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

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JULY 1997

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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ACM	asbestos-containing materials
AWWT	advanced waste water treatment (facility)
CAMU	corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
D&D	decontamination and dismantlement
DOE	U.S. Department of Energy
DTRS	Debris Tracking and Routing Sheet
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FTL/OSM	Field Tracking Log/On-Site Manifest
HDPE	high-density polyethylene
HPGe	high-purity germanium
HWMU	hazardous waste management unit
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 transfer location
MTR	minimum technology requirement
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
OSDF	on-site disposal facility
pCi/g	picocuries per gram
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
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
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Plan
SDF	Slurry Dewatering Facility
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SWIFTS	Sitewide Waste Information Forecasting and Tracking System
Tc-99	technetium-99
TCLP	toxicity characteristic leaching procedure
UST	underground storage tank
WAC	waste acceptance criteria
WAO	Waste Acceptance Operations

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 1996) 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

The need for the WAC Attainment Plan was established by U.S. Environmental Protection Agency (EPA), Ohio Environmental Protection Agency (OEPA), and DOE at a March 5, 1997 technical information exchange meeting concerning the scope and content of the IMP Plan. The IMP Plan was submitted to EPA and OEPA for approval on October 14, 1996 as a formal deliverable under the OSDF RA Work Plan (DOE 1997d). 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.

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 treatment plant residuals, analytical laboratory sample returns, and other miscellaneous solid wastes associated with the cleanup. All of these smaller-volume, remediation-support wastes also are destined for disposal in the OSDF, provided WAC attainment requirements are met.

Where the RODs categorically exclude a material type from placement in the OSDF, the material will 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); 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:

- The 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

- The Operable Unit 3 Integrated RD/RA Work Plan (DOE 1997c), which describes technical approaches and remedial action requirements for the facility D&D efforts

- The 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.

1.4 PLAN MODIFICATIONS AND REVISIONS

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.

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.
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 external oversight by EPA and OEPA.

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 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.

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 700 feet by 400 feet, or 280,000 square feet (6.5 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

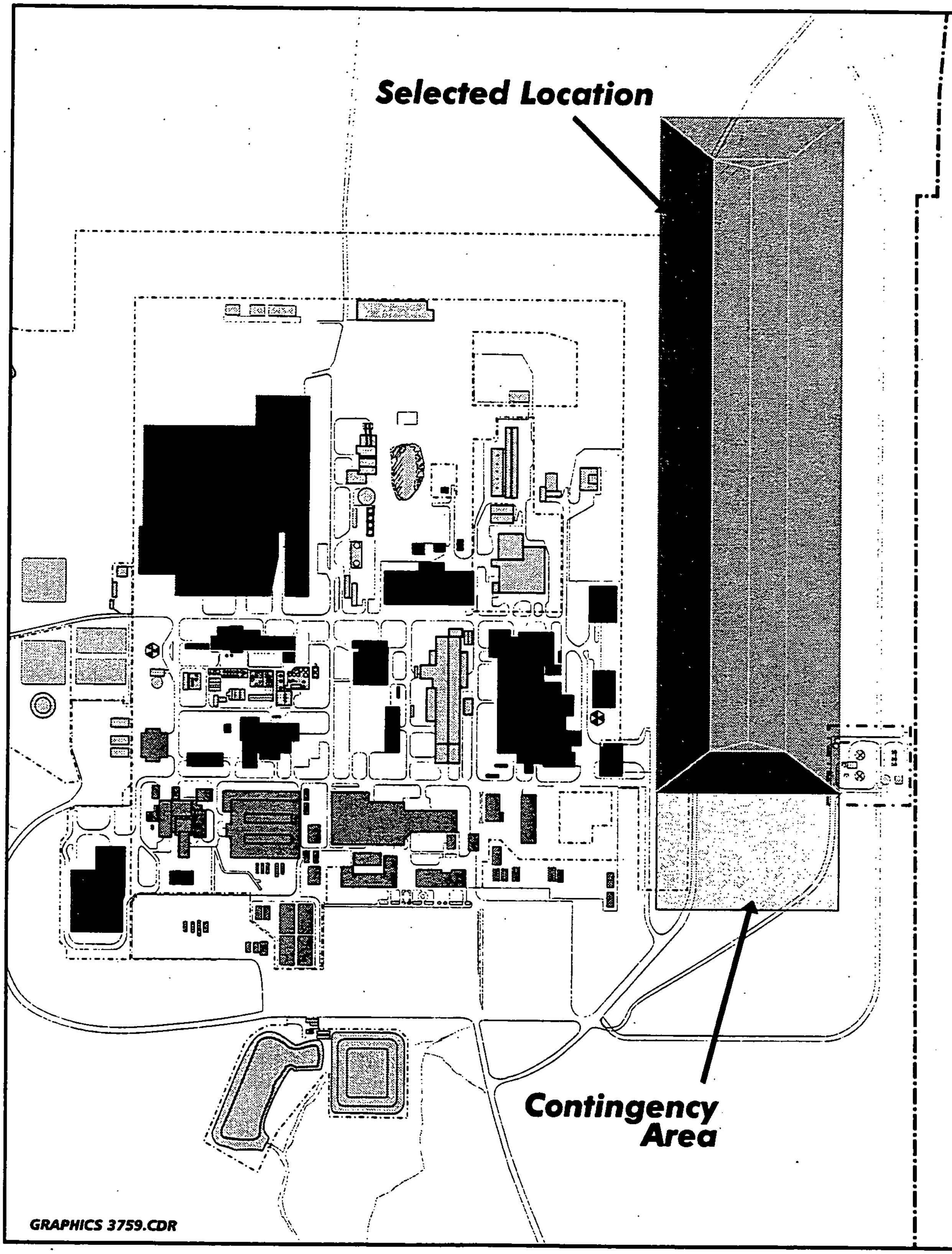


FIGURE 2-1
LOCATION AND CONFIGURATION
OF THE OSDF

geocomposite design, 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.

2.2 DESIGN AND CONSTRUCTION STATUS

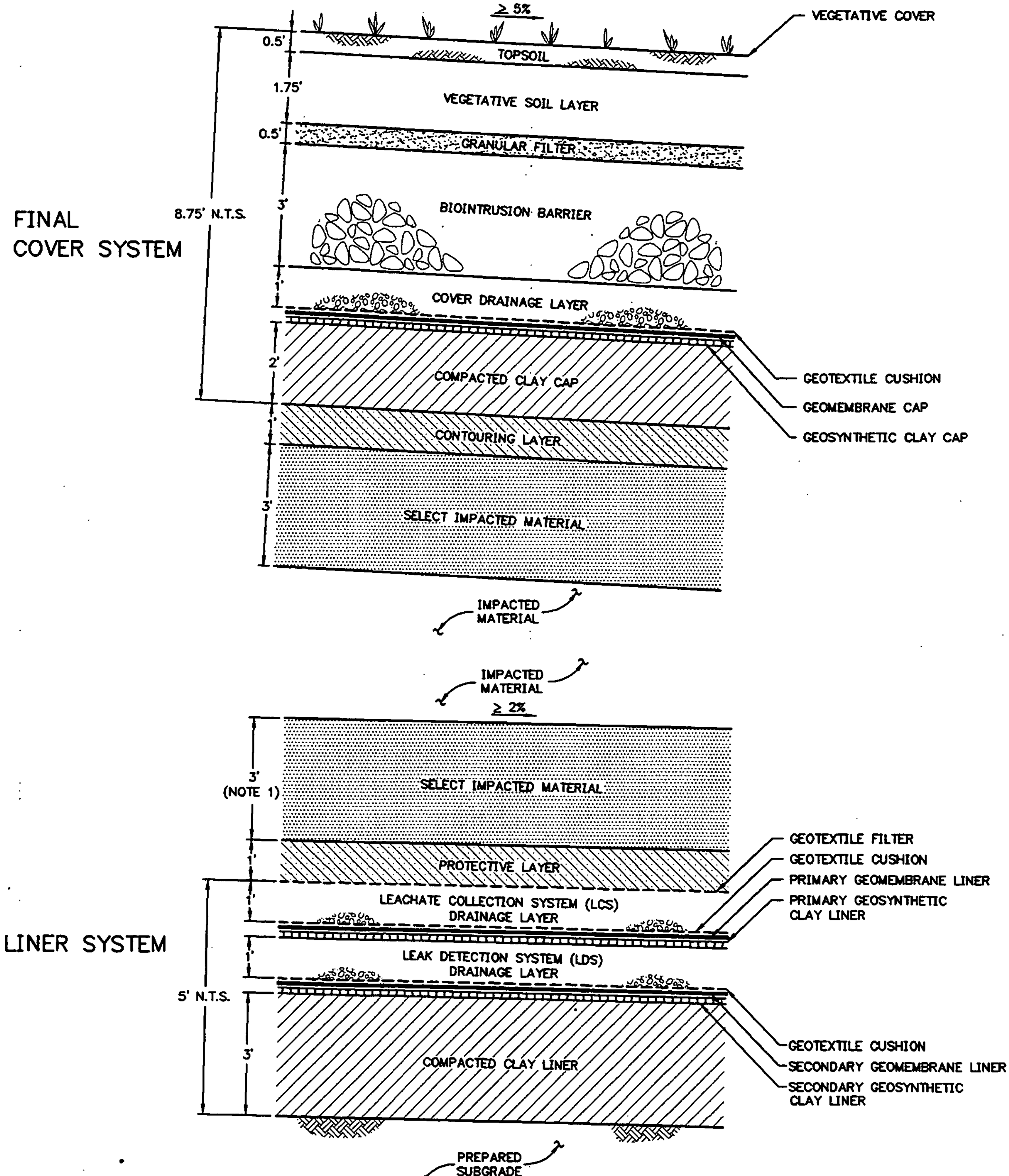
The design of the OSDF was started in August 1995 and first received approval from EPA on August 8, 1996. Final EPA approval was received on February 14, 1997. Because of the different waste types that will be disposed on site from each operable unit, the OSDF was designed to meet the requirements of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

Construction of the multi-layer liner system for the initial cell began on June 20, 1997 and is scheduled to be complete by the time first waste placement in the OSDF begins in the Spring of 1998. 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

In accordance with the OSDF RA Work Plan, placement of waste into the OSDF must commence by March 27, 1998. The first waste to be placed will be from soil stockpiles 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), and remediation will generally start in Area 1 and finish in Area 8. Figure 2-3 illustrates the FEMP remediation areas. 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.

