Pratt & Whitney
A United Technologies Company

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October 24, 2014

Ms. Elizabeth Ullrich
2100 Renaissance Blvd
King of Prussia, PA 19406

Subject: Pratt & Whitney East Hartford, CT SMB-151 Final Status Survey Plan

Dear Ms. Ullrich,

Please find the attached Final Status Survey Plan for the SMB-151 license termination surveys at the Pratt & Whitney East Hartford, CT facility.

This Final Status Survey Plan is essentially the same as the Middletown facility Final Status Survey Plan, with the exception of the Historical Site Assessment, Survey Units and Figures. This plan describes the methods to be used in planning, designing, conducting, and evaluating final status surveys.

This plan presents the number and locations of the survey units at the site, the minimum number of measurements in each survey unit, types of instruments to obtain data and the method for data analysis. The DCGL used in the plan is based upon a previously approved Technical Support Document; RSCS TSD No: 14-003, Rev 01, "Site-Specific Pratt & Whitney Building Surface DCGL".

Each survey unit will have a survey package. Each package will contain a survey map with measurement locations identified, the type(s) of instruments to be used for the measurements, measurement results, data analyses and a dose assessment.

If you have any questions, please contact Dave Alberghini at 860-565-4977 or via email at david.alberghini@pw.utc.com.

Sincerely,

Renee Welsh

Docket No.: 04000791
License No.: SMB-151

Enclosure:
Final Status Survey Plan; Termination of License SMB-151 at the East Hartford, CT Facility, Revision 0

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Final Status Survey Plan
Revision 0

<u>Pratt & Whitney</u>
A United Technologies Company
400 Main Street
East Hartford, Connecticut

Termination of License SMB-151
at the East Hartford, CT Facility

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1.0 INTRODUCTION

The purpose of the Final Status Survey Plan is to describe the methods to be used in planning, designing, conducting, and evaluating final status surveys at the Pratt & Whitney (P&W) East Hartford, CT site. The plan will be used to terminate the Pratt & Whitney SMB-151 license (1) in accordance with 10 CFR 40.42. (2) These surveys serve as key elements to demonstrate that the dose from residual radioactivity is less than the maximum annual dose criterion for license termination for unrestricted use specified in 10 CFR 20.1402 (3) and by Connecticut Remediation Standard regulations. (4) (5) The additional requirement of 10 CFR 20.1402 that all residual radioactivity at the site be reduced to levels that are as low as reasonably achievable (ALARA) will also be addressed. The Final Status Survey Plan was developed using the guidance of NUREG-1575, "The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)" (6) and NUREG-1757 Volume 2(7).

This plan is written to be both educational and informative. Each section provides the reader with sufficient information about each step of the final status survey process to understand that step. The plan also contains a statement as to the decision that will be applied to the P&W final status survey process.

2.0 SUMMARY OF THE FINAL STATUS SURVEY PROCESS

This section summarizes the final status survey process as described in MARSSIM. (6) The final status survey process consists of four principal elements:

- planning,
- design,
- implementation, and
- assessment.

Survey planning includes review of the Historical Site Assessment (HSA) and other pertinent characterization information to establish Data Quality Objectives (DQOs), survey unit classifications, and the radionuclides of concern. The HSA reviews historical use of licensed material at the facility and the levels of potential activity entailed through personnel interviews and records review. The site buildings and areas are classified based upon contamination potential. Areas that have no reasonable potential for residual contamination are classified as non-impacted areas. These areas have no radiological impact from site operations. Areas with reasonable potential for residual contamination are classified as impacted areas. Impacted areas are divided into three classifications based upon the potential contamination levels and how the contamination is distributed. Areas with the same classification are broken into survey units. Survey units are fundamental elements for which final status surveys are designed and executed. The classification of a survey unit determines how large it can be in terms of surface area.

The DQO process is a series of planning steps for establishing criteria for data quality and developing survey designs. The DQO process consists of seven steps:

1. Statement of the problem;
2. Identification of the decision;
3. Identification of inputs to the decision;
4. Definition of the study boundaries;
5. Development of a decision rule;

6. Specification of limits on decision errors; and
7. Optimization of the design for obtaining data.

Before the survey process can proceed to the design phase, concentration levels that represent the maximum annual dose criterion of 10 CFR 20.1402 (25 mrem/year) or Connecticut regulations (19 mrem/year) must be established. In general, these concentrations are established for either surface contamination (dpm/100 cm^2) or volumetric contamination (pCi/g). They are used in the survey design process to establish the minimum sensitivities required for the available survey instruments and techniques, and in some cases, the spacing of fixed measurements or samples to be made within a survey unit. Surface or volumetric concentrations that correspond to the maximum annual dose criterion are referred to as Derived Concentration Guideline Levels, or DCGLs. A DCGL established for the average residual radioactivity in a survey unit is called a $DCGL_W$. Values of the $DCGL_W$ may then be increased through the use of area factors to obtain a DCGL that represents the same dose to an individual for residual radioactivity over a smaller area within a survey unit. The scaled value is called the $DCGL_{EMC}$, where EMC stands for elevated measurement comparison.

After the $DCGL_W$ is established, a survey design is developed and documented for each survey unit. The plan is documented as a Survey Package that selects the appropriate survey instruments and techniques to provide adequate coverage of the unit through a combination of scans, fixed measurements, and sampling. The Survey Package also implements the DQOs for that survey unit and provides instructions for carrying out the survey. The package documents the data assessment of results, the statistical basis used to determine if the survey unit passes or fails, and the review and approval of the package. If any of the radionuclides of concern are present in background at levels that impact the DCGLw, the planning effort may include establishing appropriate reference areas to be used to establish baseline concentrations for these radionuclides and their variability. Reference materials are specified for establishing background instrument responses for cases where gross activity measurements are to be made. A reference coordinate system may be used for documenting locations where measurements were made and to allow replication of survey efforts if necessary. This process ensures that data of sufficient quantity and quality are obtained to make decisions regarding the suitability of the survey design assumptions and whether the unit meets the release criterion. Approved site procedures will direct this process to ensure consistent implementation and adherence to applicable requirements.

Survey implementation is the process of carrying out the survey plan (package) for a given survey unit. This consists of scan measurements, fixed measurements, and collection and analysis of samples. Scan measurements will always be made, while fixed measurements and sampling may not be necessary. Data are collected and stored using a data management system.

Data assessment includes data verification and validation (V&V), review of survey design bases, and data analysis. For a given survey unit, the survey data are evaluated to determine if the residual activity levels in the unit meet the applicable release criterion and if any areas of elevated activity exist. In some cases, data evaluation will simply serve to show that all of the measurements made in a given survey unit were below the applicable $DCGL_W$. If so, demonstrating compliance with the release criterion is a simple matter and requires little in the way of analysis. In other cases, residual radioactivity may exist where measurement results both above and below the $DCGL_W$ are observed. In these cases, statistical tests must be performed to make a decision as to whether the unit meets the release criterion. The statistical tests that might be required to make decisions regarding the residual activity levels in a survey

unit relative to the applicable $DCGL_W$ must be considered in the survey design to ensure that a sufficient number of measurements are collected.

Quality assurance and control measures are employed throughout the final status survey process to ensure that all decisions are made on the basis of data of acceptable quality. Quality assurance and control measures are applied to ensure:

- the plan is correctly implemented as prescribed,
- all data and samples are collected by individuals with the proper training following approved procedures,
- all instruments are properly calibrated,
- all collected data are validated, recorded, and stored in accordance with approved procedures,
- all required documents are properly maintained, and,
- if necessary, corrective actions are prescribed, implemented and followed up.

3.0   EAST HARTFORD FACILITY HISTORICAL SITE ASSESSMENT

The P&W East Hartford, Connecticut site is located on approximately 1,000 acres of land in Hartford County. It contains approximately 4 million square feet of combined office and factory space. Figure 3-1 presents the East Hartford site map. United Technologies' Pratt & Whitney (P&W) is licensed by the U.S. Nuclear Regulatory Commission (NRC) to possess and use radioactive material at the 400 Main Street, East Hartford, Connecticut facility under NRC License SMB-151. (1) The SMB-151 license allows possession and use of 910 kilograms of solid Thorium oxide (natural Th-232) source material not exceeding 4% (by mass) dispersed in Nickel. This was commonly referred to as TD-Nickel or TD-Ni. This material was not alloyed by P&W but was provided as sheet metal stock by a vendor.

