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RF/RMRS-97-038

Reconnaissance Level Characterization Plan

For The Building 980 Cluster

JULY 1997

ADMIN RECORD

1/58

B980-A-00020

RECONNAISSANCE LEVEL CHARACTERIZATION PLAN FOR THE BUILDING 980 CLUSTER

REVISION 0

JULY 1997

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RECONNAISSANCE LEVEL CHARACTERIZATION PLAN

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ACRONYMS

ACM	Asbestos containing material
AHA	Activity Hazard Analysis
AHERA	Asbestos Hazard Emergency Response Act
APO	Analytical Projects Office
Be	Beryllium
CDPHE	Colorado Department of Public Health and Environment
cm^2	Square Centimeters
DOE	U.S. Department of Energy
DOP	Decommissioning Operations Plan
dpm	Disintegrations per minute
DQO	Data Quality Objective
EPA	U. S. Environmental Protection Agency
MDA	Minimum Detectable Amount
PA	Protected Area
PCB	Polychlorinated biphenyl
PLM	Polarized Light Microscopy
RAD	Radioactive
RBA	Radiological Buffer Area
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
RLC	Reconnaissance Level Characterization
RLCR	Reconnaissance Level Characterization Report
RMRS	Rocky Mountain Remediation Services, L. L. C.
RWP	Radiological Work Permit
SAA	Satellite Accumulation Area
WSRIC	Waste Stream and Residue and Identification and Characterization

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RECONNAISSANCE LEVEL CHARACTERIZATION PLAN

1.0 INTRODUCTION

Due to the change in mission of the Rocky Flats Environmental Technology Site (RFETS) from the production of nuclear components to environmental cleanup and shutdown, the Building 980 Cluster and its associated facilities have no identified mission after Fiscal Year 1996. It has, therefore, been determined by site management that the Building 980 cluster should be decommissioned to a safe and stable configuration to reduce operating costs and hazards. The location of the B980 Cluster is identified in Figure 1-1.

1.1 PURPOSE

The purpose of this characterization plan is to outline the data requirements and methodology for Reconnaissance Level Characterization (RLC) of the Building 980 Cluster consisting of buildings 980, 968 and 965. This effort identifies the type, quantity, condition, and location of radioactive and hazardous materials which are, or which may be, present as residual contamination in the subject facilities. The compilation of facility information contained herein, in conjunction with the Building 980 Cluster project files established during this investigation, brings together pertinent data from various sources to serve as a practical reference for project use.

1.2 SCOPE

This report is prepared in support of the Building 980 Characterization for the U.S. Department of Energy (DOE) at the RFETS located near Golden, Colorado. The information presented in this plan specifically pertains to the Building 980 Cluster; the review of historical records and the collection of process knowledge information covers the operational time period for the facility from original construction to present.

1.3 DATA LIFE CYCLE

There are three aspects of the data life cycle that apply to the characterization process: Planning, Implementation, and Assessment. To produce a usable document (i.e. Reconnaissance Level Characterization Report) each of the three must be applied in sequence.

The planning process uses the DQOs identified in the Decommissioning Characterization Protocol procedure to determine data needs and quality and survey design. This is the initial planning phase for all characterization activities.

The second phase of the characterization process is implementation. This phase includes the assessment of historical documentation (scoping survey) concerning the operations of a site and any associated chemical or radiological inventory. Additionally, the physical survey is accomplished using the design as outlined during the planning phase.

The final phase of the life cycle is the assessment of information gathered during the implementation phase. The data is evaluated against the DQO criteria and a Reconnaissance Level Characterization Report (RLCR) is developed that outlines results and conclusions.

In the following sections the three phases of the data life cycle are developed in detail for the B980 cluster decommissioning project.

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Buildings 965, 968, And 980 D&D Area

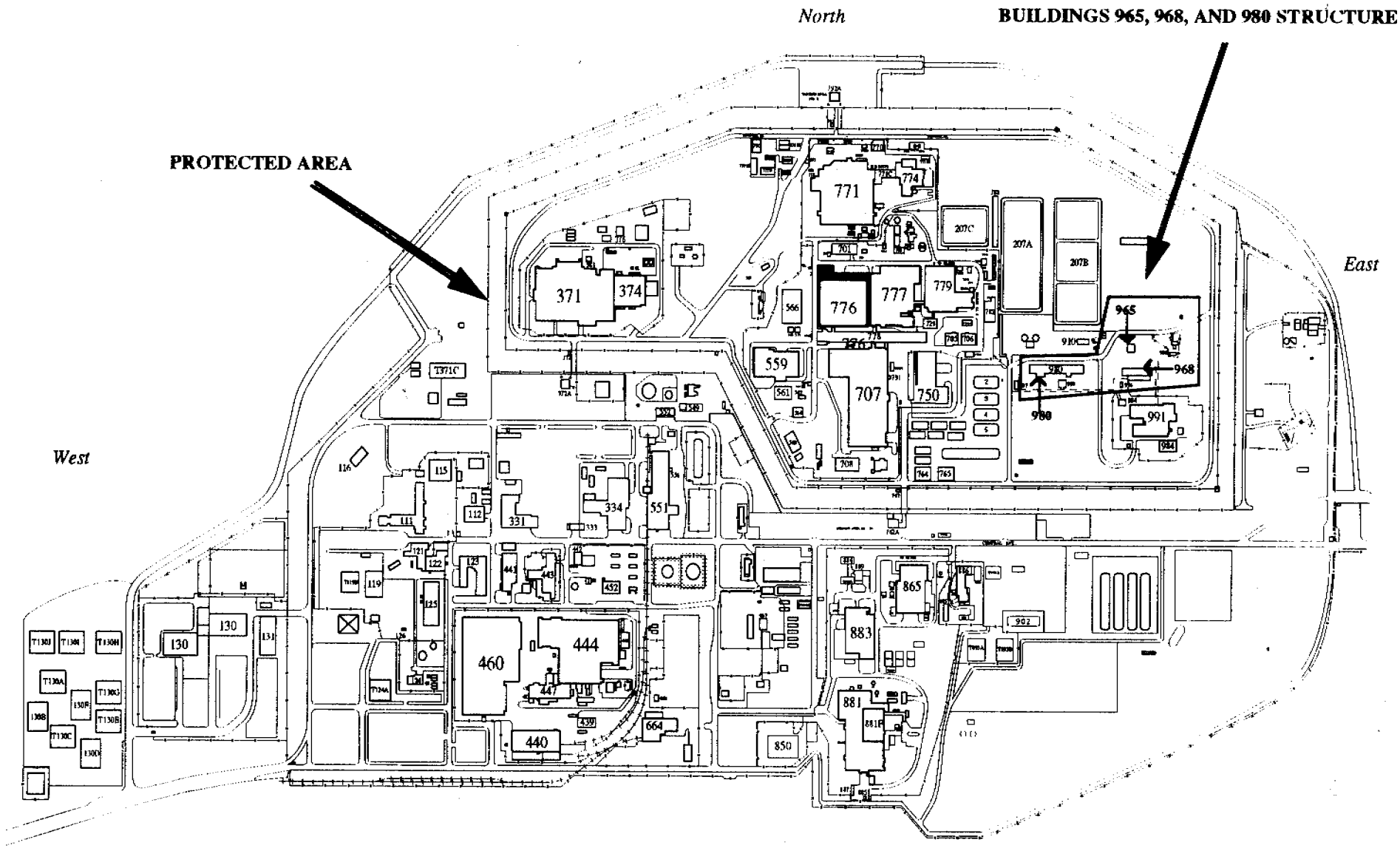

Figure 1-1 Site Map

2.0 PLANNING

To ensure the collection of usable data it is necessary to formulate the objectives of the project. The development of appropriate objectives was accomplished through the Data Quality Objective (DQO) process. The results of this process are presented in the following sections of this plan.

2.1 CHARACTERIZATION OBJECTIVES

The RLC objectives are based on the questions presented in Sections 6.0 and 6.1 of the "Decommissioning Characterization Protocols".

This plan was developed to specify the data collection requirements necessary to provide a baseline of information for use during decommissioning activities. The information obtained by implementing this plan will be compiled into the RCLR. Ultimately, the data may be used to determine the risks to the environment and personnel during these activities. (dismantling, decommissioning, etc.).

The following questions and answers were used to develop the sampling requirements for this project.

1. **What is the end use of the facility or structure?**

   There is no end use of this facility. The decommissioning activities will remove all the walls and structural members leaving the building foundations in place. The utilities will be isolated, disconnected and removed back to an appropriate location.

2. **What types of chemical, physical/biological, or radiological hazard is being evaluated?**

   The following hazards were evaluated for their presence in the B980 Cluster:

   Asbestos
   PCBs
   Excess Chemicals
   Lead
   Beryllium
   Radioactive Materials

3. **What level of worker protection is required to perform characterization in the facility, structure or environs?**

   Safety shoes and safety glasses will be worn for all the activities. Other protective measures are identified in the job-specific Radiological Work Permit (RWP) or Activity Hazard Analysis (AHA).

   No unique or special protective clothing is required.

4. **What type of instrumentation is required?**

   Radiological instrumentation is identified in Table 6-1.

   The other materials will be analyzed in a laboratory. The specific instrumentation is identified in the applicable lab procedures.

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The other materials will be analyzed in a laboratory. The specific instrumentation is identified in the applicable lab procedures.

5. Has all facility structural data been reviewed?

All the available historical and facility information has been reviewed. A copy of this information is in the project file.

6. Have all suspect materials been identified?

Yes. Additional characterization of the suspected material is identified in this plan.

7. Are there any regulatory and statistical drivers for sampling frequency?

There are no known statistical drivers for sampling frequency for reconnaissance level information.

8. Why is this characterization information being obtained?

The reconnaissance level characterization information is being obtained to establish a baseline of hazards within the B980 Cluster. The baseline information will be summarized and presented to the State in a Reconnaissance Level Characterization Report. The State uses the RLCR to determine the need for a Decommissioning Operations Plan (DOP).

9. What decisions will be made from use of the data obtained for this plan?

The decisions which will be made using this information is:

Is a DOP required or not for the B980 Cluster?

10. What information is required to make the decision?

A baseline of the hazards within the B980 Cluster is required. The types of hazards are identified in Question #2.

11. What is the scope of this data gathering effort?

This scope of the characterization is identified within the individual hazard discussions. (See Section 3)

12. What is the basis for the decision?

The decision to require (or not) a DOP is somewhat arbitrary. It is based on the risk associated with the identified hazards. The decision is made by the DOE and the State.

13. What are the limits on decision errors?

This question does not apply to the reconnaissance level characterization. Since there is no specified criteria or limits on which decisions are based.

14. How will the survey design be optimized?

If the DOE or the State decide they do not have enough characterization information (based on their review of the RLCR), additional information will be requested.

3.0 IMPLEMENTATION

This section provides information necessary to implement the requirements of the planning (DQO) task of this project.

3.1 HISTORICAL ASSESSMENT

A detailed examination of process knowledge and documents, relating to the Building 980 Cluster was initiated in March 1997. As part of this examination, a comprehensive survey of historical records was undertaken to determine the location and character of any radioactive and hazardous contaminants which were present in the area. The general conclusions drawn from this examination are as follows:

Presently, the Building 980 Cluster is in a safe shut-down condition. All required utility services (i.e., natural gas, electrical service, water supply) are active. All manually-actuated and automated fire/alarm suppression systems are operational.

The Building 980 Cluster housed a significant quantity of warehouse materials and equipment, most of which are non-radioactive, although some may contain hazardous materials. These materials and equipment are being removed prior to the decommissioning of the buildings.

Building 980 was constructed in 1957 and was used for storage, warehousing and as support shops for site construction activities. Building 965 was constructed in 1981 and provided carpentry services as well as equipment repair and storage. Building 968 was constructed in 1982 and was used for storage of excess parts to support the Protected Area (PA) maintenance activities and also served as a staging area for painting (mixing and blending) and motor pool activities.

Contamination is not expected from materials stored or processed in the Building 980 Complex. However, the east section of Building 980 presently houses a vacuum truck which was used to remove liquid and sludge from the Solar Ponds. The holding tank and vacuum system mounted on the truck was radiologically contaminated during the Solar Pond evolution.

The information collected in this section has been obtained from several sources, including past/current records and RFETS personnel with relevant Building 980 Cluster work experience or related knowledge.

Although not all inclusive, the following list contains some of the hazardous materials which have been used in the 980 Cluster and will be addressed during the characterization. Appendix 6.2 contains the sampling protocols for the contaminants listed below.

