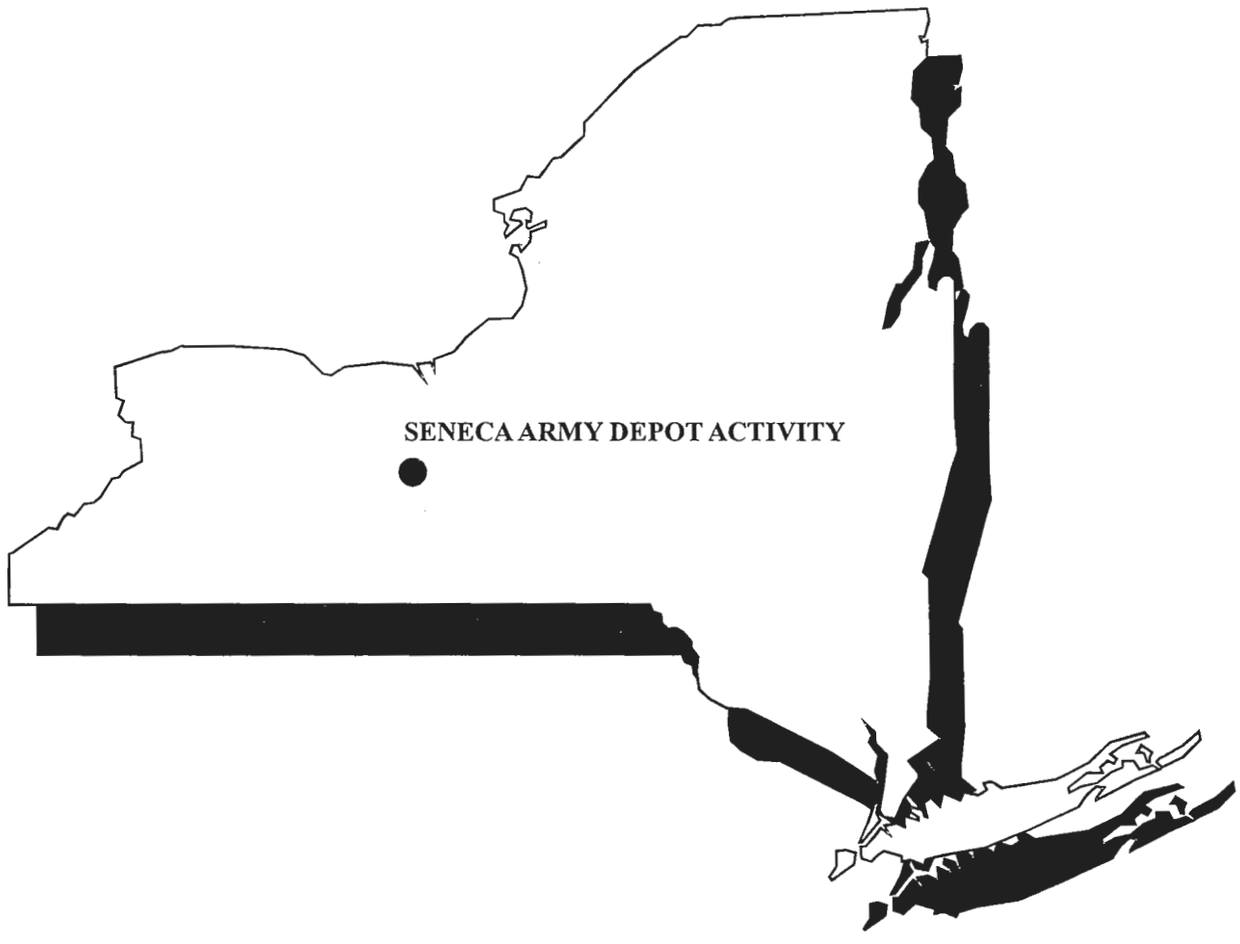
# U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

01323




# FINAL
# RADIOLOGICAL SURVEY REPORT - SEAD-12
## PHASE I AND PHASE II SURVEYS
## VOLUME I - REPORT

CONTRACT NO. DACA87-95-D-0031
DELIVERY ORDER NO. 0005

MARCH 2003
PARSONS

# DRAFT
# RADIOLOGICAL SURVEY REPORT
# SEAD-12

Prepared For:

SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

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Contract Number DACA87-95-D-0031
Delivery Order # 5
730047

August 2002

# TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF APPENDICES

## LIST OF ACRONYMS

| | |
|---|---|
| A | Alpha Radiation |
| Am | Americium |
| AEC | Atomic Energy Commission |
| AEHA | Army Environmental Hygiene Agency |
| Ag | Silver |
| ALARA | As Low As Reasonably Achievable |
| ANSI | American National Standards Institute, Inc. |
| ASTM | American Society for Testing and Materials |
| Au | Gold |
| B | Beta Radiation |
| BKGD | Background |
| C | Carbon |
| Ca | Calcium |
| CB | Concrete Block |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| Cd | Cadmium |
| CFR | Code of Federal Regulations |
| Ci | Curie |
| Cl | Chlorine |
| Cm | Curium |
| cm | Centimeters |
| cm/sec | Centimeters per second |
| Co | Cobalt |
| cpm | counts per minute |
| Cr | Chromium |
| Cs | Cesium |
| DCGL | Derived Concentration Guideline Level |
| $DCGL_{emc}$ | Derived Concentration Guideline Level for Elevated Measurement Comparisons |
| $DCGL_w$ | Derived Concentration Guideline Level for Wide Area Contamination |
| DOE | Department of Energy |
| DOT | Department of Transportation |
| dpm | Disintegrations Per Minute |
| dps | Disintegrations Per Second |
| DQO | Data Quality Objective |
| DU | Depleted Uranium |
| EE/CA | Engineering Evaluation/ Cost Analysis |
| EMC | Elevated Measurement Comparison |

| | |
|---|---|
| EPA | Environmental Protection Agency |
| ESI | Expanded Site Inspections |
| Eu | Europium |
| Fe | Iron |
| FIDLER | Field Instrument for the Detection of Low Energy Radiation |
| FM | Floor Monitor |
| FS | Feasibility Study |
| ft | Feet |
| ft/sec | Feet per second |
| ft/yr | Feet per year |
| G | Gamma Radiation |
| H3 | Tritium |
| HPS | Health Physics Society |
| HSA | Historic Site Assessment |
| I | Iodine |
| IAG | Interagency Agreement |
| In | Indium |
| Ir | Iridium |
| IRDC | Ionizing Radiation Dosimetry Center |
| KeV | Kilo-electron volts |
| m | meter |
| MARSSIM | Multi-Agency Radiological Survey and Site Investigation Manual |
| MDA | Minimum Detectable Activity |
| MDC | Minimum Detectable Concentration |
| mg | Milligram |
| mg/l | Milligram per liter |
| mg/kg | Milligrams per kilogram |
| mL | Milliliter |
| Mn | Manganese |
| mrem | milli-Roentgen equivalent man |
| mrem/yr | milli-Roentgen equivalent man per year |
| mR | Milli-Roentgen |
| Na | Sodium |
| NA | Not analyzed or not available |
| Nb | Niobium |
| NaI | Sodium Iodide |
| NBS | National Bureau of Standards |

| | |
|---|---|
| Ni | Nickel |
| NIST | National Institute of Standards |
| Np | Neptunium |
| NRC | Nuclear Regulatory Commission |
| NRC | Nuclear Regulatory Commission |
| NYCRR | New York Code of Rules and Regulations |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYSDOL | New York State Department of Labor |
| | |
| P | Plutonium |
| pCi | pico Curies |
| pCi/g | pico Curies per gram |
| pCi/l | pico Curies per liter |
| Pb | Lead |
| Parsons ES | Parsons Engineering Science, Inc |
| Pm | Promethium |
| Po | Polonium |
| ppm | parts per million |
| Pu | Plutonium |
| | |
| QA | Quality Assurance |
| QA/QC | Quality Assurance/Quality Control |
| QC | Quality Control |
| | |
| Ra | Radium |
| rad | Radiation absorbed dose |
| RAGS | EPA Risk Assessment Guidance for Superfund |
| RCRA | Resource Conservation and Recovery Act |
| rem | Roentgen equivalent man |
| rem/yr | Roentgen equivalent man per year |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| Rn | Radon |
| ROC | Radionuclide of Concern |
| Ru | Ruthenium |
| | |
| Sb | Antimony |
| SEAD | Seneca Army Depot (old name) |
| SEDA | Seneca Army Depot Activity |
| sec | Seconds |
| SOW | Statement of Work |
| Sr | Strontium |

| | |
|---|---|
| TAGM | Technical and Administrative Guidance Memorandum |
| Tc | Technetium |
| Th | Thorium |
| U | Uranium |
| UCL | Upper Confidence Level |
| ug/g | Micrograms per gram |
| ug/kg | Micrograms per kilogram |
| ug/mg | Micrograms per milligram |
| ug/L | Micrograms per liter |
| uR | micro Roentgen |
| urem/hr | micro Roentgen per hour |
| URSA | Universal Radiation Spectrum Analyzer |
| USACE | United States Army Corps of Engineers |
| USAEHA | United States Army Environmental Hygiene Agency |
| USATHAMA | United States Army Toxic and Hazardous Materials Agency |
| USDA | United States Department of Agriculture |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| UST | Underground Storage Tank |
| UTL | Upper Threshold Limit |
| WRS | Wilcoxon Rank Sum Test |
| WSA | Weapons Storage Area |
| Zn | Zinc Sulfide |
| ZnS | Zinc Sulfide |

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# 1 INTRODUCTION

## 1.1 PURPOSE OF REPORT

This report presents the findings of both Phase I and Phase II radiological surveys for buildings within the Former Weapons Storage Area (WSA), SEAD-12, at the Seneca Army Depot and serves as both the characterization survey and the final status survey. Phase I of the radiological investigation at SEAD-12 includes surveys of the buildings and rooms most likely to have been impacted by previous radiological activities at the site. Results from Phase I are reported in an interim report, Radiological Survey Report, Class I & II Buildings (Parsons ES, July 2000). Phase II of the radiological investigation at SEAD-12 includes surveys of the remaining buildings, in situ gamma spectroscopy on Phase I and Phase II buildings, the material sampling for Phase I and Phase II buildings, and the conclusions for the final status survey of all the SEAD-12 buildings.

The radiological surveys were conducted as part of the Remedial Investigation/Feasibility Study (RI/FS) for the site. The scope of this work is outlined in the SEAD-12 and SEAD-63 Project Scoping Plan for Performing a CERCLA Remedial Investigation/Feasibility (RI/FS) (Parsons ES, June 1998). Results of Remedial Investigation (RI) activities within SEAD-63 and the remainder of SEAD-12 (excluding the building radiological investigations) have been reported separately in the SEAD-63 Engineering Evaluation/Cost Analysis (EE/CA) (Parsons ES, Oct. 2001) and the SEAD-12 RI Report (Parsons ES, Feb. 2002)

This report incorporates the results and the conclusions presented in the interim report (Parsons, July 2000) with results of the radiological survey investigations of the remaining Class II buildings and all Class III buildings surveyed during Phase II of the investigation. The buildings investigated, as shown in **Figure 1-1,** are:

Phase I Investigation:

- Building 803
- Building 804
- Building 805
- Building 810 (the receiving room)
- Building 812 (the ammunition storage room)
- Building 815 (room 15)
- Building 816 (rooms 8, 9 and 10)
- Building 819

Phase II Investigation:

- Building 800
- Building 802

- Building 806
- Building 807
- Building 809
- Building 810 (except for the receiving room)
- Building 812 (except for the ammunition storage room)
- Building 813
- Building 814
- Building 815 (except for room 15)
- Building 816 (except for rooms 8, 9 and 10)
- Building 817
- Building 823
- Building 824
- Building 825
- Building 827

This report presents an overview of the instrumentation and methods used to collect the radiation scanning data, the data results and statistical interpretations using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) protocols, and proposed conclusions for the building survey areas at SEAD-12.

The findings of this report are based on building guideline values, referred to in MARSSIM as Derived Concentration Guideline Levels (DCGLs). DCGLs are defined in MARRSIM as residual levels of radioactive material that correspond to allowable radiation dose standards and are developed based on site-specific release criteria, in this case for the buildings. In the case of SEAD-12, the release criteria selected are based on the NYSDEC TAGM of 10 mrem/yr as an acceptable dose equivalent exposure. The Derived Concentration Guideline Level (DCGL) Development for Radiological Surveys in Class I Buildings at SEAD-12 report (Parsons ES, Jan. 2000) describes the development of DCGLs used in this report. This DCGL report, which was updated based on communications between the Army, Parsons, NYSDOH, NYSDEC, and USEPA, is included as **Appendix A** of this report with the revised values presented with the data in **Section 4**.

The remainder of **Section 1** provides a history of the site, a history of the buildings investigated as well as their radiological classification based on historical use. **Section 2** describes the classification system employed for the building work and how each building fits in the system. **Section 3** describes the radionuclides of concern and the instruments and field methods used to detect them. **Section 4** describes the compliance statistics that were generated in evaluating the survey data collected in the buildings in accordance with MARSSIM. **Section 5** discusses conclusions and recommendations for the final status survey based on the surveys and sampling within the buildings presented in this report.

## 1.2 SITE HISTORY

This SEAD-12 site history is derived from a report documenting historical information about the Deep Creek Air Force Station (now the Fairchild Air Force Base), a trip-report prepared by Sandia National Labs in 1994, reviews of all declassified and/or unclassified Seneca Army Depot Activity (SEDA) reports and maps that are currently known to exist, aerial photos dating from 1959, 1968, and 1985 and personal communications with SEDA personnel. The information contained in the Deep Creek Air Force Station report is thought to be pertinent to this site investigation because until approximately 1962, all Weapons Storage Area (WSA) facilities nation-wide were controlled and operated by the Atomic Energy Commission (AEC). Also, the design and construction of the buildings used for weapons storage and maintenance at the Deep Creek Air Force Station are identical to those at SEDA.

SEAD-12 occupies the area of the former SEDA WSA. The former WSA was constructed by the U.S. Army Corps of Engineers from mid-1955 to 1957. In 1957, the WSA became operational and the facility was operated jointly by the Army and the AEC up to 1962. After 1962, all activities in the WSA were transferred to the full control of the Army. Activities at several of the facilities in the WSA, in particular Buildings 803, 804 and 819, are relatively well documented for the operational period prior to 1962. Activities and operating practices in the WSA after 1962 are currently classified or unknown. Currently, all buildings in the former WSA are completely demilitarized. The historical use of each building presented in this report is described below.

### 1.2.1 Buildings 803, 804, and 805

Buildings 803, 804, and 805 are located in the northern portion of SEAD-12, and include the area investigated as SEAD-12B during the Expanded Site Investigation (ESI) conducted in 1994. This area was the site of the initial WSA operations. During the period from 1957 to 1962, Building 803 was used for the storage of removable nuclear capsules, Building 804 was used as a maintenance building for removable nuclear capsules, and Building 805 was used as a storeroom. Maintenance activities involved disassembling of nuclear capsules for routine maintenance and cleaning, and for verification of the integrity of the fissile materials. Refer to **Figure 1-2** and **Figure 1-3** for floor plans of Buildings 803, 804, and 805 respectively.

Wastes generated during the processes performed in Building 804 included swipes containing solvents and uranium oxides, butcher paper, gloves, and lead-wire seals. It is estimated that 5 gallons of trichloroethylene, 1 gallon of alcohol and 1 quart of acetone were used annually. From 1957 to 1962, these wastes were stored in a dry waste disposal pit that was located 150 feet north and 28 feet east of Building 805 (the equipment building for Building 804). This dry waste disposal pit was lined with and covered by plywood. Former Sandia National Laboratory personnel reported that the wastes stored in this pit were removed and shipped for disposal whenever the pit was full. It is presumed that these wastes were shipped to Sandia National Laboratories in New Mexico for

disposal, though this has not been confirmed. The dry waste disposal pit was reported to have been excavated by the AEC in 1957, presumably to empty it for continued use, and again prior to their leaving the site in 1962. No data or further information is available on these two excavation events. SEDA personnel later excavated the dry waste disposal pit in 1965 and 1986. Reports from the 1965 and 1986 excavations indicated that no buried wastes were found in the area of the dry waste disposal pit. There are no records of radiological surveys from the 1965 excavation. Field notes from the 1986 excavation indicate that some plywood was unearthed, and laboratory analyses from soil samples and plywood samples reported that there was no residual radioactivity present. A copy of these field notes and the available laboratory analyses are presented in **Appendix B**.

Building 804 has a floor drain system that leads to an emergency holding tank, or underground storage tank (UST) located behind the building. The purpose of the UST was to contain any fissile material in case of an accidental release during maintenance of the nuclear capsules. There are no recorded releases of fissile materials at SEDA during the period from 1957 to 1962. In July of 1986, SEDA attempted to remove the tank. During this removal attempt, a portion of the top of the tank was ripped off. The tank was then back filled in place. The field notes and analysis results from this excavation are included with those from the 1986 dry waste pit excavation in **Appendix B**.

Although the operations performed in Building 804 are not known for the period following 1962, advances in weapons design by the mid-1960's had phased out the use of removable nuclear component capsules, therefore the maintenance activities associated with the nuclear capsules at Building 804 should have ceased. SEDA personnel have indicated that since 1962, the Army did not use Building 803 for nuclear capsule storage or Building 804 for nuclear capsule maintenance. Since at least the mid-1980s, Building 803 was used by the Army as a holding area for containerized radioactive wastes. Building 804 was occupied by the WSA Security Systems Maintenance Division.

### 1.2.2 Building 806

When the former WSA was active, Building 806 was used as a training center for radiological assistance team personnel. Room number 1 in Building 806 was used as a calibrations laboratory to calibrate and function check radiation scanning instruments with sealed radioactive sources. Refer to **Figure 1-4** for the floor plan of Building 806.

### 1.2.3 Building 810

Building 810, **Figure 1-5,** was used as a transfer area for military items that entered and exited the WSA. It was used for this purpose from the inception of the WSA in 1957 to the final demilitarization of the WSA in 1996. All military items arriving at and leaving from the WSA were sealed in specially designed containers that were then packed in Department of Transportation compliant transport containers. Only the loading and unloading area (receiving room, room 810-1 on

**Figure 1-5**) of Building 810 would have had sealed military items present that could have had radioactive materials within them. This area is located in the center of the northern portion of the building and measures approximately 50 feet by 28 feet. Also included in the receiving room area is the exterior loading dock area, measuring approximately 50 feet by 16 feet. No other areas of Building 810 were used to store or hold shipping containers that could have contained radioactive materials.

### 1.2.4 Building 812

Building 812 was used as the command structure for all security operations within the former WSA. When the WSA was active, all security activities including communications, monitoring, patrolling, and security weapons storage were coordinated and controlled from Building 812. Room 32 in Building 812 was used to store military equipment containing sealed radioactive sources as integral components. Refer to **Figure 1-6** for the floor plan for Building 812.

### 1.2.5 Buildings 815 and 816

Buildings 815 and 816 were constructed to maintain non-nuclear components of the weapons stored in the WSA. Activities up to 1962 included inspection and testing of non-nuclear mechanical and electrical systems. Following 1962, and up to approximately 1992, these buildings were used for classified maintenance functions. The actual operations that occurred in these buildings remain classified. Discussions with SEDA personnel indicate that any maintenance or quality assurance operations performed on military items that may have contained radioactive materials would have been done with those radioactive materials still sealed within those military items. The only radioactive material that would not have been considered sealed would have been metal parts that were fabricated with alloys containing U-238 and/or U-235. Once any maintenance or quality assurance operations were completed on any given military item, the item was immediately returned to and sealed in its shipping container. All military items were transported and stored in their sealed shipping containers. It should be noted that it was not Army policy to perform swipe sampling or radiation surveys on the shipping containers and these activities were not performed at SEDA. Refer to **Figure 1-7** and **Figure 1-8** for floor plans of Buildings 815 and 816 respectively.

After approximately 1992, Buildings 815 and 816 were used to de-militarize non-nuclear components as part of the nuclear stockpile reduction effort.

### 1.2.6 Building 819

From 1957 to 1962, Building 819 was used as a quality assurance inspection laboratory and was used by Sandia National Laboratories under contract to the AEC. For the period after 1962, Building 819 was likely used for similar quality assurance inspection purposes. During a site visit to Building 819

in 1994, it was being used for the storage of office furniture. Presently, the building is completely de-militarized. Refer to **Figure 1-9** for the floor plan for Building 819.

### 1.2.7 Additional SEAD-12 Buildings

The remaining buildings located within SEAD-12 were used for non-radiological and non-munitions related activities. According to historic reports (Woodward-Clyde, 1997) the uses of the remaining buildings are as follows:

- Building 800 was used as a security check-point building for access into SEAD-12 via the north-northwest section of SEDA;
- Building 802 was used as an administrative office;
- Building 807 was used as a supply support shop;
- Building 809 was used for flammable storage;
- Building 813 was used as a storage workshop;
- Building 814 was used as a spray painting facility for painting vehicles;
- Building 817 was used as a utility building;
- Building 823 was used as a general purpose magazine depot;
- Building 824 was used as a railway loading platform; and
- Building 825 was used as a non-hazardous warehouse.

Refer to **Figures 1-10** through **1-19** for floor plans of these buildings.

### 1.2.8 Background Buildings

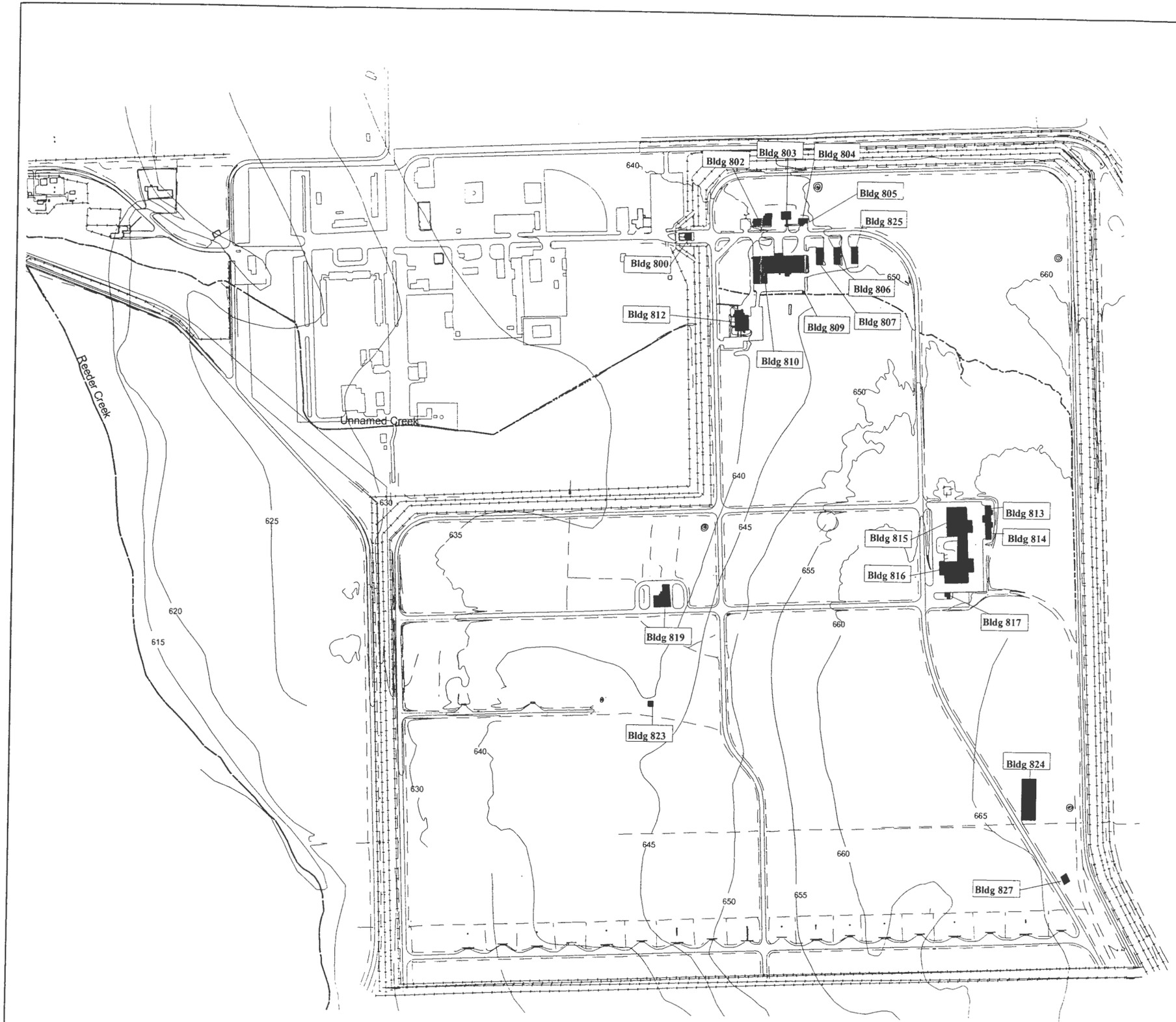
The criteria for the selection of background buildings included: documentation that the building was not used in the handling or storage of radionuclides, and similar construction to the buildings being scanned in SEAD-12. Building 722, Igloo C0912, and Building 2104 were selected for the collection of background scanning data.

Igloo C0912 is located approximately 2 miles south of SEAD-12, near the west-end of Igloo Road 23. Igloo C0912 was selected for the collection of background scanning survey data for Building 803, because both have similar reinforced concrete construction and soil covered roofs.

Building 722 is located in the administrative area north-northwest of SEAD-12. Survey measurements from this building were used for background comparisons to the buildings included as part of the Phase I and Phase II surveys, (except Building 803). These buildings are of similar construction of reinforced concrete combined with block and mortar construction. Additionally, Building 722 had similar wall and floor coverings to those found in the SEAD-12 buildings (including painted concrete block, wallboard, paneling, and porcelain).

The property where Building 722 was located was transferred subsequent to the collection of the data for the Phase I survey, and the building was demolished. Consequently, an alternate reference building, which was Building 2104, was used during Phase II of the investigation for collection of background material samples and in situ gamma spectroscopy background reference measurements. Building 2104 is located just south west of the "Q" area. This building was built in 1951, within a five-year period of the buildings located at SEAD-12.

Additionally, Building 118, which is located it the administration area by Post 1, was used to collect one spectra for background comparison for in situ gamma analysis. This building was one of few buildings not used for radiological purposes that contained ceramic tile like that found in SEAD-12.




N

## LEGEND

- BUILDINGS
- SEAD 63
- FENCE
- ROADS
- WATER
- DRAINAGE
- 630 GROUND ELEVATION CONTOURS (5 FOOT INTERVALS)

600 0 600
(feet)

**PARSONS**

SENECA ARMY DEPOT ACTIVITY
Remedial Investigaton
SEAD-12

FIGURE 1-1
SEAD-12 BUILDING LOCATIONS

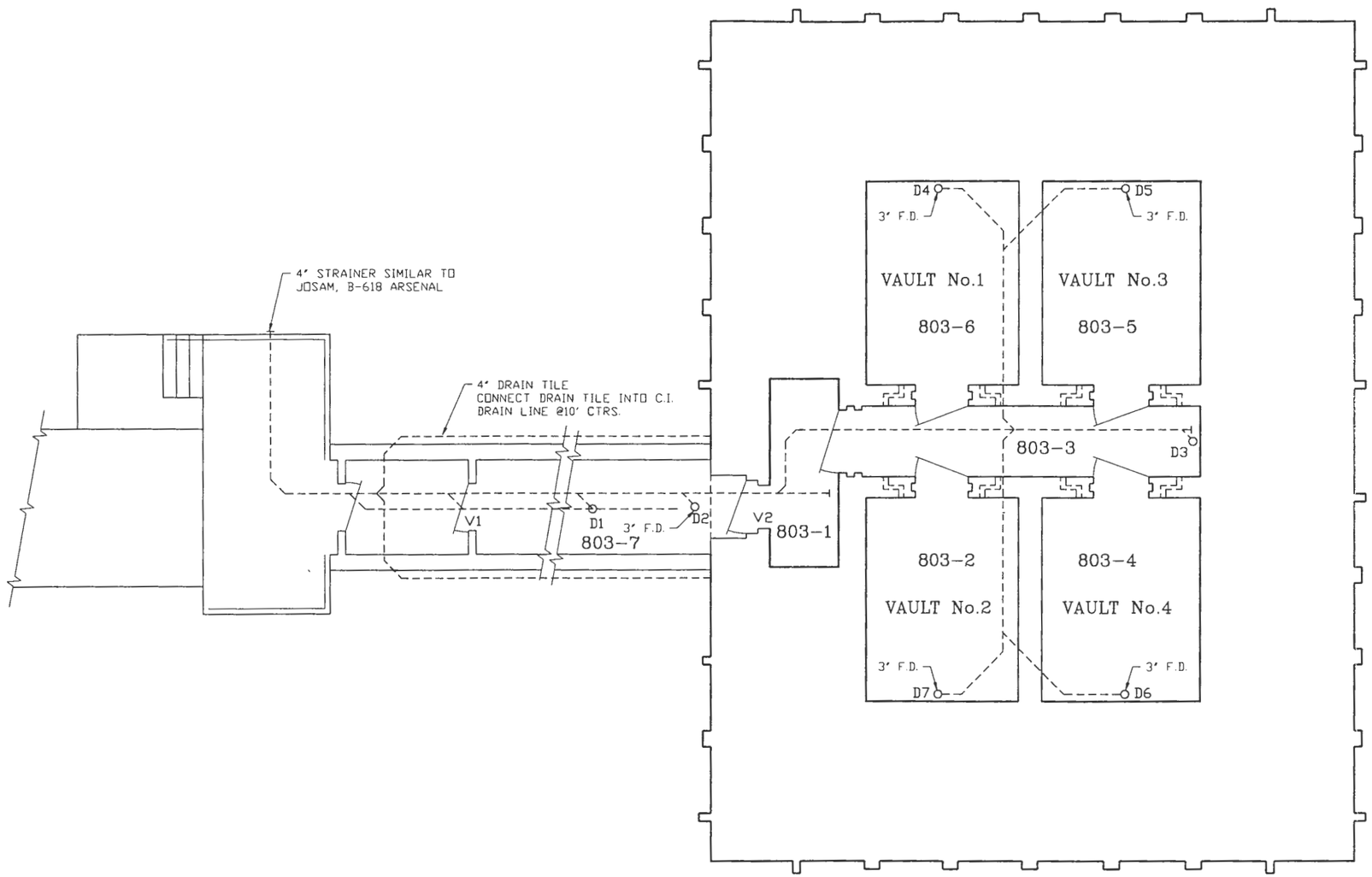
| SCALE | DATE | REV |
|---|---|---|
| 1:600 | FEB 2002 | Sheet 1 of 1 |

O:/AV_GIS30/SENECA/SEAD-12/SAMPLELO/BASEMAP.APR

NOTE:

Entire Building is a Class One Area.

N




BLDG. 803

NOTE(S):

BUILDING INFORMATION REFERENCED FROM BLACK & VEATCH CONSULTING ENGINEERS. DRAWING NO. Y2-300, MAY 2, 1955. REVISED RECORD WORK AS-BUILT 9/5/58.

FEET 0 3 6
METERS 0 1 2

0 4' 8' 12'

(APPROX. SCALE FT.)

PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

| DEPT | Dwg. No. |
|---|---|
| ENVIRONMENTAL ENGINEERING | 7500047-01001 |

FIGURE 1-2
FLOOR PLAN- BUILDING 803

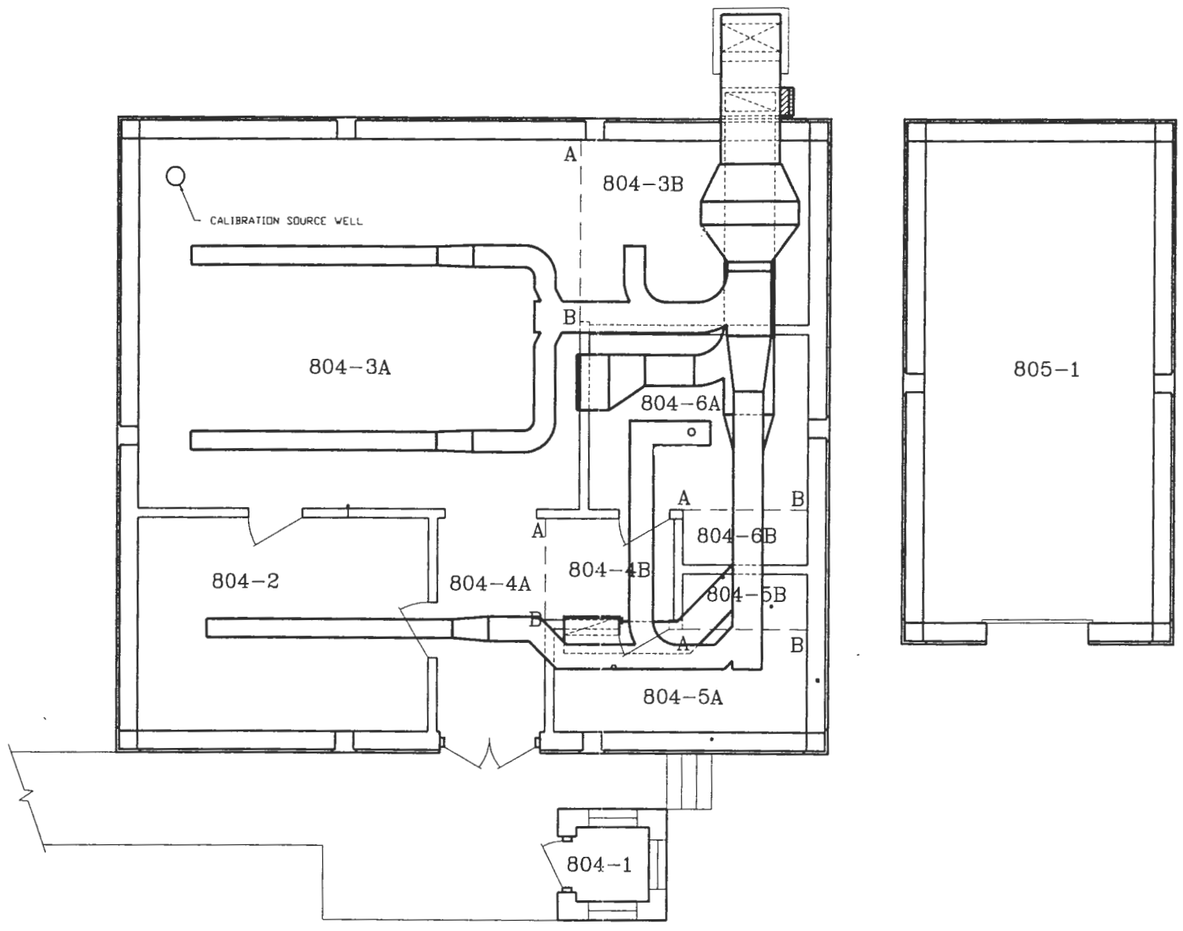
| SCALE | DATE | REV |
|---|---|---|
| AS NOTED | FEBRUARY 2000 | A |

R:\SENECA\RIFS\SD12\BLDG803.DWG

NOTE:

Entire Building is a Class One Area:
2m x 2m GRIDS, 100% COVERAGE
- FLOOR
- WALL SURFACES BELOW 2 METERS
- UNEARTHEN ROOFS WITH DUCTS
- EXTERIOR BUILDING SURFACES 2m FROM ACCESS
- HORIZONTAL SURFACES ABOVE 2m ABOVE FLOOR WHERE DUST OR PARTICLES WOULD DEPOSIT.

1m x 1m GRIDS, 10% COVERAGE
- CEILING (SUSPENDED AND NONSUSCENDED)
- UPPER WALLS (ABOVE 2m)




BLDG. 804 AND 805

NOTE(S):

BUILDING INFORMATION REFERENCED FROM BLACK & VEATCH CONSULTING ENGINEERS. DRAWING NO. Y2-855, MAY 2, 1955. REVISED RECORD WORK AS-BUILT 6/2/58. CAMPBELL DESIGN ARCH./ENG. PLANNERS FLOOR PLANS, DETAIL & SCHEDULES DRAWING NO. 10-87, SHEET M-1, PR. NO. 52-85, DATE: FEB. 18, 87.

FEET 0 3 6
METERS 0 1 2
0 4' 8' 12'
(APPROX. SCALE FT.)

PARSONS

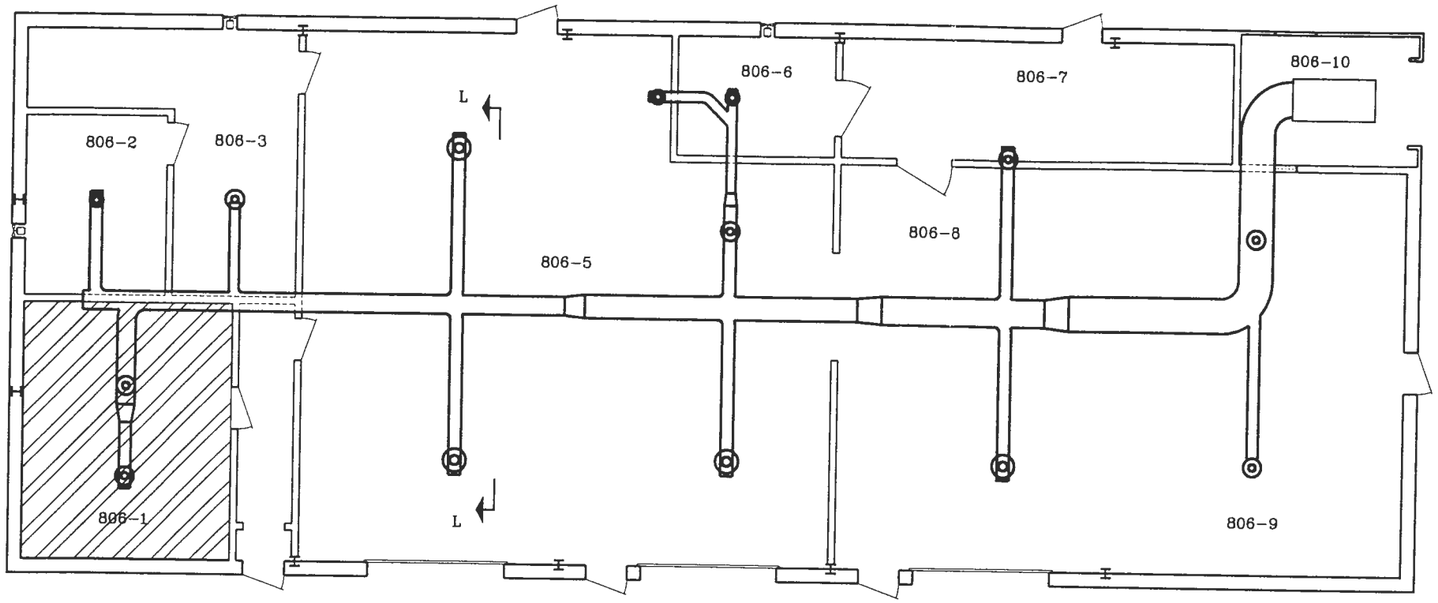
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg. No. 750047-01001

FIGURE 1-3
FLOOR PLAN-
BUILDINGS 804 & 805

SCALE AS NOTED | DATE OCTOBER 1999 | REV A

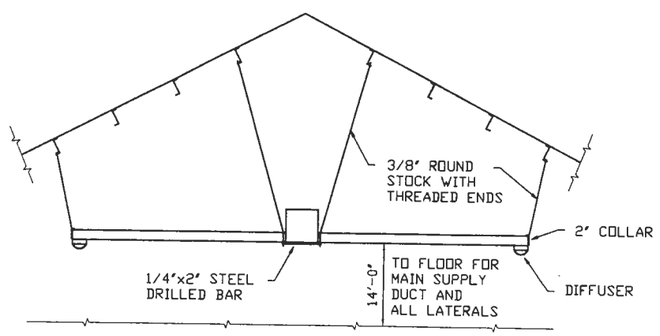
R:\SENECA\RIFS\SD12\BLDG8045.DWG




N

Note:
Class II Area
Remainder of Building is Class III.

BLDG. 806




SECTION "L-L"
TYPICAL DETAILS OF HEATING DUCT SUPPORT AND DIFFUSER OUTLESTS IN NON-CELING AREAS

NOTE(S):

BUILDING INFORMATION REFERENCED FROM MAJOR CORP. OF ENG. DRAWING NO. MISC. 275. RECORD DRAWING AS-BUILT YEAR 1959.

0 4' 8' 12'
(APPROX. SCALE FT.)

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | DWG No. 7300047-01001

FIGURE 1-4
FLOOR PLAN- BUILDING 806

SCALE AS NOTED | DATE OCTOBER 1999 | REV A

R:\SENECA\RIFS\SD12\BLDG806.DWG

Note:
Class II Area
Remainder of Building is Class III.

N

1 3 5 6 7 9 11

G F E D C B A

810-1
810-2
810-3
810-5
810-6
810-7
810-8
810-9
810-10
810-11
810-12
810-13
810-15
810-16
810-17
810-18
810-19
810-20
810-21
810-22
810-23
810-24

SEE DWG. BUILDING 810 SHEET 2 A

A AIR-COOLED CONDENSING UNIT

BLDG. 810
FLOOR PLAN

FEET 0 3 6
METERS 0 1 2

0 10' 20' 30'
(APPROX. SCALE FT.)

NOTE(S):

BLACK & VEACH CONSULTING ENGINEERS PLAN & ELEVATIONS DRAWING NO. Y2-359, DATE: MAY 2, 1955.
VENTILATION & AIR CONDITIONING SYSTEM DRAWING NO. 24-71, PR4-71, DATE: OCT. 21, 1971.
BLACK & VEACH CONSULTING ENGINEERS REVISION RECORD WORK AS-BUILT JUNE 2, 1958. DRAWING NO. Y2-625.
GALSON & GALSON CONSULTING ENGINEERS, FLOOR PLAN MECHANICAL, DRAWING NO. 26-88, SHEET NO. 5 OF 6, PR. NO. 35-86, DATE: MAY 12, 1988.

PARSONS

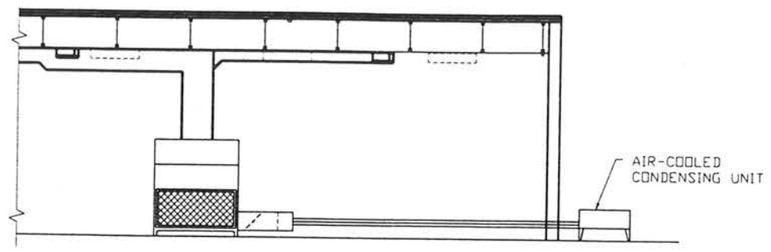
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT: ENVIRONMENTAL ENGINEERING
Dwg No. 730047-01001

FIGURE 1-5A
FLOOR PLAN- BUILDING 810

SCALE: AS NOTED
DATE: OCTOBER 1990
REV: A

R:\SENECA\RIFS\SD12\BLDG810sh1.DWG

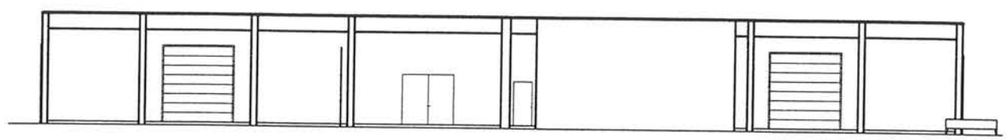



SECTION A-A ELEVATION

FEET 0 3 6
METERS 0 1 2

0 6' 12' 18'

(APPROX. SCALE FT.)



REAR ELEVATION

FEET 0 3 6
METERS 0 1 2

0 12' 24' 36'

(APPROX. SCALE FT.)

FRONT ELEVATION

FEET 0 3 6
METERS 0 1 2

0 12' 24' 36'

(APPROX. SCALE FT.)

N

Note:

Class II Area

Remainder of Building is Class III.

NOTE(S):

BLACK & VEACH CONSULTING ENGINEERS
PLAN & ELEVATIONS DRAWING NO. Y2-359,
DATE: MAY 2, 1955.
VENTILATION & AIR CONDITIONING SYSTEM
DRAWING NO. 24-71, PR4-71, DATE: OCT. 21, 1971.
BLACK & VEACH CONSULTING ENGINEERS
REVISION RECORD WORK AS-BUILT JUNE 2, 1958.
DRAWING NO. Y2-625.
GALSON & GALSON CONSULTING ENGINEERS,
FLOOR PLAN MECHANICAL, DRAWING NO. 26-88,
SHEET NO. 5 OF 6, PR. NO. 35-86,
DATE: MAY 12, 1988.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT: ENVIRONMENTAL ENGINEERING
Dwg. No. 730047-01001

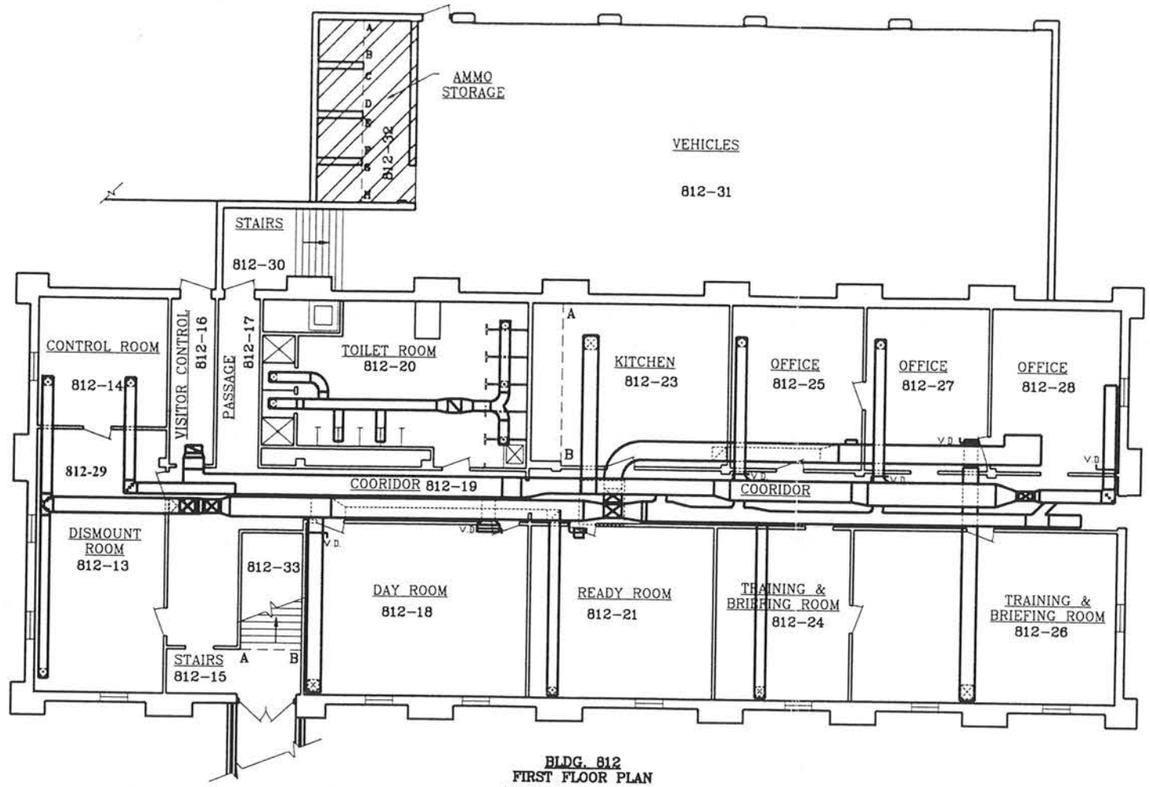
FIGURE 1-5B
FLOOR PLAN- BUILDING 810

SCALE: AS NOTED
DATE: OCTOBER 1990
REV: A

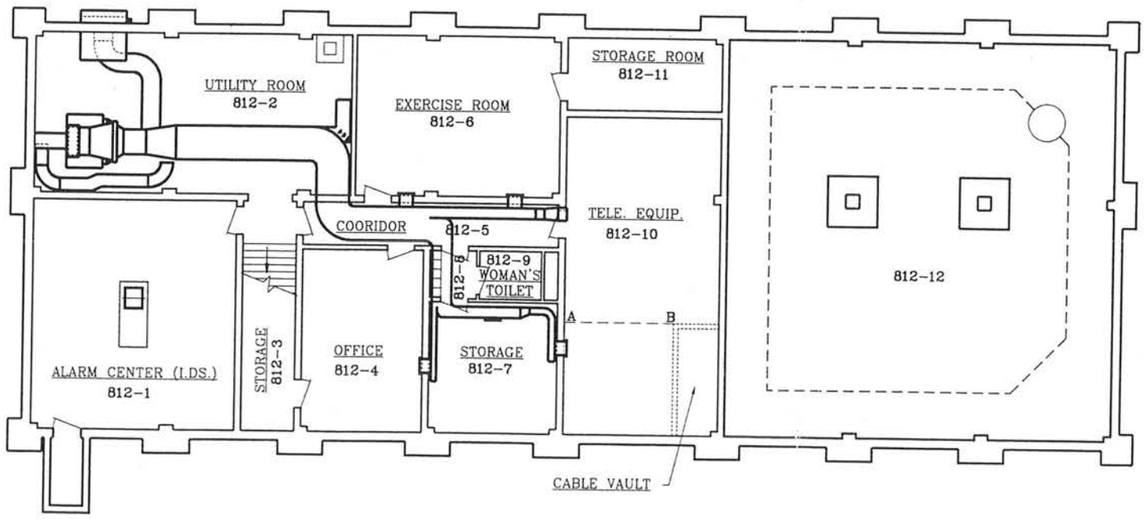
R:\SENECA\RIFS\SD12\BLDG810sh2.DWG

Note:
Class II Area
Remainder of Building is Class III.

N




BLDG. 812
FIRST FLOOR PLAN
APPROX. SCALE: 1" = 8'-0"




BLDG. 812
BASEMENT PLAN

FEET 0 3 6
METERS 0 1 2

0 8' 16' 24'
(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM RECORD DRAWING OF WORK-AS-BUILT SEP. 5, 1958, DRAIWNG NO. Y2-632.2, AND DRAWING FROM MACKNIGHT-FULIGNI-FRANGOLA ARCHITECTS ROBINSON & WOESE INC. CONSULTING ENGINEERS. SHEET NO. P1 (4 OF 7), DRAWING NO. 15-82, FEB. 12, 1982.
OFFICE OF FACILITES ENGINEER
AIR CONDITIONING & DETAILS DRAWING NO. 15.82 SHEET NO. HVAC-2 (7 OF 7), PR NO. 50-21, DATE FEB. 12, 1982.
OFFICE OF FACILITES ENGINEER
SHEET TITLE CHANGE ORDER #3, PR. NO. 50-81 DRAWING NO. 15-82, DATE FEB. 17, 1983.

PARSONS

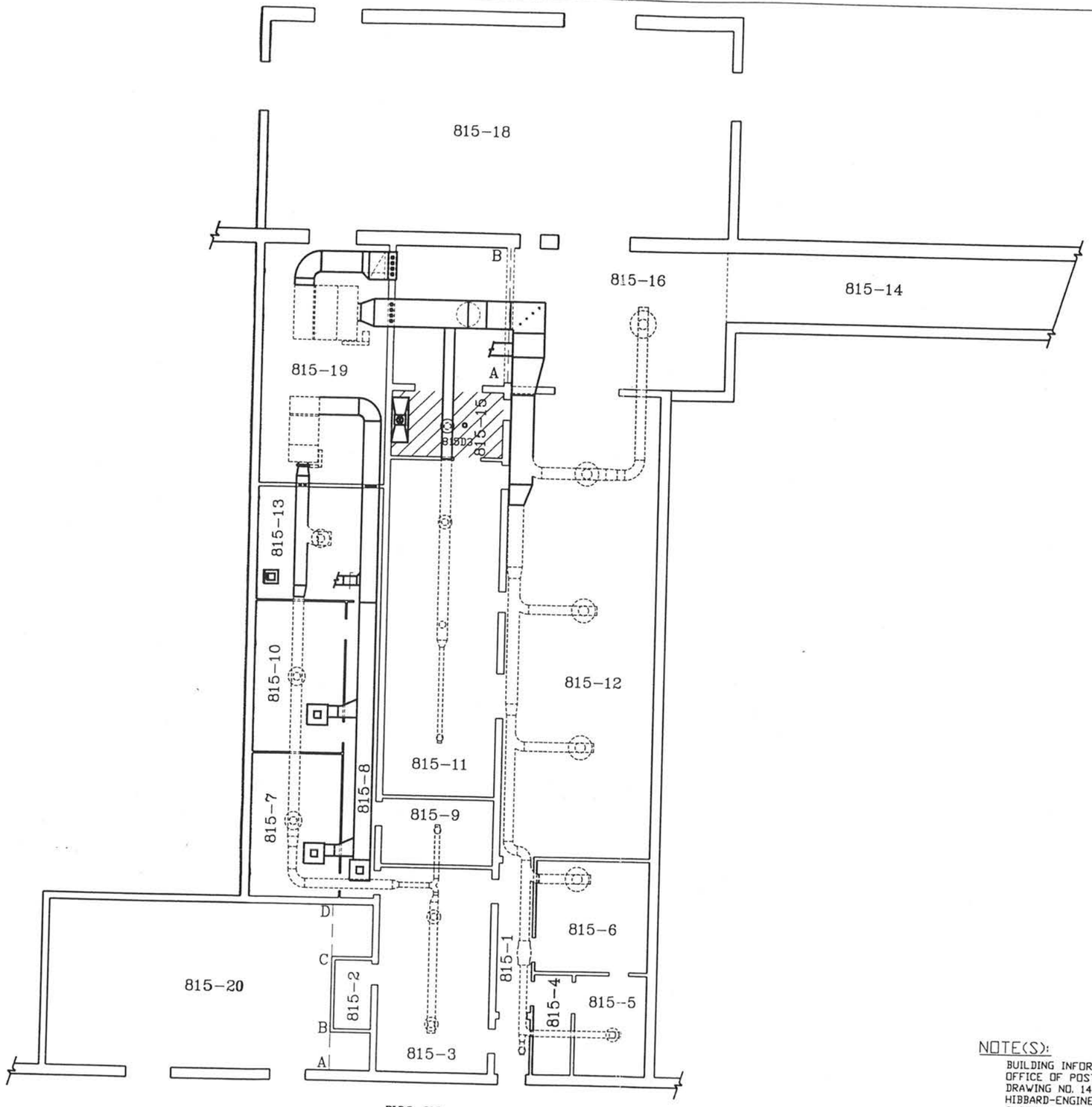
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT: ENVIRONMENTAL ENGINEERING | DWG NO.: 730047-01001

FIGURE 1-6
FLOOR PLAN- BUILDING 812

SCALE: AS NOTED | DATE: OCTOBER 1990 | REV: A

R:\SENECA\RIFS\SD12\BLDG812.DWG




BLDG. 815

NOTE:

- CLASS ONE AREA
- REMAINDER OF BUILDING IS CLASS TWO, WITH THE EXCEPTION OF 815-18, 815-19 AND 815-20 WHICH ARE LIMITED CLASS SURVEY UNIT.
- ROOM 815-14 IS A HALLWAY THAT CONNECTS BUILDINGS 815 AND 816.

NOTE(S):

BUILDING INFORMATION REFERENCED FROM OFFICE OF POST THE ENGINEER DRAWING NO. 14-76, JULY 19, 1976. HIBBARD-ENGINEERS DRAWING NO. 20-80, SHEET NO. 1-10, DATE 5/16/80. ROBSON & WOESE INC. CONSULTING ENGINEERS DRAWING NO. M/E-1, SHEET NO. 1 OF 4, DATE AUG. 6, 1986.

FEET 0 3 6
METERS 0 1 2

0 8' 16' 24'
(APPROX. SCALE FT.)

PARSONS

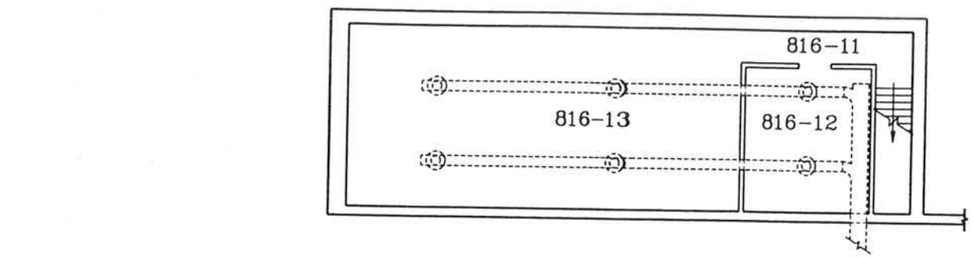
CLIENT/PROJECT TITLE
SENECA army DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg No 730047-01001

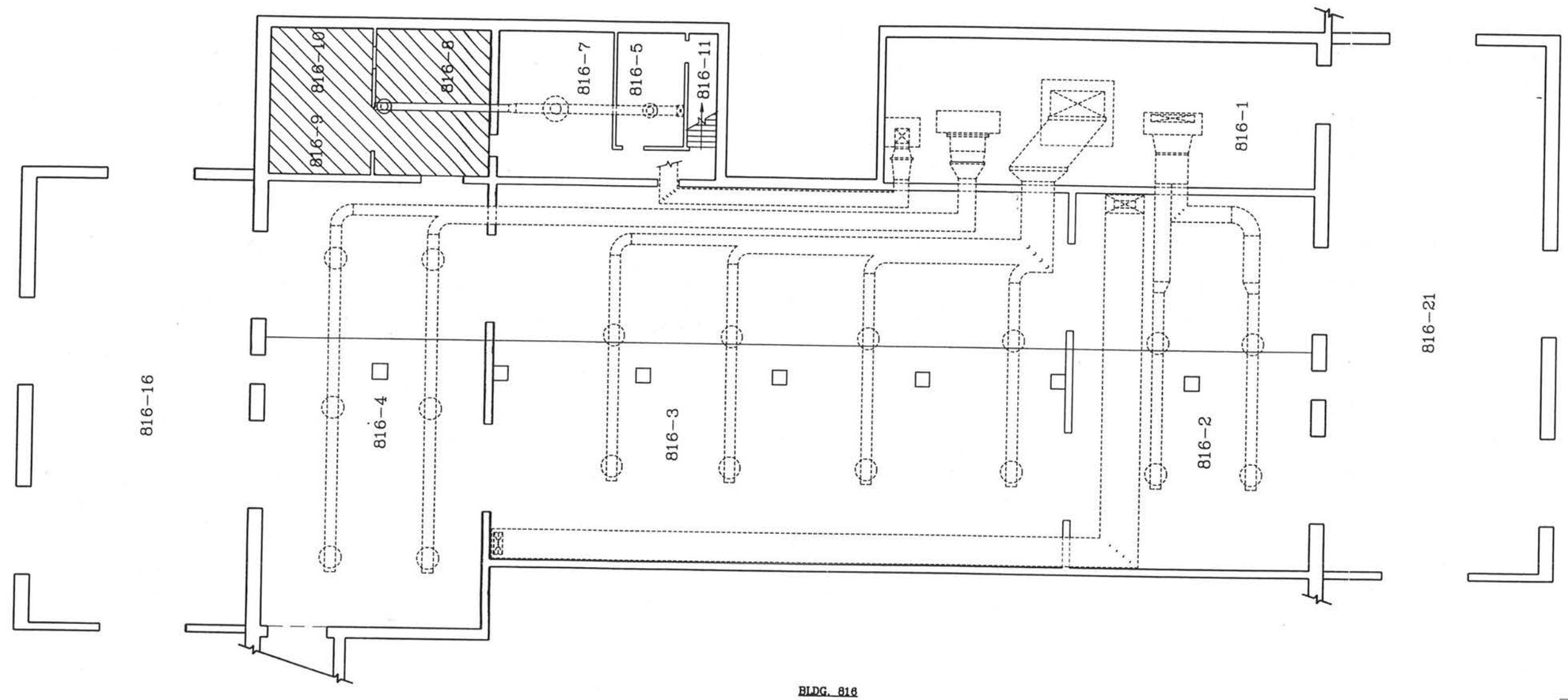
FIGURE 1-7
FLOOR PLAN- BUILDING 815

SCALE AS NOTED | DATE NOVEMBER 1990 | REV A

R:\SENECA\RIFS\SD12\BLDG815.DWG




BLDG. 816
SECOND FLOOR




BLDG. 816

N

NOTE:

- CLASS ONE AREA
- REMAINDER OF BUILDING IS CLASS TWO WITH THE EXCEPTION OF 815-16, 816-21 AND 816-1 WHICH ARE LIMITED CLASS III SURVEY UNITS.

