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JAN 29 1998

DOE-0389-98

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Dear Mr. Saric and Mr. Schneider:

SUBMITTAL OF DRAFT FINAL WASTE ACCEPTANCE CRITERIA ATTAINMENT PLAN FOR THE ON-SITE DISPOSAL FACILITY

Reference: Letter from Reising to Saric and Schneider, "Extension Request for the Submittal of the Draft Final Waste Acceptance Criteria Attainment Plan and Sitewide Excavation Plan," dated December 2, 1997.

The purpose of this letter is to transmit, for your review and approval, the draft final version of the Waste Acceptance Criteria (WAC) Attainment Plan for the On-Site Disposal Facility (OSDF). The draft final plan incorporates responses to the U.S. Environmental Protection Agency (U.S. EPA) and Ohio Environmental Protection Agency (OEPA) comments on the August 1997 initial version of the plan. Draft agency-specific comment response documents were provided to the U.S. EPA on November 3, 1997, and to the OEPA on December 2, 1997. The draft responses were developed to support the comment resolution meetings held during the months of December 1997 and January 1998. In accordance with the referenced letter, the revised WAC Attainment Plan and accompanying final comment response documents are to be submitted to the U.S. EPA and OEPA no later than January 30, 1998.

Stand-alone final comment response documents have been prepared for both the U.S. EPA and OEPA comments. Where individual responses have been modified from the draft versions submitted earlier, they have been redlined to facilitate agency review of the refinements. A foreword has also been added to the draft final WAC Attainment Plan that highlights the major changes to the document from the initial draft version.

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If you have any immediate questions concerning the draft final WAC Attainment Plan or the accompanying comment response documents, please contact Robert Janke at (513) 648-3124. The Fernald Environmental Management Project (FEMP) looks forward to approval of the OSDF WAC Attainment Plan and the successful commencement of OSDF waste placement activities later this year.

If you have any questions, please contact Robert Janke at (513) 648-3124.

Sincerely,

Johnny Reising

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WASTE ACCEPTANCE CRITERIA ATTAINMENT PLAN FOR THE ON-SITE DISPOSAL FACILITY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 1998

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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WASTE ACCEPTANCE CRITERIA ATTAINMENT PLAN FOR THE ON-SITE DISPOSAL FACILITY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 1998

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

DRAFT FINAL

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LIST OF ACRONYMS

ACM	asbestos-containing material
AWWT	Advanced Wastewater Treatment (facility)
BAT	Best Available Technology
CAMU	corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
D&D	decontamination and dismantlement
DOE	U.S. Department of Energy
DTRS	Debris Transport Routing Sheet
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRESH	Fernald Residents for Environmental Safety and Health
FRL	final remediation level
FTL/OSM	Field Tracking Log/On-Site Manifest
HDPE	high-density polyethylene
HPGe	high-purity germanium
HWMU	hazardous waste management unit
IDW	investigation-derived waste
IEMP	Integrated Environmental Monitoring Plan
IIMS	Integrated Information Management System
IMP	Impacted Materials Placement (Plan)
IRDP	Integrated Remedial Design Package
LDR	land disposal restriction
mg/kg	milligram per kilogram
MSCC	Material Segregation and Containerization Criteria (form)
MTL	material tracking location
MTR	minimum technology requirement
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
OSDF	on-site disposal facility
pCi/g	picocuries per gram
PPE	personal protective equipment
ppm	parts per million
PSP	project-specific plan
PWID	Project Waste Identification and Disposition (form)
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RD/RA	remedial design/remedial action

LIST OF ACRONYMS
(Continued)

RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SDF	Slurry Dewatering Facility
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SWIFTS	Sitewide Waste Information Forecasting and Tracking System
SWU	Southern Waste Unit(s)
TCLP	toxicity characteristic leaching procedure
UST	underground storage tank
WAC	waste acceptance criteria
WAO	Waste Acceptance Operations

FOREWORD

The Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility (WAC Attainment Plan) has been revised to address the comments received from the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA) on the August 1997 submittal of this document. Following issuance of the comments, several meetings and conference calls were held between U.S. Department of Energy (DOE), EPA, OEPA, and DOE contractor staff to resolve issues and identify technical modifications required to address the comments. This foreword assembles the commitments made to EPA and OEPA about how their comments have been addressed in the revised WAC Attainment Plan.

Changes to the WAC Attainment Plan are set apart from regular text. They are formatted as follows:

- Revised text is redlined and the DOE-assigned sequential number of the comment being addressed appears in the left margin at the beginning of the paragraph. EPA comments begin with the letter "E" (e.g., E-1); OEPA comments begin with the letter "O" (e.g., O-1).
- Text revised at DOE's initiative is also redlined and "DOE" appears in the left margin at the beginning of the paragraph.
- Figure revisions are not noted within the document, but the changes are indicated in the response document.
- Editing and minor revisions made by DOE are not marked.

Key revisions made as a result of the comments are as follows:

- The use of real-time analytical technologies as part of the multi-step WAC attainment demonstration process for soils and subsurface debris has been added to the program, with the recognition that key components of the real-time radiological characterization program are still being developed (usability report, QA/QC program, and new Appendix to the CERCLA Sitewide Quality Assurance Project Plan). These key components will require EPA approval prior to implementation of the real-time technologies.
- Additional text has been added to Sections 2.0, 3.0, 4.0, and 5.0 describing DOE's commitment to a best management practice to remove actual and/or suspected acid brick identified during soil excavation activities.

- Additional commitments for soil stockpile administrative and engineering controls have been added to Section 4.0.

- The document reaffirms the commitment contained in the Operable Unit 2 ROD to ship RCRA characteristic material from the South Field Firing Range off site.

- As requested by OEPA, the setting of area-specific WAC constituents of concern and appropriate sampling strategies for water and wastewater treatment sludges and residuals is being deferred until additional process knowledge information is obtained.

- Several draft example material tracking forms that previously appeared in the text have been updated to reflect the FEMP's latest internal procedures. These forms now appear as an appendix to the plan.

1.0 INTRODUCTION

This document presents the Waste Acceptance Criteria (WAC) Attainment Plan for the On-Site Disposal Facility (OSDF) at the U.S. Department of Energy's (DOE's) Fernald Environmental Management Project (FEMP). The WAC Attainment Plan is a support plan for the OSDF that functions together with the Impacted Materials Placement (IMP) Plan (GeoSyntec 1998) to define the on-site disposal requirements for materials generated by the FEMP's environmental restoration and facility decontamination and dismantlement (D&D) efforts. The scope and schedule of planned on-site disposal activities are outlined in the five FEMP records of decision (RODs) and subsequent remedial design/remedial action (RD/RA) documents.

1.1 PLAN ORIGIN

O-5 The need for a global WAC attainment strategy for the OSDF was initially identified by the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA) in the fall of 1996, as a logical extension of the OSDF IMP Plan. The IMP Plan was submitted for approval on October 14, 1996 as a formal deliverable under the OSDF RA Work Plan (DOE 1997d) and was approved on November 12, 1997. The IMP Plan defines the material size and configuration considerations associated with waste placement in the OSDF. It also provides the engineering-based requirements for material conditioning, segregation, placement, and compaction to enhance the long-term integrity and performance characteristics of the facility.

Following review of the IMP Plan and its engineering emphasis, EPA and OEPA requested that a companion WAC Attainment Plan be prepared to complement the IMP Plan by describing, under one cover, the FEMP material-specific approaches for demonstrating attainment of the radiological, chemical, and physical WAC for all materials destined for placement in the OSDF. Although it was not identified as a formal deliverable in the OSDF RA Work Plan, the WAC Attainment Plan provides the same level of control and direction as the other OSDF design support plans required by the OSDF RA Work Plan. The overall objectives, scope, and content of the WAC Attainment Plan were formally decided upon by EPA, OEPA, and DOE at a March 5, 1997 OSDF IMP Plan project review meeting.

1.2 SCOPE AND OBJECTIVES

The WAC Attainment Plan describes the approach for demonstrating attainment with the radiological/chemical and physical WAC for all FEMP waste streams that are identified for on-site disposal. The four fundamental objectives of the WAC Attainment Plan follow:

- To consolidate all of the sitewide WAC for on-site disposal in a single stand-alone document
- To present the WAC attainment strategies for each FEMP waste stream that is targeted for on-site disposal
- To describe the quality assurance, quality control, and organizational responsibilities for WAC attainment—including the responsibilities of the OSDF organization, independent oversight organization, and generator organizations
- To identify the plans for accommodating independent oversight by EPA and OEPA in the attainment demonstration process.

The WAC Attainment Plan provides both the rule book for WAC attainment and a description of the strategies for complying with the rule book for all of the materials that will be placed in the OSDF.

The OSDF WAC are derived from FEMP RODs (for radiological and chemical WAC) and from OSDF remedial design requirements (for physical WAC). In accordance with the RODs, the primary material types destined for on-site disposal include all contaminated in-place soil and soil stockpiles (Operable Unit 5); the waste materials present in the South Field, Active and Inactive Flyash Piles, the Lime Sludge Ponds, and the Solid Waste Landfill (Operable Unit 2); and the debris resulting from sitewide facility D&D efforts (Operable Unit 3, with small contributions from other operable units). Taken together, these primary materials represent an on-site disposal volume estimated at 2.5 million cubic yards.

Each of the operable units will also generate a range of smaller-volume, remediation-support wastes as a consequence of the cleanup effort, such as personal protective equipment (PPE), water and treatment plant residuals, analytical laboratory sample returns, and other miscellaneous solid wastes associated with the cleanup. All of these smaller-volume, remediation-support wastes are also destined for disposal in the OSDF, provided WAC attainment requirements are met.

E-3 Where the RODs categorically exclude a material type from placement in the OSDF, the material will
O-7 be sent to an off-site facility for disposal. The management, control, and off-site disposal of these materials is not part of the scope of this OSDF WAC Attainment Plan. For reference, the primary categorically-excluded materials include the waste pit contents, covers, and liners (Operable Unit 1); material from the South Field Firing Range that is found to be Resource Conservation and Recovery Act (RCRA) hazardous waste (part of Operable Unit 2); nuclear material products, residues, and other special materials (part of Operable Unit 3); and waste materials contained in Silos 1, 2, and 3 (Operable Unit 4). These designated materials will be shipped for off-site disposal, along with the portions of the non-designated waste streams that are determined to exceed one or more of the OSDF WAC.

1.3 RELATIONSHIP TO OTHER DOCUMENTS

The WAC Attainment Plan is a stand-alone, umbrella plan that consolidates information and attainment approaches from other FEMP remedial design and regulatory compliance documents. The plan also provides new information for several ancillary waste streams not specifically covered elsewhere. The primary remedial design documents that provide supporting WAC attainment and material handling information for the WAC Attainment Plan include:

- Sitewide Excavation Plan (SEP) (DOE 1997e), which addresses technical approaches and remedial action requirements for soil, at- and below-grade debris, and the Operable Unit 2 waste units
- Operable Unit 3 Integrated RD/RA Work Plan (DOE 1997c), which describes technical approaches and remedial action requirements for the facility D&D efforts
- IMP Plan, which is the source of physical WAC for the OSDF.

Other remedial action plans prepared for the OSDF, or the FEMP as a whole, contain information relevant to this plan. A list of these other plans with brief statements of their contents follows:

- OSDF Systems Plan (FDF 1997c), which describes the inspection and maintenance requirements for the OSDF prior to closure
- OSDF Post-Closure Care and Inspection Plan (FDF 1997b), which describes the post-closure care and inspection requirements for the facility and contains a conceptual description of corrective actions and response actions

- OSDF Groundwater/Leak Detection and Leachate Monitoring Plan (DOE 1997a), which describes the monitoring program developed to meet regulatory requirements for groundwater detection monitoring in both the Great Miami Aquifer and the perched groundwater system

- Integrated Environmental Monitoring Plan (IEMP) (DOE 1997b), which describes the sitewide environmental monitoring efforts and the requirements for reporting on environmental monitoring, including data from sitewide air monitoring and from the OSDF groundwater monitoring program.

O-3 The WAC Attainment Plan is designed to serve as a stand-alone document that governs all aspects of
O-8 WAC attainment demonstration for the OSDF. As the first-tier "umbrella" document, the WAC Attainment Plan is expected to remain current as the overarching document to provide the foundation from which the FEMP's area-specific detailed design packages are prepared. The plan will be revised when necessary so that it remains current with any new WAC attainment issues identified during detailed remedial design. All high-level changes in the future (i.e., concept or strategy changes) will result in a revised WAC Attainment Plan document that will be submitted to EPA and OEPA for review and approval. Changes that are not considered to be high level, but rather are related to implementation details, will be addressed through the revision of subordinate area-specific detailed design/implementation documents as necessary. These subordinate document revisions will also be provided to EPA and OEPA in accordance with the review and approval requirements for the individual detailed design documents. The process for revising the WAC Attainment Plan is described in the next subsection.

1.4 PLAN MODIFICATIONS AND REVISIONS

O-9 The requirements and strategies provided in the WAC Attainment Plan are expected to remain in place throughout the duration of FEMP remediation activities. This plan encompasses all of the material categories destined for on-site disposal, so no regularly scheduled revisions are needed. In the event revisions to this plan are found to be necessary in order to respond to changes in operating circumstances in the future, DOE will discuss the circumstances and required modifications with EPA and OEPA prior to revision of the document or implementation of any changes. All revisions or modifications to the process for WAC attainment outlined in the WAC Attainment Plan will be submitted for review and approval by EPA and OEPA.

As an umbrella plan, the WAC Attainment Plan will ultimately serve as the management and technical basis for the development of detailed internal procedures and personnel training requirements for material handling, tracking, and reporting activities. These internal procedures and training requirements are required to fulfill DOE Conduct of Operations obligations and other internal DOE Orders for material handling and on-site disposal. As an internal FEMP activity, the detailed internal procedures developed from the WAC Attainment Plan will be reviewed regularly by appropriate FEMP personnel and updated or refined where necessary to ensure that plan requirements are implemented consistently.

1.5 DOCUMENT ORGANIZATION

The WAC Attainment Plan consists of eight sections, organized around the major waste stream categories destined for on-site disposal. The remaining sections and their contents are as follows:

Section 2.0 Background: Provides an overview of the on-site disposal program, a definition of the waste stream categories covered by the plan, and an overview of previous WAC development processes for soil, debris, and ancillary remediation waste.

Section 3.0 OSDF Waste Acceptance Criteria: Summarizes WAC for soil, debris, and ancillary remediation waste.

O-47 Section 4.0 WAC Attainment Plan for Soil: Provides the plan for WAC attainment for sitewide soil, including the Operable Unit 2 waste unit materials. Includes a discussion of the pre-excavation, excavation and segregation, post-excavation, and documentation activities necessary to achieve WAC attainment. Also includes a discussion of oversight activities, including measures to facilitate the coordination of external oversight by EPA and OEPA.

O-47 Section 5.0 WAC Attainment Plan for Debris: Provides the plan for WAC attainment for the above-grade and at- and below-grade debris, including pre-dismantlement/ pre-excavation, segregation, visual inspection, size reduction, interim storage, documentation activities, and the coordination of internal and external oversight. Includes debris generated from all of the FEMP's remediation activities.

Section 6.0 WAC Attainment Plan for Ancillary Remediation Waste: Provides WAC attainment considerations for current ancillary waste streams, plus a description of the process for new waste streams that may be included in this category in the future.

Section 7.0 Organization Roles and Responsibilities: Defines the roles and responsibilities for the FEMP's generator organizations, the OSDF organization, and the waste acceptance oversight organization.

Section 8.0 WAC Compliance Assurance Plan: Contains the FEMP's plan for quality assurance during the generation of materials destined for on-site disposal, including reviews during the design, execution, staging, and transport phases of the effort. Discusses inspection and documentation requirements and resolution of non-conformances

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2.0 BACKGROUND

This section presents the key elements of the FEMP's on-site disposal program, including an overview of the OSDF, status of OSDF design and construction activities, and current schedule for waste placement. The section also defines the waste stream categories covered by this plan, and provides an overview of the WAC development process conducted for the major types of materials (soil, debris, and ancillary remediation waste) during the remedial investigation/feasibility study (RI/FS) process. An overview of the approved implementation strategy for satisfying Resource Conservation and Recovery Act (RCRA) characteristic waste disposal restrictions is also provided.

2.1 OVERVIEW OF THE ON-SITE DISPOSAL FACILITY

The OSDF will ultimately provide on-site disposal capacity for an estimated 2.5 million cubic yards of contaminated soil and debris generated through the environmental restoration and facility D&D activities. The OSDF will be situated along the northeast portion of the FEMP property, occupying a land area of approximately 70 acres. This area will be dedicated to disposal and will remain under federal administrative control following completion of DOE's cleanup mission.

As required by the Operable Unit 2, 3 and 5 RODs (DOE 1995c, 1996c, and 1996a), the OSDF is situated over the area of the FEMP with the best available geology, to provide maximum protection of the Great Miami Aquifer. The Predesign Investigation and Site Selection Report for the OSDF (DOE 1995e) determined that this best location was on the east side of the FEMP property. Figure 2-1 denotes the selected location for the OSDF and the planned layout of the facility following completion of all disposal activities.

The OSDF will be constructed in phases, starting in the north and working south, with eight individual cells planned, plus a ninth contingency cell, if needed. Constructing the OSDF in phases will allow the facility to be the size needed to accommodate the FEMP remediation waste. Each individual cell is planned to be 800 feet by 400 feet, or 320,000 square feet (7.4 acres) and will be constructed with a leachate collection system to collect infiltrating rainwater (and storm water runoff during waste placement) and inhibit it from entering the underlying environment. The primary engineered features include a multi-layer liner system, a leak detection system positioned beneath the primary liner, and a multi-layer cap system. The 8.75-foot thick cap and 5-foot thick liner are a geocomposite design,

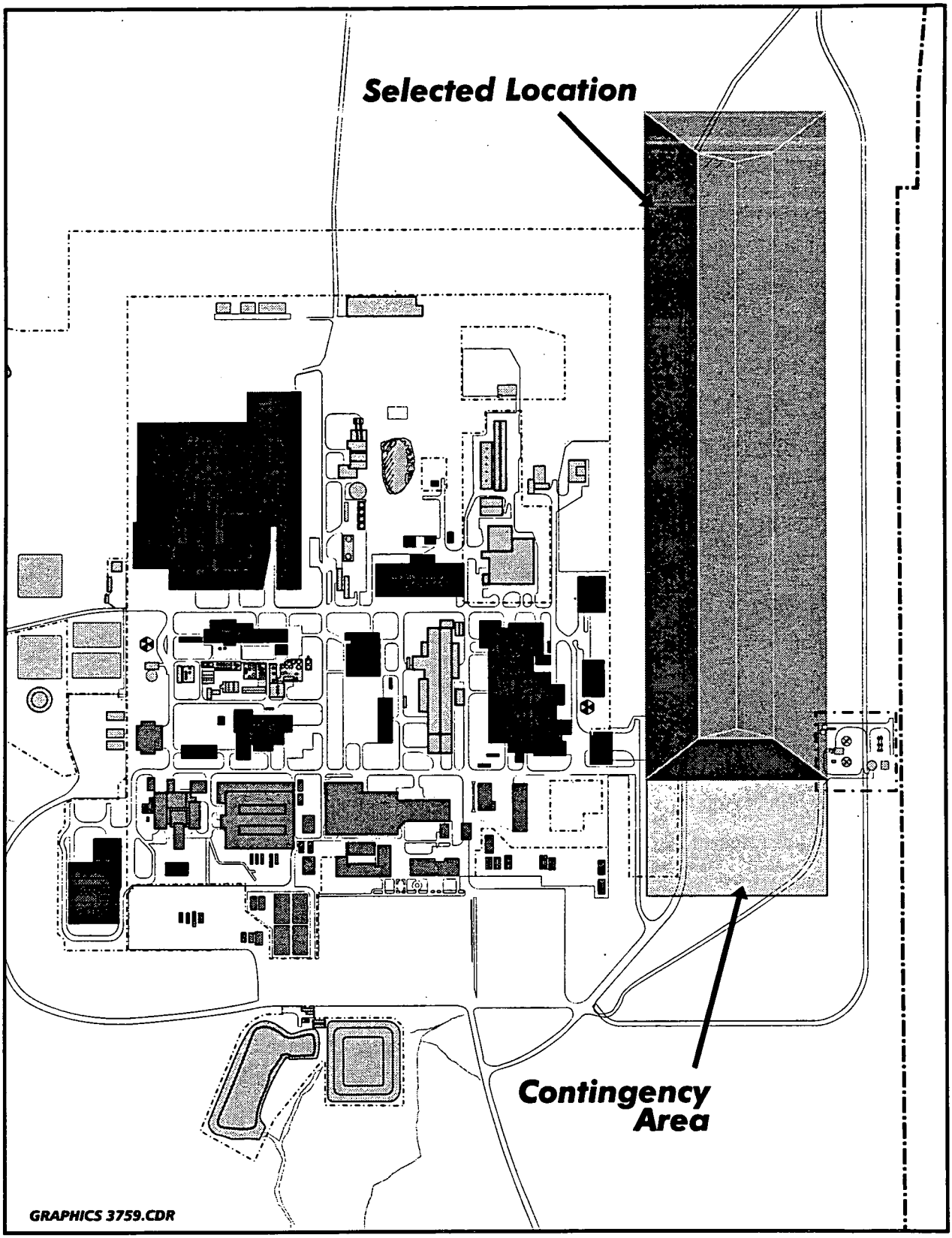

FIGURE 2-1
LOCATION AND CONFIGURATION
OF THE OSDF

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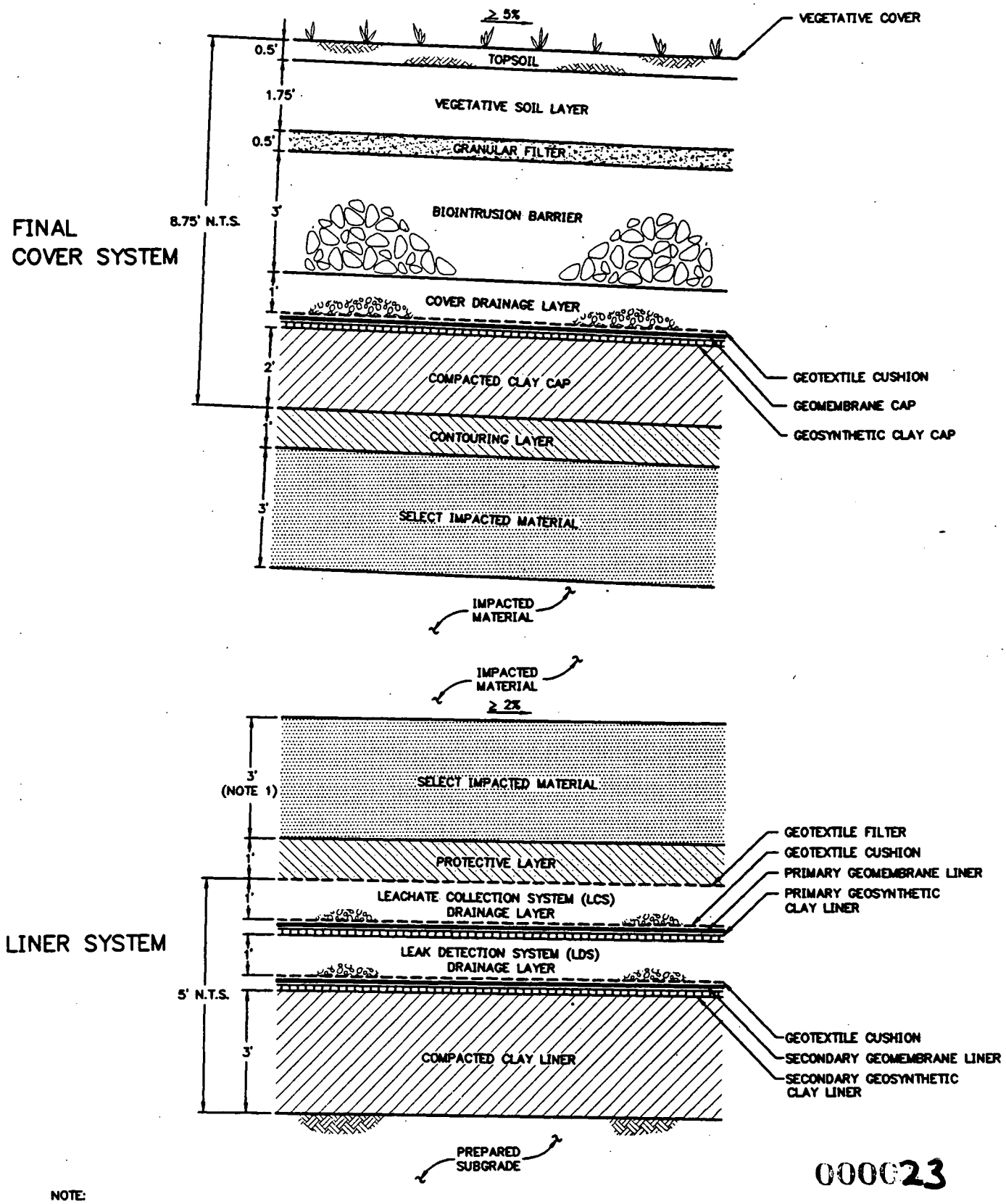
meaning that both natural materials (e.g., clay and soil) and man-made materials (e.g., high-density polyethylene liners) will be used in the construction. A cross-section of the OSDF cap and liner systems is illustrated in Figure 2-2.

The OSDF will be an above-ground facility and, following completion, is expected to measure approximately 3700 feet by 800 feet and have a maximum height of 65 feet. A groundwater, leak detection, and leachate monitoring plan has also been developed for the facility to satisfy regulatory requirements for groundwater detection monitoring in both the Great Miami Aquifer and the perched groundwater system underlying the facility.

O-4 As a natural course of the site-wide remediation, the FEMP will be tracking the quantities and origins of the impacted material volumes that are placed in the OSDF. However, because differences in bulking factors for various materials and the varying compaction requirements for the variety of materials disposed of at the OSDF, it will be possible to draw only approximate correlations back to the estimated volumes produced during the FEMP's remedial investigation/feasibility study (RI/FS) process. The actual placed volumes will still be useful for OSDF capacity planning and other planning estimates needed to track the progress of the remediation. As part of the volume tracking effort, the FEMP will maintain a waste-category-specific tracking system to account for the post-placement volumes in the OSDF, and the general volumes (or weights) sent off site for disposal. Current-in-time summaries of the ongoing placed-volume tracking efforts (e.g., that are current with each major implementation step for the FEMP's soil remediation and D&D actions) will be available for review on an "as requested" basis during cleanup. Project-closeout-related placed volume summaries will also be prepared to formally document the placed volumes following the completion of each major remedial action component of the site-wide remedy (i.e., as part of the FEMP's D&D complex closeout reports; and as part of the area-specific certification reports that follow completion of soil excavation activities within an individual soil remediation area). A final master site-wide summary of placed and shipped materials would also be expected to be produced as part of the FEMP's site-wide final closeout documentation. The placed-volume tracking activity will generally mirror the system used to track the soil excavation and facility D&D subcontractor's progress and pay items.

LINER AND COVER SYSTEM DESIGN
ON-SITE DISPOSAL FACILTY



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NOTE:

1. SELECT IMPACTED MATERIAL THICKNESS ABOVE LINER SYSTEM MAY BE DECREASED TO 2 FEET IF THE FIRST LIFT OF MATERIAL TO BE PLACED OVER THE SELECT IMPACTED MATERIAL CONSISTS OF SOIL OR RELATIVELY SMALL SIZE DEBRIS THAT CAN BE PLACED IN CONTROLLED LIFTS.

GEOSYNTEC CONSULTANTS
ATLANTA, GEORGIA

FIGURE NO.	2-2
PROJECT NO.	GQ0166-05
DOCUMENT NO.	WACPLN
FILE NO.	3900F019.DWG

2.2 DESIGN AND CONSTRUCTION STATUS

The design of the OSDF was started in August 1995 and first received approval from EPA on August 8, 1996. Final EPA approval was received on February 14, 1997. Because of the different waste types that will be disposed on site from each operable unit, the OSDF was designed to meet the requirements of RCRA for hazardous waste, the Uranium Mill Tailings Remedial Action Program for radioactive waste, and the Ohio Solid Waste Disposal Regulations.

DOE Construction of the multi-layer liner system for the initial cell began on June 20, 1997 and was completed on December 31, 1997. Construction of the perched groundwater and Great Miami Aquifer monitoring wells was also initiated for the first cell in conjunction with liner construction.

2.3 WASTE PLACEMENT SCHEDULE

DOE In accordance with the OSDF RA Work Plan, placement of waste into the OSDF must commence by March 27, 1998. First waste placement was initiated approximately three months early on December 23, 1997. The first waste placed was from the east soil stockpile which was generated as a result of the cleanup of Area 1, Phase I (the area within the OSDF footprint). The OSDF waste placement schedule will then follow the sequential remediation of the FEMP. The FEMP has been divided into eight general cleanup areas (with a total of 13 subareas). These areas are illustrated in Figure 4-4. The remediation sequence of these areas is provided in Appendix B of the SEP. The goal is to stockpile as little soil and debris as possible once the OSDF is available to accept waste. Disposal of currently stockpiled and containerized soil and debris is a high priority, but it will not interrupt the flow of waste being excavated and moved directly to the OSDF without being stockpiled.

2.4 ENGINEERING-BASED MATERIAL CATEGORIES

The IMP Plan established five material categories to support the achievement of waste placement objectives and enhance the overall, long-term integrity of the facility. These categories were developed in consideration of the techniques and procedures that will be used to place the waste to achieve desired compaction and configuration requirements. All material coming to the OSDF for disposal will be classified into one of these five engineering-based categories:

- Category 1 - Impacted materials that are soil and soil-like

DOE
- Category 2 - Impacted materials that can be handled *en masse*, are no more than 18 inches high and 10 feet long, and are expected to be moderately compactable

- Category 3 - Impacted materials that must be individually handled and placed in the OSDF, are suitable for having Category 1 material placed around and against them, have a nominal height of no more than 4 feet, are regularly shaped, and are essentially incompactable using standard compaction equipment

- Category 4 - Impacted materials that are high in organic content (i.e., it will decompose) and/or very compressible

- Category 5 - Impacted materials that require special handling due to their special nature.

These five material categories are engineering based and do not necessarily consider the radiological and chemical composition of the materials assigned to the categories. From an engineering perspective, it is assumed that the materials in these placement categories have met their corresponding radiological and chemical WAC prior to delivery to the facility. A key focus of the WAC Attainment Plan is to demonstrate, therefore, how this overlying requirement will be met.

2.5 WASTE STREAM DEFINITIONS FOR WAC ATTAINMENT

For the purpose of WAC definition and attainment strategy development, the waste materials slated for on-site disposal can be divided into three broad categories:

- Soil and soil-like material
- Facility D&D debris
- Ancillary remediation waste.

The scope and range of on-site materials that fall within these three categories are presented in the following subsections.

2.5.1 Soil and Soil-Like Material

E-3 Soil and soil-like material consists of the excavated surface and subsurface soil from within Operable
O-7 Unit 5; the material excavated from the Operable Unit 2 waste units (flyash from the Active and Inactive Flyash Piles, soil from the South Field, and the soil and sludge from the Lime Sludge Ponds and Solid Waste Landfill), with the exception of material that is found to be RCRA characteristic waste

from the South Field Firing Range, which is ineligible for disposal in the OSDF; sludge, sediment, and filter media from FEMP water treatment processes; and any other material that can be managed and sampled in the same manner as soil. It also includes the soil from within the boundaries of Operable Units 1 and 4, unless specifically excluded from on-site disposal by either of the RODs for these two operable units. For Operable Unit 4, all soil within the geographic boundaries of the unit, including soil used to construct earthen berms around the silos, is targeted for on-site disposal, provided WAC attainment requirements are met. For Operable Unit 1, all soil that exists below the waste pit liners is targeted for on-site disposal, provided WAC attainment requirements are met. The earthen pit liner and cover materials are considered to be Operable Unit 1 waste and will be shipped for off-site disposal along with the waste pit contents.

Soil and soil-like material will comprise approximately 85 percent of the waste disposed in the OSDF, with the majority being generated from the Operable Unit 5 excavations within the boundaries of the former production area. Portions of the soil and soil-like material will be used as necessary, for engineering purposes, to pack around debris and to fill void spaces during compaction in the OSDF.

Throughout the remainder of this plan, the use of the term "soil" refers to the soil and soil-like materials identified in this section that are not categorically excluded from on-site disposal.

2.5.2 Decontamination and Dismantlement Debris

The Operable Unit 3 ROD for Final Remedial Action (hereinafter referred to as the Operable Unit 3 ROD) established ten categories of debris (denoted as categories A through J) that will be generated during sitewide D&D activities. These ten categories and examples of debris types contained within these categories are listed in Table 2-1. The categories are based on similar or inherent properties and configuration.

As specified in the Operable Unit 3 ROD, certain debris categories are excluded from disposal in the OSDF, and other debris may only be disposed of in the OSDF following treatment. These categories include all of debris categories C (Process-Related Metals), F (Acid Brick), and J (Product, Residues, and Special Materials), and a subset of Category D (lead sheeting, unless treated). All remaining streams are eligible for disposal in the OSDF provided they satisfy the radiological WAC cited in the Operable Unit 3 ROD and the physical WAC contained in the IMP Plan.

TABLE 2-1

DEBRIS MATERIAL CATEGORIES/DESCRIPTIONS

Category A Accessible Metals	Category B Inaccessible Metals[c]	Category C Process-Related Metals[a,c]	Category D Painted Light-Gauge Metals	Category E Concrete	Category F Acid Brick[a]	Category G Non-Regulated ACM[b]	Category H Regulated ACM	Category I Miscellaneous Materials	Category J Product, Residues, and Special Materials[a]
Structural and Miscellaneous Steel	Doors	Electrical Equipment	Ductwork	Asphalt	Acid Brick	Ceiling Demo.	Ductwork Insulation	PVC Conduit	Low-Level Legacy Waste
	Conduit/Wire/ Cable Tray	HVAC Equipment	Lead Sheeting	Slabs		Feeder Cable	Piping Insulation	Basin Liners	Marketable Nuclear Material
	Electrical Wiring and Fixtures	Material Handling Equipment	Louvers	Columns		Fire Brick	Personal Protective Equipment	Fabric	Thorium Inventory
	Electrical Transformers	Process Equipment	Metal Wall and Roof Panels	Beams		Floor Tile	Copper Scrap Metal Pile	Drywall	
	Miscellaneous Electrical Items	Miscellaneous Equipment		Foundations		Transite Wall and Roof Panels		Building Insulation	
	Electrical Equipment	Process Piping		Walls				Miscellaneous Debris	
	HVAC Equipment			Masonry				Personal Protective Equipment	
	Material Handling Equipment			Clay Piping				PVC Piping	
	Process Equipment							Roofing Build-Up	
	Miscellaneous Equipment							Process Trailers	
	Piping							Non-Process Trailers	
								Windows	
								Miscellaneous Wood	

[a]The materials listed in these columns are categorically excluded from disposal in the OSDF.
[b]ACM = asbestos-containing material
[c]Debris types that are listed in both Category B and Category C will be segregated based on the visual inspection for process residues. (See Section 5.1.2.2)

will be segregated and managed in accordance with the Operable Unit 3 Integrated RD/RA Work Plan. The eligible at- and below-grade debris will be segregated into the five OSDF categories (presented in Section 2.4) and managed in accordance with the SEP.

O-11 Certain designated debris streams from Operable Units 1 and 4 are excluded from on-site disposal by the RODs, along with the primary waste materials from these two operable units. The excluded debris categories include any contaminated concrete from Silos 1 and 2 that exhibits highly-elevated direct radiation fields, and any debris found within the waste pits. The intent of the Operable Unit 4 ROD provision for the structural concrete was to segregate the highly-contaminated concrete from Silos 1 and 2 for potential vitrification and off-site disposal. This material was proposed to be segregated to minimize the potential for human exposure to the elevated direct radiation fields associated with K-65 residues that may have impregnated the concrete in the silo structures. Recognizing the current status and path forward for Silos 1 and 2, a more quantitative delineation of the ROD criterion of "highly-elevated direct radiation fields" will need to be established during the remedial design process for Operable Unit 4 as a means to delineate that portion of the concrete from Silos 1 and 2 that must be sent off site for disposal.

O-12 The remainder of the debris from Operable Units 1 and 4 (and all remaining operable units) can be placed in the OSDF, provided they meet the OSDF radiological WAC for debris established by the Operable Unit 3 ROD and the physical WAC for debris contained in the IMP Plan. Section 5.3 provides additional detail on the technical basis for extending the Operable Unit 3 visually-based radiological WAC for debris to the debris to be generated by the other operable units.

2.5.3 Ancillary Remediation Waste

As mentioned above, the category of ancillary remediation waste will include waste streams that do not lend themselves to general WAC attainment planning and need to be evaluated on a case-by-case basis. The known waste streams that fall in this category are the water treatment residuals from the FEMP Advanced Wastewater Treatment (AWWT) facility, analytical sample residue returns, and PPE. It is expected that, as the remediation progresses, additional ancillary waste streams will be identified. Although these waste streams will be inherently "soil-like" or "debris-like" and may eventually have a WAC attainment strategy similar to those two categories, a special WAC attainment strategy must be developed for each type of ancillary remediation waste because of either the type of material or the

manner in which it was generated. Section 3.5 of this plan presents the WAC determination process for this waste category and Section 6.0 addresses the WAC attainment strategy for ancillary waste streams in detail.