The SMB-151 license was obtained on March 31, 1961. Licensed material was initially used in Middletown. Building 10 in Middletown, CT was constructed in 1968 and was used for the manufacture of jet engine heat shields installed in combustion chambers from TD-Ni. Licensed activities in Building 10 ceased in 2000 when the TD-Ni sheet metal stock manufacturing equipment and production operations were moved to the L building in the East Hartford Facility. Combustion chambers from engines being overhauled were disassembled and assembled in both the L and M buildings. Manufacturing of TD-Ni parts in East Hartford ceased in 2012.

As in Middletown Building 10, no smelting or alloying of the metal was done in the L or M Buildings. Also, no other kind of high temperature work was done on this metal, so no radioactive fumes or other finely divided particulate contamination was ever produced. Any fine particulate produced was generally associated with tumbling and polishing operations which remained wet, entailing very low airborne radioactivity release fractions (ARFs). Any contamination present was the result of stamping, forming, de-burring, tumbling, polishing or some other low velocity production operation. . Standard housekeeping practices were employed at that time which included cleaning up each work station at the end of each shift.

Over the years, small areas in various buildings were used for temporary storage of stock, parts and scrap waste. These areas were located within the North Production Test Building, South Production Test Building, the B, D, F, H, J and K buildings and a waste storage trailer. By the mid 2000s, several buildings were deemed no longer necessary. The North Production, South

Production and F buildings were surveyed, free released, and then demolished in whole. A major portion of the H building was also demolished.

The Historical Site Assessment (HSA) commenced in the fall of 2013. Historical records were reviewed including surveys and relevant memos. Interviews with key long-time employees were also conducted.

Several key documents were reviewed and are listed below:
- Several Final Status Surveys at the East Hartford facility that were undertaken at the request of P&W upon cessation of TD-Ni activities.
    - RSA Final Radiological Status Report, Pratt & Whitney, East Hartford Facility (Portions) North Production Test, dated July 16, 2007
    - RSA Decommissioning, Pratt & Whitney North Experimental Test Building (North Test), dated 11/1/2010
    - RSA Final Radiological Status Report, Pratt & Whitney, East Hartford Facility (Portions), dated January 8, 2004
    - RSA Final Radiological Status Report, Welding/Blending Area, L-Building, Pratt & Whitney, East Hartford, Connecticut, dated September 17, 2008.
- Annual radiation surveys from 2001 through 2011.

A summary of the relevant points identified in the above documents are listed below.

1. Final Status Surveys performed at the East Hartford facility

    Several final radiological status surveys were conducted at the East Hartford facility from 2003 to 2010 upon cessation of the use of the TD-Ni material in those areas. The surveys were performed in storage areas, test cells and a welding/blending area. All the surveys were conducted under the MARSSIM guidance. The DCGL for the surveys were either the NRC screening level of 6 dpm/100 cm^2 or reduced to 5 dpm/100 cm^2 to account for the 19 mrem Connecticut recommended limit. The conclusion in each of the survey reports is that no single measurement exceeded the NRC total contamination limit of 6 dpm/100 cm^2 or the removable limit of 0.6 dpm/100 cm^2.

2. Annual radiation surveys

    The annual radiation surveys from 2001 through 2011 were reviewed. They included one or more air samples and a wipe survey of areas where thoriated material was used. The conclusion in every report what the no activity distinguishable from background was detected for alpha.

Based upon the information collected and reviewed, the following conclusions have been drawn:
1. Based upon the results of the previous final status surveys at the East Hartford facility, residual contamination at the East Hartford facility is a very small fraction (<5%) of the site-specific building DCGL of 354 dpm/100 cm^2. Therefore, the survey units for final status survey in East Hartford will be designated as Class 3.
2. All manufacturing and refurbishment of the TD-Ni parts occurred in the L and M Buildings. The J and K Buildings were used for engine assembly. Small temporary storage areas were established in the B and D Buildings. Scrap waste was moved from the point of generation to the Waste Storage Trailer. Therefore, based upon this

information, the final status survey of the East Hartford facility will be performed in the L, M, J and K Buildings, as well as the Waste Storage Trailer. The B Building is contiguous within the D Building. Both buildings are generally referred to as the D Building. The one small storage area in the B Building and one small storage area in the D Building will be included as part of the final status survey identified in Item #3 below.

3. Spray powders have been and will continue to be used in the East Hartford facility. Spray powders have been used in all the buildings scheduled for final status survey plus in the D and E Buildings. Based upon concerns expressed by the NRC about spray powder use in the Middletown facility, the D and E Buildings have been added to the final status survey.

Figure 3-1 East Hartford Site Map
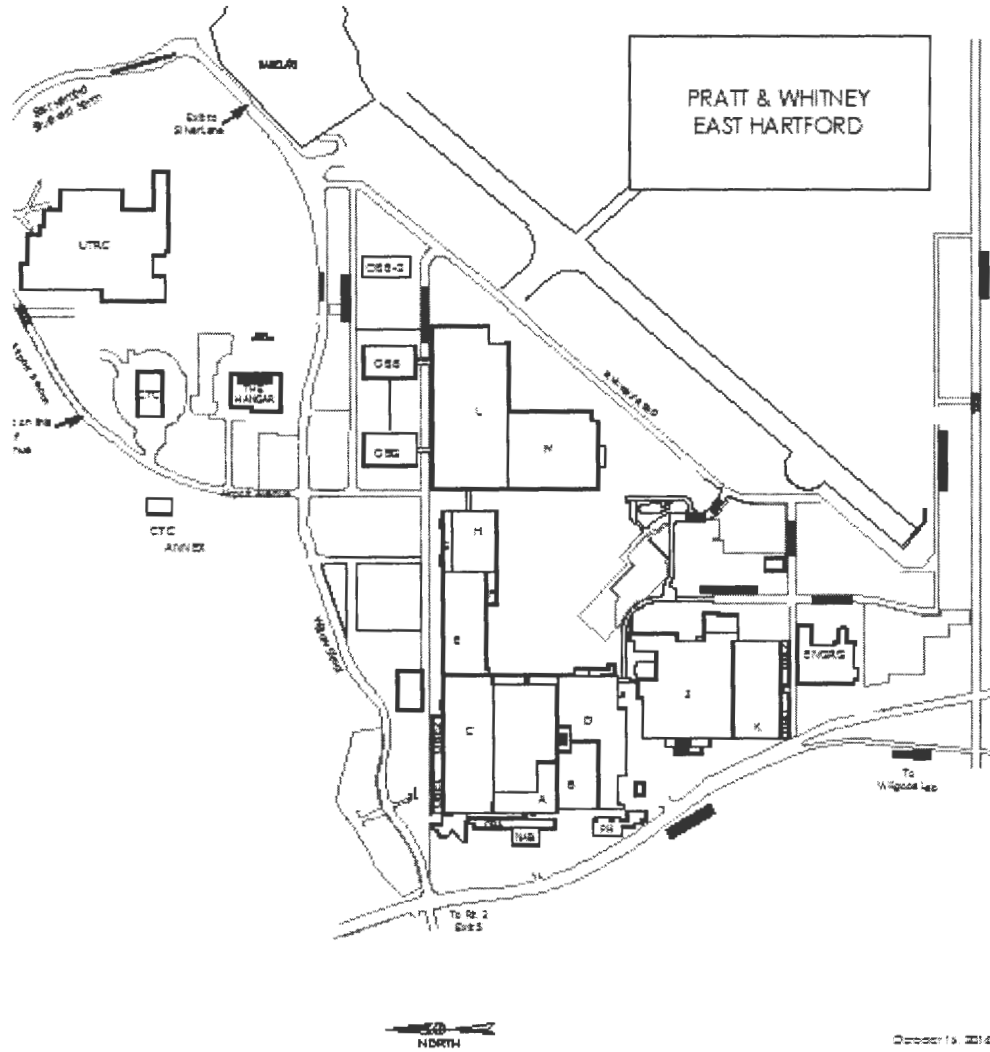
4.0   SURVEY PLANNING

4.1   Classification of Survey Areas and Units

The adequacy of the final status survey process rests upon partitioning the site into properly classified survey units of appropriate physical area. The following definitions are taken from MARSSIM.

- Class 1 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 radiation surveys) above the $DCGL_W$. Examples of Class 1 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 and high specific activity.

- Class 2 Areas: Areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the $DCGL_W$. To justify changing the classification from Class 1 to Class 2, there should be measurement data that provides a high degree of confidence that no individual measurement would exceed the $DCGL_W$. Examples of areas that might be classified as Class 2 for the final status survey include: 1) locations where radioactive materials were present in an unsealed form, 2) potentially contaminated transport routes, 3) areas downwind from stack release points, 4) upper walls and ceilings of buildings or rooms subjected to airborne radioactivity, 5) areas handling low concentrations of radioactive materials, and 6) areas on the perimeter of former contamination control areas.