FEET 0 3 6
METERS 0 1 2

0 8' 16' 24'
(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM OFFICE OF POST THE ENGINEER DRAWING NO. 14-76, JULY 19, 1976. HIBBARD-ENGINEERS DRAWING NO. 20-80, SHEET NO. 1-10, DATE 5/16/80. ROBSON & WOESE INC. CONSULTING ENGINEERS DRAWING NO. M/E-1, SHEET NO. 1 OF 4, DATE AUG. 6, 1986.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg No 730047-01001

FIGURE 1-8
FLOOR PLAN- BUILDING 816

SCALE AS NOTED | DATE AUGUST 2001 | REV B

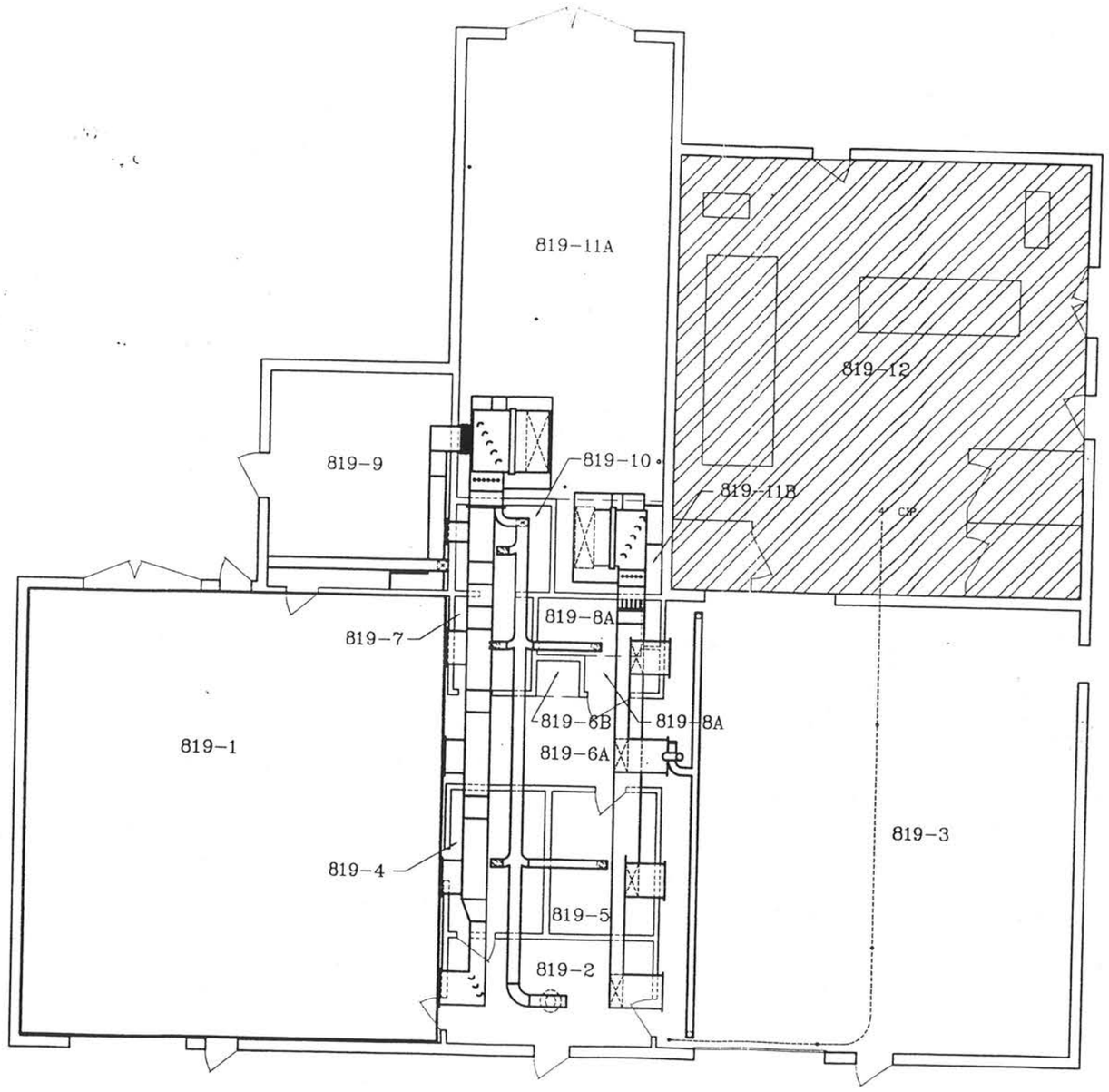
R:\SENECA\REFS\SD12\BLDG816.DWG

Note:

Class II Area

Remainder of Building is Class I.

N




BLDG. 819

APPROX. SCALE: 1" = 6'-0"

NOTE(S):

*THIS DRAWING IS PRESENTED IN 1/2 SIZE. SO YOUR SCALE IS 1/2 OF WHAT IS MARKED. i.e. IF THE SCALE IS MARKED 1" = 4'-0" THAN THE THRUE SCALE OF THE DRAWING IS 1" = 2'-0".

FEET 0 3 6

METERS 0 1 2

0 6' 12' 18'

(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM BLACK & VEATCH CONSULTING ENGINEERS. DRAWING NO. 72-621, MAY 2, 1955. REVISED RECORD WORK AS-BUILT 6/2/58. BLACK & VEATCH CONSULTING ENGINEERS. DRAWING NO. 72-845, MAY 2, 1955. REVISED RECORD WORK AS-BUILT 6/2/58.

PARSONS

CLIENT/PROJECT TITLE

SENECA army DEPOT ACTIVITY

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No. 730047-01001

FIGURE 1-9

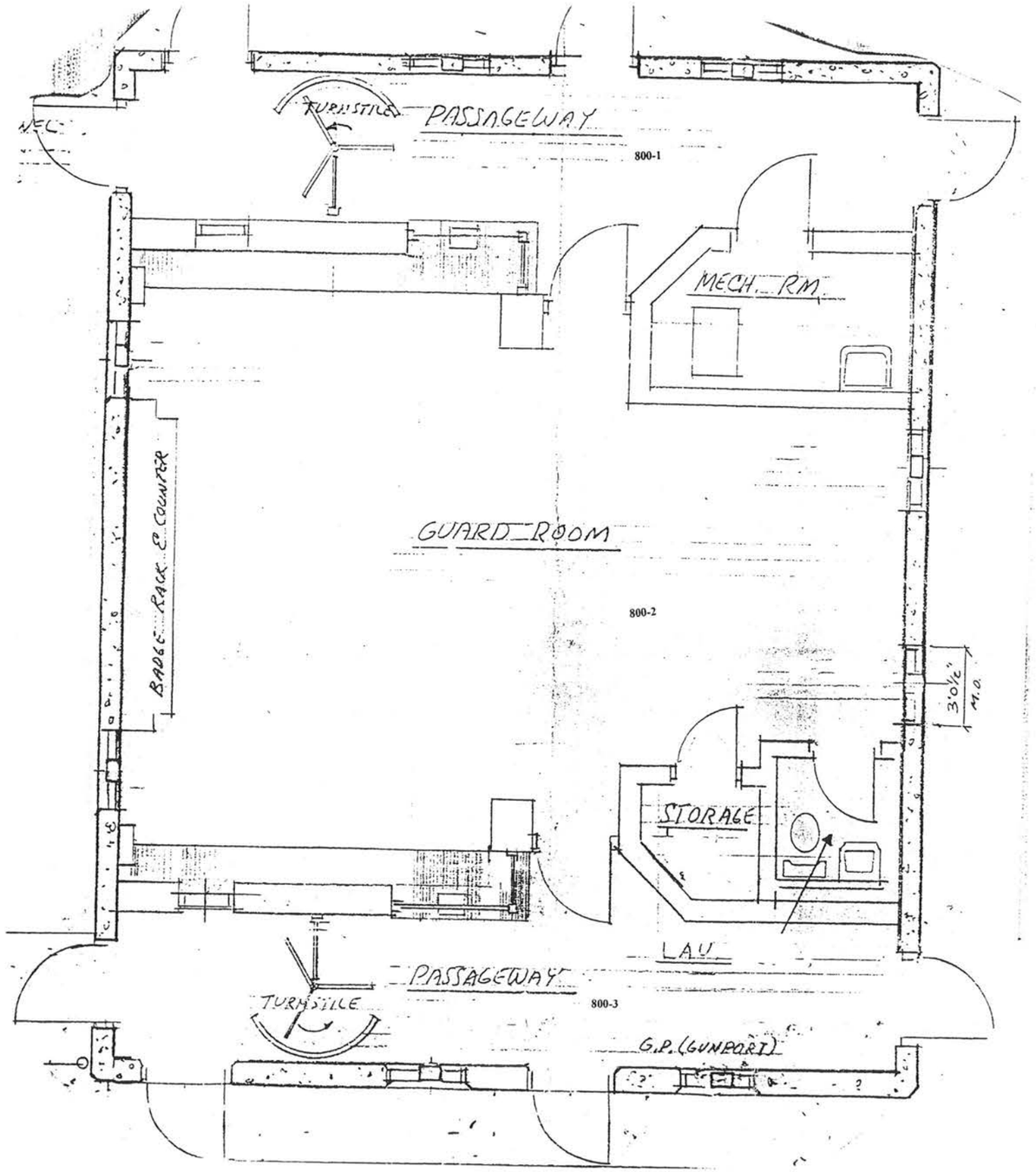
FLOOR PLAN- BUILDING 819

SCALE AS NOTED

DATE AUGUST 1989

REV. A

R:\SENECA\RIFS\SD12\BLDG819.DWG




N

NOTES:
1) THIS DRAWING IS NOT TO SCALE. IT HAS BEEN ADAPTED FROM 1980 SEDA ENGINEERING DRAWING.

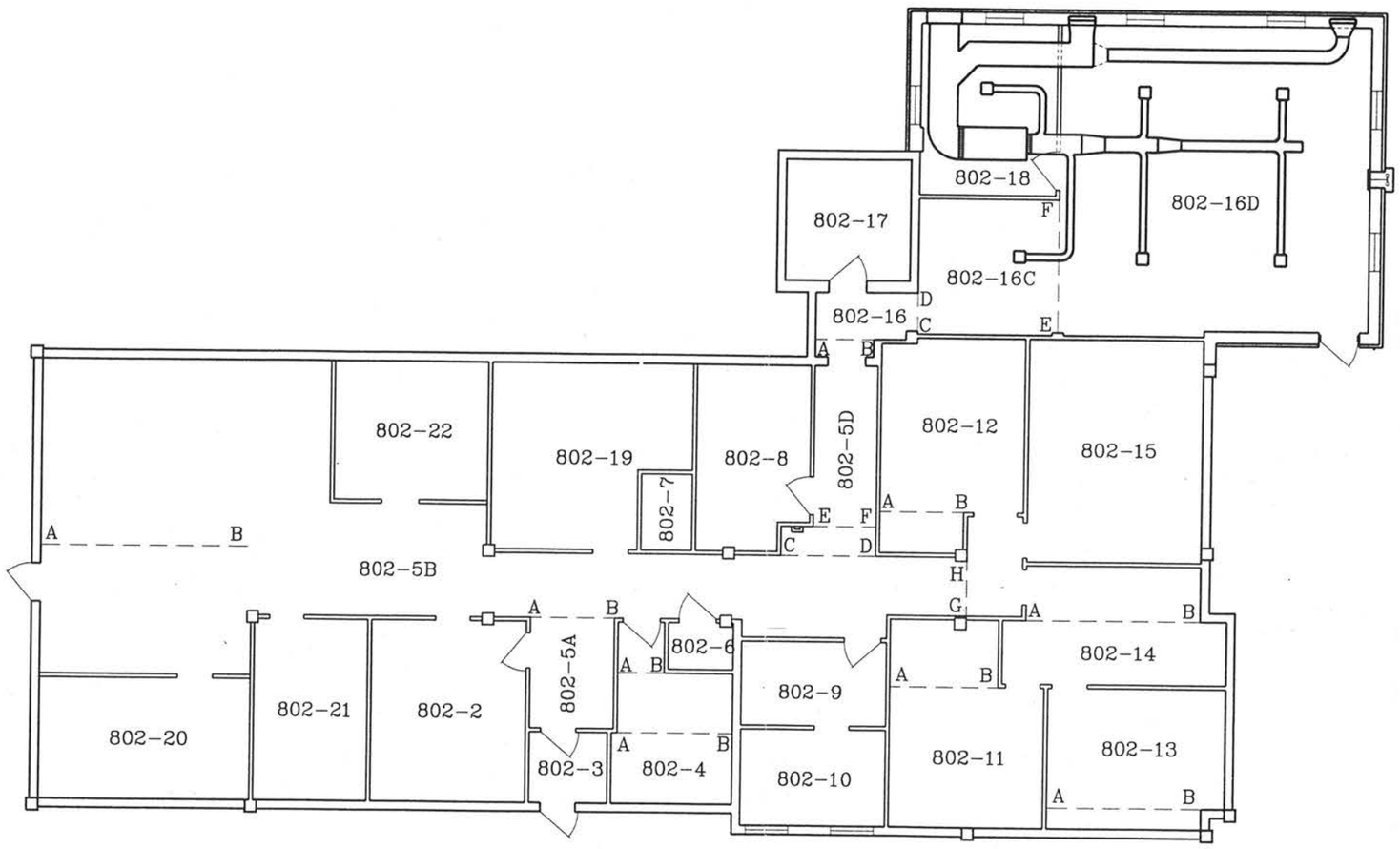
2) THE AREA OF BUILDING 800 IS1,272 SQ FT.

**PARSONS**

SENECA ARMY DEPOT ACTIVITY

FIGURE 1-10
FLOOR PLAN- BUILDING 800

| SCALE | DATE | REV |
|---|---|---|
| NOT TO SCALE | FEB 2002 | Sheet 1 of 1 |




BLDG. 802
APPROX. SCALE: 1" = 6'-0"

0 6' 12' 18'
(APPROX. SCALE FT.)

NOTE(S):

OFFICE OF THE FACILITIES ENGINEER
PLUMBING AND HEATING PLAN
DRAWING NO. 18-79, SHEET NO. 7 OF 8,
PR. NO. 49-76, DATE: DEC. 14, 1983.

* CHECK INTERIOR LAYOUT, INCONSISTENT INFORMATIN ON DRAWINGS.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT: ENVIRONMENTAL ENGINEERING
Dwg No. 730047-01001

FIGURE 1-11
FLOOR PLAN- BUILDING 802

SCALE: AS NOTED | DATE: AUGUST 1999 | REV: A

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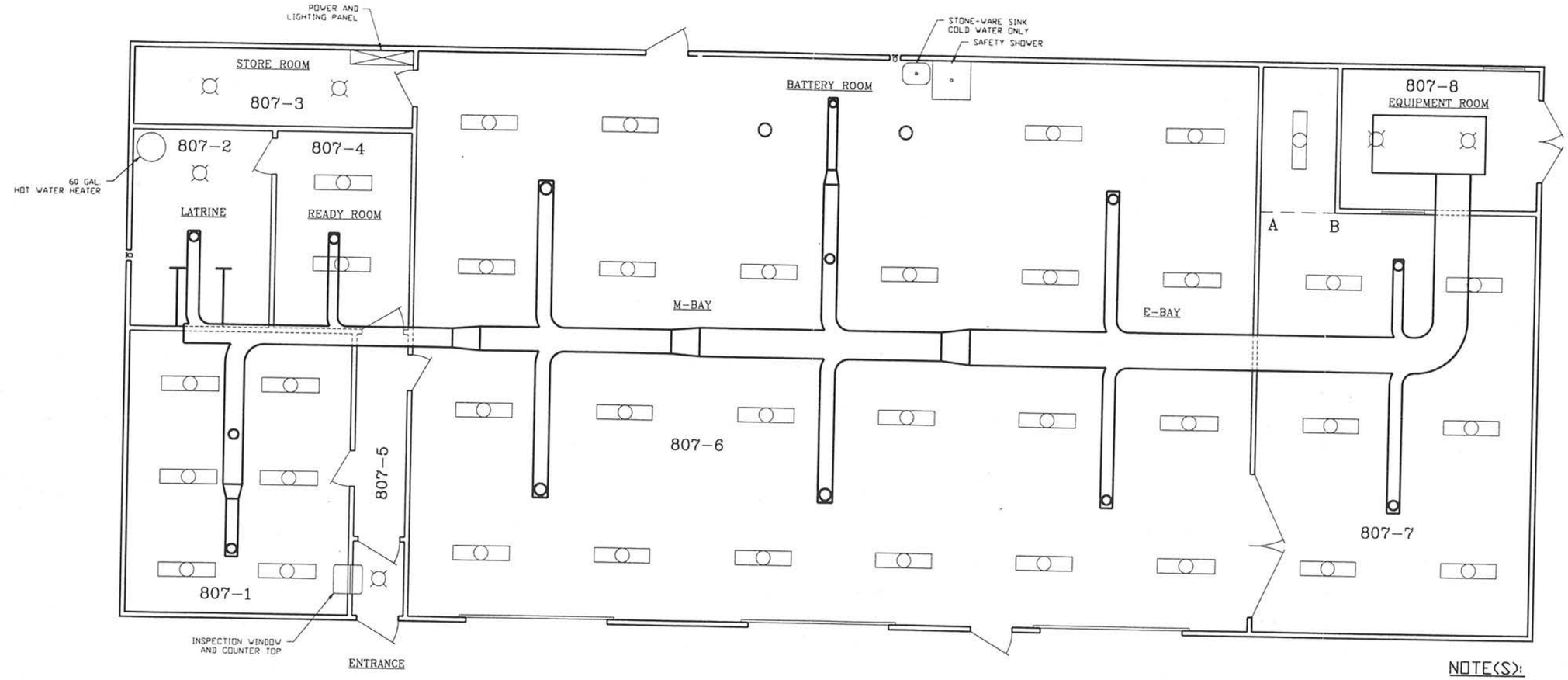



BLDG. 807
APPROX. SCALE: 1" = 4'-0"

NOTE(S):

*THIS DRAWING IS PRESENTED IN 1/2 SCALE. SO YOUR SCALE IS 1/2 OF WHAT IS MARKED. i.e. IF THE SCALE IS MARKED 1" = 4'-0" THAN THE TRUE SCALE OF THE DRAWING IS 1" = 2'-0".

FEET 0 3 6
METERS 0 1 2
0 4' 8' 12'
(APPROX. SCALE FT.)

LEGEND:

- FLOURESCENT FIXTURE (4FT. - 3TUBE)
- INCANDESCENT - CEILING TYPE
- EXPLOSION PROOF FIXTURES (INCANDESCENT)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM MAJOR CORP. OF ENG. DRAWING MISC. 266. RECORD DRAWING AS-BUILT YEAR 1958. HEATING AND VENTILATION PLAN DRAWING NO. MISC. 267, RECORD DRAWING AS-BUILT YEAR 1958, REVISIONS: MARCH 17, 1959 FUEL TANK RELOCATED.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

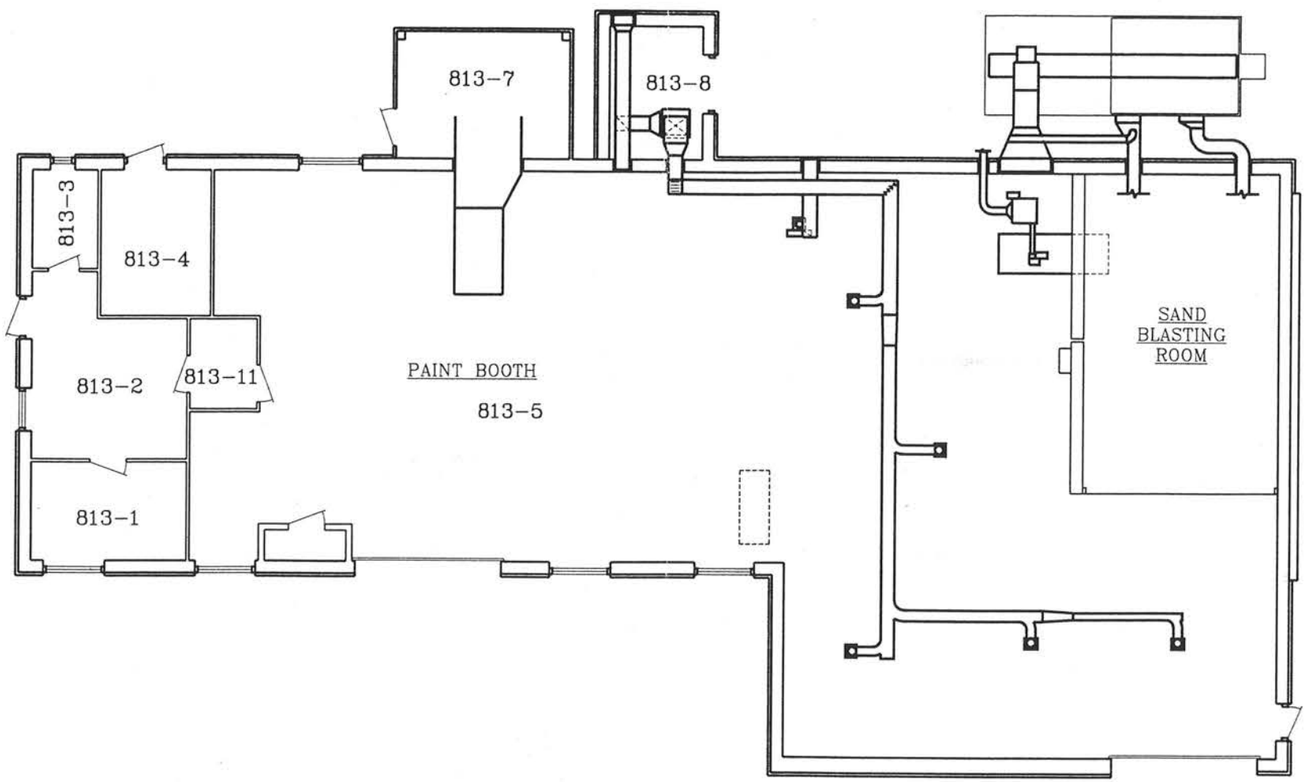
DEPT. ENVIRONMENTAL ENGINEERING | Dwg. No. 730047-01001

**FIGURE 1-12**
**FLOOR PLAN- BUILDING 807**

SCALE AS NOTED | DATE AUGUST 1990 | REV A

R:\SENECA\RIFS\SD12\BLDG807.DWG

N




BLDG. 813
APPROX. SCALE: 1" = 6'-0"

0 6' 12' 18'
(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM CAMBELL DESIGN GROUP ARCH./ENG. PLANNERS DRAWING NO. 27-87, SHEET NO. M-1 (SHEET 6 OF 8) DATE MAY 1987.

PARSONS

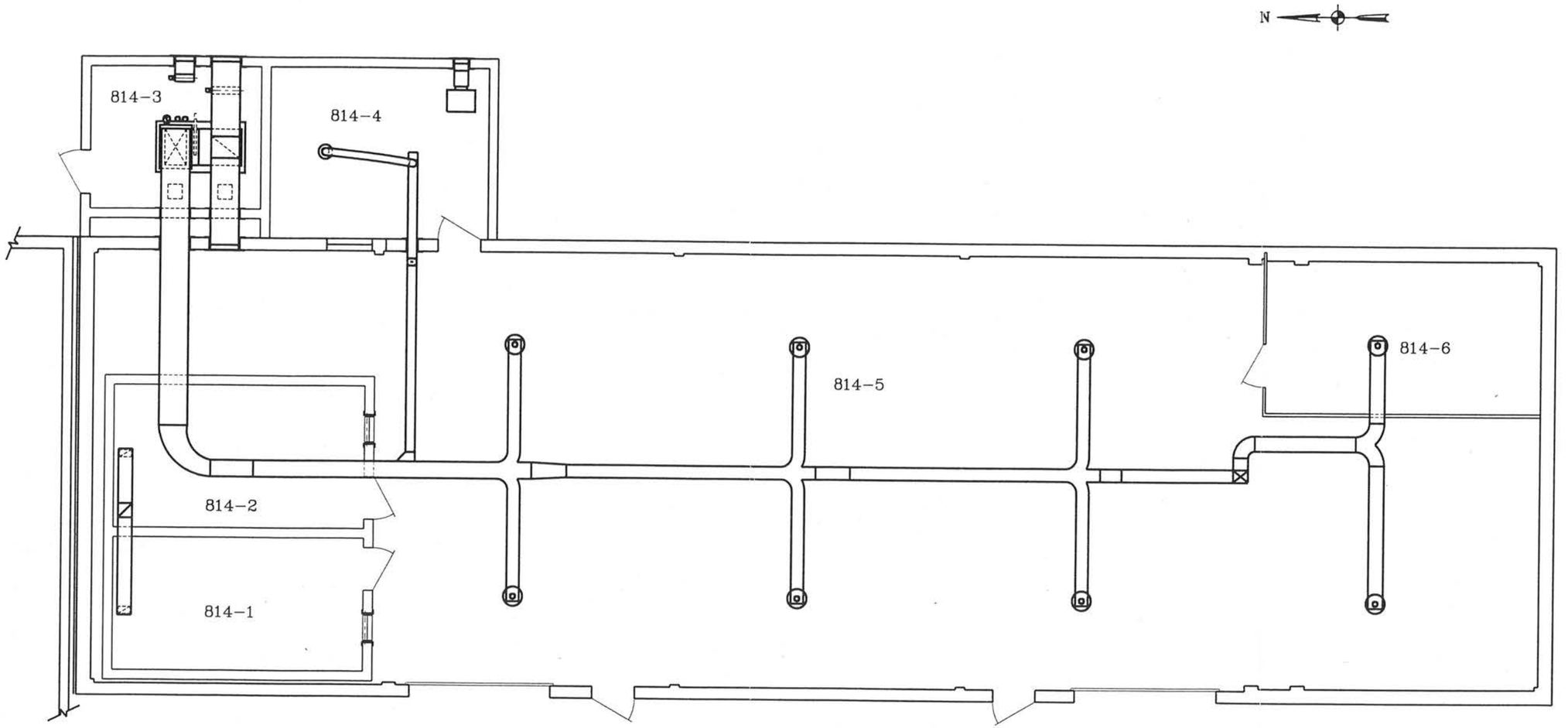
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg. No. 730047-01001

**FIGURE 1-13**
**FLOOR PLAN- BUILDING 813**

SCALE AS NOTED | DATE JULY 1990 | REV A

R:\SENECA\RIFS\SD12\BLDG813.DWG




BLDG. 814
FIRST FLOOR PLAN
APPROX. SCALE: 1" = 4'-0"

NOTE(S):

BUILDING INFORMATION REFERENCED FROM CAMBELL DESIGN GROUP ARCH./ENG. PLANNERS SHEET NO. M-1 (6 OF 8), DRAWING NO. 42-87, DATE 1988.

0 4' 8' 12'
(APPROX. SCALE FT.)

PARSONS

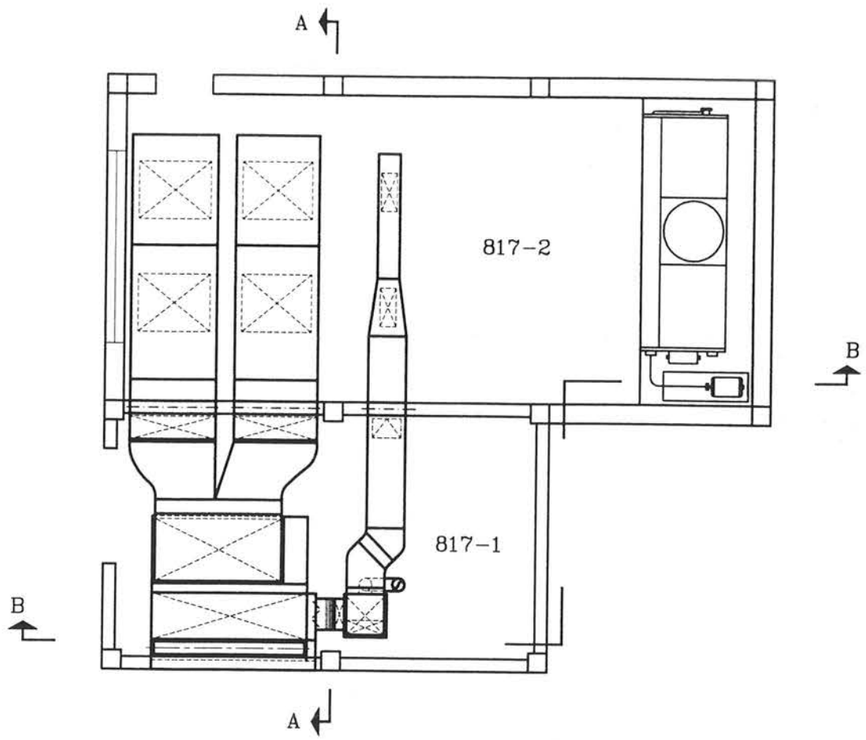
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT. ENVIRONMENTAL ENGINEERING | Dwg. No. 7300047-01001

FIGURE 1-14
FLOOR PLAN- BUILDING 814

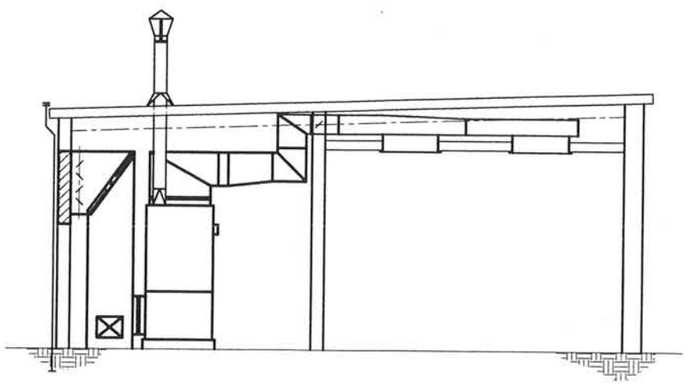
SCALE AS NOTED | DATE JULY 1999 | REV A

R:\SENECA\RIFS\SD12\BLDG814.DWG

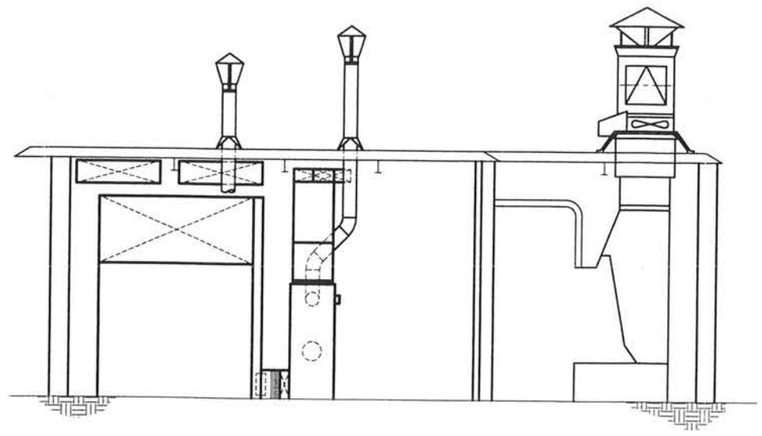



BLDG. 817
APPROX. SCALE: 1" = 4'-0"

N



SECTION A-A
APPROX. SCALE: 1" = 4'-0"



SECTION B-B
APPROX. SCALE: 1" = 4'-0"

NOTE(S):

*THIS DRAWING IS PRESENTED IN 1/2 SIZE. SO YOUR SCALE IS 1/2 OF WHAT IS MARKED. i.e. IF THE SCALE IS MARKED 1" = 4'-0" THAN THE THRUE SCALE OF THE DRAWING IS 1" = 2'-0".

0 4' 8' 12'
(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM CARR, WILCOX & ERICKSON ARCHITECT ENGINEER FILE NO. 7527-908, SPEC. NO. ENG. 30-075-58-305, DATE MAY 19 1958.
RECORD DRAWING OF AS-BUILT MAY 30, 1960.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

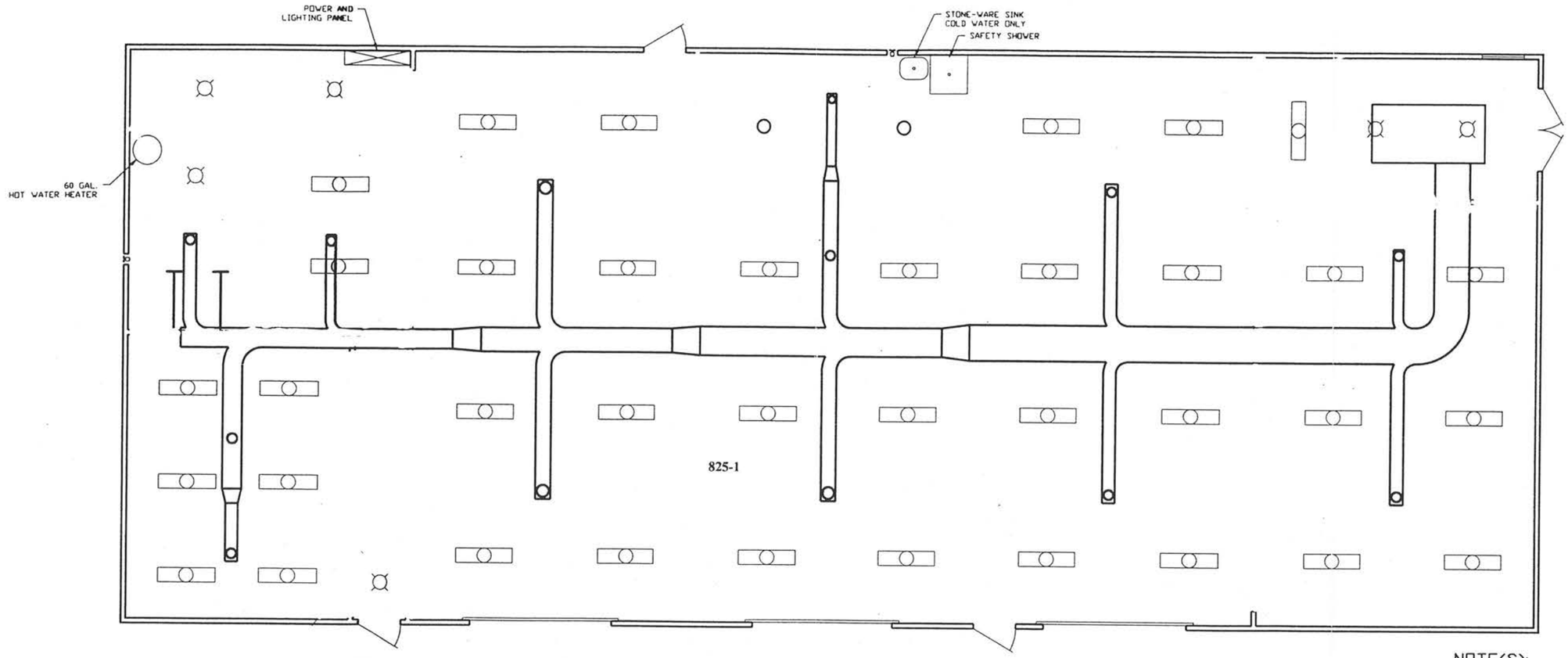
DEPT. ENVIRONMENTAL ENGINEERING | DWG NO. 730047-01001

FIGURE 1-15
FLOOR PLAN- BUILDING 817

SCALE AS NOTED | DATE AUGUST 1999 | REV A

R:\SENECA\RIFS\SD12\BLDG817.DWG

N




BLDG. 825

APPROX. SCALE: 1" = 4'-0"

NOTE(S):

*THIS DRAWING IS PRESENTED IN 1/2 SCALE. SO YOUR SCALE IS 1/2 OF WHAT IS MARKED. i.e. IF THE SCALE IS MARKED 1" = 4'-0" THAN THE TRUE SCALE OF THE DRAWING IS 1" = 2'-0".

FEET 0 3 6
METERS 0 1 2

0 4' 8' 12'

(APPROX. SCALE FT.)

LEGEND:

- FLOURESCENT FIXTURE (4FT. - 3TUBE)
- INCANDESCENT - CEILING TYPE
- EXPLOSION PROOF FIXTURES (INCANDESCENT)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM MAJOR CORP. OF ENG. DRAWING MISC. 266. RECORD DRAWING AS-BUILT YEAR 1958. HEATING AND VENTILATION PLAN DRAWING NO. MISC. 267, RECORD DRAWING AS-BUILT YEAR 1958, REVISIONS: MARCH 17, 1959 FUEL TANK RELOCATED.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT. ENVIRONMENTAL ENGINEERING | Dwg. No. 780047-01001

FIGURE 1-16
FLOOR PLAN- BUILDING 825

SCALE AS NOTED | DATE AUGUST 1988 | REV A

R:\SENECA\RIFS\SD12\BLDG807.DWG

# 2 BUILDING CLASSIFICATIONS

Buildings within SEAD-12 were classified as Class I, Class II, or Class III in the SEAD-12 RI/FS Project Scoping Plan based upon past operating history and threat of residual radioactive contamination. The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides guidance on classification of buildings or grounds based upon past activities and is the basis for the classification system employed in this program. The percentage of building surfaces surveyed is dependent on the classification of the survey area to ensure that potential residual radiation is detected. The lower the classification number (Class I having greatest potential for residual radiation), the greater the survey coverage. As noted previously, the radiological survey portion of this report includes all of the buildings within SEAD-12 surveyed in both Phase I and Phase II radiological investigations.

## 2.1 MARSSIM AREA CLASSIFICATIONS

Impacted areas, as defined in the SEAD-12 RI/FS Project Scoping Plan, are areas that have some potential for containing radioactive material. In the SEAD-12 RI/FS Scoping Plan, impacted areas were subdivided into three classes in accordance with MARSSIM guidelines.

- Class I Areas: Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiological surveys). Examples of Class I areas include: 1) site areas previously subjected to remedial actions, 2) locations where leaks or spills are known to have occurred, 3) former burial or disposal sites, 4) waste storage sites, and 5) areas with contaminants in discrete solid pieces of material with high specific activity. Note that areas containing radioactivity in excess of the Derived Concentration Guideline Levels (DCGLs), as defined in MARSSIM, prior to remediation were classified as Class I areas. DCGLs are defined in MARRSIM as residual levels of radioactive material that correspond to allowable radiation dose standards.

- Class II Areas: These areas have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL, defined above. To justify changing an area's classification from Class I to Class II, the existing data (from the Historic Site Assessment (HSA) scoping surveys, or characterization surveys) should provide a high degree of confidence that no individual measurement would exceed the DCGL. Examples of areas that might be classified as Class I for the final status survey include: 1) locations where radioactive materials were present in an unsealed form (*e.g.*, process facilities), 2) potentially contaminated transport routes, 3) areas downwind from stack release points, 4) upper walls and ceilings of some buildings or rooms subjected to airborne radioactive materials, 5) areas where low concentrations of radioactive materials were handled, and 6) areas on the perimeter of former contamination control areas.

- Class III and Limited Class III Areas: Any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL, based on site operating history and previous radiological surveys. Examples of areas that might be classified as Class III include buffer zones around Class I or Class II areas, and areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

## 2.2 CLASSIFICATION OF BUILDINGS AT SEAD-12

According to MARSSIM, a characterization survey is normally conducted prior to establishing a survey area and assignment of its classification used for the final survey. Limited information was available for much of the site and the Army did not feel it was cost effective to conduct both a characterization and final survey of each building. Therefore, this survey program was designed to serve as both a characterization survey and a final status survey to be conducted within the buildings in SEAD-12. Survey areas at SEAD-12 were established and assigned conservative classifications based on past operating history. In all cases a separate survey area was established in each room in each building of SEAD-12 as discussed in the meeting at Seneca Army Depot Activity on November 17th, 1999 with New York State Department of Health (NYSDOH) and New York State Department of Conservation (NYSDEC). Sampling and measurement frequency of the radiological surveys at SEAD-12 were then determined based on this classification. Although establishment of survey areas and final survey classifications without first conducting a characterization survey is a deviation from MARSSIM methodology, the conservative classification system employed and dense sampling coverage assigned provided a high degree of confidence for detection of radioactive contamination. The ultimate goal of collecting adequate survey data to assess each survey area for both characterization and final closure is achieved through the conservative assignment of classifications for each survey area.

The classifications of the survey areas, with rationale, are presented in **Table 2-1**. The room classifications for each of the buildings are presented in **Table 2-2**. It is identified in **Table 2-2** if a survey area (room) was included as part of the Phase I (in the interim report) or the Phase II investigation. As indicated previously, the survey areas included in Phase I of the project had the highest potential for being impacted by past practices.

Survey areas within Buildings 806, 810, 812, 815, 816, and 819 were comprised of multiple classifications within each building (refer to **Figures 1-4** to **1-9** respectively). Survey areas within these buildings having the greatest potential for impact were classified as Class I or II, and adjacent areas within these buildings were classified one level below these classifications (i.e. either Class II, III, or Limited Class III).

**Table 2-1**
**Survey Unit Classifications**
**SEAD-12 Building Survey Report**
**Seneca Army Depot Activity**

| Class I Survey Units | Rational For Classification | Radionuclides of Concern |
|---|---|---|
| Building 803 | Used to store containerized radioactive waste and military items containing radionuclides. | Pu-239, U-238, U-235, Ra-226, Co-60, Co-57, H-3 |
| Building 804 | Used to perform maintenance on military items that contained radionuclides. | Pu-239, U-238, U-235, Ra-226, H-3 |
| Building 805 | Used as a stores room for Building 804. | Pu-239, U-238, U-235, Ra-226, H-3 |
| Building 815, Hot Room (Room 15) and areas of adjoining rooms to a distance of 2 meters from the access point to the Hot Room. | Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air | Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3 |
| Building 816 Hot Rooms (Rooms 8, 9, 10) and areas of adjoining rooms to a distance of 2 meters from the access point to the Hot Room. | Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air. | Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3 |
| Building 819 And Surrounding Grounds and Asphalt, excluding the generator room as noted below | Used to perform quality assurance testing on military items that contained radionuclides. | Pu-239, U-238, U-235, Ra-226, Co-60, H-3 |

| Class II Survey Units | Rational For Classification | Radionuclides of Concern |
|---|---|---|
| Building 815, except hot room and adjoining areas described above | Building 815 was used to perform maintainance on military items that contained radionuclides. | Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3 |
| Building 816 and surrounding asphalt, except hot room and adjoining areas described above | Building 816 was used to perform maintainance on military items that contained radionuclides. | Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3 |
| Building 806, Calibration Lab Only | Used to calibrate radiological survey meters and store sealed radioactive callibration sources. | Am-241, U-238, U-235, Th-230, Cs-137 |
| Building 810, Receiving Room Only | Used as a loading and unloading area for containerized military items that contained radionuclides. | U-238, Ra-226, Co-60, H-3 |
| Building 812, Ammunition Storage Room | Used to store military items that contained radionuclides as integral componetry. | Ra-226, Pm-147, H-3 |
| Generator Room of Building 819 | Electrical Power generation of parts of SEAD-12, Other part of building used to perform quality assurance testing on military items that contained radionuclides. | Pu-239, U-238, U-235, Ra-226, Co-60, H-3 |

Note:
1) All other survey units are Limited Class III with the the rational that there is a very low potential for residual contamination based on the historic usage of the room and/or the Class I or Class II room analysed in Phase I that is in the same building indicated no elevated radioactivity.

**TABLE 2-2**
**Room Classifications**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Survey Area (room) | Classification | Presentation |
|---|---|---|---|
| 722 | All Rooms | Background | Phase I |
| 800 | All Rooms | Limited III | Phase II |
| 802 | All Rooms | Limited III | Phase II |
| 803 | Room 1 | I | Phase I |
| | Room 2 | I | Phase I |
| | Room 3 | I | Phase I |
| | Room 4 | I | Phase I |
| | Room 5 | I | Phase I |
| | Room 6 | I | Phase I |
| | Room 7 | I | Phase I |
| 804 | Room 1 | I | Phase I |
| | Room 2 | I | Phase I |
| | Room 3 | I | Phase I |
| | Room 4 | I | Phase I |
| | Room 5 | I | Phase I |
| | Room 6 | I | Phase I |
| 805 | Room 1 | I | Phase I |
| 806 | Room 1 | II | Phase I |
| | Remainder of Rooms | Limited III | Phase II |
| 807 | All Rooms | Limited III | Phase II |
| 809 | All Rooms | Limited III | Phase II |
| 810 | Room 1 | II | Phase I |
| | Remainder of Rooms | Limited III | Phase II |
| 812 | Room 32 | II | Phase I |
| | Remainder of Rooms | Limited III | Phase II |
| 813 | All Rooms | Limited III | Phase II |
| 814 | All Rooms | Limited III | Phase II |
| 815 | Room 15 | I | Phase I |
| | Rooms 1-14, 16 | II | Phase II |
| | Rooms 18, 20 | III | Phase II |
| 816 | Room 8 | I | Phase I |
| | Room 9 | I | Phase I |
| | Room 10 | I | Phase I |
| | Rooms 2-5, 7,11,12,13 | II | Phase II |
| | Rooms 1, 16, 21 | Limited III | Phase II |
| 817 | All Rooms | Limited III | Phase II |
| 819 | Room 1 | I | Phase I |
| | Room 2 | I | Phase I |
| | Room 3 | I | Phase I |
| | Room 4 | I | Phase I |
| | Room 5 | I | Phase I |
| | Room 6 | I | Phase I |
| | Room 7 | I | Phase I |
| | Room 8 | I | Phase I |
| | Room 9 | I | Phase I |
| | Room 10 | I | Phase I |
| | Room 11 | I | Phase I |
| | Room 12 | II | Phase I |
| 823 | All Rooms | Limited III | Phase II |
| 824 | All Rooms | Limited III | Phase II |
| 825 | All Rooms | Limited III | Phase II |
| 827 | All Rooms | Limited III | Phase II |

Notes:
1) Data for Phase I of the report was collected 10/1999 through 1/2000.
2) Data for Phase II of the report was collected 6/2001 through 8/2001.

# 3 RADIONUCLIDES OF CONCERN AND FIELD METHODOLOGY

This section describes the radionuclides of concern, and the methodology and instrumentation used to conduct the Class I, Class II, Class III, and Limited Class III radiological surveys within the buildings at SEAD-12. Included in this report are the results from the following surveys:

- Phase I of building surveys conducted between October 18, 1999 and January 31, 2000;
- Phase II of building surveys conducted between June 4, 2001 and August 29, 2001; and
- The duct and drain surveys conducted in the Fall, 1998.

## 3.1 RADIONUCLIDES OF CONCERN

The identity of all radionuclides that were stored, as integral parts of military items within SEAD-12 and all radionuclides that were contained in sealed calibration check sources in SEAD-12 have been released by the Army. These radionuclides, and the buildings in which they were stored or maintained, are listed in **Table 2-1**. In addition, **Table 3-1** presents a partial list of the military items that may have been stored in SEAD-12 along with the radionuclides that would have been contained as components of those items. All radionuclides of concern, their associated decay emissions, emission energies, and associated detection instruments are presented in **Table 3-2**.

## 3.2 FIELD METHODOLOGY

Field instrumentation, field personnel and field activities performed for Class I, Class II, Class III and Limited Class III Building Surveys, as well as the Duct and Drain Surveys, in situ gamma spectroscopy and material sampling are discussed in this section.

### 3.2.1 Instrumentation

This section describes the different survey instruments used to conduct alpha, beta, gamma, exposure rate and duct and drain surveys within the SEAD-12 buildings surveyed. The instruments used during the building surveys were selected in accordance with MARSSIM (NRC, 2000) and those described in the SEAD-12 RI/FS Project Scoping Plan (Parsons ES, June 1998).

#### 3.2.1.1 Alpha and Beta Radiation Surveys

Alpha and beta radiation surveys were conducted concurrently with one instrument. The Ludlum model 43-37 large area gas proportional probe, also referred to as the floor monitor, was employed for all accessible floor grid locations and a few wall grids under 2 meters throughout the survey.

Through the first half of the Phase I building survey program, the Ludlum model 43-68 hand-held gas proportional probe, (known as the hand-held) was used to survey all survey grids on upper walls, ceilings, horizontal surfaces, and all survey grids that were inaccessible with the floor monitor. Approximately halfway through the Phase I building survey program the hand-held began to have trouble maintaining instrument readings within the calibration range due to the effects of cold weather and fluctuating temperatures on the gas pressure within the instrument. Therefore, the hand-held was replaced with the Ludlum model 43-1-1 plastic scintillator probe, referred to as the phoswich. The phoswich is much less sensitive to temperature changes and is more efficient than the hand-held (**Table 3-3**). Both NYSDEC and USEPA were notified of this instrument change in a letter December 13, 1999 from Parsons on behalf of the Army. Building 805, Building 819, the Building 815 Class I room, and the Building 816 Class I rooms were surveyed for alpha and beta radiation with the hand-held. Building 803, the Building 806 calibration lab, the Building 810 receiving room, and the Building 812 ammunition storage room were surveyed for alpha and beta radiation with the phoswich. The phoswich was used for all buildings surveyed during Phase II. Detailed function check and scanning procedures are included in **Appendix C.**

#### 3.2.1.2 Gamma Radiation Surveys

Gamma radiation surveys conducted during the building surveys were conducted using the Bicron G5 FIDLER (Field Instrument to Detect Low Energy Gamma Radiation) coupled with either the Bicron Analyst portable count rate meter or the Ludlum model 2350 data logger. FIDLER instrument efficiencies are provided in **Table 3-3**. Function check and scanning procedures are provided in **Appendix C**.

#### 3.2.1.3 Exposure Rate Surveys

Exposure rate surveys performed during the building surveys were completed using the Bicron Micro-Rem meter. Exposure rate surveys were conducted as a diagnostic tool and for health and safety purposes only. Function check and scanning procedures are provided in **Appendix C**.

#### 3.2.1.4 Duct and Drain Surveys

The duct and drain surveys, which were included as part of the "special sampling" in the SEAD-12 RI/FS Project Scoping Plan, were conducted employing a Ludlum model 44-62-2 sodium iodide (NaI) Tl scintillator, also referred to as a "peanut probe", coupled with a Ludlum Model 12 count rate meter. For the duct and drain surveys, the peanut probe-Model 12 combination was equipped with a 50-foot cable. The peanut probe and 50-foot cable were attached to a rigid steel fish tape to allow field personnel to scan up to 50 feet into a duct or drain from the access point. At the access point of each duct and drain location a direct measurement of low energy gamma radiation was collected with a Bicron FIDLER, and a direct measurement of alpha radiation was collected using a Ludlum model 43-5 zinc sulfide (ZnS) probe. In addition to the scanning data, debris samples were collected from

drains in the buildings where there was a sufficient volume of material for analysis. A total of 14 debris samples were collected from drains in Building 804 (six samples), Building 815 (two samples), and Building 816 (six samples). Debris sample locations from Buildings 804, 815, and 816 are shown on **Figures 3-1** through **3-3**.

### 3.2.1.5 Gamma Spectroscopy and Material Sampling

In situ gamma spectroscopy was completed using a Universal Radiation Spectrum Analyzer (URSA) manufactured by Radiation Safety Associates, Inc (RSA). The URSA is a combination of hardware and software that can be used with various detectors to acquire spectra that can be analyzed mathematically to identify and quantify radionuclides present in a source material. For this investigation a FIDLER was used in conjunction with the URSA to collect isotopic information at certain locations of interest within the buildings. A limited number of material samples were collected to verify results or obtain isotopic information where the use of gamma spectrometer was impractical. Function check and survey procedures are provided in **Appendix L.**

### 3.2.1.6 Instrument Function Check Procedures

To ensure that the highest quality data possible were collected during the radiation-scanning program, all radiation survey data were collected using laboratory calibrated survey instruments. All survey instruments were calibrated every twelve months, except for the FIDLER that was calibrated every three months. All health and safety instruments were calibrated every six months with the exception of the Micro-Rem that was calibrated every four months. The gamma spectroscopy system with the FIDLER was calibrated specifically to the SEAD-12 radionuclides of concern prior to collecting spectra. Detailed function check procedures are provided in **Appendix C** for the survey instruments and **Appendix L** for the gamma spectroscopy system.

In addition to the periodic laboratory calibrations, daily function checks were performed on survey and health and safety instruments. While in use, the floor monitors, phoswiches, FIDLERs, and Micro Rems were checked three times daily using National Institute of Standards (NIST) traceable radioactive sources to ensure that each instrument was operating properly and within specifications. The gamma spectroscopy system was checked several times a day using a NIST-traceable radioactive source to ensure that the calibration was still valid and the system was working properly.

**Appendix D** and **Appendix E** document the periodic calibrations and daily function checks from Phase I. Periodic calibrations and daily function checks from Phase II are documented in **Appendix M** and **Appendix N**. All NIST traceable sources used for daily instrument function checks were calibrated every two years to ensure that each source's emission rate was accurately known.

### 3.2.2 Class I Building Surveys

The Class I Building surveys were conducted in accordance with the SEAD-12 RI/FS Project Scoping Plan. For the purpose of the radiation surveys, Class I Buildings were divided horizontally into two distinct subsets. These subsets were surveyed according to the following frequency:

1. 100% of the following surfaces conducted in 2 meter by 2-meter areas:

    - Lower walls (up to two meters above floor level),
    - Floor surfaces,
    - Horizontal surfaces above 2 meters,
    - Horizontal surfaces above floor level where dust or particulate material could deposit, and
    - Upper walls and ceilings of the Class I rooms in Buildings 815 and 816 (1 meter by 1 meter grids).

The Class I rooms in Buildings 815 and 816 received 100% coverage on the upper walls because of the higher potential for contamination on upper walls due to the use of hoods in those rooms.

2. 10% of the following surfaces conducted randomly in 1 meter by 1-meter areas:

    - Upper walls (above two meters above floor level),
    - Ceilings (suspended and non-suspended) - 10% of surface conducted in randomly located 1 meter by 1-meter areas.
    - These areas will also serve as direct measurement and smear sample locations.

In accordance with the frequency described above, the following survey measurements were collected within the survey area:

- Alpha, beta, and gamma scanning measurements;
- Alpha, beta, and gamma direct measurements collected at the center of each 2m x 2m or 1m x 1m grid;
- Exposure rate measurements collected at the center of each 2m x 2m or 1m x 1m grid; and
- Gross alpha, beta, gamma and tritium smears collected at the center of each 2m x 2m or 1m x 1m grid.

Class I Buildings surveyed during Phase I of the investigation included Buildings 803, 804, 805, 815 (1 room), 816 (three rooms), and 819. All Class I surveys were completed during the Phase I of the investigation. Each survey grid square was assigned a unique grid square number. The grid number was combined with the building number and the room number to form a unique location identifier. Within each survey area the radiation dose in each survey grid to be scanned was first measured with an exposure rate meter, the Micro-Rem, to ensure that field personnel were working in a safe

radiological environment. Upon completion of the Micro-Rem measurements, each survey grid was scanned for low energy gamma radiation with the FIDLER and for alpha and beta radiation with the hand-held or phoswich. Scanning results for each grid square were recorded and all areas identified through the scanning surveys as elevated measurements (MARSSIM terminology defines elevated measurements as "hot spots") were marked and recorded for further investigation. Hot spots were defined in the field as areas where radiation of any type exceeded the field flag value, as defined in **Appendix A,** the DCGL Report. After the scanning surveys were completed, co-located direct measurements of low energy gamma radiation (measured using the FIDLER) and alpha and beta radiation measurements (using the hand-held or the phoswich) were collected at the center of each survey grid. All areas identified previously through the scanning surveys as "hot spots" were assigned a unique location identifier and additional direct measurements (discretionary measurements) were collected over the point in the "hot spot" having the highest measured radiation.

After all radiation surveys were complete, dry smears for gross alpha, beta, and gamma radiation and liquid scintillation smears for tritium were collected at the center of each grid and at each previously identified hot spot location. Detailed smear sampling procedures are provided in **Appendix C**. All smears collected as part of this program were sent under chains of custody to Ionizing Radiation Dosimetry Center (IRDC) Nuclear Counting Laboratory at the Red Stone Arsenal in Alabama for analysis.

### 3.2.3 Class II Building Surveys

For the purpose of the radiation surveys, Class II buildings were divided horizontally into two distinct subsets:

1. 50% of the following surfaces conducted in 2 meter by 2-meter areas:

    - Lower walls (up to two meters above floor level),
    - Floor surfaces,
    - Pavement,
    - Access points (such as doors or windows) to a distance of two meters beyond the Class II survey unit, and
    - Interior horizontal surfaces above 2 meters.

2. 10% of the following surfaces conducted in 1 meter by 1-meter areas:

    - Upper walls (above two meters above floor surface), and
    - Ceilings.

Class II survey areas were scanned in exactly the same way as Class I survey areas, but at the frequency described above (i.e. 50% rather than 100% of the lower walls, floors, etc.). The Class II survey areas surveyed during Phase I of the investigation consisted of the Building 806 calibration laboratory, the Building 810 receiving room, the Building 812 ammunition storage room, and the Building 819 Room 12 generator room. The Class II survey areas surveyed during Phase II of the investigation consisted of the remaining rooms in Building 815 and Building 816, including the hallway that connects the two buildings.

### 3.2.4 Limited Class III Building Surveys

Limited Class III buildings were completed by collecting direct alpha, beta, and gamma measurements, Micro Rem readings, and alpha, beta, gamma smears at a minimum of 15 locations per survey area, or 10% coverage. These locations were selected at places that would have been high traffic areas or areas where dust and debris would likely accumulate. Therefore the data was biased high. Additionally, all thresholds, (i.e. doorways and windows) were scanned and alpha, beta, gamma smears were collected. The same instrumentation used for Class I and II surveys was used for Limited Class III surveys.

If a direct measurement exceeded the instrument flag value, then the grid that the location was within was scanned with the alpha, beta and gamma instrumentation. The highest location in the grid was assigned a unique location identifier and additional direct measurements were collected over the point. The new location was recorded as a "hot spot" and marked for further investigation.

It should be noted that in the SEAD-12 RI/FS Project Scoping Plan (Parsons ES, June 1998) two different types of surveys were proposed for Class III buildings: Class III and Limited Class III. Those labeled "Class III" consisted of gridding each area and scanning and taking direct measurements at 10% of the grids. The majority of Buildings 806, 810, and 812 were designated "Class III". Buildings designated as "Limited Class III" would be scanned in areas where radioactivity may accumulate and a specific number of direct measurements would be collected, as described above. Buildings 800, 802, and 817 were designated "Limited Class III" buildings in the Scoping Plan (Parsons ES, June 1998). The level of effort accomplishes the same goals in demonstrating that no residual contamination exists within a survey unit.

All Limited Class III surveys were performed during Phase II of the investigation. The survey area classified as Limited Class III consisted of all of the following buildings: Building 800, Building 802, Building 806 (excluding the calibration room), Building 807, Building 809, Building 810 (except for the receiving room), Building 812 (except for the ammunition storage room), Building 813, Building 814, the open bay garages connected to Buildings 815 and 816, Building 817, Building 823, Building 824, Building 825, and Building 827, as noted in **Table 2-2**.

### 3.2.5 In Situ Gamma Spectroscopy and Material Sampling

In situ gamma spectroscopy, using the URSA, was used to further investigate a minimum of one location within each SEAD-12 building. Rationale for the locations where in situ gamma spectra were collected is as follows:

a) The grid had the highest gamma measurement in a room that exceeded background using WRS statistics;
b) The grid was potentially elevated; or
c) The grid had the highest gamma in a building where spectra were being collected for general coverage of the building.

Approximately 100 locations, which are identified in **Table 3-4**, were analyzed using in situ gamma spectroscopy. The survey grids (either 1m x 1m or 2m x 2m) that were chosen for in situ gamma spectroscopy were first scanned using a FIDLER with an energy window set to preferentially detect the 59 keV photon of Am-241 at the location within the survey grid with the highest Am-241 scanning reading. The gamma spectroscopy system was then used to acquire a gamma spectrum at the same location.

The acquisition of the gamma spectrum at each location lasted between 30 to 120 minutes. The spectrum produced resulted in one of the four following outcomes:

i. A radionuclide was identified and quantified below the DCGLw;
ii. A radionuclide was identified and quantified above the DCGLw;
iii. A radionuclide was identified, but not quantified and therefore its activity in relationship to the DCGLw is unknown, or
iv. A radionuclide present could not be identified due to interferences, surface anomalies, or other complicating factors.

Once the identification and quantification at a location were completed, a comparison with the $DCGL_w$s was made to determine if the radionuclides present were among the radionuclides of concern (ROC) or if the radionuclides present were naturally occurring and the reading was an anomalous elevated background location. If the quantity present exceeded the $DCGL_w$s, a material sample was taken for further analysis at the off-site lab and the location was marked for potential remediation. The lab analysis requested for these samples was based on the findings of the in situ spectroscopy.

To confirm the gamma spectroscopy results, material samples were collected at seven locations that were identified in the Class I and Class II survey units during Phase I of the investigation. After collection, the samples were weighed and analyzed with the gamma spectroscopy system in the temporary laboratory set up in the background Building 2104. The samples were then sent off-site to General Engineering Laboratories for further Pu-239 and Am-241 isotopic analysis.

All material samples were collected in accordance with established procedures to avoid cross contamination. Between 50 and 500 grams of material were collected at each location, based on analytical requirements.

It should be noted that use of in situ gamma spectroscopy eliminated much of the material sampling that was proposed in the SEAD-12 RI/FS Project Scoping Plan (Parsons, June 1998). In the Draft Radiological Survey Report (Parsons, July 2000), approximately 100 locations were identified for collection and analysis of material samples based on the findings of the Phase I building surveys and the anticipated findings of the Phase II surveys. However, an attachment that supplemented the report (see **Appendix O**) was issued to the USEPA and the NYSDEC proposing the use of in situ gamma spectroscopy to provide isotopic information at the proposed locations and limit the number of material samples collected.

### 3.2.6 Duct and Drain Surveys

Duct and drain surveys were conducted in the same manner in all Class I and Class II buildings during the Fall of 1998. All ducts and drains in each building were accessed to the greatest extent practical by opening all duct and drain maintenance points and cutting additional access points where no maintenance points were available. Each access point to be scanned was assigned a unique location identifier made up of the building number and a unique location number. Prior to any scanning and sampling activities, the radiation dose at each location was measured using a Bicron Micro-R meter to assure that all workers were in a safe environment. Direct measurements of the low energy gamma radiation present at the access points were measured with the FIDLER and direct measurements of the alpha radiation present at the access locations were measured with the ZnS probe.

At locations where a duct was being scanned, the pipe probe was inserted into the access point and advanced into the duct as far as possible. As the pipe probe was advanced, the field personnel ensured that the pipe probe was being inserted along a straight line into the duct. The depth of insertion was noted as well as the compass direction of the duct being scanned. After all collection details were noted in the field team logbook, the pipe probe was slowly withdrawn at a maximum rate of 0.1 feet per second. Scanning data was recorded in five-foot intervals from the deepest point into the duct to the access point. If at any point during scanning activities an area of elevated radiation was detected, scanning activities were halted and the area was re-scanned to confirm the elevated measurements. Dry smears were collected for gross alpha, beta, and gamma radiation analysis at all access locations surveyed.

