U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

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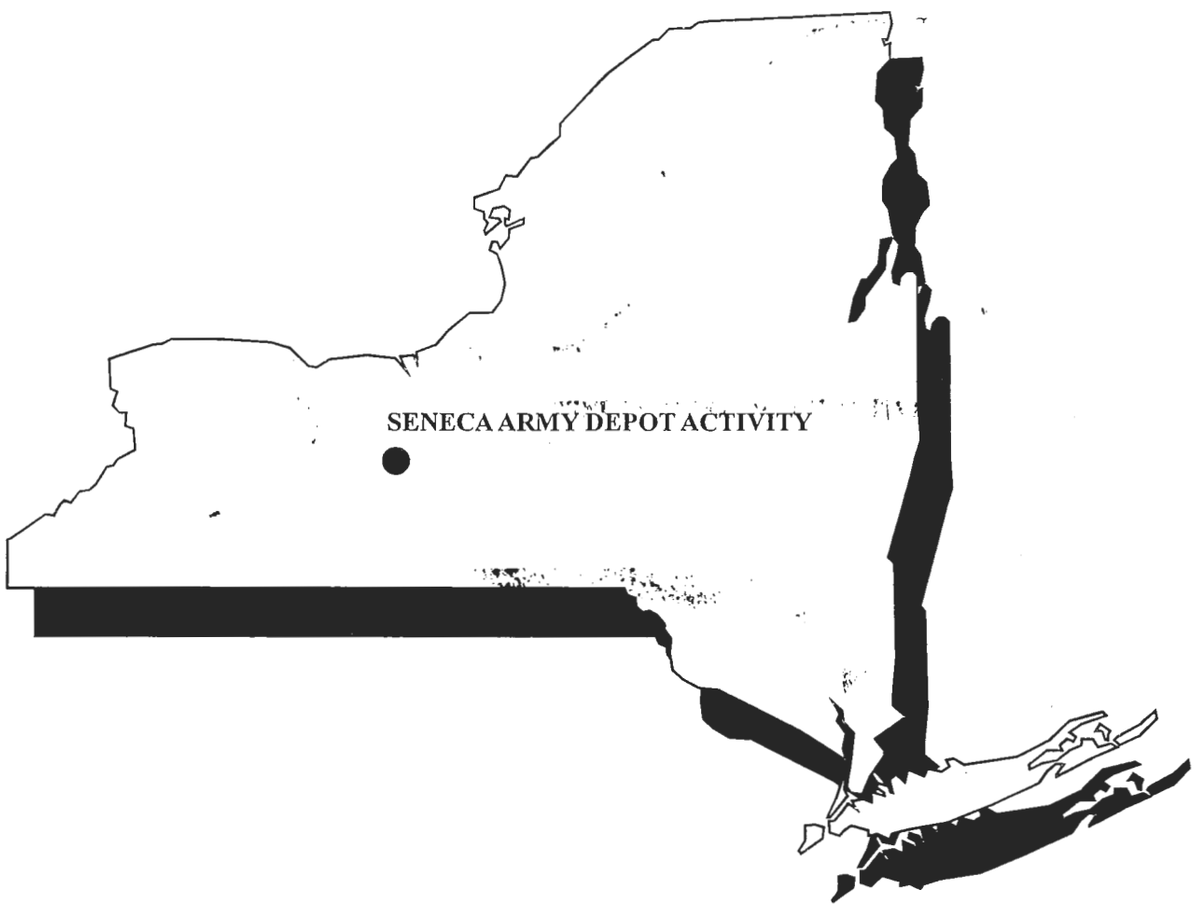

FINAL
RADIOLOGICAL SURVEY REPORT - SEAD-12
PHASE I AND PHASE II SURVEYS
VOLUME II - APPENDICES A THROUGH I

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

MARCH 2003
PARSONS

LIST OF APPENDICES

APPENDIX A

DCGL Report
(Revised per Comments)

PARSONS ENGINEERING SCIENCE, INC.

36 Dan Road • Canton, Massachusetts 02021-2809 • (781) 401-3200 • Fax (781) 401-2575

January 20, 2000

Mr. Julio Vazquez
USEPA Region II
Emergency & Remedial Response Division
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. James Quinn
New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, NY 12233-7010

SUBJECT: **Derived Concentration Guideline Level (DCGL) Development for Radiological Surveys in Class 1 Buildings at SEAD-12, Seneca Army Depot Activity, Romulus, NY**

Dear Mr. Vazquez/Mr. Quinn:

Enclosed is the Derived Concentration Guideline Level (DCGL) Developed for Radiological Surveys in Class 1 Buildings at SEAD-12, Seneca Army Depot Activity, Romulus, NY. This report documents how DCGL flag values, being used in the field, were developed. This report is being provided to you at this stage in the project to solicit comments and/or gain regulatory approval on the guideline levels being used, since these values are used as a first step in determining if the buildings at SEAD-12 may be released for unrestricted use. The extent of radiological surveys in the remainder of some of the buildings is dependent on acceptance of these DCGLs.

Our goal is to schedule a conference call in early February to discuss any comments you may have on the development of these DCGLs.

If you have any questions or need additional information, please do not hesitate to call me at (781) 401-2535. We look forward to your input on this report.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Jacqueline Travers

Jacqueline Travers, P.E.
Task Order Manager

file

PARSONS ENGINEERING SCIENCE, INC.

30 Dan Road • Canton, Massachusetts 02021-2809 • (781) 401-3200 • Fax (781) 401-2575

January 21, 2000

Commander
U.S. Army Corps of Engineers
Engineering and Support Center, Huntsville
Attn: Ms. Dorothy Richards, CEHNC-PM
4820 University Square
Huntsville, AL 35816-1822

SUBJECT: **Derived Concentration Guideline Level (DCGL) Development for Radiological Surveys in Class 1 Buildings at SEAD-12, Seneca Army Depot Activity, Romulus, NY**

Dear Ms. Richards:

Parsons Engineering Science is pleased to provide you with a report entitled Derived Concentration Guideline Level (DCGL) Developed for Radiological Surveys in Class 1 Buildings at SEAD-12, Seneca Army Depot Activity, Romulus, NY. This document was prepared under Delivery Order 5 under Contract No. DACA87-95-D-0031.

This report documents how DCGL flag values, being used in the field, were developed. This report is being provided to you and the regulatory agencies at this stage in the project to solicit comments and/or gain regulatory approval on the guideline levels being used, since these values are used as a first step in determining if the buildings at SEAD-12 may be released for unrestricted use. The extent of radiological surveys in the remainder of some of the buildings is dependent on acceptance of these DCGLs.

Our goal is to schedule a conference call in early February to discuss any comments you or the regulators may have on the development of these DCGLs. If you have any questions or need additional information, please do not hesitate to call me at (781) 401-2535. We look forward to your input on this report.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Jacqueline Travers

Jacqueline Travers, P.E.
Task Order Manager

cc: Mr. Tom Enroth, CENAN-PP-HE
Mr. Stephen Absolom, SEDA
Mr. Jim Mullikin, USACHPPM
Mr. Keith Hoddinott, USACHPPM (Prov.)
Mr. John Buck, USAEC

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PARSONS

DERIVED CONCENTRATION GUIDELINE LEVEL (DCGL) DEVELOPMENT FOR RADIOLOGICAL SURVEYS CONDUCTED IN CLASS I BUILDINGS AT SEAD-12

SENECA ARMY DEPOT ACTIVITY, ROMULUS, NY

TABLE OF CONTENTS

1.0 Introduction

This preliminary report addresses the establishment of the action levels that will be used to determine whether unrestricted release criteria have been achieved in the Class I buildings at SEAD-12 at the Seneca Army Depot Activity in Romulus, NY. A list of the buildings and a brief historical description of each is provided in **Table 1**. The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, 1997) process was used to calculate the derived concentration guideline level (DCGL). The process consists of the following steps:

- Classifying each room based on the risk for residual radioactivity,
- Dividing the site into survey units,
- Determining DCGL values for small areas of elevated activity based on area factors ($DCGL_{EMC}$)
- Calculating radionuclide-specific DCGLs for uniform contamination at each survey unit ($DCGL_W$),
- Determining the number of measurements required to statistically demonstrate that each survey unit is less than the minimum DCGL,
- Verify that sampling grid size based on the size of the survey unit and the required number of measurements is adequate.

The DCGLs calculated will be used to determine if uniform contamination exists in any of the rooms of the buildings of SEAD-12 or if there are small areas of elevated activity. Table 4-3 of the SEAD-12 Project Scoping Plan references Table 5 of Part 38, Section 12 of the New York Code of Rules and Regulations (NYCRR) as preliminary guidelines for this survey. However, upon further discussion with NYSDOH, these guidelines were found to be inapplicable (refer to meeting minutes from November 17, 1999). Instead, the DCGL values referred to above will be modeled based on an acceptable dose equivalent exposure. The NYSDEC TAGM of 10 mrem/yr was used for this purpose.

2.0 RADIOLOGICAL BUILDING SURVEYS

This section provides background on the radiological building surveys being conducted at SEAD-12. Section 4.2.3 of the SEAD-12 Project Scoping Plan (Parsons ES, 1998) describes the radiological surveys to be conducted at SEAD-12. These surveys consist of both grounds and building surveys. The radiological surveys in the buildings are currently being conducted and are the subject of this preliminary report. These surveys consist of the following types of measurements:

- Alpha, beta and gamma scanning measurements as described in Section 4.2.3.1 of the Project Scoping Plan,

- Alpha, beta, and gamma direct measurements collected at the nodes of an established grid as described in Section 4.2.3.2 of the Project Scoping Plan,
- Exposure rate measurements as described in Section 4.2.3.3 of the Project Scoping Plan,
- Removable radiation surveys (consisting of gross alpha, beta, gamma, and tritium smears) as described in Section 4.2.3.4 of the Project Scoping Plan, and
- Material samples to be collected at a frequency of 1 per 1000 sq.ft. of building floor area or where necessary to further investigate elevated levels of radioactivity that may be fixed rather than removable.