3.1.1 Asbestos

A complete asbestos inspection of the building will be conducted in accordance with Colorado Department of Public Health and Environment (CDPHE) and Asbestos Hazard Emergency Response Act (AHERA) regulations by a state certified inspector. Table 3-1 presents results of previous sampling efforts and additional sampling requirements.

3.1.2 Polychlorinated biphenyls (PCBs)

A PCB evaluation was conducted for the B980 cluster. Based on a review of construction information, Building 980 is the only structure in the cluster that was erected prior to 1980. Therefore, B980 is suspected to contain PCB materials. The B980 Cluster facilities fluorescent lights and fluorescent light ballast will be removed and disposed in accordance with appropriate RFETS procedures. Records also indicate that a waterproof paint (gray) was used on the floor of B980. Samples of this paint will be collected and analyzed for PCBs.

3.1.3 Excess Chemicals

Although there were hazardous chemicals in the B980 Cluster facilities, all excess and hazardous chemicals have been removed from the B980 Cluster facilities during the deactivation process with the exception of some paints and cleaning solvents, which will be disposed of by the subcontractor. Because the chemicals have been removed and there are no known areas which have a buildup of chemical residue, no special chemical characterization is anticipated. Should a chemical be found during the decommissioning process, the chemical will be handled in accordance with existing chemical identification and handling procedures. There are no RCRA units associated with this project, therefore; no closure plans are required.

3.1.4 Lead Paint

Experience with other facilities at RFETS indicates that it is a fair assessment to assume that the majority of painted surfaces associated with safety markings and fire protection systems contain lead. This assessment is based on previous sampling conducted by the Industrial Hygiene group and is documented in the Health and Safety Lead Abatement Plan files. This is the assumption made for the B980 Cluster decommissioning planning process. The first decommissioning effort in each area will be to wipe down and thoroughly clean all surfaces. This effort is to remove any dust which may contain contaminants. Computer modeling and leachability studies have demonstrated that lead in paint, if it exists, will not create a disposal problem. The amount of lead in the painted surfaces will be determined and compared to the previous model as necessary to support the decommissioning effort.

3.1.5 Beryllium

Based on a review of historical data, there is no evidence that beryllium (Be) was used in the B980 cluster. Therefore no Be sampling will required under this plan.

3.1.6 Radioactive Materials

There are no areas within the B980 Cluster which are suspected to contain significant amounts of unidentified/uncontrolled/unmarked radioactive contamination. However, radiological surveys will be completed. The areas requiring surveys are given in Table 3-1.

3.1.7 Hazard Assessment

An assessment of the hazards that may be encountered during specific decommissioning activities will be performed through walkdowns and job safety analyses. This information will be incorporated into the planning process of each activity to ensure maximum protection of the worker.

3.1.8 Hazardous Waste

The Waste Stream and Residue and Identification and Characterization (WSRIC) Building books for 980, 965 and 968 were reviewed to determine the hazardous materials associated with the Cluster. The information indicates that the wastes generated from operations were removed from the buildings for disposal, or accumulated in Satellite Accumulation Areas (SAAs) for staging purposes. At this time there are no hazardous wastes being stored in the buildings. Hazardous product material identified during the walkdowns will be removed prior to the start of decommissioning.

3.1.9 Sampling

Table 3-1 "Building 980 Cluster Survey Design" lists the locations and the types of samples that

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are required for characterization purposes. A trained sampling team will be selected to perform the sampling activities required for characterization purposes. Analysis for characterization purposes will be performed using Environmental Protection Agency (EPA) approved procedures through laboratory facilities. Data Quality Objectives are established for the analytical methods referenced and are on file at the on-site Analytical Projects Office (APO) in Building 881. Sampling and analysis activities will be conducted in accordance with the "characterization protocols" which describe the methods for sampling and analysis for various contaminants of concern including lead, asbestos, PCBs, and radioactive constituents.

Table 3-1 includes the descriptions associated with each area, process information regarding the processes conducted in each room, radioactive and/or hazardous considerations (i.e., known materials associated with a specific process or area), and the confirmation analysis that will be performed. Lead and Asbestos surveys will be conducted by a state-certified inspector who will determine appropriate sampling locations.

TABLE 3-1 BUILDING 980 CLUSTER SURVEY DESIGN

Building & Area	Process Information	Rad/Haz Concerns	Confirmation Analysis	Sampling Locations
980 East Wall	Transite	Asbestos	Assumed To Be >1% Acm	None Required
980 Water Lines	Mud Pipe Fitting Insulation	Asbestos	PLM for Asbestos	Professional Judgement
980 Safety Railings	Yellow Safety Paint	Lead	Known to Contain Lead	None Required
980 Fire Water Systems	Red Safety Paint	Lead	Known to Contain Lead	None Required
980 Brown Beam Paint	Brown Paint	Lead	Known to Contain Lead	None Required
980 Grey Paint	Grey Paint	Lead	Known to Contain Lead	None Required
980 North Exterior Wall	Exposed to Solar Ponds	Rad Contaminants	Rad Survey Joints	Instruction (Appendix 6.1)
980 East Section of Building	Contains Vacuum Truck in RBA	Rad Contaminants	Rad Survey Required	Instruction (Appendix 6.1)
980 Floor Paint	Grey Paint	PCBs	SW-846 Method for PCB solids	Professional Judgement
968 Water Lines	Mud Pipe Fitting Insulation	Asbestos	PLM for Asbestos	Professional Judgement
968 Safety Railings	Yellow Safety Paint	Lead	Known to Contain Lead	None Required
968 Fire Water Systems	Red Safety Paint	Lead	Known to Contain Lead	None Required
968 Brown Beam Paint	Brown Paint	Lead	Known to Contain Lead	None Required
968 Grey Paint	Grey Paint	Lead	Known to Contain Lead	None Required
968 Tan Window Putty	Tan Putty from West Upper Window	Asbestos	PLM for Asbestos	Professional Judgement
965 Safety Railings	Yellow Safety Paint	Lead	Known to Contain Lead	None Required
965 Fire Water Systems	Red Safety Paint	Lead	Known to Contain Lead	None Required
965 Brown Beam Paint	Brown Paint	Lead	Known to Contain Lead	None Required
965 Grey Paint	Grey Paint	Lead	Known to Contain Lead	None Required
965 North Exterior Wall	Exposed to Solar Ponds	Rad Contaminants	Rad Survey Joints	Instruction (Appendix 6.1)

4.0 ASSESSMENT

The assessment stage of the Building 980 cluster data life cycle will include an evaluation of data and any conclusions that may be drawn from the data. The information collected will be detailed in the characterization report.

4.1 DATA EVALUATION

The data will be evaluated for completeness and adherence to the appropriate protocols.

5.0 REFERENCES

DOE/EM-0142P - Decommissioning Handbook

Decommissioning Characterization Protocols (June, 1997) (Draft)

MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual (Draft)

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination (Draft)

6.0 APPENDICES

6. 1 RADIOLOGICAL SURVEY INSTRUCTIONS

This appendix applies to radiological constituents only. Other Instructions presented in Appendix 6.2.

6.1.1 RADIOLOGICAL SURVEY DESIGN

To meet the DQOs surveys must be conducted in a well defined consistent manner. There are three important aspects of designing a well defined consistent survey:

Instrumentation
Survey Locations/Instruction
Procedures/Protocols

These must be accomplished to maximize efficiency and quality data which may be used to determine building status.

6.1.2 RADIOLOGICAL SURVEY INSTRUCTIONS

To define the specific survey requirements for this project, characterization survey radiological instructions were developed for each building/area. These instructions include a description of the item/area, number of alpha/beta swipes, the number of direct measurements and special instruction. These instructions were developed to meet DQO criteria. The specific instructions for the Building 980 cluster are presented in below.

6.1.3 RADIOLOGICAL PROCEDURES/PROTOCOLS

The appropriate procedures/ protocols to conduct the requirements of the characterization survey instruction are contained in Appendix 6.2.

6.1 RADIOLOGICAL SURVEY INSTRUCTIONS ATTACHMENT

Building 965 Decommissioning Project
Characterization Survey Radiological Instructions

Location/Room: Inside Bldg. 965

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha/Beta Swipes**	**# of Direct Alpha/Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Floors/Walls ≤ 2 meters	A minimum of 1 measurement for each 50 m^2	A minimum of 1 measurement for each 50 m^2	N/A	Obtain measurements on floor & wall surfaces ≤ 2 meters throughout the bldg.
Fixed Equipment	A minimum of 10 measurements	A minimum of 10 measurements	N/A	Obtain biased measurements on horizontal surfaces of fixed equipment

Location/Room: Outside Bldg. 965

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha/Beta Swipes**	**# of Direct Alpha/Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Walls ≤ 2 meters	A minimum of 1 measurement for each 50 m^2	A minimum of 1 measurement for each 50 m^2	N/A	Obtain measurements on wall surfaces ≤ 2 meters.

Notes

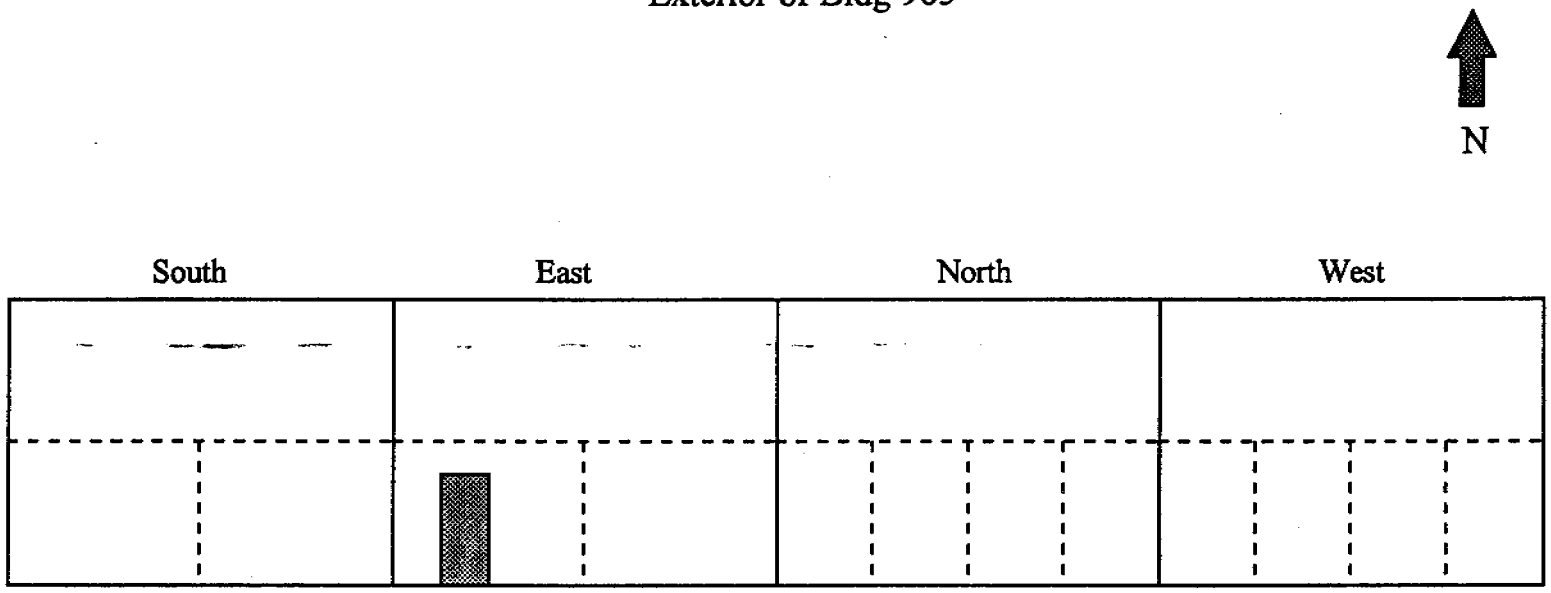
[1] See attached map of building layout.
[2] Surveys to be performed in accordance with 4-K62-ROI-03.01, "Performance of Surface Contamination Surveys". Other radiological references are 1-P73-HSP-18.10, " Radioactive Material Transfer and Unrestricted Release of Property and Waste", 4-S23-ROI-03.02, "Radiological Requirements for Unrestricted Release", and 4-N83-REP-1108, "Radioactive Material Management Area (RMMA) Determination".
[3] Perform an alpha/beta scan survey of the percentage of the accessible surfaces, including fixed equipment, as listed.

