**REVISION 0**

# FINAL STATUS SURVEY EVALUATION FOR SURFACES OF STRUCTURES ASSOCIATED WITH THE JANA ELEMENTARY SCHOOL, HAZELWOOD SCHOOL DISTRICT

## ST. LOUIS, MISSOURI

**APRIL 24, 2023**

**U.S. Army Corps of Engineers**
**St. Louis District Office**
**Formerly Utilized Sites Remedial Action Program**

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## ST. LOUIS, MISSOURI

**APRIL 24, 2023**

*prepared by*
U.S. Army Corps of Engineers St. Louis District
Formerly Utilized Sites Remedial Action Program

*with assistance from*
Leidos, Inc.
Under Contract No. W912P923P0003

# ABSTRACT


| | |
|---|---|
| Site Name | Hazelwood School District property for the Jana Elementary School |
| Location | Florissant, Missouri |
| Description | This final status survey evaluation (FSSE) is for surfaces of structures associated with the school. The phrase "these structures" is used to refer to school structures. These structures are used for institutional (educational) and recreational purposes. These structures include floors, tables, cabinets, desks, bookshelves, ducting and piping, kitchen and recreational equipment, pavement, and the lower 2 m of interior and exterior walls. This FSSE was conducted per the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).<br>The U.S. Army Corps of Engineers (USACE) performed surveys of structure surfaces associated with the school in response to community concerns about allegations that the surfaces of structures had unacceptable levels of radioactivity associated with Manhattan Engineer District (MED) and U.S. Atomic Energy Commission (AEC) activities (Brustowicz, Thompson, and Kaltofen 2022). |
| **Conclusion** | **The surfaces of these structures meet CERCLA protectiveness requirements and are consistent with background levels. No evidence was identified that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces. These conclusions are based on 922 radiological survey results, scan surveys, 941 structure swipe measurements, 40 analytical results from 9 dust/pavement sediment samples, and risk and dose assessments.** |
| Regulatory Oversight | U.S. Environmental Protection Agency (USEPA), Region 7<br>Missouri Department of Natural Resources |
| Contractor Oversight | USACE St. Louis District |
| Verification Contractor | Leidos, Inc. |
| Possible Waste Source | Historical storage of MED/AEC uranium processing waste materials occurred 5 miles upstream of this property. The storage occurred from the 1940s through 1960s at the St. Louis Airport Site (SLAPS) and the Hazelwood Interim Storage Site/Futura Coatings Company (HISS/Futura). Rain washed soil from these sites into Coldwater Creek (CWC). CWC transported the soil downstream until the soil was deposited in and along the stream. Soil deposits were not uniform. Remediation of accessible soil was completed at the SLAPS and HISS/Futura in 2006 and 2013, respectively. |
| Contaminants of Concern (COCs) | Per Table 2-2 of the *Record of Decision for the North St. Louis County Sites* (ROD) (USACE 2005), the COCs for structures at the North St. Louis County Sites are actinium-227, lead-210, protactinium-231, radium-226, radium-228, thorium-228, thorium-230, thorium-232, uranium-234, uranium-235, and uranium-238. |
| Regulatory Requirements/ Remediation Goals (RGs) | See the ROD for regulatory requirements and RGs that provide protectiveness. In summary, the National Oil and Hazardous Substances Pollution Contingency Plan (40 *Code of Federal Regulations [CFR]* 300.430) identifies that protectiveness is achieved when the additional risk[a] to an individual's entire lifetime is generally less than 1 in 10,000. These example everyday risks of death are higher than 1 in 10,000 by the listed multiple (NSC 2022). |

| | | |
|---|---|---|
| Vehicle Crash: 90 times | Drowning: 8 times | Choking on Food: 3 times |
| Falls: 80 times | Fire/Smoke: 6 times | |

**ABSTRACT (Continued)**

| | |
|---|---|
| Regulatory Requirements/ RGs (Continued) | Because these COCs are naturally present in the environment and in structural materials, natural background levels of these COCs in the environment and in structural materials are not required to be included in property-specific risk estimates. Because instruments do not measure risk, the ROD provides for an equivalent control number[1] for what they measure.<br>• The control number for structure surfaces is 2,800 dpm/100 $cm^2$ of total alpha radioactivity[b]. As an additional health-conservative measure, a control of 6,000 dpm/100 $cm^2$ for total beta radioactivity on structure surfaces is applied. Both of these limits are for radioactivity in excess of background.<br>• The control number for soil is 1.0 for the average net sum of ratios ($SOR_N$) for an area of 100 $m^2$. The $SOR_N$ is based on sample results, RGs, and subtraction of background radioactivity.<br>• While natural background is not required to be included in these numerical assessments, practical limitations on determining the amount of all background radiation resulted in some types of background radioactivity being included in these assessments. See Section 2.0 of this FSSE for more information on the types of background radiation.<br>The ROD requires site-specific data be used to assess the risk and dose for the site that is in excess of background. This risk estimate is compared to 1 in 10,000 and the dose[c] is compared to 19 mrem per year. |
| Data Collection Method and Dates | Hand-held instruments that detect very low levels were used to measure alpha radioactivity and beta radioactivity at 461 locations. The locations were either randomly selected or selected because they were more likely to have radioactivity. At these locations, 480 swipes with standard cloth discs were taken across the surfaces to collect removable radioactivity. Those cloth discs were analyzed for alpha radioactivity and beta radioactivity, and 19 cloths from areas of higher indoor dust were analyzed for lead-210.<br>Dust was collected from 5 indoor locations, and pavement sediment was collected from 4 outdoor locations. These samples underwent laboratory analysis for the primary COCs associated with MED/AEC activities. For the 3 pavement sediment locations with sufficient material for additional laboratory analyses, results were obtained for lead-210 and polonium-210.<br>These data were collected from October 24, 2022, through November 1, 2022. |
| Remediation Methods/Dates | No results exceeded the limits. No remediation was necessary or occurred. |

[1] The term "control number" is a generic term for the various types of words, acronyms, and expressions that have numbers that were established in the effort to be protective of health and the environment per CERCLA requirements and guidance. Site-specific results are compared against control numbers.

## ABSTRACT (Continued)

<table>
<tr><td>Results</td><td>The surfaces of these structures meet the protectiveness requirements for unlimited use and unrestricted exposure (UUUE) and are consistent with background levels.<ul><li>The additional lifetime risk estimate is 1/7th of protectiveness level. These example everyday risks of death are higher by the listed multiple (NSC 2022).<table><tr><td>Vehicle Crash: 650 times</td><td>Drowning: 65 times</td><td>Choking on Food: 25 times</td></tr><tr><td>Falls: 630 times</td><td>Fire/Smoke: 45 times</td><td>Sunstroke: 8 times</td></tr></table></li><li>The additional dose estimate is 1/5th of the protectiveness level.</li><li>The additional risk and dose from natural background radiation, excluding radon, from living in Colorado instead of Missouri is 8 times higher than the estimated risk and dose for Jana Elementary School.</li><li>These risk and dose estimates are designed to avoid underestimates.</li><li>All fixed-point surface measurements were less than 1/9th of the surrogate control for alpha radioactivity and half of the control for beta radioactivity. These results are within the expected range of natural background levels for the structure materials.</li><li>None of the measurements for removable radioactivity exceeded minimum detectable concentrations that were 1/22nd or less of the surrogate alpha control and 1/9th or less of the surrogate beta control.</li><li>All dust/pavement sediment sample results were less than 1/11th of the control number for soil.</li></ul></td></tr>
</table>

[a] When estimating cancer risk, predictions indicate a lifetime risk level for an exposed individual and how many additional cancer cases might occur in a population of exposed people (i.e., $1 \times 10^{-6}$ is equal to one additional case in a population of one million). These cancers may or may not occur, but should they occur, they would be in addition to cancers from other causes, such as smoking tobacco or obesity.

[b] Alpha radioactivity refers to all alpha particles being produced whether naturally occurring or from MED/AEC activities. Beta radioactivity refers to all beta particles being produced whether naturally occurring or from MED/AEC activities.

[c] Dose is a quantity that expresses all radiations on a common scale for calculating the effective absorbed dose and is measured in mrem.

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## BACK COVER

The primary distribution format for this document is electronic files. If printed copies are distributed, the following portions will be included on a CD-ROM on the back cover of the report instead of being printed: Appendix C; Appendix E; Attachment G-1, EPC Calculations File and ProUCL Output Files; and Attachment G-2, RESRAD-ONSITE Output Summary Reports.

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| $\varepsilon_i$ | instrument efficiency |
| $\varepsilon_s$ | surface efficiency |
| 1997 EFH | *Exposure Factors Handbook* |
| 2011 EFH | *Exposure Factors Handbook: 2011 Edition* |
| Ac | actinium |
| AEC | U.S. Atomic Energy Commission |
| amsl | above mean sea level |
| ANL | Argonne National Laboratory |
| ANSI | American National Standards Institute |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| *CFR* | *Code of Federal Regulations* |
| COC | contaminant of concern |
| CWC | Coldwater Creek |
| DCGL | derived concentration guideline level |
| DoD | U.S. Department of Defense |
| DOE | U.S. Department of Energy |
| DQA | data quality assessment |
| DQO | data quality objective |
| ELAP | Environmental Laboratory Accreditation Program |
| EPC | exposure point concentration |
| FGR-13 | *Federal Guidance Report No. 13: Cancer Risk Coefficients for Environmental Exposure to Radionuclides* |
| FS | *Feasibility Study for the St. Louis North County Site* |
| FSS | final status survey |
| FSSE | final status survey evaluation |
| FSSP | *Final Status Survey Plan for Soils, Structures, and Sediments at the St. Louis FUSRAP Sites* |
| FUSRAP | Formerly Utilized Sites Remedial Action Program |
| Futura | Futura Coatings Company |
| GFPC | gas flow proportional counter |
| GIS | geographic information system |
| GPS | global positioning system |
| HISS | Hazelwood Interim Storage Site |
| HSD-JES | Hazelwood School District property for the Jana Elementary School |
| ICRP | International Commission on Radiological Protection |
| LBGR | lower bound of the gray region |
| Leidos | Leidos, Inc. |
| MARSSIM | *Multi-Agency Radiation Survey and Site Investigation Manual* |
| MDC | minimum detectable concentration |
| MDHSS | Missouri Department of Health and Senior Services |
| MDNR | Missouri Department of Natural Resources |
| MED | Manhattan Engineer District |
| NCP | National Oil and Hazardous Substances Contingency Plan |

## ACRONYMS AND ABBREVIATIONS (Continued)

| | |
|---|---|
| NRC | U.S. Nuclear Regulatory Commission |
| NUREG | U.S. Nuclear Regulatory Commission (technical report designation) |
| ORNL | Oak Ridge National Laboratory |
| OSWER | Office of Solid Waste and Emergency Response |
| Pa | protactinium |
| Pb | lead |
| PDI | pre-design investigation |
| QA | quality assurance |
| RA | remedial action |
| Ra | radium |
| RAGS Part A | *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part A)* |
| RESRAD | RESidual RADioactivity (computer model) |
| RG | remediation goal |
| RME | reasonably maximally exposed |
| ROD | *Record of Decision for the North St. Louis County Sites* |
| SLAPS | St. Louis Airport Site |
| $SOR_G$ | gross sum of ratios (unitless) |
| $SOR_N$ | net sum of ratios (unitless) |
| SRNL | Savannah River National Laboratory |
| STSU | structure survey unit |
| SU | survey unit |
| TEDE | total effective dose equivalent |
| Th | thorium |
| U | uranium |
| UCL | upper confidence limit |
| $UCL_{95}$ | 95 percent upper confidence limit |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| UUUE | unlimited use and unrestricted exposure |
| VQ | validation qualifier |

## UNIT ABBREVIATIONS

Both English and metric units are used in this report. The units used in a specific situation are based on common unit usage or regulatory language (e.g., depths are given in feet, and areas are given in square meters). Units included in the following list are not defined at first use in this report.

| | |
|---|---|
| cm | centimeter(s) |
| $cm^2$ | square centimeter(s) |
| cpm | counts per minute |
| dpm/100 $cm^2$ | disintegrations per minute per 100 square centimeters |
| ft | foot/feet |
| $g/cm^3$ | gram(s) per cubic centimeter |
| m | meter(s) |
| $m^2$ | square meter(s) |
| $m^3$ | cubic meter(s) |
| MeV | megaelectron volt(s) |
| mL | milliliter(s) |
| mrem | millirem |
| pCi | picocurie(s) |
| pCi/g | picocurie(s) per gram |
| $pCi/m^2$ | picocurie(s) per square meter(s) |

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# 1.0 INTRODUCTION

The *Record of Decision for the North St. Louis County Sites* (ROD) (USACE 2005) includes Coldwater Creek (CWC) in its requirements for investigation of potential contamination[2]. The potential for contamination results from the storage and hauling of residues generated by uranium processing activities conducted by the Manhattan Engineer District (MED) and the U.S. Atomic Energy Commission (AEC) from the 1940s through the 1960s. The historical MED/AEC storage areas are the St. Louis Airport Site (SLAPS) and the Hazelwood Interim Storage Site/Futura Coatings Company (HISS/Futura); both are adjacent to CWC. The SLAPS is located adjacent to Banshee Road, and the HISS/Futura is located approximately 1,250 m downstream of the SLAPS. As part of the Formerly Utilized Sites Remedial Action Program (FUSRAP), the U.S. Army Corps of Engineers (USACE) St. Louis District implements the ROD.

The USACE performed surveys of structure surfaces associated with the Jana Elementary School[3] in response to community conerns about allegations that the surfaces of structures had unacceptable levels of radioactivity associated with MED/AEC activities (Brustowicz, Thompson, and Kaltofen 2022). Information related to the referenced report is provided by the Savannah River National Laboratory (SRNL) in Appendix A, "SRNL Technical Review of the Kaltofen 'Radioactive Contamination at the Jana Elementary School' Document" (SRNL 2022).

The Hazelwood School District property for the Jana Elementary School (HSD-JES) is located approximately 8,100 m downstream of the SLAPS (Figure 1). These building structures are located on a knoll approximately 6 ft higher than the 500-year floodplain for CWC that approximates the 504-ft above mean sea level (amsl) contour (Figure 2). These structures are used for institutional (educational) and recreational purposes. These structures include indoor floors, tables, cabinets, desks, bookshelves, ducting and piping, and kitchen equipment; outdoor pavement and recreational equipment; and walls. The initial buildings were constructed in the early 1970s.

Surface water transport of contaminated soil from historical MED/AEC storage areas adjacent to CWC at the SLAPS and the HISS/Futura is the predominant mechanism for contamination in CWC. Because of flooding events, the potential exists for the sediment to be deposited on floodplain properties adjacent to CWC. The USACE has identified the 10-year floodplain as the primary area for investigation based on evidence of contaminated soil in the CWC floodplain between Banshee Road and Dunn Road. The 10-year floodplain is also flooded more frequently (50 times more frequently than the 500-year floodplain), providing more opportunity for sediment to be deposited.

The MED/AEC COCs for North St. Louis County Sites structures are listed in Table 2-2 of the ROD (USACE 2005): actinium (Ac)-227, lead (Pb)-210, protactinium (Pa)-231, radium (Ra)-226, Ra-228, thorium (Th)-228, Th-230, Th-232, uranium (U)-234, U-235, and U-238. The purpose of this final status survey evaluation (FSSE) is to evaluate the information gathered per the *Final Status Survey Plan for Soils, Structures, and Sediments at the St. Louis FUSRAP Sites* (FSSP) (USACE 2015) against the ROD requirements for structure surfaces to determine if unlimited use and unrestricted exposure (UUUE) or remedial action (RA) criteria are met.

Separate reports for the Jana Elementary School contain the FSSEs for soil and information about lead-210.

[2] For the purposes of this report, the term "contamination" refers to the presence of contaminants of concern (COCs) in concentrations that exceed the ROD remediation goals (RGs).

[3] The surfaces of structures associated with the Jana Elementary School will be referred to as "these structures" in this report.

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## 2.0 SURVEY DESIGN AND EXECUTION

The initial pre-design investigation (PDI) activities were planned for and conducted within the 10-year floodplain (USACE 2019a, 2019b). The initial planned PDI activities were substantially more than traditional scoping and characterization surveys described in *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) guidance (DoD 2000). Based on the results of those initial PDI activities and information available to the USACE, the impacted area requiring investigation did not require expansion beyond the 10-year floodplain to upgradient portions of the school property. Based on community concerns about the Brustowicz, Thompson, and Kaltofen report, the USACE expanded the PDI activities beyond the 10-year floodplain to collect additional data on the remaining upgradient HSD-JES (HGL 2021, 2022). The SRNL report notes, "None of the Jana Elementary School sample data reported by Eberline Analytical in the Kaltofen Report exceeded criteria set forth in 40 *[Code of Federal Regulations] CFR* 192." Soil would have to exceed the criteria set forth in 40 *CFR* 192 to be considered contaminated.

MARSSIM (DoD 2000) guidance recommends using site information and analytical data to assign structure surfaces to one of three classifications. The classifications are based on the potential for radioactive contamination in soil. Class 1 areas have the greatest potential for contamination, while Class 3 areas have the least potential. Instead of using MARSSIM scoping and characterization surveys to classify the survey units (SUs) (i.e., MARSSIM Figure 2.4), PDI data are used. The PDI data support a Class 3 classification. The potential for these structures to have MED/AEC radioactivity exceeding protectiveness criteria is low based on the following.

- None of the PDI fixed-point measurements taken from these structures exceeded half of the derived concentration guideline levels (DCGLs). The FSSP (USACE 2015) states that the Class 3 structure survey unit (STSU) investigation level is half of the DCGLs. None of the swipe measurements for removable radioactivity from these structures exceeded the low minimum detectable concentrations (MDCs).
- The structures are located on a knoll that is approximately 6 ft higher than the 500-year floodplain for CWC that approximates the 504-ft amsl contour (Figure 2). The structures are also approximately 3 ft higher than the highest recorded flooding of CWC in 1957 before the school was built (USGS 1971). Sediment deposits from CWC would be a potential mechanism for MED/AEC contamination to be present on the surfaces if flood waters were to rise high enough.
- More than 600 radiological fixed-point measurements representing 176,000 $m^2$ of surface area have been taken on upstream structures between the SLAPS and the HSD-JES. These structures are in the 10-year floodplain and within the CWC banks. Because instruments do not measure risk and dose from surface radioactivity, the ROD contains methods for deriving an equivalent control number, or surrogate, for what the instruments measure. The resulting numbers are called DCGLs or RGs. The *Derivation of Site-Specific DCGLs for North County Structures* (USACE 2004) and the FSSP contain more details on the derivation. For structure surfaces, the resulting DCGLs at the time of the survey was 2,800 dpm/100 $cm^2$ for total alpha radioactivity and the designated total beta DCGL of 6,000 dpm/100 $cm^2$ (USACE 2015). None of these 600 measurements have exceeded these DCGLs. The following list contains additional information on these measurements.
    - All but 1 of the alpha measurements were less than 20 percent of the surrogate total alpha DCGL, and that result of 2,371 dpm/100 $cm^2$ was attributed to radon decay products attracted to a plastic surface by static electricity.

- All but 3 of the beta measurements were less than 50 percent of the total beta DCGL, and those 3 results (3,125, 3,320, and 3,909 dpm/100 $cm^2$) were attributed to naturally occurring radioactivity in brick.
- The original derivation of the surrogate total alpha DCGL used activity fractions from *Feasibility Study for the St. Louis North County Site* (FS) data for CWC (USACE 2003). The activity fractions have now been updated to use PDI sample data with net sum of ratio ($SOR_N$) values exceeding 1.0 collected from CWC (approximately 1,100 samples from 7 miles of CWC properties downstream of Dunn Road) to provide an improved dataset for determining the activity fractions associated with MED/AEC radioactivity. While these updated activity fractions for CWC result in a revised surrogate total alpha DCGL of 6,000 dpm/100 $cm^2$, this FSSE continues to use 2,800 dpm/100 $cm^2$ as the surrogate total alpha DGCL that was used during fieldwork. Thus, the reported fractions have a health-conservative bias.

Based on MARSSIM guidance (DoD 2000), site information, and analytical data, these structures are classified into eight Class 3 STSUs. For Class 3 STSUs, MARSSIM guidance is to use randomly located fixed-point measurements of radioactivity on structure surfaces (DoD 2000). Random locations are preferred to gridded locations because the MARSSIM statistical tests assume random locations. Per MARSSIM, Class 3 STSUs can be unlimited in size. However, the number of random fixed-point measurement locations estimated for each STSU was based on achieving an average measurement density of one measurement per 100 $m^2$ for the floors and pavement, which is a higher density more typical of Class 2 areas than Class 3 areas. The area of the walls and equipment could not be estimated in advance, so judgment was used to assign a comparable number of random locations to those surfaces and augment with biased locations as necessary. The lower 2 m of the walls were selected for survey because they would be representative of the entire wall without requiring workers to be on ladders or lift equipment; the lower 2 m of walls are contacted more frequently by people, increasing the potential for dirt transfer to the lower walls. The STSUs are described as follows.

- STSU-1: The floors of the first story of the buildings.
- STSU-2: The floors of the second story of the buildings.
- STSU-3: The interior walls up to 2 m and equipment, including furniture, in the first story of the buildings.
- STSU-4: The interior walls up to 2 m and equipment, including furniture, in the second story of the buildings.
- STSU-5: The exterior walls up to 2 m of the buildings.
- STSU-6: The playground equipment.
- STSU-7: The pavement near the buildings.
- STSU-8: The walkway from the end of Marsielle Place to Jana Drive.

The PDI surveys of these structures were planned so the data would meet MARSSIM requirements (DoD 2000), allowing the data to be used for the final status survey (FSS). Specifically, the FSSP (USACE 2015) was followed in planning and executing the survey design to ensure the data quality objectives (DQOs) for the FSS would be met.

The performance of these surveys involved five different categories of background radiation that are described in the following bulleted list.

- General Area Background Radiation (Field). Prior to beginning surveys of the surfaces, count rates are taken in the open area of the building away from the walls and floors. These count rates are subtracted from the fixed-point measurements of the structure surfaces.
- General Area Background Radiation (Laboratory). General area background radiation within the counting equipment is measured at the laboratory by taking readings without any samples loaded into the equipment. The equipment is shielded to lower general area background inside the equipment to help achieve the desired MDCs. The equipment general area background count rate is subtracted from the count rates associated with a sample. This subtraction is why some sample results are reported as negative values.
- Material Background Radiation. The materials used to the make a structure can have different amounts of natural radioactivity. Examples of materials with higher levels of natural radioactivity are bricks, stone, ceramic tiles, granite, concrete (from certain sands or coal ash), asphalt, and gypsum. When a radiation instrument is placed on the surface of such materials, the instrument detects the radiation coming from the material itself, in addition to any radioactivity lying on the surface. To determine the count rate of radiation coming from the material alone requires finding the exact same material without any possibility of radioactivity on its surface. Another difficulty is that a large building's bricks may look the same, but the clay may be from different locations with differing levels of background radioactivity. The count rates of material background radiation are often not determined because of the following.
    - The material background radiation count rates are generally small compared to the DCGLs.
    - The effort to determine the material background radiation for all of a building's materials requiring a survey is generally large.
    - The fixed-point measurement results are generally low enough so the risk and dose estimates made using the measurement results without subtracting material background count rates still meet the risk and dose protectiveness criteria.

  Material background radiation was not subtracted from the fixed-point measurements made for this FSSE.
- Natural Background Radon Progeny Deposits. Radon is a naturally occurring radioactive noble gas that can migrate out of soil. Radon progeny tend to become fixed to dust particles in the air. These particles can become attached to surfaces as a result of electrostatic charge or gravitational settling. Air flow through ventilation ducts or outdoor wind can produce an electrostatic charge that will attract these particles. A decrease in atmospheric pressure often precedes a rainstorm, which increases the radon release rate. Immediately prior to an electrical storm, an electrostatic charge can build up on equipment resulting in elevated radioactivity from radon progeny.

  The first four radon progeny in the decay chain have short half-lives with a combined half-life[4] of about 40 minutes. The fixed-point measurement count rate of a surface can be significantly elevated while those four progeny are decaying on the surface. Count rates from these radon progeny can be readily investigated by covering the surface or placing an item, like a ventilation filter, in a bag to prevent more radon progeny from settling on the surface. Then the fixed-point measurement can be retaken after a few hours. If the count

[4] A half-life is the amount of time for half of a given amount of radioactivity to decay to the next step in the decay chain.

rates have decreased significantly, then the first measurement included natural background radon progeny deposits. The second fixed-point measurement is representative of the condition of the surface for the purposes of this FSSE. Section 3.1 contains a discussion of when measurements were retaken after the surface had been covered or bagged for a few hours. Because this process takes extra time, some locations where radon progeny were suspected to be causing higher results were not investigated. The initial fixed-point measurements were used without attempting to subtract the count rate from natural background radon progeny deposits or remeasure as described.

- Soil Background Radioactivity. Radioactive elements were part of the formation of the earth. Some of those radioactive elements have very long decay rates, so a portion of the original radioactivity remains present in the earth's crust. These elements are from the uranium-238 decay chain, the uranium-235 decay chain, the thorium-232 decay chain, and potassium-40. Because the concentration of these radioactive elements varies with different soils, unimpacted local soil is sampled to determine the background concentrations. Because the dust and pavement sediment discussed in this FSSE eventually becomes part of soil, sample results for dust and pavement sediment are compared against background soil concentrations. For $SOR_N$ calculations, background soil concentrations are subtracted.

## 2.1 SELECTION OF FIXED-POINT MEASUREMENT LOCATIONS

### 2.1.1 Random Locations Based on MARSSIM Guidance

Appendix B contains a description of the process for ensuring measurements are taken at a sufficient number of random locations. A geographic information system (GIS) was used to randomly generate the measurement locations given to the field technicians. For outdoor locations on horizontal surfaces, the locations are identified by coordinates, and the field technicians use a civil-survey grade global positioning system (GPS) to find those locations. For indoor locations, a GIS analyst provided a figure with 5-ft grids and the specific grid spaces that were randomly selected for measurements. For the indoor floor, the field technicians measured distances from the southwestern corner of the room to record the location of each fixed-point measurement; photographs of the locations were also taken. For indoor walls and equipment, photographs were taken to document the location of each fixed-point measurement within the 5-ft grid. As discussed in Appendix B, MARSSIM guidance provides for 20 percent extra measurement locations to ensure sufficient data to meet objectives in the event of unusable or unavailable data (DoD 2000). The 301 random locations for fixed-point measurements are shown on Figures 3 through 10. These locations are grouped into eight STSUs.

### 2.1.2 Biased Locations Based on Scan Surveys

Scan surveys were performed on 100 percent of the accessible floor surfaces on the first story of the buildings and over a 2-$m^2$ area surrounding each of the random locations not on the floor of the first story. Biased locations were selected where the field technicians identified an increase in the audible count rates produced by the scan instrument; the increase in audible count rates indicated radioactivity could exceed the MDC. The 103 locations for fixed-point measurements based on scan surveys are shown on Figures 3 through 10.

### 2.1.3 Biased Locations Based on Professional Judgment

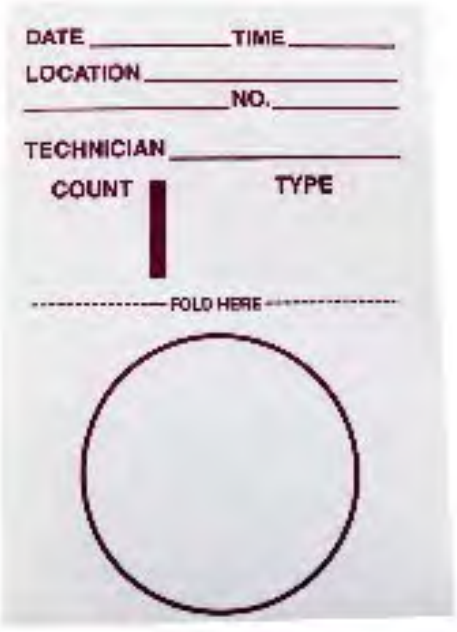
Field technicians and health physics staff selected locations based on areas that appeared underrepresented by the random locations; that were high-traffic areas such as doorways, kitchen, cafeteria; or that were areas infrequently cleaned such as closets, boiler, and mechanical rooms. The 35 locations for fixed-point measurements based on professional judgment are shown on Figures 3 through 10. In addition, USACE staff selected another 22 dusty locations for fixed-point measurements.

## 2.2 SURVEY METHODS

The fixed-point measurements of the structures were taken using a Ludlum Model 43-89 probe (125-$cm^2$ zinc-sulfide plastic alpha/beta scintillation detector) coupled with a Ludlum Model 2360 scaler/rate meter. The scan surveys were performed by keeping the probe face within 0.4 inch of the surface while moving the probe at a rate of 1 to 2 inches per second. A wheeled skate was used to hold the probe at the proper distance during the scan survey. In addition, the accessible areas of interior floors of the buildings were scanned using a floor monitor. The floor monitor was a Ludlum Model 43-37 probe (584-$cm^2$ gas flow proportional detector) coupled with a Ludlum Model 2360 scaler/rate meter. The probe and scaler/rate meter were mounted on a Ludlum Model 239-1 floor monitor cart. The rate of scan for the floor monitor was 3 inches per second. For either set of instruments, the technician listens for increases from the background count rate to identify locations for biased fixed-point measurements. The scaler/rate meter has different-sounding chirps for alpha and beta radioactivity. The technician operating the floor monitor would inform another technician of increased count rates, and that technician would investigate the area with the Ludlum Model 43-89 and collect a biased fixed-point measurement where increased count rates were observed.

The fixed-point measurements are taken by setting the detector on the surface to be measured and then using the built-in timer to count for 1 minute. The alpha radioactivity results and beta radioactivity results are each recorded by the technician.

Following each fixed-point measurement, the potential for loose surface radioactivity at that location was investigated by wiping a dry swipe over an area of 100 $cm^2$. A 100-$cm^2$ area is approximated by moving the swipe in an "S" shape through a 4-inch-by-4-inch square area. A swipe is a cloth disc of 20 $cm^2$ in size that is mounted on a piece of paper. The paper is folded to prevent cross contamination between swipes. Investigation levels for swipes were established at 10 percent of the DCGLs at 280 dpm/100 $cm^2$ for alpha radioactivity and 600 dpm/100 $cm^2$ for beta radioactivity.




The USACE staff inspected indoor and outdoor surfaces to select locations with higher potential for radioactivity to collect surface dust and pavement sediment. In addition, the USACE worked with school staff to investigate and collect dust samples at indoor locations examined as part

of the recent allegations. Surface dust and pavement sediment were sampled by scraping and picking up the dust or pavement sediment to place in a 120-mL metal sample container.

## 2.3 SURVEY EXECUTION

The surveys of these structure surfaces were conducted from October 24, 2022, through November 1, 2022. The USACE was on site during contractor work to perform these structure surveys. Three to four teams of field technicians and two senior health physicists were deployed to perform the surveys. In addition, the USACE St. Louis Radiation Safety Officer selected the fixed-point measurement locations identified as USACE judgmental locations. When a location was obstructed or the location did not have the intended surface (e.g., no equipment or wall at the specified location), a nearby location without an obstruction or with the intended surface was surveyed.

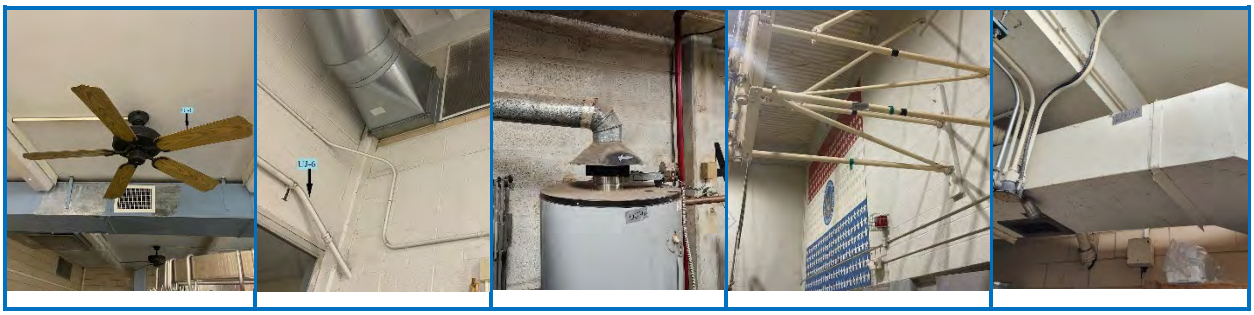
Sufficient surface dust was available and collected at five indoor locations (UB-1, UB-6, UB-11, UB-14, and UB-18), and sufficient pavement sediment was available and collected at four outdoor locations (SVP264222, SVP264223, SVP264224, and SVP264225). These locations are identified on Figures 5 and 9. The swipes, surface dust, and pavement sediment samples were logged on a chain-of-custody form for transfer to a laboratory for analysis (either the FUSRAP St. Louis Radioanalytical Laboratory or the Eurofins St. Louis laboratory in Earth City). Copies of the field logbook entries for the surface dust and pavement sediment samples are contained in Appendix C.

The swipes were analyzed for gross alpha radioactivity and gross beta radioactivity by the FUSRAP St. Louis Radioanalytical Laboratory, which is certified by the U.S. Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP). The instruments used for counting swipes were laboratory Mirion Series 5HP and Series 5XLB gas flow proportional counters (GFPCs). In addition, the swipes from 19 less disturbed and dirtier locations were analyzed for lead-210 through chemical leaching and liquid scintillation counting. The surface dust and pavement sediment samples were analyzed by chemical separation and alpha spectroscopy for Ra-226, Th-228, Th-230, Th-232, U-234, U-235, and U-238 at the FUSRAP St. Louis Radioanalytical Laboratory. The pavement sediment samples with sufficient material for multiple laboratory processes were also analyzed for lead-210 and polonium-210 by gamma spectroscopy and alpha spectroscopy, respectively, at the Eurofins St. Louis laboratory.

The short-lived decay products of natural background radon can settle on surfaces and temporarily interfere with measurement results for surfaces by causing higher count rates from background radon progeny deposits. Higher initial measurement results were investigated by covering the surface with plastic or placing the item (e.g., ventilation system filter) in a plastic bag. After a few hours, the covering or bag would be removed, and the surface would be resurveyed in the same manner as before. This process allowed time for the short-lived radon decay products to decay so the repeated measurement was not confounded by natural background radon (USACE 2019a). In all cases where this process was performed, short-lived radon decay products decayed away, and the final measurement results were consistent with material background levels.

Examples of fixed-point survey locations are indicated by the blue or gray tape on the following photographs.

On the following photographs, black arrows or gray tape identify the surfaces from which dust was removed.



## 2.4 QUALITY CONTROL AND QUALITY ASSURANCE

### 2.4.1 Field Instruments

Instruments used to perform this survey were previously described. These instruments were maintained and calibrated to manufacturers' specifications to ensure required quality assurance (QA) requirements for traceability, accuracy, precision, and sensitivity criteria of the equipment/instrumentation were met (DoD 2000, USACE 2015).

Instruments were calibrated at least annually in accordance with American National Standards Institute (ANSI) N323A-1997 or ANSI N323AB-2013, *American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments* (ANSI 1997, 2014). Current calibration and maintenance records for these instruments include, at a minimum, the following information:

- Name of the equipment,
- Equipment identification (model and serial number),
- Manufacturer,
- Date of calibration, and
- Next calibration due date.

To ensure the instrument continues to operate properly between calibrations, source and background checks were performed prior to and after daily use, as follows.

- Selecting a reference location for performance of checks. The reference location is selected based on the low general area ambient background radiation and on being consistently available for the daily checks.
- Inspecting for physical damage and ensuring the calibration is current.
- Performing 1-minute integrated counts with the source positioned in a reproducible geometry at the reference location. For the survey instruments, a designated Th-230 alpha radiation source and a designated strontium/yttrium-90 beta radiation source were used.
- Performing 1-minute integrated counts of general area ambient background radioactivity (with no designated source) at the reference location.
- Comparing the instruments' responses against the averages established at the post-calibration check-in. Performance criteria of $\pm$20 percent or within 3 standard deviations of the averages were used as investigation action levels for source and background checks, respectively. One exception to these checks occurred. While the floor monitor had met the daily background check at the beginning of the day on October 26, 2022, for alpha radioactivity, the floor monitor exceeded 3 standard deviations of the background value at the end of the day. The next morning, the floor monitor again met the daily background check for alpha radioactivity. The floor monitor also met the separately performed daily source checks at both the beginning and end of that day. The instrument was determined to still be operating within its calibration. The alpha background check is more susceptible to changes in natural background radioactivity, and if the instrument were biased high, then more (not fewer) biased fixed-point measurements would result.

Other QA parameters for these instruments and the corresponding confirmation data are listed as follows.

- Fixed-point MDCs for the field instruments ranged from 1 to 6 percent of the surrogate total alpha DCGL and 5 to 12 percent of the total beta DCGL. These MDCs met the goal of being less than 50 percent, and all the alpha MDCs met the preferred goal of being less than 10 percent. Three-quarters of the beta MDCs met the preferred goal of being less than 10 percent, and all the beta MDCs were 12 percent or less.
- The alpha scan probability for all instruments was 100 percent, which is greater than or equal to the goal of 85 percent.
- The lowest instrument efficiencies of 0.262 for alpha radiation and 0.22 for beta radiation are greater than 0.15 to optimize counting statistics.

### 2.4.2 Laboratory Instruments

The FUSRAP St. Louis Radioanalytical Laboratory is certified and audited through the DoD ELAP to ensure quality results. The ELAP includes requirements and audits of calibrations, source checks, and background checks similar to those discussed for field instruments. This project laboratory measures radioactivity at very low levels. In general, the MDC represents the lowest level that the laboratory can achieve for each sample given a set of variables, including detection efficiencies and conversion factors due to influences such as individual sample aliquot, sample density, and variations in analyte background radioactivity at the laboratory. The MDCs reported with laboratory analytical results met the goal of being less than 50 percent of release criteria.

Eurofins St. Louis undergoes similar reviews to be accredited for testing by the following.

- The State of Louisiana Department of Environmental Quality as part of the National Environmental Laboratory Accreditation Program to the "2009 TNI Standard" established by the National Environmental Laboratories Accreditation Conference Institute.
- The ANSI National Accreditation Board to the "ISO/IEC 17025:2017" standard and the U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories (DoD QSM V5.4).

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# 3.0 FINAL STATUS SURVEY EVALUATION

The FSSP (USACE 2015) uses the DQOs and data quality assessment (DQA) processes from *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA 2006a), *Data Quality Assessment: A Reviewer's Guide* (USEPA 2006b), and MARSSIM Chapter 8 and Appendix E (DoD 2000). These processes involve scientific and statistical planning and evaluations to ensure the analytical data are of the right type, quality, and quantity to provide the necessary basis for deciding whether these structures meet the criteria for UUUE.

## 3.1 STRUCTURE SURVEY UNIT EVALUATION

The primary goal of the FSS is to establish whether the null hypothesis statement, which is that the "radioactivity in the survey unit exceeds the release criterion" (DoD 2000), is accepted or rejected for each STSU. In this case, the release criterion is either the surrogate alpha or beta DCGLs. Several evaluations, described as follows, were conducted to test the null hypothesis.

- Comparing each fixed-point measurement to the applicable DCGL and investigating any result that exceeds the half[5] of the applicable DCGL, such as allowing for short-lived radon decay products to decay or taking additional measurements to average the result over 1 $m^2$.
- Evaluating the average random fixed-point measurement for each STSU to confirm the average measurements do not exceed either DGCL.
- Ensuring the STSU passes the Sign Test[6] to establish with sufficient statistical probability that the average measurement in the STSU does not exceed the RG. Data from biased fixed-point measurements are not included in the statistical test per MARSSIM guidance: "Judgment measurements are not included in the statistical evaluation of the survey unit because they violate the assumption of randomly selected, independent measurements. Instead, judgment measurements are individually compared to the DCGL" (DoD 2000). Therefore, only the random fixed-point measurements are included in the Sign Test.

The FSS radiological survey data for these structures are reported in Tables D-1 through D-9 of Appendix D. The locations of the fixed-point measurements are shown on Figures 3 through 10. The coordinates for the outdoor locations are included in Appendix D, and the photographic documentation of the indoor locations is provided in Appendix E.

The short-lived decay products of natural background radon can settle on surfaces and temporarily interfere with measurement results for surfaces by causing higher results that are not from contamination. Higher initial measurement results were investigated by covering the surface with plastic or placing the item (e.g., ventilation system filter) in a plastic bag. After several hours, the covering or bag would be removed, and the surface would be resurveyed in the same manner as before. This would allow time for the short-lived radon decay products to decay so the repeated measurement is not confounded by natural background radon. The fractions of the DCGLs for the initial and repeat surveys are provided in Table 1. Other surfaces with measurement results exceeding MDCs were also affected by natural background radon to a lesser degree, but those results were not similarly investigated. The final results for alpha radioactivity and beta radioactivity were consistent with expected background levels by being within 3 standard deviations of the average result.

[5] The FSSP (USACE 2015) requires results exceeding half of a DCGL to be investigated for Class 3 areas.

[6] The amount of natural background radioactivity in common building materials is low enough to allow selection of the Sign Test for statistical evaluation of an STSU in accordance with MARSSIM guidance (DoD 2000).

Appendix F contains the structure surface data grouped according to material types for this evaluation.

**Table 1. Fractions of the Derived Concentration Guideline Level for the Initial and Repeat Surveys**

| Location ID | B7 | | UB4 | | UB8 | | UB15 | | UB17 | | Seven Locations on Playground Slides | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alpha | Beta | Alpha | Beta | Alpha | Beta | Alpha | Beta | Alpha | Beta | Alpha | Beta |
| **Initial** | 0.14 | 0.04 | 0.35 | 0.30 | 3.04 | 5.78 | 0.19 | 0.12 | 0.52 | 0.54 | 0.12 to 0.31 | Not Recorded |
| **Repeat** | 0.01 | 0 | 0.01 | 0.01 | 0.05 | 0.11 | 0.05 | 0.01 | 0.01 | 0.04 | 0 to 0.03 | 0.03 to 0.04 |

Table 2 includes a summary of information about the STSUs. Each final fixed-point measurement (random and biased locations) was less than the alpha or beta DCGL, with the greatest fraction of the surrogate total alpha DCGL being 0.11 and of the beta DCGL being 0.496. Each STSU had an average of the random fixed-point measurements that was less than the alpha or beta DCGL, with the greatest average fraction being 0.03 of the surrogate total alpha DCGL and 0.18 of the beta DCGL. When the largest STSU random measurement does not exceed either DCGL, the Sign Test will always show that the STSU meets release criterion. No random systematic fixed-point measurement at any location exceeded a DCGL. Therefore, the STSUs automatically pass the Sign Test.

**Table 2. Information on Measurement Locations for Structure Survey Units**

| STSU | Required Number of Random Locations | Actual Number of Random Locations | Average DCGL Fraction of Random Locations | | Number of Biased Locations | Largest DCGL Fraction[a] | | Number of Swipes | Number of Swipes Exceeding MDC[b] | Figure Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha | Beta | | Alpha | Beta | | | |
| 1 | 8 | 50 | 0.02 | 0.01 | 51 | 0.09 | 0.11 | 101 | 0 | 3 |
| 2 | 8 | 20 | 0.00 | 0.00 | 2 | 0.02 | 0.01 | 22 | 0 | 4 |
| 3 | 8 | 50 | 0.03 | 0.03 | 37 | 0.08 | 0.496 | 87 | 0 | 5 |
| 4 | 8 | 20 | 0.01 | 0.04 | 4 | 0.11 | 0.36 | 24 | 0 | 6 |
| 5 | 8 | 50 | 0.01 | 0.18 | 7 | 0.03 | 0.38 | 57 | 0 | 7 |
| 6 | 8 | 20 | 0.02 | 0.04 | 5 | 0.05 | 0.17 | 25 | 0 | 8 |
| 7 | 8 | 81 | 0.02 | 0.07 | 50 | 0.10 | 0.20 | 130 | 0 | 9 |
| 8 | 8 | 10 | 0.01 | 0.12 | 4 | 0.04 | 0.26 | 14 | 0 | 10 |

[a] The largest fraction after investigation of confounding radioactivity from short-lived natural background radon decay products.

[b] MDC is the lowest activity achievable by the instrument for the count times.

## 3.2 PAVEMENT SEDIMENT AND DUST SAMPLE RESULTS

Sufficient surface dust was available and collected at five indoor locations (UB1, UB6, UB11, UB14, and UB18); these locations are identified on Figure 5. Sufficient pavement sediment was available and collected at four outdoor locations (SVP264222, SVP264223, SVP264224, and SVP264225). Locations of the pavement sediment are shown on Images 1 through 3 and Figure 9. Pavement sediment collects at cracks in the pavement, edges of pavement, or at sunken areas of the asphalt/concrete. While sufficient dust and pavement sediment was available at these locations for a single laboratory analysis for alpha spectroscopy, only three of these locations had sufficient material for a second sample to undergo the analyses for lead-210 and polonium-210.

**Image 1. Pavement Sediment Near Kindergarten Play Area**

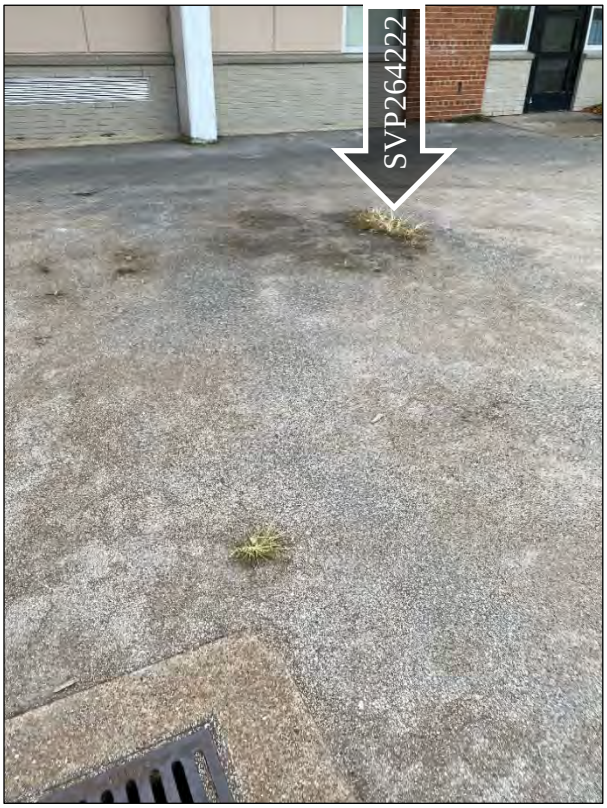


**Image 2. Pavement Sediment Northeast of Basketball Courts**


**Image 3. Pavement Sediment Southwest of Basketball Courts**

The surface dust and pavement sediment sample results are provided in Table D-9 of Appendix D. Table D-9 also contains the average and maximum sample results and the background reference area[8] average and maximum values. Table D-10 contains the background soil dataset. For the primary COCs, the sample results are evaluated by comparing the average and maximum sample results to the background reference area values, which shows they were consistent.

Because of small sample volumes, alpha spectroscopy was the applicable laboratory analysis suited to all nine samples. The analytical results included the following primary COCs, which are radionuclides in the uranium-238 decay chain: radium-226, thorium-230, uranium-234, and uraninum-238.

The analyses for lead-210 and polonium-210 required additional sample material. Only three of the pavement sediment sample locations (SVP264231, SVP264332, and SVP264333) had enough pavement sediment to collect a second sample for analysis for lead-210 and polonium-210 at the Eurofins St. Louis laboratory. The fourth pavement sediment area and none of the areas where dust samples were collected had enough material for a second sample to be collected. The 40 analytical results are contained in Table D-9 of Appendix D.

For radium-226, thorium-230, uranium-234, and uraninum-238, the average result for these samples was less than the natural background average value for soil. The Wilcoxon-Mann-Whitney Comparison Test confirmed the pavement sediment and dust results for radium-226, thorium-230, uranium-234, and uraninum-238 were consistent with or smaller than the values for the background dataset. These conclusions are based on a 95 percent confidence interval. These results indicate MED/AEC radioactivity is not present in pavement sediment and dust.

However, two of the pavement sediment samples (SVP264231 and SVP264332) had lead-210 results that were approximately 10 and 40 times higher than the results for radium-226, thorium-230, and uranium-238. Lead-210 is in the same uranium-238 decay chain as these three radionuclides. Early in the project, source term analysis was performed for soil at the SLAPS and the HISS/Futura (DOE 1993). The source term analysis established relationships of these primary radionuclides to lead-210. Specifically, lead-210 concentrations in soil are up to 2.4 times the radium-226 concentrations in soil. Thus, the these two samples having lead-210 results of 10 and 40 times the radium-226 results requires investigation. This investigation is documented in detail in a separate USACE report about lead-210 sample results at the HSD-JES.

In summary from the separate USACE report, the following reasons are the only ones that could cause the higher lead-210 concentrations.

- Natural processes that concentrate decay products from background levels of radon. Radon is produced from the decay of radium-226. Radon is a naturally occurring radioactive noble gas that can migrate out of soil. When radon decays, the non-gas progeny can settle on surfaces. Radon progeny that has settled on surfaces is separated from the original decay chain. Approximately 4 days is required for decay to transform half of a given amount of radon into lead-210. Lead-210 does not decay as quickly, taking approximately 22 years for half of a given amount to decay. Natural concentrating processes for pavement sediment have been found to have background lead-210 concentrations as high as 71 pCi/g (Gellis et al. 2020).

[8] The background reference areas were Saint Ann Park, Aubuchon Park, and Howdershell Park.

- Sediment transport by CWC and deposition at locations downstream of storage locations for MED/AEC leftover materials from uranium processing. The storage occurred from the 1940s through 1960s at the SLAPS and the HISS/Futura. Remediation of accessible soil was completed at the SLAPS and the HISS/Futura in 2006 and 2013, respectively. These former storage sites are approximately 5 miles upstream of the HSD-JES.
- Soil transfer by human activities from downstream CWC locations with sediments contaminated with MED/AEC radioactivity.
- Radon gas transport from downstream CWC locations with sediments contaminated with MED/AEC radioactivity.

The separate report concludes that only the first reason is viable to cause the higher lead-210 results while the other primary COCs are consistent with background soil. Despite this conclusion, the risk and dose assessment includes a health-conservative assumption that this lead-210 is not background. Further, the assumption is made that the highest lead-210 sample result represents the average amount of lead-210 in pavement sediment and dust. The progeny from lead-210 are included in these assumptions for the risk and dose assessment for this FSSE.

The polonium-210 results for pavement sediment samples SVP264231 and SVP264332 are closely related to the lead-210 results. Lead-210 decays to bismuth-210, which decays to polonium-210. Because the half-life of lead-210 is in years and the half-life for the other two progeny are in days, polonium-210 is expected to be at concentrations consistent with lead-210. The polonium-210 results for samples SVP264231 and SVP264332 were relatively close to the lead-210 results. The variances are attributed to different analysis methods that had different yields, and the polonium-210 result meets the criteria for the estimated "J" validation qualifier. Bottom line is that the polonium-210 results substantiate the lead-210 results.

## 3.3 RISK AND DOSE ASSESSMENT

The impacts of radiation on human health have been part of development of nuclear science from the beginning. Parameters for how radioactivity enters a body have been identified and measured. Equations and conversion factors for quantifying the impact to human health were established. Regulatory guidance was issued to assist in selecting the appropriate parameters for different scenarios of human activity (e.g., workers and residents). Computer models were developed to efficiently perform calculations for site-specific parameters for these scenarios.

Although the evaluation in the previous section identified no evidence that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces, Appendix G contains a risk and dose assessment for these structure surfaces. The numerical estimates from that assessment are for comparison to ROD (USACE 2005) values that are protective of human health and the environment. The receptor scenarios, which encompass the reasonably maximally exposed (RME) receptor scenario, and their associated parameters are explained in Appendix G. The ROD identifies that protectiveness is achieved when the additional risk to an individual's entire lifetime is generally less than 1 in 10,000 (i.e., $10^{-4}$) based on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Contingency Plan (NCP) risk criteria specified in 40 *CFR* 300.430(e)(2)(i)(A)(*1*). The ROD also identifies the benchmark dose limit of 19 mrem per year as the dose RG.

Exposure factors used in this risk and dose assessment are either consistent with or more health-conservative than those published in U.S. Environmental Protection Agency (USEPA)

Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-120, *Human Health Evaluation Manual, Supplemental Guidance, Update of Standard Default Exposure Factors* (USEPA 2014a), which are designed to not underestimate the risk and dose to the receptor. This means that the actual risk and dose received by an individual from these structure surfaces will be lower than the estimates in this assessment.

The risk and dose estimates for the receptor scenarios for these structures are summarized in Table 3. When compared to the risk and benchmark dose criteria, the results of this risk and dose assessment indicate surface dust and pavement sediment on these structures is protective of human health and the environment and meets the criteria for UUUE. More information detailing the calculation of these values is provided in Appendix G.

**Table 3. Risk and Dose Estimate**

| Receptor Scenario | Maximum Risk[a] | Maximum Dose (mrem/year) |
|---|---|---|
| Student | $3.8 \times 10^{-6}$ | 4.7 |
| Staff | $2.2 \times 10^{-6}$ | 0.4 |
| Suburban Resident | $1.4 \times 10^{-5}$ | 2.7 |

[a] When estimating cancer risk, predictions indicate a lifetime risk level for an exposed individual and how many additional cancer cases might occur in a population of exposed people (i.e., $1 \times 10^{-6}$ is equal to one additional case in a population of one million). These cancers may or may not occur, but should they occur, they would be in addition to cancers from other causes, such as smoking tobacco or obesity.

Background radiation from natural sources other than radon varies widely in the United States. Terrestrial radiation is from natural radioactivity in the Earth's crust. Excluding radon, terrestrial background radiation varies from 14 mrem per year in Florida to 29 mrem per year in Missouri to 43 mrem per year in Colorado (Mauro et al. 2005). Cosmic radiation is from space, primarily the sun, that interacts with the atmosphere to produce secondary radiation that reaches the Earth's surface. Cosmic radiation generally varies by elevation because higher elevations have less atmosphere to provide shielding. Cosmic background radiation varies from 26 mrem per year in Florida to 28 mrem per year in Missouri to 47 mrem per year in Colorado (Mauro et al. 2005). Combining these terrestrial and cosmic background radiation doses, Colorado residents receive 33 mrem per year more than Missouri residents. Using the USEPA generalized radiation dose to risk conversion of 12 mrem per year to $3 \times 10^{-4}$ (USEPA 2014b), this additional 33 mrem per year equates to an additional risk of $8 \times 10^{-4}$. The estimates in Table 3 are significantly lower than these terrestrial and cosmic variations in natural background radioactivity.

# 4.0 CONCLUSIONS

The conditions established in the ROD (USACE 2005) for protecting human health and the environment are met for these structures. This conclusion is the result of a comparison of ROD requirements and the current conditions, as presented in Table 4, and the statistical test rejection of the null hypothesis (i.e., the radioactivity in the STSUs exceeds the release criterion) by the MARSSIM process. The FSS analytical results and the risk and dose assessment demonstrate that the STSUs for these structures meet the criteria for UUUE in accordance with the ROD. Further, no evidence was identified that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces.

**Table 4. Comparison of Structure Results to Remediation Goals**

| RG Type | Specification | Results |
|---|---|---|
| Structure Surfaces DCGL | Determine the DCGL.<br>Fixed-point measurements do not exceed the DCGL. | The surrogate total alpha DCGL is 2,800 dpm/100 $cm^2$.<br>The total beta DCGL is 6,000 dpm/100 $cm^2$.<br>The greatest final measurement for all the STSUs is 11 percent of the surrogate total alpha DCGL and 49.6 percent of the total beta DCGL.<br>Each STSU passes the Sign Test. |
| Structure Surface Sign Test | Pass the MARSSIM Sign Test. | |
| Health Risk[a,b] | Generally less $10^{-4}$. | $3.8 \times 10^{-6}$ (Student)<br>$2.2 \times 10^{-6}$ (Staff)<br>$1.4 \times 10^{-5}$ (Suburban Resident) |
| Dose[b] | Total effective dose equivalent (TEDE) <19 mrem/year. | 4.7 mrem/year (Student)<br>0.4 mrem/year (Staff)<br>2.7 mrem/year (Suburban Resident) |

[a] When estimating cancer risk, predictions indicate a lifetime risk level for an exposed individual and how many additional cancer cases might occur in a population of exposed people (i.e., $1 \times 10^{-6}$ is equal to one additional case in a population of one million). These cancers may or may not occur, but should they occur, they would be in addition to cancers from other causes, such as smoking tobacco or obesity.

[b] Represents the highest radiological risk and dose in a 1,000-year period to the ROD-based and informational receptor scenarios from exposure to the radionuclides present on these structures (see Appendix G for additional information.).

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# 5.0 CONTACT INFORMATION

Contact information for the primary project team participants is provided in the following list.

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**For the State of Missouri Government – Missouri Department of Natural Resources**
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# FIGURES

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Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 1 Location of North St. Louis County Sites.mxd

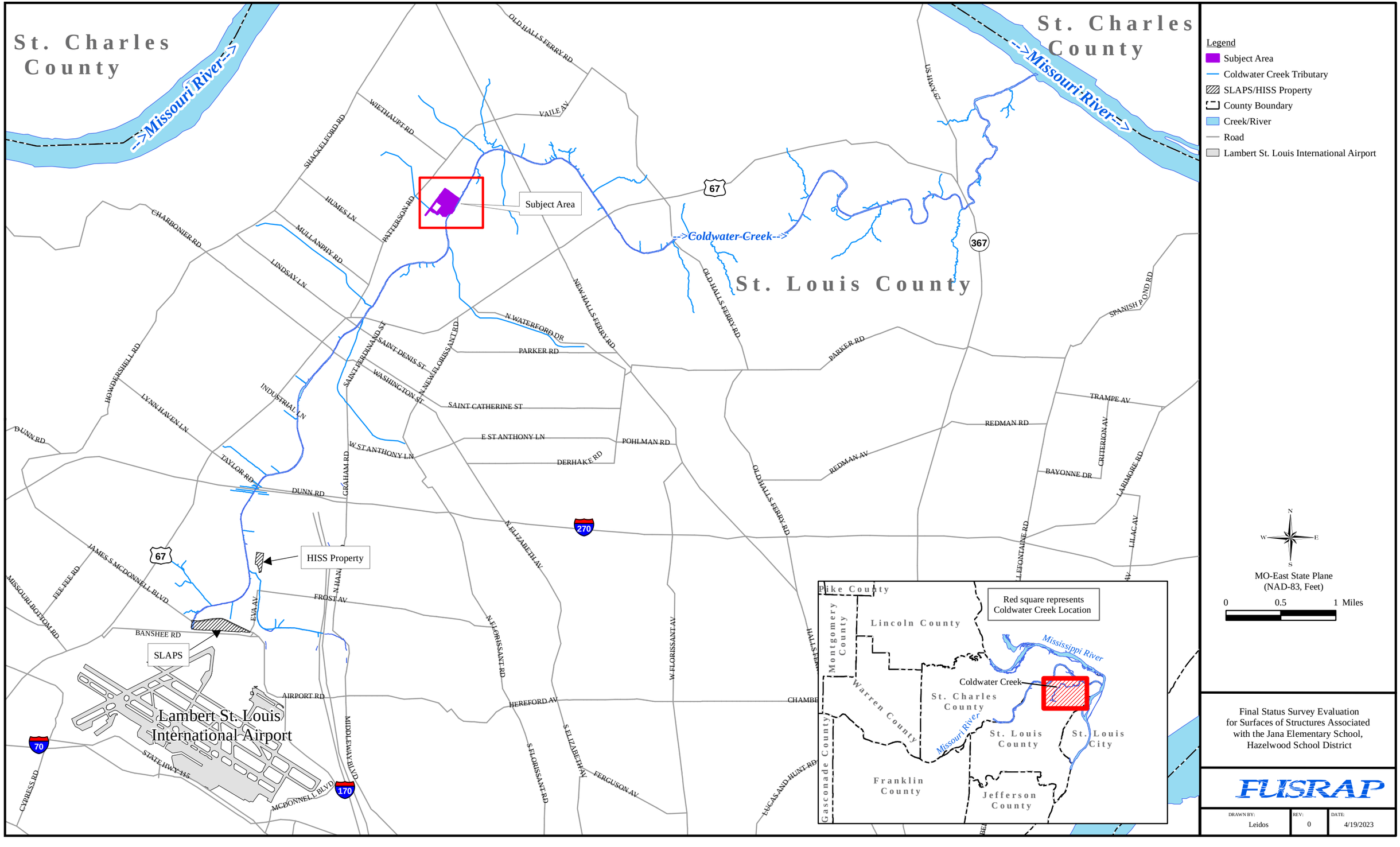


Figure 1. Location of North St. Louis County Sites

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 2 Light Detection and Ranging-Based Elevation Contours.mxd


Legend

- LiDAR Contour (ft)
- Jana School Building
- Jana Elementary Parcels

Elevation (ft)

- 474 - 479
- 480 - 485
- 486 - 491
- 492 - 495
- 496 - 499
- 500 - 503
- 504 - 506
- 507 - 509
- 510 - 512
- 513 - 520

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MO-East State Plane
(NAD-83, Feet)

0 50 100 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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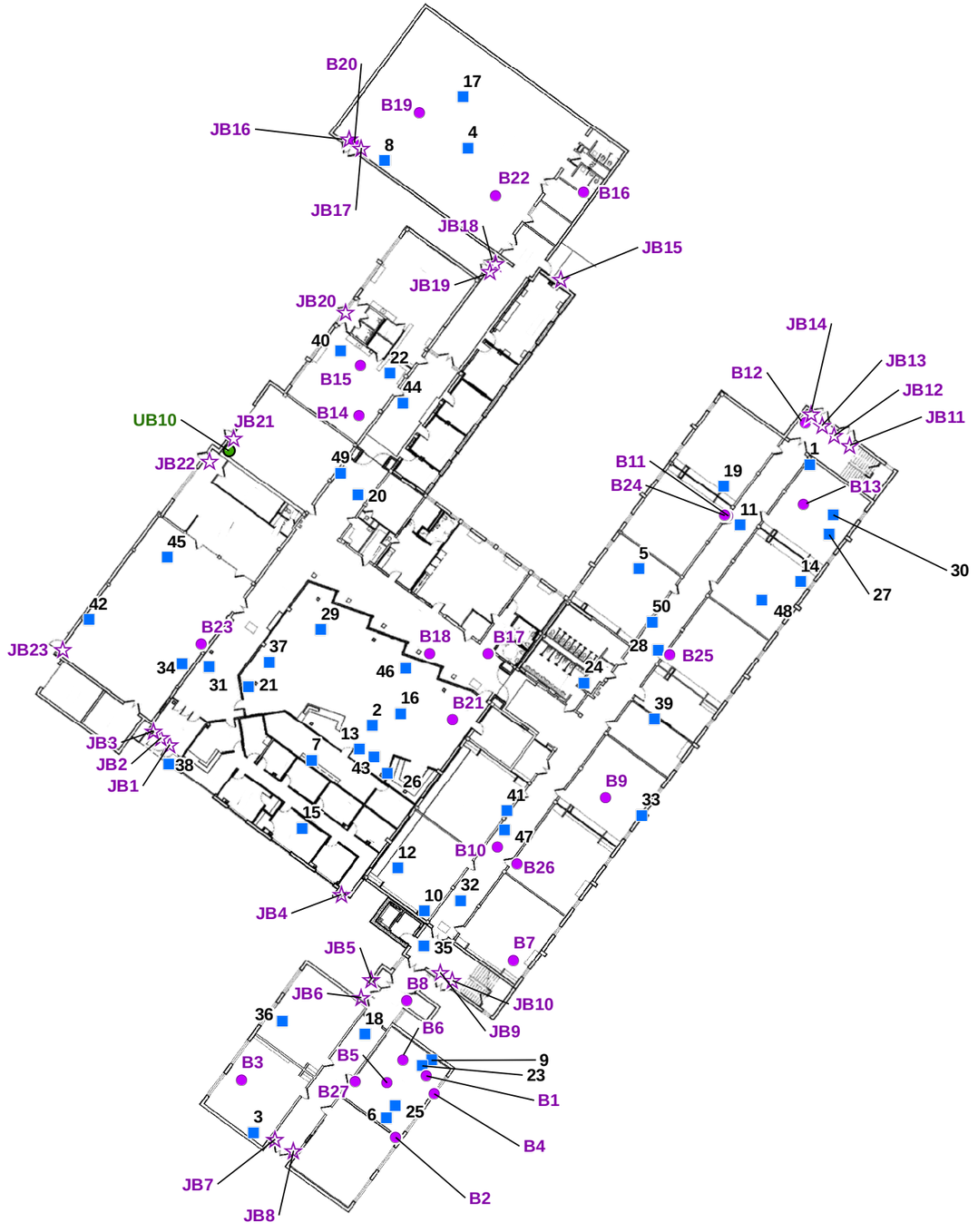
|---|---|---|
| Leidos | 0 | 4/19/2023 |

Figure 2. Light Detection and Ranging-Based Elevation Contours

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 3 STSU-1 Floor Measurement Locations, First Story.mxd




Legend

- Biased Location- Surveyor Selected
- Biased Location- Based on Scan
- Random Location
- USACE Judgmental Measurement Location
- Door

-All biased measurement locations were areas of less than or equal to 125 $cm^2$ with the exception of B6 which was approximately 900 $cm^2$ in size.

-Scan surveys were performed on 100% of the accessible areas of the 1st floor

MO-East State Plane
(NAD-83, Feet)

0 25 50 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 3. STSU-1 Floor Measurement Locations, First Story

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 4 STSU-2 Floor Measurement Locations, Second Story.mxd


Legend

- Biased Location- Based on Scan
- Random Location
- Jana 2nd Floor
- Door

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 25 50 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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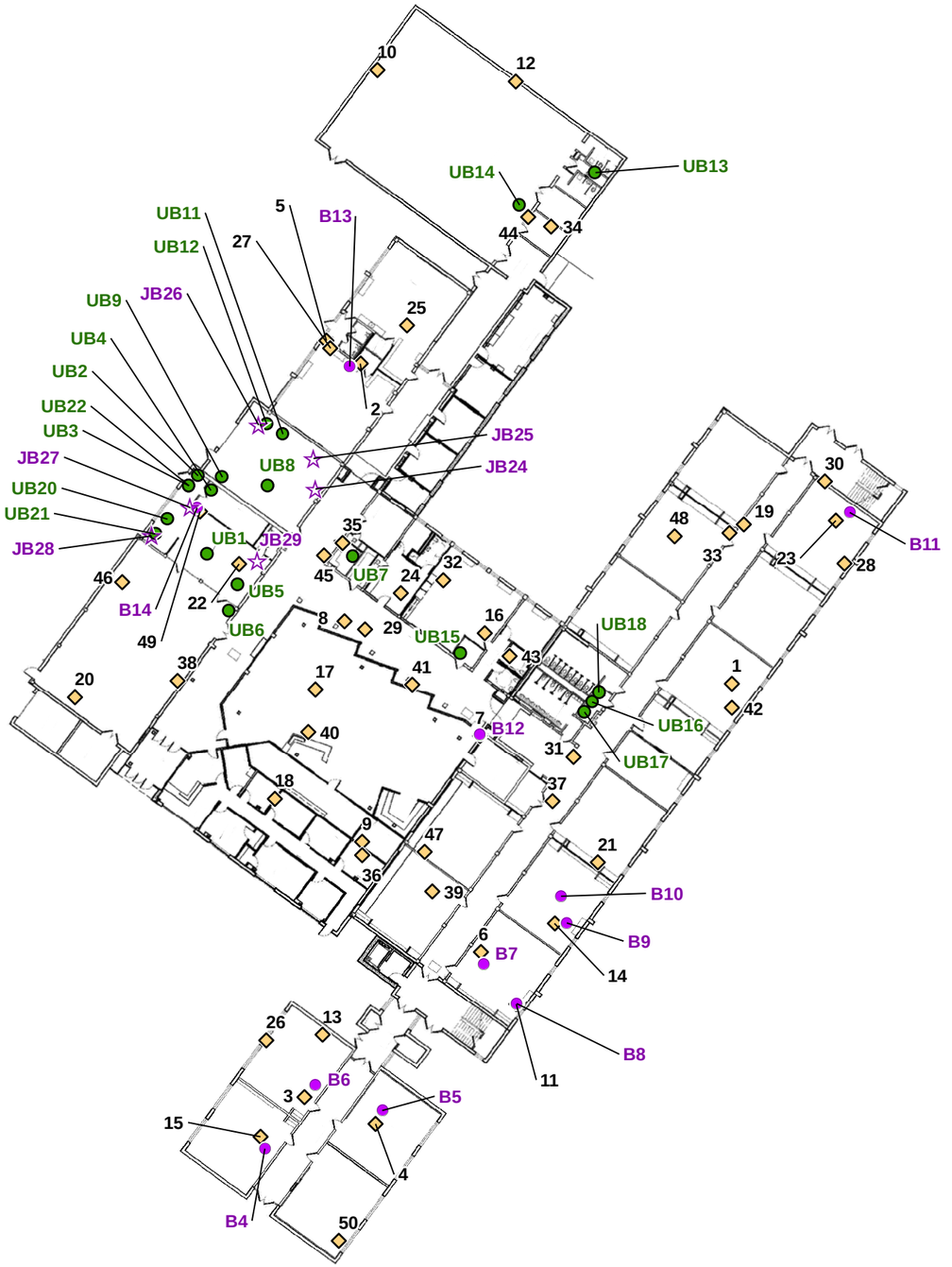
Figure 4. STSU-2 Floor Measurement Locations, Second Story

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 5 STSU-3 Interior Walls and Equipment Measurement Locations, First Story.mxd




Legend

- Biased Location- Surveyor Selected
- Biased Location- Based on Scan
- Random Location
- USACE Judgmental Measurement Location
- Door

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 25 50 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 5. STSU-3 Interior Walls and Equipment Measurement Locations, First Story

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 6 STSU-4 Interior Walls and Equipment Measurement Locations, Second Story.mxd


Legend

- Biased Location- Based on Scan
- 2nd Floor Interior Wall, Furniture and Countertop Location
- USACE Judgmental Measurement Location
- Jana 2nd Floor
- Door

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 25 50 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 6. STSU-4 Interior Walls and Equipment Measurement Locations, Second Story

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 7 STSU-5 Exterior Walls Measurement Locations.mxd


Legend

- Random Exterior Wall Location
- Biased Location- Based on Scan
- Building Exterior Wall

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 25 50 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 7. STSU-5 Exterior Walls Measurement Locations

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 8 STSU-6 Playground Equipment Measurement Locations.mxd


Legend

- Biased Location- Based on Scan
- Random Playground Equipment Location

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 50 100 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 8. STSU-6 Playground Equipment Measurement Locations

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 9 STSU-7 Pavement Measurement Locations.mxd


Legend

- Biased Location- Based on Scan
- Random Pavement Location
- Pavement Area
- Pavement Sediment Location

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 50 100 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 9. STSU-7 Pavement Measurement Locations

Document Path: U:\GPS\NorthCo\CWC\CWC St Denis to Old Halls Ferry WP\Jana School to New Halls Ferry\Jana School\Projects\FSSE\Rev0\Figure 10 STSU-8 Walkway Measurement Locations.mxd


Legend

- Biased Location- Based on Scan
- Walkway Random Location
- Walkway
- Jana Elementary Parcels
- CWC Tributary

-All biased measurement locations were areas of less than or equal to 125 $cm^2$.

-Scan surveys were performed at approximately 2 $m^2$ of accessible areas around all measurement locations.

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MO-East State Plane
(NAD-83, Feet)

0 50 100 Feet

Final Status Survey Evaluation for Surfaces of Structures Associated with the Jana Elementary School, Hazelwood School District

FUSRAP

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Figure 10. STSU-8 Walkway Measurement Locations

# APPENDIX A

# "SRNL TECHNICAL REVIEW OF THE KALTOFEN 'RADIOACTIVE CONTAMINATION AT THE JANA ELEMENTARY SCHOOL' DOCUMENT"

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SRNL
SAVANNAH RIVER NATIONAL LABORATORY

April 18, 2023 SRNL-L3000- 2022-00017, Rev. 1

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CC: Darina Castillo, DOE-LM
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Dave DiPrete, SRNL

CAROL EDDY-DILEK (Affiliate) Digitally signed by CAROL EDDY-DILEK (Affiliate) Date: 2023.04.18 10:46:58 -04'00'
Carol Eddy-Dilek, SRNL

APPROVER: CONNIE HERMAN (Affiliate) Digitally signed by CONNIE HERMAN (Affiliate) Date: 2023.04.18 11:48:11 -04'00'
Connie C. Herman, Associate Laboratory Director, SRNL

**SRNL Technical Review of the Kaltofen "Radioactive Contamination at the Jana Elementary School" Document**

The U.S. Army Corps of Engineers (USACE) St. Louis District (MVS) requested the services of the Department of Energy (DOE) Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) to assist with USACE's Jana Elementary School response at the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Airport Site Vicinity Properties (SLAPS VPs). The objective of the response is to evaluate the presence, nature, and/or extent of radiological contaminants of concern, if any, on the school property. Jana Elementary is located at 405 Jana Drive, Florissant, Missouri and is situated along the banks of Coldwater Creek. Coldwater Creek is a part of the SLAPS VPs FUSRAP site.

As part of this request, SRNL was called upon to review the October 10, 2022, report titled "Radioactive Contamination at the Jana Elementary School, Hazelwood, MO" issued to Brustowicz and Thompson by Kaltofen of the Boston Chemical Data Corporation. This report will be referred to as the Kaltofen Report hence forth in this review. Boston Chemical Data Corporation was contracted to sample areas in and around the Jana Elementary School to investigate concerns of contamination at this site, which borders Coldwater Creek, and radiochemical analyses were subcontracted to Eberline Analytical. Coldwater Creek is part of a designated FUSRAP Site including the SLAPS and the Hazelwood Interim Storage Site (HISS). The US Army Corps of Engineers is monitoring and remediating Coldwater Creek for contamination from the nation's early atomic energy program, conducted by Mallinckrodt Chemical Works.

Key observations from the limited review of the report include the following:

- None of the Jana Elementary School sample data reported by Eberline Analytical in the Kaltofen Report exceeded criteria set forth in 40 CFR Part 192.
- The Kaltofen Report claims the Jana School is never screened for radioactivity but was in fact screened by the Missouri Department of Health and Senior Services (MDHSS) and was found to be less than the EPA recommended 4 pCi/L concentration for the primary radiological dose hazard (radon) from naturally occurring uranium and thorium radiological material.
- The Kaltofen Report cites recommendations of a public health assessment from the Agency for Toxic Substances and Disease Registry (ATSDR) as justification for sampling of the school building, but the ATSDR only recommends sampling for areas flooded by the Coldwater Creek. Flooding from Coldwater Creek has never impacted the school building.
- The Kaltofen Report cites historic sample data with high levels of radioactivity attributed to Coldwater Creek, but the referenced sample data is actually from a contaminated site not physically connected to Coldwater Creek.
- The Kaltofen Report cites examples of levels of radioactivity elevated well above background levels measured at the Jana School by the USACE. These statements are misleading as the school property lines at one point actually extend into the Coldwater Creek FUSRAP Site, the high levels were limited to the creek bank, and these areas are recognized as needing remediation by the USACE.
- The Kaltofen Report cites a number of other radioisotopes sampled and measured in the school and surrounding area by Boston Chemical Data Corporation as concerning, but these isotopes (e.g. metallic thorium, Cs-137, etc.) are not attributable to the Mallinckrodt Chemical Work Processes that contaminated the Coldwater Creek FUSRAP Site.
- The Kaltofen Report highlights the presence of naturally-occurring radon (Rn-222) daughter radioisotopes Pb-210 and Po-210 levels measured by the Boston Chemical Data Corporation in the Jana School. There is no data available that points to Coldwater Creek

contamination causing excessive levels of Pb-210 and Po-210 to be present in the Jana School. Samples collected from the Coldwater Creek near Jana do not contain Ra-226 (the parent of Rn-222) levels above the EPA guidelines of 5 pCi/g. The Jana school was screened for elevated radon levels and elevated levels of radon were not detected.

- Details of the Boston Chemical Data Corporation sample collection and Eberline data analysis were not provided in the Kaltofen Report; therefore, only a limited evaluation of the sampling and analyses methods could be performed based on information provided in the Kaltofen Report.

Given the limited access to the supporting data and the sampling and analyses methods that team used to generate the report, a peer review of all of the Kaltofen Report documents, data, and methodology is recommended.

**Boston Chemical Data Assessment**: The Kaltofen Report states the results of the radiological analyses on surface sediment conducted by Eberline indicated the combined activities of radium and thorium on the Jana School Site exceed the level of "5 pCi/g above background". There is no indication that background levels of radium and thorium were subtracted from the concentrations reported in the Kaltofen Report "5 pCi/g above background" criteria.

Also, the Kaltofen Report misinterprets how the 5 pCi/g limit for the sum of Ra-226 and Ra-228 in surface soils provided in 40 CFR Part 192 applies. The Kaltofen Report cites "Use of Soil Cleanup Criteria in 40 CFR Part 192 As Remediation Goals for CERCLA Sites" (1988, p. 5) as justification for the Kaltofen Report "5 pCi/g above background" criteria. The EPA Directive # 9200.4-25 titled "Use of Soil Cleanup Criteria in 40 CFR Part 192 As Remediation Goals for CERCLA Sites" (a 1998 document, not a 1988 as cited in the Kaltofen Report) clarifies the requirements set forth in the federal regulation 40 CFR Part 192 for health and environmental protection standards for uranium and thorium mill tailings. It explains how thorium isotope remediation goals should also be part of developing "a relevant and appropriate requirement" (ARAR) remediation goal for CERCLA sites as the radium isotopes activity levels will rise to match the radiological parent thorium isotopes activity over tens of thousands of years when environmental transport conditions allow. Directive 9200.4-25 does not call for the sum of radium and thorium isotopes to be maintained below a 5 pCi/g limit for surface soils. Additionally, in Directive no. 9200.4-35P "Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A I, Criterion 6(6)" page 8, the example clearly defines the 5 pCi/g limit to apply to the sum of radium isotopes **or** to the sum of thorium isotopes in surface soils. The Kaltofen Report mistakenly applied the 5 pCi/g limit to the sum of both the radium **and** the thorium isotopes. Federal Regulation 40 CFR Part 192 does allow for the sum of fractions of radium and thorium isotopes when the ARAR remediation goals are factored in, which in this case would be 5 pCi/g for the radium isotopes and 14 pCi/g thorium isotopes for surface soils. Additionally, the Eberline Data in the Kaltofen Report from the Kaltofen Jana School samples did not exceed the 5 pCi/g combined sum of Th and Ra isotopes above background applied Kaltofen Report criteria.

The Kaltofen Report cites the EPA Region 7 Proposed Record of Decision for the nearby Westlake Landfill as setting limits for the sum of Ra-226 + Ra-228 activity to be less than 2.9 pCi/g, and the sum of Th-230 + Th-232 to be less than 2.9 pCi/g. However, these limits were listed in that document as preliminary remediation goals based on levels indistinguishable from normal environmental background levels of these isotopes and were established for a different region than the Coldwater Creek area. The EPA Region 7 Proposed Record of Decision also clearly states the final cleanup levels were to be determined in the amended Record of Decision. At the time of writing this memo, SRNL did not have access to the amended Record of Decision so these limits cannot be validated.

The Directive (9200.4-25) also clearly states these are guidelines, and applicable or relevant and appropriate requirements can be developed for the individual CERCLA Sites. The USACE has developed ARAR remediation goals (RGs) for soils, structures, and sediments at the North St. Louis County sites. For surface soils up to 6" depth, the Ra-226 RG is 5 pCi/g and the Th-230 RG is 14 pCi/g. The Kaltofen Report did not provide background levels, which would have to be subtracted from the analytical results to generate a value above background levels. The highest result for the gross sum of radium and thorium results above method detection limits provided by the Kaltofen Report was 6.99 pCi/g +/- 55.3% in a 95% confidence interval in the sample having Lab ID 22-08062-08. The USACE Coldwater Creek background levels for the sum of these same isotopes is 4.42 pCi/g. When this background is considered, the sample with the highest radium and thorium activity reported by the Kaltofen Report is substantially below even the "5 pCi/g above background" Kaltofen assumed limit used in the Kaltofen Report.

Boston Chemical Data was recently contracted to perform additional sampling in and around the Jana School. This sampling effort is consistent with the recommendations of the ATSDR 2019 report assuming the Jana School was flooded by Coldwater Creek. However, historic Coldwater Creek flooding data indicates the Jana School building has never been flooded by Coldwater Creek. Thirty-two samples of soil, dust, and plant materials were collected and sent to a contract radioanalytical laboratory, Eberline Analytical. The Kaltofen Report datasets are difficult to validate with the information provided in the Kaltofen Report. However, as reported, the results of these analyses indicate elevated levels of Pb-210 and its decay products above background levels, and elevated levels of Ra-226 above background levels. The levels of Pb-210 are significantly higher than what would be expected from the measured levels of its radiological parent, Ra-226. These samples are surface samples. Consequently, one would not expect to find Pb-210 in equilibrium with the Ra-226 parent, but rather would be deposited unevenly following the decay of Rn-222, a daughter of Ra-226. These isotopes are ubiquitous in nature.

Qualitative analysis results by scanning electron microscopy/ energy dispersive X-ray spectrometry (SEM/EDS) were also provided that identified particles high in elemental thorium. SEM/EDS is a qualitative elemental analysis useful for characterizing and visualizing particle morphology but is not considered an accurate method for determining quantities of the element. This SEM/EDS measurement identifying the presence of elemental thorium is not relevant as

trace Th-230 at levels cited throughout the Kaltofen Report for this area were likely well below the detection limits for an SEM/EDS analysis. Additionally, the data provided from Eberline in the Kaltofen Report indicated that by mass, thorium in these samples was overwhelmingly Th-232. The thorium present would be normal background Th-232, which is also ubiquitous in nature, and is not related to the Mallinckrodt processes, which were the source of the Coldwater Creek's designation as a FUSRAP Site. The Kaltofen Report analyses in fact found no statistically relevant evidence of elevated Th-230, which is the contaminant that is driving the remediation of various sites along Coldwater Creek. The highest level of Th-230 reported in the Kaltofen Report from the sampling executed by the Boston Chemical Data Corporation was 3.13 pCi/g with a 51% uncertainty in the 95% confidence interval, well below the remediation goals of this FUSRAP Site. Additionally, this datapoint was not in fact from the Jana Elementary School, but from a 2018 sampling of the Moule Drive property.

**School Location and Geology Assessment**: The Kaltofen Report details that the Jana School property is bordered on two sides by the Coldwater Creek. Based on Google Earth maps, the Jana School property appears to share one border with the Coldwater Creek and not two. An adjacent neighborhood is bordered by a Coldwater creek tributary. The Coldwater Creek is a recognized down gradient extension of a FUSRAP Site, and the creek is in the process of being remediated by the Army Corps of Engineers. Contaminant levels requiring remediation have not been documented for the tributary. The Kaltofen Report cites NUREG CR2722, Table 4 as detailing high Th-230 activity levels in Coldwater Creek (up to 178,000 pCi/g Th-230). The NUREG CR2722 Table 4 does indeed have a datapoint of 178,000 pCi/g Th-230, but this datapoint is from a sample taken from Area 1 of the West Lake Landfill Superfund Site, approximately 5 miles away, and not located near or on Coldwater Creek, or the tributary creek, so this datapoint and value cannot be validated. Drainage from West Lake landfill does not flow into Coldwater Creek; therefore, they should not be considered the same site.

The Kaltofen Report cites data from the reference 2018 US EPA Record of Decision, West Lake Landfill as contributing to the body of evidence of the levels of contamination in and around Coldwater Creek, but in fact, this EPA report specifically states that it only addresses the West Lake Landfill Superfund Site, and not the Coldwater Creek area. The West Lake Site is located approximately 5 miles from the Coldwater Creek area and is not a part of the SLAPS VP FUSRAP Site that includes Coldwater Creek. The Kaltofen Report also cites this EPA report for elevated Th-230 data from 84 locations and depths sampled at the Jana School, but again, as the EPA report does not address this Coldwater Creek area. The source of the data cited by the Kaltofen Report is also not clear for these 84 locations. The Kaltofen Report claims the average of these 84 samples had Th-230 levels averaging 6.18 ±1.46 pCi/g. However, these levels are not above the USACE RGs for this FUSRAP Site and consequently not over EPA guidelines for residual risk. The USACE provided SRNL with a dataset of 215 locations where samples were collected in 2018 and 2019 inside the Jana School property lines regions subjected to flooding by Coldwater Creek. It is assumed the 84 location data has been extracted from this dataset of 215 points. The Jana School property lines actually extend at a point into the FUSRAP Site

Coldwater Creek's banks and water. There are some locations in the creek bed and banks where residual contamination has been identified and remediation of those locations by the USACE is planned. A number of sampling points in the creek banks were measured over RG goals by the USACE and are marked as such in the data reports SRNL received. There are no data points in the Jana School grounds floodplain (again, above the actual banks of the creek) that are above the RG for Th-230. It would be a misrepresentation of risk to the Jana School population to average datapoints from the actual FUSRAP Site's creek banks and creek area that are scheduled for remediation with a subset of the 215 datapoints from the Jana School grounds floodplain. The report appears to further imply that the entire region exceeds the average Kaltofen Report "5 pCi/g above background" criteria . It should be noted that all of these 215 datapoints were well below RGs for radium isotopes alone.

The Kaltofen Report raises the scenario of potential contamination of the Jana School by flooding from Coldwater Creek. Examination of the topographic map of Jana School shows that the difference in elevation between the creek bed and the southeast corner of the Jana School is greater than 20 ft. The steep creek embankment bounds the edge of lower play field and is approximately 10 feet. The USGS has maintained a water level gauge upstream in Coldwater Creek for the last 20 years and the highest water level measured in the creek was only fourteen feet which would not impact the school building (https://waterdata.usgs.gov/nwis/uv: Coldwater Creek). The largest recorded flood at the Jana School area occurred in 1957 before the current school building was constructed. A map developed by the USACE shows the extent of flooding for the 1957 event (prior to the construction of the school), which shows the location of the lower fields was impacted but that the school building site was never impacted by flooding with water from the stream. This data shows that flooding from Coldwater has not impacted the Jana School.

**Assessment of Army Corp Data and Sampling Plan**: The Kaltofen Report cites Army Corps test results well in excess of 5 pCi/g, as high as 22.6 +/- 4.39 pCi/g at soil surfaces of Jana School, and as high as 34.30 +/- 6.61 pCi/g subsurface soils. The Kaltofen Report does not provide the reference for these datapoints so the validity of the assumptions, data corrections, and limits comparisons cannot be verified.

A review of the most recent "North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2021" report showed all values of sediment samples taken from the Coldwater Creek were well below the remediation goals for Th-230 and Ra-226 of the record of decision for the North St. Louis County Sites. All the Ra-226 and Ra-228 measurements were below the EPA protective health-based level of 5 pCi/g above background for surface soils. NUREG CR2722 clearly indicated Ra-226 is not in radio-equilibrium with Th-230. Consequentially, Ra-226 and its chain of radiological daughters including Rn-222, are present at substantially lower levels than Th-230. Three of the 10 Coldwater Creek sampling site sediment samples exceeded the 5 pCi/g levels of Th-230 and Th-232 (C007 at 8.15pCi/g, C-009 at 5.44 pCi/g, C011 at 5.37 pCi/g) in the 1$^{st}$ sampling event. One of the 10 Coldwater Creek

samples exceeded the 5 pCi/g level of Th-230 and Th-232 (C011 at 13.17) in the second sampling event. But again, all of these values were below the applicable or relevant and appropriate requirement (ARAR) remediation goal of 14 pCi/g for surface and 43 pCi/g for deep sediments for thorium isotopes set by the record of decision for the North St. Louis County Sites. A review of the historical data available in the 2021 monitoring report for the period of 3/11 – 10/21 indicates no Coldwater Creek sediment sample has ever exceeded the EPA protective health-based level of 5 pCi/g for the sum of the Ra-226 and Ra-228 isotopes. No thorium values exceeded the remediation goals over that historical period, with the highest value being 8.32 pCi/g on 3/21 at station C007. However, the ATSDR 2019 Report supports ongoing efforts to identify and properly remediate radiological waste around Coldwater Creek. The basis for the ATSDR 2019 Reports conclusion were that Th-230 has been found above FUSRAP RGs in several areas of the Coldwater Creek floodplain and reducing Th-230 levels in accessible areas will reduce the risk of harmful exposure. For example, soil erosion on the banks of Coldwater Creek could expose deep sediments that pass the 43 pCi/g RG, but later fail the 14 pCi/g surface RG.

The Kaltofen Report stated that the current USACE sampling plan is inadequate to assess the presence or levels of radium and thorium contamination at the Jana Elementary School. The Kaltofen Report states the USACE only sampled at points that were located at least 300 feet from the school and cites numerous sampling points in and around the school that were not sampled. The Kaltofen Report also cites the risk of contamination of the surrounding area from flooding events in the past. However, because the creek is the source of the contamination, the USACE sampling points were closer to the source of contamination (Coldwater Creek) than the school itself, and intuitively, samples taken closer to the source of contamination should be more radioactive than points located closer to the school. The school building itself is significantly elevated above the 1000-year floodplain and has never been subjected to a flooding event. Some portions of the fields south of the school are located within the 1000-year floodplain. The school ground points in the Coldwater Creek floodplain sampled by the USACE in 2018 and 2019 were all measured to be below remediation goals for Ra-226. All points were also below remediation goals for Th-230 except for several points in the banks of the creek itself.

The Jana Elementary School was, in fact, screened for the primary radiological dose hazard (radon) from naturally occurring uranium and thorium radiological material by the Missouri Department of Health and Senior Services (MDHSS) and found to have radon concentrations below the EPA recommended 4 pCi/L concentration in air. Jana was screened for radon contamination by MDHSS along with the rest of the 31 schools in the Hazelwood School District. The set of test results showed Jana had on average the lowest level of radon concentration (tied with 12 other schools at 0.3 pCi/L). Of the 28 radon samples taken at Jana, the highest measurement of 1.5 pCi/L ranked #19 out of the 31 schools. All of the Jana radon test results showed radon levels well below EPA guidelines of 4 pCi/L.

The Kaltofen Report claims the contamination on Jana School grounds extends from surface to 6-foot depths below the surface but does not cite the reference for the information. A portion of the school grounds extends into the creek itself, and if this is the datapoint the Kaltofen Report refers to, the claim misrepresents the risk to the physical school population.

The Kaltofen Report cites the ATSDR public health assessment titled "Evaluation of Community Exposures Related to Coldwater Creek", issued April 30, 2019, as justification for sampling the Jana School building. The ATSDR report evaluated potential exposures to people who played or lived near Coldwater Creek in North St. Louis County, Missouri. The ATSDR report acknowledges the presence of radiological contamination in and around Coldwater Creek prior to remediation activities (prior to year 2000), that could have increased the risk of some types of cancer in people who played or lived there. The ATSDR report concluded that recent exposures after the completion of the 2000 remediation efforts would not likely result in detectable increased cancer rates in the community as a whole.

The ATSDR supported ongoing efforts to identify and properly remediate radiological waste around Coldwater Creek. The ATSDR recommended that the FUSRAP program continue to investigate and remediate Coldwater Creek sediments and floodplain soils to meet regulatory goals. To increase knowledge about contaminant distribution and allay community concerns relating to buildings adjacent to Coldwater Creek, the ATSDR recommended future activities include sampling of indoor dust and sediments and soils present in basements that were directly flooded by Coldwater Creek in the past. The Kaltofen Report accurately restates the conclusions of the ATSDR report regarding the need for sampling structures adjacent to Coldwater Creek that have been flooded by Coldwater Creek. However, the Jana Elementary School has never been flooded by Coldwater Creek, so the ATSDR recommendations do not apply to sampling of the Jana Elementary School.

**Assessment of Additional Data Cited in Kaltofen Report**: The Kaltofen Report cites testing data from a home on Moule Drive. The source of this data was not provided and cannot be verified. A number of the radioisotopes listed were decay products of U-238 (i.e., Th-230 and Pb-210) and could have originated from the Mallinckrodt processes if they are elevated above normal environmental background levels. A number of the radioisotopes listed were not used in the Mallinckrodt Chemical Works and so would not be attributable to that process. Mallinckrodt Chemical Works processed uranium ore, which was shipped to other DOE Sites (Y-12 at Oak Ridge, the Portsmouth Site in Ohio, the Paducah Site in Kentucky) for U-235 enrichment. From there, the uranium would be used in the weapons programs or used for fuel for nuclear reactors. Metallic thorium was not part of a Mallinckrodt process. Cs-137 is a fission product, which requires neutron irradiation of fissile material like U-235, which was also not part of the Mallinckrodt process. Cs-137 is also ubiquitous in the environment at trace levels from radioactive fall-out from past nuclear weapons testing.

**Summary Assessment:** In conclusion, portions of the Kaltofen Report attribute elevated radioactivity measurements (as high as 178,000 pCi/g) to the Coldwater Creek but our assessment indicates the data were from samples of the West Lake superfund site and should not be attributed to Coldwater Creek. Portions of the Kaltofen Report improperly average USACE datasets to imply Jana School grounds exceed EPA guidelines for the site. However, these high datapoints on school grounds are a result of the fact the school property actually extends into the Coldwater Creek FUSRAP Site, and the creek bank areas in question are known to the USACE and are slated for further remediation. In addition, analytes that were not attributable to the Mallinckrodt process have been included and are not relevant to this FUSRAP project. There is no evidence that the school has ever been contaminated by Coldwater Creek floodwaters; therefore, recommendations from the ATSDR public health assessment do not apply. The Eberline data from the school samples provided in the Kaltofen Report for the Th-230 and Ra-226 isotopes being remediated in Coldwater Creek were all within EPA guidelines. The Jana Elementary school was analyzed for the major radiological hazard (radon) from the decay of naturally occurring radiological material and has been found to be in the lowest radon concentration grouping of the 31 schools in the Hazelwood School district and was well within EPA guidelines of 4 pCi/L in air for acceptable radon levels in a public facility. However, to allay community concerns potentially created from the reported data, SRNL recommends a structured sampling and analyses of the Jana Elementary School and associated property using regulatory methods and protocols for the radioisotopes of concern. The follow-up analyses and the generated data should be compared to the appropriate federal and regulatory limits for protecting the health of the local community. Given the limited access to the supporting data and the sampling and analyses team, a peer review of all of the Kaltofen Report documents, data, and methodology is recommended.

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# APPENDIX B

# DETERMINATION OF THE MINIMUM NUMBER OF RANDOM FIXED-POINT MEASUREMENT LOCATIONS

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## DETERMINATION OF THE MINIMUM NUMBER OF RANDOM FIXED-POINT MEASUREMENT LOCATIONS

The number of random fixed-point measurement locations estimated for each STSU was based on achieving an average measurement density of one measurement per 100 $m^2$, which is a higher density that is more typical of Class 2 areas than Class 3 areas. The following retrospective analysis confirms that an adequate number of locations were selected for random fixed-point measurements.

Determining the minimum number of locations for fixed-point measurements in STSUs starts with using the standard deviation, the average of the total alpha measurement results for the lower bound of the gray region (LBGR), and the DCGL to calculate the relative shift. As an example, values from STSU-1 for alpha radioactivity are used.

$$Relative\ Shift = \frac{\Delta}{\sigma} = \frac{DCGL - LBGR}{\sigma} = \frac{DCGL - Average}{\sigma} = \frac{2{,}800 - 56}{45} = 61$$

For the next step, MARSSIM Table 5.4 is used to determine the $Sign_p$ because the Sign Test applies to structures. For the STSU-1 relative shift of 61, the corresponding $Sign_p$ value is 1.0. The minimum number of measurement locations necessary to satisfy requirements, N, is obtained using the following MARSSIM equation. $Z_{1-\alpha}$ and $Z_{1-\beta}$ are the same variables identified in the preceding section for soil.

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(Sign_p - 0.5)^2} = \frac{(1.645 + 0.842)^2}{4(1 - 0.5)^2} = 6.2$$

The uncertainty associated with the calculation, N, is accounted for by increasing the number of data points by 20 percent and rounding up to yield the minimum number of measurement locations required, or $N^*$. This ensures sufficient data points to allow for any possible lost or unusable data.

$$N^* = 6.2 + 0.2(6.2) = 8\ Measurement\ Locations$$

Therefore, 8 measurement locations for alpha radioactivity are required in the STSU.

The same equations are used to calculate the minimum number of measurement locations for beta radioactivity. Values from STSU-1 for total beta radioactivity are used in the following example; for a relative shift of 55, the corresponding $Sign_p$ value is 1.0.

$$Relative\ Shift = \frac{6{,}000 - 42}{109} = 55, \qquad N = \frac{(1.645 + 0.842)^2}{4(1 - 0.5)^2} = 6.2, \qquad N^* = 8$$

The actual number of fixed-point measurement locations in STSU-1 is 50. The same calculation was performed for the other STSUs using the summary statistics in Appendix D. For all STSUs, at least 8 random fixed-point measurement locations were required; the lowest number of random fixed-point measurements for any STSU was 10.