LINER AND COVER SYSTEM DESIGN
ON-SITE DISPOSAL FACILTY



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

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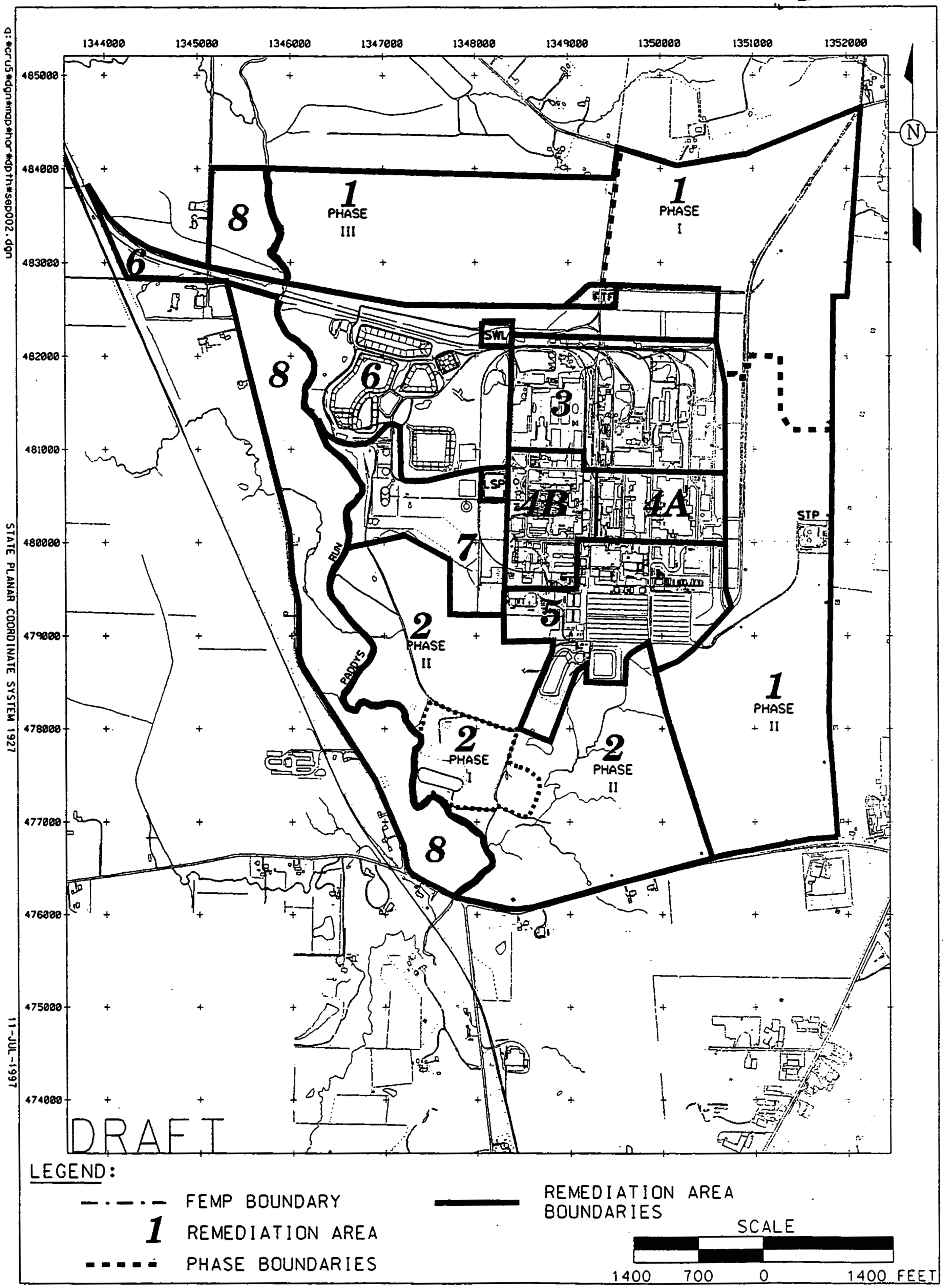

FIGURE 2-3. GENERALIZED SITEWIDE REMEDIATION AREAS

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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
- Category 2 - Impacted materials that can be handled *en masse*, can be spread in loose lifts of 18 to 21 inches thick, 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 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 is presented in the following subsections.

2.5.1 Soil and Soil-Like Material

Soil and soil-like material consists of the excavated surface and subsurface soil from within Operable 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); 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, F, and J, and a subset of Category D (lead sheeting, unless

TABLE 2-1

DEBRIS MATERIAL CATEGORIES/DESCRIPTIONS

Category A Accessible Metals	Category B Inaccessible Metals	Category C Process-Related Metals[a]	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	Hazardous/Mixed Waste
	Conduit/Wire/ Cable Tray	HVAC Equipment	Lead Sheeting	Slabs		Feeder Cable	Piping Insulation	Basin Liners	Low-Level Legacy Waste
	Electrical Wiring and Fixtures	Material Handling Equipment	Louvers	Columns		Fire Brick	Personal Protective Equipment	Fabric	Marketable Nuclear Material
	Electrical Transformers	Process Equipment	Metal Wall and Roof Panels	Beams		Floor Tile	Copper Scrap Metal Pile	Drywall	Thorium Inventory
	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

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.

Following the identification and segregation of the excluded categories, from both the above-grade and at- and below-grade debris, the remaining eligible debris will be segregated. Above-grade debris 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.

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 contaminated concrete from Silos 1 and 2 (which exhibits highly elevated direct radiation fields) and any debris found within the waste pits. The remainder of the debris streams from operable units 1 and 4 (and all remaining operable units) can be placed in the OSDF, provided it satisfies the OSDF radiological WAC for debris established by the Operable Unit 3 ROD and the physical WAC for debris contained in the IMP Plan.

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 are inherently "soil-like" or "debris-like" and may eventually have a WAC attainment strategy similar to these two categories, a special WAC attainment strategy must be developed for each type of ancillary remediation waste because of 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. They 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 for off-site 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 which 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 (Tc-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 of 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.

The leachability studies indicated that Tc-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 Tc-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 Tc-99-contaminated debris. In order not to exceed the 105-gram limit for the OSDF, those materials that have the highest amounts of Tc-99 will be packaged and shipped for off-site disposal. The Operable Unit 3 ROD designated the specific materials that will be shipped off site to attain the Tc-99 mass limit. The ROD also made the commitment to scabble the surfaces of contaminated concrete from four designated locations to prescribed depths. The removal and off-site disposal of the scabbled concrete from these areas is expected to reduce the total amount of Tc-99 going into the OSDF to less than 59 grams, which is 44 percent below the 105-gram allowable mass limit. Section 3.4 of this plan identifies the specific waste streams that will be sent off site to comply with the visually-based uranium and the mass-based Tc-99 WAC for debris destined for disposal in the OSDF.

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

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. The numerical WAC limits, therefore, do not reflect the actual contaminant concentrations and distributions known to be present in the FEMP soil and ultimately present in the OSDF. Under this conservative assumption, the average soil concentrations used in the model to assess cumulative Great Miami Aquifer impacts were artificially set for decision-making purposes at the upper-bound WAC limit values. When the known concentrations and distributions of the WAC constituents of concern in soil are considered (as revealed by the FEMP's extensive RI/FS sitewide characterizations of soil), the actual average concentrations that will be present in the OSDF will be far less than their corresponding numerical WAC limits.

To illustrate this point using total uranium in soil as an example, the 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 (inside the production area). 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 cleanup levels, but less than the 1030 ppm WAC limit. This is 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 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 numerical-WAC-limit-based average assumed in the development modeling and accompanying Great Miami Aquifer impact projections.

To illustrate further, even if the soil volume shown through the RI/FS studies to be contaminated above the 1030 ppm uranium WAC limit (conservatively estimated at 25,000 cubic yards or less) were placed in the OSDF along with the other soil, the average uranium concentration would still remain at approximately 100 ppm.

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. For these other 17 WAC constituents of concern, the average concentrations following soil placement will closely approximate their 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 were 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 for all of the WAC constituents of concern were placed in the facility. While there are no plans to place known above-WAC soil in the OSDF (consistent with the WAC attainment strategies contained in this plan), the above discussion illustrates the degree of protection offered by the numerical WAC limits and should help allay concerns over the potential effects of having above-WAC soil placed in the OSDF.