Review and Approval

Prepared By: _____ Date: _____

Reviewed By: _____ Date: _____

Exterior of Bldg 965



1 m. x 3 m. and
3 m. x 4 m. grids

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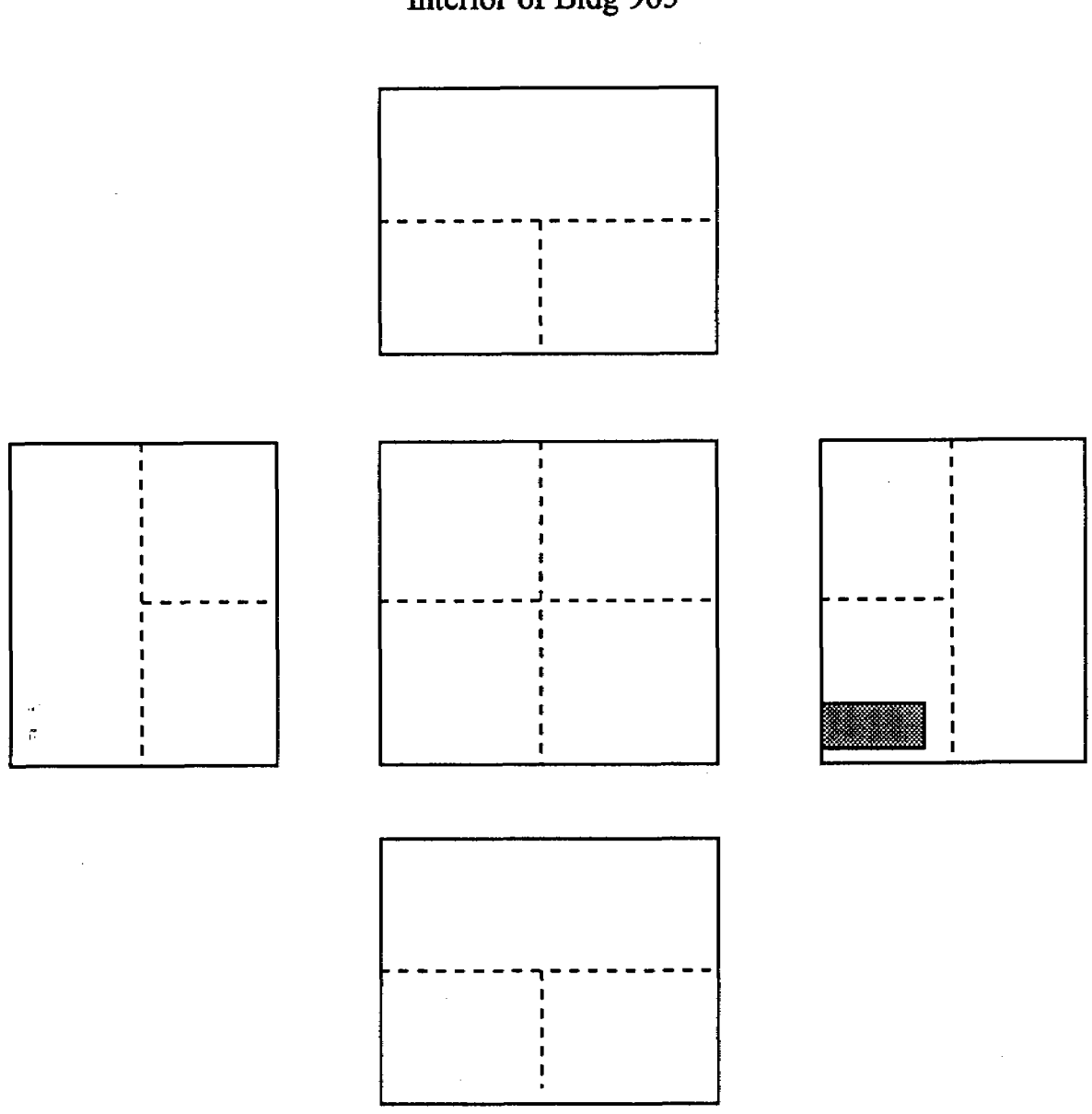
Interior of Bldg 965



Building 968 Decommissioning Project
Characterization Radiological Instructions

Location/Room: Inside Bldg. 968

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha Beta Swipes**	**# of Direct Alpha Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Item # 1 Floor	Approximately 1 measurement for each 9 m^2 area	Approximately 1 measurement for each 9 m^2 area	N/A	Record the survey location and the survey results on a Radiological Operations Contamination survey form and attach to this survey instruction.
Item # 2 Misc. Equipment	Approximately 1 measurement on a selected component within each 9m^2 survey location	Approximately 1 measurement on a selected component within each 9m^2 survey location	N/A	Record the survey location, name of the component and the survey results on a Radiological Operations Contamination survey form and attach to this survey instruction

Notes

[1] See attached map of building layout.
[2] Surveys to be performed in accordance with 4-K62-ROI-03.01, "Performance of Surface Contamination Surveys". Other radiological references are: 1-P73-HSP-18.10, " Radioactive Material Transfer and Unrestricted Release of Property and Waste", 4-S23-ROI-03.02, "Radiological Requirements for Unrestricted Release", and 4-N83-REP-1108, "Radioactive Material Management Area (RMMA) Determination".
[3] Perform an alpha/beta scan survey of the percentage of the accessible surfaces, including fixed equipment, as listed.

Review and Approval

Prepared By: _____ Date: _____

Reviewed By: _____ Date: _____

Building 980 Decommissioning Project
Characterization Survey Radiological Instructions

Location/Room: Interior of Bldg. 980 (except the radiological buffer area)

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha/Beta Swipes**	**# of Direct Alpha/Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Floors/Walls ≤ 2 meters	A minimum of 1 measurement for each 50 m^2	A minimum of 1 measurement for each 50 m^2	N/A	Obtain measurements on floor & wall surfaces ≤ 2 meters throughout the bldg.
Fixed Equipment	A minimum of 30 measurements	A minimum of 30 measurements	N/A	Obtain biased measurements on horizontal surfaces of fixed equipment
Sink drains	A minimum of 1 measurement per sink drain	A minimum of 1 measurement per sink drain	N/A	Obtain measurements on accessible surfaces of drains.

Location/Room: Exterior of Bldg. 980

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha/Beta Swipes**	**# of Direct Alpha/Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Item # 1 North facing walls	A minimum of 1 measurement for each 9 m^2	A minimum of 1 measurement for each 9 m^2	N/A	Obtain measurements on wall surfaces of the north side of the bldg.
Sheet metal seams on north facing walls	A minimum of 1 measurement for each 9m^2	A minimum of 1 measurement for each 9 m^2	N/A	Obtain biased measurements under the overlap of the sheet metal siding
Item # 2 Non-North facing walls	A minimum of 1 measurement for each 50 m^2	A minimum of 1 measurement for each 50 m^2	N/A	Obtain measurements on east, south & west wall surfaces & roof of the bldg.

Notes

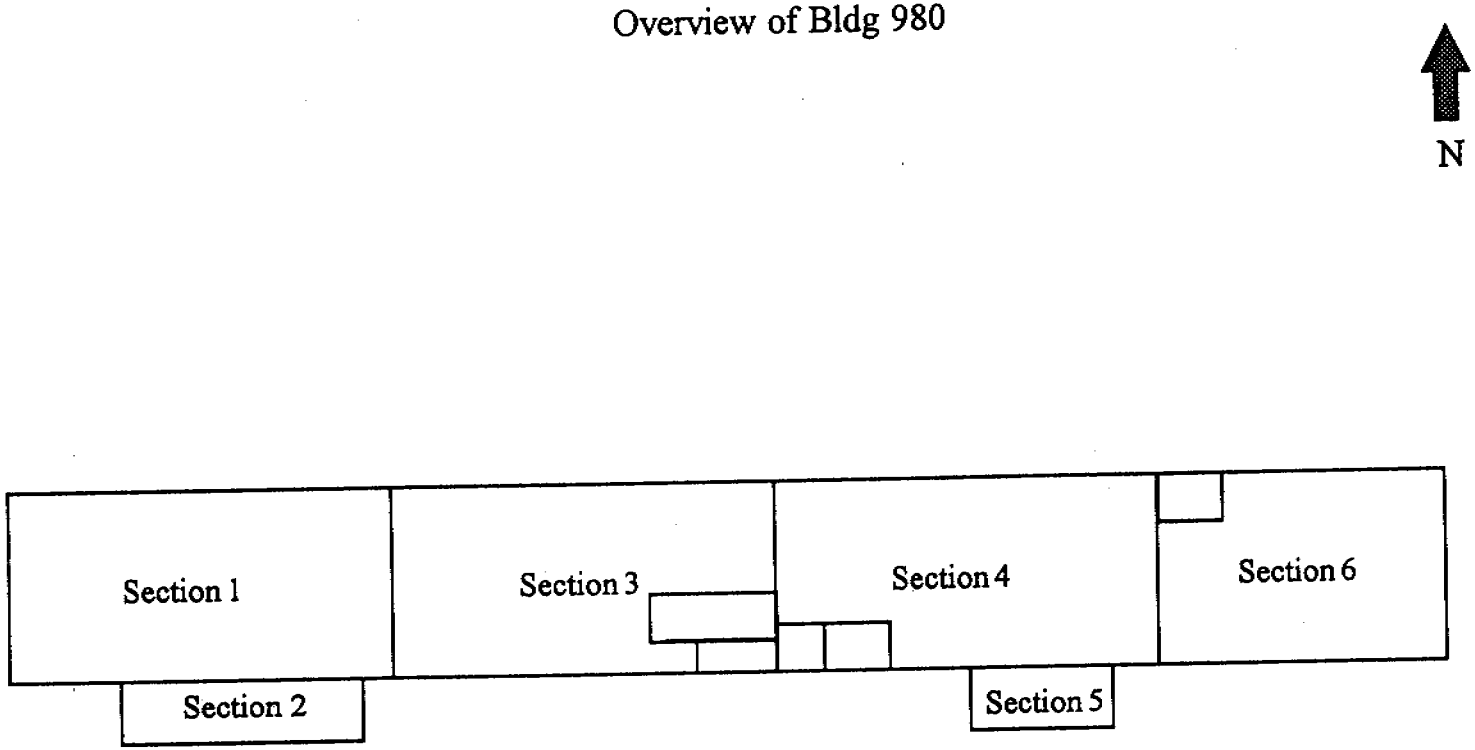
[1] See attached map of building layout.
[2] Surveys to be performed in accordance with 4-K62-ROI-03.01, "Performance of Surface Contamination Surveys". Other radiological references are 1-P73-HSP-18.10, " Radioactive Material Transfer and Unrestricted Release of Property and Waste", 4-S23-ROI-03.02, "Radiological Requirements for Unrestricted Release", and 4-N83-REP-1108, "Radioactive Material Management Area (RMMA) Determination".
[3] Perform an alpha/beta scan survey of the percentage of the accessible surfaces, including fixed equipment, as listed.

