained, at a minimum:

- Survey Unit number (e.g., Building and Room Number, System Number, etc.)
- Percentage of surfaces requiring scan surveys
- Number of total and removable contamination measurements required
- Instrumentation to be used with static count times and scan rates
- Maps of the survey unit surfaces
- Any additional specific survey instruction

If the initial characterization survey results indicated that contamination was not present in excess of the ALARA goals, then data from the survey was used as part of the final status survey. For areas that were partially contaminated, the characterization survey data was used as part of the final status survey provided that 1) the data used was only from areas with contamination levels below the ALARA goals, and 2) decontamination work was controlled such that areas could not have become cross-contaminated.

Instrument operating parameters and methodologies were established to meet the DQOs. Additionally, investigation levels were developed to verify the assumptions for classifying survey units. If these investigation levels were exceeded, an investigation was performed to verify the initial assumptions behind the classification and determine the appropriate resolution. The established investigation levels are summarized in Table 17-1.

Table 19-1 Survey Investigation Levels

Survey Unit Classification	Flag Direct Measurement or Sample Result When:	Flag Scanning Measurement Result When:	Flag Removable Measurement Result When:
All	>5,000 dpm/100cm^2	>5,000 dpm/100cm^2	> 200 dpm/100cm^2 in any channel

20.0 Remediation

20.1 Remediation Activities

Remediation methods included simple decontamination (i.e. wet wiping with a mild detergent) and removal of contaminated material by dismantling systems and structures. Cutting consisted of the use of reciprocating saws and high leverage shears. Where it was likely that radioactive materials had migrated to inaccessible areas, such as behind or under casework, dismantlement was performed as necessary to assess activity levels. All areas of elevated activity due to residual radioactivity were remediated for ALARA purposes, even if activity levels were below the ALARA goals. SLU remediated all removable activity to less than 200 dpm/100cm^2 to be consistent with operational contamination limits. Remediation performed on structural surfaces and systems are summarized in Table 20-1 and Table 20-2.

Table 20-1 Remediated Surfaces and Structures

Survey Unit	Location/ (Size in ft^2)	Maximum Activity (dpm/100cm^2)		Remediation Method	Post-Remediation Maximum Activity (dpm/100cm^2)	
		Total	Removable		Total	Removable
1201	Room 190 floor (4)	3,646	1 – ^{3}H 3 – ^{14}C	Scraped paint	2,148	3 – ^{3}H 4 – ^{14}C
1201	Room 174 sink (1)	37,646	27 – ^{3}H 7 – ^{14}C	Removed drain flange and wiped sink	10	27 – ^{3}H 29 – ^{14}C
1201	Room 188C drawer (2.5)	7,745	19 – ^{3}H 9 – ^{14}C	Removed drawer	N/A	N/A
2201	Room 209 fume hood interior (1)	12,183	54 – ^{3}H 47 – ^{14}C	Scrubbed, scoured and wiped	2,287	13 – ^{3}H 0 – ^{14}C
2201	Room 209 fume hood interior (2)	9,373	8 – ^{3}H 8 – ^{14}C	Scrubbed, scoured and wiped	594	19 – ^{3}H 3 – ^{14}C

Table 20-2 Remediated Systems

Survey Unit	Location	Maximum Activity (dpm/100cm^2)		Remediation Method	Post-Remediation Maximum Activity (dpm/100cm^2)[2]	
		Total	Removable		Total	Removable
VA01	Room 103 vacuum nozzle	N/A	588 – ^{3}H 0 – ^{14}C	Removed Nozzle	N/A	48 – ^{3}H 0 – ^{14}C
VA01	Room 207 vacuum nozzle	N/A	1153 – ^{3}H 0 – ^{14}C	Removed Nozzle	N/A	53 – ^{3}H 8 – ^{14}C
VA01	Room 208 vacuum nozzle	N/A	809 – ^{3}H 9 – ^{14}C	Removed Nozzle	N/A	10 – ^{3}H 0 – ^{14}C
DR01	Room 188B drain trap	N/A	257 – ^{3}H 505 – ^{14}C	Removed Trap	N/A	22 – ^{3}H 3 – ^{14}C

20.2 Remedial Action Surveys

Remediation was conducted to control the spread of contamination and keep personnel exposures ALARA. Remedial action surveys were conducted in support of remediation activities to help determine when an area was ready for a final status survey and to provide updated estimates for final status survey planning. Remedial action surveys served to monitor the effectiveness of decontamination efforts and to ensure that surrounding areas were not cross-contaminated from remediation actions.

Remedial action surveys consist of scan surveys, direct measurements and removable contamination measurements. These were conducted following remediation activities to establish the success or failure of decontamination efforts. Results of the survey were the decision basis for continued remediation or conduct of final status surveys. Remedial action surveys were designed to meet the objectives of the final status surveys and, to the extent allowed by MARSSIM, the results of the remedial action surveys were used to supplement the final status survey.

21.0 Design and Performance of Final Status Surveys

Final status surveys were performed using the Data Quality Objective (DQO) process to demonstrate that residual radioactivity in each survey unit satisfied the predetermined criteria for release for unrestricted use. Final status surveys were conducted by performing the appropriate combination of scan surveys, total activity measurements and removable activity measurements as discussed further in this section. All final status surveys were performed according to survey package instructions. Survey data were documented on survey maps and/or associated data information sheets.

[2] Where system piping/ducts were removed, post remediation results are for the remaining portions.

21.1 Background Determination

The use of reference background areas or paired background comparisons was not necessary. Material and ambient background values were not significant in comparison to the DCGLs or ALARA goals. For direct measurements, an ambient background was determined for each survey, was subtracted from gross measurements, and was used to calculate the actual survey MDCs and associated count errors. Material-specific background determinations were not performed. For smears, the LSC performed automatic background subtractions.

21.2 Surface Scans

Scanning was used to identify locations within the survey unit that exceed the investigation level. Table 21-1 summarizes the minimum scan percentage of accessible building structural surfaces based on classification.

Table 21-1 Scan Survey Coverage by Classification

Structure	Class 1	Class 2	Class 3
Floors	100%	75%	25%
Fume Hoods	100%	100%	N/A
Other Structures	100%	50%	10%

For surfaces that received less than 100% scan survey, the surfaces scanned were those with the highest potential to contain residual radioactivity at the discretion of the surveyor. The percentage of survey area scanned was, in some cases, increased based on suspected or actual elevated activity. If elevated activity was identified in excess of the ALARA goals, an evaluation was made regarding the decision to upgrade an area. If the contamination was confined to a single confined area, then that area received additional scans (100%). Floor areas near building entrances and exits received a 100% scan survey regardless of the area classification.

If elevated activity was detected during the scan surveys, then the location was marked and total and removable surface activity measurements were taken to quantify the activity. However, these total surface activity measurements were in addition to the static measurements required for the Sign test.

21.3 Total Surface Activity Measurements

Direct surveys (static measurements) for total surface activity were taken on building surfaces in impacted areas utilizing instrumentation of the best geometry based on the surface at the survey location. Additionally, locations of elevated activity identified and marked during the scan survey received direct survey measurements. Static measurements were taken in impacted areas at each identified sample location. Scaler count times were determined to achieve the detection sensitivities stated in the DQOs.

Field measurements were converted to activity concentrations using the following equation:

Equation 5

$$\text{Activity}\,(\text{dpm}/100\text{cm}^2) = \frac{cpm_{sample} - cpm_{background}}{E_{total} \cdot \frac{A}{100cm^2}}$$

21.3.1 Determining the Number of Samples

The minimum number of samples required for the Sign Test was calculated using equations in Section 5 of MARSSIM. A conservative estimate of the standard deviation of total surface activity measurements (2500 dpm/100cm^2) was used. The LBGR was set at one half of the DCGL. The calculations performed to determine the required number of samples is provided below.

21.3.2 Determination of the Relative Shift

The number of required samples depends on the ratio involving the activity level to be measured relative to the variability in the concentration. The ratio to be used is called the Relative Shift, Δ/σ_S, and is defined in MARSSIM as:

Equation 6

$$\Delta / \sigma_S = \frac{DCGL - LBGR}{\sigma_S}$$

Where:

DCGL = derived concentration guideline level (dpm/100cm^2)
LBGR = concentration at the lower bound of the gray region. The LBGR is the average concentration to which the survey unit should be cleaned in order to have an acceptable probability of passing the test (dpm/100cm^2)
σ_S = an estimate of the standard deviation of the residual radioactivity in the survey unit (dpm/100cm^2)

The actual calculation is provided below:

$$\Delta / \sigma_S = \frac{3.7E6 - 1.85E6}{2500} = 740$$

Since MARRSIM Table 5.5 does not include relative shifts above 3 and the number of samples required decreases with an increasing relative shift, the relative shift was conservatively set at 3.

21.3.3 Determination of Acceptable Decision Errors

A decision error is the probability of making an error in the decision on a survey unit by failing a unit that should pass (β decision error) or passing a unit that should fail (α decision error). MARSSIM uses the terminology α and β decision errors; this is the same as the more common terminology of Type I and Type II errors, respectively. The decision errors are 0.05 for Type I errors and 0.05 for Type II errors.

21.3.4 Determination of Number of Data Points (Sign Test)

The number of direct measurements for a particular survey unit, employing the Sign Test, is determined from MARSSIM Table 5.5, which is based on the following equation (MARSSIM equation 5-2):

Equation 7

$$N = \frac{\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2}{4\left(SignP - 0.5\right)^2}$$

Where:

N = number of samples needed in the survey unit
$Z_{1-\alpha}$ = percentile represented by the decision error α
$Z_{1-\beta}$ = percentile represented by the decision error β
SignP = estimated probability that a random measurement will be less than the DCGL when the survey unit median is actually at the LBGR

Note: SignP is determined from MARSSIM Table 5.4

MARSSIM recommends increasing the calculated number of measurements by 20% to ensure sufficient power of the statistical tests and to allow for possible data losses. MARSSIM Table 5.5 values include an increase of 20% of the calculated value. The approach for this project was to predetermine a number of samples to be applied to all survey units. This approach provides sufficient power for the statistical test while streamlining the survey planning process. The following calculations were made to determine this number:

$$N = \frac{\left(1.645 + 1.645\right)^2}{4\left(0.998650 - 0.5\right)^2} = 11$$

$Z_{1-\alpha}$ and $Z_{1-\beta}$ are equal to 1.645 using the error rate of 0.05 from MARSSIM Table 5.2. SignP is equal to 0.998650 from MARSSIM Table 5.4. Adding an additional 20% to account for data losses resulted in a value of 14.

Therefore, the determined number of samples per survey unit for the final status surveys for planning purposes was **14**.

21.3.5 Determination of Sample Locations

Determination of Class 2 survey unit sample locations is accomplished by first determining sample spacing and then systematically plotting the sample locations from a randomly generated start location. The random starting point of the grid provides an unbiased method for obtaining measurement locations to be used in the statistical tests. A square grid is used in this survey design. The use of a systematic grid allows the decision-maker to draw conclusions about the size of potential areas of elevated activity based on the area between measurement locations. Class 3 survey locations are determined from computer selected randomly generated x and y coordinates. Survey protocols for all areas are summarized in Table 21-2.

Table 21-2 Survey Sample Placement Overview

Survey Unit Classification		$DCGL_w$ Comparison	Elevated Measurement Comparison	Measurement Locations
Impacted	Class 2	Yes	N/A	Systematic Random
	Class 3	Yes	N/A	Random
Non-Impacted		None	None	None

In laboratory areas, permanent counter tops and other horizontal surfaces that block floor surfaces were included as a replacement to the blocked floor surface. Likewise, fixed cabinetry faces and other permanent equipment were used to replace blocked wall surfaces. Internal surfaces of permanent furnishings (i.e., drawer or cabinetry interior surfaces) were not included in the systematic measurement location placement. However, these surfaces were included in the scan surveys. Additional total surface activity measurements were collected at each area of elevated activity identified during the scan surveys.

21.3.5.1 Determining Sample Locations

Class 2 and Class 3 survey units generally consist of many rooms. Representing each room in a "fold-out" view to show all surfaces is difficult and time-consuming. The process to identify, map and locate measurement coordinates in survey units with many rooms is complicated due to the noncontiguous nature of the survey unit once walls are "folded-out".

For the reasons above, the MARSSIM sample measurement locations (i.e., random static and wipe measurements) for Class 2 and Class 3 survey units were determined only on horizontal surfaces as determined on floor plans. This protocol increases the sample density on the surfaces with the highest probability for residual contamination (floors, benchtops, fume hood working surfaces, etc.). The appropriate percentage of all survey unit surfaces (including vertical surfaces) were scanned according to the survey unit classification.

As part of characterization, the survey technician judgmentally selected locations with the highest probability of contamination on vertical surfaces for a static measurement and smear, such as light switches, door knobs, door pulls, push plates, and other locations. These measurements were in addition to and were not included in the statistical analysis of the locations selected by MARSSIM protocols.

Determining Class 2 Sample Locations

In Class 2 survey units, the sampling locations were established in a unique pattern beginning with the random start location and the determined sample spacing. After determining the number of samples needed in the survey unit, sample spacing was determined from MARSSIM equation 5-8:

Equation 8

$$L = \sqrt{\frac{A}{N}} \text{ for a square grid}$$

Where:

L = sample spacing interval
A = the survey unit floor area
N = number of samples needed in the survey unit

Maps were generated of the survey unit's permanent horizontal surfaces included in the statistical tests. A random starting point was determined using computer-generated random numbers coinciding with the x and y coordinates of the total survey unit. A grid was then plotted across the survey unit surfaces based on the random start point and the determined sample spacing. A measurement location was plotted at each intersection of the grid plot.

Determining Class 3 Sample Locations

For Class 3 areas, maps were generated of the survey unit horizontal surfaces. Sample locations were determined using computer generated random x and y coordinates for each sample location. Each location was then plotted on the applicable survey map.

Maps of final status survey locations for all survey units are included in Appendix D.

21.4 Removable Contamination Measurements

Removable contamination measurements were collected by wiping an area of approximately 100 cm^2 on structural surfaces and inside building systems. The smears/swabs were counted to achieve the detection sensitivities stated in the DQOs. The

liquid scintillation counter (LSC) was setup for dual label counting with background subtraction (net dpm) for ^{3}H and ^{14}C.

21.5 Surveys of Building Mechanical System Internals

Surveys of various building system components were performed. Survey design for these systems is out of the scope of MARSSIM. For the purposes of identifying potential residual contamination within these systems, a survey protocol was established and is presented in the following sections.

21.5.1 Ventilation Systems

Surveys of building ventilation and fume hood ventilation systems consisted of removable contamination measurements of accessible ventilation exhaust points and at locations of potential collection or buildup. The frequency of the survey effort depended on the classification of the surrounding area. Ventilation system survey requirements are summarized in Table 21-3.

Table 21-3 Ventilation System Survey Requirements

Component	Classification of Area in Which Components Exist	Survey Requirements	
		Scan Surveys	Static (Total Activity) and Removable Activity Measurements
Exhaust ducts	Class 2	100% scan survey of accessible[1] internal surfaces of 100% of fume hood and 50% of general exhaust duct openings	At least one static measurement on the accessible[1] internal surfaces of 100% of fume hood and 50% of general exhaust duct openings
	Class 3	100% scan survey of accessible[1] internal surfaces of at least 10% of general exhaust duct openings	At least one static measurement taken on the accessible[1] internal surfaces of 10% of exhaust duct openings
Collection points within ventilation exhaust fan units	All	100% scan survey of accessible[1] internal surfaces of all applicable ventilation fan units	At least one static measurement taken on each internal surface of each accessible[1] opening on the units

[1] Within reach of duct or component opening

21.5.2 Vacuum Systems

Surveys of building vacuum system internals consisted of removable contamination measurements of accessible vacuum inlet points. Scan surveys and static measurements were not practical due to the small geometry of the vacuum inlet points. Additionally, surveys of potential collection points were performed. The frequency of the survey effort was dependent on the classification of the surrounding area. Vacuum system survey requirements are summarized in Table 21-4.

Table 21-4 Vacuum System Survey Requirements

Component(s)	Classification of Area in Which Components Exist	Survey Requirements	
		Scan Surveys and Static (Total Activity) Measurements	Removable Contamination Measurements
Vacuum system inlets	Class 2	N/A[1]	At least one smear on the internal surfaces of 100% of vacuum inlet points
	Class 3	N/A[1]	At least one smear on the internal surfaces of 10% of vacuum inlet points
Collection points within vacuum system pumps, accumulators and filtration components	All	N/A[1]	At least one smear on the internal surfaces of all accessible locations within the vacuum system pumps, accumulator(s) and filtration points.

[1] Scan surveys and static measurements are not practical for these locations due to the small geometry of the openings.

21.5.3 Drain Systems

Surveys of building drain system internals consisted of surveys of accessible sink drains, sink drain traps, floor drains and collection points such as sumps. Removable contamination surveys of sink drains, sink drain traps and floor drains were collected because scan surveys and static measurements are not practical due to their small geometry. The frequency of the survey effort was dependent on the classification of the surrounding area. Drain system survey requirements are summarized in Table 21-5.