2.6 OVERVIEW OF THE WAC DEVELOPMENT PROCESS

Radiological and chemical WAC for the OSDF were developed during the course of the Operable Unit 2, 3, and 5 RI/FS efforts, to support the evaluation of on-site disposal as a remedial alternative. Following remedy selection and issuance of the RODs, the radiological and chemical WAC became binding requirements. The physical WAC were developed during the detailed design of the OSDF (once the full suite of material types, sizes, and estimated volumes became known) and were issued as final with the OSDF IMP Plan.

The subsections that follow provide an overview of the OSDF WAC development process for FEMP soil, debris, and ancillary remediation waste streams. An overview of the implementation strategy for satisfying RCRA characteristic waste disposal restrictions is also provided at the end of the section.

2.6.1 Soil WAC Development

The radiological and chemical WAC for soil, sludge, and other soil-like materials were established as final by the Operable Unit 5 ROD. These WAC apply to all in-place soil and soil stockpiles sitewide; AWWT facility process residuals, and the waste materials found within the Operable Unit 2 waste units, where such materials are contaminated with one or more of the constituents of concern that were assigned numerical WAC limits. The WAC limits are listed in Table 9-7 of the Operable Unit 5 ROD.

The radiological and chemical WAC were derived, through fate and transport modeling, to establish mass-based or activity-based operational limits for soil contaminant concentrations to ensure the long-term protection of the Great Miami Aquifer underlying and downgradient of the OSDF. The intent of the operational limits is to ensure that the water quality in those portions of the aquifer potentially impacted by the OSDF do not exceed the health-based groundwater final remediation levels established in the Operable Unit 5 ROD over the long term.

In order to meet both Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and RCRA compliance obligations, the soil WAC were developed by a two-step evaluation

process. The first step considered all 93 of the detected soil and groundwater constituents at the FEMP, and determined, based on their expected fate following placement in the OSDF, which constituents required a numerical WAC limit. The modeling conducted to make this determination was a conservative approach that considered:

- An OSDF performance period of up to 1000 years
- The hydraulic and geochemical barrier properties of the OSDF engineered earthen liners and caps
- The persistence and mobility characteristics of the constituents placed in the facility
- The hydraulic and geochemical properties of the grey clay layer (present within the glacial overburden) beneath the OSDF
- The potential for cumulative impacts to the Great Miami Aquifer to occur across the width of the OSDF, extending to its downgradient edge.

As part of the conservatism built into the approach, no beneficial credit was taken in the modeling for the additional protectiveness offered by the geomembranes and high-density polyethylene barriers that are part of the design of the liners and caps of the OSDF, or any of the other natural geologic layers (i.e., the brown clay layer) separating the OSDF from the Great Miami Aquifer. Only the engineered earthen layers and the native grey clay layer were considered.

The results of the WAC development modeling demonstrated that, under the conservative conditions modeled, numerical WAC limits were necessary for 12 of the 93 constituents of concern present in the environmental media at the FEMP. For the remaining constituents of concern, the modeling demonstrated that the constituents could be placed in the facility at all possible concentrations (including pure substance concentrations) without the potential for impacting the Great Miami Aquifer within the 1000-year performance period. Based on the protective features offered by the OSDF, 81 of the 93 constituents of concern do not require a numerical WAC limit.

In the second step of the process, to address RCRA compliance obligations, the fate and transport modeling was repeated for 27 additional RCRA-regulated constituents known to have been managed within the confines of FEMP hazardous waste management units. These additional constituents are known as the RCRA constituents of concern in the RI/FS documentation. The results of the modeling

showed that numerical WAC limits were necessary for 6 of the 27 RCRA constituents of concern, bringing the total number of constituents requiring a numerical WAC limit (from both steps) to 18. These 18 radiological and chemical constituents were formally cited in Table 9-7 of the Operable Unit 5 ROD, and are known collectively in this plan (and other remedial design documents) as the WAC constituents of concern for soil.

As part of the radiological and chemical WAC development process for the RCRA constituents of concern, the Operable Unit 5 ROD adopted a best management practice as an additional safeguard to track and segregate soil that may be contaminated with organic solvents at concentrations that are potentially incompatible with the OSDF earthen liners. To track these concentrations during soil excavation, the FEMP will rely on field screening methods (e.g., organic vapor surveys) to identify potentially incompatible soil. This soil will be segregated and either shipped off-site for disposal or treated before it is placed in the OSDF.

2.6.2 Debris WAC Development

The radiological and chemical WAC for the D&D debris were established in the Operable Unit 3 ROD. As the last ROD issued for the FEMP, this document finalized the sitewide disposition decision for all debris not excluded from on-site disposal by earlier decisions. The previous RODs for Operable Units 1, 2, 4, and 5 had identified which individual waste streams (including individual debris streams, as appropriate) are categorically excluded from on-site disposal and must be disposed of off site. The remaining sitewide debris streams, therefore, need to meet the intentions of the Operable Unit 3 on-site debris disposal requirements and the accompanying OSDF WAC constraints conveyed by the Operable Unit 3 ROD. (Recycling and free release decisions for eligible Operable Unit 3 materials, which are not part of the scope of this OSDF WAC Attainment Plan, are also discussed in the Operable Unit 3 ROD.)

The OSDF WAC for FEMP debris streams were based on the Operable Unit 5 soil WAC development modeling and then adjusted to apply to debris-specific materials. Using similar conservative modeling objectives, assumptions, and configurations as employed for soil, the results of the modeling showed that only total uranium and technetium-99 from the debris streams have the potential to create unacceptable groundwater conditions in the Great Miami Aquifer beneath the OSDF. Data from debris leachability studies conducted on the most heavily contaminated debris streams indicated that the

uranium that leached from all test samples had concentrations that were well below acceptable levels for on-site disposal in the OSDF. The Operable Unit 3 ROD reflected the conclusion that all uranium-contaminated debris materials, with the exception of visually discernable process materials, can be safely disposed of in the OSDF. A visual inspection process was, therefore, adopted in the Operable Unit 3 ROD as the OSDF WAC attainment mechanism for uranium-contaminated debris.

E-5 The leachability studies indicated that technetium-99 does have the potential to leach at levels that could impact the Great Miami Aquifer. The WAC development model was used to determine that a total mass limit of 105 grams of technetium-99 could be safely placed in the OSDF without adverse consequence, and the Operable Unit 3 ROD adopted the 105-gram-mass limit as the OSDF WAC for technetium-99-contaminated debris. In order not to exceed the 105-gram limit for the OSDF, those materials that have the highest amounts of technetium-99 will be packaged and shipped for off-site disposal. The Operable Unit 3 ROD specified the materials containing the highest amounts of technetium-99 that will be sent off-site in order to meet the Operable Unit 3 WAC. The Operable Unit 3 ROD specifically states that the selected remedy includes scabbling the top inch of the three most contaminated areas within Operable Unit 3: the enriched uranium casting area in Plant 9; the uranium machining area in Plant 9; and the muffle furnace area in Plant 8. Additionally, due to inherent chemical and radiological contamination in the Pilot Plant, the top half inch of concrete in the southern extraction area will also be scabbled. The removal and off-site disposal of the scabbled concrete from these areas is expected to reduce the total amount of technetium-99 going into the OSDF to less than 59 grams, which is 44 percent below the 105-gram allowable mass limit. No additional actions are required in order to comply with the technetium-99 WAC.

Following the issuance of the Operable Unit 3 ROD, the final physical WAC for debris were established in the OSDF IMP Plan. Section 3.4 summarizes the physical WAC for debris and Section 5.0 presents the attainment plan for meeting the physical WAC established by the IMP Plan.

2.6.3 Ancillary Remediation Waste WAC Development

The ancillary remediation wastes that are destined for on-site disposal in the OSDF must meet the soil WAC (if the materials are soil-like) or the debris WAC (if the materials are debris-like). Specific WAC development modeling was not conducted for the ancillary remediation waste streams; rather, the

development process relies on the extensive modeling performed for soil (to support the Operable Unit 5 ROD) or debris (to support the Operable Unit 3 ROD).

The ancillary remediation wastes must be administratively eligible for disposal in the OSDF (i.e., not categorically excluded from on-site disposal by one or more of the FEMP's RODs), and they must also satisfy the physical WAC established in the IMP Plan.

2.6.4 Conservatism in WAC Development

O-13 It is important to emphasize that the numerical WAC limits for the 18 soil WAC constituents of concern were established by conservatively assuming that the entire volume of soil placed in the OSDF is contaminated at the numerical WAC limit concentrations. By assuming that the soil is contaminated at the numerical WAC limit, no credit was taken in the development modeling for the actual range of contaminant concentrations and distributions known to be present in FEMP soil (which, for the vast majority of the soil volume, exist at concentrations much lower than the WAC limits). Under this conservative modeling approach, the assumed average OSDF soil concentrations used to evaluate potential cumulative Great Miami Aquifer impacts from the OSDF were artificially set for decision-making purposes at the upper-bound WAC limit values. When the known actual contaminant concentrations for the WAC constituents of concern in soil are considered (as revealed by the FEMP's extensive RI/FS sitewide characterization of soil), the resultant average concentrations that will be present in the OSDF under actual conditions will be far less than the corresponding numerical WAC limits.

The following discussion serves to illustrate this conservative decision-making approach using total uranium in soil as an example. The upper-bound numerical OSDF WAC limit for uranium in soil is 1030 parts per million (ppm), and the soil cleanup levels for uranium are 80 ppm (outside the production area) and 20 ppm (for select areas inside the production area where more leachable forms of uranium are anticipated). Uranium is the most abundant and widely distributed soil contaminant present at the FEMP, and approximately 1.8 million cubic yards of soil has been shown to be contaminated at concentrations greater than the 80 ppm and 20 ppm cleanup levels, but less than the upper-bound 1030 ppm WAC limit. The 1.8 million cubic yards of affected soil represents the soil volume that is targeted for excavation and disposal in the OSDF. Based on the site-specific distribution of uranium concentrations within this soil volume extending over the range from 20 ppm to the upper

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limit 1030 ppm WAC value, the RI/FS data showed that the average soil uranium concentration in the OSDF, following soil placement, will be approximately 100 ppm. This is considerably less than the 1030 ppm assumed average (set at the upper-bound WAC limit) used in the modeling runs and accompanying Great Miami Aquifer impact projections.

To illustrate further, even if the full portion of the soil volume shown through the RI/FS studies to be contaminated above the 1030 ppm uranium WAC limit (estimated conservatively to be 25,000 cubic yards or less) was, hypothetically, placed in the OSDF along with the other soil, the average uranium concentration would still remain at approximately 100 ppm -- due to the negligible volume that the above-WAC soil represents relative to the total soil volume of 1.8 million cubic yards.

For the other 17 non-uranium WAC constituents of concern, which are considerably less abundant and less widely distributed than uranium, the resulting reducing effect on the volumetric averages is even more pronounced. These constituents of concern were also modeled using the upper-bound WAC values to conservatively represent average concentrations in the OSDF. In actuality, the average OSDF concentrations for these other 17 WAC constituents of concern will be at or near natural background levels, since the vast majority of the soil is being excavated to satisfy uranium cleanup needs. Within the footprint of the planned uranium excavation, the 17 non-uranium WAC constituents of concern are intermittently dispersed and none of the constituents extends over the full excavation footprint represented by uranium. Based on the extensive RI/FS data, more than 95 percent of the soil that is excavated to satisfy the uranium cleanup is expected to be uncontaminated with the other WAC constituents of concern. Based on its relatively small volume, even if all of the FEMP soil that is contaminated with the non-uranium WAC constituents of concern was, hypothetically, to be placed in the OSDF, regardless of the numerical WAC limits, the average concentrations within the 1.8 million cubic yards of placed volume would still remain close to background, and the conservative assumptions used in the WAC development modeling (average OSDF concentrations set equal to the WAC upper bound limit) would remain unaffected.

As this discussion illustrates, based on the known actual distributions of uranium and the other 17 WAC constituents of concern in the FEMP environment, there would be no expected cumulative impact to the Great Miami Aquifer at the downgradient edge of the OSDF even if all of the above-WAC soil volume was, hypothetically, to be placed in the facility. This hypothetical discussion

is intended to illustrate the degree of protection offered by the numerical WAC limits and is not meant to imply that known materials with contaminant concentrations exceeding the WAC limits are suitable for placement in the OSDF. As summarized in Section 3.3, the WAC Attainment Plan acknowledges that the numerical WAC represent maximum permissible limits (i.e., "not to exceed" limits) and there are no plans for the placement of materials in the OSDF in a manner inconsistent with the WAC attainment strategies contained in this document.

2.6.5 RCRA Characteristic Waste Restrictions

E-6 During the ROD public comment periods for Operable Units 2, 3, and 5, the local public (primarily
O-14 Fernald Residents for Environmental Safety and Health [FRESH] members) and OEPA commented on the need to restrict the disposal of RCRA characteristic waste in the OSDF (beyond numerical WAC limits). This restriction was also a condition of OEPA support of a necessary waiver from State of Ohio Solid Waste Disposal Regulations to allow the OSDF to be sited at the FEMP. As part of the final RODs for Operable Units 2, 3 and 5, approved implementation approaches were developed to meet the intent of the RCRA characteristic waste restriction sought by OEPA.

The RODs for Operable Units 3 and 5 acknowledged that EPA's corrective action management unit (CAMU) rule is an applicable or relevant and appropriate requirement for the FEMP on-site disposal remedy that provides the regulatory framework for determining the treatment and on-site disposal requirements for RCRA-regulated constituents in the materials destined for on-site disposal. Among other items, the CAMU rule provides needed relief for on-site disposal from strict RCRA Subtitle C disposal requirements, including land-disposal restrictions (LDRs) and minimum technology requirements (MTRs). The CAMU rule permits the on-site disposal of both RCRA listed and characteristic waste provided a protective, implementable remedy is identified through the following three decision steps, cited in Section 264.552 of the CAMU rule:

1. The remedy must be protective of human health and the environment.

2. The remedy must minimize the potential for future release.

3. The remedy must enhance long-term effectiveness through the application, as appropriate, of treatment technologies that reduce toxicity, mobility or volume of wastes that will remain in place following closure of the CAMU.

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The RODs acknowledge that the FEMP's on-site disposal remedy is a protective remedy that adequately minimizes the potential for future release. The need to identify and segregate RCRA characteristic materials for treatment has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for treatment that is contained in decision step 3 above. As stated in the preamble to the CAMU rule, the decision to apply cost-effective treatment at a site is a case-by-case decision that must consider waste- and site-specific factors. Based on a review of site characterization data and historical process knowledge, DOE, EPA, and OEPA agreed that several FEMP RCRA toxicity characteristic waste streams offer a reasonable site-specific potential to provide additional cost-effective treatment before on-site disposal. The following Operable Unit 5 geographic areas and readily segregatable waste streams within Operable Unit 3 were designated in the respective Operable Unit 5 and 3 RODs as exhibiting the potential for sufficient quantities of RCRA toxicity characteristic material to offer reasonable opportunities to apply cost-effective levels of treatment before disposal in the OSDF (or alternatively, off-site disposal):

E-3
O-7

- RCRA characteristic soil from six geographic areas within Operable Unit 5—the abandoned sump west of the pilot plant, the area between the KC-2 warehouse and railroad tracks, the FEMP's trap range, the fill material west of the silos along Paddys Run stream bank, the scrap metal pile area, and the area north of the maintenance building. A seventh geographic area within the boundaries of Operable Unit 2 (the South Field Firing Range) also contains RCRA characteristic soil associated with lead contamination from spent bullets. However, under the terms of the Operable Unit 2 ROD, this material must be sent off site and is therefore not eligible for disposal in the OSDF.

- Lead sheeting (formed as flashing, window sills, and door moldings) within the jurisdictional boundaries of Operable Unit 3.

O-12

- Acid-resistant brick (which represents a potential source of RCRA characteristic metals contamination) within the jurisdictional boundaries of Operable Unit 3. This "acid brick" – as it is commonly called – also represents a potential source of technetium-99 contamination. Under the terms of the Operable Unit 3 ROD, the acid brick generated from Operable Unit 3 D&D activities will be sent off site for disposal to provide an additional level of assurance that mass-based technetium-99 limitations for debris are satisfied.

O-12 Section 5.3 of this WAC Attainment Plan provides an overall approach and justification for extending the Operable Unit 3 visual inspection requirement for process-related residuals to the debris that is associated with the other operable units. This extension represents a best management practice commitment to provide further assurance that the debris residing outside of Operable Unit 3 is safely

dispositioned in the OSDF. Under this approach, the debris from the Operable Unit 2 waste-unit excavations is eligible for disposal in the OSDF without further constraint, provided it passes an equivalent Operable Unit 3 visual check for discernable process-related materials, and meets the OSDF's physical size criteria. The same applies to Operable Unit 1 and 4 debris, except for those items specifically prohibited from on-site disposal by the Operable Unit 1 and 4 RODs.

The approach in Section 5.3 recognizes that there are no additional RCRA-based constraints that prevent the on-site disposal of debris generated outside of Operable Unit 3, and therefore there are no additional RCRA-based requirements to further sort and remove individual items of debris that may be unearthed during the excavation of the Operable Unit 2 waste units. However, segregation of individual items may still be necessary to satisfy other constraints, such as to satisfy the visual inspection commitment for discernable process-related materials. Along these lines, Section 5.3 describes an additional FEMP commitment to segregate and send off site the vast majority of actual and/or suspected acid bricks that may be unearthed during all soil excavation activities, including the Operable Unit 2 waste units, as a best management practice to further reduce the chance that process-related residuals are placed in the OSDF. Direct removal and off-site shipment of the segregatable bricks observed in the field (i.e., those bricks that can be readily identified and safely removed during soil excavation and/or placement at the OSDF) represents the most expeditious way to assure that this best management action is achieved. As is the case with above-WAC soil, the segregated bricks will be sent off site for disposal in accordance with off-site WAC requirements established for the off-site permitted commercial disposal facility.

As stated in the Operable Unit 5 ROD, the agencies also agree that sufficient existing data and historical process knowledge are available to identify the boundaries of the six geographic areas of Operable Unit 5 as those that represent a reasonable opportunity for cost-effective soil treatment. Outside of these geographic areas, the agencies concur that there is no reasonable basis to conclude that an increased potential for the presence of RCRA characteristic waste exists that would provide additional opportunity for cost-effective soil treatment. Therefore, outside the boundaries of the designated geographic areas, no additional analytical data will be required to screen for the presence of characteristic waste before it is placed in the OSDF. EPA's toxicity characteristic leaching procedure (TCLP) was the stated analytical procedure in the Operable Unit 5 ROD for identifying soil that requires treatment from within the boundaries of the designated geographic areas.

Viable technologies for treating the RCRA characteristic soil were identified in the Operable Unit 5 ROD. The technologies cited include EPA-approved stabilization technologies (for inorganic constituents) and low temperature thermal desorption techniques (for organic constituents). Stabilization technologies are also contemplated for treatment of the Operable Unit 3 RCRA characteristic waste before disposal. The decision to treat eligible RCRA characteristic materials on site (and dispose of them in the OSDF) versus sending them off site for treatment and disposal will be a case-by-case cost/benefit decision that will be made as part of detailed implementation planning for both soil and debris, once definitive quantity estimates and the timing of treatment needs can be specified.

E-3 The FEMP is committed to identifying, segregating, and treating as needed, the contaminated soil from
O-7 within the six designated geographic areas of Operable Unit 5 that exhibit a RCRA characteristic, and the lead sheeting and acid brick from the Operable Unit 3 D&D waste streams. This commitment satisfies the requirements of the Operable Unit 5 and 3 RODs regarding the disposal of RCRA characteristic waste in the OSDF.

3.0 ON-SITE DISPOSAL FACILITY WASTE ACCEPTANCE CRITERIA

This section provides the WAC for all of the FEMP materials contemplated for on-site disposal. Section 3.1 begins by listing all of the materials that have been categorically excluded from on-site disposal, based on either ROD requirements or the engineering constraints for waste placement imposed by the IMP Plan. Section 3.2 presents a similar listing of the restricted-category materials, which can be disposed of on site provided the identified restrictive conditions are met. Section 3.3 presents general requirements applicable to all materials going to the OSDF for disposal. Sections 3.4 and 3.5 present the specific radiological/chemical and physical WAC for all of the allowable waste streams, organized by soil, debris, and ancillary remediation waste.

The information provided in Section 3.0 will assist plan users in understanding the rule book for WAC attainment, so that effective and efficient attainment strategies can be formulated. This section is organized using tables and lists to aid in locating the specific requirements or restrictions for a specific material type.

3.1 EXCLUDED MATERIALS

The RODs for all five operable units identified materials and waste streams that are excluded from disposal in the OSDF due to levels of contamination or agreements with EPA and OEPA. Likewise, the OSDF IMP Plan also identified materials that are excluded from disposal in the OSDF based on engineering design standards, facility integrity considerations, and OEPA regulations.

Materials Categorically Excluded by the RODs

- The contents of Silos 1, 2, and 3 from Operable Unit 4
- O-11 Concrete from Operable Unit 4 Silos 1 and 2 that exhibits highly-elevated direct radiation fields. (Note: A definitive threshold criterion for identifying the affected concrete will be established in the future, as part of Remedial Design for Operable Unit 4).
- Waste pit contents from Operable Unit 1, including any debris found within the waste pits
- Waste pit covers and liners from Operable Unit 1

- Off-site waste that was not generated as a direct result of FEMP remediation (i.e., FEMP analytical residual waste from off-site laboratories is permitted)

E-3 O-7
- Lead bullets from the South Field Firing Range and the associated soil that is identified as RCRA characteristic.

O-12
- Process-related metals (i.e., piping and equipment that did not pass visual inspection) as defined in the Operable Unit 3 ROD[1].

- Product, residues, and other special materials (e.g., uranium and thorium inventories) as defined in the Operable Unit 3 ROD.[1]

- Acid brick generated from Operable Unit 3 facility D&D activities.[1]

- Material exceeding any of the radiological/chemical WAC

Materials Categorically Excluded by the OSDF IMP Plan

- Materials containing free liquids
DOE
- Whole or shredded scrap tires (those specific types of tires defined by OEPA)
- Used oils

E-7 O-17 The intent of the exclusion of free liquids is to prevent contaminated liquid waste from being directly disposed of in the OSDF (e.g., a drum of solvent). Materials that contain rainwater or, like sludges, that have an inherent moisture content are not excluded from disposal in the OSDF. If a material that arrives at the OSDF for disposal is too wet to meet moisture content or compaction requirements, the material will be air dried or blended with a drier WAC-acceptable material at the OSDF, in accordance with construction quality control requirements.

3.2 RESTRICTED MATERIALS

The following materials are "restricted" from disposal in the OSDF (i.e., they are excluded if the restricting requirements are not met):

O-12 [1]Section 5.3 of this WAC Attainment Plan describes a best management approach to extend the Operable Unit 3 ROD-based visual inspection requirements for discernable process materials and associated piping/equipment to the FEMP's non-Operable Unit 3 debris. As part of this best management approach, actual and/or suspected acid brick from the FEMP's soil excavation activities, including the excavation of the Operable Unit 2 waste units, will be segregated from other debris during excavation and sent off site for disposal. The objective is to remove the vast majority of the brick (i.e., that brick which can be readily identified and safely removed during soil excavation and OSDF placement activities) to further minimize the chance that brick containing process residuals is placed in the OSDF.

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E-3 O-7
- RCRA toxicity characteristic soil from the six geographic areas designated in the Operable Unit 5 ROD, unless it has been treated

- Lead sheeting from facility D&D activities within the boundaries of Operable Unit 3, unless it has been treated

- Pressurizable gas cylinders (i.e., gas cylinders that are still mechanically able to be pressurized)

- Intact drums (i.e., they must be empty and crushed)

E-8
- Transformers that have not been crushed or had their void spaces filled with grout, or another acceptable material. Used oil must be drained from all transformers

3.3 GENERAL CONSTRAINTS APPLICABLE TO ALL MATERIAL

The following four requirements are applicable to all waste streams destined for disposal in the OSDF.

- Material above the chemical WAC must be treated to meet the WAC or sent off site for disposal.

- Material not meeting the physical WAC must be size reduced or repackaged to meet the WAC or sent for off-site disposal.

- Planned blending (i.e., dilution) is not to be used to satisfy the WAC.

- The radiological/chemical WAC represent maximum values, rather than average values. Where measurement data are obtained to characterize eligible waste streams for WAC attainment, the planned averaging of known above-WAC measurements with known below-WAC measurements is not acceptable for attainment demonstration.

3.4 WAC FOR ALLOWABLE SOIL AND DEBRIS

Radiological/Chemical WAC for Soil

The radiological and chemical WAC for soil are presented in Table 3-1.

Radiological WAC for Debris

- Technetium-99 is limited to a total of 105 grams from debris waste streams in the OSDF. This limit is to be controlled through the ROD-based categorical exclusions listed in Section 3.1 and the following commitments:

DOE
  - The top inch of concrete will be scabbled and sent off site for disposal from the three most contaminated concrete areas identified in the Operable Unit 3 ROD (the enriched uranium casting area in Plant 9, the uranium machining area in Plant 9, and the muffle furnace area in Plant 8).

TABLE 3-1

RADIOLOGICAL/CHEMICAL WAC FOR SOIL

WAC Constituent[a]	Maximum Concentration
Neptunium-237	3.12×10^{9} pCi/g
Strontium-90	5.67×10^{10} pCi/g
Technetium-99	29.1 pCi/g
Total Uranium	1,030 mg/kg
Carbazole	7.27×10^{4} mg/kg
Bis(2-chloroisopropyl)ether[b]	2.44×10^{-2} mg/kg
Alpha-chlordane	2.89 mg/kg
Bromodichloromethane	9.03×10^{-1} mg/kg
Chloroethane	3.92×10^{5} mg/kg
1,1-Dichloroethene	11.4 mg/kg
1,2-Dichloroethene	11.4 mg/kg
4-Nitroaniline[b]	4.42×10^{-2} mg/kg
Tetrachloroethene	128 mg/kg
Toxaphene	1.06×10^{5} mg/kg
Trichloroethene	128 mg/kg
Vinyl chloride	1.51 mg/kg
Boron	1.04×10^{3} mg/kg
Mercury	5.66×10^{4} mg/kg

[a]In addition to these numerical limits, the Operable Unit 5 ROD states that a best management approach is to be applied during excavation activities to identify, segregate, and treat as necessary, soil containing concentrations of organic compounds at levels that could potentially jeopardize the integrity of the earthen liners of the OSDF.

[b]The WAC for bis(2-chloroisopropyl)ether and 4-nitroaniline may be below the laboratory practical quantitation limits for these compounds in soil. Analytical limitations for these compounds will be addressed in the individual project-specific plans for the supplemental characterization activities in areas that involve these compounds. See Section 4 for a description of the supplemental characterization activities planned during soil remediation.

- The top half-inch of concrete in the southern extraction area of the Pilot Plant will be scabbled and sent off site for disposal.

O-12 • The mass of total uranium is to be controlled by visually inspecting debris generated from within the boundaries of Operable Unit 3 to ensure that it does not contain discernable process materials. (See footnote on page 3-2.)

Physical WAC for Debris

- The maximum length of irregularly shaped metals or other components of a building superstructure or finish components shall be 10 feet.
- The maximum thickness of irregularly shaped metals or other components of a building superstructure or finish components shall be 18 inches.
- The maximum thickness of an individual concrete member or other component of a building slab or substructure shall be 4 feet, when the item is handled individually and is a regular shape having no concrete protrusions greater than 18 inches.
- Concrete reinforcement bars shall be cut within a nominal 12 inches of the concrete mass. The additional length added by these bars is not considered in determining the total length of the concrete mass.
- The maximum thickness of uniform pallets of building cladding (e.g., transite panels), properly banded into rectangular shapes, shall be 4 feet.
- Regulated asbestos-containing material (ACM) shall be double-bagged.
- ACM brick and commingled debris shall be double contained.
- Piping having insulation of ACM shall be segregated.
- Equipment shall be drained of all oils and liquids.
- Piping with a nominal diameter of 12 inches or greater shall be split in half.
- OSDF Category 3 items having voids greater than 1 cubic foot shall be filled with a quick set grout, or flowable cohesionless material approved by the OSDF Construction Manager. If a grout is used in this manner, it shall be allowed to set for a minimum of four hours prior to the commencement of placement of that item.

3.5 WAC FOR ALLOWABLE ANCILLARY REMEDIATION WASTE

The WAC requirements for ancillary remediation waste will be determined on a case-by-case basis as ancillary waste streams are identified. Because all ancillary waste will be either inherently soil-like or debris-like, the process of determining WAC requirements for this waste stream will include applying the soil or debris WAC, as appropriate. Section 6.0 presents the WAC attainment strategies for current and future ancillary remediation waste streams.

3.5.1 Current Ancillary Waste Streams

Currently, there are three known ancillary waste streams: (1) wastes associated with the AWWT Facility (2) residues from FEMP samples that will be returned from off-site laboratories following analysis, and (3) PPE. These waste streams are not directly generated as a result of the soil excavation or D&D activities, and therefore are classified as ancillary waste.

There are a number of related soil-like waste streams associated with the AWWT Facility operations. These include sludge from the Slurry Dewatering Facility (SDF) which includes dewatered sediment from stormwater retention basins; spent resins; and spent carbon. The Operable Unit 5 ROD states that sediment from retention basins and AWWT residues will meet the Operable Unit 5 WAC or be disposed of off site. In accordance with the Operable Unit 5 ROD, the Operable Unit 5 radiological/chemical WAC and physical WAC, therefore, will be applied to the sediment and treatment residues from the AWWT Facility.

Off-site laboratory sample residues are no longer being returned to the FEMP, but the Operable Unit 5 ROD permits laboratory waste resulting from the analysis of FEMP materials to be disposed in the OSDF. If in the future, these materials are returned, the WAC will be applied according to the category of wastes. The soil WAC will be applied to the soil and soil-like waste that is returned and the debris WAC will be applied to any sample returns containing debris.

PPE from all FEMP projects will be managed as debris. The debris physical WAC will be applied to the PPE ancillary waste stream.

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3.5.2 Future Ancillary Waste Streams

O-21 Because additional ancillary waste streams may be identified in the future as remediation progresses, a generic process for determining applicable WAC has been developed. This will ensure that decisions regarding applicable and appropriate WAC are consistent throughout the FEMP remediation. Figure 3-1 illustrates the logic process that will be used if additional ancillary waste streams are identified. If additional ancillary waste streams are identified, addenda to this plan will be prepared and submitted to EPA and OEPA for review and approval. These addenda will present the applicable WAC and the WAC attainment strategy for the new ancillary waste streams.

The first determination to be made when applying WAC to a new ancillary waste stream is whether the waste is a soil/soil-like material or debris. The next step is to determine whether the waste is categorically excluded from on-site disposal (see Section 3.1). This step ensures that no waste is disposed in the OSDF in violation of a ROD. If the waste stream is soil/soil-like, eligible for on-site disposal, and the origin of the waste stream is known (i.e., it is known what area of the FEMP from which it was originally generated), then the area-specific soil radiological/chemical WAC may be applied (area-specific WAC are described in detail in Section 4.0). If the area-specific WAC do not apply, or if the origin of the soil/soil-like waste stream is not fully known, all 18 radiological/chemical WAC for soil will be considered for application.

The Operable Unit 3 ROD identified the major debris waste streams containing high levels of technetium-99 and this debris is being sent off site so that the mass-based radiological WAC will be met. In addition, all debris will be visually inspected to determine that it is free of process hold-up material before on-site disposal. Because of these requirements from the Operable Unit 3 ROD, the determination of whether the debris ancillary waste is categorically excluded from on-site disposal will satisfy the debris radiological WAC. Following this determination, the debris physical WAC will then be applied to the debris ancillary waste stream.

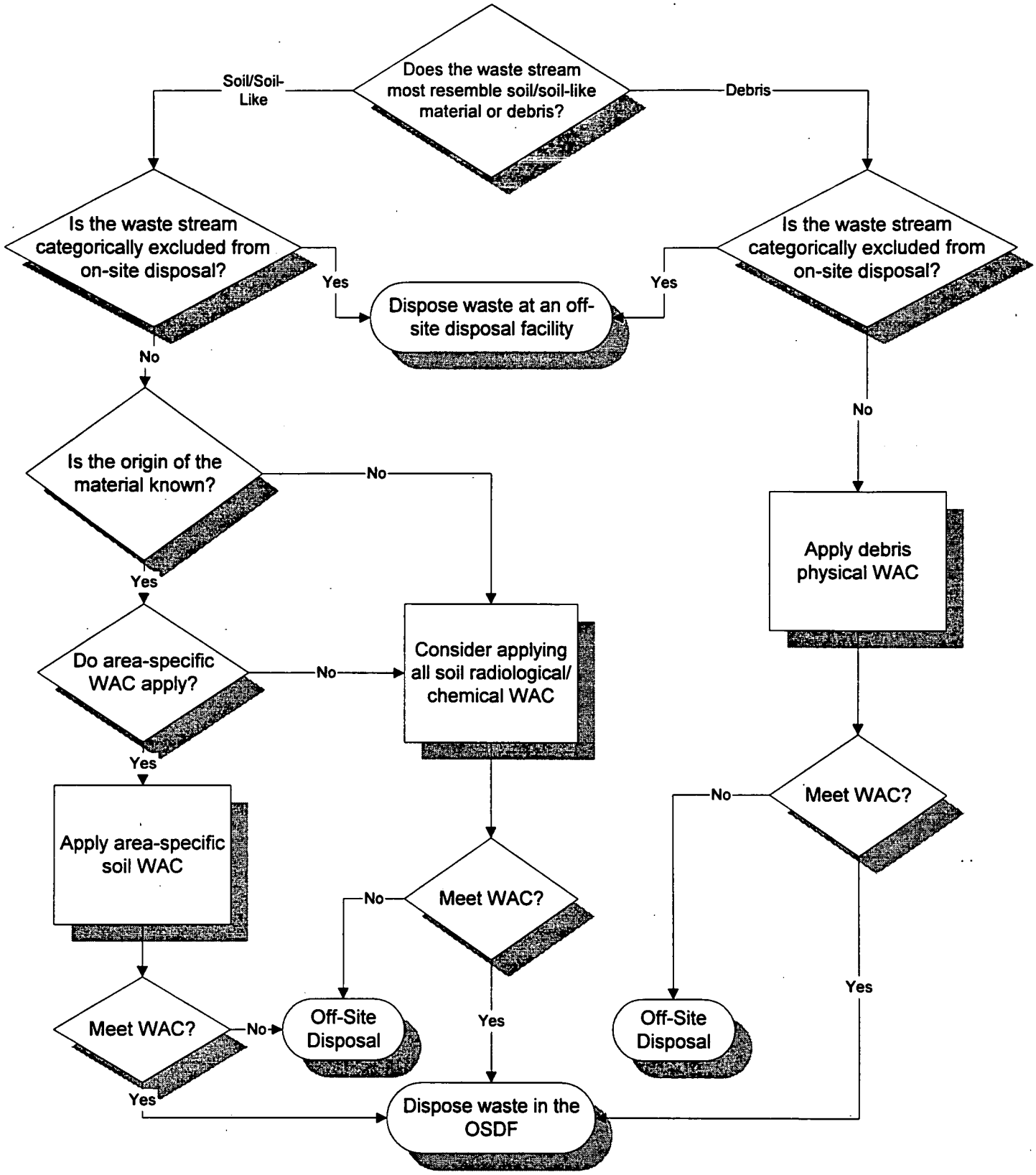

FIGURE 3-1
WAC LOGIC PROCESS FOR FUTURE ANCILLARY REMEDIATION WASTE STREAMS

4.0 WAC ATTAINMENT PLAN FOR SOIL

Section 4.0 presents the WAC attainment plan for soil and soil-like materials. The intent of the section is to define the characterization, excavation, segregation, treatment, transportation, tracking, and oversight activities necessary to successfully demonstrate attainment of the soil WAC provided in Section 3.0. For presentation purposes, the FEMP's soil remediation can be organized into three phases, based on the step-wise progression of the work:

- Pre-Excavation
- Excavation
- Post-Excavation

O-47 Section 4.1 provides an overview of the WAC attainment strategy and the elements comprising each of the three remediation phases. Section 4.2 describes the general WAC attainment strategy applicable to all areas of soil remediation, and Section 4.3 provides additional details regarding location-specific excavation approaches and characterization steps to address the particulars of soil excavation from within six different soil contamination settings. Section 4.4 concludes with a description of WAC attainment oversight activities, including internal oversight and the planning for and coordination of EPA and OEPA oversight at all major steps of the plan.

4.1 SOIL WAC ATTAINMENT PLAN OVERVIEW

O-3 The strategy for soil WAC attainment provided in this section establishes the approach that is expanded upon in the draft SEP. The SEP is currently under review by EPA and OEPA, with approval anticipated during the Spring of 1998. Because the WAC Attainment Plan is the "umbrella" document, it is not expected that there will be any changes to the WAC attainment strategy presented in this section as a result of EPA and OEPA's review of the SEP. However, if such changes are identified during the process of finalizing the SEP, the WAC Attainment Plan will be revised accordingly.

E-1 One of the current areas of concern raised by EPA and OEPA pertains to the use of real-time
E-15 field screening techniques to assist with the demonstration of WAC and final remediation
O-1 level (FRL) attainment. Currently, EPA and OEPA have not fully approved of the use of real-time techniques for either WAC or FRL attainment, although there is conceptual agreement that the techniques comprise important elements of a multi-step attainment demonstration process. In support

of the SEP and the WAC Attainment Plan, the FEMP will be submitting for EPA and OEPA approval several subordinate detailed implementation plans[1] for the real-time analytical techniques in order to gain final approval of the techniques for use in WAC and/or FRL attainment. Accordingly, this plan describes the generalized use of the real-time field screening techniques in the WAC attainment demonstration process at a level of detail for which there is conceptual agreement by the regulatory agencies. The SEP review and approval process (and the accompanying detailed implementation document approvals) will provide the mechanism for resolving the final applicability of real-time field screening techniques in WAC and/or FRL attainment demonstration. Incorporation of these real-time monitoring techniques provides an approach that reasonably honors the requirements of the Operable Unit 2 and Operable Unit 5 RODs.