At drain scanning locations, the drain was accessed by removing surface grates and catch basins when present. As with the duct locations, after the access location was opened, the pipe probe was inserted and advanced into the drain as far as possible. The depth of insertion was measured and noted. After all collection details were noted in the field team logbook, the pipe probe was slowly withdrawn at a maximum rate of 0.1 feet per second. Scanning data was recorded in five-foot intervals from the deepest point into the drain to the access point. If at any point during scanning activities an area of elevated radiation was detected, scanning activities were halted and the area was re-scanned to confirm the elevated measurements. Dry smears were collected for gross alpha, beta, and gamma radiation analysis at all access locations surveyed. In addition to the dry smears, material samples were collected from all drains that contained a sufficient volume of material. These material samples were analyzed for speciated radionuclides at Core Laboratories in Casper, Wyoming.

### 3.2.7 Health and Safety

All Parsons ES field personnel working on the SEAD-12 Building Program received a minimum of one hour of radiological safety and fundamentals training, as well as a minimum of 24 hours of onsite orientation and procedure training. Phase I surveys were overseen by either Rebecca Cropper (Health Physicist) or J. J. Davis (Certified Health Physicist). Phase II building surveys were overseen by either Ronald McConn (Health Physicist) or John Hackett (Health Physicist). The technical director for the SEAD -12 building surveys was overseen by Steve Woolfolk (Certified Health Physicist).

To ensure protection of all field personnel and to protect against cross-contamination between buildings, exclusion zones were made at the primary entrance to each surveyed building. A body scan was performed prior to exiting SEAD-12 buildings and when contact with potentially contaminated building surfaces could have occurred. Additionally, all instruments and supplies exiting the building were scanned before passing through the exclusion zone. The Health and Safety Plan for SEAD-12 provided further instruction on precautions that were taken throughout the building radiological survey at SEAD-12.

**Table 3-1**
**Military Items That Contain Radionuclides**
**As Integral Parts Of Their Components**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Taken from the Generic Radioactive Commodity Site Remediation Survey Protocol (November 1995) | |
|---|---|
| **Military Item** | **Isotope** |
| Front Sight Post Assembly | H-3 |
| Radioluminous Fire Control Devices | H-3 |
| Compasses | H-3 |
| Infinity Collimator | H-3 |
| M1A1 Collimator | H-3 |
| M1A1 Quadrant Fire Control Device | H-3 |
| M58 and M59 Aiming Light Post | H-3 |
| Wrist Watches | H-3 |
| M72 Light Antitank Weapon (LAW) | Pm-147 |
| Front Sight Post Assembly | Pm-147 |
| Radium Dial/Compass/Check Source | Ra-226 |
| MC-1 Moisture Density Tester | Am-241 |
| M8A1 Chemical Agent Alarm | Am-241 |
| MA1 Tank Armor | U-238 |
| M1 Tank Armor | DU (Depleted Uranium) |
| MC-1 Moisture Density Gauge | Cs-137<br>Am-241 |

**TABLE 3-2**
**Radionulides of Concern**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Radionuclide of Concern | Half Life (years) | Major Radiaton Energies (MeV) and (Probability of Occurrence) | | | Detection Instrument |
|---|---|---|---|---|---|
| | | Alpha | Beta | Gamma | |
| Pu-239 | $2.4x10^4$ | 5.10 (11.5%) | .007 (19%) | 0.14 (4.4%) | Gas Proportional/Phoswich |
| | | 5.14 (15.1%) | | | |
| | | 5.15 (73.3%) | | | |
| U-238 | $4.51x10^9$ | 4.15 (25%) | 0.029 (16.8%) | 0.13 (8.8%) | Gas Proportional/Phoswich |
| | | 4.2 (75%) | 0.044 (6.1%) | | |
| U-235 | $7.1x10^8$ | 4.36 (11%) | 0.009 (28.5%) | 0.013 (30.9%) | Gas Proportional/Phoswich Fidler |
| | | 4.40 (55%) | 0.011 (17.6%) | 0.144 (10.5%) | |
| | | | 0.014 (68%) | 0.184 (54%) | |
| | | | 0.021 (19.6%) | | |
| Ra-226 | $1.6x10^3$ | 4.60 (5.5%) | | | Gas Proportional/Phoswich |
| | | 4.78 (94.5%) | | | |
| Co-60 | 5.2 | | 0.096 (100%) | 1.173 (100%) | Gas Proportional/Phoswich |
| | | | | 1.334 (100%) | |
| Co-57 | 0.8 | | 0.007 (69.5%) | 0.006 (49.3%) | Gas Proportional/Phoswich Fidler |
| | | | 0.014 (7.8%) | 0.014 (9.5%) | |
| | | | | 0.122 (85.5%) | |
| | | | | 0.136 (10.6%) | |
| H-3 | 12.3 | | | | |
| | | | | | |
| Pm-147 | 2.6 | | 0.062 (100%) | | Gas Proportional/Phoswich |
| | | | | | |
| Am-241 | 432 | 5.44 (12.8%) | 0.004 (16.1%) | 0.014 (42.7%) | Gas Proportional/Phoswich Fidler |
| | | 5.49 (85.2%) | 0.010 (30.9%) | 0.060 (35.9%) | |
| | | | 0.011 (14.8%) | | |
| | | | 0.037 (30.9%) | | |
| Th-230 | $77x10^3$ | 4.62 (23.4%) | 0.009 (8.4%) | 0.012 (8.4%) | Gas Proportional/Phoswich Fidler |
| | | 4.69 (76.3%) | 0.048 (16.9%) | | |
| Cs-137 | 30.1 | 0.157 (94.6%) | 0.157 (94.6%) | | Gas Proportional/Phoswich |
| | | 0.415 (5.4%) | 0.415 (5.4%) | | |

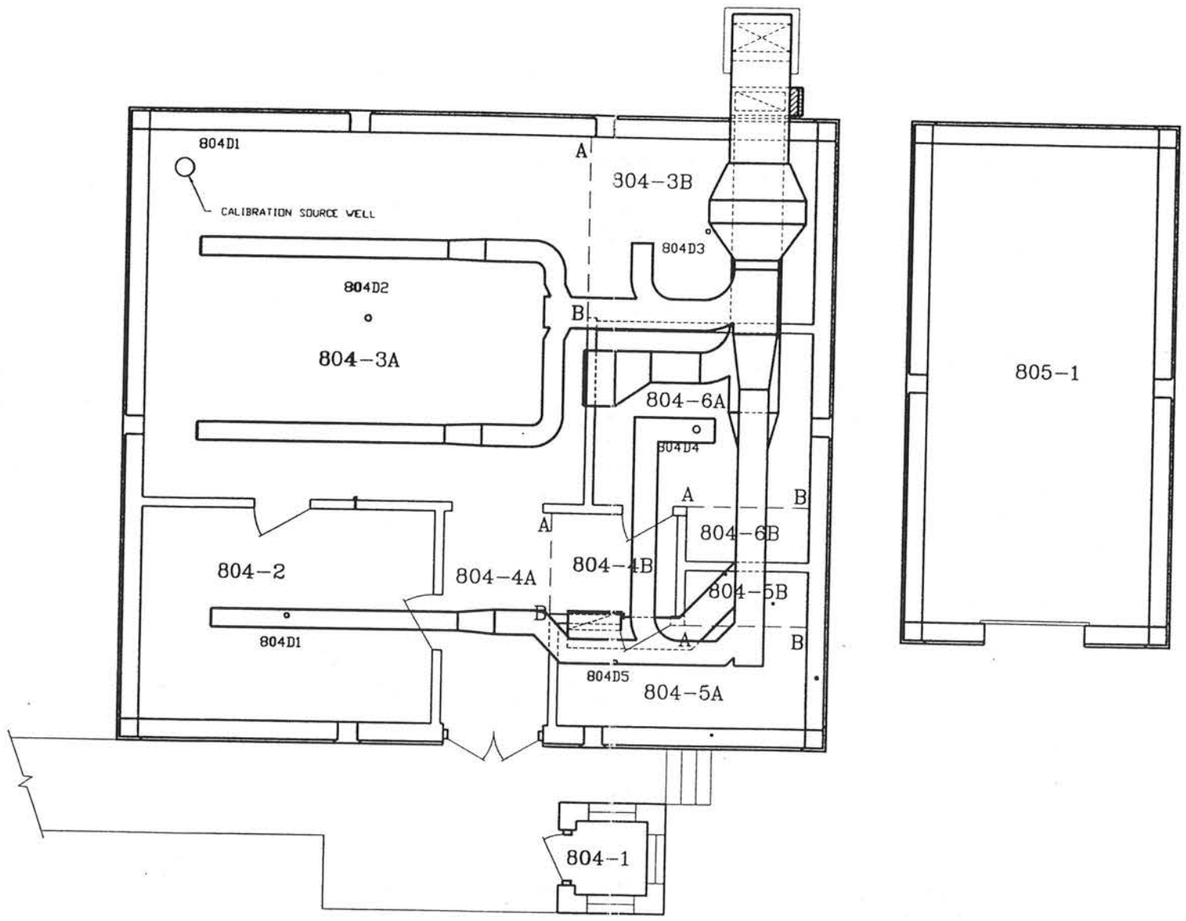
**Table 3-3**
**Radiation Survey Instrument Efficiencies**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Date | Instrument | Radiation type | Serial number | Source | 4-pie Emission rate | Average Background | Average Source Check | 4-pie Efficiency |
|---|---|---|---|---|---|---|---|---|
| 10/18/1999 | Fidler | Low E Gamma | A981P/A397Q | Am-241 | 109090.8 | 6327 | 8324 | 1.83% |
| 10/18/1999 | Fidler | Low E Gamma | A959P/A386Q | Am-241 | 109090.8 | 6487 | 8594 | 1.93% |
| 10/18/1999 | Fidler | Low E Gamma | 142486/A391Q | Am-241 | 109090.8 | 6590 | 10921.67 | 3.97% |
| 10/18/1999 | Floor monitor | Alpha | 138256/136498 | Th-230 | 8880 | 2 | 1076 | 12.09% |
| 10/18/1999 | Floor monitor | Beta | 138256/136498 | Tc-99 | 11100 | 798 | 3253 | 22.12% |
| 11/4/1999 | Floor monitor | Alpha | 138256/136498 | Th-230 | 8880 | 2 | 1099 | 12.35% |
| 11/4/1999 | Floor monitor | Beta | 138256/136498 | Tc-99 | 11100 | 630 | 2471 | 16.59% |
| 11/5/1999 | Floor monitor | Alpha | 138256/136498 | Am-241 | 296969.4 | 4 | 79590.4 | 26.80% |
| 11/5/1999 | Floor monitor | Beta | 138256/136498 | Am-241 | 296969.4 | 624 | 22220.8 | 7.27% |
| 10/18/1999 | Floor monitor | Alpha | 138262/136499 | Th-230 | 8880 | 1 | 781 | 8.78% |
| 10/18/1999 | Floor monitor | Beta | 138262/136499 | Tc-99 | 11100 | 440 | 2705 | 20.41% |
| 11/4/1999 | Floor monitor | Alpha | 138262/136499 | Th-230 | 8880 | 2 | 1063 | 11.95% |
| 11/4/1999 | Floor monitor | Beta | 138262/136499 | Tc-99 | 11100 | 416 | 2006 | 14.32% |
| 11/5/1999 | Floor monitor | Alpha | 138262/136499 | Am-241 | 296969.4 | 4 | 75972.6 | 25.58% |
| 11/5/1999 | Floor monitor | Beta | 138262/136499 | Am-241 | 296969.4 | 4 | 20003.2 | 6.73% |
| 10/18/1999 | Hand Held | Alpha | 138238/138734 | Th-230 | 8880 | 1 | 1618 | 18.21% |
| 10/18/1999 | Hand Held | Beta | 138238/138734 | Tc-99 | 11100 | 73 | 2353 | 20.54% |
| 10/18/1999 | Hand Held | Alpha | 138254/140515 | Th-230 | 8880 | 1 | 1534 | 17.26% |
| 10/18/1999 | Hand Held | Beta | 138254/140515 | Tc-99 | 11100 | 81 | 2438 | 21.23% |
| 11/5/1999 | High E Gamma | High E Gamma | 142486/150783 | Cs-137 | 1628000 | 216 | 49252 | 3.01% |
| 10/18/1999 | Micro-R | Gross Gamma | 109980 | Cs-137 | 1628000 | 8 | 227 | |
| 10/18/1999 | Micro-R | Gross Gamma | 109978 | Cs-137 | 1628000 | 8 | 187 | |
| 10/18/1999 | Micro-Rem | Gross Gamma | C250A | Cs-137 | 1628000 | 7 | 790 | |
| 10/18/1999 | Micro-Rem | Gross Gamma | C251A | Cs-137 | 1628000 | 7 | 803 | |
| 10/18/1999 | Pancake G-M | Gross Gamma | 61403/51751 | Cs-137 | 1628000 | 33 | 41800 | 2.57% |
| 10/18/1999 | Pancake G-M | Beta | 61403/51751 | Tc-99 | 11100 | 33 | 1147 | 10.04% |
| 10/29/1998 | Peanut Probe | Gamma | 102850/144955 | I-125 | 129870 | 200 | 3400 | 2.46% |
| 10/29/1998 | Peanut Probe | Gamma | 102850/144955 | Cs-137 (wide) | 2429691 | 200 | 26000 | 1.06% |
| 10/29/1998 | Peanut Probe | Gamma | 102850/144955 | Cs-137 (point) | 149835 | 200 | 3000 | 1.87% |
| 12/15/1999 | Phoswitch | Alpha | 133669/166008 | Th-230 | 8880 | 2 | 2473 | 27.83% |
| 12/15/1999 | Phoswich | Beta | 133669/166008 | Tc-99 | 11100 | 218 | 3045 | 25.47% |
| 12/16/1999 | Phoswich | Alpha | 138254/155183 | Th-230 | 8880 | 2 | 2569 | 28.91% |
| 12/16/1999 | Phoswich | Beta | 138254/155183 | Tc-99 | 11100 | 218 | 2466 | 20.25% |

**Table 3-4**
**Location of In-Situ Gamma Spectroscopy Measurements**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Grid |
|---|---|---|
| 800 | 2 | 26 |
| 802 | 20 | 3 |
| 803 | 2 | 7 |
| 803 | 2 | 81 |
| 803 | 3 | 3 |
| 803 | 3 | 12 |
| 803 | 4 | 87 |
| 803 | 4 | 89 |
| 803 | 5 | 86 |
| 803 | 5 | 102 |
| 803 | 6 | 85 |
| 803 | 6 | 95 |
| 803 | 6 | 157 |
| 804 | 1 | 5 |
| 804 | 1 | 10 |
| **804** | **1** | **13** |
| **804** | **2** | **6** |
| 804 | 4 | 5 |
| **804** | **3A** | **0** |
| 804 | 3A | 2 |
| 804 | 3A | 14 |
| **804** | **5A** | **7** |
| 804 | 6A | 6 |
| 805 | 1 | 3 |
| 805 | 1 | 6 |
| 805 | 1 | 13 |
| **805** | **1** | **14** |
| 805 | 1 | 17 |
| **805** | **1** | **20** |
| **806** | **1** | **3** |
| 806 | 5 | 14 |
| 806 | 5 | 29 |
| 807 | 2 | 3 |
| 809 | 1 | 9 |
| 810 | 1 | 10 |
| 810 | 1 | 31 |
| **810** | **3** | **18** |
| 810 | 10 | 8 |
| 812 | 20 | 20 |
| 812 | 32 | 0 |
| 812 | 9 | 2 |
| 813 | 3 | 5 |
| 814 | 4 | 14 |
| 815 | 6 | 15 |
| 815 | 9 | 5 |
| 815 | 11 | 26 |
| 815 | 14 | 9 |
| **815** | **15** | **15** |
| 815 | 15 | 17 |
| 815 | 15 | 27 |
| 815 | 15 | 29 |
| 815 | 15 | 38 |
| 815 | 16 | 21 |

| Building | Room | Grid |
|---|---|---|
| 816 | 2 | 22 |
| **816** | **3** | **61** |
| 816 | 4 | 45 |
| 816 | 5 | 5 |
| **816** | **7** | **3** |
| **816** | **8** | **5** |
| 816 | 8 | 14 |
| 816 | 9 | 1 |
| **816** | **10** | **9** |
| **816** | **10** | **9** |
| 817 | 2 | 15 |
| **819** | **1** | **5 (Hot spot 86)** |
| **819** | **1** | **91 (Hot spot 96)** |
| 819 | 2 | 11 |
| 819 | 3 | 78 |
| 819 | 3 | 152 |
| 819 | 3 | 0D |
| 819 | 3 | 130 (Hot spot 148) |
| **819** | **4** | **5** |
| 819 | 4 | 7 |
| 819 | 4 | 8 |
| **819** | **5** | **7** |
| **819** | **5** | **11** |
| **819** | **5** | **12** |
| **819** | **5** | **15** |
| 819 | 7 | 5 |
| **819** | **7** | **8** |
| 819 | 7 | 10 |
| **819** | **8** | **2** |
| 819 | 8 | 3 |
| 819 | 8 | 9 |
| 819 | 9 | 10 |
| 819 | 10 | 10 |
| **819** | **11** | **19** |
| 819 | 12 | 5 |
| **819** | **12** | **23** |
| **819** | **12d** | **2** |
| **819** | **12d** | **4** |
| 819 | 6b | 3 |
| **823** | **1** | **5** |
| 824 | 1 | 11 |
| 825 | 1 | 21 |
| 827 | 1 | 10 |




BLDG. 804 AND 805

N

NOTE:

Entire Building is a Class One Area:
2m x 2m GRIDS, 100% COVERAGE

- FLOOR
- WALL SURFACES BELOW 2 METERS
- UNEARTHEN ROOFS WITH DUCTS
- EXTERIOR BUILDING SURFACES 2m FROM ACCESS
- HORIZONTAL SURFACES ABOVE 2m ABOVE FLOOR WHERE DUST OR PARTICLES WOULD DEPOSIT.

1m x 1m GRIDS, 10% COVERAGE

- CEILING (SUSPENDED AND NONSUSCENDED)
- UPPER WALLS (ABOVE 2m)

o 816D2 DEBRIS SAMPLE LOCATION WITH LABEL.

NOTE(S):

BUILDING INFORMATION REFERENCED FROM BLACK & VEATCH CONSULTING ENGINEERS. DRAWING NO. Y2-855, MAY 2, 1955. REVISED RECORD WORK AS-BUILT 6/2/58. CAMPBELL DESIGN ARCH./ENG. PLANNERS FLOOR PLANS, DETAIL & SCHEDULES DRAWING NO. 10-87, SHEET M-1, PR. NO. 52-85, DATE: FEB. 18, 87.

FEET 0 3 6
METERS 0 1 2

0 4' 8' 12'
(APPROX. SCALE FT.)

PARSONS

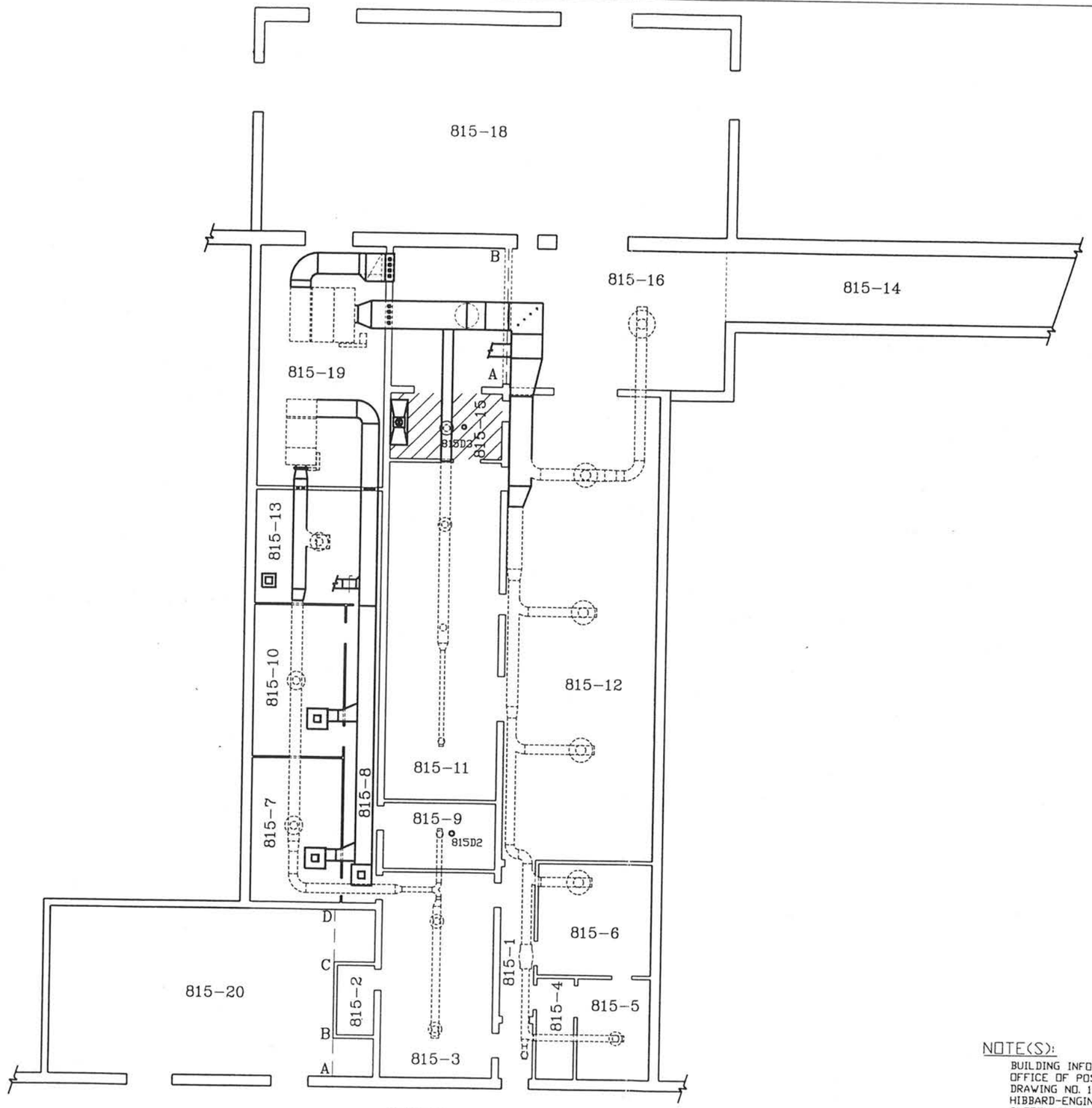
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | DWG NO. 730047-01001

FIGURE 3-1
BUILDING 804 AND 805
DEBRIS SAMPLING LOCATIONS

SCALE AS NOTED | DATE OCTOBER 1990 | REV A

R:\SENECA\RIFS\SD12\BLDG8045.DWG




BLDG. 815

N

NOTE:

- CLASS ONE AREA
- REMAINDER OF BUILDING IS CLASS TWO, WITH THE EXCEPTION OF 815-18, 815-19 AND 815-20 WHICH ARE LIMITED CLASS SURVEY UNIT.
- ROOM 815-14 IS A HALLWAY THAT CONNECTS BUILDINGS 815 AND 816.
- 816D2 DEBRIS SAMPLE LOCATION WITH LABEL.

NOTE(S):

BUILDING INFORMATION REFERENCED FROM OFFICE OF POST THE ENGINEER DRAWING NO. 14-76, JULY 19, 1976. HIBBARD-ENGINEERS DRAWING NO. 20-80, SHEET NO. 1-10, DATE 5/16/80. ROBSON & WOESE INC. CONSULTING ENGINEERS DRAWING NO. M/E-1, SHEET NO. 1 OF 4, DATE AUG. 6, 1986.

FEET 0 3 6
METERS 0 1 2

0 8' 16' 24'
(APPROX. SCALE FT.)

PARSONS

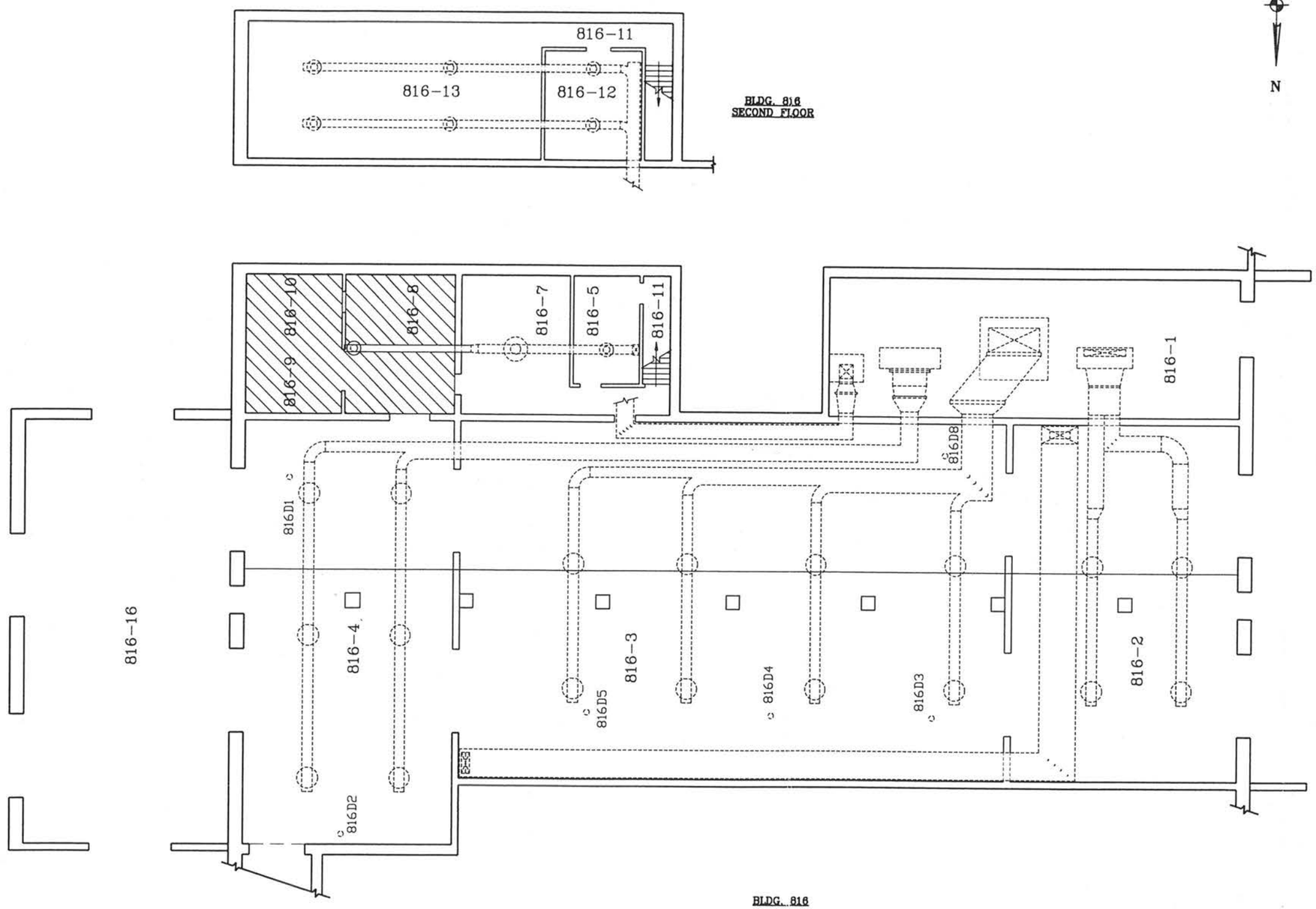
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg No 730047-01001

FIGURE 3-2
BUILDING 815
DEBRIS SAMPLING LOCATIONS

SCALE AS NOTED | DATE NOVEMBER 1990 | REV A

R:\SENECA\RIFS\SD12\BLDG815.DWG




BLDG. 816
SECOND FLOOR

BLDG. 816

N

NOTE:

- CLASS ONE AREA
- REMAINDER OF BUILDING IS CLASS TWO WITH THE EXCEPTION OF 815-16, 816-21 AND 816-1 WHICH ARE LIMITED CLASS III SURVEY UNITS.
- ○ 816D2 DEBRIS SAMPLE LOCATION WITH LABEL.

FEET 0 3 6
METERS 0 1 2

0 8' 16' 24'
(APPROX. SCALE FT.)

NOTE(S):

BUILDING INFORMATION REFERENCED FROM OFFICE OF POST THE ENGINEER DRAWING NO. 14-76, JULY 19, 1976. HIBBARD-ENGINEERS DRAWING NO. 20-80, SHEET NO. 1-10, DATE 5/16/80. ROBSON & WOESE INC. CONSULTING ENGINEERS DRAWING NO. M/E-1, SHEET NO. 1 OF 4, DATE AUG. 6, 1986.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT ENVIRONMENTAL ENGINEERING | Dwg. No. 730047-01001

FIGURE 3-3
BUILDING 816
DEBRIS SAMPLING LOCATIONS

SCALE AS NOTED | DATE AUGUST 2001 | REV 0

R:\SENECA\RFS\SD12\BLDG816.DWG

# 4 BUILDING SURVEY RESULTS

This section describes 1) the guideline values used to evaluate the buildings; 2) the data collected during the building surveys at SEAD-12 and how they are used to evaluate the buildings; and 3) the statistical analysis used to evaluate the survey data in accordance with MARSSIM.

## 4.1 BUILDING GUIDELINE VALUES

The process described in MARSSIM was used to develop the derived concentration guideline levels (DCGL) used to evaluate the building survey direct and scanning measurements. Using the RESRAD-BUILD computer code, the DCGL report, (Parsons ES, January 2000), **Appendix A**, describes the development of the two DCGLs based on the area of contamination, the $DCGL_{EMC}$ and the $DCGL_W$ values. In Section 2.2 of MARSSIM, the $DCGL_{EMC}$ is defined as the guideline level for elevated measurement comparisons. It is used for evaluation "if the residual radioactivity appears as small areas of elevated activity within a larger area, typically smaller than the area between two measurement locations." Alternatively, the $DCGL_W$ is derived based on an average concentration over a broad area and the average activity over the entire area is evaluated. The $DCGL_W$ values are lower (more conservative) then the $DCGL_{EMC}$ values.

The DCGL report data evaluation confirmed that the sampling grids were of appropriate size and that the number of measurements collected in each survey area was sufficient for statistically valid data analysis. $DCGL_W$ and $DCGL_{EMC}$ values, originally derived in the DCGL report, were revised based on communications of April 18, 2000 between the Army, Parsons, NYSDOH, USEPA, and NYSDEC. The revised $DCGL_W$s and $DCGL_{EMC}$s are presented in **Table 4-1** and **Table 4-2**, respectively. The evaluation of the SEAD-12 building survey data using $DCGL_W$ values is described below.

## 4.2 USE OF SURVEY DATA TO EVALUATE BUILDING STATUS

**Section 3.2** describes the various survey measurements collected during the Phase I and Phase II building surveys at SEAD-12. These include:

- Alpha, beta, and gamma direct measurements,
- Alpha, beta and gamma scanning measurements,
- Exposure rate measurements,
- Removable radiation surveys (consisting of gross alpha, beta, gamma, and tritium smears),
- Duct and drain scanning data,
- Radon measurements,
- In-situ gamma spectroscopy, and
- Materials sampling.

The survey measurements listed above were used to evaluate the status of the building survey areas as follows:

- Direct measurements were grouped as a data set per room and statistically compared to direct measurements collected from the background reference area (Building 722) using the Wilcoxon Rank Sum (WRS) test. The $DCGL_W$ value was added to each data point in the background data set to comprise the $DCGL_W$ -adjusted background data set. This data set was used to determine if direct measurements from a particular room exceeded the allowable exposure over background. Section 8.4 of MARSSIM describes the comparison of survey data to $DCGL_W$ values. In addition, direct measurement flag values were established to identify potentially elevated areas of activity in Limited Class III areas.
- Scanning measurements were used to determine if small areas of elevated levels of radioactivity were present in the buildings. Scanning results were compared to flag values based on the DCGLs and background data to determine if such areas exist. It should be noted that Section 2.5.1.1 of MARSSIM recommends the use of $DCGL_{EMC}$s to define elevated measurements. However, more conservative flag values were used to compare to site scanning data sets to determine the presence or absence of elevated activity.
- Exposure rate measurements were collected and used primarily to monitor the health and safety of the survey crew. Exposure rate measurements also served as a diagnostic tool in finding areas of elevated activity, but were not used to statistically support the facility closure.
- Smear data were used to determine if elevated levels of removable activity were present. In addition, smears were collected to test for the presence of tritium. Smear results were compared to American National Standard Institute (ANSI) criteria.
- Duct and drain scanning and removable radiation data were collected to determine if elevated levels of activity were present in the ventilation ducts and floor drains of the buildings.
- In-situ gamma spectroscopy was performed to identify and to quantify, where relevant, the radionuclides associated with elevated-activity materials.
- Material samples were collected and analyzed by an independent off-site laboratory to verify that fixed contamination was not present. In addition, materials sampling data were used to independently confirm the gamma spectroscopy results.

MARSSIM only utilizes the scanning and direct measurement data in evaluating the status of the survey areas.

## 4.3 MARSSIM EVALUATION OF DIRECT AND SCANNING MEASUREMENTS

All the statistical tests used to investigate whether a survey area contained residual radiological contamination were based on MARSSIM guidance. The process followed to perform compliance statistics is presented in **Figure 4-1**. Two types of data analysis were performed:

1) Direct measurements for the investigation of uniform contamination above allowable activity; and
2) Scanning measurements for the investigation of localized elevated radioactivity above allowable limits.

### 4.3.1 Wilcoxon Rank Sum Test

MARSSIM recommends the use of the WRS test, at specified probabilities of making Type I ($\alpha$-level) and Type II ($\beta$-level) errors, to compare radioactivity data from survey areas to data collected from background, or reference, areas. The advantage of the WRS test is that no assumption is made about the underlying distributions of the data sets (i.e., it is a non-parametric test). The WRS test compares the relative ranks of the two data sets in order to determine if they are drawn from the same distribution. The test is insensitive to higher values or outliers. If a data set passes the WRS test, it can be concluded that the radionuclide concentrations in the survey area are not statistically different from the background buildings.

If a survey area data set failed the WRS test per MARSSIM, the background measurements were adjusted by adding the $DCGL_W$ to each background measurement. The WRS test was then re-run, comparing the survey area data set to the $DCGL_W$-adjusted background data set.

The WRS test was run using the commercial software STATISTICA™ (Statsoft, 2001). The software generates a WRS test "p-value" that ranges between zero and one. A p-value of 0.05 or greater was used as the "pass" condition (i.e., the distributions of the two data sets are similar), which corresponds to a Type I error probability of 0.05. In other words, there is only a one-in-twenty chance of a false positive (i.e., incorrectly identifying the distributions as similar when they in fact are not). A p-value of less than 0.05 resulted in a "fail" (i.e., the distributions of the two data sets are different), and box-and-whisker plots were generated to determine which data set was elevated above the other.

### 4.3.2 The Confidence and Power of the WRS Test

Before conducting the WRS test, MARSSIM requires that the probabilities of making Type I ($\alpha$) and Type II ($\beta$) errors be described. The confidence of a test is given by $1-\alpha$ and the power of a test is given by $1-\beta$. The level of these errors is estimated based on what MARSSIM defines as the relative shift in background data. The relative shift was estimated using the example outlined in Appendix A of MARSSIM. The gray region for each measurement was estimated as half the maximum detected

concentration in the background building. Based on this assumption, the relative shifts for alpha, beta, gamma and FIDLER measurements are presented in **Table 4-4**. The maximum Type I and Type II error probabilities supported for each measurement type are determined from Table 5.3 of MARSSIM which shows total the number of samples required at various error levels and relative shifts. The error probabilities are listed in the last two columns of **Table 4-4**.

### 4.3.3 Box-and-Whisker Plots

EPA (1992) recommends the use of box-and-whisker plots as a way to visualize and compare the variances and spreads between data sets. Therefore, box-and-whisker plots were used for cases that failed the WRS test to determine if the survey data are statistically less than or greater than background buildings. Box-and-whisker plots provide a summary view of the entire data set, including the overall location, degree of symmetry, and positions of outliers. The box encloses the central 50-percent of the data, with the top of the box representing the 75th-percentile and the bottom of the box representing the 25th-percentile. The small square in the middle of box represents the median of the data set. The upper and lower whiskers extend to the maximum and minimum measurement, respectively. Plots of survey area data were placed side by side to plots of background data and the data sets were compared visually to determine if the survey data were less or greater than the background data. **Appendix H** presents the box-and-whisker plots for each instrument and radiation type in each Phase I survey area. **Appendix K** presents the box-and-whisker plots for the Phase II survey data analysis.

### 4.3.4 Direct Measurements

For direct measurements collected in the grid-based surveys, the WRS test was performed for each instrument for alpha, beta, and gamma radiation measurements for each survey area. The WRS test compared the survey area data set with the background data set on a radiation-type and instrument-type basis. The WRS test was performed to establish whether the survey area data set was statistically similar to or different from the background data set. If the WRS test demonstrated that the two data sets were statistically different, box-and-whisker plots of the data were drawn and compared to determine which data set had the more elevated central tendency.

In the event that the survey area data set was elevated compared to the background data set, the WRS test was re-run using $DCGL_W$-adjusted background data in place of the original background data set. This process is described in Section 2.5.1.2 of MARSSIM. This analysis allows for the comparison of the survey data against the most conservative radioactivity concentrations, aside from background, to evaluate compliance with release criterion. The $DCGL_W$-adjusted background data set for a given radiation and instrument type was created by using the $DCGL_W$ for the radionuclide that generates the lowest DCGL. This value was added to each background data point.

If a survey area data set was equivalent to or less than either the background or the $DCGL_W$-adjusted background data sets, it was concluded that the survey area met the release criterion and no further investigation was required to demonstrate compliance. If a data set was above the $DCGL_W$-adjusted background data set, additional investigation of the survey area was conducted.

Decisions were made in the field to collect discretionary measurements (from elevated measurement locations) in areas of potential contamination from survey units that were outside of the grid-based sampling data sets. Additional comparisons to background and $DCGL_W$-adjusted background using the WRS test were performed for survey areas where discretionary measurements were taken.

### 4.3.5 Scanning Measurements

Scanning measurements were compared to flag values, listed in **Table 4-3,** to determine the presence or absence of localized areas of elevated radioactivity within a survey area. Within a survey area, the maximum alpha/beta scanning measurement from each grid was compared to the $DCGL_{EMC/5}$ (the $DCGL_{EMC}$ divided by 5) plus the background mean value to establish the presence or absence of areas of elevated radiation. The $DCGL_{EMC/5}$ value for a middle-sized room (5x12x4 meters, scanned on a 2x2-meter grid) was selected as an average room size across the site. The $DCGL_{EMC}$ value was divided by 5 to provide a more conservative flag value, making an allowance for up to five elevated measurements per room. Gamma scanning measurements were compared to the 95% upper threshold limit (UTL) of the background FIDLER scanning results. The results of the scanning surveys are presented in **Sections 4.4.3** and **4.5.3**.

## 4.4 PHASE I BUILDING SURVEY RESULTS

Seven types of field measurements were collected during the SEAD-12 Phase I building surveys in order to support the closure. These measurement data were collected in units of counts per minute (cpm). These measurement types are:

- gross alpha from floor monitors,
- gross beta from floor monitors,
- gross alpha (gas proportional) from hand-held,
- gross beta (gas proportional) from hand-held,
- gross alpha (scintillation) from phoswich,
- gross beta (scintillation) from phoswich, and
- gross gamma from the FIDLER (field instrument for the detection of low energy radiation).

Any given survey area contains only five data types because the phoswich scintillation detector replaced the gas proportional detector for gross alpha and beta measurements during the Phase I investigation, as described in **Section 3.2.1.1**. However, all seven data types were collected from the background buildings to ensure comparability.

### 4.4.1 Background Data

As noted in **Section 1**, data were collected from Building 722 to be used as background measurements for all SEAD-12 buildings constructed of cement blocks (i.e. similar construction materials) except Building 803. Data from igloo CO912 were used as background data for Building 803 because both have similar woven-reinforcing bar and poured concrete construction.

At Building 722, data were collected for a number of surfaces in order to capture the variability in ambient radioactivity. Refer to **Appendix F** for the complete background data set. The data sets for all indoor surface matrices were combined to create a single background building data set. The purpose of collecting a background data set is to establish the radiation levels at which or below are considered to be attributable to natural sources, and above which are considered to be attributable to a synthetic or man-made source. The survey area data sets were then compared to background to determine if radioactivity in the survey areas was attributable to background or caused by a synthetic component. Capturing the full range of variability in background and making it available for comparison to all survey units at SEAD-12 obviates the need to classify and match survey and background building data sets by surface matrix criteria, removing an important source of subjectivity, error and uncertainty from the remedial investigations. Furthermore, this approach treats every survey unit as a single entity for the purpose of making closure and remedial decisions, and avoids remediation of different surface areas at different cleanup levels within the same survey unit.

The limitation of combining data for all surfaces is that certain elevated measurement locations may be smoothed over during this process. To insure that elevated measurements in a survey area were not being overlooked, site data were compared to $DCGL_W$s and $DCGL_{EMC}$s based on Section 8.2 of MARSSIM. This process was conducted after survey area data were compared to background building data.

### 4.4.2 Analysis of Direct Measurements

The results of the WRS test on direct measurement data types for all of the Phase I survey areas are presented in this section. Refer to **Appendix F** for the complete Phase I direct measurement data sets on a room-by-room basis.

#### 4.4.2.1 Survey Area Measurements Versus Background

The results of the direct measurement data (not including discretionary measurements) compared to background data are presented in **Table 4-5**. As noted above, WRS tests were performed for each of the five data types collected at each survey area.

The WRS test results are shown on **Table 4-5** and indicate that the majority of the survey areas have similar data distributions to the background data set (p-values greater than 0.05). Survey areas that exceeded background are listed in bold type. Alpha measurements, while similar to background in most cases, exceeded background primarily in Buildings 803, 804, and 819. Beta measurements exceed background in several buildings; however, these exceedences occur predominantly in the rooms of Building 819. Gamma measurements exceeded background in only a few cases.

#### 4.4.2.2 Discretionary Measurements Versus Background

If a potentially elevated grid was located, additional direct measurements were collected at the location of the highest scanning measurement in that grid. These measurements, identified as discretionary measurements, were collected following procedures outlined in **Section 3.2.2**. Discretionary measurements were collected in Building 803 (Room 6), Building 819 (Rooms 1, 3, 4, and 5), and Building 804 (Room 3), because elevated locations were found during the scanning of these survey areas. WRS tests were re-run for these survey areas by including these elevated measurements in the data sets for the rooms (**Table 4-6**). As shown, for the six rooms and 30 data sets, 15 (i.e., half) of the readings exceed background. The majority of exceedences are beta measurements, with only two gamma exceedences (Rooms 4 and 5 of Building 819).

#### 4.4.2.3 Survey Area Measurements Versus $DCGL_W$-Adjusted Background

Background data was adjusted by adding the $DCGL_W$ to each measurement, as recommended in MARSSIM, and the WRS tests were re-run. The results for survey area data without discretionary measurements are presented in **Table 4-7**. Results for survey area data sets including discretionary measurements compared to the $DCGL_W$-adjusted background data set are presented in **Table 4-8**. In all cases the $DCGL_W$-adjusted background is higher than the survey areas. This is illustrated by the box and whisker plots presented in **Appendix I**.

### 4.4.3 Analysis of Scanning Measurements

The purpose of scanning measurements is to find localized areas of elevated radioactivity. For scanning measurement data, only summary statistics were compiled. Refer to **Appendix F** for the complete scanning data sets tabulated by building and by room. Scanning grids are shown for each of the buildings, by room, on figures presented in **Appendix H**. The comparisons of Phase I scanning measurements to the flag values are presented in **Table 4-9**. Scanning data from the survey areas (63 data sets) were generally below the flag value. The survey areas where the maximum scanning value exceeded the flag values were:

- Building 803, Room 3 – (with the alpha/beta phoswich detector);
- Building 803, Room 6 – (with the alpha/beta phoswich detector);
- Building 804, Room 3 – (with the alpha/beta gas proportional hand-held detector);
- Building 804, Room 3B – (with the alpha/beta gas proportional floor monitor and hand-held detector, and the gamma FIDLER detector);
- Building 805, Room 1 – ( with the gamma FIDLER detector);
- Building 816, Room 9 – (with the alpha/beta gas proportional hand-held detector); and
- Building 819, Room 3 – (with the alpha/beta gas proportional hand-held detector).

For these seven survey areas, the maximum gross alpha-beta scanning or gamma scanning result exceeded the scanning flag value.

### 4.4.4 Exposure Rate Measurements

Exposure rate measurements were collected concurrently with scanning and direct measurements to ensure a safe working environment for data collection crews and as a diagnostic tool to qualitatively locate areas of elevated radiation. **Table 4-10** presents the minimum, mean, and maximum exposure rate values for background building 722 and all Phase I survey areas. **Table 4-10** shows the survey area exposure rates to be at or below 10 μrem/ hr and below the dose limit for one hour (0.002 Rem or 2000 μrem [10 CFR 20]). A constant dose of 10 μrem/ hr is equivalent to 0.088 Rem/yr, which is less than both the dose limit to an individual member of the general public (0.1 Rem/yr) and the dose limit to occupationally exposed workers (5 Rem/yr [10 CFR 20]). These levels are also well below the established worker safety level of 500 μrem/hr (Radiation Protection Manual ER385-1-80, U.S. Army Corps of Engineers, based on an annual exposure of 1,000 mrem and an exposure time of 2,000 hours per year).

### 4.4.5 Smear Results

Smear samples were collected at all grid locations in each survey area, as well as at locations where discretionary measurements were collected. The gross alpha, beta, and gamma results from the dry smears, as well as the beta results from the tritium smears, are summarized in **Table 4-11**. Smear samples were used as a diagnostic tool to investigate the presence of removable contamination. Gross alpha, beta, and gamma radiation data from smear samples collected from each site survey area were compared to gross alpha, beta, and gamma smear sample data collected from the background building (Building 722) and with criteria published in the ANSI N13.12-1999 publication *Surface and Volume Radioactivity Standards for Clearance* (a standard for clearance and to derive screening levels based on the dose standard, **Table 4-12**). Refer to **Section 5.1** for further discussion of smear sampling results. The complete results are included in **Appendix F**.

### 4.4.6 Duct and Drain Data

The ducts and floor drains in the buildings in SEAD-12 were investigated to ascertain the presence or absence of radioactive contamination above permissible levels in the ventilation and floor drain systems. The duct and drain investigation methodology, as presented in **Section 3.2.1.4**, consisted of collecting gross gamma radiation scanning data inside the ducts and drains using a "peanut" probe at points of access. Low-energy gamma radiation and alpha radiation data were collected in the ducts and drains where accessible (**Appendix G**). Smear samples were collected from all openings in the ducts and floor drains and analyzed at the Army's Red Stone Arsenal counting lab for gross alpha, beta, and gamma radiation (**Appendix G**). The duct and drain smear sampling results are presented in **Table 4-11**. Gross alpha, beta, and gamma radiation data from smear samples collected from the ducts and drains were compared to gross alpha, beta, and gamma smear sample data collected from the background building (Building 722) and with criteria published in ANSI N13.12-1999 (**Table 4-12**). Refer to **Appendix G** for complete smear sampling results.

A total of 14 debris samples were collected from the drains in the Class I and II buildings. These samples were collected in all locations where there was sufficient material for speciated radionuclide analysis. The results for the speciated radionuclide analyses for the debris samples collected from the Class I and II buildings are presented in **Appendix G**. The results for the speciated radionuclide analyses for the debris samples collected from the Class I and II buildings were compared to criteria published in ANSI N13.12-1999. A summary of the comparison between the debris sample analyses and the ANSI standard is presented in **Table 4-13**. Refer to **Appendix G** for the full debris sample data set.

As shown in **Table 4-13**, radionuclides from the debris samples exceeding the screening levels ($95^{th}$ percentile of soil background data set, plus the ANSI screening criteria) were limited to a single exceedence apiece for bismuth-214, lead-210, lead-211, and radium-226. The maximum radium-226 and bismuth-214 concentrations were equal to the screening levels while lead-210 and lead-211 exceed the screening level by less than 5 pCi/g.

### 4.4.7 Radon

Radon data was collected using track-etch radon detection equipment. Thirty-three detectors were analyzed for radon from sixteen SEAD-12 buildings, as reported in **Table 4-14**. These data are from a SEDA survey conducted between July 1994 and July 1995. These data represent a long sampling interval, with data collection occurring while the buildings were operational. Both factors contribute to the data being highly representative of true radiological conditions in the buildings.

As shown on **Table 4-14**, the average radon concentrations ranged from 0.2 pCi/L to 12.1 pCi/L. The maximum average concentration of 12.1 pCi/L came from the west wall of Building 803 (room 1). Out of the 33 samples collected, there were only three samples contained greater than 1.0 pCi/L.

Only the one sample from Building 803 exceeds the EPA guidance (EPA402-R-93-003) of 4 pCi/L for air.

## 4.5 PHASE II BUILDING SURVEY RESULTS

### 4.5.1 Background Data

Building 722 data were used as background data for the Phase II building surveys. Refer to **Appendix F** for the complete Building 722 background data set. Comparisons of Phase II survey data to background data were conducted in a similar manner as the Phase I data analysis.

Background material samples of cinder block wall and of concrete floor were obtained from Building 2104. These samples were sent to the laboratory for isotopic analysis. The data obtained was used for comparison against the building material samples and collected from SEAD-12 during Phase II of the investigation.

Background in situ gamma spectroscopy spectra were also collected from Building 2104. Additionally, background spectra were collected from Igloo C0912 and Building 118. The background spectra were collected to have material-specific background spectra to compare with spectra collected from survey areas. Moreover, the background spectra were used to attempt to establish a correlation between the laboratory results and the gamma spectroscopy results. In situ gamma spectroscopy was performed on the background material samples that were sent to the laboratory.

Background gamma spectra were collected using the same procedures established for the collection of site survey gamma spectra (refer to **Section 3.2.5** and **Appendix L**).

### 4.5.2 Analysis of Direct Measurements

The results of the WRS test on direct measurement data types for all of the Phase II survey areas are presented in this section. Refer to **Appendix J** for the complete Phase II direct measurement data sets on a room by room basis. Additional discussion of the results is presented in **Section 5**.

#### 4.5.2.1 Survey Area Measurements Versus Background

Summaries of the WRS results of the site survey data compared to background data are presented in **Table 4-15**. As noted above, WRS tests were performed for each of the five data types collected at each survey area.

Summary statistics and the WRS test results for each survey area are shown on **Table 4-15** and indicate that the majority of the survey areas have similar data distributions to the background data set (p-levels greater than 0.05). Alpha floor monitor survey data sets, while similar to background in

most cases, exceeded background in six survey areas located within Buildings 807, 810, and 815. There were no above-background beta floor monitor survey data sets. One alpha phoswich data set, from Building 810, was elevated above background. Likewise, there was one beta phoswich data set, from Building 812, that exceeded background. Gamma FIDLER data sets exceeded background for six survey areas, located in Buildings 810 and 812.

#### 4.5.2.2 Survey Plus Discretionary Measurements Versus Background

Survey areas of where direct or scanning measurements detected a potentially elevated surface activity location are listed in **Table 4-16**. Per the procedures outlined in **Section 3.2.2**, additional direct measurements were taken in the potentially elevated grids at the highest scanning location. However, for several of the Phase II grids with potentially-elevated locations, the highest scanning location could not be determined because the reading was a function of the building material (i.e., readings were consistent throughout the grid). As a result, a discretionary measurement was not taken within that survey grid, and the potentially-elevated results were kept in the survey data set (listed in regular type in **Table 4-16**). For survey grids with a discernible maximum reading, a discretionary measurement was taken as before (locations listed in bold type in **Table 4-16**). WRS tests were re-run for these survey areas by including these elevated measurements in the data sets for the survey areas (**Table 4-17**). Of the five survey areas where discretionary measurements were taken, three survey areas (four data sets total) exceeded background. The data set for Building 812 (Room 20), was elevated for the gamma and beta phoswich data; the data sets for Building 810 (Rooms 10 and 12) were elevated for gamma data.

#### 4.5.2.3 Survey Area Measurements Versus $DCGL_W$-Adjusted Background

As with the Phase I data analysis, the background data set was adjusted by adding the $DCGL_W$ to each measurement, as recommended in MARSSIM, and the WRS tests were re-run for survey areas (without discretionary measurements) that exceeded background. The $DCGL_W$ was converted from the RESRAD-BUILD output units of dpm/100cm$^2$ to cpm using the daily instrument efficiency and the active surface area of the detector, which are presented in **Table 4-18** along with the survey areas that exceeded background. Where more than one instrument was used to survey a survey area, $DCGL_W$s were calculated and the WRS test performed on an instrument-by-instrument basis. The results for the WRS test between survey area and the $DCGL_W$-adjusted background data set are presented in **Table 4-19**. For all alpha and beta measurements analyzed (for both floor monitor and phoswich), the survey area data are less than the $DCGL_W$-adjusted background. For the gamma data sets analyzed, six of the seven data sets exceed the $DCGL_W$-adjusted background. These data sets were from Building 810 (Rooms 9, 10, and 11) and Building 812 (Rooms 9, and 20). Box-and-whisker plots for these comparisons are presented in **Appendix K**.

#### 4.5.2.4 Survey Plus Discretionary Measurements Versus $DCGL_W$-Adjusted Background

The four survey area data sets including discretionary measurements that exceeded background were compared to the $DCGL_W$-adjusted background. As with the survey area data without discretionary measurements, $DCGL_W$s were calculated on an instrument-by-instrument basis, using the average daily instrument efficiency and the active detector surface area. Results for the WRS tests for survey area data including discretionary measurements and the $DCGL_W$-adjusted background data are presented in **Table 4-20**. All four of the gamma data sets including discretionary measurements exceeded the $DCGL_W$-adjusted background.

### 4.5.3 Analysis of Scanning Measurements

The purpose of scanning measurements is to find localized areas of elevated radioactivity. For scanning measurement data, only summary statistics were compiled. Refer to **Appendix J** for the complete Phase II scanning data sets tabulated by building and by room. Scanning grids are shown for each of the buildings, by room, on figures presented in **Appendix P**. The comparisons of Phase II scanning measurements to the scanning flag values are presented in **Table 4-21**. All alpha-beta scanning data (both floor monitor and phoswich) from the Phase II survey areas are below the $DCGL_{EMC\,5}$ plus background flag value. The seven survey areas that had gamma scanning measurements that exceeded the scanning flag value are discussed in **Section 5.2.2**.

### 4.5.4 Exposure Rate Measurements

Exposure rate measurements were collected concurrently with scanning and direct measurements to ensure a safe working environment for data collection crews and as a diagnostic tool to qualitatively locate areas of elevated radiation. **Table 4-22** presents the minimum, mean, and maximum exposure rate values for all Phase II survey areas. **Table 4-22** shows the survey area exposure rates to be, at a maximum, slightly above or at 10 µrem/ hr and below the dose limit for one hour (0.002 Rem or 2000 µrem [10 CFR 20]). A constant dose of 10 µrem/ hr is equivalent to 0.088 Rem/yr, which is less than both the dose limit to an individual member of the general public (0.1 Rem/yr) and the dose limit to occupationally exposed workers (5 Rem/yr [10 CFR 20]). These levels are also well below the established worker safety level of 500 µrem/hr (Radiation Protection Manual ER385-1-80, U.S. Army Corps of Engineers, based on an annual exposure of 1,000 mrem and an exposure time of 2,000 hours per year).

### 4.5.5 Smear Results

Smear samples were collected at all surveyed grid locations in each Phase II survey area, as well as at locations where discretionary measurements were collected. Smear samples were used as a diagnostic tool to investigate the presence of removable contamination. Gross alpha, beta, and gamma radiation data from smear samples collected from each site survey area were compared to

gross alpha, beta, and gamma smear sample data collected from the background building (Building 722) and with criteria published in ANSI-HPS N13.12-1999 (refer to **Table 4-12**). The gross alpha, beta, and gamma smear sampling results are summarized in **Table 4-23**. During the Phase II work, tritium smears were collected only in the Class II survey areas of Buildings 815 and 816. The results from the tritium smear sampling are summarized in **Table 4-24**. Refer to **Section 5.2** for further discussion of Phase II smear sampling results. The complete results from Phase II are included in **Appendix J**.

### 4.5.6 Gamma Spectroscopy Results

Gamma spectroscopy measurements were collected from 103 locations, including background locations. The field gamma spectroscopy measurement locations (not including background and material sample spectroscopy measurements) are summarized in **Table 4-25**. Twenty-eight measurements demonstrated a potential difference from the spectra collected from background locations. These 28 spectra (listed in bold type in **Table 4-25**) required additional scrutiny to make identifications of the radionuclides present. The identification process is described in detail in **Appendix O.** The gamma spectroscopy results of the 28 locations are summarized in **Table 4-26**. Also presented in **Table 4-26** are results from additional potentially elevated (as indicated by WRS test results or scanning measurements) survey areas from the Phase I and Phase II surveys and one elevated material sample. The results of the gamma spectroscopy measurements demonstrate that the materials present at SEAD-12 are within background levels.

### 4.5.7 Material Sampling Results

A total of seven material samples, including two background samples, were collected during the Phase II field effort. Two of these samples were background samples. The remaining sample locations were selected because the gamma FIDLER measurements were either the highest gamma measurement in a room that exceed background based on WRS statistics, or the room location had one of the highest elevated gamma readings. The purpose of these samples was to verify both the identification and quantification results of the gamma spectroscopy measurements. The analytical results of the material samples, along with the gamma spectroscopy results for the same samples, are listed in **Table 4-27**.

**TABLE 4-1**
**DERIVED CONCENTRATION GUIDELINE LIMITS (DCGLw)[a]**
**FOR BUILDING SURVEY AREAS**
**SEAD-12 BUILDING REPORT**
**SENECA ARMY DEPOT ACTIVITY**

| Room Size (m) | 2x2x4 | 6x5x2.5 | 5x12x4 | 12x12x5 | 10x20x5 |
|---|---|---|---|---|---|
| Scenario | Worker (dpm/100 $cm^2$) | | | | |
| AM-241 | 1.83E+02 | **1.15E+02** | 1.83E+02 | 2.29E+02 | 2.29E+02 |
| CO-57 | 1.00E+06 | 3.63E+05 | 2.91E+05 | 2.28E+05 | **2.10E+05** |
| CO-60 | 3.96E+04 | 1.45E+04 | 1.20E+04 | 9.57E+03 | **8.84E+03** |
| CS-137 | 1.39E+05 | 5.46E+04 | 4.77E+04 | 3.89E+04 | **3.60E+04** |
| H-3 | 3.24E+08 | **2.08E+08** | 3.24E+08 | 4.03E+08 | 4.03E+08 |
| PM-147 | 3.44E+06 | **2.35E+06** | 3.44E+06 | 4.15E+06 | 4.15E+06 |
| PU-239 | 1.90E+02 | **1.18E+02** | 1.90E+02 | 2.37E+02 | 2.37E+02 |
| RA-226 | 5.98E+03 | **3.50E+03** | 4.79E+03 | 5.14E+03 | 4.98E+03 |
| SR-90 | 4.88E+04 | **3.06E+04** | 4.78E+04 | 5.88E+04 | 5.88E+04 |
| TC-99 | 6.79E+06 | **4.25E+06** | 6.79E+06 | 8.49E+06 | 8.49E+06 |
| TH-230 | 2.54E+02 | **1.58E+02** | 2.54E+02 | 3.17E+02 | 3.17E+02 |
| U-235 | 6.71E+02 | **4.19E+02** | 6.69E+02 | 8.33E+02 | 8.33E+02 |
| U-238 | 6.98E+02 | **4.37E+02** | 6.98E+02 | 8.73E+02 | 8.73E+02 |
| Scenario | Residential (dpm/100 $cm^2$) | | | | |
| AM-241 | 6.36E+01 | **3.97E+01** | 6.36E+01 | 7.94E+01 | 7.94E+01 |
| CO-57 | 3.46E+05 | 1.26E+05 | 1.01E+05 | 7.89E+04 | **7.26E+04** |
| CO-60 | 1.38E+04 | 5.02E+03 | 4.15E+03 | 3.31E+03 | **3.06E+03** |
| CS-137 | 4.84E+04 | 1.90E+04 | 1.65E+04 | 1.35E+04 | **1.25E+04** |
| H-3 | 1.12E+08 | **7.19E+07** | 1.12E+08 | 1.39E+08 | 1.39E+08 |
| PM-147 | 1.20E+06 | **8.15E+05** | 1.19E+06 | 1.44E+06 | 9.32E+04 |
| PU-239 | 6.57E+01 | **4.10E+01** | 6.57E+01 | 8.21E+01 | 8.21E+01 |
| RA-226 | 2.08E+03 | **1.21E+03** | 1.67E+03 | 1.77E+03 | 1.73E+03 |
| SR-90 | 1.69E+04 | **1.06E+04** | 1.65E+04 | 2.04E+04 | 2.04E+04 |
| TC-99 | 2.36E+06 | **1.48E+06** | 2.36E+06 | 2.95E+06 | 2.95E+06 |
| TH-230 | 8.80E+01 | **5.50E+01** | 8.80E+01 | 1.10E+02 | 1.10E+02 |
| U-235 | 2.33E+02 | **1.45E+02** | 2.32E+02 | 2.89E+02 | 2.89E+02 |
| U-238 | 2.43E+02 | **1.52E+02** | 2.42E+02 | 3.03E+02 | 3.03E+02 |

Notes:
[a] - $DCCL_W$ -Derived concentration guideline level used for Wilcoxon Rank Sum statistical tests, derived based on an average concentration over a large area
-All values are provided as dpm per 100 $cm^2$.
-Bold values are the most conservative.
-All DCGLs correspond to 10 mrem/yr at 0 years except for Th-230 where thie maximum dose occurred at 100 years.
-DCGL values derived using RESRAD-Build.