Table 21-5 Drain System Survey Requirements

Component(s)	Classification of Area in Which Components Exist	Survey Requirements	
		Scan Surveys and Static (Total Activity) Measurements	Removable Contamination Measurements
Drain system inlets	Class 2	N/A[1]	At least one smear on the internal surfaces of 100% of sink drains, sink drain traps and floor drains.
	Class 3	N/A[1]	At least one smear on the internal surfaces of 10% of sink drains, sink drain traps and floor drains.
Drain system neutralization tank	All	Scan surveys, total surface activity measurements and removable contamination measurements of accessible surfaces of neutralization tank.	

[1] Scan surveys and static measurements are not practical for these locations due to the small geometry of the drain system inlets.

21.6 Data Validation

Field data were reviewed by the Project Manager and validated to ensure:

- Completeness of forms
- Proper types of surveys were performed
- The MDCs for measurements met the established data quality objectives
- Independent calculations were performed on a representative sample of data sheets
- Satisfactory instrument calibrations and daily functionality checks were performed as required

Additionally, all final status survey data were entered into the Final Status Survey Database. This provided the means to sort survey data, verify activity calculations, and to compute the associated MDC and counting errors. Once data entry for a survey unit was complete, a verification report was printed and compared to original data sheets to ensure correct data entry.

21.7 Survey Documentation

A survey package was developed for each survey unit containing the following:

- Survey Instruction Sheets
- General survey requirements

- Instrument requirements with associated MDCs, count times and scan rates
- Overview maps detailing survey locations and placement methodology
- Survey Data Sheets
- Signature of Data Collector and Reviewer

To ensure proper data management and organization, a unique location code system was used so that survey data could be properly entered and organized in the Final Status Survey Database. A breakdown of the location code and specific code components are provided in Table 21-6.

Table 21-6 Location Code Description

A unique location code was assigned to each individual survey location to ensure proper data management of the survey results. The following format was used to ensure consistency throughout the final status survey process:

BBB-RRRR-SS-M-LLL

Where:

BBB:	Building Code. This field represents the building number. (3 characters)
RRRR:	Survey Unit Number. This is the assigned survey unit number. (4 characters)
SS:	Structural Surface Code. This field represents the structural surface such as floor, wall, ceiling, etc. (2 characters) B1 = Benchtop D1 = Fumehood Drains D2 = Floor Drains D3 = Sink Drains D4 = Other Drains F1 = Floor H1 = Fume Hood O1 = Other Structures R1 = Roof V1 = Hood Vent or Vacuum Nozzle V2 = General Ventilation or Vacuum System Component V3 = Ventilation Components S1 = Sink
M:	Structural Material Code. This field represents the type of structural material on which a particular measurement is taken. (1 character) C = Concrete E = Epoxied Concrete M = Miscellaneous (wood, plastic, metal) R = Rug/Carpet T = Ceramic Tile X = Composite Countertop
LLL:	Numerical Identifier. This field represents the survey location number. The field "001" means survey point location number 1. Numerical identifiers are unique within a survey unit. (3-characters)

22.0 Data Quality Assessment and Interpretation of Survey Results

The statistical guidance contained in Section 8 of MARSSIM was used to determine if areas are acceptable for unrestricted release and whether additional surveys or sample measurements were required.

22.1 Preliminary Data Review

A preliminary data review was performed for each survey unit to identify any patterns, relationships or anomalies. Additionally, measurement data were reviewed and compared with the DCGLs and investigation levels to confirm the correct classification of survey units. All calculations of means, standard deviations, minimum and maximum values and comparisons between survey data and investigation levels are presented in the following tables. Total beta surface activity reports for each survey unit are included as Appendix E[3]. Reports for building systems surveys are presented in Appendix F.

Table 22-1 Structural Surfaces Total Beta Surface Activity DQA

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)						
1201	13	61	1,178	334	-583	477	5,000	NO
1202	14	-280	1,316	402	-901	371	5,000	NO
1203	29	355	1,226	554	-583	1,697	5,000	NO
1204	15	81	159[4]	121	-72	453	5,000	NO
1205	17	341	1,082	772	-367	2,318	5,000	NO
1301	13	273	1,127	318	-265	1,007	5,000	NO
2201	20	127	1,118	406	-475	1,126	5,000	NO
R301	14	136	363[4]	139	-116	349	5,000	NO

[3] For all results presented in Appendices E, F and G: results greater than MDC are presented in bold type.
[4] The static measurement MDCs for Survey Units 1204 and R301 are drastically different than the other survey units because measurements were taken with 43-37 probes vs. a 43-68 probes and the count time for survey unit 1204 was 1 minute vs. 0.1 minutes.

Table 22-2 Structural Surfaces Removable ^{3}H Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)					
1201	13	11	7	4	30	200	NO
1202	14	10	5	0	17	200	NO
1203	29	1	1	0	5	200	NO
1204	15	17	7	4	27	200	NO
1205	17	12	7	0	24	200	NO
1301	13	9	7	0	26	200	NO
2201	20	18	5	6	26	200	NO
R301	14	8	10	0	33	200	NO

Table 22-3 Structural Surfaces Removable ^{14}C Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)					
1201	13	1	2	0	9	200	NO
1202	14	2	2	0	8	200	NO
1203	29	1	1	0	5	200	NO
1204	15	1	1	0	5	200	NO
1205	17	0	1	0	3	200	NO
1301	13	2	3	0	8	200	NO
2201	20	0	1	0	5	200	NO
R301	14	4	4	0	13	200	NO

Table 22-4 Systems Total Beta Surface Activity DQA

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)						
DR01	4	1,629[5]	1,109	171	1,435	1,849	5,000	NO
VA01	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VE01	3	48	1,096	107	-72	134	5,000	NO

Table 22-5 Building Systems Removable ^{3}H Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)					
DR01	122	11	8	0	31	200	NO
VA01	238	14	17	0	134	200	NO
VE01	98	10	7	0	25	200	NO

Table 22-6 Building Systems Removable ^{14}C Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross cpm/100 cm^2)					
DR01	122	2	3	0	11	200	NO
VA01	238	2	8	0	111	200	NO
VE01	98	3	4	0	16	200	NO

22.2 Determining Compliance for Building Surfaces and Structures

Survey results were initially compared to the investigation levels. All total and removable activity results on building structural surfaces were less than the investigation levels.

The Sign test is used to determine the minimum number of sample locations. Because all measurements are less than the DCGL, all survey units pass the Sign Test. Therefore, the null hypothesis can be rejected and all survey units meet the release criterion and are suitable for release for unrestricted use.

[5] All static measurements on the drain system were performed in a concrete vault. Elevated activity is likely due to naturally-occurring radioactive materials in the structural concrete.

The results of the data quality assessment and calculations of the dose from each structural surface survey unit are presented in Table 22-7.

Table 22-7 Structural Surfaces Total Beta Surface Activity Dose Calculations

Survey Unit	Standard Deviation (dpm/100 cm^2)	# Samples Required	# of Samples	Adequate # of Samples?	Mean (dpm/100 cm^2)	Calculated Annual TEDE[6] (mrem/yr)
1301	334	11	13	YES	61	8.2E-04
1201	402	11	14	YES	-280	-3.8E-03
1202	554	11	29	YES	355	4.8E-03
1203	121	11	15	YES	81	1.1E-03
1204	772	11	17	YES	341	4.6E-03
1205	318	11	13	YES	273	3.7E-03
2201	406	11	20	YES	127	1.7E-03
R301	139	11	14	YES	136	1.8E-03
					Maximum:	4.8E-03

22.3 Determining Compliance for Building Systems

Survey results were initially compared to the investigation levels. All total and removable activity results on building structural surfaces were less than the investigation levels. Therefore, all systems survey units meet the release criteria and are suitable for release.

23.0 Quality Assurance Surveys

Quality assurance surveys consisted of re-performing the FSS protocol scans, static measurements and smears to achieve a minimum of 5% duplication. Areas were selected to randomly sample all indoor structural surface survey units. The locations of QA static and removable measurements are presented in Table 23-1. All QA survey results were similar to FSS results and the conclusions were the same.

[6] The TEDE shown is calculated by multiplying 25 mrem/yr by the ratio of the mean total surface activity to the C-14 DCGL of 3.7E6 dpm/100cm^2 and then multiplying by 2 to account for the ISO 7503-1 surface efficiency. See Section 16.6 for a discussion of efficiency determinations.

Table 23-1 QA Survey Locations

QA Survey Location	Survey Unit	FSS Location
1	1201	1
2	1201	4
3	1202	3
4	1202	7
5	1203	1
6	1203	2
7	1204	16
8	1204	3
9	1205	15
10	1205	9
11	1205	10
12	1301	6
13	1301	2
14	1301	9
15	2201	6
16	2201	4

23.1 QA Survey Results

The conclusions reached based on QA surveys would be the same as those based on the initial surveys. QA survey results are presented in Appendix G and are summarized in the tables below.

Table 23-2 QA Survey Building Structural Surfaces Total Activity Summary

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		($dpm/100\ cm^2$)						
QA01	16	32	388	142	-258	207	5,000	NO

Table 23-3 QA Survey Building Structural Surfaces Removable ^3H Summary

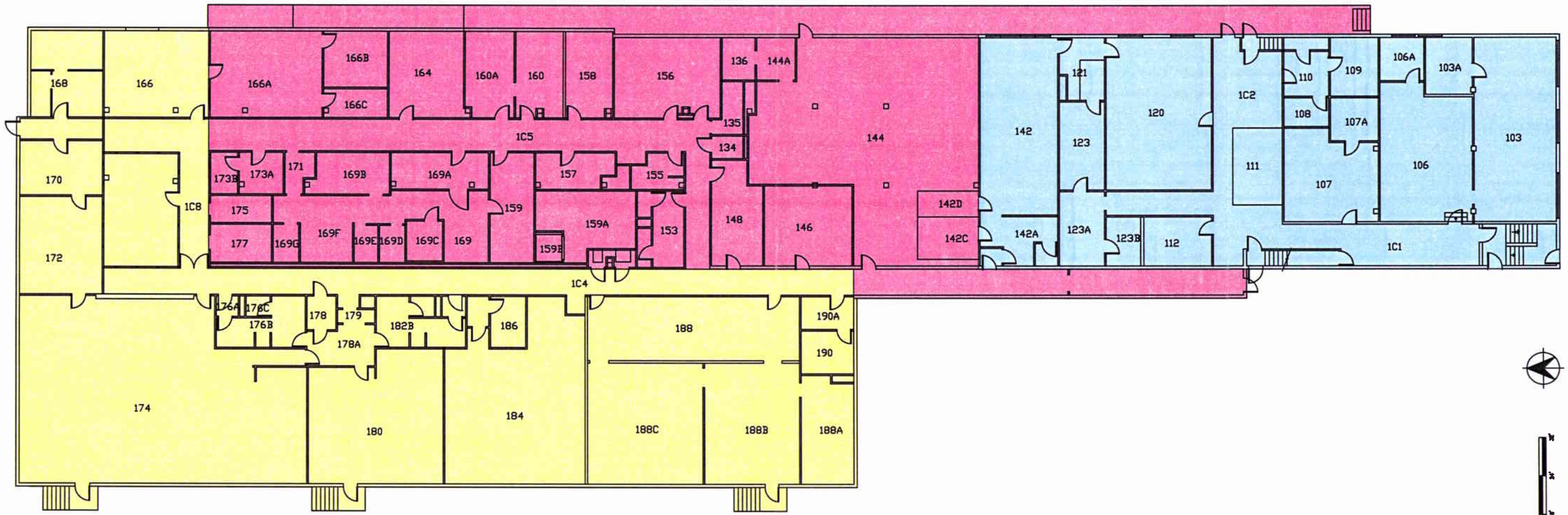
Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		($dpm/100\ cm^2$)					
QA01	16	11	6	4	23	200	NO

Table 23-4 QA Survey Building Structural Surfaces Removable ^{14}C Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)					
QA01	16	2	3	0	10	200	NO

24.0 References

- NRC Regulations 10 CFR 20 Subpart E
- NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM)
- NUREG-1505, "A Nonparametric Statistical Methodology for the Design and Analysis of Final Decommissioning Surveys"
- NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions"
- NUREG 1757, Volume 1 "Consolidated NMSS Decommissioning Guidance," September, 2002
- USNRC Policy and Guidance Directive FC 83-23, "Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source, or Special Nuclear Material Licenses."
- ISO-7503-1, "Evaluation of Surface Contamination – Part 1: Beta Emitters and Alpha Emitters." 1988
- Institute for Molecular Virology Site Decommissioning Work Plan
- Institute for Molecular Virology Site Decommissioning Quality Assurance Project Plan
- Institute for Molecular Virology Site Decommissioning Health and Safety Plan
- Saint Louis University Radioactive Materials License Number 24-00196-07

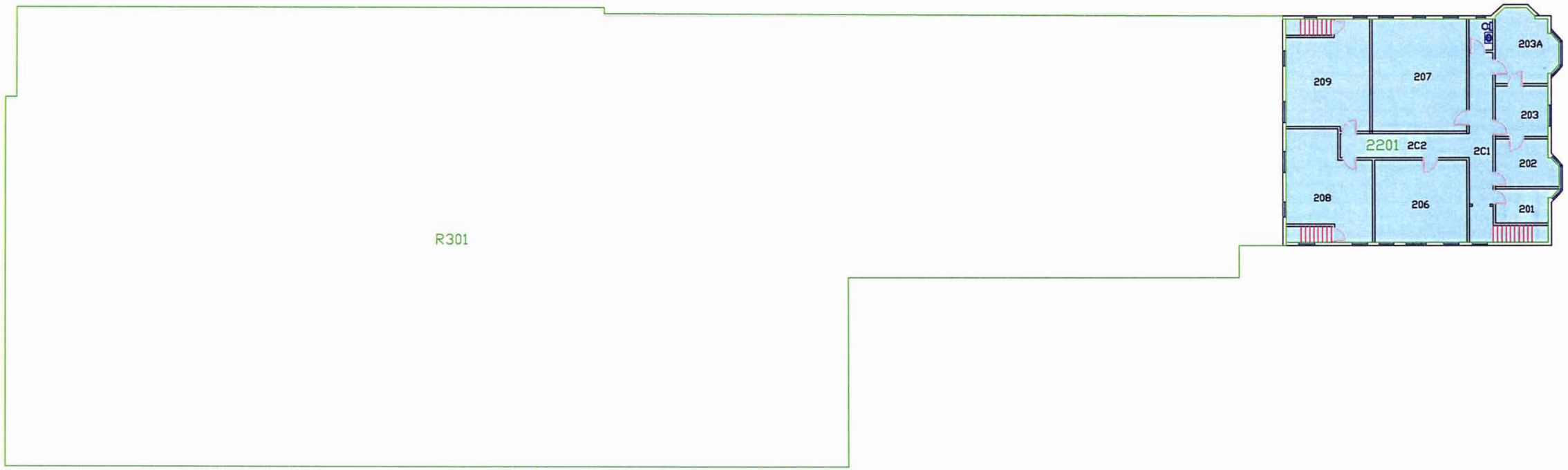


Original Building

1968 Addition

1971 Addition

St. Louis University Institute for Molecular Virology Final Status Survey Report	
Appendix A, Facility Layout: 1st Floor	Page: A.1 of A.2



Original Building

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GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2221 SERIAL# 126523

Owner: GI

DATE: 06/10/08 LOCATION: Griffin Inst

TECH: Joanne Glenn DATE LAST CAL EXPIRES: 08/12/07

Reason For Calibration: (•) Due For Calibration ( ) Repair (See Remarks)

( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: M-500 SERIAL #: 114512 CAL. DUE: 12/20/08

MODEL: SERIAL #: CAL DUE:

☑ Fast/Slow Switch working properly ☑ Audio Response ☑ Geotropism CABLE LENGTH 5'

CONDITION: Sat AF MECHANICAL ZERO: 0 AL MECHANICAL ZERO: 0

NEW BATTERIES: (•) Yes ( ) No BATTERY CHECK: 6.2 V

HV	AS FOUND HV	AS LEFT HV
600 V:	602	585
1200 V:	1218	1206
1800 V:	1821	1799

AF INPUT SENSITIVITY (mV): 10 AL INPUT SENSITIVITY (mV): 10

RATE METER / SCALER

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100		0.0%	A.F.					
	250	250		0.0%	A.F.		251	0.4%	A.F.	
	400	400		0.0%	A.F.					
x1 or x10	1000	1000		0.0%	A.F.					
	2500	2500		0.0%	A.F.					
	4000	4000		0.0%	A.F.					
x10 or x100	10K	10	K	0.0%	A.F.					
	25K	25	K	0.0%	A.F.					
	40K	40	K	0.0%	A.F.					
x100 or x1000	100K	100	K	0.0%	A.F.					
	250K	250	K	0.0%	A.F.					
	400K	400	K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

LOG SCALE

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR
Log	200	200		0.0%	A.F.	
	2000	2000		0.0%	A.F.	
	20K	20	K	0.0%	A.F.	
	200K	200	K	0.0%	A.F.	