The numerical WAC limits for soil shown in Table 9-7 of the Operable Unit 5 ROD represent risk-based concentrations derived from fate and transport modeling that are not adjusted for practical limitations such as analytical detection limit considerations. The numerical WAC limits for two of the constituents [4-nitroaniline and bis(2-chloroisopropyl)ether] listed in Table 9-7 of the ROD are below technology-imposed analytical detection limits for the constituents and thus need to be revised to reflect current analytical abilities for constituent measurement. A revision to the WAC limit values for these two constituents, aligning them with reasonably achievable analytical detection limits for soil, is provided in Section 2.1.2.2 of the SEP. The numerical WAC limits provided in Section 3.0 of this plan adopt the revised values contained in the SEP along with a notation to this effect.

2.6.5 RCRA Characteristic Waste Restrictions

During the ROD public comment periods for operable units 2, 3, and 5, OEPA commented on the need for a restriction on the disposal of RCRA characteristic waste in the OSDF. OEPA's comment, imposed a requirement to treat RCRA characteristic material before disposal in the OSDF or, alternatively, to dispose of the RCRA characteristic material off site. 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 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.

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 geographic areas and waste streams were designated in the FEMP 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) of:

- The estimated 300 cubic yards of lead-contaminated soil located at the South Field Firing Range (under the terms of the Operable Unit 2 ROD, this material is designated for treatment and off-site disposal).

- 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.

- Operable Unit 3 lead sheeting (formed as flashing, window sills, and door moldings) and acid brick (under the terms of the Operable Unit 3 ROD, the acid brick will be sent off site for disposal because of Tc-99 limitations).

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.

The decision to send firing range lead-contaminated soil off site for disposal was an element of the Operable Unit 2 ROD, which preceded the Operable Unit 5 remedy decision by approximately seven months. The off-site disposal decision was based solely on the relatively small volume of material under consideration and on the fact that the final decision regarding the fate of the similarly contaminated but potentially larger volume Operable Unit 5 RCRA characteristic materials was not yet available. This allowed the Operable Unit 2 ROD to be finalized without the need to hold any material decisions in abeyance pending the outcome of a later decision from a subsequent operable unit. With EPA and OEPA concurrence, DOE is planning to preserve the option to treat and dispose of the estimated 300 cubic yards of soil from the firing range in a manner identical to the RCRA characteristic soil from the six geographic areas ultimately specified in the Operable Unit 5 ROD. This will bring into alignment all portions of the remedy for similarly contaminated soil and will facilitate the selection and sizing of treatment systems during detailed design.

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 the 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.

The FEMP is committed to identifying, segregating, and treating as needed, the contaminated soil from within the seven designated geographic areas 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 2, 3, and 5 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 in a tabular format 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
- Concrete from Operable Unit 4 Silos 1 and 2 that exhibits highly elevated direct radiation fields
- 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)

- Soil containing lead bullets from the South Field Firing Range[1]
- Process-related metals (i.e., piping and equipment that did not pass visual inspection)
- Product, residues, and other special materials (e.g., uranium and thorium inventories)
- Acid brick
- Material exceeding any of the radiological/chemical WAC

Materials Categorically Excluded by the OSDF IMP Plan

- Materials containing free liquids
- Whole or shredded scrap tires
- Used oils

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 for proper placement and compaction, the material will be mechanically processed (e.g., blended with drier material, set aside to dry, etc.) before placement.

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):

- RCRA toxicity characteristic soil from the seven areas designated in the Operable Unit 2 and Operable Unit 5 RODs, unless it has been treated
- Lead sheeting from facility D&D activities, 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)

[1] As discussed in Section 2.6.5, although the Operable Unit 2 ROD excluded the soil containing lead bullets from the South Field Firing Range from on-site disposal, this decision has been revisited based on the fact that subsequent RODs (Operable Unit 3 and Operable Unit 5) permitted on-site treatment of characteristic hazardous waste and disposal in the OSDF. If on-site treatment of lead-contaminated material is implemented, it would make economical sense to include the South Field Firing Range material in that treatment process, instead of sending it off site for treatment and disposal.

- Transformers that have not been crushed or had their void spaces filled with grout, or another acceptable material.

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

- Tc-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:
  - The top inch of concrete will be scabbled and sent off site for disposal from the three most contaminated concrete areas (the enriched uranium casting area in Plant 9, the uranium machining area in Plant 9, and the muffle furnace area in Plant 8).
  - The top half-inch of concrete in the southern extraction area of the Pilot Plant will be scabbled and sent off site for disposal.
- The mass of total uranium is to be controlled by visually inspecting debris to ensure that it does not contain discernable process materials.

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]	2.2×10^{-1} 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]	9.0×10^{-1} 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 these two constituents have been modified in accordance with the SEP to reflect the achievable analytical detection limits.

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 will 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.

There will be a small volume (approximately 1000 cubic yards) of oversized material disposed in the OSDF that exceeds the physical WAC presented above. It is not cost effective to further size reduce this material and it has been shown that this oversized material can be safely handled and placed in the OSDF and will pose no threat to the integrity of the cap and liner systems of the OSDF (GeoSyntec 1997). The oversized material includes mill rolls, mill stand housings, machine stands, and structural steel.

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 will present 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 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.

3.5.2 Future Ancillary Waste Streams

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.

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). 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 Tc-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.

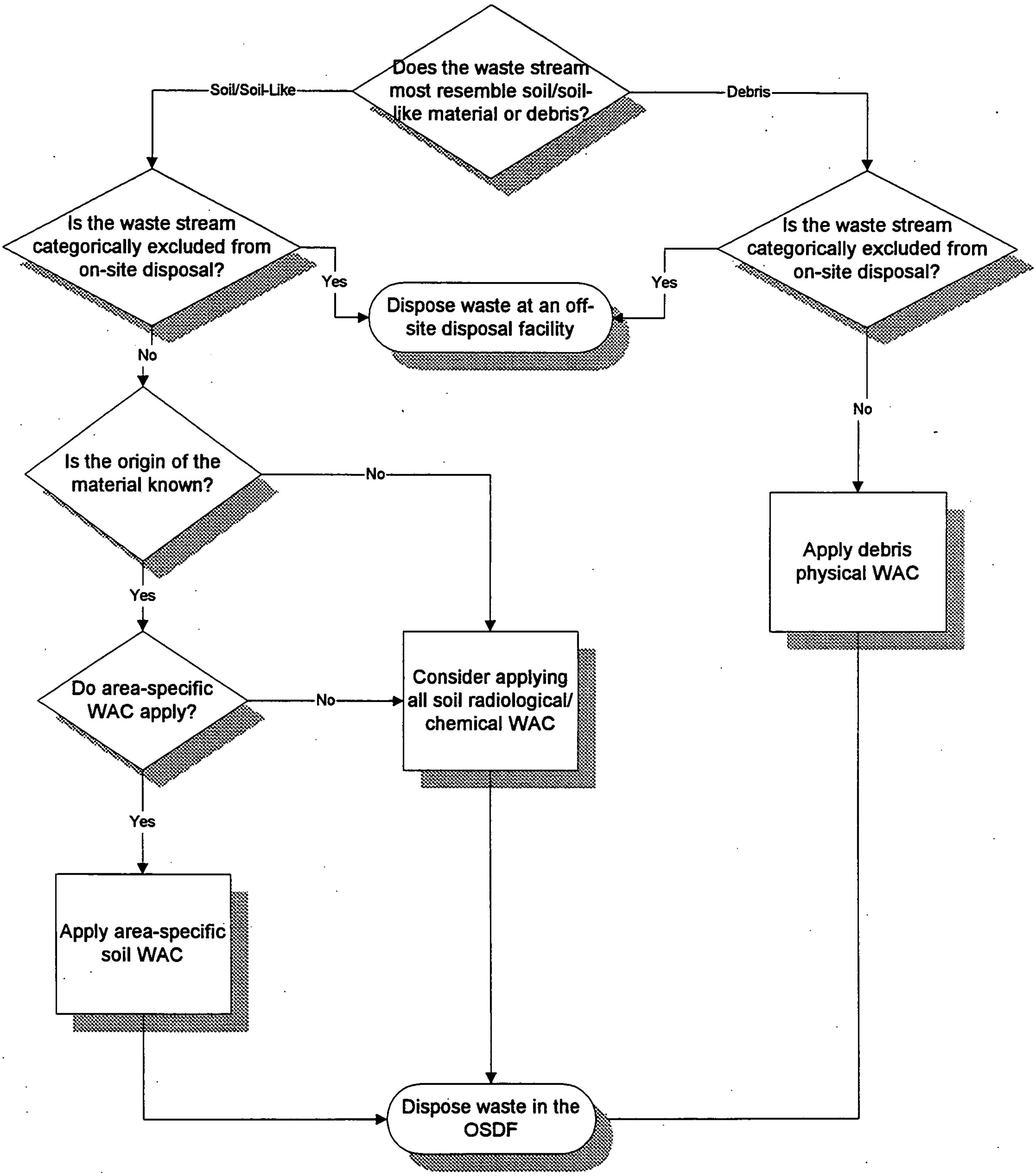

FIGURE 3-1
WAC LOGIC PROCESS FOR FUTURE ANCILLARY REMEDIATION WASTE STREAMS

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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, soil remediation can be organized into three phases, based on the step-wise progression of the work:

1. Pre-excavation
2. Excavation
3. Post-excavation

Section 4.1 provides an overview of the WAC attainment strategy and the elements comprising each of the three phases. Section 4.2 describes the general WAC attainment strategy for soil, and Section 4.3 provides additional details regarding location-specific excavation approaches which will be applied to six different soil contamination situations. The section concludes with a description of WAC attainment oversight activities, including internal oversight and the accommodation of EPA and OEPA oversight at all major steps of the plan.