Scanning measurements will be used to determine if small areas of elevated levels of activity exist anywhere in the buildings. Such results will be compared to the $DCGL_{EMC}$ to determine if such areas exist. This comparison is described in Section 8.2.5 of MARSSIM.

Direct measurements will be grouped as a data set per room and statistically compared to direct measurements collected from a reference area. $DCGL_W$ values derived will be added to the background dataset to determine if direct measurements from a Class I room exceed the allowable exposure over background. Section 8.4 of MARSSIM describes the data comparison to $DCGL_W$ values.

Exposure rate measurements are used primarily to monitor the health and safety of the survey crew and as a diagnostic tool in finding areas of elevated activity.

Smear data will also be used for diagnostic purposes to determine if elevated levels of removable activity are present. Smears are the only type of data collected to test for the presence of tritium (radiological instruments used during the survey will not detect the presence of tritium).

Material samples will be used to verify that elevated fixed contamination is not present or that where there are elevated levels, which radionuclide is the source of the activity.

3.0 ROOM CLASSIFICATIONS AND SURVEY UNITS

Based on the historical information, individual rooms within buildings under investigation at SEAD-12 were divided into impacted and non-impacted areas based on the criteria identified in MARSSIM. Non-impacted areas have no reasonable potential for residual contamination and therefore were not included in the survey effort expect to establish background levels. Impacted areas are areas that have some potential for containing contaminated material and are further subdivided into the following three MARSSIM defined classes based on the potential for residual contamination.

- 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 high specific activity. Note that areas containing contamination in excess of the derived concentration guideline level (DCGL) prior to remediation should be classified as Class I areas.
- 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. To justify changing an area's classification from Class I to Class 2, the existing data (from the historical assessment, scoping surveys, or characterization surveys) should provide a high degree of confidence that no individual measurement would exceed the DCGL. Other justifications for this change in an area's classification may be appropriate based on the outcome of the data quality objective (DQO) process. Examples of areas that might be classified as Class II 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 radioactivity, 5) areas where low concentrations of radioactive materials were handled, and 6) areas on the perimeter of former contamination control areas.
- 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.

The scope of the current survey is restricted to Class I areas; therefore, the survey areas considered in this report were Class I areas. DCGLs for Class II and Class III areas will be developed before those areas are surveyed.

In order to model dose and calculate DCGL values, each room within a building was considered as one survey unit, regardless of number of rooms. This was discussed and agreed upon with NYSDOH. Room size, height, and construction materials were also considered in defining the survey units. The Class I buildings were presented in **Table 1**. The number of rooms is listed in **Table 2.**

4.0 DCGL DEVELOPMENT

This section describes the development of $DCGL_W$ values. The $DCGL_W$ is described as the concentration of residual radioactivity distinguishable from background that, if distributed uniformly throughout a survey unit, would result in a total effective dose equivalent (TEDE) of 10 millirem per year (NYSDEC TAGM) to an average member of the critical group. The $DCGL_W$ values were estimated by assuming uniform contamination in a room. This was simulated in RESRAD-Build by if the entire floor area is the size of the source. As described in MARSSIM, an independent modeling procedure was used to calculate the radionuclide-specific DCGLs for each survey unit. RESRAD-Build was determined to be the most appropriate model for establishing the DCGLs at Seneca Army Depot and is described further in below. The $DCGL_W$ will be added to direct measurements made in the background dataset and this new dataset will then be compared to direct measurements from a survey unit using Wilcoxen Rank Sum test (hence, the "W" in $DCGL_W$). This will be performed in accordance with the procedures outlined in Section 8 of MARSSIM.

In addition to $DCGL_W$, and in accordance with MARSSIM, $DCGL_{EMC}$ values area also developed so that the grid spacing at which the direct measurements are collected is sufficiently small to ensure that "hot-spot" contamination is not overlooked. The $DCGL_{EMC}$ values will be used to compare with instrument scanning minimum detectable concentrations (MDCs) as required by MARSSIM to ensure that the instruments are sensitive enough to see any hot spot contamination. The $DCGL_{EMC}$ values were estimated by assuming the source size in RESRAD-Build is the size of the grid. This is numerically equivalent to the area factor procedure outlined in Section 5.5.2 of MARSSIM.

4.1 RESRAD-BUILD INPUT PARAMETERS

The computer code RESRAD-Build, version 2.37 was used by Parsons ES to model residential and worker exposure scenarios for determining surface activity action levels (e.g., derived concentration guideline levels) for the unrestricted occupancy of buildings at Seneca Army Depot. Though it is unlikely that the survey areas will be used for residential occupancy, a residential scenario was evaluated to determine the worst-case DCGLs. As discussed within ANL/EAD/LD-3, *RESRAD-Build: A Computer Model for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Material*, the RESRAD-Build computer code is a pathway analysis model designed to evaluate the potential radiological dose incurred by an individual that works or lives in a building contaminated with radioactive material.

The model calculates the transport of radioactive material inside a building from one compartment to another with an indoor air quality model. The model considers the transport of

radioactive dust particles and radon progeny due to air exchange, deposition and resuspension, and radioactive decay and in-growth. Shielding material can be specified for each receptor/source scenario for the external gamma dose calculations. Six exposure pathways are possible in the RESRAD-Build model: (1) external exposure directly from the source, (2) external exposure to materials deposited on the floor, (3) external exposure due to air submersion, (4) inhalation of airborne radioactive particulates, (5) inhalation of aerosol indoor radon progeny, and (6) inadvertent ingestion of radioactive material, either directly or from materials deposited on building surfaces.

RESRAD-Build requires 25 input parameters for the model set-up. The input parameters describe the building, receptor, and source specifications within five categories: exposure time, building specifications, receptor characteristics, shielding specifications, and source parameters. Parsons ES utilized site-specific data where available. Where no site-specific data was available, standard default values or conservative assumptions were used. The modeling effort included evaluation of a residential and worker occupation scenario. Input parameters are detailed in **Table 3**. These input variables and parameters, including any variation between the inputs for the two exposure scenarios are described below.

4.1.1 Building Parameters

RESRAD-Build allows up to three connected rooms to be modeled together and takes airflow between rooms and airflow out of the building into consideration. A one room, one receptor scenario was used to calculate dose in all buildings. The source and receptor are located in the center of the room for each survey unit. No air exchange occurs when the isotopes are isolated in one room with the receptor; therefore, the total activity of the isotopes remains in the one room. By modeling one receptor located at the same location as the source, the largest possible dose is calculated resulting in the most conservative DCGL value.

The largest, smallest and average room size were used in the model runs (as indicated in **Table 2**) for developing the DCGLs. For each room size (a total of three), the model was run assuming source sizes of 1m x 1m and 2m x 2m based on the grid sizes (established in Section 4.2.3 of the SEAD-12 Project Scoping Plan) in these rooms (for a total of 6 model runs). These room sizes for the given grid sizes would capture the range of DCGLs expected for all the survey units. The most conservative $DCGL_{EMC}$ resulting from the six model runs is used to compare with the minimum detectable activities (MDAs).

4.1.2 Source Parameters

RESRAD-Build is able to model four source types, which include area, point, line, and volume sources. An area contamination spread uniformly throughout the survey unit was used in the model in accordance with MARSSIM requirements. The source was located at floor level, and

the contamination was assumed to be 50 percent removable, which is the default assumption for the model. The time of source removal is 365 days.

DCGLw values were estimated for all the isotopes of concern listed in the SEAD-12 Project Scoping Plan and shown in **Table 1** (Co-57, Co-60, Cs-137, H-3, Pm-147, Pu-239/240, Ra-226, Th-230, U-235, U-238, Am-241).

$DCGL_{EMC}$ values were estimated for Th-230, Am-241, Tc-99, and Cs-137 because $DCGL_{EMC}$ values are used only to compare with the scanning MDA. As discussed in **Section 5** below, field instrument MDAs are estimated based on these selected isotopes since these were the sources available for instrument source checks. Furthermore, these isotopes capture the highest alpha, beta, and gamma energies among the isotopes of concern listed in **Table 1**. Field instrument calibration curves were also developed. For completeness, model runs for all the isotopes of concern will be included in the closure report.

4.1.3 Evaluation Time

RESRAD-Build calculates dose per receptor at user-specified time intervals beginning with an initial exposure time of zero years. At time zero, an arbitrary initial activity of 1.0E+06 pCi per m^2 was entered for all isotopes of concern listed in the work plan. At each successive time interval, new activities and associated doses were calculated for each isotope. For the purpose of modeling, evaluation times of 20, 40, 60, 80, and 100 years were chosen, which equates to an estimated building life of 100 years.

4.1.4 Receptor Parameters

An exposure duration of 350 days was used to incorporate a full year (with two weeks vacation) of exposure. This duration creates a "worst-case" residential exposure scenario. The resident is also assumed to spend 16 hours a day indoors. This assumption produces a higher dose resulting in a lower, conservative DCGL value. The receptor was located in the center of the modeled room at the same point as the source.

A worker scenario is also estimated to provide a more realistic estimate of DCGLs. An exposure duration of 200 days a year and an indoor time of 8 hours a day is assumed for the worker scenario.

The receptor is assumed to have a breathing rate of 18 m^3 per day which is representative of a residential scenario. The fraction of the source released into air was set at the model default value of 1E-6 based on NUREG 5512 guidance on resuspension factors. The direct ingestion of the source was not included in the model.

4.1.5 Shielding Parameters

The exposure scenario included only one room and assumed that shielding between the receptor and the source was not provided (i.e. zero thickness of concrete).