O-23 As discussed in Section 2.3, the FEMP is required to begin waste placement in the OSDF by March 27, 1998. First waste placement was initiated approximately three months early on December 23, 1997 with the placement of soil from the east stockpile (generated during Area 1, Phase I excavation activities) in Cell 1 of the OSDF. This soil comprises the one-foot protective layer of the liner (the final layer of the Cell 1 liner) and will protect the compacted clay and geosynthetics from frost during the winter shutdown. In order to facilitate this first placement, a separate WAC attainment demonstration report for the east stockpile was submitted to EPA and OEPA in June 1997. This report was approved in November 1997, along with the OSDF IMP Plan. The approved IMP Plan and the east stockpile WAC attainment demonstration report serve as the governing documents for the east stockpile soil that has been (and will continue to be, when activities resume during the 1998 construction season) placed in the OSDF. All remaining remediation-based soil excavation activities beyond the placement of the east stockpile soil will be performed in accordance with this WAC Attainment Plan, the approved IMP Plan, and the detailed procedures contained in the SEP.

E-1 Figure 4-1 provides an overview of the WAC attainment objectives for each of the three soil
E-3 remediation phases (pre-excavation, excavation, and post-excavation). The figure also identifies key
O-1 activities designed to accommodate independent FEMP oversight and external oversight by EPA and

[1]The detailed subordinate documents currently envisioned for submittal to EPA and OEPA are the HPGe Comparability Study Report, the RTRAK Applicability Study Report, a real-time field screening radiological usability report, and a formal Addendum to the FEMP's Sitewide CERCLA Quality Assurance Project Plan (SCQ) that documents implementing procedures and QA/QC requirements for an effective real-time analytical program. These documents will be approved outside this WAC Attainment Plan.

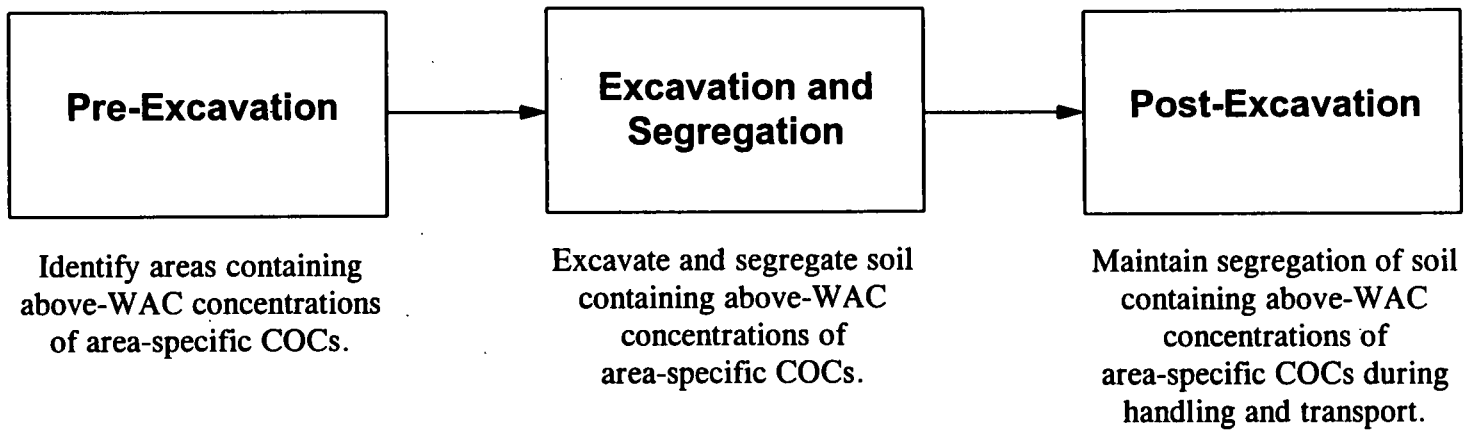

FIGURE 4-1. SOIL REMEDIATION - WAC ATTAINMENT OBJECTIVES BY PHASE

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O-7 OEPA. In brief, during the pre-excavation phase, soil containing above-WAC concentrations of constituents of concern will be identified and bounded. Identification and bounding will be accomplished for in-situ soil using existing RI/FS data, radiological survey data, and supplemental sampling activities, where necessary, conducted during a pre-excavation characterization step. In those six designated geographic areas where a potential exists for the presence of soil that qualifies as RCRA characteristic waste in sufficient quantities to provide a reasonable opportunity for treatment, as well as in the geographic area surrounding the South Field Firing Range, additional sampling will be undertaken to determine the extent of RCRA toxicity characteristic soil present.

O-35 The supplemental characterization of soils "in situ" represents the most conservative characterization approach, since in-situ soil will not demonstrate the potential effects of contaminant dilution which will occur naturally during excavation. The results of the pre-excavation characterization step and the delineation of the above-WAC and above-FRL soil to be excavated will be documented in the Integrated Remedial Design Packages (IRDPs) prepared for each remediation area. Soil excavation for remediation purposes in a given area will not commence until the IRDP for the area is approved or conditionally approved by EPA and OEPA. (Other non-remediation soil excavation activities -- for example, to install pipelines or support site preparation -- may be conducted provided the activities follow governing requirements for such excavation contained in the SEP or other appropriate remedial documents).

E-1 Design drawings and data from the IRDP will be used to physically designate soil areas requiring
E-2 excavation. Soil containing above-WAC concentrations of technetium-99 will be excavated first
E-4 followed by soil that contains above-WAC concentrations of uranium. Should either of these above-
O-1 WAC soil volumes contain soil that tests positive for the toxicity characteristic during the six-area pre-
O-31 excavation characterization, they will be segregated for treatment prior to off-site disposal or for transport to an off-site treatment and disposal facility. The decision to employ on-site treatment or off-site treatment will be made on a case-by-case basis based on economic factors occurring at the time of the decision. Following the excavation of above-WAC soil to the boundaries specified in the IRDP, the remaining soil will be radiologically surveyed to ensure that no above-WAC soil remains in the area to be excavated. The remaining soil that is contaminated above FRLs will be removed and the excavation area certified consistent with the procedures contained in Section 3.4 of the SEP. During the excavation of above-FRL soil, additional radiological surveys will be performed in many areas to provide additional assurance that above-WAC material is no longer present in the area being excavated.

Also, the screening of the excavation sites for organic vapors in conjunction with health and safety monitoring will be performed at all locations of excavation. This screening will be used to identify and segregate additional soil for treatment, thus fulfilling the Operable Unit 5 ROD commitment for continuous organic vapor screening during all excavation activities. Lastly, all soil determined to be RCRA characteristic in the area of the South Field Firing Range will be sent off site for disposal, in accordance with the Operable Unit 2 ROD.

E-10 During the post-excavation phase, the identification of above-WAC and above-FRL soil will be
E-21 maintained using material handling and transport controls to assure that only WAC-compliant soil is
DOE transported to the OSDF. Excavated material will be transferred to one of seven types of material tracking locations (MTLs) depending upon its material profile and ultimate disposition. To the extent practical, excavation will be scheduled such that excavated material will either be transferred directly to an interim staging area for treatment, to the Waste Pits Remedial Action Project organization for transport off site, or to the OSDF for on-site disposal as appropriate. This will minimize the need for interim soil stockpiles and double handling of excavated soil. Field personnel will complete material tracking documentation for each loaded transport vehicle, unless each MTL is within visual contact and within the same project boundary. In this case, an alternate documentation frequency may be used that will still provide adequate material tracking. The documentation to be used are Field Tracking Logs (FTLs) and On-Site Manifests (OSMs). Examples of what these forms may look like are shown in Appendix A. Currently, however, a single form is being developed that will include the information contained in both the FTL and OSM. The exact combined form will be finalized through internal procedures, but will generally contain the information included in Appendix A. The remainder of this document will refer to a combined FTL/OSM that will be used for material tracking from generation to disposal. On a routine basis, FTL/OSMs will be reconciled and entered into the Integrated Information Management System (IIMS). Subsequent transfers of soil from one MTL to another will be similarly documented and controlled using FTL/OSMs. The FTL/OSMs will reflect the appropriate coding for the waste material (e.g., above-WAC, below-WAC, etc.) and will be designed such that the coding will be readily discernable.

O-35 A new, internal FEMP oversight organization [Waste Acceptance Operations (WAO)] has been created that will provide independent oversight of the FEMP's waste generation and placement activities to assure compliance with OSDF WAC attainment requirements. Following full or conditional agency

approval of an IRDP, monthly remediation schedules will be provided to EPA and OEPA to coordinate EPA and OEPA participation in field oversight activities. The FEMP will coordinate with EPA and OEPA representatives to identify those excavation or sampling events that EPA and OEPA would like to observe and to assure that appropriate personnel are on-hand to support split sampling.

The following sections provide additional detail for the activities that will occur during each of the three soil remediation phases. This is followed by a description of the independent oversight activities that will be performed during each phase to assure that critical activities are executed in accordance with this plan.

4.2 GENERAL WAC ATTAINMENT PLAN FOR SOIL

The general WAC attainment strategy for soil remediation encompasses all three remediation phases (pre-excavation, excavation, and post-excavation) as a means to assure WAC attainment for soil to be placed in the OSDF. The general attainment strategy will be applied to all FEMP soil remediation activities regardless of location. However, because of the wide range of physical conditions at the FEMP, location-specific soil excavation approaches and/or characterization steps will be necessary to execute the general strategy. For example, soil contamination in impacted soil outside the former production area and outside existing waste storage/management areas is the result of air deposition and generally consists of uranium contamination in surface and near surface soil. In contrast, contamination within the former production area may be the result of spills, leakage, and seepage of a variety of constituents in addition to uranium. As a result of the differences in contaminants, their origin, and their method of deposition, different pre-excavation characterization steps or excavation processes may be necessary in different geographic areas.

This section focuses on the general WAC attainment strategy that will be employed in all areas. The location-specific pre-excavation characterization steps and excavation processes are presented in Section 4.3.

4.2.1 Pre-Excavation Phase

Pre-excavation activities begin with the identification of the area to be remediated and conclude with the submittal of the IRDP to EPA and OEPA for approval. Figure 4-2 identifies the sequence of

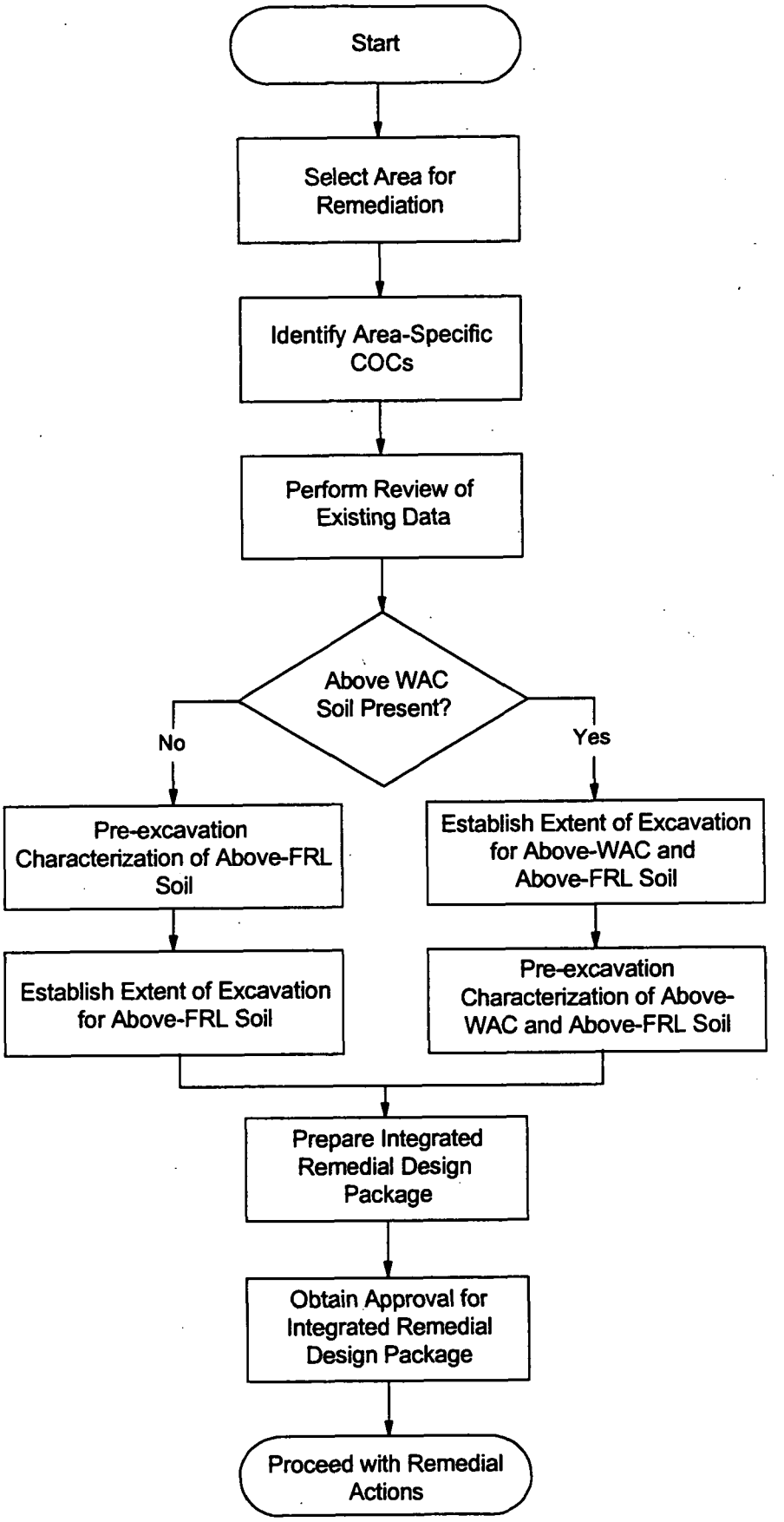


FIGURE 4-2. SEQUENCE OF PRE-EXCAVATION PHASE ACTIVITIES

activities that will be executed during the pre-excavation phase. The following sections provide details for each of the activities highlighted in Figure 4-2.

4.2.1.1 Select Remediation Area

The order in which specific areas of the FEMP are remediated will not impact WAC attainment for the OSDF. The following discussion is provided only as a basis for the definition of remediation areas, which are addressed later in this section.

The FEMP areas requiring soil remediation are summarized in Figure 4-3. Soil remediation will be coordinated with other on-site activities and sequenced to protect human health and the environment (by minimizing potential exposure to contamination) and to minimize the potential for cross-contamination and re-contamination of areas undergoing remediation. The order in which areas are remediated will:

- Prioritize excavation of contamination source areas
- Excavate from up-gradient to down-gradient surface drainage areas to prevent re-contamination
- Control haul routes to minimize cross-contamination and re-contamination of remediated areas
- Use paved roads and dust control methods to minimize cross-contamination and re-contamination of remediated areas.

To accomplish these objectives, the FEMP has been divided into eight remediation areas. Figure 4-4 shows the location of the remediation areas. Details regarding the identification of the eight areas and the basis for the sequence of remediation are presented in Appendix B of the SEP.

Although the order in which specific areas of the FEMP are remediated will not impact WAC attainment for the OSDF, the constituents of concern and characterization methods will vary based upon the specific area to be remediated and the origin of the contamination. To accommodate the differences in constituents of concern and characterization methods, site soil excavation is divided into six location-specific approaches:

A. Impacted on-property soil outside the former production area and outside other waste storage/management areas

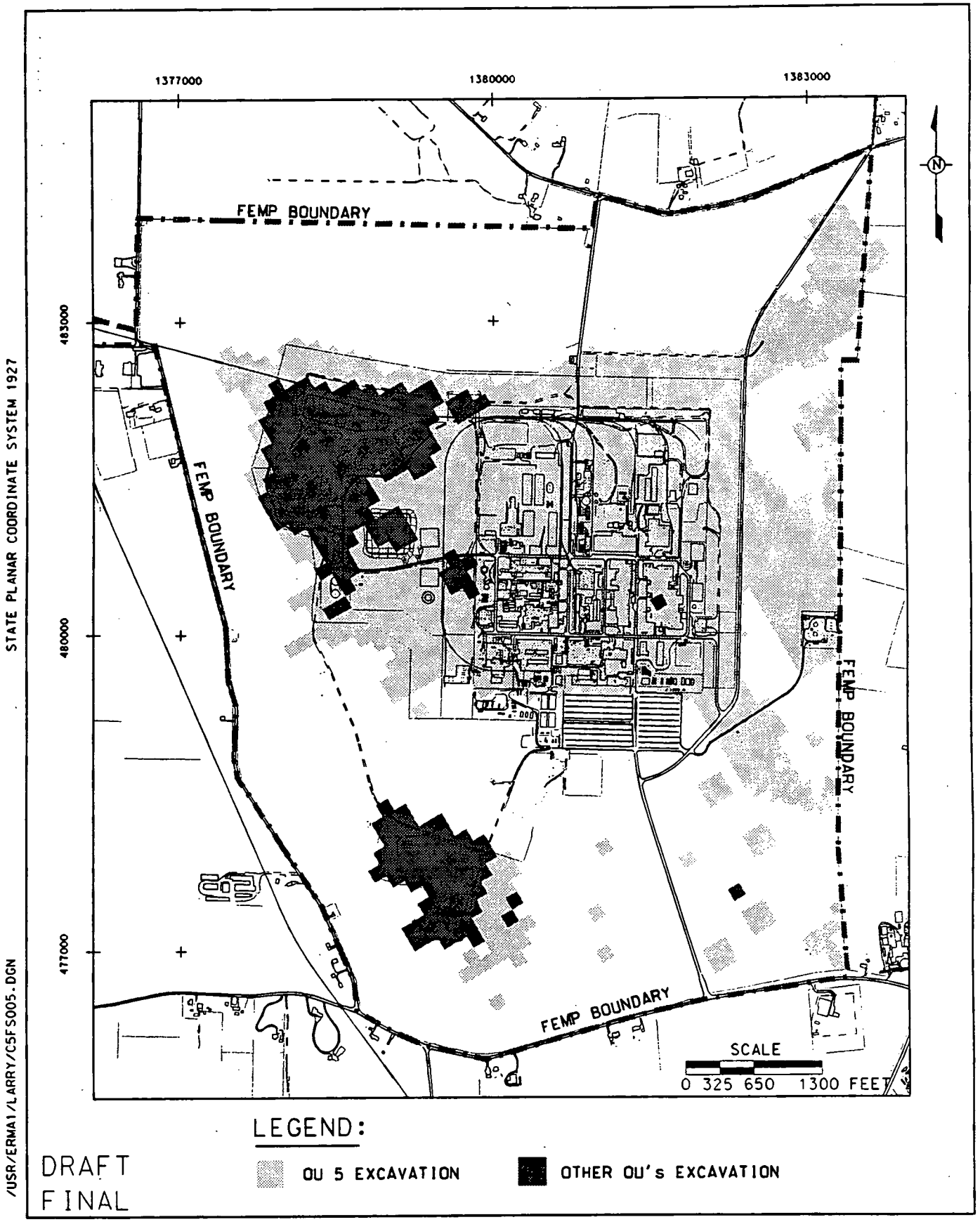


FIGURE 4-3. FEMP AREAS REQUIRING SOIL REMEDIATION (BASED ON RI/FS INFORMATION)

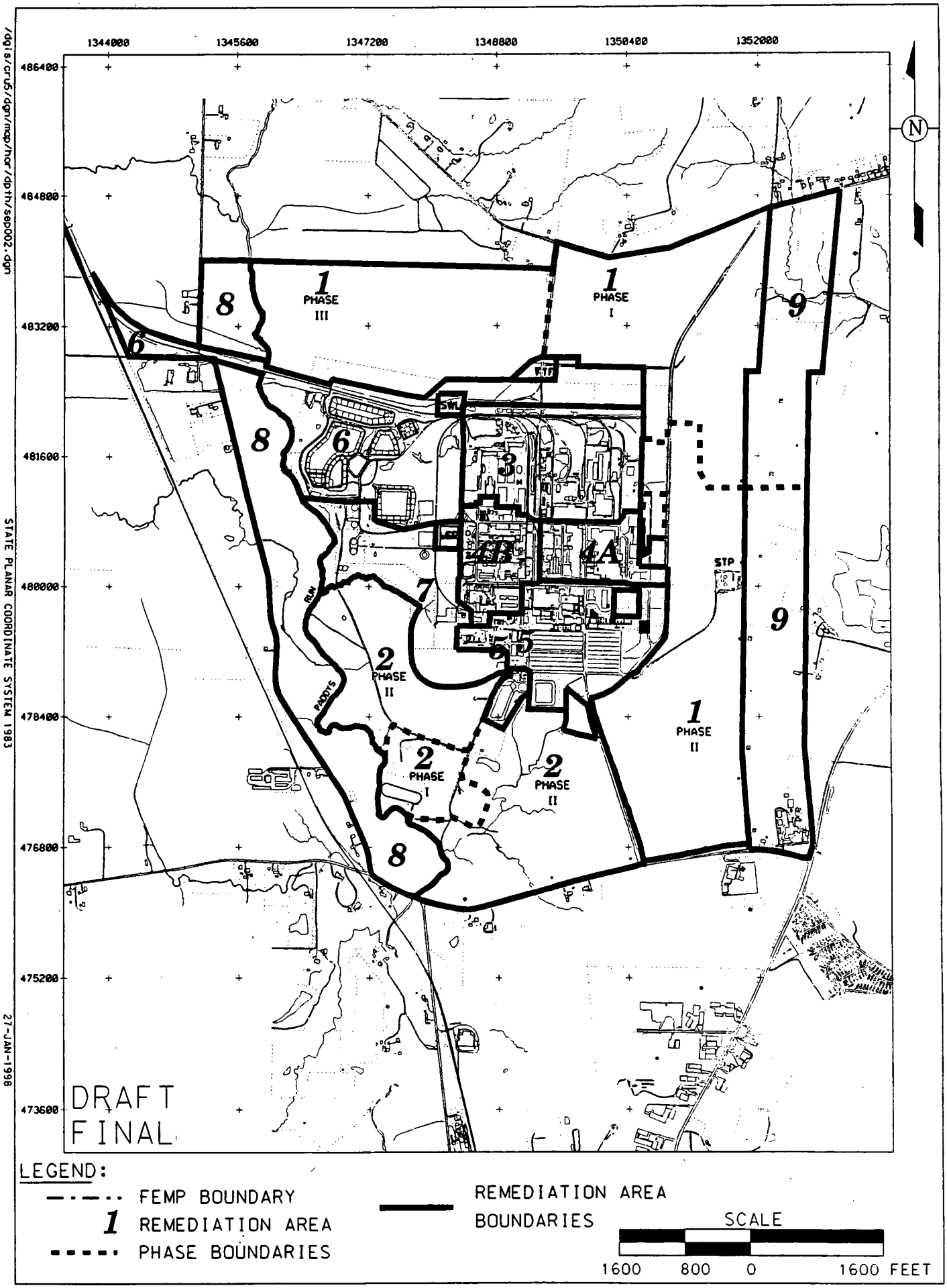


FIGURE 4-4. GENERALIZED SITEWIDE REMEDIATION AREAS

B. Soil and soil-like material contained within waste storage/management areas outside the former production area

C. Existing soil stockpiles in the former production area

D. Soil in the former production area, sewage treatment plant, and fire training facility

E. Off-property and non-impacted on-property areas

F. Non-high-density polyethylene (HDPE) pipeline excavation outside the former production area.

4.2.1.2 Area-Specific WAC Constituents of Concern

Table 3-1 provides a list of the 18 FEMP soil constituents of concern for which OSDF WAC exist. While there are other constituents of concern, there are no constraints on the levels of those contaminants that can be accepted for disposal in the OSDF. These 18 WAC constituents of concern, therefore, form the basis for development of area-specific constituents of concern for WAC attainment.

E-11 The process for developing and gaining EPA and OEPA approval of the proposed area-specific
O-25 constituents of concern for WAC attainment involves several steps; final approval for a particular remediation area is gained with approval of the IRDP. Prior to beginning pre-excavation characterization activities for a given remediation area, the FEMP will produce a project-specific plan (PSP) that initially proposes the list of area-specific WAC constituents of concern for the area. The initial proposal will result from a detailed review of the FEMP's environmental databases to identify those WAC constituents that have been detected within the given remediation area. Based on the concentration ranges and frequencies of detection seen in the existing database, coupled with a review of the overall completeness and representativeness of the WAC constituent data for the area, a short-list of constituents will be developed for EPA and OEPA's consideration. Other information from the RI/FS databases that will be used to develop the lists and assess the extent of affected areas includes underlying perched and Great Miami Aquifer groundwater and nearby surface water analytical results; process knowledge; and any existing real-time analytical results that may be available for a given area.

The justification of the adequacy of the short list will be provided as part of the PSP. EPA and OEPA will be furnished the PSP for information purposes so that all parties are familiar with the information used to derive the lists. Actual approval of the lists, however, rests with the approval of the follow-up IRDP, that will generally be submitted to the agencies following completion of the pre-excavation

characterization step. The intent of sharing the results of the database searches and area-specific constituent list justifications at the PSP stage is to help alleviate concerns over the adequacy of the FEMP's existing RI/FS data for design purposes, and to allow for the mutual identification of known database shortcomings early in the process before detailed design documents are prepared. If there are any future remediation areas that are found to not require a pre-excavation characterization step, the proposed list of area-specific constituents of concern for WAC attainment, and appropriate justification for them, will be provided at the IRDP step.

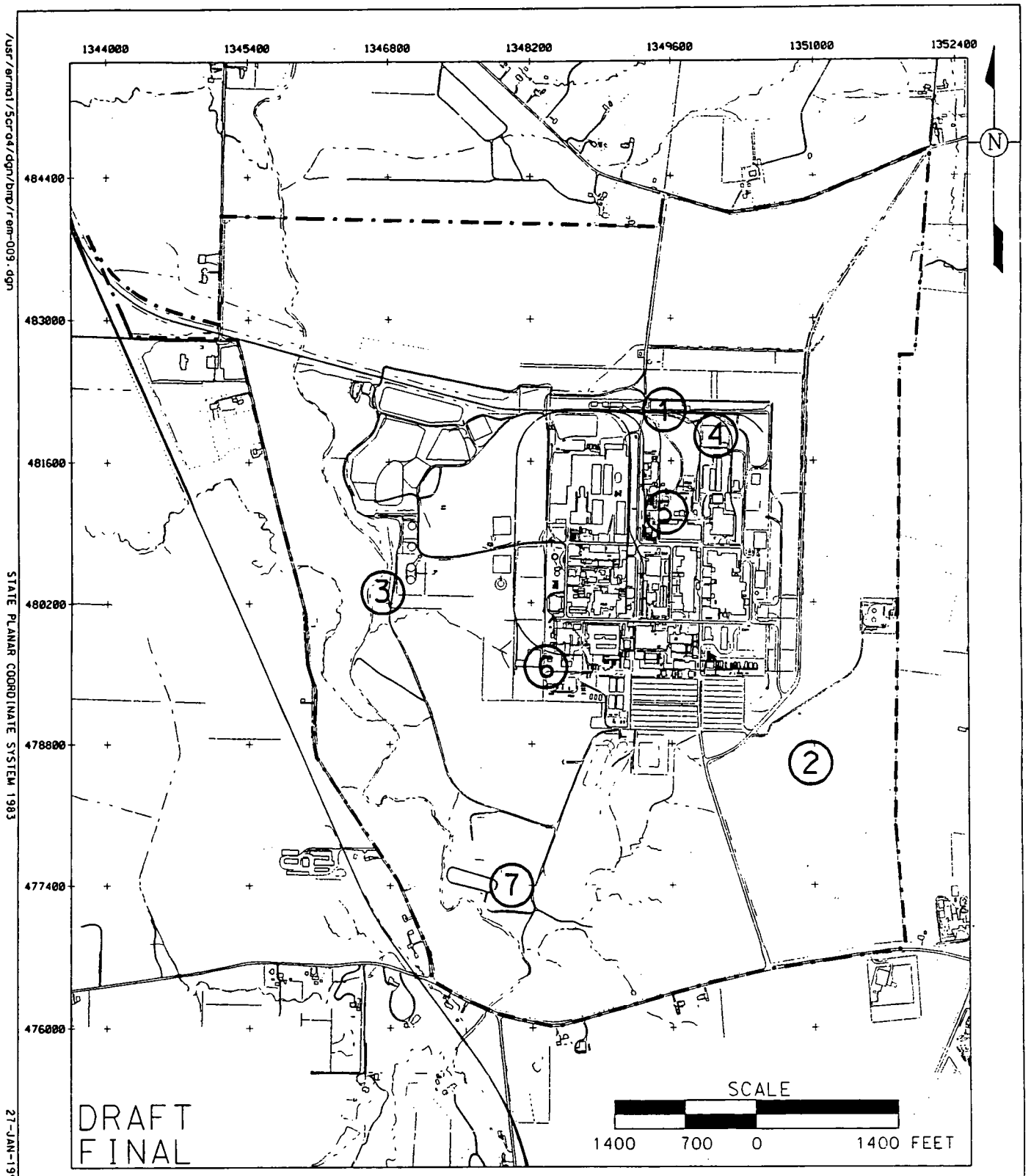
Generally speaking, the proposed list of area-specific constituents of concern for WAC attainment for a given remediation area will consist of 1) the primary constituents of concern (for example, total uranium) that drive the overall extent of WAC-related excavation; and 2) the secondary constituents of concern (for example, a nonradiological constituent) that are found to be in association with the primary constituent(s).

O-2 Following review of the PSPs by EPA and OEPA, those areas of the FEMP where the assembled information (including groundwater, surface water, soil, and process knowledge information) indicates that one or more of the area-specific WAC constituents of concern may be present in concentrations that exceed their OSDF WAC, the soil will be characterized as described in the following sections to assure that the OSDF WAC are not exceeded.

4.2.1.2.1 RCRA Characteristic Waste

E-3 The Operable Unit 5 ROD identified six geographic areas where a reasonable potential exists for the
O-7 presence of soil that qualifies as hazardous (RCRA toxicity characteristic) and also presents a reasonable opportunity for cost-effective treatment. These areas are shown on Figure 4-5 and listed in Table 4-1. It is conservatively estimated that approximately 28,000 cubic yards of material from these areas could be considered RCRA characteristic (i.e., would not pass the RCRA TCLP test). Generally, screening for the presence of characteristic soil will not be performed outside of these areas, except for existing stockpiles where additional characterization information may be needed, or where it is necessary to satisfy off-site WAC for soil that is not destined for the OSDF.

The RCRA characteristic potential for soil in these six areas was identified using validated data in the Sitewide Environmental Database (SED) for constituents with concentrations that exceed 20 times the



LEGEND:

- · — · — FEMP BOUNDARY
1. AREA BETWEEN KC-2 WAREHOUSE AND THE ADJACENT RAILROAD TRACKS
2. TRAP RANGE
3. PADDYS RUN STREAMBANK FILL MATERIAL LOCATED WEST OF THE SILOS
4. SCRAP METAL PILE
5. AREA NORTH OF THE MAINTENANCE BUILDING
6. ABANDONED SUMP WEST OF THE PILOT PLANT
7. SOUTH FIELD FIRING RANGE

FIGURE 4-5. AREAS POTENTIALLY CONTAINING RCRA CHARACTERISTIC WASTE THAT QUALIFIES FOR TREATMENT

TABLE 4-1

AREAS POTENTIALLY CONTAINING RCRA CHARACTERISTIC WASTE IN SOIL

Description of Area	Remediation Area
Area between the KC-2 Warehouse and the adjacent railroad tracks	3
Trap Range	1
Paddys Run streambank fill material located west of the Silos	7
Scrap Metal Pile	3
Area north of the Maintenance Building	3
Abandoned Sump West of the Pilot Plant[a]	4b
South Field Firing Range[b]	2

[a]Also designated as Hazardous Waste Management Unit No. 22.

[b]RCRA characteristic material from the South Field Firing Range will be disposed of off site as required by the Operable Unit 2 ROD.

respective TCLP limit. The 20 times rule accounts for the dilution effects of the TCLP test (i.e., 1 liter of diluent per 50 grams of sample). A sample with a contaminant content less than 20 times the TCLP limit cannot be characteristically hazardous. If the contaminant concentration is greater than 20 times the TCLP limit, it may be hazardous, depending on the leachability of the contaminant as measured by the TCLP test.

E-3 As presented later in this section, characteristically hazardous soil from the South Field Firing Range
O-7 will be disposed off-site in accordance with the Operable Unit 2 ROD, while characteristically hazardous soil from the other six geographic areas will be disposed of in either an off-site facility or the OSDF following treatment, depending on economic factors. All such soil that also exceeds the radiological WAC for the OSDF will be dispositioned off site. The characteristically hazardous soil that is dispositioned off site must be treated to meet LDR treatment standards prior to disposal. The characteristically hazardous soil from the six geographic areas that will be dispositioned to the OSDF will be treated before disposal. The decision as to whether such soil that does not exceed the radiological WAC for the OSDF will be dispositioned to the OSDF or off site will depend on such factors as the availability of appropriate on-site treatment and the cost differential between on-site and off-site treatment/disposal.

The procedures to be used to identify, excavate, and handle these characteristically hazardous soil materials are similar to those for material with contaminant concentrations that exceed the WAC for the OSDF. The decision points for the characteristically hazardous soil from these six areas are presented as part of Figure 4-6.

4.2.1.2.2 Monitoring for the Presence of Organic Solvents in Soil

E-4 As presented earlier in Table 3-1, the Operable Unit 5 ROD states that a best management approach is
O-31 to be applied during soil excavation activities to identify, segregate, and treat as necessary soil containing concentrations of organic solvents at levels that could potentially jeopardize the integrity of the earthen liners of the OSDF. The health and safety screening using hand-held organic vapor analyzers that will be performed at all excavation locations will provide the information to implement this best management approach. Soils exhibiting elevated concentrations of organic compounds during the screening will be segregated for further characterization and potential treatment before disposal in the OSDF. The implementation aspects of the field screening process will be provided in the SEP,

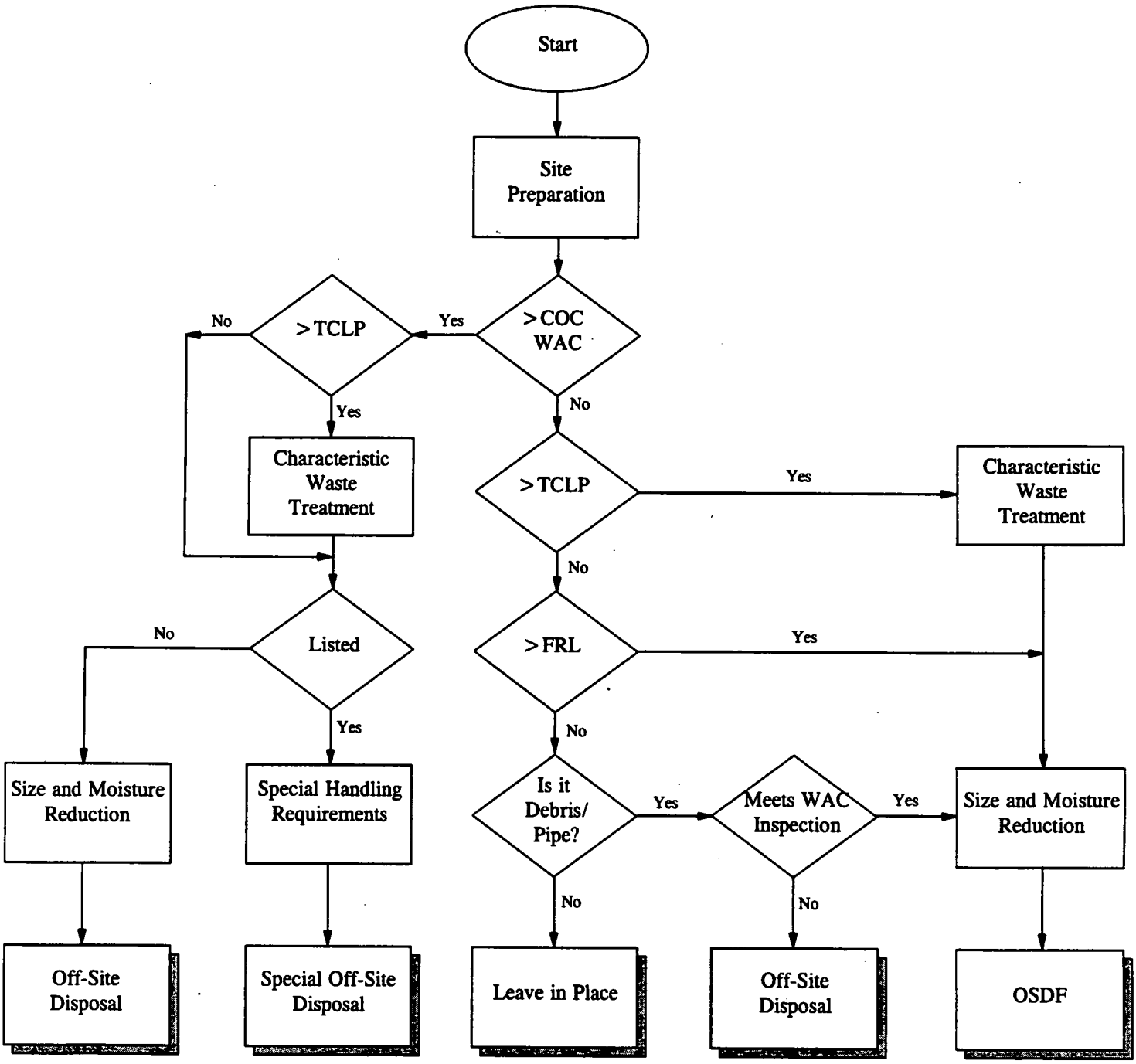


FIGURE 4-6 - SEQUENCE FOR SOIL EXCAVATION AND DISPOSAL

along with a discussion of the segregation and treatment steps to be taken should significant solvent-saturated soils be indicated through the organic vapor monitoring.

