Groundwater Characterization Work Plan
Phase 1: Preliminary Investigation

Volume 1 of 3: Groundwater Characterization Work Plan
Volume 2 of 3 : Soils Characterization Work Plan
Volume 3 of 3: Buildings Characterization Work Plan

RMI-L-205

October 1993
Revision 0

RMI Project
Ashtabula, Ohio
DOE Contract No. DE-AC05-930R-22103

RMI TITANIUM COMPANY EXTRUSION PLANT

RMI Titanium Company
Extrusion Plant
P.O. Box 579
Ashtabula, Ohio 44004

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LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
cpm	counts per minute
OE	United States Department of Energy
dpm	disintegrations per minute
DQO	Data Quality Objective
G-M	Geiger-Mueller
GC	Gas Chromatograph
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Standards
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MS	Mass Spectroscopy
MSD	Matrix Spike Duplicates
MTU	Metric Ton Unit
MW	Monitoring Well
NIST	National Institute of Standards and Testing
NRC	Nuclear Regulatory Commission
PID	Photoionization Detector
PQL	Practical Quantitation Limit
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RMI	RMI Titanium Company Extrusion Plant
RPD	Relative Percent Difference
RWP	Radiation Work Permit
SCP	Site Characterization Plan
SDMP	Site Decommissioning Management Plan
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
SR	Scoping Report
SRQAPP	Site Restoration Quality Project Plan
Tc-99	Technetium 99
TCE	Trichloroethylene
TEGD	(RCRA Groundwater Monitoring) Technical Enforcement Guidance Document
USCS	Unified Soil Classification System

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

SECTION 1

INTRODUCTION

The RMI Titanium Company Extrusion Plant (RMI), Ashtabula, Ohio was contracted by the United States Department of Energy (DOE) in 1962 to extrude uranium. The RMI extrusion operations for the DOE ceased in 1988. Commercial extrusion operations continued until October 1990 when the site began preparations for decommissioning.

The site is currently listed on the Nuclear Regulatory Commission's (NRC's) Site Decommissioning Management Plan (SDMP) as radiologically contaminated. A final draft Decommissioning Plan was issued to the NRC for RMI on December 30, 1991. In response to the Decommissioning Plan, the NRC requested that a Site Characterization Plan (SCP) be prepared and submitted to the NRC for review. The purpose of the SCP is to describe the approach used by RMI to provide characterization data for planning the decommissioning effort. Among the media to be characterized is groundwater.

1.1 Purpose and Scope

The purpose of this work plan is to describe the activities necessary to characterize the groundwater at RMI for planning the decommissioning effort. This plan describes the objectives, technical approach, and requirements for the Phase 1 preliminary investigation of groundwater at RMI for radiological and hazardous chemical contaminants. This plan is intended to provide data to supplement existing data in support of future remedial design efforts. Evaluation of the results from the Phase 1 preliminary investigation will either determine that subsequent phases of characterization are required or that no further groundwater data are needed to satisfy overall characterization objectives.

The Phase 1 preliminary investigation is divided into separate tasks which can be individually scheduled and implemented. Specific tasks include monitoring well installation, land surveying, and water and soil sampling and analysis. Completion of all tasks is necessary to meet the overall objectives of the site characterization plan.

1.2 Objectives

Radiological and hazardous chemical characterization activities for the groundwater at RMI will meet the following objectives:

1) Collect hydrogeologic information in areas of suspected contaminant release as well as in the general site area and runoff settling areas.

2) Establish background concentrations for suspected contaminants and selected analytical screening parameters.

3) Define the vertical and horizontal extent and concentration of groundwater contamination if present.

4) Establish initial concentrations of selected contaminants and select analytical screening parameters.

1.3 Site Description

1.3.1 Site Location

The RMI site is located in northern Ashtabula County, Ohio, approximately 2 miles northeast of the center of the City of Ashtabula. The general location of the RMI site is shown on Figure 1-1. The site can be reached from State Route 11 approximately 1-1/2 miles north of its intersection with U.S. Route 20. The plant lies approximately 1/4 mile east of State Route 11 on East 21st Street. Access to the plant is controlled by a manned guard house at the plant entrance.

The area to be characterized is approximately 40 acres in size and is comprised of the RMI Extrusion Plant site, RMI-owned land to the south and east, and potentially affected privately owned lands located to the north and west of the extrusion plant site. The extrusion plant occupies approximately 7 acres and consists of 25 buildings plus associated roads and parking facilities. The area to be characterized has been subdivided into Areas A through G as shown on Figure 1-2.

1.3.2 Site Operational History

RMI is a contractor for the DOE and is licensed by the NRC to handle radioactive source materials. The principal activity at the facility from 1962 until 1990 was extrusion of depleted, natural, and slightly enriched (up to 2.1 percent) uranium. A total of 121,224 metric ton units (MTUs) of uranium were handled at the site during this time period. The facility also processed approximately 31 MTUs of thorium.

The site is currently listed on the NRC's SDMP as radiologically contaminated. A site decommissioning project is being conducted to safely remove the facility from service and reduce residual contamination to a level which permits release of the site for unrestricted use. Completion of the decommissioning project will allow termination of RMI's radioactive material license.

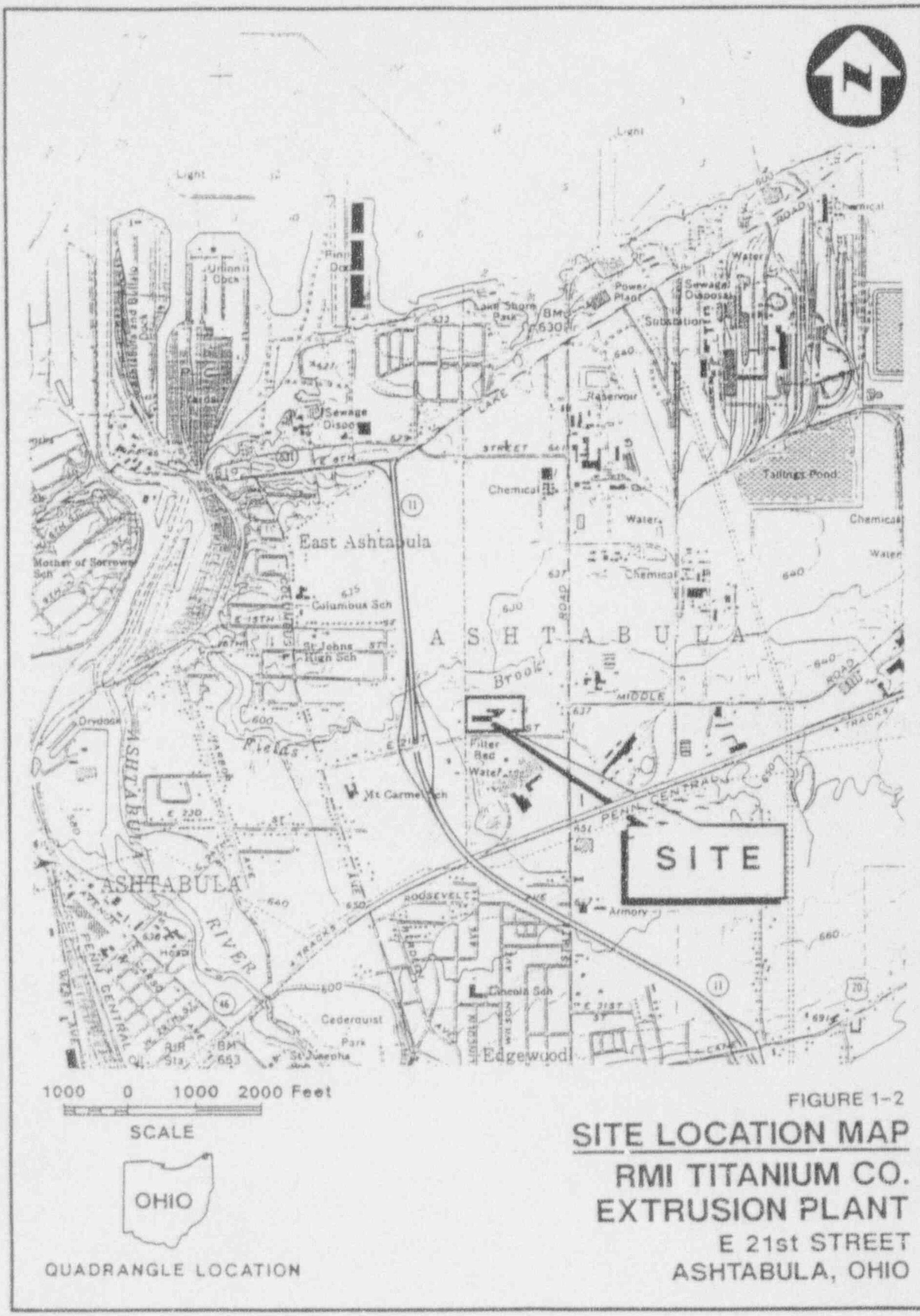
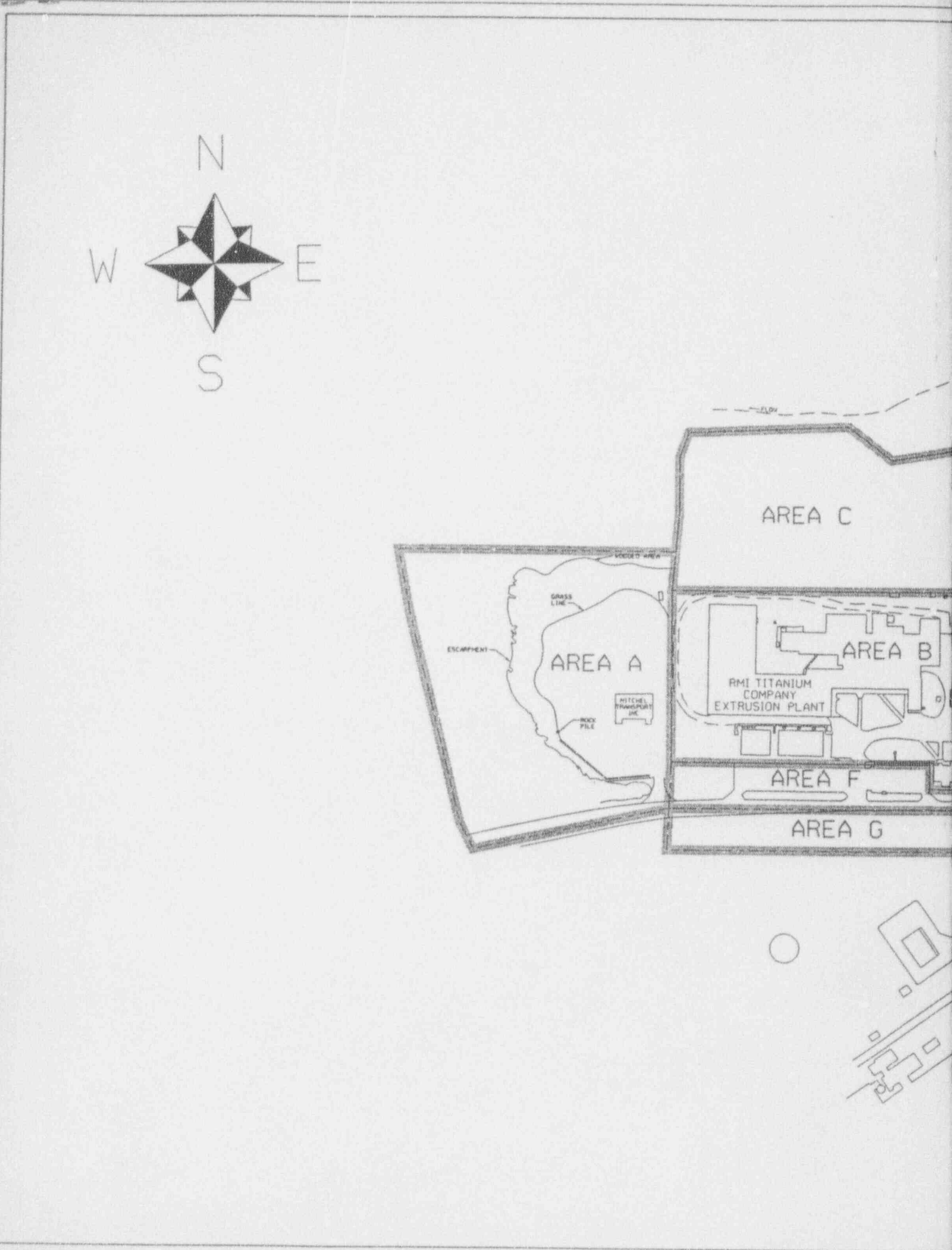


Figure 1-1 - Site Location Map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AREA C
GRASS LINE
ESCARPMENT
AREA A
MITCHEL TRANSPORT INC
ROCK PILE
AREA B
RMI TITANIUM
COMPANY
EXTRUSION PLANT
AREA F
AREA G

P-0012.DGN

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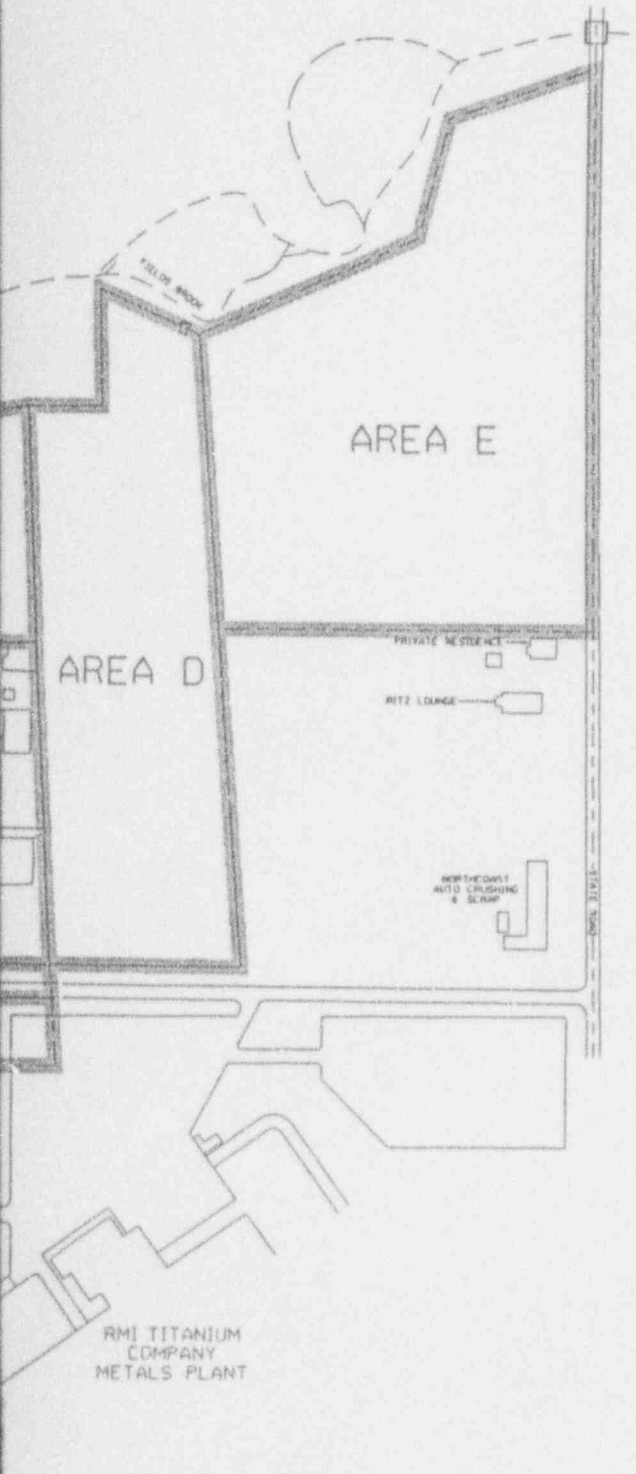

Figure 1-2 - Areas A through G

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REVISION		
DATE	NO.	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

DESIGNED TO FIT: P-0012.DGN	DATE: 8/31/93	SCALE
TITLE: AREAS A THROUGH G	DRWN BY: L.GEORGE	CHK'D BY: (RMS)
	WBS 1.1.2.2.1	

1.3.3 Contaminant Identification

The primary function of RMI from 1962 through 1988 was extrusion and closed-die forging of metallic depleted, normal, and slightly enriched uranium (<2.1 weight percent U-235).

Residual uranium at the site is generally believed to occur in the form of insoluble uranium oxide. Airborne emissions and subsequent deposition on the ground are considered the primary source of uranium contamination at the site.

Thirty-one MTUs of thorium-232 were also handled at the site. Isotopic analysis of surface soil samples indicates that thorium is detectable at low concentrations throughout the site.

Technetium 99 (Tc-99), identified as a trace contaminant from uranium extrusion processing, has been detected in groundwater samples. Due to a low sorption potential, Tc-99 is mobile in a soil water matrix and is considered primarily a groundwater contaminant.

Trace quantities of transuranic elements have been identified in the drummed sediment/soil mixtures excavated during cleanup of an evaporation pond located in Area B just north of the plant buildings. These elements, plutonium and neptunium, were introduced at the facility as a contaminant in reprocessed uranium. The pickling process used to treat the billets is believed to have leached the contaminants from the billets. As the pickling acid became neutralized it was discarded in the evaporation pond. Because transuranic contamination has only been found in the evaporation pond sediments and soils, concentrations are low, and the sediment/soil mixtures have been drummed and stored, airborne emissions are not regarded as a depositional source.

Chemical treatment processes used during extrusion are potential sources of compounds detected in soils at the site. Other sources include site activities such as dust suppression and occurrences such as accidental spills and equipment leaks. Contaminants detected in soil samples include trichloroethylene (TCE), lead, barium, and arsenic. One source of the lead is believed to be from oils once contained within the extrusion presses. Hydraulic oils and press lubricants, potentially containing lead, were occasionally discharged from the containment trenches and sumps inside the buildings to an area north of the main plant to prevent overflow of the trenches to the facility floor. Oil leaks from equipment stored at various locations around the site, as well as along the fenceline north of the facility, are other potential sources of lead in surface soils.

Waste oils, potentially containing lead and other organic compounds, were applied during the operational period to the main plant fenceline surrounding Area B as a weed suppressant and to the fire (gravel) road as a dust suppressant.

Salt baths containing barium chloride were used to preheat uranium billets prior to extrusion. Unintentional releases of the salt bath liquids and stored, drummed sludges from the evaporation tank may have been potential sources of contamination to soils.

The source of the arsenic detected in a single soil sample collected from the waste soil piles has not been determined.

A solvent containing TCE was used as a degreasing agent from 1962 until 1972. A TCE release occurred in 1972 into the former evaporation pond. This area is currently under study and is known as the Corrective Action Management Unit (CAMU). A corrective measures study (CMS) (Eckenfelder 1992) for TCE has been prepared and conditional cleanup levels have been approved by the regulating agencies. The possibility of other small spent solvent spills south of the RF-6 Building has been identified in the Decommissioning Plan (RMI 1991f) and Site Scoping Report (SR) (PARSONS 1993).

1.4 Physical Characteristics

1.4.1 Site Topography

The RMI site buildings are located on a flat upland surface. The maximum elevation variation of the area occupied by the facility buildings is approximately 4 feet (Eckenfelder 1989a). Approximately 120 feet north of the plant boundary, a 20- to 30-foot high east-west trending escarpment is present. The escarpment slopes northward to the edge of the floodplain of Fields Brook (Eckenfelder 1989a). A north-south trending drainage swale is located immediately north of the plant. Surface runoff from the vicinity of the former evaporation pond, portions of the plant, and the escarpment area flow into the natural drainage swale. The swale carries this runoff to a seepage pond at the base of the escarpment.

Within plant boundaries is a natural drainage feature located to the east and northeast of the plant buildings, draining to Fields Brook. A drainage ditch located along the north side of East 21st Street diverts surface runoff east to this natural drainage feature and also west toward the neighboring Mitchell Transport, Inc. property's natural drainage feature. A second drainage ditch is located parallel to and south of East 21st Street. Figure 1-3 shows the general site topography and location of the hydrogeologic cross section shown in Figure 1-4.

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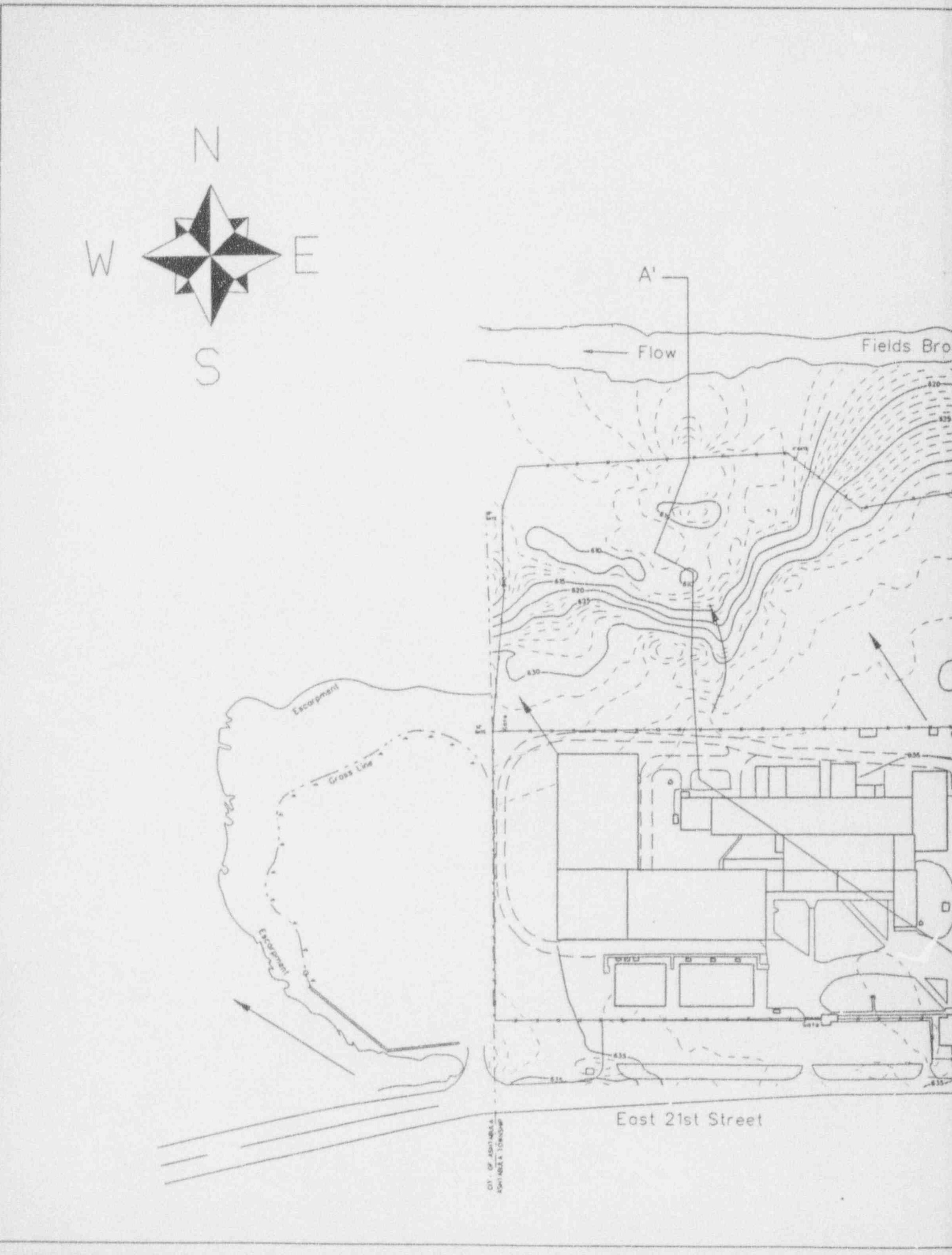

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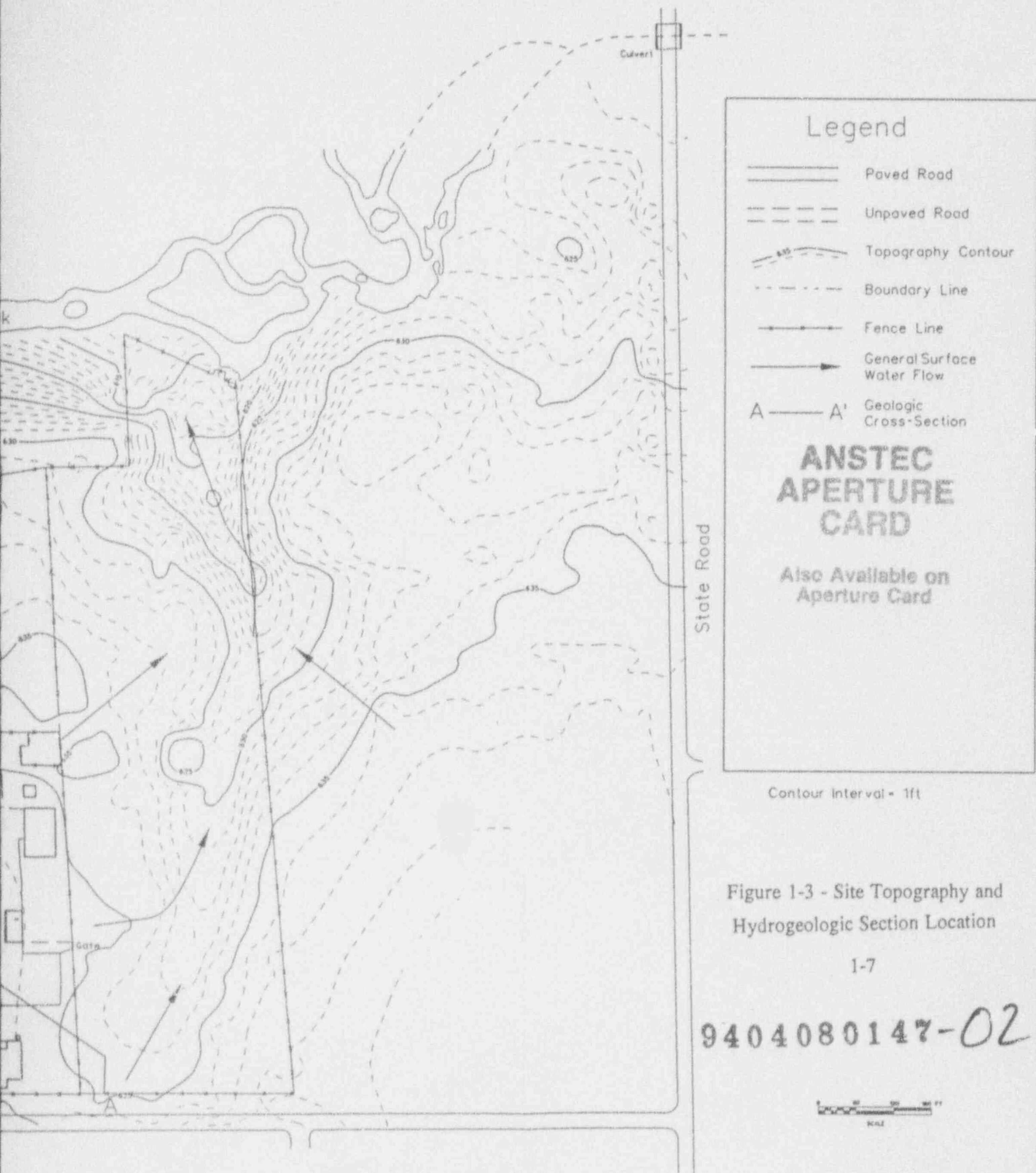

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Figure 1-3 - Site Topography and Hydrogeologic Section Location

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REVISIONS		
DATE	NO.	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

DESIGNED TO FIT P-0003.DGN	DATE 3/19/93	SCALE
TITLE SITE TOPOGRAPHY AND HYDROGEOLOGIC SECTION LOCATION	DRAWN BY ERJAVEC	CHECKED BY ERNST
	PROJECT WBS-1.1.2.2.1	
	DWG. NO. P-0003	

Rev. No.: 0

1.4.2 Site Geology

The RMI site is situated on glacial till overlying the Chagrin Shale Bedrock. The glacial till unit under the main plant is approximately 30 feet in thickness, as observed from soil boring information, thinning to 10 feet in thickness beyond the escarpment north of the plant, near the Fields Brook floodplain (Figure 1-4). The thicker till unit near the main plant is composed of silt with clay and some shale fragments. Vertical and horizontal fractures have been observed at depths of 9 to 12 feet. Fracture surfaces are typically oxidized and saturated. Underlying the silty layer, the till is composed of a dark gray, very dry to moist, plastic clay with varying amounts of silt and reworked shale. Rounded quartz fragments are evident in the lower portion of the till. Isolated sand lenses 1 to 2 feet in thickness are also present in the glacial till zone (Eckenfelder 1989a).

The till/shale interface consists of friable shale and displays relict bedding planes. The interface zone occurs at approximately 25 feet below the ground surface south of the escarpment and only 5 feet below the surface north of the escarpment. As identified from soil boring information, the thickness of this zone varies, ranging up to several feet thick (Eckenfelder 1989a).

The Chagrin Shale bedrock is dry and platy. The depth to bedrock varies from approximately 30 feet south of the escarpment to an average of 10 feet north of the escarpment on the Fields Brook floodplain. It is several hundred feet thick (Eckenfelder 1989a).

1.4.3 Groundwater Properties

From existing monitoring wells (MWs), groundwater has been observed to occur within three zones beneath the RMI site.

1) An unconfined water table zone within the glacial till unit occurs on the site to the south of the escarpment only.

2) A partially confined water bearing zone exists within the low to moderate conductive materials represented by the till/bedrock interface.

3) A confined water bearing zone with low hydraulic conductivity occurs in the shale bedrock.

Figure 1-5 shows the typical water table surface within the glacial till unit. Figure 1-6 shows the typical piezometric contour for the till/bedrock interface. Table 1-1 shows representative hydraulic conductivities which have been estimated for 18 wells based on slug test data.

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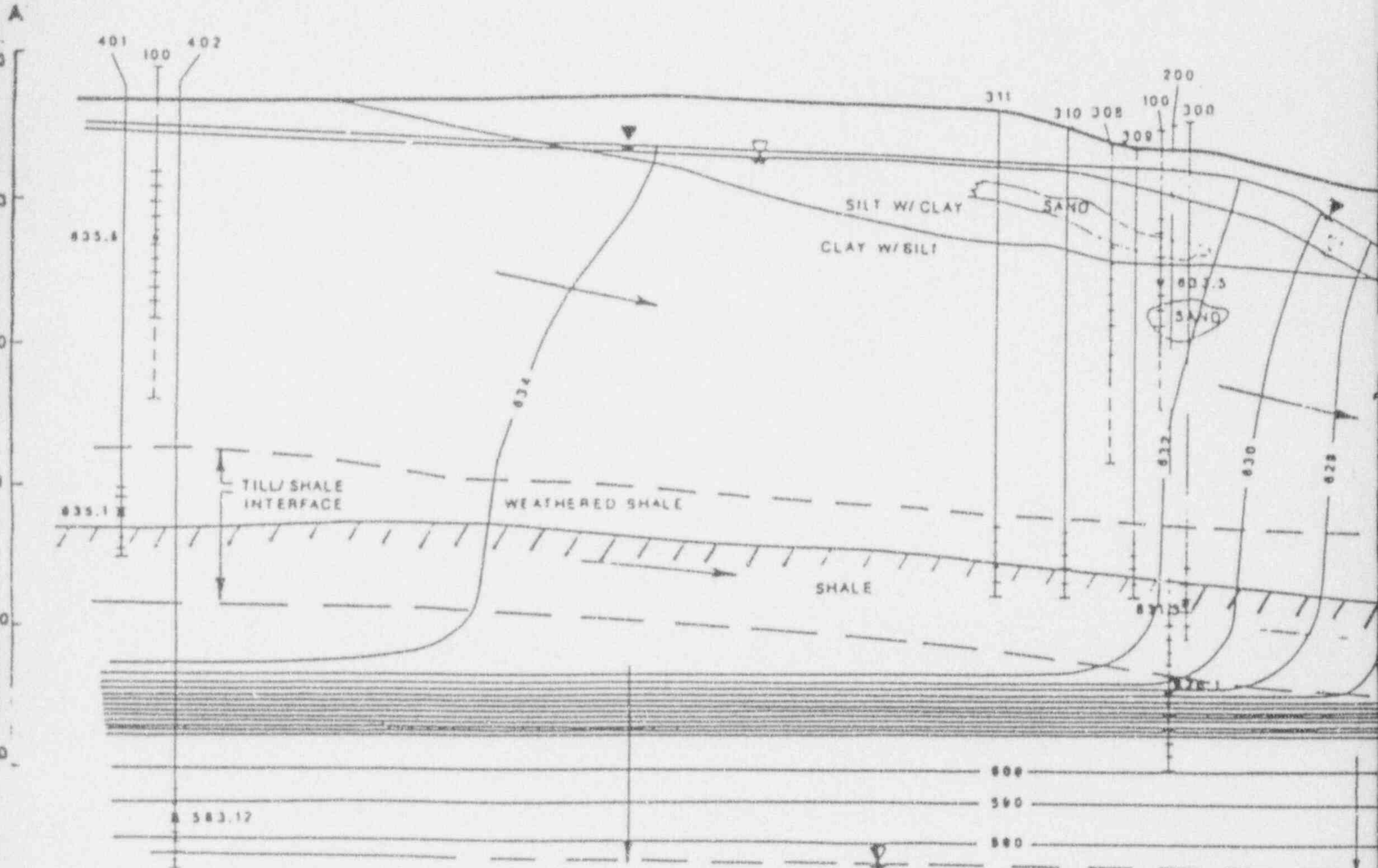

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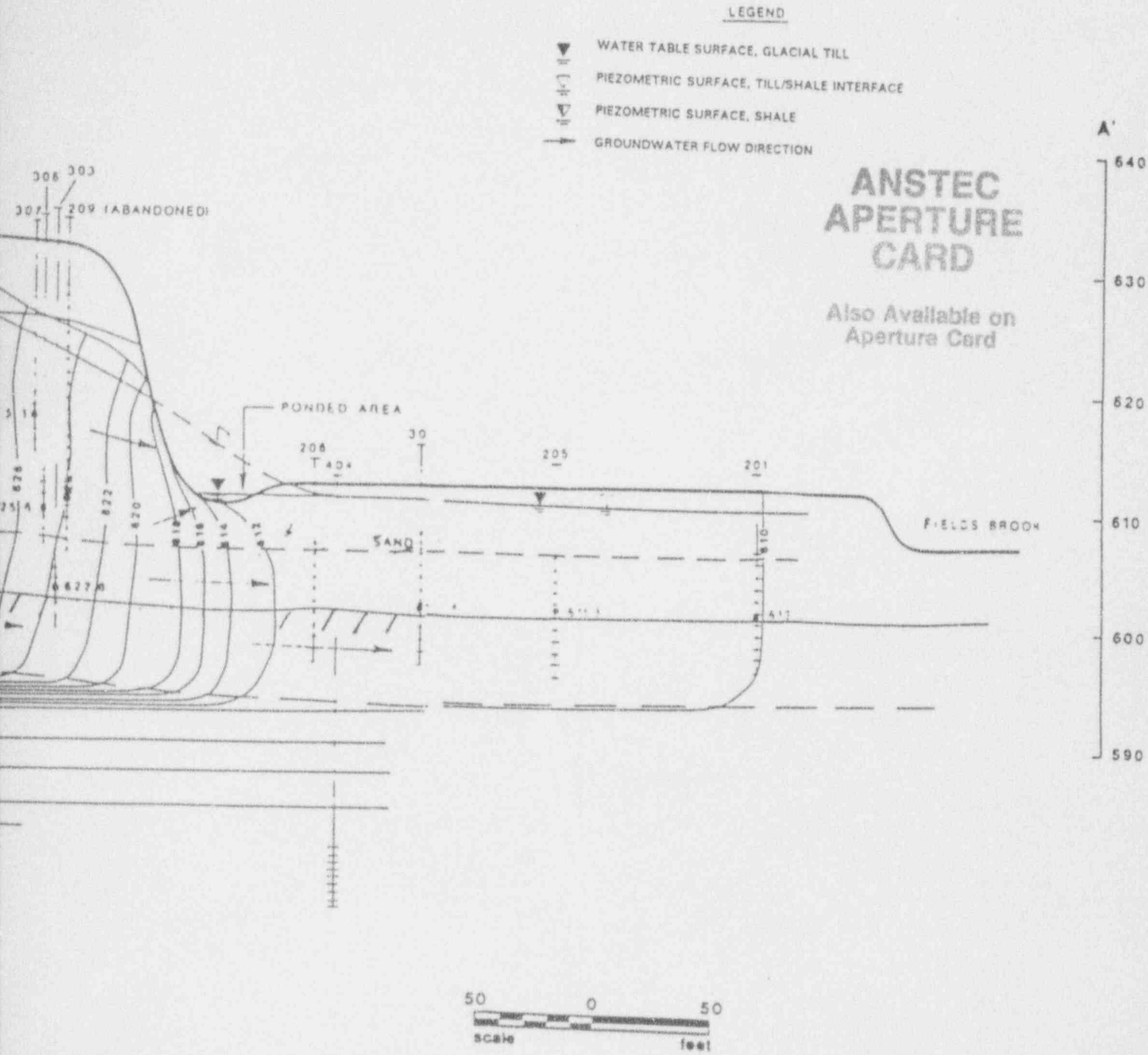

Figure 1-4 - Hydrogeologic Cross Section of Site

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In 1987, the sixteen 300-series MWs were installed. Nine were screened into the till/bedrock interface, and seven were screened into the glacial till. In 1988, the five 400-series wells were installed. Three of these wells were screened in the bedrock water bearing zone and two were screened into the till/bedrock interface. In 1993, a single MW was installed near the east fenceline of Area D.

RMI currently conducts semi-annual sampling of the existing MWs. Groundwater samples collected during this program are analyzed for pH, specific conductance, gross alpha, gross beta, gamma spectroscopy, temperature, isotopic uranium (U-234, U-235, and U-238), Tc-99, thorium, lead, barium, and halogenated volatile organic compounds (VOCs).

1.5.2 Groundwater Contamination Detected

Since 1985, the areas of radionuclide groundwater contamination which have exceeded clean-up standards specified for the CAMU have been identified in three areas:

1) The CAMU area which includes the former evaporation pond, the associated groundwater plume, and the seepage pond

2) The northeast corner of the plant property near MW 103

3) The new office complex area near MW 101

Areas within the CAMU have also been found to have hazardous chemical contamination. The majority of contamination has been found in the vicinity of the former evaporation pond and the seepage pond. Levels of lead and barium above background were detected at varying locations and concentrations around the RMI site in 1992. Groundwater contamination is only suspected in the glacial till and the till/shale interface zones.

1.5.3 Surface Radiation Survey

A site scoping radiation survey was conducted in 1992 to evaluate surface radiation in counts per minute (cpm) using Geiger-Mueller counters with readings obtained at 10 meter grid intervals. The survey, conducted in support of the Site SR (PARSONS 1993), identified regions as unaffected (having an activity level less than 100 cpm above background) and affected (having an activity level greater than 100 cpm above background). Figure 1-7 shows results of this surface radiation survey.

Groundwater within the glacial till receives recharge predominantly through infiltration of precipitation. The surface of the glacial till water table zone occurs at a shallow depth, ranging from approximately 2.5 feet south of the plant to approximately 15 feet near the escarpment. Along the north face of the escarpment the groundwater from this zone outcrops. Flow within the unit is generally toward Fields Brook. The horizonal flow rate of groundwater in the glacial till has been estimated to be 0.07 feet per year south of the former evaporation pond and 0.7 feet per year north of the former evaporation pond to the escarpment (Eckenfelder 1989b).

The groundwater within the till/bedrock interface zone is confined by the glacial till in the area south of the escarpment but is unconfined between the escarpment and Fields Brook. Groundwater flow is generally toward the north. There is little difference between the glacial till water table elevation and the piezometric surface elevation of the interface zone except near the escarpment where vertical head differences exist. This relatively high head condition may be attributable to direct recharge to this zone in an area south of the site. The horizonal flow rate of groundwater in the till/bedrock interface has been estimated to be 0.3 feet per year south of the former evaporation pond, 3.9 feet per year north of the former evaporation pond to the escarpment, and 0.4 feet per year in the Fields Brook floodplain (Eckenfelder 1989b).

Groundwater occurs under fully confined conditions in the deeper shale bedrock water-bearing zone. The hydraulic conductivity is low and the potentiometric surface within this zone has only been partially defined. Horizontal flow of groundwater in the shale is northward toward Lake Erie. The horizonal flow rate of groundwater in the bedrock zone has been estimated to be 0.025 feet per year (Eckenfelder 1989b).

1.5 Previous Investigations

1.5.1 Monitoring Wells Installed

The existing 39 MWs installed on the RMI site were constructed primarily in four separate phases since 1985. In June 1985, the six 100-series MWs were installed on RMI property to provide preliminary geochemical and geophysical data. Well MW 104, near the former evaporation pond, was found to contain elevated levels of uranium and TCE.

Based on these findings and due to TCE being a Resource Conservation and Recovery Act (RCRA) contaminant, the eleven 200-series wells were installed north of the former evaporation pond in December 1985. Four wells were screened in the glacial till and six within the till/bedrock interface. MW 200 was screened into the shale lithostratigraphic unit, although this well was later determined to be partially screened in the till/shale interface lithostratigraphic unit. Wells MW 208, MW 209, and MW 210 have since been abandoned by pressure grouting.

Table 1-1 - Hydraulic Conductivity Test Results RMI Extrusion Plant, Ashtabula, Ohio

Well Number	Geologic Unit	Hydraulic Conductivity (cm/sec)
100	Till	2.4×10^{-6}
101	Till	4.9×10^{-5}
103	Till	7.5×10^{-5}
104	Till	1.1×10^{-5}
105	Till	4.2×10^{-6}
106	Till	3.0×10^{-5}
306	Till	5.1×10^{-8}
307	Till	5.8×10^{-8}
314	Till	2.4×10^{-7}
315	Till	6.2×10^{-8}
	Till Geometric Mean	1.9×10^{-6}
205	Till/Shale	7.7×10^{-5}
301	Till/Shale	1.1×10^{-4}
303	Till/Shale	4.7×10^{-7}
304	Till/Shale	1.4×10^{-7}
305	Till/Shale	9.2×10^{-6}
401	Till/Shale	4.9×10^{-7}
403	Till/Shale	4.6×10^{-6}
	Till/Shale Geometric Mean	3.8×10^{-6}
402	Shale	2.4×10^{-7}

Reference: Eckenfelder Inc., 1989. *Supplemental Hydrogeologic Assessment, RMI Extrusion Plant, Ashtabula, Ohio*, May 1989.

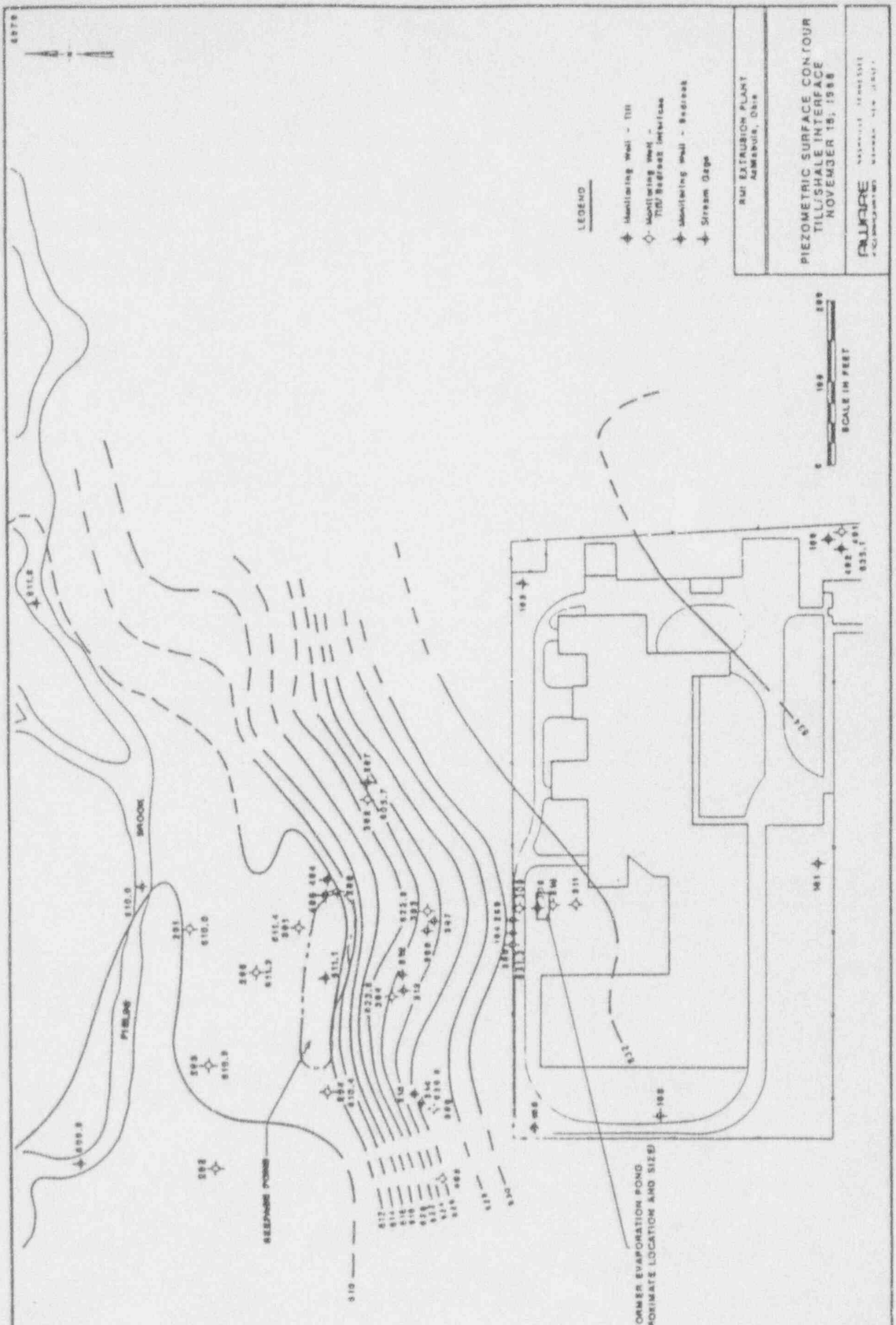

Figure 1-6 - Piezometric Contours

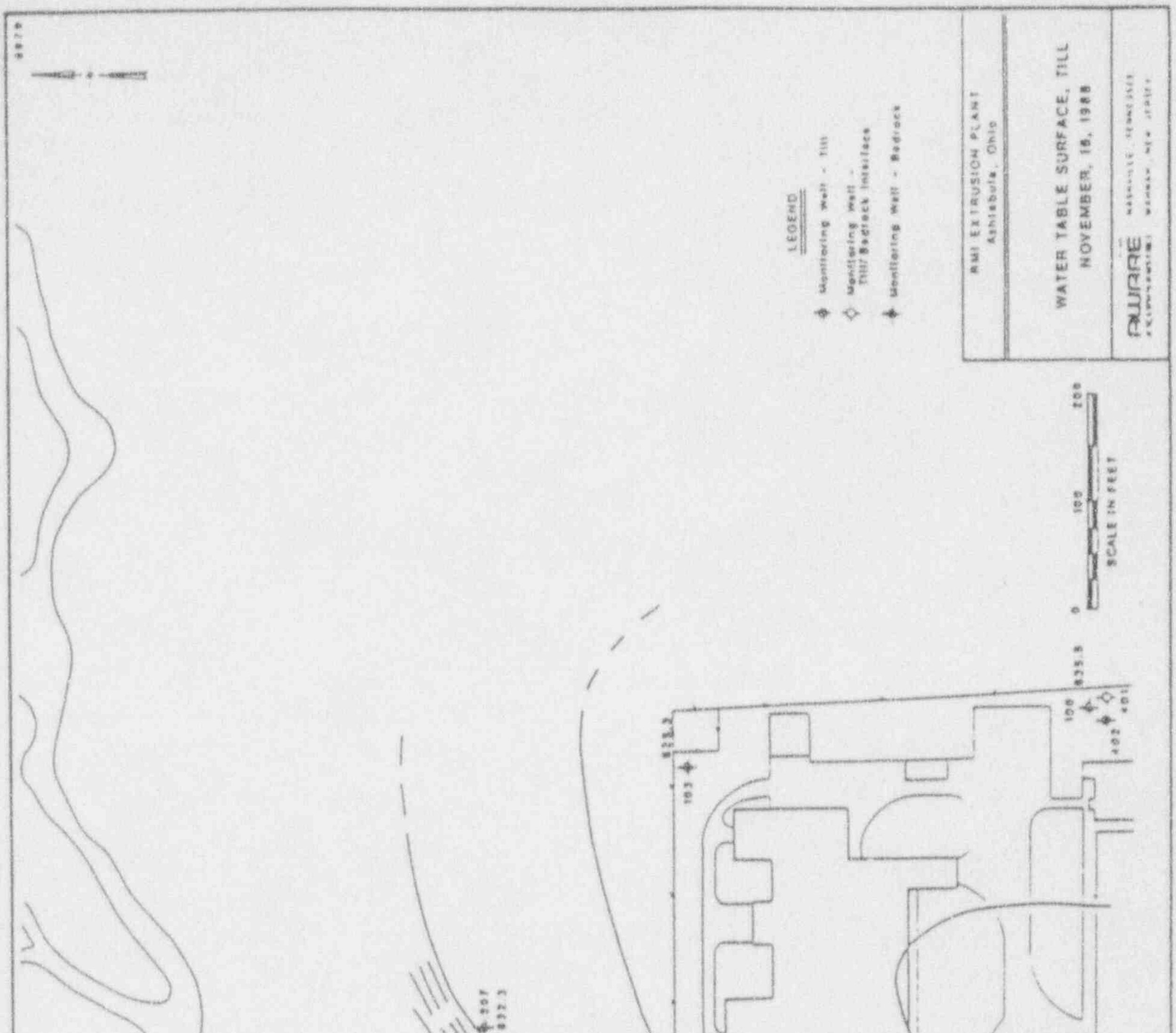

Figure 1-5 - Typical Water Table Surface

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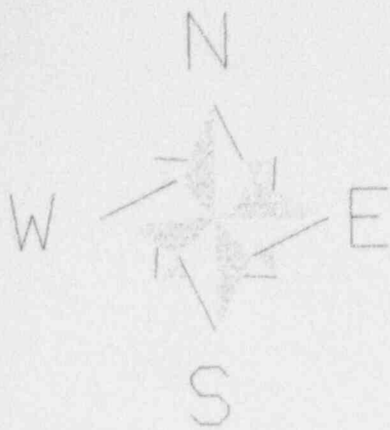

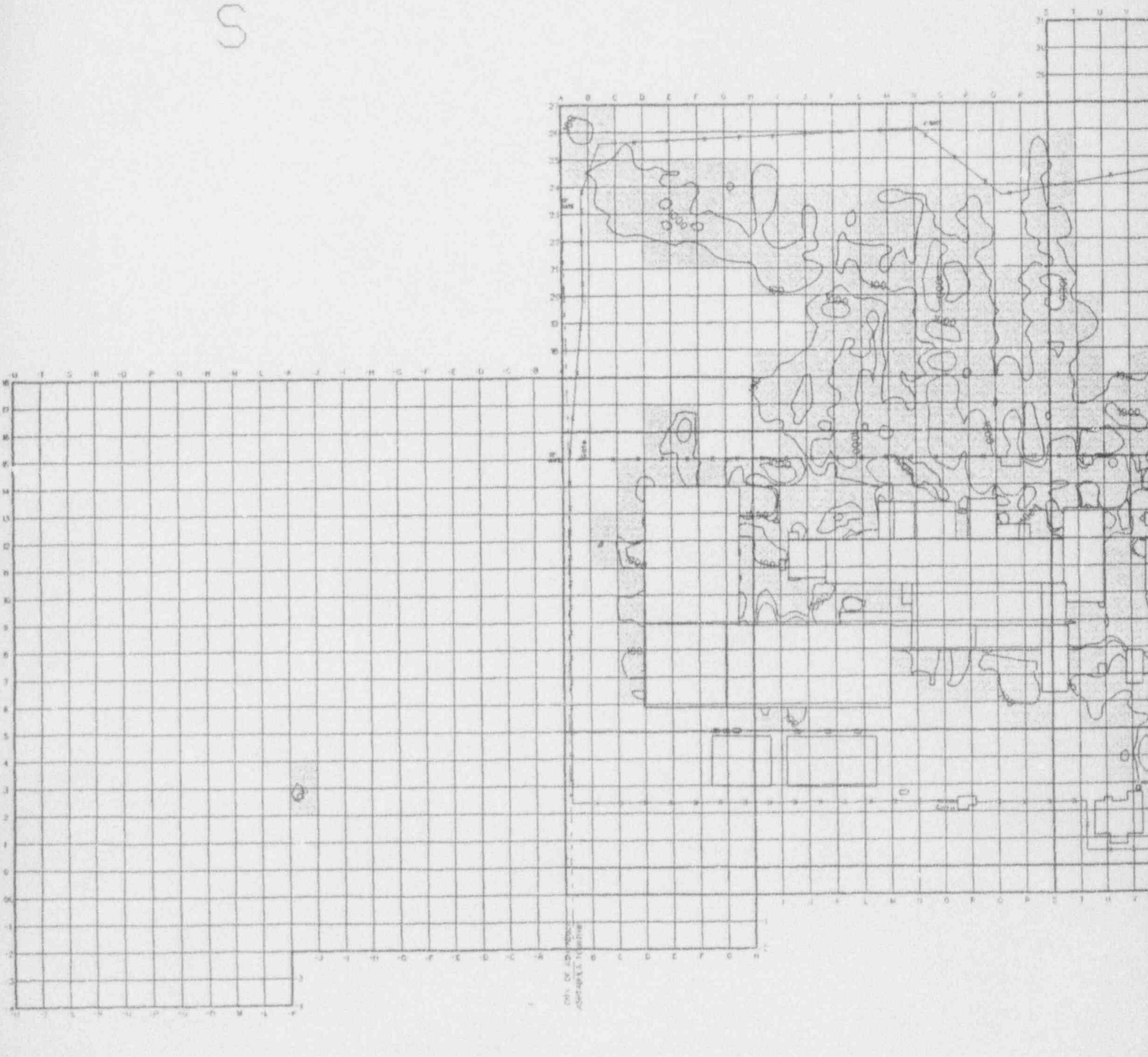

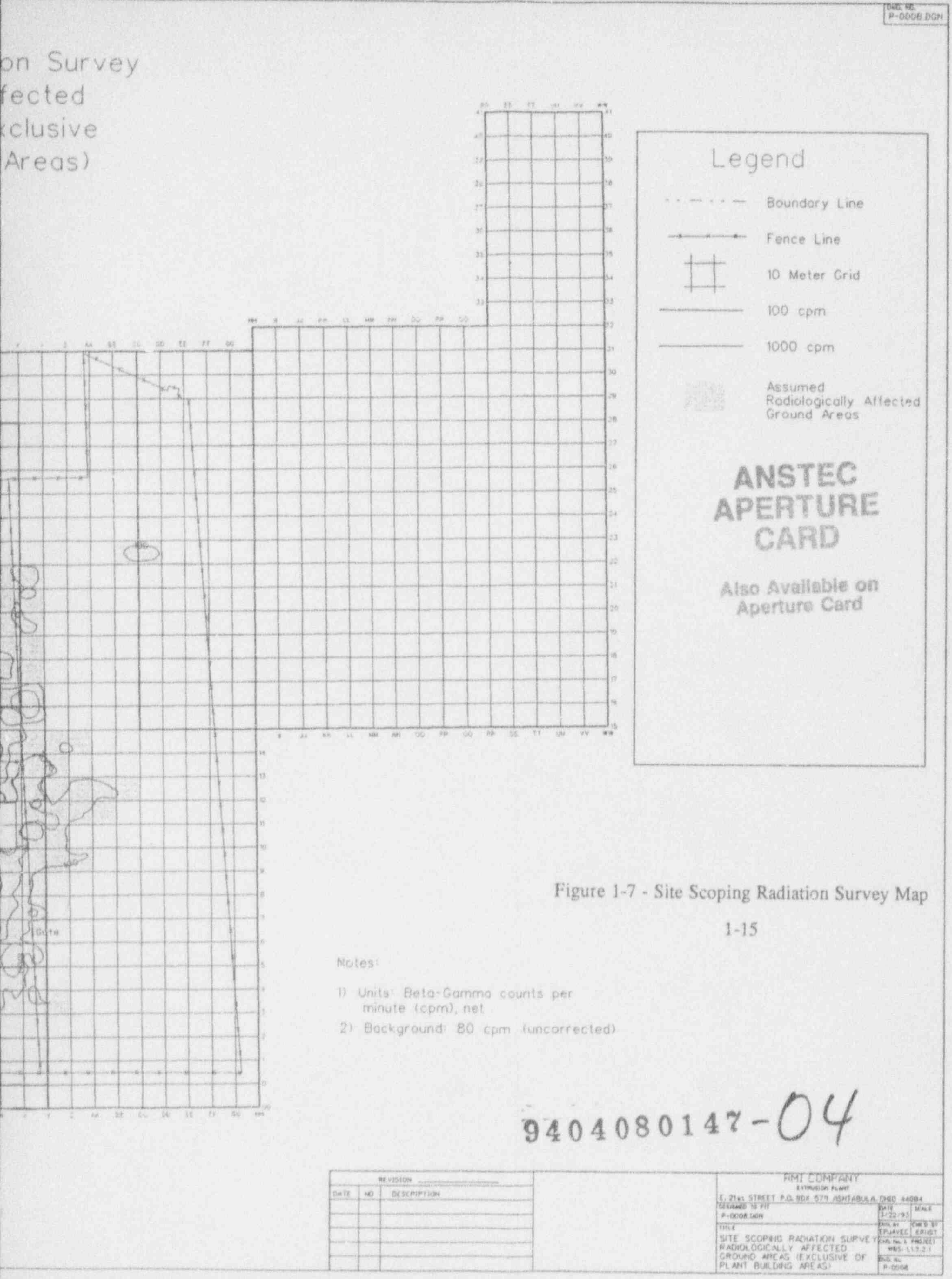

Figure 1-7 - Site Scoping Radiation Survey Map

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1.6 Regulatory Cleanup Goals

1.6.1 Radioactive Constituents

Uranium and Tc-99 are expected to be the primary radiological contaminants. However, because experimental quantities of thorium and transuranics were processed at the site, a percentage of total samples will be analyzed to determine if these contaminants are present.

Groundwater cleanup levels for uranium and Tc-99 have been established by the United States Environmental Protection Agency (US EPA) for the CAMU area. The groundwater characterization plan adopts these approved cleanup goals for the entire RMI site. Based on risk assessment guidance from the US EPA *Safe Drinking Water Act* (SDWA) (US EPA 1991), guideline values for the remaining radioactive constituents are estimated in Table 1-2 for the groundwater characterization plan. When establishing the site specific guideline value for multiple radionuclides, the sum of ratios of the concentration of each radionuclide to its respective guideline must not exceed 1.

Table 1-2 - Radioisotope Guideline Values

Parameter	**Guideline Value**
Uranium	20 μg/ℓ
Thorium-232	2 pCi/ℓ
Tc-99	900 pCi/ℓ
Plutonium	1.5 pCi/ℓ
Neptunium	1 pCi/ℓ

1.6.2 Chemical Constituents

Samples will also be analyzed for the selected primary contaminants, TCE and metals. The contaminants and existing data are presented in the Site SR. A release of TCE has been investigated in the groundwater within an area already defined as a CAMU. Levels of lead and barium above background have been detected to varying degrees throughout the RMI site.

Clean-up limits for chemical contaminants in groundwater are established by the US EPA or, in some cases, by authorized state regulating agencies. The action levels shown in Table 1-3 are Maximum Contaminant Levels from the SDWA for the contaminants identified at the site.

Table 1-3 - SDWA Maximum Contaminant Levels

Parameter	Action Level
TCE	5 ppb
Barium	1,000 ppb
Lead	50 ppb

1.7 RMI Decommissioning Project Organization

The RMI Project Decommissioning Project Organization will direct the site characterization. The interfaces between RMI as the Project Management Company and the responsible individuals within RMI are presented in this subsection.

1.7.1 Characterization Project Management

RMI will serve to coordinate the project management and maintain liaison with the NRC, DOE, US EPA, Ohio Environmental Protection Agency, and any other local agencies as needed. Materials and services required for the characterization investigations will be acquired through an appropriate bid process as required by DOE Project Management Orders. Various subcontractors may be employed for tasks in the site characterization effort. Tasks currently identified for which RMI may use subcontractors are survey, drilling, and geological oversight of groundwater monitoring wells and subsurface soil sampling near utilities. Laboratory services, as needed, will be subcontracted for chemical and radiological analysis services as identified by RMI.

1.7.2 Individual Responsibilities

The SCP will be implemented by qualified RMI personnel. The RMI organizational structure and functions are presented in Figure 1-8. For clarity, not all positions are shown on the organization chart.

Key personnel in the characterization effort are listed below:

1) The **Program Manager** will be responsible for oversight in the implementation of the Site Characterization and Decommissioning Plan and the associated separate Work Plans.

2) The **Deputy Program Manager** will be responsible for the overall project management and will administratively report to the Program Manager.

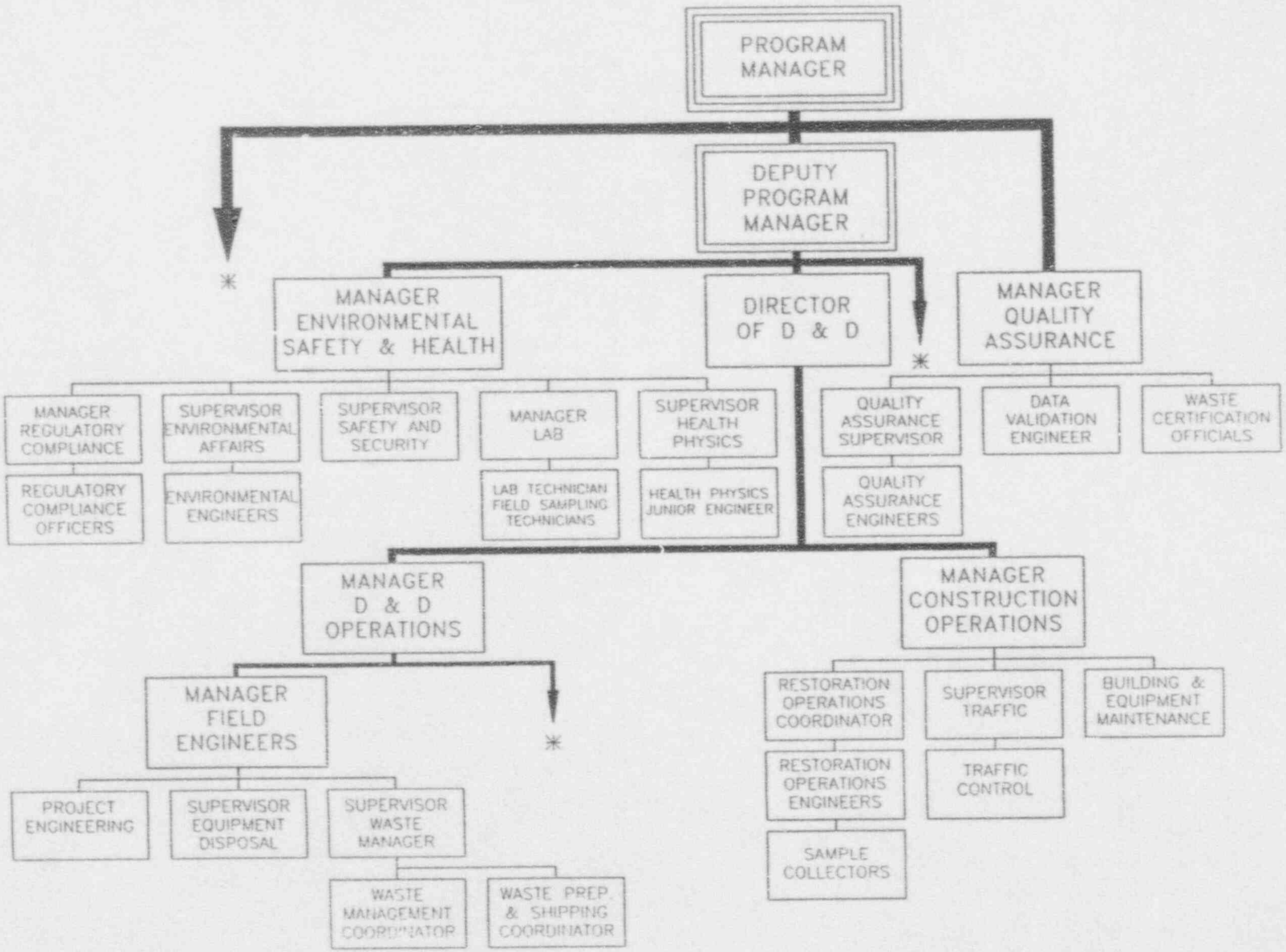


Figure 1-8 - Functional Organization Structure

3) The **Director, Decommissioning and Decontamination** will be responsible for the management of the technical support services, characterization, and decommissioning efforts. The Director, Decommissioning and Decontamination administratively and technically reports to the Deputy Program Manager.

4) The **Manager, Decommissioning and Decontamination Operations** will be responsible for the management of the characterization, decommissioning, and support services, and administratively reports to the Deputy Program Manager and technically reports to the Director, Decommissioning and Decontamination.

5) The **Manager, Field Engineering** will be responsible for the management of the site characterization and decommissioning implementation. The Manager Field Engineering administratively reports to the Manager, Decommissioning and Decontamination Operations.

6) The **Environmental Safety and Health Manager** will be responsible for the management of the environmental compliance, health, safety, and laboratory services. The Environmental Safety and Health Manager administratively reports to the Deputy Program Manager.

7) The **Manager, Regulatory Compliance** will be responsible for evaluating and coordinating the integration of Federal, State, and local laws and regulations to project technical documentation and activities. The position assures that remediation is conducted in compliance with regulations, DOE orders, and specified plans and procedures. The Manager, Regulatory Compliance administratively reports to the Environmental Safety and Health Manager.

8) The **Manager of Quality Assurance** will be responsible for the management of the Quality Assurance (QA) throughout the complete project, including data validation and waste certification. Any changes on alterations to characterization procedures will be conducted in accordance with QA procedures. The Manager of Quality Assurance administratively reports to the Program Manager.

1.7.3 Project Personnel Responsibilities

1.7.3.1 RMI Laboratory Personnel

The RMI laboratory will be responsible for supplying necessary equipment, forms, and sample numbers to the sample collectors; logging and tracking of completed sample forms; preserving and storing samples; preparing blank samples; and shipping samples to contract laboratories in accordance with approved procedures. The RMI laboratory will conduct radiological and chemical analysis of characterization samples in accordance with RMI standard operating procedures, the media-specific work plans, and the requirements of RMI-L-125, *Site Restoration Quality Assurance Program Plan*. Laboratory personnel report administratively to the Manager of Technical Service and Laboratory.

1.7.3.2 Restoration Operations Engineers

Restoration Operations Engineers will be responsible for providing direct oversight of the sample collectors and for assuring that the appropriate procedures are being followed. The Restoration Operation Engineers report administratively to the Manager, Engineering and Restoration Operations.

1.7.3.3 Sample Collectors

Sample Collectors are Restoration Operations personnel who will be responsible for collecting samples, completing necessary documentation, transferring samples to the RMI laboratory, and assisting with sample compositing, as required.

1.7.3.4 Health Physics Junior Engineers

Health Physics Junior Engineers will be responsible for conducting the following activities in accordance with approved RMI procedures: (1) surveying the appropriate work areas for radioactivity, (2) surveying sample packages, (3) writing any radiation work permits (RWPs), and (4) monitoring personnel and equipment as necessary. Health Physics Junior Engineers report administratively to the Environmental Safety and Health Manager through the Radiation Safety Officer.

1.7.3.5 Certification Officials

Certification Officials will be responsible for auditing the activities during the characterization effort and notifying the Manager Regulatory Compliance of any deviations from the approved procedures. The Certification Officials report administratively to the Quality Assurance Manager.

1.7.3.6 Equipment Disposition Supervisor/Project Engineer

This individual will be responsible for supervising the field characterization effort and coordinating between different departments involved in the characterization/remediation activities. The Equipment Disposition Supervisor/Project Engineer reports administratively to the Manager of Field Engineering.

1.8 Overview of the Phase 1 Preliminary Groundwater Characterization Work Plan

This plan is divided into seven sections. Summary statements describe each section below.

1) Section 1 provides an overall introduction and a brief history of the RMI site. Information on the physical and chemical characteristics of the groundwater obtained from previous investigations are presented.

2) Section 2 discusses the Data Quality Objectives (DQOs) for the groundwater characterization activities.

3) Section 3 describes the groundwater characterization program to be implemented. Rationale for each new well is justified. The tasks which will be implemented are outlined.

4) Section 4 describes in detail the objectives, scope, equipment, and work elements which make up each task of groundwater characterization.

5) Section 5 describes the procedures for deviating from the work plan, field activities, or laboratory procedures.

6) Section 6 identifies the reports which will be generated from the Phase 1 preliminary groundwater characterization.

7) Section 7 lists the references used to generate this document.

1.9 Technical Guidance

The primary guidance documents used to develop this work plan are listed in Table 1-4. A complete listing of references is contained in Section 7.

Table 1-4 - Groundwater Characterization: Primary Guidance Documents

Titles	Reference (see Section 7)	Guidance for:
RCRA Ground-Water Monitoring Technical Enforcement Guidance Document	US EPA 1986a	1) Monitoring well installation 2) Background determination
(Draft) Manual for Conducting Radiological Surveys in Support of License Termination, (NUREG/CR-5849)	NRC 1992b	Final termination survey guidance
(Draft) Branch Technical Position on Site Characterization for Decommissioning Sites	NRC 1992a	Hydrogeologic characterization, methods and monitoring practices
Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance	US EPA 1989	Analysis of groundwater monitoring data
Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846)	US EPA 1986b	RCRA Analytical Methods
DQOs for Remedial Response Activities, Vol. 1 (US EPA/9355, O-07B)	US EPA 1987	DQOs

SECTION 2

DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative statements concerning the data needs and quality of data. The DQOs are the starting point for designing the sampling plan and data collection program for the groundwater characterization activities at RMI. This section identifies the objectives of the sampling program in terms of data needs and the quality of data required. The US EPA designated DQO levels used to describe data quality are listed in Table 2-1.

Although the DQO levels were developed by the US EPA to assure that a specific standard of care, appropriate for a defined set of data, was being applied to all US EPA analyses, it is useful to apply similar standards of care to radiological analyses. RMI procedures establish the standard of care for data quality, and because they are analogous to US EPA DQO levels, no distinction will be made between DQO levels for RCRA analyses and those for radiological analyses. They will both be referred to as DQO levels 1 through 5 in the media-specific work plans.

2.1 Data or Information Needs

The overall objectives for the site characterization and the media-specific objectives for the groundwater characterization are listed in Table 2-2. Table 2-3 presents the data needs for groundwater characterization and compares these needs with the characterization objectives. A general description of the activity planned to fulfill the data need and associated work plan tasks are also listed. A description of work plan tasks is contained in Section 4.

2.2 Data Quality

Data quality is judged by the ability of the data to meet the objectives of the plan and the needs of the data users. The level of data quality generally associated with field measurements will be maintained for direct alpha, beta, and gamma measurements. Actions which will ensure this level of quality is attained include:

1) Work shall be performed in accordance with approved procedures which implement the requirements in this plan.

2) Performance checks of the measuring instruments shall be made at least once per day. Instruments not passing the performance check shall not be used.

3) A field logbook shall be maintained to document daily activities and unusual conditions.

Table 2-1 - US EPA Designated DQO Levels

US EPA DQO Level	General Description	Example
1	Qualitative Field Analysis Provides the most rapid results. Level 1 is often used for health and safety monitoring, initial site characterization to locate areas for subsequent and more accurate analyses, field screening of samples to select those for fixed laboratory analysis, and engineering screening of alternatives (bench scale tests).	Field screening for alpha, beta, and gamma radiation conducted with portable field equipment provides real time qualitative analysis for the presence or absence or radioactive isotopes.
2	Semi-Quantitative and Qualitative Analyses Provides more quality control checks than Level 1. The results may be qualitative, semi-quantitative, or quantitative. Level 2 can be assigned when rapid turnaround results are needed. Methods may range from more sophisticated screening techniques to fully defined methods similar to Level 3 or 4 but with reduced QA/Quality Control (QC) frequency and data reporting.	Determination of volatile halogenated organic compounds in water by purge and trap gas chromatography without second column configuration with a limited suite of field and laboratory QC samples, and a minimal data package.
3	Quantitative with Fully Defined QA/QC Provides data generated with full QA/QC checks of types and frequencies specified for Level 4 according to analytical procedures for radiological and nonradiological parameters. The analytical methods are identical to Level 4 for QA/QC sample analysis and method performance criteria. However, the data package does not typically contain raw instrument output but does include summaries of QA/QC sample results.	Analysis of total uranium with a full set of QA/QC samples as specified for Level 4. A summary data package is provided including QA/QC sample performance without raw instrument output. A limited level of data validation is required because only the summary forms need review.
4	Confirmational with Complete QA/QC Reporting Provides data generated with a full complement of QA/QC checks of specified types and frequencies according to analytical procedures for radiological and nonradiological parameters. The data package includes raw instrument output of validation of Level 4 data.	Analysis of total uranium per analytical batch with analytical results and a full raw data package reported from the laboratory.
5	Non-Standard Procedures Analysis by non-standard procedures that often require method development or validation Level 5 methods may be significantly different from those specified for Levels 2, 3, or 4 data.	Analysis or evaluation of a geotextile material for suitability for use as component of a remedial action at the site. Existing evaluation methods may not be adequate to evaluate site-specific needs, so development of a new method is required.

Note: Examples are generic and are not intended to reflect project-specific activities.

Table 2-2 - Site Characterization Objectives

Overall Site Characterization Objectives:	Groundwater Characterization Objectives:
1) Establish a baseline for natural conditions (background) with respect to known or suspected contaminants identified in Table 4-1 of Subsection 4.1 of the SCP and review existing data, reports, and the SR that serve as a basis for development of the media-specific or topically focused work plans.	1) Collect hydrogeologic information and data for areas potentially contaminated by release sources and the general site area.
	2) Establish background concentrations for contaminants and selected analytical screening parameters.
2) Establish the nature, level, and extent of contaminants listed in Table 4-1 of Subsection 4.1 of the SCP in Areas A through G with respect to known or suspected contaminants for the individual areas by sampling and analysis of soils, groundwater, and buildings.	3) Define the vertical and horizontal extent and concentration of groundwater contamination present.
	4) Establish initial concentrations of contaminants and selected analytical screening parameters.
3) Determine site stratigraphy and hydrogeology through the use of existing geological and hydrogeological data, geologic logging of borings, and geophysical borehole logging.	
4) Define local groundwater flow directions through use of existing groundwater data and by installing additional monitoring wells.	
5) Provide data to assess the concentration or exposure hazard and determine if special precautions or monitoring of the contaminants during remediation are required.	
6) Provide data to support engineering evaluation, selection and design of remediation options, and assist in preparation of the final termination survey.	

Table 2-3 - Data Needs for the Groundwater Characterization

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Groundwater Objective	
Area meeting Technical Enforcement Guidance Document (TEGD) requirements for background monitoring wells	Background groundwater quality data in each of the three water bering zones	1	2	Evaluation of existing off-site wells for use as background wells. Installation and development of an upgradient monitoring well south of East 21st Street meeting TEGD requirements for a background well; collect and analyze groundwater samples for suspected contaminants and selected analytical parameters (Tasks 1, 2, 3, and 4)
A	Area A has been classified as a radiologically unaffected area with respect to groundwater contamination and is not expected to have been impacted by RCRA groundwater contaminants resulting from RMI Extrusion Plant operations. Additional data or information may be required based upon the initial phase of groundwater characterization for Areas B and C, or characterization of soils in Area A	NA	NA	No groundwater activities planned for the Phase I preliminary investigation.

NA - Not Applicable for Phase I
Note: Numbers in "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-3 - Data Needs for the Groundwater Characterization (Continued)

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Groundwater Objective	
B	Nature, level, and extent of radiological and RCRA groundwater contamination in the general area of the RMI Extrusion Plant buildings	2, 3, 4, 6	1, 3, 4	Installation and development of additional monitoring wells along the downgradient perimeter of Area B; collect and analyze groundwater samples from new and existing wells for suspected contaminants and selected analytical screening parameters (Tasks 1, 2, 3, and 4)
	Nature, level, and extent of radiological and RCRA groundwater contamination at specific localized areas of known or suspected subsurface contamination	2, 3, 4, 6	1, 3, 4	Installation and development of additional monitoring wells; collect and analyze groundwater samples from new wells for suspected contaminants and selected analytical screening parameters (Tasks 1, 2, 3, and 4)
	Hydrogeologic information	2, 3, 4, 6	1, 3, 4	Logging of well borings during installation and determination soil grain-size distribution of screened interval in new wells, seasonal monitoring of groundwater elevations for all wells (Tasks 1, 2, and 3)

NA - Not Applicable for Phase 1

Note: Numbers in "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-3 - Data Needs for the Groundwater Characterization (Continued)

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Groundwater Objective	
C	Nature, level, and extent of radiological and RCRA groundwater contamination at specific localized areas of known or suspected subsurface contamination	2, 3, 4, 6	1, 3, 4	Collect and analyze groundwater samples from wells of existing CAMU monitoring network for suspected contaminants and selected analytical screening parameters (Tasks 2, 3, and 4)
	Hydrogeologic information	2, 3, 4, 6	1, 3, 4	Seasonal monitoring of groundwater elevations for existing CAMU monitoring well network (Tasks 1 and 3)
D	Area D has been classified as an radiologically unaffected area with respect to groundwater contamination; additional data or information may be required based upon the initial phase of groundwater characterization for Areas B and C, or the characterization of soils and subsurface utilities in Area D	2, 3, 4, 6	1, 3, 4	Collect and analyze groundwater samples from the existing monitoring well (installed by Woodward-Clyde for Fields Brook Remedial Investigation/Feasibility study for suspected contaminants and selected screening parameters (Tasks 3 and 4)
	Hydrogeologic information	2, 3, 4, 6	1, 3, 4	Quarterly monitoring of groundwater elevations for existing Woodward-Clyde monitoring well (Tasks 2 and 3)

NA - Not Applicable for Phase 1

Note: Numbers in "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-6 - Current and Proposed Quality Assurance/Administrative Procedures

Subject	Current Procedure Number	Procedure Type
Data validation of inorganic analyses	Proposed	Quality Assurance
Data validation of organic analyses	Proposed	Quality Assurance
Document control	RMI-L-116	Administrative
Audits	RMI-L-120	Quality Assurance
Nonconformances	RMI-L-122	Quality Assurance
Document review and approval	RMI-L-112	Administrative
Unusual occurrence reporting	RMI-L-117	Quality Assurance
Equipment and services procurement	RMI-L-127	Administrative
Corrective actions	RMI-L-128	Quality Assurance
Contract laboratory evaluation	RMI-L-154	Quality Assurance
Laboratory Services Procurement	RMI-L-159	Quality Assurance
Operational readiness reviews	RMI-L-161	Quality Assurance
QA surveillances	RMI-L-166	Quality Assurance
Audit personnel qualification	RMI-L-169	Quality Assurance

2.4.3 Quality Assurance/Administrative Procedures

QA procedures provide assurance that the data are collected in a manner designed to meet project objectives. Field data or analytical data received from the laboratory must be validated prior to reporting to ensure the data is of sufficient quality to meet the project objectives, reported to the appropriate individuals, and stored to allow future retrieval and use. Administrative procedures provide a standard method to conduct administrative tasks such as document approval, procurement, document control, etc. Table 2-6 lists the applicable QA and administrative procedures.

SECTION 3

PHASE 1 GROUNDWATER CHARACTERIZATION PROGRAM

Characterization of the groundwater at the RMI site will build upon the data collected from previous investigations. Investigations performed since 1985 were conducted primarily to find the movement rate and contamination extent of the groundwater within the CAMU. However, many of the wells and associated data can be used to evaluate sitewide groundwater conditions. Remediation of TCE and uranium in groundwater within the CAMU is addressed in the CMS (Eckenfelder 1992). Therefore, the Phase 1 groundwater characterization will focus on characterizing the groundwater at other areas of the site for both radiological and RCRA hazardous contaminants, focusing the preliminary investigation on areas of known surface contamination in Area B.

3.1 Approach to Groundwater Investigation

The characterization of groundwater at the RMI site will consider each water-bearing zone (till, till/shale interface, and shale) individually, based on its potential for having been contaminated by the activities conducted at the RMI plant and by migration between zones. This will be accomplished by providing general area characterization as well as localized characterization of areas and groundwater zones suspected of specific contamination.

This work plan allows an iterative approach to be taken to characterize the groundwater at the RMI site. Samples from the wells installed during each phase will first be analyzed using DQO Level 2 data quality standards. If DQO Level 2 analytical results show no contamination at wells located downgradient of all known and suspected contaminant sources, groundwater at that point and downgradient will be considered free of contamination. Periodic DQO Level 3 analysis will be used to confirm this assumption. If the DQO Level 2 analytical results show contamination, additional wells will be installed during the next phase to further assess the extent of contamination. Each of the MWs installed will be sampled and analyzed by DQO Level 2 standards until all contamination has been bound by MWs which are free of contamination. The final network of MWs will be periodically sampled and analyzed by DQO Level 3 laboratory standards to confirm analytical results for remediation and decommissioning purposes (US EPA 1987).

3.1.1 Characterization of Known or Suspected Subsurface Contamination

Phase 1 MWs will be installed to characterize localized areas of known or suspected sub-surface contamination. The extent of contamination upgradient and to the sides of the former evaporation pond will be investigated. Groundwater from wells outside the CAMU which have exhibited contamination above the guideline values will require further characterization to define the extent of contamination.

This includes the vicinity around existing MWs 101 and 103. To define the extent of contamination, additional wells will be installed in the same water-bearing zone, where contamination was previously detected, and in the deeper water-bearing zone to determine if vertical migration has occurred. Based on the results of this preliminary phase characterization, an assessment will be made of the need for additional phases of MW and/or soil boring installations to fully define the extent of contamination.

Of the four MWs screened in the shale water bearing zone, only one, MW 200, has had hazardous constituents identified. Because it is screened across the till/shale interface and the shale water-bearing zone, contaminants detected in MW 200 may be attributable to contamination in the interface. A new well screened only in the shale water-bearing zone will be installed to determine if contamination exists in the shale water-bearing zone.

3.1.2 General Area Characterization

The RCRA Groundwater Monitoring (September 1986) TEGD points out that a minimum of four MWs are necessary to adequately characterize the groundwater at a site. This would include one well placed upgradient and three wells downgradient of the potential contamination source. Due to multiple water-bearing zones and potential contaminant locations, understanding the complexity of the RMI site requires more than four MW locations.

The RMI plant, Area B, is the primary source of contamination of the RMI site to be characterized. Due to the relatively low horizonal flow rates in the water bearing zones and the land use history, it is anticipated that any contaminants released to the groundwater during the plant operation would be detectable in wells located on the plant property (Eckenfelder 1989b).

The uppermost water bearing zone in the glacial till has the greatest potential for receiving contaminant migration downgradient from the RMI plant. The horizontal spacing of wells placed within this zone will require the highest density to ensure adequate characterization.

Existing wells MW 103, MW 104, MW 105, MW 106, and MW 207 can be used to assist in the characterization of groundwater downgradient of the RMI plant in the till water bearing zone. Additional wells in the till zone will be needed to provide thorough characterization downgradient of the RMI plant. By thoroughly characterizing the till zone along the downgradient perimeter of Area B, a determination can be made whether or not additional MWs are required further downgradient on the site. If the initial downgradient characterization in the till zone confirms that no contamination is present, it can be concluded that exclusive of the CAMU, groundwater in the till zone downgradient of the perimeter of Area B is also free of contamination without additional wells being required. This assumes there is no slug flow of contaminant beyond the proposed downgradient MWs.

3.1.3 Background Characteristics

In accordance with RCRA Groundwater Monitoring (September 1986) TEGD, upgradient MWs are to provide background groundwater quality data in each of the three water bearing zones to be characterized. Wells used to determine background characteristics must meet the three following requirements. Upgradient wells must be:

1) Located beyond the upgradient extent of potential contamination to provide samples of background quality

2) Screened at the same stratigraphic horizons as the downgradient wells to ensure compatibility of data

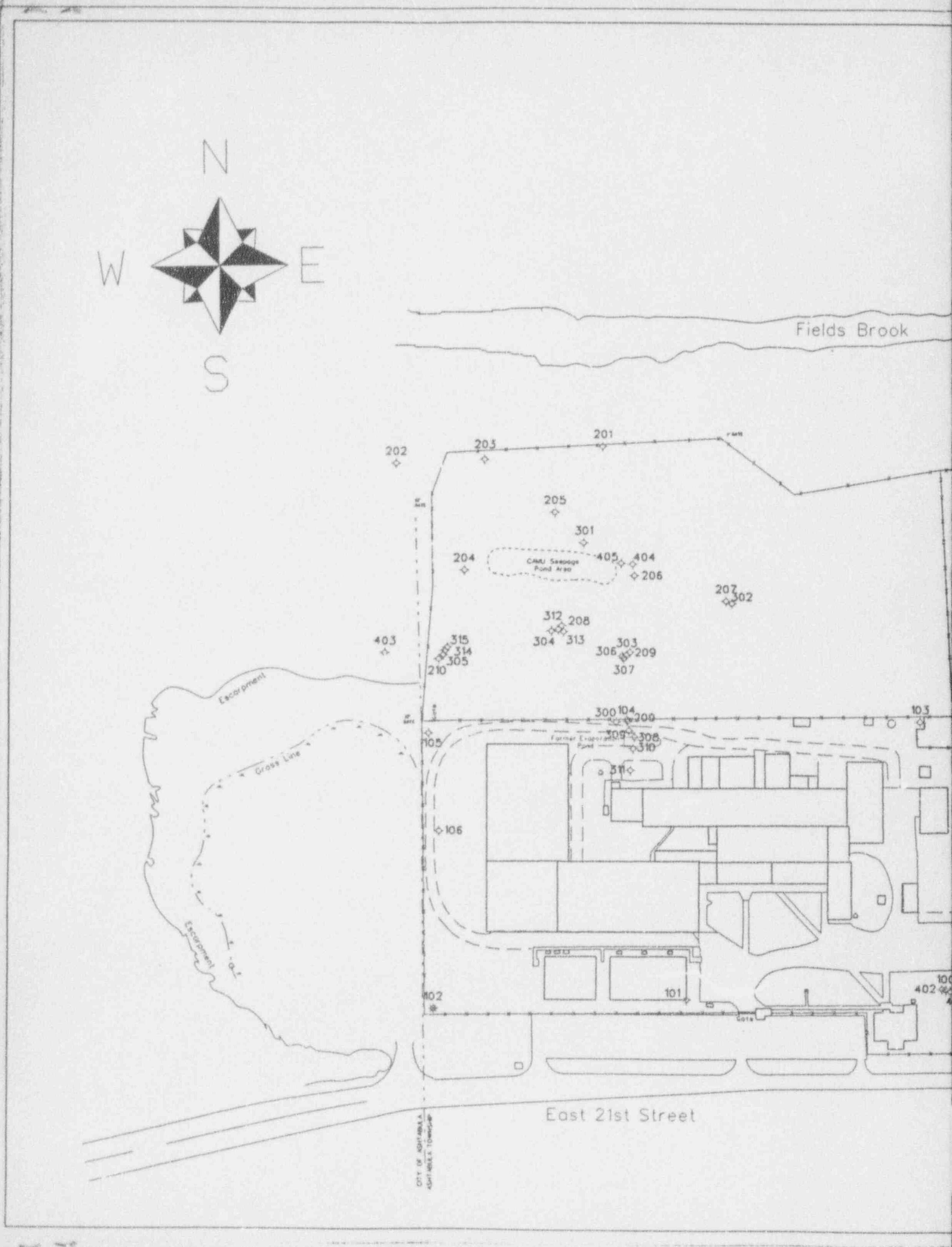
3) Of sufficient number to yield statistically significant results such that heterogeneity in background groundwater quality does not affect conclusions

Existing MWs 100, 401, and 402 were installed to establish background groundwater quality in the three water-bearing zones. Based on the hydraulic gradient which has been recorded at the site, these three wells in the southeast corner of Area B are upgradient of the CAMU but may not be upgradient of well MW 101; therefore, MW 517T will be installed for the purpose of defining background groundwater quality in the till.

3.2 Well Locations

The existing MW network at the RMI site is shown on Figure 3-1. The locations of the proposed MWs are shown on Figure 3-2. The proposed well locations are based on an evaluation of the data presented in the reports of previous investigations, as discussed in Subsection 1.6, which primarily focused on the CAMU. The primary focus of the Phase 1 preliminary investigation is to characterize the groundwater in areas of known or suspected contamination in Area B to determine whether additional groundwater characterization is needed.

New MWs installed under this groundwater characterization work plan shall be identified as 500-series wells. Each MW identification number shall be followed by a suffix (T, I, or S) to indicate the water-bearing zone in which each well was installed (till, till/shale interface, or shale). The well locations indicated are approximate. There is a degree of flexibility in the exact locations to avoid buried or overhead utility lines. The rationale for each proposed MW is stated in Table 3-1.



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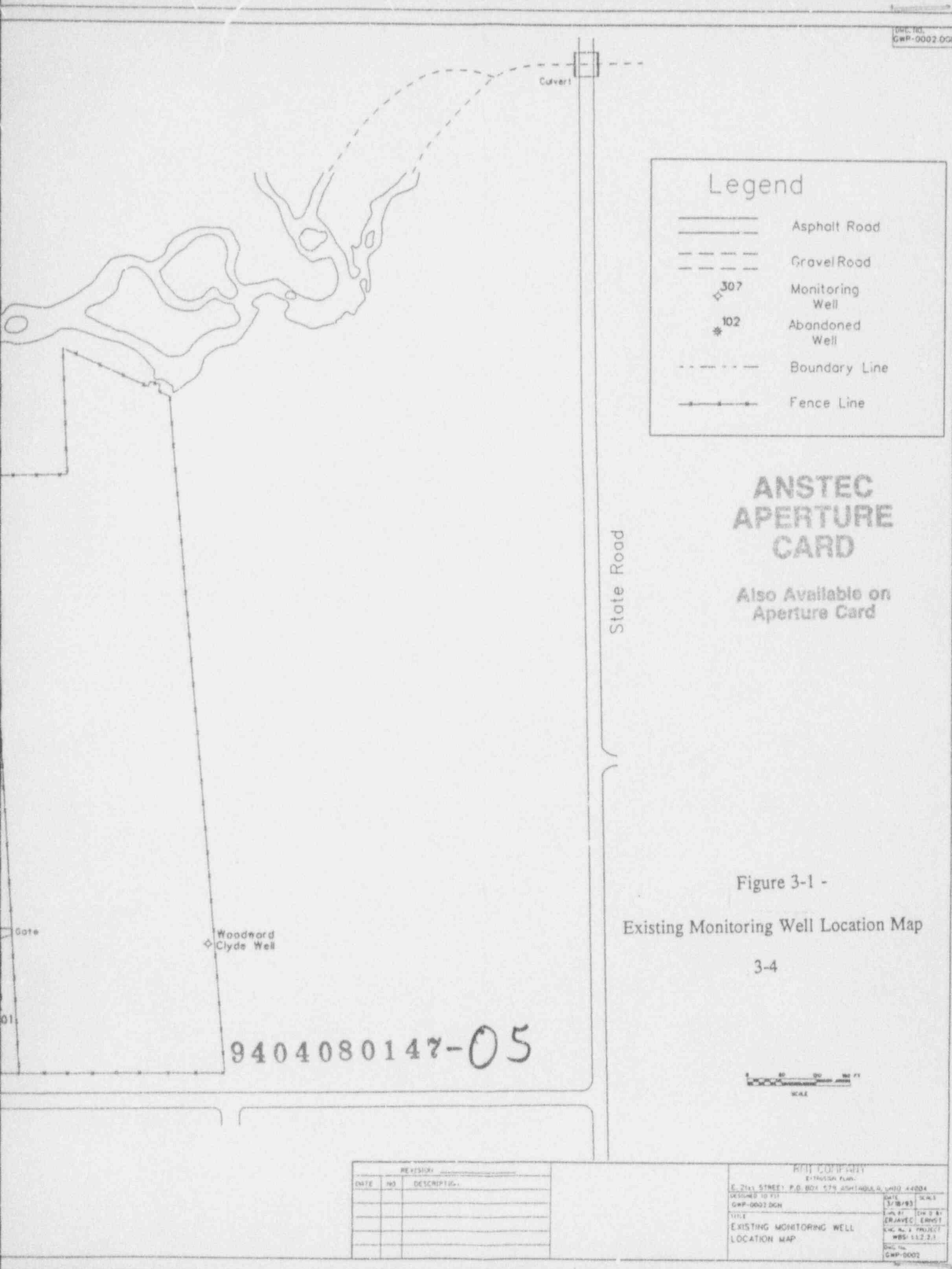

ANSTEC APERTURE CARD

Also Available on Aperture Card

Figure 3-1 -

Existing Monitoring Well Location Map

3-4

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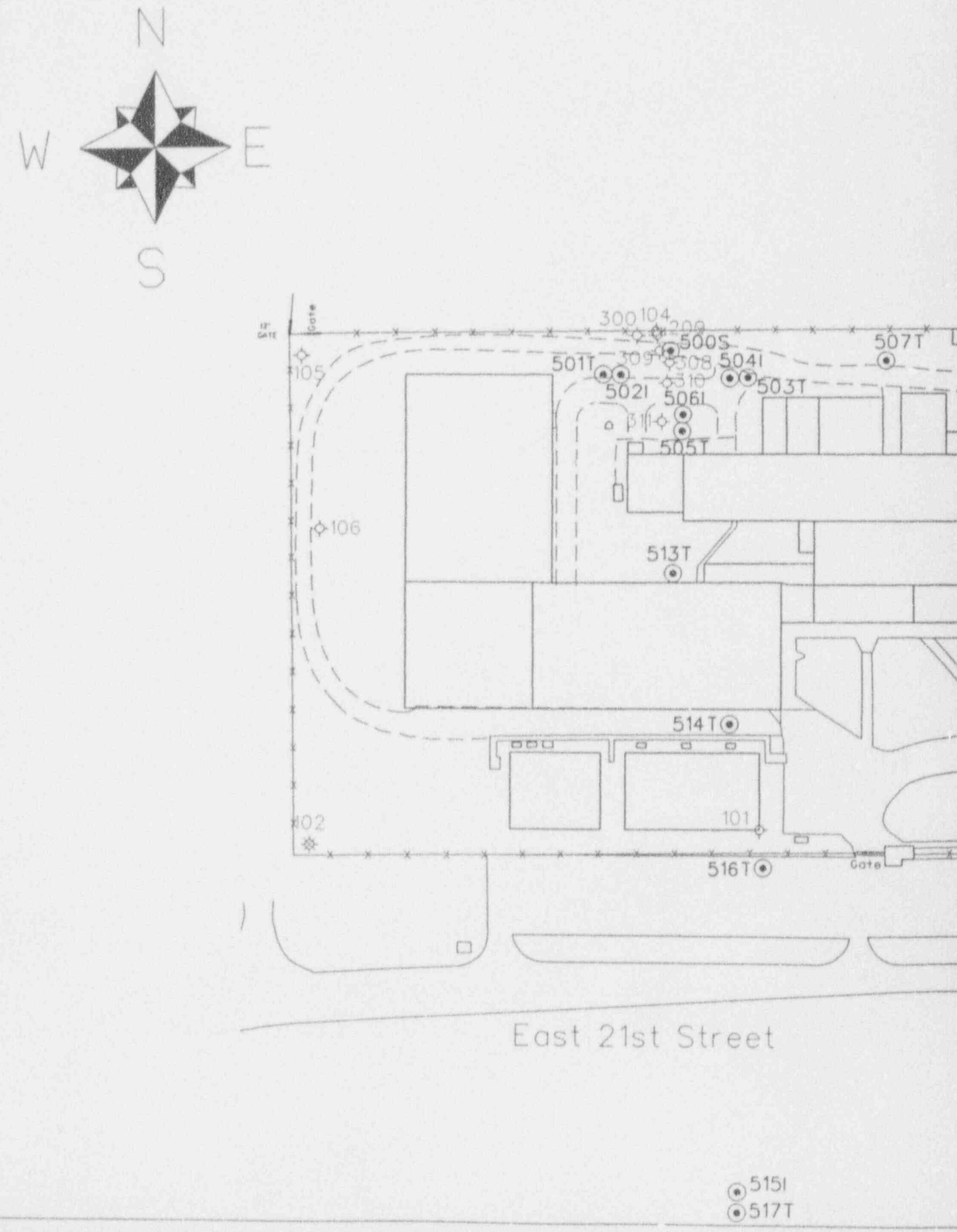

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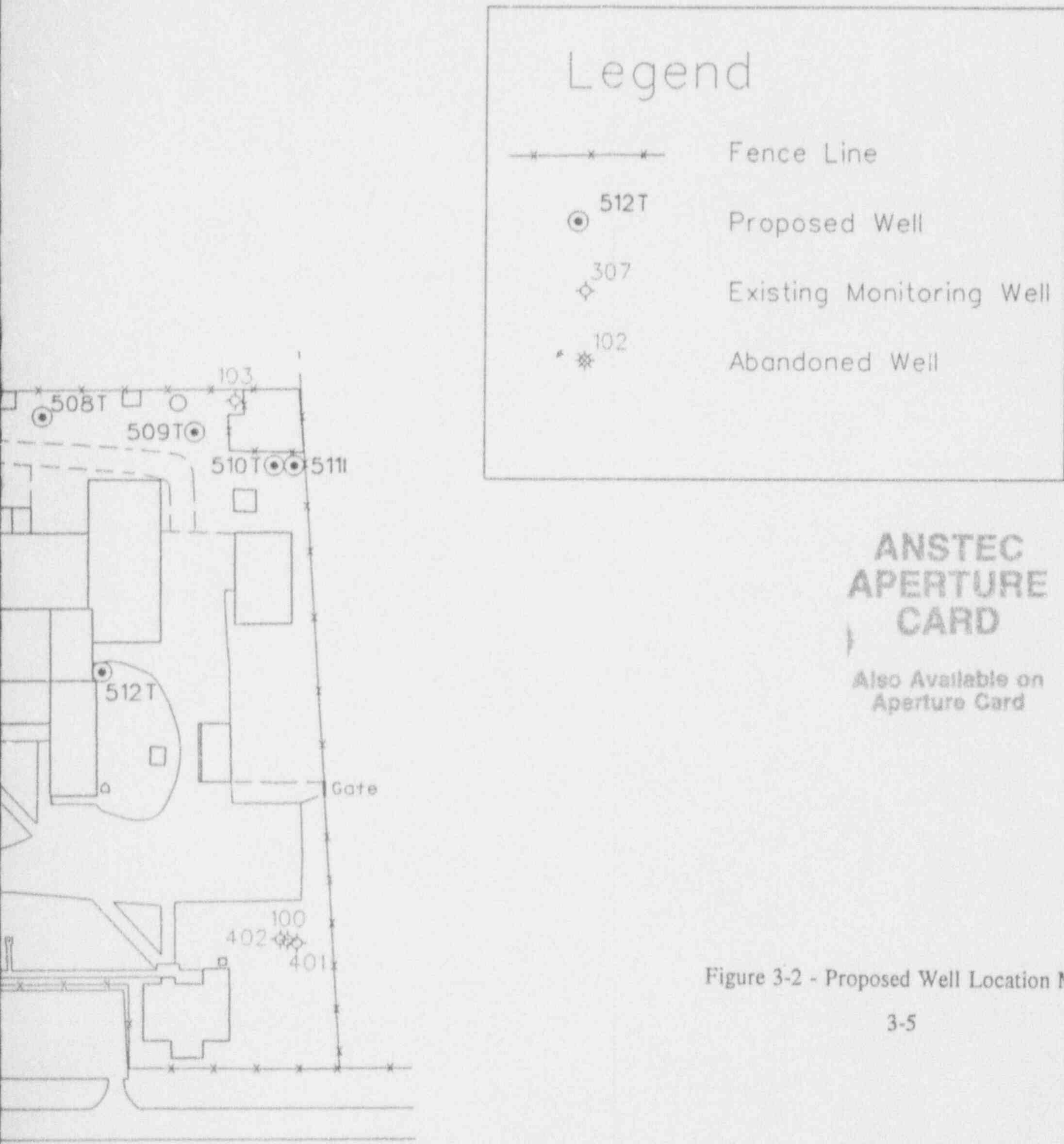


Figure 3-2 - Proposed Well Location Map

REVISION		
DATE	NO	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004
GWP-0001.DGN
TITLE PROPOSED WELL LOCATION MAP
GEORGE ERNST
GWP-0001

Rev. No.: 0

Table 3-1 - Proposed Well Location Rationale

Well Number	Location	Rationale
MW-500S	Water-bearing zone in shale, immediately upgradient and adjacent to MW-200.	TCE has been detected in MW-200 but the screen of MW 200 spans the shale and interface zones. This well will confirm whether or not TCE detected at MW 200 came from the shale or interface water bearing zone.
MW-501T	Water-bearing zone in till, approximately 15 feet west of the former evaporation pond, nested with MW-502I.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.
MW-502I	Water-bearing zone at interface, approximately 15 feet west of the former evaporation pond, nested with MW-501T.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.
MW-503T	Water-bearing zone in till, approximately 15 feet east of the former evaporation pond, nested with MW-504I.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.
MW-504I	Water-bearing zone at interface, approximately 15 feet east of the former evaporation pond, nested with MW-503T.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.
MW-505T	Water-bearing zone in till, approximately 15 feet south of former evaporation pond, nested with MW-506I.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.
MW-506I	Water-bearing zone at interface, approximately 15 feet south of former evaporation pond, nested with MW-505T.	To further define the extent of contamination upgradient and to the sides of the former evaporation pond.

Table 3-1 - Proposed Well Location Rationale (Continued)

Well Number	Location	Rationale
MW-507T	Water-bearing zone in till, north of the Tool Crib Building between the perimeter road and the north property fence.	To provide general coverage for characterization downgradient of the Main Plant Building.
MW-508T	Water-bearing zone in till, north of the Compressor Room between the perimeter road and the north property fence.	To provide general coverage for characterization downgradient of the Main Plant Building.
MW-509T	Water-bearing zone in till, approximately 15 feet southeast of the batch reactor.	To further define the extent of contamination detected at MW-103 and to provide general coverage for characterization downgradient of the Main Plant Building.
MW-510T	Water-bearing zone in till, approximately 15 feet north of the manhole located south of the southeast corner of the substation fence, nested with MW-511I.	To further define the extent of contamination at MW-103 and to determine if contaminants have leaked from the sanitary sewer near the manhole.
MW-511I	Water-bearing zone at interface, approximately 15 feet north of the manhole located south of the southeast corner of the substation fence, nested with MW-510T.	To further define the extent of contamination detected at MW-103 and to determine if contaminants have leaked form the sanitary sewer near the manhole.
MW-512T	Water-bearing zone in till, approximately 10 feet outside the northeast corner of the Truck Ramp Enclosure.	This area is susceptible to surface water infiltration from roof tops, traffic areas, and storage areas. This well will also provide general areal coverage for characterization of contaminants east of the plant building.
MW-513T	Water-bearing zone in till, approximately 10 feet north of RF-6 Building between Stack #8 and Enclosed Ramp.	To characterizes groundwater downgradient of the sump in the RF-6 Building near the center of the plant.

Table 3-1 - Proposed Well Location Rationale (Continued)

Well Number	Location	Rationale
MW-514T	Water-bearing zone in till, on the edge of the fire road north of the Modular Office.	To further characterize the extent of contamination detected at MW-101.
MW-515I	Water-bearing zone at the interface nested with MW-517T.	To provide background characterization upgradient from MW-101.
MW-516T	Water-bearing zone in till, at the edge of the parking lot south of MW-101.	To further characterize the extent of contamination detected at MW-101.
MW-517T	Water-bearing zone in till, approximately 15 feet south of Area G directly south of MW-101.	To provide background characterization upgradient from MW-101.

3.3 Analytical Parameters

Laboratory analyses will be required to evaluate the presence of potential contaminants at the site. Table 3-2 below lists the radiological isotopes and analytical methodology required for characterization.

Table 3-2 - Radioisotope Method Analysis

Parameter	Analytical Method
Uranium	Alpha or Gamma Spectroscopy
Thorium-232	Alpha Spectroscopy
Tc-99	Liquid Scintillation Counting
Plutonium	Alpha Spectroscopy
Neptunium	Alpha Spectroscopy

Potential decommissioning wastes will also be analyzed for the presence of RCRA wastes used and possibly released at the facility. Table 3-3 lists the RCRA parameters and analytical methodology required for characterization.

Table 3-3 - RCRA Analytical Methods

Parameter	US EPA Method
VOCs	8240
Metals (Ar, Ba, Cd, Cr, Pb, Ag)	200.7
Selenium	270.2
Mercury	245.1

Analyses for uranium, Tc-99, VOCs, RCRA metals, and thorium will be performed on samples from each MW every time they are sampled. MWs adjacent to the former evaporation pond will be sampled for plutonium and neptunium analysis. Routine monitoring for all wells will be established since the presence of contaminants is time dependent. Routine sampling and analysis will be performed to provide statistically defensible results and the justification necessary to make any recommended future changes in the analytical program.

SECTION 4

GROUNDWATER CHARACTERIZATION TASKS

The Phase 1 preliminary groundwater characterization consists of the following tasks:

1) Task 1 - Install and develop new MWs.

2) Task 2 - Survey the locations and elevations of all existing and new wells.

3) Task 3 - Collect groundwater samples from all existing and new MWs.

4) Task 4 - Analyze groundwater samples collected.

5) Task 5 - Validate analytical data.

6) Task 6 - Evaluate data from the Phase 1 preliminary investigation to determine whether detailed Phase 2 characterization or supplemental studies are required, or determine that no further groundwater data is needed to meet the objectives.

Each of these tasks is described below.

4.1 Task 1 - Monitoring Well Installation

4.1.1 Objectives

The objectives of the MW installation task are to:

1) Install additional MWs at the RMI site to be used for groundwater characterization

2) Classify the sub-surface soils

3) Collect sub-surface soil samples around the former evaporation pond to characterize the contamination present

4) Evaluate the condition of existing MWs

4.1.2 Scope of Work

By Subtasks 1A and 1B below, install and develop MWs within the water-bearing zones shown on Table 4-1 and at the locations shown on Figure 3-2. Continuous split-spoon samples shall be collected from the borings for visual geologic logging. Split-spoon samples will be field screened for VOC using a Photoionization Detector (PID) and for beta-gamma activity using a Geiger-Mueller (G-M), scintillation or proportional type detector. Grain-size distribution will be determined from a sample collected within the water-bearing zone.

Survey all existing MWs using a video inspection system.

At one new well location with the auger removed and again after the well construction is complete, geophysically survey the borehole using a gamma logger to determine if a correlation can be established. If the geophysical logs are compatible, continue gamma logging the remaining new MWs after construction.

Table 4-1 - Estimated Depth of Proposed Monitoring Wells

MW Number	Water Bearing Zone	Approximate Depth Below Surface (ft)
500S	shale	60
501T	glacial till	20
502I	till/bedrock interface	35
503T	glacial till	20
504I	till/bedrock interface	35
505T	glacial till	20
506I	till/bedrock interface	35
507T	glacial till	20
508T	glacial till	20
509T	glacial till	20
510T	glacial till	20
511I	till/bedrock interface	35
512T	glacial till	20
513T	glacial till	20
514T	glacial till	20
515I	till/bedrock interface	35
516T	glacial till	20
517T	glacial till	20

1) Subtask 1A - Install and develop MW 500S through MW 517T as indicated on Table 4-1. Soil samples will be collected for laboratory analysis from all borings according to the following procedure: one sample will be collected from the bottom of each boring and submitted for analysis to determine the vertical extent of contamination. In addition, the soil sample from each boring exhibiting the highest PID reading (determined during field screening of the samples) will be submitted for analysis, since the field screening is going to be conducted to estimate the subsurface zone of highest concentration. This means that two soil samples from each boring will

be submitted for analysis. Since it is anticipated that field screening with a G-M, scintillation or proportional type detector will show the greatest concentration of radioactive contamination in the first 0.5 feet below grade, and the Soil Characterization Work Plan will include Area B at this depth, it will be unnecessary to submit to the lab the soil sample with the highest radioactive contaminant reading observed during field screening. If, however, the highest radioactive contaminant reading is observed at a depth greater than 0.5 feet in any of the borings, this soil sample should also be submitted for analysis in addition to the original two samples as described above. All soil samples collected for analysis may be analyzed for the following parameters: uranium, thorium, Tc-99, plutonium, neptunium, RCRA metals (eight total), and volatiles (US EPA Method 8240). Analysis parameters are listed in Table 4-2.

Table 4-2 - Sub-Surface Soil Samples Parameters

Parameter	Container	Preservative	Holding time
Uranium Thorium-232 Neptunium Plutonium	zipper lock bag	Not Required	6 months
Technetium 99	zipper lock bag	Not Required	6 months
Volatile Organic	glass, teflon lid	Cool to 4 C	14 days
RCRA Metals	glass jar	Cool to 4 C	6 months

Note: The holding times indicated are the maximum allowed before analysis.

1) Subtask 1B - Install and develop MW 514T through MW 517T with well screens placed in the areas of interest as indicated on Table 4-1.

2) Subtask 1C - Re-mobilize and install up to 10 additional MWs at locations to be determined at the RMI site.

4.1.3 Equipment/Instrumentation

1) Drill rig

2) 6 inch inner diameter hollow stem auger

3) Split-spoon sampler

4) Natural Gamma Logger

5) Video Inspection System

6) PID

7) G-M, scintillation or proportional type detector for beta-gamma activity with a detection limit of 500 disintegrations per minute (dpm)/100 cm^2

8) Personal protective equipment per Health and Safety Plan and will be in accordance with site requirements for the area being sampled

9) Drums or "rolloffs" for soil cutting containment

4.1.4 Work Elements

1) Establish a decontamination pad for the drill rig and other heavy equipment.

2a) Decontaminate all heavy equipment used above the bore hole before entering the site and after each well installation by steam cleaning at a location designated on the site. Equipment will be screened using field instruments and inspected for leaks and safety prior to beginning work and before exiting the site.

2b) All downhole and sampling equipment shall be decontaminated in accordance with approved procedures prior to installation, sampling, and development at each location to avoid cross-contamination.

3) Calibrate the PID and the G-M, scintillation or proportional type detector in accordance with manufacturer's recommended procedures.

4) Determine background activity.

5) Survey all existing MWs using a video inspection system in accordance with manufacturer's recommended procedures.

6) Stake out boring locations for MWs.

7) Advance hollow-stem boring to specified depth.

8) Collect continuous split-spoon samples in accordance with ASTM-D 1586-87.

9) Field screen the split-spoon samples using the PID for VOC and using a G-M, scintillation or proportional type detector for beta-gamma activity in accordance with manufacturer's recommended procedures.

10) Record field screening result on the appropriate data sheet.

11) Classify the sub-surface soils according to the Unified Soil Classification System (USCS). Record the information on a standardized boring log per approved procedures and documentation requirements.

12) Collect sub-surface soil samples for laboratory analyses as described in Subsection 4.1.2.

13) Package and identify the sample for potential analysis.

14) Sub-surface soil samples to be used for laboratory analysis will be handled in accordance with Table 4-2 and the RMI procedure for the Receipt, Storage, and Shipment of Type 2 Samples.

15) Determine the grain-size distribution from a sample collected within the water-bearing zone in accordance with ASTM-D 421 and ASTM-D 422.

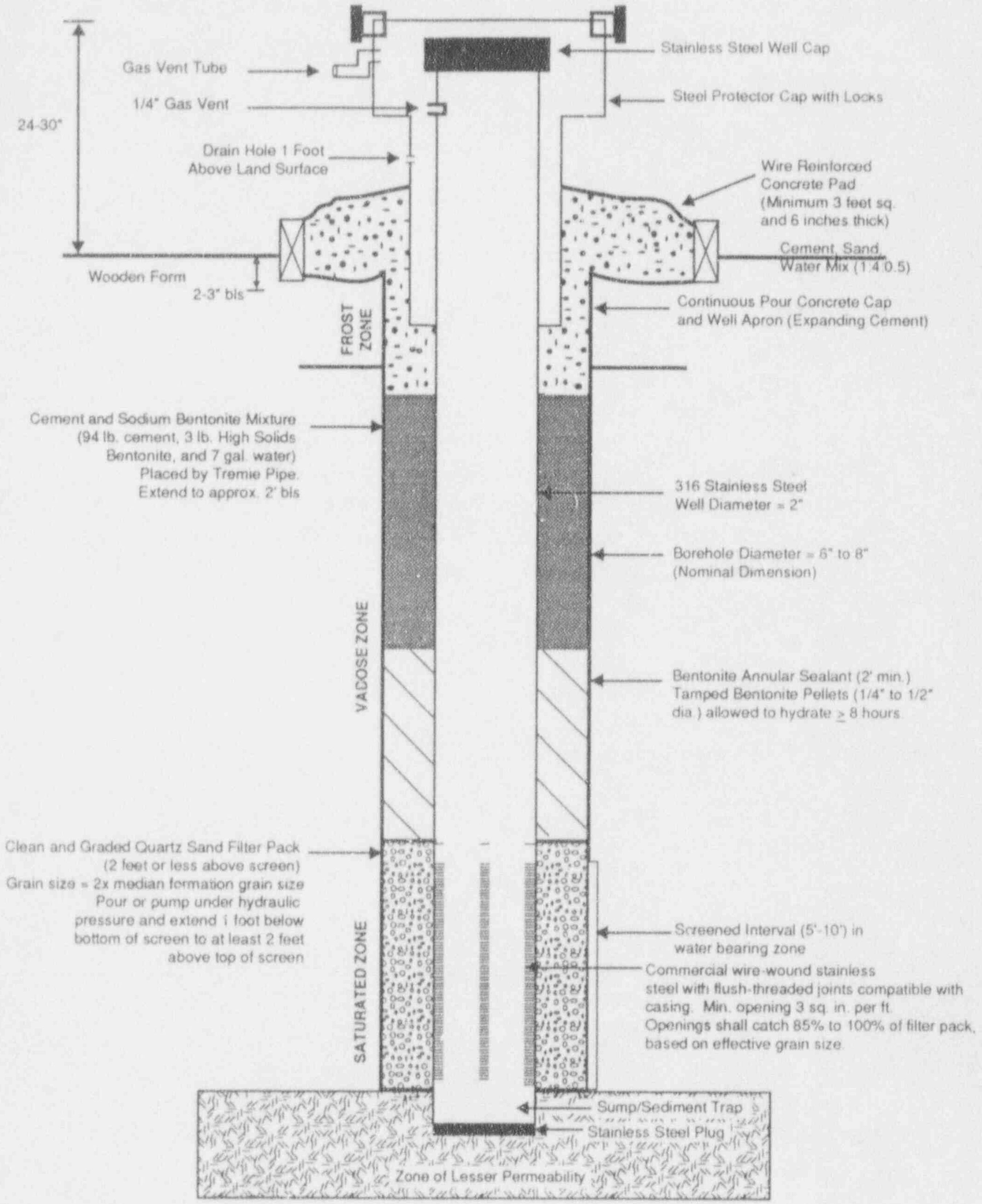
16) Remove the auger at one new well location. Geophysically survey the borehole using a gamma logger in accordance with manufacturer's procedures. Perform the geophysical survey again after the well construction is complete to determine if a correlation can be established.

17) Construct the well in accordance with the schematic diagram of a typical well shown on Figure 4-1.

18) Continue gamma logging the remaining new MWs after construction, if the geophysical logs are compatible, in accordance with manufacturer's procedures.

19) Complete the above ground portion of each well by providing the protection as shown on Figure 4-1.
    (1) Mark the well identification on the well protector in three places:
        a) On the inside of the cover with permanent paint
        b) Welded, stamped, engraved, or permanently painted on the top of the locking or flush-mounted cover
        c) Engraved or marked with indelible marker on the outside of the well cap

General Monitoring Well Cross Section



ERAFS2\MACDATA\ILLUS\RMNGENL WELL XSEC.EPS

Figure 4-1 - Monitoring Well Construction Diagram

(2) If guardposts are necessary, install 3-inch diameter steel posts, radially located around the well at 4-foot intervals, 2 feet below land surface and a minimum of 4-feet above the surface. Concrete the posts in place and fill with concrete or cement grout.

20) Regrade and restore any surrounding areas which were disturbed by the drilling and well placement activities.

21) Develop the well as soon as possible after well installation but no sooner than 48 hours after completion of the grouting as follows.
   (1) Remove a minimum of 3 to 5 well volumes (calculated using the casing and the filter pack).
   (2) If the well is purged to dryness during development, allow it to recharge completely and purge to dryness a minimum of 2 more times.
   (3) Monitor the water level, pH, temperature, specific conductance, and clarity of the water before, during, and at the completion of well development.
   (4) Continue development for a minimum of 4 hours or until the water is visually clear and the pH and specific conductance have stabilized.
   (5) An electric purge pump or bladder pump may be used if conditions permit.

22) All drill cutting, development water, and wastes generated by these activities shall be handled in accordance with the RMI Procedure for Disposal of Drill Cuttings and Groundwater.

23) A site geologist shall be present and document all field activities associated with well installation, sub-surface soil sampling, well development, well abandonment, and waste handling in accordance with RMI procedures.

4.1.5 Quality Assurance Requirements

QA shall be maintained during this task by implementing the following tasks:

1) Document daily activities in a logbook in accordance with the RMI Procedure for Field Activity Documentation.

2) Collect QA/QC samples including duplicate samples, trip blanks, equipment rinsate samples, etc. in accordance with the approved RMI Procedure for Subsurface Soil Sampling.

3) Samples will be processed in accordance with the RMI Procedure for the Receipt, Storage, and Shipment of Type 2 Samples.

4) Samples will be preserved in accordance with the RMI Laboratory Procedures Manual.

5) Part II of the Sample Collection and Shipping Checklist will be completed prior to shipping to ensure all of the necessary information is recorded and the samples are properly shipped.

6) Calibrate the PID and the G-M, scintillation or proportional type detector in accordance with manufacturer's recommended procedures.

7) Nonconformances with the plan will be documented in accordance with nonconformance reporting procedures, and effects (e.g., costs, schedule, analysis, etc.) noted.

8) Implement all RMI Site Restoration Quality Project Plan (SRQAPP) requirements.

4.1.6 Health and Safety Requirements

The health and safety of site personnel will be maintained through implementation of the site Health and Safety Plan.

1) Site personnel will be trained in accordance with all RMI training requirements, including: RMI Entry Control Plan, RMI Extrusion Plant Health Physics Manual, and the RMI Extrusion Plant Training Program Plan.

2) A pre-job briefing shall be conducted each day prior to the start of work.

3) Each person assigned to this task shall have read and signed the Health and Safety Plan and applicable RWPs prior to the start of work indicating that they understand and will comply with its requirements.

4.2 Task 2 - Land Surveying

4.2.1 Objective

The objective of this task is to establish the location and elevations of newly installed wells and to verify the location and elevations of existing MWs at the RMI site.

4.2.2 Scope of Work

At the MWs indicated on Figure 3-2, install permanent survey markers and determine the location and elevation of each new and existing MW. Determine the top of the well casing at all new and existing wells at the point where the water level is measured. Report the coordinates of the survey markers and the elevations of each survey marker and the top of the well casing in tabular form for all new and existing wells.

4.2.3 Equipment/Instrumentation

1) Transit
2) Survey Rod
3) Survey Tape
4) Survey Pins
5) Field Book
6) Personal Protective Equipment per site Health and Safety Plan

4.2.4 Task Elements

1) All surveying will be performed by a State of Ohio Certified Land Surveyor.

2) The coordinates will be determined for the survey markers to the nearest 1 foot and referenced to the State Plane Coordinate System.

3) All elevations will be determined to the nearest 0.01 foot and will be referenced to the National Geodetic Vertical Datum of 1929.

4) The tabulated list of results shall consist of the designated well number; the X and Y coordinates; and the elevations for the top of the survey marker and the top of the well casing.

5) The completed tabulated list shall be submitted within 10 working days after completion of field surveying activities.

4.2.5 Quality Assurance Requirements

QA shall be maintained during this task by implementing the following tasks:

1) Document daily activities in a logbook in accordance with the RMI Procedure for Field Activity Documentation.

2) Nonconformances with the plan will be documented in accordance with the RMI Nonconformance Procedure with effects (e.g., costs, schedule, analysis, etc.) noted.

3) Implement all RMI SRQAPP requirements.

4.2.6 Health and Safety Requirements

The health and safety of site personnel will be maintained through implementation of the Site Health and Safety Plan:

1) Site personnel will be trained in accordance with all RMI training requirements, including: RMI Entry Control Plan, RMI Extrusion Plant Health Physics Manual, and the RMI Extrusion Plant Training Program Plan.

2) A pre-job briefing shall be conducted each day prior to the start of work.

3) Each person assigned to this task shall have read and signed the Health and Safety Plan and applicable RWPs prior to the start of work indicating that they understand and will comply with its requirements.

4.3 Task 3 - Groundwater Sample Collection

4.3.1 Objective

Collect representative samples and develop a potentiometric surface map of the groundwater beneath the RMI site.

4.3.2 Scope of Work

Groundwater sample collection shall occur following completion of development of the new wells. The groundwater elevation shall be recorded at all MWs prior to collecting samples. The first phase of sample collection shall be at MW 500S through MW 517T. Subsequent groundwater samples shall be collected from any additional wells installed after the previous sample collection. On a semi-annual basis thereafter, all MWs, new and existing, at the RMI site shall be sampled for analysis.

During the sampling event, sufficient volume and number of samples will be collected from each of the wells for analysis of the parameters listed in Table 4-3. Samples for analysis for thorium-232 will only be collected during the first semi-annual sampling event of all MWs. Samples shall be collected for analysis for the parameters listed on Table 4-4 at the following wells during the first semi-annual sampling event: MW 104, MW 300, MW 308 through MW 311, and MW 500S through MW 506I.

During a sampling event, if sufficient seepage flow can be identified along the escarpment east of the swale from the former evaporation pond, water samples will also be collected from the seepage for analysis of the parameters listed in Table 4-3.

Table 4-3 - Groundwater Sample Containers, Estimated Number, Preservation, and Holding Times

Parameter	Container	Estimated Number	Preservative	Holding time
Volatile Organics	40 mL VOA vials	2	HCl, pH<2	14 days
RCRA Metals	1-L polyethylene	1	HNO_3, pH<2	6 months
Uranium	1-L plastic or glass	1	HNO_3, pH<2	6 months
Thorium-232	1-L plastic or glass	1	HNO_3, pH<2	6 months
Tc-99	1-L plastic or glass	1	HNO_3, pH<2	6 months

Holding times, preservation, and container requirements are obtained from SW-846 3rd edition, 1986. Holding times are the maximum allowed for the analysis.

Table 4-4 - Transuranic Groundwater Sample Containers, Estimated Number, Preservation, and Holding Times

Parameter	Container	Estimated Number	Preservative	Holding time
Plutonium	1-L plastic or glass	1	HNO_3, pH<2	6 months
Neptunium	1-L plastic or glass	1	HNO_3, pH<2	6 months

Holding times, preservation, and container requirements are obtained from SW-846 3rd edition, 1986. Holding times are the maximum allowed for the analysis.

4.3.3 Equipment/Instrumentation

1) As listed in the RMI Groundwater Sampling Procedure.

2) PID.

3) G-M, scintillation or proportional type detector with a detection limit of 500 dpm/cm^2.

4) Personal Protective Equipment per Health and Safety Plan and will be in accordance with site requirements for the area being studied.

5) Containers for purgewater.

4.3.4 Work Elements

Follow the procedures for bailing and sampling contained in the RMI Groundwater Sampling Procedure with the following additions:

1) All new and existing wells shall also be sampled during a semi-annual sampling event.

2) Samples will also be collected for analysis of RCRA Metals. For each well, a one-liter polyethylene sample bottle shall be preserved with approximately 1 mℓ of concentrated nitric acid to maintain the sample at a pH of 2.0 or less.

3) Calibrate the PID and the G-M, scintillation or proportional type detector in accordance with manufacturer's recommended procedures.

4) While opening the well cap, measure and record the PID and G-M, scintillation or proportional type detector readings for VOC and beta-gamma activity, respectively.

5) Record the v[illegible] of groundwater removed during the purging process in the field log book.

6) MWs 500S through 506I may also contain TCE. Purge water from these wells should also be placed in dedicated containers as described in the RMI Groundwater Sampling Procedure.

7) The sample container for RCRA metals shall be filled before radionuclides.

8) If sufficient seepage flow can be identified along the escarpment east of the swale from the former evaporation pond, the exact location should be noted and water samples should also be collected there.

4.3.5 Quality Assurance Requirements

QA shall be maintained during this task by implementing the following tasks:

1) Document daily activities in a logbook in accordance with the RMI Procedure for Field Activity Documentation.

2) Collect QA/QC samples including duplicate samples, trip blanks, equipment rinsate samples, etc. in accordance with the RMI Procedure for Groundwater Sampling.

3) Samples will be processed in accordance with the RMI Procedure for the Receipt, Storage, and Shipment of Type 2 Samples.

4) Samples will be preserved in accordance with the RMI Laboratory Procedures Manual.

5) Part II of the Sample Collection and Shipping Checklist contained in the RMI Procedure for Receipt, Storage, and Shipment of Type 2 Samples will be completed prior to shipping to ensure all of the necessary information is recorded and the samples are properly shipped.

6) Calibrate the PID and the G-M, scintillation or proportional type detector in accordance with manufacturer's recommended procedures.

7) Nonconformances with the plan will be documented in accordance with nonconformance reporting procedures, and effects (e.g., costs, schedule, analysis, etc.) noted.

8) Implement all RMI SRQAPP requirements.

4.3.6 Health and Safety Requirements

The health and safety of site personnel will be maintained through implementation of the site Health and Safety Plan.

1) Site personnel will be trained in accordance with all RMI training requirements, including: RMI Entry Control Plan, RMI Extrusion Plant Health Physics Manual, and the RMI Extrusion Plant Training Program Plan.

2) A pre-job briefing shall be conducted each day prior to the start of work.

3) Each person assigned to this task shall have read and signed the Health and Safety Plan and applicable RWPs prior to the start of work indicating that they understand and will comply with its requirements.

4.4 Task 4 - Laboratory Analysis

4.4.1 Objectives

Determine the presence and concentration of contaminants in the environmental samples. DQO Level 2 and DQO Level 3 data quality standards will be required.

4.4.2 Scope of Work

Samples will be analyzed in accordance with SW-846 and *US EPA Methods of Analysis for Water and Wastes* methodology. The levels of data quality for analytical results are defined in Table 2-1. Soil samples will be analyzed for the parameters listed in Table 4-5 to DQO Level 3 data quality standards. The initial water samples will be collected as soon as practicable after development and will be analyzed to DQO Level 2 data quality standards. The analyses performed to DQO Level 2 data quality standards will be completed in 5 workings days after sample collection.

Subsequent water samples will be collected on a semi-annual basis and will be analyzed to DQO Level 3 data quality standards. The DQO Level 3 analyses will be completed in standard turnaround times. The minimum number of analyses which will be performed is estimated in Table 4-5 for soils and in Table 4-6 for water by the parameter and level of quality required.

Guideline values for uranium and Tc-99 are based upon those approved for the CAMU. The remaining guideline values for parameters of interest are based upon US EPA *Safe Drinking Water Act* Maximum Concentration Limits.

Table 4-5 - Soil Sample Parameters and Estimated Number

Estimated Number	Parameter	Method	Holding Time
36	Uranium	Alpha or Gamma Spectroscopy	6 months
8	Isotopic Thorium-232	Alpha Spectroscopy	6 months
18	Tc-99	Liquid Scintillation Counting	6 months
8	Plutonium	Alpha Spectroscopy	6 months
8	Neptunium	Alpha Spectroscopy	6 months
18	Volatile Organic	US EPA Method 8240	14 days
18	RCRA Metals	US EPA Method 6010/7471	6 months

Notes: (1) The number of samples does not include those required for QA/QC.

(2) The holding time is the maximum allowed before analysis.

(3) All soil samples shall be analyzed to DQO Level 3 data quality standards.

(4) Detection limits are method dependent.

Table 4-6 - Water Sample Parameters and Estimated Number

Estimated Number		Parameter	Method	Holding Time
DQO Level 2	DQO Level 3			
18	216	Uranium	Alpha or Gamma Spectroscopy	6 months
	54	Thorium-232		
	8	Plutonium		
	8	Neptunium		
18	216	Tc-99	Liquid Scintillation Counting	6 months
18	216	TCE	US EPA 8240	14 days
18	216	RCRA Metals	US EPA 200.7/270.2/245.1	6 months

Notes: (1) The number of samples does not include those required for QA/QC.
(2) The holding time is the maximum allowed before analysis.
(3) All DQO Level 2 samples should be analyzed within 5 working days if practicable
(4) Detection limits are method dependent.

4.4.3 Equipment/Instrumentation

As required by SW-846 methodology to perform the desired analyses.

4.4.4 Task Elements

1) Chain of custody will be maintained and documented for all samples.

2) Samples will be analyzed in accordance with SW-846 methodology, *US EPA Methods of Analysis for Water and Wastes* methodology, or approved radiochemical analytical methods.

3) Data will be reduced by computer, using direct interfaces, where possible. The computer generated data will be reviewed by an experienced analyst for validity and correct identification with the given sample. In the absence of automated data reduction by computer, the analyst may

reduce the data into a reportable format using hand-held calculators or computer programs. Data will be recorded by the analyst in a dedicated bench book.

4) A DQO Level 3 data quality package of results will be produced by the laboratory. All results will be certified by the laboratory.
   (1) The final data package submitted by the laboratory must include a summary of the analytical results for each sample, as well as all reports and documentation generated as required by the analytical methods (e.g., chromatogram, extraction notes, and chain-of-custody forms).
   (2) All reports and documentation, including mass spectra, calibration records, QC results, etc., will be clearly labeled with the laboratory sample number and associated field sample identification number.
   (3) Analytical data will be reported on an "as-received" basis as the analysis for each parameter is completed.
   (4) Analytical results will be given in standard units, as specified by the analytical method. If reporting units are not specified in the method, data from chemical analysis will be reported in milligrams per kilogram for solid matrices and micrograms per liter for aqueous matrices.
   (5) Details regarding any corrective actions taken and a discussion of any necessary modifications to established protocols will be included in the final report.

4.4.5 Quality Assurance Requirements

4.4.5.1 Methods of Calibration

Calibration procedures differ by analytical method. The following sections describe the general calibration required for the laboratory equipment used for each analytical method.

Metals by Graphite Furnace and Flame

A calibration curve of at least three standards is run daily, prior to analysis of samples. The calibration curve must have a correlation coefficient of 0.995 or greater. Afterwards, a single standard is run every 10 samples. The apparent concentration of this standard must lie within 10 percent of the true concentration. Standards are checked quarterly against a US EPA or NIST check solution.

Metals by Inductively Coupled Plasma (ICP)

A calibration curve of the two standards is run daily, prior to analysis of samples. Afterwards, calibration verification is run every 10 samples. The apparent concentration of this standard must lie within 10 percent of the true concentration. Standards are prepared by diluting mixed element concentrates, which are prepared from commercial solutions. The concentrations of the commercial standards are checked quarterly against an US EPA or NIST check solution.

Volatile and Semi-Volatile Organic Analysis by GC/MS

A calibration curve of at least five standards is run daily, prior to analysis of samples. The instrument will be tuned prior to the initiation of analysis to meet the required criteria of the method.

Radioisotope Analysis

Instrument stability will be checked weekly using reference radioactive sources. The calibration procedures will be method specific and in conjunction with the laboratory's SOPs and the manufacturer's guidelines.

4.4.5.2 Quality Control

Laboratory QC includes procedures to assess laboratory accuracy and precision. Analytical instrument performance is determined by routinely conducting the following checks:

1) Calibration verification
2) Instrument sensitivity
3) Daily performance checks.

The types of laboratory quality control samples to be used are as follows:

Method Blanks

Method blanks consist of organic-free deionized water that is carried through the analytical scheme like a sample. They serve to measure contamination associated with laboratory storage, preparation, or instrumentation. For most analyses, a method blank is analyzed on a daily basis and at a frequency of one per 20 samples if more than 20 samples are run in a given batch. If the analyte of interest is above the reporting detection limit, corrective action should be taken except for common solvents such as methylene chloride, acetone, toluene, 2-butane, and phthalates. The method blank must contain less than or equal to five times (5x) the reporting detection limit for corrective action.

Calibration Blanks

Calibration blanks are prepared with standards to create a calibration curve. They differ from the other standards only by the absence of analytes and provide the "zero point" for the curve.

