VSAP

Verification Sampling & Analysis Plan

for T Building

Final

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Department of Energy

Miamisburg Closure Project

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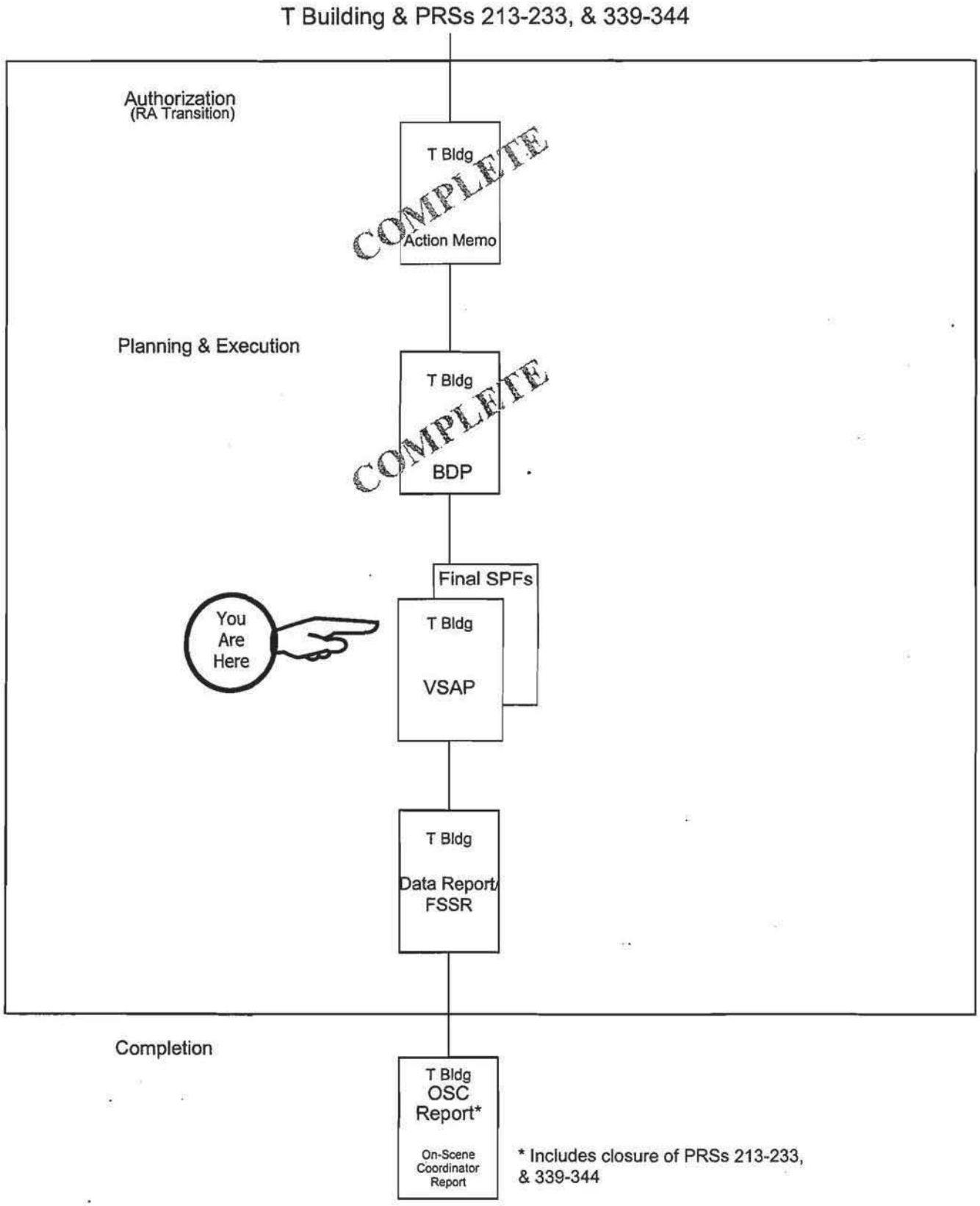
T Building & PRSs 213-233, & 339-344



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ACRONYMS

α	Alpha, Type I error (false positive)
β	Beta, Type II error (false negative)
COC	contaminant of concern
cpm	count per minute
DCGLs	Derived Concentration Guideline Levels
$DCGL_W$	DCGL for average concentration over a wide area
$DCGL_{EMC}$	DCGL for Elevated Measurement Comparison
DOE	US Department of Energy
dpm	disintegrations per minute
DQO	Data Quality Objective
FSS	Final Status Survey
Ho	Null Hypothesis
HSA	Historical Site Assessment
LBGR	Lower Bound of the Gray Region
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCP	Miamisburg Closure Project
MDA	minimum detectable activity
MMCIC	Miamisburg Mound Community Improvement Corporation
NIST	National Institute of Standards and Technology
PRS	Potential Release Site
QA/QC	Quality Assurance/Quality Control
SOP	Standard Operating Procedure
SPF	Survey Plan Form
SU	Survey Unit
UCL	Upper Confidence Limit
US EPA	US Environmental Protection Agency
VSAP	Verification Sampling and Analysis Plan

1.0 INTRODUCTION

1.1 Objective

The objective of this Verification Sampling and Analysis Plan is to provide a framework for evaluating the post-remedial levels of residual radioactivity at the Technical (T) Building located at the US Department of Energy's (DOE) Mound Site. Residual radioactivity levels will be evaluated versus established surface cleanup criteria stated in Appendix A of the "Work Plan for Environmental Restoration of the DOE Mound Site, *The Mound 2000 Approach"* (hereafter referred to as 'Mound 2000', Reference 1). The data compiled during this sampling and analysis effort will serve as the final status survey with the eventual goal of transferring ownership of T Building to the Miamisburg Mound Community Improvement Corporation (MMCIC).

This Verification Sampling and Analysis Plan (VSAP) provides the basis, and outlines the resulting plan, to verify that residual contamination, if any, meets cleanup criteria. This VSAP is based on Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Reference 2) guidance on planning, performing, and assessing radiological data and incorporates the data quality objective (DQO) process in "EPA QA/G-4 Guidance for Data Quality Objective Process" (Reference 3).

1.2 Scope

The T Building VSAP has been designed to meet the requirements of a MARSSIM Final Status Survey (FSS). The FSS is the radiation survey performed to demonstrate that the residual radioactivity in the building satisfies the criteria for release. Therefore, radiological data collected during this survey will be used to demonstrate that any residual radioactivity left in the building satisfies the criteria to release T Building for unrestricted use as an industrial site. Release criteria are detailed in this survey as per the Action Memorandum T Building Removal Action (Reference 4). The survey DQOs in Section 3.0 present the specific design details.

2.0 HISTORICAL OVERVIEW OF T BUILDING

2.1 Overview

T Building is a heavily reinforced subterranean concrete structure located almost entirely under the Development and Standards (DS) Building, previously removed by demolition. The south-end section of the building tunnel area is exposed aboveground and abuts the multi-story Central Operations Support (COS) Building. T Building and COS Building are separated by an approximate 6-inch thick expansion joint.

Construction was completed in 1948 on T Building and associated structures. The two main floors are compartmentalized into three general areas (bays) by two 30-inch thick

reinforced concrete firewalls. T Building contains more than 200 rooms and 20 corridors.

Associated building structures include two exhaust airshafts, each with a two-hundred-foot tall brick and mortar exhaust stack. The building has three towers along the north wall, one at each end and one at the center. The end towers contain stairways, passenger elevators, airshafts for intake ventilation air, and pedestrian entrances at grade level. The middle tower was used for providing intake ventilation air. The air required for the ventilation of the main body of the building enters at the penthouse level of each individual tower. The eastern-most tower is designated the East Tower (or Tower 1) and the western-most tower is designated the West Tower (or Tower 1A). The East Tower also provides space for various utility lines coming into the building. The East and West Towers also contain airshafts that are part of the intake air ventilation system. Large doors permit vehicles and personnel to enter the building at either end of the second floor. The vehicular tunnel extends the length of the south side of the building.

The building was constructed by excavating the side of a hill, assembling the basic reinforced concrete building shell, and then back filling the excavated area to essentially the original slope and grade. The interior dimensions of the basic building shell are 345 feet long by 150 feet wide. The roof is 15 feet thick reinforced concrete.

The building heating and cooling is achieved through single pass supply and exhaust ventilation units located on the first floor. These units are supplied with steam and chilled water / glycol from temporary boilers and chillers that will be removed prior to building transition. Control of both the supply and exhaust ventilation units is computerized with daily monitoring and alarm capability. The building has potable and non-potable water and sanitary services provided by the Miamisburg Closure Project (MCP). Electric service is 12,000 volts.

2.2 Past Uses

T Building was originally built to process radioactive polonium and minor amounts of other radionuclides. From 1949 to 1973, polonium programs included a processing and separation program, fuels research and development program, neutron source program, and a variety of other research, development, and production programs with polonium. Per MLM-2239 "A Report on the Decontamination and Decommissioning of the Technical (T) Building at Mound Laboratory" (Reference 5), T Building underwent a significant decontamination in the early 1970s, and a substantial modification during the early 1980s in order to accommodate tritium-processing operations. Figures 1 and 2 (Appendix A) show areas that were previously decontaminated during the decontamination effort in the 1970s. Areas where contamination was previously fixed in place using paint or concrete will be remediated during Safe Shutdown activities. These include the concrete cap (1C-07 through 1C-12) located in the 1st floor center bay area, and the painted fixed contamination areas located in T-277, T-245, and outside elevator 9 (2S-08). A variety of other activities have taken place in T Building such as nondestructive testing, environmental testing, gamma and mass spectroscopy,

calorimetry, neutron activation analysis, and safeguards research and development (R&D). Building operations have included offices and administrative areas, laboratories, and material storage. Materials stored have included chemical products, office supplies, and waste disposal containers. The building also has a vault that was used to store secured nuclear materials.

2.3 Current Uses

T Building contains laboratories previously used for radioactive and non-radioactive work, offices, and service rooms. The Tritium Emissions Recovery Facility (TERF) processes tritiated gases to recover waste tritium for disposal. TERF will continue to operate until approximately third quarter CY2004. Current actions pertinent to T Building include characterization, work planning for decontamination and decommissioning, safe shutdown, and post-characterization remedial activities. Work planning consists of preliminary work that is required to execute building disposition activities in accordance with Environmental Safety & Health requirements, DOE Orders, and best management practices. Safe shutdown includes building surveillance (weekly and monthly contamination surveys), and the accumulation, decontamination, characterization, and disposition of equipment and waste. Several of the rooms contain radiological control areas. The building is to be vacated in September 2006, at which time it will be prepared for transfer to MMCIC.

2.4 Results of Previous Investigations

T Building was identified as a clean-up effort due to radiological contamination based on contaminants associated with various missions and projects that were associated with the building and that may be present at unacceptable levels. Based on the clean-up effort the Core Team recommended a removal action for T Building. Mound's Core Team consists of representatives from US DOE, US Environmental Protection Agency (US EPA) Region 5, and Ohio EPA.

The contaminants of concern (COC) list is in agreement with the analytes reported in the Action Memorandum T Building Removal Action (Reference 4) and includes uranium-235/238 (U-235/238), cobalt-60 (Co-60), silver 108m (Ag-108m), plutonium-238/239 (Pu-238/239), americium-241 (Am-241), radium-226 (Ra-226), bismuth-207/210m (Bi-207/210m), cesium-137 (Cs-137), strontium-90 (Sr/Y-90), and tritium (H-3). Previous measurements conducted by in-situ gamma spectroscopy have confirmed presence of Bi-207, Bi-210m, Cs-137, Ag-108m, Am-241, Pu-238, Pu-239, Po-209 and Co-60 as COCs. A complete list of COCs is provided in Table 1-1.

Twenty-seven Potential Release Sites (PRSs) are associated within the T Building. Final Status Survey of these PRSs is addressed in this plan. There are a total of 43 other PRSs in proximity to T Building, but these are outside the scope of this survey effort and will be addressed by the Environmental Restoration Program.

Table 1-1: T Building Contaminants of Concern

Radionuclide	Name	Half Life	Principal Decay Emissions
H-3	Tritium	12.3 yr	β_{max} (0.0185 MeV)
Co-60	Cobalt-60	5.3 yr	β_{max} (0.318 MeV) γ (1.332, 1.173 MeV)
Sr/Y-90	Strontium-90 Yttrium-90	28.8 yr 2.67d	β_{max} (0.546 MeV) β_{max} (2.281 MeV)
Ag-108m	Silver-108m (metastable)	127 yr	γ (0.434, 0.614, 0.723 MeV)
Cs-137	Cesium-137	30.07 yr	β_{max} (0.514 MeV) γ (0.662 MeV) from Ba-137m
Bi-207	Bismuth-207	33.7 yr	γ (0.569, 1.063 MeV)
Bi-210m	Bismuth-210m	3.0E6 yr	α (4.910, 4.949 MeV) γ (0.266, 0.305 MeV)
Po-209	Polonium-209	103 yr	α (4.866 MeV)
Ra-226	Radium-226	1599 yr	α (4.784, 4.602 MeV) γ (0.1862 MeV)
Ac-227	Actinium-227	21.7 yr	α (several from progeny) β_{max} (0.043 MeV)
Th-230	Thorium-230	7.7E4 yr	α (4.621, 4.688 MeV)
U-234	Uranium- 234	2.47E5 yr	α (4.77, 4.72 MeV)
U-235	Uranium-235	7.04E8 yr	α (4.364, 4.396 MeV) γ (0.144, 0.184 MeV)
U-238	Uranium-238	4.47E9 yr	α (4.197, 4.147 MeV)
Pu-238	Plutonium-238	87.75 yr	α (5.456, 5.499 MeV)
Pu-239	Plutonium-239	2.41E4 yr	α (4.858 MeV)
Pu-240	Plutonium-240	6.58E3 yr	α (5.17, 5.12 MeV)
Pu-241	Plutonium-241	13.2 yr	β_{max} (0.021 MeV)
Pu-242	Plutonium-242	3.79E5 yr	α (4.90, 4.86 MeV)
Am-241	Americium-241	432.7 yr	α (5.486, 5.443 MeV) γ (0.0595 MeV)

3.0 DATA QUALITY OBJECTIVES

The Data Quality Objective (DQO) process is a series of steps defined by US EPA to ensure that the type, quantity, and quality of survey data used in decision-making is sufficient for its intended purpose.

3.1 Problem statement

Based on contaminants associated with the various missions and projects undertaken in T Building and the fact that residual contamination is currently present, T Building was identified as a clean-up effort. T Building must be evaluated to determine if residual contamination is present above the release criteria as a result of past missions and projects conducted within the building. The release criteria are specified in Table 3-1. The values in Table 3-1 are consistent with the release criteria specified in Mound 2000 (Reference 1, Table 1 "Surface Contaminations Guidelines", page A-3).

3.2 Decision statement

The decision to be made is whether or not the residual contamination (if any) meets the release criteria. The null hypothesis (H_o) is stated as; the median concentration in the survey unit is greater than the Derived Concentration Guideline Level for the wide area average ($DCGL_w$). (See Reference 2, page 8-11). This is the state that is presumed to exist.

- If COC concentrations present on building and structural surfaces do not exceed the $DCGL_w$ listed in Table 3-1, the null hypothesis is rejected and the survey unit (SU) satisfies the release criteria with no further remediation required.

- If COC concentrations present on building and structural surfaces do exceed the $DCGL_w$ values listed in Table 3-1, the null hypothesis is accepted and further remediation may be required. Further investigation will be necessary to determine the extent and concentration of the elevated areas.

This survey plan will provide the data to make this decision.

3.3 Inputs to the Decision

The Historical Site Assessment (HSA) titled "White Paper, T Building Structural History and Process History Summary Background Document" (Reference 6), MLM-2239 "A Report on the Decontamination and Decommissioning of the Technical (T) Building at Mound Laboratory" (Reference 5), previous and current survey data are the initial inputs to determine area classification. Surface scanning will be performed to locate anomalies that might indicate elevated areas of residual activity and that require further investigation or remedial action. Gross surface activity measurements for alpha and beta surface contamination will be performed. Removable alpha, beta and tritium activity will be assessed using smears.

All field and laboratory instrumentation will be specified on the Survey Plan Form (SPF) and shall be operated in accordance with the appropriate Mound procedures. SPFs for use during the Final Status Survey are provided in Appendix D.

All surveys and samples collected for this survey plan will be performed in accordance with the Quality Control (QC) requirements of MD-80046, Op 402, "MARSSIM Implementing Procedure, Field Quality Control for Building Contamination Surveys"

(Reference 7). Replicate surveys, sample recounts, instrument performance checks, chain of custody for samples, control of field survey data and databases, and QC investigations provide the highest level of confidence in the data collected to support the survey outcome. The SPF will specify the QC requirements for this survey.

3.4 Study Boundaries

Defining the boundaries helps to ensure that the data taken during the final status survey is representative of the survey unit. This verification sampling and analysis plan covers the entire interior and exposed exterior surfaces of T Building and building systems, equipment, and embedded system materials. Each of these areas will be divided into discrete survey units. Each survey unit will be assigned a classification in alignment with "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM) guidance (Reference 2). Survey planning involves dividing the building into discrete survey units, identifying the nature and number of measurements, and selecting the various measurement techniques. The classification of the rooms and systems located in T building is provided in Appendix B. Statistical methods will be used to determine the number and location of survey data points and the extent of the survey using a MARSSIM approach.

Statistically selected survey points will be identified in each survey unit. In addition to the statistically selected survey points, biased survey points may be added to address areas with a higher probability of being contaminated. Bias surveys should be taken that are representative of equipment or surfaces that are being surveyed for free release, have visible signs of stains, and are potentially unique source terms. Examples of potential biased survey locations include openings to air handling systems, sumps, and drain lines. The minimum number of biased samples to be taken will be specified on the specific SPF for the survey unit. The data from bias survey points will not be used in the statistical tests. Instead, bias survey data will be compared directly to the release criteria in Table 3-1.

3.4.1 Final Status Survey of Buildings and Structural Surfaces

Final Status Survey of building and structural surfaces (e.g. doors, stairs) will include determinations of total fixed and removable contamination. Floors, walls and structural surfaces less than (<) 2 meters (m) in areas that had previously been decontaminated were assigned as Class 1 areas. Ceilings, walls and structural surfaces greater than (>) 2m in these areas were assigned as Class 2 areas (See Reference 2, pages 4-12 and 4-15). Areas adjacent to Class 1 SUs were assigned Class 2 areas on floors, walls and structural surfaces < 2m and Class 3 areas for ceilings, walls and structural surfaces > 2m. The remaining areas in the building were assigned as Class 3 areas.

Specific survey information for each survey unit will be supplied on the SPF.

3.4.2 Final Status Survey of Systems

Based on a review of T Building design documentation, the following systems have been identified for Final Status Survey:

- Supply air systems
- Exhaust ventilation systems
- Inert gas delivery systems
- Building utility systems

Each system will be assigned a survey unit number and surveyed for determinations of fixed plus removable and removable contamination on external and internal surfaces. Based on process history, historical documentation, original and current building drawings, and an understanding of the purpose each system was designed for, the systems and equipment in T Building were initially divided into two classes. Systems that have or had prior to remediation a potential for radioactive contamination (based on process knowledge and/or historical information) or known contamination (based on previous radiological surveys) and are expected to exceed the DCGLs (e.g. radioactive process lines) are being removed during Safe Shutdown Activities.

Systems that have or had prior to remediation a potential for radioactive contamination (based on process knowledge and/or historical information) or known contamination (based on previous radiological surveys) but based on more recent survey data are not expected to exceed the DCGLs were assigned as Class 2 areas (e.g. exhaust ventilation ductwork). Figure 5 located in Appendix A provides a diagram of the HVAC systems. It shows which rooms each supply and exhaust systems service. The actual HVAC runs for each system are on 46 different drawings and can be made available for review. The remaining systems and equipment were assigned as Class 3 (e.g. breathing air).

Specific survey information for each survey unit will be supplied on the SPF.

3.4.3 Final Status Survey of Sumps and Associated Piping

Embedded system materials (drains, sumps, piping, etc) will be assessed as they become available. Because of its history, all locations in the building are considered impacted. T Building has many sumps built into the sub floor of the 1st floor elevation that support current building systems or previously retired systems. The design of the sumps was fairly consistent, with a cylindrical 1-inch thick steel liner tank placed into a concrete bunker lined with gravel or other substrate.

Based on process history, historical documentation, original and current building drawings, and an understanding of the purpose each sump was designed for, the sumps in T Building were divided into two classes. A Class 1 sump is one that was located in a Radioactive Process Area, identified as a high-risk sump on building drain prints, has previously been decontaminated, known to have contamination above the $DCGL_w$, or has the potential to exceed the $DCGL_w$. A Class 2 sump is one that was

located in a non-Radioactive Process Area, identified as a low-risk sump on building drain prints, has not been previously decontaminated and has the potential for radioactive contamination, but is not expected to exceed the $DCGL_w$. Class 2 sumps include active sumps that are used to support building utility systems. Active sumps include sanitary sewer sumps, storm sewer sumps, fire water, condensate collection, and return sumps. Sanitary sewer sumps were emptied and flushed during Safe Shutdown Activities by a commercial vendor and are not expected to contain any residual radioactivity. Sanitary sewer sump systems will be released under the site-wide sampling and analysis plan for sanitary sewage. Classification of each sump is provided in Appendix B. Figure 6 provided in Appendix A shows sump and drain locations.

Final Status Survey of sumps and associated piping will include determinations of fixed plus removable and removable contamination. All sumps will be investigated for residual contamination. Previously isolated, abandoned, or enclosed sumps covered or filled with concrete will have the fill material removed. Piping associated with Class 1 sumps will be removed and surrounding area scanned. Final Status Survey data will determine the fate of sumps (e.g. remain as is vs. decontamination).

Specific survey information for each sump and its associated piping will be supplied on the SPF.

3.4.4 Final Status Survey of First And Second Floor Crawlspaces

T Building was designed with interstitial spaces above the two primary floors (1st and 2nd) to serve utility and service supply needs of the offices, laboratories, and operational spaces. These interstitial spaces are referred to as "Crawlspaces" as access to them is provided only via hatchways located at several points on the ceilings of the 1st and 2nd floors. The crawlspaces extend along the same footprint as the primary structure of T Building, with three bays on each level separated by the same thirty-inch firewall that separates the bays on the main building levels.

The current state of the crawlspaces is very crowded with piping, ductwork, and other service equipment, including but not limited to radioactive waste transfer lines, piping and ductwork previously used in radioactive isotope processing and transfer, and piping used to support all building drains and sumps. The waste transfer lines and ductwork with contamination greater than Table 3-1 values will be removed from the crawlspaces prior to final status survey. Post-job surveys will be taken to ensure that the removal of these contaminated items did not contaminate the surrounding structures. Surveys of crawlspaces will include determinations of fixed plus removable and removable contamination. Approximately 10% surface scan of area will be accomplished with a hand-held detector, with focus on areas where process or waste lines were formerly located. In addition to the statistically selected survey points, biased survey points will be taken. Specific survey information for each survey unit will be supplied on the SPF.

3.5 The Decision rule

The decision rule relates the concentration of residual radioactivity in the survey unit to the release criteria so that decisions can be made based on the results of the final status survey.

Historical documentation indicates that multiple radionuclides may be present in the building (See Table 1-1). Measurements for gross alpha, gross beta, removable tritium and external gamma radiation exposure will be taken to demonstrate compliance with the release criteria. The release criteria for each radionuclide are provided in Table 3-1. These release criteria are designated as the Derived Concentration Guideline Levels (DCGLs) on building surfaces and systems for release in this sampling and analysis plan. The most restrictive radionuclide group from Table 3-1 will be assumed for gross alpha measurements (i.e., Group 1 radionuclides), unless demonstrated through alpha or gamma spectroscopy measurements in accordance with MD-80030, Environmental Analytical Procedures (Reference 16) and/or MD-10167 Radioactive Waste Procedures, Op 900 ISOCS Operating Procedures (Reference 17) that only radionuclides from a less restrictive group are present. Alpha and/or gamma spectroscopy measurements will be required to justify using the less restrictive values.Per Mound 2000, (Reference 1, Table 1, "Surface Contamination Guidelines", page A-3), the limits for these measurements should be applied separately.

Surveys will be designed to ensure that the COCs listed in Table 1-1 will be detected with adequate sensitivity to demonstrate compliance with the release criteria. Gross measurements, scanning, and smears can be used to demonstrate compliance for all COCs except Ag-108m, Bi-207, and Pu-241, which will be evaluated based on their association with other readily measurable nuclides. See Sections 3.5.8 and 3.5.9 for discussion.

All of the other radionuclides listed as a COC, with the exception of tritium, may be detected with adequate efficiency by gross alpha or gross beta measurements. For tritium, smears are assayed by liquid scintillation count (LSC). General area exposure rate measurements will be taken in order to demonstrate compliance with DOE Order 5400.5, Change 2, "Radiation Protection of the Public and the Environment" (Reference 8, Chapter IV, Section 4.c).

If a survey unit fails to demonstrate compliance with the release criteria, the first step will be to review and confirm the data that led to the decision. If the review supports that the survey unit still fails, the area will be remediated and resurveyed.

3.5.1 Surface Contamination Criteria

The release criteria for residual surface contamination are given in Table 3-1. The release criteria given in Table 3-1 consist of 3 separate requirements (average, maximum, and removable) for each group of radionuclides. Each requirement must be met in order to satisfy the release criteria.

Table 3-1: Surface Release Criteria and Contamination Clean-Up Objectives

Allowable Total Residual Surface Contamination (dpm/100 cm^2)[1]			
Radionuclides[2]	**Averag**[3,4] **($DCGL_w$)**	**Maximum**[5,6] **($DCGL_{EMC}$)**	**Removable**[6]
Group 1: Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Group 2: Th-natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
Group 3: U-Natural, U235, U238 and associated decay products, alpha emitters	5,000	15,000	1,000
Group 4: Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous[7] fission) except Sr-90 and others listed above. Includes mixed fission products containing Sr-90.	5,000	15,000	1,000
Tritium	N/A	N/A	10,000

Note: Refer to Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach, Table 1, "Surface Contamination Guidelines", page A-3 for specific information on surface contamination guidelines and additional notes (Reference 1).

3.5.2 Fixed-point measurements on a statistical grid

Gross alpha and gross beta will be measured using fixed-point direct measurements on a statistical grid. The average activity levels shown in Table 3-1 are designated as the $DCGL_w$. If all the measurements are below the $DCGL_w$, the release criteria has been met.

If the average of the measurements is greater than the $DCGL_w$, then the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. If the average of the residual activity in the survey unit is less than the $DCGL_w$, but some areas are greater than the $DCGL_w$, then additional investigation will occur. This investigation will include isolating the area that is greater than the $DCGL_w$ and taking additional measurements over a contiguous 1 square meter (m^2) area. If the average residual activity in the contiguous $1m^2$ area is greater than the $DCGL_w$ then the survey unit fails and remediation will be conducted. If the average of the residual activity in the contiguous $1m^2$ area is less than the $DCGL_w$, but some areas are greater than the $DCGL_w$, then the Sign test as described below will be used to determine if the release criteria in the survey unit has been met. If the Sign test shows the release criteria has been met, then it will be accepted as a FSS and no further survey action is required.

A one-sample statistical test (i.e. Sign test) will be used for evaluating these results for the T Building. The Sign test was chosen since the surface contamination surveys being performed attribute all activities (background concentration + residual contamination). Thus, the total concentration is compared to the release criteria.

Per MARSSIM (Reference 2, section 8.3.1, page 8-11) "The Sign test is designed to detect uniform failure of remedial action throughout the survey unit. The test does not assume that the data follow any particular distribution." The one-sample Sign test evaluates whether the median of the data is above or below the $DCGL_W$. "If the data distribution is symmetric, the median is equal to the mean. In cases where the data are severely skewed, the mean may be above the $DCGL_W$, while the median is below the $DCGL_W$. In such cases, the survey unit does *not* meet the release criterion regardless of the result of the statistical tests. On the other hand, if the largest measurement is below the $DCGL_W$, the Sign test will always show that the survey unit meets the release criterion."

3.5.3 Fixed-point biased measurements

Gross alpha and gross beta will be measured using fixed-point biased direct measurements. The average activity levels shown in Table 3-1 are designated as the $DCGL_W$. If a fixed-point biased measurement is greater than the $DCGL_W$, then the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. The Sign test is not applicable for biased measurements. Biased results will not be combined with the statistical data but compared directly to the $DCGL_W$.