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

GRIFFIN INSTRUMENTS

SERIAL # 126523
06/10/08

Audio Divide:	(•) Sat ( ) Unsat	**Push Buttons:**	(•) Sat ( ) Unsat
Lamp:	(•) Sat ( ) Unsat	**Scaler/Digital:**	(•) Sat ( ) Unsat

Remarks:

Does Instrument Meet Final Acceptance Criteria?: (•) Yes ( ) No

Calibration Sticker Attached?: (•) Yes ( ) No

Date Instrument is Due For Next Calibration: 06/10/09

Performed/Reviewed by: Joanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-68 PROBE # PR103613

Owner: GI

DATE: 06/10/08 **LOCATION:** Griffin Inst

TECH: Joanne Glenn **DATE LAST CAL EXPIRES:** 01/14/09

REASON FOR CALIBRATION:

○ Due For Calibration ○ Repair (See Remarks) ◉ Other (See Remarks) ○ Due and Repair

CABLE LENGTH: 5' **INPUT SENSITIVITY:** 4 mV

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL:	2221	**SERIAL #:**	126523	**CAL. DUE:**	06/10/09
MODEL:		**SERIAL #:**		**CAL. DUE:**	

NIST TRACEABLE SOURCES USED

SOURCE #:	2695-00	**SOURCE #:**	PX 726
ISOTOPE:	Tc99 Ni	**ISOTOPE:**	C14
ACTIVITY(dpm):	18400	**ACTIVITY:**	48,780 dpm
ASSAY DATE:	03/01/00	**ASSAY DATE:**	01/21/08

Condition: ◉ Sat ○ Unsat **Efficiency from last cal.:** **Pu:** **Tc Ni:**

Th: **C-14:**

	HV	Vernier
Setpoints from last cal.:	N/A	N/A

Source	Alpha Response CPM	Beta Response CPM	
Background:			
Pu-239:			**A-B XTLK:**
Tc-99 NI:			**B-A XTLK:**
As Found Efficiencies Pu, Tc:			
Th-230 / C-14	/		/
Background:			
Pu-239:			**A-B XTLK:**
Tc-99 Ni:			**B-A XTLK:**
As Left Efficiencies Pu, Tc: (Used for repairs)			
Th-230 / C-14	/		/

Is as found efficiency within 20% of the efficiency from the last cal? ○ Yes ◉ No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks.

GRIFFIN INSTRUMENTS

PROBE #: PR103613
Date: 06/10/08

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
1550		4617	24.5%					101		
1600		6094	32.3%					149		
1650		6884	36.2%					225		
1700		6947	36.3%					260		
1750		7128	37.4%					252		
1800		7348	38.2%					323		

Alpha / Beta Bkg (cpm) 251

HV / Vernier		**Pu-239**	**Tc-99 Ni**	**Tc-99 SS**	**Th-230**	**C-14**	**Sr-90**
1750	**CPM:**		7295	9632		7551	4594
	4 pi AL Efficiencies:		**38.28%**	**25.15%**		**14.97%**	**43.42%**
	2 pi AL Efficiencies:		***61.25%***	***40.26%***		***39.12%***	***62.10%***

Other NIST sources: Th-230 Source #99TH470-1815 4/11/06 30,000 dpm Pu-239 Source #2696-00 7/18/06 18,500dpm
Tc-99 on Stainless Steel Source #99TC470-1814 8/3/99 37,300 dpm, Sr90 Source #2697-00 3/1/00 12,200 dpm

REMARKS: Previously calibrated with a dual box. Calibrated w2221 #126523.

Does Instrument Meet Final Acceptance Criteria?: (•) Yes ( ) No

Calibration Sticker Attached?: (•) Yes ( ) No

Date Instrument is Due For Next Calibration: **06/10/09**

Performed/Reviewed by: Joanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

2 pi efficiencies denoted in italics.

Calibrations performed to ANSI N323A-1997 standards.

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2221 SERIAL# 183997

Owner: GI

DATE: 06/10/08 **LOCATION:** Griffin Inst

TECH: Joanne Glenn **DATE LAST CAL EXPIRES:** 08/12/07

Reason For Calibration: (•) Due For Calibration ( ) Repair (See Remarks) ( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: M-500 **SERIAL #:** 114512 **CAL. DUE:** 12/20/08

MODEL: **SERIAL #:** **CAL DUE:**

☑ **Fast/Slow Switch working properly** ☑ **Audio Response** ☑ **Geotropism** **CABLE LENGTH** 5'

CONDITION: Sat **AF MECHANICAL ZERO:** 0 **AL MECHANICAL ZERO:** 0

NEW BATTERIES: (•) Yes ( ) No **BATTERY CHECK:** 6.2 V

HV	AS FOUND HV	AS LEFT HV
600 V:	599	A.F.
1200 V:	1208	A.F.
1800 V:	1832	A.F.

AF INPUT SENSITIVITY (mV): 10 **AL INPUT SENSITIVITY (mV):** 10

RATE METER / SCALER

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100		0.0%	A.F.					
	250	250		0.0%	A.F.		252	0.8%	A.F.	
	400	400		0.0%	A.F.					
x1 or x10	1000	1000		0.0%	A.F.					
	2500	2500		0.0%	A.F.					
	4000	4000		0.0%	A.F.					
x10 or x100	10K	10	K	0.0%	A.F.					
	25K	25	K	0.0%	A.F.					
	40K	40	K	0.0%	A.F.					
x100 or x1000	100K	100	K	0.0%	A.F.					
	250K	250	K	0.0%	A.F.					
	400K	400	K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

LOG SCALE

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR
Log	200	200		0.0%	A.F.	
	2000	2000		0.0%	A.F.	
	20K	20	K	0.0%	A.F.	
	200K	200	K	0.0%	A.F.	

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

GRIFFIN INSTRUMENTS

SERIAL # 183997

06/10/08

Audio Divide:	◉ Sat ○ Unsat	**Push Buttons:**	◉ Sat ○ Unsat
Lamp:	◉ Sat ○ Unsat	**Scaler/Digital:**	◉ Sat ○ Unsat

Remarks:

Does Instrument Meet Final Acceptance Criteria?: ◉ Yes ○ No

Calibration Sticker Attached?: ◉ Yes ○ No

Date Instrument is Due For Next Calibration: 06/10/09

Performed/Reviewed by: Jeanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-68 PROBE # PR178063

Owner: GI

DATE:	06/10/08	**LOCATION:**	Griffin Inst
TECH:	Joanne Glenn	**DATE LAST CAL EXPIRES:**	02/06/09

REASON FOR CALIBRATION:

○ Due For Calibration ○ Repair (See Remarks) ◉ Other (See Remarks) ○ Due and Repair

CABLE LENGTH: 5' **INPUT SENSITIVITY:** 4 mV

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL:	2221	**SERIAL #:**	183997	**CAL. DUE:**	06/10/09
MODEL:		**SERIAL #:**		**CAL. DUE:**	

NIST TRACEABLE SOURCES USED

SOURCE #:	2695-00	**SOURCE #:**	PX 726
ISOTOPE:	Tc99 Ni	**ISOTOPE:**	C14
ACTIVITY(dpm):	18400	**ACTIVITY:**	48,780 dpm
ASSAY DATE:	03/01/00	**ASSAY DATE:**	01/21/08

Condition: ◉ Sat ○ Unsat **Efficiency from last cal.:** **Pu:** **Tc Ni:** 37.32%

Th: **C-14:** 12.28%

	HV	Vernier
Setpoints from last cal.:	1700	N/A

Source	Alpha Response CPM	Beta Response CPM	
Background:		333	
Pu-239:			**A-B XTLK:**
Tc-99 Ni:		7142	**B-A XTLK:**
As Found Efficiencies Pu, Tc:		**37.01%**	***59.21%***
Th-230 / C-14	/	7830	/ **15.37%** ***40.18%***
Background:			
Pu-239:			**A-B XTLK:**
Tc-99 Ni:			**B-A XTLK:**
As Left Efficiencies Pu, Tc: (Used for repairs)			
Th-230 / C-14	/		/

Is as found efficiency within 20% of the efficiency from the last cal? ◉ Yes ○ No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks.

GRIFFIN INSTRUMENTS

PROBE #: PR178063
Date: 06/10/08

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
N/A										

Alpha / Beta Bkg (cpm) 333

HV / Vernier		**Pu-239**	**Tc-99 Ni**	**Tc-99 SS**	**Th-230**	**C-14**	**Sr-90**
1700	**CPM:**		7142	10019		7830	4627
	4 pi AL Efficiencies:		**37.01%**	**25.97%**		**15.37%**	**42.93%**
	2 pi AL Efficiencies:		***59.21%***	***41.57%***		***40.18%***	***61.40%***

Other NIST sources: Th-230 Source #99TH470-1815 4/11/06 30,000 dpm Pu-239 Source #2696-00 7/18/06 18,500dpm
Tc-99 on Stainless Steel Source #99TC470-1814 8/3/99 37,300 dpm, Sr90 Source #2697-00 3/1/00 12,200 dpm

REMARKS: Reverified efficiencies. Calibrated w/2221 #183997.

Does Instrument Meet Final Acceptance Criteria?: (•) Yes ( ) No

Calibration Sticker Attached?: (•) Yes ( ) No

Date Instrument is Due For Next Calibration: **06/10/09**

Performed/Reviewed by: Joanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

2 pi efficiencies denoted in italics. **Calibrations performed to ANSI N323A-1997 standards.**

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2221 SERIAL# 127245

Owner: GI

DATE: 02/05/08 **LOCATION:** Griffin Inst

TECH: Joanne Glenn **DATE LAST CAL EXPIRES:** 03/09/07

Reason For Calibration: (•) Due For Calibration ( ) Repair (See Remarks)

( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: M-500 **SERIAL #:** 114512 **CAL. DUE:** 12/20/08

MODEL: **SERIAL #:** **CAL DUE:**

☑ Fast/Slow Switch working properly ☑ Audio Response ☑ Geotropism **CABLE LENGTH** 6'

CONDITION: Sat **AF MECHANICAL ZERO:** 0 **AL MECHANICAL ZERO:** 0

NEW BATTERIES: (•) Yes ( ) No **BATTERY CHECK:** 6.2 V

HV	AS FOUND HV	AS LEFT HV
600 V:	578	A.F.
1200 V:	1195	A.F.
1800 V:	1785	A.F.

AF INPUT SENSITIVITY (mV): 4 **AL INPUT SENSITIVITY (mV):** A.F.

RATE METER / SCALER

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100		0.0%	A.F.					
	250	250		0.0%	A.F.		249	0.4%	A.F.	
	400	400		0.0%	A.F.					
x1 or x10	1000	1000		0.0%	A.F.					
	2500	2500		0.0%	A.F.					
	4000	4000		0.0%	A.F.					
x10 or x100	10K	10	K	0.0%	A.F.					
	25K	25	K	0.0%	A.F.					
	40K	40	K	0.0%	A.F.					
x100 or x1000	100K	100	K	0.0%	A.F.					
	250K	250	K	0.0%	A.F.					
	400K	400	K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

LOG SCALE

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR
Log	200	200		0.0%	A.F.	
	2000	2000		0.0%	A.F.	
	20K	20	K	0.0%	A.F.	
	200K	200	K	0.0%	A.F.	

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

GRIFFIN INSTRUMENTS

SERIAL # 127245
02/05/08

Audio Divide:	(•) Sat ( ) Unsat	**Push Buttons:**	(•) Sat ( ) Unsat
Lamp:	(•) Sat ( ) Unsat	**Scaler/Digital:**	(•) Sat ( ) Unsat

Remarks: Calibrated w/43-37 #PR161372.

Does Instrument Meet Final Acceptance Criteria?: (•) Yes ( ) No

Calibration Sticker Attached?: (•) Yes ( ) No

Date Instrument is Due For Next Calibration: 02/05/09

Performed/Reviewed by: Jeanne Glenn **Date:** 2/5/2008 **Entered by:** _____ **Initials**

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-37 PROBE # PR161372

Owner: GI

DATE:	06/10/08	**LOCATION:**	Griffin Inst
TECH:	Joanne Glenn	**DATE LAST CAL EXPIRES:**	02/05/09

REASON FOR CALIBRATION:

Due For Calibration ○ Repair (See Remarks) ● Other (See Remarks) ○ Due and Repair

CABLE LENGTH: 6' **INPUT SENSITIVITY:** 4 mV

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL:	2221	**SERIAL #:**	127245	**CAL. DUE:**	02/05/09
MODEL:		**SERIAL #:**		**CAL. DUE:**	

NIST TRACEABLE SOURCES USED

SOURCE #:	2695-00	**SOURCE #:**	PX 726
ISOTOPE:	Tc99 Ni	**ISOTOPE:**	C14
ACTIVITY(dpm):	18400	**ACTIVITY:**	48,780 dpm
ASSAY DATE:	03/01/00	**ASSAY DATE:**	01/21/08

Condition: ● Sat ○ Unsat **Efficiency from last cal.:** Pu: 24.81% Tc Ni: 35.55% Th: 23.21% C-14: 12.99%

	α HV	Vernier β⁻ HV
Setpoints from last cal.:	1300	1750

Source	Alpha Response CPM		Beta Response CPM	
Background:	5		886	
Pu-239:	4511			**A-B XTLK:**
Tc-99 Ni:			7614	**B-A XTLK:**
As Found Efficiencies Pu, Tc:	**24.36%**	***47.99%***	**36.57%**	***58.50%***
Th-230 / C-14	6535	/	7015	**21.77%** / **12.56%**
				42.96% ***32.85%***
Background:				
Pu-239:				**A-B XTLK:**
Tc-99 Ni:				**B-A XTLK:**
As Left Efficiencies Pu, Tc: (Used for repairs)				
Th-230 / C-14		/		/

Is as found efficiency within 20% of the efficiency from the last cal? ● Yes ○ No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks

GRIFFIN INSTRUMENTS

PROBE #: PR161372
Date: 06/10/08

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
N/A										

Alpha / Beta Bkg (cpm)		5	886				
~~HV / Vernier~~		Pu-239	Tc-99 Ni	Tc-99 SS	Th-230	C-14	Sr-90
1300a1750b	CPM:	4511	7614	9885	6535	7015	4497
	4 pi AL Efficiencies:	24.36%	36.57%	24.13%	21.77%	12.56%	36.10%
	2 pi AL Efficiencies:	*47.99%*	*58.50%*	*38.62%*	*42.96%*	*32.85%*	*51.64%*

Other NIST sources: Th-230 Source #99TH470-1815 4/11/06 30,000 dpm Pu-239 Source #2696-00 7/18/06 18,500dpm
Tc-99 on Stainless Steel Source #99TC470-1814 8/3/99 37,300 dpm, Sr90 Source #2697-00 3/1/00 12,200 dpm

REMARKS: Reverified efficiencies. Calibrated w/2221 #127245. Cal due 2/5/09 to match box.

Does Instrument Meet Final Acceptance Criteria?: • Yes ○ No

Calibration Sticker Attached?: • Yes ○ No

Date Instrument is Due For Next Calibration: **02/05/09**

Performed/Reviewed by: Joanne Glenn **Date:** 6/10/2008 **Entered by:** _____ **Initials**

2 pi efficiencies denoted in italics.

Calibrations performed to ANSI N323A-1997 standards.

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2221 SERIAL# 196059

Owner: GI

DATE: 06/10/08 **LOCATION:** Griffin Inst

TECH: Joanne Glenn **DATE LAST CAL EXPIRES:** 10/18/08

Reason For Calibration: (•) Due For Calibration ( ) Repair (See Remarks)

( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: M-500 **SERIAL #:** 114512 **CAL. DUE:** 12/20/08

MODEL: **SERIAL #:** **CAL DUE:**

☑ **Fast/Slow Switch working properly** ☑ **Audio Response** ☑ **Geotropism** **CABLE LENGTH** 5'

CONDITION: Sat **AF MECHANICAL ZERO:** 0 **AL MECHANICAL ZERO:** 0

NEW BATTERIES: (•) Yes ( ) No **BATTERY CHECK:** 6.3 V

HV	AS FOUND HV	AS LEFT HV
600 V:	601	A.F.
1200 V:	1213	A.F.
1800 V:	1810	A.F.

AF INPUT SENSITIVITY (mV): 10 **AL INPUT SENSITIVITY (mV):** 10

RATE METER / SCALER

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100		0.0%	A.F.					
	250	250		0.0%	A.F.		250	0.0%	A.F	
	400	400		0.0%	A.F.					
x1 or x10	1000	1000		0.0%	A.F.					
	2500	2500		0.0%	A.F.					
	4000	4000		0.0%	A.F.					
x10 or x100	10K	10	K	0.0%	A.F.					
	25K	25	K	0.0%	A.F.					
	40K	40	K	0.0%	A.F.					
x100 or x1000	100K	100	K	0.0%	A.F.					
	250K	250	K	0.0%	A.F.					
	400K	400	K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

LOG SCALE

SCALE	RATE CPM	AS FOUND		% ERROR	AS LEFT	% ERROR
Log	200	200		0.0%	A.F.	
	2000	2000		0.0%	A.F.	
	20K	20	K	0.0%	A.F.	
	200K	200	K	0.0%	A.F.	