**TABLE 4-2**
**DERIVED CONCENTRATION GUIDELINE LIMITS ($DCGL_{EMC}$)[a]**
**FOR BUILDING SURVEY AREAS**
**SEAD-12 BUILDING REPORT**
**SENECA ARMY DEPOT ACTIVITY**

| Room Size (m) | 2x2x4 | 2x2x4 | 5x12x4 | 5x12x4 | 12x12x5 | 12x12x5 |
|---|---|---|---|---|---|---|
| Grid Size (m) | 1x1 | 2x2 | 1x1 | 2x2 | 1x1 | 2x2 |
| Scenario | Worker (dpm/100 $cm^2$) | | | | | |
| AM-241 | 7.33E+02 | **1.83E+02** | 1.10E+04 | 2.75E+03 | 3.28E+04 | 8.21E+03 |
| CO-57 | 3.05E+06 | **1.00E+06** | 3.29E+06 | 1.11E+06 | 3.31E+06 | 1.11E+06 |
| CO-60 | 1.23E+05 | **3.96E+04** | 1.38E+05 | 4.61E+04 | 1.38E+05 | 4.66E+04 |
| CS-137 | 4.49E+05 | **1.39E+05** | 5.76E+05 | 1.91E+05 | 5.85E+05 | 1.96E+05 |
| H-3 | 1.30E+09 | **3.24E+08** | 1.95E+10 | 4.87E+09 | 5.80E+10 | 1.45E+10 |
| PM-147 | 1.38E+07 | **3.44E+06** | 2.04E+08 | 5.10E+07 | 5.70E+08 | 1.45E+08 |
| PU-239 | 7.59E+02 | **1.90E+02** | 1.13E+04 | 2.84E+03 | 3.41E+04 | 8.53E+03 |
| RA-226 | 2.32E+04 | **5.98E+03** | 1.31E+05 | 3.94E+04 | 1.68E+05 | 5.39E+04 |
| SR-90 | 1.95E+05 | **4.88E+04** | 2.49E+06 | 6.49E+05 | 5.66E+06 | 1.57E+06 |
| TC-99 | 2.72E+07 | **6.79E+06** | 4.07E+08 | 1.02E+08 | 1.22E+09 | 3.06E+08 |
| TH-230 | 1.01E+03 | **2.54E+02** | 1.52E+04 | 3.81E+03 | 4.56E+04 | 1.14E+04 |
| U-235 | 2.68E+03 | **6.71E+02** | 3.95E+04 | 9.91E+03 | 1.14E+05 | 2.90E+04 |
| U-238 | 2.80E+03 | **6.98E+02** | 4.18E+04 | 1.05E+04 | 1.24E+05 | 3.12E+04 |
| Scenario | Residential (dpm/100 $cm^2$) | | | | | |
| AM-241 | 2.54E+02 | **6.36E+01** | 3.81E+03 | 9.52E+02 | 1.14E+04 | 2.85E+03 |
| CO-57 | 1.06E+06 | **3.46E+05** | 1.14E+06 | 3.83E+05 | 1.15E+06 | 3.86E+05 |
| CO-60 | 4.26E+04 | **1.38E+04** | 4.76E+04 | 1.59E+04 | 4.80E+04 | 1.62E+04 |
| CS-137 | 1.56E+05 | **4.84E+04** | 2.00E+05 | 6.67E+04 | 2.04E+05 | 6.81E+04 |
| H-3 | 4.50E+08 | **1.12E+08** | 6.75E+09 | 1.69E+09 | 2.02E+10 | 5.02E+09 |
| PM-147 | 4.77E+06 | **1.20E+06** | 7.03E+07 | 1.77E+07 | 1.98E+08 | 5.00E+07 |
| PU-239 | 2.63E+02 | **6.57E+01** | 3.94E+03 | 9.87E+02 | 1.18E+04 | 2.95E+03 |
| RA-226 | 8.03E+03 | **2.08E+03** | 4.54E+04 | 1.37E+04 | 5.84E+04 | 1.86E+04 |
| SR-90 | 6.73E+04 | **1.69E+04** | 8.63E+05 | 2.25E+05 | 1.96E+06 | 5.45E+05 |
| TC-99 | 9.40E+06 | **2.36E+06** | 1.41E+08 | 3.53E+07 | 4.24E+08 | 1.06E+08 |
| TH-230 | 3.51E+02 | **8.80E+01** | 5.28E+03 | 1.32E+03 | 1.58E+04 | 3.96E+03 |
| U-235 | 9.28E+02 | **2.33E+02** | 1.37E+04 | 3.44E+03 | 3.96E+04 | 1.00E+04 |
| U-238 | 9.69E+02 | **2.43E+02** | 1.45E+04 | 3.63E+03 | 4.31E+04 | 1.08E+04 |

Notes:

[a] - $DCGL_{EMC}$ =Derived concentration guideline level using an elevated measurement comparison. A concervative approach applied to investigate applied to smaller areas by modifying the $DCGL_W$.

-All values are provided as dpm per 100 $cm^2$.

-Bold values are the most conservative.

-All DCGLs correspond to 10 mrem/yr at 0 years except for Th-230 where thie maximum dose occurred at 100 years.

-DCGL values derived using RESRAD-Build.

**Table 4-3**
**Instrument Flag Values for Direct and Scanning Measurements**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Instrument | Limiting Radionuclides | DCGL (dpm/100cm$^2$) [a] | Area (cm$^2$) | Efficiency [b] | Above Background Instrument Flag Value (cpm) | Background Average (cpm) [c] | Field Instrument Flag Value (cpm) |
|---|---|---|---|---|---|---|---|
| **Direct Measurements** | | | | | | | |
| Alpha Floor Monitor | Pu-239 | 41 | 425 | 0.24 | 42 | 4 | 46 |
| Beta Floor Monitor | Co-60 | 3060 | 425 | 0.17 | 2158 | 775 | 2933 |
| Alpha Hand-Held | Pu-239 | 41 | 100 | 0.17 | 7 | 3 | 10 |
| Beta Hand-Held | Co-60 | 3060 | 100 | 0.10 | 306 | 175 | 481 |
| Alpha Phoswich | Pu-239 | 41 | 75 | 0.27 | 8 | 4 | 12 |
| Beta Phoswich | Co-60 | 3060 | 75 | 0.20 | 459 | 365 | 824 |
| FIDLER | Am-241 | -- [d] | -- | -- | -- | 11265 | 17000 [e] |
| **Scanning Measurements** | | | | | | | |
| Alpha-Beta Floor Monitor | Pu-239, Co-60 | 13/2760 | 425 | 0.24/0.17 [f] | 2007 | 800 [g] | 2807 |
| Alpha-Beta Hand-Held | Pu-239, Co-60 | 13/2760 | 100 | 0.17/0.10 | 278 | 256 [g] | 534 |
| Alpha-Beta Phoswich | Pu-239, Co-60 | 13/2760 | 75 | 0.27/0.20 | 417 | 437 [g] | 854 |
| FIDLER | Am-241 | -- [d] | -- | -- | -- | 15541 | 19000 [e] |

[a] dpm/100cm$^2$ = distintegrations per minute per 100 square centimeters. The DCGLs for the direct measurements ($DCGL_W$s) are listed in Table 4-1. The DCGLs for the scanning measurements ($DCGL_{EMC}$s, or $DCGL_{EMC}$ divided by 5) are listed in Table 4-2. The DCGLs listed here are the most conservative for the measurement type.

[b] The values in this column are based on the initial efficiencies for each instrument, as presented in Table 3-3. For the alpha-beta scanning measurements, the efficiency is a combination of the individual alpha and beta efficiencies.

[c] The background average is the mean of the direct or scanning background measurements from Building 722 for each instrument, except where noted.

[d] For the FIDLER, the low efficiency along with the low DCGLs for Am-241 resulted in a low instrument flag value. As a result the instrument flag value was based only on background data.

[e] The FIDLER direct and scanning measurement flag values are equal to the 95% UTL (upper tolerance limit) of the Building 722 background direct and scanning data, respectively.

[f] The efficiencies for the scanning measurements were a combination of the individual radiation type efficiencies from the direct measurements (i.e., alpha FM efficiency was 0.24/ beta FM efficiency was 0.17).

[g] The background average is the mean of the scanning measurements from the background igloo CO912.

**Table 4-4**
**Summary Statistics to Support Statistical Decision Levels**
**SEAD 12 Building Report**
**Seneca Army Depot Activity**

| Radiation Type/ Detector | Number of Samples | Range of Values (cpm) Detected Concentration Minimum | Maximum | Mean cpm | Standard Deviation | Shift | Minimum Number of Background & Site Samples | Test Supports At Most Type I Error Probablity | Type II Error Probablity |
|---|---|---|---|---|---|---|---|---|---|
| Alpha Floor | 15 | 0 | 8 | 3.8 | 2.40 | 1.6692 | 25 | 0.05 | 0.1 |
| Beta Floor | 15 | 498 | 1435 | 775.0 | 284.05 | 2.5259 | 25 | 0.05 | 0.1 |
| Alpha Hand Held | 105 | 0 | 8 | 2.7 | 1.91 | 2.0899 | 115 | 0.05 | 0.1 |
| Beta Hand Held | 105 | 86 | 436 | 175.7 | 55.30 | 3.9420 | 115 | 0.05 | 0.1 |
| FIDLER | 120 | 5267 | 19762 | 11265.3 | 3307.29 | 2.9876 | 130 | 0.05 | 0.1 |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA PHOSWICH** | | | | | | | | | | | |
| **APH803R1** | **4.9** | **0** | **17** | **740** | **437** | **4.23** | **2.3E-05** | **22** | **26** | **Fail** | **APH803R1** |
| **APH803R2** | **5.0** | **0** | **16** | **37289** | **938** | **6.92** | **4.8E-12** | **250** | **26** | **Fail** | **APH803R2** |
| **APH803R3** | **8.8** | **2** | **18** | **677** | **359** | **5.59** | **2.3E-08** | **19** | **26** | **Fail** | **APH803R3** |
| **APH803R4** | **5.4** | **0** | **16** | **37426** | **801** | **7.27** | **3.7E-13** | **250** | **26** | **Fail** | **APH803R4** |
| **APH803R5** | **6.3** | **0** | **25** | **37414** | **813** | **7.22** | **5.1E-13** | **250** | **26** | **Fail** | **APH803R5** |
| **APH803R6** | **7.9** | **0** | **83** | **37224** | **727** | **7.43** | **1.1E-13** | **249** | **26** | **Fail** | **APH803R6** |
| **APH803R7** | **3.4** | **1** | **7** | **782** | **443** | **4.27** | **1.9E-05** | **23** | **26** | **Fail** | **APH803R7** |
| APH806R1 | 1.1 | 0 | 3 | 387 | 6635 | -5.18 | 2.3E-07 | 18 | 100 | Fail | Background |
| APH810R1 | 2.4 | 0 | 6 | 1639 | 7406 | -3.39 | 6.9E-04 | 34 | 100 | Fail | Background |
| APH812R3 | 1.8 | 0 | 5 | 527 | 6376 | -3.73 | 1.9E-04 | 17 | 100 | Fail | Background |
| **BETA PHOSWICH** | | | | | | | | | | | |
| BPH803R1 | 164 | 94 | 226 | 254 | 922 | -5.90 | 3.7E-09 | 22 | 26 | Fail | Background |
| BPH803R2 | 162 | 108 | 596 | 31606 | 6620 | -7.80 | 6.6E-15 | 250 | 26 | Fail | Background |
| BPH803R3 | 333 | 129 | 705 | 426 | 610 | -0.26 | 0.79 | 19 | 26 | Pass | -- |
| BPH803R4 | 149 | 88 | 273 | 31402 | 6824 | -8.32 | 9.0E-17 | 250 | 26 | Fail | Background |
| BPH803R5 | 153 | 109 | 315 | 31479 | 6748 | -8.12 | 4.6E-16 | 250 | 26 | Fail | Background |
| BPH803R6 | 158 | 90 | 329 | 31235 | 6715 | -8.10 | 5.5E-16 | 249 | 26 | Fail | Background |
| BPH803R7 | 304 | 164 | 407 | 660 | 565 | 1.70 | 0.089 | 23 | 26 | Pass | -- |
| BPH806R1 | 205 | 153 | 272 | 404 | 6617 | -4.99 | 6.0E-07 | 18 | 100 | Fail | Background |
| BPH810R1 | 330 | 182 | 482 | 2264 | 6782 | -0.16 | 0.87 | 34 | 100 | Pass | -- |
| BPH812R3 | 241 | 201 | 272 | 610 | 6293 | -3.04 | 0.0024 | 17 | 100 | Fail | Background |
| **ALPHA HAND-HELD** | | | | | | | | | | | |
| AHH804R1 | 1.4 | 0 | 4 | 1353 | 7693 | -3.33 | 8.5E-04 | 29 | 105 | Fail | Background |
| AHH804R2 | 2.2 | 0 | 5 | 753 | 6387 | -0.73 | 0.46 | 14 | 105 | Pass | -- |
| AHH804R3 | 3.0 | 0 | 22 | 3641 | 9080 | -2.52 | 0.012 | 54 | 105 | Fail | Background |
| **AHH804R4** | **3.5** | **1** | **8** | **2390** | **6656** | **2.38** | **0.017** | **29** | **105** | **Fail** | **AHH804R4** |
| AHH804R5 | 2.6 | 0 | 10 | 3538 | 8397 | -1.03 | 0.30 | 49 | 105 | Pass | -- |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AHH804R6 | 1.4 | 0 | 5 | 1607 | 8123 | -3.88 | 1.0E-04 | 34 | 105 | Fail | Background |
| AHH805R1 | 1.3 | 0 | 3 | 1138 | 7641 | -3.79 | 1.5E-04 | 27 | 105 | Fail | Background |
| AHH815R15 | 2.4 | 0 | 15 | 5137 | 9742 | -2.11 | 0.035 | 67 | 105 | Fail | Background |
| AHH816R8 | 1.3 | 0 | 6 | 6306 | 12223 | -5.59 | 2.3E-08 | 87 | 105 | Fail | Background |
| AHH816R9 | 2.8 | 0 | 18 | 1836 | 7895 | -2.72 | 6.6E-03 | 34 | 105 | Fail | Background |
| AHH816R10 | 4.3 | 0 | 13 | 2000 | 6647 | 1.66 | 9.7E-02 | 26 | 105 | Pass | -- |
| AHH819R1 | 1.0 | 0 | 5 | 2368 | 9722 | -5.98 | 2.3E-09 | 50 | 105 | Fail | Background |
| AHH819R2 | 1.6 | 0 | 4 | 773 | 6854 | -2.51 | 0.012 | 18 | 105 | Fail | Background |
| **AHH819R3** | **9.3** | **0** | **37** | **11794** | **8709** | **4.74** | **2.2E-06** | **97** | **105** | **Fail** | **AHH819R3** |
| AHH81910 | 1.6 | 0 | 6 | 589 | 447 | -2.50 | 0.013 | 30 | 15 | Fail | Background |
| AHH819R4 | 2.3 | 0 | 4 | 807 | 6333 | -0.28 | 0.78 | 14 | 105 | Pass | -- |
| AHH819R5 | 1.8 | 0 | 4 | 599 | 6423 | -1.53 | 0.12 | 13 | 105 | Pass | -- |
| AHH819R6 | 1.4 | 0 | 5 | 860 | 7268 | -3.56 | 3.7E-04 | 22 | 105 | Fail | Background |
| AHH819R7 | 1.5 | 0 | 3 | 442 | 6345 | -1.94 | 0.052 | 11 | 105 | Pass | -- |
| AHH819R8 | 1.4 | 0 | 5 | 1772 | 8240 | -3.77 | 1.6E-04 | 36 | 105 | Fail | Background |
| AHH819R9 | 1.2 | 0 | 6 | 785 | 7217 | -3.66 | 2.5E-04 | 21 | 105 | Fail | Background |
| AHH81911 | 1.8 | 0 | 5 | 3102 | 8833 | -2.75 | 0.0059 | 49 | 105 | Fail | Background |
| AHH819R12 | 2.2 | 0 | 6 | 4366 | 9001 | -1.38 | 0.17 | 58 | 105 | Pass | -- |
| **BETA HAND-HELD** | | | | | | | | | | | |
| **BHH804R1** | **214** | **140** | **296** | **2680** | **6366** | **3.90** | **9.5915E-05** | **29** | **105** | **Fail** | **BHH804R1** |
| BHH804R2 | 160 | 106 | 253 | 711 | 6429 | -1.06 | 0.29 | 14 | 105 | Pass | -- |
| BHH804R3 | 217 | 108 | 594 | 4818 | 7903 | 1.81 | 0.070 | 54 | 105 | Pass | -- |
| BHH804R4 | 162 | 93 | 534 | 1303 | 7742 | -3.54 | 4.1E-04 | 29 | 105 | Fail | Background |
| BHH804R5 | 158 | 82 | 313 | 3259 | 8677 | -2.09 | 0.037 | 49 | 105 | Fail | Background |
| BHH804R6 | 131 | 72 | 231 | 1525 | 8205 | -4.19 | 2.7996E-05 | 34 | 105 | Fail | Background |
| **BHH805R1** | **197** | **113** | **258** | **2190** | **6588** | **2.23** | **0.026** | **27** | **105** | **Fail** | **BHH805R1** |
| BHH815R15 | 113 | 72 | 212 | 3084 | 11794 | -8.51 | 1.7E-17 | 67 | 105 | Fail | Background |
| BHH816R8 | 118 | 49 | 227 | 5214 | 13315 | -8.30 | 1.1E-16 | 87 | 105 | Fail | Background |
| BHH816R9 | 118 | 72 | 260 | 1111 | 8619 | -6.22 | 5.0E-10 | 34 | 105 | Fail | Background |
| BHH816R10 | 155 | 89 | 256 | 1409 | 7237 | -1.77 | 7.6E-02 | 26 | 105 | Pass | -- |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BHH819R1 | 152 | 71 | 291 | 3218 | 8873 | -2.61 | 0.0090 | 50 | 105 | Fail | Background |
| **BHH819R2** | **206** | **157** | **272** | **1543** | **6083** | **3.06** | **0.0022** | **18** | **105** | **Fail** | **BHH819R2** |
| BHH819R3 | 129 | 52 | 278 | 7146 | 13357 | -6.50 | 7.9E-11 | 97 | 105 | Fail | Background |
| **BHH81910** | **240** | **150** | **358** | **884** | **152** | **4.66** | **3.2E-06** | **30** | **15** | **Fail** | **BHH81910** |
| **BHH819R4** | **266** | **175** | **378** | **1371** | **5769** | **4.38** | **1.2E-05** | **14** | **105** | **Fail** | **BHH819R4** |
| BHH819R5 | 156 | 84 | 255 | 604 | 6417 | -1.46 | 0.15 | 13 | 105 | Pass | -- |
| **BHH819R6** | **203** | **114** | **301** | **1795** | **6333** | **2.47** | **0.014** | **22** | **105** | **Fail** | **BHH819R6** |
| **BHH819R7** | **269** | **204** | **380** | **1120** | **5667** | **4.49** | **7.3E-06** | **11** | **105** | **Fail** | **BHH819R7** |
| **BHH819R8** | **231** | **139** | **320** | **3663** | **6348** | **5.23** | **1.7E-07** | **36** | **105** | **Fail** | **BHH819R8** |
| **BHH819R9** | **217** | **125** | **322** | **1795** | **6207** | **3.02** | **0.0025** | **21** | **105** | **Fail** | **BHH819R9** |
| BHH81911 | 198 | 100 | 336 | 4196 | 7740 | 1.54 | 0.12 | 49 | 105 | Pass | -- |
| BHH819R12 | 149 | 71 | 264 | 3962 | 9405 | -2.75 | 0.0059 | 58 | 105 | Fail | Background |
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | |
| **AFM803R2** | **9.5** | **8** | **12** | **49** | **56** | **2.74** | **0.0062** | **4** | **10** | **Fail** | **AFM803R2** |
| **AFM803R4** | **12.5** | **11** | **14** | **50** | **55** | **2.87** | **0.0042** | **4** | **10** | **Fail** | **AFM803R4** |
| **AFM803R5** | **16.8** | **13** | **20** | **50** | **55** | **2.87** | **0.0041** | **4** | **10** | **Fail** | **AFM803R5** |
| **AFM803R6** | **11.0** | **4** | **17** | **59** | **62** | **2.31** | **0.021** | **5** | **10** | **Fail** | **AFM803R6** |
| **AFM803R7** | **7.7** | **4** | **11** | **71** | **65** | **2.21** | **0.027** | **6** | **10** | **Fail** | **AFM803R7** |
| **AFM804R2** | **15.4** | **2** | **26** | **798** | **149** | **4.64** | **3.5E-06** | **28** | **15** | **Fail** | **AFM804R2** |
| **AFM804R3** | **11.3** | **2** | **58** | **1061** | **215** | **3.57** | **3.5E-04** | **35** | **15** | **Fail** | **AFM804R3** |
| AFM804R4 | 5.5 | 5 | 6 | 25 | 129 | 0.98 | 0.33 | 2 | 15 | Pass | -- |
| **AFM804R6** | **6.3** | **2** | **12** | **190** | **162** | **2.14** | **0.032** | **11** | **15** | **Fail** | **AFM804R6** |
| AFM805R1 | 3.2 | 1 | 9 | 56 | 175 | -0.79 | 0.43 | 6 | 15 | Pass | -- |
| AFM806R1 | 3.7 | 2 | 5 | 66 | 165 | 0.00 | 1 | 6 | 15 | Pass | -- |
| AFM810R1 | 4.6 | 2 | 8 | 422 | 245 | 1.07 | 0.28 | 21 | 15 | Pass | -- |
| AFM812R3 | 4.0 | 1 | 8 | 41 | 149 | 0.10 | 0.92 | 4 | 15 | Pass | -- |
| AFM815R15 | 3.0 | 1 | 6 | 57 | 174 | -0.71 | 0.48 | 6 | 15 | Pass | -- |
| AFM816R8 | 3.9 | 1 | 8 | 368 | 263 | 0.25 | 0.80 | 20 | 15 | Pass | -- |
| AFM816R9 | 2.5 | 0 | 6 | 105 | 220 | -1.41 | 0.16 | 10 | 15 | Pass | -- |
| AFM816R10 | 4.8 | 3 | 7 | 48 | 142 | 0.81 | 0.42 | 4 | 15 | Pass | -- |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AFM819R1 | 5.1 | 1 | 9 | 1018 | 308 | 1.71 | 0.087 | 36 | 15 | Pass | -- |
| AFM819R2 | 5.5 | 2 | 12 | 216 | 190 | 1.28 | 0.20 | 13 | 15 | Pass | -- |
| **AFM819R3** | **7.3** | **1** | **17** | **1811** | **269** | **3.48** | **5.0E-04** | **49** | **15** | **Fail** | **AFM819R3** |
| AFM81910 | 2.0 | 2 | 2 | 11 | 142 | -1.06 | 0.29 | 2 | 15 | Pass | -- |
| AFM819R4 | 3.3 | 1 | 7 | 158 | 220 | -0.50 | 0.62 | 12 | 15 | Pass | -- |
| AFM819R5 | 3.7 | 2 | 6 | 166 | 212 | -0.10 | 0.92 | 12 | 15 | Pass | -- |
| AFM819R6 | 4.3 | 2 | 12 | 217 | 218 | 0.31 | 0.76 | 14 | 15 | Pass | -- |
| AFM819R7 | 5.1 | 2 | 11 | 149 | 177 | 1.04 | 0.30 | 10 | 15 | Pass | -- |
| AFM819R9 | 5.4 | 2 | 11 | 322 | 206 | 1.58 | 0.11 | 17 | 15 | Pass | -- |
| **AFM81911** | **6.6** | **1** | **10** | **406** | **190** | **2.55** | **0.011** | **19** | **15** | **Fail** | **AFM81911** |
| **AFM819R12** | **7.2** | **1** | **17** | **1506** | **264** | **3.25** | **0.0011** | **44** | **15** | **Fail** | **AFM819R12** |
| **BETA FLOOR MONITOR** | | | | | | | | | | | |
| BFM803R2 | 675 | 609 | 706 | 21 | 84 | -1.27 | 0.20 | 4 | 10 | Pass | -- |
| BFM803R4 | 523 | 474 | 570 | 10 | 95 | -2.83 | 0.0047 | 4 | 10 | Fail | Background |
| BFM803R5 | 509 | 493 | 532 | 10 | 95 | -2.83 | 0.0047 | 4 | 10 | Fail | Background |
| BFM803R6 | 657 | 406 | 735 | 40 | 80 | 0.00 | 1 | 5 | 10 | Pass | -- |
| BFM803R7 | 731 | 676 | 762 | 63 | 73 | 1.30 | 0.19 | 6 | 10 | Pass | -- |
| BFM804R2 | 710 | 563 | 1005 | 599 | 347 | -0.43 | 0.66 | 28 | 15 | Pass | -- |
| BFM804R3 | 872 | 543 | 2554 | 902 | 374 | 0.19 | 0.85 | 35 | 15 | Pass | -- |
| BFM804R4 | 562 | 517 | 606 | 9 | 144 | -1.34 | 0.18 | 2 | 15 | Pass | -- |
| BFM804R6 | 705 | 558 | 1079 | 136 | 215 | -0.65 | 0.52 | 11 | 15 | Pass | -- |
| BFM805R1 | 792 | 755 | 835 | 86 | 146 | 1.52 | 0.13 | 6 | 15 | Pass | -- |
| BFM806R1 | 495 | 410 | 597 | 30 | 202 | -2.84 | 0.00447974 | 6 | 15 | Fail | Background |
| **BFM810R1** | **866** | **625** | **1018** | **492** | **174** | **3.32** | **9.0E-04** | **21** | **15** | **Fail** | **BFM810R1** |
| BFM812R3 | 598 | 552 | 616 | 24 | 166 | -1.60 | 0.11 | 4 | 15 | Pass | -- |
| **BFM815R15** | **862** | **828** | **914** | **99** | **132** | **2.57** | **0.01020237** | **6** | **15** | **Fail** | **BFM815R15** |
| BFM816R8 | 659 | 455 | 865 | 339 | 292 | -0.72 | 0.47 | 20 | 15 | Pass | -- |
| BFM816R9 | 640 | 482 | 877 | 110 | 216 | -1.14 | 0.26 | 10 | 15 | Pass | -- |
| **BFM816R10** | **876** | **821** | **901** | **62** | **129** | **2.15** | **0.03** | **4** | **15** | **Fail** | **BFM816R10** |
| **BFM819R1** | **920** | **824** | **1025** | **1134** | **192** | **4.09** | **4.2E-05** | **36** | **15** | **Fail** | **BFM819R1** |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BFM819R2 | 906 | 527 | 1083 | 230 | 176 | 1.91 | 0.05592208 | 13 | 15 | Pass | -- |
| **BFM819R3** | **1011** | **502** | **1215** | **1828** | **252** | **3.73** | **1.9E-04** | **49** | **15** | **Fail** | **BFM819R3** |
| BFM81910 | 1107 | 1063 | 1151 | 29 | 124 | 1.64 | 0.10 | 2 | 15 | Pass | -- |
| **BFM819R4** | **952** | **598** | **1093** | **225** | **153** | **2.78** | **0.0054** | **12** | **15** | **Fail** | **BFM819R4** |
| **BFM819R5** | **925** | **712** | **1183** | **221** | **157** | **2.59** | **0.0097** | **12** | **15** | **Fail** | **BFM819R5** |
| BFM819R6 | 800 | 549 | 1058 | 233 | 203 | 0.98 | 0.33 | 14 | 15 | Pass | -- |
| **BFM819R7** | **1147** | **956** | **1264** | **185** | **140** | **3.05** | **0.0023** | **10** | **15** | **Fail** | **BFM819R7** |
| **BFM819R9** | **956** | **520** | **1125** | **353** | **175** | **2.74** | **0.0062** | **17** | **15** | **Fail** | **BFM819R9** |
| BFM819R10 | 1107 | 1063 | 1151 | 29 | 124 | 1.64 | 0.1011 | 2 | 15 | Pass | -- |
| **BFM819R11** | **934** | **870** | **998** | **437** | **158** | **3.63** | **2.9E-04** | **19** | **15** | **Fail** | **BFM819R11** |
| BFM819R12 | 731 | 406 | 1029 | 1341 | 430 | 0.36 | 0.72 | 44 | 15 | Pass | -- |
| **GAMMA FIDLER** | | | | | | | | | | | |
| GF803R1 | 4547 | 1593 | 8007 | 293 | 884 | -5.10 | 3.4E-07 | 22 | 26 | Fail | Background |
| GF803R2 | 4264 | 2996 | 6783 | 32385 | 6955 | -8.40 | 4.8E-17 | 254 | 26 | Fail | Background |
| GF803R3 | 4815 | 2336 | 6790 | 210 | 871 | -5.76 | 8.4E-09 | 20 | 26 | Fail | Background |
| GF803R4 | 3743 | 2120 | 7042 | 32385 | 6955 | -8.40 | 4.8E-17 | 254 | 26 | Fail | Background |
| GF803R5 | 4116 | 2470 | 6968 | 32385 | 6955 | -8.40 | 4.8E-17 | 254 | 26 | Fail | Background |
| GF803R6 | 3559 | 2276 | 6882 | 32385 | 6955 | -8.40 | 4.8E-17 | 254 | 26 | Fail | Background |
| GF803R7 | 7463 | 5176 | 8563 | 703 | 837 | -1.84 | 0.066 | 29 | 26 | Pass | -- |
| **GF804R1** | **12631** | **8472** | **14896** | **2631** | **8544** | **2.19** | **0.029** | **29** | **120** | **Fail** | **GF804R1** |
| GF804R2 | 9753 | 5588 | 15040 | 2746 | 10457 | -2.59 | 0.0097 | 42 | 120 | Fail | Background |
| GF804R3 | 9702 | 5592 | 19106 | 7091 | 13615 | -3.34 | 8.3E-04 | 83 | 120 | Fail | Background |
| GF804R4 | 6288 | 4971 | 8224 | 782 | 10694 | -7.25 | 4.2E-13 | 31 | 120 | Fail | Background |
| GF804R5 | 9215 | 5443 | 13904 | 3100 | 11265 | -3.69 | 2.2E-04 | 49 | 120 | Fail | Background |
| GF804R6 | 7459 | 4833 | 13264 | 1965 | 11731 | -6.48 | 9.4E-11 | 45 | 120 | Fail | Background |
| **GF805R1** | **13078** | **7896** | **16107** | **3196** | **8585** | **2.91** | **0.0037** | **33** | **120** | **Fail** | **GF805R1** |
| GF806R1 | 7051 | 6394 | 7765 | 625 | 9815 | -5.98 | 2.3E-09 | 24 | 120 | Fail | Background |
| GF810R1 | 10101 | 6796 | 15876 | 5414 | 12164 | -2.49 | 0.013 | 67 | 120 | Fail | Background |
| GF812R3 | 6382 | 5881 | 6820 | 441 | 9570 | -6.08 | 1.2E-09 | 21 | 120 | Fail | Background |
| GF815R1 | 7854 | 6264 | 10772 | 4205 | 14323 | -7.36 | 1.9E-13 | 72 | 120 | Fail | Background |

**Table 4-5**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GF816R8 | 8832 | 6544 | 13016 | 9246 | 16632 | -5.98 | 2.3E-09 | 107 | 120 | Fail | Background |
| GF816R9 | 8086 | 6854 | 9019 | 2045 | 11485 | -5.88 | 4.0E-09 | 44 | 120 | Fail | Background |
| GF816R10 | 8455 | 7448 | 9771 | 1313 | 10012 | -4.47 | 7.7E-06 | 30 | 120 | Fail | Background |
| GF819R1 | 8982 | 5080 | 13907 | 6834 | 14488 | -4.90 | 9.6E-07 | 86 | 120 | Fail | Background |
| GF819R2 | 11549 | 7002 | 15548 | 2447 | 9029 | 0.42 | 0.68 | 31 | 120 | Pass | -- |
| GF819R3 | 7290 | 1642 | 14692 | 14176 | 21335 | -8.51 | 1.8E-17 | 146 | 120 | Fail | Background |
| **GF819R4** | **12730** | **7595** | **15963** | **2342** | **8390** | **2.20** | **0.028** | **26** | **120** | **Fail** | **GF819R4** |
| **GF819R5** | **13371** | **8359** | **16756** | **2410** | **8175** | **3.06** | **0.0022** | **25** | **120** | **Fail** | **GF819R5** |
| GF819R6 | 11435 | 6811 | 15985 | 2889 | 9357 | 0.26 | 0.79 | 36 | 120 | Pass | -- |
| **GF819R7** | **13692** | **9873** | **16779** | **2051** | **7960** | **3.24** | **0.0012** | **21** | **120** | **Fail** | **GF819R7** |
| **GF819R8** | **12653** | **8650** | **15402** | **3385** | **8862** | **2.35** | **0.019** | **36** | **120** | **Fail** | **GF819R8** |
| GF819R9 | 11221 | 6196 | 15557 | 3008 | 9553 | -0.05 | 0.96 | 38 | 120 | Pass | -- |
| GF81910 | 12293 | 9109 | 16084 | 2813 | 8815 | 1.65 | 0.099 | 32 | 120 | Pass | -- |
| GF81911 | 9422 | 4717 | 15621 | 5126 | 12640 | -3.63 | 2.9E-04 | 68 | 120 | Fail | Background |
| GF819R12 | 6600 | 2531 | 14211 | 6810 | 17944 | -9.57 | 1.2E-21 | 102 | 120 | Fail | Background |

[a/] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b/] cpm = counts per minute.

[c/] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix H for the Phase I box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

**Table 4-6**
**Summary of WRS Tests**
**Phase I Direct Measurements (Including Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Minimum (cpm) | Maximum (cpm) | Survey plus Discretionary Rank Sum | Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | |
| **AFM803R6** | **11** | **4** | **17** | **59** | **62** | **2.31** | **0.021** | **5** | **10** | **Fail** | **AFM803R6** |
| **AFM804R3** | **13** | **2** | **58** | **1215** | **216** | **3.75** | **1.8E-04** | **38** | **15** | **Fail** | **AFM804R3** |
| **AFM819R1** | **6** | **1** | **15** | **1401** | **310** | **2.37** | **1.8E-02** | **43** | **15** | **Fail** | **AFM819R1** |
| **AFM819R3** | **8** | **1** | **17** | **2845** | **316** | **3.56** | **3.8E-04** | **64** | **15** | **Fail** | **AFM819R3** |
| AFM819R5 | 4 | 2 | 6 | 419 | 284 | 0.03 | 0.97 | 22 | 15 | Pass | -- |
| **BETA FLOOR MONITOR** | | | | | | | | | | | |
| BFM803R6 | 657 | 406 | 735 | 40 | 80 | 0.00 | 1 | 5 | 10 | Pass | -- |
| BFM804R3 | 951 | 543 | 2554 | 1048 | 384 | 0.42 | 0.67 | 38 | 15 | Pass | -- |
| **BFM819R1** | **923** | **824** | **1060** | **1505** | **206** | **4.20** | **2.7E-05** | **43** | **15** | **Fail** | **BFM819R1** |
| **BFM819R3** | **1017** | **502** | **1215** | **2878** | **282** | **3.97** | **7.1E-05** | **64** | **15** | **Fail** | **BFM819R3** |
| **BFM819R5** | **939** | **712** | **1183** | **519** | **184** | **3.13** | **0.0018** | **22** | **15** | **Fail** | **BFM819R5** |
| **ALPHA HAND-HELD** | | | | | | | | | | | |
| AHH804R3 | 3 | 0 | 22 | 3961.5 | 9079.5 | -2.07 | 0.038 | 56 | 105 | Fail | Background |
| AHH819R1 | 2 | 0 | 41 | 3132.5 | 10070.5 | -5.41 | 6.4233E-08 | 57 | 105 | Fail | Background |
| **AHH819R3** | **20** | **0** | **316** | **14765** | **9106** | **5.14** | **2.7736E-07** | **113** | **105** | **Fail** | **AHH819R3** |
| AHH819R4 | 2 | 0 | 4 | 1023.5 | 6479.5 | -0.17 | 0.87 | 17 | 105 | Pass | -- |
| AHH819R5 | 2 | 0 | 4 | 676 | 6584 | -1.87 | 0.061 | 15 | 105 | Pass | -- |
| **BETA HAND-HELD** | | | | | | | | | | | |
| **BHH804R3** | **227** | **108** | **594** | **5139** | **7903** | **2.14** | **0.032** | **56** | **105** | **Fail** | **BHH804R3** |
| BHH819R1 | 175 | 71 | 584 | 4261 | 8942 | -1.35 | 0.18 | 57 | 105 | Pass | -- |
| BHH819R3 | 168 | 52 | 1125 | 10247 | 13625 | -4.57 | 4.9E-06 | 113 | 105 | Fail | Background |
| **BHH819R4** | **280** | **175** | **378** | **1730** | **5773** | **5.06** | **4.2E-07** | **17** | **105** | **Fail** | **BHH819R4** |
| BHH819R5 | 152 | 84 | 255 | 670 | 6590 | -1.88 | 0.059 | 15 | 105 | Pass | -- |
| **ALPHA PHOSWICH** | | | | | | | | | | | |
| **APH803R6** | **7.9** | **0** | **83** | **37224** | **727** | **7.43** | **1.1E-13** | **249** | **26** | **Fail** | **APH803R6** |
| **APH819R3** | **6.1** | **3** | **10** | **1550** | **5472** | **3.58** | **3.4E-04** | **18** | **100** | **Fail** | **APH819R3** |
| **BETA PHOSWICH** | | | | | | | | | | | |
| BPH803R6 | 164 | 90 | 1640 | 31511 | 6715 | -8.04 | 9.3E-16 | 250 | 26 | Fail | Background |

**Table 4-6**
**Summary of WRS Tests**
**Phase I Direct Measurements (Including Discretionary Measurements) VS Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey plus Discretionary Rank Sum | Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **BPH819R3** | **500** | **329** | **1492** | **1440** | **5582** | **2.76** | **0.0058** | **18** | **100** | **Fail** | **BPH819R3** |
| **GAMMA FIDLER** | | | | | | | | | | | |
| GF803R6 | 3560 | 2276 | 6882 | 32640 | 6981 | -8.40 | 4.7E-17 | 255 | 26 | Fail | Background |
| GF804R3 | 10181 | 5592 | 19106 | 8115 | 13621 | -2.52 | 0.012 | 88 | 120 | Fail | Background |
| GF819R1 | 9297 | 5080 | 15079 | 8969 | 15342 | -4.43 | 9.6E-06 | 100 | 120 | Fail | Background |
| GF819R3 | 7659 | 1642 | 14692 | 20344 | 23612 | -8.01 | 1.2E-15 | 176 | 120 | Fail | Background |
| **GF819R4** | **12755** | **7595** | **15963** | **2667** | **8509** | **2.36** | **0.018** | **29** | **120** | **Fail** | **GAM819R4** |
| **GF819R5** | **13766** | **8359** | **16756** | **3952** | **8451** | **4.26** | **2.1E-05** | **37** | **120** | **Fail** | **GAM819R5** |

[a/] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b/] cpm = counts per minute.

[c/] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix H for the Phase I box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

**Table 4-7**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary measurements) VS $DCGL_W$-Adjusted Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | |
| AFM803R2 | 9.5 | 8 | 12 | 10 | 95 | -2.87 | 0.0041 | 4 | 10 | Fail | Background |
| AFM803R4 | 12.5 | 11 | 14 | 10 | 95 | -2.87 | 0.0042 | 4 | 10 | Fail | Background |
| AFM803R5 | 16.8 | 13 | 20 | 10 | 95 | -2.87 | 0.0041 | 4 | 10 | Fail | Background |
| AFM803R6 | 11.0 | 4 | 17 | 15 | 105 | -3.10 | 0.0020 | 5 | 10 | Fail | Background |
| AFM803R7 | 7.7 | 4 | 11 | 21 | 115 | -3.29 | 0.0010 | 6 | 10 | Fail | Background |
| AFM804R2 | 15.4 | 2 | 26 | 406 | 540 | -5.36 | 8.5E-08 | 28 | 15 | Fail | Background |
| AFM804R3 | 11.3 | 2 | 58 | 646 | 630 | -5.24 | 1.6E-07 | 35 | 15 | Fail | Background |
| AFM804R6 | 6.3 | 2 | 12 | 66 | 285 | -4.30 | 1.7E-05 | 11 | 15 | Fail | Background |
| AFM819R3 | 7.3 | 1 | 17 | 1225 | 855 | -5.84 | 5.3E-09 | 49 | 15 | Fail | Background |
| AFM819R11 | 6.6 | 1 | 10 | 190 | 405 | -4.96 | 7.1E-07 | 19 | 15 | Fail | Background |
| AFM819R12 | 7.2 | 1 | 17 | 990 | 780 | -5.76 | 8.6E-09 | 44 | 15 | Fail | Background |
| **BETA FLOOR MONITOR** | | | | | | | | | | | |
| BFM810R1 | 866 | 625 | 1018 | 231 | 435 | -5.05 | 4.3E-07 | 21 | 15 | Fail | Background |
| BFM815R15 | 862 | 828 | 914 | 21 | 210 | -3.50 | 4.6E-04 | 6 | 15 | Fail | Background |
| BFM816R10 | 876 | 821 | 901 | 10 | 180 | -3.00 | 0.0027 | 4 | 15 | Fail | Background |
| BFM819R1 | 920 | 824 | 1025 | 666 | 660 | -5.58 | 2.4E-08 | 36 | 15 | Fail | Background |
| BFM819R3 | 1011 | 502 | 1215 | 1225 | 855 | -5.82 | 5.8E-09 | 49 | 15 | Fail | Background |
| BFM819R4 | 952 | 598 | 1093 | 78 | 300 | -4.39 | 1.1E-05 | 12 | 15 | Fail | Background |
| BFM819R5 | 925 | 712 | 1183 | 78 | 300 | -4.39 | 1.1E-05 | 12 | 15 | Fail | Background |
| BFM819R7 | 1147 | 956 | 1264 | 55 | 270 | -4.16 | 3.2E-05 | 10 | 15 | Fail | Background |
| BFM819R9 | 956 | 520 | 1125 | 153 | 375 | -4.81 | 1.5E-06 | 17 | 15 | Fail | Background |
| BFM819R11 | 934 | 870 | 998 | 190 | 405 | -4.94 | 7.7E-07 | 19 | 15 | Fail | Background |
| BFM819R12 | 731 | 406 | 1029 | 589 | 358 | -0.70 | 0.48 | 28 | 15 | Pass | -- |
| **ALPHA PHOSWICH** | | | | | | | | | | | |
| APH803R1 | 4.9 | 0 | 17 | 318 | 859 | -4.65 | 3.3E-06 | 22 | 26 | Fail | Background |
| APH803R2 | 5.0 | 0 | 16 | 32074 | 6152 | -6.62 | 3.7E-11 | 250 | 26 | Fail | Background |
| APH803R3 | 8.8 | 2 | 18 | 406 | 629 | -0.73 | 0.47 | 19 | 26 | Pass | -- |
| APH803R4 | 5.4 | 0 | 16 | 32111 | 6116 | -6.53 | 6.8E-11 | 250 | 26 | Fail | Background |
| APH803R5 | 6.3 | 0 | 25 | 32845 | 5381 | -4.61 | 4.0E-06 | 250 | 26 | Fail | Background |
| APH803R6 | 7.9 | 0 | 83 | 33209 | 4742 | -3.00 | 0.0027 | 249 | 26 | Fail | Background |
| APH803R7 | 3.4 | 1 | 7 | 276 | 949 | -6.07 | 1.3E-09 | 23 | 26 | Fail | Background |

**Table 4-7**
**Summary of WRS Test**
**Phase I Direct Measurements (Excluding Discretionary measurements) VS $DCGL_W$-Adjusted Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Minimum (cpm) | Maximum (cpm) | Survey Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA HAND-HELD** | | | | | | | | | | | |
| AHH804R4 | 3.5 | 1 | 8 | 378 | 8400 | -8.08 | 6.8E-16 | 27 | 105 | Fail | Background |
| AHH819R3 | 9.3 | 0 | 37 | 4753 | 3762 | -8.58 | 1.0E-17 | 97 | 33 | Fail | Background |
| AHH819R12 | 2.2 | 0 | 6 | 6870 | 9240 | 0.62 | 0.53 | 74 | 105 | Pass | -- |
| **BETA HAND-HELD** | | | | | | | | | | | |
| BHH804R1 | 214 | 140 | 296 | 677 | 8369 | -6.92 | 4.5E-12 | 29 | 105 | Fail | Background |
| BHH805R1 | 197 | 113 | 258 | 473 | 8306 | -7.46 | 8.6E-14 | 27 | 105 | Fail | Background |
| BHH819R2 | 206 | 157 | 272 | 253 | 7374 | -6.18 | 6.5E-10 | 18 | 105 | Fail | Background |
| BHH819R4 | 266 | 175 | 378 | 627 | 6514 | -1.76 | 0.078 | 14 | 105 | Pass | -- |
| BHH819R6 | 203 | 114 | 301 | 491 | 7637 | -5.84 | 5.2E-09 | 22 | 105 | Fail | Background |
| BHH819R7 | 269 | 204 | 380 | 461 | 6325 | -1.72 | 0.085 | 11 | 105 | Pass | -- |
| BHH819R8 | 231 | 139 | 320 | 1535 | 8477 | -4.83 | 1.4E-06 | 36 | 105 | Fail | Background |
| BHH819R9 | 217 | 125 | 322 | 608 | 7393 | -4.75 | 2.0E-06 | 21 | 105 | Fail | Background |
| BHH819R11 | 198 | 100 | 336 | 4196 | 10170 | 0.11 | 0.92 | 49 | 120 | Pass | -- |

[a] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b] cpm = counts per minute.

[c] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix H for the Phase I box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

**Table 4-8**
**Summary of WRS Test**
**Phase I Direct Measurements (Including Discretionary Measurements) VS $DCGL_W$-Adjusted Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey plus Discretionary Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | |
| AFM803R6 | 11.0 | 4 | 17 | 15 | 105 | -3.10 | 0.0020 | 5 | 10 | Fail | Background |
| AFM804R3 | 13.2 | 2 | 58 | 772 | 659 | -5.02 | 5.1E-07 | 38 | 15 | Fail | Background |
| AFM819R1 | 5.8 | 1 | 15 | 946 | 765 | -5.76 | 8.7E-09 | 43 | 15 | Fail | Background |
| AFM819R3 | 7.5 | 1 | 17 | 2080 | 1080 | -6.01 | 1.8E-09 | 64 | 15 | Fail | Background |
| AFM819R5 | 3.8 | 2 | 6 | 253 | 450 | -5.14 | 2.8E-07 | 22 | 15 | Fail | Background |
| **BETA FLOOR MONITOR** | | | | | | | | | | | |
| BFM803R6 | 657 | 406 | 735 | 15 | 105 | -3.06 | 0.0022 | 5 | 10 | Fail | Background |
| BFM804R3 | 951 | 543 | 2554 | 814 | 617 | -4.19 | 2.8E-05 | 38 | 15 | Fail | Background |
| BFM819R1 | 923 | 824 | 1060 | 946 | 765 | -5.73 | 1.0E-08 | 43 | 15 | Fail | Background |
| BFM819R3 | 1017 | 502 | 1215 | 2080 | 1080 | -6.00 | 2.0E-09 | 64 | 15 | Fail | Background |
| BFM819R4 | 952 | 598 | 1093 | 78 | 300 | -4.39 | 1.1E-05 | 12 | 15 | Fail | Background |
| BFM819R5 | 939 | 712 | 1183 | 253 | 450 | -5.11 | 3.3E-07 | 22 | 15 | Fail | Background |
| **ALPHA PHOSWICH** | | | | | | | | | | | |
| APH803R6 | 7.9 | 0 | 83 | 33209 | 4742 | -3.00 | 0.0027 | 249 | 26 | Fail | Background |
| APH819R3 | 6.1 | 3 | 10 | 171 | 819 | -5.68 | 1.4E-08 | 18 | 26 | Fail | Background |
| **BETA PHOSWICH** | | | | | | | | | | | |
| BPH803R6 | 164 | 90 | 1640 | 31401 | 6825 | -8.32 | 8.8E-17 | 250 | 26 | Fail | Background |
| BPH819R3 | 500 | 329 | 1492 | 236 | 754 | -4.03 | 5.5E-05 | 18 | 26 | Fail | Background |

**Table 4-8**
**Summary of WRS Test**
**Phase I Direct Measurements (Including Discretionary Measurements) VS $DCGL_W$-Adjusted Background**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Minimum (cpm) | Maximum (cpm) | Survey plus Discretionary Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA HAND-HELD** | | | | | | | | | | | |
| AHH804R3 | 3.4 | 0 | 22 | 2363 | 10678 | -7.76 | 8.5E-15 | 56 | 105 | Fail | Background |
| AHH819R1 | 2.1 | 0 | 41 | 1863 | 11340 | -9.83 | 8.8E-23 | 57 | 105 | Fail | Background |
| AHH819R3 | 20.1 | 0 | 316 | 11749 | 12123 | -1.35 | 0.18 | 113 | 105 | Pass | -- |
| AHH819R4 | 2.4 | 0 | 4 | 153 | 7350 | -6.68 | 2.4E-11 | 17 | 105 | Fail | Background |
| AHH819R5 | 1.7 | 0 | 4 | 120 | 7140 | -6.33 | 2.4E-10 | 15 | 105 | Fail | Background |
| **BETA HAND-HELD** | | | | | | | | | | | |
| BHH804R3 | 227 | 108 | 594 | 2724 | 10318 | -6.43 | 1.3E-10 | 56 | 105 | Fail | Background |
| BHH805R1 | 197 | 113 | 258 | 756 | 8424 | -6.80 | 1.1E-11 | 30 | 105 | Fail | Background |
| BHH819R1 | 175 | 71 | 584 | 2125 | 11078 | -8.84 | 1.0E-18 | 57 | 105 | Fail | Background |
| BHH819R2 | 206 | 157 | 272 | 317 | 7685 | -6.66 | 2.8E-11 | 21 | 105 | Fail | Background |
| BHH819R3 | 168 | 52 | 1125 | 7420 | 16451 | -10.65 | 2.0E-26 | 113 | 105 | Fail | Background |
| BHH819R4 | 280 | 175 | 378 | 931 | 6572 | -0.85 | 0.40 | 17 | 105 | Pass | -- |
| BHH819R5 | 152 | 84 | 255 | 153 | 7107 | -5.99 | 2.2E-09 | 15 | 105 | Fail | Background |
| BHH819R8 | 231 | 139 | 320 | 1873 | 8567 | -4.29 | 1.8E-05 | 39 | 105 | Fail | Background |

[a/] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b/] cpm = counts per minute.

[c/] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix H for the Phase I box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

**Table 4-9**
**Summary Statistics of Phase I Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| **ALPHA/BETA FLOOR MONITOR** | | | | | | | | |
| 803 | 2 | AB [c] | 4 | 400 | 900 | 613 | 2807 | No |
| 803 | 4 | AB | 4 | 400 | 620 | 505 | 2807 | No |
| 803 | 5 | AB | 4 | 400 | 620 | 510 | 2807 | No |
| 803 | 6 | AB | 5 | 300 | 900 | 630 | 2807 | No |
| 803 | 7 | AB | 6 | 700 | 700 | 700 | 2807 | No |
| 804 | 2 | AB | 28 | 400 | 1200 | 732 | 2807 | No |
| **804** | **3B** | **AB** | **35** | **400** | **3000** | **860** | **2807** | **Yes** |
| 804 | 4B | AB | 2 | 400 | 700 | 525 | 2807 | No |
| 804 | 6B | AB | 11 | 400 | 1200 | 659 | 2807 | No |
| 805 | 1 | AB | 8 | 600 | 800 | 700 | 2807 | No |
| 806 | 1 | AB | 6 | 400 | 700 | 508 | 2807 | No |
| 810 | 1 | AB | 21 | 400 | 1100 | 807 | 2807 | No |
| 812 | 32 | AB | 4 | 400 | 600 | 500 | 2807 | No |
| 815 | 15 | AB | 6 | 600 | 1000 | 825 | 2807 | No |
| 816 | 8 | AB | 23 | 200 | 1000 | 572 | 2807 | No |
| 816 | 9 | AB | 12 | 40 | 600 | 162 | 2807 | No |
| 816 | 10 | AB | 4 | 600 | 1000 | 813 | 2807 | No |
| 819 | 1 | AB | 36 | 800 | 1100 | 924 | 2807 | No |
| 819 | 2 | AB | 13 | 400 | 1200 | 888 | 2807 | No |
| 819 | 3 | AB | 49 | 400 | 2000 | 1001 | 2807 | No |
| 819 | 4 | AB | 12 | 750 | 1050 | 917 | 2807 | No |
| 819 | 5 | AB | 12 | 800 | 1200 | 946 | 2807 | No |
| 819 | 6B | AB | 14 | 500 | 950 | 750 | 2807 | No |
| 819 | 7 | AB | 10 | 1000 | 1200 | 1115 | 2807 | No |
| 819 | 9 | AB | 9 | 900 | 1200 | 1033 | 2807 | No |
| 819 | 10 | AB | 2 | 1200 | 1200 | 1200 | 2807 | No |
| 819 | 11B | AB | 19 | 700 | 1200 | 955 | 2807 | No |
| 819 | 12D | AB | 44 | 200 | 1200 | 743 | 2807 | No |
| **ALPHA/BETA PHOSWICH** | | | | | | | | |
| 803 | 1 | AB | 22 | 40 | 380 | 162 | 854 | No |
| 803 | 2 | AB | 250 | 80 | 600 | 177 | 854 | No |
| **803** | **3** | **AB** | **20** | **50** | **900** | **322** | **854** | **Yes** |
| 803 | 4 | AB | 250 | 40 | 460 | 160 | 854 | No |
| 803 | 5 | AB | 250 | 60 | 400 | 300 | 854 | No |
| **803** | **6** | **AB** | **249** | **40** | **2500** | **172** | **854** | **Yes** |
| 803 | 7 | AB | 23 | 180 | 350 | 310 | 854 | No |
| 806 | 1 | AB | 18 | 100 | 350 | 202 | 854 | No |
| 810 | 1 | AB | 34 | 140 | 600 | 335 | 854 | No |
| 812 | 32 | AB | 17 | 100 | 480 | 274 | 854 | No |
| **ALPHA/BETA HAND-HELD** | | | | | | | | |
| 804 | 1 | AB | 29 | 100 | 340 | 221 | 534 | No |
| 804 | 2 | AB | 14 | 40 | 360 | 166 | 534 | No |
| **804** | **3B** | **AB** | **54** | **40** | **1000** | **216** | **534** | **Yes** |
| **804** | **4B** | **AB** | **29** | **30** | **600** | **162** | **534** | **Yes** |
| 804 | 5B | AB | 49 | 40 | 400 | 161 | 534 | No |
| 804 | 6B | AB | 34 | 40 | 360 | 147 | 534 | No |
| 805 | 1 | AB | 33 | 80 | 400 | 192 | 534 | No |
| 815 | 15 | AB | 30 | 60 | 200 | 130 | 534 | No |
| 816 | 8 | AB | 84 | 40 | 400 | 127 | 534 | No |
| **816** | **9** | **AB** | **6** | **200** | **1000** | **604** | **534** | **Yes** |
| 816 | 10 | AB | 26 | 40 | 200 | 113 | 534 | No |
| 819 | 2 | AB | 18 | 90 | 320 | 215 | 534 | No |

**Table 4-9**
**Summary Statistics of Phase I Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| **819** | **3** | **AB** | **97** | **40** | **950** | **156** | **534** | **Yes** |
| 819 | 4 | AB | 14 | 220 | 400 | 283 | 534 | No |
| 819 | 5 | AB | 13 | 110 | 300 | 186 | 534 | No |
| 819 | 6B | AB | 22 | 150 | 300 | 215 | 534 | No |
| 819 | 7 | AB | 11 | 250 | 360 | 275 | 534 | No |
| 819 | 8B | AB | 36 | 100 | 500 | 242 | 534 | No |
| 819 | 9 | AB | 9 | 150 | 230 | 169 | 534 | No |
| 819 | 10 | AB | 18 | 140 | 370 | 246 | 534 | No |
| 819 | 11B | AB | 49 | 80 | 450 | 205 | 534 | No |
| 819 | 12D | AB | 58 | 60 | 450 | 167 | 534 | No |
| GAMMA FIDLER | | | | | | | | |
| 803 | 1 | gamma | 22 | 1000 | 9000 | 4568 | 19000 | No |
| 803 | 2 | gamma | 254 | 2000 | 8000 | 4194 | 19000 | No |
| 803 | 3 | gamma | 20 | 3000 | 8000 | 5250 | 19000 | No |
| 803 | 4 | gamma | 254 | 3000 | 11000 | 5608 | 19000 | No |
| 803 | 5 | gamma | 254 | 2000 | 9000 | 4303 | 19000 | No |
| 803 | 6 | gamma | 254 | 2000 | 8500 | 3594 | 19000 | No |
| 803 | 7 | gamma | 29 | 5950 | 9250 | 7793 | 19000 | No |
| 804 | 1 | gamma | 29 | 8800 | 15400 | 12403 | 19000 | No |
| 804 | 2 | gamma | 42 | 4000 | 16000 | 9474 | 19000 | No |
| **804** | **3B** | **gamma** | **83** | **4000** | **20000** | **9505** | **19000** | **Yes** |
| 804 | 4B | gamma | 31 | 4000 | 9000 | 6190 | 19000 | No |
| 804 | 5B | gamma | 49 | 500 | 15000 | 8993 | 19000 | No |
| 804 | 6B | gamma | 45 | 4000 | 14000 | 7626 | 19000 | No |
| **805** | **1** | **gamma** | **33** | **8000** | **20000** | **13174** | **19000** | **Yes** |
| 806 | 1 | gamma | 24 | 6000 | 9000 | 7469 | 19000 | No |
| 810 | 1 | gamma | 67 | 6000 | 18000 | 10444 | 19000 | No |
| 812 | 32 | gamma | 21 | 5000 | 8000 | 6976 | 19000 | No |
| 815 | 15 | gamma | 73 | 5000 | 14000 | 8173 | 19000 | No |
| 816 | 8 | gamma | 82 | 5000 | 15000 | 8416 | 19000 | No |
| 816 | 9 | gamma | 44 | 5900 | 10000 | 7888 | 19000 | No |
| 816 | 10 | gamma | 30 | 6000 | 12000 | 8408 | 19000 | No |
| 819 | 1 | gamma | 36 | 6500 | 10500 | 7722 | 19000 | No |
| 819 | 2 | gamma | 31 | 5000 | 16000 | 10661 | 19000 | No |
| 819 | 3 | gamma | 146 | 2900 | 16000 | 7107 | 19000 | No |
| 819 | 4 | gamma | 26 | 7500 | 15500 | 12370 | 19000 | No |
| 819 | 5 | gamma | 25 | 8500 | 16000 | 12950 | 19000 | No |
| 819 | 6B | gamma | 36 | 7000 | 15500 | 10790 | 19000 | No |
| 819 | 7 | gamma | 21 | 9500 | 16500 | 13333 | 19000 | No |
| 819 | 8B | gamma | 36 | 7000 | 17000 | 11903 | 19000 | No |
| 819 | 9 | gamma | 38 | 6500 | 14000 | 10776 | 19000 | No |
| 819 | 10 | gamma | 32 | 9000 | 15000 | 12109 | 19000 | No |
| 819 | 11B | gamma | 68 | 4000 | 16000 | 9154 | 19000 | No |
| 819 | 12D | gamma | 102 | 3100 | 13650 | 6478 | 19000 | No |

[a] cpm = counts per minute.

[b] For instruments measuring gross alpha and beta radiation, the flag value is equal to the instrument-specific $DCGL_{EMC/5}$ plus the mean background scanning value. The $DCGL_{EMC/5}$ is calculated by dividing the $DCGL_{EMC}$ (see Table 4-2) by 5 to provide a more conservative flag value. For instruments measuring gross gamma radiation, the flag value was equal to the 95% UCL of the background scanning results.

[c] AB = gross alpha and beta radiation.