3.5.4 Smears

Gross alpha, gross beta and removable tritium will be measured using smears. Smears will be collected at every fixed-point measurement location. If any smear result for removable activity is above the removable release criteria values, then the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. The Sign test is not applicable for smears. Smear results will not be combined with the statistical data but compared directly to the values in the far right column (Removable) of Table 3-1. .

3.5.5 Surface Scan measurements

Surfaces will be scanned for gross alpha and gross beta. The maximum activity levels shown in Table 3-1 represent the DCGL for small areas of elevated activity within a large area and is identified as the elevated measurement comparison value ($DCGL_{EMC}$). Surface scanning measurements will be designed to ensure that these levels are not exceeded. Scanning will be conducted in accordance with MARSSIM (Reference 2, section 6.7.2 Scanning Sensitivity). The surface scan criteria limits will be chosen to ensure that the hardest to detect radionuclide in each radionuclide group shown in Table 3-1 can be detected below its respective $DCGL_{EMC}$. These limits are dependent

on several variables (i.e. instrument efficiency, background, surface efficiency, scanning speed).

The decision rule for the scan measurements will be a two-stage process. In the first stage, areas will be flagged as potentially elevated if visual or audible indication of elevated activity is observed above the area background value. A thirty second direct measurement will be obtained at that location and if the thirty second measurement appears to be greater than the background value a fixed-point biased measurement will be taken. If any surface scan results is above the $DCGL_{EMC}$, then the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. The Sign test is not applicable for surface scan measurements. Surface scanning results will not be combined with the statistical data but compared directly to the $DCGL_{EMC}$.

3.5.6 Volumetric Radiological Survey Criteria

No volumetric radiological release criterion has been established. Known volumetric contamination is being removed during safe shutdown activities. If volumetric contamination is found it will be remediated. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. With the potential exception of tritium, volumetric contamination is not expected to be present in T Bldg.

Concrete contaminated on the surface with tritium is also likely to have contamination beyond its surface. The tritium does not, however, migrate past the surface such that only subsurface contamination exists. The contamination will exist, as both surface and subsurface contamination, which means that significant subsurface contamination, would be detected using surface smears.

This specific issue has been addressed in a reasonable manner in Mound 2000, Appendix A, where it states that: "If there is no surface contamination above the surface contamination criteria (Reference 1,Table 1, page A-3), it is reasonable to assume that there is no significant exposure due to existence of residual volumetric contamination."

3.5.7 External Gamma Radiation Criteria

In order to demonstrate compliance with DOE Order 5400.5 (Reference 8, Chapter IV, Section 4.c), general area exposure rate measurements will be performed in each room to ensure that exposure rates do not exceed the background level by more than 20 μR/h. If any measurement is greater than this value, the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed. The Sign Test is not applicable for general area exposure rate measurements. External gamma radiation results will not be combined with the statistical data but compared directly to the cleanup objective.

3.5.8 Ag-108m and Bi-207 Criteria

Several of the radionuclides listed in Table 1-1, "T Building Contaminants of Concern," are related in that they were associated with the polonium-210 work that was conducted from 1949 through 1972. This work involved processing metal canisters that originally contained Bi-209 (natural non-radioactive bismuth). These canisters of bismuth were irradiated with neutrons in a nuclear reactor at another site prior to being sent to Mound for processing. This neutron irradiation of Bi-209 resulted in the production of Po-210. Several radioactive byproducts also resulted from this process, most of which are short-lived and have long since decayed away. Some longer-lived radionuclides still remain as contaminants of concern (COCs) in T Building. These include the activation products, Co-60, Ag-108m, Bi-207, and Bi-210m, and trace quantities of fission products, Cs-137 and Sr-90.

With the exception of Sr-90, all of these remaining radioactive byproducts are strong gamma emitters, which are readily detected using gamma spectroscopy. Previous *in-situ* gamma spectroscopy measurements of sumps and contaminated areas in T Building and laboratory gamma spectroscopy analyses of sludge and sediments from sumps and piping in T Building have consistently shown these radionuclides to reside together and furthermore, that Bi-210m is the most predominant.

Ag-108m and Bi-207 do not decay by alpha or beta emission and are therefore not readily detected using gross alpha or gross beta measurements. This survey effort will rely on gross alpha measurements to assess concentrations of all alpha emitters, including Bi-210m. If these measurements are able to demonstrate that the levels of Bi-210m meet the release criteria, then one may also conclude that the levels of Ag-108m and Bi-207 meet their respective release criteria. When gross alpha measurements are made, anything detected is initially assumed to be from the most restrictive group in Table 3-1, i.e., Group1 transuranics, while the actual gross alpha release criteria for the other alpha emitting COCs associated with the polonium work is a factor of 50 higher. If the respective release criteria are not met then the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed.

3.5.9 Pu-241 Criteria

Pu-241, a weak beta emitter, is difficult to measure directly and cannot be detected efficiently with gross beta measurements. The levels of Pu-241 will be determined using scaling factors and isotopic distribution information. The value will be compared against its respective measurement (statistical or biased) release criteria.

Heat source plutonium, the only plutonium handled in unsealed form in T Building, consists of over 95% (by activity) Pu-238 and also contains trace quantities of Pu-239, Pu-240, Pu-241, Pu-242, and Am-241 (Pu-241 decays to Am-241). With the exception of Pu-241 all of these radionuclides are readily detected with gross alpha measurements. If the gross alpha measurements show that the concentration of alpha emitting plutonium isotopes meet the release criteria, then it can also be demonstrated

that the Pu-241 concentration meets the release criteria. If the release criteria is not met, the survey unit fails and remediation will be conducted. Areas that are remediated will be reclassified as Class 1 areas (if not originally classified as a Class 1 area) and resurveyed.

3.6 The Limits On Decision Errors

3.6.1 Null Hypothesis

The decisions necessary to determine compliance with the release criteria for the average contamination level ($DCGL_w$) is based on a precise statistical statement called a hypothesis. The hypothesis will be tested using data from each survey unit (SU). The hypothesis selected for the T Building VSAP is the null hypothesis (H_0): The null hypothesis (H_o) is stated as; the median concentration of residual radioactivity in the survey unit is greater than the DCGLw. (See Reference 2, page 8-11). The state that is presumed to exist is expressed as H_0.

Therefore, the SU will not be released until proven to meet the release criterion (i.e. reject H_o). The measured median concentration in the SU must be less than the $DCGL_W$ in order to pass. Releasing a SU that requires additional remediation is an unacceptable alternative.

This survey plan is designed to address all radionuclide groups identified in Table 3-1 in each SU using gross alpha, gross beta, and tritium measurements. The most restrictive radionuclide group from Table 3-1 will be assumed for gross measurements, unless demonstrated through spectroscopy measurements that only radionuclides from a less restrictive group are present. The data from the fixed-point measurements on a statistical grid will be tested independently against the null hypothesis (H_0) for each radionuclide group for each survey unit.

3.6.2 Type I and Type II Errors

Acceptability decisions are often made based on acceptance criteria. If the mean and median concentrations of a contaminant are less than the associated acceptance criteria, for example, the results can usually be accepted. In cases where data results are not so clear, statistically based decisions are necessary. Statistical acceptability decisions, however, are always subject to error.

A decision error occurs when the decision maker rejects the null hypothesis when it is true, or accepts the null hypothesis when it is false. These two types of decision errors are referred to as Type I and Type II decision errors.

The probability of making a Type I error denoted by Alpha (α) occurs when the null hypothesis (H_o), as described previously, is rejected when it is actually true and is sometimes referred to as a false positive error. It represents the amount of evidence that the decision maker would like to see before abandoning the null hypothesis. It is

also referred to as the size of the test. The consequence of a Type 1 error could lead to increased residual risk and is set at α=0.05.

The probability of making a Type II error denoted by Beta (β) occurs when the null hypothesis (H_o) is not rejected when it is actually false and is sometimes referred to as a false negative error. The consequence of making a Type II error does not increase residual risk, but rather may result in unnecessary remediation and project delays, and is set at β=0.01. The term (1-β) is the probability of rejecting the null hypothesis when it is false and is also referred to as the power of the test. (Reference 2, page D-15).

3.6.3 Relative Shift

The concentration range between the Lower Bound of the Gray Region (LBGR) and the DCGL, defines the gray region of residual radioactivity concentration in which the consequences of Type II decision errors are relatively minor. The statistical test uses the LBGR to define the level that, above which, false positive rates greater than specified by the limits on decision errors are accepted. The LBGR is limited by the variability exhibited by the measurement system and the decisions errors chosen.

The number of data points is determined by calculating the relative shift [Δ/σ = (DCGL – LBGR)/ σ]. The relative shift is an expression of the resolution of the measurement in terms of uncertainty. The number of data points (N) necessary when using the Sign test is a function of the relative shift and can be obtained directly from MARSSIM (Reference 2, Table 5.5 "Values of N for use with the Sign Test", page 5-34). When the relative shift is greater than 3, then the number of data points default to 20. The following is a direct quote from MARSSIM (Reference 2, page 5-35) "Alternatively, for α = 0.05 and β = 0.01, and $\Delta/\sigma > 3$, a value of 20 is obtained for N. The table value has already been increased by 20% to account for missing and or unusable data and uncertainty in the calculated value of N."

For planning purposes an arbitrary initial value of one-half the DCGLw is selected for the lower bound of the gray region (LBGR) and adjusted to provide a relative shift value between 1 and 3. (See Reference 2, page 2-31). This can be accomplished by altering the selected LBGR, if necessary. Note that shifting the LBGR to a greater value is a conservative assumption; the further that the actual concentration is below the assumed LBGR, the more powerful is the statistical test, and the greater the probability that the SU evaluation will be successful.

When data is available the LBGR should represent the median concentration in the survey unit. Based on some preliminary measurements in T Building, the median measured concentration is expected to be somewhat less than one-half the DCGLw. That being the case, it is important to note that a lesser value for LBGR, resulting in a higher value for the relative shift, would have zero impact on the required number of measurements (i.e. 20). If the median concentration actually turns out to be greater than one-half the $DCGL_w$ the survey unit would likely fail the sign test.

Previous surveys at Mound, using the designated instrument, have shown that the standard deviation denoted by Sigma (σ) of measurements on uncontaminated and previously decontaminated concrete surfaces is seventeen disintegrations per minute per one hundred centimeters squared (17-dpm/100 cm^2). The standard deviation of measurements in T Building, using this instrument, is expected to be similar. Using a DCGLw of 100-dpm/100cm^2 from Group 1 radionuclides (most stringent COCs) and standard deviation of 17-dpm/100cm^2 and LBGR = 50-dpm/100cm^2 the relative shift is calculated below:

$$\frac{DCGLw - LBGR}{\sigma} = \frac{\Delta}{\sigma} = \text{Relative shift} = \frac{100-50}{17} = \frac{50}{17} = 2.94$$

Given: $DCGL_w$ = 100-dpm/100cm^2,

$LBGR_{(\text{based on } 1/2 \text{ DCGL})}$ = 50-dpm/100cm^2,

$\alpha = 0.05$,

$\beta = 0.01$,

σ = 17-dpm/100cm^2, Δ = 50-dpm/100cm^2, $\Delta/\sigma = 2.94$

Utilizing the table 5.5 from Reference 2, the number of samples (N) = 20.

MARSSIM recommends that the relative shift should be about 3 when the standard deviation is much smaller than the DCGLw. (Reference 2, page 8-13). Verification that the initially selected LBGR was selected appropriately is tested below:

If $\Delta/\sigma = (DCGL_w - LBGR)/\sigma$

$= 3$

Then $LBGR = DCGL_w - 3\sigma$

= 100-dpm/100cm^2 – (3x17-dpm/100cm^2)

= 49-dpm/100cm^2

Therefore, the initially selected LBGR is appropriate to use in determining the relative shift for this survey and the number of selected data points. A prospective power curve Figure 7 in Appendix A was constructed using COMPASS software (Reference 9, "Computerization of the MARSSIM for Planning and Assessing Site Surveys") demonstrates sufficient power exists at the LBGR to detect residual contamination. A retrospective power curve will be constructed if the Sign test is necessary to demonstrate compliance with the release criteria. If the 95% Upper Confidence Limit (UCL) of the median for the data set for any radionuclide group exceeds the release criteria, additional remediation action and surveying will be required to demonstrate

compliance. After the surveys have been completed then the relative shift will be recalculated using the actual standard deviation to ensure the appropriate number of measurements was taken.

3.7 Optimize the Design

The DQO process is an iterative method. As new information is collected it will be incorporated into the planning. In order to facilitate the process a SPF is developed for field use to direct the specific details required for the overall survey plan. The SPF will define the types of samples to be collected, specific instruments to be used for the survey, the exact sampling locations and type of surveys required. A specific SPF will be prepared for each survey unit prior to implementing the FSS of that SU. The SPF is reviewed and approved prior to beginning the survey and is subsequently reviewed and approved after all data is collected to ensure completeness and accuracy. Data from initial survey efforts may result in altering area classifications. Additional SPFs may be required to complete the final status survey process for a survey unit. A review of the DQOs will ensure that data have appropriately and adequately addressed the stated objectives.

4.0 COORDINATION/PREREQUISITES

Interior building surfaces must be free of dirt, insulation, and loose paint at survey locations in order to ensure that paint or other coverings do not obscure any residual radioactive material present on the surfaces of the building materials. Obstacles such as floor tile, insulation and false ceilings must be removed to provide access to building surfaces. Surveys will be sequenced in a manner to minimize cross contamination (i.e. top to bottom, east to west).

Prior to implementation of the survey process all Decontamination & Decommissioning activities must be completed in accordance with their appropriate work packages and maintenance service requests. It is critical to the DQO process that the survey units are isolated (e.g. holes between survey units sealed, doors locked, etc.) from the potential for recontamination or disturbances that could lead to invalidating the survey results. Access shall be restricted in areas until all remediation is complete, surveys are done, final status data collection is complete and the building is released.

5.0 DOCUMENTATION RESPSONSIBILITIES

To support documentation of defensibility in the generation of the VSAP, approvals from the author, technical reviewer, and approver (management) will be documented on the cover of the VSAP.

When all of the DQOs are satisfied, a report of the status of the survey units will be prepared and submitted for review. The Final Status Survey Report will summarize and document the results of the survey and the final disposition of the survey units.

6.0 FIELD INSTRUCTIONS

Survey Plan Forms (SPF) for use as field instructions are provided in Appendix D to this instructional document. Instructions for surveying each survey unit will be provided on an SPF.

6.1 Survey Unit Classification

6.1.1 Survey Unit Classification Definitions

T Building has been split up into survey units (SUs) based on the contamination potential of each area. The SUs were then classified based on the contamination potential of each area. The contamination potential of each SU was evaluated using historical information, site characterization document, process knowledge, routine surveys, and in-process and post-job surveys conducted during remediation activities. Survey data is available for review. SU classification is subject to changing to a higher classification pending remediation activities or any additional information collected prior to implementing the FSS. This would be captured in the FSS Report. Surveys will be performed in each SU to the rigor of a MARSSIM FSS. Figures 3 and 4 show the SUs on the first and second floor. The classification process described in MARSSIM (Reference 2, Sections 2.2, 4.4, 5.5.2, and 5.5.3) was used for these purposes.

Floors and walls < 2m in areas that had previously been decontaminated as shown in Figures 1 and 2 were assigned as Class 1 areas requiring 100 % surface scan. Ceilings and walls > 2m in Class 1 areas were assigned as Class 2 areas with a reduction in surface scanning requirements because of their reduced potential for contamination. Per MARSSIM (Reference 2, page 2-33) the level of scanning effort should be proportional to the potential for finding areas of elevated activity. Areas adjacent to Class 1 were assigned as Class 2 areas. The same scanning strategy was applied in Class 2 areas with the floors and walls less than 2 meters (m) receiving a higher scan rate than upper walls and ceilings. The crawlspaces between the floors were assigned as Class 2 areas with a reduction in scanning requirements. If elevated activity were detected using the reduced scan rate an increased scan rate would be required. Since all of the building is considered impacted by default any area that was not previously classified as a Class 1 or 2 was classified as a Class 3 area.

A detailed listing of SU classification is provided in Appendix B. A detailed listing of SU data collection requirements is provided in Appendix C. The SU classes developed for the T Building floors, walls, ceilings, and some systems are introduced below:

Class 1

Floors & Lower Walls (< 2m)	Perform 100% scan survey of the floor surfaces and lower walls (< 2m). Collect fixed-point measurements*

	at systematic locations using a random start location and a triangular grid pattern. Floor area limit of 100 m^2 applied.
*High-risk sumps***	Perform 100% scan survey of the sump surface. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern.
Class 2	
Floors & Lower Walls (< 2m)	Perform minimum 25% scan survey of the floor surfaces and lower walls *(< 2m)*. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern. Floor area limit of 1000 m^2 applied.
Upper Walls (> 2m) & Ceilings	Perform minimum 25% scan survey on walls above 2m in SU where the floor is designated as a Class 1 area. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement located on the ceiling. This area should equate to at least 10% scan survey on accessible ceiling surfaces. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern. Collect at least ten (10) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination. Ceiling area limit of 100 m^2 applied. Perform minimum 10% scan on walls above 2m in SUs where the floor is designated as a Class 2 area. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement located on the ceiling. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern. Collect at least ten (10) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Ceiling area limit of 1000 m^2 applied.

*Low-risk sumps*** and drains*	Perform 100% scan survey of the sump surface. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern on the surface of each sump and each accessible location in the drainage system.
Building Utility Sumps	Perform 100% scan survey of the dry accessible sump surface. Collect fixed-point measurements at accessible sump locations. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement.
Exhaust ventilation systems	Collect a minimum of twenty (20) fixed-point measurements on accessible surfaces of the exhaust systems. Collect a minimum of thirty (30) fixed-point measurements on areas in the exhaust system where, in the professional judgment of the project engineer or building manager, a potential exists for flow restriction. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Area limit of 1000 m^2 applied.
Crawlspaces	Perform minimum 10% scan of the survey unit. Collect a minimum 20 fixed-point measurements at systematic locations using a random start location and a triangular grid pattern. Collect a minimum of thirty (30) fixed-point measurements on areas in the crawlspace SU where, in the professional judgment of the surveyor a potential for residual contamination would a exist. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Floor area limit of 1000 m^2 applied.
Class 3	
Floors & Lower Walls (< 2m)	Perform minimum 10% scan survey of the floor surfaces and lower walls *(< 2m)*. Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Collect fixed-point measurements at random locations within the SU. No floor area size limit enforced.
Upper Walls (> 2m) & Ceilings	Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Collect fixed-point measurements at systematic locations using a random start location and a triangular grid pattern. Collect at least ten (10) fixed-point bias measurements on beams, supports, or other

	horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination. No ceiling area size limit enforced.
Supply air systems	Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Collect minimum 20 fixed-point measurements at accessible locations. Area limit of 1000 m^2 applied.
Inert Gas Delivery Systems	Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Collect minimum 20 fixed-point measurements at accessible locations. . Area limit of 1000 m^2 applied.
Building utility systems	Perform scan surveys on an area of approximately 1 m^2 around each fixed-point measurement. Collect minimum 20 fixed-point measurements systems at accessible locations. Area limit of 1000 m^2 applied.

* Each fixed-point measurement includes direct measurements for gross alpha and gross beta; smears for removable gross alpha, beta and tritium.

** High-risk drain lines associated with high-risk sumps will be excavated and disposed of as low-level waste. See Figure 6 for sump locations.

***If initial survey dictates that remediation will be required, any removed fill material will be assumed to be potentially contaminated and will be disposed of as low-level waste. If initial surveys show the sumps to be clean, any removed fill material may be scanned with FIDLER or NaI detector, if no contamination is detected the fill may be returned to the sump.

The SUs were defined in this manner in order to simplify administration of the survey and handling of the data. Surveys of upper walls and ceilings are being administered as separate SUs from those of the floor and lower walls, although they occupy the same physical boundaries. Dividing the rooms into two SUs increases the sample density in the areas.

In the initial breakdown of survey units, corridors were sometimes identified with adjacent rooms. In order to survey and isolate survey units in a timely fashion, some may be divided into two survey units. The classification will remain the same. An additional 20 survey locations would be identified in the newly generated SU. A complete listing of SUs, their classification, and justification is provided in Appendix A.

Since the initial breakdown of survey units, some rooms (17 B and Corr. 49) no longer exist due to remediation activities that removed their walls. Some rooms no longer exist due to remodeling activities (Room 342 and 343). The areas the rooms occupied will be surveyed in the appropriate SU. PRS 213 was removed during the D&D effort in the 1970s and PRS 214 was previously removed as part of Safe Shutdown Activities. The

area they occupied will still be surveyed in the appropriate SU. See Appendix B for additional information.

6.1.2 SU Naming Convention

The SUs within T Building were named based on which floor elevation and bay it occupied. The designated SUs on each floor were sub-categorized into 'north', 'central', and 'south' areas, corresponding to the three bays split by the firewalls within the building. The general naming convention follows: XY-ZZ-#

where:	X	=	building floor elevation
	Y	=	bay
	ZZ	=	SU number
	#	=	floor/lower wall or upper wall/ceiling designator

For example:

1C-01-1	=	1st floor, center bay, SU #1, floor & lower wall survey unit
2N-05-2	=	2nd floor, north bay, SU #5, upper wall & ceiling survey unit

The numerical indices restart in each bay of each floor.

Systems within T Building were named based on the PRS number associated with them or were assigned a unique ID number. Examples are: SYS-PRS 215 (for PRS 215), SYS-10 (Breathing Air System), and 2CS-01-1 (2nd floor crawlspace south east bay).

6.1.3 Number of Measurement Locations

The number of data points is a function of the relative shift (as defined in subsection 3.6.2). The number of data points (N) required for using the Sign Test is obtained from MARSSIM Table 5.5 (Reference 2), the *COMPASS* software utility (Reference 9), Visual Sample Plan (VSP) software (Reference 10) or similar software. COMPASS and VSP calculate the required number of measurement locations based on the survey data and assumptions. Section 3.6.2 establishes acceptable decision errors α=0.05 and β=0.01 for this survey. Using a standard deviation assumption of 17-dpm/100cm^2, the most restrictive $DCGL_w$ and an LBGR set to one-half of the most restrictive $DCGL_W$, the minimum number of measurement locations in the SU is calculated to be 20, which includes the MARSSIM recommended 20% additional samples to protect against the possibility of lost or unusable data. A screen capture of the COMPASS utility, complete with the calculated survey power curve, is provided in Figure 7 located in Appendix A.

6.1.4 Grid Spacing

Grid spacing and placement of fixed-point measurement locations within each SU will be based on a relative coordinate system using a commercial software program such as Visual Sample Plan (Reference 10). Measurement locations will be identified using a reproducible measurement technique. A graphical representation will be provided along with the SPF to the surveyor. Prior to the start of the survey, the locations will be

identified and marked. The number of calculated survey data points (N), based on the statistical test, is used to determine the spacing (L) of a systematic pattern by:

$$L=\sqrt{\frac{A}{0.866n}}$$ Equation 5-7, Reference 2

where: L= Distance between data point (feet)

A = survey unit area (square feet)

n = number of data points (20)

The starting point is randomly selected and the data points are located within the survey unit using a triangular grid for Class 1 and Class 2 areas. The systematic locations for floor layouts will also include the first 2 m of each wall. Likewise, the layout for walls > 2m will also include the ceilings.

Locations of measurement locations in other SUs are determined by multiplying the east-west (Y) and the north-south (X) dimensions of each survey unit by a randomly generated number between 0 and 1 for each dimension. For consistency, the origin will be defined the same way in each survey unit. Sample locations will be calculated using a computer to determine random numbers and plot data point locations on a survey map. To facilitate field measurements, the calculated coordinates will be rounded to the nearest whole number of feet. If additional surveys are required due to area reclassification or remediation, the survey design parameters will be specified as necessary in accordance with Reference 2.

6.1.5 Survey Reference Coordinate System

SU boundaries on each floor of the T Building will be marked on the room/area breakdowns provided in Appendix B. For those SUs that extend beyond existing partitions, i.e. walls, physical markings will be made on floors and walls to distinguish boundaries for technicians to follow during surveys.

The program used to grid the SUs is being modified to enhance the reference coordinate system. The reference coordinate system will be the same in each SU. Gridded SUs for T Building including their data point locations and specific coordinates will be provided to the surveyor prior to implementation of the survey.

6.2 Survey Instrumentation And Methods

All field and laboratory instrumentation will be specified on the Survey Plan Form (SPF) and shall be operated in accordance with the appropriate Mound procedures. SPFs for use during the Final Status Survey are provided in Appendix D.

6.2.1 Scan Surveys

Surface scanning will be performed to locate anomalies that might indicate elevated areas of residual activity and that require further investigation or remedial action. A floor scan for alpha and beta contamination will be performed using the following instrument or equivalent: a Ludlum model 2350 data logging scaler/ratemeter with a 584 cm^2 model 43-37 gas-flow proportional counter at a scan speed of 1 inch per second with the floor probe located within one-fourth of an inch of the surface being scanned. Field survey limits will be established in accordance with MARSSIM Section 6.7.2 Scanning Sensitivity guidance for each scan survey instrument to give technicians a trigger level for determining whether a survey unit requires additional investigation.

These limits will be documented on the SPF. Trigger levels will be calculated in gross count per minute (cpm) for a given area with a stated background level. A 30 second integrated count for both alpha and beta will be performed at locations where elevated measurements are observed.

6.2.2 Fixed-Point Measurements

Fixed-point measurements are defined as static counts performed with a portable instrument at locations of suspected contamination. Direct field measurements for gross alpha and gross beta will be made at fixed locations using a gas-flow proportional counter, Ludlum model 2350 with a 43-68 probe. The 43-68 probe may be operated in either alpha or beta mode, depending upon chosen instrument settings. For safety reasons in areas where access is limited, the Ludlum model 2360 with a 43-89 probe will be used. This is an alpha/beta scintillator counter not a gas-flow proportional counter. See MD-80036, Op 30030 for minimum datable activity (MDA) information (Reference 11).

For alpha (α) and beta (β) surveys, the MDA for each instrument will be calculated by using the following equation from NUREG 1507, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, December 1997 (Reference 15, page 3-7):

$$\frac{3+3.29\sqrt{R_b T_{s+B}\left(1+\frac{T_{S+B}}{T_B}\right)}}{KT_{S+B}}=MDA$$

Where Rb is the background counting rate, and T_{s+b} and Tb are the sample and background counting times, respectively.

K = [E*A/100]

Where E = efficiency (e_i * e_s) and A = active probe area

e_i = instrument efficiency, and e_s = surface efficiency

Example: the MDA for the 43-68 probe is 46 dpm/100cm^2 (α) given the following conditions: Rb = 3 cpm, Tb = 5 minutes, T_{s+b} = 2 minutes, A=126 cm^2, e_i = 0.215, and e_s = 0.5. The length of time for these measurements is dependent on the background and instrument efficiency, count time should be long enough to ensure that a MDA less than the $DCGL_W$ can be achieved.

6.2.3 Smear Sample Collection and Analysis

Selected building surfaces will have smear samples taken to assess the presence of removable contamination. Smears will be taken at every location that a fixed-point measurement is taken and at any other locations deemed necessary based on visual inspections and professional judgment. The presence of loose surface activity will be determined using coin smears. An area of 100cm^2 will be smeared at each data point. Smears will be counted in an alpha/beta counter. A liquid scintillation counter (LSC) will measure removable tritium.

6.2.4 External Gamma Radiation Measurements

External gamma radiation measurements will be performed using a Bircron Micro Rem Survey meter in each room 1 m up from floor. This will ensure compliance with the 20 μR/h above background guideline value in DOE Order 5400.5 (Reference 8).

6.3 Survey Quality Assurance and Quality Control

6.3.1 General

Surveys and samples collected for this survey plan will be performed in accordance with the standard quality control (QC) requirements of MD-80046, MARSSIM Implementing Procedures (Reference 7). Replicate surveys, sample recounts, sample chain of custody, instrument performance checks, control of field survey data and databases, QC investigations, and using approved standard operating procedures (SOPs), trained personnel and QC practices provide a high level of confidence in the data collected to support the survey outcome. The survey plan form will specify the QC requirements.

6.3.2 Instrument Calibration

Calibration of survey instrumentation will be performed using Mound approved procedures. Radiological survey instrumentation is calibrated using National Institute of Standards and Technology (NIST) traceable sources and controlled in accordance with ANSI–N323a, "Radiation Protection Instrumentation and Calibration". Plutonium-238 is used for alpha calibrations; Technetium-99 is used for beta calibrations. Survey instrument types will be provided with a correction factor if the sources used do not adequately approximate the nuclide energies of interest in the field. Survey instrumentation is performance tested daily for proper operation and the results of the operational checks are documented as part of the daily work activities as required by MD-80036, Radiological Operations Procedures (Reference 11). Calibration documents

are maintained in accordance with the requirements of PP-1060A Quality Assurance (QA) Program Plan (Reference 12).