4.2.1.3 Pre-Excavation Characterization

O-2 The objective of pre-excavation characterization is to define above-WAC and above-FRL soil excavation volumes. RI/FS data for soil, groundwater, and surface water in an area, process knowledge, other data contained in the SED, and pre-excavation characterization data required to fill data gaps will be used to generate excavation profiles using kriging or other three-dimensional (3-D) data interpolation programs.

These excavation profiles will then be used to prepare the IRDPs detailed in the next section. The following paragraphs describe the characterization techniques that will generally be used throughout the FEMP. Location-specific characterization requirements for each of the six FEMP soil categories defined in the previous section are presented in Section 4.3.

E-11 The WAC constituents of concern for soil within the area to be remediated will be proposed for EPA
O-25 and OEPA approval following the process discussed previously in Section 4.2.1.2. In general, approval of the area-specific lists is obtained following approval of an IRDP for a given remediation area.

E-1 Radiological surveys, high-purity germanium (HPGe) measurements, and supplementary soil sampling
E-3 and analysis will be executed during the pre-excavation step to fill RI/FS data gaps and establish the
O-1 extent of excavation for above-WAC and above-FRL soil. The data will also be used to establish the
O-7 extent of excavation for RCRA characteristic soil in the six Operable Unit 5 ROD-designated areas.
O-25 The specific number of samples needed to establish the excavation extent will depend on the nature
O-33 and extent of area-specific constituents of concern and the balancing of cost between laboratory analysis and soil excavation. A large number of samples will result in very accurate delineation of excavation volumes, which may be too precise to follow during excavation. Conversely, too few samples will result in delineation of excavation volumes that overestimate the above-WAC and above-FRL soil volumes, and unneeded excavation will take place. This section presents a conceptual model which provides a basis for the subsequent development of detailed area-specific PSPs which will delineate supplemental data needs for a given area and the appropriate number of area-specific

pre-design samples to be taken. The PSPs will be submitted to EPA and OEPA for information purposes and oversight planning prior to the start of pre-excavation characterization activities for a given remediation area. The intent is to provide the PSPs to EPA and OEPA for review at least 30 days in advance of initiating sampling activities, wherever possible. Following delivery of the individual PSPs to EPA and OEPA, discussions will be held to review the adequacy of existing RI/FS data for identifying above-WAC material, the proposed list of area-specific WAC constituents of concern and accompanying justification, and the areal bounding requirements to be addressed by the pre-excavation characterization sampling program. The intent of the discussions is to gain alignment on the nature and scope of the supplementary data needs before commencement of the field program, and permit EPA and OEPA to offer comments or concerns relative to the area-specific characterization effort. Agency approval of the completion of the pre-excavation characterization step and its ability to support the detailed design for a given area will be accomplished through EPA and OEPA's review of the area-specific IRDPs. The individual IRDPs will be submitted at the end of the pre-excavation characterization step once detailed design tasks have been completed.

E-1 The conceptual characterization model begins with the use of existing SED data (which contains the
O-1 RI/FS database) in a 3-D interpolation model to determine an initial estimate of the excavation volume. A unit volume, not to exceed one-fourth of the total estimated excavation volume, will then be selected to determine the cell size for a survey/sample grid. The grid will be surveyed to locate any potentially elevated activity areas to ensure the grid nodes lie on these areas. HPGe measurements or samples will be collected from the grid nodes. The survey data and analytical results will be evaluated to determine whether all nodes lie below the WAC and FRLs of the area-specific constituents of concern. If the perimeter nodes are greater than the WAC or FRL criteria, the sampling grid will be extended until all soil above the WAC and FRL is captured. When the lateral extent of constituents of concern is determined, Geoprobe™ borings will be placed at the nodes of the grid exhibiting the highest constituent concentrations, and a core soil boring sample will be obtained to a depth of three feet to determine the vertical distribution of the constituents of concern. At least one subsurface sample will be collected in every one-foot interval, and if the deepest sample contains above-WAC and/or above-FRL constituents of concern, the Geoprobe™ boring will be extended an additional three feet to obtain at least three additional samples. Sampling will continue until the depth of excavation is established. The excavation volumes for above-WAC and above-FRL soil will then be refined based on the depth of excavation established at each Geoprobe™ boring location. In all cases, all samples that reveal above-

WAC concentrations for the area-specific constituents of concern (both existing and new supplementary samples) will be acknowledged as requiring further bounding definition through this process.

The data collected from the pre-design characterization will be used to generate an excavation profile through kriging or other appropriate 3-D interpolation techniques. The kriged profile will be carried forward to remedial design so that a final volume and slope of excavation can be determined from the kriged profile of each excavation type (i.e., above-WAC and above-FRL). In all cases, the final engineered slope of excavation will be located outside the profile estimated from the kriging data, owing to standard construction practices for slope stability. This approach will provide added assurance that the WAC will be attained for soil placed in the OSDF and that soil left in place is below the WAC or FRL established for each constituent of concern. The final engineered design will appear in the IRDP.

In most instances, the extent of excavation for above-WAC soil will be driven by what will generally be the primary WAC constituent of concern, uranium. In this instance, the horizontal extent of above-WAC uranium contamination will be determined through the use of in-situ radiological surveys. The vertical extent of above-WAC uranium contamination will be determined through the use of a Geoprobe™ to collect soil samples and surveys of the collected samples at one-foot intervals.

O-34 In those areas where RI/FS data indicate that above-WAC concentrations of technetium-99 may be present, a sampling and analysis program will be used to determine both the horizontal and vertical extent of above-WAC contamination (for technetium-99, the WAC and FRL are equal). The horizontal extent of above-WAC technetium-99 contamination will be determined through the collection and laboratory analysis of discrete surface soil samples, using the FEMP's approved laboratory methods for technetium-99. The vertical extent of above-WAC technetium-99 contamination will be determined through the use of a Geoprobe™ to collect soil samples at one-foot intervals and laboratory analysis of the discrete samples.

E-3 In those six areas where a potential exists for the presence of soil that qualifies as RCRA characteristic
O-7 waste in sufficient quantities to provide a reasonable opportunity for treatment, and also in the area of the South Field Firing Range, a sampling program will be undertaken to determine if toxicity characteristic soil is present. The horizontal extent of contamination will be determined through the

collection and laboratory TCLP analysis of discrete surface soil samples. The vertical extent of soil failing the toxicity characteristic will be determined through the use of a Geoprobe™ to collect soil samples at one-foot intervals and TCLP analysis of the discrete samples. To the extent possible, sampling and analysis activities to determine the extent of uranium contamination, technetium-99 contamination, and toxicity characteristic soil will be performed concurrently. Sample collection, handling procedures, sample preparation, analytical methods, and detection limits will be discussed in Appendix E of the SEP.

4.2.1.4 Integrated Remedial Design Package

Data collected during pre-excavation characterization will be used along with existing SED data to generate excavation profiles through kriging or other 3-D interpolation technique. In all cases, the final excavation profile will be located outside the profile estimated using the kriged data. This approach will assure that the WAC will be attained for soil placed in the OSDF.

Upon completion of the excavation profile, a remedial design will be prepared and documented in an IRDP. IRDPs will be prepared for individual areas or combinations of remediation areas. The IRDP will contain the detailed plans, specifications, and implementation requirements that will be used to procure and direct the remedial construction subcontractor and guide the stepwise progression of the work in the field. Items to be included in each IRDP are presented in Table 4-2.

O-35 Each IRDP will be submitted to EPA and OEPA for approval prior to implementation. DOE will formally respond to EPA and OEPA comments within 30 days of receipt of agency comments. Upon approval of the IRDP or conditional approval by the agencies of the responses to comments, remediation excavation may commence. Necessary revisions to the IRDP will then be incorporated and a final document transmitted. As a general practice, the FEMP does not intend to initiate IRDP-based field work unless either a conditional or final agency approval of the IRDP is obtained. Whenever possible, the submittal of draft IRDPs will be scheduled such that sufficient time is made available to submit a revised document for review and approval prior to the need to initiate excavation activities. Under select schedule-driven circumstances, the FEMP may need to request conditional approval of an IRDP based on agency review of detailed comment responses and/or change pages or revised drawings from the document.

000066

TABLE 4-2

ITEMS INCLUDED IN EACH INTEGRATED REMEDIATED DESIGN PACKAGE (IRDP)

Remedial Action Work Plan	Design Drawings	Specifications
• Schedule of remedial activities • Scope of work and boundaries of the data, including areas of remediation • Summary of existing RI/FS data, process knowledge, and additional pre-excavation data • Summary of subsurface conditions (e.g., piping, structure foundation, pile, perched water, and soil geotechnical properties) • Known extent of contamination • Applicable WAC and FRLs • Area-specific constituents of concern • Anticipated excavation boundaries • Area-specific access control requirements • Area-specific excavation approaches • Excavation control equipment • Erosion and surface water control • Pre-certification protocols	• Site preparation • Temporary facilities locations • Excavation plan and cross-sections • Storm water control elements • Erosion and sediment control • Interim grading plan • Decontamination facility utilities to be saved/removed • Survey monuments	General Requirements • Summary of work • Submittal schedule • Health & Safety requirements • Mobilization and site access • Quality assurance / control requirements • Management of impacted material Construction-related items • Dust control measures • Erosion control measures • Excavation requirements • Demolition requirements • Dewatering requirements • Waste handling/disposition • Interim restoration • Process piping

4.2.2 Excavation and Segregation Activities

O-35 Upon approval of the IRDP (or conditional approval to proceed as discussed in the previous section), soil remediation activities will begin. Figure 4-6 shows the sequence to be followed during excavation, segregation, and disposal. Contaminated soil will be excavated following a standard hierarchy to support segregation of material that will be treated and disposed of in different manners. The following sections describe the soil excavation sequence and the methods that will be used to ensure the above-WAC soil is not transferred to the OSDF.

4.2.2.1 Excavation and Segregation of Above-WAC Soil

E-1 The IRDP used to sequence excavation will identify area-specific constituents of concern, above-WAC
E-3 and above-FRL boundaries for each area-specific constituent of concern, and excavation boundaries
O-1 for each contaminated soil category. Based upon the IRDP, the excavation hierarchy shown on
O-7 Figure 4-6 will begin with the excavation and segregation of soil containing above-WAC concentrations of area-specific constituents of concern. If the soil being excavated is from one of the six areas containing RCRA characteristic waste which is suitable for treatment, soil that failed TCLP will be removed and segregated first, followed by the soil that passed TCLP but contains above-WAC concentrations of area-specific constituents of concern. If the excavated soil includes soil that has failed the TCLP test, it will be segregated for on-site treatment or transport to an off-site treatment facility. Excavation of above-WAC soil will continue until soil within the boundaries of all above-WAC concentrations of area-specific constituents of concern, as identified in the IRDP, has been removed from the excavation area. During actual excavation activities and prior to the excavation of soil containing above-FRL concentrations of area-specific constituents of concern, real-time field radiological surveys (RTRAK followed by HPGe) will be used to confirm that above-WAC concentrations of uranium have been excavated. It is recognized that the real-time systems are currently under review by EPA. Further, in order to gain EPA approval to use these real-time systems to identify and confirm that above-WAC concentrations of uranium have been removed, DOE has committed to the development of a quality assurance and quality control program for the real-time instruments. Additionally, DOE has committed to the development of a usability and limitations document to guide the use of the real-time systems in performance of the excavation process.

Following the excavation of soil containing above-WAC concentrations of area-specific constituents of concern, if the area being excavated is one of the six areas containing RCRA characteristic waste which

is suitable for treatment, additional soil that failed TCLP will be excavated and segregated. This material will be staged for on-site treatment and disposal in the OSDF or transport to an off-site treatment and disposal facility. The choice of treatment and disposal methods will be pre-defined in the IRDP and will be dependent upon soil volume and the cost/benefit of on-site versus off-site treatment and disposal.

Following removal of above-WAC and toxicity characteristic soil, soil containing above-FRL concentrations of area-specific constituents of concern will be excavated and transported for disposal in the OSDF.

4.2.2.2 Further Segregation of Material Requiring Treatment or Conditioning

4.2.2.2.1 RCRA Characteristic Soil

E-3 As discussed in Section 4.2.1.2.1, six FEMP areas (Table 4-1) have been identified where RCRA
O-7 characteristic waste may be present in sufficient quantities to justify treatment prior to disposal in the OSDF. During excavation, that soil that failed TCLP testing will be segregated for subsequent treatment prior to disposal. Material from the seventh area, the South Field Firing Range, that does not pass the TCLP testing will be sent off-site for disposal in accordance with the Operable Unit 2 ROD.

Where the soil also contains above-WAC concentrations of other area-specific constituents of concern, the soil will be segregated for on-site treatment followed by off-site disposal or staged for transport to an off-site treatment and disposal facility. Where the soil contains below-WAC concentrations of other area-specific constituents of concern, the soil will be segregated for on-site treatment and subsequent placement in the OSDF or for transport to an off-site treatment and disposal facility. The choice of treatment and disposal methods will be defined in the IRDPs and will be dependent upon volume of soil and the cost/benefit of on-site versus off-site treatment and disposal.

4.2.2.2.2 Excavation and Segregation of Debris

O-12 In general, debris and other non-soil-like items encountered during excavation will be evaluated and segregated from the excavated soil as necessary to satisfy radiological health and safety concerns, removal and off-site disposal of prohibited items, physical size restrictions, and achievement of best management practice commitments for inspection and removal of certain types of debris (see Section 5.3). The overall intent of the field evaluations is to meet the visual inspection requirements

for debris associated with the Operable Unit 3 ROD and the size restrictions mandated by the IMP Plan (summarized in Section 3.0). Examples of debris material types that may be encountered during excavation include:

- General construction debris
- Asbestos
- Non-pressurized containers
- Pressurized containers
- Scrap metal
- Sumps and associated piping
- Transformers
- Lead-acid batteries
- Medical/infectious waste
- Miscellaneous debris (trash)
- Tires
- Brick, including acid brick

Some of the debris that will be encountered during excavation may reside within the boundaries of above-WAC delineated soil areas and as a general practice this debris will be sent off site for disposal in tandem with the above-WAC soil. Other debris will be encountered in the below-WAC delineated areas. This debris will require further visual examination to determine its eligibility for disposal in the OSDF. In general, when debris, pipes, structures, or other non-soil like items are encountered outside of known WAC-exceeding areas delineated in an IRDP, the materials encountered will be visually examined and/or scanned using real-time radiological techniques to determine OSDF eligibility and assess health and safety concerns prior to handling or removal. After the items requiring removal have been appropriately segregated, the remaining associated soils in the excavation will be scanned using real-time radiological techniques to re-confirm the original OSDF WAC status. Excessive soil will be removed from the debris items requiring segregation and the items will be set aside for disposal consistent with the WAC, segregation, and disposal criteria for debris as presented in Sections 3.4 and 5.2.2, respectively.

As discussed in Section 2.6.5, there are no further RCRA-based restrictions for the on-site disposal of debris that is encountered outside of Operable Unit 3, except for the spent lead bullets associated with the South Field Firing Range (which must be sent off site). Debris (if any) found during soil excavation within the boundaries of the six Operable Unit 5 RCRA characteristic soil areas is eligible for disposal in the OSDF provided it is found within a below-WAC area. If it is encountered within an above-WAC area and from within the boundaries of one of the six geographic RCRA characteristic soil areas, it must be dispositioned off site in accordance with off-site WAC requirements for the permitted commercial disposal facility. This debris will be managed separately from other debris that is destined for off-site disposal until such time that off-site WAC compliance requirements (including off-site RCRA requirements) are demonstrated. Similarly, subsurface debris that is encountered within the

footprints of the FEMP's hazardous waste management units (HWMUs) that are being closed via the integrated CERCLA/RCRA process (see Section 4.3.4) is eligible for on-site disposal, provided it originates within a below-WAC soil area. If it is encountered within an above-WAC soil area and also from within the confines of the HWMU footprint, it will need to be evaluated further for its RCRA status before being dispositioned off site.

In general, if the debris is eligible for on-site disposal and does not require further segregation for placement purposes (e.g., debris classified as OSDF Category 2), the material can be excavated coincident with the below-WAC soil and sent to the OSDF directly in a commingled state. Close coordination with OSDF personnel, however, will need to be maintained during such excavation to ensure that the commingled debris and soil can be accommodated for placement at that time at the OSDF. (Placement considerations and timing could therefore drive the need for additional debris segregation, beyond WAC requirements.)

The individual IRDPs will convey the detailed needs and implementation strategies for inspecting, real-time scanning, and segregating the particular types of debris that are anticipated to be found in a given area, in accordance with the general obligations identified in this WAC Attainment Plan. FEMP field representatives will be positioned at the excavation sites and will be trained to consistently and accurately identify items requiring segregation and further handling. These representatives will be responsible for making the segregation and dispositioning decisions in accordance with the specific IRDP requirements for the types of debris that may be encountered in a respective remediation area. Along with the FEMP field representatives, the excavation contractor will also be observing for the presence of buried non-soil objects, and will be required, by contract, to alert the field representatives to the possible presence of non-soil objects identified by the equipment operators during the active excavation process.

4.2.2.2.3 Non-Soil Residue and Process Waste

E-16 Uranium metal in various forms (e.g., ingots, end crops, cuttings) may be encountered during
O-36 excavation activities. These metals will be segregated and managed as waste in accordance with the FEMP Waste Disposition Program. In addition to uranium metal, non-soil process residue may be encountered during excavation activities. Recognizable non-soil process residues include green salt,

black oxide, orange oxide, and sump cake. If encountered, these materials will be excavated, segregated, field screened, and surveyed to determine radionuclide content. The excavated waste will be transferred to an interim storage area and processed in accordance with the FEMP Waste Disposition Program. On-site field representatives at the excavation sites will be trained to be able to identify such materials and implement the proper protocols for safely handling and dispositioning these materials.

4.2.2.3 Management of Unexpected Conditions

Unexpected conditions that may be encountered during the course of excavation include:

- Unearthing debris in an unanticipated location
- Unearthing unanticipated non-soil residue or process waste
- Discovery of unexpected cultural or historic resources

E-2 Contingency plans for each of these conditions are provided below and are discussed in detail in Appendix F.4 of the SEP.

4.2.2.3.1 Unearthing Unanticipated Debris

E-1 Generally, debris may be encountered at any time during soil excavation, so in a sense all debris
E-4 occurrences need to be anticipated and planned for in terms of dispositioning strategy. However, the
E-17 quantities of debris or specific locations of debris pockets cannot be predicted with total accuracy.
O-1 Likewise, subsurface structures cannot always be fully identified and prepared for ahead of excavation
O-31 activities in a particular area. In the event that unanticipated debris is encountered during excavation,
O-37 the material encountered will be assessed prior to removal to assure that the health and safety of site personnel are maintained during excavation activities. The encountered debris will be segregated as necessary during excavation, consistent with radiological safety practices, material identification procedures, and segregation requirements for OSDF prohibited items. In general, in the event that debris is encountered during excavation, the material encountered will be scanned using real-time radiological techniques and hand-held organic vapor analyzers to assess health and safety concerns prior to handling or removal. After the items have been removed and appropriately segregated, associated soils will be scanned using real-time radiological techniques and hand-held organic vapor analyzers for OSDF WAC determination. Excessive soil will be removed from the debris and the

materials will be inspected and segregated for disposal consistent with the WAC, segregation, and disposal criteria for debris as presented in Sections 3.4 and 5.2.2, respectively.

4.2.2.3.2 Unearthing Unanticipated Non-Soil Residue or Process Waste

E-1 In the event that unanticipated uranium metal or non-soil process residues are encountered during soil
E-18 excavation, the encountered material will be assessed to assure that the health and safety of site
O-1 personnel are maintained during excavation. For example, some forms of uranium metal are
O-38 pyrophoric. Once safety is assured, the materials will be excavated, segregated, field screened, and surveyed to determine radionuclide content. The excavated waste will be transferred to an interim storage area and processed in accordance with the FEMP Waste Disposition Program. If these types of materials are removed from what was considered to be a below-WAC area, real-time analytical screening techniques will be utilized to fully screen the resulting excavated area for the presence of any remaining above-WAC materials.

4.2.2.3.3 Discovery of Unexpected Cultural or Historic Resources

In the event that excavation activities encounter an unidentified cultural resource, project personnel will isolate the affected area until an on-call contractor performs the necessary data recovery. DOE will consult with the State of Ohio Historic Preservation Office, consistent with 36 Code of Federal Regulations (CFR) Part 800, to determine the appropriate course of action.

In the event that human remains, an associated funerary object, unassociated funerary object, sacred object, or object of cultural patrimony are discovered during soil excavation, the appropriate Native American tribes will be consulted to expedite removal of the remains or objects. Pending removal of the remains or objects, DOE will cease activity in the immediate area and make a reasonable effort to secure the remains or objects.

DOE 4.2.2.4 Information Management and Material Tracking

Data management for soil remediation will be accomplished using the IIMS. This data management system acts as a front-end to the SED which contains RI/FS and other characterization data gathered since completion of the RI/FS Reports. The IIMS will be used to query the SED in preparation for pre-excavation characterization, to enter group SED characterization data for MTLs, and to track soil to its final destination during and following excavation.

The extent of soil excavations presented in the IRDPs will be calculated based upon RI/FS and pre-excavation characterization data extracted from the SED. Then, soil excavation will be performed in accordance with an IRDP that has been reviewed and approved by EPA and OEPA. As soil is excavated and placed into trucks for transport to the OSDF or to a stockpile, it will be assigned a material profile, as designated in the Project Waste Identification and Disposition (PWID) form, based upon the area from which the soil was excavated. The material profile number will be entered on an FTL/OSM. One copy of the FTL/OSM will accompany the truck load of soil to its destination. The other will be retained by project representatives who were present during the loading of the truck. The two copies of the FTL/OSM will be reconciled (matched) to assure transport and receipt of the soil, from and to the correct locations. Finally, the information from the FTL/OSM will be entered into the IIMS. In this manner, excavated soil will be tracked from one location to another until it reaches its final destination, either the OSDF or an off-site disposal facility.

4.2.3 Post-Excavation Activities

Post-excavation activities include soil transport, interim storage, and disposition. The following sections address the destinations of contaminated soil and controls that will be employed to assure OSDF WAC attainment.

4.2.3.1 Material Destination Decisions and Organization Handoff Points

E-19 Following excavation, soil will be transferred to one of seven different types of locations shown in Figure 4-7. These include:

- Designated staging areas for treatment prior to off-site disposal
- Designated staging areas for off-site treatment and disposal
- Interim storage pending acceptance by FEMP Waste Pits Remedial Action Project for transport to an off-site disposal facility
- Waste Pits Remedial Action Project for transport to an off-site disposal facility
- Designated staging areas for treatment prior to disposal in the OSDF
- Interim storage pending acceptance by the OSDF
- OSDF for disposal.

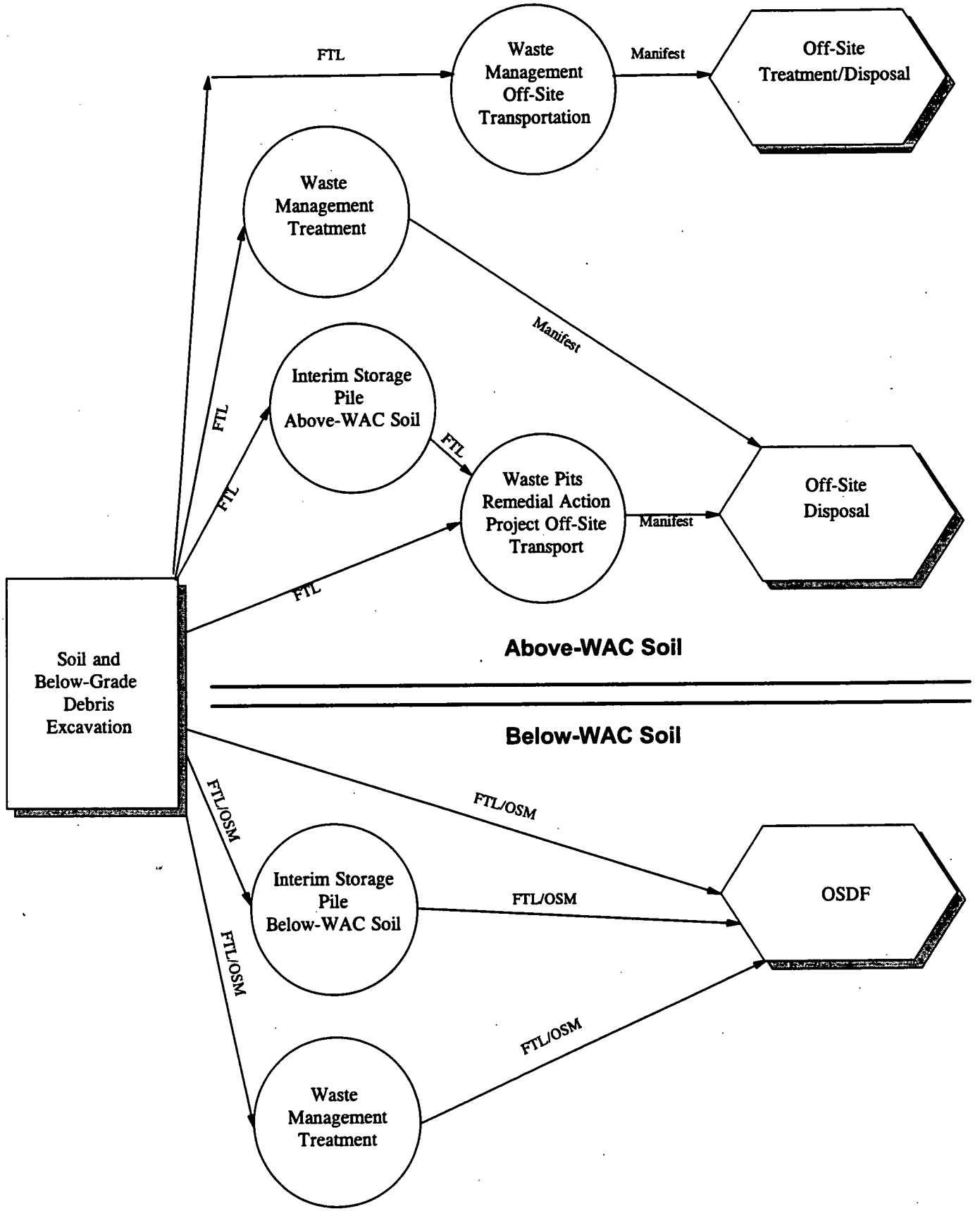


FIGURE 4-7 - MATERIAL DESTINATION DECISIONS AND ORGANIZATIONAL HAND-OFF

In addition soil will also be moved within and between projects for use in construction (e.g., to construct a sedimentation basin). Because of the variable nature of these interim movements, they are not shown on Figure 4-7, however FTL/OSMs will be used to also track the movement of this material. The following sections summarize each of the seven possible flow paths that eventually lead to either off-site disposal for above-WAC soil or to the OSDF for below-WAC soil.

4.2.3.1.1 Above-WAC Material

Excavated soil that contains above-WAC concentrations of area-specific constituents of concern may follow one of four paths leading to off-site disposal. Compliance with the WAC for the off-site disposal facility will be demonstrated before shipment will occur.

Off-site bulk soil shipments will be performed by the Waste Pits Remedial Action Project. If the Waste Pits Remedial Action Project is prepared to accept the soil for off-site shipment, excavated soil containing above-WAC concentrations of constituents of concern will be transported directly to the Waste Pits Remedial Action Project. The soil transfer will be documented using an FTL/OSM. The Waste Pits Remedial Action Project will then be responsible for loading and manifesting the material for off-site transport.

If the Waste Pits Remedial Action Project is not prepared to accept the soil for off-site transport, excavated soil containing above-WAC concentrations of constituents of concern will be transported to an interim storage site. The soil will be stockpiled in a controlled, posted location until accepted by the Waste Pits Remedial Action Project. At that point, the stockpile will be reloaded into trucks and transferred to the Waste Pits Remedial Action Project soil staging location. The transfer of soil from the excavation site, and transfer of the soil from the interim storage area to the Waste Pits Remedial Action Project staging area, will also be documented using FTL/OSMs. The Waste Pits Remedial Action Project will be responsible for loading and transporting the bulk material for off-site disposal.

Excavated soil that exceeds the OSDF WAC and that contains RCRA characteristic waste may require treatment to meet LDRs prior to off-site disposal. This soil will be transferred to a staging area for treatment using an FTL/OSM. The FEMP may choose to treat the material on-site and then transport the treated material through the Waste Disposition Program to an off-site disposal facility or transport the untreated material for off-site treatment and disposal. The method selected by the FEMP will

depend upon the volume of soil requiring treatment, available treatment technologies, and cost. Off-site transport will be documented using a manifest.

O-39 RCRA characteristic soil that is delineated as described in this WAC Attainment Plan will be stored in compliance with applicable RCRA storage requirements. Generally, it is envisioned that these soils will be containerized at the time they are excavated and then delivered for treatment, based on anticipated volumes. Alternately, the soils will be stored in bulk for later centralized treatment, again following applicable RCRA bulk storage requirements. The IRDPs will delineate actual approaches for RCRA-compliant storage for a given remediation area, based on the actual volumes determined through the planned pre-excavation characterization step and economic-based decisions regarding treatment strategy and location.

4.2.3.1.2 Below-WAC Material

Excavated soil that contains below-WAC concentrations of area-specific constituents of concern may follow one of three paths leading to placement in the OSDF.

If the OSDF is prepared to accept the soil for placement, excavated soil containing below-WAC concentrations of constituents of concern will be transported directly to the OSDF. Soil transfers to the OSDF will be documented using an FTL/OSM. Following acceptance of the soil, OSDF personnel will be responsible for placing the soil in the cell and documenting its final disposition.

If the OSDF is not prepared to accept the soil, excavated soil containing below-WAC concentrations of constituents of concern will be transported to an interim storage site. The soil will be stockpiled until accepted by the OSDF. At that point, the stockpile will be reloaded into trucks and transferred to the OSDF for placement in a staging pile or direct placement in a cell. Transfers of soil from the excavation site to interim storage will be documented using FTL/OSMs. Transfers of soil from the interim storage area to the OSDF will also be documented using FTL/OSMs. OSDF personnel will be responsible for final documentation and placement of the material in a disposal cell.

E-3 Excavated soil from the six specified areas that meets the OSDF WAC but contains RCRA
O-7 characteristic waste must be treated prior to disposal in the OSDF. These soils will be transferred to a staging area using a FTL/OSM. The FEMP may choose to treat the material on-site and then transport

the treated material to the OSDF or transport the untreated material for off-site treatment and disposal. The method selected by the FEMP will depend upon the volume of soil requiring treatment, available treatment technologies, and cost. Regardless of the ultimate disposition selected by the FEMP, transfers from the excavation to the staging area will be documented using a FTL/OSM. Transfers from the staging area to the OSDF will be documented using FTL/OSMs. Any off-site transport of materials will be documented using a manifest.

4.2.3.2 Management of Temporary Stockpiles

Due to logistics considerations, the Waste Pits Remedial Action Project or the OSDF may not be prepared to immediately accept excavated soil for disposal. In these situations, the soil will be stockpiled pending acceptance.

O-40 As part of the stockpile management process, all remediation, construction, and maintenance projects are required to generate a PWID as part of their respective project's initiation. PWID development includes a review of SED analytical data and a determination of the character or profile of the waste materials to be encountered. The information gathered into the PWID is then used by personnel from FEMP's Soil Characterization and Excavation Project to identify an appropriate stockpile location for any excess soils generated by the project. The "source" location in the project and the "destination" stockpile are assigned unique MTL numbers. PWIDs are reviewed and approved by the Soil Characterization and Excavation Project Manager.

The actual movement of waste material is documented on an FTL/OSM which identifies the source and destination MTL as well as the volume of material moved. These FTL/OSMs are completed by Soil Characterization and Excavation Project field representatives who monitor ongoing work activities.

Information from the PWID (including MTL locations) and the FTL/OSM are all recorded into an electronic database (IIMS) which ties the SED data to the stockpile placement. IIMS reports can list the volume in each stockpile, the source of the material in a stockpile, and the SED data associated with the material in the stockpile. Other reports can also track where excavated soils were staged during project activities.

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Administrative controls are also necessary to ensure routine application of the PWID to projects not directly associated with soil remediation projects. This is accomplished by linking generation of a PWID to the issuance of the FEMP's well-recognized internal penetration permit. This extends control to the occasional maintenance-type actions that occur outside of the soil remediation project.

E-20 Engineering controls (such as colored placards, security fencing, gates) are the third step to effective
O-40 temporary stockpile management. Internal FEMP procedures and organizational interfaces have been established to recognize a distinction between a designated stockpile for the temporary storage or staging of materials intended for transfer to a designated final placement facility (such as the OSDF or an off-site facility) and the working stockpiles necessary for a project to execute work activities. Stockpiles for off-site transportation or OSDF placement will be controlled by the installation of perimeter fencing and controlled ingress and egress. Project working stockpiles which have had a formal dispositioning pathway (i.e., OSDF, off site, or clean backfill) assigned to them will be fenced (construction fencing) and posted if they will remain in place for more than 45 days. Stockpiles will be demarcated by postings, which will identify the MTL number, status of soil (e.g., above-WAC, below-WAC, etc.), and the stockpile manager. Specific controls will be maintained to minimize cross-contamination between stockpiles and the ground. For any new piles that present the possibility of mixing impacted and non-impacted materials or above-WAC and below-WAC materials, a physical barrier (e.g., geotextile) will be placed on the surface of the stockpile area prior to stockpiling to segregate the two types of materials. Dust controls (e.g., dust suppression agents, crusting agents, and temporary seeding), as required by the Best Available Technology (BAT) determination for the FEMP, and erosion and sediment controls (e.g., crusting agents, temporary seeding, and silt fences) will be implemented during active stockpiling and inactive periods. Crusting agent, seeding, or other types of cover will also be used for all piles with a life extending beyond 45 days. The decision to apply fencing and cover will be triggered as soon as project personnel have determined the need for these time frames; it should not be construed that these time frames have to elapse before the decision is made.

The waste generator projects will have responsibility for waste material identification, segregation, handling, and inventory control and management. WAO will perform full-time oversight of project activities to monitor the integrity and accountability of these functions. Necessary for WAO acceptance of any waste material for placement in the OSDF will be the demonstration of traceability to the

materials' point of site origin. Sections 7.0 and 8.0 provide details on WAO's oversight roles and responsibilities.

DOE 4.2.3.3 Information Management and Material Tracking

Based upon RI/FS and pre-excavation characterization data, an IRDP will be prepared. In addition to identifying the area-specific constituents of concern, the IRDP will identify the excavation boundaries by soil category and the soil segregation requirements. For example, if the area to be excavated contains some soil that exceeds the OSDF WAC for uranium and another portion of soil that exceeds the FRL for uranium, the two soil categories would be (1) above-WAC soil and (2) above-FRL soil. The IRDP would identify the excavation boundaries for each of these two soil categories and identify that the two soil categories must be segregated during excavation.

Tracking of soil from excavation to its ultimate on-site destination will be accomplished using the IIMS. Unique material profiles will be established in the IIMS for each soil category to be excavated from an established excavation area. Also, MTLs will be established in the IIMS for each location that the soil may be transferred from or to. Then, FTL/OSMs will be used to document soil transfers from one MTL to the next until the soil reaches its ultimate on-site destination.

The FTL/OSM, which will be completed at the excavation site or at the point of origin if the soil is being transferred from a temporary stockpile, will identify the material profile, the approximate soil volume, the source MTL, and the destination MTL. One copy of the FTL/OSM will accompany the truck to its destination. The other copy will be retained by project representatives who were present during the loading of the truck. On a routine basis, source and destination FTL/OSMs for each soil transfer will be reconciled and the information entered into the IIMS. In this manner, the IIMS will be used to monitor the status of soil excavation, maintain an approximate soil inventory at each MTL, and track soil by FTL/OSM from its origin to its ultimate on-site destination.

4.3 LOCATION-SPECIFIC WAC ATTAINMENT FOR SOIL

E-2 Location-specific remediation approaches have been developed to accommodate the wide range of physical conditions and differing mechanisms of contaminant deposition at the FEMP. Planned soil excavation in impacted areas outside the FEMP former production area is envisioned to be relatively straightforward when compared to the logistics of soil excavation in the former production area.

Extensive investigations conducted as part of the RI/FS process have identified that the perimeter areas of the site have surface contamination primarily as a result of air deposition of stack and fugitive emissions. Such contamination can be readily removed using shallow excavation methods. However, within the former production area, deep excavations of soil must be coordinated with D&D activities, removal of at- and below-grade structures (e.g., building foundations and pipelines), and removal and closure of HWMUs, underground storage tanks (USTs), and non-homogenous stockpiles. Six location-specific soil excavation approaches are summarized below to address the diverse nature of the conditions present at the site. These location-specific approaches are presented in more detail in Section 4.0 of the SEP.

The six location-specific excavation approaches that will be discussed are: A) shallow excavation of impacted on-property soil outside the former production area and outside other waste storage/management areas; B) excavation in waste storage/management areas outside the former production area; C) excavation of existing stockpiles in the former production area; D) excavation following D&D in the former production area, at the Sewage Treatment Plant, and Fire Training Facility; E) off-property and non-impacted on-property area certification; and F) non-HDPE pipeline excavation outside the former production area. Figure 4-4 identified the eight sitewide geographically-based remediation areas that have been adopted for purposes of executing soil cleanup activities at the site. Table 4-3 presents a crosswalk relating the probable excavation approach to each of the eight remediation areas.