4.1 SOIL WAC ATTAINMENT PLAN OVERVIEW

Figure 4-1 provides an overview of the WAC attainment objectives for each of the three soil remediation phases. The figure also identifies key activities designed to accommodate independent FEMP oversight and external oversight by EPA and 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 data and radiological survey data collected during a pre-excavation characterization step. In those seven designated 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, a sampling program will be undertaken to determine the extent of RCRA toxicity characteristic soil present.

Characterization of soils "in situ" represents the most conservative characterization approach, since in-situ soil will not demonstrate the effects of contaminant dilution which will occur naturally during excavation. Above-WAC and above-final-remediation-level (FRL) soil to be excavated will be documented in the IRDPs prepared for each remediation area. No soil will be excavated until the IRDP is approved by EPA and OEPA.

Design drawings and data from the IRDP will be used to physically designate soil areas requiring excavation. Soil containing above-WAC concentrations of Tc-99 will be excavated first followed by soil that contains above-WAC concentrations of uranium. Should either of these above-WAC soil volumes contain soil that tested positive for the toxicity characteristic during the 7-area pre-excavation characterization, they will be segregated for treatment prior to off-site disposal or for transport to an off-site treatment and disposal facility. Following the excavation of above-WAC soil, the remaining soil will be radiologically surveyed to ensure that no above-WAC soil remains in the area to be excavated. During 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, within those areas that have the potential for containing small quantities of soil with elevated concentrations of organic solvents, monitoring for organic vapors will be performed as a best management practice to identify and segregate additional soil for treatment.

During the post-excavation phase, the identification of above-WAC and above-FRL soils will be maintained using material handling and transport controls to assure that only WAC-compliant soil is transported to the OSDF. Excavated material will be transferred to one of six material transfer 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, the Waste Pits Remedial Action Project organization for transport off site, or 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 Field Transfer Logs/On-Site Manifests (FTL/OSM) for each loaded transport vehicle. 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.

A new, internal FEMP oversight organization (Waste Acceptance Operations) 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. 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 survey/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 methods that will be employed during each of the three remediation phases work in an integrated fashion to assure WAC attainment for soil to be placed in the OSDF. These methods and requirements will be applied to the majority of FEMP soil remediation activities. However, because of the wide range of physical conditions at the FEMP, additional location-specific WAC attainment approaches are necessary. For example, soil contamination in impacted soil outside the former production and 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. As a result of these differences in contaminants, their origin, and their method of deposition, different WAC attainment methods must be employed in different areas.

This section will focus on the general WAC attainment methods that will be employed in all areas. Where additional area-specific WAC attainment methods must be employed, they will be identified in this section, but discussed in detail 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 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, and
- 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 on-site remediation areas. Figure 4-4 shows the location of the remediation areas and the approximate sequence for remediation. 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-site soil outside the former production area and other waste storage/management areas,

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

C. Uncharacterized soil stockpiles in the former production area,

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

E. Off-property and non-impacted areas

F. Soil beneath non-high-density polyethylene (HDPE) pipelines outside the former production area

4.2.1.2 Area-Specific WAC Constituents of Concern

Table 4-1 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 constituents of concern, therefore, form the basis for development of area-specific constituents of concern for WAC attainment.

Of the 18 soil contaminants for which WAC exist, only five [uranium, Tc-99, 4-nitroaniline, bis(2-chloroisopropyl)ether, and trichloroethene] have been detected in FEMP soils in concentrations above their WAC (shaded entries in Table 4-1). In most cases, the WAC is at least an order of magnitude above the highest level detected. Given the level of conservatism provided by the OSDF design and the order of magnitude difference between the WAC and the concentrations detected on site for these remaining constituents of concern, no additional verification is required to demonstrate that the WAC has been met for these constituents in soil.

Of the remaining five constituents (shaded), three [bis(2-chloroisopropyl)ether, 4-nitroaniline, and trichloroethene] were used in specialized processes (as documented in the Operable Unit 5 RI/FS) and their presence at above-WAC concentrations is localized within the former production area. Furthermore, the single indicated detection for both 4-nitroaniline and trichloroethene, and the two positive detections of bis(2-chloroisopropyl)ether are all estimated values. Therefore, all three of these contaminants are of only limited concern in terms of OSDF WAC attainment. Their presence in these limited areas will be verified during pre-excavation characterization and addressed in the IRDP for the area.

Of the two constituents uranium and Tc-99, only uranium has been found universally across the FEMP. So uranium is the primary WAC constituent of concern. During pre-excavation characterization, soils destined for the OSDF will be characterized to assure that the OSDF WAC for uranium will not be exceeded.

As shown in Figure 4-5, occurrences of above-WAC concentrations of Tc-99 are limited to seven locations. Similarly, above WAC concentrations of bis(2-chloroisopropyl)ether, 4-nitroaniline, and trichloroethene are limited to four locations. So they are secondary, or area-specific, constituents of concern. The primary and secondary WAC constituents of concern, by area as defined in Figure 4-5, are summarized in Table 4-2.

In those areas of the FEMP where data from the Sitewide Environmental Database (SED) indicate that one or more of these 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

The RI/FS program at the FEMP identified seven geographic areas where a reasonable potential exists for the 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 4-6 and listed, along with their location and potentially hazardous constituents, in Table 4-3. The first six of the areas listed in Table 4-3 are identified in the Operable Unit 5 ROD whereas the seventh area was identified in the ROD for Operable Unit 2. It is conservatively estimated that approximately 28,000 cubic yards of material from these areas could be considered RCRA characteristic. Screening for the presence of characteristic soil will not be performed outside of these areas.

The hazardous potential in these seven areas was identified using validated data in the SED for constituents with concentrations that exceed 20 times the 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.

A recent comparison of the SED data with lab data report sheets identified errors in the units of measurement that were originally input to the SED. Such errors involved the use of a larger unit of measurement (milligrams per kilogram) instead of the correct, smaller unit (micrograms per kilogram). The result was that concentrations are actually three orders of magnitude lower than that indicated with the incorrect units. Upon correction of these errors, only the constituents shown in the last column of Table 4-3 remain a concern. While these constituents do not represent a WAC concern, they will be included in the list of area-specific constituents of concern for the respective remediation area to identify and remediate above-FRL contaminant concentrations.

As presented later in this section, characteristically hazardous wastes from these seven geographic areas will be disposed of in either an off-site facility or the OSDF. All such wastes that also exceed the radiological WAC for the OSDF will be dispositioned off site. The characteristically hazardous wastes that are dispositioned off site must be treated to meet LDR treatment standards prior to disposal. The characteristically hazardous wastes from the seven geographic areas that will be dispositioned to the OSDF will be treated before disposal. The decision as to whether such wastes that do 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 wastes are similar to those for material with contaminant concentrations that exceed the WAC for the OSDF. The decision points and treatment options for the hazardous wastes from these seven areas are presented on Figure 4-7.

4.2.1.2.2 Best Management Practices

While RCRA characteristic and listed wastes may exist outside these seven areas, they are not expected to be present in volumes sufficient to justify cost-effective treatment prior to placement in the OSDF. The mathematical models used in determining the OSDF WAC did not, however, consider the potential effects of organic solvents on earthen material comprising the liner of the disposal facility. Full strength solvents have been shown to cause clay shrinkage, resulting in the potential for increased permeability of clay liner material.

Table 4-4 provides a list of FEMP areas with the potential for containing small quantities of soil with elevated concentrations of organic solvents. These areas consist of the 29 hazardous waste management units (HWMUs) and the six underground storage tank (UST) locations which remain to be closed under the CERCLA remedial response action.

As a best management practice, during excavation of soil in the vicinity of these areas, the FEMP will perform field screening using hand-held organic vapor analyzers. Soils exhibiting elevated concentrations of organic solvents will be segregated for further characterization and potential treatment before disposal.

4.2.1.3 Characterization

The objective of pre-excavation characterization is to define above-WAC and above-FRL soil excavation volumes. RI/FS data, 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 3-dimensional 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.

The WAC constituents of concern for soil within the area to be remediated are listed in Table 4-2. This list was derived from RI characterization data. Uranium is the primary WAC constituent of concern. Secondary WAC constituents of concern include Tc-99, 4-nitroaniline, bis(2-chloroisopropyl)ether, and trichloroethene. The locations of above-WAC concentrations for these WAC constituents of concern are shown in Figure 4-5.

Radiological surveys, high-purity germanium (HPGe) measurements, and sampling and analysis will be executed to fill RI data gaps and establish the extent of excavation for above-WAC and above-FRL soil. The data will also be used to establish the extent of excavation for RCRA characteristic soil in the seven ROD-designated areas. The specific number of samples needed to establish the excavation extent will depend on the nature 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, therefore, presents a conceptual model that can be used to develop the detailed excavation plan in the IRDP, which will finalize the appropriate area-specific number of pre-design samples.