# Table 4-10
# Phase I Exposure Rate Data
# SEAD-12 Building Report
# Seneca Army Depot Activity

| Building | Room | Minimum (urem/hr) | Mean (urem/hr) | Maximum (urem/hr) |
|---|---|---|---|---|
| 722 | ~ | 4 | 9.28 | 16 |
| 803 | 1 | 3 | 5 | 9 |
| | 2 | 3 | 4.65 | 7 |
| | 3 | 3 | 4.2 | 5 |
| | 4 | 2 | 4.57 | 8 |
| | 5 | 2 | 4.63 | 8 |
| | 6 | 2 | 4.5 | 8 |
| | 7 | 5 | 6.41 | 9 |
| 804 | 1 | 7 | 8.7 | 10 |
| | 2 | 6 | 8.35 | 11 |
| | 3 | 4 | 7.81 | 14.5 |
| | 4 | 4 | 6.27 | 8 |
| | 5 | 5 | 7.29 | 10 |
| | 6 | 4 | 7.29 | 11 |
| 805 | 1 | 7 | 9.97 | 13 |
| 806 | 1 | 3 | 4.82 | 7 |
| 810 | 1 | 4 | 7.47 | 11 |
| 812 | 32 | 3.5 | 5.57 | 9 |
| 815 | 15 | 5 | 7.69 | 10 |
| 816 | 8 | 5 | 7.1 | 10 |
| | 9 | 7 | 8.9 | 10 |
| | 10 | 6 | 7.56 | 9 |
| 819 | 1 | 4 | 7.05 | 12 |
| | 2 | 6 | 8.95 | 13 |
| | 3 | 3 | 6.61 | 10 |
| | 4 | 7 | 9.85 | 12 |
| | 5 | 7 | 10.06 | 13 |
| | 6 | 6 | 8.79 | 11 |
| | 7 | 7 | 10.14 | 12 |
| | 8 | 8 | 10.03 | 12 |
| | 9 | 6 | 8.7 | 12 |
| | 10 | 7 | 9.58 | 13 |
| | 11 | 5.5 | 8.36 | 12 |
| | 12 | 3 | 6.2 | 12 |

**Table 4-11**
**Summary of Phase I Smear Sampling Results[a/, b/, c/]**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| BUILDING | ROOM | ALPHA (dpm) [d/] | | | BETA (dpm) | | | GAMMA (dpm) | | | TRITIUM BETA (dpm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MINIMUM | MAXIMUM | MEAN | MINIMUM | MAXIMUM | MEAN | MINIMUM | MAXIMUM | MEAN | MINIMUM | MAXIMUM | MEAN |
| 803 | 1 | 0.0 | 23.0 | 2.5 | 0.0 | 64.0 | 5.7 | 0.0 | 0.0 | 0.0 | 0.0 | 80.0 | 6.9 |
| 803 | 2 | 0.0 | 25.0 | 1.2 | 0.0 | 43.0 | 2.2 | 0.0 | 56.0 | 0.2 | 0.0 | 54.0 | 1.5 |
| 803 | 3 | 0.0 | 3.7 | 0.4 | 0.0 | 2.7 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 18.6 | 2.2 |
| 803 | 4 | 0.0 | 6.4 | 0.3 | 0.0 | 16.0 | 0.5 | 0.0 | 58.0 | 0.4 | 0.0 | 31.0 | 0.5 |
| 803 | 5 | 0.0 | 8.3 | 0.5 | 0.0 | 17.3 | 0.9 | 0.0 | 84.0 | 1.3 | 0.0 | 41.4 | 2.3 |
| 803 | 6 | 0.0 | 26.3 | 0.7 | 0.0 | 14.9 | 1.0 | 0.0 | 65.0 | 0.0 | 0.0 | 73.6 | 8.6 |
| 803 | 7 | 0.0 | 2.5 | 0.3 | 0.0 | 4.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 0.6 |
| 804 | 1 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 26.0 | 0.9 |
| 804 | 2 | 0.0 | 0.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 804 | 3A/B | 0.0 | 1.3 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 176.0 | 3.9 |
| 804 | 4A/B | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 11.5 | 0.7 |
| 804 | 5A/B | 0.0 | 1.6 | 0.0 | 0.0 | 2.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 804 | 6A/B | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.2 | 0.3 |
| 805 | 1 | 0.0 | 1.1 | 0.2 | 0.0 | 5.4 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 12.0 | 0.3 |
| 806 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | 0.4 |
| 810 | 1 | 0.0 | 1.5 | 0.0 | 0.0 | 3.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 9.2 | 0.4 |
| 812 | 32 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 815 | 15 | 0.0 | 138.5 | 8.3 | 0.0 | 60.0 | 3.7 | 0.0 | 66.7 | 1.7 | 0.0 | 301.0 | 11.4 |
| 816 | 8 | 0.0 | 1.1 | 0.1 | 0.0 | 5.0 | 0.1 | 0.0 | 65.0 | 1.6 | 0.0 | 8.4 | 0.2 |
| 816 | 9 | 0.0 | 15.1 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 816 | 10 | 0.0 | 1.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 819 | 1 | 0.0 | 14.0 | 0.3 | 0.0 | 25.0 | 0.7 | 0.0 | 78.0 | 1.4 | 0.0 | 123.0 | 2.1 |
| 819 | 2 | 0.0 | 3.4 | 0.2 | 0.0 | 5.2 | 0.7 | 0.0 | 64.0 | 2.1 | 0.0 | 0.0 | 0.0 |
| 819 | 3 | 0.0 | 22.3 | 3.4 | 0.0 | 38.8 | 5.1 | 0.0 | 76.0 | 1.2 | 0.0 | 58.0 | 1.1 |
| 819 | 4 | 0.0 | 1.2 | 0.2 | 0.0 | 14.1 | 0.2 | 0.0 | 71.4 | 2.7 | 0.0 | 15.0 | 1.3 |
| 819 | 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 819 | 6A/B | 0.0 | 4.0 | 0.3 | 0.0 | 5.8 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 45.0 | 12.9 |
| 819 | 7 | 0.0 | 1.4 | 0.2 | 0.0 | 2.9 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 17.0 | 3.5 |
| 819 | 8A/B | 0.0 | 1.7 | 0.1 | 0.0 | 3.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 17.0 | 2.0 |
| 819 | 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.0 | 1.6 | 0.0 | 26.0 | 1.9 |
| 819 | 10 | 0.0 | 17.0 | 0.7 | 0.0 | 16.0 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 17.6 | 0.0 |
| 819 | 11A/B | 0.0 | 1.1 | 0.1 | 0.0 | 5.8 | 0.3 | 0.0 | 73.0 | 2.8 | 0.0 | 22.0 | 2.3 |
| 819 | 12A/B | 0.0 | 1.3 | 0.1 | 0.0 | 4.7 | 0.1 | 0.0 | 77.0 | 1.3 | 0.0 | 15.7 | 4.6 |
| 722 | NA | 0.0 | 1.8 | 0.1 | 0.0 | 3.3 | 0.1 | 0.0 | 59.0 | 1.5 | | | |
| CO912 | 1 | | | | | | | | | | | | |

Notes:

[a/] ANSI/ HPS N13.13-1999 Screening levels: Group 1- Ra, Th, and Transuranics 600 dpm; Group 2 - Uranium and Select High Dose Beta-Gamma emitters, 6000 dpm; Group 3 - General Beta-Gamma emitters, 60000 dpm; Group 4 other Beta-Gamma Emitters, 600000 dpm.

[b/] NYS DOL proposed acceptable levels: U-ntuaral and assoc. decay products - 1000 dpm alpha/$cm^2$; Transuranics - 200 dpm/$cm^2$; Beta-Gamma Emitters - 1000 beta-gamma/ 100 $cm^2$.

[c/] Smear Samples collected over a 100 $cm^2$ area.

[d/] dpm = disintegrations per minute.

# TABLE 4-12
## Smear Sampling - Surface and Volume Radioactivity Standards for Clearance
## ANSI N13.12-1999 and 12 NYCRR Part 38 (Table 5)
## SEAD-12 Building Report
## Seneca Army Depot Activity

ANSI/ HPS N12.12 - 1999

| Radionuclide Groups | Surface Screening Conventional Units [a] dpm/100 $cm^2$ | Volume Screening Conventional Units [a] pCi/g |
|---|---|---|
| **Group 1) Radium, Thorium, and Transuranics:** $^{210}Po$, $^{210}PB$, $^{226}Ra$, $^{228}Ra$, $^{230}Th$, $^{232}Th$, $^{237}Np$, $^{239}Pu$, $^{240}Pu$, $^{241}Am$, $^{244}Cm$, and associated decay chains [b], and others | 600 | 3 |
| **Group 2) Uranium and select high dose beta and gamma emitters:** $^{22}Na$, $^{54}Mn$, $^{58}Co$, $^{60}Co$, $^{65}Zn$, $^{90}Sr$, $^{94}Nb$, $^{106}Ru$, $^{110m}Ag$, $^{124}Sb$, $^{134}Cs$, $^{137}Cs$, $^{152}Eu$, $^{154}Eu$, $^{192}Ir$, $^{234}U$, $^{235}U$, $^{238}U$, Natural Uranium[c] and others | 6000 | 30 |
| **Group 3) General Beta, Gamma Emitters:** $^{24}Na$, $^{36}Cl$, $^{59}Fe$, $^{109}Cd$, $^{131}I$, $^{129}I$, $^{144}Ce$, $^{198}Au$, $^{241}Pu$, and others [a]. | 60000 | 300 |
| **Group 4) Other Beta, Gamma Emitters:** $^{3}H$, $^{14}C$, $^{32}P$, $^{35}S$, $^{45}Ca$, $^{51}Cr$, $^{55}Fe$, $^{63}Ni$, $^{89}Sr$, $^{99}Tc$, $^{111}In$, $^{125}I$, $^{147}Pm$, and others | 600000 | 3000 |

a) Rounded by 1 significant figure.

b) For decay chains, the screening levels represent the total activity (i.e.: the activity of the parent plus the activity of the progeny) present.

c) Where the natural uranium activity equals 48.9% from 238U, 48.9% from 234U, plus 2.25% from 235U.

d) reproduced from ANSI Standard N13.12-1999, Surface and Volume Radioactivity Standards for clearance, Health Physics Society, 1999.

# TABLE 4-12
## Smear Sampling - Surface and Volume Radioactivity Standards for Clearance
## ANSI N13.12-1999 and 12 NYCRR Part 38 (Table 5)
## SEAD-12 Building Report
## Seneca Army Depot Activity

NYCRR Part 38 (Table 5) — ACCEPTABLE SURFACE CONTAMINATION LEVELS

| NUCLIDE [a] | REMOVABLE [bcde] |
|---|---|
| U-nat, U-235, U-238, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231. | 1,000 dpm alpha/100cm$^2$ |
| Transuranics, Ra-223, Ra-224, Ra-226, Ra-228, Th-nat, Th-228, Th-230, Th-232, U-232, Pa-231, Ac-227, Sr-90, I-125, I-126, I-129, I-131, I-133. | 200 dpm/ 100cm$^2$ |
| Beta-gamma emitters (nuclides with decay modes other than alpha emissions or spontaneous fission) except Sr-90 and others noted above. | 1,000 dpm beta, gamma/100cm$^2$ |

a.) Where surface contamination by both alpha and beta -gamma emitting nuclides exist, the limits established for alpha and beta-gamma emitting nuclides should apply independently.
b.) As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
c.) Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each object.
d.) The amount of removable radioactive material per 100 cm^2 ofsurface area should be determined by wiping that area with dryfilter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionately and the entire surface should be wiped.
e.) The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 centimeter and 1.0 mrad/hr at 1 centimeter, respectively, measured through not more than 7 mg/cm^2 of total absorber.

# TABLE 4-13
## SUMMARY STATISTICS
## FOR RADIOLOGICAL ANALYSES ON DEBRIS SAMPLES COLLECTED FROM CLASS I AND II BUILDINGS
## SEAD-12 BUILDING REPORT
## SENECA ARMY DEPOT ACTIVITY

| PARAMETER | UNIT | MAXIMUM | FREQUENCY OF DETECTION | 95TH PERCENTILE OF BKGD SOIL DATA SET | SCREENING CRITERIA(1) | SCREENING CRITERIA PLUS BKGD SOIL DATA SET. | NUMBER ABOVE SCREENING CRITERIA PLUS BKGD | NUMBER OF DETECTS | NUMBER OF ANALYSES |
|---|---|---|---|---|---|---|---|---|---|
| Bismuth-214 | pCi/g | 5.2 | 100% | 2.2 | 3 | 5.2 | 1 | 14 | 14 |
| Cesium-137 | pCi/g | 1.1 | 94% | 0.7 | 30 | 30.7 | 0 | 14 | 14 |
| Cobalt-57 | pCi/g | 0.6 | 24% | 0.1 | 30 | 30.1 | 0 | 4 | 14 |
| Cobalt-60 | pCi/g | 0.6 | 71% | 0.3 | 30 | 30.3 | 0 | 12 | 14 |
| Lead-210 | pCi/g | 20.2 | 82% | 13.7 | 3 | 16.7 | 1 | 14 | 14 |
| Lead-211 | pCi/g | 16.3 | 53% | 9.9 | 3 | 12.9 | 1 | 9 | 14 |
| Lead-214 | pCi/g | 3.4 | 100% | 2.2 | 3 | 5.2 | 0 | 13 | 13 |
| Plutonium-239/240 | pCi/g | 0.1 | 35% | 0.2 | 3 | 3.2 | 0 | 5 | 14 |
| Promethium-147 | pCi/g | 0.3 | 17% | 16 | 3000 | 3016 | 0 | 1 | 10 |
| Radium-223 | pCi/g | 1.8 | 24% | 0.4 | 3 | 3.4 | 0 | 4 | 14 |
| Radium-226 | pCi/g | 5.2 | 100% | 2.2 | 3 | 5.2 | 1 | 14 | 14 |
| Radium-228 | pCi/g | 3.4 | 88% | 2.6 | 3 | 5.6 | 0 | 14 | 14 |
| Thorium-230 | pCi/g | 0.8 | 18% | 1.6 | 3 | 4.6 | 0 | 3 | 14 |
| Thorium-232 | pCi/g | 0.6 | 100% | 1.6 | 3 | 3.5 | 0 | 14 | 14 |
| Tritium | pCi/g | 166 | 78% | 11 | 3000 | 3011 | 0 | 6 | 7 |
| Uranium-233/234 | pCi/g | 18.1 | 94% | 1.1 | 30 | 31.1 | 0 | 14 | 14 |
| Uranium-235 | pCi/g | 0.8 | 53% | 0.3 | 30 | 30.3 | 0 | 8 | 14 |
| Uranium-238 | pCi/g | 1.2 | 100% | 1.2 | 30 | 31.2 | 0 | 14 | 14 |

(1) Reference utilized for this table is ANSI/ Health Physics Society N13.12-1999.

**TABLE 4-14**
**Radon Survey Results**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Location | Sample ID | Average Radon Concentration (pCi/l) |
|---|---|---|---|---|
| 800 | | Office | 1411471 | 0.9 |
| 802 | 4 | Wall | 3909812 | 0.9 |
| 802 | 4 | Wall | 3909761 | 0.8 |
| 803 | 1 | W Wall | 3909784 | 12.1 |
| 804 | 3A | Wall | 3909730 | 0.8 |
| 805 | 1 | W Wall | 3909777 | 0.2 |
| 806 | 3 | Wall | 3909756 | 0.2 |
| 806 | 6 | Wall | 3909822 | 0.4 |
| 806 | 1 | Wall | 3909774 | 0.5 |
| 807 | 5 | E Wall | 3909654 | 0.3 |
| 807 | 9 | Door | 3909669 | 0.2 |
| 810 | 1 | Bay 1 | 3909690 | 1.0 |
| 810 | 1 | Bay 3 | 3909150 | 0.6 |
| 810 | 1 | Bay 4 | 3909086 | 1.1 |
| 812 | 18 | Snack Machine Room | 1411477 | 0.9 |
| 812 | 25 | MPDO Office | 1411490 | 1.3 |
| 813 | 5B | E Wall | 3909752 | 1.0 |
| 814 | 2B | E Wall | 3909723 | 0.5 |
| 815 | 1A | E Bay | 3909080 | 0.6 |
| 815 | 9 | Crew #9 | 3909133 | 0.7 |
| 815 | 1A | E Bay | 3909131 | 0.6 |
| 816 | 4 | Hallway | 3909104 | 0.7 |
| 816 | 4 | D Bay | 3909166 | 0.8 |
| 816 | 3 | A Bay | 3909132 | 0.8 |
| 816 | 3 | A Bay | 3909097 | 0.7 |
| 816 | 4 | C Bay | 3909107 | 0.6 |
| 816 | 8 | RO Room | 3909165 | 0.9 |
| 817 | 1 | W Wall | 3909063 | 0.4 |
| 819 | 3 | NE Corner | 3909651 | 0.4 |
| 819 | 6A | Hall | 3909722 | 0.4 |
| 825 | | N Wall | 3909731 | 0.2 |
| 825 | | N Wall | 3909834 | 0.3 |
| 825 | | S Wall | 3909743 | 0.3 |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | | | |
| AFM800R1 | 3.2 | 2 | 0 | 9 | 3.4 | 45 | 166 | -0.70 | 0.48 | 5 | 15 | Pass | -- |
| AFM800R2 | 3.7 | 3.5 | 0 | 7 | 2.3 | 66 | 166 | -0.04 | 0.97 | 6 | 15 | Pass | -- |
| AFM800R3 | 4.2 | 4 | 0 | 10 | 3.8 | 53 | 157 | 0.04 | 0.96 | 5 | 15 | Pass | -- |
| AFM802R1 | 2.6 | 3 | 1 | 4 | 1.1 | 42 | 169 | -0.97 | 0.33 | 5 | 15 | Pass | -- |
| AFM802R2 | 1.8 | 1.5 | 1 | 3 | 1.0 | 24 | 166 | -1.62 | 0.11 | 4 | 15 | Pass | -- |
| AFM802R3 | 7.5 | 6 | 4 | 14 | 4.5 | 57 | 133 | 1.71 | 0.087 | 4 | 15 | Pass | -- |
| AFM802R4 | 2.9 | 2.5 | 1 | 8 | 2.4 | 81 | 195 | -0.98 | 0.33 | 8 | 15 | Pass | -- |
| AFM802R5A | 4.5 | 5 | 2 | 6 | 1.7 | 46 | 145 | 0.56 | 0.58 | 4 | 15 | Pass | -- |
| AFM802R5B | 3.3 | 4 | 0 | 6 | 1.7 | 140 | 211 | -0.45 | 0.65 | 11 | 15 | Pass | -- |
| AFM802R5D | 3.5 | 3.5 | 2 | 5 | 1.3 | 39 | 152 | -0.15 | 0.88 | 4 | 15 | Pass | -- |
| AFM802R6 | 4.5 | 5 | 3 | 5 | 1.0 | 46 | 144 | 0.60 | 0.55 | 4 | 15 | Pass | -- |
| AFM802R7 | 2.7 | 2 | 2 | 4 | 1.2 | 23 | 149 | -0.72 | 0.47 | 3 | 15 | Pass | -- |
| AFM802R8 | 2.6 | 2 | 1 | 5 | 1.5 | 41 | 169 | -1.01 | 0.31 | 5 | 15 | Pass | -- |
| AFM802R9 | 2.7 | 2.5 | 1 | 5 | 1.9 | 54 | 177 | -0.95 | 0.34 | 6 | 15 | Pass | -- |
| AFM802R10 | 5.0 | 7 | 2 | 7 | 2.7 | 64 | 147 | 0.97 | 0.33 | 5 | 15 | Pass | -- |
| AFM802R11 | 3.5 | 3.5 | 2 | 5 | 1.3 | 39 | 152 | -0.15 | 0.88 | 4 | 15 | Pass | -- |
| AFM802R12 | 2.3 | 2 | 0 | 5 | 1.9 | 50 | 181 | -1.26 | 0.21 | 6 | 15 | Pass | -- |
| AFM802R13 | 2.6 | 3 | 1 | 4 | 1.5 | 42 | 168 | -0.93 | 0.35 | 5 | 15 | Pass | -- |
| AFM802R14 | 4.0 | 2 | 2 | 8 | 2.8 | 53 | 157 | 0.04 | 0.96 | 5 | 15 | Pass | -- |
| AFM802R15 | 2.3 | 2 | 1 | 6 | 1.9 | 49 | 183 | -1.38 | 0.17 | 6 | 15 | Pass | -- |
| AFM802R16B | 3.3 | 3 | 1 | 6 | 2.2 | 36 | 154 | -0.41 | 0.69 | 4 | 15 | Pass | -- |
| AFM802R16C | 6.5 | 6 | 4 | 10 | 3.0 | 57 | 134 | 1.67 | 0.095 | 4 | 15 | Pass | -- |
| AFM802R16D | 4.3 | 4 | 1 | 7 | 2.2 | 88 | 166 | 0.50 | 0.62 | 7 | 15 | Pass | -- |
| AFM802R17 | 3.5 | 3.5 | 3 | 4 | 0.6 | 39 | 151 | -0.10 | 0.92 | 4 | 15 | Pass | -- |
| AFM802R18 | 5.8 | 6 | 5 | 7 | 0.8 | 72 | 139 | 1.68 | 0.094 | 5 | 15 | Pass | -- |
| AFM802R19 | 2.3 | 2 | 1 | 4 | 1.3 | 29 | 162 | -1.16 | 0.24 | 4 | 15 | Pass | -- |
| AFM802R20 | 3.7 | 4 | 2 | 5 | 1.5 | 29 | 143 | 0.00 | 1.00 | 3 | 15 | Pass | -- |
| AFM802R21 | 5.0 | 4 | 2 | 10 | 3.5 | 46 | 144 | 0.61 | 0.54 | 4 | 15 | Pass | -- |
| AFM802R22 | 1.8 | 2 | 0 | 3 | 1.5 | 25 | 166 | -1.57 | 0.12 | 4 | 15 | Pass | -- |
| AFM807R1 | 3.0 | 3 | 1 | 5 | 1.4 | 58 | 174 | -0.67 | 0.50 | 6 | 15 | Pass | -- |
| AFM807R2 | 3.5 | 3.5 | 2 | 5 | 1.4 | 64 | 168 | -0.20 | 0.84 | 6 | 15 | Pass | -- |
| AFM807R3 | 2.8 | 2.5 | 1 | 5 | 1.7 | 32 | 158 | -0.81 | 0.42 | 4 | 15 | Pass | -- |
| AFM807R4 | 3.8 | 4 | 3 | 4 | 0.5 | 42 | 149 | 0.15 | 0.88 | 4 | 15 | Pass | -- |
| AFM807R5 | 4.4 | 5 | 2 | 6 | 1.8 | 58 | 152 | 0.49 | 0.63 | 5 | 15 | Pass | -- |
| **AFM807R6** | **7.3** | **7.5** | **3** | **13** | **3.8** | **128** | **148** | **2.08** | **0.037** | **8** | **15** | **Fail** | **Survey** |
| AFM807R7 | 2.0 | 1.5 | 1 | 4 | 1.3 | 46 | 186 | -1.62 | 0.11 | 6 | 15 | Pass | -- |
| AFM807R8 | 4.8 | 4 | 2 | 11 | 3.2 | 73 | 158 | 0.55 | 0.58 | 6 | 15 | Pass | -- |
| AFM809R1 | 6.2 | 5.5 | 4 | 10 | 2.4 | 89 | 142 | 1.81 | 0.070 | 6 | 15 | Pass | -- |
| **AFM810R8** | **6.8** | **6** | **2** | **15** | **3.5** | **467** | **199** | **2.5** | **0.011** | **21** | **15** | **Fail** | **Survey** |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AFM810R21** | **8.4** | **8** | **2** | **21** | **4.8** | **833** | **203** | **3.45** | **5.6E-04** | **30** | **15** | **Fail** | **Survey** |
| AFM815R1 | 2.8 | 0.5 | 0 | 10 | 3.9 | 77 | 199 | -1.24 | 0.22 | 8 | 15 | Pass | -- |
| AFM815R2 | 1.0 | 1 | 1 | 1 | NA [d] | NA | NA | NA | NA | 1 | 15 | Pass [e] | -- |
| AFM815R3 | 3.9 | 4.5 | 2 | 5 | 1.4 | 99 | 178 | 0.16 | 0.87 | 8 | 15 | Pass | -- |
| AFM815R4 | 9.0 | 9 | 9 | 9 | NA | NA | NA | NA | NA | 1 | 15 | Fail [f] | -- |
| AFM815R5 | 5.0 | 5 | 5 | 5 | 0.0 | 23 | 130 | 0.75 | 0.45 | 2 | 15 | Pass | -- |
| AFM815R6 | 5.0 | 4 | 4 | 7 | 1.4 | 66 | 145 | 1.16 | 0.25 | 5 | 15 | Pass | -- |
| AFM815R7 | 6.3 | 6 | 3 | 10 | 3.5 | 39 | 133 | 1.20 | 0.23 | 3 | 15 | Pass | -- |
| AFM815R8 | 7.0 | 6 | 5 | 11 | 2.7 | 58 | 132 | 1.82 | 0.069 | 4 | 15 | Pass | -- |
| AFM815R9 | 5.3 | 5 | 4 | 7 | 1.5 | 38 | 133 | 1.14 | 0.26 | 3 | 15 | Pass | -- |
| **AFM815R10** | **7.0** | **8** | **3** | **9** | **2.8** | **60** | **131** | **2.0** | **0.050** | **4** | **15** | **Fail** | **Survey** |
| **AFM815R11** | **6.7** | **6** | **1** | **13** | **3.4** | **499** | **204** | **2.52** | **0.012** | **22** | **15** | **Fail** | **Survey** |
| AFM815R12 | 5.5 | 5 | 3 | 9 | 1.8 | 183 | 168 | 1.8 | 0.071 | 11 | 15 | Pass | -- |
| **AFM815R13** | **7.6** | **7** | **4** | **11** | **2.6** | **81** | **130** | **2.46** | **0.014** | **5** | **15** | **Fail** | **Survey** |
| AFM815R14 | 3.3 | 3 | 1 | 8 | 1.9 | 492 | 329 | -0.6 | 0.55 | 25 | 15 | Pass | -- |
| AFM815R16 | 3.7 | 4 | 2 | 6 | 1.4 | 167 | 211 | -0.05 | 0.96 | 12 | 15 | Pass | -- |
| AFM816R2 | 4.2 | 4 | 0 | 10 | 2.7 | 340 | 255 | 0.3 | 0.79 | 19 | 15 | Pass | -- |
| AFM816R3 | 2.9 | 3 | 1 | 8 | 1.6 | 1688 | 591 | -1.2 | 0.22 | 52 | 15 | Pass | -- |
| AFM816R4 | 4.2 | 4 | 0 | 11 | 2.7 | 559 | 303 | 0.3 | 0.73 | 26 | 15 | Pass | -- |
| AFM816R7 | 2.8 | 3 | 0 | 6 | 2.8 | 44 | 167 | -0.8 | 0.43 | 5 | 15 | Pass | -- |
| AFM816R11 | 2.0 | 2 | 2 | 2 | 0.0 | 11 | 142 | -1.06 | 0.29 | 2 | 15 | Pass | -- |
| AFM816R13 | 2.0 | 1 | 0 | 8 | 1.7 | 426 | 394 | -2.49 | 0.013 | 25 | 15 | Fail | Background |
| AFM817R1 | 3.3 | 3 | 1 | 7 | 2.1 | 61 | 170 | -0.39 | 0.69 | 6 | 15 | Pass | -- |
| AFM817R2 | 3.8 | 5 | 0 | 5 | 2.2 | 54 | 156 | 0.13 | 0.89 | 5 | 15 | Pass | -- |
| AFM823R1 | 1.4 | 1 | 0 | 3 | 1.1 | 30 | 181 | -2.03 | 0.043 | 5 | 15 | Fail | Background |
| AFM824R1 | 3.1 | 2.5 | 0 | 8 | 2.5 | 86 | 191 | -0.68 | 0.49 | 8 | 15 | Pass | -- |
| AFM825R1 | 4.6 | 4 | 2 | 11 | 2.7 | 161 | 190 | 0.66 | 0.51 | 11 | 15 | Pass | -- |
| **BETA FLOOR MONITOR** | | | | | | | | | | | | | |
| BFM800R1 | 469 | 651 | 181 | 668 | 259 | 33 | 177 | -1.70 | 0.089 | 5 | 15 | Pass | -- |
| BFM800R2 | 649 | 479.5 | 417 | 1040 | 304 | 49 | 182 | -1.32 | 0.19 | 6 | 15 | Pass | -- |
| BFM800R3 | 424 | 573 | 182 | 599 | 217 | 23 | 187 | -2.58 | 0.010 | 5 | 15 | Fail | Background |
| BFM802R1 | 485 | 491 | 464 | 495 | 13 | 15 | 195 | -3.27 | 0.001 | 5 | 15 | Fail | Background |
| BFM802R2 | 543 | 541.5 | 513 | 576 | 26 | 18 | 172 | -2.20 | 0.028 | 4 | 15 | Fail | Background |
| BFM802R3 | 517 | 515 | 490 | 549 | 25 | 16 | 174 | -2.40 | 0.016 | 4 | 15 | Fail | Background |
| BFM802R4 | 410 | 471.5 | 116 | 519 | 142 | 38 | 238 | -3.74 | 1.8E-04 | 8 | 15 | Fail | Background |
| BFM802R5A | 492 | 496 | 458 | 516 | 25 | 13 | 177 | -2.70 | 0.0069 | 4 | 15 | Fail | Background |
| BFM802R5B | 479 | 484 | 416 | 549 | 44 | 72 | 279 | -3.97 | 7.2E-05 | 11 | 15 | Fail | Background |
| BFM802R5D | 507 | 502.5 | 462 | 560 | 46 | 14 | 176 | -2.60 | 0.009 | 4 | 15 | Fail | Background |
| BFM802R6 | 560 | 545 | 514 | 635 | 58 | 21 | 169 | -1.90 | 0.057 | 4 | 15 | Pass | -- |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFM802R7 | 454 | 428 | 426 | 508 | 47 | 8 | 163 | -2.43 | 0.015 | 3 | 15 | Fail | Background |
| BFM802R8 | 704 | 703 | 663 | 747 | 35 | 50 | 160 | -0.22 | 0.827 | 5 | 15 | Pass | -- |
| BFM802R9 | 567 | 450 | 443 | 1139 | 280 | 34 | 197 | -2.49 | 0.013 | 6 | 15 | Fail | Background |
| BFM802R10 | 491 | 487 | 467 | 530 | 26 | 18 | 192 | -3.01 | 0.0026 | 5 | 15 | Fail | Background |
| BFM802R11 | 444 | 446 | 427 | 457 | 13 | 10 | 180 | -3.00 | 0.0027 | 4 | 15 | Fail | Background |
| BFM802R12 | 494 | 490 | 442 | 552 | 39 | 26 | 205 | -3.11 | 0.0018 | 6 | 15 | Fail | Background |
| BFM802R13 | 506 | 515 | 429 | 546 | 46 | 23 | 187 | -2.57 | 0.010 | 5 | 15 | Fail | Background |
| BFM802R14 | 452 | 450 | 419 | 484 | 23 | 15 | 195 | -3.27 | 0.0011 | 5 | 15 | Fail | Background |
| BFM802R15 | 488 | 484 | 443 | 533 | 31 | 25 | 206 | -3.19 | 0.0014 | 6 | 15 | Fail | Background |
| BFM802R16B | 484 | 485 | 443 | 521 | 33 | 12 | 178 | -2.80 | 0.0051 | 4 | 15 | Fail | Background |
| BFM802R16C | 446 | 442.5 | 410 | 487 | 33 | 10 | 180 | -3.00 | 0.0027 | 4 | 15 | Fail | Background |
| BFM802R16D | 454 | 465 | 428 | 481 | 22 | 28 | 225 | -3.70 | 2.1E-04 | 7 | 15 | Fail | Background |
| BFM802R17 | 474 | 470 | 443 | 513 | 33 | 12 | 178 | -2.80 | 0.0051 | 4 | 15 | Fail | Background |
| BFM802R18 | 443 | 444 | 409 | 480 | 26 | 15 | 195 | -3.27 | 0.0011 | 5 | 15 | Fail | Background |
| BFM802R19 | 522 | 531 | 482 | 543 | 28 | 16 | 174 | -2.40 | 0.016 | 4 | 15 | Fail | Background |
| BFM802R20 | 557 | 548 | 530 | 593 | 32 | 14 | 157 | -1.72 | 0.086 | 3 | 15 | Pass | -- |
| BFM802R21 | 566 | 576.5 | 503 | 606 | 46 | 21 | 169 | -1.90 | 0.057 | 4 | 15 | Pass | -- |
| BFM802R22 | 531 | 526.5 | 480 | 591 | 52 | 16 | 174 | -2.40 | 0.016 | 4 | 15 | Fail | Background |
| BFM807R1 | 429 | 434.5 | 385 | 454 | 24 | 21 | 210 | -3.50 | 4.6E-04 | 6 | 15 | Fail | Background |
| BFM807R2 | 700 | 703.5 | 659 | 752 | 37 | 64 | 167 | -0.16 | 0.88 | 6 | 15 | Pass | -- |
| BFM807R3 | 764 | 765 | 758 | 768 | 4 | 43 | 148 | 0.25 | 0.80 | 4 | 15 | Pass | -- |
| BFM807R4 | 444 | 451.5 | 419 | 455 | 17 | 10 | 180 | -3.00 | 0.0027 | 4 | 15 | Fail | Background |
| BFM807R5 | 439 | 446 | 403 | 464 | 24 | 15 | 195 | -3.27 | 0.0011 | 5 | 15 | Fail | Background |
| BFM807R6 | 663 | 689 | 578 | 717 | 54 | 82 | 194 | -0.90 | 0.37 | 8 | 15 | Pass | -- |
| BFM807R7 | 450 | 493 | 182 | 542 | 133 | 26 | 206 | -3.15 | 0.0016 | 6 | 15 | Fail | Background |
| BFM807R8 | 744 | 753 | 692 | 795 | 38 | 71 | 160 | 0.39 | 0.70 | 6 | 15 | Pass | -- |
| **BFM809R1** | **901** | **899** | **853** | **955** | **36** | **99** | **132** | **2.57** | **0.010** | **6** | **15** | **Fail** | **Survey** |
| **BFM810R8** | **841** | **826** | **640** | **1100** | **121** | **465** | **202** | **2.4** | **0.015** | **21** | **15** | **Fail** | **Survey** |
| BFM810R21 | 721 | 714 | 470 | 1038 | 148 | 677 | 359 | -0.33 | 0.75 | 30 | 15 | Pass | -- |
| BFM815R1 | 290 | 218 | 162 | 490 | 145 | 36 | 240 | -3.87 | 1.1E-04 | 8 | 15 | Fail | Background |
| BFM815R2 | 453 | 453 | 453 | 453 | NA | NA | NA | NA | NA | 1 | 15 | Pass [g/] | -- |
| BFM815R3 | 486 | 474 | 430 | 609 | 56 | 42 | 234 | -3.49 | 4.9E-04 | 8 | 15 | Fail | Background |
| BFM815R4 | 545 | 545 | 545 | 545 | NA | NA | NA | NA | NA | 1 | 15 | Pass [g/] | -- |
| BFM815R5 | 481 | 480.5 | 476 | 485 | 6 | 3 | 150 | -2.24 | 0.025 | 2 | 15 | Fail | Background |
| BFM815R6 | 650 | 648 | 586 | 724 | 64 | 42 | 168 | -0.92 | 0.36 | 5 | 15 | Pass | -- |
| BFM815R7 | 443 | 444 | 438 | 447 | 5 | 6 | 165 | -2.67 | 0.0077 | 3 | 15 | Fail | Background |
| BFM815R8 | 470 | 472.5 | 444 | 492 | 20 | 10 | 180 | -3.00 | 0.0027 | 4 | 15 | Fail | Background |
| BFM815R9 | 530 | 534 | 495 | 561 | 33 | 10 | 161 | -2.19 | 0.028 | 3 | 15 | Fail | Background |
| BFM815R10 | 423 | 435 | 379 | 444 | 31 | 10 | 180 | -3.0 | 0.0027 | 4 | 15 | Fail | Background |
| BFM815R11 | 573 | 583 | 440 | 636 | 50 | 314 | 389 | -3.22 | 0.0013 | 22 | 15 | Fail | Background |
| BFM815R12 | 598 | 591 | 544 | 658 | 36 | 108 | 243 | -2.1 | 0.036 | 11 | 15 | Fail | Background |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFM815R13 | 435 | 438 | 393 | 465 | 26 | 15 | 195 | -3.27 | 0.0011 | 5 | 15 | Fail | Background |
| BFM815R14 | 625 | 635 | 477 | 723 | 55 | 443 | 378 | -2.0 | 0.050 | 25 | 15 | Pass | -- |
| BFM815R16 | 561 | 587 | 452 | 636 | 57 | 111 | 267 | -2.8 | 0.0054 | 12 | 15 | Fail | Background |
| BFM816R2 | 593 | 601 | 520 | 660 | 43 | 259 | 336 | -2.5 | 0.011 | 19 | 15 | Fail | Background |
| BFM816R3 | 583 | 586.5 | 472 | 664 | 45 | 1546 | 733 | -3.3 | 8.2E-04 | 52 | 15 | Fail | Background |
| BFM816R4 | 580 | 588.5 | 467 | 647 | 46 | 437 | 425 | -3.0 | 0.0030 | 26 | 15 | Fail | Background |
| BFM816R7 | 468 | 475 | 417 | 510 | 35 | 17 | 193 | -3.1 | 0.0019 | 5 | 15 | Fail | Background |
| BFM816R11 | 534 | 533.5 | 525 | 542 | 12 | 7 | 146 | -1.64 | 0.10 | 2 | 15 | Pass | -- |
| BFM816R13 | 494 | 473 | 417 | 596 | 55 | 348 | 472 | -4.60 | 4.3E-06 | 25 | 15 | Fail | Background |
| BFM817R1 | 671 | 631 | 608 | 800 | 76 | 60 | 171 | -0.47 | 0.64 | 6 | 15 | Pass | -- |
| BFM817R2 | 671 | 667 | 645 | 717 | 28 | 47 | 163 | -0.48 | 0.63 | 5 | 15 | Pass | -- |
| BFM823R1 | 428 | 417 | 402 | 461 | 28 | 15 | 195 | -3.27 | 0.0011 | 5 | 15 | Fail | Background |
| BFM824R1 | 589 | 731 | 120 | 778 | 284 | 84 | 192 | -0.77 | 0.44 | 8 | 15 | Pass | -- |
| BFM825R1 | 639 | 645 | 572 | 714 | 51 | 122 | 229 | -1.38 | 0.17 | 11 | 15 | Pass | -- |
| **ALPHA PHOSWICH** | | | | | | | | | | | | | |
| APH800R1 | 0.8 | 1 | 0 | 2 | 0.6 | 130 | 5976 | -4.47 | 7.8E-06 | 10 | 100 | Fail | Background |
| APH800R2 | 1.7 | 1 | 0 | 6 | 2.0 | 699 | 6682 | -4.02 | 5.7E-05 | 21 | 100 | Fail | Background |
| APH800R3 | 0.7 | 0 | 0 | 3 | 1.1 | 144 | 5962 | -4.32 | 1.5E-05 | 10 | 100 | Fail | Background |
| APH802R1 | 1.1 | 1 | 0 | 4 | 1.3 | 422 | 6600 | -4.91 | 9.1E-07 | 18 | 100 | Fail | Background |
| APH802R2 | 1.1 | 1 | 0 | 3 | 0.9 | 193 | 6023 | -4.22 | 2.4E-05 | 11 | 100 | Fail | Background |
| APH802R3 | 1.5 | 1 | 0 | 4 | 1.3 | 258 | 5959 | -3.58 | 3.5E-04 | 11 | 100 | Fail | Background |
| APH802R4 | 2.0 | 1 | 0 | 10 | 3.1 | 227 | 5768 | -2.98 | 0.0029 | 9 | 100 | Fail | Background |
| APH802R5A | 1.5 | 1 | 0 | 3 | 1.1 | 263 | 5953 | -3.53 | 4.2E-04 | 11 | 100 | Fail | Background |
| APH802R5B | 0.9 | 1 | 0 | 3 | 0.9 | 244 | 6311 | -4.89 | 9.9E-07 | 14 | 100 | Fail | Background |
| APH802R5D | 1.3 | 1 | 0 | 3 | 1.0 | 251 | 6077 | -4.06 | 4.9E-05 | 12 | 100 | Fail | Background |
| APH802R6 | 0.9 | 1 | 0 | 2 | 0.7 | 181 | 6147 | -4.72 | 2.3E-06 | 12 | 100 | Fail | Background |
| APH802R7 | 1.3 | 1 | 0 | 3 | 1.1 | 245 | 6083 | -4.12 | 3.8E-05 | 12 | 100 | Fail | Background |
| APH802R8 | 1.1 | 1 | 0 | 3 | 1.1 | 181 | 5925 | -3.94 | 8.2E-05 | 10 | 100 | Fail | Background |
| APH802R9 | 2.0 | 2 | 0 | 4 | 1.4 | 272 | 5723 | -2.48 | 0.013 | 9 | 100 | Fail | Background |
| APH802R10 | 3.2 | 2.5 | 0 | 10 | 3.0 | 436 | 5670 | -1.26 | 0.21 | 10 | 100 | Pass | -- |
| APH802R11 | 2.0 | 2 | 0 | 4 | 1.3 | 341 | 5875 | -2.75 | 0.0060 | 11 | 100 | Fail | Background |
| APH802R12 | 0.6 | 0.5 | 0 | 2 | 0.7 | 118 | 5988 | -4.60 | 4.3E-06 | 10 | 100 | Fail | Background |
| APH802R13 | 1.5 | 1.5 | 0 | 6 | 1.8 | 236 | 5870 | -3.36 | 7.8E-04 | 10 | 100 | Fail | Background |
| APH802R14 | 2.2 | 2 | 1 | 4 | 1.2 | 328 | 5777 | -2.39 | 0.017 | 10 | 100 | Fail | Background |
| APH802R15 | 1.4 | 1 | 0 | 4 | 1.1 | 206 | 5899 | -3.67 | 2.4E-04 | 10 | 100 | Fail | Background |
| APH802R16B | 1.1 | 1 | 0 | 3 | 1.0 | 200 | 6017 | -4.16 | 3.2E-05 | 11 | 100 | Fail | Background |
| APH802R16C | 1.9 | 2 | 1 | 3 | 0.7 | 293 | 5923 | -3.23 | 0.0012 | 11 | 100 | Fail | Background |
| APH802R16D | 2.6 | 2 | 0 | 7 | 1.9 | 566 | 5990 | -2.09 | 0.036 | 14 | 100 | Fail | Background |
| APH802R17 | 1.3 | 1.5 | 0 | 3 | 1.0 | 251 | 6078 | -4.07 | 4.7E-05 | 12 | 100 | Fail | Background |
| APH802R18 | 2.2 | 2 | 0 | 6 | 1.6 | 356 | 5860 | -2.60 | 0.0094 | 11 | 100 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APH802R19 | 0.8 | 0 | 0 | 8 | 2.3 | 208 | 6121 | -4.47 | 7.9E-06 | 12 | 100 | Fail | Background |
| APH802R20 | 1.3 | 1 | 0 | 5 | 1.5 | 266 | 6062 | -3.92 | 9.0E-05 | 12 | 100 | Fail | Background |
| APH802R21 | 2.1 | 2 | 0 | 9 | 2.4 | 300 | 5917 | -3.16 | 0.0016 | 11 | 100 | Fail | Background |
| APH802R22 | 1.0 | 1 | 0 | 4 | 1.3 | 201 | 6015 | -4.14 | 3.5E-05 | 11 | 100 | Fail | Background |
| APH806R2 | 1.1 | 1 | 0 | 4 | 1.2 | 350 | 6437 | -4.75 | 2.1E-06 | 16 | 100 | Fail | Background |
| APH806R3 | 1.3 | 1 | 0 | 3 | 1.1 | 571 | 6932 | -5.27 | 1.4E-07 | 22 | 100 | Fail | Background |
| APH806R5 | 0.6 | 0 | 0 | 3 | 0.9 | 929 | 8387 | -7.66 | 1.8E-14 | 36 | 100 | Fail | Background |
| APH806R6 | 0.8 | 1 | 0 | 2 | 0.7 | 278 | 6625 | -5.66 | 1.5E-08 | 17 | 100 | Fail | Background |
| APH806R7 | 0.9 | 1 | 0 | 3 | 0.9 | 398 | 6863 | -5.78 | 7.5E-09 | 20 | 100 | Fail | Background |
| APH806R8 | 1.1 | 1 | 0 | 3 | 0.9 | 342 | 6562 | -5.17 | 2.3E-07 | 17 | 100 | Fail | Background |
| APH806R9 | 0.9 | 1 | 0 | 4 | 0.9 | 916 | 8129 | -7.12 | 1.1E-12 | 34 | 100 | Fail | Background |
| APH806R10 | 0.7 | 1 | 0 | 2 | 0.8 | 236 | 6435 | -5.32 | 1.0E-07 | 15 | 100 | Fail | Background |
| APH807R1 | 3.0 | 3 | 0 | 7 | 2.2 | 390 | 5605 | -1.17 | 0.24 | 9 | 100 | Pass | -- |
| APH807R2 | 1.1 | 1 | 0 | 4 | 1.2 | 157 | 5838 | -3.76 | 1.7E-04 | 9 | 100 | Fail | Background |
| APH807R3 | 0.7 | 0 | 0 | 3 | 1.0 | 163 | 6054 | -4.52 | 6.1E-06 | 11 | 100 | Fail | Background |
| APH807R4 | 1.2 | 1 | 0 | 2 | 0.8 | 192 | 6024 | -4.23 | 2.3E-05 | 11 | 100 | Fail | Background |
| APH807R5 | 0.4 | 0 | 0 | 1 | 0.5 | 99 | 6006 | -4.79 | 1.7E-06 | 10 | 100 | Fail | Background |
| APH807R6 | 1.4 | 1 | 0 | 5 | 1.5 | 631 | 6873 | -4.86 | 1.2E-06 | 22 | 100 | Fail | Background |
| APH807R7 | 0.8 | 1 | 0 | 2 | 0.7 | 175 | 6153 | -4.78 | 1.7E-06 | 12 | 100 | Fail | Background |
| APH807R8 | 0.7 | 0 | 0 | 4 | 1.3 | 133 | 5862 | -4.03 | 5.7E-05 | 9 | 100 | Fail | Background |
| APH807R9 | 1.5 | 1 | 0 | 4 | 1.3 | 402 | 6269 | -3.94 | 8.3E-05 | 15 | 100 | Fail | Background |
| APH809R1 | 1.1 | 1 | 0 | 3 | 1.2 | 163 | 5833 | -3.70 | 2.1E-04 | 9 | 100 | Fail | Background |
| APH810R3 | 0.9 | 1 | 0 | 3 | 1.1 | 311 | 6475 | -5.06 | 4.3E-07 | 16 | 100 | Fail | Background |
| **APH810R5** | **7.9** | **8** | **6** | **11** | **1.4** | **1852** | **5170** | **5.89** | **3.8E-09** | **18** | **100** | **Fail** | **Survey** |
| APH810R6 | 1.1 | 1 | 0 | 2 | 0.8 | 334 | 6569 | -5.23 | 1.7E-07 | 17 | 100 | Fail | Background |
| APH810R7 | 0.4 | 0 | 0 | 3 | 0.8 | 230 | 6556 | -5.71 | 1.1E-08 | 16 | 100 | Fail | Background |
| APH810R8 | 1.1 | 1 | 0 | 3 | 1.3 | 170 | 5826 | -3.62 | 2.9E-04 | 9 | 100 | Fail | Background |
| APH810R9 | 1.4 | 1 | 0 | 5 | 1.3 | 700 | 7051 | -5.12 | 3.1E-07 | 24 | 100 | Fail | Background |
| APH810R10 | 0.9 | 0 | 0 | 5 | 1.5 | 371 | 6533 | -4.94 | 7.8E-07 | 17 | 100 | Fail | Background |
| APH810R11 | 1.1 | 1 | 0 | 3 | 1.0 | 292 | 6378 | -4.85 | 1.2E-06 | 15 | 100 | Fail | Background |
| APH810R12 | 1.2 | 1 | 0 | 4 | 1.3 | 376 | 6410 | -4.53 | 5.8E-06 | 16 | 100 | Fail | Background |
| APH810R15 | 1.2 | 1 | 0 | 3 | 1.1 | 487 | 6774 | -5.15 | 2.6E-07 | 20 | 100 | Fail | Background |
| APH810R17 | 1.3 | 1 | 0 | 4 | 1.3 | 1809 | 8923 | -6.69 | 2.2E-11 | 46 | 100 | Fail | Background |
| APH810R18 | 1.5 | 1 | 0 | 4 | 1.1 | 1188 | 7857 | -5.73 | 1.0E-08 | 34 | 100 | Fail | Background |
| APH810R19 | 1.7 | 2 | 0 | 6 | 1.8 | 451 | 6220 | -3.52 | 4.3E-04 | 15 | 100 | Fail | Background |
| APH810R20 | 1.3 | 1 | 0 | 5 | 1.4 | 357 | 6313 | -4.31 | 1.7E-05 | 15 | 100 | Fail | Background |
| APH810R22 | 1.1 | 1 | 0 | 4 | 1.0 | 1117 | 8199 | -6.73 | 1.8E-11 | 36 | 100 | Fail | Background |
| APH810R23 | 2.1 | 1 | 0 | 7 | 2.1 | 1293 | 7222 | -3.75 | 1.8E-04 | 30 | 100 | Fail | Background |
| APH810R24 | 1.3 | 1 | 0 | 4 | 1.3 | 389 | 6398 | -4.43 | 9.4E-06 | 16 | 100 | Fail | Background |
| APH810R25 | 1.7 | 2 | 0 | 4 | 1.5 | 536 | 6368 | -3.66 | 2.5E-04 | 17 | 100 | Fail | Background |
| APH812R1 | 1.4 | 1 | 0 | 4 | 1.2 | 477 | 6544 | -4.49 | 7.0E-06 | 18 | 100 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APH812R2 | 1.3 | 1 | 0 | 4 | 1.4 | 371 | 6299 | -4.19 | 2.8E-05 | 15 | 100 | Fail | Background |
| APH812R3 | 1.8 | 2 | 0 | 4 | 1.4 | 460 | 6210 | -3.44 | 5.7E-04 | 15 | 100 | Fail | Background |
| APH812R4 | 0.8 | 1 | 0 | 2 | 0.6 | 229 | 6442 | -5.38 | 7.4E-08 | 15 | 100 | Fail | Background |
| APH812R5 | 1.2 | 1 | 0 | 4 | 1.1 | 318 | 6352 | -4.63 | 3.6E-06 | 15 | 100 | Fail | Background |
| APH812R6 | 1.6 | 2 | 0 | 4 | 1.2 | 401 | 6270 | -3.95 | 8.0E-05 | 15 | 100 | Fail | Background |
| APH812R7 | 0.5 | 1 | 0 | 1 | 0.5 | 198 | 6472 | -5.63 | 1.8E-08 | 15 | 100 | Fail | Background |
| APH812R8 | 1.3 | 1 | 0 | 5 | 1.5 | 371 | 6300 | -4.19 | 2.8E-05 | 15 | 100 | Fail | Background |
| APH812R9 | 4.3 | 1.5 | 0 | 17 | 5.4 | 731 | 6055 | -1.66 | 0.10 | 16 | 100 | Pass | -- |
| APH812R10 | 1.4 | 1 | 0 | 4 | 1.3 | 376 | 6294 | -4.15 | 3.3E-05 | 15 | 100 | Fail | Background |
| APH812R11 | 1.2 | 1 | 0 | 2 | 0.8 | 297 | 6373 | -4.81 | 1.5E-06 | 15 | 100 | Fail | Background |
| APH812R13 | 0.7 | 1 | 0 | 2 | 0.7 | 332 | 6809 | -5.92 | 3.2E-09 | 19 | 100 | Fail | Background |
| APH812R14 | 0.7 | 1 | 0 | 2 | 0.8 | 419 | 7084 | -6.28 | 3.4E-10 | 22 | 100 | Fail | Background |
| APH812R15 | 0.9 | 1 | 0 | 4 | 1.1 | 269 | 6402 | -5.04 | 4.5E-07 | 15 | 100 | Fail | Background |
| APH812R16 | 0.7 | 0 | 0 | 3 | 1.0 | 243 | 6427 | -5.26 | 1.4E-07 | 15 | 100 | Fail | Background |
| APH812R17 | 1.3 | 1 | 0 | 3 | 1.0 | 367 | 6420 | -4.61 | 4.0E-06 | 16 | 100 | Fail | Background |
| APH812R18 | 1.0 | 1 | 0 | 4 | 0.9 | 489 | 7015 | -5.82 | 6.0E-09 | 22 | 100 | Fail | Background |
| APH812R19 | 0.9 | 1 | 0 | 3 | 1.0 | 906 | 8005 | -6.87 | 6.5E-12 | 33 | 100 | Fail | Background |
| APH812R20 | 5.7 | 3 | 0 | 20 | 5.7 | 2372 | 6808 | -0.04 | 0.97 | 35 | 100 | Pass | -- |
| APH812R21 | 0.9 | 1 | 0 | 4 | 1.2 | 295 | 6376 | -4.83 | 1.4E-06 | 15 | 100 | Fail | Background |
| APH812R23 | 1.3 | 0 | 0 | 11 | 2.5 | 443 | 6698 | -5.11 | 3.2E-07 | 19 | 100 | Fail | Background |
| APH812R24 | 0.5 | 0 | 0 | 4 | 1.1 | 232 | 6438 | -5.35 | 8.8E-08 | 15 | 100 | Fail | Background |
| APH812R25 | 1.3 | 1 | 0 | 3 | 1.1 | 374 | 6413 | -4.55 | 5.2E-06 | 16 | 100 | Fail | Background |
| APH812R26 | 1.2 | 1 | 0 | 5 | 1.4 | 574 | 6929 | -5.24 | 1.6E-07 | 22 | 100 | Fail | Background |
| APH812R27 | 1.0 | 1 | 0 | 2 | 0.8 | 266 | 6404 | -5.07 | 4.0E-07 | 15 | 100 | Fail | Background |
| APH812R28 | 1.4 | 1 | 0 | 4 | 1.1 | 356 | 6314 | -4.32 | 1.6E-05 | 15 | 100 | Fail | Background |
| APH812R29 | 0.9 | 1 | 0 | 2 | 0.8 | 278 | 6508 | -5.32 | 1.0E-07 | 16 | 100 | Fail | Background |
| APH812R30 | 1.7 | 1 | 0 | 4 | 1.1 | 384 | 6171 | -3.68 | 2.3E-04 | 14 | 100 | Fail | Background |
| APH812R31 | 2.2 | 2 | 0 | 9 | 2.1 | 850 | 6653 | -3.39 | 7.0E-04 | 22 | 100 | Fail | Background |
| APH812R33 | 0.7 | 0 | 0 | 3 | 0.9 | 237 | 6434 | -5.31 | 1.1E-07 | 15 | 100 | Fail | Background |
| APH813R1 | 1.1 | 1 | 0 | 3 | 1.0 | 305 | 6366 | -4.75 | 2.1E-06 | 15 | 100 | Fail | Background |
| APH813R2 | 1.8 | 1 | 0 | 5 | 1.5 | 447 | 6223 | -3.55 | 3.8E-04 | 15 | 100 | Fail | Background |
| APH813R3 | 1.5 | 2 | 0 | 5 | 1.3 | 369 | 6302 | -4.21 | 2.5E-05 | 15 | 100 | Fail | Background |
| APH813R4 | 1.4 | 1 | 0 | 5 | 1.5 | 377 | 6293 | -4.14 | 3.5E-05 | 15 | 100 | Fail | Background |
| APH813R5 | 1.4 | 1 | 0 | 5 | 1.3 | 1545 | 8467 | -6.27 | 3.6E-10 | 41 | 100 | Fail | Background |
| APH813R7 | 1.1 | 1 | 0 | 4 | 1.2 | 313 | 6357 | -4.67 | 3.0E-06 | 15 | 100 | Fail | Background |
| APH813R8 | 1.8 | 2 | 0 | 5 | 1.3 | 426 | 6244 | -3.73 | 1.9E-04 | 15 | 100 | Fail | Background |
| APH813R11 | 1.1 | 1 | 0 | 3 | 1.0 | 292 | 6378 | -4.85 | 1.2E-06 | 15 | 100 | Fail | Background |
| APH814R1 | 1.0 | 1 | 0 | 3 | 1.1 | 293 | 6377 | -4.84 | 1.3E-06 | 15 | 100 | Fail | Background |
| APH814R2 | 1.9 | 1 | 0 | 7 | 1.8 | 459 | 6211 | -3.45 | 5.6E-04 | 15 | 100 | Fail | Background |
| APH814R3 | 1.7 | 2 | 0 | 6 | 1.5 | 404 | 6267 | -3.92 | 8.9E-05 | 15 | 100 | Fail | Background |
| APH814R4 | 1.9 | 2 | 0 | 6 | 1.7 | 482 | 6188 | -3.26 | 0.0011 | 15 | 100 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APH814R5 | 1.7 | 2 | 0 | 5 | 1.3 | 1595 | 8136 | -5.39 | 7.2E-08 | 39 | 100 | Fail | Background |
| APH814R6 | 0.9 | 1 | 0 | 3 | 1.0 | 281 | 6390 | -4.95 | 7.6E-07 | 15 | 100 | Fail | Background |
| APH815R1 | 0.5 | 0.5 | 0 | 1 | 0.5 | 105 | 6000 | -4.73 | 2.3E-06 | 10 | 100 | Fail | Background |
| APH815R2 | 2.7 | 2 | 1 | 11 | 3.0 | 321 | 5785 | -2.47 | 0.014 | 10 | 100 | Fail | Background |
| APH815R3 | 0.8 | 1 | 0 | 4 | 1.0 | 491 | 7136 | -6.13 | 9.0E-10 | 23 | 100 | Fail | Background |
| APH815R4 | 0.9 | 1 | 0 | 2 | 0.7 | 142 | 5963 | -4.34 | 1.4E-05 | 10 | 100 | Fail | Background |
| APH815R5 | 1.8 | 2 | 0 | 5 | 1.5 | 453 | 6217 | -3.50 | 4.6E-04 | 15 | 100 | Fail | Background |
| APH815R6 | 0.7 | 0 | 0 | 3 | 0.9 | 237 | 6434 | -5.31 | 1.1E-07 | 15 | 100 | Fail | Background |
| APH815R7 | 2.4 | 2 | 0 | 5 | 1.7 | 541 | 6014 | -2.31 | 0.021 | 14 | 100 | Fail | Background |
| APH815R8 | 1.9 | 2 | 0 | 5 | 1.5 | 632 | 6508 | -3.73 | 1.9E-04 | 19 | 100 | Fail | Background |
| APH815R9 | 2.6 | 2 | 0 | 6 | 1.7 | 527 | 5915 | -1.95 | 0.051 | 13 | 100 | Pass | -- |
| APH815R10 | 2.7 | 2.5 | 1 | 6 | 1.8 | 591 | 5964 | -1.87 | 0.061 | 14 | 100 | Pass | -- |
| APH815R11 | 1.2 | 1 | 0 | 4 | 1.1 | 2679 | 10201 | -7.67 | 1.7E-14 | 60 | 100 | Fail | Background |
| APH815R12 | 1.7 | 2 | 0 | 5 | 1.5 | 1517 | 7937 | -5.08 | 3.7E-07 | 37 | 100 | Fail | Background |
| APH815R13 | 3.3 | 3.5 | 0 | 8 | 2.3 | 716 | 5839 | -0.78 | 0.44 | 14 | 100 | Pass | -- |
| APH815R14 | 1.2 | 1 | 0 | 5 | 1.2 | 2169 | 9613 | -7.42 | 1.2E-13 | 53 | 100 | Fail | Background |
| APH815R16 | 1.6 | 1 | 0 | 5 | 1.5 | 1592 | 8139 | -5.39 | 6.9E-08 | 39 | 100 | Fail | Background |
| APH815R18 | 1.6 | 1 | 0 | 6 | 1.4 | 708 | 6918 | -4.71 | 2.5E-06 | 23 | 100 | Fail | Background |
| APH815R19 | 4.5 | 4 | 3 | 10 | 1.9 | 1039 | 5632 | 1.42 | 0.16 | 15 | 100 | Pass | -- |
| APH815R20 | 2.6 | 2 | 0 | 6 | 1.6 | 732 | 6172 | -2.13 | 0.033 | 17 | 100 | Fail | Background |
| APH816R1 | 1.7 | 2 | 0 | 5 | 1.1 | 999 | 7386 | -5.06 | 4.1E-07 | 29 | 100 | Fail | Background |
| APH816R2 | 1.4 | 1 | 0 | 5 | 1.4 | 2802 | 9919 | -6.92 | 4.7E-12 | 59 | 100 | Fail | Background |
| APH816R3 | 0.9 | 1 | 0 | 5 | 1.0 | 10216 | 17046 | -10.70 | 1.0E-26 | 133 | 100 | Fail | Background |
| APH816R4 | 1.0 | 1 | 0 | 4 | 1.1 | 3533 | 11518 | -8.77 | 1.8E-18 | 73 | 100 | Fail | Background |
| APH816R5 | 0.9 | 1 | 0 | 3 | 0.8 | 581 | 7421 | -6.52 | 7.1E-11 | 26 | 100 | Fail | Background |
| APH816R7 | 1.1 | 1 | 0 | 4 | 1.2 | 408 | 6614 | -5.02 | 5.2E-07 | 18 | 100 | Fail | Background |
| APH816R11 | 1.0 | 0.5 | 0 | 3 | 1.2 | 618 | 7133 | -5.64 | 1.7E-08 | 24 | 100 | Fail | Background |
| APH816R12 | 2.1 | 2 | 0 | 5 | 1.6 | 400 | 5928 | -2.65 | 0.0081 | 12 | 100 | Fail | Background |
| APH816R13 | 0.5 | 0 | 0 | 2 | 0.6 | 346 | 7036 | -6.46 | 1.0E-10 | 21 | 100 | Fail | Background |
| APH816R16 | 2.4 | 3 | 0 | 6 | 1.4 | 1088 | 6788 | -3.05 | 0.0023 | 25 | 100 | Fail | Background |
| APH816R21 | 2.5 | 2 | 0 | 6 | 1.7 | 1114 | 6761 | -2.88 | 0.0040 | 25 | 100 | Fail | Background |
| APH817R1 | 0.7 | 0 | 0 | 2 | 0.9 | 112 | 5883 | -4.26 | 2.0E-05 | 9 | 100 | Fail | Background |
| APH817R2 | 0.6 | 0 | 0 | 4 | 1.3 | 145 | 5960 | -4.31 | 1.7E-05 | 10 | 100 | Fail | Background |
| APH823R1 | 1.3 | 1.5 | 0 | 3 | 1.1 | 199 | 5906 | -3.74 | 1.8E-04 | 10 | 100 | Fail | Background |
| APH824R1 | 0.8 | 0 | 0 | 4 | 1.3 | 164 | 5942 | -4.11 | 3.9E-05 | 10 | 100 | Fail | Background |
| APH825R1 | 1.1 | 1 | 0 | 6 | 1.4 | 412 | 6728 | -5.33 | 9.7E-08 | 19 | 100 | Fail | Background |
| APH827R1 | 1.1 | 1 | 0 | 6 | 1.5 | 310 | 6361 | -4.70 | 2.6E-06 | 15 | 100 | Fail | Background |
| **BETA PHOSWICH** | | | | | | | | | | | | | |
| BPH800R1 | 131 | 116 | 99 | 265 | 49 | 89 | 6017 | -4.85 | 1.2E-06 | 10 | 100 | Fail | Background |
| BPH800R2 | 174 | 140 | 95 | 460 | 102 | 442 | 6939 | -5.74 | 9.4E-09 | 21 | 100 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BPH800R3 | 117 | 112 | 102 | 140 | 14 | 55 | 6050 | -5.20 | 2.0E-07 | 10 | 100 | Fail | Background |
| BPH802R1 | 216 | 183 | 128 | 372 | 86 | 517 | 6505 | -4.15 | 3.3E-05 | 18 | 100 | Fail | Background |
| BPH802R2 | 249 | 220 | 185 | 393 | 66 | 358 | 5858 | -2.55 | 0.011 | 11 | 100 | Fail | Background |
| BPH802R3 | 220 | 205 | 167 | 332 | 45 | 257 | 5959 | -3.54 | 4.0E-04 | 11 | 100 | Fail | Background |
| BPH802R4 | 260 | 282 | 118 | 432 | 131 | 343 | 5653 | -1.68 | 0.093 | 9 | 100 | Pass | -- |
| BPH802R5A | 276 | 218 | 162 | 512 | 124 | 417 | 5800 | -1.97 | 0.049 | 11 | 100 | Fail | Background |
| BPH802R5B | 198 | 181 | 159 | 284 | 42 | 273 | 6282 | -4.59 | 4.4E-06 | 14 | 100 | Fail | Background |
| BPH802R5D | 249 | 260 | 172 | 283 | 32 | 444 | 5885 | -2.21 | 0.027 | 12 | 100 | Fail | Background |
| BPH802R6 | 184 | 184 | 154 | 209 | 17 | 153 | 6176 | -4.94 | 7.7E-07 | 12 | 100 | Fail | Background |
| BPH802R7 | 217 | 208 | 167 | 254 | 29 | 290 | 6038 | -3.65 | 2.6E-04 | 12 | 100 | Fail | Background |
| BPH802R8 | 238 | 241 | 137 | 384 | 67 | 304 | 5801 | -2.61 | 0.0091 | 10 | 100 | Fail | Background |
| BPH802R9 | 196 | 193 | 167 | 228 | 20 | 130 | 5866 | -4.02 | 5.7E-05 | 9 | 100 | Fail | Background |
| BPH802R10 | 290 | 249 | 180 | 494 | 111 | 407 | 5698 | -1.54 | 0.12 | 10 | 100 | Pass | -- |
| BPH802R11 | 209 | 193 | 175 | 362 | 52 | 206 | 6011 | -4.05 | 5.1E-05 | 11 | 100 | Fail | Background |
| BPH802R12 | 178 | 160 | 121 | 238 | 41 | 130 | 5975 | -4.42 | 9.9E-06 | 10 | 100 | Fail | Background |
| BPH802R13 | 218 | 208 | 169 | 333 | 44 | 217 | 5889 | -3.52 | 4.3E-04 | 10 | 100 | Fail | Background |
| BPH802R14 | 216 | 200 | 180 | 379 | 59 | 204 | 5902 | -3.65 | 2.6E-04 | 10 | 100 | Fail | Background |
| BPH802R15 | 200 | 161 | 140 | 364 | 84 | 191 | 5915 | -3.79 | 1.5E-04 | 10 | 100 | Fail | Background |
| BPH802R16B | 209 | 207 | 145 | 260 | 35 | 225 | 5991 | -3.86 | 1.1E-04 | 11 | 100 | Fail | Background |
| BPH802R16C | 158 | 157 | 138 | 189 | 15 | 81 | 6136 | -5.29 | 1.3E-07 | 11 | 100 | Fail | Background |
| BPH802R16D | 180 | 175 | 123 | 260 | 43 | 222 | 6334 | -5.04 | 4.7E-07 | 14 | 100 | Fail | Background |
| BPH802R17 | 197 | 194 | 133 | 251 | 30 | 206 | 6123 | -4.45 | 8.8E-06 | 12 | 100 | Fail | Background |
| BPH802R18 | 205 | 184 | 135 | 444 | 92 | 216 | 6000 | -3.95 | 7.9E-05 | 11 | 100 | Fail | Background |
| BPH802R19 | 190 | 179 | 152 | 354 | 54 | 180 | 6148 | -4.68 | 2.8E-06 | 12 | 100 | Fail | Background |
| BPH802R20 | 255 | 234 | 182 | 340 | 50 | 449 | 5880 | -2.16 | 0.031 | 12 | 100 | Fail | Background |
| BPH802R21 | 235 | 222 | 156 | 365 | 68 | 323 | 5894 | -2.90 | 0.0038 | 11 | 100 | Fail | Background |
| BPH802R22 | 245 | 211 | 204 | 423 | 66 | 341 | 5876 | -2.72 | 0.0065 | 11 | 100 | Fail | Background |
| BPH806R2 | 183 | 139 | 125 | 322 | 71 | 351 | 6435 | -4.68 | 2.8E-06 | 16 | 100 | Fail | Background |
| BPH806R3 | 145 | 143 | 116 | 197 | 19 | 270 | 7233 | -7.21 | 5.5E-13 | 22 | 100 | Fail | Background |
| BPH806R5 | 137 | 128 | 90 | 243 | 34 | 744 | 8572 | -8.49 | 2.0E-17 | 36 | 100 | Fail | Background |
| BPH806R6 | 162 | 154 | 119 | 268 | 42 | 237 | 6667 | -5.93 | 3.1E-09 | 17 | 100 | Fail | Background |
| BPH806R7 | 153 | 140 | 113 | 257 | 40 | 292 | 6968 | -6.46 | 1.0E-10 | 20 | 100 | Fail | Background |
| BPH806R8 | 143 | 141 | 104 | 199 | 19 | 161 | 6742 | -6.51 | 7.4E-11 | 17 | 100 | Fail | Background |
| BPH806R9 | 142 | 135 | 108 | 200 | 23 | 627 | 8419 | -8.53 | 1.5E-17 | 34 | 100 | Fail | Background |
| BPH806R10 | 144 | 122 | 107 | 254 | 48 | 187 | 6484 | -5.68 | 1.4E-08 | 15 | 100 | Fail | Background |
| BPH807R1 | 215 | 218 | 180 | 249 | 20 | 187 | 5808 | -3.39 | 7.0E-04 | 9 | 100 | Fail | Background |
| BPH807R2 | 186 | 172 | 146 | 277 | 40 | 120 | 5876 | -4.13 | 3.6E-05 | 9 | 100 | Fail | Background |
| BPH807R3 | 160 | 160 | 135 | 182 | 15 | 86 | 6131 | -5.24 | 1.6E-07 | 11 | 100 | Fail | Background |
| BPH807R4 | 163 | 166 | 137 | 183 | 12 | 86 | 6131 | -5.24 | 1.6E-07 | 11 | 100 | Fail | Background |
| BPH807R5 | 180 | 182 | 148 | 209 | 20 | 108 | 5998 | -4.65 | 3.3E-06 | 10 | 100 | Fail | Background |
| BPH807R6 | 179 | 163 | 131 | 604 | 97 | 394 | 7110 | -6.39 | 1.7E-10 | 22 | 100 | Fail | Background |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BPH807R7 | 158 | 156 | 142 | 177 | 11 | 91 | 6238 | -5.53 | 3.3E-08 | 12 | 100 | Fail | Background |
| BPH807R8 | 155 | 155 | 130 | 182 | 17 | 57 | 5938 | -4.82 | 1.4E-06 | 9 | 100 | Fail | Background |
| BPH807R9 | 170 | 164 | 131 | 211 | 20 | 176 | 6495 | -5.77 | 8.0E-09 | 15 | 100 | Fail | Background |
| BPH809R1 | 217 | 203 | 143 | 375 | 65 | 192 | 5804 | -3.34 | 8.3E-04 | 9 | 100 | Fail | Background |
| BPH810R3 | 270 | 245 | 155 | 615 | 124 | 633 | 6153 | -2.43 | 0.015 | 16 | 100 | Fail | Background |
| BPH810R5 | 188 | 179 | 135 | 274 | 34 | 329 | 6692 | -5.55 | 2.8E-08 | 18 | 100 | Fail | Background |
| BPH810R6 | 216 | 201 | 166 | 355 | 46 | 419 | 6484 | -4.52 | 6.3E-06 | 17 | 100 | Fail | Background |
| BPH810R7 | 197 | 197 | 163 | 237 | 24 | 297 | 6490 | -5.12 | 3.1E-07 | 16 | 100 | Fail | Background |
| BPH810R8 | 187 | 182 | 143 | 257 | 35 | 120 | 5875 | -4.13 | 3.6E-05 | 9 | 100 | Fail | Background |
| BPH810R9 | 242 | 237 | 173 | 315 | 40 | 960 | 6791 | -3.42 | 6.3E-04 | 24 | 100 | Fail | Background |
| BPH810R10 | 296 | 259 | 204 | 679 | 110 | 824 | 6079 | -1.38 | 0.17 | 17 | 100 | Pass | -- |
| BPH810R11 | 227 | 224 | 177 | 288 | 32 | 431 | 6239 | -3.65 | 2.7E-04 | 15 | 100 | Fail | Background |
| BPH810R12 | 270 | 249 | 201 | 471 | 66 | 697 | 6090 | -1.92 | 0.055 | 16 | 100 | Pass | -- |
| BPH810R15 | 244 | 242 | 166 | 327 | 39 | 754 | 6506 | -3.21 | 0.0013 | 20 | 100 | Fail | Background |
| BPH810R17 | 229 | 235 | 145 | 301 | 48 | 2152 | 8580 | -5.18 | 2.2E-07 | 46 | 100 | Fail | Background |
| BPH810R18 | 223 | 236 | 131 | 302 | 48 | 1337 | 7709 | -4.90 | 9.5E-07 | 34 | 100 | Fail | Background |
| BPH810R19 | 185 | 174 | 137 | 265 | 43 | 269 | 6401 | -4.99 | 6.0E-07 | 15 | 100 | Fail | Background |
| BPH810R20 | 263 | 181 | 144 | 1175 | 256 | 409 | 6262 | -3.83 | 1.3E-04 | 15 | 100 | Fail | Background |
| BPH810R22 | 202 | 195 | 113 | 284 | 43 | 1174 | 8143 | -6.38 | 1.8E-10 | 36 | 100 | Fail | Background |
| BPH810R23 | 195 | 190 | 124 | 274 | 49 | 859 | 7656 | -6.11 | 9.9E-10 | 30 | 100 | Fail | Background |
| BPH810R24 | 199 | 200 | 156 | 307 | 34 | 280 | 6390 | -4.90 | 9.6E-07 | 15 | 100 | Fail | Background |
| BPH810R25 | 277 | 269 | 184 | 380 | 63 | 791 | 6113 | -1.64 | 0.10 | 17 | 100 | Pass | -- |
| BPH812R1 | 127 | 124 | 91 | 161 | 18 | 172 | 6849 | -6.73 | 1.7E-11 | 18 | 100 | Fail | Background |
| BPH812R2 | 193 | 184 | 114 | 406 | 70 | 290 | 6380 | -4.82 | 1.5E-06 | 15 | 100 | Fail | Background |
| BPH812R3 | 184 | 193 | 124 | 216 | 32 | 232 | 6439 | -5.30 | 1.1E-07 | 15 | 100 | Fail | Background |
| BPH812R4 | 179 | 171 | 156 | 239 | 23 | 203 | 6467 | -5.54 | 3.0E-08 | 15 | 100 | Fail | Background |
| BPH812R5 | 151 | 148 | 122 | 202 | 23 | 140 | 6530 | -6.06 | 1.3E-09 | 15 | 100 | Fail | Background |
| BPH812R6 | 161 | 154 | 138 | 209 | 20 | 151 | 6519 | -5.97 | 2.4E-09 | 15 | 100 | Fail | Background |
| BPH812R7 | 194 | 190 | 124 | 283 | 40 | 288 | 6382 | -4.83 | 1.3E-06 | 15 | 100 | Fail | Background |
| BPH812R8 | 202 | 203 | 99 | 321 | 58 | 347 | 6324 | -4.35 | 1.4E-05 | 15 | 100 | Fail | Background |
| BPH812R9 | 346 | 306 | 169 | 539 | 134 | 938 | 5848 | 0.02 | 0.99 | 16 | 100 | Pass | -- |
| BPH812R10 | 188 | 184 | 144 | 234 | 26 | 240 | 6431 | -5.24 | 1.6E-07 | 15 | 100 | Fail | Background |
| BPH812R11 | 173 | 182 | 123 | 215 | 26 | 185 | 6486 | -5.69 | 1.3E-08 | 15 | 100 | Fail | Background |
| BPH812R13 | 197 | 191 | 156 | 245 | 26 | 383 | 6758 | -5.50 | 3.9E-08 | 19 | 100 | Fail | Background |
| BPH812R14 | 203 | 199 | 155 | 297 | 33 | 519 | 6985 | -5.56 | 2.7E-08 | 22 | 100 | Fail | Background |
| BPH812R15 | 180 | 174 | 138 | 246 | 34 | 231 | 6440 | -5.31 | 1.1E-07 | 15 | 100 | Fail | Background |
| BPH812R16 | 194 | 198 | 135 | 236 | 33 | 278 | 6392 | -4.92 | 8.8E-07 | 15 | 100 | Fail | Background |
| BPH812R17 | 228 | 213 | 147 | 412 | 63 | 454 | 6332 | -3.86 | 1.1E-04 | 16 | 100 | Fail | Background |
| BPH812R18 | 207 | 211 | 146 | 254 | 27 | 553 | 6950 | -5.33 | 1.0E-07 | 22 | 100 | Fail | Background |
| BPH812R19 | 194 | 189 | 111 | 284 | 44 | 951 | 7961 | -6.57 | 5.2E-11 | 33 | 100 | Fail | Background |
| **BPH812R20** | **398** | **408** | **193** | **631** | **133** | **2773** | **6407** | **1.97** | **0.048** | **35** | **100** | **Fail** | **Survey** |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BPH812R21 | 168 | 169 | 117 | 202 | 26 | 173 | 6497 | -5.79 | 7.1E-09 | 15 | 100 | Fail | Background |
| BPH812R23 | 195 | 188 | 138 | 413 | 59 | 375 | 6765 | -5.55 | 2.9E-08 | 19 | 100 | Fail | Background |
| BPH812R24 | 146 | 139 | 95 | 199 | 26 | 137 | 6533 | -6.09 | 1.1E-09 | 15 | 100 | Fail | Background |
| BPH812R25 | 180 | 180 | 122 | 252 | 34 | 252 | 6535 | -5.48 | 4.2E-08 | 16 | 100 | Fail | Background |
| BPH812R26 | 160 | 165 | 111 | 198 | 22 | 303 | 7201 | -7.00 | 2.6E-12 | 22 | 100 | Fail | Background |
| BPH812R27 | 170 | 177 | 125 | 224 | 29 | 187 | 6484 | -5.68 | 1.4E-08 | 15 | 100 | Fail | Background |
| BPH812R28 | 169 | 168 | 89 | 248 | 36 | 199 | 6471 | -5.57 | 2.5E-08 | 15 | 100 | Fail | Background |
| BPH812R29 | 186 | 182 | 111 | 247 | 36 | 276 | 6511 | -5.29 | 1.2E-07 | 16 | 100 | Fail | Background |
| BPH812R30 | 190 | 186 | 136 | 282 | 35 | 232 | 6324 | -4.95 | 7.4E-07 | 14 | 100 | Fail | Background |
| BPH812R31 | 182 | 190 | 109 | 227 | 34 | 411 | 7092 | -6.27 | 3.5E-10 | 22 | 100 | Fail | Background |
| BPH812R33 | 182 | 167 | 120 | 284 | 42 | 253 | 6418 | -5.13 | 2.9E-07 | 15 | 100 | Fail | Background |
| BPH813R1 | 221 | 218 | 170 | 287 | 36 | 401 | 6269 | -3.89 | 9.8E-05 | 15 | 100 | Fail | Background |
| BPH813R2 | 214 | 205 | 174 | 281 | 32 | 357 | 6313 | -4.26 | 2.0E-05 | 15 | 100 | Fail | Background |
| BPH813R3 | 253 | 240 | 193 | 345 | 45 | 569 | 6102 | -2.50 | 0.012 | 15 | 100 | Fail | Background |
| BPH813R4 | 184 | 179 | 123 | 261 | 37 | 241 | 6429 | -5.22 | 1.8E-07 | 15 | 100 | Fail | Background |
| BPH813R5 | 202 | 199 | 125 | 292 | 45 | 1441 | 8571 | -6.68 | 2.5E-11 | 41 | 100 | Fail | Background |
| BPH813R7 | 216 | 244 | 107 | 292 | 58 | 435 | 6235 | -3.61 | 3.0E-04 | 15 | 100 | Fail | Background |
| BPH813R8 | 223 | 231 | 161 | 297 | 43 | 426 | 6244 | -3.69 | 2.3E-04 | 15 | 100 | Fail | Background |
| BPH813R11 | 198 | 190 | 155 | 261 | 27 | 280 | 6391 | -4.90 | 9.4E-07 | 15 | 100 | Fail | Background |
| BPH814R1 | 202 | 211 | 149 | 308 | 41 | 312 | 6359 | -4.64 | 3.5E-06 | 15 | 100 | Fail | Background |
| BPH814R2 | 216 | 222 | 159 | 288 | 39 | 388 | 6283 | -4.01 | 6.1E-05 | 15 | 100 | Fail | Background |
| BPH814R3 | 232 | 242 | 145 | 298 | 44 | 480 | 6190 | -3.24 | 0.0012 | 15 | 100 | Fail | Background |
| BPH814R4 | 211 | 203 | 147 | 317 | 48 | 363 | 6308 | -4.21 | 2.5E-05 | 15 | 100 | Fail | Background |
| BPH814R5 | 185 | 175 | 138 | 273 | 41 | 1129 | 8602 | -7.51 | 6.0E-14 | 39 | 100 | Fail | Background |
| BPH814R6 | 202 | 192 | 139 | 279 | 45 | 323 | 6347 | -4.54 | 5.6E-06 | 15 | 100 | Fail | Background |
| BPH815R1 | 216 | 209 | 114 | 404 | 78 | 233 | 5872 | -3.35 | 8.1E-04 | 10 | 100 | Fail | Background |
| BPH815R2 | 214 | 187 | 144 | 502 | 103 | 192 | 5914 | -3.78 | 1.6E-04 | 10 | 100 | Fail | Background |
| BPH815R3 | 185 | 177 | 116 | 233 | 32 | 450 | 7176 | -6.33 | 2.4E-10 | 23 | 100 | Fail | Background |
| BPH815R4 | 202 | 207 | 138 | 244 | 38 | 193 | 5912 | -3.76 | 1.7E-04 | 10 | 100 | Fail | Background |
| BPH815R5 | 214 | 226 | 119 | 288 | 48 | 399 | 6271 | -3.91 | 9.2E-05 | 15 | 100 | Fail | Background |
| BPH815R6 | 194 | 201 | 122 | 284 | 43 | 284 | 6386 | -4.87 | 1.1E-06 | 15 | 100 | Fail | Background |
| BPH815R7 | 188 | 190 | 140 | 229 | 31 | 220 | 6335 | -5.05 | 4.4E-07 | 14 | 100 | Fail | Background |
| BPH815R8 | 182 | 182 | 114 | 245 | 37 | 346 | 6795 | -5.76 | 8.2E-09 | 19 | 100 | Fail | Background |
| BPH815R9 | 236 | 256 | 155 | 271 | 38 | 406 | 6035 | -3.01 | 0.0026 | 13 | 100 | Fail | Background |
| BPH815R10 | 193 | 188 | 124 | 284 | 43 | 258 | 6298 | -4.73 | 2.3E-06 | 14 | 100 | Fail | Background |
| BPH815R11 | 170 | 172 | 97 | 265 | 37 | 2151 | 10730 | -9.44 | 3.6E-21 | 60 | 100 | Fail | Background |
| BPH815R12 | 190 | 193 | 134 | 265 | 35 | 1057 | 8397 | -7.26 | 4.0E-13 | 37 | 100 | Fail | Background |
| BPH815R13 | 174 | 180 | 135 | 222 | 27 | 172 | 6384 | -5.47 | 4.5E-08 | 14 | 100 | Fail | Background |
| BPH815R14 | 199 | 202 | 124 | 277 | 27 | 2001 | 9780 | -7.98 | 1.5E-15 | 53 | 100 | Fail | Background |
| BPH815R16 | 180 | 182 | 122 | 240 | 26 | 1008 | 8722 | -8.07 | 6.9E-16 | 39 | 100 | Fail | Background |
| BPH815R18 | 188 | 181 | 127 | 294 | 49 | 513 | 7114 | -5.93 | 3.1E-09 | 23 | 100 | Fail | Background |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BPH815R19 | 193 | 187 | 120 | 277 | 51 | 323 | 6348 | -4.55 | 5.4E-06 | 15 | 100 | Fail | Background |
| BPH815R20 | 175 | 155 | 116 | 262 | 52 | 311 | 6592 | -5.35 | 8.7E-08 | 17 | 100 | Fail | Background |
| BPH816R1 | 194 | 191 | 119 | 291 | 51 | 822 | 7564 | -6.00 | 2.0E-09 | 29 | 100 | Fail | Background |
| BPH816R2 | 190 | 187 | 109 | 566 | 65 | 2404 | 10317 | -8.26 | 1.5E-16 | 59 | 100 | Fail | Background |
| BPH816R3 | 183 | 188 | 97 | 321 | 45 | 10132 | 17130 | -10.66 | 1.6E-26 | 133 | 100 | Fail | Background |
| BPH816R4 | 222 | 209 | 104 | 610 | 99 | 3976 | 11076 | -7.30 | 2.8E-13 | 73 | 100 | Fail | Background |
| BPH816R5 | 235 | 236 | 182 | 304 | 38 | 976 | 7025 | -4.07 | 4.7E-05 | 26 | 100 | Fail | Background |
| BPH816R7 | 215 | 213 | 153 | 276 | 33 | 474 | 6548 | -4.47 | 7.7E-06 | 18 | 100 | Fail | Background |
| BPH816R11 | 190 | 207 | 2 | 260 | 56 | 612 | 7139 | -5.62 | 1.9E-08 | 24 | 100 | Fail | Background |
| BPH816R12 | 185 | 188 | 151 | 226 | 30 | 166 | 6162 | -4.82 | 1.5E-06 | 12 | 100 | Fail | Background |
| BPH816R13 | 155 | 154 | 104 | 198 | 22 | 265 | 7117 | -6.96 | 3.5E-12 | 21 | 100 | Fail | Background |
| BPH816R16 | 203 | 190 | 102 | 308 | 64 | 738 | 7138 | -5.17 | 2.4E-07 | 25 | 100 | Fail | Background |
| BPH816R21 | 179 | 146 | 118 | 270 | 55 | 584 | 7292 | -6.12 | 9.4E-10 | 25 | 100 | Fail | Background |
| BPH817R1 | 160 | 161 | 129 | 216 | 28 | 71 | 5925 | -4.67 | 3.0E-06 | 9 | 100 | Fail | Background |
| BPH817R2 | 181 | 179 | 155 | 212 | 19 | 107 | 5998 | -4.66 | 3.2E-06 | 10 | 100 | Fail | Background |
| BPH823R1 | 251 | 239 | 213 | 295 | 31 | 359 | 5747 | -2.04 | 0.041 | 10 | 100 | Fail | Background |
| BPH824R1 | 194 | 131 | 121 | 738 | 191 | 152 | 5954 | -4.20 | 2.7E-05 | 10 | 100 | Fail | Background |
| BPH825R1 | 145 | 145 | 128 | 173 | 13 | 198 | 6942 | -6.83 | 8.3E-12 | 19 | 100 | Fail | Background |
| BPH827R1 | 132 | 131 | 103 | 198 | 28 | 134 | 6536 | -6.11 | 9.8E-10 | 15 | 100 | Fail | Background |
| **GAMMA FIDLER** | | | | | | | | | | | | | |
| GF800R1 | 3726 | 3645 | 2853 | 4781 | 589 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF800R2 | 4910 | 4537 | 3201 | 7915 | 1248 | 469 | 10409 | -7.65 | 2.0E-14 | 27 | 120 | Fail | Background |
| GF800R3 | 3754 | 3694 | 2851 | 4537 | 522 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF802R1 | 6942 | 6622 | 4778 | 9215 | 1036 | 606 | 9690 | -5.77 | 8.0E-09 | 23 | 120 | Fail | Background |
| GF802R2 | 7658 | 7360 | 5901 | 10431 | 1246 | 461 | 8856 | -4.29 | 1.8E-05 | 16 | 120 | Fail | Background |
| GF802R3 | 6542 | 6400 | 5273 | 8662 | 956 | 288 | 8892 | -5.13 | 3.0E-07 | 15 | 120 | Fail | Background |
| GF802R4 | 6018 | 6046 | 4718 | 7394 | 685 | 285 | 9168 | -5.80 | 6.7E-09 | 17 | 120 | Fail | Background |
| GF802R5A | 6616 | 6334 | 5449 | 8696 | 867 | 302 | 8878 | -5.03 | 5.0E-07 | 15 | 120 | Fail | Background |
| GF802R5B | 6160 | 5941 | 4969 | 8305 | 821 | 541 | 10044 | -6.72 | 1.8E-11 | 25 | 120 | Fail | Background |
| GF802R5D | 8651 | 9165 | 5823 | 10232 | 1340 | 635 | 8681 | -3.11 | 0.0018 | 16 | 120 | Fail | Background |
| GF802R6 | 5380 | 5430 | 3153 | 6368 | 673 | 188 | 9128 | -6.13 | 8.6E-10 | 16 | 120 | Fail | Background |
| GF802R7 | 6381 | 6557 | 5205 | 7028 | 470 | 260 | 8920 | -5.32 | 1.0E-07 | 15 | 120 | Fail | Background |
| GF802R8 | 6922 | 6902 | 5337 | 8444 | 807 | 314 | 8866 | -4.94 | 7.7E-07 | 15 | 120 | Fail | Background |
| GF802R9 | 5827 | 5795 | 5626 | 6182 | 160 | 224 | 8956 | -5.57 | 2.5E-08 | 15 | 120 | Fail | Background |
| GF802R10 | 6185 | 6113 | 4894 | 7296 | 647 | 253 | 8927 | -5.37 | 7.9E-08 | 15 | 120 | Fail | Background |
| GF802R11 | 6011 | 5793 | 5192 | 8948 | 881 | 241 | 8939 | -5.45 | 4.9E-08 | 15 | 120 | Fail | Background |
| GF802R12 | 6698 | 6422 | 5152 | 9013 | 1307 | 342 | 8974 | -5.09 | 3.5E-07 | 16 | 120 | Fail | Background |
| GF802R13 | 6663 | 6555 | 5368 | 9199 | 1015 | 301 | 8879 | -5.03 | 4.8E-07 | 15 | 120 | Fail | Background |
| GF802R14 | 5644 | 5703 | 5131 | 6163 | 321 | 194 | 8986 | -5.78 | 7.3E-09 | 15 | 120 | Fail | Background |
| GF802R15 | 5773 | 5669 | 4939 | 7600 | 611 | 232 | 9084 | -5.84 | 5.4E-09 | 16 | 120 | Fail | Background |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GF802R16B | 6784 | 6577 | 5562 | 8721 | 1014 | 319 | 8861 | -4.91 | 9.2E-07 | 15 | 120 | Fail | Background |
| GF802R16C | 4861 | 4905 | 4327 | 5147 | 255 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF802R16D | 5191 | 5256 | 4259 | 5661 | 387 | 266 | 9745 | -7.09 | 1.3E-12 | 21 | 120 | Fail | Background |
| GF802R17 | 6224 | 6272 | 5176 | 6760 | 331 | 286 | 9030 | -5.47 | 4.5E-08 | 16 | 120 | Fail | Background |
| GF802R18 | 4860 | 4884 | 4235 | 5491 | 434 | 145 | 9171 | -6.42 | 1.3E-10 | 16 | 120 | Fail | Background |
| GF802R19 | 6867 | 6635 | 5824 | 9007 | 800 | 353 | 8963 | -5.02 | 5.2E-07 | 16 | 120 | Fail | Background |
| GF802R20 | 9091 | 9097 | 6770 | 11468 | 1394 | 655 | 8525 | -2.56 | 1.1E-02 | 15 | 120 | Fail | Background |
| GF802R21 | 7604 | 7367 | 6515 | 9832 | 1064 | 409 | 8771 | -4.28 | 1.9E-05 | 15 | 120 | Fail | Background |
| GF802R22 | 6934 | 6714 | 6140 | 8894 | 807 | 335 | 8845 | -4.80 | 1.6E-06 | 15 | 120 | Fail | Background |
| GF806R2 | 7142 | 7025 | 5838 | 8327 | 611 | 371 | 8945 | -4.90 | 9.7E-07 | 16 | 120 | Fail | Background |
| GF806R3 | 6365 | 6369 | 4664 | 7820 | 656 | 467 | 9686 | -6.24 | 4.5E-10 | 22 | 120 | Fail | Background |
| GF806R5 | 5858 | 6149 | 3600 | 7617 | 997 | 931 | 11315 | -7.97 | 1.6E-15 | 36 | 120 | Fail | Background |
| GF806R6 | 6304 | 6557 | 4821 | 7537 | 774 | 299 | 9154 | -5.71 | 1.2E-08 | 17 | 120 | Fail | Background |
| GF806R7 | 6550 | 6644 | 4738 | 7501 | 645 | 416 | 9454 | -5.92 | 3.2E-09 | 20 | 120 | Fail | Background |
| GF806R8 | 6420 | 6368 | 5556 | 7475 | 458 | 330 | 9123 | -5.50 | 3.7E-08 | 17 | 120 | Fail | Background |
| GF806R9 | 6153 | 6345 | 3873 | 7544 | 835 | 876 | 11059 | -7.66 | 1.8E-14 | 34 | 120 | Fail | Background |
| GF806R10 | 4476 | 4327 | 3255 | 5649 | 803 | 132 | 9048 | -6.22 | 5.1E-10 | 15 | 120 | Fail | Background |
| GF807R1 | 4906 | 4939 | 4117 | 5490 | 420 | 127 | 9053 | -6.25 | 4.1E-10 | 15 | 120 | Fail | Background |
| GF807R2 | 4594 | 4835 | 2646 | 5805 | 960 | 133 | 9047 | -6.21 | 5.3E-10 | 15 | 120 | Fail | Background |
| GF807R3 | 4341 | 4429 | 3344 | 5168 | 630 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF807R4 | 4810 | 4869 | 4293 | 5280 | 268 | 122 | 9058 | -6.29 | 3.2E-10 | 15 | 120 | Fail | Background |
| GF807R5 | 4683 | 4585 | 3771 | 5382 | 488 | 126 | 9054 | -6.26 | 3.9E-10 | 15 | 120 | Fail | Background |
| GF807R6 | 4364 | 4486 | 3050 | 5340 | 591 | 467 | 10858 | -8.45 | 3.0E-17 | 30 | 120 | Fail | Background |
| GF807R7 | 4566 | 4509 | 3983 | 5083 | 370 | 171 | 9420 | -6.83 | 8.6E-12 | 18 | 120 | Fail | Background |
| GF807R8 | 3989 | 3901 | 2639 | 4745 | 645 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF807R9 | 4437 | 4399 | 3942 | 5024 | 253 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF809R1 | 7651 | 7586 | 6135 | 9936 | 984 | 422 | 8759 | -4.19 | 2.8E-05 | 15 | 120 | Fail | Background |
| GF810R3 | 11289 | 10455 | 7330 | 18069 | 3238 | 1072 | 8244 | -0.16 | 0.87 | 16 | 120 | Pass | -- |
| GF810R5 | 11296 | 10082 | 7314 | 17027 | 3112 | 1237 | 8354 | -0.09 | 0.93 | 18 | 120 | Pass | -- |
| GF810R6 | 10264 | 9397 | 7424 | 14716 | 2497 | 971 | 8482 | -1.32 | 0.19 | 17 | 120 | Pass | -- |
| GF810R7 | 11963 | 11270 | 9049 | 16903 | 2663 | 1208 | 8108 | 0.76 | 0.45 | 16 | 120 | Pass | -- |
| GF810R8 | 10951 | 9937 | 6750 | 16046 | 2874 | 2149 | 9176 | -0.55 | 0.59 | 30 | 120 | Pass | -- |
| **GF810R9** | **12922** | **12301** | **9698** | **16877** | **2527** | **2160** | **8280** | **2.25** | **0.024** | **24** | **120** | **Fail** | **Survey** |
| **GF810R10** | **15299** | **15474** | **11449** | **18841** | **2099** | **1861** | **7592** | **4.49** | **7.1E-06** | **17** | **120** | **Fail** | **Survey** |
| **GF810R11** | **15159** | **16070** | **10537** | **16902** | **2257** | **1644** | **7537** | **4.37** | **1.3E-05** | **15** | **120** | **Fail** | **Survey** |
| **GF810R12** | **14684** | **15360** | **11082** | **19177** | **2613** | **1647** | **7669** | **3.72** | **2.0E-04** | **16** | **120** | **Fail** | **Survey** |
| GF810R15 | 12296 | 11040 | 7318 | 16984 | 3074 | 1615 | 8256 | 1.22 | 0.22 | 20 | 120 | Pass | -- |
| GF810R17 | 10477 | 9895 | 7113 | 15478 | 2210 | 3425 | 10436 | -1.50 | 0.13 | 46 | 120 | Pass | -- |
| GF810R18 | 7956 | 7322 | 2237 | 14030 | 2707 | 1474 | 10461 | -5.06 | 4.3E-07 | 34 | 120 | Fail | Background |
| GF810R19 | 6195 | 6411 | 4471 | 9136 | 1161 | 254 | 8926 | -5.36 | 8.2E-08 | 15 | 120 | Fail | Background |
| GF810R20 | 9742 | 9490 | 8611 | 13837 | 1285 | 763 | 8417 | -1.80 | 0.072 | 15 | 120 | Pass | -- |

# Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GF810R21 | 8365 | 7563 | 5758 | 14938 | 2985 | 1354 | 9971 | -4.28 | 1.9E-05 | 30 | 120 | Fail | Background |
| GF810R22 | 6042 | 6188 | 3983 | 7371 | 828 | 942 | 11304 | -7.92 | 2.3E-15 | 36 | 120 | Fail | Background |
| GF810R23 | 6601 | 6836 | 4734 | 7812 | 973 | 804 | 10521 | -6.86 | 6.7E-12 | 30 | 120 | Fail | Background |
| GF810R24 | 10910 | 9810 | 8739 | 15070 | 2030 | 1030 | 8286 | -0.45 | 0.66 | 16 | 120 | Pass | -- |
| GF810R25 | 10548 | 9798 | 6635 | 14307 | 2471 | 1038 | 8415 | -0.88 | 0.38 | 17 | 120 | Pass | -- |
| GF812R1 | 4650 | 4819 | 3379 | 5756 | 848 | 194 | 9397 | -6.68 | 2.4E-11 | 18 | 120 | Fail | Background |
| GF812R2 | 7228 | 7082 | 4992 | 13977 | 2055 | 370 | 8810 | -4.55 | 5.3E-06 | 15 | 120 | Fail | Background |
| GF812R3 | 7831 | 8124 | 6202 | 8451 | 644 | 441 | 8739 | -4.05 | 5.0E-05 | 15 | 120 | Fail | Background |
| GF812R4 | 8080 | 8346 | 6012 | 8683 | 837 | 493 | 8687 | -3.69 | 2.2E-04 | 15 | 120 | Fail | Background |
| GF812R5 | 6956 | 7418 | 5077 | 8440 | 998 | 338 | 8842 | -4.77 | 1.8E-06 | 15 | 120 | Fail | Background |
| GF812R6 | 7781 | 8102 | 5409 | 8577 | 961 | 444 | 8736 | -4.03 | 5.5E-05 | 15 | 120 | Fail | Background |
| GF812R7 | 9508 | 8955 | 6200 | 14487 | 2164 | 729 | 8451 | -2.04 | 0.042 | 15 | 120 | Fail | Background |
| GF812R8 | 10285 | 9162 | 7125 | 14960 | 2242 | 859 | 8321 | -1.13 | 0.26 | 15 | 120 | Pass | -- |
| **GF812R9** | **15738** | **15943** | **10866** | **18360** | **2100** | **1797** | **7519** | **4.73** | **2.2E-06** | **16** | **120** | **Fail** | **Survey** |
| GF812R10 | 8132 | 8425 | 4831 | 9331 | 1178 | 506 | 8674 | -3.60 | 3.2E-04 | 15 | 120 | Fail | Background |
| GF812R11 | 5888 | 5946 | 4731 | 6469 | 452 | 229 | 8951 | -5.54 | 3.1E-08 | 15 | 120 | Fail | Background |
| GF812R13 | 9328 | 9188 | 6352 | 12395 | 1606 | 922 | 8808 | -2.50 | 0.012 | 19 | 120 | Fail | Background |
| GF812R14 | 10104 | 9852 | 7189 | 13020 | 1760 | 1292 | 8862 | -1.59 | 0.11 | 22 | 120 | Pass | -- |
| GF812R15 | 8111 | 8409 | 4457 | 12183 | 2486 | 551 | 8629 | -3.28 | 1.0E-03 | 15 | 120 | Fail | Background |
| GF812R16 | 10257 | 10353 | 7199 | 11762 | 1313 | 849 | 8331 | -1.20 | 0.23 | 15 | 120 | Pass | -- |
| GF812R17 | 12521 | 11735 | 8240 | 17570 | 2815 | 1291 | 8026 | 1.31 | 0.19 | 16 | 120 | Pass | -- |
| GF812R18 | 10873 | 10832 | 6964 | 13344 | 1729 | 1478 | 8675 | -0.54 | 0.59 | 22 | 120 | Pass | -- |
| GF812R19 | 9940 | 9858 | 7020 | 14296 | 2330 | 1968 | 9661 | -2.17 | 0.030 | 32 | 120 | Fail | Background |
| **GF812R20** | **14464** | **13875** | **9529** | **20286** | **3135** | **3731** | **8359** | **4.28** | **1.8E-05** | **35** | **120** | **Fail** | **Survey** |
| GF812R21 | 8262 | 7813 | 5446 | 11802 | 1774 | 522 | 8658 | -3.49 | 4.9E-04 | 15 | 120 | Fail | Background |
| GF812R23 | 10232 | 9778 | 7006 | 14324 | 2410 | 1104 | 8626 | -1.39 | 0.17 | 19 | 120 | Pass | -- |
| GF812R24 | 7095 | 7145 | 6426 | 7925 | 431 | 332 | 8848 | -4.82 | 1.5E-06 | 15 | 120 | Fail | Background |
| GF812R25 | 8040 | 7823 | 6799 | 10348 | 928 | 514 | 8802 | -3.93 | 8.5E-05 | 16 | 120 | Fail | Background |
| GF812R26 | 7147 | 7534 | 4275 | 9245 | 1274 | 615 | 9538 | -5.40 | 6.6E-08 | 22 | 120 | Fail | Background |
| GF812R27 | 7883 | 7711 | 6927 | 9989 | 824 | 448 | 8733 | -4.01 | 6.1E-05 | 15 | 120 | Fail | Background |
| GF812R28 | 7296 | 7481 | 4402 | 9491 | 1077 | 372 | 8808 | -4.54 | 5.7E-06 | 15 | 120 | Fail | Background |
| GF812R29 | 9054 | 9076 | 5853 | 12380 | 1313 | 711 | 8605 | -2.60 | 9.3E-03 | 16 | 120 | Fail | Background |
| GF812R30 | 6300 | 5989 | 4939 | 10702 | 1412 | 303 | 9150 | -5.68 | 1.3E-08 | 17 | 120 | Fail | Background |
| GF812R31 | 4894 | 5186 | 2747 | 5718 | 875 | 282 | 9871 | -7.28 | 3.4E-13 | 22 | 120 | Fail | Background |
| GF812R33 | 9969 | 9083 | 6707 | 13908 | 2241 | 811 | 8369 | -1.46 | 0.14 | 15 | 120 | Pass | -- |
| GF813R1 | 10990 | 10372 | 8366 | 15194 | 2098 | 958 | 8222 | -0.43 | 0.66 | 15 | 120 | Pass | -- |
| GF813R2 | 9507 | 9200 | 7447 | 14173 | 1676 | 719 | 8461 | -2.11 | 0.035 | 15 | 120 | Fail | Background |
| GF813R3 | 11762 | 11478 | 5686 | 17005 | 3106 | 1107 | 8074 | 0.61 | 0.54 | 15 | 120 | Pass | -- |
| GF813R4 | 6642 | 6434 | 4297 | 9582 | 1363 | 315 | 8865 | -4.94 | 8.0E-07 | 15 | 120 | Fail | Background |
| GF813R5 | 6995 | 6731 | 3841 | 13173 | 1956 | 1554 | 11487 | -6.86 | 7.1E-12 | 41 | 120 | Fail | Background |
| GF813R7 | 7537 | 7447 | 4647 | 10406 | 1967 | 440 | 8740 | -4.06 | 4.9E-05 | 15 | 120 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GF813R8 | 7393 | 7183 | 4929 | 12550 | 1691 | 397 | 8783 | -4.36 | 1.3E-05 | 15 | 120 | Fail | Background |
| GF813R11 | 7883 | 7956 | 6804 | 8671 | 555 | 450 | 8730 | -3.99 | 6.6E-05 | 15 | 120 | Fail | Background |
| GF814R1 | 6120 | 6036 | 4844 | 7149 | 869 | 228 | 8952 | -5.55 | 2.9E-08 | 15 | 120 | Fail | Background |
| GF814R2 | 6355 | 5940 | 4491 | 7481 | 913 | 269 | 8911 | -5.26 | 1.5E-07 | 15 | 120 | Fail | Background |
| GF814R3 | 6681 | 6837 | 4796 | 7868 | 986 | 294 | 8886 | -5.08 | 3.7E-07 | 15 | 120 | Fail | Background |
| GF814R4 | 7140 | 7354 | 5413 | 8281 | 882 | 350 | 8830 | -4.69 | 2.7E-06 | 15 | 120 | Fail | Background |
| GF814R5 | 5853 | 5958 | 4204 | 8168 | 813 | 1043 | 11677 | -8.31 | 9.2E-17 | 39 | 120 | Fail | Background |
| GF814R6 | 6293 | 6365 | 5713 | 6957 | 394 | 259 | 8921 | -5.33 | 9.9E-08 | 15 | 120 | Fail | Background |
| GF815R1 | 7688 | 6874 | 5498 | 13063 | 2273 | 578 | 9013 | -4.25 | 2.1E-05 | 18 | 120 | Fail | Background |
| GF815R2 | 6668 | 6514 | 5934 | 9030 | 825 | 201 | 8445 | -4.36 | 1.3E-05 | 11 | 120 | Fail | Background |
| GF815R3 | 7625 | 7306 | 5996 | 12599 | 1408 | 1124 | 10352 | -5.68 | 1.4E-08 | 31 | 120 | Fail | Background |
| GF815R4 | 9277 | 7758 | 6945 | 14601 | 2769 | 482 | 8164 | -2.02 | 0.043 | 11 | 120 | Fail | Background |
| GF815R5 | 7610 | 7522 | 5715 | 11165 | 1365 | 493 | 8960 | -4.44 | 9.0E-06 | 17 | 120 | Fail | Background |
| GF815R6 | 7890 | 7530 | 6140 | 12577 | 1722 | 684 | 9186 | -4.32 | 1.5E-05 | 20 | 120 | Fail | Background |
| GF815R7 | 5997 | 6251 | 4417 | 7396 | 963 | 283 | 9170 | -5.81 | 6.2E-09 | 17 | 120 | Fail | Background |
| GF815R8 | 5700 | 5684 | 4153 | 7158 | 893 | 405 | 9891 | -6.87 | 6.3E-12 | 23 | 120 | Fail | Background |
| GF815R9 | 9101 | 8571 | 6167 | 13594 | 1858 | 709 | 8608 | -2.62 | 8.9E-03 | 16 | 120 | Fail | Background |
| GF815R10 | 5798 | 5983 | 4139 | 7347 | 1002 | 289 | 9302 | -6.08 | 1.2E-09 | 18 | 120 | Fail | Background |
| GF815R11 | 5785 | 5935 | 4180 | 8753 | 839 | 3946 | 16557 | -10.73 | 7.6E-27 | 82 | 120 | Fail | Background |
| GF815R12 | 6518 | 6248 | 5027 | 11335 | 1227 | 1747 | 12450 | -8.11 | 5.1E-16 | 48 | 120 | Fail | Background |
| GF815R13 | 6261 | 6321 | 4802 | 7675 | 734 | 371 | 9359 | -5.88 | 4.1E-09 | 19 | 120 | Fail | Background |
| GF815R14 | 8013 | 8114 | 5950 | 8541 | 366 | 4874 | 14827 | -7.33 | 2.3E-13 | 78 | 120 | Fail | Background |
| GF815R16 | 6250 | 6172 | 4371 | 9660 | 986 | 1815 | 12891 | -8.68 | 4.0E-18 | 51 | 120 | Fail | Background |
| GF815R18 | 5360 | 5506 | 3567 | 6585 | 880 | 373 | 9923 | -7.05 | 1.8E-12 | 23 | 120 | Fail | Background |
| GF815R19 | 5978 | 6171 | 4151 | 7001 | 936 | 233 | 8947 | -5.51 | 3.6E-08 | 15 | 120 | Fail | Background |
| GF815R20 | 5146 | 5276 | 3650 | 6846 | 1179 | 223 | 9230 | -6.20 | 5.6E-10 | 17 | 120 | Fail | Background |
| GF816R1 | 6422 | 6780 | 3430 | 7769 | 1024 | 719 | 10456 | -6.98 | 2.9E-12 | 29 | 120 | Fail | Background |
| GF816R2 | 6495 | 6360 | 2872 | 10733 | 1398 | 4007 | 15695 | -9.53 | 1.6E-21 | 78 | 120 | Fail | Background |
| GF816R3 | 5755 | 5442 | 3160 | 11789 | 1265 | 18358 | 28308 | -13.22 | 0.0 | 185 | 120 | Fail | Background |
| GF816R4 | 6883 | 7219 | 3557 | 11932 | 1697 | 6345 | 17527 | -9.47 | 2.9E-21 | 98 | 120 | Fail | Background |
| GF816R5 | 7976 | 7606 | 5214 | 11953 | 1646 | 979 | 9753 | -4.77 | 1.8E-06 | 26 | 120 | Fail | Background |
| GF816R7 | 8185 | 8098 | 7162 | 11316 | 1019 | 853 | 9443 | -4.41 | 1.0E-05 | 23 | 120 | Fail | Background |
| GF816R11 | 6677 | 6224 | 4398 | 10107 | 1235 | 698 | 10034 | -6.21 | 5.4E-10 | 26 | 120 | Fail | Background |
| GF816R12 | 5216 | 5287 | 4289 | 5995 | 683 | 119 | 8659 | -5.37 | 7.7E-08 | 12 | 120 | Fail | Background |
| GF816R13 | 6237 | 6235 | 4326 | 7945 | 823 | 1535 | 12326 | -8.32 | 8.8E-17 | 46 | 120 | Fail | Background |
| GF816R16 | 5669 | 5820 | 3147 | 6955 | 1103 | 477 | 10108 | -7.06 | 1.7E-12 | 25 | 120 | Fail | Background |
| GF816R21 | 5059 | 5321 | 2958 | 6516 | 1027 | 409 | 10177 | -7.41 | 1.2E-13 | 25 | 120 | Fail | Background |
| GF817R1 | 4151 | 4336 | 2913 | 4929 | 724 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |
| GF817R2 | 4730 | 4960 | 3247 | 5692 | 861 | 140 | 9040 | -6.16 | 7.2E-10 | 15 | 120 | Fail | Background |
| GF823R1 | 10204 | 9738 | 7592 | 12168 | 1410 | 845 | 8335 | -1.23 | 0.22 | 15 | 120 | Pass | -- |
| GF824R1 | 3839 | 3752 | 3071 | 4663 | 572 | 171 | 9420 | -6.83 | 8.6E-12 | 18 | 120 | Fail | Background |

## Table 4-15
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | St Dev (cpm) | Survey Rank Sum | Background Rank Sum | Z | p-level | Survey Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GF825R1 | 4906 | 4913 | 3919 | 6142 | 516 | 495 | 10830 | -8.32 | 9.1E-17 | 30 | 120 | Fail | Background |
| GF827R1 | 4295 | 4302 | 3152 | 5261 | 636 | 120 | 9060 | -6.30 | 3.0E-10 | 15 | 120 | Fail | Background |

[a] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b] cpm = counts per minute.

[c] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix XXXX for the Phase II box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

[d] NA = not applicable.

[e] The alpha floor monitor measurement for survey area 815R2 was compared to the 95 % upper threshold limit (UTL) of the alpha floor monitor background. The measurement of one cpm is less than the background 95% UTL of 8 cpm, so it is concluded that the survey area is within background. .

[f] The alpha floor monitor measurement for survey area 815 R4 was compared to the 95 % upper threshold limit (UTL) of the alpha floor monitor background. The measurement of 9 cpm is greater than the background 95% UTL of 8 cpm. However, the alpha phoswich measurements from this survey area pass the WRS background test, so it is concluded that the entire survey area is within background.

[g] The beta floor monitor measurements for survey areas 815 R2 and 815 R4 was compared to the 95 % upper threshold limit (UTL) of the beta floor monitor background. The measurements of 453 and 545 cpm (for survey areas 815 R2 and 815 R4, respectively) are less than the background 95% UTL of 1435 cpm. As a result, it is concluded that these survey areas are within background.

## Table 4-16
## Locations of Potentially Elevated Surface Activity [a/]
## Phase II Building Surveys
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Original Grid | Hotspot Designation |
|---|---|---|---|
| **810** | **3** | **10** | **17** |
| **810** | **3** | **11** | **18** |
| 810 | 3 | 16 | 16 |
| 810 | 5 | 4 | 4 |
| **810** | **10** | **12** | **17** |
| 810 | 12 | 4 | 4 |
| **810** | **12** | **5** | **17** |
| **810** | **12** | **13** | **18** |
| 812 | 9 | 2 | 2 |
| 812 | 9 | 4 | 4 |
| 812 | 9 | 8 | 8 |
| 812 | 9 | 10 | 10 |
| 812 | 9 | 11 | 11 |
| 812 | 9 | 16 | 16 |
| 812 | 17 | 8 | 17 |
| 812 | 17 | 9 | 18 |
| **812** | **17** | **10** | **19** |
| **812** | **20** | **5** | **44** |
| **812** | **20** | **11** | **45** |
| **812** | **20** | **15** | **36** |
| **812** | **20** | **16** | **37** |
| **812** | **20** | **17** | **38** |
| **812** | **20** | **18** | **39** |
| **812** | **20** | **19** | **40** |
| **812** | **20** | **20** | **41** |
| **812** | **20** | **21** | **42** |
| **812** | **20** | **25** | **46** |
| **812** | **20** | **33** | **43** |
| 813 | 3 | 5 | 5 |

[a/] Bolded values indicate discretionary measurements that were not included with the survey data. For several survey grids, readings over the instrument flag value were taken, but a localized elevated measurement could not be discerned. As a result, the original grid measurement was noted as a elevated but left in the survey data set, and an additional discretionary measurement was not taken.

# Table 4-17
## Summary of WRS Test
## Phase II Direct Measurements (Including Discretionary Measurements) VS Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm) [b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | Std Dev (cpm) | Survey plus Discretionary Rank Sum | Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | Background Valid N | Pass/Fail Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA PHOSWICH** | | | | | | | | | | | | | |
| APH810R3HS | 0.9 | 1 | 0 | 3 | 1.1 | 369 | 6653 | -5.3 | 1.1E-07 | 18 | 100 | Fail | Background |
| APH810R10HS | 0.9 | 0 | 0 | 5 | 1.5 | 391 | 6631 | -5.1 | 2.7E-07 | 18 | 100 | Fail | Background |
| APH810R12HS | 1.1 | 1 | 0 | 4 | 1.3 | 421 | 6600 | -4.9 | 8.8E-07 | 18 | 100 | Fail | Background |
| APH812R17HS | 1.4 | 1 | 0 | 3 | 1.0 | 404 | 6499 | -4.7 | 2.8E-06 | 17 | 100 | Fail | Background |
| APH812R20HS | 7.2 | 4 | 0 | 20 | 6.5 | 3739 | 6992 | 1.5 | 0.13 | 46 | 100 | Pass | -- |
| **BETA PHOSWICH** | | | | | | | | | | | | | |
| BPH810R3HS | 266 | 241 | 155 | 615 | 117 | 718 | 6304 | -2.6 | 0.0081 | 18 | 100 | Fail | Background |
| BPH810R10HS | 294 | 259 | 204 | 679 | 107 | 875 | 6146 | -1.5 | 0.14 | 18 | 100 | Pass | -- |
| BPH810R12HS | 268 | 249 | 201 | 471 | 62 | 793 | 6229 | -2.1 | 0.037 | 18 | 100 | Fail | Background |
| BPH812R17HS | 236 | 214 | 147 | 412 | 71 | 535 | 6369 | -3.6 | 2.9E-04 | 17 | 100 | Fail | Background |
| **BPH812R20HS** | **445** | **448** | **193** | **655** | **145** | **4228** | **6503** | **3.6** | **3.6E-04** | **46** | **100** | **Fail** | **Survey** |
| **GAMMA FIDLER** | | | | | | | | | | | | | |
| GF810R3HS | 12079 | 10910 | 7330 | 18535 | 3812 | 1345 | 8246 | 0.6 | 0.55 | 18 | 120 | Pass | -- |
| **GF810R10HS** | **15377** | **15632** | **11449** | **18841** | **2062** | **1996** | **7595** | **4.7** | **2.5E-06** | **18** | **120** | **Fail** | **Survey** |
| **GF810R12HS** | **14988** | **15868** | **11082** | **19177** | **2619** | **1919** | **7672** | **4.2** | **2.4E-05** | **18** | **120** | **Fail** | **Survey** |
| GF812R17HS | 12807 | 12154 | 8240 | 17570 | 2969 | 1427 | 8027 | 1.7 | 0.10 | 17 | 120 | Pass | -- |
| **GF812R20HS** | **15616** | **14923** | **9529** | **21545** | **3603** | **5468** | **8393** | **5.9** | **4.4E-09** | **46** | **120** | **Fail** | **Survey** |

[a] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b] cpm = counts per minute.

[c] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix K for the Phase II box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

## Table 4-18
## Phase II Survey Areas Exceeding Background
## Based on WRS Test
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Location | | Measurement Type | Instrument | | Survey Date | Average Survey Efficiency [a/] | Detector Area ($cm^2$) [b/] |
|---|---|---|---|---|---|---|---|
| Building | Room | | | | | | |
| | | | | | | | |
| 807 | 6 | Alpha | Floor Monitor | 138256 | 6/9/2001 | 0.0315 | 425 |
| 810 | 8 | Alpha | Floor Monitor | 138256 | 7/13/2001 | 0.0437 | 425 |
| 810 | 21 | Alpha | Floor Monitor | 138256 | 7/13/2001 | 0.0437 | 425 |
| 815 | 11 | Alpha | Floor Monitor | 138256 | 6/13/01, 6/20/01 | 0.0347 | 425 |
| 815 | 13 | Alpha | Floor Monitor | 138256 | 6/12/2001 | 0.0363 | 425 |
| 809 | 1 | Beta | Floor Monitor | 138256 | 6/10/2001 | 0.144 | 425 |
| 810 | 8 | Beta | Floor Monitor | 138256 | 7/13/2001 | 0.139 | 425 |
| 810 | 5 | Alpha | Phoswich | 119803 | 7/12/2001 | 0.113 | 86 |
| 812 | 20 | Beta | Phoswich | 119803 | 7/17/2001 | 0.116 | 86 |
| | | | | 119815 | 7/17/01, 7/18/01 | 0.1465 | 86 |
| 810 | 9 | Gamma | Fidler | A951P | 7/12/01, 7/23/01 | 0.0042 | 126 |
| 810 | 10 | Gamma | Fidler | A983P | 7/13/2001 | 0.00447 | 126 |
| | | | | A951P | 7/23/2001 | 0.00423 | 126 |
| 810 | 11 | Gamma | Fidler | A983P | 7/12/2001 | 0.00457 | 126 |
| 810 | 12 | Gamma | Fidler | A983P | 7/13/2001 | 0.00447 | 126 |
| 812 | 9 | Gamma | Fidler | A983P | 7/28/01, 7/29/01 | 0.0046 | 126 |
| 812 | 20 | Gamma | Fidler | A951P | 7/17/01, 7/18/01 | 0.00424 | 126 |

[a/] The average daily efficiency was obtained by averaging the efficiencies obtained from the three daily source checks for the day(s) on which the survey was performed.

[b/] $cm^2$ = square centimeters.

## Table 4-19
## Summary of WRS Test
## Phase II Direct Measurements (Excluding Discretionary Measurements) VS $DCGL_W$-Adjusted Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a] | Mean (cpm)[b] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | Standard Deviation (cpm) | Survey Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ALPHA FLOOR MONITOR** | | | | | | | | | | | | | |
| AFM807R6 | 7.3 | 7.5 | 3 | 13 | 3.8 | 78 | 198 | -1.17 | 0.24 | 8 | 15 | Pass | -- |
| AFM810R8 | 6.8 | 6 | 2 | 15 | 3.5 | 278 | 388 | -3.55 | 3.8E-04 | 21 | 15 | Fail | Background |
| AFM810R21 | 8.4 | 8 | 2 | 21 | 4.8 | 581 | 454 | -2.63 | 0.0085 | 30 | 15 | Fail | Background |
| AFM815R11 | 6.7 | 6 | 1 | 13 | 3.4 | 341 | 362 | -2.39 | 0.017 | 22 | 15 | Fail | Background |
| AFM815R13 | 7.6 | 7 | 4 | 11 | 2.6 | 32 | 178 | -1.80 | 0.072 | 5 | 15 | Pass | -- |
| **BETA FLOOR MONITOR** | | | | | | | | | | | | | |
| BFM809R1 | 901 | 899 | 853 | 955 | 36 | 21 | 210 | -3.50 | 4.6E-04 | 6 | 15 | Fail | Background |
| BFM810R8 | 841 | 826 | 640 | 1100 | 121 | 231 | 435 | -5.05 | 4.3E-07 | 21 | 15 | Fail | Background |
| **ALPHA PHOSWICH** | | | | | | | | | | | | | |
| APH810R5 | 7.9 | 8 | 6 | 11 | 1.4 | 1301 | 5720 | 1.73 | 0.083 | 18 | 100 | Pass | -- |
| **BETA PHOSWICH** | | | | | | | | | | | | | |
| BPH812R20/119803 [d] | 222 | 227 | 193 | 243 | 21 | 10 | 5450 | -3.38 | 7.2E-04 | 4 | 100 | Fail | Background |
| BPH812R20/119815 [d] | 421 | 424 | 227 | 631 | 124 | 584 | 8063 | -7.92 | 2.4E-15 | 31 | 100 | Fail | Background |
| **GAMMA FIDLER** | | | | | | | | | | | | | |
| **GF810R9** | **12922.38** | **12300.5** | **9698** | **16877** | **2527** | **2160** | **8280** | **2.25** | **0.024** | **24** | **120** | **Fail** | **Survey** |
| **GF810R10/A983P** [d] | **15244.06** | **15109** | **11449** | **18841** | **2155** | **1731** | **7585** | **4.29** | **1.8E-05** | **16** | **120** | **Fail** | **Survey** |
| GF810R10/A951P [d] | 16186 | 16186 | 16186 | 16186 | NA [c] | NA | NA | NA | NA | 1 | 120 | Pass [d] | -- |
| **GF810R11** | **15159.13** | **16070** | **10537** | **16902** | **2257** | **1643** | **7537** | **4.36** | **1.3E-05** | **15** | **120** | **Fail** | **Survey** |
| **GF810R12** | **14684** | **15360** | **11082** | **19177** | **2613** | **1647** | **7669** | **3.72** | **2.0E-04** | **16** | **120** | **Fail** | **Survey** |
| **GF812R9** | **15738.38** | **15942.5** | **10866** | **18360** | **2100** | **1797** | **7519** | **4.73** | **2.2E-06** | **16** | **120** | **Fail** | **Survey** |
| **GF812R20** | **14463.71** | **13875** | **9529** | **20286** | **3135** | **3731** | **8359** | **4.28** | **1.8E-05** | **35** | **120** | **Fail** | **Survey** |

[a] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b] cpm = counts per minute.

[c] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix XXXX for the Phase II box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

[d] More than one instrument was used to collect data for this above-background room. The WRS test was performed for the data collected by each individual instrument used for an above-background room.

## Table 4-20
## Summary of WRS Test
## Phase II Direct Measurements (Including Discretionary Measurements) VS $DCGL_W$-Adjusted Background
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Measurement/ Instrument/ Survey Area [a/] | Mean (cpm) [b/] | Median (cpm) | Minimum (cpm) | Maximum (cpm) | Standard Deviation (cpm) | Survey plus Discretionary Rank Sum | $DCGL_W$-Adjusted Background Rank Sum | Z | p-level | Survey plus Discretionary Valid N | $DCGL_W$-Adjusted Background Valid N | Pass/Fail $DCGL_W$-Adjusted Background? Alpha = 0.05 [c/] | Higher if Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BETA PHOSWICH** | | | | | | | | | | | | | |
| BPH812R20/119803 [d/] | 222 | 226.5 | 193 | 243 | 21 | 10 | 5450 | -3.38 | 7.2E-04 | 4 | 100 | Fail | Background |
| BPH812R20/119815 [d/] | 466 | 448.5 | 227 | 655 | 133 | 1169 | 8984 | -8.20 | 2.5E-16 | 42 | 100 | Fail | Background |
| **GAMMA FIDLER** | | | | | | | | | | | | | |
| GF810R10/A951P [d/] | 16437 | 16436.5 | 16186 | 16687 | 354 | 233 | 7270 | 2.22 | 0.027 | 2 | 120 | Fail | Survey |
| GF810R10/A983P [d/] | 15244 | 15109 | 11449 | 18841 | 2155 | 1731 | 7585 | 4.29 | 1.8E-05 | 16 | 120 | Fail | Survey |
| GF810R12HS | 14988 | 15867.5 | 11082 | 19177 | 2619 | 1919 | 7672 | 4.22 | 2.4E-05 | 18 | 120 | Fail | Survey |
| GF812R20HS | 15616 | 14922.5 | 9529 | 21545 | 3603 | 5468 | 8393 | 5.87 | 4.4E-09 | 46 | 120 | Fail | Survey |

[a/] Measurement - A = Alpha; B = Beta; G = Gamma
Instrument - PH = phoswich; HH = hand-held; FM = floor monitor; F = FIDLER
Survey Area - Building, Room Number

[b/] cpm = counts per minute.