7.0 DATA ASSESSMENT

Assessment of analytical data will be conducted in accordance with MARSSIM (Reference 2, Chapter 9.3). Assessment evaluates whether the data meet the objectives of the survey and whether the data are sufficient to determine compliance with the release criteria. Data Assessment consists of data verification, data validation, and data quality assessment. As with all components of a successful survey, the level of effort associated with the assessment of survey data should be consistent with the objectives of the survey (i.e. graded approach).

Data reduction and analysis will result in both graphical and numerical interpretations and will lead to the acceptance or rejection of the null hypothesis. The DQOs will be reviewed to ensure that data has appropriately and adequately addressed the stated objectives or to determine if additional surveys will be required for further investigation. If all of the initial characterization data supports the rejection of the null hypothesis, then no further survey data will be necessary.

7.1 Data Verification

Data verification ensures that the requirements stated in the planning documents are implemented. This means that difficulties or problems that occur during implementation should be documented. Data verification will performed in accordance with MD-80046, MARSSIM Implementing Procedures, Op 402 "Field Quality Control for Building Contamination Surveys" (Reference 7).

7.2 Data Validation

Data Validation is a review process for judging the analytical quality and usefulness of a discrete set of data. Data validation can be viewed as a decision-making process during which established quality control criteria are applied to the data. During this process, individual sample results are accepted, rejected or qualified. The end product of data validation is data of known analytical quality. 100% of the field measurements will be validated using the following Mound SOP MD-80043 Methods Compendium, Q-009 "Data Validation for Field Measurements" (Reference 13).

NOTE: The data validation is a specific, prescribed process for data generated under the Superfund Contract Laboratory Program. This level of effort associated with data validation should be consistent with the objectives of the survey (i.e. graded approach).

7.3 Data Quality Assessment

Data quality assessment will be conducted in accordance with MARSSIM (Reference 2, Section 8). Data will be evaluated for spatial independence, symmetry, data variance and statistical power (if applicable). Field measurements will be assessed in

accordance with MD-80046, MARSSIM Implementing Procedures, Op 402, "Field Quality Control for Building Contamination Surveys" (Reference 7). Guidance on performance of data quality assessment contained in Section 8 and Appendix E of the MARSSIM should be consulted. Additional guidance is provided within EPA QA1/G-9 Guidance for Data Quality Assessment: Practical Methods for Data Analysis (Reference 14).

8.0 EVALUATION AND REPORTING

When all of the DQOs are satisfied, the data will be reported in a Final Status Survey (FSS) Report and an On-Scene Coordinator (OSC) Report. The report will summarize and document the results of the survey, document any SU reclassifications, changes to survey approach, results of all data assessment activities, and the final disposition of the survey units. The FSS report will be transmitted to the Mound 2000 Core Team for review and approval prior to proceeding with building transition.

9.0 REFERENCES

1. Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach, BWXT of Ohio, February 1999.

2. Multi-Agency Radiation Survey and Site Investigation Manual, (MARSSIM), August 2000.

3. EPA QA/G-4 Guidance for Data Quality Objective Process.

4. Action Memorandum T Building Removal Action, Final, CH2M-Hill-Mound, June 2003

5. MLM-2239 A Report on the Decontamination and Decommissioning of the Technical (T) Building at Mound Laboratory, May 21, 1976

6. White Paper, T Building Structural History and Process History Summary Background Document, BWXT of Ohio, November 2002.

7. MD-80046, Op 402, MARSSIM Implementing Procedure, Field Quality Control for Building Contamination Surveys.

8. DOE Order 5400.5, Change 2, Radiation Protection of the Public and the Environment, January 7, 1993.

9. Computerization of the MARSSIM for Planning and Assessing Site Surveys (COMPASS), Version 1.0, Oak Ridge Institute for Science and Education, 2001.

10. Visual Sample Plan, Version 2.0, Pacific Northwest Laboratory, September 2002.

11. MD80036, Radiological Operations Procedure.

12. PP-1060A, Quality Assurance Program Plan.

13. MD-80043 Methods Compendium.

14. EPA QA/G-9 Guidance for Data Quality Assessment: Practical Methods for Data Analysis.

15. NUREG 1507, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, December 1997

16. MD-80030, Environmental Analytical Procedures

17. MD-10167, Radioactive Waste Procedures, Op 900 ISOCS Operating Procedures

APPENDIX A

FIGURES

Figure 1 T-Building Operations Floor

Figure 2 T-Building Service Floor

Figure 3 1st Floor Survey Units

Figure 4 2nd Floor Survey Units

Figure 5 HVAC Area Flow Diagram

Figure 6 T Building Drainage System

Figure 7 Screen capture of COMPASS software utility and associated power curve for T Building

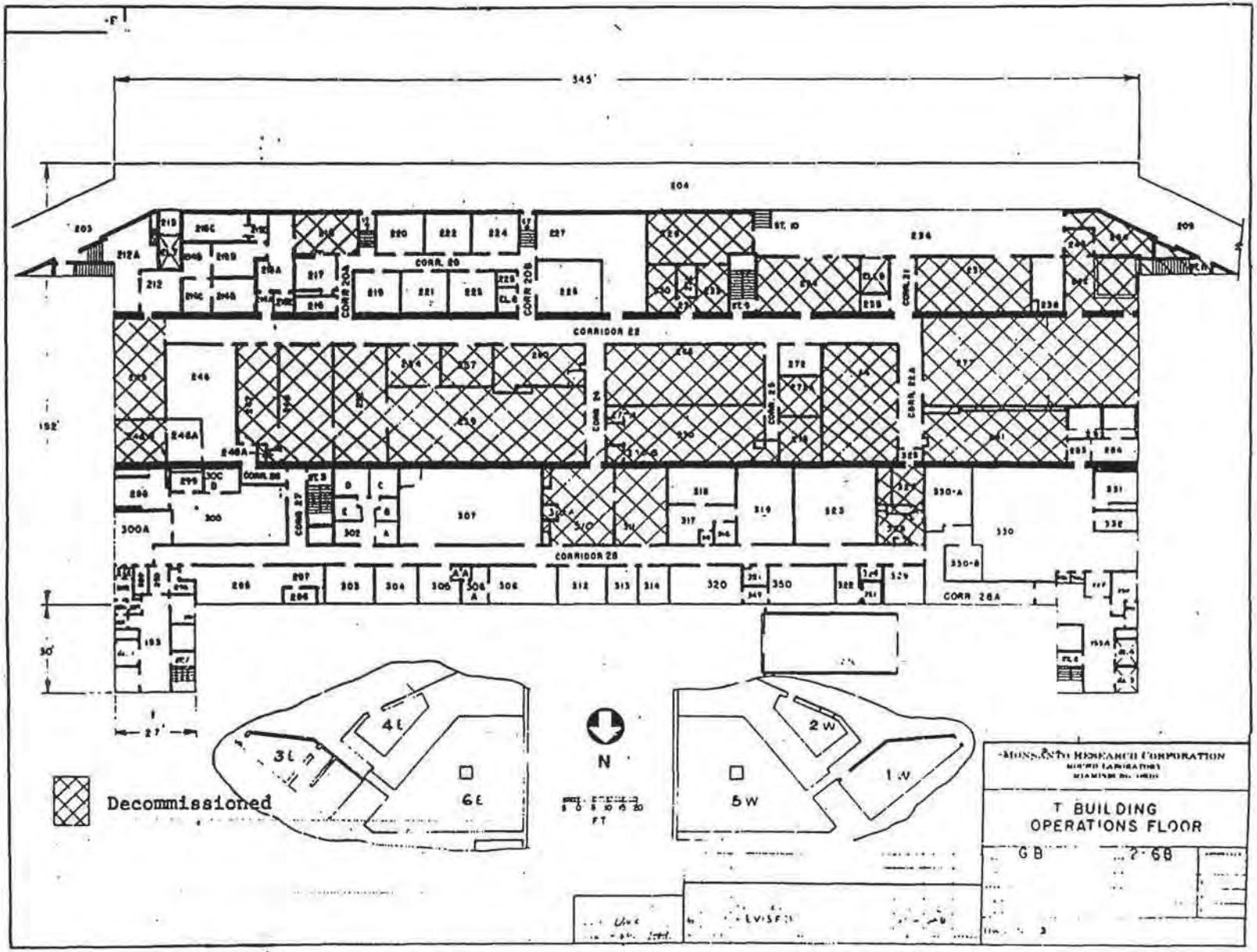


FIGURE 1 - T-Building operations floor.

UNCLASSIFIED
[redacted]
UNCLASSIFIED & NON-SENSITIVE
Reviewed by Mound Declassification Office. Reviewer Initials: Paul B. Hand 7-29-04

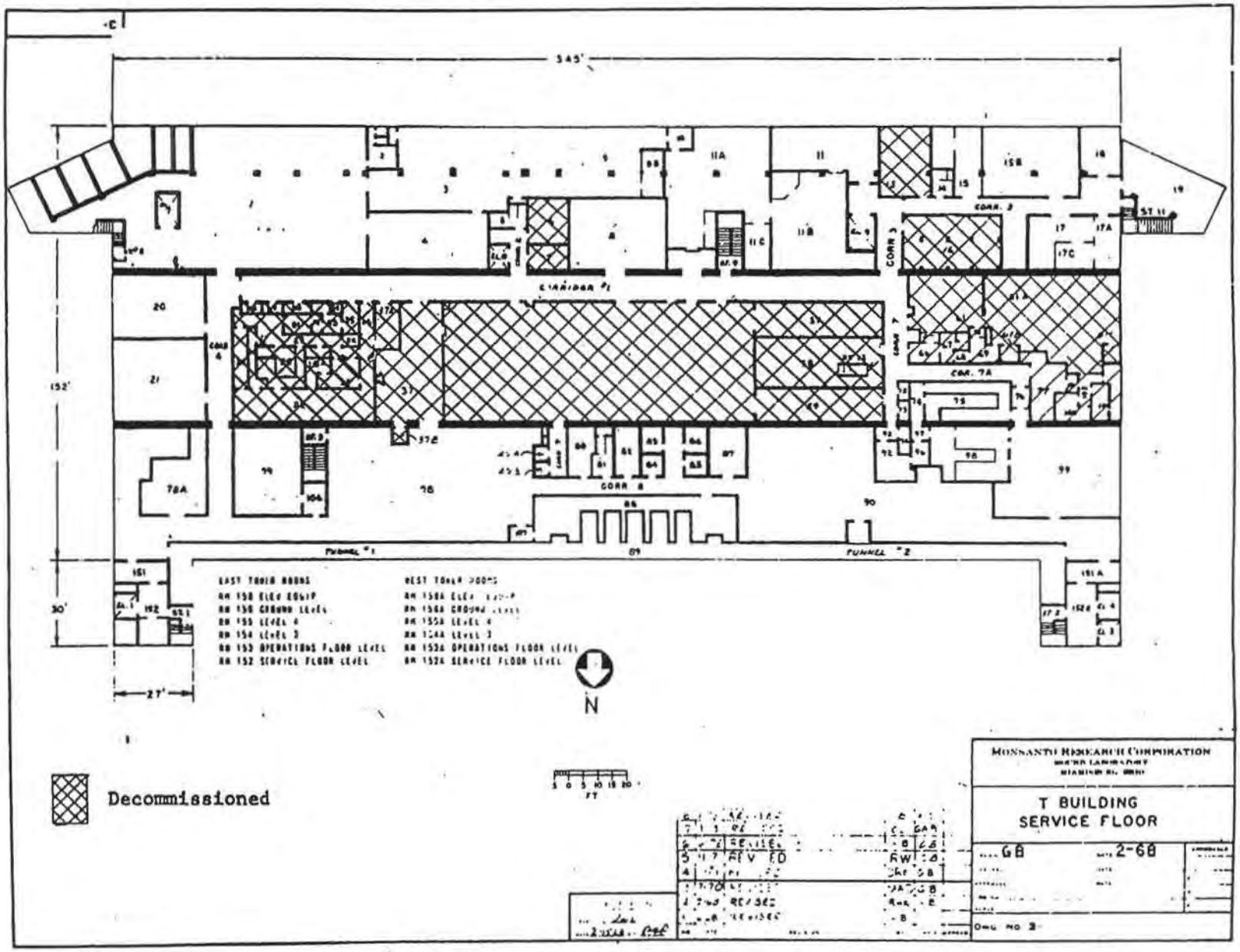
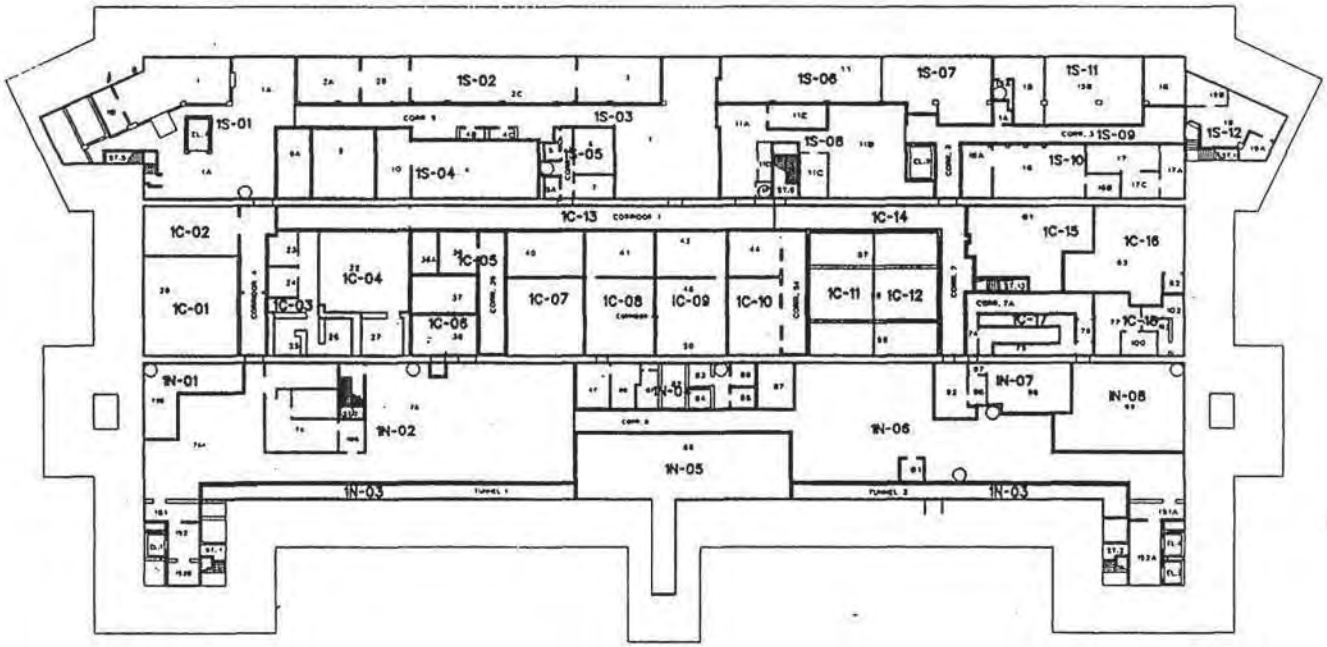


FIGURE 2 - T-Building service floor.

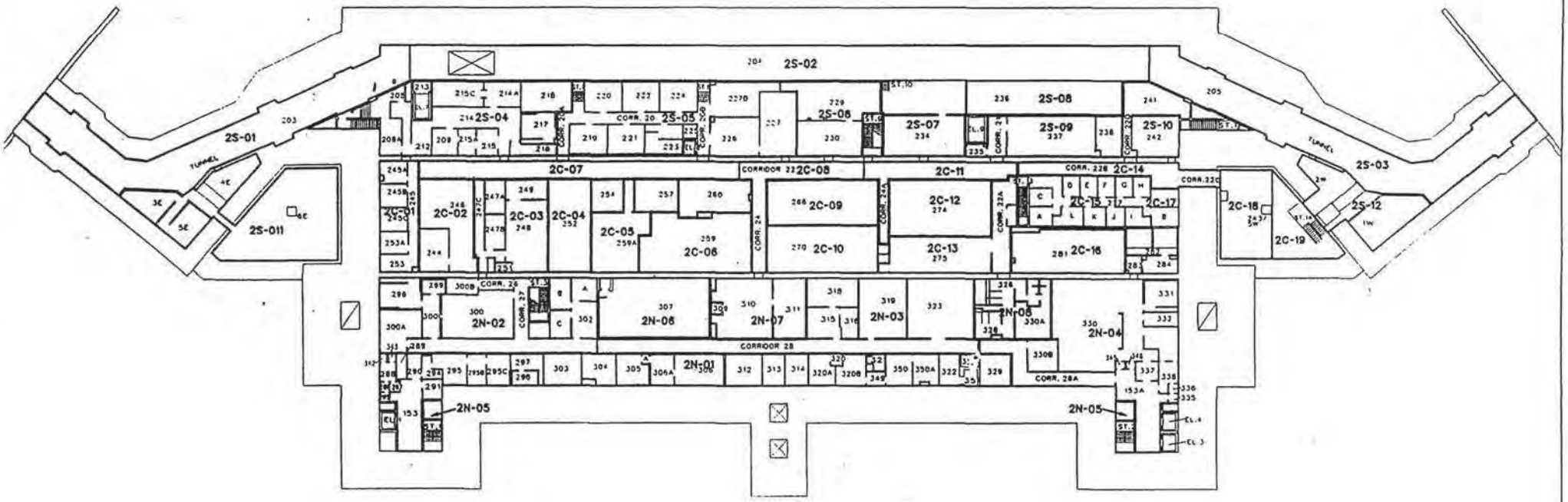
UNCLASSIFIED
~~OFFICIAL USE ONLY~~
~~OFFICIAL USE ONLY~~
UNCLASSIFIED & NON-SENSITIVE
Reviewed by Mound Declassification Office. Reviewer Initials: Paul B. Nard 7-29-04



T - BLDG. FIRST FLOOR

N

Figure 3: 1st Floor Survey Units



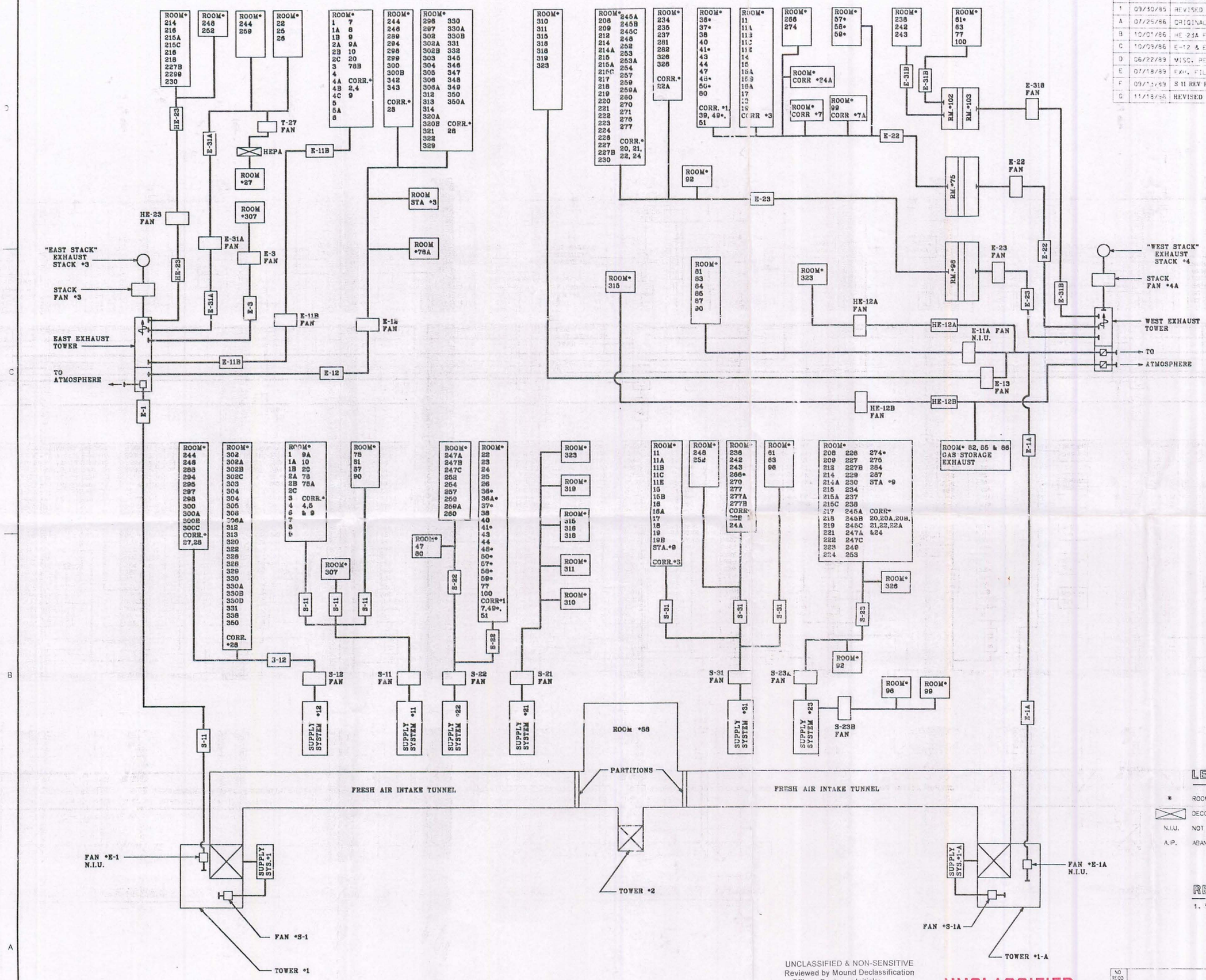
T - BLDG. SECOND FLOOR

N

Figure 4: 2nd Floor Survey Units

SEE DRAWINGS ATTACHED

ISS	DATE	REVISION	BY	CHKR	ENG	PROJ	APVD	M
0	05/01/84	PRELIMINARY ISSUE	TE	CG	NP		WBC	
1	09/30/85	REVISED PRELIM ISSUE	TE	MR	GH		WBC	
A	07/25/86	ORIGINAL ISSUE	TE	MR	GH		WBC	
B	10/01/86	HE 24A FAN REMOVED	TE	MR	GH		WBC	
C	10/09/86	E-12 & E-24 REVISED	TE	MR	GH		WBC	
D	06/22/89	MISC. REVISIONS: (B) SYSTEMS	TE	MR	GH		WBC	
E	07/18/89	FAN, FILT. BANKS REMOVED, LEGEND REVISED	TE	MR	GH		WBC	
F	09/12/89	S 11 REV RM 20, ECS REV RM 38,40,43,44,CORR 19	TE	MR	GH		WBC	
G	11/18/96	REVISED & REDRAWN PER AS BUILT	REW	[illegible]				



LEGEND

* ROOM SERVED BY EMERGENCY CONTAINMENT SYSTEM (ECS)

DECONTAMINATION FILTER BANK

N.I.U. NOT IN USE

A.I.P. ABANDONED IN PLACE

REFERENCE DRAWINGS

1. 351500-04043

Figure 5

UNCLASSIFIED & NON-SENSITIVE
Reviewed by Mound Declassification Office. Reviewer Initials: ____
Paul B. Dowd 8-3-04
Sr. Classification Consultant for CH2M Hill Mound, Inc.

UNCLASSIFIED

NOT FOR PUBLIC DISSEMINATION

~~MAY CONTAIN UNCLASSIFIED CONTROLLED NUCLEAR~~ INFORMATION SUBJECT TO SECTION 148 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED (42 USC 2168). APPROVAL BY THE DEPARTMENT OF ENERGY PRIOR TO RELEASE IS REQUIRED.

UNCLASSIFIED

APPROVALS: DATES:
SAFETY COMMITTEE REQUIRED: ___NONE ___TRUESOC ___TESOC ___EMSOC
TECH. RESP. ____ ____
SR. MGR. ____ ____
TRUESOC ____ ____
TESOC ____ ____
EMSOC ____ ____

DESIGN ENG | PROJ MGR
SPONS | ENG SUPV
P & EC | PEER REV
ENG MGR
APVD | DATE

NO REQD | DESCRIPTION/MATERIAL | ITEM

SHEET 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 2
ISSUE
SHEET 1 2 3 4 5 6
ISSUE G
PART CLASSIFICATION

TITLE (U) TITLE CLASSIFICATION
T BUILDING
AS-BUILT
H.V.A.C. AIR FLOW DIAGRAM

DRAWING CLASSIFICATION [redacted] | SIZE E | DRAWING NUMBER CFE850578 | JOB NUMBER 11468
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STATUS WD-REL-11/18/96 | ORIGN MSTATION 5.0