- Class 3 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 $DCGL_W$, based on site operating history and previous radiation surveys. Examples of areas that might be classified as Class 3 include buffer zones around Class 1 or Class 2 areas, and areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification. Survey Units

Class 1 areas have the greatest potential for contamination and therefore receive the highest degree of survey effort for the final status survey using a graded approach, followed by Class 2, and then by Class 3. Non-impacted areas do not receive any level of survey coverage because they have no potential for residual contamination. Non-impacted areas are determined on a site-specific basis. A survey unit can have only one classification.

Based upon the Historical Site Assessment, all survey units in the P&W East Hartford facility are designated as Class 3. Survey units are limited in size based on classification, exposure pathway modeling assumptions, and site-specific conditions. The surface area limits shown in Table 4-1 are consistent with the guidance in MARSSIM.

Table 4-1 Survey Unit Surface Area Limits

Survey Unit Classification	Description	Surface Area Limit
Class 1	Structures (floor area)	$\leq 100 \text{ m}^2$
	Land areas	$\leq 2000 \text{ m}^2$
Class 2	Structures (floor area)	$100 \text{ m}^2 - 1{,}000 \text{ m}^2$
	Land areas	$2{,}000 \text{ m}^2 - 10{,}000 \text{ m}^2$
Class 3	Structures (floor area)	no limit
	Land areas	no limit

Table 4-2 presents the survey units at the East Hartford facility subject to final status survey.

Table 4-2 Final Status Survey Units

Survey Unit	Description	Class	Survey Scope
1	L Bldg - East Half	3	Floor only
2	L Bldg - West Half	3	Floor only
3	J Building	3	Floor only
4	M Building	3	Floor only
5	K Building	3	Floor only
6	D Building – East Half	3	Floor only
7	D Building – West Half (with B Bldg included)	3	Floor only
8	Waste Storage Trailer	3	Floor only
9	E Building	3	Floor only

Figure 4-1 presents the survey units in L Building, Figure 4-2 presents the J Building survey unit, Figure 4-3 presents the M Building survey unit, Figure 4-4 presents the K Building survey unit, Figure 4-5 presents the D Building survey units, Figure 4-6 presents the Waste Storage Trailer survey unit and Figure 4-7 presents the E Building survey unit. If survey units are added or re-classified, the NRC and state will be notified and the size limits in Table 4-1 will be used.

4.2 Reference Areas and Materials

If any of the radionuclides of concern are present in background, establishing reference background concentrations may be necessary to identify and evaluate contributions attributable to site operations. Background concentrations can be determined via measurements made in one or more reference areas selected to represent the baseline radiological conditions for the site. In addition, measurements may be required to establish background levels for various construction materials to accommodate gross activity (non-radionuclide-specific) measurements.

The material background levels are expected to be insignificant when compared to the DCGL. It is currently envisioned that a general area background measurement will be collected with each instrument prior to taking direct measurements and scanning. This measurement will be

collected in the center of the room/area at waist height. If other materials with high natural radioactivity are encountered in the survey unit and are part of the final status survey, we may take background measurements on similar non-impacted materials. The final method of which background will be used will be specified in the Final Status Survey Package for that survey unit.

Figure 4-1 L Building Survey Units

Figure 4-2 J Building Survey Unit
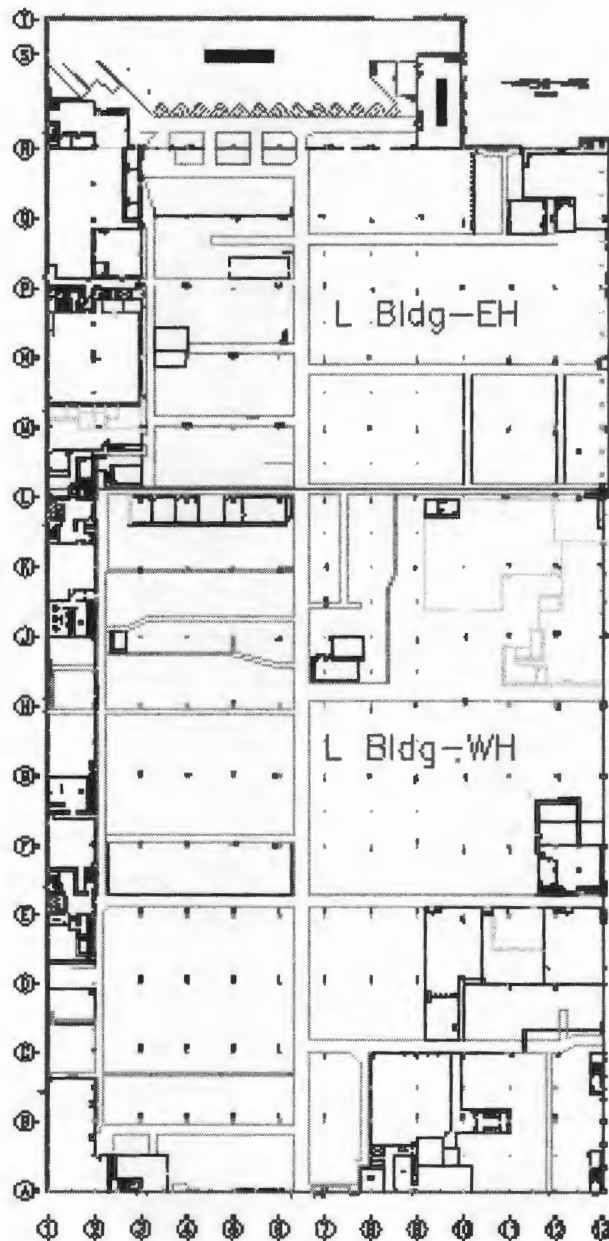
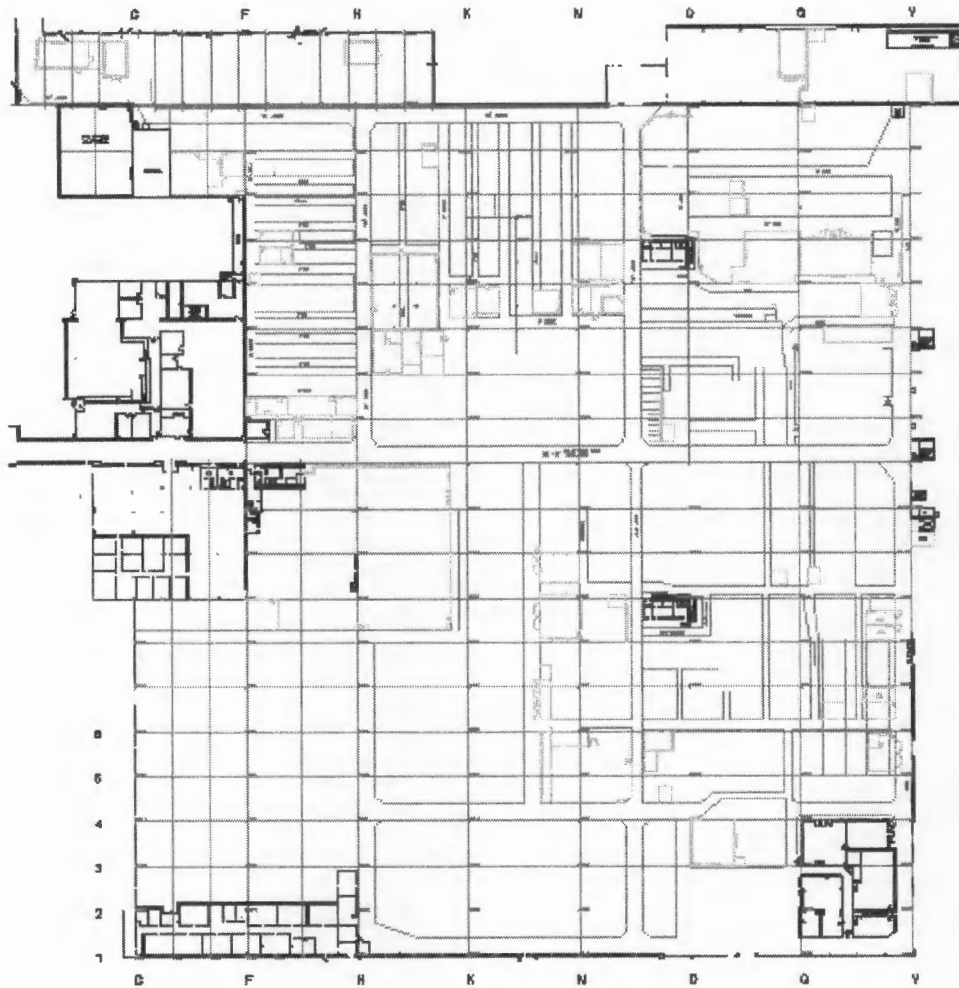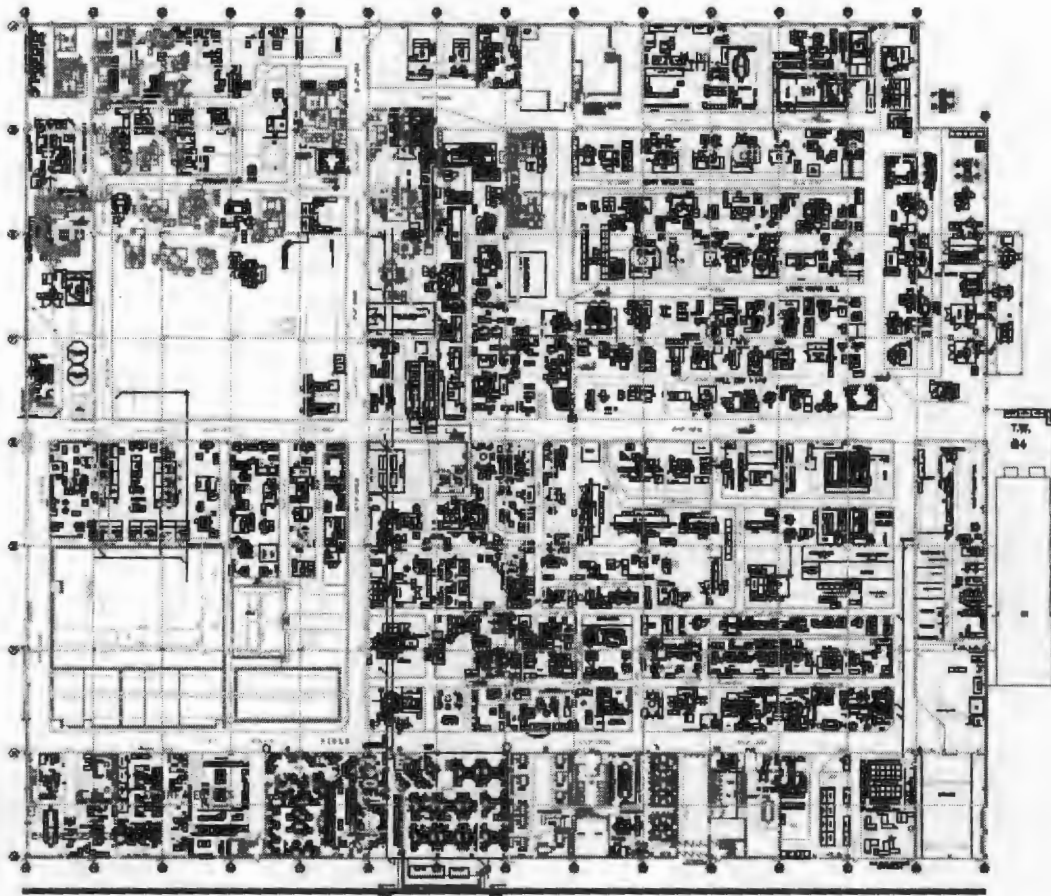**Figure 4-3 M Building Survey Unit**