[c/] If the p-level is less than the alpha (type I) error of 0.05, the survey and background data sets are not considered to be part of the same population and the WRS test is said to fail. Box-and-whisker plots are generated (refer to Appendix XXXX for the Phase II box-and-whisker plots) and compared in order to determine if the survey data is elevated above the background data.

[d/] More than one instrument was used to collect data for this above-background room. The WRS test was performed for the data collected by each individual instrument used for an above-background room.

**Table 4-21**
**Summary Statistics of Phase II Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| **ALPHA/BETA FLOOR MONITOR** | | | | | | | | |
| 810 | 8 | AB [c] | 1 | 400 | 600 | 500 | 2807 | No |
| 810 | 21 | AB | 3 | 400 | 800 | 567 | 2807 | No |
| 815 | 1 | AB | 12 | 80 | 800 | 259 | 2807 | No |
| 815 | 3 | AB | 8 | 200 | 600 | 419 | 2807 | No |
| 815 | 4 | AB | 8 | 100 | 600 | 250 | 2807 | No |
| 815 | 5 | AB | 2 | 350 | 700 | 475 | 2807 | No |
| 815 | 6 | AB | 5 | 400 | 800 | 540 | 2807 | No |
| 815 | 7 | AB | 3 | 300 | 500 | 417 | 2807 | No |
| 815 | 8 | AB | 4 | 300 | 600 | 438 | 2807 | No |
| 815 | 9 | AB | 3 | 300 | 800 | 533 | 2807 | No |
| 815 | 10 | AB | 4 | 200 | 600 | 413 | 2807 | No |
| 815 | 11 | AB | 22 | 300 | 800 | 545 | 2807 | No |
| 815 | 12 | AB | 11 | 400 | 800 | 545 | 2807 | No |
| 815 | 13 | AB | 5 | 300 | 600 | 410 | 2807 | No |
| 815 | 14 | AB | 25 | 400 | 800 | 578 | 2807 | No |
| 815 | 16 | AB | 12 | 400 | 800 | 546 | 2807 | No |
| 816 | 3 | AB | 52 | 400 | 800 | 563 | 2807 | No |
| 816 | 4 | AB | 26 | 400 | 800 | 561 | 2807 | No |
| 816 | 7 | AB | 5 | 400 | 600 | 490 | 2807 | No |
| 816 | 11 | AB | 2 | 400 | 600 | 500 | 2807 | No |
| 816 | 13 | AB | 25 | 300 | 800 | 500 | 2807 | No |
| **ALPHA/BETA PHOSWICH** | | | | | | | | |
| 800 | 1 | AB | 5 | 60 | 200 | 130 | 854 | No |
| 800 | 2 | AB | 3 | 60 | 250 | 138 | 854 | No |
| 800 | 3 | AB | 5 | 60 | 200 | 124 | 854 | No |
| 802 | 1 | AB | 10 | 80 | 420 | 204 | 854 | No |
| 802 | 2 | AB | 4 | 100 | 480 | 254 | 854 | No |
| 802 | 3 | AB | 2 | 120 | 350 | 228 | 854 | No |
| 802 | 4 | AB | 2 | 100 | 240 | 155 | 854 | No |
| 802 | 5A | AB | 2 | 140 | 280 | 215 | 854 | No |
| 802 | 5B | AB | 8 | 120 | 300 | 205 | 854 | No |
| 802 | 5D | AB | 2 | 180 | 300 | 228 | 854 | No |
| 802 | 6 | AB | 1 | 120 | 300 | 210 | 854 | No |
| 802 | 7 | AB | 1 | 160 | 220 | 190 | 854 | No |
| 802 | 8 | AB | 2 | 100 | 260 | 160 | 854 | No |
| 802 | 9 | AB | 2 | 100 | 320 | 215 | 854 | No |
| 802 | 10 | AB | 2 | 150 | 300 | 213 | 854 | No |
| 802 | 11 | AB | 3 | 100 | 300 | 203 | 854 | No |
| 802 | 12 | AB | 1 | 100 | 220 | 160 | 854 | No |
| 802 | 13 | AB | 3 | 120 | 250 | 192 | 854 | No |
| 802 | 14 | AB | 5 | 120 | 400 | 198 | 854 | No |
| 802 | 15 | AB | 3 | 100 | 220 | 157 | 854 | No |
| 802 | 16B | AB | 3 | 100 | 300 | 213 | 854 | No |
| 802 | 16D | AB | 6 | 100 | 280 | 173 | 854 | No |
| 802 | 17 | AB | 1 | 100 | 280 | 190 | 854 | No |
| 802 | 18 | AB | 3 | 120 | 300 | 195 | 854 | No |
| 802 | 19 | AB | 2 | 100 | 450 | 235 | 854 | No |
| 802 | 20 | AB | 2 | 140 | 500 | 275 | 854 | No |
| 802 | 21 | AB | 3 | 120 | 240 | 183 | 854 | No |
| 802 | 22 | AB | 2 | 100 | 400 | 245 | 854 | No |
| 806 | 2 | AB | 1 | 80 | 220 | 150 | 854 | No |
| 806 | 3 | AB | 7 | 80 | 220 | 143 | 854 | No |
| 806 | 5 | AB | 6 | 80 | 280 | 138 | 854 | No |
| 806 | 6 | AB | 2 | 100 | 180 | 140 | 854 | No |
| 806 | 7 | AB | 3 | 100 | 180 | 140 | 854 | No |
| 806 | 8 | AB | 2 | 80 | 200 | 140 | 854 | No |
| 806 | 9 | AB | 4 | 80 | 220 | 143 | 854 | No |
| 806 | 10 | AB | 1 | 100 | 200 | 150 | 854 | No |
| 807 | 1 | AB | 1 | 120 | 220 | 170 | 854 | No |
| 807 | 2 | AB | 1 | 100 | 260 | 180 | 854 | No |

**Table 4-21**
**Summary Statistics of Phase II Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| 807 | 3 | AB | 3 | 100 | 300 | 197 | 854 | No |
| 807 | 4 | AB | 1 | 100 | 300 | 200 | 854 | No |
| 807 | 5 | AB | 4 | 120 | 300 | 203 | 854 | No |
| 807 | 6 | AB | 8 | 100 | 300 | 177 | 854 | No |
| 807 | 7 | AB | 3 | 100 | 240 | 183 | 854 | No |
| 807 | 8 | AB | 1 | 100 | 200 | 150 | 854 | No |
| 809 | 1 | AB | 4 | 100 | 300 | 198 | 854 | No |
| 810 | 3 | AB | 4 | 160 | 600 | 348 | 854 | No |
| 810 | 5 | AB | 4 | 120 | 420 | 220 | 854 | No |
| 810 | 6 | AB | 2 | 120 | 280 | 205 | 854 | No |
| 810 | 7 | AB | 1 | 120 | 260 | 190 | 854 | No |
| 810 | 8 | AB | 3 | 120 | 320 | 203 | 854 | No |
| 810 | 9 | AB | 4 | 100 | 380 | 270 | 854 | No |
| 810 | 10 | AB | 3 | 200 | 400 | 275 | 854 | No |
| 810 | 11 | AB | 2 | 200 | 380 | 270 | 854 | No |
| 810 | 12 | AB | 5 | 180 | 550 | 309 | 854 | No |
| 810 | 15 | AB | 5 | 120 | 380 | 252 | 854 | No |
| 810 | 17 | AB | 6 | 120 | 380 | 257 | 854 | No |
| 810 | 18 | AB | 3 | 100 | 260 | 183 | 854 | No |
| 810 | 20 | AB | 2 | 180 | 350 | 248 | 854 | No |
| 810 | 22 | AB | 8 | 120 | 400 | 244 | 854 | No |
| 810 | 23 | AB | 3 | 120 | 400 | 240 | 854 | No |
| 810 | 24 | AB | 3 | 180 | 400 | 267 | 854 | No |
| 810 | 25 | AB | 2 | 120 | 320 | 215 | 854 | No |
| 812 | 1 | AB | 2 | 60 | 200 | 130 | 854 | No |
| 812 | 3 | AB | 1 | 100 | 280 | 190 | 854 | No |
| 812 | 4 | AB | 2 | 120 | 250 | 173 | 854 | No |
| 812 | 5 | AB | 7 | 80 | 250 | 132 | 854 | No |
| 812 | 6 | AB | 2 | 100 | 180 | 140 | 854 | No |
| 812 | 7 | AB | 1 | 100 | 200 | 150 | 854 | No |
| 812 | 8 | AB | 3 | 80 | 220 | 157 | 854 | No |
| 812 | 9 | AB | 8 | 100 | 600 | 351 | 854 | No |
| 812 | 10 | AB | 2 | 80 | 240 | 153 | 854 | No |
| 812 | 11 | AB | 1 | 100 | 200 | 150 | 854 | No |
| 812 | 13 | AB | 4 | 100 | 220 | 166 | 854 | No |
| 812 | 14 | AB | 4 | 100 | 300 | 193 | 854 | No |
| 812 | 15 | AB | 4 | 100 | 260 | 163 | 854 | No |
| 812 | 16 | AB | 3 | 100 | 360 | 193 | 854 | No |
| 812 | 17 | AB | 5 | 100 | 600 | 268 | 854 | No |
| 812 | 18 | AB | 4 | 100 | 280 | 175 | 854 | No |
| 812 | 19 | AB | 17 | 80 | 400 | 189 | 854 | No |
| 812 | 20 | AB | 12 | 180 | 800 | 481 | 854 | No |
| 812 | 21 | AB | 2 | 100 | 180 | 145 | 854 | No |
| 812 | 23 | AB | 1 | 100 | 200 | 150 | 854 | No |
| 812 | 24 | AB | 3 | 60 | 200 | 143 | 854 | No |
| 812 | 25 | AB | 2 | 80 | 240 | 165 | 854 | No |
| 812 | 26 | AB | 4 | 60 | 220 | 143 | 854 | No |
| 812 | 27 | AB | 3 | 80 | 280 | 177 | 854 | No |
| 812 | 28 | AB | 3 | 80 | 220 | 133 | 854 | No |
| 812 | 29 | AB | 4 | 80 | 300 | 168 | 854 | No |
| 812 | 30 | AB | 3 | 100 | 240 | 160 | 854 | No |
| 812 | 31 | AB | 7 | 60 | 360 | 184 | 854 | No |
| 813 | 1 | AB | 2 | 120 | 280 | 220 | 854 | No |
| 813 | 2 | AB | 5 | 120 | 400 | 226 | 854 | No |
| 813 | 3 | AB | 3 | 100 | 500 | 308 | 854 | No |
| 813 | 4 | AB | 1 | 120 | 240 | 180 | 854 | No |
| 813 | 5 | AB | 11 | 80 | 340 | 199 | 854 | No |
| 813 | 7 | AB | 1 | 100 | 300 | 200 | 854 | No |
| 813 | 8 | AB | 1 | 200 | 400 | 300 | 854 | No |
| 813 | 11 | AB | 2 | 80 | 300 | 180 | 854 | No |
| 814 | 1 | AB | 1 | 120 | 320 | 220 | 854 | No |
| 814 | 2 | AB | 1 | 100 | 300 | 200 | 854 | No |
| 814 | 3 | AB | 1 | 150 | 300 | 225 | 854 | No |
| 814 | 4 | AB | 1 | 200 | 300 | 250 | 854 | No |

**Table 4-21**
**Summary Statistics of Phase II Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a/] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b/] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| 814 | 5 | AB | 8 | 80 | 420 | 210 | 854 | No |
| 814 | 6 | AB | 3 | 100 | 400 | 233 | 854 | No |
| 815 | 1 | AB | 10 | 60 | 800 | 286 | 854 | No |
| 815 | 2 | AB | 10 | 100 | 500 | 222 | 854 | No |
| 815 | 3 | AB | 23 | 80 | 340 | 192 | 854 | No |
| 815 | 4 | AB | 3 | 100 | 260 | 185 | 854 | No |
| 815 | 5 | AB | 15 | 60 | 420 | 237 | 854 | No |
| 815 | 6 | AB | 15 | 100 | 360 | 201 | 854 | No |
| 815 | 7 | AB | 14 | 80 | 340 | 208 | 854 | No |
| 815 | 8 | AB | 19 | 60 | 400 | 188 | 854 | No |
| 815 | 9 | AB | 13 | 100 | 420 | 246 | 854 | No |
| 815 | 10 | AB | 14 | 80 | 360 | 199 | 854 | No |
| 815 | 11 | AB | 60 | 60 | 600 | 191 | 854 | No |
| 815 | 12 | AB | 37 | 80 | 380 | 197 | 854 | No |
| 815 | 13 | AB | 14 | 60 | 320 | 188 | 854 | No |
| 815 | 14 | AB | 53 | 100 | 380 | 204 | 854 | No |
| 815 | 16 | AB | 39 | 80 | 380 | 187 | 854 | No |
| 815 | 18 | AB | 8 | 60 | 360 | 198 | 854 | No |
| 815 | 19 | AB | 1 | 120 | 280 | 200 | 854 | No |
| 815 | 20 | AB | 4 | 80 | 240 | 155 | 854 | No |
| 816 | 1 | AB | 1 | 100 | 280 | 190 | 854 | No |
| 816 | 3 | AB | 132 | 30 | 360 | 193 | 854 | No |
| 816 | 4 | AB | 73 | 60 | 700 | 230 | 854 | No |
| 816 | 5 | AB | 26 | 140 | 400 | 247 | 854 | No |
| 816 | 7 | AB | 18 | 100 | 380 | 213 | 854 | No |
| 816 | 11 | AB | 24 | 80 | 320 | 206 | 854 | No |
| 816 | 12 | AB | 12 | 100 | 300 | 196 | 854 | No |
| 816 | 13 | AB | 21 | 75 | 250 | 154 | 854 | No |
| 816 | 16 | AB | 9 | 60 | 320 | 186 | 854 | No |
| 816 | 21 | AB | 9 | 80 | 340 | 194 | 854 | No |
| 817 | 1 | AB | 1 | 100 | 250 | 175 | 854 | No |
| 817 | 2 | AB | 3 | 60 | 240 | 158 | 854 | No |
| 824 | 1 | AB | 4 | 80 | 300 | 173 | 854 | No |
| 825 | 1 | AB | 7 | 100 | 350 | 186 | 854 | No |
| 827 | 1 | AB | 2 | 60 | 240 | 155 | 854 | No |
| **GAMMA FIDLER** | | | | | | | | |
| 800 | 1 | Gamma | 5 | 2000 | 4500 | 3350 | 19000 | No |
| 800 | 2 | Gamma | 3 | 3500 | 5000 | 4333 | 19000 | No |
| 800 | 3 | Gamma | 5 | 2000 | 4000 | 3100 | 19000 | No |
| 802 | 1 | Gamma | 10 | 3000 | 10000 | 6150 | 19000 | No |
| 802 | 3 | Gamma | 6 | 4000 | 9000 | 6167 | 19000 | No |
| 802 | 4 | Gamma | 2 | 4000 | 8000 | 5750 | 19000 | No |
| 802 | 6 | Gamma | 1 | 4000 | 8000 | 6000 | 19000 | No |
| 802 | 7 | Gamma | 1 | 5000 | 8000 | 6500 | 19000 | No |
| 802 | 8 | Gamma | 2 | 400 | 8000 | 3950 | 19000 | No |
| 802 | 9 | Gamma | 2 | 4000 | 7000 | 5500 | 19000 | No |
| 802 | 10 | Gamma | 2 | 4000 | 8000 | 5750 | 19000 | No |
| 802 | 11 | Gamma | 3 | 3000 | 8000 | 5833 | 19000 | No |
| 802 | 12 | Gamma | 1 | 4000 | 7000 | 5500 | 19000 | No |
| 802 | 13 | Gamma | 3 | 4000 | 7000 | 5500 | 19000 | No |
| 802 | 14 | Gamma | 5 | 3000 | 8000 | 5400 | 19000 | No |
| 802 | 15 | Gamma | 3 | 4000 | 7000 | 5167 | 19000 | No |
| 802 | 17 | Gamma | 1 | 4000 | 9000 | 6500 | 19000 | No |
| 802 | 18 | Gamma | 3 | 4000 | 7000 | 5167 | 19000 | No |
| 802 | 19 | Gamma | 2 | 6000 | 8000 | 7000 | 19000 | No |
| 802 | 20 | Gamma | 2 | 5000 | 9000 | 6750 | 19000 | No |
| 802 | 21 | Gamma | 3 | 4000 | 11000 | 6333 | 19000 | No |
| 802 | 22 | Gamma | 2 | 5000 | 8000 | 6500 | 19000 | No |
| 802 | 16B | Gamma | 3 | 3000 | 10000 | 6167 | 19000 | No |
| 802 | 16D | Gamma | 6 | 3000 | 9000 | 5583 | 19000 | No |
| 802 | 5A | Gamma | 2 | 5000 | 10000 | 7250 | 19000 | No |
| 802 | 5B | Gamma | 8 | 3000 | 9000 | 5813 | 19000 | No |
| 802 | 5D | Gamma | 2 | 4000 | 10000 | 6500 | 19000 | No |

**Table 4-21**
**Summary Statistics of Phase II Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| 806 | 2 | Gamma | 1 | 5000 | 9000 | 7000 | 19000 | No |
| 806 | 3 | Gamma | 7 | 4000 | 8000 | 5714 | 19000 | No |
| 806 | 5 | Gamma | 6 | 3000 | 8000 | 5417 | 19000 | No |
| 806 | 6 | Gamma | 2 | 4000 | 8000 | 6000 | 19000 | No |
| 806 | 7 | Gamma | 3 | 4000 | 8000 | 5833 | 19000 | No |
| 806 | 8 | Gamma | 2 | 4000 | 8000 | 6250 | 19000 | No |
| 806 | 9 | Gamma | 4 | 3000 | 8000 | 5375 | 19000 | No |
| 806 | 10 | Gamma | 1 | 3000 | 5000 | 4000 | 19000 | No |
| 807 | 1 | Gamma | 1 | 3000 | 7000 | 5000 | 19000 | No |
| 807 | 2 | Gamma | 1 | 3000 | 6000 | 4500 | 19000 | No |
| 807 | 3 | Gamma | 3 | 2000 | 7000 | 4500 | 19000 | No |
| 807 | 4 | Gamma | 1 | 3000 | 6000 | 4500 | 19000 | No |
| 807 | 5 | Gamma | 4 | 3000 | 6000 | 4375 | 19000 | No |
| 807 | 6 | Gamma | 8 | 1000 | 7000 | 3875 | 19000 | No |
| 807 | 7 | Gamma | 3 | 3000 | 6000 | 4500 | 19000 | No |
| 807 | 8 | Gamma | 1 | 2000 | 5000 | 3500 | 19000 | No |
| 809 | 1 | Gamma | 4 | 4000 | 10000 | 6625 | 19000 | No |
| **810** | **3** | **Gamma** | **4** | **6000** | **20000** | **12125** | **19000** | **YES** |
| **810** | **5** | **Gamma** | **4** | **4000** | **20000** | **11250** | **19000** | **YES** |
| 810 | 6 | Gamma | 2 | 5000 | 10000 | 7750 | 19000 | No |
| 810 | 7 | Gamma | 1 | 9000 | 14000 | 11500 | 19000 | No |
| 810 | 8 | Gamma | 4 | 5000 | 8000 | 6500 | 19000 | No |
| 810 | 9 | Gamma | 5 | 7000 | 14000 | 11000 | 19000 | No |
| **810** | **10** | **Gamma** | **5** | **10000** | **21000** | **15000** | **19000** | **YES** |
| 810 | 11 | Gamma | 2 | 8000 | 17000 | 12500 | 19000 | No |
| **810** | **12** | **Gamma** | **5** | **9000** | **20000** | **13800** | **19000** | **YES** |
| 810 | 15 | Gamma | 5 | 6000 | 15000 | 10400 | 19000 | No |
| 810 | 17 | Gamma | 6 | 4000 | 12000 | 8000 | 19000 | No |
| 810 | 18 | Gamma | 3 | 4000 | 8000 | 5833 | 19000 | No |
| 810 | 20 | Gamma | 2 | 6000 | 12000 | 9250 | 19000 | No |
| 810 | 21 | Gamma | 3 | 4000 | 10000 | 6500 | 19000 | No |
| 810 | 22 | Gamma | 8 | 2000 | 8000 | 5250 | 19000 | No |
| 810 | 23 | Gamma | 3 | 3000 | 8000 | 5667 | 19000 | No |
| 810 | 24 | Gamma | 3 | 8000 | 12000 | 9667 | 19000 | No |
| 810 | 25 | Gamma | 2 | 6000 | 12000 | 8500 | 19000 | No |
| 812 | 1 | Gamma | 2 | 3000 | 6000 | 4250 | 19000 | No |
| 812 | 2 | Gamma | 1 | 4000 | 7000 | 5500 | 19000 | No |
| 812 | 3 | Gamma | 1 | 4000 | 7000 | 5500 | 19000 | No |
| 812 | 4 | Gamma | 2 | 6000 | 8000 | 7000 | 19000 | No |
| 812 | 5 | Gamma | 7 | 4000 | 9000 | 6286 | 19000 | No |
| 812 | 6 | Gamma | 2 | 3000 | 8000 | 5500 | 19000 | No |
| 812 | 7 | Gamma | 1 | 6000 | 10000 | 8000 | 19000 | No |
| 812 | 8 | Gamma | 3 | 5000 | 10000 | 8167 | 19000 | No |
| **812** | **9** | **Gamma** | **7** | **10000** | **20000** | **15000** | **19000** | **YES** |
| 812 | 10 | Gamma | 2 | 5000 | 9000 | 6750 | 19000 | No |
| 812 | 11 | Gamma | 1 | 5000 | 8000 | 6500 | 19000 | No |
| 812 | 13 | Gamma | 4 | 4000 | 12000 | 8000 | 19000 | No |
| 812 | 14 | Gamma | 4 | 4000 | 13000 | 7875 | 19000 | No |
| 812 | 15 | Gamma | 4 | 3000 | 11000 | 6000 | 19000 | No |
| 812 | 16 | Gamma | 3 | 4000 | 12000 | 7667 | 19000 | No |
| **812** | **17** | **Gamma** | **5** | **6000** | **24000** | **15600** | **19000** | **YES** |
| 812 | 18 | Gamma | 4 | 4000 | 14000 | 8875 | 19000 | No |
| 812 | 19 | Gamma | 17 | 1000 | 15000 | 8206 | 19000 | No |
| **812** | **20** | **Gamma** | **12** | **8000** | **26000** | **17292** | **19000** | **YES** |
| 812 | 21 | Gamma | 2 | 4000 | 8000 | 6000 | 19000 | No |
| 812 | 23 | Gamma | 1 | 6000 | 10000 | 8000 | 19000 | No |
| 812 | 24 | Gamma | 3 | 3000 | 9000 | 6167 | 19000 | No |
| 812 | 25 | Gamma | 2 | 6000 | 9000 | 7500 | 19000 | No |
| 812 | 26 | Gamma | 4 | 2000 | 10000 | 6125 | 19000 | No |
| 812 | 27 | Gamma | 3 | 6000 | 9000 | 7167 | 19000 | No |
| 812 | 28 | Gamma | 3 | 3000 | 9000 | 6333 | 19000 | No |
| 812 | 29 | Gamma | 4 | 3000 | 12000 | 7750 | 19000 | No |
| 812 | 30 | Gamma | 3 | 4000 | 10000 | 6833 | 19000 | No |
| 812 | 31 | Gamma | 7 | 2000 | 8000 | 5143 | 19000 | No |

**Table 4-21**
**Summary Statistics of Phase II Scanning Measurements VS Instrument Scanning Flag Value**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Measurement Type | Number of Grids Scanned | Minimum (cpm) [a] | Maximum (cpm) | Mean (cpm) | Flag Value (cpm) [b] | Maximum Reading Greater than Flag? |
|---|---|---|---|---|---|---|---|---|
| 812 | 33 | Gamma | 1 | 10000 | 14000 | 12000 | 19000 | No |
| 813 | 1 | Gamma | 2 | 6000 | 13000 | 9500 | 19000 | No |
| 813 | 2 | Gamma | 5 | 6000 | 13000 | 9400 | 19000 | No |
| 813 | 3 | Gamma | 3 | 8000 | 17000 | 12667 | 19000 | No |
| 813 | 4 | Gamma | 1 | 5000 | 8000 | 6500 | 19000 | No |
| 813 | 5 | Gamma | 11 | 3000 | 10000 | 5773 | 19000 | No |
| 813 | 7 | Gamma | 1 | 5000 | 9000 | 7000 | 19000 | No |
| 813 | 8 | Gamma | 1 | 4000 | 9000 | 6500 | 19000 | No |
| 813 | 11 | Gamma | 2 | 5000 | 10000 | 7250 | 19000 | No |
| 814 | 1 | Gamma | 1 | 3000 | 7000 | 5000 | 19000 | No |
| 814 | 2 | Gamma | 1 | 4000 | 6000 | 5000 | 19000 | No |
| 814 | 3 | Gamma | 1 | 4000 | 8000 | 6000 | 19000 | No |
| 814 | 4 | Gamma | 1 | 3000 | 7000 | 5000 | 19000 | No |
| 814 | 5 | Gamma | 8 | 3000 | 9000 | 5188 | 19000 | No |
| 814 | 6 | Gamma | 3 | 4000 | 7000 | 5167 | 19000 | No |
| 815 | 1 | Gamma | 18 | 5000 | 14000 | 7639 | 19000 | No |
| 815 | 2 | Gamma | 11 | 2000 | 11000 | 6273 | 19000 | No |
| 815 | 3 | Gamma | 31 | 3000 | 14000 | 7468 | 19000 | No |
| 815 | 4 | Gamma | 11 | 5000 | 15000 | 8909 | 19000 | No |
| 815 | 5 | Gamma | 17 | 4000 | 12000 | 7206 | 19000 | No |
| 815 | 6 | Gamma | 20 | 3000 | 15000 | 7750 | 19000 | No |
| 815 | 7 | Gamma | 17 | 3000 | 9000 | 5853 | 19000 | No |
| 815 | 8 | Gamma | 23 | 3000 | 9000 | 5674 | 19000 | No |
| 815 | 9 | Gamma | 16 | 5000 | 16000 | 8875 | 19000 | No |
| 815 | 10 | Gamma | 18 | 3000 | 8000 | 5611 | 19000 | No |
| 815 | 11 | Gamma | 82 | 3000 | 12000 | 5713 | 19000 | No |
| 815 | 12 | Gamma | 48 | 3000 | 13000 | 6432 | 19000 | No |
| 815 | 13 | Gamma | 19 | 4000 | 10000 | 6263 | 19000 | No |
| 815 | 14 | Gamma | 78 | 4000 | 11000 | 7651 | 19000 | No |
| 815 | 16 | Gamma | 51 | 3000 | 12000 | 6137 | 19000 | No |
| 815 | 18 | Gamma | 8 | 3000 | 7000 | 4813 | 19000 | No |
| 815 | 19 | Gamma | 1 | 2000 | 7000 | 4500 | 19000 | No |
| 815 | 20 | Gamma | 4 | 2000 | 7000 | 4375 | 19000 | No |
| 816 | 1 | Gamma | 1 | 3000 | 6000 | 4500 | 19000 | No |
| 816 | 3 | Gamma | 185 | 2000 | 13000 | 5965 | 19000 | No |
| 816 | 4 | Gamma | 99 | 2000 | 16000 | 6682 | 19000 | No |
| 816 | 5 | Gamma | 26 | 500 | 14000 | 7433 | 19000 | No |
| 816 | 7 | Gamma | 23 | 5000 | 13000 | 7848 | 19000 | No |
| 816 | 11 | Gamma | 26 | 3000 | 13000 | 6500 | 19000 | No |
| 816 | 12 | Gamma | 12 | 3000 | 8000 | 5083 | 19000 | No |
| 816 | 13 | Gamma | 46 | 3000 | 9000 | 5924 | 19000 | No |
| 816 | 16 | Gamma | 9 | 2000 | 8000 | 4667 | 19000 | No |
| 816 | 21 | Gamma | 10 | 3000 | 6000 | 4500 | 19000 | No |
| 817 | 1 | Gamma | 1 | 2500 | 4000 | 3250 | 19000 | No |
| 817 | 2 | Gamma | 3 | 3000 | 7000 | 4833 | 19000 | No |
| 823 | 1 | Gamma | 1 | 6000 | 10000 | 8000 | 19000 | No |
| 824 | 1 | Gamma | 7 | 2000 | 7000 | 4071 | 19000 | No |
| 825 | 1 | Gamma | 7 | 3000 | 6000 | 4286 | 19000 | No |
| 827 | 1 | Gamma | 2 | 3000 | 6000 | 4250 | 19000 | No |

[a] cpm = counts per minute.

[b] For instruments measuring gross alpha and beta radiation, the flag value is equal to the instrument-specific $DCGL_{EMC/5}$ plus the mean background scanning value. The $DCGL_{EMC/5}$ is calculated by dividing the $DCGL_{EMC}$ (see Table 4-2) by 5 to provide a more conservative flag value. For instruments measuring gross gamma radiation, the flag value was equal to the 95% UTL (upper threshold limit) of the background scanning results.

[c] AB = gross alpha and beta radiation.

**Table 4-22**
**Phase II Exposure Rate Data**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Minimum (µRem/hr) [a/] | Mean (µRem/hr) | Maximum (µRem/hr) |
|---|---|---|---|---|
| | | | | |
| 722 [b/] | -- | 4 | 9.3 | 16 |
| 800 | 1 | 3 | 4.9 | 7 |
| 800 | 2 | 3 | 4.9 | 8 |
| 800 | 3 | 2 | 4.5 | 6 |
| 802 | 1 | 4 | 5.7 | 8 |
| 802 | 2 | 4 | 6.2 | 8 |
| 802 | 3 | 5 | 6.2 | 9 |
| 802 | 4 | 4 | 6.4 | 8 |
| 802 | 6 | 2 | 4.8 | 7 |
| 802 | 7 | 5 | 5.8 | 7 |
| 802 | 8 | 5 | 6.3 | 8 |
| 802 | 9 | 3 | 5.4 | 7 |
| 802 | 10 | 4 | 6.8 | 9 |
| 802 | 11 | 4 | 5.7 | 8 |
| 802 | 12 | 4 | 5.9 | 8 |
| 802 | 13 | 5 | 6.4 | 9 |
| 802 | 14 | 5 | 5.8 | 7 |
| 802 | 15 | 3 | 5.4 | 8 |
| 802 | 17 | 4 | 5.6 | 7 |
| 802 | 18 | 3 | 5.1 | 7 |
| 802 | 19 | 3 | 5.6 | 8 |
| 802 | 20 | 6 | 7.3 | 9 |
| 802 | 21 | 5 | 6.1 | 8 |
| 802 | 22 | 4 | 6.2 | 8 |
| 802 | 16B | 4 | 5.7 | 7 |
| 802 | 16C | 3 | 4.9 | 6 |
| 802 | 16D | 4 | 5.6 | 7 |
| 802 | 5A | 4 | 6.1 | 8 |
| 802 | 5C | 3 | 5.5 | 9 |
| 802 | 5D | 5 | 6.8 | 8 |
| 806 | 2 | 4 | 4.9 | 6 |
| 806 | 3 | 3 | 4.2 | 6 |
| 806 | 5 | 0 | 0.6 | 3 |
| 806 | 6 | 3 | 3.9 | 5 |
| 806 | 7 | 3 | 4.6 | 6 |
| 806 | 8 | 3 | 4.3 | 6 |
| 806 | 9 | 3 | 4.2 | 6 |
| 806 | 10 | 4 | 5.4 | 7 |
| 807 | 1 | 4 | 4.6 | 7 |
| 807 | 2 | 3 | 4.3 | 5 |
| 807 | 3 | 3 | 4.6 | 6 |
| 807 | 4 | 3 | 4.3 | 6 |
| 807 | 5 | 2 | 4.5 | 6 |
| 807 | 6 | 4 | 4.6 | 6 |
| 807 | 7 | 3 | 4.9 | 11 |
| 807 | 8 | 3 | 4.7 | 6 |
| 807 | 9 | 3 | 5.0 | 8 |
| 809 | 1 | 4 | 6.1 | 7 |
| 810 | 3 | 6 | 8.6 | 11 |
| 810 | 5 | 6 | 7.9 | 11 |
| 810 | 6 | 5 | 8.3 | 11 |
| 810 | 7 | 7 | 8.3 | 11 |

**Table 4-22**
**Phase II Exposure Rate Data**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Minimum (µRem/hr) [a/] | Mean (µRem/hr) | Maximum (µRem/hr) |
|---|---|---|---|---|
| 810 | 8 | 6 | 8.7 | 12 |
| 810 | 9 | 7 | 8.8 | 12 |
| 810 | 10 | 7 | 9.4 | 12 |
| 810 | 11 | 7 | 8.7 | 10 |
| 810 | 12 | 7 | 10.2 | 12 |
| 810 | 15 | 6 | 8.5 | 11 |
| 810 | 17 | 4 | 7.3 | 10 |
| 810 | 18 | 4 | 5.6 | 9 |
| 810 | 19 | 4 | 5.4 | 8 |
| 810 | 20 | 5 | 6.6 | 9 |
| 810 | 21 | 4 | 6.2 | 9 |
| 810 | 22 | 4 | 5.3 | 7 |
| 810 | 23 | 3 | 5.6 | 8 |
| 810 | 24 | 5 | 6.7 | 9 |
| 810 | 25 | 5 | 7.8 | 10 |
| 812 | 1 | 4 | 4.9 | 7 |
| 812 | 2 | 4 | 5.5 | 10 |
| 812 | 3 | 4 | 5.3 | 6 |
| 812 | 4 | 3 | 5.4 | 7 |
| 812 | 5 | 3 | 4.8 | 8 |
| 812 | 6 | 4 | 6.1 | 12 |
| 812 | 7 | 5 | 6.5 | 12 |
| 812 | 8 | 3 | 7.0 | 10 |
| 812 | 9 | 8 | 10.1 | 12 |
| 812 | 10 | 4 | 5.9 | 7 |
| 812 | 11 | 4 | 5.3 | 7 |
| 812 | 13 | 6 | 7.1 | 9 |
| 812 | 14 | 6 | 6.9 | 9 |
| 812 | 15 | 5 | 8.5 | 11 |
| 812 | 16 | 6 | 7.3 | 9 |
| 812 | 17 | 7 | 9.8 | 13 |
| 812 | 18 | 6 | 9.0 | 12 |
| 812 | 19 | 5 | 7.2 | 10 |
| 812 | 20 | 6 | 10.9 | 15 |
| 812 | 21 | 5 | 7.3 | 9 |
| 812 | 23 | 5 | 7.1 | 9 |
| 812 | 24 | 4 | 5.7 | 8 |
| 812 | 25 | 5 | 5.9 | 7 |
| 812 | 26 | 5 | 5.9 | 8 |
| 812 | 27 | 5 | 5.9 | 7 |
| 812 | 28 | 4 | 5.6 | 7 |
| 812 | 29 | 6 | 6.8 | 9 |
| 812 | 30 | 4 | 5.6 | 8 |
| 812 | 31 | 3 | 5.2 | 7 |
| 812 | 33 | 4 | 6.9 | 10 |
| 813 | 1 | 5 | 6.7 | 10 |
| 813 | 2 | 4 | 5.7 | 7 |
| 813 | 3 | 5 | 6.7 | 9 |
| 813 | 4 | 4 | 6.3 | 9 |
| 813 | 5 | 4 | 5.8 | 9 |
| 813 | 7 | 4 | 7.2 | 10 |
| 813 | 8 | 5 | 6.8 | 8 |
| 813 | 11 | 3 | 5.1 | 6 |

**Table 4-22**
**Phase II Exposure Rate Data**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Minimum (µRem/hr) [a/] | Mean (µRem/hr) | Maximum (µRem/hr) |
|---|---|---|---|---|
| 814 | 1 | 3 | 5.5 | 7 |
| 814 | 2 | 4 | 5.7 | 7 |
| 814 | 3 | 5 | 6.0 | 8 |
| 814 | 4 | 5 | 7.1 | 10 |
| 814 | 5 | 3 | 5.2 | 7 |
| 814 | 6 | 4 | 5.4 | 7 |
| 815 | 1 | 4 | 5.7 | 7 |
| 815 | 2 | 4 | 5.1 | 6 |
| 815 | 3 | 4 | 6.0 | 8 |
| 815 | 4 | 5 | 7.3 | 12 |
| 815 | 5 | 3 | 6.2 | 9 |
| 815 | 6 | 5 | 6.2 | 9 |
| 815 | 7 | 4 | 5.5 | 9 |
| 815 | 8 | 4 | 5.6 | 8 |
| 815 | 9 | 5 | 7.0 | 9 |
| 815 | 10 | 1 | 3.7 | 9 |
| 815 | 11 | 3 | 5.2 | 10 |
| 815 | 12 | 4 | 6.0 | 10 |
| 815 | 13 | 5 | 5.3 | 7 |
| 815 | 14 | 4 | 5.7 | 8 |
| 815 | 16 | 3.5 | 5.6 | 9 |
| 815 | 18 | 3 | 4.3 | 6 |
| 815 | 19 | 3 | 4.1 | 7 |
| 815 | 20 | 2 | 4.1 | 7 |
| 816 | 1 | 2 | 4.6 | 6 |
| 816 | 2 | 3 | 5.6 | 9 |
| 816 | 3 | 3 | 5.4 | 8 |
| 816 | 4 | 3 | 5.2 | 8 |
| 816 | 5 | 5 | 7.9 | 10 |
| 816 | 7 | 6 | 7.8 | 10 |
| 816 | 11 | 5 | 6.4 | 9 |
| 816 | 12 | 5 | 5.9 | 8 |
| 816 | 13 | 4 | 5.6 | 7 |
| 816 | 16 | 3 | 4.3 | 5 |
| 816 | 21 | 3 | 4.1 | 5 |
| 817 | 1 | 4 | 5.2 | 7 |
| 817 | 2 | 4 | 5.3 | 7.5 |
| 823 | 1 | 10 | 10.0 | 10 |
| 824 | 1 | 3 | 3.6 | 5 |
| 825 | 1 | 3 | 4.5 | 7 |
| 827 | 1 | 4 | 4.7 | 6 |

[a/] µRem/hr = microrem per hour.

[b/] Building 722 is the background building.

## Table 4-23
## Summary of Phase II Dry Smear Sampling Results[a/, b/, c/]
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Alpha (dpm) [d/] | | | Beta (dpm) | | | Gamma (dpm) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mimimum | Average | Maximum | Mimimum | Average | Maximum | Mimimum | Average | Maximum |
| 800 | 1 | 0.0 | 0.1 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 800 | 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 800 | 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 3 | 0.0 | 0.1 | 0.9 | 0.0 | 0.6 | 3.5 | 0.0 | 0.0 | 0.0 |
| 802 | 4 | 0.0 | 0.2 | 2.1 | 0.0 | 0.4 | 4.1 | 0.0 | 0.0 | 0.0 |
| 802 | 5A | 0.0 | 0.3 | 1.3 | 0.0 | 0.3 | 2.9 | 0.0 | 0.0 | 0.0 |
| 802 | 5B | 0.0 | 0.1 | 1.3 | 0.0 | 0.4 | 3.8 | 0.0 | 0.0 | 0.0 |
| 802 | 5D | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 3.4 | 1.4 | 0.0 | 57.4 |
| 802 | 6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 8 | 0.0 | 0.2 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 53.5 |
| 802 | 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 3.2 | 0.0 |
| 802 | 10 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 1.4 | 3.7 | 0.0 |
| 802 | 11 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 2.8 | 1.2 | 4.0 | 50.6 |
| 802 | 12 | 0.0 | 0.1 | 1.2 | 0.0 | 0.3 | 4.0 | 0.0 | 0.0 | 0.0 |
| 802 | 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | 63.6 |
| 802 | 14 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 4.0 | 0.0 | 0.0 | 0.0 |
| 802 | 15 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 16B | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 16C | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 2.7 | 0.0 |
| 802 | 16D | 0.0 | 0.1 | 2.2 | 0.0 | 0.7 | 6.9 | 0.0 | 0.0 | 0.0 |
| 802 | 17 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 4.4 | 0.0 | 0.0 | 0.0 |
| 802 | 18 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 3.3 | 0.0 |
| 802 | 19 | 0.0 | 0.2 | 1.8 | 0.0 | 0.3 | 4.1 | 0.0 | 0.0 | 0.0 |
| 802 | 20 | 0.0 | 0.2 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 802 | 22 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 |
| 806 | 2 | 0.0 | 0.1 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 49.2 |
| 806 | 3 | 0.0 | 0.1 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 67.7 |
| 806 | 5 | 0.0 | 0.1 | 1.1 | 0.0 | 0.2 | 4.3 | 0.0 | 0.0 | 0.0 |
| 806 | 6 | 0.0 | 0.1 | 1.6 | 0.0 | 0.9 | 5.8 | 0.0 | 3.2 | 50.4 |
| 806 | 7 | 0.0 | 0.2 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 806 | 8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | 43.4 |
| 806 | 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 4.7 | 0.0 | 0.0 | 0.0 |
| 806 | 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 807 | 1 | 0.0 | 0.2 | 1.4 | 0.0 | 0.2 | 3.5 | 0.0 | 0.0 | 0.0 |
| 807 | 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 807 | 3 | 0.0 | 0.2 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 807 | 4 | 0.0 | 0.1 | 1.9 | 0.0 | 1.3 | 8.5 | 0.0 | 7.1 | 56.9 |
| 807 | 5 | 0.0 | 0.1 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 807 | 6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 56.9 |
| 807 | 7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 52.6 |
| 807 | 8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.2 | 0.0 | 0.0 | 0.0 |
| 807 | 9 | 0.0 | 0.5 | 2.6 | 0.0 | 3.5 | 8.5 | 0.0 | 6.4 | 52.0 |
| 809 | 1 | 0.0 | 0.3 | 1.0 | 0.0 | 1.3 | 7.6 | 0.0 | 0.0 | 0.0 |
| 810 | 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 4.1 | 0.0 | 0.0 | 0.0 |
| 810 | 6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 8 | 0.0 | 0.1 | 1.6 | 0.0 | 0.2 | 3.6 | 0.0 | 0.0 | 0.0 |
| 810 | 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 65.9 |
| 810 | 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 4.2 | 0.0 | 0.0 | 0.0 |

## Table 4-23
## Summary of Phase II Dry Smear Sampling Results[a/, b/, c/]
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Alpha (dpm) [d/] | | | Beta (dpm) | | | Gamma (dpm) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mimimum | Average | Maximum | Mimimum | Average | Maximum | Mimimum | Average | Maximum |
| 810 | 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 3.6 | 0.0 | 0.0 | 0.0 |
| 810 | 15 | 0.0 | 0.2 | 1.7 | 0.0 | 0.3 | 5.8 | 0.0 | 2.6 | 52.3 |
| 810 | 17 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 18 | 0.0 | 0.1 | 1.2 | 0.0 | 0.1 | 3.2 | 0.0 | 1.5 | 51.9 |
| 810 | 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.6 | 0.0 | 2.9 | 44.1 |
| 810 | 21 | 0.0 | 0.2 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 22 | 0.0 | 0.1 | 1.8 | 0.0 | 0.5 | 5.0 | 0.0 | 1.2 | 44.5 |
| 810 | 23 | 0.0 | 0.2 | 1.6 | 0.0 | 0.4 | 3.5 | 0.0 | 1.8 | 54.6 |
| 810 | 24 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 810 | 25 | 0.0 | 0.1 | 1.0 | 0.0 | 0.2 | 3.3 | 0.0 | 0.0 | 0.0 |
| 812 | 1 | 0.0 | 0.1 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 3 | 0.0 | 0.3 | 4.0 | 0.0 | 0.7 | 9.9 | 0.0 | 0.0 | 0.0 |
| 812 | 4 | 0.0 | 0.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 46.0 |
| 812 | 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 45.0 |
| 812 | 7 | 0.0 | 0.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 46.5 |
| 812 | 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.1 | 61.8 |
| 812 | 11 | 0.0 | 0.1 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 13 | 0.0 | 0.1 | 1.0 | 0.0 | 0.3 | 3.3 | 0.0 | 8.2 | 60.9 |
| 812 | 14 | 0.0 | 0.1 | 1.0 | 0.0 | 0.6 | 4.1 | 0.0 | 2.5 | 54.0 |
| 812 | 15 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 45.4 |
| 812 | 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 17 | 0.0 | 0.1 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | 48.5 |
| 812 | 18 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.5 | 0.0 | 3.0 | 66.5 |
| 812 | 19 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 20 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 49.2 |
| 812 | 21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 23 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 24 | 0.0 | 0.3 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 5.5 | 0.0 | 0.0 | 0.0 |
| 812 | 26 | 0.0 | 0.1 | 1.3 | 0.0 | 0.7 | 4.6 | 0.0 | 0.0 | 0.0 |
| 812 | 27 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 48.4 |
| 812 | 28 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 4.6 | 0.0 | 0.0 | 0.0 |
| 812 | 29 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.5 | 0.0 | 0.0 | 0.0 |
| 812 | 30 | 0.0 | 0.1 | 1.3 | 0.0 | 0.8 | 4.4 | 0.0 | 0.0 | 0.0 |
| 812 | 31 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 812 | 33 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 813 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.3 | 0.0 | 0.0 | 0.0 |
| 813 | 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 3.9 | 0.0 | 0.0 | 0.0 |
| 813 | 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 2.8 | 0.0 | 0.0 | 0.0 |
| 813 | 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 813 | 5 | 0.0 | 0.1 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 813 | 7 | 0.0 | 0.1 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 8.2 | 72.9 |
| 813 | 8 | 0.0 | 0.1 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 55.6 |
| 813 | 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 3.3 | 0.0 | 0.0 | 0.0 |
| 814 | 1 | 0.0 | 0.1 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 814 | 2 | 0.0 | 0.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 814 | 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | 52.8 |
| 814 | 4 | 0.0 | 0.1 | 1.4 | 0.0 | 0.9 | 3.8 | 0.0 | 0.0 | 0.0 |

## Table 4-23
## Summary of Phase II Dry Smear Sampling Results[a/, b/, c/]
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Alpha (dpm) [d/] | | | Beta (dpm) | | | Gamma (dpm) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mimimum | Average | Maximum | Mimimum | Average | Maximum | Mimimum | Average | Maximum |
| 814 | 5 | 0.0 | 0.2 | 1.8 | 0.0 | 0.1 | 2.7 | 0.0 | 0.0 | 0.0 |
| 814 | 6 | 0.0 | 0.2 | 2.2 | 0.0 | 0.2 | 3.5 | 0.0 | 0.0 | 0.0 |
| 815 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 2.9 | 0.0 | 0.0 | 0.0 |
| 815 | 2 | 0.0 | 0.2 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 815 | 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 815 | 4 | 0.0 | 0.3 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 815 | 5 | 0.0 | 0.2 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 53.3 |
| 815 | 6 | 0.0 | 0.2 | 1.3 | 0.0 | 0.2 | 3.0 | 0.0 | 0.0 | 0.0 |
| 815 | 7 | 0.0 | 0.1 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 46.7 |
| 815 | 8 | 0.0 | 0.2 | 1.3 | 0.0 | 0.1 | 2.7 | 0.0 | 4.1 | 50.5 |
| 815 | 9 | 0.0 | 0.3 | 2.1 | 0.0 | 0.3 | 4.9 | 0.0 | 3.3 | 52.7 |
| 815 | 10 | 0.0 | 0.1 | 1.5 | 0.0 | 0.2 | 3.8 | 0.0 | 2.8 | 50.5 |
| 815 | 11 | 0.0 | 0.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 46.6 |
| 815 | 12 | 0.0 | 0.0 | 1.5 | 0.0 | 0.1 | 3.0 | 0.0 | 1.4 | 67.3 |
| 815 | 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 5.5 | 0.0 | 6.1 | 65.3 |
| 815 | 14 | 0.0 | 0.0 | 1.8 | 0.0 | 0.3 | 4.5 | 0.0 | 0.0 | 0.0 |
| 815 | 16 | 0.0 | 0.2 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 46.2 |
| 815 | 18 | 0.0 | 0.2 | 2.2 | 0.0 | 0.5 | 5.0 | 0.0 | 0.0 | 0.0 |
| 815 | 19 | 0.0 | 0.2 | 1.6 | 0.0 | 0.2 | 3.0 | 0.0 | 0.0 | 0.0 |
| 815 | 20 | 0.0 | 0.1 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 816 | 1 | 0.0 | 0.1 | 1.6 | 0.0 | 0.1 | 3.3 | 0.0 | 0.0 | 0.0 |
| 816 | 2 | 0.0 | 0.1 | 1.2 | 0.0 | 0.2 | 5.0 | 0.0 | 1.4 | 58.3 |
| 816 | 3 | 0.0 | 0.1 | 2.1 | 0.0 | 0.2 | 4.5 | 0.0 | 3.9 | 65.5 |
| 816 | 4 | 0.0 | 0.1 | 2.0 | 0.0 | 0.1 | 2.9 | 0.0 | 0.0 | 0.0 |
| 816 | 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 53.0 |
| 816 | 7 | 0.0 | 0.1 | 1.1 | 0.0 | 0.4 | 4.6 | 0.0 | 2.3 | 53.1 |
| 816 | 11 | 0.0 | 0.1 | 1.5 | 0.0 | 0.2 | 4.6 | 0.0 | 2.1 | 54.7 |
| 816 | 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.3 | 51.0 |
| 816 | 13 | 0.0 | 0.2 | 1.7 | 0.0 | 0.3 | 3.7 | 0.0 | 0.0 | 0.0 |
| 816 | 16 | 0.0 | 0.1 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 46.4 |
| 816 | 21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 817 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 9.3 | 0.0 | 5.9 | 48.0 |
| 817 | 2 | 0.0 | 0.1 | 1.0 | 0.0 | 1.7 | 7.3 | 0.0 | 0.0 | 0.0 |
| 823 | 1 | 0.0 | 0.3 | 1.0 | 0.0 | 3.8 | 9.6 | 0.0 | 0.0 | 0.0 |
| 824 | 1 | 0.0 | 0.2 | 1.3 | 0.0 | 0.2 | 2.8 | 0.0 | 3.5 | 62.1 |
| 825 | 1 | 0.0 | 0.1 | 1.7 | 0.0 | 0.4 | 4.2 | 0.0 | 1.7 | 50.1 |
| 827 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.7 | 51.3 |

Notes:

[a/] ANSI/ HPS N13.13-1999 Screening levels: Group 1- Ra, Th, and Transuranics 600 dpm; Group 2 - Uranium and Select High Dose Beta-Gamma emitters, 6000 dpm; Group 3 - General Beta-Gamma emitters, 60000 dpm; Group 4 other Beta-Gamma Emitters, 600000 dpm.

[b/] NYS DOL proposed acceptable levels: natural U and assoc. decay products - 1000 dpm alpha/$cm^2$; Transuranics - 200 dpm/$cm^2$; Beta-Gamma Emitters - 1000 beta-gamma/ 100 $cm^2$.

[c/] Smear Samples collected over a 100 $cm^2$ area.

[d/] dpm = disintegrations per minute.

## Table 4-24
## Summary of Phase II Tritium Smear Sampling Results[a/, b/, c/]
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Tritium Beta (dpm) [d/] | | |
|---|---|---|---|---|
| | | Minimum | Average | Maximum |
| 815 | 1 | 0.0 | 0.6 | 10.2 |
| 815 | 2 | 0.0 | 0.0 | 0.0 |
| 815 | 3 | 0.0 | 0.0 | 0.0 |
| 815 | 4 | 0.0 | 1.1 | 11.9 |
| 815 | 5 | 0.0 | 0.0 | 0.0 |
| 815 | 6 | 0.0 | 0.0 | 0.0 |
| 815 | 7 | 0.0 | 0.0 | 0.0 |
| 815 | 8 | 0.0 | 0.0 | 0.0 |
| 815 | 9 | 0.0 | 0.0 | 0.0 |
| 815 | 10 | 0.0 | 0.0 | 0.0 |
| 815 | 11 | 0.0 | 0.0 | 0.0 |
| 815 | 12 | 0.0 | 0.2 | 8.5 |
| 815 | 13 | 0.0 | 0.5 | 9.5 |
| 815 | 14 | 0.0 | 0.1 | 11.4 |
| 815 | 16 | 0.0 | 1.1 | 46.2 |
| 815 | 18 | NA [e/] | NA | NA |
| 815 | 19 | NA | NA | NA |
| 815 | 20 | NA | NA | NA |
| 816 | 1 | NA | NA | NA |
| 816 | 2 | 0.0 | 3.4 | 15.8 |
| 816 | 3 | 0.0 | 5.1 | 15.9 |
| 816 | 4 | 0.0 | 4.7 | 16.1 |
| 816 | 5 | 0.0 | 4.5 | 17.9 |
| 816 | 7 | 0.0 | 6.0 | 18.1 |
| 816 | 11 | 0.0 | 0.4 | 9.6 |
| 816 | 12 | 0.0 | 0.0 | 0.0 |
| 816 | 13 | 0.0 | 7.7 | 21.7 |
| 816 | 16 | NA | NA | NA |
| 816 | 21 | NA | NA | NA |

Notes:

[a/] ANSI/ HPS N13.13-1999 Screening levels: Group 1- Ra, Th, and Transuranics 600 dpm; Group 2 - Uranium and Select High Dose Beta-Gamma emitters, 6000 dpm; Group 3 - General Beta-Gamma emitters, 60000 dpm; Group 4 other Beta-Gamma Emitters, 600000 dpm.

[b/] NYS DOL proposed acceptable levels: natural U and assoc. decay products - 1000 dpm alpha/$cm^2$; Transuranics - 200 dpm/$cm^2$; Beta-Gamma Emitters - 1000 beta-gamma/ 100 $cm^2$.

[c/] Smear Samples collected over a 100 $cm^2$ area.

[d/] dpm = disintegrations per minute.

[e/] NA = Not applicable. Tritium smears were not collected at this location.

**Table 4-25**
**Summary of In-Situ Gamma Spectroscopy Measurements**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Grid | Gamma Spec Location ID | Potentially Elevated? [a/] | Outcome |
|---|---|---|---|---|---|
| 800 | 2 | 26 | C1 | No | Bkgd |
| 802 | 20 | 3 | C1 | No | Bkgd |
| 803 | 2 | 7 | C8 | No | Bkgd |
| 803 | 2 | 81 | C7 | No | Bkgd |
| 803 | 3 | 3 | C2 | No | Bkgd |
| 803 | 3 | 12 | C1b | No | Bkgd |
| 803 | 4 | 87 | C3 | No | Bkgd |
| 803 | 4 | 89 | C4 | No | Bkgd |
| 803 | 5 | 86 | C6 | No | Bkgd |
| 803 | 5 | 102 | C5 | No | Bkgd |
| 803 | 6 | 85 | C9 | No | Bkgd |
| 803 | 6 | 95 | C10 | No | Bkgd |
| 803 | 6 | 157 | C11 | No | Bkgd |
| 804 | 1 | 5 | C8 | No | Bkgd |
| 804 | 1 | 10 | C9 | No | Bkgd |
| **804** | **1** | **13** | **C10** | **Yes** | **< $DCGL_{EMC}$** |
| **804** | **2** | **6** | **C6** | **Yes** | **Bkgd** |
| 804 | 4 | 5 | C7 | No | Bkgd |
| **804** | **3A** | **0** | **C1** | **Yes** | **Bkgd** |
| 804 | 3A | 2 | C2b | No | Bkgd |
| 804 | 3A | 14 | C3 | No | Bkgd |
| **804** | **5A** | **7** | **C5** | **Yes** | **Bkgd** |
| 804 | 6A | 6 | C4 | No | Bkgd |
| 805 | 1 | 3 | C1 | No | Bkgd |
| 805 | 1 | 6 | C2 | No | Bkgd |
| 805 | 1 | 13 | C5 | No | Bkgd |
| **805** | **1** | **14** | **C4** | **Yes** | **Bkgd** |
| 805 | 1 | 17 | C3 | No | Bkgd |
| **805** | **1** | **20** | **C6** | **Yes** | **Bkgd** |
| **806** | **1** | **3** | **C1** | **Yes** | **Bkgd** |
| 806 | 5 | 14 | C3 | No | Bkgd |
| 806 | 5 | 29 | C2 | No | Bkgd |
| 807 | 2 | 3 | C1 | No | Bkgd |
| 809 | 1 | 9 | C1 | No | Bkgd |
| 810 | 1 | 10 | C1 | No | Bkgd |
| 810 | 1 | 31 | C2 | No | Bkgd |
| **810** | **3** | **18** | **C3** | **Yes** | **Bkgd** |
| 810 | 10 | 8 | C4 | No | Bkgd |
| 812 | 20 | 20 | C3 | No | Bkgd |
| 812 | 32 | 0 | C1 | No | Bkgd |
| 812 | 9 | 2 | C2 | No | Bkgd |
| 813 | 3 | 5 | C1 | No | Bkgd |
| 814 | 4 | 14 | C1 | No | Bkgd |
| 815 | 6 | 15 | C8 | No | Bkgd |
| 815 | 9 | 5 | C6 | No | Bkgd |
| 815 | 11 | 26 | C5 | No | Bkgd |
| 815 | 14 | 9 | C9 | No | Bkgd |
| **815** | **15** | **15** | **C3** | **Yes** | **Bkgd** |
| 815 | 15 | 17 | C4 | No | Bkgd |
| 815 | 15 | 27 | Duct smear sample | No | Bkgd |
| 815 | 15 | 29 | C2 | No | Bkgd |
| 815 | 15 | 38 | C1 | No | Bkgd |
| 815 | 16 | 21 | C7 | No | Bkgd |

**Table 4-25**
**Summary of In-Situ Gamma Spectroscopy Measurements**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Building | Room | Grid | Gamma Spec Location ID | Potentially Elevated? a/ | Outcome |
|---|---|---|---|---|---|
| 816 | 2 | 22 | C7 | No | Bkgd |
| **816** | **3** | **61** | **C6** | **Yes** | **Bkgd** |
| 816 | 4 | 45 | C5 | No | Bkgd |
| 816 | 5 | 5 | C8 | No | Bkgd |
| **816** | **7** | **3** | **C9** | **Yes** | **Bkgd** |
| **816** | **8** | **5** | **C1** | **Yes** | **Bkgd** |
| 816 | 8 | 14 | C2 | No | Bkgd |
| 816 | 9 | 1 | C3 | No | Bkgd |
| **816** | **10** | **9** | **C4** | **Yes** | **Bkgd** |
| **816** | **10** | **9** | **C4a** | **Yes** | **Bkgd** |
| 817 | 2 | 15 | C1 | No | Bkgd |
| **819** | **1** | **5 (Hot spot 86)** | **C2** | **Yes** | **Bkgd** |
| **819** | **1** | **91 (Hot spot 96)** | **C1** | **Yes** | **Bkgd** |
| 819 | 2 | 11 | C3 | No | Bkgd |
| 819 | 3 | 78 | C4 | No | Bkgd |
| 819 | 3 | 152 | C5 | No | Bkgd |
| 819 | 3 | 0D | C7 | No | Bkgd |
| 819 | 3 | 130 (Hot spot 148) | C6 | No | Bkgd |
| **819** | **4** | **5** | **C8** | **Yes** | **Bkgd** |
| 819 | 4 | 7 | C9 | No | Bkgd |
| 819 | 4 | 8 | C10 | No | Bkgd |
| **819** | **5** | **7** | **C12** | **Yes** | **Bkgd** |
| **819** | **5** | **11** | **C13** | **Yes** | **Bkgd** |
| **819** | **5** | **12** | **C14** | **Yes** | **Bkgd** |
| **819** | **5** | **15** | **C11** | **Yes** | **Bkgd** |
| 819 | 7 | 5 | C16 | No | Bkgd |
| **819** | **7** | **8** | **C17** | **Yes** | **Bkgd** |
| 819 | 7 | 10 | C18 | No | Bkgd |
| **819** | **8** | **2** | **C19** | **Yes** | **Bkgd** |
| 819 | 8 | 3 | C20 | No | Bkgd |
| 819 | 8 | 9 | C21 | No | Bkgd |
| 819 | 9 | 10 | C22 | No | Bkgd |
| 819 | 10 | 10 | C23 | No | Bkgd |
| **819** | **11** | **19** | **C24** | **Yes** | **Bkgd & < $DCGL_{EMC}$** |
| 819 | 12 | 5 | C26 | No | Bkgd |
| **819** | **12** | **23** | **C28** | **Yes** | **Bkgd** |
| **819** | **12d** | **2** | **C27** | **Yes** | **Bkgd** |
| **819** | **12d** | **4** | **C25** | **Yes** | **Bkgd** |
| 819 | 6b | 3 | C15 | No | Bkgd |
| **823** | **1** | **5** | **C1** | **Yes** | **Bkgd** |
| 824 | 1 | 11 | C1 | No | Bkgd |
| 825 | 1 | 21 | C1 | No | Bkgd |
| 827 | 1 | 10 | C1 | No | Bkgd |

a/ A measurement was considered suspect if there had been an exceedence in that survey area during the building surveys (refer to Tables 5-1 and 5-4), or if a radionuclide was identified and quantified above the $DCGL_W$. All potentially elevated results are described in Tables 4-26 and 5-7.