Principal steps in each excavation approach are 1) pre-design investigation and remedial design; 2) soil excavation and segregation; 3) pre-certification activities; 4) certification and preparation of certification report; and 5) interim grading and restoration. Within each remediation step, distinct tasks are performed that are specific to each excavation approach. These tasks are tied to each excavation approach in Table 4-4 to provide a cross-comparison among the area-specific approaches.

4.3.1 Excavation Approach A - Shallow Excavation of Impacted On-Property Area Outside the Former Production Area and Outside Other Waste Storage/Management Areas

Excavation Approach A is designed to handle shallow soil excavation in impacted areas which surround the former production area. The nature and extent of constituents of concern in areas proposed for Excavation Approach A is generally limited to a small number of constituents of concern in localized areas of contamination that are restricted to the top few feet of soil.

TABLE 4-3

EXCAVATION APPROACHES TIED TO REMEDIATION AREAS

Excavation Approach	Remediation Areas
A: Shallow Excavation of Impacted, On-Property Area Outside the Former Production Area and Other Waste Storage/Management Areas	1, 2, 6, and 7
B: Excavation in Waste Storage/Management Areas Outside the Former Production Area	2, 3, 6, 7, LSP, and SWL
C: Excavation of Existing Soil Stockpiles in the Former Production Area and Remediation Area 1, Phase I	1, 3 and 5
D: Excavation Following D&D in the Former Production Area, STP, and FTF	3, 4a, 4b, 5, 7, FTF, and STP
E: Off-Property and Non-Impacted On-Property Area Certification	1, 8, and off site areas
F: Non-HDPE Pipeline Excavation Outside the Former Production Area	(See Figure 4-13)

D&D = decontamination and dismantlement
FTF = Fire Training Facility
HDPE = high-density polyethylene
LSP = Lime Sludge Ponds
STP = Sewage Treatment Plant
SWL = Solid Waste Landfill

TABLE 4-4

CROSS-COMPARISON OF TASKS WITHIN THE EXCAVATION APPROACHES

Step	Task	Excavation Approach A	B	C	D	E	F
	Potential Excavation Area Delineation and Data Review	x	x	x	x	x	x
	Select COCs, Identify Potential Technetium-99, RCRA, HWMU, and Above-WAC areas	x	x	x	x	x	x
	Coordination with D&D Activities				x		
	Pre-Excavation Surveys and Sampling	x	x	x	x	x	x
	Delineate Excavation Extent Due to Technetium-99 Contamination	x	x	x	x		
	TCLP Test and Delineate Characteristic Waste Extent	x	x	x	x		
	Delineate Remaining Excavation Types	x				x	
	Determine Excavation Extent and Vertical Intervals or Unit Volume		x	x	x		
	Determine Excavation Extent and Pipeline Section Sequence						x
	Prepare Area-Specific IRDP	x	x	x	x	x	x
1	Pre-Excavation CU Delineation/Classification					x	
	Prepare Excavation Site	x	x	x			x
	Implement Run-off Control, as Needed	x	x	x	x	x	x
	Technetium-99 Driven Excavation, as Necessary	x	x	x	x		
	Characteristic Waste Excavation, as Necessary	x	x	x	x		
	Implement Perched Water Control, as Needed		x		x		x
	Layer/Volume-Specific, Non-Tc-99 WAC Scan		x	x			x
	Non-Technetium-99, WAC-Driven, Excavation/Confirmation (Search and Remove)	x	x	x			x
	Real-Time, Non-Tc-99, WAC Monitoring/Excavation				x		
	FRL-Driven Excavation (after above-WAC material is removed)	x				x	
	Bulk Excavation to OSDF		x	x	x		
2	Bulk Excavation to Temporary Staging Area for Segregation						x
	Pre-Certification Scan	x	x		x	x	x
	Post-Excavation CU Delineation/Classification	x	x		x		x
3	Pre-Certification Hot-Spot/FRL Excavation/Confirmation	x	x		x	x	x
	CU-Specific Certification Sampling	x	x		x	x	x
	FRL/HWMU/UST Certification/Recertification	x	x		x	x	x
	Additional FRL/Hot-Spot Excavation/Confirmation, As Necessary	x	x		x	x	x
4	Prepare Area-Wide-Certification Report	x	x		x	x	x
5	Area-Wide Interim Grading and Restoration	x	x		x	x	x

CU = Certification Unit
FRL = Final Remediation Level
HWMU = Hazardous Waste Management Unit
OSDF = On-Site Disposal Facility
UST = Underground Storage Tank
WAC = Waste Acceptance Criteria

O-35 Excavation Approach A will be applied to Remediation Areas 1, 2, 6, and 7 (Table 4-3; Figures 4-4
O-42 and 4-8). (Note: Figures 4-8 through 4-13, which represent anticipated excavation areas for each of the excavation approaches, are included for information purposes only. Each IRDP will formally propose the estimated excavation areas along with the appropriate justification.) Remediation Areas 1 and 2 encompass most of the perimeter of the FEMP, where impacted soil has been documented through the collection of RI/FS characterization data. In Remediation Areas 6 and 7, Excavation Approach A will be applied to the areas between waste storage units and the former production area. The list of area-specific WAC constituents of concern for these remediation areas will be developed as part of the PSP development process (to support necessary pre-excavation characterization activities) and approved by EPA and OEPA through review and approval of the individual IRDPs.

E-1 Under Excavation Approach A it is envisioned that the soil remediation process will begin with a pre-
O-1 design investigation to estimate the extent of the excavation using supplementary pre-excavation radiological surveys and sampling activities that build upon existing RI/FS data. A PSP will be developed for the pre-excavation sampling to identify supplementary data needs and the appropriate collection approach. The plan will be furnished to EPA and OEPA for information purposes and to help coordinate oversight activities. Radiological survey results and laboratory analytical results from the supplementary sampling will be combined with existing data as part of the design process to delineate the extent of soil excavation for RCRA characteristic waste (within the seven areas shown on Figure 4-5), above-WAC, and above-FRL areas. This information will be incorporated into an IRDP and submitted to EPA and OEPA for approval. After the IRDP has been approved, soil excavation will begin and above-WAC materials delineated as RCRA characteristic waste will be segregated for treatment, if required, and disposal.

Much of the area designated for remediation under Excavation Approach A is open field terrain that is amenable to radiological scanning (100 percent coverage, if possible) using the RTRAK equipment. However, the northeast corner of Remediation Area 1 contains a stand of conifers that prevents use of the RTRAK for radiological scans. Therefore in the forested portion of Remediation Area 1 and other locations that preclude the use of the RTRAK, radiological surveys will be conducted with a sodium iodide (NaI) detector mounted on a tri-wheel stroller (BTRAK).

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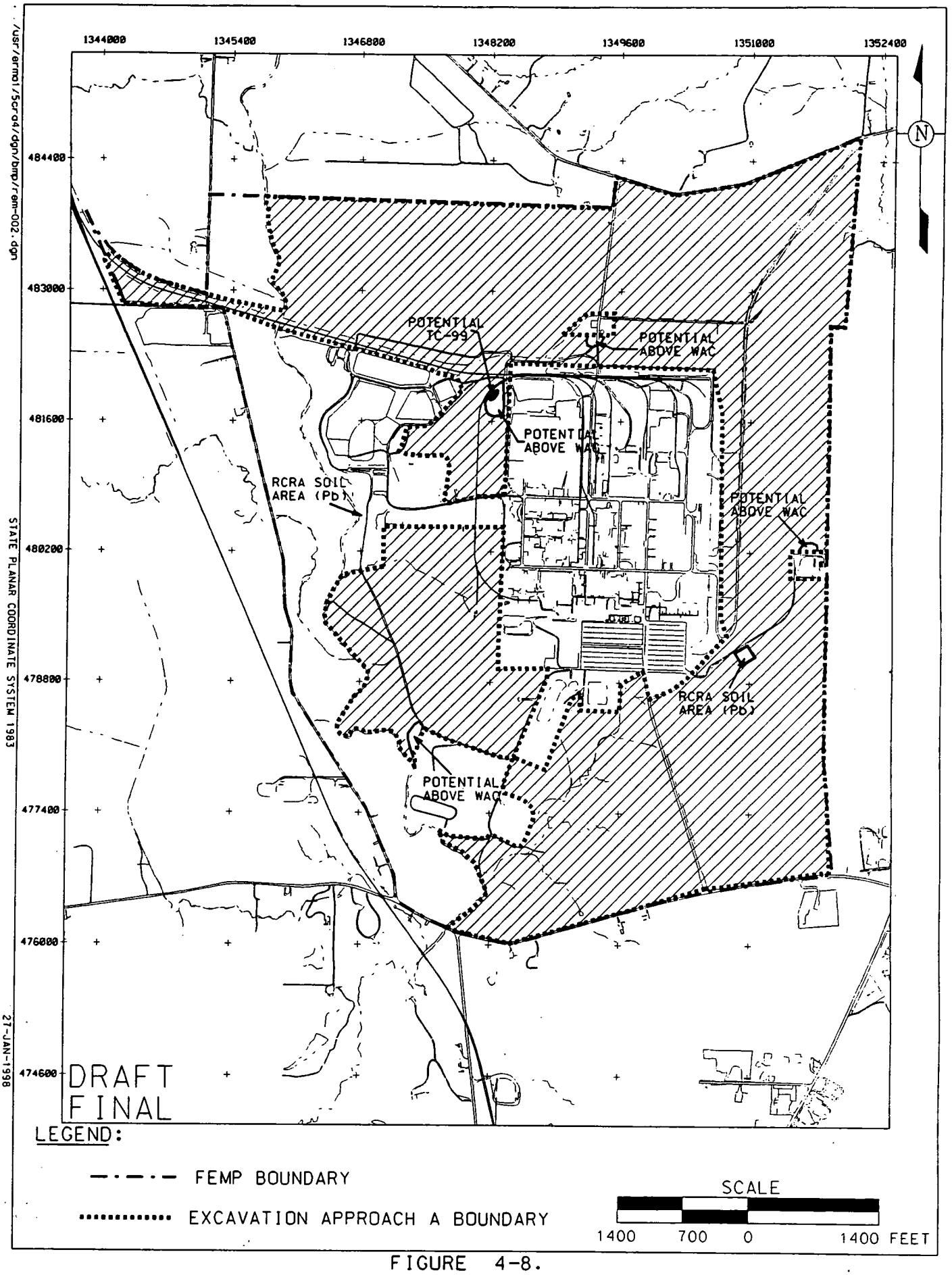

FIGURE 4-8.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH A
(FOR INFORMATION PURPOSES ONLY)

To assure that a high level of confidence is achieved in the ability to screen and segregate above-WAC material from material that can be placed in the OSDF, several methods will be used to demonstrate WAC attainment under Excavation Approach A. RI/FS data will be used to focus pre-excavation investigations on areas known to contain above-WAC materials. Above-WAC areas will be delineated for excavation by establishing the areal extent using real-time, large-volume NaI detectors. Radiological boundaries established by NaI detectors will be verified for gamma-emitting radionuclides by obtaining field measurements of their gamma spectra with the HPGe instrument. Discrete surface and subsurface soil samples will be collected to establish the extent of above-WAC soil for all area-specific constituents of concern with numerical WAC (e.g., technetium-99). The samples will be submitted for laboratory analysis of area-specific constituents of concern to determine the extent of above-WAC material. All available existing, radiological survey, and new laboratory data will be used to support the demonstration of WAC attainment.

O-42 Based on the RI/FS characterization data for uranium, there are four known areas within the proposed Excavation Approach A boundaries with the potential to exceed established WAC levels for uranium, as depicted on Figure 4-8, which is presented for information purposes. Above-WAC areas for uranium have been identified along the northern boundary of the Sewage Treatment Plant (Remediation Area 1), around the northwest perimeter of the Inactive Flyash Pile (Remediation Area 2), surrounding the south and east perimeter of the technetium-99 area in Remediation Area 6, and along the southern boundary of the Fire Training Facility in Remediation Area 6. Initial data reviews for planning purposes suggest that technetium-99 was detected in only one area in Remediation Area 6 in concentrations exceeding the WAC and FRL.

E-1 To establish the areal extent of above-WAC concentrations of area-specific constituents of concern,
O-1 RI/FS data will be used to optimize the number of samples collected during pre-excavation survey and sampling activities. Survey and sampling activities will be carried out by placing a grid with appropriate cell dimensions over the estimated excavation area and executing a systematic survey and/or sampling protocol. After establishing the areal extent of excavation, applicable RI/FS data will be reviewed to determine the location and number of Geoprobe™ borings. Geoprobe™ borings will be placed on the established perimeter of the excavation and within the delineated excavation area to determine the depth of excavation. Collected samples will undergo laboratory analysis. Sample

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collection and handling procedures, laboratory protocols and methods, and instrument detection limits are presented in Appendix E of the SEP.

E-3 As identified in Figure 4-8, one of the six geographic areas with the potential for the presence of a
O-7 sufficient quantity of soil exhibiting the RCRA characteristic of toxicity is located in a portion of Remediation Area 1. Focused sampling and analysis will be conducted in this area to validate the presence of these materials and identify the appropriate excavation boundaries so that this soil may be selectively excavated and segregated for treatment. The number of sample locations will be established by the adequacy of RI/FS data, the cell dimensions of the surface grid, and the number of Geoprobe™ borings needed to define the depth where constituents of concern are below their FRLs. Samples will undergo TCLP testing to determine what portions, if any, of the area possess the RCRA toxicity characteristic. If soil is identified as possessing the RCRA toxicity characteristic, it will be delineated as such to indicate that treatment is required prior to disposal.

O-35 After the delineation of all above-WAC areas, soil remaining above the FRLs of the area-specific constituents of concern will be delineated for excavation. The pre-excavation characterization program focused on defining the extent of required excavations to attain the FRLs is discussed in detail in the SEP. Following the completion of the pre-excavation characterization program, an area-specific IRDP will be prepared. The IRDP will summarize the findings of the pre-excavation investigations through the delineation of the proposed footprints of excavation for above-WAC material and those necessary to attain the FRLs. As discussed in Section 4.2.1.4, the IRDP is planned to be submitted to EPA and OEPA for approval prior to beginning excavation activities.

Delineated areas of soil that exhibit the RCRA characteristic of toxicity will be excavated, staged, and transferred to the Waste Disposition Program at the FEMP to establish treatment and disposal options. The FEMP Waste Disposition Program, as it pertains to excavated soil or soil-like material, is defined in Appendix F of the SEP. If the toxicity characteristic soil contains non-RCRA constituents of concern above the WAC (e.g., uranium), the above-WAC soil will be excavated and separately staged for treatment prior to off-site disposal. Following the excavation and staging of the soil exhibiting the characteristic of toxicity, the above-WAC soil will be excavated and segregated to isolate the above-WAC material prior to off-site disposal.

After completing the excavations to remove soil containing the toxicity characteristic, and soil exceeding the WAC, any remaining soil with uranium, thorium, radium, metal area-specific constituents of concern, and/or organic area-specific constituents of concern above their respective FRL will be excavated and staged (if needed) prior to placement in the OSDF. Upon completion of excavation activities within the remediation area, the area will be prepared for the certification process. This process does not involve WAC attainment issues and is therefore not discussed in this plan. Details on the certification process can be found in the SEP.

4.3.2 Excavation Approach B - Excavation in Waste Storage/Management Areas Outside the Former Production Area

Excavation Approach B is designed to handle moderate to deep excavation of Operable Unit 2 waste units and of soil that underlies current waste storage/management areas in Operable Units 1, 2, and 4. Soil underlying the waste storage/management areas is expected to be contaminated. The list of potential area-specific constituents of concern in soil areas proposed for Excavation Approach B reflects RI/FS data on the waste presently stored in the remediation areas. However, the distribution of constituents of concern in soil under the waste storage/management areas cannot be fully established until waste has been removed from the remediation areas.

O-42 Excavation Approach B will be applied to the Operable Unit 2 waste units and soil underlying waste storage areas in Remediation Areas 2, 3, 6, and 7 (Tables 4-3 and 4-4; Figures 4-4 and 4-9), which is presented for information purposes. Remediation Areas 2, 3, 6, and 7 encompass the waste storage areas of Operable Units 1, 2, and 4. The waste storage areas include the Southern Waste Units (SWUs; a.k.a. the Flyash Piles and South Field area) in Remediation Area 2, the Lime Sludge Ponds and Solid Waste Landfill in Remediation Area 3, the Operable Unit 1 waste pits in Remediation Area 6, and Operable Unit 4 silos housing the K-65 and metal-oxide material (Remediation Area 7).

The soil remediation process in Remediation Areas 2 and 3 is coupled with the removal of materials in the SWUs, Lime Sludge Ponds, and Solid Waste Landfill because all these materials will go to the OSDF if the WAC are met. In Remediation Areas 6 and 7, the soil remediation process begins after waste materials have been removed because the waste materials from Operable Units 1 and 4 will be shipped off site for disposal.

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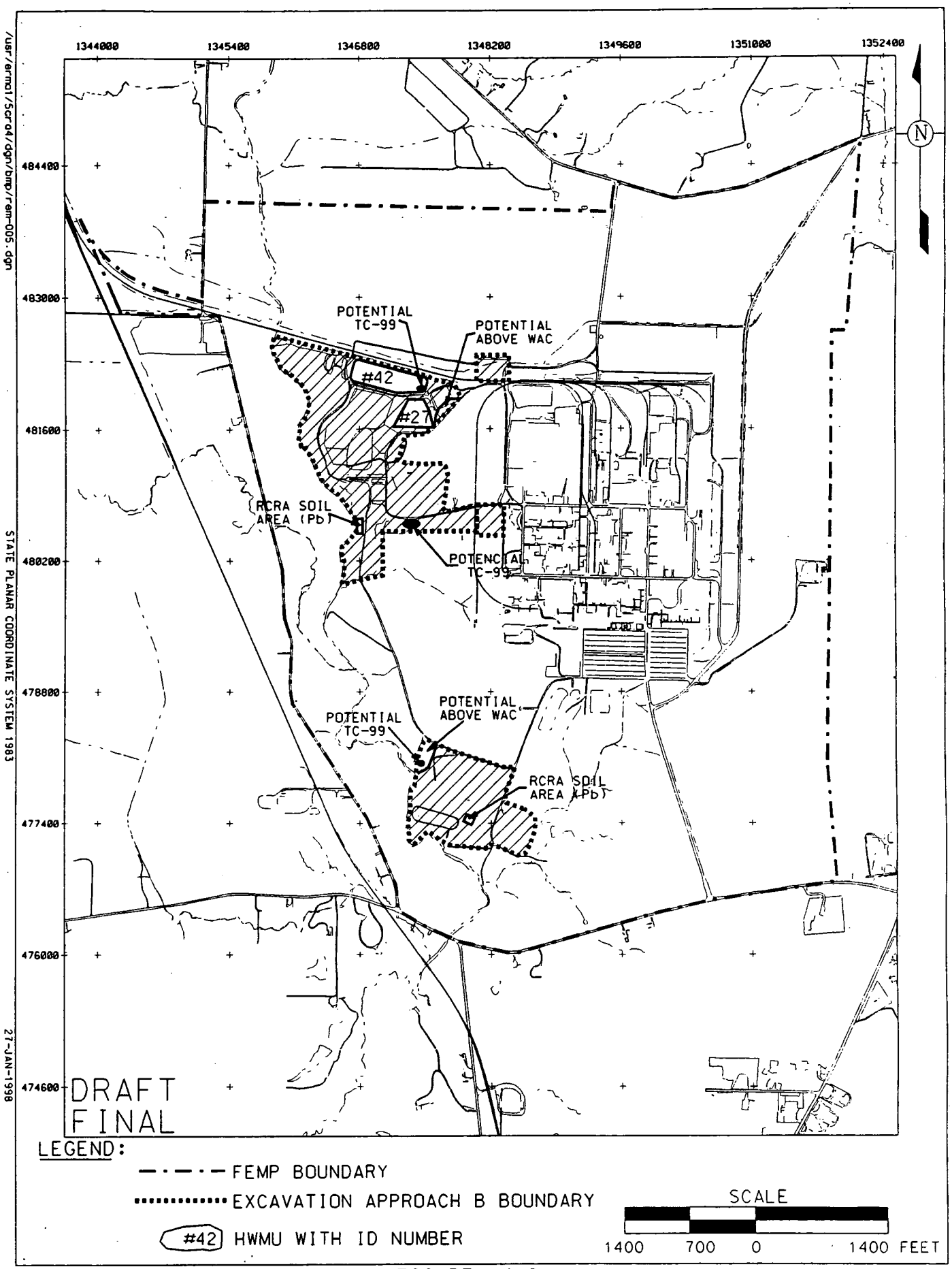

FIGURE 4-9.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH B
(FOR INFORMATION PURPOSES ONLY)

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E-1 A pre-design investigation will be conducted to estimate the extent of the excavation and above-WAC
E-3 material using RI/FS data, pre-excavation radiological surveys, and additional sampling activities as
O-1 needed. As with the other specific approaches, a PSP will be developed to delineate supplementary
O-7 data needs and collection approaches. All radiological survey and sampling and laboratory analytical results will be carried forward to the remedial design to delineate the extent of soil excavation for soil exhibiting the characteristic of toxicity (within the previously defined six areas and the former Firing Range), and above-WAC and above-FRL areas. This information will be incorporated into an IRDP and submitted to EPA and OEPA for approval.

After the IRDP has been approved, waste and soil excavation will begin and materials delineated as RCRA characteristic waste and above WAC will be segregated for treatment, if required, and disposal. Because moderate to deep soil excavations are expected within the waste storage footprints, excavation will proceed in layers or lifts, with each lift being surveyed with a large-volume NaI detector and/or an HPGe instrument to demonstrate WAC attainment for appropriate primary radiological constituents of concern. The specification of lift thicknesses for radiological scanning under Excavation Approach B will be defined for EPA and OEPA approval as part of the followup detailed design documentation. If special materials are encountered during the excavations, the materials will be handled, treated (as needed), and disposed of in accordance with the procedures outlined in the SEP.

The rheology of the Lime Sludge Ponds material may not allow loading of the surface, which would eliminate walk-over-based systematic radiological surveys or sampling efforts. Under these conditions, materials will be screened and sampled after excavation. Similar consideration must be given to the heterogeneity of materials expected to be found in the Solid Waste Landfill when planning and conducting radiological surveys and sampling activities. These considerations will be factored into the development of the area-specific PSPs that will identify the data needs and collection approaches for the pre-excavation characterization activities associated with these waste units.

For planning purposes, the SEP has noted that technetium-99 has been measured above the FRL in three of the four remediation areas designated for Excavation Approach B: near the northwest corner of the SWUs in Remediation Area 2; in the northeast corner of Waste Pit 5 (Remediation Area 6); and surrounding the west portion of the slurry line in Remediation Area 7. Most of the technetium-99 material in Remediation Areas 6 and 7 is likely to be removed with the waste materials prior to

conducting soil excavation activities. However, the material in the SWUs and soil underlying the waste storage areas will be investigated for potential technetium-99 removal under this excavation approach.

There are two areas planned to be addressed by Excavation Approach B which are denoted as RCRA toxicity characteristic soil areas: an area in Remediation Area 7, directly west of the K-65 Silos (denoted in the Operable Unit 5 ROD); and the South Field Firing Range in Remediation Area 2 (denoted in the Operable Unit 2 ROD).

O-42 Based on the RI/FS characterization data for uranium, there are two known areas within the proposed Excavation Approach B boundaries with the potential to exceed established WAC levels (Figure 4-9, which is presented for information purposes). Above-WAC areas for uranium have been identified along the eastern margin of the waste pit area in Remediation Area 6 and along the northwest margin of the SWUs in Remediation Area 2. It is likely that much of the above-WAC material in Remediation Area 6 will be removed when the waste materials are removed. However, underlying soil will be sampled and analyzed to determine whether above-WAC soil exists. All above-WAC material in Operable Unit 2 waste units and above-WAC soil underlying all waste units will be excavated and handled under this approach. All above-WAC material will be shipped off-site for disposal.

As described under Excavation Approach A, an IRDP will be prepared summarizing the findings of the pre-excavation investigations in the form of designated footprints of needed soil removal to address the above-WAC material and the soil exhibiting the characteristic of toxicity. The IRDP will be submitted to EPA and OEPA for approval prior to the initiation of excavation activities.

Following all excavations the certification process will be initiated. This process is discussed in detail in the SEP.

4.3.3 Excavation Approach C - Excavation of Existing Soil Stockpiles in the Former Production Area and Remediation Area 1, Phase 1

Excavation Approach C is designed to remove existing soil stockpiles in the former production area (a.k.a. Removal Action 17) and in Remediation Area 1, Phase I. For soil stockpiles in the former production area, this approach will apply only to delineation and removal of the soil stockpile, with the underlying soil evaluated for removal by Excavation Approach D. The purpose of handing the

underlying soil through Excavation Approach D is to allow the soil in the entire former production area to be remediated at one time, following removal of all buildings, structures, and stockpiles. For the soil stockpiles in Remediation Area 1, Phase I, this approach will apply to the removal of the stockpile to the former, grade surface with the former footprint of the piles to be addressed as part of Area 1, Phase II under Excavation Approach A. The list of primary and secondary area-specific constituents of concern for Excavation Approach C areas is based on the constituent of concern list for the remediation areas that contain the piles.

O-42 Excavation Approach C will be applied to the seven existing soil stockpiles in Remediation Areas 1, 3, and 5 (Tables 4-3 and 4-4; Figures 4-4 and 4-10, which is presented for information purposes). Two of the stockpiles are located northwest of the Sewage Treatment Plant in the eastern corridor of Remediation Area 1, four of the soil stockpiles are located in the northwest portion of Remediation Area 3, and one pile is located at the termination of the southwest extension of Remediation Area 5.

E-1 Characterization of the soil stockpiles will begin by conducting a pre-design investigation to delineate
O-1 the soil stockpile to be removed, identify constituents of concern, and perform pre-excavation
O-44 radiological surveys and sampling activities. Because their origin history is not fully known, pre-existing stockpiles other than the Remediation Area 1, Phase I piles will also be evaluated for RCRA toxicity characteristics using TCLP sampling. This pile sampling will follow EPA SW-846 sampling strategies and OSWER Directive 9938.4-03 RCRA waste characterization objectives. The remaining sampling activities will generally be carried out to achieve a density of surface and subsurface sampling points similar to the RI/FS sampling density in the former production area or in the vicinity of the stockpile. For the western stockpile in Remediation Area 1, Phase I, sample density is approximately 60 samples (surface and subsurface) for 35,000 cubic yards. The source of the soil in the eastern stockpile in Remediation Area 1, Phase I was characterized during Area 1, Phase I activities. Supplemental characterization data for the eastern stockpile was collected in conjunction with OEPA, and these data were included in the approved eastern stockpile WAC attainment demonstration report that supported the placement of the eastern stockpile soil into the OSDF.

Existing and new supplemental analytical data and radiological survey results will be carried forward to the remedial design to delineate the extent of excavation for technetium-99, RCRA characteristic waste, above-WAC, and above-FRL areas. For most stockpiles (except the Area 1, Phase I piles) the

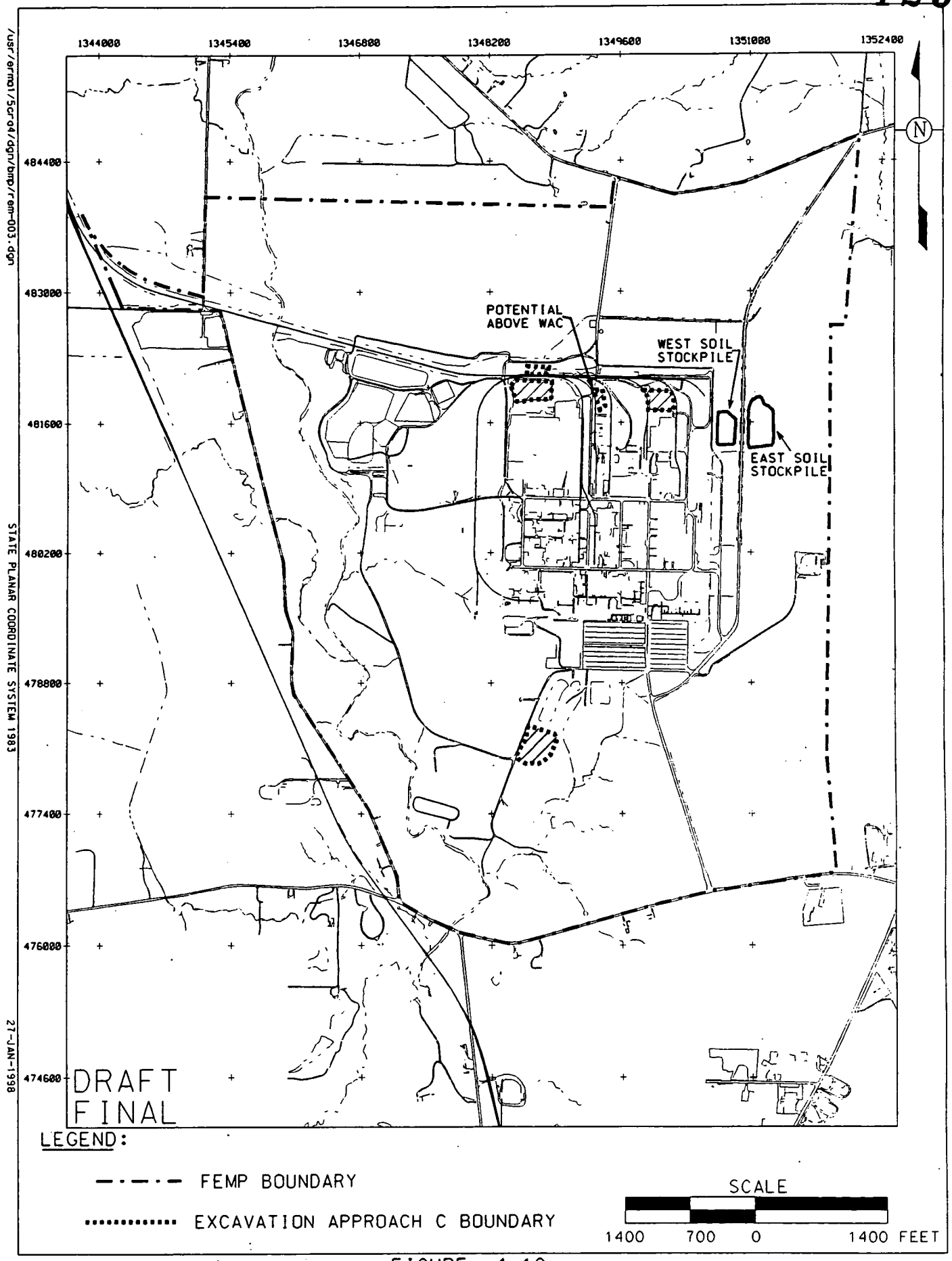

FIGURE 4-10.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH C
(FOR INFORMATION PURPOSES ONLY).

characterization data will be summarized in an IRDP and submitted to EPA and OEPA for approval prior to soil movement.

After the IRDP has been approved, removal of the soil stockpiles will begin and soil delineated as technetium-99, RCRA characteristic waste, and above WAC will be segregated for treatment, if required, and disposal. Because of the potential for heterogeneity within the stockpiles, excavation may proceed in layers, with each layer being surveyed by a large-volume NaI detector. The excavation lift thicknesses will be specified in the followup design documentation for the stockpile of interest. If special materials are encountered during the removal activities, the materials will be handled, treated (as needed), and disposed of in accordance to the procedures outlined in the SEP.

The area-specific WAC constituent of concern lists for stockpile excavation will be formally defined and approved as part of subsequent PSPs and IRDP-level design documentation that will govern stockpile characterization and remediation. In general, the full list of 18 numerical WAC constituents of concern will be utilized for existing stockpiles, where the origin history for the stockpile does not support use of a defensible short list. If an acceptable shortlist can be utilized for a particular stockpile based on pile history and/or followup supplemental sampling, it will be proposed for stockpile-specific EPA and OEPA acceptance through the PSP and design-level document review and approval process.

Existing RI/FS data indicates that technetium-99 has not been detected in the current soil stockpiles. If pre-excavation characterization indicates technetium-99 is present above its FRL or if future stockpiles are generated which contain technetium-99, it will be excavated and segregated under this excavation approach. The current soil stockpiles are also not known to contain characteristic waste, however this will be verified as mentioned earlier by the TCLP sampling. For planning purposes, excavation of toxicity-characteristic waste is not expected under this excavation approach. If characteristic soil is identified in any of the stockpiles, it will be managed using the general approach followed for RCRA characteristic soil excavated from the six geographic areas designated in the Operable Unit 5 ROD.

Based on the RI/FS characterization data for uranium, there is one known area near the northeast margin of Soil Stockpile 1, which is located in the northern portion of the former production area, with the potential to exceed established WAC levels. If pre-excavation characterization indicates the

presence of soil with area-specific constituents of concern at or above the WAC here or in other stockpiles, it will be excavated and segregated under this approach.

O-43 Containerized soil will also require proper characterization prior to dispositioning to the OSDF. Containerized soil at the FEMP originates from two sources. The first is investigation-derived waste (IDW), comprising approximately 3100 containers. One hundred and fifty of these containers are known to have originated from within the six potential RCRA characteristic areas designated in the Operable Unit 5 ROD. Another 150 containers of IDW soil are of unknown origin. These 300 containers were sampled for TCLP following EPA SW-846 percentile sampling methods to ensure compliance with Removal Action 17 Work Plan restrictions on bulk storage of RCRA soil. Following confirmation that the soil is non-RCRA, the containers are emptied into existing Soil Stockpile 1. Any containerized soil that exhibits RCRA characteristic is sent off site. The remainder of the IDW containers (approximately 2800) have been emptied into Soil Stockpile 1 in accordance with the requirements of Removal Action No. 17. Soil Stockpile 1 itself will be evaluated for on-site disposal in accordance with Excavation Approach C (and its attendant pre-excavation characterization step).

The second group consists of containerized soils historically generated as a result of maintenance and construction activities. Available characterization information is reviewed to determine sampling requirements and eligibility of this material for OSDF placement. TCLP analyses are then conducted for the eligible containers in accordance with EPA SW-846 percentile sampling methods for RCRA toxicity characteristics, and the materials are bulked to Soil Stockpile 1. Containerized soil not found to be eligible for OSDF placement, or exhibiting a RCRA characteristic from TCLP testing, is sent off site for disposal.

The approvable document trail for stockpile soil characterization and dispositioning involves a two-step process to be followed for each remediation activity. Step one consists of the submittal of a PSP for agency review that prescribes characterization needs and strategies. Step two consists of the submittal of a short report (akin to a letter report) following completion of the characterization step. This report would contain the details of the approach for dispositioning these items, based on the characterization information gained. It would contain the basic implementation information conveyed in an IRDP but at a level of detail commensurate with the reduced complexity of dealing with the stockpiles and containers. This report would provide the mechanism for gaining agency approval to the FEMP's

approach for dispositioning these materials. The document trail for containerized soil is through the approved Removal Action No. 17 Work Plan, (Revision 3) and the FEMP Prototype Sampling Plan for Containerized Waste (internal FEMP waste management plan developed pursuant to the SCQ). Any future OSDF-eligible containerized soil that was not managed as part of the Removal Action No. 17 bulking project will be reviewed on a case-by-case basis and appropriate documents prepared.

4.3.4 Excavation Approach D - Excavation Following D&D in the Former Production Area, Sewage Treatment Plant, and Fire Training Facility

E-11 Excavation Approach D is designed to handle shallow to deep soil excavations that take place after
O-25 buildings, above-grade structures, and soil stockpiles (Excavation Approach C) have been removed from the former production area, the Sewage Treatment Plant, and the Fire Training Facility. Soil underlying buildings, structures, and stockpiles is anticipated to be contaminated. The list of area-specific constituents of concern for proposed Excavation Approach D areas will need to reflect the production history of process materials and RI/FS data on soil samples collected around the perimeter of buildings and structures. However, the distribution of area-specific constituents of concern under the buildings, structures, and stockpiles cannot be established completely until preliminary, above-grade D&D activities in the former production area, Sewage Treatment Plant, and Fire Training Facility are completed. As discussed in earlier sections, the proposed lists of area-specific constituents of concern for WAC attainment for the affected remediation areas will be furnished for consideration in subsequent PSPs and approved through the IRDP approval processes.

O-42 Excavation Approach D will be applied in the following remediation areas: Remediation Area 1, Phase II - soil underlying the Sewage Treatment Plant on the eastern border of the FEMP; Remediation Area 3 - soil underlying the Fire Training Facility; and Remediation Areas 3, 4A, 4B, 5, and 7 - soil and at- and below-grade structures and debris associated with the former production area (Figure 4-11, which is presented for information purposes). A comparison of Excavation Approach D with other excavation approaches is provided in Table 4-4.