Review and Approval

Prepared By: _____ Date: _____

Reviewed By: _____ Date: _____

Overview of Bldg 980



Not to scale

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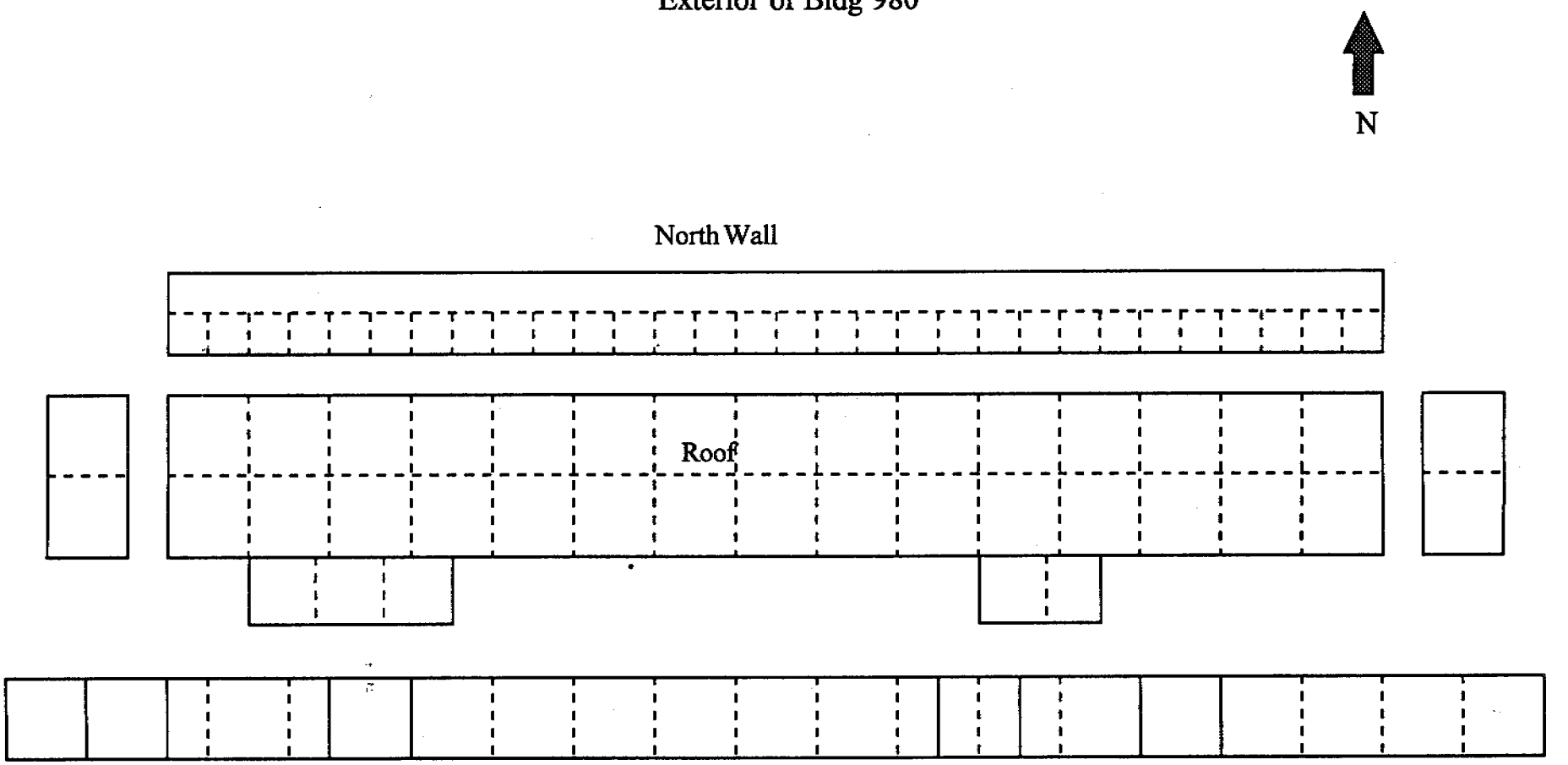
Exterior of Bldg 980



Not to scale

3 m. X 3 m. abd
6 m. x 6 m. grids

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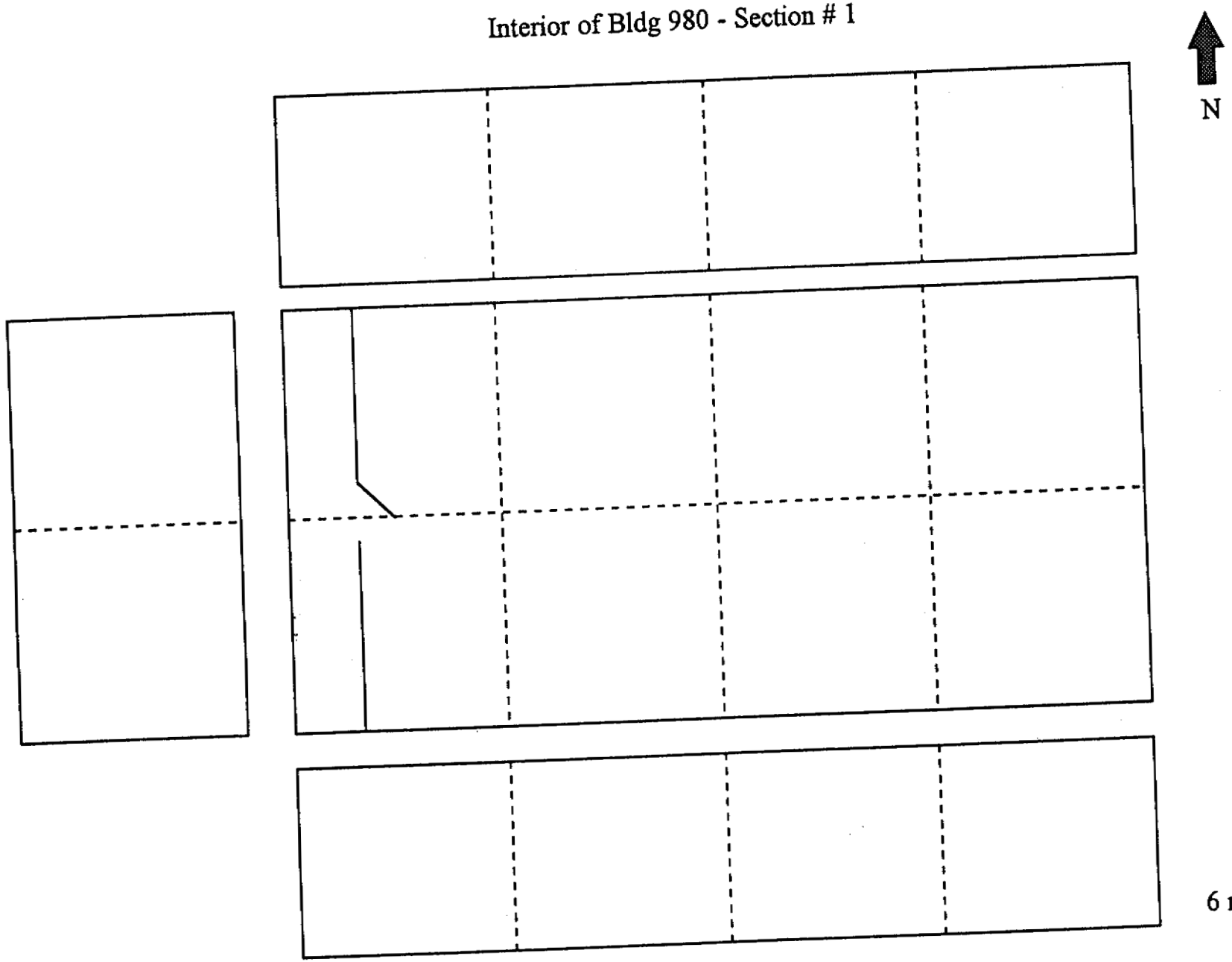
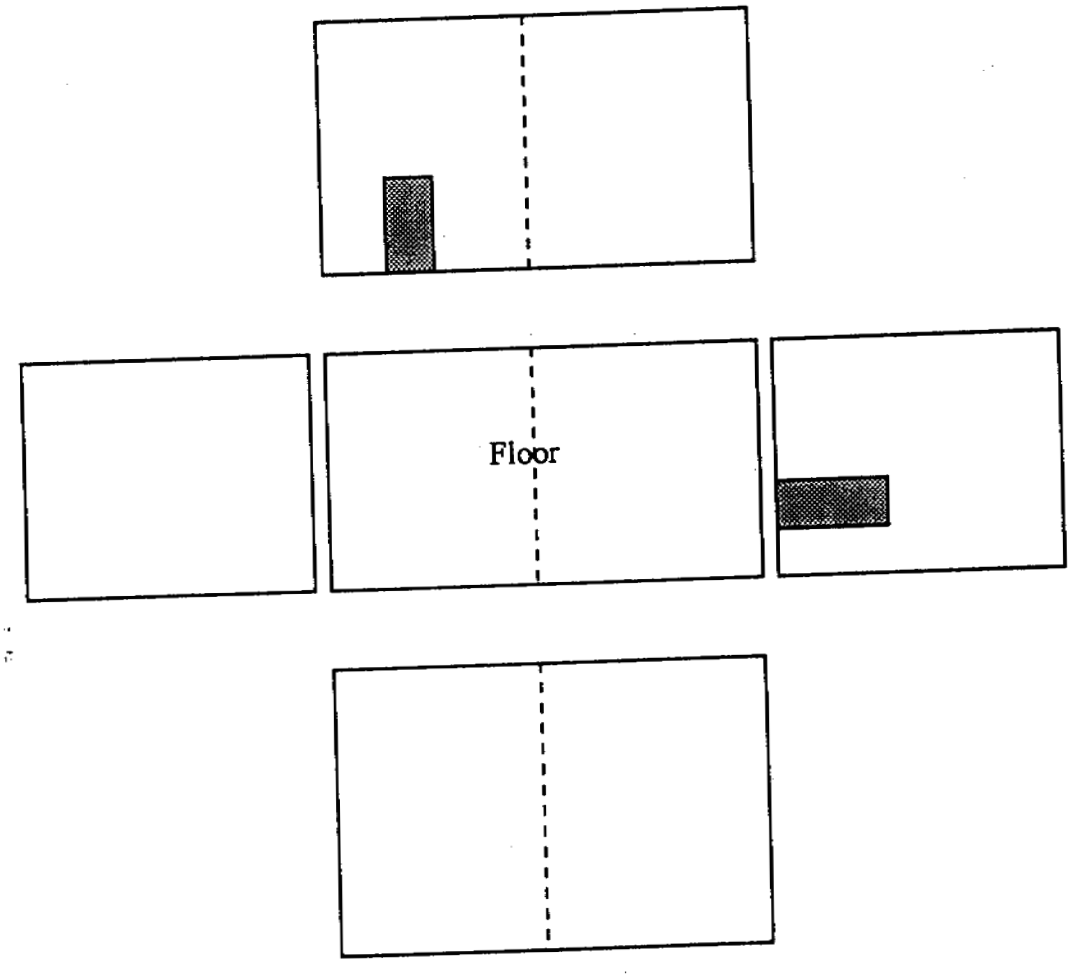
Interior of Bldg 980 - Section # 1