Internal Standards

Internal standards are measured amounts of certain compounds added after preparation or extraction of a sample. They are used in an internal standard calibration method to correct sample results suffering from capillary column injection losses, purging losses, or viscosity effects. Internal standard calibration is currently used for volatile organics, chlorinated pesticides, GC/MS extractables, and metals by ICP.

Matrix Spikes

Spikes are aliquots of samples to which known amounts of analyte have been added. They are subjected to the same sample preparation or extraction procedure and are analyzed as samples. The stock solutions used for spiking are purchased or prepared independently of calibration standards. The spike recovery measures the effects of interferences in the sample matrix and reflects the accuracy of the determination. Matrix Spikes will be used for metals analyses.

Spikes are prepared and analyzed on a daily basis and at a frequency of at least one per 20 samples if more than 20 samples are run in a given batch.

Spike recoveries are stored in the laboratory data base and are retrievable for statistical analysis. Laboratory control limits are calculated for individual matrix types when 20 data points become available.

Duplicates, Duplicate Spikes, and Matrix Spike Duplicates (MSD)

Duplicates are additional aliquots of samples subjected to the same preparation and analytical scheme as the original sample. In cases where the analyte concentration is consistently below the detection limit, duplicate spikes are substituted for originals. MSD are duplicate spikes associated with organic analysis. The RPD between duplicates, duplicate spikes, or MSD measures the precision of a given analysis.

Duplicates (or duplicate spikes) are prepared and analyzed on a daily basis and at a frequency of at least one per every 20 samples. RPDs are stored in the laboratory data base and are retrievable for statistical analysis.

Laboratory Control Standards

Laboratory control standards (LCS) are aliquots of organic-free or deionized water to which known amounts of analyte have been added. They are subjected to the same sample preparation or extraction procedure and are analyzed as samples. The stock solutions used for LCSs are purchased or prepared independently of calibration standards. The LCS recovery tests the function of analytical methods and equipment.

Surrogate Spikes

The surrogate spike is used to monitor the efficiency of the sample preparation and analysis. Calculated percent recovery is used as a measure of the accuracy of the analytical method. A surrogate is an organic compound that is chemically similar to a contaminant of interest but is not normally found in the waste. Samples are spiked with the compound prior to analysis. The percent recovery is calculated for each surrogate.

4.5 Task 5 - Data Validation

4.5.1 Objectives

Evaluate the validity of laboratory data. To achieve this objective, a data validation plan is currently under development.

4.5.2 Scope of Work

Data validation will be conducted in accordance with all applicable requirements of the data validation plan. The data will be assessed for confidence, representativeness, accuracy, precision, completeness, and comparability.

4.6 Task 6 - Data Collection, Evaluation, and Response

4.6.1 Objectives

Determine if the characterization data provides an adequate level of information required to support decommissioning activities. Identify additional data needs to achieve the stated objectives and to supplement existing tasks by providing that data.

4.6.2 Scope of Work

Characterization analytical data and field data will be assembled and reviewed. The adequacy of the data to meet the objectives of the groundwater characterization program will continuously be evaluated as the data become available. Additional data needs to achieve the groundwater characterization objectives will be identified. Supplemental tasks will be developed to obtain the required information.

4.6.3 Task Elements

4.6.3.1 Data Collection

A substantial amount of environmental data has been collected over the past years to support specific objectives at RMI. The field investigation and laboratory analysis required of the Phase 1 of groundwater characterization will generate a large quantity of new data. The type and use of the data from each of these sources are discussed in the following sections.

Existing Data

The most recent and complete collection of existing data is compiled in the Site SR (PARSONS 1993). The existing data have been used in developing the rationale for the proposed MW locations, and will be used as the source for existing environmental and geological conditions. Existing information will provide a basis for comparison with the data obtained from this investigation.

Monitoring Well Installation

As part of the Phase 1 groundwater characterization, 18 new MWs will be installed. Each new MW will produce documentation of the installation, geologic information, and well development information. The following data will be generated from these activities.

1) Installation Documentation:
   - (1) Drilling date or dates
   - (2) Drilling equipment
   - (3) Drilling conditions
   - (4) Reference elevations for all depth measurements
   - (5) Nominal hole diameters
   - (6) Depth at which hole diameter changes
   - (7) Total depth of completed boring
   - (8) Any sealing off of water-bearing strata
   - (9) Depth of any grouting or sealing
   - (10) Amount of cement used for grouting or sealing

(11) Depth or location of any loss of tools or equipment

(12) Depth, size, and type of well casing

(13) Description of well screen, including

a) Length

b) Location

c) Diameter

d) Slot sizes

e) Material

f) Manufacturer

The MW installation data will document the procedures which were followed and serve as a record of the work which was performed.

2) Geologic Information

(1) Depth of each change of stratum

(2) Thickness of each stratum

(3) Soil classification according to the USCS

(4) Location of fractures, faults, joints, cavities, or weathered zones

(5) Organic vapor concentration of headspace in sample containers

(6) Beta-gamma activity of samples based on field screen using a G-M, scintillation or proportional type detector

(7) Depth at which groundwater is first encountered

(8) Depth to the static water level and changes in static water level

The geologic data will provide preliminary characterization of the stratigraphy and will be used to develop geologic cross-sections. This information will be useful when assessing the potential fate of contaminants in the soil.

3) Well Development Information

(1) Date of development

(2) Static water level upon completion of the well

(3) Static water level after development

(4) Method of development

(5) Quantity of water removed

(6) Characteristics of water before, during, and after development, including:

a) Specific Conductance

b) Temperature

c) pH

d) Visual character

The information obtained from the well development will be used to characterize the hydrogeology of the region around RMI. Included in this information should be verification of the groundwater contours and hydraulic gradient. These hydrologic characteristics will be used to evaluate the findings of the existing and the new MWs and will provide insight into the potential for contaminant migration in the groundwater.

Sub-Surface Soil Sampling

Sub-surface soil samples will be collected from all new wells. The following data will be generated from these activities:

1) Depth and location of sample

2) PID reading of headspace in sample containers

3) Beta-gamma activity of samples based on field screen using G-M, scintillation or proportional type detector

4) Results reported from laboratory for analyses of radionuclides.

The results of the PID readings during sampling will identify zones of potential contamination for laboratory analyses. The laboratory analyses will determine if and in what concentration contaminants are present. This data will help define the level, extent, and possible source of contamination. It will also indicate potential health risks and possible exposure routes.

Groundwater Sampling

Groundwater sampling from the new and existing wells will be conducted semi-annually. The following data will be generated from these activities:

1) Date of sampling

2) Static water level prior to sampling

3) Characteristics of groundwater, including:
   (1) Specific Conductance
   (2) Temperature
   (3) pH
   (4) Visual character

4) Volumes of water purged

5) Chemical analysis, results reported from laboratory:
   (1) Volatile Organics, SW 8240
   (2) Radionuclides
   (3) Metals, SW 6010

The laboratory analyses of the groundwater samples will determine if, and at what concentration, contaminants are present. This data will help define the level, extent, and possible source of groundwater contamination. It will also indicate potential health risks and possible exposure routes.

Location Surveys

Location surveys will provide the identification, coordinates, and elevations of all new and existing MWs. The elevation of the top of casing of each new and existing MW will also be recorded. In addition to all field documentation and computation sheets, a tabulated list of the data will be generated. The tabulation will include the designated name or number of the well, location coordinates, and all required elevations. The data will serve as documentation of the location of points used in this study.

4.6.3.2 Data Evaluation

Data evaluation methods will be used to aid in data interpretation. On collecting and interpreting hydrologic and geologic data, analytical data will be evaluated according to standard statistical methods.

Concentrations of chemicals in groundwater vary considerably depending on factors such as soil characteristics, geochemical interaction, flow rates, precipitation, evapotranspiration rates, and proximity to recharge and discharge areas. Because of this variability, a statistical baseline must be established. The groundwater monitoring program proposed in this plan will establish baseline conditions for background wells and downgradient wells. A statistically sound monitoring program relies on this baseline data in detecting and tracking contamination from on-site as well as off-site sources. Once the baseline is established, statistical tests and spatial and graphical techniques will be used to identify anomalous conditions that need further investigation. Further investigations will be designed to bring any uncertainty to manageable levels. The current monitoring system may be expanded if results identify additional contaminants sources not observed in the wells.

Hydrologic and Geologic Data Interpretation

Standard hydrogeologic data interpretation methods will be used to evaluate groundwater data. All well locations will be surveyed and represented on base maps of the site using state planar coordinates. These base maps will be used for displaying constituent concentrations associated with individual wells. Base maps will also be used for representing water level contours and contaminant isoconcentrations to aid in tracking changes in the water bearing zones and movement of any contamination plumes. Graphical methods such as hy drographs and concentration plots will also be used to track trends. Regional hydrologic and geolc gic data from local agencies will also be incorporated into the data evaluation process when appropriate.

Statistical Determinations

Analytical results obtained from groundwater sampling will be examined as appropriate at selected wells to determine whether there has been a statistically significant change in contaminant concentrations. Descriptive statistical functions included in these examinations will include the mean, range, standard deviation, variance, maximum, and minimum. Other statistical functions will be applied as necessary. Statistical methods provide one data evaluation tool to determine the impact of potential units on the groundwater and to help select the best fit or most representative data that should be used in analysis or conclusions. Several statistical procedures are specified below to allow flexibility to respond to changes in monitoring conditions. Different data bases available at different wells will also affect the selection of statistical methods. The statistical procedures described cover several anticipated conditions. However, should these procedures prove inadequate for a currently unforeseen situation, additional statistical procedures may be necessary.

Background or Upgradient Well to Downgradient Well Comparisons

In certain situations, the data being evaluated may involve comparisons between upgradient wells (background) and downgradient wells. Cochran's Approximation to Behrens-Fisher Student's t-Test will be the primary statistical procedure for downgradient to upgradient well data comparisons. An analysis of variance (ANOVA) procedure may be performed in cases where the Student's t-Test proves to be inadequate and also to provide some assurance against false positive or negatives. Two other statistical procedures, tolerance intervals and prediction intervals, will be used as alternate procedures to the ANOVA procedure if deemed necessary. Discussed below are the specific conditions under which each procedure may be used to determine whether there is statistically significant evidence of contamination.

1) Analysis of Variance:

If 50 percent or more of the observations are below the detection limit, then an ANOVA will be the first choice for the determination of statistical significance. A one-way analysis of variance statistical procedures will be used to determine whether differences in mean concentrations among wells or groups of wells are statistically significant. A one-way parametric analysis of variance procedure will be used for situations where data for a monitoring parameter are available from several wells but only for one time period, or when data which do not exhibit seasonality are available from several wells for several time periods. A one-way nonparametric analysis of variance procedure will be used for interwell comparisons when the data or the residuals from a parametric ANOVA have been found to be significantly different from normal and when a log transformation fails to adequately normalize the data.

2) Tolerance Intervals Based on the Normal Distribution:

Areas of homogeneous geology between the background and downgradient wells may allow an alternate approach, such as a tolerance intervals procedure. Tolerance intervals will be constructed from data on background wells. The concentrations from downgradient wells will then be compared with the tolerance interval. With the exception of pH, concentrations which do not fall within the tolerance interval would indicate statistically significant evidence of contamination. A coverage and a tolerance coefficient of 90 percent will be employed providing at least a 90 percent confidence level.

Comparisons with Regulatory Standards

Statistical procedures will also be used when comparisons are being made between concentrations of monitored constituents in wells and regulation specified concentration limits. The mean well concentration will be compared against the DOE and US EPA limits through the construction of a confidence level.

Using the 90th percentile of the t-distribution for the mean concentration, confidence intervals will be constructed with downgradient well data. Once constructed, the interval will be compared with the regulatory-based standard to determine whether the mean concentration significantly exceeds the standard. This statistical procedure will be used for both normal and log-normal data. If the well data do not adequately follow the normal distribution even after logarithm transformation, a nonparametric confidence interval will be constructed using a minimum of seven observations to obtain a one-sided significance level of 10 percent (confidence of 90 percent). This may require pooling of data from two or more wells or sampling periods.

Optional Intra-Well Comparisons

When sufficient data is established for each well (eight or more independent samples), control charts may be constructed by plotting each data point against time to allow detection of possible trends or drifts in the data. This is an optional statistical procedure that will complement the statistical procedures specified above. A procedure such as the combined Shewhart-Cusum control charts may be used for each well and constituent.

Test of Proportions

In situations where more than 50 percent of the data are below detection but at least 10 percent of the observations are quantified, a test of proportions may be used to compare the background well data with the downgradient well data. A higher proportion of quantitated values in the downgradient wells may indicate the presence of contamination. If only a small portion of the observations are not detected, these will be replaced with either the Method Detection Limit (MDL) or the Practical Quantitation Limit (PQL) divided by two (MDL/2 or PQL/s). The PQL will be taken from Appendix IX of 40 CFR 264 or other standard analytical reference, depending upon the US EPA analytical method used for each parameter.

Handling Outlying Data

An "outlier" or groundwater constituent value much different from most other values may indicate one of the following situations:

(1) A catastrophic unnatural occurrence such as a spill
(2) Inconsistent sampling or analytical chemistry methods that may result in laboratory contamination or other anomalies
(3) Errors in the transcription of data values or decimal points
(4) True but extreme groundwater constituent concentration measurements

When such suspect data is encountered, a test will be performed for outliers which determines whether there is statistical evidence that the observation in question does not fit the distribution of the rest of the data. If determined to be an outlier, the value in question will not be dropped or replaced unless it is determined that an error has occurred.

4.6.3.3 Response

The data obtained from the initial phase of groundwater characterization will be available for determining the need for additional investigation phases. Guideline values for uranium and Tc-99, presented in Table 4-7, are based upon those approved for the CAMU. The remaining guideline values in Table 4-7 are based upon US EPA *Safe Drinking Water Act* standards. Maximum Contaminant Levels for the RCRA parameters of concern, presented in Table 4-8, are based upon US EPA *Safe Drinking Water Act* standards.

Table 4-7 - Radioisotope Method Detection Limits and Guideline Values

Parameter	Method	Detection Limit	Guideline Value
Uranium	Alpha Spectroscopy or Gamma Spectroscopy	Lab method dependent	20 μg/ℓ
Thorium-232	Alpha Spectroscopy	Lab method dependent	2 pCi/ℓ
Tc-99	Liquid Scintillation Counting	Lab method dependent	900 pCi/ℓ
Plutonium	Alpha Spectroscopy	Lab method dependent	1.5 pCi/ℓ
Neptunium	Alpha Spectroscopy	Lab method dependent	1 pCi/ℓ

Table 4-8 - RCRA Practical Quantitation Limits and Maximum Contaminant Levels

Parameter	US EPA Method	Detection Limit	Maximum Contaminant Level
TCE	8240	5 ppb	5 ppb
Barium	200.7	1 ppb	1,000 ppb
Lead	200.7	19 ppb	50 ppb

Findings from the existing and the new MWs will provide insight into the potential for contaminant migration in the groundwater. The culmination of the sampling data will be used to recommend remedial action as a result of the findings.

4.6.4 Quality Assurance

QA/QC data will be produced as a result of documentation requirements imposed and standard operating procedures being implemented. QA/QC documentation will provide verification that procedures were followed. QA/QC samples collected for chemical analyses will include split samples, equipment blanks, and trip blanks. These samples will verify the precision and accuracy of field sampling techniques and laboratory analyses. The continual interpretation of this data will insure quality of all data being generated.

The laboratory data will be stored in computer data bases for ease of report generation. In addition to the chemical analysis data, the laboratory will maintain documentation on equipment calibration, preventive maintenance, and corrective actions.

SECTION 5

CORRECTIVE ACTION PROCEDURES

5.1 Response and Documentation

Finding and correcting sampling and analytical problems are the responsibility of all project personnel. Corrective actions must be documented in the laboratory or in the field. It is important to document these occurrences and to take immediate corrective action in accordance with approved procedures. Appropriate management personnel will be notified of these occurrences. All personnel will be made aware of the need to report problems and to correct problems promptly.

5.1.1 Field Procedures

The initial responsibility for monitoring the quality of field requirements lies with the professionals in the field. The personnel responsible for verifying that all QA procedures are followed assess the appropriateness of the field methods and the ability to meet QA objectives, and make an assessment of the impact a procedure has upon the field objectives and subsequent data quality. Daily activities are reported up the management chain. If a problem occurs that might jeopardize the integrity of the project, cause a QA objective to not be met, or impact data quality, the appropriate individual will immediately notify management personnel in accordance with RMI procedures. Corrective action measures will then be decided upon and implemented. If the situation warrants, notification of higher management levels will be made. Appropriate personnel will document the situation, the affected field objective, the corrective action taken, and the results of that action. Copies of the documentation will be provided to the appropriate field, laboratory, management, and QA personnel.

5.1.2 Laboratory Procedures

The need for corrective action comes from several sources including equipment malfunction, failure of internal QC checks, method blank contamination failure of performance of system audits, and noncompliance with QA requirements.

Laboratory corrective action may take several forms but the following steps are almost always included:

1) Check the calculations.
2) Check the instrument for proper setup.
3) Re-analyze the control item.

If these steps fail to eliminate the problem, additional actions are implemented. The LCS and spike recoveries may be compared to reveal matrix interferences. Recalibration of the instrument may be necessary. In certain cases an entire batch will be re-analyzed. If a problem cannot be corrected by the previously prescribed measures, the analyst will involve the appropriate personnel responsible for laboratory, project, and Quality Assurance management functions. A record of all corrective action is maintained in the project file and signed and dated by the analyst.

Contract laboratories will implement corrective actions in accordance with established corrective action procedures. If the contract laboratory cannot correct the problem, the appropriate managers and QA personnel will be notified immediately. Contract laboratories will be audited in accordance with ASME NQA-1.

5.2 Procedures for Work Plan Modifications

Any deviation from the project requirements as specified in this document requires proper documentation. This documentation will be completed in the field and forwarded to the project management and regulatory compliance personnel. Appropriate management personnel will communicate the deviation from project requirements and send a Field Change Request Form in accordance with RMI procedures. Upon receipt, the form will be reviewed and final disposition of the request will be determined and the original document will be returned to the originator. A copy of the document should be retained for the project file. Changes that require an immediate response will be initiated by telephone and then documented using the procedure described above.

SECTION 6

REPORTING

Status reports will be issued periodically. Status reports will include progress to date, remaining tasks to be completed, and any changes to the work plan.

Interim task reports will be prepared as Phase 1 preliminary characterization tasks are completed. The interim task reports will include analytical data summaries, preliminary data evaluations, and identification of additional data needs.

A site groundwater characterization report will be prepared following completion of all Phase 1 preliminary characterization tasks and interim reports. The report will incorporate the guidance presented in the *Draft Branch Technical Position on Site Characterization for Decommissioning Sites*.

All reporting will be consistent with the *Site Restoration Quality Assurance Program Plan*, RMI-L-125.

SECTION 7

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Soils Characterization Work Plan
Phase 1: Preliminary Investigation

Volume 1 of 3: Groundwater Characterization Work Plan
Volume 2 of 3 : Soils Characterization Work Plan
Volume 3 of 3: Buildings Characterization Work Plan

RMI-L-206

October 1993
Revision 0

RMI Project
Ashtabula, Ohio
DOE Contract No. DE-AC05-930R-22103

RMI Titanium Company
Extrusion Plant
P.O. Box 579
Ashtabula, Ohio 44004

Soils Characterization Work Plan
Phase 1: Preliminary Investigation

Volume 1 of 3: Groundwater Characterization Work Plan
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Soils Characterization Work Plan
Phase 1: Preliminary Investigation

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LIST OF ILLUSTRATIONS

FIGURES

TABLES

LIST OF ILLUSTRATIONS (Continued)

TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ASER	Annual Site Environmental Report
bls	below land surface
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
cpm	counts per minute
DOE	United States Department of Energy
dpm	disintegrations per minute
DQO	Data Quality Objective
ES&H	Environmental Safety and Health
G-M	Geiger Mueller
GC	Geiger Counter
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Standards
MS	Matrix Spike
MSD	Matrix Spike Duplicates
MTI	Mitchell Transport, Inc.
MTU	Metric Ton Unit
NIST	National Institute of Standards and Testing
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NUREG/CR	NRC Contractor Technical Report Designation
ORNL	Oak Ridge National Laboratories
PCB	Polychlorinated Biphenyl
pCi/g	picoCurie/gram
PID	Photoionization Detector
ppb	parts per billion
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RMI	RMI Titanium Company Extrusion Plant
RPD	Relative Percent Difference
RWP	Radiation Work Permit
SRQAPP	Site Restoration Quality Project Plan
Tc-99	Technetium 99
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
US EPA	United States Environmental Protection Agency
WAC	Waste Acceptance Criteria

SECTION 1

INTRODUCTION

This soils characterization work plan describes the objectives, technical approach, and requirements for the characterization of soils at the RMI Titanium Extrusion Plant (RMI) for radiological contaminants and materials defined by the Resource Conservation and Recovery Act (RCRA) as hazardous. This plan is intended to provide data to supplement existing data in support of future remedial design/cleanup efforts. The soil characterization data may also be used to fulfill secondary objectives such as unrestricted release identification and waste disposal characterization. Although this plan is not intended to be a substitute for the final termination survey required by the United States Nuclear Regulatory Commission (NRC) for termination of RMI's NRC license, much of the data may be used to support design of the final termination survey and for determination of unaffected areas.

1.1 Purpose and Scope

The purpose of this characterization work plan is to describe the activities necessary to characterize on-site and off-site surface soils and subsurface utility pathways for radioactive and RCRA contaminants as a result of RMI Extrusion Plant operations for the United States Department of Energy (DOE). This plan addresses sampling of on-site and off-site soils for potential migration of contaminants.

This plan is intended to provide the rationale for the approach to radiological and RCRA characterization of soils at RMI and is designed to meet the definition of a characterization survey in NRC's *Draft Radiological Surveys in Support of License Termination*, NUREG/CR-5849 (NRC 1992a). The plan is divided into separate tasks which can be individually scheduled and implemented based upon the priority for obtaining the data. Completion of all tasks is necessary to meet the overall objectives of the site characterization plan.

1.2 Objectives

The primary objective of the soils characterization program is to evaluate the concentration and extent of radiological and RCRA contamination at the site. This information is required to assist in defining the scope of remedial activities required as part of the decommissioning program and to provide waste volume estimates.

The characterization program will also generate baseline radiological and RCRA data for potential wastes generated during decommissioning activities. The data will be used to evaluate if the material will meet disposal site waste acceptance criteria (WAC) as established in *Nevada Test Site Waste Acceptance Criteria, Certification, and Transfer Requirements* (Nevada Field Office [NVO]-325) (DOE 1992).

1.3 Site Description

1.3.1 Site Location

The RMI Titanium Company Extrusion Plant site is located in northern Ashtabula County, Ohio, approximately 2 miles northeast of the center of the City of Ashtabula. The general location of the RMI site is shown on Figure 1-1. The site can be reached from State Route 11 approximately 1-1/2 miles north of its intersection with U.S. Route 20. The plant lies approximately 1/4 mile east of State Route 11 on East 21st Street. Access to the plant is controlled by a manned guard house at the plant entrance.

The area to be characterized is approximately 40 acres in size and is comprised of the RMI Extrusion Plant site, RMI-owned land to the south and east, and potentially affected privately owned lands located to the north and west of the extrusion plant site. The extrusion plant occupies approximately 7 acres and consists of 25 buildings plus associated roads and parking facilities. The area to be characterized has been subdivided into Areas A through G as shown on Figure 1-2.

1.3.2 Site Operational History

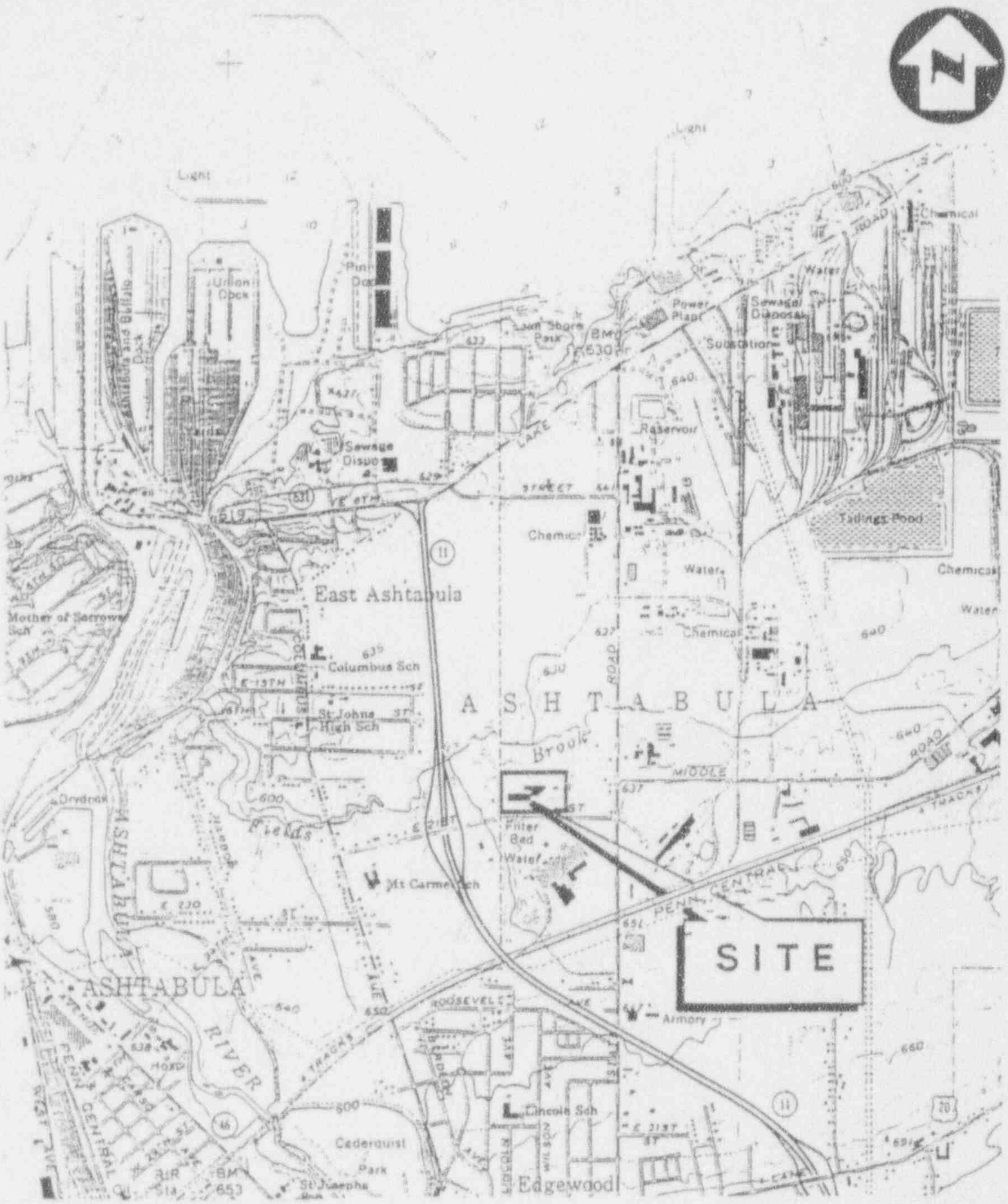
The RMI Titanium Company is a contractor for the DOE and is licensed by the NRC to handle radioactive source materials. The principal activity at the facility from 1962 until 1990 was extrusion of depleted, natural, and slightly enriched (up to 2.1 percent) uranium. A total of 121,224 metric ton units (MTUs) of uranium were handled at the site during this time period. The facility also processed approximately 31 MTUs of thorium.

The site is currently listed on the NRC's Site Decommissioning Management Plan (SDMP) as radiologically contaminated. A site decommissioning project is being conducted to safely remove the facility from service and reduce residual contamination to a level which permits release of the site for unrestricted use. Completion of the decommissioning project will allow termination of RMI's radioactive material license.

1.3.3 Contaminant Identification

The primary function of the RMI Extrusion Plant from 1962 through 1988 was extrusion and closed-die forging of metallic depleted, normal, and slightly enriched uranium (<2.1 weight percent U-235).

Residual uranium at the site is generally believed to occur in the form of insoluble uranium oxide. Airborne emissions and subsequent deposition on the ground are considered the primary source of uranium contamination at the site.



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SCALE

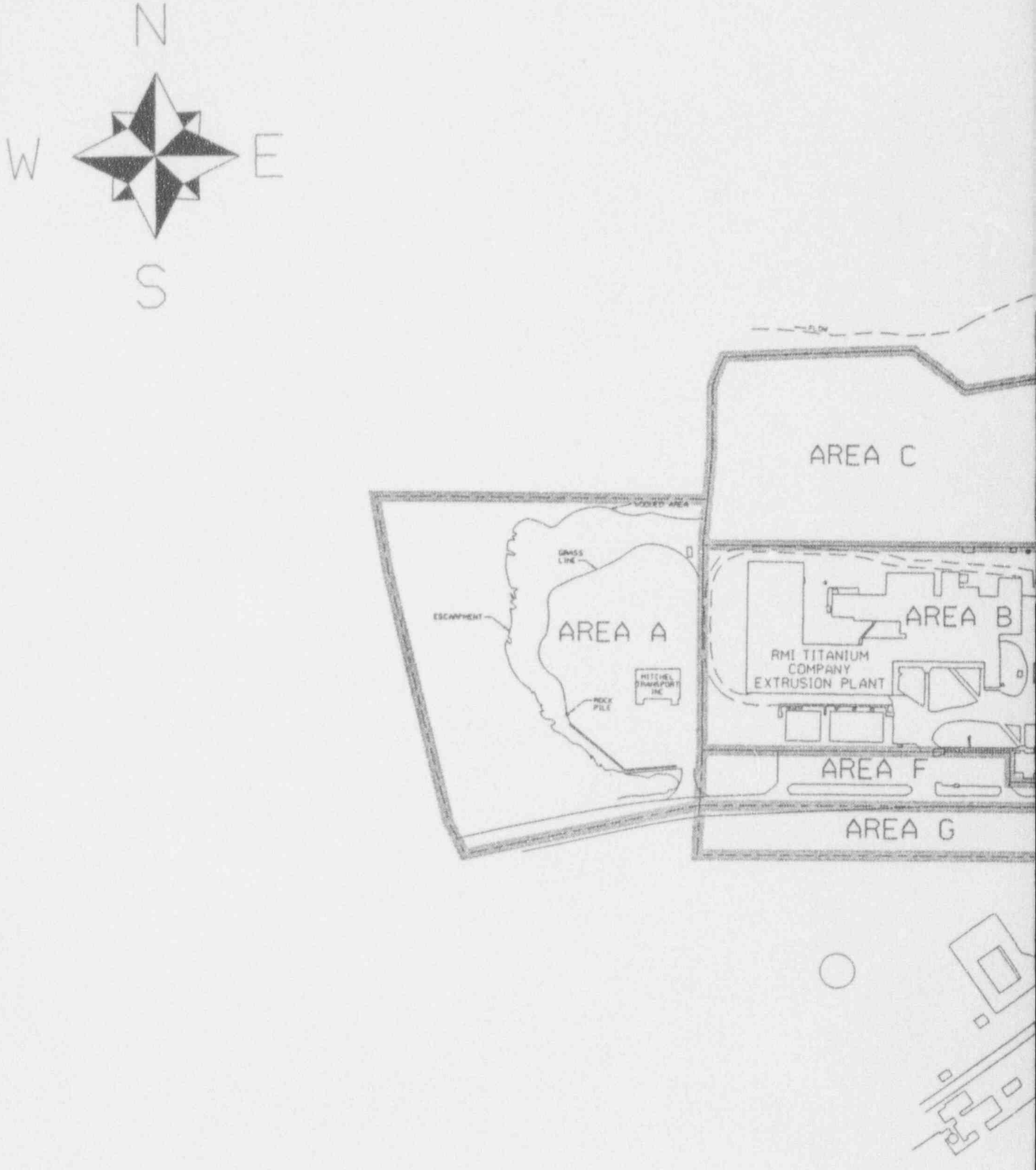
QUADRANGLE LOCATION

FIGURE 1–2

SITE LOCATION MAP

RMI TITANIUM CO.
EXTRUSION PLANT
E 21st STREET
ASHTABULA, OHIO

Figure 1-1 - Site Location Map



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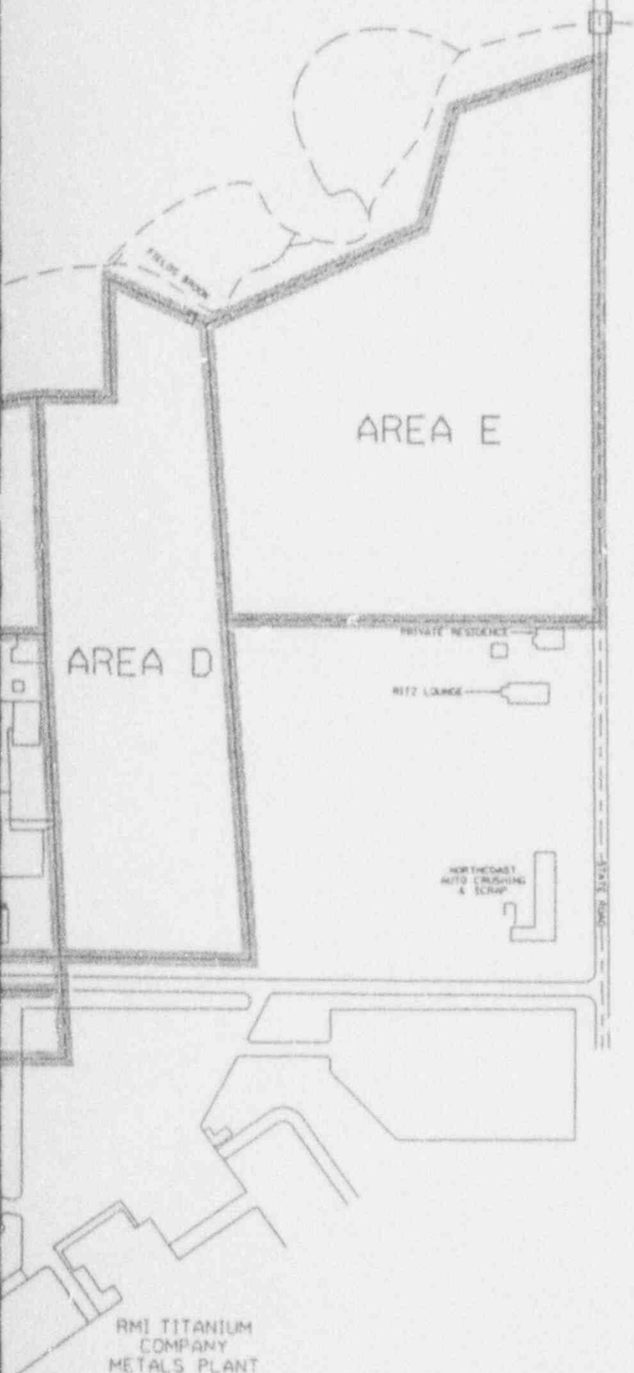


Figure 1-2 - Areas A through G

REVISION		
DATE	NO.	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

DESIGN FILE: P-0012.DGN
DATE: 8/31/93
TITLE: AREAS A THROUGH G
DRAWN BY: L.GEORGE
CHECKED BY: ERNST
WBS 1.1.2.2.1
DWG. No.: P-0012

Thirty-one MTUs of thorium-232 were also handled at the site. Isotopic analysis of surface soil samples indicates that thorium is detectable at low concentrations throughout the site.

Technetium 99 (Tc-99), identified as a trace contaminant from uranium extrusion processing, has been detected in groundwater samples. Due to a low sorption potential, Tc-99 is mobile in a soil water matrix and is considered primarily a groundwater contaminant.

Trace quantities of transuranic elements have been identified in the drummed sediment/soil mixtures excavated during cleanup of an evaporation pond located in Area B just north of the plant buildings. These elements, plutonium and neptunium, were introduced at the facility as a contaminant in reprocessed uranium. The pickling process used to treat the billets is believed to have leached the contaminants from the billets. As the pickling acid became neutralized it was discarded in the evaporation pond. Because transuranic contamination has only been found in the evaporation pond sediments and soils, concentrations are low, and the sediment/soil mixtures have been drummed and stored, airborne emissions are not regarded as a depositional source.

Chemical treatment processes used during extrusion are potential sources of compounds detected in soils at the site. Other sources include site activities such as dust suppression and occurrences such as accidental spills and equipment leaks. Contaminants detected in soil samples include trichloroethylene (TCE), lead, barium, and arsenic. One source of the lead is believed to be from oils once contained within the extrusion presses. Hydraulic oils and press lubricants, potentially containing lead, were occasionally discharged from the containment trenches and sumps inside the buildings to an area north of the main plant to prevent overflow of the trenches to the facility floor. Oil leaks from equipment stored at various locations around the site, as well as along the fenceline north of the facility, are other potential sources of lead in surface soils.

Waste oils, potentially containing lead and other organic compounds, were applied during the operational period to the main plant fenceline surrounding Area B as a weed suppressant and to the fire (gravel) road as a dust suppressant.

Salt baths containing barium chloride were used to preheat uranium billets prior to extrusion. Unintentional releases of the salt bath liquids and stored, drummed sludges from the evaporation tank may have been potential sources of contamination to soils.

Solvent containing TCE was used as a degreasing agent from 1962 until 1972. A TCE release occurred in 1972 into the former evaporation pond. This area is currently under study and is known as the Corrective Action Management Unit (CAMU). A corrective measures study (CMS) (Eckenfelder 1992) for TCE has been prepared and conditional cleanup levels have been approved by the regulating agencies. The possibility of other small spent solvent spills south of the RF-6 Building has been identified in the Decommissioning Plan (RMI 1991f) and Site Scoping Report (SR) (PARSONS 1993).

1.4 Physical Characteristics

1.4.1 Site Topography

The RMI site buildings are located on a flat upland surface. The maximum elevation variation of the area occupied by the facility buildings is approximately 4 feet (Eckenfelder 1989a). Approximately 120 feet north of the plant boundary, a 20- to 30-foot high east-west trending escarpment is present. The escarpment slopes northward to the edge of the floodplain of Fields Brook (Eckenfelder 1989a). A north-south trending drainage swale is located immediately north of the plant. Surface runoff from the vicinity of the former evaporation pond, portions of the plant, and the escarpment area flow into the natural drainage swale. The swale carries this runoff to a seepage pond at the base of the escarpment. Within plant boundaries is a natural drainage feature located to the east and northeast of the plant buildings, draining to Fields Brook. A drainage ditch located along the north side of East 21st Street diverts surface runoff east to this natural drainage feature and also west toward the neighboring Mitchell Transport, Inc. (MTI) property's natural drainage feature. A second drainage ditch is located parallel to and south of East 21st Street.

1.4.2 Site Geology

The RMI site is situated on glacial till overlying the Chagrin Shale Bedrock. The glacial till unit under the main plant is approximately 30 feet in thickness, as observed from soil boring information, thinning to 10 feet in thickness beyond the escarpment north of the plant, near the Fields Brook floodplain. The thicker till unit near the main plant is composed of silt with clay and some shale fragments. Vertical and horizontal fractures have been observed at depths of 9 to 12 feet. Fracture surfaces are typically oxidized and saturated. Underlying the silty layer, the till is composed of a dark gray, very dry to moist, plastic clay with varying amounts of silt and reworked shale. Rounded quartz fragments are evident in the lower portion of the till. Isolated sand lenses 1 to 2 feet in thickness are also present in the glacial till zone (Eckenfelder 1989a).

The till/shale interface consists of friable shale and displays relict bedding planes. This unit is approximately 10 feet in thickness, as identified from soil boring information (Eckenfelder 1989a).

The Chagrin Shale Bedrock underlying the interface zone is dry and platy. Depth to the bedrock varies from approximately 30 feet south of the escarpment to an average of 10 feet north of the escarpment on the Fields Brook floodplain (Eckenfelder 1989a).

1.5 Existing Soils Data

1.5.1 Surface Radiation Survey

A site scoping radiation survey was conducted from June to December 1992 to evaluate surface radiation in counts per minute (cpm), using Geiger-Mueller counters with readings obtained at 10 meter grid intervals. The survey, conducted as a first approximation to identify affected and unaffected surface soils, identified regions as unaffected, having an activity level less than 100 cpm above background, and affected, having an activity level greater than 100 cpm above background. The radiation survey in conjunction with data from annual environmental monitoring of surface soil samples (Section 1.5.2) was used to classify Areas A through G (Figure 1-2) as affected or unaffected regarding radiological soils contamination (PARSONS 1993a). Figure 1-3 shows the affected and unaffected areas.

1.5.2 Surface Soils

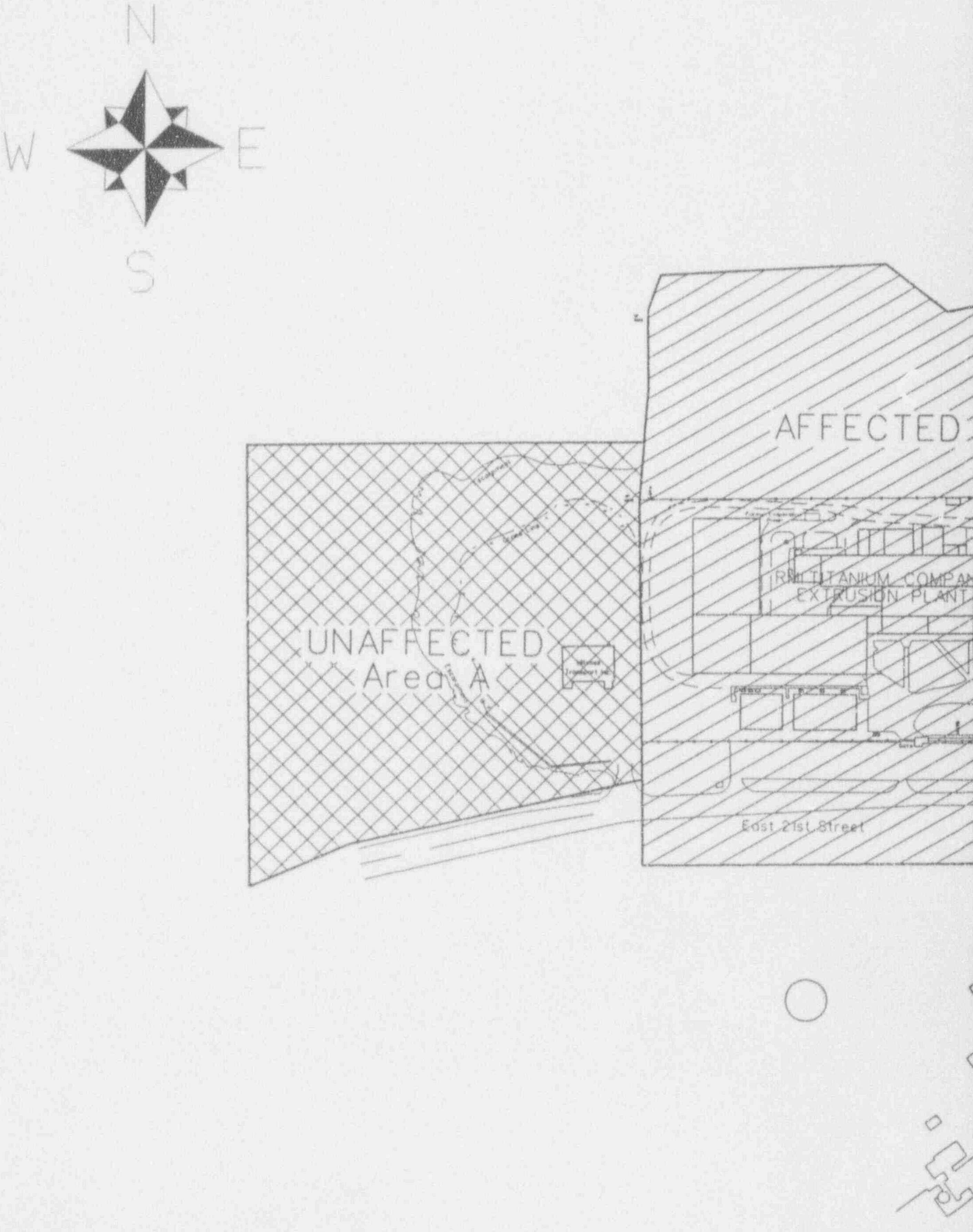
Surface soils (0-6 inches) are collected annually for isotopic uranium analysis at several locations on and off site as part of the Annual Site Environmental Report (ASER). Additionally, the 1992 soil sampling campaign included Tc-99 and isotopic thorium analyses. Sampling locations were established to evaluate uranium concentrations in high traffic areas near the plant and to evaluate surface transport due to run-off. Samples were also collected in concentric rings around the site to evaluate the presence, if any, of prevailing wind transport of airborne emissions and to evaluate background conditions.

Surface soils and seepage pond sediments have been analyzed for TCE, uranium, and Tc-99 as part of the investigation of the CAMU. Surface soil samples were collected from the swale leading to the seepage pond and from seepage pond sediments. The CAMU (former evaporation pond, swale, and seep pond) has not been sampled for chemical analyses since 1989.

1.5.3 Background Soils Conditions

Radiological and chemical background conditions at the RMI facility have not been fully evaluated for all compounds of concern. Existing data is limited to surface soil total and isotopic uranium concentrations and surface radiation readings (beta-gamma cpm). As part of the ASER, background uranium concentrations are determined at locations upgradient from the prevailing wind direction. Soil samples have been collected at a distance of 3.25 and 3.5 miles south and west, respectively, from the site.

The site scoping radiation survey identified background surface radiation at a maximum of 80 cpm at Lake Shore Park, Ashtabula County, located northeast of the facility.



N
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E
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UNAFFECTED
Area A
RMI TITANIUM COMPAN
EXTRUSION PLANT
East 21st Street

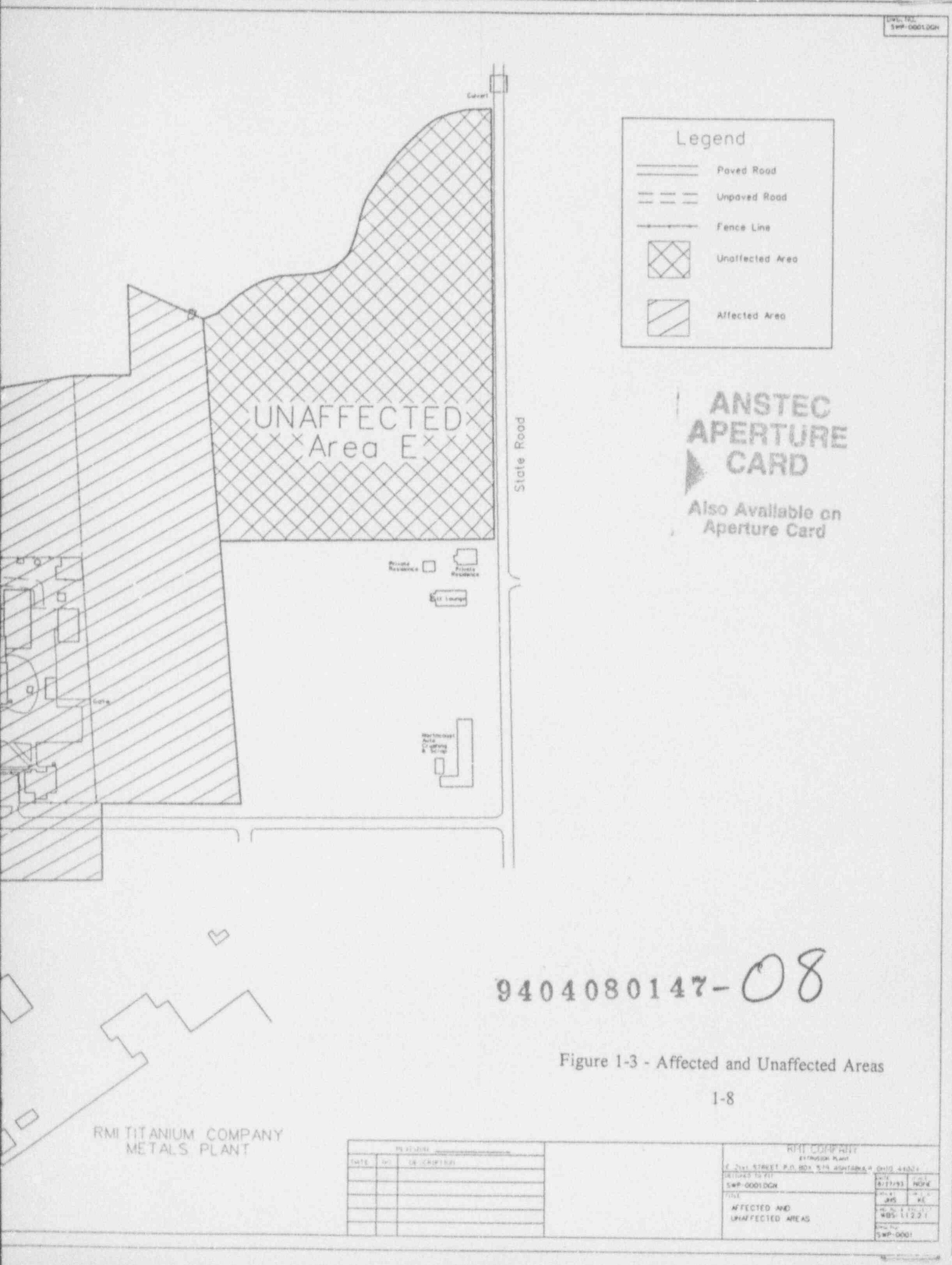

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Figure 1-3 - Affected and Unaffected Areas

Background concentrations of total uranium, thorium, lead, barium, arsenic, cadmium, chromium, selenium, silver, and mercury have not been evaluated. Section 3.3 discusses background sampling and analysis.

1.5.4 Subsurface Soils

1.5.4.1 Radiological Analyses

As part of the CAMU investigation, six soil borings were drilled in the vicinity of the former evaporation pond. Samples were collected to a maximum depth of 24 feet below land surface (bls). Based upon field screening with a Geiger counter, select samples were analyzed for total uranium and Tc-99. Total uranium concentrations did not exceed the guideline cleanup value of 30 picoCuries/gram (pCi/g) at any sample location or depth. Subsurface soils outside of the CAMU have not been evaluated.

1.5.4.2 Chemical Analysis

Samples from the six soil borings mentioned in Subsection 1.5.4.1 were collected from various depths and analyzed for TCE, depending on Photoionization Detector (PID) monitoring of sample headspace. TCE was detected in subsurface soil samples collected in the CAMU in 1989 during installation of the 300-series monitoring wells.

1.5.4.3 Physical Properties

Physical properties of soils on site may be assessed in support of the corrective measures study, and for the engineering and design of remediation activities in the CAMU.

1.6 Program Strategy

To achieve the soils characterization objectives stated in Section 1.2, an observational approach will be used to categorize the site into representative areas based upon the surface radiation survey and process knowledge. The strategy employs combinations of random sampling, biased sampling, and systematic sampling, as defined in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846* (US EPA 1986). Additional walkover radiation surveys will be conducted to guide supplemental soil sampling efforts in Area G.

Random sampling will be performed where existing data indicate that contaminants are uniformly distributed across or not suspected in the sample area.

Systematic sampling will be used to evaluate the distribution of contaminants in areas known or suspected to be contaminated. Areas presumed to be unaffected will be sampled at randomly selected nodes on the 10-meter grid.

Biased sampling will be used to delineate discrete localized areas identified during the surface radiation survey, where readings were 100 cpm above background, or to identify the point of greatest contamination. To determine the extent of contamination, a phased or iterative approach may be necessary when using biased or systematic sampling. By refining the contamination boundary, the volume of waste generated during decommissioning can be minimized.

The sampling program will target specific areas of suspected contamination based upon historic analytical data, radiation survey data, process knowledge, and previous operational occurrences. Laboratory analysis of samples collected from specific areas will address the list of target analytes identified for each area.

1.7 RMI Decommissioning Project Organization

The RMI Project Decommissioning Project Organization will direct the site characterization. The interfaces between RMI as the Project Management Company and the responsible individuals within RMI are presented in this subsection.

1.7.1 Characterization Project Management

RMI will serve to coordinate the project management and maintain liaison with the NRC, DOE, US EPA, Ohio EPA, and any other local agencies as needed. Materials and services required for the characterization investigations will be acquired through an appropriate bid process as required by DOE Project Management Orders. Various subcontractors may be employed for tasks in the site characterization effort. Tasks currently identified for which RMI may use subcontractors are survey, drilling, and geological oversight of groundwater monitoring wells and subsurface soil sampling near utilities. Laboratory services, as needed, will be subcontracted for chemical and radiological analysis services as identified by RMI.

1.7.2 Individual Responsibilities

The SCP will be implemented by qualified RMI personnel. The RMI organizational structure and functions are presented in Figure 1-4. For clarity, not all positions are shown on the organization chart.

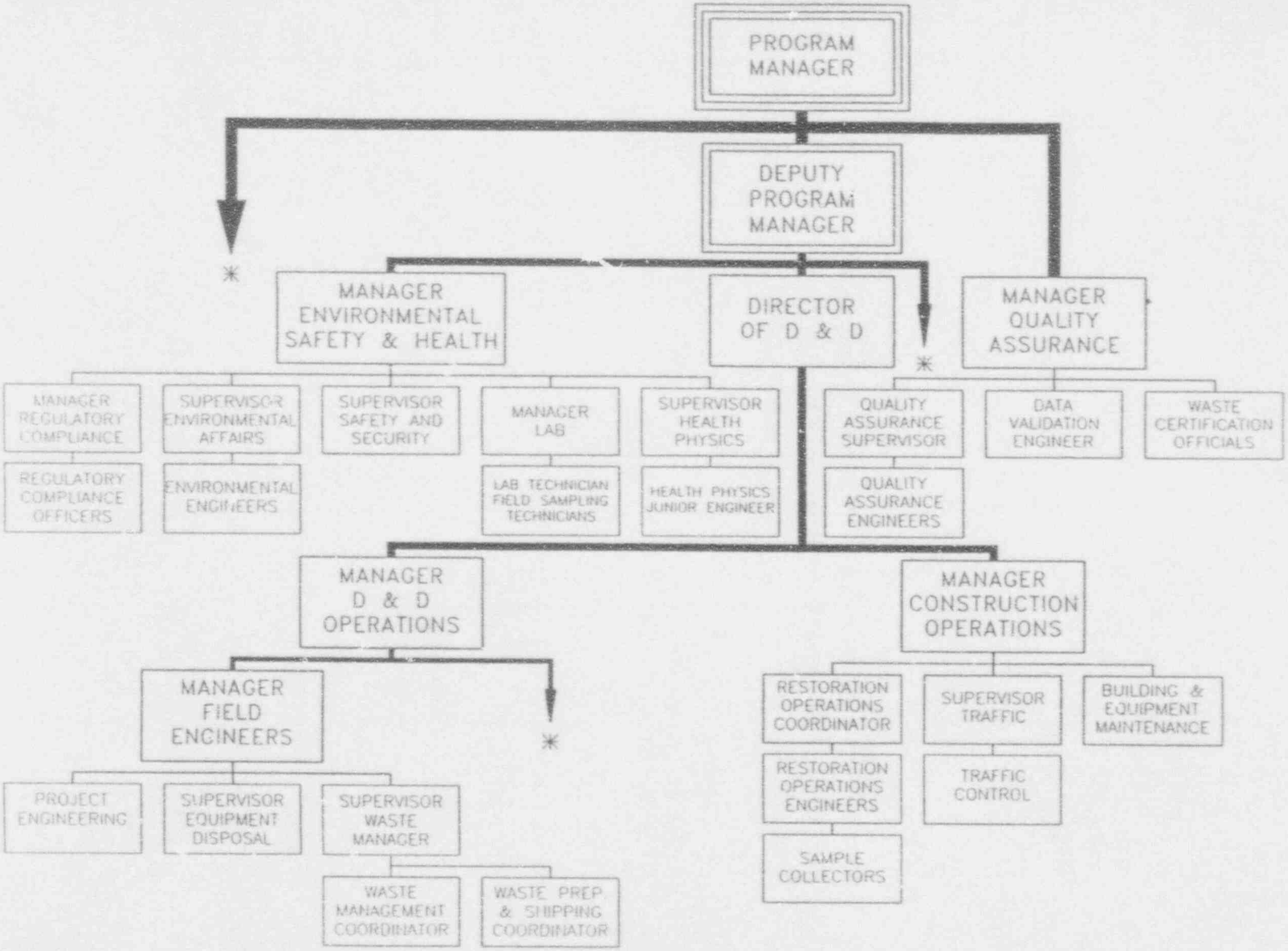


Figure 1-4 - Functional Organization Structure

Key personnel in the characterization effort are listed below:

1) The **Program Manager** will be responsible for oversight in the implementation of the Site Characterization and Decommissioning Plan and the associated separate Work Plans.

2) The **Deputy Program Manager** will be responsible for the overall project management and will administratively report to the Program Manager.

3) The **Director Decommissioning and Decontamination** will be responsible for the management of the technical support services, characterization, and decommissioning efforts. The Director Decommissioning and Decontamination administratively and technically reports to the Deputy Program Manager.

4) The **Manager Decommissioning and Decontamination Operations** will be responsible for the management of the characterization, decommissioning, and support services. The Manager Decommissioning and Decontamination Operations administratively reports to the Deputy Program Manager and technically reports to the Director Decommissioning and Decontamination.

5) The **Manager Field Engineering** will be responsible for the management of the site characterization and decommissioning implementation. The Manager Field Engineering administratively reports to the Manager, Decommissioning and Decontamination Operations.

6) The **Environmental Safety and Health Manager** will be responsible for the management of the environmental compliance, health, safety, and laboratory services. The Environmental Safety and Health Manager administratively reports to the Deputy Program Manager.

7) The **Manager Regulatory Compliance** will be responsible for evaluating and coordinating the integration of Federal, State, and Local laws and regulations to project technical documentation and activities. The position assures that remediation is conducted in compliance with regulations, DOE Orders, and specified plans and procedures. The Manager Regulatory Compliance administratively reports to The Environmental Safety and Health Manager.

8) The **Manager of Quality Assurance** will be responsible for the management of the QA throughout the complete project, including data validation and waste certification. Any changes on alterations to characterization procedures will be conducted in accordance with QA procedures. The Manager of Quality Assurance administratively reports to the Program Manager.

1.7.3 Project Personnel Responsibilities

1.7.3.1 RMI Laboratory Personnel

The RMI Laboratory will be responsible for supplying necessary equipment, forms, and sample numbers to the sample collectors; logging and tracking of completed sample forms; preserving and storing samples; preparing blank samples; and shipping samples to contract laboratories in accordance with approved procedures. The RMI Laboratory will conduct radiological and chemical analysis of characterization samples in accordance with RMI standard operating procedures, the media-specific work plans, and the requirements of RMI-L-125, "Site Quality Restoration Assurance Program Plan." Laboratory personnel report administratively to the Manager of Technical Service and Laboratory.

1.7.3.2 Restoration Operations Engineers

Restoration Operations Engineers will be responsible for providing direct oversight of the sample collectors and for assuring that the appropriate procedures are being followed. The Restoration Operation Engineers report administratively to the Manager, Engineering and Restoration Operations.

1.7.3.3 Sample Collectors

Sample Collectors are Restoration Operations personnel who will be responsible for collecting samples, completing necessary documentation, transferring samples to the RMI Laboratory and assisting with sample compositing, as required.

1.7.3.4 Health Physics Junior Engineers

Health Physics Junior Engineers will be responsible for conducting the following activities in accordance with approved RMI procedures: (1) surveying the appropriate work areas for radioactivity, (2) surveying sample packages, (3) writing any radiation work permits (RWPs), and (4) monitoring of personnel and equipment as necessary. Health Physics Junior Engineers report administratively to the ES&H Manager through the Radiation Safety Officer.

1.7.3.5 Certification Officials

Certification Officials will be responsible for auditing the activities during the characterization effort and notifying the Manager Regulatory Compliance of any deviations from the approved procedures. The Certification Officials report administratively to the Quality Assurance Manager.

1.7.3.6 Equipment Disposition Supervisor/Project Engineer

This individual will be responsible for supervising the field characterization effort and coordinating between different departments involved in the characterization/remediation activities. The Equipment Disposition Supervisor/Project Engineer reports administratively to the Manager of Field Engineering.

1.8 Overview of the Soils Characterization Work Plan

This plan is divided into seven sections. Summary statements describing each section are listed below.

1) Section 1 provides an introduction and site background information.

2) Section 2 discusses the Data Quality Objectives for characterization activities.

3) Section 3 discusses the technical approach of characterization activities, sample collection and analysis requirements.

4) Section 4 discusses the specific tasks which will be completed.

5) Section 5 discusses corrective action procedures.

6) Section 6 discusses reporting.

7) Section 7 presents the list of references.

1.9 Technical Guidance

Several guidance documents published by regulatory agencies were used to develop this work plan. Table 1-1 lists the primary documents. A complete listing of references is contained in Section 7.

Table 1-1 - Primary Guidance Documents

Titles	Reference (see Section 7)	Guidance for:
Environmental Implementation Guide for Radiological Survey Procedures	ORNL 1992	Sample plan design
(Draft) Manual for Conducting Radiological Surveys in Support of License Termination (NUREG/CR-5849)	NRC 1992a	Sample plan design
(Draft) Branch Technical Position on Site Characterization for Decommissioning Sites	NRC 1992b	1) Plan requirements 2) Sample plan design
Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO-325, Rev. 1)	DOE 1991	Analytical waste acceptance criteria
Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846)	US EPA 1986	1) RCRA analytical methods 2) Sample design
Data Quality Objectives for Remedial Response Activities, Vol. 1 (US EPA/9355, O-07B)	US EPA 1987	Data Quality Objectives

SECTION 2

DATA QUALITY OBJECTIVES

Data Quality Objective (DQOs) are qualitative and quantitative statements concerning the data needs and quality of data. The DQOs are the starting point for designing the sampling plan and data collection program for the soils characterization activities at RMI. This section identifies the objectives of the sampling program in terms of data needs and the quality of data required. The US EPA designated DQO levels used to describe data quality are listed in Table 2-1.

Although the DQO levels were developed by the US EPA to assure that a specific standard of care, appropriate for a defined set of data was being applied to all US EPA analyses, it is useful to apply similar standards of care to radiological analyses. RMI procedures establish the standard of care for data quality, and because they are analogous to US EPA DQO levels, no distinction will be made between DQO levels for RCRA analyses and those for radiological analyses. They will both be referred to as DQO levels 1 through 5 in the media-specific work plans.

2.1 Data or Information Needs

The overall objectives for the site characterization and the media-specific objectives for the soils characterization are listed in Table 2-2. Table 2-3 presents the data needs for soils characterization and compares these needs with the characterization objectives. A general description of the activity planned to fulfil the data need and associated work plan tasks are also listed. A description of work plan tasks is contained in Section 4.

2.2 Data Quality

Data quality is judged by the ability of the data to meet the objectives of the plan and the needs of the data users. The level of data quality generally associated with field measurements will be maintained for direct alpha, beta and gamma measurements. Actions which will ensure this level of quality is attained include:

1) Work shall be performed in accordance with approved procedures which implement the requirements in this plan.

2) Performance checks of the measuring instruments shall be made at least once per day. Instruments not passing the performance check shall not be used.

3) A field logbook shall be maintained to document daily activities and unusual conditions.

Table 2-1 - US EPA Designated DQO Levels

US EPA DQO Level	General Description	Example
1	Qualitative Field Analysis Provides the most rapid results. Level 1 is often used for health and safety monitoring, initial site characterization to locate areas for subsequent and more accurate analyses, field screening of samples to select those for fixed laboratory analysis, and engineering screening of alternatives (bench scale tests).	Field screening for alpha, beta, and gamma radiation conducted with portable field equipment provides real time qualitative analysis for the presence or absence or radioactive isotopes.
2	Semi-Quantitative and Qualitative Analyses Provides more quality control checks than Level 1. The results may be qualitative, semi-quantitative, or quantitative. Level 2 can be assigned when rapid turnaround results are needed. Methods may range from more sophisticated screening techniques to fully defined methods similar to Level 3 or 4 but with reduced QA/QC frequency and data reporting.	Determination of volatile halogenated organic compounds in water by purge and trap gas chromatography without second column configuration with a limited suite of field and laboratory QC samples, and a minimal data package.
3	Quantitative with Fully Defined QA/QC Provides data generated with full QA/AC checks of types and frequencies specified for Level 4 according to analytical procedures for radiological and nonradiological parameters. The analytical methods are identical to Level 4 for QA/QC sample analysis and method performance criteria. However, the data package does not typically contain raw instrument output but does include summaries of QA/QC sample results.	Analysis of total uranium with a full set of QA/QC samples as specified for Level 4. A summary data package is provided including QA/QC sample performance without raw instrument output. A limited level of data validation is required because only the summary forms need review.
4	Confirmational with Complete QA/QC Reporting Provides data generated with a full complement of QA/QC checks of specified types and frequencies according to analytical procedures for radiological and nonradiological parameters. The data package includes raw instrument output of validation of Level 4 data.	Analysis of total uranium per analytical batch with analytical results and a full raw data package reported from the laboratory.
5	Non-Standard Procedures Analysis by non-standard procedures that often require method development or validation Level 5 methods may be significantly different from those specified for Levels 2, 3, or 4 data.	Analysis or evaluation of a geotextile material for suitability for use as component of a remedial action at the site. Existing evaluation methods may not be adequate to evaluate site-specific needs, so development of a new method is required.

Note: Examples are generic and are not intended to reflect project-specific activities.

Table 2-2 - Site Characterization Objectives

Overall Site Characterization Objectives:	Soils Characterization Objectives:
1) Establish a baseline for natural conditions (background) with respect to known or suspected contaminants identified in Table 4-1 of Subsection 4.1 of the Site Characterization Plan and review existing data, reports and the SR that serve as a basis for development of the media-specific, or topically focused work plans 2) Establish the nature, level, and extent of contaminants listed in Table 4-1 of Subsection 4.1 of the Site Characterization Plan in Areas A through G with respect to known or suspected contaminants for the individual areas by sampling and analysis of soils, groundwater, and buildings 3) Determine site stratigraphy and hydrogeology through the use of existing geological and hydrogeological data, geologic logging of borings, and geophysical borehole logging 4) Define local groundwater flow directions through use of existing groundwater data and by installing additional monitoring wells 5) Provide data to assess the concentration or exposure hazard and determine if special precautions or monitoring of the contaminants during remediation are required 6) Provide data to support engineering evaluation, selection and design of remediation options, and assist in preparation of the final termination survey	1) Evaluate the degree and lateral extent of radiological and RCRA contamination 2) Generate baseline radiological and RCRA data for potential decommissioning wastes 3) Evaluate the ability to meet disposal site waste acceptance criteria as established in *Nevada Test Site Waste Acceptance Criteria, Certification, and Transfer Requirements* (Nevada Field Office [NVO]-325, Rev. 1) (DOE 1992) and assist in development of waste volume estimates

Table 2-3 - Data Needs for the Soils Characterization

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	**Soils Objective**	
A	Unaffected: Confirm or deny the assumption of lack of contamination of surface soils	2	1,3	Sampling at 30 randomly selected grid nodes on an existing 10-meter grid of surface soils from 0-6 inches; analysis for uranium, and Th-232 and Tc-99 as necessary (Tasks 1,2 and 5)
	Localized Areas of Elevated Radioactivity (affected): Nature, level and extent of radiological contamination at identified discrete locations	2	1,3	Biased soil sampling and analysis for isotopic uranium to identify source; and/or systematic sampling at the discrete location and analysis for uranium, and Th-232 and Tc-99 as necessary to evaluate extent (Tasks 1, 2 and 5)
	Unaffected: Confirm or deny the assumption of lack of contamination in drainage ditch which diverts surface runoff west and north to Fields Brook	2	1,3	Biased sampling of surface sediments (0-6 inches) at regular intervals along the ditch; analysis for uranium, and Tc-99 as necessary (Tasks 2 and 5)

Note: Numbers in the "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-3 - Data Needs for the Soils Characterization (Continued)

Area	Data or Information Need	Supports: Overall Objective	Supports: Soils Objective	Activity and Work Plan Task Number
B	Affected: Nature, level and extent of radiological contamination of soils	2	1,3	Systematic soil sampling at 20-meter intervals on an existing 10-meter grid (10-meter intervals or less near buildings) at varying depths up to 2 feet; analysis for uranium, and Th-232 and Tc-99 as necessary (Tasks 1,2 and 5)
	RCRA: Nature, level and extent of RCRA contamination in potential or suspect areas	2	1,2,3	Biased area samples, systematically collected at varying depths up to 2 feet; analysis for RCRA compounds including eight RCRA metals, volatile, and semivolatile compounds: Biased areas are: 1) Fenceline 2) Area north of Main Plant 3) Burn Pad 4) Fire Road 5) Area south of RF-6 Butler Building/Main Plant (Tasks 1,2, and 5)
	Affected and RCRA: Nature, level and extent of radiological and RCRA contamination in soil piles	2,5,6	1,3	Sampling and analysis of soil piles to meet the requirements of NVO-325, Rev.1
	Affected and RCRA: Nature, level and extent of radiological and RCRA contamination resulting from leaking, leaching, etc. of underground utilities	2,3	1	Location and investigation of suspect utility lines. Biased sample locations selected using a gamma probe; followed by soil borings to collect soil samples. Samples will be analyzed for uranium, Tc-99, as necessary, and RCRA characteristics based on field screening of samples and process knowledge (Tasks 3,4, and 5)

Note: Numbers in the "Objective" columns represent numbered objectives presented in Table 2-2

Table 2-3 - Data Needs for the Soils Characterization (Continued)

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Soils Objective	
B (cont'd)	Affected: Nature, level and extent of potential transuranic elements in soils in the vicinity of the former evaporation pond	2,3,5,6	1,2	Collection of soil samples at ground surface and at depth, and analysis for transuranic elements on samples containing elevated levels of uranium (Tasks 4 and 5)
C	Affected: Nature, level and extent of radiological contamination of soils	2,3,5,6	1,2,3	Systematic soil sampling at 20-meter intervals on an existing 10-meter grid at varying depths up to 2 feet; analysis for uranium, Th-232 and Tc-99 as necessary (Tasks 1,2 and 5)
D	Affected: Nature, level and extent of radiological contamination of soils	2	1,3	Biased soil sampling at 20-meter intervals on an existing 10-meter grid at varying depths up to 2 feet; analysis for uranium, and Th-232 and Tc-99 as necessary (Tasks 1,2 and 5)
	Affected: Nature, level and extent of radiological contamination at discrete localized areas of elevated radioactivity	2	1,3	Biased soil sampling at the discrete locations; analysis for uranium, and Th-232 and Tc-99 as necessary to evaluate extent (Tasks 1,2 and 5)
	Affected and RCRA: Nature, level and extent of radiological and RCRA contamination resulting from leaking, leaching, etc. of outfall line to Fields Brook	2,5,6	1,2	Location and investigation of the outfall line. Biased sample locations selected using a gamma probe; followed by soil borings to collect soil samples. Samples will be analyzed for uranium, Tc-99 as necessary, and RCRA characteristics based on field screening of samples and process knowledge (Tasks 3,4, and 5)
	Affected: Nature, level and extent of radiological contamination in the vicinity of a previously excavated area near the Fields Brook Outfall	2,3,6	1,3	Systematic soil sampling on a grid interval determined by field screening, of the historical excavation area and adjacent undisturbed soils; analysis of samples for uranium, and [illegible]99 as necessary (Tasks 1,2 and 5)

Note: Numbers in the "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-3 - Data Needs for the Soils Characterization (Continued)

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Soils Objective	
D (cont'd)	Affected: Nature, level and extent of radiological contamination in drainage ditch which diverts surface runoff north to Fields Brook	2	1,3	Biased sampling of surface sediments (0-6 inches) at regular intervals to be determined by field screening along the ditch; analysis for uranium, and Tc-99 as necessary (Tasks 2 and 5)
E	Unaffected and RCRA: Confirm or deny the assumption of the lack of contamination of surface soils	2,5,6	1,3	Sampling at 30 randomly selected grid nodes on a 10-meter grid of surface soils from 0-6 inches depth; analysis for uranium, and Tc-99, eight RCRA metals, volatile and semivolatile compounds as necessary (Tasks 1,2 and 5)
F	Affected: Nature, level and extent of radiological contamination of soils	2	1,2,3	Systematic soil sampling at 20-meter intervals on an existing 10-meter grid at varying depths up to 2 feet; analysis for uranium, Th-232 and Tc-99 as necessary (Tasks 1,2 and 5)
	Affected: Nature, level and extent of radiological contamination in drainage ditch located parallel to and north of East 21st Street	2	1,3	Biased sampling of surface sediments (0-6 inches) at regular intervals to be determined by field screening, along the ditch; analysis for uranium, and Tc-99 as necessary (Tasks 2 and 5)
	Affected and RCRA: Nature, level and extent of soil contamination resulting from leaking, leaching, etc. of underground utilities	2	1,3	Location and investigation of suspect utility lines. Biased sample locations selected using a gamma probe; followed by soil borings to collect soil samples. Samples will be analyzed for uranium, Tc-99 as necessary, and RCRA characteristics based on field screening of samples and process knowledge (Tasks 3,4, and 5)

Note: Numbers in the "Objective" columns represent numbered objectives presented in Table 2-2.

Table 2-3 - Data Needs for the Soils Characterization (Continued)

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Soils Objective	
G	Affected: Nature, level and extent of radiological contamination in drainage ditch located parallel to and south of East 21st Street	2	1,3	Biased sampling of surface sediments (0-6 inches) at regular intervals to be determined by field screening, along the ditch; analysis for uranium, and Tc-99 as necessary (Tasks 2 and 5)
	Affected: Nature, level and extent of ground surface radiation levels	2	1	Radiation walkover survey of the 30 meter by 250 meter area (Task 8)
Off-Site Conneaut Silt Loam Locations	Baseline for natural conditions (background) with respect to uranium, thorium and RCRA metals	1	1	Soil sampling (0-6 inches) at off-site Conneaut Silt Loam locations and analysis of samples for uranium, thorium and eight RCRA metals (Tasks 1,2 and 5)

Note: Numbers in the "Objective" columns represent numbered objectives presented in Table 2-2.

4) All measurements shall be documented on survey sheets. The Health Physicist shall verify the data is recorded properly.

5) Tools used for sample collection shall be decontaminated, as necessary, to prevent cross contamination of samples.

The level of quality is associated with US EPA DQO level 3 shall be used for samples sent to the laboratory for chemical analysis unless otherwise specified in the media-specific work plan. Radiological laboratory analyses will be conducted per approved laboratory procedures. In addition to the actions above, this level of quality will be attained by the following.

1) All off-site laboratories shall be approved per RMI-L-159, *QA Requirements for Procurement of Contract Laboratory Services*, before any samples are sent to the laboratory for analysis.

2) Any on-site laboratory analyses shall be conducted in accordance with approved procedures.

3) Sample integrity shall be maintained through the use of chain-of-custody procedures.

4) All quality control samples will be reported by the laboratory with the analytical data package.

Additional requirements to provide assurance that the required data quality is attained are discussed below.

2.2.1 Confidence

Unless stated otherwise in the task descriptions, a 90 percent confidence shall be used to describe the uncertainty in the data. To verify that a 90 percent confidence has been achieved, the confidence will be evaluated using the equations stated in S[illegible] *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*, Third Edition, Table [illegible] These equations require the data to be normally distributed. The regulatory thresholds for chemical contaminants are stated in 40 CFR Part 261. If the data are not normally distributed, other statistical methods, such as data transformations, will be conducted to confirm that 90 percent confidence has been achieved.

The regulatory thresholds for chemical contaminants are stated in 40 CFR Part 261. For radiological samples of materials for free release, the regulatory threshold is the appropriate free release limit, per Regulatory Guide 1.86, for the radionuclide being analyzed. For cases where contamination above free release levels is known or suspected, a 90 percent confidence interval will be calculated to describe the uncertainty in the data.

2.2.2 Representativeness

It is anticipated that the samples obtained will be representative of the media being characterized. A combination of random, biased and systematic samples will be collected from the various media. The types of samples chosen for each sample area and medium will depend on the operational history, and will be selected to maximize representativeness.

2.2.3 Sampling Accuracy and Precision

Accuracy may be defined as the difference between the value of the reported data and the true value of the parameter being measured. Sample accuracy will be assessed through the comparison of the analysis of the unknown sample (obtained in the field) with the analysis of samples with known concentrations created in the laboratory. The accuracy of analytical data is tested through the analysis of laboratory blank samples, spiked samples, laboratory standards, reference samples and field duplicates.

Sampling precision will be achieved by collecting the appropriate number of samples as necessary to achieve the desired confidence limit.

2.2.4 Completeness

Completeness is defined as the percentage of measurements or amount of data required in order to make a decision concerning the media being characterized. The completeness goal is essentially the same for all data uses. Completeness will be calculated as follows:

$$Completeness\ (\%) = \frac{(No.\ of\ valid\ values\ reported\ per\ parameter)}{(No.\ of\ samples\ planned\ for\ analysis)} \times 100$$

The target for completeness is 90 percent for all analyses. If 90 percent completeness is not achieved, the data will be reviewed and a determination will be made as to whether additional samples must be collected to achieve the desired confidence limit. If the desired confidence limit is achieved, additional samples may not be required.

2.2.5 Comparability

Comparability expresses the confidence with which data sets can be compared. Sample data generated during this procedure will be comparable with other sample data if consistently documented field and laboratory procedures are used for similar samples and similar sampling methods and sampling conditions are maintained. The objectives for comparability are to demonstrate traceability by using approved methods field or laboratory method, reporting results for similar materials or analyses in consistent units, and applying appropriate quality control. All calibration standards shall be traceable to National Institute of Standards and Testing (NIST) standards.

2.3 Quality Control

Quality control activities will be implemented per approved field and laboratory procedures to ensure the data quality objectives of this plan are achieved.

2.3.1 <u>Field Quality Control</u>

The following types of field quality control samples will be collected and sent with the samples to be analyzed. Field quality control samples will be tested for the same parameters as the medium sampled. The minimum number of field quality control samples are identified. If additional samples are required, they will be specified in the applicable task description or implementing procedure.

1) <u>Trip Blanks</u> - A sample of deionized water filled in the RMI laboratory, transported to the sample site, handled like a sample but not opened, and stored and transported to the laboratory for analysis. One trip blank will be sent with every container containing samples to be analyzed for volatiles. Trip blanks are analyzed for volatiles and the results are used to indicate if any contamination occurred during sample collection, storage, or shipment.

2) <u>Equipment Blanks</u> - A sample of the deionized water used to rinse the sampling equipment. The rinsate is collected after decontamination and before collecting the next sample. The results may indicate if any cross contamination has occurred. Equipment blanks are collected at a frequency of one per every 10 samples collected. If less than ten samples are collected, an equipment blank will be collected after the last sample is collected.

3) <u>Field Duplicates</u> - The sample and its field duplicate are defined as two samples taken from the same source, stored, and analyzed separately. The duplicate sample is given a false identifier to minimize bias. These samples are collected at a frequency of one per every 10 samples collected. If less than 10 samples are collected, one duplicate will be collected at the last location to be sampled.

4) <u>Source Water Blanks</u> - Deionized water generated in the RMI Laboratory and used in decontaminating sample equipment is poured into the sample container and stored and transported to the laboratory for analysis. The results may indicate if contamination of rinse water has occurred. Source water blanks will be collected at a frequency of one per every 10 samples collected. If less than 10 samples are collected, a source water blank will be collected after the last sample is collected.

All field data shall be recorded on survey sheets and, as applicable, the field logbook and shall be checked for completeness and correctness in accordance with approved procedures.

2.3.2 Analytical Quality Control

Quality control samples shall be prepared and analyzed by the analytical laboratory as stated in the applicable analytical method and may include the following:

1) Method blank/reagent blank results - Reagent blanks are analyzed to verify the procedures do not introduce contaminants that affect the analytical results. Reagent blanks will be prepared by the addition of all reagents to a substance of similar matrix as the sample. This blank will then undergo all of the procedures required for sample preparation and will be analyzed with the field samples prepared under identical conditions.

2) Matrix spike results - This technique is used to determine the effect of matrix interference on analysis results. Aliquots of the same sample are prepared in the laboratory and each aliquot is treated exactly the same throughout the analytical method. Spikes are added at concentrations specified in the method. The percent difference between the values of the spiked duplicates is taken as a measure of the precision of the analytical method.

3) Surrogate Spike Results - Surrogate spike analysis is used to determine the efficiency of recovery of analytes in the sample preparation and analysis. Calculated percentage recovery of the spike is used as a measure of the accuracy of the total analytical method. A surrogate spike is prepared by adding to a sample, a known amount of pure compound of similar type to that which is to be analyzed in the sample. Surrogate compounds will be added to all samples that are to be analyzed by gas chromatograph (GC) or gas chromatograph/mass spectroscopy (GC/MS), including method blanks, duplicate samples, and matrix spikes.

4) Laboratory Control Sample Results - Laboratory control samples are samples prepared independently of the field samples and blanks. These samples of known concentration are used to measure the accuracy of the instrumentation utilized. Laboratory quality control samples will be analyzed at a frequency of one QA sample for every 20 samples, with a minimum of one sample for each sample batch of 20 or less.

The results of the analysis of the quality control samples shall be reported with the analytical results of the field samples.

2.3.3 Sample Preservation

Samples shall be preserved per the requirements stated in SW-846, *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*. The standard operating procedures for collecting samples shall state the preservation techniques to be followed for the sample being collected.

2.3.4 Sample Holding Times

The sample holding times stated in SW-846, *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*, shall be followed.

2.3.5 Sample Volumes

The standard operating procedures for collecting the samples shall specify the minimum sample volume and sample container for each sample collected. The analytical laboratory conducting the sample analysis will provide this information taking into account the analytical method being conducted and associated quality control samples required by the laboratory's procedures.

2.4 Procedures

This work plan provides overall technical guidance for characterization activities. RMI Standard Operating Procedures (SOPs) provide the detailed instructions for completing the various activities required by the work plans. All work activities shall be performed in accordance with RMI SOPs. Work not authorized by an approved procedure or work instruction shall not be performed.

Tables 2-4 through 2-6 identify existing or planned field, analytical, and quality assurance procedures. The Quality Assurance Officer shall maintain a list of all approved procedures applicable for soils characterization activities and will update this list as new procedures are written and approved.

2.4.1 Field Procedures

Field activities consist primarily of all the activities necessary to collect a sample and transfer the sample to the laboratory or to measure properties such as surface contamination levels in the field. Key field procedures applicable to characterization efforts are listed in Table 2-4.

2.4.2 Analytical Procedures

All on-site or off-site laboratory analyses shall be performed in accordance with written and approved standard operating procedures and analytical methods. Table 2-5 lists the analytical methods to be used for the various analyses required.

2.4.3 Quality Assurance/Administrative Procedures

Quality Assurance procedures provide assurance that the data are collected in a manner designed to meet project objectives. Field data or analytical data received from the laboratory must be reviewed prior to reporting to ensure the data is of sufficient quality to meet the project objectives, reported to the appropriate individuals and stored to allow future retrieval and use. Administrative procedures provide a standard method to conduct administrative tasks such as document approval, procurement, document control, etc. Table 2-6 lists the applicable quality assurance and administrative procedures.

Table 2-4 - Current and Proposed Field Procedures

Subject	Current Procedure Number	Procedure Type
Surface Soil Sampling	Proposed	Field Sampling
Subsurface Soil Sampling	Proposed	Field Sampling
Verify radiation and surface contamination instruments performance is within approved limits prior to use.	RMI-L-60	Health Physics Procedures
Provide instructions for the calibration and maintenance of radiation and surface contamination measuring instruments.	RMI-L-60	Health Physics Procedures
Issuing Radiological Work Permits	RMI-L-155	Health Physics Procedures
Receipt, storage and shipment of samples by the RMI laboratory	RMI-L-138	Laboratory Procedures
Decontamination of sampling equipment	Proposed	Field Sampling
Sample Numbering, Labeling and Sealing	RMI-L-138	Laboratory Procedures
Field Activity Documentation	Proposed	Field Sampling
Disposal of Drill Cuttings and Groundwater	Proposed	Field Sampling
Walkover Radiation Survey	RMI-L-149	Field Sampling

Table 2-5 - Applicable Analytical Methods

Analyte	Analytical Method
Radiological Contaminants	
Gross Alpha	gas flow proportional counter; laboratory specific procedure
Gross Beta	gas flow proportional counter; laboratory specific procedure
Total Uranium	kinetic phosphorescence analysis or equal; laboratory specific procedure
Isotopic Uranium (U-238, U-235, U-234)	alpha or gamma spectroscopy; laboratory specific procedure
Thorium 232	alpha spectroscopy; laboratory specific procedure
Technetium 99	liquid scintillation; laboratory specific procedure
Isotopic Plutonium (Pu-238, Pu-239, Pu-240)	alpha spectroscopy; laboratory specific procedure
RCRA Hazardous Contaminants	
Volatiles	SW-846, Method 8240
Semi-Volatiles	SW-846, Method 8270
Pesticides	SW-846, Method 8080
Herbicides	SW-846, Method 8150
As, Ba, Cd, Cr, Pb, Se, Ag	SW-846, Method 6010
Mercury	SW-846, Method 7471
Cyanide (Total)	SW-846, Method 9010
Sulfides (Reactive S)	SW-846, Method 9030
Polychlorinated Biphenyls (PCBs)	SW-846, Method 8080
Asbestos	40 CFR Part 763, Subpart E, Appendix A
Toxicity Characteristic Leaching Procedure	SW-846, Method 1311 (40 CFR 261.24)
Ignitability	SW-846, Method 1010 or 1020
Corrosivity	SW-846, Method 9040
Free Liquids	SW-846, Method 9095
Particle Size	ASTM-D-422
Percent Moisture	ASTM-D2974-87

Table 2-6 - Current and Proposed Quality Assurance/Administrative Procedures

Subject	Current Procedure Number	Procedure Type
Data validation of inorganic analyses	Proposed	Quality Assurance
Data validation of organic analyses	Proposed	Quality Assurance
Document control	RMI-L-116	Administrative
Audits	RMI-L-120	Quality Assurance
Nonconformances	RMI-L-122	Quality Assurance
Document review and approval	RMI-L-112	Administrative
Unusual occurrence reporting	RMI-L-117	Quality Assurance
Equipment and services procurement	RMI-L-127	Administrative
Corrective actions	RMI-L-128	Quality Assurance
Contract laboratory evaluation	RMI-L-154	Quality Assurance
Laboratory Services Procurement	RMI-L-159	Quality Assurance
Operational readiness reviews	RMI-L-161	Quality Assurance
QA surveillances	RMI-L-166	Quality Assurance
Audit personnel qualification	RMI-L-169	Quality Assurance

SECTION 3

PHASE 1 SOILS CHARACTERIZATION PROGRAM

The soils characterization plan will use the observational approach to characterize soils. Surface soils will be characterized to a maximum depth of 24 inches in areas where the primary mode of deposition (e.g., airborne emissions, spills, surface runoff) is expected to have contaminated surface soils. If contaminants are below 24 inches, supplemental tasks to evaluate contaminant extent may be required. Subsurface soils will be characterized where the primary mode of deposition is at depth, such as along subsurface utility pathways.

Site history, process knowledge, or previous analytical data will also be used to identify the analytical parameters within a sampling area.

3.1 Radiological Investigative Sampling

For the radiological characterization of soils, the area to be characterized is divided into unaffected and affected areas as introduced in Section 1.5.1. Figure 1-3 shows the unaffected and affected areas. NUREG/CR-5849 defines "affected" and "unaffected". Within these areas are specific features, or investigative units, that are targeted for discrete radiological sampling. The investigative units include:

1) Localized areas of elevated radioactivity
2) Soil piles
3) Drainage ditches
4) Underground utilities
5) Fields Brook outfall
6) Former evaporation pond

For convenience and ease of discussion, the entire area to be characterized has been divided into Areas A through G (Figure 1-2).

3.1.1 Unaffected Areas

The surface radiation survey conducted in support of the SR was used to classify two parcels of land as unaffected: Areas A and E. The Mitchell Transport, Inc. (MTI) property located west of the RMI plant has been identified as Area A for site characterization. Discrete localized areas with radiation readings of 100 cpm above background within otherwise unaffected areas were identified during the walkover radiation survey (PARSONS 1993) and are excluded from this unaffected area. The fenced area referred to as Area E, is owned by RMI and is located to the northeast.

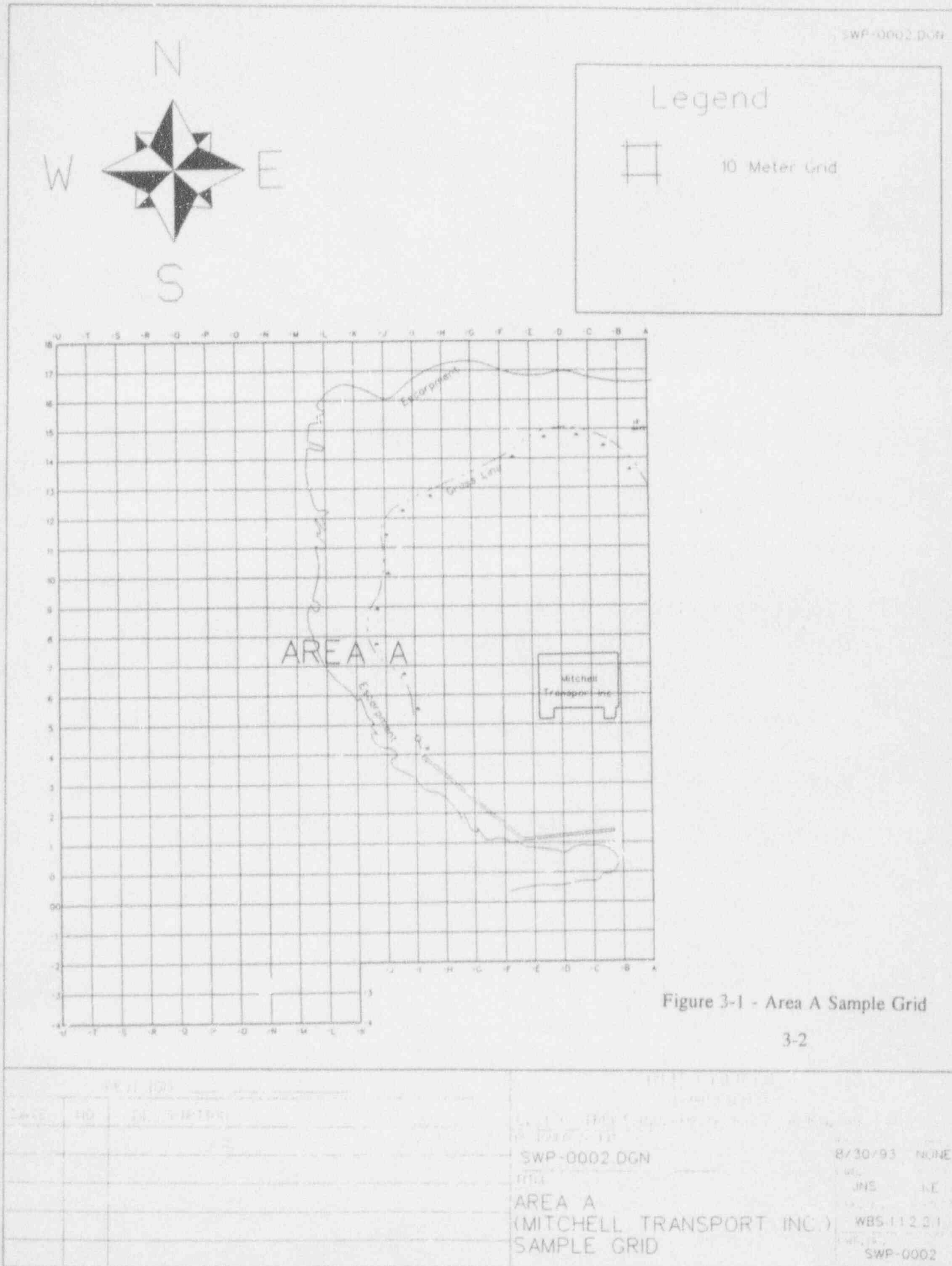


Figure 3-1 - Area A Sample Grid

Area A

Radiological contaminants are the focus of investigations in Area A. If analyses indicate contamination, further investigation will be conducted.

Sampling of surface soils (from 0-6 inches depth) at 30 randomly selected grid nodes of a 10-meter grid and analysis for uranium and Tc-99 will be conducted (Figure 3-1). Approximately ten percent of the samples collected will be analyzed for Th-232.

Area E

Area E encompasses approximately 11 acres. This area is located in the prevailing down wind direction from the plant and, therefore, will be assessed for the presence of uranium and Tc-99. Although this area is not anticipated to be contaminated by RCRA materials since it was not used by RMI and is not a site of former industrial activity, samples will be tested for RCRA constituents.

Because the walkover radiation survey of this area indicated background and the area was therefore classified as unaffected, 30 samples will be collected from randomly identified nodes on a 10-meter grid (Figure 3-2). Analyses will be conducted for uranium, Tc-99, the eight RCRA metals, and semi-volatile and volatile organics.

3.1.2 Affected Area

The surface radiation survey was conducted to identify potentially affected areas. These areas were identified as B, C, D, and F. The affected areas had surface radiation survey grid readings over 100 cpm net. Isolated areas of elevated surface radioactivity in areas A and D will be targeted for specific characterization (see Subsection 3.1.3).

A systematic sampling approach will be employed to delineate radiological surface soil concentrations within the affected area. The data will be used to create uranium isopleths to a depth of 2 feet bls. Samples will be systematically collected at 20-meter intervals on a 10-meter grid from the affected area. Sample spacing may be decreased to 10 meters or less in the vicinity of the buildings (Area B, Figure 3-3).

Samples will be collected and analyses conducted for uranium and Tc-99. Isotopic uranium analyses will be conducted on about 20 percent of the samples. The remaining 80 percent of the samples will be analyzed for total uranium by gamma spectroscopy. The isotopic data will be used to determine uranium isotopic ratios. Samples for isotopic analysis will be selected to provide adequate coverage, representativeness and confidence in the data used to determine the ratios for soils in the affected area. Approximately ten percent of the samples collected will be analyzed for Th-232.

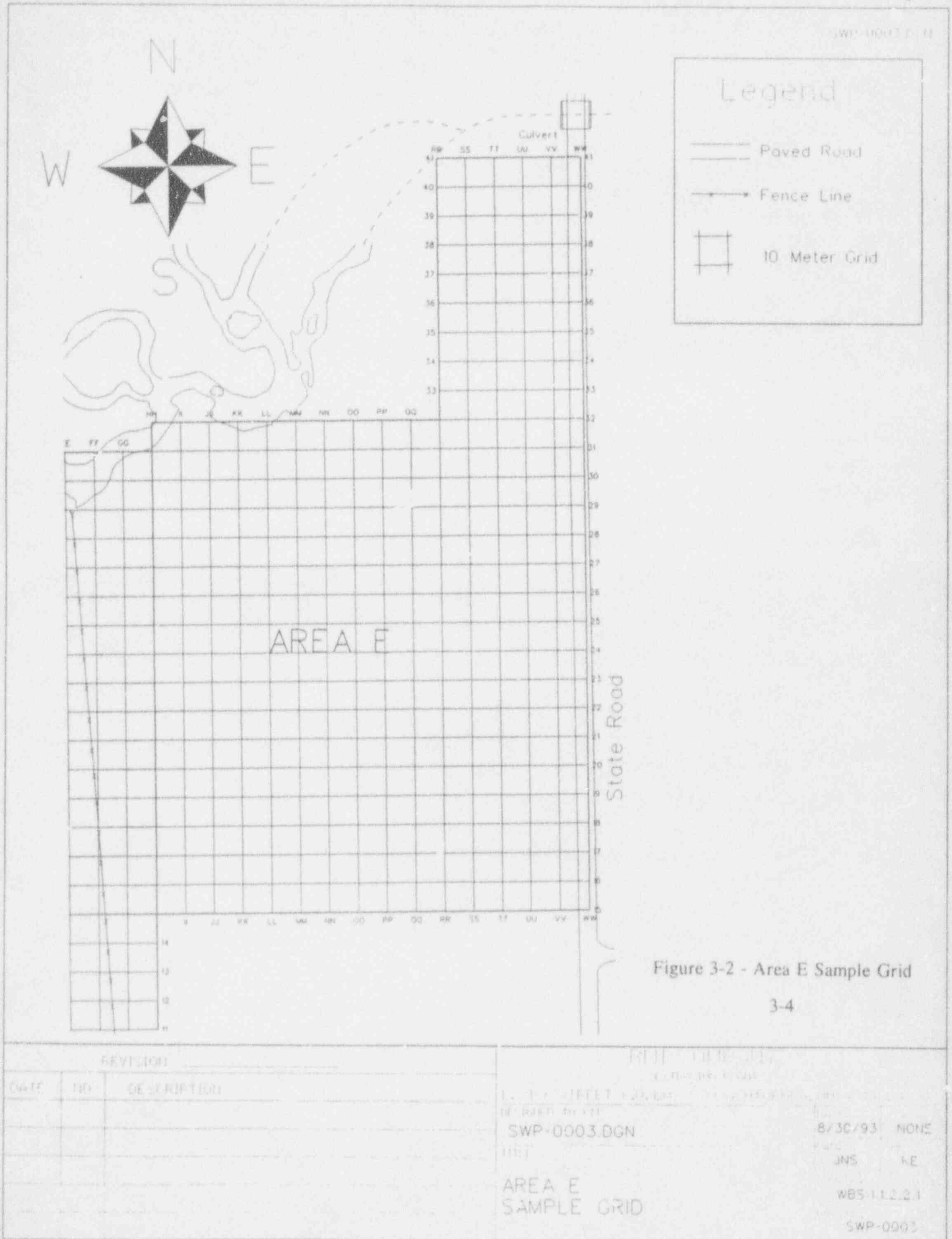
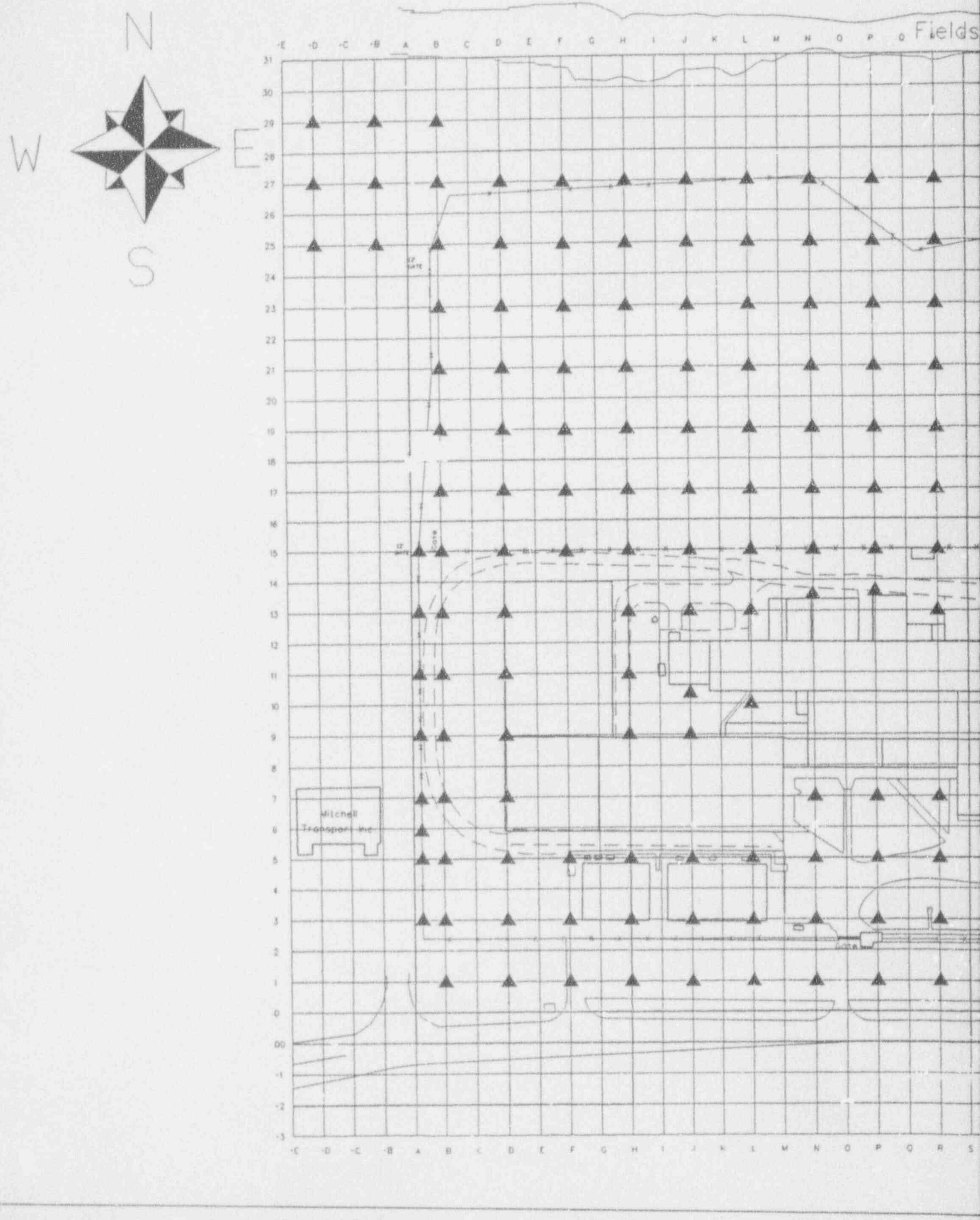


Figure 3-2 - Area E Sample Grid



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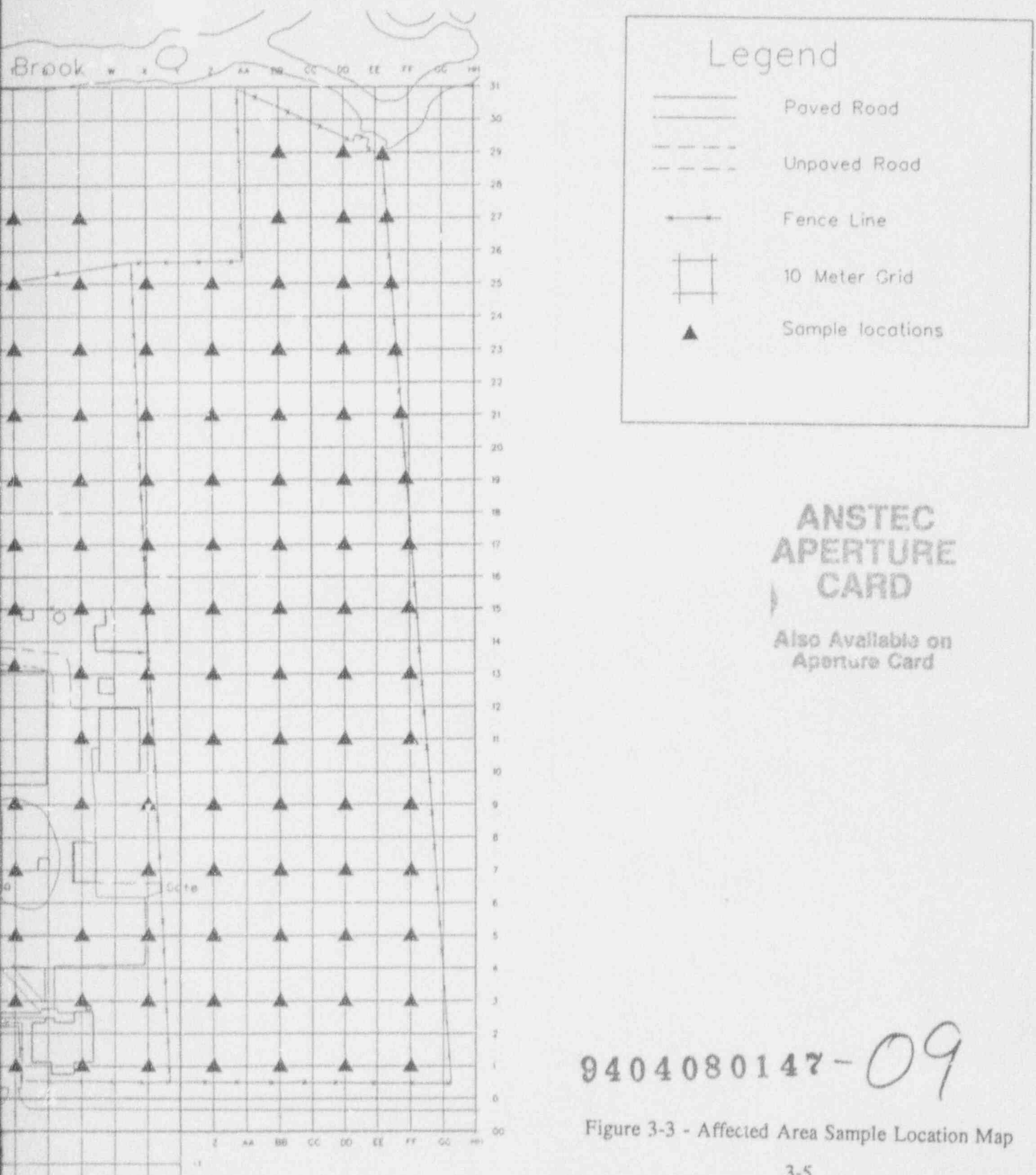

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Figure 3-3 - Affected Area Sample Location Map

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AFFECTED AREA
SAMPLE LOCATION MAP

Area G, located adjacent to and south of East 21st Street, is assumed to be affected. A surface walkover radiation survey will be performed during Phase 1. Supplemental soil sampling tasks will be developed to assess radionuclide concentrations in soils after the radiation survey data has been assessed.

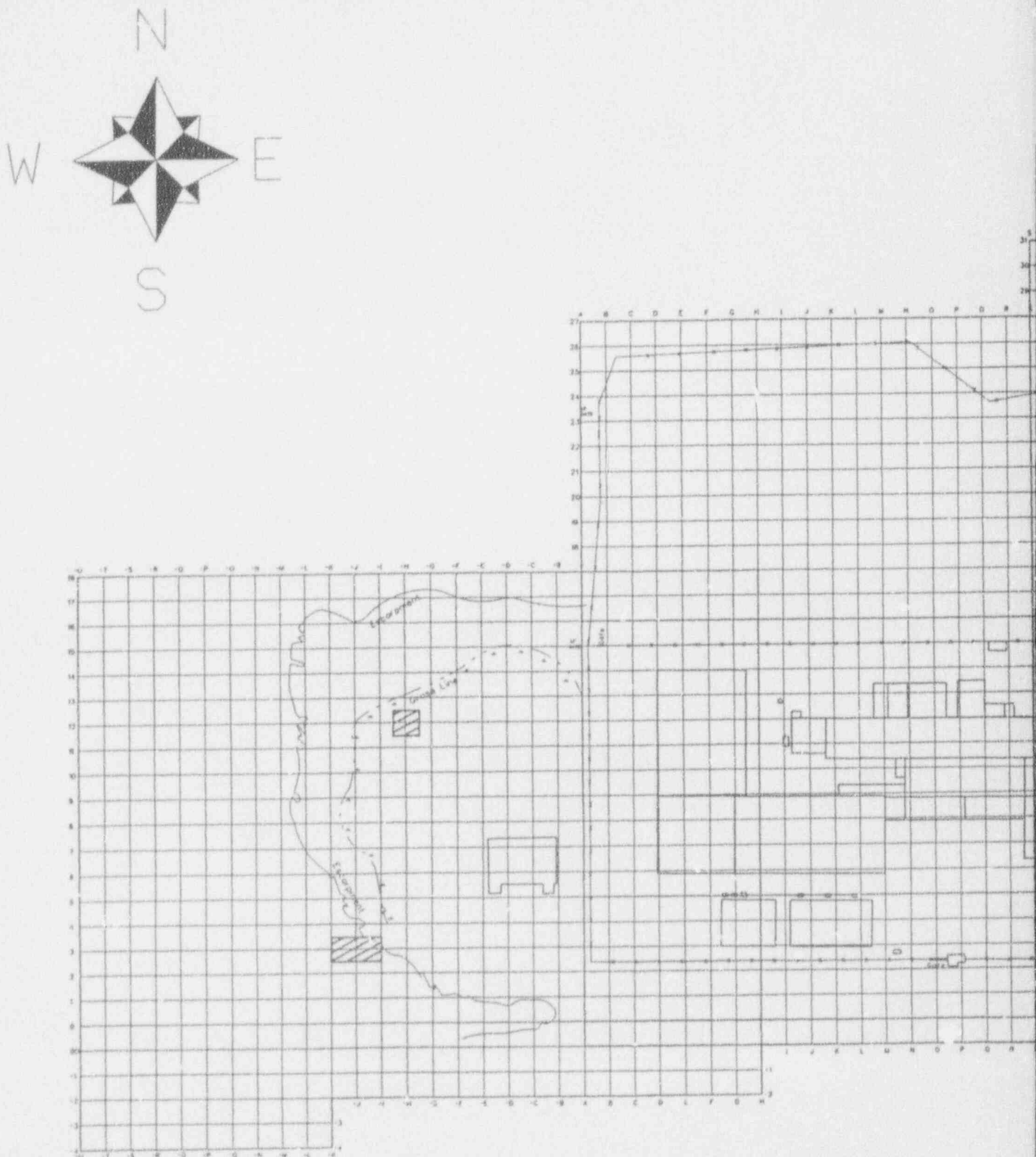
3.1.3 Localized Areas of Elevated Radioactivity

Discrete localized areas of elevated surface activity were identified by the surface radiation survey. Survey personnel reported that such an area is located near grid coordinates -K,3 in Area A and appears to be confined to a single pocket of soil located at the base of a tree. This area will be sampled and analyzed for isotopic uranium to evaluate the source of the material. A second area is located on MTI property near coordinate -H,12. This area of elevated radioactivity will be sampled to determine the extent of surface contamination. A third area, located within the fenced area east of the plant, between the drainage ditch and the National Pollutant Discharge Elimination System (NPDES) permitted outfall, will be sampled to evaluate the lateral extent of contamination (Figure 3-4).

To determine the extent of contamination in these localized areas, sampling and analyses will be conducted for uranium and Tc-99. Ten percent of the samples collected will be analyzed for isotopic thorium.

3.1.4 Soil Piles

The site contains soil piles as a result of construction activities over the past several years. Characterization of the soil piles for off-site disposal is addressed under a separate sampling and analysis plan. The plan incorporates waste acceptance criteria per NVO-325, Rev. 1, and comments from the disposal site. Access to the underlying soils will be necessary to complete site characterization. It is preferred that the soil piles will be removed prior to further sampling for site characterization. If the soil piles remain in place during the site characterization, then provisions will be made for access to the historical soil surface for sample collection.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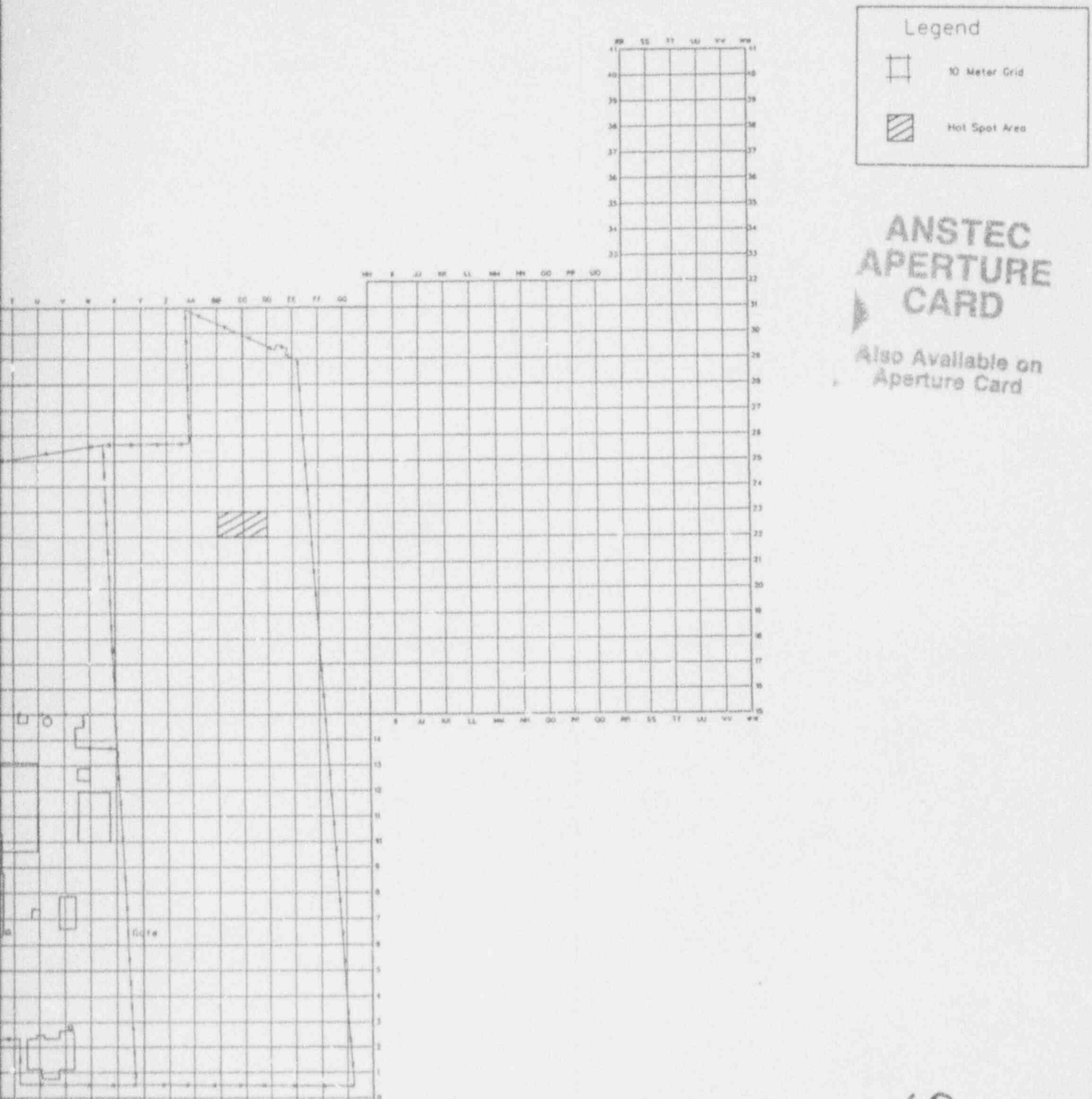


Figure 3-4 - Localized Areas of Elevated Radioactivity (See Section 3.1.3)

HISTORY		
DATE	NO.	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

SWP-0005.DGN
DATE 6/17/93 SCALE NONE
DRN. BY JMS CHK'D BY KE
TITLE: LOCALIZED AREAS OF ELEVATED RADIOACTIVITY
CHG. No. & PROJECT WBS-1.1.2.2.1
DWG. No. SWP-0005

3.1.5 East 21st Street Drainage Ditches

The drainage ditch south of Area F diverts surface runoff east and north to Fields Brook, and west and north, across Area A. Sediment sampling will be conducted to determine if sediments from RMI property were transported and deposited along the ditch. Samples will be collected at regular intervals along the ditch and used to evaluate the presence and/or lateral extent of contamination (Figure 3-5). The initial sampling point will be located at the highest elevation of the ditch as determined by topographic survey. Surface sediments (0 - 6 inches) will be collected at low points along the ditch and analyzed for uranium and Tc-99. The drainage ditch adjacent to and south of 21st Street (Area G) will also be sampled after the walkover radiation survey has been conducted, the data analyzed, and a supplemental sampling task prepared.

3.1.6 Underground Utilities

Underground utilities on site constitute a specific investigative unit (Figure 3-6). These utilities transport stormwater, treated and untreated sanitary wastes, treated and untreated process effluent, and non-contact cooling water. Liquid wastes are treated on site, combined into a 30-inch outfall and discharged to Fields Brook in accordance with the NPDES permit. A biased sampling program will be used to identify and characterize potential locations of elevated radioactivity. The biased sample locations will be identified through the use of a gamma probe and video camera system to detect areas of increased activity and to provide a visual identification of pipe deterioration and material buildup. Other biased sampling locations will be determined based upon access to the utility (some utilities may not be accessible due to the presence of surface obstructions). In the absence of identifiable elevated radioactivity (greater than 1.5 times background), each of the utility lines listed below will be sampled at up to 3 locations.

The following utility lines identified by plan drawings will be investigated:

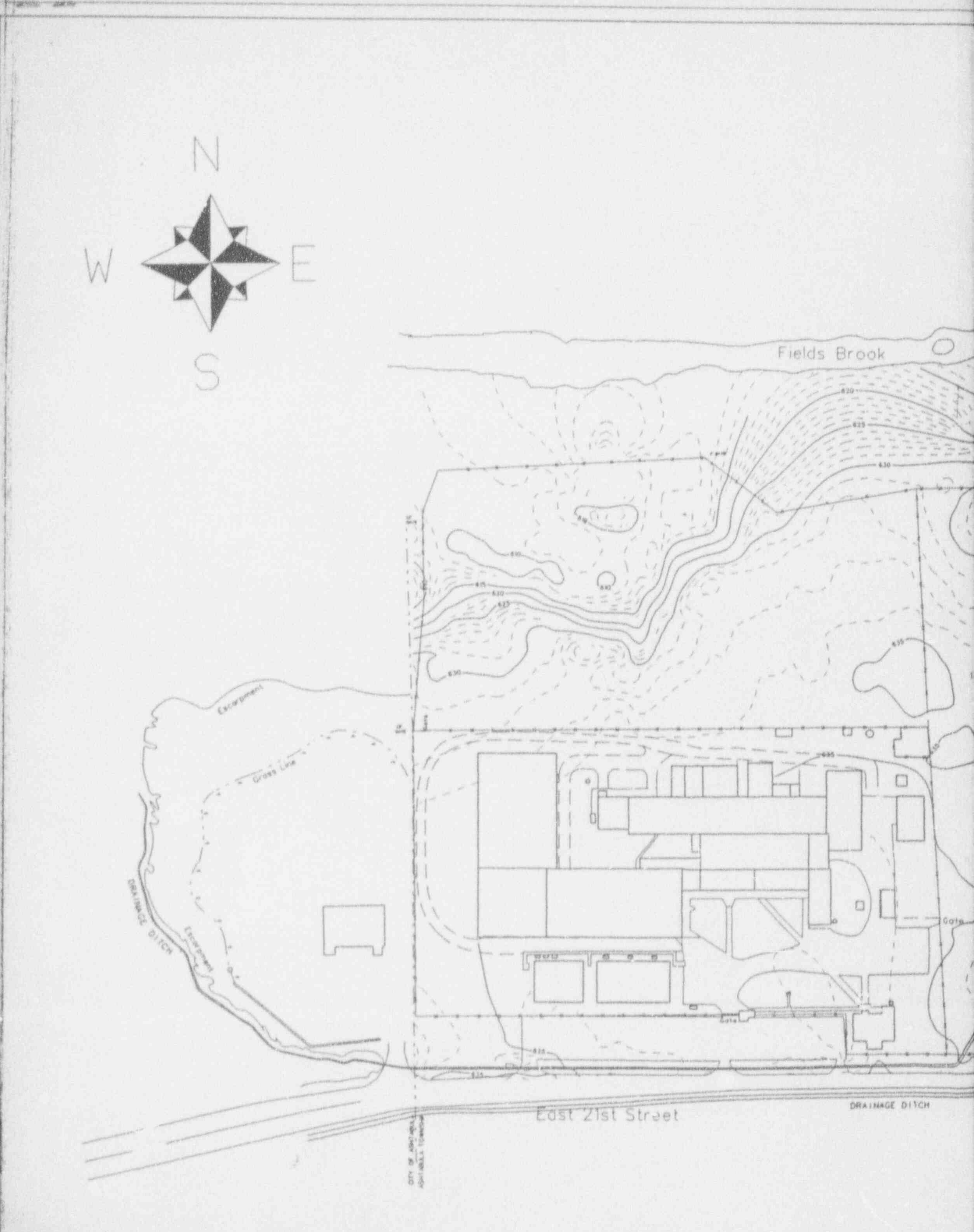
1) Drainage tile and catch basin leading from the southwest area of the RF-3 Butler Building to the wastewater treatment plant, and piping from the building east to the Main Plant

2) The process water line from the RF-6 Butler Building lab acid neutralization pit to the Sparkler filter system and the associated 6-inch line leading from the Sparkler filter system to the 18-inch storm sewer

3) The 18-inch abandoned storm sewer south of the plant

4) The 30-inch combined outfall leading to Fields Brook

5) Piping leading from the sump west of the burn pad



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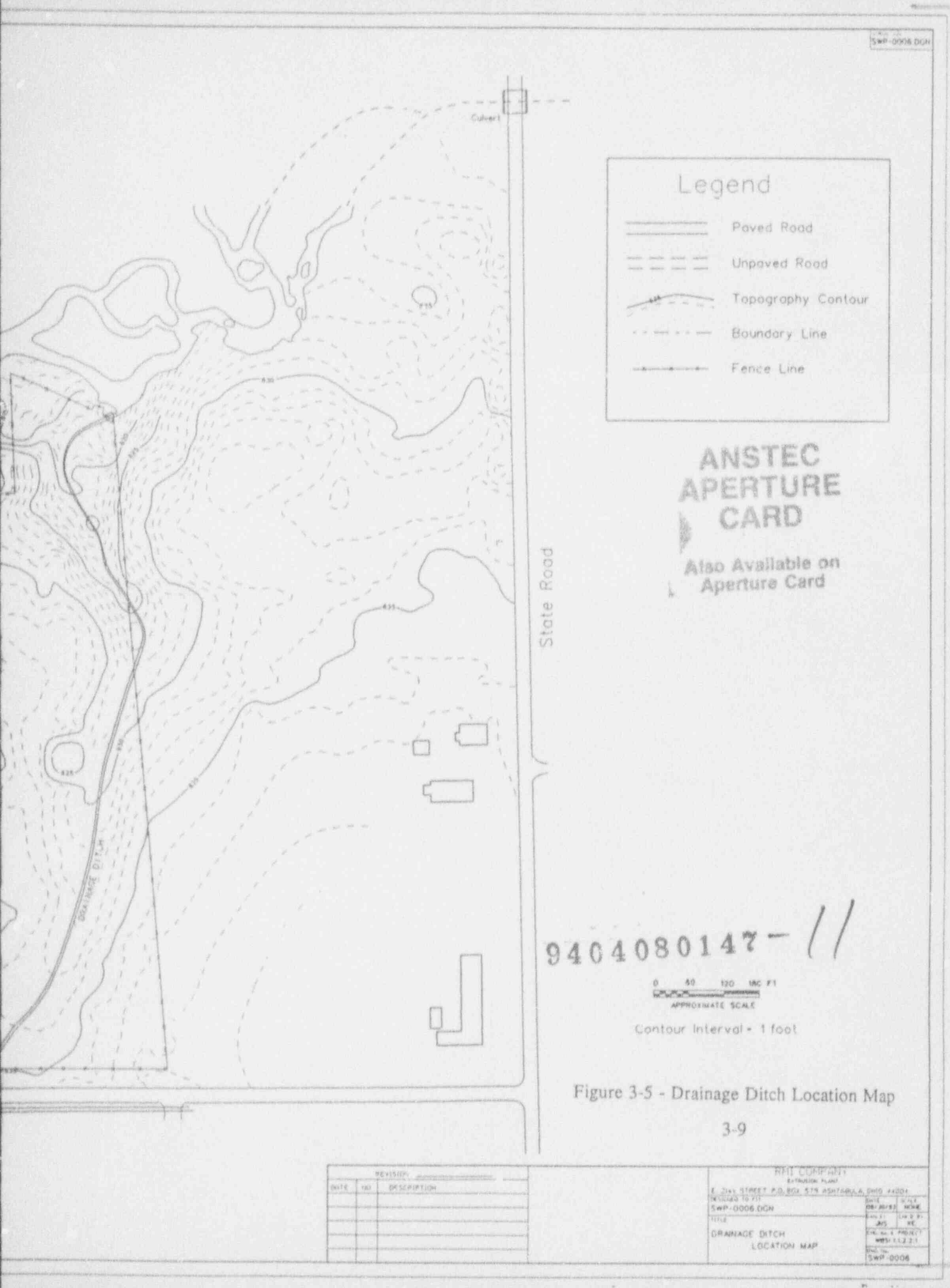

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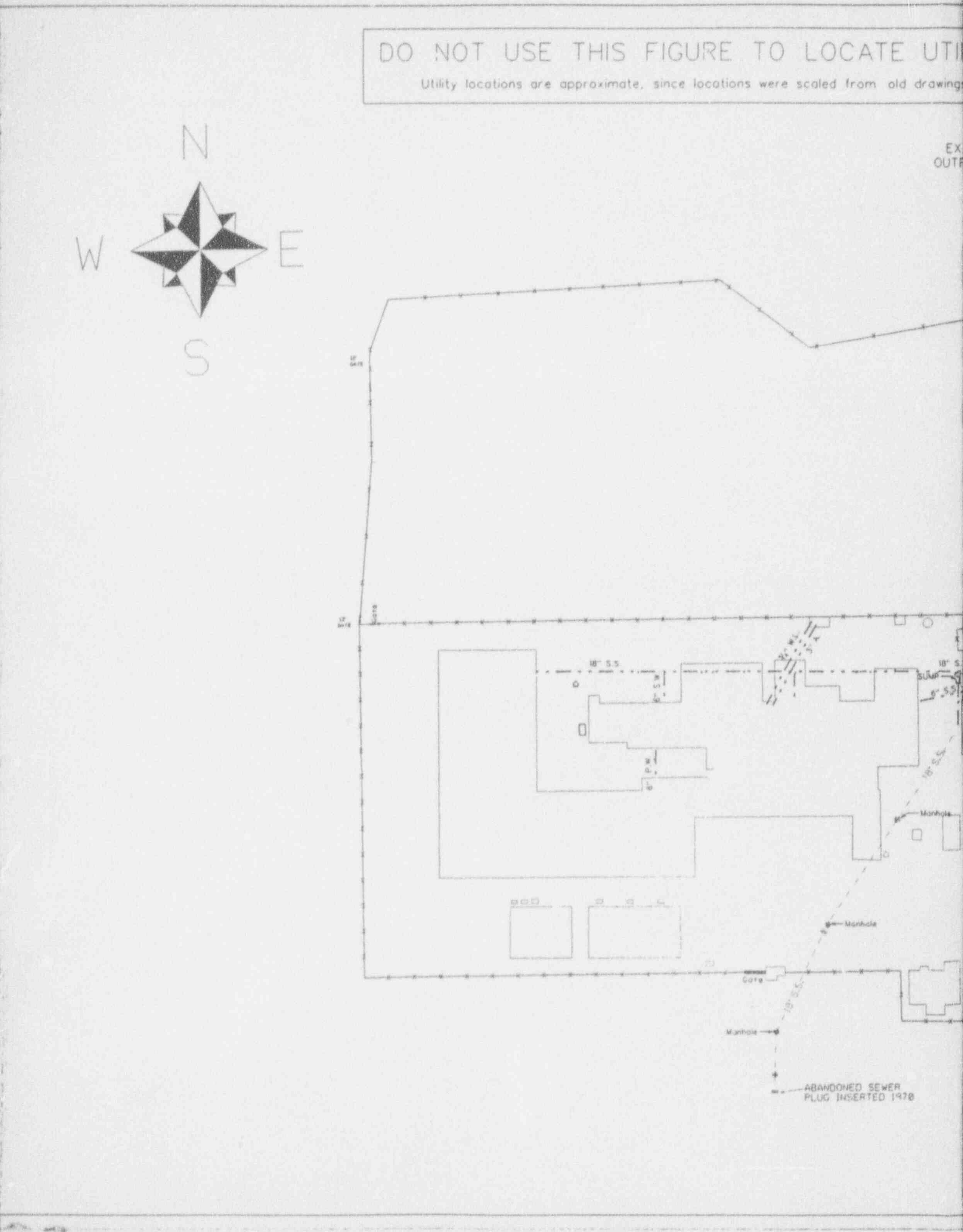
Figure 3-5 - Drainage Ditch Location Map


DO NOT USE THIS FIGURE TO LOCATE UTI
Utility locations are approximate, since locations were scaled from old drawings
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18" S.S.
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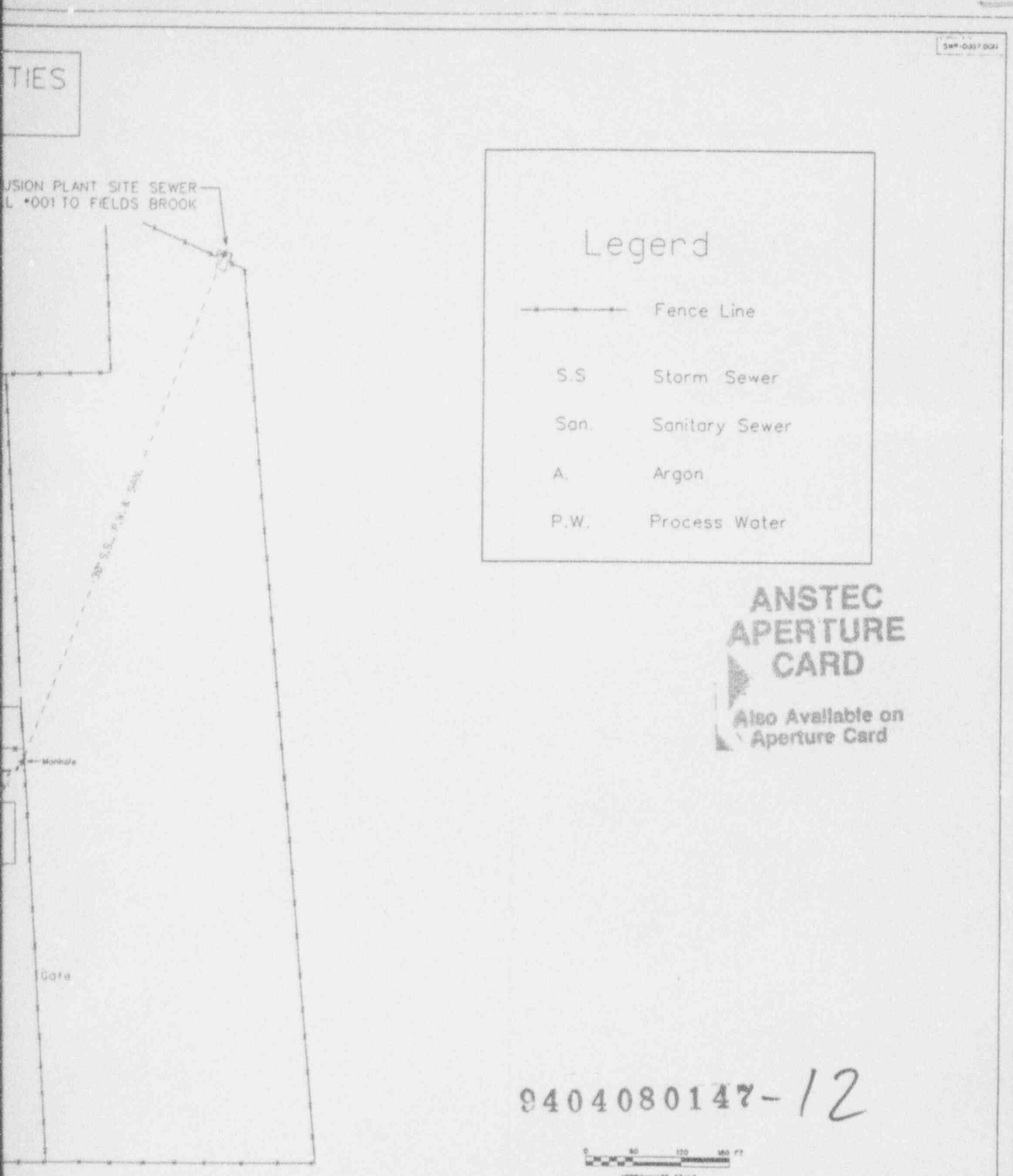
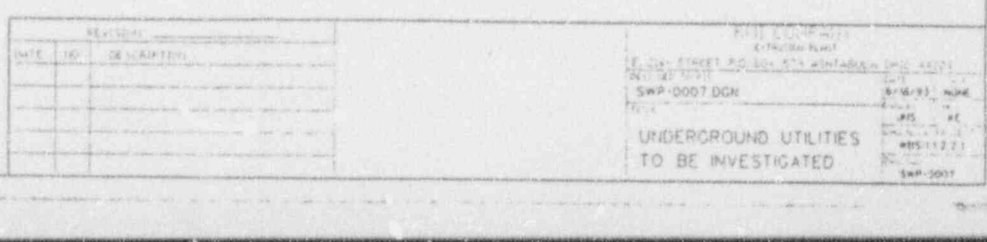


Figure 3-6 - Underground Utilities to be Investigated



6) The 18-inch sanitary sewer north and under the Main Plant

7) The argon gas line north of the Main Plant

Samples will be collected from a depth consistent with the base of the piping. To evaluate vertical migration of radionuclides, all soil samples will be field screened for beta-gamma activity using a G-M, scintillation or proportional type detector. Sample collection at 5-foot depth intervals will continue until field screening indicates activity less than 1.5 times background or the bedrock shale unit is encountered. The maximum depth of the borings will be about 30 feet. The first sample below the base of the utility with detectable activity less than 1.5 times background will also be collected for laboratory analysis. Samples will be analyzed for uranium and Tc-99. If field screening indicates that wastewater has contaminated the soils, additional analysis for RCRA characteristics, based on process knowledge of effluent, is warranted. Additionally, select samples will be screened for waste acceptance criteria. A phased approach to delineate the extent of contamination will be employed if contaminants are detected above regulatory limits.