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# APPENDIX C

# FIELD LOGBOOK ENTRIES FOR DUST/PAVEMENT SEDIMENT SAMPLES FROM STRUCTURE SURFACES

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COC No.: LE 1024 2022-02 ML

Task Team Members: M. Shuman, M. Miller

Sample ID: SVP264222 | Station ID: SVP264222

Collection Date: 10-24-22 | Collection Time: 1525

Property Name: Jana School | Sample Location: Deposited soil on NW Parking lot near swings

Northing (units): 1086167.32 | Easting (units): 871949.63

Cover Depth (ft): N/A | Elevation: 509.76

Sample Collection Method: ☒ Bowl and Trowel ☐ Auger | Sample Depth: 0-0.1'

Soil Type: Sandy Silt | Rad Screen Instrument: 44-9: H Cal Due: 1-3-23; 44-10: G Cal Due: 8-2-23

Rad Screen Bkg. (cpm): 48/3997 | Rad Screen (cpm): 70/4142

Sample Type: Homogenous grab | HTZ Area ($m^2$): N/A | HTZ Field Reading: N/A | GWS Background Reading: N/A

Sample is: ☐ in excavation wall ☒ in excavation floor ☐ measured from original ground surface N/A (GW 10.28.22)

Comments:

Recorded by: Megan Shuman 10-24-22 | QA by: MS 11-1-22 | Date: 11-1-22

COC No.: LE 1024 2022-02 ML

Task Team Members: M. Shuman, M. Miller

Sample ID: SVP264223 | Station ID: SVP264223

Collection Date: 10-24-22 | Collection Time: 1535

Property Name: Jana School | Sample Location: Deposited soil on sidewalk in NE Parking lot

Northing (units): 1086125.30 | Easting (units): 872211.44

Cover Depth (ft): N/A | Elevation: 507.45

Sample Collection Method: ☒ Bowl and Trowel ☐ Auger | Sample Depth: 0-0.1'

Soil Type: Silt and sand | Rad Screen Instrument: 44-9: H Cal Due: 1-3-23; 44-10: G Cal Due: 8-2-23

Rad Screen Bkg. (cpm): 48/3997 | Rad Screen (cpm): 74/4063

Sample Type: Homogenous grab | HTZ Area ($m^2$): N/A | HTZ Field Reading: N/A | GWS Background Reading: N/A

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface N/A

Comments:

Recorded by: Megan Shuman 10-24-22 | QA by: MS 11-1-22 | Date: 11-1-22

COC No.: LE 10242022-02ML

Task Team Members: M. Sherman, M. Miller

Sample ID: SVP264224 | Station ID: SVP264224

Collection Date: 10-24-22 | Collection Time: 1545

Property Name: Jana School | Sample Location: Deposited soil by drain on NE of property

Northing (units): 1086138.11 | Easting (units): 872211.96

Cover Depth (ft): N/A | Elevation: 5063

Sample Collection Method: [X] Bowl and Trowel [ ] Auger | Sample Depth: 0-0.1'

Soil Type: Gray brow silt w/organics | Rad Screen Instrument: 44-9: H Cal Due: 1-3-23; 44-10: C Cal Due: 8-2-23

Rad Screen Bkg. (cpm): 48/3997 | Rad Screen (cpm): 61/4108

Sample Type: Homogenous grab | HTZ Area (m²): N/A HTZ Field Reading: N/A | GWS Background Reading: N/A

Sample is: [ ] in excavation wall [ ] in excavation floor [ ] measured from original ground surface NA

Comments:

MS 11.1.22

Recorded by: Megan Sherman 10-24-22 | QA by: MS Steine Date: 11-1-22

COC No.: LE 10242022-02ML

Task Team Members: M. Sherman, M. Miller

Sample ID: SVP264225 | Station ID: SVP264225

Collection Date: 10-24-22 | Collection Time: 1548

Property Name: Jana School | Sample Location: Deposited soil on sidewalk on SE of school bldg

Northing (units): 1086026.90 | Easting (units): 872140.29

Cover Depth (ft): N/A | Elevation: 508.23

Sample Collection Method: [X] Bowl and Trowel [ ] Auger | Sample Depth: 0-0.1'

Soil Type: Brown silt | Rad Screen Instrument: 44-9: H Cal Due: 1-3-23; 44-10: G Cal Due: 8-2-23

Rad Screen Bkg. (cpm): 48/3997 | Rad Screen (cpm): 57/4144

Sample Type: Homogenous grab | HTZ Area (m²): N/A HTZ Field Reading: N/A | GWS Background Reading: N/A

Sample is: [ ] in excavation wall [ ] in excavation floor [ ] measured from original ground surface NA

Comments:

MS 11.1.22

Recorded by: Megan Sherman 10-24-22 | QA by: MS Steine Date: 11-1-22



COC No.: LE 10252022-08TA

Task Team Members: Mark Coppotelli, Ross Obermueffmann, Mike Miller, Chuck Finkenbine

Sample ID: SVP264226 | Station ID: SVP264226 MC 10.25.22

Collection Date: 10.25.22 | Collection Time: 1300

Property Name: Jana School | Sample Location: VJ-1

Northing (units): N/A | Easting (units): N/A

Cover Depth (ft): N/A | Elevation: N/A

Sample Collection Method: [ ] Bowl and Trowel [ ] Auger | Sample Depth: 0.0-0.1'

Used scraper | MS 11.1.22

Soil Type: DUST | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: I3 Cal Due: 7.11.23

Rad Screen Bkg. (cpm): 40/5888 | Rad Screen (cpm): 63/6044

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — | GWS Background Reading: —

Sample is: [ ] in excavation wall [ ] in excavation floor [ ] measured from original ground surface NA

Comments: DUST COLLECTED FROM KITCHEN FAN BLADES. ~500 cm²

Recorded by: Mark Coppotelli 10.25.22 | QA by: MS Steine Date: 11-1-22

COC No.: LE 10252022-08TA

Task Team Members: M. Coppotelli, M. Miller, R. Obermueffmann, C. Finkenbine

Sample ID: SVP264227 | Station ID: SVP264227

Collection Date: 10.25.22 | Collection Time: 1407

Property Name: Jana Elementary | Sample Location: VJ-6

Northing (units): N/A | Easting (units): N/A

Cover Depth (ft): N/A | Elevation: N/A

MS 11-1-22

Sample Collection Method: [ ] Bowl and Trowel [ ] Auger | Sample Depth: 0.0-0.1'

Used scraper

Soil Type: DUST | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: I3 Cal Due: 7.11.23

Rad Screen Bkg. (cpm): 40/5888 | Rad Screen (cpm): 58/6884

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — | GWS Background Reading: —

Sample is: [ ] in excavation wall [ ] in excavation floor [ ] measured from original ground surface NA

Comments: DUST COLECTED FROM CAFETERIA ELECTRICAL CONDUITS. ~500 cm²

Recorded by: Mark Coppotelli 10.25.22 | QA by: MS Steine Date: 11-1-22

COC No.: LE10252022-08TA

Task Team Members: C. FINKENBINE, M. Coppolelli, M. Miller, R. Obermueffemann

Sample ID: SVP264228 | Station ID: SVP264228

Collection Date: 10.25.22 | Collection Time: 1448

Property Name: Jana School | Sample Location: UJ-11

Northing (units): N/A | Easting (units): N/A

Cover Depth (ft): N/A | Elevation: N/A

Sample Collection Method: ☐ Bowl and Trowel ☐ Auger | Sample Depth: 0.0-0.1'

MS 11-1-22

Used Scraper

Soil Type: DUST | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: I3 Cal Due: 7.11.23

Rad Screen Bkg. (cpm): 40/5888 | Rad Screen (cpm): 99/7212

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments: DUST COLLECTED FROM EXHAUST/HOT WATER HEATER IN BOILER ROOM. ~2000 cm²

Recorded by: Mark Coppolelli 10.25.22 | QA by: MSterner | Date: 11-1-22

[redacted]

COC No.: LE10252022-08TA

Task Team Members: M. Coppolelli, C. FINKENBINE, R. Obermueffemann, M. Miller

Sample ID: SVP264229 | Station ID: SVP264229

Collection Date: 10.25.22 | Collection Time: 1541

Property Name: Jana School | Sample Location: UJ-14

Northing (units): N/A | Easting (units): N/A

Cover Depth (ft): N/A | Elevation: N/A

Sample Collection Method: ☐ Bowl and Trowel ☐ Auger | Sample Depth: 0.0-0.1

MS 11-1-22

Used Scraper

Soil Type: DUST | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: I3 Cal Due: 7.11.23

Rad Screen Bkg. (cpm): 40/5888 | Rad Screen (cpm): 72/7213

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments: DUST COLLECTED FROM BASKETBALL HOOP FRAME IN GYM. ~1000 cm²

Recorded by: Mark Coppolelli 10.25.22 | QA by: MSterner | Date: 11-1-22



COC No.: LE10252022-08TA

Task Team Members: M. Coppolelli, R. Obermueffemann, C. Finkenbine, M. Miller

Sample ID: SVP264230 | Station ID: SVP264230

Collection Date: 10.25.22 | Collection Time: 1611

Property Name: Jana School | Sample Location: UJ-18

Northing (units): N/A | Easting (units): N/A

Cover Depth (ft): N/A | Elevation: N/A

Sample Collection Method: ☐ Bowl and Trowel ☐ Auger | Sample Depth: 0.0-0.1'

MS 11-1-22

Used Scraper

Soil Type: DUST | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: I3 Cal Due: 7.11.23

Rad Screen Bkg. (cpm): 40/5888 | Rad Screen (cpm): 41/7002

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments: DUST COLLECTED FROM TOP OF VENT IN CUSTODIAL CLOSET. ~2500 cm²

Recorded by: Mark Coppolelli 10.25.22 | QA by: MSterner | Date: 11-1-22

[redacted]

COC No.: LE10262022-04TA

Task Team Members: M. Coppolelli, K. Winkler

Sample ID: SVP264231 | Station ID: SVP264231

Collection Date: 10.26.22 | Collection Time: 1515

Property Name: Jana School | Sample Location: Deposited soil on NW Parking Lot near swings

Northing (units): 1086167.32 | Easting (units): 871949.53

Cover Depth (ft): N/A | Elevation: 509.76

Sample Collection Method: ☑ Bowl and Trowel ☐ Auger | Sample Depth: 0-0.1ft

Soil Type: Black silty sand (SM) moist | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: 6 Cal Due: 8.2.23

Rad Screen Bkg. (cpm): 51/8448 | Rad Screen (cpm): 51/8439

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments:

MS 11-1-22

Recorded by: David W Bunger 10.26.22 | QA by: MSterner | Date: 11-1-22

COC No.: LE 10262022-04TA

Task Team Members: M. Coppotelli, K. Winkler

Sample ID: SVP264232 | Station ID: SVP264232

Collection Date: 10.26.22 | Collection Time: 1528

Property Name: Jana School | Sample Location: Deposited soil on sidewalk in NE Parking lot

Northing (units): 1086125.30 | Easting (units): 87 2211.44

Cover Depth (ft): N/A | Elevation: 507.45

Sample Collection Method: ☑ Bowl and Trowel ☐ Auger | Sample Depth: 0-0.1'

Soil Type: Black silty sand (SM) sl. moist | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: G Cal Due: 8.2.23

Rad Screen Bkg. (cpm): 51 / 8448 | Rad Screen (cpm): 52 / 8240

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments:

Recorded by: David W. Gregg 10.26.22 | QA by: MS 11-1-22 | Date: 11-1-22

[redacted]

COC No.: LE 10262022-04TA

Task Team Members: M. Coppotelli, K. Winkler

Sample ID: SVP264233 | Station ID: SVP264233

Collection Date: 10.26.22 | Collection Time: 1535

Property Name: Jana School | Sample Location: Deposited soil by drain NE of Property

Northing (units): 1086138.11 | Easting (units): 87 2211.96

Cover Depth (ft): N/A | Elevation: 506.63

Sample Collection Method: ☑ Bowl and Trowel ☐ Auger | Sample Depth: 0-0.1'

Soil Type: Brown clayey silt, fr. sand, sl. moist (ML) | Rad Screen Instrument: 44-9: D Cal Due: 12.27.22; 44-10: G Cal Due: 8.2.23

Rad Screen Bkg. (cpm): 51 / 8448 | Rad Screen (cpm): 50 / 8910

Sample Type: Homogenous grab | HTZ Area (m²): — HTZ Field Reading: — GWS Background Reading: —

Sample is: ☐ in excavation wall ☐ in excavation floor ☐ measured from original ground surface NA

Comments:

Recorded by: David W. Gregg 10.26.22 | QA by: MS 11-1-22 | Date: 11.1.22

# APPENDIX D

# FIXED-POINT AND SWIPE MEASUREMENT RESULTS FOR STRUCTURE SURFACE SURVEY UNITS

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## Table D-1. SU-1 Survey Data for Floor of First Story

| Surrogate Total Alpha DCGL: | 2,800 dpm/100 cm$^2$ | Total Beta DCGL: | 6,000 dpm/100 cm$^2$ |
|---|---|---|---|

### Table D-1a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 56 | 42 | 0.02 | 0.01 |
| Median | Fixed-Point Random | 53 | 0 | 0.02 | 0.00 |
| Standard Deviation | Fixed-Point Random | 45 | 109 | 0.02 | 0.02 |
| Maximum | Fixed-Point All | 262 | 678 | 0.09 | 0.11 |
| Range | Fixed-Point All | 262 | 678 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta | Swipe Lead-210 |
|---|---|---|---|---|---|---|---|
| Number of Measurements | 50 | 50 | 51 | 51 | 101 | 101 | 1 |
| Number Exceeding MDC | 12 | 0 | 17 | 5 | 0 | 0 | 0 |

### Table D-1b. Structure Surfaces Measurements Data

| Location ID | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity | Error | MDC | Activity | Error | MD |
| 1 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.67 | 102 | 83 | 0.04 | 176 | 206 | 0 | 622 | 0.00 | JF-1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 2 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 200 | 206 | 0 | 622 | 0.00 | JF-2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 3 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.67 | 77 | 83 | 0.03 | 194 | 206 | 0 | 622 | 0.00 | JF-3 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 4 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.67 | 41 | 83 | 0.01 | 249 | 206 | 383 | 622 | 0.06 | JF-4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 5 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 162 | 206 | 0 | 622 | 0.00 | JF-5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 6 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.67 | 77 | 83 | 0.03 | 191 | 206 | 0 | 622 | 0.00 | JF-6 | -0.12 | 0.03 | 5.97 | 5.12 | 5.35 | 7.03 | -- | -- | -- |
| 7 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 157 | 206 | 0 | 622 | 0.00 | JF-7 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 8 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 225 | 206 | 169 | 622 | 0.03 | JF-8 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 9 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 16 | 0.67 | 187 | 83 | 0.07 | 227 | 206 | 187 | 622 | 0.03 | JF-9 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 10 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 1 | 0.67 | 4 | 83 | 0.00 | 149 | 206 | 0 | 622 | 0.00 | JF-10 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 11 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 193 | 206 | 0 | 622 | 0.00 | JF-11 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 12 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 13 | 0.67 | 151 | 83 | 0.05 | 177 | 206 | 0 | 622 | 0.00 | JF-12 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 13 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 0 | 0.67 | 0 | 83 | 0.00 | 197 | 206 | 0 | 622 | 0.00 | JF-13 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 14 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.67 | 102 | 83 | 0.04 | 210 | 206 | 36 | 622 | 0.01 | JF-14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 15 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 185 | 206 | 0 | 622 | 0.00 | JF-15 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 16 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.67 | 41 | 83 | 0.01 | 197 | 206 | 0 | 622 | 0.00 | JF-16 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 17 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.67 | 77 | 83 | 0.03 | 211 | 206 | 45 | 622 | 0.01 | JF-17 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 18 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.67 | 65 | 83 | 0.02 | 208 | 206 | 18 | 622 | 0.00 | JF-18 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 | -- | -- | -- |
| 19 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 195 | 206 | 0 | 622 | 0.00 | JF-19 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 20 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 190 | 206 | 0 | 622 | 0.00 | JF-20 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 21 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 172 | 206 | 0 | 622 | 0.00 | JF-21 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 22 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.67 | 41 | 83 | 0.01 | 209 | 206 | 27 | 622 | 0.00 | JF-22 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 23 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 11 | 0.67 | 126 | 83 | 0.05 | 246 | 206 | 357 | 622 | 0.06 | JF-23 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 24 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.67 | 65 | 83 | 0.02 | 225 | 206 | 169 | 622 | 0.03 | JF-24 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 25 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 12 | 0.67 | 138 | 83 | 0.05 | 230 | 206 | 214 | 622 | 0.04 | JF-25 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 26 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 1 | 0.67 | 4 | 83 | 0.00 | 197 | 206 | 0 | 622 | 0.00 | JF-26 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 27 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.67 | 102 | 83 | 0.04 | 194 | 206 | 0 | 622 | 0.00 | JF-27 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |

## Table D-1b. Structure Surfaces Measurements Data (Continued)

| Location ID | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| 28 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 1 | 0.67 | 4 | 83 | 0.00 | 178 | 206 | 0 | 622 | 0.00 | JF-28 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 29 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 176 | 206 | 0 | 622 | 0.00 | JF-29 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 30 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 10 | 0.67 | 114 | 83 | 0.04 | 198 | 206 | 0 | 622 | 0.00 | JF-30 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 31 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 177 | 206 | 0 | 622 | 0.00 | JF-31 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 32 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 185 | 206 | 0 | 622 | 0.00 | JF-32 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 33 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 13 | 0.67 | 151 | 83 | 0.05 | 197 | 206 | 0 | 622 | 0.00 | JF-33 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 34 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 0 | 0.67 | 0 | 83 | 0.00 | 167 | 206 | 0 | 622 | 0.00 | JF-34 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 35 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 263 | 206 | 508 | 622 | 0.08 | JF-35 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 36 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 10 | 0.67 | 114 | 83 | 0.04 | 197 | 206 | 0 | 622 | 0.00 | JF-36 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 37 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.67 | 102 | 83 | 0.04 | 183 | 206 | 0 | 622 | 0.00 | JF-37 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 38 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 1 | 0.67 | 4 | 83 | 0.00 | 173 | 206 | 0 | 622 | 0.00 | JF-38 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 39 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 177 | 206 | 0 | 622 | 0.00 | JF-39 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 40 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 173 | 206 | 0 | 622 | 0.00 | JF-40 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 41 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.67 | 90 | 83 | 0.03 | 170 | 206 | 0 | 622 | 0.00 | JF-41 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 42 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 182 | 206 | 0 | 622 | 0.00 | JF-42 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 43 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 175 | 206 | 0 | 622 | 0.00 | JF-43 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 44 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 180 | 206 | 0 | 622 | 0.00 | JF-44 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 45 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.67 | 16 | 83 | 0.01 | 165 | 206 | 0 | 622 | 0.00 | JF-45 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 46 | Random | Carpet | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 179 | 206 | 0 | 622 | 0.00 | JF-46 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 47 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 171 | 206 | 0 | 622 | 0.00 | JF-47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 48 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.67 | 28 | 83 | 0.01 | 159 | 206 | 0 | 622 | 0.00 | JF-48 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 49 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.67 | 41 | 83 | 0.01 | 180 | 206 | 0 | 622 | 0.00 | JF-49 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 50 | Random | Tile Floor | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.67 | 53 | 83 | 0.02 | 179 | 206 | 0 | 622 | 0.00 | JF-50 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| B1 | Biased based on scan | Tile Floor | 0.305 | 0.433 | 0.25 | 0.25 | 14 | 2.00 | 126 | 101 | 0.04 | 282 | 277 | 37 | 594 | 0.01 | JF-B1 | 1.54 | 3.33 | 5.97 | 4.04 | 4.88 | 7.03 | -- | -- | -- |
| B2 | Biased based on scan | Tile Floor | 0.305 | 0.433 | 0.25 | 0.25 | 20 | 2.00 | 189 | 101 | 0.07 | 356 | 277 | 584 | 594 | 0.10 | JF-B2 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| B3 | Biased based on scan | Tile Floor | 0.275 | 0.343 | 0.25 | 0.25 | 10 | 1.00 | 105 | 89 | 0.04 | 196 | 180 | 149 | 610 | 0.02 | JF-B3 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| B4 | Biased based on scan | Tile Floor | 0.297 | 0.450 | 0.25 | 0.25 | 11 | 1.67 | 101 | 97 | 0.04 | 348 | 289 | 420 | 584 | 0.07 | JF-B4 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| B5 | Biased based on scan | Tile Floor | 0.301 | 0.388 | 0.25 | 0.25 | 20 | 0.67 | 206 | 72 | 0.07 | 261 | 210 | 421 | 581 | 0.07 | JF-B5 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| B6 | Biased based on scan | Tile Floor | 0.301 | 0.388 | 0.25 | 0.25 | 24 | 0.67 | 248 | 72 | 0.09 | 257 | 210 | 388 | 581 | 0.06 | JF-B6 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 | -- | -- | -- |
| B7[a] | Biased based on scan | Tile Floor | 0.307 | 0.401 | 0.25 | 0.25 | 5 | 2.33 | 28 | 97 | 0.01 | 193 | 231 | 0 | 584 | 0.00 | JF-B7 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| B8 | Biased based on scan | Tile Floor | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 0.67 | 56 | 71 | 0.02 | 249 | 217 | 255 | 571 | 0.04 | JF-B8 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| B9 | Biased based on scan | Tile Floor | 0.297 | 0.450 | 0.25 | 0.25 | 11 | 1.67 | 101 | 97 | 0.04 | 274 | 289 | 0 | 584 | 0.00 | JF-B9 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| B10 | Biased based on scan | Tile Floor | 0.307 | 0.401 | 0.25 | 0.25 | 8 | 0.67 | 76 | 71 | 0.03 | 211 | 217 | 0 | 571 | 0.00 | JF-B10 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B11 | Biased based on scan | Tile Floor | 0.307 | 0.401 | 0.25 | 0.25 | 8 | 0.67 | 76 | 71 | 0.03 | 231 | 217 | 112 | 571 | 0.02 | JF-B11 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| B12 | Biased based on scan | Tile Floor | 0.307 | 0.401 | 0.25 | 0.25 | 3 | 0.67 | 24 | 71 | 0.01 | 272 | 217 | 439 | 571 | 0.07 | JF-B12 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| B13 | Biased based on scan | Tile Floor | 0.275 | 0.343 | 0.25 | 0.25 | 13 | 1.00 | 140 | 89 | 0.05 | 173 | 180 | 0 | 610 | 0.00 | JF-B13 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B14 | Biased based on scan | Tile Floor | 0.297 | 0.450 | 0.25 | 0.25 | 26 | 1.67 | 262 | 97 | 0.09 | 384 | 289 | 676 | 584 | 0.11 | JF-B14 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| B15 | Biased based on scan | Tile Floor | 0.301 | 0.388 | 0.25 | 0.25 | 11 | 0.67 | 110 | 72 | 0.04 | 207 | 210 | 0 | 581 | 0.00 | JF-B15 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B16 | Biased based on scan | Tile Floor | 0.275 | 0.343 | 0.25 | 0.25 | 8 | 1.00 | 81 | 89 | 0.03 | 250 | 180 | 653 | 610 | 0.11 | JF-B16 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| B17 | Biased based on scan | Tile Floor | 0.289 | 0.421 | 0.25 | 0.25 | 1 | 3.67 | 0 | 132 | 0.00 | 151 | 248 | 0 | 580 | 0.00 | JF-B17 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B18 | Biased based on scan | Tile Floor | 0.289 | 0.421 | 0.25 | 0.25 | 6 | 3.67 | 26 | 132 | 0.01 | 173 | 248 | 0 | 580 | 0.00 | JF-B18 | 1.52 | 3.22 | 5.61 | 3.90 | 5.34 | 8.50 | -- | -- | -- |
| B19 | Biased based on scan | Tile Floor | 0.289 | 0.421 | 0.25 | 0.25 | 1 | 3.67 | 0 | 132 | 0.00 | 255 | 248 | 53 | 580 | 0.01 | JF-B19 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B20 | Biased based on scan | Tile Floor | 0.289 | 0.421 | 0.25 | 0.25 | 5 | 3.67 | 15 | 132 | 0.01 | 215 | 248 | 0 | 580 | 0.00 | JF-B20 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| B21 | Biased based on scan | Carpet | 0.288 | 0.424 | 0.25 | 0.25 | 8 | 0.33 | 85 | 63 | 0.03 | 255 | 181 | 558 | 495 | 0.09 | JF-B21 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |

## Table D-1b. Structure Surfaces Measurements Data (Continued)

| Location ID | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| B22 | Biased based on scan | Tile Floor | 0.289 | 0.421 | 0.25 | 0.25 | 11 | 3.67 | 81 | 132 | 0.03 | 261 | 248 | 99 | 580 | 0.02 | JF-B22 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| B23 | Biased based on scan | Tile Floor | 0.288 | 0.424 | 0.25 | 0.25 | 9 | 0.67 | 93 | 63 | 0.03 | 244 | 209 | 264 | 495 | 0.04 | JF-B23 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| B24 | Biased, surveyor selected | Tile Floor | 0.276 | 0.441 | 0.25 | 0.25 | 10 | 1.33 | 101 | 97 | 0.04 | 218 | 233 | 0 | 537 | 0.00 | JBC-B3 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| B25 | Biased, surveyor selected | Tile Floor | 0.276 | 0.441 | 0.25 | 0.25 | 9 | 1.33 | 89 | 97 | 0.03 | 215 | 233 | 0 | 537 | 0.00 | JBC-B4 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| B26 | Biased, surveyor selected | Tile Floor | 0.276 | 0.441 | 0.25 | 0.25 | 9 | 1.33 | 89 | 97 | 0.03 | 190 | 233 | 0 | 537 | 0.00 | JBC-B5 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| B27 | Biased, surveyor selected | Tile Floor | 0.276 | 0.441 | 0.25 | 0.25 | 9 | 1.33 | 89 | 97 | 0.03 | 261 | 233 | 203 | 537 | 0.03 | JBC-B6 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| JB1 | Biased, surveyor selected | Aluminium Threshold | 0.307 | 0.401 | 0.25 | 0.25 | 3 | 2.33 | 7 | 105 | 0.00 | 232 | 231 | 8 | 588 | 0.00 | IJ-B1 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| JB2 | Biased, surveyor selected | Aluminium Threshold | 0.307 | 0.401 | 0.25 | 0.25 | 7 | 2.33 | 49 | 105 | 0.02 | 236 | 231 | 40 | 588 | 0.01 | IJ-B2 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB3 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 1 | 2.33 | 0 | 105 | 0.00 | 227 | 231 | 0 | 588 | 0.00 | IJ-B3 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB4 | Biased, surveyor selected | Carpet | 0.307 | 0.401 | 0.25 | 0.25 | 3 | 2.33 | 7 | 105 | 0.00 | 297 | 231 | 527 | 588 | 0.09 | IJ-B4 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB5 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 8 | 2.33 | 59 | 105 | 0.02 | 282 | 231 | 407 | 588 | 0.07 | IJ-B5 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB6 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 3 | 2.33 | 7 | 105 | 0.00 | 283 | 231 | 415 | 588 | 0.07 | IJ-B6 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| JB7 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.33 | 38 | 105 | 0.01 | 250 | 231 | 152 | 588 | 0.03 | IJ-B7 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| JB8 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 4 | 2.33 | 17 | 105 | 0.01 | 255 | 231 | 192 | 588 | 0.03 | IJ-B8 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB9 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 3 | 2.33 | 7 | 105 | 0.00 | 302 | 231 | 567 | 588 | 0.09 | IJ-B9 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB10 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.33 | 38 | 105 | 0.01 | 294 | 231 | 503 | 588 | 0.08 | IJ-B10 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| JB11 | Biased, surveyor selected | Aluminium Threshold | 0.307 | 0.401 | 0.25 | 0.25 | 7 | 2.33 | 49 | 105 | 0.02 | 242 | 231 | 88 | 588 | 0.01 | IJ-B11 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| JB12 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.33 | 38 | 105 | 0.01 | 280 | 231 | 391 | 588 | 0.07 | IJ-B12 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| JB13 | Biased, surveyor selected | Aluminium Threshold | 0.307 | 0.401 | 0.25 | 0.25 | 5 | 2.33 | 28 | 105 | 0.01 | 217 | 231 | 0 | 588 | 0.00 | IJ-B13 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| JB14 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 2 | 2.33 | 0 | 105 | 0.00 | 255 | 231 | 192 | 588 | 0.03 | IJ-B14 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| JB15 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 2 | 2.33 | 0 | 105 | 0.00 | 273 | 231 | 335 | 588 | 0.06 | IJ-B15 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB16 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 7 | 2.33 | 49 | 105 | 0.02 | 270 | 231 | 311 | 588 | 0.05 | IJ-B16 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| JB17 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 7 | 2.33 | 49 | 105 | 0.02 | 261 | 231 | 239 | 588 | 0.04 | IJ-B17 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| JB18 | Biased, surveyor selected | Aluminium Threshold | 0.307 | 0.401 | 0.25 | 0.25 | 15 | 2.33 | 132 | 105 | 0.05 | 310 | 231 | 630 | 588 | 0.11 | IJ-B18 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB19 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 5 | 2.33 | 28 | 105 | 0.01 | 316 | 231 | 678 | 588 | 0.11 | IJ-B19 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| JB20 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 1 | 2.33 | 0 | 105 | 0.00 | 193 | 231 | 0 | 588 | 0.00 | IJ-B20 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| JB21 | Biased, surveyor selected | Concrete | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.33 | 38 | 105 | 0.01 | 211 | 231 | 0 | 588 | 0.00 | IJ-B21 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| JB22 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 9 | 2.33 | 70 | 105 | 0.02 | 258 | 231 | 215 | 588 | 0.04 | IJ-B22 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| JB23 | Biased, surveyor selected | Floor Tile | 0.307 | 0.401 | 0.25 | 0.25 | 4 | 2.33 | 17 | 105 | 0.01 | 219 | 231 | 0 | 588 | 0.00 | IJ-B23 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| UB10 | Biased, USACE selected | Floor Pit | 0.329 | 0.452 | 0.25 | 0.25 | 10 | 0.33 | 94 | 55 | 0.03 | 331 | 259 | 510 | 551 | 0.08 | UJ10 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 | -2.03 | 2.14 | 3.75 |

[a] Survey after a few hours of being covered or bagged to allow short-lived radon decay products to decay to provide a true measurement of long-lived radioactivity. Initial measurements were 402 and 235 dpm/100 cm$^2$ for alpha radioactivity and beta radioactvity, respectively.

Notes:

Survey locations are identified on Figure 3 and on photographs in Appendix E.

The location ID for the USACE-selected biased location was modified from the survey record by adding a "U" as the first letter.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi instrument efficiency ($\varepsilon_i$) for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The surface efficiency ($\varepsilon_s$) for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs. The lead-210 content on the swipes was measured at Eurofins St. Louis laboratory through chemical leaching and liquid scintillation counting (method ST-RC-0211).

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

-- indicates data not available.

## Table D-2. SU-2 Survey Data for Floor of Second Story

**Surrogate Total Alpha DCGL:** 2,800 dpm/100 cm$^2$ | **Total Beta DCGL:** 6,000 dpm/100 cm$^2$

### Table D-2a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 11 | 0 | 0.00 | 0.00 |
| Median | Fixed-Point Random | 7 | 0 | 0.00 | 0.00 |
| Standard Deviation | Fixed-Point Random | 12 | 0 | 0.00 | 0.00 |
| Maximum | Fixed-Point All | 66 | 47 | 0.02 | 0.01 |
| Range | Fixed-Point All | 66 | 47 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta |
|---|---|---|---|---|---|---|
| **Number of Measurements** | 20 | 20 | 2 | 2 | 22 | 22 |
| **Number Exceeding MDC** | 0 | 0 | 0 | 0 | 0 | 0 |

### Table D-2b. Structure Surfaces Measurements Data

| Location ID | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC |
| 1 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 2 | 0.33 | 17 | 58 | 0.01 | 257 | 279 | 0 | 591 | 0.00 | J2F-1 | 1.47 | 3.27 | 6.14 | -2.46 | 0.22 | 8.14 |
| 2 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 227 | 279 | 0 | 591 | 0.00 | J2F-2 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 |
| 3 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 3 | 0.33 | 27 | 58 | 0.01 | 265 | 279 | 0 | 591 | 0.00 | J2F-3 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 4 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 254 | 279 | 0 | 591 | 0.00 | J2F-4 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 5 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 4 | 0.33 | 38 | 58 | 0.01 | 250 | 279 | 0 | 591 | 0.00 | J2F-5 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| 6 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 260 | 279 | 0 | 591 | 0.00 | J2F-6 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 7 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 4 | 0.33 | 38 | 58 | 0.01 | 241 | 279 | 0 | 591 | 0.00 | J2F-7 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 8 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 209 | 279 | 0 | 591 | 0.00 | J2F-8 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 9 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 235 | 279 | 0 | 591 | 0.00 | J2F-9 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 10 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 266 | 279 | 0 | 591 | 0.00 | J2F-10 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 11 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 235 | 279 | 0 | 591 | 0.00 | J2F-11 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| 12 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 265 | 279 | 0 | 591 | 0.00 | J2F-12 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 13 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 264 | 279 | 0 | 591 | 0.00 | J2F-13 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 |
| 14 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 251 | 279 | 0 | 591 | 0.00 | J2F-14 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 |
| 15 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 249 | 279 | 0 | 591 | 0.00 | J2F-15 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 16 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 240 | 279 | 0 | 591 | 0.00 | J2F-16 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| 17 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 273 | 279 | 0 | 591 | 0.00 | J2F-17 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 18 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 3 | 0.33 | 27 | 58 | 0.01 | 241 | 279 | 0 | 591 | 0.00 | J2F-18 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 19 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 238 | 279 | 0 | 591 | 0.00 | J2F-19 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 20 | Random | Floor Tile | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 264 | 279 | 0 | 591 | 0.00 | J2F-20 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |

## Table D-2b. Structure Surfaces Measurements Data (Continued)

| Location ID | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/100 cm2) | | | | | |
| B1 | Biased, surveyor selected | Floor Tile | 0.276 | 0.411 | 0.25 | 0.25 | 4 | 1.33 | 31 | 97 | 0.01 | 232 | 233 | 0 | 576 | 0.00 | JBC-B1 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| B2 | Biased, surveyor selected | Floor Tile | 0.276 | 0.411 | 0.25 | 0.25 | 7 | 1.33 | 66 | 97 | 0.02 | 239 | 233 | 47 | 576 | 0.01 | JBC-B2 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |

Notes:

Survey locations are identified on Figure 4 and on photographs in Appendix E.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_S$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs.

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

## Table D-3. SU-3 Survey Data for Interior Walls and Equipment of First Story

| **Surrogate Total Alpha DCGL:** | 2,800 dpm/100 cm$^2$ | **Total Beta DCGL:** | 6,000 dpm/100 cm$^2$ |
|---|---|---|---|

### Table D-3a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 83 | 203 | 0.03 | 0.03 |
| Median | Fixed-Point Random | 73 | 0 | 0.03 | 0.00 |
| Standard Deviation | Fixed-Point Random | 46 | 444 | 0.02 | 0.07 |
| Maximum | Fixed-Point All | 220 | 2,973 | 0.08 | 0.496 |
| Range | Fixed-Point All | 220 | 2,833 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta | Swipe Lead-210 |
|---|---|---|---|---|---|---|---|
| **Number of Measurements** | 50 | 50 | 37 | 37 | 87 | 87 | 17 |
| **Number Exceeding MDC** | 39 | 3 | 24 | 5 | 0 | 0 | 0 |

### Table D-3b. Structure Surfaces Measurements Data

| Location ID | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| 1 | 2.5 | Random | Plastic Table | 0.262 | 0.359 | 0.25 | 0.25 | 15 | 0.00 | 183 | 37 | 0.07 | 171 | 204 | 0 | 619 | 0.00 | JIW-1 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 2 | 4.5 | Random | Counter Top | 0.262 | 0.359 | 0.25 | 0.25 | 12 | 0.00 | 147 | 37 | 0.05 | 194 | 204 | 0 | 619 | 0.00 | JIW-2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 3 | 3 | Random | Desk Top | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.00 | 24 | 37 | 0.01 | 213 | 204 | 80 | 619 | 0.01 | JIW-3 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 4 | 2 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 174 | 204 | 0 | 619 | 0.00 | JIW-4 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 5 | 5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.00 | 98 | 37 | 0.03 | 253 | 204 | 437 | 619 | 0.07 | JIW-5 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 6 | 2.5 | Random | Desk Top | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 160 | 204 | 0 | 619 | 0.00 | JIW-6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 7 | 6 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.00 | 24 | 37 | 0.01 | 224 | 204 | 178 | 619 | 0.03 | JIW-7 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 8 | 1 | Random | Painted Concrete Pilar | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 140 | 204 | 0 | 619 | 0.00 | JIW-8 | 1.54 | 3.33 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 9 | 1 | Random | Drywall | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 155 | 204 | 0 | 619 | 0.00 | JIW-9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 10 | 1.5 | Random | Wall | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 265 | 204 | 544 | 619 | 0.09 | JIW-10 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 11 | 3.5 | Random | Metal Cabinet | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.00 | 85 | 37 | 0.03 | 187 | 204 | 0 | 619 | 0.00 | JIW-11 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 12 | 5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 11 | 0.00 | 134 | 37 | 0.05 | 220 | 204 | 143 | 619 | 0.02 | JIW-12 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 13 | 3 | Random | Dry Erase Board | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 269 | 204 | 579 | 619 | 0.10 | JIW-13 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 14 | 2.5 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 186 | 204 | 0 | 619 | 0.00 | JIW-14 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 15 | 4 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 10 | 0.00 | 122 | 37 | 0.04 | 196 | 204 | 0 | 619 | 0.00 | JIW-15 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 16 | 1 | Random | Counter Top | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.00 | 85 | 37 | 0.03 | 195 | 204 | 0 | 619 | 0.00 | JIW-16 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 17 | 1.5 | Random | Book Shelf | 0.262 | 0.359 | 0.25 | 0.25 | 11 | 0.00 | 134 | 37 | 0.05 | 190 | 204 | 0 | 619 | 0.00 | JIW-17 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 18 | 1 | Random | Drywall | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 152 | 204 | 0 | 619 | 0.00 | JIW-18 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 19 | 5.5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 202 | 204 | 0 | 619 | 0.00 | JIW-19 | 1.54 | 3.33 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 20 | 3 | Random | Table Top | 0.262 | 0.359 | 0.25 | 0.25 | 2 | 0.00 | 24 | 37 | 0.01 | 195 | 204 | 0 | 619 | 0.00 | JIW-20 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 21 | 3.5 | Random | Wood Shelf | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 189 | 204 | 0 | 619 | 0.00 | JIW-21 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| 22 | 3.5 | Random | Stainless Steel Table | 0.262 | 0.359 | 0.25 | 0.25 | 17 | 0.00 | 208 | 37 | 0.07 | 194 | 204 | 0 | 619 | 0.00 | JIW-22 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 | -- | -- | -- |
| 23 | 2.5 | Random | Plastic Desk | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 198 | 204 | 0 | 619 | 0.00 | JIW-23 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| 24 | 3 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 191 | 204 | 0 | 619 | 0.00 | JIW-24 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 25 | 2 | Random | Counter Top | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.00 | 98 | 37 | 0.03 | 172 | 204 | 0 | 619 | 0.00 | JIW-25 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |

## Table D-3b. Structure Surfaces Measurements Data (Continued)

| Location ID | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| 26 | 3 | Random | Bulletin Board | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 197 | 204 | 0 | 619 | 0.00 | JIW-26 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| 27 | 2.5 | Random | Counter Top | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 192 | 204 | 0 | 619 | 0.00 | JIW-27 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| 28 | 2 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.00 | 98 | 37 | 0.03 | 272 | 204 | 606 | 619 | 0.10 | JIW-28 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 | -- | -- | -- |
| 29 | 2.5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.00 | 85 | 37 | 0.03 | 229 | 204 | 223 | 619 | 0.04 | JIW-29 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| 30 | 1 | Random | Brick Wall | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 351 | 204 | 1,310 | 619 | 0.22 | JIW-30 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 31 | 5.5 | Random | Painted Concrete Pilar | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 147 | 204 | 0 | 619 | 0.00 | JIW-31 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| 32 | 1.5 | Random | Table Top | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.00 | 98 | 37 | 0.03 | 169 | 204 | 0 | 619 | 0.00 | JIW-32 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 33 | 3 | Random | Wood Cabinet | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 144 | 204 | 0 | 619 | 0.00 | JIW-33 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 34 | 1 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.00 | 85 | 37 | 0.03 | 248 | 204 | 392 | 619 | 0.07 | JIW-34 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 35 | 2.5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.00 | 49 | 37 | 0.02 | 227 | 204 | 205 | 619 | 0.03 | JIW-35 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| 36 | 6 | Random | Drywall | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 160 | 204 | 0 | 619 | 0.00 | JIW-36 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 37 | 2 | Random | Painted Cinder Block | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.00 | 110 | 37 | 0.04 | 229 | 204 | 223 | 619 | 0.04 | JIW-37 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| 38 | 3.5 | Random | Painted Cinder Block | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 243 | 204 | 348 | 619 | 0.06 | JIW-38 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 39 | 3 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 161 | 204 | 0 | 619 | 0.00 | JIW-39 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| 40 | 2.5 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 5 | 0.00 | 61 | 37 | 0.02 | 175 | 204 | 0 | 619 | 0.00 | JIW-40 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| 41 | 1 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 9 | 0.00 | 110 | 37 | 0.04 | 216 | 204 | 107 | 619 | 0.02 | JIW-41 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 42 | 3 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 4 | 0.00 | 49 | 37 | 0.02 | 256 | 204 | 464 | 619 | 0.08 | JIW-42 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 43 | 2 | Random | Tile Wall | 0.262 | 0.359 | 0.25 | 0.25 | 18 | 0.00 | 220 | 37 | 0.08 | 381 | 204 | 1,578 | 619 | 0.26 | JIW-43 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 44 | 0.5 | Random | Door Frame | 0.262 | 0.359 | 0.25 | 0.25 | 10 | 0.00 | 122 | 37 | 0.04 | 244 | 204 | 357 | 619 | 0.06 | JIW-44 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 45 | 0.5 | Random | Cinder Block Wall | 0.262 | 0.359 | 0.25 | 0.25 | 3 | 0.00 | 37 | 37 | 0.01 | 169 | 204 | 0 | 619 | 0.00 | JIW-45 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 46 | 2.5 | Random | Table | 0.262 | 0.359 | 0.25 | 0.25 | 8 | 0.00 | 98 | 37 | 0.03 | 175 | 204 | 0 | 619 | 0.00 | JIW-46 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 47 | 2 | Random | Power Strip | 0.262 | 0.359 | 0.25 | 0.25 | 7 | 0.00 | 85 | 37 | 0.03 | 164 | 204 | 0 | 619 | 0.00 | JIW-47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 48 | 2.5 | Random | Desk | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 187 | 204 | 0 | 619 | 0.00 | JIW-48 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 49 | 1 | Random | Ceramic Tile | 0.262 | 0.359 | 0.25 | 0.25 | 16 | 0.00 | 195 | 37 | 0.07 | 467 | 204 | 2,344 | 619 | 0.39 | JIW-49 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 50 | 3 | Random | Book Shelf | 0.262 | 0.359 | 0.25 | 0.25 | 6 | 0.00 | 73 | 37 | 0.03 | 210 | 204 | 53 | 619 | 0.01 | JIW-50 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| B4 | 2.5 | Biased based on scan | Desk Top | 0.305 | 0.433 | 0.25 | 0.25 | 13 | 0.33 | 133 | 60 | 0.05 | 318 | 332 | 0 | 649 | 0.00 | JIW-B4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| B5 | 2.5 | Biased based on scan | Desk Top | 0.305 | 0.433 | 0.25 | 0.25 | 20 | 0.33 | 206 | 60 | 0.07 | 298 | 332 | 0 | 649 | 0.00 | JIW-B5 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| B6 | 2.5 | Biased based on scan | Desk Top | 0.305 | 0.433 | 0.25 | 0.25 | 7 | 0.33 | 70 | 60 | 0.02 | 316 | 332 | 0 | 649 | 0.00 | JIW-B6 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| B7 | 2.5 | Biased based on scan | Desk Top | 0.305 | 0.433 | 0.25 | 0.25 | 10 | 0.33 | 101 | 60 | 0.04 | 237 | 332 | 0 | 649 | 0.00 | JIW-B7 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| B8 | 1 | Biased based on scan | Metal Cabinet | 0.305 | 0.433 | 0.25 | 0.25 | 15 | 0.33 | 154 | 60 | 0.05 | 265 | 332 | 0 | 649 | 0.00 | JIW-B8 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| B9 | 2.5 | Biased based on scan | Plastic Desk | 0.305 | 0.433 | 0.25 | 0.25 | 8 | 0.33 | 80 | 60 | 0.03 | 249 | 332 | 0 | 649 | 0.00 | JIW-B9 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| B10 | 2.5 | Biased based on scan | Plastic Desk | 0.305 | 0.433 | 0.25 | 0.25 | 10 | 0.33 | 101 | 60 | 0.04 | 281 | 332 | 0 | 649 | 0.00 | JIW-B10 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| B11 | 2.5 | Biased based on scan | Plastic Desk | 0.305 | 0.433 | 0.25 | 0.25 | 8 | 0.33 | 80 | 60 | 0.03 | 267 | 332 | 0 | 649 | 0.00 | JIW-B11 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| B12 | 1 | Biased based on scan | Cinder Block Wall | 0.305 | 0.433 | 0.25 | 0.25 | 7 | 0.33 | 70 | 60 | 0.02 | 235 | 332 | 0 | 649 | 0.00 | JIW-B12 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| B13 | 2.5 | Biased based on scan | Counter Top | 0.305 | 0.433 | 0.25 | 0.25 | 12 | 0.33 | 122 | 60 | 0.04 | 286 | 332 | 0 | 649 | 0.00 | JIW-B13 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| B14 | 2 | Biased based on scan | Tile Wall | 0.305 | 0.433 | 0.25 | 0.25 | 16 | 0.33 | 164 | 60 | 0.06 | 590 | 332 | 1,907 | 649 | 0.32 | JIW-B14 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| JB24 | -- | Biased, surveyor selected | Ceramic Sink | 0.307 | 0.401 | 0.25 | 0.25 | 10 | 2.67 | 76 | 111 | 0.03 | 216 | 231 | 0 | 588 | 0.00 | IJ-B24 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| JB25 | -- | Biased, surveyor selected | Metal bench | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.67 | 35 | 111 | 0.01 | 223 | 231 | 0 | 588 | 0.00 | IJ-B25 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| JB26 | -- | Biased, surveyor selected | Metal Pipe | 0.307 | 0.401 | 0.25 | 0.25 | 13 | 2.67 | 108 | 111 | 0.04 | 315 | 231 | 670 | 588 | 0.11 | IJ-B26 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| JB27 | -- | Biased, surveyor selected | Metal Countertop | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.67 | 35 | 111 | 0.01 | 287 | 231 | 447 | 588 | 0.07 | IJ-B27 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 | -- | -- | -- |
| JB28 | -- | Biased, surveyor selected | Metal Countertop | 0.307 | 0.401 | 0.25 | 0.25 | 5 | 2.67 | 24 | 111 | 0.01 | 335 | 231 | 830 | 588 | 0.14 | IJ-B28 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |

## Table D-3b. Structure Surfaces Measurements Data (Continued)

| Location ID | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| JB29 | -- | Biased, surveyor selected | Oven | 0.307 | 0.401 | 0.25 | 0.25 | 6 | 2.67 | 35 | 111 | 0.01 | 302 | 231 | 567 | 588 | 0.09 | IJ-B29 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| UB1 | -- | Biased, USACE selected | Kitchen Fan Blade | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 0.33 | 55 | 55 | 0.02 | 269 | 259 | 71 | 551 | 0.01 | UJ1 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -1.97 | 1.85 | 3.24 |
| UB2 | -- | Biased, USACE selected | Ceramic Tile on Wall | 0.329 | 0.452 | 0.25 | 0.25 | 8 | 0.33 | 75 | 55 | 0.03 | 679 | 259 | 2,973 | 551 | 0.496 | UJ2 | 1.52 | 3.22 | 5.61 | 4.99 | 5.77 | 8.50 | -2.82 | 2.26 | 4.00 |
| UB3 | -- | Biased, USACE selected | Exterior Kitchen Door Ledge | 0.329 | 0.452 | 0.25 | 0.25 | 1 | 0.33 | 7 | 55 | 0.00 | 270 | 259 | 78 | 551 | 0.01 | UJ3 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 | -3.75 | 2.18 | 3.91 |
| UB4[a] | -- | Biased, USACE selected | Air Vent | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.33 | 36 | 55 | 0.01 | 281 | 271 | 71 | 551 | 0.01 | UJ4 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 | -2.22 | 2.13 | 3.75 |
| UB5 | -- | Biased, USACE selected | Refrigerator Top | 0.329 | 0.452 | 0.25 | 0.25 | 9 | 0.33 | 84 | 55 | 0.03 | 302 | 259 | 304 | 551 | 0.05 | UJ5 | 4.74 | 5.59 | 5.61 | 7.17 | 6.55 | 8.50 | -2.49 | 2.08 | 3.69 |
| UB6 | -- | Biased, USACE selected | Conduit Pipe | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 0.33 | 65 | 55 | 0.02 | 270 | 259 | 78 | 551 | 0.01 | UJ6 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -1.88 | 1.97 | 3.46 |
| UB7 | -- | Biased, USACE selected | Water Heater | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 0.33 | 55 | 55 | 0.02 | 213 | 259 | 0 | 551 | 0.00 | UJ7 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -2.93 | 2.20 | 3.91 |
| UB8[b] | -- | Biased, USACE selected | Filter | 0.329 | 0.452 | 0.25 | 0.25 | 14 | 0.33 | 133 | 55 | 0.05 | 368 | 271 | 687 | 551 | 0.11 | UJ8 | 4.87 | 5.77 | 5.97 | -0.32 | 2.18 | 7.03 | -2.14 | 2.17 | 3.80 |
| UB9 | -- | Biased, USACE selected | Pipes | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 0.33 | 65 | 55 | 0.02 | 266 | 259 | 50 | 551 | 0.01 | UJ9 | -0.12 | 0.03 | 5.97 | 5.12 | 5.35 | 7.03 | -1.91 | 2.22 | 3.89 |
| UB11 | -- | Biased, USACE selected | Water Heater | 0.329 | 0.452 | 0.25 | 0.25 | 15 | 0.33 | 143 | 55 | 0.05 | 274 | 259 | 106 | 551 | 0.02 | UJ11 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -0.52 | 2.16 | 3.71 |
| UB12 | -- | Biased, USACE selected | Cleaning Equipment | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 0.33 | 45 | 55 | 0.02 | 295 | 259 | 255 | 551 | 0.04 | UJ12 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -2.31 | 2.05 | 3.62 |
| UB13 | -- | Biased, USACE selected | Vent | 0.329 | 0.452 | 0.25 | 0.25 | 12 | 0.33 | 114 | 55 | 0.04 | 336 | 259 | 545 | 551 | 0.09 | UJ13 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -2.60 | 2.15 | 3.80 |
| UB14 | -- | Biased, USACE selected | Basketball Hoop Frame | 0.329 | 0.452 | 0.25 | 0.25 | 12 | 0.33 | 114 | 55 | 0.04 | 318 | 259 | 418 | 551 | 0.07 | UJ14 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -2.22 | 2.20 | 3.86 |
| UB15[c] | -- | Biased, USACE selected | Air Conditioner | 0.329 | 0.452 | 0.25 | 0.25 | 16 | 0.33 | 152 | 55 | 0.05 | 283 | 271 | 85 | 551 | 0.01 | UJ15 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -1.48 | 2.15 | 3.75 |
| UB16 | -- | Biased, USACE selected | Sink | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 0.33 | 45 | 55 | 0.02 | 249 | 259 | 0 | 551 | 0.00 | UJ16 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -4.00 | 2.44 | 4.35 |
| UB17[d] | -- | Biased, USACE selected | Vent | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.33 | 36 | 55 | 0.01 | 305 | 271 | 241 | 551 | 0.04 | UJ17 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -0.96 | 2.12 | 3.66 |
| UB18 | -- | Biased, USACE selected | Top of Vent | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 0.33 | 55 | 55 | 0.02 | 239 | 259 | 0 | 551 | 0.00 | UJ18 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -1.20 | 2.08 | 3.62 |
| UB20 | -- | Biased, USACE selected | Refrigerator | 0.307 | 0.401 | 0.25 | 0.25 | 0 | 1.00 | 0 | 80 | 0.00 | 207 | 210 | 0 | 562 | 0.00 | JIW-B1 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| UB21 | -- | Biased, USACE selected | Refrigerator | 0.307 | 0.401 | 0.25 | 0.25 | 9 | 1.00 | 83 | 80 | 0.03 | 267 | 210 | 455 | 562 | 0.08 | JIW-B2 | 3.21 | 4.71 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| UB22 | -- | Biased, USACE selected | Exhaust Fan | 0.305 | 0.433 | 0.25 | 0.25 | 8 | 2.00 | 63 | 101 | 0.02 | 283 | 300 | 0 | 618 | 0.00 | JIW-B3 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |

[a] Survey after a few hours of being covered or bagged to allow short-lived radon decay products to decay to provide a true measurement of long-lived radioactivity. Initial measurements were 979 and 1,827 dpm/100 cm$^2$ for alpha radioactivity and beta radioactvity, respectively.

[b] Survey after a few hours of being covered or bagged to allow short-lived radon decay products to decay to provide a true measurement of long-lived radioactivity. Initial measurements were 8,517 and 34,690 dpm/100 cm$^2$ for alpha radioactivity and beta radioactvity, respectively.

[c] Survey after a few hours of being covered or bagged to allow short-lived radon decay products to decay to provide a true measurement of long-lived radioactivity. Initial measurements were 532 and 722 dpm/100 cm$^2$ for alpha radioactivity and beta radioactvity, respectively.

[e] Survey after a few hours of being covered or bagged to allow short-lived radon decay products to decay to provide a true measurement of long-lived radioactivity. Initial measurements were 1,465 and 3,221 dpm/100 cm$^2$ for alpha radioactivity and beta radioactvity, respectively.

Notes:

Survey locations are identified on Figure 5 and on photographs in Appendix E.

The location ID for the USACE-selected biased locations were modified from the survey record by adding a "U" as the first letter.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_S$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs. The lead-210 content on the swipes was measured at Eurofins St. Louis laboratory through chemical leaching and liquid scintillation counting (method ST-RC-0211).

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

-- indicates data not available.

## Table D-4. SU-4 Survey Data for Interior Walls and Equipment of Second Story

| **Surrogate Total Alpha DCGL:** | 2,800 dpm/100 cm$^2$ |
|---|---|

| **Total Beta DCGL:** | 6,000 dpm/100 cm$^2$ |
|---|---|

### Table D-4a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 28 | 252 | 0.01 | 0.04 |
| Median | Fixed-Point Random | 17 | 0 | 0.01 | 0.00 |
| Standard Deviation | Fixed-Point Random | 43 | 545 | 0.02 | 0.09 |
| Maximum | Fixed-Point All | 295 | 2,168 | 0.11 | 0.36 |
| Range | Fixed-Point All | 295 | 2,168 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta | Swipe Lead-210 |
|---|---|---|---|---|---|---|---|
| **Number of Measurements** | 20 | 20 | 4 | 4 | 24 | 24 | 1 |
| **Number Exceeding MDC** | 3 | 2 | 2 | 4 | 0 | 0 | 0 |

### Table D-4b. Structure Surfaces Measurements Data

| Location ID | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error | MDC | Activity | Error | MDC | Activity | Error[c] | MDC |
| 1 | 2.5 | Random | Desk | 0.311 | 0.437 | 0.25 | 0.25 | 2 | 0.33 | 17 | 58 | 0.01 | 241 | 279 | 0 | 591 | 0.00 | J2IW-1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 2 | 3.0 | Random | Ceramic Wall Tile | 0.311 | 0.437 | 0.25 | 0.25 | 19 | 0.33 | 192 | 58 | 0.07 | 572 | 279 | 2,146 | 591 | 0.36 | J2IW-2 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 3 | 3.0 | Random | Wood Shelf | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 239 | 279 | 0 | 591 | 0.00 | J2IW-3 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 4 | 2.5 | Random | Table | 0.311 | 0.437 | 0.25 | 0.25 | 3 | 0.33 | 27 | 58 | 0.01 | 244 | 279 | 0 | 591 | 0.00 | J2IW-4 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 5 | 2.5 | Random | Desk | 0.311 | 0.437 | 0.25 | 0.25 | 2 | 0.33 | 17 | 58 | 0.01 | 240 | 279 | 0 | 591 | 0.00 | J2IW-5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 6 | 1.0 | Random | Cinder Block Wall | 0.311 | 0.437 | 0.25 | 0.25 | 3 | 0.33 | 27 | 58 | 0.01 | 312 | 279 | 242 | 591 | 0.04 | J2IW-6 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 7 | 2.0 | Random | Wood Shelf | 0.311 | 0.437 | 0.25 | 0.25 | 6 | 0.33 | 58 | 58 | 0.02 | 313 | 279 | 249 | 591 | 0.04 | J2IW-7 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 8 | 3.0 | Random | Drywall | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 205 | 279 | 0 | 591 | 0.00 | J2IW-8 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 9 | 4.0 | Random | Drywall | 0.311 | 0.437 | 0.25 | 0.25 | 5 | 0.33 | 48 | 58 | 0.02 | 188 | 279 | 0 | 591 | 0.00 | J2IW-9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 10 | 3.0 | Random | Wood Shelf | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 337 | 279 | 425 | 591 | 0.07 | J2IW-10 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 11 | 2.5 | Random | Desk | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 219 | 279 | 0 | 591 | 0.00 | J2IW-11 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 12 | 5.0 | Random | Wood Shelf | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 307 | 279 | 205 | 591 | 0.03 | J2IW-12 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 13 | 2.0 | Random | Brick Wall | 0.311 | 0.437 | 0.25 | 0.25 | 6 | 0.33 | 58 | 58 | 0.02 | 466 | 279 | 1,369 | 591 | 0.23 | J2IW-13 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 14 | 2.0 | Random | Drywall | 0.311 | 0.437 | 0.25 | 0.25 | 1 | 0.33 | 7 | 58 | 0.00 | 196 | 279 | 0 | 591 | 0.00 | J2IW-14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| 15 | 2.5 | Random | Desk | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 259 | 279 | 0 | 591 | 0.00 | J2IW-15 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 16 | 4.0 | Random | Painted Concrete Wall | 0.311 | 0.437 | 0.25 | 0.25 | 4 | 0.33 | 38 | 58 | 0.01 | 272 | 279 | 0 | 591 | 0.00 | J2IW-16 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| 17 | 2.5 | Random | Desk | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 309 | 279 | 220 | 591 | 0.04 | J2IW-17 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| 18 | 5.0 | Random | Cinder Block Wall | 0.311 | 0.437 | 0.25 | 0.25 | 0 | 0.33 | 0 | 58 | 0.00 | 303 | 279 | 176 | 591 | 0.03 | J2IW-18 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| 19 | 3.0 | Random | Wood Shelf | 0.311 | 0.437 | 0.25 | 0.25 | 2 | 0.33 | 17 | 58 | 0.01 | 255 | 279 | 0 | 591 | 0.00 | J2IW-19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| 20 | 2.0 | Random | Drywall | 0.311 | 0.437 | 0.25 | 0.25 | 3 | 0.33 | 27 | 58 | 0.01 | 185 | 279 | 0 | 591 | 0.00 | J2IW-20 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |

## Table D-4b. Structure Surfaces Measurements Data (Continued)

| Location ID | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| B1 | 3.5 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 2 | 0.33 | 16 | 55 | 0.01 | 500 | 271 | 1,621 | 563 | 0.27 | J2IW-B1 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| B2 | 3.0 | Biased based on scan | Ceramic Wall Tile | 0.311 | 0.437 | 0.25 | 0.25 | 29 | 0.33 | 295 | 58 | 0.11 | 552 | 279 | 1,999 | 591 | 0.33 | J2IW-B2 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| B3 | 3.0 | Biased based on scan | Ceramic Wall Tile | 0.311 | 0.437 | 0.25 | 0.25 | 17 | 0.33 | 172 | 58 | 0.06 | 575 | 279 | 2,168 | 591 | 0.36 | J2IW-B3 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| UB19 | -- | Biased, USACE selected | Vent | 0.329 | 0.452 | 0.25 | 0.25 | 3 | 0.33 | 26 | 55 | 0.01 | 349 | 259 | 637 | 563 | 0.11 | UJ19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -0.75 | 2.21 | 3.80 |

Notes:

Survey locations are identified on Figure 6 and on photographs in Appendix E.

The location ID for the USACE-selected biased location was modified from the survey record by adding a "U" as the first letter.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_S$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs. The lead-210 content on the swipes was measured at Eurofins St. Louis laboratory through chemical leaching and liquid scintillation counting (method ST-RC-0211).

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

-- indicates data not available.

## Table D-5. SU-5 Survey Data for Exterior Walls

**Surrogate Total Alpha DCGL:** 2,800 dpm/100 cm$^2$

**Total Beta DCGL:** 6,000 dpm/100 cm$^2$

### Table D-5a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 32 | 1,093 | 0.01 | 0.18 |
| Median | Fixed-Point Random | 32 | 1,121 | 0.01 | 0.19 |
| Standard Deviation | Fixed-Point Random | 26 | 609 | 0.01 | 0.10 |
| Maximum | Fixed-Point All | 97 | 2,308 | 0.03 | 0.38 |
| Range | Fixed-Point All | 97 | 2,308 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta |
|---|---|---|---|---|---|---|
| Number of Measurements | 50 | 50 | 7 | 7 | 57 | 57 |
| Number Exceeding MDC | 6 | 42 | 0 | 6 | 0 | 0 |

### Table D-5b. Structure Surfaces Measurements Data

| Location ID | Easting (ft) | Northing (ft) | Height (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation (cpm) | | Alpha Radiation (dpm/100 cm$^2$) | | Fraction of the Alpha DCGL | Beta Radiation (cpm) | | Beta Radiation (dpm/100 cm$^2$) | | Fraction of the Beta DCGL | Swipe ID | Alpha (dpm/swipe of 100 cm$^2$) | | | Beta (dpm/swipe of 100 cm$^2$) | | |
| | | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| 1 | 871957.5 | 1085909.7 | 1.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 8 | 0.67 | 81 | 75 | 0.03 | 429 | 261 | 1,277 | 594 | 0.21 | JEW1 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| 2 | 871948.7 | 1085907.4 | 0.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 3 | 0.33 | 30 | 64 | 0.01 | 487 | 291 | 1,621 | 681 | 0.27 | JEW2 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| 3 | 871934.9 | 1085916.9 | 5.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 8 | 0.67 | 71 | 66 | 0.03 | 551 | 309 | 1,713 | 600 | 0.29 | JEW3 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 4 | 871921.6 | 1085898.5 | 2.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 503 | 309 | 1,373 | 600 | 0.23 | JEW4 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 5 | 871918.7 | 1085894.4 | 0.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 4 | 0.67 | 37 | 75 | 0.01 | 438 | 261 | 1,345 | 594 | 0.22 | JEW5 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| 6 | 871912.3 | 1085885.5 | 2.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 5 | 0.33 | 52 | 64 | 0.02 | 466 | 291 | 1,447 | 681 | 0.24 | JEW6 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 7 | 871901.7 | 1085871.1 | 5.5 | Random | Glass Window | 0.289 | 0.421 | 0.25 | 0.25 | 4 | 0.67 | 37 | 75 | 0.01 | 192 | 261 | 0 | 594 | 0.00 | JEW7 | 1.52 | 3.22 | 5.61 | 1.73 | 4.35 | 8.50 |
| 8 | 871897.4 | 1085866.0 | 6.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 510 | 309 | 1,423 | 600 | 0.24 | JEW8 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 9 | 871915.6 | 1085852.4 | 5.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 517 | 309 | 1,473 | 600 | 0.25 | JEW9 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| 10 | 871935.1 | 1085838.1 | 4.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 3 | 0.67 | 26 | 75 | 0.01 | 207 | 261 | 0 | 594 | 0.00 | JEW10 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 11 | 871969.5 | 1085855.7 | 6.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 3 | 0.67 | 23 | 66 | 0.01 | 555 | 309 | 1,742 | 600 | 0.29 | JEW11 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 12 | 871963.7 | 1085847.4 | 6.0 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 9 | 0.33 | 97 | 64 | 0.03 | 474 | 291 | 1,513 | 681 | 0.25 | JEW12 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 13 | 871977.4 | 1085893.7 | 2.0 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 5 | 0.67 | 48 | 75 | 0.02 | 463 | 261 | 1,535 | 594 | 0.26 | JEW13 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| 14 | 872020.3 | 1085923.1 | 3.0 | Random | Grey Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 2 | 0.67 | 13 | 66 | 0.00 | 635 | 309 | 2,308 | 600 | 0.38 | JEW14 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 |
| 15 | 872027.7 | 1085934.2 | 5.0 | Random | Glass Window | 0.289 | 0.421 | 0.25 | 0.25 | 1 | 0.67 | 4 | 75 | 0.00 | 244 | 261 | 0 | 594 | 0.00 | JEW15 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| 16 | 872060.0 | 1085976.2 | 0.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 1 | 0.33 | 8 | 64 | 0.00 | 447 | 291 | 1,290 | 681 | 0.21 | JEW16 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| 17 | 872064.3 | 1085982.2 | 1.5 | Random | Grey Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 5 | 0.67 | 48 | 75 | 0.02 | 543 | 261 | 2,143 | 594 | 0.36 | JEW17 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 18 | 872098.8 | 1086028.0 | 2.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 525 | 309 | 1,529 | 600 | 0.25 | JEW18 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 19 | 872131.5 | 1086072.4 | 0.5 | Random | Concrete Foundation | 0.289 | 0.421 | 0.25 | 0.25 | 3 | 0.67 | 26 | 75 | 0.01 | 383 | 261 | 927 | 594 | 0.15 | JEW19 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 20 | 872137.5 | 1086080.1 | 1.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 7 | 0.33 | 75 | 64 | 0.03 | 489 | 291 | 1,637 | 681 | 0.27 | JEW20 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 21 | 872092.4 | 1086105.9 | 1.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 3 | 0.67 | 23 | 66 | 0.01 | 497 | 309 | 1,331 | 600 | 0.22 | JEW21 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 |
| 22 | 872076.4 | 1086109.2 | 0.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 8 | 0.67 | 81 | 75 | 0.03 | 536 | 261 | 2,090 | 594 | 0.35 | JEW22 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| 23 | 872071.3 | 1086101.8 | 4.5 | Random | Grey Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 206 | 309 | 0 | 600 | 0.00 | JEW23 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 24 | 872118.7 | 1086102.9 | 2.0 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 2 | 0.67 | 15 | 75 | 0.01 | 367 | 261 | 806 | 594 | 0.13 | JEW24 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |

## Table D-5b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Height | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| 25 | 872057.6 | 1086084.7 | 1.0 | Random | Grey Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 6 | 0.67 | 59 | 75 | 0.02 | 510 | 261 | 1,893 | 594 | 0.32 | JEW25 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| 26 | 872008.6 | 1086055.6 | 3.0 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 6 | 0.67 | 59 | 75 | 0.02 | 410 | 261 | 1,133 | 594 | 0.19 | JEW26 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 27 | 871993.2 | 1086096.5 | 2.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 402 | 309 | 658 | 600 | 0.11 | JEW27 | -0.17 | 0.04 | 6.14 | 4.91 | 5.58 | 8.14 |
| 28 | 872000.7 | 1086107.6 | 5.5 | Random | Tan Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 5 | 0.67 | 48 | 75 | 0.02 | 367 | 261 | 806 | 594 | 0.13 | JEW28 | 1.47 | 3.27 | 6.14 | 1.75 | 4.21 | 8.14 |
| 29 | 872016.2 | 1086129.0 | 2.5 | Random | Tan Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 435 | 309 | 892 | 600 | 0.15 | JEW29 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 30 | 872020.0 | 1086155.5 | 5.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 0.67 | 52 | 66 | 0.02 | 420 | 307 | 800 | 600 | 0.13 | JEW30 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 |
| 31 | 872036.5 | 1086180.8 | 4.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 3 | 3.00 | 0 | 75 | 0.00 | 384 | 251 | 1,011 | 594 | 0.17 | JEW31 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 32 | 872020.3 | 1086220.0 | 3.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 2 | 0.67 | 13 | 66 | 0.00 | 454 | 307 | 1,041 | 600 | 0.17 | JEW32 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 33 | 872016.0 | 1086222.9 | 6.0 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 4 | 3.00 | 11 | 75 | 0.00 | 397 | 251 | 1,110 | 594 | 0.18 | JEW33 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| 34 | 871981.2 | 1086248.7 | 3.0 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 2 | 3.67 | 0 | 64 | 0.00 | 404 | 310 | 777 | 681 | 0.13 | JEW34 | 1.47 | 3.27 | 6.14 | 1.75 | 4.21 | 8.14 |
| 35 | 871952.0 | 1086213.8 | 3.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 9 | 0.67 | 81 | 66 | 0.03 | 462 | 307 | 1,097 | 600 | 0.18 | JEW35 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 36 | 871968.3 | 1086187.6 | 3.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 2 | 0.67 | 13 | 66 | 0.00 | 445 | 307 | 977 | 600 | 0.16 | JEW36 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 37 | 871982.4 | 1086177.3 | 4.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 1 | 3.00 | 0 | 75 | 0.00 | 462 | 251 | 1,604 | 594 | 0.27 | JEW37 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 38 | 871999.6 | 1086157.3 | 0.5 | Random | Glass Door | 0.285 | 0.387 | 0.25 | 0.25 | 2 | 3.67 | 0 | 64 | 0.00 | 289 | 310 | 0 | 681 | 0.00 | JEW38 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 39 | 871982.5 | 1086165.0 | 1.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 5 | 3.00 | 22 | 75 | 0.01 | 416 | 251 | 1,254 | 594 | 0.21 | JEW39 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 40 | 871981.8 | 1086165.7 | 1.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 0.67 | 32 | 66 | 0.01 | 549 | 307 | 1,713 | 600 | 0.29 | JEW40 | 1.47 | 3.27 | 6.14 | 2.80 | 4.71 | 8.14 |
| 41 | 871962.0 | 1086158.6 | 0.5 | Random | Grey Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 6 | 3.67 | 26 | 64 | 0.01 | 502 | 310 | 1,588 | 681 | 0.26 | JEW41 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 42 | 871944.6 | 1086135.7 | 5.0 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 0 | 0.67 | 0 | 66 | 0.00 | 429 | 307 | 864 | 600 | 0.14 | JEW42 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 43 | 871941.1 | 1086130.3 | 1.0 | Random | Aluminium Vent Cover | 0.289 | 0.421 | 0.25 | 0.25 | 2 | 3.00 | 0 | 75 | 0.00 | 243 | 251 | 0 | 594 | 0.00 | JEW43 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| 44 | 871913.5 | 1086103.4 | 4.5 | Random | Glass Window | 0.289 | 0.421 | 0.25 | 0.25 | 6 | 3.00 | 33 | 75 | 0.01 | 177 | 251 | 0 | 594 | 0.00 | JEW44 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 45 | 871880.8 | 1086066.6 | 1.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 2 | 3.67 | 0 | 64 | 0.00 | 414 | 310 | 860 | 681 | 0.14 | JEW45 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| 46 | 871898.6 | 1086089.1 | 4.5 | Random | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 0.67 | 62 | 66 | 0.02 | 462 | 307 | 1,097 | 600 | 0.18 | JEW46 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 47 | 871869.5 | 1086051.5 | 0.5 | Random | Brick Wall | 0.285 | 0.387 | 0.25 | 0.25 | 5 | 3.67 | 15 | 64 | 0.01 | 455 | 310 | 1,199 | 681 | 0.20 | JEW47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 48 | 871852.1 | 1086028.2 | 4.5 | Random | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 9 | 3.00 | 66 | 75 | 0.02 | 378 | 251 | 965 | 594 | 0.16 | JEW48 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 49 | 871888.5 | 1085983.0 | 1.0 | Random | Dark Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 0 | 0.67 | 0 | 66 | 0.00 | 417 | 307 | 779 | 600 | 0.13 | JEW49 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 50 | 871911.1 | 1085965.7 | 4.0 | Random | Glass Window | 0.289 | 0.421 | 0.25 | 0.25 | 3 | 3.00 | 0 | 75 | 0.00 | 155 | 251 | 0 | 594 | 0.00 | JEW50 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| B1 | 871913.4 | 1085886.6 | 5.0 | Biased based on scan | Glass Window | 0.285 | 0.387 | 0.25 | 0.25 | 7 | 0.33 | 75 | 64 | 0.03 | 234 | 291 | 0 | 681 | 0.00 | JEW-B1 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| B2 | 871913.5 | 1085853.8 | 3.0 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 0.67 | 52 | 66 | 0.02 | 501 | 309 | 1,359 | 600 | 0.23 | JEW-B2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B3 | 871969.0 | 1085854.9 | 4.5 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 0.67 | 62 | 66 | 0.02 | 498 | 309 | 1,338 | 600 | 0.22 | JEW-B3 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| B4 | 872118.3 | 1086103.1 | 3.5 | Biased based on scan | Brick Wall | 0.289 | 0.421 | 0.25 | 0.25 | 2 | 0.67 | 15 | 75 | 0.01 | 380 | 261 | 905 | 594 | 0.15 | JEW-B4 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| B5 | 872090.7 | 1086107.2 | 4.0 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 0.67 | 42 | 66 | 0.02 | 548 | 309 | 1,692 | 600 | 0.28 | JEW-B5 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |

## Table D-5b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Height | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| B6 | 871968.4 | 1086187.5 | 4.0 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 8 | 0.67 | 71 | 66 | 0.03 | 480 | 307 | 1,225 | 600 | 0.20 | JEW-B6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B7 | 871899.7 | 1086090.4 | 3.5 | Biased based on scan | Brick Wall | 0.329 | 0.452 | 0.25 | 0.25 | 9 | 0.67 | 81 | 66 | 0.03 | 483 | 307 | 1,246 | 600 | 0.21 | JEW-B7 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |

Notes:

Survey locations are identified on Figure 7.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_S$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs.

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

## Table D-6. SU-6 Survey Data for Playground Equipment

**Surrogate Total Alpha DCGL:** 2,800 dpm/100 cm$^2$ **Total Beta DCGL:** 6,000 dpm/100 cm$^2$

### Table D-6a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Awerage | Fixed-Point Random | 45 | 242 | 0.02 | 0.04 |
| Median | Fixed-Point Random | 48 | 242 | 0.02 | 0.04 |
| Standard Deviation | Fixed-Point Random | 28 | 178 | 0.01 | 0.03 |
| Maximum | Fixed-Point All | 137 | 1,026 | 0.05 | 0.17 |
| Range | Fixed-Point All | 137 | 1,026 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta |
|---|---|---|---|---|---|---|
| **Number of Measurements** | 20 | 20 | 5 | 5 | 25 | 25 |
| **Number Exceeding MDC** | 2 | 3 | 3 | 3 | 0 | 0 |

### Table D-6b. Structure Surfaces Measurements Data

| Location ID | Easting (ft) | Northing (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error (dpm/swipe of 100 cm$^2$) | MDC (dpm/swipe of 100 cm$^2$) | Activity (dpm/swipe of 100 cm$^2$) | Error (dpm/swipe of 100 cm$^2$) | MDC (dpm/swipe of 100 cm$^2$) |
| 1 | 872138.3 | 1086187.0 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 7 | 0.67 | 70 | 76 | 0.03 | 176 | 163 | 98 | 471 | 0.02 | JPG1 | 1.14 | 1.85 | 2.86 | -0.35 | 1.89 | 4.49 |
| 2 | 871939.9 | 1085758.0 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 0 | 0.67 | 0 | 76 | 0.00 | 216 | 163 | 400 | 471 | 0.07 | JPG2 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| 3 | 871925.6 | 1086134.0 | Random | Coated Metal Platform | 0.288 | 0.424 | 0.25 | 0.25 | 2 | 0.67 | 15 | 76 | 0.01 | 174 | 163 | 83 | 471 | 0.01 | JPG3 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| 4 | 872140.7 | 1086199.4 | Random | Plastic Vertical Wall | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 150 | 163 | 0 | 471 | 0.00 | JPG4 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 5 | 871925.6 | 1086140.8 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 3 | 0.67 | 26 | 76 | 0.01 | 209 | 163 | 347 | 471 | 0.06 | JPG5 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| 6 | 871932.8 | 1085751.4 | Random | Coated Metal Steps | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 197 | 163 | 257 | 471 | 0.04 | JPG6 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| 7 | 872186.8 | 1086162.2 | Random | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 7 | 0.67 | 70 | 76 | 0.03 | 228 | 163 | 491 | 471 | 0.08 | JPG7 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 8 | 872126.6 | 1086198.9 | Random | Coated Metal Steps | 0.288 | 0.424 | 0.25 | 0.25 | 7 | 0.67 | 70 | 76 | 0.03 | 153 | 163 | 0 | 471 | 0.00 | JPG8 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 9 | 871933.3 | 1085738.8 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 236 | 163 | 551 | 471 | 0.09 | JPG9 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 10 | 871928.8 | 1085744.1 | Random | Coated Metal Platform | 0.288 | 0.424 | 0.25 | 0.25 | 2 | 0.67 | 15 | 76 | 0.01 | 202 | 163 | 294 | 471 | 0.05 | JPG10 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| 11 | 872128.9 | 1086212.6 | Random | Coated Metal Platform | 0.288 | 0.424 | 0.25 | 0.25 | 4 | 0.67 | 37 | 76 | 0.01 | 197 | 163 | 257 | 471 | 0.04 | JPG11 | 1.52 | 3.22 | 5.61 | 6.08 | 6.17 | 8.50 |
| 12 | 872145.1 | 1086210.1 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 8 | 0.67 | 81 | 76 | 0.03 | 171 | 163 | 60 | 471 | 0.01 | JPG12 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| 13 | 871940.6 | 1085747.7 | Random | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 3 | 0.67 | 26 | 76 | 0.01 | 193 | 163 | 226 | 471 | 0.04 | JPG13 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 14 | 872126.2 | 1086191.5 | Random | Plastic | 0.288 | 0.424 | 0.25 | 0.25 | 11 | 0.67 | 115 | 76 | 0.04 | 184 | 163 | 158 | 471 | 0.03 | JPG14 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 15 | 872166.2 | 1086207.0 | Random | Wood Balance Beam | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 224 | 163 | 460 | 471 | 0.08 | JPG15 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| 16 | 872192.1 | 1086168.6 | Random | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 216 | 163 | 400 | 471 | 0.07 | JPG16 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 17 | 871922.0 | 1086136.4 | Random | Metal Tube Step | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 178 | 163 | 113 | 471 | 0.02 | JPG17 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 18 | 871920.1 | 1086133.6 | Random | Coated Metal Platform | 0.288 | 0.424 | 0.25 | 0.25 | 1 | 0.67 | 4 | 76 | 0.00 | 168 | 163 | 38 | 471 | 0.01 | JPG18 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 19 | 871918.4 | 1086139.4 | Random | Metal Tube Step | 0.288 | 0.424 | 0.25 | 0.25 | 4 | 0.67 | 37 | 76 | 0.01 | 179 | 163 | 121 | 471 | 0.02 | JPG19 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 |
| 20 | 872115.4 | 1086228.6 | Random | Aluminium Bench | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 227 | 163 | 483 | 471 | 0.08 | JPG20 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| B1 | 871927.5 | 1086139.2 | Biased based on scan | Plastic Slide | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 177 | 163 | 106 | 471 | 0.02 | JPG-B1 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| B2 | 871995.3 | 1086290.4 | Biased based on scan | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 4 | 0.67 | 37 | 76 | 0.01 | 209 | 163 | 347 | 471 | 0.06 | JPG-B2 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| B3 | 872010.9 | 1086310.7 | Biased based on scan | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 5 | 0.67 | 48 | 76 | 0.02 | 299 | 163 | 1,026 | 471 | 0.17 | JPG-B3 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |

## Table D-6b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| B4 | 871889.1 | 1086163.2 | Biased based on scan | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 11 | 0.67 | 115 | 76 | 0.04 | 296 | 163 | 1,004 | 471 | 0.17 | JPG-B4 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| B5 | 871904.4 | 1086183.5 | Biased based on scan | Rubber Swing Seat | 0.288 | 0.424 | 0.25 | 0.25 | 13 | 0.67 | 137 | 76 | 0.05 | 270 | 163 | 808 | 471 | 0.13 | JPG-B5 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |

Notes:

Survey locations are identified on Figure 8.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_s$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs.

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

## Table D-7. SU-7 Survey Data for Pavement

**Surrogate Total Alpha DCGL:** 2,800 dpm/100 cm$^2$ | **Total Beta DCGL:** 6,000 dpm/100 cm$^2$

### Table D-7a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 49 | 414 | 0.02 | 0.07 |
| Median | Fixed-Point Random | 35 | 400 | 0.01 | 0.07 |
| Standard Deviation | Fixed-Point Random | 45 | 233 | 0.02 | 0.04 |
| Maximum | Fixed-Point All | 280 | 1,216 | 0.10 | 0.20 |
| Range | Fixed-Point All | 280 | 1,026 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta |
|---|---|---|---|---|---|---|
| **Number of Measurements** | 81 | 81 | 20 | 20 | 101 | 101 |
| **Number Exceeding MDC** | 15 | 19 | 15 | 15 | 0 | 0 |

### Table D-7b. Structure Surfaces Measurements Data

| Location ID | Easting (ft) | Northing (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 cm$^2$) | MDC (dpm/100 cm$^2$) | | | Activity (dpm/swipe of 100 cm$^2$) | Error (dpm/swipe of 100 cm$^2$) | MDC (dpm/swipe of 100 cm$^2$) | Activity (dpm/swipe of 100 cm$^2$) | Error (dpm/swipe of 100 cm$^2$) | MDC (dpm/swipe of 100 cm$^2$) |
| 1 | 872125.2 | 1086104.7 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.33 | 60 | 72 | 0.02 | 217 | 187 | 247 | 555 | 0.04 | JA1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 1a | 872125.2 | 1086104.7 | Random | Rubber Mat | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 230 | 191 | 322 | 555 | 0.05 | JA-1a | -0.17 | 0.04 | 6.14 | 8.07 | 6.69 | 8.14 |
| 2 | 871717.6 | 1085849.6 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 5 | 0.00 | 53 | 72 | 0.02 | 244 | 177 | 553 | 555 | 0.09 | JA2 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 3 | 872161.7 | 1086149.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 5 | 0.67 | 46 | 72 | 0.02 | 261 | 191 | 577 | 555 | 0.10 | JA3 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 4 | 872200.7 | 1085994.5 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 11 | 0.67 | 110 | 72 | 0.04 | 257 | 191 | 544 | 555 | 0.09 | JA4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 5 | 872046.5 | 1086177.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 262 | 191 | 586 | 555 | 0.10 | JA5 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 6 | 871978.8 | 1086277.2 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 256 | 191 | 536 | 555 | 0.09 | JA6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 7 | 871719.2 | 1085827.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 0 | 0.00 | 0 | 72 | 0.00 | 197 | 177 | 165 | 555 | 0.03 | JA7 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 8 | 871899.0 | 1085933.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 231 | 191 | 330 | 555 | 0.05 | JA8 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 9 | 871922.4 | 1085930.3 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 18 | 0.67 | 184 | 72 | 0.07 | 293 | 191 | 841 | 555 | 0.14 | JA9 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| 10 | 871823.1 | 1085916.7 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 219 | 191 | 231 | 555 | 0.04 | JA10 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| 11 | 871853.7 | 1085868.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.00 | 32 | 72 | 0.01 | 204 | 177 | 223 | 555 | 0.04 | JA11 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| 12 | 871656.7 | 1085788.5 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.00 | 11 | 72 | 0.00 | 235 | 177 | 478 | 555 | 0.08 | JA12 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 13 | 872073.7 | 1086162.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 237 | 191 | 379 | 555 | 0.06 | JA13 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 14 | 872212.2 | 1086069.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 225 | 191 | 280 | 555 | 0.05 | JA14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 15 | 871831.8 | 1085998.6 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 230 | 191 | 322 | 555 | 0.05 | JA15 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 16 | 871865.7 | 1085795.4 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 8 | 0.00 | 85 | 72 | 0.03 | 268 | 177 | 751 | 555 | 0.13 | JA16 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 17 | 871801.8 | 1085913.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 230 | 191 | 322 | 555 | 0.05 | JA17 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 18 | 872152.8 | 1086102.5 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 218 | 191 | 223 | 555 | 0.04 | JA18 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 19 | 871670.4 | 1085750.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.00 | 43 | 72 | 0.02 | 229 | 177 | 429 | 555 | 0.07 | JA19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 20 | 871872.0 | 1086112.7 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 213 | 191 | 181 | 555 | 0.03 | JA20 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 21 | 872249.4 | 1086076.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 248 | 191 | 470 | 555 | 0.08 | JA21 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 22 | 871823.7 | 1085862.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.00 | 43 | 72 | 0.02 | 238 | 177 | 503 | 555 | 0.08 | JA22 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 23 | 872207.2 | 1086056.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 250 | 191 | 487 | 555 | 0.08 | JA23 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |

## Table D-7b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| 24 | 872060.9 | 1086180.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 253 | 191 | 511 | 555 | 0.09 | JA24 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 25 | 871860.3 | 1085879.1 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.00 | 21 | 72 | 0.01 | 254 | 177 | 635 | 555 | 0.11 | JA25 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| 26 | 871796.4 | 1085988.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 201 | 191 | 82 | 555 | 0.01 | JA26 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 27 | 871950.7 | 1086243.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 263 | 191 | 594 | 555 | 0.10 | JA27 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 |
| 28 | 871979.8 | 1086262.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 237 | 191 | 379 | 555 | 0.06 | JA28 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 29 | 872066.6 | 1086168.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 245 | 191 | 445 | 555 | 0.07 | JA29 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 30 | 872077.3 | 1086140.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 8 | 0.67 | 78 | 72 | 0.03 | 286 | 191 | 784 | 555 | 0.13 | JA30 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 |
| 31 | 872047.3 | 1086195.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 276 | 191 | 701 | 555 | 0.12 | JA31 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| 32 | 871930.4 | 1085934.6 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 14 | 0.67 | 142 | 72 | 0.05 | 298 | 191 | 882 | 555 | 0.15 | JA32 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 |
| 33 | 871700.6 | 1085817.7 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 218 | 191 | 223 | 555 | 0.04 | JA33 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 34 | 871878.9 | 1085970.0 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 13 | 0.67 | 131 | 72 | 0.05 | 239 | 191 | 396 | 555 | 0.07 | JA34 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 35 | 872102.9 | 1086160.6 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 2.67 | 23 | 103 | 0.01 | 288 | 261 | 191 | 553 | 0.03 | JA35 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| 36 | 872151.5 | 1086033.8 | Random | Asphalt | 0.285 | 0.387 | 0.25 | 0.25 | 6 | 5.33 | 8 | 154 | 0.00 | 317 | 257 | 496 | 642 | 0.08 | JA36 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 37 | 872132.6 | 1086101.4 | Random | Concrete | 0.285 | 0.387 | 0.25 | 0.25 | 20 | 5.33 | 165 | 154 | 0.06 | 308 | 257 | 422 | 642 | 0.07 | JA37 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 38 | 871868.4 | 1085842.1 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.00 | 11 | 72 | 0.00 | 213 | 177 | 297 | 555 | 0.05 | JA38 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| 39 | 871834.5 | 1085891.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 5 | 0.00 | 53 | 72 | 0.02 | 190 | 177 | 107 | 555 | 0.02 | JA39 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| 40 | 872040.3 | 1086238.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 289 | 191 | 808 | 555 | 0.13 | JA40 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| 41 | 871944.0 | 1085821.2 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 7 | 0.67 | 67 | 72 | 0.02 | 268 | 191 | 635 | 555 | 0.11 | JA41 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 42 | 872087.1 | 1086167.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 240 | 191 | 404 | 555 | 0.07 | JA42 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 43 | 871859.4 | 1085885.9 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 16 | 0.67 | 163 | 72 | 0.06 | 291 | 191 | 825 | 555 | 0.14 | JA43 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 44 | 872165.7 | 1086125.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 225 | 191 | 280 | 555 | 0.05 | JA44 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 45 | 872056.7 | 1086182.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 8 | 0.67 | 78 | 72 | 0.03 | 258 | 191 | 553 | 555 | 0.09 | JA45 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 46 | 871872.9 | 1085911.7 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 248 | 191 | 470 | 555 | 0.08 | JA46 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 47 | 871858.0 | 1085864.4 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 221 | 191 | 247 | 555 | 0.04 | JA47 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 48 | 872067.3 | 1086168.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 3 | 0.67 | 25 | 72 | 0.01 | 247 | 191 | 462 | 555 | 0.08 | JA48 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 49 | 872179.1 | 1086091.0 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 10 | 0.67 | 99 | 72 | 0.04 | 270 | 191 | 652 | 555 | 0.11 | JA49 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 50 | 871892.4 | 1085783.2 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 12 | 0.67 | 120 | 72 | 0.04 | 313 | 191 | 1,006 | 555 | 0.17 | JA50 | -0.09 | 0.03 | 5.61 | 4.99 | 5.77 | 8.50 |
| 51 | 871862.6 | 1085912.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 226 | 191 | 289 | 555 | 0.05 | JA51 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| 52 | 871693.7 | 1085758.9 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 2.67 | 42 | 103 | 0.02 | 259 | 261 | 0 | 553 | 0.00 | JA52 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 53 | 871926.0 | 1086178.1 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 7 | 2.67 | 42 | 103 | 0.02 | 283 | 261 | 156 | 553 | 0.03 | JA53 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 54 | 871814.4 | 1085834.6 | Random | Concrete | 0.329 | 0.452 | 0.25 | 0.25 | 13 | 2.67 | 100 | 103 | 0.04 | 297 | 261 | 255 | 553 | 0.04 | JA54 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 55 | 872076.4 | 1086210.0 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 6 | 2.67 | 32 | 103 | 0.01 | 298 | 261 | 262 | 553 | 0.04 | JA55 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| 56 | 872101.2 | 1086145.0 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 9 | 2.67 | 62 | 103 | 0.02 | 256 | 261 | 0 | 553 | 0.00 | JA56 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| 57 | 871699.5 | 1085753.4 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 4 | 2.67 | 13 | 103 | 0.00 | 249 | 261 | 0 | 553 | 0.00 | JA57 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| 58 | 871864.1 | 1086122.0 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 3 | 2.67 | 3 | 103 | 0.00 | 269 | 261 | 57 | 553 | 0.01 | JA58 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| 59 | 871725.2 | 1085896.7 | Random | Concrete | 0.329 | 0.452 | 0.25 | 0.25 | 16 | 2.67 | 130 | 103 | 0.05 | 307 | 261 | 326 | 553 | 0.05 | JA59 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| 60 | 871929.9 | 1086218.9 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 8 | 2.67 | 52 | 103 | 0.02 | 282 | 261 | 149 | 553 | 0.02 | JA60 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| 61 | 871700.1 | 1085827.5 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 2.67 | 23 | 103 | 0.01 | 250 | 261 | 0 | 553 | 0.00 | JA61 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| 62 | 871760.9 | 1085857.2 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 2.67 | 23 | 103 | 0.01 | 237 | 261 | 0 | 553 | 0.00 | JA62 | 1.47 | 3.27 | 6.14 | -2.46 | 0.22 | 8.14 |
| 63 | 871939.5 | 1086201.0 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 10 | 2.67 | 71 | 103 | 0.03 | 311 | 261 | 354 | 553 | 0.06 | JA63 | -0.17 | 0.04 | 6.14 | 5.96 | 5.97 | 8.14 |
| 64 | 871915.8 | 1086222.7 | Random | Asphalt | 0.329 | 0.452 | 0.25 | 0.25 | 5 | 2.67 | 23 | 103 | 0.01 | 272 | 261 | 78 | 553 | 0.01 | JA64 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |

## Table D-7b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| 65 | 871893.9 | 1085856.1 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 14 | 0.67 | 142 | 72 | 0.05 | 285 | 191 | 775 | 555 | 0.13 | JA65 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 66 | 871821.8 | 1086096.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 230 | 191 | 322 | 555 | 0.05 | JA66 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 67 | 872150.4 | 1086106.1 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 6 | 0.67 | 57 | 72 | 0.02 | 243 | 191 | 429 | 555 | 0.07 | JA67 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| 68 | 871865.5 | 1085817.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 204 | 191 | 107 | 555 | 0.02 | JA68 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| 69 | 872233.3 | 1086071.1 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 229 | 191 | 313 | 555 | 0.05 | JA69 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 |
| 70 | 871800.8 | 1086061.3 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 5 | 0.67 | 46 | 72 | 0.02 | 240 | 191 | 404 | 555 | 0.07 | JA70 | 1.47 | 3.27 | 6.14 | -1.41 | 2.11 | 8.14 |
| 71 | 871990.6 | 1086260.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 217 | 191 | 214 | 555 | 0.04 | JA71 | 1.47 | 3.27 | 6.14 | 4.91 | 5.58 | 8.14 |
| 72 | 872040.8 | 1086160.8 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 9 | 0.67 | 89 | 72 | 0.03 | 283 | 191 | 759 | 555 | 0.13 | JA72 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| 73 | 872039.6 | 1086167.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 12 | 0.67 | 120 | 72 | 0.04 | 306 | 191 | 948 | 555 | 0.16 | JA73 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 74 | 871942.4 | 1086170.5 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 5 | 0.67 | 46 | 72 | 0.02 | 281 | 191 | 742 | 555 | 0.12 | JA74 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 75 | 871767.0 | 1085936.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 212 | 191 | 173 | 555 | 0.03 | JA75 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 76 | 871888.4 | 1085823.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 218 | 191 | 223 | 555 | 0.04 | JA76 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 77 | 871820.7 | 1085952.7 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 250 | 191 | 487 | 555 | 0.08 | JA77 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| 78 | 871754.6 | 1085875.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 1 | 0.67 | 4 | 72 | 0.00 | 211 | 191 | 165 | 555 | 0.03 | JA78 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| 79 | 871853.3 | 1086105.9 | Random | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 2 | 0.67 | 14 | 72 | 0.01 | 218 | 191 | 223 | 555 | 0.04 | JA79 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 |
| 80 | 871856.1 | 1085803.7 | Random | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 4 | 0.67 | 35 | 72 | 0.01 | 272 | 191 | 668 | 555 | 0.11 | JA80 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| B1 | 871820.1 | 1085953.3 | Biased based on scan | Asphalt | 0.297 | 0.450 | 0.25 | 0.25 | 4 | 0.00 | 43 | 73 | 0.02 | 317 | 226 | 647 | 499 | 0.11 | JA-B1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| B2 | 871816.5 | 1085835.0 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 16 | 0.00 | 172 | 73 | 0.06 | 365 | 226 | 988 | 499 | 0.16 | JA-B2 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| B3 | 872056.1 | 1086184.6 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 15 | 0.00 | 162 | 73 | 0.06 | 346 | 226 | 853 | 499 | 0.14 | JA-B3 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| B4 | 872060.2 | 1086183.5 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 13 | 0.00 | 140 | 73 | 0.05 | 360 | 226 | 953 | 499 | 0.16 | JA-B4 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B5 | 872072.0 | 1086161.9 | Biased based on scan | Asphalt | 0.297 | 0.450 | 0.25 | 0.25 | 5 | 0.00 | 54 | 73 | 0.02 | 262 | 226 | 256 | 499 | 0.04 | JA-B5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B6 | 872101.7 | 1086159.5 | Biased based on scan | Asphalt | 0.297 | 0.450 | 0.25 | 0.25 | 8 | 0.00 | 86 | 73 | 0.03 | 238 | 226 | 85 | 499 | 0.01 | JA-B6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B7 | 872087.3 | 1086167.5 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 11 | 0.67 | 111 | 73 | 0.04 | 343 | 208 | 960 | 499 | 0.16 | JA-B7 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| B8 | 872078.6 | 1086137.8 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 18 | 0.67 | 187 | 73 | 0.07 | 354 | 208 | 1,038 | 499 | 0.17 | JA-B8 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| B9 | 872100.0 | 1086144.8 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 20 | 0.67 | 208 | 73 | 0.07 | 379 | 208 | 1,216 | 499 | 0.20 | JA-B9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| B10 | 872131.5 | 1086101.9 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 16 | 0.67 | 165 | 73 | 0.06 | 349 | 208 | 1,003 | 499 | 0.17 | JA-B10 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| B11 | 872133.4 | 1086101.3 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 16 | 0.67 | 165 | 73 | 0.06 | 304 | 208 | 683 | 499 | 0.11 | JA-B11 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| B12 | 872153.5 | 1086102.1 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 16 | 0.67 | 165 | 73 | 0.06 | 339 | 208 | 932 | 499 | 0.16 | JA-B12 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 |
| B13 | 872179.7 | 1086092.3 | Biased based on scan | Concrete | 0.297 | 0.450 | 0.25 | 0.25 | 14 | 0.67 | 144 | 73 | 0.05 | 369 | 208 | 1,145 | 499 | 0.19 | JA-B13 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| B14 | 872164.1 | 1086126.6 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 13 | 0.33 | 133 | 60 | 0.05 | 345 | 286 | 436 | 604 | 0.07 | JAB14 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| B15 | 872175.9 | 1086134.5 | Biased based on scan | Concrete | 0.305 | 0.433 | 0.25 | 0.25 | 23 | 0.33 | 238 | 60 | 0.08 | 376 | 286 | 665 | 604 | 0.11 | JAB15 | 3.13 | 4.56 | 5.61 | 0.64 | 3.77 | 8.50 |
| B16 | 872176.2 | 1086132.8 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 14 | 1.33 | 132 | 87 | 0.05 | 332 | 217 | 918 | 571 | 0.15 | JAB16 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B17 | 872165.2 | 1086127.4 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 14 | 0.33 | 143 | 60 | 0.05 | 359 | 286 | 539 | 604 | 0.09 | JAB17 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B18 | 872180.0 | 1086094.8 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 16 | 0.33 | 164 | 60 | 0.06 | 397 | 286 | 820 | 604 | 0.14 | JAB18 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B19 | 872211.6 | 1086068.0 | Biased based on scan | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 11 | 0.00 | 117 | 72 | 0.04 | 295 | 202 | 767 | 555 | 0.13 | JAB19 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B20 | 872150.8 | 1086033.3 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 17 | 1.33 | 163 | 87 | 0.06 | 284 | 217 | 535 | 571 | 0.09 | JAB20 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B21 | 872151.5 | 1086034.5 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 14 | 1.33 | 132 | 87 | 0.05 | 297 | 217 | 638 | 571 | 0.11 | JAB21 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| B22 | 872201.1 | 1085996.1 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 19 | 0.33 | 196 | 60 | 0.07 | 378 | 286 | 680 | 604 | 0.11 | JAB22 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| B23 | 872248.9 | 1086078.5 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 16 | 0.00 | 170 | 72 | 0.06 | 278 | 202 | 627 | 555 | 0.10 | JAB23 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| B24 | 871993.1 | 1086261.9 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 19 | 0.00 | 202 | 72 | 0.07 | 300 | 202 | 808 | 555 | 0.13 | JAB24 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| B25 | 872038.5 | 1086235.7 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 15 | 0.33 | 154 | 60 | 0.05 | 368 | 286 | 606 | 604 | 0.10 | JAB25 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |

## Table D-7b. Structure Surfaces Measurements Data (Continued)

| Location ID | Easting | Northing | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross | Bkgd | Activity | MDC | | Gross | Bkgd | Activity | MDC | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | | | | | (cpm) | | (dpm/100 cm$^2$) | | | (cpm) | | (dpm/100 cm$^2$) | | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| B26 | 872039.1 | 1086169.0 | Biased based on scan | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 15 | 0.00 | 159 | 72 | 0.06 | 292 | 202 | 742 | 555 | 0.12 | JAB26 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| B27 | 872039.6 | 1086161.3 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 20 | 1.33 | 195 | 87 | 0.07 | 290 | 217 | 583 | 571 | 0.10 | JAB27 | 1.52 | 3.22 | 5.61 | -2.62 | 0.24 | 8.50 |
| B28 | 872045.1 | 1086177.7 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 15 | 0.33 | 154 | 60 | 0.05 | 373 | 286 | 643 | 604 | 0.11 | JAB28 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B29 | 872066.9 | 1086165.5 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 20 | 0.33 | 206 | 60 | 0.07 | 381 | 286 | 702 | 604 | 0.12 | JAB29 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| B30 | 871853.1 | 1086107.9 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 15 | 1.33 | 142 | 87 | 0.05 | 268 | 217 | 407 | 571 | 0.07 | JAB30 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| B31 | 871939.1 | 1086200.9 | Biased based on scan | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 19 | 0.00 | 202 | 72 | 0.07 | 322 | 202 | 990 | 555 | 0.16 | JAB31 | 1.52 | 3.22 | 5.61 | -2.62 | 0.24 | 8.50 |
| B32 | 871939.5 | 1086202.3 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 18 | 0.33 | 185 | 60 | 0.07 | 371 | 286 | 628 | 604 | 0.10 | JAB32 | -0.09 | 0.03 | 5.61 | 4.99 | 5.77 | 8.50 |
| B33 | 871860.2 | 1085886.3 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 13 | 1.33 | 122 | 87 | 0.04 | 327 | 217 | 878 | 571 | 0.15 | JAB33 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| B34 | 871873.7 | 1085909.5 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 18 | 1.33 | 174 | 87 | 0.06 | 290 | 217 | 583 | 571 | 0.10 | JAB34 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 |
| B35 | 871874.4 | 1085911.9 | Biased based on scan | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 17 | 0.00 | 181 | 72 | 0.06 | 290 | 202 | 726 | 555 | 0.12 | JAB35 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| B36 | 871753.4 | 1085877.7 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 14 | 1.33 | 132 | 87 | 0.05 | 276 | 217 | 471 | 571 | 0.08 | JAB36 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| B37 | 871696.0 | 1085755.5 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 11 | 1.33 | 101 | 87 | 0.04 | 279 | 217 | 495 | 571 | 0.08 | JAB37 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| B38 | 871718.5 | 1085830.7 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 15 | 0.33 | 154 | 60 | 0.05 | 346 | 286 | 443 | 604 | 0.07 | JAB38 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| B39 | 871865.4 | 1085798.8 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 17 | 1.33 | 163 | 87 | 0.06 | 346 | 217 | 1,029 | 571 | 0.17 | JAB39 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| B40 | 871867.3 | 1085794.4 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 16 | 0.33 | 164 | 60 | 0.06 | 407 | 286 | 894 | 604 | 0.15 | JAB40 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| B41 | 871867.3 | 1085796.6 | Biased based on scan | Asphalt | 0.301 | 0.388 | 0.25 | 0.25 | 14 | 0.00 | 149 | 72 | 0.05 | 317 | 202 | 948 | 555 | 0.16 | JAB41 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| B42 | 871857.4 | 1085880.0 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 17 | 1.33 | 163 | 87 | 0.06 | 309 | 217 | 734 | 571 | 0.12 | JAB42 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| B43 | 871861.7 | 1085881.2 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 14 | 0.33 | 143 | 60 | 0.05 | 299 | 286 | 96 | 604 | 0.02 | JAB43 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| B44 | 871879.9 | 1085970.4 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 17 | 1.33 | 163 | 87 | 0.06 | 304 | 217 | 694 | 571 | 0.12 | JAB44 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| B45 | 871922.9 | 1085929.2 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 16 | 1.33 | 153 | 87 | 0.05 | 298 | 217 | 646 | 571 | 0.11 | JAB45 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| B46 | 871931.6 | 1085934.9 | Biased based on scan | Concrete | 0.305 | 0.433 | 0.25 | 0.25 | 27 | 0.33 | 280 | 60 | 0.10 | 347 | 286 | 451 | 604 | 0.08 | JAB46 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| B47 | 871933.1 | 1085934.9 | Biased based on scan | Concrete | 0.305 | 0.433 | 0.25 | 0.25 | 22 | 0.33 | 227 | 60 | 0.08 | 446 | 286 | 1,182 | 604 | 0.20 | JAB47 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| B48 | 871897.8 | 1085856.1 | Biased based on scan | Concrete | 0.305 | 0.433 | 0.25 | 0.25 | 23 | 0.33 | 238 | 60 | 0.08 | 392 | 286 | 783 | 604 | 0.13 | JAB48 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| B49 | 871892.0 | 1085780.6 | Biased based on scan | Asphalt | 0.305 | 0.433 | 0.25 | 0.25 | 18 | 0.33 | 185 | 60 | 0.07 | 306 | 286 | 148 | 604 | 0.02 | JAB49 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| B50 | 871854.0 | 1085804.1 | Biased based on scan | Asphalt | 0.307 | 0.401 | 0.25 | 0.25 | 14 | 1.33 | 132 | 87 | 0.05 | 258 | 217 | 327 | 571 | 0.05 | JAB50 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |

Notes:

Survey locations are identified on Figure 9.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-cm$^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_s$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 cm$^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs.