E-1 Excavation Approach D follows the general soil remediation process discussed under Excavation
O-1 Approach A. It deviates from this approach with respect to coordinating pre-excavation characterization with above-grade D&D activities and in dealing with the disposition of at- and below-grade construction debris. The remediation process will begin by conducting a data review to estimate the potential extent of the excavation using RI/FS data and to identify area-specific constituents of

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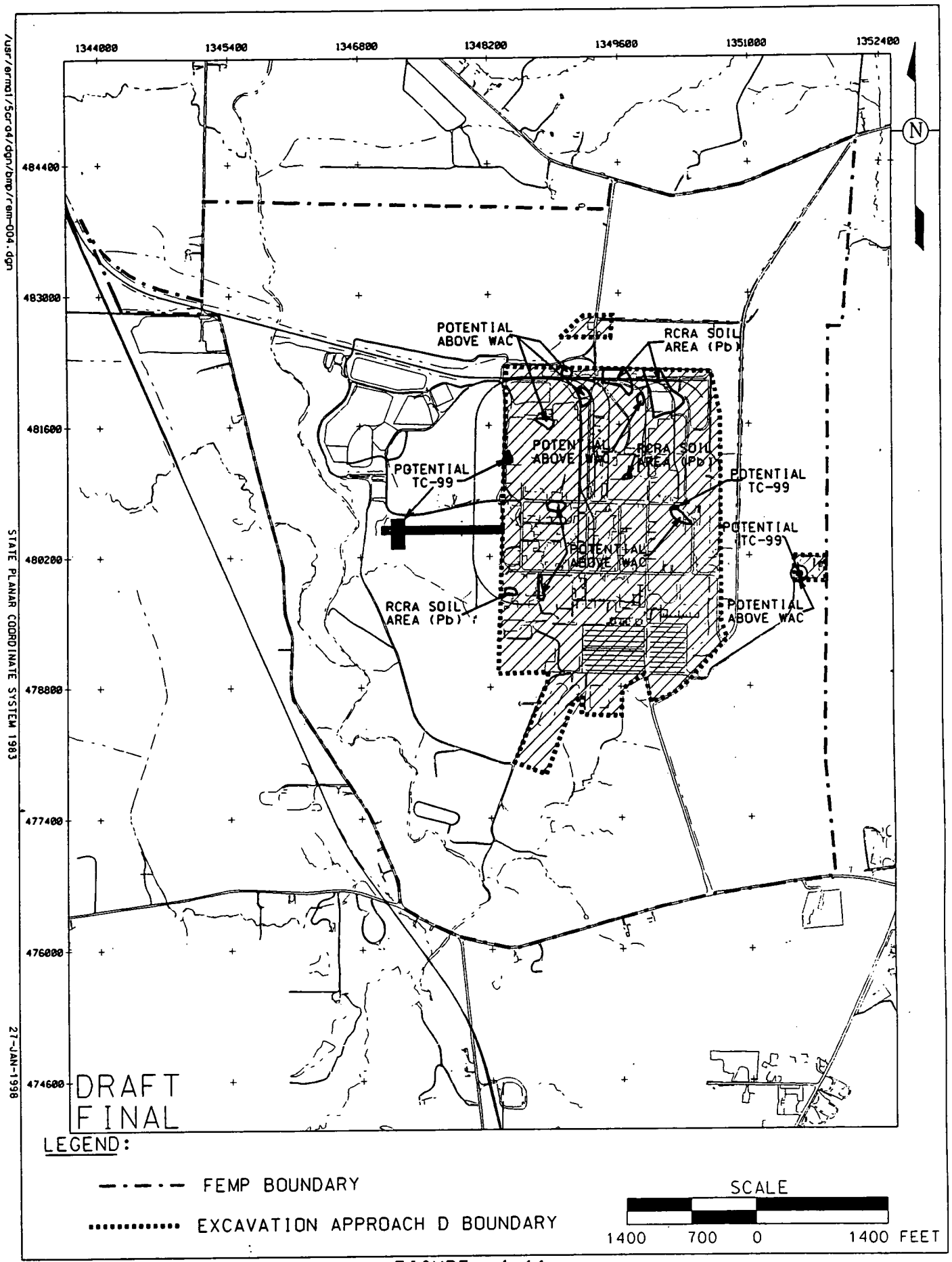

FIGURE 4-11.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH D
(FOR INFORMATION PURPOSES ONLY)

concern. After initial, above-grade D&D activities have removed equipment, piping, and all other attendant materials from the buildings and structures, pre-excavation radiological surveys and sampling activities inside the remaining structure will commence to refine the extent of excavation and the list of area-specific constituents of concern, as needed. Similar to the other approaches, the supplementary surveying and sampling conducted as part of the pre-excavation activity will be conducted under the direction of a PSP prepared for the effort. Upon completion of the pre-excavation surveys and sampling activities, final above-grade D&D activities will be implemented and completed. Existing data, radiological survey results, and supplementary new data will be carried forward to the remedial design to delineate the extent of soil excavation for technetium-99, RCRA characteristic waste, HWMUs, USTs, above-WAC, and above-FRL areas. This information will be incorporated into an IRDP for each respective remediation area and submitted to EPA and OEPA for approval.

After the IRDP has been approved by EPA and OEPA, at- and below-grade structures will be removed and staged for disposal assessment by the Waste Disposition Program. Soil excavation will begin after the structures are removed and appropriate materials from the areas delineated as technetium-99, RCRA characteristic waste, HWMU, UST, and above WAC will be segregated for treatment, if required, and disposal. Because deep soil excavations are expected below some of the buildings, excavations in these areas will proceed in lifts, with each lift being surveyed for WAC attainment for the primary radiological constituents of concern. As with the other excavation approaches employing lifts, the specified lift thicknesses will be defined for EPA and OEPA approval as part of the followup design documentation. Additionally, because of the expected heterogeneity of contamination within the former production area, real-time monitoring of each volume unit of active excavation may need to be conducted for WAC attainment purposes. If special materials are encountered during the excavations, the materials will be handled, treated (as needed), and disposed of in accordance with the procedures outlined in this Plan and the SEP.

The diversity and concentration of area-specific constituents of concern within the former production area dictates that remediation activities will progress slowly, because of the possibility of encountering special materials and perched water. Sampling and analysis conducted prior to above-grade demolition may not be sufficient to delineate completely the excavation zones for technetium-99, RCRA characteristic waste, above-WAC soil, and above-FRL soil or to identify all areas containing special materials. When excavation zones need to be delineated further, additional sampling and analysis will

need to be coordinated with removal of at- and below-grade structures or conducted during excavation. If special materials are encountered during excavation activities, additional monitoring, sampling, and analysis may be necessary to characterize the materials. Such followup sampling activities will be covered through updates to the area-specific PSPs prepared for the former production area excavation activities.

Because of access controls and limited equipment maneuverability in the former production area, real-time monitoring for WAC attainment with the large-volume NaI detector will be restricted to the BTRAK or hand-held instruments. When conducting real-time monitoring in deep excavations with the NaI detector, the geometry of the excavation and the presence of saturated conditions from perched water zones may affect the instrument reading. The real-time monitoring will be an integral part of the excavations in the former production area, and the geometry of the excavations and implementation of perched-water controls will place additional time constraints on this monitoring, which will be considered when excavation plans and schedules are developed.

Because of the expected heterogeneous distribution of area-specific constituents of concern in the soil, surveys with NaI detectors may also need to be conducted on each volume unit removed during active excavation and on the excavation layer prior to removing the next lift. Where excavation takes place in zones of perched water, scanning techniques may need to be modified to obtain a reliable reading from saturated soil and/or delayed until the soil has been dried by placement in a working stockpile. Above-WAC zones identified during these scans will be investigated for all area-specific constituents of concern as needed or demonstrated by existing RI/FS and pre-excavation characterization data. The IRDPs will specify the details on how the real-time technologies will be applied for a given area, recognizing the heterogeneous conditions that may be encountered.

Debris associated with the removal of at- and below-grade structures will not undergo further characterization other than the visual checks and responses specified for debris in Section 5.0, and the observations and/or scans necessary to address worker health and safety concerns for handling the materials.

E-3 There are four geographic areas within those portions of the site designated for remediation under
O-7 Excavation Approach D which have been identified in the Operable Unit 5 ROD as potential RCRA toxicity-characteristic soil areas. The largest potential characteristic-waste area is associated with the decontamination pad and is located in the northeast corner of the Remediation Area 3. A second potential characteristic-waste area is located along the northern boundary of Remediation Area 3 and is associated with the KC-2 warehouse (Building 63) and west pad. The third potential characteristic-waste area is associated with the lumber storage area (Building 12C) and maintenance warehouse (Building 12D) in Remediation Area 3. A fourth potential characteristic-waste area is in Remediation Area 4b and is associated with the abandoned sump west of the Pilot Plant Excavation. All of these potential characteristic-waste areas will be dealt with under Excavation Approach D.

O-42 Based on the RI/FS characterization data for uranium, eight known areas within the proposed Excavation Approach D boundaries have the potential to exceed established WAC levels for uranium (Figure 4-11, which is presented for information purposes). These areas are as follows: northeast of Soil Stockpile 1; west of Soil Stockpile 4; northeast of Quonset Hut #1; under Tension Structure #6; north of the Ore Refinery Plant; the northeast corner of the Metals Fabrication Plant; the southwest and northwest corners of the analytical laboratory; and the southwest area associated with the Sewage Treatment Plant. Additional above-WAC areas may be delineated in soil underlying buildings and structures. All identified above-WAC soil in the former production area will be excavated and segregated under this approach.

E-1 Initial D&D activities anticipated to be performed prior to pre-excavation radiological surveying and
O-1 sampling include removal of equipment and associated hardware, piping, and other materials from within buildings and structures. It is desirable to perform these D&D activities prior to sampling and analysis activities to eliminate cross-contamination of samples by concurrent D&D activities. Buildings and structures will be considered ready for pre-excavation sampling activities when their shells are ready for demolition, and such sampling activities will be carried out prior to demolition when possible.

When possible, final D&D on above-grade buildings and structures will be carried out after pre-excavation surveying and sampling activities. Pre-excavation sampling will be executed to determine whether area-specific constituents of concern are present at above-WAC and above-FRL

values in soil below building floors and foundations. Sampling holes will be drilled through concrete floors and foundations to assess the presence of area-specific constituents of concern in underlying soils. In general, RI/FS data will be used to determine the number of additional samples to be collected near the perimeter and center of the building foundation and in areas where process knowledge and history indicate the potential for contamination to occur. When possible and as needed, Geoprobe™ borings will be placed prior to demolition of the above-grade structures to determine the depth of area-specific constituents of concern above-WAC and above-FRL values.

In the event Geoprobe™ borings cannot be placed prior to demolition of the above-grade structures (e.g., Geoprobe™ equipment cannot fit into building or structure), the pre-excavation sampling event will investigate the presence of area-specific constituents of concern in the first six inches of soil underlying the concrete floors and foundations. A comprehensive laboratory analysis of all area-specific constituents of concern applicable to the production area will be performed to establish the nature of contamination below the building structures. The initial area-specific constituent of concern list will be modified, as needed, pending the results of the laboratory analyses. If area-specific constituents of concern are determined to be present above their respective FRL, the extent of the area-specific constituents of concern will be pursued after final D&D activities are completed.

E-6 Excavation Approach D will also encompass the final closure of the 25 active and inactive HWMUs
O-14 that are to be closed under the FEMP's integrated CERCLA/RCRA closure process. The integrated process and the specific HWMUs to be closed are defined in the June 6, 1996 Ohio EPA Director's Final Findings and Orders. The SEP contains a description of the closure certification process that will be applied (following completion of soil removal) to the resulting excavation footprints underlying the HWMUs of interest. The soils that are excavated during the integrated process will need to be evaluated for WAC attainment, consistent with the other soils located in the respective remediation area encompassing the HWMU. In general, all soil residing within the boundaries of an individual HWMU footprint that is found to be below WAC for all of the area-specific constituents of concern for the remediation area can be dispositioned to the OSDF. Conversely, all soil that is found to exceed WAC cannot go to the OSDF and thus will need to be dispositioned off site. However, because this above-WAC soil portion originates from within the boundaries of the HWMU footprint, it will need to be evaluated further as an interim step following excavation to determine its RCRA status prior to

dispositioning off site. This soil portion cannot be combined with any other soil destined for off-site disposal until the interim evaluations following excavation are complete.

Two different interim evaluations of this above-WAC soil portion are necessary – depending on whether the specific HWMU managed listed or characteristic waste during its active history. For those HWMUs that managed RCRA characteristic waste during active use, TCLP sampling will be necessary on the above-WAC soil to determine if it is characteristic, prior to transferring it to the Waste Pits Remedial Action Project's above-WAC soil stockpile. If the TCLP sampling demonstrates that the above-WAC portion of the excavated soil is characteristic, it will need to be managed separately for off-site disposal as a RCRA characteristic waste (e.g., similar to the treatment and dispositioning path for the above-WAC soil originating from the six geographic RCRA characteristic areas denoted in the Operable Unit 5 ROD). If this soil passes the TCLP evaluation and is determined not to be RCRA characteristic, it can then be transferred to the above-WAC soil stockpile and combined with other soil for off-site dispositioning. For those HWMUs with records that show they managed RCRA listed waste during their active history, analyses for the individual listed constituents managed in the HWMU will be necessary on the above-WAC portion of the soil excavated from beneath the footprint of the HWMU. If one or more of the individual constituents are detected in the above-WAC portion of the soil, the soil will need to be managed separately as a RCRA listed waste, in accordance with the RCRA Contained-In Policy for environmental media. Subsequently, this soil will need to be dispositioned off site as a RCRA listed waste, with appropriate treatment provisions followed. If none of the individual listed constituents managed in the HWMU are detected, management of the above-WAC soil volume as a listed RCRA waste is not necessary (again, under the provisions of the Contained-In Policy) and the excavated soil can be transported directly to the above-WAC soil stockpile and combined with other soil for off-site dispositioning.

The same interim evaluations are necessary for subsurface debris (if any) found within the confines of the HWMU footprints as well. Excavated debris found within the below-WAC areas is eligible for disposal in the OSDF, provided size restrictions and visual inspection criteria are met. Excavated debris found within the above-WAC areas will need to go through the same type of interim-step RCRA evaluations as the soil, prior to sending the debris off site. (The above-ground structurally-related components and equipment that are associated with the dismantling of the HWMU will be handled as part of Operable Unit 3 facility D&D activities under the integrated CERCLA/RCRA closure process.)

Similar to the approach for existing stockpiles discussed under Excavation Approach C, EPA SW-846 sampling strategies and OSWER Directive 9938.4-03 RCRA waste characterization objectives will be followed for all interim evaluations of the above-WAC soil portions identified beneath the HWMU footprints. As indicated elsewhere in this plan, applicable on-site RCRA storage requirements will be followed for the debris and the soils found through the interim evaluations to be RCRA-regulated.

4.3.5 Excavation Approach E - Off-Property and Non-Impacted On-Property Area Excavation

E-1 O-1 Excavation Approach E is designed to handle shallow soil excavations that take place in remediation areas which require a minimal amount of excavation prior to certification. In nonimpacted areas (i.e., no known hot spots), the need for excavation is unlikely, and existing data and radiological scans may be used to forward the area directly to certification. The nature and extent of constituents of concern in areas proposed for Excavation Approach E is generally limited to a few constituents of concern in the top one foot of soil. Soil excavations for technetium-99, RCRA characteristic waste, and above-WAC material are not expected. If these types of excavations are required, the area will be addressed by Excavation Approach A.

O-42 Excavation Approach E will be applied to Remediation Areas 1 (Phase III), 8, and off-property areas having the potential for excavation (Table 4-3 and Figures 4-4 and 4-12, which is presented for information). Remediation Area 1, Phase III, encompasses most of the northern perimeter of the FEMP, where most areas along the perimeter have been shown by RI/FS characterization data to be nonimpacted. In Remediation Area 8, this approach will be applied throughout the area. Off-property areas with the potential for remediation include the active outfall line and areas adjacent to the eastern fenceline.

E-1 O-1 WAC attainment will not be relevant to most areas remediated under Excavation Approach E, as remediation will move immediately to certification without excavation. When excavation is needed to remove soil above established FRLs, WAC attainment will be demonstrated using existing data, radiological scans, and pre-excavation data where collected. PSPs will be developed for all supplemental sampling conducted during the pre-excavation step. RI/FS data and pre-excavation data (if collected) will be used to demonstrate that excavated soil placed in the OSDF has met the WAC for any secondary nonradiological area-specific constituents of concern.

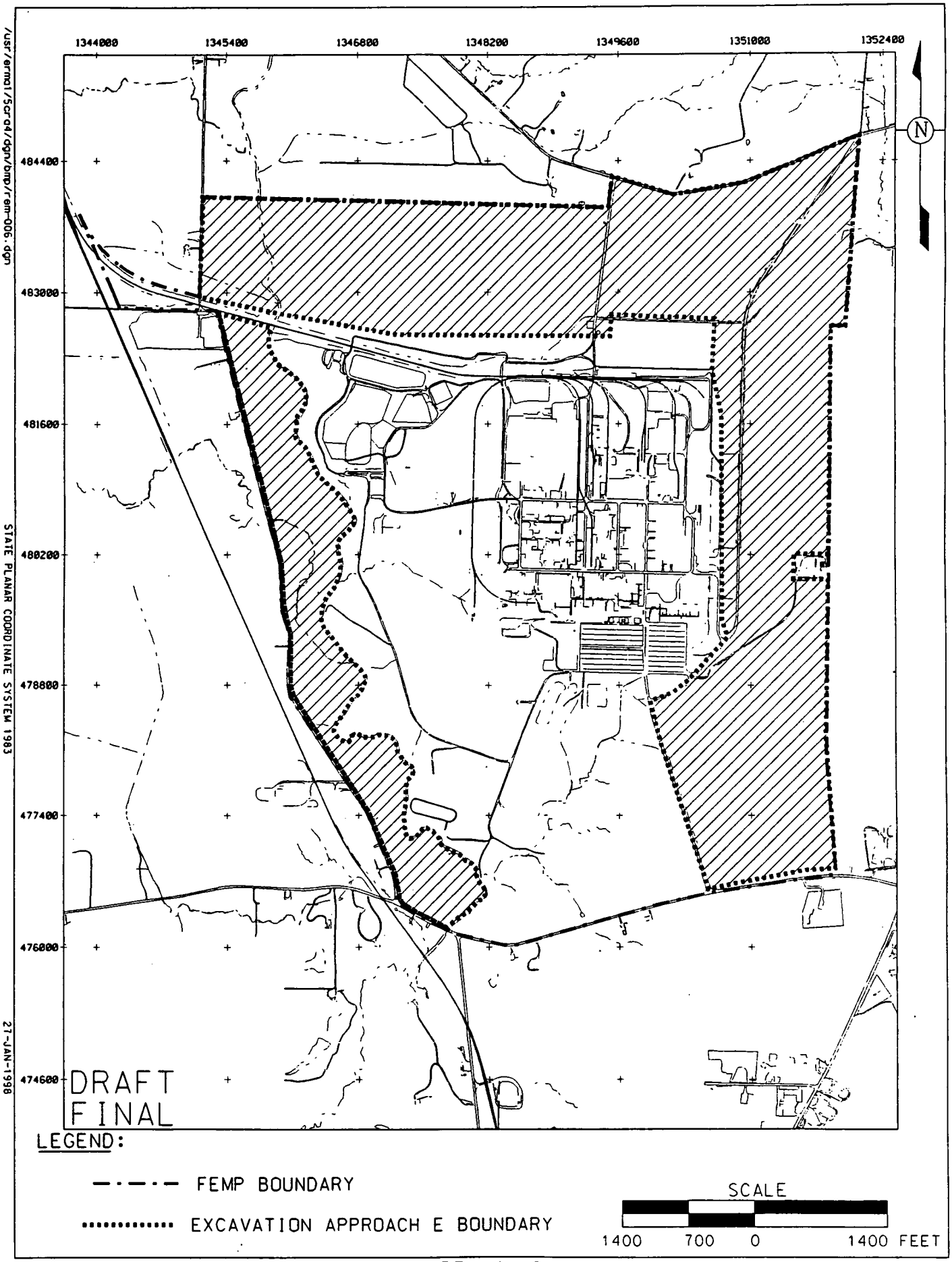

FIGURE 4-12.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH E
(FOR INFORMATION PURPOSES ONLY)

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4.3.6 Excavation Approach F - Non-HDPE Pipeline Excavation Outside the Former Production Area

E-11 Excavation Approach F is designed to handle non-HDPE pipeline excavations outside the former
O-25 production area (Figure 4-13, which is presented for information). HDPE pipelines associated with
O-42 the aquifer restoration activities and the AWWT will be left in place as part of the post-closure monitoring system in case prolonged groundwater extraction is required. Excavation depths using this approach may be moderate to deep. The list of area-specific constituents of concern in areas proposed for Excavation Approach F (to be provided in subsequent PSPs and IRDPs) will reflect RI/FS data for the soils in the vicinity of the pipelines and process knowledge of materials handled by the pipelines. However, the distribution of area-specific constituents of concern under the pipelines will not be established until the pipelines are removed.

Excavation Approach F will be applied to the pipeline associated with the Sewage Treatment Plant. The Sewage Treatment Plant pipeline is located in Remediation Area 1, Phase II, and off site, extending from the former production area to the Sewage Treatment Plant and off site to the Great Miami River. Additional non-HDPE pipelines may be delineated upon completion of Excavation Approaches A through E.

E-1 Excavation Approach F will be implemented in Remediation Area 1, Phase II, after Excavation
O-1 Approach A has been completed. The process will begin by conducting a pre-design investigation to delineate the extent of the Sewage Treatment Plant pipeline, identify potential area-specific constituents of concern, and perform pre-excavation surveys and sampling activities as needed. A PSP will be prepared to address all supplemental sampling found to be necessary. Existing data, radiological survey results, and new laboratory analytical data will be carried forward to the remedial design to delineate the extent of soil excavation and the removal sequencing of the pipeline sections. This information will be incorporated into an IRDP and submitted to EPA and OEPA for approval. After the IRDP has been approved, soil excavation and removal of the pipe will begin. Upon completion of excavation and pipeline removal in sections, a pre-certification survey, certification unit delineation (as sections of the pipe), and certification sampling activities will commence.

The nature of contamination associated with soil surrounding (primarily underlying) the Sewage Treatment Plant pipeline is expected to be similar to Sewage Treatment Plant constituents of concern that are established with RI/FS data. Pre-excavation and excavation characterization data will be

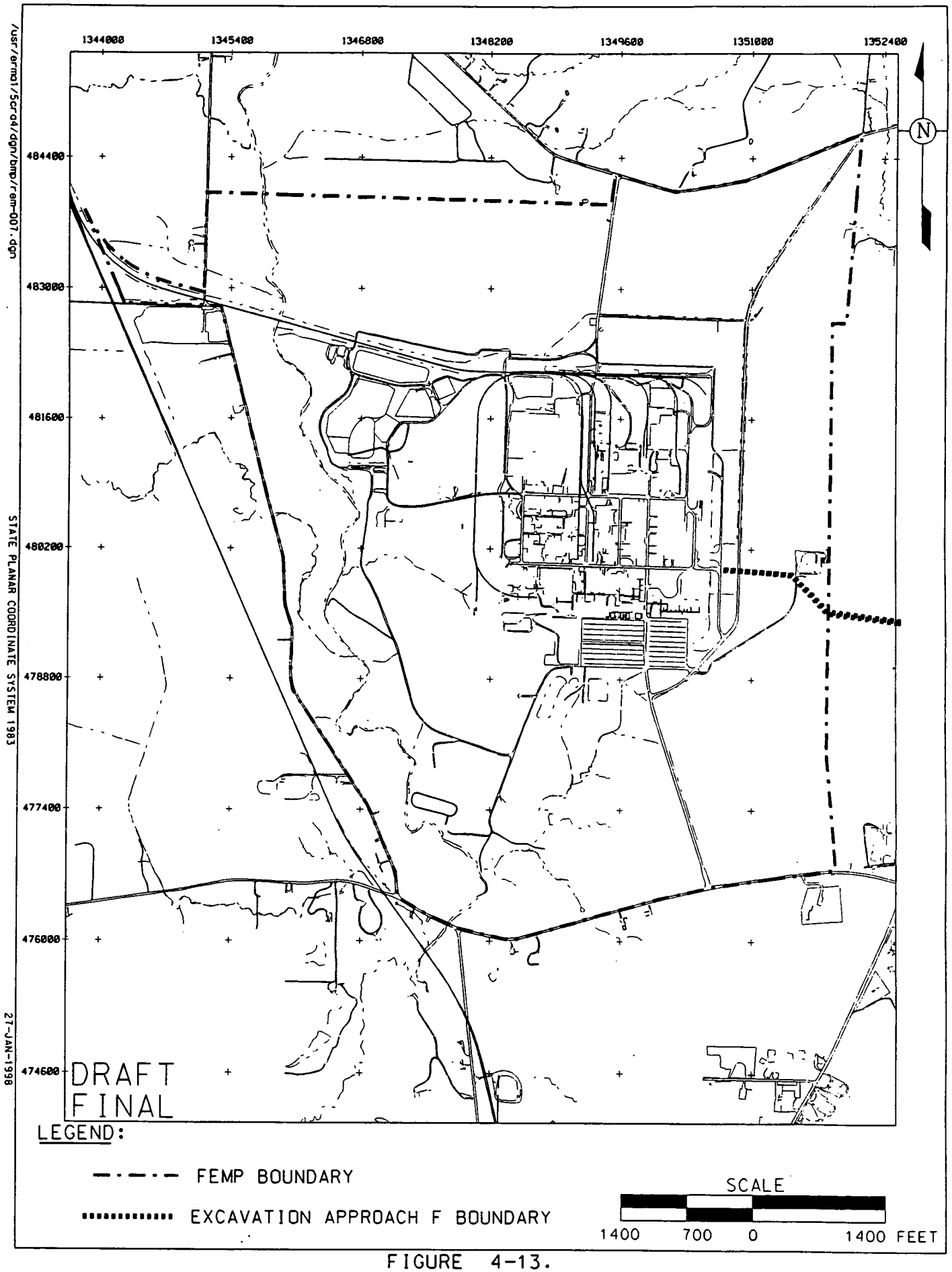

FIGURE 4-13.
ANTICIPATED EXCAVATION AREAS FOR EXCAVATION APPROACH F
(FOR INFORMATION PURPOSES ONLY)

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needed to establish the extent of contamination surrounding the Sewage Treatment Plant pipeline and any other non-HDPE pipelines remediated under this approach.

Real-time radiological scanning is anticipated to be an advantageous approach to control excavation of potentially impacted soil underlying the pipes. However, radiological scanning with NaI detectors and in-situ measurements with the HPGe instrument at the bottom of a trench may not be feasible for some conditions encountered in the field. Open trenches may prove to be unsuitable for real-time scanning and/or HPGe measurements, because of the geometry of the trench or because of risk to personnel entering the trench. If pre-excavation surveys indicate the potential for contamination under the pipe and if in-situ HPGe measurements within the trench cannot be performed, excavated soil from under the pipe will be staged at an on-property location and the stockpile will be assigned to Excavation Approach C for later characterization and disposition decisions. Alternatively, if scanning and HPGe measurements can be performed in the trench and widespread contamination is indicated, excavation of the impacted soil under the pipe will be conducted similar to Excavation Approach D.

Surface radiological surveys and/or sampling may need to be conducted for the pipeline extending from the Sewage Treatment Plant to the Great Miami River. If sampling is implemented, a nominal grid width of 50 feet will be centered along the length of the pipeline to develop an initial zone of investigation that is 25 feet on each side of the pipeline. After establishing the grid, Geoprobe™ borings will be placed on the established perimeter of the grid and within the estimated excavation area between the surface projection of the pipeline and grid perimeter to determine the depth of excavation.

Excavation volumes will be defined by using soil cores returned from Geoprobe™ borings and sampling the cores to define the depth where area-specific constituents of concern are above their respective FRL. The presence of soil with area-specific constituents of concern at or above the WAC will result in delineation of a WAC excavation volume. Soil with area-specific constituents of concern at or above their respective FRL that meets the WAC will be delineated as a FRL excavation.

Pipeline sections outside the former production area but within the FEMP boundary will be removed first. If holdup material is present in the pipeline, it will be drained and managed with the pipeline as summarized in Section 5.0. The length of section to be removed will be tied to the nominal dimensions of the certification unit adjacent to the pipeline (i.e., 250 feet or 500 feet) or the length of the entire

pipeline, whichever is shorter. After the pipeline is exposed by excavating the surrounding soil and staging the soil into appropriate clean or contaminated piles, a section of the pipeline will be removed and the open end will be capped, if applicable.

If pre-excavation surveys and/or sampling indicates the potential for soil beneath the pipeline to exceed the WAC, and if scanning instrumentation can enter the trench, a scan of the soil under the removed section of pipeline will be conducted to delineate the above-WAC excavation area. However, if access to the trench is restricted and a scan cannot be performed, bulk excavation will proceed following Excavation Approach C to determine the disposal option.

When access to the trench is possible, soil below the pipeline will be surveyed to establish whether above-WAC material is present. If above-WAC soil is detected, additional scans will be conducted during excavation and Geoprobe™ borings will be used as necessary to determine the depth of above-WAC material. In the absence of finding any above-WAC soil, bulk excavation of the remaining impacted soil will proceed.

After the extent of above-WAC soil has been delineated, excavation will resume to remove the identified volume of above-WAC material. Soil above the WAC will be excavated, segregated, and contained to prevent contamination of below-WAC areas. Following the removal of soil above the WAC, if applicable, any remaining soil containing area-specific constituents of concern above the FRLs will be excavated and staged prior to placement in the OSDF. RI/FS data and pre-excavation characterization data will be used to demonstrate WAC attainment.

4.4 OVERSIGHT

This section provides details on the internal oversight activities to be performed by the FEMP independent oversight organization and the opportunities for external (i.e., EPA and OEPA) oversight during the three phases of the soil cleanup program. A complete discussion of the FEMP's compliance assurance plan for WAC attainment is provided in Section 8.0. In essence, the compliance assurance plan creates a new internal FEMP organization known as WAO that will provide independent oversight of the FEMP's waste generation and waste placement activities to assure compliance with OSDF WAC attainment requirements. Definitions of the FEMP's organizational roles and responsibilities for waste generation, waste acceptance, and waste placement activities are provided in Section 7.0.

O-47 Table 4-5 lists the soil remediation activities for which specific oversight activities will be performed. The remedial actions are listed sequentially in the first column and cover the key steps from initial identification of the area to be remediated through delivery of the soil to its final on-site destination. Column 2 identifies the documentation that will be generated as part of the remedial action. Column 3 identifies the oversight activities that will be performed by the FEMP's independent WAO organization. Column 4 identifies those actions that will be taken to coordinate EPA and OEPA oversight activities. The shaded remedial actions represent key checkpoints, where oversight activities can be readily performed and will be most effective in assuring that the WAC attainment objectives are met. Each of these activities will, to the degree possible, be coordinated logistically with EPA and OEPA to assure that EPA/OEPA oversight objectives are readily attained. As with all oversight activities conducted by EPA and OEPA, agency oversight of the FEMP's WAC attainment activities remains an independent process subject to the internal needs of the agencies.

The following sections summarize the activities listed in the table for each phase of soil remediation. The summaries include oversight activities that will be performed by FEMP personnel and actions that will be taken to help coordinate the logistical considerations associated with EPA and OEPA oversight.

4.4.1 Pre-Excavation Phase

Pre-excavation activities begin with the identification of the area to be remediated and conclude with EPA and OEPA approval of an IRDP. The following sections summarize each of the key pre-excavation activities, describe FEMP independent oversight, and identify FEMP actions to support independent oversight by EPA and OEPA.

4.4.1.1 FEMP Independent Oversight

To initiate soil remediation activities, the FEMP's soil remediation organization will prepare a map identifying the area to be remediated. The independent WAO organization will review the drawing for consistency with the soil remediation sequence provided to EPA and OEPA in the SEP. Using data from the SED, the area-specific constituents of concern and additional site characterization needs will be identified to determine the extent of above-WAC and above-FRL soils. A PSP will then be prepared that reflects these characterization requirements. The independent WAO organization will review and sign-off the PSP to assure that the proposed characterization is sufficient to meet WAC attainment definition objectives.

TABLE 4-5

FEMP, EPA AND OEPA INDEPENDENT OVERSIGHT

	Remedial Action	Documentation	FEMP Oversight	EPA/OEPA Oversight
Pre-Excavation	Identify area to be remediated.	• Area map	• WAO - Verify area against SEP	• Remediation sequence provided to EPA/OEPA in SEP
	Review SED data. • Identify area-specific constituents of concern • Identify characterization requirements Prepare PSP.	• PSP	• WAO - Sign-off PSP	• PSP available for review
	Execute field radiological surveys and sampling.	• Survey Records • Sample Log • Chain of Custody	• QA - oversee split samples.	• Monthly remediation schedule provided to EPA/OEPA to coordinate oversight and split sampling.
	Enter characterization data into SED.	• Data validation records	• QA - Data Validation	
	Interpret characterization data. Prepare IRDP.	• IRDP	• WAO - Sign-off IRDP • WAO - Prepare Material Profiles • WAO Establish MTLs	• IRDPs submitted to EPA/OEPA for review and approval.
Excavation	Excavate soil. Survey to assure above-WAC soil removed.	• IRDP • Material Profiles • PWID form	• WAO - Prepare PWID Form • QA - excavation and survey oversight	• Monthly remediation schedule provided to EPA/OEPA to coordinate excavation oversight.
Post-Excavation	Transfer soil to interim stockpile, Waste Management, Waste Pits Remedial Action Project, or OSDF.	• FTL/OSM	• WAO - Reconcile FTL/OSMs • WAO - Verify MTL contents periodically • QA - routinely check truck contents against FTL/OSMs	• MTL inspection schedule provided to EPA and OEPA to coordinate oversight • FTL/OSMs and IIMS reports maintained on-site for EPA/OEPA inspection.

*Shading denotes key QA checkpoint. Task coordinated to support oversight by EPA and OEPA.

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E-1 All supplemental sampling and radiological surveys will be executed as identified in the PSP.

O-1 Following receipt of validated analytical results, the data will be entered into the SED. This information will be used to identify the extent of soil excavations for above-WAC and above-FRL soils (and to identify the area of excavation for RCRA toxicity characteristic soil from the seven designated geographic areas, as appropriate). The SED data and accompanying excavation area interpretations will form the basis of the remedial design contained in the IRDP. The IRDP will be reviewed by the independent WAO organization and, following resolution of internal comments, the completed IRDP will be forwarded to EPA and OEPA for review and approval. Upon EPA and OEPA approval of the IRDP, preparations for excavation will begin and the WAO organization will prepare material profiles and MTLs for the soil excavation activities covered by the IRDP. The data used to develop the final excavation areas will be used for tracking the excavated soil from its origin to its ultimate on-site destination.

4.4.1.2 EPA and OEPA Independent Oversight

Monthly project-activity schedules will be provided to EPA and OEPA to coordinate agency oversight of the planned activities needed to support development of the IRDP. The schedule will identify the areas to be radiologically surveyed and sampled during the coming month and the days for which radiological surveys and sampling are scheduled. FEMP personnel will coordinate closely with EPA and OEPA's designated representatives to identify those field activities that are desired to be observed and to plan for split-sampling, should it be desired. If EPA and/or OEPA elect to perform split sampling, close coordination will be necessary to assure that sufficient time is made available to review the split sampling results and rectify any significant differences before the IRDP is submitted for agency approval. Alternatively, if the split-sampling results cannot be made available and resolved in time to meet IRDP delivery dates, the split-sampling results and resultant follow-up actions (if any) will be accommodated during EPA and OEPA review of the IRDP.

Both the existing and the new pre-excavation characterization data will be summarized in the IRDP, along with agency split-sample results as appropriate. The completed IRDP will be forwarded to EPA and OEPA for review and approval prior to the excavation of above-WAC soil.

4.4.2 Excavation Phase

Soil excavation activities will begin with site preparation and end with certification sampling to assure that above-FRL soil has been removed. The following sections summarize the key excavation activities, describe FEMP independent oversight, and identify FEMP actions to support independent oversight by EPA and OEPA.

4.4.2.1 FEMP Independent Oversight

Prior to field mobilization, a PWID Package will be prepared which denotes the specific areas to be excavated; identifies material profiles and MTLs; and identifies final destination points. The PWID will be used by field personnel to assure that the proper areas are excavated and the materials are transferred to the appropriate locations.

To prepare the area for excavation, runoff controls will be established and above-WAC areas will be marked for excavation. Area markings will be based on the PWID Package. Soil excavation will proceed in the manner and sequence described in Section 4.3. In brief, soil containing above-WAC concentrations of area-specific constituents of concern will be excavated first. If the soil being excavated is from one of the designated areas where RCRA toxicity characteristic soil is required to be identified and segregated for treatment, any of the above-WAC soil that also failed toxicity characteristic testing will be sent for treatment to meet off-site disposal requirements. Alternatively, the materials will be shipped off site for both treatment and disposal.

Following the excavation of above-WAC soil, the remaining soil will be surveyed using either the RTRAK or BTRAK to further assure that no above-WAC soil remains in the area to be excavated. Areas containing above-FRL contamination will be marked for excavation. Excavation of above-FRL soil will then proceed in designated lifts, depending upon the area being excavated. Continuous radiological surveys will be performed during excavation of above-FRL soil to provide additional assurance that above-WAC material is no longer present in the area being excavated. Also, as presented in Section 4.2.1.2.2, continuous monitoring for organic vapors will be performed as a best management practice at the locations of all remedial excavation activities. Finally, if the soil is being excavated from one of the geographic areas designated for segregation and treatment of RCRA toxicity characteristic soil, that soil determined to be above the FRL and RCRA characteristic (based on the

pre-excavation characterization data) will be managed separately to satisfy treatment obligations prior to on-site disposal.

The FEMP's WAO organization will provide an independent review of the excavation phase activities to assure that all project documentation requirements are met.

4.4.2.2 EPA and OEPA Independent Oversight

E-1 Monthly remediation schedules will be provided to EPA and OEPA showing the areas to be excavated,
O-1 the basis for excavation (above-WAC areas, above-FRL areas, and RCRA toxicity characteristic areas,
O-48 as appropriate), and the excavation schedule. FEMP personnel will coordinate with EPA and OEPA representatives to identify agency desires for observing key excavation activities in the field. Key opportunities for independent oversight by the agencies during this phase include visual observation of the excavation activity, real-time analytical surveying activities conducted during excavation, and associated excavation controls. In certain circumstances, additional sampling and laboratory analytical data will also be procured during (or subsequent to) the above-WAC excavation activity, and such events will be relayed to the agencies through the monthly remediation schedules in the event split sampling is desired.