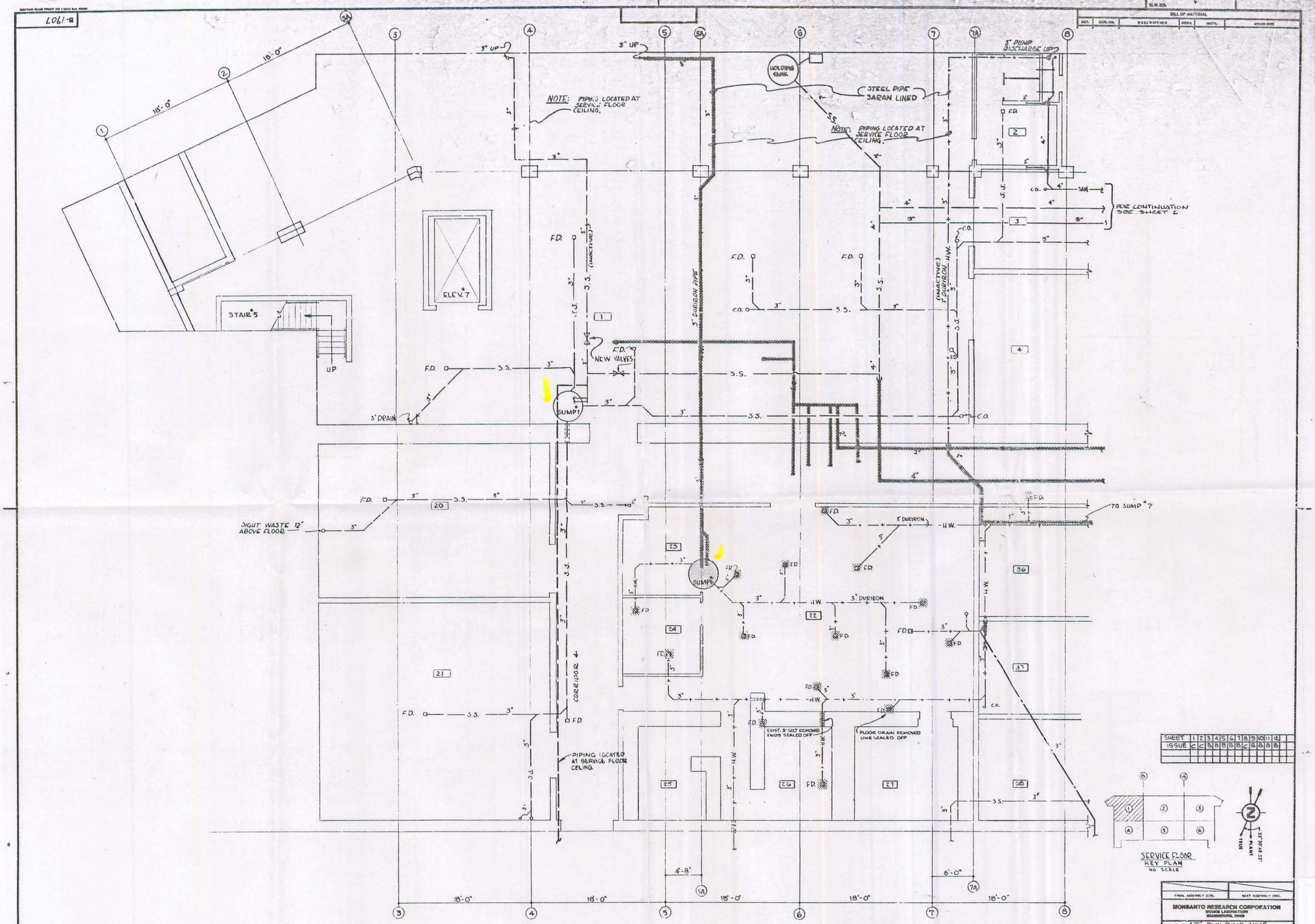


Figure 6
12 sheets

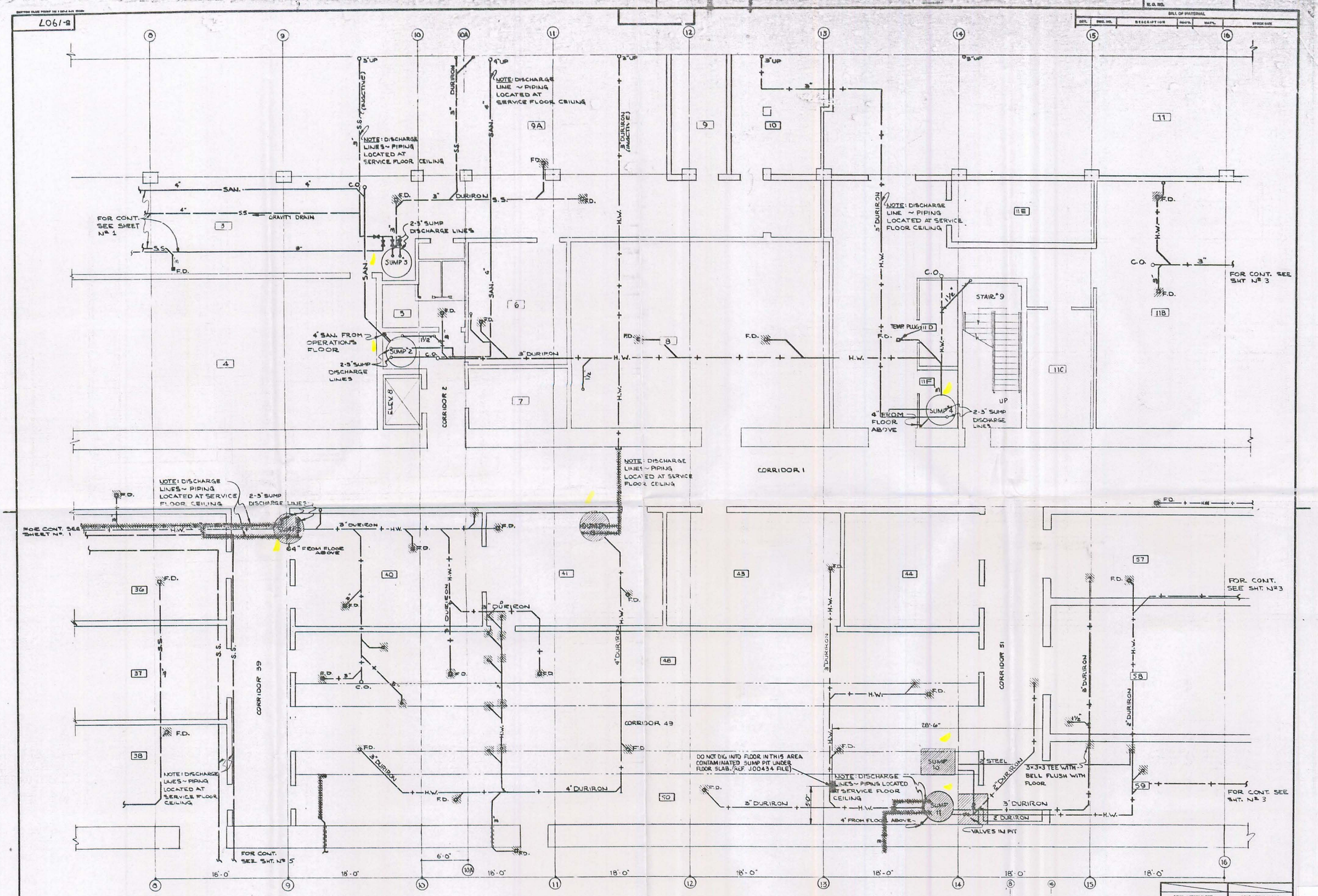

NOTE: DISCHARGE LINES ~ PIPING LOCATED AT SERVICE FLOOR CEILING
FOR CONT. SEE SHEET Nº 1
FOR CONT. SEE SHT Nº 3
FOR CONT. SEE SHT. Nº 23
FOR CONT. SEE SEZ. SHT. Nº 5
SUMP 3
SUMP 2
SUMP 4
SUMP 10
SUMP 11
STAIR Nº 9
ELEV. 8
CORRIDOR 2
CORRIDOR 1
CORRIDOR 39
CORRIDOR 49
CORRIDOR 51
4" SAN. FROM OPERATIONS FLOOR
2-3" SUMP DISCHARGE LINES
4" FROM FLOOR ABOVE
DO NOT DIG INTO FLOOR IN THIS AREA CONTAMINATED SUMP PIT UNDER FLOOR SLAB. (REF. J00434 FILE)
3x3x3 TEE WITH -5 BELL FLUSH WITH FLOOR
VALVES IN PIT
SERVICE FLOOR KEY PLAN NO SCALE
PART FIRST FLOOR PLAN
SCALE - 1/4 = 1'-0
MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO
'T' BUILDING/KYLE
PART. FIRST FLOOR PLAN
DRAINAGE SYSTEM
DRA: ADAM
CHECKED GAB
APPROVED RCR
JOB NO. 7862
SCALE - AS NOTED
DWG. NO. S-1907
SHT. 2 OF 12
CODE IDENT. NO. 14055
ORIGINAL ISSUE
AS BUILT

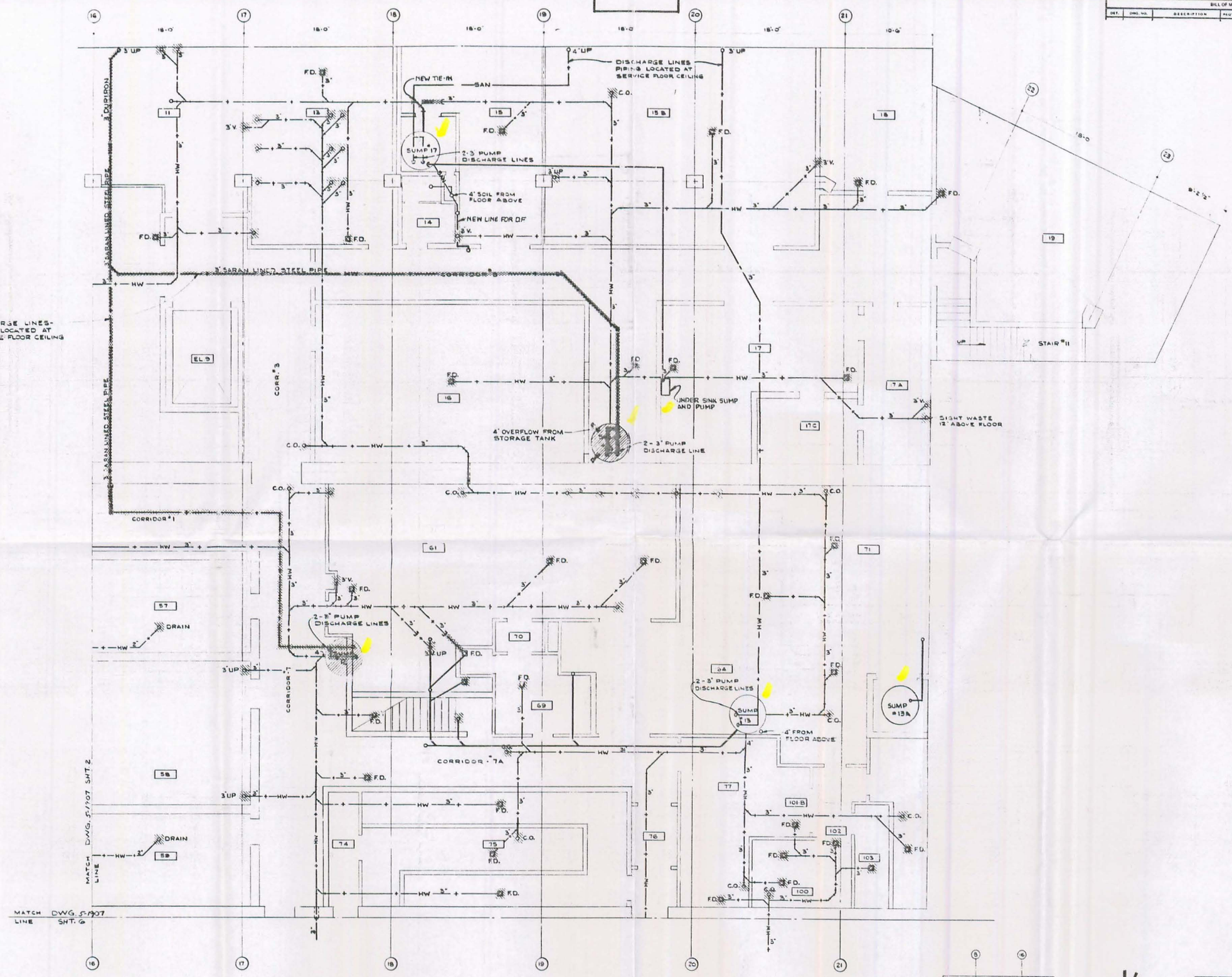
Figure 6

5-1907

W.O. NO.

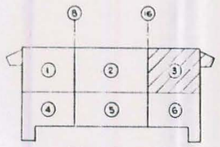
BILL OF MATERIAL

QNT.	DWG. NO.	DESCRIPTION	REQ'D	MAT'L	STOCK SIZE



PART. FIRST FLOOR PLAN

SCALE: 1/4"=1'-0"



SERVICE FLOOR KEY PLAN NO SCALE

B	3-15-71	AS BUILT	KRW	GAB	
0		ORIGINAL ISSUE			
ISS.	DATE	REVISION	BY	CHK'D	APPRD.

DESIGNED FOR PART NO. & ISSUE | REFERENCE DWG. & ISSUE

DWG. CLASSIFICATION LEVEL UNCL. DATE 7/1/71

CODE IDENT. NO. 14085

FINAL ASSEMBLY DWG. | NEXT ASSEMBLY DWG.

MONSANTO RESEARCH CORPORATION
DOUND LABORATORY
MIAMISBURG, OHIO

"T" BUILDING/KYLE

PART. FIRST FLOOR PLAN
DRAINAGE SYSTEM

DRAWN VICTOR J.	DATE 6-22-71	APPROVALS	
CHECKED GAB	DATE 3-7-72		
APPROVED RER	DATE 7-9-72	1	
JOB NO. 7862		2	
SCALE 1/4 = 1'-0"		3	
		4	

DWG. NO. 5-1907 SHT. 3 OF 12

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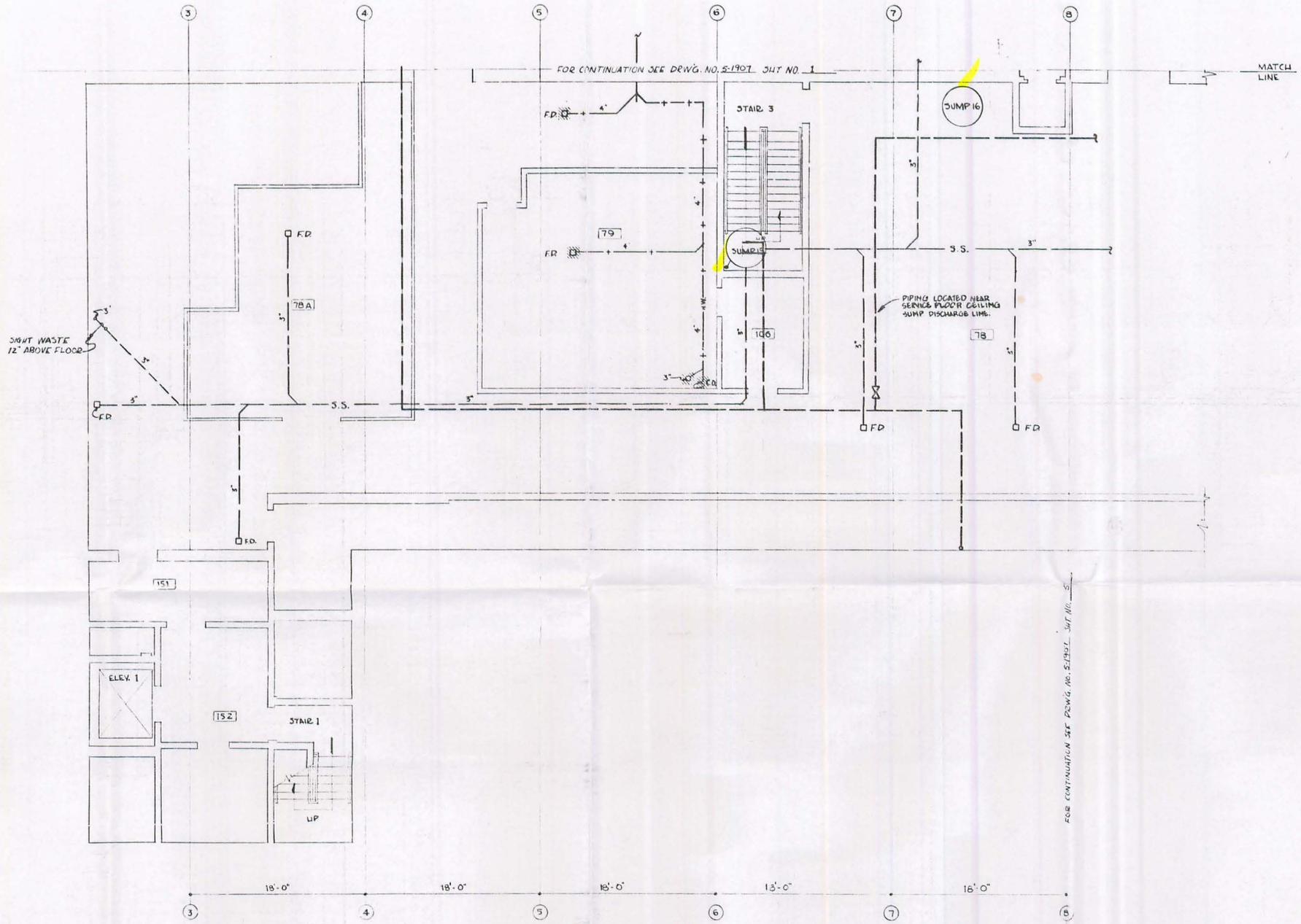
Figure 6

S-1907

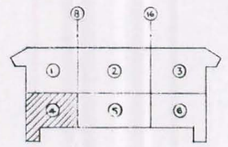
W. O. NO.

BILL OF MATERIAL

DET.	DWG. NO.	DESCRIPTION	REQD.	MATL.	STOCK SIZE



PART FIRST FLOOR PLAN
SCALE - 1/8" = 1'-0"



SERVICE FLOOR KEY PLAN
NO SCALE

FINAL ASSEMBLY DWG.	NEXT ASSEMBLY DWG.

MONSANTO RESEARCH CORPORATION
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MIAMISBURG, OHIO

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PART. FIRST FLOOR PLAN
DRAINAGE SYSTEM

DRAWN ADAM	DATE 6-23-71	APPROVALS
CHECKED GAB	DATE 3-7-72	
APPROVED RCR	DATE 3-7-72	1
JOB NO. 7862		2
SCALE NOTED		3
		4
DWG. NO. S-1907	SHT. 4 OF 12	

DWG. CLASSIFICATION
LEVEL UNCL — 0
DATE 11/11/71 INIT. GAB
CODE IDENT. NO. 14065

REVISED FOR PART NO. & ISSUE	REFERENCE DWG. & ISSUE

USE	DATE	REVISION	BY	CHK'D	APPRD.
B	3-5-84	AS BUILT	KRW	GAB	USK
0		ORIGINAL ISSUE			GAB

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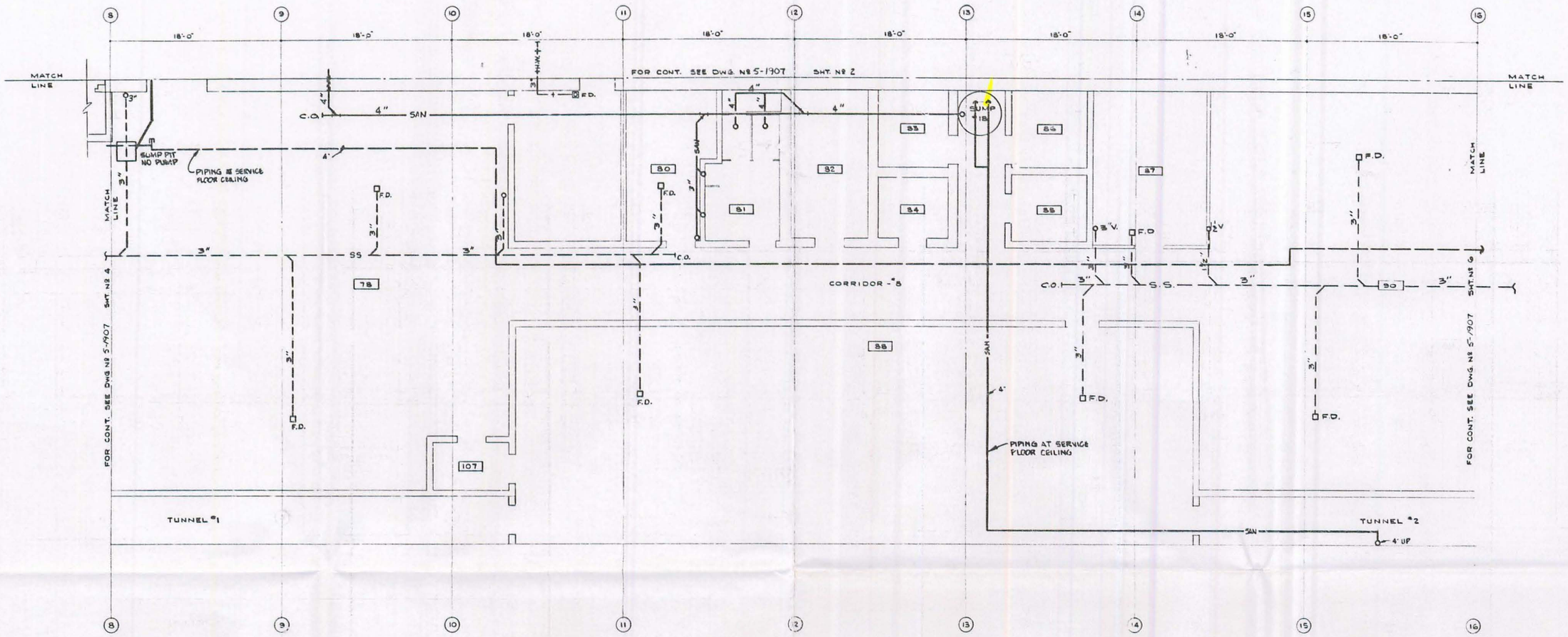
Figure 6

S-1907

W. O. NO.

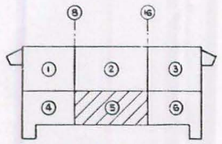
BILL OF MATERIAL

DET.	DWG. NO.	DESCRIPTION	REQ'D	MAT'L	STOCK SIZE



PART. FIRST FLOOR PLAN

SCALE : 1/4" = 1'-0"



SERVICE FLOOR KEY PLAN
NO SCALE

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DRAINAGE SYSTEM

DRAWN VICTOR J.	DATE 6-21-71	APPROVALS
CHECKED G.A.R.	DATE 7-7-71	1
APPROVED R.C.R.	DATE 7-9-71	2
JOB NO. 7862		3
SCALE 1/4" = 1'-0"		4

DWG. NO. S-1907 SHT 5 OF 12

DESIGNED FOR PART NO. & ITEM | REFERENCE DWG. & ITEM

Figure 6

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W. O. NO.

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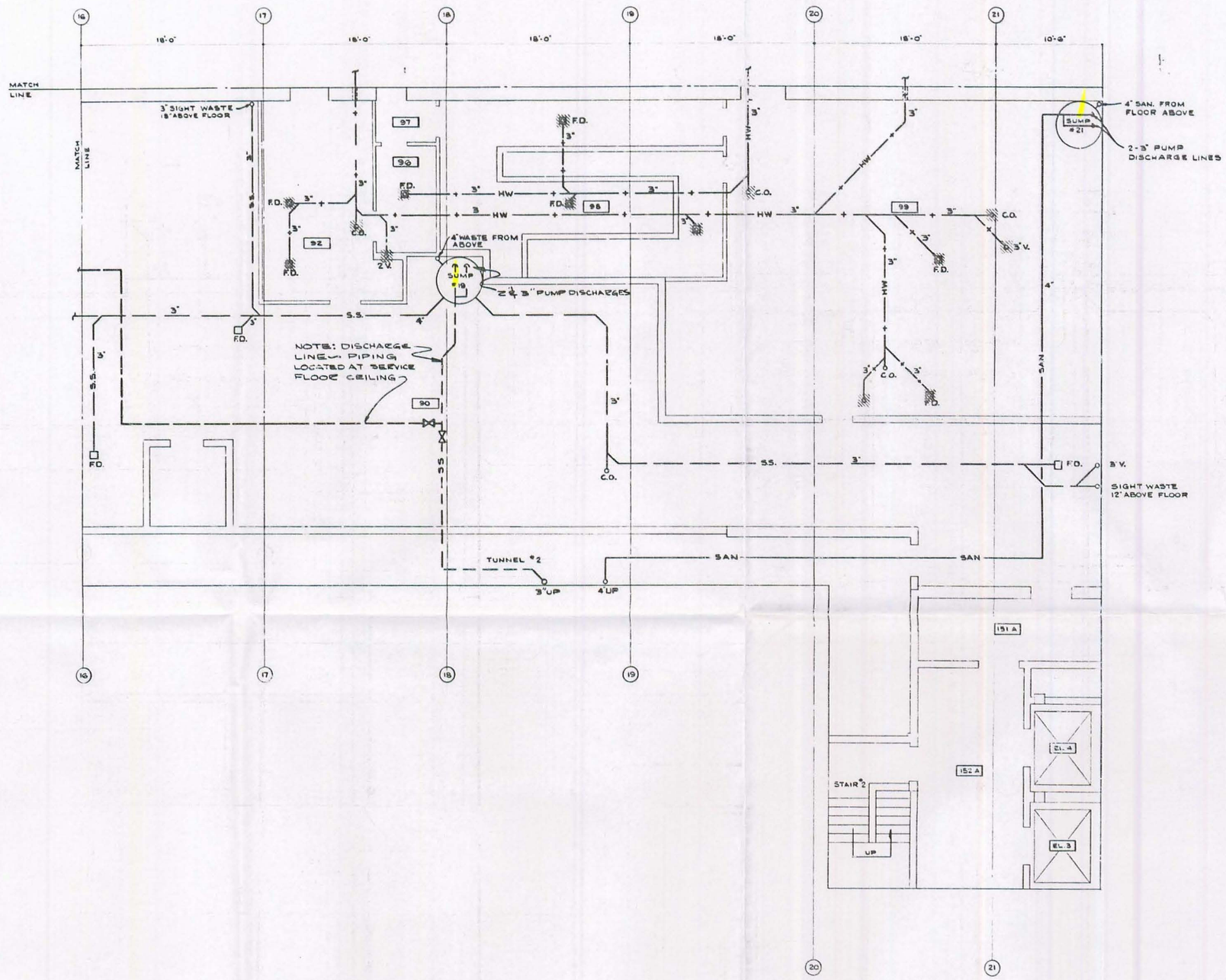
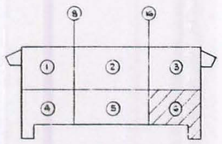


PART. FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"



SERVICE FLOOR

KEY PLAN

NO SCALE

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REV.	DATE	REVISION	BY	CHK'D	APPRD.

DWG. CLASSIFICATION
LEVEL UNCLASS
DATE 7/1/71 INIT.
CODE IDENT. NO. 14096

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MIAMISBURG, OHIO

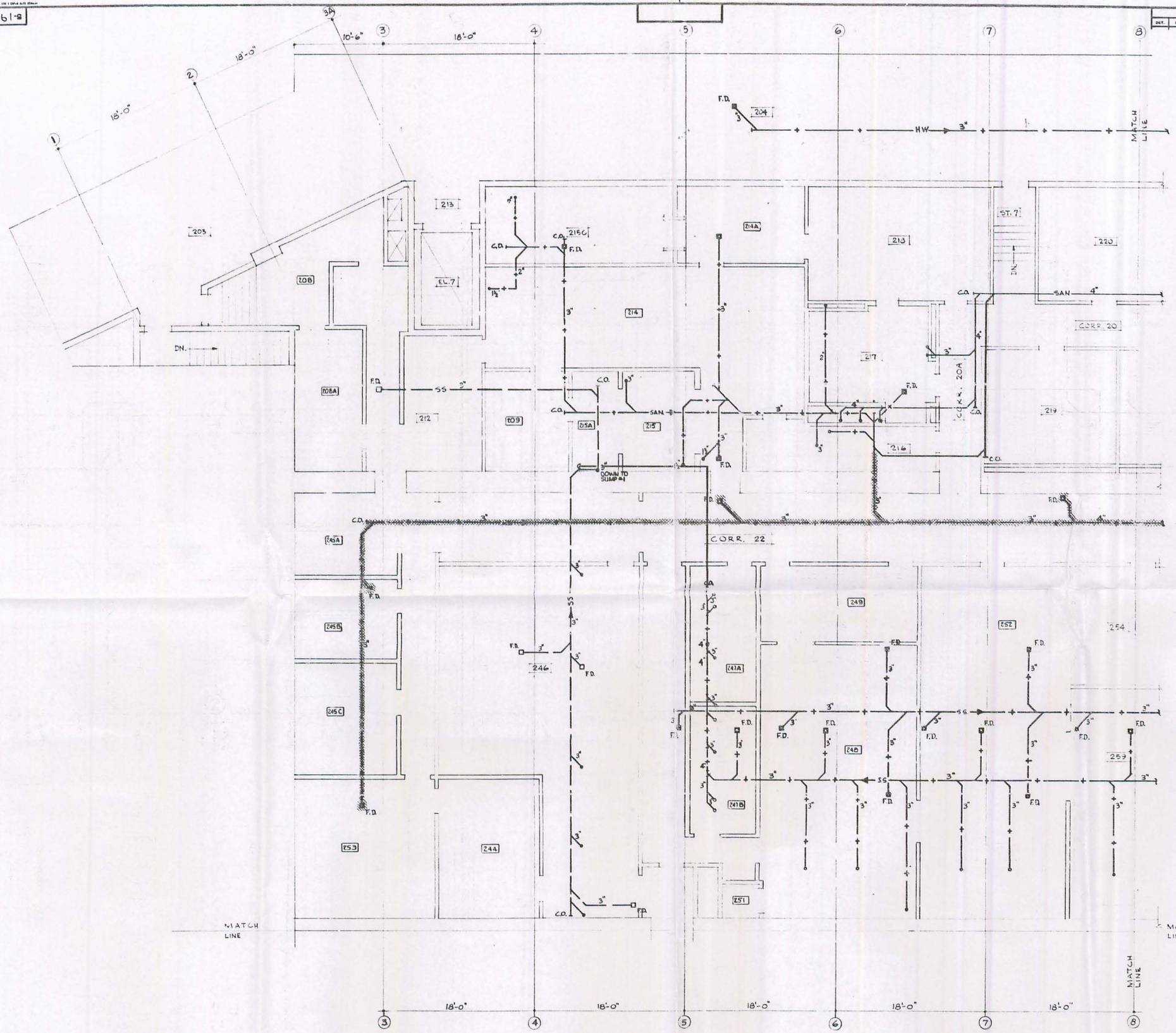
"T" BUILDING/KYLE

PART. FIRST FLOOR PLAN, DRAINAGE SYSTEM

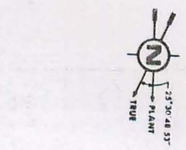
DRAWN VICTOR J.	DATE 6-22-71	APPROVALS	
CHECKED GAB	DATE 3-7-72		
APPROVED RCR	DATE 3-7-72	2	
JOB NO. 7862		3	
SCALE 1/4" = 1'-0"		4	

DWG. NO. 5-1907 SHT. 6 OF 12

Figure 6



PART SECOND FLOOR PLAN
SCALE ¼" = 1'-0"



OPERATIONS FLOOR
KEY PLAN
NO SCALE

INDICATES AREA TO BE PLUGED AND MATCH EXIST. FLOOR
INDICATES LINE TO BE REMOVED

STORM SEWER — — — SS — — — □ F.D.
SANITARY SEWER — — — SAN — — — ▣ F.D.
HOT WASTE SEWER — — — H.W. — — — ▣ F.D.