The conceptual characterization model begins with the use of existing SED data in a three-dimensional (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 exhibiting the highest constituent concentrations, and a core soil boring sample will be obtained to a depth of 3 feet to determine the vertical distribution of the constituents of concern. At least one subsurface sample will be collected in every 1-foot interval, and if the deepest sample contains above-FRL constituents of concern, the GeoProbe boring will be extended an additional 3 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.

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 forwarded to remedial design so that a final volume and slope of excavation can be determined from the kriged profile of each excavation type (e.g., 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 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 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 1-foot intervals.

In those seven areas where RI/FS and SED data indicate that above-WAC concentrations of Tc-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 Tc-99, the WAC and FRL are equal). The horizontal extent of above-WAC Tc-99 contamination will be determined through the collection and laboratory analysis (for characteristic beta radiation) of discrete surface soil samples. The vertical extent of above-WAC Tc-99 contamination will be determined through the use of a GeoProbe to collect soil samples at 1-foot intervals and laboratory analysis of the discrete samples.

In those seven 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, 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 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, Tc-99 contamination, and toxicity characteristic soil will be performed concurrently. Sample collection, handling procedures, sample preparation, analytical methods, and detection limits are presented in Appendix E of the SEP.

4.2.1.4 Integrated Remedial Design Package

Data collected during pre-excavation characterization will be used 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. Items to be included in each IRDP are presented in Table 4-5.

Each IRDP will be submitted to EPA and OEPA for concurrence prior to implementation. DOE will formally respond to EPA and OEPA comments within 30 days of receipt of agency comments. Comment resolutions will be incorporated into each IRDP, although the revisions will not be formally submitted to the agencies for approval.

4.2.2 Excavation and Segregation Activities

Upon approval of the IRDP, soil remediation activities will begin. Figure 4-7 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

The IRDP used to sequence excavation will identify area-specific constituents of concern, above-WAC and above-FRL boundaries for each area-specific constituent of concern, and excavation boundaries for each contaminated soil category. Based upon the IRDP, the excavation hierarchy shown on Figure 4-7 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 seven areas containing RCRA characteristic waste which is suitable for treatment, those soils 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 all above-WAC concentrations of area-specific constituents of concern, as identified in the IRDP, have been removed from the excavation area. During excavation activities and prior to the excavation of soil containing above-FRL concentrations of area specific constituents of concern, field radiological surveys will be used to confirm that above-WAC concentrations of uranium have been excavated.

Following the excavation of soil containing above-WAC concentrations of area-specific constituents of concern, if the area being excavated is one of the seven 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

As discussed in Section 4.1.2.1, although RCRA characteristic waste may be disposed of in the OSDF, seven FEMP areas (Table 4-3) have been identified where RCRA characteristic waste may be present in sufficient quantities to justify treatment prior to disposal. During excavation, that soil that failed TCLP testing will be segregated for subsequent treatment prior to disposal.

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 pre-defined in the IRDP 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

Debris, USTs, pipes and other non-soil-like items encountered during excavation will be removed and segregated from the excavated soil. Examples of debris material types include:

• General construction debris	• Scrap metal	• Medical/infectious waste
• Asbestos	• Sumps and associated piping	• Misc. debris (trash)
• Non-pressurized containers	• Transformers	• Tires
• Pressurized containers	• Lead-acid batteries	

Excessive soil will be removed from the materials prior to inspection. 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, 5.1.2, and 5.1.3, respectively.

4.2.2.2.3 Non-Soil Residue and Process Waste

Uranium metal in various forms (e.g., ingots, end crops, cuttings) may be encountered during excavation activities. These metals will be managed in accordance with the FEMP Waste Disposition Program. If encountered during excavation activities, uranium metal will be segregated and moved to an interim storage area for evaluation, classification and sale as a nuclear material. If the metals do not meet nuclear material specifications or if a buyer cannot be found, the material will be characterized as waste and disposed off site.

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.

4.2.2.3 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
- Discovery of unexpected cultural or historic resources

Contingency plans for each of these conditions are provided below.

4.2.2.3.1 Unearthing Unanticipated Debris

In the event that unanticipated debris, USTs, pipes and other non-soil-like items are encountered during excavation, the material encountered will be assessed prior to excavation to assure that the health and safety of site personnel are maintained during excavation activities. The encountered debris will be segregated during excavation. Excessive soil will be removed 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, 5.1.2, and 5.1.3, respectively.

4.2.2.3.2 Unearthing Unanticipated Non-Soil Residue or Process Waste

In the event that unanticipated uranium metal or non-soil process residues are encountered during soil excavation, the encountered material will be assessed to assure that the health and safety of site personnel are maintained during excavation. For example, some forms of uranium metal are 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.

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 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.

4.2.2.4 Documentation

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 RIs. The IIMS will be used to query the SED in preparation for pre-excavation characterization, to enter pre-excavation characterization data into the SED, to query the SED for data necessary to determine the extent of soil excavation necessary to prepare the IRDPs, and to track soils during and following soil excavation to their final destination.

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 using the IIMS. Then, soil excavation will be performed in accordance with an IRDP that has been reviewed and approved by the EPA. As soil is excavated and placed into trucks for transport, it will be assigned a material profile, as designated in the IRDP, based upon the area from which the soil was excavated. The material profile will be entered on a FTL/OSM that will be completed for each truck load of soil. One copy of the FTL/OSM will accompany the truck load of soil to its destination. The other will be retained by those personnel who loaded 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 data 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 treatment and 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

Following excavation, soil will be transferred to one of six different locations shown in Figure 4-8. These include:

- Designated staging area for treatment prior to off-site 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 area for treatment prior to disposal in the OSDF
- Interim Storage pending acceptance by the OSDF
- OSDF for disposal

The following sections summarize each of the six possible flow paths that eventually lead to either off-site disposal for above-WAC soil or 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 three paths leading to off-site disposal.

Off-site bulk soil shipments will be performed by Waste Pits Remedial Action Project. If 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 Waste Pits Remedial Action Project. The soil transfer to Waste Pits Remedial Action Project will be documented using a FTL/OSM. Waste Pits Remedial Action Project will then be responsible for loading and manifesting the material for off-site transport.

If 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 within the former production area. The soil will be stockpiled in a posted location until accepted by 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 will be documented using FTL/OSMs. 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. 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 prior to off-site disposal to meet LDRs. 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 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.

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 on-site disposal facility.

If the OSDF is prepared to accept the soil for placement in the disposal facility, 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 a 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 outside the former production area. 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.

Excavated soil that meets the OSDF WAC but contains RCRA 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, Waste Pits Remedial Action Project and the OSDF may not be prepared to immediately accept excavated soil for disposal. In these situations, the soil will be stockpiled pending acceptance. Stockpiles for soil containing above-WAC concentrations of constituents of concern will be maintained in the former production area. Stockpiles for soil containing below-WAC concentrations of constituents of concern will be maintained outside the former production area, near the OSDF. Stockpiles will be clearly posted regarding their use. For example, stockpiles for soil containing below-WAC concentrations of constituents of concern may be posted using green signage while stockpiles for soil containing above-WAC concentrations of constituents of concern may be posted using red signage. Transfers to and from the stockpiles will be documented using FTL/OSMs.

4.2.3.3 Material Tracking and Documentation

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 contained some soil that exceeded 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 be maintained at the source MTL. A second copy of the FTL/OSM will accompany the soil transfer to the destination MTL. On a routine basis, source and destination FTL/OSMs for each soil transfer will be matched and the data 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 material profile from its origin to its ultimate on-site destination.

4.3 LOCATION-SPECIFIC WAC ATTAINMENT FOR SOIL

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 excavations 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 remedial investigation 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, 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 the SEP.

The six location-specific excavation approaches that will be discussed are: A) shallow excavation of impacted on-property areas outside the former production area and 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 and at the Sewage Treatment Plant; E) Off-property and nonimpacted on-property area certification; and F) Non-HDPE pipeline excavation outside the former production area. Figure 4- 4 previously identified the eight sitewide remediation areas that have been adopted for purposes of executing soil cleanup activities at the site. Table 4-6 presents a crosswalk relating the probable excavation approach to each of the eight remediation areas.

The eight sitewide remediation areas are numbered 1 through 8, with Remediation Area 4 divided into 4A and 4B. Remediation Area 1 also contains the Sewage Treatment Plant, Remediation Area 3 also includes the Fire Training Facility and Lime Sludge Ponds, and Remediation Area 6 also contains the Solid Waste Landfill. Figure 4-4 shows the location of the eight sitewide remediation areas and their proposed division into subareas that correspond to the various excavation approaches (i.e., A, B, C, etc). remediation area. For example, Remediation Area 5 is in the former production area and contains an existing soil stockpile; therefore, Excavation Approaches C and D apply to Remediation Area 5. This example is important to keep in mind because remediation will be implemented within a remediation area or subarea rather than within a single excavation-approach area (i.e., remediation of all areas designated as Excavation Approach A will not take place simultaneously).

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 4-7 to provide a cross-comparison among the area-specific approaches. Each of these tasks are discussed in detail in the SEP. Only those tasks relevant to WAC attainment are discussed below.

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

Excavation Approach A is designed to handle shallow soil excavation that takes place 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 restricted to the top few feet of soil.