4.2 RESRAD-BUILD MODELING RESULTS

The initial starting activity level for each radionuclide was assumed to be 1E+6 pCi/m^2. A relatively large source activity was used, so that the resulting dose would be greater than zero (RESRAD-Build assigns a zero value to dose values less than 1 mrem). DCGLs are independent of the source activity used. With this initial starting concentration, a resulting radionuclide-specific dose for each receptor over the exposure duration of 100 years was calculated using RESRAD-Build. The activity and resulting doses of each isotope were compiled into an Excel® spreadsheet to determine a threshold activity that would produce a total effective dose equivalent (TEDE) of 10 millirem per year per the following equation.

$$Activity_n = \frac{TEDE * Activity_{mt}}{Dose_{mt}} \quad (1)$$

Where:

- *TEDE* = total effective dose equivalent. This is equal to 10 mrem/yr (NYSDEC TAGM).
- $Activity_n$ is the activity necessary to achieve the TEDE (10 mrem per year) in units of pCi/m^2.
- $Activity_{mt}$ is the RESRAD modeled activity in pCi/m^2 for the parent isotope at the specified time interval t (1E+6 pCi/m^2 at t=0), and
- $Dose_{mt}$ is the total dose (in mrem) calculated by RESRAD-Build for the parent and daughter isotopes at time interval t.

The lowest calculated radionuclide-specific threshold activity ($Activity_n$) over the 100 year exposure period was established as the DCGL. The activity is then converted to dpm/100 cm^2 using the following equation.

$$DCGL = \frac{(Activity_n * 2.22\ dpm - m^2 / pCi)}{100\ cm^2} \quad (2)$$

Because of the number of conservative estimates and the unknown nature of contamination, the sum of fractions rule is not applied to derive the DCGL values.

The RESRAD-Build calculated DCGLw and $DCGL_{EMC}$ for each survey unit are presented in **Tables 4 and 5**, respectively. The most conservative $DCGL_w$ values for Co-60 and Cs-137 estimated by site-specific modeling and presented in this report are 3,400 and 14,000 dpm/100 cm^2, respectively. For comparison purposes, screening level $DCGL_w$ values for Co-60 and Cs-137 published in 63FR64132 (November 1998) are 2,800 and 11,000 dpm/100 cm^2, respectively, after adjusting the values for a TEDE of 10 mrem/year.

As shown in **Table 4,** the most conservative $DCGL_W$ values were obtained in the 12m x 12m x 5m room under the residential scenario, with the exception of Pu-239 and tritium. As shown in **Table 5,** the most conservative results $DCGL_{EMC}$ values were obtained with a 4 m^2 (2 x 2 m grid) in a 2m x 2m x 4m room under a residential scenario.

A sample RESRAD-Build output is included as an Attachment to this report.

5.0 MINIMUM DETECTABLE ACTIVITIES (MDA) FOR FIELD INSTRUMENTS

Radionuclide-specific MDAs were calculated for each field instrument following the protocols identified in Section 6 of MARSSIM. The MDAs are dependent on the background radiation levels, instrument type, instrument efficiency, effective area of the detector, survey technique (i.e., static or scanning), geometry, mode of instrument operation (i.e., rate meter or scalar), and the time period over which the measurement was taken. The estimated radionuclide-specific MDAs calculated for each instrument (meter and probe) used for scanning measurements are provided in **Table 6**. The specific methodology used to estimate the MDAs for scanning and direct measurements is described in the following subsections.

5.1 Scanning Measurements

The scanning MDAs for all the instruments were calculated using the average background levels from the daily operational checks and radionuclide-specific efficiencies identified in **Table 6**. Additional instrument parameters required to estimate these efficiencies are also provided in **Table 6**. Scanning MDAs were estimated based on MARSSIM Eqns. 6-8, 6-9 and 6-10. The following MDA assumes a 95% detection of MDA_{scan} with a false positive rate of 60% as recommended in DG-4006 (NRC, 1998).

$$MDA_{scan} = \frac{60/i * 1.38\sqrt{B_R * t}}{\sqrt{p}E_d E_s \frac{A}{100cm^2}} \quad (3)$$

MDA_{scan} = Minimum detectable scanning activity in dpm per 100 cm^2
B_R = Background rate in cpm
P = Surveyor efficiency (0.5, MARSSIM)
i = Observation time interval
t = Scan observation interval in minutes (0.03 mins, MARSSIM)
E_s = Surface efficiency in counts per disintegration (0.5, MARSSIM)
E_d = Detector efficiency in counts per disintegration
A = Active probe area in cm^2

The observation interval (i) is defined as the time the source is under the probe during scanning. This is conservatively assumed at 2 seconds (0.03 minutes) per MARSSIM guidance.

5.2 Direct Measurements

The MDAs for direct (static) measurements were estimated using MARSSIM guidance according to in Eq. 6-7 and as provided in the MARSSIM example. The following formula was used to calculated the Static MDAs listed in Table 6 and Table 7.

$$MDA = \frac{3 + 4.65\sqrt{B}}{E * \frac{A}{100}} \quad (4)$$

where,

MDA = Minimum detectable concentration in dpm per 100 cm^2
B = Background counts in cpm
E = Detector efficiency in counts per disintegration
A = Active probe area in cm^2

Direct measurements are an integrated measurement over a preset time.

6.0 COMPARISON OF DCGL TO FIELD INSTRUMENT COUNTS

This section describes the comparison of instrument MDAs and instrument counts per minute (cpms) to DCGLs per the MARSSIM guidance.

6.1 Comparison of MDAs to DCGLs

Scanning measurements are conducted to assess the potential presence of localized contamination (i.e., "hot-spots") and direct measurements are conducted to detect average contamination in a survey area. The calculated scanning and static MDAs were compared to $DCGL_W$ and $DCGL_{EMC}$ values, respectively, to ensure that the field scanning instruments would be sensitive enough to detect localized contamination. The comparison is presented in **Table 7**. All of the scanning MDAs are less than 10% of the corresponding $DCGL_{EMC}$ values (**Table 6**).

The static surface measurements are used to assess compliance with the $DCGL_W$ to demonstrate that uniform contamination in excess of background levels would not contribute to a dose greater than 10 mrem per year. All of the MDAs are less than 10% of the corresponding DCGL value. It should be noted that the scanning MDAs are less than the $DCGL_W$ values as well. Thus, it can be concluded that by collecting both scanning and static measurements, any residual radioactivity in the buildings in excess of the $DCGL_W$ and $DCGL_{EMC}$ values will be adequately detected.

6.2 Instrument Count Rate Corresponding to DCGLs – Flag Values

A flag value was established for each type of field instrument based on the DCGLs calculated in **Section 4**. First, DCGL values were converted to instrument counts per minute (cpm) units. The minimum calculated count rate that is equal to the $DCGL_W$ value in cpm was established as the flag value above background for each type of instrument. The flag values are based on the following equation from MARSSIM:

$$\text{Instrument CPM} = \frac{A \times E \times DCGL}{100} \qquad (5)$$

where,

DCGL = Derived concentration guideline limit in dpm per 100 cm^2
E = Detector efficiency in counts per disintegration
A = Active probe area in cm^2

The field flag values were based on the most conservative $DCGL_W$ values and are presented in **Table 8**. In order to maintain the as low as reasonably achievable (ALARA) principles, the instrument readings reported in **Table 8** that are based on the most conservative $DCGL_W$ values are used as "hot-spot" flag values in the field. These flag values are used in the field to indicate whether further investigation in a particular area may be necessary. When scanning or direct measurements exceed a flag value, additional investigation will be performed to verify if contamination exists and identify isotopes of concern. The additional investigation may involve

comparing survey data to a survey area-specific DCGLS, additional surveying, smear or material sampling. Flag values are not used to determine if the building may satisfy unrestricted release criteria. Unrestricted release of the buildings will be determined using the MARSSIM methods referenced in **Section 2** of this report as well as the DCGLs derived in this report.

7.0 GRID SPACING

Per MARSSIM requirements, the $DCGL_{EMC}$ values were compared against scanning instrument MDAs to ensure that no hot-spots were overlooked. The calculated scanning MDAs based on building survey results are presented in **Table 7**. The scanning instrument MDAs are all less than the corresponding $DCGL_{EMC}$ value. As such, additional data points or smaller sampling grids than those proposed in the SEAD-12 Project Scoping Plan are not required.

8.0 REFERENCES

EPA, 1995. *Exposure Factors Handbook, Volume III, Activity Factors,* Office of Health and Environmental Assessment, Washington, D.C., EPA/600/p-95/002Fc.

NRC, 1997. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575,* December 1997.

NRC, 1992, ***Residual Radioactive Contamination from Decommissioning. Volume 1, Technical Basis for Translating Contamination Levels for Annual Dose***, Battelle Pacific Northwest Labs., Richland, Washington, NUREG/CR-5512, September 25. Including U.S. NRC, 1990, ***Residual Radioactive Contamination from Decommissioning. Technical Basis for Translating Contamination Levels for Annual Dose. Draft Report for Comment***, Battelle Pacific Northwest Labs., Richland, Washington, NUREG/CR-5512, PNL-7212, January, 1992.

NRC, 1998, *Draft Regulatory Guide, Demonstrating Compliance With The Radiological Criteria for License Termination*, ***Residual Radioactive Contamination from Decommissioning*** , DG-4006, August, 1998.

Parsons ES, 1998. *Project Scoping Plan for Performing a CERCLA RI/FS at SEAD-12.* June 1998.