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

## Table D-8. SU-8 Survey Data for Walkway

**Surrogate Total Alpha DCGL:** 2,800 dpm/100 $cm^2$

**Total Beta DCGL** 6,000 dpm/100 $cm^2$

### Table D-8a. Structure Surfaces Measurements Summary

| Statistic | Type | Alpha Activity (dpm/100 $cm^2$) | Beta Activity (dpm/100 $cm^2$) | Fraction of Alpha DCGL | Fraction of Beta DCGL |
|---|---|---|---|---|---|
| Average | Fixed-Point Random | 40 | 737 | 0.01 | 0.12 |
| Median | Fixed-Point Random | 31 | 681 | 0.01 | 0.11 |
| Standard Deviation | Fixed-Point Random | 44 | 318 | 0.02 | 0.05 |
| Maximum | Fixed-Point All | 124 | 1,534 | 0.04 | 0.26 |
| Range | Fixed-Point All | 124 | 1,443 | Not Applicable | Not Applicable |

| Statistic | Alpha Fixed-Point Random | Beta Fixed-Point Random | Alpha Fixed-Point Biased | Beta Fixed-Point Biased | Swipe Alpha | Swipe Beta |
|---|---|---|---|---|---|---|
| **Number of Measurements** | 10 | 10 | 4 | 4 | 14 | 14 |
| **Number Exceeding MDC** | 0 | 0 | 0 | 0 | 4 | 11 |

### Table D-8b. Structure Surfaces Measurements Data

| Location ID | Easting (ft) | Northing (ft) | Type | Survey Surface Material | Structure Surfaces Fixed-Point Measurement Data | | | | | | | | | | | | | Structure Surfaces Swipe Measurement Data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2π Instrument Efficiency | | Surface Efficiency | | Alpha Radiation | | | | Fraction of the Alpha DCGL | Beta Radiation | | | | Fraction of the Beta DCGL | Swipe ID | Alpha | | | Beta | | |
| | | | | | Alpha | Beta | Alpha | Beta | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 $cm^2$) | MDC (dpm/100 $cm^2$) | | Gross (cpm) | Bkgd (cpm) | Activity (dpm/100 $cm^2$) | MDC (dpm/100 $cm^2$) | | | Activity (dpm/swipe of 100 $cm^2$) | Error (dpm/swipe of 100 $cm^2$) | MDC (dpm/swipe of 100 $cm^2$) | Activity (dpm/swipe of 100 $cm^2$) | Error (dpm/swipe of 100 $cm^2$) | MDC (dpm/swipe of 100 $cm^2$) |
| 1 | 871540.9 | 1085690.6 | Random | Concrete | 0.276 | 0.411 | 0.25 | 0.25 | 11 | 2.67 | 97 | 123 | 0.03 | 387 | 190 | 1,534 | 523 | 0.26 | JW-1 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| 2 | 871400.5 | 1085508.5 | Random | Asphalt | 0.276 | 0.411 | 0.25 | 0.25 | 1 | 2.67 | 0 | 123 | 0.00 | 243 | 190 | 413 | 523 | 0.07 | JW-2 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |
| 3 | 871373.6 | 1085470.0 | Random | Asphalt | 0.276 | 0.411 | 0.25 | 0.25 | 0 | 2.67 | 0 | 123 | 0.00 | 293 | 190 | 802 | 523 | 0.13 | JW-3 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| 4 | 871440.7 | 1085561.8 | Random | Asphalt | 0.276 | 0.411 | 0.25 | 0.25 | 8 | 2.67 | 62 | 123 | 0.02 | 292 | 190 | 794 | 523 | 0.13 | JW-4 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| 5 | 871272.5 | 1085335.0 | Random | Concrete | 0.276 | 0.411 | 0.25 | 0.25 | 1 | 2.67 | 0 | 123 | 0.00 | 261 | 190 | 553 | 523 | 0.09 | JW-5 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| 6 | 871298.9 | 1085372.1 | Random | Asphalt | 0.276 | 0.411 | 0.25 | 0.25 | 0 | 2.67 | 0 | 123 | 0.00 | 249 | 190 | 459 | 523 | 0.08 | JW-6 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| 7 | 871479.3 | 1085612.7 | Random | Asphalt | 0.276 | 0.411 | 0.25 | 0.25 | 1 | 2.67 | 0 | 123 | 0.00 | 302 | 190 | 872 | 523 | 0.15 | JW-7 | -0.11 | 0.03 | 5.91 | 3.00 | 4.36 | 6.96 |
| 8 | 871258.6 | 1085317.5 | Random | Concrete | 0.276 | 0.411 | 0.25 | 0.25 | 11 | 2.67 | 97 | 123 | 0.03 | 274 | 190 | 654 | 523 | 0.11 | JW-8 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |
| 9 | 871077.5 | 1085088.2 | Random | Concrete | 0.276 | 0.411 | 0.25 | 0.25 | 8 | 2.67 | 62 | 123 | 0.02 | 281 | 190 | 709 | 523 | 0.12 | JW-9 | -0.11 | 0.03 | 5.91 | -1.36 | 0.14 | 6.96 |
| 10 | 871170.4 | 1085203.2 | Random | Concrete | 0.276 | 0.411 | 0.25 | 0.25 | 10 | 2.67 | 85 | 123 | 0.03 | 264 | 190 | 576 | 523 | 0.10 | JW-10 | -0.11 | 0.03 | 5.91 | -1.36 | 0.14 | 6.96 |
| B1 | 871540.3 | 1085691.5 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 9 | 0.33 | 92 | 60 | 0.03 | 321 | 158 | 1,344 | 507 | 0.22 | JWB1 | 1.55 | 3.33 | 5.91 | 0.82 | 3.08 | 6.96 |
| B2 | 871170.9 | 1085201.3 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 12 | 0.33 | 124 | 60 | 0.04 | 247 | 158 | 734 | 507 | 0.12 | JWB2 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| B3 | 871075.4 | 1085086.9 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 12 | 0.33 | 124 | 60 | 0.04 | 226 | 158 | 561 | 507 | 0.09 | JWB3 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| B4 | 871255.6 | 1085315.7 | Biased based on scan | Concrete | 0.301 | 0.388 | 0.25 | 0.25 | 10 | 0.33 | 103 | 60 | 0.04 | 169 | 158 | 91 | 507 | 0.02 | JWB4 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |

Notes:

Survey locations are identified on Figure 10.

Types of surveys identified as "biased, surveyor selected" were based on professional judgment of the technician to select locations with a higher likelihood of having radioactivity, such as at doorway entry points to the building.

The instruments used for fixed-point measurements were a Ludlum Model 2360 coupled with a Ludlum Model 43-89 (125-$cm^2$ zinc sulfide plastic alpha/beta scintillation detector).

The 2 pi $\varepsilon_i$ for fixed-point measurements was determined at the time of instrument check in and was regularly checked as part of instrument performance checks.

The $\varepsilon_S$ for fixed-point measurements is 0.25 for alpha and low-energy (0.15 to 0.40 MeV) beta, per the FSSP (USACE 2015).

General area ambient background (bkgd) for fixed-point measurements was determined for entry in the background column by collecting three, 1-minute background measurements and averaging the results. Background radiation from natural materials within the structural materials was not included in the background column.

The activity (in dpm/100 $cm^2$) for fixed-point measurements was determined using the following equation.

$$activity\ (dpm/100\ cm^2) = \frac{gross(cpm\ per\ 125\ cm^2) - general\ area\ background\ (cpm\ per\ 125\ cm^2)}{(\varepsilon_i)(\varepsilon_s)}\left(\frac{100\ cm^2}{100\ cm^2}\right) = \frac{gross(cpm\ ) - general\ area\ background\ (cpm)}{(\varepsilon_i)(\varepsilon_s)\left(\frac{125\ cm^2}{100\ cm^2}\right)} per 100\ cm^2$$

The instruments used for counting swipes were a laboratory Mirion Series 5HP and Series 5XLB GFPCs.

The *Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (DoD 2021) was followed to determine the counting effiriencies, daily checks against control charts, and instrument background for the GFPCs.

## Table D-9. Analytical Results for Samples of Dust and Pavement Sediment on Structure Surfaces

| Sample ID | Easting | Northing | Elevation | Collect Date | Lead-210 | | | | Polonium-210 | | | | Radium-226 | | | | Thorium-228 | | | | Thorium-230 | | | | Thorium-232 | | | | Uranium-234 | | | | Uranium-235 | | | | Uranium-238 | | | | $SOR_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | |
| | (ft) | | (ft amsl) | | (pCi/g) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Average Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 0.95 | | | | 1.09 | | | | 1.49 | | | | 1.07 | | | | 0.98 | | | | 0.06 | | | | 1.08 | | | | -- |
| $UCL_{95}$ Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 1.01 | | | | 1.18 | | | | 1.58 | | | | 1.17 | | | | 1.07 | | | | 0.08 | | | | 1.16 | | | | -- |
| Maximum Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 1.27 | | | | 1.95 | | | | 2.17 | | | | 1.95 | | | | 1.52 | | | | 0.22 | | | | 1.69 | | | | -- |
| Average Sample Result | | | | -- | 20.39 | | | | 27.34 | | | | 0.67 | | | | 0.41 | | | | 0.92 | | | | 0.39 | | | | 0.60 | | | | 0.03 | | | | 0.66 | | | | 0.02 |
| Maximum Sample Result | | | | -- | 44.90 | | | | 60.10 | | | | 1.40 | | | | 1.03 | | | | 1.41 | | | | 1.03 | | | | 1.13 | | | | 0.11 | | | | 1.20 | | | | 0.09 |
| Maximum MDC to RG Ratio | | | | -- | -- | | | | -- | | | | 0.082 | | | | -- | | | | 0.015 | | | | -- | | | | -- | | | | -- | | | | 0.004 | | | | |
| SVP264222<br>SVP264231 | 871949.5 | 1086167.3 | 509.8 | 10/24/22 | 44.90 | 6.09 | 2.41 | = | 60.10 | 5.97 | 0.35 | J | 1.19 | 0.53 | 0.39 | = | 0.34 | 0.21 | 0.21 | J | 0.90 | 0.34 | 0.21 | J | 0.39 | 0.22 | 0.21 | J | 0.54 | 0.24 | 0.12 | = | 0.00 | 0.09 | 0.22 | UJ | 0.74 | 0.29 | 0.18 | = | 0.05 |
| SVP264223<br>SVP264332 | 872211.4 | 1086125.3 | 507.5 | 10/24/22 | 12.70 | 2.74 | 2.43 | = | 18.90 | 2.50 | 0.43 | J | 0.78 | 0.43 | 0.41 | J | 0.28 | 0.18 | 0.15 | J | 1.06 | 0.36 | 0.12 | J | 0.21 | 0.16 | 0.19 | J | 0.63 | 0.29 | 0.22 | = | 0.11 | 0.15 | 0.27 | UJ | 0.78 | 0.32 | 0.14 | = | 0.00 |
| SVP264224<br>SVP264233 | 872212.0 | 1086138.1 | 506.6 | 10/24/22 | 3.56 | 1.52 | 1.79 | = | 3.02 | 0.71 | 0.25 | J | 1.17 | 0.52 | 0.25 | = | 0.69 | 0.29 | 0.20 | = | 1.37 | 0.43 | 0.13 | J | 0.77 | 0.31 | 0.20 | = | 0.74 | 0.30 | 0.13 | = | 0.00 | 0.10 | 0.25 | UJ | 1.07 | 0.37 | 0.20 | = | 0.04 |
| SVP264225 | 872140.3 | 1086026.9 | 508.2 | 10/24/22 | -- | -- | -- | -- | -- | -- | -- | -- | 1.40 | 0.53 | 0.28 | = | 1.03 | 0.35 | 0.18 | = | 1.34 | 0.40 | 0.12 | J | 1.03 | 0.35 | 0.18 | = | 1.13 | 0.35 | 0.15 | = | 0.03 | 0.08 | 0.22 | UJ | 1.20 | 0.36 | 0.11 | = | 0.09 |
| SVP264226 | Dust Inside Buildings at UB-1 from a 500 $cm^2$ area | | | 10/26/22 | -- | -- | -- | -- | -- | -- | -- | -- | 0.16 | 0.17 | 0.24 | UJ | 0.17 | 0.15 | 0.19 | UJ | 0.34 | 0.21 | 0.15 | J | 0.05 | 0.09 | 0.19 | UJ | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SVP264227 | Dust Inside Buildings at UB-6 from a $500^2$ area | | | 10/26/22 | -- | -- | -- | -- | -- | -- | -- | -- | 0.13 | 0.14 | 0.17 | UJ | 0.21 | 0.17 | 0.26 | UJ | 0.75 | 0.30 | 0.12 | J | 0.13 | 0.13 | 0.19 | UJ | 0.23 | 0.16 | 0.12 | J | 0.03 | 0.06 | 0.15 | UJ | 0.07 | 0.09 | 0.12 | UJ | 0.00 |
| SVP264228 | Dust Inside Buildings at UB-11 from a 2,000 $cm^2$ area | | | 10/26/22 | -- | -- | -- | -- | -- | -- | -- | -- | 0.40 | 0.23 | 0.15 | J | 0.25 | 0.17 | 0.19 | J | 0.78 | 0.29 | 0.13 | J | 0.34 | 0.19 | 0.11 | J | 1.03 | 0.38 | 0.19 | = | 0.06 | 0.11 | 0.23 | UJ | 0.91 | 0.35 | 0.19 | = | 0.00 |
| SVP264229 | Dust Inside Buildings at UB-14 from a 1,000 $cm^2$ area | | | 10/26/22 | -- | -- | -- | -- | -- | -- | -- | -- | 0.14 | 0.16 | 0.26 | UJ | 0.14 | 0.13 | 0.20 | UJ | 0.36 | 0.20 | 0.16 | J | 0.10 | 0.11 | 0.18 | UJ | 0.07 | 0.10 | 0.18 | UJ | 0.02 | 0.07 | 0.19 | UJ | 0.11 | 0.13 | 0.21 | UJ | 0.00 |
| SVP264230 | Dust Inside Buildings at UB-18 from a 2,500 $cm^2$ area | | | 10/26/22 | -- | -- | -- | -- | -- | -- | -- | -- | 0.70 | 0.32 | 0.22 | = | 0.56 | 0.24 | 0.15 | J | 1.41 | 0.39 | 0.11 | J | 0.46 | 0.21 | 0.11 | J | 0.40 | 0.20 | 0.14 | = | 0.00 | 0.08 | 0.20 | UJ | 0.43 | 0.20 | 0.12 | = | 0.00 |

Notes:

$UCL_{95}$ is the 95 percent upper confidence limit of the arithmetic mean.

For the first three entries in this table, two samples were collected from the same location for separate submittal to different laboratories.

Survey locations are identified on Figure 9.

Validation qualifier (VQ) symbols indicate: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, "UJ" for not detected above estimated value, and "R" for unusable.

The differences in the way lead-210 and pollonium-210 are analyzed and the estimated "J" result for polonium-210 resulted in disequilibrium in results between the two.

-- indicates data not available because of insufficient sample volume to perform laboratory analysis.

The ratios of MDCs to RG are less than the MARSSIM goal of 0.1.

$SOR_N$ equations follow.

$$SOR_N^{depth \leq 0.5 ft\ bgs} = \frac{Ra-226_N}{5\ pCi/g} + \frac{Th-230_N}{14\ pCilg} + \frac{U-238_N}{50\ pCi/g}$$

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## Table D-10. Background Reference Surface Soil Data

| Background Reference Surface Soil Data Summary (37 Samples) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Statistic** | **Ac-227** | **Pa-231** | **Ra-226** | **Ra-228** | **Th-228** | **Th-230** | **Th-232** | **U-235** | **U-238** | **$SOR_G$** |
| | **(pCi/g)** | | | | | | | | | |
| Mean | 0.20 | 0.24 | 0.95 | 0.91 | 1.09 | 1.49 | 1.07 | 0.06 | 1.08 | 0.32 |
| Median | 0.09 | 0.20 | 1.03 | 0.91 | 1.05 | 1.41 | 1.07 | 0.06 | 1.06 | 0.33 |
| $UCL_{95}$ | 0.37 | 0.37 | 1.01 | 0.93 | 1.18 | 1.58 | 1.17 | 0.08 | 1.16 | 0.33 |
| Standard Deviation | 0.23 | 0.48 | 0.19 | 0.07 | 0.32 | 0.32 | 0.34 | 0.06 | 0.28 | 0.04 |
| Maximum | 0.73 | 2.17 | 1.27 | 1.08 | 1.95 | 2.17 | 1.95 | 0.22 | 1.69 | 0.40 |
| Range | 0.78 | 2.66 | 0.68 | 0.30 | 1.32 | 1.23 | 1.42 | 0.26 | 1.04 | 0.20 |
| **Background Reference Surface Soil Sample Results** | | | | | | | | | | |
| **Sample ID** | **Ac-227** | **Pa-231** | **Ra-226** | **Ra-228** | **Th-228** | **Th-230** | **Th-232** | **U-235** | **U-238** | **$SOR_G$** |
| | **(pCi/g)** | | | | | | | | | |
| SLA04300 | 0.05 | 0.25 | 1.27 | 1.08 | 1.07 | 1.33 | 0.81 | 0.07 | 0.76 | 0.36 |
| SLA04302 | 0.21 | 0.09 | 1.11 | 0.96 | 0.74 | 1.41 | 0.64 | 0.17 | 1.38 | 0.35 |
| SLA04304 | 0.06 | -0.49 | 1.15 | 1.01 | 1.41 | 1.80 | 1.18 | 0.12 | 1.51 | 0.39 |
| SLA04306 | 0.08 | -0.14 | 1.01 | 0.93 | 1.11 | 1.18 | 0.57 | 0.06 | 1.33 | 0.31 |
| SLA04308 | 0.09 | -0.25 | 1.16 | 1.01 | 1.32 | 1.21 | 1.12 | 0.07 | 1.21 | 0.34 |
| SLA04310 | -0.02 | 2.17 | 1.12 | 0.91 | 1.62 | 1.40 | 1.58 | 0.06 | 1.11 | 0.35 |
| SLA04312 | -0.02 | -0.06 | 1.07 | 0.87 | 1.47 | 1.20 | 0.83 | 0.00 | 1.47 | 0.33 |
| SLA04314 | 0.56 | 0.20 | 1.17 | 0.87 | 0.86 | 2.01 | 1.37 | 0.03 | 1.16 | 0.40 |
| SLA04316 | 0.05 | 0.38 | 1.09 | 0.84 | 0.98 | 1.28 | 1.00 | 0.05 | 0.79 | 0.33 |
| SLA04318 | 0.01 | 0.68 | 1.08 | 0.91 | 1.95 | 1.74 | 1.34 | 0.13 | 0.94 | 0.36 |
| SLA04320 | 0.12 | -0.37 | 1.10 | 0.99 | 1.71 | 1.74 | 1.00 | 0.06 | 0.88 | 0.36 |
| SLA04322 | -0.05 | 0.60 | 1.08 | 0.94 | 1.27 | 1.68 | 1.08 | 0.00 | 1.06 | 0.36 |
| SLA04324 | 0.10 | -0.10 | 1.12 | 0.96 | 1.05 | 1.47 | 1.34 | 0.00 | 1.05 | 0.35 |
| SLA04326 | 0.01 | 0.47 | 1.07 | 0.89 | 0.71 | 1.93 | 0.57 | 0.00 | 0.92 | 0.37 |
| SLA04328 | 0.06 | 0.05 | 1.11 | 0.92 | 0.67 | 1.14 | 1.16 | 0.00 | 1.16 | 0.33 |
| SLA04330 | 0.03 | 0.09 | 0.98 | 0.85 | 1.21 | 1.30 | 0.55 | 0.08 | 0.85 | 0.31 |
| SLA04332 | -0.02 | 0.10 | 1.04 | 0.97 | 0.96 | 1.19 | 1.24 | 0.05 | 1.02 | 0.31 |
| SLA04334 | 0.20 | 0.30 | 1.16 | 0.91 | 1.19 | 1.01 | 1.02 | 0.00 | 1.15 | 0.33 |
| SLA04336 | 0.06 | 0.54 | 1.03 | 0.89 | 0.67 | 1.16 | 0.76 | 0.07 | 1.06 | 0.31 |
| SLA04338 | 0.07 | -0.32 | 0.92 | 0.85 | 0.85 | 1.48 | 1.07 | 0.16 | 0.90 | 0.31 |
| SLA04340 | 0.32 | 0.49 | 0.92 | 0.99 | 0.99 | 1.95 | 1.95 | 0.22 | 1.38 | 0.35 |
| SLA04342 | 0.08 | -0.39 | 0.94 | 0.86 | 0.86 | 1.62 | 0.86 | 0.00 | 0.94 | 0.32 |
| SLA04344 | 0.44 | 0.15 | 1.10 | 0.97 | 0.97 | 1.75 | 1.50 | 0.07 | 0.65 | 0.36 |
| SLA04346 | 0.06 | 0.46 | 0.97 | 0.88 | 0.88 | 1.81 | 1.59 | 0.00 | 1.45 | 0.35 |
| SLA04348 | 0.08 | -0.18 | 1.04 | 0.79 | 0.79 | 1.34 | 1.53 | 0.00 | 0.74 | 0.32 |
| SLA04167 | 0.57 | 0.48 | 0.59 | 0.78 | 0.96 | 2.11 | 0.98 | 0.08 | 1.65 | 0.30 |
| SLA04168 | 0.47 | 0.51 | 0.61 | 0.86 | 0.81 | 1.44 | 1.17 | 0.13 | 0.95 | 0.24 |
| SLA04169 | 0.73 | 0.11 | 0.69 | 1.04 | 1.10 | 1.61 | 0.99 | -0.02 | 0.91 | 0.27 |
| SLA04170 | 0.50 | 1.06 | 0.75 | 0.91 | 1.74 | 2.17 | 1.36 | 0.02 | 1.33 | 0.33 |
| SLA04179 | 0.13 | 0.43 | 0.71 | 0.79 | 0.63 | 1.27 | 0.55 | -0.04 | 0.79 | 0.25 |
| SLA04180 | 0.15 | 0.13 | 0.64 | 0.80 | 1.19 | 1.84 | 1.43 | 0.12 | 1.20 | 0.28 |
| SLA04181 | 0.08 | 0.23 | 0.60 | 0.84 | 1.14 | 0.94 | 1.24 | 0.13 | 0.66 | 0.20 |
| SLA04187 | 0.21 | -0.20 | 0.85 | 0.97 | 1.36 | 1.23 | 1.10 | 0.10 | 1.69 | 0.29 |
| SLA04182 | 0.67 | 0.31 | 0.74 | 0.88 | 0.68 | 1.40 | 0.80 | 0.02 | 1.40 | 0.28 |
| SLA04183 | 0.68 | 0.59 | 0.85 | 0.97 | 1.05 | 1.06 | 0.90 | 0.16 | 0.84 | 0.26 |
| SLA04184 | 0.56 | -0.02 | 0.77 | 0.87 | 1.22 | 1.51 | 0.53 | 0.12 | 0.73 | 0.28 |
| SLA04185 | 0.15 | 0.52 | 0.71 | 0.91 | 1.30 | 1.37 | 0.91 | 0.10 | 1.11 | 0.26 |

Notes:

$UCL_{95}$ is the 95 percent upper confidence limit of the arithmetic mean.

All samples are surface samples, which were collected in the uppermost 0.5 ft of soil.

Negative results are less than the laboratory system's background level.

These samples were collected between August 21, 1998, and October 21, 1998, from representative native soil at Saint Ann Park, Aubuchon Park, and Howdershell Park. Summary statistics for these data are included in Appendix D, Attachment 1, of the FS (USACE 2003). The mean soil background values for Ra-226, Th-230, and U-238 are listed in the ROD (USACE 2005).

$SOR_G$ – gross sum of ratios (unitless)

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# APPENDIX E

# PHOTOGRAPHIC DOCUMENTATION OF THE INDOOR LOCATIONS OF FIXED-POINT MEASURMENTS

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STSU-1 Random Location 1


STSU-1 Random Location 2

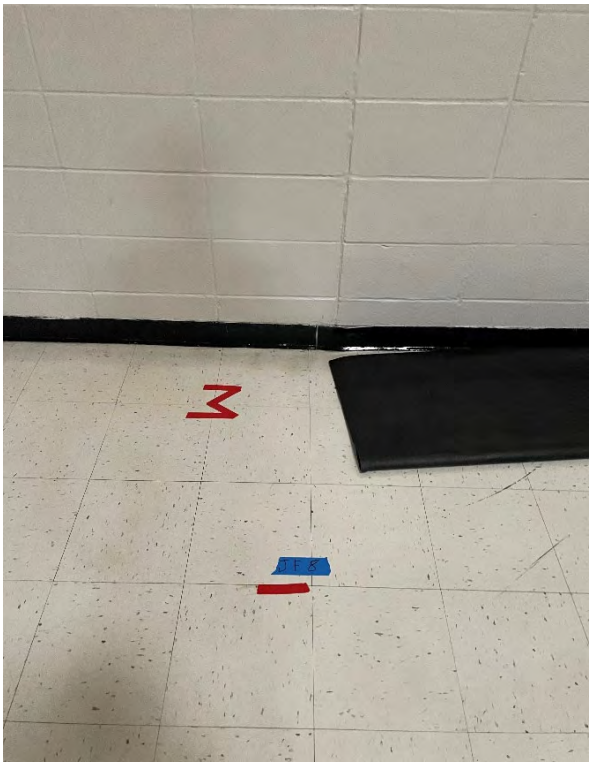

STSU-1 Random Location 3


STSU-1 Random Location 4

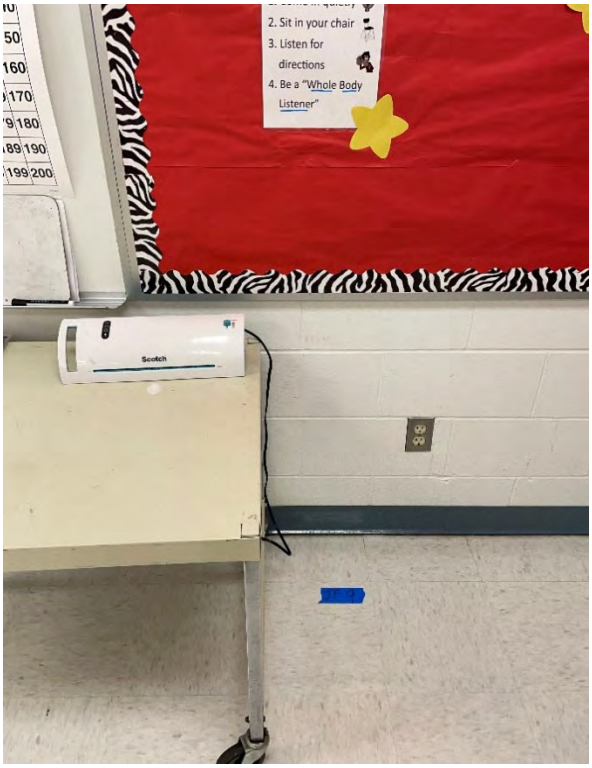
STSU-1 Random Location 5

STSU-1 Random Location 6

STSU-1 Random Location 7



STSU-1 Random Location 8

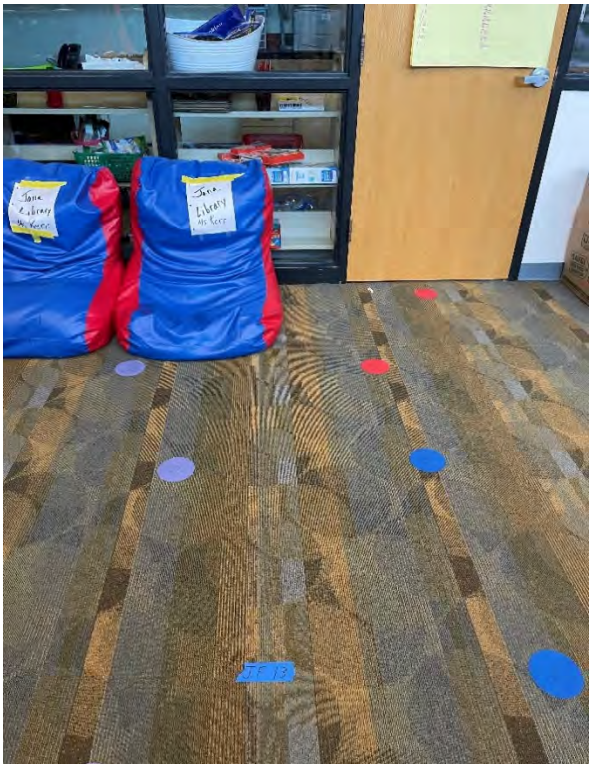



STSU-1 Random Location 9


STSU-1 Random Location 10

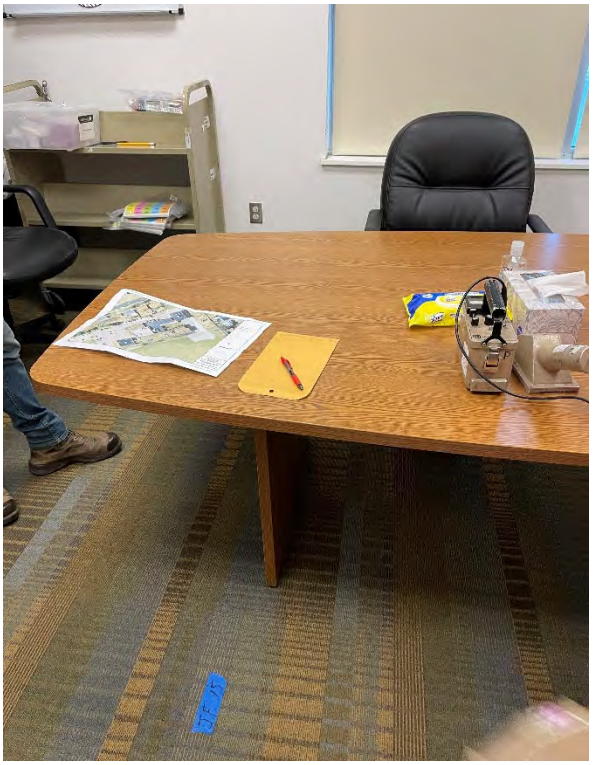
STSU-1 Random Location 11

STSU-1 Random Location 12



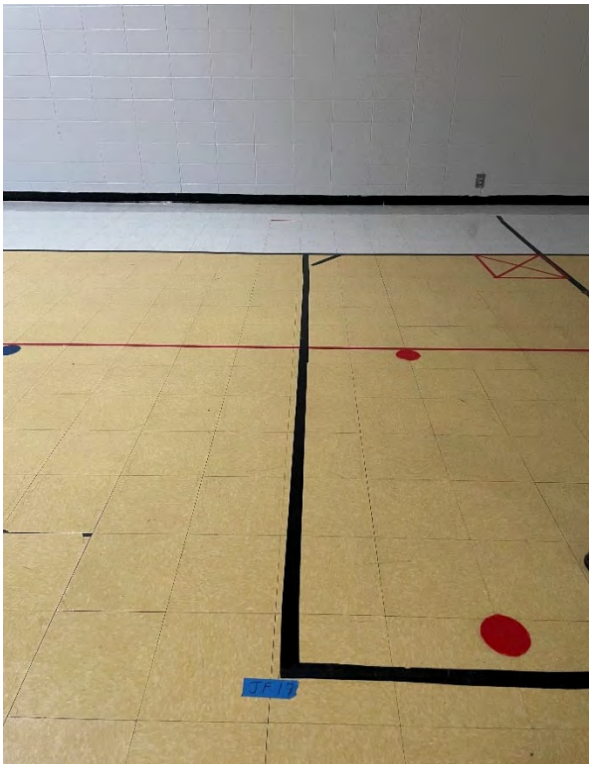
STSU-1 Random Location 13

STSU-1 Random Location 14

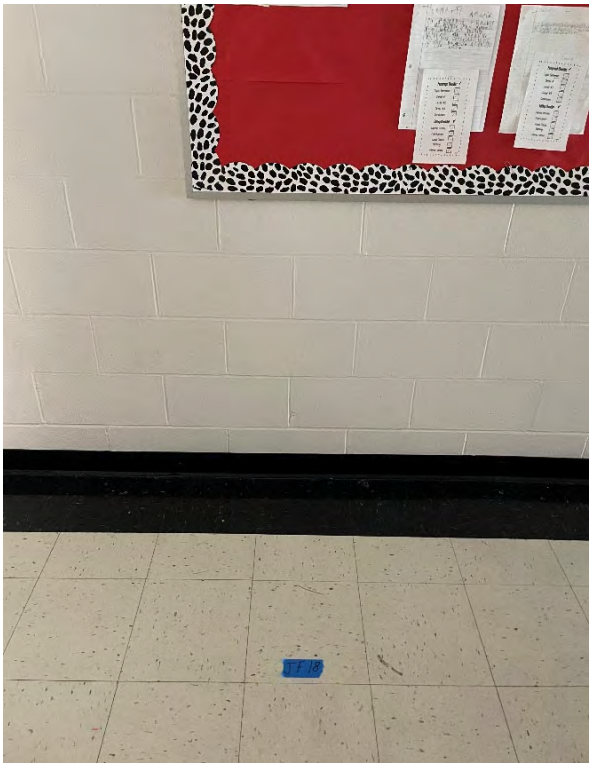


STSU-1 Random Location 15

STSU-1 Random Location 16



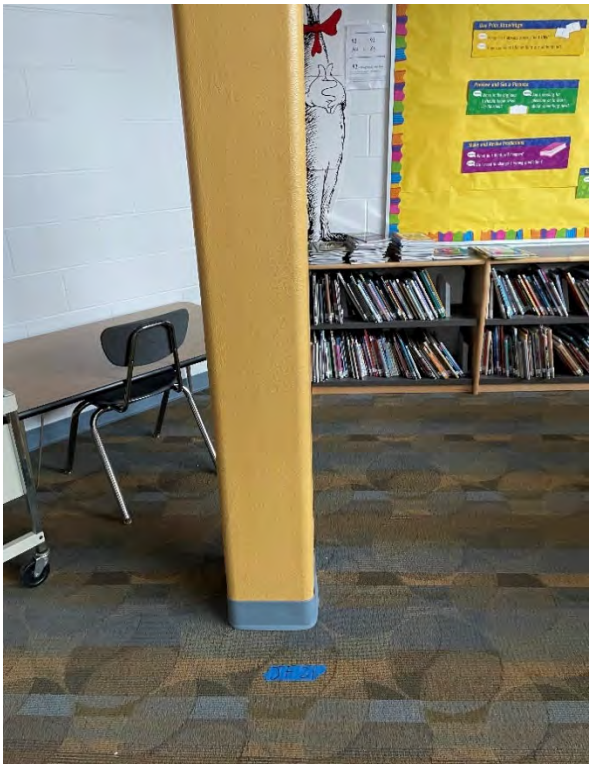
STSU-1 Random Location 17



STSU-1 Random Location 18

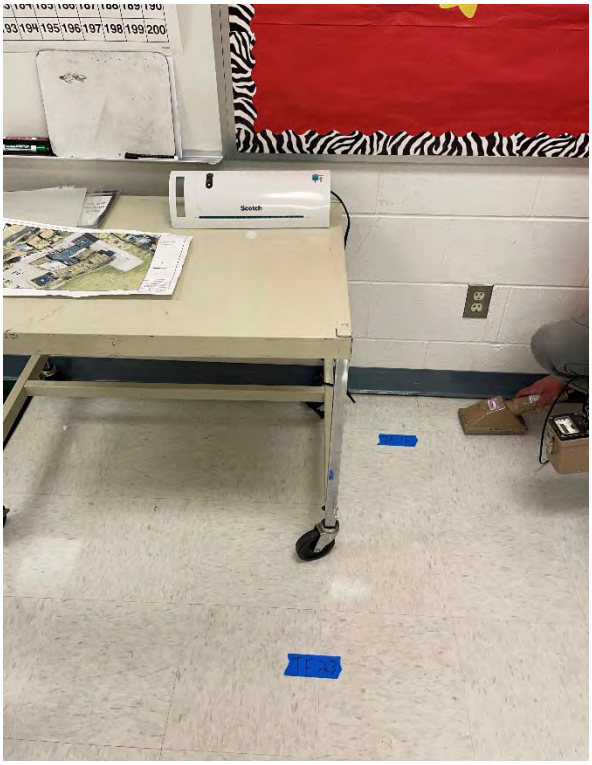
STSU-1 Random Location 19

STSU-1 Random Location 20



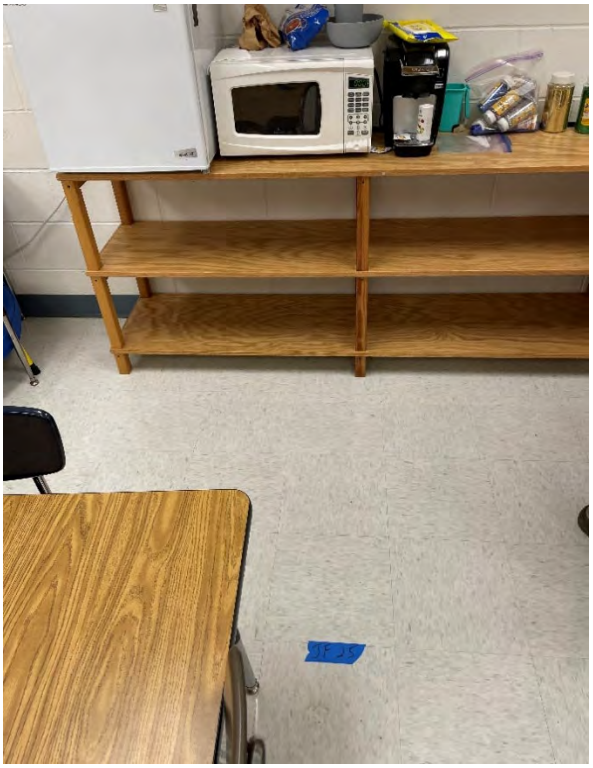
STSU-1 Random Location 21

STSU-1 Random Location 22

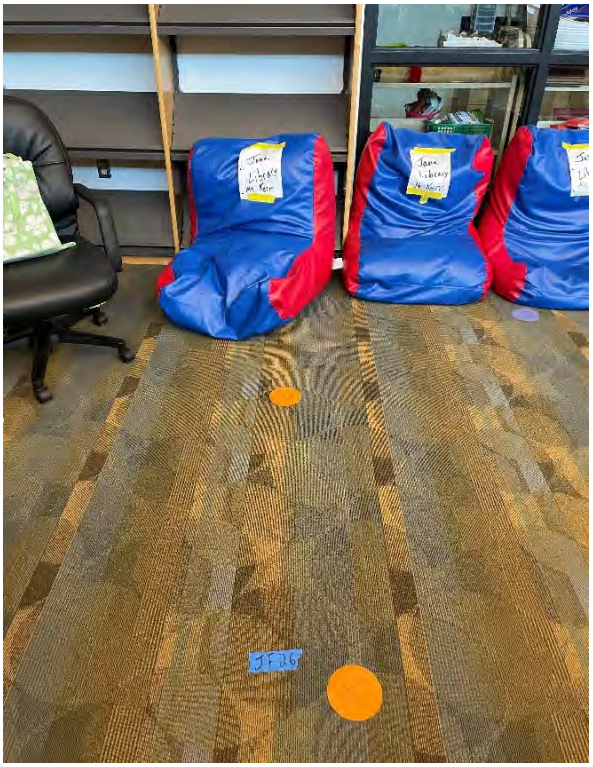


STSU-1 Random Location 23

STSU-1 Random Location 24



STSU-1 Random Location 25



STSU-1 Random Location 26

STSU-1 Random Location 27

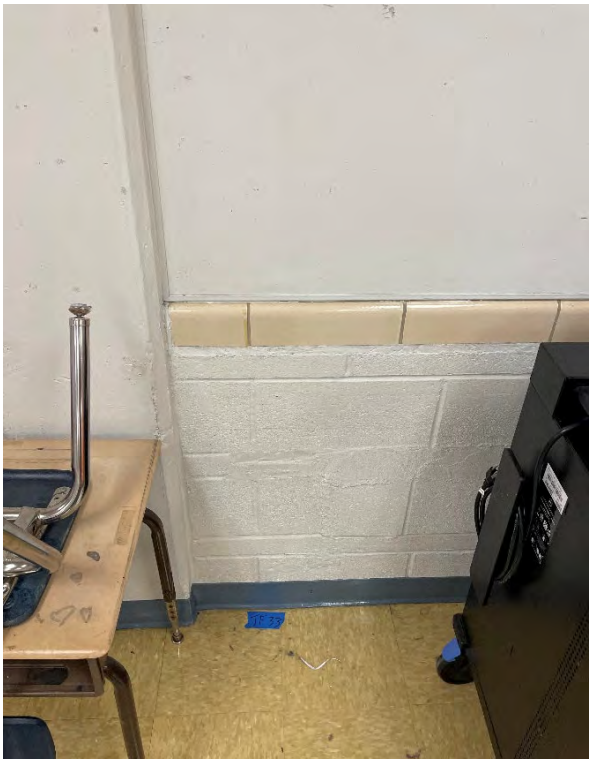

STSU-1 Random Location 28

STSU-1 Random Location 29

STSU-1 Random Location 30

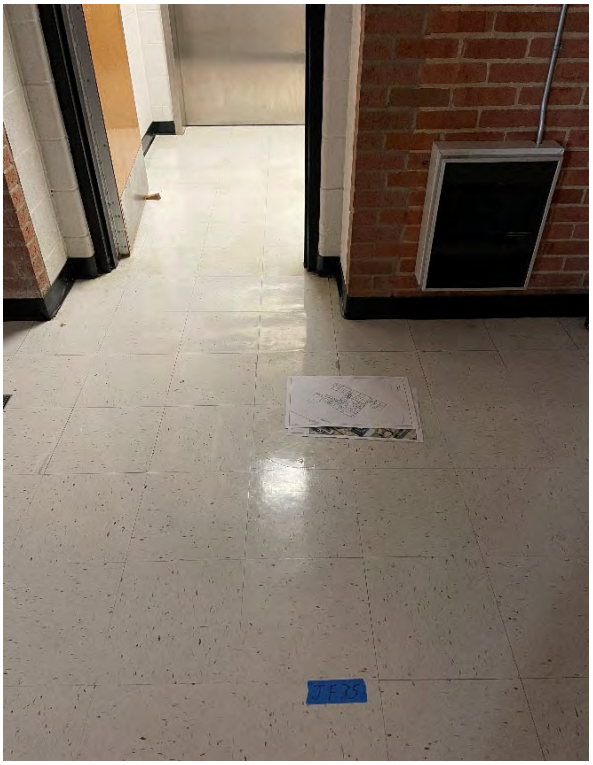
STSU-1 Random Location 31

STSU-1 Random Location 32



STSU-1 Random Location 33

STSU-1 Random Location 34



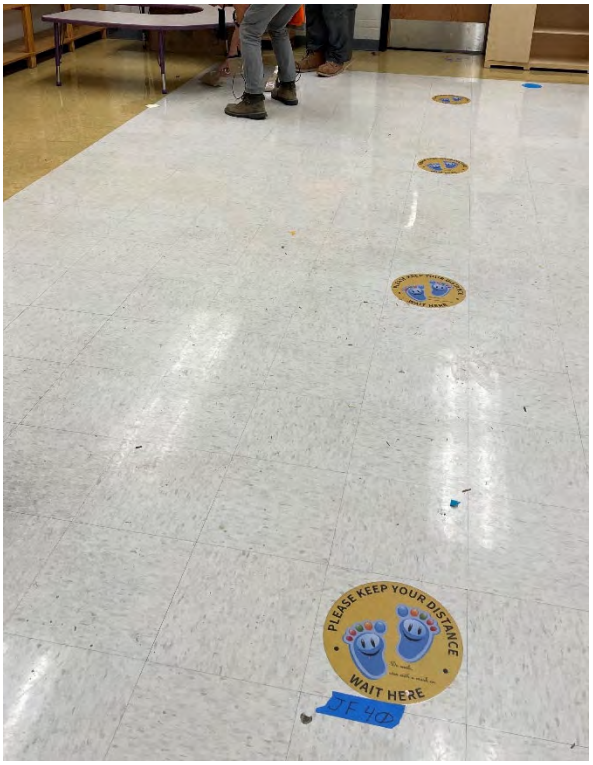
STSU-1 Random Location 35


STSU-1 Random Location 36

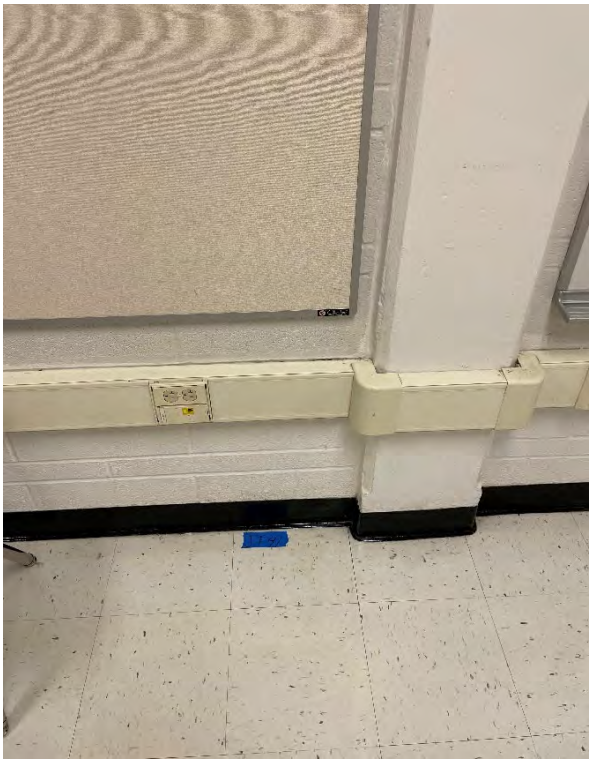
STSU-1 Random Location 37

STSU-1 Random Location 38

STSU-1 Random Location 39




STSU-1 Random Location 40



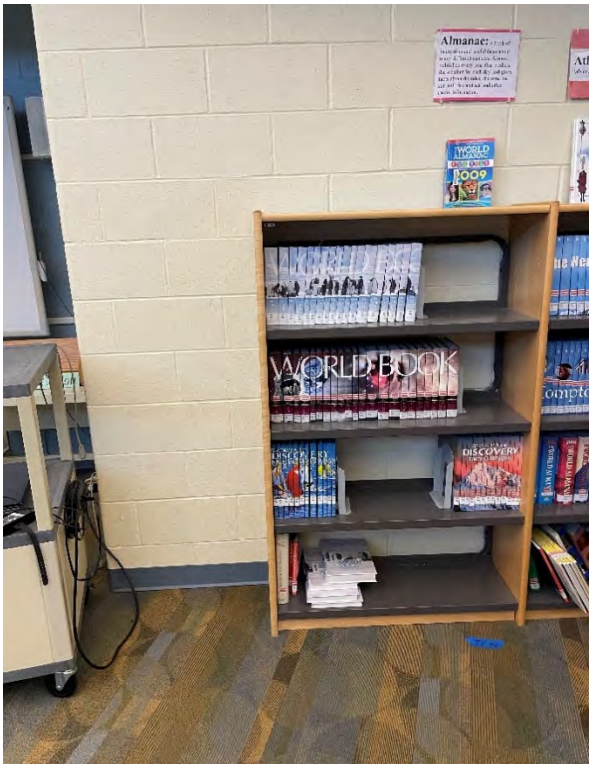
STSU-1 Random Location 41

STSU-1 Random Location 42

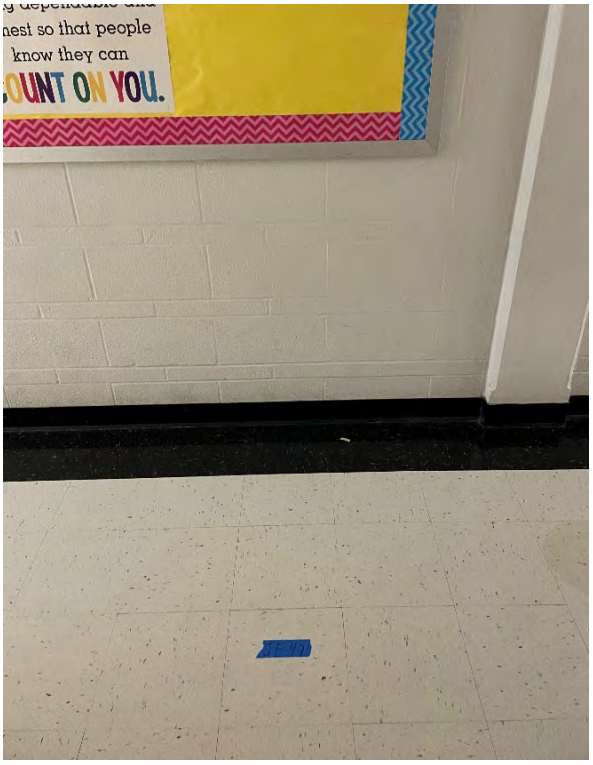
STSU-1 Random Location 43

STSU-1 Random Location 44

STSU-1 Random Location 45




STSU-1 Random Location 46



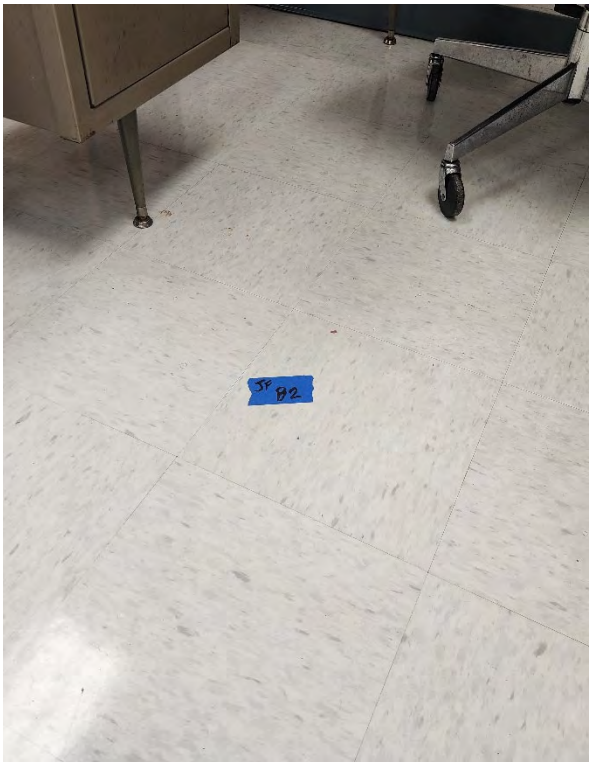

STSU-1 Random Location 47


STSU-1 Random Location 48

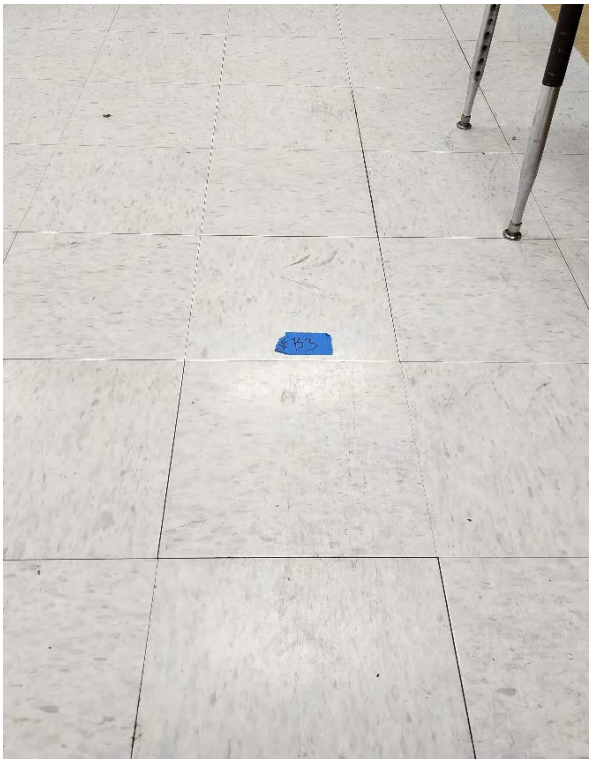

STSU-1 Random Location 49

STSU-1 Random Location 50

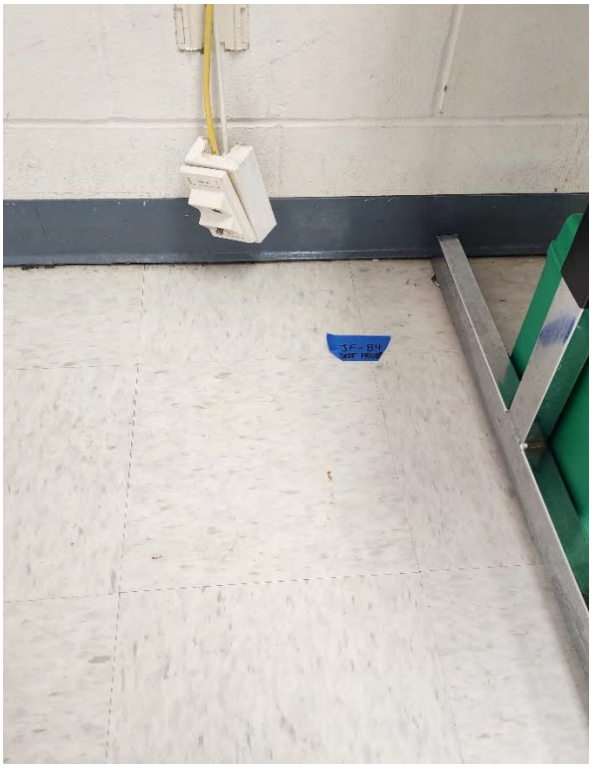

STSU-1 Scan Survey Biased Location 1




STSU-1 Scan Survey Biased Location 2

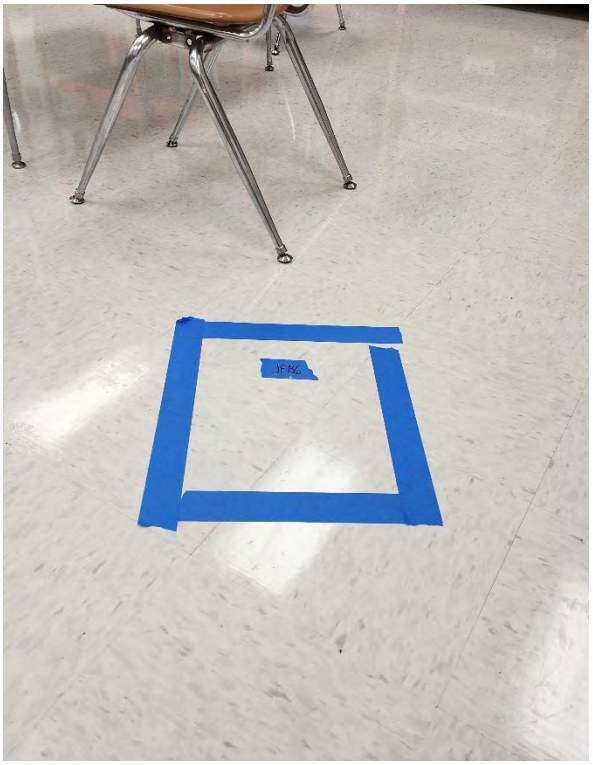


STSU-1 Scan Survey Biased Location 3

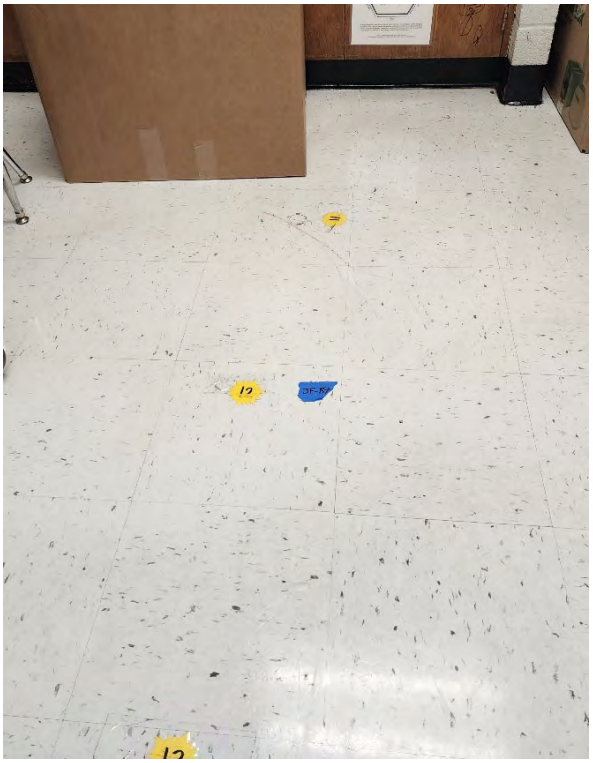


STSU-1 Scan Survey Biased Location 4

STSU-1 Scan Survey Biased Location 5



STSU-1 Scan Survey Biased Location 6



STSU-1 Scan Survey Biased Location 7

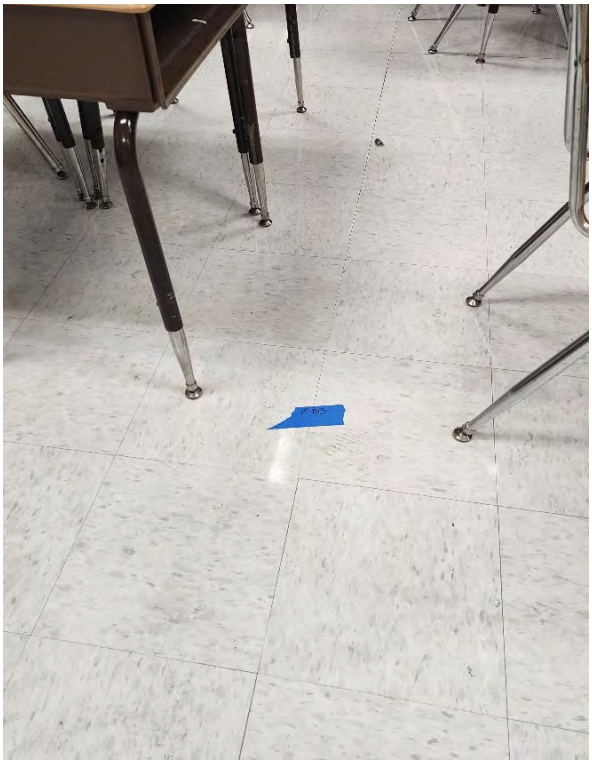
STSU-1 Scan Survey Biased Location 8

STSU-1 Scan Survey Biased Location 9

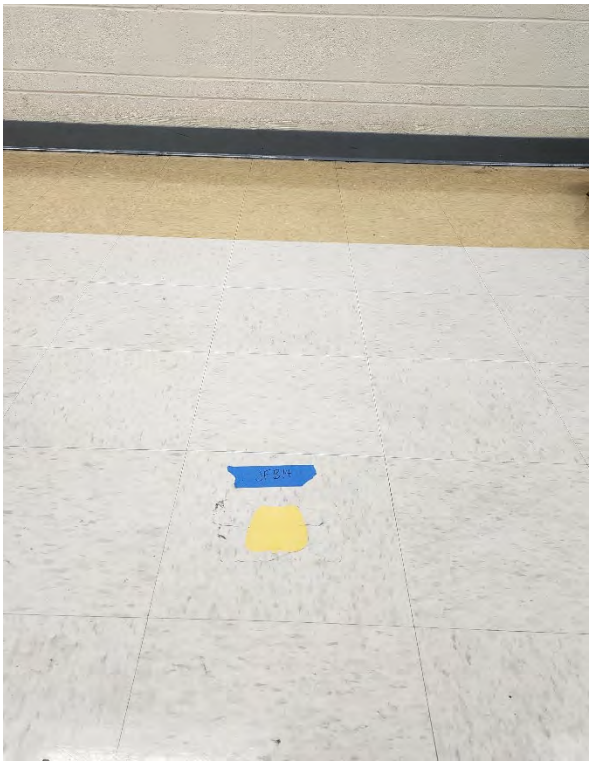
STSU-1 Scan Survey Biased Location 10

STSU-1 Scan Survey Biased Location 11

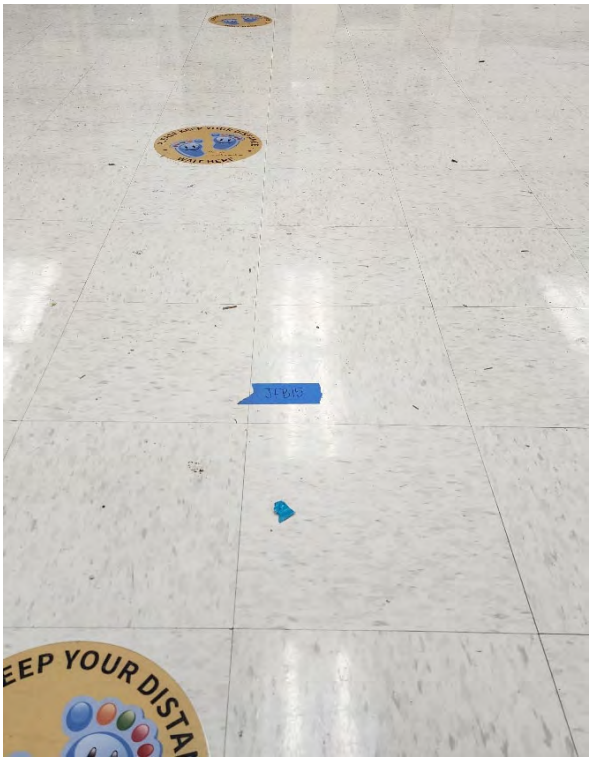
STSU-1 Scan Survey Biased Location 12



STSU-1 Scan Survey Biased Location 13



STSU-1 Scan Survey Biased Location 14



STSU-1 Scan Survey Biased Location 15

STSU-1 Scan Survey Biased Location 16

STSU-1 Scan Survey Biased Location 17

STSU-1 Scan Survey Biased Location 18

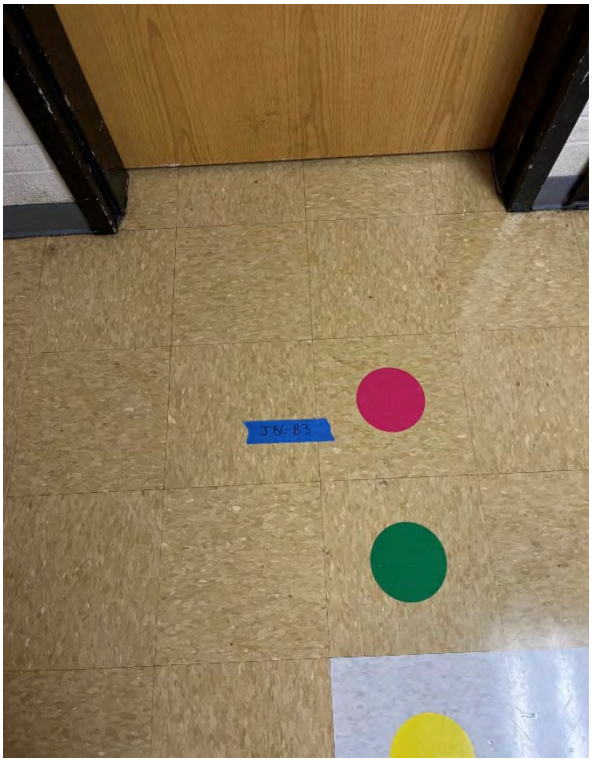
STSU-1 Scan Survey Biased Location 19

STSU-1 Scan Survey Biased Location 20

STSU-1 Scan Survey Biased Location 21

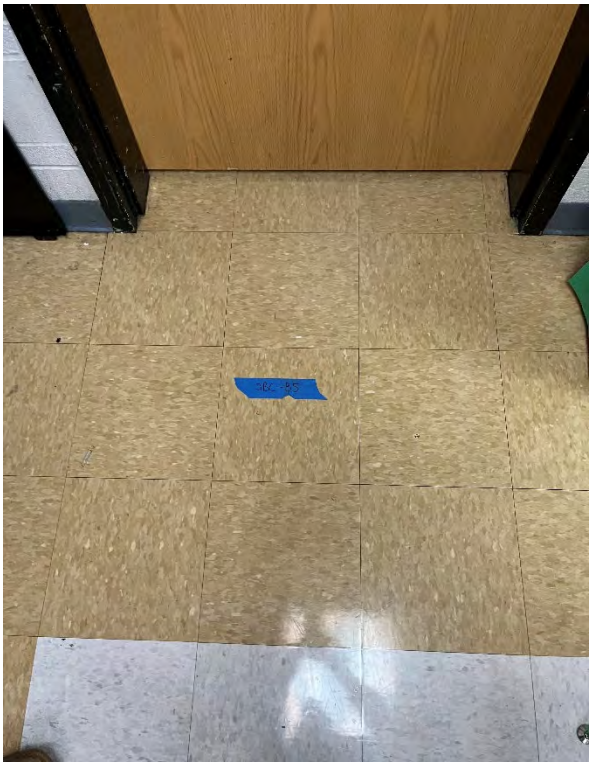
STSU-1 Scan Survey Biased Location 22

STSU-1 Scan Survey Biased Location 23



STSU-1 Scan Survey Biased Location 24

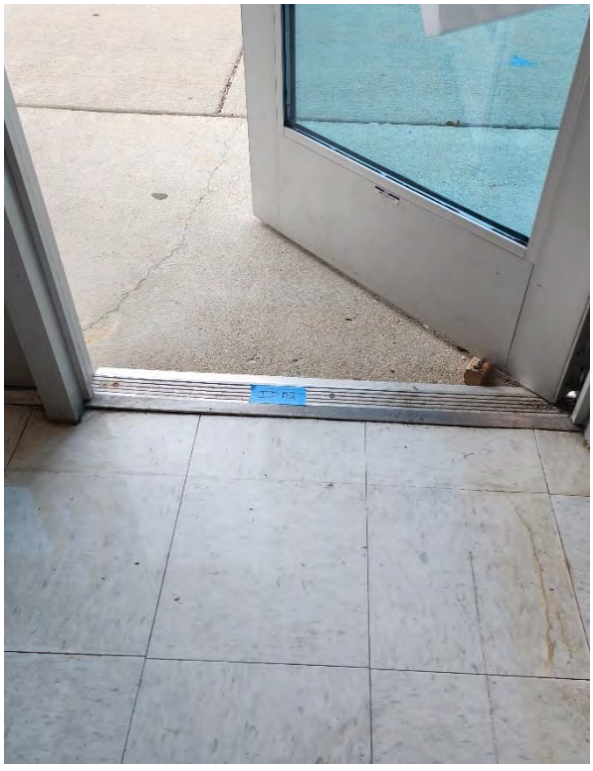
STSU-1 Scan Survey Biased Location 25



STSU-1 Scan Survey Biased Location 26

STSU-1 Scan Survey Biased Location 27

STSU-1 Surveyor Judgment Biased Location 1



STSU-1 Surveyor Judgment Biased Location 2

STSU-1 Surveyor Judgment Biased Location 3


STSU-1 Surveyor Judgment Biased Location 4

STSU-1 Surveyor Judgment Biased Location 5

STSU-1 Surveyor Judgment Biased Location 6


STSU-1 Surveyor Judgment Biased Location 7


STSU-1 Surveyor Judgment Biased Location 8


STSU-1 Surveyor Judgment Biased Location 9


STSU-1 Surveyor Judgment Biased Location 10

STSU-1 Surveyor Judgment Biased Location 11

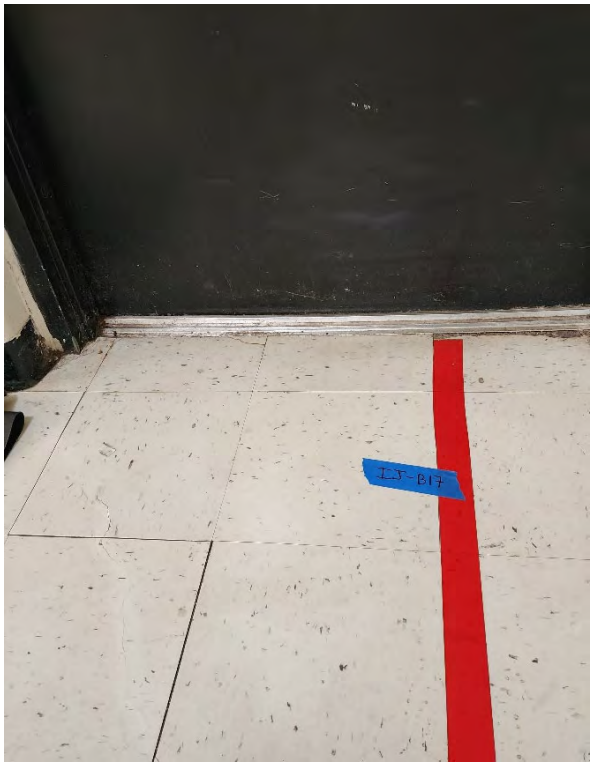
STSU-1 Surveyor Judgment Biased Location 12

STSU-1 Surveyor Judgment Biased Location 13

STSU-1 Surveyor Judgment Biased Location 14

STSU-1 Surveyor Judgment Biased Location 15

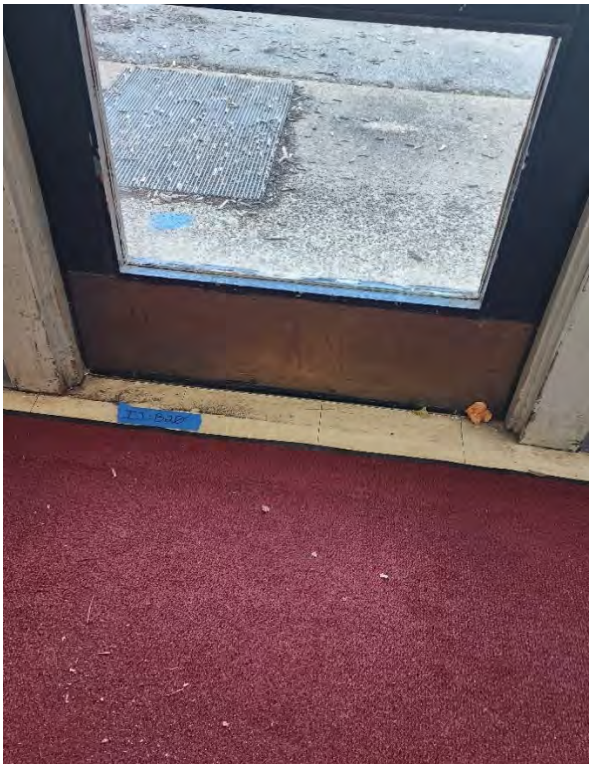
STSU-1 Surveyor Judgment Biased Location 16



STSU-1 Surveyor Judgment Biased Location 17

STSU-1 Surveyor Judgment Biased Location 18


STSU-1 Surveyor Judgment Biased Location 19



STSU-1 Surveyor Judgment Biased Location 20

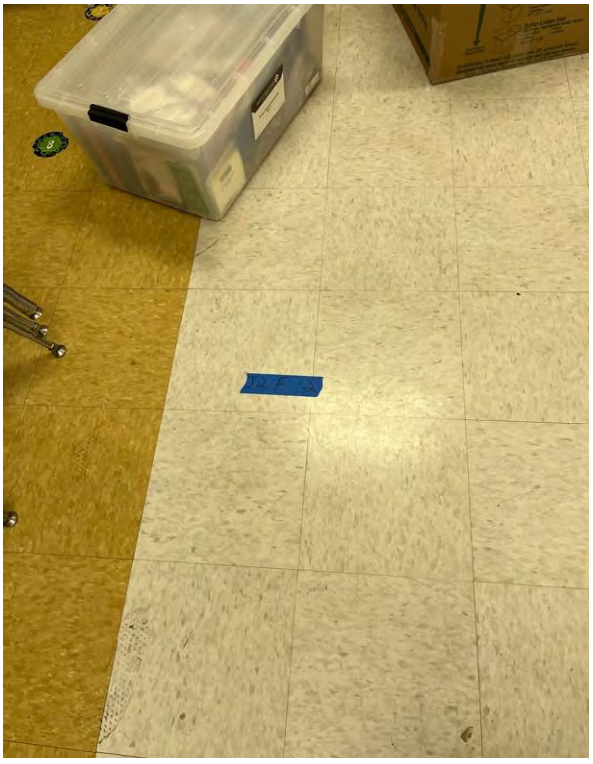
STSU-1 Surveyor Judgment Biased Location 21