4.4.3 Post-Excavation Phase

Post-excavation activities begin with the loading of soil for transport and end with the arrival of excavated soil at its ultimate, on-site destination. The following sections summarize the key post-excavation activities, describe FEMP independent oversight, and identify FEMP actions to support independent oversight by EPA and OEPA.

4.4.3.1 FEMP Independent Oversight

E-19 As discussed in Section 4.2.3.1, excavated material will be transferred to one of seven types of MTLs depending upon its material profile and ultimate disposition. The initial destination for excavated soil will be specified in the PWID Package. Based upon the data provided in this package, field personnel will complete FTL/OSMs for each loaded transport vehicle. One copy of the form will be retained at the excavation site and a second will accompany the soil transfer to its destination MTL. The soil will be accepted at the MTL based upon the information contained on the completed FTL/OSM.

Routinely at the completion of excavation and transport activities, both copies of the FTL/OSMs will be reconciled by the independent WAO organization and entered into the IIMS. Subsequent transfers of soil from one MTL to another will be similarly documented and controlled using FTL/OSMs.

O-48 The FEMP will provide three levels of control and oversight to ensure that soil is controlled following excavation and prior to delivery to its final, on-site destination. First, for all on-site soil excavation and transfer activities, the WAO organization will oversee soil transfers, comparing truck contents with the data contained on the FTL/OSM. On a routine basis, the independent WAO organization will reconcile FTL/OSMs from origin and destination MTLs and enter the FTL/OSM data into the IIMS. Periodically, the independent WAO organization will inspect each of the active MTLs to ensure that they are properly maintained and that their contents are consistent with the data maintained by the IIMS. During this phase, WAO personnel will conduct independent observations of the placement of the materials at the destination locations to provide a second check that visually-observable prohibited items have not been transferred.

4.4.3.2 EPA and OEPA Independent Oversight

O-47 Monthly remediation schedules will be provided to EPA and OEPA to coordinate oversight of soil transport by the agencies. Schedules for MTL reviews will also be coordinated with EPA and OEPA to facilitate agency participation. In addition, the file of executed FTL/OSMs and IIMS reports will be maintained on site to support inspection by EPA and OEPA. During this phase, EPA and/or OEPA may elect to independently sample truck contents on arrival at an individual MTL (including the OSDF). In the event a truck is stopped for such sampling prior to placement of its contents at the MTL, the truck and its contents will be sequestered off line in a managed area until such time that the agency results (and FEMP splits, if taken) have been reviewed. During this period of time while analytical results are in progress, soil excavation and placement activities will continue, although the individual truck contents will remain sequestered. If the analytical results subsequently indicate that the truck contents are not suitable for placement at the MTL, an immediate review by the FEMP will be conducted to establish whether the situation is 1) the result of a statistical occurrence, limited to that individual shipment, with no systemic breakdown of protocol or 2) the result of a systemic breakdown of protocol. If the result is attributed to a systemic breakdown of protocol, a material nonconformance report will be generated consistent with existing FEMP QA procedures. Issuance of the nonconformance report will trigger a defined and controlled investigation of the circumstances

surrounding the nonconformance, including a determination of the apparent cause and overall impact of the nonconformance. Corrective actions will be taken to address both the immediate nonconformance and its cause. The nonconformance resolution process will include the actions necessary to correct the nonconformance and preclude its reoccurrence, including, as appropriate, the cessation of work associated with the nonconformance until the appropriate corrective action can be successfully implemented.

It should be emphasized that the above scenario would generally be the first indication of a need to look back to the FEMP's excavation and segregation processes for further refinement and should not be considered a direct basis for looking at previously-placed volumes in the OSDF. The types of corrective actions contemplated for addressing a systemic condition in need of refinement will be discussed with EPA and OEPA before a request is made to resume excavation and placement operations that may have been halted as part of the process.

The individual sequestered truck contents that fail EPA or OEPA's independent sampling will be dispositioned off site. The sequestered contents that are subsequently found to pass an independent agency "gate check" can be transferred to the MTL of interest without further restriction.

5.0 WAC ATTAINMENT PLAN FOR DEBRIS

DOE The Operable Unit 3 final remedial action addresses treatment and final disposition of debris resulting from the FEMP's facility D&D activities. Operable Unit 3 encompasses the structures (e.g., process buildings, storage pads, warehouses, and above-grade storage tanks), remaining product, and equipment contaminated by FEMP production activities and waste management practices. By definition, Operable Unit 3 also includes the structures, piping, and other at- and below-grade debris that may be encountered coincident with the excavation activities associated with Operable Unit 5.

Most debris streams contain low levels of contaminants and are, therefore, not considered a principal threat. For these materials, the remedial strategy calls for disposition, through institutional and engineering controls in the OSDF. Debris that exceeds WAC for the OSDF will be packaged and transported to an off-site disposal facility. The debris disposition strategy, as discussed in the Operable Unit 3 ROD and the Operable Unit 3 Integrated RD/RA Work Plan, provides for several alternatives to debris disposal that will be considered during each project. These alternatives (unrestricted recycling/reuse and restricted recycling) are consistent with current DOE policies and initiatives and will be considered for each material at the time of its generation.

DOE This section contains the plan for ensuring that all debris sent to the OSDF meets the OSDF WAC, that the debris has been sufficiently tracked from generation to disposition, and that all pertinent information regarding the debris has been documented. Section 5.1 deals with the requirements for above-grade debris associated with Operable Unit 3 D&D activities, and Section 5.2 deals with the requirements for at- and below-grade debris. Section 5.3 addresses the extension of Operable Unit 3 visual inspection requirements for WAC attainment to the subsurface debris that will be encountered during the excavation of the Operable Unit 2 waste units, and also to the debris associated with the future D&D of the new remediation facilities constructed for Operable Units 1, 4, and 5. Sections 2.6.5 and 4.2.2 provide additional information relating to the inspection and handling of at- and below-grade debris unearthed during soil (i.e., Operable Unit 2 and 5) excavation activities.

5.1 ABOVE-GRADE DEBRIS

This section describes the approach used for handling and tracking debris generated from above-grade D&D projects. This approach was initially developed during the dismantlement of Building 4A and was later refined during the dismantlement of the Plant 1 (Phase I) Complex.

Debris management does not occur only after the debris is generated but is a continuous process exercised throughout the planning and execution of a project. This section, therefore, is divided into three subsections representing three phases of an above-grade D&D project: pre-dismantlement (i.e, safe shutdown and D&D project design); dismantlement (including segregation, size reduction, and containerization); and post-dismantlement, which includes interim storage of debris and eventual disposition.

5.1.1 Pre-Dismantlement Activities

The tasks described in the following subsections represent typical activities performed before the start of D&D. These activities can be divided into two general areas: preparing the structure for the D&D subcontractor through the Safe Shutdown Program; and performing remedial design, including the preparation of implementation plans and project-specific design specifications for the D&D subcontractor. These two general areas are discussed below.

5.1.1.1 Safe Shutdown

Safe shutdown refers to actions performed to place a facility in a controlled state ready for D&D. The largest focus of this effort is to remove the bulk of the highly contaminated materials from the structures by removing hold-up material from pipes and equipment, and performing a general cleaning of accessible surfaces.

Hold-up material will be removed from equipment, auxiliary ductwork, and piping for these primary reasons:

- To reduce potential hazards from the work environment for the remediation subcontractor
- To provide FEMP Health and Safety and Waste Management organizations with known starting conditions that are needed to develop the Safety Analysis, work permits, and Health and Safety Plan for remediation activities
- To aid in determining disposition options for the remediation materials.

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All systems will be inspected to ensure such material has been removed and that any previously undetected material is located, quantified, and removed. Inspection techniques include visual inspection and non-destructive analysis/assay.

For process buildings, a general cleaning operation will be performed to remove gross levels of contamination and may include visible dust and loose debris (including biohazards, such as pigeon remains) from building surfaces, walls, and floors. The purpose of this activity is to remove loose radiological contamination held within the dust as well as other hazards (e.g., biological and chemical), thereby reducing the potential personnel exposure during aggressive remediation activities. Building penetrations that allow animal access will be sealed to ensure no further intrusion from animals and to minimize the potential migration of loose contamination to the environment.

DOE Waste materials removed during safe shutdown will mostly fall into debris Categories C (Process-Related Metals) and J (Product, Residues, and Special Material), which are both designated for off-site disposition under the Operable Unit 3 ROD. By removing these categorically excluded materials and cleaning the structure and its contents, the bulk of the debris remaining for removal by the D&D subcontractor will meet the OSDF WAC.

5.1.1.2 Implementation Plans and D&D Specifications

The remedial design effort for each above-grade D&D project will include an evaluation of the debris to be generated in order to determine handling, treatment, and disposition requirements. The primary objective of material evaluation is to ensure that debris streams are clearly identified, handled, and containerized (if required) according to project specifications to treat and dispose of debris in accordance with the Operable Unit 3 ROD. It is also recognized that the results from remedial investigation efforts will be readily usable during remedial design to complete most of the documentation needed for material handling, containerization, and disposition; however, some further evaluation will have to be performed in the field to differentiate between process and non-process metals based on the "visual inspection" standard which will be discussed further in Section 5.1.2.2.

During project design, data from the Operable Unit 3 RI/FS Report (DOE 1996b) and Sitewide Waste Information, Forecasting, and Tracking System (SWIFTS) will be reviewed to identify Operable Unit 3 materials to be generated during each Operable Unit 3 D&D project, estimate their volumes and

weights, and classify them as either a specific material type pursuant to one of the Operable Unit 3 debris categories (Categories A - J, as shown in Table 2-1) or as a material having a certain description (e.g., equipment or pipe) that will be further evaluated in the field during remediation to determine its Operable Unit 3 debris category designation. The classification of materials into debris categories is necessary for providing the remediation subcontractor with project-specific segregation requirements that reflect decisions made in the Operable Unit 3 ROD. FEMP project management will also use this information to estimate the number and types of containers and the configurations of stockpiles needed for a project.

E-6 Materials will be field-qualified for disposal in the OSDF by Operable Unit 3 (pending WAO
O-14 concurrence) using an on-site manifest. The Operable Unit 3 ROD provides that if all acid brick, process-related metals, process residues, product materials, and 2400 cubic feet of concrete from specific locations (containing the highest levels of technetium-99) associated with Operable Unit 3 are disposed of off-site, then all remaining Operable Unit 3 materials are eligible for disposal in the OSDF, provided that they satisfy visual inspection criteria (summarized in Section 5.1.2.2). The exception is lead sheeting, for which the Operable Unit 3 ROD also imposes an additional requirement that it be treated to remove its RCRA characteristic property before on-site disposal, or, alternatively, be sent off-site for disposal in compliance with off-site WAC attainment requirements for disposal at the permitted off-site commercial disposal facility.

A key strategy for the implementation of above-grade D&D and material handling activities is the use of performance specifications to direct the remediation subcontractor in the performance of work. Performance specifications differ from descriptive or detailed specifications in that the remediation work methods are not specified. The performance specifications state what is to be done and what regulations, codes, and standards apply. They also identify any limitations on activities. Details of how to accomplish the task are left to the discretion of the remediation subcontractor. This approach allows the remediation subcontractor to use past experience and existing equipment in the development of a competitive bid or proposal, thereby minimizing costs. The remediation subcontractor will be required to submit work plans identifying proposed methods for performing various activities to FEMP project management for review and approval. For above-grade D&D projects, therefore, much of the project implementation details are proposed by the remediation subcontractor and approved by FEMP project management shortly before implementation.

Since all of the Operable Unit 3 remediation projects will involve the execution of similar activities, performance specifications for above-grade D&D and material handling have been standardized in a generic format and are included in the Operable Unit 3 Integrated RD/RA Work Plan. While also ensuring consistency among projects, these generic performance specifications may be modified according to the particular needs of a project.

5.1.2 Dismantlement Activities

The primary above-grade dismantlement activities that relate to WAC attainment are material segregation, visual inspection of piping and equipment, and size reduction. These three activities are performed by a remediation subcontractor in accordance with the D&D performance specifications and under the oversight of FEMP waste management personnel assigned to the project.

5.1.2.1 Material Segregation

The segregation strategy for debris was developed for the Removal Action 17 Work Plan (Revision 3) (DOE 1995f) and addenda (DOE 1996e). It provides cradle-to-grave management of materials to ensure proper handling, treatment, and disposition according to the decisions of the Operable Unit 3 ROD and determinations made during the D&D project design. This strategy specifies that above-grade debris will be segregated (generally by the remediation subcontractor) according to the material categories identified in Table 2-1.

As stated in Sections 3.1 and 3.2, certain debris streams (material categories) will not be allowed to be disposed of in the OSDF. For example, in order to comply with public preference to restrict the on-site disposal of RCRA characteristic hazardous waste streams, acid brick and lead sheeting will be segregated from other materials that are destined for the OSDF. The following are specific types of debris that, untreated, do not meet OSDF WAC and are currently planned for off-site disposition.

(1) Approximately 151,000 cubic feet of process-related metals (Category C) from former process facilities will be disposed of off-site. This volume estimate is subject to change based on success of field decontamination efforts and results of visual inspection, discussed further in Section 5.1.2.2. Process-related metals will be removed during both above-grade D&D and at- and below-grade excavation.

(2) Approximately 20,600 cubic feet of acid brick (Category F), considered to generally have the highest concentrations and widest variety of contaminants due the historical use of acid brick in chemical-related processes, will be treated as

necessary to meet LDRs and disposed of off site. All acid brick will be removed during above-grade D&D.

(3) Approximately 50 cubic feet of lead sheeting (Category D), considered to be potentially mixed waste, will be either treated for on-site disposal, sent off site, or recycled. Note: lead sheeting is currently projected for off-site treatment and disposition but may be disposed of on site if treated to meet the TCLP criteria of the LDR standards, as stated in the Operable Unit 3 ROD. All lead sheeting will be removed during above-grade D&D.

(4) Approximately 2400 cubic feet of concrete (Category E), due to its high concentrations of technetium-99, will be scabbled from the top of slabs in four process areas and shipped for off-site disposal. Scabbling is discussed in more detail in Section 5.2 as a pre-excavation activity.

O-50 (5) In addition, items containing free liquids, whole or shredded scrap tires, and used oils are prohibited from on-site disposal.

E-6 As recognized in the FEMP's integrated CERCLA/RCRA HWMU closure process, the above-grade
O-14 debris from the D&D of the HWMUs is eligible for on-site disposal, provided it meets the visual inspection requirements for process-related metals and residues summarized in Section 5.1.2.2. (The below-grade debris and associated contaminated environmental media is also eligible for on-site disposal, provided the WAC attainment requirements summarized in Section 4.3.4 are met). Above-grade debris from HWMU closure activities that does not meet the visual inspection requirements will need to be dispositioned off site, in compliance with off-site WAC attainment requirements for the permitted commercial disposal facility.

Procedures adopted from Removal Action 9 will be used to characterize and manage materials classified as "unknowns" since such material would fall under debris Category J (product, residues, and special materials). Additionally, all materials listed as a prohibited item in Section 3.1 will also be segregated for treatment and/or off-site disposal.

DOE Table 5-1 presents the crosswalk between the debris categories and the OSDF placement categories. In many cases, there is not a one-to-one crosswalk between the two category systems. For example, non-regulated ACM, which consists of transite panels, feeder cables, fire brick, and floor tiles, can fall into two OSDF placement categories; palletized transite meets the definition (based on size) of OSDF Category 3, while the remaining non-regulated ACM is Category 2. Since several Operable Unit 3 categories have the potential to include more than one OSDF category, shipments to the OSDF will be

categorized by identifying the most prevalent OSDF category in the container. During placement, the OSDF contractor will manage the materials to ensure that appropriate placement occurs.

To ensure that the materials destined for the OSDF meet the WAC, FEMP waste management personnel will certify each container or shipment of debris generated during above-grade D&D. This certification will include an inspection of the containerized debris to determine which OSDF category definition best applies. The debris category and the OSDF placement category will be identified and entered into SWIFTS. This process, along with discussion of debris tracking, is discussed further in Section 5.1.4.

5.1.2.2 Visual Inspection

Although sampling and analysis of debris usually will not be required for OSDF disposal, Operable Unit 3 materials will require a visual inspection during dismantlement to verify that the OSDF prohibition of process-related metals and residues is met. To execute this regulatory requirement, the visual inspection requirement stipulated in D&D Performance Specification 01517 (Removing/Fixing Radiological Contamination) will be used to segregate materials accordingly. Materials that fail the visual inspection will be classified as process-related and will be disposed of off site. Surface decontamination activities apply to all materials that do not meet the conditions and limits that must be exhibited by equipment and other debris before they are removed from a local containment or enclosure, as specified under Specification 01517. The related provision of the specification states (paraphrased) the following:

> To remove equipment or debris out of a local containment or enclosure or prior to loading into containers, or to containerize outside of an enclosure, or prior to moving to the inspection area, surfaces shall be free of visible process residues and dry as determined by the Construction Engineer/Construction Coordinator. The definition of visible process residues (green salt, yellow cake, etc.) is material on the interior or exterior surfaces of debris that is obvious and that if rubbed, would be easily removed. Stains, rust, corrosion, and flaking do NOT qualify as visible process material. If an item fails visual inspection, the items shall be deemed a Category C (Process-Related Metals) item and shall either be encapsulated or wrapped in accordance with Specification 01120. Rust, corrosion, and flaking will be considered for contamination control purposes. All equipment, material, and debris are still considered to be radiologically contaminated.

TABLE 5-1

CROSSWALK BETWEEN DEBRIS CATEGORIES AND OSDF CATEGORIES

Debris Category		OSDF Category
A	Accessible Metals	2/3
B	Inaccessible Metals	2/3
C	Process-Related Metals	N/A
D	Painted Light-Gauge Metals	2
	Untreated Lead Sheeting	N/A
E	Concrete	2/3
F	Acid Brick	N/A
G	Non-Regulated ACM	2
	Transite	3
H	Regulated ACM	5
I	Miscellaneous	2/3
	PPE, Wood, and Trash	4
J	Product, Residues, and Special Materials	N/A

DOE Note: Multiple OSDF category designations are possible for single Operable Unit 3 debris categories. Containers will be managed with the most prevalent OSDF category in the shipment as a designation.

For safety reasons, equipment/material that has greater than two percent enrichment (ratio of uranium-235 to total uranium) will not be decontaminated but will automatically be removed, containerized, and disposed of off site as a process-related metal.

5.1.2.3 Size Reduction

Once the debris has been segregated, the D&D subcontractor will perform any necessary size reduction activities. As discussed in Section 3.4, any material destined for disposal in the OSDF must meet certain design-based size criteria (i.e., physical WAC). As shown in Table 5-2, debris-specific size constraints have been developed to ensure compliance with the OSDF WAC. These constraints have been adopted into the D&D specifications.

DOE Debris stockpiles will be clearly posted regarding their use and point of contact. Access to the stockpile locations will be controlled. Transfers to and from stockpiles will be documented using FTL/OSMs, which are discussed further in Section 5.1.4. Once the OSDF begins accepting debris, paperwork will be prepared in accordance with Section 5.1.5 and the designated debris will be transported to the OSDF transfer area. The generation, transportation, and delivery of debris to the OSDF will be tracked by SWIFTS.

5.1.3 Post-Dismantlement Activities

Prior to the availability of the OSDF, generated debris has been placed in interim storage in accordance with the strategies developed initially for revision 3 of the Removal Action 17 Work Plan and later adopted into the Operable Unit 3 Integrated RD/RA Work Plan. Additionally, while staging will be minimal, some stockpiling of generated debris may continue to be necessary after OSDF placement activities commence (e.g., during OSDF shutdown in winter). Based on the material category, the debris will either be stockpiled or stored in containers awaiting final shipment to the OSDF. Categories A, B, D (not including lead), and concrete that does not need to be scabbled (Category E) will generally be stockpiled. Transite (Category G) will be palletized and wrapped. Large quantities of wood may be segregated from Category I to be stockpiled and ultimately chipped. The remaining debris in Categories G and I and all of Category H will be containerized for disposal in the OSDF. Categories C, D (lead only), F, J, and scabbled Category E will be containerized for treatment or off-site disposal.

TABLE 5-2

OSDF SIZE CONSTRAINTS FOR DEBRIS

Debris Category	Associated Size Constraint
General for all categories	Any piece ≤ 10′ in any dimension Any piece ≤ 1.5′ in height
A - Accessible Metals	Maximum length = 10′ Maximum width = 4′ Maximum height (incl. projections) = 1.5′
B - Inaccessible Metals	Maximum length = 10′ Maximum width = 4′ Maximum height = (incl. projections) = 1.5′ Pipes with diameter ≥ 12" split in half
D - Painted Light Gauge Metals	Maximum length = 10′ Maximum width = 4′ Maximum height (incl. projections) = 1.5′
E - Concrete	Maximum length = 6′ Maximum width = 4′ Maximum height 1.5′
G - Non-Regulated ACM	Maximum length = 8′ Maximum width = 4′ Maximum height = 1.5′ (bundled stacks)
H - Regulated ACM	Maximum volume/piece = 27 ft^3 For pipes: Maximum length = 10′ Maximum width = 4′ Maximum height = (incl. projections) = 1.5′ Pipes with diameter ≥ 12" split in half
I - Miscellaneous Materials	All miscellaneous materials will be compacted Maximum length = 8′ Maximum width = 4′ Maximum height = 1.5′

5.1.4 Material Evaluation and Tracking Documentation

DOE Proper documentation of material segregation, storage, transportation, and disposition is essential to ensuring WAC compliance is maintained. The following two subsections describe the documentation process for material evaluation and for tracking the material once generated.

5.1.4.1 Material Evaluation Documentation

During the design phase of an above-grade D&D project, the types and quantities of debris are evaluated. This material evaluation includes the process of completing several forms of documentation to: (1) identify materials according to a particular waste stream that is recognizable to the accepting disposal/recycling facility; (2) identify assigned disposal pathways; and (3) specify size reduction and containerization or stockpiling requirements for debris. The three items that are essential to the documentation process used for material evaluation are material profiles, the PWID form, and the Material Segregation and Containerization Criteria (MSCC) form, which are all described below.

Material Profiles

OSDF material profiles are used to identify debris streams according to a unique FEMP material profile and number. For debris categories destined for the OSDF, material profiles have been developed based on the criteria necessary to fulfill the WAC for the associated disposal route.

Project Waste Identification and Disposition Form

DOE The PWID is used for planning and management of soil, debris, and waste from a project. This form identifies all material that will be generated during a D&D project, as well as interim and final disposition locations where the waste streams will be managed. It is prepared during remedial design to prequalify material based on new and existing data for future segregation, stockpiling, containerization, and disposal.

As discussed in Section 5.1.1.2, debris that will be generated during above-grade D&D is evaluated during the project planning and design stages to determine the appropriate handling and disposal activities required. Information obtained as a result of forecasted estimates of the building contents, project site walk-down inspections, and site drawings will be used to prepare the PWID form. The preparation of the PWID requires that Operable Unit 3 RI/FS data, any other existing characterization data for the debris, process knowledge of facility operations, and all applicable waste streams be

reviewed to record applicable information needed for completion of the PWID. A listing of the debris categories to be generated are reported on the PWID. Due to specific material handling requirements, however, a debris category could be subdivided further for a particular project to ensure that like materials having similar contamination concerns are handled together. An example of such special handling is when certain thorium-contaminated materials are managed separately from uranium-contaminated materials.

Material Segregation and Containerization Criteria Form

DOE The MSCC is used to document the Operable Unit 3 debris category that a particular waste stream falls under, the stage of a project when that material would typically be generated, the type of container or stockpiling to be used, and the size restrictions for each type of material that is generated. The MSCC provides detail to support implementation of the PWID.

The MSCC is prepared during project design to guide the remediation subcontractor as well as FEMP Project Management and Quality Assurance personnel in proper sizing, segregation, and containerization of materials to facilitate disposition. Use of the MSCC during the Building 4A and Plant 1 - Phase I Complex D&D projects has proven to be a useful and effective implementation document.

5.1.4.2 Material Tracking Documentation

DOE Debris handling and tracking activities for materials generated from above-grade dismantlement operations are governed by site procedure EW-0006, "Management of Debris." This procedure provides the necessary steps to successfully implement the debris management and tracking strategies outlined in the Operable Unit 3 Integrated RD/RA Work Plan. The procedure supports tracking above-grade debris from generation through disposal. The debris tracking and handling logic is pictorially summarized in Figure 5-1.

Field Tracking Log/On-Site Manifest

DOE The Debris Transport Routing Sheet (DTRS) has been the primary tracking document for debris generated from above-grade D&D projects, but did not apply to soil or below-grade debris. In an effort to generate a single tracking document for all soil and debris, a new form, called the FTL/OSM will be developed. The FTL/OSM contains the same information as the DTRS and also includes the

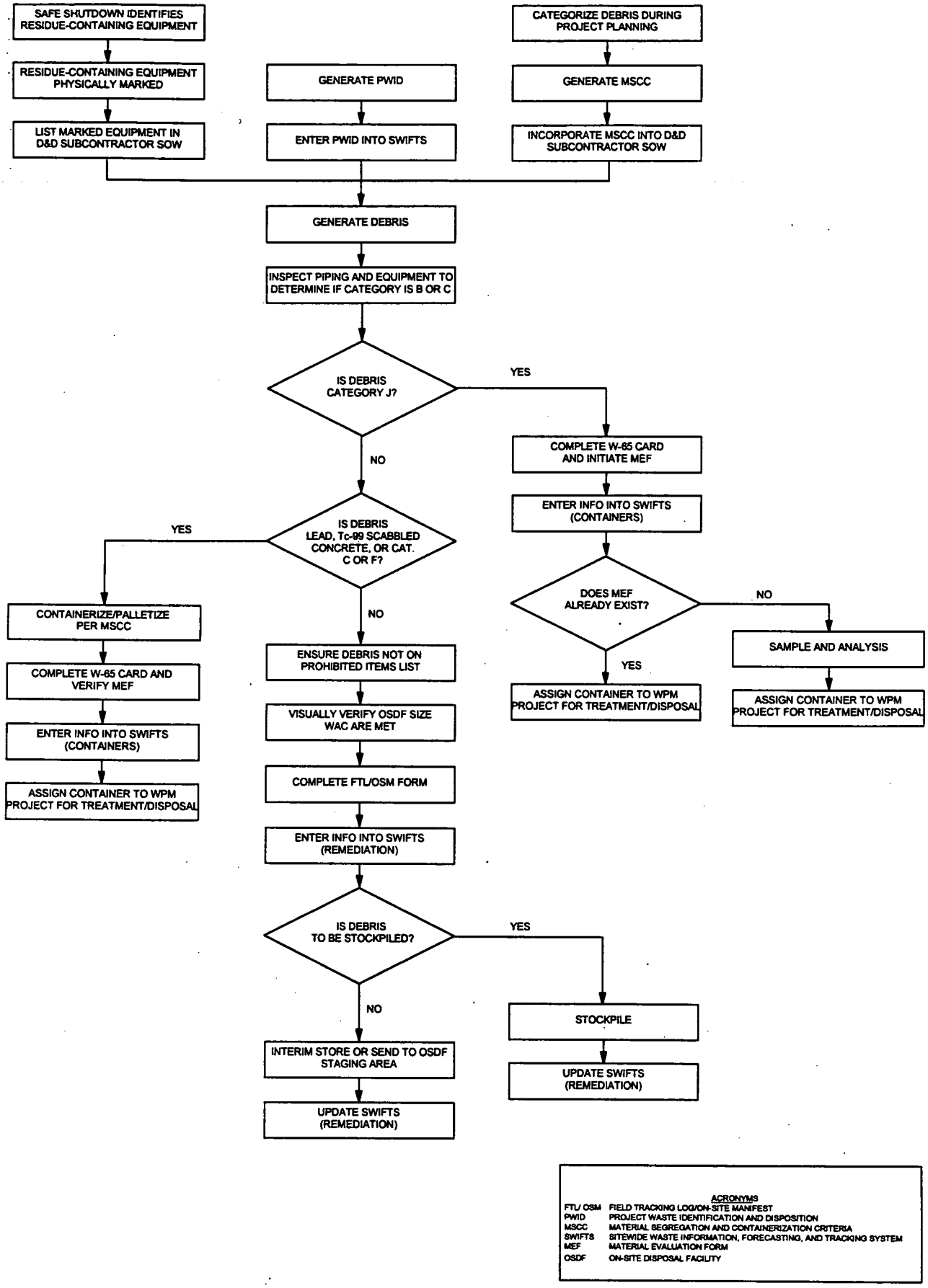

FIGURE 5-1. DEBRIS HANDLING AND TRACKING APPROACH

OSDF placement category, the volume of soil or debris generated, and the corresponding material profile number for the soil or debris stream. The FTL/OSM will replace the DTRS form for debris generated in the future as an integrated, site-wide manifest for disposal of material in the OSDF. Waste material generated prior to the development of the FTL/OSM will continue to be tracked using the DTRS.

SWIFTS Database

The FEMP SWIFTS database is a computerized system that was designed to track all wastes from project generation to disposal location. SWIFTS tracks containerized and non-containerized (stockpiled) waste from its point of origin to its final disposition, whether off-site shipment or placement in the OSDF. For debris destined for disposal in the OSDF, SWIFTS tracks the information presented on the DTRS form or the FTL/OSM. For debris destined for off-site disposal, SWIFTS contains similar information, but also includes information specific to the off-site disposal facility. SWIFTS can produce a wide variety of reports to summarize the material management status for each of the projects or a total for all projects to date.

5.1.5 Oversight

The following sections summarize the internal oversight activities that will be performed by FEMP personnel and the opportunity for external (i.e., EPA and OEPA) oversight during above-grade debris generation, handling, and disposal.

5.1.5.1 FEMP Independent Oversight

Quality control for above-grade debris handling is inherent to the D&D project since the D&D subcontractor generates, segregates, size reduces, and containerizes above-grade debris based on performance specifications. These subcontractor activities are overseen by FEMP waste management personnel, as a quality control check, who verify that all containers and stockpiles of debris have been segregated, visually inspected, and size reduced in accordance with the OSDF WAC. Once the debris has been inspected and is found to meet the OSDF WAC, the inspector signs the FTL/OSM. The WAO organization will review the WAC attainment process and authorize shipment of debris to the OSDF.

Above-grade debris will be transported to the OSDF either from interim storage or directly from the D&D project. In either case, the FTL/OSM will accompany the shipment. Upon receipt at the OSDF, the shipment will be checked against the manifest to assure that the material identified on the form corresponds to the delivery and that it is acceptable for disposal in the OSDF. Once this material has been disposed, the disposal data from the manifest will be entered into SWIFTS to complete the tracking requirements for the debris.

5.1.5.2 EPA and OEPA Oversight

Upon approval of the complex-specific implementation plans, the schedule for dismantlement of the various structures will be finalized. Monthly remediation schedules will be provided to EPA and OEPA to coordinate oversight of the D&D process. Both EPA and OEPA are welcome to inspect the dismantlement, segregation, interim storage, and disposal process at their convenience. The file of executed DTRSs, FTL/OSMs, and SWIFTS reports will be maintained on site to support inspection by EPA and OEPA.

5.2 BELOW-GRADE DEBRIS

E-2 In general, at- and below-grade debris associated with Operable Unit 3 will be removed in
O-12 conjunction with soil remediation activities and will, therefore, have many project-related commonalities with soil with regard to material handling and tracking. It is important to note, however, that at- and below-grade debris is defined as part of Operable Unit 3 and, therefore, has a WAC attainment strategy similar to that for above-grade debris. For these reasons, this section focuses on those issues and differences specific to at- and below-grade debris. (Below-grade debris associated with Operable Unit 2 waste unit excavations is discussed in Sections 2.6.5, 4.2.2, and 5.3 of this plan. Additional detail on the removal of at- and below-grade debris is provided in Section 4.4 of the SEP).

5.2.1 Pre-Excavation Activities

The two primary pre-excavation activities associated with removing and handling at- and below-grade debris are scabbling of concrete heavily contaminated with technetium-99 and remedial design and planning. These two activities are discussed below.

5.2.1.1 Scabbling

As discussed in Section 2.6.2 and 3.4, the radiological OSDF WAC established for debris limits the mass of technetium-99 in debris disposed in the OSDF to 105 grams (specific details on the development of this WAC are provided in Appendix G of the Operable Unit 3 RI/FS Report).

In order to reduce the amount of technetium-99 going into the OSDF, it was decided in the Operable Unit 3 ROD that the top inch of concrete slabs in three particular process areas, which have the most technetium-99 contamination, would be removed and dispositioned off site. The three process areas are the Enriched Uranium Casting Area in Plant 9; the Uranium Machining Area in Plant 9; and the Muffle Furnace Area in Plant 8. Additionally, due to inherent chemical and radiological contamination in the Pilot Plant, the top half-inch of concrete in the Southern Extraction Area will also be removed. The removal and off-site disposition of the specific volume of concrete from these four process areas will reduce the total amount of technetium-99 going into the OSDF to less than an estimated 59 grams, which is about 44 percent below the 105-gram allowable mass limit.

This scabbling activity will be performed prior to at- and below-grade excavation (similar to performing Safe Shutdown prior to above-grade D&D). Once these process areas of concrete have been scabbled, all remaining at- and below-grade debris meet the OSDF technetium-99 radiological WAC.

5.2.1.2 Integrated Remedial Design Package

Remedial planning performed under the SEP for at- and below-grade debris excavation will include an evaluation of the debris to be generated in order to determine handling, treatment, and disposal requirements. This evaluation, similar to that used in planning above-grade dismantlement of debris, identifies debris for which there may be particular handling concerns. For example, a large focus of the remedial design activity for below-grade debris is locating (using site drawings) below-grade piping and determining its historical uses. The purpose of this determination is to identify those pipes which may contain process-related residues, such as building sump systems. As these process-related pipes are excavated (as discussed further in Section 5.2.2), precautionary measures will be taken to prevent a spill of contaminated water or sediment from the ends of a severed pipe.

As discussed in Section 4.1.4, remedial planning and design activities will lead to the development of an IRDP, which will address an integrated approach to excavating soil and removing at- and below-grade debris in a specified area.

5.2.2 Excavation and Segregation Activities

O-12 The bulk of the debris anticipated to be encountered during excavation of Operable Unit 3 at- and below-grade debris includes concrete pads, asphalt roads, below-grade piping and storm sewers, and structural steel (e.g., supports remaining in basements, etc.). Since all acid brick will be removed as part of above-grade building dismantlement, it is generally not expected to be encountered in the below-grade portions of Operable Unit 3. Similarly, once the designated process areas of concrete have been scabbled to ensure the technetium-99 mass-based OSDF WAC for debris will be met, all remaining concrete to be excavated as part of at- and below-grade remediation meets the OSDF technetium-99 radiological WAC. As a best management practice for soil excavation, the FEMP will segregate and send off site the vast majority of actual and/or suspected acid bricks that may be unearthed during the excavation of Operable Units 2 and 5, to further reduce the chance that process-related residuals are placed in the OSDF. This best management practice will result in the direct removal and off-site shipment of those bricks that can be readily identified and safely removed during soil excavation and/or placement at the OSDF. Sections 2.6.5 and 5.3 discuss this best management practice further.

Below-grade piping that is not process-related (e.g., storm sewers, steam lines, potable water lines, conduit, etc.) will be excavated, size-reduced in accordance with Table 5-2, and dispositioned in the OSDF. If these non-process pipes are excavated from areas of soil that do not meet the OSDF WAC, the debris will, as a general practice, be sent off site for disposal along with the above-WAC soil (see Section 4.2.2.2.2).

Below-grade piping that is, or has historically been, process-related could potentially contain contaminated residuals. Therefore, spill prevention techniques will be employed during excavation of these pipes. For example, one end of the pipe will be elevated and any residual wastewater, sediment, or sludge will be collected and containerized for off-site disposal. The excavated pipe will then be size reduced and visually inspected (see Section 5.1.2.2) to ensure that the pipe is free from process residues. If a pipe fails visual inspection, a determination will be made to either decontaminate the pipe

or to containerize it for off-site disposition. Any pipe suspected of having an enrichment level greater than two percent will not be decontaminated but will automatically be containerized for off-site disposition. Finally, the ends of pipes will be capped prior to containerization or stockpiling.

At- and below-grade debris that satisfies the OSDF WAC will be segregated as necessary during excavation to support OSDF placement in accordance with OSDF placement requirements (see Section 4.2.2.2). Debris that does not satisfy the OSDF WAC will either be treated or disposed of off site.

5.2.3 Post-Excavation Activities

As stated earlier, the Operable Unit 3 debris types anticipated to be encountered during excavation are concrete, asphalt, piping, and structural steel supports. Since these materials, if they satisfy the OSDF WAC, are amenable to stockpiling under the interim storage strategies of Removal Action 17, they will be segregated based on OSDF placement category and stockpiled (if necessary).

5.2.4 Management of Unexpected Conditions

Unexpected conditions that may be encountered during the course of excavation include unearthing unanticipated debris, unearthing unanticipated non-soil residue or process waste, and discovery of unexpected cultural or historic resources. Contingency plans for each of these conditions are presented in Section 4.0.

5.2.5 Material Tracking and Documentation

As discussed in Section 4.0, excavation projects utilize the IIMS as a data management tool and tracking system for both soil and at- and below-grade debris. This system is designed for soil characterization data needs but is also compatible with the above-grade debris tracking system, SWIFTS. Since the two systems are compatible and linked, reports can be generated that include both above-grade debris and at- and below-grade debris.

FTL/OSMs will be used to document at- and below-grade debris generation and movement in the same way that it does for above-grade debris (see Section 5.1.4).