TABLES

Table 1
Seneca Army Depot Activity
Survey Unit Classification for Class 1 Buildings

Class One 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
Hot Room of Building 815 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
Hot Room of Building 816 and areas of adjoining rooms to a distance of 2 meters from the access point of 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	Used to perform quality assurance testing on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Co-60, H-3

TABLE 2
SURVEY UNIT DIMENSIONS
AND CLASSIFICATIONS
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Building	Number of Rooms	Max Room (m)	Min Room (m)	Other Room (m)	Class
803	5	3 x 4 x 6	3 x 4 x 6	3 x 4 x 6	1
804	6	7 x 6 x 5	2 x 2 x 5	5 x 4 x 5	1
805	1	5 x 12 x 4 [a]	5 x 12 x 4	5 x 12 x 4	1
815 Hot Room	1	3 x 5 x 4	3 x 5 x 4	3 x 5 x 4	1
816 Hot Room B	1	4 x 4 x 4	4 x 4 x 4	4 x 4 x 4	1
816 Hot Room C	1	4 x 2 x 4	4 x 2 x 4	4 x 2 x 4	1
819	11	12 x 12 x 5 [a,b]	2 x 2 x 4 [a,b]	6 x 5 x 2.5 [a,b]	1

[a] Room sizes included in $DCGL_w$ development

[b] Room sizes included in $DCGL_{emc}$ development

TABLE 3
RESRAD-BUILD MODEL INPUT PARAMETERS
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Parameter	Value	Rationale
Building Parameters		
Number of Rooms	1	Assumes one contaminated room, conservative assumption since no air flow between rooms.
Deposition Velocity (m/s)	1.00E-02	Default value
Resuspension Rate (1/s)	5.00E-07	Default value
Building Exchange Rate (1/hr)	0.8	Default value
Room Area (m^2)	---	Dependent on survey unit – see Table 1
Room height (m)	---	Dependent on survey unit – see Table 1
Source Parameters		
Number of Sources	1	Assumes one source.
Source Geometry	Area	
Source Size	1 m^2 and 4 m^2	Corresponding to grid sizes of 1 x 1 m and 2 x 2 m for $DCGL_{emc}$ and area of floor for $DCGL_w$ (see Table 1 for areas)
Source Location	Center of Room	The source is conservatively located in the center of the room at the same point as the receptor.
Air Release Fraction	0.1	Default value
Direct Ingestion Rate (1/hr)	0	Default value
Source Removable Fraction	0.5	Default value
Time of Source Removal (days)	365	Default value
Radon Release Fraction	0.1	Default value
Radionuclides	See Section 3.1	
Concentration (pCi/m^2)	1.00 E6	For each radionuclide. (DCGLs are independent of starting concentrations).
Shielding Parameters		
Thickness (cm)	0	Default value
Density (g/cc)	2.4	Default value
Material	Concrete	Default value

TABLE 3
RESRAD-BUILD MODEL INPUT PARAMETERS
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Receptor Parameters		
Parameter	**Value**	**Rationale**
Exposure Duration for resident (days)	350	Assumes a full year of exposure, with two weeks vacation
Exposure Duration for worker (days)	200	Assumes a 5-day work week, with two weeks vacation
Evaluation Times (years)	20, 40, 60, 80, 100	Building life of 100 years
Number of Receptors	1	One receptor located at the same point as the source.
Indoor Time Fraction for resident	0.68	For residential receptor 16.3 hrs/ 24 hour day (EPA, 1996)
Indoor Time Fraction for office worker	0.33	For office worker 8 hrs /24 hrs occupational receptor (EPA, 1996)
Breathing Rate (m^3/day)	18.0	Default value
Secondary Ingestion Rate (m^2/hr)	0.0001	Default value
Receptor Location	Center of Room	Receptors for all survey units will be conservatively located in the center of the room with the source contamination.

TABLE 4
DERIVED AVERAGE CONCENTRATION
GUIDELINE LIMITS (DCGLw) FOR SURVEY AREAS
SEAD-12 DCGL DEVELOPMENT 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:

-All values 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 this dose maximum dose occurred at 100 years.
-DCGL values derived using RESRAD-Build

TABLE 5
DERIVED ELEVATED CONCENTRATION GUIDELINE LIMITS ($DCGL_{EMC}$) FOR SMALL AREAS OF ELEVATED ACTIVITIES
SEAD-12 DCGL DEVELOPMENT 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

-All values 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 maximum dose occurred at 100 years
–DCGLs derived using RESRAD-Build

TABLE 6
RADIONUCLIDE-SPECIFIC INSTRUMENT EFFICIENCIES AND MDAs
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Instrument	Serial Number	Source	Radiation Type	Background (CPM)	Instrument Efficiency	Probe Area (cm^2)	Scanning MDA (dpm/100 cm2)	Static MDA (dpm/100 cm2)
Floor Monitor[1]	138256/136498	TH-230	Alpha	2.00E+00	1.21E-01	4.25E+02	59	19
Floor Monitor	138256/136498	TC-99	Beta	7.98E+02	2.21E-01	4.25E+02	643	143
Floor Monitor	138262/136498	TH-230	Alpha	1.00E+00	8.79E-02	4.25E+02	57	20
Floor Monitor	138262/136499	TC-99	Beta	4.40E+02	2.04E-01	4.25E+02	517	116
Hand held[2]	138238/138734	TH-230	Alpha	1.00E+00	1.82E-01	1.00E+02	117	42
Hand held	138238/138734	TC-99	Beta	7.30E+01	2.02E-01	7.50E+01	1206	282
Hand held	138254/140515	TH-230	Alpha	1.00E+00	1.73E-01	1.00E+02	124	44
Hand held	138254/140515	TC-99	beta	8.10E+01	2.12E-01	1.00E+02	908	212
Fidler[3]	A981P/A397Q	AM-241	Gamma	6.49E+03	2.68E-01	1.26E+02	10201	1118
Fidler	A959P/A386Q	AM-241	Gamma	6.49E+03	1.80E-02	1.26E+02	151878	16649
Phoswich[4]	133669/166008	Th-230	Alpha	2.00E+00	2.78E-01	8.60E+01	126	40
Phoswich	133669/166008	Tc-99	Beta	2.18E+02	2.54E-01	8.60E+01	1445	328
Phoswich	138254/155183	TH-230	Alpha	2.00E+00	2.89E-01	8.60E+01	122	39
Phoswich	138254/155183	Tc-99	Beta	2.18E+02	2.03E-01	8.60E+01	1808	410

1) – Floor Monitor instruments were a Ludlum 2360 with a Ludlum 43-47 detectors.
2) – Hand Held instruments were a Ludlum 2360 with a Ludlum 43-68 detectors.
3) – FIDLER instruments were either a Ludlum 2350-1 or a Bicron Analyst, with Bicron G5 detectors.
4) – Phoswich instruments were a Ludlum 2360 with a Ludlum 43-1-1 detector.

TABLE 7

COMPARISON ON INSTRUMENT MDAS TO DCGLS
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Instrument	Serial Numbers	Radiation Type	Scanning MDA (dpm/100 cm^2)	Lowest [(a)] $DCGL_{EMC}$ (dpm/100 cm^2)	Isotope Basis of $DCGL_{EMC}$	Direct [(b)] MDA (dpm/100 cm^2)	Lowest [(a)] $DCGL_W$ (dpm/100 cm^2)	Isotope $DCGL_W$ is based on
Floor Monitor[1]	138256/136498	Alpha	59	88	Th-230	19	1210	Ra-226
Floor Monitor	138256/136498	Beta	643	2.36E+06	Tc-99	143	3060	Co-60
Floor Monitor	138262/136499	Alpha	57	88	Th-230	20	1210	Ra-226
Floor Monitor	138262/136499	Beta	517	2.36E+06	Tc-99	116	3060	Co-60
Hand held[2]	138238/138734	Alpha	117	88	Th-230	42	1210	Ra-226
Hand held	138238/138734	Beta	1206	2.36E+06	Tc-99	282	3060	Co-60
Hand held	138254/140515	Alpha	124	88	Th-230	44	1210	Ra-226
Hand held	138254/140515	Beta	908	2.36E+06	Tc-99	212	3060	Co-60
Fidler[3]	A981P/A397Q	Low energy gamma	10201	64	Am-241	1118	40	Am-241
Fidler	A959P/A386Q	Low energy gamma	151878	64	Am-241	16649	40	Am-241
Phoswich[4]	133669/166008	Alpha	126	88	Th-230	40	1210	Ra-226
Phoswich	133669/166008	Beta	1445	2.36E+06	Tc-99	328	3060	Co-60
Phoswich	138254/155183	Alpha	122	88	Th-230	39	1210	Ra-226
Phoswich	138254/155183	Beta	1808	2.36E+06	Tc-99	410	3060	Co-60

(a) Values taken from values on Tables 4 and 5
(b) Direct or Static MDA
1) – Floor Monitor instruments were a Ludlum 2360 with a Ludlum 43-47 detectors.
2) – Hand Held instruments were a Ludlum 2360 with a Ludlum 43-68 detectors.
3) – FIDLER instruments were either a Ludlum 2350-1 or a Bicron Analyst, with Bicron G5 detectors.
4) – Phoswich instruments were a Ludlum 2360 with a Ludlum 43-1-1 detector.

TABLE 8
INSTRUMENT FIELD VALUES BASED ON $DCGL_W$
SEAD-12 DCGL DEVELOPMENT REPORT
SENECA ARMY DEPOT ACTIVITY

Isotope	DCGLw	Instrument	Area	Efficiency	Above Background Instrument Flag Value CPM	Average Background Value (a) CPM	Field Instrument Flag Value CPM
Co-60	3.06E+03	Beta Floor	4.25E+02	1.66E-01	2.16E+03	7.75E+02	2.93E+03
Co-60	3.06E+03	Beta Hand Held	1.00E+02	1.00E-01	3.06E+02	1.75E+02	4.81E+02
Ra-226	1.21E+03	Alpha Floor	4.25E+02	2.40E-01	1.23E+03	3.80E+00	1.24E+03
Ra-226	1.21E+03	Alpha Hand Held	1.00E+02	1.70E-01	2.06E+02	2.72E+00	2.08E+02
Am-241	3.97E+01	Fiddler	1.26E+02	1.80E-02	9.00E-01	1.13E+04	1.13E+04
Co-60	3.06E+03	Beta Phoswich	8.60E+01	2.00E-01	5.26E+02	NA	
Ra-226	1.21E+03	Alpha Phoswich	8.60E+01	2.70E-01	2.81E+02	NA	

(a) Average background value is the average of the background direct measurements collected in Background Building 722.
NA – Not currently available

1) – Floor Monitor instruments were a Ludlum 2360 with a Ludlum 43-47 detectors.
2) – Hand Held instruments were a Ludlum 2360 with a Ludlum 43-68 detectors.
3) – FIDLER instruments were either a Ludlum 2350-1 or a Bicron Analyst, with Bicron G5 detectors.
4) – Phoswich instruments were a Ludlum 2360 with a Ludlum 43-1-1 detector.