3.1.7 Fields Brook Outfall

The Fields Brook outfall is a NPDES permitted discharge for plant process effluent, non-contact cooling water, and sanitary wastes treated on site. Stormwater drained from building gutters, paved areas, and unpaved areas is also discharged through the NPDES outfall. A cleanup of uranium contaminated soils at the outfall was conducted at the request of the NRC in the 1980s. The cleanup consisted of excavation of contaminated soils. Samples were collected during the excavation and analyzed for uranium. The excavation, sampling, and analysis continued until the uranium contaminated soils were removed. The excavation was backfilled with soils obtained from an unknown source. Documentation regarding the volume of soils excavated, final clean-up level, and disposal of the soils is not available.

Systematic sampling at the base of the h[illegible] excavation and of adjacent undisturbed soils will be conducted to assess the ability of the previ[illegible]eanup to meet release requirements for unrestricted use and to evaluate potential presence and lateral extent of residual uranium in subsurface soils. Soil samples will be collected at grid nodes. The lateral extent and depth of the sampling effort is dependent upon the lateral extent and depth of the excavation. Analyses will be conducted for uranium and Tc-99. The number and location of samples to be collected will be determined after initial characterization information is available.

3.1.8 Former Evaporation Pond

The former evaporation pond is part of the CAMU which also includes the swale, and the seep pond. Soils in the vicinity of the former evaporation pond have been removed and placed in drums for temporary storage. The CMS completed by Eckenfelder (Eckenfelder 1992) for remediation of the

CAMU incorporates US EPA and NRC clean-up levels for TCE and uranium in soils. Additional characterization of the CAMU for design of remedial alternatives or waste volume estimates is not required at this time.

The RFIES for RMI identifies the presence of transuranic elements in drummed materials (evaporation pond sediment and soil mixture) excavated from the former evaporation pond. Although transuranics are not expected to be a significant contributor to soil contamination or worker exposure, quantification of the presence of these elements, specifically plutonium and neptunium, is required to achieve characterization objectives. Soil samples will be collected at ground surface and at depth in the vicinity of the former evaporation pond (Figure 3-7). Sample locations are located to identify the potential extent of transuranic elements in subsurface soils. Samples will be analyzed by alpha spectroscopy to identify and quantify the presence of transuranic elements. The soil boring and sampling activities will be conducted in conjunction with Task 1 of the Phase 1 Groundwater Characterization Work Plan.

3.2 Potential RCRA Investigative Sampling

The SR identifies several areas of potential RCRA contamination. Although these areas may be contained within radiologically affected areas scheduled for remediation, the presence of RCRA materials will be evaluated, particularly in regard to regulatory cleanup guidelines and land disposal restrictions. Therefore, the sampling program for RCRA contaminants is biased toward areas of suspected and/or known contamination. Within each biased study area, samples will be systematically collected at varying depths up to 2 feet to identify and delineate potentially contaminated soils. Figure 3-8 provides the sample locations for potentially contaminated RCRA investigative units including the Area B fenceline, the area north of the main plant, the burn pad, the fire road, and the RF-6 Butler/Main Plant South. At several sample locations, the investigative units described below (e.g., the fenceline, the area between the Main Plant and the north fenceline of Area B, and the fire road) overlap. Analytical data obtained from such locations may be used to evaluate any of the applicable investigative units.

3.2.1 Fenceline

The fenceline enclosing Area B constitutes a separate investigative unit due to the reported application of waste oils from the hydraulic press as a weed suppressant. The extent or frequency of this practice is not known. Soils along the fenceline will be systematically sampled to evaluate the presence of residual RCRA metals, and volatile and semi-volatile organic compounds.

1

IMAGE EVALUATION TEST TARGET (MT-3)

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6"

1

IMAGE EVALUATION
TEST TARGET (MT-3)

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150mm

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IMAGE EVALUATION TEST TARGET (MT-3)

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150mm

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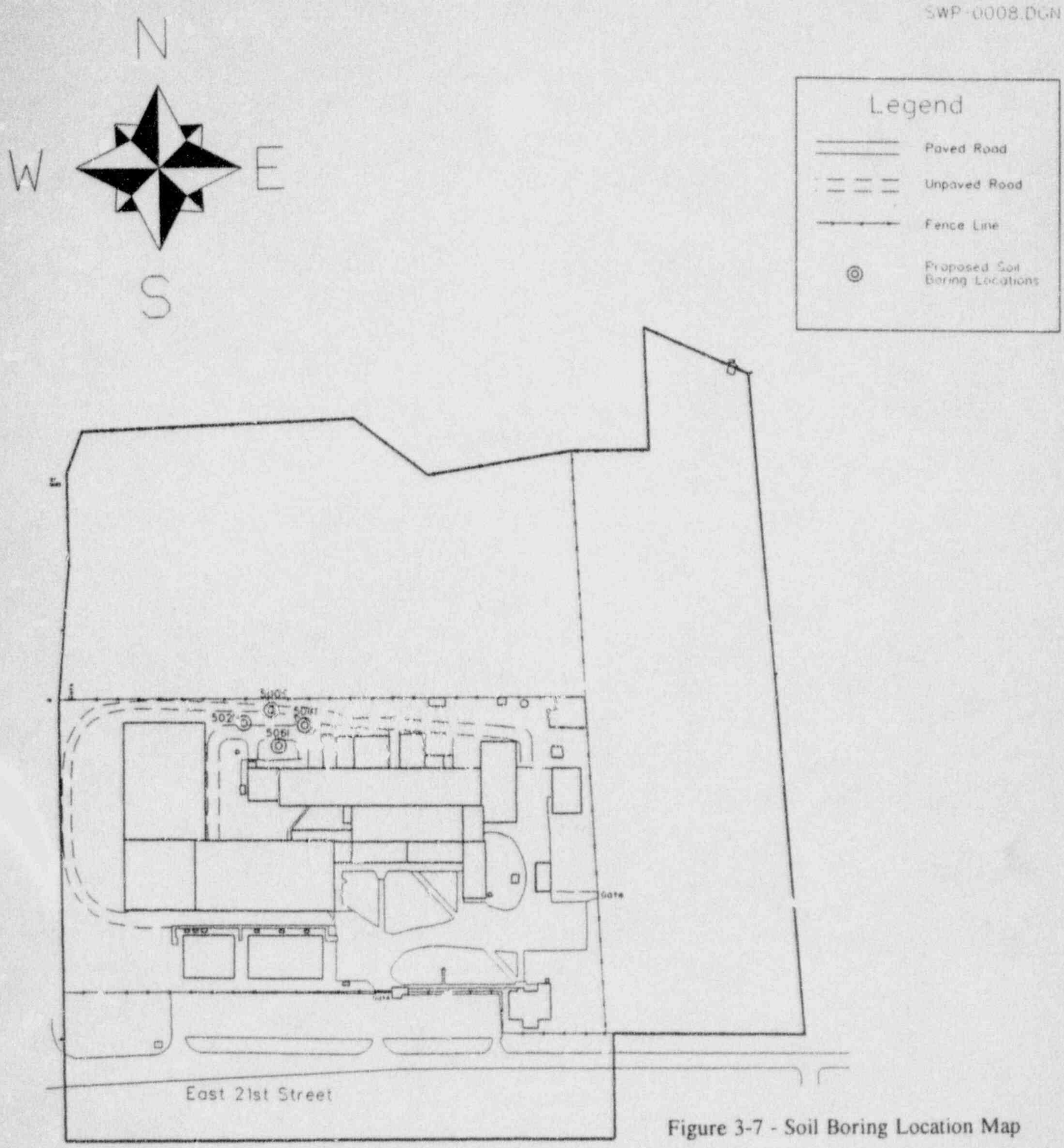


Figure 3-7 - Soil Boring Location Map

REVISION

DATE | NO | DESCRIPTION

SWP-0008.DGN

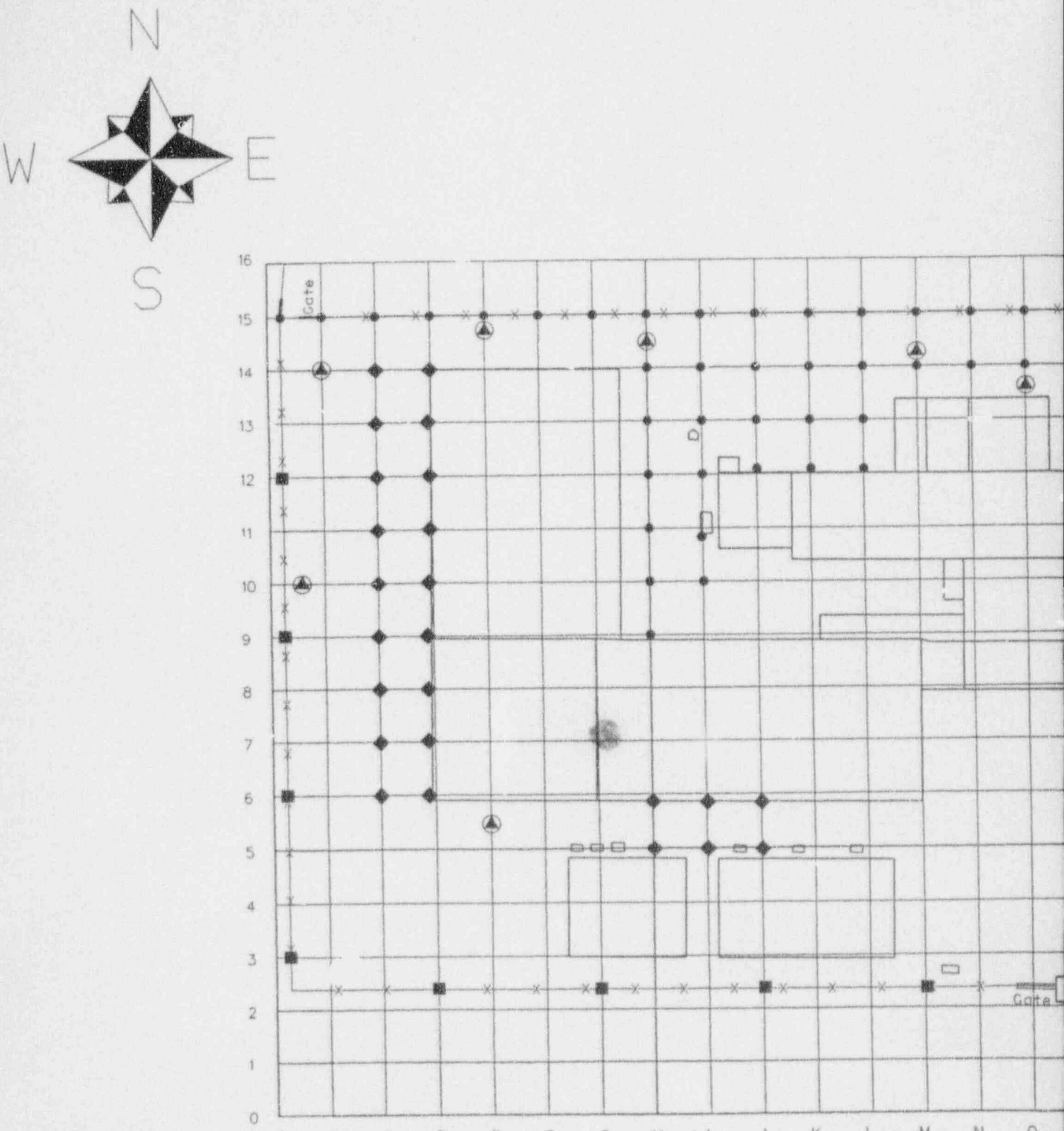
6/18/93 NONE

JNS KE

SOIL BORING
LOCATION MAP

WBS

SWP-0008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SWP-0009

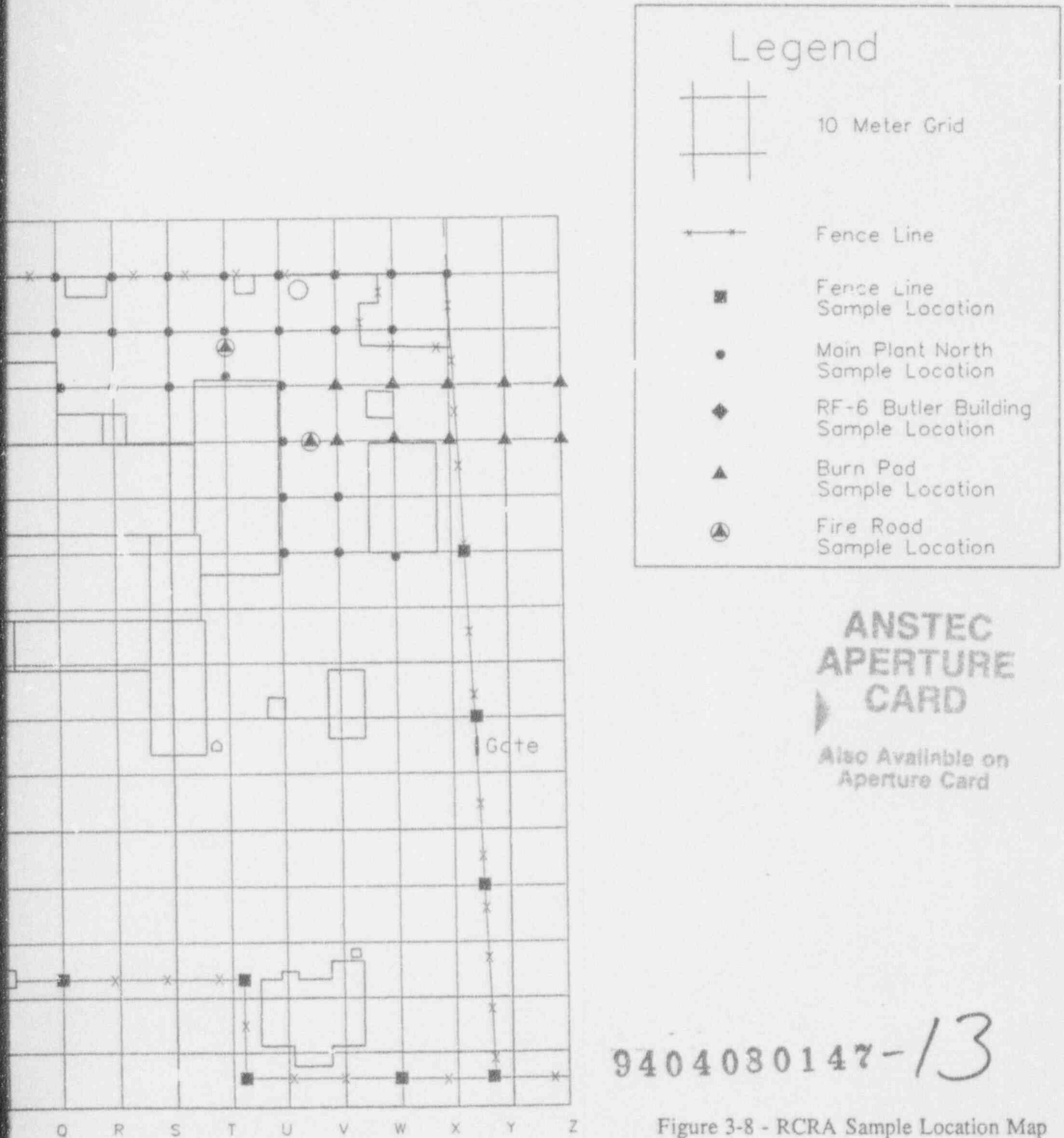

Figure 3-8 - RCRA Sample Location Map

REVISION		
DATE	NO	DESCRIPTION

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

DESIGN FILE: SWP-0009.DGN	DATE: 6/18/93	SCALE: NONE
TITLE: RCRA SAMPLE LOCATION MAP	DRAWN BY: JWS	CHECKED BY: KE
	CHG. No. & PROJECT: WBS 1.1.2.2.1	
	DWG. No.: SWP-0009	

3.2.2 Area North of the Main Plant

The area north of the Main Plant, and extending north to the Area B perimeter fenceline, was previously used for equipment and drum storage, and as a laydown area for equipment cleaning. Hydraulic oil leaks from plant presses were also discharged north of the Main Plant. Currently, the area is partially covered with soil piles from previous site activities. As discussed in Subsection 3.1.4, a separate soil pile sampling and analysis plan has been developed. This soil characterization work plan assumes the piles will be characterized and packaged or moved as necessary to provide access to the previous ground surface.

Systematic sampling in this biased area will be used to determine the chemical contamination of surface soils. Soil samples will be collected at 5 to 10 meter intervals on a 10-meter grid. Analyses will be conducted for RCRA compounds known to occur on site, including the eight RCRA metals, and volatile and semi-volatile organic compounds. Samples obtained from the drum storage portion of this area will be analyzed for the presence of transuranic elements.

3.2.3 Burn Pad

RMI burned light combustible materials such as wood and cardboard from 1962 to 1975 on a burn pad located at the northeast corner of Area B. Documentation concerning quantity and types of burned materials is not available. A systematic, phased approach to soil sampling will be used. Samples will be collected at grid nodes on a 10 meter grid.

The area is included in the larger affected area; therefore samples collected under this phase need not be analyzed for radiological compounds. Analyses will be conducted for the presence of RCRA compounds, including the eight RCRA metals, and volatile and semi-volatile organic compounds. If RCRA compounds are identified in soil samples, an additional sampling phase may be necessary.

3.2.4 Fire Road

The fire road is a gravel and dirt roadway constructed to provide fire fighting equipment, trucks, and personnel access to all sides of the plant in case of fire. Records indicate that waste oils were periodically applied to the roadway to suppress generation of dust. It is possible, however, that this practice resulted in residual contamination of the underlying soils, primarily by metals [illegible] ganic compounds.

A systematic random sampling approach will be used to evaluate contamination in this area. Soils will be collected from a depth below the base of the road construction materials (primarily ballast stone). The first sample location will be randomly selected, and remaining samples will be collected at specified intervals around the road to provide comprehensive coverage. In addition to radiological testing, laboratory analyses will include organic compounds (volatile, semi-volatile) and metals.

3.2.5 RF-6 Butler Building/Main Plant South

The area south of the RF-6 Butler Building roll-up door was historically used as a laydown area for equipment cleaning. It is suspected that small quantities of waste solvent may have been used of in the area on an infrequent basis. Additionally, soils from this area may have been used as backfill south of the RF-6 Butler Building and the Main Plant.

A systematic sampling approach will be used to evaluate the presence of residual contamination from these activities. A phased or iterative approach may be used if necessary to closely define the lateral extent of contamination and average concentrations if compounds are detected. The area will be sampled for organic compounds (volatile and semi-volatile) and the eight RCRA metals.

3.3 Background Determination

When analyte levels are low, determination of background concentrations becomes necessary to evaluate potential effect of site activities on the environment. A total of 18 random surface soil samples (0-6 inches) will be collected from three off-site locations underlain by Conneaut silt loam deemed not affected by RMI or other industrial activities. The Conneaut silt loam is present at the site, and at several locations near the site (Figure 3-9). Samples will be analyzed for the eight RCRA metals, uranium and thorium. The background concentration of uranium in surface soils determined annually between 1986 and 1992, in support of the ASER, will also be used for characterization and remedial design. An iterative approach to evaluation of background analyte concentrations may be necessary.


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810 000 FEET
(Joins sheet 10)
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ASHTABULA
BACKGROUND SOILS
BACKGROUND SOILS
BACKGROUND SOILS
Bunker School
CHESTNUT GROVE CEMETERY
RIVER
Reservoir
PENN CENTRAL
NORFOLK AND WESTERN
CoB PsB

Figure 3-9
Background Sample Location Map
Page 3-17

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3.3.1 Sample Requirement Calculations

The number of background soil samples required for a specified confidence level for the data is developed in accordance with NUREG/CR-5849 and the *Environmental Implementation Guide for Radiological Survey Procedures*, 1992. Initially, six soil surface soil samples will be collected for analysis from each background location. If the average background variations determined from the samples are considered to be less than one tenth the specific guideline value for unrestricted release, then background analyte concentration is insignificant and no additional samples are required. If the upper bound of the 95 percent confidence level for the background average is greater than 10 percent of the guideline value, then additional samples will be required to demonstrate that the measured average represents the true average to within plus or minus 20 percent at the 95 percent confidence level. This 95 percent upper confidence limit is a guide and not an absolute requirement for site characterization. If the measured average does not fall within plus or minus 20 percent of the true average at the 95 percent confidence level after taking additional background samples, it will not be necessary to continue the sampling effort. It is expected that calculated confidence level in the range of 90 percent is sufficient for characterization of background.

3.3.2 Sample Confidence Calculations

Confidence calculations will be performed upon validated data to ensure sufficient, quantifiable confidence in the data as part of the data evaluation task.

3.4 Analytical Parameters

Laboratory analyses will be required to evaluate the presence of potential contaminants at the site. For the purposes of decommissioning, analyses will be limited to radioisotopes known or suspected to have been handled and possibly released to soils on the site. Table 3-1 below lists the radiological isotopes and analytical methods required for characterization.

Table 3-1 - Radioisotope Method Analysis

Parameter	Method
Isotopic Uranium	Alpha Spectroscopy
Total Uranium	Gamma Spectroscopy
Isotopic Thorium	Alpha Spectroscopy
Tc-99	Liquid Scintillation Counting
Plutonium	Alpha Spectroscopy
Neptunium	Alpha Spectroscopy

Potential decommissioning wastes will also be analyzed for the presence of RCRA wastes used and possibly released to soils at the facility. RCRA analyses will be limited to samples collected from areas of suspected contamination, as identified in Subsection 3.2. Table 3-2 lists the RCRA Parameters and Analytical Methodology required for characterization.

Table 3-2 - RCRA Analytical Methods

Parameter	US EPA Method
Volatile Organic Compounds	8240
Semi-volatile Compounds	8270
Metals (Ar, Ba, Cd, Cr, Pb, Se, Ag)	6010
Mercury	7470/7471

Potential decommissioning wastes may be analyzed for waste acceptance criteria, as established by the planned waste acceptance facility. Table 3-3 lists potential waste acceptance criteria per NVO-325 Rev. 1.

Table 3-3 - NVO-325 Waste Acceptance Criteria

Parameter	US EPA Test Method
Ignitability	1010 or 1020
Reactivity	per 40 CFR 261.23
Corrosivity	9040
Toxicity Characteristic	1311
Cyanide (Total)	9010
Sulfides (Reactive S)	9030
LDR Halogenated Organic Compounds	9020
PCBs	8080
Free Liquids	9095, Paint Filter Test

3.5 Regulatory Contaminant Levels

The detected analyte concentrations will be compared to regulatory clean-up levels and to limits established for the classification of wastes as RCRA characteristic wastes. Consistent with the observational approach to characterization, samples will be analyzed for a limited list of parameters. Based upon the initial analytical results, supplemental sampling and analysis tasks may be required for a more comprehensive list of parameters.

3.5.1 Radioactive Constituents

Guideline values for on-site disposal of uranium and thorium wastes have been developed by the NRC and published in 46 FR 52061-52065, October 1981. The site characterization plan adopts these guideline values as analogous to US EPA clean-up levels for RCRA wastes since the NRC will allow unrestricted on-site disposal of wastes below these guideline values. Sample calculations will utilize these guideline values as the "Regulatory Threshold" as presented in SW-846. The guideline value for Tc-99 is currently under development for approval by the NRC. When establishing the site-specific guideline value for total activity due to multiple radionuclides, the sum of ratios of the concentration of each radionuclide to its respective guideline must not exceed 1. Table 3-4 presents analytical method detection limits and guideline limits for suspected contaminants.

Table 3-4 - Radioisotope Method Detection Limits and Guideline Values

Parameter	Method	Detection Limit	Guideline Value
Isotopic Uranium	Alpha Spectroscopy	Lab method dependent	30 pCi/g*
Total Uranium	Gamma Spectroscopy	Lab method dependent	30 pCi/g*
Isotopic Thorium	Alpha Spectroscopy	Lab method dependent	10 pCi/g*
Tc-99	Liquid Scintillation Counting	Lab method dependent	TBD
Plutonium	Alpha Spectroscopy	Lab method dependent	TBD
Neptunium	Alpha Spectroscopy	Lab method dependent	TBD

*The guideline value is the total of all isotopes detected.
TBD indicates that the guideline value has not been determined at this time.

3.5.2 Chemical Constituents

Detected analytes will be compared to RCRA characteristic waste limits, as established in the Code of Federal Regulations (CFR) 40 CFR 261, and to regulatory cleanup limits, as applicable. A pathways risk analysis has been used to establish a site-specific risk-based clean-up level of 64 μg/kg for TCE in the CAMU (Eckenfelder 1991). This clean-up level has been adopted site wide.

Consistent with NVO-325 Rev. 1, RCRA metals analytical data will be compared to the calculated equivalent Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit for classification of the waste as a RCRA characteristic waste. This equivalent is calculated by multiplying total metal analyte concentration by 20 to account for differences in the analysis procedures. An action limit of one half of the equivalent regulatory limit will be established to identify media which may require additional characterization for RCRA characteristic waste. Media having a detected analyte concentration in excess of the action limit will be resampled for TCLP metals analysis.

Table 3-5 presents analytical practical quantitation limits (PQLs), total metals equivalent regulatory threshold, and the action limit for contaminants previously identified at the site.

Table 3-5 - RCRA Practical Quantitation Limit and Equivalent Regulatory Threshold

Parameter	US EPA Method	Practical Quantitation Limit	Equivalent Regulatory Threshold	Action Limit
* TCE	8010	5 ppb	Not Applicable	64 ppm
Barium	6010	20 ppb	2,000 ppm	1,000 ppm
Lead	6010	420 ppb	100 ppm	50 ppm
Arsenic	6010	530 ppb	100 ppm	50 ppm

* The action limit for TCE established using a pathways analysis will also be used as a cleanup limit. Media with concentrations of TCE above this action limit will be treated on site, prior to disposal. The method detection limit for TCE is 5 ppb.

SECTION 4

SOILS CHARACTERIZATION TASKS

The Phase 1 preliminary soils characterization consists of the following tasks:

1) Task 1 - Establish Survey Grid
2) Task 2 - Surface/Near Surface Soil Sampling
3) Task 3 - Underground Utility Evaluation/Location
4) Task 4 - Subsurface Soil Boring and Sampling
5) Task 5 - Laboratory Analysis
6) Task 6 - Data Validation
7) Task 7 - Data Evaluation and Response
8) Task 8 - Area G Walkover Radiation Survey

Each task is described below.

4.1 Task 1 - Establish Survey Grid

4.1.1 Objective

The objective of Task 1 is to establish the survey grid in the field using visible markers for field sampling personnel.

4.1.2 Scope of Work

The grid system will use the 10 meter grid previously established at the site and will provide the basis for all future characterization activities. The grid shall be established using a laser transit, such that specified sample points can be accurately located and reproduced at a later date. Grid nodes will be clearly identified at 20-meter intervals with labeled pin flags, survey stakes, or equivalent markers. Prior to sample collection, all staked locations will be inspected for correct identification.

4.1.3 Equipment/Instrumentation

1) Laser transit/tripod
2) Level rod
3) Tape measure (in meters)
4) Grid markers (e.g., pin flags, survey stakes, or equivalent)
5) Chaining pins

6) Permanent markers
7) Fluorescent paint
8) Mallet or small sledge hammer

4.1.4 Task Elements

1) Locate the existing grid origin southeast of the main facility.

2) Identify grid transit lines.

3) Clearly label grid nodes at 20-meter intervals, using pin flags, survey stakes, or equivalent. Each grid transit intersection shall be clearly identified using a permanent marker. Grid nodes are identified alphanumerically along the east-west trend, and numerically on a north-south trending line.

4.1.5 Quality Assurance Requirements

Quality assurance shall be maintained by implementation of the following tasks and standard operating procedures:

1) Documentation will be in accordance with RMI procedures for documentation of field activities.

2) Inspect staked sample locations to verify correct identification.

3) Implementation of the SRQAPP and the current ASME NQA-1 requirements.

4.1.6 Health and Safety Requirements

Health and safety of site personnel shall be maintained through implementation of the site health and safety plan, and the following requirements:

1) Personal Protective Equipment (PPE) will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Personnel training will be in accordance with entry control procedures, RMI-L-148, *RMI Entry Control Plan*.

3) Personnel shall be trained in accordance with all RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

4.2 Task 2 - Surface/Near Surface Soil Sampling

4.2.1 Objective

The objective of Task 2 is to collect surface soil samples for laboratory analysis.

4.2.2 Scope of Work

Surface/near surface soil samples will be collected from grid locations and packaged for shipment to the analytical laboratory. Field screening of soil samples will be conducted for beta-gamma activity and the presence of volatile organic compounds. Surface/near surface soils will be collected from a maximum of two discrete depths, including 0 - 6 inches, and either 6 - 12 inches, 12 - 18 inches, or 18 - 24 inches, pending results of field screening. The depth of the second sample at each location is dependent on the activity of the first. If all sample activities are at or above 1.5 times background, then the second sample will be from the maximum depth of 18-24 inches. If all sample activities are less than 1.5 times background, then the second sample will be obtained from the 6 - 12 inch or 12 - 18 inch interval based on field screening. Documentation of all activities will be in accordance with established procedures. Tables 4-1 and 4-2 below present the estimated number of samples to be collected from each radiological and RCRA area, as described in Subsection 3.1. Approximately 20 percent of the number of samples analyzed for uranium will be analyzed for Tc-99, and 10 percent for thorium-232. Tables 4-3 and 4-4 identify, container, preservation, and holding time requirements.

4.2.3 Equipment/Instrumentation

The following equipment and monitoring instrumentation is required for activities associated with task 3:

1) Sampling equipment as presented in RMI Document RMI-L-156 for surface soil collection.

2) G-M, scintillation or proportional type detector for field screening beta-gamma activity, with a detection limit of 500 disintegrations per minute (dpm)/100 cm^2, or equivalent.

3) PID for field screening of soil samples for volatile organic compounds.

Table 4-1 - Estimated Number of Radiological Samples and Analytical Methods

Area	Locations	Estimated Number	Parameter	Method
Unaffected (MTI) (Area A)	30	60 (12)* (6)*	Uranium Tc-99 Thorium 232	Gamma spectroscopy Liquid scintillation counting Alpha spectroscopy
Unaffected (RMI) (Area E)	30	60 (12)*	Uranium Tc-99	Gamma spectroscopy Liquid scintillation counting
Affected (Areas B, C, D, and F)	225	450 (90)* (24)* (24)* (45)*	Uranium (80%) Isotopic Uranium (20%) Tc-99 Plutonium ** Neptunium ** Thorium 232	Gamma spectroscopy Alpha spectroscopy Liquid scintillation counting Alpha spectroscopy Alpha spectroscopy Alpha spectroscopy
Localized Areas of Elevated Radioactivity (located in Area A)	10	20 (4)* (2)*	Uranium (80%) Isotopic Uranium (20%) Tc-99 Thorium 232	Gamma spectroscopy Alpha spectroscopy Liquid scintillation counting Alpha spectroscopy
Localized Area of Elevated Radioactivity (located in Area D)	5	10 (2)* (2)*	Uranium Tc-99 Thorium 232	Gamma spectroscopy Liquid scintillation counting Alpha spectroscopy
East 21st Street Ditches (located in Areas A, D, E, F, and G)	10	20 (4)*	Uranium Tc-99	Gamma spectroscopy Liquid scintillation counting
Fields Brook Outfall (located in Area D)	10	20 (4)* (2)*	Uranium Tc-99 Thorium 232	Gamma spectroscopy Liquid scintillation counting Alpha spectroscopy

Note: * Of the total number of samples, the number of samples indicated in parentheses ( ) will be analyzed for the additional parameters listed

** Samples for Plutonium and Neptunium analysis will be collected from sample points within the area north of the Main Plant used for storage of drummed wastes.

Table 4-2 - Estimated Number of RCRA Samples and Laboratory Analytical Methods

Area	Estimated Number	Parameter	US EPA Method
Fenceline	16	RCRA Metals Volatile Organics Semi-volatile Organics	6010/7471 8240 8270
Burn Pad	10	RCRA Metals Volatile Organics Semi-volatile Organics	6010/7471 8240 8270
Fire Road	9	RCRA Metals Volatile Organics Semi-volatile Organics	6010/7471 8240 8270
Main Plant North	67	RCRA Metals Volatile Organics Semi-volatile Organics	6010/7471 8240 8270
RF-6 Butler Building	24	RCRA Metals Volatile Organics Semi-volatile Organics	6010/7471 8240 8270
Area E	15	RCRA Metals Volatile Organics Semi-volatile organics	6010/7471 8240 8270

Table 4-3 - Radiological Parameters, Containers, Preservation, and Holding Times

Parameter	Container	Preservative	Holding time
Uranium Thorium Plutonium Neptunium	Plastic zipper lock bag	Not required	6 months
Tc-99	Plastic zipper lock bag	Not required	6 months

Note: The holding time indicated is the maximum allowed for the analysis.

Table 4-4 - RCRA Containers, Preservation, and Holding Times

Parameter	Container	Preservative	Holding time
Volatile Organic	glass, teflon lid	Cool to 4 C	14 days
Semi-volatile Organic	glass, teflon lid	Cool to 4 C	14 days
RCRA metals	glass jar	Cool to 4 C	6 months

Note: Holding times, preservation and container requirements are obtained from SW-846 3rd edition, 1986. Holding times are the maximum allowed for the analysis.

4) Personal protective equipment (PPE) will be in accordance with RMI-L-163, *OSHA 1910.120, Site Safety and Health Plan*, and applicable RWPs.

4.2.4 Task Elements

1) Calibrate field screening equipment in accordance with manufacturer specification for calibration, or RMI approved equivalent. Equipment calibration checks will be conducted using NIST sources.

2) Determine background radioactivity in accordance with RMI-L-60.010 and recorded on the appropriate data form.

3) Samples will be collected in accordance with RMI Standard Operating Procedure for surface soil collection, as presented in Section 9.3 of RMI-L-156.001, *SOP for Radiological and Hazardous Environmental Sampling and Analysis of RMI Secured SCM Property (Area C)*.

4) Field screen soil samples in accordance with established procedures for beta-gamma activity and volatile organic compounds. Record the field screening data on the appropriate data sheet.

5) Equipment decontamination procedures will be in accordance with procedure RMI-L-138 for decontamination of sampling equipment for radionuclides and RCRA compounds.

6) Samples will be processed in accordance with RMI-L-138.119, *RMI Procedure for the Receipt, Storage, and Shipment of Type 2 Samples*. Samples shipped to vendor laboratories for DQO Level 3 analyses will be packaged for shipment in accordance with RMI-L-138.119 sample shipment procedures. Samples analyzed by RMI will be stored on site in accordance with standardized procedures.

4.2.5 Quality Assurance Requirements

Quality Assurance (QA) shall be maintained by implementation of the following tasks and Standard Operating Procedures:

1) Standard Operating Procedure for documentation of field activities.

2) Collection of field sampling QA/Quality Control (QC) samples, including duplicate samples, trip blanks, equipment blanks, etc. in accordance with RMI Standard Operating Procedure for collection of surface soil samples.

3) Samples will be processed in accordance with RMI-L-138.119, *RMI Procedure for the Receipt, Storage, and Shipment of Type 2 Samples*.

4) Samples will be preserved in accordance with Appendix 2 of RMI-L-138, *Laboratory Procedures Manual*.

5) Samples analyzed at the RMI field laboratory will be stored in accordance with RMI procedure RMI-L-138.119 until analysis is complete. Part II of the Sample Collection and Shipping Checklist will be completed for samples shipped to the vendor laboratory to ensure all of the necessary information is recorded and the samples are properly shipped.

6) Standard Operating Procedures for calibration of field monitoring instruments will be followed per manufacturer instructions or approved RMI equivalent procedure

7) Implementation of all SRQAPP and the current ASME NQA-1 requirements.

8) Nonconformances with the plan will be documented in accordance with nonconformance reporting procedures.

4.2.6 Health and Safety Requirements

Health and Safety of site personnel will be maintained through implementation the plan and as identified by applicable RWPs.

1) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Site personnel will be trained in Entry Control Procedures in accordance with RMI-L-148, *RMI Entry Control Plan*.

3) Site personnel will be trained in accordance with RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

4.3 Task 3 - Underground Utility Evaluation/Location

4.3.1 Objectives

The objective of Task 3 is to identify the surface pathway of underground utilities, including clean-out ports, and surface entries or openings, and to identify the presence and surface locations of any detectable areas of elevated radioactivity for future sampling. The task has been divided into Subtask 3A: location of underground utilities, and Subtask 3B: evaluation of underground utility integrity.

4.3.2 Subtask 3A Locating of Underground Utilities

4.3.2.1 Scope of Work

The subsurface pathways of eight utility lines will be located and clearly identified using survey flags, stakes, or paint. The utility locations will then be surveyed. The depth of the utilities below land surface will also be determined. The Township Engineer (or equivalent) will be contacted to investigate the presence of unknown utilities on site. Utilities to be identified include:

1) Drainage tile and catch basin leading from the southwest area of the RF-3 Butler Building to the wastewater treatment plant, and piping from the building east to the Main Plant

2) The process water line from the RF-6 Butler Building lab acid neutralization pit to the Sparkler filter system and the associated 6-inch line leading from the Sparkler filter system to the 18-inch storm sewer

3) The 18-inch abandoned storm sewer south of the plant

4) The 30-inch combined outfall leading to Fields Brook

5) Piping leading from the sump east of the burn pad

6) The 18-inch sanitary sewer north of and under the Main Plant

7) The argon gas line north of the Main Plant

8) Other utilities as identified by the Township Engineer

4.3.2.2 Equipment/Instrumentation

1) Survey transit equipment (see Subsection 4.1.1.3)

2) PPE will be in accordance with the RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

3) Utility locating equipment capable of detecting vitrified clay and other non-metallic piping to a depth of 15 feet.

4) Density survey geophysical equipment capable of detecting subsurface piping at a depth of 15 feet

4.3.2.3 Task Elements

1) Review underground utility plan drawings.

2) Conduct a site walkover to identify the approximate surface pathway of the underground utilities.

3a) Identify the surface pathway and depth of subsurface utilities using a utility locator.

3b) Locate the surface pathway of large diameter (storm sewers) using a density probe to identify subsurface void spaces.

4) Stake out and survey the surface pathway of underground utilities.

5) Prepare/upgrade existing utility diagram for eventual use in decommissioning activities.

6) Contact local authorities to review historical utility maps to locate any unknown utilities.

4.3.2.4 Quality Assurance Requirements

QA for subtask 3A shall be maintained by implementation of the following requirements and standard operating procedures:

1) Training of personnel in the use of utility locating equipment.

2) The surveyor shall be licensed in the State of Ohio.

3) Implementation of all SRQAPP and the current ANSI ASME NQA-1 requirements.

4.3.2.5 Health and Safety Requirements

Health and safety of site personnel shall be maintained through implementation of the site health and safety plan and the following requirements:

1) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Site personnel will be trained in Entry Control Procedures in accordance with RMI-L-148, *RMI Entry Control Plan*.

3) Personnel shall be trained in accordance with all RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

4.3.3 Subtask 3B - Evaluation of Underground Utilities

4.3.3.1 Scope of Work

Utilities will be evaluated using a video camera with a gamma probe to assess piping integrity and material buildup, and to detect radioactivity of the piping and nearby soils. Instrumentation will consist of gamma probe or equivalent, capable of detecting activity above background levels. Video camera images will be recorded for future reference. The gamma log printout will be calibrated for distance to allow for correlation to the visual display. Locations of increased radioactivity (greater than 1.5 times background level) will be targeted and staked for soil sampling. In the absence of identifiable areas of elevated radioactivity, the location of each third pipe joint will be identified and staked for sampling, for a maximum of 36 boring locations. The following utilities will be evaluated:

1) Drainage tile and catch basin leading from the southwest area of the RF-3 Butler Building to the wastewater treatment plant, and piping from the building east to the Main Plant

2) The process water line from the RF-6 Butler Building lab acid neutralization pit to the Sparkler filter system and the associated 6-inch line leading from the Sparkler filter system to the 18-inch storm sewer

3) The 18-inch abandoned storm sewer south of the plant

4) The 30-inch combined outfall leading to Fields Brook

5) Piping leading from the sump east of the burn area

6) The 18-inch sanitary sewer north of and under the Main Plant

7) The argon gas line north of the Main Plant

4.3.3.2 Equipment/Instrumentation

1) Gamma probe with video camera and associated equipment.

2) Modified Level D personal protective equipment.

4.3.3.3 Task Elements

1) Identify all access ports for the utilities.

2) Run the probe through the utilities.

3) Identify areas of increased radioactivity.

4) Stake out the surface locations where increased radioactivity was detected. A minimum of 20 and a maximum of 36 locations will be staked.

4.3.3.4 Quality Assurance

QA shall be maintained by implementation of the following training requirements and standard operating procedures:

1) Use of adequately trained personnel in the interpretation of gamma log readouts.

2) Standard operating procedure for documentation of field activities.

3) Implementation of the SRQAPP and the current ANSI NQA-1 requirements.

4.3.3.5 Health and Safety Requirements

Health and safety of site personnel shall be maintained through implementation of the site health and safety plan and the following requirements:

1) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Site personnel will be trained in Entry Control Procedures in accordance with RMI-L-148, *RMI Entry Control Plan*.

3) Personnel shall be trained in accordance with all RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

4.4 Task 4 - Subsurface Soil Boring and Sampling

4.4.1 Objectives

Soil borings will be made to collect soil samples for radiochemical analyses from utility pathways to evaluate the presence and concentration of subsurface uranium contamination from leaking or leaching underground utilities. Soil borings will also be made with soil samples collected to determine the presence and concentration of transuranic compounds in subsurface soils. Other boring locations will be determined at a later date, depending upon the outcome of the subsurface utility evaluation and additional information regarding the Fields Brook outfall.

4.4.2 Scope of Work

Soil borings will be advanced to a maximum depth of 30 feet bls. Split spoon samples will be continuously collected for geologic logging. Samples will be field screened for beta-gamma activity using a G-M, scintillation or proportional type detector with a detection limit of 500 dpm/100 cm^2, or equivalent. A maximum of two samples will be collected for laboratory analysis from each boring pending field screening results. Table 4-5 presents the estimated number of samples, approximate depth of sample, and the analyses required. Table 4-6 presents container, preservation, and maximum holding time requirements for the analytes. Figure 3-7 illustrates the boring locations near the former evaporation pond.

Table 4-5 - Estimated Number of Samples, Sample Depth, and Parameter

Area	Estimated Number	Depth	Parameter
Subsurface Utility pathways	36 (8)* 36 (8)*	Utility base Field screen	Uranium Tc-99 Uranium Tc-99
Fields Brook outfall	10 (2)* 10 (2)*	Excavation base Field screen	Uranium Tc-99 Uranium Tc-99
Former evaporation pond	4	Native soil	Uranium Plutonium Neptunium

Note: * Of the total number of samples, the number of samples indicated in parentheses ( ) will be analyzed for the additional parameters listed

Table 4-6 - Radiological Parameters, Containers, Preservation, and Holding Times

Parameter	Container	Preservative	Holding time
Uranium Thorium Plutonium Neptunium	Zipper lock bag	Not required	6 months
Tc-99	Zipper lock bag	Not required	6 months

Note: The holding time is the maximum allowed for the analysis.

4.4.3 Equipment/Instrumentation

1) Split spoon samplers

2) G-M, scintillation or proportional type detector for field screening beta-gamma activity, with a detection limit of 500 dpm/100 cm^2, or equivalent

3) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

4) Hollow stem auger drill rig with 6-inch inner diameter augers

4.4.4 Task Elements

1) Establish a decontamination pad for the drill rig and other heavy equipment.

2a) Decontaminate all down hole equipment in accordance with procedure for decontamination of heavy equipment.

2b) Decontaminate sampling equipment in accordance with established decontamination procedures for radiological analysis.

3) Stake out soil boring locations.

4) Advance soil borings with continuous split spoon sample collection.

5) Collect continuous split spoon samples in accordance with ASTM-D-1586-87.

6) Classify the subsurface soils in accordance with the Unified Soils Classification System, and record the information on a standardized boring log per documentation requirements.

7) Calibrate field screening equipment in accordance with manufacturers specifications for calibration, or approved RMI equivalent. Conduct equipment calibration checks using NIST check sources.

8) Determine background activity in accordance with RMI-L-60.010 and record on the appropriate data form.

9) Field screen soil samples in accordance with established procedures for field screening of soil samples for beta-gamma activity and volatile organic compounds.

10) Record field screening result on the appropriate data sheet.

11) Package and identify the sample for potential analysis.

12) Collect the sample from a depth consistent with the base of the utility line for laboratory analysis.

13) Advance the boring to the shale unit or until field screening indicates activity of the sample is less than 1.5 times background. Depth to the shale unit varies across the site, but is not expected to exceed 30 feet.

14) Package the first sample collected below the base of the utility with a total activity of less than 1.5 times background for analysis or the maximum depth of the boring if all sample activities are greater than 1.5 times background.

4.4.5 Quality Assurance Requirements

QA shall be maintained by implementation of the following tasks and standard operating procedures:

1) Documentation will be in accordance with approved procedures for documentation of field activities.

2) Collection of field sampling QA/QC samples, including duplicate samples, trip blanks, equipment rinsate samples, etc. in accordance with RMI Standard Operating Procedure for collection of surface soil samples.

3) Samples will be processed in accordance with RMI-L-138.119, *RMI Procedure for the Receipt, Storage, and Shipment of Type 2 Samples*.

4) Samples will be preserved in accordance with Appendix 2 of RMI-L-138, *Laboratory Procedures Manual*.

5) Samples analyzed at the RMI field laboratory will be stored in accordance with RMI-L-138.119 until analysis is completed. Part II of the Sample Collection and Shipping Checklist will be completed for samples shipped to the vendor laboratory to ensure all of the necessary information is recorded and the samples are properly shipped.

6) Standard Operating Procedures for calibration of field monitoring instruments will be followed per manufacturer instructions or approved RMI equivalent.

7) Nonconformances with the plan will be documented in accordance with nonconformance reporting procedures, with effects noted.

8) Implementation of all SRQAPP and the current ASME NQA-1 requirements.

4.4.6 Health and Safety Requirements

Health and Safety of site personnel will be maintained through implementation of the site health and safety plan and the following requirements:

1) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Site personnel will be trained in Entry Control Procedures in accordance with RMI-L-148, *RMI Entry Control Plan*.

3) Personnel shall be trained in accordance with all RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

4.5 Task 5 - Laboratory Analysis

4.5.1 Objectives

The objective of Task 5 is to determine the presence and concentration of contaminants in the environmental samples. Initial rounds of samples will be analyzed to US EPA DQO Level 2 data quality standards. Supplemental samples will be analyzed to level requiring US EPA DQO Level 3 analytical support.

4.5.2 Scope of Work

Approximately 900 soil samples will be analyzed in accordance with SW-846 methodology and Oak Ridge National Laboratories (ORNL) guidelines. A listing of analytical methodology, maximum allowable holding times for sample analysis, and method detection limits or practical quantitation limits are presented in Tables 4-7 and 4-8 below. Initial rounds of samples will be analyzed to DQO Level 2 data quality standards. Supplemental sample rounds may be analyzed to DQO Level 3 data quality standards if data validation is required.

Table 4-7 - Radioisotope Methodology, Method Detection Limits, and Holding Time

Estimated Number	Parameter	Method	Detection Limit	Holding Time
100	Isotopic Uranium	Alpha Spectroscopy	Lab method dependent	6 months
650	Total Uranium	Gamma Spectroscopy	Lab method dependent	6 months
50	Isotopic Thorium	Alpha Spectroscopy	Lab method dependent	6 months
150	Tc-99	Liquid Scintillation Counting	Lab method dependent	6 months
50	Plutonium	Alpha Spectroscopy	Lab method dependent	6 months
50	Neptunium	Alpha Spectroscopy	Lab method dependent	6 months

Note: The holding time is the maximum allowed for the analysis.

Table 4-8 - RCRA Methodology, Practical Quantitation Limit, and Holding Time

Estimated Number	Parameter	US EPA Method	Practical Quantitation Limit	Holding Time
150	Volatile Organic	8240	per SW-846	14 days
150	Semi-volatile	8270	per SW-846	14 days
150	RCRA metals	6010/7471	per SW-846	6 months

Note: Practical quantitation limits are obtained from SW-846 3rd edition, 1986. The holding time is the maximum allowed for the analysis.

4.5.3 Task Elements

1) Chain of Custody: Chain of custody will be maintained and documented for all samples.

2) Sample Analysis: Samples will be analyzed in accordance with SW-846 methodology or approved radiochemical analytical methods.

3) Data Reduction: Data will be reduced by computer using direct interfaces, where possible. The computer generated data will be reviewed by an experienced analyst for validity and correct identification with the given sample.

   If the laboratory instrumentation does not interface with a computer, the analyst reduces the data into a reportable format. Hand held calculators or computer programs are used to produce the data results. Data are recorded by the analyst in a dedicated bench book.

4) Reporting: US EPA DQO Level 2 and Level 3 data packages will be produced by the laboratory. All results will be certified by the laboratory. The final data package submitted by the laboratory must include a summary of the analytical results for each sample, as well as applicable reports and documentation generated as required by the analytical methods (e.g., chromatogram, extraction notes, and Chain-of-Custody forms). All reports and documentation, including mass spectra, calibration records, QC results, etc., will be clearly labeled with the laboratory sample number and, if applicable, associated field sample identification number.

   Analytical data will be reported on an "as-received" basis. Analytical results will be given in standard units, as specified by the analytical method. If reporting units are not specified in the method, data from chemical analysis will be reported in milligrams per kilogram for solid matrices. In addition to the analytical results and QC data, details regarding any corrective actions taken and a discussion of any necessary modifications to established protocols will be included in the final report.

4.5.4 Quality Assurance Requirements

4.5.4.1 Method Calibration

Calibration procedures differ by analytical method, but fall into broad categories. The following sections describe the general methods that will be performed for the project.

Metals by Graphite Furnace and Flame

A calibration curve of at least three standards is run daily, prior to analysis of samples. The calibration curve must have a correlation coefficient of 0.995 or greater. Afterwards, a single standard is run every ten samples. The apparent concentration of this standard must lie within 10 percent of the true concentration. Standards are checked quarterly against a US EPA or NIST check solution.

Metals by Inductively Coupled Plasma (ICP)

A calibration curve of the two standards is run daily, prior to analysis of samples. Afterwards, calibration verification is run every ten samples. The apparent concentration of this standard must lie within 10 percent of the true concentration. Standards are prepared by diluting mixed element concentrates, which are themselves prepared from commercial solutions. The concentrations of the commercial standards are checked quarterly against a US EPA or NIST check solution.

Volatile and Semi-Volatile Organic Analysis by Gas Chromatograph/Mass Spectrometer

A calibration curve of at least five standards is run daily, prior to analysis of samples. The instrument will be tuned prior to the initiation of analysis to meet the required criteria of the method.

Radioisotope Analysis

Instrument stability will be checked weekly using reference radioactive sources. The calibration procedures will be method specific and in conjunction with the laboratory's standard operating procedures and the manufacturer's guidelines.

4.5.4.2 Quality Control

Laboratory QC includes several procedures to assess laboratory accuracy and precision. Analytical instrument performance is determined by routinely conducting the following checks:

1) Calibration verification
2) Instrument sensitivity
3) Daily performance checks

The types of laboratory quality control samples to be used are as follows:

Method Blanks

Method blanks consist of organic-free, deionized water that is carried through the analytical scheme like a sample. They serve to measure contamination associated with laboratory storage, preparation, or instrumentation. For most analyses, a method blank is analyzed on a daily basis, and at a frequency of 1 per 20 samples if more than 20 samples are run in a given batch. If the analyte of interest is above the reporting detection limit, corrective action should be taken except for common solvents such as methylene chloride, acetone, toluene, 2 butane, and phthalates. The method blank must contain less than or equal to five times the reporting detection limit for corrective action.

Calibration Blanks

Calibration blanks are prepared with standards to create a calibration curve. They differ from the other standards only by the absence of analytes and provide the "zero point" for the curve.

Internal Standards

Internal standards are measured amounts of a certain compound added after preparation or extraction of a sample. They are used in an internal standard calibration method to correct sample results suffering from capillary column injection losses, purging losses, or viscosity effects. Internal standard calibration is currently used for GC/MS extractables, chlorinated pesticides, and metals by ICP.

Matrix Spikes

Spikes are aliquots of samples to which known amounts of analyte have been added. They are subjected to the sample preparation or extraction procedure and analyzed as samples. The stock solutions used for spiking are purchased or prepared independently of calibration standards. The spike recovery measures the effects of interferences in the sample matrix, and reflects the accuracy of the determination. MS will be used for metals analyses.

Spikes are prepared and analyzed on a daily basis and at a frequency of at least one per 20 samples if more than 20 samples are run in a given batch.

Spike recoveries are stored in the laboratory database and are retrievable for statistical analysis. Laboratory control limits are calculated for individual matrix types when 20 data points become available.

Duplicates, Duplicate Spikes, and Matrix Spike Duplicates (MSD)

Duplicates are additional aliquots of samples subjected to the same preparation and analytical scheme as the original sample. In cases where the analyte concentration is consistently below the detection limit, duplicate spikes are substituted for duplicates. MSD are duplicate spikes associated with organic analysis. The Relative Percent Difference (RPD) between duplicates, duplicate spikes, or MSD measures the precision of a given analysis.

Duplicates (or duplicate spikes) are prepared and analyzed on a daily basis and at a frequency of at least one per every 20 samples. RPDs are stored in the laboratory database and are retrievable for statistical analysis.

Laboratory Control Standards (LCSs)

LCSs are aliquots of organic-free or deionized water to which known amounts of analyte have been added. They are subjected to the sample preparation or extraction procedure and analyzed as samples. The stock solutions used for LCSs are purchased or prepared independently of calibration standards. The LCS recovery tests the function of analytical methods and equipment.

Surrogate Spikes

The surrogate spike is used to monitor the efficiency of the sample preparation and analysis. Calculated percent recovery is used as a measure of the accuracy of the analytical method. A surrogate is an organic compound that is chemically similar to a contaminant of interest but is not normally found in the waste. Samples are spiked with the compound prior to analysis. The percent recovery is calculated for each surrogate.

4.6 Task 6 - Data Validation

4.6.1 Objectives

The objective of task 6 is to evaluate the validity of laboratory data. To achieve this objective, a data validation plan is currently under development.

4.6.2 Scope of Work

Task 6 will be conducted in accordance with all applicable requirements of the data validation plan. The data will be assessed for confidence, representativeness, accuracy, precision, completeness, and comparability.

4.7 Task 7 - Data Evaluation and Response

4.7.1 Objectives

The objective of task 7 is to evaluate if the validated data provides an adequate level of information required to support decommissioning activities, including, but not limited to, comparison of detected analyte concentrations to background concentrations, waste volume estimates, and WAC, if applicable. The secondary objective of task 7 is to identify additional data needs to achieve the stated objectives, and to supplement existing tasks to provide that data.

4.7.2 Scope of Work

Gamma logs generated during the utility evaluation will be reviewed to identify potential subsurface sampling locations. Characterization data will be assembled and reviewed. The adequacy of the data to meet the objectives of the characterization program will be determined, on an ongoing basis, as the data are made available. Additional data needs to meet characterization objectives will be identified. Supplemental tasks will be developed to obtain the required information. If supported by the validated characterization data, the sampling requirements may be amended to increase or decrease the number of samples and/or analytes.

4.7.3 Task Elements

1) Data Evaluation: A substantial amount of environmental data will be generated during the site characterization. The type and use of the new data from the investigative tasks is discussed below.

Surface Soil Analyses

Surface soils will be extensively sampled for radiochemical and RCRA parameters. The purpose of the sample analyses is to support planning of decommissioning activities. The data will be evaluated to ensure that a sufficient level of detail is obtained to support remedial design alternatives.

Samples will also be collected to evaluate worker health and safety protective measures employed during decommissioning activities.

Underground Utility Scan

Underground utilities will be scanned using a gamma probe to evaluate the presence of subsurface radiation levels. The gamma readout will be reviewed, in conjunction with a video recording, to identify potential areas of radioactivity in soils associated with the utilities. Potential soil boring locations will be identified from the utility scan.

Subsurface Soil Analyses

Subsurface soils will be collected to aid in the development of remedial design alternatives for subsurface utilities across the site. Analytical results will be reviewed to ensure a sufficient level of detail is obtained to support remedial design alternatives.

Subsurface soils will be collected from the vicinity of the former evaporation pond to evaluate worker health and safety protective measures employed during decommissioning activities. The analytical results will also be reviewed to assess any potential impacts to disposal options of wastes generated during decommissioning activities.

2) Response: Upon review of validated data, additional information needed to supplement the decommissioning plan, ensure worker safety, or satisfy characterization DQOs will be identified. The list of analytes will be reviewed and amended if warranted.

Supplemental tasks to obtain the additional data will be produced and implemented. All amendments to the original soils characterization work plan will be documented and approved prior to implementation. The supplemental data will be reviewed prior to incorporation into a comprehensive site characterization report.

4.8 Task 8 - Area G Walkover Radiation Survey

4.8.1 Objective

The objective of Task 8 is to perform a walkover radiation survey of Area G to guide further soil characterization efforts for this area.

4.8.2 Scope of Work

The walkover radiation survey will be performed to provide the necessary data required to perform the radiological soil sampling and analysis to support the Site Characterization Plan. The survey will be performed in accordance with Procedure RMI-L-149.2, *Scoping Procedure for Surface Soils*

Characterization, over the 10-meter by 10-meter site grid which extends over Area G. To perform the survey, a technician will stand at a grid location and slowly sweep a Geiger-Mueller (G-M) detector as close as possible to the soil surface, but not greater than 5 cm above the surface. The maximum obtainable reading (counts per minute [cpm], uncorrected for background) from the detector at the corresponding grid intersection point will be recorded on a field data sheet. The technician will then walk a straight line toward the next grid intersection point while sweeping the detector perpendicular to the direction of travel. The maximum reading detected between the data points will be recorded on the field data sheet. This process will be repeated at each grid intersection and along each grid line (north-south and east-west).

4.8.3 Equipment/Instrumentation

1) Table 1 of RMI-L-149

2) Non-erasable black ink pan

3) Instrument equipped with a G-M detector

4) Laser transit to establish the grid

5) Markers to be placed at each grid intersection (see Subsection 4.1)

6) Detector harness

7) Clipboard

8) Personal protective health and safety equipment as required in RMI-L-163, OSHA 1910.120, and *Site Safety and Health Plan*, and applicable RWPs.

4.8.4 Task Elements

1) Calibrate transit and G-M detector in accordance with manufacturer's specification for calibration or RMI-approved equivalent. Equipment calibration checks will be conducted using NIST sources.

2) Inspect each grid point intersection marker for correct coordinate identification.

3) Execute an Instrument Performance Evaluation on instruments per RMI-L-60.101, Attachment III.

4) Determine background radioactivity in accordance with RMI-L-60.010.

5) Take beta-gamma radiation readings with a G-M detector.

4.8.5 Quality Assurance Requirements

Quality assurance shall be maintained by implementation of the following tasks and standard operating procedures:

1) Documentation will be in accordance with RMI procedures for documentation of field activities.

2) The radiation walkover survey will meet the requirements of RMI-L-149, *Quality Assurance Project Plan for the Surface Soil Characterization Project Walkover Survey*.

3) Grid locations will be inspected to verify correct information.

4) The SRQAPP and the current ASME NQA-1 requirements will be implemented.

5) Standard operating procedures for calibration of field instruments will be followed per the manufacturer's instructions or RMI-approved equivalent procedures.

6) Nonconformances with the plan will be documented in accordance with nonconformance reporting procedures.

4.8.6 Health and Safety Requirements

Health and safety of site personnel will be maintained through implementation of the site health and safety plan and the following requirements:

1) PPE will be in accordance with RMI-L-163, OSHA 1910.120, *Site Safety and Health Plan*, and applicable RWPs.

2) Site personnel will be trained in Entry Control Procedures in accordance with RMI-L-148, *RMI Entry Control Plan*.

3) Personnel shall be trained in accordance with all RMI training requirements for radiological workers, including the *RMI Extrusion Plant Health Physics Manual, Volume I* and RMI-L-150, *RMI Extrusion Plant Training Program Plan*.

SECTION 5

CORRECTIVE ACTION PROCEDURES

5.1 Response and Documentation

Finding and correcting sampling and analytical problems are the responsibility of all project personnel. Corrective actions must be documented in the laboratory or in the field. It is important to document these occurrences and to take immediate corrective action in accordance with approved procedures. Appropriate management personnel will be notified of these occurrences. All personnel will be made aware of the need to report problems and to correct problems promptly.

5.1.1 Field Procedures

The initial responsibility for monitoring the quality of field requirements lies with the professionals in the field. The personnel responsible for verifying that all QA procedures are followed assess the appropriateness of the field methods and the ability to meet QA objectives, and make an assessment of the impact a procedure has upon the field objectives and subsequent data quality. Daily activities are reported up the management chain. If a problem occurs that might jeopardize the integrity of the project, cause a QA objective to not be met, or impact data quality, the appropriate individual will immediately notify management personnel in accordance with RMI procedures. Corrective action measures will then be decided upon and implemented. If the situation warrants, notification of higher management levels will be made. Appropriate personnel will document the situation, the affected field objective, the corrective action taken, and the results of that action. Copies of the documentation will be provided to the appropriate field, laboratory, management and QA personnel.

5.1.2 Laboratory Procedures

The need for corrective action comes from several sources including: equipment malfunction, failure of internal QC checks, method blank contamination, failure of performance of system audits, and noncompliance with QA requirements.

Laboratory corrective action may take several forms, but the following steps are almost always included:

1) Check the calculations
2) Check the instrument for proper setup
3) Re-analyze the control [illegible]

If these steps fail to eliminate the problem, additional actions are implemented. The LCS and spike recoveries may be compared to reveal matrix interferences. Recalibration of the instrument may be necessary. In certain cases an entire batch will be re-analyzed. If a problem cannot be corrected by the previously prescribed measures, the analyst will involve the appropriate personnel responsible for laboratory, project, and Quality Assurance management functions. A record of all corrective action is maintained in the project file and signed and dated by the analyst.

Contract laboratories will implement corrective actions in accordance with established corrective action procedures. If the contract laboratory cannot correct the problem, the appropriate managers and Quality assurance personnel will be notified immediately. Contract laboratories will be audited in accordance with ASME NQA-1.

5.2 Procedures for Work Plan Modifications

Any deviation from the project requirements as specified in this document requires proper documentation. This documentation will be completed in the field and forwarded to the project management and regulatory compliance personnel. Appropriate management personnel will communicate the deviation from project requirements and send a Field Change Request Form in accordance with RMI procedures. Upon receipt, the form will be reviewed and final disposition of the request will be determined and the original document will be returned to the originator. A copy of the document should be retained for the project file. Changes that require an immediate response will be initiated by telephone and then documented using the procedure described above.

SECTION 6

REPORTING

Status reports will be issued periodically. Status reports will include progress to date, remaining tasks to be completed, and any changes to the work plan.

Interim task reports will be prepared as Phase 1 preliminary characterization tasks are completed. The interim task reports will include analytical data summaries, preliminary data evaluations, and identification of additional data needs.

A site soils characterization report will be prepared following completion of all Phase 1 preliminary characterization tasks and interim reports. The report will incorporate the guidance presented in the *Draft Branch Technical Position on Site Characterization for Decommissioning Sites*.

All reporting will be consistent with the *Site Restoration Quality Assurance Program Plan*, RMI-L-125.

SECTION 7

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Buildings Characterization Work Plan
Phase 1: Preliminary Investigation

Volume 1 of 3: Groundwater Characterization Work Plan
Volume 2 of 3 : Soils Characterization Work Plan
Volume 3 of 3: Buildings Characterization Work Plan

October 1993
Revision 0

RMI Project
Ashtabula, Ohio
DOE Contract No. DE-AC05-930R-22103

RMI TITANIUM
COMPANY EXTRUSION PLANT

RMI Titanium Company
Extrusion Plant
P.O. Box 579
Ashtabula, Ohio 44004

Buildings Characterization Work Plan
Phase 1: Preliminary Investigation

CONTENTS

SECTION

CONTENTS (Continued)

CONTENTS (Continued)

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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
CFR	Code of Federal Regulations
cpm	counts per minute
DOE	United States Department of Energy
dpm	disintegrations per minute
DQO	Data Quality Objective
ES&H	Environmental Safety and Health
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrophotometer
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Standards
MS	Matrix Spike
MSD	Matrix Spike Duplicates
NRC	Nuclear Regulatory Commission
NUREG/CR	NRC Contractor Technical Report Designation
OEPA	Ohio Environmental Protection Agency
PCB	Polychlorinated Biphenyl
Pu	Plutonium
pCi/g	picoCurie/gram
ppb	parts per billion
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RMI	RMI Titanium Company Extrusion Plant
RPD	Relative Percent Difference
RWP	Radiation Work Permit
SRQAPP	Site Restoration Quality Project Plan
Tc	Technetium
Th	Thorium
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TRU	Transuranic
U	Uranium
US EPA	United States Environmental Protection Agency
WAC	Waste Acceptance Criteria

SECTION 1

INTRODUCTION

The RMI Building Characterization Work Plan describes the objectives, technical approach, and requirements for the characterization of the buildings at the RMI Titanium Company Extrusion Plant (RMI) for radiological and Resource Conservation and Recovery Act (RCRA) hazardous contaminants.

1.1 Purpose and Scope

This characterization plan is the guidance document for the radiological and RCRA hazardous characterization of the buildings at RMI. Within the plan, the RMI buildings are defined as all structures, associated major equipment, process piping, ductwork and soil underneath the buildings. This plan is designed to meet the NUREG/CR-5849 (draft), *Manual for Conducting Radiological Surveys in Support of License Termination*, definition of a characterization survey. Identification of potential RCRA hazardous wastes is in accordance with 40 *Code of Federal Regulations* (CFR) Part 260 - 261. This plan provides a structured approach to collect statistically valid characterization data to supplement existing data in support of future remedial design. This plan is not a substitute for the final termination survey required by the United States Nuclear Regulatory Commission (NRC) for termination of RMI's NRC license. In addition, the data collected by this plan will not be used to certify wastes for disposal or identify materials for unrestricted release.

All structures, equipment and piping are assumed to be radiologically "affected" areas, i.e. contaminated above unrestricted release limits. Previous radioactive contamination surveys and process history indicate uranium (U) is the primary radiological contaminant of interest. However, because experimental quantities of thorium-232 (Th-232) were processed at the site and technetium-99 (Tc-99) has been reported in soil and groundwater, a percentage of total samples will be analyzed to determine if these contaminants are present. In addition, because trace quantities of transuranic (TRU) material (plutonium and neptunium) has been detected in some process residues, a percentage of samples will be analyzed for isotopic plutonium (Pu) to confirm significant quantities of TRU material are not present.

The plan is divided into separate tasks which can be individually scheduled and implemented depending upon the priority for obtaining the data. Since certain tasks are prerequisites for others, a recommended implementation plan is provided to show sequential and parallel tasks. Completion of all tasks is necessary to meet the objectives of the characterization plan.

1.2 Objectives

The characterization activities for the buildings at RMI will generate data which may be used to support the disposal of decommissioning wastes and to confirm that levels of Th-232, Tc-99 and TRU contamination are not significant. The specific objectives of this plan are listed below.

1) Establish baseline radiological characterization data for estimating total U, isotopic U, Th-232, and Tc-99 concentrations in potential decommissioning wastes and for evaluating the ability of these wastes to meet disposal site acceptance criteria.

2) Provide additional data to verify the levels of Th-232, Tc-99 and TRU contamination are not significant contributors to worker exposures and special precautions or monitoring of these contaminants during decommissioning are not required.

3) Provide a structured approach for identifying materials which may become a RCRA hazardous waste during building decommissioning.

4) Provide data to further define the scope of remediation activities that includes determining if the soil and utilities underneath the buildings are contaminated and the depth of penetration of contamination on selected concrete surfaces.

5) Provide data to support engineering evaluations of decontamination techniques to allow unrestricted release of equipment and building materials.

6) Provide data to support the development of dose assessments and the establishment of cleanup levels.

1.3 Buildings Description

The RMI Extrusion Plant consists of 25 buildings (Figure 1-1). All facility buildings are surrounded by a perimeter security fence. Of the 25 buildings, RMI owns 12 and the DOE owns 13. Each building, its floor dimension, and associated floor area are listed in Appendix A, Table A-1. Figure 1-2 shows the layout and major equipment contained in the buildings at the site.

1.4 RMI Decommissioning Project Organization

The RMI Project Decommissioning Project Organization will direct the site characterization. The interfaces between RMI as the Project Management Company and the responsible individuals within RMI are presented in this subsection.

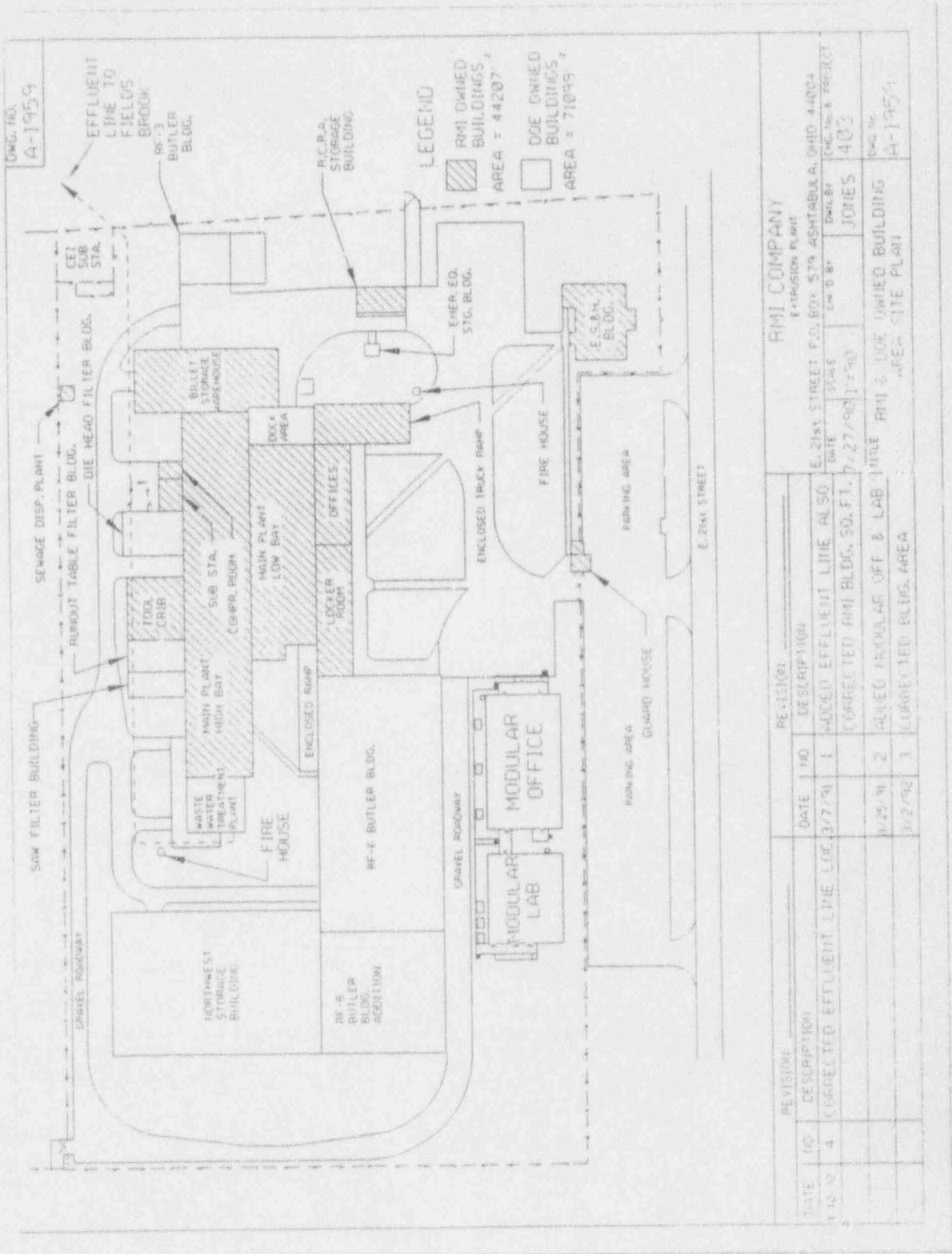


Figure 1-1 - RMI Site Buildings Layout

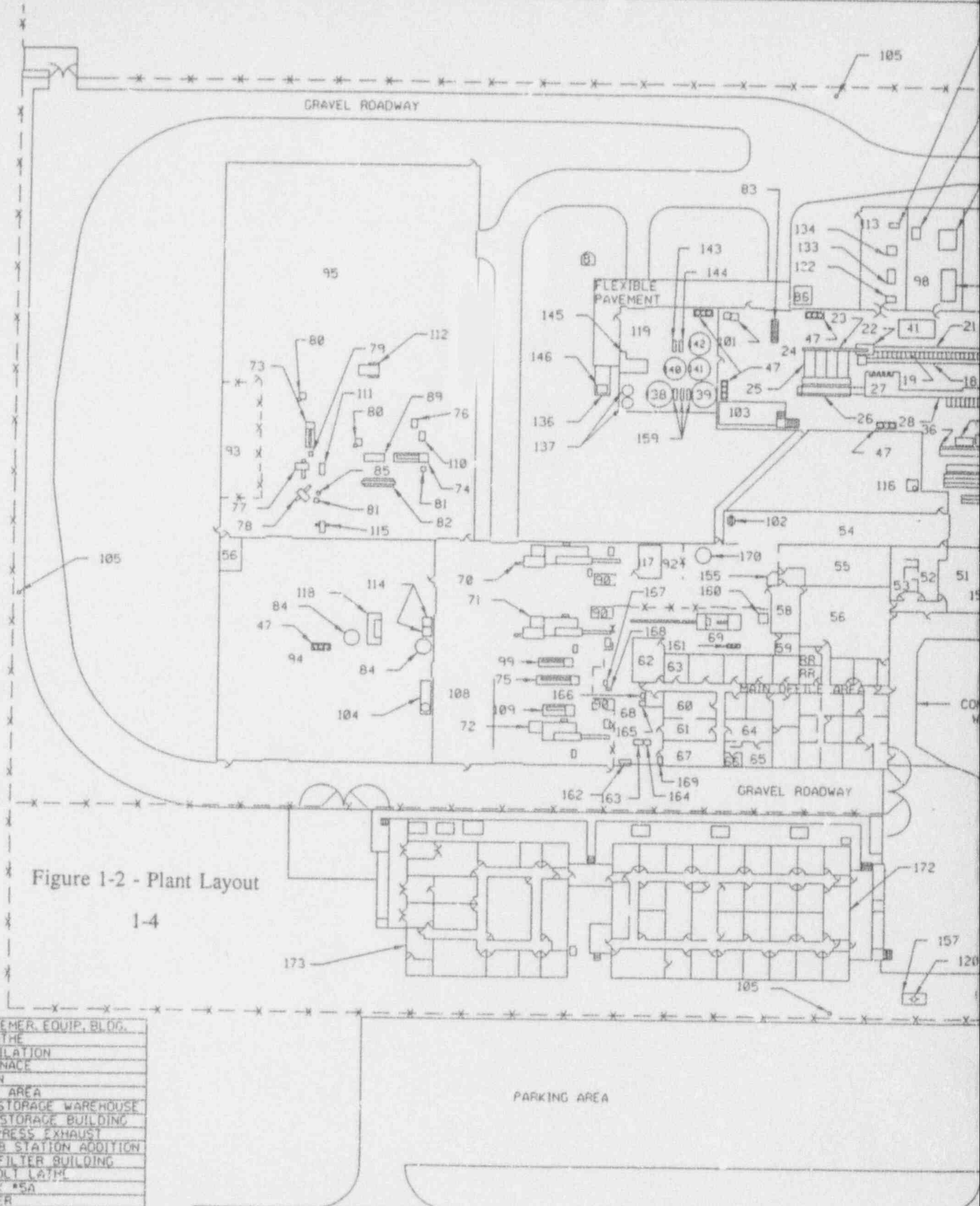


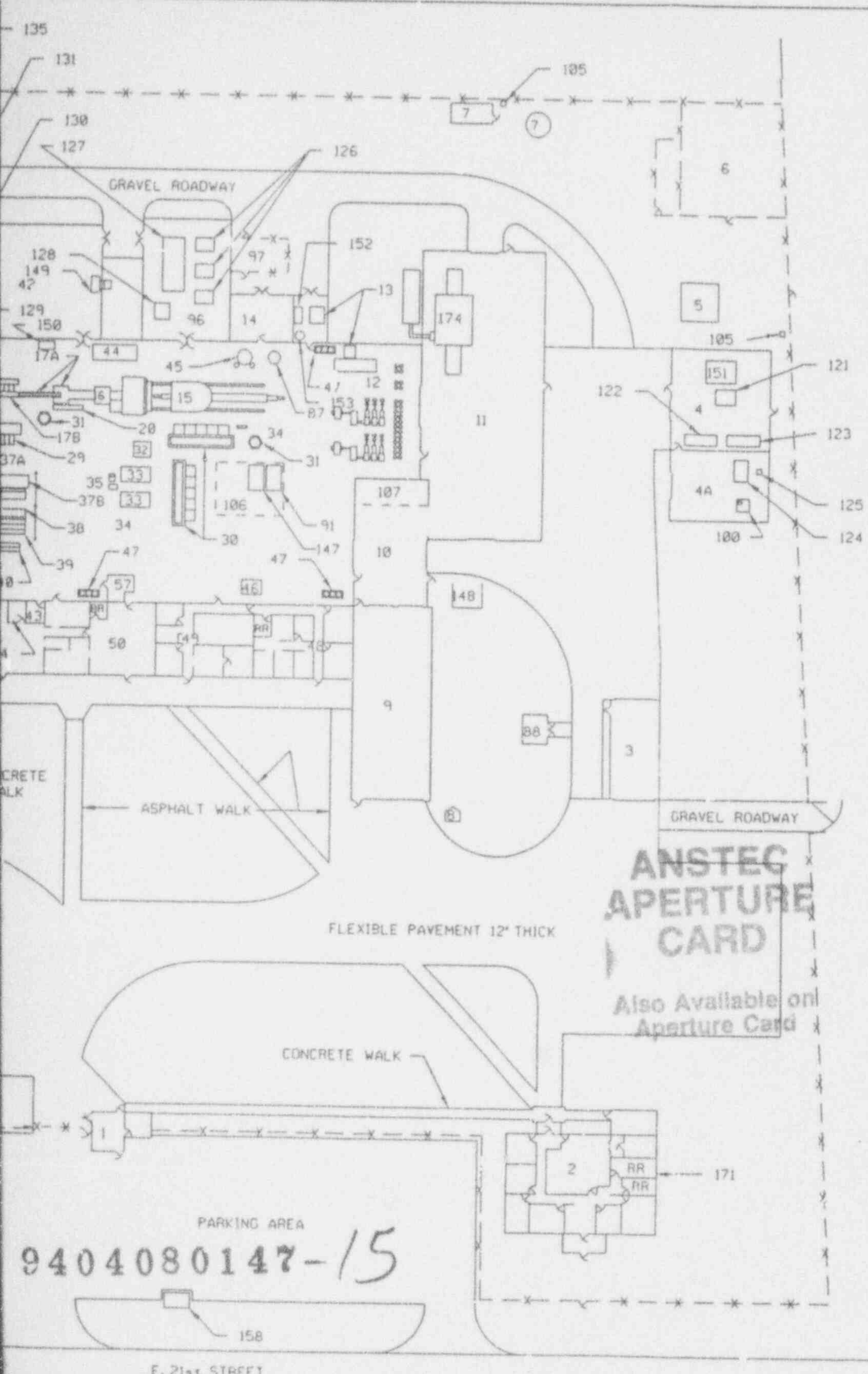
Figure 1-2 - Plant Layout

88	HAZ. WASTE EMER. EQUIP. BLDG.
89	TOOLMEX LATHE
90	LATHE VENTILATION
91	COOLEY FURNACE
92	SUB STATION
93	STORE ROOM AREA
94	RF-6 COLD STORAGE WAREHOUSE
95	NORTHWEST STORAGE BUILDING
96	STACK *1A PRESS EXHAUST
97	OUTDOOR SUB STATION ADDITION
98	STACK *3A FILTER BUILDING
99	NORTH GISHOLT LATHE
100	FAN - STACK *5A
101	SAND BLASTER
102	EMERGENCY GENERATOR
103	MEZZANINE
104	FORGE AREA, STACK *6
105	OUTSIDE AIR SAMPLER
106	STORAGE AREA
107	EXTRUSION STORAGE AREA
108	AUXILIARY STORAGE AREA
[illegible]	SOUTH GISHOLT LATHE
[illegible]	K.R. WILSON HYDRAULIC PRESS
[illegible]	CHICAGO SHEAR
112	LIFT TRUCK HOIST
113	STACK *4A FILTER BUILDING
114	CAUSTIC TANKS
115	STARTRITE BAND SAW
116	MAIN PLANT ACID, STACK *7
117	HEALTH-SAFETY TECH'S OFFICE
118	PLATE & FRAME FILTER PRESS

119	WASTE WATER TREATMENT BLDG.
120	FIRE HYDRANT
121	CHIP CHOPPER
122	THERMAL OXIDATION TANK *1
123	THERMAL OXIDATION TANK *2
124	BAG HOUSE
125	HEPA FILTER HOUSING
126	95% & HEPA FILTER HOUSING
127	CARTRIDGE FILTER HOUSING
128	FAN - STACK *1A
129	CARTRIDGE FILTER HOUSING
130	95% & HEPA FILTER HOUSING
131	FAN - STACK *3A

132	MOISTURE SEPARATOR
133	CARTRIDGE FILTER HOUSING
134	95% & HEPA FILTER HOUSING
135	FAN - STACK *4A
136	CLEAR WELL
137	PRESSURE FILTERS
138	DETENTION TANK *2
139	DETENTION TANK *1
140	PROCESS TANK *1
141	PROCESS TANK *2
142	PROCESS TANK *3
143	SLUDGE PUMP *2
144	SLUDGE PUMP *1

145	PRESS FILTER
146	BACKWASH PUMPS
147	HMC FURNACE
148	LUMBER RACK
149	TOOL COATING VENT & STACK
150	TOOL GRINDING BOOTH
151	HOLDING TANK
152	D.C. EXCITERS
153	RECEIVER
154	WATER HEATER ROOM
155	PROJECT STORAGE CAGE
156	MAINTENANCE TOOL STORAGE
157	INCOMING H20 & H20 METER R



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LEGEND — DWG. NO. DD-1095

No.	DESCRIPTION
1	GUARD HOUSE-CONTRACTOR EMER. ASS'Y AREA
2	EMERGENCY ASSEMBLY AREA
3	HAZARDOUS WASTE STORAGE BUILDING
4	RF-3 BUILDING
4A	RF-3 BUILDING ADDITION
5	EQUIPMENT CLEANING AREA
6	ELECTRICAL SUB STATION
7	SEWAGE DISPOSAL
8	FIRE HOUSE
9	TRUCK RAMP ENCLOSURE
10	SHIPPING & RECIEVING DOCK
11	NORTHEAST BILLET STORAGE WAREHOUSE
12	ACCUMULATOR STATION
13	AIR COMPRESSOR
14	SUB STATION
15	3850 TON LOWEY HORIZ. EXTRUSION PRESS
16	DIE HEAD
17A	RUNOUT TABLE (MOVABLE SECTION)
17B	POWERED RUNOUT TABLE
18	HORIZONTAL EXTRUSION QUENCH TANK
19	EXTRUSION COOLING & TRANSFER TABLE
20	ROTATING NPR EXTRUSION COOLING TABLE
21	EXTRUSION TRANSFER CONVEYOR TO CAMPBELL SAW
22	ABRASIVE CAMPBELL SAW
23	EXTRUSION TRANSFER CONVEYOR FROM CAMPBELL SAW
24	INSPECTION AFTER SAWING
25	TRANSFER TABLE TO ROLL STRAIGHTNER
26	ROLL STRAIGHTNER ENTRANCE CONVEYOR
27	ROLL STRAIGHTNER
28	ROLL STRAIGHTNER EXIT CONVEYOR
29	IN PROCESS TRANSFER & STORAGE TABLE
30	SALT BATH
31	VERTICAL EXTRUSION QUENCH TANK
32	SUNBEAM FURNACE
33	IFSI FURNACE
34	SALT BATH LOADING AREA
35	RECEIPT INSPECTION AREA
36	MK-31 RINSE TANK
37A	COMMERCIAL PICKLE TANK
37B	COMMERCIAL RINSE TANK
38	EXTRUSION WASH TANK
39	EXTRUSION PICKLE TANK
40	INSPECTION WEIGHING & PACKING TABLE
41	CONTAINER PREHEAT FURNACE
42	TOOL CRIB
43	GUAGE ROOM
44	TOOL PREHEAT FURNACE
45	PREFILL TANK
46	FLOOR SCALE
47	AREA HEATING FURNACE
48	ENGINEERING OFFICE AREA
49	FOREMANS OFFICE AREA
50	MENS HOURLY CLEAN LOCKER ROOM
51	PORTAL ROOM
52	WOMENS DIRTY LOCKER ROOM
53	WOMENS CLEAN LOCKER ROOM
54	ENCLOSED RAMPWAY
55	STORE ROOM
56	LUNCH ROOM
57	ELECTRICAL SHOP
58	SALARY CHANGE ROOM
59	LAB TOOL ROOM
60	WET CHEMICAL ROOM
61	METALOGRAPHICAL ROOM
62	CONFERENCE ROOM
63	COMPUTER ROOM
64	CHEMIST/TECHNICIANS OFFICE
65	PRINT ROOM
66	DARK ROOM
67	ANALYTICAL ROOM
68	DEVELOPEMENT LAB & QUALITY CONTROL AREA
69	350 TON LOMBARD HORIZ. EXTRUSION PRESS AND VENTILATION
70	#1 GIDDINGS & LEWIS CNC LATHE
71	#2 GIDDINGS & LEWIS CNC LATHE
72	#3 GIDDINGS & LEWIS CNC LATHE
73	SMALL MONARCH LATHE
74	LODGE & SHIPLEY LATHE
75	LARGE MONARCH LATHE
76	ROCKWELL DRILL PRESS
77	RACINE SAW
78	CINCINNATI MILL MACHINE
79	STANLEY GRINDER
80	DO ALL SAW
81	U.S. ELECTRICAL TOOL CO. GRINDER
82	CINCINNATI GILBERT DRILLING MACHINE
83	STAIRWAY DOWN TO BOILER ROOM SEE DWG. B-1590
84	ACID NEUTRALIZATION TANK
85	ENGLEBERG BELT SANDER
86	EVAPORATOR
87	MANDREL QUENCH TANK

158	INCOMING NATURAL GAS & GAS METER
159	FILL PUMPS
160	ABRASIVE SAW
161	SALT POTS
162	SHELDON LATHE
163	FISHER SCIENTIFIC ISOTEMP LAB REFRIDGERATOR
164	ROSS TEMP ICE MAKER
165	COOLEY FURNACE
166	NEYTECH FURNACE
167	WALKER-TURNER DRILL PRESS
168	DELTA BAND SAW
169	PNEUMOTIVE AIR COMPRESSOR
170	RF-6 SUMP

171	ENVIRONMENTAL, SAFETY & HEALTH BUILDING
172	MODULAR OFFICE BUILDING
173	MODULAR LAB BUILDING
174	EMPIRE SAND BLASTER

REVISION

DATE	NO	DESCRIPTION
5/2/90	6	REVISED TO CURRENT LAYOUT & INSTALLED IN CAD
8/17/90	7	GENERAL REVISIONS
1/27/91	8	ADDED MODULAR OFFC & LAB
1/16/92	9	ADDED #174 SAND BLASTER
9/21/93	10	CHANGED DESCRIPTIONS 50 AND 51

- DIA'S TO BE CONCENTRIC WITHIN — T.I.R.
- FACES TO BE SQUARE WITH ℄ WITHIN —
- STAMP PART & SERIAL NUMBER.
- DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED
- TOLERANCES UNLESS OTHERWISE SPECIFIED WHOLE NUMBERS & FRACTIONS ± 1/64, TWO PLACE DECIMALS ± .010, THREE PLACE DECIMALS ± .005, ANGLES ± 15 MIN.

RMI COMPANY
EXTRUSION PLANT
E. 21st STREET P.O. BOX 579 ASHTABULA, OHIO 44004

MATERIAL | HARDNESS | DATE 1/25/83 | SCALE 1"=30'-0"
DESIGNED TO FIT | DRN BY JONES | CHK'D
DWG. NO. & PROJECT H03
TITLE PLANT LAYOUT
DWG. NO. DD-1095

1.4.1 Characterization Project Management

RMI will serve to coordinate the project management and maintain liaison with the NRC, DOE, US EPA, state EPAs, and any local agencies as needed. Materials and services required for the characterization investigations will be acquired through an appropriate bid process as required by DOE Project Management Orders. Various subcontractors may be employed for tasks in the site characterization effort. Tasks currently identified which RMI may use subcontractors for are survey, drilling, and geological oversight of groundwater monitoring wells and subsurface soil sampling near utilities. Laboratory services, as needed, will be subcontracted for chemical and radiological analysis services as identified by RMI.

1.4.2 Individual Responsibilities

The SCP will be implemented by qualified RMI personnel. The RMI organizational structure and functions are presented in Figure 1-3. For clarity, not all positions are shown on the organization chart.

Key personnel in the characterization effort are listed below:

1) The **Program Manager** will be responsible for oversight in the implementation of the Site Characterization and Decommissioning Plan and the associated separate Work Plans.

2) The **Deputy Program Manager** will be responsible for the overall project management. The Deputy Program Manager will administratively report to the Program Manager.

3) The **Director of Decommissioning and Decontamination** will be responsible for the management of the technical support services, characterization, and decommissioning efforts. The Director of Decommissioning and Decontamination administratively and technically reports to the Deputy Program Manager.

4) The **Manager of Decommissioning and Decontamination Operations** will be responsible for the management of the characterization, decommissioning, and support services. The Manager of Decommissioning and Decontamination Operations administratively reports to the Deputy Program Manager and technically reports to the Director Decommissioning and Decontamination.

5) The **Manager of Field Engineering** will be responsible for the management of the site characterization and decommissioning implementation. The Manager of Field Engineering administratively reports to the Manager, Decommissioning and Decontamination Operations.

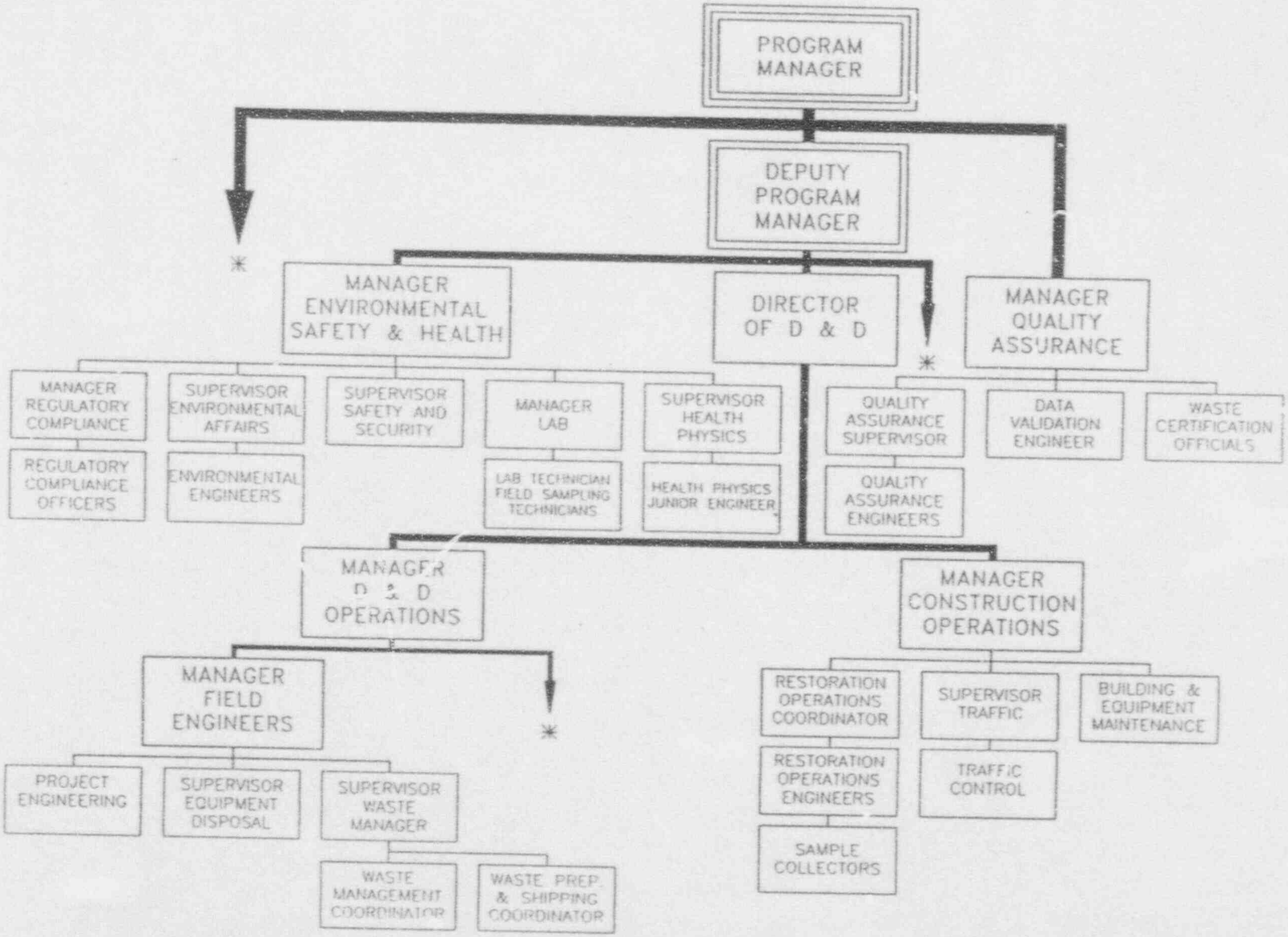

Figure 1-3 - Functional Organization Structure

6) The **Environmental Safety and Health Manager** will be responsible for the management of the environmental compliance, health, safety, and laboratory services. The Environmental Safety and Health Manager administratively reports to the Deputy Program Manager.

7) The **Manager of Regulatory Compliance** will be responsible for evaluating and coordinating the integration of Federal, State, and Local laws and regulations to project technical documentation and activities. The position assures that remediation is conducted in compliance with regulations, DOE Orders, and specified plans and procedures. The Manager of Regulatory Compliance administratively reports to the Environmental Safety and Health Manager.

8) The **Manager of Quality Assurance** will be responsible for the management of the Quality Assurance throughout the complete project, including data validation and waste certification. Any changes on alterations to characterization procedures will be conducted in accordance with QA procedures. The Manager of Quality Assurance administratively reports to the Program Manager.

1.4.3 Project Personnel Responsibilities

1.4.3.1 RMI Laboratory Personnel

The RMI Laboratory will be responsible for supplying necessary equipment, forms, and sample numbers to the sample collectors; logging and tracking of completed sample forms; preserving and storing samples; preparing blank samples; and shipping samples to contract laboratories in accordance with approved procedures. The RMI Laboratory will conduct radiological and chemical analysis of characterization samples in accordance with RMI standard operating procedures, the media-specific work plans, and the requirements of RMI-L-125, "Site Quality Restoration Assurance Program Plan." Laboratory personnel report administratively to the Environmental Safety and Health Manager.

1.4.3.2 Restoration Operations Engineers

Restoration Operations Engineers will be responsible for providing direct oversight of the sample collectors and for assuring that the appropriate procedures are being followed. The Restoration Operation Engineers report administratively to the Manager of Field Engineering.

1.4.3.3 Sample Collectors

Sample Collectors are Restoration Operations personnel who will be responsible for collecting samples, completing necessary documentation, transferring samples to the RMI Laboratory and assisting with sample compositing, as required.

1.4.3.4 Health Physics Junior Engineers

Health Physics Junior Engineers will be responsible for conducting the following activities in accordance with approved RMI procedures: (1) surveying the appropriate work areas for radioactivity, (2) surveying sample packages, (3) writing any radiation work permits (RWPs), and (4) monitoring of personnel and equipment as necessary. Health Physics Junior Engineers report administratively to the ES&H Manager through the Radiation Safety Officer.

1.4.3.5 Certification Officials

Certification Officials will be responsible for auditing the activities during the characterization effort and notifying the Manager Regulatory Compliance of any deviations from the approved procedures. The Certification Officials report administratively to the Quality Assurance Manager.

1.4.3.6 Equipment Disposition Supervisor/Project Engineer

This individual will be responsible for supervising the field characterization effort and coordinating between different departments involved in the characterization/remediation activities. The Equipment Disposition Supervisor/Project Engineer reports administratively to the Manager of [illegible]d Engineering.

1.5 Overview of the Work Plan

This plan is divided into seven sections with associated appendices. Summary statements describing each subsequent section are listed below.

1) Section 2 discusses the Data Quality Objectives for the characterization activities.

2) Section 3 discusses the technical approach of the characterization activities.

3) Section 4 outlines the specific tasks which will be performed.

4) Section 5 describes corrective action procedures.

5) Section 6 identifies the reporting requirements.

6) Section 7 lists the references used to prepare this work plan.

7) Appendix A summarizes the radiological contamination data for the RMI buildings.

8) Appendix B provides a detailed task description for identifying the interior grid locations (Task 1).

9) Appendix C provides a detailed task description for conducting random sampling of the interior building surfaces (Task 2).

10) Appendix D provides a detailed task description for conducting judgmental (biased) sampling of interior building surfaces and selected equipment (Task 3).

11) Appendix E provides a detailed task description for collecting concrete core samples from selected floor areas (Task 4).

12) Appendix F provides a detailed task description for collecting samples of the soil underneath selected areas of the buildings (Task 5).

13) Appendix G provides a detailed task description for sampling exterior building surfaces and roofing materials (Task 6).

14) Appendix H provides a detailed task description for surveying underground utilities for radioactive contamination (Task 7).

15) Appendix I provides a detailed task description for identifying potential RCRA hazardous contaminants within the buildings (Task 8).

16) Appendix J provides interior elevations of the RMI buildings with the sampling grid shown.

1.6 Technical Guidance

Several guidance documents were used to develop this work plan. Table 1-1 lists the primary documents. A complete listing of references are contained in Section 7.

Table 1-1 - Primary Guidance Documents

Title	Reference (See Section 7)	Guidance for:
(Draft) Manual for Conducting Radiological Surveys in Support of License Termination, NUREG/CR 5849	(NRC 1992)	Radiation survey design
Monitoring for Compliance with Decommissioning Termination Survey Criteria, NUREG/CR 2082	(NRC 1981)	Radiation survey design
Test Methods for Evaluating Solid Waste (SW): Physical/Chemical Methods, SW-846	(US EPA 1986)	1) Sampling design 2) Quality assurance project plan 3) Sampling documentation 4) Analytical methods
Data Quality Objectives for Remedial Response Activities	(US EPA 1987)	1) Sampling design 2) Data quality objectives
Survey Procedures Manual for the Oak Ridge Associated Universities (ORAU) Environmental Survey and Site Assessment Program (ESSAP)	(DOE 1990)	Radiation Survey Procedures
Quality Assurance (QA) Program Requirements for Nuclear Facilities, NQA-1-1989	(ASME 1989)	Overall QA requirements
(Draft) Branch Technical Position Paper on Site Characterization for Decommissioning Sites	(NRC 1992)	Sampling design
Nevada Test Site Defense Waste Acceptance Criteria, Certification and Transfer Requirements, NVO-325, Rev. 1	(DOE 1992)	1) Analytical requirements 2) QA requirements

SECTION 2

DATA QUALITY OBJECTIVES

Data Quality Objective (DQOs) are qualitative and quantitative statements concerning the data needs and quality of data. The DQOs are the starting point for designing the sampling plan and data collection program for the soils characterization activities at RMI. This section identifies the objectives of the sampling program in terms of data needs and the quality of data required. The EPA designated DQO levels used to describe data quality are listed in Table 2-1.

Although the DQO levels were developed by the EPA to assure that a specific standard of care, appropriate for a defined set of data, was being applied to all EPA analyses, it is useful to apply similar standards of care to radiological analyses. RMI procedures establish the standard of care for data quality; and because they are analogous to EPA DQO levels, no distinction will be made between DQO levels for RCRA analyses and those for radiological analyses. They will both be referred to as DQO levels 1 through 5 in the work plans.

2.1 Data or Information Needs

The overall objectives for the site characterization and the media-specific objectives for the buildings characterization are listed in Table 2-2. Table 2-3 presents the data needs for buildings characterization and compares these needs with the characterization objectives. A general description of the activity planned to fulfill the data need and associated work plan tasks are also listed.

2.2 Data Quality

Data quality is judged by the ability of the data to meet the objectives of the plan and the needs of the data users. The level of data quality generally associated with field measurements will be maintained for direct alpha, beta and gamma measurements. Actions which will ensure this level of quality is attained include:

1) Work shall be performed in accordance with approved procedures which implement the requirements in this plan.

2) Performance checks of the measuring instruments shall be made at least once per day. Instruments not passing the performance check shall not be used.

3) A field logbook shall be maintained to document daily activities and unusual conditions.

Table 2-1 - EPA Designated DQO Levels

EPA DQO Level	General Description	Example
1	<u>Qualitative Field Analysis</u> Provides the most rapid results. Level 1 is often used for health and safety monitoring, initial site characterization to locate areas for subsequent and more accurate analyses, field screening of samples to select those for fixed laboratory analysis, and engineering screening of alternatives (bench scale tests).	Field screening for alpha, beta, and gamma radiation conducted with portable field equipment provides real time qualitative analysis for the presence or absence or radioactive isotopes.
2	<u>Semi-Quantitative and Qualitative Analyses</u> Provides more quality control checks than Level 1. The results may be qualitative, semi-quantitative, or quantitative. Level 2 can be assigned when rapid turnaround results are needed. Methods may range from more sophisticated screening techniques to fully defined methods similar to Level 3 or 4 but with reduced QA/QC frequency and data reporting.	Determination of volatile halogenated organic compounds in water by purge and trap gas chromatography without second column configuration with a limited suite of field and laboratory QC samples, and a minimal data package.
3	<u>Quantitative with Fully Defined QA/QC</u> Provides data generated with full QA/AC checks of types and frequencies specified for Level 4 according to analytical procedures for radiological and nonradiological parameters. The analytical methods are identical to Level 4 for QA/QC sample analysis and method performance criteria. However, the data package does not typically contain raw instrument output but does include summaries of QA/QC sample results.	Analysis of total uranium with a full set of QA/QC samples as specified for Level 4. A summary data package is provided including QA/QC sample performance without raw instrument output. A limited level of data validation is required because only the summary forms need review.
4	<u>Confirmational with Complete QA/QC Reporting</u> Provides data generated with a full complement of QA/QC checks of specified types and frequencies according to analytical procedures for radiological and nonradiological parameters. The data package includes raw instrument output of validation of Level 4 data.	Analysis of total uranium per analytical batch with analytical results and a full raw data package reported from the laboratory.
5	<u>Non-Standard Procedures</u> Analysis by non-standard procedures that often require method development or validation Level 5 methods may be significantly different from those specified for Levels 2, 3, or 4 data.	Analysis or evaluation of a geotextile material for suitability for use as component of a remedial action at the site. Existing evaluation methods may not be adequate to evaluate site-specific needs, so development of a new method is required.

Note: Examples are generic and are not intended to reflect project-specific activities.

Table 2-2 - Site Characterization Objectives

Overall Site Characterization Objectives	Buildings Characterization Objectives
1) Establish a baseline for natural conditions (background) with respect to known or suspected contaminants identified in Table 4-1 of Subsection 4.1 of the Site Characterization Plan and review existing data, reports, and the Site Scoping Report that serve as a basis for development of the media-specific or topically-focused work plans	1) Establish baseline radiological characterization data for estimating total U, isotopic U, Th-232, and Tc-99 concentrations in potential decommissioning wastes and for evaluating the ability of these wastes to meet disposal site acceptance criteria.
2) Establish the nature, level, and extent of contaminants listed in Table 4-1 of Subsection 4.1 of the Site Characterization Plan in Areas A through G with respect to known or suspected contaminants for the individual areas by sampling and analysis of soils, groundwater, and buildings	2) Provide additional data to verify the levels of Th-232, Tc-99 and TRU contamination are not significant contributors to worker exposures and special precautions or monitoring of these contaminants during decommissioning are not required.
3) Determine site stratigraphy and hydrogeology through the use of existing geological and hydrogeological data, geologic logging of borings, and geophysical borehole logging	3) Provide a structured approach for identifying materials which may become a RCRA hazardous waste during building decommissioning.
4) Define local groundwater flow directions through the use of existing data and by installing additional monitoring wells	4) Provide data to further define the scope of remediation activities that includes determining if the soil and utilities underneath the buildings are contaminated and the depth of penetration of contamination on selected concrete surfaces.
5) Provide data to assess the concentration or exposure hazard and determine if special precautions or monitoring of the contaminants during remediation are required	5) Provide data to support engineering evaluations of decontamination techniques to allow unrestricted release of equipment and building materials.
6) Provide data to support engineering evaluation, selection and design of remediation options, and assist in the preparation of the final termination survey	6) Provide data to support the development of dose assessments and the establishment of cleanup levels.

Table 2-3 - Data Needs for the Buildings Characterization

Area	Data or Information Need	Supports		Activity and Work Plan Task Number
		Overall Objective	Building Objective	
B BUILDINGS	Presence or absence and the level and extent of fixed and removable alpha and beta contamination on building and selected equipment surfaces	2	1,6	Random and judgmental building surfaces and selected equipment will be surveyed for alpha and beta contamination (Tasks 2,3,6,7)
	Depth of contamination on concrete and painted surfaces	2,5,6	1,4	Concrete core samples (Task 4) and paint chip (Task 3) samples will be collected
	Presence or absence and level and extent of Th-232 contamination	2,5	2	Th-232 analysis will be conducted on samples collected at selected floor grids (Tasks 2,4,5)
	Presence or absence and level and extent of radiological soil contamination underneath the buildings	2,5,6	1,2,4	Uranium, Th-232, Tc-99 and isotopic Pu analyses will be conducted on selected soil samples (Tasks 5)
	Presence or absence and level and extent of Tc-99 contamination	2,5,6	2	Tc-99 analysis will be conducted on samples collected at selected floor grids (Tasks 2,4,5)
	Presence or absence and level and extent of Pu contamination	2,5,6	2	Isotopic Pu analysis will be conducted on samples collected at selected floor grids (Tasks 2,4,5)
	Uranium isotopic concentrations in contamination	2	1	Isotopic uranium analysis will be conducted on samples collected (Tasks 2,4,5)
	RCRA hazardous contaminants which could result in a RCRA hazardous or mixed waste during decommissioning	2,5,6	3	An evaluation of potential RCRA hazardous contaminants will be made (Task 8)

Note: Numbers in "Objective" columns represent numbered objectives presented in Table 2-2.

4) All measurements shall be documented on survey sheets. The Health Physicist shall verify the data is recorded properly.

5) Tools used for sample collection shall be decontaminated, as necessary, to prevent cross contamination of samples.

The level of quality associated with EPA DQO Level 3 shall be used for samples sent to the laboratory for chemical analysis unless otherwise specified in the media-specific work plan. Radiological laboratory analyses will be conducted per approved laboratory procedures. In addition to the actions above, the level of quality will be attained by the following.

1) All off-site laboratories shall be approved per RMI-L-159, *QA Requirements for Procurement of Contract Laboratory Services*, before any samples are sent to the laboratory for analysis.

2) Any on-site laboratory analyses shall be conducted in accordance with approved procedures.

3) Sample integrity shall be maintained through the use of chain-of-custody procedures.

4) All quality control samples will be reported by the laboratory with the analytical data package.

Additional requirements to provide assurance that the required data quality is attained are discussed below.

2.2.1 Confidence

Unless stated otherwise, 90% confidence shall be used to describe the uncertainty in the data. To verify that 90% confidence has been achieved, the confidence will be evaluated using the equations stated in SW-846, *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*, Third Edition, Table 9-1. These equations require the data to be normally distributed. The regulatory thresholds for chemical contaminants are stated in 40 CFR Part 261. If the data are not normally distributed, other statistical methods, such as data transformations, will be conducted to confirm that 90% confidence has been achieved.

The regulatory thresholds for chemical contaminants are stated in 40 CFR Part 261. For radiological samples of materials for free release, the regulatory threshold is the appropriate free release limit, per Regulatory Guide 1.86, for the radionuclide being analyzed. For cases where contamination above free release levels is known or suspected, a 90% confidence interval will be calculated to describe the uncertainty in the data.

2.2.2 Representativeness

It is anticipated the samples obtained will be representative of the media being characterized. A combination of random and judgmental (biased) samples will be taken to increase the representativeness of the data.

2.2.3 Sampling Accuracy and Precision

Accuracy may be defined as the difference between the value of the reported data and the true value of the parameter being measured. Sample accuracy will be assessed through the comparison of the analysis of the unknown sample (obtained in the field) with the analysis of samples with known concentrations created in the laboratory. The accuracy of analytical data is tested through the analysis of laboratory blank samples, spiked samples, laboratory standards, reference samples and field duplicates.

Sampling precision will be achieved by collecting the appropriate number of samples as necessary to achieve the desired confidence limit.

2.2.4 Completeness

Completeness is defined as the percentage of measurements or amount of data required in order to make a decision concerning the media being characterized. The completeness goal is essentially the same for all data uses. Completeness will be calculated as follows:

$$Completeness\ (\%) = \frac{(No.\ of\ valid\ values\ reported\ per\ parameter)}{(No.\ of\ samples\ planned\ for\ analysis)} \times 100$$

The target for completeness is 90% for all analyses. If 90% completeness is not achieved, the data will be reviewed, and a determination will be made as to whether additional samples must be collected to achieve the desired confidence. If the desired confidence is achieved, additional samples may not be required.

2.2.5 Comparability

Comparability expresses the confidence with which data sets can be compared. Sample data generated during this procedure will be comparable with other sample data if consistently documented field and laboratory procedures are used for similar samples and similar sampling methods and sampling conditions are maintained. The objectives for comparability are to demonstrate traceability by using approved methods field or laboratory method, reporting results for similar materials or analyses in consistent units, and applying appropriate quality control. All calibration standards shall be traceable to National Institute of Standards and Testing (NIST) standards.

2.3 Quality Control

Quality control activities will be implemented per approved field and laboratory procedures to ensure the data quality objectives of this plan are achieved.

2.3.1 Field Quality Control

The following types of field quality control samples will be collected and sent with the samples to be analyzed. Field quality control samples will be tested for the same parameters as the medium sampled. The minimum number of field quality control samples are identified. If additional samples are required, they will be specified in the applicable task description or implementing procedure.

1) Trip Blanks - A sample of deionized water filled in the RMI laboratory, transported to the sample site, handled like a sample but not opened, and stored and transported to the laboratory for analysis. One trip blank will be sent with every container containing samples to be analyzed for volatiles. Trip blanks are analyzed for volatiles and the results are used to indicate if any contamination occurred during sample collection, storage, or shipment.

2) Equipment Blanks - A sample of the deionized water used to rinse the sampling equipment. The rinsate is collected after decontamination and before collecting the next sample. The results may indicate if any cross contamination has occurred. Equipment blanks are collected at a frequency of one per every 10 samples collected. If less than ten samples are collected, an equipment blank will be collected after the last sample is collected.

3) Field Duplicates - The sample and its field duplicate are defined as two samples taken from the same source, stored, and analyzed separately. The duplicate sample is given a false identifier to minimize bias. These samples are collected at a frequency of one per every 10 samples collected. If less than 10 samples are collected, one duplicate will be collected at the last location to be sampled.

4) Source Water Blanks - Deionized water generated in the RMI Laboratory and used in decontaminating sample equipment is poured into the sample container and stored and transported to the laboratory for analysis. The results may indicate if contamination of rinse water has occurred. Source water blanks will be collected at a frequency of one per every 10 samples collected. If less than 10 samples are collected, a source water blank will be collected after the last sample is collected.

All field data shall be recorded on survey sheets and, as applicable, the field logbook and shall be checked completeness and correctness in accordance with approved procedures.

2.3.2 Analytical Quality Control

Quality control samples shall be prepared and analyzed by the analytical laboratory as stated in the applicable analytical method and may include the following:

1) Method blank/reagent blank results - Reagent blanks are analyzed to verify the procedures do not introduce contaminants that affect the analytical results. Reagent blanks will be prepared by the addition of all reagents to a substance of similar matrix as the sample. This blank will then undergo all of the procedures required for sample preparation and will be analyzed with the field samples prepared under identical conditions.

2) Matrix spike results - This technique is used to determine the effect of matrix interference on analysis results. Aliquots of the same sample are prepared in the laboratory and each aliquot is treated exactly the same throughout the analytical method. Spikes are added at concentrations specified in the method. The percent difference between the values of the spiked duplicates is taken as a measure of the precision of the analytical method.

3) Surrogate Spike Results - Surrogate spike analysis is used to determine the efficiency of recovery of analytes in the sample preparation and analysis. Calculated percentage recovery of the spike is used as a measure of the accuracy of the total analytical method. A surrogate spike is prepared by adding to a sample, a known amount of pure compound of similar type to that which is to be analyzed in the sample. Surrogate compounds will be added to all samples that are to be analyzed by gas chromatograph (GC) or gas chromatograph/mass spectroscopy (GC/MS), including method blanks, duplicate samples, and matrix spikes.

4) Laboratory Control Sample Results - Laboratory control samples are samples prepared independently of the field samples and blanks. These samples of known concentration are used to measure the accuracy of the instrumentation utilized. Laboratory quality control samples will be analyzed at a frequency of one QA sample for every 20 samples, with a minimum of one sample for each sample batch of 20 or less.

The results of the analysis of the quality control samples shall be reported with the analytical results of the field samples.

2.3.3 Sample Preservation

Samples shall be preserved per the requirements stated in SW-846, *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*. The standard operating procedures for collecting samples shall state the preservation techniques to be followed for the sample being collected.

2.3.4 Sample Holding Times

The sample holding times stated in SW-846, *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods*, shall be followed.

2.3.5 Sample Volumes

The standard operating procedures for collecting the samples shall specify the minimum sample volume and sample container for each sample collected. The analytical laboratory conducting the sample analysis will provide this information taking into account the analytical method being conducted and associated quality control samples required by the laboratory's procedures.

2.4 Procedures

This work plan provides overall technical guidance for characterization activities. RMI Standard Operating Procedures (SOPs) provide the detailed instructions for completing the various activities required by the work plans. All work activities shall be performed in accordance with RMI SOPs. Work not authorized by an approved procedure or work instruction shall not be performed.

Tables 2-4 through 2-6 identify existing or planned field, analytical, quality assurance and administrative procedures applicable to buildings characterization activities. A list of all approved procedures applicable for characterization activities shall be maintained and updated as new procedures are written and approved.

2.4.1 Field Procedures

Field activities consist primarily of all the activities necessary to collect a sample and transfer the sample to the laboratory or to measure properties such as surface contamination levels in the field. Key field procedures applicable to characterization efforts are listed in Table 2-4.

2.4.2 Analytical Procedures

All on-site or off-site laboratory analyses shall be performed in accordance with written and approved standard operating procedures and analytical methods. Table 2-5 lists the analytical methods to be used for the various analyses required.

2.4.3 Quality Assurance/Administrative Procedures

Quality Assurance procedures provide assurance that the data were collected in a manner designed to meet the project objectives. Field data or analytical data received from the laboratory must be reviewed prior to reporting to ensure the data is of sufficient quality to meet the project objectives, reported to the appropriate individuals and stored to allow future retrieval and use. Administrative procedures provide a standard method to conduct administrative tasks such as document approval, procurement, document control, etc. Table 2-6 lists the applicable quality assurance and administrative procedures.

Table 2-4 - Current and Proposed Field Procedures

Subject	Cu. ent Procedure Number	Procedure Type
Surface Soil Sampling	Proposed	Field Sampling
Subsurface Soil Sampling	Proposed	Field Sampling
Verify radiation and surface contamination instruments performance is within approved limits prior to use.	RM' L-60	Health Physics Procedures
Provide instructions for the calibration and maintenance of radiation and surface contamination measuring instruments.	RMI-L-60	Health Physics Procedures
Building surfa.e survey	Proposed	Field Sampling
Conducting surface contamination surveys	RMI-L-60	Health Physics Procedures
Issuing Radiological Work Permits	RMI-L-155	Health Physics Procedures
Receipt, storage and shipment of samples by the RMI laboratory	RMI-L-138	Laboratory Procedures
Decontamination of sampling equipment	Proposed	Field Sampling
Sample Numbering, Labeling and Sealing	RMI-L-138	Laboratory Procedures
Field activity documentation	Proposed	Field Sampling

Table 2-5 - Applicable Analytical Methods

Analyte	Analytical Method
Radiological Contaminants	
Gross Alpha	gas flow proportional counter; laboratory specific procedure
Gross Beta	gas flow proportional counter; laboratory specific procedure
Total Uranium	kinetic phosphorescence analysis or equal; laboratory specific procedure
Isotopic Uranium (U-238, U-235, U-234)	alpha or gamma spectroscopy; laboratory specific procedure
Thorium 232	alpha spectroscopy; laboratory specific procedure
Technetium 99	liquid scintillation; laboratory specific procedure
Isotopic Plutonium (Pu-238, Pu-239, Pu-240)	alpha spectroscopy; laboratory specific procedure
RCRA Hazardous Contaminants	
Volatiles	SW-846, Method 8240
Semi-Volatiles	SW-846, Method 8270
Pesticides	SW-846, Method 8080
Herbicides	SW-846, Method 8150
As, Ba, Cd, Cr, Pb, Se, Ag	SW-846, Method 6010
Mercury	SW-846, Method 7471
Cyanide (Total)	SW-846, Method 9010
Sulfides (Reactive S)	SW-846, Method 9030
Polychlorinated Biphenyls (PCBs)	SW-846, Method 8080
Asbestos	40 CFR Part 763, Subpart E, Appendix A
Toxicity Characteristic Leaching Procedure	SW-846, Method 1311 (40 CFR 261.24)
Ignitability	SW-846, Method 1010 or 1020
Corrosivity	SW-846, Method 9040
Free Liquids	SW-846, Method 9095
Particle Size	ASTM-D-422
Percent Moisture	ASTM-D2974-87

Table 2-6 - Current and Proposed Quality Assurance/Administrative Procedures

Subject	Current Procedure Number	Procedure Type
Data validation of inorganic analyses	Proposed	Quality Assurance
Data validation of organic analyses	Proposed	Quality Assurance
Document control	RMI-L-116	Administrative
Audits	RMI-L-120	Quality Assurance
Nonconformances	RMI-L-122	Quality Assurance
Document review and approval	RMI-L-112	Administrative
Unusual occurrence reporting	RMI-L-117	Quality Assurance
Equipment and services procurement	RMI-L-127	Administrative
Corrective actions	RMI-L-128	Quality Assurance
Contract laboratory evaluation	RMI-L-154	Quality Assurance
Laboratory Services Procurement	RMI-L-159	Quality Assurance
Operational readiness reviews	RMI-L-161	Quality Assurance
QA surveillances	RMI-L-166	Quality Assurance
Audit personnel qualification	RMI-L-169	Quality Assurance

SECTION 3

BUILDING CHARACTERIZATION PROGRAM

This section describes the technical approach for the radiological and RCRA hazardous characterization of the RMI buildings, major equipment, piping, ductwork, etc., and the soil underneath selected buildings. Section 4 discusses the tasks which must be completed to meet the objectives for the characterization activities.

3.1 Results from Previous Radiological Contamination Surveys

The existing radiological data of the RMI buildings used for preparation of this plan included measurements of the contamination on the walls and floors of the various buildings. This data is presented in Appendix A. The wall contamination data consisted of direct and removable alpha and beta contamination measurements taken from March to July 1991 as part of the preliminary radiological survey conducted by RMI personnel. The floor contamination data consisted of direct and removable alpha and beta contamination measurements taken during January and February 1992 as part of RMI's radiological contamination control program.

Measurements were taken in over 100 locations throughout 23 of the 25 buildings that constitute the RMI complex (Table A-1). Two buildings, the modular offices and modular lab, are excluded from this table because they are new buildings erected after the preliminary radiological survey was conducted in 1991, and are kept as "non-radiological" buildings. The total area occupied by the 23 buildings is 104,595 ft^2. The following data summary was based on the grouping of measurements according to the 23 buildings. It should be noted that this approach provides a general estimate of radioactivity for a given building relative to the entire facility and is not a quantitative assessment of contamination.

The unrestricted release levels applicable for the equipment and structures at RMI are in Table 3-1.

3.1.1 <u>Direct Alpha Radioactivity</u>

Mean levels of direct alpha radioactivity taken at the various locations in 1991 and 1992 are presented by ranks in Tables A-2 and A-3, respectively. Mean activities of direct alpha radioactivity ranged from 951 dpm/100 cm^2 at the Main Plant (1992) to 4 dpm/100 cm^2 at five other locations (1991). The highest levels of mean direct alpha radioactivity occurred at the RF-3 and RF-6 Butler Buildings, Main Plant, and RCRA Storage Building.

Table 3-1 - Unrestricted Release Levels for the RMI Site

	Average	Maximum	Removable
U-nat, U-235, U-238, and associated decay products	5,000 (dpm α/100 cm^2)	15,000 (dpm α/100 cm^2)	1,000 (dpm α/100 cm^2)
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 (dpm $\beta\gamma$/100 cm^2)	15,000 (dpm $\beta\gamma$/100 cm^2)	1,000 (dpm $\beta\gamma$/100 cm^2)
Source: *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material*, USNRC, July 1982.			

3.1.2 Direct Beta Radioactivity

Mean levels of direct beta radioactivity (Tables A-4 and A-5) ranged from 3 dpm/100 cm^2 at the Guard House to 362,943 dpm/100 cm^2 at the Main Plant.

3.1.3 Indirect (Removable) Alpha Radioactivity

Levels of removable alpha radioactivity are listed in Table A-6 and Table A-7. The average mean level of removable alpha radioactivity from the wall surveys in 1991 is 116 dpm/100 cm^2 (number of samples (n) = 838). The mean of the floor survey data taken in 1992 is 39 dpm/100 cm^2 (n = 327). The buildings with the highest removable alpha radioactivity on the walls were the RF-6 Butler Building, Northwest Storage Building, and RF-3 Butler Building. The buildings with the highest floor removable alpha radioactivity were the Main Plant, Northwest Storage Building, RCRA Storage Building, Tool Crib, and Enclosed Ramp. The lowest was in the Guard House (Table A-7).

3.1.4 Indirect (Removable) Beta Radioactivity

Levels of removable beta radioactivity are listed in Table A-8 and Table A-9. The average mean level of removable beta radioactivity from the wall surveys in 1991 is 1,126 dpm/100 cm^2 (n = 838). The mean of the floor survey data taken in 1992 is 238 dpm/100 cm^2 (n = 324). The mean level of removable beta radioactivity on the floors was also highest in the Main Plant and lowest in the Guard House in 1992 (Table A-9).

3.2 Radiological Characterization Design

There are 25 buildings at the RMI site. Of these, five buildings (modular offices, modular laboratory, ES&H Building, Guardhouse, and Health Physicists Offices) are used daily. As a result, contamination levels may vary significantly over time. Each of these areas is maintained such that removable contamination is less than 700 dpm/100 cm^2. The modular offices and modular laboratory will be excluded from this characterization plan because these structures were installed after production operations stopped and the soil underneath these buildings was remediated to unrestricted release levels. Direct and removable radiation data are routinely collected as part of RMI's radiation control program. Limited sampling will be conducted in the ES&H building (current Operations office), Guardhouse and Health Physicist offices.

The primary radiological parameters of concern include alpha and beta radioactivity expressed in units of dpm per 100 cm^2. Preliminary surveys taken during a walk-through of the buildings confirm the contamination levels on the walls and floor are not evenly distributed. As expected, the majority of surface contamination is at or slightly above background; however, enough localized areas of elevated activity, "hot spots", are present to prevent unrestricted release. Because surface contamination is not homogeneous, spot sampling of selected grids is not appropriate.

To minimize the chance of missing a "hot spot", surface contamination measurements will be made by surveying the entire one meter grid. For alpha and beta contamination, the five highest measurements will be averaged to determine a mean surface contamination level for the grid. The grid means on similar surfaces will be averaged to determine an average mean contamination level for that surface. By using the mean contamination of individual grid location to estimate average surface contamination levels, a normal distribution may be assumed.

Sampling locations for this plan were selected using random and judgmental sampling designs. A stratified design was used to determine the random sample locations for the RMI buildings. This design was selected because it is flexible and useful for estimating average contamination concentrations. Based on existing information, the RMI facility was stratified into the 20 locations or buildings. Each location was further stratified into walls, floor, and ceiling. Each stratum is subsequently randomly sampled to provide an estimate of the population mean.

The number of grids to sample from each stratum was estimated using existing data and the formula:

$$N = t^2 s^2 / E^2 \text{ or } (ts/E)^2 \qquad \text{(US EPA 1986)}$$

where: s^2 = the sample variance,
t = Student's t value, and
E = the desired half-width of the error interval

The estimated sample requirements for the 20 locations are shown in Table 3-2. The number of samples were allocated proportionately to the relative area of the structure. Fifty percent of the samples were arbitrarily allocated to the floor. Of the remaining 50 percent of the samples, half were allocated to the walls, one-fourth to the ceilings and one-fourth to piping, equipment and additional judgmental samples. Those areas that were inaccessible because of equipment or other reasons were excluded from sampling consideration. The margin of error is defined as that value within 25 percent of the mean; an alpha value of 0.10 (90 percent confidence) was selected.

For sampling to estimate the radiological contamination present on selected major equipment, piping, ductwork, etc., and the soil underneath selected buildings, judgmental sampling is appropriate. Sample locations were determined using process histories, engineering judgement, drawings or other pertinent material. Samples will be selectively taken in those areas having the greatest potential for being contaminated.

3.3 Building RCRA Hazardous Characterization

RCRA Characterization will be conducted using an observational approach based upon operational history. An evaluation will be done to identify potential materials which may contain RCRA contaminants above regulatory levels. If a review of available data is unable to demonstrate the material would not contain RCRA contaminants above regulatory levels, sampling of the material may be conducted. This task follows the approach developed for characterization of the old RF6 offices and documented in RMI-L-175, *Characterization of Building Materials in the Old Offices in the RF-6 Butler Building*.

Table 3-2 - Estimated Number of Sample Locations

Estimated number of samples for direct and removable alpha and beta radioactivity at the RMI facility.

Location	Area (ft2)	Percent	Samples Required	Sample Allocation Floor	Walls	Ceiling	Judgemental
RF6 Building	20350	21.2	551	282	141	71	56
Northwest Storage Building	18810	19.6	509	261	130	65	52
Main Plant (High Bay)	15303	15.9	414	212	106	53	42
RF6 Butler Building Addition	9650	10.0	261	134	67	33	27
Main Plant (Low Bay)	8446	8.8	229	117	59	29	23
Billet Storage Warehouse	5615	5.8	152	78	39	19	16
RF3 Butler Building	2720	2.8	74	38	19	9	8
Enclosed Truck Ramp (See Note 1)	2457	2.6	68	35	17	9	7
Tool Crib	2250	2.3	61	31	16	8	6
Wastewater Treatment Plant	2024	2.1	55	28	14	7	6
Die Head Filter Building	1680	1.7	45	23	12	6	5
Dock Area	1510	1.6	41	21	10	5	4
Enclosed Ramp	1500	1.6	41	21	10	5	4
Saw Filter Building	1125	1.2	30	16	8	4	3
Runout Table Filter Building	900	0.9	24	12	6	3	2
RCRA Storage Building	800	0.8	22	11	6	3	2
Substation	474	0.5	13	7	3	2	1
Compressor Room	262	0.3	7	4	2	1	1
Sewage Disposal Plant	128	0.1	3	2	1	0	0
Emergency Equipment Storage Bldg.	120	0.1	3	2	1	0	0
TOTAL	96124		2602	1335	667	334	267

Note 1: Contamination data not available, used data from the RF3 Butler Building to conservatively estimate the number of samples

SECTION 4

BUILDING CHARACTERIZATION TASKS

To satisfy the overall objectives, eight tasks, listed below, must be completed. A detailed description of each task is provided in Appendices B-I. These task descriptions describe the technical approach and guidance for the activities which will be implemented to achieve the plan objectives. The locations to be sampled and analyses required may be modified from that shown in the task descriptions as data is collected and evaluated. Deviations from this plan will be approved and documented in accordance with RMI procedures. All activities will be implemented via standard operating procedures.

1) Task 1 - Establish Interior Sample Grid Coordinates
2) Task 2 - Survey Interior Random Sample Locations for Radioactive Contamination
3) Task 3 - Survey Interior Judgmental Sample Locations for Radioactive Contamination
4) Task 4 - Collect Concrete Core Samples
5) Task 5 - Collect Soil Samples
6) Task 6 - Survey Building Exterior Surfaces
7) Task 7 - Underground Utilities Characterization
8) Task 8 - RCRA Hazardous Characterization Evaluation

Task 1 establishes the coordinate grid for all interior sampling and surveys, and is a prerequisite to all tasks except for Task 6 and 8 which can be performed independently. Tasks 2 and 3 include contamination and dose rate surveys for walls/floors/ceilings and major building equipment/structures. These tasks are prerequisites to Task 4 and 5 since the survey must be performed prior to collecting concrete core or soil samples. Because Task 8 may result in the recommendation to collect soil and concrete samples for RCRA determination, Task 8 should be completed before Tasks 4 or 5. This could allow samples for radiological and RCRA characterization to be collected concurrently. The following implementation sequence is recommended.

1) Complete Task 1 before starting Tasks 2, 3, 4, 5, or 7.
2) Complete Tasks 2 and 3 before starting Task 4.
3) Complete Task 8
4) Complete Tasks 4 and 5 concurrently.
5) Complete Tasks 6 as desired.

Each of the eight characterization tasks is summarized below.

4.1 Task 1 - Establish Interior Sample Grid Coordinates

The objective of this task is to establish a 3-dimensional coordinate grid on the floors, walls and ceilings in each building. This grid system shall establish the basis for all interior characterization activities. The grid system shall be constructed by drawing reference lines to indicate X, Y, and Z coordinates with the distance from the origin indicated every five meters. These reference lines then may be used to accurately locate the one meter grid locations for surveying. The drawing of the grids on the floor, walls and ceiling are not required.

4.2 Task 2 - Survey Interior Random Sample Locations for Radioactive Contamination

The objective of this task is to assess the extent and degree of radioactive surface contamination in the RMI buildings by surveying random locations within each building. The random building wall, floor, and ceiling grids identified in Table C-1 through C-20 shall be surveyed for direct (fixed) and removable (2smearable) gross alpha and beta radioactivity. Samples will be collected at a minimum of 5% of the floor grid locations to validate the gross measurements and determine total U, isotopic U, Th-232, Tc-99 and isotopic Pu concentrations. All survey data shall be collected and stored using the identification number assigned to that grid location.

4.3 Task 3 - Survey Interior Judgmental Sample Locations for Radioactive Contamination

The objective of this task is to assess the extent and degree of radiological contamination on building surfaces and selected equipment by surveying judgmental locations within each building. The judgmental building wall, floor, ceiling grids and equipment identified in Appendix D shall be surveyed for both direct (fixed) and indirect (removable) gross alpha and beta radioactivity. Analyses shall be performed at the selected grid locations to determine the total uranium, Th-232, Tc-99, and isotopic Pu concentrations.

4.4 Task 4 - Collect Concrete Core Samples

The objective of this task is to assess the extent of radiological contamination (specifically depth of penetration) in the building concrete floors. Concrete core sampling shall establish the basis for identifying the extent to which the concrete is contaminated. Cores shall be taken at a minimum of 5 percent of the random sample locations (Appendix C) with the highest direct beta surface contamination readings. Core samples will be sent to the laboratory where the top 1 inch of the sample will be sectioned into 1/4-inch sections. Each section will be acid digested, plated, and counted for gross alpha, gross beta and total U. The minimum core depth is 2 inches.