Excavation Approach A will be applied to Remediation Areas 1, 2, 6, and 7 (Table 4-6; Figures 4-4 and 4-9). 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 potential area-specific constituents of concern for these remediation areas is provided in Table 4-2.

Under Excavation Approach A it is envisioned that the soil remediation process will begin with a pre-design investigation to estimate the extent of the excavation, and perform pre-excavation surveys and sampling activities. Radiological survey results and laboratory analytical data will be forwarded to the remedial design to delineate the extent of soil excavation for, RCRA characteristic waste (within the seven areas shown on Figure 4-6), above-WAC, and above-FRL areas. This information will be incorporated into an IRDP and submitted to the OEPA and EPA for approval. After the IRDP has been approved, soil excavation will begin and materials delineated as RCRA characteristic waste, and above WAC 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).

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 independent 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 any above-WAC area for the secondary area-specific constituents of concern with numerical WAC (e.g. Tc-99). The samples will be submitted for laboratory analysis of secondary area-specific constituents of concern to determine the extent of above-WAC material. All available field and laboratory data will be used to support the demonstration of WAC attainment.

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 (Figure 4-9). 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 Tc-99 area in Remediation Area 6, and along the southern boundary of the Fire Training Facility in Remediation Area 6. Tc-99 was detected in only one area in Remediation Area 6 in concentrations exceeding the WAC and FRL.

To establish the area extent of above-WAC concentrations of area-specific constituents of concern, RI/FS data will be used to minimize 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 surface survey and/or sampling protocol. After establishing the area 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 collection and handling procedures, laboratory protocols and methods, and instrument detection limits are presented in the Appendix E to the SEP.

As identified in Figure 4-9, one area with the potential for the presence of a sufficient quantity of soil exhibiting the 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 toxicity characteristic. If soil is identified as possessing the toxicity characteristic, it will be delineated as such to indicate that treatment is required prior to disposal.

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 are discussed in detail in the SEP. Following the completion of the pre-excavation characterization program an area-specific IRDP (i.e., a remedial design) will be prepared. The IRDP will summarized 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. The IRDP will be submitted for approval by the OEPA and EPA prior to beginning excavation activities.

Excavations of soil that exhibit the characteristic of toxicity will be excavated, staged, and passed 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 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 or above 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 adversely affected by contaminants. 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.

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 4-6 and 4-7; Figures 4-4 and 4-10). 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 Operable Units 1 and 4 waste materials will be shipped off site for disposal.

A pre-design investigation will be conducted to estimate the extent of the excavation and above WAC material using RI/FS data, pre-excavation surveys, and additional sampling activities as needed. Radiological survey results and laboratory analytical data are forwarded to the remedial design to delineate the extent of soil excavation for soil exhibiting the characteristic of toxicity (within the previously defined seven areas), and above-WAC and above-FRL areas. This information will be incorporated into an IRDP and submitted to the OEPA and EPA 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 layer being surveyed with a large-volume NaI detector and/or an HPGe instrument to demonstrate WAC attainment for primary radiological constituents of concern. 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.

In the Solid Waste Landfill, field measurements or scanning for organic vapors will be conducted in addition to the radiological scans. The rheology of Lime Sludge Ponds material may not allow loading of the surface, which would eliminate walk-over radiation surveys and systematic 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 conducting radiation surveys and sampling activities. Excavation of the Solid Waste Landfill is not anticipated to result in the smooth surfaces expected for soil excavations. Therefore, the geometry of the surface must be considered when radiation scans and/or HPGe measurements are performed. The heterogeneity of materials expected to be found in the Solid Waste Landfill also creates unique problems with sampling efforts designed to identify metals above the WAC, as no real-time scanning instrument similar to NaI detectors and photoionization detection (PID) meters is available for metal constituents of concern.

For the heterogeneous materials expected to be found in the Solid Waste Landfill, radiation surveys can demonstrate WAC attainment for primary area-specific constituents of concern by scanning nearly 100 percent (if possible) of the exposed surfaces in the Solid Waste Landfill, but it is not feasible to sample 100 percent of the waste to demonstrate WAC attainment for other area-specific constituents of concern. Therefore, biased sampling, based on radiation and organic-vapor surveys during excavation will be coupled with random sampling during the pre-design investigation to demonstrate WAC attainment.

Tc-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 Tc-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 Tc-99 removal under this excavation approach.

There are two areas addressed by Excavation Approach B which have the potential for significant quantities of soil to exhibit the characteristic of toxicity. In Remediation Area 7, directly west of the waste storage units that comprise Silos 1 and 2, and the South Field Firing Range in Remediation Area 2.

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 4-10). 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 estimated 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 for handing the underlying soil to 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, certified grade surface. 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.

Excavation Approach C will be applied to the seven existing soil stockpiles in Remediation Areas 1, 3, and 5 (Tables 4-6 and 4-7; Figures 4-4 and 4-11). 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.

Excavation Approach C terminates when the soil stockpiles have been removed. For stockpiles in the former production area, the stockpile footprint and the certification process are forwarded to Excavation Approach D . The purpose for handing the underlying soil to Excavation Approach D is to allow the soil in the entire former production area to be remediated at one time, after all buildings, structures, and stockpiles have been removed. After removal of the two stockpiles in Remediation Area 1, Phase I, to the former grade surface, the former footprint of the piles will be addressed as part of Area 1 Phase II under Excavation Approach A.

Characterization of the soil stockpiles will begin by conducting a pre-design investigation to delineate the soil stockpile to be removed, identify constituents of concern, and perform pre-excavation surveys and sampling activities. Sampling activities will 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 yd^3. The source of the soil in the eastern stockpile in Remediation Area 1, Phase I was characterized during Area 1, Phase I activities, and no additional characterization of this stockpile is required. Radiological survey results and laboratory analytical data will be forwarded to the remedial design to delineate the extent of excavation for Tc-99, RCRA characteristic waste, above-WAC, and above-FRL areas. For most stockpiles (except the Area 1, Phase 1 piles), the characterization data will be summarized in an IRDP and submitted to the 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 Tc-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 for WAC attainment of primary area-specific constituents of concern. 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. Upon removal of the stockpiles in the former production area, the soil footprint will be remediated and certified under Excavation Approach D. For the stockpiles in Remediation Area 1, removal of the stockpiles to the previous grade surface will be followed by soil excavations as part of Area 1 Phase II.

The area-specific constituent of concern lists for Remediation Areas 1, 3, and 5 are summarized in Table 4-2. These lists are derived from RI/FS characterization data and are divided into primary and secondary area-specific constituents of concern. Tc-99 has not been detected in the current soil stockpiles. If pre-excavation characterization indicates Tc-99 is present above its FRL or if future stockpiles are generated which contain Tc-99, it will be excavated and segregated under this excavation approach.

The current soil stockpiles are not known to contain characteristic waste. Therefore, RCRA excavation of toxicity-characteristic waste is not expected under this excavation approach unless organic-vapor monitoring indicates the presence of potentially toxic material.

Based on the RI characterization data for uranium, there is one known area near the northeast margin of Soil Stockpile 1 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.

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

Excavation Approach D is designed to handle shallow to deep soil excavations that take place after 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 affected by contaminants. The list of area-specific constituents of concern for proposed Excavation Approach D areas 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.

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 4-12). A comparison of Excavation Approach D with other excavation approaches is provided in Table 4-7.

Excavation Approach D follows most of the general soil remediation process discussed under Excavation 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 concern. After initial, above-grade D&D activities have removed equipment, piping, and all other ancillary materials from the buildings and structures, pre-excavation surveys and sampling activities inside the remaining structure will commence to refine the list of area-specific constituents of concern, as needed. Upon completion of the pre-excavation surveys and sampling activities, final, above-grade D&D activities will be initiated and completed. Radiological survey results and laboratory analytical data will be forwarded to the remedial design to delineate the extent of soil excavation for Tc-99, RCRA characteristic waste, HWMUs, USTs, above-WAC, and above-FRL areas. This information will be incorporated into an IRDP and submitted to the OEPA and EPA for approval.

After the IRDP has been approved by the OEPA and EPA, 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 materials delineated as Tc-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 layers with each layer being surveyed for WAC attainment of primary radiological area-specific constituents of concern prior to excavating the next. Additionally, because of the expected heterogeneity of contamination within the former production area, real-time monitoring of the active excavation will 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 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 additional monitoring, sampling, and analysis and 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 Tc-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.

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. Likewise, monitoring for organic vapors will be conducted with 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 must be considered when excavation plans and schedules are developed.

A combination of radiological surveys and field and laboratory measurements will be used to demonstrate that soil placed in the OSDF meets the WAC. Initial radiological scans will identify above-WAC zones, and additional sampling and analysis will be conducted to delineate these zones for all area-specific constituents of concern when RI/FS data are not sufficient to make the delineation. These surveys will be concentrated in zones identified as highly contaminated by RI/FS data and in areas where historical knowledge indicates process materials were spilled. However, because of the expected heterogeneous distribution of area-specific constituents of concern in the soil, surveys with NaI detectors will also 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 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.

Debris associated with the removal of at- and below-grade structures will not undergo further characterization, and treatment to remove area-specific constituents of concern above the WAC will be limited to actions specified in Section 5.0.