ATTACHMENT – Sample RESRAD-Build Output

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.I

RESRAD-BUILD Table of Contents

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.I

RESRAD-BUILD Input Parameters

Number of Sources : 1
Number of Receptors: 1
Total Time : 3.500000E+02 days
Fraction Inside : 6.800000E-01

Receptor Information

Receptor	Room	x [m]	y [m]	z [m]	FracTime	Inhalation [m3/day]	Ingestion(Dust) [m2/hr]
1	1	6.000	6.000	1.000	1.000	1.80E+01	1.00E-04

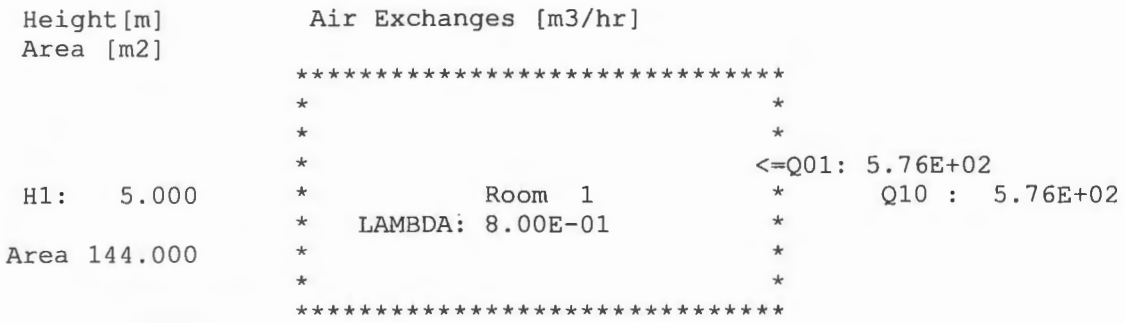
Receptor-Source Shielding Relationship

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.I

íííííííí Building Information íííííííí

Building Air Exchange Rate: 8.00E-01 1/hr



Deposition velocity: 1.00E-02 [m/s] Resuspension Rate: 5.00E-07 [1/s]

Source Information

Source: 1

Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00[m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration	Dose Conversion Factors				
		Ingestion	Inhalation	External (Surface)	External (Volume)	Submersion
	[pCi/m2]	[mrem/pCi]	[mrem/pCi]	[mrem/yr/ (pCi/m2)]	[mrem/yr/ (pCi/m3)]	[mrem/yr/ (pCi/m3)]
AM-241	1.000E+06	3.640E-03	4.440E-01	3.220E-06	2.740E-08	9.570E-05
PU-239	1.000E+06	3.540E-03	4.290E-01	4.290E-08	1.850E-10	4.960E-07
NP-237	0.000E+00	4.440E-03	5.400E-01	2.620E-05	6.880E-07	1.210E-03
U-238	1.000E+06	2.690E-04	1.180E-01	3.530E-06	9.510E-08	1.600E-04
U-235	1.000E+06	2.670E-04	1.230E-01	1.950E-05	4.740E-07	9.030E-04
U-234	0.000E+00	2.830E-04	1.320E-01	8.750E-08	2.520E-10	8.930E-07
U-233	0.000E+00	2.890E-04	1.350E-01	8.380E-08	8.750E-10	1.910E-06
PA-231	0.000E+00	1.060E-02	1.280E+00	4.760E-06	1.190E-07	2.010E-04
TH-230	1.000E+06	5.480E-04	3.260E-01	8.780E-08	7.570E-10	2.040E-06
TH-229	0.000E+00	4.030E-03	2.160E+00	3.680E-05	9.870E-07	1.720E-03
AC-227	0.000E+00	1.480E-02	6.720E+00	4.530E-05	1.260E-06	2.160E-03
RA-226	1.000E+06	1.330E-03	8.600E-03	1.940E-04	7.000E-06	1.040E-02
PB-210	0.000E+00	7.270E-03	2.320E-02	4.140E-07	3.820E-09	1.430E-05
SM-147	0.000E+00	1.850E-04	7.470E-02	0.000E+00	0.000E+00	0.000E+00
PM-147	1.000E+06	1.050E-06	2.580E-05	3.990E-09	3.140E-11	8.110E-08
CO-60	1.000E+06	2.690E-05	2.190E-04	2.750E-04	1.020E-05	1.470E-02

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.IEvaluation Time: 0.000000 years

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ÍÍÍ Assessment for Time: 1 ÍÍÍ
ÍÍÍ Time =0.00E+00 yr ÍÍÍ
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ÍÍÍÍÍÍÍÍ Source Information ÍÍÍÍÍÍÍÍ

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Contamination:: Nuclide Concentration [pCi/m2]

Nuclide	Concentration [pCi/m2]
AM-241	1.000E+06
PU-239	1.000E+06
NP-237	0.000E+00
U-238	1.000E+06
U-235	1.000E+06
U-234	0.000E+00
U-233	0.000E+00
PA-231	0.000E+00
TH-230	1.000E+06
TH-229	0.000E+00
AC-227	0.000E+00
RA-226	1.000E+06
PB-210	0.000E+00
SM-147	0.000E+00
PM-147	1.000E+06
CO-60	1.000E+06

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	1.2E+02	1.2E+02
Total	1.2E+02	1.2E+02

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.14E+02	3.03E-05	2.35E-07	8.85E-02	3.21E+00	1.57E-03
Total	1.14E+02	3.03E-05	2.35E-07	8.85E-02	3.21E+00	1.57E-03

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	1.09E+00	1.09E+00
PU-239		
PU-239	5.35E-02	5.35E-02
U-238		
U-238	7.90E-01	7.90E-01
U-235		
U-235	4.15E+00	4.15E+00
TH-230		
TH-230	5.29E-02	5.29E-02
RA-226		
RA-226	4.80E+01	4.80E+01
PM-147		
PM-147	8.54E-04	8.54E-04
CO-60		
CO-60	6.32E+01	6.32E+01

Assessment for Time: 2
Time =2.00E+01 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
AM-241	4.842E+05
PU-239	4.997E+05
NP-237	3.188E+00
U-238	5.000E+05
U-235	5.000E+05
U-234	2.835E+01
U-233	1.401E-04
PA-231	2.115E+02
TH-230	4.999E+05
TH-229	8.842E-08
AC-227	5.515E+01
RA-226	5.000E+05
PB-210	2.315E+05
SM-147	1.231E-05
PM-147	2.535E+03
CO-60	3.604E+04

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses

[mrem]

		Source 1	Total
Receptor	1	2.9E+01	2.9E+01
Total		2.9E+01	2.9E+01

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.77E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00
Total	2.77E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	5.15E-01	5.15E-01
NP-237	1.90E-05	1.90E-05
U-233	4.85E-12	4.85E-12
TH-229	7.54E-13	7.54E-13
PU-239		
PU-239	1.33E-02	1.33E-02
U-235	4.07E-08	4.07E-08
PA-231	2.50E-12	2.50E-12
AC-227	3.77E-12	3.77E-12
U-238		
U-238	3.91E-01	3.91E-01
U-234	1.30E-06	1.30E-06
TH-230	8.40E-11	8.40E-11
RA-226	3.53E-10	3.53E-10
PB-210	1.66E-13	1.66E-13
U-235		
U-235	2.07E+00	2.07E+00
PA-231	2.54E-04	2.54E-04
AC-227	5.46E-04	5.46E-04
TH-230		
TH-230	1.65E-02	1.65E-02
RA-226	2.07E-01	2.07E-01
PB-210	1.80E-04	1.80E-04
RA-226		
RA-226	2.38E+01	2.38E+01
PB-210	3.77E-02	3.77E-02
SM-147		
SM-147	0.00E+00	0.00E+00
PM-147	2.16E-06	2.16E-06
CO-60		
CO-60	2.28E+00	2.28E+00

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ííí Assessment for Time: 3 ííí
ííí Time =4.00E+01 yr ííí
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íííííííí Source Information íííííííí

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
AM-241	4.689E+05
PU-239	4.994E+05
NP-237	6.275E+00
U-238	5.000E+05
U-235	5.000E+05
U-234	5.670E+01
U-233	5.546E-04
PA-231	4.230E+02
TH-230	4.998E+05
TH-229	7.014E-07
AC-227	1.840E+02
RA-226	5.000E+05
PB-210	3.558E+05
SM-147	1.237E-05
PM-147	1.285E+01
CO-60	2.597E+03

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses
[mrem]

	Source 1	Total
Receptor 1	2.7E+01	2.7E+01
Total	2.7E+01	2.7E+01

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.56E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00
Total	2.56E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00

Nuclide Detail of Doses
[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	4.99E-01	4.99E-01
NP-237	3.74E-05	3.74E-05
U-233	1.92E-11	1.92E-11
TH-229	5.98E-12	5.98E-12
PU-239		
PU-239	1.33E-02	1.33E-02
U-235	8.15E-08	8.15E-08
PA-231	1.00E-11	1.00E-11
AC-227	2.62E-11	2.62E-11
U-238		
U-238	3.91E-01	3.91E-01
U-234	2.60E-06	2.60E-06
TH-230	3.36E-10	3.36E-10
RA-226	2.82E-09	2.82E-09
PB-210	2.37E-12	2.37E-12
U-235		
U-235	2.07E+00	2.07E+00
PA-231	5.08E-04	5.08E-04
AC-227	1.82E-03	1.82E-03
TH-230		
TH-230	1.65E-02	1.65E-02
RA-226	4.12E-01	4.12E-01
PB-210	6.02E-04	6.02E-04
RA-226		
RA-226	2.36E+01	2.36E+01
PB-210	5.76E-02	5.76E-02
SM-147		
SM-147	0.00E+00	0.00E+00
PM-147	1.10E-08	1.10E-08
CO-60		
CO-60	1.64E-01	1.64E-01