THIS DOCUMENT CONTAINS NO TECHNICAL DATA SUBJECT TO THE EAR OR THE ITAR.

Figure 4-4 K Building Survey Unit
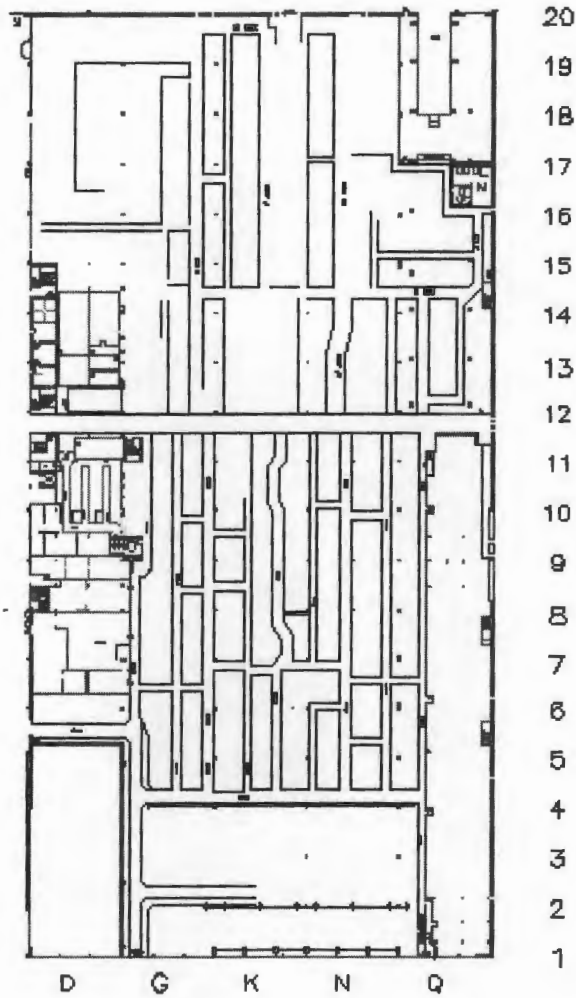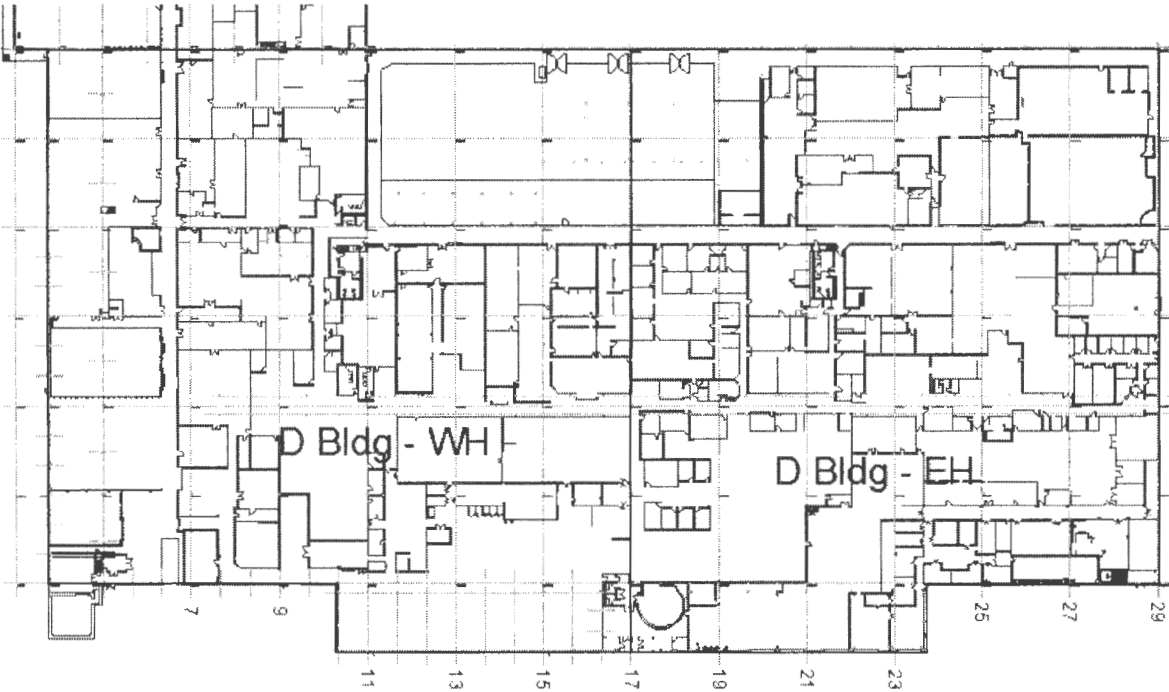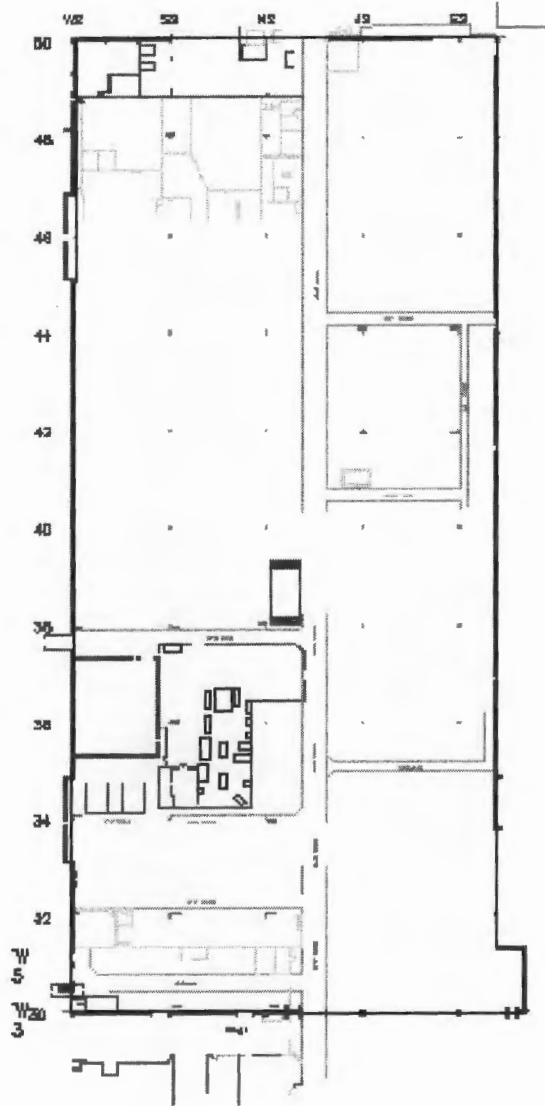
Figure 4-5 D Building Survey Units