Is the As Found Data Within 20% of the Set Point?: (•) Yes ( ) No

GRIFFIN INSTRUMENTS

SERIAL # 196059

06/10/08

Audio Divide:	◉ Sat ○ Unsat	**Push Buttons:**	◉ Sat ○ Unsat
Lamp:	◉ Sat ○ Unsat	**Scaler/Digital:**	◉ Sat ○ Unsat

Remarks: Calibrated w/43-37 #PR190618.

Does Instrument Meet Final Acceptance Criteria?: ◉ Yes ○ No

Calibration Sticker Attached?: ◉ Yes ○ No

Date Instrument is Due For Next Calibration: 06/10/09

Performed/Reviewed by: Jeanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-37 PROBE # PR190618

Owner: GI

DATE: 06/10/08
TECH: Joanne Glenn
LOCATION: Griffin Inst
DATE LAST CAL EXPIRES: 10/18/08

REASON FOR CALIBRATION:

○ Due For Calibration ○ Repair (See Remarks) • Other (See Remarks) ○ Due and Repair

CABLE LENGTH: 6' INPUT SENSITIVITY: 4 mV

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL:	2221	SERIAL #:	196059	CAL. DUE:	06/10/09
MODEL:		SERIAL #:		CAL. DUE:	

NIST TRACEABLE SOURCES USED

SOURCE #:	2695-00	SOURCE #:	PX 726
ISOTOPE:	Tc99 Ni	ISOTOPE:	C14
ACTIVITY(dpm):	18400	ACTIVITY:	48,780 dpm
ASSAY DATE:	03/01/00	ASSAY DATE:	01/21/08

Condition: • Sat ○ Unsat Efficiency from last cal.: Pu: 24.43% Tc Ni: 35.30%
Th: 21.92% C-14: 13.54%

	∝ HV	Vernier BHV
Setpoints from last cal.:	1300	1800

Source	Alpha Response CPM		Beta Response CPM	
Background:	4		1025	
Pu-239:	4375			A-B XTLK:
Tc-99 Ni:			8005	B-A XTLK:
As Found Efficiencies Pu, Tc:	23.63%	*46.55%*	37.93%	*60.70%*
Th-230 / C-14	6566	/	8503	21.87% / 15.33%
				43.17% *40.08%*
Background:				
Pu-239:				A-B XTLK:
Tc-99 Ni:				B-A XTLK:
As Left Efficiencies Pu, Tc: (Used for repairs)				
Th-230 / C-14		/		/

Is as found efficiency within 20% of the efficiency from the last cal? • Yes ○ No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks.

GRIFFIN INSTRUMENTS

PROBE #: PR190618
Date: 06/10/08

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
N/A										

Alpha / Beta Bkg (cpm) 4 1025

~~HV / Vernier~~		Pu-239	Tc-99 Ni	Tc-99 SS	Th-230	C-14	Sr-90
1300a1800b	CPM:	4375	8005	9942	6566	8503	5029
	4 pi AL Efficiencies:	**23.63%**	**37.93%**	**23.91%**	**21.87%**	**15.33%**	**40.03%**
	2 pi AL Efficiencies:	***46.55%***	***60.70%***	***38.27%***	***43.17%***	***40.08%***	***57.26%***

Other NIST sources: Th-230 Source #99TH470-1815 4/11/06 30,000 dpm Pu-239 Source #2696-00 7/18/06 18,500dpm
Tc-99 on Stainless Steel Source #99TC470-1814 8/3/99 37,300 dpm, Sr90 Source #2697-00 3/1/00 12,200 dpm

REMARKS: Calibrated w/2221 #196059.

Does Instrument Meet Final Acceptance Criteria?: • Yes ○ No

Calibration Sticker Attached?: • Yes ○ No

Date Instrument is Due For Next Calibration: **06/10/09**

Performed/Reviewed by: Joanne Glenn **Date:** 6/10/2008 **Entered by:** ____ **Initials**

2 pi efficiencies denoted in italics.

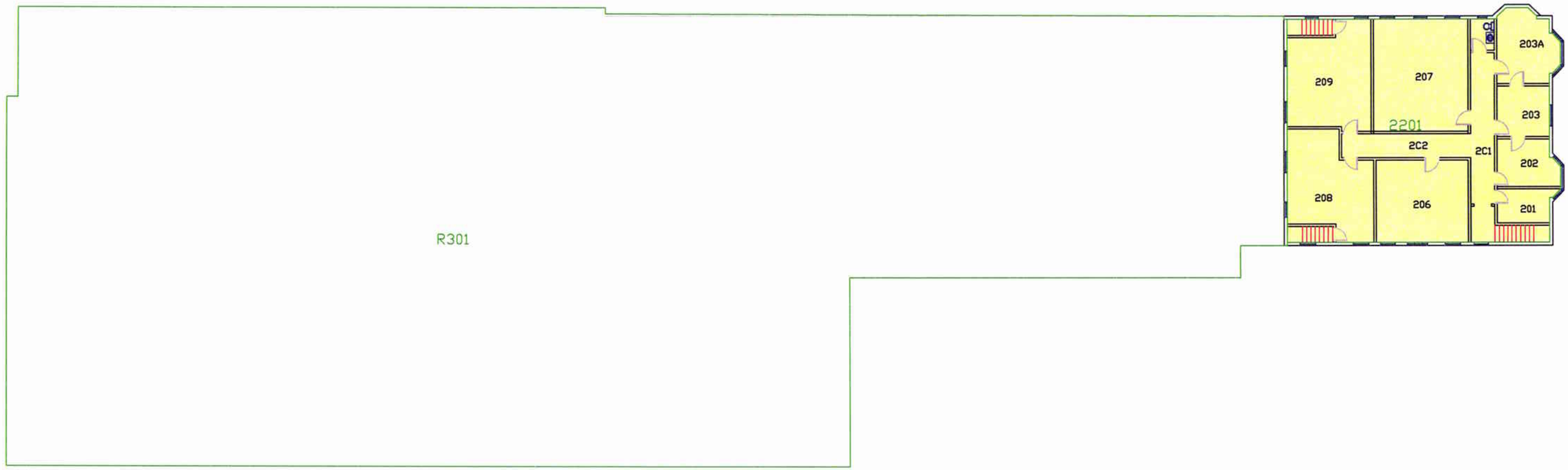
Calibrations performed to ANSI N323A-1997 standards.

Class 2

Class 3

XX Survey Unit #

St. Louis University
Institute for Molecular Virology
Final Status Survey Report

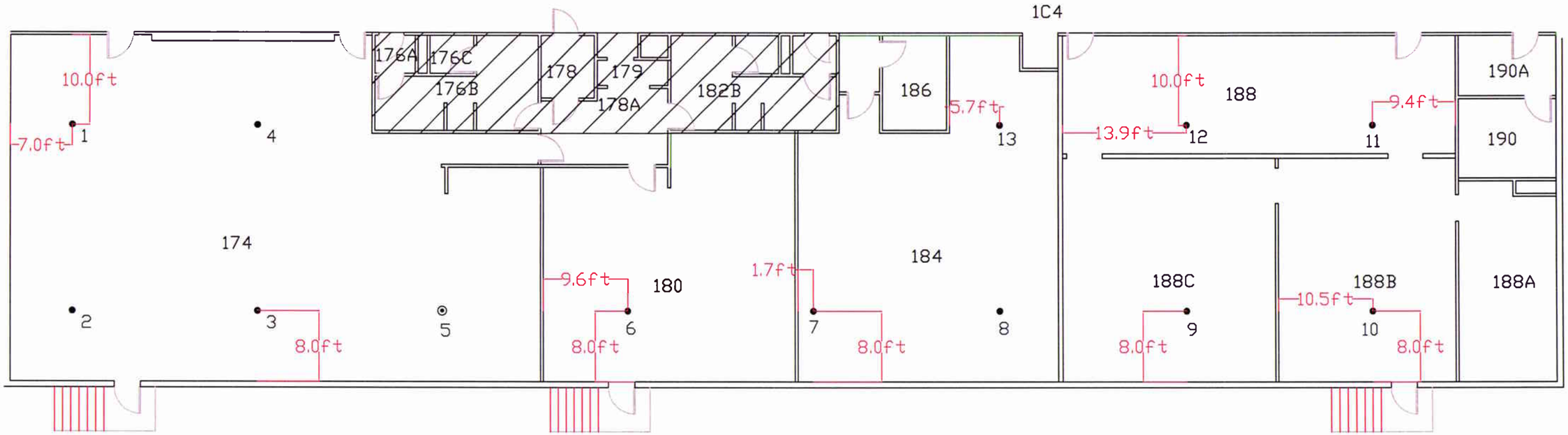


Class 2

Class 3

XX Survey Unit #

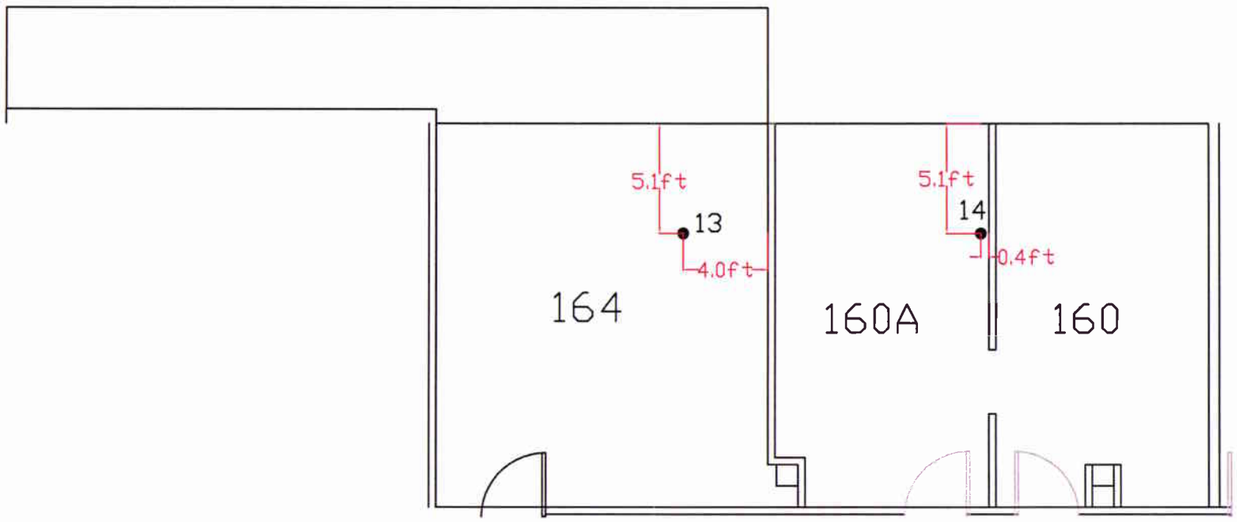
St. Louis University Institute for Molecular Virology Final Status Survey Report	
Appendix C, Survey Units: 2nd Floor	Page: C.2 of C.2