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.IEvaluation Time: 60.0000 years

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ÍÍÍ Assessment for Time: 4 ÍÍÍ
ÍÍÍ Time =6.00E+01 yr ÍÍÍ
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ÍÍÍÍÍÍÍÍ Source Information ÍÍÍÍÍÍÍÍ

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
AM-241	4.541E+05
PU-239	4.991E+05
NP-237	9.264E+00
U-238	5.000E+05
U-235	5.000E+05
U-234	8.504E+01
U-233	1.235E-03
PA-231	6.343E+02
TH-230	4.997E+05
TH-229	2.347E-06
AC-227	3.518E+02
RA-226	5.000E+05
PB-210	4.225E+05
SM-147	1.237E-05
PM-147	6.518E-02
CO-60	1.872E+02

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses

[mrem]

		Source 1	Total
Receptor	1	2.7E+01	2.7E+01
Total		2.7E+01	2.7E+01

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.IEvaluation Time: 60.0000 years

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.55E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00
Total	2.55E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	4.83E-01	4.83E-01
NP-237	5.52E-05	5.52E-05
U-233	4.27E-11	4.27E-11
TH-229	2.00E-11	2.00E-11
PU-239		
PU-239	1.33E-02	1.33E-02
U-235	1.22E-07	1.22E-07
PA-231	2.25E-11	2.25E-11
AC-227	7.80E-11	7.80E-11
U-238		
U-238	3.91E-01	3.91E-01
U-234	3.90E-06	3.90E-06
TH-230	7.56E-10	7.56E-10
RA-226	9.49E-09	9.49E-09
PB-210	1.08E-11	1.08E-11
U-235		
U-235	2.07E+00	2.07E+00
PA-231	7.62E-04	7.62E-04
AC-227	3.48E-03	3.48E-03
TH-230		
TH-230	1.65E-02	1.65E-02
RA-226	6.16E-01	6.16E-01
PB-210	1.15E-03	1.15E-03
RA-226		
RA-226	2.34E+01	2.34E+01
PB-210	6.79E-02	6.79E-02
SM-147		
SM-147	0.00E+00	0.00E+00
PM-147	5.56E-11	5.56E-11
CO-60		
CO-60	1.18E-02	1.18E-02

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.IEvaluation Time: 80.0000 years

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ÍÍÍ Assessment for Time: 5 ÍÍÍ
ÍÍÍ Time =8.00E+01 yr ÍÍÍ
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ÍÍÍÍÍÍÍÍ Source Information ÍÍÍÍÍÍÍÍ

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination:: Nuclide Concentration [pCi/m2]

Nuclide	Concentration [pCi/m2]
AM-241	4.398E+05
PU-239	4.988E+05
NP-237	1.216E+01
U-238	5.000E+05
U-235	5.000E+05
U-234	1.134E+02
U-233	2.172E-03
PA-231	8.456E+02
TH-230	4.996E+05
TH-229	5.518E-06
AC-227	5.401E+02
RA-226	5.000E+05
PB-210	4.584E+05
SM-147	1.237E-05
PM-147	3.305E-04
CO-60	1.349E+01

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses
[mrem]

	Source 1	Total
Receptor 1	2.7E+01	2.7E+01
Total	2.7E+01	2.7E+01

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.IEvaluation Time: 80.0000 years

Pathway Detail of Doses
ffffffffffffffffffffffff
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.55E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00
Total	2.55E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	4.68E-01	4.68E-01
NP-237	7.25E-05	7.25E-05
U-233	7.52E-11	7.52E-11
TH-229	4.71E-11	4.71E-11
PU-239		
PU-239	1.33E-02	1.33E-02
U-235	1.63E-07	1.63E-07
PA-231	4.00E-11	4.00E-11
AC-227	1.65E-10	1.65E-10
U-238		
U-238	3.91E-01	3.91E-01
U-234	5.20E-06	5.20E-06
TH-230	1.34E-09	1.34E-09
RA-226	2.25E-08	2.25E-08
PB-210	3.11E-11	3.11E-11
U-235		
U-235	2.07E+00	2.07E+00
PA-231	1.02E-03	1.02E-03
AC-227	5.35E-03	5.35E-03
TH-230		
TH-230	1.64E-02	1.64E-02
RA-226	8.18E-01	8.18E-01
PB-210	1.76E-03	1.76E-03
RA-226		
RA-226	2.32E+01	2.32E+01
PB-210	7.32E-02	7.32E-02
SM-147		
SM-147	0.00E+00	0.00E+00
PM-147	2.82E-13	2.82E-13
CO-60		
CO-60	8.53E-04	8.53E-04

Assessment for Time: 6
Time =1.00E+02 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:1.44E+02 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-06
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
AM-241	4.259E+05
PU-239	4.986E+05
NP-237	1.496E+01
U-238	5.000E+05
U-235	5.000E+05
U-234	1.417E+02
U-233	3.359E-03
PA-231	1.057E+03
TH-230	4.996E+05
TH-229	1.069E-05
AC-227	7.393E+02
RA-226	5.000E+05
PB-210	4.777E+05
SM-147	1.237E-05
PM-147	1.676E-06
CO-60	9.725E-01

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	2.7E+01	2.7E+01
Total	2.7E+01	2.7E+01

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.54E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00
Total	2.54E+01	0.00E+00	0.00E+00	0.00E+00	1.60E+00	0.00E+00

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
AM-241		
AM-241	4.53E-01	4.53E-01
NP-237	8.92E-05	8.92E-05
U-233	1.16E-10	1.16E-10
TH-229	9.12E-11	9.12E-11
PU-239		
PU-239	1.33E-02	1.33E-02
U-235	2.03E-07	2.03E-07
PA-231	6.25E-11	6.25E-11
AC-227	2.89E-10	2.89E-10
U-238		
U-238	3.91E-01	3.91E-01
U-234	6.50E-06	6.50E-06
TH-230	2.10E-09	2.10E-09
RA-226	4.38E-08	4.38E-08
PB-210	6.94E-11	6.94E-11
U-235		
U-235	2.07E+00	2.07E+00
PA-231	1.27E-03	1.27E-03
AC-227	7.32E-03	7.32E-03
TH-230		
TH-230	1.64E-02	1.64E-02
RA-226	1.02E+00	1.02E+00
PB-210	2.41E-03	2.41E-03
RA-226		
RA-226	2.30E+01	2.30E+01
PB-210	7.57E-02	7.57E-02
SM-147		
SM-147	0.00E+00	0.00E+00
PM-147	1.43E-15	1.43E-15
CO-60		
CO-60	6.15E-05	6.15E-05

Title : Seneca, 12x12x5 room and source, residen
Input File : C:\WINBLD\12X12X5A.I

RESRAD-BUILD Dose (Time) Tables

Receptor Doses Received for the Exposure Duration

(mrem)

	Evaluation Time [yr]					
	0.00E+00	2.00E+01	4.00E+01	6.00E+01	8.00E+01	1.00E+02
1	1.17E+02	2.93E+01	2.72E+01	2.71E+01	2.71E+01	2.70E+01

Receptor Dose/Yr Averaged Over Exposure Duration

(mrem/yr)

	Evaluation Time [yr]					
	0.00E+00	2.00E+01	4.00E+01	6.00E+01	8.00E+01	1.00E+02
1	1.22E+02	3.06E+01	2.84E+01	2.83E+01	2.82E+01	2.82E+01

APPENDIX B

Notes from Removal Action

North End Dewa

19 May 86

A Opened large pit

1) Discovered 3 concrete culvert pipes under large concrete slab - all filled with water

2) Discovered 1 large metal corregated pipe that was back filled under a concrete slab.

3) Discovered 1 rectangular, back filled area under another concrete slab.

4) Talked w/ Howard Marchitell who stated that other items were buried at the north end of the pit.

B. Workers: T. Stucic, John Cleary, Ken Cranford Frank Anthony, Shirley Bentley, Frank D'Amico

C. Visitors: Bill Van Dusen, Phil Lowrie, Howard Marchitell

20 May 86 - No work - Rain

21 May 86 "

22 May 86 "

23 May 86 " - SDO

27 May 86

A. Opened suspected pit behind Bldg 304

metal pit (Pit 4).

B. Workers: T. Stincic, C. Rance, J. M. Milligan, M Lew. B. Owen, R. Carbonato.

C. Visitors. J. Cleary, Capt Kehoe, K. Crawford, F. Anthony

29 June 86

A. Alpha Team members continue to stake out pit.

B. J. Jones, R. Wright, T. Stincic

C. ~~Phil~~ Louvier

25 June 86

A. Alpha Team members continue to stake out pit.

B.

26 June 86 - No work. Alpha Team couldn't support with people.

27 June 86

A. Alpha Team surveying w/ Fidler.

B. S. Bentley, R. Hamilton, T. Stincic

C. LTC Owen, D. Van Dusen, K Crawford, CPT Kehoe, R Wri

21 July (cont)

3. John Brannagan, Frank Fisher, Tomcic

22 July

23 July Opened Pad

24 July Opened Pad

18 Aug Used large backhoe to dig down to water tank. Struck underground streams @ 18 feet
T.J.S. F. D'Amico, Bob Tansley, Tom Bennett
Visitors Bill VanDusen Life Owner

19 Aug Pumped out water, used dozer w/winch and large backhoe but could not move the tank. Covered it over.
TJS F. D'Amico, Bob Tansley, Tom Bennett
Visitors Bill VanDusen, J Quill, T Battaglia, P Matrisian

20 Aug F. D'Amico restored site.

---

3 Sept TJS monitored culverts with PRS-1 w/ probe, No readings. also swipod all culverts. #1 + #2 Large Concrete Culverts. #3 - #6 Small Concrete Culverts #7 Large metal culvert.