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Figure 4-6 Waste Storage Trailer Survey Unit

Figure 4-7 E Building Survey Unit

4.3 Area Preparation: Isolation and Control

Before final status survey activities can begin in an area, a transition must occur where planned decommissioning activities are completed and the area is subsequently assessed to scope the required isolation and control measures. This includes establishing if the area is ready for final survey activities and identifying any work practice issues that must be addressed in survey planning and design.

Based upon the current radiological status of the facility, no isolation or controls are needed prior to implementing the final status survey.

4.4 Selection of DCGLs

Residual levels of radioactive material that correspond to allowable radiation dose standards are calculated by analysis of various pathways and scenarios (direct radiation, inhalation, ingestion, etc.) through which exposures could occur. These derived levels, known as derived concentration guideline levels (DCGLs), are presented in terms of surface or mass activity concentrations. DCGLs usually refer to average levels of radiation or radioactivity above appropriate background levels. DCGLs applicable to building or other structural surfaces are expressed in units of activity per surface area (typically Bq/m^2 or $dpm/100\ cm^2$). When applied to soil, sediments or structural materials where the radionuclides are distributed throughout the mass, DCGLs are expressed in units of activity per unit of mass (typically Bq/kg or pCi/g).

RESRAD-BUILD v3.5 was selected to perform site-specific dose modeling of impacted structural surfaces. RESRAD-BUILD is a computer code designed to evaluate the radiation doses from RESidual RADioactivity in BUILDings. The RESRAD-BUILD code was developed by Argonne National Laboratory (ANL) under sponsorship of the Department of Energy (DOE) and other federal agencies.

Since the end use scenario entails continued use of the buildings for industrial purposes, the Building Occupancy Scenario described in NUREG/CR-5512, Volume 1, (8) was selected to estimate potential radiation doses from radioactive material in buildings at the Middletown site. The average member of the critical group is defined as an adult individual engaging in work within the buildings following license termination. The person occupies and carries out light to moderate work activities inside the building for a full year of employment. The breathing rate applied in the sensitivity analysis was appropriate for light to moderate activity.

Results of the probabilistic sensitivity analysis and parameter selections for the RESRAD-BUILD code runs are presented in RSCS TSD 14-003 (13) which was previously submitted to the Commission and state of Connecticut for review and was subsequently approved for use by the NRC. Using a conservative methodology that included the radon pathway, a site-specific total surface activity TD-Ni concentration $DCGL_W$ of 354 $dpm/100\ cm^2$ was calculated for use at P&W. This DCGLw corresponds to the state of Connecticut release criterion of less than 19 mrem/year. (13) This $DCGL_W$ is extremely conservative for the following reasons:

1. It is based upon an extremely small room size relative to most rooms at the Middletown and East Hartford facilities which results in higher inhalation doses due to the smaller ratio of air volume to room surface area.

2. The inhalation pathway is the predominant dose contributor and the receptor is modeled at 1 meter above the floor.

3. NUREG/CR-6755 allows evaluation of Building Occupancy Scenario exposures with the radon pathway turned off, the $DCGL_W$ is based upon deterministic calculations with the radon pathway on.

4. Building Air Exchange parameter was the most sensitive parameter and air was set to the 25th percentile value of the distribution.

5. Source release times (RF0) were set at 10,000 days which corresponds to the 9th percentile of the distribution.

The removable contamination activity concentration will be set at 10% of the total activity $DCGL_W$ which is equal to 35 dpm/100 cm². Further explanation regarding the need for site specific DCGLs and their conservatism is provided in RSCS TSD 14-003. (13)

5.0 FINAL STATUS SURVEY DESIGN

The general approach prescribed by MARSSIM for final status surveys requires that at least some minimum number of measurements or samples be taken within a survey unit, so that the non-parametric statistical tests used for data assessment can be applied with adequate confidence or statistical power. Decisions regarding whether a given survey unit meets the applicable release criterion are made based on the results of these tests. Scanning measurements are used to check the design basis for the survey by evaluating if any small areas of elevated activity exist that would require reclassification, a tighter grid spacing for the fixed measurements, or both. However, MARSSIM also recognizes that alternatives to this general approach for final status surveys exist. Specifically, MARSSIM states that if the equipment and methodology used for scanning are capable of providing data of the same quality as fixed measurements (e.g., detection limit, location of measurements, ability to record and document results), then scanning may be used in place of fixed measurements, provided that results are documented for at least the number of locations that would have been necessary had fixed measurements been used.

Under MARSSIM, the level of survey effort required for a given survey unit is determined by the potential for contamination as indicated by its classification. Class 3 survey units receive judgmental scanning and randomly located measurements or samples. Class 2 survey units receive scanning over a portion of the survey unit based on the potential for contamination, combined with fixed measurements or sampling performed on a systematic grid. Class 1 survey units receive scanning over 100% of the survey unit combined with fixed measurements or sampling performed on a systematic grid. Depending on the sensitivity of the scanning method, the grid spacing may need to be adjusted to ensure that small areas of elevated activity are detected.

For combinations of fixed measurements and traditional scanning, the MARSSIM methodology is to select a requisite number of measurement locations to satisfy confidence limits for the non-parametric statistical test to be used for data evaluation and to account for sample losses or data anomalies. The purpose of scans is to confirm that the area was properly classified and that any small areas of elevated activity are within acceptable levels (i.e., are less than the applicable $DCGL_{EMC}$). Depending on the sensitivity of the scanning method used, the number of fixed measurement locations may need to be increased so the spacing between measurements is reduced.

Since all survey units at the site are Class 3, judgmental scanning will be performed in each survey unit.

For fixed measurements, MARSSIM states that MDCs should be as far below the $DCGL_W$ as possible, with values less than 10% of the $DCGL_W$ being preferred, and up to 50% of the $DCGL_W$ being acceptable.

5.1   Selecting the Number of Fixed Measurements and Locations

The MARSSIM methodology for evaluating whether a survey unit meets its applicable release criterion using fixed measurements plus scans is based on using non-parametric statistical tests for data assessment. Specifically, the methods of MARSSIM are based on two non-parametric tests: the Wilcoxon Rank Sum (WRS) test and the Sign test. The WRS test is a two sample test, making it applicable in cases where data are being compared against background data from an appropriate reference area. The Sign test is a one sample test, making it appropriate for radionuclide-specific measurements where the contaminant of interest does not appear in background or for gross activity measurements where background has been subtracted or is negligible when compared to the DCGL.

Because the approved DCGL is much greater than the background, the Sign test will be used for evaluating survey data at the East Hartford site. Additional fixed measurements and samples beyond the minimum required at biased locations will be obtained to ensure the data has sufficient statistical power to assess if the survey unit passes or fails the statistical test.

5.1.1   Establishing Acceptable Decision Error Rates

One input to the process of selecting the required number of data points for a given survey, which does not depend on the statistical test applied, is the selection of the acceptable decision error rates. Decision errors refer to making false decisions by either rejecting a null hypothesis when it is true (a Type I error) or accepting a null hypothesis when it is false (a Type II error). If the null hypothesis is that the survey unit of interest contains residual contamination in excess of the applicable release criterion, a Type I error refers to concluding that an area meets the release criteria when in fact it does not. The probability of making a Type I error is referred to as alpha (α). Likewise, a Type II error refers to concluding a unit does not meet the release criteria when it actually does. The probability of making a Type II error is denoted beta (β). Selecting values of α or β that are too low will result in an excessive number of fixed measurements being required. Likewise, selecting a β value that is too large can result in excessive costs in that survey units that meet the release criterion could be subjected to superfluous remediation efforts.