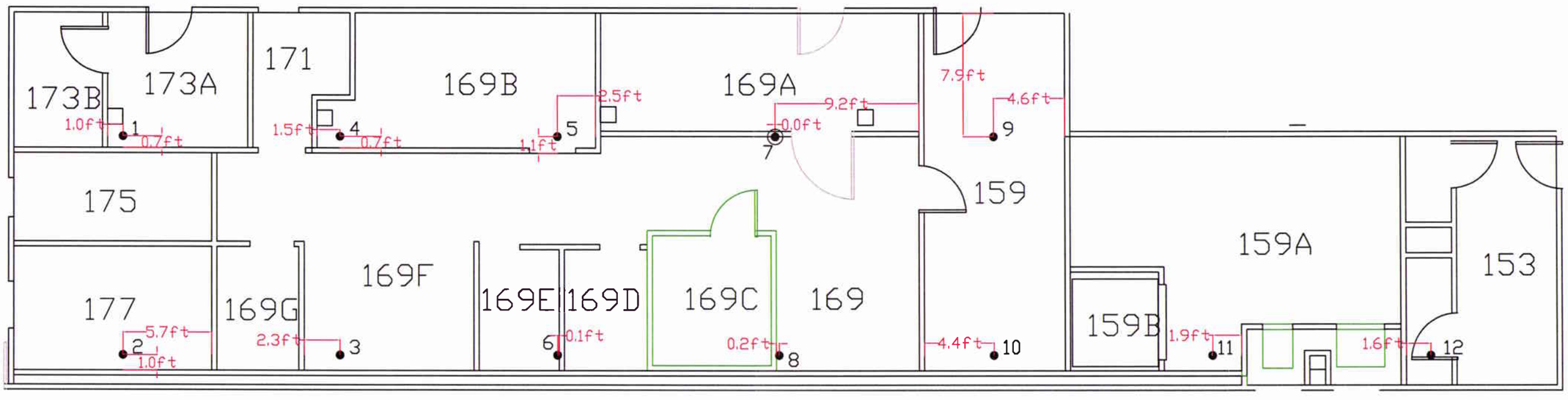
◉ Random Start Location

• Sample Location

Spacing = 21ft



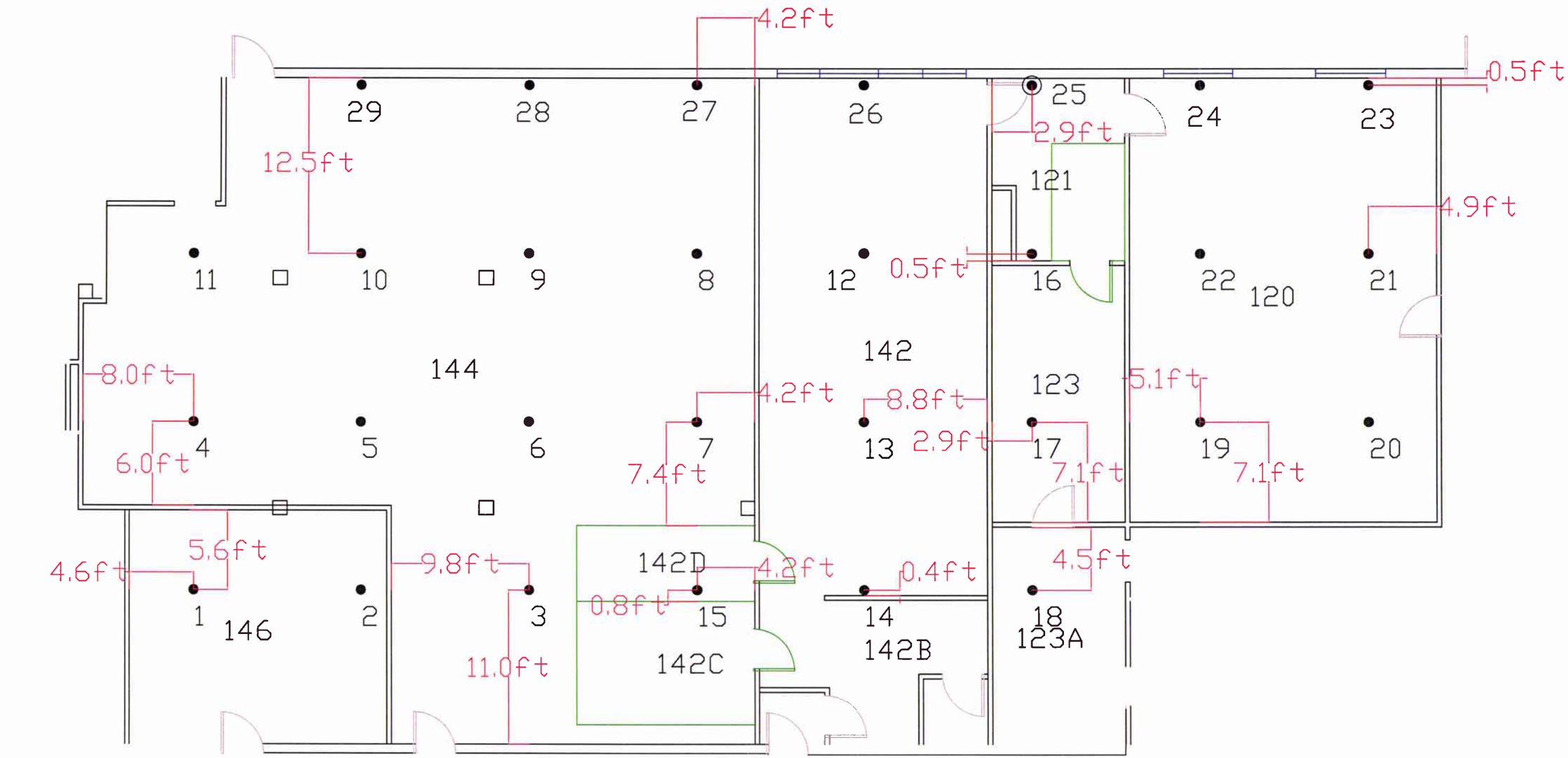
1C5



◉ Random Start Location

• Sample Location

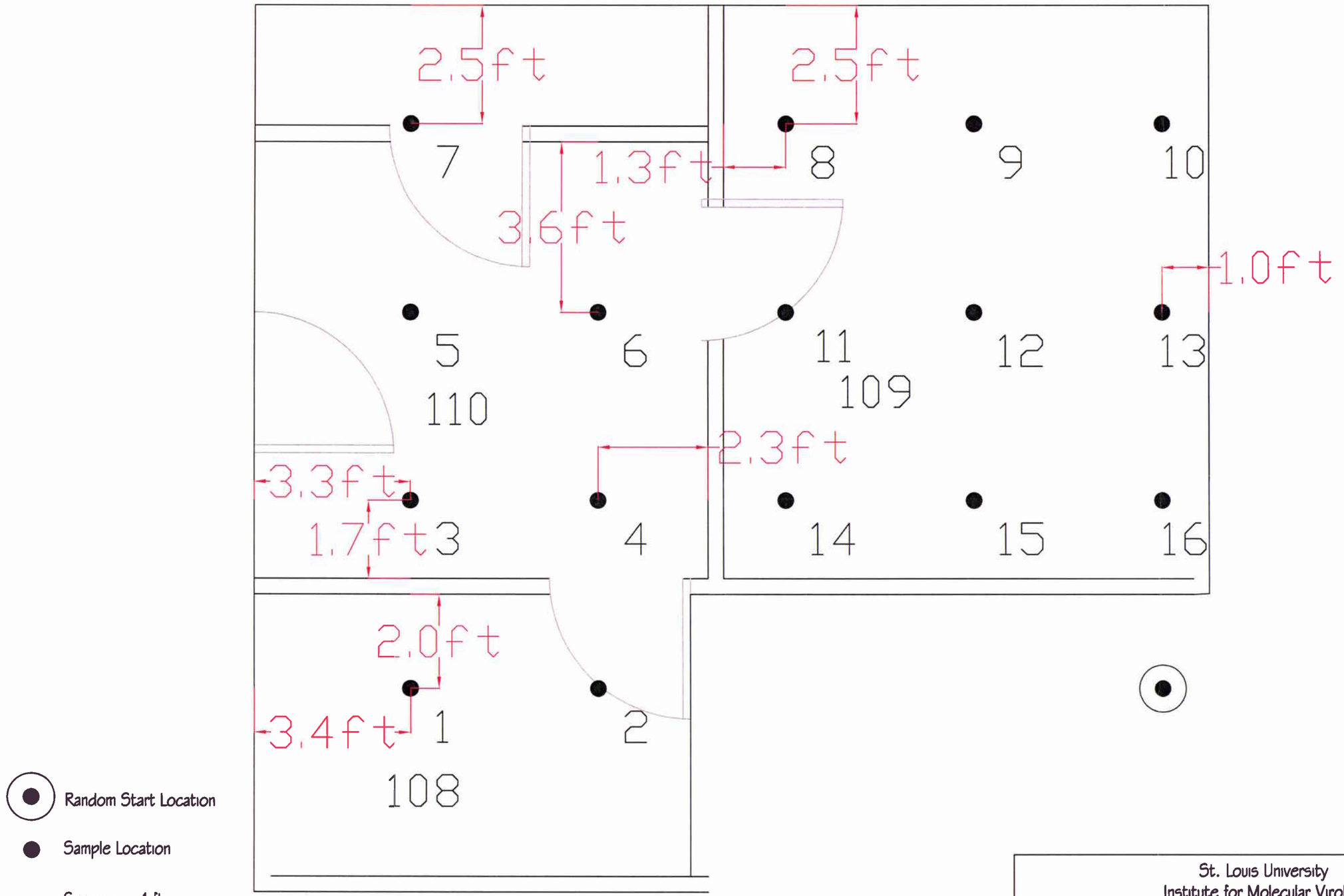
Spacing = 14 ft



Random Start Location

Sample Location

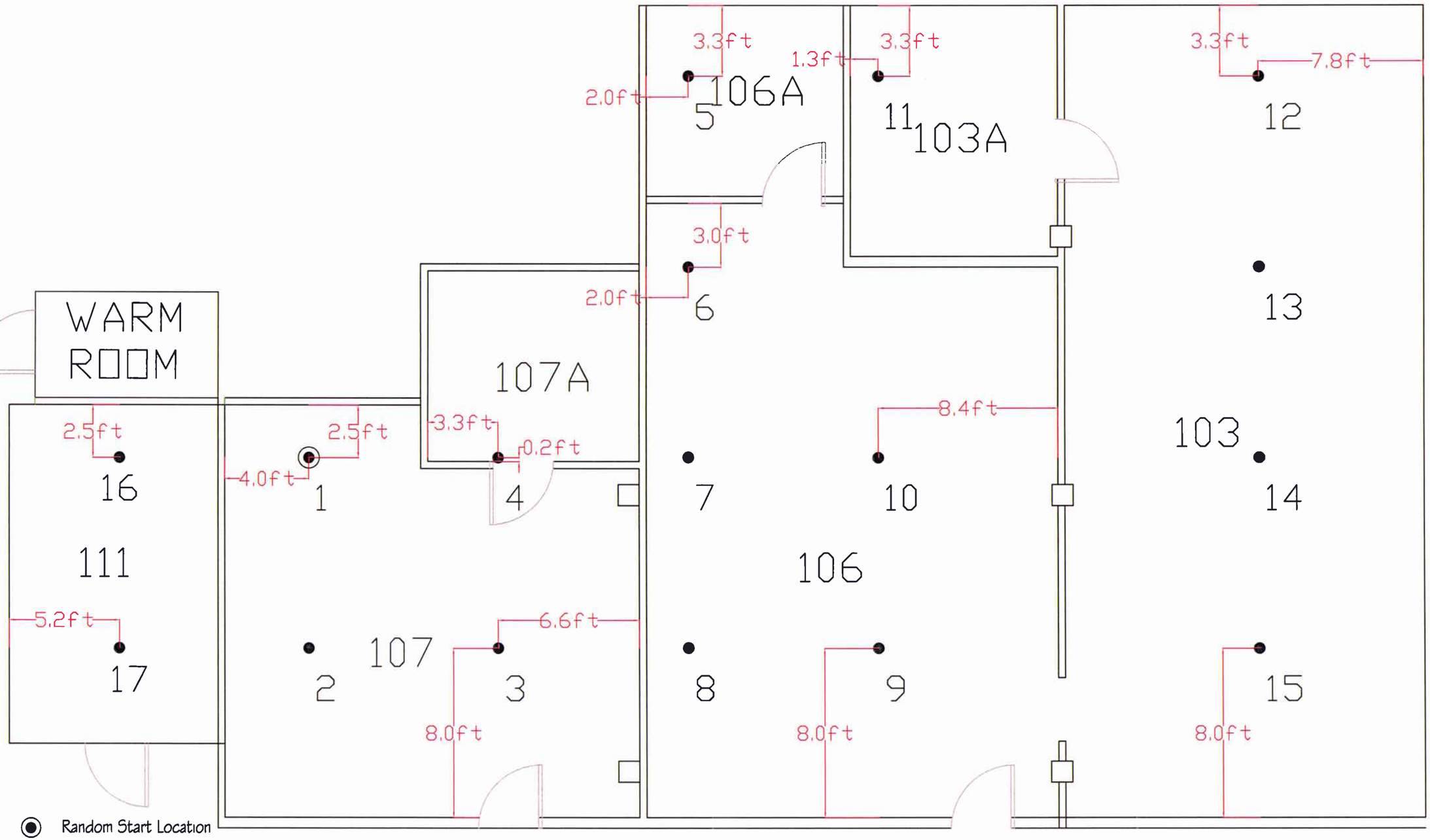
Spacing = 12ft



Random Start Location

Sample Location

Spacing = 4 ft

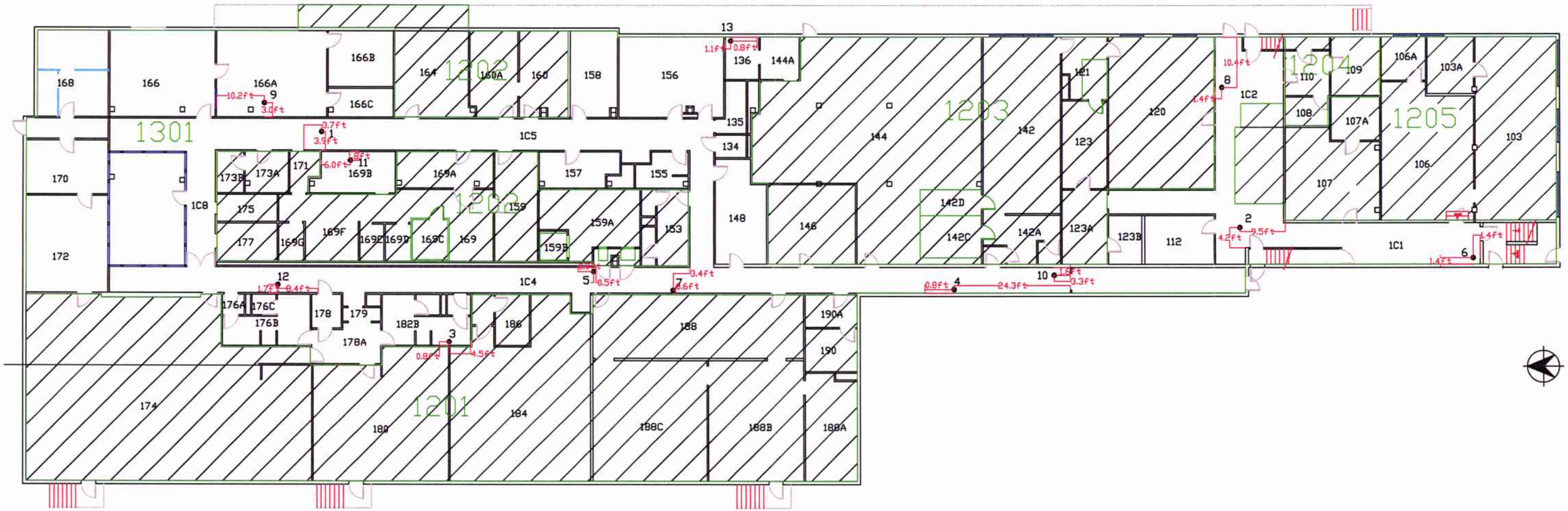


Random Start Location

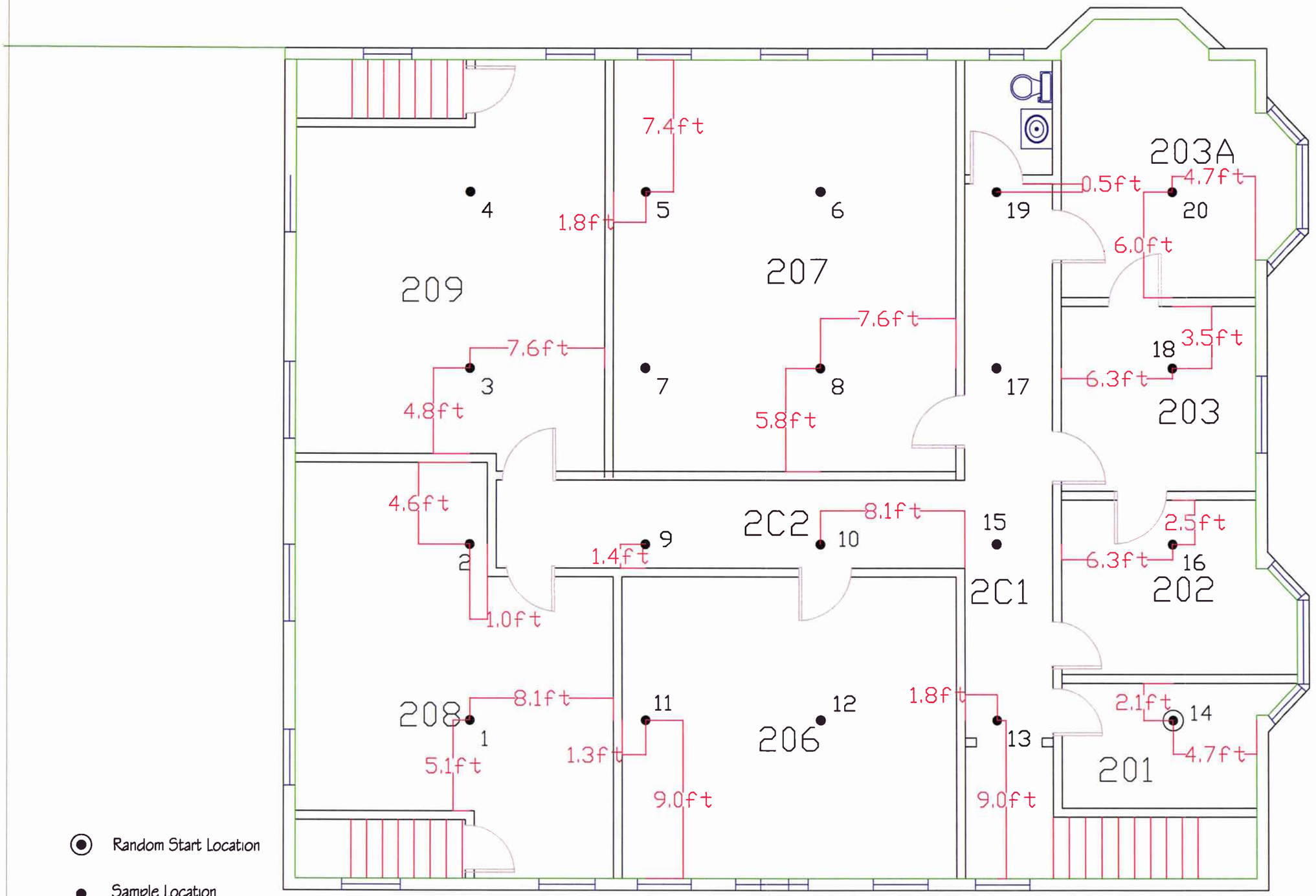
Sample Location

Spacing = 9 ft

St. Louis University Institute for Molecular Virology Final Status Survey Report	
Appendix D, FSS Locations: Survey Unit 1205	Page: D.5 of D.8



● Sample Location



Random Start Location

Sample Location

Spacing = 10ft

St. Louis University
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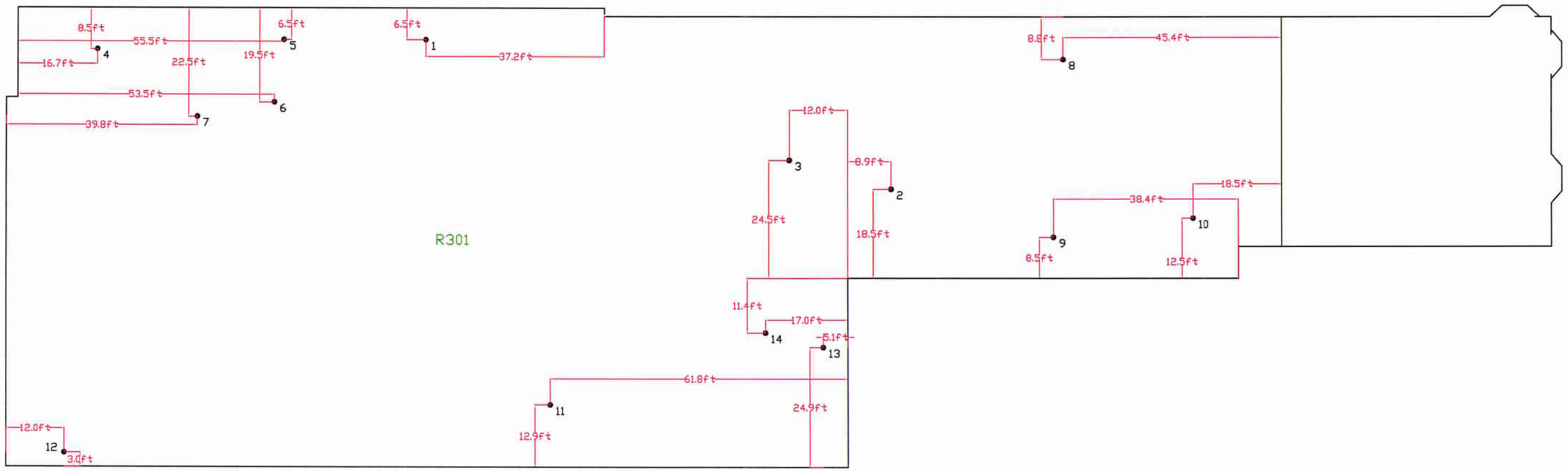
Final Status Survey Report