AMSDS-SF (SDSSE-LS/6 Dec 88) (385-11a) 1st End Mr. Owen/AV 570-9328
SUBJECT: Radiological Decontamination Report

CDR, U.S. Army Depot System Command, Chambersburg, PA 17201-4170 6 Apr 89

FOR CDR, U.S. Army Materiel Command, ATTN: AMCSF-P, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001

1. Reference telephone conversation between Mr. R. Owen, this office, and Mr. T. Stincic, SEAD (SDSSE-LS), 3 Apr 89, SAB.

2. Subject report is forwarded for your review and action.

3. Pursuant to our review and referenced telephone conversation, concur with adequacy of site cleanup and release of site for unrestricted use.

4. It should be noted that wipe test results are in dpm/100 sq.cm., and soil samples are in pCi/gm.

FOR THE COMMANDER:

John E. Rankin

JOHN E. RANKIN
Chief, Safety Office

Encl
nc

CF (w/o encl):
CDR, SEAD, ATTN: SDSSE-LS

Original

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT
ROMULUS, NEW YORK 14541-5001

REPLY TO ATTENTION OF

SDSSE-LS

6 December 1988

MEMORANDUM THRU: Commander, U.S. Army Depot System Command, ATTN: AMSDS-SF, Chambersburg, PA 17201-4170

FOR: Commander, U.S. Army Materiel Command, ATTN: AMCSF-P, Alexandria, VA 22333-0001

SUBJECT: Radiological Decontamination Report

1. Radioactive contamination was presumed to be located at two sites in Seneca Army Depot, Romulus, New York. This information was obtained from employees who worked here in the 1960's.

2. The two sites were a 5000 gallon tank with an associated pit and a burial area with five separate pits.

3. The 5000 gallon tank and associated pit were used by the AEC. When the site was turned over to the Army, the AEC removed all the waste. The other site was apparently of U.S. Army origin.

4. Operations began 19 May 1986 and ended on 3 September 1986. The 5000 tank and associated pit were free from radioactive contamination (encl 1&2). The other site did have a sizeable amount of lab trash buried in the pits.

5. The trash was wet and handled by a backhoe. The trash and dirt was loaded into 23 each B25 containers which were shipped to Chem-Nuclear Systems, Inc., Barnwell, South Carolina in December, 1987.

6. All phases of the operation were monitored with appropriate survey instruments. In addition, dry swipes were taken and read on a Nuclear Measurements Corp PC-5 Proportional Counter (encl 3). Soil samples were taken and analyzed at the Ballistics Research Laboratory (encl 4).

7. The Seneca Army Depot Alpha Team performed a radiological survey of the entire area where the lab trash was buried with negative results.

8. Request you review the enclosed information and concur that the sites have been cleaned and are certified for unrestricted use.

FOR THE COMMANDER:

Thomas C. Battaglia

5 Encls

THOMAS C. BATTAGLIA
Safety Manager

DEPARTMENT OF THE ARMY
US ARMY BELVOIR RESEARCH & DEVELOPMENT CENTER
FORT BELVOIR, VIRGINIA 22060-5606

REPLY TO
ATTENTION OF

STRBE-VR

21 July 1986

SUBJECT: Spectroscopic Analysis

Commander
US Seneca Army Depot
ATTN: SDSSE-AX (T. Stincic)
Romulus, NY 14451-5001

1. Reference letter SDSSE-AX, dated 3 June 1986, subject: Request for Analysis.

2. A gamma spectroscopic analysis of 4 samples of water is forwarded:

Sample	Concentration
Pit #1	560 pCi/L
Pit #2	630 pCi/L
Pit #3	550 pCi/L
Tank	540 pCi/L
Background	300 pCi/L

3. Licenses shall not release radioactivity in effluents to unrestricted areas in concentrations which exceed the limits specified in Appendix B, Table II of 10 CFR 20. This limit for natural uranium is 3×10^{-5} microcurie per milliliter.

4. The highest concentration from pit #2 is 630 picocuries per liter or 6.3×10^{-7} microcurie per milliliter.

5. The concentrations of gamma emitting radioactivity at Para 2 do not exceed limits at Para 3.

6. A beta analysis of 4 samples of water is forwarded:

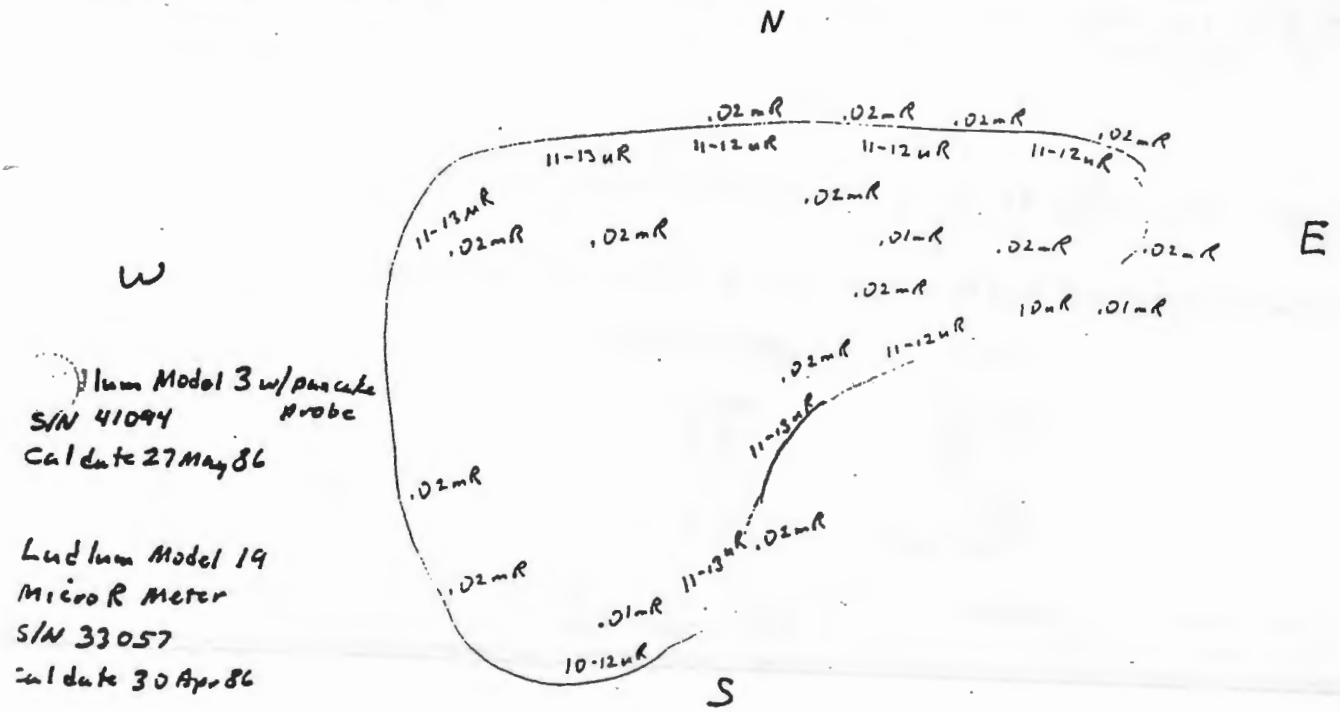
Sample	Concentration
Pit #1	79 dpm/mL
Pit #2	83 dpm/mL
Pit #3	79 dpm/mL
Pit #4	75 dpm/mL
Background	80 dpm/mL
Lower limit of detection	93 dpm/mL

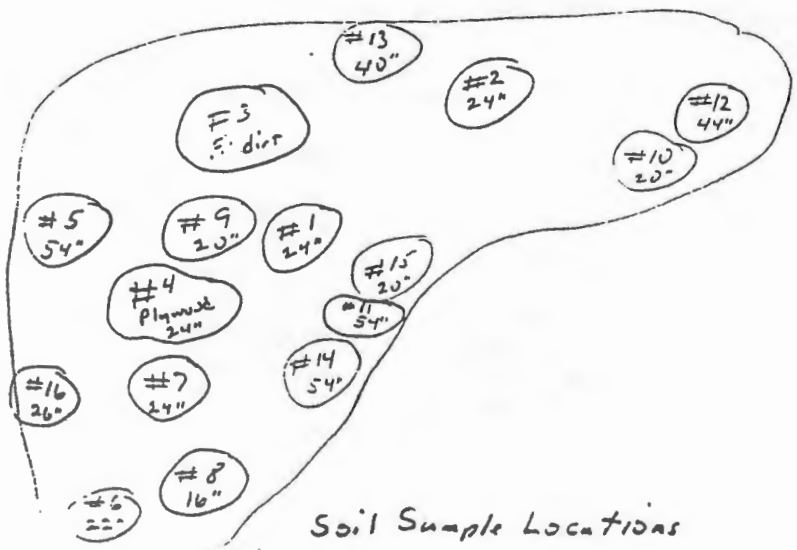
PIT NEAR BUILDING 804

Pit was opened on 27 May 1986. No suspicious debris were encountered except for pieces of plywood. The pit was approximately 18 feet long by 10 feet wide by 4.5 feet deep.

Readings were taken with a Ludlum Model 3 equipped with a pancake beta/gamma probe and a Ludlum Model 19 MicroR Meter. No readings above background were noted.

Soil samples were taken from the bottom of the pit (54") and when the pit was partially back filled (22").