4.5 Task 5 - Collect Soil Samples

The objective of this task is to make a preliminary assessment of soil contamination beneath selected buildings. The basis for this preliminary assessment is that there are two potential sources for contamination beneath buildings: (1) cracks in floors, trenches and pits and (2) underground process and drain piping. Surface and subsurface soil samples will be collected, using a judgmental (biased) sampling approach, from sub-floor areas. A surface soil sample will be collected from the hole created from concrete core sampling. Additional sampling locations are identified in Appendix F, Table F-1.

4.6 Task 6 - Survey Building Exterior Surfaces

The objective of this task is to establish the extent of radiological contamination on the exterior surfaces (e.g., walls, roofs, and foundations) of selected RMI buildings. Direct alpha and beta surface contamination surveys shall be performed at systematically selected sample locations on the selected building exterior walls and exposed foundations. Judgmental (biased) samples will be collected at locations on selected roofs.

4.7 Task 7 - Characterize Underground Utilities

The objective of this task is to characterize the extent of radiological contamination in utilities under the building footprint. First, potentially affected utility lines will be identified based upon process knowledge of what the utility lines serviced, e.g. drain and sump lines, process water lines, etc. Secondly, a sampling of the utility line will be conducted. Should the utility line have a trap or low point before exiting through the slab a sample will be taken at this point to determine if contaminated. The identified utility lines will be swiped using a cloth swab attached to a plumber's snake. If there appears to be deposits on the interior of the line then the pipe will be scraped and the deposits analyzed. Analysis of the swab and deposit scrapings will include total U, isotopic U, Th-232 and Tc-99.

4.8 Task 8 - RCRA Hazardous Characterization Evaluation

Decommissioning activities will generate a wide variety of solid wastes including excess chemicals and trade name products, miscellaneous equipment, piping, floor tile, concrete, etc. Because each waste has the potential to be a RCRA hazardous waste, it is important to individually evaluate whether or not the waste is RCRA hazardous. For the majority of the waste, this determination may be made quickly. Process knowledge or knowledge of the material may be used to show that the waste is not RCRA hazardous. For other wastes, further investigation including interviewing operating personnel and/or sampling the waste will be required.

The objective of this task is to provide a structured approach for determining if RCRA hazardous materials are present within each building. This task parallels the approach developed for characterization of the old RF6 offices and documented in RMI-L-175, *Characterization of Building Materials in the Old Offices in the RF-6 Butler Building*. In addition to RCRA hazardous contaminants, potential asbestos and PCB contamination will be identified and evaluated. An evaluation team, using knowledge of past operations and visual inspection, will identify materials which may contain RCRA contaminants exceeding regulatory levels. The evaluation team will review past sample results, Material Safety Data Sheets, discussions with material vendors, etc. to determine if documentation exists indicating the material is not RCRA hazardous. If the evaluation team is not able to document the material does not contain RCRA contaminants above regulatory levels, a sample of the material will be collected. These samples will be analyzed for either the concentration of the specific contaminant or using the Toxicity Characteristic Leaching Procedure to determine if regulatory levels are exceeded.

SECTION 5

CORRECTIVE ACTION PROCEDURES

5.1 Response and Documentation

Finding and correcting sampling and analytical problems are the responsibility of all project personnel. Many corrective actions must be documented in the laboratory or in the field. It is important to document these occurrences and to take immediate corrective action in accordance with approved procedures. Appropriate management personnel will be notified of these occurrences. All personnel will be made aware of the need to report problems and to correct problems promptly.

5.1.1 Field Procedures

The initial responsibility for monitoring the quality of field requirements lies with the professionals in the field. The personnel responsible for verifying that all QA procedures are followed assess the appropriateness of the field methods and the ability to meet QA objectives, and make an assessment of the impact a procedure has upon the field objectives and subsequent data quality. Daily activities are reported up the management chain. If a problem occurs that might jeopardize the integrity of the project, cause a QA objective to not be met, or impact data quality, the appropriate individual will immediately notify management personnel in accordance with RMI procedures. Corrective action measures will then be decided upon and implemented. If the situation warrants, notification of higher management levels will be made. Appropriate personnel will document the situation, the affected field objective, the corrective action taken, and the results of that action. Copies of the documentation will be provided to the appropriate field, laboratory, management, and QA personnel.

5.1.2 Laboratory Procedures

The need for corrective action comes from several sources: equipment malfunction, failure of internal QC checks, method blank contamination, failure of performance or system audits, and noncompliance with QA requirements.

Laboratory corrective action may take several forms, but the following steps are almost always included:

1) Check the calculations.
2) Check the instrument for proper setup.
3) Re-analyze the control item.

If these steps fail to eliminate the problem, additional actions are implemented. The LCS and spike recoveries may be compared to reveal matrix interferences. Recalibration of the instrument may be necessary. In certain cases an entire batch will be re-analyzed. If a problem cannot be corrected by the previously prescribed measures, the analyst will involve the appropriate personnel responsible for laboratory, project, and Quality Assurance management functions. A record of all corrective action is maintained in the project file and signed and dated by the analyst.

Contract laboratories will implement corrective actions in accordance with established corrective action procedures. If the contract laboratory cannot correct the problem, the appropriate managers and QA personnel will be notified immediately. Contract laboratories will be audited in accordance with ASME NQA-1.

5.2 Procedures for Work Plan Modifications

Any deviation from the project requirements as specified in this document requires proper documentation. This documentation will be completed in the field by the Restoration Operations Engineer and forwarded to the Site Characterization Manager. The Site Characterization Manager will communicate the deviation from project requirements and send a Field Change Request Form to the Quality Assurance Officer or designated representative by the most expedient means available. Upon receipt, the Quality Assurance Officer will review and indicate final disposition of the request and return the original document to the originator. A copy of the document should be retained for the project file. Changes that require an immediate response will be initiated by telephone and then documented using the procedure described above.

SECTION 6

REPORTING

Status reports will be issued periodically. Status reports will include progress to date, remaining tasks to be completed, and any changes to the work plan.

Interim task reports will be prepared as Phase 1 preliminary characterization tasks are completed. The interim task reports will include analytical data summaries, preliminary data evaluations, and identification of additional data needs.

A buildings/equipment characterization report will be prepared following completion of all Phase 1 preliminary characterization tasks and interim reports. The report will incorporate the guidance presented in the *Draft Branch Technical Position on Site Characterization for Decommissioning Sites*.

All reporting will be consistent with the Site Restoration Quality Assurance Program Plan, RMI-L-125.

SECTION 7

REFERENCES

(ASME 1989) American Society of Mechanical Engineers, 1989. *Quality Assurance Program Requirements for Nuclear Facilities*, NQA-1-1989.

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(FR 1981) 46 Federal Register (FR) 961, October 23, 1981. *Branch Technical Position on the Disposal or On Site Storage of Residual Thorium or Uranium From Past Operations.*

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(RMI 1991b) RMI Titanium Company Extrusion Plant, April 1991. *RMIEP Site Restoration Quality Assurance Program Plan (SRQAPP)*, Document Number RMI-L-125: RMI.

(RMI 1991c) RMI Titanium Company Extrusion Plant, May 1991. *RMIEP Training Program Plan*, Number RMI-L-150.

(RMI 1991d) RMI Titanium Company Extrusion Plant, June 1991. *Procedure for Receipt, Storage and Shipment of Samples*, Document Number RMI-L-138.101.

(RMI 1991f) RMI Titanium Company Extrusion Plant, December, 1991. *Decommissioning Plan for RMI Titanium Company Extrusion Plant, Ashtabula, Ohio:* RMI.

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(US EPA 1987) United States Environmental Protection Agency, 1987. *Data Quality Objectives for Remedial Response Activities.*

APPENDIX A

EXISTING RADIOLOGICAL CHARACTERIZATION DATA

Table A-1 - Dimensions and coverage of selected structures at the RMI Facility, Ashtabula, Ohio.

Building	Dimensions (ft)	Area (sq. ft.)	Percent
Northwest Storage Building	114 x 165	18,810	18.0
RF-6 Butler Building Addition	96.5 x 100	9,650	9.2
RF-6 Butler Building	203.5 x 100	20,350	19.4
Enclosed Rampway	15 x 100	1,500	1.4
Locker Rooms, Foreman's Offices	29.3 x 183.4	5,380	5.1
Enclosed Truck Ramp	31.5 x 78	2,457	2.3
Dock Area	51.3 x 29.4	1,510	1.4
Emer. Equipment Storage Building	10 x 12	120	0.1
RCRA Storage Building	40 x 20	800	0.8
Billet Storage Warehouse	50/46.4 x 114	5,614	5.4
Main Plant High Bay	53.1 x 288.2	15,303	14.6
Main Plant Low Bay	26.3/25 x 170.5/158.5	8,446	8.1
Runout Table Filter Building	45 x 20	900	0.9
Saw Filter Building	45 x 25	1,125	1.1
Tool Crib	45 x 50	2,250	2.2
Die Head Filter Building	48 x 50	1,680	1.6
Substation	26.3 x 18.7	474	0.5
Compressor Room	14 x 18.7	262	0.3
Wastewater Treatment Plant	46 x 44	2,024	1.9
RF-3 Butler Building	68 x 40	2,720	2.6
ES&H Building	No Dimensions Recorded	2,774	2.7
Guard House	No Dimensions Recorded	316	0.3
Sewage Disposal Plant	10.6 x 12.1	128	0.1
TOTAL		104,595	100.0

Table A-2. Levels of net direct alpha radioactivity (dpm/100 sq cm) on various walls, RMI 1991.

Location	Area (ft2)	Percent *	n	Mean	Variances	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	45	351	278270	78.64	454	249
RF6 Building	20350	19.5	20	729	713504	188.88	980	478
Northwest Warehouse	18810	18.0	23	81	5057	14.83	100	61
RF6 Building Addition	9650	9.2	20	100	8933	21.13	128	72
Billet Storage Warehouse	5615	5.4	10	123	3482	18.66	149	98
Locker Rooms\Foreman Offices	5380	5.1	371	29	654	1.33	30	27
ES&H Bldg	2774	2.7	58	29	422	2.70	32	25
RF3 Bldg	2720	2.6	40	470	2297843	239.68	784	156
Tool Crib	2250	2.2	20	247	171235	92.53	370	124
Wastewater Treatment Plant	2024	1.9	20	15	232	3.40	20	11
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	20	25	578	5.38	32	17
Dock Area	1510	1.4	39	293	140370	59.99	372	214
Enclosed Rampway	1500	1.4	20	226	38171	43.69	284	168
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	20	151	34020	41.24	206	96
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	20	39	1254	7.92	50	29
Hazmat (RCRA) Storage Bldg	800	0.8	20	43	1509	8.69	55	32
Substation	474	0.5	20	31	1114	7.46	41	21
Guard House	317	0.3	8	31	594	8.62	43	19
Compressor Room	262	0.3	13	78	2798	14.67	97	58
Sewage Disposal Plant	128	0.1	4	52	1209	17.38	80	23
Emergency Equipment Storage Bldg.	120	0.1	20	14	178	2.98	18	10

* Values are based on a total area of 104,595 ft2.

Table A–3. Levels of net direct alpha radioactivity (dpm/100 sq cm) on various floors, RMI 1992.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	99	951	5131761	227.68	1246	656
Northwest Warehouse	18810	18.0	10	287	27220	52.17	359	215
RF6 Building Addition	9650	9.2	10	509	1058881	325.40	959	59
Billet Storage Warehouse	5615	5.4	11	235	36216	57.38	314	157
Locker Rooms\Foreman Offices	5380	5.1	45	140	112993	50.11	206	75
ES&H Bldg	2774	2.7	9	62	1005	10.57	77	47
Tool Crib	2250	2.2	14	121	4556	18.04	146	97
Wastewater Treatment Plant	2024	1.9	8	155	23369	54.05	231	78
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	4	88	1225	17.50	116	59
Dock Area	1510	1.4	17	239	45105	51.51	308	170
Enclosed Rampway	1500	1.4	4	284	151787	194.80	603	−35
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	4	281	78961	140.50	511	50
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	4	74	913	15.11	99	49
Hazmat (RCRA) Storage Bldg	800	0.8	19	507	959365	224.71	806	208
Guard House	317	0.3	4	93	2282	23.88	132	53
Compressor Room	262	0.3	7	130	1952	16.70	154	106

* Values are based on a total area of 104,595 ft2.

Table A-4. Levels of net direct beta radioactivity (dpm/100 sq cm) on various walls, RMI 1991.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	45	18803	1240000000	5249.34	25643	11963
RF6 Building	20350	19.5	20	12584	955000000	6910.14	21760	3407
Northwest Warehouse	18810	18.0	23	1292	8085163	592.90	2075	509
RF6 Building Addition	9650	9.2	20	368	210061	102.48	504	232
Billet Storage Warehouse	5615	5.4	10	714	711738	266.78	1083	345
Locker Rooms\Foreman Offices	5380	5.1	375	273	671467	42.32	327	218
ES&H Bldg	2774	2.7	58	216	115280	44.58	274	158
RF3 Bldg	2720	2.6	40	10144	802000000	4477.72	16010	4278
Tool Crib	2250	2.2	20	3955	99651477	2232.17	6919	991
Wastewater Treatment Plant	2024	1.9	20	663	1312574	256.18	1004	323
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	20	168	56899	53.34	239	97
Dock Area	1510	1.4	39	4996	90324641	1521.85	6989	3002
Enclosed Rampway	1500	1.4	20	691	549049	165.69	911	471
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	20	396	980398	221.40	690	102
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	20	604	446266	149.38	803	406
Hazmat (RCRA) Storage Bldg	800	0.8	20	263	155826	88.27	380	146
Substation	474	0.5	20	535	272866	116.80	690	380
Guard House	317	0.3	8	349	42831	73.17	452	245
Compressor Room	262	0.3	13	1415	582902	211.75	1703	1128
Sewage Disposal Plant	128	0.1	4	315	151814	194.82	634	−4
Emergency Equipment Storage Bldg.	120	0.1	20	10	469	4.84	16	3

* Values are based on a total area of 104,595 ft2.

Table A–5. Levels of net direct beta radioactivity (dpm/100 sq cm) on various floors, RMI 1992.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	64	362943	9240000000	12016	378516	347371
Northwest Warehouse	18810	18.0	8	121392	48400000000	77782	231454	11331
RF6 Building Addition	9650	9.2	8	80335	2610000000	18062	105893	54776
Billet Storage Warehouse	5615	5.4	12	34604	1330000000	10528	48953	20255
Locker Rooms\Foreman Offices	5380	5.1	50	18920	1630000000	5710	26360	11480
ES&H Bldg	2774	2.7	14	894	1141722	286	1280	509
Tool Crib	2250	2.2	10	10342	30364792	1743	12751	7932
Wastewater Treatment Plant	2024	1.9	12	5399	94394092	2805	9222	1576
Dock Area	1510	1.4	10	102011	23300000000	48270	168769	35254
Enclosed Rampway	1500	1.4	10	85115	8970000000	29950	126536	43694
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	8	8020	137000000	4138	13875	2164
Hazmat (RCRA) Storage Bldg	800	0.8	23	95298	25500000000	33297	139284	51313
Guard House	317	0.3	3	433	224401	273	949	−83

* Values are based on a total area of 104,595 ft2.

Table A–6. Levels of net removable alpha radioactivity (dpm/100 sq cm) on various walls, RMI 1991.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	45	419	1060102	153.5	618.9	219.0
RF6 Building	20350	19.5	20	1093	4199517	458.2	1701.6	484.5
Northwest Warehouse	18810	18.0	23	757	6942550	549.4	1482.8	31.3
RF6 Building Addition	9650	9.2	20	76	3886	13.9	94.6	57.5
Billet Storage Warehouse	5615	5.4	10	78	3059	17.5	102.0	53.6
Locker Rooms\Foreman Offices	5380	5.1	371	11	633	1.3	12.4	9.0
ES&H Bldg	2774	2.7	58	7	841	3.8	12.3	2.3
RF3 Bldg	2720	2.6	40	577	633778	125.9	742.0	412.2
Tool Crib	2250	2.2	20	83	10829	23.3	113.5	51.7
Wastewater Treatment Plant	2024	1.9	20	11	254	3.6	16.0	6.5
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	20	30	1639	9.1	42.4	18.3
Dock Area	1510	1.4	39	32	2130	7.4	41.9	22.5
Enclosed Rampway	1500	1.4	20	46	2774	11.8	61.9	30.6
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	20	118	20560	32.1	160.2	75.1
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	20	16	378	4.3	21.9	10.4
Hazmat (RCRA) Storage Bldg	800	0.8	20	28	648	5.7	35.8	20.6
Substation	474	0.5	20	26	963	6.9	35.4	16.9
Guard House	317	0.3	8	5	19	1.6	6.8	2.4
Compressor Room	262	0.3	20	28	686	5.9	35.4	19.8
Sewage Disposal Plant	128	0.1	4	12	78	4.4	18.7	4.3
Emergency Equipment Storage Bldg.	120	0.1	20	10	264	3.6	14.5	4.9

* Values are based on a total area of 104,595 ft2.

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Table A–7. Levels of net removable alpha radioactivity (dpm/100 sq cm) on various floors, RMI 1992.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	101	86.2	21710.4	14.66	105.2	67.2
Northwest Warehouse	18810	18.0	10	36.5	1142.5	10.69	51.3	21.7
RF6 Building Addition	9650	9.2	10	19.4	498.0	7.06	29.2	9.6
Billet Storage Warehouse	5615	5.4	10	13.8	175.4	4.19	19.6	8.0
Locker Rooms\Foreman Offices	5380	5.1	61	9.5	705.6	3.40	13.9	5.1
ES&H Bldg	2774	2.7	14	6.7	57.1	2.02	9.4	4.0
Tool Crib	2250	2.2	10	25.2	428.0	6.54	34.2	16.2
Wastewater Treatment Plant	2024	1.9	12	7.7	9.5	0.89	8.9	6.5
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	7	9.6	46.0	2.56	13.3	5.9
Dock Area	1510	1.4	20	11.5	239.5	3.46	16.1	6.9
Enclosed Rampway	1500	1.4	10	20.9	160.1	4.00	26.4	15.4
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	8	16.5	66.3	2.88	20.6	12.4
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	8	13.9	78.4	3.13	18.3	9.4
Hazmat (RCRA) Storage Bldg	800	0.8	22	33.0	2301.4	10.23	46.5	19.4
Guard House	317	0.3	3	3.7	2.3	0.88	5.3	2.0
Compressor Room	262	0.3	10	17.4	115.4	3.40	22.1	12.7

* Values are based on a total area of 104,595 ft2.

Table A–8. Levels of net removable beta radioactivity (dpm/100 sq cm) on various walls, RMI 1991.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	45	3972	40914013	954	5215	2730
RF6 Building	20350	19.5	20	12966	910000000	6745	21923	4008
Northwest Warehouse	18810	18.0	23	10168	1720000000	8648	21591	−1256
RF6 Building Addition	9650	9.2	20	871	3695353	430	1441	300
Billet Storage Warehouse	5615	5.4	10	430	125624	112	585	275
Locker Rooms\Foreman Offices	5380	5.1	371	67	78069	15	85	48
ES&H Bldg	2774	2.7	58	11	285	2	14	8
RF3 Bldg	2720	2.6	40	2955	21039144	725	3905	2005
Tool Crib	2250	2.2	20	1021	3718994	431	1593	448
Wastewater Treatment Plant	2024	1.9	20	92	20657	32	135	49
Stack 1A Bldg (Die Head Filter Bldg)	166[illegible]	1.6	20	372	628469	177	608	137
Dock Area	1510	1.4	39	464	519734	115	616	313
Enclosed Rampway	1500	1.4	20	354	271097	116	509	200
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	20	1509	5436095	521	2202	817
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	20	169	104993	72	265	73
Hazmat (RCRA) Storage Bldg	800	0.8	20	187	49414	50	253	121
Substation	474	0.5	20	212	78342	63	295	129
Guard House	317	0.3	8	30	825	10	44	16
Compressor Room	262	0.3	20	408	272153	117	562	253
Sewage Disposal Plant	128	0.1	4	198	3073	28	243	153
Emergency Equipment Storage Bldg.	120	0.1	20	34	3383	13	51	16

* Values are based on a total area of 104,595 ft2.

Table A–9. Levels of net removable beta radioactivity (dpm/100 sq cm) on various floors, RMI 1992.

Location	Area (ft2)	Percent *	n	Mean	Variance	Standard Error	90% Upper Confidence Interval	90% Lower Confidence Interval
Main Plant (High & Low Bays)	23749	22.7	100	539.4	1127113	106.17	677	402
Northwest Warehouse	18810	18.0	10	208.7	51832	71.99	308	109
RF6 Building Addition	9650	9.2	9	88.9	3747	20.40	117	60
Billet Storage Warehouse	5615	5.4	11	73.1	5435	22.23	104	43
Locker Rooms\Foreman Offices	5380	5.1	53	73.0	50083	30.74	113	33
ES&H Bldg	2774	2.7	20	37.4	1819	9.54	50	25
Tool Crib	2250	2.2	10	145.9	8925	29.87	187	105
Wastewater Treatment Plant	2024	1.9	11	68.3	2154	13.99	87	49
Stack 1A Bldg (Die Head Filter Bldg)	1680	1.6	8	49.9	1796	14.98	71	29
Dock Area	1510	1.4	17	70.8	12683	27.31	107	34
Enclosed Rampway	1500	1.4	10	95.0	8261	28.74	135	55
Stack 4A Bldg (Saw Filter Bldg)	1125	1.1	8	70.0	3877	22.01	101	39
Stack 3A Bldg (Runout Table Filter Bldg)	900	0.9	8	80.3	1784	14.93	101	59
Hazmat (RCRA) Storage Bldg	800	0.8	23	128.9	28488	35.19	175	82
Guard House	317	0.3	6	28.2	474	8.89	41	15
Compressor Room	262	0.3	10	163.9	23103	48.07	230	97

* Values are based on a total area of 104,595 ft2.

APPENDIX B

ESTABLISH INTERIOR SAMPLE GRID COORDINATES

ESTABLISH INTERIOR SAMPLE GRID COORDINATES

1.0 Objective

To establish a 3-dimensional coordinate grid on the floors, walls and ceilings in each building.

2.0 Scope of Work

The coordinate grid system shall establish the basis for all interior characterization activities. One meter grids shall be used. This grid shall be established such that specified sample points can be accurately located and reproduced at a later date. Data collected for each grid shall be recorded and tracked via the grid identification number.

3.0 Primary Equipment/Instrumentation

1) Measuring tape (calibrated)
2) Permanent marker
3) Identification marker
4) Ladders, lifts, etc. to reach elevated areas
5) Transient, electronic
6) Laser Beam

4.0 Task Elements

1) Obtain an RWP for the task, have all personnel read it, and sign off. Ensure that project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Remove all packaging prior to entry into the work area to minimize radioactive waste generation.

3) Obtain all required personnel protective equipment specified in the RWP.

4) Review building drawings, located in Appendix K, showing wall, floor and ceiling sample locations. The random sample locations are also listed in Tables C-1 through C-20 in Appendix C. Ceiling grids are defined by the floor coordinate grid.

5) Establish the interior grid coordinates as follows.
   (1) Define the southwest corner of the building as the origin (X0, Y0, Z0) of the coordinate system and permanently mark it as such.

(2) Using a permanent marker and the sample location drawings, establish reference lines on the floor and walls with one meter increments. These reference lines should be drawn on the floor near the base of each wall and each corner of the building. For large areas, such as the main plant area, additional reference lines may be drawn on the walls to facilitate locating the grid locations.

Note: Do not assume the building is square. At a minimum, verify the zero point off each reference line is accurately marked with respect to the building origin. The configuration of some buildings will require the use of negative numbers to identify some grid locations.

(3) Identify the distance from the origin at least every five (5) meters along the reference lines. All measurements shall be in meters.

5.0 Quality Assurance Requirements

The quality assurance associated with this task shall include the following:

1) All measurements shall be made using a calibrated measuring tape or electronic transient.

2) All field activities shall be recorded in a field log book.

3) Personnel shall be trained in accordance with all applicable procedures. Personnel training shall be periodically reviewed and updated. Personnel training records shall be documented.

4) The project supervisor shall independently verify the zero points of each reference line. These points shall be no more than 2.5 cm (approximately 1 inch) off-line from the origin. Verification of these points shall be documented in the field logbook.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this task shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

APPENDIX C

SURVEY INTERIOR RANDOM SAMPLE LOCATIONS FOR RADIOACTIVE CONTAMINATION

SURVEY INTERIOR RANDOM SAMPLE LOCATIONS FOR RADIOACTIVE CONTAMINATION

1.0 Objective

To assess the extent and degree of radioactive surface contamination in the RMI buildings by surveying random locations within each building.

2.0 Scope of Work

Tables C-1 through C-20 identify random building wall, floor, and ceiling grids for direct (fixed) and removable (smearable) gross alpha and beta radioactivity surveying. Survey data will be evaluated to determine the number of surveys needed to meet the desired confidence and to identify locations for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis. All survey data shall be collected and recorded using the identification number located for that grid location.

3.0 Primary Equipment/Instrumentation

1) Whatman 50 filter paper or equivalent, approximately 47 mm diameter

2) Coin envelope

3) Tape

4) Latex or cotton gloves

5) Monitoring equipment for beta surveys - Ludlum Model 177 meter with a G-M type Ludlum Model 44-9 probe or approved equal

6) Monitoring equipment for alpha surveys - Eberline ESP-2 meter with a Ludlum Alpha Scintillation probe or approved equal

7) Monitoring equipment for dose rate surveys - Victoreen 450P ion chamber meter or approved equal

8) Protective clothing and equipment as required by RWP

9) Grease pencil

4.0 Task Elements

1) Obtain an RWP for the task, have all project personnel read it and sign off. Ensure project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for the day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required personnel protective equipment specified in the RWP.

4) Prepare to perform the required surveys by obtaining required instrumentation, work instructions, data forms, etc.

5) Perform pre-operational survey instrumentation checks in accordance with approved procedures.

6) Verify a reference grid system within the survey/sampling location has been established. Locate the grid to be surveyed. Using a grease pencil, indicate the four corners of the grid and write the corresponding sample number and grid location on the surface.

7) Conduct direct alpha and beta surface contamination surveys in accordance with approved procedures.

8) Conduct an indirect (removable) contamination survey for each identified area of elevated activity in accordance with approved procedures. Both the direct beta and direct alpha contamination surveys should be conducted for the identified grid before taking the removable survey.

9) Suggested sample locations for total U, isotopic U, Th-232, Tc-99 and/or isotopic plutonium analysis are identified with an "*" in Tables C-1 through C-20. Work instructions will be issued to identify specific locations to be sampled and the analyses required.

5.0 Quality Assurance Requirements

QA shall be maintained during this task by implementing the following tasks:

1) Document daily work activities in a field logbook. This logbook should contain descriptions of daily activities, personnel involved, grid locations surveyed, survey sheet numbers, unusual occurrences, etc.

2) Personnel shall be trained in accordance with all applicable procedures. Training shall be documented and periodically reviewed and updated.

3) Chain-of-custody forms shall be used for samples sent to either the RMI laboratory or an off-site laboratory for analyses. All samples shall be labeled with the sampler's name, date, time, sample number/smear number, and analysis required.

4) Field survey instruments shall be calibrated once a quarter and a response check shall be performed daily. All standards shall be traceable to an NIST standard.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

TABLE C-1
RF6 BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X23, Y24
2. X22, Y21
3. X10, Y5
4. X28, Y24
5. X16, Y25
6. X14, Y24
7. X38, Y23
8. X14, Y27
9. X11, Y12
10. X14, Y1
11. X25, Y28
12. X29, Y11
13. X31, Y21
14. X2, Y14
15. X32, Y7
16. X22, Y15
17. X16, Y28
18. X34, Y25
19. X32, Y9
20. X48, Y26*
21. X33, Y25
22. X6, Y17
23. X3, Y19
24. X49, Y27
25. X12, Y6
26. X41, Y16
27. X5, Y26
28. X31, Y4
29. X31, Y18
30. X28, Y1
31. X35, Y5
32. X9, Y16
33. X9, Y22
34. X36, Y26
35. X18, Y21
36. X30, Y25
37. X22, Y18
38. X11, Y20
39. X12, Y10
40. X62, Y27*
41. X58, Y28
42. X30, Y5
43. X1, Y12
44. X9, Y30
45. X6, Y23
46. X42, Y29
47. X53, Y30
48. X21, Y13
49. X31, Y20
50. X58, Y30
51. X27, Y25
52. X35, Y19
53. X18, Y24
54. X44, Y20
55. X15, Y3
56. X15, Y25
57. X46, Y26
58. X26, Y8
59. X7, Y27
60. X32, Y26*
61. X38, Y20
62. X24, Y17
63. X3, Y31
64. X37, Y26
65. X56, Y27
66. X34, Y27
67. X32, Y30
68. X4, Y17
69. X25, Y17
70. X3, Y11
71. X33, Y3
72. X19, Y27
73. X46, Y29
74. X43, Y31
75. X26, Y17
76. X24, Y21
77. X43, Y18
78. X46, Y19
79. X23, Y19
80. X12, Y23*
81. X2, Y27
82. X42, Y28
83. X37, Y25
84. X48, Y28
85. X26, Y12
86. X6, Y13
87. X40, Y29
88. X44, Y26
89. X25, Y9
90. X29, Y21
91. X20, Y25
92. X44, Y16
93. X45, Y24
94. X1[illegible], Y22
95. X55, Y29
96. X12, Y28
97. X30, Y23
98. X57, Y31
99. X31, Y30
100. X37, Y18*
101. X19, Y23
102. X28, Y30
103. X11, Y21
104. X37, Y23
105. X56, Y31
106. X5, Y18
107. X44, Y30
108. X45, Y25
109. X1, Y9
110. X46, Y25
111. X31, Y28
112. X55, Y26
113. X29, Y6
114. X18, Y1
115. X6, Y28
116. X34, Y12
117. X3, Y26
118. X10, Y14
119. X4, Y24
120. X28, Y15*
121. X38, Y22
122. X40, Y16
123. X22, Y28
124. X28, Y7
125. X39, Y24
126. X30, Y22

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Building
Random Sample Locations
(continued)

Floor Samples (continued):

127. X23, Y20
128. X15, Y4
129. X4, Y29
130. X26, Y24
131. X41, Y18
132. X21, Y27
133. X2, Y13
134. X24, Y26
135. X32, Y22
136. X27, Y13
137. X34, Y19
138. X35, Y21
139. X8, Y2
140. X45, Y19*
141. X29, Y15
142. X22, Y30
143. X22, Y17
144. X41, Y25
145. X47, Y16
146. X29, Y27
147. X11, Y18
148. X5, Y22
149. X34, Y10
150. X36, Y21
151. X40, Y27
152. X4, Y28
153. X36, Y3
154. X26, Y13
155. X40, Y19
156. X44, Y27
157. X9, Y31
158. X42, Y18
159. X60, Y30
160. X8, Y20*
161. X16, Y23
162. X46, Y18
163. X25, Y14
164. X36, Y20
165. X42, Y20
166. X3, Y22
167. X38, Y25
168. X61, Y29
169. X23, Y13
170. X8, Y1
171. X48, Y31
172. X30, Y24
173. X6, Y26
174. X5, Y19
175. X56, Y28
176. X33, Y7
177. X45, Y27
178. X55, Y28
179. X31, Y11
180. X30, Y12*
181. X41, Y21
182. X10, Y10
183. X42, Y25
184. X28, Y10
185. X23, Y29
186. X38, Y19
187. X35, Y25
188. X12, Y3
189. X11, Y4
190. X35, Y6
191. X31, Y6
192. X11, Y5
193. X28, Y21
194. X30, Y3
195. X28, Y9
196. X46, Y28
197. X53, Y29
198. X40, Y31
199. X33, Y10
200. X36, Y1*
201. X55, Y31
202. X22, Y3
203. X16, Y3
204. X52, Y28
205. X17, Y26
206. X28, Y13
207. X23, Y7
208. X6, Y16
209. X26, Y29
210. X46, Y27
211. X12, Y22
212. X29, Y1
213. X45, Y20
214. X21, Y31
215. X21, Y28
216. X53, Y28
217. X27, Y28
218. X33, Y8
219. X22, Y10
220. X57, Y26*
221. X40, Y24
222. X51, Y30
223. X1, Y20
224. X26, Y10
225. X57, Y25
226. X35, Y4
227. X41, Y29
228. X61, Y26
229. X11, Y16
230. X13, Y22
231. X8, Y26
232. X21, Y14
233. X51, Y28
234. X23, Y14
235. X8, Y23
236. X10, Y17
237. X59, Y28
238. X25, Y15
239. X23, Y27
240. X2, Y30*
241. X13, Y27
242. X17, Y2
243. X20, Y4
244. X31, Y17
245. X6, Y12
246. X24, Y2
247. X43, Y24
248. X5, Y29
249. X10, Y27
250. X2, Y12
251. X62, Y28
252. X12, Y25

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Building
Random Sample Locations
(continued)

Floor Samples (continued):

253. X18, Y27
254. X41, Y23
255. X55, Y29
556. X1, Y21
257. X24, Y6
258. X22, Y23
259. X29, Y2
260. X33, Y27*
261. X30, Y20
262. X33, Y13
263. X46, Y23
264. X37, Y27
265. X21, Y20
266. X29, Y19
267. X43, Y26
268. X10, Y8
269. X29, Y10
270. X22, Y1
271. X25, Y23
272. X28, Y26
273. X21, Y25
274. X26, Y9
275. X4, Y12
276. X22, Y20
277. X21, Y2
278. X23, Y26
279. X10, Y9
280. X58, Y25*
281. X7, Y22
282. X36, Y19*

Ceiling Samples:

1. X44, Y21
2. X30, Y25
3. X58, Y2
4. X10, Y17
5. X19, Y24
6. X44, Y29
7. X61, Y23
8. X27, Y15
9. X50, Y7
10. X49, Y27
11. X4, Y6
12. X52, Y29
13. X60, Y13
14. X16, Y15
15. X53, Y28
16. X6, Y26
17. X44, Y27
18. X39, Y25
19. X12, Y6
20. X48, Y7
21. X19, Y16
22. X45, Y18
23. X62, Y2
24. X58, Y3
25. X53, Y13
26. X42, Y13
27. X5, Y1
28. X35, Y6
29. X10, Y23
30. X55, Y22
31. X11, Y1
32. X47, Y27
33. X13, Y15
34. X31, Y27
35. X53, Y2
36. X3, Y15
37. X9, Y22
38. X5, Y15
39. X46, Y22
40. X10, Y15*
41. X18, Y5
42. X3, Y30
43. X22, Y30
44. X28, Y28
45. X42, Y19
46. X48, Y17
47. X18, Y13
48. X8, Y1
49. X38, Y24
50. X4, Y18
51. X32, Y13
52. X19, Y21
53. X51, Y2
54. X47, Y10
55. X25, Y11
56. X37, Y11
57. X57, Y25
58. X19, Y29
59. X50, Y9
60. X56, Y16
61. X12, Y16
62. X45, Y16
63. X46, Y25
64. X51, Y7
65. X62, Y22
66. X23, Y5
67. X52, Y27
68. X3, Y11
69. X51, Y19
70. X51, Y23
71. X10, Y29

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Building
Random Sample Locations
(continued)

North Wall Samples:

1. X29, Z4
2. X4, Z5
3. X36, Z4
4. X34, Z5
5. X54, Z3
6. X19, Z1
7. X51, Z3
8. X19, Z2
9. X11, Z5
10. X40, Z3
11. X25, Z2
12. X61, Z5
13. X4, Z3
14. X37, Z2
15. X1, Z3
16. X58, Z3
17. X53, Z4
18. X37, Z5
19. X27, Z1
20. X20, Z3
21. X42, Z1
22. X55, Z1
23. X9, Z4
24. X4, Z1
25. X6, Z2
26. X30, Z5
27. X53, Z2
28. X20, Z5
29. X29, Z3
30. X34, Z4
31. X14, Z3
32. X12, Z3
33. X60, Z1
34. X30, Z4
35. X38, Z3
36. X45, Z5

South Wall Samples:

1. X44, Z1
2. X57, Z4
3. X22, Z5
4. X49, Z4
5. X24, Z1
6. X20, Z5
7. X7, Z2
8. X61, Z1
9. X50, Z3
10. X18, Z2
11. X50, Z4
12. X19, Z4
13. X41, Z1
14. X32, Z5
15. X54, Z5
16. X60, Z4
17. X41, Z4
18. X61, Z2
19. X15, Z4
20. X18, Z3
21. X35, Z4
22. X59, Z5
23. X50, Z5
24. X10, Z5
25. X38, Z2
26. X26, Z2
27. X27, Z5
28. X44, Z5
29. X4, Z2
30. X21, Z2
31. X53, Z5
32. X7, Z4
33. X57, Z3
34. X11, Z5
35. X43, Z1

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Building
Random Sample Locations
(continued)

West Wall Samples:		East Wall Samples:	
1.	Y27, Z2	1.	Y19 Z1
2.	Y30, Z2	2.	Y5, Z6
3.	Y15, Z5	3.	Y6, Z4
4.	Y6, Z3	4.	Y1, Z4
5.	Y9, Z4	5.	Y2, Z4
6.	Y10, Z4	6.	Y9, Z4
7.	Y29, Z5	7.	Y18, Z2
8.	Y8, Z2	8.	Y9, Z6
9.	Y21, Z4	9.	Y7, Z5
10.	Y22, Z1	10.	Y16, Z4
11.	Y1, Z3	11.	Y12, Z4
12.	Y4, Z2	12.	Y20, Z1
13.	Y17, Z4	13.	Y4, Z4
14.	Y28, Z2	14.	Y3, Z5
15.	Y29, Z4	15.	Y11, Z4
16.	Y17, Z1	16.	Y26, Z3
17.	Y6, Z2	17.	Y9, Z5
18.	Y26, Z3	18.	Y31, Z1
19.	Y5, Z4	19.	Y24, Z6
20.	Y2, Z5	20.	Y8, Z6
21.	Y29, Z3	21.	Y20, Z3
22.	Y31, Z4	22.	Y26, Z5
23.	Y1, Z1	23.	Y31, Z3
24.	Y3, Z3	24.	Y23, Z6
25.	Y13, Z3	25.	Y19, Z2
26.	Y14, Z3	26.	Y25, Z4
27.	Y18, Z4	27.	Y13, Z5
28.	Y2, Z2	28.	Y30, Z5
29.	Y22, Z5	29.	Y19, Z3
30.	Y19, Z4	30.	Y31, Z5
31.	Y30, Z1	31.	Y6, Z6
32.	Y30, Z4	32.	Y25, Z5
33.	Y11, Z1	33.	Y23, Z5
34.	Y23, Z4	34.	Y7, Z4
35.	Y6, Z6		

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-2
NORTHWEST STORAGE BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X28, Y21
2. X16, Y19
3. X7, Y44
4. X11, Y25
5. X33, Y8
6. X10, Y32
7. X7, Y9
8. X34, Y10
9. X6, Y39
10. X24, Y3
11. X14, Y23
12. X33, Y42
13. X11, Y38
14. X31, Y39
15. X23, Y30
16. X12, Y43
17. X13, Y34
18. X11, Y43
19. X24, Y13
20. X25, Y6*
21. X35, Y18
22. X15, Y45
23. X33, Y5
24. X19, Y7
25. X27, Y32
26. X23, Y12
27. X9, Y30
28. X13, Y13
29. X24, Y29
30. X29, Y16
31. X35, Y45
32. X8, Y4
33. X20, Y31
34. X10, Y28
35. X26, Y26
36. X30, Y27
37. X29, Y31
38. X21, Y7
39. X14, Y37
40. X23, Y9*
41. X29, Y6
42. X33, Y27
43. X29, Y11
44. X26, Y35
45. X27, Y39
46. X10, Y18
47. X8, Y8
48. X32, Y8
49. X34, Y2
50. X31, Y36
51. X3, Y32
52. X28, Y26
53. X31, Y21
54. X32, Y31
55. X28, Y12
56. X24, Y46
57. X29, Y37
58. X6, Y25
59. X18, Y24
60. X15, Y3*
61. X4, Y21
62. X27, Y23
63. X2, Y24
64. X8, Y42
65. X9, Y21
66. X22, Y18
67. X5, Y15
68. X27, Y43
69. X7, Y2
70. X23, Y3
71. X13, Y24
72. X7, Y8
73. X4, Y2
74. X18, Y2
75. X33, Y38
76. X22, Y17
77. X17, Y11
78. X3, Y43
79. X24, Y26
80. X8, Y3*
81. X30, Y7
82. X11, Y22
83. X26, Y43
84. X22, Y49
85. X29, Y47
86. X25, Y40
87. X18, Y45
88. X8, Y39
89. X33, Y4
90. X2, Y48
91. X17, Y4
92. X9, Y9
93. X13, Y37
94. X16, Y13
95. X12, Y3
96. X13, Y8
97. X31, Y14
98. X7, Y42
99. X1, Y46
100. X7, Y16*
101. X18, Y4
102. X25, Y46
103. X1, Y23
104. X16, Y24
105. X26, Y21
106. X28, Y34
107. X7, Y3
108. X9, Y8
109. X5, Y4
110. X32, Y43
111. X28, Y17
112. X19, Y4
113. X31, Y9
114. X9, Y10
115. X22, Y7
116. X31, Y20
117. X18, Y25
118. X28, Y2
119. X28, Y13
120. X29, Y26*
121. X22, Y20
122. X20, Y26
123. X17, Y43

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Northwest Storage Building
Random Sample Locations (continued)

Floor Samples (continued):

124. X25, Y33
125. X3, Y24
126. X11, Y36
127. X19, Y33
128. X12, Y33
129. X14, Y40
130. X34, Y4
131. X17, Y36
132. X2, Y10
133. X21, Y46
134. X23, Y29
135. X26, Y29
136. X29, Y4
137. X28, Y27
138. X2, Y2
139. X26, Y28
140. X7, Y23*
141. X6, Y16
142. X31, Y15
143. X4, Y1
144. X16, Y25
145. X6, Y9
146. X3, Y23
147. X33, Y22
148. X9, Y37
149. X13, Y17
150. X28, Y33
151. X32, Y6
152. X21, Y20
153. X5, Y24
154. X6, Y42
155. X26, Y44
156. X16, Y22
157. X21, Y9
158. X27, Y46
159. X9, Y43
160. X33, Y13*
161. X33, Y6
162. X31, Y2
163. X24, Y45
164. X11, Y18
165. X34, Y26
166. X12, Y1
167. X2, Y23
168. X25, Y30
169. X4, Y45
170. X27, Y2
171. X16, Y10
172. X22, Y23
173. X5, Y25
174. X35, Y8
175. X17, Y12
176. X33, Y18
177. X27, Y47
178. X11, Y30
179. X29, Y50
180. X30, Y17*
181. X31, Y27
182. X7, Y19
183. X13, Y3
184. X18, Y7
185. X2, Y20
186. X3, Y19
187. X8, Y36
188. X28, Y40
189. X27, Y40
190. X17, Y5
191. X9, Y44
192. X24, Y2
193. X12, Y44
194. X8, Y41
195. X34, Y44
196. X15, Y15
197. X15, Y17
198. X14, Y5
199. X30, Y50
200. X28, Y30*
201. X29, Y23
202. X7, Y45
203. X21, Y39
204. X4, Y23
205. X10, Y11
206. X17, Y23
207. X8, Y15
208. X27, Y7
209. X26, Y9
210. X9, Y40
211. X26, Y14
212. X8, Y10
213. X12, Y15
214. X28, Y7
215. X33, Y28
216. X28, Y23
217. X14, Y3
218. X25, Y20
219. X14, Y7
220. X24, Y22*
221. X27, Y37
222. X2, Y50
223. X17, Y41
224. X34, Y42
225. X29, Y33
226. X4, Y11
227. X19, Y8
228. X28, Y28
229. X35, Y31
230. X1, Y17
231. X35, Y23
232. X24, Y24
233. X30, Y30
234. X1, Y13
235. X21, Y26
236. X35, Y29
237. X26, Y50
238. X3, Y18
239. X24, Y39
240. X17, Y39*
241. X14, Y6
242. X14, Y33
243. X22, Y30
244. X20, Y29
245. X34, Y11
246. X21, Y38
247. X6, Y4
248. X16, Y5
249. X25, Y43

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Northwest Storage Building
Random Sample Locations
(continued)

Floor Samples (continued):

250. X1, Y7
251. X33, Y19
252. X19, Y14
253. X10, Y42
254. X22, Y48
255. X33, Y50
256. X30, Y29
257. X11, Y40
258. X21, Y21
259. X15, Y10
260. X18, Y13*
261. X26, Y38*

Ceiling Samples:

1. X29, Y28
2. X21, Y48
3. X35, Y15
4. X7, Y43
5. X21, Y42
6. X20, Y40
7. X35, Y3
8. X35, Y36
9. X7, Y50
10. X12, Y9
11. X13, Y25
12. X7, Y15
13. X29, Y30
14. X6, Y38
15. X29, Y2
16. X23, Y35
17. X13, Y31
18. X32, Y38
19. X8, Y16
20. X10, Y30
21. X28, Y43
22. X19, Y17
23. X3, Y38
24. X12, Y16
25. X30, Y14
26. X6, Y12
27. X11, Y46
28. X33, Y16
29. X23, Y8
30. X23, Y5
31. X28, Y5
32. X2, Y3
33. X10, Y2
34. X18, Y28
35. X26, Y40
36. X18, Y8
37. X2, Y25
38. X28, Y8
39. X34, Y17
40. X14, Y29
41. X2, Y15
42. X3, Y46
43. X31, Y49
44. X9, Y25
45. X30, Y20
46. X26, Y10
47. X19, Y18
48. X3, Y34
49. X26, Y7
50. X29, Y22
51. X1, Y26
52. X24, Y25
53. X16, Y41
54. X19, Y42
55. X6, Y31
56. X17, Y35
57. X19, Y19
58. X20, Y47
59. X34, Y6
60. X10, Y46
61. X25, Y39
62. X9, Y3
63. X1, Y50
64. X1, Y5
65. X9, Y29

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Northwest Storage Building
Random Sample Locations
(continued)

South Wall Samples:

1. X5, Z5
2. X5, Z1
3. X10, Z1
4. X6, Z3
5. X26, Z3
6. X30, Z1
7. X31, Z5
8. X21, Z5
9. X9, Z3
10. X8, Z3
11. X3, Z4
12. X7, Z5
13. X33, Z3
14. X25, Z4
15. X7, Z4
16. X16, Z2
17. X23, Z4
18. X20, Z5
19. X31, Z4
20. X25, Z1
21. X8, Z4
22. X3, Z1
23. X2, Z2
24. X18, Z5
25. X5, Z3
26. X20, Z4
27. X4, Z2
28. X32, Z4
29. X4, Z1
30. X16, Z1
31. X7, Z2
32. X9, Z2

North Wall Samples:

1. X35, Z2
2. X28, Z4
3. X23, Z1
4. X24, Z4
5. X25, Z3
6. X28, Z5
7. X22, Z1
8. X2, Z4
9. X23, Z5
10. X30, Z5
11. X33, Z4
12. X23, Z4
13. X27, Z3
14. X32, Z4
15. X30, Z4
16. X28, Z3
17. X27, Z1
18. X24, Z1
19. X29, Z3
20. X1, Z1
21. X26, Z5
22. X35, Z3
23. X1, Z2
24. X33, Z5
25. X22, Z3
26. X35, Z4
27. X34, Z5
28. X29, Z4
29. X22, Z5
30. X2, Z3
31. X1, Z5
32. X25, Z2

East Wall Samples:

1. Y22, Z3
2. Y33, Z2
3. Y9, Z3
4. Y50, Z2
5. Y29, Z1
6. Y6, Z5
7. Y9, Z1
8. Y45, Z3
9. Y21, Z5
10. Y19, Z5
11. Y27, Z1
12. Y40, Z5
13. Y49, Z1
14. Y50, Z4
15. Y50, Z5
16. Y42, Z3
17. Y3, Z5
18. Y24, Z5

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Northwest Storage Building
Random Sample Locations
(continued)

East Wall Samples (continued):

19.	Y30, Z1	27.	Y15, Z3
20.	Y3, Z2	28.	Y28, Z3
21.	Y23, Z1	29.	Y48, Z5
22.	Y12, Z4	30.	Y19, Z4
23.	Y34, Z2	31.	Y50, Z1
24.	Y30, Z3	32.	Y50, Z3
25.	Y42, Z1	33.	Y16, Z3
26.	Y26, Z1		

West Wall Samples:

1.	Y12, Z5	18.	Y24, Z1
2.	Y20, Z3	19.	Y7, Z4
3.	Y24, Z3	20.	Y35, Z1
4.	Y2, Z3	21.	Y38, Z3
5.	Y8, Z3	22.	Y15, Z4
6.	Y42, Z4	23.	Y37, Z4
7.	Y41, Z1	24.	Y35, Z5
8.	Y5, Z1	25.	Y3, Z3
9.	Y23, Z2	26.	Y2, Z1
10.	Y19, Z1	27.	Y7, Z5
11.	Y7, Z1	28.	Y23, Z3
12.	Y13, Z2	29.	Y34, Z2
13.	Y7, Z3	30.	Y44, Z2
14.	Y5, Z5	31.	Y9, Z5
15.	Y47, Z3	32.	Y38, Z1
16.	Y16, Z2	33.	Y45, Z2
17.	Y28, Z5		

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-3
MAIN PLANT (HIGH BAY)
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X52, Y7
2. X11, Y15
3. X85, Y6
4. X25, Y7
5. X28, Y4
6. X34, Y8
7. X79, Y10
8. X18, Y14
9. X71, Y14
10. X84, Y16
11. X31, Y8
12. X22, Y13
13. X47, Y15
14. X68, Y4
15. X55, Y3
16. X31, Y2
17. X26, Y15
18. X9, Y12
19. X71, Y13
20. X30, Y7*
21. X32, Y4
22. X85, Y1
23. X76, Y12
24. X76, Y6
25. X39, Y1
26. X3, Y15
27. X56, Y14
28. X11, Y1
29. X42, Y5
30. X14, Y14
31. X42, Y10
32. X18, Y2
33. X2, Y6
34. X69, Y12
35. X61, Y7
36. X69, Y5
37. X8, Y15
38. X37, Y3
39. X65, Y4
40. X77, Y8*
41. X13, Y11
42. X21, Y13
43. X43, Y3
44. X48, Y14
45. X35, Y2
46. X68, Y10
47. X71, Y12
48. X20, Y16
49. X41, Y8
50. X19, Y11
51. X44, Y7
52. X8, Y16
53. X5, Y13
54. X83, Y4
55. X7, Y10
56. X28, Y1
57. X37, Y5
58. X55, Y2
59. X24, Y8
60. X55, Y12*
61. X36, Y8
62. X88, Y8
63. X55, Y15
64. X52, Y2
65. X78, Y4
66. X41, Y15
67. X27, Y2
68. X6, Y13
69. X82, Y1
70. X75, Y6
71. X45, Y4
72. X21, Y1
73. X84, Y8
74. X14, Y12
75. X73, Y7
76. X48, Y10
77. X60, Y13
78. X58, Y8
79. X87, Y7
80. X82, Y14*
81. X49, Y7
82. X69, Y9
83. X31, Y1
84. X82, Y16
85. X31, Y6
86. X42, Y6
87. X86, Y3
88. X80, Y2
89. X72, Y7
90. X56, Y7
91. X37, Y15
92. X79, Y8
93. X73, Y2
94. X38, Y1
95. X43, Y1
96. X60, Y15
97. X84, Y15
98. X55, Y8
99. X71, Y15
100. X52, Y8*
101. X42, Y11
102. X80, Y12
103. X74, Y12
104. X69, Y1
105. X69, Y15
106. X87, Y11
107. X42, Y1
108. X71, Y11
109. X61, Y2
110. X44, Y16
111. X54, Y12
112. X86, Y2
113. X74, Y4
114. X48, Y11
115. X38, Y4
116. X57, Y14
117. X70, Y10
118. X46, Y1
119. X37, Y8
120. X66, Y4*
121. X43, Y4
122. X84, Y2
123. X36, Y6
124. X77, Y9
125. X81, Y11
126. X14, Y11

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Main Plant (High Bay)
Random Sample Locations
(continued)

Floor Samples (continued):

127. X48, Y8
128. X64, Y1
129. X70, Y6
130. X67, Y5
131. X32, Y2
132. X2, Y3
133. X56, Y6
134. X2, Y5
135. X20, Y5
136. X45, Y13
137. X86, Y6
138. X51, Y12
139. X69, Y6
140. X25, Y4*
141. X47, Y6
142. X28, Y2
143. X27, Y13
144. X28, Y7
145. X29, Y4
146. X13, Y8
147. X14, Y3
148. X87, Y13
149. X71, Y7
150. X12, Y13
151. X82, Y3
152. X22, Y14
153. X18, Y10
154. X52, Y1
155. X16, Y4
156. X7, Y1
157. X9, Y1
158. X1, Y6
159. X11, Y10
160. X20, Y1*
161. X13, Y10
162. X1, Y1
163. X25, Y11
164. X13, Y15
165. X3, Y14
166. X28, Y10
167. X5, Y10
168. X18, Y5
169. X27, Y6
170. X29, Y14
171. X9, Y13
172. X12, Y8
173. X2, Y9
174. X16, Y3
175. X19, Y12
176. X14, Y13
177. X21, Y7
178. X5, Y9
179. X3, Y1
180. X27, Y3*
181. X21, Y11
182. X12, Y15
183. X7, Y7
184. X12, Y6
185. X16, Y7
186. X20, Y13
187. X5, Y1
188. X13, Y5
189. X28, Y13
190. X3, Y7
191. X13, Y12
192. X74, Y5
193. X60, Y12
194. X40, Y11
195. X1, Y7
196. X46, Y5
197. X62, Y14
198. X10, Y11
199. X19, Y8
200. X3, Y10*
201. X72, Y4
202. X76, Y9
203. X48, Y2
204. X17, Y3
205. X11, Y3
206. X7, Y15
207. X71, Y3
208. X42, Y13
209. X82, Y2
210. X12, Y3
211. X75, Y16
212. X59, Y16
213. X31, Y14*

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Main Plant (High Bay)
Random Sample Locations
(continued)

Ceiling Samples:

1. X72, Y4
2. X73, Y16
3. X71, Y5
4. X55, Y9
5. X9, Y4
6. X76, Y6
7. X86, Y11
8. X33, Y7
9. X84, Y14
10. X3, Y10
11. X61, Y14
12. X15, Y6
13. X13, Y1
14. X7, Y8
15. X62, Y6
16. X33, Y15
17. X38, Y8
18. X1, Y2
19. X5, Y2
20. X55, Y11
21. X59, Y9
22. X83, Y2
23. X56, Y11
24. X34, Y9
25. X7, Y10
26. X46, Y7
27. X50, Y15
28. X84, Y4
29. X20, Y7
30. X73, Y8
31. X62, Y7
32. X12, Y8
33. X23, Y10
34. X73, Y6
35. X65, Y14
36. X11, Y9
37. X54, Y5
38. X18, Y4
39. X25, Y14
40. X43, Y9
41. X81, Y12
42. X44, Y8
43. X20, Y2
44. X16, Y9
45. X78, Y14
46. X4, Y6
47. X71, Y2
48. X74, Y13
49. X69, Y16
50. X67, Y14
51. X38, Y6
52. X55, Y16
53. X31, Y9

North Wall Samples:

1. X2, Z5
2. X29, Z12
3. X5, Z14
4. X75, Z15
5. X7, Z11
6. X58, Z3
7. X12, Z15
8. X4, Z1
9. X69, Z3
10. X45, Z4
11. X52, Z4
12. X34, Z15
13. X42, Z1
14. X27, Z7
15. X7, Z15
16. X59, Z12
17. X45, Z12
18. X17, Z4
19. X85, Z9
20. X19, Z3
21. X63, Z2
22. X71, Z12
23. X35, Z10
24. X8, Z8
25. X35, Z1
26. X82, Z8
27. X24, Z4
28. X42, Z8
29. X88, Z12
30. X56, Z14
31. X33, Z4
32. X26, Z5
33. X67, Z3
34. X5, Z11
35. X19, Z12
36. X36, Z5
37. X20, Z10
38. X63, Z15
39. X19, Z2
40. X36, Z10
41. X88, Z2
42. X67, Z2
43. X64, Z13
44. X56, Z1
45. X77, Z15
46. X28, Z8
47. X28, Z3
48. X77, Z2
49. X78, Z5
50. X59, Z11
51. X72, Z3
52. X87, Z12

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Main Plant (High Bay)
Random Sample Locations
(continued)

South Wall Samples:

1.	X87, Z9	18.	X22, Z3
2.	X1, Z4	19.	X17, Z7
3.	X24, Z4	20.	X6, Z7
4.	X16, Z15	21.	X73, Z13
5.	X81, Z3	22.	X87, Z10
6.	X8, Z1	23.	X11, Z2
7.	X23, Z12	24.	X52, Z11
8.	X86, Z2	25.	X72, Z12
9.	X74, Z15	26.	X35, Z11
10.	X13, Z5	27.	X25, Z2
11.	X56, Z11	28.	X21, Z14
12.	X9, Z2	29.	X30, Z10
13.	X76, Z11	30.	X28, Z11
14.	X8, Z4	31.	X60, Z11
15.	X56, Z12	32.	X86, Z10
16.	X17, Z12	33.	X84, Z10
17.	X14, Z3	34.	X17, Z5

East Wall Samples:

1. Y15, Z9
2. Y4, Z8
3. Y12, Z9
4. Y12, Z3
5. Y3, Z13
6. Y11, Z3
7. Y4, Z14
8. Y5, Z13
9. Y16, Z8
10. Y16, Z11

West Wall Samples:

1. Y8, Z9
2. Y3, Z7
3. Y1, Z5
4. Y13, Z11
5. Y16, Z5
6. Y14, Z9
7. Y2, Z12
8. Y8, Z15
9. Y4, Z15
10. Y6, Z15

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-4
RF6 BUTLER BUILDING ADDITION
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X13, Y5
2. X18, Y25
3. X24, Y26
4. X26, Y30
5. X13, Y6
6. X7, Y28
7. X10, Y4
8. X10, Y9
9. X13, Y17
10. X7, Y22
11. X13, Y14
12. X25, Y23
13. X8, Y20
14. X17, Y9
15. X26, Y10
16. X30, Y11
17. X25, Y5
18. X26, Y15
19. X24, Y17
20. X14, Y30*
21. X20, Y20
22. X30, Y24
23. X10, Y23
24. X30, Y30
25. X12, Y13
26. X13, Y9
27. X25, Y11
28. X23, Y28
29. X30, Y27
30. X11, Y6
31. X10, Y6
32. X13, Y28
33. X28, Y10
34. X7, Y31
35. X13, Y3
36. X10, Y24
37. X25, Y9
38. X23, Y13
39. X22, Y19
40. X30, Y19*
41. X26, Y17
42. X29, Y25
43. X24, Y24
44. X29, Y27
45. X11, Y20
46. X4, Y29
47. X10, Y11
48. X21, Y22
49. X6, Y22
50. X24, Y8
51. X11, Y3
52. X19, Y9
53. X17, Y20
54. X9, Y28
55. X11, Y22
56. X16, Y24
57. X2, Y22
58. X14, Y23
59. X11, Y4
60. X13, Y23*
61. X22, Y10
62. X14, Y11
63. X24, Y28
64. X4, Y31
65. X9, Y31
66. X20, Y28
67. X15, Y25
68. X14, Y27
69. X12, Y11
70. X17, Y26
71. X13, Y29
72. X12, Y14
73. X1[illegible], Y13
74. X29, Y24
75. X11, Y14
76. X12, Y6
77. X26, Y29
78. X6, Y25
79. X10, Y1
80. X23, Y7*
81. X19, Y27
82. X12, Y19
83. X6, Y26
84. X26, Y5
85. X26, Y5
86. X7, Y30
87. X23, Y17
88. X27, Y5
89. X19, Y6
90. X14, Y10
91. X19, Y17
92. X11, Y16
93. X4, Y22
94. X11, Y12
95. X27, Y12
96 X9, Y13
97. X12, Y26
98. X13, Y11
99. X2, Y20
100. X25, Y8*
101. X21, Y25
102. X11, Y27
103. X28, Y7
104. X13, Y19
105. X2, Y21
106. X22, Y30
107. X29, Y9
108. X17, Y8
109. X11, Y23
110. X9, Y29
111. X24, Y7
112. X13, Y24
113. X11, Y19
114. X29, Y18
115. X17, Y24
116. X19, Y22
117. X8, Y27
118. X10, Y21
119. X28, Y22
120. X28, Y20*
121. X12, Y15
122. X22, Y6
123. X7, Y21
124. X19, Y31
125. X15, Y30
126. X9, Y19

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Butler Building Addition
Random Sample Locations
(continued)

Floor Samples (continued):

127.	X27, Y27	131.	X23, Y11
128.	X29, Y26	132.	X19, Y21
129.	X23, Y19	133.	X25, Y28
130.	X18, Y28	134.	X12, Y22*

Ceiling Samples:

1. X6, Y2
2. X30, Y23
3. X18, Y1
4. X19, Y7
5. X17, Y31
6. X26, Y9
7. X23, Y15
8. X16, Y26
9. X7, Y15
10. X16, Y7
11. X15, Y29
12. X24, Y3
13. X23, Y4
14. X22, Y3
15. X10, Y30
16. X24, Y9
17. X8, Y31
18. X15, Y15
19. X25, Y7
20. X28, Y18
21. X22, Y20
22. X14, Y3
23. X26, Y27
24. X21, Y10
25. X25, Y26
26. X8, Y4
27. X11, Y10
28. X25, Y6
29. X13, Y25
30. X18, Y5
31. X29, Y24
32. X29, Y7
33. X27, Y18

North Wall:

1. X25, Z5
2. X17, Z1
3. X6, Z3
4. X15, Z2
5. X17, Z2
6. X26, Z5
7. X8, Z3
8. X2, Z5
9. X27, Z4
10. X10, Z5
11. X11, Z4
12. X25, Z1
13. X3, Z4
14. X30, Z2
15. X6, Z5
16. X30, Z3

South Wall:

1. X7, Z5
2. X22, Z1
3. X17, Z5
4. X5, Z1
5. X25, Z3
6. X2, Z5
7. X15, Z2
8. X10, Z2
9. X25, Z4
10. X22, Z3
11. X24, Z1
12. X5, Z3
13. X29, Z5
14. X2, Z3
15. X13, Z5
16. X3, Z2
17. X18, Z3

East Wall:

1. Y26, Z1
2. Y27, Z1
3. Y30, Z3
4. Y1, Z3
5. Y15, Z5
6. Y14, Z2
7. Y23, Z6
8. Y16, Z1
9. Y30, Z5
10. Y9, Z1
11. Y8, Z5
12. Y5, Z1
13. Y19, Z2
14. Y6, Z4
15. Y21, Z1
16. Y19, Z1
17. Y31, Z2

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF6 Butler Building Addition
Random Sample Locations
(continued)

West Wall:

1. Y11, Z3
2. Y12, Z2
3. Y19, Z3
4. Y29, Z5
5. Y16, Z5
6. Y4, Z2
7. Y16, Z3
8. Y23, Z4
9. Y24, Z3
10. Y17, Z2
11. Y3, Z4
12. Y13, Z1
13. Y27, Z1
14. Y23, Z6
15. Y21, Z3
16. Y18, Z4
17. Y7, Z2

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-5
MAIN PLANT (LOW BAY)
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X43, Y1
2. X35, Y5
3. X40, Y11
4. X11, Y12
5. X36, Y13
6. X36, Y15
7. X2, Y9
8. X2, Y8
9. X32, Y13
10. X32, Y7
11. X31, Y5
12. X29, Y8
13. X39, Y7
14. X15, Y3
15. X18, Y12
16. X10, Y9
17. X27, Y9
18. X21, Y10
19. X41, Y7
20. X24, Y7*
21. X48, Y3
22. X9, Y7
23. X29, Y2
24. X24, Y3
25. X4, Y5
26. X39, Y2
27. X18, Y13
28. X4, Y7
29. X10, Y1
30. X5, Y3
31. X9, Y6
32. X28, Y9
33. X18, Y15
34. X25, Y1
35. X32, Y16
36. X41, Y3
37. X37, Y5
38. X11, Y16
39. X37, Y15
40. X37, Y8*
41. X11, Y6
42. X17, Y7
43. X28, Y6
44. X31, Y16
45. X8, Y14
46. X32, Y5
47. X38, Y4
48. X26, Y7
49. X5, Y2
50. X42, Y6
51. X12, Y11
52. X39, Y16
53. X13, Y8
54. X32, Y4
55. X48, Y5
56. X44, Y1
57. X25, Y5
58. X23, Y10
59. X40, Y5
60. X13, Y4*
61. X21, Y6
62. X8, Y10
63. X15, Y7
64. X41, Y1
65. X33, Y11
66. X5, Y5
67. X34, Y10
68. X39, Y1
69. X8, Y13
70. X12, Y7
71. X41, Y4
72. X13, Y15
73. X16, Y3
74. X19, Y7
75. X19, Y16
76. X36, Y7
77. X18, Y11
78. X33, Y3
79. X9, Y14
80. X20, Y16*
81. X24, Y5
82. X33, Y5
83. X48, Y1
84. X29, Y1
85. X14, Y4
86. X16, Y4
87. X38, Y8
88. X44, Y15
89. X18, Y4
90. X10, Y5
91. X28, Y1
92. X46, Y8
93. X39, Y12
94. X19, Y6
95. X44, Y16
96. X24, Y6
97. X26, Y5
98. X34, Y11
99. X20, Y6
100. X33, Y9*
101. X29, Y4
102. X44, Y8
103. X39, Y3
104. X35, Y6
105. X2, Y2
106. X27, Y6
107. X40, Y12
108. X23, Y5
109. X16, Y15
110. X12, Y13
111. X42, Y15
112. X1, Y1
113. X25, Y9
114. X40, Y6
115. X3, Y2
116. X32, Y11*

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Main Plant (Low Bay)
Random Sample Locations
(continued)

Ceiling Samples:

1. X38, Y4
2. X27, Y10
3. X3, Y6
4. X16, Y2
5. X1, Y10
6. X31, Y1
7. X4, Y6
8. X1, Y2
9. X36, Y14
10. X36, Y12
11. X25, Y8
12. X31, Y2
13. X38, Y14
14. X23, Y13
15. X23, Y8
16. X27, Y2
17. X13, Y12
18. X34, Y4
19. X35, Y9
20. X35, Y15
21. X(-4), Y12
22. X12, Y6
23. X(-4), Y15
24. X23, Y9
25. X33, Y15
26. X3, Y2
27. X46, Y1
28. X5, Y9
29. X21, Y11

South Wall Samples:

1. X15, Z2
2. X7, Z5
3. X7, Z4
4. X47, Z6
5. X24, Z10
6. X20, Z10
7. X33, Z9
8. X23, Z3
9. X32, Z2
10. X41, Z5
11. X44, Z7
12. X(-1), Z1
13. X22, Z4
14. X16, Z4
15. X30, Z3
16. X40, Z9
17. X6, Z10
18. X8, Z6
19. X29, Z9
20. X12, Z8
21. X20, Z5
22. X8, Z4
23. X14, Z6
24. X39, Z7
25. X39, Z5
26. X44, Z3
27. X36, Z6
28. X41, Z2
29. X19, Z5
30. X31, Z3
31. X13, Z9
32. X33, Z1
33. X4, Z9
34. X39, Z2
35. X1, Z9
36. X15, Z7

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Main Plant (Low Bay)
Random Sample Locations
(continued)

East Wall Samples:

1. Y15, Z9
2. Y16, Z8
3. Y3, Z5
4. Y14, Z5
5. Y12, Z8
6. Y1, Z6
7. Y11, Z10
8. Y10, Z10
9. Y5, Z9
10. Y11, Z8
11. Y6, Z10

West Wall Samples:

1. Y2, Z9
2. Y1, Z3
3. Y8, Z6
4. Y11, Z10
5. Y2, Z6
6. Y7, Z10
7. Y1, Z29
8. Y14, Z9
9. Y5, Z9
10. Y15, Z8
11. Y13, Z10
12. Y10, Z9

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-6
BILLET STORAGE WAREHOUSE
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X13, Y8
2. X2, Y24
3. X15, Y14
4. X3, Y7
5. X3, Y14
6. X10, Y28
7. X1, Y28
8. X1, Y35
9. X14, Y29
10. X1, Y6
11. X11, Y26
12. X(-1), Y8
13. X5, Y6
14. X14, Y13
15. X7, Y9
16. X12, Y27
17. X8, Y21
18. X4, Y8
19. X7, Y15
20. X5, Y12*
21. X5, Y2
22. X11, Y21
23. X9, Y21
24. X6, Y29
25. X(-1), Y27
26. X1, Y21
27. X11, Y35
28. X8, Y35
29. X4, Y17
30. X15, Y2
31. X8, Y29
32. X14, Y34
33. X8, Y31
34. X1, Y32
35. X12, Y17
36. X14, Y33
37. X4, Y33
38. X11, Y31
39. X13, Y25
40. X9, Y2*
41. X7, Y23
42. X6, Y3
43. X14, Y17
44. X2, Y19
45. X10, Y7
46. X2, Y31
47. X15, Y1
48. X15, Y13
49. X(-1), Y23
50. X14, Y31
51. X4, Y5
52. X9, Y32
53. X2, Y33
54. X8, Y26
55. X15, Y30
56. X3, Y13
57. X9-Y1
58. X11, Y19
59. X3, Y5
60. X4, Y19*
61. X1, Y8
62. X5, Y3
63. X9, Y24
64. X12, Y7
65. X9, Y14
66. X15, Y12
67. X5, Y31
68. X14, Y7
69. X6, Y25
70. X2, Y17
71. X(-1), Y25
72. X10, Y3
73. X8, Y23
74. X13, Y21
75. X7, Y7
76. X9, Y11
77. X11, Y18
78. X7, Y22*

Ceiling Samples:

1. X2, Y18
2. X8, Y34
3. X11, Y11
4. X4, Y13
5. X7, Y10
6. X15, Y23
7. X5, Y32
8. X13, Y33
9. X6, Y16
10. X(-1), Y14
11. X1, Y24
12. X13, Y20
13. X5, Y27
14. X13, Y31
15. X15, Y11
16. X4, Y31
17. X11, Y1
18. X1, Y11
19. X9, Y6

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

Billet Storage Warehouse
Random Sample Locations
(continued)

West Wall Samples:

1. Y5, Z5
2. Y26, Z2
3. Y7, Z2
4. Y35, Z2
5. Y7, Z5
6. Y8, Z3
7. Y32, Z4
8. Y18, Z3
9. Y34, Z3
10. Y8, Z2
11. Y10, Z3
12. Y24, Z5
13. Y10, Z5

East Wall Samples:

1. Y20, Z5
2. Y13, Z3
3. Y11, Z1
4. Y30, Z1
5. Y24, Z1
6. Y28, Z3
7. Y31, Z4
8. Y32, Z2
9. Y23, Z3
10. Y32, Z5
11. Y17, Z2
12. Y35, Z3
13. Y29, Z1
14. Y19, Z3

South Wall Samples:

1. X4, Z4
2. X(-1), Z2
3. X2, Z2
4. X9, Z1
5. X11, Z2
6. X10, Z3

North Wall Samples:

1. X1, Z4
2. X15, Z3
3. X10, Z3
4. X4, Z2
5. X8, Z5
6. X9, Z5

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-7
RF3 BUTLER BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X4, Y6
2. X5, Y7
3. X3, Y16
4. X6, Y20
5. X9, Y8
6. X6, Y13
7. X2, Y5
8. X8, Y16
9. X11, Y10
10. X2, Y17
11. X6, Y19
12. X3, Y17
13. X11, Y2
14. X1, Y3
15. X5, Y21
16. X13, Y18
17. X10, Y1
18. X2, Y20
19. X10, Y5
20. X8, Y19*
21. X6, Y17
22. X8, Y8
23. X4, Y18
24. X5, Y4
25. X1, Y1
26. X9, Y12
27. X2, Y19
28. X13, Y15
29. X12, Y11
30. X2, Y7
31. X9, Y2
32. X6, Y5
33. X6, Y2
34. X3, Y7
35. X6, Y15
36. X13, Y16
37. X12, Y15
38. X9, Y20*

Ceiling Samples:

1. X9, Y9
2. X8, Y20
3. X10, Y11
4. X6, Y12
5. X9, Y12
6. X8, Y19
7. X7, Y16
8. X13, Y18
9. X7, Y20

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

RF3 Butler Building
Random Sample Locations
(continued)

West Wall Samples:

1. Y2, Z7
2. Y14, Z5
3. Y8, Z6
4. Y5, Z5

East Wall Samples:

1. Y19, Z2
2. Y6, Z6
3. Y1, Z1
4. Y10, Z4

North Wall (High Bay) Samples:

1. X5, Z5
2. X8, Z1
3. X1, Z6

South Wall (High Bay) Samples:

1. X12, Z2
2. X12, Z5
3. X3, Z4

North Wall (Low Bay) Samples:

1. X2, Z4
2. X8, Z5
3. X5, Z2

South Wall (Low Bay) Samples:

1. X3, Z2
2. X1, Z2

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-8
ENCLOSED TRUCK RAMP
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X6, Y20
2. X6, Y10
3. X5, Y3
4. X8, Y20
5. X9, Y14
6. X9, Y6
7. X2, Y17
8. X10, Y2
9. X9, Y20
10. X7, Y15
11. X2, Y10
12. X2, Y5
13. X9, Y4
14. X7, Y1
15. X6, Y4
16. X3, Y2
17. X4, Y6
18. X1, Y1
19. X7, Y24
20. X3, Y13*
21. X5, Y5
22. X3, Y9
23. X5, Y13
24. X4, Y12
25. X4, Y21
26. X1, Y24
27. X2, Y3
28. X9, Y18
29. X5, Y9
30. X2, Y19
31. X5, Y2
32. X10, Y1
33. X9, Y3
34. X1, Y19
35. X5, Y25*

South Wall Samples:

1. X1, Z(-1)
2. X2, Z6

Ceiling Samples:

1. X6, Y6
2. X9, Y2
3. X1, Y13
4. X1, Y14
5. X5, Y22
6. X2, Y18
7. X9, Y10
8. X7, Y4
9. X8, Y19

East Wall Samples:

1. Y12, Z(-1)
2. Y8, Z3
3. Y11, Z6
4. Y21, Z3
5. Y25, Z2
6. Y22, Z4

West Wall Samples:

1. Y12, Z1
2. Y13, Z(-1)
3. Y11, Z6
4. Y22, Z4
5. Y11, Z4
6. Y19, Z(-1)

North Wall Samples:

1. X10, Z5
2. X6, Z4
3. X7, Z5

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-9
TOOL CRIB
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X6, Y7
2. X8, Y7
3. X2, Y14
4. X9, Y3
5. X10, Y13
6. X3, Y4
7. X3, Y12
8. X5, Y13
9. X15, Y13
10. X2, Y13
11. X10, Y14
12. X5, Y5
13. X14, Y14
14. X10, Y12
15. X14, Y12
16. X10, Y9
17. X4, Y8
18. X4, Y3
19. X3, Y6
20. X14, Y11*
21. X9, Y2
22. X15, Y5
23. X6, Y2
24. X12, Y13
25. X4, Y1
26. X2, Y1
27. X14, Y10
28. X8, Y14
29. X10, Y5
30. X6, Y3
31. X13, Y9*

Ceiling Samples:

1. X2, Y9
2. X6, Y4
3. X2, Y3
4. X5, Y14
5. X9, Y6
6. X8, Y3
7. X15, Y5
8. X5, Y2

South Wall Samples:

1. X16, Z3
2. X14, Z3
3. X15, Z4
4. X13, Z3

North Wall Samples:

1. X14, Z3
2. X11, Z3
3. X4, Z1
4. X16, Z2

East Wall Samples:

1. Y13, Z5
2. Y1, Z5
3. Y13, Z3
4. Y12, Z3

West Wall Samples:

1. Y12, Z1
2. Y8, Z5
3. Y7, Z5
4. Y10, Z23

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-10
WASTEWATER TREATMENT PLANT
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X12, Y12
2. X2, Y13
3. X3, Y1
4. X2, Y3
5. X10, Y6
6. X9, Y5
7. X5, Y7
8. X13, Y8
9. X1, Y4
10. X1, Y7
11. X11, Y13
12. X6, Y6
13. X4, Y2
14. X10, Y8
15. X2, Y10
16. X14, Y5
17. X5, Y13
18. X11, Y5
19. X8, Y1
20. X12, Y11*
21. X7, Y13
22. X4, Y14
23. X1, Y1
24. X8, Y12
25. X9, Y14
26. X2, Y11
27. X1, Y13
28. X2, Y1
29. X10, Y11*

Ceiling Samples:

1. X14, Y9
2. X3, Y12
3. X11, Y4
4. X10, Y12
5. X11, Y3
6. X2, Y6
7. X11, Y6

North Wall Samples:

1. X12, Z7
2. X7, Z4
3. X3, Z7

South Wall Samples:

1. X13, Z8
2. X8, Z5
3. X8, Z7

East Wall Samples:

1. Y2, Z2
2. Y5, Z1
3. Y10, Z5
4. Y3, Z4

West Wall Samples:

1. Y10, Z3
2. Y1, Z3
3. Y14, Z7
4. Y2, Z4

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-11
DIE HEAD FILTER BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X3, Y9
2. X3, Y12
3. X5, Y5
4. X6, Y7
5. X9, Y2
6. X4, Y7
7. X3, Y6
8. X8, Y4
9. X8, Y15
10. X9, Y3
11. X3, Y5
12. X8, Y1
13. X9, Y13
14. X1, Y15
15. X6, Y9
16. X5, Y4
17. X6, Y4
18. X2, Y8
19. X3, Y7
20. X1, Y9*
21. X6, Y6
22. X5, Y9
23. X7, Y10*

Ceiling Samples:

1. X11, Y5
2. X11, Y10
3. X3, Y14
4. X11, Y1
5. X10, Y1
6. X3, Y3

North Wall Samples:

1. X6, Z2
2. X11, Z5
3. X8, Z4

South Wall Samples:

1. X4, Z8
2. X6, Z3
3. X7, Z7

East Wall Samples:

1. Y10, Z5
2. Y6, Z5
3. Y4, Z2

West Wall Samples:

1. Y14, Z8
2. Y11, Z8
3. Y5, Z3

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-12
DOCK AREA
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X9, Y1
2. X5, Y11
3. X2, Y6
4. X4, Y3
5. X5, Y10
6. X3, Y4
7. X2, Y9
8. X3, Y6
9. X7, Y2
10. X9, Y12
11. X8, Y14
12. X8, Y10
13. X5, Y8
14. X7, Y11
15. X4, Y4
16. X7, Y13
17. X6, Y5
18. X5, Y5
19. X1, Y3
20. X4, Y2*
21. X4, Y8*

Ceiling Samples:

1. X4, Y2
2. X9, Y8
3. X7, Y1
4. X8, Y5
5. X1, Y5

North Wall Samples:

1. X6, Z5
2. X8, Z5

South Wall Samples:

1. X4, Z4
2. X5, Z5

West Wall Samples:

1. Y5, Z2
2. Y5, Z5
3. Y3, Z3

East Wall Samples:

1. Y13, Z5
2. Y11, Z5
3. Y6, Z5

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-13
ENCLOSED RAMP
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X16, Y3
2. X15, Y3
3. X7, Y5
4. X15, Y2
5. X9, Y1
6. X13, Y3
7. X24, Y4
8. X26, Y3
9. X24, Y(-1)
10. X3, Y3
11. X23, Y4
12. X15, Y5
13. X21, Y3
14. X24, Y3
15. X25, Y3
16. X15, Y4
17. X9, Y4
18. X17, Y2
19. X11, Y4
20. X4, Y4*
21. X10, Y4*

Ceiling Samples:

1. X9, Y1
2. X10, Y3
3. X5, Y1
4. X20, Y1
5. X11, Y4

North Wall Samples:

1. X26, Z3
2. X24, Z3
3. X8, Z1
4. X8, Z3

South Wall Samples:

1. X2, Z1
2. X11, Z2
3. X8, Z1
4. X25, Z1

East Wall Samples:

1. Y1, Z2

West Wall Samples:

1. Y2, Z4

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-14
SAW FILTER BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X5, Y12
2. X4, Y10
3. X6, Y3
4. X1, Y9
5. X2, Y1
6. X4, Y11
7. X5, Y5
8. X2, Y7
9. X4, Y14
10. X6, Y7
11. X2, Y9
12. X4, Y8
13. X5, Y6
14. X6, Y4
15. X4, Y2
16. X1, Y7*

Ceiling Samples:

1. X5, Y6
2. X4, Y3
3. X2, Y8
4. X2, Y10

North Wall Samples:

1. X6, Z3
2. X5, Z4

East Wall Samples:

1. Y3, Z3
2. Y7, Z5

South Wall Samples:

1. X6, Z5
2. X3, Z3

West Wall Samples:

1. Y8, Z1
2. Y10, Z5

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-15
RUNOUT TABLE FILTER BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:		Ceiling Samples:	
1.	X7, Y1	1.	X6, Y11
2.	X8, Y14	2.	X6, Y7
3.	X5, Y5	3.	X5, Y12
4.	X5, Y2		
5.	X7, Y12		
6.	X4, Y1		
7.	X3, Y5		
8.	X7, Y2		
9.	X4, Y2		
10.	X2, Y9		
11.	X1, Y13		
12.	X8, Y1*		

North Wall Samples:		South Wall Samples:	
1.	X7, Z3	1.	X7, Z3

East Wall Samples:		West Wall Samples:	
1.	Y10, Z4	1.	Y6, Z2
2.	Y9, Z7		
3.	Y12, Z3		

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-16
RCRA STORAGE BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X5, Y4
2. X7, Y8
3. X5, Y8
4. X7, Y13
5. X2, Y3
6. X1, Y2
7. X2, Y1
8. X5, Y6
9. X4, Y13
10. X4, Y11
11. X2, Y11*

Ceiling Samples:

1. X6, Y4
2. X6, Y2
3. X6, Y5

North Wall Samples:

1. X7, Z2

West Wall Samples:

1. Y10, Z1
2. Y6, Z5

East Wall Samples:

1. Y13, Z3
2. Y13, Z1

South Wall Samples:

1. X2, Z1

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-17
SUBSTATION BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X5, Y3
2. X8, Y1
3. X6, Y6
4. X3, Y6
5. X1, Y4
6. X3, Y1
7. X4, Y1*

Ceiling Samples:

1. X1, Y5
2. X3, Y2

North Wall Samples:

1. X1, Z4

East Wall Samples:

1. Y1, Z4

West Wall Samples:

1. Y4, Z2

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-18
COMPRESSOR ROOM BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X2, Y3
2. X2, Y1
3. X1, Y3
4. X1, Y2*

Ceiling Samples:

1. X2, Y1

East Wall Samples:

1. Y6, Z4

West Wall Samples:

1. Y3, Z4

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-19
SEWAGE DISPOSAL PLANT
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X2, Y2
2. X2, Y4*

South Wall Samples:

1. X3, Z2

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

TABLE C-20
EMERGENCY EQUIPMENT STORAGE BUILDING
RANDOM SAMPLE LOCATIONS

Floor Samples:

1. X1, Y4
2. X3, Y3*

North Interior Elev. Samples:

1. Y2, Z1

*After the swipe sample is collected, collect a sample for total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

APPENDIX D

SURVEY INTERIOR JUDGMENTAL SAMPLE LOCATIONS FOR RADIOACTIVE CONTAMINATION

SURVEY INTERIOR JUDGMENTAL SAMPLE LOCATIONS FOR RADIOACTIVE CONTAMINATION

1.0 Objective

To assess the extent and degree of radiation dose and radioac[illegible]mination in the RMI buildings by surveying judgmental locations within each building.

2.0 Scope of Work

Tables D-1 through D-19 list judgmental sample location to be surveyed for d[illegible]ed) and indirect (removable) gross alpha and beta radioactivity. Survey data will be evaluated [illegible]ermine the number of surveys needed to meet the desired confidence and to identify locations for total U, Th-232, Tc-99, and isotopic Pu analysis. All survey data shall be collected and recorded using the identification number for that grid location.

3.0 Primary Equipment/Instrumentation

1) Whatman 50 filter paper or equivalent, approximately 47 mm diameter

2) Coin envelope

3) Tape

4) Latex or cotton gloves

5) Monitoring equipment for beta surveys - Ludlum Model 177 me[illegible]er with a G-M type Ludlum Model 44-9 probe or approved equal

6) Monitoring equipment for alpha surveys - Eberline ESP-2 meter with a Ludlum Alpha S[illegible]intillation probe or approved equal

7) Mon[illegible]toring equipment for dose rate surveys - Victoreen 450P ion chamber meter or approved [illegible]

8) [illegible]ective clothing and equipment as required by RWP

9) Grease pencil

4.0 Task Elements

1) Obtain an RWP for the task, have all project personnel read it and sign off. Ensure that project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for that day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required personnel protective equipment specified in the RWP.

4) Prepare to perform the required surveys by obtaining required instrumentation, work instructions, data forms, etc.

5) Perform pre-operational survey instrumentation checks in accordance with approved procedures.

6) Verify a reference grid system within the survey/sampling location has been established. Locate the grid to be surveyed. Using a grease pencil, indicate the four corners of the grid and write the corresponding sample number and grid location on the surface. Where the area to be surveyed is a specific location on a building surface or equipment, outline the area surveyed with the grease pencil and write the corresponding sample number next to the area.

7) Conduct direct alpha and beta surface contamination surveys in accordance with approved procedure.

8) Conduct an indirect (removable) contamination survey for each identified area of elevated activity in accordance with approved procedures. Both the direct beta and direct alpha contamination surveys should be conducted for the identified grid before taking the removable survey.

9) The ES&H building, Health Physicist's offices and guardhouse are maintained as non-radiological control areas. Review historical contamination survey sheets and operational history to identify suspected areas of elevated activity and perform contamination surveys at these areas.

10) Suggested sample locations for total U analysis are identified with an "*" in Tables D-1 through D-19. Work instructions will be issued to identify specific locations to be sampled and the analyses required.

11) Work instructions will be issued to describe sampling requirements for determining if contamination exists under the paint on selected equipment and building surfaces.

5.0 Quality Assurance Requirements

QA shall be maintained during this task by implementing the following tasks:

1) Document daily work activities in a field logbook. This logbook should contain descriptions of daily activities, personnel involved, grid locations surveyed, survey sheet numbers, unusual occurrences, etc.

2) Personnel shall be trained in accordance with all applicable procedures. Training shall be documented and periodically reviewed and updated.

3) Chain-of-custody forms shall be used for indirect contamination samples sent to the RMI laboratory for analyses. All samples shall be labeled with the sampler's name, date, time, smear number, and analysis required.

4) Field survey instruments shall be calibrated once a quarter and a response check shall be performed daily. All standards shall be traceable to an NIST standard.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

TABLE D-1
RF6 BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
5.	Deteriorated Concrete	X1, Y5
6.	Low Point in Ductwork (Interior Surface)	X31, Y16
7.	Low Point in Ductwork (Interior Surface)	X25, Y28
8.	Ceiling Vent Stack	X32, Y23
9.	Concrete Floor	X28, Y19
10	Return Air Duct (Interior Surface)	X39, Y17
11.	Top of Duct (Exterior Surface)	X42, Y16
12.	Sump Cover (Internal Surface)	X47, Y30

Sample Locations Not Shown on Drawings:

RF6 Offices Exterior Walls:

1. X47, Y25, Z1
2. X46, Y22, Z2
3. X47, Y18, Z1
4. X46, Y16, Z2
5. X42, Y16, Z1
6. X38, Y16, Z2
7. X36, Y18, Z1
8. X33, Y17, Z2
9. X33, Y13, Z1
10. X34, Y10, Z2
11. X36, Y8, Z1
12. X36, Y4, Z2
13. X36, Y1, Z1

Office Area Exterior Samples:

Walls

1. X40, Y29, Z1
2. X40, Y25, Z2
3. X36, Y26, Z1
4. X36, Y29, Z2

Ceiling

1. X39, Y26
2. X38, Y28
3. X39, Y29

Office Area Interior Samples:

Walls

1. X37, Y28, Z2
2. X39, Y25, Z1
3. X40, Y28, Z2

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

RF6 Building
Judgmental Sample Locations
(continued)

Ceiling

1. X39, Y28

Floor

1. X38, Y29
2. X38, Y26
3. X39, Y26

Sump Cover Exterior

1. X48, Y29*
2. X47, Y28

Extrusion Tooling (Exterior Surface)

1. X9, Y15, Z1*
2. X9, Y14, Z1
3. X9, Y13, Z2*
4. X1, Y28, Z1
5. X1, Y28, Z2*
6. X1, Y29, Z3

Lathe L15001

1. X20, Y29*
2. X18, Y29
3. X16, Y29*

Equipment Storage Areas (Floor Samples)

1. X3, Y7
2. X3, Y9
3. X5, Y3
4. X5, Y7
5. X5, Y9
6. X7, Y5
7. X7, Y7
8. X7, Y9
9. X9, Y4
10. X9, Y6
11. X9, Y8
12. X12, Y12
13. X12, Y16
14. X12, Y20
15. X14, Y5
16. X14, Y7
17. X14, Y9
18. X14, Y13
19. X14, Y17
20. X19, Y6
21. X19, Y10
22. X19, Y14
23. X19, Y20
24. X20, Y5
25. X20, Y9
26. X20, Y14
27. X20, Y19
28. X21, Y17
29. X22, Y5
30. X22, Y7

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-2
NORTHWEST STORAGE WAREHOUSE
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
1.	Floor Drain	X31, Y22
2.	Expansion Joint	X28, Y21
3.	Chipped Concrete	X13, Y21

Sample Locations Not Shown on Drawings:

Floor Drains

1.	X9, Y5	4.	X9, Y44	7.	X17, Y31
2.	X9, Y18	5.	X17, Y5	8.	X17, Y44
3.	X9, Y31	6.	X17, Y18		

Vertical Roof Support Steel

1.	X1, Y6, Z1	6.	X1, Y44, Z2	11.	X18, Y36, Z1
2.	X1, Y13, Z2	7.	X18, Y6, Z1	12.	X1, Y44, Z2
3.	X1, Y21, Z1	8.	X18, Y13, Z2	13.	X35, Y35, Z1
4.	X1, Y29, Z2	9.	X18, Y21, Z1	14.	X35, Y44, Z2
5.	X1, Y36, Z1	10.	X18, Y29, Z2		

Horizontal Roof Support Steel

1.	X4, Y44, Z5	7.	X24, Y44, Z5
2.	X8, Y44, Z5	8.	X28, Y44, Z5
3.	X12, Y44, Z5	9.	X32, Y44, Z5
4.	X4, Y6, Z5	10.	X24, Y6, Z5
5.	X8, Y6, Z5	11.	X28, Y6, Z5
6.	X12, Y6, Z5	12.	X32, Y6, Z5

Horizontal Wall Support Steel

1.	X1, Y4, Z2	11.	X30, Y50, Z2	21.	X28, Y1, Z2
2.	X1, Y4, Z5	12.	X30, Y50, Z5	22.	X28, Y1, Z5
3.	X1, Y16, Z2	13.	X35, Y4, Z2	23.	X18, Y1, Z2
4.	X1, Y16, Z5	14.	X35, Y4, Z5	24.	X18, Y1, Z5
5.	X1, Y33, Z2	15.	X35, Y16, Z2	25.	X6, Y1, Z2
6.	X1, Y33, Z5	16.	X35, Y16, Z5	26.	Z6, Y1, Z5
7.	X1, Y49, Z2	17.	X35, Y32, Z2		
8.	X1, Y49, Z2	18.	X35, Y32, Z5		
9.	X22, Y50, Z2	19.	X35, Y46, Z2		
10.	X22, Y50, Z5	20.	X35, Y46, Z5		

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-3
MAIN PLANT (HIGH BAY)
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
25.	Furnace F10014 (Interior Surface)	X53, Y2
35.	Motor Casing (External Surface)	X77, Y9*
36.	Motor Casing (External Surface)	X77, Y2*
37.	Extrusion Press (External Surface)	X64, Y8*
38.	Extrusion Press (External Surface)	X63, Y10*
39.	Extrusion Press (Internal Surface)	X63, Y9
40.	Die Head Ductwork (Interior Surface)	X64, Y9
41.	Die Head Ductwork (Interior Surface)	X47, Y9
42.	Conveyor Hood (Interior Surface)	X48, Y9
43.	Conveyor Hood (External Surface)	X50, Y9
44.	Cooling Table Ductwork (Interior Surface)	X38, Y10
45.	Saw Filter Ductwork (Interior Surface)	X23, Y11
46.	Crane Horizontal Support (Top Side)	X18, Y16
47.	Crane Horizontal Support (Top Side)	X10, Y1
48.	Crane Horizontal Support (Top Side)	X43, Y16
49.	Crane Horizontal Support (Top Side)	X42, Y1
50.	Crane Horizontal Support (Top Side)	X79, Y16
51.	Crane Horizontal Support (Top Side)	X77, Y1
52.	Louver	X15, Y16, Z5
53.	Louver	X18, Y16, Z5
54.	Container Heater F10008 (Interior Surface)	X25, Y14*
55.	Container Heater F10008 (Exterior Surface)	X28, Y14
58.	Main Disconnect Enclosure	X18, Y1
60.	Conveyor Rollers	X31, Y11
61.	Louvers	X44, Y16
62.	Grieve Oven (Interior Surface)	X51, Y14*
63.	Grieve Oven (Exterior Surface)	X52, Y15
64.	Electrical Cabinet	X55, Y16
65.	T10003 (External Surface)	X60, Y16*
71.	Water Tank (External Surface)	X82, Y14*
72.	Pressure Cylinder (External Surface)	X85, Y8*
73.	Pump P10008 (External Surface)	X82, Y7*
74.	Pump P10009 (External Surface)	X82, Y7*
75.	Quench Tank (External Surface)	X68, Y3*

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

Main Plant (High Bay)
Judgmental Sample Locations
(continued)

Sample Locations Not Shown on Drawings:

Decontamination Tent

1.	X58, Y3	3.	X60, Y3	5.	X62, Y4
2.	X58, Y5	4.	X60, Y4	6.	X62, Y5
3.	X60, Y3				

Drainage Trench (Bottom Surface)

1.	X85, Y2*	13.	X61, Y11
2.	X85, Y9	14.	X58, Y7
3.	X85, Y13	15.	X58, Y11*
4.	X80, Y12	16.	X49, Y4
5.	X77, Y12	17.	X34, Y7
6.	X74, Y12*	18.	X34, Y2
7.	X72, Y12	19.	X21, Y7
8.	X69, Y10	20.	X13, Y7*
9.	X69, Y8	21.	X9, Y7
10.	X65, Y11	22.	X9, Y4
11.	X65, Y8*	23.	X7, Y9
12.	X61, Y7		

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-4
RF6 BUTLER BUILDING ADDITION
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
4.	Ventilation Equipment Pan	X29, Y6

Sample Locations Not Shown on Drawings:

Utility Room:

Floor		East Wall		West Wall	
1.	X1, Y27	1.	Y27, Z2	1.	Y27, Z2
2.	X1, Y30	2.	Y29, Z4	2.	Y29, Z4
3.	X2, Y29				
4.	X3, Y28				

North Wall		South Wall	
1.	X2, Z2	1.	X3, Z3

Acid Tank #1:

Base		Exterior Surface	
1.	X21, Y20	1.	X19, Y18, Z1
2.	X18, Y19	2.	X18, Y20, Z1

Acid Tank #2:

Base		Exterior Surface	
1.	X28, Y18	1.	X28, Y19, Z1
2.	X28, Y20	2.	X26, Y18, Z1

Caustic Tanks:

Base		Exterior Surface	
1.	X29, Y20	1.	X29, Y20
2.	X29, Y21	2.	X29, Y21

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

RF6 Butler Building Addition
Judgmental Sample Locations
(continued)

Vertical Roof Support Steel

1. X8, Y30, Z2
2. X15, Y30, Z31
3. X22, Y30, Z32
4. X29, Y30, Z1

Horizontal Roof Support Steel

1. X4, Y15
2. X12, Y15
3. X18, Y15
4. X26, Y15

Horizontal Wall Support Steel

1. X1, Y22, Z2
2. X30, Y10, Z2
3. X18, Y31, Z2
4. X25, Y31, Z2

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-5
MAIN PLANT (LOW BAY)
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
13.	Pit Bottom Surface	X8, Y16*
14.	Tank (Exterior Surface)	X7, Y16*
15.	Tank T10015 (Interior Surface)	X6, Y16
16.	Ductwork (Interior Surface)	X(-3), Y9
17.	Ductwork (Exterior Surface)	X(-2), Y9
18.	HNO_3 Dip Tank Ductwork (Internal Surface)	X5, Y16
19.	HNO_3 Dip Tank Ductwork (External Surface)	X5, Y16
20.	Pickling Tank	X4, Y7
21.	Crane Horizontal Support (Top Side)	X4, Y9
22.	Mezzanine Floor	X9, Y16*
23.	Mezzanine Floor	X13, Y16*
24.	HNO_3 Dip Tank Ductwork (External Surface)	X(-3), Y9
25.	Furnace F10014 (Interior Surface)	X21, Y16*
26.	Furnace F10015 (Interior Surface)	X21, Y14*
27.	Furnace F10016 (Interior Surface)	X21, Y11*
29.	Crane Horizontal Support (Top Side)	X29, Y16
30.	Crane Horizontal Support (Top Side)	X37, Y16
31.	Crane Horizontal Support (Top Side)	X41, Y1
32.	Crane Horizontal Support (Top Side)	X32, Y1
33.	Heater F10006 Gas Exhaust Duct (Interior Surface)	X(-2), Y9
34.	Floor (Under Former Salt Bath)	X27, Y12*
56.	Office Ceiling	X18, Y1
57.	Office Ceiling Vent (Interior Surface)	X19, Y2

Sample Locations Not Shown on Drawings:

Decontamination Tent #1:

Floor

1.	X43, Y9	5.	X46, Y14*	9.	X48, Y9
2.	X45, Y10	6.	X47, Y11	10.	X48, Y11*
3.	X46, Y10	7.	X47, Y14	11.	X48, Y15
4.	X46, Y12	8.	X47, Y16		

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

Main Plant (Low Bay)
Judgmental Sample Locations
(continued)

East Wall

1.	X48, Y10, Z2	4.	X48, Y13, Z4
2.	X48, Y12, Z3	5.	X48, Y16, Z3
3.	X48, Y12, Z2		

Decontamination Tent #2 (Floor)

1.	X29, Y10	4.	X28, Y14
2.	X27, Y10	5.	X28, Y15*
3.	X27, Y12		

Trench Floor

1.	X7, Y9	5.	X3, Y9*	9.	X(-2), Y10
2.	X7, Y11	6.	X3, Y11	10.	X(-2), Y12*
3.	X7, Y13	7.	X3, Y13	11.	X(-2), Y14
4.	X7, Y15	8.	X3, Y15	12.	X(-2), Y16

Offices (Floor)

1. X17, Y2
2. X19, Y1
3. X19, Y3

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-6
BILLET STORAGE WAREHOUSE
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
78. Floor Drain	Y10, X8
79. Expansion Joint	Y16, X8
80. Floor Drain	Y20, X8
81. Floor Drain	Y30, X8

Sample Locations Not Shown on Drawings:

Billet Storage Warehouse Floor	Y16, X(-1)
	Y11, X(-1)
Top of Roll-Up Doors (West)	Y3, Z4
	Y15, Z5
Top of Roll-Up Doors (South)	X8, Z4
Top of Roll-Up Doors (North)	X6, Z4
Roll-Up Door (North) Surface	X6, Z2
Roll-Up Door (West) Surface	Y16, Z1
Tops of Ceiling Light Fixtures (Nearest this Grid)	Y15, X11
Tops of Ceiling Light Fixtures (Nearest this Grid)	Y4, X3
Tops of Ceiling Light Fixtures (Nearest this Grid)	Y22, X9
Tops of Ceiling Light Fixtures (Nearest this Grid)	Y29, X11

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-7
RF3 BUTLER BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description		Grid Location
82.	Sill Northwest Corner	X2, Y20
83.	Floor Drain 22'-8" from Northwest Corner	X7, Y20
84.	Drum Ledge Oxide Transfer Box	X4, Y17
85.	Top Oxide Transfer Box (Horizontal)	X5, Y18
86.	Ductwork Oxide Transfer Box	X10, Y21
87.	Top Heater Hung From Ceiling	X6, Y21
88.	Trench Drain	X7, Y14
89.	Holdup Barrier in Trench	X6, Y14
90.	Lift Beam Horizontal (West)	X2, Y17
91.	Lift Beam Horizontal (East)	X12, Y12
92.	Electrical Conduit Floor Penetration	X13, Y16
93.	Electrical Conduit Access at 90 Degrees (Horizontal)	X13, Y15
94.	Dead End Drum Heat Heater Ductwork	X6, Y10
95.	Dead End Drum Heat Heater Ductwork	X7, Y9
96.	Drum Heater (Burring Lathe Turns) Interior	X3, Y10
97.	Drum Heater (Burring Lathe Turns) Interior	X10, Y10
98.	Electrical Panels Interior	X1, Y18
99.	Electrical Panel Conduit Elbow Panel SP (Horizontal)	X1, Y17
100.	Ductwork Elbow (Lowpoint) Horizontal	X9, Y20
101.	Ductwork Sampling Both (Rectangular)	X11, Y18
102.	Capped End (Was to Bag House and Filters)	X6, Y7
103.	Bag House Fallout	X8, Y6
104.	Interior Filter Box.	X11, Y5
105.	Collar After Blower Up to Stack	X8, Y1
106.	Stack Fallout (Floor Level)	X7, Y3
107.	Stack Flange Prior to Leaving Roof	X8, Y3
108.	Collection Drum Collar at Fallout from Filter Box	X9, Y5
109.	Horizontal Structural Beam at 16'-0" High	X12, Y3
110.	Top Roll-Up Door	X10, Y4
111.	Horizontal Structural Beam at 12'-0" High	X6, Y1
112.	Portable HEPA Box	X6, Y6
113.	Floor Drain	X7, Y7

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-8
ENCLOSED TRUCK RAMP
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
I-Beam Surface	X10, Y13, Z1
Floor	X9, Y10
Top of Interior Roll-Up Door (South)	X7, Z5
Roll-Up Door Interior Surface (South)	X8, Z2
Top of Ceiling Light Fixture (Nearest this Grid)	X3, Y9
Top of Ceiling Light Fixture (Nearest this Grid)	X8, Y17
Floor	Y2, Y22

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-9
TOOL CRIB
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
Surface of I-Beam	X8, Y1, Z2
Internal Surface of Funnel Hood	X15, Y7
Louver Surface (South Wall)	X12, Z2
Top Surface of Ceiling Light Fixture (Nearest this grid)	X14, Y4
Floor	X13, Y1
Interior Window Ledge (West Wall)	Y4, Z2

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-10
WASTEWATER TREATMENT PLANT
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
Sump Interior Wall Surface	X2, Y5
Drip Pan Pump #1 Surface	X8, Y10
Top Surface of Electrical Panels (North)	X19, Z3
Top Surface of Ceiling Light Fixture (Nearest this Grid)	X9, X13
Top Surface of Ceiling Light Fixture (Nearest this Grid)	X9, Y8
Top Surface of Roll-Up Door (North)	X3, Z4

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-11
DIE HEAD FILTER BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
66. Ductwork Before HEPA (Interior Surface)	X8, Y5
67. Stack (Exterior Surface)	X2, Y1

Sample Locations Not Shown on Drawings:

Floor Samples

1. X5, Y1
2. X1, Y13
3. X9, Y8

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-12
DOCK AREA
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
77. Floor Drain	X5, Y8

Sample Locations Shown on Drawings:

Dock Area Floor	Y14, X2
Interior Surface of Roll-Up Door (West)	Y7, Z2
Top of Roll-Up Door (West)	Y8, Z5
Interior Surface of Roll-Up Door (East)	Y11, Z1

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-13
ENCLOSED RAMP
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
Emergency Generator Surface	X1, Y4
I-Beam Surface	X3, Y5
Top of Roll-Up Door (East)	Y3, Z2
Floor	X4, Y1

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-14
SAW FILTER BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
59. Ductwork before HEPA (Interior Surface)	X4, Y9

Sample Locations Not Shown on Drawings:

Saw Filter Building Floor

1. X1, Y13
2. X2, Y4

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-15
RUNOUT TABLE FILTER BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
I-Beam Surface	X1, Y7, Z2
Floor	X5, Y13

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-16
RCRA STORAGE BUILDING
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Not Shown on Drawings:

Sample Description	Grid Location
Floor	X2, Y7
Roll-Up Door Interior Surface (South)	X4, Z1

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-17
SUBSTATION
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
68. Intake Grid of Transformer	X7, Y4
69. Transformer (External Surface)	X7, Y3

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-18
COMPRESSOR ROOM
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings:

Sample Description	Grid Location
70. Air Tank (External Surface)	X2, Y1*

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

TABLE D-19
BOILER ROOM
JUDGMENTAL SAMPLE LOCATIONS

Sample Locations Shown on Drawings: None

Sample Locations Not Shown on Drawings:

Sample Description — Grid Location

Floor Samples

1. X11, Y2
2. X18, Y4
3. X13, Y1
4. X17, Y3
5. X16, Y(-2)*
6. X6, Y(-2)
7. X15, Y(4)
8. X18, Y3
9. X4, Y3
10. X2, Y1*
11. X5, Y(-1)
12. X3, Y2
13. X6, Y2
14. X18, Y(-1)
15. X16, Y(1)*
16. X7, (Y1)

Ceiling Samples

1. X17, Y(-1)
2. X11, Y(1)
3. X(4), Y(1)
4. X(18), Y(4)
5. X(7), Y(3)*

North Interior Elevation Samples

1. X1, Z3
2. X2, Z2
3. X1, Z3
4. X5, Z1
5. X4, Z1*
6. X16, Z1
7. X17, Z3
8. X8, Z3
9. X11, Z1
10. X10, Z2*
11. X15, Z3
12. X13, Z1
13. X16, Z2

West Interior Elevation Samples

1. Y2, Z1
2. Y4, Z1*
3. Y(-1), Z2

East Interior Elevation Samples

1. Y3, Z2
2. Y4, Z2*
3. Y(-1), Z1

South Interior Elevation Samples

1. X1, Z1
2. X6, Z1*
3. X13, Z1
4. X19, Z2
5. X9, Z2
6. X14, Z3

*After the swipe sample is collected, collect a sample for total U, Th-232, Tc-99, and isotopic Pu.

APPENDIX E

COLLECT CONCRETE CORE SAMPLES

COLLECT CONCRETE CORE SAMPLES

1.0 Objective

To assess the extent of radiological contamination (specifically depth of penetration) in the building concrete floors.

2.0 Scope of Work

Concrete core sampling shall establish the basis for identifying the extent to which the concrete is contaminated. Cores shall be taken at 5 percent, minimum, of the random sample locations (Appendix C) with the highest direct beta surface contamination readings. Core samples will be sent to the laboratory where the top 1 inch of the sample will be sectioned into 1/4-inch sections. Each section will be acid digested, plated, and counted for gross alpha, gross beta, and total uranium. The minimum core depth is 2 inches.

It is expected that most of the contamination will have originated at the floor surface and that a portion of it has migrated downward or laterally through either cracks in the surface or via capillary action. Presuming this is the case, it is likely most of the contamination exists in the uppermost portions of the concrete flooring. During the coring process, a portion of the contamination may be carried downward by the coring bit. As a result, the sample collected may not be representative. To generate a more representative concrete core, a larger than needed diameter core will be drilled, the core removed, inverted and then a smaller diameter core drilled from the bottom to the top surface. This smaller diameter core will be submitted to the laboratory from sectioning and analysis.

3.0 Primary Equipment/Instrumentation

1) Diamond Bit Coring Drill 8 inches in diameter for obtaining a 7.75-inch core or approved equal

2) Diamond Bit Coring Drill 4.25 inches in diameter with fixture for drilling a 4-inch diameter core sample from the above or approved equal

3) Custom fixture to hold initial core

4) Water (cooling) supply with hose connection

5) Backing Plate

6) Hilte bolts

7) Hammer

8) Wedge

9) Wet Vac

10) Core container

11) Indelible pen

12) Plastic wrapping material to provide floor covering adjacent to sample site

13) Monitoring equipment for Alpha/Beta survey

14) Protective clothing and equipment as required by RWP

15) Grease pencil

16) Core plug

17) Crow bar

18) Tape

4.0 Task Elements

1) Obtain an RWP for the task, have all project personnel read it and sign off. Ensure project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for the day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required PPE specified in the RWP.

4) Using the direct beta measurements from Appendix C, sort the sample locations from highest activity to lowest activity.

5) Identify the top 5 percent sample locations to be sampled. Confirm an identification marker is still in the designated sample grid location. If it is not, place an identification mark on the grid. (Note: If the floor is not concrete in the indicated grid location, select the grid location with the next highest surface contamination level and indicate the new grid location in the field logbook.)

6) Place an identification marker on any grids identified for judgmental core sampling.

7) Collect the core sample in accordance with approved procedures.

5.0 Quality Assurance

1) Clean sampling tools and core drill bits between grid locations to minimize cross-contamination.

2) Document daily work activities in a field logbook. This logbook should contain descriptions of daily work activities, personnel involved, grid locations surveyed, survey sheet numbers completed, unusual occurrences, etc.

3) Personnel shall be trained in accordance all applicable procedures and the manufacturer instructions for the coring device.

4) Chain-of-Custody form and custody seals shall be used for all samples. All samples shall be labeled with the sampler's name, date, time, grid identification number, sample description, and analysis required.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

APPENDIX F

COLLECT SOIL SAMPLES

COLLECT SOIL SAMPLES

1.0 Objective

The purpose of this task is to make a preliminary assessment of soil contamination beneath selected buildings.

2.0 Scope of Work

Surface and subsurface soil samples will be collected, using a judgmental (biased) sampling approach, from sub-floor areas. A surface soil sample will be collected from the hole created from concrete core sampling. Additional sampling locations are identified in Table F-1.

3.0 Primary Equipment/Instrumentation

1) Plastic sample containers, 250 ml minimum volume

2) Masking tape

3) Indelible pen

4) Stainless steel scoop or trowel

5) Bucket with water (deionized preferred) for decontaminating sample equipment between samples; scrubbers, drying cloth, and misc. cleaning supplies as required

6) Plastic wrapping material to provide floor covering adjacent to sample site

7) Monitoring equipment for alpha and beta contamination

8) Protective clothing and equipment as required by RWP

4.0 Task Elements

1) Obtain an RWP for the task, have all project personnel read it and sign off. Ensure project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for the day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required PPE specified in the RWP.

4) At the concrete core boring locations where the soil has been exposed, collect a surface soil sample in accordance with approved procedure. Submit the soil sample to the laboratory for gross alpha, gross beta, total U, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.

5) At the sampling locations identified in Table F-1, remove an appropriate amount of the concrete floor, excavate and collect surface and subsurface soil samples. Submit these samples to the laboratory for analysis as directed by work instructions.

5.0 Quality Assurance

1) Document daily work activities in a field logbook. This logbook should contain descriptions of daily work activities, personnel involved, grid locations sampled, unusual occurrences, etc.

2) Sampling personnel shall be trained in accordance with all applicable procedures and equipment manufacturer's procedures. Training shall be documented and updated yearly.

3) Chain-of-Custody forms and custody seals shall be used for samples. All sample containers shall be labeled with the sampler's name, date, time, grid identification number, sample description, and analyses required.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

TABLE F-1
VARIOUS BUILDINGS
FLOOR DRAINS FOR EXCAVATION & SUBSURFACE
SOIL SAMPLING

	Floor Drain Grid Location
RF3 Butler Building	X7, Y20
RF6 Butler Building Addition	X28, Y7
RF6 Building	X21, Y7
Northwest Storage Building	X9, Y18
Northeast Storage Building	X7, Y18

APPENDIX G

SURVEY BUILDING EXTERIOR SURFACES

SURVEY BUILDING EXTERIOR SURFACES

1.0 Objective

To establish the extent of radiological contamination on the exterior surfaces (e.g., walls, roofs, and foundations) of selected RMI buildings.

2.0 Scope of Work

Direct alpha and beta contamination surveys shall be performed at systematically selected sample locations on the selected building exterior walls and exposed foundations. Judgmental (biased) samples will be collected at locations on selected roofs.

NOTE: Serious injuries could result from falling or tripping while conducting sampling activities on a roof. Extreme care must always be maintained to prevent accidents from occurring. Health and Safety will specify any required PPE on the RWP.

3.0 Primary Equipment/Instrumentation

1) Whatman 50 filter paper or equivalent, approximately 47 mm diameter

2) Coin envelope

3) Tape

4) Latex or cotton gloves

5) Monitoring equipment for beta surveys - Ludlum Model 177 meter with a G-M type Ludlum Model 44-9 probe or approved equal

6) Monitoring equipment for alpha surveys - Eberline ESP-2 meter with a Ludlum Alpha Scintillation probe or approved equal

7) Protective clothing and equipment as required by RWP

8) Grease pencil

4.0 Task Elements

1) Obtain an RWP for this task, have all project personnel read it and sign off. Ensure project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for the day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required PPE specified in the RWP.

4) Establish a coordinate grid on the north wall of each process building, excluding the RCRA Storage Building, the Sewage Treatment Plant, and the Emergency Equipment Storage Building. Actual grids need not be drawn. The origin of the grid shall be the lower left corner of the building. Each grid shall extend 2 meters high and 5 meters wide. The last grid on each wall may be less than 5 meters wide. Document grid locations in the field logbook. (Note: It is assumed there is not a significant difference in contamination levels between walls. Therefore, the data collected from the north wall may be used to estimate the contamination present on the other walls.)

5) Identify one square meter areas at the upper left and upper right corners of each grid. Conduct direct alpha and beta surveys at each of these areas in accordance with approved procedures.

6) Identify one meter lengths of exposed foundation at the lower left and lower right corners of each grid. Conduct direct beta and alpha contamination surveys per Step 5 and 6 above. If the foundation at the grid corner is not exposed, conduct the survey at the nearest exposed place. document any changes in location in the field logbook.

7) Establish a coordinate grid on the small roof area supporting the pickling area ventilation equipment. Each grid shall be 1 meter square. Actual grids need not be drawn. Document the grid locations in the field logbook.

8) Perform direct alpha and beta contamination survey per approved procedures at each grid location. Record the results in the field logbook and on the survey sheets. Collect samples of the aggregate at the the two grid locations with the highest beta activity for total U, isotopic U and Th-232 analysis.

9) Establish a coordinate grid on the roof of the Main Plant - High Bay area. Each grid location shall be 10 meters square. Actual grids need not be drawn. Document the grid locations in the field logbook.

10) Conduct direct alpha and beta contamination surveys per approved procedures at a one meter square area around the intersection of each grid. Record the direct readings on the survey sheets and in the field logbook.

11) Number the large roof vents from one to four beginning with the most western vent. Divide each vent into four sections: north, south, east, and west. Conduct direct and indirect surveys per approved procedures on the interior and exterior vertical surface of each section. Record the direct readings in the field logbook.

12) Repeat Steps 9 and 10 for the roof of the Main Plant Low Bay and RF-6 buildings. (Note: Facilities engineering shall review the work plan and locations to be sampled to ensure the roof is structurally sound and can support the weight of the personnel assigned to this task prior to beginning any work on the roof.)

5.0 Quality Assurance

1) Document daily work activities in a field logbook. This logbook should contain descriptions of daily work activities, personnel involved, grid locations sampled, unusual occurrences, etc.

2) Sampling personnel shall be training in accordance with all applicable procedures. Training shall be documented and updated yearly.

3) Chain-of-Custody forms and custody seals shall be used for samples. All sample containers shall be labeled with the sampler's name, date, time, grid identifier, sample description, and analyses required.

4) Field survey instruments shall be calibrated once a quarter and a response check shall be performed daily. All radiological standards shall be traceable to an NIST standard.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

APPENDIX H

UNDERGROUND UTILITIES CHARACTERIZATION

UNDERGROUND UTILITIES CHARACTERIZATION

1.0 Objective

The objective of this task is to characterize the presence of radiological contamination in utilities under the building footprint.

2.0 Scope of Work

Utility line samples will be collected, using a systematic sampling approach, from sub-floor penetrations or low points or traps of potentially affected utility lines.

3.0 Primary Equipment/Instrumentation

1) Plastic bags for sample containers of cloth swab and/or plastic containers, 250 ml minimum volume

2) Equipment to open utility lines at low points or break lines at connection points immediately prior to penetrating the floor.

3) Masking tape

4) Indelible pen

5) Stainless steel scoop or trowel

6) Bucket with water (deionized preferred) for decontaminating sample equipment between samples; scrubbers, drying cloth, and misc. cleaning supplies as required

7) Plastic wrapping material to provide floor covering adjacent to sample site

8) Monitoring equipment for alpha and beta contamination

9) Protective clothing and equipment as required by RWP

4.0 Task Elements

1) Obtain an RWP for the task, have all project personnel read it and sign off. Ensure project personnel have been trained to perform their assigned task.

2) Assemble all equipment in a clean staging area. Review the work plan and assignments for the day. Remove all equipment packaging prior to entry into the contaminated work area to minimize radioactive waste generation.

3) Obtain all required PPE specified in the RWP.

4) Identify all potentially affected utility lines and document in logbook.

5) At the utility line penetration or trap, survey the interior of the line per approved procedure using the following guidance.

   (1) Lay down plastic floor covering, ensuring the utility line is not in use and clear of any standing liquids, open th[illegible]ne joint or trap access.
   (2) Attach the cloth swab to the plumber's snake.
   (3) Using the plumber's snake swab 20 feet of the utility line.
   (4) Retract the plumber's snake and place the cloth swab in a plastic bag for analysis.
   (5) If deposits of material are noted on the open end of the utility line, scrape with the trowel and place samples in a plastic container.
   (6) Complete the appropriate chain of custody and package each section into a sample container and submit the sample to the laboratory for gross alpha, gross beta, isotopic U, Th-232, Tc-99 and isotopic Pu analysis.
   (7) Seal sample container with lid and masking tape.
   (8) With an indelible pen, mark masking tape and sample form with sample location, beta-gamma reading, and HP technician name.
   (9) Enter appropriate information on Chain of Custody form.
   (10) Reconnect or seal the sampling access point.
   (11) Plumber's snake, hand trowel, sampler's gloves and any other equipment used shall be surveyed and decontaminated/replaced as necessary between each sampling operation to avoid cross contamination of samples. These survey(s) results shall be documented on the survey form.
   (12) Any water used for equipment decontamination will be disposed of through the Wastewater Treatment Facility per approved procedures.

5.0 Quality Assurance

1) Document daily work activities in a field logbook. This logbook should contain descriptions of daily work activities, personnel involved, utility line sampled, unusual occurrences, etc.

2) Sampling personnel shall be trained in accordance with all applicable procedures. Training shall be documented and updated yearly.

3) Chain-of-Custody forms and custody seals shall be used for samples. All sample containers shall be labeled with the sampler's name, date, time, grid identifier, sample description, and analyses required.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under an RWP issued by RMI Environmental Safety and Health. Each person assigned to this tasks shall have read and signed the RWP indicating they understand and will comply with its requirements prior to the start of work.

3) Lock and tag-out procedures will be followed prior to performing work on any electrical lines.

APPENDIX I

RCRA HAZARDOUS CHARACTERIZATION EVALUATION

RCRA HAZARDOUS CHARACTERIZATION EVALUATION

1.0 Objective

To provide a structured approach for determining if RCRA hazardous materials are present within each building.

2.0 Scope of Work

Decommissioning activities will generate a wide variety of solid wastes including excess chemicals and trade name products, miscellaneous equipment, piping, floor tile, concrete, etc. Because each waste has the potential to be a RCRA hazardous waste, it is important to individually evaluate whether or not the waste is RCRA hazardous. For the majority of the waste, this determination may be made quickly. Process knowledge or knowledge of the material may be used to show that the waste is not RCRA hazardous. For other wastes, further investigation including interviewing operating personnel and/or sampling the waste will be required. Similarly, each waste must be evaluated to determine if asbestos may be present. Field tests or material sampling followed by laboratory analysis for asbestos fibers may be required to confirm the presence of asbestos.

This task parallels the approach developed for the characterization of the old RF6 offices and documented in RMI-L-175, *Characterization of Building Materials in the Old Offices in the RF6 Butler Building*. An evaluation team will be formed to identify, through process knowledge and visual inspection, materials which may contain RCRA contaminants exceeding regulatory limits. The evaluation team will review past sample results, Material Safety Data Sheets, discussions with material vendors, etc. to determine if documentation exists indicating the material is not RCRA hazardous. If the evaluation team is not able to document the material does not contain RCRA contaminants above regulatory levels, a sample of the material will be collected and analyzed to determine if the contaminants present exceed regulatory limits.

3.0 Primary Equipment/Instrumentation

1) Protective clothing and equipment as required by the RWP
2) Grease pencil

4.0 Work Requirements

1) Form an evaluation team consisting of representatives of ES&H, Engineering, Project Management, Restoration Operations and Laboratory personnel. The ES&H manager will select the team leader. Representatives will be selected by the respective department managers and will be approved by the team leader.

   At least one of the team members will possess in-depth knowledge of the historical uses of the buildings, process areas, and equipment under evaluation and at least one team member will possess in-depth knowledge of site assessment methodologies and RCRA requirements.

2) Areas of potential RCRA contamination will be identified using historical knowledge of the area, as well as visual indicators such as staining or discoloration of building materials or the presence of oils, greases, etc. in equipment.

3) Each building will be evaluated separately. Areas of potential contamination will be identified by detailed description including suspected contaminant and the location referenced by the appropriate grid location. A separate checklist will be completed for each building. The information required by the checklists are listed in Figure I-1. The checklists will be reviewed by the evaluation team to determine if confirmatory sampling is required.

4) If the historical usage of the area or equipment was known to involve the use of chemicals or other possibly hazardous materials, or records indicating a spill(s) had occurred in an area, confirmatory sampling and analysis may be conducted. If visual indicators indicate hazardous contaminants may be present confirmatory sampling will also be conducted. The evaluation team will review past sample results, Material Safety Data Sheets, discussions with material vendors, etc. to determine if documentation exists indicating the material is not RCRA hazardous. If the evaluation team is not able to document the material does not contain RCRA contaminants above regulatory levels, a sample of the material will be collected and analyzed to determine if the contaminants present exceed regulatory limits.

5) Samples will be collected by scraping, chipping, etc. the surface of the material to be sampled to removed the amount of material required by the laboratory for the analysis being requested. For liquids, greases, etc., the required amount of material will be collected scooping or dipping a sample of the material. All samples will be packaged per the requirements of the laboratory.

5.0 Quality Assurance Requirements

The Quality Assurance associated with this task shall be maintained by implementing the following activities:

1) Document daily work activities in a field logbook. This book should contain descriptions of daily activities, personnel involvement, grid locations surveyed, survey sheet numbers, unusual occurrences, etc.

2) Chain-of-custody forms and custody seals shall be used for samples sent to a laboratory for analyses. All samples shall be labeled with the sampler's name, date, time, grid identification number, sample description, and analysis required. Specific forms shall be used to ensure that consistent and complete information is gathered.

3) Sampling personnel shall be trained in accordance with this procedure and other site specific and equipment manufacturer's procedures. Training shall be documented and updated yearly.

4) Field samples shall be collected and then containerized in EPA glassware, fitted with teflon-lined caps and sealed with tape. containers shall be double bagged, packed in plastic bubble wrap and kept in coolers with ice (less than 4 degrees C) while at the facility and during shipment. Coordinate with the testing laboratory prior to sample collection to (1) determine the sample volume required for each analysis, (2) obtain approval to ship (3) transmit gross activity levels for each sample. Ensure that sufficient volume is included for QA analysis.

5) Sample holding times from field collection to TCLP extraction shall be coordinated and expe-'ted to insure that the maximum hold times are not exceeded.

6) Every reasonable effort shall be made to maintain sampling equipment and containers free of contamination.

6.0 Health and Safety Requirements

1) A pre-job briefing shall be conducted each day prior to the start of work.

2) All work shall be conducted under a RWP issued by RMI Environmental Safety and Health. Each person assigned to this task shall have read and signed the RWP indicating that they understand and will comply with the RWP's requirements prior to the start of work.

CHECKLIST QUESTIONS FOR CHEMICAL CHARACTERIZATION

1) Identify the building and describe past and current use of building. If different operations were conducted in specific areas of the building, describe each area separately.

2) Identify any hazardous or toxic materials known to be used, stored or generated in the building. Describe the area of the building where these materials may have been present. Areas may be described using the floor grid locations.

3) Describe the floor and any floor coverings. Identify the location of visible cracks in the floor or evidence of staining or discoloration. Are any of these locations in areas where hazardous or toxic materials may have been used or stored?

4) Describe any equipment present in the building and identify where it is located. Did this equipment process or stored any hazardous or toxic materials? Does this equipment contain any oils, greases, lubricants, etc? Is data available to confirm any oils, greases, etc. are not hazardous or toxic? Does the equipment contain any asbestos containing materials (ACMs) such as gaskets, insulation, etc? Have these materials been sampled to confirm the presence or absence of ACMs?

5) Describe the walls and ceiling. Are there cracks or is there staining or discoloration? Locate any staining or discoloration using the applicable grid location.

6) Describe the any electrical equipment in the building. Does this equipment contain or has it ever contained dielectric fluids? If so, was the fluid ever sampled for polychlorinated biphenyls (PCBs)?

7) Identify any potential ACMs in building materials. Have these materials been sampled to confirm the presence or absence of ACMs?