● Sample Location

Structural Surfaces Survey Results

Building IMV Survey Unit R301 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-R301-R1-M-001	212 ± 3900	363	7 ± 9	48	5 ± 8	25
IMV-R301-R1-M-002	-7 ± 3364	363	12 ± 10	48	2 ± 8	25
IMV-R301-R1-M-003	198 ± 3869	363	33 ± 13	48	0 ± 7	25
IMV-R301-R1-M-004	171 ± 3805	363	21 ± 11	48	6 ± 9	25
IMV-R301-R1-M-005	130 ± 3708	363	0 ± 7	48	9 ± 9	25
IMV-R301-R1-M-006	267 ± 4023	363	0 ± 7	48	13 ± 10	25
IMV-R301-R1-M-007	349 ± 4201	363	0 ± 7	48	6 ± 9	25
IMV-R301-R1-M-008	89 ± 3608	363	0 ± 7	48	2 ± 8	25
IMV-R301-R1-M-009	335 ± 4172	363	13 ± 10	48	0 ± 7	25
IMV-R301-R1-M-010	-62 ± 3216	363	9 ± 9	48	10 ± 9	25
IMV-R301-R1-M-011	-116 ± 3061	363	0 ± 7	48	0 ± 7	25
IMV-R301-R1-M-012	21 ± 3435	363	1 ± 7	48	2 ± 8	25
IMV-R301-R1-M-013	144 ± 3741	363	2 ± 7	48	7 ± 9	25
IMV-R301-R1-M-014	171 ± 3805	363	8 ± 9	48	0 ± 7	25
Summary for Survey Unit # R301 (14 detail records)						
Average	136		8		4	
Minimum	-116		0		0	
Maximum	349		33		13	
Standard Deviation	139		10		4	
Summary for Building # IMV (135 detail records)						
Avg	164		12		1	
Min	-901		0		0	
Max	2318		33		13	

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV | Survey Unit 1201 | Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1201-F1-E-001	-53 ± 2279	1178	8 ± 9	48	0 ± 7	25
IMV-1201-F1-E-002	265 ± 2495	1178	15 ± 10	48	2 ± 8	25
IMV-1201-B1-X-003	-583 ± 1866	1178	5 ± 8	48	0 ± 7	25
IMV-1201-B1-X-004	-53 ± 2279	1178	11 ± 9	48	0 ± 7	25
IMV-1201-F1-E-005	159 ± 2425	1178	4 ± 8	48	0 ± 7	25
IMV-1201-F1-E-006	212 ± 2460	1178	30 ± 13	48	0 ± 7	25
IMV-1201-F1-C-007	477 ± 2629	1178	15 ± 10	48	0 ± 7	25
IMV-1201-F1-R-008	106 ± 2390	1178	8 ± 9	48	9 ± 9	25
IMV-1201-F1-E-009	-265 ± 2124	1178	13 ± 10	48	0 ± 7	25
IMV-1201-B1-X-010	-424 ± 1999	1178	9 ± 9	48	0 ± 7	25
IMV-1201-F1-E-011	477 ± 2629	1178	10 ± 9	48	1 ± 7	25
IMV-1201-F1-E-012	53 ± 2353	1178	9 ± 9	48	0 ± 7	25
IMV-1201-F1-C-013	424 ± 2596	1178	7 ± 9	48	0 ± 7	25
Summary for Survey Unit # 1201 (13 detail records)						
Average	61		11		1	
Minimum	-583		4		0	
Maximum	477		30		9	
Standard Deviation	334		7		2	

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV Survey Unit 1202 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1202-O1-M-001	-901 ± 2003	1316	11 ± 9	48	0 ± 7	25
IMV-1202-F1-E-002	-530 ± 2283	1316	9 ± 9	48	0 ± 7	25
IMV-1202-F1-V-003	-477 ± 2320	1316	17 ± 11	48	2 ± 8	25
IMV-1202-F1-V-004	-159 ± 2532	1316	11 ± 9	48	0 ± 7	25
IMV-1202-F1-M-005	-53 ± 2599	1316	12 ± 10	48	3 ± 8	25
IMV-1202-B1-X-006	-530 ± 2283	1316	13 ± 10	48	0 ± 7	25
IMV-1202-F1-V-007	-318 ± 2428	1316	16 ± 10	48	0 ± 7	25
IMV-1202-H1-M-008	-901 ± 2003	1316	12 ± 10	48	4 ± 8	25
IMV-1202-F1-V-009	-265 ± 2463	1316	0 ± 7	48	0 ± 7	25
IMV-1202-F1-V-010	-530 ± 2283	1316	8 ± 9	48	4 ± 8	25
IMV-1202-F1-E-011	371 ± 2851	1316	17 ± 11	48	0 ± 7	25
IMV-1202-F1-C-012	212 ± 2759	1316	6 ± 8	48	4 ± 8	25
IMV-1202-F1-C-013	-159 ± 2532	1316	6 ± 8	48	3 ± 8	25
IMV-1202-F1-C-014	318 ± 2820	1316	7 ± 9	48	8 ± 9	25
Summary for Survey Unit # 1202 (14 detail records)						
Average	-280		10		2	
Minimum	-901		0		0	
Maximum	371		17		8	
Standard Deviation	402		5		2	

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV Survey Unit 1203 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1203-F1-V-001	-159 ± 2318	1226	18 ± 11	48	0 ± 7	25
IMV-1203-B1-X-002	636 ± 2818	1226	15 ± 10	48	0 ± 7	25
IMV-1203-F1-C-003	106 ± 2496	1226	10 ± 9	48	0 ± 7	25
IMV-1203-F1-C-004	-106 ± 2355	1226	2 ± 7	48	0 ± 7	25
IMV-1203-F1-C-005	**1325** ± 3189	1226	5 ± 8	48	0 ± 7	25
IMV-1203-F1-C-006	106 ± 2496	1226	16 ± 10	48	0 ± 7	25
IMV-1203-F1-C-007	-159 ± 2318	1226	0 ± 7	48	1 ± 7	25
IMV-1203-F1-C-008	-265 ± 2243	1226	16 ± 10	48	0 ± 7	25
IMV-1203-O1-M-009	-106 ± 2355	1226	17 ± 11	48	0 ± 7	25
IMV-1203-F1-C-010	**1484** ± 3269	1226	9 ± 9	48	0 ± 7	25
IMV-1203-F1-C-011	**1697** ± 3372	1226	6 ± 8	48	0 ± 7	25
IMV-1203-F1-V-012	795 ± 2908	1226	0 ± 7	48	0 ± 7	25
IMV-1203-F1-V-013	53 ± 2461	1226	0 ± 7	48	4 ± 8	25
IMV-1203-F1-V-014	795 ± 2908	1226	6 ± 8	48	3 ± 8	25
IMV-1203-F1-M-015	-318 ± 2204	1226	17 ± 11	48	0 ± 7	25
IMV-1203-F1-C-016	212 ± 2564	1226	0 ± 7	48	0 ± 7	25
IMV-1203-F1-V-017	-212 ± 2281	1226	11 ± 9	48	0 ± 7	25
IMV-1203-F1-V-018	477 ± 2726	1226	7 ± 9	48	0 ± 7	25
IMV-1203-B1-X-019	318 ± 2630	1226	8 ± 9	48	0 ± 7	25
IMV-1203-F1-V-020	159 ± 2530	1226	0 ± 7	48	0 ± 7	25
IMV-1203-F1-V-021	-583 ± 2000	1226	22 ± 11	48	0 ± 7	25
IMV-1203-B1-X-022	583 ± 2788	1226	17 ± 11	48	0 ± 7	25
IMV-1203-F1-V-023	0 ± 2426	1226	0 ± 7	48	0 ± 7	25
IMV-1203-F1-V-024	424 ± 2694	1226	20 ± 11	48	3 ± 8	25
IMV-1203-F1-V-025	371 ± 2662	1226	14 ± 10	48	1 ± 7	25

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

IMV-1203-F1-V-026	477 ± 2726	1226	13 ± 10	48	0 ± 7	25
IMV-1203-F1-C-027	424 ± 2694	1226	25 ± 12	48	0 ± 7	25
IMV-1203-F1-C-028	1060 ± 3052	1226	0 ± 7	48	5 ± 8	25
IMV-1203-F1-C-029	689 ± 2849	1226	4 ± 8	48	3 ± 8	25

Summary for Survey Unit # 1203 (29 detail records)			
Average	355	10	1
Minimum	-583	0	0
Maximum	1697	25	5
Standard Deviation	554	8	1

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV Survey Unit 1204 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1204-F1-T-001	-12 ± 533	159	11 ± 9	48	3 ± 8	25
IMV-1204-F1-T-002	2 ± 535	159	16 ± 10	48	0 ± 7	25
IMV-1204-F1-T-003	-72 ± 521	159	20 ± 11	48	0 ± 7	25
IMV-1204-F1-T-004	-8 ± 534	159	15 ± 10	48	0 ± 7	25
IMV-1204-F1-T-006	77 ± 549	159	7 ± 9	48	0 ± 7	25
IMV-1204-F1-C-007	453 ± 614	159	22 ± 11	48	0 ± 7	25
IMV-1204-F1-T-008	142 ± 561	159	25 ± 12	48	0 ± 7	25
IMV-1204-F1-T-009	94 ± 552	159	21 ± 11	48	0 ± 7	25
IMV-1204-F1-T-010	91 ± 552	159	27 ± 12	48	0 ± 7	25
IMV-1204-F1-T-011	145 ± 561	159	16 ± 10	48	0 ± 7	25
IMV-1204-B1-M-012	79 ± 550	159	20 ± 11	48	5 ± 8	25
IMV-1204-F1-T-013	135 ± 560	159	4 ± 8	48	0 ± 7	25
IMV-1204-F1-T-014	55 ± 545	159	18 ± 11	48	0 ± 7	25
IMV-1204-F1-T-015	40 ± 542	159	9 ± 9	48	0 ± 7	25
IMV-1204-F1-T-016	-5 ± 534	159	22 ± 11	48	0 ± 7	25
Summary for Survey Unit # 1204 (15 detail records)						
Average	81		17		1	
Minimum	-72		4		0	
Maximum	453		27		5	
Standard Deviation	121		7		1	

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV Survey Unit 1205 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1205-F1-V-001	253 ± 2291	1082	12 ± 10	48	1 ± 7	25
IMV-1205-B1-X-002	-160 ± 1987	1082	2 ± 7	48	2 ± 8	25
IMV-1205-F1-V-003	98 ± 2182	1082	12 ± 10	48	0 ± 7	25
IMV-1205-F1-V-004	98 ± 2182	1082	4 ± 8	48	0 ± 7	25
IMV-1205-F1-V-005	201 ± 2255	1082	19 ± 11	48	0 ± 7	25
IMV-1205-H1-X-006	-160 ± 1987	1082	4 ± 8	48	0 ± 7	25
IMV-1205-B1-X-007	-160 ± 1987	1082	19 ± 11	48	0 ± 7	25
IMV-1205-B1-X-008	-160 ± 1987	1082	11 ± 9	48	0 ± 7	25
IMV-1205-B1-X-009	46 ± 2144	1082	10 ± 9	48	0 ± 7	25
IMV-1205-B1-X-010	-263 ± 1903	1082	15 ± 10	48	0 ± 7	25
IMV-1205-F1-V-011	-367 ± 1816	1082	20 ± 11	48	0 ± 7	25
IMV-1205-F1-V-012	-57 ± 2067	1082	11 ± 9	48	0 ± 7	25
IMV-1205-F1-V-013	563 ± 2495	1082	11 ± 9	48	0 ± 7	25
IMV-1205-F1-V-014	873 ± 2683	1082	0 ± 7	48	3 ± 8	25
IMV-1205-B1-X-015	614 ± 2527	1082	24 ± 12	48	0 ± 7	25
IMV-1205-F1-T-016	**2060** ± 3307	1082	11 ± 9	48	0 ± 7	25
IMV-1205-F1-T-017	**2318** ± 3428	1082	17 ± 11	48	0 ± 7	25

Summary for Survey Unit # 1205 (17 detail records)			
Average	341	12	0
Minimum	-367	0	0
Maximum	2318	24	3
Standard Deviation	772	7	1

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV — Survey Unit 1301 — Class 3

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-1301-F1-V-001	-265 ± 1998	1127	15 ± 10	48	0 ± 7	25
IMV-1301-F1-V-002	265 ± 2389	1127	10 ± 9	48	4 ± 8	25
IMV-1301-O1-M-003	0 ± 2202	1127	9 ± 9	48	0 ± 7	25
IMV-1301-F1-V-004	371 ± 2459	1127	4 ± 8	48	2 ± 8	25
IMV-1301-F1-V-005	0 ± 2202	1127	7 ± 9	48	0 ± 7	25
IMV-1301-F1-C-006	424 ± 2494	1127	2 ± 7	48	0 ± 7	25
IMV-1301-F1-V-007	530 ± 2562	1127	9 ± 9	48	6 ± 9	25
IMV-1301-F1-V-008	159 ± 2316	1127	26 ± 12	48	0 ± 7	25
IMV-1301-F1-C-009	424 ± 2494	1127	13 ± 10	48	0 ± 7	25
IMV-1301-F1-V-010	424 ± 2494	1127	2 ± 7	48	0 ± 7	25
IMV-1301-F1-M-011	212 ± 2352	1127	17 ± 11	48	2 ± 8	25
IMV-1301-F1-V-012	0 ± 2202	1127	2 ± 7	48	0 ± 7	25
IMV-1301-F1-E-013	1007 ± 2847	1127	0 ± 7	48	8 ± 9	25
Summary for Survey Unit # 1301 (13 detail records)						
Average	273		9		2	
Minimum	-265		0		0	
Maximum	1007		26		8	
Standard Deviation	318		7		3	

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV — Survey Unit 2201 — Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-2201-F1-V-001	248 ± 2361	1118	26 ± 12	48	0 ± 7	25
IMV-2201-F1-V-002	661 ± 2622	1118	13 ± 10	48	0 ± 7	25
IMV-2201-F1-V-003	-320 ± 1946	1118	18 ± 11	48	0 ± 7	25
IMV-2201-F1-V-004	-320 ± 1946	1118	26 ± 12	48	0 ± 7	25
IMV-2201-F1-V-005	93 ± 2256	1118	21 ± 11	48	0 ± 7	25
IMV-2201-F1-V-006	351 ± 2429	1118	17 ± 11	48	0 ± 7	25
IMV-2201-F1-V-007	454 ± 2495	1118	15 ± 10	48	0 ± 7	25
IMV-2201-F1-V-008	558 ± 2560	1118	17 ± 11	48	0 ± 7	25
IMV-2201-F1-V-009	93 ± 2256	1118	15 ± 10	48	0 ± 7	25
IMV-2201-F1-V-010	41 ± 2219	1118	19 ± 11	48	0 ± 7	25
IMV-2201-B1-X-011	196 ± 2327	1118	17 ± 11	48	0 ± 7	25
IMV-2201-B1-X-012	**1126** ± 2888	1118	25 ± 12	48	0 ± 7	25
IMV-2201-F1-V-013	248 ± 2361	1118	21 ± 11	48	0 ± 7	25
IMV-2201-F1-V-014	-269 ± 1988	1118	22 ± 11	48	5 ± 8	25
IMV-2201-F1-V-015	-475 ± 1817	1118	19 ± 11	48	0 ± 7	25
IMV-2201-F1-R-016	-320 ± 1946	1118	8 ± 9	48	0 ± 7	25
IMV-2201-F1-V-017	-62 ± 2145	1118	19 ± 11	48	0 ± 7	25
IMV-2201-F1-R-018	-372 ± 1904	1118	6 ± 8	48	0 ± 7	25
IMV-2201-F1-V-019	248 ± 2361	1118	12 ± 10	48	2 ± 8	25
IMV-2201-F1-R-020	351 ± 2429	1118	23 ± 12	48	0 ± 7	25

Summary for Survey Unit # 2201 (20 detail records)			
Average	127	18	0
Minimum	-475	6	0
Maximum	1126	26	5
Standard Deviation	406	5	1

Note: All results reported in dpm/100cm^2.