For final status surveys, the null hypothesis is that the survey unit of interest contains residual contamination in excess of the applicable release criterion. Both the α and β decision error rates for final status surveys designed for the East Hartford site will be set at 0.05.

5.1.2   Determining the Relative Shift

Another input to the process of selecting the required number of measurements that is somewhat independent of the statistical test to be employed is the determination of what is called the relative shift. The relative shift is a parameter that quantifies the concentrations to be measured in a survey unit relative to the variability in these measurements. The relative shift is

a function of the DCGL$_W$, a parameter called the "lower bound of the gray region" (LBGR), and the expected standard deviation of the measurements to be made in the survey unit (σ).

The σ value is selected by using existing characterization or remediation support survey data or by making preliminary measurements. Since most of the survey data are non-detection MDA levels, the sigma value cannot be calculated. In accordance with MARSSIM, when preliminary data are not obtained, it may be reasonable to assume a coefficient of variation on the order of 30%, based on experience.

The relative shift (Δ/σ) is computed as the quotient of the difference between the DCGL and the LBGR (Δ or shift) and the appropriate standard deviation value.

To compute the relative shift, the appropriate sigma value and an initial LBGR are selected. Per MARSSIM, the initial value for the LBGR will be set to one-half of the DCGL$_W$. If the resulting relative shift is not between 1.0 and 3.0, the LBGR is adjusted until it is. If the relative shift is too low, the LBGR is decreased; and if the relative shift is too high, the LBGR is increased.

Assuming a σ value of 0.3, the value for the relative shift is calculated as:

Relative shift = (0.5 / 0.3) = 1.67.

The value for the relative shift used in the determination of the number of measurements for the final status surveys at the East Hartford site will be conservatively decreased to 1.5; the lower the number, the more the measurements or samples.

5.1.3   Selecting the Required Number of Measurements for the Sign Test

The minimum number of fixed measurements required when using the Sign test is computed by the following equation:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(Sign\ p - 0.5)^2}$$

where: N = the minimum number of measurements required;
$Z_{1-\alpha}$ = the percentile represented by the α decision error;
$Z_{1-\beta}$ = the percentile represented by the β decision error; and
Sign p = the probability that a random measurement from the survey unit will be less than the DCGL$_W$ when the survey unit median concentration is equal to the LBGR.

Values for N will be taken from Table 5-5 of MARSSIM. (6)

Using the relative shift value of 1.5, and the α and β decision error rate values of 0.05, the minimum number of measurements for each survey unit from Table 5-5 of MARSSIM is equal to eighteen (18). Additional measurements at biased locations will be added to for each survey unit.

5.1.4   Determining Measurement Locations

For Class 1 and Class 2 survey units, fixed measurements will be performed over a systematic measurement pattern consisting of a grid having either a triangular or a square pitch. The pitch (grid spacing) will be determined based on the number of measurements required and whether the desired grid is triangular or square. Given that a triangular grid in general is more efficient than a square grid for detecting small areas of elevated activity, triangular grids should be employed for final status surveys involving fixed measurements in Class 1 and Class 2 survey units when practical. Systematic grids will not be used for surveys involving fixed measurements for Class 3 units. Instead, fixed measurement locations will be selected at random throughout the survey unit area.

All survey units at the East Hartford site are designated as Class 3; therefore, all measurement locations will be selected at random. In addition to randomly selected locations, additional biased sample locations will be added (e.g. near floor drains, TD-Ni historical storage and use areas). If the exact location of a randomly selected measurement location is inaccessible due to the current manufacturing use in the area, it will be noted in the Survey Package and the nearest accessible location will be surveyed preserving the random nature of the measurement location selection process.

5.2   Data Investigations

5.2.1   Investigation Levels

An important aspect of the final status survey is the selection and implementation of investigation levels. Investigation levels are levels of radioactivity used to indicate when additional investigations may be necessary. Investigation levels also serve as a quality control check to determine when a measurement process begins to deviate from expected norms. For example, a measurement that exceeds an investigation level may indicate a failing instrument or an improper measurement. However, in general, investigation levels are used to confirm that survey units have been properly classified.

When an investigation level is exceeded, the first step is to confirm that the initial measurement/sample actually exceeds the particular investigation level. Depending on the results of the investigation actions, the survey unit may subsequently require reclassification, remediation, and/or resurvey. Investigation levels are established for each class of survey unit. The investigation levels (criteria), to be employed for the East Hartford site final status survey effort, are given in Table 5-1.

Table 5-1 Investigation Levels

Survey Unit Classification	For fixed measurements or samples, perform investigation if:	For scan measurements, perform investigation if:
Class 1	$> DCGL_{EMC}$ or $> DCGL_W$ and a statistical outlier.	$> DCGL_{EMC}$
Class 2	$> DCGL_W$	$> DCGL_W$ or $> MDC_{scan}$ if MDC_{scan} is greater than the $DCGL_W$
Class 3	$> 0.5 \times DCGL_W$	Detectable over background.

Because all survey units at East Hartford are designated as Class 3, a fixed measurement that is greater than 0.5 x $DCGL_W$ will be investigated. Any scan measurement that shows a positive indication over background will also be investigated.

5.2.2 Investigations

Locations where initial measurements give results that exceed an applicable investigation level will be identified for confirmatory measurements. If it is confirmed that residual activity exists in excess of the investigation level, additional measurements will be made to determine the extent of the area of elevated activity and to provide reasonable assurance that other areas of elevated activity do not exist. Potential sources of the elevated activity will be postulated and evaluated against the original classification of the survey unit. Documentation will be compiled containing the results from the investigation surveys and showing any areas where residual activity was confirmed to be in excess of the investigation level. If residual activity in excess of the applicable investigation level is confirmed, the documentation will also address the potential source(s) of the activity and the impact this has on the original classification assigned to the survey unit. A decision will then be made regarding re-classification of the unit in whole or in part. The NRC and the CT DEEP will be notified of any survey unit re-classifications and the size limits in Table 4-1 will be used.

5.3 Survey Implementation and Data Collection

The requirements and objectives outlined in this plan will be incorporated into a survey package for each survey unit, which addresses various elements of the survey, including, but not limited to:
- maps of the survey unit and measurement/wipe sample locations, as appropriate;
- applicable DCGLs;
- instrumentation to be used;
- types and quantities of measurements (including backgrounds) and wipe samples to be made or collected;
- investigation criteria;
- QA/QC requirements (e.g., response checks, etc.);
- applicable health and safety procedures; and
- applicable operating procedures.

5.3.1 Survey Methods

The survey methods to be employed in the final status surveys will consist of combinations of scanning, fixed measurements and wipes to meet the survey objectives. Note that in some

cases, the same instrument may be used for more than one type of survey. For instance, a zinc sulfide (ZnS) detector may be used in either a scanning mode or for fixed measurements.

5.3.1.1 Scanning

Scanning is the process by which the operator uses portable radiation detection instruments to detect the presence of radionuclides on a specific surface (i.e., ground, wall, floor, equipment). The term scanning survey is used to describe the process of moving portable radiation detectors across a surface with the intent of locating residual radioactivity. Investigation levels for scanning surveys are determined during survey planning to identify areas of elevated activity. Scanning surveys are performed to locate radiation anomalies indicating residual gross activity that may require further investigation or action.

No matter what survey approach is selected (combination of instrumentation and techniques), one of the most important elements of a survey is *a priori* scanning to confirm that the unit is properly classified and to identify any areas where residual activity levels are elevated relative to the $DCGL_W$. The purpose of scanning is to detect areas of residual activity that may not be detected by other measurement methods. Thus, scanning should always be performed prior to any fixed measurements or sample collections in a survey unit.

Table 5-2, based upon guidance in MARSSIM, gives the areal coverage requirements when scanning is used with fixed measurements.

Table 5-2 Traditional Scanning Coverage Requirements

Survey Unit Classification	Recommended Scanning Coverage
Class 1	100%
Class 2	Outdoor areas, floors, or lower walls of buildings: 10% to 100%
Class 3	Judgmental

Because all survey units at East Hartford are Class 3, only judgmental scanning will be performed in each survey unit. This will encompass a minimum of 10% of the accessible areas in the survey unit. Survey packages will instruct personnel performing scans to stop and investigate further upon any indication of activity above background.