Figure I-1 Checklist Questions for Chemical Characterization

APPENDIX J

INTERIOR BUILDING ELEVATIONS AND SAMPLING GRIDS

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SK-X-00350		NORTHWEST STORAGE BUILDING / PROJECTED CEILING PLAN - SHEET 1 OF 2
SK-X-00351		NORTHWEST STORAGE BUILDING / PROJECTED CEILING PLAN - SHEET 2 OF 2
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SK-X-00379		BILLET STORAGE WAREHOUSE / ELEVATIONS
SK-X-00380		MAIN PLANT HIGH BAY / FLOOR PLAN - SHEET 1 OF 3
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SK-X-00386		MAIN PLANT HIGH BAY / ELEVATIONS - SHEET 1 OF 7
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SK-X-00435		RUNOUT TABLE FILTER BUILDING / ELEVATIONS

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NOTES

GENERAL LEGEND:

(A) INDICATES EXISTING COLUMN LINE WHERE ALPHA-NUMERIC DESIGNATION IS KNOWN

( ) INDICATES EXISTING COLUMN LINE WHERE ALPHA-NUMERIC DESIGNATION IS UNKNOWN

INDICATES RANDOM SAMPLE LOCATION

(1) INDICATES JUDGEMENTAL SAMPLE LOCATION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES DEPARTMENT OF ENERGY

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PARSONS

THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
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RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

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DRAWING INDEX - SHEET 1 OF 2

DRAWN BY JSB DATE 03-17-92 CHECKED BY MSF DATE 05-11-92 SCALE NONE

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INDEX OF DRAW

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SK-X-00438		SAW FITLER BUILDING / ELEVATIONS - SHEET 1 OF 2
SK-X-00439		SAW FILTER BUILDING / ELEVATIONS - SHEET 2 OF 2
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SK-X-00441		TOOL CRIB / ELEVATIONS
SK-X-00442		DIE HEAD FILTER BUILDING / FLOOR & PROJECTED CEILING PLANS
SK-X-00443		DIE HEAD FILTER BUILDING / ELEVATIONS
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SK-X-00445		SUB STATION / ELEVATIONS
SK-X-00446		COMPRESSOR ROOM / PLANS & ELEVATIONS
SK-X-00447		WASTEWATER TREATMENT PLANT / FLOOR & PROJECTED CEILING PLANS
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SK-X-00465		
SK-X-00466		
SK-X-00467		BOILER ROOM (BELOW MAIN PLANT HIGH BAY) / FLOOR AND PROJECTED CEILING PLANS
SK-X-00468		BOILER ROOM (BELOW MAIN PLANT HIGH BAY) / ELEVATIONS
SK-X-00469		MAIN PLANT HIGH BAY / ELEVATIONS SHEET 3 OF 7
SK-X-00470		DRAWING INDEX - SHEET 2 OF 2

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NOTES

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES
DEPARTMENT OF ENERGY

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THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
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REV NO.: A

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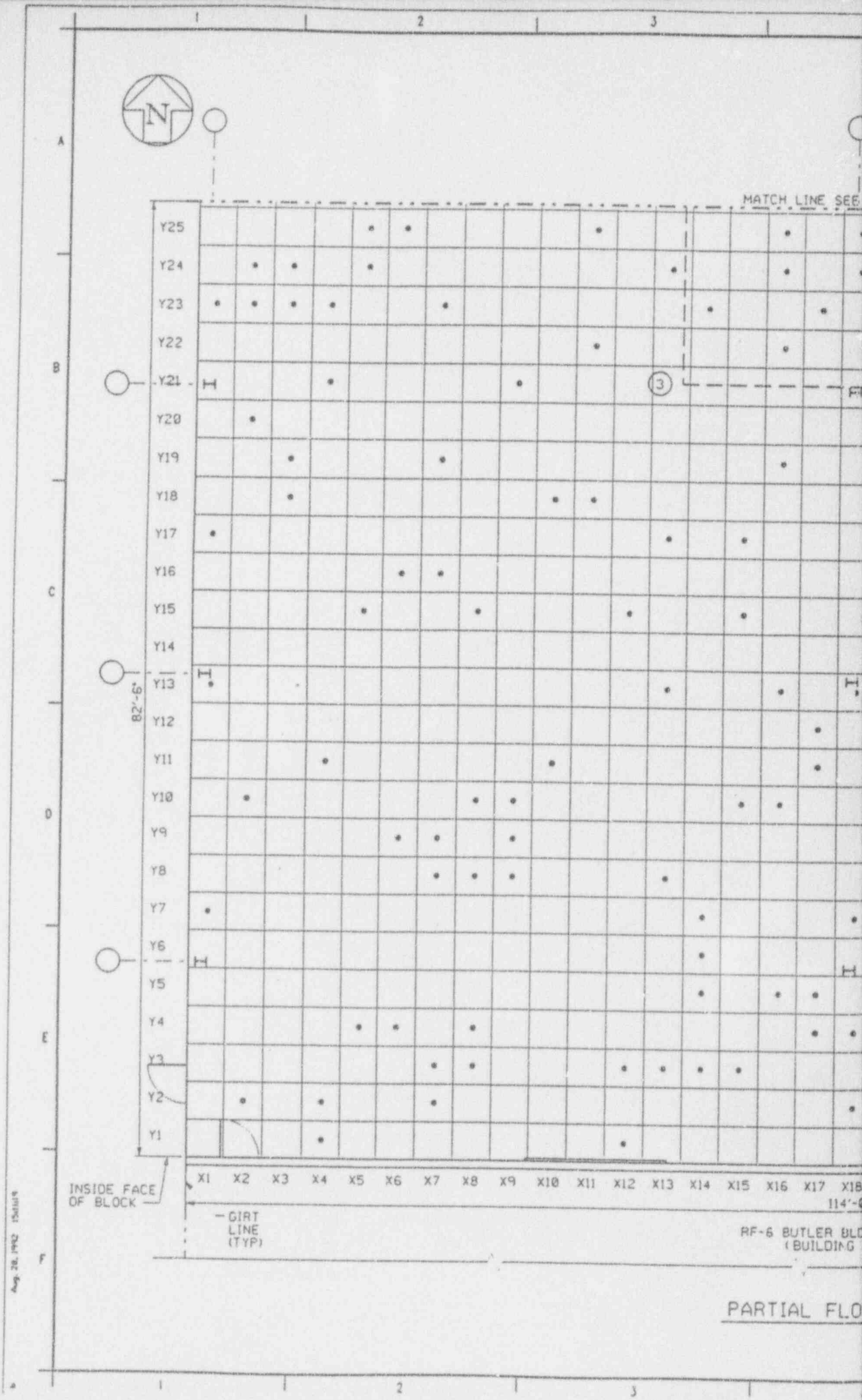

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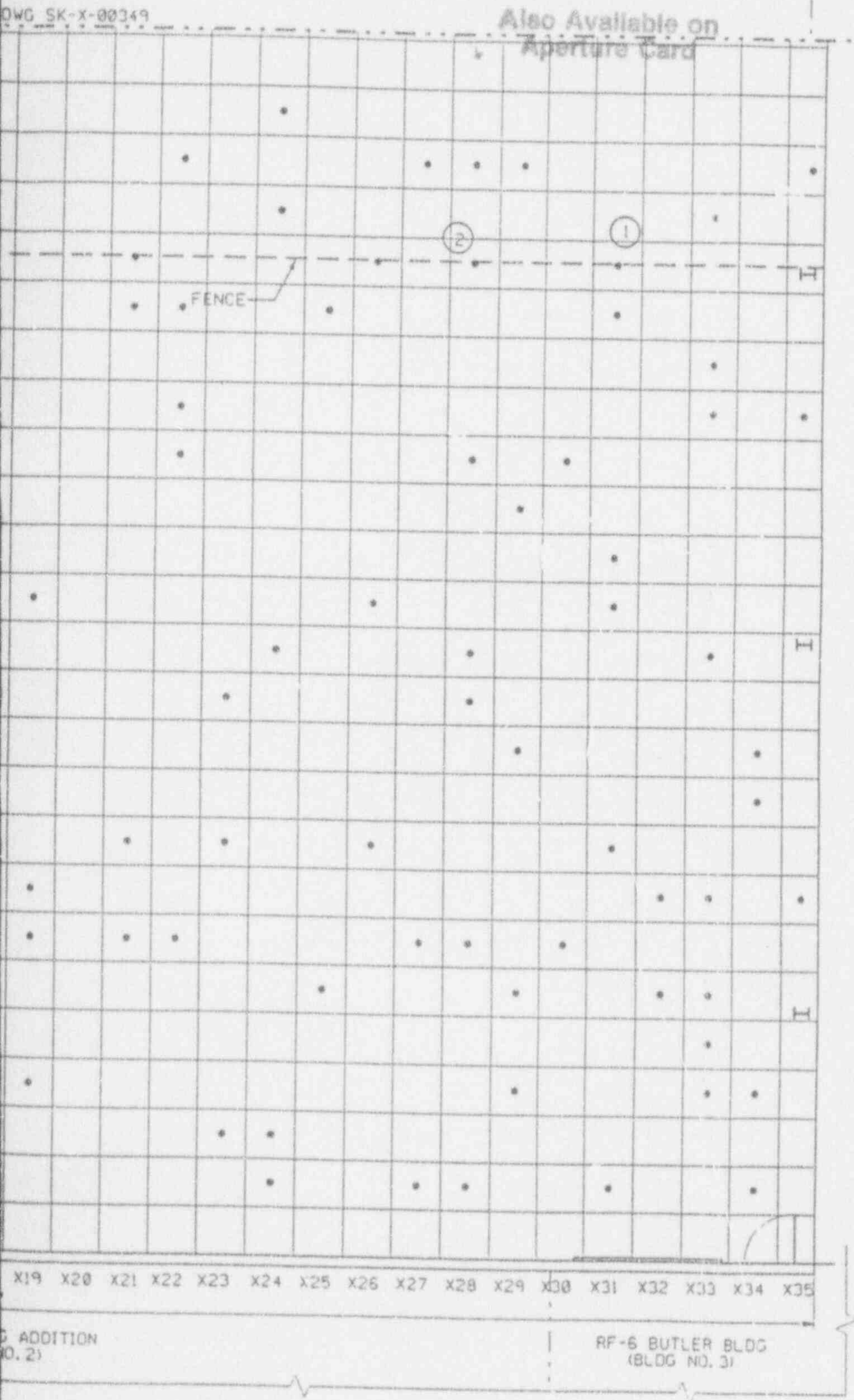

OR PLAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

1. FLOOR DRAIN.
2. EXPANSION JOINT.
3. CHIPPED CONCRETE.

RANDOM SAMPLE LOCATIONS

FLOOR

1. X28,Y21	51. X3,Y32	101. X18,Y4
2. X16,Y19	52. X28,Y26	102. X25,Y46
3. X7,Y44	53. X31,Y21	103. X1,Y23
4. X11,Y25	54. X32,Y31	104. X16,Y24
5. X33,Y8	55. X28,Y12	105. X26,Y21
6. X10,Y32	56. X24,Y46	106. X28,Y34
7. X7,Y9	57. X29,Y37	107. X7,Y3
8 X34,Y10	58. X6,Y25	108. X9,Y8
9. X6,Y39	59. X18,Y24	109. X5,Y4
10. X24,Y3	60. X15,Y3	110. X32,Y43
11. X14,Y23	61. X4,Y21	111. X28,Y17
12. X33,Y42	62. X27,Y23	112. X19,Y4
13. X11,Y38	63. X2,Y24	113. X31,Y9
14. X31,Y39	64. X8,Y42	114. X9,Y10
15. X23,Y30	65. X9,Y21	115. X22,Y7
16. X12,Y43	66. X22,Y18	116. X31,Y20
17. X13,Y34	67. X5,Y15	117. X18,Y25
18. X11,Y43	68. X27,Y43	118. X28,Y2
19. X24,Y13	69. X7,Y2	119. X28,Y13
20. X25,Y6	70. X23,Y3	120. X29,Y26
21. X35,Y18	71. X13,Y24	121. X22,Y20
22. X15,Y45	72. X7,Y8	122. X20,Y26
23. X33,Y5	73. X4,Y2	123. X17,Y43
24. X19,Y7	74. X18,Y2	124. X25,Y33
25. X27,Y32	75. X33,Y38	125. X3,Y24
26. X23,Y12	76. X22,Y17	126. X11,Y36
27. X9,Y30	77. X17,Y11	127. X19,Y33
28. X13,Y13	78. X3,Y43	128. X12,Y33
29. X24,Y29	79. X24,Y26	129. X14,Y40
30. X29,Y16	80. X8,Y3	130. X34,Y4
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35. X26,Y26	85. X29,Y47	135. X26,Y29
36. X30,Y27	86. X25,Y40	136. X29,Y4
37. X29,Y31	87. X18,Y45	137. X28,Y27
38. X21,Y7	88. X8,Y39	138. X2,Y2
39. X14,Y37	89. X33,Y4	139. X26,Y28
40. X23,Y9	90. X2,Y48	140. X7,Y23
41. X29,Y6	91. X17,Y4	141. X6,Y16
42. X33,Y27	92. X9,Y9	142. X31,Y15
43. X29,Y11	93. X13,Y37	143. X4,Y1
44. X26,Y35	94. X16,Y13	144. X16,Y25
45. X27,Y39	95. X12,Y3	145. X6,Y9
46. X10,Y18	96. X13,Y8	146. X3,Y23
47. X8,Y8	97. X31,Y14	147. X33,Y22
48. X32,Y8	98. X7,Y42	148. X9,Y37
49. X34,Y2	99. X1,Y46	149. X13,Y17
50. X31,Y36	100. X7,Y18	150. X28,Y33

(CONT. ON DWG. SK-X-00349)

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UNITED STATES DEPARTMENT OF ENERGY

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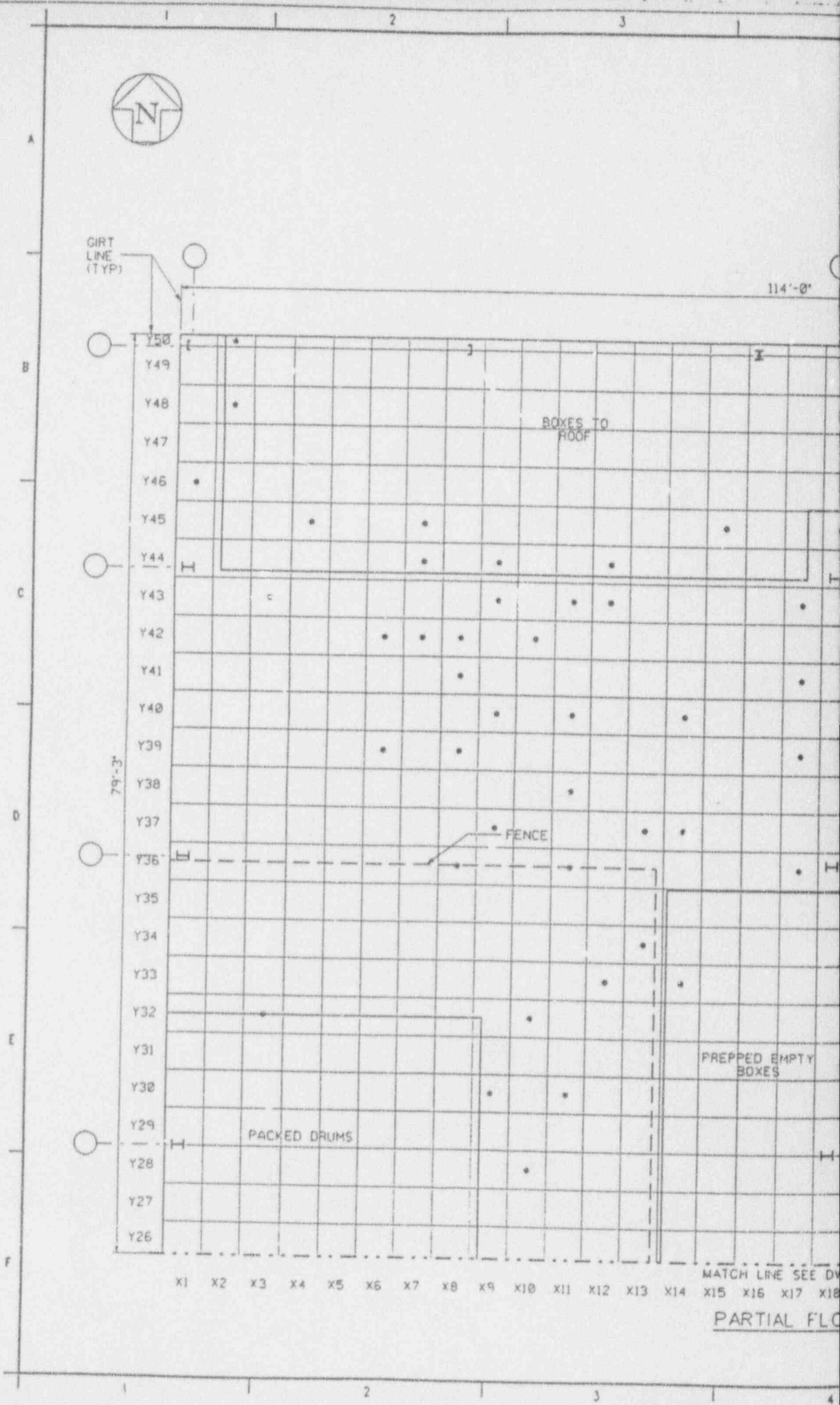
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

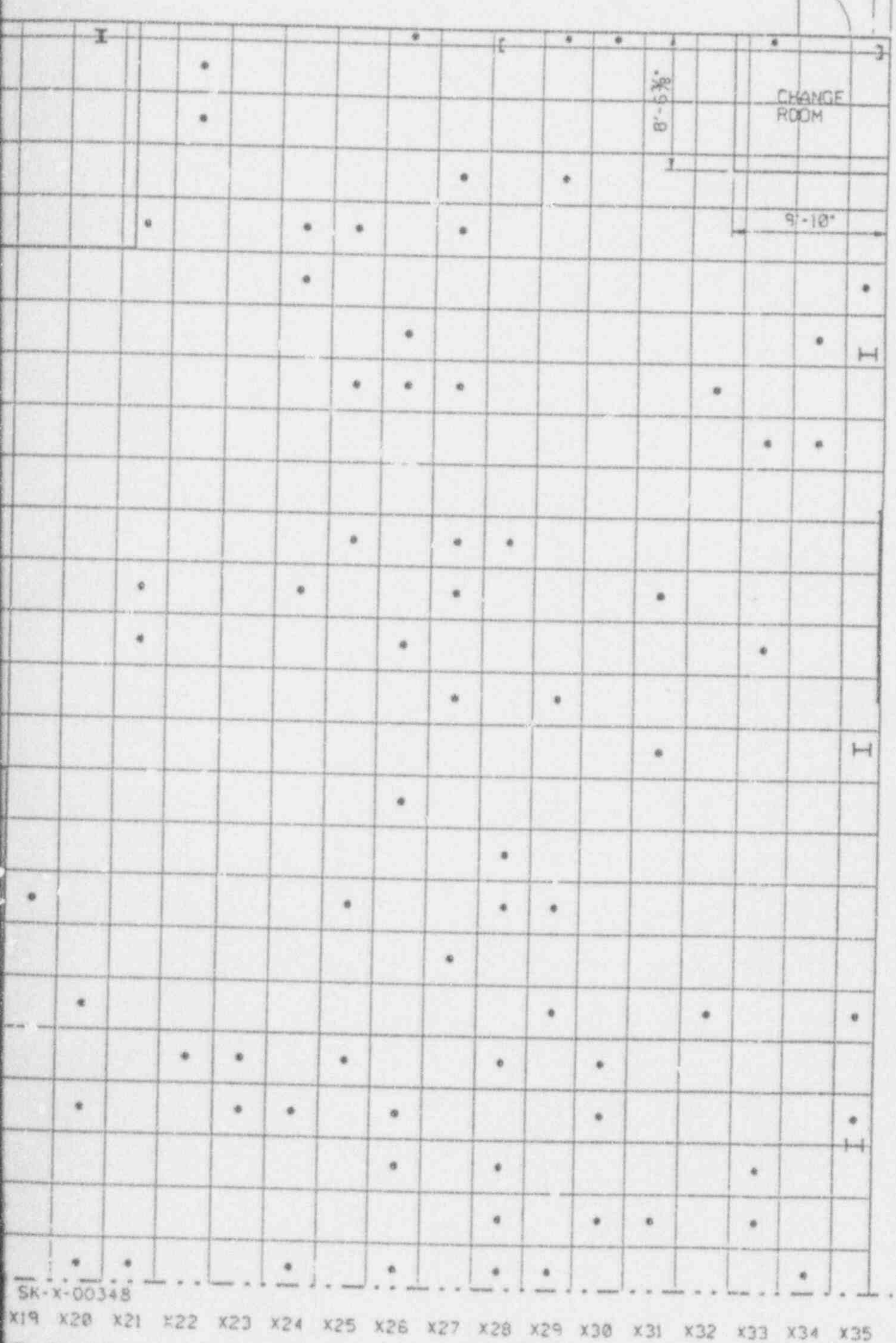
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 1 OF 2
NORTHWEST STORAGE BUILDING

DRAWN BY JSB/DEP DATE 02-21-92
CHECKED BY MSF/DVR
BLDG NO 1
WBS 1.1.2.2.1.2.0
00-90701
SK-X-00348
A

9404080147-18



GIRT LINE (TYP)
114'-0"
79'-3"
Y50
Y49
Y48
Y47
Y46
Y45
Y44
Y43
Y42
Y41
Y40
Y39
Y38
Y37
Y36
Y35
Y34
Y33
Y32
Y31
Y30
Y29
Y28
Y27
Y26
BOXES TO ROOF
FENCE
PACKED DRUMS
PREPPED EMPTY BOXES
MATCH LINE SEE
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17
PARTIAL



R PLAN

NOTES

(CONT. FROM DWG. SK-X 00348)

RANDOM SAMPLE LOCATIONS

FLOOR

151. X32,Y6	210. X9,Y40
152. X21,Y20	211. X26,Y14
153. X5,Y24	212. X8,Y10
154. X6,Y42	213. X12,Y15
155. X26,Y44	214. X28,Y7
156. X16,Y22	215. X33,Y28
157. X21,Y9	216. X28,Y23
158. X27,Y46	217. X14,Y3
159. X9,Y43	218. X25,Y20
160. X33,Y13	219. X14,Y7
161. X33,Y6	220. X24,Y22
162. X31,Y2	221. X27,Y37
163. X24,Y45	222. X2,Y50
164. X11,Y18	223. X17,Y41
165. X34,Y26	224. X34,Y42
166. X12,Y1	225. X29,Y33
167. X2,Y23	226. X4,Y11
168. X25,Y30	227. X19,Y8
169. X4,Y45	228. X28,Y28
170. X27,Y2	229. X35,Y3[illegible]
171. X16,Y10	230. X1,Y17
172. X22,Y23	231. X35,Y23
173. X5,Y25	232. X24,Y24
174. X35,Y8	233. X30,Y30
175. X17,Y12	234. X1,Y13
176. X33,Y18	235. X21,Y26
177. X27,Y47	236. X35,Y29
178. X11,Y30	237. X26,Y50
179. X29,Y50	238. X3,Y18
180. X30,Y17	239. X24,Y39
181. X31,Y27	240. X17,Y39
182. X7,Y19	241. X14,Y6
183. X13,Y3	242. X14,Y33
184. X18,Y7	243. X22,Y30
185. X2,Y20	244. X20,Y29
186. X3,Y19	245. X34,Y11
187. X8,Y36	246. X2' Y38
188. X28,Y40	247. X6,[illegible]4
189. X27,Y40	248. X16,Y5
190. X17,Y5	249. X25,Y43
191. X9,Y44	250. X1,Y7
192. X24,Y2	251. X33,Y19
193. X12,Y44	252. X19,Y14
194. X8,Y41	253. X10,Y42
195. X34,Y44	254. X22,Y48
196. X15,Y15	255. X33,Y50
197. X15,Y17	256. X30,Y29
198. X14,Y5	257. X11,Y40
199. X30,Y50	258. X21,Y21
200. X28,Y30	259. X15,Y10
201. X29,Y23	260. X18,Y13
202. X7,Y45	261. X26,Y38
203. X21,Y39	
204. X4,Y23	
205. X10,Y11	
206. X17,Y23	
207. X8,Y15	
208. X27,Y7	
209. X26,Y9	

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DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 2 OF 2
NORTHWEST STORAGE BUILDING

SCALE NONE

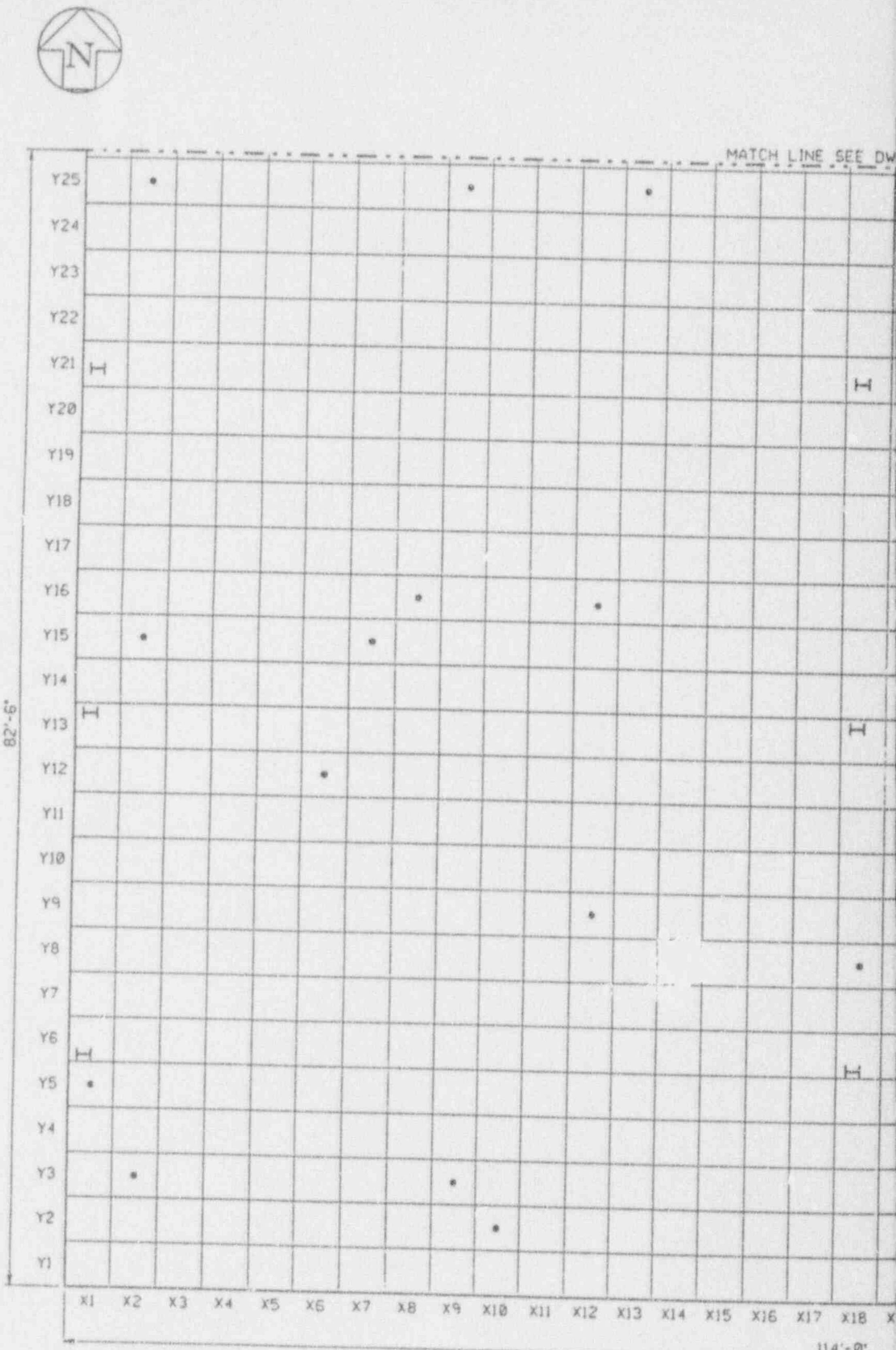
BLDG NO. 1

WBS 1.1.7.2.1.2.0
00-90701

SK-X-00349

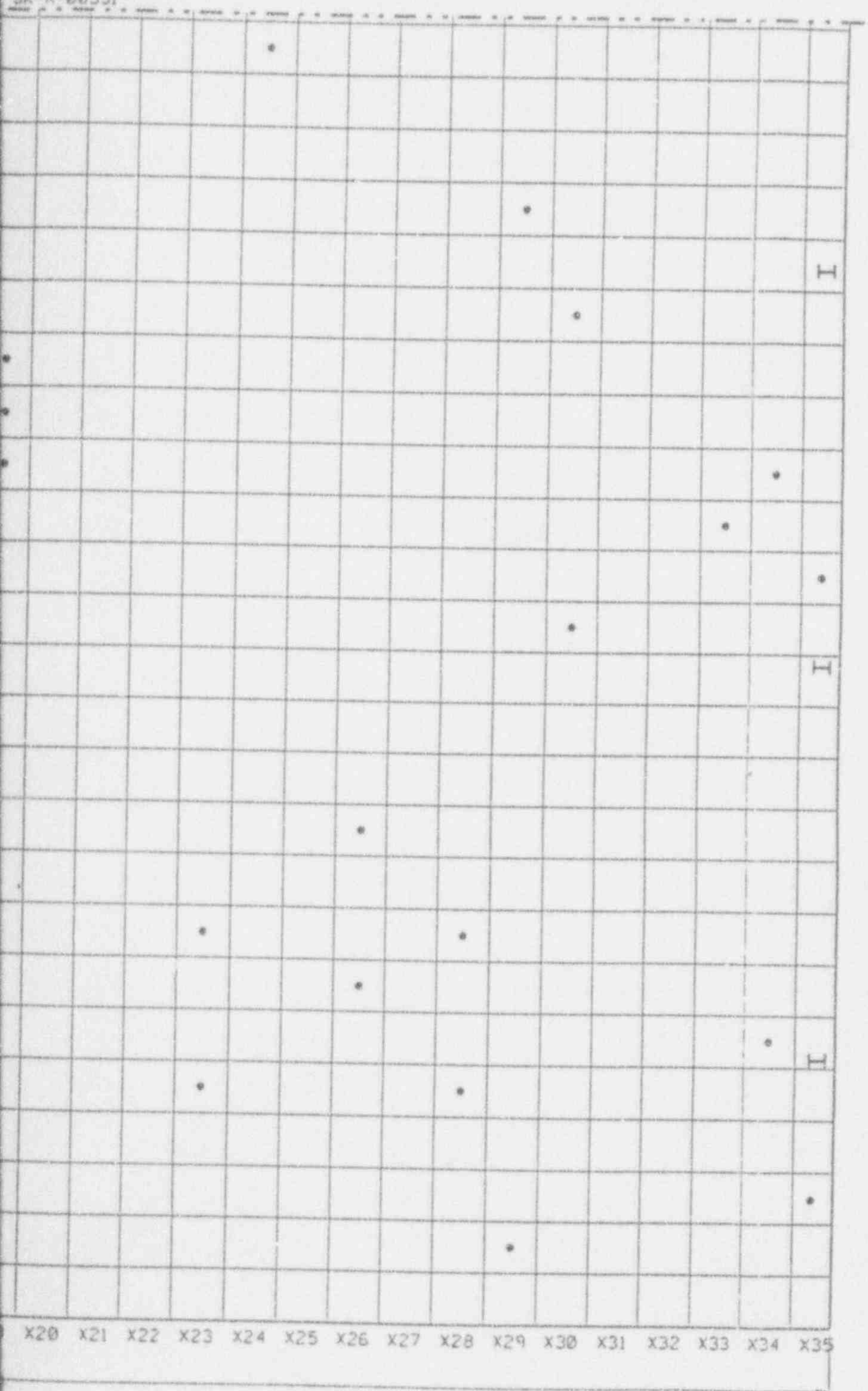
A

9404080147-19



PARTIAL PROJECTED C

SK-X-00351



ILING PLAN

NOTES

RANDOM SAMPLE LOCATIONS

CEILING

1. X29,Y28
2. X21,Y48
3. X35,Y15
4. X7,Y43
5. X21,Y42
6. X20,Y40
7. X35,Y3
8. X35,Y36
9. X7,Y50
10. X12,Y9
11. X13,Y25
12. X7,Y15
13. X29,Y30
14. X6,Y38
15. X29,Y2
16. X23,Y35
17. X13,Y31
18. X32,Y38
19. X8,Y16
20. X10,Y30
21. X28,Y43
22. X19,Y17
23. X3,Y38
24. X12,Y16
25. X30,Y14
26. X6,Y12
27. X11,Y46
28. X33,Y16
29. X23,Y8
30. X23,Y5
31. X28,Y5
32. X2,Y3
33. X10,Y2
34. X18,Y28
35. X26,Y40
36. X18,Y8
37. X2,Y25
38. X28,Y8
39. X34,Y17
40. X14,Y29
41. X2,Y15
42. X3,Y46
43. X31,Y49
44. X9,Y25
45. X30,Y20
46. X26,Y10
47. X19,Y18
48. X3,Y34
49. X26,Y7
50. X29,Y22
51. X1,Y26
52. X24,Y25
53. X16,Y41
54. X19,Y42
55. X6,Y31
56. X17,Y35
57. X19,Y19
58. X20,Y47
59. X34,Y6
60. X10,Y46
61. X25,Y39
62. X9,Y3
63. X1,Y50
64. X1,Y5
65. X9,Y29

ANSTEC APERTURE CARD

Also Available on Aperture Card

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 1 OF 2
NORTHWEST STORAGE BUILDING

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/CEP	03-03-92			MSF/DWR	08-11-92
BLDG NO 1		FLOOR		SCALE NONE	
WBS 1.1.2.2.1.2.0 00-90701		SK-X-00350			A

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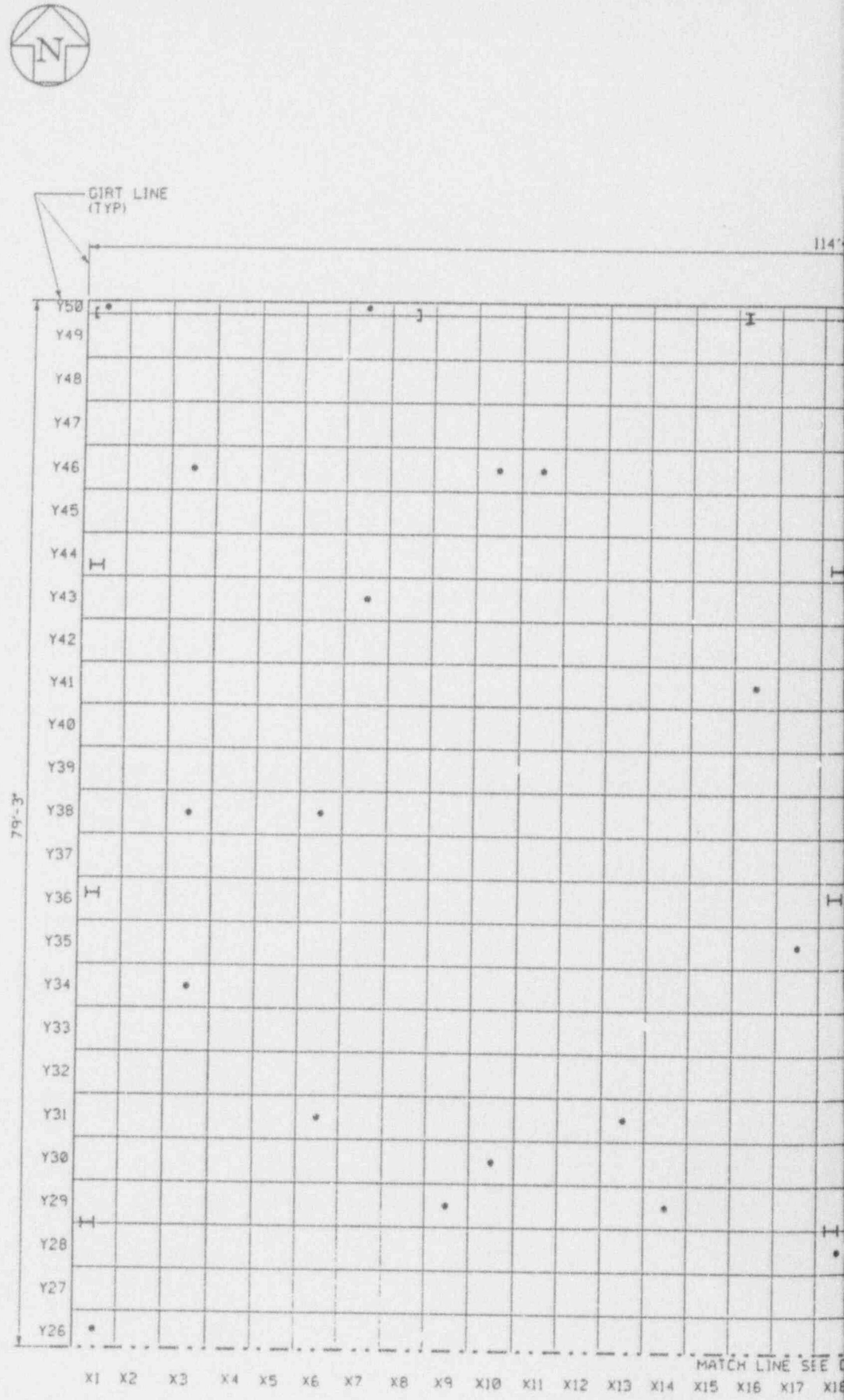
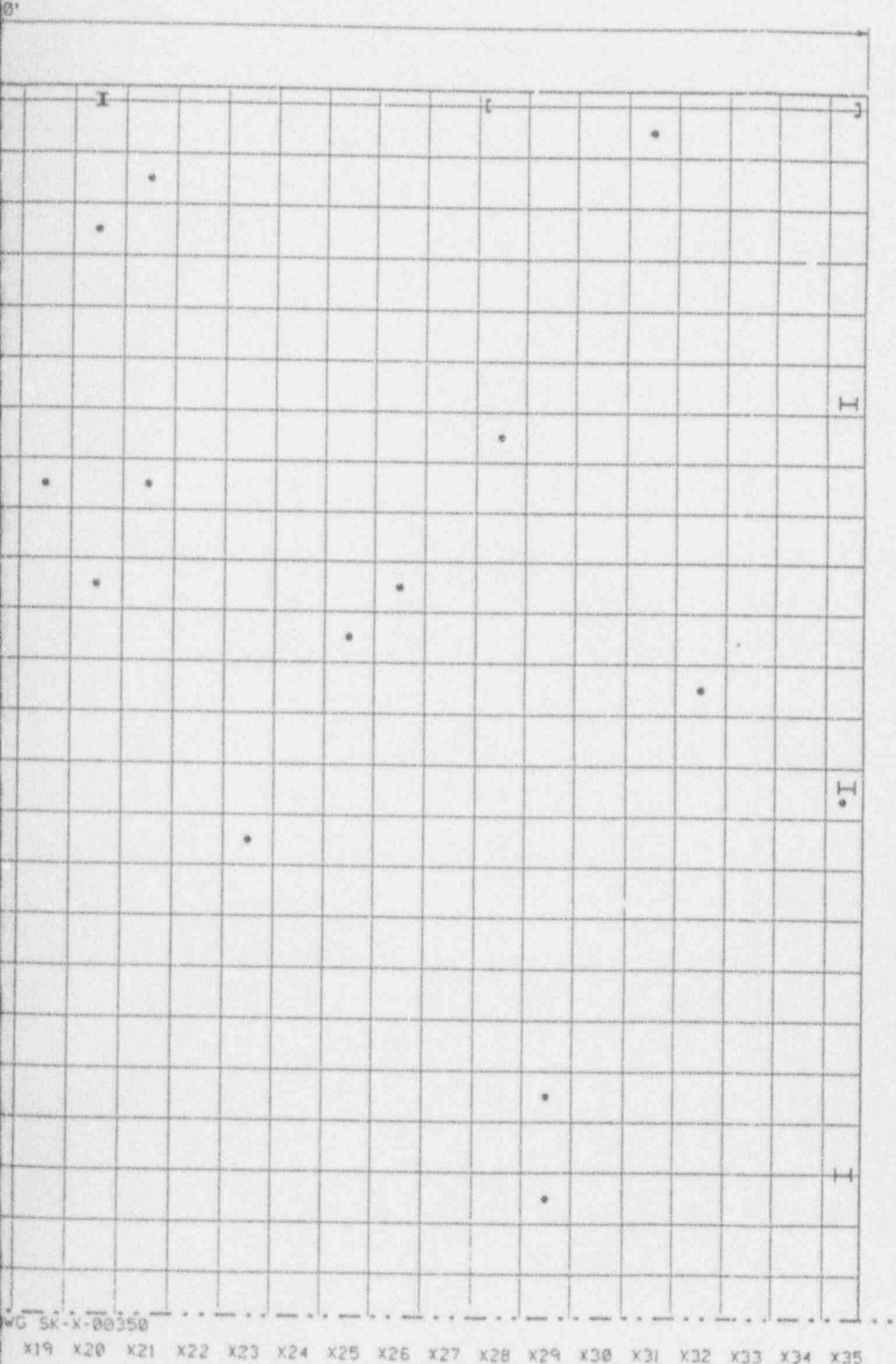


PARTIAL PROJECTE



D CEILING PLAN

NOTES

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CINCINNATI, OHIO

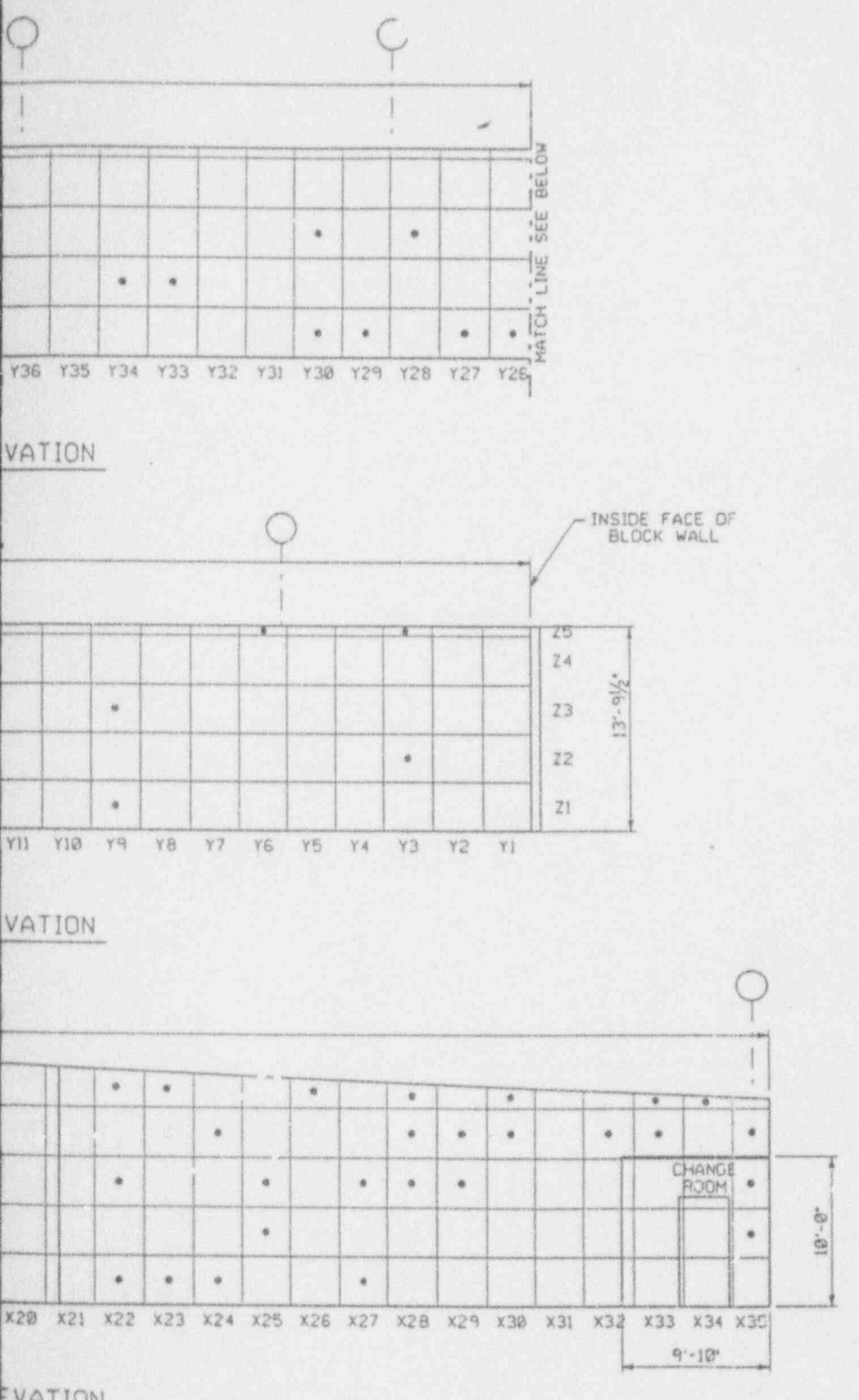
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS PROJECTED CEILING PLAN - SHEET 2 OF 2
NORTHWEST STORAGE BUILDING

JSB/DEP 02-21-92
MSF/DWR 08-14-92
BLDG NO 1
SCALE NONE
WBS LL2.2.1.2.8
00-90701
SK-X-00351
A

9404080147-21

79'-3"
Z5
Z4
Z3
Z2
Z1
13'-9½"
10'-0"
CHANGE ROOM
ROLL UP DOOR
Y50 Y49 Y48 Y47 Y46 Y45 Y44 Y43 Y42 Y41 Y40 Y39 Y38 Y37
9'-10"
EAST INTERIOR ELE
82'-6
MATCH LINE SEE ABOVE
Y25 Y24 Y23 Y22 Y21 Y20 X19 Y18 Y17 Y16 Y15 Y14 Y13 Y12
EAST INTERIOR ELE
114'-0"
2'-4"
Z5
Z4
Z3
Z2
Z1
13'-9½"
BURIAL BOXES
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17 X18 X19
NORTH INTERIOR EL



NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL	NORTH WALL
1. Y22.Z3	1. X35.Z2
2. Y33.Z2	2. X28.Z4
3. Y9.Z3	3. X23.Z1
4. Y50.Z2	4. X24.Z4
5. Y29.Z1	5. X25.Z3
6. Y6.Z5	6. X28.Z5
7. Y9.Z1	7. X22.Z1
8. Y45.Z3	8. X2.Z4
9. Y21.Z5	9. X23.Z5
10. Y19.Z5	10. X30.Z5
11. Y27.Z1	11. X33.Z4
12. Y40.Z5	12. X23.Z4
13. Y49.Z1	13. X27.Z3
14. Y50.Z4	14. X32.Z1
15. Y50.Z5	15. X30.Z4
16. Y42.Z3	16. X28.Z3
17. Y3.Z5	17. X27.Z1
18. Y24.Z5	18. X24.Z1
19. Y30.Z1	19. X29.Z3
20. Y3.Z2	20. X1.Z1
21. Y23.Z1	21. X26.Z5
22. Y12.Z4	22. X35.Z3
23. Y34.Z2	23. X1.Z2
24. Y30.Z3	24. X33.Z5
25. Y42.Z1	25. X22.Z3
26. Y26.Z1	26. X35.Z4
27. Y15.Z3	27. X34.Z5
28. Y28.Z3	28. X29.Z4
29. Y48.Z5	29. X22.Z5
30. Y19.Z4	30. X2.Z3
31. Y50.Z1	31. X1.Z5
32. Y50.Z3	32. X25.Z2
33. Y16.Z3	

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

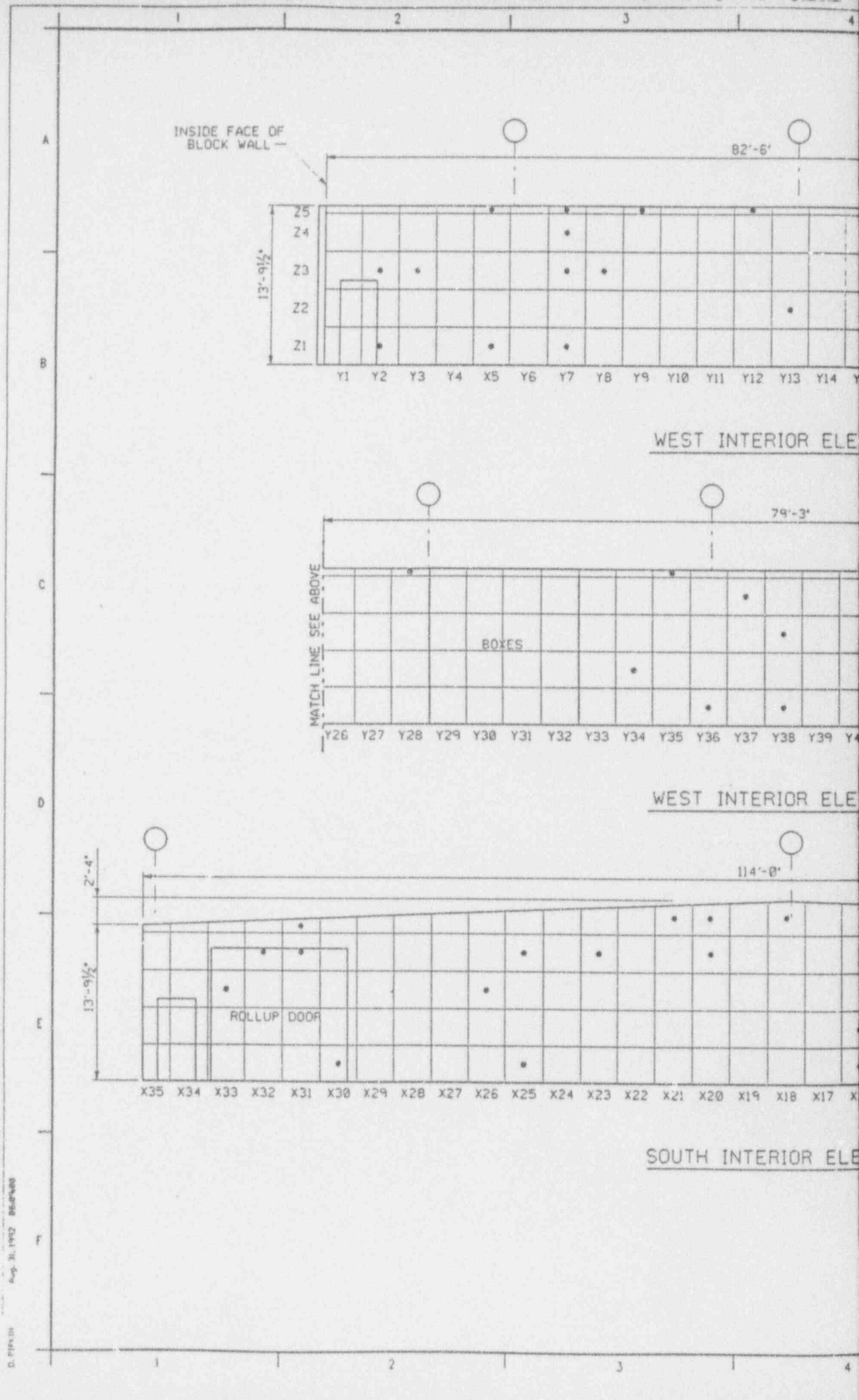
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 1 OF 2
NORTHWEST STORAGE BUILDING

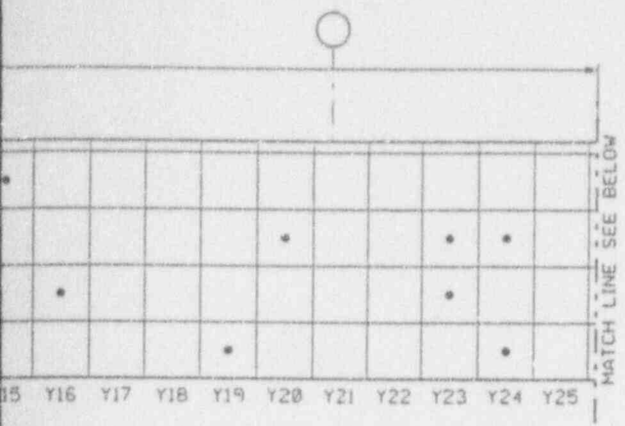
DRAWN BY	DATE	CHECKED BY	DATE
JSB/DEP	03-12-92	MSF/DWR	08-14-92

BLDG NO 1 — SCALE: NONE

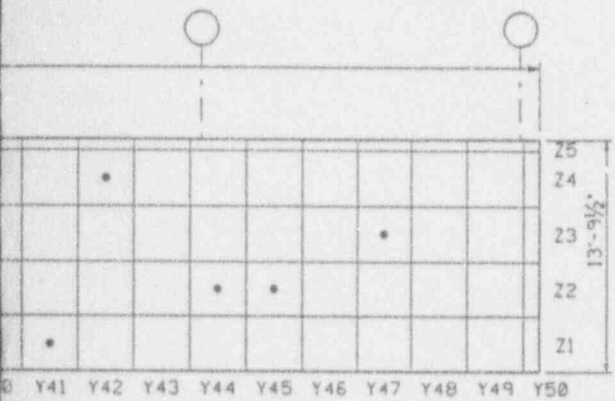
OPER. CONTR. PROJ. NO.	DRAWING NO.	REV. NO.
WBS 1.1.2.2.1.2.0 00-90701	SK-X-00352	A

9404080147-22

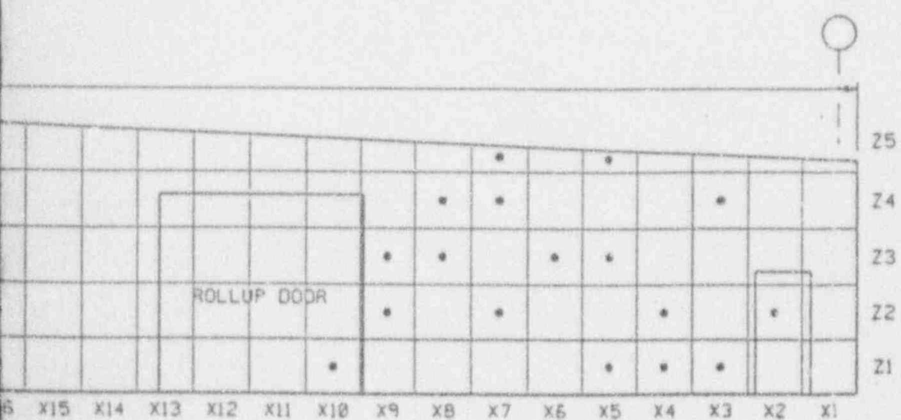

INSIDE FACE OF
BLOCK WALL
82'-6"
13'-9½"
Z5
Z4
Z3
Z2
Z1
Y1 Y2 Y3 Y4 X5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14
WEST INTERIOR ELE
79'-3"
MATCH LINE SEE ABOVE
BOXES
Y26 Y27 Y28 Y29 Y30 Y31 Y32 Y33 Y34 Y35 Y36 Y37 Y38 Y39
WEST INTERIOR ELE
2'-4"
114'-0"
13'-9½"
ROLLUP DOOR
X35 X34 X33 X32 X31 X30 X29 X28 X27 X26 X25 X24 X23 X22 X21 X20 X19 X18 X17
SOUTH INTERIOR ELE



VATION



VATION



VATION

NOTES

RANDOM SAMPLE LOCATIONS

WEST WALL	SOUTH WALL
1. Y12.Z5	1. X5.Z5
2. Y20.Z3	2. X5.Z1
3. Y24.Z3	3. X10.Z1
4. Y2.Z3	4. X6.Z3
5. Y8.Z3	5. X26.Z3
6. Y42.Z4	6. X30.Z1
7. Y41.Z1	7. X31.Z5
8. Y5.Z1	8. X21.Z5
9. Y23.Z2	9. X9.Z3
10. Y19.Z1	10. X8.Z3
11. Y7.Z1	11. X3.Z4
12. Y13.Z2	12. X7.Z5
13. Y7.Z3	13. X33.Z3
14. Y5.Z5	14. X25.Z4
15. Y47.Z3	15. X7.Z4
16. Y16.Z2	16. X16.Z2
17. Y28.Z5	17. X23.Z4
18. Y24.Z1	18. X20.Z5
19. Y7.Z4	19. X31.Z4
20. Y36.Z1	20. X25.Z1
21. Y38.Z3	21. X8.Z4
22. Y15.Z4	22. X3.Z1
23. Y37.Z4	23. X2.Z2
24. Y35.Z5	24. X18.Z5
25. Y3.Z[illegible]	25. X5.Z3
26. Y2.Z1	26. X20.Z4
27. Y7.Z5	27. X4.Z2
28. Y23.Z3	28. X32.Z4
29. Y34.Z2	29. X4.Z1
30. Y44.Z2	30. X16.Z1
31. Y9.Z5	31. X7.Z2
32. Y38.Z1	32. X9.Z2
33. Y45.Z2	

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	90% CLIENT REVIEW	

UNITED STATES
DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

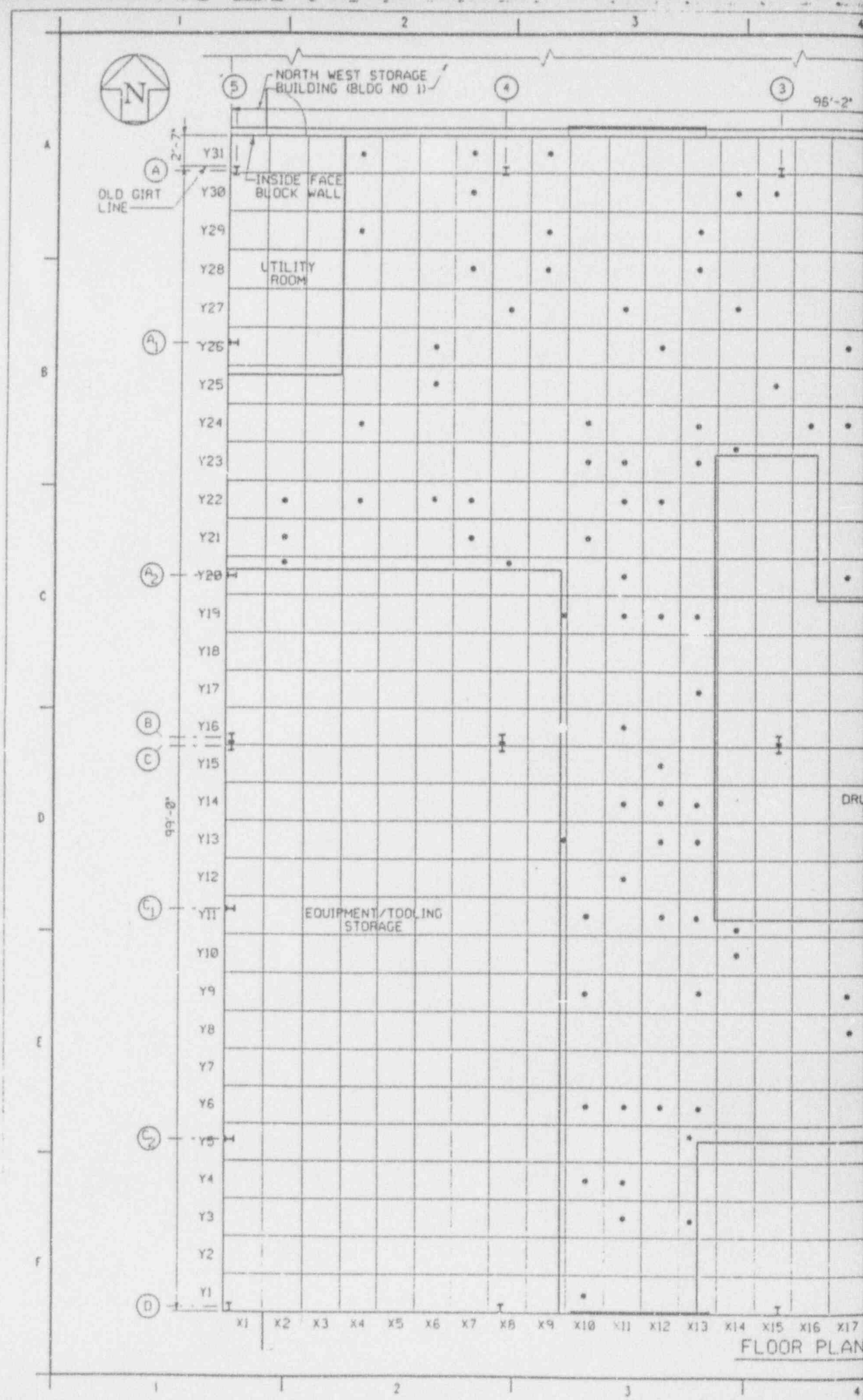
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE
RADIOLOGICAL SAMPLI'G LOCATIONS
ELEVATIONS - SHEET 2 OF 2
NORTH EST STORAGE BUILDING

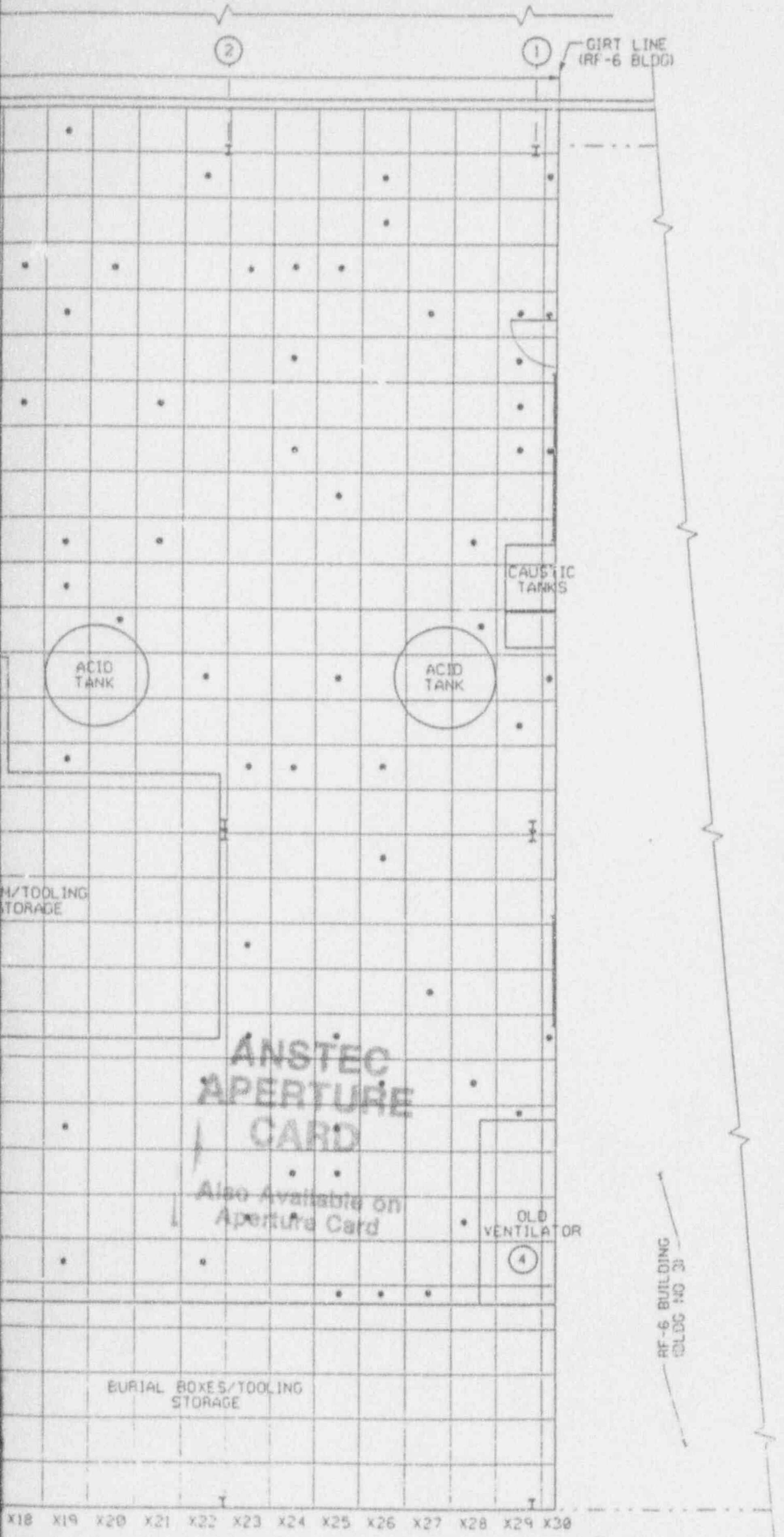
DRAWN BY: JSB/DEP	DATE: 03-12-92	DESIGNED, CHECKED BY	DATE	CHECKED BY: MSF/DWR	DATE: 08-14-92
BLDG NO 1		FLOOR		SCALE: NONE	CLASS

DOE PROJECT NO. | SPEC. CONTROL NO.: VBS LL2.2.1.2.8 00-90701 | DRAWING NO.: SK-X-00353 | SHEET NO. | REV. NO.: A

9404080147-23



NORTH WEST STORAGE BUILDING (BLDG NO 1)
N
5
4
3
96'-2"
A
A1
A2
B
C
C1
C2
D
2'-7"
99'-0"
OLD GIRT LINE
INSIDE FACE BLOCK WALL
UTILITY ROOM
EQUIPMENT/TOOLING STORAGE
DRU
Y31
Y30
Y29
Y28
Y27
Y26
Y25
Y24
Y23
Y22
Y21
Y20
Y19
Y18
Y17
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17
FLOOR PLAN



9404080147-24

NOTES

4. VENTILATION EQUIPMENT PAD.

RANDOM SAMPLE LOCATIONS

1. X13,Y5	65. X9,Y31	129. X25,Y19
2. X18,Y25	66. X20,Y28	130. X18,Y28
3. X24,Y26	67. X15,Y25	131. X23,Y11
4. X26,Y30	68. X14,Y27	132. X19,Y21
5. X13,Y6	69. X12,Y11	133. X25,Y28
6. X7,Y28	70. X17,Y26	134. X12,Y22
7. X10,Y4	71. X13,Y29	
8. X10,Y9	72. X12,Y14	
9. X13,Y17	73. X13,Y13	
10. X7,Y22	74. X29,Y24	
11. X13,Y14	75. X11,Y14	
12. X25,Y23	76. X12,Y6	
13. X8,Y20	77. X26,Y29	
14. X17,Y9	78. X6,Y25	
15. X26,Y10	79. X10,Y1	
16. X30,Y11	80. X23,Y7	
17. X25,Y5	81. X19,Y27	
18. X26,Y15	82. X12,Y19	
19. X24,Y17	83. X6,Y26	
20. X14,Y30	84. X26,Y5	
21. X20,Y20	85. X4,Y24	
22. X30,Y24	86. X7,Y30	
23. X10,Y23	87. X23,Y17	
24. X30,Y30	88. X27,Y5	
25. X12,Y13	89. X19,Y6	
26. X13,Y9	90. X14,Y10	
27. X25,Y11	91. X19,Y17	
28. X23,Y28	92. X11,Y16	
29. X30,Y27	93. X4,Y22	
30. X11,Y6	94. X11,Y12	
31. X10,Y6	95. X27,Y12	
32. X13,Y28	96. X9,Y13	
33. X28,Y10	97. X12,Y26	
34. X7,Y31	98. X13,Y11	
35. X13,Y3	99. X2,Y20	
36. X10,Y24	100. X25,Y8	
37. X25,Y9	101. X21,Y25	
38. X23,Y13	102. X11,Y27	
39. X22,Y19	103. X28,Y7	
40. X30,Y19	104. X13,Y19	
41. X26,Y17	105. X2,Y21	
42. X29,Y25	106. X22,Y30	
43. X24,Y24	107. X29,Y9	
44. X29,Y27	108. X17,Y8	
45. X11,Y20	109. X11,Y23	
46. X4,Y29	110. X9,Y29	
47. X10,Y11	111. X24,Y7	
48. X21,Y22	112. X13,Y24	
49. X6,Y22	113. X11,Y19	
50. X24,Y8	114. X29,Y18	
51. X11,Y3	115. X17,Y24	
52. X19,Y9	116. X19,Y22	
53. X17,Y20	117. X8,Y27	
54. X9,Y28	118. X10,Y21	
55. X11,Y22	119. X28,Y22	
56. X16,Y24	120. X28,Y20	
57. X2,Y22	121. X12,Y15	
58. X14,Y23	122. X22,Y6	
59. X11,Y4	123. X7,Y21	
60. X13,Y23	124. X19,Y31	
61. X22,Y10	125. X15,Y30	
62. X14,Y11	126. X9,Y19	
63. X24,Y28	127. X27,Y27	
64. X4,Y31	128. X29,Y26	

A — 90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

THIS DRAWING PREPARED BY

PARSONS

THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.

CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE:

RADIOLOGICAL SAMPLING LOCATIONS FLOOR PLAN RF-6 BUTLER BUILDING ADDITION

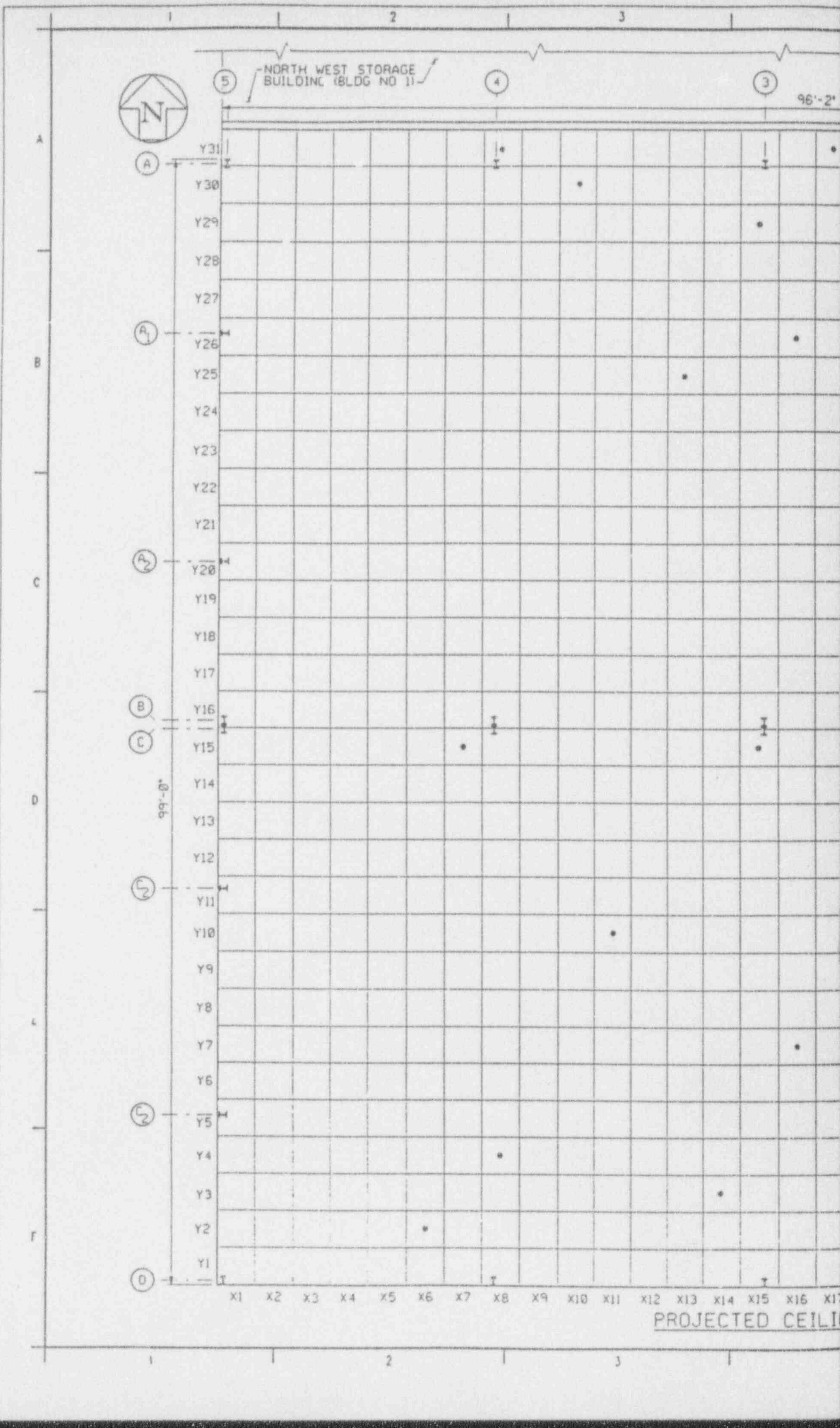
BLDG NO 2

SCALE: NONE

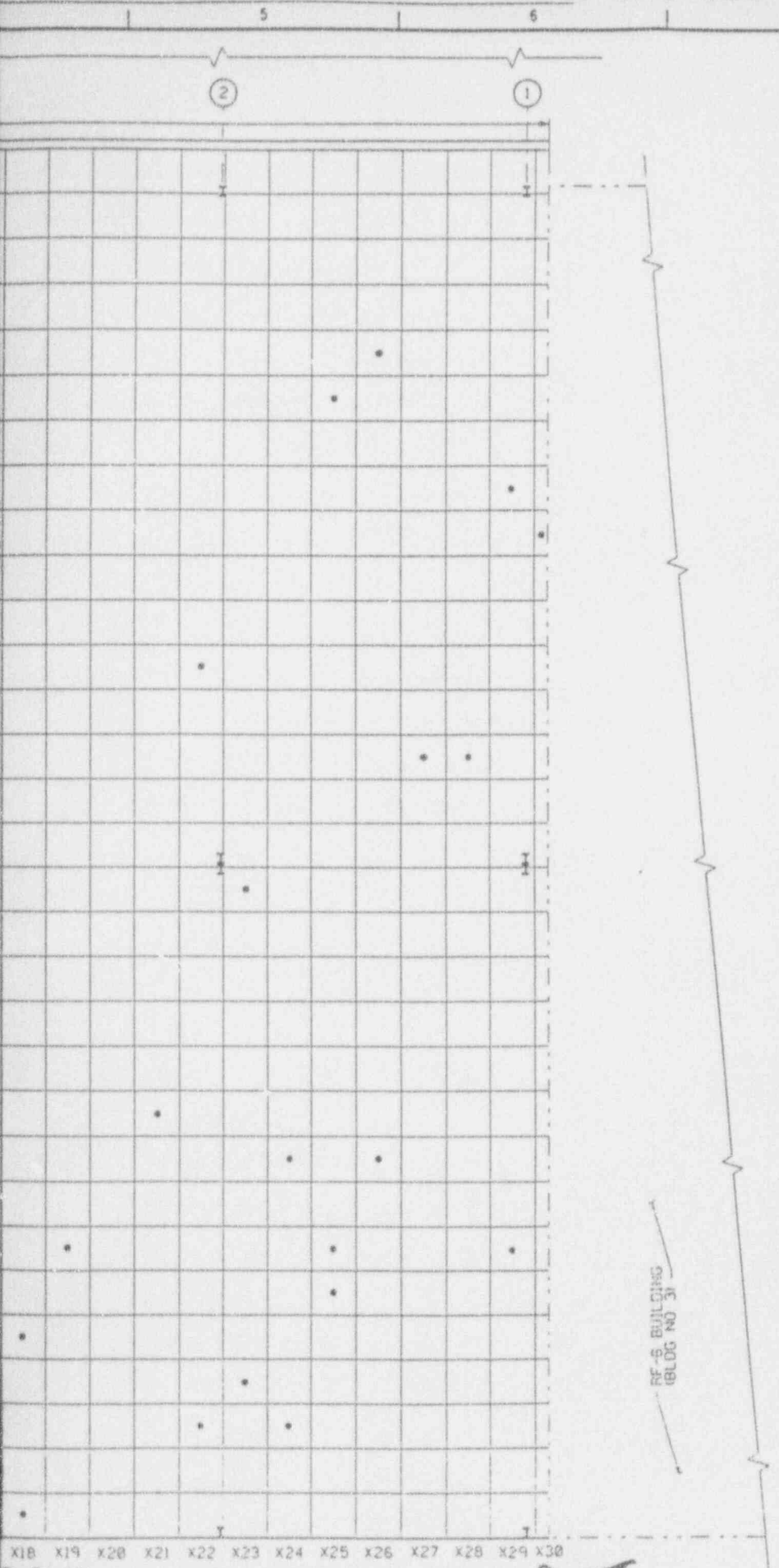
WBS 1.1.2.2.1.2.8 00-90701

DRAWING NO. SK-X-00354

REV. NO. A



NORTH WEST STORAGE BUILDING (BLDG NO 1)
N
5
4
3
96'-2"
99'-0"
A
B
C
D
Y31
Y30
Y29
Y28
Y27
Y26
Y25
Y24
Y23
Y22
Y21
Y20
Y19
Y18
Y17
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16
PROJECTED CEILI



G PLAN

9404080147-25

NOTES

RANDOM SAMPLE LOCATIONS

1. X6,Y2
2. X30,Y23
3. X18,Y1
4. X19,Y7
5. X17,Y31
6. X26,Y9
7. X23,Y15
8. X16,Y26
9. X7,Y15
10. X16,Y7
11. X15,Y29
12. X24,Y3
13. X23,Y4
14. X22,Y3
15. X10,Y30
16. X24,Y9
17. X8,Y31
18. X15,Y15
19. X25,Y7
20. X28,Y18
21. X22,Y20
22. X14,Y3
23. X26,Y27
24. X21,Y10
25. X25,Y26
26. X8,Y4
27. X11,Y10
28. X25,Y6
29. X13,Y25
30. X18,Y5
31. X29,Y24
32. X29,Y7
33. X27,Y18

REV NO	DATE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

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PARSONS

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CINCINNATI, OHIO

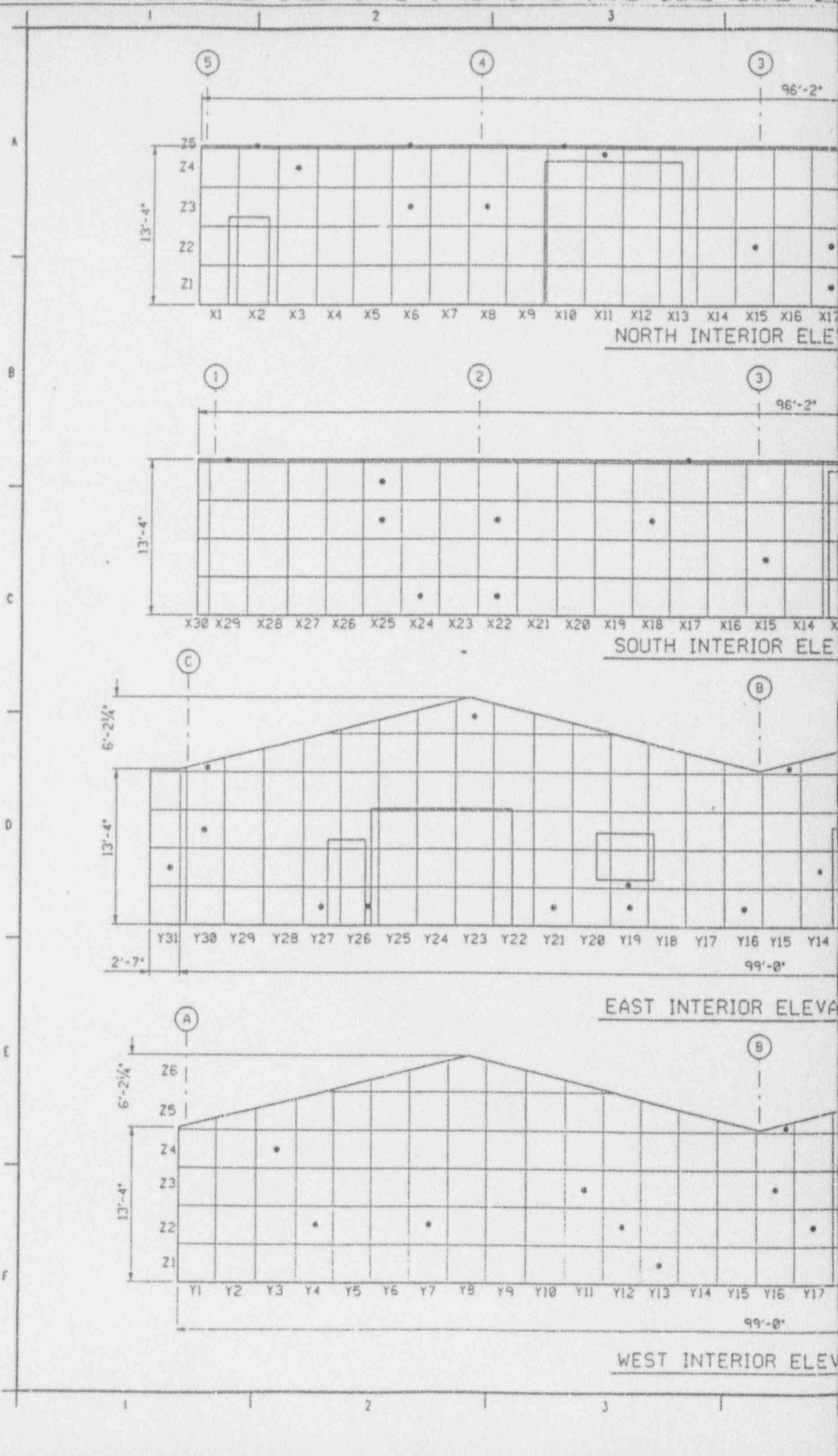
PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

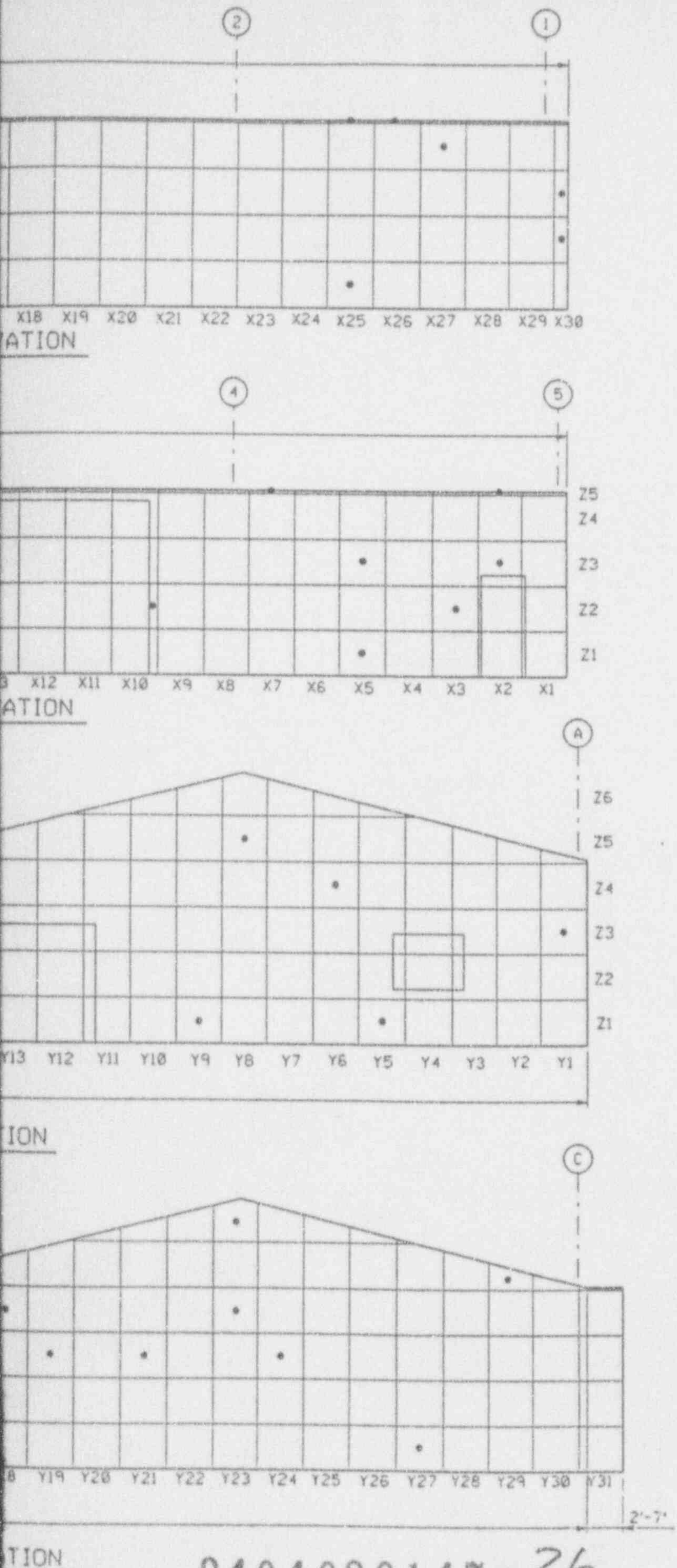
DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN
RF-6 BUTLER BUILDING ADDITION

DRAWN BY	DATE	CHECKED BY	DATE	SCALE	OPER. CONTR. PROG. NO.	DRAWING NO.	REV NO
JSB/DWR	03-09-92	MSP/MAO	08-14-92	NONE	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00355	A



1
2
3
A
B
C
D
E
F
5
4
3
96'-2"
Z5
Z4
Z3
Z2
Z1
13'-4"
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16
NORTH INTERIOR ELE
1
2
3
96'-2"
13'-4"
X30 X29 X28 X27 X26 X25 X24 X23 X22 X21 X20 X19 X18 X17 X16 X15 X14
SOUTH INTERIOR ELE
C
B
6'-2¼"
13'-4"
Y31 Y30 Y29 Y28 Y27 Y26 Y25 Y24 Y23 Y22 Y21 Y20 Y19 Y18 Y17 Y16 Y15 Y14
2'-7"
99'-0"
EAST INTERIOR ELEVA
A
B
Z6
Z5
6'-2¼"
Z4
Z3
Z2
Z1
13'-4"
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17
99'-0"
WEST INTERIOR ELEV



9404080147-26

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL	SOUTH WALL
1. X25,Z5	1. X7,Z5
2. X17,Z1	2. X22,Z1
3. X6,Z3	3. X17,Z5
4. X15,Z2	4. X5,Z1
5. X17,Z2	5. X25,Z3
6. X26,Z5	6. X2,Z5
7. X8,Z3	7. X15,Z2
8. X2,Z5	8. X10,Z2
9. X27,Z4	9. X25,Z4
10. X10,Z5	10. X22,Z3
11. X11,Z4	11. X24,Z1
12. X25,Z1	12. X5,Z3
13. X3,Z4	13. X29,Z5
14. X30,Z2	14. X2,Z3
15. X6,Z5	15. X13,Z5
16. X30,Z3	16. X3,Z2
	17. X18,Z3

EAST WALL	WEST WALL
1. Y26,Z1	1. Y11,Z3
2. Y27,Z1	2. Y12,Z2
3. Y30,Z3	3. Y19,Z3
4. Y1,Z3	4. Y29,Z5
5. Y15,Z5	5. Y16,Z5
6. Y14,Z2	6. Y4,Z2
7. Y23,Z6	7. Y16,Z3
8. Y16,Z1	8. Y23,Z4
9. Y30,Z5	9. Y24,Z3
10. Y9,Z1	10. Y17,Z2
11. Y8,Z5	11. Y3,Z4
12. Y5,Z1	12. Y13,Z1
13. Y19,Z2	13. Y27,Z1
14. Y6,Z4	14. Y23,Z6
15. Y21,Z1	15. Y21,Z3
16. Y19,Z1	16. Y18,Z4
17. Y31,Z2	17. Y7,Z2

ANSTEC APERTURE CARD

Also Available on Aperture Card

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CINCINNATI, OHIO

RMI ENVIRONMENTAL MANAGEMENT PLAN

RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

RADIOLOGICAL SAMPLING LOCATIONS ELEVATIONS

RF-6 BUTLER BUILDING ADDITION

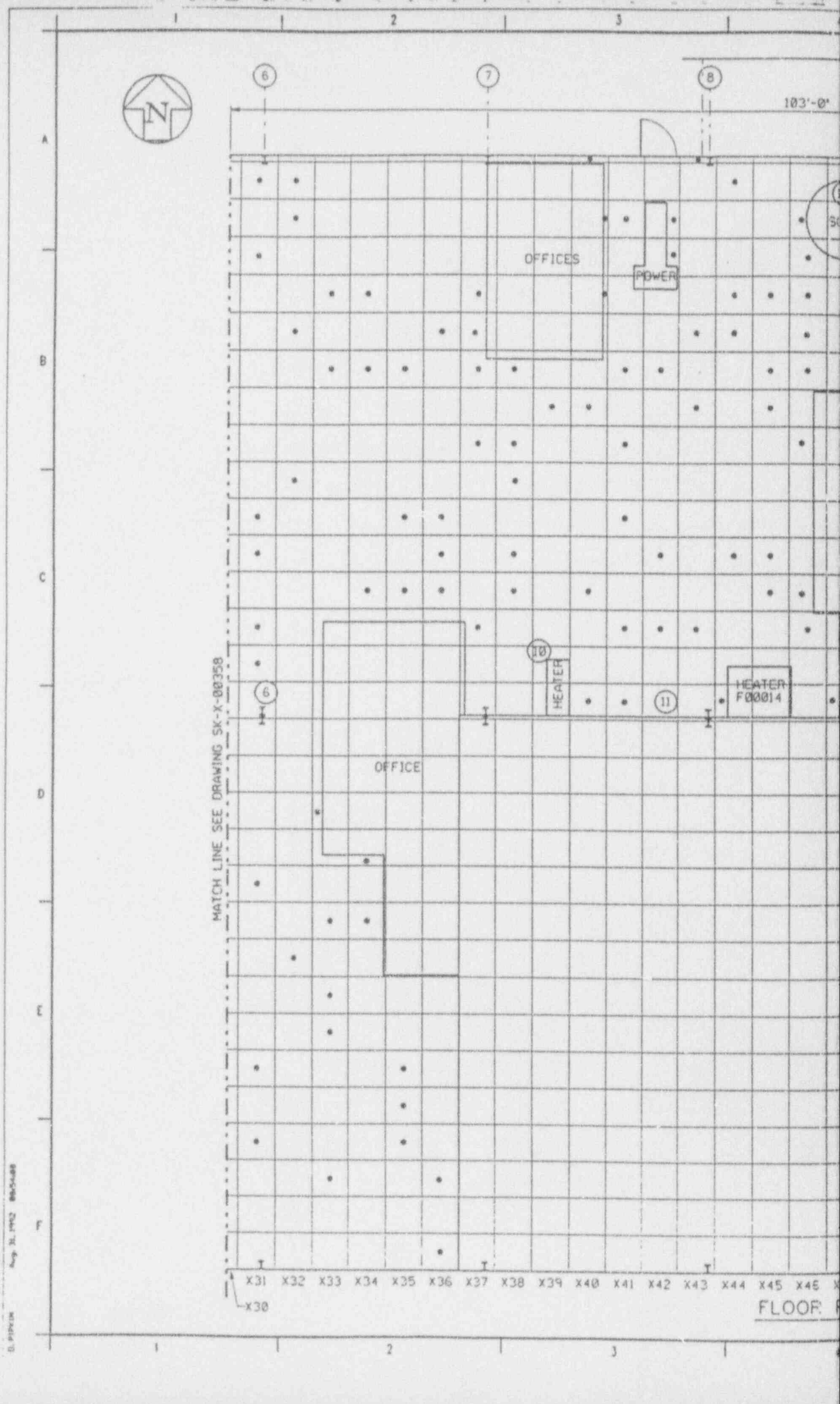
BLDG NO 2

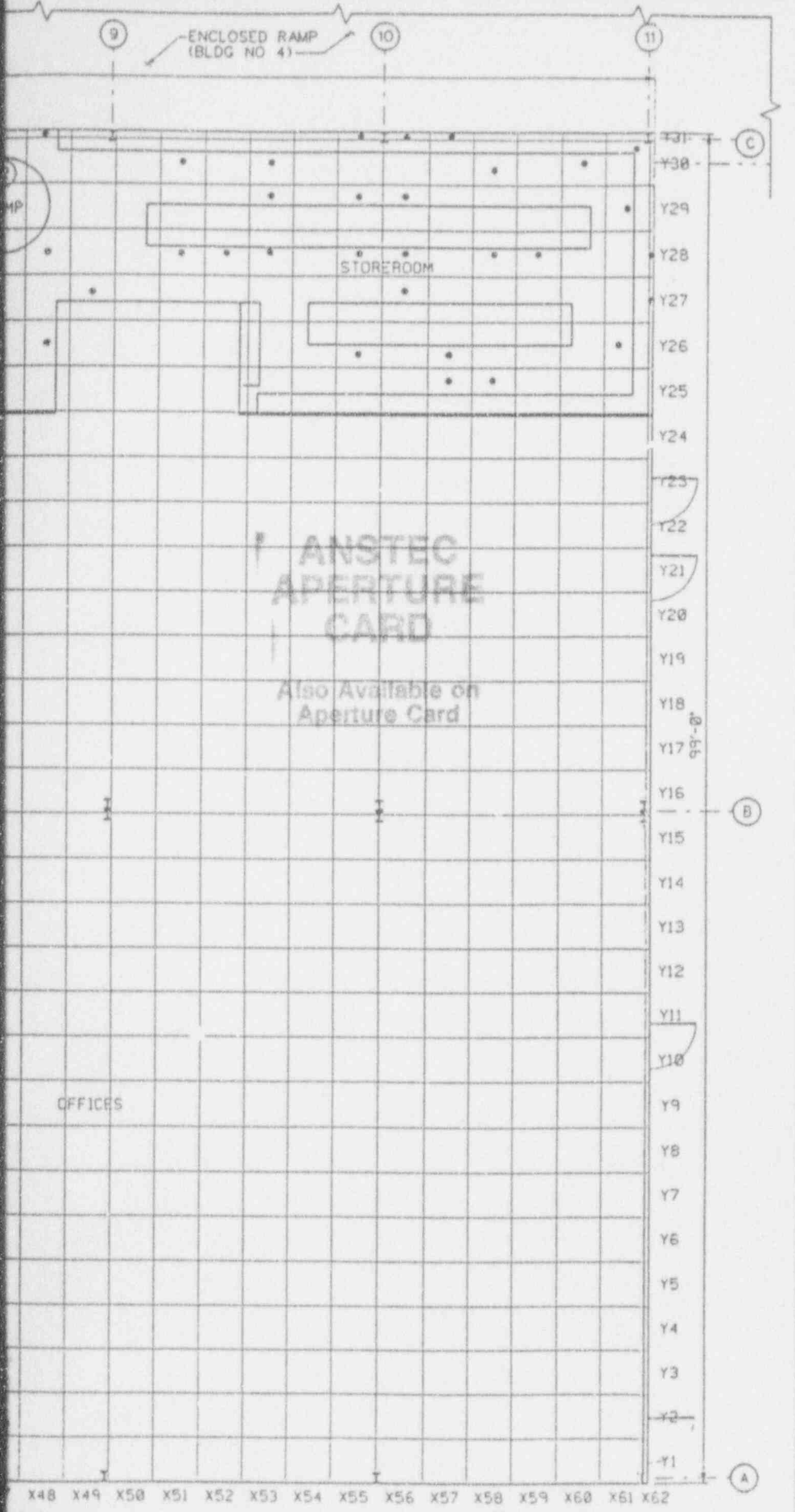
SCALE NONE

WBS 1.1.2.2.1.2.8 00-90701

SK-X-00356

A


N
103'-0"
OFFICES
POWER
OFFICE
HEATER
HEATER F00014
MATCH LINE SEE DRAWING SK-X-00358
X30
X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45 X46
FLOOR



9404080147-27

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

6. LOW POINT IN DUCTWORK (INTERIOR SURFACE).
10. RETURN AIR DUCT (INTERIOR SURFACE).
11. TOP OF DUCTWORK (EXTERNAL SURFACE).
12. SUMP COVER (INTERNAL SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR

1. X23,Y24	56. X15,Y25	111. X31,Y28
2. X22,Y21	57. X46,Y26	112. X55,Y26
3. X10,Y5	58. X26,Y8	113. X29,Y6
4. X28,Y24	59. X7,Y27	114. X18,Y1
5. X16,Y25	60. X32,Y26	115. X6,Y28
6. X14,Y24	61. X38,Y20	116. X34,Y12
7. X38,Y23	62. X24,Y17	117. X3,Y26
8. X14,Y27	63. X3,Y31	118. X10,Y14
9. X11,Y12	64. X37,Y26	119. X4,Y24
10. X14,Y1	65. X56,Y27	120. X28,Y15
11. X25,Y28	66. X34,Y27	121. X38,Y22
12. X29,Y11	67. X32,Y30	122. X40,Y16
13. X31,Y21	68. X4,Y17	123. X22,Y28
14. X2,Y14	69. X25,Y17	124. X28,Y7
15. X32,Y29	70. X3,Y11	125. X39,Y24
16. X22,Y15	71. X33,Y3	126. X30,Y22
17. X16,Y28	72. X19,Y27	127. X23,Y20
18. X34,Y25	73. X46,Y29	128. X15,Y4
19. X32,Y9	74. X43,Y31	129. X4,Y29
20. X48,Y26	75. X26,Y17	130. X26,Y24
21. X33,Y25	76. X24,Y21	131. X41,Y18
22. X6,Y17	77. X43,Y18	132. X21,Y27
23. X3,Y19	78. X46,Y19	133. X2,Y13
24. X49,Y27	79. X23,Y19	134. X24,Y26
25. X12,Y6	80. X12,Y23	135. X32,Y22
26. X41,Y16	81. X2,Y27	136. X27,Y13
27. X5,Y26	82. X42,Y28	137. X34,Y19
[illegible] X31,Y4	83. X37,Y25	138. X35,Y21
[illegible] X31,Y18	84. X48,Y28	139. X8,Y2
30. X28,Y1	85. X26,Y12	140. X45,Y19
31. X35,Y5	86. X6,Y13	141. X29,Y15
32. X9,Y16	87. X40,Y29	142. X22,Y30
33. X9,Y22	88. X44,Y26	143. X22,Y17
34. X36,Y26	89. X25,Y9	144. X41,Y25
35. X18,Y21	90. X29,Y21	145. X47,Y16
36. X30,Y25	91. X20,Y25	146. X29,Y27
37. X22,Y18	92. X44,Y16	147. X11,Y18
38. X11,Y20	93. X45,Y24	148. X5,Y22
39. X12,Y10	94. X19,Y22	149. X34,Y10
40. X62,Y27	95. X56,Y29	150. X36,Y21
41. X58,Y28	96. X12, Y28	151. X40,Y27
42. X30,Y5	97. X30,Y23	152. X4,Y28
43. X1,Y12	98. X57,Y31	153. X36,Y3
44. X9,Y30	99. X31,Y30	154. X26,Y13
45. X6,Y23	100. X37,Y18	155. X40,Y19
46. X42,Y29	101. X19,Y23	156. X44,Y27
47. X53,Y30	102. X28,Y30	157. X9,Y31
48. X21,Y13	103. X11,Y21	158. X42,Y18
49. X31,Y20	104. X37,Y23	159. X60,Y30
50. X58,Y30	105. X56,Y31	160. X8,Y20
51. X27,Y25	106. X5,Y18	161. X16,Y23
52. X35,Y19	107. X44,Y30	162. X46,Y18
53. X18,Y24	108. X45,Y25	163. X25,Y14
54. X44,Y20	109. X1,Y9	164. X36,Y20
55. X15,Y3	110. X46,Y25	165. X42,Y20

(FOR CONT. SEE DWG. SK-X-00358)

REV	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

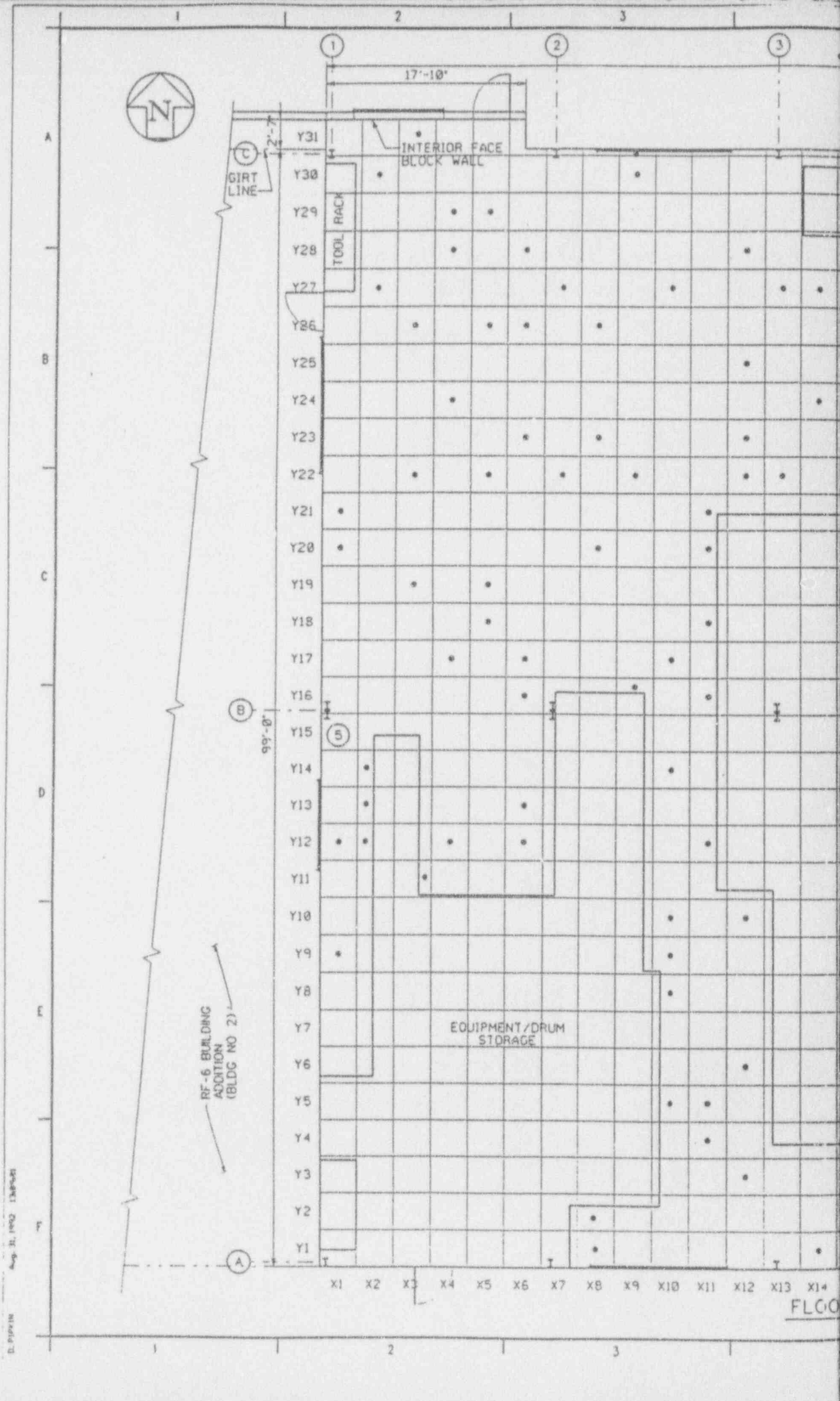
DRAWING TITLE

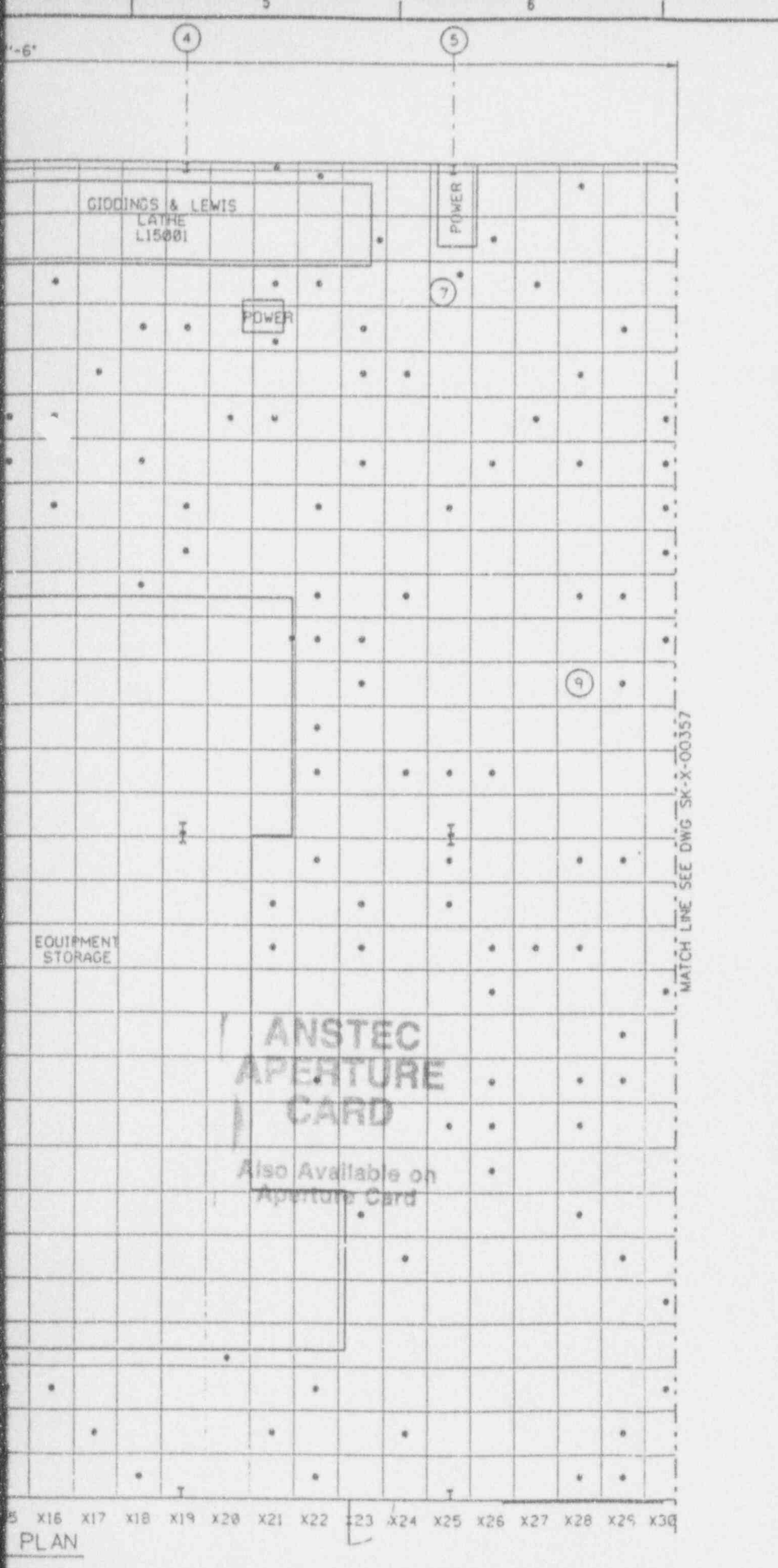
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 1 OF 2
RF-6 BUTLER BUILDING

DRAWN BY	DATE	DESIGNED CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	03-05-92			MSF/DEP	08-14-92

BLDG NO	FLOOR	SCALE
BLDG NO 3		NONE

DOE PROJECT NO.	WBS NO.	DRAWING NO.	SHEET NO.	REV NO.
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00357		A


N
17'-10"
2'-7"
INTERIOR FACE
BLOCK WALL
GIRT
LINE
TOOL RACK
99'-0"
RF-6 BUILDING
ADDITION
(BLDG NO 2)
EQUIPMENT/DRUM
STORAGE
Y31
Y30
Y29
Y28
Y27
Y26
Y25
Y24
Y23
Y22
Y21
Y20
Y19
Y18
Y17
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
FLOO



NOTES

JUDGEMENTAL SAMPLE LOCATIONS

5. DETERIORATED CONCRETE.
7. LOW POINT IN DUCTWORK FROM D15001 (INTERIOR SURFACE).
9. CONCRETE FLOOR UNDER H15004 CHUTE.

RANDOM SAMPLE LOCATIONS

FLOOR (CONT. FROM DWG. SK-X00357)

166. X3,Y22
167. X38,Y25
168. X61,Y29
169. X23,Y13
170. X8,Y1
171. X48,Y31
172. X30,Y24
173. X6,Y26
174. X5,Y19
175. X56,Y28
176. X33,Y7
177. X45,Y27
178. X55,Y28
179. X31,Y11
180. X30,Y12
181. X41,Y21
182. X10,Y10
183. X42,Y25
184. X28,Y10
185. X23,Y29
186. X38,Y19
187. X35,Y25
188. X12,Y3
189. X11,Y4
190. X35,Y6
191. X31,Y6
192. X11,Y5
193. X28,Y21
194. X30,Y3
195. X28,Y9
196. X46,Y28
197. X53,Y29
198. X40,Y31
199. X33,Y10
200. X36,Y1
201. X55,Y31
202. X22,Y3
203. X16,Y3
204. X52,Y28
205. X17,Y26
206. X28,Y13
207. X23,Y7
208. X6,Y16
209. X26,Y29
210. X46,Y27
211. X12,Y22
212. X29,Y1
213. X45,Y20
214. X21,Y31
215. X21,Y28
216. X53,Y28
217. X27,Y28
218. X33,Y8
219. X22,Y10
220. X57,Y26
221. X40,Y24
222. X51,Y30
223. X1,Y20
224. X26,Y10
225. X57,Y25
226. X35,Y4
227. X41,Y29
228. X61,Y26
229. X11,Y16
230. X13,Y22
231. X8,Y26
232. X21,Y14
233. X51,Y28
234. X23,Y14
235. X8,Y23
236. X10,Y17
237. X59,Y28
238. X25,Y15
239. X23,Y27
240. X2,Y30
241. X13,Y27
242. X17,Y2
243. X20,Y4
244. X31,Y17
245. X6,Y12
246. X24,Y2
247. X43,Y24
248. X5,Y29
249. X10,Y27
250. X2,Y12
251. X62,Y28
252. X12,Y25
253. X18,Y27
254. X41,Y23
255. X55,Y29
256. X1,Y21
257. X24,Y6
258. X22,Y23
259. X29,Y2
260. X33,Y27
261. X30,Y20
262. X33,Y13
263. X46,Y23
264. X37,Y27
265. X21,Y20
266. X29,Y19
267. X43,Y26
268. X10,Y8
269. X29,Y10
270. X22,Y1
271. X25,Y23
272. X28,Y26
273. X21,Y25
274. X26,Y9
275. X4,Y12
276. X22,Y20
277. X21,Y2
278. X23,Y26
279. X10,Y9
280. X58,Y25
281. X7,Y22
282. X36,Y19

A	90% CLIENT REVIEW
REV NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION

UNITED STATES
DEPARTMENT OF ENERGY

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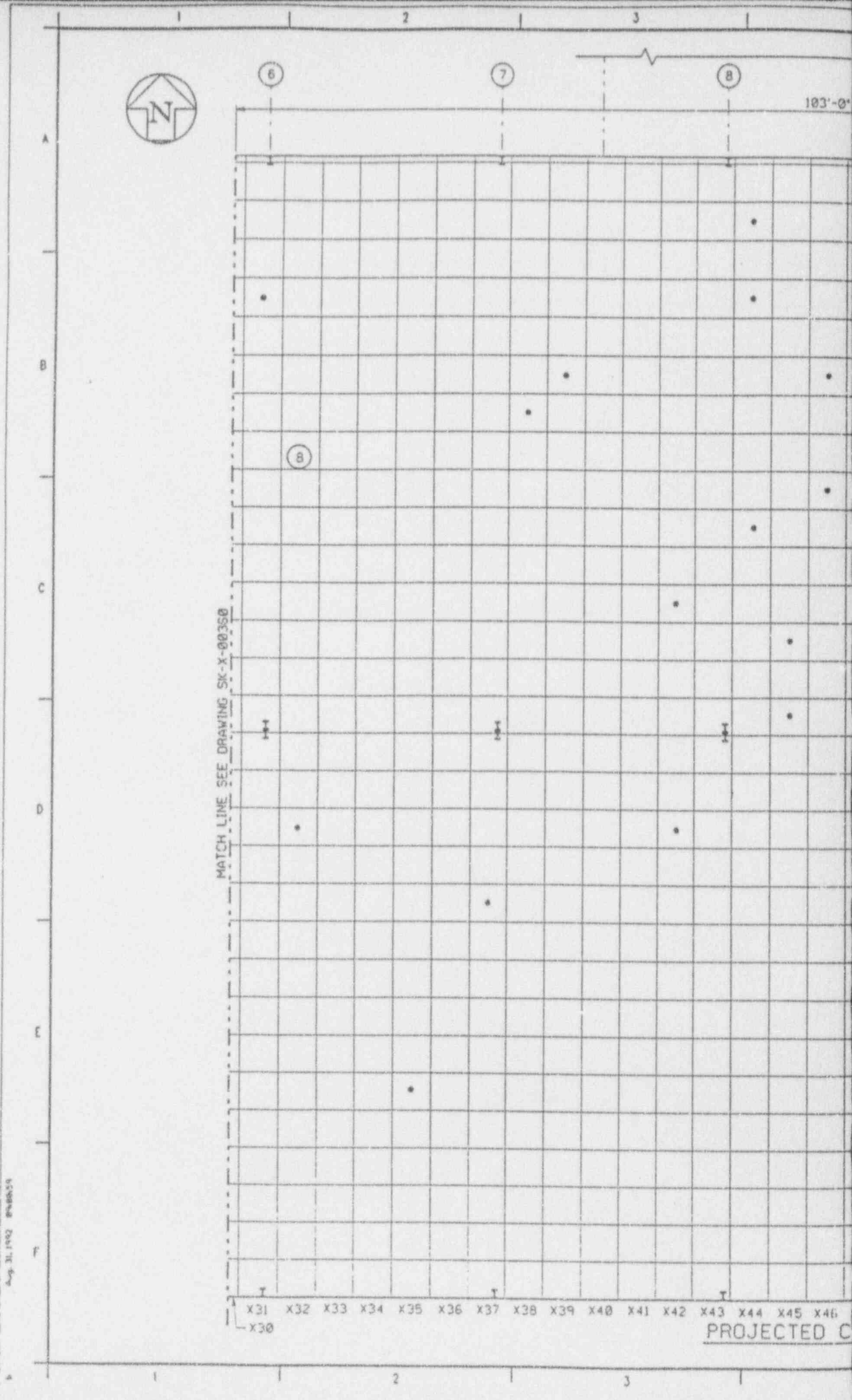
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

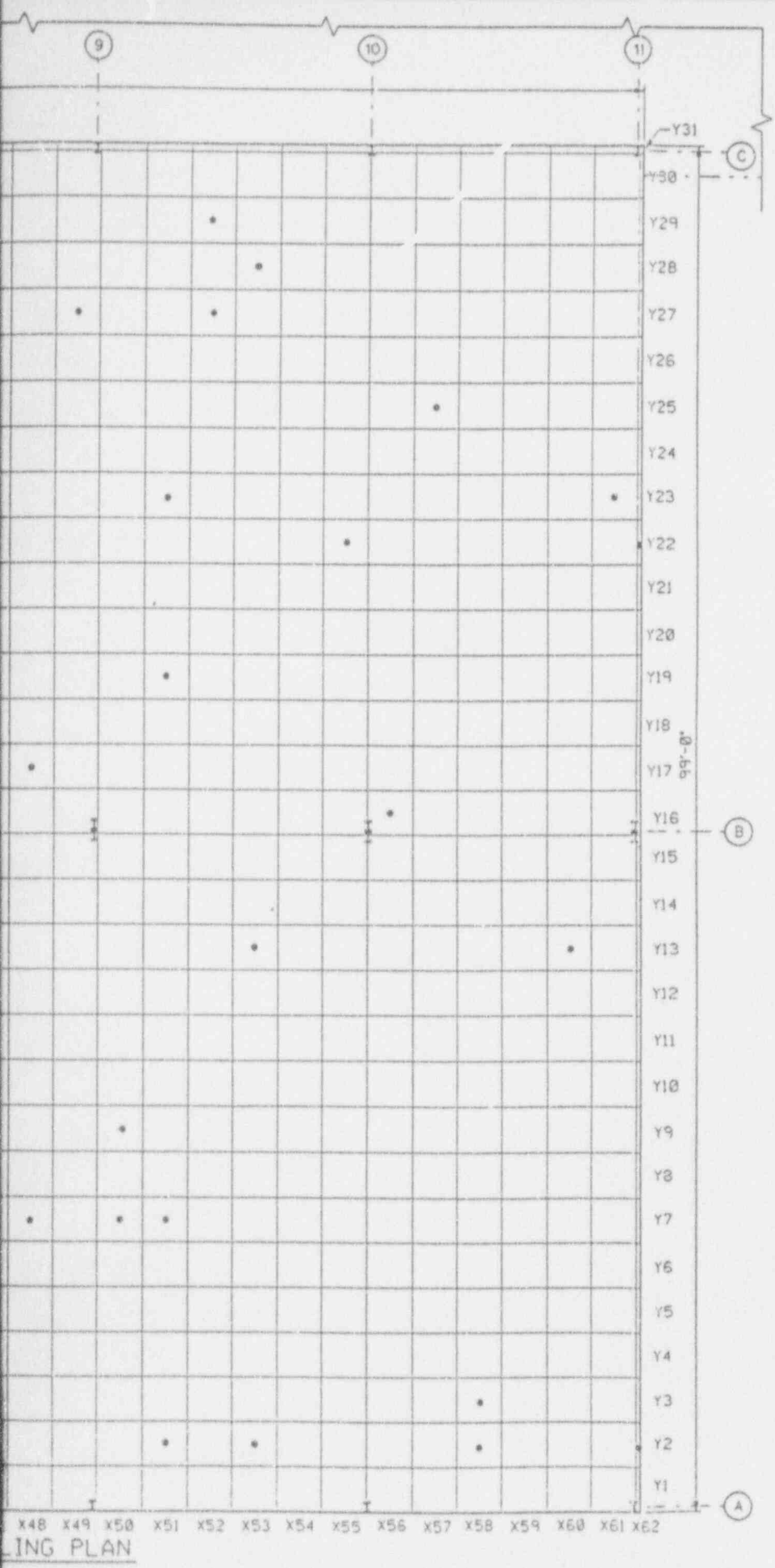
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 2 OF 2
RF-6 BUTLER BUILDING

SCALE: NONE
BLDG NO 3
WBS 1.1.2.2.1.2.0
00-90701
DRAWING NO. SK-X-00358
REV A

9404080147 -28


1
2
3
A
B
C
D
E
F
N
6
7
8
103'-0"
MATCH LINE SEE DRAWING SK-X-00360
X30
X31
X32
X33
X34
X35
X36
X37
X38
X39
X40
X41
X42
X43
X44
X45
X46
PROJECTED C



LING PLAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

8. CEILING VENT STACK.

RANDOM SAMPLE LOCATIONS

CEILING

1. X44,Y21
2. X30,Y25
3. X58,Y2
4. X10,Y17
5. X19,Y24
6. X44,Y29
7. X61,Y23
8. X27,Y15
9. X50,Y7
10. X49,Y27
11. X4,Y6
12. X52,Y29
13. X60,Y13
14. X16,Y15
15. X53,Y28
16. X6,Y26
17. X44,Y27
18. X39,Y25
19. X12,Y6
20. X48,Y7
21. X19,Y16
22. X45,Y18
23. X62,Y2
24. X58,Y3
25. X53,Y13
26. X42,Y13
27. X5,Y1
28. X35,Y6
29. X10,Y23
30. X55,Y22
31. X11,Y1
32. X47,Y27
33. X13,Y15
34. X31,Y27
35. X53,Y2
36. X3,Y15
37. X9,Y22
38. X5,Y15
39. X46,Y22
40. X10,Y15
41. X18,Y5
42. X3,Y30
43. X22,Y30
44. X28,Y28
45. X42,Y19
46. X48,Y17
47. X18,Y13
48. X8,Y1
49. X38,Y24
50. X4,Y18
51. X32,Y13
52. X19,Y21
53. X51,Y2
54. X47,Y10
55. X25,Y11
56. X37,Y11
57. X57,Y25
58. X19,Y29
59. X50,Y9
60. X56,Y16
61. X12,Y16
62. X45,Y16
63. X46,Y25
64. X51,Y7
65. X62,Y22
66. X23,Y5
67. X52,Y27
68. X3,Y11
69. X51,Y19
70. X51,Y23
71. X10,Y29

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

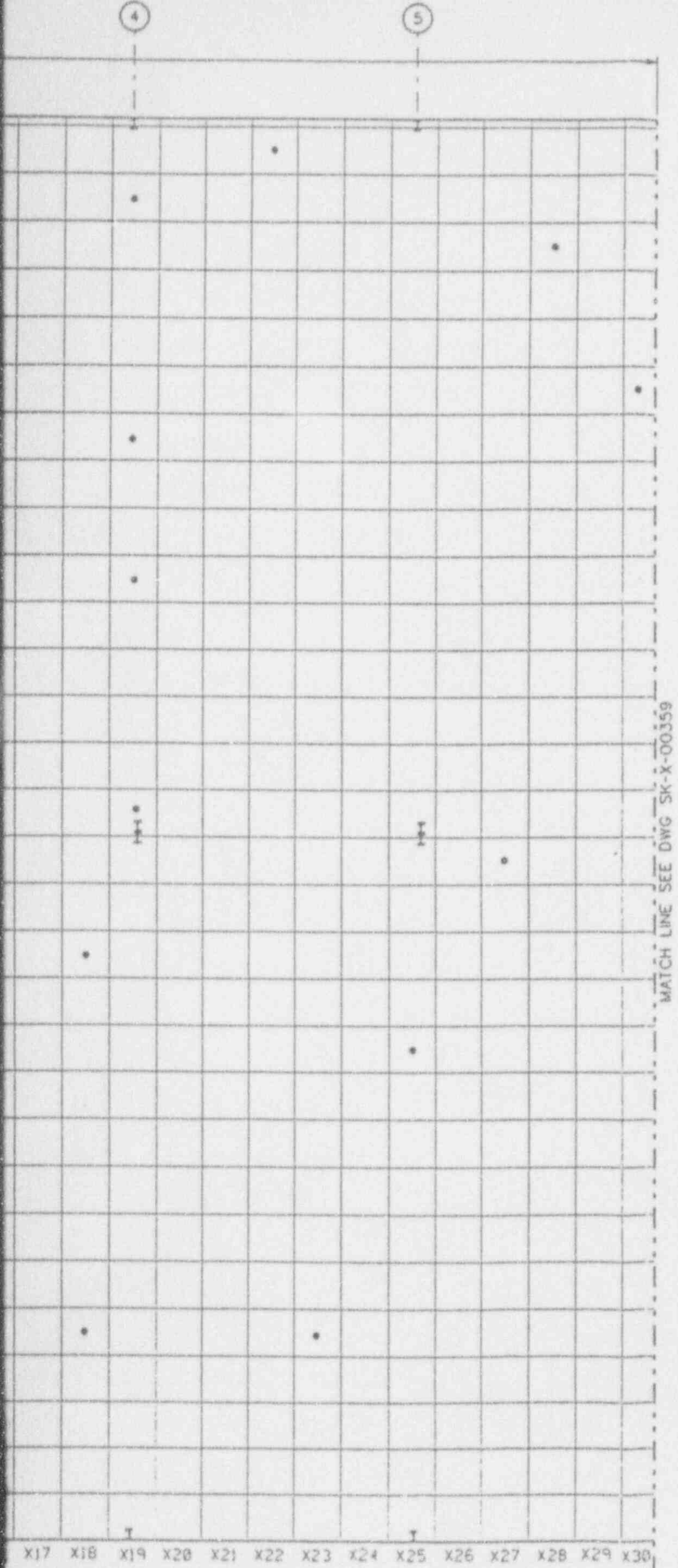
DRAWING TITLE: RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 1 OF 2
RF-6 BUTLER BUILDING

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-06-92			MSF/DWM	08-11-92
BLDG NO 3		FLOOR		SCALE NONE	

WBS	DRAWING NO.	REV NO.
WBS 1.1.2.2.1.2.0 00-90701	SK-X-00359	A

9404080147-29

1 2 3 4
A B C D E F
N
RF-6 BUILDING ADDITION (BLDG NO 2)
99'-0"
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y20 Y21 Y22 Y23 Y24 Y25 Y26 Y27 Y28 Y29 Y30 Y31
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14
PROJECTED C



9404080147-30

NOTES

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES
DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

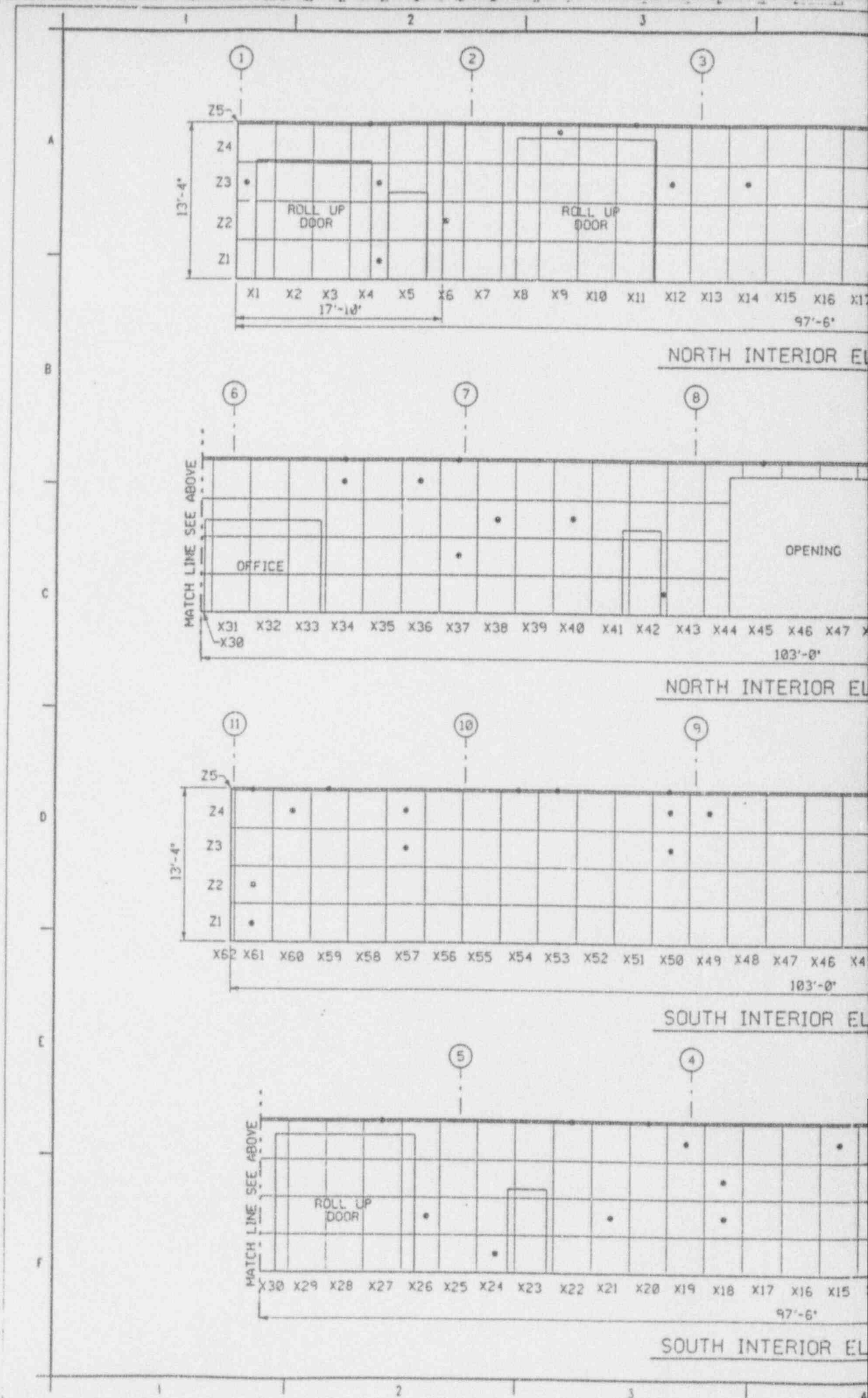
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 2 OF 2
RF-6 BUTLER BUILDING

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/HAO	03-06-92			MSF/DWR	09-11-92

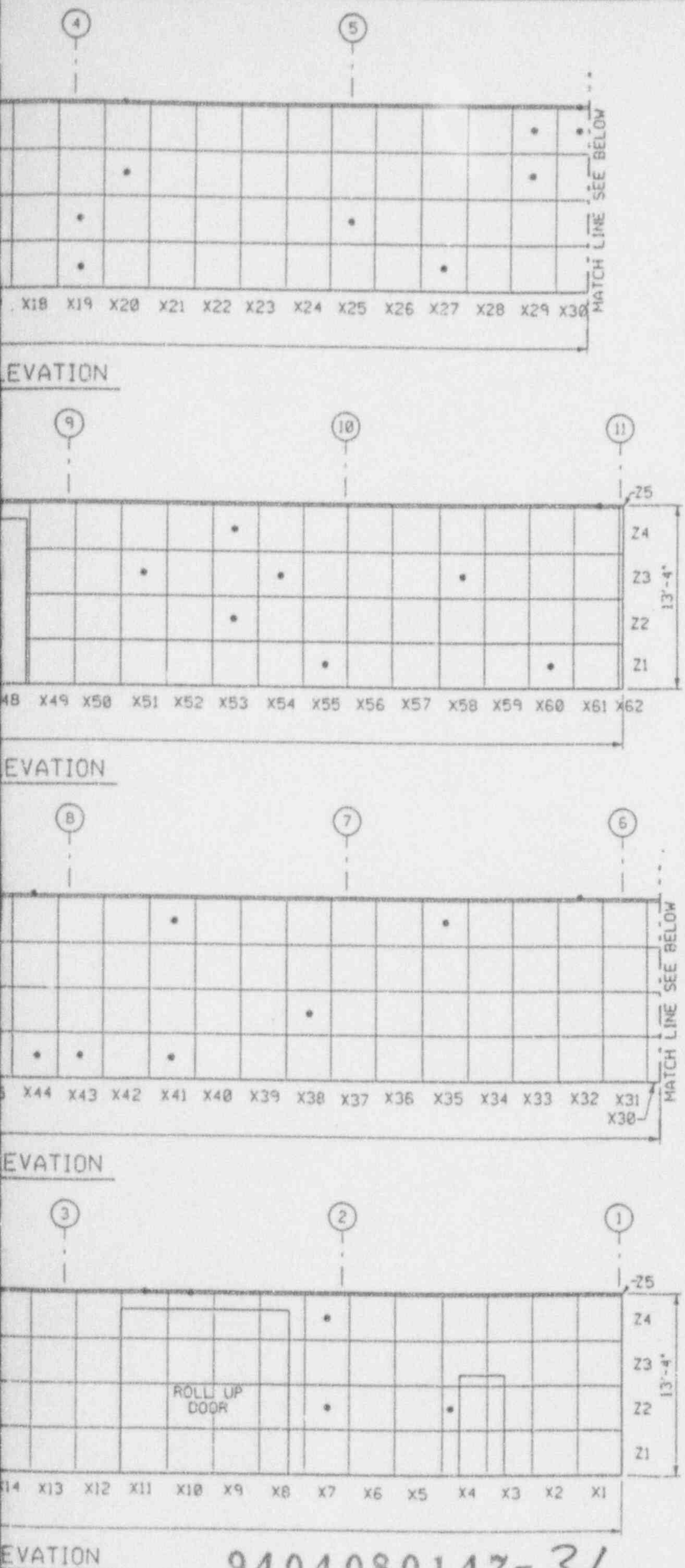
BLDG NO 3 — SCALE: NONE

WBS 1.1.2.2.1.2.8
00-90701

DRAWING NO. SK-X-00360 — REV. NO. A



NORTH INTERIOR EL
NORTH INTERIOR EL
SOUTH INTERIOR EL
SOUTH INTERIOR EL
ROLL UP DOOR
ROLL UP DOOR
OFFICE
OPENING
ROLL UP DOOR
MATCH LINE SEE ABOVE
MATCH LINE SEE ABOVE
13'-4"
13'-4"
17'-10"
97'-6"
103'-0"
103'-0"
97'-6"
Z5
Z4
Z3
Z2
Z1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17
X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45 X46 X47
X30
X62 X61 X60 X59 X58 X57 X56 X55 X54 X53 X52 X51 X50 X49 X48 X47 X46
X30 X29 X28 X27 X26 X25 X24 X23 X22 X21 X20 X19 X18 X17 X16 X15



9404080147-31

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL	SOUTH WALL
1. X29,Z4	1. X44,Z1
2. X4,Z5	2. X57,Z4
3. X36,Z4	3. X22,Z5
4. X34,Z5	4. X49,Z4
5. X54,Z3	5. X24,Z1
6. X19,Z1	6. X20,Z5
7. X51,Z3	7. X7,Z2
8. X19,Z2	8. X61,Z1
9. X11,Z5	9. X50,Z3
10. X40,Z3	10. X18,Z2
11. X25,Z2	11. X50,Z4
12. X61,Z5	12. X19,Z4
13. X4,Z3	13. X41,Z1
14. X37,Z2	14. X32,Z5
15. X1,Z3	15. X54,Z5
16. X58,Z3	16. X60,Z4
17. X53,Z4	17. X41,Z4
18. X37,Z5	18. X61,Z2
19. X27,Z1	19. X15,Z4
20. X20,Z3	20. X18,Z3
21. X42,Z1	21. X35,Z4
22. X55,Z1	22. X59,Z5
23. X9,Z4	23. X50,Z5
24. X4,Z1	24. X10,Z5
25. X6,Z2	25. X38,Z2
26. X30,Z5	26. X26,Z2
27. X53,Z2	27. X27,Z5
28. X20,Z5	28. X44,Z5
29. X29,Z3	29. X4,Z2
30. X34,Z4	30. X21,Z2
31. X14,Z3	31. X53,Z5
32. X12,Z3	32. X7,Z4
33. X60,Z1	33. X57,Z3
34. X30,Z4	34. X11,Z5
35. X38,Z3	35. X43,Z1
36. X45,Z5	

REV NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
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CINCINNATI, OHIO

PROJECT NAME

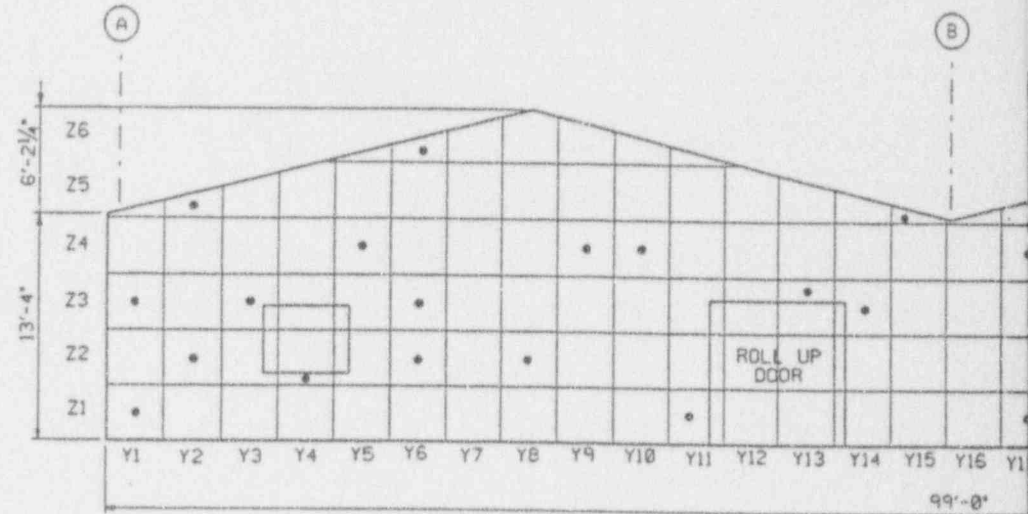
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

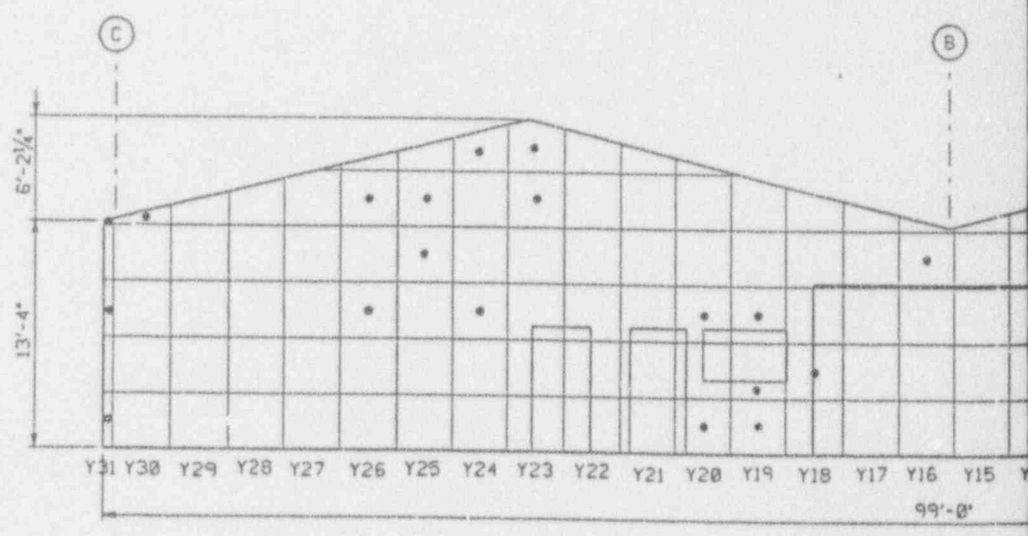
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 1 OF 2
RF-6 BUTLER BUILDING

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	03-06-92			MSF/DWR	08-11-92
BLDG NO 3		FLOOR		SCALE NONE	

DOE PROJECT NO	OPER. CONTR. PROG. NO.	DRAWING NO	SHEET NO	REV NO
	VBS L1.2.2.1.2.8 00-90701	SK-X-00361		A



WEST INTERIOR EL

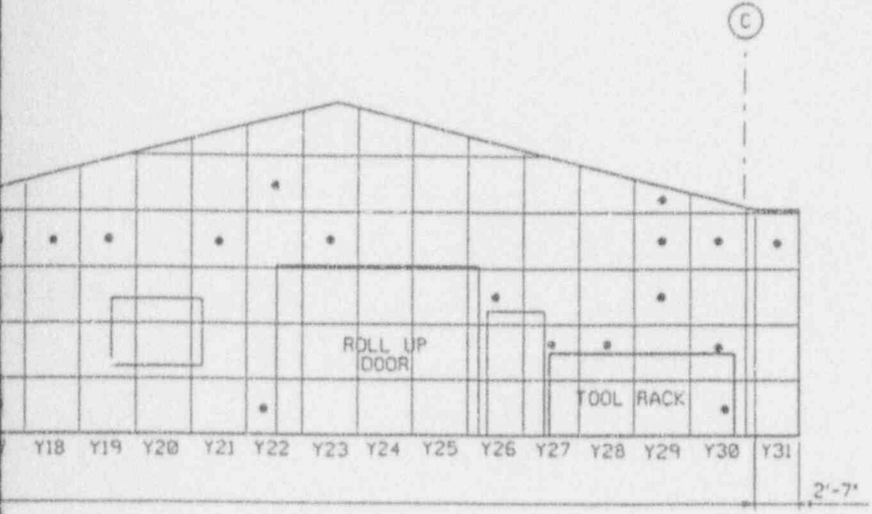


EAST INTERIOR EL

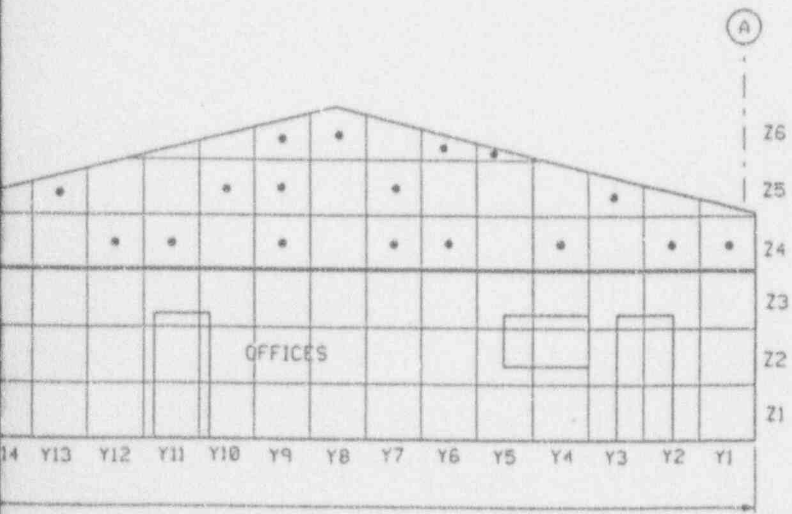
NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL	WEST WALL
1. Y19,Z1	1. Y27,Z2
2. Y5,Z6	2. Y30,Z2
3. Y6,Z4	3. Y15,Z5
4. Y1,Z4	4. Y6,Z3
5. Y2,Z4	5. Y9,Z4
6. Y9,Z4	6. Y10,Z4
7. Y18,Z2	7. Y29,Z5
8. Y9,Z6	8. Y8,Z2
9. Y7,Z5	9. Y21,Z4
10. Y16,Z4	10. Y22,Z1
11. Y12,Z4	11. Y1,Z3
12. Y20,Z1	12. Y4,Z2
13. Y4,Z4	13. Y17,Z4
14. Y3,Z5	14. Y28,Z2
15. Y11,Z4	15. Y29,Z4
16. Y26,Z3	16. Y17,Z1
17. Y9,Z5	17. Y6,Z2
18. Y31,Z1	18. Y26,Z3
19. Y24,Z6	19. Y5,Z4
20. Y8,Z6	20. Y2,Z5
21. Y20,Z3	21. Y29,Z3
22. Y26,Z5	22. Y31,Z4
23. Y31,Z3	23. Y1,Z1
24. Y23,Z6	24. Y3,Z3
25. Y19,Z2	25. Y13,Z3
26. Y25,Z4	26. Y14,Z3
27. Y13,Z5	27. Y18,Z4
28. Y30,Z5	28. Y2,Z2
29. Y19,Z3	29. Y22,Z5
30. Y31,Z5	30. Y19,Z4
31. Y6,Z6	31. Y30,Z1
32. Y25,Z5	32. Y30,Z4
33. Y24,Z3	33. Y11,Z1
34. Y23,Z5	34. Y23,Z4
35. Y7,Z4	35. Y6,Z6