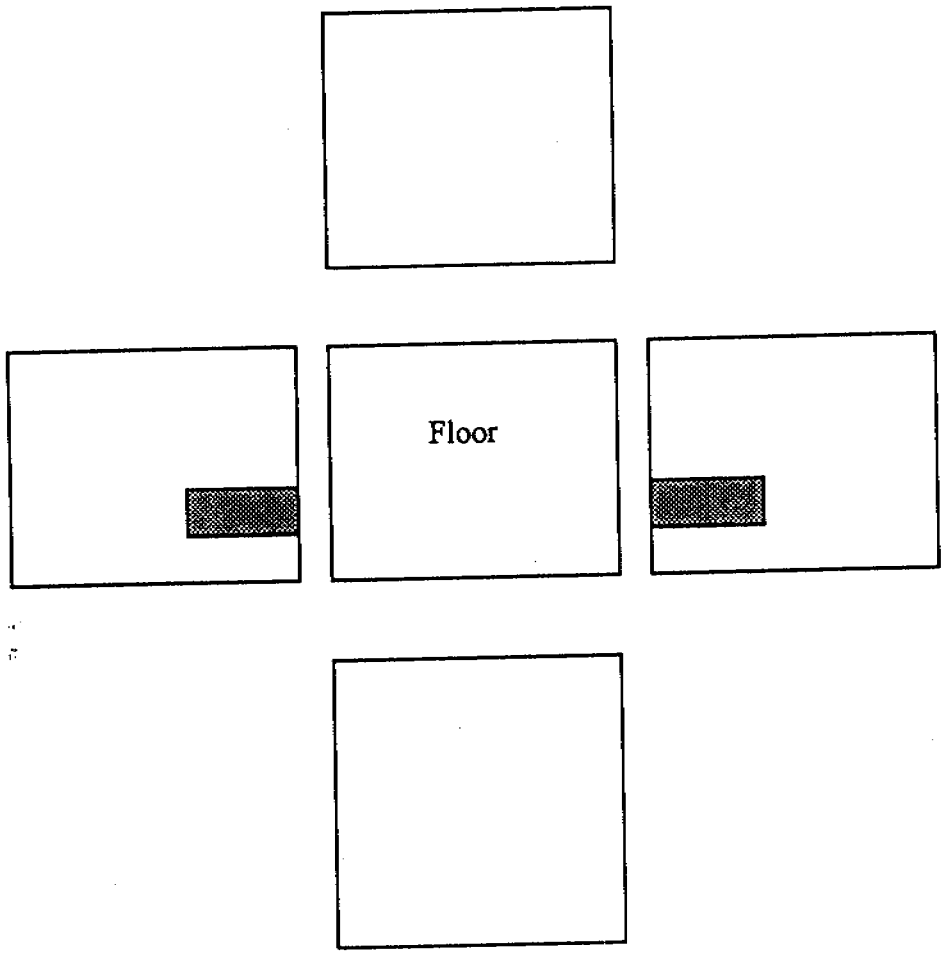


Bldg 980 - Section # 2



6 m. x 6 m. and
4 m. x 6 m. grids

Bldg 980 -Section # 2



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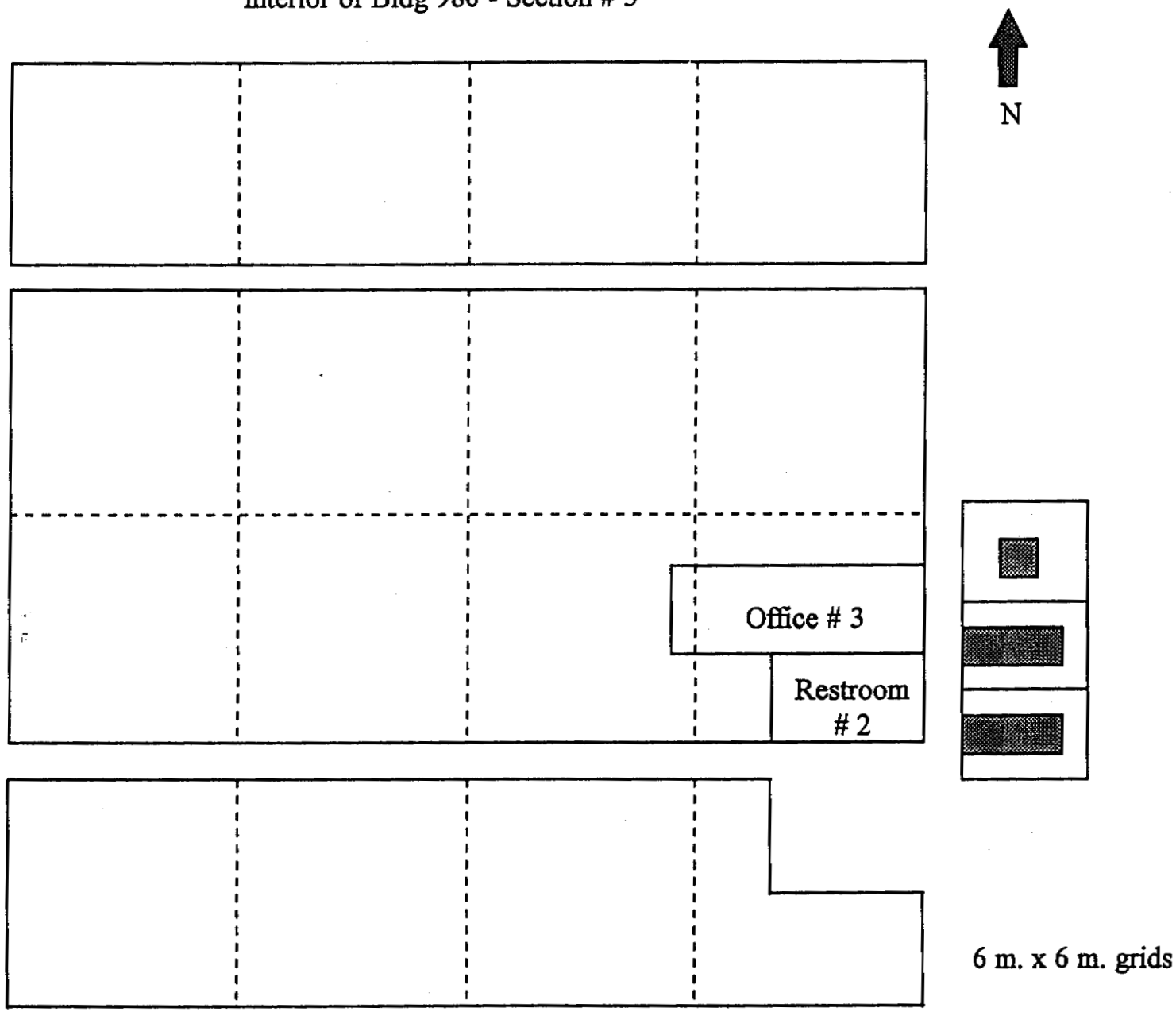
Interior of Bldg 980 - Section # 3



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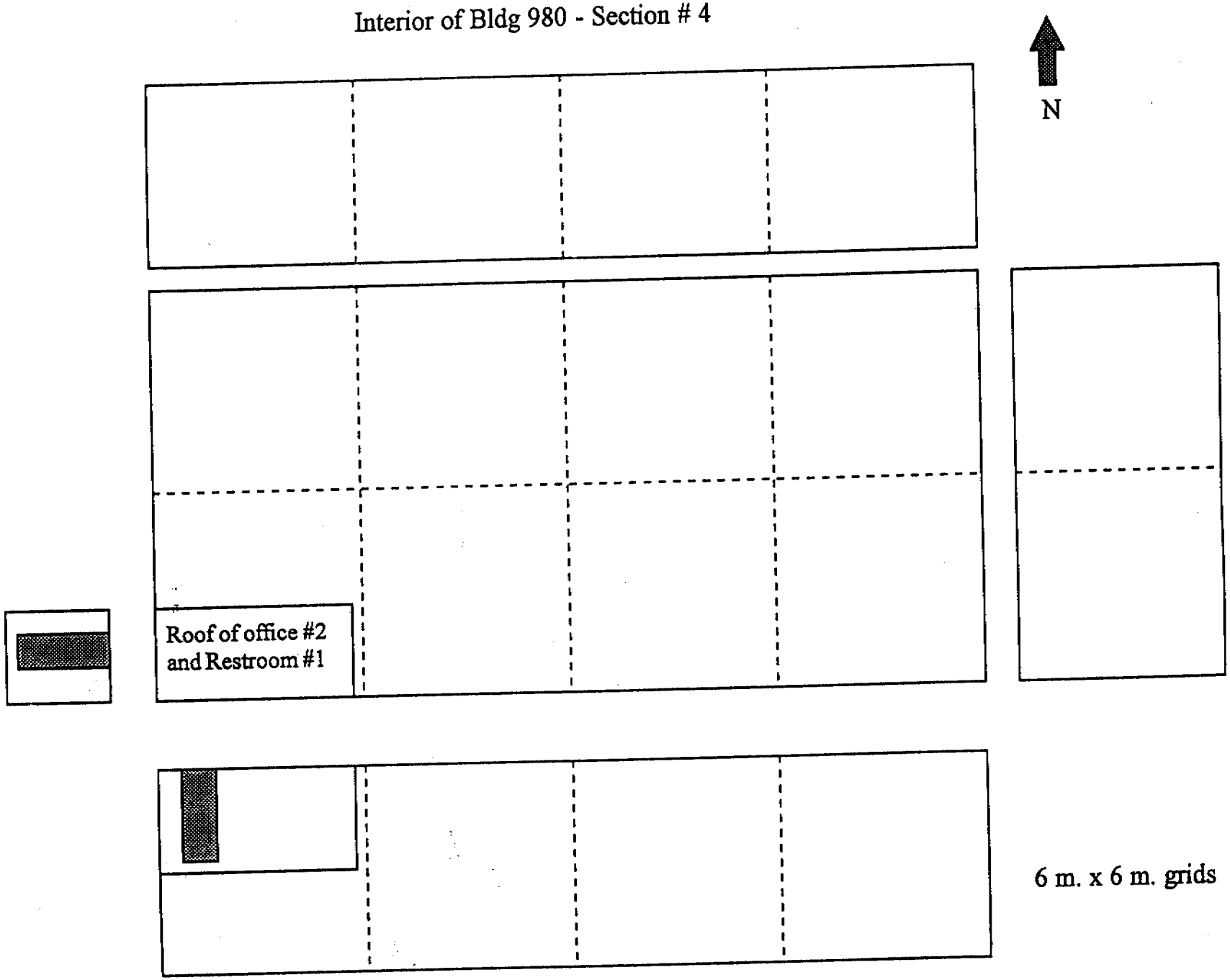
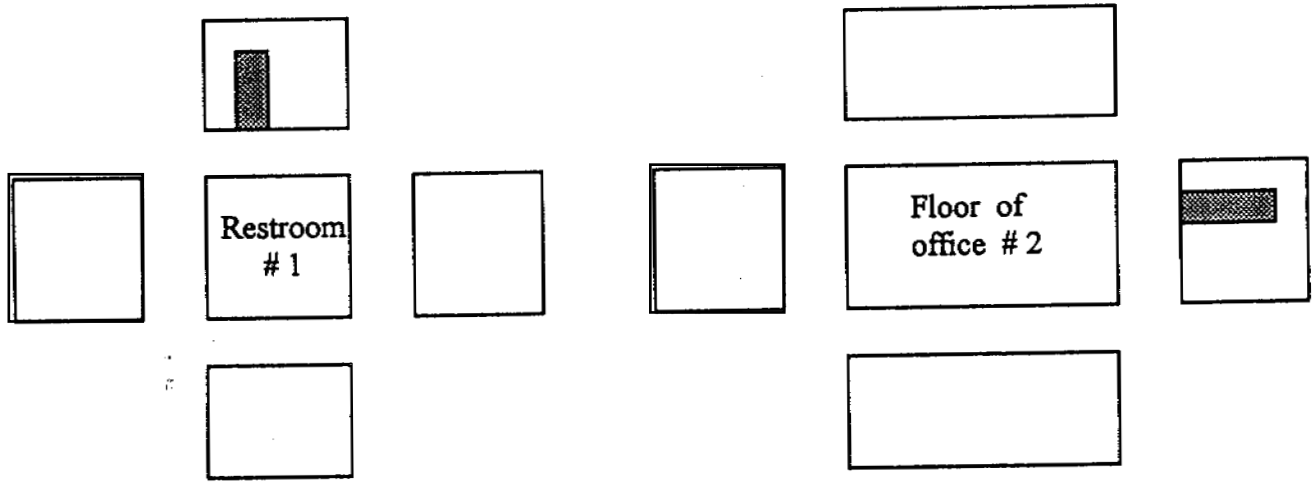
Interior of Bldg 980 - Section # 4



Bldg 980 Section 4 Interior Rooms



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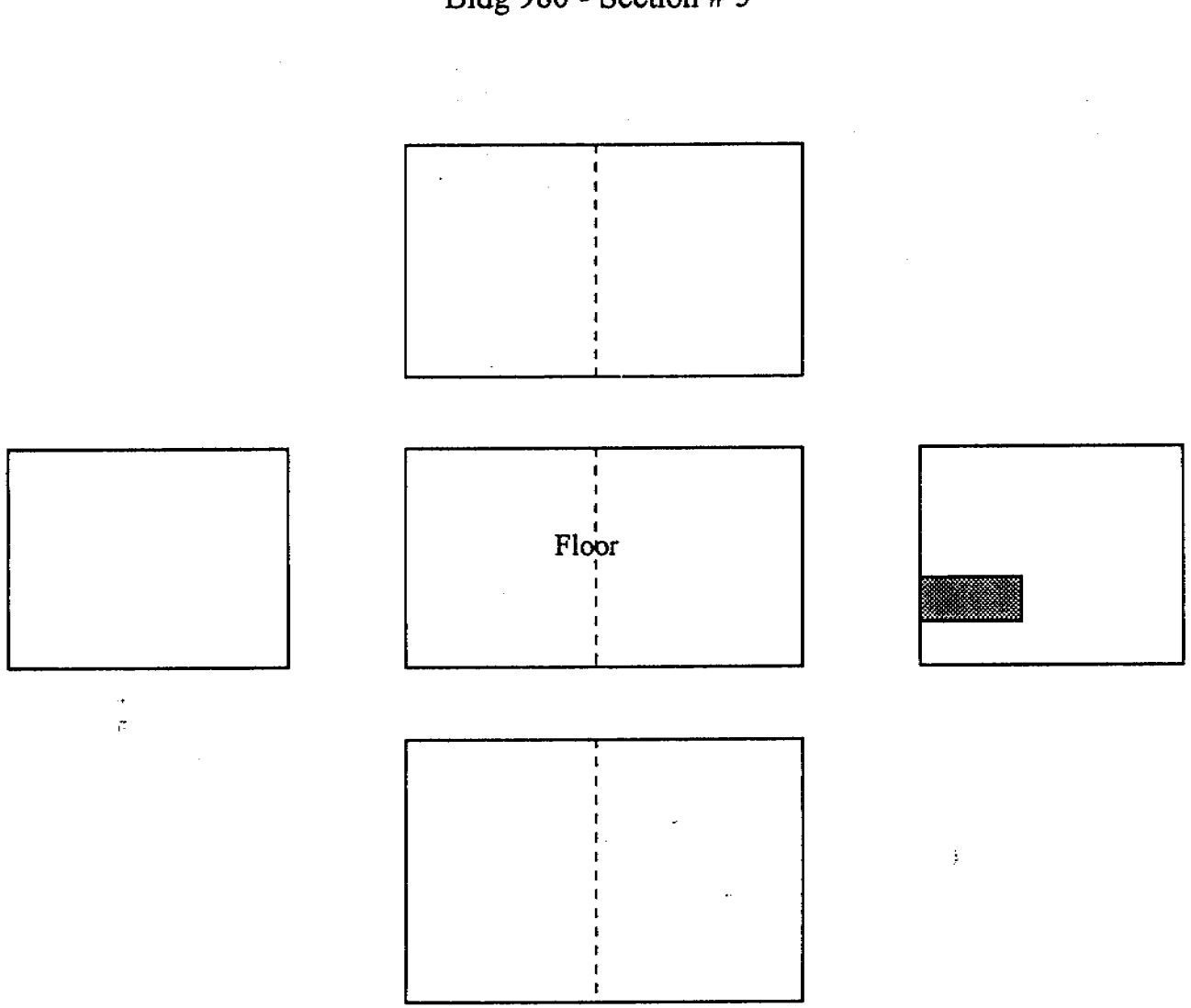

4 m. x 6 m. grids

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6.1.4 RADIOLOGICAL INSTRUMENTATION

Radiological instrumentation (portable and fixed) for making direct field measurements and laboratory analysis respectively will be utilized during characterization activities. Instrumentation which is reliable, suited to the physical conditions at the site, and capable of detecting the radiations of concern (at the required detection levels) will be chosen. Instrumentation which may be used for this project is presented in Table 6-1. Additional equivalent instrumentation may be used if approved by radiological engineering.