5.3.1.2 Fixed Measurements

Fixed measurements are taken by placing the instrument at the appropriate distance above the surface, taking a discrete measurement for a pre-determined time interval, and recording the reading. Fixed measurements may be collected at random locations in a survey unit or may be collected at systematic locations and supplement scanning surveys for the identification of small areas of elevated activity. Fixed measurements may also be collected at locations identified by scanning surveys as part of an investigation to determine the source of the elevated instrument response. Professional judgment may also be used to identify locations for fixed measurements to further define the areal extent of contamination.

A minimum of eighteen (18) fixed measurements will be collected in each survey unit at the East Hartford site. An additional 3 to 5 biased fixed measurements will be performed in each survey unit.

5.4 Survey Instrumentation

5.4.1 Instrument Selection

The selection and proper use of appropriate instruments for both fixed measurements and laboratory analyses is one of the most important factors in assuring that a survey accurately determines the radiological status of a survey unit and meets the survey objectives. The particular capabilities of a radiation detector establish its potential for being used in conducting a specific type of survey.

The radiation detectors to be used for final survey activities can be divided into three general classes:

- gas-filled detectors,
- scintillation detectors, and
- solid-state detectors.

Gas-filled detectors include ionization chambers, proportional counters (both gas-flow and pressurized) and Geiger-Mueller (GM) detectors. Scintillation detectors include plastic scintillators, zinc-sulfide (ZnS) detectors and sodium-iodide (NaI) detectors. Solid-state detectors include both n-type and p-type intrinsic germanium detectors.

Instrument detection limits are typically quantified in terms of their minimum detectable concentration, or MDC. The MDC is the concentration that a given instrument and measurement technique can be expected to detect 95% of the time under actual conditions of use.

In general, instruments used for measurements to demonstrate that the average concentration in a survey unit is less than the $DCGL_W$ will have an MDC that is no greater than 50% of the $DCGL_W$. Table 5-3 presents some of the available instruments for use during the final status survey.

Table 5-3 Available Instruments and Associated MDCs

Instrument	Application	Nominal Efficiency	Nominal Background	Nominal Fixed Measurement MDC	Nominal Scan MDC
gas proportional counter (100 cm^2)	alpha or beta scans or fixed measurements for structure surfaces	β plateau: 16% (Tc-99); α plateau: 23% (Th-230)	350 cpm (β plateau); 15 cpm (α plateau)	560 dpm/100 cm^2 (β plateau) 90 dpm/100 cm^2 (α plateau); 1 minute counts	1770 dpm/100 cm^2 (β plateau); 400 dpm/100 cm^2 (α plateau)
dual-phosphor scintillator (100 cm^2)	scans or fixed measurements; α and β, independently or simultaneously	20% (Tc-99) 18% (Th-230)	300 cpm (β mode); 6 cpm (α mode)	420 dpm/100 cm^2 (β mode); 80 dpm/100 cm^2 (α mode)	1300 dpm/100 cm^2 (β mode); 400 dpm/100 cm^2 (α mode)

Instrument	Application	Nominal Efficiency	Nominal Background	Nominal Fixed Measurement MDC	Nominal Scan MDC
ZnS scintillator (100 cm^2)	alpha scans or fixed measurements on structure surfaces	19% (Th-230)	2 cpm	50 dpm/100 cm^2 (1 minute count time)	400 dpm/100 cm^2

5.4.2 Calibration and Maintenance

All instrumentation used for measurements to demonstrate compliance with the radiological criterion for license termination will be calibrated and maintained under approved procedures. Instruments will be calibrated for normal use under typical field conditions. Calibration standards will be traceable to the National Institute of Standards and Technology (NIST). If external vendors are used for instrument calibration or maintenance, these services must have a QA program.

Instruments used to measure gross beta surface activity will be calibrated to Tc-99 or Co-60. Th-230 will be used to calibrate instruments used to assess alpha surface activity. Instrument efficiencies may require modifications to account for surface conditions or coverings. Such modifications, if necessary, will be established using the information in Section 5 of NUREG-1507 (15) and pertinent site characterization data.

5.4.3 Response Checks

Instrumentation will be response checked in accordance with RSCS Final Status Survey procedures which require an instrument response check prior to and after each survey. If the instrument response does not fall within the established range, the instrument will be removed from use until the reason for the deviation can be resolved and acceptable response again demonstrated. If the instrument fails a post-survey source check, all data collected during that time period with the instrument will be carefully reviewed and possibly adjusted or discarded, depending on the cause of the failure.

5.4.4 MDC calculations

Before any measurements are performed, the instruments and techniques to be used must be shown to have sufficient detection capability relative to the applicable DCGLs. The detection capability of a given instrument and measurement technique is quantified by its MDC.

5.4.4.1 MDCs for Fixed Measurements

Per NUREG-1507 (15), MDCs for fixed measurements are computed as

$$MDC_{fixed} = \frac{3 + 4.65\sqrt{C_B}}{Kt}$$

Where:

3 and 4.65 = constants as described in NUREG-1507;
C_B = background counts during the measurement time interval (t);
t = measurement time; and
K = a proportionality constant that relates the detector response to the activity level in the sample being measured.

The proportionality constant K typically encompasses the detector efficiency, self-absorption factors and probe area corrections, as required.

5.4.4.2 MDCs for Beta-Gamma Scan Surveys for Structure Surfaces

MDCs for surface scans for structure surfaces for beta and gamma emitters will be computed via

$$MDC_{structure,scan} = \frac{1.38\sqrt{B}}{\sqrt{p}\,\varepsilon_i\varepsilon_s\left(\dfrac{A}{100}\right)t} \ dpm/100cm^2$$

Where:

1.38 = sensitivity index;
B = number of background counts in time interval t;
p = surveyor efficiency;
ε_i = instrument efficiency for the emitted radiation (cpm per dpm);
ε_s = source efficiency (intensity) in emissions per disintegration;
A = sensitive area of the detector (cm²); and
t = time interval of the observation while the probe passes over the source (minutes).

The value of 1.38 used for the sensitivity index corresponds to a 95% confidence level for detection of a concentration at the scanning MDC with a false positive rate of 60%. The numerator in the equation represents the minimum detectable count rate that the observer would "see" at the performance level represented by the sensitivity index. The surveyor efficiency (p) will be taken to be 0.5, as recommended by MARSSIM. The factor of 100 corrects for probe areas that are not 100 cm². In the case of a scan measurement, the counting interval is the time the probe is actually over the source of radioactivity. This time depends on scan speed, the size of the source, and the fraction of the detector's sensitive area that passes over the source; with the latter depending on the direction of probe travel. The source efficiency term (ε_s) in the equation may be adjusted to account for effects such as self-absorption, as appropriate.

5.4.4.3 MDCs for Alpha Scan Surveys for Structure Surfaces

In cases where alpha scan surveys may be required, MDCs must be quantified differently than those for beta-gamma surveys because the background count rate from a typical alpha survey instrument is nearly zero (1 to 3 counts per minute typically). Since the time that an area of alpha activity is under the probe varies and the background count rates of alpha survey instruments is so low, it is not practical to determine a fixed MDC for scanning. Instead, it is

more useful to determine the probability of detecting an area of contamination at a predetermined DCGL for given scan rates.

For alpha survey instrumentation with a background around one to three counts per minute, a single count will give a surveyor sufficient cause to stop and investigate further. Thus, the probability of detecting given levels of alpha emitting radionuclides can be calculated by use of Poisson summation statistics. Doing so (see Section 6.7.2.2 and Appendix J of MARSSIM for details), one finds that the probability of detecting an area of alpha activity of 300 dpm/100cm^2 at a scan rate of 3 cm per second (roughly 1 inch per second) is 90% if the probe dimension in the direction of the scan is 10 cm. If the probe dimension in the scan direction is halved to 5 cm, the detection probability is still 70%. These values will be used to evaluate MDCs for alpha surveys of structure surfaces against the applicable DCGLs for the purposes of survey design. If for some reason lower MDCs are desired, then scan speeds can be adjusted, within practical limits, via the methods of Section 6.7.2.2 and Appendix J of the MARSSIM.

We currently are planning to perform alpha scans at a very slow speed; between 1 and 2 inches per second with a scintillation detector such as the Ludlum 43-89 moving in the 4 inch (10 cm) width direction. Using Figure J.4 in MARSSIM, we estimate the probability of detecting 2 counts over a 100cm^2 source equal to our site-specific DCGL to be between 70 and 90 percent.