EVATION



EVATION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION
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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN

RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/PO31

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS

ELEVATIONS - SHEET 2 OF 2

RF-6 BUTLER BUILDING

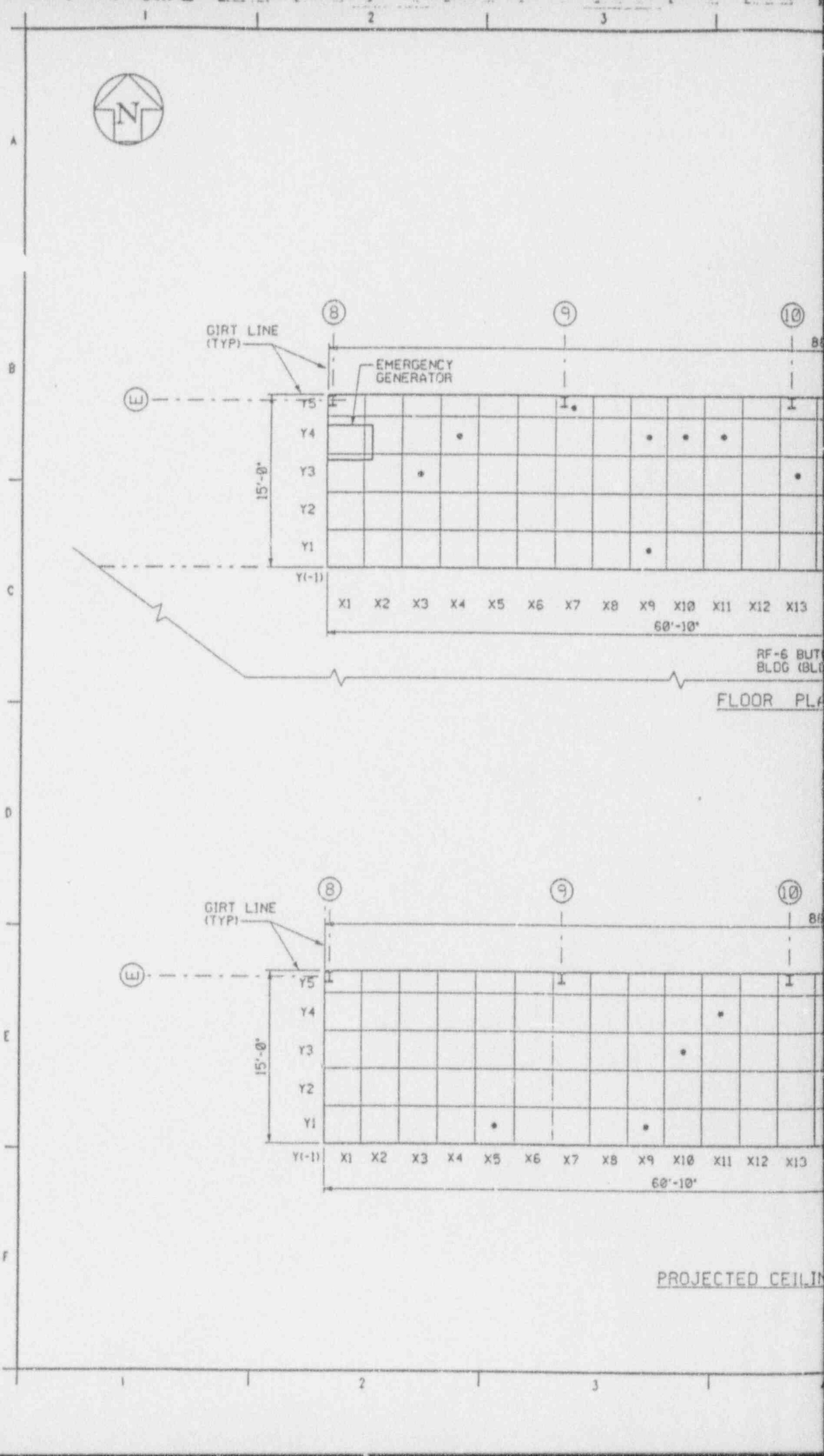
DRAWN BY	DATE	CHECKED BY	DATE	SCALE
JSB/MAO	03-06-92	MSF/DVR	09-11-92	NONE

BLDG NO 3

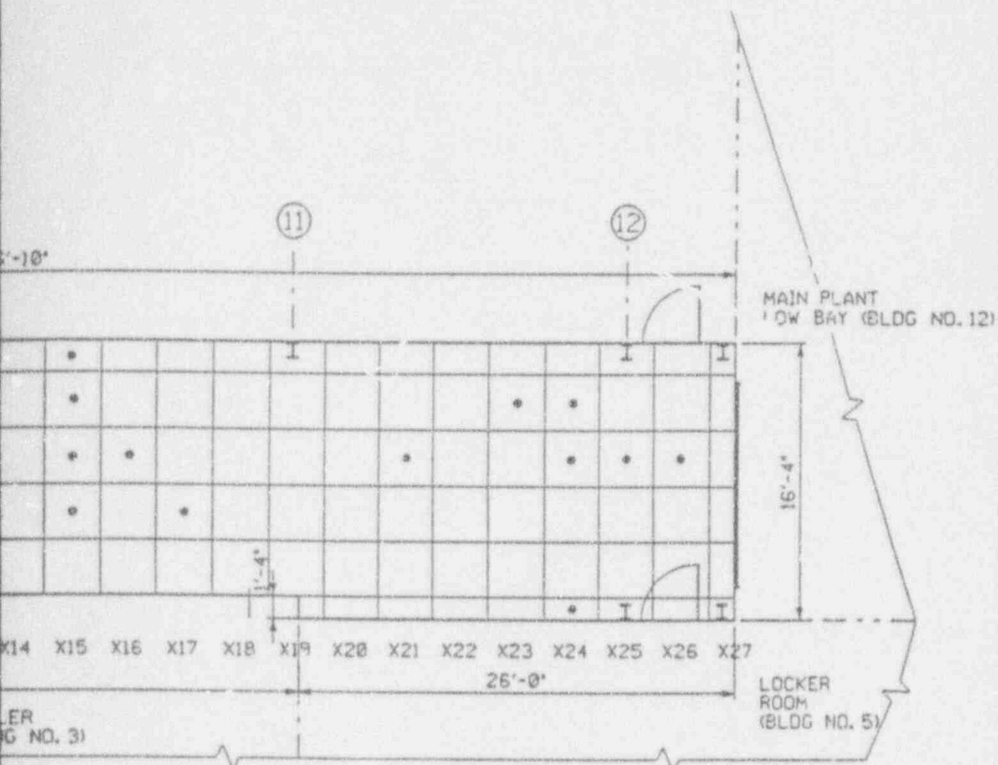
WBS L1.2.2.1.2.8 00-90701

DRAWING NO. SK-X-00362 REV. NO. A

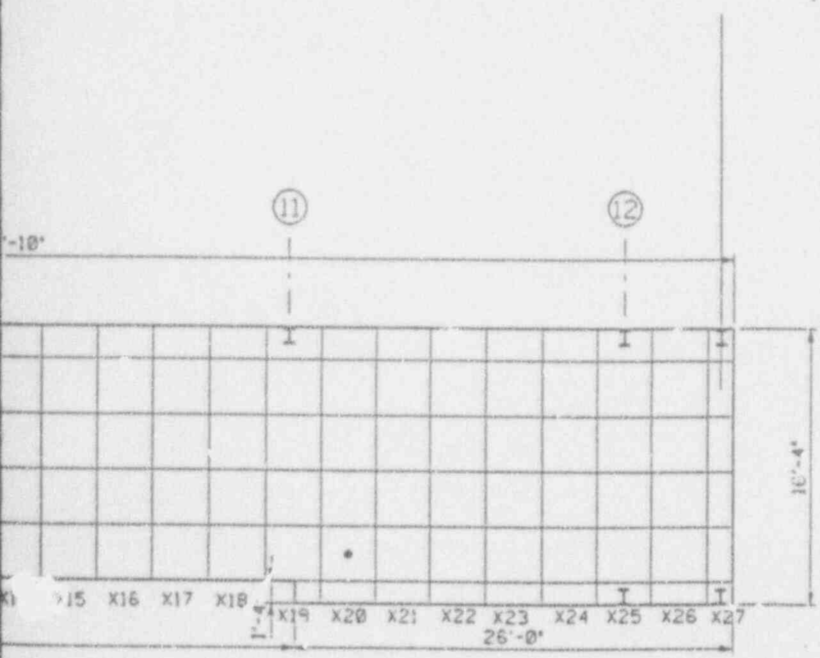
9404080147-32



GIRT LINE (TYP)
EMERGENCY GENERATOR
8
9
10
E
Y5
Y4
Y3
Y2
Y1
Y(-1)
15'-0"
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13
60'-10"
RF-6 BUT
BLDG (BL
FLOOR PLA
GIRT LINE (TYP)
8
9
10
E
Y5
Y4
Y3
Y2
Y1
Y(-1)
15'-0"
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13
60'-10"
PROJECTED CEILIN



AN



G PLAN

9404080147-33

NOTES

RANDOM SAMPLE LOCATIONS

FLOOR	CEILING
1. X16,Y3	1. X9,Y1
2. X15,Y3	2. X10,Y3
3. X7,Y5	3. X5,Y1
4. X15,Y2	4. X20,Y1
5. X9,Y1	5. X11,Y4
6. X13,Y3	
7. X24,Y4	
8. X26,Y3	
9. X24,Y(-1)	
10. X3,Y3	
11. X23,Y4	
12. X15,Y5	
13. X21,Y3	
14. X24,Y3	
15. X25,Y3	
16. X15,Y4	
17. X9,Y4	
18. X17,Y2	
19. X11,Y4	
20. X4,Y4	
21. X10,Y4	

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DEPARTMENT OF ENERGY

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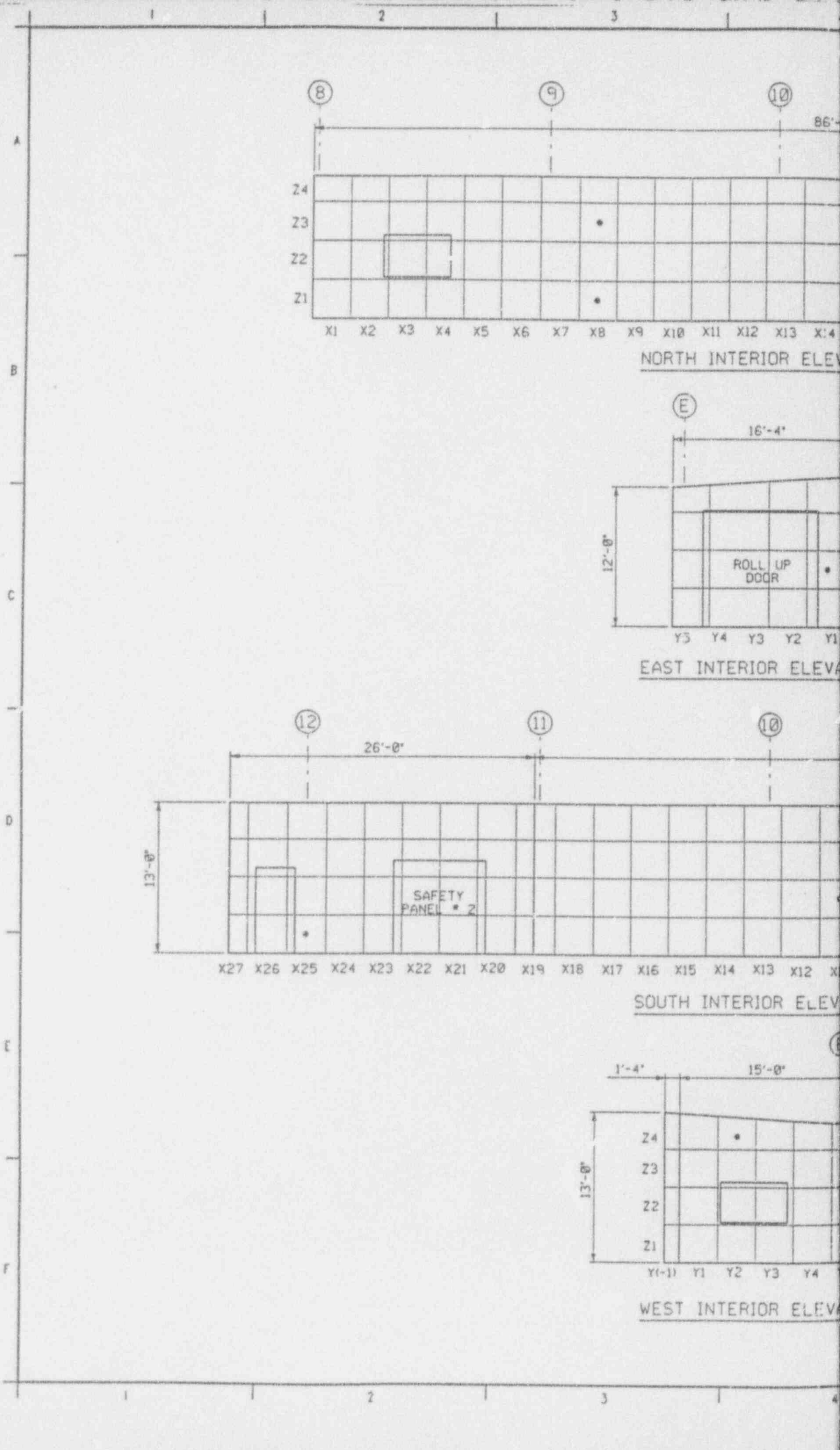
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/PO31

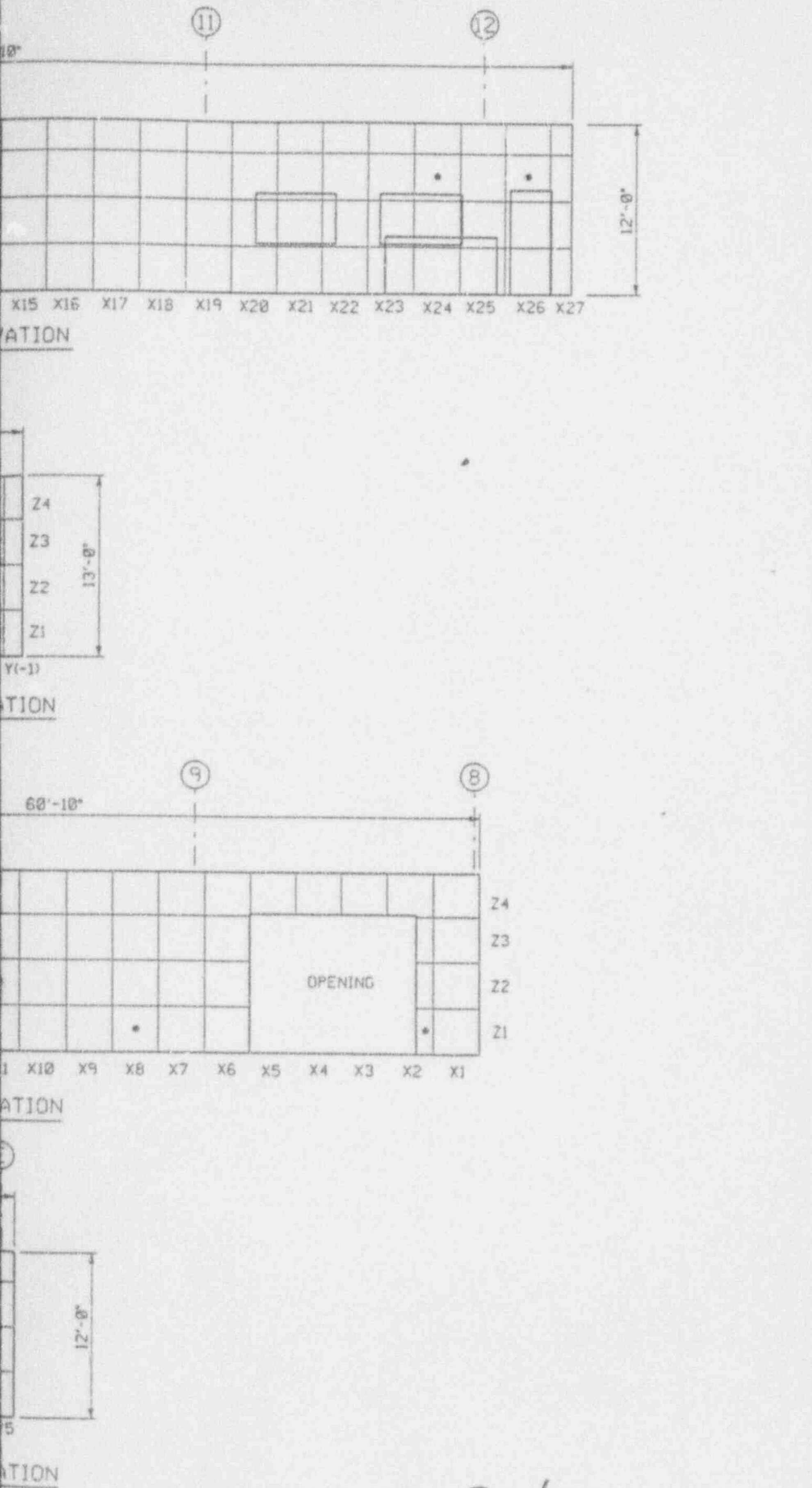
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
ENCLOSED RAMP

DRAWN BY: XLR/DWR — DATE: 02-24-92
CHECKED BY: MSF/MAD — DATE: 08-14-92
BLDG NO 4
SCALE: NONE

WBS 1.1.2.2.1.2.8
00-90701
SK-X-00363
REV A



8
9
10
86'-
Z4
Z3
Z2
Z1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13
NORTH INTERIOR ELEV
E
16'-4"
12'-0"
ROLL UP DOOR
Y5 Y4 Y3 Y2
EAST INTERIOR ELEVA
12
11
10
26'-0"
13'-0"
SAFETY PANEL # 2
X27 X26 X25 X24 X23 X22 X21 X20 X19 X18 X17 X16 X15 X14 X13 X12
SOUTH INTERIOR ELEV
1'-4"
15'-0"
13'-0"
Z4
Z3
Z2
Z1
Y(-1) Y1 Y2 Y3 Y4
WEST INTERIOR ELEVA
1
2
3
A
B
C
D
E
F



NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL
1. X26.Z3
2. X24.Z3
3. X8.Z1
4. X8.Z3

SOUTH WALL
1. X2.Z1
2. X11.Z2
3. X8.Z1
4. X25.Z1

EAST WALL
1. Y1.Z2

WEST WALL
1. Y2.Z4

REV.	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

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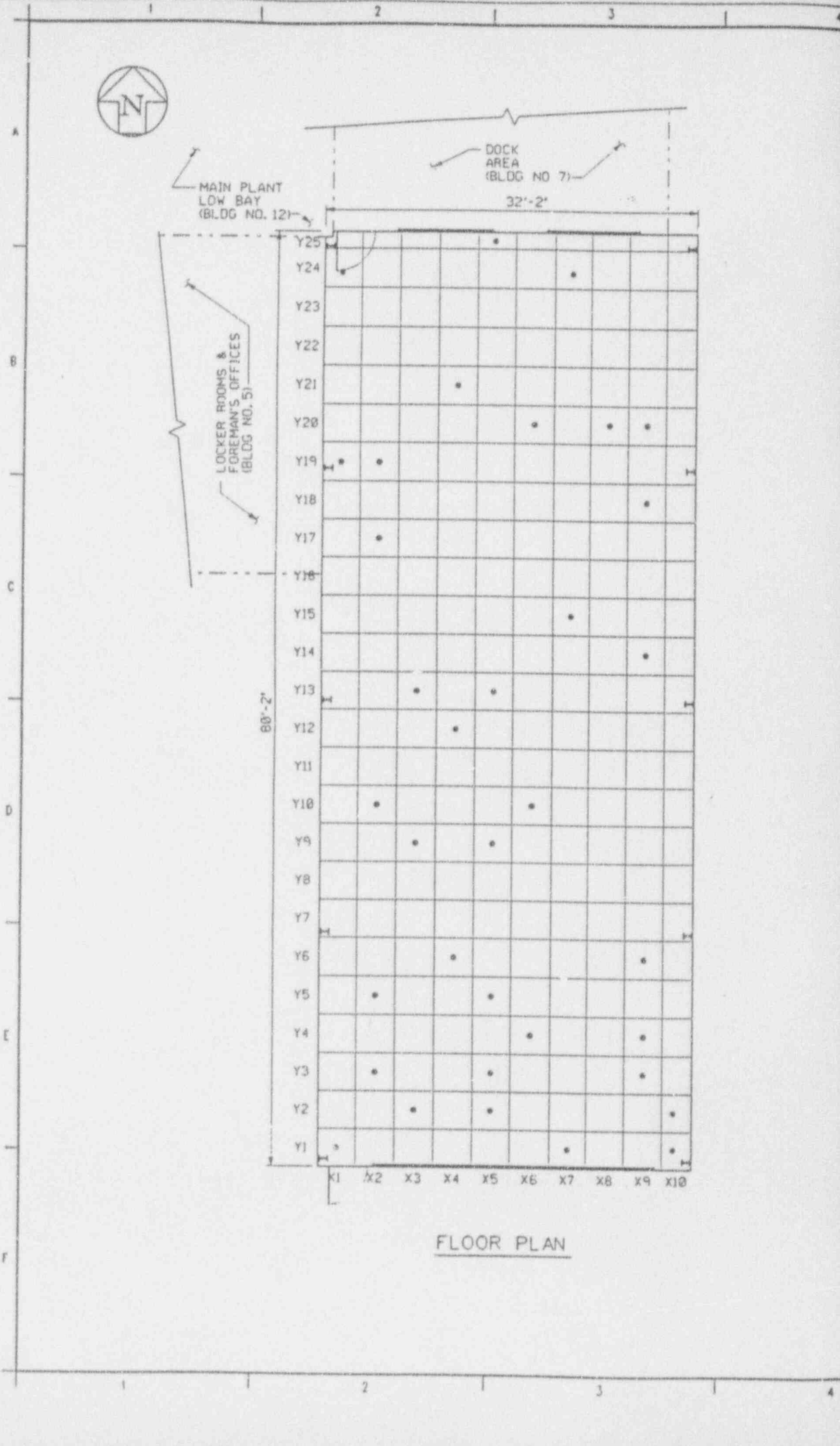
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
ENCLOSED RAMP

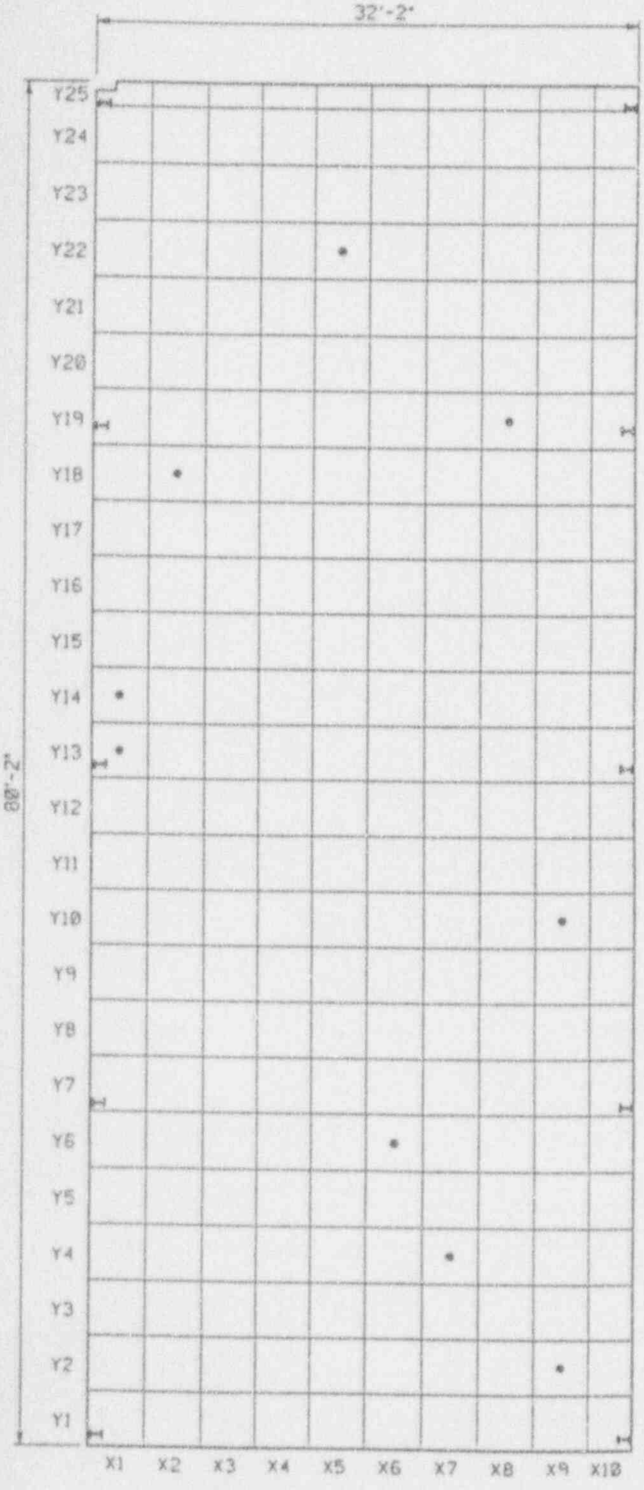
DRAWN BY JSB/DWR — DATE 3/2/92 — CHECKED BY MSF/MAD — DATE 09-14-92
PLANT/BLDG NO. BLDG NO 4 — SCALE NONE
VBS 1.1.2.2.1.2.8
00-90701
SK-X-00364
REV. A

9404080147-34



N
DOCK
AREA
(BLDG NO 7)
MAIN PLANT
LOW BAY
(BLDG NO. 12)
32'-2"
LOCKER ROOMS &
FOREMAN'S OFFICES
(BLDG NO. 5)
80'-2"
Y25
Y24
Y23
Y22
Y21
Y20
Y19
Y18
Y17
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10

FLOOR PLAN



PROJECTED CEILING PLAN

NOTES

RANDOM SAMPLE LOCATIONS

FLOOR	CEILING
1. X6,Y20	1. X6,Y6
2. X6,Y10	2. X9,Y2
3. X5,Y3	3. X1,Y13
4. X8,Y20	4. X1,Y14
5. X9,Y14	5. X5,Y22
6. X9,Y6	6. X2,Y18
7. X2,Y17	7. X9,Y10
8. X10,Y2	8. X7,Y4
9. X9,Y20	9. X8,Y19
10. X7,Y15	
11. X2,Y10	
12. X2,Y5	
13. X9,Y4	
14. X7,Y1	
15. X6,Y4	
16. X3,Y2	
17. X4,Y6	
18. X1,Y1	
19. X7,Y24	
20. X3,Y13	
21. X5,Y5	
22. X3,Y9	
23. X5,Y13	
24. X4,Y12	
25. X4,Y21	
26. X1,Y24	
27. X2,Y3	
28. X9,Y18	
29. X5,Y9	
30. X2,Y19	
31. X5,Y2	
32. X10,Y1	
33. X9,Y3	
34. X1,Y19	
35. X5,Y25	

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

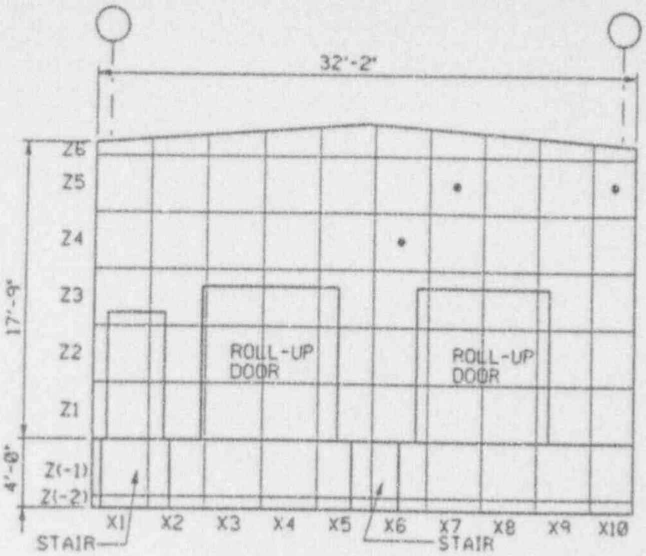
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
ENCLOSED TRUCK RAMP

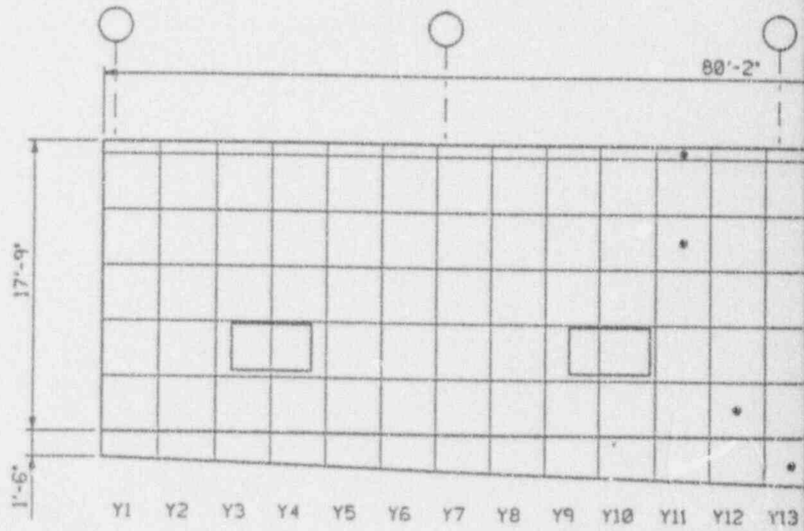
DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	03-12-92			MSF/DWR	08-11-92
BLDG NO 6				SCALE NONE	

DOE PROJECT NO	OPER. CONTR. PROJ. NO	DRAWING NO	SHEET NO	REV NO
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00369		A

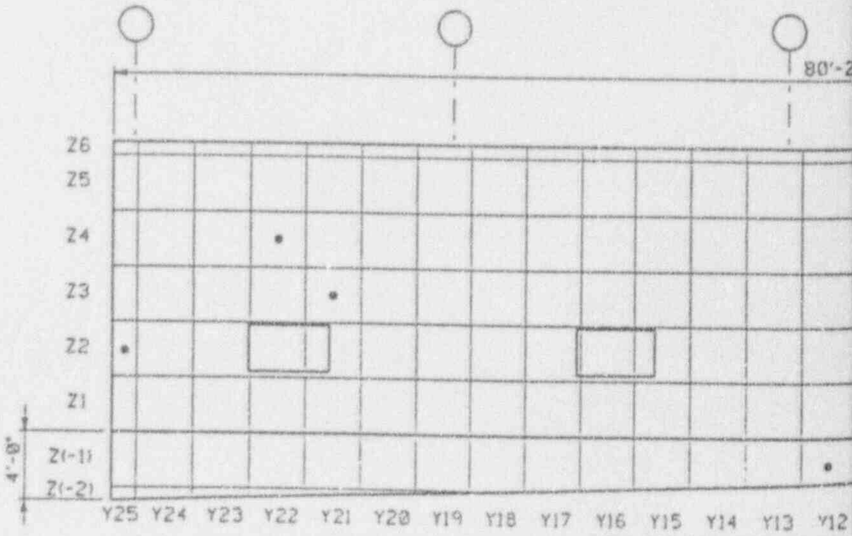
9404080147-35



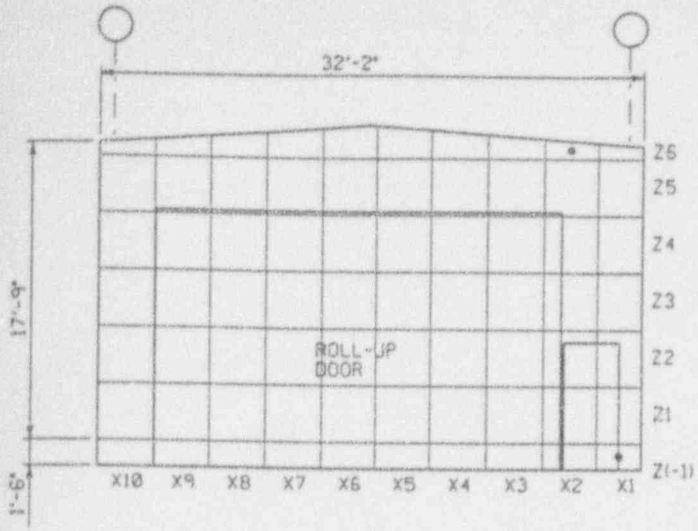
NORTH INTERIOR ELEVATION



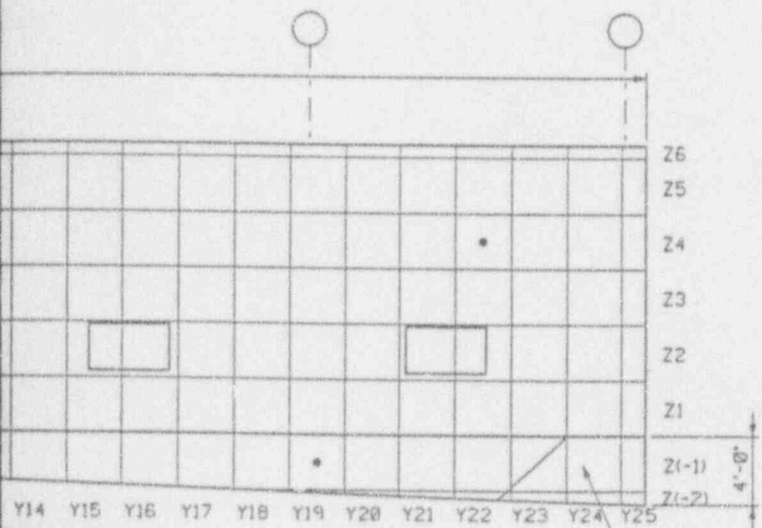
WEST INTERIOR



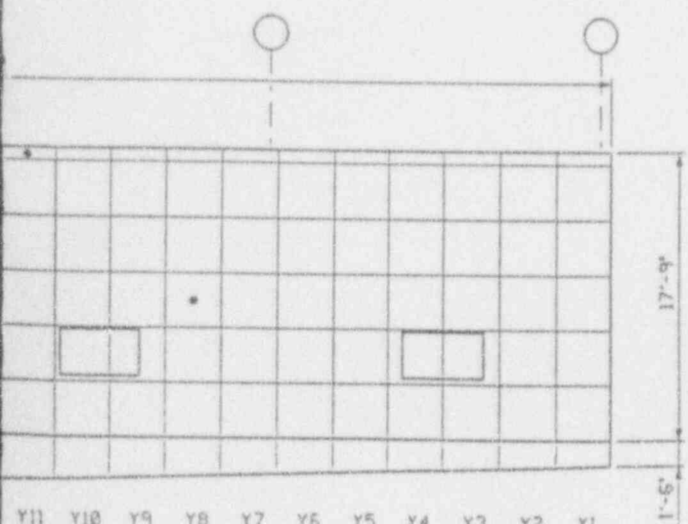
EAST INTERIOR



SOUTH INTERIOR ELEVATION



ELEVATION



ELEVATION

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL
1. X10,Z5
2. X6,Z4
3. X7,Z5

SOUTH WALL
1. X1,Z(-1)
2. X2,Z6

WEST WALL
1. Y12,Z1
2. Y13,Z(-1)
3. Y11,Z6
4. Y22,Z4
5. Y11,Z4
6. Y19,Z(-1)

EAST WALL
1. Y12,Z(-1)
2. Y8,Z3
3. Y11,Z6
4. Y21,Z3
5. Y25,Z2
6. Y22,Z4

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	90% CLIENT REVIEW			

UNITED STATES
DEPARTMENT OF ENERGY

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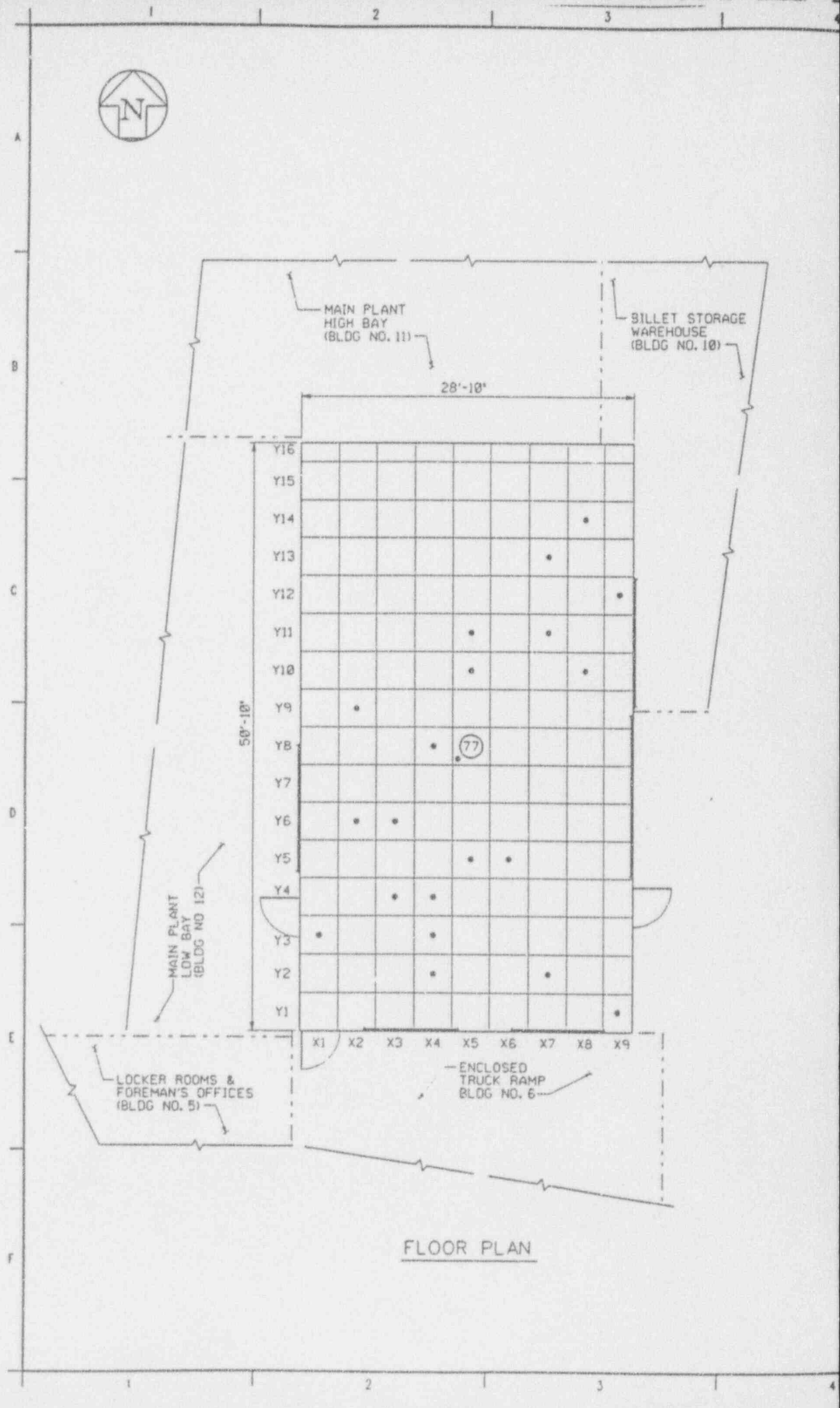
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
ENCLOSED TRUCK RAMP

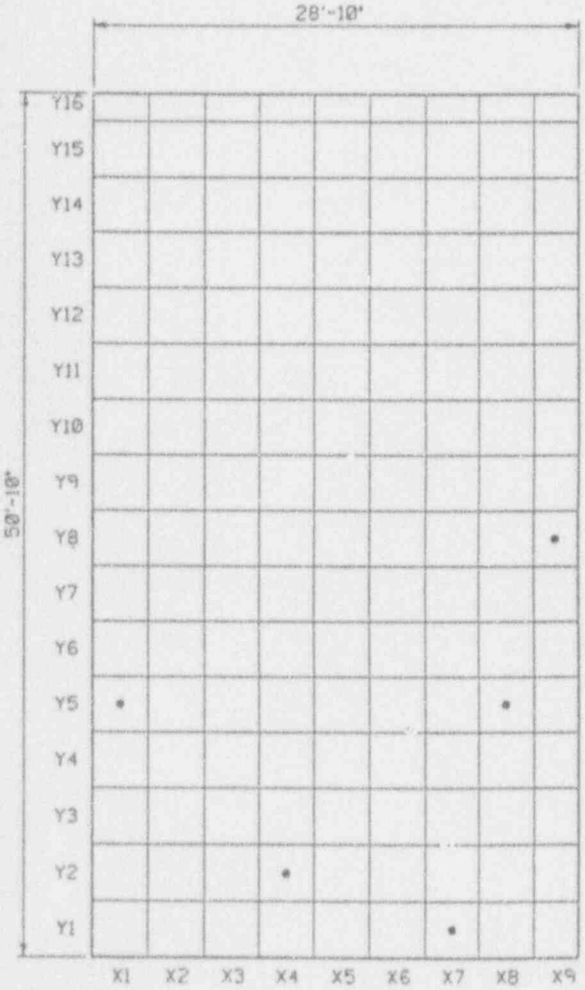
DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	03-29-92			MSF/CMR	08-14-92
PLANT/BLDG NO. BLDG NO 6		FLOOR		SCALE NONE	CLASS
WBS	VBS 1.1.2.2.1.2.8 00-90701	DRAWING NO. SK-X-00370		SHEET NO.	REV. NO. A

9404080147-36



N
MAIN PLANT HIGH BAY (BLDG NO. 11)
BILLET STORAGE WAREHOUSE (BLDG NO. 10)
28'-10"
50'-10"
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1 X2 X3 X4 X5 X6 X7 X8 X9
77
MAIN PLANT LOW BAY (BLDG NO 12)
LOCKER ROOMS & FOREMAN'S OFFICES (BLDG NO. 5)
ENCLOSED TRUCK RAMP BLDG NO. 6

FLOOR PLAN



PROJECTED CEILING PLAN

9404080147-37

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

77. FLOOR DRAIN.

RANDOM SAMPLE LOCATIONS

FLOOR

1. X9,Y1
2. X5,Y11
3. X2,Y6
4. X4,Y3
5. X5,Y10
6. X3,Y4
7. X2,Y9
8. X3,Y6
9. X7,Y2
10. X9,Y12
11. X8,Y14
12. X8,Y10
13. X5,Y8
14. X7,Y11
15. X4,Y4
16. X7,Y13
17. X6,Y5
18. X5,Y5
19. X1,Y3
20. X4,Y2
21. X4,Y8

CEILING

1. X4,Y2
2. X9,Y8
3. X7,Y1
4. X8,Y5
5. X1,Y5

ANSTEC APERTURE CARD

Also Available on Aperture Card

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION
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CINCINNATI, OHIO

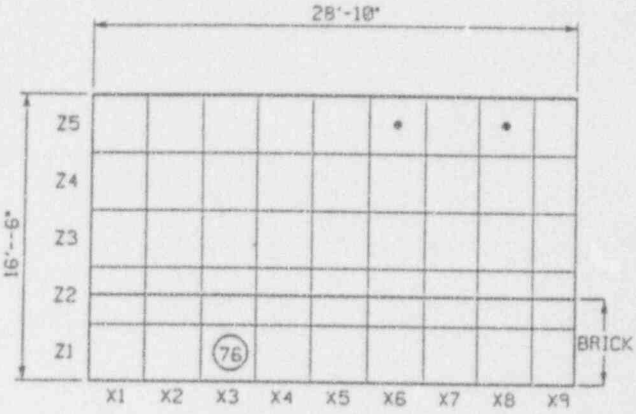
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
DOCK AREA

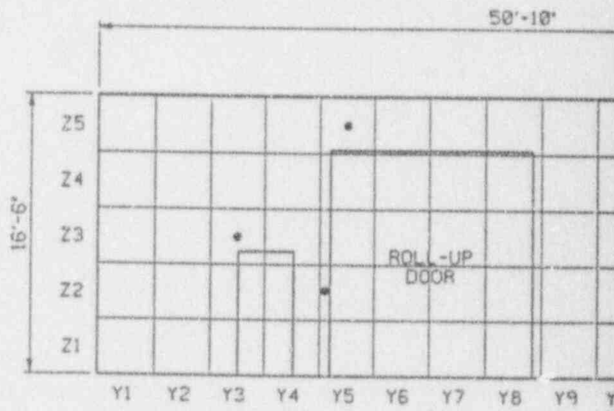
DRAWN BY	DATE	CHECKED BY	DATE
JSB/MAG	03-24-92	MST/DWR	08-11-92

PLANT/BLDG NO: BLDG NO 7 — SCALE: NONE

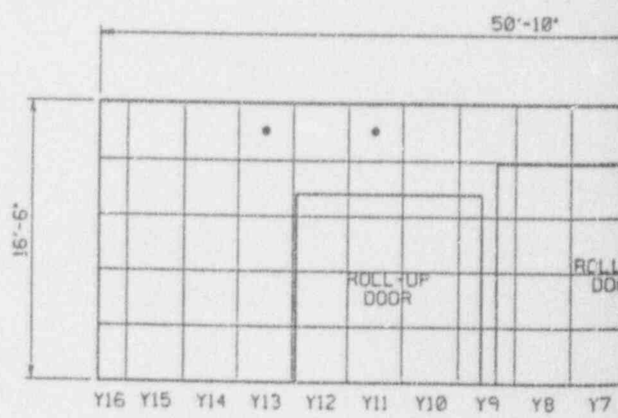
WBS 1.1.2.2.1.2.8 00-90701 — DRAWING NO. SK-X-00371 — REV. A



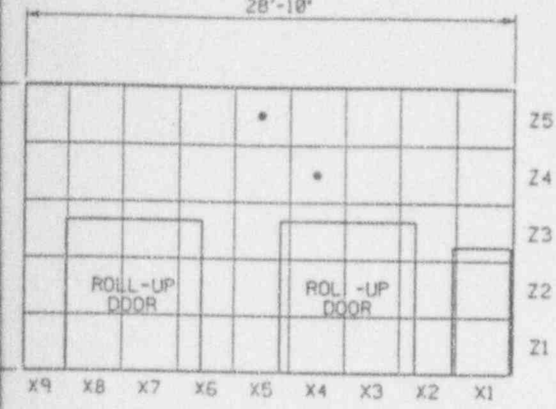
NORTH INTERIOR ELEVATION



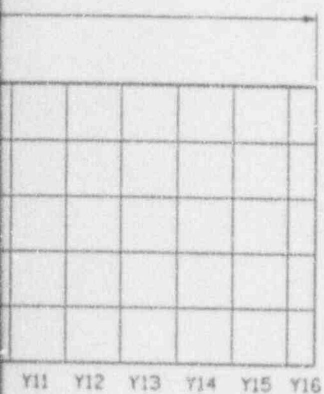
WEST INTERIOR ELE



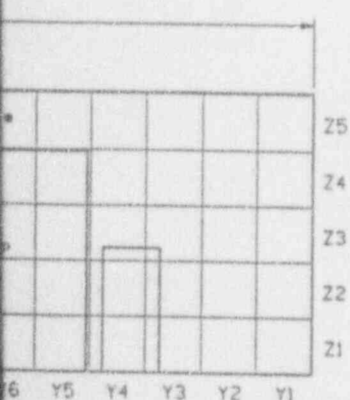
EAST INTERIOR ELE



SOUTH INTERIOR ELEVATION



ATION



ATION

9404080147-38

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

76. BRICK (EXTERNAL SURFACE).

RANDOM SAMPLE LOCATIONS

NORTH WALL

1. X6,Z5
2. X8,Z5

SOUTH WALL

1. X4,Z4
2. X5,Z5

WEST WALL

1. Y5,Z2
2. Y5,Z5
3. Y3,Z3

EAST WALL

1. Y13,Z5
2. Y11,Z5
3. Y6,Z5

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	OPERATOR	DOE
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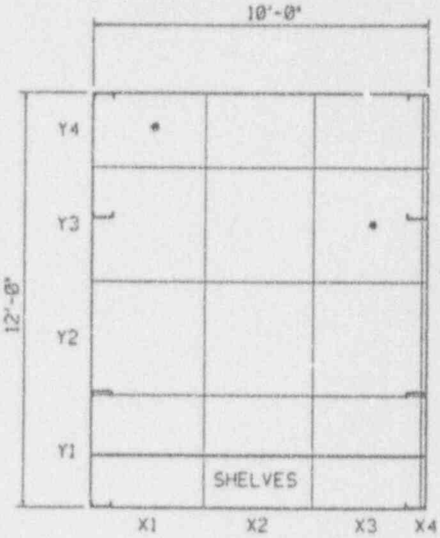
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

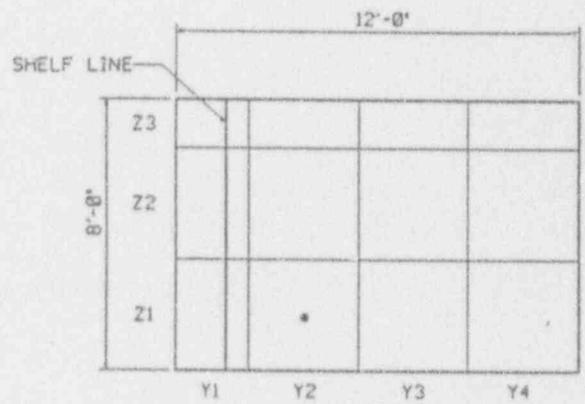
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
DOCK AREA

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-20-92			MSF/DWM	08-14-92
PLANT/BLDG NO. BLDG NO 7		FLOOR		SCALE NONE	

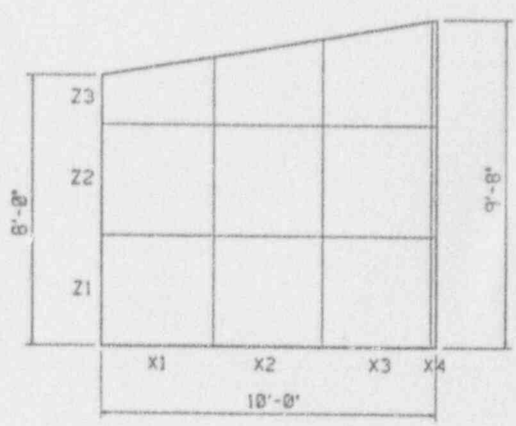
DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00372		A



FLOOR PLAN



WEST INTERIOR ELEVATION



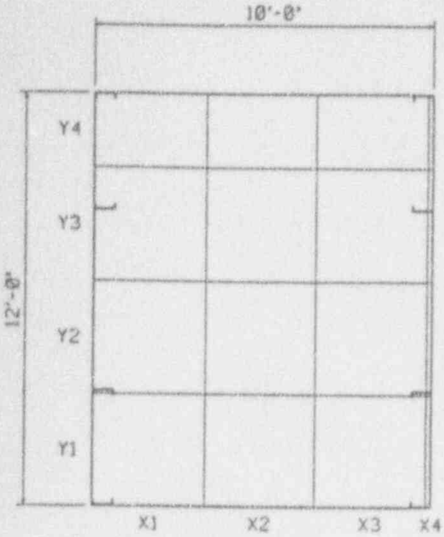
NORTH INTERIOR ELEVATION

NOTES

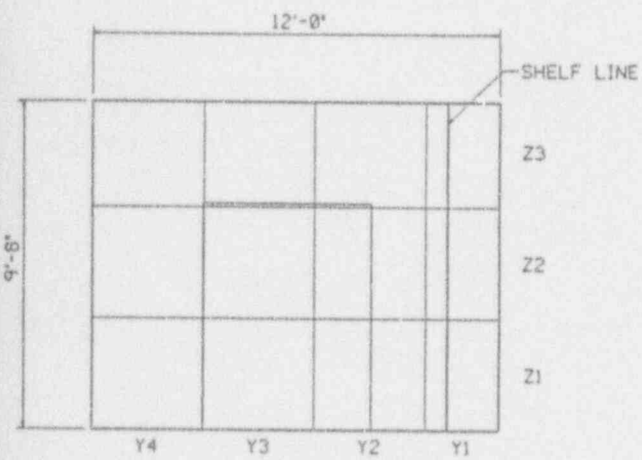
RANDOM SAMPLE LOCATIONS

FLOOR
1. X1,Y4
2. X3,Y3

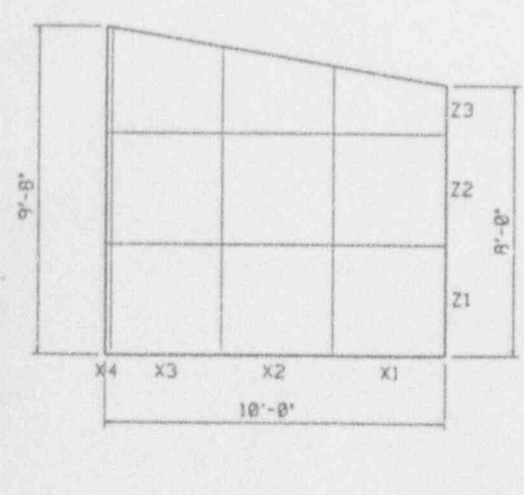
WEST WALL
1. Y2,Z1



PROJECTED CEILING PLAN



EAST INTERIOR ELEVATION



SOUTH INTERIOR ELEVATION

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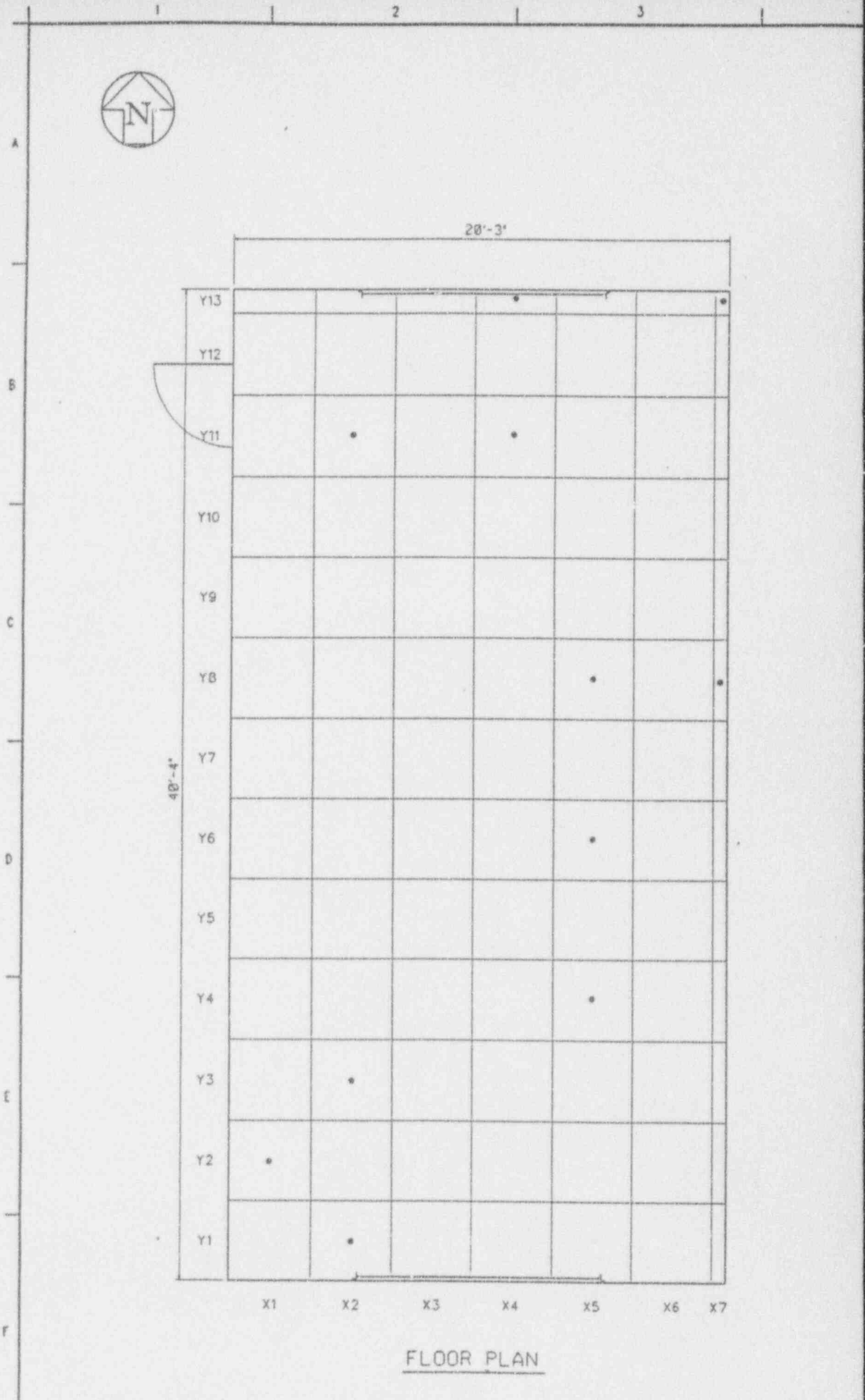
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

RADIOLOGICAL SAMPLING LOCATIONS
PLANS & ELEVATIONS
EMERGENCY EQUIPMENT STORAGE BUILDING

BLDG NO 8
SCALE: NONE

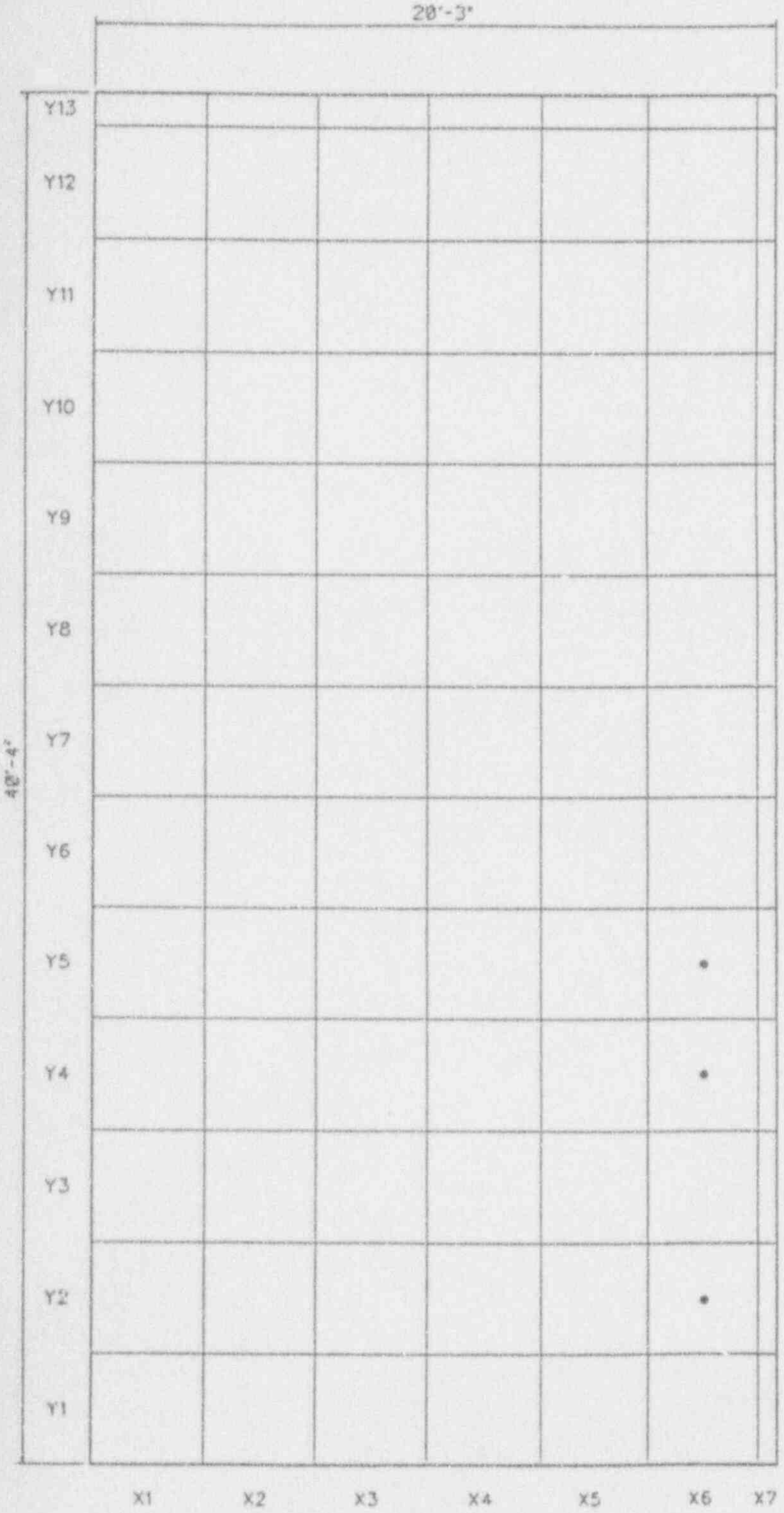
WBS 1.1.2.2.1.2.8
00-90701
SK-X-00373
A

9404080147-39



N
20'-3"
40'-4"
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1
X2
X3
X4
X5
X6
X7

FLOOR PLAN



PROJECTED CEILING PLAN

9404080147-40

NOTES

RANDOM SAMPLE LOCATIONS

FLOOR

1. X5,Y4
2. X7,Y8
3. X5,Y8
4. X7,Y13
5. X2,Y3
6. X1,Y2
7. X2,Y1
8. X5,Y6
9. X4,Y13
10. X4,Y11
11. X2,Y11

CEILING

1. X6,Y4
2. X6,Y2
3. X6,Y5

ANSTEC APERTURE CARD

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PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

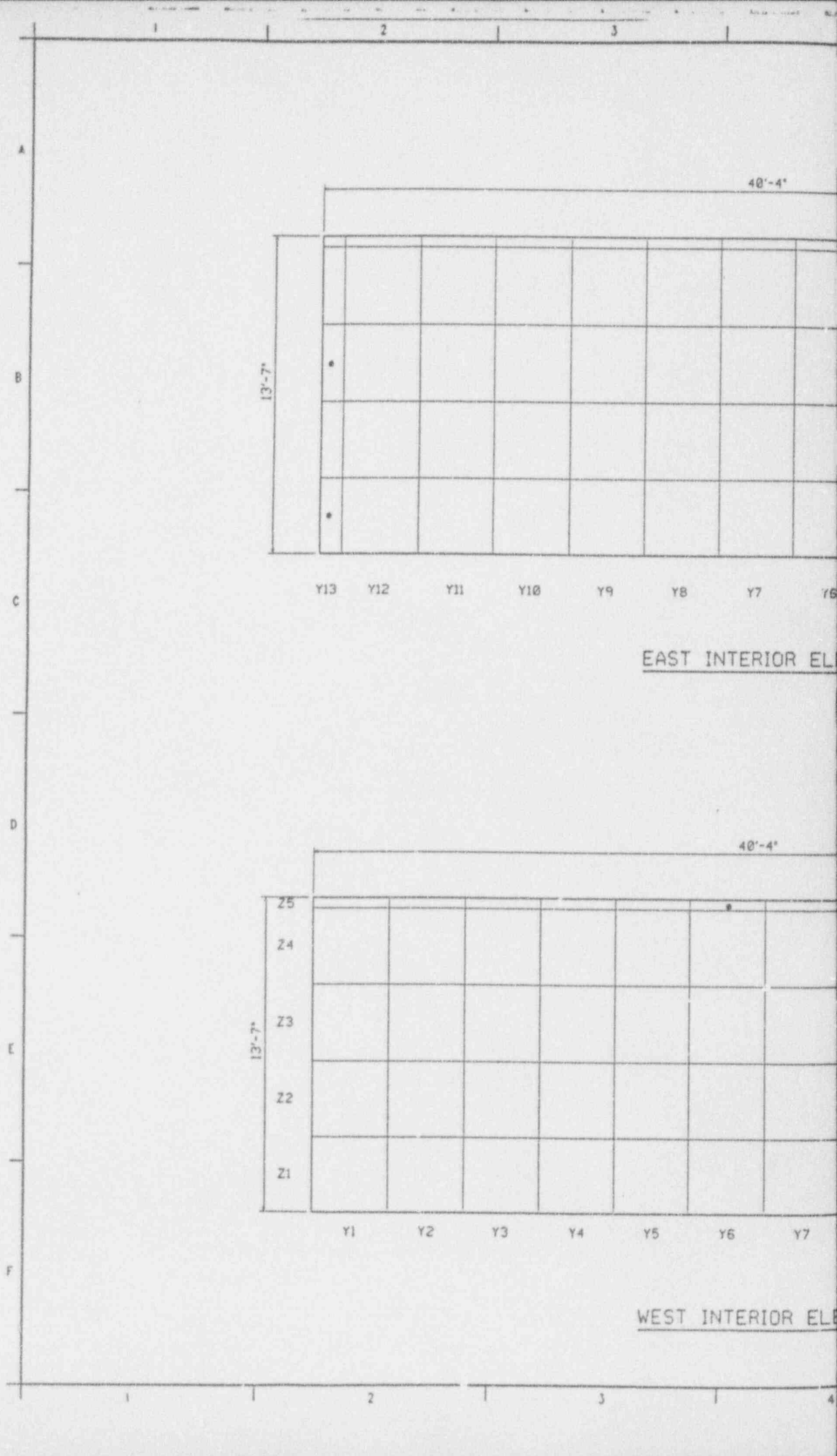
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
RCRA STORAGE BUILDING

DRAWN BY	DATE	CHECKED BY	DATE
JSB/MHO	07-20-92	MSF/DWR	08-14-92

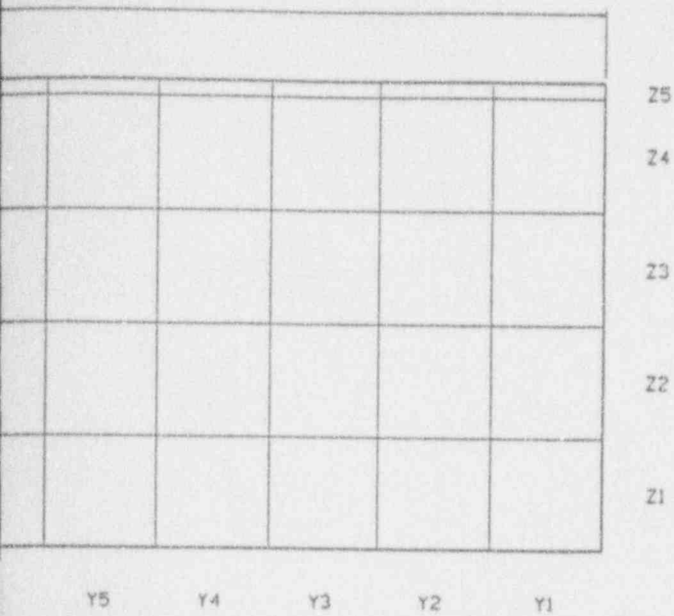
BLDG NO 9 — SCALE: NONE

WBS 1.1.2.2.1.2.8
00-90701

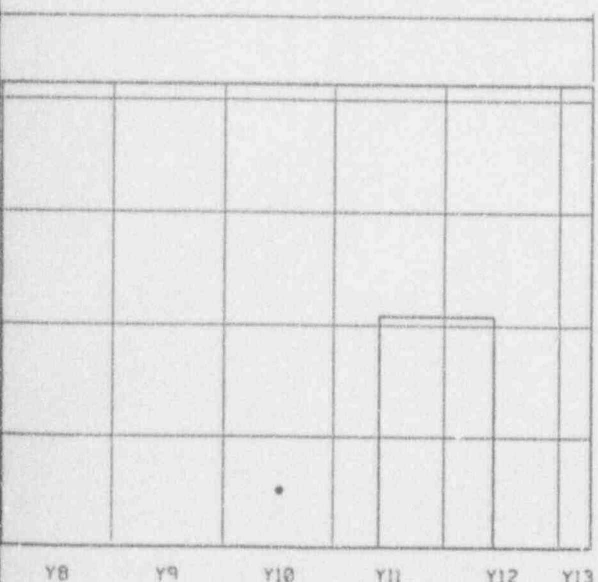
DRAWING NO. SK-X-00374 — REV. NO. A



40'-4"
13'-7"
Y13
Y12
Y11
Y10
Y9
Y8
Y7
EAST INTERIOR EL
40'-4"
13'-7"
Z5
Z4
Z3
Z2
Z1
Y1
Y2
Y3
Y4
Y5
Y6
Y7
WEST INTERIOR ELE



EVATION



EVATION

9404080147-41

NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL
1. Y13,Z3
2. Y13,Z1

WEST WALL
1. Y10,Z1
2. Y6,Z5

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REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION

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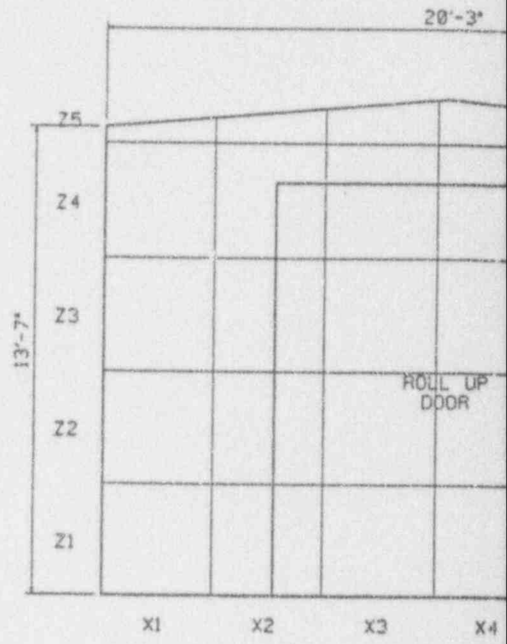
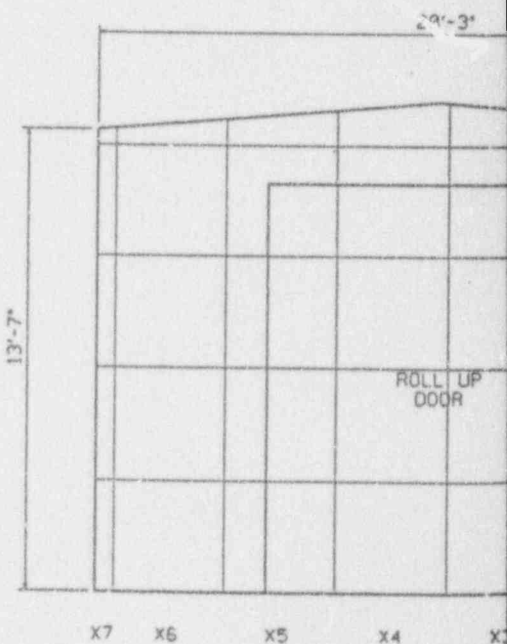
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 1 OF 2
RCRA STORAGE BUILDING

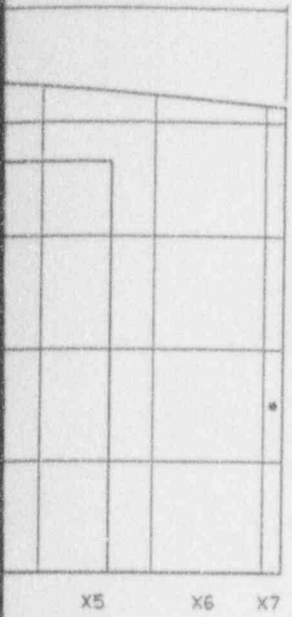
DRAWN BY JSB/MAO; DATE 03-20-92; CHECKED BY MSF/DWR; DATE 08-11-92
BLDG NO 9; SCALE NONE
WBS 1.1.2.2.1.2.0
00-90701
SK-X-00375
A



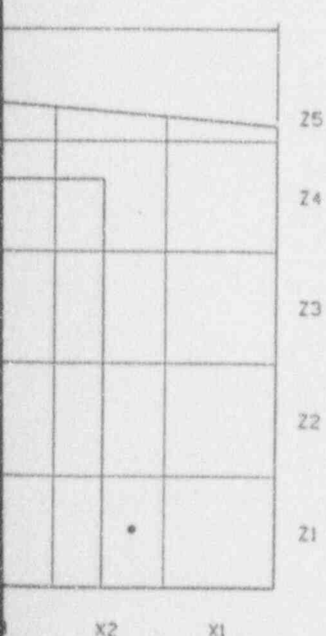
NORTH INTERIOR E



SOUTH INTERIOR E



LEVATION



LEVATION

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL

1. X7,Z2

SOUTH WALL

1. X2,Z1

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
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ENVIRONMENTAL

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PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN

RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS

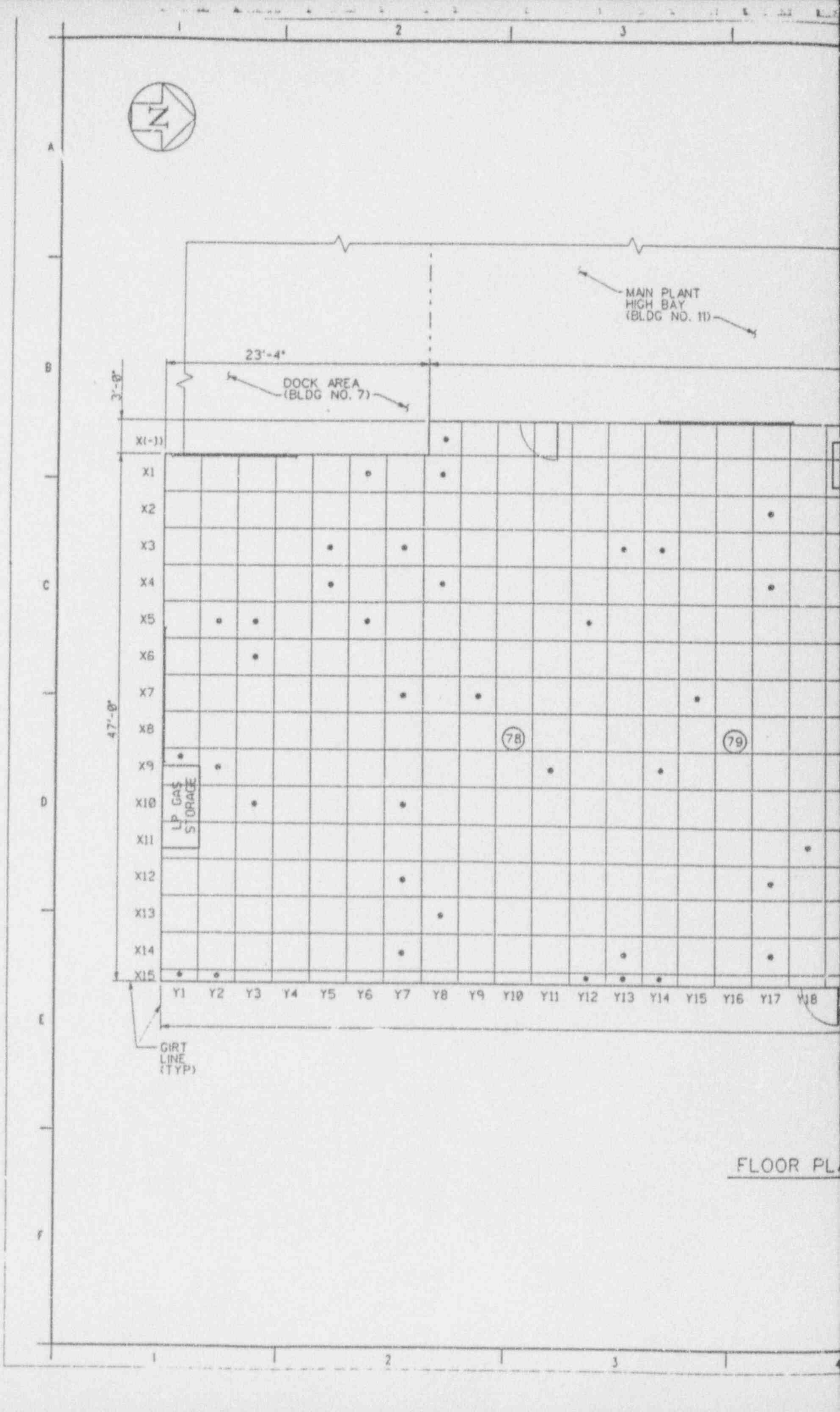
ELEVATIONS - SHEET 2 OF 2

RCRA STORAGE BUILDING

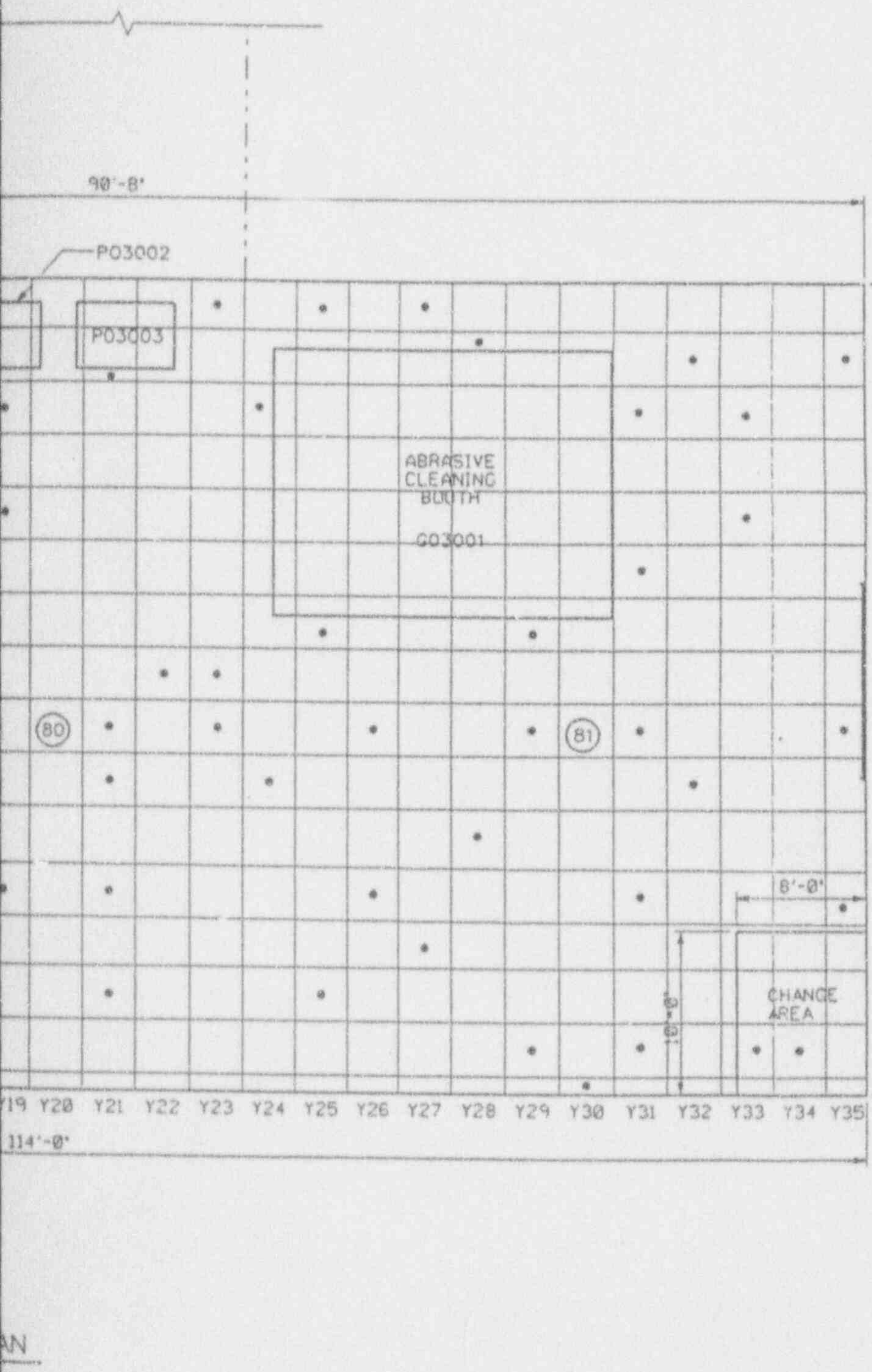
DRAWN BY	DATE	CHECKED BY	DATE
JSB/MAO	03-28-92	MSF/DWR	08-11-92
BLDG NO 9		SCALE: NONE	

OPER. CONTR. PROJ. NO.	DRAWING NO.	REV. NO.
VBS 1.1.2.2.1.2.0 00-90701	SK-X-00376	A

9404080147-42



N
MAIN PLANT
HIGH BAY
(BLDG NO. 11)
23'-4"
DOCK AREA
(BLDG NO. 7)
3'-0"
47'-0"
X(-1)
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Y9
Y10
Y11
Y12
Y13
Y14
Y15
Y16
Y17
Y18
78
79
LP GAS
STORAGE
GIRT
LINE
(TYP)
FLOOR PL



NOTES

JUDGEMENTAL SAMPLE LOCATIONS

78. FLOOR DRAIN.
79. EXPANSION JIONT.
80. FLOOR DRAIN.
81. FLOOR DRAIN.

RANDOM SAMPLE LOCATIONS

FLOOR

1. X13,Y8
2. X2,Y24
3. X15,Y14
4. X3,Y7
5. X3,Y14
6. X10,Y28
7. X1,Y28
8. X1,Y35
9. X14,Y29
10. X1,Y6
11. X11,Y26
12. X(-1),Y8
13. X5,Y6
14. X14,Y13
15. X7,Y9
16. X12,Y27
17. X8,Y21
18. X4,Y8
19. X7,Y15
20. X5,Y12
21. X5,Y2
22. X11,Y21
23. X9,Y21
24. X6,Y29
25. X(-1),Y27
26. X1,Y21
27. X11,Y35
28. X8,Y35
29. X4,Y17
30. X15,Y2
31. X8,Y29
32. X14,Y34
33. X8,Y31
34. X1,Y32
35. X12,Y17
36. X14,Y33
37. X4,Y33
38. X11,Y31
39. X13,Y25
40. X9,Y2
41. X7,Y23
42. X6,Y3
43. X14,Y17
44. X2,Y19
45. X10,Y7
46. X2,Y31
47. X15,Y1
48. X15,Y13
49. X(-1),Y23
50. X14,Y31
51. X4,Y5
52. X9,Y32
53. X2,Y33
54. X8,Y26
55. X15,Y30
56. X3,Y13
57. X9,Y1
58. X11,Y19
59. X3,Y5
60. X4,Y19
61. X1,Y8
62. X5,Y3
63. X9,Y24
64. X12,Y7
65. X9,Y14
66. X15,Y12
67. X5,Y31
68. X14,Y7
69. X6,Y25
70. X2,Y17
71. X(-1),Y25
72. X10,Y3
73. X8,Y23
74. X13,Y21
75. X7,Y7
76. X9,Y11
77. X11,Y18
78. X7,Y22

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REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION		INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY

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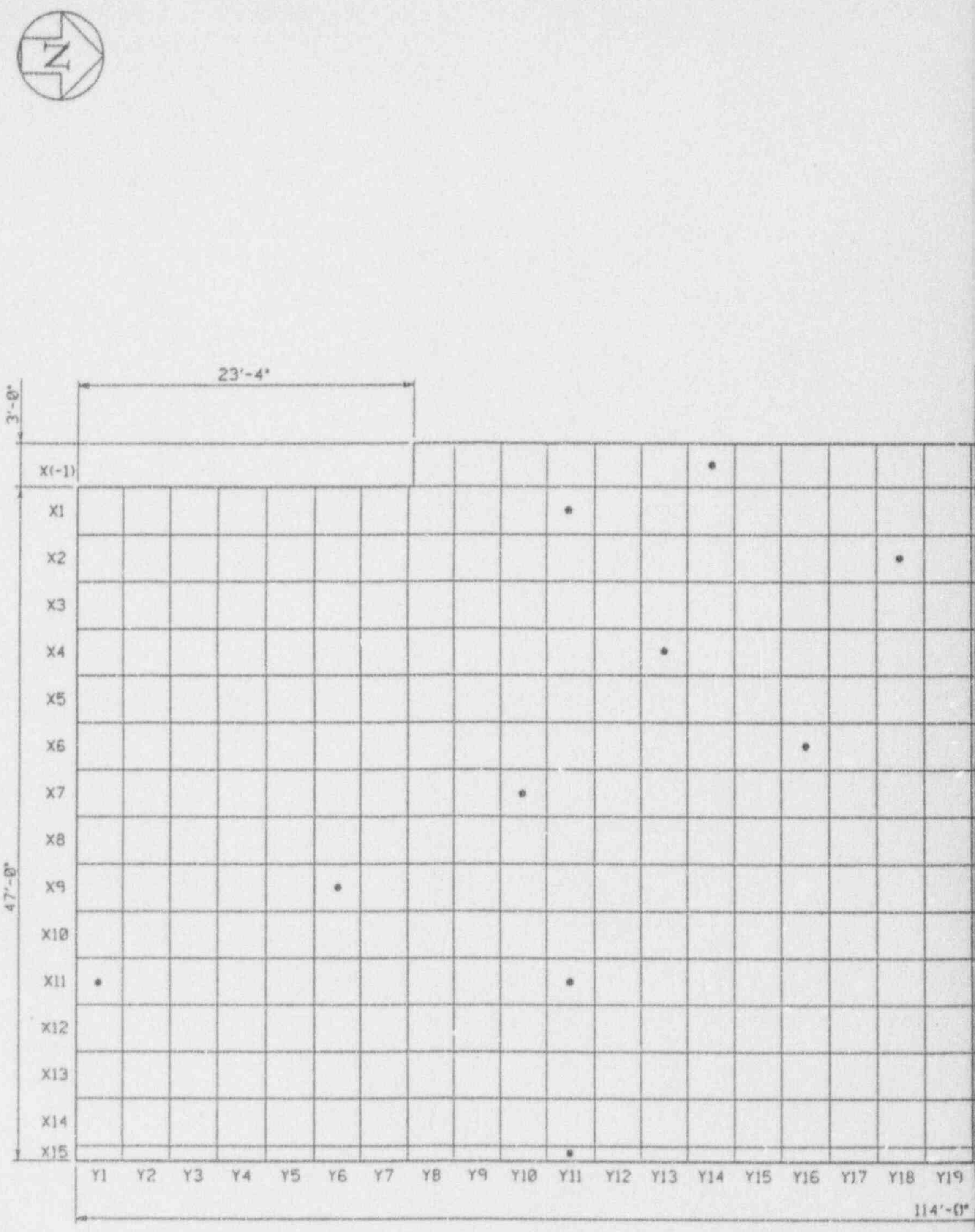
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN
BILLET STORAGE WAREHOUSE

DRAWN BY: JSB/DWR	DATE: 03-03-92	DESIGNED, CHECKED BY	DATE	CHECKED BY: MST/HWO	DATE: 08-12-92
BLDG NO 10		FLOOR		SCALE: 1/8" = 1'-0"	
DOE PROJECT NO.	WBS 1.1.2.2.1.2.8 00-90701	DRAWING NO. SK-X-00377		SHEET NO.	REV. NO. A

9404080147-43



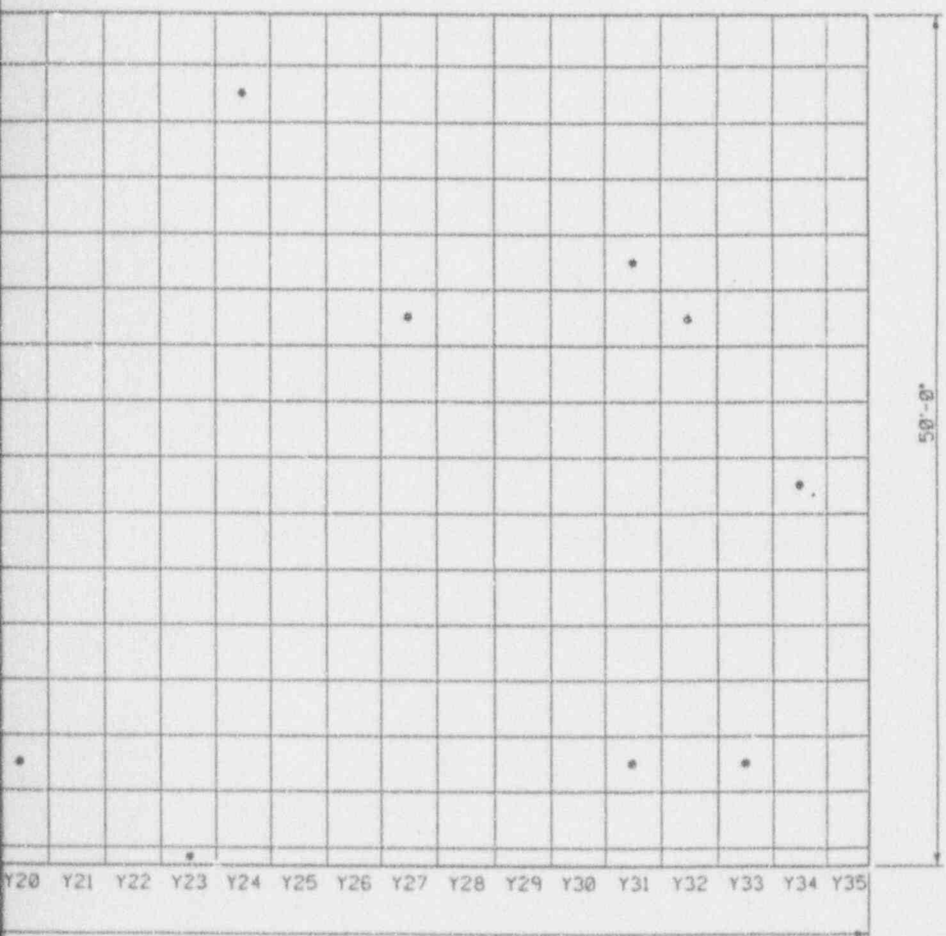
PROJECTED CEIL

NOTES

RANDOM SAMPLE LOCATIONS

CEILING

1. X2,Y18
2. X8,Y34
3. X11,Y11
4. X4,Y13
5. X7,Y10
6. X15,Y23
7. X5,Y32
8. X13,Y33
9. X6,Y16
10. X(-1),Y14
11. X1,Y24
12. X13,Y20
13. X5,Y27
14. X13,Y31
15. X15,Y11
16. X4,Y31
17. X11,Y1
18. X1,Y11
19. X9,Y6



ING PLAN

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REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION		INITIALS AND DATE	

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN
BILLET STORAGE WAREHOUSE

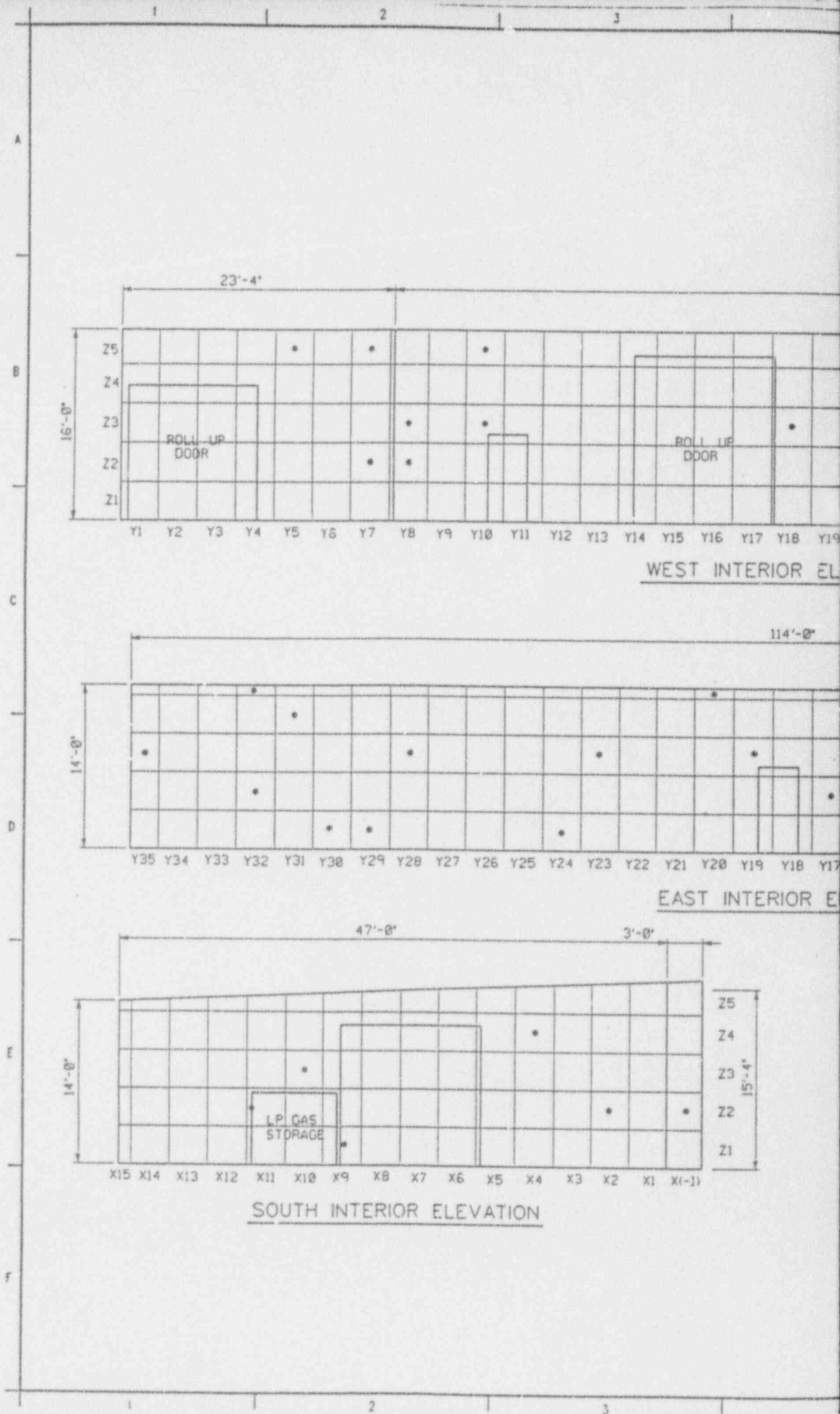
DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSR/DWR	03-03-92			MSF/MAO	08-11-92
PLANT/BLDG NO.		FLOOR		SCALE	
BLDG NO 10		-		NONE	

VBS 1.1.2.2.1.2.8
00-90701

SK-X-00378

A

9404080147-44



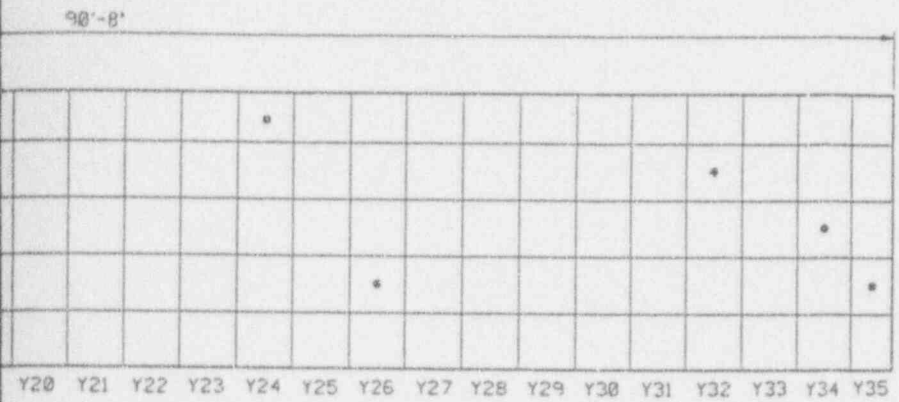
23'-4"
16'-0"
Z5
Z4
Z3
Z2
Z1
ROLL UP DOOR
ROLL UP DOOR
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19
WEST INTERIOR EL
114'-0"
14'-0"
Y35 Y34 Y33 Y32 Y31 Y30 Y29 Y28 Y27 Y26 Y25 Y24 Y23 Y22 Y21 Y20 Y19 Y18 Y17
EAST INTERIOR E
47'-0"
3'-0"
14'-0"
15'-4"
LP GAS STORAGE
X15 X14 X13 X12 X11 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1 X(-1)
SOUTH INTERIOR ELEVATION

NOTES

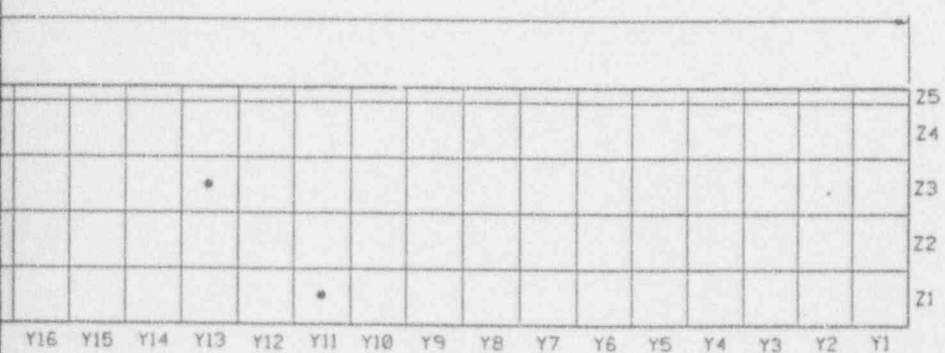
RANDOM SAMPLE LOCATIONS

NORTH WALL	SOUTH WALL
1. X1,Z4	1. X4,Z4
2. X15,Z3	2. X(-1),Z2
3. X10,Z3	3. X2,Z2
4. X4,Z2	4. X9,Z1
5. X8,Z5	5. X11,Z2
6. X9,Z5	6. X10,Z3

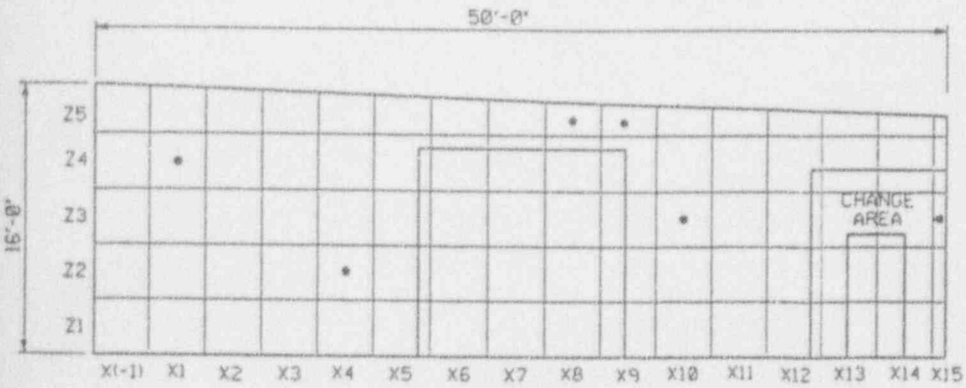
EAST WALL	WEST WALL
1. Y20,Z5	1. Y5,Z5
2. Y13,Z3	2. Y26,Z2
3. Y11,Z1	3. Y7,Z2
4. Y30,Z1	4. Y35,Z2
5. Y24,Z1	5. Y7,Z5
6. Y28,Z3	6. Y8,Z3
7. Y31,Z4	7. Y32,Z4
8. Y32,Z2	8. Y18,Z3
9. Y23,Z3	9. Y34,Z3
10. Y32,Z5	10. Y8,Z2
11. Y17,Z2	11. Y10,Z3
12. Y35,Z3	12. Y24,Z5
13. Y29,Z1	13. Y10,Z5
14. Y19,Z3	



EVATION



LEVATION



NORTH INTERIOR ELEVATION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
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UNITED STATES DEPARTMENT OF ENERGY

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THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/PD31

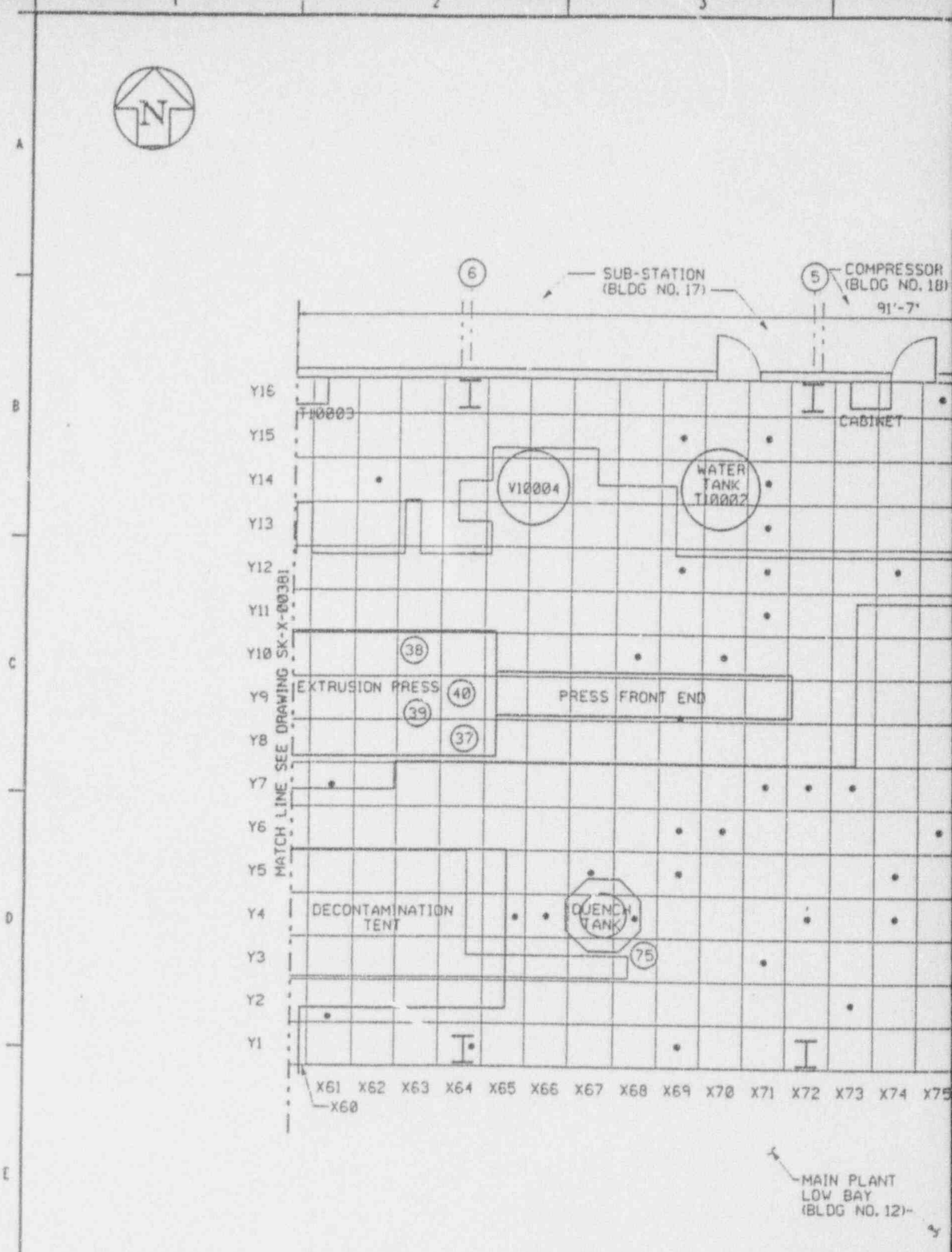
DRAWING TITLE: RADIOLOGICAL SAMPLING LOCATIONS ELEVATIONS BILLET STORAGE WAREHOUSE

DRAWN BY	DATE	CHECKED BY	DATE
JSB/DWR	03-28-92	MSF/MAO	08-14-92
PLANT/BLDG NO.	FLOOR	SCALE	
BLDG NO 10		NONE	

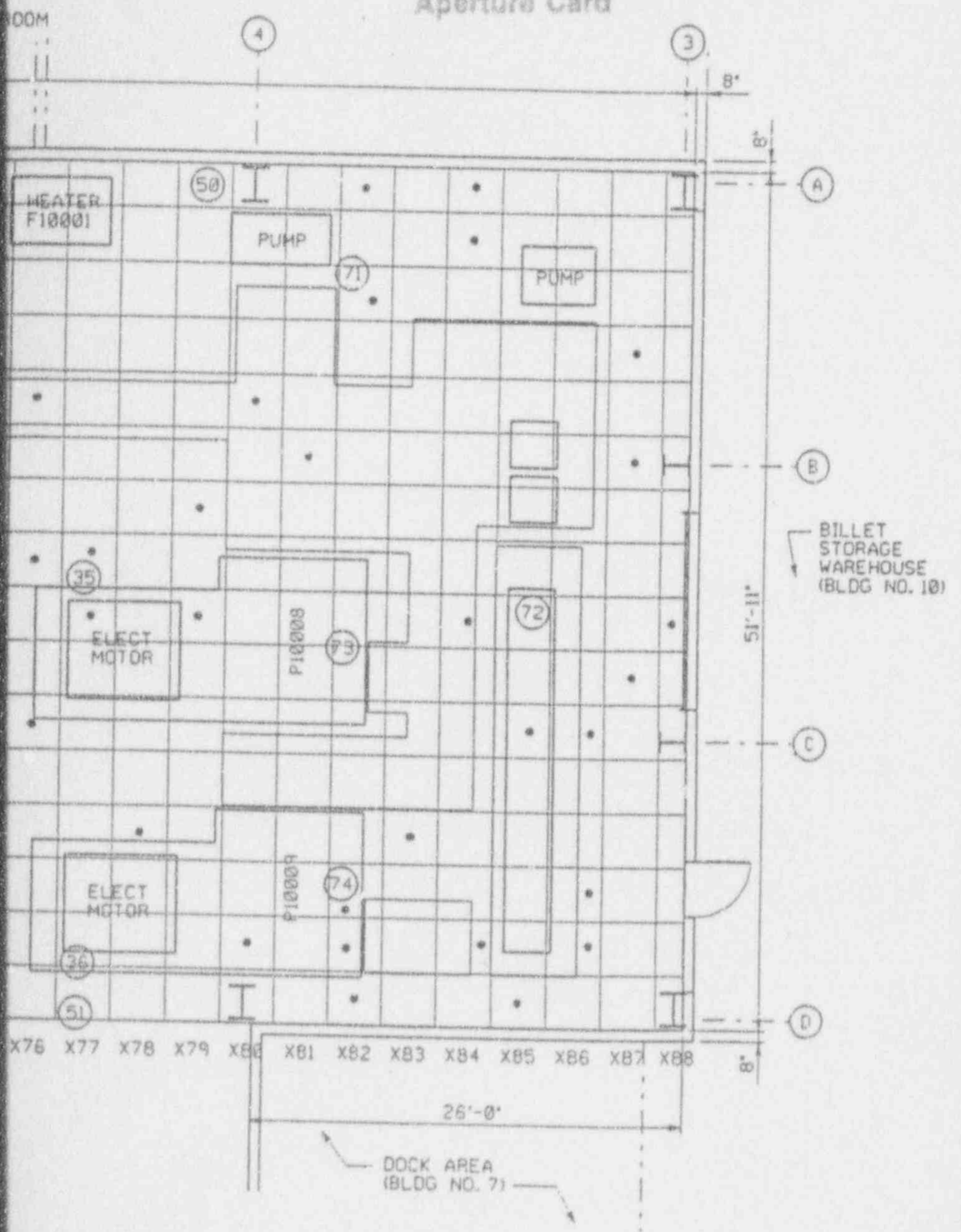
VBS 1.1.2.2.1.2.8
00-90701

SK-X-00379 A

9404080147-45



PARTIAL FLOOR P



NOTES

JUDGEMENTAL SAMPLE LOCATIONS

35. MOTOR CASING (EXTERNAL SURFACE).
36. MOTOR CASING (EXTERNAL SURFACE).
37. EXTRUSION PRESS (EXTERNAL SURFACE).
38. EXTRUSION PRESS (EXTERNAL SURFACE).
39. EXTRUSION PRESS (INTERNAL SURFACE).
40. DIE HEAD DUSTWORK (INTERIOR SURFACE ABOVE FRONT END).
50. CRANE HORIZONTAL SUPPORT (TOP SIDE).
51. CRANE HORIZONTAL SUPPORT (TOP SIDE).
71. WATER TANK (EXTERNAL SURFACE).
72. PRESSURE CYLINDERS (EXTERNAL SURFACE).
73. PUMP P10008 (EXTERNAL SURFACE).
74. PUMP P10009 (EXTERNAL SURFACE).
75. QUENCH TANK (EXTERNAL SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR

1.	X52,Y7	42.	X21,Y13
2.	X11,Y15	43.	X43,Y3
3.	X85,Y6	44.	X48,Y14
4.	X25,Y7	45.	X35,Y2
5.	X28,Y4	46.	X68,Y10
6.	X34,Y8	47.	X71,Y12
7.	X79,Y10	48.	X20,Y16
8.	X18,Y14	49.	X41,Y8
9.	X71,Y14	50.	X19,Y11
10.	X84,Y16	51.	X44,Y7
11.	X31,Y8	52.	X8,Y16
12.	X22,Y13	53.	X5,Y13
13.	X47,Y15	54.	X83,Y4
14.	X68,Y4	55.	X7,Y10
15.	X55,Y3	56.	X28,Y1
16.	X31,Y2	57.	X37,Y5
17.	X26,Y15	58.	X55,Y2
18.	X9,Y12	59.	X24,Y8
19.	X71,Y13	60.	X55,Y12
20.	X30,Y7	61.	X36,Y8
21.	X32,Y4	62.	X88,Y8
22.	X85,Y1	63.	X55,Y15
23.	X76,Y12	64.	X52,Y2
24.	X76,Y6	65.	X78,Y4
25.	X39,Y1	66.	X41,Y15
26.	X3,Y15	67.	X27,Y2
27.	X56,Y14	68.	X6,Y13
28.	X11,Y1	69.	X82,Y1
29.	X42,Y5	70.	X75,Y6
30.	X14,Y14	71.	X45,Y4
31.	X42,Y10	72.	X21,Y1
32.	X18,Y2	73.	X84,Y8
33.	X2,Y6	74.	X14,Y12
34.	X69,Y12	75.	X73,Y7
35.	X61,Y7	76.	X48,Y10
36.	X69,Y5	77.	X60,Y13
37.	X8,Y15	78.	X58,Y8
38.	X37,Y3	79.	X87,Y7
39.	X65,Y4	80.	X82,Y14
40.	X77,Y8	81.	X49,Y7
41.	X13,Y11	82.	X69,Y9

(FOR CONT. SEE DWG. NO. SK-X-00381)

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES
DEPARTMENT OF ENERGY
ONMENTAL A

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THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

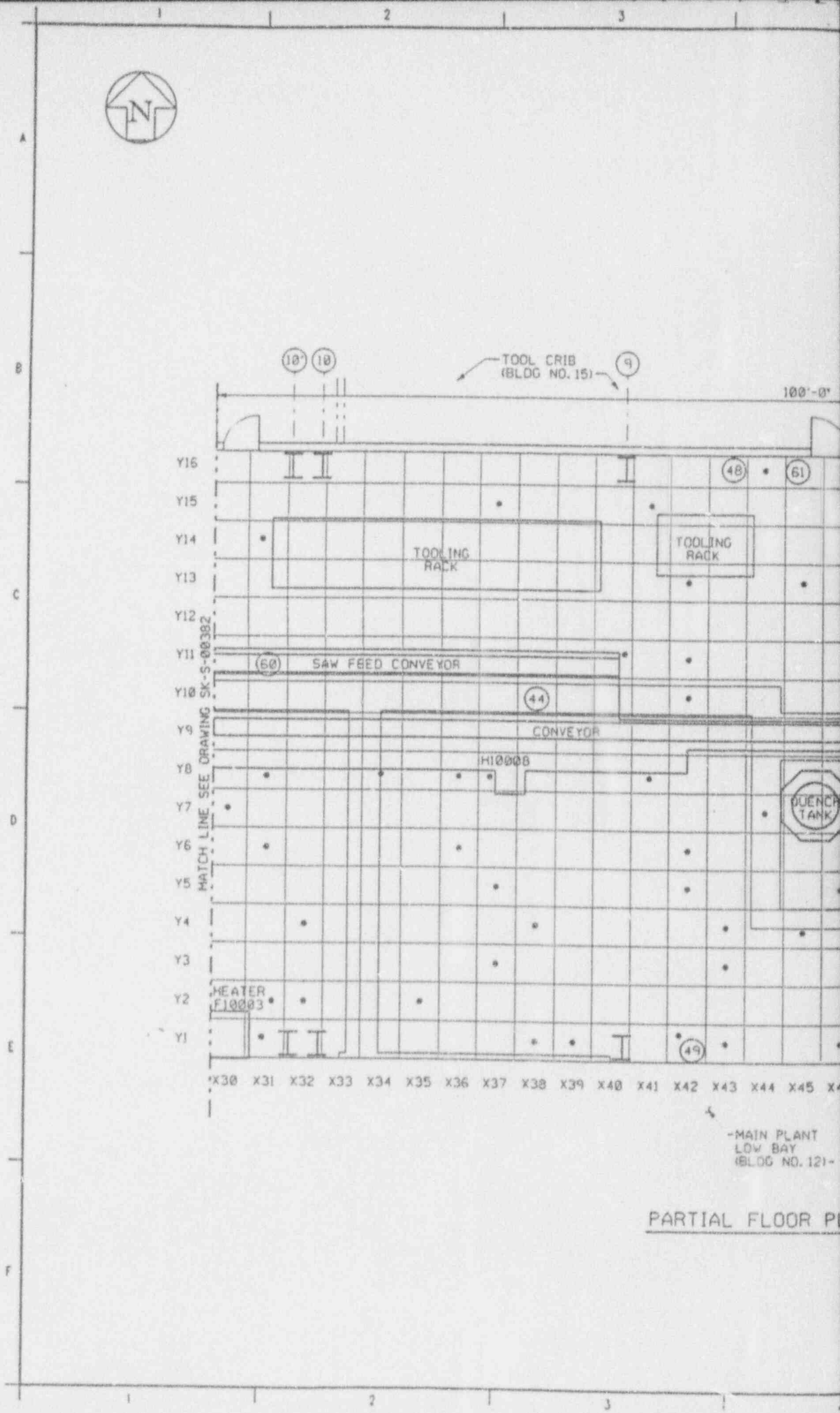
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

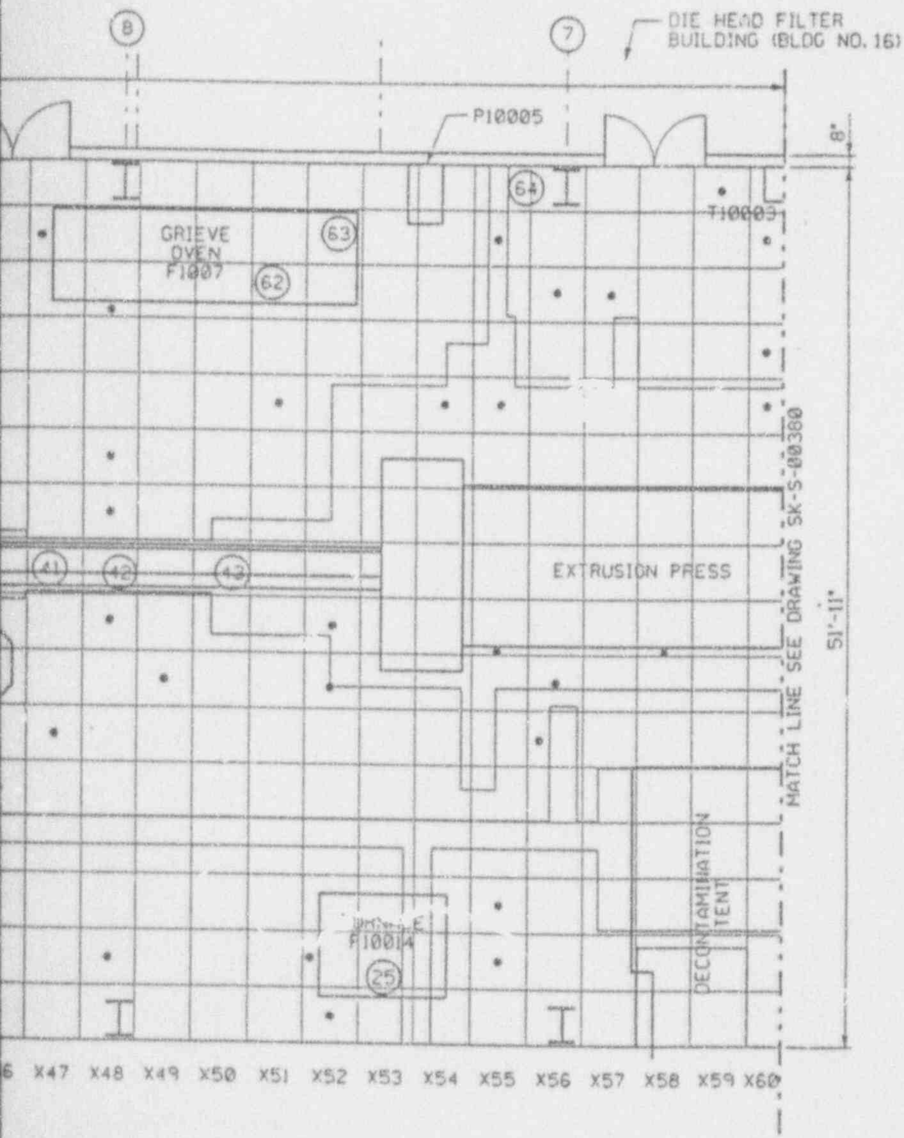
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 1 OF 3
MAIN PLANT HIGH BAY

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-06-92			MSF/DEP	06-11-92
PLANT/BLDG NO. BLDG NO 11		FLOOR		SCALE NONE	

DOE PROJECT NO.	OPTX CONTR. PROJ NO.	DRAWING NO.	SHEET NO.	REV. NO.
	VBS 1.1.2.2.1.2.0 00-90701	SK-X-00380		A

9404080147-46


N
TOOL CRIB
(BLDG NO. 15)
100'-0"
TOOLING RACK
TOOLING RACK
SAW FEED CONVEYOR
CONVEYOR
H10008
QUENCH TANK
HEATER F10003
MATCH LINE SEE DRAWING SK-S-00382
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X30 X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45
-MAIN PLANT LOW BAY (BLDG NO. 12)-
PARTIAL FLOOR PL



LAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

25. FURNACE F10014 (INTERIOR SURFACE).
41. DIE HEAD DUCTWORK (INTERIOR SURFACE).
42. CONVEYOR HOOD (INTERIOR SURFACE).
43. CONVEYOR HOOD (EXTERNAL SURFACE).
44. COOLING TABLE DUCTWORK (INTERIOR SURFACE).
48. CRANCE HORIZONTAL SUPPORT (TOP SIDE).
49. CRANCE HORIZONTAL SUPPORT (TOP SIDE).
60. CONVEYOR ROLLERS.
61. LOUVERS.
62. GRIEVE OVEN (INTERIOR SURFACE).
63. GRIEVE OVEN (EXTERIOR SURFACE).
64. ELECTRICAL CABINET (INTERIOR SURFACE).
65. T10003 (EXTERNAL SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR (CONT. FROM DWG. NO. SK-X-00380)

83. X31,Y1	124. X77,Y9
84. X82,Y16	125. X81,Y11
85. X31,Y6	126. X14,Y11
86. X42,Y6	127. X48,Y8
87. X86,Y3	128. X64,Y1
88. X80,Y2	129. X70,Y6
89. X72,Y7	130. X67,Y5
90. X56,Y7	131. X32,Y2
91. X37,Y15	132. X2,Y3
92. X79,Y8	133. X56,Y6
93. X73,Y2	134. X2,Y5
94. X38,Y1	135. X20,Y5
95. X43,Y1	136. X45,Y13
96. X60,Y15	137. X86,Y6
97. X84,Y15	138. X51,Y12
98. X55,Y8	139. X69,Y6
99. X71,Y15	140. X25,Y4
100. X52,Y8	141. X47,Y6
101. X42,Y11	142. X28,Y2
102. X80,Y12	143. X27,Y13
103. X74,Y12	144. X28,Y7
104. X69,Y1	145. X29,Y4
105. X69,Y15	146. X13,Y8
106. X87,Y11	147. X14,Y3
107. X42,Y1	148. X87,Y13
108. X71,Y[illegible]	149. X71,Y7
109. X61,Y2	150. X12,Y13
110. X44,Y16	151. X82,Y3
111. X54,Y12	152. X22,Y14
112. X86,Y2	153. X18,Y10
113. X74,Y4	154. X52,Y1
114. X48,Y11	155. X16,Y4
115. X38,Y4	156. X7,Y1
116. X57,Y14	157. X9,Y1
117. X70,Y10	158. X1,Y6
118. X46,Y1	159. X11,Y10
119. X37,Y8	160. X20,Y1
120. X66,Y4	161. X13,Y10
121. X43,Y4	162. X1,Y1
122. X84,Y2	163. X25,Y11
123. X36,Y6	164. X13,Y15

(FOR CONT. SEE DWG. NO. SK-X-00382)

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UNITED STATES
DEPARTMENT OF ENERGY

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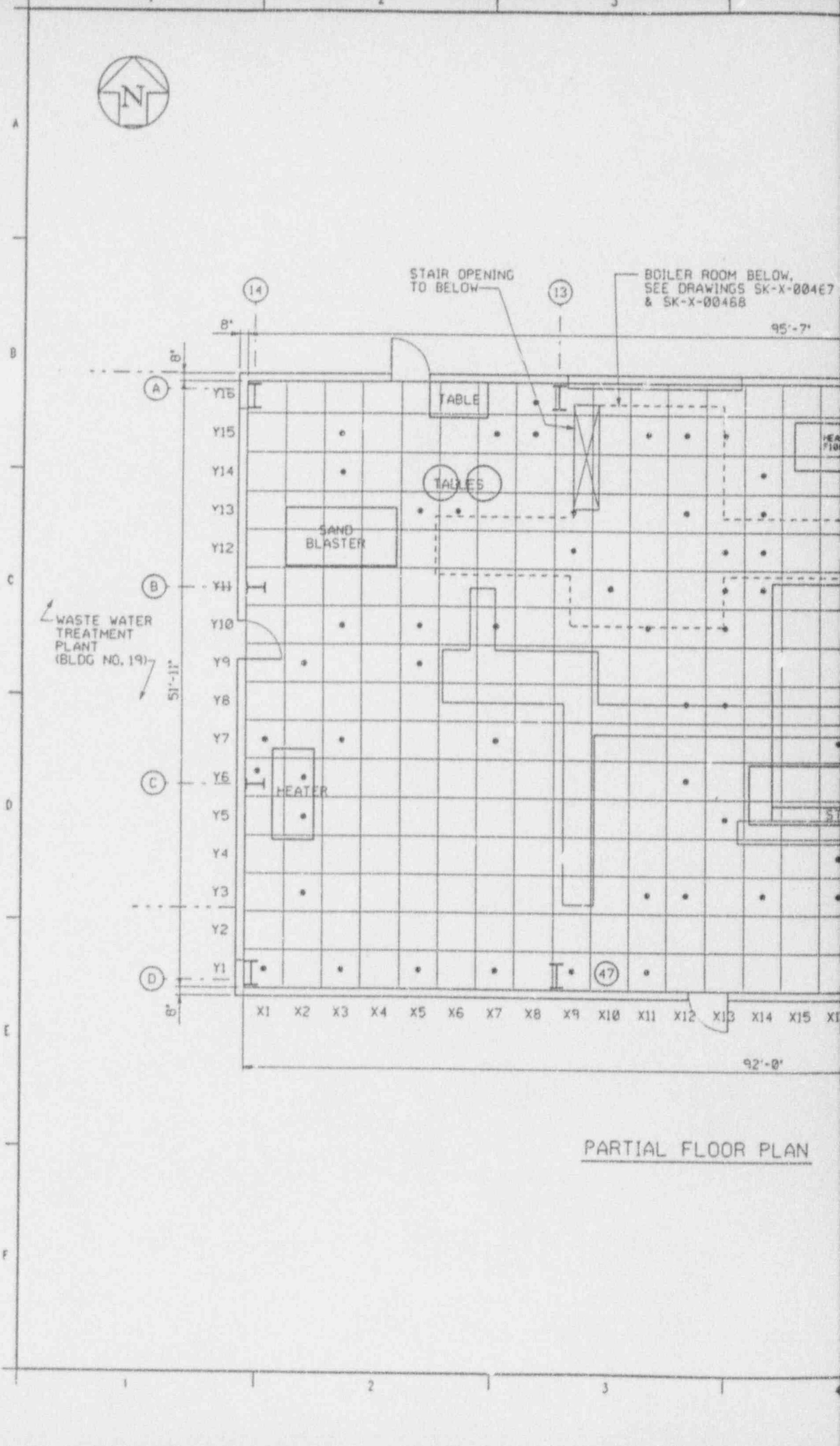
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 2 OF 3
MAIN PLANT HIGH BAY

BLDG NO 11
SCALE NONE
WBS 1.1.2.2.1.2.8
00-90701
SK-X-00381
A

9404080147-47



PARTIAL FLOOR PLAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

45. SAW FILTER DUCTWORK 1/4(INTERIOR SURFACE).
46. CRANE HORIZONTAL SUPPORT (TOP SIDE).
47. CRANE HORZONTAL SUPPORT (TOP SIDE).
54. CONTAINER HEATER F10008 (INTERIOR SURFACE).
55. CONTAINER HEATER F10008 (EXTERIOR SURFACE).
58. MAIN DISCONNECT ENCLOSURE (INTERIOR SURFACE).