STSU-1 Surveyor Judgment Biased Location 22

STSU-1 Surveyor Judgment Biased Location 23

STSU-1 USACE Selected Biased Location 10

STSU-2 Random Location 1



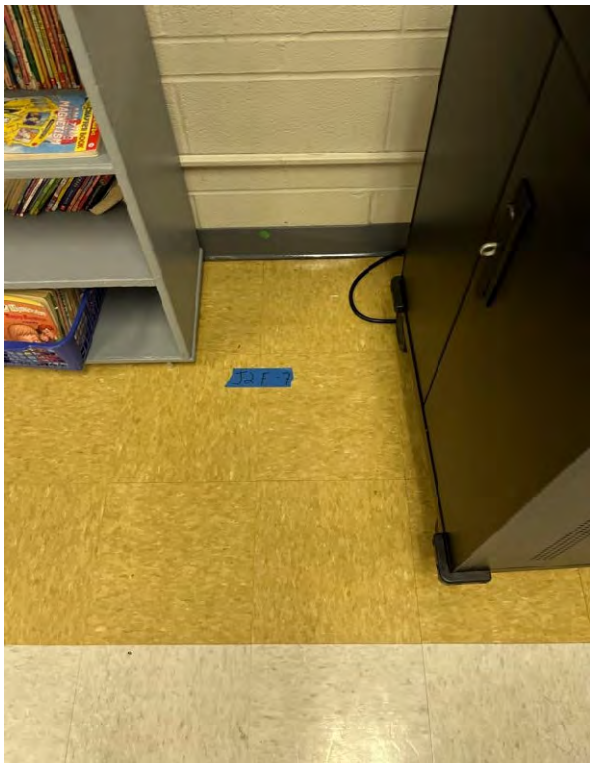
STSU-2 Random Location 2

STSU-2 Random Location 3

STSU-2 Random Location 4

STSU-2 Random Location 5

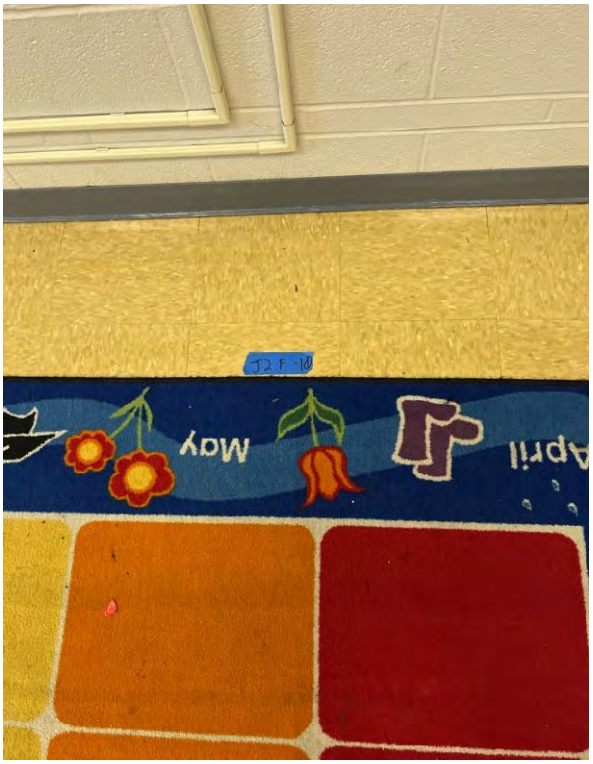
STSU-2 Random Location 6



STSU-2 Random Location 7

STSU-2 Random Location 8

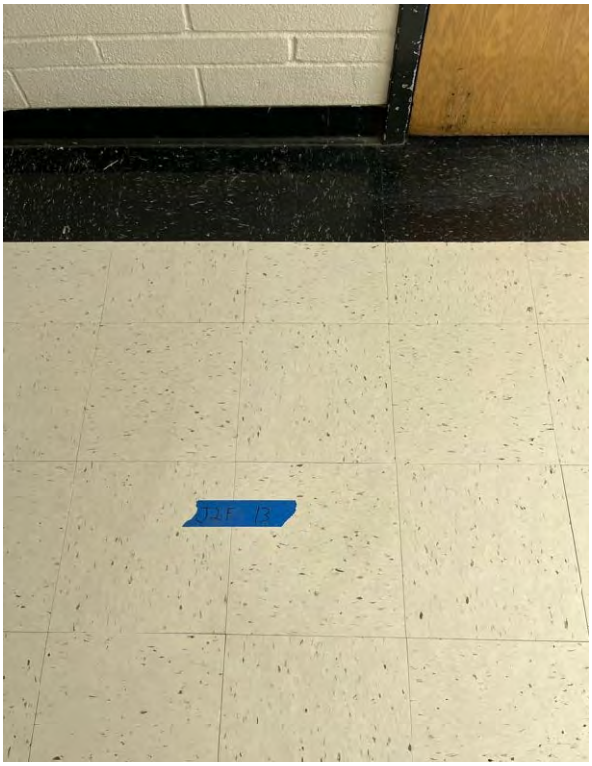
STSU-2 Random Location 9



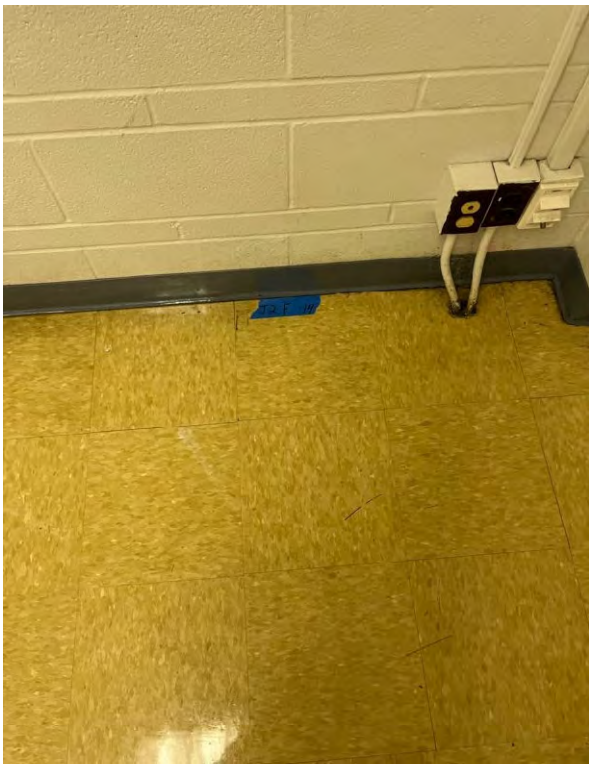

STSU-2 Random Location 10

STSU-2 Random Location 11

STSU-2 Random Location 12



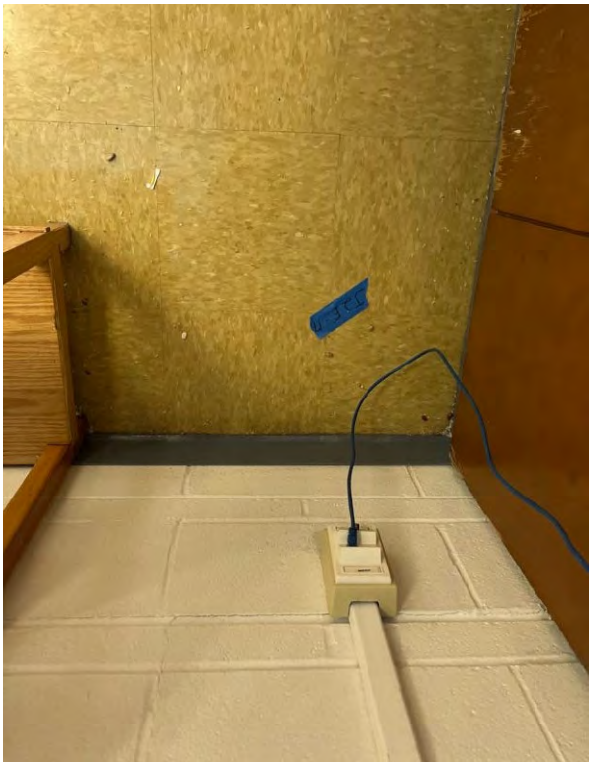
STSU-2 Random Location 13



STSU-2 Random Location 14

STSU-2 Random Location 15

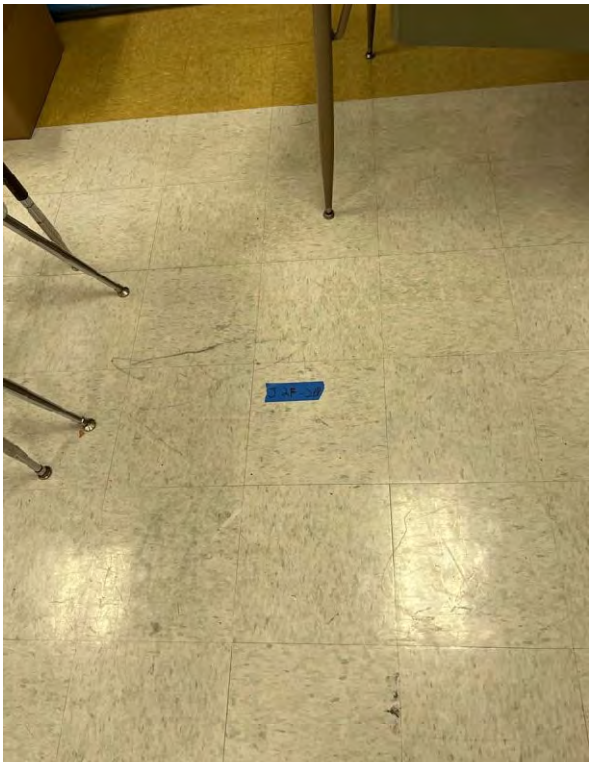
STSU-2 Random Location 16



STSU-2 Random Location 17

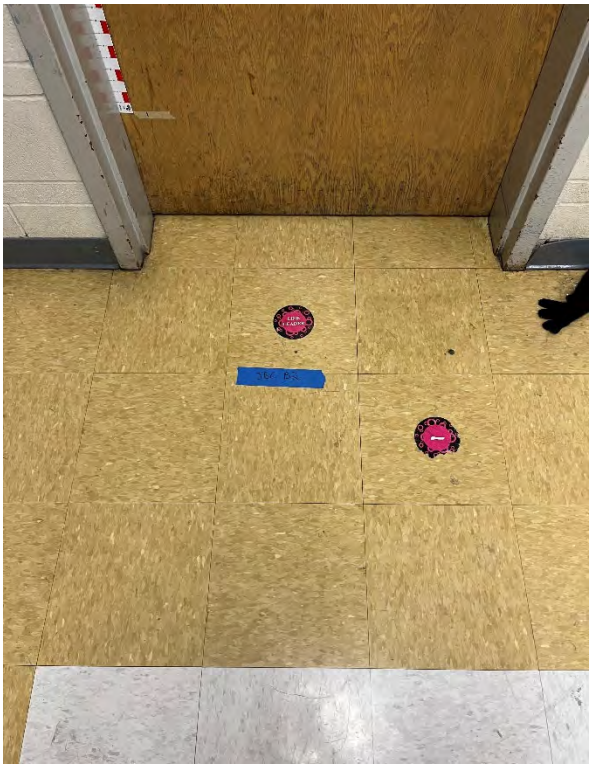
STSU-2 Random Location 18

STSU-2 Random Location 19



STSU-2 Random Location 20

STSU-2 Scan Survey Biased Location 1



STSU-2 Scan Survey Biased Location 2

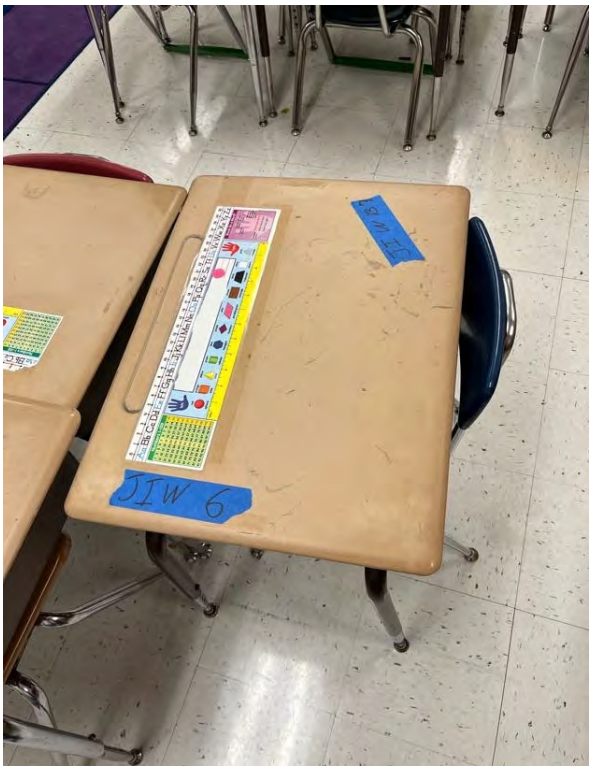
STSU-3 Random Location 1

STSU-3 Random Location 2


STSU-3 Random Location 3


STSU-3 Random Location 4

STSU-3 Random Location 5




STSU-3 Random Location 6


STSU-3 Random Location 7

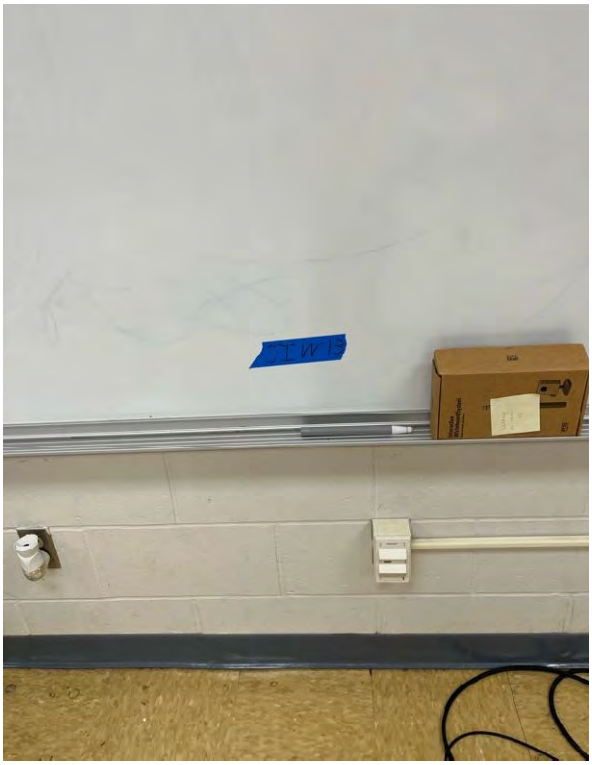

STSU-3 Random Location 8

STSU-3 Random Location 9

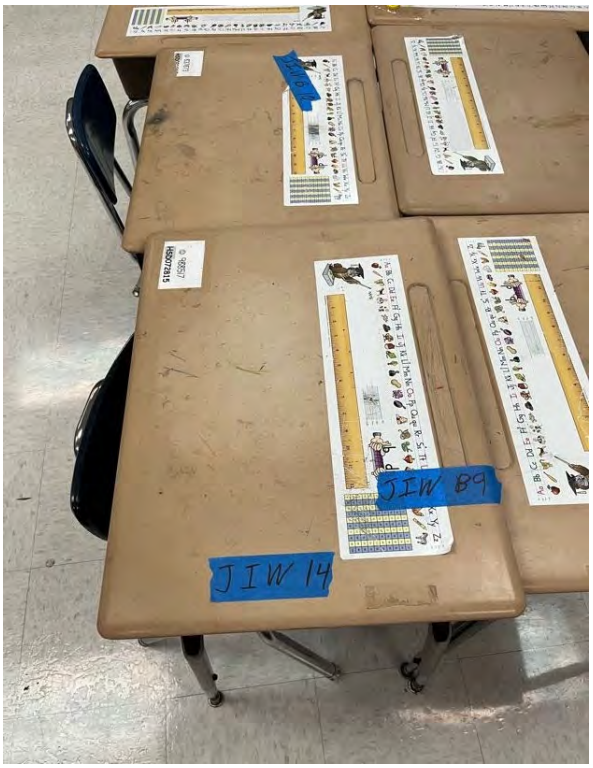
STSU-3 Random Location 10

STSU-3 Random Location 11

STSU-3 Random Location 12



STSU-3 Random Location 13



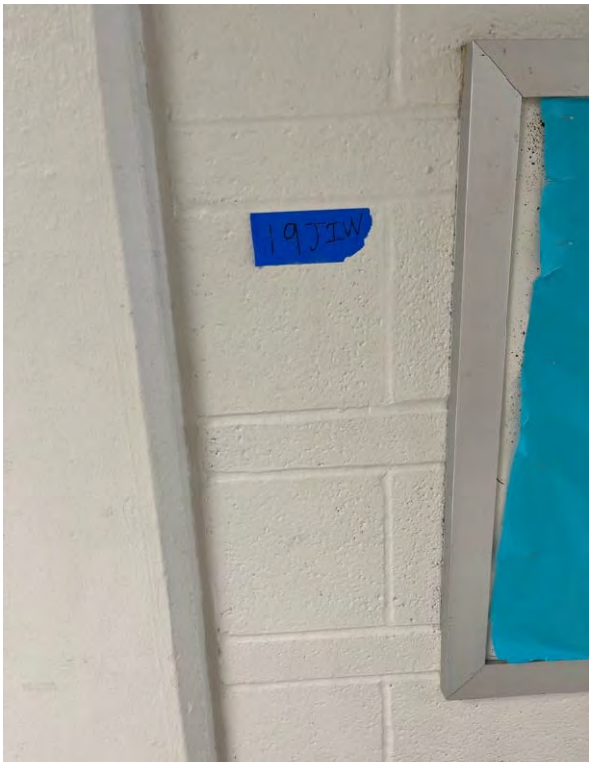

STSU-3 Random Location 14


STSU-3 Random Location 15

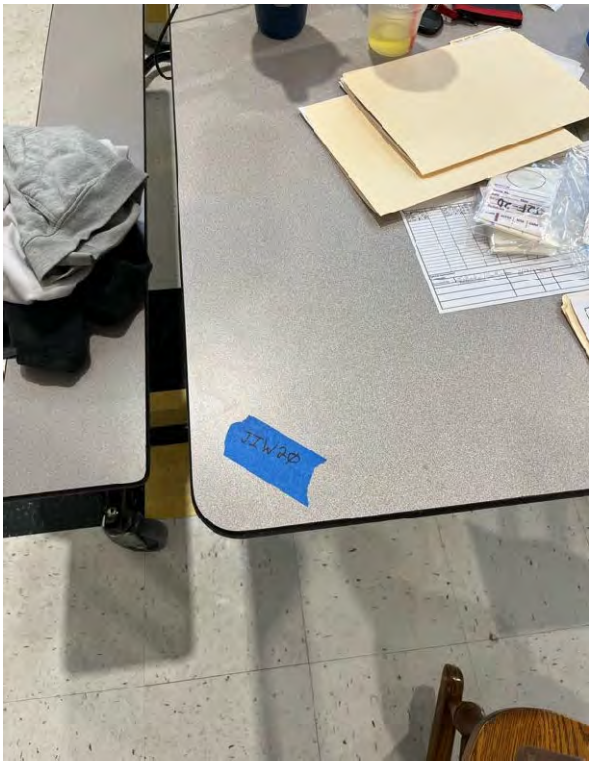

STSU-3 Random Location 16


STSU-3 Random Location 17

STSU-3 Random Location 18




STSU-3 Random Location 19



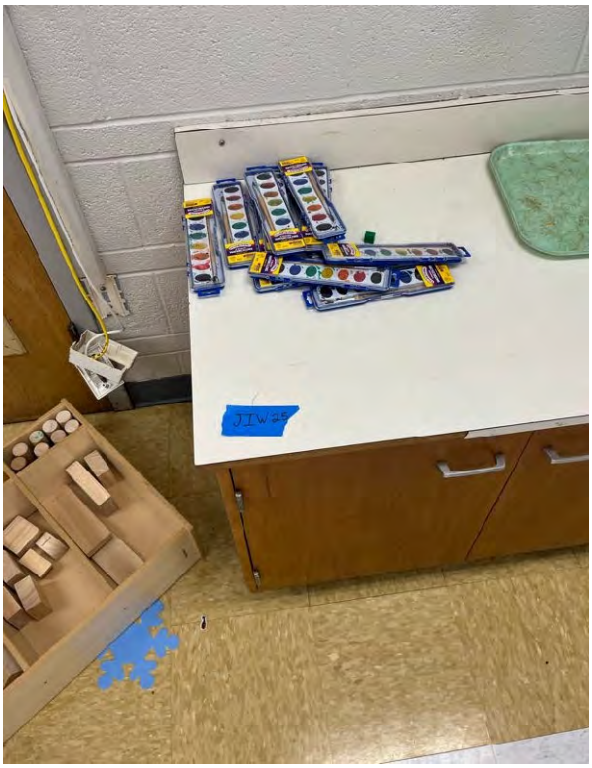

STSU-3 Random Location 20


STSU-3 Random Location 21

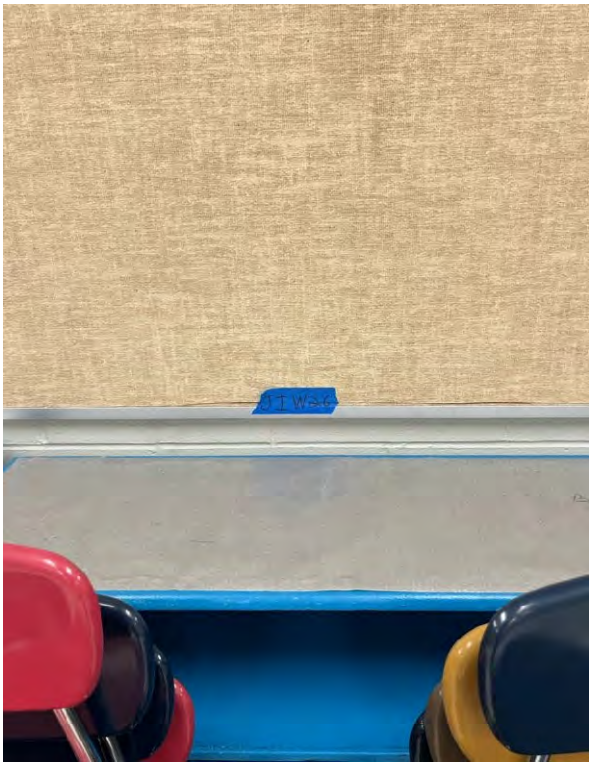

STSU-3 Random Location 22


STSU-3 Random Location 23

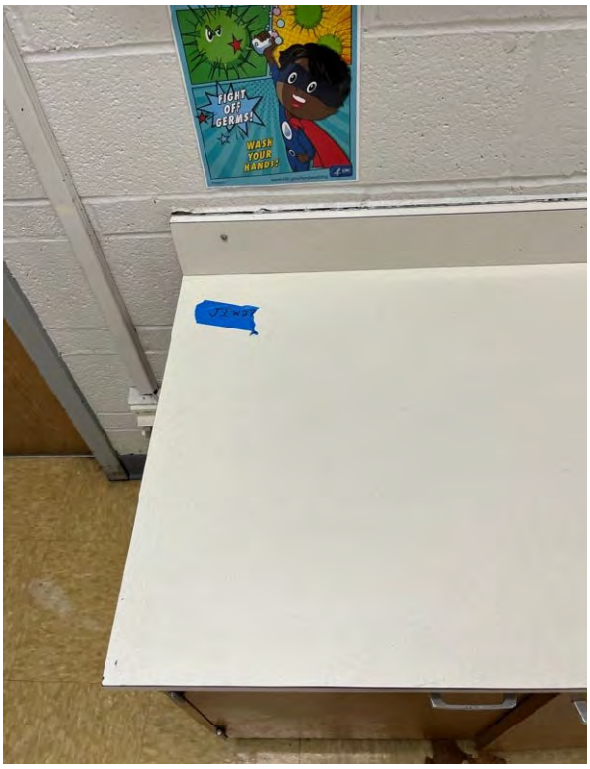

STSU-3 Random Location 24




STSU-3 Random Location 25

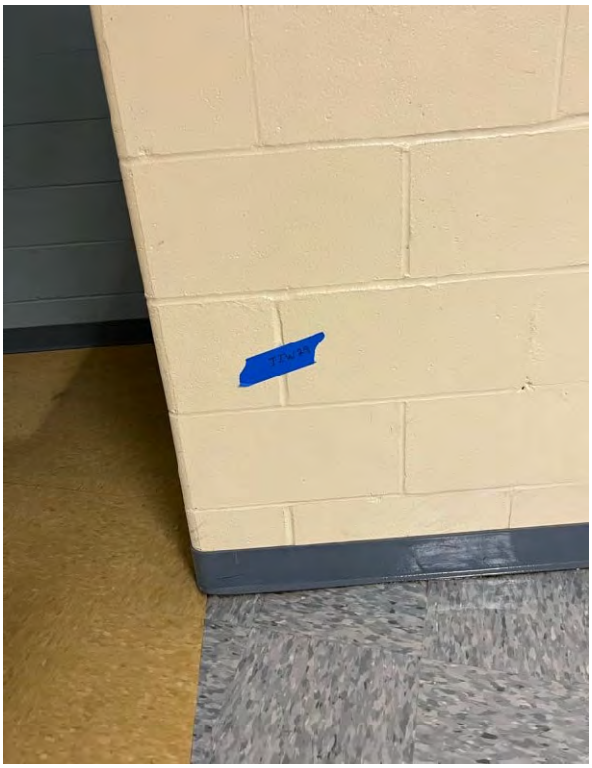


STSU-3 Random Location 26




STSU-3 Random Location 27

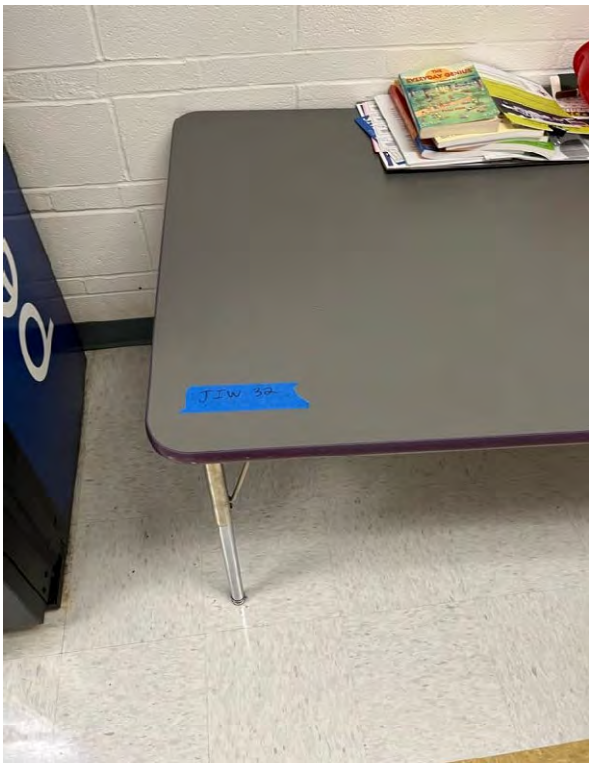
STSU-3 Random Location 28



STSU-3 Random Location 29

STSU-3 Random Location 30

STSU-3 Random Location 31



STSU-3 Random Location 32

STSU-3 Random Location 33


STSU-3 Random Location 34

STSU-3 Random Location 35

STSU-3 Random Location 36


STSU-3 Random Location 37


STSU-3 Random Location 38


STSU-3 Random Location 39

STSU-3 Random Location 40

STSU-3 Random Location 41

STSU-3 Random Location 42

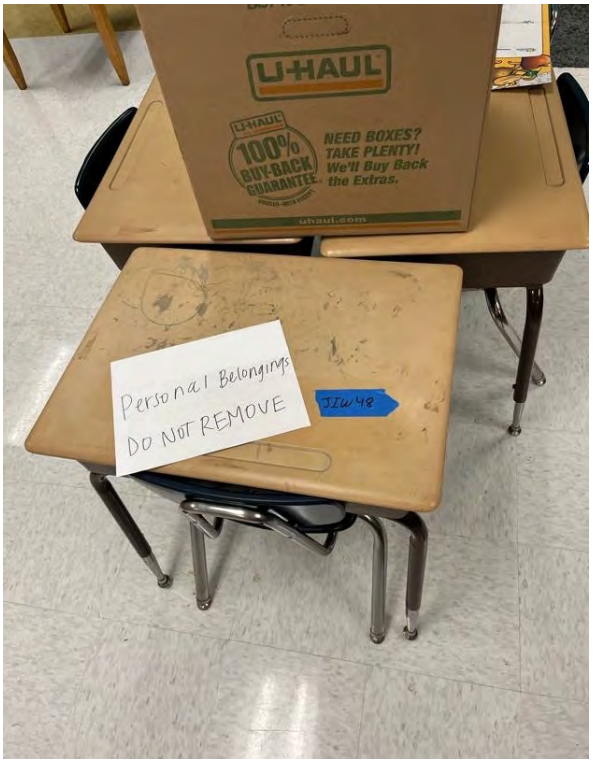

STSU-3 Random Location 43

STSU-3 Random Location 44


STSU-3 Random Location 45

STSU-3 Random Location 46

STSU-3 Random Location 47




STSU-3 Random Location 48

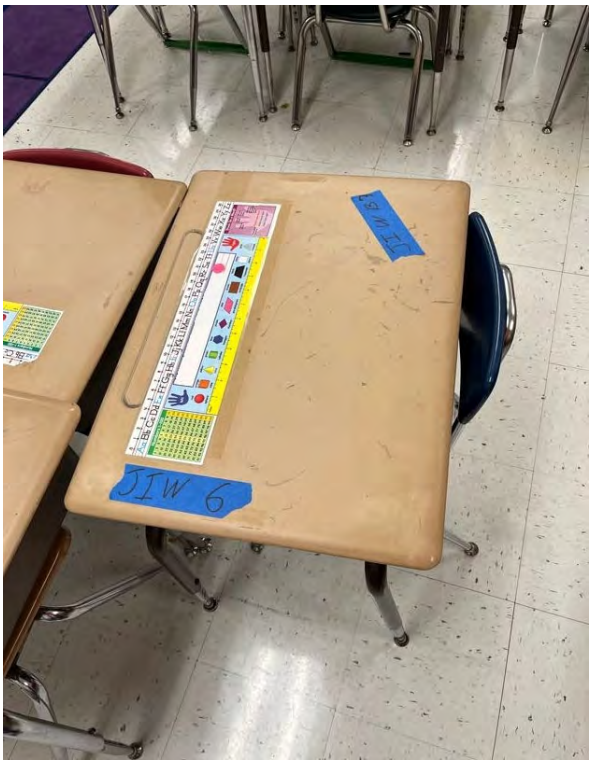
STSU-3 Random Location 49


STSU-3 Random Location 50


STSU-3 Scan Survey Biased Location 4

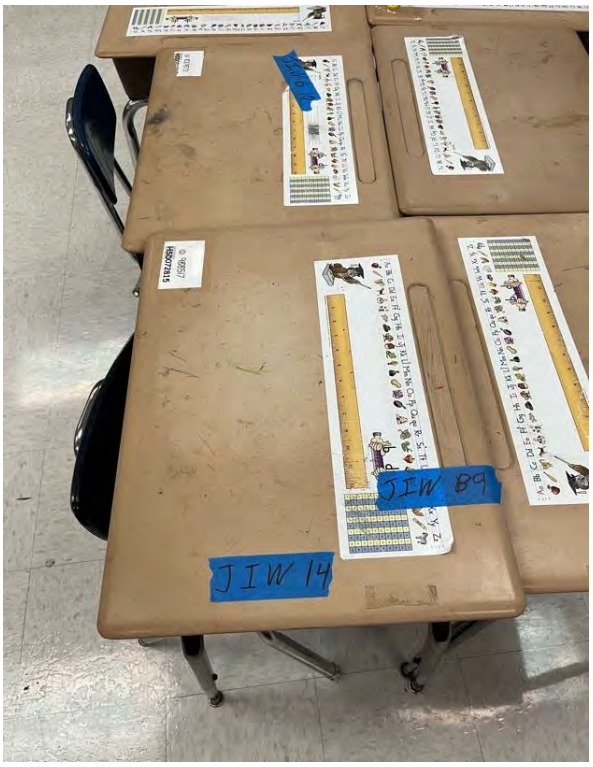

STSU-3 Scan Survey Biased Location 5


STSU-3 Scan Survey Biased Location 6

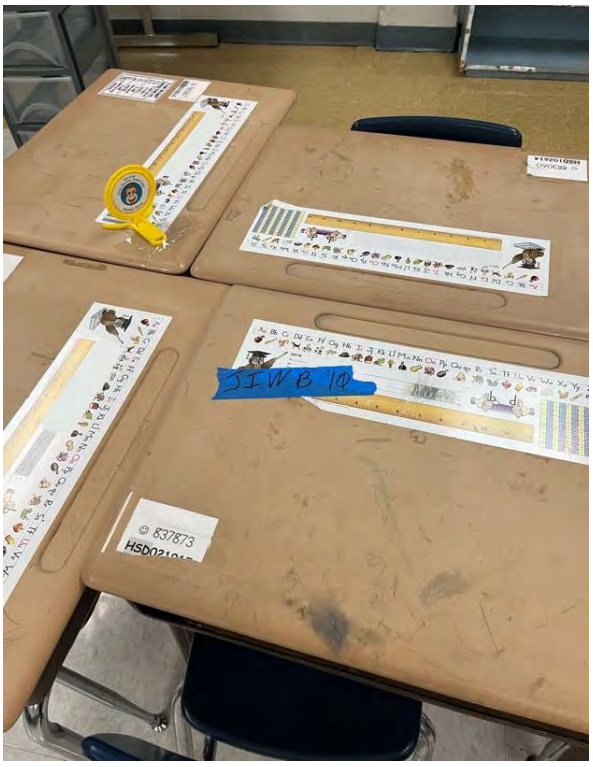



STSU-3 Scan Survey Biased Location 7

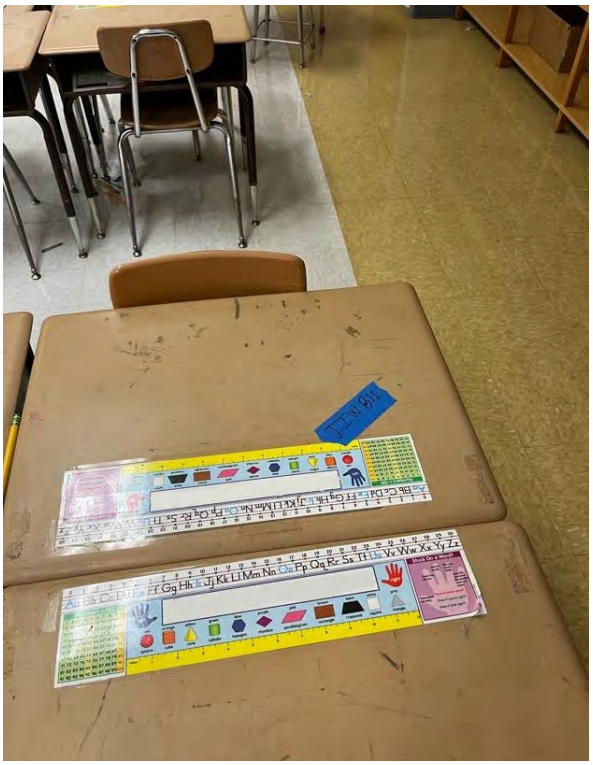
STSU-3 Scan Survey Biased Location 8




STSU-3 Scan Survey Biased Location 9

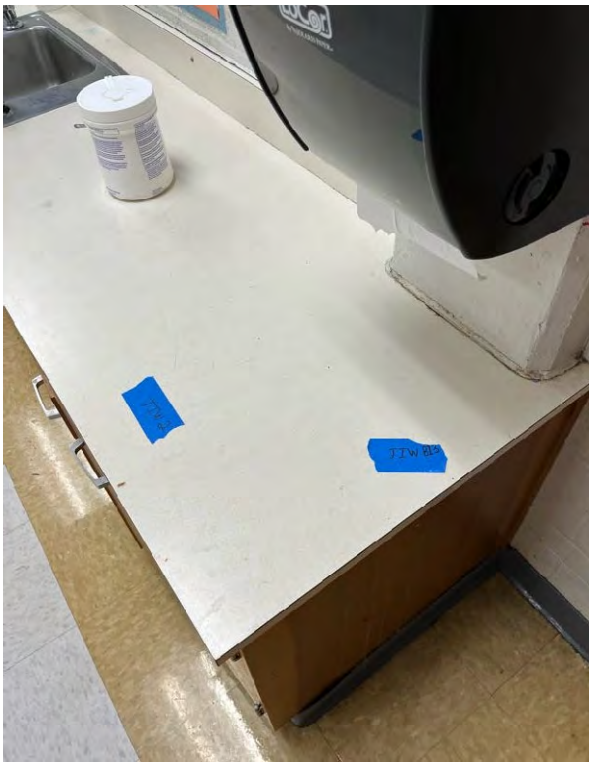



STSU-3 Scan Survey Biased Location 10



STSU-3 Scan Survey Biased Location 11

STSU-3 Scan Survey Biased Location 12



STSU-3 Scan Survey Biased Location 13

STSU-3 Scan Survey Biased Location 14


STSU-3 Surveyor Judgment Biased Location 24

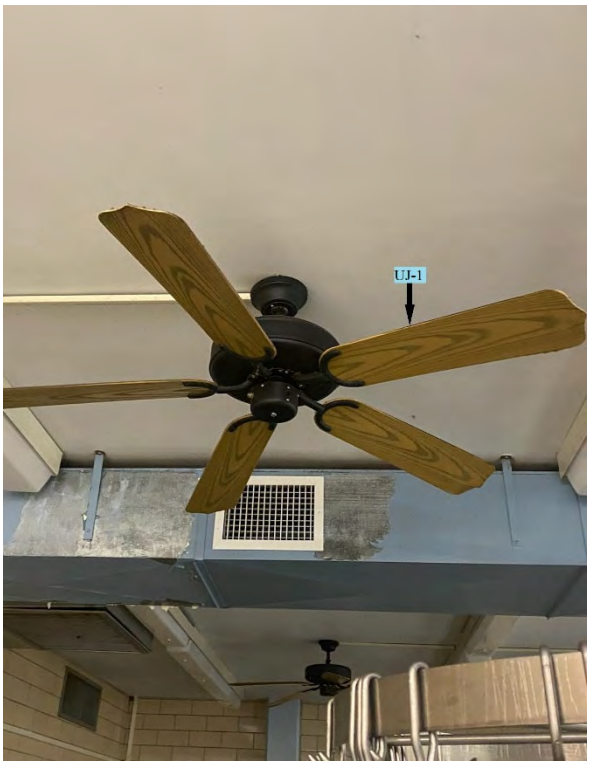

STSU-3 Surveyor Judgment Biased Location 25


STSU-3 Surveyor Judgment Biased Location 26

STSU-3 Surveyor Judgment Biased Location 27

STSU-3 Surveyor Judgment Biased Location 28

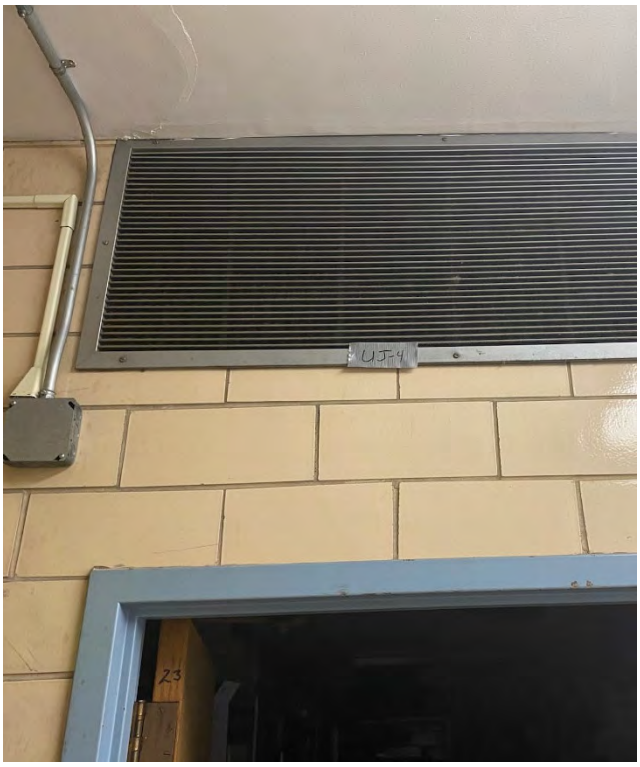

STSU-3 Surveyor Judgment Biased Location 29




STSU-3 USACE Selected Biased Location 1


STSU-3 USACE Selected Biased Location 2


STSU-3 USACE Selected Biased Location 3



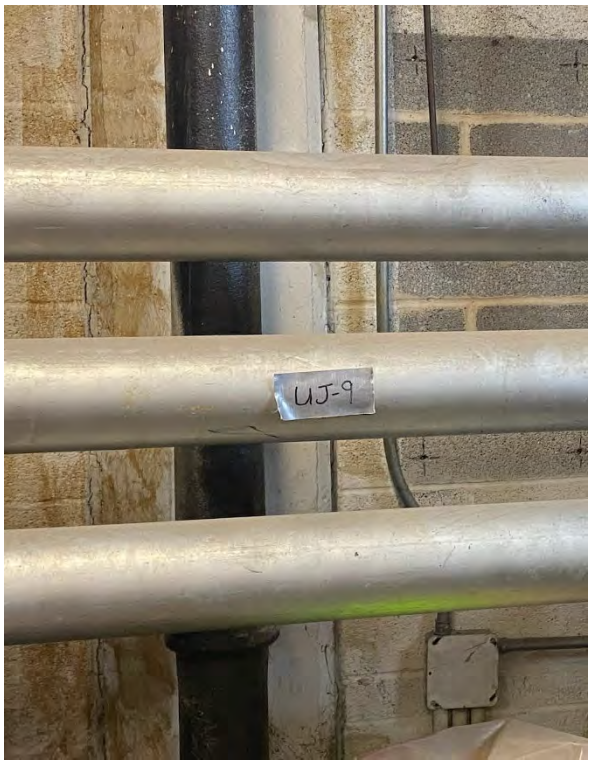

STSU-3 USACE Selected Biased Location 4


STSU-3 USACE Selected Biased Location 5

STSU-3 USACE Selected Biased Location 6


STSU-3 USACE Selected Biased Location 7


STSU-3 USACE Selected Biased Location 8




STSU-3 USACE Selected Biased Location 9


STSU-3 USACE Selected Biased Location 11


STSU-3 USACE Selected Biased Location 12

STSU-3 USACE Selected Biased Location 13

STSU-3 USACE Selected Biased Location 14

STSU-3 USACE Selected Biased Location 15


STSU-3 USACE Selected Biased Location 16

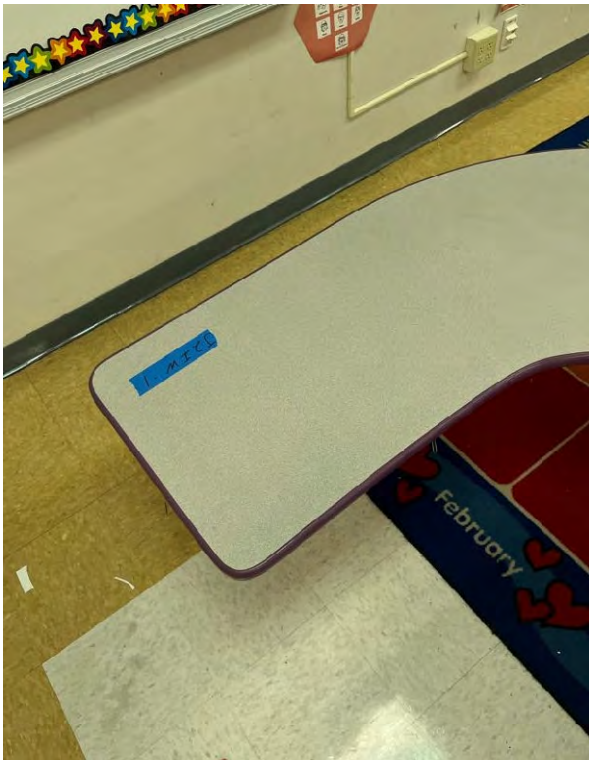

STSU-3 USACE Selected Biased Location 17


STSU-3 USACE Selected Biased Location 18

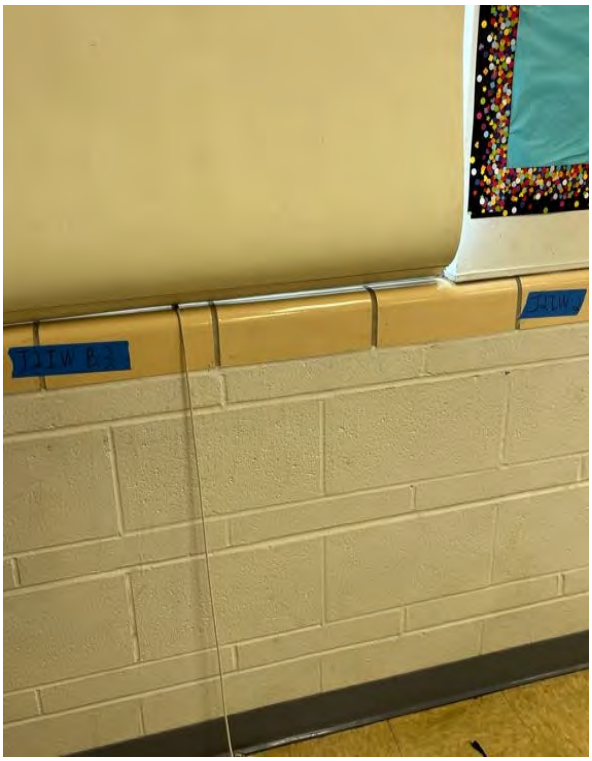

STSU-3 USACE Selected Biased Location 20


STSU-3 USACE Selected Biased Location 21


STSU-3 USACE Selected Biased Location 22




STSU-4 Random Location 1

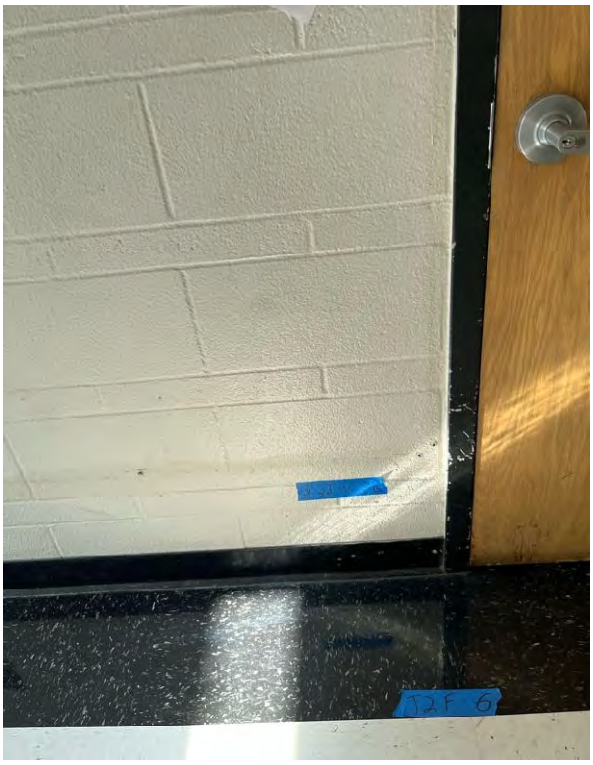


STSU-4 Random Location 2


STSU-4 Random Location 3

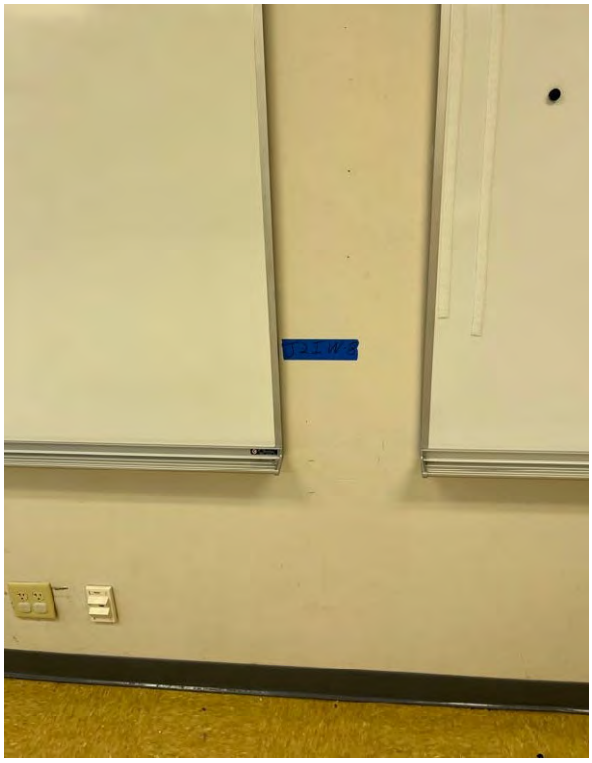

STSU-4 Random Location 4


STSU-4 Random Location 5




STSU-4 Random Location 6

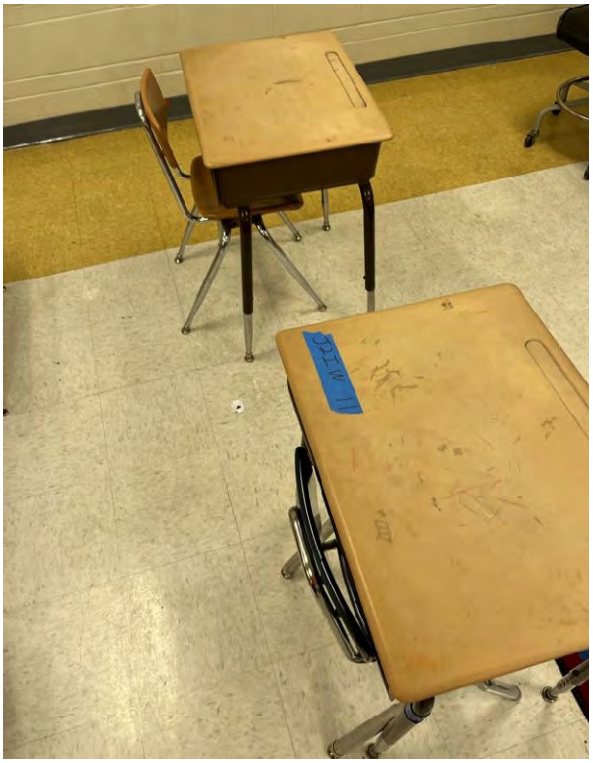
STSU-4 Random Location 7



STSU-4 Random Location 8

STSU-4 Random Location 9

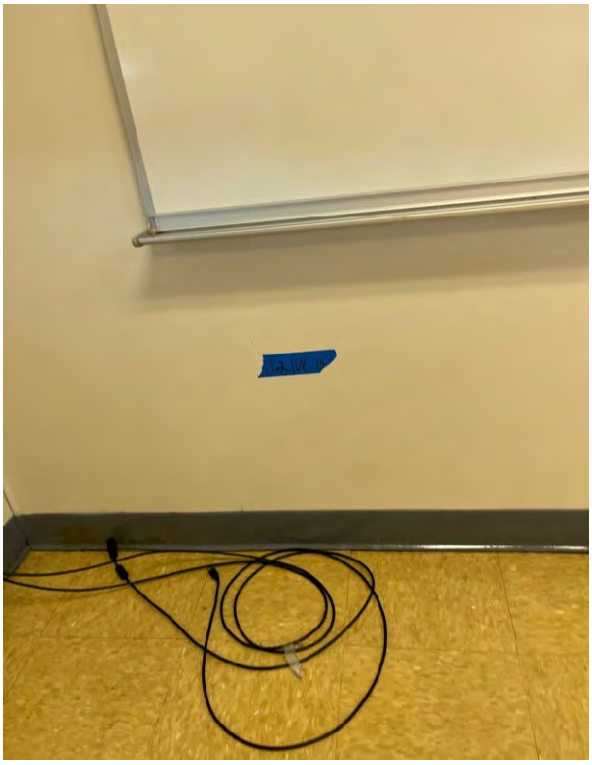
STSU-4 Random Location 10



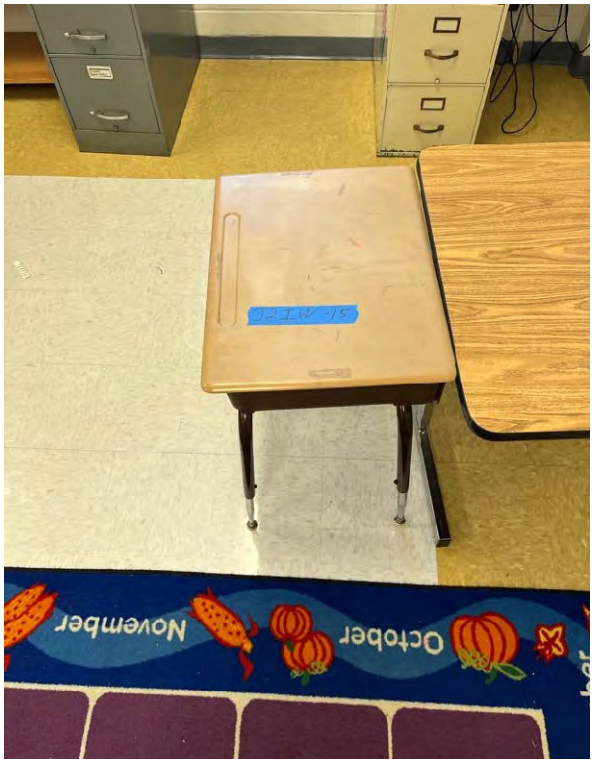
STSU-4 Random Location 11


STSU-4 Random Location 12

STSU-4 Random Location 13



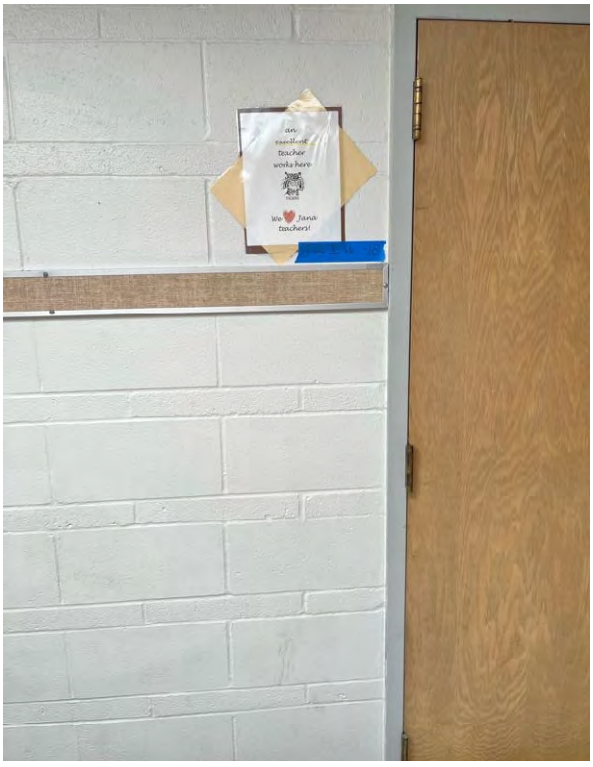
STSU-4 Random Location 14




STSU-4 Random Location 15

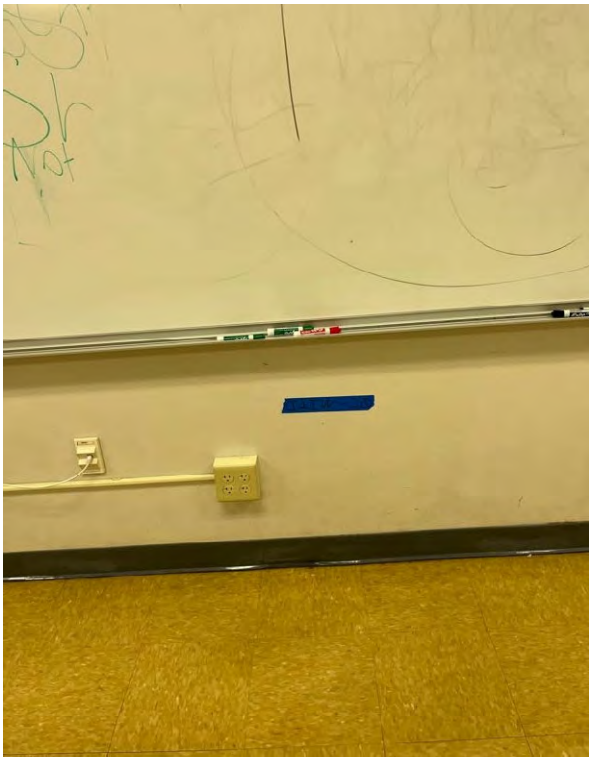

STSU-4 Random Location 16


STSU-4 Random Location 17



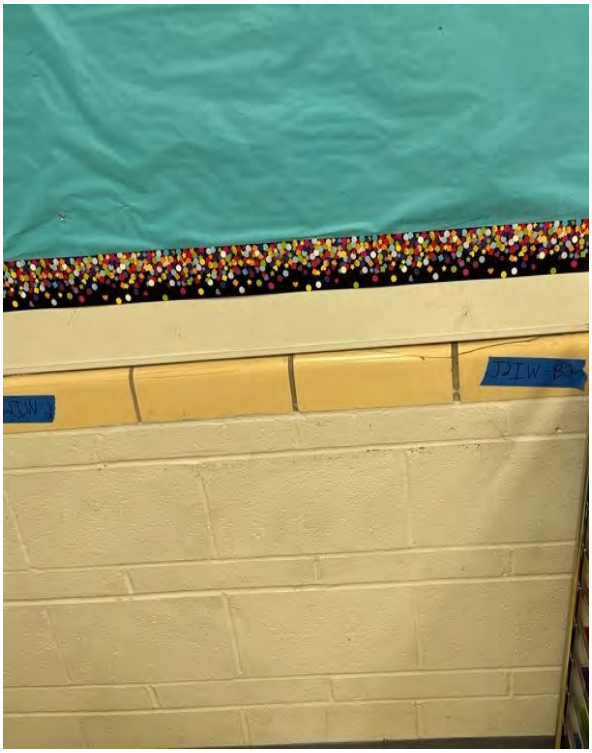
STSU-4 Random Location 18


STSU-4 Random Location 19

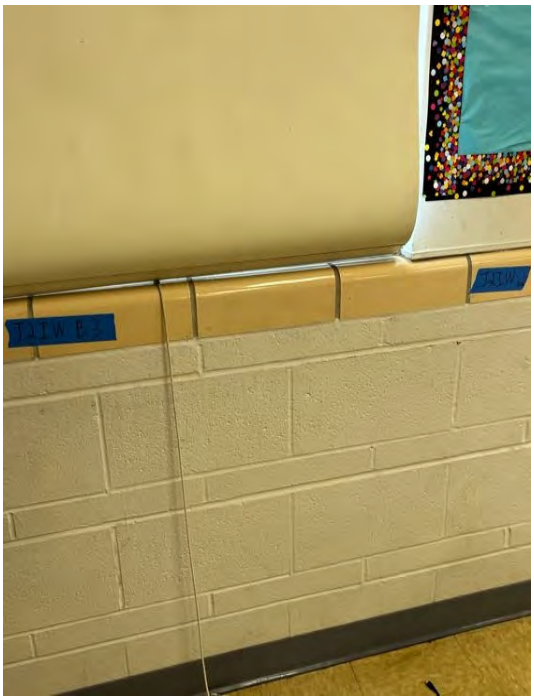


STSU-4 Random Location 20

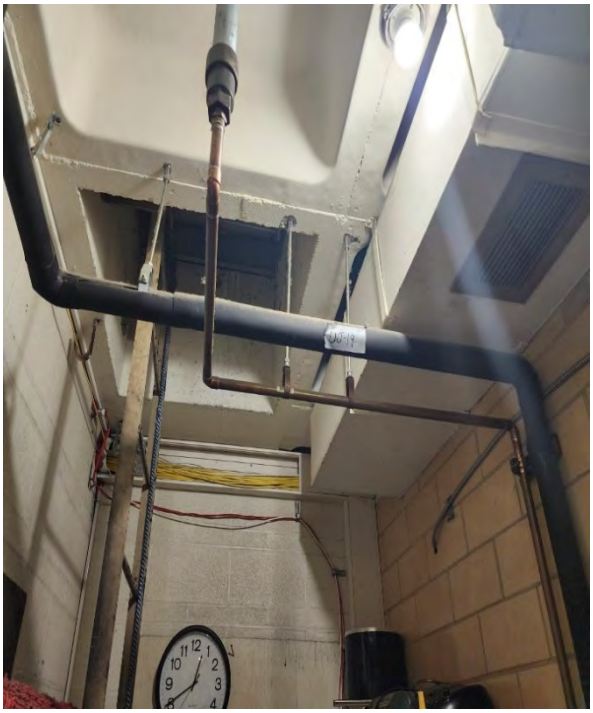
STSU-4 Scan Survey Biased Location 1



STSU-4 Scan Survey Biased Location 2



STSU-4 Scan Survey Biased Location 3



STSU-4 USACE Judgmental Biased Location 19

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# APPENDIX F

# EVALUATION OF FIXED-POINT AND SWIPE MEASUREMENTS BY CONSTRUCTION MATERIAL TYPES

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# Table F-1. Structure Surface Survey Data for Floor Materials

## Table F-1a. Summary Statistics

| Statistic | Fixed-Point Measurements | | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | Number Collected | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 124 | 53 | 52 | 262 | 2 | 0 | 124 | 0 |
| **Beta Activity** | 124 | 113 | 191 | 678 | 0 | 0 | 124 | 0 |
| **Lead-210** | -- | -- | -- | -- | -- | -- | 1 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

## Table F-1b. Data

| Location ID[a] | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha | Beta | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | Activity | Activity | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU1-1 | Tile Floor | 102 | 0 | JF-1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-2 | Carpet | 53 | 0 | JF-2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-3 | Tile Floor | 77 | 0 | JF-3 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-4 | Tile Floor | 41 | 383 | JF-4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-5 | Tile Floor | 53 | 0 | JF-5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-6 | Tile Floor | 77 | 0 | JF-6 | -0.12 | 0.03 | 5.97 | 5.12 | 5.35 | 7.03 | -- | -- | -- |
| STSU1-7 | Tile Floor | 28 | 0 | JF-7 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-8 | Tile Floor | 16 | 169 | JF-8 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-9 | Tile Floor | 187 | 187 | JF-9 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-10 | Tile Floor | 4 | 0 | JF-10 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-11 | Tile Floor | 53 | 0 | JF-11 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-12 | Tile Floor | 151 | 0 | JF-12 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-13 | Carpet | 0 | 0 | JF-13 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-14 | Tile Floor | 102 | 36 | JF-14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-15 | Carpet | 16 | 0 | JF-15 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-16 | Carpet | 41 | 0 | JF-16 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |

## Table F-1b. Data (Continued)

| Location ID[a] | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU1-17 | Tile Floor | 77 | 45 | JF-17 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU1-18 | Tile Floor | 65 | 18 | JF-18 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 | -- | -- | -- |
| STSU1-19 | Tile Floor | 16 | 0 | JF-19 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-20 | Tile Floor | 28 | 0 | JF-20 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-21 | Carpet | 28 | 0 | JF-21 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-22 | Tile Floor | 41 | 27 | JF-22 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-23 | Tile Floor | 126 | 357 | JF-23 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-24 | Tile Floor | 65 | 169 | JF-24 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-25 | Tile Floor | 138 | 214 | JF-25 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-26 | Carpet | 4 | 0 | JF-26 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-27 | Tile Floor | 102 | 0 | JF-27 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-28 | Tile Floor | 4 | 0 | JF-28 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU1-29 | Carpet | 28 | 0 | JF-29 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-30 | Tile Floor | 114 | 0 | JF-30 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU1-31 | Tile Floor | 16 | 0 | JF-31 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-32 | Tile Floor | 53 | 0 | JF-32 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-33 | Tile Floor | 151 | 0 | JF-33 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-34 | Tile Floor | 0 | 0 | JF-34 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-35 | Tile Floor | 53 | 508 | JF-35 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-36 | Tile Floor | 114 | 0 | JF-36 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-37 | Carpet | 102 | 0 | JF-37 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-38 | Tile Floor | 4 | 0 | JF-38 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-39 | Tile Floor | 28 | 0 | JF-39 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-40 | Tile Floor | 16 | 0 | JF-40 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-41 | Tile Floor | 90 | 0 | JF-41 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU1-42 | Tile Floor | 28 | 0 | JF-42 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-43 | Carpet | 16 | 0 | JF-43 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-44 | Tile Floor | 53 | 0 | JF-44 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-45 | Tile Floor | 16 | 0 | JF-45 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU1-46 | Carpet | 53 | 0 | JF-46 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-47 | Tile Floor | 53 | 0 | JF-47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |

## Table F-1b. Data (Continued)

| Location ID[a] | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU1-48 | Tile Floor | 28 | 0 | JF-48 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-49 | Tile Floor | 41 | 0 | JF-49 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-50 | Tile Floor | 53 | 0 | JF-50 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU1-B1 | Tile Floor | 126 | 37 | JF-B1 | 1.54 | 3.33 | 5.97 | 4.04 | 4.88 | 7.03 | -- | -- | -- |
| STSU1-B2 | Tile Floor | 189 | 584 | JF-B2 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU1-B3 | Tile Floor | 105 | 149 | JF-B3 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-B4 | Tile Floor | 101 | 420 | JF-B4 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-B5 | Tile Floor | 206 | 421 | JF-B5 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-B6 | Tile Floor | 248 | 388 | JF-B6 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 | -- | -- | -- |
| STSU1-B7 | Tile Floor | 28 | 0 | JF-B7 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| STSU1-B8 | Tile Floor | 56 | 255 | JF-B8 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| STSU1-B9 | Tile Floor | 101 | 0 | JF-B9 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| STSU1-B10 | Tile Floor | 76 | 0 | JF-B10 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B11 | Tile Floor | 76 | 112 | JF-B11 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-B12 | Tile Floor | 24 | 439 | JF-B12 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-B13 | Tile Floor | 140 | 0 | JF-B13 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B14 | Tile Floor | 262 | 676 | JF-B14 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-B15 | Tile Floor | 110 | 0 | JF-B15 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B16 | Tile Floor | 81 | 653 | JF-B16 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-B17 | Tile Floor | 0 | 0 | JF-B17 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B18 | Tile Floor | 26 | 0 | JF-B18 | 1.52 | 3.22 | 5.61 | 3.90 | 5.34 | 8.50 | -- | -- | -- |
| STSU1-B19 | Tile Floor | 0 | 53 | JF-B19 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B20 | Tile Floor | 15 | 0 | JF-B20 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-B21 | Carpet | 85 | 558 | JF-B21 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B22 | Tile Floor | 81 | 99 | JF-B22 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-B23 | Tile Floor | 93 | 264 | JF-B23 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU1-B24 | Tile Floor | 101 | 0 | JBC-B3 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-B25 | Tile Floor | 89 | 0 | JBC-B4 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-B26 | Tile Floor | 89 | 0 | JBC-B5 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-B27 | Tile Floor | 89 | 203 | JBC-B6 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-JB1 | Aluminium Threshold | 7 | 8 | IJ-B1 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |

## Table F-1b. Data (Continued)

| Location ID[a] | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU1-JB2 | Aluminium Threshold | 49 | 40 | IJ-B2 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB3 | Floor Tile | 0 | 0 | IJ-B3 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB4 | Carpet | 7 | 527 | IJ-B4 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB5 | Concrete | 59 | 407 | IJ-B5 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB6 | Concrete | 7 | 415 | IJ-B6 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| STSU1-JB7 | Concrete | 38 | 152 | IJ-B7 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-JB8 | Concrete | 17 | 192 | IJ-B8 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB9 | Concrete | 7 | 567 | IJ-B9 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB10 | Concrete | 38 | 503 | IJ-B10 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 | -- | -- | -- |
| STSU1-JB11 | Aluminium Threshold | 49 | 88 | IJ-B11 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-JB12 | Concrete | 38 | 391 | IJ-B12 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-JB13 | Aluminium Threshold | 28 | 0 | IJ-B13 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-JB14 | Concrete | 0 | 192 | IJ-B14 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU1-JB15 | Floor Tile | 0 | 335 | IJ-B15 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB16 | Floor Tile | 49 | 311 | IJ-B16 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 | -- | -- | -- |
| STSU1-JB17 | Floor Tile | 49 | 239 | IJ-B17 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-JB18 | Aluminium Threshold | 132 | 630 | IJ-B18 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB19 | Floor Tile | 28 | 678 | IJ-B19 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 | -- | -- | -- |
| STSU1-JB20 | Floor Tile | 0 | 0 | IJ-B20 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 | -- | -- | -- |
| STSU1-JB21 | Concrete | 38 | 0 | IJ-B21 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU1-JB22 | Floor Tile | 70 | 215 | IJ-B22 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU1-JB23 | Floor Tile | 17 | 0 | IJ-B23 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU1-UB10 | Floor Pit | 94 | 510 | UJ10 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 | -2.03 | 2.14 | 3.75 |
| STSU2-1 | Floor Tile | 17 | 0 | J2F-1 | 1.47 | 3.27 | 6.14 | -2.46 | 0.22 | 8.14 | -- | -- | -- |
| STSU2-2 | Floor Tile | 0 | 0 | J2F-2 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-3 | Floor Tile | 27 | 0 | J2F-3 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU2-4 | Floor Tile | 7 | 0 | J2F-4 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-5 | Floor Tile | 38 | 0 | J2F-5 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 | -- | -- | -- |
| STSU2-6 | Floor Tile | 7 | 0 | J2F-6 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU2-7 | Floor Tile | 38 | 0 | J2F-7 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-8 | Floor Tile | 0 | 0 | J2F-8 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |

## Table F-1b. Data (Continued)

| Location ID[a] | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU2-9 | Floor Tile | 7 | 0 | J2F-9 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-10 | Floor Tile | 7 | 0 | J2F-10 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU2-11 | Floor Tile | 7 | 0 | J2F-11 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 | -- | -- | -- |
| STSU2-12 | Floor Tile | 0 | 0 | J2F-12 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-13 | Floor Tile | 7 | 0 | J2F-13 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-14 | Floor Tile | 7 | 0 | J2F-14 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-15 | Floor Tile | 0 | 0 | J2F-15 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-16 | Floor Tile | 7 | 0 | J2F-16 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 | -- | -- | -- |
| STSU2-17 | Floor Tile | 0 | 0 | J2F-17 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-18 | Floor Tile | 27 | 0 | J2F-18 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-19 | Floor Tile | 7 | 0 | J2F-19 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU2-20 | Floor Tile | 7 | 0 | J2F-20 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU2-B1 | Floor Tile | 31 | 0 | JBC-B1 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 | -- | -- | -- |
| STSU2-B2 | Floor Tile | 66 | 47 | JBC-B2 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 | -- | -- | -- |
| STSU7-1a | Rubber Mat | 35 | 322 | JA-1a | -0.17 | 0.04 | 6.14 | 8.07 | 6.69 | 8.14 | -- | -- | -- |

[a] Location ID is the STSU number followed by the location within that STSU.

Notes:

-- indicates data not available or not applicable.

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-2. Structure Survey Data for Interior Walls and Equipment Made of Brick, Ceramics, Tile, or Concrete

### Table F-2a. Summary Statistics

| Statistic | Fixed-Point Measurements | | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | Number Collected | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 29 | 91 | 70 | 295 | 0 | 0 | 29 | 0 |
| **Beta Activity** | 29 | 785 | 912 | 2,973 | 0 | 0 | 29 | 0 |
| **Lead-210** | -- | -- | -- | -- | -- | -- | 1 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-2b. Data

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU3-5 | 5 | Cinder Block Wall | 98 | 437 | JIW-5 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-7 | 6 | Cinder Block Wall | 24 | 178 | JIW-7 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-8 | 1 | Painted Concrete Pilar | 61 | 0 | JIW-8 | 1.54 | 3.33 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-12 | 5 | Cinder Block Wall | 134 | 143 | JIW-12 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-19 | 5.5 | Cinder Block Wall | 61 | 0 | JIW-19 | 1.54 | 3.33 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-28 | 2 | Cinder Block Wall | 98 | 606 | JIW-28 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 | -- | -- | -- |
| STSU3-29 | 2.5 | Cinder Block Wall | 85 | 223 | JIW-29 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-30 | 1 | Brick Wall | 61 | 1,310 | JIW-30 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-31 | 5.5 | Painted Concrete Pilar | 37 | 0 | JIW-31 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU3-35 | 2.5 | Cinder Block Wall | 49 | 205 | JIW-35 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-37 | 2 | Painted Cinder Block | 110 | 223 | JIW-37 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU3-38 | 3.5 | Painted Cinder Block | 37 | 348 | JIW-38 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-41 | 1 | Cinder Block Wall | 110 | 107 | JIW-41 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-42 | 3 | Cinder Block Wall | 49 | 464 | JIW-42 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-43 | 2 | Tile Wall | 220 | 1,578 | JIW-43 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-45 | 0.5 | Cinder Block Wall | 37 | 0 | JIW-45 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |

## Table F-2b. Data (Continued)

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha | Beta | | Alpha | | | Beta | | | Lead-210 | | |
| | | | Activity | Activity | Swipe ID | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU3-49 | 1 | Ceramic Tile | 195 | 2,344 | JIW-49 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-B12 | 1 | Cinder Block Wall | 70 | 0 | JIW-B12 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-B14 | 2 | Tile Wall | 164 | 1,907 | JIW-B14 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -- | -- | -- |
| STSU3-JB24 | -- | Ceramic Sink | 76 | 0 | IJ-B24 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU3-UB2 | -- | Ceramic Tile on Wall | 75 | 2,973 | UJ2 | 1.52 | 3.22 | 5.61 | 4.99 | 5.77 | 8.50 | -2.82 | 2.26 | 4.00 |
| STSU4-2 | 3.0 | Ceramic Wall Tile | 192 | 2,146 | J2IW-2 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-6 | 1.0 | Cinder Block Wall | 27 | 242 | J2IW-6 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU4-13 | 2.0 | Brick Wall | 58 | 1,369 | J2IW-13 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU4-16 | 4.0 | Painted Concrete Wall | 38 | 0 | J2IW-16 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU4-18 | 5.0 | Cinder Block Wall | 0 | 176 | J2IW-18 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU4-B1 | 3.5 | Brick Wall | 16 | 1,621 | J2IW-B1 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU4-B2 | 3.0 | Ceramic Wall Tile | 295 | 1,999 | J2IW-B2 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU4-B3 | 3.0 | Ceramic Wall Tile | 172 | 2,168 | J2IW-B3 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |

[a] Location ID is the STSU number followed by the location within that STSU.

Notes:

-- indicates data not available or not applicable.

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-3. Structure Survey Data for Interior Walls and Equipment Made of Other Materials

### Table F-3a. Summary Statistics

| Statistic | Fixed-Point Measurements | | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | Number Collected | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 82 | 68 | 48 | 208 | 0 | 0 | 82 | 0 |
| **Beta Activity** | 82 | 118 | 210 | 830 | 1 | 0 | 82 | 0 |
| **Lead-210** | -- | -- | -- | -- | -- | -- | 17 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-3b. Data

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | | Lead-210 | | |
| | | | | | | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU3-UB15 | -- | Air Conditioner | 152 | 85 | UJ15 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -1.48 | 2.15 | 3.75 |
| STSU3-UB4 | -- | Air Vent | 36 | 71 | UJ4 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 | -2.22 | 2.13 | 3.75 |
| STSU3-UB14 | -- | Basketball Hoop Frame | 114 | 418 | UJ14 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -2.22 | 2.20 | 3.86 |
| STSU3-17 | 1.5 | Book Shelf | 134 | 0 | JIW-17 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-50 | 3 | Book Shelf | 73 | 53 | JIW-50 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-UB12 | -- | Cleaning Equipment | 45 | 255 | UJ12 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -2.31 | 2.05 | 3.62 |
| STSU3-UB6 | -- | Conduit Pipe | 65 | 78 | UJ6 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -1.88 | 1.97 | 3.46 |
| STSU3-2 | 4.5 | Counter Top | 147 | 0 | JIW-2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-16 | 1 | Counter Top | 85 | 0 | JIW-16 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-25 | 2 | Counter Top | 98 | 0 | JIW-25 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-27 | 2.5 | Counter Top | 73 | 0 | JIW-27 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU3-B13 | 2.5 | Counter Top | 122 | 0 | JIW-B13 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-26 | 3 | Bulletin Board | 37 | 0 | JIW-26 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 | -- | -- | -- |
| STSU3-4 | 2 | Desk | 61 | 0 | JIW-4 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU3-14 | 2.5 | Desk | 37 | 0 | JIW-14 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-15 | 4 | Desk | 122 | 0 | JIW-15 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |

## Table F-3b. Data (Continued)

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha | Beta | | Alpha | | | Beta | | | Lead-210 | | |
| | | | Activity | Activity | Swipe ID | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU3-24 | 3 | Desk | 61 | 0 | JIW-24 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-34 | 1 | Desk | 85 | 392 | JIW-34 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-39 | 3 | Desk | 73 | 0 | JIW-39 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-40 | 2.5 | Desk | 61 | 0 | JIW-40 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-48 | 2.5 | Desk | 73 | 0 | JIW-48 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU4-1 | 2.5 | Desk | 17 | 0 | J2IW-1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-5 | 2.5 | Desk | 17 | 0 | J2IW-5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU4-11 | 2.5 | Desk | 7 | 0 | J2IW-11 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-15 | 2.5 | Desk | 0 | 0 | J2IW-15 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU4-17 | 2.5 | Desk | 0 | 220 | J2IW-17 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-3 | 3.0 | Desk Top | 24 | 80 | JIW-3 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-6 | 2.5 | Desk Top | 73 | 0 | JIW-6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-B4 | 2.5 | Desk Top | 133 | 0 | JIW-B4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-B5 | 2.5 | Desk Top | 206 | 0 | JIW-B5 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU3-B6 | 2.5 | Desk Top | 70 | 0 | JIW-B6 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-B7 | 2.5 | Desk Top | 101 | 0 | JIW-B7 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-44 | 0.5 | Door Frame | 122 | 357 | JIW-44 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-13 | 3 | Dry Erase Board | 73 | 579 | JIW-13 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-9 | 1 | Drywall | 73 | 0 | JIW-9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-18 | 1 | Drywall | 37 | 0 | JIW-18 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-36 | 6 | Drywall | 61 | 0 | JIW-36 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU4-8 | 3 | Drywall | 7 | 0 | J2IW-8 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU4-9 | 4 | Drywall | 48 | 0 | J2IW-9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-14 | 2 | Drywall | 7 | 0 | J2IW-14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-20 | 2 | Drywall | 27 | 0 | J2IW-20 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-UB22 | -- | Exhaust Fan | 63 | 0 | JIW-B3 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-UB3 | -- | Exterior Kitchen Door Ledge | 7 | 78 | UJ3 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 | -3.75 | 2.18 | 3.91 |
| STSU3-UB8 | -- | Filter | 133 | 687 | UJ8 | 4.87 | 5.77 | 5.97 | -0.32 | 2.18 | 7.03 | -2.14 | 2.17 | 3.80 |
| STSU3-UB1 | -- | Kitchen Fan Blade | 55 | 71 | UJ1 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 | -1.97 | 1.85 | 3.24 |
| STSU3-JB25 | -- | Metal bench | 35 | 0 | IJ-B25 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |

## Table F-3b. Data (Continued)

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha | Beta | | Alpha | | | Beta | | | Lead-210 | | |
| | | | Activity | Activity | Swipe ID | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU3-11 | 3.5 | Metal Cabinet | 85 | 0 | JIW-11 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-B8 | 1 | Metal Cabinet | 154 | 0 | JIW-B8 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-JB27 | -- | Metal Countertop | 35 | 447 | IJ-B27 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 | -- | -- | -- |
| STSU3-JB28 | -- | Metal Countertop | 24 | 830 | IJ-B28 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-JB26 | -- | Metal Pipe | 108 | 670 | IJ-B26 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-JB29 | -- | Oven | 35 | 567 | IJ-B29 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |
| STSU3-UB9 | -- | Pipes | 65 | 50 | UJ9 | -0.12 | 0.03 | 5.97 | 5.12 | 5.35 | 7.03 | -1.91 | 2.22 | 3.89 |
| STSU3-23 | 2.5 | Plastic Desk | 73 | 0 | JIW-23 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 | -- | -- | -- |
| STSU3-B9 | 2.5 | Plastic Desk | 80 | 0 | JIW-B9 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 | -- | -- | -- |
| STSU3-B10 | 2.5 | Plastic Desk | 101 | 0 | JIW-B10 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-B11 | 2.5 | Plastic Desk | 80 | 0 | JIW-B11 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU3-1 | 2.5 | Plastic Table | 183 | 0 | JIW-1 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-47 | 2 | Power Strip | 85 | 0 | JIW-47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-UB20 | -- | Refrigerator | 0 | 0 | JIW-B1 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-UB21 | -- | Refrigerator | 83 | 455 | JIW-B2 | 3.21 | 4.71 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU3-UB5 | -- | Refrigerator Top | 84 | 304 | UJ5 | 4.74 | 5.59 | 5.61 | 7.17 | 6.55 | 8.50 | -2.49 | 2.08 | 3.69 |
| STSU3-UB16 | -- | Sink | 45 | 0 | UJ16 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -4.00 | 2.44 | 4.35 |
| STSU3-22 | 3.5 | Stainless Steel Table | 208 | 0 | JIW-22 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 | -- | -- | -- |
| STSU3-46 | 2.5 | Table | 98 | 0 | JIW-46 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-4 | 2.5 | Table | 27 | 0 | J2IW-4 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -- | -- | -- |
| STSU3-20 | 3 | Table Top | 24 | 0 | JIW-20 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU3-32 | 1.5 | Table Top | 98 | 0 | JIW-32 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-UB18 | -- | Top of Vent | 55 | 0 | UJ18 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -1.20 | 2.08 | 3.62 |
| STSU3-UB13 | -- | Vent | 114 | 545 | UJ13 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -2.60 | 2.15 | 3.80 |
| STSU3-UB17 | -- | Vent | 36 | 241 | UJ17 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 | -0.96 | 2.12 | 3.66 |
| STSU4-UB19 | -- | Vent | 26 | 637 | UJ19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -0.75 | 2.21 | 3.80 |
| STSU3-10 | 1.5 | Wall | 37 | 544 | JIW-10 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU3-UB7 | -- | Water Heater | 55 | 0 | UJ7 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -2.93 | 2.20 | 3.91 |
| STSU3-UB11 | -- | Water Heater | 143 | 106 | UJ11 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 | -0.52 | 2.16 | 3.71 |
| STSU3-33 | 3 | Wood Cabinet | 37 | 0 | JIW-33 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 | -- | -- | -- |
| STSU3-21 | 3.5 | Wood Shelf | 73 | 0 | JIW-21 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 | -- | -- | -- |

## Table F-3b. Data (Continued)

| Location ID[a] | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Alpha | Beta | | Alpha | | | Beta | | | Lead-210 | | |
| | | | Activity | Activity | Swipe ID | Activity | Error | MDC | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | | | | |
| STSU4-3 | 3 | Wood Shelf | 0 | 0 | J2IW-3 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 | -- | -- | -- |
| STSU4-7 | 2 | Wood Shelf | 58 | 249 | J2IW-7 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU4-10 | 3 | Wood Shelf | 7 | 425 | J2IW-10 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |
| STSU4-12 | 5 | Wood Shelf | 0 | 205 | J2IW-12 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 | -- | -- | -- |
| STSU4-19 | 3 | Wood Shelf | 17 | 0 | J2IW-19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 | -- | -- | -- |

[a] Location ID is the STSU number followed by the location within that STSU.

Notes:

-- indicates data not available or not applicable.

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-4. Structure Survey Data for Exterior Walls

### Table F-4a. Summary Statistics

| Statistic | Fixed-Point Measurements | | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | Number Collected | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 57 | 35 | 27 | 97 | 0 | 0 | 57 | 0 |
| **Beta Activity** | 57 | 1,095 | 596 | 2,308 | 0 | 0 | 57 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-4b. Data

| Location ID[a] | Easting | Northing | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU5-1 | 871957.5 | 1085909.7 | 1.5 | Brick Wall | 81 | 1,277 | JEW1 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU5-2 | 871948.7 | 1085907.4 | 0.5 | Brick Wall | 30 | 1,621 | JEW2 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU5-3 | 871934.9 | 1085916.9 | 5.5 | Brick Wall | 71 | 1,713 | JEW3 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU5-4 | 871921.6 | 1085898.5 | 2 | Brick Wall | 32 | 1,373 | JEW4 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU5-5 | 871918.7 | 1085894.4 | 0.5 | Brick Wall | 37 | 1,345 | JEW5 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU5-6 | 871912.3 | 1085885.5 | 2.5 | Brick Wall | 52 | 1,447 | JEW6 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU5-7 | 871901.7 | 1085871.1 | 5.5 | Glass Window | 37 | 0 | JEW7 | 1.52 | 3.22 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU5-8 | 871897.4 | 1085866.0 | 6 | Brick Wall | 32 | 1,423 | JEW8 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU5-9 | 871915.6 | 1085852.4 | 5 | Brick Wall | 32 | 1,473 | JEW9 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU5-10 | 871935.1 | 1085838.1 | 4.5 | Brick Wall | 26 | 0 | JEW10 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU5-11 | 871969.5 | 1085855.7 | 6 | Brick Wall | 23 | 1,742 | JEW11 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU5-12 | 871963.7 | 1085847.4 | 6 | Brick Wall | 97 | 1,513 | JEW12 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU5-13 | 871977.4 | 1085893.7 | 2 | Brick Wall | 48 | 1,535 | JEW13 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| STSU5-14 | 872020.3 | 1085923.1 | 3 | Grey Brick Wall | 13 | 2,308 | JEW14 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU5-15 | 872027.7 | 1085934.2 | 5 | Glass Window | 4 | 0 | JEW15 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU5-16 | 872060.0 | 1085976.2 | 0.5 | Brick Wall | 8 | 1,290 | JEW16 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| STSU5-17 | 872064.3 | 1085982.2 | 1.5 | Grey Brick Wall | 48 | 2,143 | JEW17 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU5-18 | 872098.8 | 1086028.0 | 2 | Brick Wall | 32 | 1,529 | JEW18 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |

## Table F-4b. Data (Continued)

| Location ID[a] | Easting | Northing | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Alpha | Beta | Swipe ID | Alpha | | | Beta | | |
| | | | | | Activity | Activity | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU5-19 | 872131.5 | 1086072.4 | 0.5 | Concrete Foundation | 26 | 927 | JEW19 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU5-20 | 872137.5 | 1086080.1 | 1.5 | Brick Wall | 75 | 1,637 | JEW20 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU5-21 | 872092.4 | 1086105.9 | 1.5 | Brick Wall | 23 | 1,331 | JEW21 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-22 | 872076.4 | 1086109.2 | 0.5 | Brick Wall | 81 | 2,090 | JEW22 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU5-23 | 872071.3 | 1086101.8 | 4.5 | Grey Brick Wall | 32 | 0 | JEW23 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU5-24 | 872118.7 | 1086102.9 | 2.0 | Brick Wall | 15 | 806 | JEW24 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU5-25 | 872057.6 | 1086084.7 | 1.0 | Grey Brick Wall | 59 | 1,893 | JEW25 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| STSU5-26 | 872008.6 | 1086055.6 | 3.0 | Brick Wall | 59 | 1,133 | JEW26 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU5-27 | 871993.2 | 1086096.5 | 2.5 | Brick Wall | 32 | 658 | JEW27 | -0.17 | 0.04 | 6.14 | 4.91 | 5.58 | 8.14 |
| STSU5-28 | 872000.7 | 1086107.6 | 5.5 | Tan Brick Wall | 48 | 806 | JEW28 | 1.47 | 3.27 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU5-29 | 872016.2 | 1086129.0 | 2.5 | Tan Brick Wall | 32 | 892 | JEW29 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-30 | 872020.0 | 1086155.5 | 5.5 | Brick Wall | 52 | 800 | JEW30 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 |
| STSU5-31 | 872036.5 | 1086180.8 | 4.5 | Brick Wall | 0 | 1,011 | JEW31 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU5-32 | 872020.3 | 1086220.0 | 3 | Brick Wall | 13 | 1,041 | JEW32 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU5-33 | 872016.0 | 1086222.9 | 6 | Brick Wall | 11 | 1,110 | JEW33 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU5-34 | 871981.2 | 1086248.7 | 3 | Brick Wall | 0 | 777 | JEW34 | 1.47 | 3.27 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU5-35 | 871952.0 | 1086213.8 | 3 | Brick Wall | 81 | 1,097 | JEW35 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-36 | 871968.3 | 1086187.6 | 3.5 | Brick Wall | 13 | 977 | JEW36 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-37 | 871982.4 | 1086177.3 | 4.5 | Brick Wall | 0 | 1,604 | JEW37 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU5-38 | 871999.6 | 1086157.3 | 0.5 | Glass Door | 0 | 0 | JEW38 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-39 | 871982.5 | 1086165.0 | 1.5 | Brick Wall | 22 | 1,254 | JEW39 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU5-40 | 871981.8 | 1086165.7 | 1 | Brick Wall | 32 | 1,713 | JEW40 | 1.47 | 3.27 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU5-41 | 871962.0 | 1086158.6 | 0.5 | Grey Brick Wall | 26 | 1,588 | JEW41 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU5-42 | 871944.6 | 1086135.7 | 5 | Brick Wall | 0 | 864 | JEW42 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU5-43 | 871941.1 | 1086130.3 | 1 | Aluminium Vent Cover | 0 | 0 | JEW43 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU5-44 | 871913.5 | 1086103.4 | 4.5 | Glass Window | 33 | 0 | JEW44 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU5-45 | 871880.8 | 1086066.6 | 1.5 | Brick Wall | 0 | 860 | JEW45 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU5-46 | 871898.6 | 1086089.1 | 4.5 | Brick Wall | 62 | 1,097 | JEW46 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU5-47 | 871869.5 | 1086051.5 | 0.5 | Brick Wall | 15 | 1,199 | JEW47 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU5-48 | 871852.1 | 1086028.2 | 4.5 | Brick Wall | 66 | 965 | JEW48 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |

## Table F-4b. Data (Continued)

| Location ID[a] | Easting | Northing | Height | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Alpha | Beta | Swipe ID | Alpha | | | Beta | | |
| | | | | | Activity | Activity | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU5-49 | 871888.5 | 1085983.0 | 1 | Dark Brick Wall | 0 | 779 | JEW49 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU5-50 | 871911.1 | 1085965.7 | 4 | Glass Window | 0 | 0 | JEW50 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU5-B1 | 871913.4 | 1085886.6 | 5 | Glass Window | 75 | 0 | JEW-B1 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU5-B2 | 871913.5 | 1085853.8 | 3.0 | Brick Wall | 52 | 1,359 | JEW-B2 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU5-B3 | 871969.0 | 1085854.9 | 4.5 | Brick Wall | 62 | 1,338 | JEW-B3 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU5-B4 | 872118.3 | 1086103.1 | 3.5 | Brick Wall | 15 | 905 | JEW-B4 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU5-B5 | 872090.7 | 1086107.2 | 4 | Brick Wall | 42 | 1,692 | JEW-B5 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU5-B6 | 871968.4 | 1086187.5 | 4 | Brick Wall | 71 | 1,225 | JEW-B6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU5-B7 | 871899.7 | 1086090.4 | 3.5 | Brick Wall | 81 | 1,246 | JEW-B7 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |

[a] Location ID is the STSU number followed by the location within that STSU.

Note:

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-5. Structure Survey Data for Playground Equipment

### Table F-5a. Summary Statistics

| Statistic | Number Collected | Fixed-Point Measurements | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDA |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 25 | 52 | 34 | 137 | 0 | 0 | 25 | 0 |
| **Beta Activity** | 25 | 325 | 287 | 1,026 | 0 | 0 | 25 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-5b. Data

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU6-1 | 872138.3 | 1086187.0 | Plastic Slide | 70 | 98 | JPG1 | 1.14 | 1.85 | 2.86 | -0.35 | 1.89 | 4.49 |
| STSU6-2 | 871939.9 | 1085758.0 | Plastic Slide | 0 | 400 | JPG2 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU6-3 | 871925.6 | 1086134.0 | Coated Metal Platform | 15 | 83 | JPG3 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU6-4 | 872140.7 | 1086199.4 | Plastic Vertical Wall | 48 | 0 | JPG4 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU6-5 | 871925.6 | 1086140.8 | Plastic Slide | 26 | 347 | JPG5 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| STSU6-6 | 871932.8 | 1085751.4 | Coated Metal Steps | 48 | 257 | JPG6 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| STSU6-7 | 872186.8 | 1086162.2 | Rubber Swing Seat | 70 | 491 | JPG7 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU6-8 | 872126.6 | 1086198.9 | Coated Metal Steps | 70 | 0 | JPG8 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU6-9 | 871933.3 | 1085738.8 | Plastic Slide | 48 | 551 | JPG9 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU6-10 | 871928.8 | 1085744.1 | Coated Metal Platform | 15 | 294 | JPG10 | 1.52 | 3.22 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU6-11 | 872128.9 | 1086212.6 | Coated Metal Platform | 37 | 257 | JPG11 | 1.52 | 3.22 | 5.61 | 6.08 | 6.17 | 8.50 |
| STSU6-12 | 872145.1 | 1086210.1 | Plastic Slide | 81 | 60 | JPG12 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU6-13 | 871940.6 | 1085747.7 | Plastic Slide | 26 | 226 | JPG13 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU6-14 | 872126.2 | 1086191.5 | Plastic | 115 | 158 | JPG14 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU6-15 | 872166.2 | 1086207.0 | Wood Balance Beam | 48 | 460 | JPG15 | 1.52 | 3.22 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU6-16 | 872192.1 | 1086168.6 | Rubber Swing Seat | 48 | 400 | JPG16 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU6-17 | 871922.0 | 1086136.4 | Metal Tube Step | 48 | 113 | JPG17 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU6-18 | 871920.1 | 1086133.6 | Coated Metal Platform | 4 | 38 | JPG18 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |

## Table F-5b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU6-19 | 871918.4 | 1086139.4 | Metal Tube Step | 37 | 121 | JPG19 | 3.13 | 4.56 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU6-20 | 872115.4 | 1086228.6 | Aluminium Bench | 48 | 483 | JPG20 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |
| STSU6-B1 | 871927.5 | 1086139.2 | Plastic Slide | 48 | 106 | JPG-B1 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU6-B2 | 871995.3 | 1086290.4 | Rubber Swing Seat | 37 | 347 | JPG-B2 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU6-B3 | 872010.9 | 1086310.7 | Rubber Swing Seat | 48 | 1,026 | JPG-B3 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU6-B4 | 871889.1 | 1086163.2 | Rubber Swing Seat | 115 | 1,004 | JPG-B4 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU6-B5 | 871904.4 | 1086183.5 | Rubber Swing Seat | 137 | 808 | JPG-B5 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |

[a] Location ID is the STSU number followed by the location within that STSU.

Note:

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-6. Structure Survey Data for Concrete Pavement

### Table F-6a. Summary Statistics

| Statistic | Number Collected | Fixed-Point Measurements | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 37 | 140 | 60 | 280 | 0 | 0 | 37 | 0 |
| **Beta Activity** | 37 | 759 | 311 | 1,534 | 0 | 0 | 37 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-6b. Data

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU8-B4 | 871255.6 | 1085315.7 | Concrete | 103 | 91 | JWB4 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |
| STSU8-B3 | 871075.4 | 1085086.9 | Concrete | 124 | 561 | JWB3 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| STSU8-B2 | 871170.9 | 1085201.3 | Concrete | 124 | 734 | JWB2 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| STSU8-B1 | 871540.3 | 1085691.5 | Concrete | 92 | 1,344 | JWB1 | 1.55 | 3.33 | 5.91 | 0.82 | 3.08 | 6.96 |
| STSU8-9 | 871077.5 | 1085088.2 | Concrete | 62 | 709 | JW-9 | -0.11 | 0.03 | 5.91 | -1.36 | 0.14 | 6.96 |
| STSU8-8 | 871258.6 | 1085317.5 | Concrete | 97 | 654 | JW-8 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |
| STSU8-5 | 871272.5 | 1085335.0 | Concrete | 0 | 553 | JW-5 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| STSU8-10 | 871170.4 | 1085203.2 | Concrete | 85 | 576 | JW-10 | -0.11 | 0.03 | 5.91 | -1.36 | 0.14 | 6.96 |
| STSU8-1 | 871540.9 | 1085690.6 | Concrete | 97 | 1,534 | JW-1 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| STSU7-9 | 871922.4 | 1085930.3 | Concrete | 184 | 841 | JA9 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-16 | 871865.7 | 1085795.4 | Concrete | 85 | 751 | JA16 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-1 | 872125.2 | 1086104.7 | Concrete | 60 | 247 | JA1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-32 | 871930.4 | 1085934.6 | Concrete | 142 | 882 | JA32 | 1.54 | 3.33 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-34 | 871878.9 | 1085970.0 | Concrete | 131 | 396 | JA34 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-37 | 872132.6 | 1086101.4 | Concrete | 165 | 422 | JA37 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-41 | 871944.0 | 1085821.2 | Concrete | 67 | 635 | JA41 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU7-43 | 871859.4 | 1085885.9 | Concrete | 163 | 825 | JA43 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU7-54 | 871814.4 | 1085834.6 | Concrete | 100 | 255 | JA54 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |

## Table F-6b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU7-59 | 871725.2 | 1085896.7 | Concrete | 130 | 326 | JA59 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU7-65 | 871893.9 | 1085856.1 | Concrete | 142 | 775 | JA65 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-80 | 871856.1 | 1085803.7 | Concrete | 35 | 668 | JA80 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU7-B2 | 871816.5 | 1085835.0 | Concrete | 172 | 988 | JA-B2 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU7-B3 | 872056.1 | 1086184.6 | Concrete | 162 | 853 | JA-B3 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-B4 | 872060.2 | 1086183.5 | Concrete | 140 | 953 | JA-B4 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-B7 | 872087.3 | 1086167.5 | Concrete | 111 | 960 | JA-B7 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-B8 | 872078.6 | 1086137.8 | Concrete | 187 | 1,038 | JA-B8 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-B9 | 872100.0 | 1086144.8 | Concrete | 208 | 1,216 | JA-B9 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-B10 | 872131.5 | 1086101.9 | Concrete | 165 | 1,003 | JA-B10 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU7-B11 | 872133.4 | 1086101.3 | Concrete | 165 | 683 | JA-B11 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-B12 | 872153.5 | 1086102.1 | Concrete | 165 | 932 | JA-B12 | 1.54 | 3.33 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-B13 | 872179.7 | 1086092.3 | Concrete | 144 | 1,145 | JA-B13 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-B15 | 872175.9 | 1086134.5 | Concrete | 238 | 665 | JAB15 | 3.13 | 4.56 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B23 | 872248.9 | 1086078.5 | Concrete | 170 | 627 | JAB23 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B24 | 871993.1 | 1086261.9 | Concrete | 202 | 808 | JAB24 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B46 | 871931.6 | 1085934.9 | Concrete | 280 | 451 | JAB46 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-B47 | 871933.1 | 1085934.9 | Concrete | 227 | 1,182 | JAB47 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-B48 | 871897.8 | 1085856.1 | Concrete | 238 | 783 | JAB48 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |

[a] Location ID is the STSU number followed by the location within that STSU.

Note:

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

## Table F-7. Structure Survey Data for Asphalt Pavement

### Table F-7a. Summary Statistics

| Statistic | Number Collected | Fixed-Point Measurements | | | | | Swipe Measurements | |
|---|---|---|---|---|---|---|---|---|
| | | Average | Standard Deviation | Maximum | Number Exceeding Mean Plus | | Number Collected | Number Exceeding MDC |
| | | (dpm/100 cm$^2$) | | | 3 Standard Deviations | 4 Standard Deviations | | |
| **Alpha Activity** | 107 | 70 | 62 | 206 | 0 | 0 | 107 | 0 |
| **Beta Activity** | 107 | 459 | 263 | 1,029 | 0 | 0 | 107 | 0 |

Note: Fixed-point measurements that exceed 4 standard deviations from the average indicate the measurements are inconsistent with material background radiation. More than 3 fixed-point measurements from Tables F-1 through F-7 that exceed 3 standard deviations from the average indicate the measurements are inconsistent with material background radiation. Swipe measurements less than the MDC supports the fixed-point measurements being from background radioactivity other than surface radioactivity.

### Table F-7b. Data

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU8-7 | 871479 | 1085613 | Asphalt | 0 | 872 | JW-7 | -0.11 | 0.03 | 5.91 | 3.00 | 4.36 | 6.96 |
| STSU8-6 | 871299 | 1085372 | Asphalt | 0 | 459 | JW-6 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| STSU8-4 | 871441 | 1085562 | Asphalt | 62 | 794 | JW-4 | -0.11 | 0.03 | 5.91 | -0.27 | 2.18 | 6.96 |
| STSU8-3 | 871374 | 1085470 | Asphalt | 0 | 802 | JW-3 | -0.11 | 0.03 | 5.91 | 1.91 | 3.78 | 6.96 |
| STSU8-2 | 871400 | 1085508 | Asphalt | 0 | 413 | JW-2 | -0.11 | 0.03 | 5.91 | 0.82 | 3.08 | 6.96 |
| STSU7-8 | 871899 | 1085933 | Asphalt | 14 | 330 | JA8 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-7 | 871719 | 1085827 | Asphalt | 0 | 165 | JA7 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-6 | 871979 | 1086277 | Asphalt | 4 | 536 | JA6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-5 | 872047 | 1086177 | Asphalt | 25 | 586 | JA5 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-4 | 872201 | 1085995 | Asphalt | 110 | 544 | JA4 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-3 | 872162 | 1086149 | Asphalt | 46 | 577 | JA3 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-28 | 871980 | 1086262 | Asphalt | 57 | 379 | JA28 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-27 | 871951 | 1086244 | Asphalt | 35 | 594 | JA27 | -0.12 | 0.03 | 5.97 | 4.04 | 4.88 | 7.03 |
| STSU7-26 | 871796 | 1085989 | Asphalt | 14 | 82 | JA26 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-25 | 871860 | 1085879 | Asphalt | 21 | 635 | JA25 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-24 | 872061 | 1086181 | Asphalt | 4 | 511 | JA24 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-23 | 872207 | 1086056 | Asphalt | 25 | 487 | JA23 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-22 | 871824 | 1085862 | Asphalt | 43 | 503 | JA22 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |

## Table F-7b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU7-21 | 872249 | 1086077 | Asphalt | 57 | 470 | JA21 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-20 | 871872 | 1086113 | Asphalt | 14 | 181 | JA20 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-2 | 871718 | 1085850 | Asphalt | 53 | 553 | JA2 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-19 | 871670 | 1085751 | Asphalt | 43 | 429 | JA19 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-18 | 872153 | 1086102 | Asphalt | 57 | 223 | JA18 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-17 | 871802 | 1085913 | Asphalt | 4 | 322 | JA17 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-15 | 871832 | 1085999 | Asphalt | 25 | 322 | JA15 | -0.12 | 0.03 | 5.97 | 1.86 | 3.78 | 7.03 |
| STSU7-14 | 872212 | 1086069 | Asphalt | 25 | 280 | JA14 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-13 | 872074 | 1086163 | Asphalt | 4 | 379 | JA13 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-12 | 871657 | 1085788 | Asphalt | 11 | 478 | JA12 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-11 | 871854 | 1085868 | Asphalt | 32 | 223 | JA11 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU7-10 | 871823 | 1085917 | Asphalt | 25 | 231 | JA10 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU7-29 | 872067 | 1086168 | Asphalt | 35 | 445 | JA29 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-30 | 872077 | 1086140 | Asphalt | 78 | 784 | JA30 | 1.54 | 3.33 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-31 | 872047 | 1086195 | Asphalt | 14 | 701 | JA31 | 1.54 | 3.33 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-33 | 871701 | 1085818 | Asphalt | 35 | 223 | JA33 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-35 | 872103 | 1086161 | Asphalt | 23 | 191 | JA35 | -0.12 | 0.03 | 5.97 | 0.77 | 3.08 | 7.03 |
| STSU7-36 | 872152 | 1086034 | Asphalt | 8 | 496 | JA36 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-38 | 871868 | 1085842 | Asphalt | 11 | 297 | JA38 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-39 | 871834 | 1085891 | Asphalt | 53 | 107 | JA39 | -0.12 | 0.03 | 5.97 | 2.95 | 4.36 | 7.03 |
| STSU7-40 | 872040 | 1086238 | Asphalt | 57 | 808 | JA40 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-42 | 872087 | 1086167 | Asphalt | 14 | 404 | JA42 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU7-44 | 872166 | 1086125 | Asphalt | 57 | 280 | JA44 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU7-45 | 872057 | 1086182 | Asphalt | 78 | 553 | JA45 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-46 | 871873 | 1085912 | Asphalt | 4 | 470 | JA46 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-47 | 871858 | 1085864 | Asphalt | 14 | 247 | JA47 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-48 | 872067 | 1086168 | Asphalt | 25 | 462 | JA48 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU7-49 | 872179 | 1086091 | Asphalt | 99 | 652 | JA49 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU7-50 | 871892 | 1085783 | Asphalt | 120 | 1,006 | JA50 | -0.09 | 0.03 | 5.61 | 4.99 | 5.77 | 8.50 |
| STSU7-51 | 871863 | 1085912 | Asphalt | 35 | 289 | JA51 | -0.09 | 0.03 | 5.61 | 3.90 | 5.34 | 8.50 |

## Table F-7b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU7-52 | 871694 | 1085759 | Asphalt | 42 | 0 | JA52 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU7-53 | 871926 | 1086178 | Asphalt | 42 | 156 | JA53 | -0.09 | 0.03 | 5.61 | 2.82 | 4.87 | 8.50 |
| STSU7-55 | 872076 | 1086210 | Asphalt | 32 | 262 | JA55 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU7-56 | 872101 | 1086145 | Asphalt | 62 | 0 | JA56 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-57 | 871699 | 1085753 | Asphalt | 13 | 0 | JA57 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-58 | 871864 | 1086122 | Asphalt | 3 | 57 | JA58 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-60 | 871930 | 1086219 | Asphalt | 52 | 149 | JA60 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU7-61 | 871700 | 1085827 | Asphalt | 23 | 0 | JA61 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU7-62 | 871761 | 1085857 | Asphalt | 23 | 0 | JA62 | 1.47 | 3.27 | 6.14 | -2.46 | 0.22 | 8.14 |
| STSU7-63 | 871939 | 1086201 | Asphalt | 71 | 354 | JA63 | -0.17 | 0.04 | 6.14 | 5.96 | 5.97 | 8.14 |
| STSU7-64 | 871916 | 1086223 | Asphalt | 23 | 78 | JA64 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-66 | 871822 | 1086096 | Asphalt | 4 | 322 | JA66 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-67 | 872150 | 1086106 | Asphalt | 57 | 429 | JA67 | -0.17 | 0.04 | 6.14 | 2.80 | 4.71 | 8.14 |
| STSU7-68 | 871865 | 1085818 | Asphalt | 35 | 107 | JA68 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU7-69 | 872233 | 1086071 | Asphalt | 35 | 313 | JA69 | -0.17 | 0.04 | 6.14 | 3.86 | 5.17 | 8.14 |
| STSU7-70 | 871801 | 1086061 | Asphalt | 46 | 404 | JA70 | 1.47 | 3.27 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-71 | 871991 | 1086261 | Asphalt | 35 | 214 | JA71 | 1.47 | 3.27 | 6.14 | 4.91 | 5.58 | 8.14 |
| STSU7-72 | 872041 | 1086161 | Asphalt | 89 | 759 | JA72 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU7-73 | 872040 | 1086168 | Asphalt | 120 | 948 | JA73 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-74 | 871942 | 1086171 | Asphalt | 46 | 742 | JA74 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-75 | 871767 | 1085937 | Asphalt | 14 | 173 | JA75 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-76 | 871888 | 1085824 | Asphalt | 14 | 223 | JA76 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-77 | 871821 | 1085953 | Asphalt | 4 | 487 | JA77 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-78 | 871755 | 1085876 | Asphalt | 4 | 165 | JA78 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-79 | 871853 | 1086106 | Asphalt | 14 | 223 | JA79 | 1.47 | 3.27 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-B1 | 871820 | 1085953 | Asphalt | 43 | 647 | JA-B1 | -0.12 | 0.03 | 5.97 | -1.41 | 0.14 | 7.03 |
| STSU7-B5 | 872072 | 1086162 | Asphalt | 54 | 256 | JA-B5 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-B6 | 872102 | 1086159 | Asphalt | 86 | 85 | JA-B6 | -0.12 | 0.03 | 5.97 | -0.32 | 2.18 | 7.03 |
| STSU7-B14 | 872164 | 1086127 | Asphalt | 133 | 436 | JAB14 | -0.09 | 0.03 | 5.61 | 1.73 | 4.35 | 8.50 |
| STSU7-B16 | 872176 | 1086133 | Asphalt | 132 | 918 | JAB16 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B17 | 872165 | 1086127 | Asphalt | 143 | 539 | JAB17 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |

## Table F-7b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU7-B18 | 872180 | 1086095 | Asphalt | 164 | 820 | JAB18 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B19 | 872212 | 1086068 | Asphalt | 117 | 767 | JAB19 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B20 | 872151 | 1086033 | Asphalt | 163 | 535 | JAB20 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B21 | 872152 | 1086035 | Asphalt | 132 | 638 | JAB21 | 1.52 | 3.22 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B22 | 872201 | 1085996 | Asphalt | 196 | 680 | JAB22 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU7-B25 | 872038 | 1086236 | Asphalt | 154 | 606 | JAB25 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B26 | 872039 | 1086169 | Asphalt | 159 | 742 | JAB26 | -0.09 | 0.03 | 5.61 | 0.64 | 3.77 | 8.50 |
| STSU7-B27 | 872040 | 1086161 | Asphalt | 195 | 583 | JAB27 | 1.52 | 3.22 | 5.61 | -2.62 | 0.24 | 8.50 |
| STSU7-B28 | 872045 | 1086178 | Asphalt | 154 | 643 | JAB28 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B29 | 872067 | 1086166 | Asphalt | 206 | 702 | JAB29 | -0.09 | 0.03 | 5.61 | -0.45 | 3.08 | 8.50 |
| STSU7-B30 | 871853 | 1086108 | Asphalt | 142 | 407 | JAB30 | -0.09 | 0.03 | 5.61 | -1.53 | 2.18 | 8.50 |
| STSU7-B31 | 871939 | 1086201 | Asphalt | 202 | 990 | JAB31 | 1.52 | 3.22 | 5.61 | -2.62 | 0.24 | 8.50 |
| STSU7-B32 | 871939 | 1086202 | Asphalt | 185 | 628 | JAB32 | -0.09 | 0.03 | 5.61 | 4.99 | 5.77 | 8.50 |
| STSU7-B33 | 871860 | 1085886 | Asphalt | 122 | 878 | JAB33 | -0.09 | 0.03 | 5.61 | -2.62 | 0.24 | 8.50 |
| STSU7-B34 | 871874 | 1085909 | Asphalt | 174 | 583 | JAB34 | 1.47 | 3.27 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU7-B35 | 871874 | 1085912 | Asphalt | 181 | 726 | JAB35 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-B36 | 871753 | 1085878 | Asphalt | 132 | 471 | JAB36 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| STSU7-B37 | 871696 | 1085756 | Asphalt | 101 | 495 | JAB37 | -0.17 | 0.04 | 6.14 | -2.46 | 0.22 | 8.14 |
| STSU7-B38 | 871718 | 1085831 | Asphalt | 154 | 443 | JAB38 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU7-B39 | 871865 | 1085799 | Asphalt | 163 | 1,029 | JAB39 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-B40 | 871867 | 1085794 | Asphalt | 164 | 894 | JAB40 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU7-B41 | 871867 | 1085797 | Asphalt | 149 | 948 | JAB41 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU7-B42 | 871857 | 1085880 | Asphalt | 163 | 734 | JAB42 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |
| STSU7-B43 | 871862 | 1085881 | Asphalt | 143 | 96 | JAB43 | -0.17 | 0.04 | 6.14 | -0.35 | 2.98 | 8.14 |
| STSU7-B44 | 871880 | 1085970 | Asphalt | 163 | 694 | JAB44 | -0.17 | 0.04 | 6.14 | 1.75 | 4.21 | 8.14 |
| STSU7-B45 | 871923 | 1085929 | Asphalt | 153 | 646 | JAB45 | -0.17 | 0.04 | 6.14 | -1.41 | 2.11 | 8.14 |

## Table F-7b. Data (Continued)

| Location ID[a] | Easting | Northing | Survey Surface Material | Fixed-Point Measurements | | Swipe Measurements | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Alpha Activity | Beta Activity | Swipe ID | Alpha | | | Beta | | |
| | | | | | | | Activity | Error | MDC | Activity | Error | MDC |
| | (ft) | | | (dpm/100 cm$^2$) | | | (dpm/swipe of 100 cm$^2$) | | | | | |
| STSU7-B49 | 871892 | 1085781 | Asphalt | 185 | 148 | JAB49 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |
| STSU7-B50 | 871854 | 1085804 | Asphalt | 132 | 327 | JAB50 | -0.17 | 0.04 | 6.14 | 0.70 | 3.65 | 8.14 |

[a] Location ID is the STSU number followed by the location within that STSU.

Note:

Negative results are less than the laboratory system's background level. The system's background level was determined using a 48-hour count time, while the smears were counted for 2 minutes; the number of negative results is attributed to this difference in count times.

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## Table F-8. Analytical Results for Samples of Dust and Pavement Sediment on Structure Surfaces

| Sample Name | Easting | Northing | Elevation | Collect Date | Lead-210 | | | | Polonium-210 | | | | Radium-226 | | | | Thorium-230 | | | | Uranium-234 | | | | Uranium-238 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ | Result | Error | MDC | VQ |
| | (ft) | | (ft amsl) | | (pCi/g except for VQ that has no units) | | | | | | | | | | | | | | | | | | | | | | | |
| Average Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 0.95 | | | | 1.49 | | | | 0.98 | | | | 1.08 | | | |
| $UCL_{95}$ Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 1.01 | | | | 1.58 | | | | 1.07 | | | | 1.16 | | | |
| Maximum Reference Area Surface Soil Value | | | | -- | -- | | | | -- | | | | 1.27 | | | | 2.17 | | | | 1.52 | | | | 1.69 | | | |
| Average Sample Result | | | | -- | 20.39 | | | | 27.34 | | | | 0.67 | | | | 0.92 | | | | 0.60 | | | | 0.66 | | | |
| Maximum Sample Result | | | | -- | 44.90 | | | | 60.10 | | | | 1.40 | | | | 1.41 | | | | 1.13 | | | | 1.20 | | | |
| Number of Results | | | | -- | 3 | | | | 3 | | | | 9 | | | | 9 | | | | 8 | | | | 8 | | | |
| SVP264222 SVP264231 | 871949.5 | 1086167.3 | 509.8 | 10/24/2022 | 44.90 | 6.09 | 2.41 | = | 60.10 | 5.97 | 0.35 | J | 1.19 | 0.53 | 0.39 | = | 0.90 | 0.34 | 0.21 | J | 0.54 | 0.24 | 0.12 | = | 0.74 | 0.29 | 0.18 | = |
| SVP264223 SVP264332 | 872211.4 | 1086125.3 | 507.5 | 10/24/2022 | 12.70 | 2.74 | 2.43 | = | 18.90 | 2.50 | 0.43 | J | 0.78 | 0.43 | 0.41 | J | 1.06 | 0.36 | 0.12 | J | 0.63 | 0.29 | 0.22 | = | 0.78 | 0.32 | 0.14 | = |
| SVP264224 SVP264233 | 872212.0 | 1086138.1 | 506.6 | 10/24/2022 | 3.56 | 1.52 | 1.79 | = | 3.02 | 0.71 | 0.25 | J | 1.17 | 0.52 | 0.25 | = | 1.37 | 0.43 | 0.13 | J | 0.74 | 0.30 | 0.13 | = | 1.07 | 0.37 | 0.20 | = |
| SVP264225 | 872140.3 | 1086026.9 | 508.2 | 10/24/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 1.40 | 0.53 | 0.28 | = | 1.34 | 0.40 | 0.12 | J | 1.13 | 0.35 | 0.15 | = | 1.20 | 0.36 | 0.11 | = |
| SVP264226 | Dust Inside Buildings at STSU3-UB1 from a 500-$cm^2$ area | | | 10/26/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 0.16 | 0.17 | 0.24 | UJ | 0.34 | 0.21 | 0.15 | J | -- | -- | -- | -- | -- | -- | -- | -- |
| SVP264227 | Dust Inside Buildings at STSU3-UB6 from a 500-$cm^2$ area | | | 10/26/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 0.13 | 0.14 | 0.17 | UJ | 0.75 | 0.30 | 0.12 | J | 0.23 | 0.16 | 0.12 | J | 0.07 | 0.09 | 0.12 | UJ |
| SVP264228 | Dust Inside Buildings at STSU3-UB11 from a 2,000-$cm^2$ area | | | 10/26/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 0.40 | 0.23 | 0.15 | J | 0.78 | 0.29 | 0.13 | J | 1.03 | 0.38 | 0.19 | = | 0.91 | 0.35 | 0.19 | = |
| SVP264229 | Dust Inside Buildings at STSU3-UB14 from a 1,000-$cm^2$ area | | | 10/26/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 0.14 | 0.16 | 0.26 | UJ | 0.36 | 0.20 | 0.16 | J | 0.07 | 0.10 | 0.18 | UJ | 0.11 | 0.13 | 0.21 | UJ |
| SVP264230 | Dust Inside Buildings at STSU3-UB18 from a 2,500-$cm^2$ area | | | 10/26/2022 | -- | -- | -- | -- | -- | -- | -- | -- | 0.70 | 0.32 | 0.22 | = | 1.41 | 0.39 | 0.11 | J | 0.40 | 0.20 | 0.14 | = | 0.43 | 0.20 | 0.12 | = |

Notes:

$UCL_{95}$ is the 95 percent upper confidence limit of the arithmetic mean.

For the first three entries in this table, two samples were collected from the same location for separate submittal to different laboratories.

VQ symbols indicate: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, “UJ” for not detected above estimated value, and “R” for unusable.

The differences in the way lead-210 and pollonium-210 are analyzed and the estimated "J" result for polonium-210 caused disequilibrium in results between the two.

-- indicates data not available or not applicable.

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# APPENDIX G

# RISK AND DOSE ASSESSMENT FOR STRUCTURAL SURFACES

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# RADIOLOGICAL RISK AND DOSE ASSESSMENT FOR STRUCTURAL SURFACES

## RADIOLOGICAL RISK AND DOSE ASSESSMENT MODEL

The RESidual RADioactivity (RESRAD) family of computer codes was developed by the Argonne National Laboratory (ANL) for the U.S. Department of Energy (DOE). The models use input parameters to calculate site-specific radiological risk and dose to various future hypothetical onsite receptors at sites with radioactive materials. RESRAD-BUILD calculates the radiological risks and doses resulting from the occupancy of buildings with radioactive material. The use of the RESRAD family of codes for modeling risk and dose has become an acceptable regulatory standard. Examples follow.