The constituent of concern lists for Remediation Areas 1, 3, 4a, 4b, 5, and 7 are summarized in Table 4-2. These lists are derived from RI/FS characterization data and divided into primary and secondary area-specific constituents of concern. Tc-99 has been measured above the FRL in soil below Tension Support Structures 4 and 5, located in the southwest corner of Remediation Area 3; in the northeast corner of the Metal Fabrication Building, located in the northeast section of Remediation Area 4a; in the southwest corner of the area associated with the Sewage Treatment Plant, and along the west end of the slurry pipeline in Remediation Area 7.

There are three areas within those portions of the site designated for remediation under Excavation Approach D with the potential for the existence of sufficient quantities of soil exhibiting the characteristic of toxicity to present the potential for cost-effective treatment. 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 HWMU #22 - the abandoned sump west of the Pilot Plant Excavation. All of these potential characteristic-waste areas will be dealt with under Excavation Approach D.

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 4-12).

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.

Initial D&D activities anticipated to be performed prior to pre-excavation surveying and 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 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 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 access 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 6 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 .

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

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 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 1 foot of soil. Soil excavations for Tc-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.

Excavation Approach E will be applied to Remediation Areas 1 (Phase III), 8, and off-property areas having the potential for excavation (Table 4-6 and Figures 4-4 and 4-13). 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.

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 for primary area-specific constituents of concern which have WAC, using scans conducted with NaI detectors and/or HPGe measurements. 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 secondary area-specific constituents of concern.

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

Excavation Approach F is designed to handle non-HDPE pipeline excavations outside the former production area (Figure 4-14). HDPE pipelines associated with the aquifer restoration activities and the AWWT will be left in place as part of the post-closure monitoring system in case that 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 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.

Excavation Approach F will be implemented in Remediation Area 1, Phase II, after Excavation 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. Radiological survey results and laboratory analytical data will be forwarded 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 the OEPA and EPA 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, CU 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 needed to establish the extent of contamination surrounding the Sewage Treatment Plant pipeline and any other non-HDPE pipelines remediated under this approach.

Soil above the crown of the pipe to be excavated using this Approach F is not expected to be significantly contaminated. However, in certain sections of the pipe where the pipe was under pressure and/or previous leaks are suspected, radiological scanning with NaI detectors and in-situ measurements with the HPGe instrument will also be used to confirm whether soil lying above the crown of the pipe can be staged and directly used to backfill the trench. No matter what soil will be used for backfill, backfill operation can only be conducted after completion of pipe removal and certification of residual impacted soil underlying the pipe for FRL attainment.

Real-time radiological scanning is preferred to control excavation of the potentially impacted soil underlying the pipe. 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 excavation 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 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 surveying and/or 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. Sample collection and handling procedures, laboratory protocols and methods, and instrument detection limits are presented in the SEP Quality Assurance Project Plan (Appendix E of the SEP).

Pipeline sections outside the former production area but within the FEMP boundary will be removed first. If holding 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 indicate the potential for soil to exceed the WAC and if scanning instrumentation can enter the trench, a WAC scan of the soil under the removed section of pipeline will be conducted to delineate the excavation area. However, if access to the trench is restricted and a WAC scan cannot be performed, bulk excavation will proceed without the WAC scan and the soil will be remediated under 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 WAC scans will be conducted during excavation and/or GeoProbe borings will be placed to determine the depth of WAC material, as needed. 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 scans and 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 the waste acceptance operations (WAO) organization 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.

Table 4-8 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. 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 be coordinated with EPA and OEPA to assure that EPA/OEPA oversight objectives are readily attained.

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 coordinate 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 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 will be identified to determine the extent of above-WAC and above-FRL soils. A Project Sampling Plan will then be prepared that reflects these characterization requirements. The independent WAO organization will review and sign-off the sampling plan to assure that the proposed characterization is sufficient to meet WAC attainment definition objectives.

Field surveys and sampling will be executed as identified in the Project Sampling Plan. 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 IRDP. The IRDP will be reviewed by the independent WAO organization and, following resolution of 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 <u>EPA and OEPA Independent Oversight</u>

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 surveyed and sampled during the coming month and the days for which 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 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 Project Waste Identification and Disposition (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 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 seven 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 R-TRACK, or B-TRACK 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 6-inch or 12-inch 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 4.2.2.2, within areas that have the potential for containing small quantities of soil with elevated concentrations of organic solvents, continuous monitoring for organic vapors will be performed as a best management practice. Finally, if the soil is being excavated from one of the seven 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.

4.4.2.2 EPA and OEPA Independent Oversight

Monthly remediation schedules will be provided to EPA and OEPA showing the areas to be excavated, the basis for excavation (above WAC areas, above FRL areas, and RCRA toxicity characteristic areas, 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. Because the actual above-WAC excavation activities will be based on the characterization information provided in the IRDP, no new data will be collected from the field except for the field instrument scans. Thus there will be no opportunities for split sampling during the WAC attainment excavation activity itself. Key opportunities for independent oversight by the agencies during this phase include visual observation of the excavation activity and associated excavation controls, and independent review of the FEMP's PWID Packages.

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

As discussed in Section 4.4, excavated material will be transferred to one of six MTLs depending upon their 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 delivered to the independent WAO organization where they will be reconciled and entered into the

Integrated Information Tracking System. Subsequent transfers of soil from one MTL to another will be similarly documented and controlled using FTL/OSMs.

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 excavation and transfer activities, the SCEP project 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.

4.4.3.2 EPA and OEPA Independent Oversight

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 of the project, no new data will be procured and thus there will be no new opportunities for split sampling during the post-excavation activities.

Table 4-1
On-Site Waste Disposal Facility
WAC versus Detected Concentrations in Soil

	WAC Constituent of Concern	Units	WAC	Total No. Samples / Freq Above Bkgrnd / Freq Above WAC	Range of Positive Detections
	Radionuclides				
1	Neptunium-237	pCi/g	3.12×10^9	1331/86/0	0.214-2.63
2	Strontium-90	pCi/g	5.67×10^{10}	1493/422/0	0.510-47.6
3	Technetium-99	pCi/g	29.1 [a]	1536/205/18	1.02-692
4	Total Uranium	mg/kg	1,030	5565/4213/112	0.500-57,223
	Inorganics				-
5	Boron	mg/kg	1,040	20/15/0	7.2 - 32.8
6	Mercury	mg/kg	56,600	1171/104/0	0.020 - 4.60
	Organics				
7	Bromodichloromethane	mg/kg	0.903	1046/3/0	0.006-0.013
8	Carbazole	mg/kg	72,700	484/34/0	0.001-89.0
9	Alpha-chlordane	mg/kg	2.89	824/7/0	0.0021-0.093
10	Bis(2-chloroisopropyl)ether	ug/kg	24.4 [b]	886/2/2	44 - 48
11	Chloroethane	mg/kg	392,000	1087/3/0	0.002-0.210
12	1,1-Dichloroethene	mg/kg	11.4	1087/31/0	0.001-0.460
13	1,2-Dichloroethene	mg/kg	11.4	1084/8/0	0.002-0.010
14	4-Nitroaniline	ug/kg	44.2 [c]	868/1/1	330
15	Tetrachloroethene	mg/kg	128	1083/90/0	0.001-48.00
16	Toxaphene	mg/kg	106,000	843/1/0	0.190
17	Trichloroethene	mg/kg	128	1092/99/1	0.001-150.0
18	Vinyl Chloride	mg/kg	1.51	1087/7/0	0.002-0.110

a Additionally, maximum total mass in debris is limited to 105 g.
b WAC revised upward to 220 ug/kg to reflect current analytical capabilities
c WAC revised upward to 900 ug/kg to reflect current analytical capabilities

Shading denotes constituents of concern that have been found at the FEMP in concentrations above the OSDF WAC.

Table 4-2
Primary and Secondary WAC Constituents of Concern by Remediation Area

Remediation Area	Primary WAC Constituents of Concern	Secondary WAC Constituents of Concern
1	total uranium	
2	total uranium	technetium-99
3	total uranium	technetium-99 bis(2-chloroisopropyl)ether trichloroethene 4-nitroaniline
4	total uranium	technetium-99
5	total uranium	
6	total uranium	technetium-99 bis(2-chloroisopropyl)ether
7	total uranium	technetium-99
8	total uranium	

Table 4-3
Areas Potentially Containing RCRA Characteristic Waste in Soil

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

a Also designated as HWMU No. 22.