Soil Sample Locations

Sample No.	Description	Findings
# 1	24 inches	< MDA
# 2	24 inches found	< MDA
# 3	Mass 79.4 g	< MDA
# 5	54 inches West	< MDA
# 6	22 inches	< MDA
# 7	stuck to plywood at 2 feet	< MDA
# 8	16 inches	< MDA
# 9	20 inches	< MDA
# 10		< MDA
# 11	54 East	< MDA
# 12	44 inches East	< MDA
# 13	40 inches North	< MDA
# 14	54 inches SE	< MDA
# 15	20 inches	< MDA
# 16		< MDA
# 4	Plywood found in hole	< MDA

DISPOSITION FORM

For use of this form: see AR 340-15; the proponent agency is TAGO

FERENCE OR OFFICE SYMBOL SUBJECT Grid Survey

SDSSE-NX

TO: Safety Officer FROM: Chief Alpha Team DATE: 5 July 88 CMT 1
RPO

. Subject survey has been completed for some time but final compass readings are not established.

. Attached is a copy of the initial DF that established the requirements and nstrumentation to be used. In addition to this initial DF the following nformation is provided:

a. Instrumentation - One Ludlum Model 2220 w/SPA3 probe, S/N 31992 robe S/N NA

One Ludlum Model 2220 w/Fidler probe, S/N 31963 robe S/N MD734.

b. Standardization as stated on initial DF.

. Survey was conducted for initial start point as depicted on attached ortion of a current Depot map. Grid starting at 27.50 by 86.65 approx. Compass readings from start point were taken utilizing the peak of the water ower and a intersecting reading taken utilizing the peak of the commo tower r Bldg 812. The readings are; commo tower 268w, water tower 287w. rently the start point is marked by a stake and red flag.

. The survey consisted of a back and forth slow walk by two alpha team members. Each member carried an instrument as listed in para 2 above. The initial direction was on compass heading 95e until intersection of the patrol oad. One step, approximately 3 feet, was taken in an easternly direction and the team headed in a back azimuth of 275w. This process continued until the entire noted area was completed. The western boundry of the survey area was determined by the start point and an azimuth of 5e.

. This survey was conducted with no readings above background being noted. The background during each days survey by various teams did vary but in all cases each team noted no readings above their starting background.

. Point of contacts for the survey are, Mr. J. Cleary or Mr. P. Louvier, at ext 30-207/560.

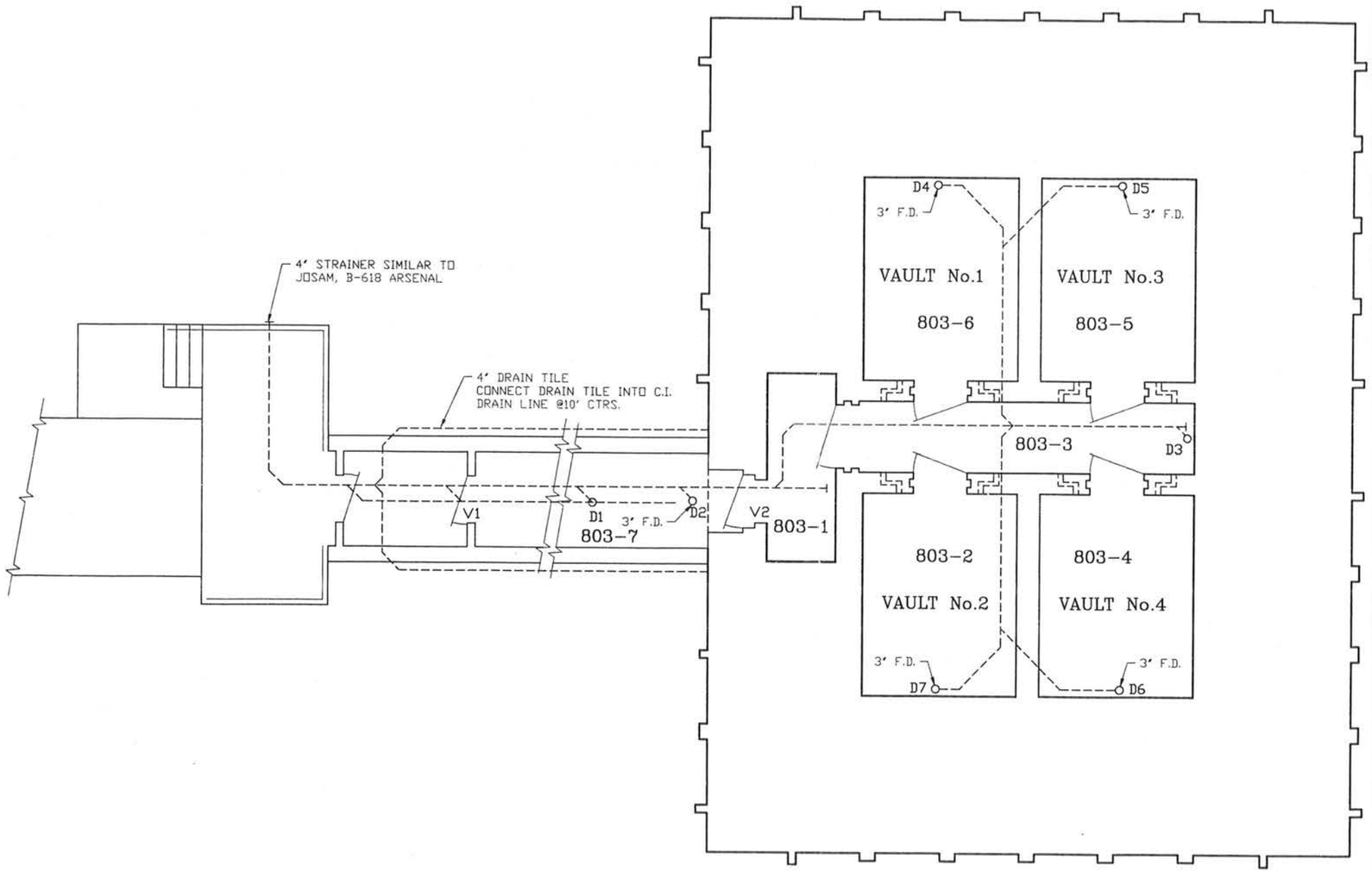
2 encl
as

PHILIP T. LOUVIER
CHIEF ALPHA TEAM

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
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

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

BUILDING 803

SCALE AS NOTED | DATE FEBRUARY 2000 | REV A

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

SHELVING ON WEST WALL

19
18
17

20
BATHROOM STALL DOOR (FRONT)

21
BATHROOM STALL DOOR (BACK)

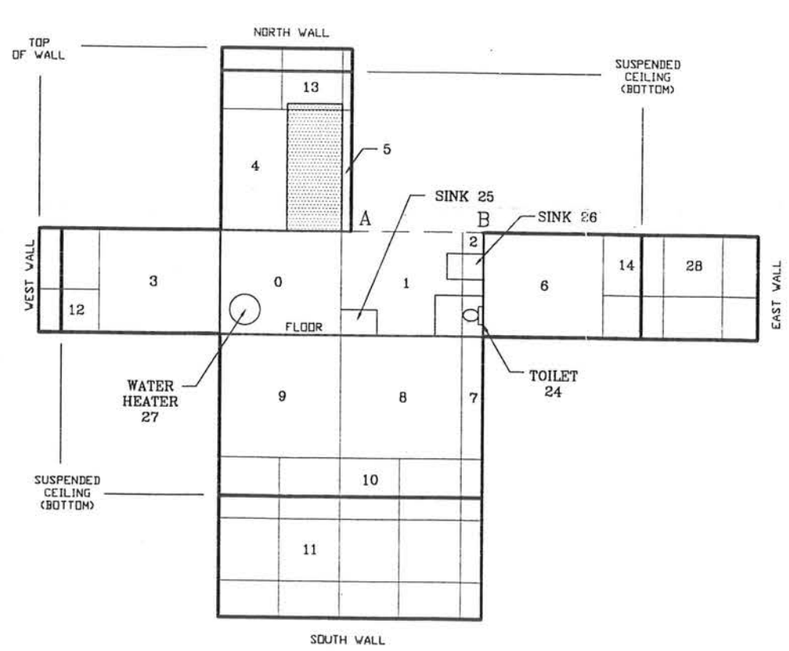
22
SIDE OF BATHROOM STALL (FRONT)

23
SIDE OF BATHROOM STALL (BACK)

NORTH
16
SOUTH
SUSPENDED CEILING (BOTTOM)

NORTH
15
SOUTH
SUSPENDED CEILING (TOP)

NORTH
29
SOUTH
METAL CEILING



ROOM 804-5A

SHOWER STALL

INSIDE
11
NORTH

OUTSIDE
NORTH

BOTTOM
EAST
12
14
EAST

INSIDE
13
SOUTH

OUTSIDE
15
SOUTH

N

NOTE:

CLASS ONE ROOM
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.

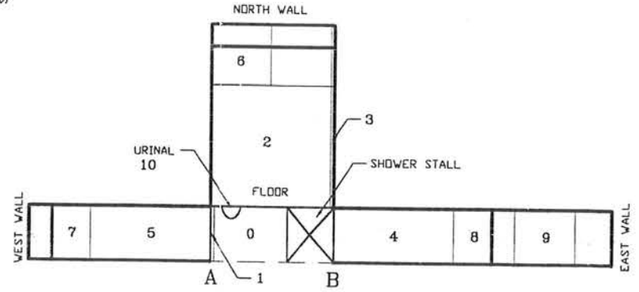
1m x 1m GRIDS, 10% COVERAGE
- CEILING (SUSPENDED AND NONSUSCENDED)
- UPPER WALLS (ABOVE 2m)

DOORWAY (IF DOOR PRESENT, CLOSE AND TREAT AS WALL)

NORTH
18
SOUTH
CEILING

NORTH
17
SOUTH
DUCT WORK (TOP)

NORTH
16
SOUTH
DUCT WORK (BOTTOM)



ROOM 804-5B

FEET 0 3 6
METERS 0 1 2

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

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.

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY

DEPT. ENVIRONMENTAL ENGINEERING
Proj. No. 730047-01001

BUILDING 804
ROOM 804-5 A AND B

SCALE AS NOTED
DATE OCTOBER 1988
REV A

R:\SENECA\FIES\SD12\804-5.DWG