TABLE 6-1 RADIOLOGICAL INSTRUMENTATION

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm^2)
Bicron w/ A100 Probe	60 sec. (alpha)	2	Direct Alpha Surveys	55
Bicron w/ B50 Probe	60 sec. (beta)	250	Direct Beta Surveys	610
NE Electra W/ DP6 Probe	60 sec. (alpha) 60 sec. (beta)	2 700	Direct Alpha Surveys Direct Beta Surveys	60 455
Eberline SAC-4	60 sec. (alpha)	1	Removable Alpha Swipes	18
Eberline BC-4	60 sec. (beta)	200	Removable Beta Swipes	205
LB-5100LW	60 sec. (alpha) 60 sec. (beta)	0.5 4	Simultaneous Removable Alpha and Beta Swipes	20 35

6.2 DECOMMISSIONING CHARACTERIZATION PROTOCOLS

Radiological Characterization Protocol

RADIOLOGICAL CHARACTERIZATION PROTOCOL FOR BUILDING AND STRUCTURES

Introduction

This protocol establishes the framework for performance of radiological characterization activities to support planning for decontamination and decommissioning activities. This process will be consistent with the most conservative information available as well as ensure that characterization activities are compatible and in compliance with federal/state regulations.

Purpose and Objectives

As characterization activities are performed, the purpose and objectives must support an understanding of the facility or building radiological conditions. These objectives are: (1) Initiate detailed decommissioning planning. (2) Establish the type and volume of waste to be generated. (3) Ensure protection of the workers and environment during decommissioning operations. (4) Determine the nature and extent of radiological contamination present in remaining equipment, systems and building surfaces.

Instruction Development

Before starting the actual characterization activities a historical profile must be developed to support the characterization process. This process will include: (1) A review of operating history of the facility or building with respect to use, spills, releases and any other significant radiological events. (2) Review of radiological data from past scoping and characterization surveys. (3) Identification of radionuclides of concern and determine guidelines. (4) Classification of areas as to "affected" and "unaffected".

Initital Classification

All areas of facilities or buildings do not have the same potential for residual contamination and therefore do not require the same level of characterization survey coverage to determine the initial classification. By combining historical data with initial classification surveys, an effective and efficient characterization process will be conducted.

Two classifications of survey areas will be used when determining survey requirements: These are affected and unaffected areas. These are defined as follows:

- **Affected areas:** These are areas that have potential radioactive contamination (based on historical reviews) or known radioactive contamination (based on past or preliminary radiological surveillance). This would normally include areas where radioactive materials were used and stored, where records indicate spills or other unusual occurrences that could have resulted in spread of contamination and where radioactive materials were buried. Areas immediately surrounding or adjacent to locations where radioactive materials were used or stored, spilled, or buried are included in this classification because of the potential for inadvertent spread of contamination.

- **Unaffected areas:** All areas not classified as affected will be labeled unaffected. These areas are not expected to contain residual radioactivity, based on a knowledge of site history and previous survey information.

Suggested Survey Requirements

When performing characterization surveys in affected and unaffected areas the surveys will be directed toward biased locations identified during the historical review phase. Additionally random points will also be selected in non biased areas to validate previous survey data.

Normally when performing characterization activities the surveys will consist of surveying structures (which consist of equipment, ceilings, walls, floors, etc.), environs (surface and subsurface) and liquid pathways, if applicable. Sampling guidance from NUREG/CR-5849 "Manual for Conducting Radiation Surveys In Support of License Termination" will be utilized as appropriate.

Survey Techniques And Plans

When performing radiological surveys three main techniques will be utilized to acquire the survey data. The characterization will be conducted in accordance with documented plans, instructions and procedures. The survey plan or instruction will define the general approach to performing measurements and sampling. Figure 5-1 provides an example of a survey instruction. The quality assurance plan establishes the basis for assuring the adequacy and quality of the survey data. Specific survey techniques are detailed in procedures, which may be included in the instruction or plan or incorporated by reference. Personnel conducting the surveys will be trained and qualified in the procedures they use. Changes in plans and procedures will on occasion be necessary, based on unanticipated findings or conditions encountered as the survey progresses. These changes will be reviewed and/or documented by the supervision in charge of the survey(s).

Surveys will address alpha, beta and gamma contamination when applicable. Various types of instrumentation will be utilized. However, the instrumentation normally falls into (3) categories. These categories are: (1) Gas filled detectors, (2) Scintillation detectors, and (3) Solid state detectors.

The design and the conditions under which a specific detector is operated determines the types of radiations (alpha, beta and/or gamma) that can measured, the sensitivity level for measurements and the ability of the detector both to differentiate between different types of radiation and distinguish between the energies of the interacting radiations. The particular capabilities of a radiation detector will, in turn, establish its potential applications in conducting a survey for final site release. A listing of alpha, beta, and gamma radiation detector types along with their usual applications are listed in Appendices 5-2 and 5-3.

Survey techniques to be utilized include (3) major techniques. These techniques include:

Scan surveys: Scan surveys are conducted by holding the detector as close as possible to a surface and moving the detector across the surface at a slow speed, (about one detector width per second). Nominally the distance between the detector and the surface is maintained at less than 2 centimeters with the exception of alpha scanning for which the distance should be less than 1 centimeter.

- **Fixed point surveys or Direct measurements:** To conduct direct measurements of surface alpha and beta activity, instruments and techniques providing the required detection sensitivity are selected. Experience has shown that an integrated count for one minute, using a large area (100 cm2) detector, is a practical field survey technique and will provide detection sensitivities that are below most guideline values.

- **Removable contamination measurements:** Smears for removable surface activity are obtained by wiping an area of approximately 100 cm2 using a dry filter paper, such as a Whatman

50 or equivalent, while applying a moderate pressure. Normally a smear is taken at each direct measurement location, although for characterization purposes it is not always required. Large area wipes or "masslin smears" can be utilized during scoping and characterization surveys.

Additional sampling for soil, water or other liquids may be required depending on the structure being characterized. However, specific requirements for these types of samples will be detailed in a procedure plan or instruction.

Sample Analysis

Samples collected during radionuclide characterization surveys for characterization purposes will be analyzed by trained individuals using the appropriate equipment and procedures. Samples may be analyzed on or off site, however, there must be written procedures that document the laboratory's analytical capabilities for the radionuclides of interest and a QA/QC program which assures validity of the analytical results. An example of equipment sensitivities for laboratory radiometric equipment/procedures to anaylze characterization surveys is found in Appendix 5-4.

Survey Documentation And Reports

Documentation for characterization will provide a thumbprint of the current status of the facility, structure or room. Surveys will be documented in accordance with existing radiation protection procedures, Quality Assurance and Quality Control requirements.

Appendix 5-1
EXAMPLE
Building 779 Decommissioning Project
Characterization Instruction Sheet

Location/Room Room 150

Item/Area (1) Description	Radiological Survey(2)		# Be (4) Swipes	Special Instructions
	# of swipes (3) (Alpha Beta)	# of Direct Measurements (Alpha/Beta)		
Work Table w/Hood	5	5	3	Obtain measurements on suspected contaminated surfaces.
Motor Generator Set	5	5	1	Obtain measurements on external equipment surfaces and points where contamination is potentially present.

Notes

1. See Attached Map of Room And Component Layout.
2. Surveys To Be Performed In Accordance With 4-K62-ROI-03.01, "Performance of Surface Contamination Surveys".
3. Large Area Wipe Technique May Be Used As Deemed Appropriate.
4. When Possible Use Radiological Swipes For Be Survey Requirements.

Review And Approval

Prepared By _____ Date _____

Rad Engineer _____ Date _____

Attachment 5.2

Radiation Detectors With Applications To Alpha Surveys

Detector Type	Detector Description	Application	Remarks
gas proportional	< 1mg/cm^2 window; probe face area 50 to 100cm^2.	surface scanning; surface activity measurement; field evaluation of smears	
	< 0.1 mg/cm^2 window; probe face area 10 to 20 cm^2.	laboratory measurement of water, air and smear samples	
	no window (internal proportional); Probe face area 10 to 20 cm^2.	laboratory measurement of water, air and smear samples	
scintillation	ZnS(Ag) scintillator; probe face area 50 to 100 cm^2.	surface scanning; surface activity measurement; field evaluation of smears	
	ZnS(Ag) scintillator; probe face area 10 to 20 cm^2.	laboratory measurement of water, air and smear samples	
	Lucas scintillation flask	laboratory measurement for low levels of radium	
solid state	silicon surface barrier detector	laboratory analysis by alpha spectroscopy	

Attachement 5.3

Radiation Detectors With Applications To Beta/Gamma Surveys

Detector Type	Detector Description	Application	Remarks
gas proportional	< 1mg/cm^2 window; probe face area 50 to 1000 cm^2.	surface scanning; surface activity measurement; field evaluation of smears	
	< 0.1 mg/cm^2 window; probe face area 10 to 20 cm^2.	laboratory measurement of water, air and smear samples	better measurement sensitivity for low energy beta particles than detectors with windows
	no window (internal proportional); Probe face area 10 to 20 cm^2.	laboratory measurement of water, air and smear samples	
Geiger-Mueller	1.4 mg/cm^2 window; probe area 10 to 100cm^2	surface scanning; surface activity measurement; laboratory measurement of samples	
	various window thickness; few cm^2 probe face	special scanning applications laboratory	

Attachment 5.3 Continued

Radiation Detectors With Applications To Beta Surveys

Detector Type	Detector Description	Application	Remarks
scintillation	liquid scintillation cocktail containing sample	laboratory analysis; spectrum analysis capabilities	

Attachment 5.4

Typical Measurement Sensitivities For Laboratory Radiometric Procedures Associated With Characterization Surveys

Sample Type	Radionuclides or Radiation Measured	Procedure	Approximate Measurement Sensitivity
Smears (filter paper)	Gross Alpha	Low-background gas proportional counter; 5-min. count	5 dpm
		Alpha scintillation detector with scaler; 5-min. count	20 dpm
	Gross Beta	Low background gas proportional counter; 5-min. count	10 dpm
		End window GM with scaler; 5-min. in count (unshielded detector)	80 dpm
	Low Energy Beta (H-3, C-14, Ni-63)	Liquid scintillation B Counter; 5-min count	30 dpm

-10

Attachment 5.4 Continued

Typical Measurement Sensitivities For Laboratory Radiometric Procedures Associated With Characterization Surveys

Sample Type	Radionuclides or Radiation Measured	Procedure	Approximate Measure Sensitivity
Soil Sediment	Cs-137, Co-60, Ra-226, (Bi-214)*, TH-232 (Ac-228)*, U-235	Gamma Spectrometry - Intrinsic germanium detector (25% relative efficiency); pulse height analyzer; 500-g sample; 15-min. analysis.	1-3 pCi/g
	U-234, 235, 238; Pu-328, 239/240; Th-228, 230, 232; other alpha emitters	Alpha spectrometry - pyrosulfate fusion and solvent extraction; surface barrier detector; pulse height analyzer; 1-g sample; 16-hour count	0.1-0.5 pCi/g
Water	Gross alpha	Low-background gas proportional counter; 100-ml sample, 200-min. count	1 pCi/l
	Gross beta	Low background gas proportional counter; 100-ml sample, 200-min. count	1 pCi/l
	Miscellaneous gamma emitter	Gamma spectrometry - 3.5-ml sample 16-hour count	10 pCi/l
	Miscellaneous alpha emitter	Alpha spectrometry - 100-ml sample; 16-hour count	0.1-0.5 pCi/l

Attachment 5.4 Continued

Typical Measurement Sensitivities For Laboratory Radiometric Procedures Associated With Characterization Surveys

Sample Type	Radionuclides or Radiation Measured	Procedure	Approximate Measurement Sensitivity
	H-3	Liquid scintillation spectrometry; 5-ml sample; 30 min. count	300 pCi/l

Decommissioning
Polychlorinated Biphenyls (PCBs)
Protocol

Sampling Protocol for Polychlorinated Biphenyls (PCBs)

Introduction

The intent of this document is to describe the characterization protocol regarding PCBs within the facility to be decommissioned.