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 cm$^2$) [b] | DCGLw (dpm/100 cm$^2$) [c] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 803 | 3 | 12 | C1b | concrete | Alpha exceeds background based on WRS test; alpha/beta scanning above flag | No ID after background subtraction | NA [d] | NA | NA | NA | NA | Background |
| 803 | 3 | 3 | C2 | concrete | Alpha exceeds background based on WRS test; alpha/beta scanning above flag | No ID after background subtraction | NA | NA | NA | NA | NA | Background |
| 803 | 6 | 95 | C10 | concrete | Alpha exceeds background based on WRS test; alpha/beta scanning above flag | No ID after background subtraction | NA | NA | NA | NA | NA | Background |
| 803 | 6 | 157 | C11 | metal | Alpha exceeds background based on WRS test; alpha/beta scanning above flag | Th-228 | 79.35 | -- | 204 | No DCGL | NA | Background |
| | | | | | | Pb-212 | 234.6 | 78.67 | 25 | No DCGL | NA | Background |
| 803 | 6 | 85 | C9 | metal | Alpha exceeds background based on WRS test; alpha/beta scanning above flag | No ID after background subtraction | NA | NA | NA | NA | NA | Background |
| 804 | 1 | 13 | C10 | cinder block | Gamma exceeds background based on WRS test | U-235 | 187.9 | 96.93 | 219 | 145 | Yes | Within the $DCGL_{EMC}$ - Refer to Table 5-5 |
| | | | | | | Pb-210 | 46.95 | -- | 1717 | No DCGL | NA | Background |
| 804 | 2 | 6 | C6 | glass | Alpha exceeds background based on WRS test | Th-234 | 96.16 | 63.29 | 849 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 190 | 96.93 | 81 | 145 | No | Background |
| | | | | | | Pb-210 | 50.53 | -- | 478 | No DCGL | NA | Background |
| 804 | 3a | 0 | C1 | floor tile w/ concrete base | Alpha/beta scanning above flag | Tl-208 | 70.07 | 277.4 | 610 | No DCGL | NA | Background |
| | | | | | | Th-234 | 95.65 | 63.29 | 665 | 152 | Yes | Background - Refer to Table 5-5 |

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a/] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 cm$^2$) [b/] | DCGLw (dpm/100 cm$^2$) [c/] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 804 | 5a | 7 | C5 | cinder block | Bi-214 and Ra-226 debris sampling results potentially elevated; Class I Survey Area | Ra-223 | 82.86 | 269.5 | 114 | No DCGL | NA | Background |
| | | | | | | Th-228 | 82.86 | -- | 3706 | No DCGL | NA | Background |
| | | | | | | Pb-210 | 52.36 | -- | 1003 | No DCGL | NA | Background |
| | | | | | | Th-234 | 96.66 | 63.29 | 1188 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 179.9 | 96.93 | 36 | 145 | No | Background |
| 805 | 1 | 14 | C4 | concrete | Gamma exceeds background based on WRS test | Pb-210 | 44.02 | | 1895 | No DCGL | NA | Background |
| | | | | | | Th-228 | 79.1 | | 445 | No DCGL | NA | Background |
| | | | | | | Th-234 | 95.91 | 63.29 | 662 | 152 | Yes | Background - Refer to Table 5-5 |
| 805 | 1 | 20 | C6 | concrete | Gamma exceeds background based on WRS test | Th-228 | 80.36 | | 6406 | No DCGL | NA | Background |
| | | | | | | Th-234 | 94.65 | 63.29 | 1599 | 152 | Yes | Background - Refer to Table 5-5 |
| 806 | 1 | 3 | C1 | wood over concrete floor | General Coverage, Class II Survey Area | U-238 | 13.9 | -- | 54 | 152 | No | Background |
| | | | | | | Pb-210 | 45.61 | -- | 1397 | No DCGL | NA | Background |
| 810 | 10 | 8 | C4 | porcelain | Gamma exceeds background based on WRS test | Pb-210 | 48.41 | -- | 1705 | No DCGL | NA | Background |
| | | | | | | Th-228 | 80.11 | -- | 971 | No DCGL | NA | Background |
| 810 | 1 | 18 | C3 | concrete | General Coverage, Class II Survey Area | Th-228 | 87.38 | -- | 4736 | No DCGL | NA | Background |
| | | | | | | Th-234 | 87.38 | 63.29 | 1059 | 152 | Yes | Background - Refer to Table 5-5 |
| 812 | 9 | 2 | C2 | ceramic block | Gamma exceeds background based on WRS test | Pb-210 | 47.49 | -- | 1563 | No DCGL | NA | Background |
| | | | | | | Cs-137 | 33.07 | 661.7 | 43 | 12500 | No | Background and not exceeding DCGL$_w$ |
| 812 | 20 | 20 | C3 | ceramic block | Beta and gamma exceed background based on WRS test | Pb-210 | 43.66 | -- | 938 | No DCGL | NA | Background |
| 813 | 3 | 5 | C1 | cinder block | General Coverage, Limited Class III Survey Area | U-235 | 191.2 | 96.93 | 88 | 145 | No | Background |
| | | | | | | Pb-210 | 47.55 | -- | 1528 | No DCGL | NA | Background |

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 cm$^2$) [b] | DCGLw (dpm/100 cm$^2$) [c] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 815 | 15 | 15 | C3 | cinder block | Phase I debris sampling indicated elevated levels of Pb-211; Beta exceeds background based on WRS test | Ac-228 | 96.66 | 336 | 557 | No DCGL | NA | Background |
| | | | | | | Pb-212 | 242.9 | 78.67 | 112 | No DCGL | NA | Background |
| | | | | | | Th-234 | 96.66 | 63.29 | 1030 | 152 | Yes | Background - Refer to Table 5-5 |
| 816 | 10 | 9 | C4 | wood (analyzed using wood background) | Beta exceeds background based on WRS test; Class I Survey Area | Th-234 | 91.64 | 63.29 | 993 | 152 | Yes | Background - Refer to Table 5-5 and reanalysis below (#C4a) |
| | | | | | | U-235 | 191 | 96.93 | 5 | 145 | No | Background |
| | | | | | | Th-231 | 24.04 | 85.27 | 1183 | No DCGL | NA | Background |
| | | | | | | Pb-210 | 49.99 | -- | 192 | No DCGL | NA | Background |
| 816 | 10 | 9 | C4a | wood (analyzed using concrete background) | Beta exceeds background based on WRS test; Class I Survey Area | Pb-210 | 47.07 | -- | 924 | No DCGL | NA | Background |
| | | | | | | Th-234 | 91.89 | 63.29 | 789 | 152 | Yes | Background - Refer to Table 5-5 |
| 816 | 3 | 61 | C6 | cinder block | General Coverage | Th-234 | 98.16 | 63.29 | 832 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 186.2 | 96.93 | 64 | 145 | No | Background |
| 816 | 7 | 3 | C9 | cinder block | General Coverage | No ID after background subtraction | NA | NA | NA | NA | NA | Background |
| 816 | 8 | 5 | C1 | concrete | Class 1 room in Bldg. 816 | Th-234 | 94.15 | 63.29 | 761 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | Pb-210 | 47.07 | -- | 1776 | No DCGL | NA | Background |
| 819 | 11 | 19 | C24 | cinder block | Alpha and beta exceed background based on WRS test | Th-234 | 98.41 | 63.29 | 586 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | Tl-208 | 75.59 | 277.4 | 602 | No DCGL | NA | Background |
| | | | | | | Bi-211 | 355.2 | 74.39 | 401 | No DCGL | NA | Background |
| | | | | | | Pb-214 | 355.2 | 78.67 | 140 | No DCGL | NA | Background |

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 cm$^2$) [b] | DCGLw (dpm/100 cm$^2$) [c] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 819 | 12 | 23 | C28 | cinder block | Alpha exceeds background based on WRS test | Ra-226 | 192.7 | 351.9 | 5388 | 1210 | Yes | Background and $DCGL_{EMC}$ - Refer to Table 5-5 |
| | | | | | | U-235 | 192.7 | 96.93 | 328 | 145 | Yes | Background and $DCGL_{EMC}$ - Refer to Table 5-5 |
| | | | | | | Bi-211 | 353.7 | 74.39 | 538 | No DCGL | NA | Background |
| | | | | | | Pb-214 | 353.7 | 78.67 | 187 | No DCGL | NA | Background |
| 819 | 12D | 2 | C27 | cinder block | Alpha exceeds background based on WRS test | Th-231 | 21.76 | 85.27 | 545 | No DCGL | NA | Background |
| | | | | | | Ra-223 | 80.86 | 269.5 | 107 | No DCGL | NA | Background |
| | | | | | | Th-228 | 80.86 | -- | 3493 | No DCGL | NA | Background |
| | | | | | | Ac-228 | 94.15 | 336 | 1002 | No DCGL | NA | Background |
| | | | | | | Th-234 | 94.15 | 63.29 | 1575 | 152 | Yes | Background - Refer to Table 5-5 |
| 819 | 1 | 91 (Hot Spot 96) | C1 | ceramic block | Beta exceeds background based on WRS test | Pb-210 | 51.33 | -- | 567 | No DCGL | NA | Background |
| | | | | | | Th-228 | 88.38 | -- | 2179 | No DCGL | NA | Background |
| | | | | | | Th-234 | 88.38 | 63.29 | 487 | 152 | Yes | Background |
| 819 | 1 | 5 (Hot Spot 86) | C2 | concrete | Beta exceeds background based on WRS test | Pb-210 | 52 | -- | 2285 | No DCGL | NA | Background |
| | | | | | | Tl-208 | 70.83 | 277.4 | 210 | No DCGL | NA | Background |
| 819 | 4 | 5 | C8 | cinder block | Gamma exceeds background based on WRS test | Ac-228 | 95.91 | 336 | 225 | No DCGL | NA | Background |
| | | | | | | Pb-210 | 48.41 | -- | 515 | No DCGL | NA | Background |
| | | | | | | Th-234 | 95.91 | 63.29 | 468 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 179.9 | 96.93 | 88 | 145 | No | Background |
| 819 | 5 | 15 | C11 | wood panel over cinder block wall | Gamma exceeds background based on WRS test | U-235 | 181.2 | 96.93 | 140 | 145 | No | Background |
| | | | | | | Th-228 | 79.6 | -- | 2747 | No DCGL | NA | Background |
| | | | | | | Pb-210 | 46.15 | -- | 879 | No DCGL | NA | Background |
| | | | | | | Th-234 | 92.14 | 63.29 | 1196 | 152 | Yes | Background - Refer to Table 5-5 |

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 cm$^2$) [b] | DCGLw (dpm/100 cm$^2$) [c] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 819 | 5 | 7 | C12 | wood panel over cinder block wall | Gamma exceeds background based on WRS test | Pb-210 | 46.95 | -- | 1038 | No DCGL | NA | Background |
| | | | | | | Th-234 | 97.41 | 63.29 | 1044 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | Tl-208 | 71.58 | 277.4 | 2084 | No DCGL | NA | Background |
| | | | | | | Ac-228 | 97.41 | 336 | 663 | No DCGL | NA | Background |
| 819 | 5 | 11 | C13 | wood panel over cinder block wall | Gamma exceeds background based on WRS test | Ra-226 | 188.4 | 351.9 | 1871 | 1210 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 188.4 | 96.93 | 114 | 145 | No | Background |
| 819 | 5 | 12 | C14 | wood panel over cinder block wall | Gamma exceeds background based on WRS test | Pb-210 | 47.07 | -- | 1303 | No DCGL | NA | Background |
| | | | | | | Ac-228 | 96.66 | 336 | 37 | No DCGL | NA | Background |
| | | | | | | Ra-226 | 182.7 | 351.9 | 1764 | 1210 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-235 | 182.7 | 96.93 | 108 | 145 | No | Background |
| | | | | | | Bi-211 | 354 | 74.39 | 211 | No DCGL | NA | Background |
| | | | | | | Pb-214 | 354 | 78.67 | 73 | No DCGL | NA | Background |
| | | | | | | Th-228 | 84.87 | -- | 173 | No DCGL | NA | Background |
| | | | | | | Th-234 | 91.89 | 63.29 | 14 | 152 | No | Background |
| 819 | 7 | 8 | C17 | cinder block | Gamma exceeds background based on WRS test | Pb-210 | 40.62 | -- | 1480 | No DCGL | NA | Background |
| | | | | | | Th-228 | 79.1 | -- | 4358 | No DCGL | NA | Background |
| | | | | | | Th-234 | 94.4 | 63.29 | 1504 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | Ac-228 | 94.4 | 336 | 951 | No DCGL | NA | Background |
| 819 | 8 | 2 | C19 | cinder block | Gamma exceeds background based on WRS test | Pb-210 | 47.68 | -- | 262 | No DCGL | NA | Background |
| | | | | | | Th-234 | 97.41 | 63.29 | 214 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | Ra-223 | 83.87 | 269.5 | 102 | No DCGL | NA | Background |
| | | | | | | Th-228 | 83.87 | -- | 3339 | No DCGL | NA | Background |
| | | | | | | Ac-228 | 97.41 | 336 | 136 | No DCGL | NA | Background |
| 819 | 12d | 4 | C25 | material | Alpha exceeds background based on WRS test | Pb-210 | 42.69 | -- | 399 | No DCGL | NA | Background |
| | | | | | | Th-234 | 93.15 | 63.29 | 602 | 152 | Yes | Background - Refer to Table 5-5 |
| 823 | 1 | 5 | C1 | cinder block | General coverage | Pb-210 | 52.12 | -- | 829 | No DCGL | NA | Background |

## Table 4-26
## Summary of Potentially Elevated Gamma Spectroscopy Results
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Sample Material | Rationale for Gamma Spectroscopy | Radionuclides Identified | Peak Energy (keV) [a/] | 2nd Peak Energy (keV) | Upper Bound Peak Activity (dpm/100 $cm^2$) [b/] | DCGLw (dpm/100 $cm^2$) [c/] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2104 | Bkgd Material Sample | NA | NA | background cinder block | Background | Pb-210 | 50.78 | -- | 713 | No DCGL | NA | Background |
| | | | | | | Th-234 | 95.65 | 63.29 | 350 | 152 | Yes | Background - Refer to Table 5-5 |
| | | | | | | U-238 | 16.42 | -- | 360 | 152 | Yes | Background - Refer to Table 5-5 |

[a/] keV = kiloelectron volts; the peak energy refers to the primary photon energy that was used to identify the radionuclide.

[b/] dpm/100$cm^2$ = disintegrations per minute per 100 square centimeters; the upper bound peak activity is a conservative estimate of the surficial activity for the identified radionuclide based on the energy peak activity determined by the analysis software plus 50 percent.

[c/] DCGLw = Derived Concentration Guideline Level; from Table 4-1.

[d/] NA = not applicable.

[e/] "--" indicates that a second energy peak was either not identified or not used to verify the identification of a radionuclide.

# Table 4-27
## Analytical and In-Situ Gamma Spectroscopy Results for Material Samples
## SEAD-12 Building Survey
## Seneca Army Depot Activity

| Sample | Laboratory Analytical Data | | | | URSA Gamma Spectroscopy Data | | |
|---|---|---|---|---|---|---|---|
| | Result (pCi/g) [a/] | Error (+/-) | Qualifier | MDA (pCi/g) [b/] | Result (pCi/g) | Error (+/-) | MDA (pCi/g) |
| **804-1-C8** | | | | | | | |
| Americium-241 | 0.0143 | 0.0107 | | 0.0122 | Not Identified [c/] | | 0.06 |
| Plutonium-239/240 | -0.0122 | 0.0139 | U [d/] | 0.0297 | Not Identified | | 0.04 |
| **804-3-C3** | | | | | | | |
| Americium-241 | 0.00571 | 0.0151 | U | 0.0273 | Not Identified | | 0.07 |
| Plutonium-239/240 | -0.0137 | 0.012 | U | 0.0288 | Not Identified | | 0.04 |
| **819-5-C11** | | | | | | | |
| Americium-241 | 0.0118 | 0.0103 | U | 0.0141 | Not Identified | | 0.08 |
| Plutonium-239/240 | -0.0166 | 0.0126 | U | 0.0288 | Not Identified | | 0.04 |
| **819-5-C13** | | | | | | | |
| Americium-241 | 0.0123 | 0.0099 | U | 0.0136 | Not Identified | | 0.08 |
| Plutonium-239/240 | 0.00136 | 0.0027 | U | 0.0299 | Not Identified | | 0.05 |
| **819-12D-C27** | | | | | | | |
| Americium-241 | 0.0104 | 0.0139 | U | 0.0233 | Not Identified | | 0.08 |
| Plutonium-239/240 | 0.00542 | 0.0109 | U | 0.0163 | Not Identified | | 0.05 |
| **BKGD CB1** | | | | | | | |
| Americium-241 | 0.0141 | 0.0116 | U | 0.0169 | 0.37 [e/] | 0.19 | 0.09 |
| Plutonium-239/240 | 0.0193 | 0.0225 | | 0.0193 | 1.67 [e/] | 0.83 | 0.05 |
| **BKGD FL** | | | | | | | |
| Americium-241 | 0.019 | 0.0159 | U | 0.024 | Not Identified | | 0.12 |
| Plutonium-239/240 | 0.011 | 0.0156 | U | 0.0165 | Not Identified | | 0.06 |

[a/] pCi/g = picocuries per gram.

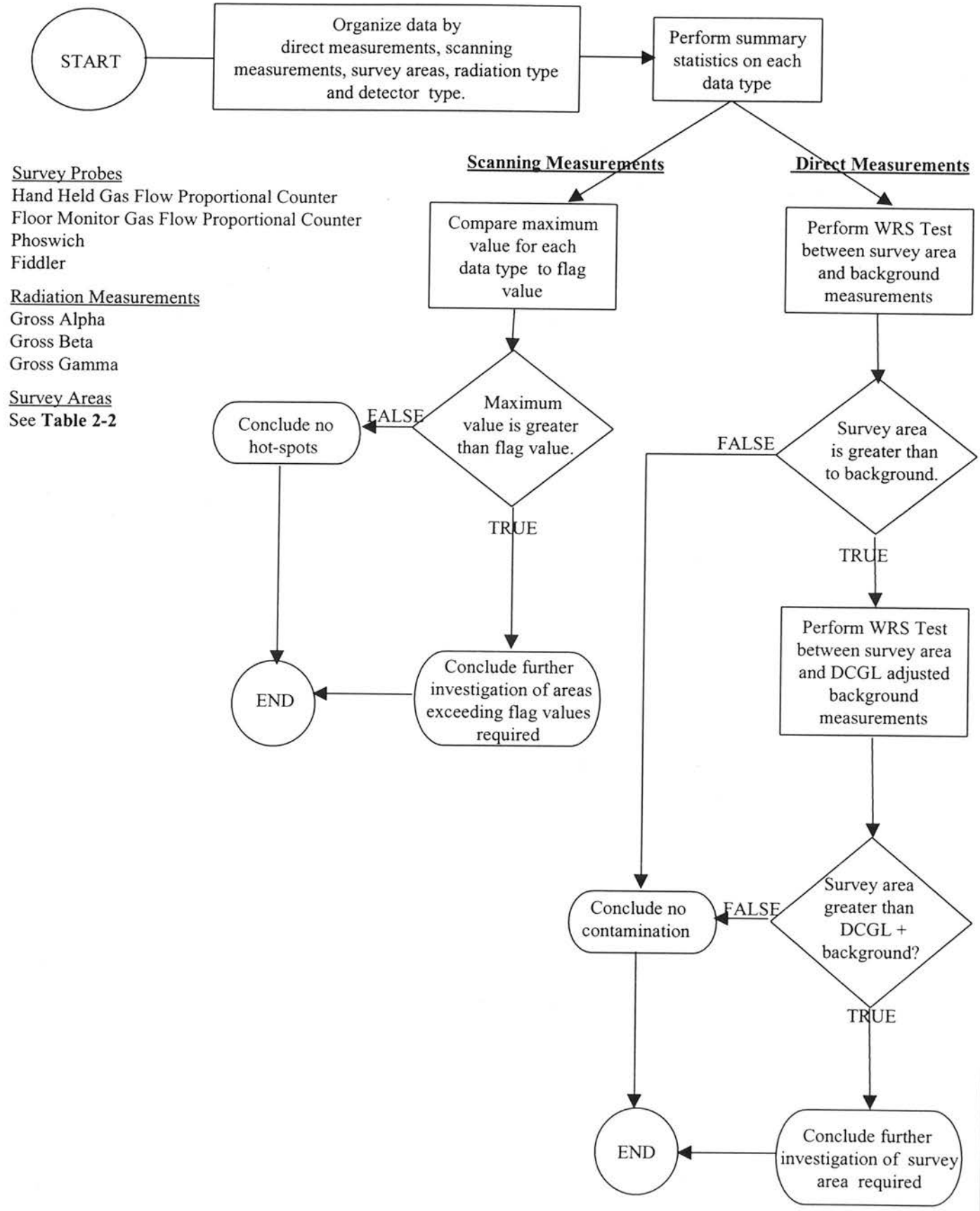
[b/] MDA = minimum detectable activity.

[c/] "Not Identified" indicates that there is no discernable activity detected above the MDA to allow the radionucludes to be identified.

[d/] In the laboratory analysis the "U" qualifiers indicate that the reported results are below the MDA and are non-detectable activity.

[e/] The identification for BKGD-CB1 of Pu-239 and Am-241 is complicated by the presence of multiple radionuclides having a gamma emission at the 13 keV energy level. Also identified were U-233 at 1.88 pCi/g (+/- 0.94), U-238 at 0.83 pCi/g (+/-0.42), Th-208 at 0.81pCi/g (+/-0.94), and Pb-210 at 1.65 pCi/g (+/- 0.83). The correct identification is naturally-occurring U-238 based on the other radionuclides that were identified in the sample and the fact that background building 2104 was never used for radiological activities.

# FIGURE 4-1
# DATA ANALYSIS PROCESS - FLOW DIAGRAM
# SEAD 12 RADIOLOGICAL BUILDING SURVEY




p:\pit\projects\seneca\s12ri\bldgsurv\data_report\draft(PhaseI&II)\figures\figure4-1.ppt

# 5 DISCUSSION AND CONCLUSIONS

During the Phase I and Phase II building surveys at SEAD-12, radiological investigations were conducted in all Class I, Class II, and Class III/ Limited Class III buildings. The investigations included alpha, beta, and gamma direct and scanning measurements, exposure rate measurements, gross alpha/beta/gamma smear samples, tritium smear samples, gamma spectroscopy, and materials sampling. MARSSIM compliance analyses were performed for gross alpha, beta, and gamma direct and scanning survey data for the areas listed above as described in **Section 4**. The results from the MARSSIM analysis and exposure rate and smear analyses from the Phase I work are discussed in **Section 5.1** below. The results from the Phase II building surveys are discussed in **Section 5.2**. The conclusions based on these results are presented in **Section 5.3**.

## 5.1 DISCUSSION OF PHASE I BUILDING SURVEY RESULTS

The results of the Phase I direct measurements, scanning, exposure rate measurements, smear and debris sampling, and duct and drain investigation are summarized in **Tables 5-1** and **5-2** and are discussed below.

### 5.1.1 Direct Measurements

Alpha, beta, and gamma direct measurement data sets from each room were statistically compared to the background data set using the WRS test. The survey areas/measurement types that were elevated above background based on the WRS are listed in **Table 5-1**. Twenty-eight of the Phase I survey areas had at least one measurement data set that was elevated above background. In addition, six of the survey areas where discretionary measurements were taken had data sets elevated above background.

The alpha and beta data sets that were elevated above background were compared to a $DCGL_W$-adjusted background (**Table 4-7**). None of these data sets were elevated above the $DCGL_W$-adjusted background data set. The gamma measurement data sets that were elevated above background are discussed below in **Section 5.1.1.1**. The final step in the data analysis process involved comparing the survey area data sets including discretionary measurements with the $DCGL_W$-adjusted background (**Table 4-8**). The results of this comparison indicate that none of the survey area data sets with discretionary measurement data were elevated above the $DCGL_W$-adjusted background data set.

The primary criterion for release of the SEAD-12 buildings is compliance with the DCGLs, which has been demonstrated here. Although no survey area exceeded the DCGLs, and thus met the release criteria, several areas were further investigated. Specific locations of concern from Phase I survey areas identified to be above background were evaluated further by the collection of gamma

spectroscopy measurements. The gamma spectroscopy results are presented in **Section 4.5.6**, and discussed below in **Section 5.2.5**.

#### 5.1.1.1 Gamma Measurements

Gamma direct measurements were not compared to the $DCGL_W$-adjusted background. The worst-case gamma $DCGL_W$ (for Am-241) is equal to 39.7 dpm/100cm$^2$. When the $DCGL_W$ is converted to cpm using the FIDLER field efficiency for Am-241 and the detector area, it is equal to less than 1 cpm. The addition of a $DCGL_W$ of less than 1-cpm does not significantly change a gamma background data set that ranges from 5,000 to 20,000 cpm. As a result, gamma measurement data was compared only to background. If the gamma measurements for a survey area exceeded background, the survey area was considered to be potentially elevated and was evaluated further.

As shown in **Table 5-1**, six Phase I survey areas had gamma measurements that were elevated above background based on the WRS test. In situ gamma spectroscopy was performed at locations within these six survey areas during the Phase II work. The gamma spectroscopy results are presented in **Section 4.5.6**, and discussed below in **Section 5.2.5**.

### 5.1.2 Scanning Measurements

Comparisons of the alpha and beta radiation scanning measurements to the $DCGL_{EMC\,5}$ plus the mean of the background data set (**Table 4-9** and **Table 5-1**) found that seven of the Phase I survey areas contained localized areas of elevated radioactivity. The survey areas containing one or more scanning measurements in excess of the $DCGL_{EMC\,5}$ are:

- Building 803 (Room 3),
- Building 803 (Room 6),
- Building 804 (Room 3),
- Building 804 (Room 4),
- Building 805 (Room 1),
- Building 816 (Room 9), and
- Building 819 (Room 3).

As noted in **Table 5-2**, none of these seven rooms have more then five alpha/beta radiation scanning measurements that exceed the $DCGL_{EMC/5}$ criteria (which provides for up to five elevated measurements per room). Building 803 (Room 6), and Building 816 (Room 9) had only a single scanning measurement that exceeded the $DCGL_{EMC/5}$ criteria. Building 819 (Room 3) had two alpha/beta scanning measurements that exceeded the $DCGL_{EMC/5}$ criteria. The four measurements that exceeded the $DCGL_{EMC/5}$ criteria in Building 803 (Room 3) were all 900 dpm ($DCGL_{EMC/5}$ criteria of 854 dpm). The three scanning measurements with the alpha/beta gas proportional that exceeded the $DCGL_{EMC\,5}$ criteria in Building 804 (Room 3) (1000, 800, and 700 dpm) were all from

ceramic tile, a material that has a naturally high background. In addition there were two scanning measurements taken with the floor monitor from Building 804 (Room 3) that exceeded the $DCGL_{EMC\ 5}$ criteria. Building 804 (Room 4) also had two scanning measurements that exceeded the $DCGL_{EMC\ 5}$.

Two of the Phase I survey areas had potentially elevated areas of gamma radiation – Building 804 (Room 3), and Building 805 (Room 1). The field flag value for scanning for gamma radiation was 19,000 cpm, or the 95% UTL (upper tolerance limit) of the background scanning data set. Building 804 (Room 4) had four scanning measurements that equaled or exceeded the flag value, while Building 805 (Room 1) had only one exceedence. Gamma spectroscopy was performed on these survey areas during the Phase II work. The gamma spectroscopy results are presented in **Section 4.5.6**, and discussed below in **Section 5.2.5**.

Four specific areas of concern that were initially surveyed during the Phase I investigation – the metal shelf in Building 803 (Room 6), the ceramic sink in Building 819 (Room 1), the metal crane in Building 819 (Room 3), and selected areas in Building 819 (Room 12D) – are addressed in individually in **Section 5.3**. These areas warranted additional discussion either due to elevated scanning or direct measurements encountered or based on community interest in the re-use of the area.

### 5.1.3 Exposure Rate Measurements

All exposure rate measurements collected from the Phase I survey areas were below the maximum exposure rate measurement of 16 µrem/hr collected in the background building (**Table 4-10**). In addition, all measurements were well below the established worker safety level of 500 µrem/hr (Radiation Protection Manual ER385-1-80, USACE).

### 5.1.4 Smear Sampling Results

The smear data collected from the Phase I survey areas are summarized in **Table 4-11**. As indicated in **Table 5-2**, there were no exceedances of the ANSI or NYSDOL standards.

### 5.1.5 Duct and Drain Results

The results of the Phase I duct and drain smear sampling are summarized in **Table 4-11**. As indicated in **Table 5-2**, none of the duct and drain smears samples collected during Phase I exceed the ANSI and NYSDOL standards.

The results of the debris sampling conducted at several duct and drain locations is presented in **Table 4-13**. Three survey areas (listed in **Table 5-2**) had radionuclide levels at or exceeding the radionuclide-specific ANSI standard. As such, these survey areas were investigated further during Phase II using gamma spectroscopy (see **Sections 4.5.6** and **5.2.5**).

## 5.2 DISCUSSION OF PHASE II BUILDING SURVEY RESULTS

The results of the Phase II building surveys are discussed below.

### 5.2.1 Direct Measurements

Direct measurements collected during the Phase II investigation were analyzed using the same methodology utilized during the analysis if the data collected during Phase I of the investigation. The comparisons of survey area data and survey area data plus discretionary measurements to the background data set are shown in **Tables 4-15** and **4-16**. Fourteen of the Phase II survey areas had measurement data sets that were elevated above background, as shown in **Table 5-3**. Only three of the Phase II survey areas with data sets including discretionary measurements were elevated above background.

The Phase II alpha and beta radiation measurement data sets that were elevated above background were compared to the $DCGL_W$-adjusted background (**Table 4-19**). There were no alpha or beta data sets that were elevated above the $DCGL_W$-adjusted background. The comparison of alpha and beta measurement data sets including discretionary measurements to the $DCGL_W$-adjusted background resulted in no exceedences. The gamma measurement data sets that were elevated above background are discussed below in **Section 5.2.1.1**.

The primary criterion for release of the SEAD-12 buildings is compliance with the DCGLs, which has been demonstrated here. While no survey area exceeded the DCGLs, and thus met the release criteria, several of the above background survey areas from Phase II were evaluated further by the collection of gamma spectroscopy measurements. The gamma spectroscopy results are presented in **Section 4.5.6**, and discussed below in **Section 5.2.5**.

#### 5.2.1.1 Gamma Measurements

Gamma radiation data sets that exceeded background were not compared to the $DCGL_W$-adjusted background. The worst-case gamma $DCGL_W$ (for Am-241) is equal to 39.7 dpm/100cm$^2$ (**Table 4-1**). When the $DCGL_W$ is converted to cpm using the FIDLER field efficiency for Am-241 and the detector area, the $DCGL_W$ is equal to less than 1 cpm. The addition of a $DCGL_W$ of less than 1-cpm will not significantly change a background data set that ranges from 5,000 to 20,000 cpm. As a result, gamma measurement data was compared only to background. If the gamma measurements for a survey area exceeded background, the survey area was considered to be potentially elevated and was evaluated further.

As shown in **Table 5-3**, six Phase II survey areas have gamma measurement data sets that are elevated above background. In addition, three of the survey area data sets with discretionary measurements are elevated above background. To further investigate, gamma spectroscopy was performed at locations within these survey areas (refer to **Sections 4.5.6** and **5.2.5**).

### 5.2.2 Scanning Measurements

Comparisons of the alpha/beta scanning measurements to the $DCGL_{EMC/5}$ plus the mean of the background data set (**Table 4-21**) found that none of the Phase II survey areas had alpha/beta scanning measurements above the $DCGL_{EMC/5}$ flag value. There were seven Phase II survey areas (listed in **Table 5-4**) that had at least one gamma scanning measurement above the background 95% UTL flag value.

As noted in **Table 5-4**, Building 812 (Room 20) is the only one of these survey areas that has more than five gamma measurements that exceed the 95% UTL – all other Phase II survey areas have three or less. The materials associated with Building 812 (Room 20) are ceramic tiles and ceramic block, which intrinsically have naturally high background radiation. To further investigate the area, gamma spectroscopy was performed in this survey area (refer to **Sections 4.5.6** and **5.2.5**).

### 5.2.3 Exposure Rate Measurements

All exposure rate measurements collected from the Phase II survey areas were below the maximum exposure rate measurement of 16 µrem/hr collected in the background building (**Table 4-22**). In addition, all measurements were well below the established worker safety level of 500 µrem/hr (Radiation Protection Manual ER385-1-80, USACE).

### 5.2.4 Smear Sampling Results

Smear results were compared to the ANSI standard and the NYSDOL guidelines for each radiation type (alpha, beta, gamma, and $H^3$-beta) on a room-by-room basis. **Table 4-23** summarizes the dry smear data collected from the Phase II survey areas. **Table 4-24** summarizes the tritium smear sampling results from Phase II. All Phase II smear sampling results met ANSI and NYSDOL standards.

### 5.2.5 Gamma Spectroscopy

Results of in-situ gamma spectroscopy conducted at SEAD-12 are presented in **Tables 4-25** and **4-26**. The gamma spectroscopy results for the survey areas that may have had potential exceedences as determined by in-situ gamma spectroscopy are listed in **Table 5-5**. A more detailed discussion of the results and their interpretation is presented in **Appendix O**.

For the most part, the radionuclides identified were associated with the U-238, U-235, or Th-232 natural decay series. Often several radionuclides from the same decay chain were identified, confirming the presence of naturally occurring material. Where applicable, the activity concentrations of identified radionuclides were compared to the $DCGL_W$s. If the activity was greater than the $DCGL_W$, then a weight of evidence approach was taken to determine if the measurement indicated a source of contamination, or was a naturally occurring elevation in background. For

example, the gamma spectroscopy measurement for Building 804 (Room 1, Grid 13) indicated an upper bound activity that was greater than the $DCGL_W$. The following arguments were made to support a "suitable for release" consideration:

- The measured activity concentration is less than the $DCGL_{EMC}$;
- Direct alpha and beta measurements for this survey area did not exceed the $DCGL_W$-adjusted background
- There are no scanning exceedences associated with this survey area.
- Only one other radionuclide (associated with the natural U-238 decay chain) was identified.

As a result, the U-235 activity that was greater than the U-235 $DCGL_W$ was considered to be a naturally occurring elevated background measurement. Other gamma spectroscopy measurements with radionuclide identification and quantification that was greater than the $DCGL_W$ were handled similarly. In this manner, it was determined from the gamma spectroscopy results that the in situ spectra collected during Phase II were characteristic of background, and did not indicate the presence of contamination.

### 5.2.6 Material Sampling

As shown in **Table 4-27**, material samples were collected from seven locations and analyzed with the field gamma spectroscopy system and by an offsite laboratory. The results demonstrate that there was no Pu-239 or Am-241 contamination present in any of the survey area samples. Pu-239 and Am-241 were identified in the background material sample BKGD CB1; however, this identification is the result of the presence of several other naturally occurring radionuclides that have similar low-energy gamma photons (around 13 keV), such as U-238, U-235, Th-234, and U-234. Background Building 2104, as additional evidence to support the misidentification, was never used for radiological activities; any radioactive materials present would have to be the result of naturally occurring materials.

## 5.3 FINDINGS FROM SPECIFIC AREAS OF CONCERN

Over the course of the Phase I and II surveys, four specific sampling locations of concern were noted. The survey results from these four areas are addressed below. Based on elevated scanning or direct measurements encountered during the survey or because of community interest in the re-use of the area, these areas required additional clarification. Additionally described below are measures that will be taken in some of the areas to satisfy the criteria of being as low as reasonable achievable (ALARA).

### 5.3.1 Building 803, Room 6, Grid 15T (metal shelf)

Elevated alpha and beta measurements (849 and 1640 cpm, respectively, compared to field flag values of 12 and 824 cpm) were detected on this shelf during the Phase I building survey. The

gamma measurement for this location was within background. Both dry and tritium smear samples collected from the shelf were within background, indicating that any contamination present was not removable. During Phase II of the building surveys, in-situ gamma spectroscopy analysis was performed on the shelf in order to identify the radionuclides present. The gamma component of the contamination was not significant enough to allow for identification, and the gamma spectroscopy system was not able to differentiate between the contamination on the shelf and background.

Based on the initial elevated alpha/beta measurements, it is likely that the detected radioactivity is associated with radium paint, which is comprised of the alpha-emitter Ra-226 and the beta emitter Ra-228. Ra-226 also has a significant gamma emission at 186 keV; however, this emission was not notable during the survey since the FIDLER used with the gamma spectroscopy system is most efficient at detecting gamma energies less than 100 keV, and its efficiency drops as gamma energies increase. It is likely that the background gamma levels in the room (constructed of concrete) were sufficient to mask or drown out the Ra-226 gamma emissions.

As discussed in **Section 4**, the survey area in which this elevated reading was found - Building 803, Room 6 - met the release criteria. The data set from the entire survey area passed the comparison to the $DCGL_W$-adjusted background. In addition, while the hotspot on the shelf exceeded the $DCGL_{EMC\ 5}$, it was the only hotspot associated with the survey area and so met the localized elevated measurement criterion because the $DCGL_{EMC\ 5}$ allows for five exceedences. However, in the interest of satisfying ALARA criteria, the elevated shelf Building 803, Room 6 will be removed and disposed.

### 5.3.2 Building 819, Room 1, Grid 91 (ceramic sink)

During the Phase I building surveys, elevated alpha and beta measurements were detected inside and around the ceramic sink located in Building 819, Room 1. Smear samples did not indicate the presence of removable contamination. In-situ gamma spectroscopy was performed on interior of the sink during the Phase II building surveys. Three naturally occurring radionuclides were positively identified based on the in-situ gamma spectroscopy measurement – Pb-210, Th-228, and Th-234. Pb-210 and Th-234 are decay products associated with the U-238 decay chain, and Th-228 is associated the Th-232 decay chain.

While the measured activity of Th-234 is higher than the U-238 $DCGL_W$ of 152 dpm/100cm$^2$, it is likely to be naturally occurring. Ceramic materials typically contain high levels of naturally occurring materials. In fact, elevated readings associated with ceramic wall blocks and tiles were also observed elsewhere during the SEAD-12 building surveys (for example in Building 812, Room 20; Background Building 2104; and Background Building 118, among others). The identification of the other naturally occurring long-lived decay products such as Pb-210 and Th-228 also supports the conclusion that the elevated activity observed in the sink is naturally occurring. Refer to **Appendix O** for more information on the radionuclide identification process using gamma spectroscopy.

The presence of this localized elevated area did not prevent the survey area from meeting the release criteria. The data set for Building 819, Room 1, was not elevated above the $DCGL_W$-adjusted background data set. In addition, there were no scanning measurements for Building 819, Room 1, that exceeded the $DCGL_{EMC/5}$ release criteria.

### 5.3.3 The crane in Building 819, Room 3

Elevated alpha and beta measurements were collected from the metal crane. There was no elevated gamma component as confirmed by the in-situ gamma spectroscopy and by the statistics indicating that the gamma measurements were not elevated above background. Smear samples collected at this location did not indicate the presence of removable contamination.

To further investigate the potentially elevated alpha and beta measurements, a paint sample was collected from the surface of the crane. This was done in order to determine if the source of the elevated measurements was from the metal of the crane or from the coat of paint covering the crane. Collection of the paint sample was difficult. Scraping was attempted but was extremely time consuming and produced an insufficient sample amount for any type of analysis. The paint sample was finally obtained by heating and scraping the coat of paint from the crane metal in the location of the elevated measurement. This method of collection produced enough sample volume to obtain a gross radiation result, but was insufficient to obtain isotopic results. The sample was sent to Radiation Safety Associates, Inc. for laboratory alpha spectroscopy analysis. The results are presented in **Appendix J**. The gross alpha concentration detected in the analysis was 17.55 +/- 4.13 pCi/g and the detected gross beta concentration was 23.13 +/- 3.33 pCi/g. These results were not as elevated as those noted in the field and no specific radionuclides were identified during the alpha spectroscopy analysis. However, after the paint sample was obtained, the exposed crane section was re-scanned and found to be at background levels, indicating that the source of the elevated levels was most likely contained in the paint.

Since alpha spectroscopy of the paint sample did not provide any specific radionuclide identification, it is possible that the use of the heat gun to melt or soften the paint before it was removed may have resulted in the volatilization of radioactive material within the paint.

When the measurement data from the room and the crane in Building 819, Room 3 were evaluated together as a whole, the room met the $DCGL_W$ release criteria (i.e., the direct measurement data sets for the room were not elevated above the $DCGL_W$-adjusted background data set). Building 819, Room 3 only had two scanning measurements that exceeded the $DCGL_{EMC/5}$, one of which was from the crane.

For further investigation, Building 819 (room 3) was divided into two survey units: the room, and the large crane that is attached to two of the walls and runs across the ceiling. The alpha and beta direct measurement data from just the crane were evaluated and found to be statistically elevated above

background when compared without the other data from Building 819, Room 3. WRS test results indicated that the alpha direct measurements from the crane were elevated above the $DCGL_W$-adjusted background, while the beta direct measurements were not (see **Figure 5-1**). The alpha and beta direct measurements including the additional discretionary "hotspot" measurements from the crane were compared to the $DCGL_W$-adjusted background data set as in **Section 4**, and both the alpha and beta measurements from the crane were found to be elevated above the $DCGL_W$-adjusted background (see **Figure 5-1**).

Since Building 819, Room 3 meets the release criteria, the room is suitable for release. However, to satisfy ALARA requirements, the elevated areas of paint on the crane will be removed.

### 5.3.4 Building 819, Room 12D (generator room)

Building 819, Room 12, contains an electrical generator that may be accessed by the KidsPeace organization, located on the northwest boundary of SEAD-12. Room 12D in Building 819 (a bathroom in the southwest corner of the room) was of concern after the Phase I surveys because the WRS test indicated that the Room 12 alpha survey measurements were elevated above background (although not above the $DCGL_W$-adjusted background) and Room 12D had the highest scanning (alpha/beta and gamma) measurements. During Phase II, a material sample was taken from the west wall of Room 12D. The results of both in-situ gamma spectroscopy and laboratory analysis of this material sample (with specific analysis performed for Pu-239 and Am-241) are presented in **Table 4-27**. As noted for sample 819-12D-C27, both Pu-239 and Am-241 were not detected in either the laboratory analysis or the in-situ gamma spectroscopy of the sample. As noted in **Table 5-5**, in-situ gamma spectroscopy of sampling location C27 detected Th-231, Ra-223, Th-228, Ac-228, and Th-234, which are all naturally occurring radionuclides. In-situ gamma spectroscopy at an additional sampling location in Room 12D (819-12D-C25) identified the presence of Th-234 and Pb-210, which are both members of the U-238 decay series, supporting the conclusion that the residual activity detected in Room 12D is naturally-occurring.

Given these results, Building 819, Room 12 meets the release criteria. The data set from the entire survey area passed the comparison to the $DCGL_W$-adjusted background. In addition, there were no elevated measurement locations. As such, Building 819, Room 12, is suitable for release.

## 5.4 SUMMARY OF FINDINGS

The purpose of this report was to document the completion of two phases of radiological surveys of the buildings at SEAD-12, Seneca Army Depot, New York. These surveys were conducted according to MARSSIM guidance. The following findings were made during the Phase I and II surveys and data analysis:

- The DCGL values calculated using RESRAD-BUILD and presented in **Appendix A** were adequate to ensure that the maximum exposure to on-site receptors would not exceed the NYSDEC TAGM of 10 mrem/yr.
- The survey design and number of samples collected were adequate to support compliance with the DCGLs.
- Statistical analyses of direct measurements demonstrated that all survey areas met the DCGLs for alpha and beta radiation.
- Statistical analyses of direct measurements demonstrated that 166 out of 178 survey areas were indistinguishable from background for gamma radiation.
- In-situ gamma spectroscopy measurements showed that the survey areas with above-background gamma measurements were the result of naturally elevated building materials and not radioactive contamination.
- The results of dry and wet smear sampling demonstrated that removable radioactive contamination above ANSI or NYSDOL standards was not present in any of the survey areas.
- Exposure rate measurements demonstrated that all personnel worked in radiologically safe conditions at all times.
- Of the four specific areas of concern (the metal shelf in Building 803, Room 6; the ceramic sink in Building 819, Room 1; the metal crane in Building 819, Room 3; and Building 819, Room 12D), all met the criteria for release.
- To satisfy ALARA, the elevated areas of paint on the crane in Building 819 will be removed and the metal shelf on Building 803, Room 6 will be disposed.

## 5.5 CONCLUSIONS

Based on the findings presented above, it is concluded that all areas within SEAD-12 meet the 10 mrem/year release criterion. Consequently, all survey units within the buildings in SEAD-12 demonstrate compliance with regulations based on results of the Final Status Survey completed.

**Table 5-1**
**Summary of Phase I Direct Measurement Potential Exceedences**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Survey > Background | | | |
|---|---|---|---|
| **Building** | **Room** | **Measurement** | **Instrument** |
| 803 | 1 | Alpha | Phoswich |
| 803 | 2 | Alpha | Phoswich |
| | | Alpha | Floor Monitor |
| 803 | 3 | Alpha | Phoswich |
| 803 | 4 | Alpha | Phoswich |
| | | Alpha | Floor Monitor |
| 803 | 5 | Alpha | Phoswich |
| | | Alpha | Floor Monitor |
| 803 | 6 | Alpha | Phoswich |
| | | Alpha | Floor Monitor |
| 803 | 7 | Alpha | Phoswich |
| | | Alpha | Floor Monitor |
| 804 | 1 | Beta | Hand-Held |
| | | Gamma | FIDLER |
| 804 | 2 | Alpha | Floor Monitor |
| 804 | 3 | Alpha | Floor Monitor |
| 804 | 4 | Alpha | Hand-Held |
| 804 | 6 | Alpha | Floor Monitor |
| 805 | 1 | Beta | Hand-Held |
| | | Gamma | FIDLER |
| 810 | 1 | Beta | Floor Monitor |
| 815 | 15 | Beta | Floor Monitor |
| 816 | 10 | Beta | Floor Monitor |
| 819 | 1 | Beta | Floor Monitor |
| 819 | 2 | Beta | Hand-Held |
| 819 | 3 | Alpha | Hand-Held |
| | | Alpha | Floor Monitor |
| | | Beta | Floor Monitor |
| 819 | 4 | Beta | Hand-Held |
| | | Beta | Floor Monitor |
| | | Gamma | FIDLER |
| 819 | 5 | Beta | Floor Monitor |
| | | Gamma | FIDLER |
| 819 | 6 | Beta | Hand-Held |
| 819 | 7 | Beta | Hand-Held |
| | | Beta | Floor Monitor |
| | | Gamma | FIDLER |
| 819 | 8 | Beta | Hand-Held |
| | | Gamma | FIDLER |
| 819 | 9 | Beta | Hand-Held |
| | | Beta | Floor Monitor |
| 819 | 10 | Beta | Hand-Held |
| 819 | 11 | Alpha | Floor Monitor |
| | | Beta | Floor Monitor |
| 819 | 12 | Alpha | Floor Monitor |
| **Survey plus Discretionary > Background** | | | |
| **Building** | **Room** | **Measurement** | **Instrument** |
| 803 | 6 | Alpha | Floor Monitor |
| | | Alpha | Phoswich |
| 804 | 3 | Alpha | Floor Monitor |
| 819 | 1 | Alpha | Floor Monitor |
| | | Beta | Floor Monitor |
| 819 | 3 | Alpha | Floor Monitor |
| | | Alpha | Phoswich |
| | | Beta | Floor Monitor |
| | | Beta | Phoswich |
| 819 | 4 | Gamma | FIDLER |
| 819 | 5 | Beta | Floor Monitor |
| | | Gamma | FIDLER |

## Table 5-2
## Summary of Phase I Scanning and Debris Sampling
## Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Building Class | Isotope/ Instrument | Criteria | | Site Condition/ Measurement | Comment |
|---|---|---|---|---|---|---|---|
| | | | | Reference | Level | | |
| **Scanning Data (including discretionary measurements)** | | | | | cpm | cpm | |
| **803** | 3 | I | ABPH | $DCGL_{EMC/5}$ | 854 | 900 | 4 floor measurements exceed criteria (all 900 cpm) |
| **803** | 6 | I | ABPH | $DCGL_{EMC/5}$ | 854 | 2500 | 1 measurement exceeds criteria (a shelf recommended for removal) |
| **804** | 3 | I | ABHH | $DCGL_{EMC/5}$ | 534 | 1000 | 5 measurements exceed criteria |
| **804** | 3 | I | ABFM | $DCGL_{EMC/5}$ | 2807 | 3000 | 2 measurements equal or exceed criteria |
| **804** | 3 | I | FIDLER | Background 95% UTL | 19000 | 20000 | 4 measurements equal or exceed criteria |
| **804** | 4 | I | ABHH | $DCGL_{EMC/5}$ | 534 | 600 | 2 measurements exceed criteria |
| **805** | 1 | I | FIDLER | Background 95% UTL | 19000 | 20000 | 1 measurement exceeds criteria |
| **816** | 9 | I | ABHH | $DCGL_{EMC/5}$ | 534 | 1000 | 1 measurement exceeds criteria |
| **819** | 3 | I | ABHH | $DCGL_{EMC/5}$ | 534 | 950 | 2 measurements exceed criteria |
| **Smear Sampling ( including Duct and Drain smear sampling)** | | | | | | | |
| No Exceedences of either ANSI or NYSDOL Standards[2] | | | | | | | |
| **Debris Sampling** | | | | | pCi/g | pCi/g | |
| **804** | 3 | I | Pb-210 | ANSI | 16.7 | 20.2 | Estimated value, error range = ± 18.4 pCi/g |
| **804** | 5 | I | Bi-214 | ANSI | 5.2 | 5.2 | Estimated value, error range = ± 1.1 pCi/g |
| **804** | 5 | I | Ra-226 | ANSI | 5.2 | 5.2 | Estimated value, error range =± 1.1 pCi/g |
| **815** | 15 | I | Pb-211 | ANSI | 12.9 | 16.3 | Estimated value, error range = ± 4.1 pCi/g |

**Notes:**

[1] $DCGL_{EMC/5}$ - $DCLG_{EMC}$ (calculated using RESRAD-Build) and divided by 5 (assumes 5 elevated measurements). A room size of 5x12x4 m was used for RESRAD model.

[2] No exceedences of the ANSI or NYSDOL criteria for smear/removeable radiation (See Table 4-11 ).

[3] ANSI/HPS N13.12-19 Criteria for volume source (pCi/g) plus 95$^{th}$ percentile of soil background data.

# Table 5-3
## Summary of Phase II Direct Measurement Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Survey > Background | | | |
|---|---|---|---|
| **Building** | **Room** | **Measurement** | **Instrument** |
| 807 | 6 | Alpha | Floor Monitor |
| 809 | 1 | Beta | Floor Monitor |
| 810 | 5 | Alpha | Phoswich |
| 810 | 8 | Alpha | Floor Monitor |
| | | Beta | Floor Monitor |
| 810 | 9 | Gamma | FIDLER |
| 810 | 10 | Gamma | FIDLER |
| 810 | 11 | Gamma | FIDLER |
| 810 | 12 | Gamma | FIDLER |
| 810 | 21 | Alpha | Floor Monitor |
| 812 | 9 | Gamma | FIDLER |
| 812 | 20 | Beta | Phoswich |
| | | Gamma | FIDLER |
| 815 | 10 | Alpha | Floor Monitor |
| 815 | 11 | Alpha | Floor Monitor |
| 815 | 13 | Alpha | Floor Monitor |
| **Survey plus Discretionary > Background** | | | |
| **Building** | **Room** | **Measurement** | **Instrument** |
| 810 | 10 | Gamma | FIDLER |
| 810 | 12 | Gamma | FIDLER |
| 812 | 20 | Beta | Phoswich |
| | | Gamma | FIDLER |

**Table 5-4**
**Summary of Phase II Scanning Potential Exceedences**
**SEAD-12 Building Report**
**Seneca Army Depot Activity**

| Scanning Results > Flag Value | | | | Criteria | | Site Condition/ Measurement | Comment |
|---|---|---|---|---|---|---|---|
| Building | Room | Measurement | Instrument | Reference | Level | | |
| 810 | 3 | Gamma | FIDLER | Background 95% UTL | 19000 | 20000 | 1 measurement exceeds criteria |
| 810 | 5 | Gamma | FIDLER | Background 95% UTL | 19000 | 20000 | 1 measurement exceeds criteria |
| 810 | 10 | Gamma | FIDLER | Background 95% UTL | 19000 | 21000 | 3 measurements exceed criteria |
| 810 | 12 | Gamma | FIDLER | Background 95% UTL | 19000 | 20000 | 2 measurements exceed criteria |
| 812 | 9 | Gamma | FIDLER | Background 95% UTL | 19000 | 20000 | 2 measurements exceed criteria (associated material is ceramic block) |
| 812 | 17 | Gamma | FIDLER | Background 95% UTL | 19000 | 24000 | 3 measurements exceed criteria (associated material is ceramic tile and block) |
| 812 | 20 | Gamma | FIDLER | Background 95% UTL | 19000 | 26000 | 9 measurements exceed criteria (associated material is ceramic tile and block) |

## Table 5-5
## Summary of Gamma Spectroscopy Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Radionuclides Identified | Upper Bound Peak Activity (dpm/100 $cm^2$) [a] | DCGLw (dpm/100 $cm^2$) [b] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|
| 804 | 1 | 13 | C10 | U-235 | 219 | 145 | Yes | The U-235 measurement is below the $DCGL_{EMC}$ of 233 dpm/100$cm^2$ for U-235; direct alpha and beta measurements for the survey area are within $DCGL_W$s; there are no scanning exceedences associated with the survey area. This evidence suggests that the elevated U-235 activity is naturally occurring. |
| | | | | Pb-210 | 1717 | No DCGL | NA [c] | Background associated with U-238 decay series. |
| 804 | 2 | 6 | C6 | Th-234 | 849 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | U-235 | 81 | 145 | No | Background associated with U-235 decay series |
| | | | | Pb-210 | 478 | No DCGL | NA | Background associated with U-238 decay series. |
| 804 | 3a | 0 | C1 | Tl-208 | 610 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 665 | 152 | Y | Naturally-occuring elevated background associated with the U-238 decay series. |
| 804 | 5a | 7 | C5 | Ra-223 | 114 | No DCGL | NA | Background associated with U-235 decay series |
| | | | | Th-228 | 3706 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Pb-210 | 1003 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 1188 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | U-235 | 36 | 145 | No | Background associated with U-235 decay series |
| 805 | 1 | 14 | C4 | Pb-210 | 1895 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-228 | 445 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 662 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| 805 | 1 | 20 | C6 | Th-228 | 6406 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 1599 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |

## Table 5-5
## Summary of Gamma Spectroscopy Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Radionuclides Identified | Upper Bound Peak Activity (dpm/100 cm$^2$) [a/] | DCGLw (dpm/100 cm$^2$) [b/] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|
| 810 | 1 | 18 | C3 | Th-228 | 4736 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 1059 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |
| 815 | 15 | 15 | C3 | Ac-228 | 557 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Pb-212 | 112 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 1030 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |
| 816 | 10 | 9 | C4 | Th-234 | 993 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | U-235 | 5 | 145 | No | Background associated with U-235 decay series. |
| | | | | Th-231 | 1183 | No DCGL | NA | Background associated with U-235 decay series. |
| | | | | Pb-210 | 192 | No DCGL | NA | Background associated with U-238 decay series. |
| 816 | 10 | 9 | C4a | Pb-210 | 924 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 789 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| 816 | 3 | 61 | C6 | Th-234 | 832 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |
| | | | | U-235 | 64 | 145 | No | Background associated with U-235 decay series. |
| 816 | 8 | 5 | C1 | Th-234 | 761 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | Pb-210 | 1776 | No DCGL | NA | Background associated with U-238 decay series. |
| 819 | 11 | 19 | C24 | Th-234 | 586 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |
| | | | | Tl-208 | 602 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Bi-211 | 401 | No DCGL | NA | Background associated with U-235 decay series. |
| | | | | Pb-214 | 140 | No DCGL | NA | Background associated with U-238 decay series. |

## Table 5-5
## Summary of Gamma Spectroscopy Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Radionuclides Identified | Upper Bound Peak Activity (dpm/100 $cm^2$) [a/] | DCGLw (dpm/100 $cm^2$) [b/] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|
| 819 | 12 | 23 | C28 | Ra-226 | 5388 | 1210 | Yes | Although the Ra-226 measurement is greater than both the $DCGL_W$ and $DCGL_{EMC}$ of 2080 dpm/100$cm^2$, direct alpha measurements for the room do not exceed the DCGLs. The presence of another member of the U-238 decay chain (Pb-214) suggests that the elevated Ra-226 activity is naturally-occurring. |
| | | | | U-235 | 328 | 145 | Yes | Although the U-235 measurement is greater than both the $DCGL_W$ and $DCGL_{EMC}$ of 233 dpm/100$cm^2$, direct alpha measurements for the room do not exceed the DCGLs. The presence of another member of the U-235 decay chain (Bi-211) suggests that the elevated U-235 activity is naturally-occurring. |
| | | | | Bi-211 | 538 | No DCGL | NA | Background associated with U-235 decay series. |
| | | | | Pb-214 | 187 | No DCGL | NA | Background associated with U-238 decay series. |
| 819 | 12D | 2 | C27 | Th-231 | 545 | No DCGL | NA | Background associated with U-235 decay series. |
| | | | | Ra-223 | 107 | No DCGL | NA | Background associated with U-235 decay series. |
| | | | | Th-228 | 3493 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Ac-228 | 1002 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 1575 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series. |
| 819 | 4 | 5 | C8 | Ac-228 | 225 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Pb-210 | 515 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 468 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | U-235 | 88 | 145 | No | Background associated with U-235 decay series. |
| 819 | 5 | 15 | C11 | U-235 | 140 | 145 | No | Background associated with U-235 decay series. |
| | | | | Th-228 | 2747 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Pb-210 | 879 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 1196 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| 819 | 5 | 7 | C12 | Pb-210 | 1038 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 1044 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | Tl-208 | 2084 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Ac-228 | 663 | No DCGL | NA | Background associated with Th-232 decay series. |

## Table 5-5
## Summary of Gamma Spectroscopy Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Radionuclides Identified | Upper Bound Peak Activity (dpm/100 cm$^2$) [a] | DCGLw (dpm/100 cm$^2$) [b] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|
| 819 | 5 | 11 | C13 | Ra-226 | 1871 | 1210 | Yes | The Ra-226 measurement is below the DCGLEMC of 2080 dpm/100 cm$^2$ for Ra-226; direct alpha measurements for the survey area are within background, and direct beta measurements are within DCGLs; there are no scanning exceedences associated with the survey area. This evidence suggests that the elevated Ra-226 activity is naturally-occurring. |
| | | | | U-235 | 114 | 145 | No | Background associated with U-235 decay series |
| 819 | 5 | 12 | C14 | Pb-210 | 1303 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Ac-228 | 37 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Ra-226 | 1764 | 1210 | Yes | The Ra-226 measurement is below the DCGLEMC of 2080 dpm/100 cm$^2$ for Ra-226; direct alpha measurements for the survey area are within background, and direct beta measurements are within DCGLs; there are no scanning exceedences associated with the survey area. In addition, other members of the U-238 decay chain (Pb-214, Pb-210) have been identified. This evidence suggests that the elevated Ra-226 activity is naturally-occurring. |
| | | | | U-235 | 108 | 145 | No | Background associated with U-235 decay series |
| | | | | Bi-211 | 211 | No DCGL | NA | Background associated with U-235 decay series |
| | | | | Pb-214 | 73 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-228 | 173 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 14 | 152 | No | Background associated with U-238 decay series. |
| 819 | 7 | 8 | C17 | Pb-210 | 1480 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-228 | 4358 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Th-234 | 1504 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | Ac-228 | 951 | No DCGL | NA | Background associated with Th-232 decay series. |
| 819 | 8 | 2 | C19 | Pb-210 | 262 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 214 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | Ra-223 | 102 | No DCGL | NA | Background associated with U-235 decay series |
| | | | | Th-228 | 3339 | No DCGL | NA | Background associated with Th-232 decay series. |
| | | | | Ac-228 | 136 | No DCGL | NA | Background associated with Th-232 decay series. |

## Table 5-5
## Summary of Gamma Spectroscopy Potential Exceedences
## SEAD-12 Building Report
## Seneca Army Depot Activity

| Building | Room | Grid | Gamma Spec Location ID | Radionuclides Identified | Upper Bound Peak Activity (dpm/100 $cm^2$) [a/] | DCGLw (dpm/100 $cm^2$) [b/] | Upper Bound Activity Exceeds DCGL? | Conclusion |
|---|---|---|---|---|---|---|---|---|
| 819 | 12D | 4 | C25 | Pb-210 | 399 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 602 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| 2104 | Bkgd Material Sample | NA | NA | Pb-210 | 713 | No DCGL | NA | Background associated with U-238 decay series. |
| | | | | Th-234 | 350 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |
| | | | | U-238 | 360 | 152 | Yes | Naturally-occuring elevated background associated with the U-238 decay series, confirmed by the identification of Pb-210. |

[a/] dpm/100$cm^2$ = disintegrations per minute per 100 square centimeters; the upper bound peak activity is a conservative estimate of the surficial activity for the identified radionuclide based on the energy peak activity determined by the analysis software plus 50 percent.

[b/] DCGLw = Derived Concentration Guideline Level; from Table 4-1.

[c/] NA = not applicable.

**Figure 5-1**
**Box-and-Whisker Plots for Building 819, Room 3, Metal Crane (Alpha and Beta Measurements)**
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