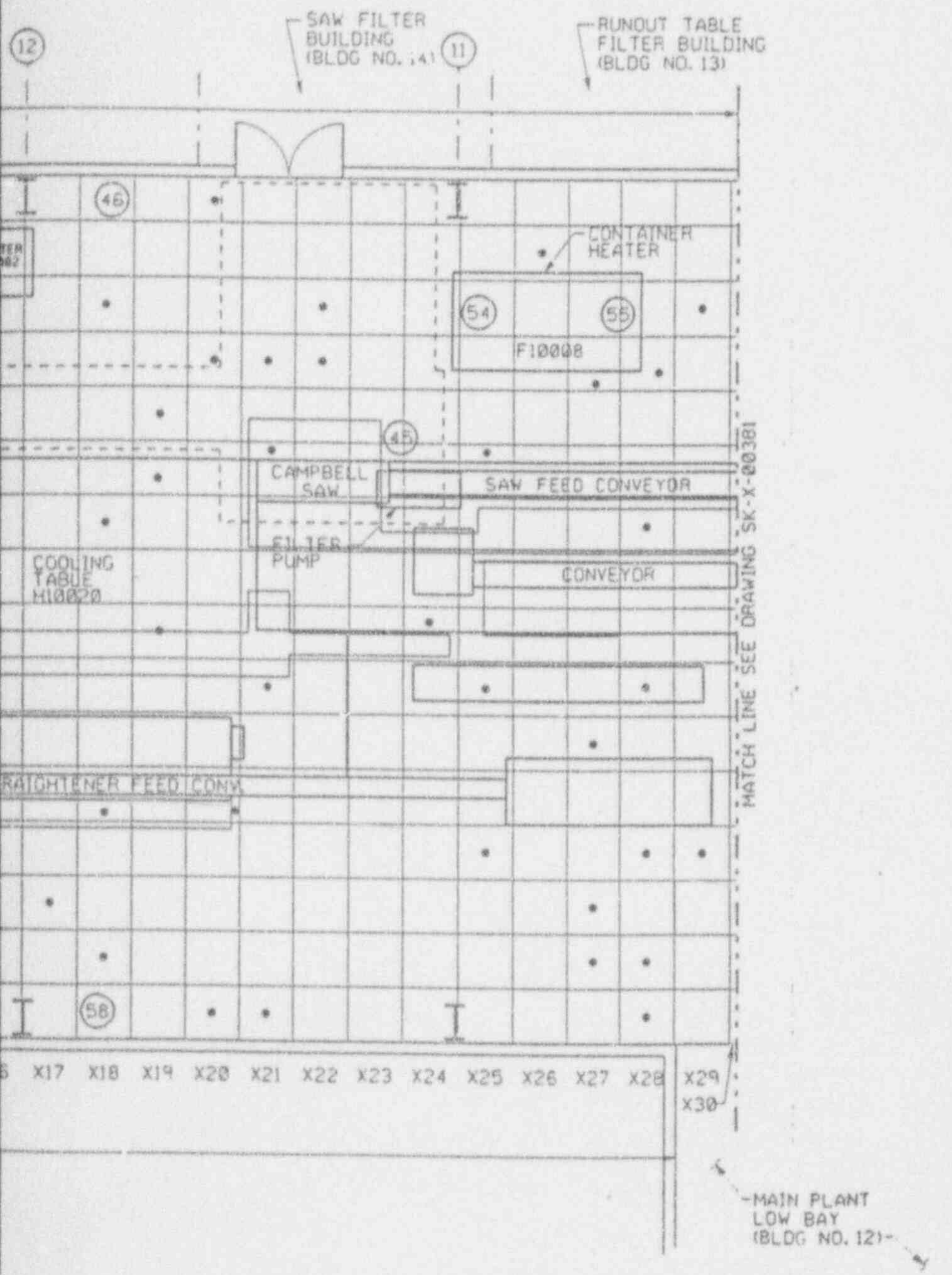
RANDOM SAMPLE LOCATIONS

FLOOR (CONT. FROM DWG. NO. SK-X-00381)

165. X3,Y14
166. X28,Y10
167. X5,Y10
168. X18,Y5
169. X27,Y6
170. X29,Y14
171. X9,Y13
172. X12,Y8
173. X2,Y9
174. X16,Y3
175. X19,Y12
176. X14,Y13
177. X21,Y7
178. X5,Y9
179. X3,Y1
180. X27,Y3
181. X21,Y11
182. X12,Y15
183. X7,Y7
184. X12,Y6
185. X16,Y7
186. X20,Y13
187. X5,Y1
188. X13,Y5
189. X28,Y13
190. X3,Y7
191. X13,Y12
192. X74,Y5
193. X60,Y12
194. X40,Y11
195. X1,Y7
196. X46,Y5
197. X62,Y14
198. X10,Y11
199. X19,Y8
200. X3,Y10
201. X72,Y4
202. X76,Y9
203. X48,Y2
204. X17,Y3
205. X11,Y3
206. X7,Y15
207. X71,Y3
208. X42,Y13
209. X82,Y2
210. X12,Y3
211. X75,Y16
212. X59,Y16
213. X31,Y14

ANSTEC APERTURE CARD

Also Available on Aperture Card



A	90% CLIENT REVIEW	
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE

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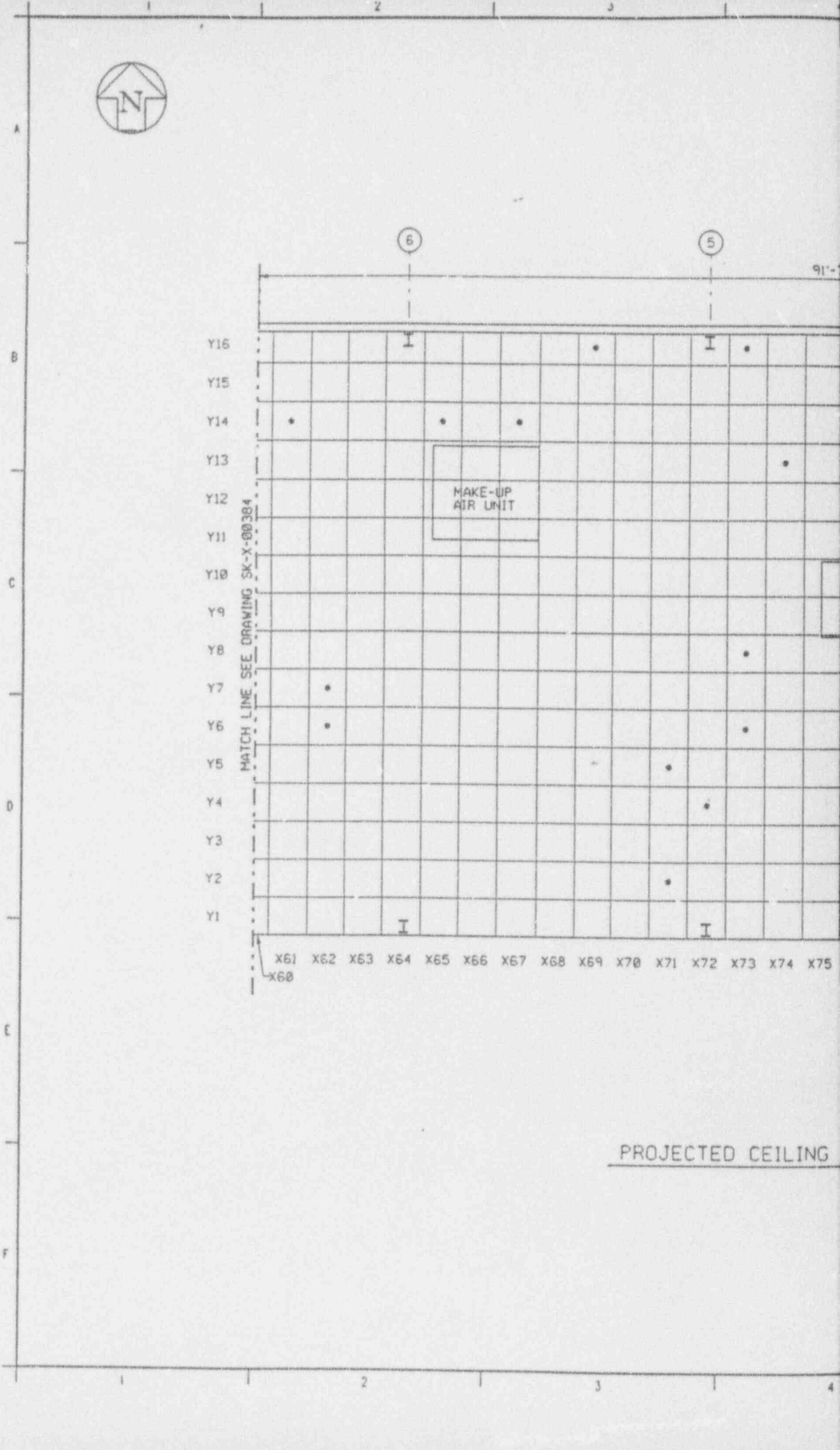
CINCINNATI, OHIO

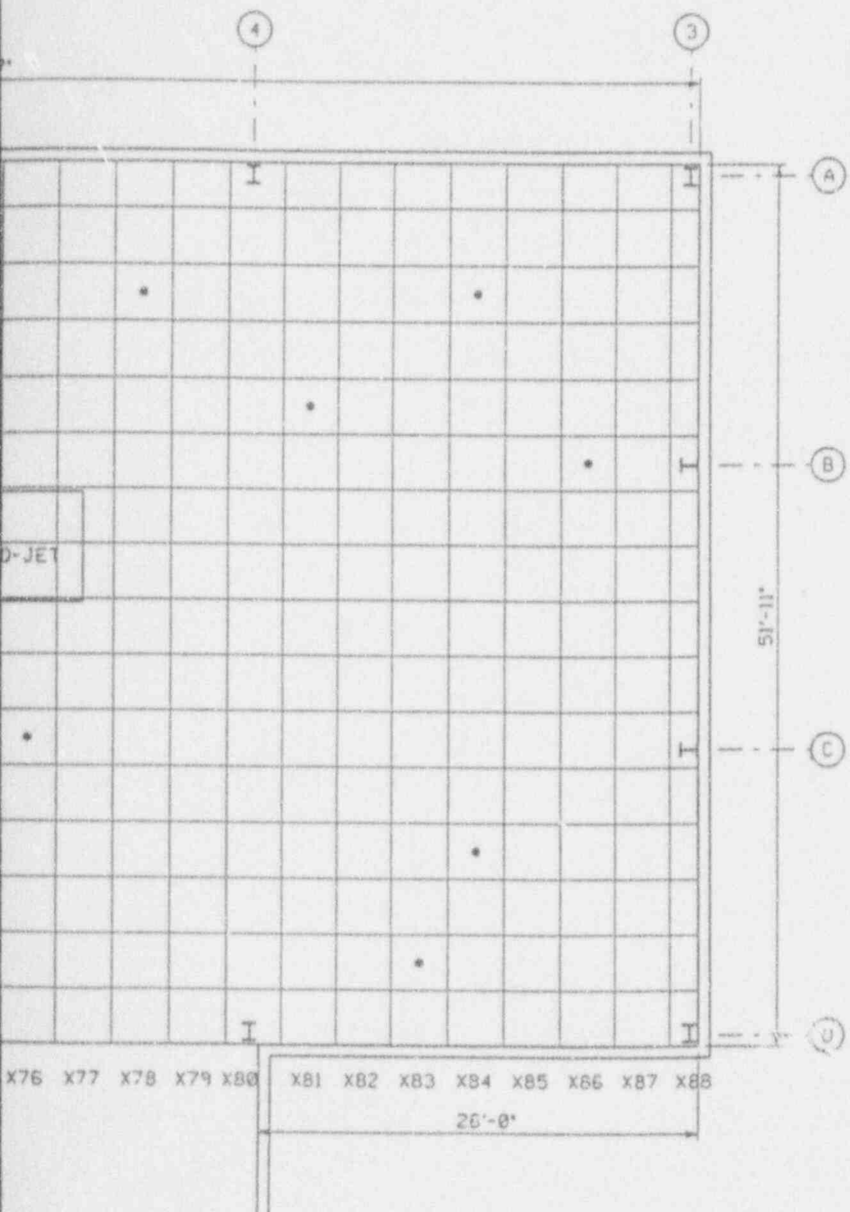
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 3 OF 3
MAIN PLANT HIGH BAY

DRAWN BY	DATE	CHECKED BY	DATE
JSB/MAO	07-06-92	MSF/DEP	08-14-92
PLANT/BLDG NO. BLDG NO 11		SCALE NONE	
WBS 1.1.2.2.1.2.0	00-90701	SK-X-00382	A

9404080147-48


N
6
5
91'-
MAKE-UP
AIR UNIT
MATCH LINE SEE DRAWING SK-X-00384
Y16
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X60
X61 X62 X63 X64 X65 X66 X67 X68 X69 X70 X71 X72 X73 X74 X75
PROJECTED CEILING



PLAN

NOTES

RANDOM SAMPLE LOCATIONS

CEILING

1. X72,Y4
2. X73,Y16
3. X71,Y5
4. X55,Y9
5. X9,Y4
6. X76,Y6
7. X86,Y11
8. X33,Y7
9. X84,Y14
10. X3,Y10
11. X61,Y14
12. X15,Y6
13. X13,Y1
14. X7,Y8
15. X62,Y6
16. X33,Y15
17. X38,Y8
18. X1,Y2
19. X5,Y2
20. X55,Y11
21. X59,Y9
22. X83,Y2
23. X56,Y11
24. X34,Y9
25. X7,Y10
26. X46,Y7
27. X50,Y15
28. X84,Y4
29. X20,Y7
30. X73,Y8
31. X62,Y7
32. X12,Y8
33. X23,Y10
34. X73,Y6
35. X65,Y14
36. X11,Y9
37. X54,Y5
38. X18,Y4
39. X25,Y14
40. X43,Y9
41. X81,Y12
42. X44,Y8
43. X20,Y2
44. X16,Y9
45. X78,Y14
46. X4,Y6
47. X71,Y2
48. X74,Y13
49. X69,Y16
50. X67,Y14
51. X38,Y6
52. X55,Y16
53. X31,Y9

REV.	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

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CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS DU-RMI/P031

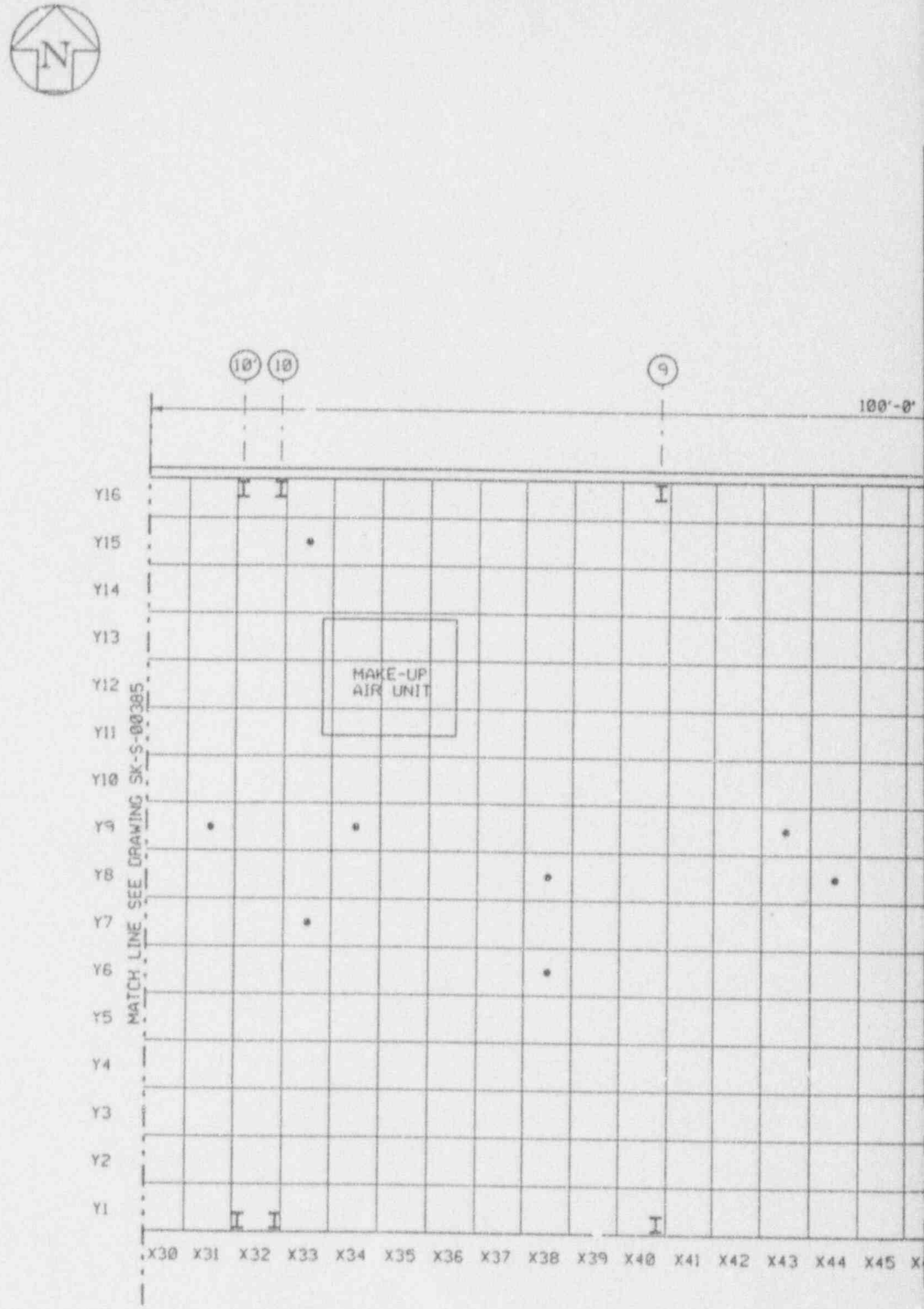
DRAWING TITLE: RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN SHEET 1 OF 3
MAIN PLANT HIGH BAY

DRAWN BY: JSB/MAO	DATE: 03-09-92	DESIGNED, CHECKED BY	DATE	CHECKED BY: MSF/DWR	DATE: 08-11-92
BLDG NO 11		FLOOR		SCALE: NONE	

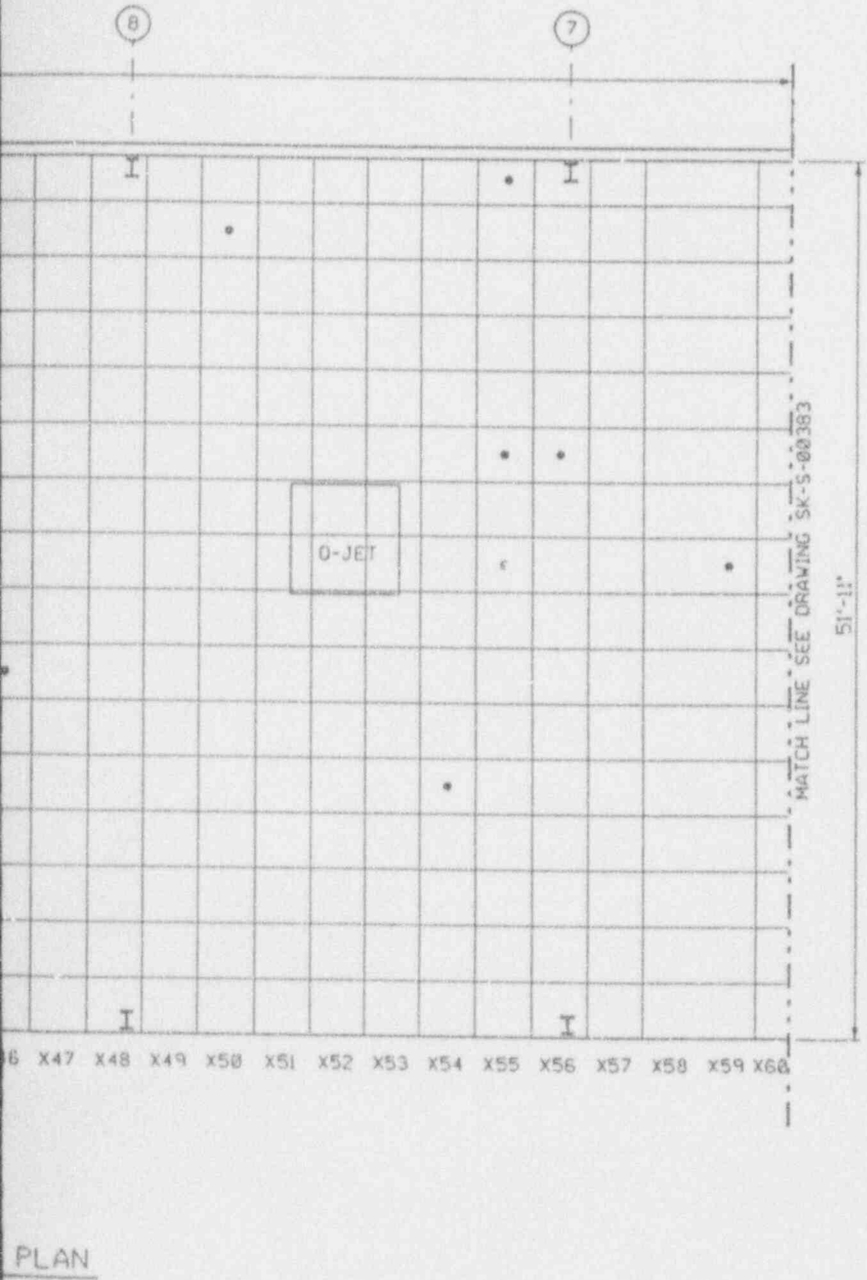
WBS 1.1.2.2.1.2.0
00-90701

DRAWING NO. SK-X-00383 REV. A

9404080147-49



PROJECTED CEILING



NOTES

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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 2 OF 3
MAIN PLANT HIGH BAY

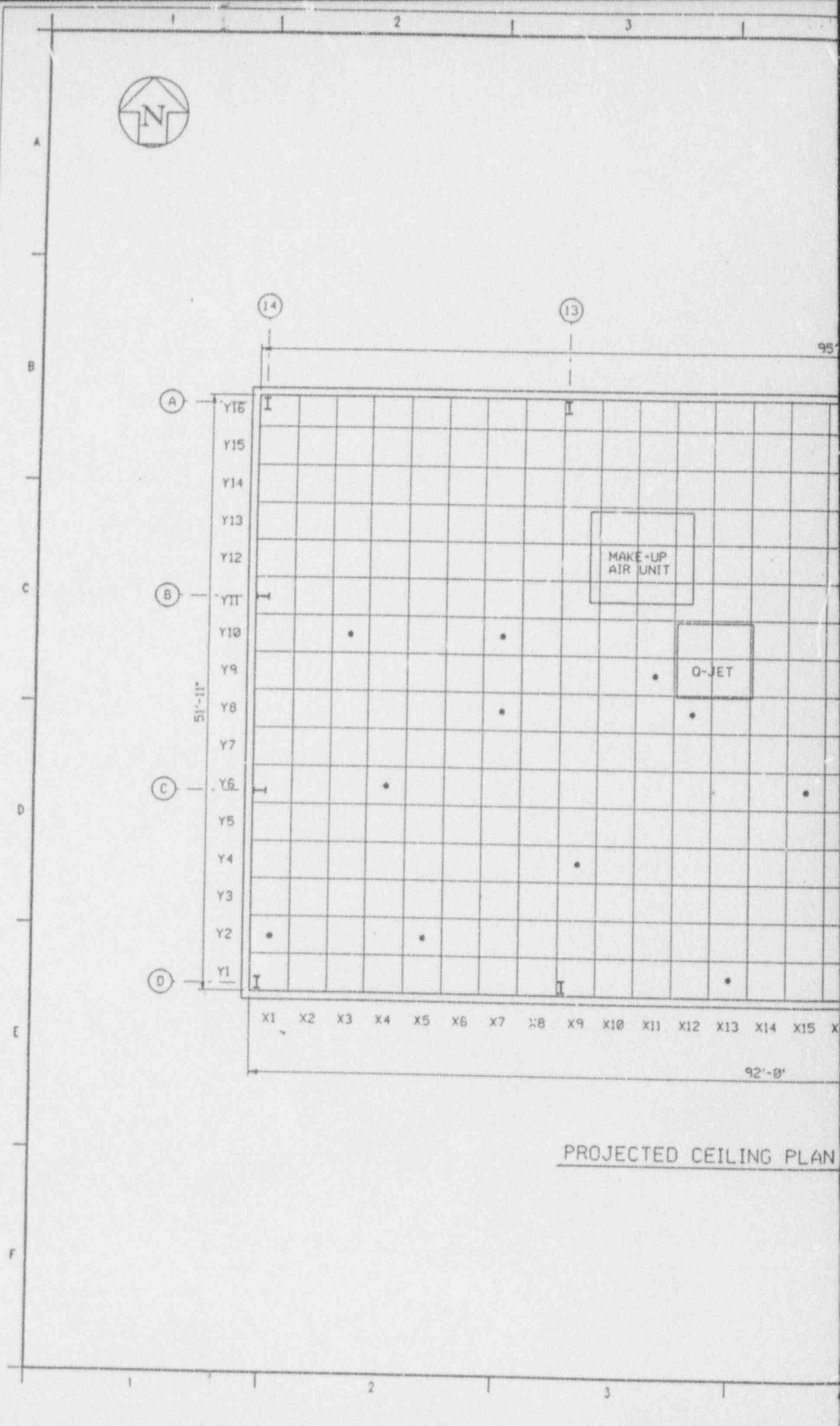
DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	03-09-92			MSF/DWR	08-14-92

BLDG NO 11 — SCALE: NONE

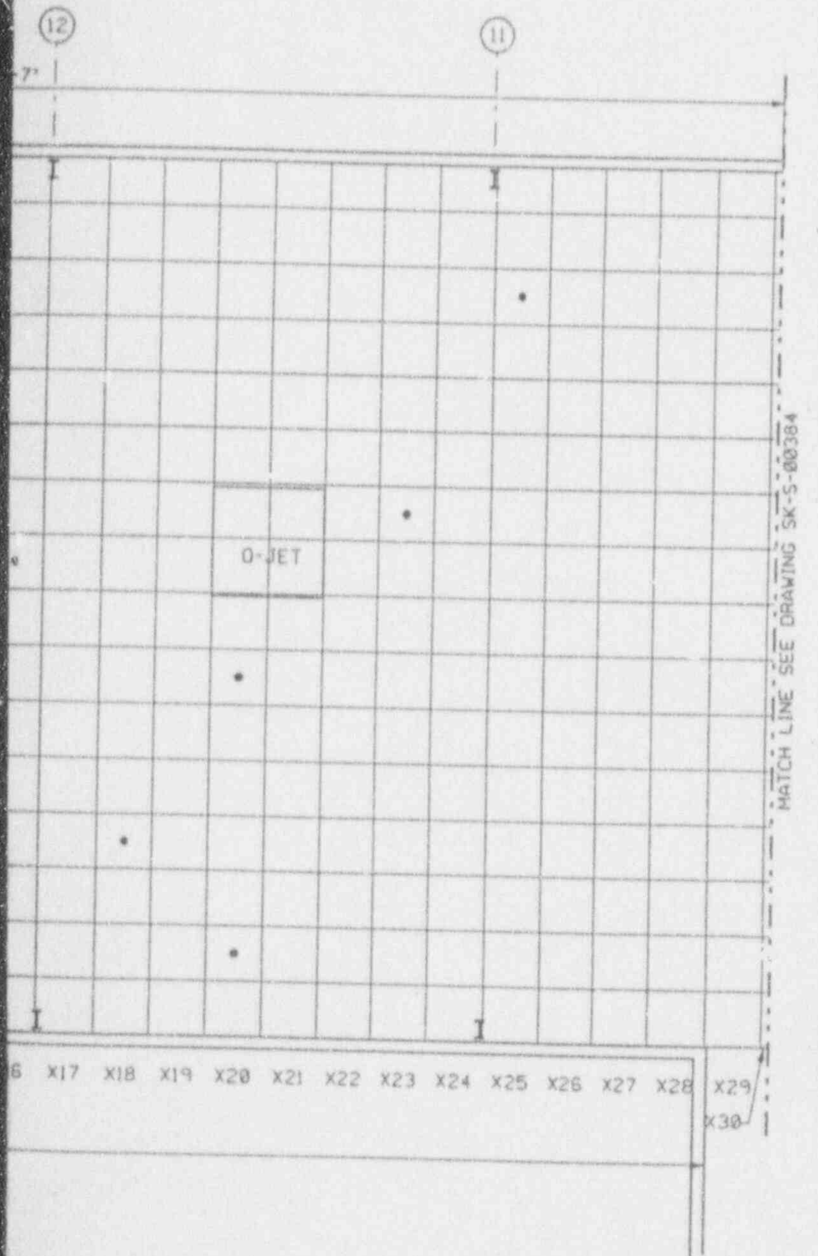
WBS 1.1.2.2.1.2.0
00-90701

DRAWING NO. SK-X-00384 — REV NO. A

9404080147-50



PROJECTED CEILING PLAN



NOTES

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	SPONSOR	DOE
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

PROJECT NAME

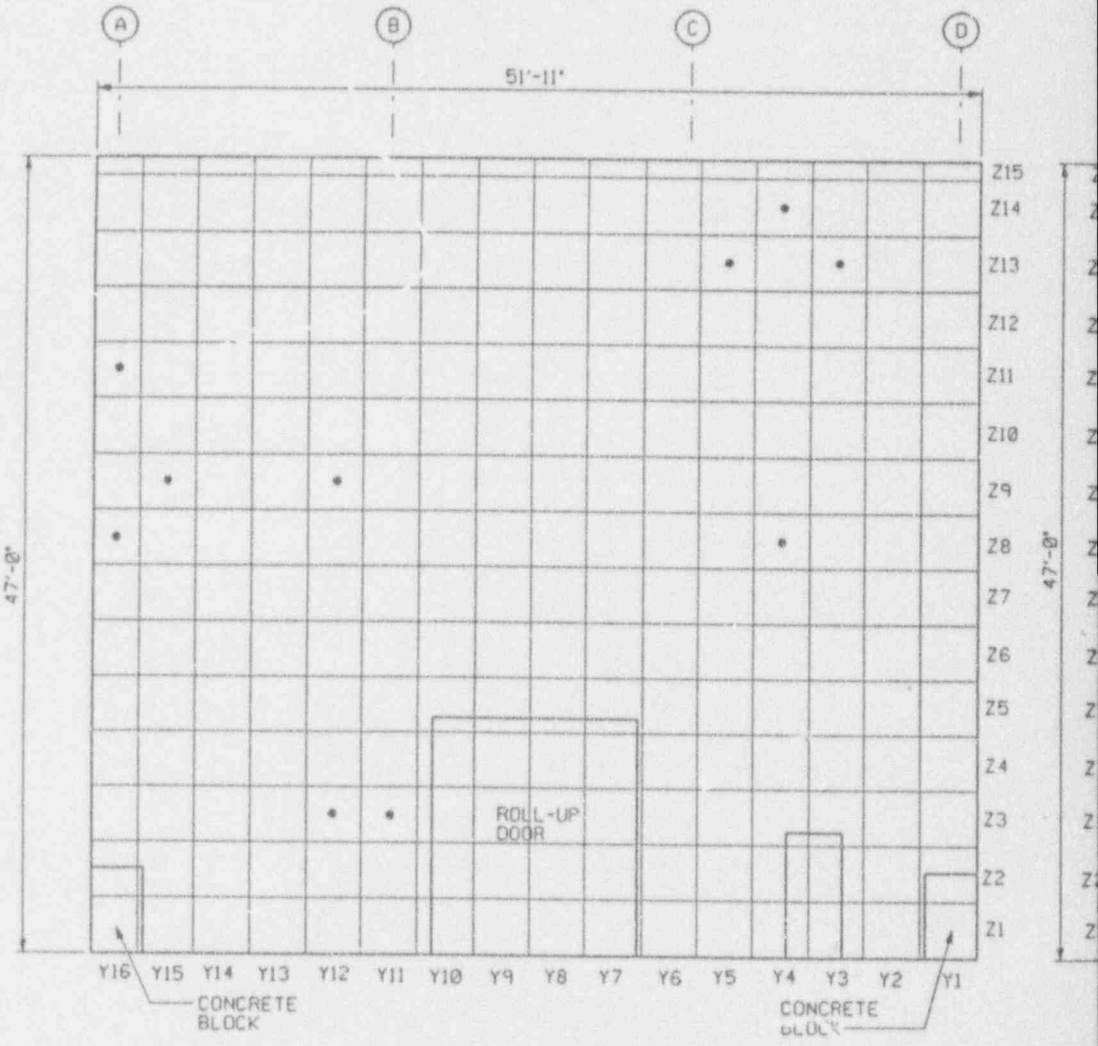
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 3 OF 3
MAIN PLANT HIGH BAY

DRAWN BY: JSB/HAO — DATE: 03-09-92
CHECKED BY: MSF/DWR — DATE: 08-14-92
PLANT/BLDG NO.: BLDG NO 11
SCALE: NONE
WBS 1.1.2.2.1.2.0
00-90701
DRAWING NO.: SK-X-00385
REV NO.: A

9404080147-51

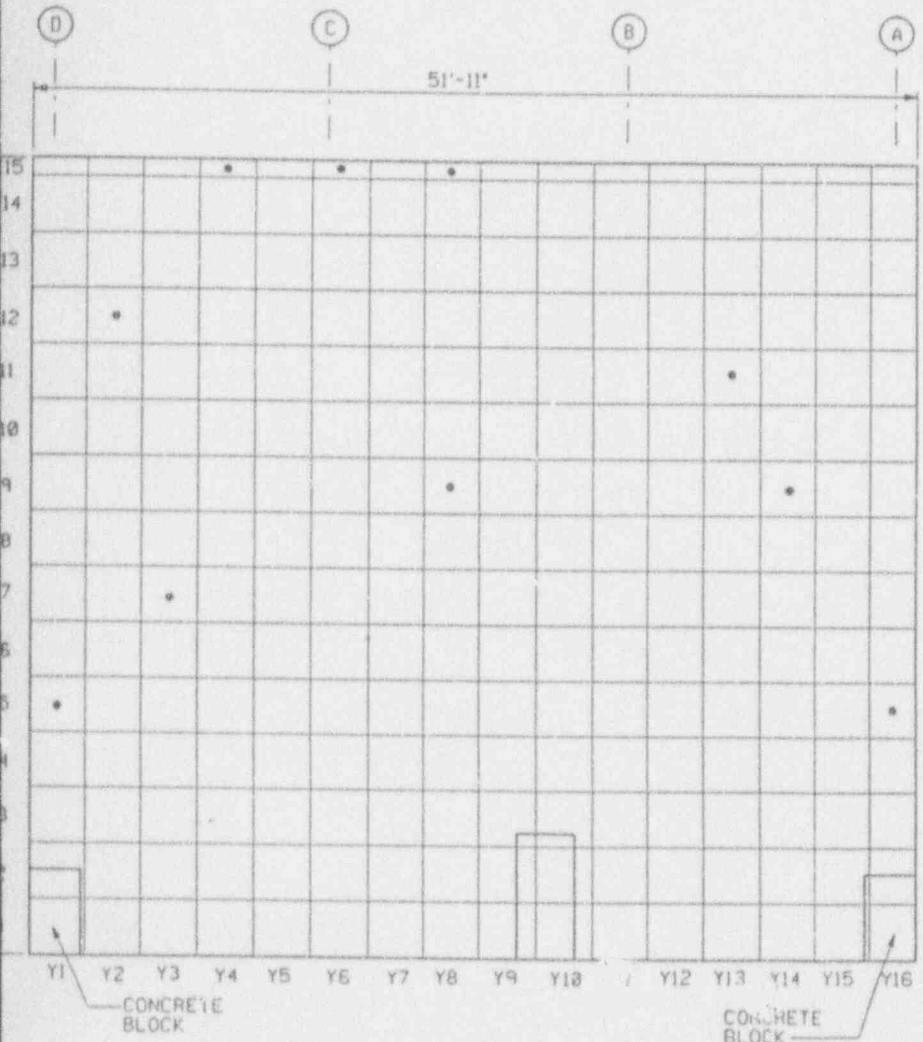


EAST INTERIOR ELEVATION

NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL	WEST WALL
1. Y15,Z9	1. Y8,Z9
2. Y4,Z8	2. Y3,Z7
3. Y12,Z9	3. Y1,Z5
4. Y12,Z3	4. Y13,Z11
5. Y3,Z13	5. Y16,Z5
6. Y11,Z3	6. Y14,Z9
7. Y4,Z14	7. Y2,Z12
8. Y5,Z13	8. Y8,Z15
9. Y16,Z8	9. Y4,Z15
10. Y16,Z11	10. Y6,Z15



WEST INTERIOR ELEVATION

REV NO.	DATE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

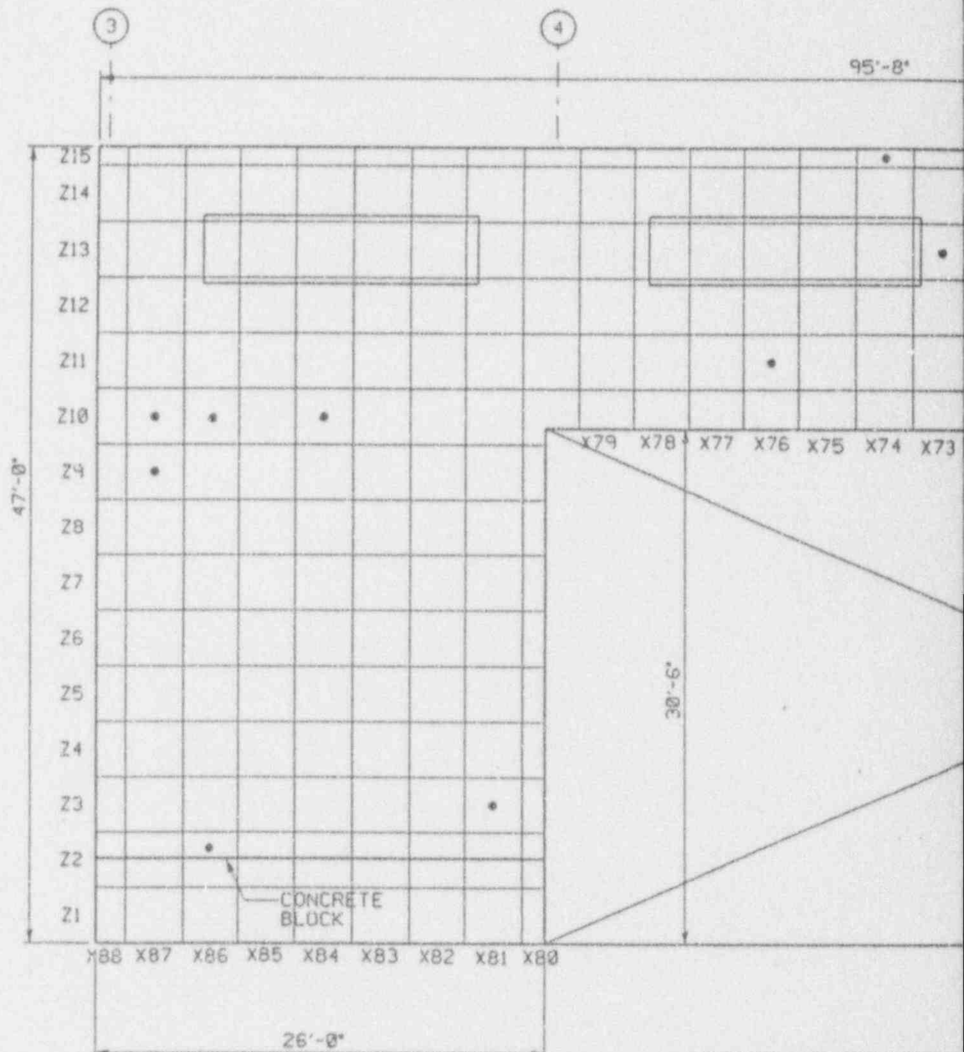
DRAWING TITLE: RADIOLOGICAL SAMPLING LOCATIONS ELEVATIONS - SHEET 1 OF 7 MAIN PLANT HIGH BAY

DRAWN BY: JSB/MAO — CHECKED BY: MSF/DEP

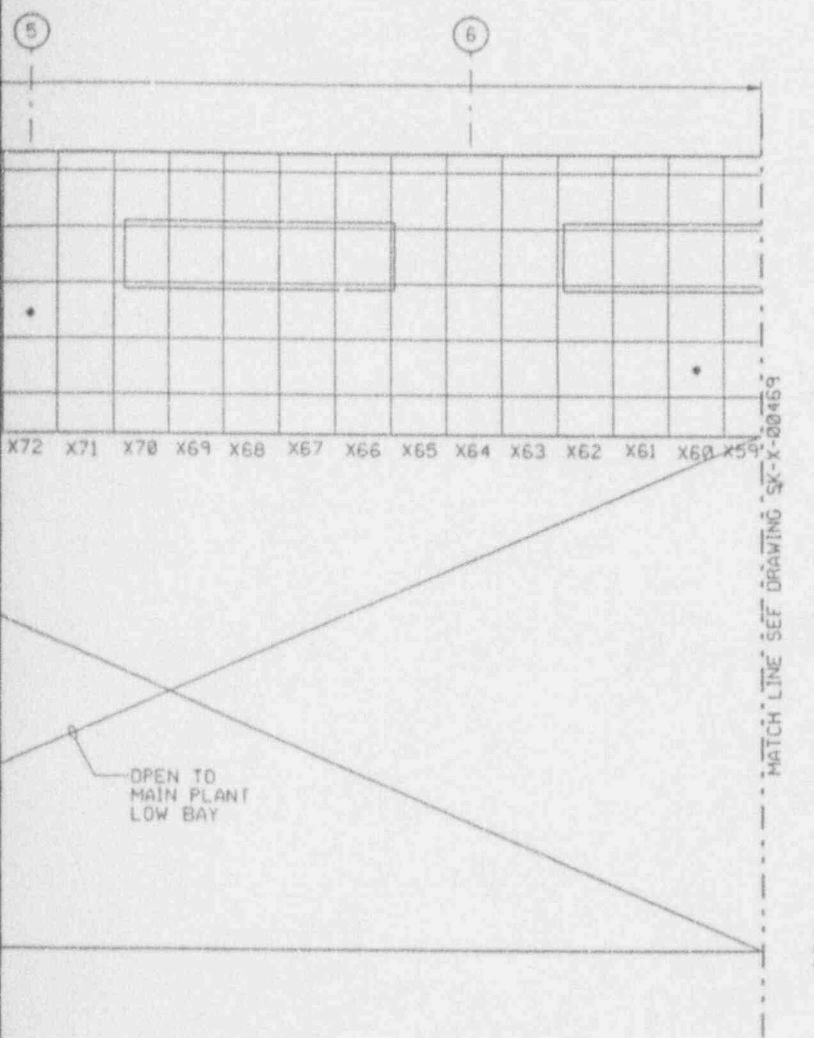
PLANT/BLDG NO: BLDG NO 11 — SCALE: NONE

WBS 1.1.2.2.1.2.0 — 00-90701 — DRAWING NO. SK-X-00386 — REV. A

9404080147-52



SOUTH INTERIOR



ELEVATION

NOTES

RANDOM SAMPLE LOCATIONS

SOUTH WALL

1. X87,Z9
2. X1,Z4
3. X24,Z4
4. X16,Z15
5. X81,Z3
6. X8,Z1
7. X23,Z12
8. X86,Z2
9. X74,Z15
10. X13,Z5
11. X56,Z11
12. X9,Z2
13. X76,Z11
14. X8,Z4
15. X56,Z12
16. X17,Z12
17. X14,Z3
18. X22,Z3
19. X17,Z7
20. X6,Z7
21. X73,Z13
22. X87,Z10
23. X11,Z2
24. X52,Z11
25. X72,Z12
26. X35,Z11
27. X25,Z2
28. X21,Z14
29. X30,Z10
30. X28,Z11
31. X60,Z11
32. X86,Z10
33. X84,Z10
34. X17,Z5

ANSTEC APERTURE CARD

Also Available on Aperture Card

REV	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES DEPARTMENT OF ENERGY

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PARSONS
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

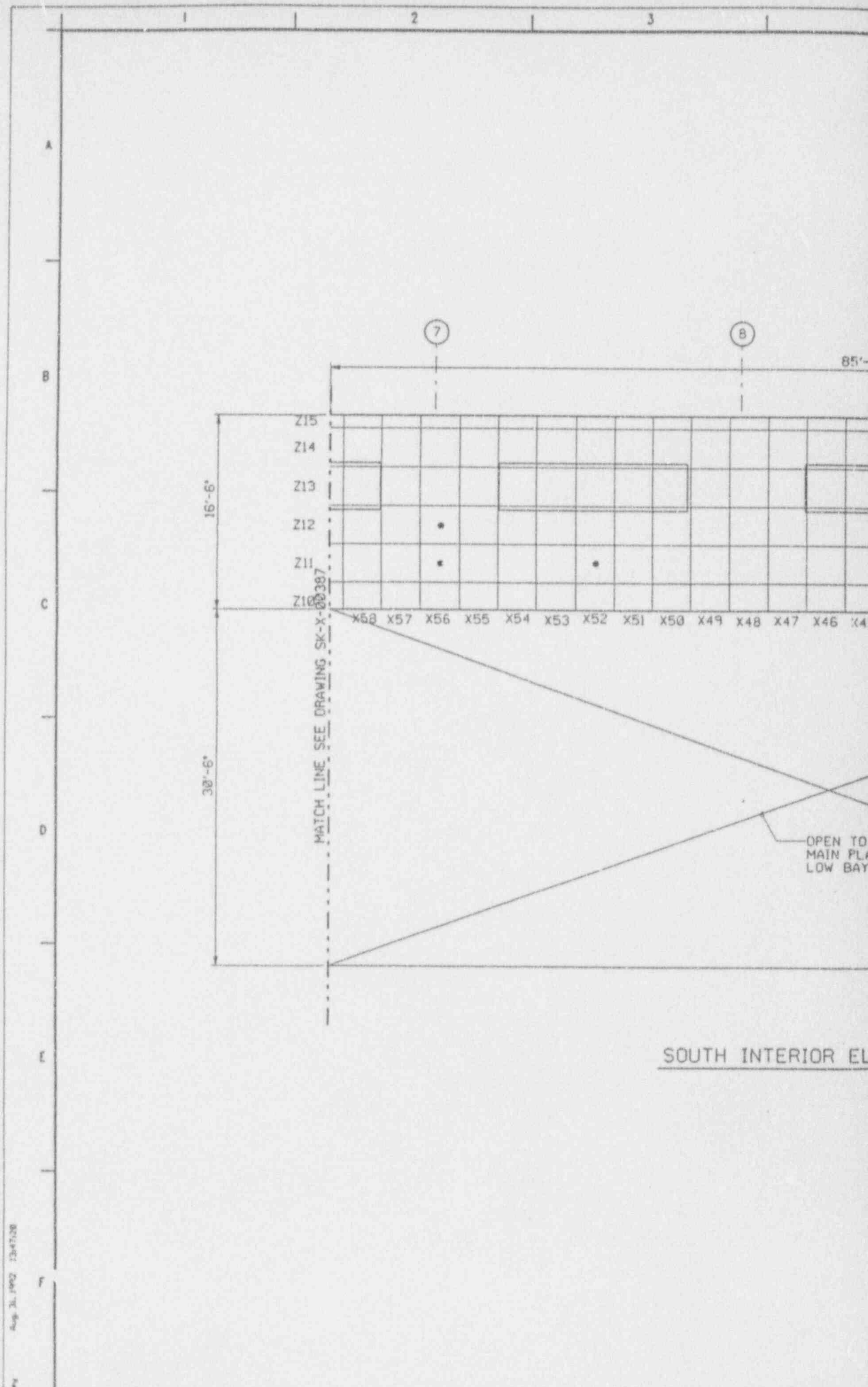
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/PO31

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 2 OF 7
MAIN PLANT HIGH BAY

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-16-92			MSF/DEY	08-14-92
PLANT/BLDG NO. BLDG NO 11		FLOOR		SCALE NONE	

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV NO.
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00387		A

9404080147-53



1
2
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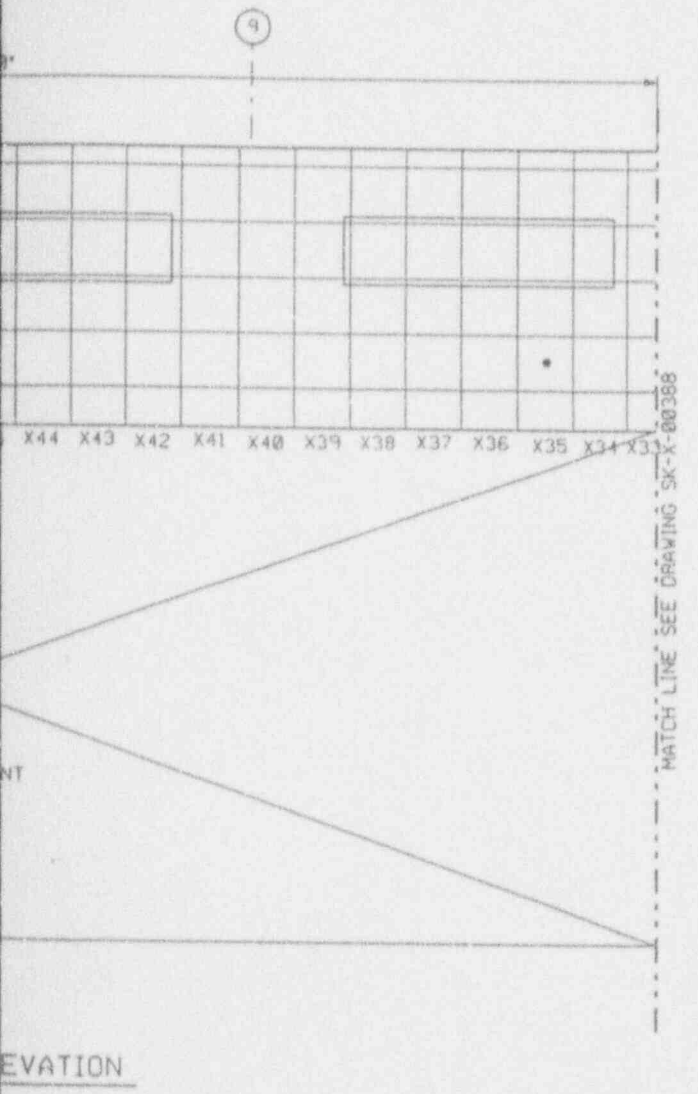
7
8
85'-
Z15
Z14
Z13
Z12
Z11
Z10
16'-6"
30'-6"
MATCH LINE SEE DRAWING SK-X-00387
X58 X57 X56 X55 X54 X53 X52 X51 X50 X49 X48 X47 X46 X45
OPEN TO
MAIN PLA
LOW BAY
SOUTH INTERIOR EL



NOTES

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 3 OF 7
MAIN PLANT HIGH BAY

DRAWN BY	DATE	CHECKED BY	DATE
JSB/MAO	03-25-92	MSJ/GEP	09-14-92
BLDG NO 11		SCALE NONE	

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV NO
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00469		A

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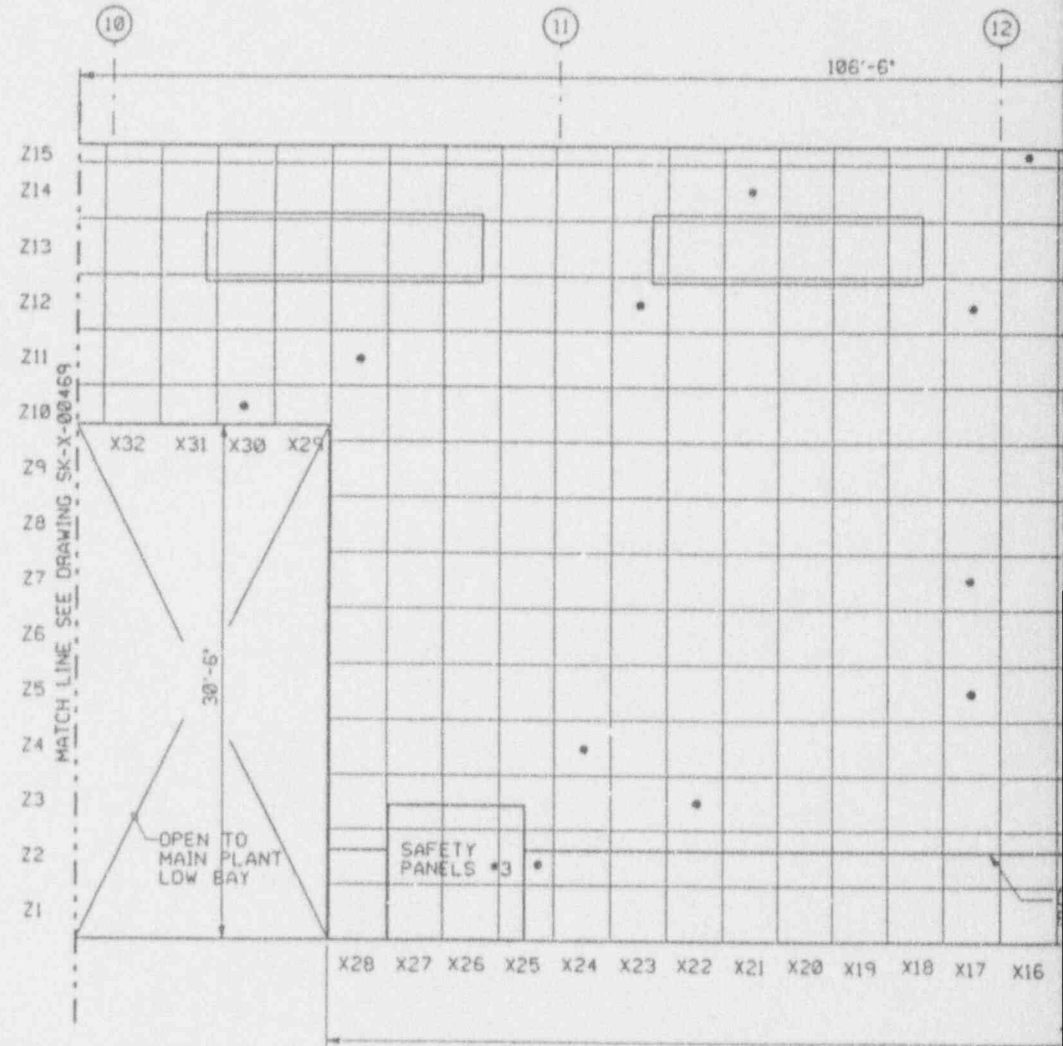
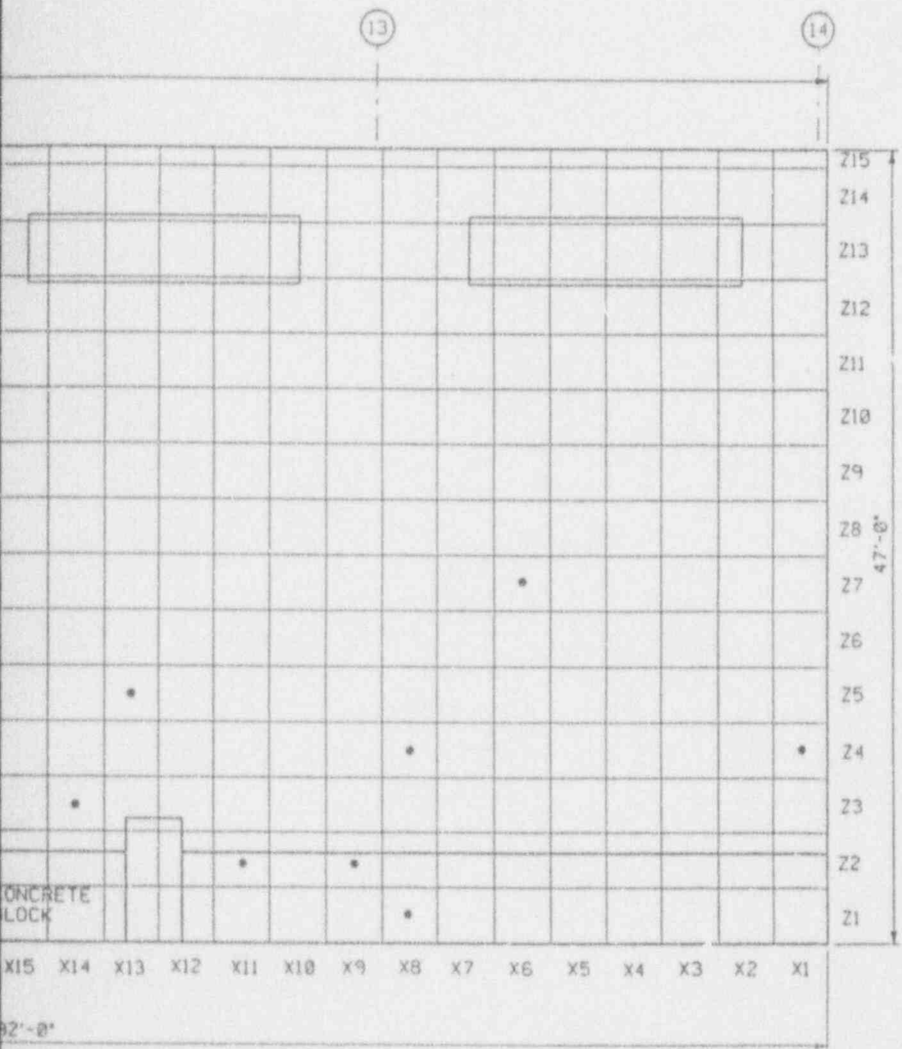


SOUTH INTERIOR EL

D. PIPKIN Aug 31 1992 13:49:56

NOTES



ELEVATION

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE		
A	90% CLIENT REVIEW			

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DEPARTMENT OF ENERGY

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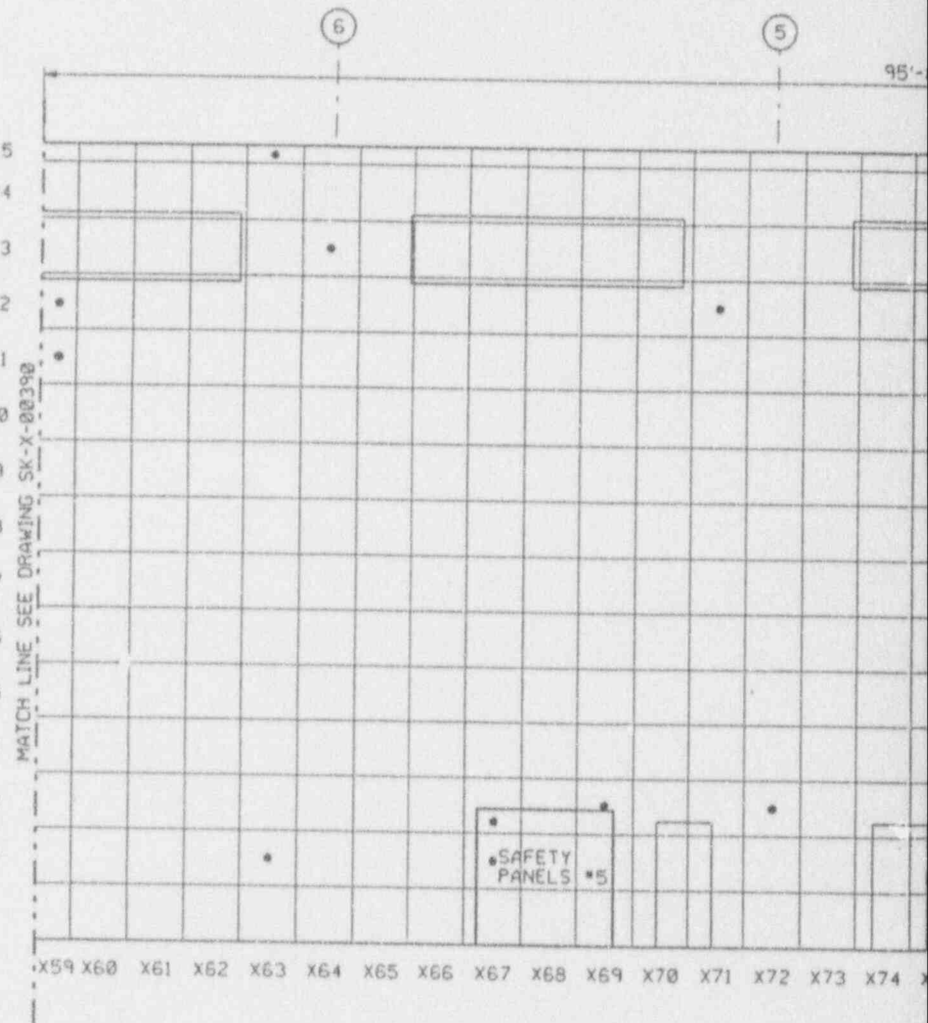
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 4 OF 7
MAIN PLANT HIGH BAY

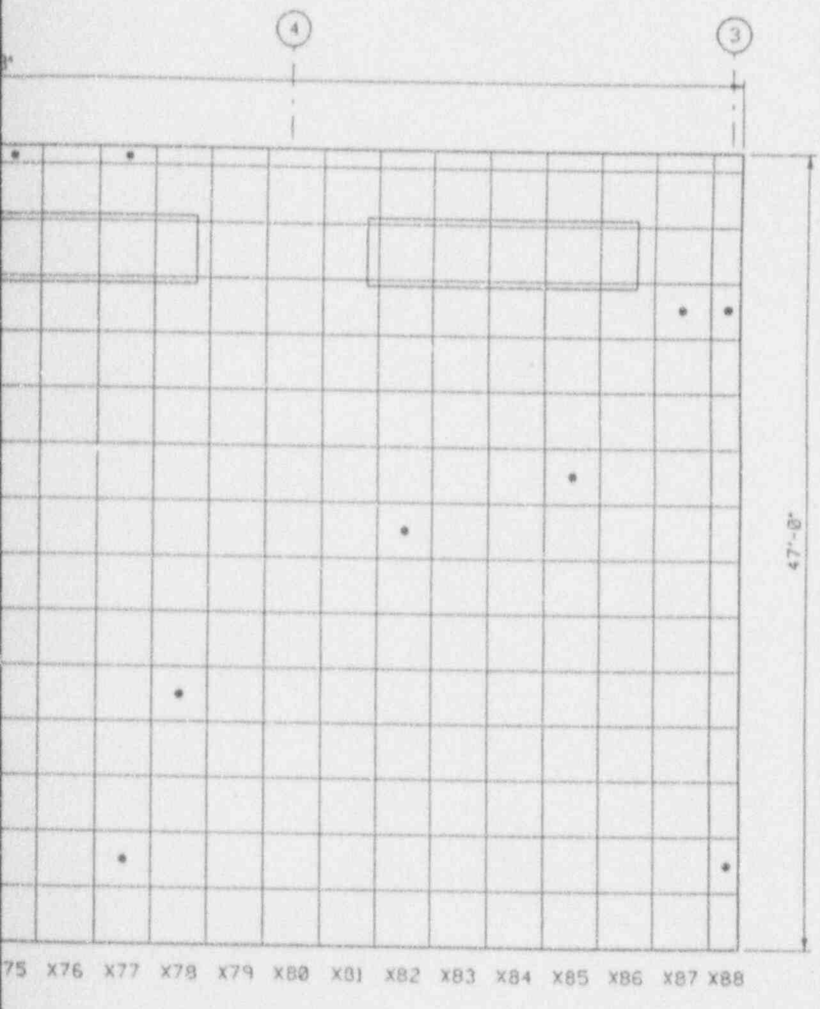
DRAWN BY: JSB/HAO DATE: 07-8-92
CHECKED BY: MSF/DEP DATE: 08-14-92
PLANT/BLDG NO.: BLDG NO 11
SCALE: NONE
OPER CONTR PROJ NO.: WBS 1.1.2.2.1.2.8 00-90701
DRAWING NO.: SK-X-00388
REV NO: A

9404080147-55



NORTH INTERIOR EL

D. PIPKIN Aug. 31, 1992 13:53:38



LEVATION

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL

1. X2,Z5
2. X29,Z12
3. X5,Z14
4. X75,Z15
5. X7,Z11
6. X58,Z3
7. X12,Z15
8. X4,Z1
9. X69,Z3
10. X45,Z4
11. X52,Z4
12. X34,Z15
13. X42,Z1
14. X27,Z7
15. X7,Z15
16. X59,Z12
17. X45,Z12
18. X17,Z4
19. X85,Z9
20. X19,Z3
21. X63,Z2
22. X71,Z12
23. X35,Z10
24. X8,Z8
25. X35,Z1
26. X82,Z8
27. X24,Z4
28. X42,Z8
29. X88,Z12
30. X56,Z14
31. X33,Z4
32. X26,Z5
33. X67,Z3
34. X5,Z11
35. X19,Z12
36. X36,Z5
37. X20,Z10
38. X63,Z15
39. X19,Z2
40. X36,Z10
41. X88,Z2
42. X67,Z2
43. X64,Z13
44. X56,Z1
45. X77,Z15
46. X28,Z8
47. X28,Z3
48. X77,Z2
49. X78,Z5
50. X59,Z11
51. X72,Z3
52. X87,Z12

REV. NO.	GIVE OF REVISION PURPOSE - DESCRIPTION	A/E	OPERATOR	DOE
A	90% CLIENT REVIEW			

UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

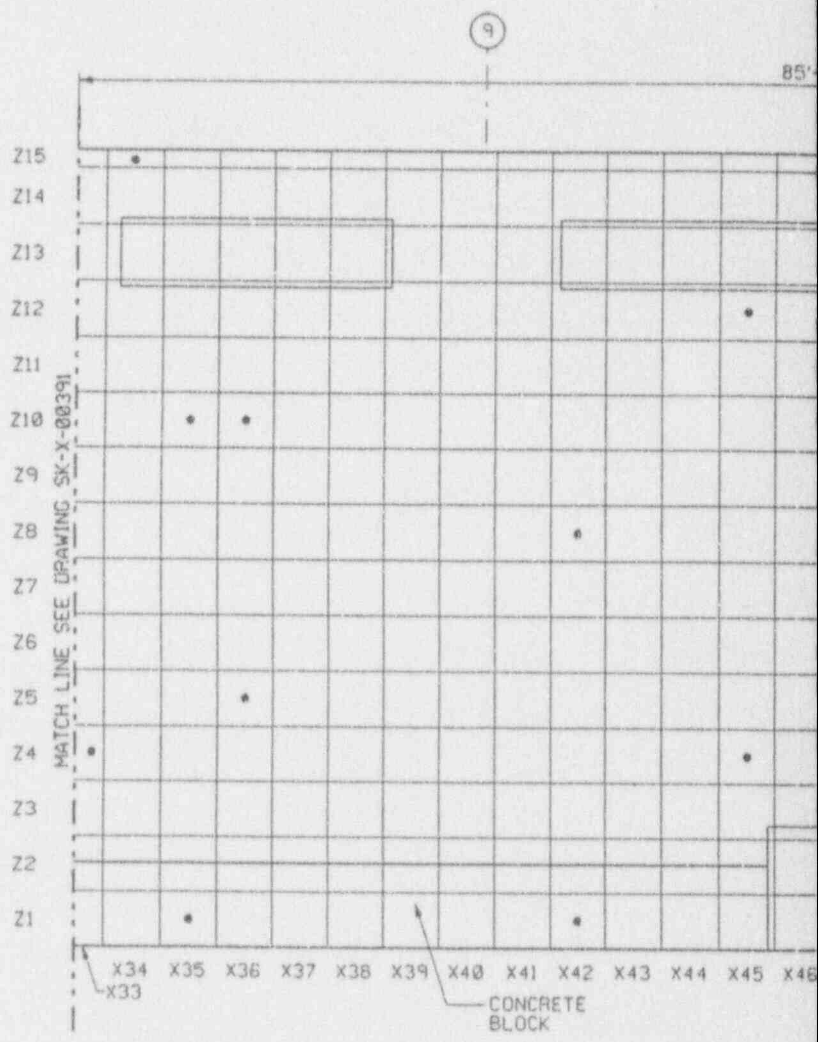
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 5 OF 7
MAIN PLANT HIGH BAY

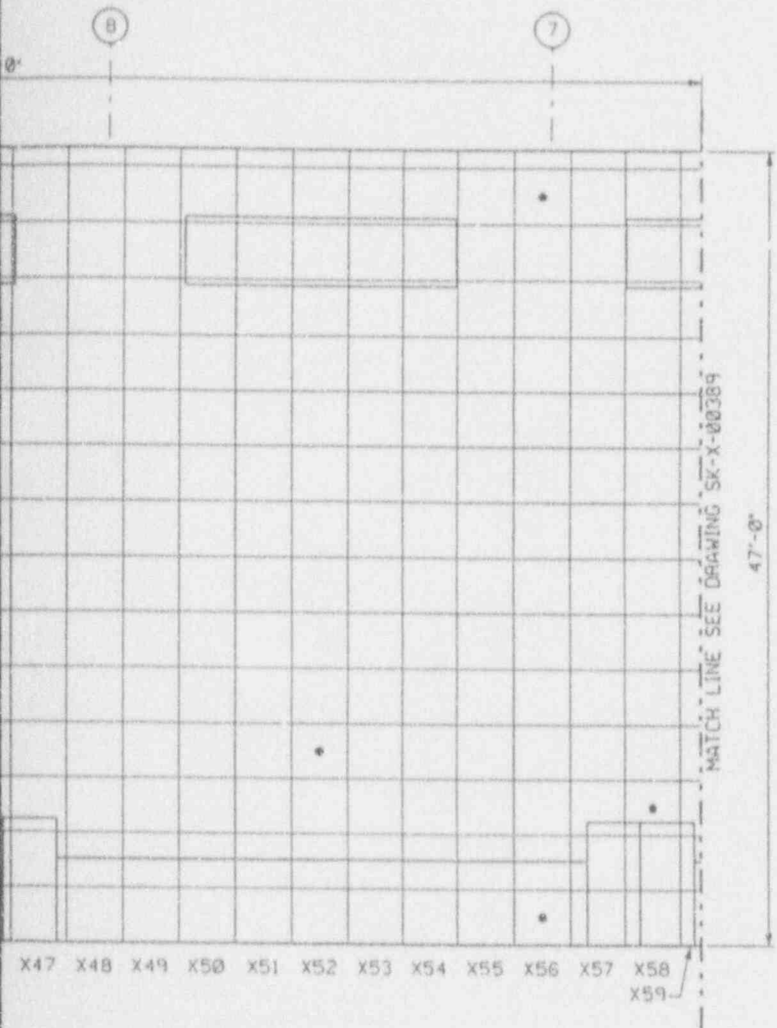
DRAWN BY	DATE	DESIGN CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-11-92			MSF/DEP	08-11-92
PLANT BLDG NO. BLDG NO 11		FLOOR		SCALE NONE	CLASS

DOE PROJECT NO.	OPER. CONTR. WBS NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00389		A

9404080147-56



NORTH INTERIOR



R ELEVATION

NOTES

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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 6 OF 7
MAIN PLANT HIGH BAY

BLDG NO 11

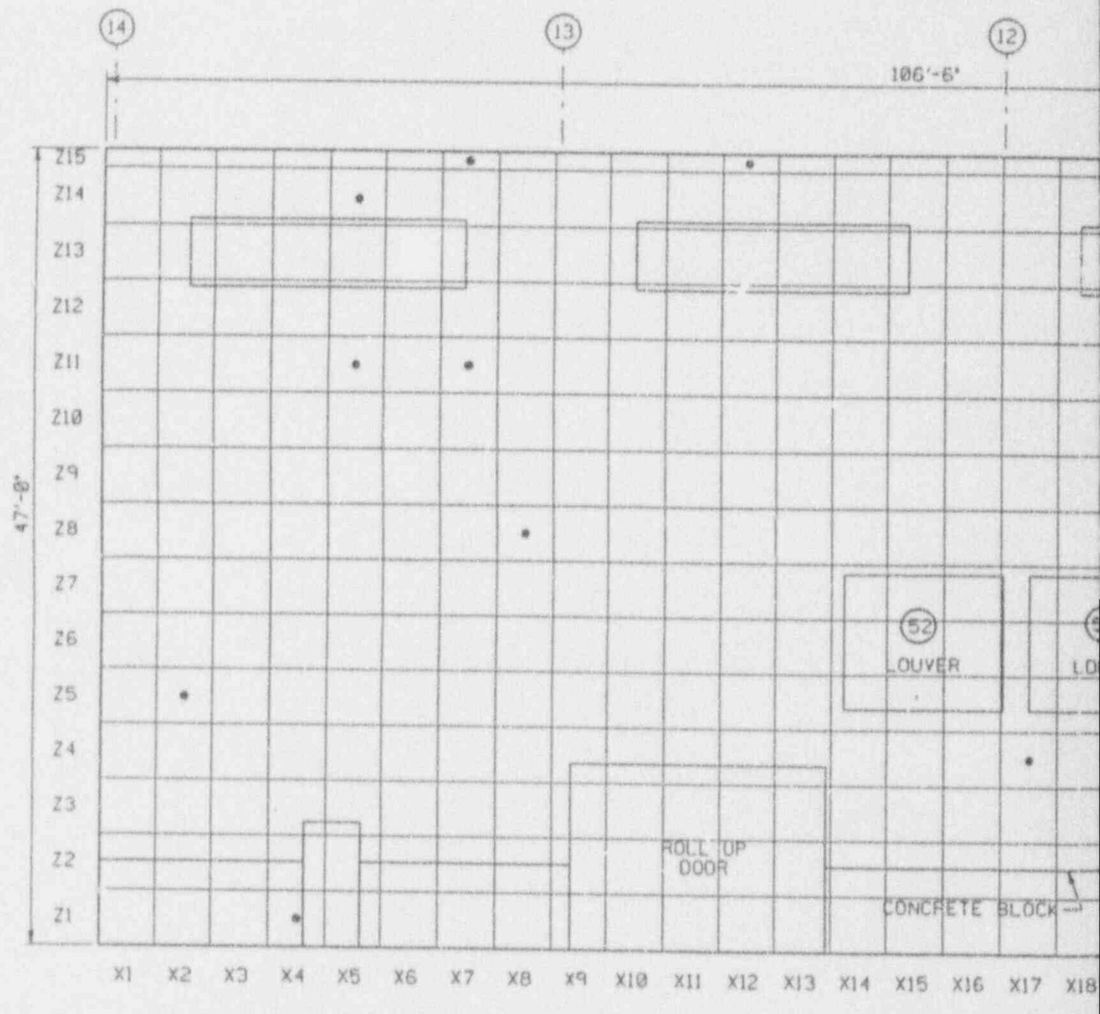
SCALE NONE

WBS 1.1.2.2.1.2.8
00-90701

SK-X-00390

A

9404080147-57



NORTH INTERIOR EL

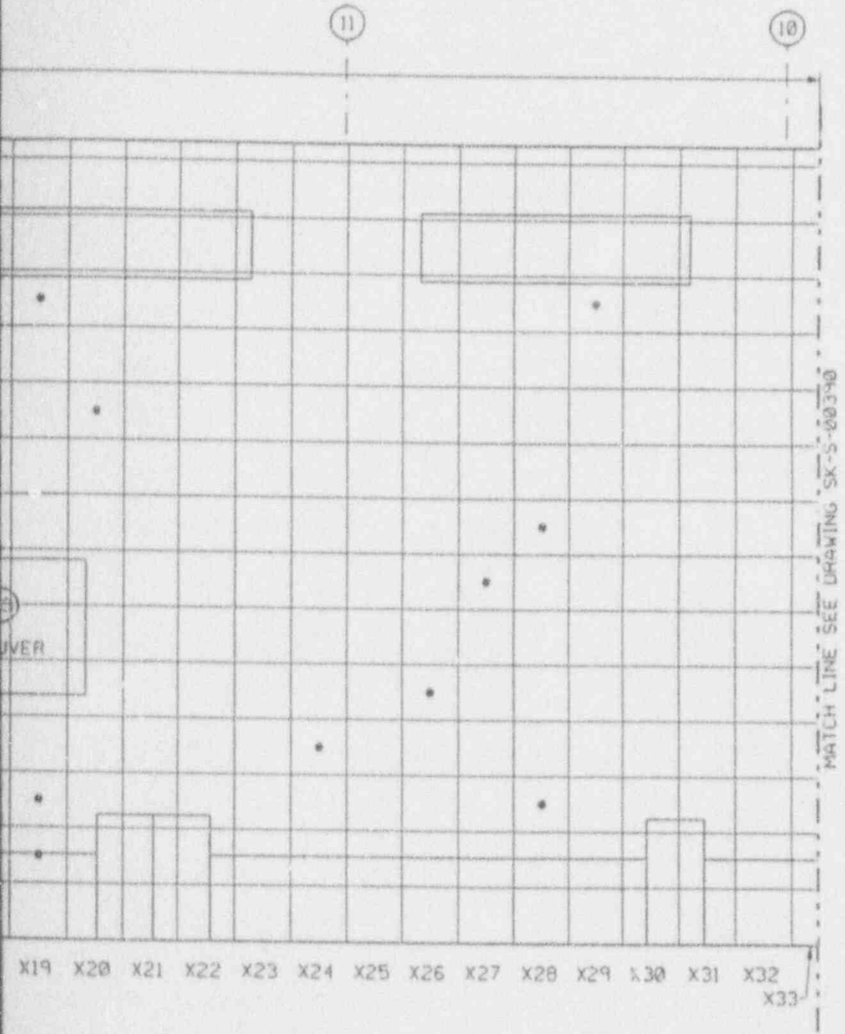
NOTES

JUDGEMENTAL SAMPLE LOCATIONS

52. LOUVER
53. LOUVER

ANSTEC APERTURE CARD

Also Available on Aperture Card



EVATION

A | 90% CLIENT REVIEW

REV NO | ISSUE OR REVISION PURPOSE - DESCRIPTION | INITIALS AND DATE

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 7 OF 7
MAIN PLANT HIGH BAY

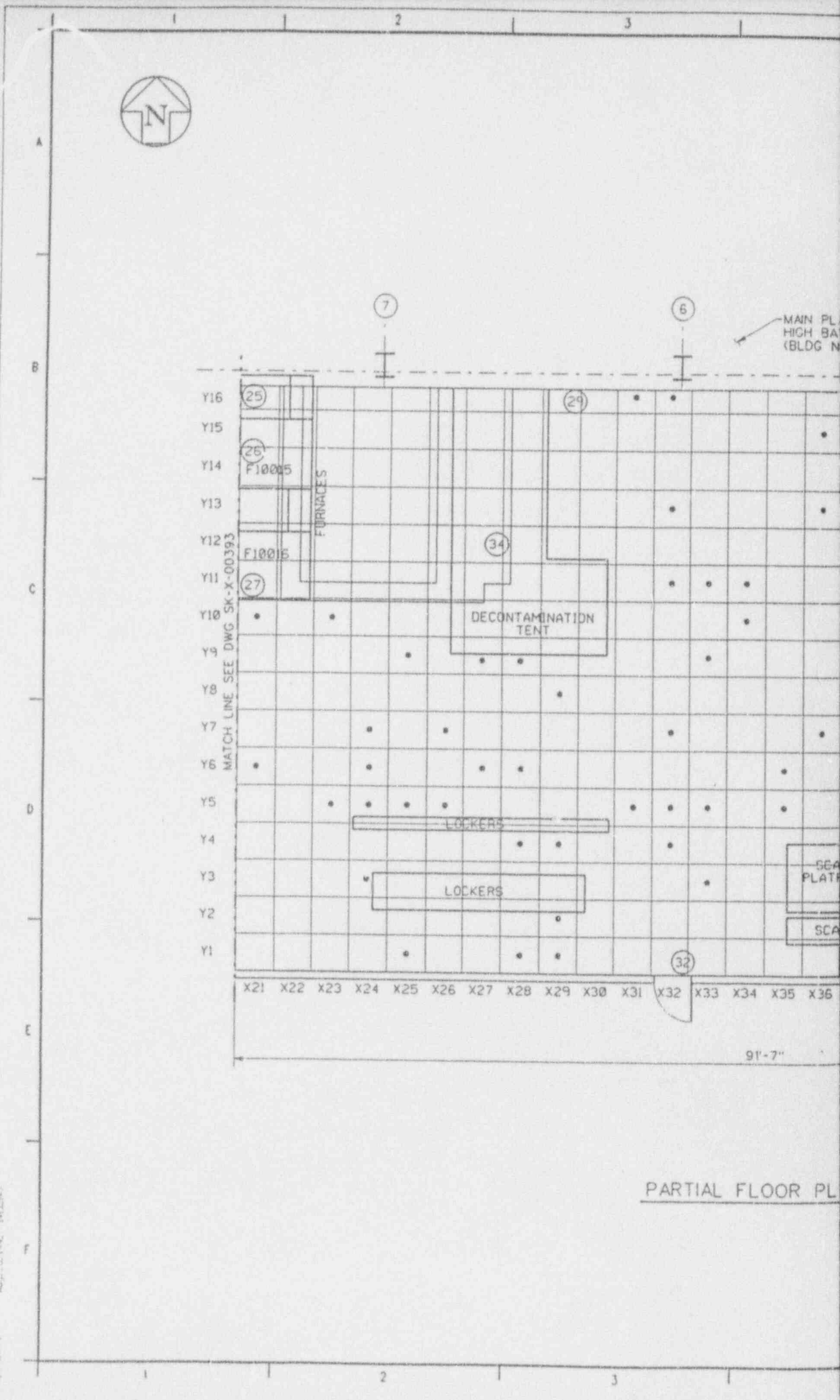
DRAWN BY JSB/MAD | DATE 03-11-92 | CHECKED BY HSF/DEP | DATE 08-11-92

BLDG NO 11 | SCALE NONE

WBS 1.1.2.2.1.2.0
00-90701

SK-X-00391 | A

9404080147-58



N
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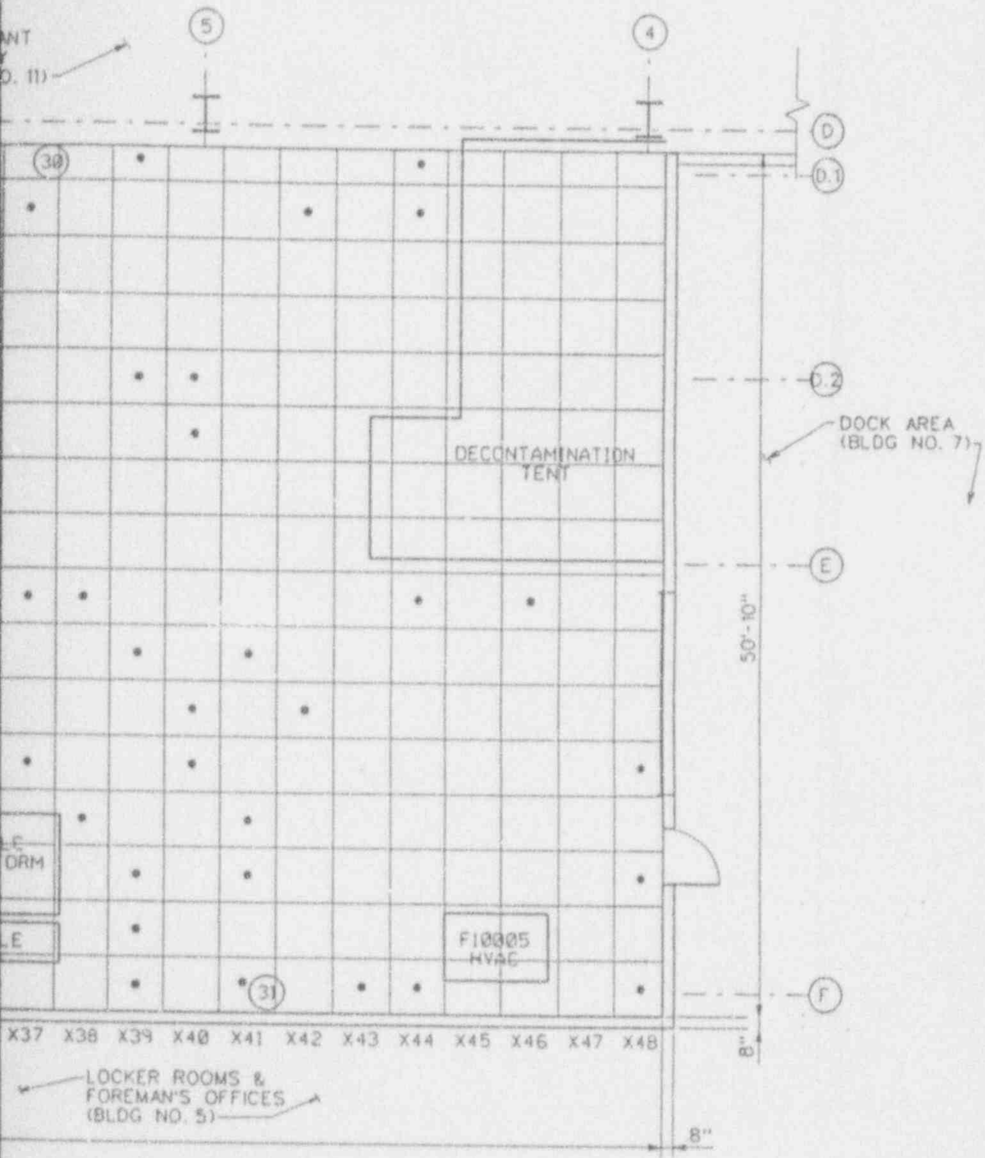
HIGH BA
(BLDG N
MATCH LINE SEE DWG SK-X-00393
FURNACES
F10015
F10016
DECONTAMINATION TENT
LOCKERS
LOCKERS
91'-7"
PARTIAL FLOOR PL



AN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

25. FURNACE F10014 (INTERIOR SURFACE).
26. FURNACE F10015 (INTERIOR SURFACE).
27. FURNACE F10016 (INTERIOR SURFACE).
29. CRANE HORIZONTAL SUPPORT (TOP SIDE).
30. CRANE HORIZONTAL SUPPORT (TOP SIDE).
31. CRANE HORIZONTAL SUPPORT (TOP SIDE).
32. CRANE HORIZONTAL SUPPORT (TOP SIDE).
34. FLOOR (UNDER FORMER SALT BATH).

RANDOM SAMPLE LOCATIONS

FLOOR

1. X43,Y1
2. X35,Y5
3. X40,Y11
4. X11,Y12
5. X36,Y13
6. X36,Y15
7. X2,Y9
8. X2,Y8
9. X32,Y13
10. X32,Y7
11. X31,Y5
12. X29,Y8
13. X39,Y7
14. X15,Y3
15. X18,Y12
16. X10,Y9
17. X27,Y9
18. X21,Y10
19. X41,Y7
20. X24,Y7
21. X48,Y3
22. X9,Y7
23. X29,Y2
24. X24,Y3
25. X4,Y5
26. X39,Y2
27. X18,Y13
28. X4,Y7
29. X10,Y1
30. X5,Y3
31. X9,Y6
32. X28,Y9
33. X18,Y15
34. X25,Y1
35. X32,Y16
36. X41,Y3
37. X37,Y5
38. X11,Y16
39. X37,Y15
40. X37,Y8
41. X11,Y6
42. X17,Y7
43. X28,Y6
44. X31,Y16
45. X8,Y14
46. X32,Y5
47. X38,Y4
48. X26,Y7
49. X5,Y2
50. X42,Y6
51. X12,Y11
52. X39,Y16
53. X13,Y8
54. X32,Y4
55. X48,Y5
56. X44,Y1
57. X25,Y5
58. X23,Y10
59. X40,Y5
60. X13,Y4
61. X21,Y6
62. X8,Y10
63. X15,Y7
64. X41,Y1
65. X33,Y11
66. X5,Y5
67. X34,Y10
68. X39,Y1
69. X8,Y13
70. X12,Y7
71. X41,Y4
72. X13,Y15
73. X16,Y3
74. X19,Y7
75. X28,Y4
76. X19,Y16
77. X36,Y7
78. X18,Y11
79. X33,Y3
80. X9,Y14
81. X20,Y16
82. X24,Y5
83. X33,Y5
84. X48,Y1
85. X29,Y1
86. X14,Y4
87. X16,Y4
88. X38,Y8
89. X44,Y15
90. X18,Y4
91. X10,Y5
92. X28,Y1
93. X46,Y8
94. X39,Y12
95. X19,Y6
96. X44,Y16
97. X24,Y6
98. X26,Y5
99. X34,Y11
100. X20,Y6
101. X33,Y9
102. X29,Y4

(FOR CONT. SEE DWG. NO. SK-X00393)

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

UNITED STATES
DEPARTMENT OF ENERGY

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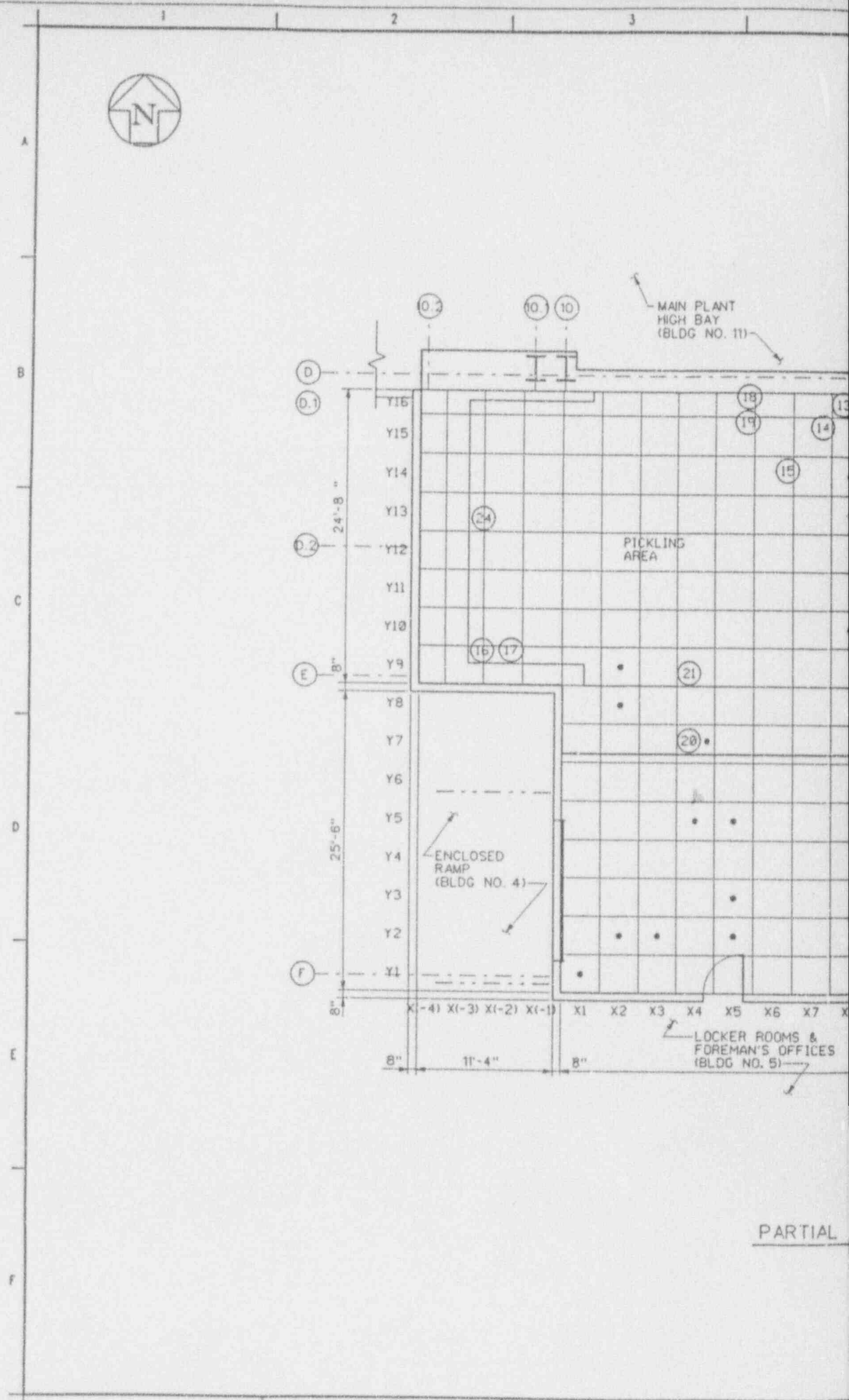
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 1 OF 2
MAIN PLANT LOW BAY

DRAWN BY JSB/MAD DATE 03-03-92 CHECKED BY MSF/DEF DATE 08-11-92
PLANT/BLDG NO BLDG NO 12 SCALE NONE
WBS 1.1.2.2.1.2.8 00-90701
DRAWING NO. SK-X-00392 REV NO. A

9404080147-59



D. PIPKIN Aug. 28, 1992 14:45:24

NOTES

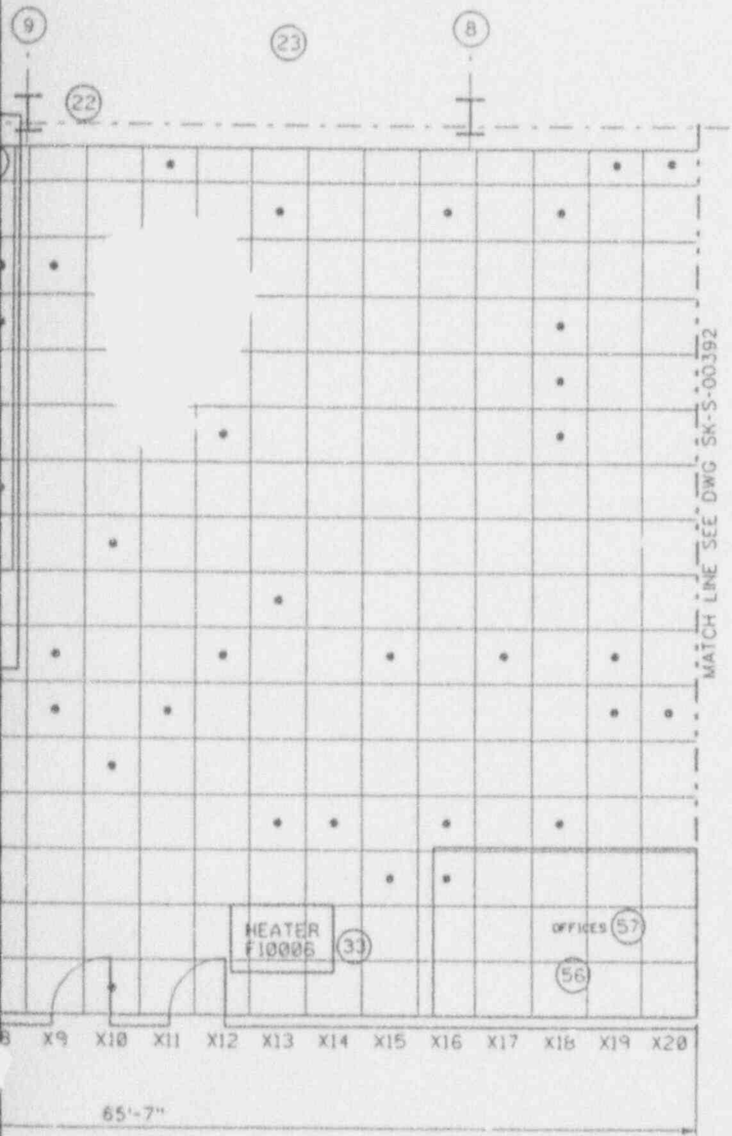
JUDGEMENTAL SAMPLE LOCATIONS

13. PIT BOTTOM SURFACE.
14. TANK (EXTERIOR SURFACE).
15. TANK T10015 (INTERIOR SURFACE).
16. DUCTWORK (INTERIOR SURFACE).
17. DUCTWORK (EXTERIOR SURFACE).
18. HNO_3 DIP TANK DUCTWORK (INTERNAL SURFACE).
19. HNO_3 DIP TANK DUCTWORK (EXTERNAL SURFACE).
20. PICKLING TABLE.
21. CRANE HORIZONTAL SUPPORT (TOP SIDE).
22. MEZZANINE FLOOR.
23. MEZZANINE FLOOR.
24. HNO_3 DIP TANK DUCTWORK (EXTERNAL SURFACE).
33. HEATER F10006 GAS EXHAUST DUCT (INTERIOR SURFACE).
56. OFFICE CEILING.
57. OFFICE CEILING VENT (INTERIOR SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR (CONT. FROM DWG. NO. SK-X-00392)

103. X44,Y8
104. X39,Y3
105. X35,Y6
106. X2,Y2
107. X27,Y6
108. X40,Y12
109. X23,Y5
110. X16,Y15
111. X12,Y13
112. X42,Y15
113. X1,Y1
114. X25,Y9
115. X40,Y6
116. X3,Y2
117. X32,Y11



FLOOR PLAN

A	90% CLIENT REVIEW	
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR PLAN - SHEET 2 OF 2
MAIN PLANT LOW BAY

DRAWN BY JSB/MAO	DATE 03-03-92	DESIGNED, CHECKED BY	DATE	CHECKED BY MSF/DEP	DATE 08-14-92
PLANT/BLDG. NO. BLDG NO 12		FLOOR		SCALE NONE	CLASS
SUBMITTED FOR APPROVAL		APPROVAL RECOMMENDED		DRAWING APPROVED	
DOE PROJECT NO.	OPER. CONTR. PROJ. NO. VBS 1.1.2.2.1.2.0 00-9070	DRAWING NO. SK-X-00393		SHEET NO.	REV. NO. A

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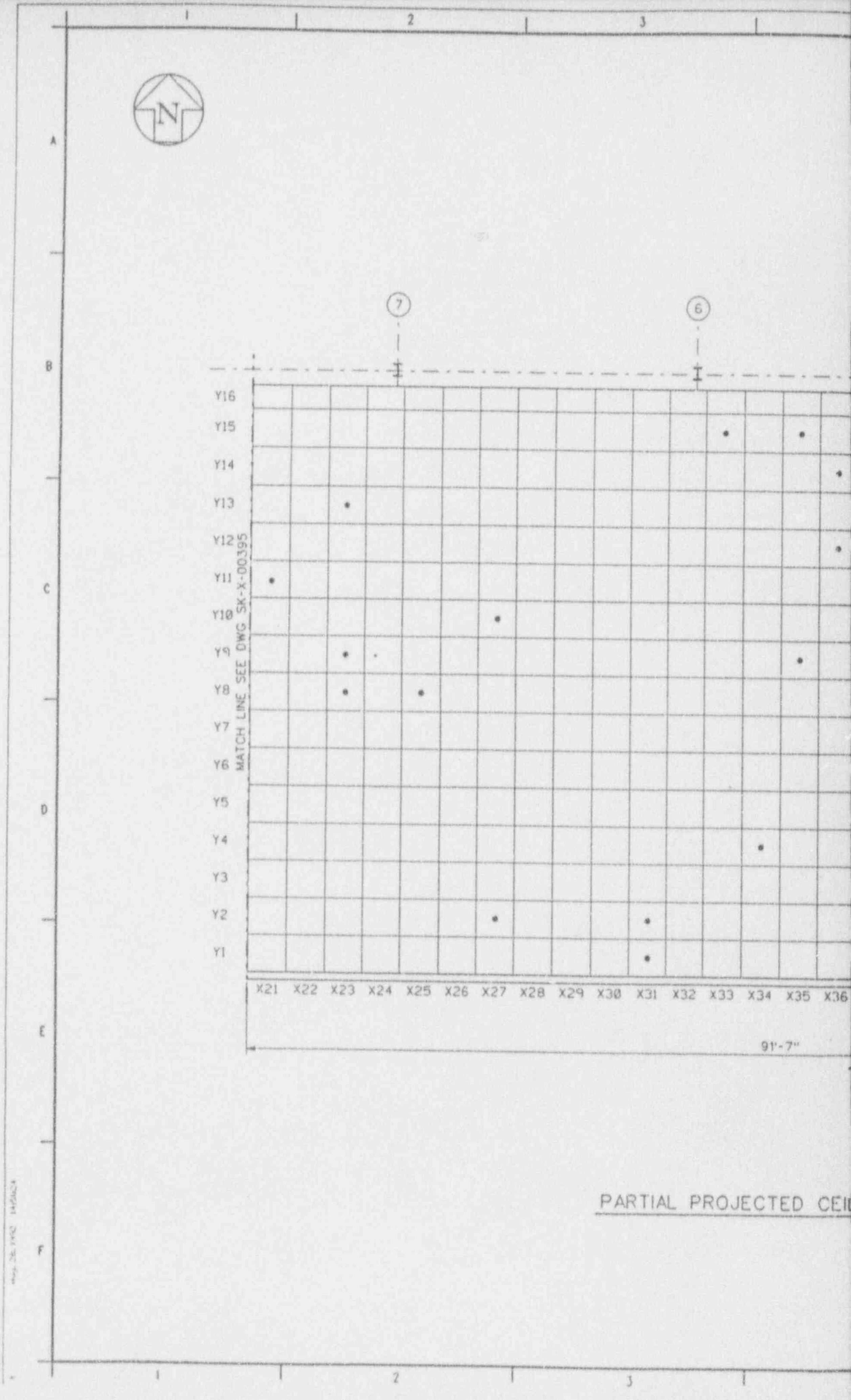

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Y14
Y13
Y12
Y11
Y10
Y9
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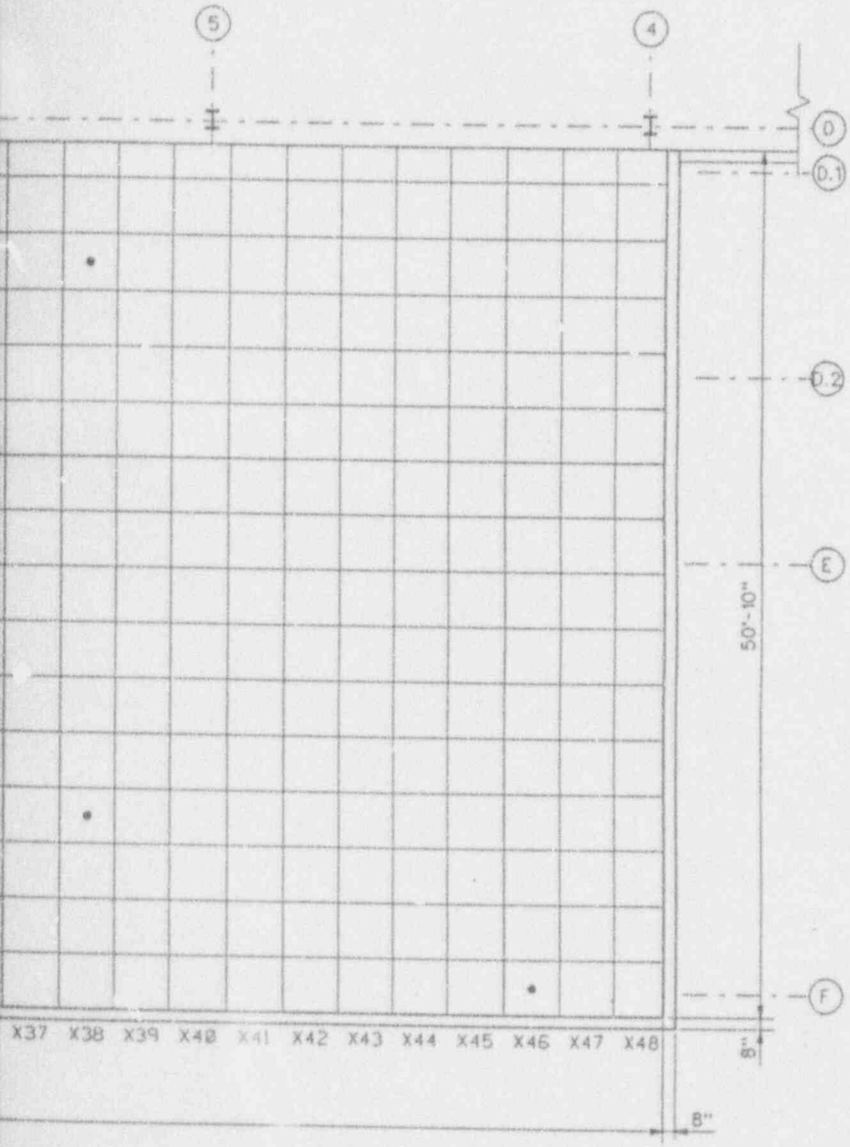
Y7
Y6
Y5
Y4
Y3
Y2
Y1
MATCH LINE SEE DWG SK-X-00395
X21 X22 X23 X24 X25 X26 X27 X28 X29 X30 X31 X32 X33 X34 X35 X36
91'-7"
PARTIAL PROJECTED CEI



LING PLAN

NOTES

RANDOM SAMPLE LOCATIONS

CEILING

1. X38,Y4
2. X27,Y10
3. X3,Y6
4. X16,Y2
5. X1,Y10
6. X31,Y1
7. X4,Y6
8. X1,Y2
9. X36,Y14
10. X36,Y12
11. X25,Y8
12. X31,Y2
13. X38,Y14
14. X23,Y13
15. X23,Y8
16. X27,Y2
17. X13,Y12
18. X34,Y4
19. X35,Y9
20. X35,Y15
21. X(-4),Y12
22. X12,Y6
23. X(-4),Y15
24. [illegible]3,Y9
25. [illegible],Y15
26. [illegible]2
27. X46,Y1
28. X5,Y9
29. X21,Y11

A	90% CLIENT REVIEW			
REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	OPERATOR	DOE
		INITIALS AND DATE		

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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE

RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 1 OF 2
MAIN PLANT LOW BAY

DRAWN BY: JSB/MAD	DATE: 03-04-92	DESIGN CHECKED BY	DATE	CHECKED BY: MSF/DWR	DATE: 03-11-92
PLANT BLDG NO: BLDG NO 12		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL		APPROVAL RECOMMENDED		DRAWING APPROVED	
DOE PROJECT NO.	OPER CONTR PROJ NO: WBS 1.1.2.2.1.2.0 00-90701	DRAWING NO: SK-X-00394		SHEET NO.	REV NO: A

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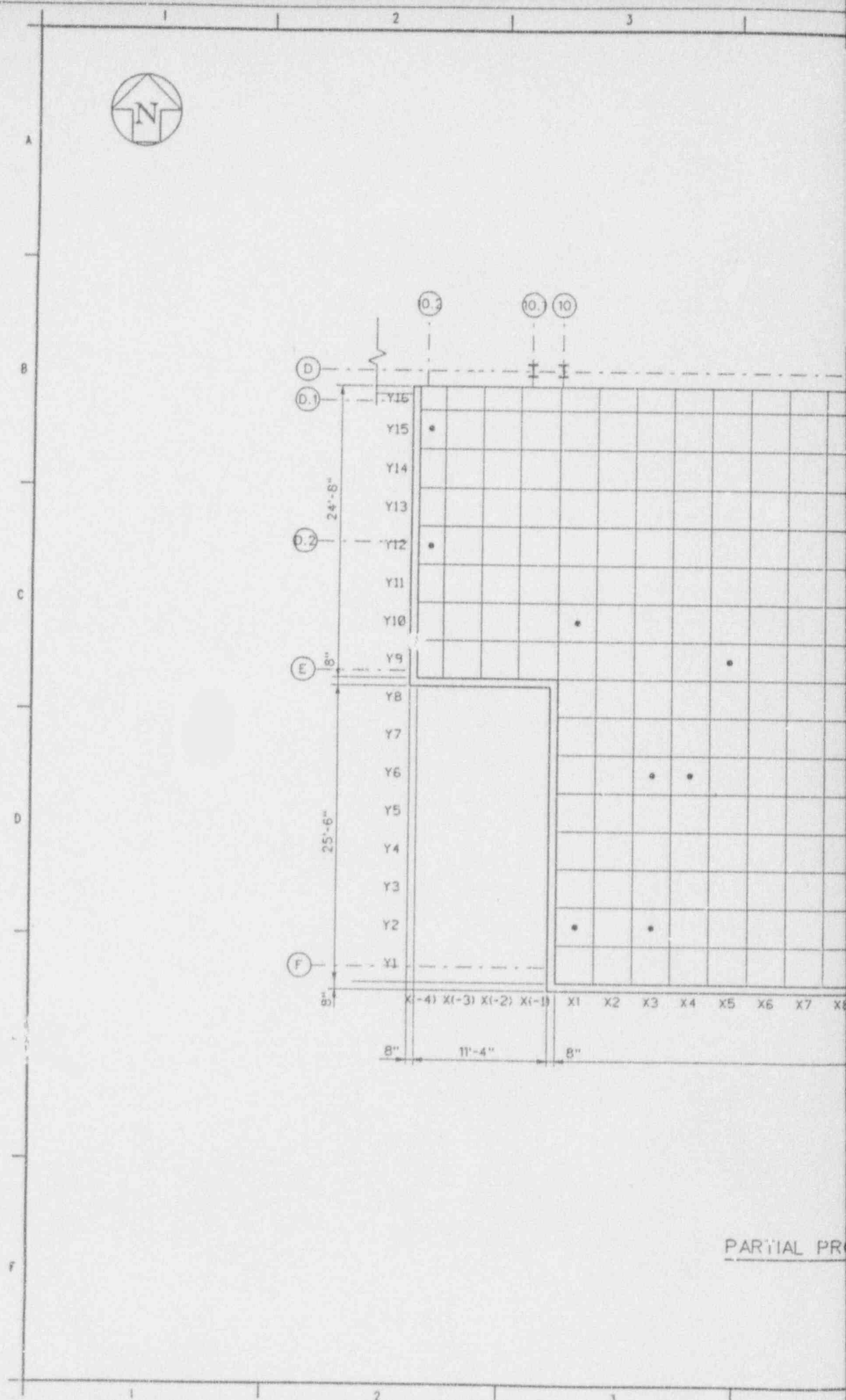
N
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D.1
D.2
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Y6
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Y4
Y3
Y2
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X(-4) X(-3) X(-2) X(-1) X1 X2 X3 X4 X5 X6 X7
24'-8"
25'-6"
8"
11'-4"
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A
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C
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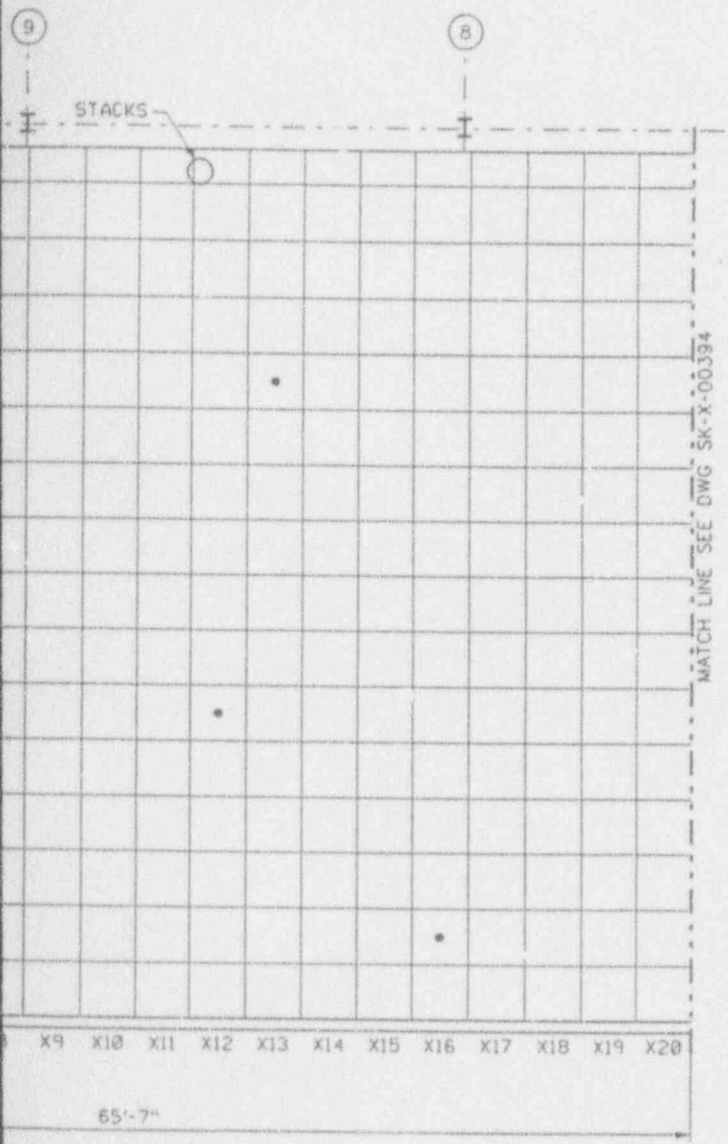
PARTIAL PR



JECTED CEILING PLAN

NOTES

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	OPERATOR	DOE
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
PROJECTED CEILING PLAN - SHEET 2 OF 2
MAIN PLANT LOW BAY

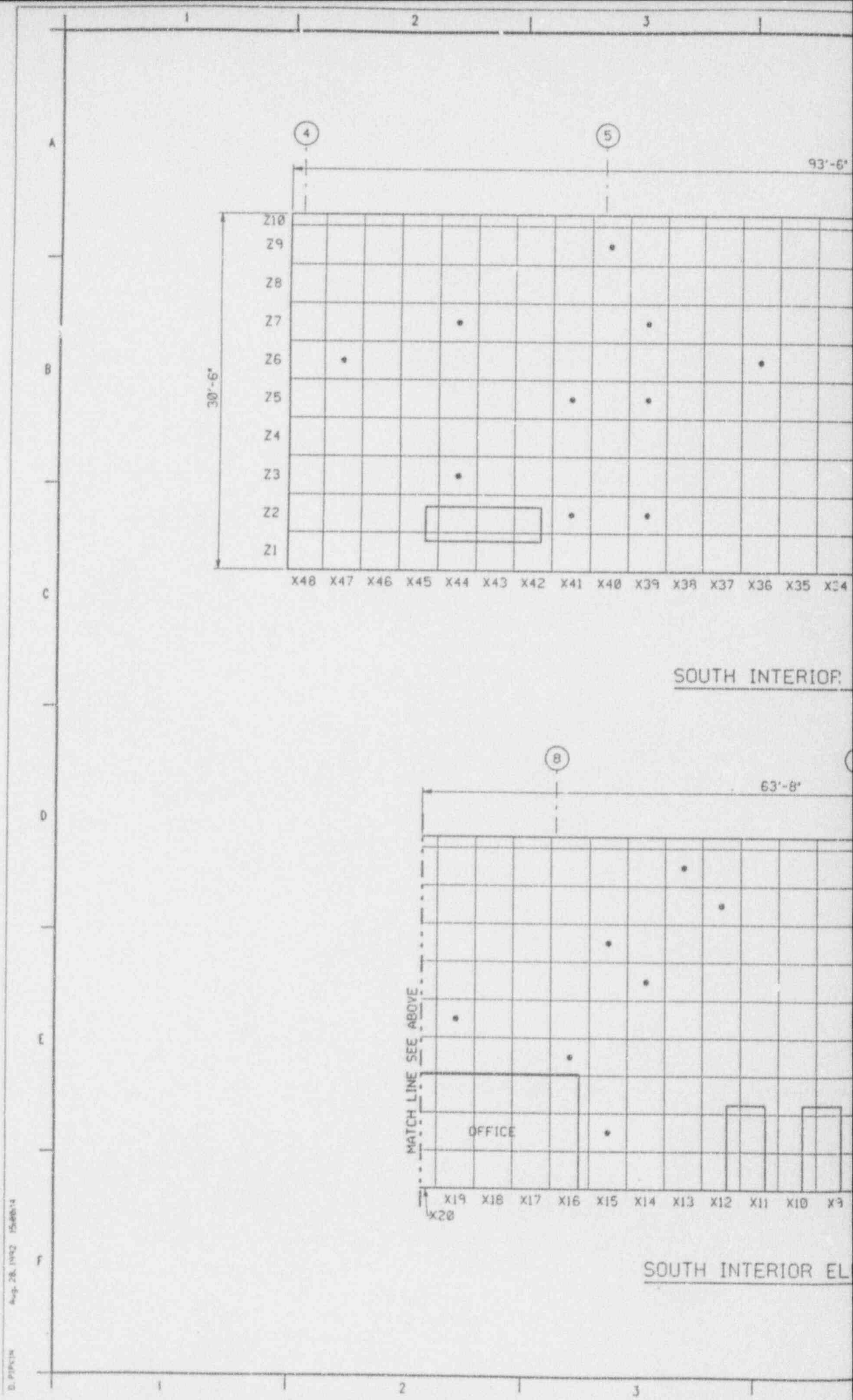
DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-04-92			MSF/DWR	03-11-92

PLANT/BLDG NO	FLOOR	SCALE	
BLDG NO 12		NONE	

SUBMITTED FOR APPROVAL / APPROVAL RECOMMENDED / OPERATING CONTRACTOR / DOE

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00395		A

9404080147-62



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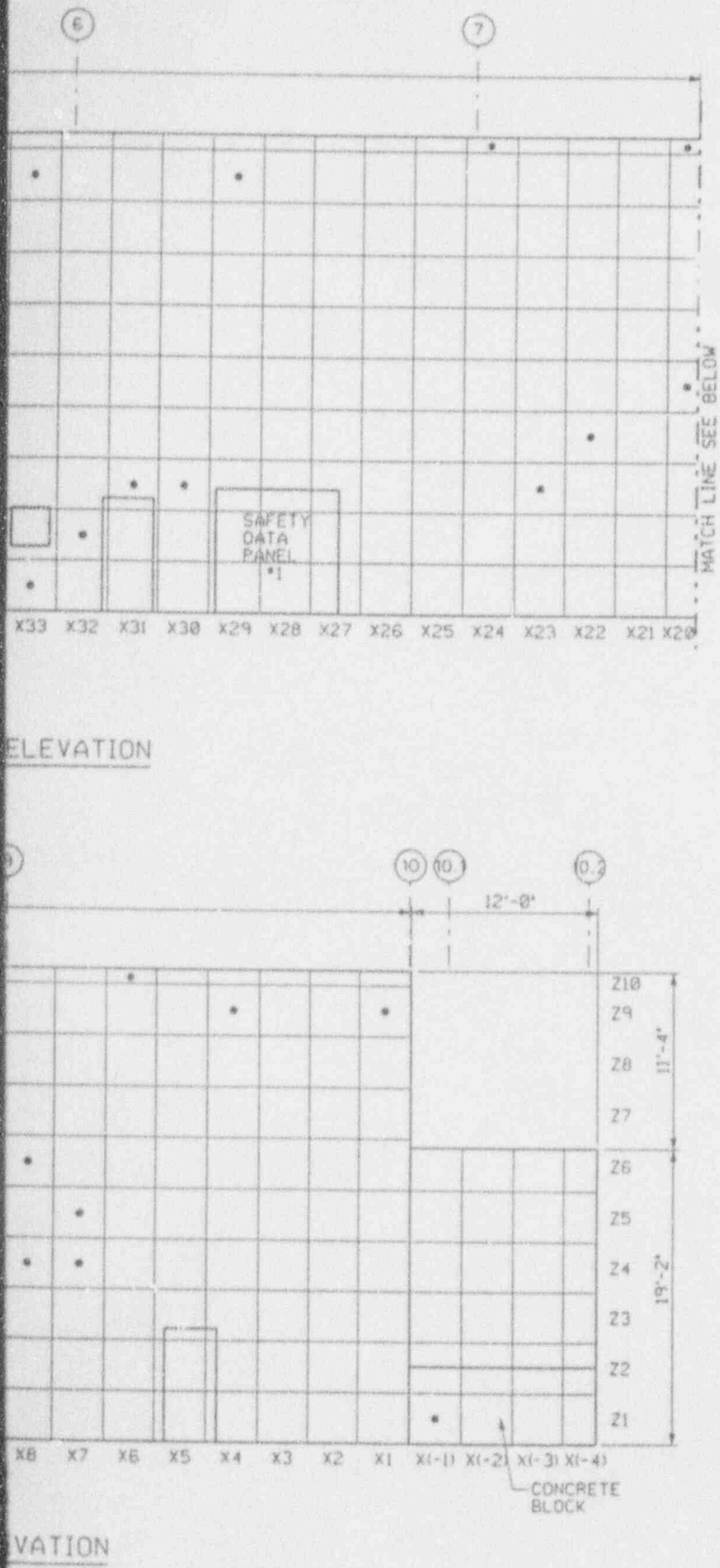
5
93'-6"
30'-6"
Z10
Z9
Z8
Z7
Z6
Z5
Z4
Z3
Z2
Z1
X48 X47 X46 X45 X44 X43 X42 X41 X40 X39 X38 X37 X36 X35 X34
SOUTH INTERIOR
8
63'-8"
MATCH LINE SEE ABOVE
OFFICE
X19 X18 X17 X16 X15 X14 X13 X12 X11 X10 X9
X20
SOUTH INTERIOR EL
D. PIPKIN
Aug. 28, 1992



NOTES

RANDOM SAMPLE LOCATIONS

SOUTH WALL

1. X15,Z2
2. X7,Z5
3. X7,Z4
4. X47,Z6
5. X24,Z10
6. X20,Z10
7. X33,Z9
8. X23,Z3
9. X32,Z2
10. X41,Z5
11. X44,Z7
12. X(-1),Z1
13. X22,Z4
14. X16,Z4
15. X30,Z3
16. X40,Z9
17. X6,Z10
18. X8,Z6
19. X29,Z9
20. X12,Z8
21. X20,Z5
22. X8,Z4
23. X14,Z6
24. X39,Z7
25. X39,Z5
26. X44,Z3
27. X36,Z6
28. X41,Z2
29. X19,Z5
30. X31,Z3
31. X13,Z9
32. X33,Z1
33. X4,Z9
34. X39,Z2
35. X1,Z9
36. X15,Z7

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	90% CLIENT REVIEW	

UNITED STATES DEPARTMENT OF ENERGY

THIS DRAWING PREPARED BY
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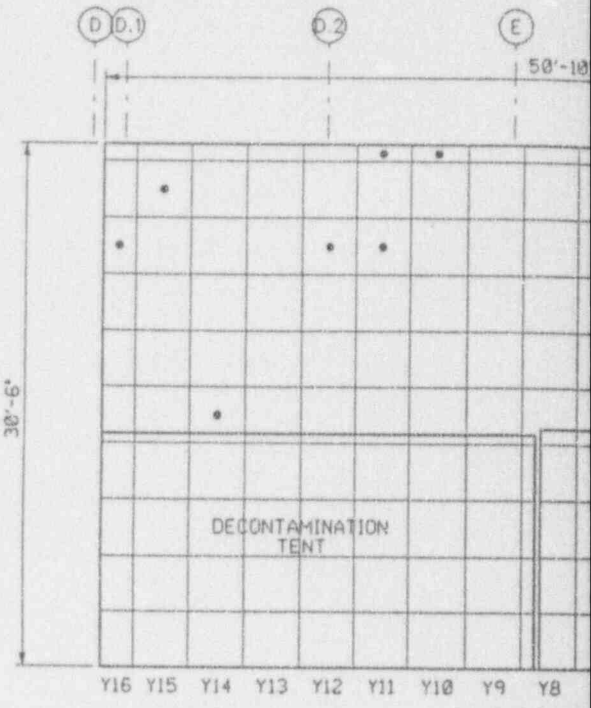
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

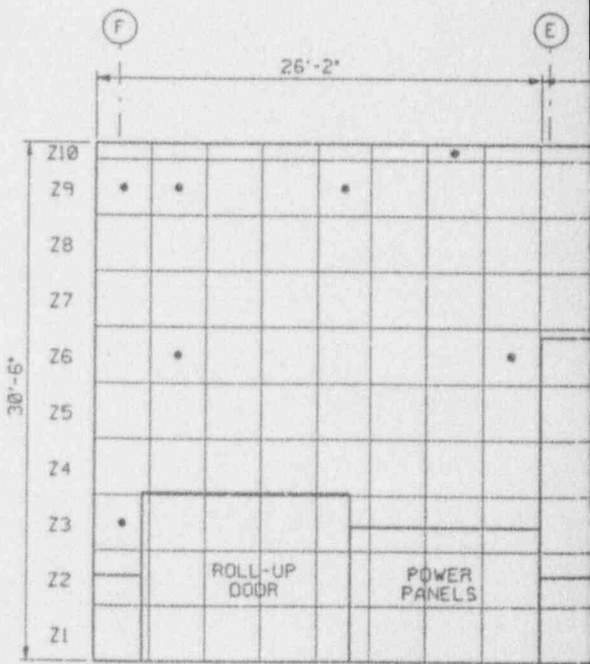
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 1 OF 2
MAIN PLANT LOW BAY

DRAWN BY: JSB/MAO — DATE: 07-25-92
CHECKED BY: MSF/DWR — DATE: 08-14-92
PLANT BLDG NO: BLDG NO 12
SCALE: NONE
WBS 1.1.2.2.1.2.8
00-90701
DRAWING NO: SK-X-00431
REV NO: A

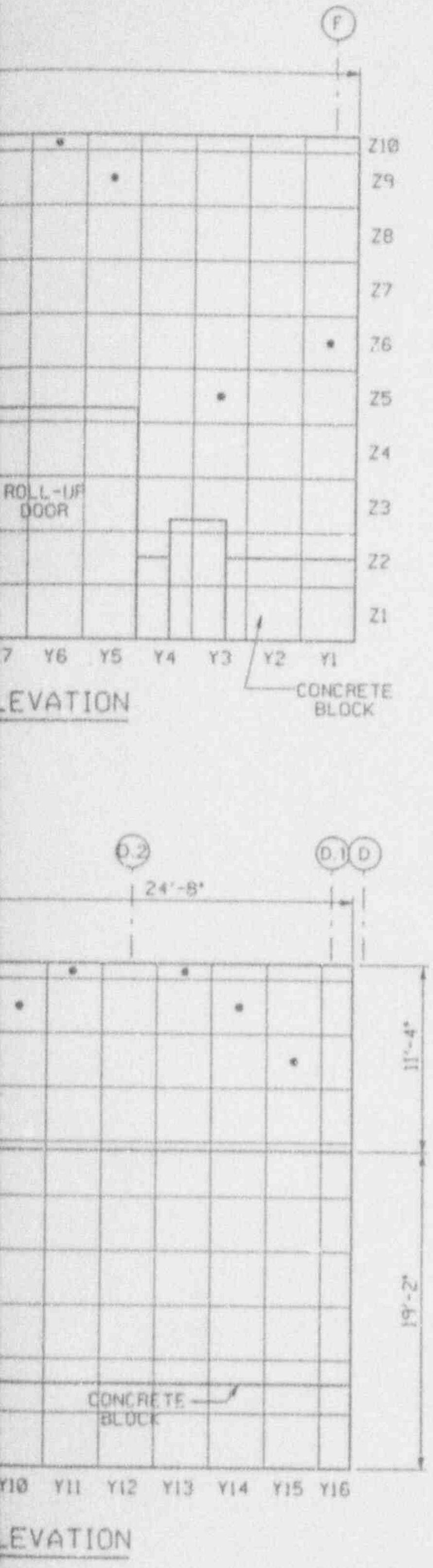
9404080147-63



EAST INTERIOR E



WEST INTERIOR E



NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL	WEST WALL
1. Y15,Z9	1. Y2,Z9
2. Y16,Z8	2. Y1,Z3
3. Y3,Z5	3. Y8,Z6
4. Y14,Z5	4. Y11,Z10
5. Y12,Z8	5. Y2,Z6
6. Y1,Z6	6. Y7,Z10
7. Y11,Z10	7. Y1,Z9
8. Y10,Z10	8. Y14,Z9
9. Y5,Z9	9. Y5,Z9
10. Y11,Z8	10. Y15,Z8
11. Y6,Z10	11. Y13,Z10
	12. Y10,Z9

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE		
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

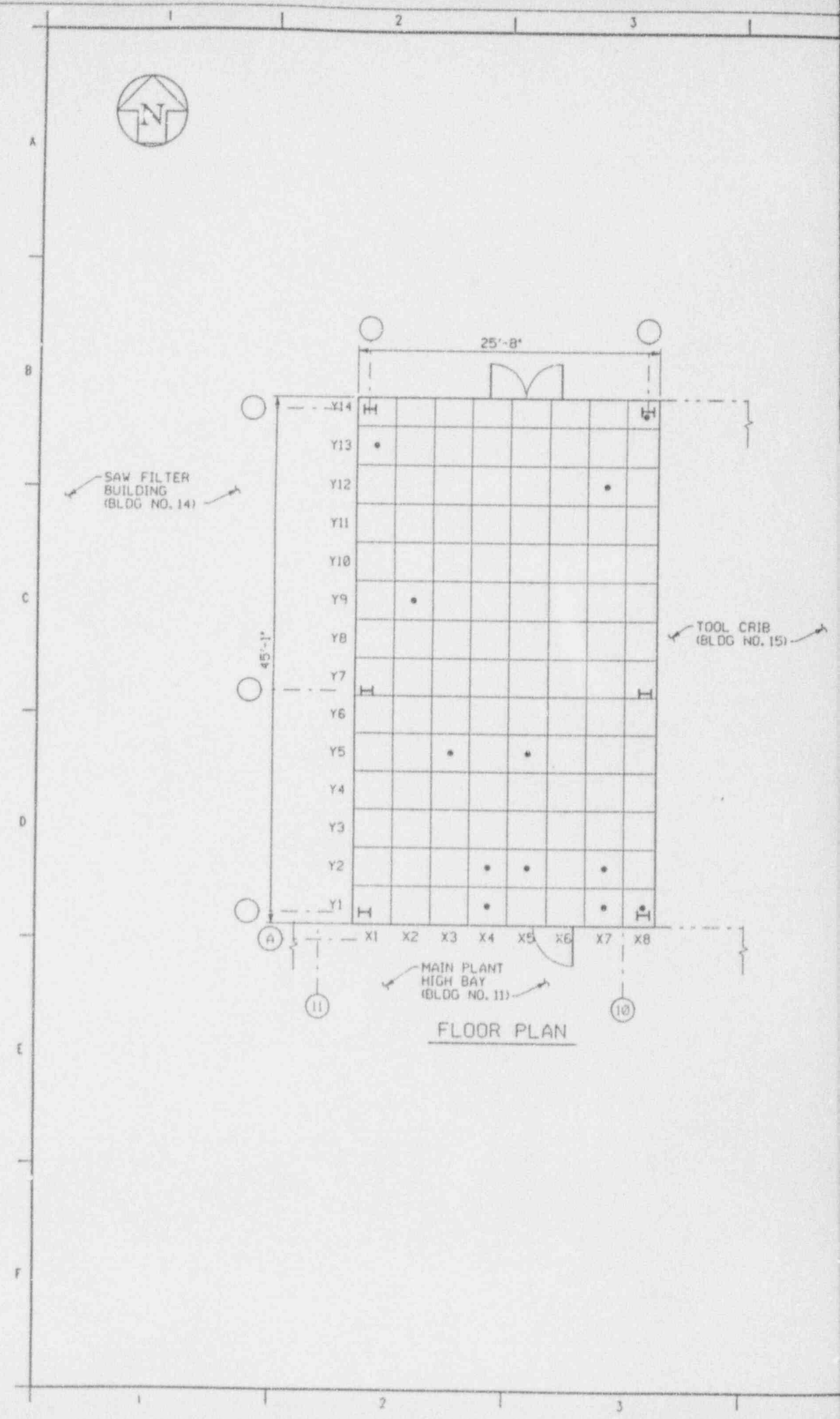
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 2 OF 2
MAIN PLANT LOW BAY

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-30-92			MSF/DWR	08-14-92
PLANT/BLDG NO. BLDG NO 12		FLOOR		SCALE NONE	CLASS

DOE PROJECT NO.	OPER CONTR PROJ NO	DRAWING NO.	SHEET NO	REV NO
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00432		A

9404080147-64



N
25'-8"
45'-1"
SAW FILTER BUILDING (BLDG NO. 14)
TOOL CRIB (BLDG NO. 15)
MAIN PLANT HIGH BAY (BLDG NO. 11)
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1 X2 X3 X4 X5 X6 X7 X8
A
11
10

FLOOR PLAN

NOTES

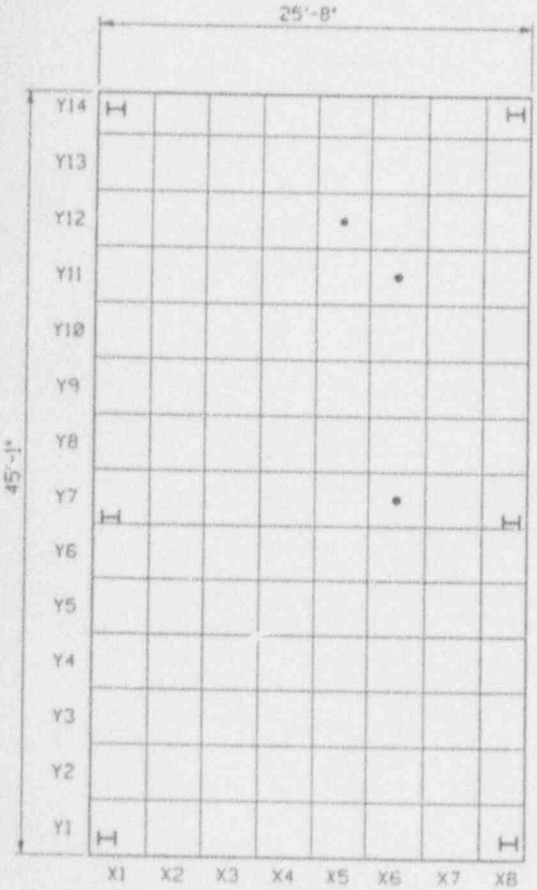
RANDOM SAMPLE LOCATIONS

FLOOR

1. X7,Y1
2. X8,Y14
3. X5,Y5
4. X5,Y2
5. X7,Y12
6. X4,Y1
7. X3,Y5
8. X7,Y2
9. X4,Y2
10. X2,Y9
11. X1,Y13
12. X8,Y1

CEILING

1. X6,Y11
2. X6,Y7
3. X5,12



PROJECTED CEILING PLAN

REV NO	DATE OR REVISION PURPOSE - DESCRIPTION			
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

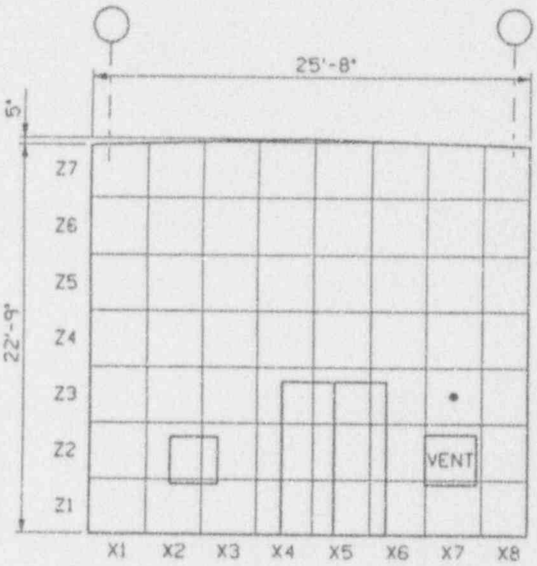
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLAN
RUNOUT TABLE FILTER BUILDING

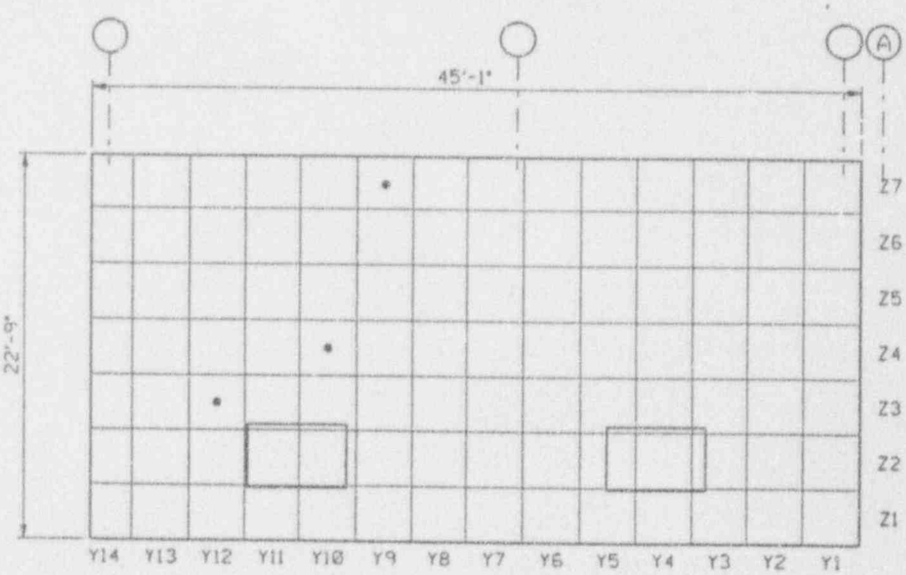
DRAWN BY	DATE	DESIGNED CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAD	02-26-92			MSF/DWR	08-14-92
BLDG NO 13		FLOOR		SCALE NONE	