Purpose

The survey practices outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities within a facility. However, in some cases the results, particularly those from locations not affected by new introductions of PCBS (i.e., closed loop) may be used as final status results or to support a final survey.

Initial Classification

In an effort to provide an organized approach to the characterization activities, rooms and/or equipment items will be classified in two categories, "PCB-suspect" and "unaffected". These classifications aid in focusing the sampling effort to the areas/equipment with a higher potential for containing PCB contaminants.

Instruction Development

This protocol serves as a guide in the preparation of specific instructions to obtain the desired PCB characterization information. The instructions end result shall provide the following data:

- To determine the presence and extent of PCB contamination.
- To quantify and qualify environmental parameters that effect potential human exposure from existing and residual PCB contamination.
- To support evaluation of detailed planning for decontamination, equipment removal and waste disposal.
- To support required project plan considerations regarding exposure assessments.
- To support selection of cleanup criteria and approach.

Initial Classifications

In an effort to provide an organized approach to the characterization activities, rooms and/or equipment items will be classified in two categories, "PCB-suspect" and "unaffected". These classifications aid in focusing the sampling effort to the areas/equipment with a higher potential for containing PCB contaminants.

Sampling Approach

Prior to assessing materials for PCBs or defining an area as "affected" or "unaffected" facility equipment and systems should be evaluated using program guidance. Upon initial characterization as a PCB-suspect area or item, a facility walk-down of the area or equipment is conducted in an effort to visually identify those items that require sampling. A request is then completed and forwarded to the Analytical Projects Office (APO) for each room and equipment item to be sampled. APO coordinates with the project engineer to

arrange for the sampling event.

PCB-Suspect Areas/Equipment

"PCB-suspect areas/equipment" for the purpose of PCB sampling are defined as those areas/equipment items that have the potential to contain PCBs. The following is a brief list of items which may potentially contain PCBs:

- Oil soluble and plasticizer application paints prior to 1982 - so used for the purpose of flame retardant, waterproofing an s/or chemical resistance.
- Flexible coatings in high thermal heat environments or where thermal cycling or fluctuations were a concern (waterproofing, fire resistance, extreme chemical resistance).
- Stucco/masonry materials and asbestos surfaces such as siding, roofing and wallboard.
- Military specification paint used in system piping, system components and associated equipment (e.g. valves, heat exchangers, pumps, electrical cabinets, etc.)
- Electrical cable insulation for high voltage, underground use (Not in use at RFETS).
- Adhesive coating on ventilation gaskets in HVAC systems (adhesives, lagging cloth/paste).
- Multilayered steel siding materials consisting of steel, asphalt, or zinc; asphalt-impregnated asbestos felt; and alsphaltic waterproofing coating (manufactured by H.H. Robertson, Circa 1917).
- Wool felt for sound dampening; may also have been incorporated in some ceiling tile (fireproofing).

Facility drawings, photographs and facility walk-downs provide detailed information to assist the project engineer in making determinations as the location where sampling should be conducted.

PCB Non Suspect Areas

Unaffected areas are those defined as areas or equipment where there is no history or process knowledge of PCBs being present, or verified through the review of specifications which can be traced to the area item, manufacturer, or verified to have been previously tested as negative. TSCA program guidance must be obtained to identify unaffected areas. In general, areas or equipment that are unaffected do not meet any of the criteria listed as "PCB-suspect" above.

Sampling Methodology

Data collected during the characterization activities will consist of two types (1) field swipes taken from PCB-suspect items and (2) sample analyses of media (paint chips, etc.) using laboratory equipment or systems. A minimum of 5 grams of media is required to perform the PCB solids analysis. Radiological surveys will be performed by trained Radiological Control Technicians (RCTs) using field instrumentation in accordance with Radiological Operations Instructions during sampling activities, as necessary. Radiation protection for the sampling event and the sampling team will be addressed under a Radiological Work Permit (RWP). Additional personal protective equipment for the sampling activity, if required, will be as specified by Industrial Hygiene support personnel.

A trained sampling team is used to perform the sampling activities. Analysis for characterization purposes will be performed using Environmental Protection Agency (EPA) approved procedures identified in, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, U.S. EPA SW-846, 1986, Third Edition." Laboratory facilities located on-site or off site will support the analysis. Onsite methods for analysis of PCBs includes SW-846 Method 8081 "GC Analysis for PCBs in oils and solids. Off-site methods include SW-846 Method 8080A. A table describing the differences in these methods is included in Appendix 1. Data Quality Objectives (DQOs) are established for the analytical methods referenced and are available through the on-site Kaiser-Hill APO office in B-881. DQOs for Off-site laboratories are established under individual QA/QC Programs which meet the intent of EPA SW-846 requirements.

During characterization activities, several direct, indirect and media samples will be, obtained and analyzed for radiological (as needed) and PCB contaminants. The results will be used to determine contaminants and as the basis for estimating waste quantities and decontamination options. Sample collection, analysis, and the associated documentation will follow site procedures which meet the recommendations and requirements of applicable regulatory agencies. A "chain of custody" sample tracking form is used for each sample collected to account for the sample from collection to the point of analysis. Samples will be collected and documented in accordance with Laboratory Procedure No. L-6294-A "Sampling Within an RBA/CA".

Analysis Methodology

Specialized procedures have been developed at RFETS to meet technical requirements for analyzing certain substances, such as those containing radionuclides or compounds which interfere with the accuracy and precision of the analysis. These test methods are entitled the "L-Procedures." "L-Procedures" are based on test methods found in 6CCR, 1007-3, Part 261; "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", U.S. EPA SW-846, 1986, Third Edition, " as amended by Updates I (July 1992), II (September, 1994), and IIA (August 1993); "Methods for Chemical Analysis of Water and Wastes, " EPA Publication No. 600/4-79-020 (1979). Various other EPA approved protocols such as those from the American Society of Testing and Materials (ASTM) are also used.

Analysis for hazardous waste determination is conducted in accordance with Rocky Flats Plant Procedure 1-C75-HWRM-03 "Waste Identification and Analysis". This document outlines and references requirements of waste management for liquids which will be handled as waste material. This document contains the guidelines used at RFETS to determine if a waste is regulated as hazardous under RCRA, and to identify the waste characteristics/constituents for proper management of the waste.

Quality Assurance

The Quality Assurance Program for characterization activities follows the same program for management of hazardous wastes on-site and meets the minimum requirements established by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", U.S. EPA SW-846, 1986, Third Edition. QA/QC procedures addressing waste characterization are maintained at the site.

Data Quality Objectives

Waste Management

Materials from removal activities will be generated as waste and must be characterized prior to disposition. Procedures must be in place to insure sampling and analysis of this waste are in accordance with EPA and State regulations. The information required includes analytical data for hazardous and radioactive contaminants, to a level consistent with regulatory and procedural requirements, for wastes that are generated. The requirements for characterization of hazardous waste is specified in several RFETS waste management procedures that are based on the requirements established primarily by 40 CFR 261 and 6 CCR 1007-3, 261. If the waste materials tested demonstrate hazardous or radioactive characteristics, then they will be managed as such in accordance with the Low-Level or Hazardous Waste Requirements Manual.

Industrial Hygiene

Some removal activities involve the potential to generate hazardous dusts and fumes. These activities could create potential exposures of personnel to hazardous materials or constituents (i.e. lead paint that is being welded) if mitigation measures are not taken. To determine the protective actions which need to be taken, the level of contaminant must be measured and quantified prior to conducting the operation. This requirement is driven by OSHA 1926.61 for lead and other sections of OSHA for other constituents. In accordance with OSHA and NIOSH requirements procedures must be in place to assess the workplace activities for hazardous materials, which could create an exposure to employees, prior to execution of the work. The information that needs to be learned involves the acquisition of data for levels of hazardous contaminants associated with equipment, building materials, or residuals within construction areas, that could be associated with exposures of the workers to hazardous substances. Preliminary screening and sampling in accordance with OSHA requirements is required for materials such as beryllium, lead, cadmium, chrome, asbestos and other hazardous constituents. If the materials to be decommissioned demonstrate hazardous contaminants above the OSHA Action Levels, then appropriate steps such as Engineering and Administrative Controls, Decontamination, or the use of PPE will be implemented under appropriate plans and procedures to meet OSHA requirements.

Data Analysis And Review

As specified in 40 CFR 761.60(4), disposal of solid PCBs is regulated at concentrations of 50 ppm or greater in the form of contaminated soil, rags or other debris. Processing or distribution in commerce of any PCB or PCB item, regardless of concentration, that is not specifically authorized is prohibited. The limit of detection for distribution in commerce is 2 ppm. This applies to the resale, reuse, or recycling of materials such as equipment that have painted surfaces with PCBs.

Results of all characterization activities will be documented in field notebooks and summarized in a characterization report. This characterization report will be distributed to appropriate project personnel to support decisions made for waste management, industrial hygiene, decontamination and other activities which may involve hazardous and radiological contaminants. The inventory of materials and the characterization results will be provided to the Industrial Hygiene and Safety (IH & S) group for hazard review. IH&S will determine if controls or personal protective equipment will be required during Decommissioning activities and provide recommendations during work package development. Sample results for liquid wastes generated are submitted to the building Environmental Coordinator (EC) and/or the project Waste Specialists in order to prepare for waste disposal.

Attachment 6.1

Summary of the Major Differences Between Method 8080A and 8081A

	8080A	8081
Compound		The compound list is considerably longer in 8081. However, it is important to note that the method does not define the compound list, i.e. we do not have to analyze for all compounds on the 8081 list.
MDL	Method MDLs are generally lower in 8080A than in 8081.	These MDLs should not present any problem, except for the aqueous Aroclor at 0.054 ug/L which may be a typo.
Extraction Solvent	CH^2CL^2/Acetone is the extraction solvent for soils.	Hexane/Acetone is listed as an optional extraction solvent for solid. CH^2CL^2/Acetone is also OK.
Columns	Packed Columns listed.	Capillary columns listed.
Standards	Stock standards expire in one year. Calibration standards in six months.	All standards expire in six months.
Surrogates	TCMX and Decachlorobiphenyl recommended.	TCMX and Deacachlorobiphenyl recommended, single colum technique, 4-chloro-3 nitrobenzotrifluoride recommended, dual column technique. (Quanterra will use the TCMX/DCB combo for all tests.)
Aroclors, Calibration	No additional guidance for calibration of Aroclors.	Use 5 points of 1016/1260, single point of other Aroclors. Use 5 points of other Aroclors if present in samples.
Multicomponents, Quantitation	The two methods have different guidance for quantitation of multicomponent Aroclors - total area.	Aroclors - total area or 3-5 characteristic peaks.
LCS		LCS (called QC reference sample in the method) limits are set at 80-120%.

Attachment 6.1 Continued

Summary of the Major Differences Between Method 8080A and 8081A

	8080A	8081
Calibration Verification	Every 10 samples. Reinject any samples injected after a failed calibration verification.	Every 20 samples (every 10 recommended). Samples must be bracketed with acceptable calibration verification (7.5.3.1).
Endrin/DDT Breakdown	≤ 20% each compound.	≤ 15% each compound.

Asbestos Characterization Protocol

ASBESTOS CHARACTERIZATION PROTOCOL

Introduction

This protocol describes asbestos sampling of facilities identified for decommissioning.

Purpose

This approach is consistent with the most conservative information available, and ensures compliance with applicable federal and state regulations. All asbestos sampling will be completed by a Colorado State Certified Inspector.