5.4.4.4 MDCs for Wipe Samples

The following equation will be used to determine the wipe MDC:

$$MDC = \frac{k_1^2 + 2k_1\sqrt{R_b t_s \left(1 + \frac{t_s}{t_b}\right)}}{(t_s)(E)\left(\frac{A}{100}\right)}$$

Where:

MDC = Minimum Detectable Concentration in dpm/100 cm^2
k_1 = one-sided confidence level factor for the chosen confidence level (95% =1.645)
R_b = background count rate in cpm
t_s = sample count time in minutes
t_b = background count time in minutes
E = detector efficiency in counts per disintegration
A/100 = accounts for the area of the wipe sample

The first term is normally rounded up from 2.7 to 3 as recommended by NUREG-1575, MARSSIM. The wipes may be counted on an automatic proportional counter such as a Protean WPC 9550. These counters have internal software to calculate the MDC or LLD. These calculations will use the same or a similar equation presented above. Ambient background levels, background and sample count times and efficiencies will be maintained to ensure the MDC does not exceed 50% of the DCGLw.

6.0 SURVEY DATA ASSESSMENT

6.1 Initial Evaluation

Prior to evaluating the data collected from a survey unit against the release criterion, the data are first confirmed to have been acquired in accordance with all applicable procedures and QA/QC requirements. Any discrepancies between the data quality or the data collection process and the applicable requirements are resolved and documented prior to proceeding with data analysis. Data assessment will be performed by trained personnel using approved site procedures.

The first step in the data assessment process is to convert all of the survey results to DCGL units. Next, the individual measurements and sample concentrations will be compared to DCGL levels for evidence of small areas of elevated activity or results that are statistical outliers relative to the rest of the measurements. Graphical analyses of survey data that depict the spatial correlation of the measurements are especially useful for such assessments and will be used, if necessary, to the extent practical. The results may indicate that additional data or additional remediation and resurvey may be necessary.

Interpreting the results from a survey is most straightforward when all measurements are higher or lower than the $DCGL_W$. In such cases, the decision that a survey unit meets or exceeds the release criterion requires little in terms of data analysis. However, formal statistical tests provide a valuable tool when a survey unit's measurements are neither clearly above nor entirely below the $DCGL_W$.

The first step in evaluating the data for a given survey unit is to draw simple comparisons between the measurement results and the release criterion. The result of these comparisons will be one of three conclusions: 1) the unit meets the release criterion; 2) the unit does not meet the release criterion; or 3) no conclusion can be drawn from simple comparisons and thus one of the non-parametric statistical tests must be applied.

For final status survey data collected at the East Hartford site, the initial data evaluation will be as described in Table 6-1.

Table 6-1 Initial Evaluation of Survey Results

Evaluation Result	Conclusion
All measured concentrations less than the $DCGL_W$	Survey unit meets the release criterion
Average concentration exceeds the $DCGL_W$	Survey unit does not meet the release criterion
Individual measurement result(s) exceeds the $DCGL_W$ and the average concentration is less than the $DCGL_W$	Conduct the Sign test

6.2 Sign Test

Radionuclide specific measurements for which the radionuclide(s) of interest either does not exist in background or is present in a concentration that is a small fraction of the $DCGL_W$ can be evaluated using the Sign test. In addition, the Sign test may be used to evaluate gross activity

measurements from survey units containing multiple materials by subtracting the appropriate background from each measurement.

If any individual measurement result in a survey unit exceeds the $DCGL_W$, then the Sign Test will be performed on the data in that survey unit.

The Sign test is applied as described in the following steps:

- For each survey unit measurement, subtract the measurement from the $DCGL_W$ and record the differences.
- Discard any difference that is exactly zero and reduce the total number of measurements (N) by the number of zero differences.
- Count the number of positive differences. This value is the test statistic S+.
- Compare the number of positive difference (S+) to the critical values from Table I.3 of the MARSSIM for the appropriate values of N (total measurements) and α (decision error rate). (A positive difference corresponds to a measurement below the $DCGL_W$ and contributes evidence that the survey unit meets the release criterion.)

If S+ is greater than the critical value in Table I.3, then the null hypothesis is rejected and the alternate accepted.

Though it is not anticipated, if any of the data collected from a final status survey are reported as "less than MDC" or as background, these data will be assigned a value of the MDC for the measurement technique employed for purposes of applying the Sign test.

6.3   Data Assessment Conclusions

The result of the data assessment is the decision to reject or not to reject the null hypothesis. A rejection of the null hypothesis leads to the decision that the survey unit meets the release criterion. If the data assessment concludes that the null hypothesis cannot be rejected, this may be due to one of two things: 1) the average residual concentration in the survey unit exceeds the $DCGL_W$; or 2) the analysis did not have adequate statistical power. "Power" in this context refers to the probability that the null hypothesis is rejected when it is indeed false. Quantitatively, the power is $1 - \beta$, where β is the Type II error rate (the probability of accepting the null hypothesis when it is actually false). A retrospective power analysis can be used in the event that a survey unit is found not to meet the release criterion to determine if this is indeed due to excess residual activity or if it is due to an inadequate sample size.

Retrospective power analyses, if necessary, will be performed following the methods of MARSSIM Sections I.9 for the Sign test. If the analysis finds that an inadequate number of samples were collected to support the data assessment for a given survey unit, additional samples may be collected and the analysis repeated. Increasing the number of samples (measurements) acquired within a given survey unit increases the probability of rejecting the null hypothesis when it is indeed false. Likewise, if the analysis with the additional samples still concludes that the residual concentration in the survey unit exceeds the $DCGL_W$, then the unit must be remediated and resurveyed.

6.4 ALARA Evaluations

In order to terminate a license, a licensee must demonstrate that the dose criteria in Subpart E of 10 CRR Part 20 have been met and must demonstrate whether it is feasible to further reduce the levels of residual radioactivity to levels below those necessary to meet the dose criteria (i.e., to levels that are "as low as is reasonably achievable" (ALARA)). Appendix D in NUREG-1727 (16) describes methods acceptable to the Nuclear Regulatory Commission (NRC) staff for determining when it is feasible to further reduce the concentrations of residual radioactivity to below the concentrations necessary to meet the dose criteria.

"Reasonably achievable" is judged by considering the state of technology and the economics of improvements in relation to all the benefits from these improvements. However, a comprehensive consideration of risks and benefits will include risks from non-radiological hazards. An action taken to reduce radiation risks should not result in a significantly larger risk from other hazards.

Based upon the Historical Site Assessment, we believe the average residual radioactivity in each of the survey units to be a very small fraction (<5%) of the $DCGL_W$. If the average residual radioactivity in any survey unit exceeds 50% of the DCGL (177 dpm/100 cm^2; equivalent to 9.5 mrem/y), an ALARA evaluation will be performed to determine if remediation of that survey unit is cost effective. A base value of $2000 per person-rem, increased for inflation at a rate of 3% per year, will be used in the evaluation.

7.0 FINAL STATUS SURVEY REPORT

A single final status survey report will be written for all survey units at the site. The documentation describing the final status survey should include:

- a physical description of the survey units;

- the classification of the survey units;

- a discussion of the survey design (combination of scans, fixed measurements and wipe samples used; number of measurements, etc.);

- tabular and if necessary, graphical depictions of survey results;

- discussions of data assessments including graphical depictions if necessary;

- calculation of the estimated dose from the average residual radioactivity in each survey unit; and

- a statement that the survey unit meets the applicable release criteria.

The final status survey report will be compiled after final status survey activities for all of the survey units are completed.

8.0 QUALITY ASSURANCE AND QUALITY CONTROL MEASURES

Standard Operating Procedures (SOPs) will govern the survey design process, survey performance and data assessment (decision making). The final status survey design will be carried out in accordance with the SOPs, resulting in the generation of raw data.

Quality assurance and quality control activities include:
- surveys are performed by trained individuals;
- surveys are performed with approved written procedures;
- use of properly calibrated instruments;
- QC checks will be performed as prescribed by the implementing procedures

9.0 REFERENCES

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2. *10 CFR 40.42 Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas.*
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4. *Adoption of the 19 mrem per year total dose equivalent standard for remediation of sources of ionizing radiation within the State of Connecticut, Connecticut, State of, Office of the Attorney General Letter, From Robert D. Snook (Assistant Attorney Genera.*
5. *Remediation Standard Regulations, § 22a-133k, Hartford, CT, January 30, 1996.*
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15. *United Technologies Corp. Amendment Request Ltr Dated February 18, 2013 ML13063A520.*
16. *United Technologies Corp Letter to NRC Requesting Continuation of License Amendment to Remove Building 10 from SMB-151 Dated June 19, 2013.*
17. *NRC United Technologies Corporation, Pratt and Whitney, License Amendment, Control No. 581153, August 26, 2013.*

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