Structural Surfaces Survey Results

Building IMV Survey Unit R301 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-R301-R1-M-001	212 ± 3900	363	7 ± 9	48	5 ± 8	25
IMV-R301-R1-M-002	-7 ± 3364	363	12 ± 10	48	2 ± 8	25
IMV-R301-R1-M-003	198 ± 3869	363	33 ± 13	48	0 ± 7	25
IMV-R301-R1-M-004	171 ± 3805	363	21 ± 11	48	6 ± 9	25
IMV-R301-R1-M-005	130 ± 3708	363	0 ± 7	48	9 ± 9	25
IMV-R301-R1-M-006	267 ± 4023	363	0 ± 7	48	13 ± 10	25
IMV-R301-R1-M-007	349 ± 4201	363	0 ± 7	48	6 ± 9	25
IMV-R301-R1-M-008	89 ± 3608	363	0 ± 7	48	2 ± 8	25
IMV-R301-R1-M-009	335 ± 4172	363	13 ± 10	48	0 ± 7	25
IMV-R301-R1-M-010	-62 ± 3216	363	9 ± 9	48	10 ± 9	25
IMV-R301-R1-M-011	-116 ± 3061	363	0 ± 7	48	0 ± 7	25
IMV-R301-R1-M-012	21 ± 3435	363	1 ± 7	48	2 ± 8	25
IMV-R301-R1-M-013	144 ± 3741	363	2 ± 7	48	7 ± 9	25
IMV-R301-R1-M-014	171 ± 3805	363	8 ± 9	48	0 ± 7	25
Summary for Survey Unit # R301 (14 detail records)						
Average	136		8		4	
Minimum	-116		0		0	
Maximum	349		33		13	
Standard Deviation	139		10		4	
Summary for Building # IMV (135 detail records)						
Avg	164		12		1	
Min	-901		0		0	
Max	2318		33		13	

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit DR01 Class: N/A

Location Code	Total Beta Activity Measurements			Removable Activity Measurements			
	Activty		MDC	Tritium		Carbon-14	
				Activity	MDC	Activity	MDC
IMV-DR01-D4-C-001	**1849**	3308	1109	11 ± 9	25	6 ± 9	48
IMV-DR01-D4-C-002	**1435**	3106	1109	1 ± 7	25	0 ± 7	48
IMV-DR01-D4-C-003	**1590**	3183	1109	25 ± 12	25	0 ± 7	48
IMV-DR01-D4-C-004	**1642**	3209	1109	7 ± 9	25	2 ± 8	48
IMV-DR01-D2-M-005				17 ± 11	25	2 ± 8	48
IMV-DR01-D2-M-006				22 ± 11	25	1 ± 7	48
IMV-DR01-D2-M-007				10 ± 9	25	4 ± 8	48
IMV-DR01-D3-M-008				13 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-009				0 ± 7	25	0 ± 7	48
IMV-DR01-D1-M-010				10 ± 9	25	0 ± 7	48
IMV-DR01-D1-M-011				10 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-012				8 ± 9	25	0 ± 7	48
IMV-DR01-D1-M-013				4 ± 8	25	0 ± 7	48
IMV-DR01-D1-M-014				11 ± 9	25	6 ± 9	48
IMV-DR01-D3-M-015				7 ± 9	25	5 ± 8	48
IMV-DR01-D2-M-016				6 ± 8	25	3 ± 8	48
IMV-DR01-D1-M-017				18 ± 11	25	0 ± 7	48
IMV-DR01-D1-M-018				16 ± 10	25	3 ± 8	48
IMV-DR01-D3-M-019				17 ± 11	25	1 ± 7	48
IMV-DR01-D3-M-020				6 ± 8	25	0 ± 7	48
IMV-DR01-D3-M-021				0 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-022				5 ± 8	25	4 ± 8	48
IMV-DR01-D2-M-023				0 ± 7	25	3 ± 8	48
IMV-DR01-D3-M-024				10 ± 9	25	5 ± 8	48
IMV-DR01-D3-M-025				12 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-026				6 ± 8	25	0 ± 7	48
IMV-DR01-D3-M-027				25 ± 12	25	3 ± 8	48
IMV-DR01-D3-M-028				12 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-029				4 ± 8	25	5 ± 8	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV — Survey Unit DR01 — Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-DR01-D2-M-030			25 ± 12	25	0 ± 7	48
IMV-DR01-D2-M-031			18 ± 11	25	0 ± 7	48
IMV-DR01-D3-M-032			8 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-033			6 ± 8	25	0 ± 7	48
IMV-DR01-D2-M-034			**31** ± 13	25	0 ± 7	48
IMV-DR01-D2-M-035			6 ± 8	25	0 ± 7	48
IMV-DR01-D2-M-036			2 ± 7	25	5 ± 8	48
IMV-DR01-D1-M-037			16 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-038			6 ± 8	25	0 ± 7	48
IMV-DR01-D3-M-039			5 ± 8	25	7 ± 9	48
IMV-DR01-D3-M-040			14 ± 10	25	5 ± 8	48
IMV-DR01-D3-M-041			10 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-042			**29** ± 13	25	0 ± 7	48
IMV-DR01-D1-M-043			19 ± 11	25	0 ± 7	48
IMV-DR01-D3-M-044			0 ± 7	25	4 ± 8	48
IMV-DR01-D3-M-045			16 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-046			8 ± 9	25	3 ± 8	48
IMV-DR01-D1-M-047			25 ± 12	25	1 ± 7	48
IMV-DR01-D3-M-048			0 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-049			12 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-050			17 ± 11	25	3 ± 8	48
IMV-DR01-D3-M-051			11 ± 9	25	4 ± 8	48
IMV-DR01-D1-M-052			14 ± 10	25	1 ± 7	48
IMV-DR01-D2-M-053			**27** ± 12	25	0 ± 7	48
IMV-DR01-D2-M-054			0 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-055			9 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-056			19 ± 11	25	8 ± 9	48
IMV-DR01-D2-M-057			**30** ± 13	25	0 ± 7	48
IMV-DR01-D3-M-058			17 ± 11	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit DR01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-DR01-D2-M-059			12 ± 10	25	1 ± 7	48
IMV-DR01-D3-M-060			13 ± 10	25	7 ± 9	48
IMV-DR01-D3-M-061			4 ± 8	25	5 ± 8	48
IMV-DR01-D3-M-062			2 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-063			18 ± 11	25	0 ± 7	48
IMV-DR01-D2-M-064			4 ± 8	25	0 ± 7	48
IMV-DR01-D3-M-065			10 ± 9	25	8 ± 9	48
IMV-DR01-D2-M-066			16 ± 10	25	5 ± 8	48
IMV-DR01-D2-M-067			0 ± 7	25	1 ± 7	48
IMV-DR01-D2-M-068			1 ± 7	25	6 ± 9	48
IMV-DR01-D3-M-069			13 ± 10	25	1 ± 7	48
IMV-DR01-D3-M-070			10 ± 9	25	0 ± 7	48
IMV-DR01-D2-M-071			14 ± 10	25	5 ± 8	48
IMV-DR01-D3-M-072			9 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-073			13 ± 10	25	5 ± 8	48
IMV-DR01-D2-M-074			16 ± 10	25	11 ± 10	48
IMV-DR01-D2-M-075			31 ± 13	25	0 ± 7	48
IMV-DR01-D2-M-076			8 ± 9	25	3 ± 8	48
IMV-DR01-D2-M-077			23 ± 12	25	0 ± 7	48
IMV-DR01-D2-M-078			9 ± 9	25	2 ± 8	48
IMV-DR01-D3-M-079			16 ± 10	25	1 ± 7	48
IMV-DR01-D3-M-081			10 ± 9	25	1 ± 7	48
IMV-DR01-D3-M-082			15 ± 10	25	7 ± 9	48
IMV-DR01-D3-M-083			10 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-084			18 ± 11	25	0 ± 7	48
IMV-DR01-D3-M-085			13 ± 10	25	1 ± 7	48
IMV-DR01-D3-M-086			0 ± 7	25	9 ± 9	48
IMV-DR01-D3-M-087			27 ± 12	25	0 ± 7	48
IMV-DR01-D2-M-088			0 ± 7	25	1 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit DR01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-DR01-D3-M-089			2 ± 7	25	4 ± 8	48
IMV-DR01-D3-M-090			0 ± 7	25	0 ± 7	48
IMV-DR01-D2-M-091			**30** ± 13	25	0 ± 7	48
IMV-DR01-D1-M-092			**26** ± 12	25	6 ± 9	48
IMV-DR01-D1-M-093			8 ± 9	25	0 ± 7	48
IMV-DR01-D2-M-094			5 ± 8	25	0 ± 7	48
IMV-DR01-D3-M-095			16 ± 10	25	2 ± 8	48
IMV-DR01-D2-M-096			2 ± 7	25	5 ± 8	48
IMV-DR01-D1-M-097			2 ± 7	25	8 ± 9	48
IMV-DR01-D3-M-098			12 ± 10	25	1 ± 7	48
IMV-DR01-D3-M-099			7 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-100			8 ± 9	25	0 ± 7	48
IMV-DR01-D3-M-101			14 ± 10	25	1 ± 7	48
IMV-DR01-D2-M-102			6 ± 8	25	8 ± 9	48
IMV-DR01-D2-M-103			23 ± 12	25	0 ± 7	48
IMV-DR01-D3-M-104			7 ± 9	25	3 ± 8	48
IMV-DR01-D3-M-105			1 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-106			3 ± 8	25	1 ± 7	48
IMV-DR01-D2-M-107			16 ± 10	25	2 ± 8	48
IMV-DR01-D3-M-108			16 ± 10	25	0 ± 7	48
IMV-DR01-D3-M-109			2 ± 7	25	5 ± 8	48
IMV-DR01-D3-M-110			6 ± 8	25	0 ± 7	48
IMV-DR01-D2-M-111			2 ± 7	25	3 ± 8	48
IMV-DR01-D3-M-112			7 ± 9	25	5 ± 8	48
IMV-DR01-D2-M-113			11 ± 9	25	5 ± 8	48
IMV-DR01-D4-M-114			7 ± 9	25	6 ± 9	48
IMV-DR01-D2-M-115			4 ± 8	25	4 ± 8	48
IMV-DR01-D2-M-116			8 ± 9	25	0 ± 7	48
IMV-DR01-D2-M-117			4 ± 8	25	10 ± 9	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit DR01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-DR01-D2-M-118			3 ± 8	25	6 ± 9	48
IMV-DR01-D2-M-119			15 ± 10	25	0 ± 7	48
IMV-DR01-D2-M-120			1 ± 7	25	3 ± 8	48
IMV-DR01-D2-M-121			18 ± 11	25	0 ± 7	48
IMV-DR01-D2-M-122			0 ± 7	25	0 ± 7	48
IMV-DR01-D3-M-123			22 ± 11	25	3 ± 8	48
Summary for Survey Unit # DR01 (122 detail records)						
Average	1629		11		2	
Minimum	1435		0		0	
Maximum	1849		31		11	
Standard Deviation	171		8		3	

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-001			10 ± 9	25	4 ± 8	48
IMV-VA01-V1-M-002			5 ± 8	25	4 ± 8	48
IMV-VA01-V1-M-003			9 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-004			17 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-005			1 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-006			5 ± 8	25	4 ± 8	48
IMV-VA01-V1-M-007			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-008			25 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-009			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-010			1 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-011			0 ± 7	25	7 ± 9	48
IMV-VA01-V1-M-012			1 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-013			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-014			10 ± 9	25	1 ± 7	48
IMV-VA01-V1-M-015			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-016			0 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-017			**29** ± 13	25	6 ± 9	48
IMV-VA01-V1-M-018			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-019			17 ± 11	25	5 ± 8	48
IMV-VA01-V1-M-020			3 ± 8	25	5 ± 8	48
IMV-VA01-V1-M-021			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-022			**62** ± 17	25	**111** ± 22	48
IMV-VA01-V1-M-023			6 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-024			13 ± 10	25	2 ± 8	48
IMV-VA01-V1-M-025			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-026			**31** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-027			8 ± 9	25	2 ± 8	48
IMV-VA01-V1-M-028			15 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-029			6 ± 8	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-030			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-031			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-032			3 ± 8	25	7 ± 9	48
IMV-VA01-V1-M-033			17 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-034			6 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-035			3 ± 8	25	3 ± 8	48
IMV-VA01-V1-M-036			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-037			2 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-038			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-039			2 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-040			0 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-041			23 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-042			17 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-043			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-044			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-045			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-046			16 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-047			23 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-048			7 ± 9	25	4 ± 8	48
IMV-VA01-V1-M-049			29 ± 13	25	0 ± 7	48
IMV-VA01-V1-M-050			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-051			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-052			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-053			3 ± 8	25	2 ± 8	48
IMV-VA01-V1-M-054			7 ± 9	25	2 ± 8	48
IMV-VA01-V1-M-055			15 ± 10	25	5 ± 8	48
IMV-VA01-V1-M-056			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-057			23 ± 12	25	1 ± 7	48
IMV-VA01-V1-M-058			8 ± 9	25	9 ± 9	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-059			15 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-060			10 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-061			0 ± 7	25	6 ± 9	48
IMV-VA01-V1-M-062			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-063			3 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-064			20 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-065			0 ± 7	25	7 ± 9	48
IMV-VA01-V1-M-066			5 ± 8	25	3 ± 8	48
IMV-VA01-V1-M-067			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-068			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-069			15 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-070			6 ± 8	25	6 ± 9	48
IMV-VA01-V1-M-071			0 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-072			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-073			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-074			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-075			16 ± 10	25	1 ± 7	48
IMV-VA01-V1-M-076			2 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-077			34 ± 13	25	0 ± 7	48
IMV-VA01-V1-M-078			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-079			21 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-080			4 ± 8	25	5 ± 8	48
IMV-VA01-V1-M-081			23 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-082			0 ± 7	25	6 ± 9	48
IMV-VA01-V1-M-083			1 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-084			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-085			9 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-086			31 ± 13	25	0 ± 7	48
IMV-VA01-V1-M-087			0 ± 7	25	2 ± 8	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-088			7 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-089			**31** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-090			9 ± 9	25	6 ± 9	48
IMV-VA01-V1-M-091			4 ± 8	25	2 ± 8	48
IMV-VA01-V1-M-092			9 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-093			2 ± 7	25	4 ± 8	48
IMV-VA01-V1-M-094			23 ± 12	25	1 ± 7	48
IMV-VA01-V1-M-095			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-096			**27** ± 12	25	0 ± 7	48
IMV-VA01-V1-M-097			23 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-098			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-099			**33** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-100			9 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-101			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-102			5 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-103			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-104			11 ± 9	25	4 ± 8	48
IMV-VA01-V1-M-105			**134** ± 24	25	0 ± 7	48
IMV-VA01-V1-M-106			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-107			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-108			16 ± 10	25	8 ± 9	48
IMV-VA01-V1-M-109			4 ± 8	25	5 ± 8	48
IMV-VA01-V1-M-110			11 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-111			11 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-112			2 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-113			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-114			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-115			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-116			10 ± 9	25	11 ± 10	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-117			0 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-118			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-119			12 ± 10	25	2 ± 8	48
IMV-VA01-V1-M-120			20 ± 11	25	4 ± 8	48
IMV-VA01-V1-M-121			5 ± 8	25	3 ± 8	48
IMV-VA01-V1-M-122			22 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-123			15 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-124			12 ± 10	25	10 ± 9	48
IMV-VA01-V1-M-125			9 ± 9	25	5 ± 8	48
IMV-VA01-V1-M-126			11 ± 9	25	4 ± 8	48
IMV-VA01-V1-M-127			0 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-128			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-129			6 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-130			14 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-131			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-132			18 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-133			8 ± 9	25	4 ± 8	48
IMV-VA01-V1-M-134			1 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-135			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-136			6 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-137			7 ± 9	25	5 ± 8	48
IMV-VA01-V1-M-138			10 ± 9	25	7 ± 9	48
IMV-VA01-V1-M-139			16 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-140			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-141			0 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-142			3 ± 8	25	3 ± 8	48
IMV-VA01-V1-M-143			23 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-144			7 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-145			29 ± 13	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-146			**30** ± 13	25	6 ± 9	48
IMV-VA01-V1-M-147			11 ± 9	25	1 ± 7	48
IMV-VA01-V1-M-148			2 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-149			0 ± 7	25	3 ± 8	48
IMV-VA01-V1-M-150			16 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-151			16 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-152			20 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-153			2 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-154			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-155			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-156			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-157			12 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-158			17 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-159			10 ± 9	25	3 ± 8	48
IMV-VA01-V1-M-160			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-161			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-162			**44** ± 15	25	4 ± 8	48
IMV-VA01-V1-M-163			17 ± 11	25	7 ± 9	48
IMV-VA01-V1-M-164			18 ± 11	25	4 ± 8	48
IMV-VA01-V1-M-165			**33** ± 13	25	7 ± 9	48
IMV-VA01-V1-M-166			**31** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-167			0 ± 7	25	2 ± 8	48
IMV-VA01-V1-M-168			0 ± 7	25	7 ± 9	48
IMV-VA01-V1-M-169			9 ± 9	25	5 ± 8	48
IMV-VA01-V1-M-170			**122** ± 23	25	0 ± 7	48
IMV-VA01-V1-M-171			**32** ± 13	25	7 ± 9	48
IMV-VA01-V1-M-172			14 ± 10	25	2 ± 8	48
IMV-VA01-V1-M-173			4 ± 8	25	7 ± 9	48
IMV-VA01-V1-M-174			**80** ± 19	25	3 ± 8	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-175			0 ± 7	25	11 ± 10	48
IMV-VA01-V1-M-176			25 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-177			**57** ± 16	25	0 ± 7	48
IMV-VA01-V1-M-178			**48** ± 15	25	0 ± 7	48
IMV-VA01-V1-M-179			**88** ± 20	25	3 ± 8	48
IMV-VA01-V1-M-180			13 ± 10	25	5 ± 8	48
IMV-VA01-V1-M-182			22 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-183			**35** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-184			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-185			0 ± 7	25	4 ± 8	48
IMV-VA01-V1-M-186			13 ± 10	25	1 ± 7	48
IMV-VA01-V1-M-187			**42** ± 14	25	1 ± 7	48
IMV-VA01-V1-M-188			0 ± 7	25	1 ± 7	48
IMV-VA01-V1-M-189			25 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-190			10 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-191			**29** ± 13	25	1 ± 7	48
IMV-VA01-V1-M-192			15 ± 10	25	13 ± 10	48
IMV-VA01-V1-M-193			19 ± 11	25	1 ± 7	48
IMV-VA01-V1-M-194			11 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-195			15 ± 10	25	0 ± 7	48
IMV-VA01-V1-M-196			19 ± 11	25	6 ± 9	48
IMV-VA01-V1-M-198			8 ± 9	25	6 ± 9	48
IMV-VA01-V1-M-199			18 ± 11	25	3 ± 8	48
IMV-VA01-V1-M-200			13 ± 10	25	7 ± 9	48
IMV-VA01-V1-M-201			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-202			17 ± 11	25	4 ± 8	48
IMV-VA01-V1-M-203			5 ± 8	25	5 ± 8	48
IMV-VA01-V1-M-204			4 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-205			0 ± 7	25	2 ± 8	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-206			1 ± 7	25	4 ± 8	48
IMV-VA01-V1-M-207			2 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-208			18 ± 11	25	5 ± 8	48
IMV-VA01-V1-M-209			20 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-210			17 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-211			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-212			18 ± 11	25	6 ± 9	48
IMV-VA01-V1-M-213			9 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-214			5 ± 8	25	2 ± 8	48
IMV-VA01-V1-M-215			11 ± 9	25	2 ± 8	48
IMV-VA01-V1-M-216			25 ± 12	25	0 ± 7	48
IMV-VA01-V1-M-217			8 ± 9	25	0 ± 7	48
IMV-VA01-V1-M-218			33 ± 13	25	5 ± 8	48
IMV-VA01-V1-M-219			19 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-221			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-222			5 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-223			6 ± 8	25	0 ± 7	48
IMV-VA01-V1-M-224			17 ± 11	25	0 ± 7	48
IMV-VA01-V1-M-225			18 ± 11	25	2 ± 8	48
IMV-VA01-V1-M-226			9 ± 9	25	5 ± 8	48
IMV-VA01-V1-M-227			23 ± 12	25	1 ± 7	48
IMV-VA01-V1-M-228			25 ± 12	25	9 ± 9	48
IMV-VA01-V1-M-229			0 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-230			7 ± 9	25	5 ± 8	48
IMV-VA01-V1-M-231			20 ± 11	25	15 ± 10	48
IMV-VA01-V1-M-232			0 ± 7	25	15 ± 10	48
IMV-VA01-V1-M-233			8 ± 9	25	2 ± 8	48
IMV-VA01-V1-M-234			0 ± 7	25	3 ± 8	48
IMV-VA01-V1-M-235			7 ± 9	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VA01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VA01-V1-M-236			2 ± 7	25	4 ± 8	48
IMV-VA01-V1-M-237			2 ± 7	25	0 ± 7	48
IMV-VA01-V1-M-238			**35** ± 13	25	0 ± 7	48
IMV-VA01-V1-M-239			**48** ± 15	25	0 ± 7	48
IMV-VA01-V1-M-240			**53** ± 16	25	8 ± 9	48
IMV-VA01-V1-M-241			10 ± 9	25	0 ± 7	48
Summary for Survey Unit # VA01 (238 detail records)						
Average			14		2	
Minimum			0		0	
Maximum			134		111	
Standard Deviation			17		8	