Instruction Development

The survey practices outlined in this protocol are specifically designed to provide occupational hazard assessment information in support of decommissioning activities within buildings. However, the information may be used to provide support for a comprehensive operation and maintenance program during normal building activities.

This protocol serves as a guide in the preparation of specific instructions to obtain the desired characterization information.

Initial Classification

The first step in sampling for asbestos in a building is to research the building records such as blueprints and specifications for documentation of the use of asbestos. Dates of construction are considered in this process. In addition to building materials, certain process equipment may have used asbestos as an insulator or protective covering, and this use must be verified through research.

The second step in this process is to physically tour the building, entering every accessible area and room, looking for affected materials that may indicate, through historical data, or based on the inspector's experience, the presence of asbestos. A listing of suspect materials and areas is generated, along with estimated quantities. Non-suspect (or unaffected) materials are those traditionally made of wood, glass or metal. However, the inspector will suspect the adhesives applied to secure non-suspect materials to the substrate. Suspect, or affected materials are separated into three general categories: Thermal Systems Insulation, Surfacing Materials, and Miscellaneous Materials. Data compilation will separate the materials into homogeneous areas within these three general categories, which will lead to the number of samples necessary for regulatory compliance and statistical reliability of the outcome. Any homogeneous area may be assumed to contain asbestos, negating the need for samples. Each building and/or construction date is sampled as a single entity.

Survey Procedures

The number of samples for each homogeneous area is determined initially by it's physical condition of friability, then by it's general category. Friable materials are those that are capable of being crumbled or reduced to powder by hand pressure. Thermal systems insulation, such as that found on pipes or ducts, friable or non-friable, require a minimum of three samples per homogeneous area, one sample from

patches less than six linear or square feet, and one from cementitious or "mudded" fittings. Each mechanical system, such as hot and cold domestic water, may have several homogeneous areas. Each must be sampled accordingly. Friable surfacing materials, such as fireproofing or ceiling texture, must have a nine section grid applied to a blueprint of the area and samples must be acquired from the center of randomly selected areas within the grids. If the homogeneous area of friable surfacing material is less than 1000 square feet, three samples are needed; if between 1000 and 5000 square feet, five samples are needed; if the area is over 5000 square feet, seven samples are needed. Miscellaneous materials, such as floor and ceiling tiles, are sampled according to the inspector's discretion. A minimum of one sample of each suspected material in this category will be acquired.

Sample locations are selected randomly according to how each represents a homogeneous material. Since homogeneous areas are located throughout the building, the representativeness and number of samples are the driving factors rather than exact location of the sample in each room. Exact locations are directly affected by the radiological concerns. A Radiological Control Technician will accompany the inspector. If a selected location is determined to exceed acceptable parameters, a second location is selected. Should no radiologically acceptable location be found, a contaminated sample is acquired and treated accordingly.

Sampling Methodology

Each sample is acquired with the intent of assuring the quality of the sample, representativeness of the sample, and safety of the sampler. Note that a RCT will be present as necessary to survey the area and location of the sample prior to obtaining the sample. The following steps will be performed for each sample acquired.

- The location of the sample is visually verified against written descriptions.
- A polyethylene drop cloth is placed below the elevated sample areas.
- The immediate sample area is wetted with a mist of water and surfactant.
- A sampling tool, such as a hammer and chisel, razor knife, "Wondermaker" or hole saw is selected and the sample is acquired, making sure to take a complete sample from the substrate. Each sample must be a minimum of one cubic centimeter and no more than that necessary to be representative of the suspect material. During this process, the immediate surface is misted as if drying occurs.
- The acquired sample is placed in a sealable container, such as a plastic bag or vial.
- The container is sealed and a pre-numbered label is placed on the container. The sample number label is placed on chain of custody papers and the container is verified to be sealed.
- The sampling tool is thoroughly cleaned using the mister and wipes.
- The sample area is patched as needed.
- The description and location is documented on a form (Appendix 3-3), a sample label is placed on the form, and the location is documented on a blueprint or other suitable drawing.
- The sample container, drop cloth and immediate sample area is wet, wiped, and the drop cloth is carefully folded in to the center and placed in a sealable bag and the bag is sealed.

- In the case of routine maintenance areas, a pre-numbered label is placed at the sample location. With permission of the Building Manager, labels will be placed on all sample locations.
- The sample location is photographed with a sample photo identification card in the focus area documenting the sample number and date, and orienting the viewer to the location with an arrow.
- All spent wipes, drop cloths, and PPE will be added to the appropriate waste stream.

ACM Inventory Worksheet

Building Number_____ Room Number_____ Date_____

TSI INVENTORY:

Pipe: Type:_____ Linear/sq. ft. _____ Fitting count: _____
Type:_____ Linear/sq. ft. _____ Fitting count: _____
Type:_____ Linear/sq. ft. _____ Fitting count: _____
Type:_____ Linear/sq. ft. _____ Fitting count: _____
Type:_____ Linear/sq. ft. _____ Fitting count: _____
Duct: Type:_____ Duct Size/app. _____ Sq. ft. _____
Duct: Type:_____ Duct Size/app. _____ Sq. ft. _____

Other:_____
_____

SURFACE INVENTORY:

Location:_____ Description:_____ Sq. ft._____
Location:_____ Description:_____ Sq. ft._____
Location:_____ Description:_____ Sq. ft._____
Location:_____ Description:_____ Sq. ft._____

MISCELLANEOUS INVENTORY:

Location:_____ Description:_____ Sq./lin ft._____
Location:_____ Description:_____ Sq./lin ft._____
Location:_____ Description:_____ Sq./lin ft._____
Location:_____ Description:_____ Sq./lin ft._____
Location:_____ Description:_____ Sq./lin ft._____
Location:_____ Description:_____ Sq./lin ft._____

Bulk Sample Data Sheet

Job# _____ Name_____ Date_____

General Description of building/area:

_____

_____

Sample Number	Sample Description And Location	Lab

SAMPLE PHOTO DATA CARD

BUILDING _____ ROOM _____ DATE___

SAMPLE NUMBER:

Rocky Flats Plant Asbestos Containing Material
INSPECTION CHECK LIST

1. Inspector _____ Signature _____ Accreditation# _____ State _____
Date _____

2. BUILDING NO.: _____
BLDG. AREA CODE: _____

- ☐ 1. 1st Floor
- ☐ 2. 2nd Floor
- ☐ 3. 3rd Floor
- ☐ 4. 4th Floor
- ☐ 5. Basement
- ☐ 6. Crawl Space
- ☐ 7. Roof
- ☐ 8. Exterior of BLDG.
- ☐ 9. Plenum
- ☐ 10. Other

3. ROOM NUMBER: _____
COLUMN NUMBERS _____

4. SPECIFIC LOCATION _____

5. % FUNCTIONAL SPACE _____

6. FUNCTIONAL SPACE I.D. _____
HOMOGENEOUS AREA I.D. _____

7. MATERIAL TYPE CATEGORY:
- ☐ T. Thermal System Insulation
- ☐ S. Surfacing Material
- ☐ M. Miscellaneous Material

8.1 TSI ACM:
PIPE LENGTH (FT) _____
8.2 TSI ACM:
PIPE LENGTH (IN) _____
8.3 TSI ACM:
PIPE WITH INSULATION DIAMETER (IN)
_____
8.4 SURFACING MISC. ACM:
8.5 TOTAL SURFACE MATERIAL (SQ. FT.)
_____
8.6 SURFACING/MISC. ACM:
DEPTH OF SURFACE MATERIAL (IN)
_____

9.1 FUNCTION CODE:

- ☐ 1.Acoustic Insulation
- ☐ 2.Baseboard
- ☐ 3.Boiler/Furnace Insulation
- ☐ 4.Caulking Mat'l
- ☐ 5.Ceiling Tile
- ☐ 6.Chilled Water Pipe
- ☐ 7.Chilled Water Pipe Fitting
- ☐ 8.Cold Water Piping
- ☐ 9.Cold Water Pipe Fitting
- ☐ 10.Condensate Pipe
- ☐ 11.Condensate Pipe Fitting
- ☐ 12.Cooling Tower Baffles
- ☐ 13.Debris/Settled Dust
- ☐ 14.Domestic Cold Water Pipe
- ☐ 15.Domestic Cold Water Fitting
- ☐ 16.Door
- ☐ 17.Drain Pipe
- ☐ 18.Drain Insulation
- ☐ 19.Exterior Construction
- ☐ 20.Floor Tile
- ☐ 21.Fire Stop
- ☐ 22.fire Proofing Insulation
- ☐ 23.High Temp. Water Pipe
- ☐ 24.High Temp Water Pipe Fitting
- ☐ 25.Mastic Adhesive
- ☐ 26.Roofing
- ☐ 27.Steam Pipe
- ☐ 28.Steam Pipe Fitting
- ☐ 29.Tank Insulation
- ☐ 30.Transite Board
- ☐ 31.Vibration Damper
- ☐ 32.Wall Board
- ☐ 33.Wall Insulation
- ☐ 34.Wall Plaster/Spackle
- ☐ 35.Other: _____

9.2 ASBESTOS FORM CODE:

- ☐ 1. Air Cell
- ☐ 2. Blanket
- ☐ 3. Block
- ☐ 4. Cloth
- ☐ 5. Loose Fill
- ☐ 6. Pre-formed
- ☐ 7. Sheet
- ☐ 8. Sprayed On
- ☐ 9. Troweled On
- ☐ 10. Other: _____

9.3 COLOR CODE:

- ☐ 1. B Blue
- ☐ 2. BL Black
- ☐ 3. BR Brown
- ☐ 4. G Green
- ☐ 5. GR Gray
- ☐ 6. O Orange
- ☐ 7. W White
- ☐ 8. Y Yellow
- ☐ 9. Other: _____

10. CONSISTENCY:

- ☐ Brittle - hard
- ☐ Semi - Solid
- ☐ Fibrouse - loose
- ☐ Granular - Pliable

11. CURRENTLY FRIABLE:

☐ Yes ☐ No

12. CAUSE OF DAMAGE:

- ☐ 1. Area Usage
- ☐ 2. Vibration
- ☐ 3. Air Flow
- ☐ 4. Water Damage
- ☐ 5. Service Activity
- ☐ 6. Usual Aging
- ☐ 7. Other: _____

13. CONTAMINANT PRESENT:

- ☐ 0 None
- ☐ 1. Spotty
- ☐ 2. Widely Scattered
- ☐ 3. Entire Area

14. DISPERSAL FACTOR:

- ☐ 1. Water
- ☐ 2. Air
- ☐ 3. Occupant
- ☐ 4. Machinery

15. AREA USED BY:

- ☐ Maintenance Workers
- ☐ Operations Workers
- ☐ Administrative Personnel
- ☐ Visiting Public

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LABELS

779-970108-MS-001	779-970108-MS-0023	779-970108-MS-0045
779-970108-MS-002	779-970108-MS-0024	779-970108-MS-0046
779-970108-MS-003	779-970108-MS-0025	779-970108-MS-0047
779-970108-MS-004	779-970108-MS-0026	779-970108-MS-0048
779-970108-MS-005	779-970108-MS-0027	779-970108-MS-0049
779-970108-MS-006	779-970108-MS-0028	779-970108-MS-0050
779-970108-MS-007	779-970108-MS-0029	779-970108-MS-0051
779-970108-MS-008	779-970108-MS-0030	779-970108-MS-0052
779-970108-MS-009	779-970108-MS-0031	779-970108-MS-0053
779-970108-MS-0010	779-970108-MS-0032	779-970108-MS-0054
779-970108-MS-0011	779-970108-MS-0033	779-970108-MS-0055
779-970108-MS-0012	779-970108-MS-0034	779-970108-MS-0056
779-970108-MS-0013	779-970108-MS-0035	779-970108-MS-0057
779-970108-MS-0014	779-970108-MS-0036	779-970108-MS-0058
779-970108-MS-0015	779-970108-MS-0037	779-970108-MS-0059
779-970108-MS-0016	779-970108-MS-0038	779-970108-MS-0060
779-970108-MS-0017	779-970108-MS-0039	779-970108-MS-0061
779-970108-MS-0018	779-970108-MS-0040	779-970108-MS-0062
779-970108-MS-0019	779-970108-MS-0041	779-970108-MS-0062
779-970108-MS-0020	779-970108-MS-0042	779-970108-MS-0063
779-970108-MS-0021	779-970108-MS-0043	779-970108-MS-0064
779-970108-MS-0022	779-970108-MS-0044	779-970108-MS-0065