BILL OF MATERIAL					
DET.	DWG. NO.	DESCRIPTION	REQ'D.	MAT'L.	STOCK SIZE

REV.	DATE	REVISION	BY	CHK'D	APPRO.
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0		ORIGINAL ISSUE			

DWG. CLASSIFICATION LEVEL UNCL-E
DATE 7/7/71 INIT. KD
CODE IDENT. NO. 14088

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MOUND LABORATORY
MIAMISBURG, OHIO

"T" BUILDING / KYLE

PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM

DRAWN W.N.W.	DATE 6-23-71	APPROVALS
CHECKED GAB	DATE 3-7-72	
APPROVED RCR	DATE 7-9-72	2
JOB NO. 7862		3
SCALE		4

DWG. NO. 5-1907 SHT. 7 OF 12

Figure 6

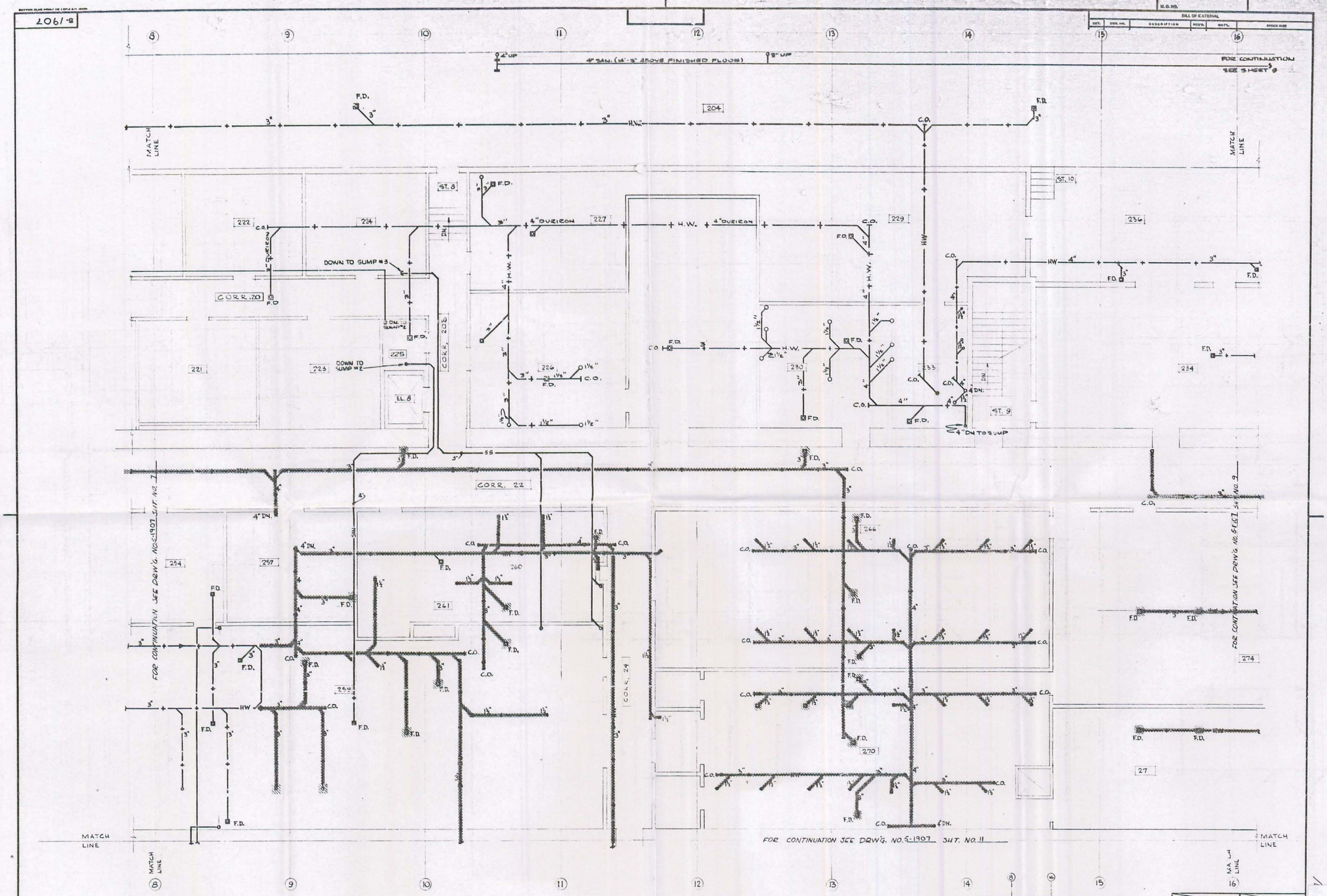
S-1907
4" SAN. (14'-3" ABOVE FINISHED FLOOR)
FOR CONTINUATION SEE SHEET 9
MATCH LINE
204
222
224
227
229
236
CORR. 20
CORR. 23
CORR. 22
CORR. 24
DOWN TO SUMP #3
DOWN TO SUMP #2
4" DN TO SUMP
ST. 8
ST. 9
ST. 10
EL. 8
FOR CONTINUATION SEE DRW'G. NO. S-1907 SHT. NO. 7
FOR CONTINUATION SEE DRW'G. NO. S-1907 SHT. NO. 9
FOR CONTINUATION SEE DRW'G. NO. S-1907 SHT. NO. 11
PART SECOND FLOOR PLAN
SCALE 1/4" = 1'-0"
OPERATIONS FLOOR
KEY PLAN
NO SCALE
MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO
"T" BUILDING/KYLE
PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM
DRAWN W.N.W.
CHECKED G.A.B.
APPROVED R.E.R.
JOB NO. 7862
DWG. NO. S-1907 SHT. 8 OF 12
AS BUILT
ORIGINAL ISSUE
CODE IDENT. NO. 14085

Figure 6

S-1907

W.O. NO.

BILL OF MATERIAL

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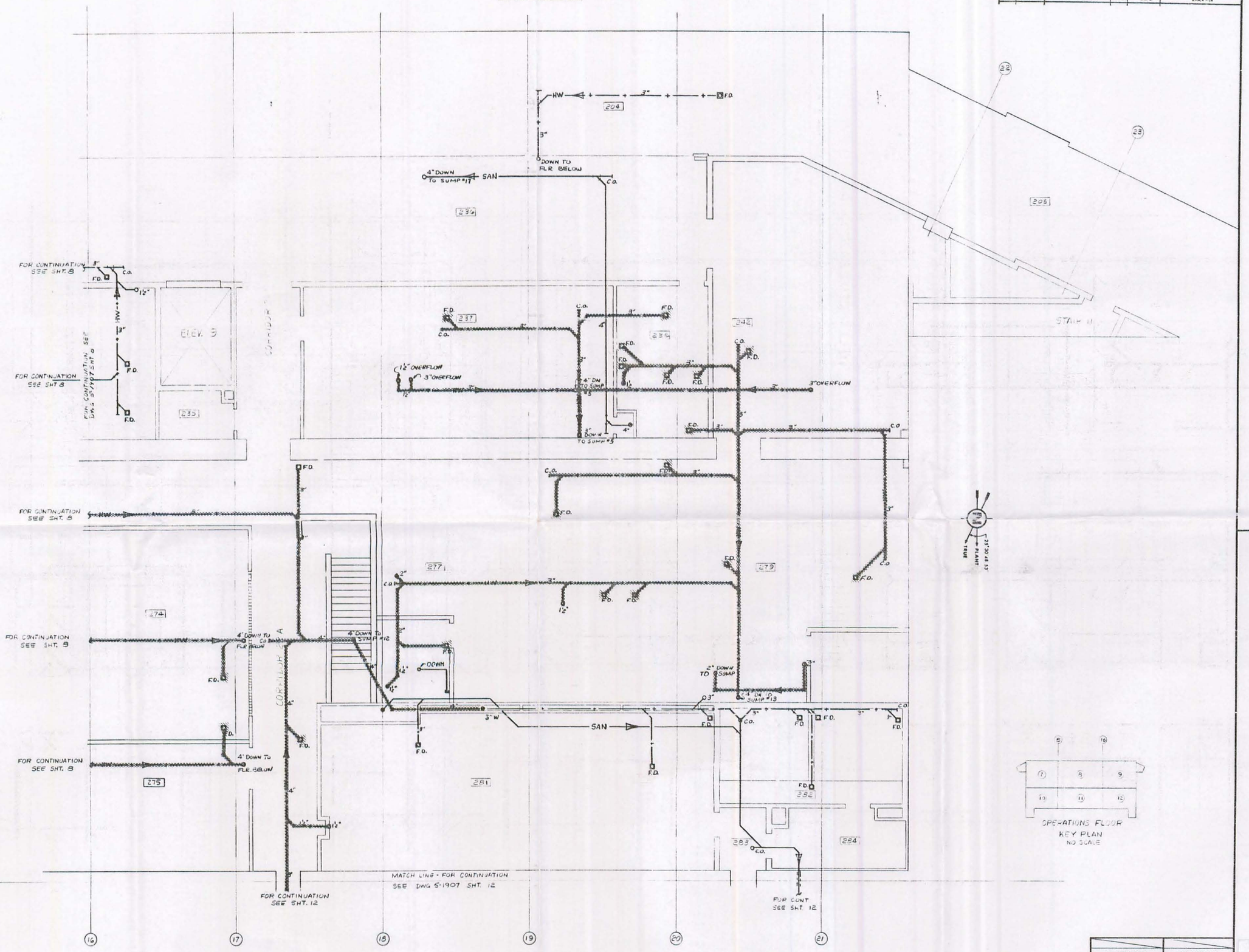

PART 2ND FLOOR PLAN
SCALE 1/4" = 1'-0"

FINAL ASSEMBLY DWG.	NEXT ASSEMBLY DWG.

MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO

T' BUILDING / KYLE

PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM

DRAWN	DATE 3-23-71	APPROVALS	
CHECKED GAB	DATE 3-7-72	1	
APPROVED RCR	DATE 3-9-72	2	
JOB NO. 7862		3	
SCALE		4	

DWG. CLASSIFICATION
LEVEL Office
DATE 7/7/71

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B	1364	AS BUILT	KRW	GAB	
O		ORIGINAL ISSUE			

CODE IDENT. NO. 14066

DWG. NO. S-1907 SHT. 9 OF 12

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Figure 6

2.061-2

W.O. NO.

BILL OF MATERIAL

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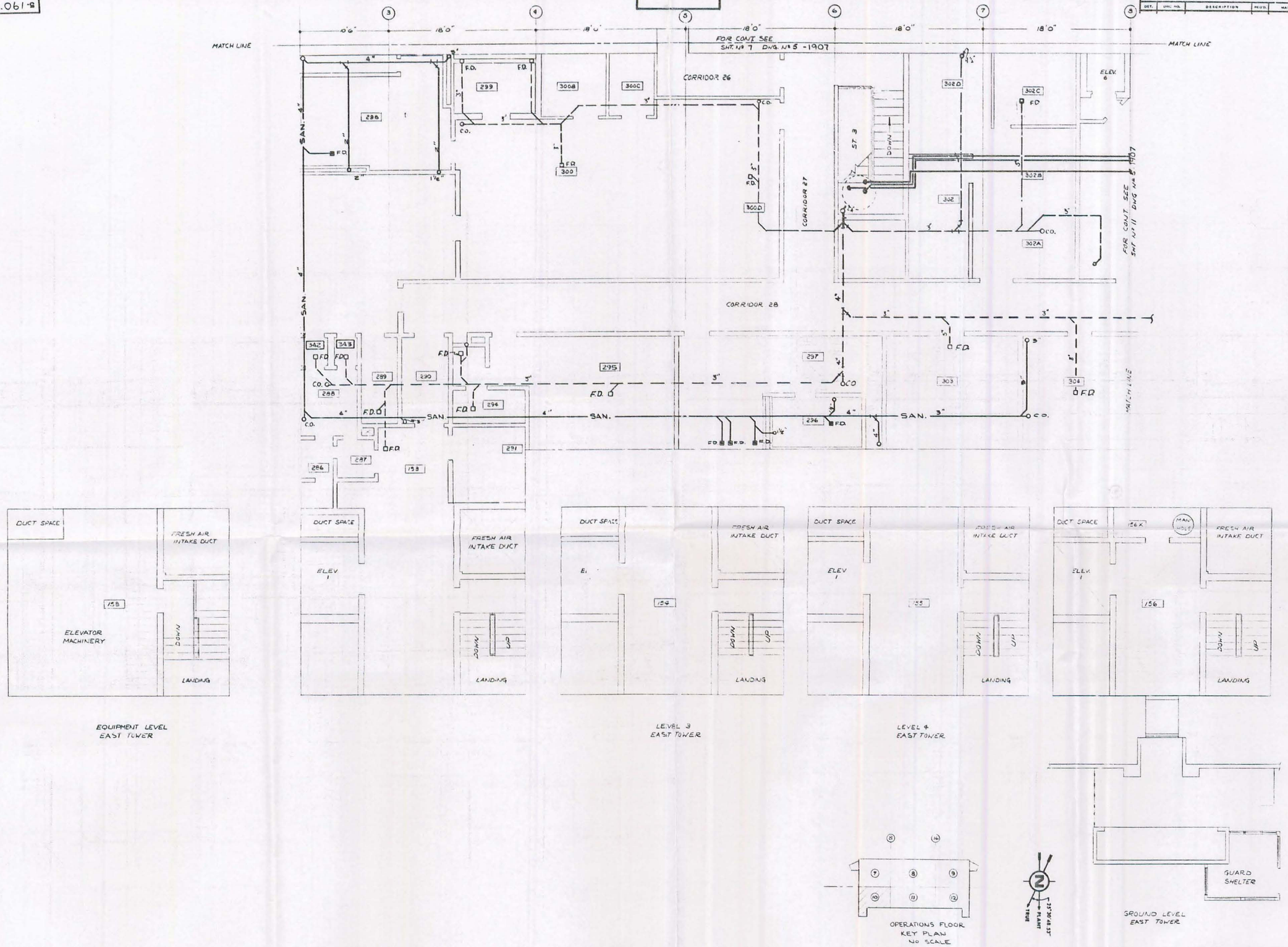


D	4-7-74	AS BUILT	KRM	GAB	
C		ORIGINAL ISSUE			
REV.	DATE	REVISION	BY	CHK'D	APP'D.

DESIGNED FOR PART NO. & REVISE | REFERENCE DWG. & REVISE

CODE IDENT. NO. 14055

DWG. TYPE | FINAL ASSEMBLY DWG. | NEXT ASSEMBLY DWG.

TOLERANCES: FRACTIONAL TOL. DECIMAL TOL. ANGLE TOL. SURFACE FIN.

PART CLASSIFICATION: LEVEL ___ OF ___ DATE ___ INIT. ___

DWG. CLASSIFICATION: LEVEL UNCL. DATE 7/7/71 INIT. GP

MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO

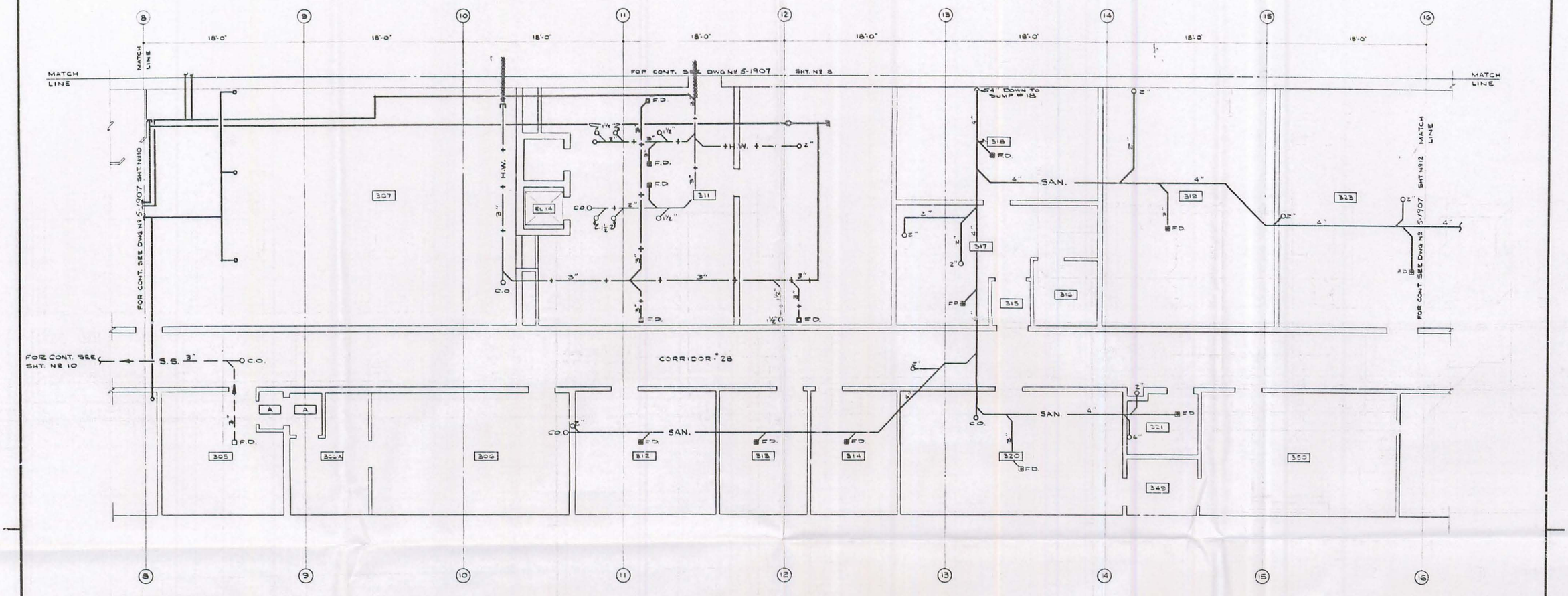
"T" BUILDING/KYLE

PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM

DRAWN Z THOMAS	DATE 6-29-71	APPROVALS
CHECKED G A B	DATE 3-7-72	
APPROVED A C R	DATE 3-9-72	2
JOB NO. 7862		3
SCALE 1/16" = 1' 0"		4

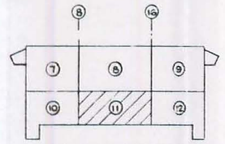
DWG. NO 5-1907 SHT 10 OF 12

Figure 6



PART. SECOND FLOOR PLAN

SCALE: 1/4" = 1'-0"



OPERATIONS FLOOR
KEY PLAN
NO SCALE

FINAL ASSEMBLY DWG.	NEXT ASSEMBLY DWG.

MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO

"T" BUILDING / KYLE

PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM

DRAWN	VICTOR I	DATE 6-26-71	APPROVALS
CHECKED	GAB	DATE 3-7-72	1
APPROVED	RCR	DATE 3-9-72	2
JOB NO.	7862		3
SCALE	1/4" = 1'-0"		4

DWG. CLASSIFICATION
LEVEL UNCL — OF —
DATE 7/7/71 INITIAL

CODE IDENT. NO. 14055

DWG. NO. 5-1907 SHT. 11 OF 12

B	8-6-74	AS BUILT	KEW/GAB		
0		ORIGINAL ISSUE			
REV.	DATE	REVISION	BY	CH'D	APP'D

DESIGNED FOR PART NO. & NAME	REFERENCE DWG. & NAME

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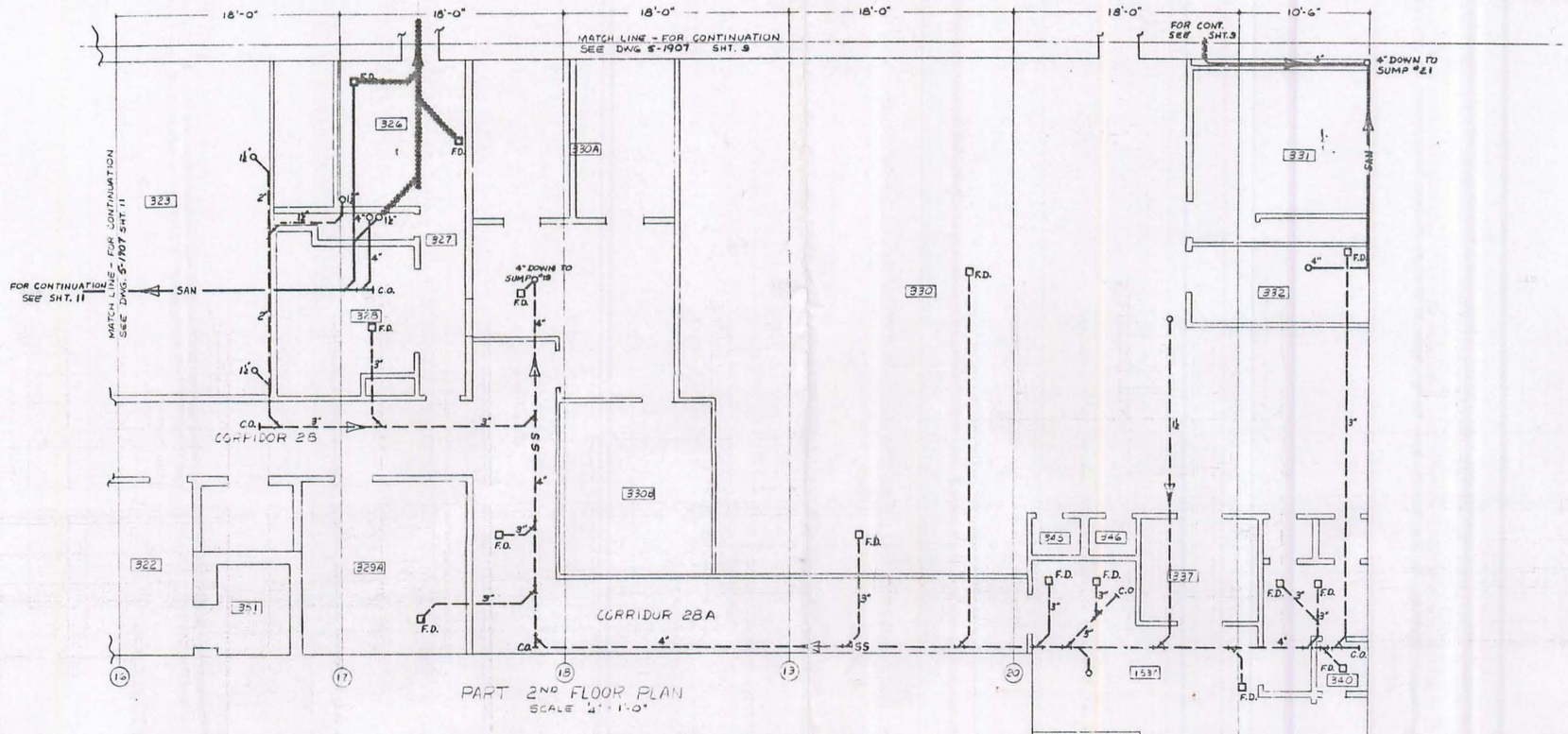
Figure 6

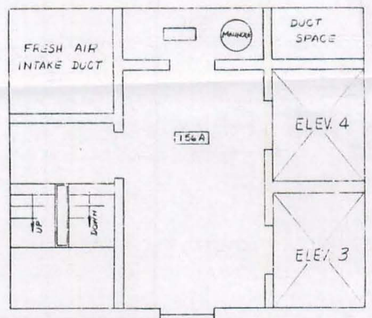
S-1907

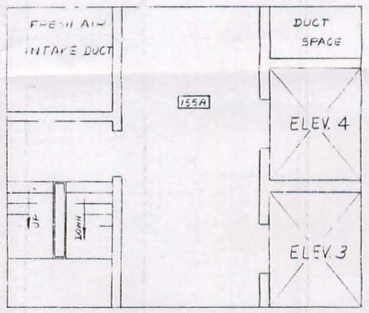
W. O. NO.

BILL OF MATERIAL

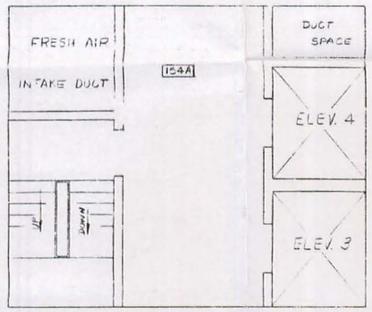
DET.	DWG. NO.	DESCRIPTION	REQ'D.	MAT'L.	STOCK SIZE



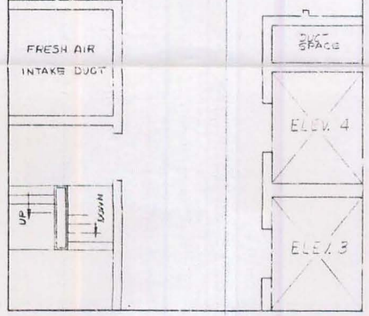




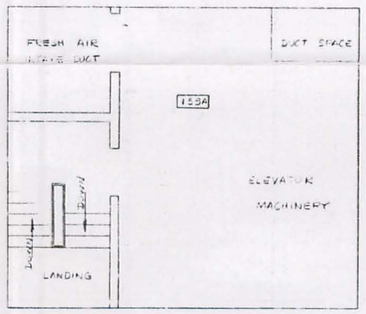
LEVEL 4
WEST TOWER



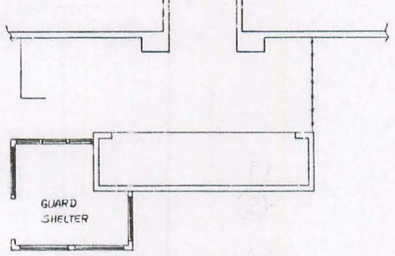
LEVEL 3
WEST TOWER



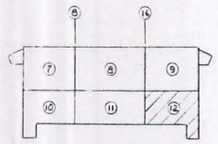
LEVEL 2
WEST TOWER



ELEVATOR EQUIPMENT LEVEL
WEST TOWER



GROUND LEVEL
WEST TOWER



OPERATIONS FLOOR
KEY PLAN
NO SCALE

FINAL ASSEMBLY DWG.	NEXT ASSEMBLY DWG.

MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO

"T" BUILDING / KYLE

PART. SECOND FLOOR PLAN
DRAINAGE SYSTEM

DRAWN	DATE 6/24/71	APPROVALS
CHECKED GAB	DATE 3-7-72	1
APPROVED RPR	DATE 3-9-72	2
JOB NO. 7862		3
SCALE		4

DWG. CLASSIFICATION
LEVEL UNCL
DATE 7/1/71
CODE IDENT. NO. 14009

DWG. NO. S-1907 SHT. 12 OF 12

REVISED FOR PART NO. & ISSUE	REFERENCE DWG. & ISSUE						
		B	8-5-69	AS BUILT	KRW	GAB	6/69
		0		ORIGINAL ISSUE			1/68
		NO.	DATE	REVISION	BY	CHK'D	APPRO.