OPER CONTR. WBS NO	DRAWING NO	SHEET NO	REV NO
WBS 1.1.2.2.1.2.8 00-90701	SK-X-00434		A

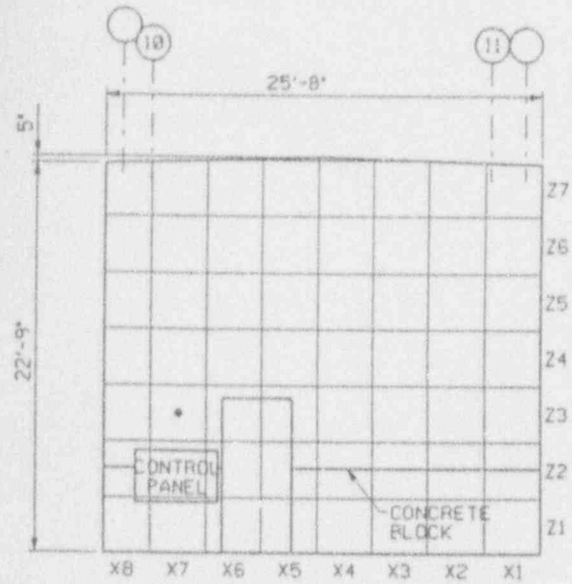
9404080147-65



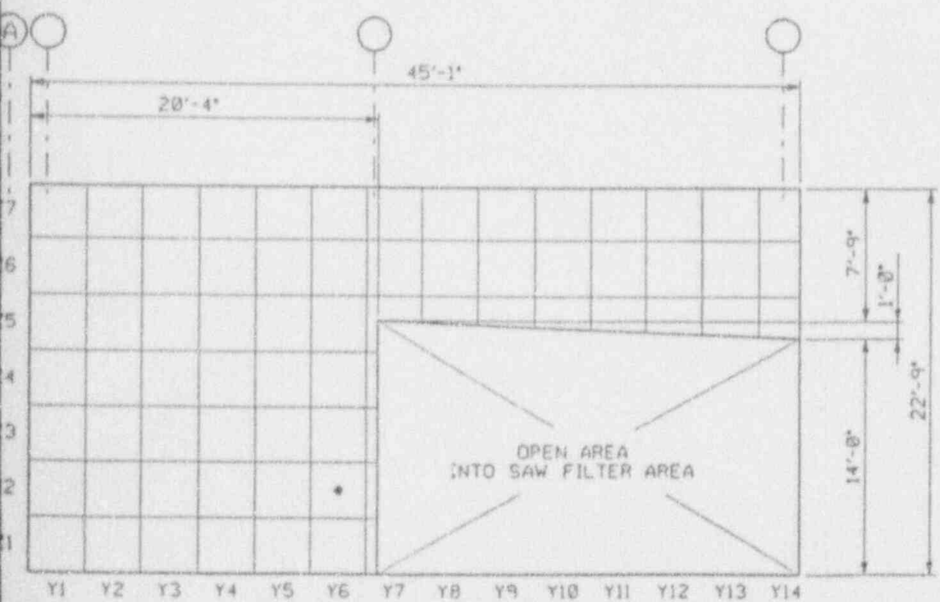
NORTH INTERIOR ELEVATION



EAST INTERIOR ELEVATION



SOUTH INTERIOR ELEVATION



WEST INTERIOR ELEVATION

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL
1. X7,Z3

SOUTH WALL
1. X7,Z3

EAST WALL
1. Y10,Z4
2. Y9,Z7
3. Y12,Z3

WEST WALL
1. Y6,Z2

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION		
A	90% CLIENT REVIEW		

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CINCINNATI, OHIO

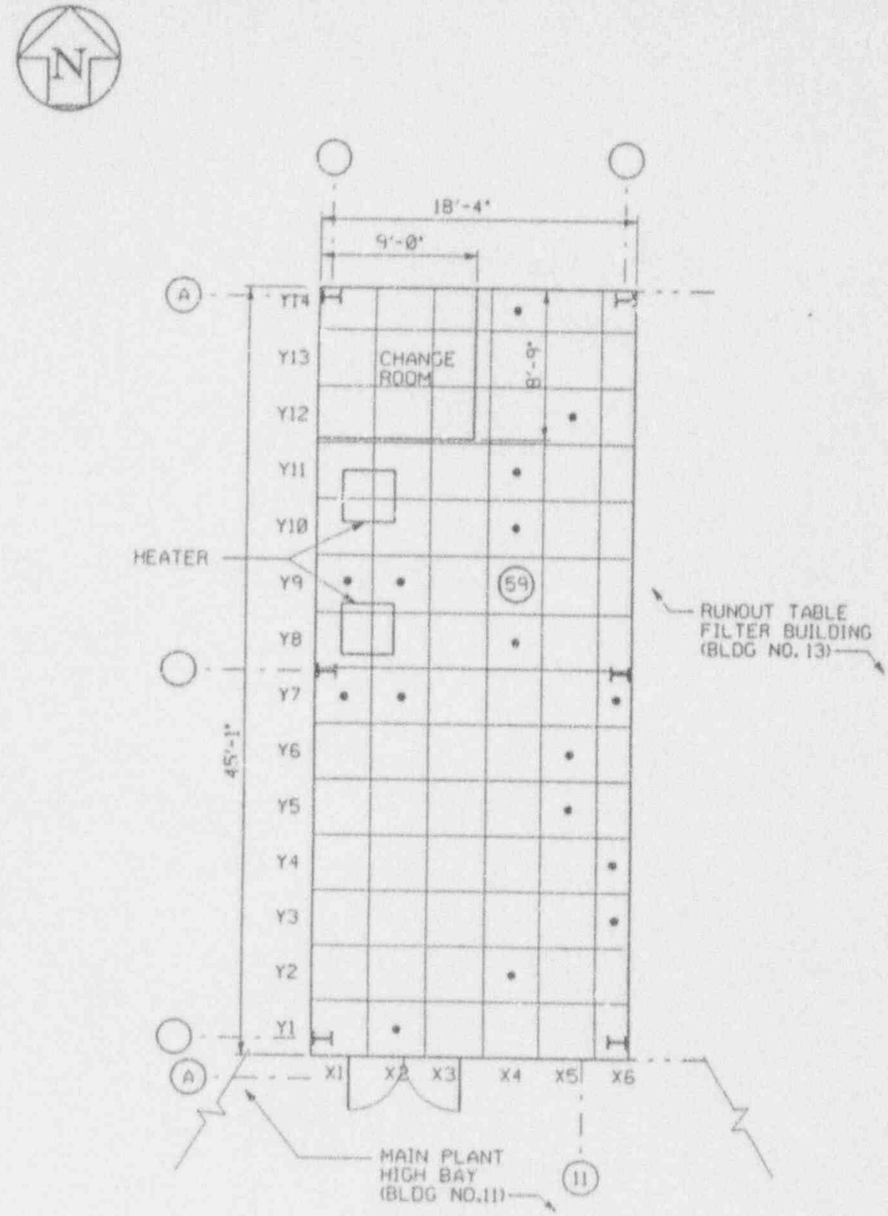
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
RUNOUT TABLE FILTER BUILDING

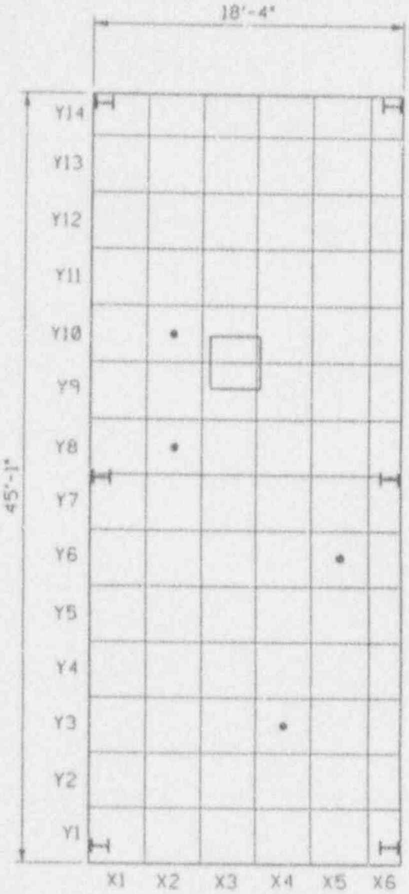
DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/MWS	03-25-92			MSF/DWR	08-14-92
PLANT/BLDG NO. BLDG NO 13		FLOOR		SCALE NONE	CLASS

WBS	DRAWING NO.	SHEET NO.	REV NO.
WBS 1.1.2.2.1.2.0 00-90701	SK-X-00435		A

9404080147-66


N
18'-4"
9'-0"
8'-9"
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
CHANGE ROOM
HEATER
59
45'-1"
X1
X2
X3
X4
X5
X6
RUNOUT TABLE FILTER BUILDING (BLDG NO. 13)
MAIN PLANT HIGH BAY (BLDG NO.11)
11
A

FLOOR PLAN



PROJECTED CEILING PLAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

59. DUCTWORK BEFORE HEPA FILTERS (INTERIOR SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR	CEILING
1. X5,Y12	1. X5,Y6
2. X4,Y10	2. X4,Y3
3. X6,Y3	3. X2,Y8
4. X1,Y9	4. X2,Y10
5. X2,Y1	
6. X4,Y11	
7. X5,Y5	
8. X2,Y7	
9. X4,Y14	
10. X6,Y7	
11. X2,Y9	
12. X4,Y8	
13. X5,Y6	
14. X6,Y4	
15. X4,Y2	
16. X1,Y7	

A	90% CLIENT REVIEW			
REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

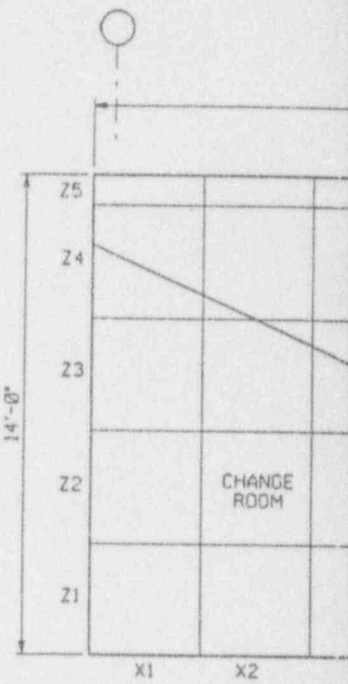
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
SAW FILTER BUILDING

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/DWR	02-25-92			MSF/MWD	10-14-92

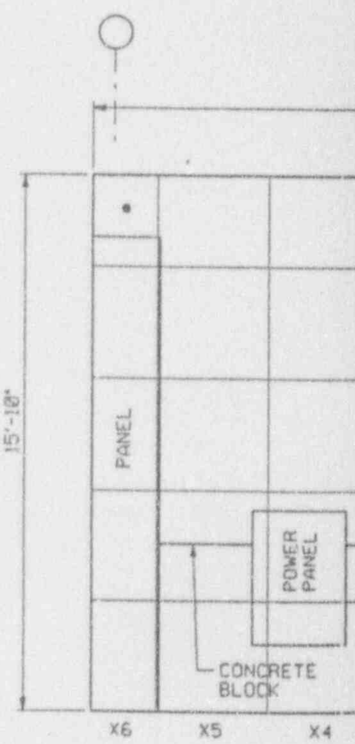
PLANT/BLDG NO.	FLOOR	SCALE
BLDG NO 14		NONE

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV NO.
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00437		A

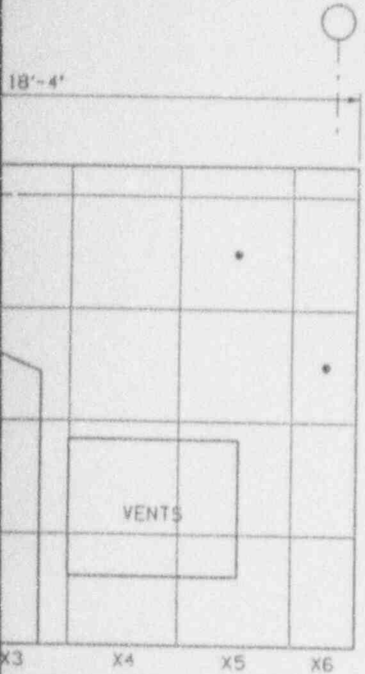
9404080147-67



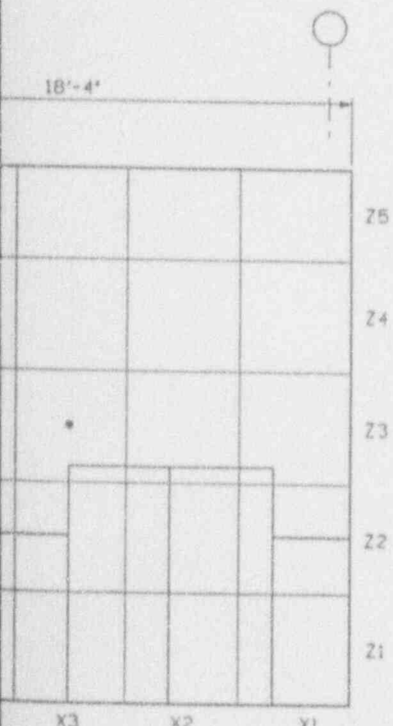
NORTH INT



SOUTH INTE



ERIOR ELEVATION



ERIOR ELEVATION

9404080147-68

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL	SOUTH WALL
1. X6,Z3	1. X6,Z5
2. X5,Z4	2. X3,Z3

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 1 OF 2
SAW FILTER BUILDING

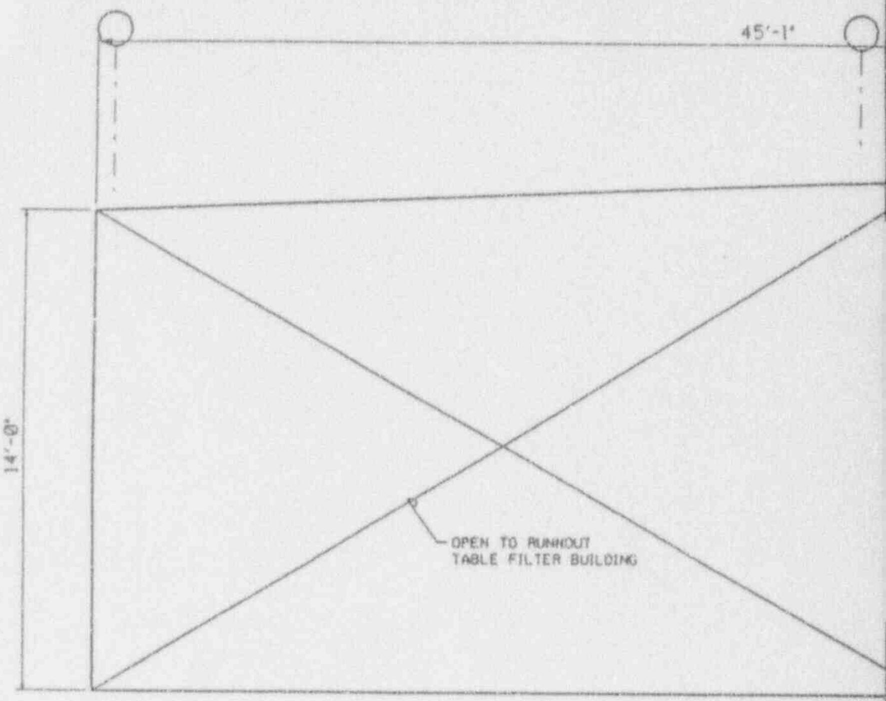
BLDG NO 14

SCALE NONE

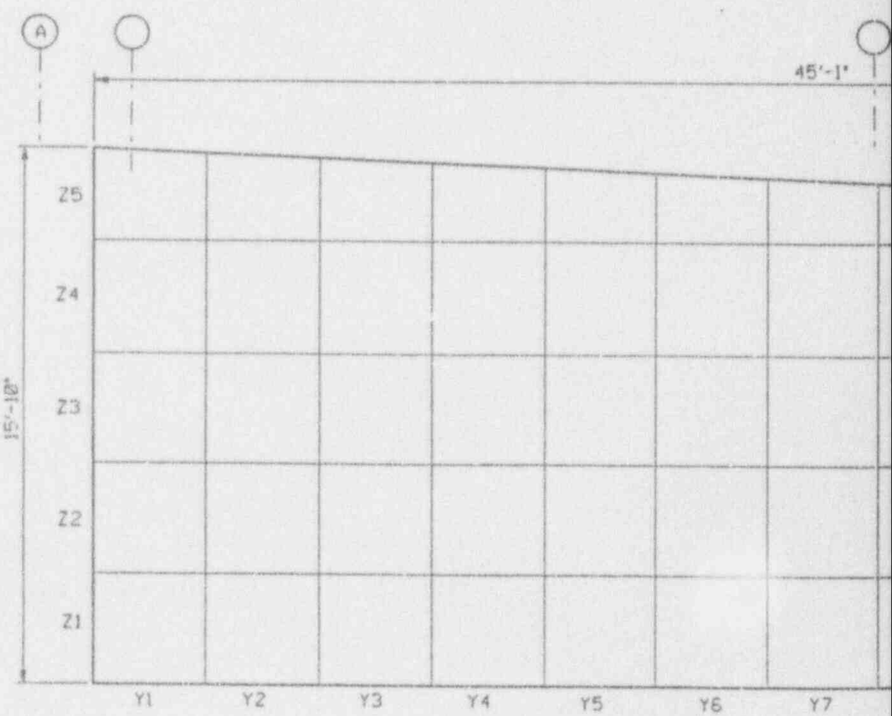
VBS 1.1.2.2.1.2.8
00-90701

SK-X-00438

A

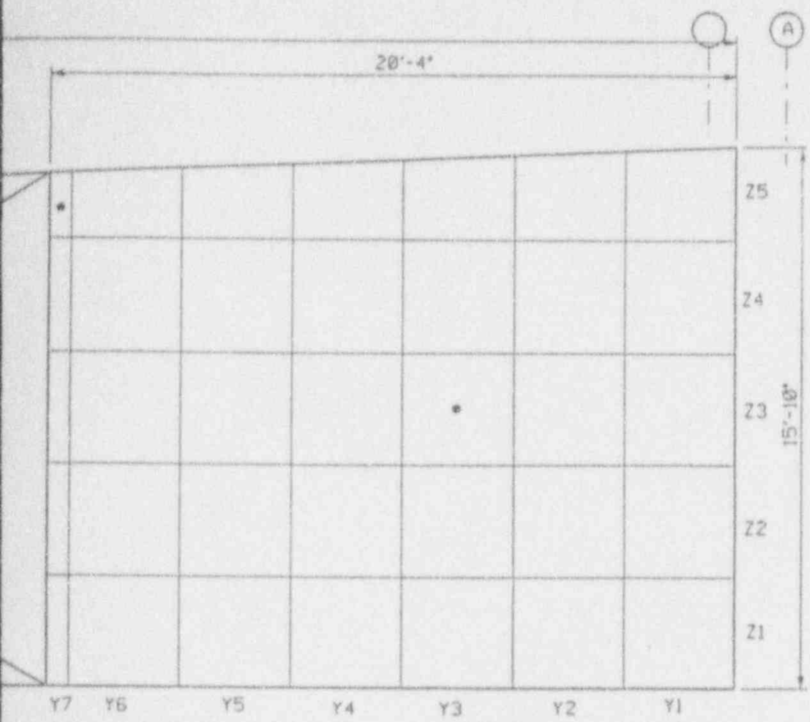


EAST INTERIOR ELEV



WEST INTERIOR ELEV

Aug. 31, 1992 0420053



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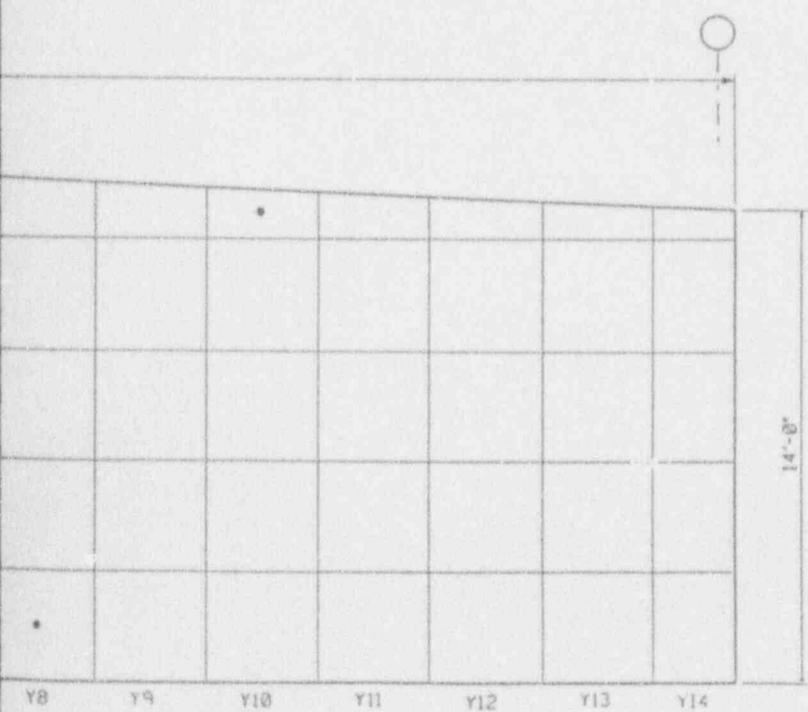

ATION

9404080147-69

NOTES

RANDOM SAMPLE LOCATIONS

EAST WALL	WEST WALL
1. Y3,Z3	1. Y8,Z1
2. Y7,Z5	2. Y10,Z5

ANSTEC APERTURE CARD

Also Available on Aperture Card

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RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS - SHEET 2 OF 2
SAW FILTER BUILDING

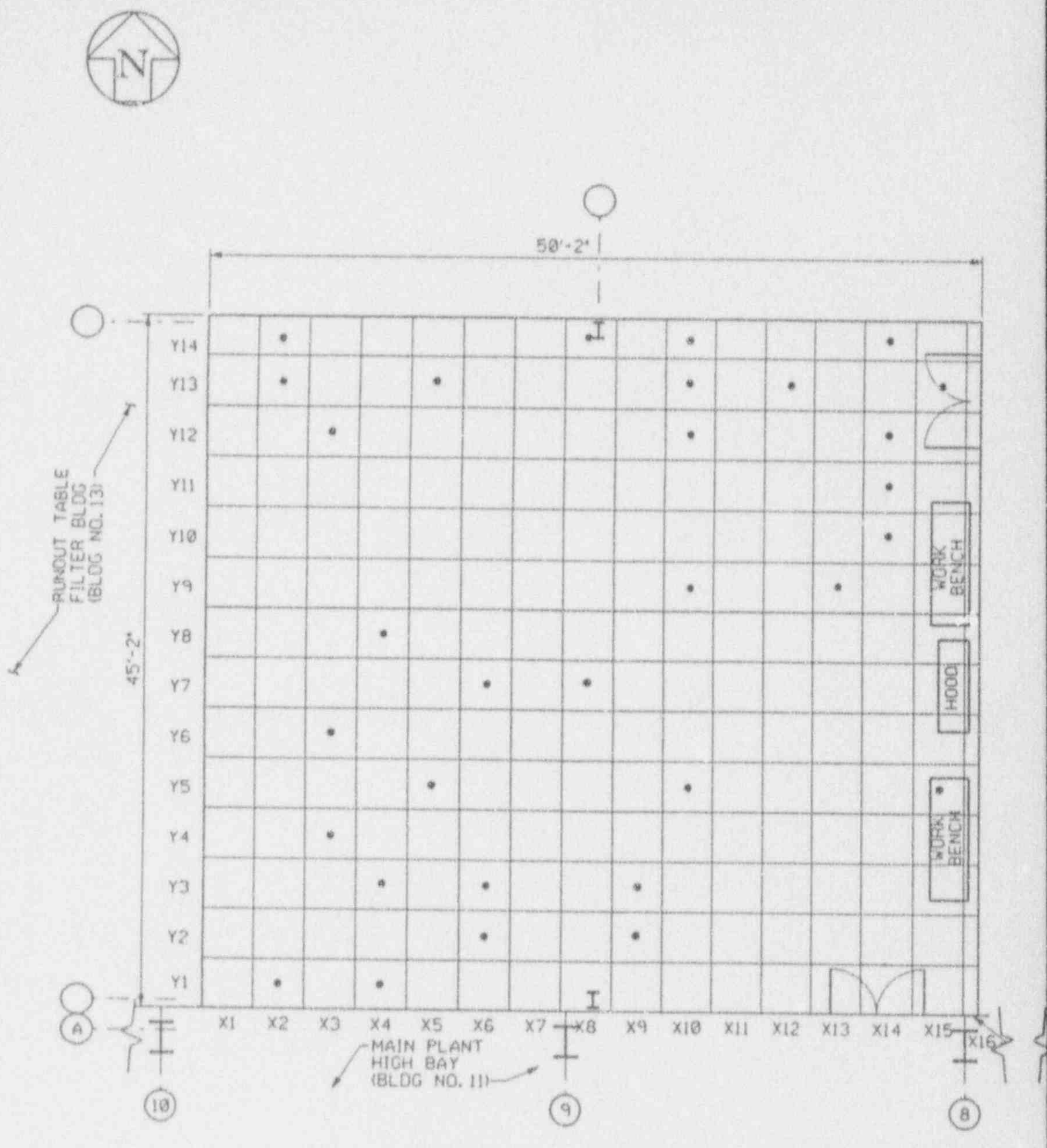
BLDG NO 14

SCALE NONE

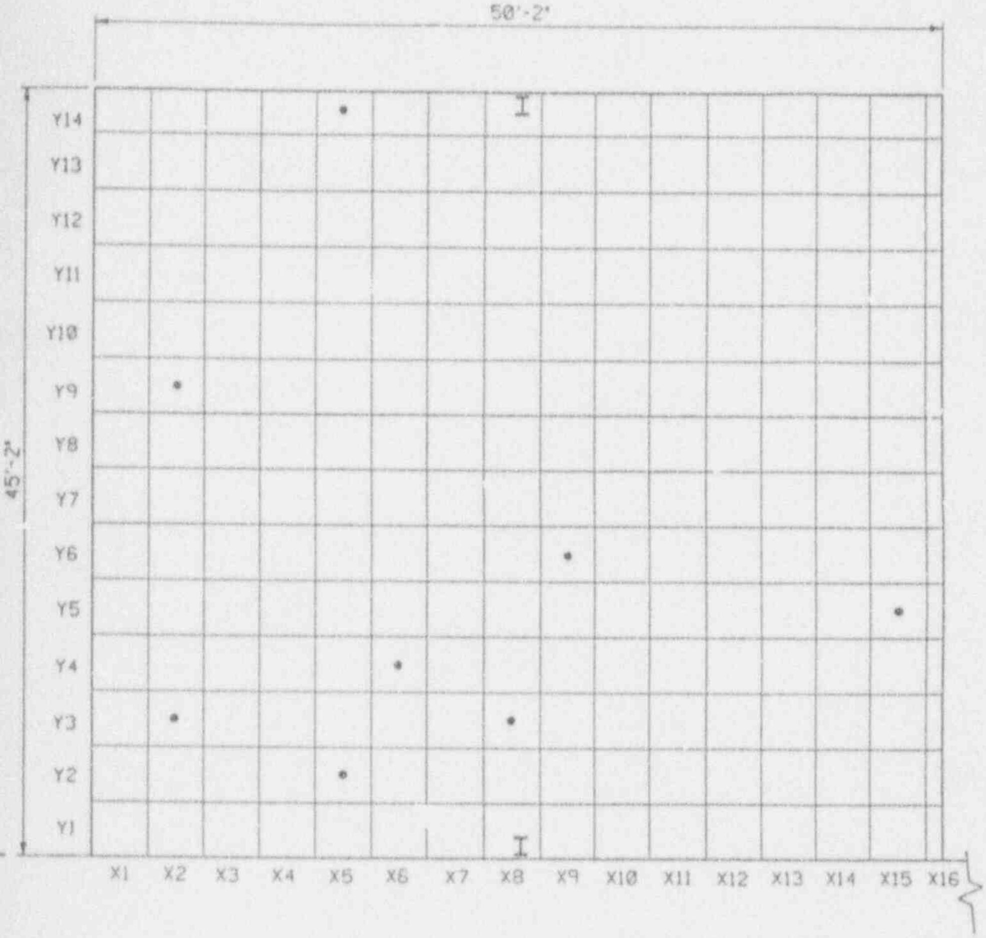
KPS 1.1.2.2.1.2.8
00-90701

SK-X-00439

A


N
50'-2"
45'-2"
RUNOUT TABLE
FILTER BLDG
(BLDG NO. 13)
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
X16
WORK BENCH
HOOD
WORK BENCH
A
MAIN PLANT
HIGH BAY
(BLDG NO. 11)
10
9
8

FLOOR PLAN



PROJECTED CEILING PLAN

NOTES

RANDOM SAMPLE LOCATIONS

FLOOR

1. X6,Y7
2. X8,Y7
3. X2,Y14
4. X9,Y3
5. X10,Y13
6. X3,Y4
7. X3,Y12
8. X5,Y13
9. X15,Y13
10. X2,Y13
11. X10,Y14
12. X5,Y5
13. X14,Y14
14. X10,Y12
15. X14,Y12
16. X10,Y9
17. X4,Y8
18. X4,Y3
19. X3,Y6
20. X14,Y11
21. X9,Y2
22. X15,Y5
23. X6,Y2
24. X12,Y13
25. X4,Y1
26. X2,Y1
27. X14,Y10
28. X8,Y14
29. X10,Y5
30. X6,Y3
31. X13,Y9

CEILING

1. X2,Y9
2. X6,Y4
3. X2,Y3
4. X5,Y14
5. X9,Y6
6. X8,Y3
7. X15,Y5
8. X5,Y2

ANSTEC APERTURE CARD

Also Available on Aperture Card

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	90% CLIENT REVIEW			

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

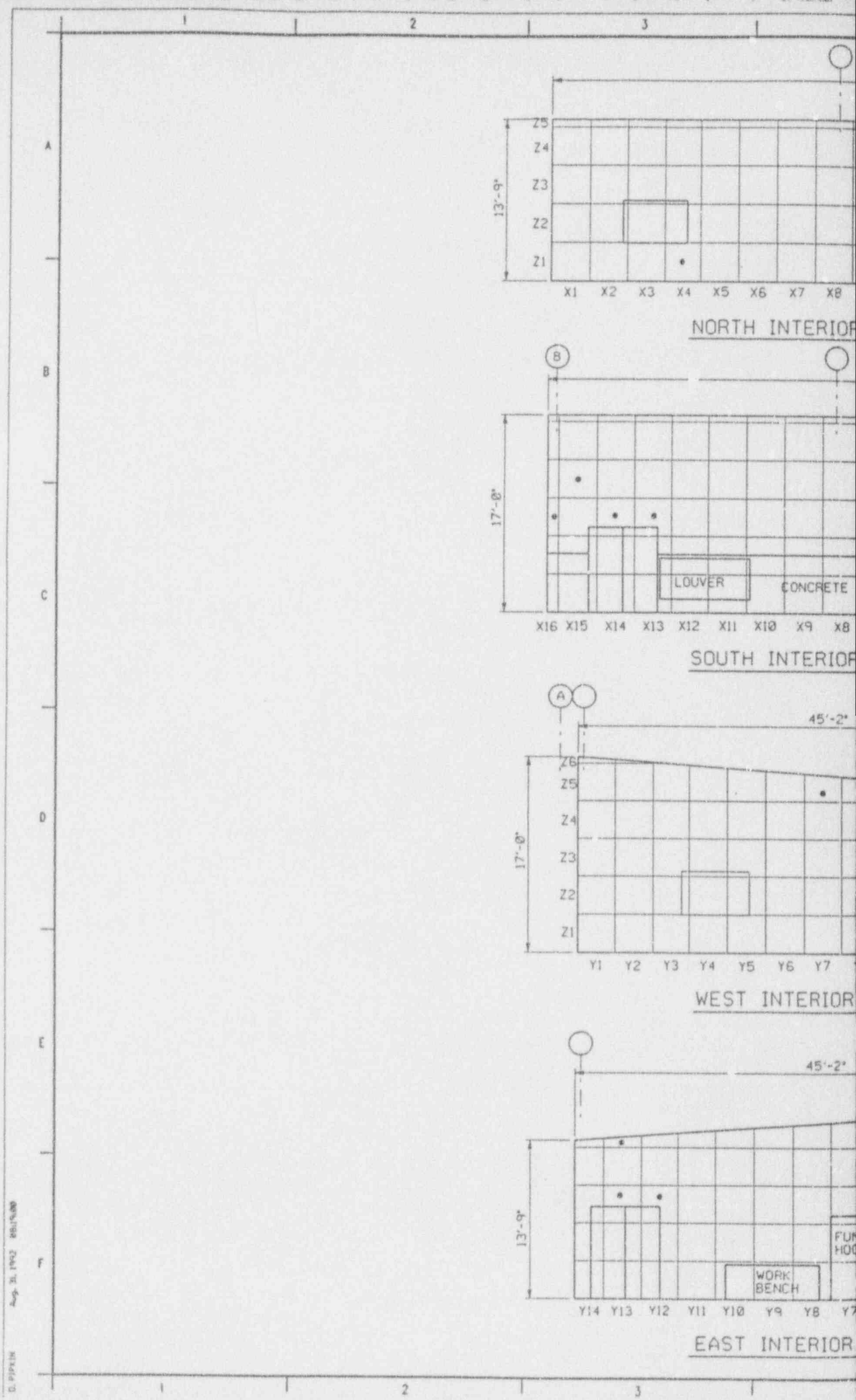
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
TOOL CRIB

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/DWR	03-25-92			HTS /MAO	08-14-92

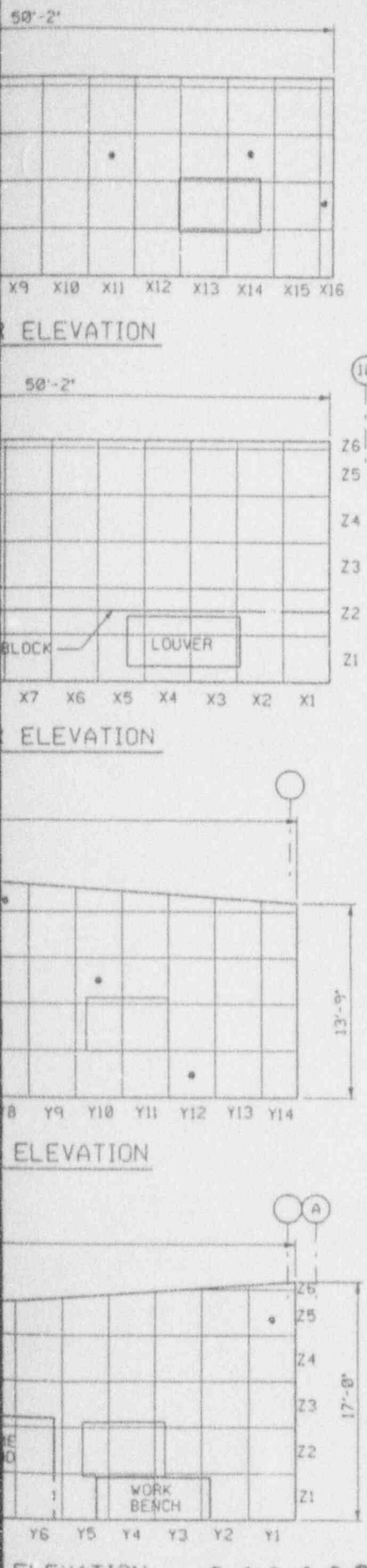
BLDG NO 15	FLOOR	SCALE NONE	CLASS

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV NO
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00440		A

9404080147-70



1
2
3
A
B
C
D
E
F
13'-9"
Z5
Z4
Z3
Z2
Z1
X1 X2 X3 X4 X5 X6 X7 X8
NORTH INTERIOR
17'-0"
LOUVER
CONCRETE
X16 X15 X14 X13 X12 X11 X10 X9 X8
SOUTH INTERIOR
45'-2"
17'-0"
Z6
Z5
Z4
Z3
Z2
Z1
Y1 Y2 Y3 Y4 Y5 Y6 Y7
WEST INTERIOR
45'-2"
13'-9"
WORK BENCH
Y14 Y13 Y12 Y11 Y10 Y9 Y8
EAST INTERIOR



9404080147-71

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL
1. X14,Z3
2. X11,Z3
3. X4,Z1
4. X16,Z2

SOUTH WALL
1. X16,Z3
2. X14,Z3
3. X15,Z4
4. X13,Z3

WEST WALL
1. Y12,Z1
2. Y8,Z5
3. Y7,Z5
4. Y10,Z3

EAST WALL
1. Y13,Z5
2. Y1,Z5
3. Y13,Z3
4. Y12,Z3

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REV. NO. | ISSUE OR REVISION PURPOSE - DESCRIPTION

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CINCINNATI, OHIO

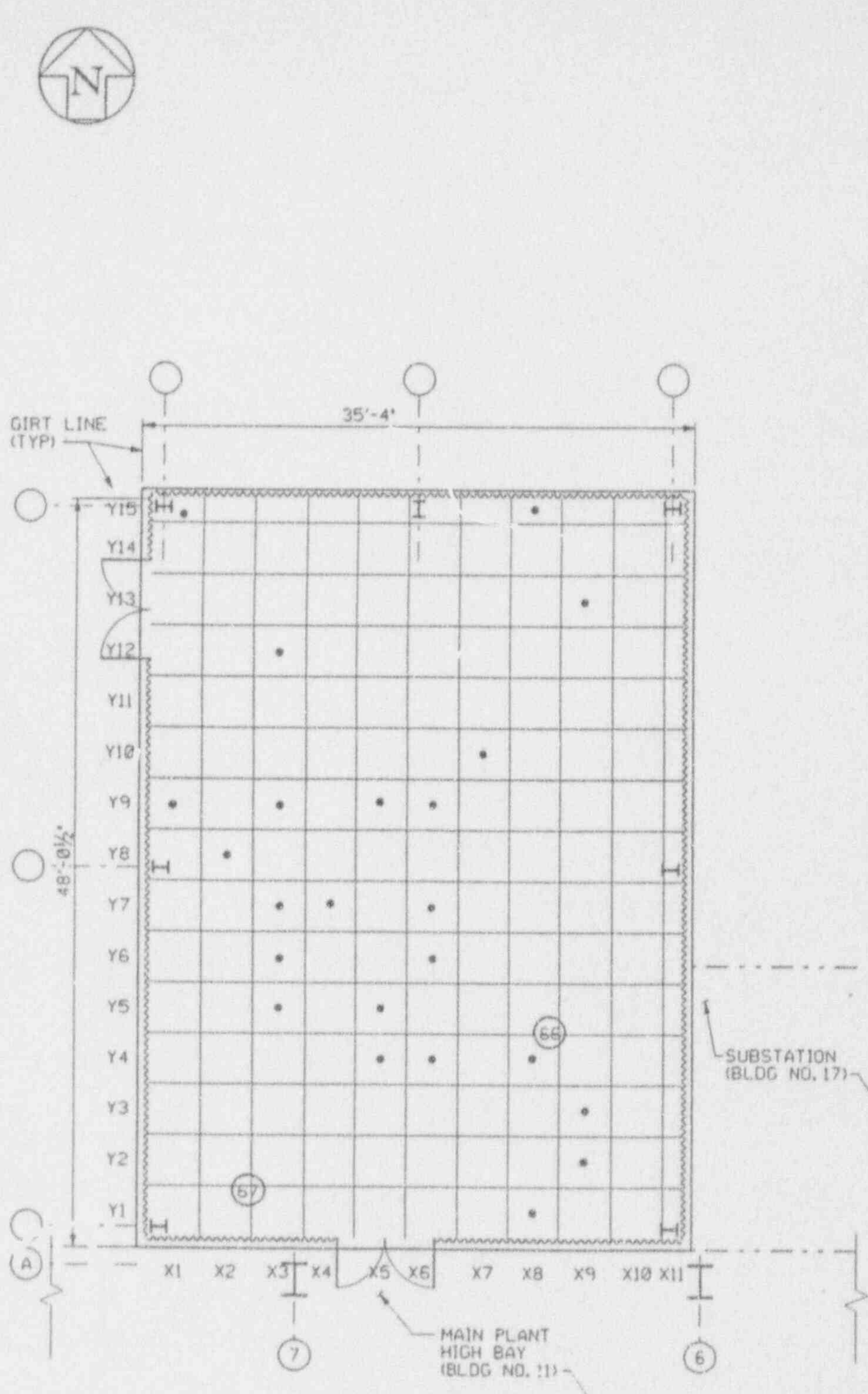
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIOINS
ELEVATIONS
TOOL CRIB

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/DWR	03-25-92			MSF/MWD	08-11-92

PLANT/BLDG NO: BLDG NO 15
SCALE: NONE

WBS 1.1.2.2.1.2.0
00-90701
SK-X-00441
REV: A



N
35'-4"
GIRT LINE
(TYP)
48'-0½"
Y15
Y14
Y13
Y12
Y11
Y10
Y9
Y8
Y7
Y6
Y5
Y4
Y3
Y2
Y1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
66
67
A
7
6
SUBSTATION
(BLDG NO. 17)
MAIN PLANT
HIGH BAY
(BLDG NO. 11)

FLOOR PLAN

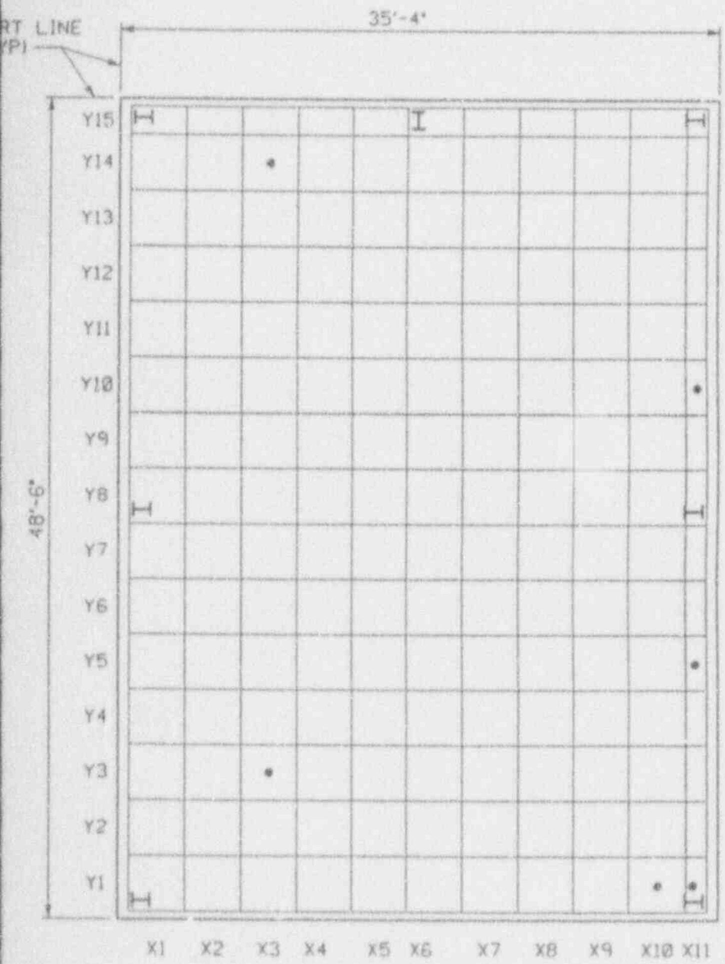
NOTES

JUDGEMENTAL SAMPLE LOCATIONS

66. DUCTWORK BEFORE HEPA (INTERIOR SURFACE).
67. STACK (EXTERIOR SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR	CEILING
1. X3,Y9	1. X11,Y5
2. X3,Y12	2. X11,Y10
3. X5,Y5	3. X3,Y14
4. X6,Y7	4. X11,Y1
5. X9,Y2	5. X10,Y1
6. X4,Y7	6. X3,Y3
7. X3,Y6	
8. X8,Y4	
9. X8,Y15	
10. X9,Y3	
11. X3,Y5	
12. X8,Y1	
13. X9,Y13	
14. X1,Y15	
15. X6,Y9	
16. X5,Y4	
17. X6,Y4	
18. X2,Y8	
19. X3,Y7	
20. X1,Y9	
21. X6,Y6	
22. X5,Y9	
23. X7,Y10	



PROJECTED CEILING PLAN

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UNITED STATES DEPARTMENT OF ENERGY

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CINCINNATI, OHIO

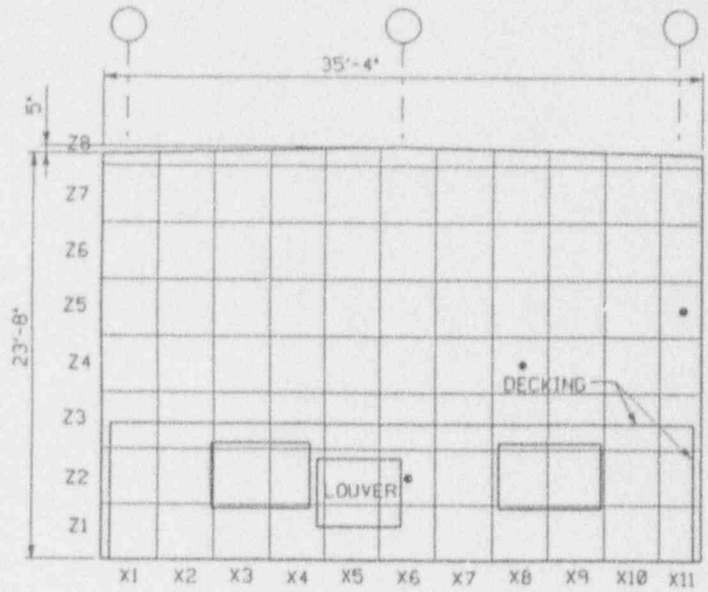
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
DIE HEAD FILTER BUILDING

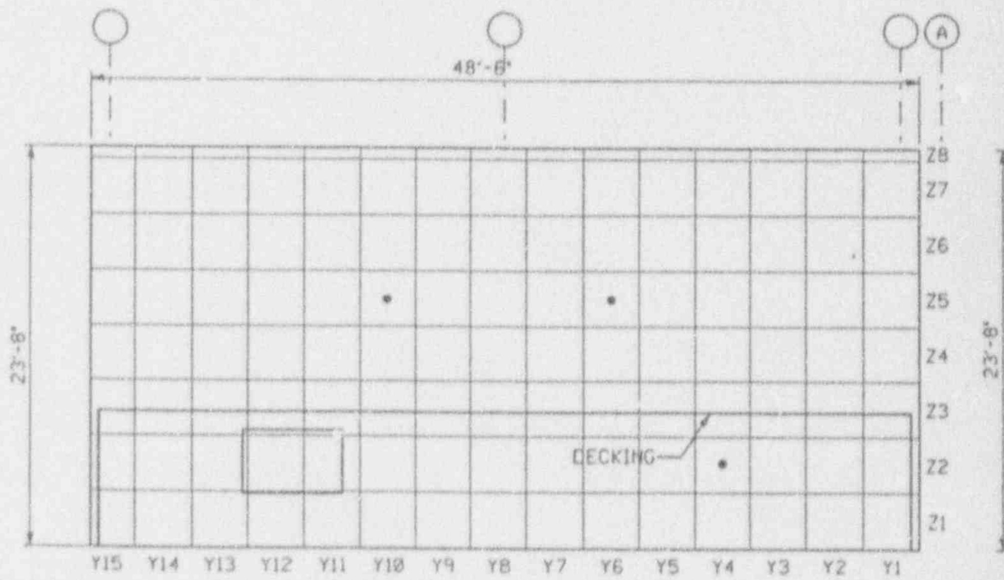
DRAWN BY KLR/DWR DATE 02-26-92 CHECKED BY MSF/MAU
BLDG NO 16 SCALE NONE

WBS 1.1.2.2.1.2.8 00-90701 SK-X-00442 A

9404080147-72



NORTH INTERIOR ELEVATION



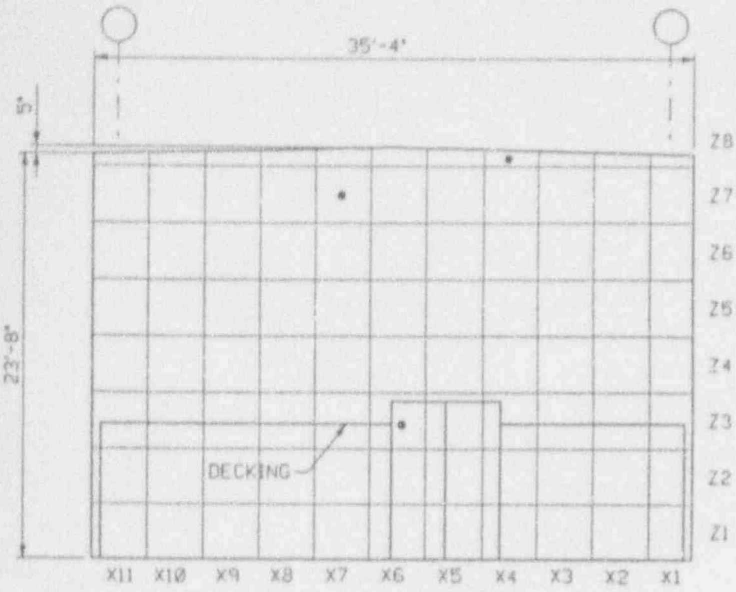
EAST INTERIOR ELEVATION

NOTES

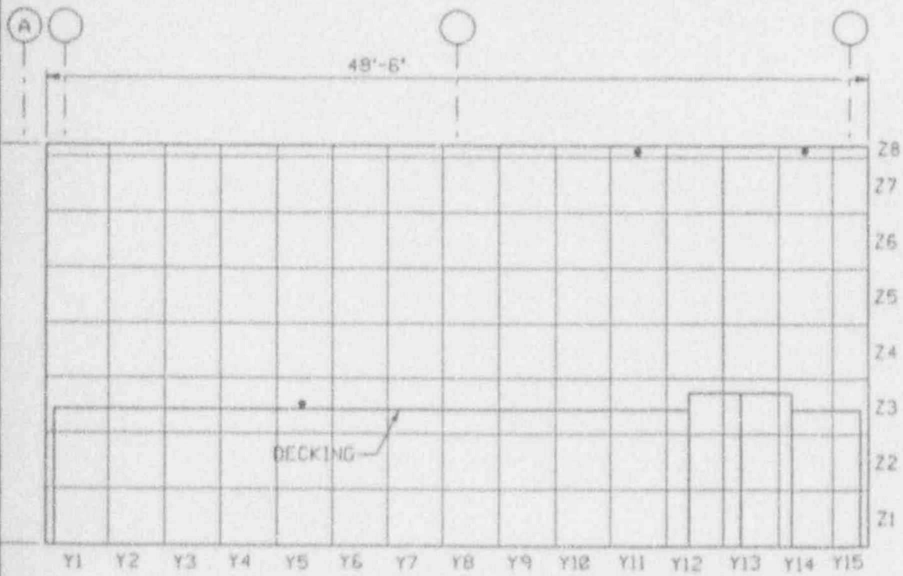
RANDOM SAMPLE LOCATIONS

NORTH WALL	SOUTH WALL
1. X6,Z2	1. X4,Z8
2. X11,Z5	2. X6,Z3
3. X8,Z4	3. X7,Z7

EAST WALL	WEST WALL
1. Y10,Z5	1. Y14,Z8
2. Y6,Z5	2. Y11,Z8
3. Y4,Z2	3. Y5,Z3



SOUTH INTERIOR ELEVATION



WEST INTERIOR ELEVATION

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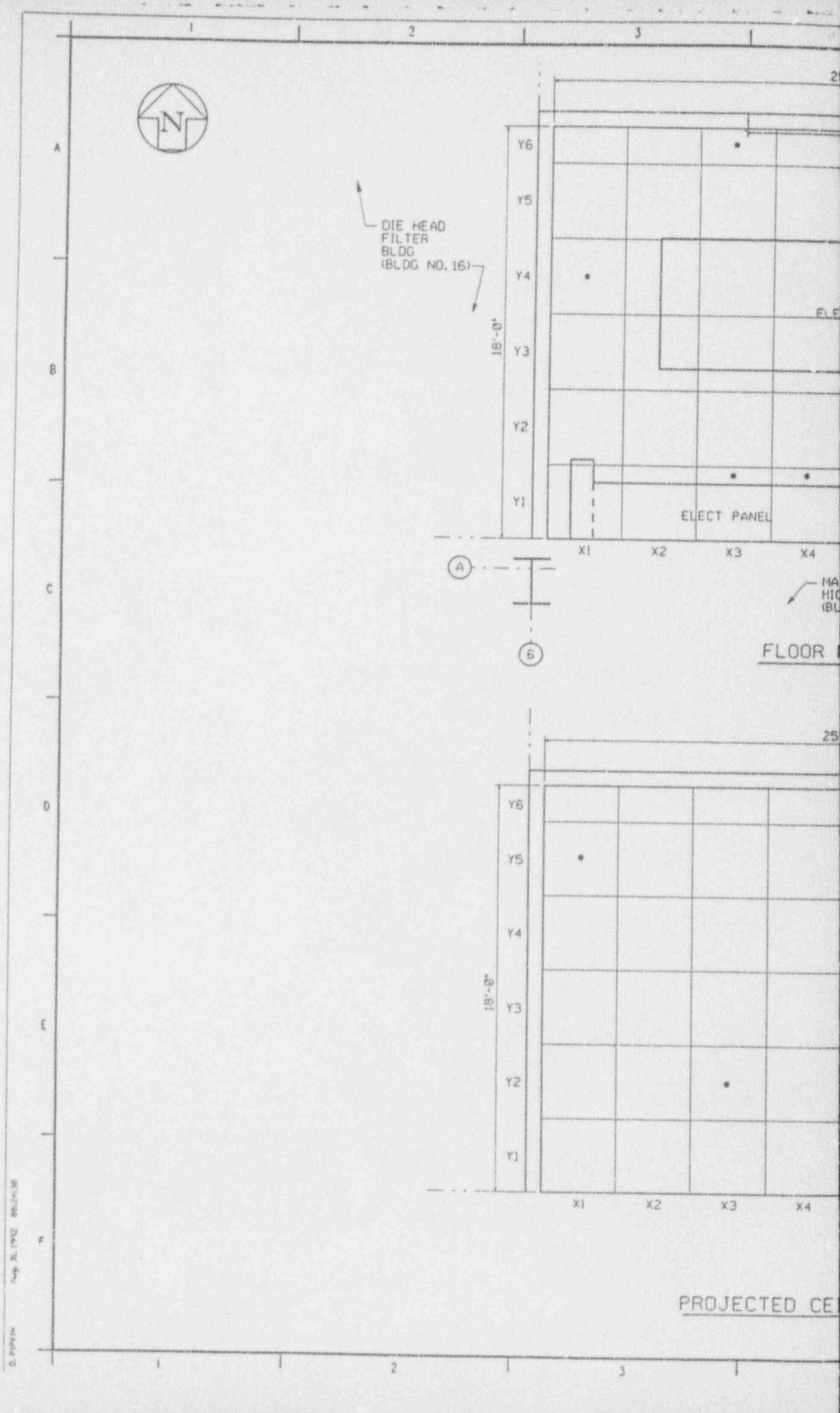
CINCINNATI, OHIO

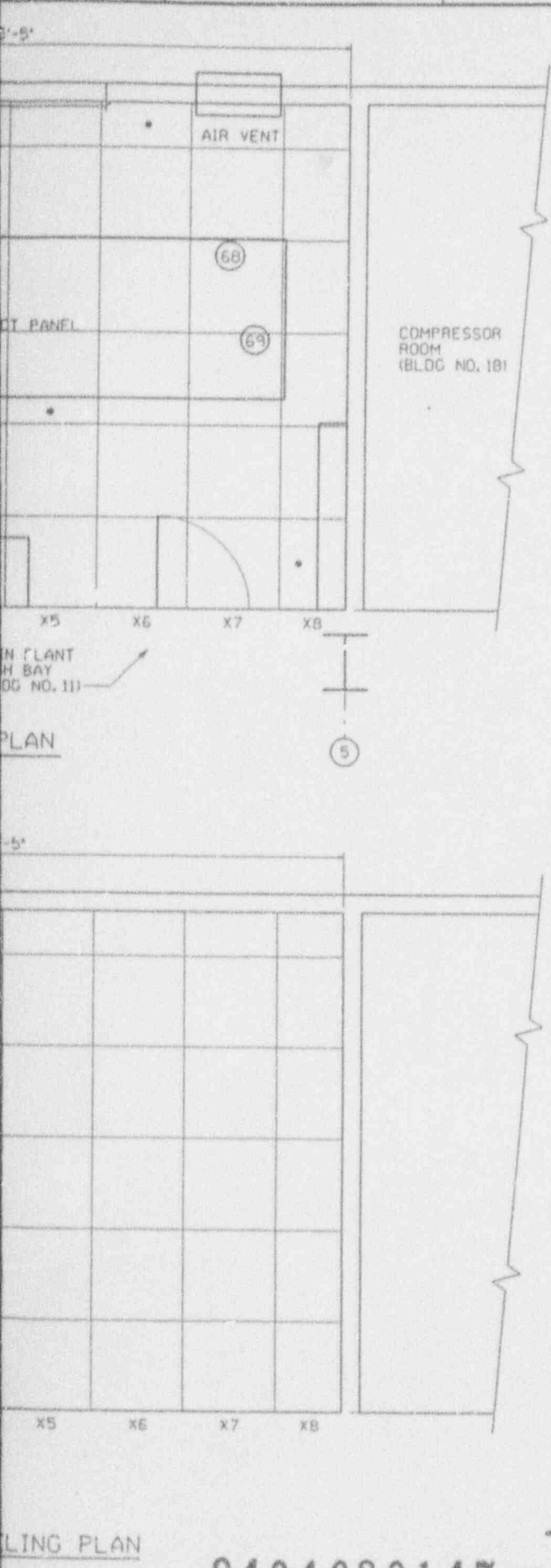
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
DIE HEAD FILTER BUILDING

DRAWN BY JSB/DVR DATE 03-25-92 CHECKED BY MSF/NAD DATE 08-14-92
BLDG NO 16 SCALE NONE
WBS 1.1.2.2.1.2.8 00-90701 SK-X-00443 A

9404080147-73


N
DIE HEAD
FILTER
BLDG
(BLDG NO. 16)
Y6
Y5
Y4
Y3
Y2
Y1
18'-0"
ELECT PANEL
X1
X2
X3
X4
A
6
FLOOR
Y6
Y5
Y4
Y3
Y2
Y1
18'-0"
X1
X2
X3
X4
PROJECTED



NOTES

JUDGEMENTAL SAMPLE LOCATIONS

68. INTAKE GRID OF TRANSFORMER.
69. TRANSFORMER (EXTERNALSURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR
1. X5,Y3
2. X8,Y1
3. X6,Y6
4. X3,Y6
5. X1,Y4
6. X3,Y1
7. X4,Y1

CEILING
1. X1,Y5
2. X3,Y2

ANSTEC APERTURE CARD

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CINCINNATI, OHIO

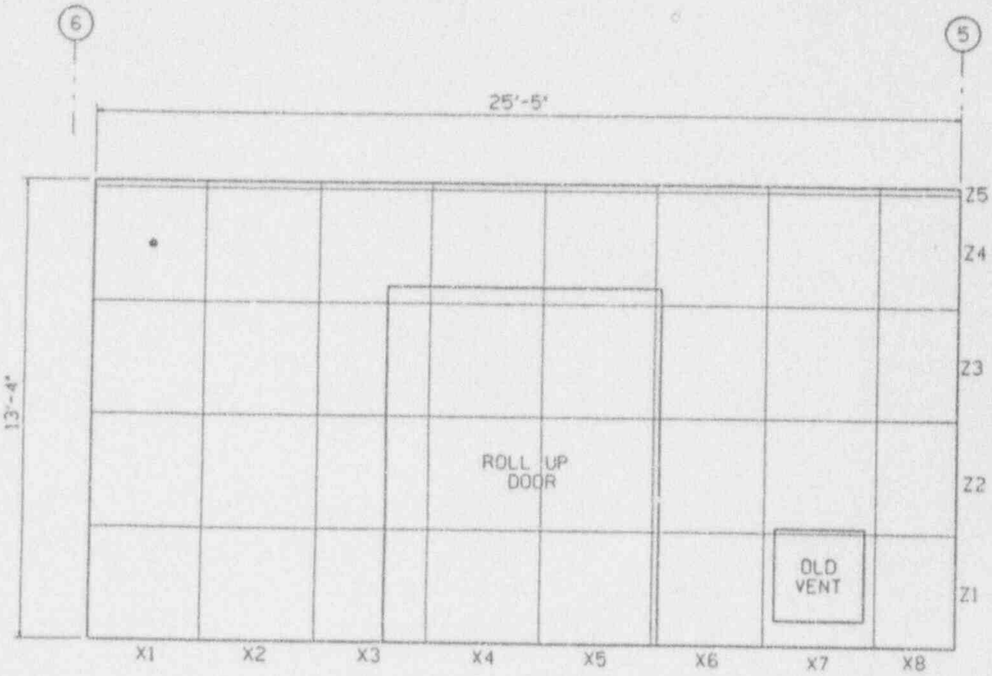
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
SUB STATION

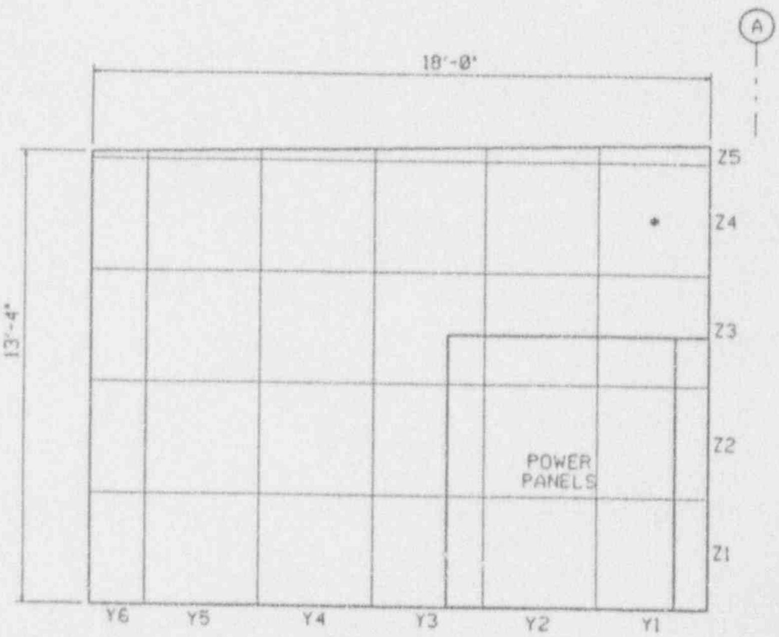
DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
JSB/DWR	03-25-92			MSF/MAO	08-14-92
BLDG NO 17				SCALE NONE	

WBS 1.1.2.2.1.2.0
00-90701
SK-X-00444
A

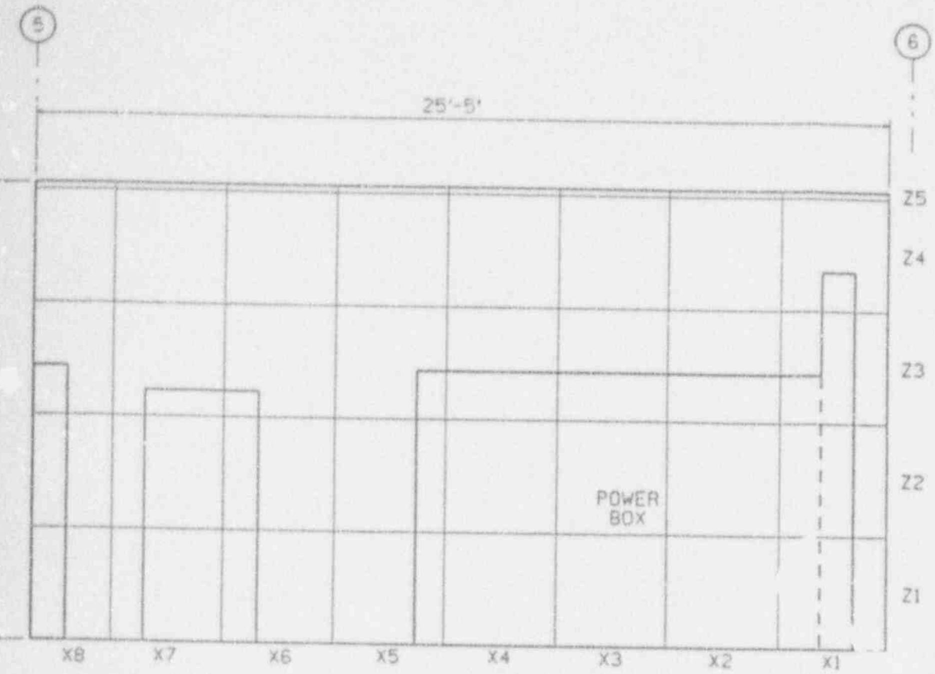
9404080147-74



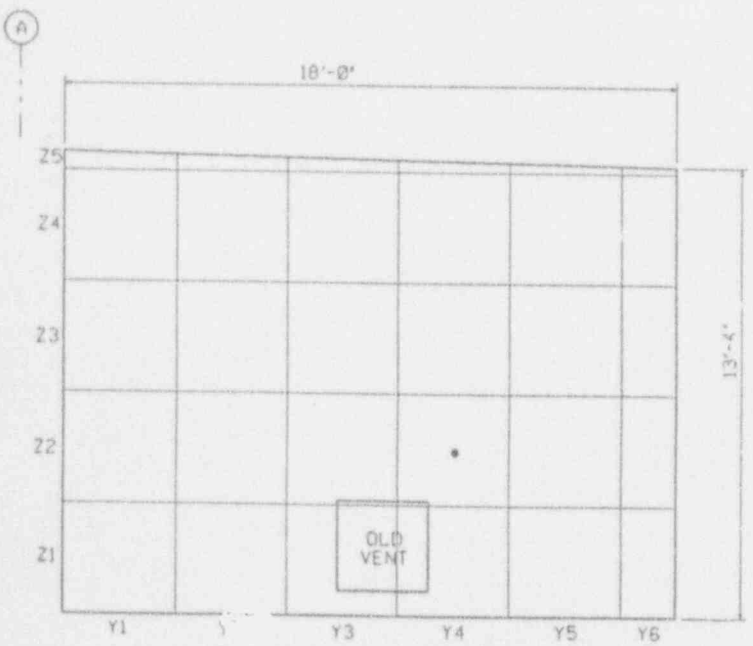
NORTH INTERIOR ELEVATION



EAST INTERIOR ELEVATION



SOUTH INTERIOR ELEVATION



WEST INTERIOR ELEVATION

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL
1. X1,Z4

EAST WALL
1. Y1,Z4

WEST WALL
1. Y4,Z2

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	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE

UNITED STATES DEPARTMENT OF ENERGY

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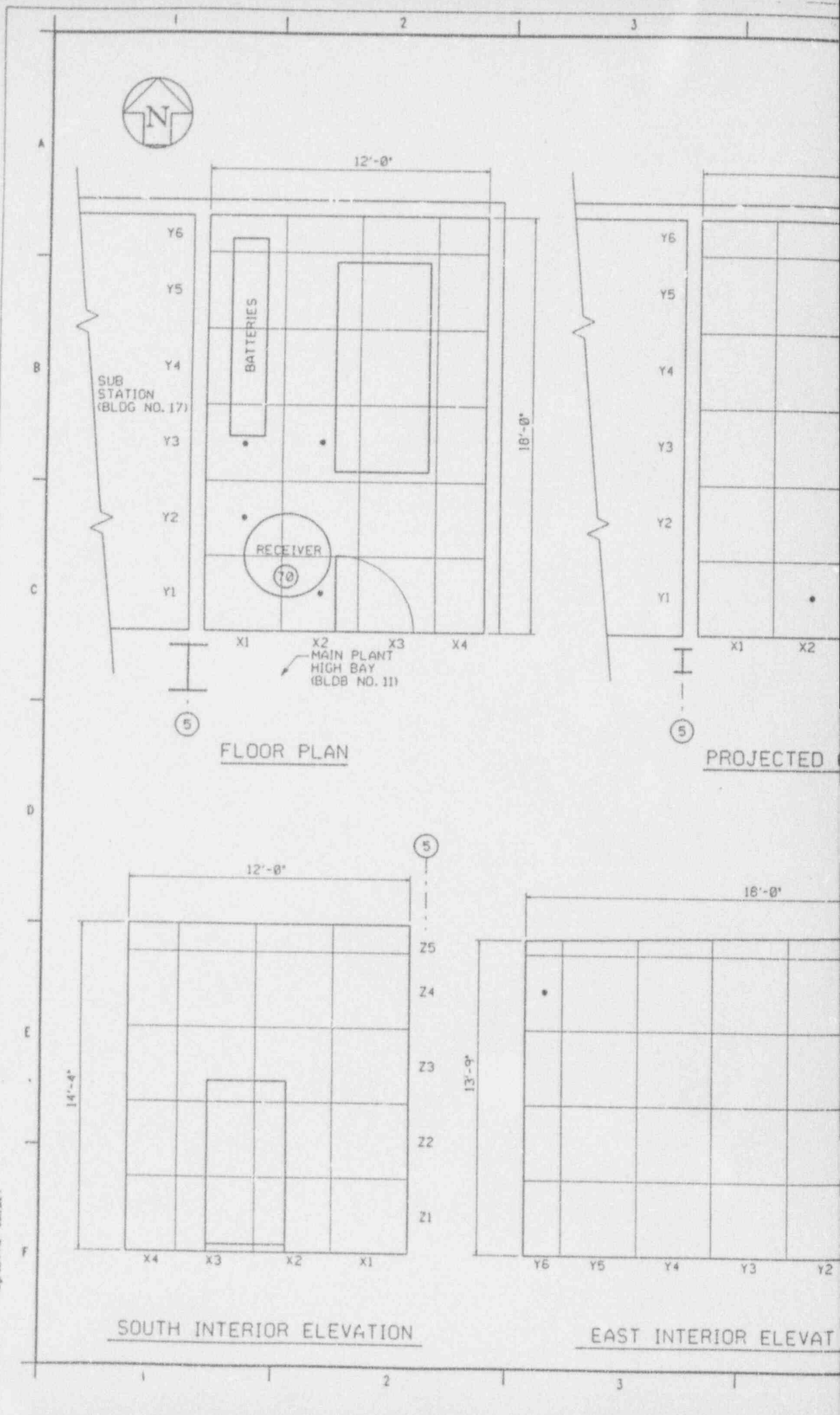
CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
SUB STATION

DRAWN BY JSB/DMR	DATE 03-25-92	DESIGNED/CHECKED BY	DATE	CHECKED BY MSF/MAO	DATE 06-14-92
PLANT/BLDG NO. BLDG NO 17		FLOOR		SCALE NONE	CLASS
DOE PROJECT NO.	WBS 1.1.2.2.1.2.8 00-90701	DRAWING NO. SK-X-00445		SHEET NO.	REV NO. A

9404080147-75



N
12'-0"
18'-0"
Y6
Y5
Y4
Y3
Y2
Y1
BATTERIES
SUB
STATION
(BLDG NO. 17)
RECEIVER
70
X1
X2
X3
X4
MAIN PLANT
HIGH BAY
(BLDB NO. 11)
5
FLOOR PLAN
PROJECTED
12'-0"
14'-4"
Z5
Z4
Z3
Z2
Z1
SOUTH INTERIOR ELEVATION
18'-0"
13'-9"
EAST INTERIOR ELEVAT

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

70. AIR TANK (EXTERNAL SURFACE).

RANDOM SAMPLE LOCATIONS

FLOOR

1. X2,Y3
2. X2,Y1
3. X1,Y3
4. X1,Y2

CEILING

1. X2,Y1

EAST WALL

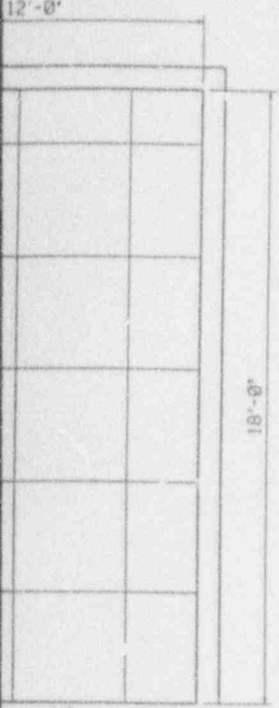
1. Y6,Z4

WEST WALL

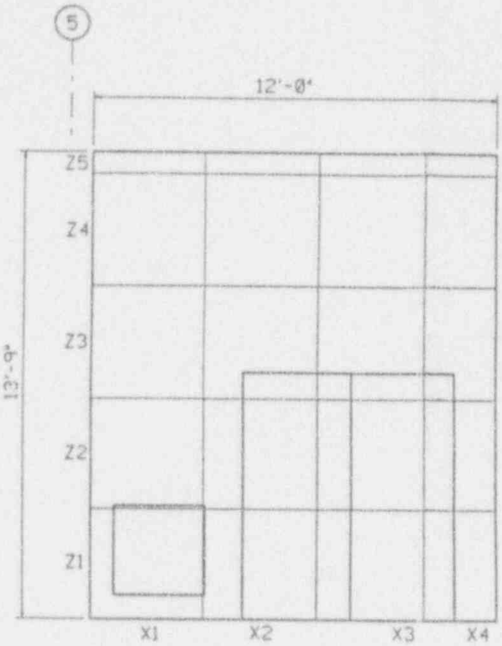
1. Y3,Z4

ANSTEC APERTURE CARD

Also Available on Aperture Card

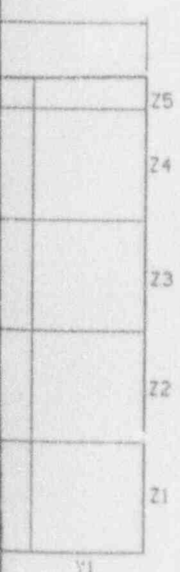


CEILING PL AN

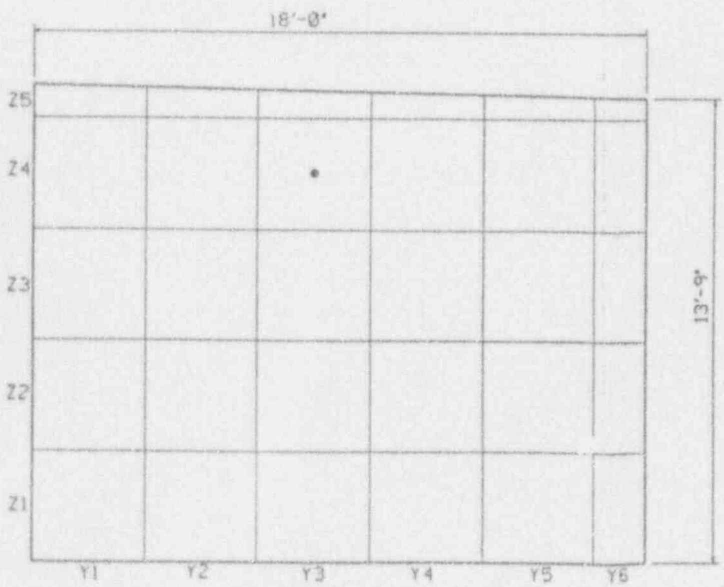


NORTH INTERIOR ELEVATION

9404080147-76



ON



WEST INTERIOR ELEVATION

REV. NO.	ISSUE OF REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE		
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CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN

RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE

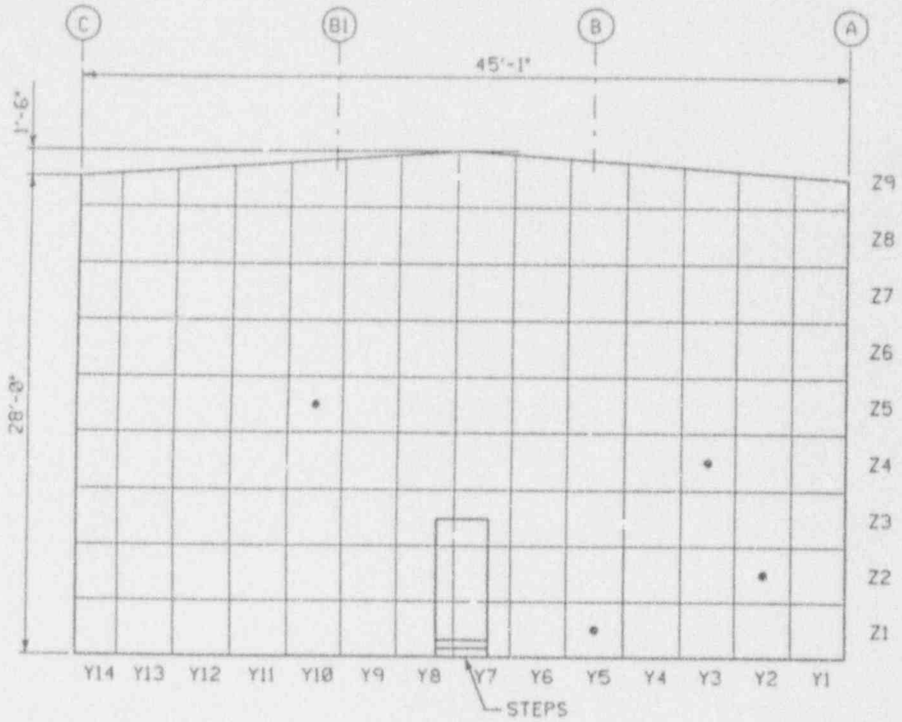
RADIOLOGICAL SAMPLING LOCATIONS

PLANS / ELEVATIONS

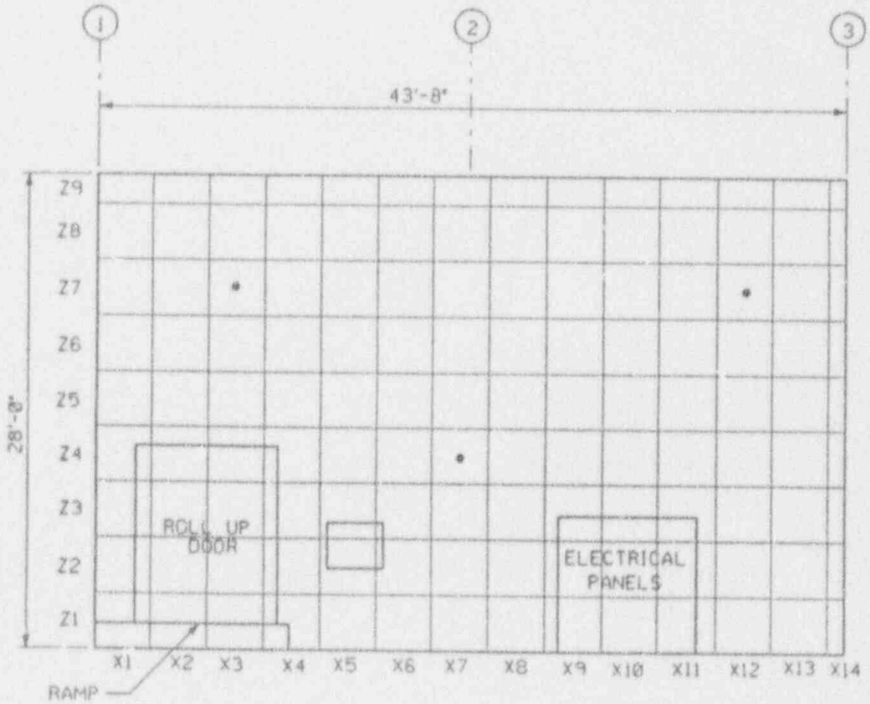
COMPRESSOR ROOM

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	03-25-92			HSF/DWR	08-14-92
PLANT/BLDG. NO. BLDG NO 18		FLOOR		SCALE NONE	
SUBMITTED FOR APPROVAL		APPROVED, RECOMMENDED		DRAWING APPROVED	

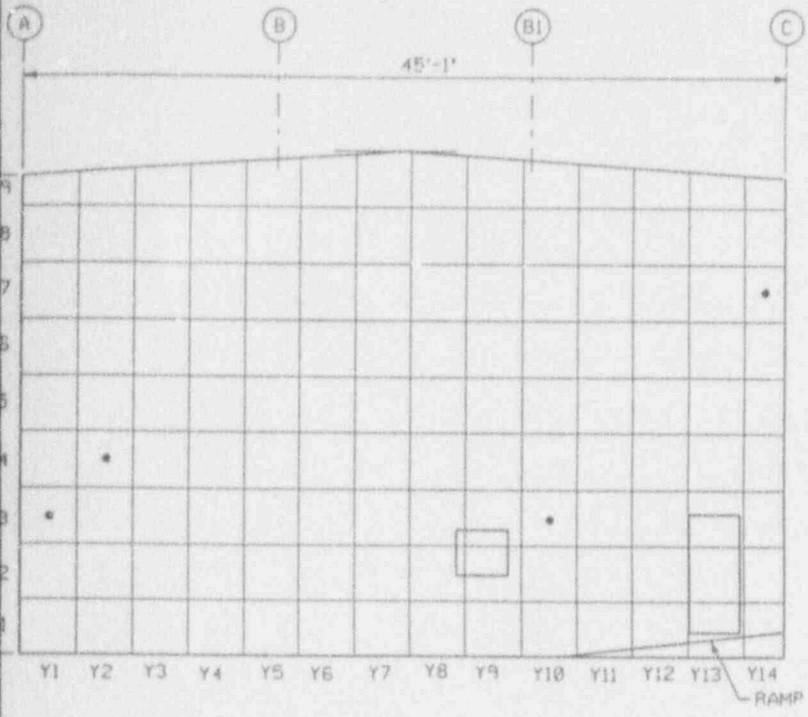
W.E. PROJECT NO.	SPEC. CONTR. PKG. NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.8 00-90701	SK-X-00446		A



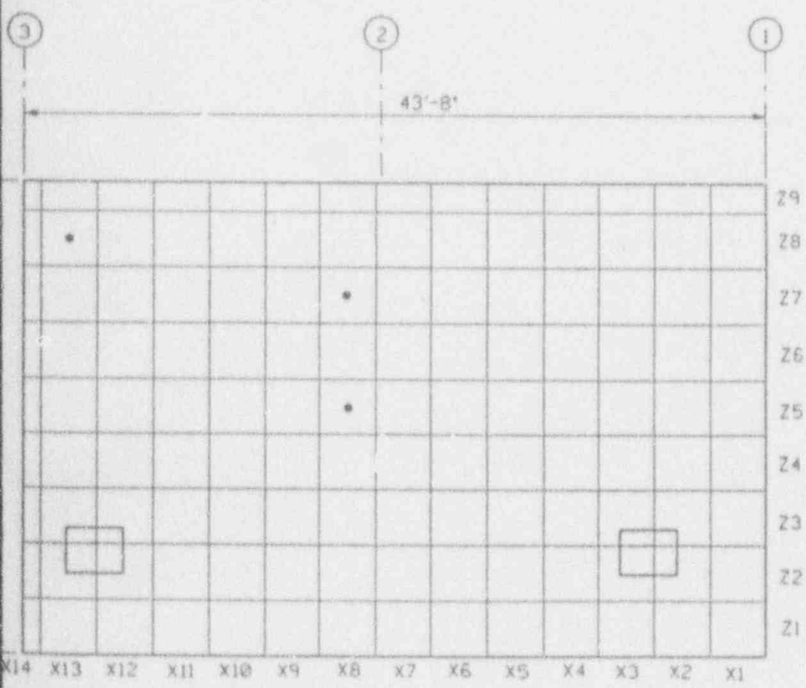
EAST INTERIOR ELEVATION



NORTH INTERIOR ELEVATION



WEST INTERIOR ELEVATION



SOUTH INTERIOR ELEVATION

9404080147-77

NOTES

RANDOM SAMPLING LOCATIONS

EAST WALL
1. Y2,Z2
2. Y5,Z1
3. Y10,Z5
4. Y3,Z4

WEST WALL
1. Y10,Z3
2. Y1,Z3
3. Y14,Z7
4. Y2,Z4

NORTH WALL
1. X12,Z7
2. X7,Z4
3. X3,Z7

SOUTH WALL
1. X13,Z8
2. X8,Z5
3. X8,Z7

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A	90% CLIENT REVIEW			

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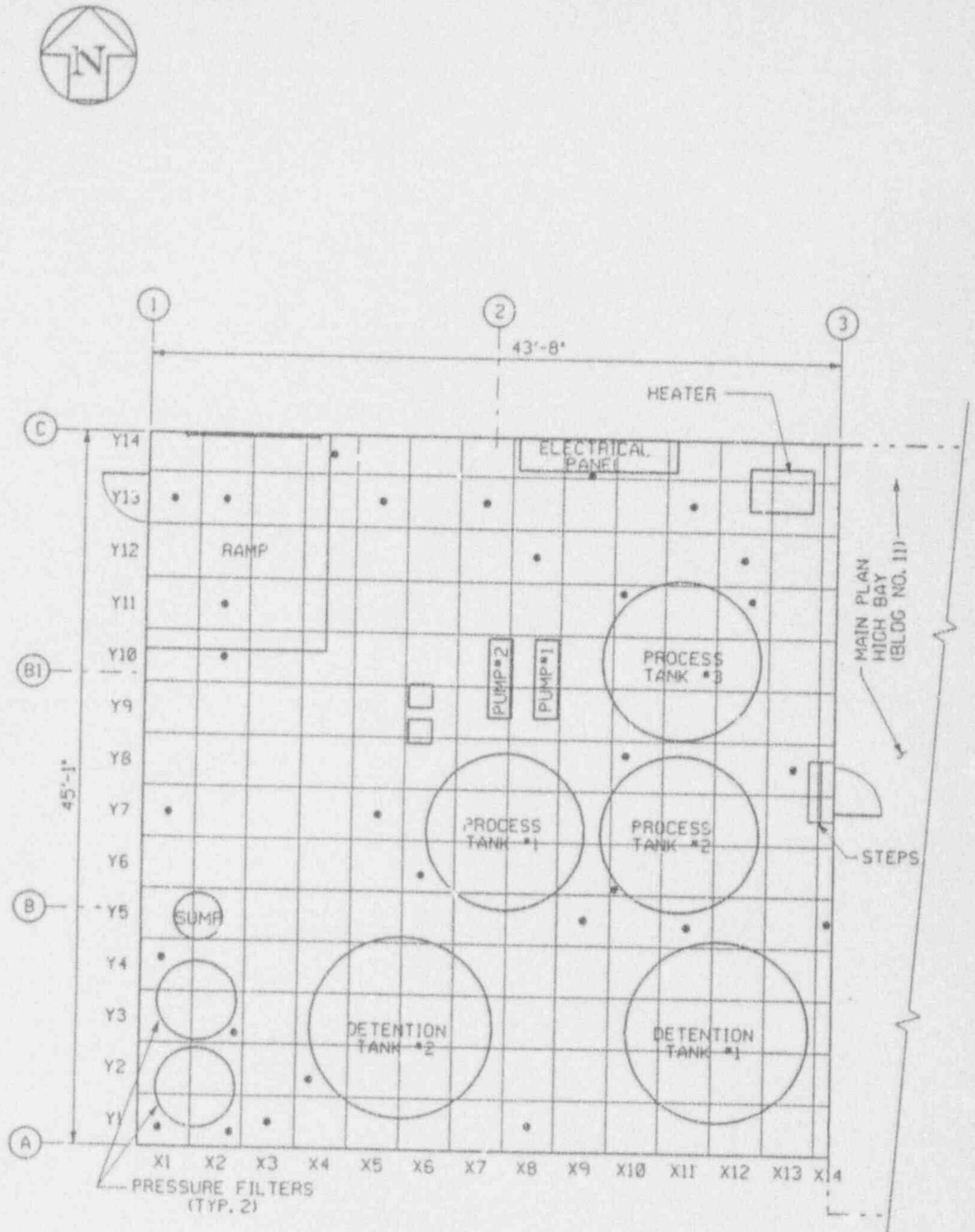
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

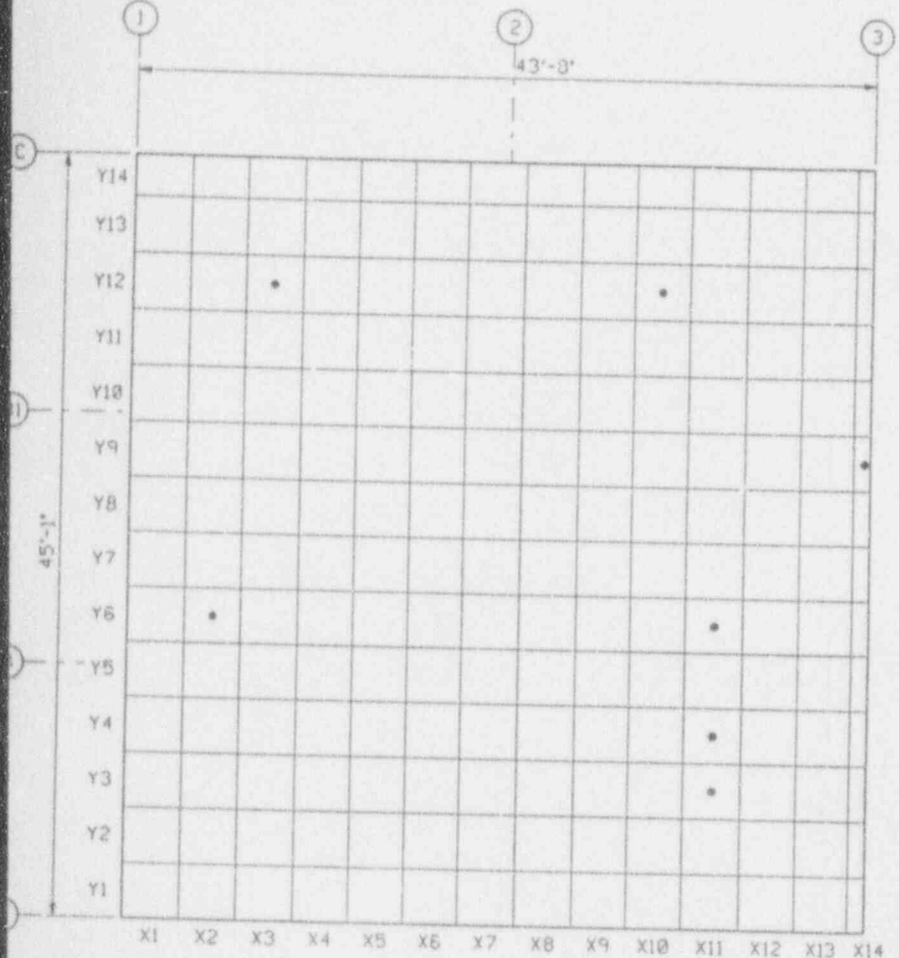
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
WASTEWATER TREATMENT PLANT

DRAWN BY: JSB/MAO — DATE: 03-25-92 — CHECKED BY: MSF/DAR — DATE: 08-14-92
PLANT/BLDG NO: BLDG NO 19 — SCALE: NONE
WBS 1.1.2.2.1.2.0 — 00-90701 — DRAWING NO. SK-X-00448 — REV A



N
43'-8"
45'-1"
HEATER
ELECTRICAL PANEL
RAMP
PUMP #2
PUMP #1
PROCESS TANK #3
PROCESS TANK #1
PROCESS TANK #2
SUMP
DETENTION TANK #2
DETENTION TANK #1
STEPS
MAIN PLAN HIGH BAY (BLDG NO. 11)
PRESSURE FILTERS (TYP. 2)
Y14 Y13 Y12 Y11 Y10 Y9 Y8 Y7 Y6 Y5 Y4 Y3 Y2 Y1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14

FLOOR PLAN



PROJECTED CEILING PLAN

NOTES

RANDOM SAMPLE LOCATIONS

FLOOR	CEILING
1. X12,Y12	1. X14,Y9
2. X2,Y13	2. X3,Y12
3. X3,Y1	3. X11,Y4
4. X2,Y3	4. X10,Y12
5. X10,Y6	5. X11,Y3
6. X9,Y5	6. X2,Y6
7. X5,Y7	7. X11,Y6
8. X13,Y8	
9. X1,Y4	
10. X1,Y7	
11. X11,Y13	
12. X6,Y6	
13. X4,Y2	
14. X10,Y8	
15. X2,Y10	
16. X14,Y5	
17. X5,Y13	
18. X11,Y5	
19. X8,Y1	
20. X12,Y11	
21. X7,Y13	
22. X4,Y14	
23. X1,Y1	
24. X8,Y12	
25. X9,Y14	
26. X2,Y11	
27. X1,Y13	
28. X2,Y1	
29. X10,Y11	

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APERTURE
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CINCINNATI, OHIO

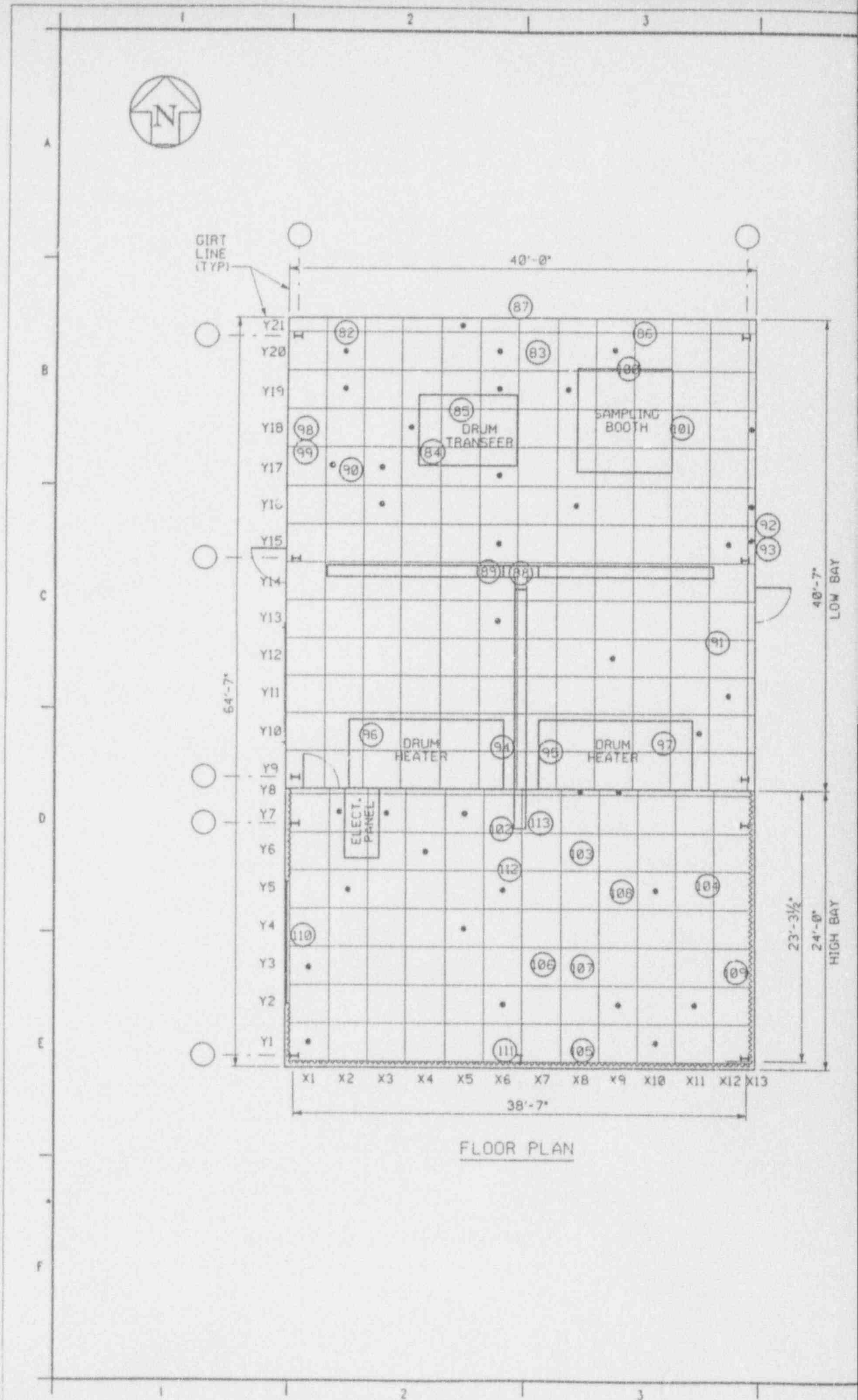
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR AND PROJECTED CEILING PLANS
WASTEWATER TREATMENT PLANT

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/HAD	02-27-92			MSF/DWR	08-14-92
PLANT/BLDG NO. BLDG NO 19		FLOOR		SCALE NONE	CLASS

DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00447		A

9404080147-78



N
GIRT LINE (TYP)
40'-0"
64'-7"
40'-7" LOW BAY
24'-0" HIGH BAY
23'-3½"
38'-7"
DRUM TRANSFER
SAMPLING BOOTH
DRUM HEATER
DRUM HEATER
ELECT. PANEL
Y21 Y20 Y19 Y18 Y17 Y16 Y15 Y14 Y13 Y12 Y11 Y10 Y9 Y8 Y7 Y6 Y5 Y4 Y3 Y2 Y1
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13
82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113

FLOOR PLAN

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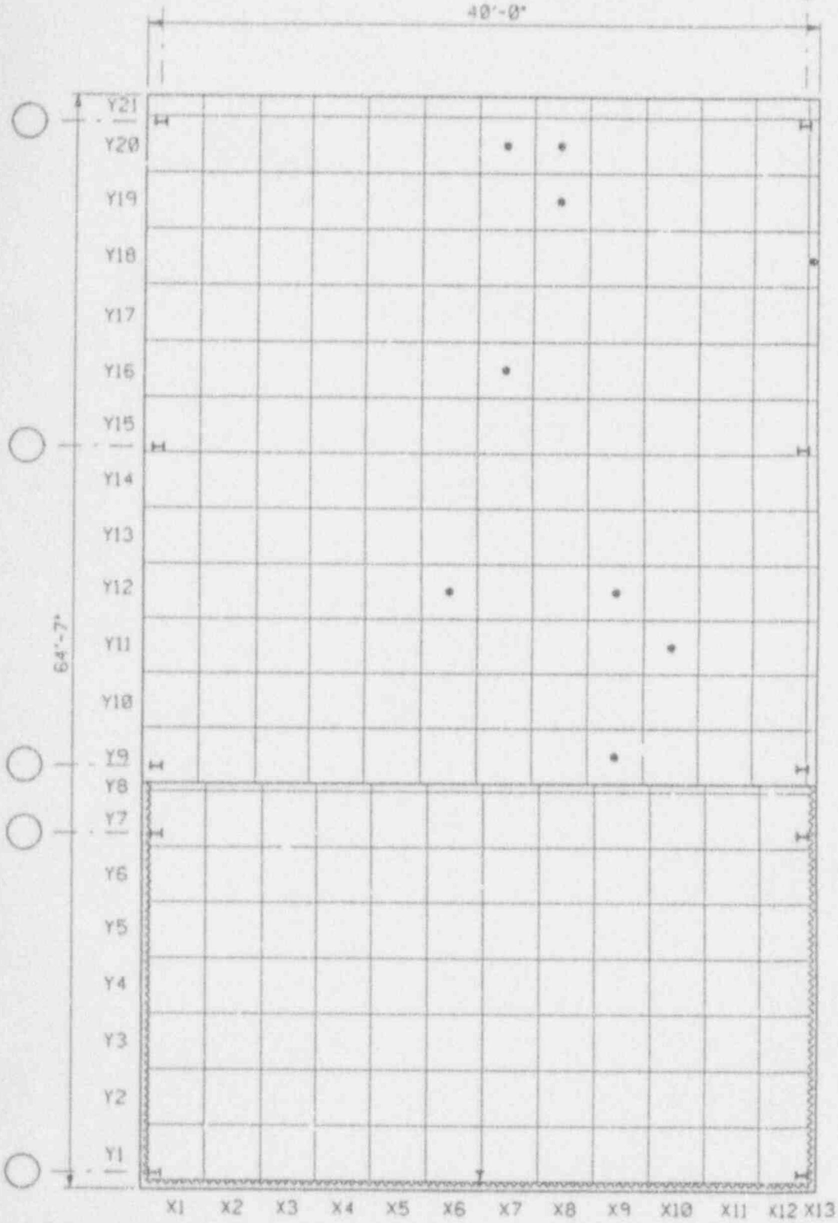

PROJECTED CEILING PLAN

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

82. SILL N-W CORNER
83. FLOOR DRAIN 22'-8" FROM N-W CORNER.
84. DRUM LEDGE OXIDE TRANSFER BOX.
85. TOP OXIDE TRANSFER BOX (HORIZONTAL).
86. DUCTWORK OXIDE TRANSFER BOX.
87. TOP HEATER HUNG FROM CEILING.
88. TRENCH DRAIN
89. HOLDUP BARRIER IN TRENCH.
90. LIFT BEAM HORIZONTAL (WEST).
91. LIFT BEAM HORIZONTAL (EAST).
92. ELECTRICAL CONDUIT FLOOR PENETRATION.
93. ELECTRICAL CONDUIT ACCESS AT 90 DEGREES (HORIZONTAL).
94. DEAD END DRUM HEAT HEATER DUCTWORK.
95. DEAD END DRUM HEAT HEATER DUCTWORK.
96. DRUM HEATER (BURING LATHE TURNS) INTERIOR.
97. DRUM HEATER (BURING LATHE TURNS) INTERIOR.
98. ELECTRICAL PANELS INTERIOR
99. ELECTRICAL PANEL CONDUIT ELBOW PANEL SP (HORIZONTAL).
100. DUCTWORK ELBOW (LOWPOINT) HORIZONTAL.
101. DUCTWORK SAMPLING BOTH (RECTANGULAR)
102. CAPPED END (WAS TO BAG HOUSE AND FILTERS).
103. BAG HOUSE FALL OUT
104. INTERIOR FILTER BOX.
105. COLLAR AFTER BLOWER UP TO STACK.
106. STACK FALLOUT (FLOOR LEVEL).
107. STACK FLANGE PRIOR TO LEAVING ROOF.
108. COLLECTION DRUM COLLAR AT FALLOUT FROM FILTER BOX.
109. HORIZONTAL STRUCTURAL BEAM AT 16'-0" HIGH.
110. TOP ROLL UP DOOR.
111. HORIZONTAL STRUCTURAL BEAM AT 12'-0" HIGH.
112. PORTABLE HEPA BOX.
113. FLOOR DRAIN.

RANDOM SAMPLE LOCATIONS

FLOOR	FLOOR	CEILING
1. X4,Y6	20. X8,Y19	1. X9,Y9
2. X5,Y7	21. X6,Y17	2. X8,Y20
3. X3,Y16	22. X8,Y8	3. X10,Y11
4. X6,Y20	23. X4,Y18	4. X6,Y12
5. X9,Y8	24. X5,Y4	5. X9,Y12
6. X6,Y13	25. X1 ,Y1	6. X8,Y19
7. X2,Y5	26. X9,Y12	7. X7,Y16
8. X8,Y16	27. X2,Y19	8. X13,Y18
9. X11,Y10	28. X13,Y15	9. X7,Y20
10. X2,Y17	29. X12,Y11	
11. X6,Y19	30. X2,Y7	
12. X3,Y17	31. X9,Y2	
13. X11,Y2	32. X6,Y5	
14. X1,Y3	33. X6,Y2	
15. X5,Y21	34. X3,Y7	
16. X13,Y18	35. X6,Y15	
17. X10,Y1	36. X13,Y16	
18. X2,Y20	37. X12,Y15	
19. X10,Y5	38. X9,Y20	

REV. NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	90% CLIENT REVIEW	

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS

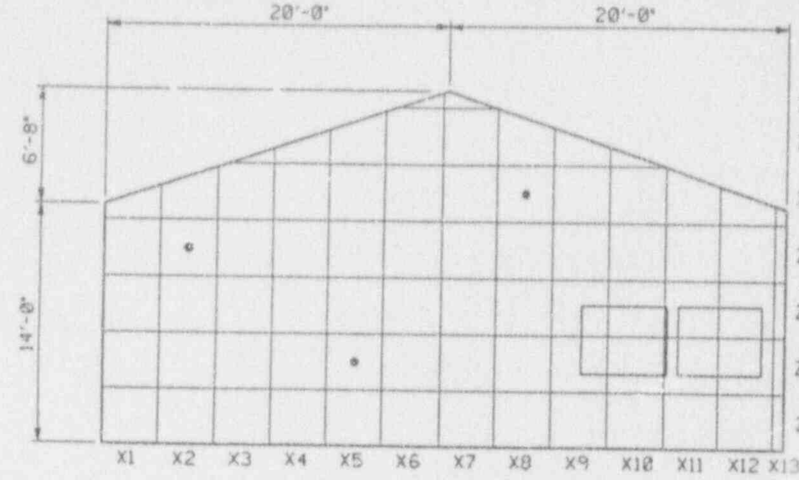
DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
RF-3 BUTLER BUILDING

DRAWN BY	DATE	DESIGNED/CHECKED BY	DATE	CHECKED BY	DATE
KLB/MAO	03-03-92			MSF/DWR	08-11-92

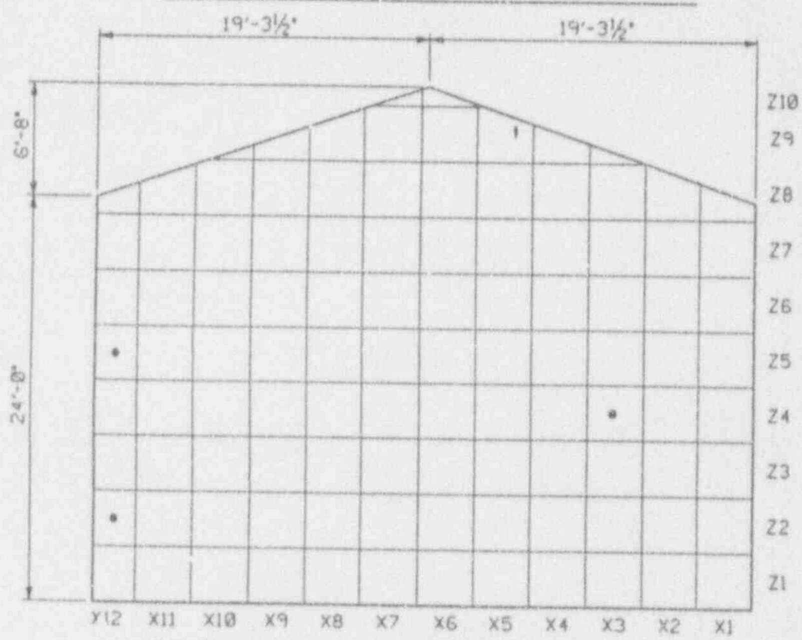
BLDG NO	FLOOR	SCALE
BLDG NO 28		NONE

OPER. CENTRE PROJ. NO.	DRAWING NO	SHEET NO	REV NO
WBS 1.1.2.2.1.2.8 00-90701	SK-X-00449		A

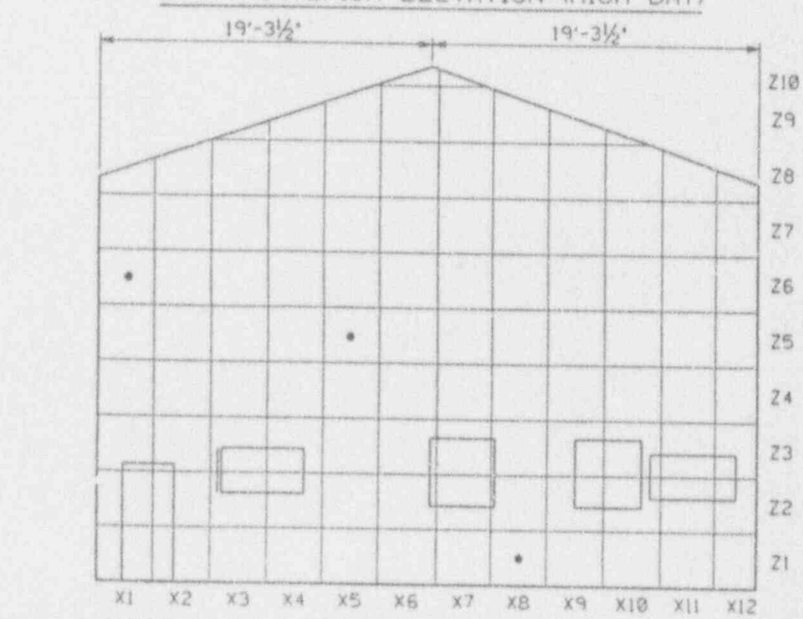
9404080147-79



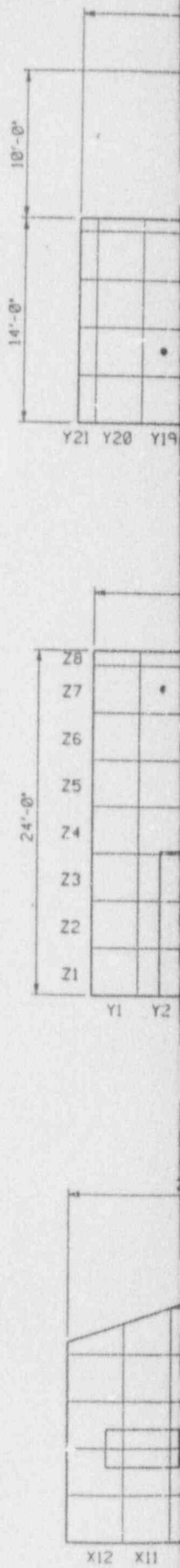
NORTH INTERIOR ELEVATION (LOW BAY)



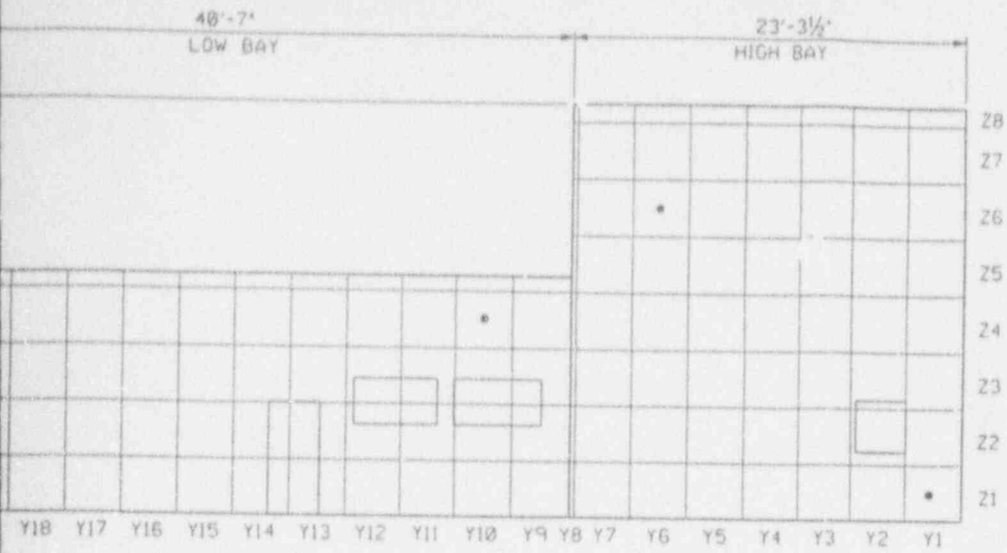
SOUTH INTERIOR ELEVATION (HIGH BAY)



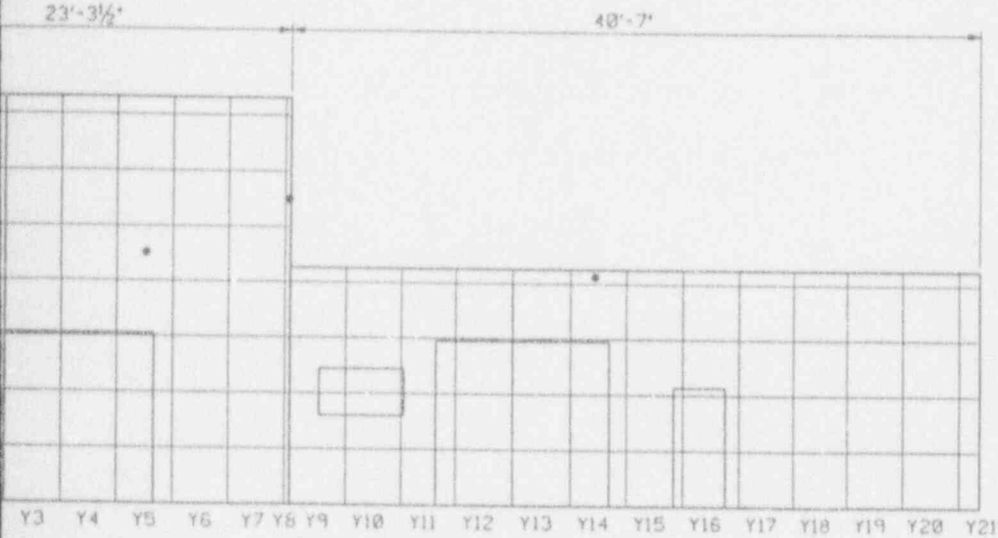
NORTH INTERIOR WALL ELEVATION (HIGH BAY)



SOUTH

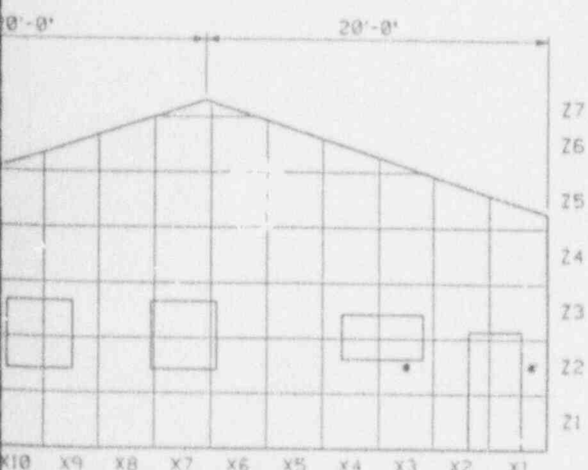


EAST INTERIOR ELEVATION



WEST INTERIOR ELEVATION

9404080147 - 80



INTERIOR WALL ELEVATION (LOW BAY)

NOTES

RANDOM SAMPLE LOCATIONS

NORTH WALL (LOW BAY)
1. X2,Z4
2. X8,Z5
3. X5,Z2

SOUTH WALL (LOW BAY)
1. X3,Z2
2. X1,Z2

NORTH WALL (HIGH BAY)
1. X5,Z5
2. X8,Z1
3. X1,Z6

SOUTH WALL (HIGH BAY)
1. X12,Z2
2. X12,Z5
3. X3,Z4

EAST WALL
1. Y19,Z2
2. Y6,Z6
3. Y1,Z1
4. Y10,Z4

WEST WALL
1. Y2,Z7
2. Y14,Z5
3. Y8,Z6
4. Y5,Z5

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	90% CLIENT REVIEW	

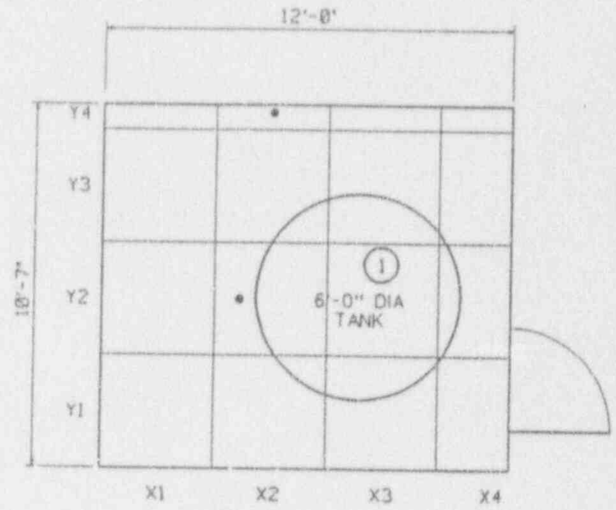
UNITED STATES
DEPARTMENT OF ENERGY

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. · CHAS. T. MAIN, INC. · ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

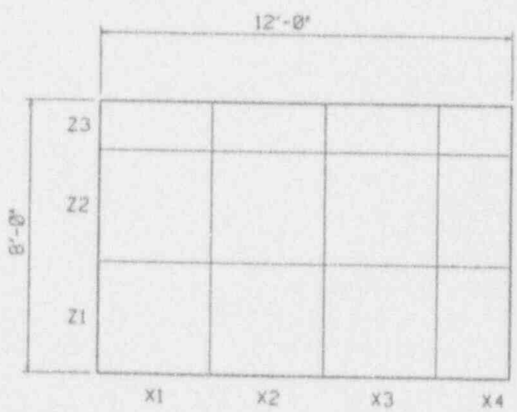
PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
RF-3 BUTLER BUILDING

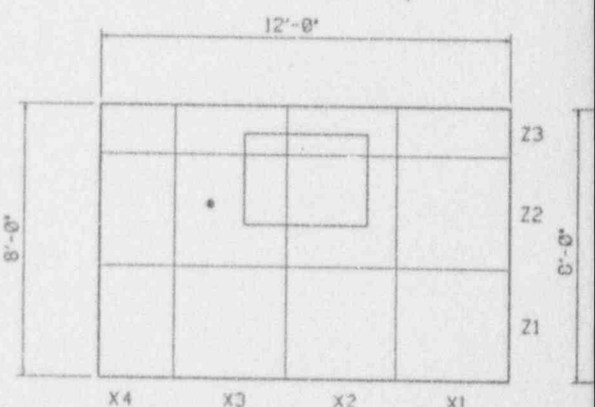
DRAWN BY JSB/MKO · DATE 03-03-92 · CHECKED BY MSF/DWR · DATE 08-14-92
BLDG NO 20 · SCALE NONE
WBS 1.1.2.2.1.2.0 · 00-90701 · DRAWING NO. 3K-X-00450 · REV A



FLOOR PLAN



NORTH INTERIOR ELEVATION



SOUTH INTERIOR ELEVATION

NOTES

JUDGEMENTAL SAMPLE LOCATIONS

1. TOP SURFACE OF TANK LID.

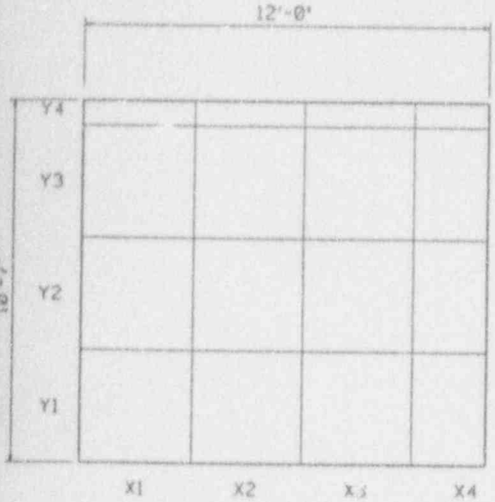
RANDOM SAMPLE LOCATIONS

FLOOR

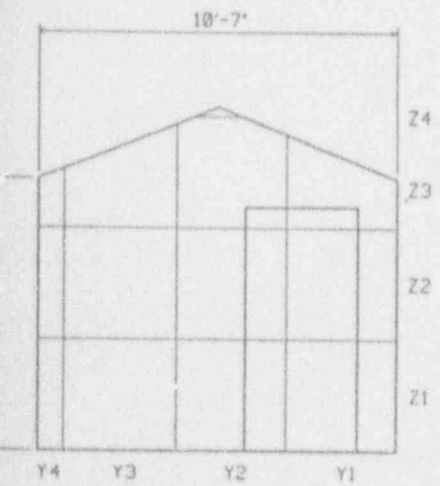
1. X2,Y2
2. X2,Y4

SOUTH WALL

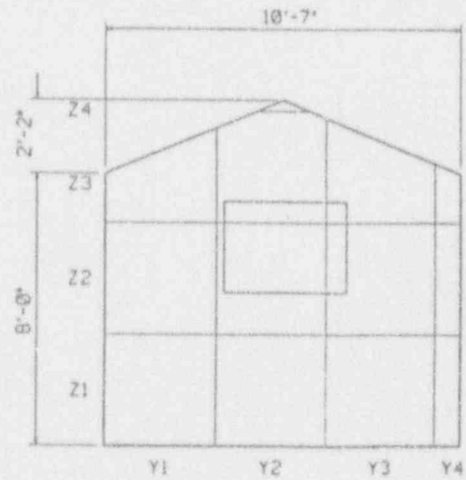
1. X3,Z2



PROJECTED CEILING PLAN



EAST INTERIOR ELEVATION



WEST INTERIOR ELEVATION

REV NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	90% CLIENT REVIEW

UNITED STATES DEPARTMENT OF ENERGY

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PARSONS

THE RALPH M. PARSONS CO. • CHAS. T. MAIN, INC. • ENGINEERING-SCIENCE, INC.

CINCINNATI, OHIO

PROJECT NAME: RMI ENVIRONMENTAL MANAGEMENT PLAN RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE: RADIOLOGICAL SAMPLING LOCATIONS PLANS / ELEVATIONS SEWAGE DISPOSAL PLANT

DRAWN BY	DATE	CHECKED BY	DATE
JSB/MAO	03-25-92	MSF/DWR	08-14-92

PLANT/BLDG NO: BLDG NO 23

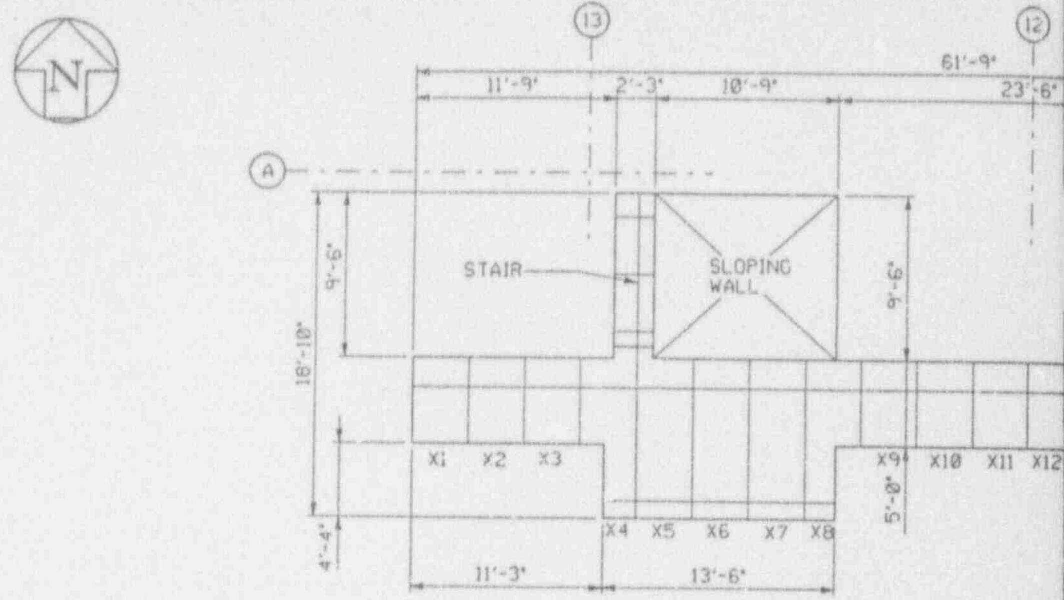
SCALE: NONE

WBS 1.1.2.2.1.2.8 00-90701

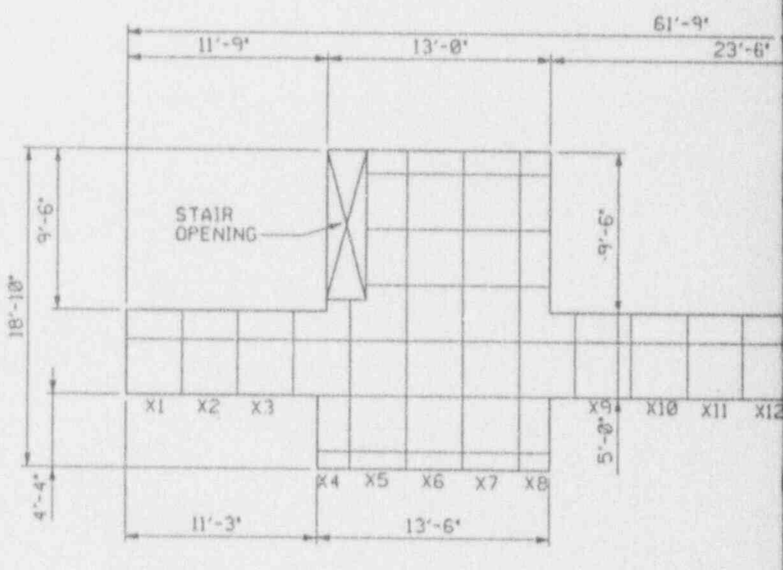
DRAWING NO: SK-X-00456

REV NO: A

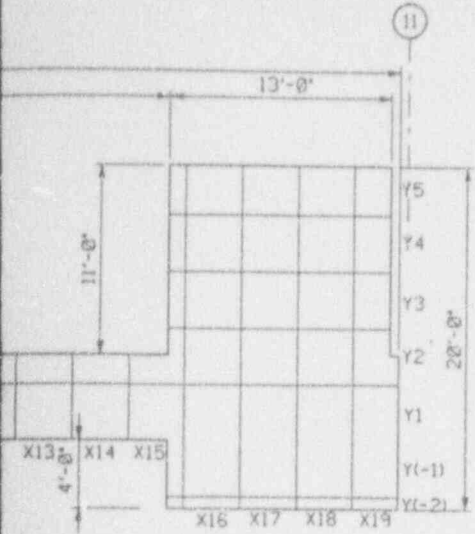
9404080147 - 81

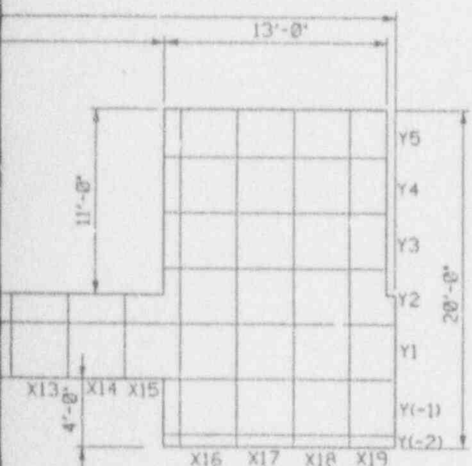


FLOOR PLAN



PROJECTED CEILING P





PLAN

NOTES

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	DESIGN	DOE
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PARSONS

THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME

RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS OU-RMI/P031

DRAWING TITLE

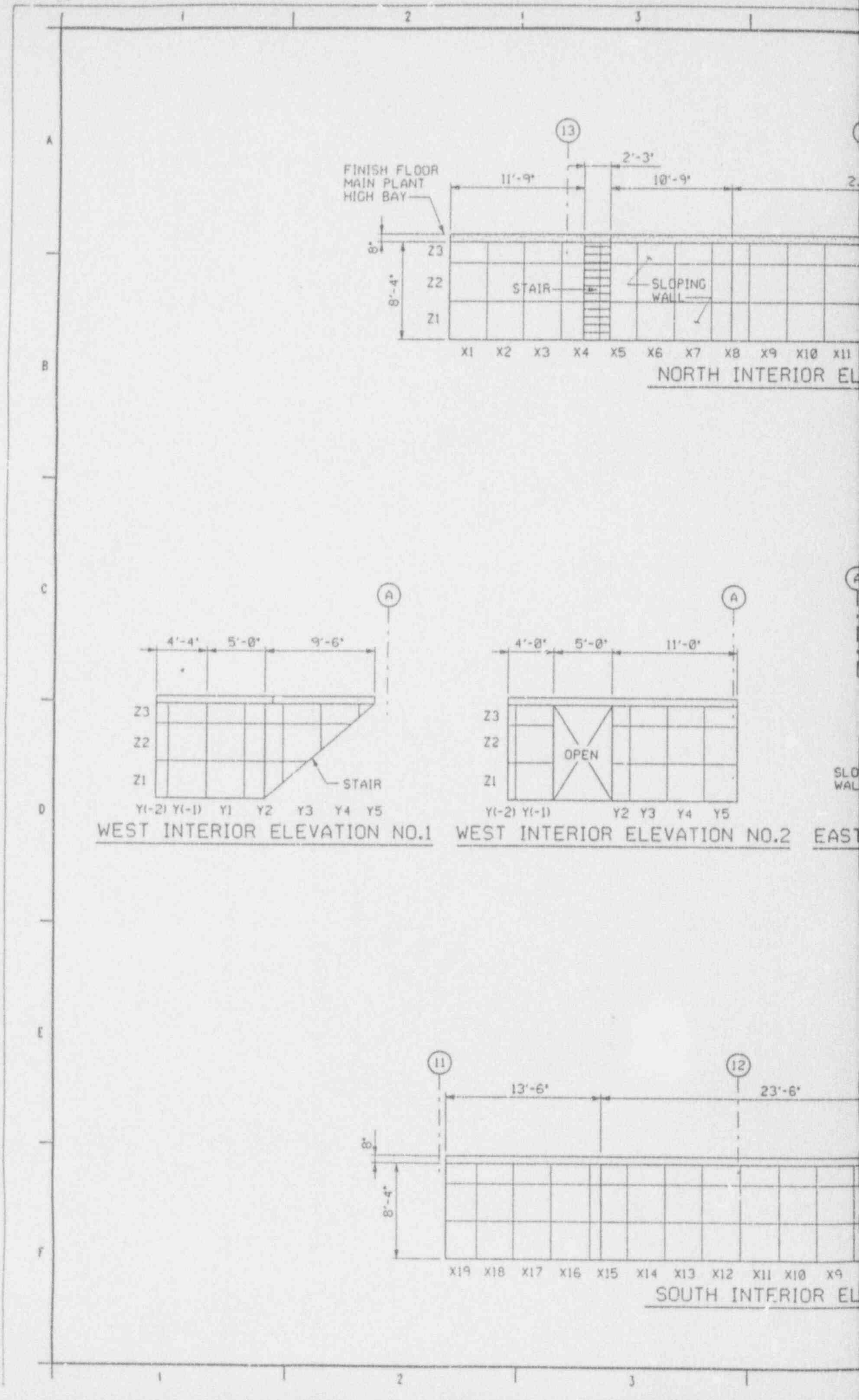
RADIOLOGICAL SAMPLING LOCATIONS
FLOOR & PROJECTED CEILING PLANS
BOILER ROOM (BELOW MAIN PLANT HIGH BAY)

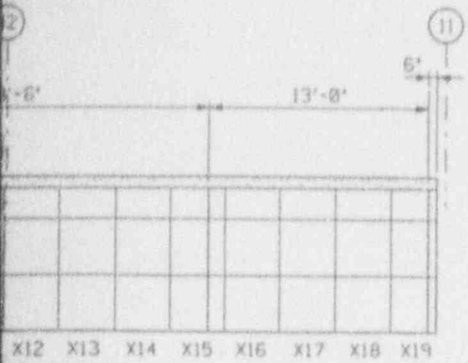
DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
JSB/MAO	05-05-92			MSF/DVR	08-14-92
PLANT BLDG NO. BLDG NO 11		FLOOR		SCALE NONE	CLASS

SUBMITTED FOR APPROVAL — A-E — DATE; APPROVAL RECOMMENDED — OPERATING CONTRACTOR — DATE; DRAWING APPROVED — DOE — DATE

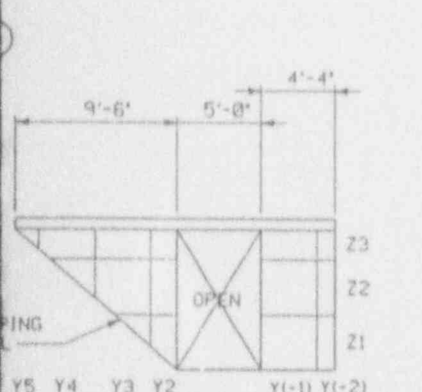
DOE PROJECT NO.	OPER. CONTR. PROJ. NO.	DRAWING NO.	SHEET NO.	REV. NO.
	WBS 1.1.2.2.1.2.0 00-90701	SK-X-00467		A

9404080147-82

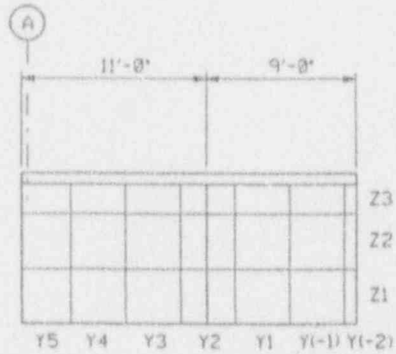

FINISH FLOOR
MAIN PLANT
HIGH BAY
11'-9"
2'-3"
10'-9"
8"
8'-4"
Z3
Z2
Z1
STAIR
SLOPING
WALL
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11
4'-4" 5'-0" 9'-6"
Z3
Z2
Z1
STAIR
Y(-2) Y(-1) Y1 Y2 Y3 Y4 Y5
WEST INTERIOR ELEVATION NO.1
4'-0" 5'-0" 11'-0"
Z3
Z2
Z1
OPEN
Y(-2) Y(-1) Y2 Y3 Y4 Y5
WEST INTERIOR ELEVATION NO.2
13'-6"
23'-6"
8"
8'-4"
X19 X18 X17 X16 X15 X14 X13 X12 X11 X10 X9



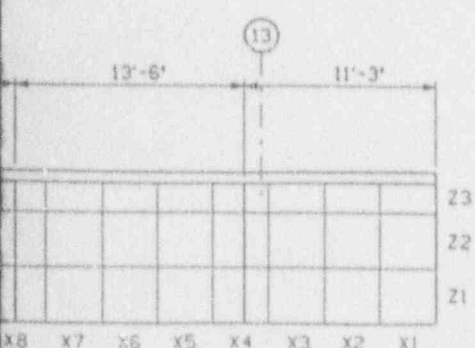
EVATION



INTERIOR ELEVATION NO.1



EAST INTERIOR ELEVATION NO.2



EVATION

9404080147-83

NOTES

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CINCINNATI, OHIO

PROJECT NAME
RMI ENVIRONMENTAL MANAGEMENT PLAN
RADIOLOGICAL CHARACTERIZATION OF BLDGS GU-RMI/P031

DRAWING TITLE
RADIOLOGICAL SAMPLING LOCATIONS
ELEVATIONS
BOILER ROOM (BELOW MAIN PLANT HIGH BAY)

DRAWN BY JSB/MAQ	DATE 08-11-92	DESIGNED, CHECKED BY	DATE	CHECKED BY MSF/DWR	DATE 08-11-92
BLDG NO 11				SCALE 1/4"=1'-0"	

VBS 1.1.2.2.1.2.8
00-90701

SK-X-00468

A