- The USEPA used RESRAD in its *Reassessment of Radium and Thorium Soil Concentrations and Annual Dose Rates* (USEPA 1996), which demonstrates the protectiveness of Uranium Mill Tailings Radiation Control Act soil criteria, and in its rulemaking for cleanup of sites with residual radioactivity.
- The USEPA was also a signatory to the ROD (USACE 2005), which used RESRAD-ONSITE and RESRAD-BUILD. The USEPA is a participant in many other CERCLA actions involving RESRAD.
- Seven U.S. Cabinet-level agencies (including the USEPA, DOE, U.S. Nuclear Regulatory Commission [NRC], and DoD), functioning as the Interagency Steering Committee on Radiation Standards, formally accepted RESRAD-BIOTA.

The RESRAD computer code for buildings and structural surfaces, RESRAD-BUILD Version 4.0, was used to calculate potential risk and dose from the interior and exterior structure surfaces to the evaluated receptors. Because no evidence was identified that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces, the risk and dose estimates are essentially estimates for natural background radioactivity.

## RESRAD-BUILD RECEPTOR SCENARIO

Due to the current and future anticipated land/building use, school user occupancy receptor scenarios were assessed for these structures, including exposure to surfaces of both interior and exterior structures (i.e., exterior walls, floors, furniture, pavement, and playground equipment). Because the ROD identifies the suburban resident scenario for UUUE determination, that scenario is included.

The receptor scenarios are summarized as follows. Although the receptors would spend time in other rooms and outdoors, the scenarios assume all the time is spent in one room the size of a classroom. This places the receptors closest to the structure surfaces.

- Student Receptor: This scenario is a student who spends 11.5 hours per day at the school for 170 days per year for 6 years. The parameter of 11.5 hours per day is based on a child receiving before- and after-school care. The parameter of 170 days is based on the school academic calendar for 2022 through 2023, and the parameter of 6 years is based on kindergarten through fifth grade.
- Staff Receptor: This scenario is a staff member who spends 8.5 hours per day at the school for 250 days per year for 25 years. The parameter of 8.5 hours per day assumes a half hour for eating lunch onsite in addition to normal onsite working hours. The parameters of

250 days and 25 years are based on worker durations in OSWER Directive 9200.1-120, *Human Health Evaluation Manual, Supplemental Guidance, Update of Standard Default Exposure Factors* (USEPA 2014a).

- Suburban Resident: This scenario is a composite of two residential periods of 0 to 6 years old and 24 years as an adult (USACE 2003, USEPA 1991). In Table 16-1 of the *Exposure Factors Handbook: 2011 Edition* (2011 EFH), the average indoor time at home for children from ages 0 to 6 years is 16.7 hours per day, and the indoor time at home for adults is 15.8 hours per day (USEPA 2011).

The receptor scenarios incorporate default modeling program input parameters, as well as parameters modified to reflect site-specific conditions. The RESRAD-BUILD input parameters for the receptor scenarios, except for the exposure point concentrations (EPCs), are presented in Table G-1.

**Table G-1. RESRAD-BUILD Input Parameters**

| Parameter | Description | Value | | | Basis for Selected Value |
|---|---|---|---|---|---|
| | | Student | Staff | Suburban Resident | |
| Exposure Duration | Amount of time that exposure occurs | 2,190 days | 9,125 days | 10,950 | Student: 6 years (kindergarten through fifth grade).<br>Staff: 25 years (USEPA 2014a).<br>Suburban Resident: 30 years (6 years as child ages 0 to 6, 24 years as an adult) (USEPA 1991). Health-conservative value because the USEPA revised its guidance to 18 years as an adult (USEPA 2014a). |
| Indoor Fraction | Fraction of the exposure duration spent inside the building or on/near the structure | 0.223 | 0.243 | 0.639 | Student: 170 days/year (Hazelwood School District academic calendar 2022-2023), 11.5 hours/day (assumes before- and after-school onsite childcare); 1,955 hours/year / 8,760 hours/year = 0.223.<br>Staff: 250 days/year (USEPA 2014a), 8.5 hours/day (8 hours onsite for work plus half-hour lunch); 2,125 hours/year / 8,760 hours/year = 0.243.<br>Suburban Resident: An average, weighted by Exposure Durations, of the child and adult hours per day is calculated first: (16.7 hours/day * 6 years + 15.8 hours/day * 24 years) / 30 years = 16 hours/day. The indoor fraction is then calculated: (16 hours/day * 350 days/year) / 8,760 hours/year = 0.639. |
| Evaluation Times | Various times for which calculated results are reported | 0, 1, 3, 6 years | 0, 1, 3, 10, 25 years | 0, 1, 3, 10, 30 years | The times include the start and end of the exposure durations plus intermediate years with focus on early years because those tend to have the higher risk and dose. |
| Number of Rooms | Number of rooms with different air-flow parameters | 1 | | | RESRAD-BUILD default value. One room is a proxy for all rooms. |
| Deposition Velocity | Velocity at which airborne particles are deposited onto the floor surfaces | 0.00039 m/second | | | RESRAD-BUILD default value. |
| Resuspension Rate | Rate at which deposited material is resuspended into the air | $5 \times 10^{-7}$ second$^{-1}$ | | | Approximate midpoint between NUREG/CR-6697 (NRC 2000a) minimum and maximum values. |
| Building Exchange Rate | Total volume of air going out of the building per unit time divided by the total volume of the building | 0.8 hour$^{-1}$ | | | RESRAD-BUILD default value. |
| Room Area | Floor area of the room | 75 m$^2$ | | | Based on the floor plan for a typical classroom at the Jana Elementary School. |
| Room Height | Height of the room | 2.5 m | | | RESRAD-BUILD default value. |
| Air Exchange Rate | Total volume of air passing through the room per unit time divided by the total volume of the room | 0.8 hour$^{-1}$ | | | RESRAD-BUILD default value. |
| Air Flow Rate | Flow rates of air passing through the room | 150 m$^3$/hour | | | In/Out Flow Rate = volume of room * air exchange rate. Interior flow rate: 75 m$^2$ * 2.5 m * 0.8 hour$^{-1}$ = 150 m$^3$/hour. The air exchange rate of 0.8 hour$^{-1}$ is the RESRAD-BUILD default value and is consistent with NUREG/CR-6697 (NRC 2000a). |
| Number of Receptors | 1 individual | 1 | | | RESRAD-BUILD default value. Health-conservative value because additional people would share in the theoretical uptake of radioactivity, effectively lowering the average concentration to each person. |
| Room Number | Receptor located in the scenario's room number 1 | 1 | | | RESRAD-BUILD default value. |
| Time Fraction | Fraction of time within the building that the exposed individual spends at this receptor location | 1 | | | RESRAD-BUILD default value. One room is a proxy for all rooms. |
| Breathing Rate | Inhalation rate of airborne material at this location | 12 m$^3$/day | 16 m$^3$/day | 14.8 m$^3$/day | Student: Rate of 12 m$^3$/day per Table 6-1 of the 2011 EFH (USEPA 2011).<br>Staff: Rate of 16 m$^3$/day per Table 6-1 of the 2011 EFH.<br>Suburban Resident: For child ages 0 to 6, the assumed rate is 10.1 m$^3$/day per Table 6-1 of the 2011 EFH. Weighted breathing rates are (10.1 m$^3$/day x 6 years + 16 m$^3$/day x 24 years) / 30 years = 14.8 m$^3$/day. The breathing rate from ages 0 to 6 ranges from 3.5 to 10.1 m$^3$/day, so using the highest rate is health-conservative. |
| Indirect Ingestion Rate | Ingestion rate of deposited dust transferred from structure surfaces to surfaces of hands, food, or other objects that contact the mouth | $3 \times 10^{-3}$ m$^2$/hour | $1.1 \times 10^{-4}$ m$^2$/hour | $6.9 \times 10^{-4}$ m$^2$/hour | Student: Table 6.5 of NUREG/CR-5512 (NRC 1992) contains indirect ingestion rates from studies primarily involving children. The rates range from $10^{-4}$ to $3 \times 10^{-3}$ m$^2$/hour. The highest of these values is selected.<br>Staff: Maximum realistic value for adults per NUREG/CR-6697 (NRC 2000a) is $1.1 \times 10^{-4}$ m$^2$/hour.<br>Suburban Resident: Weighted indirect ingestion rates are ($3 \times 10^{-3}$ m$^2$/hour x 6 years + $1.1 \times 10^{-4}$ m$^3$/hour x 24 years) / 30 years = $6.9 \times 10^{-4}$ m$^2$/hour. |
| Receptor Location | Coordinates of the receptor | 4.33, 4.33, 0.7 m | 4.33, 4.33, 1 m | | All: The receptor is located in the center of a square room with 75 m$^2$ of floor area.<br>Student: Estimated average waist height for kindergarten through fifth grade is 0.7 m.<br>Staff and Suburban Resident: Estimated average waist height for adults is 1 m. |

**Table G-1. RESRAD-BUILD Input Parameters (Continued)**

| Description | Parameter | Value | | | Basis for Selected Value |
|---|---|---|---|---|---|
| | | Student | Staff | Suburban Resident | |
| Thickness | Thickness of the shielding between the surfaces with radioactive material and the receptor location | 0 | | | No shielding of the radioactivity is assumed. |
| Density | Density of the shielding material | Not applicable | | | |
| Material | Identification of the shielding material | Not applicable | | | |
| Number of Sources | 1 floor and 4 walls | 5 | | | Floor and 4 walls. |
| Room Location | Sources are located in the scenario's room number 1 | 1 | | | Consistent with Room Number parameter. |
| Source Type | Surface of wall or floor | Area | | | The 'Area' parameter for Source Type reflects radioactivity on surfaces. |
| Source Direction | Axis perpendicular to the source wall or floor | Floor (z), 4 walls (x,y,x,y) | | | Establishes the axes for a three-dimensional room. |
| Source Location | Center point of the source wall or floor in the x, y, z direction | Floor:<br>4.33, 4.33, 0.0 m;<br>Walls:<br>0.0, 4.33, 1.0 m;<br>4.33, 8.66, 1.0 m;<br>8.66, 4.33, 1.0 m;<br>4.33, 0.0, 1.0 m | | | Based on a square room with 75 $m^2$ of floor area with radioactivity on the lower 2 m of the walls. |
| Source Geometry: Area | Area of the exposed surface over which the radioactivity is evenly distributed | 75, 17.32, 17.32, 17.32, 17.32 $m^2$ | | | Based on a square room with 75 $m^2$ of floor area with radioactivity on the lower 2 m of the walls. |
| Air Release Fraction | Fraction of the eroded material released into the air | 0.07 | | | Most likely value per NUREG/CR-6697 (NRC 2000a). |
| Direct Ingestion | Ingestion rate of dust transferred from structure surfaces to the mouth | $1.5 \times 10^{-7}$ | $5.6 \times 10^{-9}$ | $3.5 \times 10^{-8}$ | The RESRAD-BUILD default value is 0 because the direct ingestion rate is included in the RESRAD-BUILD code only for unlikely events when a receptor could directly ingest source material, such as during renovation activity. Despite none of these scenarios involving such activities, a non-zero value is included in this assessment. Per Table 2.2 of NUREG-6755, the direct ingestion can be calculated by dividing the indirect ingestion rate by the area of available surfaces (NRC 2002). The total surface area of pavement, floors, walls, and equipment at the HSD-JES is estimated to be 19,800 $m^2$; this estimate is created using available dimensions for surface area and walls but includes no area for equipment or furniture. |
| Removable Fraction | Fraction of the source that can be linearly removed throughout the exposure duration | 0.1 | | | NRC value from NUREG-1727 (NRC 2000b). Swipes were taken to measure removable radioactivity and all the results were less than the MDA. Therefore, any removable fraction greater than zero is health-conservative. |
| Erosion Lifetime | Amount of time in which the Removable Fraction of the source is linearly eroded | 10,000 days | | | Most likely value per NUREG/CR-6697 (NRC 2000a). |
| Slope/Conversion Factors Library | Library of multiplication factors that convert other input parameters into risk and dose estimates | Dose: DCFPAK3.02 (Age 5)<br>Risk: DCFPAK3.02 Morbidity | Dose: DCFPAK3.02 (Adult)<br>Risk: DCFPAK3.02 Morbidity | Dose: DCFPAK3.02 (Age 10)<br>Risk: DCFPAK3.02 Morbidity | All: DCFPAK 3.02 Morbidity reflects the most recent collection of risk multiplication factors for cancer occurring but not necessarily leading to death.<br>Student: DCFPAK 3.02 (Age 5) reflects the most recent collection of dose multiplication factors for children at age 5. The factors for age 5 result in a higher risk and dose than the factors for age 10.<br>Staff: DCFPAK 3.02 (Age 5) reflects the most recent collection of dose multiplication factors for adults.<br>Suburban Resident: DCFPAK 3.02 (Age 10) reflects the most recent collection of dose multiplication factors for children at age 10. This age was selected to represent weighted factors for adults at age 24 and for children at ages 0 to 6. |
| Radionuclide Library | Library of radionuclide decay information | ICRP 107 | | | Most recent collection of radionuclide decay chain and energy data. |
| Cut-Off Half-Life | Decay progeny with this half-life or less are automatically included in the calculation | 180 days | | | Selected so polonium-210, with its 138-day half-life, is assumed to be in secular equilibrium with lead-210. |

## DETERMINATION OF RADIONUCLIDE EXPOSURE POINT CONCENTRATIONS

Risk and dose for structures are determined by developing a source term and applying that source term to the receptor scenarios using RESRAD-BUILD. The source terms are based upon EPCs calculated from the fixed-point measurement data for the COCs and the lead-210 sample results for pavement sediment and indoor dust. Swipes were taken to measure removable radioactivity, and all results were less than the MDA. Thus, the results from swipes were not included in the EPC calculations.

EPCs are independently calculated for both biased and random fixed-point measurements. Area weighting of the two groups of results is conducted to ensure that biased fixed-point measurements do not cause the true average concentration term to be misrepresented (USEPA 1989). Structure EPCs were determined using the following process.

- The alpha and beta results from the fixed-point measurements (Appendix D of this FSSE) were summed to provide the total activity. No material background radionuclide levels are used in calculating the EPC values. For example, although the exterior brick had consistently higher fixed-point measurements because of higher concentrations of natural background radioactivity in brick, those higher natural background levels were not subtracted from the EPCs.
- The activity fractions for CWC properties downstream of Dunn Road are provided in Appendix D to the FSSP (USACE 2015) and duplicated in Table G-2 of this FSSE. Each total surface activity reading was multiplied by the corresponding CWC activity fraction to obtain results for each of the 11 COCs. The U-238, U-235, and Th-232 decay chains are accounted for in their entirety through these principal radionuclides. As stated in the *Technical Basis for Calculating Radiation Doses for the Building Occupancy Scenario Using the Probabilistic RESRAD-BUILD 3.0 Code,* "Currently, 67 radionuclides are included in the RESRADBUILD database. All 67 radionuclides have half-lives of 6 months or greater and are referred to as principal radionuclides. It is assumed that the short-lived progeny with half-lives of 6 months or less, referred to as the associated radionuclides, are in secular equilibrium with their parent principal radionuclide" (NRC 2002).

**Table G-2. CWC Activity Fractions**

| Radionuclide | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity Fraction | 0.0075 | 0.0036 | 0.0909 | 0.0379 | 0 | 0.0005 | 0.8306 | 0.0025 | 0.0131 | 0.0003 | 0.0131 |

- Pavement sediment and dust contributions of lead-210 are added to the amount of lead-210 based on the activity fraction calculations. The estimated area of pavement where sediment and dust have accumulated is 35 $m^2$. The average thickness of the pavement sediment and dust is less than 0.7 cm (i.e., a quarter inch). Although sediment density would be lower than soil density, soil density (1.5 $g/cm^3$) is used to overstate the surface activity. The total surface area of pavement, floors, walls, and equipment at the HSD-JES is estimated to be 19,800 $m^2$; this estimate is created using available dimensions for surface area and walls but includes no area for equipment or furniture.

$$Lead^{210}_{pav\ sed,dust} = \frac{Area_{pav\ sed,dust} * Thickness_{pav\ sed,dust} * Density * Lead^{210}_{concentration} * 2.22\ dpm/pCi}{Area_{all\ surfaces}}$$

$$Lead^{210}_{pav\ sed} = \frac{35\ m^2 * 0.7\ cm * 1.5\ g/cm^3 * 46.9\ pCi/g * 2.22\ dpm/pCi}{19800\ m^2} = 0.193\ dpm/cm^2$$

$$Lead^{210}_{pav\ sed} = 19.3\ dpm/100\ cm^2$$

Total surface activity values for each COC were entered into ProUCL Version 5.2 to determine a 95 percent upper confidence limit ($UCL_{95}$) value for the average of the total surface activity for each COC. This was done for both the biased and random measurements datasets.

- Each biased measurement is assumed to represent an area of 1 $m^2$, and 160 biased measurements were collected. The area represented by the random measurements is calculated by subtracting the total biased area from the total area. Next, these areas are used to calculate a weighted average of the $UCL_{95}$ values. According to RAGS Part A (USEPA 1989), purposive (i.e., biased) sampling should not be used to provide defensible information for a risk assessment. To be conservative, instead of eliminating the potentially higher biased fixed-point measurements as recommended by USEPA guidance, the random and biased fixed-point measurements are area-weighted to calculate the EPCs for input to RESRAD-BUILD. The following equation is for the area-weighted calculation.

$$EPC_{combined} = \frac{EPC_{random} * Area_{random} + EPC_{biased} * Area_{biased}}{Area_{combined}}$$

- The area-weighted total surface activity $UCL_{95}$ value for each COC was multiplied by a conversion factor (i.e., 45.045 pCi – 100 $cm^2$/dpm – $m^2$) to convert units from dpm/100 $cm^2$ to pCi/$m^2$.
- The structure EPCs are listed in Table G-3. EPC calculations (including ProUCL output files) are included as Attachment G-1.

**Table G-3. Jana Elementary School Structure Exposure Point Concentrations**

| | Area ($m^2$) | Statistic | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (dpm/100 $cm^2$) | | | | | | | | | | |
| Random Measurements | 19,640 | Maximum | 19.05 | 9.14 | 230.9 | 96.25 | NA | 1.27 | 2,109 | 6.35 | 33.27 | 0.76 | 33.27 |
| | | Distribution[a] | X | X | X | X | X | X | X | X | X | X | X |
| | | $UCL_{95}$ | 4.26 | 2.05 | 51.66 | 21.54 | NA | 0.28 | 472.1 | 1.42 | 7.45 | 0.17 | 7.45 |
| Biased Measurements | 160 | Maximum | 22.86 | 10.97 | 277.1 | 115.5 | NA | 1.52 | 2,532 | 7.62 | 39.93 | 0.91 | 39.93 |
| | | Distribution[a] | X | X | X | X | X | X | X | X | X | X | X |
| | | $UCL_{95}$ | 5.76 | 2.76 | 69.77 | 29.09 | NA | 0.38 | 637.5 | 1.92 | 10.05 | 0.23 | 10.05 |
| Combined | 19,800 | Weighted Average $UCL_{95}$ | 4.27 | 2.06 | 51.81 | 21.60 | NA | 0.28 | 473.4 | 1.42 | 7.47 | 0.17 | 7.47 |
| Assumed Lead-210 in Pavement Sediment | | | | | 19.3 | | | | | | | | |
| Total Lead-210 | | | | | 71.1 | | | | | | | | |
| **Units Conversion** | | | **Ac-227** | **Pa-231** | **Pb-210** | **Ra-226** | **Ra-228** | **Th-228** | **Th-230** | **Th-232** | **U-234** | **U-235** | **U-238** |
| Conversion Factor (dpm/100 $cm^2$ per pCi/$m^2$)[b] | | | 45.05 | | | | | | | | | | |
| EPC (pCi/$m^2$) | | | 192 | 93 | 3,203 | 973 | NA | 13 | 21,326 | 64 | 337 | 8 | 337 |

[a] Distribution: X = Non-Parametric.

[b] Conversion factor: gross activity (pCi/$m^2$) = gross activity (dpm/100 $cm^2$) * 10,000 $cm^2/m^2$ * 1 pCi/2.22 dpm = 45.045 dpm/100 $cm^2$ per pCi/$m^2$.

Note:

NA - not applicable

From the EPCs and other parameters, RESRAD-BUILD calculates the contribution from the following pathways: external directly from the source, external from suspension in air, external from deposition on the floor, ingestion of source, ingestion of deposition, inhalation, and radon.

## RADIOLOGICAL RISK AND DOSE ASSESSMENT RESULTS

The radiological risk and dose to the student, staff, and suburban resident receptors from these structure surfaces are summarized in Table G-4. When compared to the CERCLA risk range and benchmark dose criteria, the results of this risk and dose assessment confirm that the investigated structures associated with the Jana Elementary School are protective of human health and the environment and meet the criteria for UUUE. RESRAD-BUILD output files for all modeled scenarios are included as Attachment G-2.

**Table G-4. Results of Jana Elementary School Structure Surfaces Risk and Dose Assessment**

| Receptor | Year of Maximum | Maximum Risk[a] | Maximum Dose (mrem/year)[b] |
|---|---|---|---|
| Student | 0 | $3.8 \times 10^{-6}$ | 4.7 |
| Staff | 0 | $2.2 \times 10^{-6}$ | 0.4 |
| Suburban Resident | 0 | $1.4 \times 10^{-5}$ | 2.7 |

[a] When estimating cancer risk, predictions indicated a lifetime risk level for an exposed individual and how many additional cancer cases might occur in a population of exposed people (i.e., $1 \times 10^{-6}$ is equal to one additional case in a population of one million). These cancers may or may not occur, but should they occur, they would be in addition to cancers from other causes, such as smoking tobacco or obesity.

[b] The maximum dose results reported in RESRAD-BUILD are cumulative to the receptor over the exposure duration. Therefore, the maximum reported dose was divided by the scenario's exposure duration in years to calculate the annual dose to the receptor.

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# ATTACHMENT G-1

# EPC CALCULATIONS FILE AND ProUCL OUTPUT FILES

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**Determination of Exposure Point Concentration for Jana Elementary School Interior Fixed Measurement Data**

| STSU | Area ($m^2$) | Statistic | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228[a] | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ($dpm/100\ cm^2$) | | | | | | | | | | |
| Random Measurements | 19,640 | Maximum | 19.05 | 9.14 | 230.9 | 96.25 | NA | 1.27 | 2,109 | 6.35 | 33.27 | 0.76 | 33.27 |
| | | Distribution[b] | X | X | X | X | X | X | X | X | X | X | X |
| | | $UCL_{95}$ | 4.26 | 2.05 | 51.66 | 21.54 | NA | 0.28 | 472.1 | 1.42 | 7.45 | 0.17 | 7.45 |
| Biased Measurements | 160 | Maximum | 22.86 | 10.97 | 277.1 | 115.5 | NA | 1.52 | 2,532 | 7.62 | 39.93 | 0.91 | 39.93 |
| | | Distribution[b] | X | X | X | X | X | X | X | X | X | X | X |
| | | $UCL_{95}$ | 5.76 | 2.76 | 69.77 | 29.09 | NA | 0.38 | 637.5 | 1.92 | 10.05 | 0.23 | 10.05 |
| Combined Area | 19,800 | EPC | 4.27 | 2.06 | 51.81 | 21.60 | NA | 0.28 | 473.4 | 1.42 | 7.47 | 0.17 | 7.47 |
| Lead-210 in Pavement Sediment | | | | | 19.30 | | | | | | | | |
| Total Lead-210 | | | | | 71.11 | | | | | | | | |

[a] CWC activity fraction for Ra-228 is 0; therefore, no EPC for Ra-228 exists.

[b] Distribution: X = Normal

$$Lead^{210}_{pav\ sed.dust} = \frac{Area_{pav\ sed.dust} * Thickness_{pav\ sed.dust} * Density * Lead^{210}_{concentration} * 2.22\ dpm/pCi}{Area_{all\ surfaces}}$$

$$Lead^{210}_{pav\ sed} = \frac{35\ m^2 * 2\ cm * 1.5\ g/cm^3 * 46.9\ pCi/g * 2.22\ dpm/pCi}{10744\ m^2} = 1.017\ dpm/cm^2$$

$$Lead^{210}_{pav\ sed} = 101.7\ dpm/100\ cm^2$$

**Conversion to $pCi/m^2$ for RESRAD-BUILD Input**

| Conversion Factor ($cm^2$-$pCi/m^2$-dpm)[a] | 45.045 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EPC ($pCi/m^2$) | 192 | 93 | 3,203 | 973 | NA | 13 | 21,326 | 64 | 337 | 8 | 337 |

[a] Conversion factor: gross activity ($pCi/m^2$) = gross activity ($dpm/100\ cm^2$) * 10,000 $cm^2/m^2$ * 1 pCi/2.22 dpm = 45.045

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| CWC Activity Fractions | | | | | 0.0075 | 0.0036 | 0.0909 | 0.0379 | 0 | 0.0005 | 0.8306 | 0.0025 | 0.0131 | 0.0003 | 0.0131 |
| Maximum | | | | | 19.05 | 9.14 | 230.86 | 96.25 | 0.00 | 1.27 | 2109.48 | 6.35 | 33.27 | 0.76 | 33.27 |
| 1 | 1 | 102 | 0 | 102 | 0.76 | 0.37 | 9.25 | 3.86 | 0.00 | 0.05 | 84.51 | 0.25 | 1.33 | 0.03 | 1.33 |
| 1 | 2 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 3 | 77 | 0 | 77 | 0.58 | 0.28 | 7.03 | 2.93 | 0.00 | 0.04 | 64.22 | 0.19 | 1.01 | 0.02 | 1.01 |
| 1 | 4 | 41 | 383 | 424 | 3.18 | 1.53 | 38.54 | 16.07 | 0.00 | 0.21 | 352.14 | 1.06 | 5.55 | 0.13 | 5.55 |
| 1 | 5 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 6 | 77 | 0 | 77 | 0.58 | 0.28 | 7.03 | 2.93 | 0.00 | 0.04 | 64.22 | 0.19 | 1.01 | 0.02 | 1.01 |
| 1 | 7 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 8 | 16 | 169 | 186 | 1.39 | 0.67 | 16.87 | 7.03 | 0.00 | 0.09 | 154.16 | 0.46 | 2.43 | 0.06 | 2.43 |
| 1 | 9 | 187 | 187 | 374 | 2.81 | 1.35 | 34.04 | 14.19 | 0.00 | 0.19 | 311.00 | 0.94 | 4.90 | 0.11 | 4.90 |
| 1 | 10 | 4 | 0 | 4 | 0.03 | 0.01 | 0.37 | 0.15 | 0.00 | 0.00 | 3.35 | 0.01 | 0.05 | 0.00 | 0.05 |
| 1 | 11 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 12 | 151 | 0 | 151 | 1.13 | 0.54 | 13.69 | 5.71 | 0.00 | 0.08 | 125.08 | 0.38 | 1.97 | 0.05 | 1.97 |
| 1 | 13 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | 14 | 102 | 36 | 137 | 1.03 | 0.49 | 12.49 | 5.21 | 0.00 | 0.07 | 114.12 | 0.34 | 1.80 | 0.04 | 1.80 |
| 1 | 15 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |
| 1 | 16 | 41 | 0 | 41 | 0.31 | 0.15 | 3.70 | 1.54 | 0.00 | 0.02 | 33.78 | 0.10 | 0.53 | 0.01 | 0.53 |
| 1 | 17 | 77 | 45 | 122 | 0.91 | 0.44 | 11.08 | 4.62 | 0.00 | 0.06 | 101.23 | 0.30 | 1.60 | 0.04 | 1.60 |
| 1 | 18 | 65 | 18 | 83 | 0.62 | 0.30 | 7.54 | 3.14 | 0.00 | 0.04 | 68.88 | 0.21 | 1.09 | 0.02 | 1.09 |
| 1 | 19 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |
| 1 | 20 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 21 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 22 | 41 | 27 | 67 | 0.51 | 0.24 | 6.13 | 2.55 | 0.00 | 0.03 | 55.99 | 0.17 | 0.88 | 0.02 | 0.88 |
| 1 | 23 | 126 | 357 | 483 | 3.62 | 1.74 | 43.88 | 18.29 | 0.00 | 0.24 | 400.94 | 1.21 | 6.32 | 0.14 | 6.32 |
| 1 | 24 | 65 | 169 | 234 | 1.76 | 0.84 | 21.31 | 8.89 | 0.00 | 0.12 | 194.74 | 0.59 | 3.07 | 0.07 | 3.07 |
| 1 | 25 | 138 | 214 | 352 | 2.64 | 1.27 | 32.02 | 13.35 | 0.00 | 0.18 | 292.63 | 0.88 | 4.62 | 0.11 | 4.62 |
| 1 | 26 | 4 | 0 | 4 | 0.03 | 0.01 | 0.37 | 0.15 | 0.00 | 0.00 | 3.35 | 0.01 | 0.05 | 0.00 | 0.05 |
| 1 | 27 | 102 | 0 | 102 | 0.76 | 0.37 | 9.25 | 3.86 | 0.00 | 0.05 | 84.51 | 0.25 | 1.33 | 0.03 | 1.33 |
| 1 | 28 | 4 | 0 | 4 | 0.03 | 0.01 | 0.37 | 0.15 | 0.00 | 0.00 | 3.35 | 0.01 | 0.05 | 0.00 | 0.05 |
| 1 | 29 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 30 | 114 | 0 | 114 | 0.85 | 0.41 | 10.36 | 4.32 | 0.00 | 0.06 | 94.65 | 0.28 | 1.49 | 0.03 | 1.49 |
| 1 | 31 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |
| 1 | 32 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 33 | 151 | 0 | 151 | 1.13 | 0.54 | 13.69 | 5.71 | 0.00 | 0.08 | 125.08 | 0.38 | 1.97 | 0.05 | 1.97 |
| 1 | 34 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | 35 | 53 | 508 | 561 | 4.21 | 2.02 | 50.99 | 21.26 | 0.00 | 0.28 | 465.94 | 1.40 | 7.35 | 0.17 | 7.35 |
| 1 | 36 | 114 | 0 | 114 | 0.85 | 0.41 | 10.36 | 4.32 | 0.00 | 0.06 | 94.65 | 0.28 | 1.49 | 0.03 | 1.49 |
| 1 | 37 | 102 | 0 | 102 | 0.76 | 0.37 | 9.25 | 3.86 | 0.00 | 0.05 | 84.51 | 0.25 | 1.33 | 0.03 | 1.33 |
| 1 | 38 | 4 | 0 | 4 | 0.03 | 0.01 | 0.37 | 0.15 | 0.00 | 0.00 | 3.35 | 0.01 | 0.05 | 0.00 | 0.05 |
| 1 | 39 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 40 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |
| 1 | 41 | 90 | 0 | 90 | 0.67 | 0.32 | 8.14 | 3.39 | 0.00 | 0.04 | 74.36 | 0.22 | 1.17 | 0.03 | 1.17 |
| 1 | 42 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 43 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 1 | 44 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 45 | 16 | 0 | 16 | 0.12 | 0.06 | 1.48 | 0.62 | 0.00 | 0.01 | 13.49 | 0.04 | 0.21 | 0.00 | 0.21 |
| 1 | 46 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 47 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 1 | 48 | 28 | 0 | 28 | 0.21 | 0.10 | 2.59 | 1.08 | 0.00 | 0.01 | 23.64 | 0.07 | 0.37 | 0.01 | 0.37 |
| 1 | 49 | 41 | 0 | 41 | 0.31 | 0.15 | 3.70 | 1.54 | 0.00 | 0.02 | 33.78 | 0.10 | 0.53 | 0.01 | 0.53 |
| 1 | 50 | 53 | 0 | 53 | 0.40 | 0.19 | 4.81 | 2.00 | 0.00 | 0.03 | 43.93 | 0.13 | 0.69 | 0.02 | 0.69 |
| 2 | 1 | 17 | 0 | 17 | 0.13 | 0.06 | 1.56 | 0.65 | 0.00 | 0.01 | 14.27 | 0.04 | 0.23 | 0.01 | 0.23 |
| 2 | 2 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 3 | 27 | 0 | 27 | 0.21 | 0.10 | 2.50 | 1.04 | 0.00 | 0.01 | 22.82 | 0.07 | 0.36 | 0.01 | 0.36 |
| 2 | 4 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 5 | 38 | 0 | 38 | 0.28 | 0.14 | 3.43 | 1.43 | 0.00 | 0.02 | 31.37 | 0.09 | 0.49 | 0.01 | 0.49 |
| 2 | 6 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 7 | 38 | 0 | 38 | 0.28 | 0.14 | 3.43 | 1.43 | 0.00 | 0.02 | 31.37 | 0.09 | 0.49 | 0.01 | 0.49 |
| 2 | 8 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 9 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 10 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 11 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 12 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 13 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 14 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 15 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 16 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 17 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 18 | 27 | 0 | 27 | 0.21 | 0.10 | 2.50 | 1.04 | 0.00 | 0.01 | 22.82 | 0.07 | 0.36 | 0.01 | 0.36 |
| 2 | 19 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 2 | 20 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 3 | 1 | 183 | 0 | 183 | 1.37 | 0.66 | 16.65 | 6.94 | 0.00 | 0.09 | 152.17 | 0.46 | 2.40 | 0.05 | 2.40 |
| 3 | 2 | 147 | 0 | 147 | 1.10 | 0.53 | 13.32 | 5.55 | 0.00 | 0.07 | 121.74 | 0.37 | 1.92 | 0.04 | 1.92 |
| 3 | 3 | 24 | 80 | 105 | 0.78 | 0.38 | 9.51 | 3.97 | 0.00 | 0.05 | 86.92 | 0.26 | 1.37 | 0.03 | 1.37 |
| 3 | 4 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |
| 3 | 5 | 98 | 437 | 534 | 4.01 | 1.92 | 48.58 | 20.26 | 0.00 | 0.27 | 443.94 | 1.34 | 7.00 | 0.16 | 7.00 |
| 3 | 6 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 7 | 24 | 178 | 203 | 1.52 | 0.73 | 18.43 | 7.68 | 0.00 | 0.10 | 168.36 | 0.51 | 2.66 | 0.06 | 2.66 |
| 3 | 8 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |
| 3 | 9 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 10 | 37 | 544 | 580 | 4.35 | 2.09 | 52.76 | 22.00 | 0.00 | 0.29 | 482.06 | 1.45 | 7.60 | 0.17 | 7.60 |
| 3 | 11 | 85 | 0 | 85 | 0.64 | 0.31 | 7.77 | 3.24 | 0.00 | 0.04 | 71.01 | 0.21 | 1.12 | 0.03 | 1.12 |
| 3 | 12 | 134 | 143 | 277 | 2.08 | 1.00 | 25.18 | 10.50 | 0.00 | 0.14 | 230.05 | 0.69 | 3.63 | 0.08 | 3.63 |
| 3 | 13 | 73 | 579 | 653 | 4.90 | 2.35 | 59.33 | 24.74 | 0.00 | 0.33 | 542.11 | 1.63 | 8.55 | 0.20 | 8.55 |
| 3 | 14 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 15 | 122 | 0 | 122 | 0.92 | 0.44 | 11.10 | 4.63 | 0.00 | 0.06 | 101.45 | 0.31 | 1.60 | 0.04 | 1.60 |
| 3 | 16 | 85 | 0 | 85 | 0.64 | 0.31 | 7.77 | 3.24 | 0.00 | 0.04 | 71.01 | 0.21 | 1.12 | 0.03 | 1.12 |
| 3 | 17 | 134 | 0 | 134 | 1.01 | 0.48 | 12.21 | 5.09 | 0.00 | 0.07 | 111.59 | 0.34 | 1.76 | 0.04 | 1.76 |
| 3 | 18 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 19 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 3 | 20 | 24 | 0 | 24 | 0.18 | 0.09 | 2.22 | 0.93 | 0.00 | 0.01 | 20.29 | 0.06 | 0.32 | 0.01 | 0.32 |
| 3 | 21 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 22 | 208 | 0 | 208 | 1.56 | 0.75 | 18.87 | 7.87 | 0.00 | 0.10 | 172.46 | 0.52 | 2.72 | 0.06 | 2.72 |
| 3 | 23 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 24 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |
| 3 | 25 | 98 | 0 | 98 | 0.73 | 0.35 | 8.88 | 3.70 | 0.00 | 0.05 | 81.16 | 0.24 | 1.28 | 0.03 | 1.28 |
| 3 | 26 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 27 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 28 | 98 | 606 | 704 | 5.28 | 2.53 | 63.98 | 26.68 | 0.00 | 0.35 | 584.61 | 1.76 | 9.22 | 0.21 | 9.22 |
| 3 | 29 | 85 | 223 | 308 | 2.31 | 1.11 | 28.03 | 11.69 | 0.00 | 0.15 | 256.11 | 0.77 | 4.04 | 0.09 | 4.04 |
| 3 | 30 | 61 | 1,310 | 1,371 | 10.29 | 4.94 | 124.66 | 51.98 | 0.00 | 0.69 | 1139.06 | 3.43 | 17.97 | 0.41 | 17.97 |
| 3 | 31 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 32 | 98 | 0 | 98 | 0.73 | 0.35 | 8.88 | 3.70 | 0.00 | 0.05 | 81.16 | 0.24 | 1.28 | 0.03 | 1.28 |
| 3 | 33 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 34 | 85 | 392 | 478 | 3.58 | 1.72 | 43.42 | 18.10 | 0.00 | 0.24 | 396.77 | 1.19 | 6.26 | 0.14 | 6.26 |
| 3 | 35 | 49 | 205 | 254 | 1.90 | 0.91 | 23.08 | 9.62 | 0.00 | 0.13 | 210.86 | 0.63 | 3.33 | 0.08 | 3.33 |
| 3 | 36 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |
| 3 | 37 | 110 | 223 | 333 | 2.50 | 1.20 | 30.25 | 12.61 | 0.00 | 0.17 | 276.39 | 0.83 | 4.36 | 0.10 | 4.36 |
| 3 | 38 | 37 | 348 | 384 | 2.88 | 1.38 | 34.93 | 14.56 | 0.00 | 0.19 | 319.18 | 0.96 | 5.03 | 0.12 | 5.03 |
| 3 | 39 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 40 | 61 | 0 | 61 | 0.46 | 0.22 | 5.55 | 2.31 | 0.00 | 0.03 | 50.72 | 0.15 | 0.80 | 0.02 | 0.80 |
| 3 | 41 | 110 | 107 | 217 | 1.63 | 0.78 | 19.72 | 8.22 | 0.00 | 0.11 | 180.15 | 0.54 | 2.84 | 0.07 | 2.84 |
| 3 | 42 | 49 | 464 | 512 | 3.84 | 1.84 | 46.57 | 19.42 | 0.00 | 0.26 | 425.57 | 1.28 | 6.71 | 0.15 | 6.71 |
| 3 | 43 | 220 | 1,578 | 1,798 | 13.48 | 6.47 | 163.40 | 68.13 | 0.00 | 0.90 | 1493.06 | 4.49 | 23.55 | 0.54 | 23.55 |
| 3 | 44 | 122 | 357 | 479 | 3.59 | 1.72 | 43.51 | 18.14 | 0.00 | 0.24 | 397.59 | 1.20 | 6.27 | 0.14 | 6.27 |
| 3 | 45 | 37 | 0 | 37 | 0.27 | 0.13 | 3.33 | 1.39 | 0.00 | 0.02 | 30.43 | 0.09 | 0.48 | 0.01 | 0.48 |
| 3 | 46 | 98 | 0 | 98 | 0.73 | 0.35 | 8.88 | 3.70 | 0.00 | 0.05 | 81.16 | 0.24 | 1.28 | 0.03 | 1.28 |
| 3 | 47 | 85 | 0 | 85 | 0.64 | 0.31 | 7.77 | 3.24 | 0.00 | 0.04 | 71.01 | 0.21 | 1.12 | 0.03 | 1.12 |
| 3 | 48 | 73 | 0 | 73 | 0.55 | 0.26 | 6.66 | 2.78 | 0.00 | 0.04 | 60.87 | 0.18 | 0.96 | 0.02 | 0.96 |
| 3 | 49 | 195 | 2,344 | 2,540 | 19.05 | 9.14 | 230.86 | 96.25 | 0.00 | 1.27 | 2109.48 | 6.35 | 33.27 | 0.76 | 33.27 |
| 3 | 50 | 73 | 53 | 127 | 0.95 | 0.46 | 11.52 | 4.80 | 0.00 | 0.06 | 105.29 | 0.32 | 1.66 | 0.04 | 1.66 |
| 4 | 1 | 17 | 0 | 17 | 0.13 | 0.06 | 1.56 | 0.65 | 0.00 | 0.01 | 14.27 | 0.04 | 0.23 | 0.01 | 0.23 |
| 4 | 2 | 192 | 2,146 | 2,338 | 17.53 | 8.42 | 212.49 | 88.60 | 0.00 | 1.17 | 1941.64 | 5.84 | 30.62 | 0.70 | 30.62 |
| 4 | 3 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 4 | 27 | 0 | 27 | 0.21 | 0.10 | 2.50 | 1.04 | 0.00 | 0.01 | 22.82 | 0.07 | 0.36 | 0.01 | 0.36 |
| 4 | 5 | 17 | 0 | 17 | 0.13 | 0.06 | 1.56 | 0.65 | 0.00 | 0.01 | 14.27 | 0.04 | 0.23 | 0.01 | 0.23 |
| 4 | 6 | 27 | 242 | 269 | 2.02 | 0.97 | 24.46 | 10.20 | 0.00 | 0.13 | 223.53 | 0.67 | 3.53 | 0.08 | 3.53 |
| 4 | 7 | 58 | 249 | 307 | 2.30 | 1.11 | 27.93 | 11.65 | 0.00 | 0.15 | 255.25 | 0.77 | 4.03 | 0.09 | 4.03 |
| 4 | 8 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 4 | 9 | 48 | 0 | 48 | 0.36 | 0.17 | 4.37 | 1.82 | 0.00 | 0.02 | 39.91 | 0.12 | 0.63 | 0.01 | 0.63 |
| 4 | 10 | 7 | 425 | 432 | 3.24 | 1.55 | 39.23 | 16.36 | 0.00 | 0.22 | 358.49 | 1.08 | 5.65 | 0.13 | 5.65 |
| 4 | 11 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 4 | 12 | 0 | 205 | 205 | 1.54 | 0.74 | 18.64 | 7.77 | 0.00 | 0.10 | 170.30 | 0.51 | 2.69 | 0.06 | 2.69 |
| 4 | 13 | 58 | 1,369 | 1,428 | 10.71 | 5.14 | 129.78 | 54.11 | 0.00 | 0.71 | 1185.83 | 3.57 | 18.70 | 0.43 | 18.70 |
| 4 | 14 | 7 | 0 | 7 | 0.05 | 0.02 | 0.63 | 0.26 | 0.00 | 0.00 | 5.73 | 0.02 | 0.09 | 0.00 | 0.09 |
| 4 | 15 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 4 | 16 | 38 | 0 | 38 | 0.28 | 0.14 | 3.43 | 1.43 | 0.00 | 0.02 | 31.37 | 0.09 | 0.49 | 0.01 | 0.49 |
| 4 | 17 | 0 | 220 | 220 | 1.65 | 0.79 | 19.97 | 8.33 | 0.00 | 0.11 | 182.47 | 0.55 | 2.88 | 0.07 | 2.88 |
| 4 | 18 | 0 | 176 | 176 | 1.32 | 0.63 | 15.98 | 6.66 | 0.00 | 0.09 | 145.97 | 0.44 | 2.30 | 0.05 | 2.30 |
| 4 | 19 | 17 | 0 | 17 | 0.13 | 0.06 | 1.56 | 0.65 | 0.00 | 0.01 | 14.27 | 0.04 | 0.23 | 0.01 | 0.23 |
| 4 | 20 | 27 | 0 | 27 | 0.21 | 0.10 | 2.50 | 1.04 | 0.00 | 0.01 | 22.82 | 0.07 | 0.36 | 0.01 | 0.36 |
| 5 | 1 | 81 | 1,277 | 1,358 | 10.19 | 4.89 | 123.45 | 51.47 | 0.00 | 0.68 | 1128.06 | 3.40 | 17.79 | 0.41 | 17.79 |
| 5 | 2 | 30 | 1,621 | 1,651 | 12.38 | 5.94 | 150.04 | 62.56 | 0.00 | 0.83 | 1371.03 | 4.13 | 21.62 | 0.50 | 21.62 |
| 5 | 3 | 71 | 1,713 | 1,785 | 13.38 | 6.42 | 162.22 | 67.64 | 0.00 | 0.89 | 1482.26 | 4.46 | 23.38 | 0.54 | 23.38 |
| 5 | 4 | 32 | 1,373 | 1,406 | 10.54 | 5.06 | 127.79 | 53.28 | 0.00 | 0.70 | 1167.69 | 3.51 | 18.42 | 0.42 | 18.42 |
| 5 | 5 | 37 | 1,345 | 1,382 | 10.37 | 4.98 | 125.65 | 52.39 | 0.00 | 0.69 | 1148.09 | 3.46 | 18.11 | 0.41 | 18.11 |
| 5 | 6 | 52 | 1,447 | 1,499 | 11.25 | 5.40 | 136.30 | 56.83 | 0.00 | 0.75 | 1245.45 | 3.75 | 19.64 | 0.45 | 19.64 |
| 5 | 7 | 37 | 0 | 37 | 0.28 | 0.13 | 3.35 | 1.40 | 0.00 | 0.02 | 30.63 | 0.09 | 0.48 | 0.01 | 0.48 |
| 5 | 8 | 32 | 1,423 | 1,455 | 10.92 | 5.24 | 132.30 | 55.16 | 0.00 | 0.73 | 1208.85 | 3.64 | 19.07 | 0.44 | 19.07 |
| 5 | 9 | 32 | 1,473 | 1,505 | 11.29 | 5.42 | 136.80 | 57.04 | 0.00 | 0.75 | 1250.02 | 3.76 | 19.71 | 0.45 | 19.71 |
| 5 | 10 | 26 | 0 | 26 | 0.19 | 0.09 | 2.35 | 0.98 | 0.00 | 0.01 | 21.43 | 0.06 | 0.34 | 0.01 | 0.34 |
| 5 | 11 | 23 | 1,742 | 1,764 | 13.23 | 6.35 | 160.37 | 66.87 | 0.00 | 0.88 | 1465.39 | 4.41 | 23.11 | 0.53 | 23.11 |
| 5 | 12 | 97 | 1,513 | 1,611 | 12.08 | 5.80 | 146.40 | 61.04 | 0.00 | 0.81 | 1337.70 | 4.03 | 21.10 | 0.48 | 21.10 |
| 5 | 13 | 48 | 1,535 | 1,583 | 11.88 | 5.70 | 143.93 | 60.01 | 0.00 | 0.79 | 1315.12 | 3.96 | 20.74 | 0.48 | 20.74 |
| 5 | 14 | 13 | 2,308 | 2,321 | 17.41 | 8.36 | 210.97 | 87.96 | 0.00 | 1.16 | 1927.74 | 5.80 | 30.40 | 0.70 | 30.40 |
| 5 | 15 | 4 | 0 | 4 | 0.03 | 0.01 | 0.33 | 0.14 | 0.00 | 0.00 | 3.03 | 0.01 | 0.05 | 0.00 | 0.05 |
| 5 | 16 | 30 | 1,290 | 1,320 | 9.90 | 4.75 | 119.98 | 50.02 | 0.00 | 0.66 | 1096.31 | 3.30 | 17.29 | 0.40 | 17.29 |
| 5 | 17 | 48 | 2,143 | 2,191 | 16.44 | 7.89 | 199.20 | 83.05 | 0.00 | 1.10 | 1820.19 | 5.48 | 28.71 | 0.66 | 28.71 |
| 5 | 18 | 32 | 1,529 | 1,562 | 11.71 | 5.62 | 141.95 | 59.18 | 0.00 | 0.78 | 1297.06 | 3.90 | 20.46 | 0.47 | 20.46 |
| 5 | 19 | 26 | 927 | 953 | 7.15 | 3.43 | 86.64 | 36.12 | 0.00 | 0.48 | 791.66 | 2.38 | 12.49 | 0.29 | 12.49 |
| 5 | 20 | 75 | 1,637 | 1,712 | 12.84 | 6.16 | 155.63 | 64.89 | 0.00 | 0.86 | 1422.07 | 4.28 | 22.43 | 0.51 | 22.43 |
| 5 | 21 | 23 | 1,331 | 1,354 | 10.15 | 4.87 | 123.05 | 51.30 | 0.00 | 0.68 | 1124.33 | 3.38 | 17.73 | 0.41 | 17.73 |
| 5 | 22 | 81 | 2,090 | 2,171 | 16.29 | 7.82 | 197.38 | 82.30 | 0.00 | 1.09 | 1803.58 | 5.43 | 28.45 | 0.65 | 28.45 |
| 5 | 23 | 32 | 0 | 32 | 0.24 | 0.12 | 2.94 | 1.23 | 0.00 | 0.02 | 26.90 | 0.08 | 0.42 | 0.01 | 0.42 |
| 5 | 24 | 15 | 806 | 820 | 6.15 | 2.95 | 74.58 | 31.09 | 0.00 | 0.41 | 681.45 | 2.05 | 10.75 | 0.25 | 10.75 |
| 5 | 25 | 59 | 1,893 | 1,952 | 14.64 | 7.03 | 177.41 | 73.97 | 0.00 | 0.98 | 1621.04 | 4.88 | 25.57 | 0.59 | 25.57 |
| 5 | 26 | 59 | 1,133 | 1,192 | 8.94 | 4.29 | 108.31 | 45.16 | 0.00 | 0.60 | 989.71 | 2.98 | 15.61 | 0.36 | 15.61 |
| 5 | 27 | 32 | 658 | 691 | 5.18 | 2.49 | 62.79 | 26.18 | 0.00 | 0.35 | 573.78 | 1.73 | 9.05 | 0.21 | 9.05 |
| 5 | 28 | 48 | 806 | 854 | 6.40 | 3.07 | 77.60 | 32.35 | 0.00 | 0.43 | 709.04 | 2.13 | 11.18 | 0.26 | 11.18 |
| 5 | 29 | 32 | 892 | 924 | 6.93 | 3.33 | 84.03 | 35.04 | 0.00 | 0.46 | 767.83 | 2.31 | 12.11 | 0.28 | 12.11 |
| 5 | 30 | 52 | 800 | 852 | 6.39 | 3.07 | 77.43 | 32.28 | 0.00 | 0.43 | 707.54 | 2.13 | 11.16 | 0.26 | 11.16 |
| 5 | 31 | 0 | 1,011 | 1,011 | 7.58 | 3.64 | 91.89 | 38.31 | 0.00 | 0.51 | 839.68 | 2.53 | 13.24 | 0.30 | 13.24 |
| 5 | 32 | 13 | 1,041 | 1,054 | 7.90 | 3.79 | 95.78 | 39.93 | 0.00 | 0.53 | 875.16 | 2.63 | 13.80 | 0.32 | 13.80 |
| 5 | 33 | 11 | 1,110 | 1,121 | 8.41 | 4.03 | 101.88 | 42.48 | 0.00 | 0.56 | 930.95 | 2.80 | 14.68 | 0.34 | 14.68 |
| 5 | 34 | 0 | 777 | 777 | 5.83 | 2.80 | 70.65 | 29.46 | 0.00 | 0.39 | 645.59 | 1.94 | 10.18 | 0.23 | 10.18 |
| 5 | 35 | 81 | 1,097 | 1,178 | 8.84 | 4.24 | 107.11 | 44.66 | 0.00 | 0.59 | 978.75 | 2.95 | 15.44 | 0.35 | 15.44 |
| 5 | 36 | 13 | 977 | 990 | 7.42 | 3.56 | 89.98 | 37.52 | 0.00 | 0.49 | 822.23 | 2.47 | 12.97 | 0.30 | 12.97 |
| 5 | 37 | 0 | 1,604 | 1,604 | 12.03 | 5.77 | 145.79 | 60.78 | 0.00 | 0.80 | 1332.12 | 4.01 | 21.01 | 0.48 | 21.01 |
| 5 | 38 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 39 | 22 | 1,254 | 1,276 | 9.57 | 4.59 | 116.02 | 48.37 | 0.00 | 0.64 | 1060.10 | 3.19 | 16.72 | 0.38 | 16.72 |
| 5 | 40 | 32 | 1,713 | 1,746 | 13.09 | 6.28 | 158.68 | 66.16 | 0.00 | 0.87 | 1449.95 | 4.36 | 22.87 | 0.52 | 22.87 |
| 5 | 41 | 26 | 1,588 | 1,614 | 12.10 | 5.81 | 146.69 | 61.16 | 0.00 | 0.81 | 1340.39 | 4.03 | 21.14 | 0.48 | 21.14 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 5 | 42 | 0 | 864 | 864 | 6.48 | 3.11 | 78.51 | 32.73 | 0.00 | 0.43 | 717.40 | 2.16 | 11.31 | 0.26 | 11.31 |
| 5 | 43 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 44 | 33 | 0 | 33 | 0.25 | 0.12 | 3.02 | 1.26 | 0.00 | 0.02 | 27.59 | 0.08 | 0.44 | 0.01 | 0.44 |
| 5 | 45 | 0 | 860 | 860 | 6.45 | 3.10 | 78.17 | 32.59 | 0.00 | 0.43 | 714.27 | 2.15 | 11.27 | 0.26 | 11.27 |
| 5 | 46 | 62 | 1,097 | 1,159 | 8.69 | 4.17 | 105.35 | 43.92 | 0.00 | 0.58 | 962.59 | 2.90 | 15.18 | 0.35 | 15.18 |
| 5 | 47 | 15 | 1,199 | 1,214 | 9.10 | 4.37 | 110.34 | 46.01 | 0.00 | 0.61 | 1008.27 | 3.03 | 15.90 | 0.36 | 15.90 |
| 5 | 48 | 66 | 965 | 1,032 | 7.74 | 3.71 | 93.79 | 39.10 | 0.00 | 0.52 | 856.98 | 2.58 | 13.52 | 0.31 | 13.52 |
| 5 | 49 | 0 | 779 | 779 | 5.84 | 2.80 | 70.79 | 29.52 | 0.00 | 0.39 | 646.84 | 1.95 | 10.20 | 0.23 | 10.20 |
| 5 | 50 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 1 | 70 | 98 | 168 | 1.26 | 0.61 | 15.31 | 6.38 | 0.00 | 0.08 | 139.91 | 0.42 | 2.21 | 0.05 | 2.21 |
| 6 | 2 | 0 | 400 | 400 | 3.00 | 1.44 | 36.36 | 15.16 | 0.00 | 0.20 | 332.24 | 1.00 | 5.24 | 0.12 | 5.24 |
| 6 | 3 | 15 | 83 | 98 | 0.73 | 0.35 | 8.89 | 3.71 | 0.00 | 0.05 | 81.23 | 0.24 | 1.28 | 0.03 | 1.28 |
| 6 | 4 | 48 | 0 | 48 | 0.36 | 0.17 | 4.37 | 1.82 | 0.00 | 0.02 | 39.96 | 0.12 | 0.63 | 0.01 | 0.63 |
| 6 | 5 | 26 | 347 | 373 | 2.80 | 1.34 | 33.91 | 14.14 | 0.00 | 0.19 | 309.86 | 0.93 | 4.89 | 0.11 | 4.89 |
| 6 | 6 | 48 | 257 | 305 | 2.29 | 1.10 | 27.70 | 11.55 | 0.00 | 0.15 | 253.10 | 0.76 | 3.99 | 0.09 | 3.99 |
| 6 | 7 | 70 | 491 | 561 | 4.21 | 2.02 | 50.99 | 21.26 | 0.00 | 0.28 | 465.88 | 1.40 | 7.35 | 0.17 | 7.35 |
| 6 | 8 | 70 | 0 | 70 | 0.53 | 0.25 | 6.39 | 2.67 | 0.00 | 0.04 | 58.42 | 0.18 | 0.92 | 0.02 | 0.92 |
| 6 | 9 | 48 | 551 | 599 | 4.49 | 2.16 | 54.45 | 22.70 | 0.00 | 0.30 | 497.57 | 1.50 | 7.85 | 0.18 | 7.85 |
| 6 | 10 | 15 | 294 | 309 | 2.32 | 1.11 | 28.10 | 11.72 | 0.00 | 0.15 | 256.75 | 0.77 | 4.05 | 0.09 | 4.05 |
| 6 | 11 | 37 | 257 | 294 | 2.20 | 1.06 | 26.69 | 11.13 | 0.00 | 0.15 | 243.87 | 0.73 | 3.85 | 0.09 | 3.85 |
| 6 | 12 | 81 | 60 | 142 | 1.06 | 0.51 | 12.89 | 5.38 | 0.00 | 0.07 | 117.80 | 0.35 | 1.86 | 0.04 | 1.86 |
| 6 | 13 | 26 | 226 | 252 | 1.89 | 0.91 | 22.93 | 9.56 | 0.00 | 0.13 | 209.56 | 0.63 | 3.31 | 0.08 | 3.31 |
| 6 | 14 | 115 | 158 | 273 | 2.05 | 0.98 | 24.84 | 10.36 | 0.00 | 0.14 | 226.98 | 0.68 | 3.58 | 0.08 | 3.58 |
| 6 | 15 | 48 | 460 | 508 | 3.81 | 1.83 | 46.22 | 19.27 | 0.00 | 0.25 | 422.35 | 1.27 | 6.66 | 0.15 | 6.66 |
| 6 | 16 | 81 | 400 | 481 | 3.61 | 1.73 | 43.76 | 18.25 | 0.00 | 0.24 | 399.89 | 1.20 | 6.31 | 0.14 | 6.31 |
| 6 | 17 | 26 | 113 | 139 | 1.04 | 0.50 | 12.64 | 5.27 | 0.00 | 0.07 | 115.53 | 0.35 | 1.82 | 0.04 | 1.82 |
| 6 | 18 | 4 | 38 | 41 | 0.31 | 0.15 | 3.76 | 1.57 | 0.00 | 0.02 | 34.39 | 0.10 | 0.54 | 0.01 | 0.54 |
| 6 | 19 | 37 | 121 | 158 | 1.18 | 0.57 | 14.34 | 5.98 | 0.00 | 0.08 | 131.03 | 0.39 | 2.07 | 0.05 | 2.07 |
| 6 | 20 | 48 | 483 | 531 | 3.98 | 1.91 | 48.28 | 20.13 | 0.00 | 0.27 | 441.16 | 1.33 | 6.96 | 0.16 | 6.96 |
| 7 | 1 | 60 | 247 | 308 | 2.31 | 1.11 | 27.97 | 11.66 | 0.00 | 0.15 | 255.58 | 0.77 | 4.03 | 0.09 | 4.03 |
| 7 | 1a | 35 | 322 | 357 | 2.68 | 1.29 | 32.46 | 13.53 | 0.00 | 0.18 | 296.57 | 0.89 | 4.68 | 0.11 | 4.68 |
| 7 | 2 | 53 | 553 | 606 | 4.54 | 2.18 | 55.06 | 22.96 | 0.00 | 0.30 | 503.12 | 1.51 | 7.94 | 0.18 | 7.94 |
| 7 | 3 | 46 | 577 | 623 | 4.68 | 2.24 | 56.66 | 23.63 | 0.00 | 0.31 | 517.76 | 1.56 | 8.17 | 0.19 | 8.17 |
| 7 | 4 | 110 | 544 | 654 | 4.91 | 2.35 | 59.46 | 24.79 | 0.00 | 0.33 | 543.34 | 1.64 | 8.57 | 0.20 | 8.57 |
| 7 | 5 | 25 | 586 | 610 | 4.58 | 2.20 | 55.48 | 23.13 | 0.00 | 0.31 | 506.95 | 1.53 | 8.00 | 0.18 | 8.00 |
| 7 | 6 | 4 | 536 | 540 | 4.05 | 1.94 | 49.05 | 20.45 | 0.00 | 0.27 | 448.18 | 1.35 | 7.07 | 0.16 | 7.07 |
| 7 | 7 | 0 | 165 | 165 | 1.24 | 0.59 | 14.99 | 6.25 | 0.00 | 0.08 | 137.01 | 0.41 | 2.16 | 0.05 | 2.16 |
| 7 | 8 | 14 | 330 | 344 | 2.58 | 1.24 | 31.27 | 13.04 | 0.00 | 0.17 | 285.76 | 0.86 | 4.51 | 0.10 | 4.51 |
| 7 | 9 | 184 | 841 | 1,025 | 7.69 | 3.69 | 93.22 | 38.87 | 0.00 | 0.51 | 851.76 | 2.56 | 13.43 | 0.31 | 13.43 |
| 7 | 10 | 25 | 231 | 256 | 1.92 | 0.92 | 23.24 | 9.69 | 0.00 | 0.13 | 212.38 | 0.64 | 3.35 | 0.08 | 3.35 |
| 7 | 11 | 32 | 223 | 255 | 1.91 | 0.92 | 23.14 | 9.65 | 0.00 | 0.13 | 211.45 | 0.64 | 3.33 | 0.08 | 3.33 |
| 7 | 12 | 11 | 478 | 489 | 3.67 | 1.76 | 44.45 | 18.53 | 0.00 | 0.24 | 406.15 | 1.22 | 6.41 | 0.15 | 6.41 |
| 7 | 13 | 4 | 379 | 383 | 2.87 | 1.38 | 34.80 | 14.51 | 0.00 | 0.19 | 318.03 | 0.96 | 5.02 | 0.11 | 5.02 |
| 7 | 14 | 25 | 280 | 305 | 2.29 | 1.10 | 27.74 | 11.57 | 0.00 | 0.15 | 253.49 | 0.76 | 4.00 | 0.09 | 4.00 |
| 7 | 15 | 14 | 322 | 336 | 2.52 | 1.21 | 30.52 | 12.73 | 0.00 | 0.17 | 278.91 | 0.84 | 4.40 | 0.10 | 4.40 |
| 7 | 16 | 85 | 751 | 836 | 6.27 | 3.01 | 75.95 | 31.67 | 0.00 | 0.42 | 694.02 | 2.09 | 10.95 | 0.25 | 10.95 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 7 | 17 | 4 | 322 | 325 | 2.44 | 1.17 | 29.56 | 12.32 | 0.00 | 0.16 | 270.08 | 0.81 | 4.26 | 0.10 | 4.26 |
| 7 | 18 | 57 | 223 | 279 | 2.10 | 1.01 | 25.39 | 10.59 | 0.00 | 0.14 | 232.02 | 0.70 | 3.66 | 0.08 | 3.66 |
| 7 | 19 | 43 | 429 | 471 | 3.54 | 1.70 | 42.85 | 17.87 | 0.00 | 0.24 | 391.54 | 1.18 | 6.18 | 0.14 | 6.18 |
| 7 | 20 | 14 | 181 | 196 | 1.47 | 0.70 | 17.78 | 7.41 | 0.00 | 0.10 | 162.45 | 0.49 | 2.56 | 0.06 | 2.56 |
| 7 | 21 | 57 | 470 | 527 | 3.95 | 1.90 | 47.88 | 19.96 | 0.00 | 0.26 | 437.53 | 1.32 | 6.90 | 0.16 | 6.90 |
| 7 | 22 | 43 | 503 | 546 | 4.09 | 1.96 | 49.60 | 20.68 | 0.00 | 0.27 | 453.19 | 1.36 | 7.15 | 0.16 | 7.15 |
| 7 | 23 | 25 | 487 | 511 | 3.84 | 1.84 | 46.48 | 19.38 | 0.00 | 0.26 | 424.74 | 1.28 | 6.70 | 0.15 | 6.70 |
| 7 | 24 | 4 | 511 | 515 | 3.86 | 1.85 | 46.80 | 19.51 | 0.00 | 0.26 | 427.63 | 1.29 | 6.74 | 0.15 | 6.74 |
| 7 | 25 | 21 | 635 | 656 | 4.92 | 2.36 | 59.66 | 24.87 | 0.00 | 0.33 | 545.13 | 1.64 | 8.60 | 0.20 | 8.60 |
| 7 | 26 | 14 | 82 | 97 | 0.72 | 0.35 | 8.78 | 3.66 | 0.00 | 0.05 | 80.25 | 0.24 | 1.27 | 0.03 | 1.27 |
| 7 | 27 | 35 | 594 | 629 | 4.72 | 2.27 | 57.20 | 23.85 | 0.00 | 0.31 | 522.63 | 1.57 | 8.24 | 0.19 | 8.24 |
| 7 | 28 | 57 | 379 | 436 | 3.27 | 1.57 | 39.64 | 16.53 | 0.00 | 0.22 | 362.18 | 1.09 | 5.71 | 0.13 | 5.71 |
| 7 | 29 | 35 | 445 | 481 | 3.61 | 1.73 | 43.70 | 18.22 | 0.00 | 0.24 | 399.32 | 1.20 | 6.30 | 0.14 | 6.30 |
| 7 | 30 | 78 | 784 | 861 | 6.46 | 3.10 | 78.30 | 32.65 | 0.00 | 0.43 | 715.51 | 2.15 | 11.28 | 0.26 | 11.28 |
| 7 | 31 | 14 | 701 | 715 | 5.36 | 2.57 | 65.01 | 27.10 | 0.00 | 0.36 | 594.02 | 1.79 | 9.37 | 0.21 | 9.37 |
| 7 | 32 | 142 | 882 | 1,024 | 7.68 | 3.69 | 93.10 | 38.82 | 0.00 | 0.51 | 850.69 | 2.56 | 13.42 | 0.31 | 13.42 |
| 7 | 33 | 35 | 223 | 258 | 1.94 | 0.93 | 23.46 | 9.78 | 0.00 | 0.13 | 214.36 | 0.65 | 3.38 | 0.08 | 3.38 |
| 7 | 34 | 131 | 396 | 527 | 3.95 | 1.90 | 47.90 | 19.97 | 0.00 | 0.26 | 437.69 | 1.32 | 6.90 | 0.16 | 6.90 |
| 7 | 35 | 23 | 191 | 214 | 1.60 | 0.77 | 19.44 | 8.10 | 0.00 | 0.11 | 177.59 | 0.53 | 2.80 | 0.06 | 2.80 |
| 7 | 36 | 8 | 496 | 504 | 3.78 | 1.81 | 45.78 | 19.09 | 0.00 | 0.25 | 418.33 | 1.26 | 6.60 | 0.15 | 6.60 |
| 7 | 37 | 165 | 422 | 586 | 4.40 | 2.11 | 53.31 | 22.23 | 0.00 | 0.29 | 487.08 | 1.47 | 7.68 | 0.18 | 7.68 |
| 7 | 38 | 11 | 297 | 308 | 2.31 | 1.11 | 27.96 | 11.66 | 0.00 | 0.15 | 255.44 | 0.77 | 4.03 | 0.09 | 4.03 |
| 7 | 39 | 53 | 107 | 160 | 1.20 | 0.58 | 14.58 | 6.08 | 0.00 | 0.08 | 133.21 | 0.40 | 2.10 | 0.05 | 2.10 |
| 7 | 40 | 57 | 808 | 865 | 6.49 | 3.11 | 78.62 | 32.78 | 0.00 | 0.43 | 718.40 | 2.16 | 11.33 | 0.26 | 11.33 |
| 7 | 41 | 67 | 635 | 702 | 5.27 | 2.53 | 63.84 | 26.62 | 0.00 | 0.35 | 583.37 | 1.76 | 9.20 | 0.21 | 9.20 |
| 7 | 42 | 14 | 404 | 418 | 3.14 | 1.51 | 38.02 | 15.85 | 0.00 | 0.21 | 347.41 | 1.05 | 5.48 | 0.13 | 5.48 |
| 7 | 43 | 163 | 825 | 988 | 7.41 | 3.56 | 89.78 | 37.43 | 0.00 | 0.49 | 820.40 | 2.47 | 12.94 | 0.30 | 12.94 |
| 7 | 44 | 57 | 280 | 337 | 2.53 | 1.21 | 30.64 | 12.78 | 0.00 | 0.17 | 279.98 | 0.84 | 4.42 | 0.10 | 4.42 |
| 7 | 45 | 78 | 553 | 631 | 4.73 | 2.27 | 57.31 | 23.90 | 0.00 | 0.32 | 523.70 | 1.58 | 8.26 | 0.19 | 8.26 |
| 7 | 46 | 4 | 470 | 474 | 3.55 | 1.71 | 43.05 | 17.95 | 0.00 | 0.24 | 393.38 | 1.18 | 6.20 | 0.14 | 6.20 |
| 7 | 47 | 14 | 247 | 262 | 1.96 | 0.94 | 23.78 | 9.91 | 0.00 | 0.13 | 217.25 | 0.65 | 3.43 | 0.08 | 3.43 |
| 7 | 48 | 25 | 462 | 487 | 3.65 | 1.75 | 44.23 | 18.44 | 0.00 | 0.24 | 404.19 | 1.22 | 6.37 | 0.15 | 6.37 |
| 7 | 49 | 99 | 652 | 751 | 5.63 | 2.70 | 68.24 | 28.45 | 0.00 | 0.38 | 623.56 | 1.88 | 9.83 | 0.23 | 9.83 |
| 7 | 50 | 120 | 1,006 | 1,127 | 8.45 | 4.06 | 102.41 | 42.70 | 0.00 | 0.56 | 935.79 | 2.82 | 14.76 | 0.34 | 14.76 |
| 7 | 51 | 35 | 289 | 324 | 2.43 | 1.17 | 29.46 | 12.28 | 0.00 | 0.16 | 269.17 | 0.81 | 4.25 | 0.10 | 4.25 |
| 7 | 52 | 42 | 0 | 42 | 0.32 | 0.15 | 3.83 | 1.60 | 0.00 | 0.02 | 34.98 | 0.11 | 0.55 | 0.01 | 0.55 |
| 7 | 53 | 42 | 156 | 198 | 1.48 | 0.71 | 17.99 | 7.50 | 0.00 | 0.10 | 164.35 | 0.49 | 2.59 | 0.06 | 2.59 |
| 7 | 54 | 100 | 255 | 355 | 2.67 | 1.28 | 32.30 | 13.47 | 0.00 | 0.18 | 295.15 | 0.89 | 4.65 | 0.11 | 4.65 |
| 7 | 55 | 32 | 262 | 294 | 2.21 | 1.06 | 26.76 | 11.16 | 0.00 | 0.15 | 244.48 | 0.74 | 3.86 | 0.09 | 3.86 |
| 7 | 56 | 62 | 0 | 62 | 0.46 | 0.22 | 5.60 | 2.33 | 0.00 | 0.03 | 51.14 | 0.15 | 0.81 | 0.02 | 0.81 |
| 7 | 57 | 13 | 0 | 13 | 0.10 | 0.05 | 1.18 | 0.49 | 0.00 | 0.01 | 10.74 | 0.03 | 0.17 | 0.00 | 0.17 |
| 7 | 58 | 3 | 57 | 60 | 0.45 | 0.22 | 5.44 | 2.27 | 0.00 | 0.03 | 49.71 | 0.15 | 0.78 | 0.02 | 0.78 |
| 7 | 59 | 130 | 326 | 455 | 3.41 | 1.64 | 41.39 | 17.26 | 0.00 | 0.23 | 378.19 | 1.14 | 5.96 | 0.14 | 5.96 |
| 7 | 60 | 52 | 149 | 201 | 1.50 | 0.72 | 18.23 | 7.60 | 0.00 | 0.10 | 166.55 | 0.50 | 2.63 | 0.06 | 2.63 |
| 7 | 61 | 23 | 0 | 23 | 0.17 | 0.08 | 2.06 | 0.86 | 0.00 | 0.01 | 18.82 | 0.06 | 0.30 | 0.01 | 0.30 |
| 7 | 62 | 23 | 0 | 23 | 0.17 | 0.08 | 2.06 | 0.86 | 0.00 | 0.01 | 18.82 | 0.06 | 0.30 | 0.01 | 0.30 |

**Jana Elementary School Building Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions (DCGL = 2,800 dpm/100 cm$^2$)**

| Random Fixed Measurement Data | | | | Total Surface Activity (dpm/100 cm$^2$) | ProUCL Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 cm$^2$) | Beta Activity (dpm/100 cm$^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 7 | 63 | 71 | 354 | 425 | 3.19 | 1.53 | 38.66 | 16.12 | 0.00 | 0.21 | 353.24 | 1.06 | 5.57 | 0.13 | 5.57 |
| 7 | 64 | 23 | 78 | 101 | 0.75 | 0.36 | 9.14 | 3.81 | 0.00 | 0.05 | 83.51 | 0.25 | 1.32 | 0.03 | 1.32 |
| 7 | 65 | 142 | 775 | 917 | 6.88 | 3.30 | 83.35 | 34.75 | 0.00 | 0.46 | 761.64 | 2.29 | 12.01 | 0.28 | 12.01 |
| 7 | 66 | 4 | 322 | 325 | 2.44 | 1.17 | 29.56 | 12.32 | 0.00 | 0.16 | 270.08 | 0.81 | 4.26 | 0.10 | 4.26 |
| 7 | 67 | 57 | 429 | 486 | 3.64 | 1.75 | 44.13 | 18.40 | 0.00 | 0.24 | 403.28 | 1.21 | 6.36 | 0.15 | 6.36 |
| 7 | 68 | 35 | 107 | 143 | 1.07 | 0.51 | 12.96 | 5.41 | 0.00 | 0.07 | 118.46 | 0.36 | 1.87 | 0.04 | 1.87 |
| 7 | 69 | 35 | 313 | 349 | 2.62 | 1.26 | 31.71 | 13.22 | 0.00 | 0.17 | 289.72 | 0.87 | 4.57 | 0.10 | 4.57 |
| 7 | 70 | 46 | 404 | 450 | 3.38 | 1.62 | 40.92 | 17.06 | 0.00 | 0.23 | 373.90 | 1.13 | 5.90 | 0.14 | 5.90 |
| 7 | 71 | 35 | 214 | 250 | 1.87 | 0.90 | 22.71 | 9.47 | 0.00 | 0.12 | 207.51 | 0.62 | 3.27 | 0.07 | 3.27 |
| 7 | 72 | 89 | 759 | 847 | 6.35 | 3.05 | 77.02 | 32.11 | 0.00 | 0.42 | 703.78 | 2.12 | 11.10 | 0.25 | 11.10 |
| 7 | 73 | 120 | 948 | 1,069 | 8.02 | 3.85 | 97.16 | 40.51 | 0.00 | 0.53 | 887.83 | 2.67 | 14.00 | 0.32 | 14.00 |
| 7 | 74 | 46 | 742 | 788 | 5.91 | 2.84 | 71.66 | 29.88 | 0.00 | 0.39 | 654.76 | 1.97 | 10.33 | 0.24 | 10.33 |
| 7 | 75 | 14 | 173 | 187 | 1.41 | 0.67 | 17.03 | 7.10 | 0.00 | 0.09 | 155.60 | 0.47 | 2.45 | 0.06 | 2.45 |
| 7 | 76 | 14 | 223 | 237 | 1.78 | 0.85 | 21.53 | 8.98 | 0.00 | 0.12 | 196.70 | 0.59 | 3.10 | 0.07 | 3.10 |
| 7 | 77 | 4 | 487 | 490 | 3.68 | 1.76 | 44.55 | 18.58 | 0.00 | 0.25 | 407.08 | 1.23 | 6.42 | 0.15 | 6.42 |
| 7 | 78 | 4 | 165 | 168 | 1.26 | 0.61 | 15.31 | 6.38 | 0.00 | 0.08 | 139.92 | 0.42 | 2.21 | 0.05 | 2.21 |
| 7 | 79 | 14 | 223 | 237 | 1.78 | 0.85 | 21.53 | 8.98 | 0.00 | 0.12 | 196.70 | 0.59 | 3.10 | 0.07 | 3.10 |
| 7 | 80 | 35 | 668 | 703 | 5.28 | 2.53 | 63.94 | 26.66 | 0.00 | 0.35 | 584.28 | 1.76 | 9.22 | 0.21 | 9.22 |
| 8 | 1 | 97 | 1,534 | 1,630 | 12.23 | 5.87 | 148.20 | 61.79 | 0.00 | 0.82 | 1354.21 | 4.08 | 21.36 | 0.49 | 21.36 |
| 8 | 2 | 0 | 1,191 | 1,191 | 8.93 | 4.29 | 108.28 | 45.15 | 0.00 | 0.60 | 989.44 | 2.98 | 15.61 | 0.36 | 15.61 |
| 8 | 3 | 0 | 802 | 802 | 6.01 | 2.89 | 72.90 | 30.39 | 0.00 | 0.40 | 666.10 | 2.00 | 10.51 | 0.24 | 10.51 |
| 8 | 4 | 62 | 794 | 856 | 6.42 | 3.08 | 77.81 | 32.44 | 0.00 | 0.43 | 710.96 | 2.14 | 11.21 | 0.26 | 11.21 |
| 8 | 5 | 0 | 553 | 553 | 4.15 | 1.99 | 50.25 | 20.95 | 0.00 | 0.28 | 459.15 | 1.38 | 7.24 | 0.17 | 7.24 |
| 8 | 6 | 0 | 459 | 459 | 3.45 | 1.65 | 41.76 | 17.41 | 0.00 | 0.23 | 381.55 | 1.15 | 6.02 | 0.14 | 6.02 |
| 8 | 7 | 0 | 872 | 872 | 6.54 | 3.14 | 79.27 | 33.05 | 0.00 | 0.44 | 724.30 | 2.18 | 11.42 | 0.26 | 11.42 |
| 8 | 8 | 97 | 654 | 751 | 5.63 | 2.70 | 68.23 | 28.45 | 0.00 | 0.38 | 623.44 | 1.88 | 9.83 | 0.23 | 9.83 |
| 8 | 9 | 62 | 709 | 770 | 5.78 | 2.77 | 70.02 | 29.19 | 0.00 | 0.39 | 639.82 | 1.93 | 10.09 | 0.23 | 10.09 |
| 8 | 10 | 85 | 576 | 661 | 4.96 | 2.38 | 60.10 | 25.06 | 0.00 | 0.33 | 549.14 | 1.65 | 8.66 | 0.20 | 8.66 |

## UCL Statistics for Uncensored Full Data Sets

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.2 4/18/2023 3:52:06 PM |
| From File | Random Input ProUCL.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**Ac-227**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 3.284 |
| Maximum | 19.05 | Median | 1.874 |
| SD | 3.895 | Std. Error of Mean | 0.225 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 3.654 | 95% Adjusted-CLT UCL (Chen-1995) | 3.676 |
| | | 95% Modified-t UCL (Johnson-1978) | 3.658 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 3.653 | 95% BCA Bootstrap UCL | 3.683 |
| 95% Standard Bootstrap UCL | 3.642 | 95% Bootstrap-t UCL | 3.677 |
| 95% Hall's Bootstrap UCL | 3.674 | 95% Percentile Bootstrap UCL | 3.661 |
| 90% Chebyshev(Mean, Sd) UCL | 3.958 | 95% Chebyshev(Mean, Sd) UCL | 4.263 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4.686 | 99% Chebyshev(Mean, Sd) UCL | 5.518 |

### Suggested UCL to Use

95% Student's-t UCL 3.654

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 4.26

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Pa-231**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 1.576 |
| Maximum | 9.143 | Median | 0.899 |
| SD | 1.87 | Std. Error of Mean | 0.108 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 1.754 | 95% Adjusted-CLT UCL (Chen-1995) | 1.764 |
| | | 95% Modified-t UCL (Johnson-1978) | 1.756 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1.754 | 95% BCA Bootstrap UCL | 1.768 |
| 95% Standard Bootstrap UCL | 1.748 | 95% Bootstrap-t UCL | 1.765 |
| 95% Hall's Bootstrap UCL | 1.764 | 95% Percentile Bootstrap UCL | 1.757 |
| 90% Chebyshev(Mean, Sd) UCL | 1.9 | 95% Chebyshev(Mean, Sd) UCL | 2.046 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2.249 | 99% Chebyshev(Mean, Sd) UCL | 2.649 |

### Suggested UCL to Use

95% Student's-t UCL 1.754

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 2.05

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Pb-210**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 39.8 |
| Maximum | 230.9 | Median | 22.71 |
| SD | 47.21 | Std. Error of Mean | 2.721 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 44.29 | 95% Adjusted-CLT UCL (Chen-1995) | 44.55 |
| | | 95% Modified-t UCL (Johnson-1978) | 44.33 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 44.28 | 95% BCA Bootstrap UCL | 44.63 |
| 95% Standard Bootstrap UCL | 44.15 | 95% Bootstrap-t UCL | 44.56 |
| 95% Hall's Bootstrap UCL | 44.53 | 95% Percentile Bootstrap UCL | 44.37 |
| 90% Chebyshev(Mean, Sd) UCL | 47.97 | 95% Chebyshev(Mean, Sd) UCL | 51.66 |
| 97.5% Chebyshev(Mean, Sd) UCL | 56.8 | 99% Chebyshev(Mean, Sd) UCL | 66.88 |

### Suggested UCL to Use

95% Student's-t UCL 44.29

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 51.66

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Ra-226**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 16.6 |
| Maximum | 96.25 | Median | 9.469 |
| SD | 19.68 | Std. Error of Mean | 1.134 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 18.47 | 95% Adjusted-CLT UCL (Chen-1995) | 18.57 |
| | | 95% Modified-t UCL (Johnson-1978) | 18.48 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 18.46 | 95% BCA Bootstrap UCL | 18.61 |
| 95% Standard Bootstrap UCL | 18.41 | 95% Bootstrap-t UCL | 18.58 |
| 95% Hall's Bootstrap UCL | 18.57 | 95% Percentile Bootstrap UCL | 18.5 |
| 90% Chebyshev(Mean, Sd) UCL | 20 | 95% Chebyshev(Mean, Sd) UCL | 21.54 |
| 97.5% Chebyshev(Mean, Sd) UCL | 23.68 | 99% Chebyshev(Mean, Sd) UCL | 27.88 |

### Suggested UCL to Use

95% Student's-t UCL 18.47

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 21.54

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-228**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 0.219 |
| Maximum | 1.27 | Median | 0.125 |
| SD | 0.26 | Std. Error of Mean | 0.015 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 0.244 | 95% Adjusted-CLT UCL (Chen-1995) | 0.245 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.244 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.244 | 95% BCA Bootstrap UCL | 0.246 |
| 95% Standard Bootstrap UCL | 0.243 | 95% Bootstrap-t UCL | 0.245 |
| 95% Hall's Bootstrap UCL | 0.245 | 95% Percentile Bootstrap UCL | 0.244 |
| 90% Chebyshev(Mean, Sd) UCL | 0.264 | 95% Chebyshev(Mean, Sd) UCL | 0.284 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.312 | 99% Chebyshev(Mean, Sd) UCL | 0.368 |

### Suggested UCL to Use

95% Student's-t UCL 0.244

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 0.28

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-230**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 363.7 |
| Maximum | 2109 | Median | 207.5 |
| SD | 431.4 | Std. Error of Mean | 24.86 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 404.7 | 95% Adjusted-CLT UCL (Chen-1995) | 407.1 |
| | | 95% Modified-t UCL (Johnson-1978) | 405.1 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 404.6 | 95% BCA Bootstrap UCL | 407.8 |
| 95% Standard Bootstrap UCL | 403.4 | 95% Bootstrap-t UCL | 407.2 |
| 95% Hall's Bootstrap UCL | 406.9 | 95% Percentile Bootstrap UCL | 405.4 |
| 90% Chebyshev(Mean, Sd) UCL | 438.3 | 95% Chebyshev(Mean, Sd) UCL | 472.1 |
| 97.5% Chebyshev(Mean, Sd) UCL | 519 | 99% Chebyshev(Mean, Sd) UCL | 611.1 |

### Suggested UCL to Use

95% Student's-t UCL 404.7

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 472.1

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-232**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 1.095 |
| Maximum | 6.349 | Median | 0.625 |
| SD | 1.298 | Std. Error of Mean | 0.0748 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 1.218 | 95% Adjusted-CLT UCL (Chen-1995) | 1.225 |
| | | 95% Modified-t UCL (Johnson-1978) | 1.219 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1.218 | 95% BCA Bootstrap UCL | 1.228 |
| 95% Standard Bootstrap UCL | 1.214 | 95% Bootstrap-t UCL | 1.226 |
| 95% Hall's Bootstrap UCL | 1.225 | 95% Percentile Bootstrap UCL | 1.22 |
| 90% Chebyshev(Mean, Sd) UCL | 1.319 | 95% Chebyshev(Mean, Sd) UCL | 1.421 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1.562 | 99% Chebyshev(Mean, Sd) UCL | 1.839 |

### Suggested UCL to Use

95% Student's-t UCL 1.218

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 1.42

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-234**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 5.736 |
| Maximum | 33.27 | Median | 3.273 |
| SD | 6.803 | Std. Error of Mean | 0.392 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 6.383 | 95% Adjusted-CLT UCL (Chen-1995) | 6.42 |
| | | 95% Modified-t UCL (Johnson-1978) | 6.389 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 6.381 | 95% BCA Bootstrap UCL | 6.432 |
| 95% Standard Bootstrap UCL | 6.362 | 95% Bootstrap-t UCL | 6.422 |
| 95% Hall's Bootstrap UCL | 6.418 | 95% Percentile Bootstrap UCL | 6.394 |
| 90% Chebyshev(Mean, Sd) UCL | 6.913 | 95% Chebyshev(Mean, Sd) UCL | 7.445 |
| 97.5% Chebyshev(Mean, Sd) UCL | 8.185 | 99% Chebyshev(Mean, Sd) UCL | 9.638 |

### Suggested UCL to Use

95% Student's-t UCL 6.383

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 7.45

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-235**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 0.131 |
| Maximum | 0.762 | Median | 0.075 |
| SD | 0.156 | Std. Error of Mean | 0.00898 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 0.146 | 95% Adjusted-CLT UCL (Chen-1995) | 0.147 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.146 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.146 | 95% BCA Bootstrap UCL | 0.147 |
| 95% Standard Bootstrap UCL | 0.146 | 95% Bootstrap-t UCL | 0.147 |
| 95% Hall's Bootstrap UCL | 0.147 | 95% Percentile Bootstrap UCL | 0.146 |
| 90% Chebyshev(Mean, Sd) UCL | 0.158 | 95% Chebyshev(Mean, Sd) UCL | 0.171 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.187 | 99% Chebyshev(Mean, Sd) UCL | 0.221 |

### Suggested UCL to Use

95% Student's-t UCL 0.146

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 0.17

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-238**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 301 | Number of Distinct Observations | 220 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 5.736 |
| Maximum | 33.27 | Median | 3.273 |
| SD | 6.803 | Std. Error of Mean | 0.392 |
| Coefficient of Variation | 1.186 | Skewness | 1.611 |

### Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.787 | **Shapiro Wilk GOF Test** | |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors GOF Test** | |
| 1% Lilliefors Critical Value | 0.0595 | Data Not Normal at 1% Significance Level | |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 6.383 | 95% Adjusted-CLT UCL (Chen-1995) | 6.42 |
| | | 95% Modified-t UCL (Johnson-1978) | 6.389 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 6.381 | 95% BCA Bootstrap UCL | 6.432 |
| 95% Standard Bootstrap UCL | 6.362 | 95% Bootstrap-t UCL | 6.422 |
| 95% Hall's Bootstrap UCL | 6.418 | 95% Percentile Bootstrap UCL | 6.394 |
| 90% Chebyshev(Mean, Sd) UCL | 6.913 | 95% Chebyshev(Mean, Sd) UCL | 7.445 |
| 97.5% Chebyshev(Mean, Sd) UCL | 8.185 | 99% Chebyshev(Mean, Sd) UCL | 9.638 |

### Suggested UCL to Use

95% Student's-t UCL 6.383

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 7.45

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions**

| Biased Fixed Measurement Data | | | | Total Surface Activity (dpm/100 $cm^2$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 $cm^2$) | Beta Activity (dpm/100 $cm^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| CWC Activity Fractions | | | | | 0.0075 | 0.0036 | 0.0909 | 0.0379 | 0 | 0.0005 | 0.8306 | 0.0025 | 0.0131 | 0.0003 | 0.0131 |
| Maximum | | | | | 22.86 | 10.97 | 277.07 | 115.52 | 0.00 | 1.52 | 2531.71 | 7.62 | 39.93 | 0.91 | 39.93 |
| 1 | B1 | 126 | 37 | 163 | 1.22 | 0.59 | 14.80 | 6.17 | 0.00 | 0.08 | 135.27 | 0.41 | 2.13 | 0.05 | 2.13 |
| 1 | B2 | 189 | 584 | 773 | 5.80 | 2.78 | 70.24 | 29.28 | 0.00 | 0.39 | 641.79 | 1.93 | 10.12 | 0.23 | 10.12 |
| 1 | B3 | 105 | 149 | 254 | 1.90 | 0.91 | 23.09 | 9.63 | 0.00 | 0.13 | 210.97 | 0.63 | 3.33 | 0.08 | 3.33 |
| 1 | B4 | 101 | 420 | 520 | 3.90 | 1.87 | 47.28 | 19.71 | 0.00 | 0.26 | 431.98 | 1.30 | 6.81 | 0.16 | 6.81 |
| 1 | B5 | 206 | 421 | 626 | 4.70 | 2.25 | 56.91 | 23.73 | 0.00 | 0.31 | 520.06 | 1.57 | 8.20 | 0.19 | 8.20 |
| 1 | B6 | 248 | 388 | 636 | 4.77 | 2.29 | 57.78 | 24.09 | 0.00 | 0.32 | 527.98 | 1.59 | 8.33 | 0.19 | 8.33 |
| 1 | B7 | 28 | 0 | 28 | 0.21 | 0.10 | 2.53 | 1.05 | 0.00 | 0.01 | 23.12 | 0.07 | 0.36 | 0.01 | 0.36 |
| 1 | B8 | 56 | 255 | 311 | 2.33 | 1.12 | 28.26 | 11.78 | 0.00 | 0.16 | 258.25 | 0.78 | 4.07 | 0.09 | 4.07 |
| 1 | B9 | 101 | 0 | 101 | 0.75 | 0.36 | 9.14 | 3.81 | 0.00 | 0.05 | 83.50 | 0.25 | 1.32 | 0.03 | 1.32 |
| 1 | B10 | 76 | 0 | 76 | 0.57 | 0.28 | 6.95 | 2.90 | 0.00 | 0.04 | 63.46 | 0.19 | 1.00 | 0.02 | 1.00 |
| 1 | B11 | 76 | 112 | 188 | 1.41 | 0.68 | 17.10 | 7.13 | 0.00 | 0.09 | 156.26 | 0.47 | 2.46 | 0.06 | 2.46 |
| 1 | B12 | 24 | 439 | 463 | 3.47 | 1.67 | 42.10 | 17.55 | 0.00 | 0.23 | 384.73 | 1.16 | 6.07 | 0.14 | 6.07 |
| 1 | B13 | 140 | 0 | 140 | 1.05 | 0.50 | 12.69 | 5.29 | 0.00 | 0.07 | 115.98 | 0.35 | 1.83 | 0.04 | 1.83 |
| 1 | B14 | 262 | 676 | 938 | 7.03 | 3.38 | 85.24 | 35.54 | 0.00 | 0.47 | 778.85 | 2.34 | 12.28 | 0.28 | 12.28 |
| 1 | B15 | 110 | 0 | 110 | 0.82 | 0.40 | 9.98 | 4.16 | 0.00 | 0.05 | 91.22 | 0.27 | 1.44 | 0.03 | 1.44 |
| 1 | B16 | 81 | 653 | 735 | 5.51 | 2.64 | 66.77 | 27.84 | 0.00 | 0.37 | 610.09 | 1.84 | 9.62 | 0.22 | 9.62 |
| 1 | B17 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | B18 | 26 | 0 | 26 | 0.19 | 0.09 | 2.35 | 0.98 | 0.00 | 0.01 | 21.43 | 0.06 | 0.34 | 0.01 | 0.34 |
| 1 | B19 | 0 | 53 | 53 | 0.40 | 0.19 | 4.84 | 2.02 | 0.00 | 0.03 | 44.19 | 0.13 | 0.70 | 0.02 | 0.70 |
| 1 | B20 | 15 | 0 | 15 | 0.11 | 0.05 | 1.34 | 0.56 | 0.00 | 0.01 | 12.23 | 0.04 | 0.19 | 0.00 | 0.19 |
| 1 | B21 | 85 | 558 | 644 | 4.83 | 2.32 | 58.51 | 24.40 | 0.00 | 0.32 | 534.67 | 1.61 | 8.43 | 0.19 | 8.43 |
| 1 | B22 | 81 | 99 | 180 | 1.35 | 0.65 | 16.36 | 6.82 | 0.00 | 0.09 | 149.49 | 0.45 | 2.36 | 0.05 | 2.36 |
| 1 | B23 | 93 | 264 | 357 | 2.68 | 1.28 | 32.42 | 13.52 | 0.00 | 0.18 | 296.28 | 0.89 | 4.67 | 0.11 | 4.67 |
| 1 | B24 | 101 | 0 | 101 | 0.75 | 0.36 | 9.14 | 3.81 | 0.00 | 0.05 | 83.49 | 0.25 | 1.32 | 0.03 | 1.32 |
| 1 | B25 | 89 | 0 | 89 | 0.67 | 0.32 | 8.08 | 3.37 | 0.00 | 0.04 | 73.86 | 0.22 | 1.16 | 0.03 | 1.16 |
| 1 | B26 | 89 | 0 | 89 | 0.67 | 0.32 | 8.08 | 3.37 | 0.00 | 0.04 | 73.86 | 0.22 | 1.16 | 0.03 | 1.16 |
| 1 | B27 | 89 | 203 | 292 | 2.19 | 1.05 | 26.55 | 11.07 | 0.00 | 0.15 | 242.62 | 0.73 | 3.83 | 0.09 | 3.83 |
| 1 | JB1 | 7 | 8 | 15 | 0.11 | 0.05 | 1.36 | 0.57 | 0.00 | 0.01 | 12.43 | 0.04 | 0.20 | 0.00 | 0.20 |
| 1 | JB2 | 49 | 40 | 89 | 0.66 | 0.32 | 8.05 | 3.36 | 0.00 | 0.04 | 73.57 | 0.22 | 1.16 | 0.03 | 1.16 |
| 1 | JB3 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | JB4 | 7 | 527 | 534 | 4.00 | 1.92 | 48.51 | 20.23 | 0.00 | 0.27 | 443.26 | 1.33 | 6.99 | 0.16 | 6.99 |
| 1 | JB5 | 59 | 407 | 466 | 3.50 | 1.68 | 42.37 | 17.66 | 0.00 | 0.23 | 387.13 | 1.17 | 6.11 | 0.14 | 6.11 |
| 1 | JB6 | 7 | 415 | 422 | 3.16 | 1.52 | 38.35 | 15.99 | 0.00 | 0.21 | 350.47 | 1.05 | 5.53 | 0.13 | 5.53 |
| 1 | JB7 | 38 | 152 | 190 | 1.42 | 0.68 | 17.26 | 7.20 | 0.00 | 0.09 | 157.71 | 0.47 | 2.49 | 0.06 | 2.49 |
| 1 | JB8 | 17 | 192 | 209 | 1.57 | 0.75 | 18.99 | 7.92 | 0.00 | 0.10 | 173.54 | 0.52 | 2.74 | 0.06 | 2.74 |
| 1 | JB9 | 7 | 567 | 574 | 4.30 | 2.06 | 52.14 | 21.74 | 0.00 | 0.29 | 476.40 | 1.43 | 7.51 | 0.17 | 7.51 |
| 1 | JB10 | 38 | 503 | 541 | 4.06 | 1.95 | 49.18 | 20.50 | 0.00 | 0.27 | 449.35 | 1.35 | 7.09 | 0.16 | 7.09 |
| 1 | JB11 | 49 | 88 | 136 | 1.02 | 0.49 | 12.40 | 5.17 | 0.00 | 0.07 | 113.34 | 0.34 | 1.79 | 0.04 | 1.79 |
| 1 | JB12 | 38 | 391 | 429 | 3.22 | 1.55 | 39.02 | 16.27 | 0.00 | 0.21 | 356.56 | 1.07 | 5.62 | 0.13 | 5.62 |
| 1 | JB13 | 28 | 0 | 28 | 0.21 | 0.10 | 2.53 | 1.05 | 0.00 | 0.01 | 23.12 | 0.07 | 0.36 | 0.01 | 0.36 |

**Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions**

| Biased Fixed Measurement Data | | | | Total Surface Activity (dpm/100 $cm^2$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 $cm^2$) | Beta Activity (dpm/100 $cm^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 1 | JB14 | 0 | 192 | 192 | 1.44 | 0.69 | 17.41 | 7.26 | 0.00 | 0.10 | 159.08 | 0.48 | 2.51 | 0.06 | 2.51 |
| 1 | JB15 | 0 | 335 | 335 | 2.51 | 1.21 | 30.47 | 12.70 | 0.00 | 0.17 | 278.39 | 0.84 | 4.39 | 0.10 | 4.39 |
| 1 | JB16 | 49 | 311 | 360 | 2.70 | 1.30 | 32.71 | 13.64 | 0.00 | 0.18 | 298.93 | 0.90 | 4.71 | 0.11 | 4.71 |
| 1 | JB17 | 49 | 239 | 288 | 2.16 | 1.04 | 26.19 | 10.92 | 0.00 | 0.14 | 239.28 | 0.72 | 3.77 | 0.09 | 3.77 |
| 1 | JB18 | 132 | 630 | 762 | 5.72 | 2.74 | 69.31 | 28.90 | 0.00 | 0.38 | 633.32 | 1.91 | 9.99 | 0.23 | 9.99 |
| 1 | JB19 | 28 | 678 | 706 | 5.30 | 2.54 | 64.19 | 26.76 | 0.00 | 0.35 | 586.52 | 1.77 | 9.25 | 0.21 | 9.25 |
| 1 | JB20 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | JB21 | 38 | 0 | 38 | 0.29 | 0.14 | 3.48 | 1.45 | 0.00 | 0.02 | 31.77 | 0.10 | 0.50 | 0.01 | 0.50 |
| 1 | JB22 | 70 | 215 | 285 | 2.14 | 1.03 | 25.91 | 10.80 | 0.00 | 0.14 | 236.71 | 0.71 | 3.73 | 0.09 | 3.73 |
| 1 | JB23 | 17 | 0 | 17 | 0.13 | 0.06 | 1.58 | 0.66 | 0.00 | 0.01 | 14.46 | 0.04 | 0.23 | 0.01 | 0.23 |
| 1 | UB10 | 94 | 510 | 604 | 4.53 | 2.17 | 54.88 | 22.88 | 0.00 | 0.30 | 501.51 | 1.51 | 7.91 | 0.18 | 7.91 |
| 2 | B1 | 31 | 0 | 31 | 0.23 | 0.11 | 2.81 | 1.17 | 0.00 | 0.02 | 25.71 | 0.08 | 0.41 | 0.01 | 0.41 |
| 2 | B2 | 66 | 47 | 112 | 0.84 | 0.40 | 10.22 | 4.26 | 0.00 | 0.06 | 93.40 | 0.28 | 1.47 | 0.03 | 1.47 |
| 3 | B4 | 133 | 0 | 133 | 1.00 | 0.48 | 12.08 | 5.04 | 0.00 | 0.07 | 110.41 | 0.33 | 1.74 | 0.04 | 1.74 |
| 3 | B5 | 206 | 0 | 206 | 1.55 | 0.74 | 18.76 | 7.82 | 0.00 | 0.10 | 171.41 | 0.52 | 2.70 | 0.06 | 2.70 |
| 3 | B6 | 70 | 0 | 70 | 0.52 | 0.25 | 6.36 | 2.65 | 0.00 | 0.03 | 58.13 | 0.17 | 0.92 | 0.02 | 0.92 |
| 3 | B7 | 101 | 0 | 101 | 0.76 | 0.37 | 9.22 | 3.85 | 0.00 | 0.05 | 84.27 | 0.25 | 1.33 | 0.03 | 1.33 |
| 3 | B8 | 154 | 0 | 154 | 1.15 | 0.55 | 13.99 | 5.83 | 0.00 | 0.08 | 127.84 | 0.38 | 2.02 | 0.05 | 2.02 |
| 3 | B9 | 80 | 0 | 80 | 0.60 | 0.29 | 7.31 | 3.05 | 0.00 | 0.04 | 66.84 | 0.20 | 1.05 | 0.02 | 1.05 |
| 3 | B10 | 101 | 0 | 101 | 0.76 | 0.37 | 9.22 | 3.85 | 0.00 | 0.05 | 84.27 | 0.25 | 1.33 | 0.03 | 1.33 |
| 3 | B11 | 80 | 0 | 80 | 0.60 | 0.29 | 7.31 | 3.05 | 0.00 | 0.04 | 66.84 | 0.20 | 1.05 | 0.02 | 1.05 |
| 3 | B12 | 70 | 0 | 70 | 0.52 | 0.25 | 6.36 | 2.65 | 0.00 | 0.03 | 58.13 | 0.17 | 0.92 | 0.02 | 0.92 |
| 3 | B13 | 122 | 0 | 122 | 0.92 | 0.44 | 11.13 | 4.64 | 0.00 | 0.06 | 101.70 | 0.31 | 1.60 | 0.04 | 1.60 |
| 3 | B14 | 164 | 1907 | 2,071 | 15.53 | 7.46 | 188.26 | 78.49 | 0.00 | 1.04 | 1720.26 | 5.18 | 27.13 | 0.62 | 27.13 |
| 3 | JB24 | 76 | 0 | 76 | 0.57 | 0.28 | 6.95 | 2.90 | 0.00 | 0.04 | 63.46 | 0.19 | 1.00 | 0.02 | 1.00 |
| 3 | JB25 | 35 | 0 | 35 | 0.26 | 0.12 | 3.16 | 1.32 | 0.00 | 0.02 | 28.83 | 0.09 | 0.45 | 0.01 | 0.45 |
| 3 | JB26 | 108 | 670 | 778 | 5.83 | 2.80 | 70.72 | 29.49 | 0.00 | 0.39 | 646.21 | 1.94 | 10.19 | 0.23 | 10.19 |
| 3 | JB27 | 35 | 447 | 482 | 3.61 | 1.73 | 43.78 | 18.25 | 0.00 | 0.24 | 400.01 | 1.20 | 6.31 | 0.14 | 6.31 |
| 3 | JB28 | 24 | 830 | 854 | 6.41 | 3.08 | 77.65 | 32.37 | 0.00 | 0.43 | 709.51 | 2.14 | 11.19 | 0.26 | 11.19 |
| 3 | JB29 | 35 | 567 | 601 | 4.51 | 2.16 | 54.66 | 22.79 | 0.00 | 0.30 | 499.43 | 1.50 | 7.88 | 0.18 | 7.88 |
| 3 | UB1 | 55 | 71 | 126 | 0.94 | 0.45 | 11.45 | 4.77 | 0.00 | 0.06 | 104.61 | 0.31 | 1.65 | 0.04 | 1.65 |
| 3 | UB2 | 75 | 2973 | 3,048 | 22.86 | 10.97 | 277.07 | 115.52 | 0.00 | 1.52 | 2531.71 | 7.62 | 39.93 | 0.91 | 39.93 |
| 3 | UB3 | 7 | 78 | 84 | 0.63 | 0.30 | 7.67 | 3.20 | 0.00 | 0.04 | 70.10 | 0.21 | 1.11 | 0.03 | 1.11 |
| 3 | UB4 | 36 | 71 | 106 | 0.80 | 0.38 | 9.68 | 4.04 | 0.00 | 0.05 | 88.45 | 0.27 | 1.40 | 0.03 | 1.40 |
| 3 | UB5 | 84 | 304 | 389 | 2.92 | 1.40 | 35.34 | 14.73 | 0.00 | 0.19 | 322.90 | 0.97 | 5.09 | 0.12 | 5.09 |
| 3 | UB6 | 65 | 78 | 143 | 1.07 | 0.51 | 12.98 | 5.41 | 0.00 | 0.07 | 118.57 | 0.36 | 1.87 | 0.04 | 1.87 |
| 3 | UB7 | 55 | 0 | 55 | 0.41 | 0.20 | 5.01 | 2.09 | 0.00 | 0.03 | 45.81 | 0.14 | 0.72 | 0.02 | 0.72 |
| 3 | UB8 | 133 | 687 | 820 | 6.15 | 2.95 | 74.51 | 31.07 | 0.00 | 0.41 | 680.83 | 2.05 | 10.74 | 0.25 | 10.74 |
| 3 | UB9 | 65 | 50 | 114 | 0.86 | 0.41 | 10.40 | 4.34 | 0.00 | 0.06 | 95.05 | 0.29 | 1.50 | 0.03 | 1.50 |
| 3 | UB11 | 143 | 106 | 249 | 1.87 | 0.90 | 22.62 | 9.43 | 0.00 | 0.12 | 206.72 | 0.62 | 3.26 | 0.07 | 3.26 |
| 3 | UB12 | 45 | 255 | 300 | 2.25 | 1.08 | 27.30 | 11.38 | 0.00 | 0.15 | 249.42 | 0.75 | 3.93 | 0.09 | 3.93 |
| 3 | UB13 | 114 | 545 | 659 | 4.94 | 2.37 | 59.87 | 24.96 | 0.00 | 0.33 | 547.07 | 1.65 | 8.63 | 0.20 | 8.63 |
| 3 | UB14 | 114 | 418 | 531 | 3.98 | 1.91 | 48.29 | 20.13 | 0.00 | 0.27 | 441.22 | 1.33 | 6.96 | 0.16 | 6.96 |

**Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions**

| Biased Fixed Measurement Data | | | | Total Surface Activity (dpm/100 $cm^2$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 $cm^2$) | Beta Activity (dpm/100 $cm^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 3 | UB15 | 152 | 85 | 237 | 1.78 | 0.85 | 21.58 | 9.00 | 0.00 | 0.12 | 197.16 | 0.59 | 3.11 | 0.07 | 3.11 |
| 3 | UB16 | 45 | 0 | 45 | 0.34 | 0.16 | 4.13 | 1.72 | 0.00 | 0.02 | 37.73 | 0.11 | 0.60 | 0.01 | 0.60 |
| 3 | UB17 | 36 | 241 | 276 | 2.07 | 1.00 | 25.13 | 10.48 | 0.00 | 0.14 | 229.58 | 0.69 | 3.62 | 0.08 | 3.62 |
| 3 | UB18 | 55 | 0 | 55 | 0.41 | 0.20 | 5.01 | 2.09 | 0.00 | 0.03 | 45.81 | 0.14 | 0.72 | 0.02 | 0.72 |
| 3 | UB20 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | UB21 | 83 | 455 | 538 | 4.04 | 1.94 | 48.93 | 20.40 | 0.00 | 0.27 | 447.07 | 1.35 | 7.05 | 0.16 | 7.05 |
| 3 | UB22 | 63 | 0 | 63 | 0.47 | 0.23 | 5.72 | 2.39 | 0.00 | 0.03 | 52.29 | 0.16 | 0.82 | 0.02 | 0.82 |
| 4 | B1 | 16 | 1621 | 1,637 | 12.28 | 5.89 | 148.85 | 62.06 | 0.00 | 0.82 | 1360.09 | 4.09 | 21.45 | 0.49 | 21.45 |
| 4 | B2 | 295 | 1999 | 2,294 | 17.21 | 8.26 | 208.53 | 86.95 | 0.00 | 1.15 | 1905.46 | 5.74 | 30.05 | 0.69 | 30.05 |
| 4 | B3 | 172 | 2168 | 2,339 | 17.54 | 8.42 | 212.62 | 88.65 | 0.00 | 1.17 | 1942.80 | 5.85 | 30.64 | 0.70 | 30.64 |
| 4 | UB19 | 26 | 637 | 663 | 4.97 | 2.39 | 60.28 | 25.13 | 0.00 | 0.33 | 550.80 | 1.66 | 8.69 | 0.20 | 8.69 |
| 5 | B1 | 75 | 0 | 75 | 0.56 | 0.27 | 6.81 | 2.84 | 0.00 | 0.04 | 62.20 | 0.19 | 0.98 | 0.02 | 0.98 |
| 5 | B2 | 52 | 1,359 | 1,411 | 10.58 | 5.08 | 128.27 | 53.48 | 0.00 | 0.71 | 1172.09 | 3.53 | 18.49 | 0.42 | 18.49 |
| 5 | B3 | 62 | 1,338 | 1,400 | 10.50 | 5.04 | 127.23 | 53.05 | 0.00 | 0.70 | 1162.53 | 3.50 | 18.34 | 0.42 | 18.34 |
| 5 | B4 | 15 | 905 | 919 | 6.89 | 3.31 | 83.56 | 34.84 | 0.00 | 0.46 | 763.52 | 2.30 | 12.04 | 0.28 | 12.04 |
| 5 | B5 | 42 | 1,692 | 1,734 | 13.01 | 6.24 | 157.63 | 65.72 | 0.00 | 0.87 | 1440.39 | 4.34 | 22.72 | 0.52 | 22.72 |
| 5 | B6 | 71 | 1,225 | 1,296 | 9.72 | 4.67 | 117.81 | 49.12 | 0.00 | 0.65 | 1076.52 | 3.24 | 16.98 | 0.39 | 16.98 |
| 5 | B7 | 81 | 1,246 | 1,327 | 9.95 | 4.78 | 120.63 | 50.29 | 0.00 | 0.66 | 1102.24 | 3.32 | 17.38 | 0.40 | 17.38 |
| 6 | B1 | 48 | 106 | 154 | 1.15 | 0.55 | 13.98 | 5.83 | 0.00 | 0.08 | 127.72 | 0.38 | 2.01 | 0.05 | 2.01 |
| 6 | B2 | 37 | 347 | 384 | 2.88 | 1.38 | 34.92 | 14.56 | 0.00 | 0.19 | 319.09 | 0.96 | 5.03 | 0.12 | 5.03 |
| 6 | B3 | 48 | 1,026 | 1,075 | 8.06 | 3.87 | 97.67 | 40.72 | 0.00 | 0.54 | 892.50 | 2.69 | 14.08 | 0.32 | 14.08 |
| 6 | B4 | 115 | 1,004 | 1,119 | 8.39 | 4.03 | 101.68 | 42.39 | 0.00 | 0.56 | 929.07 | 2.80 | 14.65 | 0.34 | 14.65 |
| 6 | B5 | 137 | 808 | 945 | 7.08 | 3.40 | 85.86 | 35.80 | 0.00 | 0.47 | 784.54 | 2.36 | 12.37 | 0.28 | 12.37 |
| 7 | B1 | 43 | 647 | 690 | 5.18 | 2.48 | 62.74 | 26.16 | 0.00 | 0.35 | 573.29 | 1.73 | 9.04 | 0.21 | 9.04 |
| 7 | B2 | 172 | 988 | 1,161 | 8.71 | 4.18 | 105.52 | 44.00 | 0.00 | 0.58 | 964.19 | 2.90 | 15.21 | 0.35 | 15.21 |
| 7 | B3 | 162 | 853 | 1,015 | 7.61 | 3.65 | 92.26 | 38.47 | 0.00 | 0.51 | 843.02 | 2.54 | 13.30 | 0.30 | 13.30 |
| 7 | B4 | 140 | 953 | 1,093 | 8.20 | 3.93 | 99.35 | 41.42 | 0.00 | 0.55 | 907.81 | 2.73 | 14.32 | 0.33 | 14.32 |
| 7 | B5 | 54 | 256 | 310 | 2.32 | 1.12 | 28.17 | 11.74 | 0.00 | 0.15 | 257.38 | 0.77 | 4.06 | 0.09 | 4.06 |
| 7 | B6 | 86 | 85 | 172 | 1.29 | 0.62 | 15.59 | 6.50 | 0.00 | 0.09 | 142.47 | 0.43 | 2.25 | 0.05 | 2.25 |
| 7 | B7 | 111 | 960 | 1,071 | 8.03 | 3.86 | 97.38 | 40.60 | 0.00 | 0.54 | 889.82 | 2.68 | 14.03 | 0.32 | 14.03 |
| 7 | B8 | 187 | 1,038 | 1,225 | 9.19 | 4.41 | 111.35 | 46.43 | 0.00 | 0.61 | 1017.44 | 3.06 | 16.05 | 0.37 | 16.05 |
| 7 | B9 | 208 | 1,216 | 1,424 | 10.68 | 5.13 | 129.47 | 53.98 | 0.00 | 0.71 | 1183.00 | 3.56 | 18.66 | 0.43 | 18.66 |
| 7 | B10 | 165 | 1,003 | 1,168 | 8.76 | 4.20 | 106.16 | 44.26 | 0.00 | 0.58 | 970.01 | 2.92 | 15.30 | 0.35 | 15.30 |
| 7 | B11 | 165 | 683 | 848 | 6.36 | 3.05 | 77.07 | 32.13 | 0.00 | 0.42 | 704.21 | 2.12 | 11.11 | 0.25 | 11.11 |
| 7 | B12 | 165 | 932 | 1,097 | 8.23 | 3.95 | 99.69 | 41.57 | 0.00 | 0.55 | 910.94 | 2.74 | 14.37 | 0.33 | 14.37 |
| 7 | B13 | 144 | 1,145 | 1,289 | 9.66 | 4.64 | 117.13 | 48.83 | 0.00 | 0.64 | 1070.24 | 3.22 | 16.88 | 0.39 | 16.88 |
| 7 | B14 | 133 | 436 | 569 | 4.27 | 2.05 | 51.72 | 21.56 | 0.00 | 0.28 | 472.58 | 1.42 | 7.45 | 0.17 | 7.45 |
| 7 | B15 | 238 | 665 | 903 | 6.77 | 3.25 | 82.08 | 34.22 | 0.00 | 0.45 | 750.01 | 2.26 | 11.83 | 0.27 | 11.83 |
| 7 | B16 | 132 | 918 | 1,050 | 7.87 | 3.78 | 95.42 | 39.79 | 0.00 | 0.52 | 871.94 | 2.62 | 13.75 | 0.31 | 13.75 |
| 7 | B17 | 143 | 539 | 683 | 5.12 | 2.46 | 62.08 | 25.88 | 0.00 | 0.34 | 567.23 | 1.71 | 8.95 | 0.20 | 8.95 |
| 7 | B18 | 164 | 820 | 985 | 7.39 | 3.55 | 89.51 | 37.32 | 0.00 | 0.49 | 817.92 | 2.46 | 12.90 | 0.30 | 12.90 |
| 7 | B19 | 117 | 767 | 884 | 6.63 | 3.18 | 80.35 | 33.50 | 0.00 | 0.44 | 734.21 | 2.21 | 11.58 | 0.27 | 11.58 |
| 7 | B20 | 163 | 535 | 698 | 5.23 | 2.51 | 63.45 | 26.45 | 0.00 | 0.35 | 579.76 | 1.74 | 9.14 | 0.21 | 9.14 |

**Surface Activity Conversion to Radionuclide Concentrations Using CWC Activity Fractions**

| Biased Fixed Measurement Data | | | | Total Surface Activity (dpm/100 $cm^2$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STSU | Survey ID | Alpha Activity (dpm/100 $cm^2$) | Beta Activity (dpm/100 $cm^2$) | | Ac-227 | Pa-231 | Pb-210 | Ra-226 | Ra-228 | Th-228 | Th-230 | Th-232 | U-234 | U-235 | U-238 |
| 7 | B21 | 132 | 638 | 770 | 5.78 | 2.77 | 70.04 | 29.20 | 0.00 | 0.39 | 639.95 | 1.93 | 10.09 | 0.23 | 10.09 |
| 7 | B22 | 196 | 680 | 876 | 6.57 | 3.15 | 79.61 | 33.19 | 0.00 | 0.44 | 727.43 | 2.19 | 11.47 | 0.26 | 11.47 |
| 7 | B23 | 170 | 627 | 797 | 5.98 | 2.87 | 72.44 | 30.20 | 0.00 | 0.40 | 661.91 | 1.99 | 10.44 | 0.24 | 10.44 |
| 7 | B24 | 202 | 808 | 1,010 | 7.58 | 3.64 | 91.83 | 38.29 | 0.00 | 0.51 | 839.11 | 2.53 | 13.23 | 0.30 | 13.23 |
| 7 | B25 | 154 | 606 | 760 | 5.70 | 2.74 | 69.08 | 28.80 | 0.00 | 0.38 | 631.19 | 1.90 | 9.95 | 0.23 | 9.95 |
| 7 | B26 | 159 | 742 | 902 | 6.76 | 3.25 | 81.97 | 34.18 | 0.00 | 0.45 | 748.98 | 2.25 | 11.81 | 0.27 | 11.81 |
| 7 | B27 | 195 | 583 | 777 | 5.83 | 2.80 | 70.64 | 29.45 | 0.00 | 0.39 | 645.50 | 1.94 | 10.18 | 0.23 | 10.18 |
| 7 | B28 | 154 | 643 | 797 | 5.98 | 2.87 | 72.44 | 30.20 | 0.00 | 0.40 | 661.88 | 1.99 | 10.44 | 0.24 | 10.44 |
| 7 | B29 | 206 | 702 | 908 | 6.81 | 3.27 | 82.58 | 34.43 | 0.00 | 0.45 | 754.56 | 2.27 | 11.90 | 0.27 | 11.90 |
| 7 | B30 | 142 | 407 | 549 | 4.12 | 1.98 | 49.95 | 20.82 | 0.00 | 0.27 | 456.39 | 1.37 | 7.20 | 0.16 | 7.20 |
| 7 | B31 | 202 | 990 | 1,192 | 8.94 | 4.29 | 108.32 | 45.16 | 0.00 | 0.60 | 989.81 | 2.98 | 15.61 | 0.36 | 15.61 |
| 7 | B32 | 185 | 628 | 814 | 6.10 | 2.93 | 73.95 | 30.83 | 0.00 | 0.41 | 675.75 | 2.03 | 10.66 | 0.24 | 10.66 |
| 7 | B33 | 122 | 878 | 999 | 7.50 | 3.60 | 90.85 | 37.88 | 0.00 | 0.50 | 830.14 | 2.50 | 13.09 | 0.30 | 13.09 |
| 7 | B34 | 174 | 583 | 756 | 5.67 | 2.72 | 68.75 | 28.66 | 0.00 | 0.38 | 628.18 | 1.89 | 9.91 | 0.23 | 9.91 |
| 7 | B35 | 181 | 726 | 907 | 6.80 | 3.26 | 82.40 | 34.36 | 0.00 | 0.45 | 752.94 | 2.27 | 11.88 | 0.27 | 11.88 |
| 7 | B36 | 132 | 471 | 603 | 4.52 | 2.17 | 54.80 | 22.85 | 0.00 | 0.30 | 500.76 | 1.51 | 7.90 | 0.18 | 7.90 |
| 7 | B37 | 101 | 495 | 596 | 4.47 | 2.14 | 54.14 | 22.57 | 0.00 | 0.30 | 494.67 | 1.49 | 7.80 | 0.18 | 7.80 |
| 7 | B38 | 154 | 443 | 597 | 4.48 | 2.15 | 54.30 | 22.64 | 0.00 | 0.30 | 496.14 | 1.49 | 7.83 | 0.18 | 7.83 |
| 7 | B39 | 163 | 1,029 | 1,193 | 8.95 | 4.29 | 108.42 | 45.21 | 0.00 | 0.60 | 990.71 | 2.98 | 15.63 | 0.36 | 15.63 |
| 7 | B40 | 164 | 894 | 1,059 | 7.94 | 3.81 | 96.23 | 40.12 | 0.00 | 0.53 | 879.30 | 2.65 | 13.87 | 0.32 | 13.87 |
| 7 | B41 | 149 | 948 | 1,097 | 8.23 | 3.95 | 99.74 | 41.59 | 0.00 | 0.55 | 911.41 | 2.74 | 14.37 | 0.33 | 14.37 |
| 7 | B42 | 163 | 734 | 898 | 6.73 | 3.23 | 81.58 | 34.02 | 0.00 | 0.45 | 745.46 | 2.24 | 11.76 | 0.27 | 11.76 |
| 7 | B43 | 143 | 96 | 239 | 1.80 | 0.86 | 21.77 | 9.08 | 0.00 | 0.12 | 198.93 | 0.60 | 3.14 | 0.07 | 3.14 |
| 7 | B44 | 163 | 694 | 858 | 6.43 | 3.09 | 77.96 | 32.50 | 0.00 | 0.43 | 712.32 | 2.14 | 11.23 | 0.26 | 11.23 |
| 7 | B45 | 153 | 646 | 799 | 5.99 | 2.88 | 72.66 | 30.29 | 0.00 | 0.40 | 663.90 | 2.00 | 10.47 | 0.24 | 10.47 |
| 7 | B46 | 280 | 451 | 731 | 5.48 | 2.63 | 66.41 | 27.69 | 0.00 | 0.37 | 606.86 | 1.83 | 9.57 | 0.22 | 9.57 |
| 7 | B47 | 227 | 1,182 | 1,410 | 10.57 | 5.08 | 128.15 | 53.43 | 0.00 | 0.70 | 1170.98 | 3.52 | 18.47 | 0.42 | 18.47 |
| 7 | B48 | 238 | 783 | 1,021 | 7.66 | 3.68 | 92.83 | 38.70 | 0.00 | 0.51 | 848.23 | 2.55 | 13.38 | 0.31 | 13.38 |
| 7 | B49 | 185 | 148 | 333 | 2.50 | 1.20 | 30.29 | 12.63 | 0.00 | 0.17 | 276.75 | 0.83 | 4.36 | 0.10 | 4.36 |
| 7 | B50 | 132 | 327 | 459 | 3.44 | 1.65 | 41.75 | 17.41 | 0.00 | 0.23 | 381.45 | 1.15 | 6.02 | 0.14 | 6.02 |
| 8 | B1 | 92 | 1,344 | 1,437 | 10.77 | 5.17 | 130.58 | 54.44 | 0.00 | 0.72 | 1193.16 | 3.59 | 18.82 | 0.43 | 18.82 |
| 8 | B2 | 124 | 734 | 858 | 6.44 | 3.09 | 78.00 | 32.52 | 0.00 | 0.43 | 712.73 | 2.15 | 11.24 | 0.26 | 11.24 |
| 8 | B3 | 124 | 561 | 685 | 5.14 | 2.47 | 62.26 | 25.96 | 0.00 | 0.34 | 568.87 | 1.71 | 8.97 | 0.21 | 8.97 |
| 8 | B4 | 103 | 91 | 194 | 1.45 | 0.70 | 17.59 | 7.33 | 0.00 | 0.10 | 160.74 | 0.48 | 2.54 | 0.06 | 2.54 |

## UCL Statistics for Uncensored Full Data Sets

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.2 4/18/2023 3:37:41 PM |
| From File | Biased Input ProUCL.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**Ac-227**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 4.411 |
| Maximum | 22.86 | Median | 4.02 |
| SD | 3.903 | Std. Error of Mean | 0.309 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 4.922 | 95% Adjusted-CLT UCL (Chen-1995) | 4.955 |
| | | 95% Modified-t UCL (Johnson-1978) | 4.928 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 4.919 | 95% BCA Bootstrap UCL | 4.989 |
| 95% Standard Bootstrap UCL | 4.927 | 95% Bootstrap-t UCL | 4.996 |
| 95% Hall's Bootstrap UCL | 5.003 | 95% Percentile Bootstrap UCL | 4.936 |
| 90% Chebyshev(Mean, Sd) UCL | 5.337 | 95% Chebyshev(Mean, Sd) UCL | 5.756 |
| 97.5% Chebyshev(Mean, Sd) UCL | 6.338 | 99% Chebyshev(Mean, Sd) UCL | 7.482 |

### Suggested UCL to Use

95% Student's-t UCL 4.922

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 5.76

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Pa-231**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 2.117 |
| Maximum | 10.97 | Median | 1.929 |
| SD | 1.874 | Std. Error of Mean | 0.148 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 2.363 | 95% Adjusted-CLT UCL (Chen-1995) | 2.378 |
| | | 95% Modified-t UCL (Johnson-1978) | 2.365 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 2.361 | 95% BCA Bootstrap UCL | 2.395 |
| 95% Standard Bootstrap UCL | 2.365 | 95% Bootstrap-t UCL | 2.398 |
| 95% Hall's Bootstrap UCL | 2.402 | 95% Percentile Bootstrap UCL | 2.369 |
| 90% Chebyshev(Mean, Sd) UCL | 2.562 | 95% Chebyshev(Mean, Sd) UCL | 2.763 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3.042 | 99% Chebyshev(Mean, Sd) UCL | 3.591 |

### Suggested UCL to Use

95% Student's-t UCL 2.363

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 2.76

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Pb-210**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 53.47 |
| Maximum | 277.1 | Median | 48.72 |
| SD | 47.31 | Std. Error of Mean | 3.74 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 59.65 | 95% Adjusted-CLT UCL (Chen-1995) | 60.06 |
| | | 95% Modified-t UCL (Johnson-1978) | 59.72 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 59.62 | 95% BCA Bootstrap UCL | 60.47 |
| 95% Standard Bootstrap UCL | 59.71 | 95% Bootstrap-t UCL | 60.56 |
| 95% Hall's Bootstrap UCL | 60.64 | 95% Percentile Bootstrap UCL | 59.83 |
| 90% Chebyshev(Mean, Sd) UCL | 64.69 | 95% Chebyshev(Mean, Sd) UCL | 69.77 |
| 97.5% Chebyshev(Mean, Sd) UCL | 76.82 | 99% Chebyshev(Mean, Sd) UCL | 90.68 |

### Suggested UCL to Use

95% Student's-t UCL 59.65

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 69.77

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Ra-226**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 22.29 |
| Maximum | 115.5 | Median | 20.31 |
| SD | 19.72 | Std. Error of Mean | 1.559 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 24.87 | 95% Adjusted-CLT UCL (Chen-1995) | 25.04 |
| | | 95% Modified-t UCL (Johnson-1978) | 24.9 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 24.86 | 95% BCA Bootstrap UCL | 25.21 |
| 95% Standard Bootstrap UCL | 24.9 | 95% Bootstrap-t UCL | 25.25 |
| 95% Hall's Bootstrap UCL | 25.28 | 95% Percentile Bootstrap UCL | 24.94 |
| 90% Chebyshev(Mean, Sd) UCL | 26.97 | 95% Chebyshev(Mean, Sd) UCL | 29.09 |
| 97.5% Chebyshev(Mean, Sd) UCL | 32.03 | 99% Chebyshev(Mean, Sd) UCL | 37.81 |

### Suggested UCL to Use

95% Student's-t UCL 24.87

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 29.09

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-228**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 0.294 |
| Maximum | 1.524 | Median | 0.268 |
| SD | 0.26 | Std. Error of Mean | 0.0206 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 0.328 | 95% Adjusted-CLT UCL (Chen-1995) | 0.33 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.329 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.328 | 95% BCA Bootstrap UCL | 0.333 |
| 95% Standard Bootstrap UCL | 0.328 | 95% Bootstrap-t UCL | 0.333 |
| 95% Hall's Bootstrap UCL | 0.334 | 95% Percentile Bootstrap UCL | 0.329 |
| 90% Chebyshev(Mean, Sd) UCL | 0.356 | 95% Chebyshev(Mean, Sd) UCL | 0.384 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.423 | 99% Chebyshev(Mean, Sd) UCL | 0.499 |

### Suggested UCL to Use

95% Student's-t UCL 0.328

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 0.38

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-230**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 488.5 |
| Maximum | 2532 | Median | 445.2 |
| SD | 432.3 | Std. Error of Mean | 34.17 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 545.1 | 95% Adjusted-CLT UCL (Chen-1995) | 548.8 |
| | | 95% Modified-t UCL (Johnson-1978) | 545.7 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 544.8 | 95% BCA Bootstrap UCL | 552.6 |
| 95% Standard Bootstrap UCL | 545.6 | 95% Bootstrap-t UCL | 553.3 |
| 95% Hall's Bootstrap UCL | 554.1 | 95% Percentile Bootstrap UCL | 546.7 |
| 90% Chebyshev(Mean, Sd) UCL | 591.1 | 95% Chebyshev(Mean, Sd) UCL | 637.5 |
| 97.5% Chebyshev(Mean, Sd) UCL | 702 | 99% Chebyshev(Mean, Sd) UCL | 828.6 |

### Suggested UCL to Use

95% Student's-t UCL 545.1

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 637.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**Th-232**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 1.47 |
| Maximum | 7.62 | Median | 1.34 |
| SD | 1.301 | Std. Error of Mean | 0.103 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 1.641 | 95% Adjusted-CLT UCL (Chen-1995) | 1.652 |
| | | 95% Modified-t UCL (Johnson-1978) | 1.643 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1.64 | 95% BCA Bootstrap UCL | 1.663 |
| 95% Standard Bootstrap UCL | 1.642 | 95% Bootstrap-t UCL | 1.665 |
| 95% Hall's Bootstrap UCL | 1.668 | 95% Percentile Bootstrap UCL | 1.645 |
| 90% Chebyshev(Mean, Sd) UCL | 1.779 | 95% Chebyshev(Mean, Sd) UCL | 1.919 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2.113 | 99% Chebyshev(Mean, Sd) UCL | 2.494 |

### Suggested UCL to Use

95% Student's-t UCL 1.641

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 1.92

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-234**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 7.705 |
| Maximum | 39.93 | Median | 7.021 |
| SD | 6.818 | Std. Error of Mean | 0.539 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 8.597 | 95% Adjusted-CLT UCL (Chen-1995) | 8.655 |
| | | 95% Modified-t UCL (Johnson-1978) | 8.607 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 8.592 | 95% BCA Bootstrap UCL | 8.715 |
| 95% Standard Bootstrap UCL | 8.606 | 95% Bootstrap-t UCL | 8.727 |
| 95% Hall's Bootstrap UCL | 8.739 | 95% Percentile Bootstrap UCL | 8.622 |
| 90% Chebyshev(Mean, Sd) UCL | 9.322 | 95% Chebyshev(Mean, Sd) UCL | 10.05 |
| 97.5% Chebyshev(Mean, Sd) UCL | 11.07 | 99% Chebyshev(Mean, Sd) UCL | 13.07 |

### Suggested UCL to Use

95% Student's-t UCL 8.597

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 10.05

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-235**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 0.176 |
| Maximum | 0.914 | Median | 0.161 |
| SD | 0.156 | Std. Error of Mean | 0.0123 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 0.197 | 95% Adjusted-CLT UCL (Chen-1995) | 0.198 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.197 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.197 | 95% BCA Bootstrap UCL | 0.2 |
| 95% Standard Bootstrap UCL | 0.197 | 95% Bootstrap-t UCL | 0.2 |
| 95% Hall's Bootstrap UCL | 0.2 | 95% Percentile Bootstrap UCL | 0.197 |
| 90% Chebyshev(Mean, Sd) UCL | 0.213 | 95% Chebyshev(Mean, Sd) UCL | 0.23 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.254 | 99% Chebyshev(Mean, Sd) UCL | 0.299 |

### Suggested UCL to Use

95% Student's-t UCL 0.197

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 0.23

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## UCL Statistics for Uncensored Full Data Sets

**U-238**

### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 160 | Number of Distinct Observations | 150 |
| | | Number of Missing Observations | 0 |
| Minimum | 0 | Mean | 7.705 |
| Maximum | 39.93 | Median | 7.021 |
| SD | 6.818 | Std. Error of Mean | 0.539 |
| Coefficient of Variation | 0.885 | Skewness | 1.39 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk P Value | 0 | Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.0815 | Data Not Normal at 1% Significance Level |

**Data Not Normal at 1% Significance Level**

### Assuming Normal Distribution

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 8.597 | 95% Adjusted-CLT UCL (Chen-1995) | 8.655 |
| | | 95% Modified-t UCL (Johnson-1978) | 8.607 |

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution**

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 8.592 | 95% BCA Bootstrap UCL | 8.715 |
| 95% Standard Bootstrap UCL | 8.606 | 95% Bootstrap-t UCL | 8.727 |
| 95% Hall's Bootstrap UCL | 8.739 | 95% Percentile Bootstrap UCL | 8.622 |
| 90% Chebyshev(Mean, Sd) UCL | 9.322 | 95% Chebyshev(Mean, Sd) UCL | 10.05 |
| 97.5% Chebyshev(Mean, Sd) UCL | 11.07 | 99% Chebyshev(Mean, Sd) UCL | 13.07 |

### Suggested UCL to Use

95% Student's-t UCL 8.597

**User Identified Distribution:** X **User Selected UCL:** 95% Chebyshev(Mean, Sd) UCL 10.05

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

# ATTACHMENT G-2

# RESRAD-BUILD OUTPUT SUMMARY REPORTS

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RESRAD-BUILD Output Student Dose

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

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Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources : 5
Number of Receptors: 1
Total Time : 2.190000E+03 days
Fraction Inside : 2.230000E-01

Transformations data from: ICRP107
Cut off half life : 180.000000 days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 0.700 | 1.000 | 1.20E+01 | 3.00E-03 |

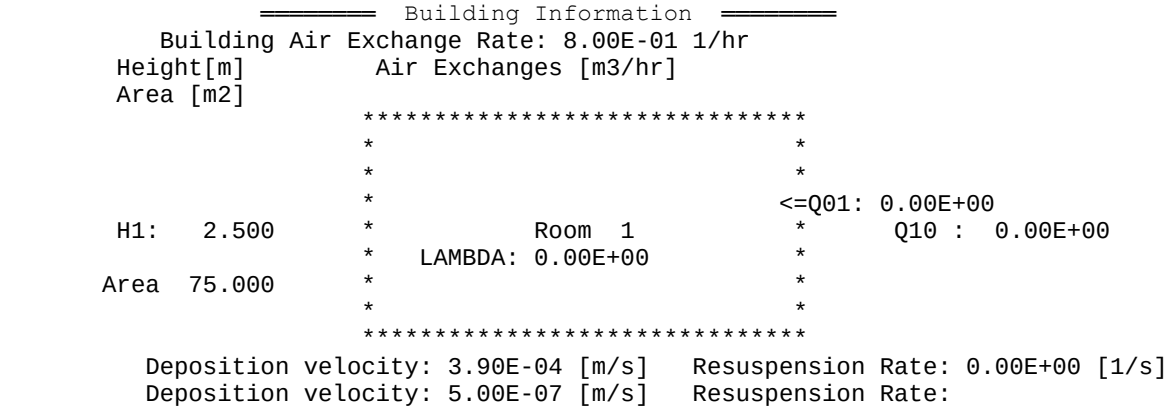
### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr




Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration

               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration

               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area       Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area       Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Temporal Summary

RESRAD-BUILD Temporal Dose Tables

Dose to Receptor over the Exposure Duration

(mrem)

| Evaluation Time years | Receptor 1 | Total |
|---|---|---|
| 0.000000000 | 2.79E+01 | 2.79E+01 |
| 1.000000000 | 2.75E+01 | 2.75E+01 |
| 3.000000000 | 2.69E+01 | 2.69E+01 |
| 6.000000000 | 2.60E+01 | 2.60E+01 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 0.00000000E+00 years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.45E+01 | 3.34E+00 | 3.34E+00 | 3.34E+00 | 3.34E+00 | 2.79E+01 |
| Total | 1.45E+01 | 3.34E+00 | 3.34E+00 | 3.34E+00 | 3.34E+00 | 2.79E+01 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 0.00000000E+00 years

## Pathway Detail of Doses

[mrem]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.11E-01 | 1.00E+00 | 1.03E-06 | 2.03E-07 | 3.97E-02 | 4.18E-02 | 1.33E+01 | 1.45E+01 |
| Total | 1.11E-01 | 1.00E+00 | 1.03E-06 | 2.03E-07 | 3.97E-02 | 4.18E-02 | 1.33E+01 | 1.45E+01 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |
| Total | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |
| Total | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |
| Total | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |
| Total | 6.18E-03 | 2.31E-01 | 2.37E-07 | 4.70E-08 | 9.17E-03 | 9.65E-03 | 3.08E+00 | 3.34E+00 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.15E-01 | 1.15E-01 |
| Pa-231 | 4.00E-02 | 4.00E-02 |
| Ac-227 | 5.49E-03 | 5.49E-03 |
| Pb-210 | 9.40E+00 | 9.40E+00 |
| Ra-226 | 4.08E-01 | 4.08E-01 |
| Pb-210 | 2.76E-01 | 2.76E-01 |
| Th-228 | 1.00E-02 | 1.00E-02 |
| Th-230 | 4.16E+00 | 4.16E+00 |
| Ra-226 | 1.16E-02 | 1.16E-02 |
| Pb-210 | 5.31E-03 | 5.31E-03 |
| Th-232 | 1.45E-02 | 1.45E-02 |
| Ra-228 | 3.20E-02 | 3.20E-02 |
| Th-228 | 1.64E-02 | 1.64E-02 |
| U-234 | 1.66E-02 | 1.66E-02 |
| Th-230 | 1.82E-06 | 1.82E-06 |
| Ra-226 | 3.37E-09 | 3.37E-09 |
| Pb-210 | 1.17E-09 | 1.17E-09 |
| U-235 | 4.69E-04 | 4.69E-04 |
| Pa-231 | 2.19E-07 | 2.19E-07 |
| Ac-227 | 2.03E-08 | 2.03E-08 |
| U-238 | 1.94E-02 | 1.94E-02 |
| U-234 | 1.41E-07 | 1.41E-07 |
| Th-230 | 1.03E-11 | 1.03E-11 |
| Ra-226 | 1.43E-14 | 1.43E-14 |
| Pb-210 | 3.79E-15 | 3.79E-15 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.56E-02 | 2.56E-02 |
| Pa-231 | 9.17E-03 | 9.17E-03 |
| Ac-227 | 1.22E-03 | 1.22E-03 |
| Pb-210 | 2.17E+00 | 2.17E+00 |
| Ra-226 | 7.89E-02 | 7.89E-02 |
| Pb-210 | 6.36E-02 | 6.36E-02 |
| Th-228 | 2.24E-03 | 2.24E-03 |
| Th-230 | 9.61E-01 | 9.61E-01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 2.24E-03 | 2.24E-03 |
| Pb-210 | 1.22E-03 | 1.22E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 7.24E-03 | 7.24E-03 |
| Th-228 | 3.67E-03 | 3.67E-03 |
| U-234 | 3.82E-03 | 3.82E-03 |
| Th-230 | 4.20E-07 | 4.20E-07 |
| Ra-226 | 6.52E-10 | 6.52E-10 |
| Pb-210 | 2.70E-10 | 2.70E-10 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 5.01E-08 | 5.01E-08 |
| Ac-227 | 4.53E-09 | 4.53E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 3.24E-08 | 3.24E-08 |
| Th-230 | 2.37E-12 | 2.37E-12 |
| Ra-226 | 2.76E-15 | 2.76E-15 |
| Pb-210 | 8.65E-16 | 8.65E-16 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.56E-02 | 2.56E-02 |
| Pa-231 | 9.17E-03 | 9.17E-03 |
| Ac-227 | 1.22E-03 | 1.22E-03 |
| Pb-210 | 2.17E+00 | 2.17E+00 |
| Ra-226 | 7.89E-02 | 7.89E-02 |
| Pb-210 | 6.36E-02 | 6.36E-02 |
| Th-228 | 2.24E-03 | 2.24E-03 |
| Th-230 | 9.61E-01 | 9.61E-01 |
| Ra-226 | 2.24E-03 | 2.24E-03 |
| Pb-210 | 1.22E-03 | 1.22E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 7.24E-03 | 7.24E-03 |
| Th-228 | 3.67E-03 | 3.67E-03 |
| U-234 | 3.82E-03 | 3.82E-03 |
| Th-230 | 4.20E-07 | 4.20E-07 |
| Ra-226 | 6.52E-10 | 6.52E-10 |
| Pb-210 | 2.70E-10 | 2.70E-10 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 5.01E-08 | 5.01E-08 |
| Ac-227 | 4.53E-09 | 4.53E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 3.24E-08 | 3.24E-08 |
| Th-230 | 2.37E-12 | 2.37E-12 |
| Ra-226 | 2.76E-15 | 2.76E-15 |
| Pb-210 | 8.65E-16 | 8.65E-16 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.56E-02 | 2.56E-02 |
| Pa-231 | 9.17E-03 | 9.17E-03 |
| Ac-227 | 1.22E-03 | 1.22E-03 |
| Pb-210 | 2.17E+00 | 2.17E+00 |
| Ra-226 | 7.89E-02 | 7.89E-02 |
| Pb-210 | 6.36E-02 | 6.36E-02 |
| Th-228 | 2.24E-03 | 2.24E-03 |
| Th-230 | 9.61E-01 | 9.61E-01 |
| Ra-226 | 2.24E-03 | 2.24E-03 |
| Pb-210 | 1.22E-03 | 1.22E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 7.24E-03 | 7.24E-03 |
| Th-228 | 3.67E-03 | 3.67E-03 |
| U-234 | 3.82E-03 | 3.82E-03 |
| Th-230 | 4.20E-07 | 4.20E-07 |
| Ra-226 | 6.52E-10 | 6.52E-10 |
| Pb-210 | 2.70E-10 | 2.70E-10 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 5.01E-08 | 5.01E-08 |
| Ac-227 | 4.53E-09 | 4.53E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 3.24E-08 | 3.24E-08 |
| Th-230 | 2.37E-12 | 2.37E-12 |
| Ra-226 | 2.76E-15 | 2.76E-15 |
| Pb-210 | 8.65E-16 | 8.65E-16 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.56E-02 | 2.56E-02 |
| Pa-231 | 9.17E-03 | 9.17E-03 |
| Ac-227 | 1.22E-03 | 1.22E-03 |
| Pb-210 | 2.17E+00 | 2.17E+00 |
| Ra-226 | 7.89E-02 | 7.89E-02 |
| Pb-210 | 6.36E-02 | 6.36E-02 |
| Th-228 | 2.24E-03 | 2.24E-03 |
| Th-230 | 9.61E-01 | 9.61E-01 |
| Ra-226 | 2.24E-03 | 2.24E-03 |
| Pb-210 | 1.22E-03 | 1.22E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 7.24E-03 | 7.24E-03 |
| Th-228 | 3.67E-03 | 3.67E-03 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 3.82E-03 | 3.82E-03 |
| Th-230 | 4.20E-07 | 4.20E-07 |
| Ra-226 | 6.52E-10 | 6.52E-10 |
| Pb-210 | 2.70E-10 | 2.70E-10 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 5.01E-08 | 5.01E-08 |
| Ac-227 | 4.53E-09 | 4.53E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 3.24E-08 | 3.24E-08 |
| Th-230 | 2.37E-12 | 2.37E-12 |
| Ra-226 | 2.76E-15 | 2.76E-15 |
| Pb-210 | 8.65E-16 | 8.65E-16 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time:  1.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.44E+01 | 3.30E+00 | 3.30E+00 | 3.30E+00 | 3.30E+00 | 2.75E+01 |
| Total | 1.44E+01 | 3.30E+00 | 3.30E+00 | 3.30E+00 | 3.30E+00 | 2.75E+01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.12E-01 | 1.01E+00 | 1.06E-06 | 2.07E-07 | 3.99E-02 | 4.50E-02 | 1.32E+01 | 1.44E+01 |
| Total | 1.12E-01 | 1.01E+00 | 1.06E-06 | 2.07E-07 | 3.99E-02 | 4.50E-02 | 1.32E+01 | 1.44E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |
| Total | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |
| Total | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |
| Total | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |
| Total | 6.22E-03 | 2.33E-01 | 2.44E-07 | 4.79E-08 | 9.22E-03 | 1.04E-02 | 3.04E+00 | 3.30E+00 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.12E-01 | 1.12E-01 |
| Pa-231 | 4.01E-02 | 4.01E-02 |
| Ac-227 | 7.24E-03 | 7.24E-03 |
| Pb-210 | 9.11E+00 | 9.11E+00 |
| Ra-226 | 4.08E-01 | 4.08E-01 |
| Pb-210 | 3.63E-01 | 3.63E-01 |
| Th-228 | 6.94E-03 | 6.94E-03 |
| Th-230 | 4.17E+00 | 4.17E+00 |
| Ra-226 | 1.55E-02 | 1.55E-02 |
| Pb-210 | 8.34E-03 | 8.34E-03 |
| Th-232 | 1.46E-02 | 1.46E-02 |
| Ra-228 | 4.10E-02 | 4.10E-02 |
| Th-228 | 2.35E-02 | 2.35E-02 |
| U-234 | 1.66E-02 | 1.66E-02 |
| Th-230 | 2.43E-06 | 2.43E-06 |
| Ra-226 | 5.33E-09 | 5.33E-09 |
| Pb-210 | 2.15E-09 | 2.15E-09 |
| U-235 | 4.69E-04 | 4.69E-04 |
| Pa-231 | 2.92E-07 | 2.92E-07 |
| Ac-227 | 3.19E-08 | 3.19E-08 |
| U-238 | 1.94E-02 | 1.94E-02 |
| U-234 | 1.88E-07 | 1.88E-07 |
| Th-230 | 1.63E-11 | 1.63E-11 |
| Ra-226 | 2.64E-14 | 2.64E-14 |
| Pb-210 | 8.40E-15 | 8.40E-15 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.49E-02 | 2.49E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 1.61E-03 | 1.61E-03 |
| Pb-210 | 2.10E+00 | 2.10E+00 |
| Ra-226 | 7.88E-02 | 7.88E-02 |
| Pb-210 | 8.39E-02 | 8.39E-02 |
| Th-228 | 1.56E-03 | 1.56E-03 |
| Th-230 | 9.63E-01 | 9.63E-01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 2.99E-03 | 2.99E-03 |
| Pb-210 | 1.92E-03 | 1.92E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 9.27E-03 | 9.27E-03 |
| Th-228 | 5.26E-03 | 5.26E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 5.60E-07 | 5.60E-07 |
| Ra-226 | 1.03E-09 | 1.03E-09 |
| Pb-210 | 4.96E-10 | 4.96E-10 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 6.69E-08 | 6.69E-08 |
| Ac-227 | 7.11E-09 | 7.11E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 4.32E-08 | 4.32E-08 |
| Th-230 | 3.75E-12 | 3.75E-12 |
| Ra-226 | 5.11E-15 | 5.11E-15 |
| Pb-210 | 1.90E-15 | 1.90E-15 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.49E-02 | 2.49E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 1.61E-03 | 1.61E-03 |
| Pb-210 | 2.10E+00 | 2.10E+00 |
| Ra-226 | 7.88E-02 | 7.88E-02 |
| Pb-210 | 8.39E-02 | 8.39E-02 |
| Th-228 | 1.56E-03 | 1.56E-03 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 2.99E-03 | 2.99E-03 |
| Pb-210 | 1.92E-03 | 1.92E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 9.27E-03 | 9.27E-03 |
| Th-228 | 5.26E-03 | 5.26E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 5.60E-07 | 5.60E-07 |
| Ra-226 | 1.03E-09 | 1.03E-09 |
| Pb-210 | 4.96E-10 | 4.96E-10 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 6.69E-08 | 6.69E-08 |
| Ac-227 | 7.11E-09 | 7.11E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 4.32E-08 | 4.32E-08 |
| Th-230 | 3.75E-12 | 3.75E-12 |
| Ra-226 | 5.11E-15 | 5.11E-15 |
| Pb-210 | 1.90E-15 | 1.90E-15 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.49E-02 | 2.49E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 1.61E-03 | 1.61E-03 |
| Pb-210 | 2.10E+00 | 2.10E+00 |
| Ra-226 | 7.88E-02 | 7.88E-02 |
| Pb-210 | 8.39E-02 | 8.39E-02 |
| Th-228 | 1.56E-03 | 1.56E-03 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 2.99E-03 | 2.99E-03 |
| Pb-210 | 1.92E-03 | 1.92E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 9.27E-03 | 9.27E-03 |
| Th-228 | 5.26E-03 | 5.26E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 5.60E-07 | 5.60E-07 |
| Ra-226 | 1.03E-09 | 1.03E-09 |
| Pb-210 | 4.96E-10 | 4.96E-10 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 6.69E-08 | 6.69E-08 |
| Ac-227 | 7.11E-09 | 7.11E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 4.32E-08 | 4.32E-08 |
| Th-230 | 3.75E-12 | 3.75E-12 |
| Ra-226 | 5.11E-15 | 5.11E-15 |
| Pb-210 | 1.90E-15 | 1.90E-15 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.49E-02 | 2.49E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 1.61E-03 | 1.61E-03 |
| Pb-210 | 2.10E+00 | 2.10E+00 |
| Ra-226 | 7.88E-02 | 7.88E-02 |
| Pb-210 | 8.39E-02 | 8.39E-02 |
| Th-228 | 1.56E-03 | 1.56E-03 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 2.99E-03 | 2.99E-03 |
| Pb-210 | 1.92E-03 | 1.92E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 9.27E-03 | 9.27E-03 |
| Th-228 | 5.26E-03 | 5.26E-03 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 5.60E-07 | 5.60E-07 |
| Ra-226 | 1.03E-09 | 1.03E-09 |
| Pb-210 | 4.96E-10 | 4.96E-10 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 6.69E-08 | 6.69E-08 |
| Ac-227 | 7.11E-09 | 7.11E-09 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 4.32E-08 | 4.32E-08 |
| Th-230 | 3.75E-12 | 3.75E-12 |
| Ra-226 | 5.11E-15 | 5.11E-15 |
| Pb-210 | 1.90E-15 | 1.90E-15 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time:  3.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.40E+01 | 3.22E+00 | 3.22E+00 | 3.22E+00 | 3.22E+00 | 2.69E+01 |
| Total | 1.40E+01 | 3.22E+00 | 3.22E+00 | 3.22E+00 | 3.22E+00 | 2.69E+01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.13E-01 | 1.01E+00 | 1.07E-06 | 2.12E-07 | 3.88E-02 | 5.45E-02 | 1.28E+01 | 1.40E+01 |
| Total | 1.13E-01 | 1.01E+00 | 1.07E-06 | 2.12E-07 | 3.88E-02 | 5.45E-02 | 1.28E+01 | 1.40E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |
| Total | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |
| Total | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |
| Total | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |
| Total | 6.29E-03 | 2.32E-01 | 2.48E-07 | 4.90E-08 | 8.97E-03 | 1.26E-02 | 2.96E+00 | 3.22E+00 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.05E-01 | 1.05E-01 |
| Pa-231 | 4.01E-02 | 4.01E-02 |
| Ac-227 | 1.06E-02 | 1.06E-02 |
| Pb-210 | 8.56E+00 | 8.56E+00 |
| Ra-226 | 4.06E-01 | 4.06E-01 |
| Pb-210 | 5.31E-01 | 5.31E-01 |
| Th-228 | 3.34E-03 | 3.34E-03 |
| Th-230 | 4.17E+00 | 4.17E+00 |
| Ra-226 | 2.31E-02 | 2.31E-02 |
| Pb-210 | 1.68E-02 | 1.68E-02 |
| Th-232 | 1.46E-02 | 1.46E-02 |
| Ra-228 | 5.60E-02 | 5.60E-02 |
| Th-228 | 3.88E-02 | 3.88E-02 |
| U-234 | 1.66E-02 | 1.66E-02 |
| Th-230 | 3.64E-06 | 3.64E-06 |
| Ra-226 | 1.09E-08 | 1.09E-08 |
| Pb-210 | 5.74E-09 | 5.74E-09 |
| U-235 | 4.68E-04 | 4.68E-04 |
| Pa-231 | 4.38E-07 | 4.38E-07 |
| Ac-227 | 6.44E-08 | 6.44E-08 |
| U-238 | 1.94E-02 | 1.94E-02 |
| U-234 | 2.81E-07 | 2.81E-07 |
| Th-230 | 3.34E-11 | 3.34E-11 |
| Ra-226 | 7.12E-14 | 7.12E-14 |
| Pb-210 | 2.97E-14 | 2.97E-14 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.33E-02 | 2.33E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 2.36E-03 | 2.36E-03 |
| Pb-210 | 1.98E+00 | 1.98E+00 |
| Ra-226 | 7.87E-02 | 7.87E-02 |
| Pb-210 | 1.22E-01 | 1.22E-01 |
| Th-228 | 7.49E-04 | 7.49E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 4.48E-03 | 4.48E-03 |
| Pb-210 | 3.89E-03 | 3.89E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.27E-02 | 1.27E-02 |
| Th-228 | 8.69E-03 | 8.69E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 8.40E-07 | 8.40E-07 |
| Ra-226 | 2.12E-09 | 2.12E-09 |
| Pb-210 | 1.32E-09 | 1.32E-09 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 1.00E-07 | 1.00E-07 |
| Ac-227 | 1.44E-08 | 1.44E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 6.48E-08 | 6.48E-08 |
| Th-230 | 7.71E-12 | 7.71E-12 |
| Ra-226 | 1.38E-14 | 1.38E-14 |
| Pb-210 | 6.78E-15 | 6.78E-15 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.33E-02 | 2.33E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 2.36E-03 | 2.36E-03 |
| Pb-210 | 1.98E+00 | 1.98E+00 |
| Ra-226 | 7.87E-02 | 7.87E-02 |
| Pb-210 | 1.22E-01 | 1.22E-01 |
| Th-228 | 7.49E-04 | 7.49E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 4.48E-03 | 4.48E-03 |
| Pb-210 | 3.89E-03 | 3.89E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.27E-02 | 1.27E-02 |
| Th-228 | 8.69E-03 | 8.69E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 8.40E-07 | 8.40E-07 |
| Ra-226 | 2.12E-09 | 2.12E-09 |
| Pb-210 | 1.32E-09 | 1.32E-09 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 1.00E-07 | 1.00E-07 |
| Ac-227 | 1.44E-08 | 1.44E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 6.48E-08 | 6.48E-08 |
| Th-230 | 7.71E-12 | 7.71E-12 |
| Ra-226 | 1.38E-14 | 1.38E-14 |
| Pb-210 | 6.78E-15 | 6.78E-15 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.33E-02 | 2.33E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 2.36E-03 | 2.36E-03 |
| Pb-210 | 1.98E+00 | 1.98E+00 |
| Ra-226 | 7.87E-02 | 7.87E-02 |
| Pb-210 | 1.22E-01 | 1.22E-01 |
| Th-228 | 7.49E-04 | 7.49E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 4.48E-03 | 4.48E-03 |
| Pb-210 | 3.89E-03 | 3.89E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.27E-02 | 1.27E-02 |
| Th-228 | 8.69E-03 | 8.69E-03 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 8.40E-07 | 8.40E-07 |
| Ra-226 | 2.12E-09 | 2.12E-09 |
| Pb-210 | 1.32E-09 | 1.32E-09 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 1.00E-07 | 1.00E-07 |
| Ac-227 | 1.44E-08 | 1.44E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 6.48E-08 | 6.48E-08 |
| Th-230 | 7.71E-12 | 7.71E-12 |
| Ra-226 | 1.38E-14 | 1.38E-14 |
| Pb-210 | 6.78E-15 | 6.78E-15 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.33E-02 | 2.33E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 2.36E-03 | 2.36E-03 |
| Pb-210 | 1.98E+00 | 1.98E+00 |
| Ra-226 | 7.87E-02 | 7.87E-02 |
| Pb-210 | 1.22E-01 | 1.22E-01 |
| Th-228 | 7.49E-04 | 7.49E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 4.48E-03 | 4.48E-03 |
| Pb-210 | 3.89E-03 | 3.89E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.27E-02 | 1.27E-02 |
| Th-228 | 8.69E-03 | 8.69E-03 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 8.40E-07 | 8.40E-07 |
| Ra-226 | 2.12E-09 | 2.12E-09 |
| Pb-210 | 1.32E-09 | 1.32E-09 |
| U-235 | 9.18E-05 | 9.18E-05 |
| Pa-231 | 1.00E-07 | 1.00E-07 |
| Ac-227 | 1.44E-08 | 1.44E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 6.48E-08 | 6.48E-08 |
| Th-230 | 7.71E-12 | 7.71E-12 |
| Ra-226 | 1.38E-14 | 1.38E-14 |
| Pb-210 | 6.78E-15 | 6.78E-15 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time:  6.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.35E+01 | 3.11E+00 | 3.11E+00 | 3.11E+00 | 3.11E+00 | 2.60E+01 |
| Total | 1.35E+01 | 3.11E+00 | 3.11E+00 | 3.11E+00 | 3.11E+00 | 2.60E+01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.14E-01 | 1.00E+00 | 1.10E-06 | 2.19E-07 | 3.73E-02 | 6.94E-02 | 1.23E+01 | 1.35E+01 |
| Total | 1.14E-01 | 1.00E+00 | 1.10E-06 | 2.19E-07 | 3.73E-02 | 6.94E-02 | 1.23E+01 | 1.35E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |
| Total | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |
| Total | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |
| Total | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |
| Total | 6.39E-03 | 2.32E-01 | 2.55E-07 | 5.06E-08 | 8.62E-03 | 1.60E-02 | 2.84E+00 | 3.11E+00 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.51E-02 | 9.51E-02 |
| Pa-231 | 4.01E-02 | 4.01E-02 |
| Ac-227 | 1.52E-02 | 1.52E-02 |
| Pb-210 | 7.79E+00 | 7.79E+00 |
| Ra-226 | 4.05E-01 | 4.05E-01 |
| Pb-210 | 7.63E-01 | 7.63E-01 |
| Th-228 | 1.12E-03 | 1.12E-03 |
| Th-230 | 4.17E+00 | 4.17E+00 |
| Ra-226 | 3.46E-02 | 3.46E-02 |
| Pb-210 | 3.53E-02 | 3.53E-02 |
| Th-232 | 1.46E-02 | 1.46E-02 |
| Ra-228 | 7.27E-02 | 7.27E-02 |
| Th-228 | 5.97E-02 | 5.97E-02 |
| U-234 | 1.66E-02 | 1.66E-02 |
| Th-230 | 5.46E-06 | 5.46E-06 |
| Ra-226 | 2.35E-08 | 2.35E-08 |
| Pb-210 | 1.69E-08 | 1.69E-08 |
| U-235 | 4.67E-04 | 4.67E-04 |
| Pa-231 | 6.56E-07 | 6.56E-07 |
| Ac-227 | 1.35E-07 | 1.35E-07 |
| U-238 | 1.94E-02 | 1.94E-02 |
| U-234 | 4.22E-07 | 4.22E-07 |
| Th-230 | 7.19E-11 | 7.19E-11 |
| Ra-226 | 2.13E-13 | 2.13E-13 |
| Pb-210 | 1.20E-13 | 1.20E-13 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.12E-02 | 2.12E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 3.39E-03 | 3.39E-03 |
| Pb-210 | 1.80E+00 | 1.80E+00 |
| Ra-226 | 7.85E-02 | 7.85E-02 |
| Pb-210 | 1.76E-01 | 1.76E-01 |
| Th-228 | 2.50E-04 | 2.50E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

| | | |
|---|---|---|
| Ra-226 | 6.71E-03 | 6.71E-03 |
| Pb-210 | 8.14E-03 | 8.14E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.64E-02 | 1.64E-02 |
| Th-228 | 1.34E-02 | 1.34E-02 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 1.26E-06 | 1.26E-06 |
| Ra-226 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 3.89E-09 | 3.89E-09 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 1.50E-07 | 1.50E-07 |
| Ac-227 | 3.01E-08 | 3.01E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 9.73E-08 | 9.73E-08 |
| Th-230 | 1.66E-11 | 1.66E-11 |
| Ra-226 | 4.13E-14 | 4.13E-14 |
| Pb-210 | 2.77E-14 | 2.77E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.12E-02 | 2.12E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 3.39E-03 | 3.39E-03 |
| Pb-210 | 1.80E+00 | 1.80E+00 |
| Ra-226 | 7.85E-02 | 7.85E-02 |
| Pb-210 | 1.76E-01 | 1.76E-01 |
| Th-228 | 2.50E-04 | 2.50E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 6.71E-03 | 6.71E-03 |
| Pb-210 | 8.14E-03 | 8.14E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.64E-02 | 1.64E-02 |
| Th-228 | 1.34E-02 | 1.34E-02 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 1.26E-06 | 1.26E-06 |
| Ra-226 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 3.89E-09 | 3.89E-09 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 1.50E-07 | 1.50E-07 |
| Ac-227 | 3.01E-08 | 3.01E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 9.73E-08 | 9.73E-08 |
| Th-230 | 1.66E-11 | 1.66E-11 |
| Ra-226 | 4.13E-14 | 4.13E-14 |
| Pb-210 | 2.77E-14 | 2.77E-14 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.12E-02 | 2.12E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 3.39E-03 | 3.39E-03 |
| Pb-210 | 1.80E+00 | 1.80E+00 |
| Ra-226 | 7.85E-02 | 7.85E-02 |
| Pb-210 | 1.76E-01 | 1.76E-01 |
| Th-228 | 2.50E-04 | 2.50E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 6.71E-03 | 6.71E-03 |
| Pb-210 | 8.14E-03 | 8.14E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.64E-02 | 1.64E-02 |
| Th-228 | 1.34E-02 | 1.34E-02 |
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 1.26E-06 | 1.26E-06 |
| Ra-226 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 3.89E-09 | 3.89E-09 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 1.50E-07 | 1.50E-07 |
| Ac-227 | 3.01E-08 | 3.01E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 9.73E-08 | 9.73E-08 |
| Th-230 | 1.66E-11 | 1.66E-11 |
| Ra-226 | 4.13E-14 | 4.13E-14 |
| Pb-210 | 2.77E-14 | 2.77E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.12E-02 | 2.12E-02 |
| Pa-231 | 9.19E-03 | 9.19E-03 |
| Ac-227 | 3.39E-03 | 3.39E-03 |
| Pb-210 | 1.80E+00 | 1.80E+00 |
| Ra-226 | 7.85E-02 | 7.85E-02 |
| Pb-210 | 1.76E-01 | 1.76E-01 |
| Th-228 | 2.50E-04 | 2.50E-04 |
| Th-230 | 9.63E-01 | 9.63E-01 |
| Ra-226 | 6.71E-03 | 6.71E-03 |
| Pb-210 | 8.14E-03 | 8.14E-03 |
| Th-232 | 3.36E-03 | 3.36E-03 |
| Ra-228 | 1.64E-02 | 1.64E-02 |
| Th-228 | 1.34E-02 | 1.34E-02 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

| | | |
|---|---|---|
| U-234 | 3.83E-03 | 3.83E-03 |
| Th-230 | 1.26E-06 | 1.26E-06 |
| Ra-226 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 3.89E-09 | 3.89E-09 |
| U-235 | 9.17E-05 | 9.17E-05 |
| Pa-231 | 1.50E-07 | 1.50E-07 |
| Ac-227 | 3.01E-08 | 3.01E-08 |
| U-238 | 4.06E-03 | 4.06E-03 |
| U-234 | 9.73E-08 | 9.73E-08 |
| Th-230 | 1.66E-11 | 1.66E-11 |
| Ra-226 | 4.13E-14 | 4.13E-14 |
| Pb-210 | 2.77E-14 | 2.77E-14 |

RESRAD-BUILD Output Student Risk

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

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Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources : 5
Number of Receptors: 1
Total Time : 2.190000E+03 days
Fraction Inside : 2.230000E-01

Transformations data from: ICRP107
Cut off half life : 180.000000 days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 0.700 | 1.000 | 1.20E+01 | 3.00E-03 |

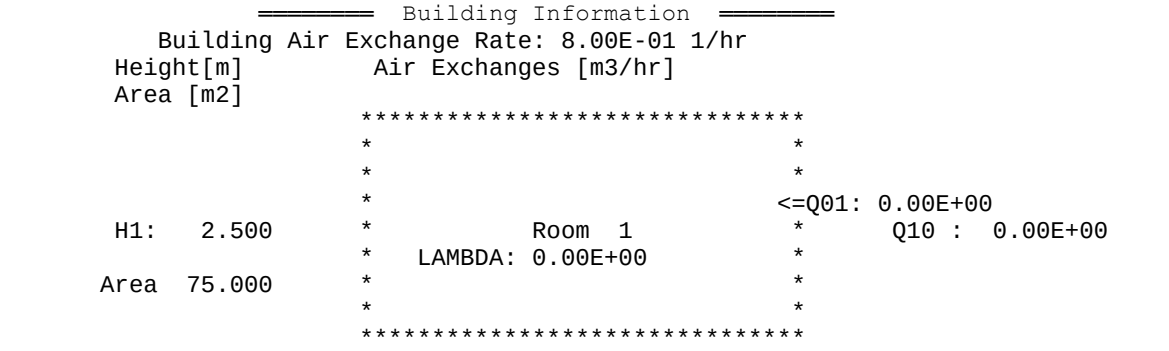
### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr




Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration

              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02
 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration

              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    1.500E-07 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Temporal Summary

RESRAD-BUILD Temporal Risk Tables

Risk to Receptor over the Exposure Duration

| Evaluation Time years | Receptor 1 (Risk) | Total (Risk) |
|---|---|---|
| 0.000000000 | 3.77E-06 | 3.77E-06 |
| 1.000000000 | 3.72E-06 | 3.72E-06 |
| 3.000000000 | 3.63E-06 | 3.63E-06 |
| 6.000000000 | 3.50E-06 | 3.50E-06 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 0.00000000E+00 years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.99E-06 | 4.44E-07 | 4.44E-07 | 4.44E-07 | 4.44E-07 | 3.77E-06 |
| Total | 1.99E-06 | 4.44E-07 | 4.44E-07 | 4.44E-07 | 4.44E-07 | 3.77E-06 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 0.00000000E+00 years

## Pathway Detail of Risks

[Risk]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.67E-08 | 7.77E-08 | 8.03E-13 | 1.62E-13 | 5.36E-09 | 1.95E-08 | 1.80E-06 | 1.99E-06 |
| Total | 8.67E-08 | 7.77E-08 | 8.03E-13 | 1.62E-13 | 5.36E-09 | 1.95E-08 | 1.80E-06 | 1.99E-06 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |
| Total | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |
| Total | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |
| Total | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |
| Total | 4.84E-09 | 1.79E-08 | 1.86E-13 | 3.73E-14 | 1.24E-09 | 4.51E-09 | 4.16E-07 | 4.44E-07 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.23E-08 | 2.23E-08 |
| Pa-231 | 3.65E-09 | 3.65E-09 |
| Ac-227 | 1.06E-09 | 1.06E-09 |
| Pb-210 | 1.34E-06 | 1.34E-06 |
| Ra-226 | 1.54E-07 | 1.54E-07 |
| Pb-210 | 3.93E-08 | 3.93E-08 |
| Th-228 | 2.36E-09 | 2.36E-09 |
| Th-230 | 3.99E-07 | 3.99E-07 |
| Ra-226 | 4.38E-09 | 4.38E-09 |
| Pb-210 | 7.56E-10 | 7.56E-10 |
| Th-232 | 1.37E-09 | 1.37E-09 |
| Ra-228 | 4.24E-09 | 4.24E-09 |
| Th-228 | 3.87E-09 | 3.87E-09 |
| U-234 | 5.08E-09 | 5.08E-09 |
| Th-230 | 1.74E-13 | 1.74E-13 |
| Ra-226 | 1.27E-15 | 1.27E-15 |
| Pb-210 | 1.66E-16 | 1.66E-16 |
| U-235 | 1.89E-10 | 1.89E-10 |
| Pa-231 | 1.99E-14 | 1.99E-14 |
| Ac-227 | 3.93E-15 | 3.93E-15 |
| U-238 | 7.79E-09 | 7.79E-09 |
| U-234 | 4.30E-14 | 4.30E-14 |
| Th-230 | 9.83E-19 | 9.83E-19 |
| Ra-226 | 5.38E-21 | 5.38E-21 |
| Pb-210 | 5.40E-22 | 5.40E-22 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.43E-09 | 4.43E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 2.11E-10 | 2.11E-10 |
| Pb-210 | 3.09E-07 | 3.09E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 9.05E-09 | 9.05E-09 |
| Th-228 | 4.91E-10 | 4.91E-10 |
| Th-230 | 9.17E-08 | 9.17E-08 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 6.62E-10 | 6.62E-10 |
| Pb-210 | 1.74E-10 | 1.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 8.58E-10 | 8.58E-10 |
| Th-228 | 8.04E-10 | 8.04E-10 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 4.01E-14 | 4.01E-14 |
| Ra-226 | 1.92E-16 | 1.92E-16 |
| Pb-210 | 3.84E-17 | 3.84E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 4.30E-15 | 4.30E-15 |
| Ac-227 | 7.81E-16 | 7.81E-16 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 9.89E-15 | 9.89E-15 |
| Th-230 | 2.26E-19 | 2.26E-19 |
| Ra-226 | 8.15E-22 | 8.15E-22 |
| Pb-210 | 1.23E-22 | 1.23E-22 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.43E-09 | 4.43E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 2.11E-10 | 2.11E-10 |
| Pb-210 | 3.09E-07 | 3.09E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 9.05E-09 | 9.05E-09 |
| Th-228 | 4.91E-10 | 4.91E-10 |
| Th-230 | 9.17E-08 | 9.17E-08 |
| Ra-226 | 6.62E-10 | 6.62E-10 |
| Pb-210 | 1.74E-10 | 1.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 8.58E-10 | 8.58E-10 |
| Th-228 | 8.04E-10 | 8.04E-10 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 4.01E-14 | 4.01E-14 |
| Ra-226 | 1.92E-16 | 1.92E-16 |
| Pb-210 | 3.84E-17 | 3.84E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 4.30E-15 | 4.30E-15 |
| Ac-227 | 7.81E-16 | 7.81E-16 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 9.89E-15 | 9.89E-15 |
| Th-230 | 2.26E-19 | 2.26E-19 |
| Ra-226 | 8.15E-22 | 8.15E-22 |
| Pb-210 | 1.23E-22 | 1.23E-22 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.43E-09 | 4.43E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 2.11E-10 | 2.11E-10 |
| Pb-210 | 3.09E-07 | 3.09E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 9.05E-09 | 9.05E-09 |
| Th-228 | 4.91E-10 | 4.91E-10 |
| Th-230 | 9.17E-08 | 9.17E-08 |
| Ra-226 | 6.62E-10 | 6.62E-10 |
| Pb-210 | 1.74E-10 | 1.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 8.58E-10 | 8.58E-10 |
| Th-228 | 8.04E-10 | 8.04E-10 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 4.01E-14 | 4.01E-14 |
| Ra-226 | 1.92E-16 | 1.92E-16 |
| Pb-210 | 3.84E-17 | 3.84E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 4.30E-15 | 4.30E-15 |
| Ac-227 | 7.81E-16 | 7.81E-16 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 9.89E-15 | 9.89E-15 |
| Th-230 | 2.26E-19 | 2.26E-19 |
| Ra-226 | 8.15E-22 | 8.15E-22 |
| Pb-210 | 1.23E-22 | 1.23E-22 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.43E-09 | 4.43E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 2.11E-10 | 2.11E-10 |
| Pb-210 | 3.09E-07 | 3.09E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 9.05E-09 | 9.05E-09 |
| Th-228 | 4.91E-10 | 4.91E-10 |
| Th-230 | 9.17E-08 | 9.17E-08 |
| Ra-226 | 6.62E-10 | 6.62E-10 |
| Pb-210 | 1.74E-10 | 1.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 8.58E-10 | 8.58E-10 |
| Th-228 | 8.04E-10 | 8.04E-10 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 4.01E-14 | 4.01E-14 |
| Ra-226 | 1.92E-16 | 1.92E-16 |
| Pb-210 | 3.84E-17 | 3.84E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 4.30E-15 | 4.30E-15 |
| Ac-227 | 7.81E-16 | 7.81E-16 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 9.89E-15 | 9.89E-15 |
| Th-230 | 2.26E-19 | 2.26E-19 |
| Ra-226 | 8.15E-22 | 8.15E-22 |
| Pb-210 | 1.23E-22 | 1.23E-22 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time:  1.00000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.96E-06 | 4.38E-07 | 4.38E-07 | 4.38E-07 | 4.38E-07 | 3.72E-06 |
| Total | 1.96E-06 | 4.38E-07 | 4.38E-07 | 4.38E-07 | 4.38E-07 | 3.72E-06 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.72E-08 | 7.81E-08 | 8.26E-13 | 1.65E-13 | 5.38E-09 | 2.03E-08 | 1.77E-06 | 1.96E-06 |
| Total | 8.72E-08 | 7.81E-08 | 8.26E-13 | 1.65E-13 | 5.38E-09 | 2.03E-08 | 1.77E-06 | 1.96E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |
| Total | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |
| Total | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |
| Total | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |
| Total | 4.87E-09 | 1.80E-08 | 1.91E-13 | 3.80E-14 | 1.24E-09 | 4.68E-09 | 4.10E-07 | 4.38E-07 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.16E-08 | 2.16E-08 |
| Pa-231 | 3.65E-09 | 3.65E-09 |
| Ac-227 | 1.40E-09 | 1.40E-09 |
| Pb-210 | 1.30E-06 | 1.30E-06 |
| Ra-226 | 1.54E-07 | 1.54E-07 |
| Pb-210 | 5.18E-08 | 5.18E-08 |
| Th-228 | 1.64E-09 | 1.64E-09 |
| Th-230 | 3.99E-07 | 3.99E-07 |
| Ra-226 | 5.83E-09 | 5.83E-09 |
| Pb-210 | 1.19E-09 | 1.19E-09 |
| Th-232 | 1.37E-09 | 1.37E-09 |
| Ra-228 | 5.43E-09 | 5.43E-09 |
| Th-228 | 5.54E-09 | 5.54E-09 |
| U-234 | 5.09E-09 | 5.09E-09 |
| Th-230 | 2.32E-13 | 2.32E-13 |
| Ra-226 | 2.01E-15 | 2.01E-15 |
| Pb-210 | 3.07E-16 | 3.07E-16 |
| U-235 | 1.89E-10 | 1.89E-10 |
| Pa-231 | 2.66E-14 | 2.66E-14 |
| Ac-227 | 6.17E-15 | 6.17E-15 |
| U-238 | 7.79E-09 | 7.79E-09 |
| U-234 | 5.74E-14 | 5.74E-14 |
| Th-230 | 1.56E-18 | 1.56E-18 |
| Ra-226 | 9.95E-21 | 9.95E-21 |
| Pb-210 | 1.20E-21 | 1.20E-21 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.29E-09 | 4.29E-09 |
| Pa-231 | 7.89E-10 | 7.89E-10 |
| Ac-227 | 2.79E-10 | 2.79E-10 |
| Pb-210 | 2.99E-07 | 2.99E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 1.19E-08 | 1.19E-08 |
| Th-228 | 3.41E-10 | 3.41E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 8.82E-10 | 8.82E-10 |
| Pb-210 | 2.74E-10 | 2.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.10E-09 | 1.10E-09 |
| Th-228 | 1.15E-09 | 1.15E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 5.34E-14 | 5.34E-14 |
| Ra-226 | 3.05E-16 | 3.05E-16 |
| Pb-210 | 7.06E-17 | 7.06E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 5.74E-15 | 5.74E-15 |
| Ac-227 | 1.23E-15 | 1.23E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.32E-14 | 1.32E-14 |
| Th-230 | 3.58E-19 | 3.58E-19 |
| Ra-226 | 1.51E-21 | 1.51E-21 |
| Pb-210 | 2.71E-22 | 2.71E-22 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.29E-09 | 4.29E-09 |
| Pa-231 | 7.89E-10 | 7.89E-10 |
| Ac-227 | 2.79E-10 | 2.79E-10 |
| Pb-210 | 2.99E-07 | 2.99E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 1.19E-08 | 1.19E-08 |
| Th-228 | 3.41E-10 | 3.41E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 8.82E-10 | 8.82E-10 |
| Pb-210 | 2.74E-10 | 2.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.10E-09 | 1.10E-09 |
| Th-228 | 1.15E-09 | 1.15E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 5.34E-14 | 5.34E-14 |
| Ra-226 | 3.05E-16 | 3.05E-16 |
| Pb-210 | 7.06E-17 | 7.06E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 5.74E-15 | 5.74E-15 |
| Ac-227 | 1.23E-15 | 1.23E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.32E-14 | 1.32E-14 |
| Th-230 | 3.58E-19 | 3.58E-19 |
| Ra-226 | 1.51E-21 | 1.51E-21 |
| Pb-210 | 2.71E-22 | 2.71E-22 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.29E-09 | 4.29E-09 |
| Pa-231 | 7.89E-10 | 7.89E-10 |
| Ac-227 | 2.79E-10 | 2.79E-10 |
| Pb-210 | 2.99E-07 | 2.99E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 1.19E-08 | 1.19E-08 |
| Th-228 | 3.41E-10 | 3.41E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 8.82E-10 | 8.82E-10 |
| Pb-210 | 2.74E-10 | 2.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.10E-09 | 1.10E-09 |
| Th-228 | 1.15E-09 | 1.15E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 5.34E-14 | 5.34E-14 |
| Ra-226 | 3.05E-16 | 3.05E-16 |
| Pb-210 | 7.06E-17 | 7.06E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 5.74E-15 | 5.74E-15 |
| Ac-227 | 1.23E-15 | 1.23E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.32E-14 | 1.32E-14 |
| Th-230 | 3.58E-19 | 3.58E-19 |
| Ra-226 | 1.51E-21 | 1.51E-21 |
| Pb-210 | 2.71E-22 | 2.71E-22 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.29E-09 | 4.29E-09 |
| Pa-231 | 7.89E-10 | 7.89E-10 |
| Ac-227 | 2.79E-10 | 2.79E-10 |
| Pb-210 | 2.99E-07 | 2.99E-07 |
| Ra-226 | 2.33E-08 | 2.33E-08 |
| Pb-210 | 1.19E-08 | 1.19E-08 |
| Th-228 | 3.41E-10 | 3.41E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 8.82E-10 | 8.82E-10 |
| Pb-210 | 2.74E-10 | 2.74E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.10E-09 | 1.10E-09 |
| Th-228 | 1.15E-09 | 1.15E-09 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 5.34E-14 | 5.34E-14 |
| Ra-226 | 3.05E-16 | 3.05E-16 |
| Pb-210 | 7.06E-17 | 7.06E-17 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 5.74E-15 | 5.74E-15 |
| Ac-227 | 1.23E-15 | 1.23E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.32E-14 | 1.32E-14 |
| Th-230 | 3.58E-19 | 3.58E-19 |
| Ra-226 | 1.51E-21 | 1.51E-21 |
| Pb-210 | 2.71E-22 | 2.71E-22 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 3.00000000 years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.92E-06 | 4.27E-07 | 4.27E-07 | 4.27E-07 | 4.27E-07 | 3.63E-06 |
| Total | 1.92E-06 | 4.27E-07 | 4.27E-07 | 4.27E-07 | 4.27E-07 | 3.63E-06 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.83E-08 | 7.79E-08 | 8.42E-13 | 1.69E-13 | 5.23E-09 | 2.24E-08 | 1.72E-06 | 1.92E-06 |
| Total | 8.83E-08 | 7.79E-08 | 8.42E-13 | 1.69E-13 | 5.23E-09 | 2.24E-08 | 1.72E-06 | 1.92E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |
| Total | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |
| Total | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |
| Total | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |
| Total | 4.93E-09 | 1.80E-08 | 1.94E-13 | 3.90E-14 | 1.21E-09 | 5.17E-09 | 3.98E-07 | 4.27E-07 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.02E-08 | 2.02E-08 |
| Pa-231 | 3.65E-09 | 3.65E-09 |
| Ac-227 | 2.04E-09 | 2.04E-09 |
| Pb-210 | 1.22E-06 | 1.22E-06 |
| Ra-226 | 1.53E-07 | 1.53E-07 |
| Pb-210 | 7.56E-08 | 7.56E-08 |
| Th-228 | 7.90E-10 | 7.90E-10 |
| Th-230 | 3.99E-07 | 3.99E-07 |
| Ra-226 | 8.71E-09 | 8.71E-09 |
| Pb-210 | 2.40E-09 | 2.40E-09 |
| Th-232 | 1.37E-09 | 1.37E-09 |
| Ra-228 | 7.41E-09 | 7.41E-09 |
| Th-228 | 9.17E-09 | 9.17E-09 |
| U-234 | 5.08E-09 | 5.08E-09 |
| Th-230 | 3.48E-13 | 3.48E-13 |
| Ra-226 | 4.12E-15 | 4.12E-15 |
| Pb-210 | 8.18E-16 | 8.18E-16 |
| U-235 | 1.89E-10 | 1.89E-10 |
| Pa-231 | 3.99E-14 | 3.99E-14 |
| Ac-227 | 1.24E-14 | 1.24E-14 |
| U-238 | 7.78E-09 | 7.78E-09 |
| U-234 | 8.61E-14 | 8.61E-14 |
| Th-230 | 3.20E-18 | 3.20E-18 |
| Ra-226 | 2.68E-20 | 2.68E-20 |
| Pb-210 | 4.23E-21 | 4.23E-21 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.03E-09 | 4.03E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 4.07E-10 | 4.07E-10 |
| Pb-210 | 2.81E-07 | 2.81E-07 |
| Ra-226 | 2.32E-08 | 2.32E-08 |
| Pb-210 | 1.74E-08 | 1.74E-08 |
| Th-228 | 1.64E-10 | 1.64E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 1.32E-09 | 1.32E-09 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.50E-09 | 1.50E-09 |
| Th-228 | 1.90E-09 | 1.90E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 8.01E-14 | 8.01E-14 |
| Ra-226 | 6.24E-16 | 6.24E-16 |
| Pb-210 | 1.88E-16 | 1.88E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 8.61E-15 | 8.61E-15 |
| Ac-227 | 2.48E-15 | 2.48E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.98E-14 | 1.98E-14 |
| Th-230 | 7.35E-19 | 7.35E-19 |
| Ra-226 | 4.06E-21 | 4.06E-21 |
| Pb-210 | 9.65E-22 | 9.65E-22 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.03E-09 | 4.03E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 4.07E-10 | 4.07E-10 |
| Pb-210 | 2.81E-07 | 2.81E-07 |
| Ra-226 | 2.32E-08 | 2.32E-08 |
| Pb-210 | 1.74E-08 | 1.74E-08 |
| Th-228 | 1.64E-10 | 1.64E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.32E-09 | 1.32E-09 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.50E-09 | 1.50E-09 |
| Th-228 | 1.90E-09 | 1.90E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 8.01E-14 | 8.01E-14 |
| Ra-226 | 6.24E-16 | 6.24E-16 |
| Pb-210 | 1.88E-16 | 1.88E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 8.61E-15 | 8.61E-15 |
| Ac-227 | 2.48E-15 | 2.48E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.98E-14 | 1.98E-14 |
| Th-230 | 7.35E-19 | 7.35E-19 |
| Ra-226 | 4.06E-21 | 4.06E-21 |
| Pb-210 | 9.65E-22 | 9.65E-22 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.03E-09 | 4.03E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 4.07E-10 | 4.07E-10 |
| Pb-210 | 2.81E-07 | 2.81E-07 |
| Ra-226 | 2.32E-08 | 2.32E-08 |
| Pb-210 | 1.74E-08 | 1.74E-08 |
| Th-228 | 1.64E-10 | 1.64E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.32E-09 | 1.32E-09 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.50E-09 | 1.50E-09 |
| Th-228 | 1.90E-09 | 1.90E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 8.01E-14 | 8.01E-14 |
| Ra-226 | 6.24E-16 | 6.24E-16 |
| Pb-210 | 1.88E-16 | 1.88E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 8.61E-15 | 8.61E-15 |
| Ac-227 | 2.48E-15 | 2.48E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.98E-14 | 1.98E-14 |
| Th-230 | 7.35E-19 | 7.35E-19 |
| Ra-226 | 4.06E-21 | 4.06E-21 |
| Pb-210 | 9.65E-22 | 9.65E-22 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.03E-09 | 4.03E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 4.07E-10 | 4.07E-10 |
| Pb-210 | 2.81E-07 | 2.81E-07 |
| Ra-226 | 2.32E-08 | 2.32E-08 |
| Pb-210 | 1.74E-08 | 1.74E-08 |
| Th-228 | 1.64E-10 | 1.64E-10 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.32E-09 | 1.32E-09 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.50E-09 | 1.50E-09 |
| Th-228 | 1.90E-09 | 1.90E-09 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 8.01E-14 | 8.01E-14 |
| Ra-226 | 6.24E-16 | 6.24E-16 |
| Pb-210 | 1.88E-16 | 1.88E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 8.61E-15 | 8.61E-15 |
| Ac-227 | 2.48E-15 | 2.48E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 1.98E-14 | 1.98E-14 |
| Th-230 | 7.35E-19 | 7.35E-19 |
| Ra-226 | 4.06E-21 | 4.06E-21 |
| Pb-210 | 9.65E-22 | 9.65E-22 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time:  6.00000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.85E-06 | 4.12E-07 | 4.12E-07 | 4.12E-07 | 4.12E-07 | 3.50E-06 |
| Total | 1.85E-06 | 4.12E-07 | 4.12E-07 | 4.12E-07 | 4.12E-07 | 3.50E-06 |

Title : Jana Elementary School User- Student
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
Evaluation Time: 6.00000000 years

## Pathway Detail of Risks

[Risk]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.97E-08 | 7.75E-08 | 8.66E-13 | 1.74E-13 | 5.02E-09 | 2.57E-08 | 1.65E-06 | 1.85E-06 |
| Total | 8.97E-08 | 7.75E-08 | 8.66E-13 | 1.74E-13 | 5.02E-09 | 2.57E-08 | 1.65E-06 | 1.85E-06 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |
| Total | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |
| Total | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |
| Total | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |
| Total | 5.02E-09 | 1.79E-08 | 2.00E-13 | 4.03E-14 | 1.16E-09 | 5.94E-09 | 3.82E-07 | 4.12E-07 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.84E-08 | 1.84E-08 |
| Pa-231 | 3.65E-09 | 3.65E-09 |
| Ac-227 | 2.93E-09 | 2.93E-09 |
| Pb-210 | 1.11E-06 | 1.11E-06 |
| Ra-226 | 1.52E-07 | 1.52E-07 |
| Pb-210 | 1.09E-07 | 1.09E-07 |
| Th-228 | 2.64E-10 | 2.64E-10 |
| Th-230 | 3.99E-07 | 3.99E-07 |
| Ra-226 | 1.30E-08 | 1.30E-08 |
| Pb-210 | 5.03E-09 | 5.03E-09 |
| Th-232 | 1.37E-09 | 1.37E-09 |
| Ra-228 | 9.60E-09 | 9.60E-09 |
| Th-228 | 1.41E-08 | 1.41E-08 |
| U-234 | 5.08E-09 | 5.08E-09 |
| Th-230 | 5.23E-13 | 5.23E-13 |
| Ra-226 | 8.81E-15 | 8.81E-15 |
| Pb-210 | 2.40E-15 | 2.40E-15 |
| U-235 | 1.88E-10 | 1.88E-10 |
| Pa-231 | 5.97E-14 | 5.97E-14 |
| Ac-227 | 2.60E-14 | 2.60E-14 |
| U-238 | 7.76E-09 | 7.76E-09 |
| U-234 | 1.29E-13 | 1.29E-13 |
| Th-230 | 6.89E-18 | 6.89E-18 |
| Ra-226 | 7.99E-20 | 7.99E-20 |
| Pb-210 | 1.71E-20 | 1.71E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.66E-09 | 3.66E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 5.84E-10 | 5.84E-10 |
| Pb-210 | 2.56E-07 | 2.56E-07 |
| Ra-226 | 2.31E-08 | 2.31E-08 |
| Pb-210 | 2.50E-08 | 2.50E-08 |
| Th-228 | 5.48E-11 | 5.48E-11 |
| Th-230 | 9.18E-08 | 9.18E-08 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

| | | |
|---|---|---|
| Ra-226 | 1.97E-09 | 1.97E-09 |
| Pb-210 | 1.16E-09 | 1.16E-09 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.95E-09 | 1.95E-09 |
| Th-228 | 2.93E-09 | 2.93E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 1.20E-13 | 1.20E-13 |
| Ra-226 | 1.34E-15 | 1.34E-15 |
| Pb-210 | 5.54E-16 | 5.54E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 1.29E-14 | 1.29E-14 |
| Ac-227 | 5.19E-15 | 5.19E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 2.97E-14 | 2.97E-14 |
| Th-230 | 1.58E-18 | 1.58E-18 |
| Ra-226 | 1.22E-20 | 1.22E-20 |
| Pb-210 | 3.94E-21 | 3.94E-21 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.66E-09 | 3.66E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 5.84E-10 | 5.84E-10 |
| Pb-210 | 2.56E-07 | 2.56E-07 |
| Ra-226 | 2.31E-08 | 2.31E-08 |
| Pb-210 | 2.50E-08 | 2.50E-08 |
| Th-228 | 5.48E-11 | 5.48E-11 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.97E-09 | 1.97E-09 |
| Pb-210 | 1.16E-09 | 1.16E-09 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.95E-09 | 1.95E-09 |
| Th-228 | 2.93E-09 | 2.93E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 1.20E-13 | 1.20E-13 |
| Ra-226 | 1.34E-15 | 1.34E-15 |
| Pb-210 | 5.54E-16 | 5.54E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 1.29E-14 | 1.29E-14 |
| Ac-227 | 5.19E-15 | 5.19E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 2.97E-14 | 2.97E-14 |
| Th-230 | 1.58E-18 | 1.58E-18 |
| Ra-226 | 1.22E-20 | 1.22E-20 |
| Pb-210 | 3.94E-21 | 3.94E-21 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.66E-09 | 3.66E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 5.84E-10 | 5.84E-10 |
| Pb-210 | 2.56E-07 | 2.56E-07 |
| Ra-226 | 2.31E-08 | 2.31E-08 |
| Pb-210 | 2.50E-08 | 2.50E-08 |
| Th-228 | 5.48E-11 | 5.48E-11 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.97E-09 | 1.97E-09 |
| Pb-210 | 1.16E-09 | 1.16E-09 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.95E-09 | 1.95E-09 |
| Th-228 | 2.93E-09 | 2.93E-09 |
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 1.20E-13 | 1.20E-13 |
| Ra-226 | 1.34E-15 | 1.34E-15 |
| Pb-210 | 5.54E-16 | 5.54E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 1.29E-14 | 1.29E-14 |
| Ac-227 | 5.19E-15 | 5.19E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 2.97E-14 | 2.97E-14 |
| Th-230 | 1.58E-18 | 1.58E-18 |
| Ra-226 | 1.22E-20 | 1.22E-20 |
| Pb-210 | 3.94E-21 | 3.94E-21 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.66E-09 | 3.66E-09 |
| Pa-231 | 7.88E-10 | 7.88E-10 |
| Ac-227 | 5.84E-10 | 5.84E-10 |
| Pb-210 | 2.56E-07 | 2.56E-07 |
| Ra-226 | 2.31E-08 | 2.31E-08 |
| Pb-210 | 2.50E-08 | 2.50E-08 |
| Th-228 | 5.48E-11 | 5.48E-11 |
| Th-230 | 9.18E-08 | 9.18E-08 |
| Ra-226 | 1.97E-09 | 1.97E-09 |
| Pb-210 | 1.16E-09 | 1.16E-09 |
| Th-232 | 3.15E-10 | 3.15E-10 |
| Ra-228 | 1.95E-09 | 1.95E-09 |
| Th-228 | 2.93E-09 | 2.93E-09 |

 Title : Jana Elementary School User- Student
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_student_r.bld
 Evaluation Time:  6.00000000  years

| | | |
|---|---|---|
| U-234 | 1.17E-09 | 1.17E-09 |
| Th-230 | 1.20E-13 | 1.20E-13 |
| Ra-226 | 1.34E-15 | 1.34E-15 |
| Pb-210 | 5.54E-16 | 5.54E-16 |
| U-235 | 3.08E-11 | 3.08E-11 |
| Pa-231 | 1.29E-14 | 1.29E-14 |
| Ac-227 | 5.19E-15 | 5.19E-15 |
| U-238 | 1.49E-09 | 1.49E-09 |
| U-234 | 2.97E-14 | 2.97E-14 |
| Th-230 | 1.58E-18 | 1.58E-18 |
| Ra-226 | 1.22E-20 | 1.22E-20 |
| Pb-210 | 3.94E-21 | 3.94E-21 |

RESRAD-BUILD Output Staff Dose

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

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 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources  :   5
Number of Receptors:   1
Total Time         :  9.125000E+03 days
Fraction Inside    :  2.430000E-01

Transformations data from: ICRP107
Cut off half life :  180.000000  days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 1.000 | 1.000 | 1.60E+01 | 1.10E-04 |

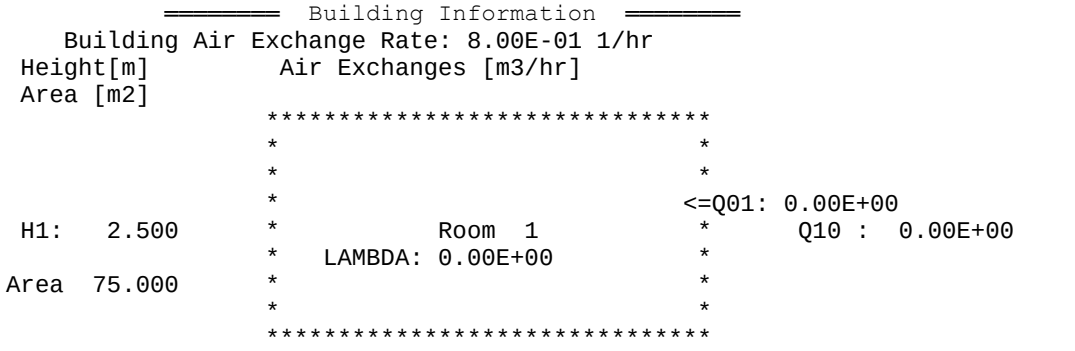
### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr




Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::

| Nuclide | Concentration |
|---|---|
| | [pCi/m2] |
| Ac-227 | 1.920E+02 |
| Pa-231 | 9.300E+01 |
| Pb-210 | 3.200E+03 |
| Ra-226 | 9.730E+02 |
| Th-228 | 1.300E+01 |
| Th-230 | 2.130E+04 |
| Th-232 | 6.400E+01 |
| U-234 | 3.370E+02 |
| U-235 | 8.000E+00 |
| U-238 | 3.370E+02 |

 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::

| Nuclide | Concentration |
|---|---|
| | [pCi/m2] |
| Ac-227 | 1.920E+02 |
| Pa-231 | 9.300E+01 |
| Pb-210 | 3.200E+03 |
| Ra-226 | 9.730E+02 |
| Th-228 | 1.300E+01 |
| Th-230 | 2.130E+04 |
| Th-232 | 6.400E+01 |
| U-234 | 3.370E+02 |
| U-235 | 8.000E+00 |
| U-238 | 3.370E+02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Temporal Summary