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VE01 Class: N/A

Location Code	Total Beta Activity Measurements			Removable Activity Measurements			
	Activty		MDC	Tritium		Carbon-14	
				Activity	MDC	Activity	MDC
IMV-VE01-V1-M-001				18 ± 11	25	0 ± 7	48
IMV-VE01-V1-M-002				5 ± 8	25	4 ± 8	48
IMV-VE01-V1-M-003				9 ± 9	25	8 ± 9	48
IMV-VE01-V1-M-004				10 ± 9	25	2 ± 8	48
IMV-VE01-V1-M-005				4 ± 8	25	0 ± 7	48
IMV-VE01-V1-M-006				0 ± 7	25	8 ± 9	48
IMV-VE01-V1-M-007				4 ± 8	25	4 ± 8	48
IMV-VE01-V1-M-008				19 ± 11	25	1 ± 7	48
IMV-VE01-V1-M-009				0 ± 7	25	13 ± 10	48
IMV-VE01-V1-M-010				6 ± 8	25	2 ± 8	48
IMV-VE01-V1-M-011				12 ± 10	25	3 ± 8	48
IMV-VE01-V1-M-012	83	2292	1096	0 ± 7	25	8 ± 9	48
IMV-VE01-V1-M-013	-72	2183	1096	1 ± 7	25	3 ± 8	48
IMV-VE01-V1-M-014	134	2327	1096	21 ± 11	25	8 ± 9	48
IMV-VE01-V1-M-015				7 ± 9	25	4 ± 8	48
IMV-VE01-V1-M-016				7 ± 9	25	11 ± 10	48
IMV-VE01-V1-M-017				0 ± 7	25	0 ± 7	48
IMV-VE01-V1-M-018				15 ± 10	25	0 ± 7	48
IMV-VE01-V1-M-019				21 ± 11	25	1 ± 7	48
IMV-VE01-V1-M-020				14 ± 10	25	0 ± 7	48
IMV-VE01-V1-M-021				4 ± 8	25	3 ± 8	48
IMV-VE01-V2-M-022				7 ± 9	25	0 ± 7	48
IMV-VE01-V2-M-023				15 ± 10	25	12 ± 10	48
IMV-VE01-V2-M-024				0 ± 7	25	13 ± 10	48
IMV-VE01-V2-M-025				3 ± 8	25	3 ± 8	48
IMV-VE01-V2-M-026				7 ± 9	25	5 ± 8	48
IMV-VE01-V2-M-027				25 ± 12	25	1 ± 7	48
IMV-VE01-V2-M-028				20 ± 11	25	2 ± 8	48
IMV-VE01-V2-M-029				12 ± 10	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VE01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VE01-V2-M-030			15 ± 10	25	0 ± 7	48
IMV-VE01-V2-M-031			22 ± 11	25	0 ± 7	48
IMV-VE01-V2-M-032			1 ± 7	25	3 ± 8	48
IMV-VE01-V2-M-033			17 ± 11	25	5 ± 8	48
IMV-VE01-V2-M-034			14 ± 10	25	4 ± 8	48
IMV-VE01-V2-M-035			4 ± 8	25	9 ± 9	48
IMV-VE01-V2-M-036			1 ± 7	25	1 ± 7	48
IMV-VE01-V2-M-037			24 ± 12	25	1 ± 7	48
IMV-VE01-V2-M-038			5 ± 8	25	2 ± 8	48
IMV-VE01-V2-M-039			4 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-040			14 ± 10	25	0 ± 7	48
IMV-VE01-V2-M-041			15 ± 10	25	0 ± 7	48
IMV-VE01-V2-M-042			0 ± 7	25	9 ± 9	48
IMV-VE01-V2-M-043			12 ± 10	25	0 ± 7	48
IMV-VE01-V2-M-044			10 ± 9	25	4 ± 8	48
IMV-VE01-V2-M-045			13 ± 10	25	2 ± 8	48
IMV-VE01-V2-M-046			17 ± 11	25	0 ± 7	48
IMV-VE01-V2-M-047			5 ± 8	25	8 ± 9	48
IMV-VE01-V2-M-048			0 ± 7	25	0 ± 7	48
IMV-VE01-V2-M-049			23 ± 12	25	0 ± 7	48
IMV-VE01-V2-M-050			19 ± 11	25	5 ± 8	48
IMV-VE01-V2-M-051			1 ± 7	25	3 ± 8	48
IMV-VE01-V2-M-052			1 ± 7	25	16 ± 11	48
IMV-VE01-V1-M-053			3 ± 8	25	8 ± 9	48
IMV-VE01-V1-M-054			10 ± 9	25	4 ± 8	48
IMV-VE01-V1-M-055			15 ± 10	25	0 ± 7	48
IMV-VE01-V1-M-056			6 ± 8	25	0 ± 7	48
IMV-VE01-V1-M-057			0 ± 7	25	11 ± 10	48
IMV-VE01-V2-M-058			11 ± 9	25	9 ± 9	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VE01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VE01-V3-M-059			0 ± 7	25	0 ± 7	48
IMV-VE01-V2-M-060			3 ± 8	25	3 ± 8	48
IMV-VE01-V3-M-061			15 ± 10	25	2 ± 8	48
IMV-VE01-V2-M-062			9 ± 9	25	0 ± 7	48
IMV-VE01-V2-M-063			18 ± 11	25	5 ± 8	48
IMV-VE01-V3-M-064			11 ± 9	25	0 ± 7	48
IMV-VE01-V2-M-065			21 ± 11	25	1 ± 7	48
IMV-VE01-V2-M-066			0 ± 7	25	0 ± 7	48
IMV-VE01-V2-M-067			6 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-068			6 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-069			19 ± 11	25	0 ± 7	48
IMV-VE01-V2-M-070			0 ± 7	25	8 ± 9	48
IMV-VE01-V2-M-071			12 ± 10	25	13 ± 10	48
IMV-VE01-V3-M-072			4 ± 8	25	1 ± 7	48
IMV-VE01-V3-M-073			8 ± 9	25	3 ± 8	48
IMV-VE01-V2-M-074			10 ± 9	25	3 ± 8	48
IMV-VE01-V2-M-075			10 ± 9	25	1 ± 7	48
IMV-VE01-V2-M-076			20 ± 11	25	0 ± 7	48
IMV-VE01-V2-M-077			19 ± 11	25	2 ± 8	48
IMV-VE01-V3-M-078			11 ± 9	25	0 ± 7	48
IMV-VE01-V3-M-079			20 ± 11	25	0 ± 7	48
IMV-VE01-V3-M-080			6 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-081			13 ± 10	25	0 ± 7	48
IMV-VE01-V2-M-082			10 ± 9	25	4 ± 8	48
IMV-VE01-V2-M-083			18 ± 11	25	0 ± 7	48
IMV-VE01-V2-M-084			10 ± 9	25	4 ± 8	48
IMV-VE01-V2-M-085			6 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-086			1 ± 7	25	3 ± 8	48
IMV-VE01-V3-M-087			17 ± 11	25	0 ± 7	48

Note: All results reported in dpm/100cm^2.

Building Systems Final Status Survey Results

Building IMV Survey Unit VE01 Class: N/A

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-VE01-V3-M-088			14 ± 10	25	0 ± 7	48
IMV-VE01-V3-M-089			2 ± 7	25	0 ± 7	48
IMV-VE01-V3-M-090			21 ± 11	25	2 ± 8	48
IMV-VE01-V2-M-091			0 ± 7	25	0 ± 7	48
IMV-VE01-V2-M-092			4 ± 8	25	0 ± 7	48
IMV-VE01-V2-M-093			5 ± 8	25	4 ± 8	48
IMV-VE01-V3-M-094			17 ± 11	25	2 ± 8	48
IMV-VE01-V2-M-095			11 ± 9	25	0 ± 7	48
IMV-VE01-V2-M-096			11 ± 9	25	0 ± 7	48
IMV-VE01-V2-M-097			0 ± 7	25	8 ± 9	48
IMV-VE01-V2-M-098			15 ± 10	25	0 ± 7	48
Summary for Survey Unit # VE01 (98 detail records)						
Average	48		10		3	
Minimum	-72		0		0	
Maximum	134		25		16	
Standard Deviation	107		7		4	
Summary for Building # IMV (458 detail records)						
Avg	952		12		2	
Min	-72		0		0	
Max	1849		134		111	

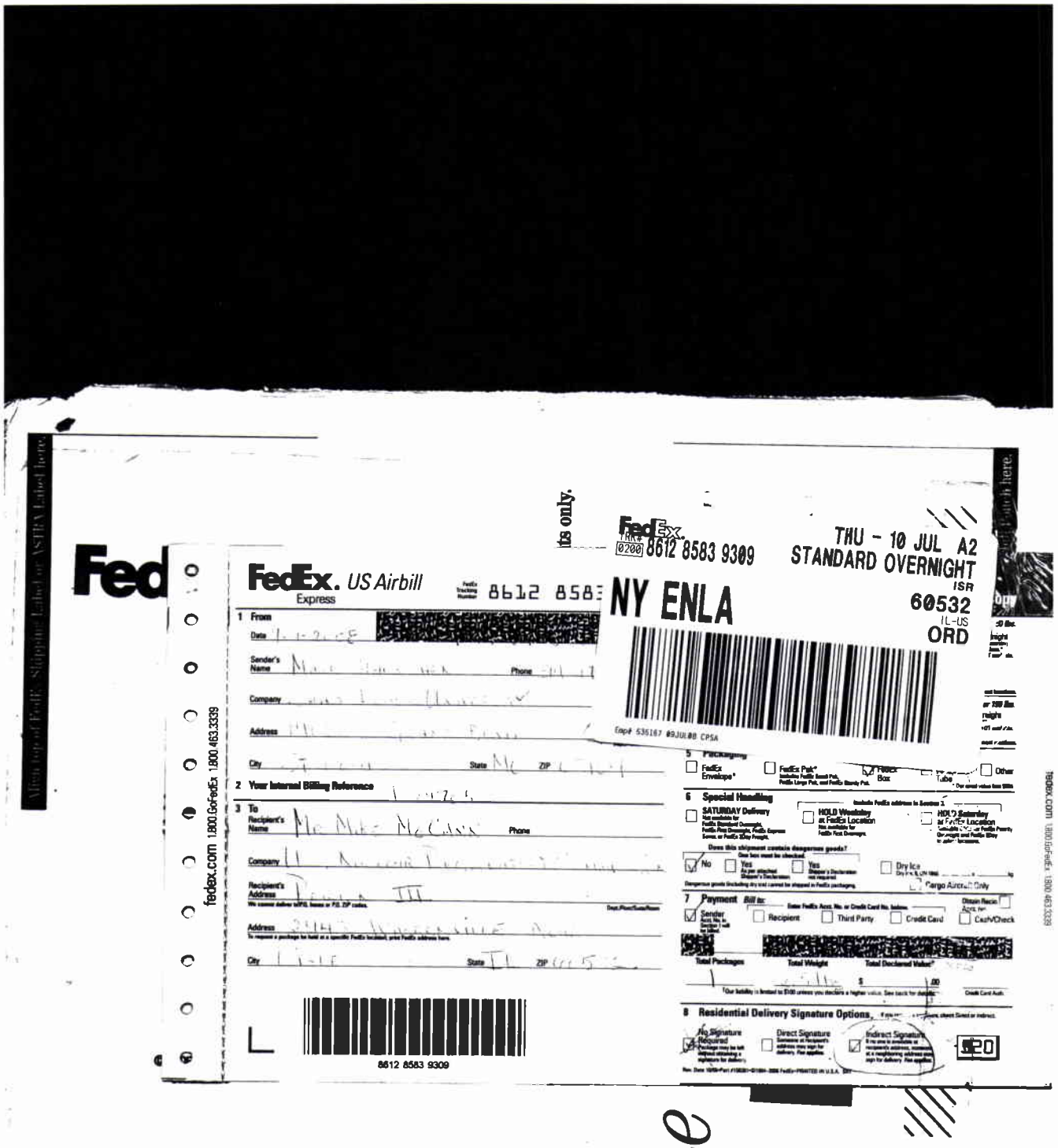
Note: All results reported in dpm/100cm^2.

Quality Assurance Survey Results

Building IMV Survey Unit QA01 Class 2

Location Code	Total Beta Activity Measurements		Removable Activity Measurements			
			Tritium		Carbon-14	
	Activty	MDC	Activity	MDC	Activity	MDC
IMV-QA01-F1-M-001	207 ± 2143	1028	6 ± 8	48	3 ± 8	25
IMV-QA01-B1-X-002	207 ± 2143	1028	7 ± 9	48	0 ± 7	25
IMV-QA01-F1-T-003	-258 ± 1769	1028	4 ± 8	48	2 ± 8	25
IMV-QA01-F1-T-004	207 ± 2143	1028	8 ± 9	48	10 ± 9	25
IMV-QA01-F1-T-005	-103 ± 1902	1028	23 ± 12	48	0 ± 7	25
IMV-QA01-B1-X-006	155 ± 2105	1028	16 ± 10	48	4 ± 8	25
IMV-QA01-F1-T-007	-52 ± 1944	1028	7 ± 9	48	5 ± 8	25
IMV-QA01-F1-T-008	0 ± 1985	1028	8 ± 9	48	4 ± 8	25
IMV-QA01-B1-X-009	52 ± 2026	1028	8 ± 9	48	2 ± 8	25
IMV-QA01-B1-X-010	-155 ± 1858	1028	4 ± 8	48	1 ± 7	25
IMV-QA01-B1-X-011	-103 ± 1902	1028	11 ± 9	48	0 ± 7	25
IMV-QA01-F1-T-012	155 ± 2105	1028	6 ± 8	48	0 ± 7	25
IMV-QA01-F1-T-013	155 ± 2105	1028	23 ± 12	48	0 ± 7	25
IMV-QA01-F1-T-014	0 ± 1985	1028	11 ± 9	48	0 ± 7	25
IMV-QA01-F1-T-015	52 ± 2026	1028	10 ± 9	48	1 ± 7	25
IMV-QA01-F1-T-016	0 ± 1985	1028	21 ± 11	48	0 ± 7	25
Summary for Survey Unit # QA01 (16 detail records)						
Average	32		11		2	
Minimum	-258		4		0	
Maximum	207		23		10	
Standard Deviation	142		6		3	
Summary for Building # IMV (16 detail records)						
Avg	32		11		2	
Min	-258		4		0	
Max	207		23		10	

Note: All results reported in dpm/100cm^2.



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