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Figure 6

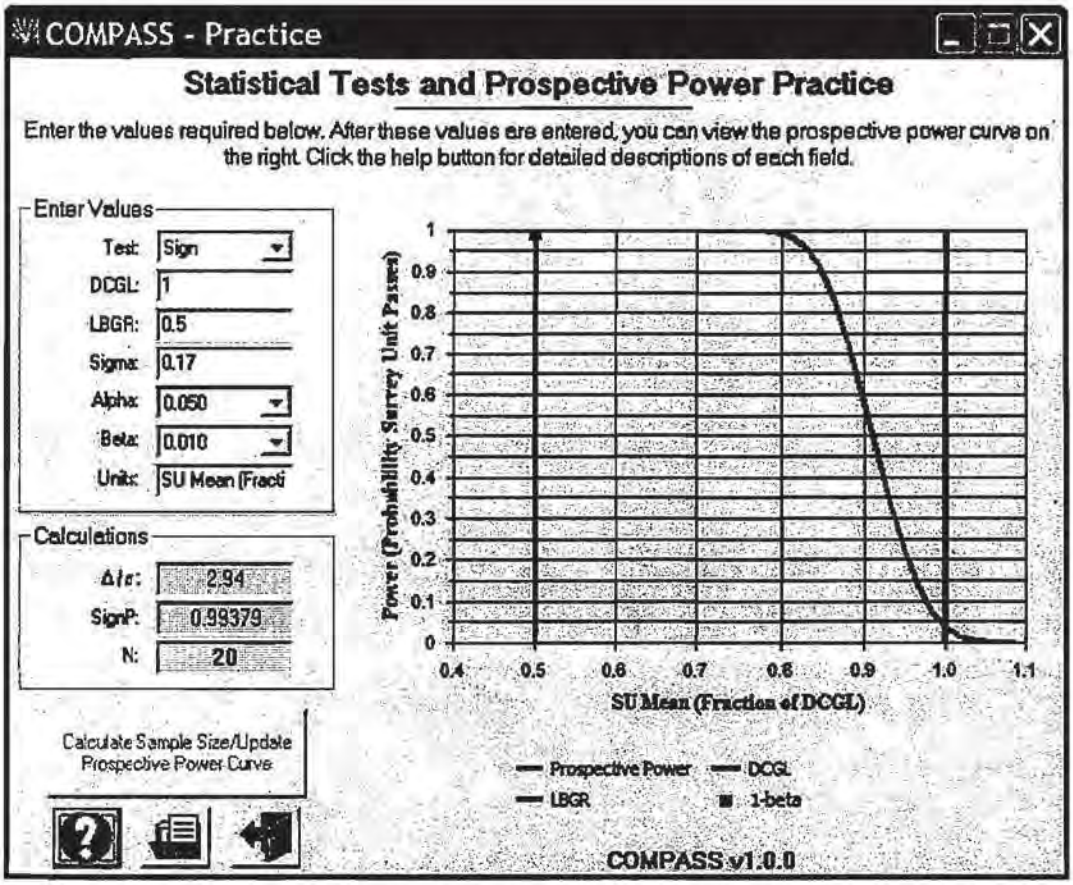

Figure 7: Screen capture of COMPASS software utility and associated power curve for T-Building.

APPENDIX B

T BUILDING ROOM AND SYSTEM CLASSIFICATION TABLE

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	1C-01	ROOM 20, North portion of room	20	1	[8]
T-01	1C-02	CORRIDOR 4	4	1	[1]
T-01	1C-02	ROOM 20, South portion of room	20	1	[8], PRS343
T-01	1C-03	ROOM 22, East Side	22	1	[1] PRS 225
T-01	1C-03	ROOM 23	23	1	[1]
T-01	1C-03	ROOM 24	24	1	[1]
T-01	1C-03	ROOM 25	25	1	[1]
T-01	1C-03	ROOM 26	26	1	[1]
T-01	1C-04	ROOM 22, West Side	22	1	[1]
T-01	1C-04	ROOM 27	27	1	[1]
T-01	1C-05	ROOM 36A	36	1	[1]
T-01	1C-05	ROOM 36	36	1	[1]
T-01	1C-05	CORRIDOR 39	39	1	[1]
T-01	1C-06	ROOM 37	37	1	[1]
T-01	1C-06	ROOM 38	38	1	[1]
T-01	1C-07	ROOM 40	40	1	[1]
T-01	1C-07	ROOM 48, East End, even with old room 40	48	1	[1]
T-01	1C-08	ROOM 41	41	1	[1]
T-01	1C-08	ROOM 48, even with old room 41	48	1	[1]
T-01	1C-09	ROOM 43	43	1	[1]
T-01	1C-09	ROOM 48, even with old room 43	48	1	[1]
T-01	1C-09	ROOM 50	50	1	[1]
T-01	1C-10	ROOM 44	44	1	[1]
T-01	1C-10	ROOM 48, West End, even with old room 44	48	1	[1]
T-01	1C-10	CORRIDOR 51	51	1	[1]
T-01	1C-11	ROOM 57, east end	57	1	[1]
T-01	1C-11	ROOM 58, east end	58	1	[1]
T-01	1C-11	ROOM 59, east end	59	1	[1]
T-01	1C-12	ROOM 57, west end	57	1	[1]
T-01	1C-12	ROOM 58, west end	58	1	[1]
T-01	1C-12	ROOM 59, west end	59	1	[1]
T-01	1C-13	CORRIDOR 1, east end to stairwell-9	1	1	[1]
T-01	1C-14	CORRIDOR 1, west of stairwell-9	1	1	[1]
T-01	1C-14	CORRIDOR 7	7	1	[1]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	1C-15	STAIRWELL 13	13	1	[1]
T-01	1C-15	ROOM 61	61	1	[1]
T-01	1C-16	ROOM 62	62	1	[1]
T-01	1C-16	ROOM 63	63	1	[1]
T-01	1C-17	CORRIDOR 7A	7	1	[1]
T-01	1C-17	ROOM 74	74	1	[1]
T-01	1C-17	ROOM 75	75	1	[1]
T-01	1C-17	ROOM 76	76	1	[1]
T-01	1C-18	ROOM 77	77	1	[1]
T-01	1C-18	ROOM 100	100	1	[1]
T-01	1C-18	ROOM 101	101	1	[1]
T-01	1C-18	ROOM 102	102	1	[1]
T-01	1C-18	ROOM 103	103	1	[1]
T-04	1CS-01-1	First Floor Crawlspace - South East		2	[7], [8]
T-04	1CS-01-2	First Floor Crawlspace - South West		2	[7], [8]
T-04	1CS-02-1	First Floor Crawlspace - Center East		2	[7], [8]
T-04	1CS-02-2	First Floor Crawlspace - Center West		2	[7], [8]
T-04	1CS-03-1	First Floor Crawlspace - North East		2	[7], [8]
T-04	1CS-03-2	First Floor Crawlspace - North West		2	[7], [8]
T-01	1N-01	ROOM 78B	78	1	[10], PRS 222
T-02	1N-02	STAIRWELL 3	3	2	[8]
T-02	1N-02	ROOM 78A - Machine Shop	78	2	[3]
T-02	1N-02	ROOM 78 - Intake Air Fans, Motors, MCCs	78	2	[10], [15]
T-02	1N-02	ROOM 79	79	2	[6]
T-02	1N-02	ROOM 106	106	2	[3]
T-02	1N-02	ROOM 151B	151	2	[8]
T-02	1N-02	ROOM 152B	152	2	[8]
T-02	1N-02	ROOM 151	151	2	[8]
T-02	1N-02	ROOM 152	152	2	[8]
T-03	1N-03	TUNNEL 1 (east air intake shaft)		3	[10]
T-03	1N-03	TUNNEL 2 (west air intake shaft)		3	[10]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	1N-04	ROOM 47	47	1	[1], [8]
T-01	1N-04	ROOM 80	80	1	[3], [8]
T-01	1N-04	ROOM 81	81	1	[3], [8]
T-01	1N-04	ROOM 82	82	1	[6]
T-01	1N-04	ROOM 83	83	1	[6]
T-01	1N-04	ROOM 84 (including corridor near sump)	84	1	[3]
T-01	1N-04	ROOM 85	85	1	[6]
T-01	1N-04	ROOM 86	86	1	[6]
T-01	1N-04	ROOM 87	87	1	[3]
T-03	1N-05	ROOM 88 - Middle Tower (air intake)	88	3	[3]
T-02	1N-06	CORRIDOR 8	8	2	[7]
T-02	1N-06	ROOM 90	90	2	[8], PRS-223
T-02	1N-06	ROOM 91	91	2	[6]
T-02	1N-06	ROOM 151A	151	2	[8]
T-02	1N-06	ROOM 152A	152	2	[8]
T-01	1N-07	ROOM 92	92	1	[3], [5]
T-01	1N-07	ROOM 96	96	1	[3], [5]
T-01	1N-07	ROOM 97	97	1	[3], [5]
T-01	1N-07	ROOM 98	98	1	[3], [5]
T-01	1N-08	ROOM 99	99	1	[3], [5]
T-02	1S-01	ROOM 1A	1	2	[8], PRS 215
T-02	1S-01	ROOM 1B	1	2	[3],[8], PRS342
T-02	1S-01	ROOM 1	1	2	[3], [8]
T-02	1S-01	STAIRWELL 5	5	2	[6], [8]
T-02	1S-02	ROOM 2A	2	2	[8], PRS 444
T-02	1S-02	ROOM 2B	2	2	[8]
T-02	1S-02	ROOM 2C	2	2	[8]
T-02	1S-02	ROOM 3	3	2	[8]
T-02	1S-03	ROOMS 4B + 4C	4	2	[6]
T-02	1S-03	ROOM 8	8	2	[8]
T-02	1S-03	CORRIDOR 9	9	2	[8]
T-02	1S-04	ROOM 4 (SUB-STATION ROOM)	4	2	[3]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	1S-04	ROOM 9A	9	2	[3]
T-01	1S-04	ROOM 9	9	2	[3]
T-02	1S-04	ROOM 10	10	2	[3]
T-01	1S-05	CORRIDOR 2	2	1	[1]
T-01	1S-05	ROOM 5A	5	1	[7]
T-01	1S-05	ROOM 5	5	1	[7]
T-01	1S-05	ROOM 6	6	1	[1], [7]
T-01	1S-05	ROOM 7	7	1	[1], [7]
T-01	1S-06	ROOM 11 (LAB) - East end to Column 16	11	1	[1]
T-01	1S-07	ROOM 11 (LAB) - West of Column 16	11	1	[1]
T-02	1S-08	ROOM 11 A	11	2	[7]
T-01	1S-08	ROOM 11 B	11	2	[1]
T-02	1S-08	ROOM 11 C	11	2	[7]
T-02	1S-08	ROOM 11D	11	2	[7]
T-02	1S-08	ROOM 11 E	11	2	[7]
T-02	1S-08	ROOM 11 F	11	2	[7]
T-01	1S-09	CORRIDOR 3	3	1	[7]
T-01	1S-09	ROOM 14	14	1	[7]
T-01	1S-10	ROOM 16A	16	1	[1], PRS 214/340
T-01	1S-10	ROOM 16B	16	1	[1]
T-01	1S-10	ROOM 16	16	1	[1], [3]
T-01	1S-10	ROOM 17A	17	1	[1]
T-01	1S-10	ROOM 17C	17	1	[1]
T-01	1S-10	ROOM 17	17	1	[1]
T-01	1S-11	ROOM 15A	15	1	[3]
T-01	1S-11	ROOM 15B	15	1	[3],[5]
T-01	1S-11	ROOM - 15	15	1	[3]
T-01	1S-12	ROOM 18	18	1	[3],[5]
T-01	1S-12	ROOM 19A	19	1	[3],[5]
T-01	1S-12	ROOM 19B	19	1	[3], [5]
T-01	1S-12	ROOM 19	19	1	[3],[5]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	2C-01	Room 245A	245	1	[3]
T-01	2C-01	Room 245B	245	1	[5]
T-01	2C-01	Room 245C	245	1	[5]
T-01	2C-01	Room 245	245	1	[5], [8]
T-01	2C-01	ROOM 253	253	1	[5]
T-01	2C-01	ROOM 253A	253A	1	[5]
T-01	2C-02	Room 244	244	1	[5]
T-01	2C-02	Room 246	246	1	[3]
T-01	2C-03	Room 247A	247	1	[5]
T-01	2C-03	Room 247B	247	1	[5]
T-01	2C-03	Room 247C	247	1	[5]
T-01	2C-03	ROOM 248	248	1	[3]
T-01	2C-03	ROOM 249	249	1	[3
T-01	2C-03	ROOM 250	250	1	[3
T-01	2C-03	ROOM 251	251	1	[3]
T-01	2C-04	ROOM 252	252	1	[3]
T-01	2C-04	ROOM 254	254	1	[3]
T-01	2C-05	ROOM 257	257	1	[3]
T-01	2C-05	ROOM 259A	259	1	[3]
T-01	2C-05	ROOM 260	260	1	[3]
T-01	2C-06	ROOM 259	259	1	[3]
T-01	2C-07	CORRIDOR 22 - East Side to Column 11	22	1	[1]
T-01	2C-08	CORRIDOR 22 - Center Portion	22	1	[1]
T-01	2C-08	CORRIDOR 24	24	1	[1]
T-01	2C-09	ROOM 266	266	1	[1], [3]
T-01	2C-10	ROOM 270	270	1	[1], [3]
T-01	2C-11	CORRIDOR 22 - West Portion (Column 14 to ST-13)		1	[1]
T-01	2C-11	CORRIDOR 24A	24	1	[1]
T-01	2C-12	ROOM 274	274	1	[1]
T-01	2C-13	CORRIDOR 22A	22	1	[1]
T-01	2C-13	ROOM 275	275	1	[1]
T-01	2C-14	CORRIDOR 22B	22	1	[1]
T-01	2C-14	CORRIDOR 22C	22	1	[1]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	2C-15	ROOM 277 (East end, includes old 277 A,C,D,E,F,J,K,L)	277	1	[1], [3]
T-01	2C-16	ROOM 281 - MEN'S CHANGE ROOM	281	1	[1]
T-01	2C-17	ROOM 277 (West end, includes old 277 B,G,H,I)	277	1	[1], [3]
T-01	2C-17	ROOM 282	282	1	[3]
T-01	2C-17	ROOM 283	283	1	[3]
T-01	2C-17	ROOM 284	284	1	[3]
T-01	2C-18	ROOM 5W (TERF)	5	1	[5]
T-01	2C-18	Room 243 - TERF (East Side)	243	1	[5]
T-01	2C-19	STAIRWELL 14	14	1	[5]
T-01	2C-19	Room 243 - TERF (West Side)	243	1	[5]
T-04	2CS-01-1	Second Floor Crawlspace - South East		2	[8]
T-04	2CS-01-2	Second Floor Crawlspace - South West		2	[8]
T-04	2CS-02-1	Second Floor Crawlspace - Center East		2	[8]
T-04	2CS-02-2	Second Floor Crawlspace - Center West		2	[8]
T-04	2CS-03-1	Second Floor Crawlspace - North East		2	[8]
T-04	2CS-03-2	Second Floor Crawlspace - North West		2	[8]
T-03	2N-01	ROOM 153	153	3	[8]
T-03	2N-01	ROOM 285	285	3	[3], [15]
T-03	2N-01	ROOM 286	286	3	[3], [15]
T-03	2N-01	ROOM 287	287	3	[3], [15]
T-03	2N-01	ROOM 288	288	3	[3], [15]
T-03	2N-01	ROOM 289	289	3	[3], [15]
T-03	2N-01	ROOM 290	290	3	[8], [9]
T-03	2N-01	ROOM 291	291	3	[8], [9]
T-03	2N-01	ROOM 294	294	3	[8], [9]
T-03	2N-01	ROOM 295B	295	3	[8], [9]
T-03	2N-01	ROOM 295C	295	3	[8], [9]
T-03	2N-01	ROOM 295	295	3	[8], [9]
T-03	2N-01	ROOM 296	296	3	[9]
T-03	2N-01	ROOM 297	297	3	[3], [15]
T-03	2N-01	ROOM 303	303	3	[9]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-03	2N-01	ROOM 304	304	3	[9]
T-03	2N-01	ROOM 305	305	3	[9]
T-03	2N-01	ROOM 306A	306	3	[9]
T-03	2N-01	ROOM 306	306	3	[9]
T-03	2N-01	ROOM 312	312	3	[9]
T-03	2N-01	ROOM 313	313	3	[9]
T-03	2N-01	ROOM 314	314	3	[9]
T-03	2N-01	ROOM 320A	320	3	[9]
T-03	2N-01	ROOM 320B	320	3	[9]
T-03	2N-01	ROOM 320	320	3	[9]
T-03	2N-01	ROOM 321	321	3	[10]
T-03	2N-01	ROOM 322	322	3	[15]
T-03	2N-01	ROOM 324	324	3	[15]
T-03	2N-01	ROOM 329	329	3	[3], [10]
T-03	2N-01	ROOM 349	349	3	[15]
T-03	2N-01	ROOM 350A	350	3	[3], [15]
T-03	2N-01	ROOM 350	350	3	[3], [15]
T-03	2N-01	ROOM 351	351	3	[3], [15]
T-02	2N-02	CORRIDOR 26	26	2	[8]
T-02	2N-02	CORRIDOR 27	27	2	[8]
T-02	2N-02	CORRIDOR 28 (East)	28	2	[8]
T-02	2N-02	ROOM 298	298	2	[15]
T-02	2N-02	ROOM 299	299	2	[3]
T-02	2N-02	ROOM 300A	300	2	[3]
T-02	2N-02	ROOM 300B	300	2	[3]
T-02	2N-02	ROOM 300C	300	2	[3]
T-02	2N-02	ROOM 300	300	2	[3]
T-02	2N-02	ROOM 302A	302	2	[3]
T-02	2N-02	ROOM 302B	302	2	[3]
T-02	2N-02	ROOM 302C	302	2	[3]
T-02	2N-02	ROOM 302	302	2	[3]
T-02	2N-03	CORRIDOR 28 (West)	28	2	[8]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-02	2N-03	ROOM 315	315	2	[8]
T-02	2N-03	ROOM 316	316	2	[6]
T-02	2N-03	ROOM 318	318	2	[6]
T-02	2N-03	ROOM 319	319	2	[3]
T-02	2N-03	ROOM 323	323	2	[3]
T-02	2N-04	CORRIDOR 28A	28A	2	[8]
T-02	2N-04	ROOM 153A	153	2	[8]
T-02	2N-04	ROOM 330B	330	2	[3]
T-02	2N-04	ROOM 330	330	2	[3]
T-02	2N-04	ROOM 331	331	2	[3]
T-02	2N-04	ROOM 332	332	2	[3]
T-02	2N-04	ROOM 335	335	2	[15]
T-02	2N-04	ROOM 336	336	2	[15]
T-02	2N-04	ROOM 337	337	2	[3]
T-02	2N-04	ROOM 338	338	2	[15]
T-02	2N-04	ROOM 345	345	2	[3]
T-02	2N-04	ROOM 346	346	2	[3]
T-02	2N-05	STAIRWELL 1	1	2	[8]
T-02	2N-05	STAIRWELL 2	2	2	[8]
T-01	2N-06	ROOM 307	307	1	[3]
T-01	2N-07	ROOM 309	309	1	[8]
T-01	2N-07	ROOM 310	310	1	[3]
T-01	2N-07	ROOM 310A	310	1	[3]
T-01	2N-07	ROOM 311	311	1	[8]
T-01	2N-08	ROOM 326	326	1	[3]
T-01	2N-08	ROOM 328	328	1	[3]
T-01	2N-08	ROOM 330A	330	1	[3]
T-02	2S-01	ROOM 203 (Vehicle Tunnel East)	203	2	[8]
T-02	2S-02	ROOM 204 (Vehicle Tunnel Center)	204	2	[8]
T-02	2S-02	ROOM 213 (Entrance from tunnel)	213	2	[8]
T-02	2S-03	ROOM 205 (Vehicle Tunnel West)	205	2	[8]
T-02	2S-04	ROOM 208A	208	2	[3]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-02	2S-04	ROOM 208	208	2	[3]
T-02	2S-04	ROOM 209	209	2	[3]
T-02	2S-04	ROOM 212	212	2	[3]
T-02	2S-04	ROOM 214A	214	2	[3]
T-02	2S-04	ROOM 214	214	2	[3]
T-02	2S-04	ROOM 215A	215	2	[3]
T-02	2S-04	ROOM 215B	215	2	[3]
T-02	2S-04	ROOM 215C	215	2	[3]
T-02	2S-04	ROOM 216	216	2	[3]
T-02	2S-04	ROOM 217	217	2	[3]
T-02	2S-04	ROOM 218	218	2	[3]
T-02	2S-05	STAIRWELL 7	7	2	[8]
T-02	2S-05	STAIRWELL 8	8	2	[8]
T-02	2S-05	CORRIDOR 20	20	2	[8]
T-02	2S-05	CORRIDOR 20A	20	2	[8]
T-02	2S-05	CORRIDOR 20B	20	2	[8]
T-02	2S-05	ROOM 219	219	2	[3], [9]
T-02	2S-05	ROOM 220	220	2	[3], [9]
T-02	2S-05	ROOM 221	221	2	[3], [9]
T-02	2S-05	ROOM 222	222	2	[3], [9]
T-02	2S-05	ROOM 223	223	2	[3], [9]
T-02	2S-05	ROOM 224	224	2	[3], [9]
T-02	2S-05	ROOM 225	225	2	[3]
T-02	2S-05	ROOM 226	226	2	[3]
T-02	2S-05	ROOM 227B	227	2	[8]
T-02	2S-05	ROOM 227	227	2	[8]
T-01	2S-06	STAIRWELL 9	9	1	[3], [8]
T-01	2S-06	Room 229	229	1	[3]
T-01	2S-06	Room 230	230	1	[6], [8]
T-01	2S-07	STAIRWELL 10	10	1	[8]
T-01	2S-07	Room 234	234	1	[5], [8]
T-01	2S-07	Room 236 (East of Elevator 9)	236	1	[5], [8]
T-01	2S-08	Room 236 (West of Elevator 9)	236	1	[5], [8]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-01	2S-09	CORRIDOR 21	21	1	[8]
T-01	2S-09	Room 235	235	1	[6]
T-01	2S-09	Room 237	237	1	[3], [5]
T-01	2S-09	Room 238	238	1	[3], [5]
T-01	2S-10	STAIRWELL 11	11	1	[1]
T-01	2S-10	CORRIDOR 22D	22	1	[8]
T-01	2S-10	Room 241	241	1	[8]
T-01	2S-10	Room 242	242	1	[3], [5]
T-02	2S-11	ROOM 3E	3	2	[3]
T-02	2S-11	ROOM 4E	4	2	[5]
T-02	2S-11	ROOM 5E	5	2	[3], [5]
T-02	2S-11	ROOM 6E	6	2	[3]
T-01	2S-12	ROOM 1W	1	1	[5]
T-01	2S-12	ROOM 2W	2	1	[5]
T-03	2S-13	East Exterior Tunnel Door and Building Surfaces		3	[14]
T-03	2S-14	West Exterior Tunnel Door and Building Surfaces		3	[14]
T-03	5N-01	154A (West Tower - 3rd Floor)	154	3	[14]
T-03	5N-01	155A (West Tower - 4th Floor)	155	3	[14]
T-03	5N-01	156A, 156AX (West Tower - 5th Floor)	156	3	[14]
T-03	5N-01	158A (West Elevator Penthouse)	158	3	[14]
T-03	5N-02	154 (East Tower - 3rd Floor)	154	3	[14]
T-03	5N-02	155 (East Tower - 4th Floor)	155	3	[14]
T-03	5N-02	156, 156X (East Tower - 5th Floor)	156	3	[14]
T-03	5N-02	158 (East Elevator Penthouse)	158	3	[14]
T-03	5N-03	East Tower Exterior Surfaces & Roof		3	[14]
T-03	5N-04	Center Tower Exterior Surfaces & Roof		3	[14]
T-03	5N-05	West Tower Exterior Surfaces & Roof		3	[14]

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
SYSTEMS AND POTENTIAL RELEASE SITES					
T-08	SYS-01	East Head House (inside & out)		3	(10)
T-08	SYS-02	West Head House (inside & out)		3	(10)
T-08	SYS-03	East Exhaust Air System (Ducts, Fans, etc.)		2	(10)
T-08	SYS-04	West Exhaust Air System (Ducts, Fans, etc.)		2	(10)
T-10	SYS-05	East Supply Air System		2	(10)
T-10	SYS-06	West Supply Air System		2	(10)
T-09	SYS-07	Compressed Air System		3	(10)
T-09	SYS-08	Breathing Air System		3	(10)
T-09	SYS-09	Argon System		3	(10)
T-09	SYS-10	Nitrogen System		3	(10)
T-09	SYS-11	Helium System		3	(10)
T-09	SYS-12	P-10 Gas System		3	(10)
T-07	SYS-13	Glycol System		3	(10)
T-07	SYS-14	Cold Chilled Waste System C		3	(10)
T-07	SYS-15	Cold Chilled Water System H		3	(10)
T-07	SYS-16	TERF Chilled Water System		3	(10)
T-07	SYS-17	Potable Water		3	(10)
T-07	SYS-18	Domestic Water		3	(10)
T-07	SYS-19	Process Water		3	(10)
T-07	SYS-20	Steam		3	(10)
T-07	SYS-21	Condensate		3	(10)
1C-10	SYS-PRS 213	Solidification Unit	44	N/A	(11)
1S-10	SYS-PRS 214	Soild Radioactive Waste Compactor	16A	N/A	(8)
T-06	SYS-PRS 215	Cooling Water Sump #1 (Tank 124)	1	2	(10)
T-06	SYS-PRS 219	Cooling Water Sump #15 (Tank 128)	St. 3	2	(10)
T-06	SYS-PRS 220	Steam Condensate Sump #16 (Tank 129)	78	2	(10)
T-06	SYS-PRS 223	Cooling System Condensate Sump #20 (Tank 132)	90	2	(10)
T-05	SYS-PRS 225	Beta Waste Water Sump #6 (Tank 227)	22	1	(13)
T-05	SYS-PRS 226	Floor Drain Sump #3 (Tank 228)	Corr.9	2	(12),(13)
T-05	SYS-PRS 227	Alpha Waste Water Sump #7 (Tank 229)	40	1	(13)
T-05	SYS-PRS 228	Alpha Waste Water Sump #8 (Tank 230)	41	1	(13)

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
T-05	SYS-PRS 229	Alpha Waste Water Sump #10 (Tank 231)	50	1	(13)
T-05	SYS-PRS 230	Alpha Waste Water Sump # 11 (Tank 232)	50	1	(13)
T-06	SYS-PRS 232	Alpha Waste Water Sump #12 (Tank 234)	Corr. 7	2	(12),(13)
T-05	SYS-PRS 233	Alpha Waste Water Sump #13 (Tank 235)	63	1	(13)
T-05	SYS-PRS 339	Waste Water Sump #9 (Tank 250)	44	1	(13)
T-06	SYS-PRS 340	Waste Water Sump #5 (Tank 251) (Tank 233)*	16	1	(13)
T-06	SYS-PRS 341	Condensate Sump #19 (Tank 269)	90	2	(10)
T-06	SYS-PRS 342	Hot Side Fire Water Tank (Tank 271)	1	2	(10)
T-06	SYS-PRS 343	Fire Water Sump (Tank 272)	20	2	(10)
T-06	SYS-PRS 344	Fire Water Sump (Tank 273)	37	2	(10)
	NOTES				
T-01	1S-10	ROOM 17B - NO LONGER EXISTS		Room 17B no longer exists. The walls were removed during a remediation effort. The area room 17B occupied is captured in SU# 1S-10.	
T-01	1C-07, 1C-08, 1C-09, 1C-10	CORRIDOR 49-NO LONGER EXISTS	49	Corridor 49 no longer exists. The walls were removed during a remediation effort. The area Corridor 49 occupied is captured in SU#s 1C-07, 1C-08, 1C-09, and 1C-10.	
T-03	2N-02	ROOM 342	342	Room 342 no longer exists. The walls were removed during a remodeling effort to enlarge room 288. The area room 342 occupied is captured in SU# 2N-02.	
T-03	2N-02	ROOM 343	343	Room 343 no longer exists. The walls were removed during a remodeling effort to enlarge room 288. The area room 343 occupied is captured in SU# 2N-02.	
T-01	1C-10	PRS 213 No longer exists	44	PRS213 (previously located in Room 44) was identified as a historical PRS in OU9 Site Scoping Report, Vol. 12 Site Summary Report, Appendix A-1. Historical PRSs are those PRSs that no longer exists in the form in which they were active (i.e. removed). Marked as NFA in Appendix A-2. The area it occupied is captured in SU# 1C-10.	
T-01	1S-10	PRS 214 No longer exists	16A	PRS214 (prevously located in Room 16A) was removed during safe shutdown activities and disposed of as low level waste. The area it occupied is captured in SU# 1S-10.	
T-06	SYS-PRS 340	* Sump # 5 was reported as Tank # 233 (PRS # 231) located in Historic Corridor 8 in 1992 UST plan, later in 1994 UST plan it was captured again as Tank # 251 located in Corridor 8 and assigned as Tank #251 (PRS# 340).			