RESRAD-BUILD Temporal Dose Tables

Dose to Receptor over the Exposure Duration

(mrem)

| Evaluation Time years | Receptor 1 | Total |
|---|---|---|
| 0.000000000 | 1.11E+01 | 1.11E+01 |
| 1.000000000 | 1.11E+01 | 1.11E+01 |
| 3.000000000 | 1.09E+01 | 1.09E+01 |
| 10.00000000 | 8.28E+00 | 8.28E+00 |
| 25.00000190 | 2.50E+00 | 2.50E+00 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  0.00000000E+00  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 5.92E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.11E+01 |
| Total | 5.92E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.11E+01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.28E-01 | 4.33E+00 | 5.11E-06 | 1.02E-06 | 2.43E-03 | 3.48E-01 | 8.19E-01 | 5.92E+00 |
| Total | 4.28E-01 | 4.33E+00 | 5.11E-06 | 1.02E-06 | 2.43E-03 | 3.48E-01 | 8.19E-01 | 5.92E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |
| Total | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |
| Total | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |
| Total | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |
| Total | 2.95E-02 | 9.99E-01 | 1.18E-06 | 2.36E-07 | 5.61E-04 | 8.05E-02 | 1.89E-01 | 1.30E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.28E-02 | 6.28E-02 |
| Pa-231 | 4.56E-02 | 4.56E-02 |
| Ac-227 | 1.36E-02 | 1.36E-02 |
| Pb-210 | 4.12E-01 | 4.12E-01 |
| Ra-226 | 4.46E-01 | 4.46E-01 |
| Pb-210 | 5.50E-02 | 5.50E-02 |
| Th-228 | 1.02E-02 | 1.02E-02 |
| Th-230 | 4.52E+00 | 4.52E+00 |
| Ra-226 | 5.22E-02 | 5.22E-02 |
| Pb-210 | 4.61E-03 | 4.61E-03 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 1.12E-02 | 1.12E-02 |
| Th-228 | 2.53E-01 | 2.53E-01 |
| U-234 | 7.56E-03 | 7.56E-03 |
| Th-230 | 8.23E-06 | 8.23E-06 |
| Ra-226 | 6.28E-08 | 6.28E-08 |
| Pb-210 | 4.34E-09 | 4.34E-09 |
| U-235 | 4.63E-04 | 4.63E-04 |
| Pa-231 | 1.04E-06 | 1.04E-06 |
| Ac-227 | 2.19E-07 | 2.19E-07 |
| U-238 | 1.51E-02 | 1.51E-02 |
| U-234 | 2.67E-07 | 2.67E-07 |
| Th-230 | 1.93E-10 | 1.93E-10 |
| Ra-226 | 1.10E-12 | 1.10E-12 |
| Pb-210 | 6.28E-14 | 6.28E-14 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.22E-02 | 1.22E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.66E-03 | 2.66E-03 |
| Pb-210 | 9.22E-02 | 9.22E-02 |
| Ra-226 | 5.22E-02 | 5.22E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 2.30E-03 | 2.30E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 6.12E-03 | 6.12E-03 |
| Pb-210 | 1.03E-03 | 1.03E-03 |
| Th-232 | 3.39E-03 | 3.39E-03 |
| Ra-228 | 1.40E-03 | 1.40E-03 |
| Th-228 | 5.68E-02 | 5.68E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 1.90E-06 | 1.90E-06 |
| Ra-226 | 7.37E-09 | 7.37E-09 |
| Pb-210 | 9.71E-10 | 9.71E-10 |
| U-235 | 5.44E-05 | 5.44E-05 |
| Pa-231 | 2.35E-07 | 2.35E-07 |
| Ac-227 | 4.28E-08 | 4.28E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.08E-08 | 6.08E-08 |
| Th-230 | 4.46E-11 | 4.46E-11 |
| Ra-226 | 1.29E-13 | 1.29E-13 |
| Pb-210 | 1.40E-14 | 1.40E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.22E-02 | 1.22E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.66E-03 | 2.66E-03 |
| Pb-210 | 9.22E-02 | 9.22E-02 |
| Ra-226 | 5.22E-02 | 5.22E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 2.30E-03 | 2.30E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.12E-03 | 6.12E-03 |
| Pb-210 | 1.03E-03 | 1.03E-03 |
| Th-232 | 3.39E-03 | 3.39E-03 |
| Ra-228 | 1.40E-03 | 1.40E-03 |
| Th-228 | 5.68E-02 | 5.68E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 1.90E-06 | 1.90E-06 |
| Ra-226 | 7.37E-09 | 7.37E-09 |
| Pb-210 | 9.71E-10 | 9.71E-10 |
| U-235 | 5.44E-05 | 5.44E-05 |
| Pa-231 | 2.35E-07 | 2.35E-07 |
| Ac-227 | 4.28E-08 | 4.28E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.08E-08 | 6.08E-08 |
| Th-230 | 4.46E-11 | 4.46E-11 |
| Ra-226 | 1.29E-13 | 1.29E-13 |
| Pb-210 | 1.40E-14 | 1.40E-14 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.22E-02 | 1.22E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.66E-03 | 2.66E-03 |
| Pb-210 | 9.22E-02 | 9.22E-02 |
| Ra-226 | 5.22E-02 | 5.22E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 2.30E-03 | 2.30E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.12E-03 | 6.12E-03 |
| Pb-210 | 1.03E-03 | 1.03E-03 |
| Th-232 | 3.39E-03 | 3.39E-03 |
| Ra-228 | 1.40E-03 | 1.40E-03 |
| Th-228 | 5.68E-02 | 5.68E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 1.90E-06 | 1.90E-06 |
| Ra-226 | 7.37E-09 | 7.37E-09 |
| Pb-210 | 9.71E-10 | 9.71E-10 |
| U-235 | 5.44E-05 | 5.44E-05 |
| Pa-231 | 2.35E-07 | 2.35E-07 |
| Ac-227 | 4.28E-08 | 4.28E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.08E-08 | 6.08E-08 |
| Th-230 | 4.46E-11 | 4.46E-11 |
| Ra-226 | 1.29E-13 | 1.29E-13 |
| Pb-210 | 1.40E-14 | 1.40E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.22E-02 | 1.22E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.66E-03 | 2.66E-03 |
| Pb-210 | 9.22E-02 | 9.22E-02 |
| Ra-226 | 5.22E-02 | 5.22E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 2.30E-03 | 2.30E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.12E-03 | 6.12E-03 |
| Pb-210 | 1.03E-03 | 1.03E-03 |
| Th-232 | 3.39E-03 | 3.39E-03 |
| Ra-228 | 1.40E-03 | 1.40E-03 |
| Th-228 | 5.68E-02 | 5.68E-02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 1.90E-06 | 1.90E-06 |
| Ra-226 | 7.37E-09 | 7.37E-09 |
| Pb-210 | 9.71E-10 | 9.71E-10 |
| U-235 | 5.44E-05 | 5.44E-05 |
| Pa-231 | 2.35E-07 | 2.35E-07 |
| Ac-227 | 4.28E-08 | 4.28E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.08E-08 | 6.08E-08 |
| Th-230 | 4.46E-11 | 4.46E-11 |
| Ra-226 | 1.29E-13 | 1.29E-13 |
| Pb-210 | 1.40E-14 | 1.40E-14 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  1.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 5.94E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.11E+01 |
| Total | 5.94E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.30E+00 | 1.11E+01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.29E-01 | 4.33E+00 | 5.17E-06 | 1.03E-06 | 2.42E-03 | 3.60E-01 | 8.13E-01 | 5.94E+00 |
| Total | 4.29E-01 | 4.33E+00 | 5.17E-06 | 1.03E-06 | 2.42E-03 | 3.60E-01 | 8.13E-01 | 5.94E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |
| Total | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |
| Total | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |
| Total | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |
| Total | 2.96E-02 | 1.00E+00 | 1.19E-06 | 2.39E-07 | 5.59E-04 | 8.32E-02 | 1.88E-01 | 1.30E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.09E-02 | 6.09E-02 |
| Pa-231 | 4.57E-02 | 4.57E-02 |
| Ac-227 | 1.46E-02 | 1.46E-02 |
| Pb-210 | 4.00E-01 | 4.00E-01 |
| Ra-226 | 4.45E-01 | 4.45E-01 |
| Pb-210 | 5.88E-02 | 5.88E-02 |
| Th-228 | 7.09E-03 | 7.09E-03 |
| Th-230 | 4.53E+00 | 4.53E+00 |
| Ra-226 | 5.62E-02 | 5.62E-02 |
| Pb-210 | 5.15E-03 | 5.15E-03 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 1.17E-02 | 1.17E-02 |
| Th-228 | 2.68E-01 | 2.68E-01 |
| U-234 | 7.57E-03 | 7.57E-03 |
| Th-230 | 8.89E-06 | 8.89E-06 |
| Ra-226 | 7.05E-08 | 7.05E-08 |
| Pb-210 | 5.05E-09 | 5.05E-09 |
| U-235 | 4.63E-04 | 4.63E-04 |
| Pa-231 | 1.12E-06 | 1.12E-06 |
| Ac-227 | 2.45E-07 | 2.45E-07 |
| U-238 | 1.50E-02 | 1.50E-02 |
| U-234 | 2.88E-07 | 2.88E-07 |
| Th-230 | 2.18E-10 | 2.18E-10 |
| Ra-226 | 1.29E-12 | 1.29E-12 |
| Pb-210 | 7.60E-14 | 7.60E-14 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.18E-02 | 1.18E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.84E-03 | 2.84E-03 |
| Pb-210 | 8.93E-02 | 8.93E-02 |
| Ra-226 | 5.20E-02 | 5.20E-02 |
| Pb-210 | 1.31E-02 | 1.31E-02 |
| Th-228 | 1.59E-03 | 1.59E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 6.59E-03 | 6.59E-03 |
| Pb-210 | 1.15E-03 | 1.15E-03 |
| Th-232 | 3.40E-03 | 3.40E-03 |
| Ra-228 | 1.47E-03 | 1.47E-03 |
| Th-228 | 6.03E-02 | 6.03E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 2.05E-06 | 2.05E-06 |
| Ra-226 | 8.27E-09 | 8.27E-09 |
| Pb-210 | 1.13E-09 | 1.13E-09 |
| U-235 | 5.43E-05 | 5.43E-05 |
| Pa-231 | 2.54E-07 | 2.54E-07 |
| Ac-227 | 4.78E-08 | 4.78E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.56E-08 | 6.56E-08 |
| Th-230 | 5.02E-11 | 5.02E-11 |
| Ra-226 | 1.51E-13 | 1.51E-13 |
| Pb-210 | 1.70E-14 | 1.70E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.18E-02 | 1.18E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.84E-03 | 2.84E-03 |
| Pb-210 | 8.93E-02 | 8.93E-02 |
| Ra-226 | 5.20E-02 | 5.20E-02 |
| Pb-210 | 1.31E-02 | 1.31E-02 |
| Th-228 | 1.59E-03 | 1.59E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.59E-03 | 6.59E-03 |
| Pb-210 | 1.15E-03 | 1.15E-03 |
| Th-232 | 3.40E-03 | 3.40E-03 |
| Ra-228 | 1.47E-03 | 1.47E-03 |
| Th-228 | 6.03E-02 | 6.03E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 2.05E-06 | 2.05E-06 |
| Ra-226 | 8.27E-09 | 8.27E-09 |
| Pb-210 | 1.13E-09 | 1.13E-09 |
| U-235 | 5.43E-05 | 5.43E-05 |
| Pa-231 | 2.54E-07 | 2.54E-07 |
| Ac-227 | 4.78E-08 | 4.78E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.56E-08 | 6.56E-08 |
| Th-230 | 5.02E-11 | 5.02E-11 |
| Ra-226 | 1.51E-13 | 1.51E-13 |
| Pb-210 | 1.70E-14 | 1.70E-14 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.18E-02 | 1.18E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.84E-03 | 2.84E-03 |
| Pb-210 | 8.93E-02 | 8.93E-02 |
| Ra-226 | 5.20E-02 | 5.20E-02 |
| Pb-210 | 1.31E-02 | 1.31E-02 |
| Th-228 | 1.59E-03 | 1.59E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.59E-03 | 6.59E-03 |
| Pb-210 | 1.15E-03 | 1.15E-03 |
| Th-232 | 3.40E-03 | 3.40E-03 |
| Ra-228 | 1.47E-03 | 1.47E-03 |
| Th-228 | 6.03E-02 | 6.03E-02 |
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 2.05E-06 | 2.05E-06 |
| Ra-226 | 8.27E-09 | 8.27E-09 |
| Pb-210 | 1.13E-09 | 1.13E-09 |
| U-235 | 5.43E-05 | 5.43E-05 |
| Pa-231 | 2.54E-07 | 2.54E-07 |
| Ac-227 | 4.78E-08 | 4.78E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.56E-08 | 6.56E-08 |
| Th-230 | 5.02E-11 | 5.02E-11 |
| Ra-226 | 1.51E-13 | 1.51E-13 |
| Pb-210 | 1.70E-14 | 1.70E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.18E-02 | 1.18E-02 |
| Pa-231 | 1.03E-02 | 1.03E-02 |
| Ac-227 | 2.84E-03 | 2.84E-03 |
| Pb-210 | 8.93E-02 | 8.93E-02 |
| Ra-226 | 5.20E-02 | 5.20E-02 |
| Pb-210 | 1.31E-02 | 1.31E-02 |
| Th-228 | 1.59E-03 | 1.59E-03 |
| Th-230 | 1.04E+00 | 1.04E+00 |
| Ra-226 | 6.59E-03 | 6.59E-03 |
| Pb-210 | 1.15E-03 | 1.15E-03 |
| Th-232 | 3.40E-03 | 3.40E-03 |
| Ra-228 | 1.47E-03 | 1.47E-03 |
| Th-228 | 6.03E-02 | 6.03E-02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 1.72E-03 | 1.72E-03 |
| Th-230 | 2.05E-06 | 2.05E-06 |
| Ra-226 | 8.27E-09 | 8.27E-09 |
| Pb-210 | 1.13E-09 | 1.13E-09 |
| U-235 | 5.43E-05 | 5.43E-05 |
| Pa-231 | 2.54E-07 | 2.54E-07 |
| Ac-227 | 4.78E-08 | 4.78E-08 |
| U-238 | 2.08E-03 | 2.08E-03 |
| U-234 | 6.56E-08 | 6.56E-08 |
| Th-230 | 5.02E-11 | 5.02E-11 |
| Ra-226 | 1.51E-13 | 1.51E-13 |
| Pb-210 | 1.70E-14 | 1.70E-14 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  3.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 5.84E+00 | 1.28E+00 | 1.28E+00 | 1.28E+00 | 1.28E+00 | 1.09E+01 |
| Total | 5.84E+00 | 1.28E+00 | 1.28E+00 | 1.28E+00 | 1.28E+00 | 1.09E+01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.32E-01 | 4.23E+00 | 5.13E-06 | 1.03E-06 | 2.34E-03 | 3.85E-01 | 7.82E-01 | 5.84E+00 |
| Total | 4.32E-01 | 4.23E+00 | 5.13E-06 | 1.03E-06 | 2.34E-03 | 3.85E-01 | 7.82E-01 | 5.84E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |
| Total | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |
| Total | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |
| Total | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |
| Total | 2.98E-02 | 9.78E-01 | 1.19E-06 | 2.37E-07 | 5.40E-04 | 8.90E-02 | 1.81E-01 | 1.28E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.64E-02 | 5.64E-02 |
| Pa-231 | 4.47E-02 | 4.47E-02 |
| Ac-227 | 1.59E-02 | 1.59E-02 |
| Pb-210 | 3.70E-01 | 3.70E-01 |
| Ra-226 | 4.40E-01 | 4.40E-01 |
| Pb-210 | 6.37E-02 | 6.37E-02 |
| Th-228 | 3.41E-03 | 3.41E-03 |
| Th-230 | 4.43E+00 | 4.43E+00 |
| Ra-226 | 6.40E-02 | 6.40E-02 |
| Pb-210 | 5.97E-03 | 5.97E-03 |
| Th-232 | 1.44E-02 | 1.44E-02 |
| Ra-228 | 1.25E-02 | 1.25E-02 |
| Th-228 | 2.97E-01 | 2.97E-01 |
| U-234 | 7.40E-03 | 7.40E-03 |
| Th-230 | 9.79E-06 | 9.79E-06 |
| Ra-226 | 8.70E-08 | 8.70E-08 |
| Pb-210 | 6.20E-09 | 6.20E-09 |
| U-235 | 4.57E-04 | 4.57E-04 |
| Pa-231 | 1.24E-06 | 1.24E-06 |
| Ac-227 | 2.88E-07 | 2.88E-07 |
| U-238 | 1.48E-02 | 1.48E-02 |
| U-234 | 3.18E-07 | 3.18E-07 |
| Th-230 | 2.55E-10 | 2.55E-10 |
| Ra-226 | 1.71E-12 | 1.71E-12 |
| Pb-210 | 9.86E-14 | 9.86E-14 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.09E-02 | 1.09E-02 |
| Pa-231 | 1.01E-02 | 1.01E-02 |
| Ac-227 | 3.09E-03 | 3.09E-03 |
| Pb-210 | 8.26E-02 | 8.26E-02 |
| Ra-226 | 5.14E-02 | 5.14E-02 |
| Pb-210 | 1.42E-02 | 1.42E-02 |
| Th-228 | 7.66E-04 | 7.66E-04 |
| Th-230 | 1.02E+00 | 1.02E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 7.47E-03 | 7.47E-03 |
| Pb-210 | 1.33E-03 | 1.33E-03 |
| Th-232 | 3.32E-03 | 3.32E-03 |
| Ra-228 | 1.56E-03 | 1.56E-03 |
| Th-228 | 6.68E-02 | 6.68E-02 |
| U-234 | 1.68E-03 | 1.68E-03 |
| Th-230 | 2.26E-06 | 2.26E-06 |
| Ra-226 | 1.01E-08 | 1.01E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 5.34E-05 | 5.34E-05 |
| Pa-231 | 2.80E-07 | 2.80E-07 |
| Ac-227 | 5.57E-08 | 5.57E-08 |
| U-238 | 2.04E-03 | 2.04E-03 |
| U-234 | 7.23E-08 | 7.23E-08 |
| Th-230 | 5.89E-11 | 5.89E-11 |
| Ra-226 | 1.99E-13 | 1.99E-13 |
| Pb-210 | 2.20E-14 | 2.20E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.09E-02 | 1.09E-02 |
| Pa-231 | 1.01E-02 | 1.01E-02 |
| Ac-227 | 3.09E-03 | 3.09E-03 |
| Pb-210 | 8.26E-02 | 8.26E-02 |
| Ra-226 | 5.14E-02 | 5.14E-02 |
| Pb-210 | 1.42E-02 | 1.42E-02 |
| Th-228 | 7.66E-04 | 7.66E-04 |
| Th-230 | 1.02E+00 | 1.02E+00 |
| Ra-226 | 7.47E-03 | 7.47E-03 |
| Pb-210 | 1.33E-03 | 1.33E-03 |
| Th-232 | 3.32E-03 | 3.32E-03 |
| Ra-228 | 1.56E-03 | 1.56E-03 |
| Th-228 | 6.68E-02 | 6.68E-02 |
| U-234 | 1.68E-03 | 1.68E-03 |
| Th-230 | 2.26E-06 | 2.26E-06 |
| Ra-226 | 1.01E-08 | 1.01E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 5.34E-05 | 5.34E-05 |
| Pa-231 | 2.80E-07 | 2.80E-07 |
| Ac-227 | 5.57E-08 | 5.57E-08 |
| U-238 | 2.04E-03 | 2.04E-03 |
| U-234 | 7.23E-08 | 7.23E-08 |
| Th-230 | 5.89E-11 | 5.89E-11 |
| Ra-226 | 1.99E-13 | 1.99E-13 |
| Pb-210 | 2.20E-14 | 2.20E-14 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.09E-02 | 1.09E-02 |
| Pa-231 | 1.01E-02 | 1.01E-02 |
| Ac-227 | 3.09E-03 | 3.09E-03 |
| Pb-210 | 8.26E-02 | 8.26E-02 |
| Ra-226 | 5.14E-02 | 5.14E-02 |
| Pb-210 | 1.42E-02 | 1.42E-02 |
| Th-228 | 7.66E-04 | 7.66E-04 |
| Th-230 | 1.02E+00 | 1.02E+00 |
| Ra-226 | 7.47E-03 | 7.47E-03 |
| Pb-210 | 1.33E-03 | 1.33E-03 |
| Th-232 | 3.32E-03 | 3.32E-03 |
| Ra-228 | 1.56E-03 | 1.56E-03 |
| Th-228 | 6.68E-02 | 6.68E-02 |
| U-234 | 1.68E-03 | 1.68E-03 |
| Th-230 | 2.26E-06 | 2.26E-06 |
| Ra-226 | 1.01E-08 | 1.01E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 5.34E-05 | 5.34E-05 |
| Pa-231 | 2.80E-07 | 2.80E-07 |
| Ac-227 | 5.57E-08 | 5.57E-08 |
| U-238 | 2.04E-03 | 2.04E-03 |
| U-234 | 7.23E-08 | 7.23E-08 |
| Th-230 | 5.89E-11 | 5.89E-11 |
| Ra-226 | 1.99E-13 | 1.99E-13 |
| Pb-210 | 2.20E-14 | 2.20E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.09E-02 | 1.09E-02 |
| Pa-231 | 1.01E-02 | 1.01E-02 |
| Ac-227 | 3.09E-03 | 3.09E-03 |
| Pb-210 | 8.26E-02 | 8.26E-02 |
| Ra-226 | 5.14E-02 | 5.14E-02 |
| Pb-210 | 1.42E-02 | 1.42E-02 |
| Th-228 | 7.66E-04 | 7.66E-04 |
| Th-230 | 1.02E+00 | 1.02E+00 |
| Ra-226 | 7.47E-03 | 7.47E-03 |
| Pb-210 | 1.33E-03 | 1.33E-03 |
| Th-232 | 3.32E-03 | 3.32E-03 |
| Ra-228 | 1.56E-03 | 1.56E-03 |
| Th-228 | 6.68E-02 | 6.68E-02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 1.68E-03 | 1.68E-03 |
| Th-230 | 2.26E-06 | 2.26E-06 |
| Ra-226 | 1.01E-08 | 1.01E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 5.34E-05 | 5.34E-05 |
| Pa-231 | 2.80E-07 | 2.80E-07 |
| Ac-227 | 5.57E-08 | 5.57E-08 |
| U-238 | 2.04E-03 | 2.04E-03 |
| U-234 | 7.23E-08 | 7.23E-08 |
| Th-230 | 5.89E-11 | 5.89E-11 |
| Ra-226 | 1.99E-13 | 1.99E-13 |
| Pb-210 | 2.20E-14 | 2.20E-14 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  10.0000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 4.45E+00 | 9.57E-01 | 9.57E-01 | 9.57E-01 | 9.57E-01 | 8.28E+00 |
| Total | 4.45E+00 | 9.57E-01 | 9.57E-01 | 9.57E-01 | 9.57E-01 | 8.28E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.43E-01 | 3.02E+00 | 3.76E-06 | 7.55E-07 | 1.62E-03 | 4.49E-01 | 5.42E-01 | 4.45E+00 |
| Total | 4.43E-01 | 3.02E+00 | 3.76E-06 | 7.55E-07 | 1.62E-03 | 4.49E-01 | 5.42E-01 | 4.45E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |
| Total | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |
| Total | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |
| Total | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |
| Total | 3.06E-02 | 6.97E-01 | 8.69E-07 | 1.74E-07 | 3.75E-04 | 1.04E-01 | 1.25E-01 | 9.57E-01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.74E-02 | 3.74E-02 |
| Pa-231 | 3.22E-02 | 3.22E-02 |
| Ac-227 | 1.52E-02 | 1.52E-02 |
| Pb-210 | 2.36E-01 | 2.36E-01 |
| Ra-226 | 4.19E-01 | 4.19E-01 |
| Pb-210 | 5.58E-02 | 5.58E-02 |
| Th-228 | 2.62E-04 | 2.62E-04 |
| Th-230 | 3.16E+00 | 3.16E+00 |
| Ra-226 | 8.81E-02 | 8.81E-02 |
| Pb-210 | 5.88E-03 | 5.88E-03 |
| Th-232 | 1.03E-02 | 1.03E-02 |
| Ra-228 | 1.29E-02 | 1.29E-02 |
| Th-228 | 3.63E-01 | 3.63E-01 |
| U-234 | 5.31E-03 | 5.31E-03 |
| Th-230 | 8.60E-06 | 8.60E-06 |
| Ra-226 | 1.57E-07 | 1.57E-07 |
| Pb-210 | 6.46E-09 | 6.46E-09 |
| U-235 | 4.05E-04 | 4.05E-04 |
| Pa-231 | 1.10E-06 | 1.10E-06 |
| Ac-227 | 3.27E-07 | 3.27E-07 |
| U-238 | 1.28E-02 | 1.28E-02 |
| U-234 | 2.82E-07 | 2.82E-07 |
| Th-230 | 2.44E-10 | 2.44E-10 |
| Ra-226 | 3.89E-12 | 3.89E-12 |
| Pb-210 | 1.07E-13 | 1.07E-13 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.02E-03 | 7.02E-03 |
| Pa-231 | 7.22E-03 | 7.22E-03 |
| Ac-227 | 2.75E-03 | 2.75E-03 |
| Pb-210 | 5.23E-02 | 5.23E-02 |
| Ra-226 | 4.78E-02 | 4.78E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 5.90E-05 | 5.90E-05 |
| Th-230 | 7.28E-01 | 7.28E-01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| Ra-226 | 9.93E-03 | 9.93E-03 |
| Pb-210 | 1.28E-03 | 1.28E-03 |
| Th-232 | 2.37E-03 | 2.37E-03 |
| Ra-228 | 1.45E-03 | 1.45E-03 |
| Th-228 | 8.16E-02 | 8.16E-02 |
| U-234 | 1.20E-03 | 1.20E-03 |
| Th-230 | 1.98E-06 | 1.98E-06 |
| Ra-226 | 1.75E-08 | 1.75E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 4.26E-05 | 4.26E-05 |
| Pa-231 | 2.46E-07 | 2.46E-07 |
| Ac-227 | 5.62E-08 | 5.62E-08 |
| U-238 | 1.61E-03 | 1.61E-03 |
| U-234 | 6.35E-08 | 6.35E-08 |
| Th-230 | 5.61E-11 | 5.61E-11 |
| Ra-226 | 4.29E-13 | 4.29E-13 |
| Pb-210 | 2.24E-14 | 2.24E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.02E-03 | 7.02E-03 |
| Pa-231 | 7.22E-03 | 7.22E-03 |
| Ac-227 | 2.75E-03 | 2.75E-03 |
| Pb-210 | 5.23E-02 | 5.23E-02 |
| Ra-226 | 4.78E-02 | 4.78E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 5.90E-05 | 5.90E-05 |
| Th-230 | 7.28E-01 | 7.28E-01 |
| Ra-226 | 9.93E-03 | 9.93E-03 |
| Pb-210 | 1.28E-03 | 1.28E-03 |
| Th-232 | 2.37E-03 | 2.37E-03 |
| Ra-228 | 1.45E-03 | 1.45E-03 |
| Th-228 | 8.16E-02 | 8.16E-02 |
| U-234 | 1.20E-03 | 1.20E-03 |
| Th-230 | 1.98E-06 | 1.98E-06 |
| Ra-226 | 1.75E-08 | 1.75E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 4.26E-05 | 4.26E-05 |
| Pa-231 | 2.46E-07 | 2.46E-07 |
| Ac-227 | 5.62E-08 | 5.62E-08 |
| U-238 | 1.61E-03 | 1.61E-03 |
| U-234 | 6.35E-08 | 6.35E-08 |
| Th-230 | 5.61E-11 | 5.61E-11 |
| Ra-226 | 4.29E-13 | 4.29E-13 |
| Pb-210 | 2.24E-14 | 2.24E-14 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.02E-03 | 7.02E-03 |
| Pa-231 | 7.22E-03 | 7.22E-03 |
| Ac-227 | 2.75E-03 | 2.75E-03 |
| Pb-210 | 5.23E-02 | 5.23E-02 |
| Ra-226 | 4.78E-02 | 4.78E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 5.90E-05 | 5.90E-05 |
| Th-230 | 7.28E-01 | 7.28E-01 |
| Ra-226 | 9.93E-03 | 9.93E-03 |
| Pb-210 | 1.28E-03 | 1.28E-03 |
| Th-232 | 2.37E-03 | 2.37E-03 |
| Ra-228 | 1.45E-03 | 1.45E-03 |
| Th-228 | 8.16E-02 | 8.16E-02 |
| U-234 | 1.20E-03 | 1.20E-03 |
| Th-230 | 1.98E-06 | 1.98E-06 |
| Ra-226 | 1.75E-08 | 1.75E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 4.26E-05 | 4.26E-05 |
| Pa-231 | 2.46E-07 | 2.46E-07 |
| Ac-227 | 5.62E-08 | 5.62E-08 |
| U-238 | 1.61E-03 | 1.61E-03 |
| U-234 | 6.35E-08 | 6.35E-08 |
| Th-230 | 5.61E-11 | 5.61E-11 |
| Ra-226 | 4.29E-13 | 4.29E-13 |
| Pb-210 | 2.24E-14 | 2.24E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.02E-03 | 7.02E-03 |
| Pa-231 | 7.22E-03 | 7.22E-03 |
| Ac-227 | 2.75E-03 | 2.75E-03 |
| Pb-210 | 5.23E-02 | 5.23E-02 |
| Ra-226 | 4.78E-02 | 4.78E-02 |
| Pb-210 | 1.23E-02 | 1.23E-02 |
| Th-228 | 5.90E-05 | 5.90E-05 |
| Th-230 | 7.28E-01 | 7.28E-01 |
| Ra-226 | 9.93E-03 | 9.93E-03 |
| Pb-210 | 1.28E-03 | 1.28E-03 |
| Th-232 | 2.37E-03 | 2.37E-03 |
| Ra-228 | 1.45E-03 | 1.45E-03 |
| Th-228 | 8.16E-02 | 8.16E-02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| U-234 | 1.20E-03 | 1.20E-03 |
| Th-230 | 1.98E-06 | 1.98E-06 |
| Ra-226 | 1.75E-08 | 1.75E-08 |
| Pb-210 | 1.38E-09 | 1.38E-09 |
| U-235 | 4.26E-05 | 4.26E-05 |
| Pa-231 | 2.46E-07 | 2.46E-07 |
| Ac-227 | 5.62E-08 | 5.62E-08 |
| U-238 | 1.61E-03 | 1.61E-03 |
| U-234 | 6.35E-08 | 6.35E-08 |
| Th-230 | 5.61E-11 | 5.61E-11 |
| Ra-226 | 4.29E-13 | 4.29E-13 |
| Pb-210 | 2.24E-14 | 2.24E-14 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  25.0000019  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.46E+00 | 2.61E-01 | 2.61E-01 | 2.61E-01 | 2.61E-01 | 2.50E+00 |
| Total | 1.46E+00 | 2.61E-01 | 2.61E-01 | 2.61E-01 | 2.61E-01 | 2.50E+00 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 4.71E-01 | 4.19E-01 | 5.60E-07 | 1.11E-07 | 2.20E-04 | 4.97E-01 | 7.06E-02 | 1.46E+00 |
| Total | 4.71E-01 | 4.19E-01 | 5.60E-07 | 1.11E-07 | 2.20E-04 | 4.97E-01 | 7.06E-02 | 1.46E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |
| Total | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |
| Total | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |
| Total | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |
| Total | 3.26E-02 | 9.68E-02 | 1.29E-07 | 2.56E-08 | 5.08E-05 | 1.15E-01 | 1.63E-02 | 2.61E-01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 8.87E-03 | 8.87E-03 |
| Pa-231 | 5.37E-03 | 5.37E-03 |
| Ac-227 | 8.19E-03 | 8.19E-03 |
| Pb-210 | 3.18E-02 | 3.18E-02 |
| Ra-226 | 3.83E-01 | 3.83E-01 |
| Pb-210 | 1.42E-02 | 1.42E-02 |
| Th-228 | 1.07E-06 | 1.07E-06 |
| Th-230 | 4.45E-01 | 4.45E-01 |
| Ra-226 | 1.37E-01 | 1.37E-01 |
| Pb-210 | 2.40E-03 | 2.40E-03 |
| Th-232 | 1.44E-03 | 1.44E-03 |
| Ra-228 | 1.05E-02 | 1.05E-02 |
| Th-228 | 4.01E-01 | 4.01E-01 |
| U-234 | 8.37E-04 | 8.37E-04 |
| Th-230 | 1.71E-06 | 1.71E-06 |
| Ra-226 | 3.87E-07 | 3.87E-07 |
| Pb-210 | 4.11E-09 | 4.11E-09 |
| U-235 | 3.01E-04 | 3.01E-04 |
| Pa-231 | 2.78E-07 | 2.78E-07 |
| Ac-227 | 3.15E-07 | 3.15E-07 |
| U-238 | 8.69E-03 | 8.69E-03 |
| U-234 | 6.57E-08 | 6.57E-08 |
| Th-230 | 6.39E-11 | 6.39E-11 |
| Ra-226 | 1.46E-11 | 1.46E-11 |
| Pb-210 | 1.06E-13 | 1.06E-13 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.07E-03 | 1.07E-03 |
| Pa-231 | 1.04E-03 | 1.04E-03 |
| Ac-227 | 8.43E-04 | 8.43E-04 |
| Pb-210 | 6.02E-03 | 6.02E-03 |
| Ra-226 | 4.10E-02 | 4.10E-02 |
| Pb-210 | 2.43E-03 | 2.43E-03 |
| Th-228 | 2.41E-07 | 2.41E-07 |
| Th-230 | 1.01E-01 | 1.01E-01 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

| | | |
|---|---|---|
| Ra-226 | 1.46E-02 | 1.46E-02 |
| Pb-210 | 3.68E-04 | 3.68E-04 |
| Th-232 | 3.29E-04 | 3.29E-04 |
| Ra-228 | 8.14E-04 | 8.14E-04 |
| Th-228 | 9.00E-02 | 9.00E-02 |
| U-234 | 1.69E-04 | 1.69E-04 |
| Th-230 | 3.86E-07 | 3.86E-07 |
| Ra-226 | 4.11E-08 | 4.11E-08 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| U-235 | 1.99E-05 | 1.99E-05 |
| Pa-231 | 5.03E-08 | 5.03E-08 |
| Ac-227 | 2.89E-08 | 2.89E-08 |
| U-238 | 6.90E-04 | 6.90E-04 |
| U-234 | 1.25E-08 | 1.25E-08 |
| Th-230 | 1.43E-11 | 1.43E-11 |
| Ra-226 | 1.55E-12 | 1.55E-12 |
| Pb-210 | 1.23E-14 | 1.23E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.07E-03 | 1.07E-03 |
| Pa-231 | 1.04E-03 | 1.04E-03 |
| Ac-227 | 8.43E-04 | 8.43E-04 |
| Pb-210 | 6.02E-03 | 6.02E-03 |
| Ra-226 | 4.10E-02 | 4.10E-02 |
| Pb-210 | 2.43E-03 | 2.43E-03 |
| Th-228 | 2.41E-07 | 2.41E-07 |
| Th-230 | 1.01E-01 | 1.01E-01 |
| Ra-226 | 1.46E-02 | 1.46E-02 |
| Pb-210 | 3.68E-04 | 3.68E-04 |
| Th-232 | 3.29E-04 | 3.29E-04 |
| Ra-228 | 8.14E-04 | 8.14E-04 |
| Th-228 | 9.00E-02 | 9.00E-02 |
| U-234 | 1.69E-04 | 1.69E-04 |
| Th-230 | 3.86E-07 | 3.86E-07 |
| Ra-226 | 4.11E-08 | 4.11E-08 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| U-235 | 1.99E-05 | 1.99E-05 |
| Pa-231 | 5.03E-08 | 5.03E-08 |
| Ac-227 | 2.89E-08 | 2.89E-08 |
| U-238 | 6.90E-04 | 6.90E-04 |
| U-234 | 1.25E-08 | 1.25E-08 |
| Th-230 | 1.43E-11 | 1.43E-11 |
| Ra-226 | 1.55E-12 | 1.55E-12 |
| Pb-210 | 1.23E-14 | 1.23E-14 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.07E-03 | 1.07E-03 |
| Pa-231 | 1.04E-03 | 1.04E-03 |
| Ac-227 | 8.43E-04 | 8.43E-04 |
| Pb-210 | 6.02E-03 | 6.02E-03 |
| Ra-226 | 4.10E-02 | 4.10E-02 |
| Pb-210 | 2.43E-03 | 2.43E-03 |
| Th-228 | 2.41E-07 | 2.41E-07 |
| Th-230 | 1.01E-01 | 1.01E-01 |
| Ra-226 | 1.46E-02 | 1.46E-02 |
| Pb-210 | 3.68E-04 | 3.68E-04 |
| Th-232 | 3.29E-04 | 3.29E-04 |
| Ra-228 | 8.14E-04 | 8.14E-04 |
| Th-228 | 9.00E-02 | 9.00E-02 |
| U-234 | 1.69E-04 | 1.69E-04 |
| Th-230 | 3.86E-07 | 3.86E-07 |
| Ra-226 | 4.11E-08 | 4.11E-08 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| U-235 | 1.99E-05 | 1.99E-05 |
| Pa-231 | 5.03E-08 | 5.03E-08 |
| Ac-227 | 2.89E-08 | 2.89E-08 |
| U-238 | 6.90E-04 | 6.90E-04 |
| U-234 | 1.25E-08 | 1.25E-08 |
| Th-230 | 1.43E-11 | 1.43E-11 |
| Ra-226 | 1.55E-12 | 1.55E-12 |
| Pb-210 | 1.23E-14 | 1.23E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.07E-03 | 1.07E-03 |
| Pa-231 | 1.04E-03 | 1.04E-03 |
| Ac-227 | 8.43E-04 | 8.43E-04 |
| Pb-210 | 6.02E-03 | 6.02E-03 |
| Ra-226 | 4.10E-02 | 4.10E-02 |
| Pb-210 | 2.43E-03 | 2.43E-03 |
| Th-228 | 2.41E-07 | 2.41E-07 |
| Th-230 | 1.01E-01 | 1.01E-01 |
| Ra-226 | 1.46E-02 | 1.46E-02 |
| Pb-210 | 3.68E-04 | 3.68E-04 |
| Th-232 | 3.29E-04 | 3.29E-04 |
| Ra-228 | 8.14E-04 | 8.14E-04 |
| Th-228 | 9.00E-02 | 9.00E-02 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

| | | |
|---|---|---|
| U-234 | 1.69E-04 | 1.69E-04 |
| Th-230 | 3.86E-07 | 3.86E-07 |
| Ra-226 | 4.11E-08 | 4.11E-08 |
| Pb-210 | 5.53E-10 | 5.53E-10 |
| U-235 | 1.99E-05 | 1.99E-05 |
| Pa-231 | 5.03E-08 | 5.03E-08 |
| Ac-227 | 2.89E-08 | 2.89E-08 |
| U-238 | 6.90E-04 | 6.90E-04 |
| U-234 | 1.25E-08 | 1.25E-08 |
| Th-230 | 1.43E-11 | 1.43E-11 |
| Ra-226 | 1.55E-12 | 1.55E-12 |
| Pb-210 | 1.23E-14 | 1.23E-14 |

RESRAD-BUILD Output Staff Risk

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

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 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources  :   5
Number of Receptors:   1
Total Time         :  9.125000E+03 days
Fraction Inside    :  2.430000E-01

Transformations data from: ICRP107
Cut off half life :  180.000000  days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 1.000 | 1.000 | 1.60E+01 | 1.10E-04 |

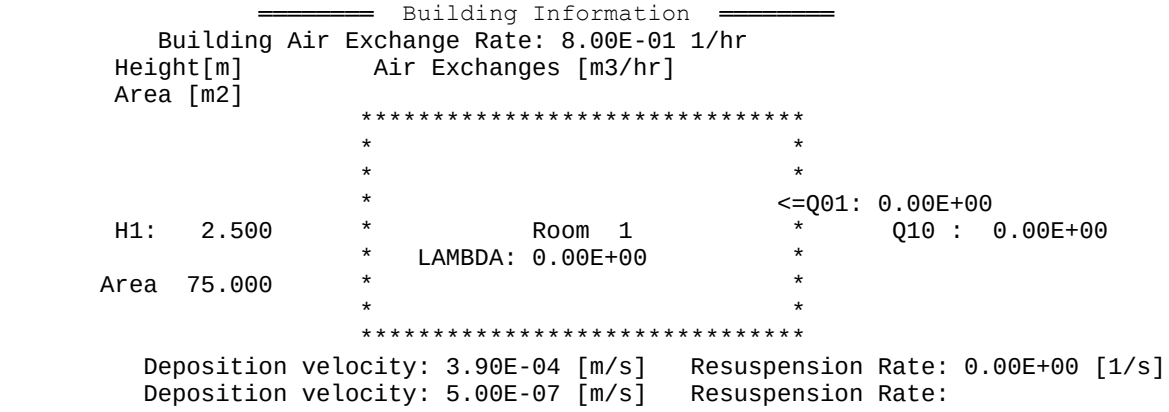
### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr




Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration
   ─────── ─────────────
              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02
 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration
   ─────── ─────────────
              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    5.600E-09 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Temporal Summary

RESRAD-BUILD Temporal Risk Tables

Risk to Receptor over the Exposure Duration

| Evaluation Time years | Receptor 1 (Risk) | Total (Risk) |
|---|---|---|
| 0.000000000 | 2.17E-06 | 2.17E-06 |
| 1.000000000 | 2.17E-06 | 2.17E-06 |
| 3.000000000 | 2.15E-06 | 2.15E-06 |
| 10.00000000 | 1.79E-06 | 1.79E-06 |
| 25.00000190 | 1.02E-06 | 1.02E-06 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  0.00000000E+00  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.24E-06 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.17E-06 |
| Total | 1.24E-06 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.17E-06 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time: 0.00000000E+00 years

## Pathway Detail of Risks

[Risk]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.36E-07 | 4.67E-07 | 4.02E-12 | 8.15E-13 | 8.04E-10 | 1.66E-07 | 2.71E-07 | 1.24E-06 |
| Total | 3.36E-07 | 4.67E-07 | 4.02E-12 | 8.15E-13 | 8.04E-10 | 1.66E-07 | 2.71E-07 | 1.24E-06 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |
| Total | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |
| Total | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |
| Total | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |
| Total | 2.32E-08 | 1.08E-07 | 9.28E-13 | 1.88E-13 | 1.86E-10 | 3.84E-08 | 6.26E-08 | 2.32E-07 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.73E-08 | 2.73E-08 |
| Pa-231 | 5.01E-09 | 5.01E-09 |
| Ac-227 | 5.91E-09 | 5.91E-09 |
| Pb-210 | 2.17E-07 | 2.17E-07 |
| Ra-226 | 3.65E-07 | 3.65E-07 |
| Pb-210 | 2.89E-08 | 2.89E-08 |
| Th-228 | 3.19E-09 | 3.19E-09 |
| Th-230 | 4.37E-07 | 4.37E-07 |
| Ra-226 | 4.27E-08 | 4.27E-08 |
| Pb-210 | 2.42E-09 | 2.42E-09 |
| Th-232 | 1.64E-09 | 1.64E-09 |
| Ra-228 | 8.23E-09 | 8.23E-09 |
| Th-228 | 7.91E-08 | 7.91E-08 |
| U-234 | 5.65E-09 | 5.65E-09 |
| Th-230 | 7.96E-13 | 7.96E-13 |
| Ra-226 | 5.14E-14 | 5.14E-14 |
| Pb-210 | 2.28E-15 | 2.28E-15 |
| U-235 | 3.58E-10 | 3.58E-10 |
| Pa-231 | 1.14E-13 | 1.14E-13 |
| Ac-227 | 9.48E-14 | 9.48E-14 |
| U-238 | 1.12E-08 | 1.12E-08 |
| U-234 | 2.00E-13 | 2.00E-13 |
| Th-230 | 1.87E-17 | 1.87E-17 |
| Ra-226 | 9.02E-19 | 9.02E-19 |
| Pb-210 | 3.30E-20 | 3.30E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.51E-09 | 4.51E-09 |
| Pa-231 | 9.87E-10 | 9.87E-10 |
| Ac-227 | 9.81E-10 | 9.81E-10 |
| Pb-210 | 4.84E-08 | 4.84E-08 |
| Ra-226 | 4.35E-08 | 4.35E-08 |
| Pb-210 | 6.45E-09 | 6.45E-09 |
| Th-228 | 6.87E-10 | 6.87E-10 |
| Th-230 | 9.98E-08 | 9.98E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 5.10E-09 | 5.10E-09 |
| Pb-210 | 5.41E-10 | 5.41E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 9.57E-10 | 9.57E-10 |
| Th-228 | 1.70E-08 | 1.70E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.82E-13 | 1.82E-13 |
| Ra-226 | 6.14E-15 | 6.14E-15 |
| Pb-210 | 5.10E-16 | 5.10E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.25E-14 | 2.25E-14 |
| Ac-227 | 1.58E-14 | 1.58E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.54E-14 | 4.54E-14 |
| Th-230 | 4.27E-18 | 4.27E-18 |
| Ra-226 | 1.08E-19 | 1.08E-19 |
| Pb-210 | 7.37E-21 | 7.37E-21 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.51E-09 | 4.51E-09 |
| Pa-231 | 9.87E-10 | 9.87E-10 |
| Ac-227 | 9.81E-10 | 9.81E-10 |
| Pb-210 | 4.84E-08 | 4.84E-08 |
| Ra-226 | 4.35E-08 | 4.35E-08 |
| Pb-210 | 6.45E-09 | 6.45E-09 |
| Th-228 | 6.87E-10 | 6.87E-10 |
| Th-230 | 9.98E-08 | 9.98E-08 |
| Ra-226 | 5.10E-09 | 5.10E-09 |
| Pb-210 | 5.41E-10 | 5.41E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 9.57E-10 | 9.57E-10 |
| Th-228 | 1.70E-08 | 1.70E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.82E-13 | 1.82E-13 |
| Ra-226 | 6.14E-15 | 6.14E-15 |
| Pb-210 | 5.10E-16 | 5.10E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.25E-14 | 2.25E-14 |
| Ac-227 | 1.58E-14 | 1.58E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.54E-14 | 4.54E-14 |
| Th-230 | 4.27E-18 | 4.27E-18 |
| Ra-226 | 1.08E-19 | 1.08E-19 |
| Pb-210 | 7.37E-21 | 7.37E-21 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.51E-09 | 4.51E-09 |
| Pa-231 | 9.87E-10 | 9.87E-10 |
| Ac-227 | 9.81E-10 | 9.81E-10 |
| Pb-210 | 4.84E-08 | 4.84E-08 |
| Ra-226 | 4.35E-08 | 4.35E-08 |
| Pb-210 | 6.45E-09 | 6.45E-09 |
| Th-228 | 6.87E-10 | 6.87E-10 |
| Th-230 | 9.98E-08 | 9.98E-08 |
| Ra-226 | 5.10E-09 | 5.10E-09 |
| Pb-210 | 5.41E-10 | 5.41E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 9.57E-10 | 9.57E-10 |
| Th-228 | 1.70E-08 | 1.70E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.82E-13 | 1.82E-13 |
| Ra-226 | 6.14E-15 | 6.14E-15 |
| Pb-210 | 5.10E-16 | 5.10E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.25E-14 | 2.25E-14 |
| Ac-227 | 1.58E-14 | 1.58E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.54E-14 | 4.54E-14 |
| Th-230 | 4.27E-18 | 4.27E-18 |
| Ra-226 | 1.08E-19 | 1.08E-19 |
| Pb-210 | 7.37E-21 | 7.37E-21 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.51E-09 | 4.51E-09 |
| Pa-231 | 9.87E-10 | 9.87E-10 |
| Ac-227 | 9.81E-10 | 9.81E-10 |
| Pb-210 | 4.84E-08 | 4.84E-08 |
| Ra-226 | 4.35E-08 | 4.35E-08 |
| Pb-210 | 6.45E-09 | 6.45E-09 |
| Th-228 | 6.87E-10 | 6.87E-10 |
| Th-230 | 9.98E-08 | 9.98E-08 |
| Ra-226 | 5.10E-09 | 5.10E-09 |
| Pb-210 | 5.41E-10 | 5.41E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 9.57E-10 | 9.57E-10 |
| Th-228 | 1.70E-08 | 1.70E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.82E-13 | 1.82E-13 |
| Ra-226 | 6.14E-15 | 6.14E-15 |
| Pb-210 | 5.10E-16 | 5.10E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.25E-14 | 2.25E-14 |
| Ac-227 | 1.58E-14 | 1.58E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.54E-14 | 4.54E-14 |
| Th-230 | 4.27E-18 | 4.27E-18 |
| Ra-226 | 1.08E-19 | 1.08E-19 |
| Pb-210 | 7.37E-21 | 7.37E-21 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  1.00000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.24E-06 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.17E-06 |
| Total | 1.24E-06 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.32E-07 | 2.17E-06 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.37E-07 | 4.67E-07 | 4.07E-12 | 8.24E-13 | 7.98E-10 | 1.70E-07 | 2.68E-07 | 1.24E-06 |
| Total | 3.37E-07 | 4.67E-07 | 4.07E-12 | 8.24E-13 | 7.98E-10 | 1.70E-07 | 2.68E-07 | 1.24E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |
| Total | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |
| Total | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |
| Total | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |
| Total | 2.33E-08 | 1.08E-07 | 9.39E-13 | 1.90E-13 | 1.84E-10 | 3.92E-08 | 6.19E-08 | 2.32E-07 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.64E-08 | 2.64E-08 |
| Pa-231 | 5.02E-09 | 5.02E-09 |
| Ac-227 | 6.31E-09 | 6.31E-09 |
| Pb-210 | 2.10E-07 | 2.10E-07 |
| Ra-226 | 3.64E-07 | 3.64E-07 |
| Pb-210 | 3.09E-08 | 3.09E-08 |
| Th-228 | 2.22E-09 | 2.22E-09 |
| Th-230 | 4.38E-07 | 4.38E-07 |
| Ra-226 | 4.60E-08 | 4.60E-08 |
| Pb-210 | 2.71E-09 | 2.71E-09 |
| Th-232 | 1.64E-09 | 1.64E-09 |
| Ra-228 | 8.65E-09 | 8.65E-09 |
| Th-228 | 8.39E-08 | 8.39E-08 |
| U-234 | 5.66E-09 | 5.66E-09 |
| Th-230 | 8.60E-13 | 8.60E-13 |
| Ra-226 | 5.76E-14 | 5.76E-14 |
| Pb-210 | 2.65E-15 | 2.65E-15 |
| U-235 | 3.57E-10 | 3.57E-10 |
| Pa-231 | 1.23E-13 | 1.23E-13 |
| Ac-227 | 1.06E-13 | 1.06E-13 |
| U-238 | 1.12E-08 | 1.12E-08 |
| U-234 | 2.16E-13 | 2.16E-13 |
| Th-230 | 2.10E-17 | 2.10E-17 |
| Ra-226 | 1.05E-18 | 1.05E-18 |
| Pb-210 | 3.99E-20 | 3.99E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.37E-09 | 4.37E-09 |
| Pa-231 | 9.89E-10 | 9.89E-10 |
| Ac-227 | 1.05E-09 | 1.05E-09 |
| Pb-210 | 4.69E-08 | 4.69E-08 |
| Ra-226 | 4.34E-08 | 4.34E-08 |
| Pb-210 | 6.90E-09 | 6.90E-09 |
| Th-228 | 4.76E-10 | 4.76E-10 |
| Th-230 | 9.99E-08 | 9.99E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 5.49E-09 | 5.49E-09 |
| Pb-210 | 6.04E-10 | 6.04E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 1.80E-08 | 1.80E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.96E-13 | 1.96E-13 |
| Ra-226 | 6.88E-15 | 6.88E-15 |
| Pb-210 | 5.93E-16 | 5.93E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.43E-14 | 2.43E-14 |
| Ac-227 | 1.76E-14 | 1.76E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.91E-14 | 4.91E-14 |
| Th-230 | 4.80E-18 | 4.80E-18 |
| Ra-226 | 1.26E-19 | 1.26E-19 |
| Pb-210 | 8.92E-21 | 8.92E-21 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.37E-09 | 4.37E-09 |
| Pa-231 | 9.89E-10 | 9.89E-10 |
| Ac-227 | 1.05E-09 | 1.05E-09 |
| Pb-210 | 4.69E-08 | 4.69E-08 |
| Ra-226 | 4.34E-08 | 4.34E-08 |
| Pb-210 | 6.90E-09 | 6.90E-09 |
| Th-228 | 4.76E-10 | 4.76E-10 |
| Th-230 | 9.99E-08 | 9.99E-08 |
| Ra-226 | 5.49E-09 | 5.49E-09 |
| Pb-210 | 6.04E-10 | 6.04E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 1.80E-08 | 1.80E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.96E-13 | 1.96E-13 |
| Ra-226 | 6.88E-15 | 6.88E-15 |
| Pb-210 | 5.93E-16 | 5.93E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.43E-14 | 2.43E-14 |
| Ac-227 | 1.76E-14 | 1.76E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.91E-14 | 4.91E-14 |
| Th-230 | 4.80E-18 | 4.80E-18 |
| Ra-226 | 1.26E-19 | 1.26E-19 |
| Pb-210 | 8.92E-21 | 8.92E-21 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.37E-09 | 4.37E-09 |
| Pa-231 | 9.89E-10 | 9.89E-10 |
| Ac-227 | 1.05E-09 | 1.05E-09 |
| Pb-210 | 4.69E-08 | 4.69E-08 |
| Ra-226 | 4.34E-08 | 4.34E-08 |
| Pb-210 | 6.90E-09 | 6.90E-09 |
| Th-228 | 4.76E-10 | 4.76E-10 |
| Th-230 | 9.99E-08 | 9.99E-08 |
| Ra-226 | 5.49E-09 | 5.49E-09 |
| Pb-210 | 6.04E-10 | 6.04E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 1.80E-08 | 1.80E-08 |
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.96E-13 | 1.96E-13 |
| Ra-226 | 6.88E-15 | 6.88E-15 |
| Pb-210 | 5.93E-16 | 5.93E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.43E-14 | 2.43E-14 |
| Ac-227 | 1.76E-14 | 1.76E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.91E-14 | 4.91E-14 |
| Th-230 | 4.80E-18 | 4.80E-18 |
| Ra-226 | 1.26E-19 | 1.26E-19 |
| Pb-210 | 8.92E-21 | 8.92E-21 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.37E-09 | 4.37E-09 |
| Pa-231 | 9.89E-10 | 9.89E-10 |
| Ac-227 | 1.05E-09 | 1.05E-09 |
| Pb-210 | 4.69E-08 | 4.69E-08 |
| Ra-226 | 4.34E-08 | 4.34E-08 |
| Pb-210 | 6.90E-09 | 6.90E-09 |
| Th-228 | 4.76E-10 | 4.76E-10 |
| Th-230 | 9.99E-08 | 9.99E-08 |
| Ra-226 | 5.49E-09 | 5.49E-09 |
| Pb-210 | 6.04E-10 | 6.04E-10 |
| Th-232 | 3.75E-10 | 3.75E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 1.80E-08 | 1.80E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 1.29E-09 | 1.29E-09 |
| Th-230 | 1.96E-13 | 1.96E-13 |
| Ra-226 | 6.88E-15 | 6.88E-15 |
| Pb-210 | 5.93E-16 | 5.93E-16 |
| U-235 | 4.14E-11 | 4.14E-11 |
| Pa-231 | 2.43E-14 | 2.43E-14 |
| Ac-227 | 1.76E-14 | 1.76E-14 |
| U-238 | 1.58E-09 | 1.58E-09 |
| U-234 | 4.91E-14 | 4.91E-14 |
| Th-230 | 4.80E-18 | 4.80E-18 |
| Ra-226 | 1.26E-19 | 1.26E-19 |
| Pb-210 | 8.92E-21 | 8.92E-21 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  3.00000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.23E-06 | 2.29E-07 | 2.29E-07 | 2.29E-07 | 2.29E-07 | 2.15E-06 |
| Total | 1.23E-06 | 2.29E-07 | 2.29E-07 | 2.29E-07 | 2.29E-07 | 2.15E-06 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.40E-07 | 4.56E-07 | 4.04E-12 | 8.18E-13 | 7.66E-10 | 1.77E-07 | 2.56E-07 | 1.23E-06 |
| Total | 3.40E-07 | 4.56E-07 | 4.04E-12 | 8.18E-13 | 7.66E-10 | 1.77E-07 | 2.56E-07 | 1.23E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |
| Total | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |
| Total | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |
| Total | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |
| Total | 2.35E-08 | 1.05E-07 | 9.33E-13 | 1.89E-13 | 1.77E-10 | 4.10E-08 | 5.92E-08 | 2.29E-07 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.45E-08 | 2.45E-08 |
| Pa-231 | 4.91E-09 | 4.91E-09 |
| Ac-227 | 6.93E-09 | 6.93E-09 |
| Pb-210 | 1.94E-07 | 1.94E-07 |
| Ra-226 | 3.60E-07 | 3.60E-07 |
| Pb-210 | 3.35E-08 | 3.35E-08 |
| Th-228 | 1.07E-09 | 1.07E-09 |
| Th-230 | 4.28E-07 | 4.28E-07 |
| Ra-226 | 5.24E-08 | 5.24E-08 |
| Pb-210 | 3.14E-09 | 3.14E-09 |
| Th-232 | 1.60E-09 | 1.60E-09 |
| Ra-228 | 9.25E-09 | 9.25E-09 |
| Th-228 | 9.29E-08 | 9.29E-08 |
| U-234 | 5.54E-09 | 5.54E-09 |
| Th-230 | 9.47E-13 | 9.47E-13 |
| Ra-226 | 7.12E-14 | 7.12E-14 |
| Pb-210 | 3.26E-15 | 3.26E-15 |
| U-235 | 3.53E-10 | 3.53E-10 |
| Pa-231 | 1.36E-13 | 1.36E-13 |
| Ac-227 | 1.25E-13 | 1.25E-13 |
| U-238 | 1.10E-08 | 1.10E-08 |
| U-234 | 2.38E-13 | 2.38E-13 |
| Th-230 | 2.47E-17 | 2.47E-17 |
| Ra-226 | 1.40E-18 | 1.40E-18 |
| Pb-210 | 5.18E-20 | 5.18E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.05E-09 | 4.05E-09 |
| Pa-231 | 9.67E-10 | 9.67E-10 |
| Ac-227 | 1.14E-09 | 1.14E-09 |
| Pb-210 | 4.34E-08 | 4.34E-08 |
| Ra-226 | 4.29E-08 | 4.29E-08 |
| Pb-210 | 7.47E-09 | 7.47E-09 |
| Th-228 | 2.29E-10 | 2.29E-10 |
| Th-230 | 9.77E-08 | 9.77E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 6.23E-09 | 6.23E-09 |
| Pb-210 | 7.00E-10 | 7.00E-10 |
| Th-232 | 3.67E-10 | 3.67E-10 |
| Ra-228 | 1.07E-09 | 1.07E-09 |
| Th-228 | 2.00E-08 | 2.00E-08 |
| U-234 | 1.26E-09 | 1.26E-09 |
| Th-230 | 2.16E-13 | 2.16E-13 |
| Ra-226 | 8.47E-15 | 8.47E-15 |
| Pb-210 | 7.27E-16 | 7.27E-16 |
| U-235 | 4.07E-11 | 4.07E-11 |
| Pa-231 | 2.68E-14 | 2.68E-14 |
| Ac-227 | 2.06E-14 | 2.06E-14 |
| U-238 | 1.55E-09 | 1.55E-09 |
| U-234 | 5.41E-14 | 5.41E-14 |
| Th-230 | 5.64E-18 | 5.64E-18 |
| Ra-226 | 1.66E-19 | 1.66E-19 |
| Pb-210 | 1.15E-20 | 1.15E-20 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.05E-09 | 4.05E-09 |
| Pa-231 | 9.67E-10 | 9.67E-10 |
| Ac-227 | 1.14E-09 | 1.14E-09 |
| Pb-210 | 4.34E-08 | 4.34E-08 |
| Ra-226 | 4.29E-08 | 4.29E-08 |
| Pb-210 | 7.47E-09 | 7.47E-09 |
| Th-228 | 2.29E-10 | 2.29E-10 |
| Th-230 | 9.77E-08 | 9.77E-08 |
| Ra-226 | 6.23E-09 | 6.23E-09 |
| Pb-210 | 7.00E-10 | 7.00E-10 |
| Th-232 | 3.67E-10 | 3.67E-10 |
| Ra-228 | 1.07E-09 | 1.07E-09 |
| Th-228 | 2.00E-08 | 2.00E-08 |
| U-234 | 1.26E-09 | 1.26E-09 |
| Th-230 | 2.16E-13 | 2.16E-13 |
| Ra-226 | 8.47E-15 | 8.47E-15 |
| Pb-210 | 7.27E-16 | 7.27E-16 |
| U-235 | 4.07E-11 | 4.07E-11 |
| Pa-231 | 2.68E-14 | 2.68E-14 |
| Ac-227 | 2.06E-14 | 2.06E-14 |
| U-238 | 1.55E-09 | 1.55E-09 |
| U-234 | 5.41E-14 | 5.41E-14 |
| Th-230 | 5.64E-18 | 5.64E-18 |
| Ra-226 | 1.66E-19 | 1.66E-19 |
| Pb-210 | 1.15E-20 | 1.15E-20 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.05E-09 | 4.05E-09 |
| Pa-231 | 9.67E-10 | 9.67E-10 |
| Ac-227 | 1.14E-09 | 1.14E-09 |
| Pb-210 | 4.34E-08 | 4.34E-08 |
| Ra-226 | 4.29E-08 | 4.29E-08 |
| Pb-210 | 7.47E-09 | 7.47E-09 |
| Th-228 | 2.29E-10 | 2.29E-10 |
| Th-230 | 9.77E-08 | 9.77E-08 |
| Ra-226 | 6.23E-09 | 6.23E-09 |
| Pb-210 | 7.00E-10 | 7.00E-10 |
| Th-232 | 3.67E-10 | 3.67E-10 |
| Ra-228 | 1.07E-09 | 1.07E-09 |
| Th-228 | 2.00E-08 | 2.00E-08 |
| U-234 | 1.26E-09 | 1.26E-09 |
| Th-230 | 2.16E-13 | 2.16E-13 |
| Ra-226 | 8.47E-15 | 8.47E-15 |
| Pb-210 | 7.27E-16 | 7.27E-16 |
| U-235 | 4.07E-11 | 4.07E-11 |
| Pa-231 | 2.68E-14 | 2.68E-14 |
| Ac-227 | 2.06E-14 | 2.06E-14 |
| U-238 | 1.55E-09 | 1.55E-09 |
| U-234 | 5.41E-14 | 5.41E-14 |
| Th-230 | 5.64E-18 | 5.64E-18 |
| Ra-226 | 1.66E-19 | 1.66E-19 |
| Pb-210 | 1.15E-20 | 1.15E-20 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 4.05E-09 | 4.05E-09 |
| Pa-231 | 9.67E-10 | 9.67E-10 |
| Ac-227 | 1.14E-09 | 1.14E-09 |
| Pb-210 | 4.34E-08 | 4.34E-08 |
| Ra-226 | 4.29E-08 | 4.29E-08 |
| Pb-210 | 7.47E-09 | 7.47E-09 |
| Th-228 | 2.29E-10 | 2.29E-10 |
| Th-230 | 9.77E-08 | 9.77E-08 |
| Ra-226 | 6.23E-09 | 6.23E-09 |
| Pb-210 | 7.00E-10 | 7.00E-10 |
| Th-232 | 3.67E-10 | 3.67E-10 |
| Ra-228 | 1.07E-09 | 1.07E-09 |
| Th-228 | 2.00E-08 | 2.00E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 1.26E-09 | 1.26E-09 |
| Th-230 | 2.16E-13 | 2.16E-13 |
| Ra-226 | 8.47E-15 | 8.47E-15 |
| Pb-210 | 7.27E-16 | 7.27E-16 |
| U-235 | 4.07E-11 | 4.07E-11 |
| Pa-231 | 2.68E-14 | 2.68E-14 |
| Ac-227 | 2.06E-14 | 2.06E-14 |
| U-238 | 1.55E-09 | 1.55E-09 |
| U-234 | 5.41E-14 | 5.41E-14 |
| Th-230 | 5.64E-18 | 5.64E-18 |
| Ra-226 | 1.66E-19 | 1.66E-19 |
| Pb-210 | 1.15E-20 | 1.15E-20 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  10.0000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.05E-06 | 1.85E-07 | 1.85E-07 | 1.85E-07 | 1.85E-07 | 1.79E-06 |
| Total | 1.05E-06 | 1.85E-07 | 1.85E-07 | 1.85E-07 | 1.85E-07 | 1.79E-06 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.49E-07 | 3.24E-07 | 2.96E-12 | 6.02E-13 | 5.24E-10 | 1.98E-07 | 1.75E-07 | 1.05E-06 |
| Total | 3.49E-07 | 3.24E-07 | 2.96E-12 | 6.02E-13 | 5.24E-10 | 1.98E-07 | 1.75E-07 | 1.05E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |
| Total | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |
| Total | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |
| Total | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |
| Total | 2.41E-08 | 7.47E-08 | 6.84E-13 | 1.39E-13 | 1.21E-10 | 4.57E-08 | 4.04E-08 | 1.85E-07 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.69E-08 | 1.69E-08 |
| Pa-231 | 3.74E-09 | 3.74E-09 |
| Ac-227 | 7.18E-09 | 7.18E-09 |
| Pb-210 | 1.24E-07 | 1.24E-07 |
| Ra-226 | 3.45E-07 | 3.45E-07 |
| Pb-210 | 2.93E-08 | 2.93E-08 |
| Th-228 | 8.21E-11 | 8.21E-11 |
| Th-230 | 3.07E-07 | 3.07E-07 |
| Ra-226 | 7.27E-08 | 7.27E-08 |
| Pb-210 | 3.09E-09 | 3.09E-09 |
| Th-232 | 1.15E-09 | 1.15E-09 |
| Ra-228 | 9.65E-09 | 9.65E-09 |
| Th-228 | 1.13E-07 | 1.13E-07 |
| U-234 | 3.97E-09 | 3.97E-09 |
| Th-230 | 8.38E-13 | 8.38E-13 |
| Ra-226 | 1.30E-13 | 1.30E-13 |
| Pb-210 | 3.40E-15 | 3.40E-15 |
| U-235 | 3.13E-10 | 3.13E-10 |
| Pa-231 | 1.33E-13 | 1.33E-13 |
| Ac-227 | 1.61E-13 | 1.61E-13 |
| U-238 | 9.50E-09 | 9.50E-09 |
| U-234 | 2.11E-13 | 2.11E-13 |
| Th-230 | 2.39E-17 | 2.39E-17 |
| Ra-226 | 3.22E-18 | 3.22E-18 |
| Pb-210 | 5.63E-20 | 5.63E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.64E-09 | 2.64E-09 |
| Pa-231 | 6.99E-10 | 6.99E-10 |
| Ac-227 | 1.06E-09 | 1.06E-09 |
| Pb-210 | 2.75E-08 | 2.75E-08 |
| Ra-226 | 4.03E-08 | 4.03E-08 |
| Pb-210 | 6.43E-09 | 6.43E-09 |
| Th-228 | 1.76E-11 | 1.76E-11 |
| Th-230 | 6.97E-08 | 6.97E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| Ra-226 | 8.43E-09 | 8.43E-09 |
| Pb-210 | 6.70E-10 | 6.70E-10 |
| Th-232 | 2.62E-10 | 2.62E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 2.42E-08 | 2.42E-08 |
| U-234 | 8.99E-10 | 8.99E-10 |
| Th-230 | 1.90E-13 | 1.90E-13 |
| Ra-226 | 1.49E-14 | 1.49E-14 |
| Pb-210 | 7.25E-16 | 7.25E-16 |
| U-235 | 3.26E-11 | 3.26E-11 |
| Pa-231 | 2.40E-14 | 2.40E-14 |
| Ac-227 | 2.22E-14 | 2.22E-14 |
| U-238 | 1.21E-09 | 1.21E-09 |
| U-234 | 4.75E-14 | 4.75E-14 |
| Th-230 | 5.38E-18 | 5.38E-18 |
| Ra-226 | 3.68E-19 | 3.68E-19 |
| Pb-210 | 1.18E-20 | 1.18E-20 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.64E-09 | 2.64E-09 |
| Pa-231 | 6.99E-10 | 6.99E-10 |
| Ac-227 | 1.06E-09 | 1.06E-09 |
| Pb-210 | 2.75E-08 | 2.75E-08 |
| Ra-226 | 4.03E-08 | 4.03E-08 |
| Pb-210 | 6.43E-09 | 6.43E-09 |
| Th-228 | 1.76E-11 | 1.76E-11 |
| Th-230 | 6.97E-08 | 6.97E-08 |
| Ra-226 | 8.43E-09 | 8.43E-09 |
| Pb-210 | 6.70E-10 | 6.70E-10 |
| Th-232 | 2.62E-10 | 2.62E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 2.42E-08 | 2.42E-08 |
| U-234 | 8.99E-10 | 8.99E-10 |
| Th-230 | 1.90E-13 | 1.90E-13 |
| Ra-226 | 1.49E-14 | 1.49E-14 |
| Pb-210 | 7.25E-16 | 7.25E-16 |
| U-235 | 3.26E-11 | 3.26E-11 |
| Pa-231 | 2.40E-14 | 2.40E-14 |
| Ac-227 | 2.22E-14 | 2.22E-14 |
| U-238 | 1.21E-09 | 1.21E-09 |
| U-234 | 4.75E-14 | 4.75E-14 |
| Th-230 | 5.38E-18 | 5.38E-18 |
| Ra-226 | 3.68E-19 | 3.68E-19 |
| Pb-210 | 1.18E-20 | 1.18E-20 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.64E-09 | 2.64E-09 |
| Pa-231 | 6.99E-10 | 6.99E-10 |
| Ac-227 | 1.06E-09 | 1.06E-09 |
| Pb-210 | 2.75E-08 | 2.75E-08 |
| Ra-226 | 4.03E-08 | 4.03E-08 |
| Pb-210 | 6.43E-09 | 6.43E-09 |
| Th-228 | 1.76E-11 | 1.76E-11 |
| Th-230 | 6.97E-08 | 6.97E-08 |
| Ra-226 | 8.43E-09 | 8.43E-09 |
| Pb-210 | 6.70E-10 | 6.70E-10 |
| Th-232 | 2.62E-10 | 2.62E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 2.42E-08 | 2.42E-08 |
| U-234 | 8.99E-10 | 8.99E-10 |
| Th-230 | 1.90E-13 | 1.90E-13 |
| Ra-226 | 1.49E-14 | 1.49E-14 |
| Pb-210 | 7.25E-16 | 7.25E-16 |
| U-235 | 3.26E-11 | 3.26E-11 |
| Pa-231 | 2.40E-14 | 2.40E-14 |
| Ac-227 | 2.22E-14 | 2.22E-14 |
| U-238 | 1.21E-09 | 1.21E-09 |
| U-234 | 4.75E-14 | 4.75E-14 |
| Th-230 | 5.38E-18 | 5.38E-18 |
| Ra-226 | 3.68E-19 | 3.68E-19 |
| Pb-210 | 1.18E-20 | 1.18E-20 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.64E-09 | 2.64E-09 |
| Pa-231 | 6.99E-10 | 6.99E-10 |
| Ac-227 | 1.06E-09 | 1.06E-09 |
| Pb-210 | 2.75E-08 | 2.75E-08 |
| Ra-226 | 4.03E-08 | 4.03E-08 |
| Pb-210 | 6.43E-09 | 6.43E-09 |
| Th-228 | 1.76E-11 | 1.76E-11 |
| Th-230 | 6.97E-08 | 6.97E-08 |
| Ra-226 | 8.43E-09 | 8.43E-09 |
| Pb-210 | 6.70E-10 | 6.70E-10 |
| Th-232 | 2.62E-10 | 2.62E-10 |
| Ra-228 | 1.01E-09 | 1.01E-09 |
| Th-228 | 2.42E-08 | 2.42E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| U-234 | 8.99E-10 | 8.99E-10 |
| Th-230 | 1.90E-13 | 1.90E-13 |
| Ra-226 | 1.49E-14 | 1.49E-14 |
| Pb-210 | 7.25E-16 | 7.25E-16 |
| U-235 | 3.26E-11 | 3.26E-11 |
| Pa-231 | 2.40E-14 | 2.40E-14 |
| Ac-227 | 2.22E-14 | 2.22E-14 |
| U-238 | 1.21E-09 | 1.21E-09 |
| U-234 | 4.75E-14 | 4.75E-14 |
| Th-230 | 5.38E-18 | 5.38E-18 |
| Ra-226 | 3.68E-19 | 3.68E-19 |
| Pb-210 | 1.18E-20 | 1.18E-20 |

Title : Jana Elementary School User- Staff
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
Evaluation Time:  25.0000019  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 6.57E-07 | 9.15E-08 | 9.15E-08 | 9.15E-08 | 9.15E-08 | 1.02E-06 |
| Total | 6.57E-07 | 9.15E-08 | 9.15E-08 | 9.15E-08 | 9.15E-08 | 1.02E-06 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.73E-07 | 4.46E-08 | 4.42E-13 | 8.85E-14 | 6.92E-11 | 2.17E-07 | 2.22E-08 | 6.57E-07 |
| Total | 3.73E-07 | 4.46E-08 | 4.42E-13 | 8.85E-14 | 6.92E-11 | 2.17E-07 | 2.22E-08 | 6.57E-07 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |
| Total | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |
| Total | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |
| Total | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |
| Total | 2.59E-08 | 1.03E-08 | 1.02E-13 | 2.04E-14 | 1.60E-11 | 5.02E-08 | 5.13E-09 | 9.15E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.57E-09 | 5.57E-09 |
| Pa-231 | 1.23E-09 | 1.23E-09 |
| Ac-227 | 5.52E-09 | 5.52E-09 |
| Pb-210 | 1.68E-08 | 1.68E-08 |
| Ra-226 | 3.20E-07 | 3.20E-07 |
| Pb-210 | 7.55E-09 | 7.55E-09 |
| Th-228 | 3.33E-13 | 3.33E-13 |
| Th-230 | 4.73E-08 | 4.73E-08 |
| Ra-226 | 1.14E-07 | 1.14E-07 |
| Pb-210 | 1.28E-09 | 1.28E-09 |
| Th-232 | 1.70E-10 | 1.70E-10 |
| Ra-228 | 8.33E-09 | 8.33E-09 |
| Th-228 | 1.22E-07 | 1.22E-07 |
| U-234 | 6.25E-10 | 6.25E-10 |
| Th-230 | 1.89E-13 | 1.89E-13 |
| Ra-226 | 3.23E-13 | 3.23E-13 |
| Pb-210 | 2.19E-15 | 2.19E-15 |
| U-235 | 2.35E-10 | 2.35E-10 |
| Pa-231 | 7.59E-14 | 7.59E-14 |
| Ac-227 | 2.22E-13 | 2.22E-13 |
| U-238 | 6.33E-09 | 6.33E-09 |
| U-234 | 4.90E-14 | 4.90E-14 |
| Th-230 | 7.53E-18 | 7.53E-18 |
| Ra-226 | 1.22E-17 | 1.22E-17 |
| Pb-210 | 5.67E-20 | 5.67E-20 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.27E-10 | 5.27E-10 |
| Pa-231 | 1.24E-10 | 1.24E-10 |
| Ac-227 | 4.62E-10 | 4.62E-10 |
| Pb-210 | 3.16E-09 | 3.16E-09 |
| Ra-226 | 3.57E-08 | 3.57E-08 |
| Pb-210 | 1.28E-09 | 1.28E-09 |
| Th-228 | 7.14E-14 | 7.14E-14 |
| Th-230 | 9.77E-09 | 9.77E-09 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

| | | |
|---|---|---|
| Ra-226 | 1.27E-08 | 1.27E-08 |
| Pb-210 | 1.93E-10 | 1.93E-10 |
| Th-232 | 3.66E-11 | 3.66E-11 |
| Ra-228 | 6.30E-10 | 6.30E-10 |
| Th-228 | 2.62E-08 | 2.62E-08 |
| U-234 | 1.26E-10 | 1.26E-10 |
| Th-230 | 3.74E-14 | 3.74E-14 |
| Ra-226 | 3.60E-14 | 3.60E-14 |
| Pb-210 | 2.89E-16 | 2.89E-16 |
| U-235 | 1.55E-11 | 1.55E-11 |
| Pa-231 | 6.58E-15 | 6.58E-15 |
| Ac-227 | 1.72E-14 | 1.72E-14 |
| U-238 | 5.07E-10 | 5.07E-10 |
| U-234 | 9.39E-15 | 9.39E-15 |
| Th-230 | 1.40E-18 | 1.40E-18 |
| Ra-226 | 1.36E-18 | 1.36E-18 |
| Pb-210 | 6.45E-21 | 6.45E-21 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.27E-10 | 5.27E-10 |
| Pa-231 | 1.24E-10 | 1.24E-10 |
| Ac-227 | 4.62E-10 | 4.62E-10 |
| Pb-210 | 3.16E-09 | 3.16E-09 |
| Ra-226 | 3.57E-08 | 3.57E-08 |
| Pb-210 | 1.28E-09 | 1.28E-09 |
| Th-228 | 7.14E-14 | 7.14E-14 |
| Th-230 | 9.77E-09 | 9.77E-09 |
| Ra-226 | 1.27E-08 | 1.27E-08 |
| Pb-210 | 1.93E-10 | 1.93E-10 |
| Th-232 | 3.66E-11 | 3.66E-11 |
| Ra-228 | 6.30E-10 | 6.30E-10 |
| Th-228 | 2.62E-08 | 2.62E-08 |
| U-234 | 1.26E-10 | 1.26E-10 |
| Th-230 | 3.74E-14 | 3.74E-14 |
| Ra-226 | 3.60E-14 | 3.60E-14 |
| Pb-210 | 2.89E-16 | 2.89E-16 |
| U-235 | 1.55E-11 | 1.55E-11 |
| Pa-231 | 6.58E-15 | 6.58E-15 |
| Ac-227 | 1.72E-14 | 1.72E-14 |
| U-238 | 5.07E-10 | 5.07E-10 |
| U-234 | 9.39E-15 | 9.39E-15 |
| Th-230 | 1.40E-18 | 1.40E-18 |
| Ra-226 | 1.36E-18 | 1.36E-18 |
| Pb-210 | 6.45E-21 | 6.45E-21 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.27E-10 | 5.27E-10 |
| Pa-231 | 1.24E-10 | 1.24E-10 |
| Ac-227 | 4.62E-10 | 4.62E-10 |
| Pb-210 | 3.16E-09 | 3.16E-09 |
| Ra-226 | 3.57E-08 | 3.57E-08 |
| Pb-210 | 1.28E-09 | 1.28E-09 |
| Th-228 | 7.14E-14 | 7.14E-14 |
| Th-230 | 9.77E-09 | 9.77E-09 |
| Ra-226 | 1.27E-08 | 1.27E-08 |
| Pb-210 | 1.93E-10 | 1.93E-10 |
| Th-232 | 3.66E-11 | 3.66E-11 |
| Ra-228 | 6.30E-10 | 6.30E-10 |
| Th-228 | 2.62E-08 | 2.62E-08 |
| U-234 | 1.26E-10 | 1.26E-10 |
| Th-230 | 3.74E-14 | 3.74E-14 |
| Ra-226 | 3.60E-14 | 3.60E-14 |
| Pb-210 | 2.89E-16 | 2.89E-16 |
| U-235 | 1.55E-11 | 1.55E-11 |
| Pa-231 | 6.58E-15 | 6.58E-15 |
| Ac-227 | 1.72E-14 | 1.72E-14 |
| U-238 | 5.07E-10 | 5.07E-10 |
| U-234 | 9.39E-15 | 9.39E-15 |
| Th-230 | 1.40E-18 | 1.40E-18 |
| Ra-226 | 1.36E-18 | 1.36E-18 |
| Pb-210 | 6.45E-21 | 6.45E-21 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.27E-10 | 5.27E-10 |
| Pa-231 | 1.24E-10 | 1.24E-10 |
| Ac-227 | 4.62E-10 | 4.62E-10 |
| Pb-210 | 3.16E-09 | 3.16E-09 |
| Ra-226 | 3.57E-08 | 3.57E-08 |
| Pb-210 | 1.28E-09 | 1.28E-09 |
| Th-228 | 7.14E-14 | 7.14E-14 |
| Th-230 | 9.77E-09 | 9.77E-09 |
| Ra-226 | 1.27E-08 | 1.27E-08 |
| Pb-210 | 1.93E-10 | 1.93E-10 |
| Th-232 | 3.66E-11 | 3.66E-11 |
| Ra-228 | 6.30E-10 | 6.30E-10 |
| Th-228 | 2.62E-08 | 2.62E-08 |

 Title : Jana Elementary School User- Staff
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_staff_r.bld
 Evaluation Time:  25.0000019  years

| | | |
|---|---|---|
| U-234 | 1.26E-10 | 1.26E-10 |
| Th-230 | 3.74E-14 | 3.74E-14 |
| Ra-226 | 3.60E-14 | 3.60E-14 |
| Pb-210 | 2.89E-16 | 2.89E-16 |
| U-235 | 1.55E-11 | 1.55E-11 |
| Pa-231 | 6.58E-15 | 6.58E-15 |
| Ac-227 | 1.72E-14 | 1.72E-14 |
| U-238 | 5.07E-10 | 5.07E-10 |
| U-234 | 9.39E-15 | 9.39E-15 |
| Th-230 | 1.40E-18 | 1.40E-18 |
| Ra-226 | 1.36E-18 | 1.36E-18 |
| Pb-210 | 6.45E-21 | 6.45E-21 |

RESRAD-BUILD Output Suburban Resident Dose

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

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Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources : 5
Number of Receptors: 1
Total Time : 1.095000E+04 days
Fraction Inside : 6.390000E-01

Transformations data from: ICRP107
Cut off half life : 180.000000 days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 1.000 | 1.000 | 1.48E+01 | 6.90E-04 |

### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr

Height[m] Air Exchanges [m3/hr]
Area [m2]

```
                  ******************************
                  *                            *
                  *                            *
                  *                            *
                  *                           <=Q01: 0.00E+00
   H1:   2.500    *           Room  1          *      Q10 :  0.00E+00
                  *   LAMBDA: 0.00E+00         *
  Area  75.000    *                            *
                  *                            *
                  ******************************
```

Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration

              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02
 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::
   Nuclide Concentration

              [pCi/m2]
    Ac-227     1.920E+02
    Pa-231     9.300E+01
    Pb-210     3.200E+03
    Ra-226     9.730E+02
    Th-228     1.300E+01
    Th-230     2.130E+04
    Th-232     6.400E+01
    U-234      3.370E+02
    U-235      8.000E+00
    U-238      3.370E+02

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Temporal Summary

RESRAD-BUILD Temporal Dose Tables

Dose to Receptor over the Exposure Duration

(mrem)

| Evaluation Time years | Receptor 1 | Total |
|---|---|---|
| 0.000000000 | 8.03E+01 | 8.03E+01 |
| 1.000000000 | 7.73E+01 | 7.73E+01 |
| 3.000000000 | 7.14E+01 | 7.14E+01 |
| 10.00000000 | 5.13E+01 | 5.13E+01 |
| 30.00000000 | 5.05E+00 | 5.05E+00 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time: 0.00000000E+00 years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 4.22E+01 | 9.52E+00 | 9.52E+00 | 9.52E+00 | 9.52E+00 | 8.03E+01 |
| Total | 4.22E+01 | 9.52E+00 | 9.52E+00 | 9.52E+00 | 9.52E+00 | 8.03E+01 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time: 0.00000000E+00 years

## Pathway Detail of Doses

[mrem]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.36E+00 | 1.29E+01 | 1.49E-05 | 2.98E-06 | 7.97E-02 | 1.17E+00 | 2.67E+01 | 4.22E+01 |
| Total | 1.36E+00 | 1.29E+01 | 1.49E-05 | 2.98E-06 | 7.97E-02 | 1.17E+00 | 2.67E+01 | 4.22E+01 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |
| Total | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |
| Total | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |
| Total | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |
| Total | 9.38E-02 | 2.98E+00 | 3.45E-06 | 6.89E-07 | 1.84E-02 | 2.70E-01 | 6.16E+00 | 9.52E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.36E-01 | 3.36E-01 |
| Pa-231 | 2.07E-01 | 2.07E-01 |
| Ac-227 | 8.20E-02 | 8.20E-02 |
| Pb-210 | 1.48E+01 | 1.48E+01 |
| Ra-226 | 2.49E+00 | 2.49E+00 |
| Pb-210 | 2.19E+00 | 2.19E+00 |
| Th-228 | 2.78E-02 | 2.78E-02 |
| Th-230 | 2.01E+01 | 2.01E+01 |
| Ra-226 | 3.36E-01 | 3.36E-01 |
| Pb-210 | 2.02E-01 | 2.02E-01 |
| Th-232 | 7.15E-02 | 7.15E-02 |
| Ra-228 | 2.94E-01 | 2.94E-01 |
| Th-228 | 8.96E-01 | 8.96E-01 |
| U-234 | 5.88E-02 | 5.88E-02 |
| Th-230 | 4.02E-05 | 4.02E-05 |
| Ra-226 | 4.67E-07 | 4.67E-07 |
| Pb-210 | 2.09E-07 | 2.09E-07 |
| U-235 | 2.26E-03 | 2.26E-03 |
| Pa-231 | 5.18E-06 | 5.18E-06 |
| Ac-227 | 1.47E-06 | 1.47E-06 |
| U-238 | 8.24E-02 | 8.24E-02 |
| U-234 | 2.28E-06 | 2.28E-06 |
| Th-230 | 1.04E-09 | 1.04E-09 |
| Ra-226 | 9.47E-12 | 9.47E-12 |
| Pb-210 | 3.33E-12 | 3.33E-12 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.08E-02 | 7.08E-02 |
| Pa-231 | 4.72E-02 | 4.72E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.41E+00 | 3.41E+00 |
| Ra-226 | 4.16E-01 | 4.16E-01 |
| Pb-210 | 5.03E-01 | 5.03E-01 |
| Th-228 | 6.24E-03 | 6.24E-03 |
| Th-230 | 4.64E+00 | 4.64E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 5.54E-02 | 5.54E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.65E-02 | 1.65E-02 |
| Ra-228 | 6.40E-02 | 6.40E-02 |
| Th-228 | 2.01E-01 | 2.01E-01 |
| U-234 | 1.35E-02 | 1.35E-02 |
| Th-230 | 9.26E-06 | 9.26E-06 |
| Ra-226 | 7.58E-08 | 7.58E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.56E-04 | 3.56E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.06E-07 | 3.06E-07 |
| U-238 | 1.47E-02 | 1.47E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.51E-12 | 1.51E-12 |
| Pb-210 | 7.65E-13 | 7.65E-13 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.08E-02 | 7.08E-02 |
| Pa-231 | 4.72E-02 | 4.72E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.41E+00 | 3.41E+00 |
| Ra-226 | 4.16E-01 | 4.16E-01 |
| Pb-210 | 5.03E-01 | 5.03E-01 |
| Th-228 | 6.24E-03 | 6.24E-03 |
| Th-230 | 4.64E+00 | 4.64E+00 |
| Ra-226 | 5.54E-02 | 5.54E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.65E-02 | 1.65E-02 |
| Ra-228 | 6.40E-02 | 6.40E-02 |
| Th-228 | 2.01E-01 | 2.01E-01 |
| U-234 | 1.35E-02 | 1.35E-02 |
| Th-230 | 9.26E-06 | 9.26E-06 |
| Ra-226 | 7.58E-08 | 7.58E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.56E-04 | 3.56E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.06E-07 | 3.06E-07 |
| U-238 | 1.47E-02 | 1.47E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.51E-12 | 1.51E-12 |
| Pb-210 | 7.65E-13 | 7.65E-13 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.08E-02 | 7.08E-02 |
| Pa-231 | 4.72E-02 | 4.72E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.41E+00 | 3.41E+00 |
| Ra-226 | 4.16E-01 | 4.16E-01 |
| Pb-210 | 5.03E-01 | 5.03E-01 |
| Th-228 | 6.24E-03 | 6.24E-03 |
| Th-230 | 4.64E+00 | 4.64E+00 |
| Ra-226 | 5.54E-02 | 5.54E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.65E-02 | 1.65E-02 |
| Ra-228 | 6.40E-02 | 6.40E-02 |
| Th-228 | 2.01E-01 | 2.01E-01 |
| U-234 | 1.35E-02 | 1.35E-02 |
| Th-230 | 9.26E-06 | 9.26E-06 |
| Ra-226 | 7.58E-08 | 7.58E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.56E-04 | 3.56E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.06E-07 | 3.06E-07 |
| U-238 | 1.47E-02 | 1.47E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.51E-12 | 1.51E-12 |
| Pb-210 | 7.65E-13 | 7.65E-13 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.08E-02 | 7.08E-02 |
| Pa-231 | 4.72E-02 | 4.72E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.41E+00 | 3.41E+00 |
| Ra-226 | 4.16E-01 | 4.16E-01 |
| Pb-210 | 5.03E-01 | 5.03E-01 |
| Th-228 | 6.24E-03 | 6.24E-03 |
| Th-230 | 4.64E+00 | 4.64E+00 |
| Ra-226 | 5.54E-02 | 5.54E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.65E-02 | 1.65E-02 |
| Ra-228 | 6.40E-02 | 6.40E-02 |
| Th-228 | 2.01E-01 | 2.01E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 1.35E-02 | 1.35E-02 |
| Th-230 | 9.26E-06 | 9.26E-06 |
| Ra-226 | 7.58E-08 | 7.58E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.56E-04 | 3.56E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.06E-07 | 3.06E-07 |
| U-238 | 1.47E-02 | 1.47E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.51E-12 | 1.51E-12 |
| Pb-210 | 7.65E-13 | 7.65E-13 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  1.00000000  years

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 4.06E+01 | 9.17E+00 | 9.17E+00 | 9.17E+00 | 9.17E+00 | 7.73E+01 |
| Total | 4.06E+01 | 9.17E+00 | 9.17E+00 | 9.17E+00 | 9.17E+00 | 7.73E+01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.36E+00 | 1.24E+01 | 1.45E-05 | 2.89E-06 | 7.67E-02 | 1.20E+00 | 2.56E+01 | 4.06E+01 |
| Total | 1.36E+00 | 1.24E+01 | 1.45E-05 | 2.89E-06 | 7.67E-02 | 1.20E+00 | 2.56E+01 | 4.06E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |
| Total | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |
| Total | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |
| Total | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |
| Total | 9.41E-02 | 2.87E+00 | 3.35E-06 | 6.68E-07 | 1.77E-02 | 2.77E-01 | 5.90E+00 | 9.17E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.19E-01 | 3.19E-01 |
| Pa-231 | 2.00E-01 | 2.00E-01 |
| Ac-227 | 8.25E-02 | 8.25E-02 |
| Pb-210 | 1.40E+01 | 1.40E+01 |
| Ra-226 | 2.44E+00 | 2.44E+00 |
| Pb-210 | 2.18E+00 | 2.18E+00 |
| Th-228 | 1.92E-02 | 1.92E-02 |
| Th-230 | 1.94E+01 | 1.94E+01 |
| Ra-226 | 3.47E-01 | 3.47E-01 |
| Pb-210 | 2.02E-01 | 2.02E-01 |
| Th-232 | 6.89E-02 | 6.89E-02 |
| Ra-228 | 2.94E-01 | 2.94E-01 |
| Th-228 | 9.37E-01 | 9.37E-01 |
| U-234 | 5.67E-02 | 5.67E-02 |
| Th-230 | 4.01E-05 | 4.01E-05 |
| Ra-226 | 4.93E-07 | 4.93E-07 |
| Pb-210 | 2.10E-07 | 2.10E-07 |
| U-235 | 2.21E-03 | 2.21E-03 |
| Pa-231 | 5.18E-06 | 5.18E-06 |
| Ac-227 | 1.49E-06 | 1.49E-06 |
| U-238 | 8.03E-02 | 8.03E-02 |
| U-234 | 2.27E-06 | 2.27E-06 |
| Th-230 | 1.04E-09 | 1.04E-09 |
| Ra-226 | 1.02E-11 | 1.02E-11 |
| Pb-210 | 3.33E-12 | 3.33E-12 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.71E-02 | 6.71E-02 |
| Pa-231 | 4.55E-02 | 4.55E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.23E+00 | 3.23E+00 |
| Ra-226 | 4.05E-01 | 4.05E-01 |
| Pb-210 | 5.02E-01 | 5.02E-01 |
| Th-228 | 4.33E-03 | 4.33E-03 |
| Th-230 | 4.48E+00 | 4.48E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 5.66E-02 | 5.66E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.59E-02 | 1.59E-02 |
| Ra-228 | 6.39E-02 | 6.39E-02 |
| Th-228 | 2.11E-01 | 2.11E-01 |
| U-234 | 1.30E-02 | 1.30E-02 |
| Th-230 | 9.25E-06 | 9.25E-06 |
| Ra-226 | 7.85E-08 | 7.85E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.45E-04 | 3.45E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.07E-07 | 3.07E-07 |
| U-238 | 1.42E-02 | 1.42E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.59E-12 | 1.59E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.71E-02 | 6.71E-02 |
| Pa-231 | 4.55E-02 | 4.55E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.23E+00 | 3.23E+00 |
| Ra-226 | 4.05E-01 | 4.05E-01 |
| Pb-210 | 5.02E-01 | 5.02E-01 |
| Th-228 | 4.33E-03 | 4.33E-03 |
| Th-230 | 4.48E+00 | 4.48E+00 |
| Ra-226 | 5.66E-02 | 5.66E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.59E-02 | 1.59E-02 |
| Ra-228 | 6.39E-02 | 6.39E-02 |
| Th-228 | 2.11E-01 | 2.11E-01 |
| U-234 | 1.30E-02 | 1.30E-02 |
| Th-230 | 9.25E-06 | 9.25E-06 |
| Ra-226 | 7.85E-08 | 7.85E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.45E-04 | 3.45E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.07E-07 | 3.07E-07 |
| U-238 | 1.42E-02 | 1.42E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.59E-12 | 1.59E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.71E-02 | 6.71E-02 |
| Pa-231 | 4.55E-02 | 4.55E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.23E+00 | 3.23E+00 |
| Ra-226 | 4.05E-01 | 4.05E-01 |
| Pb-210 | 5.02E-01 | 5.02E-01 |
| Th-228 | 4.33E-03 | 4.33E-03 |
| Th-230 | 4.48E+00 | 4.48E+00 |
| Ra-226 | 5.66E-02 | 5.66E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.59E-02 | 1.59E-02 |
| Ra-228 | 6.39E-02 | 6.39E-02 |
| Th-228 | 2.11E-01 | 2.11E-01 |
| U-234 | 1.30E-02 | 1.30E-02 |
| Th-230 | 9.25E-06 | 9.25E-06 |
| Ra-226 | 7.85E-08 | 7.85E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.45E-04 | 3.45E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.07E-07 | 3.07E-07 |
| U-238 | 1.42E-02 | 1.42E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.59E-12 | 1.59E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.71E-02 | 6.71E-02 |
| Pa-231 | 4.55E-02 | 4.55E-02 |
| Ac-227 | 1.72E-02 | 1.72E-02 |
| Pb-210 | 3.23E+00 | 3.23E+00 |
| Ra-226 | 4.05E-01 | 4.05E-01 |
| Pb-210 | 5.02E-01 | 5.02E-01 |
| Th-228 | 4.33E-03 | 4.33E-03 |
| Th-230 | 4.48E+00 | 4.48E+00 |
| Ra-226 | 5.66E-02 | 5.66E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.59E-02 | 1.59E-02 |
| Ra-228 | 6.39E-02 | 6.39E-02 |
| Th-228 | 2.11E-01 | 2.11E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 1.30E-02 | 1.30E-02 |
| Th-230 | 9.25E-06 | 9.25E-06 |
| Ra-226 | 7.85E-08 | 7.85E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.45E-04 | 3.45E-04 |
| Pa-231 | 1.18E-06 | 1.18E-06 |
| Ac-227 | 3.07E-07 | 3.07E-07 |
| U-238 | 1.42E-02 | 1.42E-02 |
| U-234 | 5.22E-07 | 5.22E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.59E-12 | 1.59E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  3.00000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 3.76E+01 | 8.45E+00 | 8.45E+00 | 8.45E+00 | 8.45E+00 | 7.14E+01 |
| Total | 3.76E+01 | 8.45E+00 | 8.45E+00 | 8.45E+00 | 8.45E+00 | 7.14E+01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.37E+00 | 1.15E+01 | 1.35E-05 | 2.70E-06 | 7.01E-02 | 1.27E+00 | 2.34E+01 | 3.76E+01 |
| Total | 1.37E+00 | 1.15E+01 | 1.35E-05 | 2.70E-06 | 7.01E-02 | 1.27E+00 | 2.34E+01 | 3.76E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |
| Total | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |
| Total | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |
| Total | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |
| Total | 9.49E-02 | 2.66E+00 | 3.12E-06 | 6.23E-07 | 1.62E-02 | 2.93E-01 | 5.39E+00 | 8.45E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 2.86E-01 | 2.86E-01 |
| Pa-231 | 1.85E-01 | 1.85E-01 |
| Ac-227 | 8.26E-02 | 8.26E-02 |
| Pb-210 | 1.25E+01 | 1.25E+01 |
| Ra-226 | 2.34E+00 | 2.34E+00 |
| Pb-210 | 2.15E+00 | 2.15E+00 |
| Th-228 | 9.25E-03 | 9.25E-03 |
| Th-230 | 1.79E+01 | 1.79E+01 |
| Ra-226 | 3.68E-01 | 3.68E-01 |
| Pb-210 | 2.02E-01 | 2.02E-01 |
| Th-232 | 6.37E-02 | 6.37E-02 |
| Ra-228 | 2.90E-01 | 2.90E-01 |
| Th-228 | 1.01E+00 | 1.01E+00 |
| U-234 | 5.24E-02 | 5.24E-02 |
| Th-230 | 3.97E-05 | 3.97E-05 |
| Ra-226 | 5.49E-07 | 5.49E-07 |
| Pb-210 | 2.10E-07 | 2.10E-07 |
| U-235 | 2.10E-03 | 2.10E-03 |
| Pa-231 | 5.14E-06 | 5.14E-06 |
| Ac-227 | 1.53E-06 | 1.53E-06 |
| U-238 | 7.61E-02 | 7.61E-02 |
| U-234 | 2.25E-06 | 2.25E-06 |
| Th-230 | 1.03E-09 | 1.03E-09 |
| Ra-226 | 1.19E-11 | 1.19E-11 |
| Pb-210 | 3.34E-12 | 3.34E-12 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.99E-02 | 5.99E-02 |
| Pa-231 | 4.21E-02 | 4.21E-02 |
| Ac-227 | 1.70E-02 | 1.70E-02 |
| Pb-210 | 2.88E+00 | 2.88E+00 |
| Ra-226 | 3.83E-01 | 3.83E-01 |
| Pb-210 | 4.96E-01 | 4.96E-01 |
| Th-228 | 2.08E-03 | 2.08E-03 |
| Th-230 | 4.14E+00 | 4.14E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 5.86E-02 | 5.86E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 6.27E-02 | 6.27E-02 |
| Th-228 | 2.28E-01 | 2.28E-01 |
| U-234 | 1.20E-02 | 1.20E-02 |
| Th-230 | 9.15E-06 | 9.15E-06 |
| Ra-226 | 8.44E-08 | 8.44E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.23E-04 | 3.23E-04 |
| Pa-231 | 1.17E-06 | 1.17E-06 |
| Ac-227 | 3.10E-07 | 3.10E-07 |
| U-238 | 1.33E-02 | 1.33E-02 |
| U-234 | 5.16E-07 | 5.16E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.77E-12 | 1.77E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.99E-02 | 5.99E-02 |
| Pa-231 | 4.21E-02 | 4.21E-02 |
| Ac-227 | 1.70E-02 | 1.70E-02 |
| Pb-210 | 2.88E+00 | 2.88E+00 |
| Ra-226 | 3.83E-01 | 3.83E-01 |
| Pb-210 | 4.96E-01 | 4.96E-01 |
| Th-228 | 2.08E-03 | 2.08E-03 |
| Th-230 | 4.14E+00 | 4.14E+00 |
| Ra-226 | 5.86E-02 | 5.86E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 6.27E-02 | 6.27E-02 |
| Th-228 | 2.28E-01 | 2.28E-01 |
| U-234 | 1.20E-02 | 1.20E-02 |
| Th-230 | 9.15E-06 | 9.15E-06 |
| Ra-226 | 8.44E-08 | 8.44E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.23E-04 | 3.23E-04 |
| Pa-231 | 1.17E-06 | 1.17E-06 |
| Ac-227 | 3.10E-07 | 3.10E-07 |
| U-238 | 1.33E-02 | 1.33E-02 |
| U-234 | 5.16E-07 | 5.16E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.77E-12 | 1.77E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.99E-02 | 5.99E-02 |
| Pa-231 | 4.21E-02 | 4.21E-02 |
| Ac-227 | 1.70E-02 | 1.70E-02 |
| Pb-210 | 2.88E+00 | 2.88E+00 |
| Ra-226 | 3.83E-01 | 3.83E-01 |
| Pb-210 | 4.96E-01 | 4.96E-01 |
| Th-228 | 2.08E-03 | 2.08E-03 |
| Th-230 | 4.14E+00 | 4.14E+00 |
| Ra-226 | 5.86E-02 | 5.86E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 6.27E-02 | 6.27E-02 |
| Th-228 | 2.28E-01 | 2.28E-01 |
| U-234 | 1.20E-02 | 1.20E-02 |
| Th-230 | 9.15E-06 | 9.15E-06 |
| Ra-226 | 8.44E-08 | 8.44E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.23E-04 | 3.23E-04 |
| Pa-231 | 1.17E-06 | 1.17E-06 |
| Ac-227 | 3.10E-07 | 3.10E-07 |
| U-238 | 1.33E-02 | 1.33E-02 |
| U-234 | 5.16E-07 | 5.16E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.77E-12 | 1.77E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 5.99E-02 | 5.99E-02 |
| Pa-231 | 4.21E-02 | 4.21E-02 |
| Ac-227 | 1.70E-02 | 1.70E-02 |
| Pb-210 | 2.88E+00 | 2.88E+00 |
| Ra-226 | 3.83E-01 | 3.83E-01 |
| Pb-210 | 4.96E-01 | 4.96E-01 |
| Th-228 | 2.08E-03 | 2.08E-03 |
| Th-230 | 4.14E+00 | 4.14E+00 |
| Ra-226 | 5.86E-02 | 5.86E-02 |
| Pb-210 | 4.65E-02 | 4.65E-02 |
| Th-232 | 1.47E-02 | 1.47E-02 |
| Ra-228 | 6.27E-02 | 6.27E-02 |
| Th-228 | 2.28E-01 | 2.28E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 1.20E-02 | 1.20E-02 |
| Th-230 | 9.15E-06 | 9.15E-06 |
| Ra-226 | 8.44E-08 | 8.44E-08 |
| Pb-210 | 4.82E-08 | 4.82E-08 |
| U-235 | 3.23E-04 | 3.23E-04 |
| Pa-231 | 1.17E-06 | 1.17E-06 |
| Ac-227 | 3.10E-07 | 3.10E-07 |
| U-238 | 1.33E-02 | 1.33E-02 |
| U-234 | 5.16E-07 | 5.16E-07 |
| Th-230 | 2.39E-10 | 2.39E-10 |
| Ra-226 | 1.77E-12 | 1.77E-12 |
| Pb-210 | 7.66E-13 | 7.66E-13 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  10.0000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 2.71E+01 | 6.04E+00 | 6.04E+00 | 6.04E+00 | 6.04E+00 | 5.13E+01 |
| Total | 2.71E+01 | 6.04E+00 | 6.04E+00 | 6.04E+00 | 6.04E+00 | 5.13E+01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.41E+00 | 8.19E+00 | 9.89E-06 | 1.99E-06 | 4.82E-02 | 1.44E+00 | 1.60E+01 | 2.71E+01 |
| Total | 1.41E+00 | 8.19E+00 | 9.89E-06 | 1.99E-06 | 4.82E-02 | 1.44E+00 | 1.60E+01 | 2.71E+01 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |
| Total | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |
| Total | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |
| Total | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |
| Total | 9.76E-02 | 1.89E+00 | 2.28E-06 | 4.59E-07 | 1.11E-02 | 3.34E-01 | 3.70E+00 | 6.04E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

## Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.86E-01 | 1.86E-01 |
| Pa-231 | 1.33E-01 | 1.33E-01 |
| Ac-227 | 7.57E-02 | 7.57E-02 |
| Pb-210 | 7.90E+00 | 7.90E+00 |
| Ra-226 | 2.00E+00 | 2.00E+00 |
| Pb-210 | 1.85E+00 | 1.85E+00 |
| Th-228 | 7.13E-04 | 7.13E-04 |
| Th-230 | 1.28E+01 | 1.28E+01 |
| Ra-226 | 4.28E-01 | 4.28E-01 |
| Pb-210 | 1.92E-01 | 1.92E-01 |
| Th-232 | 4.55E-02 | 4.55E-02 |
| Ra-228 | 2.42E-01 | 2.42E-01 |
| Th-228 | 1.19E+00 | 1.19E+00 |
| U-234 | 3.75E-02 | 3.75E-02 |
| Th-230 | 3.48E-05 | 3.48E-05 |
| Ra-226 | 7.89E-07 | 7.89E-07 |
| Pb-210 | 2.07E-07 | 2.07E-07 |
| U-235 | 1.75E-03 | 1.75E-03 |
| Pa-231 | 4.57E-06 | 4.57E-06 |
| Ac-227 | 1.64E-06 | 1.64E-06 |
| U-238 | 6.13E-02 | 6.13E-02 |
| U-234 | 1.99E-06 | 1.99E-06 |
| Th-230 | 9.87E-10 | 9.87E-10 |
| Ra-226 | 2.08E-11 | 2.08E-11 |
| Pb-210 | 3.35E-12 | 3.35E-12 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.81E-02 | 3.81E-02 |
| Pa-231 | 3.01E-02 | 3.01E-02 |
| Ac-227 | 1.49E-02 | 1.49E-02 |
| Pb-210 | 1.82E+00 | 1.82E+00 |
| Ra-226 | 3.08E-01 | 3.08E-01 |
| Pb-210 | 4.24E-01 | 4.24E-01 |
| Th-228 | 1.60E-04 | 1.60E-04 |
| Th-230 | 2.95E+00 | 2.95E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| Ra-226 | 6.24E-02 | 6.24E-02 |
| Pb-210 | 4.40E-02 | 4.40E-02 |
| Th-232 | 1.05E-02 | 1.05E-02 |
| Ra-228 | 5.09E-02 | 5.09E-02 |
| Th-228 | 2.67E-01 | 2.67E-01 |
| U-234 | 8.58E-03 | 8.58E-03 |
| Th-230 | 8.03E-06 | 8.03E-06 |
| Ra-226 | 1.09E-07 | 1.09E-07 |
| Pb-210 | 4.74E-08 | 4.74E-08 |
| U-235 | 2.44E-04 | 2.44E-04 |
| Pa-231 | 1.02E-06 | 1.02E-06 |
| Ac-227 | 3.05E-07 | 3.05E-07 |
| U-238 | 9.93E-03 | 9.93E-03 |
| U-234 | 4.53E-07 | 4.53E-07 |
| Th-230 | 2.27E-10 | 2.27E-10 |
| Ra-226 | 2.70E-12 | 2.70E-12 |
| Pb-210 | 7.63E-13 | 7.63E-13 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.81E-02 | 3.81E-02 |
| Pa-231 | 3.01E-02 | 3.01E-02 |
| Ac-227 | 1.49E-02 | 1.49E-02 |
| Pb-210 | 1.82E+00 | 1.82E+00 |
| Ra-226 | 3.08E-01 | 3.08E-01 |
| Pb-210 | 4.24E-01 | 4.24E-01 |
| Th-228 | 1.60E-04 | 1.60E-04 |
| Th-230 | 2.95E+00 | 2.95E+00 |
| Ra-226 | 6.24E-02 | 6.24E-02 |
| Pb-210 | 4.40E-02 | 4.40E-02 |
| Th-232 | 1.05E-02 | 1.05E-02 |
| Ra-228 | 5.09E-02 | 5.09E-02 |
| Th-228 | 2.67E-01 | 2.67E-01 |
| U-234 | 8.58E-03 | 8.58E-03 |
| Th-230 | 8.03E-06 | 8.03E-06 |
| Ra-226 | 1.09E-07 | 1.09E-07 |
| Pb-210 | 4.74E-08 | 4.74E-08 |
| U-235 | 2.44E-04 | 2.44E-04 |
| Pa-231 | 1.02E-06 | 1.02E-06 |
| Ac-227 | 3.05E-07 | 3.05E-07 |
| U-238 | 9.93E-03 | 9.93E-03 |
| U-234 | 4.53E-07 | 4.53E-07 |
| Th-230 | 2.27E-10 | 2.27E-10 |
| Ra-226 | 2.70E-12 | 2.70E-12 |
| Pb-210 | 7.63E-13 | 7.63E-13 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.81E-02 | 3.81E-02 |
| Pa-231 | 3.01E-02 | 3.01E-02 |
| Ac-227 | 1.49E-02 | 1.49E-02 |
| Pb-210 | 1.82E+00 | 1.82E+00 |
| Ra-226 | 3.08E-01 | 3.08E-01 |
| Pb-210 | 4.24E-01 | 4.24E-01 |
| Th-228 | 1.60E-04 | 1.60E-04 |
| Th-230 | 2.95E+00 | 2.95E+00 |
| Ra-226 | 6.24E-02 | 6.24E-02 |
| Pb-210 | 4.40E-02 | 4.40E-02 |
| Th-232 | 1.05E-02 | 1.05E-02 |
| Ra-228 | 5.09E-02 | 5.09E-02 |
| Th-228 | 2.67E-01 | 2.67E-01 |
| U-234 | 8.58E-03 | 8.58E-03 |
| Th-230 | 8.03E-06 | 8.03E-06 |
| Ra-226 | 1.09E-07 | 1.09E-07 |
| Pb-210 | 4.74E-08 | 4.74E-08 |
| U-235 | 2.44E-04 | 2.44E-04 |
| Pa-231 | 1.02E-06 | 1.02E-06 |
| Ac-227 | 3.05E-07 | 3.05E-07 |
| U-238 | 9.93E-03 | 9.93E-03 |
| U-234 | 4.53E-07 | 4.53E-07 |
| Th-230 | 2.27E-10 | 2.27E-10 |
| Ra-226 | 2.70E-12 | 2.70E-12 |
| Pb-210 | 7.63E-13 | 7.63E-13 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 3.81E-02 | 3.81E-02 |
| Pa-231 | 3.01E-02 | 3.01E-02 |
| Ac-227 | 1.49E-02 | 1.49E-02 |
| Pb-210 | 1.82E+00 | 1.82E+00 |
| Ra-226 | 3.08E-01 | 3.08E-01 |
| Pb-210 | 4.24E-01 | 4.24E-01 |
| Th-228 | 1.60E-04 | 1.60E-04 |
| Th-230 | 2.95E+00 | 2.95E+00 |
| Ra-226 | 6.24E-02 | 6.24E-02 |
| Pb-210 | 4.40E-02 | 4.40E-02 |
| Th-232 | 1.05E-02 | 1.05E-02 |
| Ra-228 | 5.09E-02 | 5.09E-02 |
| Th-228 | 2.67E-01 | 2.67E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| U-234 | 8.58E-03 | 8.58E-03 |
| Th-230 | 8.03E-06 | 8.03E-06 |
| Ra-226 | 1.09E-07 | 1.09E-07 |
| Pb-210 | 4.74E-08 | 4.74E-08 |
| U-235 | 2.44E-04 | 2.44E-04 |
| Pa-231 | 1.02E-06 | 1.02E-06 |
| Ac-227 | 3.05E-07 | 3.05E-07 |
| U-238 | 9.93E-03 | 9.93E-03 |
| U-234 | 4.53E-07 | 4.53E-07 |
| Th-230 | 2.27E-10 | 2.27E-10 |
| Ra-226 | 2.70E-12 | 2.70E-12 |
| Pb-210 | 7.63E-13 | 7.63E-13 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  30.0000000  years

## RESRAD-BUILD Dose Tables

### Source Contributions to Receptor Doses

[mrem]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 3.15E+00 | 4.77E-01 | 4.77E-01 | 4.77E-01 | 4.77E-01 | 5.05E+00 |
| Total | 3.15E+00 | 4.77E-01 | 4.77E-01 | 4.77E-01 | 4.77E-01 | 5.05E+00 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

## Pathway Detail of Doses

[mrem]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.55E+00 | 5.91E-13 | 1.85E-18 | 1.55E-19 | 7.71E-15 | 1.60E+00 | 0.00E+00 | 3.15E+00 |
| Total | 1.55E+00 | 5.91E-13 | 1.85E-18 | 1.55E-19 | 7.71E-15 | 1.60E+00 | 0.00E+00 | 3.15E+00 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |
| Total | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |
| Total | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |
| Total | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |
| Total | 1.07E-01 | 1.36E-13 | 4.27E-19 | 3.59E-20 | 1.78E-15 | 3.70E-01 | 0.00E+00 | 4.77E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

Nuclide Detail of Doses

[mrem]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.48E-02 | 1.48E-02 |
| Pa-231 | 3.31E-03 | 3.31E-03 |
| Ac-227 | 2.17E-02 | 2.17E-02 |
| Pb-210 | 1.99E-02 | 1.99E-02 |
| Ra-226 | 1.19E+00 | 1.19E+00 |
| Pb-210 | 1.75E-02 | 1.75E-02 |
| Th-228 | 4.55E-07 | 4.55E-07 |
| Th-230 | 2.24E-02 | 2.24E-02 |
| Ra-226 | 5.13E-01 | 5.13E-01 |
| Pb-210 | 4.73E-03 | 4.73E-03 |
| Th-232 | 5.35E-05 | 5.35E-05 |
| Ra-228 | 3.18E-02 | 3.18E-02 |
| Th-228 | 1.28E+00 | 1.28E+00 |
| U-234 | 3.70E-04 | 3.70E-04 |
| Th-230 | 1.47E-07 | 1.47E-07 |
| Ra-226 | 1.75E-06 | 1.75E-06 |
| Pb-210 | 1.22E-08 | 1.22E-08 |
| U-235 | 9.01E-04 | 9.01E-04 |
| Pa-231 | 2.72E-07 | 2.72E-07 |
| Ac-227 | 1.12E-06 | 1.12E-06 |
| U-238 | 2.54E-02 | 2.54E-02 |
| U-234 | 4.70E-08 | 4.70E-08 |
| Th-230 | 9.67E-12 | 9.67E-12 |
| Ra-226 | 7.94E-11 | 7.94E-11 |
| Pb-210 | 4.53E-13 | 4.53E-13 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.55E-04 | 9.55E-04 |
| Pa-231 | 1.27E-04 | 1.27E-04 |
| Ac-227 | 1.40E-03 | 1.40E-03 |
| Pb-210 | 1.26E-03 | 1.26E-03 |
| Ra-226 | 1.26E-01 | 1.26E-01 |
| Pb-210 | 1.11E-03 | 1.11E-03 |
| Th-228 | 1.02E-07 | 1.02E-07 |
| Th-230 | 4.47E-04 | 4.47E-04 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

| | | |
|---|---|---|
| Ra-226 | 5.43E-02 | 5.43E-02 |
| Pb-210 | 2.98E-04 | 2.98E-04 |
| Th-232 | 1.18E-06 | 1.18E-06 |
| Ra-228 | 2.21E-03 | 2.21E-03 |
| Th-228 | 2.87E-01 | 2.87E-01 |
| U-234 | 7.14E-06 | 7.14E-06 |
| Th-230 | 2.93E-09 | 2.93E-09 |
| Ra-226 | 1.85E-07 | 1.85E-07 |
| Pb-210 | 7.69E-10 | 7.69E-10 |
| U-235 | 5.14E-05 | 5.14E-05 |
| Pa-231 | 1.04E-08 | 1.04E-08 |
| Ac-227 | 7.25E-08 | 7.25E-08 |
| U-238 | 1.72E-03 | 1.72E-03 |
| U-234 | 9.07E-10 | 9.07E-10 |
| Th-230 | 1.93E-13 | 1.93E-13 |
| Ra-226 | 8.39E-12 | 8.39E-12 |
| Pb-210 | 2.86E-14 | 2.86E-14 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.55E-04 | 9.55E-04 |
| Pa-231 | 1.27E-04 | 1.27E-04 |
| Ac-227 | 1.40E-03 | 1.40E-03 |
| Pb-210 | 1.26E-03 | 1.26E-03 |
| Ra-226 | 1.26E-01 | 1.26E-01 |
| Pb-210 | 1.11E-03 | 1.11E-03 |
| Th-228 | 1.02E-07 | 1.02E-07 |
| Th-230 | 4.47E-04 | 4.47E-04 |
| Ra-226 | 5.43E-02 | 5.43E-02 |
| Pb-210 | 2.98E-04 | 2.98E-04 |
| Th-232 | 1.18E-06 | 1.18E-06 |
| Ra-228 | 2.21E-03 | 2.21E-03 |
| Th-228 | 2.87E-01 | 2.87E-01 |
| U-234 | 7.14E-06 | 7.14E-06 |
| Th-230 | 2.93E-09 | 2.93E-09 |
| Ra-226 | 1.85E-07 | 1.85E-07 |
| Pb-210 | 7.69E-10 | 7.69E-10 |
| U-235 | 5.14E-05 | 5.14E-05 |
| Pa-231 | 1.04E-08 | 1.04E-08 |
| Ac-227 | 7.25E-08 | 7.25E-08 |
| U-238 | 1.72E-03 | 1.72E-03 |
| U-234 | 9.07E-10 | 9.07E-10 |
| Th-230 | 1.93E-13 | 1.93E-13 |
| Ra-226 | 8.39E-12 | 8.39E-12 |
| Pb-210 | 2.86E-14 | 2.86E-14 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.55E-04 | 9.55E-04 |
| Pa-231 | 1.27E-04 | 1.27E-04 |
| Ac-227 | 1.40E-03 | 1.40E-03 |
| Pb-210 | 1.26E-03 | 1.26E-03 |
| Ra-226 | 1.26E-01 | 1.26E-01 |
| Pb-210 | 1.11E-03 | 1.11E-03 |
| Th-228 | 1.02E-07 | 1.02E-07 |
| Th-230 | 4.47E-04 | 4.47E-04 |
| Ra-226 | 5.43E-02 | 5.43E-02 |
| Pb-210 | 2.98E-04 | 2.98E-04 |
| Th-232 | 1.18E-06 | 1.18E-06 |
| Ra-228 | 2.21E-03 | 2.21E-03 |
| Th-228 | 2.87E-01 | 2.87E-01 |
| U-234 | 7.14E-06 | 7.14E-06 |
| Th-230 | 2.93E-09 | 2.93E-09 |
| Ra-226 | 1.85E-07 | 1.85E-07 |
| Pb-210 | 7.69E-10 | 7.69E-10 |
| U-235 | 5.14E-05 | 5.14E-05 |
| Pa-231 | 1.04E-08 | 1.04E-08 |
| Ac-227 | 7.25E-08 | 7.25E-08 |
| U-238 | 1.72E-03 | 1.72E-03 |
| U-234 | 9.07E-10 | 9.07E-10 |
| Th-230 | 1.93E-13 | 1.93E-13 |
| Ra-226 | 8.39E-12 | 8.39E-12 |
| Pb-210 | 2.86E-14 | 2.86E-14 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.55E-04 | 9.55E-04 |
| Pa-231 | 1.27E-04 | 1.27E-04 |
| Ac-227 | 1.40E-03 | 1.40E-03 |
| Pb-210 | 1.26E-03 | 1.26E-03 |
| Ra-226 | 1.26E-01 | 1.26E-01 |
| Pb-210 | 1.11E-03 | 1.11E-03 |
| Th-228 | 1.02E-07 | 1.02E-07 |
| Th-230 | 4.47E-04 | 4.47E-04 |
| Ra-226 | 5.43E-02 | 5.43E-02 |
| Pb-210 | 2.98E-04 | 2.98E-04 |
| Th-232 | 1.18E-06 | 1.18E-06 |
| Ra-228 | 2.21E-03 | 2.21E-03 |
| Th-228 | 2.87E-01 | 2.87E-01 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

| | | |
|---|---|---|
| U-234 | 7.14E-06 | 7.14E-06 |
| Th-230 | 2.93E-09 | 2.93E-09 |
| Ra-226 | 1.85E-07 | 1.85E-07 |
| Pb-210 | 7.69E-10 | 7.69E-10 |
| U-235 | 5.14E-05 | 5.14E-05 |
| Pa-231 | 1.04E-08 | 1.04E-08 |
| Ac-227 | 7.25E-08 | 7.25E-08 |
| U-238 | 1.72E-03 | 1.72E-03 |
| U-234 | 9.07E-10 | 9.07E-10 |
| Th-230 | 1.93E-13 | 1.93E-13 |
| Ra-226 | 8.39E-12 | 8.39E-12 |
| Pb-210 | 2.86E-14 | 2.86E-14 |

RESRAD-BUILD Output Suburban Resident Risk

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

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Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## RESRAD-BUILD Input Parameters

Number of Sources : 5
Number of Receptors: 1
Total Time : 1.095000E+04 days
Fraction Inside : 6.390000E-01

Transformations data from: ICRP107
Cut off half life : 180.000000 days

Library information in the Dose Coefficients and Slope Factors report

### Receptor Information

| Receptor | Room | x [m] | y [m] | z [m] | FracTime | Inhalation [m3/day] | Ingestion(Dust) [m2/hr] |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.330 | 4.330 | 1.000 | 1.000 | 1.48E+01 | 6.90E-04 |

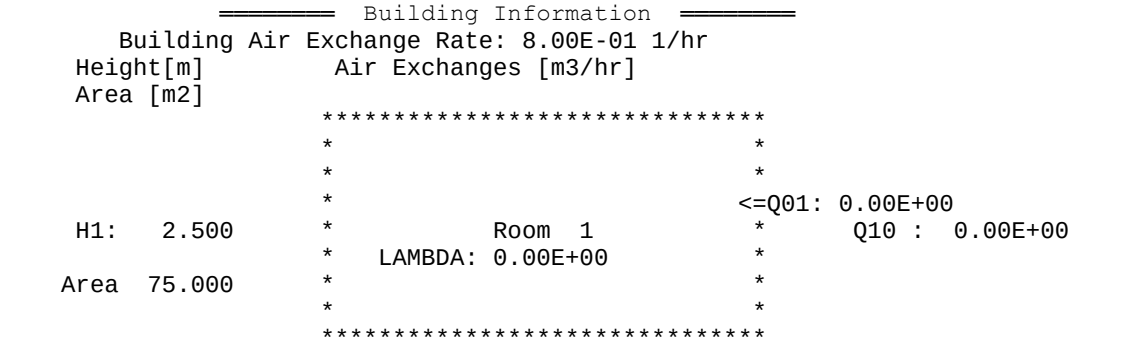
### Receptor-Source Shielding Relationship

| Receptor | Source | Density [g/cm3] | Thickness [cm] | Material |
|---|---|---|---|---|
| 1 | 1 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 2 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 3 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 4 | 2.40E+00 | 0.00E+00 | Concrete |
| 1 | 5 | 2.40E+00 | 0.00E+00 | Concrete |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## Building Information

Building Air Exchange Rate: 8.00E-01 1/hr




Deposition velocity: 3.90E-04 [m/s]  Resuspension Rate: 0.00E+00 [1/s]
Deposition velocity: 5.00E-07 [m/s]  Resuspension Rate:

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld

## Source Information

 Source:  1
        Location::  Room :  1  x:   4.33 y:   4.33  z:   0.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:8.66E+00  Direction: z
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::

| Nuclide | Concentration |
|---|---|
| | [pCi/m2] |
| Ac-227 | 1.920E+02 |
| Pa-231 | 9.300E+01 |
| Pb-210 | 3.200E+03 |
| Ra-226 | 9.730E+02 |
| Th-228 | 1.300E+01 |
| Th-230 | 2.130E+04 |
| Th-232 | 6.400E+01 |
| U-234 | 3.370E+02 |
| U-235 | 8.000E+00 |
| U-238 | 3.370E+02 |

 Source:  2
        Location::  Room :  1  x:   0.00 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

   Contamination::

| Nuclide | Concentration |
|---|---|
| | [pCi/m2] |
| Ac-227 | 1.920E+02 |
| Pa-231 | 9.300E+01 |
| Pb-210 | 3.200E+03 |
| Ra-226 | 9.730E+02 |
| Th-228 | 1.300E+01 |
| Th-230 | 2.130E+04 |
| Th-232 | 6.400E+01 |
| U-234 | 3.370E+02 |
| U-235 | 8.000E+00 |
| U-238 | 3.370E+02 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Source:  3
        Location::  Room :  1  x:   4.33 y:   8.66  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02
 Source:  4
        Location::  Room :  1  x:   8.66 y:   4.33  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: x
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    ─────── ─────────────
               [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Source:  5
        Location::  Room :  1  x:   4.33 y:   0.00  z:   1.00[m]
        Geometry::  Type: Area        Length[m]:8.66E+00  Width[m]:2.00E+00  Direction: y
        Pathway ::
             Direct Ingestion Rate:    3.500E-08 [1/hr]
             Fraction released to air: 7.000E-02
             Removable fraction:       1.000E-01
             Time to Remove:           1.000E+04 [day]

             Radon Release Fraction:   1.000E-01

    Contamination::
    Nuclide Concentration
    _______ _____________

              [pCi/m2]
     Ac-227     1.920E+02
     Pa-231     9.300E+01
     Pb-210     3.200E+03
     Ra-226     9.730E+02
     Th-228     1.300E+01
     Th-230     2.130E+04
     Th-232     6.400E+01
     U-234      3.370E+02
     U-235      8.000E+00
     U-238      3.370E+02

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Temporal Summary

RESRAD-BUILD Temporal Risk Tables

Risk to Receptor over the Exposure Duration

| Evaluation Time years | Receptor 1 (Risk) | Total (Risk) |
|---|---|---|
| 0.000000000 | 1.40E-05 | 1.40E-05 |
| 1.000000000 | 1.36E-05 | 1.36E-05 |
| 3.000000000 | 1.27E-05 | 1.27E-05 |
| 10.00000000 | 9.61E-06 | 9.61E-06 |
| 30.00000000 | 2.82E-06 | 2.82E-06 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time: 0.00000000E+00 years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 7.66E-06 | 1.60E-06 | 1.60E-06 | 1.60E-06 | 1.60E-06 | 1.40E-05 |
| Total | 7.66E-06 | 1.60E-06 | 1.60E-06 | 1.60E-06 | 1.60E-06 | 1.40E-05 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time: 0.00000000E+00 years

## Pathway Detail of Risks

[Risk]

Source: 1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-06 | 1.24E-06 | 1.17E-11 | 2.38E-12 | 1.44E-08 | 5.05E-07 | 4.83E-06 | 7.66E-06 |
| Total | 1.07E-06 | 1.24E-06 | 1.17E-11 | 2.38E-12 | 1.44E-08 | 5.05E-07 | 4.83E-06 | 7.66E-06 |

Source: 2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |
| Total | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |

Source: 3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |
| Total | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |

Source: 4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |
| Total | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |

Source: 5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |
| Total | 7.38E-08 | 2.87E-07 | 2.71E-12 | 5.49E-13 | 3.33E-09 | 1.17E-07 | 1.11E-06 | 1.60E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.03E-07 | 1.03E-07 |
| Pa-231 | 2.10E-08 | 2.10E-08 |
| Ac-227 | 2.55E-08 | 2.55E-08 |
| Pb-210 | 3.11E-06 | 3.11E-06 |
| Ra-226 | 1.28E-06 | 1.28E-06 |
| Pb-210 | 4.60E-07 | 4.60E-07 |
| Th-228 | 8.02E-09 | 8.02E-09 |
| Th-230 | 2.04E-06 | 2.04E-06 |
| Ra-226 | 1.77E-07 | 1.77E-07 |
| Pb-210 | 4.25E-08 | 4.25E-08 |
| Th-232 | 7.30E-09 | 7.30E-09 |
| Ra-228 | 4.83E-08 | 4.83E-08 |
| Th-228 | 2.59E-07 | 2.59E-07 |
| U-234 | 2.62E-08 | 2.62E-08 |
| Th-230 | 4.08E-12 | 4.08E-12 |
| Ra-226 | 2.51E-13 | 2.51E-13 |
| Pb-210 | 4.41E-14 | 4.41E-14 |
| U-235 | 1.33E-09 | 1.33E-09 |
| Pa-231 | 5.29E-13 | 5.29E-13 |
| Ac-227 | 4.66E-13 | 4.66E-13 |
| U-238 | 4.68E-08 | 4.68E-08 |
| U-234 | 1.02E-12 | 1.02E-12 |
| Th-230 | 1.05E-16 | 1.05E-16 |
| Ra-226 | 5.22E-18 | 5.22E-18 |
| Pb-210 | 7.01E-19 | 7.01E-19 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.85E-08 | 1.85E-08 |
| Pa-231 | 4.32E-09 | 4.32E-09 |
| Ac-227 | 4.52E-09 | 4.52E-09 |
| Pb-210 | 7.13E-07 | 7.13E-07 |
| Ra-226 | 1.68E-07 | 1.68E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.72E-09 | 1.72E-09 |
| Th-230 | 4.68E-07 | 4.68E-07 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| Ra-226 | 2.30E-08 | 2.30E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.68E-09 | 1.68E-09 |
| Ra-228 | 8.02E-09 | 8.02E-09 |
| Th-228 | 5.54E-08 | 5.54E-08 |
| U-234 | 5.99E-09 | 5.99E-09 |
| Th-230 | 9.34E-13 | 9.34E-13 |
| Ra-226 | 3.23E-14 | 3.23E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.79E-10 | 1.79E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.11E-14 | 8.11E-14 |
| U-238 | 7.63E-09 | 7.63E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 6.64E-19 | 6.64E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.85E-08 | 1.85E-08 |
| Pa-231 | 4.32E-09 | 4.32E-09 |
| Ac-227 | 4.52E-09 | 4.52E-09 |
| Pb-210 | 7.13E-07 | 7.13E-07 |
| Ra-226 | 1.68E-07 | 1.68E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.72E-09 | 1.72E-09 |
| Th-230 | 4.68E-07 | 4.68E-07 |
| Ra-226 | 2.30E-08 | 2.30E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.68E-09 | 1.68E-09 |
| Ra-228 | 8.02E-09 | 8.02E-09 |
| Th-228 | 5.54E-08 | 5.54E-08 |
| U-234 | 5.99E-09 | 5.99E-09 |
| Th-230 | 9.34E-13 | 9.34E-13 |
| Ra-226 | 3.23E-14 | 3.23E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.79E-10 | 1.79E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.11E-14 | 8.11E-14 |
| U-238 | 7.63E-09 | 7.63E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 6.64E-19 | 6.64E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.85E-08 | 1.85E-08 |
| Pa-231 | 4.32E-09 | 4.32E-09 |
| Ac-227 | 4.52E-09 | 4.52E-09 |
| Pb-210 | 7.13E-07 | 7.13E-07 |
| Ra-226 | 1.68E-07 | 1.68E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.72E-09 | 1.72E-09 |
| Th-230 | 4.68E-07 | 4.68E-07 |
| Ra-226 | 2.30E-08 | 2.30E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.68E-09 | 1.68E-09 |
| Ra-228 | 8.02E-09 | 8.02E-09 |
| Th-228 | 5.54E-08 | 5.54E-08 |
| U-234 | 5.99E-09 | 5.99E-09 |
| Th-230 | 9.34E-13 | 9.34E-13 |
| Ra-226 | 3.23E-14 | 3.23E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.79E-10 | 1.79E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.11E-14 | 8.11E-14 |
| U-238 | 7.63E-09 | 7.63E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 6.64E-19 | 6.64E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.85E-08 | 1.85E-08 |
| Pa-231 | 4.32E-09 | 4.32E-09 |
| Ac-227 | 4.52E-09 | 4.52E-09 |
| Pb-210 | 7.13E-07 | 7.13E-07 |
| Ra-226 | 1.68E-07 | 1.68E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.72E-09 | 1.72E-09 |
| Th-230 | 4.68E-07 | 4.68E-07 |
| Ra-226 | 2.30E-08 | 2.30E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.68E-09 | 1.68E-09 |
| Ra-228 | 8.02E-09 | 8.02E-09 |
| Th-228 | 5.54E-08 | 5.54E-08 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  0.00000000E+00  years

| | | |
|---|---|---|
| U-234 | 5.99E-09 | 5.99E-09 |
| Th-230 | 9.34E-13 | 9.34E-13 |
| Ra-226 | 3.23E-14 | 3.23E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.79E-10 | 1.79E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.11E-14 | 8.11E-14 |
| U-238 | 7.63E-09 | 7.63E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 6.64E-19 | 6.64E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  1.00000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 7.42E-06 | 1.54E-06 | 1.54E-06 | 1.54E-06 | 1.54E-06 | 1.36E-05 |
| Total | 7.42E-06 | 1.54E-06 | 1.54E-06 | 1.54E-06 | 1.54E-06 | 1.36E-05 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.07E-06 | 1.20E-06 | 1.14E-11 | 2.30E-12 | 1.39E-08 | 5.14E-07 | 4.62E-06 | 7.42E-06 |
| Total | 1.07E-06 | 1.20E-06 | 1.14E-11 | 2.30E-12 | 1.39E-08 | 5.14E-07 | 4.62E-06 | 7.42E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |
| Total | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |
| Total | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |
| Total | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |
| Total | 7.41E-08 | 2.77E-07 | 2.63E-12 | 5.32E-13 | 3.20E-09 | 1.19E-07 | 1.07E-06 | 1.54E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 9.82E-08 | 9.82E-08 |
| Pa-231 | 2.03E-08 | 2.03E-08 |
| Ac-227 | 2.59E-08 | 2.59E-08 |
| Pb-210 | 2.94E-06 | 2.94E-06 |
| Ra-226 | 1.27E-06 | 1.27E-06 |
| Pb-210 | 4.59E-07 | 4.59E-07 |
| Th-228 | 5.57E-09 | 5.57E-09 |
| Th-230 | 1.97E-06 | 1.97E-06 |
| Ra-226 | 1.86E-07 | 1.86E-07 |
| Pb-210 | 4.26E-08 | 4.26E-08 |
| Th-232 | 7.05E-09 | 7.05E-09 |
| Ra-228 | 4.90E-08 | 4.90E-08 |
| Th-228 | 2.70E-07 | 2.70E-07 |
| U-234 | 2.53E-08 | 2.53E-08 |
| Th-230 | 4.07E-12 | 4.07E-12 |
| Ra-226 | 2.72E-13 | 2.72E-13 |
| Pb-210 | 4.42E-14 | 4.42E-14 |
| U-235 | 1.31E-09 | 1.31E-09 |
| Pa-231 | 5.33E-13 | 5.33E-13 |
| Ac-227 | 4.81E-13 | 4.81E-13 |
| U-238 | 4.57E-08 | 4.57E-08 |
| U-234 | 1.01E-12 | 1.01E-12 |
| Th-230 | 1.05E-16 | 1.05E-16 |
| Ra-226 | 5.83E-18 | 5.83E-18 |
| Pb-210 | 7.02E-19 | 7.02E-19 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.76E-08 | 1.76E-08 |
| Pa-231 | 4.17E-09 | 4.17E-09 |
| Ac-227 | 4.54E-09 | 4.54E-09 |
| Pb-210 | 6.75E-07 | 6.75E-07 |
| Ra-226 | 1.66E-07 | 1.66E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.19E-09 | 1.19E-09 |
| Th-230 | 4.51E-07 | 4.51E-07 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| Ra-226 | 2.40E-08 | 2.40E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.62E-09 | 1.62E-09 |
| Ra-228 | 8.05E-09 | 8.05E-09 |
| Th-228 | 5.79E-08 | 5.79E-08 |
| U-234 | 5.78E-09 | 5.78E-09 |
| Th-230 | 9.32E-13 | 9.32E-13 |
| Ra-226 | 3.46E-14 | 3.46E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.74E-10 | 1.74E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.21E-14 | 8.21E-14 |
| U-238 | 7.40E-09 | 7.40E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 7.31E-19 | 7.31E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.76E-08 | 1.76E-08 |
| Pa-231 | 4.17E-09 | 4.17E-09 |
| Ac-227 | 4.54E-09 | 4.54E-09 |
| Pb-210 | 6.75E-07 | 6.75E-07 |
| Ra-226 | 1.66E-07 | 1.66E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.19E-09 | 1.19E-09 |
| Th-230 | 4.51E-07 | 4.51E-07 |
| Ra-226 | 2.40E-08 | 2.40E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.62E-09 | 1.62E-09 |
| Ra-228 | 8.05E-09 | 8.05E-09 |
| Th-228 | 5.79E-08 | 5.79E-08 |
| U-234 | 5.78E-09 | 5.78E-09 |
| Th-230 | 9.32E-13 | 9.32E-13 |
| Ra-226 | 3.46E-14 | 3.46E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.74E-10 | 1.74E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.21E-14 | 8.21E-14 |
| U-238 | 7.40E-09 | 7.40E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 7.31E-19 | 7.31E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.76E-08 | 1.76E-08 |
| Pa-231 | 4.17E-09 | 4.17E-09 |
| Ac-227 | 4.54E-09 | 4.54E-09 |
| Pb-210 | 6.75E-07 | 6.75E-07 |
| Ra-226 | 1.66E-07 | 1.66E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.19E-09 | 1.19E-09 |
| Th-230 | 4.51E-07 | 4.51E-07 |
| Ra-226 | 2.40E-08 | 2.40E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.62E-09 | 1.62E-09 |
| Ra-228 | 8.05E-09 | 8.05E-09 |
| Th-228 | 5.79E-08 | 5.79E-08 |
| U-234 | 5.78E-09 | 5.78E-09 |
| Th-230 | 9.32E-13 | 9.32E-13 |
| Ra-226 | 3.46E-14 | 3.46E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.74E-10 | 1.74E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.21E-14 | 8.21E-14 |
| U-238 | 7.40E-09 | 7.40E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 7.31E-19 | 7.31E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.76E-08 | 1.76E-08 |
| Pa-231 | 4.17E-09 | 4.17E-09 |
| Ac-227 | 4.54E-09 | 4.54E-09 |
| Pb-210 | 6.75E-07 | 6.75E-07 |
| Ra-226 | 1.66E-07 | 1.66E-07 |
| Pb-210 | 1.05E-07 | 1.05E-07 |
| Th-228 | 1.19E-09 | 1.19E-09 |
| Th-230 | 4.51E-07 | 4.51E-07 |
| Ra-226 | 2.40E-08 | 2.40E-08 |
| Pb-210 | 9.74E-09 | 9.74E-09 |
| Th-232 | 1.62E-09 | 1.62E-09 |
| Ra-228 | 8.05E-09 | 8.05E-09 |
| Th-228 | 5.79E-08 | 5.79E-08 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  1.00000000  years

| | | |
|---|---|---|
| U-234 | 5.78E-09 | 5.78E-09 |
| Th-230 | 9.32E-13 | 9.32E-13 |
| Ra-226 | 3.46E-14 | 3.46E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.74E-10 | 1.74E-10 |
| Pa-231 | 1.08E-13 | 1.08E-13 |
| Ac-227 | 8.21E-14 | 8.21E-14 |
| U-238 | 7.40E-09 | 7.40E-09 |
| U-234 | 2.32E-13 | 2.32E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 7.31E-19 | 7.31E-19 |
| Pb-210 | 1.60E-19 | 1.60E-19 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  3.00000000  years

RESRAD-BUILD Risk Tables

Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 6.95E-06 | 1.43E-06 | 1.43E-06 | 1.43E-06 | 1.43E-06 | 1.27E-05 |
| Total | 6.95E-06 | 1.43E-06 | 1.43E-06 | 1.43E-06 | 1.43E-06 | 1.27E-05 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.08E-06 | 1.11E-06 | 1.06E-11 | 2.15E-12 | 1.26E-08 | 5.34E-07 | 4.21E-06 | 6.95E-06 |
| Total | 1.08E-06 | 1.11E-06 | 1.06E-11 | 2.15E-12 | 1.26E-08 | 5.34E-07 | 4.21E-06 | 6.95E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |
| Total | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |
| Total | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |
| Total | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |
| Total | 7.48E-08 | 2.56E-07 | 2.45E-12 | 4.97E-13 | 2.92E-09 | 1.23E-07 | 9.72E-07 | 1.43E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 8.87E-08 | 8.87E-08 |
| Pa-231 | 1.90E-08 | 1.90E-08 |
| Ac-227 | 2.66E-08 | 2.66E-08 |
| Pb-210 | 2.63E-06 | 2.63E-06 |
| Ra-226 | 1.24E-06 | 1.24E-06 |
| Pb-210 | 4.53E-07 | 4.53E-07 |
| Th-228 | 2.68E-09 | 2.68E-09 |
| Th-230 | 1.82E-06 | 1.82E-06 |
| Ra-226 | 2.04E-07 | 2.04E-07 |
| Pb-210 | 4.26E-08 | 4.26E-08 |
| Th-232 | 6.51E-09 | 6.51E-09 |
| Ra-228 | 4.97E-08 | 4.97E-08 |
| Th-228 | 2.92E-07 | 2.92E-07 |
| U-234 | 2.34E-08 | 2.34E-08 |
| Th-230 | 4.04E-12 | 4.04E-12 |
| Ra-226 | 3.19E-13 | 3.19E-13 |
| Pb-210 | 4.43E-14 | 4.43E-14 |
| U-235 | 1.26E-09 | 1.26E-09 |
| Pa-231 | 5.38E-13 | 5.38E-13 |
| Ac-227 | 5.13E-13 | 5.13E-13 |
| U-238 | 4.36E-08 | 4.36E-08 |
| U-234 | 1.01E-12 | 1.01E-12 |
| Th-230 | 1.05E-16 | 1.05E-16 |
| Ra-226 | 7.24E-18 | 7.24E-18 |
| Pb-210 | 7.06E-19 | 7.06E-19 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.58E-08 | 1.58E-08 |
| Pa-231 | 3.86E-09 | 3.86E-09 |
| Ac-227 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 6.02E-07 | 6.02E-07 |
| Ra-226 | 1.61E-07 | 1.61E-07 |
| Pb-210 | 1.04E-07 | 1.04E-07 |
| Th-228 | 5.73E-10 | 5.73E-10 |
| Th-230 | 4.17E-07 | 4.17E-07 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| Ra-226 | 2.59E-08 | 2.59E-08 |
| Pb-210 | 9.73E-09 | 9.73E-09 |
| Th-232 | 1.50E-09 | 1.50E-09 |
| Ra-228 | 7.99E-09 | 7.99E-09 |
| Th-228 | 6.25E-08 | 6.25E-08 |
| U-234 | 5.34E-09 | 5.34E-09 |
| Th-230 | 9.23E-13 | 9.23E-13 |
| Ra-226 | 3.97E-14 | 3.97E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.64E-10 | 1.64E-10 |
| Pa-231 | 1.07E-13 | 1.07E-13 |
| Ac-227 | 8.41E-14 | 8.41E-14 |
| U-238 | 6.93E-09 | 6.93E-09 |
| U-234 | 2.29E-13 | 2.29E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 8.84E-19 | 8.84E-19 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.58E-08 | 1.58E-08 |
| Pa-231 | 3.86E-09 | 3.86E-09 |
| Ac-227 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 6.02E-07 | 6.02E-07 |
| Ra-226 | 1.61E-07 | 1.61E-07 |
| Pb-210 | 1.04E-07 | 1.04E-07 |
| Th-228 | 5.73E-10 | 5.73E-10 |
| Th-230 | 4.17E-07 | 4.17E-07 |
| Ra-226 | 2.59E-08 | 2.59E-08 |
| Pb-210 | 9.73E-09 | 9.73E-09 |
| Th-232 | 1.50E-09 | 1.50E-09 |
| Ra-228 | 7.99E-09 | 7.99E-09 |
| Th-228 | 6.25E-08 | 6.25E-08 |
| U-234 | 5.34E-09 | 5.34E-09 |
| Th-230 | 9.23E-13 | 9.23E-13 |
| Ra-226 | 3.97E-14 | 3.97E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.64E-10 | 1.64E-10 |
| Pa-231 | 1.07E-13 | 1.07E-13 |
| Ac-227 | 8.41E-14 | 8.41E-14 |
| U-238 | 6.93E-09 | 6.93E-09 |
| U-234 | 2.29E-13 | 2.29E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 8.84E-19 | 8.84E-19 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.58E-08 | 1.58E-08 |
| Pa-231 | 3.86E-09 | 3.86E-09 |
| Ac-227 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 6.02E-07 | 6.02E-07 |
| Ra-226 | 1.61E-07 | 1.61E-07 |
| Pb-210 | 1.04E-07 | 1.04E-07 |
| Th-228 | 5.73E-10 | 5.73E-10 |
| Th-230 | 4.17E-07 | 4.17E-07 |
| Ra-226 | 2.59E-08 | 2.59E-08 |
| Pb-210 | 9.73E-09 | 9.73E-09 |
| Th-232 | 1.50E-09 | 1.50E-09 |
| Ra-228 | 7.99E-09 | 7.99E-09 |
| Th-228 | 6.25E-08 | 6.25E-08 |
| U-234 | 5.34E-09 | 5.34E-09 |
| Th-230 | 9.23E-13 | 9.23E-13 |
| Ra-226 | 3.97E-14 | 3.97E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.64E-10 | 1.64E-10 |
| Pa-231 | 1.07E-13 | 1.07E-13 |
| Ac-227 | 8.41E-14 | 8.41E-14 |
| U-238 | 6.93E-09 | 6.93E-09 |
| U-234 | 2.29E-13 | 2.29E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 8.84E-19 | 8.84E-19 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.58E-08 | 1.58E-08 |
| Pa-231 | 3.86E-09 | 3.86E-09 |
| Ac-227 | 4.55E-09 | 4.55E-09 |
| Pb-210 | 6.02E-07 | 6.02E-07 |
| Ra-226 | 1.61E-07 | 1.61E-07 |
| Pb-210 | 1.04E-07 | 1.04E-07 |
| Th-228 | 5.73E-10 | 5.73E-10 |
| Th-230 | 4.17E-07 | 4.17E-07 |
| Ra-226 | 2.59E-08 | 2.59E-08 |
| Pb-210 | 9.73E-09 | 9.73E-09 |
| Th-232 | 1.50E-09 | 1.50E-09 |
| Ra-228 | 7.99E-09 | 7.99E-09 |
| Th-228 | 6.25E-08 | 6.25E-08 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  3.00000000  years

| | | |
|---|---|---|
| U-234 | 5.34E-09 | 5.34E-09 |
| Th-230 | 9.23E-13 | 9.23E-13 |
| Ra-226 | 3.97E-14 | 3.97E-14 |
| Pb-210 | 1.01E-14 | 1.01E-14 |
| U-235 | 1.64E-10 | 1.64E-10 |
| Pa-231 | 1.07E-13 | 1.07E-13 |
| Ac-227 | 8.41E-14 | 8.41E-14 |
| U-238 | 6.93E-09 | 6.93E-09 |
| U-234 | 2.29E-13 | 2.29E-13 |
| Th-230 | 2.41E-17 | 2.41E-17 |
| Ra-226 | 8.84E-19 | 8.84E-19 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  10.0000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 5.37E-06 | 1.06E-06 | 1.06E-06 | 1.06E-06 | 1.06E-06 | 9.61E-06 |
| Total | 5.37E-06 | 1.06E-06 | 1.06E-06 | 1.06E-06 | 1.06E-06 | 9.61E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.11E-06 | 7.87E-07 | 7.79E-12 | 1.58E-12 | 8.64E-09 | 5.87E-07 | 2.87E-06 | 5.37E-06 |
| Total | 1.11E-06 | 7.87E-07 | 7.79E-12 | 1.58E-12 | 8.64E-09 | 5.87E-07 | 2.87E-06 | 5.37E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |
| Total | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |
| Total | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |
| Total | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |
| Total | 7.71E-08 | 1.82E-07 | 1.80E-12 | 3.66E-13 | 2.00E-09 | 1.36E-07 | 6.64E-07 | 1.06E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 6.03E-08 | 6.03E-08 |
| Pa-231 | 1.43E-08 | 1.43E-08 |
| Ac-227 | 2.66E-08 | 2.66E-08 |
| Pb-210 | 1.66E-06 | 1.66E-06 |
| Ra-226 | 1.16E-06 | 1.16E-06 |
| Pb-210 | 3.90E-07 | 3.90E-07 |
| Th-228 | 2.06E-10 | 2.06E-10 |
| Th-230 | 1.30E-06 | 1.30E-06 |
| Ra-226 | 2.65E-07 | 2.65E-07 |
| Pb-210 | 4.07E-08 | 4.07E-08 |
| Th-232 | 4.66E-09 | 4.66E-09 |
| Ra-228 | 4.66E-08 | 4.66E-08 |
| Th-228 | 3.41E-07 | 3.41E-07 |
| U-234 | 1.67E-08 | 1.67E-08 |
| Th-230 | 3.56E-12 | 3.56E-12 |
| Ra-226 | 5.22E-13 | 5.22E-13 |
| Pb-210 | 4.43E-14 | 4.43E-14 |
| U-235 | 1.10E-09 | 1.10E-09 |
| Pa-231 | 5.16E-13 | 5.16E-13 |
| Ac-227 | 6.31E-13 | 6.31E-13 |
| U-238 | 3.62E-08 | 3.62E-08 |
| U-234 | 8.89E-13 | 8.89E-13 |
| Th-230 | 1.02E-16 | 1.02E-16 |
| Ra-226 | 1.45E-17 | 1.45E-17 |
| Pb-210 | 7.23E-19 | 7.23E-19 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.02E-08 | 1.02E-08 |
| Pa-231 | 2.78E-09 | 2.78E-09 |
| Ac-227 | 4.14E-09 | 4.14E-09 |
| Pb-210 | 3.81E-07 | 3.81E-07 |
| Ra-226 | 1.44E-07 | 1.44E-07 |
| Pb-210 | 8.89E-08 | 8.89E-08 |
| Th-228 | 4.42E-11 | 4.42E-11 |
| Th-230 | 2.98E-07 | 2.98E-07 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| Ra-226 | 3.21E-08 | 3.21E-08 |
| Pb-210 | 9.24E-09 | 9.24E-09 |
| Th-232 | 1.07E-09 | 1.07E-09 |
| Ra-228 | 6.89E-09 | 6.89E-09 |
| Th-228 | 7.29E-08 | 7.29E-08 |
| U-234 | 3.81E-09 | 3.81E-09 |
| Th-230 | 8.10E-13 | 8.10E-13 |
| Ra-226 | 6.15E-14 | 6.15E-14 |
| Pb-210 | 9.96E-15 | 9.96E-15 |
| U-235 | 1.28E-10 | 1.28E-10 |
| Pa-231 | 9.58E-14 | 9.58E-14 |
| Ac-227 | 8.90E-14 | 8.90E-14 |
| U-238 | 5.29E-09 | 5.29E-09 |
| U-234 | 2.01E-13 | 2.01E-13 |
| Th-230 | 2.29E-17 | 2.29E-17 |
| Ra-226 | 1.68E-18 | 1.68E-18 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.02E-08 | 1.02E-08 |
| Pa-231 | 2.78E-09 | 2.78E-09 |
| Ac-227 | 4.14E-09 | 4.14E-09 |
| Pb-210 | 3.81E-07 | 3.81E-07 |
| Ra-226 | 1.44E-07 | 1.44E-07 |
| Pb-210 | 8.89E-08 | 8.89E-08 |
| Th-228 | 4.42E-11 | 4.42E-11 |
| Th-230 | 2.98E-07 | 2.98E-07 |
| Ra-226 | 3.21E-08 | 3.21E-08 |
| Pb-210 | 9.24E-09 | 9.24E-09 |
| Th-232 | 1.07E-09 | 1.07E-09 |
| Ra-228 | 6.89E-09 | 6.89E-09 |
| Th-228 | 7.29E-08 | 7.29E-08 |
| U-234 | 3.81E-09 | 3.81E-09 |
| Th-230 | 8.10E-13 | 8.10E-13 |
| Ra-226 | 6.15E-14 | 6.15E-14 |
| Pb-210 | 9.96E-15 | 9.96E-15 |
| U-235 | 1.28E-10 | 1.28E-10 |
| Pa-231 | 9.58E-14 | 9.58E-14 |
| Ac-227 | 8.90E-14 | 8.90E-14 |
| U-238 | 5.29E-09 | 5.29E-09 |
| U-234 | 2.01E-13 | 2.01E-13 |
| Th-230 | 2.29E-17 | 2.29E-17 |
| Ra-226 | 1.68E-18 | 1.68E-18 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.02E-08 | 1.02E-08 |
| Pa-231 | 2.78E-09 | 2.78E-09 |
| Ac-227 | 4.14E-09 | 4.14E-09 |
| Pb-210 | 3.81E-07 | 3.81E-07 |
| Ra-226 | 1.44E-07 | 1.44E-07 |
| Pb-210 | 8.89E-08 | 8.89E-08 |
| Th-228 | 4.42E-11 | 4.42E-11 |
| Th-230 | 2.98E-07 | 2.98E-07 |
| Ra-226 | 3.21E-08 | 3.21E-08 |
| Pb-210 | 9.24E-09 | 9.24E-09 |
| Th-232 | 1.07E-09 | 1.07E-09 |
| Ra-228 | 6.89E-09 | 6.89E-09 |
| Th-228 | 7.29E-08 | 7.29E-08 |
| U-234 | 3.81E-09 | 3.81E-09 |
| Th-230 | 8.10E-13 | 8.10E-13 |
| Ra-226 | 6.15E-14 | 6.15E-14 |
| Pb-210 | 9.96E-15 | 9.96E-15 |
| U-235 | 1.28E-10 | 1.28E-10 |
| Pa-231 | 9.58E-14 | 9.58E-14 |
| Ac-227 | 8.90E-14 | 8.90E-14 |
| U-238 | 5.29E-09 | 5.29E-09 |
| U-234 | 2.01E-13 | 2.01E-13 |
| Th-230 | 2.29E-17 | 2.29E-17 |
| Ra-226 | 1.68E-18 | 1.68E-18 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.02E-08 | 1.02E-08 |
| Pa-231 | 2.78E-09 | 2.78E-09 |
| Ac-227 | 4.14E-09 | 4.14E-09 |
| Pb-210 | 3.81E-07 | 3.81E-07 |
| Ra-226 | 1.44E-07 | 1.44E-07 |
| Pb-210 | 8.89E-08 | 8.89E-08 |
| Th-228 | 4.42E-11 | 4.42E-11 |
| Th-230 | 2.98E-07 | 2.98E-07 |
| Ra-226 | 3.21E-08 | 3.21E-08 |
| Pb-210 | 9.24E-09 | 9.24E-09 |
| Th-232 | 1.07E-09 | 1.07E-09 |
| Ra-228 | 6.89E-09 | 6.89E-09 |
| Th-228 | 7.29E-08 | 7.29E-08 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  10.0000000  years

| | | |
|---|---|---|
| U-234 | 3.81E-09 | 3.81E-09 |
| Th-230 | 8.10E-13 | 8.10E-13 |
| Ra-226 | 6.15E-14 | 6.15E-14 |
| Pb-210 | 9.96E-15 | 9.96E-15 |
| U-235 | 1.28E-10 | 1.28E-10 |
| Pa-231 | 9.58E-14 | 9.58E-14 |
| Ac-227 | 8.90E-14 | 8.90E-14 |
| U-238 | 5.29E-09 | 5.29E-09 |
| U-234 | 2.01E-13 | 2.01E-13 |
| Th-230 | 2.29E-17 | 2.29E-17 |
| Ra-226 | 1.68E-18 | 1.68E-18 |
| Pb-210 | 1.61E-19 | 1.61E-19 |

Title : Jana Elementary School User- SubRes
Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
Evaluation Time:  30.0000000  years

## RESRAD-BUILD Risk Tables

### Source Contributions to Receptor Risks

[Risk]

| | Source 1 | Source 2 | Source 3 | Source 4 | Source 5 | Total |
|---|---|---|---|---|---|---|
| Receptor 1 | 1.88E-06 | 2.36E-07 | 2.36E-07 | 2.36E-07 | 2.36E-07 | 2.82E-06 |
| Total | 1.88E-06 | 2.36E-07 | 2.36E-07 | 2.36E-07 | 2.36E-07 | 2.82E-06 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

## Pathway Detail of Risks

[Risk]

Source:  1

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.22E-06 | 5.63E-20 | 1.46E-24 | 1.24E-25 | 1.36E-21 | 6.54E-07 | 0.00E+00 | 1.88E-06 |
| Total | 1.22E-06 | 5.63E-20 | 1.46E-24 | 1.24E-25 | 1.36E-21 | 6.54E-07 | 0.00E+00 | 1.88E-06 |

Source:  2

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |
| Total | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |

Source:  3

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |
| Total | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |

Source:  4

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |
| Total | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |

Source:  5

| Receptor | External directly from Source | Inhalation | External from Deposition on floor | External from Suspension in air | Ingestion of Deposition | Radon | Ingestion of Source | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |
| Total | 8.50E-08 | 1.30E-20 | 3.37E-25 | 2.87E-26 | 3.14E-22 | 1.51E-07 | 0.00E+00 | 2.36E-07 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

## Nuclide Detail of Risks

[Risk]

Source:  1

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 1.15E-08 | 1.15E-08 |
| Pa-231 | 2.62E-09 | 2.62E-09 |
| Ac-227 | 1.68E-08 | 1.68E-08 |
| Pb-210 | 1.07E-08 | 1.07E-08 |
| Ra-226 | 9.78E-07 | 9.78E-07 |
| Pb-210 | 9.45E-09 | 9.45E-09 |
| Th-228 | 1.29E-13 | 1.29E-13 |
| Th-230 | 1.71E-08 | 1.71E-08 |
| Ra-226 | 4.21E-07 | 4.21E-07 |
| Pb-210 | 2.55E-09 | 2.55E-09 |
| Th-232 | 4.01E-11 | 4.01E-11 |
| Ra-228 | 2.55E-08 | 2.55E-08 |
| Th-228 | 3.63E-07 | 3.63E-07 |
| U-234 | 2.71E-10 | 2.71E-10 |
| Th-230 | 1.12E-13 | 1.12E-13 |
| Ra-226 | 1.43E-12 | 1.43E-12 |
| Pb-210 | 6.57E-15 | 6.57E-15 |
| U-235 | 7.05E-10 | 7.05E-10 |
| Pa-231 | 2.15E-13 | 2.15E-13 |
| Ac-227 | 8.70E-13 | 8.70E-13 |
| U-238 | 1.84E-08 | 1.84E-08 |
| U-234 | 3.45E-14 | 3.45E-14 |
| Th-230 | 7.39E-18 | 7.39E-18 |
| Ra-226 | 6.52E-17 | 6.52E-17 |
| Pb-210 | 2.44E-19 | 2.44E-19 |

Source:  2

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.39E-10 | 7.39E-10 |
| Pa-231 | 1.00E-10 | 1.00E-10 |
| Ac-227 | 1.09E-09 | 1.09E-09 |
| Pb-210 | 6.50E-10 | 6.50E-10 |
| Ra-226 | 1.06E-07 | 1.06E-07 |
| Pb-210 | 5.72E-10 | 5.72E-10 |
| Th-228 | 2.76E-14 | 2.76E-14 |
| Th-230 | 3.42E-10 | 3.42E-10 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

| | | |
|---|---|---|
| Ra-226 | 4.58E-08 | 4.58E-08 |
| Pb-210 | 1.54E-10 | 1.54E-10 |
| Th-232 | 8.82E-13 | 8.82E-13 |
| Ra-228 | 1.77E-09 | 1.77E-09 |
| Th-228 | 7.74E-08 | 7.74E-08 |
| U-234 | 5.23E-12 | 5.23E-12 |
| Th-230 | 2.24E-15 | 2.24E-15 |
| Ra-226 | 1.56E-13 | 1.56E-13 |
| Pb-210 | 3.97E-16 | 3.97E-16 |
| U-235 | 4.03E-11 | 4.03E-11 |
| Pa-231 | 8.22E-15 | 8.22E-15 |
| Ac-227 | 5.61E-14 | 5.61E-14 |
| U-238 | 1.24E-09 | 1.24E-09 |
| U-234 | 6.64E-16 | 6.64E-16 |
| Th-230 | 1.47E-19 | 1.47E-19 |
| Ra-226 | 7.08E-18 | 7.08E-18 |
| Pb-210 | 1.48E-20 | 1.48E-20 |

Source:  3

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.39E-10 | 7.39E-10 |
| Pa-231 | 1.00E-10 | 1.00E-10 |
| Ac-227 | 1.09E-09 | 1.09E-09 |
| Pb-210 | 6.50E-10 | 6.50E-10 |
| Ra-226 | 1.06E-07 | 1.06E-07 |
| Pb-210 | 5.72E-10 | 5.72E-10 |
| Th-228 | 2.76E-14 | 2.76E-14 |
| Th-230 | 3.42E-10 | 3.42E-10 |
| Ra-226 | 4.58E-08 | 4.58E-08 |
| Pb-210 | 1.54E-10 | 1.54E-10 |
| Th-232 | 8.82E-13 | 8.82E-13 |
| Ra-228 | 1.77E-09 | 1.77E-09 |
| Th-228 | 7.74E-08 | 7.74E-08 |
| U-234 | 5.23E-12 | 5.23E-12 |
| Th-230 | 2.24E-15 | 2.24E-15 |
| Ra-226 | 1.56E-13 | 1.56E-13 |
| Pb-210 | 3.97E-16 | 3.97E-16 |
| U-235 | 4.03E-11 | 4.03E-11 |
| Pa-231 | 8.22E-15 | 8.22E-15 |
| Ac-227 | 5.61E-14 | 5.61E-14 |
| U-238 | 1.24E-09 | 1.24E-09 |
| U-234 | 6.64E-16 | 6.64E-16 |
| Th-230 | 1.47E-19 | 1.47E-19 |
| Ra-226 | 7.08E-18 | 7.08E-18 |
| Pb-210 | 1.48E-20 | 1.48E-20 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years
Source:  4

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.39E-10 | 7.39E-10 |
| Pa-231 | 1.00E-10 | 1.00E-10 |
| Ac-227 | 1.09E-09 | 1.09E-09 |
| Pb-210 | 6.50E-10 | 6.50E-10 |
| Ra-226 | 1.06E-07 | 1.06E-07 |
| Pb-210 | 5.72E-10 | 5.72E-10 |
| Th-228 | 2.76E-14 | 2.76E-14 |
| Th-230 | 3.42E-10 | 3.42E-10 |
| Ra-226 | 4.58E-08 | 4.58E-08 |
| Pb-210 | 1.54E-10 | 1.54E-10 |
| Th-232 | 8.82E-13 | 8.82E-13 |
| Ra-228 | 1.77E-09 | 1.77E-09 |
| Th-228 | 7.74E-08 | 7.74E-08 |
| U-234 | 5.23E-12 | 5.23E-12 |
| Th-230 | 2.24E-15 | 2.24E-15 |
| Ra-226 | 1.56E-13 | 1.56E-13 |
| Pb-210 | 3.97E-16 | 3.97E-16 |
| U-235 | 4.03E-11 | 4.03E-11 |
| Pa-231 | 8.22E-15 | 8.22E-15 |
| Ac-227 | 5.61E-14 | 5.61E-14 |
| U-238 | 1.24E-09 | 1.24E-09 |
| U-234 | 6.64E-16 | 6.64E-16 |
| Th-230 | 1.47E-19 | 1.47E-19 |
| Ra-226 | 7.08E-18 | 7.08E-18 |
| Pb-210 | 1.48E-20 | 1.48E-20 |

Source:  5

| Nuclide | Receptor 1 | Total |
|---|---|---|
| Ac-227 | 7.39E-10 | 7.39E-10 |
| Pa-231 | 1.00E-10 | 1.00E-10 |
| Ac-227 | 1.09E-09 | 1.09E-09 |
| Pb-210 | 6.50E-10 | 6.50E-10 |
| Ra-226 | 1.06E-07 | 1.06E-07 |
| Pb-210 | 5.72E-10 | 5.72E-10 |
| Th-228 | 2.76E-14 | 2.76E-14 |
| Th-230 | 3.42E-10 | 3.42E-10 |
| Ra-226 | 4.58E-08 | 4.58E-08 |
| Pb-210 | 1.54E-10 | 1.54E-10 |
| Th-232 | 8.82E-13 | 8.82E-13 |
| Ra-228 | 1.77E-09 | 1.77E-09 |
| Th-228 | 7.74E-08 | 7.74E-08 |

 Title : Jana Elementary School User- SubRes
 Input File : C:\RESRAD_Family\BUILD\4.0\UserFiles\JanaSchool_subres_r.bld
 Evaluation Time:  30.0000000  years

| | | |
|---|---|---|
| U-234 | 5.23E-12 | 5.23E-12 |
| Th-230 | 2.24E-15 | 2.24E-15 |
| Ra-226 | 1.56E-13 | 1.56E-13 |
| Pb-210 | 3.97E-16 | 3.97E-16 |
| U-235 | 4.03E-11 | 4.03E-11 |
| Pa-231 | 8.22E-15 | 8.22E-15 |
| Ac-227 | 5.61E-14 | 5.61E-14 |
| U-238 | 1.24E-09 | 1.24E-09 |
| U-234 | 6.64E-16 | 6.64E-16 |
| Th-230 | 1.47E-19 | 1.47E-19 |
| Ra-226 | 7.08E-18 | 7.08E-18 |
| Pb-210 | 1.48E-20 | 1.48E-20 |

# APPENDIX H

# RESPONSIVENESS SUMMARY

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# RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to provide the USACE responses to agency comments received on a draft of this FSSE.

## MDNR Comments and USACE Responses

1. Contact Information. The contact number for MDNR is outdated. The new number is 573-751-2126 for the new project manager and should be updated for this and future documents.

   **Response 1:** The phone number listed for the MDNR is updated.

2. General, Clarity to All Readers. This FSSE will be subject to more attention than the typical FSSE and thus will need to accommodate more to a layman's level of understanding. Decisions and topics such as STSU classification, DCGL, risk assessment, etc. should be considered in a more explanatory and basic light to meet a different level of understanding.

   **Response 2:** The USACE recognizes the difficulty of addressing multiple audiences in the same document and recognizes differing viewpoints exist on how that might be best accomplished. The audiences for this FSSE are the property owners, regulators, public, and technical experts. The USACE has worked to improve its documents for both reader-friendliness for owners and public and the quality and rigor expected by regulators and technical experts. For this document, the USACE has revised the Abstract to be more property owner- and public-facing. While the scope of the FSSE does not include tutorials to bridge a different level of understanding, additional explanations have been added to the discussions of STSU classification, DCGL, and risk assessment. In addition, the USACE has made a substantial amount of information available on its St. Louis FUSRAP website, including fact sheets about MARSSIM and CERCLA concepts.

3. General, DCGLs. The DCGLs were calculated on the basis of an adult industrial worker and based around the HISS/Futura sites. They do not include factors such the ingestion pathway of exposure in the calculations that might differ in young children. Do the assumptions made for the DCGLs calculations still apply to this very different situation? If so, some discussion should be included and why the DCGLs are still appropriate.

   **Response 3:** MARSSIM guidance contains a process for taking a risk or dose limit and converting it to something measurable in the field. The radionuclide-specific DCGLs in the ROD are one step in that process. The development of the radionuclide-specific DCGLs for the ROD was documented in the *Derivation of Site-Specific DCGLs for North County Structures* (USACE 2004). The development considered four scenarios: Resident, Industrial Worker, Renovation Worker, and a Post-Demolition Resident (with the demolition debris assumed to be buried under a new residence). None of these scenarios was based on the HISS/Futura sites. Each scenario was separately evaluated using RESRAD-BUILD to determine which scenario had the highest result (i.e., the limiting scenario). The limiting scenario results in the lowest radionuclide-specific DCGLs. The Industrial Worker scenario was the limiting scenario, resulting in lower DCGLs than the Resident scenario would have.

   The radionuclide-specific DCGLs in the ROD are not measurable in the field, so another step is required to develop surrogate total alpha and/or total beta DCGLs. This step involves the activity fractions for each of the radionuclides. Please see the response to Missouri Department of Health and Senior Services (MDHSS) comment 1 for more information about activity fractions. Besides conservatisms in the ROD DCGLs, the activity fractions provided more

conservatism in establishing the surrogate total alpha DCGL. The value of 2,800 dpm/100 $cm^2$ used for this FSSE is approximately half the updated value discussed in the response to MDHSS comment 1.

Also important to this discussion is how close the survey results are to the surrogate total alpha DCGL. The survey data for these structures have average and maximum results of 2 and 11 percent of DCGL value of 2,800 dpm/100 $cm^2$, respectively. As noted in Section 3.1 of this FSSE, the final results for alpha radioactivity and beta radioactivity were consistent with expected background levels by being within 3 standard deviations of the average result. In other words, the survey data provide no indication that MED/AEC radioactivity is present to meaningfully compare against a DCGL.

The USACE has long recognized that a site-specific risk and dose assessment provides a confirmation check that the field surrogate DCGLs are effective in achieving risk and dose lower than the required levels. This dose and risk assessment is the appropriate place to confirm the risk and dose for students is lower than required levels. Please see the responses to MDNR comments 11 and 12 for a change in the scenarios being evaluated to include a student scenario. For the student scenario, age-appropriate direct and indirect ingestion rates are used. However, any ingestion is dependent upon the presence of removable radioactivity. None of the swipe results for removable radioactivity exceeded very low MDCs. While this indicates the removable fraction parameter should be zero, a health-conservative factor of 0.1 is used to include an ingestion pathway in the risk and dose assessment.

In summary, the risk and dose for students is fully addressed by the conservative assumptions used in each step in the development of the field surrogate DCGL, the very low survey results, and the revised scenarios for the site-specific risk and dose assessment.

4. Formatting Clarity, Section 2.0 Page 3. The report cites two reasons for the structure survey units to meet Class 3 criteria, but then lists 4 bullets beneath. If the final two bullets are clarifications to the second bullet, then they should be formatted in such a way that the two reasons being referenced for the Class 3 decisions are distinct and clear. If not, then the correct number of reasons should be cited.

   **Response 4:** The phrase “for two reasons” is replaced with “based on the following.” Based on the previous comments, this paragraph and its bulleted list entries are revised.

5. MARSSIM Class Designation, Section 2.0 Page 3. The final two reasons cited for the Class 3 designation could only be known after the completion of the survey and are thus not valid reasons for the designation. Please revise to clarify these reasons or to remove the post hoc reasoning.

   **Response 5:** The survey was initially completed as a PDI survey, and the PDI results are then used to inform the design of the FSSE. The text is revised to more clearly explain this process, which does not involve post hoc reasoning.

6. MARRSIM [sic] Class Designation, Section 2. The STSUs are all designated Class 3 due to the assessment that they have little to no chance of contamination. However, as pointed out in the introduction, the reason for investigation was because of the alleged contamination within and around the Jana structure. Class 2 impacted areas are areas that have, or had, a potential for contamination or known contamination but which contamination is not expected to exceed $DCGL_W$. The Kaltofen report provides a report stating contamination is present at the site, seemingly warranting a Class 2 designation. Please detail how the Kaltofen report was used

and USACE overall approach to designate the STSUs Class 3 despite previous statements of contamination of the site being known by USACE.

**Response 6:** An evaluation of the Brustowicz, Thompson, and Kaltofen report was addressed in the SRNL report included as Appendix A of this draft FSSE. That SRNL report noted, "No Jana Elementary School sample data reported by Eberline Analytical in the Kaltofen Report exceed the criteria set forth in 40 *CFR* 192." Soil would have to exceed the criteria set forth in 40 *CFR* 192 to be contaminated. Section 2 of this FSSE is revised to provide additional discussion on the appropriateness of a Class 3 survey based on PDI results.

7. Swipe Counting Laboratory Equipment, Section 2.3 Page 6 Line 6. The FSSE scope of work specifies that the instrument to count smears in the laboratory would be either a Tennelec or Ludlum Model 2929 with Ludlum Model 43-10-1. Instead, a Mirion series 5HP and Series XLB GFPCs were used. Please explain this discrepancy.

   **Response 7:** Sometimes a brand is so strongly associated with an item, that the brand is used as the common name for the item, even when that item has a different brand. Examples are "Kleenex" for tissue and "Coke" for soda pop. In the nuclear industry, the company Tennelec achieved such a status for a type of instrument. In 2016, Mirion Technologies acquired the resources of the former Tennelec company. In the scope of work document, the instrument is being generically described, while in this FSSE, the actual name and models are identified.

   A clarification is also provided regarding the scope of work document. While the title includes "FSSE," that document was for the scope of work for additional PDI activities and should have been titled as such.

8. Natural Radon Procedure, Section 2.3, Page 6, Lines 11-19. Does the procedure for dealing with short-lived decay particles have any reference? Please include such a reference to ensure transparency and to further explain the reasoning for this step.

   **Response 8:** A reference to USACE 2019a (*Pre-Design Investigation Work Plan for Coldwater Creek North of St. Denis Bridge)* is added to this text.

9. MDAs instead of MDCs. Section 2.4.1, Page 7-8. The FSSE scope of work references the Appendix A of the 2003 *Final Status Survey Plan for Structures and Other Consolidated Material Left in Place at the St. Louis Site* as the reference for both scan surveys and fixed-point measurements. This document specifies the use of MDC be less than the DCGL in both cases and preferable under 50 or 10% of the DCGL in fixed-point measurements. The FSSE uses MDA instead. Please explain this difference and its significance.

   **Response 9:** The terms "minimum detectable activity" and "minimum detectable concentration (MDC)" are synonymous for units of dpm/100 $cm^2$. Minimum detectable activity is generally used with units of activity, and MDC is generally used with units of activity per mass. However, the units of activity per area is treated by some professionals as just activity (so minimum detectable activity is used) and is treated by other professionals as a concentration (so MDC is used). For consistency, the FSSE is revised to use MDC.

10. Null Hypothesis, Section 3.1 Page 9 Lines 9-10. The null-hypothesis is defined as "Residual radioactivity in the STSU that exceeds the release criterion" but this does not reflect a hypothesis, rather a general criteria. The "that" in the aforementioned null-hypothesis is not needed. Please rephrase the statement to be a clearly testable, "yes-or-no," statement of stating that the STSU does/does not exceed release criteria.

    **Response 10:** The phrasing of the null hypothesis is revised to quote MARSSIM.

11. Risk Assessment, Section 3.2 [now Section 3.3] and Appendix F [now Appendix G]. What is the real world equivalent of internal and external school users? People will not fall solely in one category of user. The relation of these two user types to the expected use should be clarified to justify the two distinct use cases.

    **Response 11:** The scenarios are revised to be a school staff scenario, a student scenario, and a suburban resident scenario.

12. Risk Assessment, Section 3.2 [now Section 3.3] and Appendix F [now Appendix G]. In determining risk, is there a difference of risk associated with radiation exposure at a younger age? The primary school users are children under the age of 12, do these individuals have a higher, lower or unknown difference in risk compared to adults? The exposure differences are discussed but not the underlying risk associated with such exposure. Add a brief discussion to address the concern that children might be more sensitive to radiation and its relevancy to the risk assessment.

    **Response 12:** As stated in the response to MDNR comment 11, the scenarios are revised to be a school staff scenario, a student scenario, and a suburban resident scenario. Parameters specific to children are used for the student scenario and as part of the suburban resident scenario.

**MDHSS Comments and USACE Responses**

1. Activity fractions as provided in Appendix F [now Appendix G], Table F-2, CWC Activity Fractions, and used to convert gross alpha and gross beta to isotopic activities, may result in less accurate estimates of risk. Therefore, DHSS supports revising activity fractions to use the Coldwater Creek-based activity fractions currently being developed.

   **Response 1:** The original activity fractions were developed using FS data for CWC (USACE 2003). The activity fractions are now updated to use PDI sample data with $SOR_N$ values exceeding 1.0 collected from CWC (approximately 1,100 samples from 7 miles of CWC properties downstream of Dunn Road) to provide an improved dataset for determining the activity fractions associated with MED/AEC radioactivity. While these updated activity fractions for CWC result in a revised surrogate total alpha DCGL of 6,000 dpm/100 $cm^2$, this FSSE continues to use the 2,800 dpm/100 $cm^2$ that was used during fieldwork.

2. Table F-1 [now Table G-1], RESRAD-Build Input Parameters, footnote H, provides an indoor inhalation rate of 13.2 $m^3$/day, based upon the U.S. Environmental Protection Agency's (EPA's) Exposure Factors Handbook, 1997. Because each of the risk assessments (indoor and outdoor) are to be protective of both child and adult receptors, DHSS suggests referencing EPA's updated Exposure Factor Handbook, 2011. Table 6-1, Recommended Long-Term Exposure Values for Inhalation (males and females combined). This document provides average inhalation rates for age groups within the 21 to 61 years of age that are equal to or approach 16 $m^3$/day. While 13.2 $m^3$/day is protective of a child within the 6 to eleven years of age, use of the higher value will align better with the staff inhalation exposure rates, while continuing to be conservatively protective of children.

   **Response 2:** As stated in the response to MDNR comment 11, the scenarios are revised to be a school staff scenario, a student scenario, and a suburban resident scenario. Consistent with the 2011 EFH (USEPA 2011), the breathing rate for the staff will be 16 $m^3$/day, and the breathing rate for the student will be 12 $m^3$/day.

3. This report employs RESRAD-Build for risk calculation. Please consider reviewing the default slope factors against EPA's Dose and Risk Calculation Software (DCAL)-based slope factors. Although it is not anticipated that the risk assessment would significantly differ, such a review would show consistency across other regional sites addressed under different authorities.

   **Response 3:** RESRAD-BUILD Version 4.0 was used for the risk calculation. This recent update includes risk slope factors based on International Commission on Radiological Protection (ICRP) Publication 107 (ICRP 2008) and *Federal Guidance Report No. 13: Cancer Risk Coefficients for Environmental Exposure to Radionuclides* (FGR-13) (USEPA 1999) in the form of DCFPAK 3.02. DCFPAK 3.02 has been used in RESRAD-ONSITE since 2014 when Oak Ridge National Laboratory (ORNL) updated slope factors as presented in *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014). This ORNL document states "The majority of the risk factors and dose coefficients were calculated using ORNL's DCAL software in the manner of Federal Guidance Report 12 and Federal Guidance Report 13 for internal intakes and for external exposure respectively. The only exceptions are for the nursing infant. Dose coefficients for the nursing infant were extracted from ICRP Publication 95." The slope factors in DCFPAK 3.02 have been previously reviewed during the five-year review process and found to be acceptable. The USEPA website https://www.epa.gov/radiation/tools-calculating-radiation-dose-and-risk contains discussions of DCFPAK 3.02. The USACE considers this history of review to be sufficient.

4. The ProUCL software runs provided in Attachment F-1, EPC Calculations File and ProUCL Output Files, appear to be assuming normal distributions. If this is correct, please provide reference for making this mathematical assumption.

   **Response 4:** The ProUCL software output identifies whether the data fit certain distributions and a "Suggested UCL to Use." Although ProUCL identified "Data Not Normal at 1% Significance Level" for each radionuclide, it also suggested "95% Student's UCL." This upper confidence limit (UCL) is based on a Normal distribution. The USACE is not responsible for the ProUCL suggested UCL. Because none of the data fit a Normal, Gamma, or Lognormal distributions, the USACE had selected a Nonparametric Distribution and the associated "95% Chebyshev (Mean, Sd) UCL" for each radionuclide in the draft FSSE provided for review. This user-selected UCL is added to the ProUCL output file on the line before the concluding text for each radionuclide.

**USEPA Comments and USACE Responses**

1. General Comment. The EPA understands that USACE conducted additional Pb-210 analysis on samples collected from within the Jana Elementary building and surrounding grounds for which the data is presented and evaluated in a separate draft report provided to the EPA on February 22, 2023. The EPA is currently reviewing this report. The data and associated evaluation from both reports includes evidence regarding whether contamination is present inside Jana Elementary and the surrounding grounds. Therefore, both must be considered to finalize a related conclusion.

   **Response 1:** Additional data and evaluation about lead-210 are added to this FSSE, including the following:

   - Lead-210 data are added to Table D-9,
   - A discussion and evaluation regarding those results are added in new Section 3.2, and

- An estimated amount of lead-210 radioactivity associated with pavement sediment is added to the EPC for lead-210 for the risk and dose assessment.

2. Abstract, Regulatory Requirements/Remediation Goals (RGs), General Comment. This portion of the abstract does not reference the 2005 Record of Decision for the North St. Louis County FUSRAP sites. Other Final Status Survey Reports previously completed for portions of the site near Coldwater Creek simply state, "*See the ROD for regulatory requirements and remediation goals (RGs).*" The EPA requests that a similar statement be added to clarify that remediation goals for the site have been established in the 2005 Record of Decision. The EPA believes that such information will be useful to understand the specific remediation goals to which data presented in this report is being compared.

   **Response 2:** The Abstract is rewritten to improve readability as discussed in MDNR comment 2. The rewrite includes inserting a sentence equivalent to the quoted one.

3. Abstract, Regulatory Requirements/Remediation Goals (RGs), page i, first paragraph. The first sentence states, "*Per the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] 300.430), protectiveness is achieved when the additional lifetime risk to an individual is generally less than 1 x $10^{-4}$.*" This statement does not appear to be consistent with 40 C.F.R. § 300.430. If the intent of the statement is to describe requirements in the National Contingency Plan (NCP) that relate to establishing protective remediation goals, please revise the sentence for consistency with 40 C.F.R. § 300.430(e)(2)(i)(A)(2). It states, "*For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual between $10^{-4}$ and $10^{-6}$ using information on the relationship between dose and response.*"

   **Response 3:** The portion of the NCP quoted by the USEPA in the comment does not contain all of the relevant text necessary for context and understanding of the regulation regarding CERCLA protectiveness. The USACE writes FSSEs to be focused on the information unique to that document. The USACE does not copy large of amounts of referenced material into its FSSEs and does not consider repeating all this regulatory text to be necessary for the FSSE. In this case, the FSSE is summarizing the effect of the NCP to restrict risk to generally less than $10^{-4}$.

4. Abstract, Regulatory Requirements/Remediation Goals (RGs), page i, first paragraph. The last sentence in this paragraph states that the risk range used to evaluate overall protectiveness of human health and the environment, as specified in the National Contingency Plan, does not include a consideration of risks from site related contaminants that are naturally occurring. This sentence does not appear to be consistent with the NCP and related EPA guidance documents. *See* "Role of Background in the CERCLA Cleanup Program," OSWER Dir. No. 9285.6-07P (Apr. 26, 2002), available at https://www.epa.gov/risk/role-background-cercla-cleanup-program.

   **Response 4:** The cited guidance is focused on baseline risk assessments, which are conducted early in the CERCLA process before the ROD. Within the context of a post-ROD FSSE, the statement is consistent with the guidance document, which states, "Background information is important to risk managers because the CERCLA program, generally, does not clean up to concentrations below natural or anthropogenic background levels."

5. Abstract, Results, page ii, first bullet. For clarity, the EPA recommends that this bullet provide the actual additional lifetime risks determined for each receptor scenario that was evaluated, rather than presenting it only as a fraction.

**Response 5:** Please see the response to MDNR comment 2. The intention of the Abstract is to summarize the report using language that is reader-friendly to the general public. Because scientific notation may not be understood by all, the results are reported as a fraction of the protectiveness level. For those more familiar with scientific notation, the values are provided in other sections of the FSSE.

6. Abstract, Results, page ii, third bullet. This bullet states that background radioactivity from structural materials and short-lived radon decay products was not subtracted from results for alpha radioactivity and beta radioactivity. However, the alpha and beta radioactivity RG specified at the top of the page is defined as 2,800 and 6,000 dpm/100 $cm^2$ above ambient background levels. The EPA requests that the text be revised to clarify the intended meaning of this statement in third bullet.

   In addition, the bullet states that these results are within the expected range of natural background levels. However, the first two sentences state that the greatest alpha and beta radioactivity from fixed point surface measurements were one-ninth and one-half of their respective protectiveness RG. It could be inferred from these statements that some measurements were slightly above background because RGs are defined in excess of background. The EPA recommends that this bullet be revised for clarity. Lastly, the EPA recommends that a separate bullet be included for the conclusion regarding measurements of radioactivity in removable dust from swipe samples. The EPA recommends additional context be added so that it is clear to the public that none of the measurements exceeded minimum detectable activities (MDAs) and how low the MDAs are compared to RG.

   **Response 6:** The Abstract is revised to address the imperfect subtraction of background from the measurements. Additional explanation regarding the types of background radioactivity involved in surface measurements and sample analysis is added to Section 2.0. Another bulleted entry is added in the Abstract Results box to address the swipe results for removable radioactivity.

7. Abstract, Results, page ii, fourth bullet. This bullet states that dust/pavement sediment samples were consistent with background soil samples collected from non-impacted areas. The EPA requests that a reference or footnote be added to provide additional information on the background data used for this comparison.

   **Response 7:** The soil background reference area data is added to Appendix D as Table D-10 and is referenced in the main text of the document.

8. Section 3.1 [now Section 3.2], page 10, lines 14-17. Other than the last bullet in the results portion of the abstract, these three sentences appear to be the only portion of the report that discusses the surface dust and pavement sediment sampling results and the associated background comparison. The EPA acknowledges that lines 25-31 of page 5 explain that the surface dust/pavement sediment locations were chosen based on USACE staff identifying locations with *"higher potential for radioactivity to collect surface dust and pavement sediment"* and to *"investigate and collect dust samples at indoor locations examined as part of the recent allegations."* Because this data provides a line of evidence as to whether any site-related contamination is present inside the Jana Elementary building and the surrounding grounds, the EPA requests that this text be expanded to further describe how this data was evaluated, what was determined from the evaluation, and whether the sampling showed any evidence of site-related contamination. In addition, the EPA believes it would be useful to provide an explanation as to why soil background was selected as a comparison tool for these dust and pavement sediment samples. Lastly, as requested in the preceding comment, the EPA

also recommends that additional information be included in the report related to the background reference areas described in footnote 5, such as a table of background data.

**Response 8:** Please see the responses to USEPA comments 1 and 7.

9. Section 3.2 [now Section 3.3], page 11, lines 5-10. These sentences refer to residual MED/AEC material and actual MED/AEC-related risk related to the sample results and measurements taken at Jana Elementary by USACE. However, the EPA notes that the results section of the abstract states that the fixed-point surface measurements "*are within the expected range of natural background levels.*" In addition, the greatest dust/pavement sediment sample "*was consistent with background soil samples*". Similar conclusions are repeated on lines 38-39 of page 9 and on line 14-17 of page 10. The EPA recommends USACE consider adding a sentence to this paragraph to clarify whether the investigation summarized in the report identified any evidence of the presence of MED/AEC radiological materials.

   **Response 9:** The word "residual" is removed from discussion of these structure surfaces because that term is inconsistent with the data. The following sentence is added to Section 3.2, "Although the evaluation in the previous section identified no evidence that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces, Appendix G contains a risk and dose assessment for these structure surfaces."

10. Section 4.0, General Comment. Similar to the preceding comment for Section 3.2 [now Section 3.3], the EPA recommends USACE consider adding a sentence to this paragraph to clarify whether the investigation summarized in the report identified any evidence of the presence of MED/AEC radiological materials and whether the information in the report is consistent with the preliminary results information released in November 2022.

    **Response 10:** The following sentence is added to the end of the first paragraph in Section 4.0: "Further, no evidence was identified that radioactivity from historical MED/AEC operations has been relocated from areas with MED/AEC radioactivity to these structure surfaces."

11. Appendix A, Key Observations, page 2, second bullet. The EPA recommends Savannah River National Laboratory (SRNL) clarify what is meant by "passed for the primary radiological dose hazard (radon) from naturally occurring uranium and thorium radiological material." The EPA believes it would be helpful to specify a reference level for this comparison or provide a reference where such a comparison level is specified.

    **Response 11:** This comment was provided to SRNL who issued Revision 1 of their review.

12. Appendix A, Key Observations, page 2, fifth bullet. The EPA recommends this bullet be revised for clarity because it could be misinterpreted to mean that all portions of the Jana Elementary School property extending into Coldwater Creek need to be remediated. It appears the bullet is meant to convey that the Kaltofen Report cites sample results that exceed remediation goals for the North County FUSRAP Sites but does not specify that these samples were collected by USACE from the subsurface of a portion of the bank of Coldwater Creek within Jana Elementary property as opposed to the school building or the immediate surrounding grounds, such as playground areas or walkways.

    **Response 12:** This comment was provided to SRNL who issued Revision 1 of their review.

13. Appendix A, Key Observations, page 2, sixth bullet. Given that the Kaltofen Report discussed sample results for multiple radioisotopes, the EPA believes it would be useful to list the specific isotopes that SRNL has concluded are not attributable to the "*Mallinckrodt Chemical Work*

*Processes that contaminated the Coldwater Creek FUSRAP site.*" Based on information included in the last paragraph on page 8 of this memo, it appears that this bullet may be referring to "*metallic thorium*" and "*Cs-137.*" The EPA recommends revising the bullet for clarity.

**Response 13:** This comment was provided to SRNL who issued Revision 1 of their review.

14. Appendix A, Key Observations, page 3, top of the page. This bullet states, "Samples collected from Coldwater Creek do not contain Ra-226 (the parent of Rn-222) levels above the EPA guidelines of 5 pCi/g." It is unclear if this bullet is meant to refer to all the samples collected from any part of Coldwater Creek within the site boundaries or specifically to the samples collected from the portion of Coldwater Creek that is within the Jana Elementary property boundary. The EPA recommends SRNL revise the statement for clarity.

    **Response 14:** This comment was provided to SRNL who issued Revision 1 of their review.

15. Appendix A, page 4, paragraph continuing from the previous page. The EPA acknowledges and agrees with SRNL's statement that the Ra-226 + Ra-228 and Th-230 + Th-232 limits of 2.9 pCi/g were preliminary remediation goals (PRGs) included in the February 6, 2018, Proposed Record of Decision (ROD) Amendment for Operable Unit 1 of the West Lake Landfill Superfund Site. The EPA also notes the Proposed ROD Amendment specifies that these PRGs were proposed for the Buffer Zone and Lot 2A2 portions of the West Lake Landfill Site, that these PRGs were based on a previous estimate of background for the Site, and that background was expected to be further evaluated as part of the remedial action. The EPA suggests SRNL consider whether any of this information is relevant to include in this paragraph.

    The paragraph also states that SRNL did not have access to the amended Record of Decision for OU-1 of the West Lake Landfill so the limits discussed in the paragraph could not be validated. The September 30, 2018, Record of Decision Amendment (RODA) for OU-1 of the West Lake Landfill Site is publicly available at the West Lake Landfill Site profile page. (https://semspub.epa.gov/work/07/30356608.pdf) For awareness, information regarding the remediation of the Buffer Zone and Lot 2A2 portions of the Site can be found on pages 40, 9 and 70. EPA also notes that background characterization was conducted for the North St. Louis County FUSRAP sites, which includes Coldwater Creek, and is also publicly available.

    **Response 15:** This comment was provided to SRNL who issued Revision 1 of their review.

16. Appendix A, page 4, first full paragraph. The "Directive" being referred to in the first sentence of this paragraph is not clear. The previous paragraph discusses two EPA directives (9200.4-25 and 9200.4-35P). The EPA recommends that the text be revised to name the specific directive for clarity. In addition, the sentence states that applicable or relevant and appropriate requirements, or ARARs, can be developed for the individual CERCLA sites. However, site- specific ARARs are derived from existing Federal and more stringent state environmental laws. CERCLA requires remedial actions to comply with ARARs unless a waiver is justified. However, identification and selection of ARARs is conducted on a site-by-site basis, similar to the establishment of remediation goals. The EPA acknowledges that some of the site-specific remediation goals for the North St. Louis County FUSRAP sites were developed on the basis of the identified ARARs as the remainder of the paragraph describes. The EPA requests this sentence be reviewed and revised for accuracy.

    **Response 16:** This comment was provided to SRNL who issued Revision 1 of their review.

17. Appendix A, page 5, last paragraph. This paragraph states, "*The Kaltofen Report claims the average of these 84 samples had Th-230 levels averaging 6.18±1.46 pCi/g. However, these levels are not above the USACE RGs for this FUSRAP Site and consequently not over EPA guidelines.*" It is not clear what is meant by "*EPA guidelines*" in this sentence. The EPA acknowledges that the average level of Th-230 listed in these sentences is below the remediation goals established in the 2005 Record of Decision for the North St. Louis County FUSRAP sites. The EPA recommends this sentence be revised for clarity.

    **Response 17:** This comment was provided to SRNL who issued Revision 1 of their review.

18. Appendix A, page 6, last paragraph. This paragraph states, "*All the Ra-226 and Ra-228 measurements were well below the EPA protective health-based level of 5 pCi/g for surface soils.*" It appears this sentence is meant to refer to the EPA UMTRCA regulations in 40 C.F.R. § 192.12(a) which states, "*The concentration of radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than – (1) 5 pCi/g, average over the first 15 cm of soil below the surface.*" For clarity and consistency with the rest of the memorandum, the EPA recommends adding the words "*above background*" after "*5 pCi/g*" in this sentence.

    **Response 18:** This comment was provided to SRNL who issued Revision 1 of their review.

19. Appendix A, page 6, last paragraph. This paragraph states, "*NUREG CR2722 clearly indicated Ra-226 is not in radio-equilibrium with Th-230 as it is more mobile in the environment.*" No specific citation within NUREG CR2722 is provided to support this statement. The EPA acknowledges that NUREG CR2722 discusses the disequilibrium of Th-230 and Ra-226 of radiological contaminants at the West Lake Landfill Site in at least two places (the top of page 14 and the paragraph that spans pages 20-21). However, neither paragraph discusses the mobility of either radionuclide within the environment. The latter reference in NUREG CR2722 states, "*It is likely that high concentrations of thorium resulted from separation of both uranium and radium from the ores, thus 'depleting' the ores of uranium and radium, or 'enriching' the residues in thorium.*" While the EPA believes it would be more appropriate to evaluate the potential for disequilibrium of radioactive contaminants in Coldwater Creek from site-specific data presented in associated reports for the North St. Louis County FUSRAP sites, the EPA at least recommends revising this discussion for consistency with the cited reference.

    **Response 19:** This comment was provided to SRNL who issued Revision 1 of their review.

20. Appendix A, Page 6, Last Paragraph. This paragraph states, "*The EPA guidance is less clear for a protective health-based level for the sum of Th-230 and Th-232 as these isotopes are less radio-toxic than Ra-226 and Ra-228.*" It is not clear what EPA guidance is being referred to in this sentence. The EPA has issued several guidance documents pertinent to CERCLA sites with radioactive contaminants, which are available at the following Web site: https://www.epa.gov/superfund/radiation-superfund-sites. Specifically, OSWER Directive 9200.4-25 provides guidance for establishing remediation goals for Th-230 and Th-232 at sites for which the Ra-226 cleanup standard in 40 C.F.R. § 192.12 was determined to be relevant and appropriate. The EPA requests that this statement be removed from the memorandum.

    **Response 20:** Response to be provided by SRNL.

21. Appendix A, page 7, last paragraph. The last sentence states, "*All of the Jana radon test results showed radon levels well within EPA guidelines.*" The EPA requests that the sentence specify that 4 pCi/L is the EPA's recommended Radon action level for schools (https://www.epa.gov/radon/radon-schools) if that is the intended reference.

**Response 21:** This comment was provided to SRNL who issued Revision 1 of their review.

22. Appendix A, Summary Assessment, page 9. The paragraph states, "*The Eberline data from the school samples provided in the Kaltofen Report for the Th-230 and Ra-226 isotopes being remediated in Coldwater Creek were all within EPA guidelines.*" Again, the EPA recommends that this sentence specify the relevant EPA guidelines to provide additional clarity. In addition, the paragraph also refers to, "*EPA guidelines for acceptable radon levels in a public facility.*" As requested in the previous comment, the EPA recommends that the sentence specify the EPA's recommended Radon action level for schools (4 pCi/L) if that is the guideline being referenced in this sentence.

    **Response 22:** This comment was provided to SRNL who issued Revision 1 of their review.

23. Appendix D, Tables D-1 through D-8. The EPA requests that additional information be added to these tables related to the MDAs for the fixed-point gross alpha and gross beta measurements. The EPA acknowledges that this information is summarized on lines 42 and 43 of page 7 of the report. The EPA believes that inclusion of this information within these tables will make them more complete and improve transparency.

    **Response 22:** Table D-1 through D-8 are updated to include the MDCs for the fixed-point measurements.

24. Appendix D, Tables D-1b, D-3b, and D-4b. These tables appear to include the results from the 19 swipe samples described on page 6, lines 6 through 8. Because these results were not determined using the same analytical testing method as the gross alpha and gross beta results, the EPA recommends that a footnote be added to these tables specifying the analytical testing method utilized for the Pb-210 measurements.

    **Response 24:** The footnotes to these tables are revised to include information about the analysis for the lead-210 content on the swipes.

25. Appendix D, Table D-9. The EPA requests this table include or provide a reference for the remediation goals, methodology, and supporting equations used to calculate the net sum of ratios (SORN) included in the far-right column. For example, Final Status Survey Evaluation reports for floodplain properties along Coldwater Creek typically include the SORN equations in notes at the bottom of the Soil Sample Analytical Data tables. The EPA recommends including a table similar to the "Minimum Detectable Contraction (MDC) limits for Soil Samples" table included in most Final Status Survey Evaluation reports which shows the ratio of the maximum MDC to the remediation goal.

    **Response 25:** The $SOR_N$ equation and a row for the maximum MDC to RG ratio are added to Table D-9.

26. Appendix F, page F-2, lines 3-5 [now Appendix G]. This sentence states, "For RESRAD-BUILD, the exposure pathways applicable to the radiological risk and dose assessment for the receptor scenarios are external gamma, ingestion of removal material (e.g., dusts, soil, etc.), and inhalation of particulates." Based on a review of the RESRAD-BUILD output, it appears that inhalation and exposure to radon gas is also included in the risk/dose assessment. For increased clarity, the EPA requests the sentence be revised to state that radon was also included in the evaluation.

    **Response 26:** The sentence is revised to list the pathways identified in the output file. Because the pathways are dependent on the input parameters, the sentence is relocated following Table F-4 [now Table G-3].

27. Appendix F, page F-3, Table F-1 [now Appendix G]. Footnote "g" contains a typographical error in the expression "150 $m^3$/hour."

    **Response 27:** The typographical error is corrected.

28. Appendix F, page F-4, Table F-2 [now Appendix G]. Footnote "b" states, "These radionuclide-specific DCGLs are from the ROD (USACE 2005), except for Pb-210, which is calculated in the same manner as the rest." The EPA requests that the Pb-210 calculations be added to the report or another document (such as the Final Status Survey Plan) as soon as possible and referenced in this report.

    **Response 28:** The FSSP Appendix D (USACE 2015) is updated to contain the calculations for the lead-210 DCGL and contain the updated activity fraction calculations requested in MDHSS comment 1. This FSSE is revised to reference the FSSP for that information.

29. Appendix F, page F-4, Table F-2 [now Appendix G]. Footnote "c" states the Coldwater Creek activity fractions were developed in part based on factors from table D-2 in the Feasibility Study, which was based on data from the HISS/Futura portion of the site. It further states that the Coldwater Creek activity fractions can be refined with more data collected since the finalization of the Feasibility Study. The EPA recommends that USACE proceed with this refinement as soon as possible.

    **Response 29:** Please see the responses to USEPA comment 28 and MDHSS comment 1.

30. Appendix F, page F-6, fourth bullet [now Appendix G]. This bullet lists "Ac-228, Pa-231, and Th-232" as example radionuclides with higher risk factors. Based on Table F-2, "Ac-228" apparently should be "Ac-227." Review and revise the text as necessary.

    **Response 30:** While the USACE agrees Ac-227 was intended, the updated activity fractions discussed in other comment responses make this sentence unnecessary, so it is deleted.