5.2.6 Oversight

The following sections summarize the internal oversight activities that will be performed by FEMP personnel and the opportunity for external (i.e., EPA and OEPA) oversight during at- and below-grade debris excavation, handling, and disposal.

5.2.6.1 FEMP Independent Oversight

To ensure quality control, the at- and below-grade debris excavation and material handling activities (e.g., segregation, size reduction, and transportation) are overseen by FEMP personnel who are organizationally independent of the project generating the debris. As a quality control check, they verify that all containers and stockpiles of debris have been segregated, visually inspected, and size reduced in accordance with the OSDF WAC. Once the debris has been inspected and is found to meet the OSDF WAC, the inspector signs the on-site manifest. The WAO organization will review the WAC attainment process and authorize shipment of debris to the OSDF.

At- and below-grade debris will be transported to the OSDF either from interim storage or directly from the excavation project. In either case, the on-site manifest will accompany the shipment. Upon receipt at the OSDF, the shipment will be checked against the on-site manifest to assure that the identified material was indeed shipped and that it is acceptable for disposal in the OSDF. Once this material has been disposed, the disposal data will be entered into IIMS to complete the tracking requirements for the debris.

5.2.6.2 EPA and OEPA Oversight

Monthly remediation schedules will be provided to EPA and OEPA. Both EPA and OEPA are welcome to inspect the excavation, segregation, interim storage, and disposal process at their convenience. The file of executed FTL/OSMs and SWIFTS/IIMS reports will be maintained on site to support inspection by EPA and OEPA.

O-12 5.3 APPLICATION OF OPERABLE UNIT 3 REQUIREMENTS TO NON-OPERABLE UNIT 3 DEBRIS

The miscellaneous below-grade debris that will be excavated as part of Operable Unit 2, and the D&D debris that will ultimately result from the take-down of the new remediation facilities for Operable Units 1, 2, 4, and 5, is eligible for disposal in the OSDF under the respective ROD agreements for

these materials. However, these materials were not formally included in the WAC modeling calculations for debris presented in the Operable Unit 3 Feasibility Study and ROD. The disposition determinations established in the Operable Unit 3 documents are therefore not directly applicable to the debris generated through the Operable Unit 1, 2, and 4 remedies (debris associated with Operable Unit 5 soil excavation is, by definition, within the scope of Operable Unit 3). This is particularly true for the debris associated with the Operable Unit 2 waste units, as the Operable Unit 2 ROD clearly envisioned encountered debris being placed in the OSDF. As discussed below, however, the categorical disposition determinations presented in the Operable Unit 3 ROD may be consulted for guidance in establishing proactive and conservative strategies for management of debris encountered in the Operable Unit 2 excavations.

The below-grade debris that is not included in the Operable Unit 3 WAC evaluation/calculation involves:

- Operable Unit 2 Active Flyash Pile debris
- Operable Unit 2 Inactive Flyash Pile debris
- Operable Unit 2 South Field debris
- Operable Unit 2 Sanitary Landfill debris
- Operable Unit 2 Lime Sludge Pond debris

Specific to the debris categories for which on-site disposal was deemed acceptable, the Operable Unit 3 Feasibility Study established that there were two contaminants of concern relative to WAC: uranium and technetium-99. For uranium, detailed evaluation further established that a mass-based WAC for debris in the OSDF was not required. There was a requirement in the Operable Unit 3 ROD designed to enhance protectiveness that a visual inspection be applied to appropriate (i.e., Category C) debris from Operable Unit 3 facility D&D activities. Any debris containing a "hold up" of process residual must be segregated. The same requirement will be applied for below-grade debris in those Operable Unit 2 areas listed above. Specifically, any process-related equipment or piping encountered will be inspected for "hold-up" or process residuals. As stated above, if the debris is observed to contain any such material it will be segregated. Also, if the interiors of any process-related equipment or piping cannot be observed, the material will be segregated.

The Operable Unit 3 ROD established a mass-based OSDF WAC of 105 grams for technetium-99 for all Operable Unit 3 materials dispositioned to the OSDF. The Operable Unit 3 ROD required that

certain technetium-99-containing materials (acid brick, process residues, product, and special materials) be dispositioned off site, and select concrete materials (from select process-area locations specified in the Operable Unit 3 ROD) be scabbled to prescribed depths to achieve compliance with the mass-based WAC. Calculations indicated that these measures would reduce the total amount of technetium-99 going into the OSDF from Operable Unit 3 materials to 59 grams, which is 44 percent below the 105-gram allowable mass limit. It should be noted that the Operable Unit 3 technetium-99 estimates were also based on extrapolation of biased-sampling ("hot spot") analytical results from the materials, rather than on material-wide representations, resulting in several orders of conservatism in estimated values. The FEMP's evaluation of the below-grade debris in the above-referenced Operable Unit 2 areas indicates that there will not be a significant erosion of the estimated 46-gram "buffer" existing in the Operable Unit 3 ROD provisions for technetium-99 WAC compliance, if these materials are dispositioned to the OSDF. The basis for this statement is presented below.

The Active Flyash Pile disposal area contains ash and precipitator ash from the Boiler Plant operations. There is no evidence that any other waste or debris had been dispositioned in this area. Therefore, there is considered little to no potential for technetium-99 contamination.

The Lime Sludge Ponds contain wastes that were derived from the Water Treatment Plant operations, coal pile stormwater runoff, and Boiler Plant blowdowns. These ponds would have little to no potential to contain technetium-99 because there was no interaction of process streams with these operations. These ponds are also not expected to produce significant quantities of debris (approximately 100 cubic yards).

The remaining Operable Unit 2 debris sources have a small potential for technetium-99 content, though minor in comparison to the magnitude of the Operable Unit 3 sources. The Inactive Flyash Pile and the South Field disposal areas present a potential for contamination with technetium-99 because it is known that contaminated building rubble, concrete, asphalt, and transite from early FEMP construction projects were buried in these areas. However, the debris quantities anticipated from these areas totals approximately 5,000 cubic yards, less than 2 percent of the approximately 300,000 cubic yards of debris anticipated to go to the OSDF from the Operable Unit 3 sources. It is not expected that this quantity of debris, even if identical in composition to the Operable Unit 3 materials that contribute to

technetium-99 contamination, would significantly erode the 46-gram "buffer" established by the Operable Unit 3 off-site dispositioning commitments.

The Solid Waste Landfill disposal area contains a variety of wastes and its operational history is not detailed. However, because it remained in operation until 1986, there exists a possibility that some wastes contaminated with process residues containing traces of technetium-99 might be encountered. Chemically, it is expected that technetium-99 contamination would have been in the form of the very highly soluble pertechnetate anion and would therefore have been readily leached from the solids by normal seasonal precipitation into the drainage ditch in the northwest portion of the former Production Area. It is highly unlikely that technetium-99 remains in the wastes. The debris content of the Solid Waste Landfill is also very small, estimated in the range of 1,500 cubic yards.

Because much of the debris that would have been placed in these units would have occurred prior to the introduction of recycled enriched uranium at the FEMP, the potential for technetium-99 in debris to be encountered in these units is even further reduced. If the entire estimated 6,500 cubic yards of debris from these units (though a significant portion of it would be non-porous metals) were conservatively assumed to be contaminated with technetium-99 at the geometric mean encountered for technetium-99 positives in the Operable Unit 3 RI/FS sampling, the resulting content would be 3.6 grams of technetium-99 (again not a significant erosion of the 46-gram "buffer" established by the Operable Unit 3 off site dispositioning commitments).

Based on field observations during the South Field site preparation activities, a waste stream of note was actual and/or suspected acid brick that may have been sporadically disposed of in the South Field area. As discussed in Section 2.6.5, the FEMP is adopting an additional best management practice commitment to send the acid brick that is observable (and safely segregatable) during the normal course of soil excavation activities off site for disposal. While there are no specific ROD-based prohibitions for placing the actual and/or suspected acid brick from the Operable Unit 2 waste unit excavations in the OSDF, this commitment is being made to increase confidence that process-related residuals (including residuals that could potentially contain technetium-99) are being proactively screened from placement in the OSDF.

It is also recognized that the D&D debris associated with ultimate take-down of the FEMP's existing and to-be-constructed non-Operable Unit 3 remediation facilities was not specifically included in the Operable Unit 3 WAC calculations. These include:

- Operable Unit 1 Treatment Facility
- Operable Unit 4 Silos and Radon Treatment Facility
- Operable Unit 4 Vitrification Pilot Plant
- Operable Unit 4 New Treatment Facilities
- Operable Unit 5 AWWT and Ancillary Operable Unit 5 Facilities

The existing Operable Unit 4 facilities (Silos 1, 2, 3, and 4, the present Radon Treatment System, and the existing Vitrification Pilot Plant facilities) have no potential to contain technetium-99 because they contain residues and radiogenic progeny from the processing of natural (not recycled from reactor use) uranium ores and ore concentrates. Any technetium-99 associated with Operable Unit 4 would come from global fallout from atmospheric weapons testing and would generally be less than detectable. Debris from all of the future treatment facilities to be constructed for processing Operable Unit 4 wastes will similarly not be expected to contain technetium-99.

Debris from future dismantlement of the remaining remediation structures presents a small potential to contribute technetium-99 based on several factors. In general, the technetium-99 content of processed streams will be very low; process equipment and piping will be inspected for residues and cleaned during D&D activities; and treatment facilities will be designed and constructed to facilitate easy decontamination (using concepts such as resin-sealed concrete floor and non-porous construction media).

Debris from Operable Unit 1 treatment facilities is judged to have small potential for contamination with technetium-99. Process equipment will be inspected for residues prior to acceptance for OSDF disposal. Associated administrative facilities for Operable Unit 1 treatment would not contribute technetium-99 content. (Debris encountered in Operable Unit 1 pit excavations is not eligible for disposal in the OSDF and is therefore not a factor).

Operation of the AWWT systems is not expected to result in debris-related technetium-99 contamination. Although quantitative technetium-99 removal data are not available for the AWWT treatment processes, the ion exchange process can be expected to provide some secondary removal of

the anionic pertechnetate ion along with the anionic uranium ion removal. After resin regeneration, uranium for the resin would precipitate but the technetium would not. The liquid phase containing the technetium is discharged. The pertechnetate ion is stable over a wide range of conditions and is not easily reduced to its insoluble oxide form. Coincidently, the primary potential source of the technetium-99 at the AWWT is from leaching of concrete and construction rubble during Operable Unit 3 remediation activities, which represents technetium-99 content already accounted for in the OSDF waste acceptance criteria for Operable Unit 3 debris.

6.0 WAC ATTAINMENT PLAN FOR ANCILLARY WASTE

Three known ancillary waste streams will be generated during FEMP remediation: AWWT Facility treatment residuals, analytical sample residue returns, and PPE. It was demonstrated in Section 3.5.1 that these materials are eligible for on-site disposal. The WAC attainment strategy for these waste streams and a description of WAC attainment for future ancillary waste streams will be presented in this section.

6.1 AWWT FACILITY TREATMENT RESIDUALS

DOE Three waste streams are produced as a result of the AWWT Facility operations. These are sludge from the SDF, spent resin from the ion exchange process, and spent carbon from carbon filtration. In accordance with the Operable Unit 5 ROD, these waste streams are eligible for disposal in the OSDF, if economic decision making in the future supports a preference for on-site disposal.

The soil WAC established in the Operable Unit 5 ROD and presented in Section 3.4 will be applied to these waste streams to determine whether the material will be disposed of on or off site. The AWWT Facility waste streams are generated differently and are expected to contain different contaminants, so two separate WAC attainment strategies have been developed: one for sludge from the SDF, and one joint strategy for the spent resin and spent carbon waste streams.

6.1.1 SDF Sludge

The SDF sludge is produced when waste streams are sent through the facility to be dewatered. The sludge is taken out of the filter press and containerized for disposal. Because the influent is shut off for each batch and the tank is mixed, each container of sludge will be homogeneous, but there will be differences among the containers based on the characteristics of the input waste streams. Therefore, WAC attainment decisions will be made on a container-by-container basis. The total volume of SDF sludge estimated to be generated each year is approximately 1000 cubic yards, and if this generation rate is maintained for ten years, the total would represent approximately 0.4 percent of the total OSDF volume.

O-54 In order to determine what WAC constituents of concern will apply to the SDF sludge, samples will be taken and a characterization database will be developed. After data has been collected, evaluations will

be performed to determine which of the 18 soil WAC constituents of concern (listed in Table 3-1) may be potentially present in the sludge.

A specific proposal for WAC attainment demonstration for the sludge will be provided for EPA and OEPA review and approval before the residuals are dispositioned to the OSDF. The timing of the proposal will be established once the future necessary date for dispositioning AWWT residuals to the OSDF is firmly established. The FEMP will allow sufficient lead time for agency review of the proposal ahead of the target dispositioning date. In the meantime, all current residuals in inventory are planned at this juncture to be sent off site for disposal. The earliest likely date for needing on-site disposal capacity for the residuals is estimated to be Fiscal Year 1999.

6.1.2 Spent Resin and Spent Carbon

Spent resin and spent carbon are generated on a batch basis from the AWWT Facility. These elements of the treatment system are designed to remove contaminants from the water being processed through the AWWT Facility. When the retentive capabilities of the resin and carbon are near exhaustion, they are removed and replaced with fresh materials. The WAC attainment strategy will generally be based on the manner in which these waste streams are generated (i.e., a batch basis) and the fact that these materials were designed to concentrate and accumulate a wide range of chemicals.

O-54 Like the plan for sludge, a specific proposal for WAC attainment demonstration for the spent carbon and spent resin residuals will be provided for EPA and OEPA review and approval before the residuals are dispositioned to the OSDF. The timing of the proposal will be established once the future necessary date for dispositioning AWWT residuals to the OSDF is firmly established. The FEMP will allow sufficient lead time for agency review of the proposal ahead of the target dispositioning date. In the meantime, all current residuals in inventory are planned at this juncture to be sent off site for disposal. The earliest likely date for needing on-site disposal capacity for the residuals is estimated to be Fiscal Year 1999.

6.1.3 Material Tracking and Documentation

DOE If on-site disposal of the AWWT Facility treatment residuals is selected as the preferred disposal option in the future, above-WAC and below-WAC containers of sludge will be segregated and controlled prior to final disposal. The material will be tracked by the system described in Section 4.0.

6.2 ANALYTICAL SAMPLE RESIDUE RETURNS

O-56 The Operable Unit 5 ROD states that no wastes generated off of the FEMP can be disposed of in the OSDF with the exception of laboratory wastes resulting from the analysis of FEMP materials. This option was pursued, because at the time, unused sample material and contact waste from the analysis of the samples were being returned to the FEMP for management and disposal. It is now the general policy that contracts for analytical services require the laboratory to dispose of unused sample material and associated wastes. However, one geotechnical testing contract does not include this provision and sample residues will be returned to the FEMP. Due to the nature of geotechnical testing (i.e., does not use chemicals), the soil and debris returned will be handled in accordance with the management and WAC attainment processes developed for the area from which the sample originated. The small inventory of lab returns currently stored in the KC-2 Warehouse is planned to be sent off site for disposal. If at some time in the future the laboratory contract policy is changed and additional analytical sample residues are being returned to the FEMP, these sample returns would be considered an additional ancillary waste stream and a WAC attainment strategy will be developed at that time and documented in an addendum to this plan.

6.3 PERSONAL PROTECTIVE EQUIPMENT

O-57 PPE is an ancillary waste stream because it is generated by all FEMP remediation projects and from many areas of the site. Due to the nature of PPE, a numerical radiological/chemical WAC cannot be applied to it. Therefore, PPE from the FEMP is being managed as debris under the Operable Unit 3 ROD and must meet the debris physical WAC before disposal in the OSDF. WAC attainment for PPE will be implemented under the program described in Section 5.0 and no other WAC attainment strategy is necessary. For planning purposes, the current estimate of PPE to be dispositioned to the OSDF is shown on Table 6-1.

6.4 FUTURE ANCILLARY WASTE STREAMS

O-21 If additional ancillary waste streams are generated or discovered in the future, additional WAC attainment strategies will be developed. Section 3.5.2 discussed the logic process for determining applicable WAC for any future ancillary waste streams. WAC attainment strategies will be based on what type of material the waste stream is (soil/soil-like or debris) and what WAC have been applied to it. If additional ancillary waste streams are identified, addenda to this plan will be prepared and submitted to EPA and OEPA for review and approval. These addenda will present the applicable WAC and the WAC attainment strategy for the new ancillary waste streams.

TABLE 6-1

ESTIMATES OF PPE TO BE DISPOSITIONED TO THE OSDF

Remediation Project	Unbulked Volume (cubic feet)	Weight (tons)
Operable Unit 1	Off-Site Disposal Only	Off-Site Disposal Only
Operable Unit 2	5,400	8.2
Operable Unit 3 Safe Shutdown	290	0.5
Operable Unit 3 D&D	42,900	65
Operable Unit 4	Not Yet Defined	Not Yet Defined
Operable Unit 5 Aquifer Restoration	960	1.5
Operable Unit 5 Soils Remediation	47,700	72
Low-Level Legacy Wastes	27,000	41
Mixed Legacy Wastes	2,200	3.4
TOTAL	**126,500**	**192**

If radiological/chemical WAC are applicable to the waste stream, a method and frequency for screening or sampling must be determined. The frequency must be consistent with the manner in which the waste is generated and the physical properties of the waste. Screening or sampling frequencies may be based upon a certain time interval (e.g., weekly), a certain volume (e.g., every container generated), or an event (e.g., every time the waste is generated). The data results will then be compared to the applicable WAC to determine if the material can be disposed of in the OSDF.

If physical WAC apply to the waste stream, an inspection plan must be developed to ensure compliance with the physical requirements. In many cases, the waste must be visually inspected to determine if it satisfies the WAC. If it does not, additional handling (such as size reduction or repackaging) will be performed or the waste will be sent off site for disposal.

6.5 OVERSIGHT

The following sections summarize the internal oversight activities which will be performed by FEMP personnel and the opportunity for external (i.e., EPA and OEPA) oversight during ancillary waste generation, handling, and disposition.

6.5.1 FEMP Independent Oversight

The WAO organization will review WAC attainment activities for ancillary remediation waste streams for compliance with the requirements of this plan. Any WAC attainment strategies developed for future ancillary waste streams will also be subject to FEMP quality control reviews.

6.5.2 EPA and OEPA Oversight

O-54 EPA and OEPA will be involved in the final approval of the forthcoming WAC attainment process for AWWT Facility residuals and any future ancillary waste streams. Any data generated in order to satisfy the WAC for ancillary waste streams will be maintained on site and will be available for EPA and OEPA inspection.

7.0 ORGANIZATION ROLES AND RESPONSIBILITIES

O-59 This section outlines the roles and responsibilities necessary to assure compliance with this WAC Attainment Plan. Rather than identifying organizations, three distinct functions will be discussed which coincide with the WAC attainment process outlined in this document: (1) waste generation, (2) waste acceptance, and (3) waste placement. These three functions provide for an integrated process and the roles and responsibilities that are delineated are aimed at assuring compliance with this WAC Attainment Plan.

7.1 WASTE GENERATION

Waste generation is the set of activities that will be performed by designated generator organizations to remove the soil, debris, or ancillary waste as prescribed in the applicable ROD, and to ensure that the waste is appropriately categorized and prepared for disposal in the OSDF. The major generator organizations will be responsible for categorizing and preparing for disposal all on-site soil and at- or below-grade debris, all above-grade debris, and all ancillary waste that meets this WAC Attainment Plan and the applicable RODs.

The specific responsibilities of these waste generators will vary depending on the nature and character of the waste within their remediation areas. The principal responsibilities necessary for assuring attainment of the WAC for the OSDF are:

- Utilize existing, or develop new procedures to describe and control the work processes necessary to implement the WAC attainment requirements as defined in Sections 4.0, 5.0, and 6.0 of this document
- O-1 Utilize validated site characterization data (or appropriate unvalidated data, such as field survey results) to identify and map above- and below-WAC material within their remediation area(s)
- Plan and perform confirmatory sampling of mapped remediation area(s) according to approaches described in the SEP
- Prepare design documents (e.g., IRDP, Implementation Plan, etc.) for the controlled removal of above- and below-WAC material from each remediation area
- Include in each design document, the controls that will be applied in the event that uncharacterized or prohibited material is encountered

- Arrange with the responsible FEMP organization for the staging and off-site disposal of above-WAC material
- Record and maintain sufficient documented objective evidence to establish the basis for certification that the waste material meets the off-site WAC
- Arrange with the responsible FEMP organization for the staging and treatment of waste material prior to disposal, as necessary
- Classify and segregate below-WAC material destined for placement within the OSDF
- Record and maintain sufficient documented objective evidence to establish the basis for certification that the waste material meets the OSDF WAC.

DOE

- Provide all required information on below-WAC material for permanent archiving.
- Generate and/or transport waste material only as authorized by WAO in accordance with this WAC Attainment Plan.

7.2 WASTE ACCEPTANCE

Waste acceptance activities will include both a performance role and an oversight role. The combination of responsibilities assures that waste material intended for disposal in the OSDF meets the WAC and is transported from the respective remediation areas to the OSDF in a manner that does not compromise the data and records on the material. Waste acceptance will be performed by a project team that is organizationally distinct from both the waste generation project organizations and the waste placement organization. The organizational structure provides for a WAO project team reporting directly to the FEMP's Vice President for Soil and Water Projects.

The responsibilities assigned to WAO are as follows:

- Oversee initial RA planning, scope development, characterization data recovery, contaminant of concern mapping, sampling determination, and confirmatory sample planning
- Verify that remediation area definition is consistent with the SEP
- Provide documented review of all project-specific plans for confirmatory sampling
- Monitor sampling, analysis, and data validation activities for compliance with the WAC Attainment Plan, including the adequacy and effectiveness of generator's quality assurance program implementation

- Participate in development and review of the design documentation, including verification of waste material profiles
- Establish and locate MTL for above- and below-WAC waste material categories
- Document review and concurrence with design document prior to submittal to EPA and OEPA
- Monitor above-WAC waste removal activities and associated generator quality assurance performance
- Witness certification process for below-WAC material and document concurrence with certification, if acceptable
- Provide certified material inventory control services to waste generators (generate FTL/OSM for material transport, control shipping and delivery at all MTL, and provide records assuring integrity of certified material)
- Reconcile FTL/OSM to IIMS to maintain accurate material inventory and scheduling tool
- Compile and ensure maintenance of objective documentation consistent with requirements of this plan to prove material released from remediation areas meets the OSDF WAC
- Authorize delivery of waste material with complete objective evidence to support WAC attainment to the OSDF
- Perform final receipt of waste material at OSDF
- Record acceptance of waste material at OSDF
- Generate FTL/OSM for placement of accepted waste into OSDF
- Reconcile final FTL/OSM after placement of waste material in final location within OSDF
- Maintain complete record file for each accepted OSDF waste shipment
- Provide overall scheduling support to waste generators and OSDF for work planning.

7.3 WASTE PLACEMENT

Waste placement activities will be performed by the organization responsible for construction of the OSDF (the OSDF project organization). The role of this organization is to manage the construction of the OSDF, place accepted waste within its boundaries, compact and cap waste material after placement, map the final OSDF cell configuration, and coordinate all required environmental monitoring activities associated with the OSDF. Specific responsibilities relative to this WAC Attainment Plan include:

- Receipt of WAO-accepted waste material at the OSDF
- Transport of accepted waste material within the OSDF boundaries
- Placement of waste material in designated areas within the OSDF in accordance with the approved OSDF design
- Completion of the WAO-issued FTL/OSM providing final location of the placed material
- Compaction and capping of the waste material as required by OSDF design specifications.

8.0 WAC ATTAINMENT COMPLIANCE ASSURANCE PLAN

This section establishes the WAC attainment compliance assurance requirements that will be applied to any soil, debris, and/or ancillary waste present for disposal at the FEMP OSDF. This plan also establishes the requirements for maintaining waste certification and accountability during material staging and transfer activities. The required generator approval documentation is also outlined.

8.1 ORGANIZATION AND PERSONNEL

WAC attainment compliance assurance will be achieved by a project organization independent of both the waste generators and the OSDF (as delineated in Section 7.0 of this plan). This WAO organization will have programmatic control of the certification, handling, tracking, transport, and final placement of all soil, debris, and ancillary waste intended for disposal in the OSDF. It also will have sole responsibility for final WAC verification and acceptance prior to receipt of any waste by the OSDF. WAO will develop, implement, and maintain a WAC compliance assurance program that will fulfill the requirements of this WAC Attainment Plan and be compliant with applicable contractual requirements and site functional area requirements as identified in the site Management Plan (RM-0016) (FDF 1997a). WAO will be staffed by personnel experienced in environmental and/or regulatory compliance, RCRA and/or low level nuclear waste characterization and management, and/or quality assurance or quality control program execution and performance, and will be site qualified according to FEMP requirements for this work activity.

8.2 DESIGN PHASE REVIEWS

Waste generators will be required to objectively demonstrate that all design activities associated with the identification and classification of soil, above- or below-grade debris, and ancillary waste intended for placement in the OSDF were accomplished in a manner consistent with regulatory and site requirements, and compliant with the site quality assurance program, the SCQ, and applicable engineering and environmental functional area procedures.

Objective evidence to demonstrate compliance will include, as appropriate, evidence that previous characterization data (e.g., RI/FS) was retrieved and mapped in a controlled manner (e.g., kriging or other appropriate 3-D interpolation technique), pre-design sampling was appropriately planned and performed, laboratory analysis to the appropriate analytical support level was performed by an

approved analytical laboratory, and independent data review and evaluation was performed. Appropriate objective evidence to demonstrate that these activities were adequately performed must be documented by the generator's organization prior to input of the resulting confirmatory data into the SED for use in developing the design documentation. WAO personnel will periodically review supporting documentation maintained by the generator to support the confirmatory data in the SED.

Waste generators must objectively demonstrate that development of the design document, including design specifications and drawings, was performed in accordance with the site quality assurance program, the SCQ, and applicable engineering and environmental functional area procedures. WAO personnel will actively participate during design document development and will document their review of all design documents prepared by generators. Upon approval by the EPA and OEPA, WAO personnel will oversee generator field activities to evaluate compliance with the approved design document.

O-63 Design changes which impact the design basis or alter the designed tolerances established in the IRDP will require review and approval by EPA and OEPA, after WAO has completed a review and concurred on submitted design changes. Changes to the design resulting from unanticipated field conditions which do not impact the design basis or alter the designed tolerances will not require agency review and approval. All design changes will be performed in accordance with FEMP design change procedures. All design changes will be evaluated by the responsible project's engineering group for impact to the design basis established in the IRDP.

8.3 EXECUTION PHASE REVIEWS

WAO involvement will vary, depending on the waste generator during this phase. All waste generator organizations will be responsible for maintaining appropriate documentation to objectively demonstrate compliance with this WAC Attainment Plan, other applicable EPA, OEPA, or DOE regulatory requirements, the site quality assurance program, the SCQ, and applicable functional area procedures. This objective evidence will support the generator's WAC compliance certification documentation which must be accepted by WAO before receipt of the material at the OSDF. WAO will routinely review the generator's objective documentation to assure it adequately supports certification of the waste material in question.

For generator organizations staging or shipping below-WAC, above-grade debris for placement in the OSDF, all necessary waste material data required by the IIMS database for WAO activities will be obtained from the generator's SWIFTS database. WAO will, thereafter, control the transport of all below-WAC debris through the issuance of FTL/OSMs until delivery of the waste material to the OSDF.

For organizations generating soil and/or at- or below-grade debris, initial excavation activities will be for removal of above-WAC material. WAO will provide support to the generator organizations utilizing the IIMS database. WAO will provide material inventory data, material transport and storage control through the use of FTL/OSMs and control of the MTLs. Following completion of above-WAC material excavation, all remaining below-WAC waste material will be certified in place through appropriate confirmatory surveys. The waste generator organizations will be responsible for providing the appropriate controls to assure the integrity of this process and to generate appropriate certification documentation. WAO will oversee the certification process as necessary and review the supporting documentation. Once a remediation area has been certified as containing only below-WAC waste material, WAO will provide transport, inventory control, and accountability from the remediation area to the OSDF, or to a designated interim MTL until delivery to the OSDF.

8.4 STAGING AND TRANSPORT REVIEWS

Following certification, all soil, debris, and ancillary waste intended for placement in the OSDF will be tracked from its point of origin to any interim staging areas or bulk storage piles (MTLs) and ultimately from these MTLs to the OSDF. A documented record (the FTL/OSM) will be maintained for any transfer of bulk waste that will identify the initial source of the waste material (remediation area), the material profile of the waste material, the volume or weight (depending on category) of material being transferred, the date and time of transfer, the location (MTL) from which the waste was transferred, and the location (MTL) to which the waste was transferred. WAO personnel will control release from and receipt by all MTL by authorizing all FTL/OSM prior to release of the material from a MTL and taking receipt of the FTL/OSM at the destination MTL. The transporter will also be identified. Documented records of each waste transfer will be entered into the IIMS so that there is an electronic record of the transfer of any certified waste material. Hard-copy records (the FTL/OSMs) will also be maintained. Electronic records will be reconciled with hard-copy records so that the electronic record can serve as a waste transport scheduling and inventory management tool. Reviews will be performed

by WAO to verify that electronic records accurately reflect the physical inventory at each designated staging point.

8.5 INSPECTIONS AND DOCUMENTATION

Receipt of any soil, debris, or ancillary waste at the OSDF will be performed exclusively by designated personnel within WAO. Receipt by WAO will be a two stage process. Stage one is issuance of an authorization to transport from an MTL. This authorization to transport will be issued based on a waste stream's integrity, as evidenced by an acceptable certification process and an accountable transport and storage record to the current MTL. These criteria will be verified and evaluated by WAO personnel during the design, execution, and transport phases. Documentation to support the adequacy of each phase will be prepared by WAO to reflect compliance with the requirements of the WAC Attainment Plan.

The second stage of the receipt process is receipt and verification of the FTL/OSM and visual inspection of each material delivery to verify compliance with the physical WAC criteria. This will occur at the OSDF. If receipt criteria are met, WAO personnel will stamp the FTL/OSM "ACCEPTED" and the truck will be released. The final FTL/OSM will track accepted waste material to its final OSDF location.

WAO will maintain all FTL/OSMs from point of excavation or origin to final placement within the OSDF. Copies of these records will be sent to the respective generator organization and to the OSDF organization for their record files.

8.6 NONCONFORMANCE IDENTIFICATION AND RESOLUTION

O-64 Nonconformance reports are potentially generated by the waste generator organizations for a wide variety of deviations. They could be generated to record a deviation from this WAC Attainment Plan or from FEMP approved internal procedures, regardless of how minor the deviation may be. The waste generator organizations will be responsible to notify WAO of any nonconformances issued by the waste generator organizations that could impact compliance with this WAC Attainment Plan. In addition, WAO must review and approve the corrective action disposition for any nonconformances dispositioned "Accept-As-Is" or "Repair." WAO will also be monitoring for any nonconformances associated with its own procedures.

Any deviations or nonconformances with this WAC Attainment Plan, the SEP, or the programs and/or procedures of the generator organizations, the OSDF organization, or their support subcontractor(s) which are identified by or to WAO personnel will be processed in accordance with the process as outlined in the site quality assurance functional area procedures for nonconformances. WAO will periodically review the nonconformances issued by the waste generator organizations and the corrective actions implemented for compliance with this WAC Attainment Plan. Depending on the nature of the nonconformance, the FEMP will share with EPA and Ohio EPA the key improvements and actions resulting from these internal reviews. As EPA and Ohio EPA would expect, in the unlikely event that any of the FEMP's internal review mechanisms discover that above-WAC material is being managed incorrectly, EPA and Ohio EPA will be notified.

In summary, WAO personnel will provide documented review of the design documents, witness and provide independent concurrence of the generator's waste certification process, and actively control and track waste material following certification and prior to delivery to the OSDF. These active roles provide WAO with the necessary controls to assure that accountability is maintained for certified material destined for placement within the OSDF. The remaining functions of WAO are in the nature of oversight involving regular monitoring of the generator's daily field and supporting quality assurance activities. Periodic review of generator organization records will also be performed. This monitoring and document/records review and their active involvement, as noted, will provide the bases for WAO to accept waste material shipments intended for placement in the OSDF.

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APPENDIX A

DRAFT MATERIAL TRACKING FORMS

Field Tracking Log

1. Project #	2. Project Name	3. Date	Form #

	4. From: Source MTL	Type	5. To: Destination MTL	Type	6. Material Profile # or Description	7. Volume	8. Waste Disposition Rep. Initials	A. Container Storage Storage Details	Storage Receipt
1.					☐ Th Contaminated	yd^3		Loc Area R S L	
2.					☐ Th Contaminated	yd^3		Loc Area R S L	
3.					☐ Th Contaminated	yd^3		Loc Area R S L	
4.					☐ Th Contaminated	yd^3		Loc Area R S L	
5.					☐ Th Contaminated	yd^3		Loc Area R S L	
6.					☐ Th Contaminated	yd^3		Loc Area R S L	

9. Container Destination _____

10. Project Mgr/Designee Name (PRINT): _____

Signature _____ Date: _____

Entry Block Notes:

1. Enter the Project Number.
2. Enter the Project Name.
3. Enter today's date in MM/DD/YYYY format.
4. Enter the IIMS Designation for the source MTL and MTL use.
   MTL Types: C = Container; D = Material Drop Off; F = Facility/Building; G = Grid; I = Interim Project Area; P = Special Area; S = Stockpile; W = WAC Attainment Area
5. Enter the IIMS Designation for the destination MTL and MTL type. Note: Use OSDF Manifest for shipments of impacted material to the OSDF. MTL Type codes are the same as in block 4.
6. Enter either the Profile Number or the Material Description Code of the material being moved. Profile numbers to be used for above-grade debris are listed on the reverse of this form or on the Project MSCC.
   Material Description Codes for interim movements are:
   A = Asphalt/Concrete; O = Other Manufactured Debris; R = Rocks/Gravel; S = Soil; V = Vegetation/Organic Debris
7. Volume to the nearest cubic yard
8. Printed initials of the project waste disposition representative responsible for oversight of waste generation/packaging activities.
9. Printed name of FDF Project Manager or designee, signature and date of signature.
10. Container staging information; for MC&A use only.

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FIGURE A-1
DRAFT FIELD TRACKING LOG

000157

1258

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
OSDF MANIFEST FOR PLACEMENT OF A1PI EAST SOIL PILE

SECTION I. GENERATOR INFORMATION **PRE-PRINTED SERIALIZED FORM #:**

1. Project #: 418	2. Project Name: Area 1 Phase I	
3. Source MTL: W800057	4. MTL Type: S	5. Profile #: 91002
6. Material Description: Soil		
7. This material has been visually verified during excavation and loading as containing no prohibited items: _____ (FDF Signature) _____ (Date)		
8. Load Date: _____	9. Load Time: _____	10. Est. Volume: _____ cy ☐ 1/4 Full ☐ 1/2 Full ☐ 3/4 Full ☐ Full

SECTION II. TRANSPORTER INFORMATION:

11. Transported By: _____ (Transporter Signature) **Organization:** _____
Date: _____ Time: _____

12. Vehicle #: _____

SECTION III. OSDF INFORMATION:

13. OSDF Acceptance: _____ (CQC Signature) **Date:** _____ **Time:** _____

14. Placement: _____ (Cell) _____ (Grid) _____ (Lift)

15. OSDF Rejection: _____ (CQC Signature) Date: _____ Time: _____

16. Material Return/Comments: _____

Copy 1 SCEP Waste Disposition Support Services
Copy 2 On-site Disposal Facility
Copy 3 Transporter

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FIGURE A-2
DRAFT ON-SITE MANIFEST

Instructions:

Box 1 Enter PWID number for originating remediation project.
Box 2 Enter name of originating remediation project.
Box 3 Enter source MTL code that is identified in the IIMS.
Note: MTLs are defined in IIMS by grouping SED grids for contiguous areas with similar constituents of concern.
Box 4 Enter MTL type, as identified in IIMS.
Box 5 Enter Profile number, as identified in IIMS.
Note: Profile numbers are coded to provide information regarding the approved disposal location, the impacted material category, and supporting analytical data. The first digit (9) identifies that the material has been demonstrated to meet the OSDF radiological/chemical WAC. The second digit identifies the material as impacted material category 1, 2, 3, 4, or 5. The balance of the digits are used to associate SED data for a waste stream with the Profile/MTL.
Box 6 Enter brief description of material.
Box 7 Signature of this box confirms that the material has been field inspected at the point of generation for prohibited items.
Box 8 Enter date that material is loaded for transport to OSDF.
Box 9 Enter time that material is loaded for transport to OSDF.
Box 10 Enter estimated volume of loaded material in cubic yards. Check appropriate box to indicate whether vehicle is 1/4, 1/2, 3/4 or full.
Note: Settling of material during transport may result in slightly decreased volumes upon delivery to the OSDF.
Box 11 Transporter signature indicates acceptance of load for transport to OSDF.
Box 12 Enter license plate number of vehicle. License must be visible at all times during transportation activities.
Box 13 Signature of this box indicates that the material was accepted by the OSDF. Enter date and time of load arrival at the OSDF.
Box 14 Enter placement location of the load.
Box 15 Signature of this box indicates that the material was rejected by the OSDF. Enter date and time that material is identified for segregation/return.
Box 16 Identify any material that is returned from the OSDF to the generator or forwarded to WPM.

Acronyms:
FDF Fluor Daniel Fernald
IIMS Integrated Information Management System
MTL Material Tracking Location
OSDF On-Site Disposal Facility
PWID Project Waste Identification and Disposition form
SCEP Soil Characterization and Excavation Project
SED Site-wide Environmental Database

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FIGURE A-2
(Continued)