APPENDIX B: T Building Room and System Classification

SPF#	Survey Unit No.	Room/Area #	Room / Area #	Floor and lower wall Classification	History
Notes & Design Rationale for T-Building Classification Process					
[1]		1974 D&D report, includes corridors in Decommissioning areas.			
[2]		map from Marcellous			
[3]		white paper			
[4]		wall area up to 2m (6ft)			
[5]		MD-22153 Mound Site Radionuclides by Location			
[6]		based on floor area only per MARSSIM			
[7]		Borders Class 1 area			
[8]		Safe Shutdown Activities.			
[9]		office areas			
[10]		Bldg. Service system			
[11]		OU-9 Site Scoping report vol. 12, Appendix A, Table A.1, Comprehensive Tabulaton of Potential Release Site, historical PRS previously removed in 1970s.			
[12]		Surveys taken during Safe Shutdown Actvities have not shown any activity in the sump above the release criteria. Per Ref 2, page 2-39, Sump 12 and 3 were classified as a Class 2 sump.			
[13]		OU-9 Site Scoping report vol. 12, Appendix A, Table A.1, Comprehensive Tabulaton of Potential Release Site, historical PRS previously back filled with concrete.			
[14]		Class 3 by default			
[15]		maintenance or janitorial supply area			

APPENDIX C

SURVEY UNIT DATA COLLECTI0N TABLE

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	1C-01-1	1	a	(20) d	(20) e	(1) g
T-01	1C-01-2	2	a	(20) d	(20) e	N/A
T-01	1C-02-1	1	a	(20) d	(20) e	(1) g
T-01	1C-02-2	2	a	(20) d	(20) e	N/A
T-01	1C-03-1	1	a	(20) d	(20) e	(1) g
T-01	1C-03-2	2	a	(20) d	(20) e	N/A
T-01	1C-04-1	1	a	(20) d	(20) e	(1) g
T-01	1C-04-2	2	a	(20) d	(20) e	N/A
T-01	1C-05-1	1	a	(20) d	(20) e	(1) g
T-01	1C-05-2	2	a	(20) d	(20) e	N/A
T-01	1C-06-1	1	a	(20) d	(20) e	(1) g
T-01	1C-06-2	2	a	(20) d	(20) e	N/A
T-01	1C-07-1	1	a	(20) d	(20) e	(1) g
T-01	1C-07-2	2	a	(20) d	(20) e	N/A
T-01	1C-08-1	1	a	(20) d	(20) e	(1) g
T-01	1C-08-2	2	a	(20) d	(20) e	N/A
T-01	1C-09-1	1	a	(20) d	(20) e	(1) g
T-01	1C-09-2	2	a	(20) d	(20) e	N/A
T-01	1C-10-1	1	a	(20) d	(20) e	(1) g
T-01	1C-10-2	2	a	(20) d	(20) e	N/A

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	1C-11-1	1	a	(20) d	(20) e	(1) g
T-01	1C-11-2	2	a	(20) d	(20) e	N/A
T-01	1C-12-1	1	a	(20) d	(20) e	(1) g
T-01	1C-12-2	2	a	(20) d	(20) e	N/A
T-01	1C-13-1	1	a	(20) d	(20) e	(1) g
T-01	1C-13-2	2	a	(20) d	(20) e	N/A
T-01	1C-14-1	1	a	(20) d	(20) e	(1) g
T-01	1C-14-2	2	a	(20) d	(20) e	N/A
T-01	1C-15-1	1	a	(20) d	(20) e	(1) g
T-01	1C-15-2	1	a	(20) d	(20) e	N/A
T-01	1C-16-1	1	a	(20) d	(20) e	(1) g
T-01	1C-16-2	1	a	(20) d	(20) e	N/A
T-01	1C-17-1	1	a	(20) d	(20) e	(1) g
T-01	1C-17-2	1	a	(20) d	(20) e	N/A
T-01	1C-18-1	1	a	(20) d	(20) e	(1) g
T-01	1C-18-2	1	a	(20) d	(20) e	N/A
T-04	1CS-01-1	2	dd	(20) dd	(20) dd,e	(1) g
T-04	1CS-01-2	2	dd	(20) dd	(20) dd,e	N/A
T-04	1CS-02-1	2	dd	(20) dd	(20) dd,e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-04	1CS-02-2	2	dd	(20) dd	(20) dd,e	N/A
T-04	1CS-03-1	2	dd	(20) dd	(20) dd,e	(1) g
T-04	1CS-03-2	2	dd	(20) dd	(20) dd,e	N/A
T-01	1N-01-1	1	a	(20) d	(20) e	(1) g
T-02	1N-01-2	2	a	(20) d	(20) e	N/A
T-02	1N-02-1	2	b	(20) d	(20) e	(1) g
T-02	1N-02-2	2	b	(20) d	(20) e	N/A
T-03	1N-03-1	3	c	(20) d	(20) e	(1) g
T-03	1N-03-2	3	c	(20) d	(20) e	N/A
T-01	1N-04-1	1	a	(20) d	(20) e	(1) g
T-01	1N-04-2	2	a	(20) d	(20) e	N/A
T-03	1N-05-1	3	c	(20) d	(20) e	(1) g
T-03	1N-05-2	3	c	(20) d	(20) e	N/A
T-02	1N-06-1	2	b	(20) d	(20) e	(1) g
T-02	1N-06-2	3	b	(20) d	(20) e	N/A
T-01	1N-07-1	1	a	(20) d	(20) e	(1) g
T-01	1N-07-2	1	a	(20) d	(20) e	N/A
T-01	1N-08-1	1	a	(20) d	(20) e	(1) g
T-01	1N-08-2	1	a	(20) d	(20) e	N/A

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-02	1S-01-1	2	b	(20) d	(20) e	(1) g
T-02	1S-01-2	2	b	(20) d	(20) e	N/A
T-02-1	1S-02-1	2	b	(20) d	(20) e	(1) g
T-02	1S-02-2	3	b	(20) d	(20) e	N/A
T-02	1S-03-1	2	b	(20) d	(20) e	(1) g
T-02	1S-03-2	2	b	(20) d	(20) e	N/A
T-02	1S-04-1	2	b	(20) d	(20) e	(1) g
T-02	1S-04-2	3	b	(20) d	(20) e	N/A
T-01	1S-05-1	1	a	(20) d	(20) e	(1) g
T-01	1S-05-2	2	a	(20) d	(20) e	N/A
T-01	1S-06-1	1	a	(20) d	(20) e	(1) g
T-01	1S-06-2	2	a	(20) d	(20) e	N/A
T-01	1S-07-1	1	a	(20) d	(20) e	(1) g
T-01	1S-07-2	2	a	(20) d	(20) e	N/A
T-02	1S-08-1	2	b	(20) d	(20) e	(1) g
T-02	1S-08-2	3	b	(20) d	(20) e	N/A
T-01	1S-09-1	1	a	(20) d	(20) e	(1) g
T-01	1S-09-2	2	a	(20) d	(20) e	N/A
T-01	1S-10-1	1	a	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	1S-10-2	2	a	(20) d	(20) e	N/A
T-01	1S-11-1	1	a	(20) d	(20) e	(1) g
T-01	1S-11-2	2	a	(20) d	(20) e	N/A
T-01	1S-12-1	1	a	(20) d	(20) e	(1) g
T-01	1S-12-2	2	a	(20) d	(20) e	N/A
T-01	2C-01-1	1	a	(20) d	(20) e	(1) g
T-01	2C-01-2	2	a	(20) d	(20) e	N/A
T-01	2C-02	1	a	(20) d	(20) e	(1) g
T-01	2C-02	2	a	(20) d	(20) e	N/A
T-01	2C-03-1	1	a	(20) d	(20) e	(1) g
T-01	2C-03-2	2	a	(20) d	(20) e	N/A
T-01	2C-04-1	1	a	(20) d	(20) e	(1) g
T-01	2C-04-2	2	a	(20) d	(20) e	N/A
T-01	2C-05-1	1	a	(20) d	(20) e	(1) g
T-01	2C-05-2	2	a	(20) d	(20) e	N/A
T-01	2C-06-1	1	a	(20) d	(20) e	(1) g
T-01	2C-06-2	2	a	(20) d	(20) e	N/A
T-01	2C-07-1	1	a	(20) d	(20) e	(1) g
T-01	2C-07-2	2	b	(20) d	(20) e	N/A

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	2C-08-1	1	a	(20) d	(20) e	(1) g
T-01	2C-08-2	2	a	(20) d	(20) e	N/A
T-01	2C-09-1	1	a	(20) d	(20) e	(1) g
T-01	2C-09-2	2	a	(20) d	(20) e	N/A
T-01	2C-10-1	1	a	(20) d	(20) e	(1) g
T-01	2C-10-2	2	a	(20) d	(20) e	N/A
T-01	2C-11-1	1	a	(20) d	(20) e	(1) g
T-01	2C-11-2	2	a	(20) d	(20) e	N/A
T-01	2C-12-1	1	a	(20) d	(20) e	(1) g
T-01	2C-12-2	2	a	(20) d	(20) e	N/A
T-01	2C-13-1	1	a	(20) d	(20) e	(1) g
T-01	2C-13-2	2	a	(20) d	(20) e	N/A
T-01	2C-14-1	1	a	(20) d	(20) e	(1) g
T-01	2C-14-2	2	a	(20) d	(20) e	N/A
T-01	2C-15-1	1	a	(20) d	(20) e	(1) g
T-01	2C-15-2	2	a	(20) d	(20) e	N/A
T-01	2C-16-1	1	a	(20) d	(20) e	(1) g
T-01	2C-16-2	2	a	(20) d	(20) e	N/A
T-01	2C-17-1	1	a	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	2C-17-2	2	a	(20) d	(20) e	N/A
T-01	2C-18-1	1	a	(20) d	(20) e	(1) g
T-01	2C-18-2	2	a	(20) d	(20) e	N/A
T-01	2C-19-1	1	a	(20) d	(20) e	(1) g
T-01	2C-19-2	2	a	(20) d	(20) e	N/A
T-04	2CS-01-1	2	dd	(20) dd	(20) dd,e	(1) g
T-04	2CS-01-2	2	dd	(20) dd	(20) dd,e	N/A
T-04	2CS-02-1	2	dd	(20) dd	(20) dd,e	(1) g
T-04	2CS-02-2	2	dd	(20) dd	(20) dd,e	N/A
T-04	2CS-03-1	2	dd	(20) dd	(20) dd,e	(1) g
T-04	2CS-03-2	2	dd	(20) dd	(20) dd,e	N/A
T-03	2N-01-1	3	c	(20) d	(20) e	(1) g
T-03	2N-01-2	3	c	(20) d	(20) e	N/A
T-02	2N-02-1	2	b	(20) d	(20) e	(1) g
T-02	2N-02-2	3	b	(20) d	(20) e	N/A
T-02	2N-03-1	2	b	(20) d	(20) e	(1) g
T-02	2N-03-2	3	b	(20) d	(20) e	N/A
T-02	2N-04-1	2	b	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-02	2N-04-2	3	b	(20) d	(20) e	N/A
T-02	2N-05-1	2	b	(20) d	(20) e	(1) g
T-02	2N-05-2	3	b	(20) d	(20) e	N/A
T-01	2N-06-1	1	a	(20) d	(20) e	(1) g
T-01	2N-06-2	2	a	(20) d	(20) e	N/A
T-01	2N-07-1	1	a	(20) d	(20) e	(1) g
T-01	2N-07-2	2	a	(20) d	(20) e	N/A
T-01	2N-08-1	1	a	(20) d	(20) e	(1) g
T-01	2N-08-2	2	a	(20) d	(20) e	N/A
T-02	2S-01-1	2	b	(20) d	(20) e	(1) g
T-02	2S-01-2	3	b	(20) d	(20) e	N/A
T-02	2S-02-1	2	b	(20) d	(20) e	(1) g
T-02	2S-02-2	3	b	(20) d	(20) e	N/A
T-02	2S-03-1	2	b	(20) d	(20) e	(1) g
T-02	2S-03-2	3	b	(20) d	(20) e	N/A
T-02	2S-04-1	2	b	(20) d	(20) e	(1) g
T-02	2S-04-2	3	b	(20) d	(20) e	(1) g
T-02	2S-05-1	2	b	(20) d	(20) e	N/A
T-02	2S-05-2	3	b	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-01	2S-06-1	1	a	(20) d	(20) e	N/A
T-01	2S-06-2	2	a	(20) d	(20) e	(1) g
T-01	2S-07-1	1	a	(20) d	(20) e	N/A
T-01	2S-07-2	2	a	(20) d	(20) e	(1) g
T-01	2S-08-1	1	a	(20) d	(20) e	(1) g
T-01	2S-08-2	2	a	(20) d	(20) e	N/A
T-01	2S-09-1	1	a	(20) d	(20) e	(1) g
T-01	2S-09-2	2	a	(20) d	(20) e	N/A
T-01	2S-10-1	1	a	(20) d	(20) e	(1) g
T-01	2S-10-2	2	a	(20) d	(20) e	N/A
T-02	2S-11-1	2	b	(20) d	(20) e	(1) g
T-02	2S-11-2	3	b	(20) d	(20) e	(1) g
T-01	2S-12-1	1	a	(20) d	(20) e	N/A
T-01	2S-12-2	2	a	(20) d	(20) e	(1) g
T-03	2S-13-1	3	c	(20) d	(20) e	N/A
T-03	2S-13-2	3	c	(20) d	(20) e	(1) g
T-03	2S-14-1	3	c	(20) d	(20) e	N/A
T-03	2S-14-2	3	c	(20) d	(20) e	(1) g
T-03	5N-01-1	3	c	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-03	5N-01-2	3	c	(20) d	(20) e	(1) g
T-03	5N-01-3	3	c	(20) d	(20) e	(1) g
T-03	5N-01-4	3	c	(20) d	(20) e	(1) g
T-03	5N-01-5	3	c	(20) d	(20) e	(1) g
T-03	5N-01-6	3	c	(20) d	(20) e	(1) g
T-03	5N-01-7	3	c	(20) d	(20) e	(1) g
T-03	5N-01-8	3	c	(20) d	(20) e	(1) g
T-03	5N-01-9	3	c	(20) d	(20) e	(1) g
T-03	5N-01-10	3	c	(20) d	(20) e	(1) g
T-03	5N-01-11	3	c	(20) d	(20) e	(1) g
SYSTEMS AND POTENTIAL RELEASE SITES						
T-08	SYS-01	3	f	(20) d	(20) e	(1) g
T-08	SYS-02	3	f	(20) d	(20) e	(1) g
T-08	SYS-03	2	b	(20) d	(20) e	(1) g
T-08	SYS-04	2	b	(20) d	(20) e	(1) g
T-10	SYS-05	2	f	(20) d	(20) e	(1) g
T-10	SYS-06	2	f	(20) d	(20) e	(1) g
T-09	SYS-07	3	f	(20) d	(20) e	(1) g
T-09	SYS-08	3	f	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-09	SYS-09	3	f	(20) d	(20) e	(1) g
T-09	SYS-10	3	f	(20) d	(20) e	(1) g
T-09	SYS-11	3	f	(20) d	(20) e	(1) g
T-09	SYS-12	4	f	(20) d	(20) e	(1) g
T-07	SYS-13	3	f	(20) d	(20) e	(1) g
T-07	SYS-14	3	f	(20) d	(20) e	(1) g
T-07	SYS-15	3	f	(20) d	(20) e	(1) g
T-07	SYS-16	3	f	(20) d	(20) e	(1) g
T-07	SYS-17	3	f	(20) d	(20) e	(1) g
T-07	SYS-18	3	f	(20) d	(20) e	(1) g
T-07	SYS-19	3	f	(20) d	(20) e	(1) g
T-07	SYS-20	3	f	(20) d	(20) e	(1) g
T-07	SYS-21	3	f	(20) d	(20) e	(1) g
1C-10	SYS-PRS 213	N/A	N/A	N/A	N/A	N/A
1S-10	SYS-PRS 214	N/A	N/A	N/A	N/A	N/A
T-06	SYS-PRS 215	2	f	(1)d	(1) e	(1) g
T-06	SYS-PRS 219	2	f	(1)d	(1) e	(1) g
T-06	SYS-PRS 220	2	f	(1)d	(1) e	(1) g
T-06	SYS-PRS 223	2	f	(1)d	(1) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
T-05	SYS-PRS 225	1	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 226	2	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 227	1	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 228	1	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 229	1	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 230	1	a	(20) d	(20) e	(1) g
T-06	SYS-PRS 232	2	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 233	1	a	(20) d	(20) e	(1) g
T-05	SYS-PRS 339	1	a	(20) d	(20) e	(1) g
T-06	SYS-PRS 340	2	c	(20) d	(20) e	(1) g
T-06	SYS-PRS 341	2	c	(20) d	(1) e	(1) g
T-06	SYS-PRS 342	2	c	(20) d	(20) e	(1) g
T-06	SYS-PRS 343	2	c	(20) d	(20) e	(1) g
T-06	SYS-PRS 344	2	c	(20) d	(20) e	(1) g

APPENDIX C: Survey Unit Data Collection Table for T Building Survey Design						
			Measurements Minimum Number and Type			
SPF#	Survey Unit No.	Survey Unit Classification	Surface Scan Survey (g)	Static beta-gamma count (h)	Removable (Smears) (h)	External Gamma (h)
Notes & Design Rationale for T-Building Characterization Survey, Sampling, and Analysis						
N/A	no longer exists see Appendix B for additional information					
a	Perform 100% scan survey of Class 1 areas floors and walls up to 2m, ceiling and upper walls are considered Class 2 areas and will receive 25% scan on upper walls above 2 meters, and 10% scan on accessible ceiling areas with gas flow proportional counter.					
b	Perform minimum 25% scan survey of the Class 2 area floors and walls up to 2m, ceiling and uppers walls are considered Class 3 areas and will receive 10% scan on upper walls (>2 m) and scans on $1m^2$ areas around each fixed-point measurent on the ceiling areas with gas flow proportional counter.					
c	Perform minimum 10% scan survey of Class 3 floor, wall, and ceiling surfaces with gas-flow proportional counter. Perform scans on $1m^2$ areas around each fixed-point measurent with gas flow proportional counter.					
d	Fixed, static-count measurements will be performed at systematic or random locations (depending upon SU classification) in the quantities listed in the table with a $100cm^2$ alpha/beta sensitive instrument. A minimum of (1) measurement per room should be performed, with locations added if systematic grid pattern excludes a room, this will ensure that at least one measurement is collected in each room. See Survey Plan Forms for applicable count times and MDA requirements.					
dd	Approximately 10% minimum scan area requirement. Perform scan surveys in areas adjacent to fixed-point measurements. Additional fixed point measurements may be taken if scan surveys prove problematic.					
e	Smears for removable contamination will be performed at systematic or random locations (depending upon SU classification) in the quantities listed in the table. An additional biased smear will be performed at the location of the highest scan survey result.					
f	Perform scan in areas immediately adjacent to fixed point measurements.					
g	Perform general area exposure rate measurement 1m (waist high) up from the floor in each room in the survey unit.					
h	Five percent of each survey unit will be rescanned using the same instrument but a different surveyor.					
I	Replicate surveys, sample recounts will be performed in accordance with MD-80046, Op 402 requirements					

APPENDIX D

SURVEY PLAN FORMS

T-01: Class 1 Floors & Lower Walls < 2m and Class 2 Ceilings & walls > 2m

T-02: Class 2 Floors & Lower Walls < 2m and Class 3 Ceilings & walls > 2m

T-03: Class 3 Floors & Lower Walls < 2m and Ceilings & walls > 2m

T-04: Crawlspaces

T-05: Class 1 Sumps and associated piping

T-06: Class 2 Sumps and associated piping

T-07: Building Utility Systems

T-08: Exhaust Ventilation Systems

T-09: Inert Gas Delivery Systems

T-10: Supply Air Systems

SURVEY PLAN FORM			
SP NUMBER	T-01	DATE OF REQUEST	
TYPE OF SP	☒ FSS ☐ CHARACTERIZATION ☐ REFERENCE ☐ OTHER:		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey in Class 1 floors and lower walls and Class 2 ceilings and upper walls in T Building to support decisions on final disposition and free release of the building.		
SURVEY UNIT # 1	See Attachment 1	SURVEY UNIT # 4	
SURVEY UNIT # 2		SURVEY UNIT # 5	
SURVEY UNIT # 3		SURVEY UNIT # 6	

SAMPLE TYPE

☐ SCRAPING/SEDIMENT SAMPLE:

☐ FLUID/LIQUID SAMPLE:

☐ OTHER:

SURVEY TYPE

SURFACE SCAN	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE	L-2350	SCAN RATE & DETECTOR DISTANCE FROM SURFACE	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
		PROBE TYPE	43-37 Floor Probe or 43-68 Hand Probe		
SURFACE SCAN	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE	L-2360	SCAN RATE & DETECTOR DISTANCE FROM SURFACE	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
		PROBE TYPE	43-89 hand probe		
STATIC MEASURE-MENT	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE	L-2350	COUNT TIME & DETECTOR DISTANCE FROM SURFACE	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
		PROBE TYPE	43-68 Hand Probe		
STATIC MEASURE-MENT	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE	L-2360	COUNT TIME & DETECTOR DISTANCE FROM SURFACE	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
		PROBE TYPE	43-89 hand probe		
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ BETA ☒ GAMMA ☐ ALPHA	INST. TYPE	Bicron Micro Rem meter	DETECTOR DISTANCE FROM SURFACE	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.
		PROBE TYPE			

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to upper walls, ceilings, roof, etc. Exercise extreme caution when performing surveys from ladders, lifts, or scaffolds. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Ensure ventilation units are de-energized prior to attempting to collect a sample from them. Obtain approval and assistance from the responsible building custodian to dismantle any equipment for sample collection.
3. Use L2360 if locations are not safely accessible using the L2350 (e.g. close tight spaces, on top roofs, etc).

Floor Scan Measurements using a Ludlum 2350-1 with 43-37 alpha and beta probes

1. Set the Ludlum 2350-1 datalogger to alarm at 75dpm/100cm^2 in the ratemeter mode for alpha.
2. Set the Ludlum 2350-1 datalogger to alarm at 3750 dpm/100cm^2 in the ratemeter mode for beta,
3. Scan 100% of the floor and walls up to 2 meters (m) in Class 1 survey units at a rate of 1" per second at a distance of no more than ¼" from the surface.
4. Perform a 30 second integrated count for both alpha and beta at every location where an alarm is obtained. In addition, obtain a 30 second integrated count for both alpha and beta at any point where an audible or visual indication of elevated activity is observed at two times the background count rate.
5. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes or L 2360 with L43-89 (alpha and beta) probes

1. Scan 25% of the walls above 2 meters (m) at a rate of 1" per second at a distance of less than or equal to (≤) ¼" from the surface using a serpentine pattern with scan paths spaced three probe widths apart.
2. Scan an area of approximately 1m^2 around each data point located on the ceiling at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
3. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
4. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
5. Repeat these four steps using beta probe.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Continued next page

Specific Sampling and Survey Instructions Continued

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the survey unit.
2. Perform at least ten (10) 2 minute integrated alpha and 1 minute beta measurements on beams, supports, or other horizontal structural surfaces in each survey unit where, in the judgment of the surveyor, a potential exists for residual contamination.
3. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
4. Document the gross activity value for each location (No "<" values). Record instrument background at survey location.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurement using Bicron Micro Rem survey meter in each room in the survey unit at a distance of 1 meter (m) from the floor.

Loose Surface Contamination

1. Obtain a smear of $100cm^2$ at each survey point identified above.
2. Count each smear for alpha, beta, and ^3H. ^3H analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

QUALITY CONTROL

1. Check Configuration Index (CI) for latest revision of procedures.
2. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
3. 16 fixed measurement data points will be selected for resurvey from the pool of Class 1 areas. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be randomly selected for recount from the pool of Class 1 areas.
5. 5% of the scan measurements taken in Class 1 areas will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
6. Follow Rad Con procedures for Chain of Custody requirements.
7. Ensure alpha and beta smear results are obtained before performing ^3H analysis.
8. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

Continued next page

Specific Sampling and Survey Instructions Continued

APPROVAL SIGNATURES			
Project Engineer	Mary E. Sizemore	DATE	10/26/04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	K. P. Thursby	DATE	10/26/04
SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Collect at least ten (10) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination

ATTACHMENT 1: SPF T-01

Floors and walls < 2m

1C-01-1	2C-01-1
1C-02-1	2C-02-1
1C-03-1	2C-03-1
1C-04-1	2C-04-1
1C-05-1	2C-05-1
1C-06-1	2C-06-1
1C-07-1	2C-07-1
1C-08-1	2C-08-1
1C-09-1	2C-09-1
1C-10-1	2C-10-1
1C-11-1	2C-11-1
1C-12-1	2C-12-1
1C-13-1	2C-13-1
1C-14-1	2C-14-1
1C-15-1	2C-15-1
1C-16-1	2C-16-1
1C-17-1	2C-17-1
1C-18-1	2C-18-1
1N-01-1	2C-19-1
1N-04-1	2N-06-1
1N-07-1	2N-07-1
1N-08-1	2N-08-1
1S-05-1	2S-06-1
1S-06-1	2S-07-1
1S-07-1	2S-08-1
1S-09-1	2S-09-1
1S-10-1	2S-10-1
1S-11-1	2S-12-1
1S-12-1	

Continued next page

ATTACHMENT 1 continued: SPF T-01

Ceilings and walls > 2m

1C-01-2	2C-01-2
1C-02-2	2C-02-2
1C-03-2	2C-03-2
1C-04-2	2C-04-2
1C-05-2	2C-05-2
1C-06-2	2C-06-2
1C-07-2	2C-07-2
1C-08-2	2C-08-2
1C-09-2	2C-09-2
1C-10-2	2C-10-2
1C-11-2	2C-11-2
1C-12-2	2C-12-2
1C-13-2	2C-13-2
1C-14-2	2C-14-2
1C-15-2	2C-15-2
1C-16-2	2C-16-2
1C-17-2	2C-17-2
1C-18-2	2C-18-2
1N-01-2	2C-19-2
1N-04-2	2N-06-2
1N-07-2	2N-07-2
1N-08-2	2N-08-2
1S-05-2	2S-06-2
1S-06-2	2S-07-2
1S-07-2	2S-08-2
1S-09-2	2S-09-2
1S-10-2	2S-10-2
1S-11-2	2S-12-2
1S-12-2	

SURVEY PLAN FORM			
SP NUMBER	T-02	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey in Class 2 floors and lower walls and Class 3 ceilings and upper walls in T Building to support decisions on final disposition and free release of the building.		
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-37 Floor Probe or 43-68 Hand Probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE** **PROBE TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

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Specific Sampling and Survey Instructions ContinuedSafety Considerations

1. Obtain assistance from the responsible building custodian for access to upper walls, ceilings, roof, etc. Exercise extreme caution when performing surveys from ladders, lifts, or scaffolds. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Ensure ventilation units are de-energized prior to attempting to collect a sample from them. Obtain approval and assistance from the responsible building custodian to dismantle any equipment for sample collection.
3. Use L2360 if locations are not safely accessible using the L2350 (e.g. close tight spaces, on top roofs, etc).

Floor Scan Measurements using a Ludlum 2350-1 with 43-37 alpha and beta probes

1. Set the Ludlum 2350-1 datalogger to alarm at 75dpm/100cm^2 in the ratemeter mode for alpha.
2. Set the Ludlum 2350-1 datalogger to alarm at 3750 dpm/100cm^2 in the ratemeter mode for beta,
3. Scan 50% of the floor and walls up to 2 meters (m) in Class 2 survey units using a serpentine method with scan paths spaced one probe width apart at a rate of 1" per second at a distance of no more than ¼" from the surface.
4. Perform a 30 second integrated count at every location where an alarm is obtained. In addition, obtain a 30 second integrated count at any point where an audible or visual indication of elevated activity is observed at two times the background count rate.
5. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes or L 2360 with L43-89 (alpha and beta) probes

1. Scan 25% of the walls above 2 meters (m) at a rate of 1" per second at a distance of less than or equal to (≤) ¼" from the surface using a serpentine pattern with scan paths spaced three probe widths apart.
2. Scan an area of approximately 1m^2 around each data point located on the ceiling at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
3. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
4. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
5. Repeat these four steps using beta probe.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the survey unit.
2. Perform at least ten (10) 2 minute integrated alpha and 1 minute beta measurements on beams, supports, or other horizontal structural surfaces in each survey unit where, in the judgment of the surveyor, a potential exists for residual contamination.
3. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
4. Document gross activity for each location (No "<" values). Record instrument background at survey location.

Continued next page

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter in each room in the survey unit at a distance of 1m from the floor.

Loose Surface Contamination

1. Obtain a smear of 100cm^2 at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

QUALITY CONTROL

1. Check Configuration Index (CI) for latest revision of procedures.
2. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
3. 16 fixed measurement data points will be selected for resurvey from the pool of Class 2 areas. Data points selected for resurvey should include the highest and lowest measurement in the data pool.
4. 16 smears will be randomly selected for recount from the pool of Class 2 areas.
5. 5% of the scan measurements taken in Class 2 areas will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
6. Follow Rad Con procedures for Chain of Custody requirements.
7. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
8. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary E. Sizimore	DATE	10-26-04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	[illegible]	DATE	10/26/04
SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Collect at least ten (10) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination.

ATTACHMENT 1: SPF T-02

Floors and walls < 2m	Ceilings and walls > 2m
1N-02-1	1N-02-2
1N-06-1	1N-06-2
1S-01-1	1S-01-2
1S-02-1	1S-02-2
1S-03-1	1S-03-2
1S-04-1	1S-04-2
1S-08-1	1S-08-2
2N-02-1	2N-02-2
2N-03-1	2N-03-2
2N-04-1	2N-04-2
2N-05-1	2N-05-2
2S-01-1	2S-01-2
2S-02-1	2S-02-2
2S-03-1	2S-03-2
2S-04-1	2S-04-2
2S-05-1	2S-05-2
2S-11-1	2S-11-2

SURVEY PLAN FORM			
SP NUMBER	T-03	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey in Class 3 areas in T Building to support decisions on final disposition and free release of the building.		
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-37 Floor Probe or 43-20 Hand Probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE** **PROBE TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to upper walls, ceilings, roof, etc. Exercise extreme caution when performing surveys from ladders, lifts, or scaffolds. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Ensure ventilation units are de-energized prior to attempting to collect a sample from them. Obtain approval and assistance from the responsible building custodian to dismantle any equipment for sample collection.
3. Use L2360 if locations are not safely accessible using the L2350 (e.g. close tight spaces, on top roofs, etc).

Floor Scan Measurements using a Ludlum 2350-1 with 43-37 alpha and beta probes

1. Set the Ludlum 2350-1 datalogger to alarm at 75dpm/100cm^2 in the ratemeter mode for alpha.
2. Set the Ludlum 2350-1 datalogger to alarm at 3750 dpm/100cm^2 in the ratemeter mode for beta,
3. Scan at least 25% of the floor and walls up to 2 meters (m) surface in Class 3 survey units using a serpentine pattern with scan paths spaced three probe widths apart.
4. Perform a 30 second integrated count at every location where an alarm is obtained. In addition, obtain a 30 second integrated count at any point where an audible or visual indication of elevated activity is observed at two times the background count rate.
5. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan using alpha probe an area of approximately 1m^2 around each data point located on the walls above 2m and ceiling at a rate of 1" per second at a distance less than or equal to ¼" from the surface.
2. Using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan.
3. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

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Specific Sampling and Survey Instructions Continued

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes or L 2360 with L43-89 (alpha and beta) probes

1. Scan 25% of the walls above 2 meters (m) at a rate of 1" per second at a distance of less than or equal to (≤) ¼" from the surface using a serpentine pattern with scan paths spaced three probe widths apart.
2. Scan an area of approximately $1m^2$ around each data point located on the ceiling at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
3. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
4. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
5. Repeat these four steps using beta probe.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the survey unit.
2. Perform at least ten (10) 2 minute integrated alpha and 1 minute beta measurements on beams, supports, or other horizontal structural surfaces in each survey unit where, in the judgment of the surveyor, a potential exists for residual contamination.
3. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
4. Document gross activity for each location (No "<" values). Record instrument background at survey location.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter in each room in the survey unit at a distance of 1m from the floor.

Loose Surface Contamination

1. Obtain a smear of $100cm^2$ at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

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SPECIFIC SAMPLING AND SURVEY INSTRUCTIONS CONTINUED

QUALITY CONTROL

1. Check Configuration Index (CI) for latest revision of procedures.
2. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
3. 16 fixed measurement data points will be selected for resurvey from the pool of Class 3 areas. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be randomly selected for recount from the pool of Class 3 areas.
5. 5% of the scan measurements taken in Class 3 areas will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
6. Follow Rad Con procedures for Chain of Custody requirements.
7. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
8. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES

Project Engineer	Mary E. Sizemore	**DATE**	10-26-04
Technical Reviewer	[illegible]	**DATE**	10/26/04
Manager	[illegible]	**DATE**	10/26/04

SP CLOSE-OUT SIGNATURES

Project Engineer		**DATE**	
Technical Reviewer		**DATE**	
Manager		**DATE**	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Collect at least ten (10) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination

ATTACHMENT 1: SPF T-03

Floors and walls < 2m	Ceilings and walls > 2m
1N-03-1	1N-03-2
1N-05-1	1N-05-2
2N-01-1	2N-01-2
2S-13-1	2S-13-2
2S-14-1	2S-14-2
5N-01-1	5N-01-2
5N-02-1	5N-02-2
5N-03-1	5N-03-2
5N-04-1	5N-04-2
5N-05-1	5N-05-2

SURVEY PLAN FORM			
SP NUMBER	T-04	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is perform a final status survey in T Building crawlspaces to support decisions on final disposition and free release of the building.		
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-20 Hand Probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface around each static measure location.
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2350	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE** **PROBE TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SP NUMBER	T-04	DATE OF REQUEST	

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to upper walls, ceilings, roof, etc. Exercise extreme caution when performing surveys from ladders, lifts, or scaffolds. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Ensure ventilation units are de-energized prior to attempting to collect a sample from them. Obtain approval and assistance from the responsible building custodian to dismantle any equipment for sample collection.
3. Use L2360 if locations are not safely accessible using the L2350 (e.g. close tight spaces, on top roofs, etc).

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes or L 2360 with L43-89 (alpha and beta) probes

1. Scan 25% of the walls above 2 meters (m) at a rate of 1" per second at a distance of less than or equal to (≤) ¼" from the surface using a serpentine pattern with scan paths spaced three probe widths apart.
2. Scan an area of approximately $1m^2$ around each data point located on the ceiling at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
3. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
4. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
5. Repeat these four steps using beta probe.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the survey unit.
2. Perform at least thirty (30) 2 minute integrated alpha and 1 minute beta measurements on beams, supports, or other horizontal structural surfaces in each survey unit where, in the judgment of the surveyor, a potential exists for residual contamination.
3. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
4. Document gross activity for each location (No "<" values). Record instrument background at survey location.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter in each survey unit at a distance of 1 meter from the floor.

Loose Surface Contamination

1. Obtain a smear of $100cm^2$ at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.

Continued next page

Specific Sampling and Survey Instructions Continued

3. Record location and results on RSDS map in accordance with Mound Rad Con procedures.

QUALITY CONTROL

1. Check Configuration Index (CI) for latest revision of procedures.
2. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
3. 16 fixed measurement data points will be selected for resurvey from the pool of crawlspace survey units. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be randomly selected for recount from the pool of crawlspace survey units.
5. 5% of the scan measurements taken in crawlspace survey units will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
6. Follow Rad Con procedures for Chain of Custody requirements.
7. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
8. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES

Project Engineer	Mary Sizemore	**DATE**	10-26-04
Technical Reviewer		**DATE**	10/26/04
Manager		**DATE**	10/26/04

SP CLOSE-OUT SIGNATURES

Project Engineer		**DATE**	
Technical Reviewer		**DATE**	
Manager		**DATE**	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Collect at least thirty (30) fixed-point bias measurements on beams, supports, or other horizontal structural surfaces in each SU where in the professional judgment of the surveyor, a potential exists for residual contamination

ATTACHMENT 1: SPF T-04

1CS-01-1	First Floor Crawlspace - South East
1CS-01-2	First Floor Crawlspace - South West
1CS-02-1	First Floor Crawlspace - Center East
1CS-02-2	First Floor Crawlspace - Center West
1CS-03-1	First Floor Crawlspace - North East
1CS-03-2	First Floor Crawlspace - North West
2CS-01-1	Second Floor Crawlspace - South East
2CS-01-2	Second Floor Crawlspace - South West
2CS-02-1	Second Floor Crawlspace - Center East
2CS-02-2	Second Floor Crawlspace - Center West
2CS-03-1	Second Floor Crawlspace - North East
2CS-03-2	Second Floor Crawlspace - North West

SURVEY PLAN FORM					
SP NUMBER	T-05		**DATE OF REQUEST**		
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**				
AREA/LOCATION	T Building				
PURPOSE	The purpose of this SPF is to perform a final status survey in Class 1 sumps and associated piping in T Building to support decisions on final disposition and free release of T Building				
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**		**SURVEY UNIT # 7**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**		**SURVEY UNIT # 8**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2350	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
		PROBE TYPE	43-68 Hand Probe		
SURFACE SCAN	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE**	L-2360	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Op number 30040, Operation of Ludlum 2360 with Fidler probe.
		PROBE TYPE	Fidler Probe		
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2350	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
		PROBE TYPE	43-68 Hand Probe		
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.
		PROBE TYPE			

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SP NUMBER	T-05	DATE OF REQUEST	

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to sumps. Exercise extreme caution when performing surveys inside sump area. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Previously isolated, abandoned, or enclosed sumps covered or filled with concrete should either have the concrete pad removed to ensure that embedded surface can be analyzed.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan 100% of the sump surface at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
2. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
3. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Surface Scan Using a Ludlum 2360 with a Fidler probe

1. Scan the sump and trench where the drain pipes where located surface at a rate of 2.5" per second.
2. Record the locations of the area scanned on the RSDS and document the results in accordance with Mound Rad Con procedures.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the survey unit.
2. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
3. Document gross activity for each location (No "<" values). Record instrument background at survey location.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurement using Bicron Micro Rem survey meter for each sump at a distance of 1m from the surface.
2. Record the location of the measurement the RSDS in accordance with Mound Rad Con procedures.

Loose Surface Contamination

1. Obtain a smear of $100cm^2$ at each survey point identified above.
2. Count each smear for alpha, beta, and H^3.
3. Record location and results on RSDS map in accordance with Mound Rad Con procedures.

Continued next page

Specific Sampling and Survey Instructions Continued

QUALITY CONTROL

1. Check Configuration Index (CI) for latest revision of procedures.
2. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
3. 16 fixed measurement data points will be selected for resurvey from the Class 1 sumps. Data points selected for resurvey should include the highest and lowest measurement from the data pool
4. 16 smears will be randomly selected for recount from the Class 1 sumps.
5. 5% of the scan measurements taken in Class 1 sumps will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
6. Follow Rad Con procedures for Chain of Custody requirements.
7. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
8. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary Ellen Zimmer	DATE	10/26/04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	[illegible]	DATE	10/26/04
SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Visually inspect the sump to determine if an area of breached integrity exists. Contact Radiological Engineer or RPOC to determine if additional measurements or instrumentation is needed, if there is evidence of a breach in the integrity of the sump. A smear or additional sampling of the breached area may be required.

ATTACHMENT 1: SPF T-05
Class 1 sumps

Sump #	Survey Unit ID#	Identification
Sump 5	SYS-PRS 340	Waste Water Sump (Tank 251)
Sump 6	SYS-PRS 225	Beta Waste Water Sump (Tank 227)
Sump 7	SYS-PRS 227	Alpha Waste Water Sump (Tank 229)
Sump 8	SYS-PRS 228	Alpha Waste Water Sump (Tank 230)
Sump 9	SYS-PRS 339	Waste Water Sump (Tank 250)
Sump 10	SYS-PRS 229	Alpha Waste Water Sump (Tank 231)
Sump 11	SYS-PRS 230	Alpha Waste Water Sump (Tank 232)
Sump 13	SYS-PRS 233	Alpha Waste Water Sump (Tank 235)

SURVEY PLAN FORM					
SP NUMBER	T-06			**DATE OF REQUEST**	
TYPE OF SP	☒ FSS ☐ CHARACTERIZATION ☐ REFERENCE ☐ OTHER:				
AREA/LOCATION	T Building				
PURPOSE	The purpose of this SPF is to perform a final status survey Class 2 sumps and associated piping in T Building to support decisions on final disposition and free release of the building.				
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**		**SURVEY UNIT # 7**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**		**SURVEY UNIT # 8**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**		**SURVEY UNIT # 9**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ BETA ☐ GAMMA ☒ ALPHA	**INST. TYPE**	L-2350	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
		PROBE TYPE	43-68 Hand Probe		
STATIC MEASURE-MENT	☒ BETA ☐ GAMMA ☒ ALPHA	**INST. TYPE**	L-2350	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
		PROBE TYPE	43-68 Hand Probe		
SURFACE SCAN	☐ BETA ☒ GAMMA ☐ ALPHA	**INST. TYPE**	L-2360	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Op number 30040, Operation of Ludlum 2360 with Fidler probe.
		PROBE TYPE	Fidler		
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ BETA ☒ GAMMA ☐ ALPHA	**INST. TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure measurements at specified locations 1 meter (m) from the surface.
		PROBE TYPE			

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to sumps. Exercise extreme caution when performing surveys inside sump area. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
2. Previously isolated, abandoned, or enclosed sumps covered or filled with concrete should either have the concrete pad removed to ensure that embedded surface can be analyzed.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan 100% of the dry accessible sump surface at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
2. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
3. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Surface Scan Using a Ludlum 2360 with a Fidler probe

1. Scan 100% of the dry accessible sump surface and area above trench where the drainpipes are located at a rate of 2.5" per second.
2. Record the locations of the area scanned on the RSDS and document the results in accordance with Mound Rad Con procedures.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count at each data point in the sump.
2. Perform at 2 minute integrated alpha and 1 minute beta measurements on each accessible location in sump piping system.
3. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
4. Document gross activity for each location (No "<" values). Record instrument background at survey location.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter for each sump and at each accessible location in the sump piping system at a distance of 1m from the surface.

Continued next page

Specific Sampling and Survey Instructions Continued

Loose Surface Contamination

1. Obtain a smear of 100cm^2 at each survey point identified above and at each accessible location.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

QUALITY CONTROL

1. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
2. 16 fixed measurement data points will be selected for resurvey from the Class 2 sumps and piping. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
3. 16 smears will be randomly selected for recount from the Class 2 sumps and piping.
4. 5% of the scan measurements taken in Class 2 sumps and piping will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
5. Follow Rad Con procedures for Chain of Custody requirements.
6. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
7. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary E Simon	DATE	10/26/04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	[illegible]	DATE	10/26/04

SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

Visually inspect the sump to determine if an area of breached integrity exists. Contact Radiological Engineer or RPOC to determine if additional measurements or instrumentation is needed, if there is evidence of a breach in the integrity of the sump. A smear or additional sampling of the breached area may be required.

ATTACHMENT 1: SPF T-06
Class 2 sumps

Survey Unit ID#	Identification	Sump #
SYS-PRS 215	Cooling Water Sump #1 (Tank 124) Room T-1	1
SYS-PRS 219	Cooling Water Sump (Tank 128) Stair 3	15
SYS-PRS 220	Steam Condensate Sump (Tank 129) T-78	16
SYS-PRS 223	Cooling System Condensate Sump (Tank 132)	20
SYS-PRS 226	Floor Drain Sump (Tank 228) T-3	3
SYS-PRS 232	Alpha Waste Water Sump #12 (Tank 234)	12
SYS-PRS 341	Condensate Sump (Tank 269) T-90	19
SYS-PRS 342	Hot Side Fire Water Tank (Tank 271) T-1	N/A
SYS-PRS 343	Fire Water Sump (Tank 272)	N/A
SYS-PRS 344	Fire Water Sump (Tank 273)	N/A

SURVEY PLAN FORM			
SP NUMBER	T-07	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is perform a final status survey on the building utility systems in T Building to support decisions on final disposition and free release of T Building.		
SURVEY UNIT # 1	See Attachment 1	**SURVEY UNIT # 4**	
SURVEY UNIT # 2		**SURVEY UNIT # 5**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-89 hand probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE** **PROBE TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (1m) from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to systems.
2. Exercise extreme caution when performing surveys inside crowded areas.
3. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.

Data Point Location

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute integrated beta count on 20 accessible data points in each liquid system. Minimum area limit of $1000m^2$ applied.
2. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
3. Document gross activity for each location (No "<" values). Record instrument background at survey location.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan an area of approximately $1m^2$ around each data point at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
2. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
3. Record the location of the area scanned on the RSDS and documents the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Loose Surface Contamination

1. Obtain a smear of $100cm^2$ at each survey point identified above.
2. Count each smear for alpha, beta, and H^3.
3. Record location and results on RSDS map in accordance with Mound Rad Con procedures.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter on one location for each system at a distance of 1 meter (m) from the surface.
2. Record the location of the measurement the RSDS in accordance with Mound Rad Con procedures.

Continued next page

Specific Sampling and Survey Instructions Continued

QUALITY CONTROL

1. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
2. 16 fixed measurement data points will be selected for resurvey from the liquid utility systems. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
3. 16 smears will be randomly selected for resurvey from the liquid utility systems.
4. 5% of the scan measurements taken on the liquid utility systems will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
5. Follow Rad Con procedures for Chain of Custody requirements.
6. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
7. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary E. Sagimore	**DATE**	10-26-04
Technical Reviewer	[illegible]	**DATE**	10/26/04
Manager	[illegible]	**DATE**	10-26-04
SP CLOSE-OUT SIGNATURES			
Project Engineer		**DATE**	
Technical Reviewer		**DATE**	
Manager		**DATE**	

COMMENTS

The outsides of the pipes will be surveyed and insides where accessible.

Attachment 1 SPF T-07

Building Utility Systems

SYS-15 Glycol System

SYS-16 Chilled Water System C

SYS-17 Chilled Water System H

SYS-18 TERF Water System

SYS-19 Potable Water System

SYS-20 Domestic Water System

SYS-21 Process Water System

SYS-22 Steam System

SYS-23 Condensate System

SURVEY PLAN FORM			
SP NUMBER	T-08	DATE OF REQUEST	
TYPE OF SP	☒ FSS ☐ CHARACTERIZATION ☐ REFERENCE ☐ OTHER:		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey on the exhaust systems in T Building to support decisions on final disposition and free release		
SURVEY UNIT # 1	SYS-03 East Head House	SURVEY UNIT # 4	SYS-06 West Exhaust Air System
SURVEY UNIT # 2	SYS-04 West Head House	SURVEY UNIT # 5	1N-03 Exhaust tunnels/air shafts
SURVEY UNIT # 3	SYS-05 East Exhaust Air System	SURVEY UNIT # 6	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

SURVEY TYPE

SURFACE SCAN	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE PROBE TYPE	L-2350 43-68 Hand Probe	SCAN RATE & DETECTOR DISTANCE FROM SURFACE	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
SURFACE SCAN	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE PROBE TYPE	L-2350 43-89 hand probe	SCAN RATE & DETECTOR DISTANCE FROM SURFACE	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE PROBE TYPE	L-2350 43-68 Hand Probe	COUNT TIME & DETECTOR DISTANCE FROM SURFACE	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ BETA ☐ GAMMA ☒ ALPHA	INST. TYPE PROBE TYPE	L-2360 43-89 hand probe	COUNT TIME & DETECTOR DISTANCE FROM SURFACE	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ BETA ☒ GAMMA ☐ ALPHA	INST. TYPE PROBE TYPE	Bicron Micro Rem meter	DETECTOR DISTANCE FROM SURFACE	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing survey.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to ventilation system.
2. Exercise extreme caution when performing surveys inside crawlspace area.
3. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
4. Use L2360 if locations are not safely accessible using the L2350 (e.g. close tight spaces, on top roofs, etc)

Data Point

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan an area of approximately $1m^2$ around each data point at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
2. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
3. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

Perform twenty (20) 2 minute integrated alpha and 1 minute beta measurements on accessible areas in the exhaust system. (Area limit of $1000m^2$)

1. Perform at least thirty (30) 2 minute integrated alpha and 1 minute beta measurements on areas in the exhaust system where, in the judgment of the project engineer or building manager, a potential exists for flow restriction. (Area limit of $1000m^2$)
2. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
3. Document the gross activity level for each location (No "<" values). Record instrument background at survey location.

Continued next page

Specific Sampling and Survey Instructions Continued

Loose Surface Contamination

1. Obtain a smear of 100cm^2 at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter on one location for each system at a distance of 1m from the surface.
2. Record the location of the measurement the RSDS in accordance with Mound Rad Con procedures.

Quality Control

1. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
2. 5% of the scan measurements taken from the exhaust systems will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
3. 16 fixed measurement data points will be selected for resurvey from the exhaust system. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be randomly selected for rescount from the exhaust system.
5. Follow Rad Con procedures for Chain of Custody requirements.
6. Ensure alpha and beta smear results are obtained before performing H3 analysis.
7. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary E. Sizemore	DATE	10-26-04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	[illegible]	DATE	10/26/04

SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.

SURVEY PLAN FORM			
SP NUMBER	T-09	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey on the inert gas delivery systems in T Building to support decisions on final disposition and free release		
SURVEY UNIT # 1	SYS-09 Compressed Air System	**SURVEY UNIT # 4**	SYS-12 Nitrogen System
SURVEY UNIT # 2	SYS-10 Breathing Air System	**SURVEY UNIT # 5**	SYS-13 Helium System
SURVEY UNIT # 3	SYS-11 Argon System	**SURVEY UNIT # 6**	SYS-14 P-10 System

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2350	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
		PROBE TYPE	43-68 Hand Probe		
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2360	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
			43-89 hand probe		
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2350	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
		PROBE TYPE	43-68 Hand Probe		
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2360	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
		PROBE TYPE	43-89 hand probe		
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.
		PROBE TYPE			

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing surveys.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to ventilation system.
2. Exercise extreme caution when performing surveys inside crawlspace area.
3. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
4. Use L2360 if locations are not safely accessible using the L2350 (e.g. tight places, on the roof, etc.)

Data Point

1. Locate the data points in each survey unit using the coordinates shown in Attachment 2.
2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan an area of approximately $1m^2$ around each data point at a rate of 1" per second at a distance of less than or equal to ¼" from the surface.
2. For alpha scans using the audible output of instrument, stop and pause for approximately ten (10) seconds if one pop (click) is heard. If one pop (click) is heard during pause, perform an integrated count for two (2) minutes. Otherwise, if no pop heard during pause, continue scan. For beta scans, at any point obtain where an audible or visual indication of elevated activity is observed at two times the background count rate, perform a one (1) minute integrated count.
3. Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute beta measurements on 20 accessible locations in the air system. Minimum area limit of $1000m^2$.
2. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
3. Document gross activity for each location (No "<" values). Record instrument background at survey location.

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Specific Sampling and Survey Instructions Continued

Loose Surface Contamination

1. Obtain a smear of 100cm^2 at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

General Area Exposure Rate Measurements

1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter on one location for each system at a distance of 1m from the surface.
2. Record the location of the measurement the RSDS in accordance with Mound Rad Con procedures.

QUALITY CONTROL

1. Daily source checks will be performed at the beginning and end of each day in accordance with Mound Rad Con procedures.
2. 5% of the scan measurements taken on the inert gas delivery systems will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
3. 16 fixed measurement data points will be selected for resurvey from the non-liquid utility systems. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be selected for recount from the inert gas delivery systems.
5. Follow Rad Con procedures for Chain of Custody requirements.
6. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
7. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES

Project Engineer	Mary E Simmons	**DATE**	10-26-04
Technical Reviewer	[illegible]	**DATE**	10/26/04
Manager	[illegible]	**DATE**	10-26-04

SP CLOSE-OUT SIGNATURES

Project Engineer		**DATE**	
Technical Reviewer		**DATE**	
Manager		**DATE**	

COMMENTS

The outsides of the pipes will be surveyed and insides where accessible.

SURVEY PLAN FORM			
SP NUMBER	T-10	**DATE OF REQUEST**	
TYPE OF SP	☒ **FSS** ☐ **CHARACTERIZATION** ☐ **REFERENCE** ☐ **OTHER:**		
AREA/LOCATION	T Building		
PURPOSE	The purpose of this SPF is to perform a final status survey on the supply air systems in T Building to support decisions on final disposition and free release		
SURVEY UNIT # 1	SYS-07 East Supply Air System (e.g. Ducts, Vents, Fans)	**SURVEY UNIT # 4**	
SURVEY UNIT # 2	SYS-08 West Supply Air System (e.g. Ducts, Vents, Fans)	**SURVEY UNIT # 5**	
SURVEY UNIT # 3		**SURVEY UNIT # 6**	

SAMPLE TYPE

☐ **SCRAPING/SEDIMENT SAMPLE:**

☐ **FLUID/LIQUID SAMPLE:**

☐ **OTHER:**

SURVEY TYPE

SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Scan surface at a rate of 1" per second at a distance of not more than ¼" from the surface
SURFACE SCAN	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE**	L-2360 43-89 hand probe	**SCAN RATE & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2350 43-68 Hand Probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Perform 2 minute counts (α) and 1 minute count (β) at specified locations not more than ¼" from the surface.
STATIC MEASURE-MENT	☒ **BETA** ☐ **GAMMA** ☒ **ALPHA**	**INST. TYPE** **PROBE TYPE**	L-2360 43-89 hand probe	**COUNT TIME & DETECTOR DISTANCE FROM SURFACE**	Refer to MD-80036, Iss. 29, Op number 30030, Operation of Ludlum 2360 Scaler/ratemeter with Ludlum 43-89 alpha/beta scintillator, Sect. 6.3
GENERAL AREA EXPOSURE RATE MEASURE-MENT	☐ **BETA** ☒ **GAMMA** ☐ **ALPHA**	**INST. TYPE** **PROBE TYPE**	Bicron Micro Rem meter	**DETECTOR DISTANCE FROM SURFACE**	Perform general area exposure rate measurements at specified locations 1 meter (m) from the surface.

COMMENTS AND GENERAL REQUIRE-MENTS

All surveys shall be performed and documented in accordance with Mound Radiological Control procedures.

Perform scan surveys prior to fixed-point surveys.

Ensure building surfaces are clean and free of loose debris, dirt, and obstructions prior to performing survey.

Rad Con shall document all discrepancies from the above sampling and surveying instructions on the Survey Plan Continuation Sheet.

Continued next page

SPECIFIC SAMPLING / SURVEY INSTRUCTIONS

Specific Sampling and Survey Instructions Continued

Safety Considerations

1. Obtain assistance from the responsible building custodian for access to ventilation system.
2. Exercise extreme caution when performing surveys inside crawlspace area.
3. Follow appropriate site safety procedures when accessing areas requiring fall protection measures.
4. Use L2360 if locations are not safely accessible using the L2350 (e.g. tight places, on the roof, etc.)

Data Point

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2. Mark each data point with tape or other non-permanent marking.
3. Document locations on the appropriate RSDS.

Surface Scan Using a Ludlum 2350-1 with a 43-68 Hand (alpha and beta) probes

1. Scan an area of approximately $1m^2$ around each data point at a rate of 1" per second at a distance of no more than ¼" from the surface.
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3. .Record the locations of the area scanned on the RSDS and document the results of each integrated count in accordance with Mound Rad Con procedures.
4. Repeat these three steps using beta probe.

Static Measurements Using L 2350 With a 43-68 probe (alpha and beta) or L 2360 with L43-89 probe (alpha and beta)

1. Perform a 2 minute integrated alpha and 1 minute beta measurements on 20 accessible locations in the air system. Minimum area limit of $1000m^2$.
2. Record location, material type, and results on RSDS in accordance with Mound Rad Con procedures.
3. Document the gross activity level for each location (No "<" values). Record instrument background at survey location.

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Specific Sampling and Survey Instructions Continued

Loose Surface Contamination

1. Obtain a smear of 100cm^2 at each survey point identified above.
2. Count each smear for alpha, beta, and H^3. H^3 analysis is not required for building external surfaces.
3. Record location and results on RSDS in accordance with Mound Rad Con procedures.

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1. Perform general area exposure rate measurements using Bicron Micro Rem survey meter on one location for each system at a distance of 1m from the surface.
2. Record the location of the measurement the RSDS in accordance with Mound Rad Con procedures.

QUALITY CONTROL

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2. 5% of the scan measurements taken on the non-liquid utility systems will randomly be selected for replicate scan surveys in accordance with MD-80046, Op 402.
3. 16 fixed measurement data points will be selected for resurvey from the non-liquid utility systems.. Data points selected for resurvey should include the highest and lowest measurement from the data pool.
4. 16 smears will be selected for recount from the non-liquid utility systems.
5. Follow Rad Con procedures for Chain of Custody requirements.
6. Ensure alpha and beta smear results are obtained before performing H^3 analysis.
7. Record location, material, and results on RSDS in accordance with Mound Rad Con procedures.

APPROVAL SIGNATURES			
Project Engineer	Mary Szymon	DATE	10-26-04
Technical Reviewer	[illegible]	DATE	10/26/04
Manager	[illegible]	DATE	10/26/04

SP CLOSE-OUT SIGNATURES			
Project Engineer		DATE	
Technical Reviewer		DATE	
Manager		DATE	

COMMENTS

An additional biased smear will be performed at the location of the highest scan survey result.