000082

Table 4-4
Areas Potentially Containing Organic Solvents in Soil - Hazardous Waste Management Units and Underground Storage Tanks to be Closed Under CERCLA

	HWMU IDENTIFICATION	DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,8]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
		INACTIVE HWMUs				
1	Fire Training Facility	Land-based miscellaneous unit; fire training exercise area, used oil and listed spent solvents were spread on ground and ignited. Spills are recorded. Soil contamination previously excavated under Removal Action 28.	FTF	1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
				Toluene	Toluene[8]	N/A[8]
4	Drum Storage Area Near Lab Bldg. Loading Dock	Outdoor unpaved (during active life) container storage area without secondary containment system. Managed containers with free liquids. No spills are recorded. Unit has documented soil contamination from roofing tar. Area is presently overlain by concrete due to loading dock expansion.	4b	Corrosive (low pH)	N/A[8]	N/A[8]
				Benzene	Benzene[8]	N/A[8]
				Tetrachloroethene	Tetrachloroethene[8]	Tetrachloroethene[8]
				Toluene	Toluene[8]	N/A[8]
5	Drum Storage Area South of W-26	Outdoor unpaved container storage area without secondary containment system. Managed containers with free liquids. No spills are recorded. Unit has documented soil contamination from roofing tar.	4b, 5	Lead	Lead[8]	N/A[8]
				Mercury	Mercury[8]	Mercury[8]
10	Nitric Acid Recovery (NAR) System Components	Tank system, primarily indoor with single outdoor tank; indoor and outdoor components have secondary containment system. Stored waste nitric acid. Spills are recorded.	4b	Corrosive (low pH)	N/A[8]	N/A[8]
				Chromium	Chromium IV[8]	N/A[8]
11	Tank Farm Sump	Land-based surface impoundment unit. Spills (from leaking drums stored in area) are recorded.	3	Corrosive (low pH)	N/A	N/A
14	Box Furnace	Outdoor furnace/ incinerator unit; has structurally sound flooring pad, but no secondary containment berm system. Managed only solid materials; burned rags and gloves contaminated by spent solvents. No spills are recorded.	4b	Tetrachloroethene	Tetrachloroethene[8]	Tetrachloroethene[8]
				1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
				Trichloroethene	Trichloroethene[8]	Trichloroethene[8]
				Barium	Barium[8]	N/A[8]
				Chromium	Chromium IV[8]	N/A[8]
				Lead	Lead[8]	N/A[8]
				Silver	Silver[8]	N/A[8]

Table 4-4
(Continued)

HWMU IDENTIFICATION	DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,8]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
15 Oxidation Furnace #1	Indoor furnace/miscellaneous unit with cracked, pitted and heavily stained flooring pad but only a partial secondary containment diking system (where two ancillary scrubber liquid pumps were located). Managed materials with free liquids. No spills are recorded.	4b	1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
17 Plant 8 East Pad	Outdoor paved container storage area with secondary containment system. Managed containers with free liquids. Spills are recorded.	4b	Ignitable (Xylene)	Xylene[8]	N/A[8]
			Methyl Ethyl Ketone	N/A[8]	N/A[8]
			Lead	Lead[8]	N/A[8]
18 Plant 8 West Pad	Outdoor paved container storage area with secondary containment system. Managed containers with free liquids. Spills are recorded.	4b	Ignitable (Xylene)	Xylene[8]	N/A[8]
			Methyl Ethyl Ketone	N/A[8]	N/A[8]
			Lead	Lead[8]	N/A[8]
22 Abandoned Sump West of Pilot Plant	Tank system. Sump contents failed TCLP for metals. Spills (leakage from the sump) are recorded.	4b	Benzene	Benzene	N/A
			Tetrachloroethene	Tetrachloroethene	Tetrachloroethene
	NOTE: Also identified as an area where the soils may be RCRA *toxicity* characteristic hazardous for barium and lead.		Barium	Barium	Barium (by TCLP)
			Chromium	Chromium IV	N/A
			Lead	Lead	Lead (by TCLP)
			Mercury	Mercury	Mercury
25 Plant 1 Storage Building	Indoor paved container storage area without secondary containment system. Managed containers with free liquids. No spills are recorded.	4b	Ignitability	N/A[8]	N/A[8]
			Corrosivity	N/A[8]	N/A[8]
			Chromium	Chromium IV[8]	N/A[8]
			Lead	Lead[8]	N/A[8]
27 Waste Pit 4	Land-based land disposal unit. No spills are recorded.	6	Barium	Barium	N/A

Table 4-4
(Continued)

	HWMU IDENTIFICATION	DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,6]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
28	Trane Thermal Liquid Incinerator	Indoor incinerator unit, with outdoor ancillary above-ground one-tank tank system and two outdoor paved container storage areas. Indoor components with structurally sound flooring pad; outdoor tank system and one container storage area with secondary containment system, other without. Stored then burned oil containing lead and listed spent solvents. No spills are recorded; however, potential yellow cake in immediate area.	4b	1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
				Lead	Lead[8]	N/A[8]
36	Storage Pad North of Plant 6	Outdoor paved container storage area without secondary containment berm system. Managed containers with free liquids. No spills are recorded.	4a	1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
				Lead	Lead[8]	N/A[8]
41	Sludge Drying Beds	Land-based surface impoundments that are part of the sanitary wastewater treatment system; managed sludges from wastewater treatment, where wastewater contained listed spent solvent. No spills are recorded.	STP	Tetrachloroethene	Tetrachloroethene[8]	Tetrachloroethene[8]
42	Waste Pit 5	Land-based land disposal unit. No spills are recorded.	6	1,1,1-Trichloroethane	1,1,1-Trichloroethane	N/A
				Possible characteristic to be determined during removal of waste pit contents[8]	TBD[7]	TBD[7]
46	UNH Tanks - NFS Storage Area	Outdoor five-tank above-ground tank system with secondary containment system. Stored corrosive uranyl nitrate hexahydrate (UNH). Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Barium	Barium	N/A
				Chromium	Chromium IV	N/A
				Lead	Lead	N/A
				Mercury	Mercury	Mercury
47	UNH Tanks - North of Plant 2A	Outdoor three-tank above-ground tank system with secondary containment system. Stored corrosive uranyl nitrate hexahydrate (UNH). Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Barium	Barium	N/A
				Chromium	Chromium IV	N/A
				Lead	Lead	N/A

Table 4-4
(Continued)

	HWMU IDENTIFICATION	DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,8]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
				Mercury	Mercury	Mercury
48	UNH Tanks - Southeast of Plant 2A	Outdoor one-tank above-ground tank system with secondary containment system. Stored corrosive uranyl nitrate hexahydrate (UNH). Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Barium	Barium	N/A
				Chromium	Chromium IV	N/A
				Lead	Lead	N/A
				Mercury	Mercury	Mercury
49	UNH Tanks - Digestion Area (2 locations)	Indoor eight-tank above-ground tank system with secondary containment system. Stored corrosive uranyl nitrate hexahydrate (UNH). Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Barium	Barium	N/A
				Chromium	Chromium IV	N/A
				Lead	Lead	N/A
				Mercury	Mercury	Mercury
50	UNH Tanks - Raffinate Building (2 locations)	Indoor four-tank above-ground tank system with secondary containment system. Stored corrosive uranyl nitrate hexahydrate (UNH). Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Barium	Barium	N/A
				Chromium	Chromium IV	N/A
				Lead	Lead	N/A
				Mercury	Mercury	Mercury
54	Thorium Nitrate Tank (T2)	Outdoor one-tank above-ground tank system with secondary containment system. Stored corrosive thorium nitrate. Spills are recorded.	4b	Corrosive (low pH)	N/A	N/A
				Cadmium	Cadmium	N/A
				Chromium	Chromium IV	N/A
			ACTIVE HWMUs			
19	CP Storage Warehouse (Butler Building)	Indoor container storage area with secondary containment system. Manages containers with and without free liquids. Spills are recorded.	3	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]

Table 4-4
(Continued)

HWMU IDENTIFICATION		DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,8]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
20	Plant 1 Storage Pad	Outdoor and indoor container storage area. Paved outdoor portion with partial secondary containment berm system presently only manages containers without free liquids; indoor portion with secondary containment system manages containers with free liquids. Spills are recorded.	3, 4b	Methylene Chloride	Methylene Chloride[8]	N/A[8]
				Tetrachloroethene	Tetrachloroethene[8]	Tetrachloroethene[8]
				1,1,1-Trichloroethane	1,1,1-Trichloroethane[8]	N/A[8]
				Xylene	Xylene[8]	N/A[8]
				Barium	Barium[8]	N/A[8]
				Lead	Lead[8]	N/A[8]
				All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]
29	Plant 8 Warehouse	Indoor container storage area with secondary containment system. Manages containers with and without free liquids. Spills are recorded.	4b	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]
33	Pilot Plant Warehouse	Indoor container storage area with secondary containment system. Manages containers with and without free liquids. Spills are recorded.	4b	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]
34	KC-2 Warehouse	Indoor container storage area with secondary containment system. Manages containers with and without free liquids. Spills are recorded.	3	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]
35	Plant 9 Warehouse	Indoor container storage area with secondary containment system. Manages containers with and without free liquids, equipped for storage of ignitible liquids. Spills are recorded.	3	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]

Table 4-4
(Continued)

HWMU IDENTIFICATION		DESCRIPTION[1, 2, 3]	REMEDIATION AREA(s)[4]	HWMU COCs OR RCRA CHARACTERISTICS[3,8]	FINAL REMEDIATION LEVEL COCs[5]	OSDF WAC[6] OR RCRA TC COCs
37	Plant 6 Warehouse	Indoor container storage area with secondary containment system. Manages containers with and without free liquids, equipped for storage of ignitible liquids. Spills are recorded.	4a	All documented hazardous waste codes previously stored; constituents depend on documented waste codes stored[8]	TBD[7]	TBD[7]

NOTES:

(1) Source: Status of Closure and Field Activities of HWMUs from the U.S. EPA Approval Letters of Final Reports for 13 FEMP Removal Actions and Ohio EPA Acceptance Letters for 13 RCRA Closure Certifications at the FEMP, December 1, 1996; File G:|CRU3T76\MISC\1996\SCHD12-11.WK1

(2) Sources: Table 1-1, HWMU Identification, OU5 FS (FEMP-05FS-5 DRAFT FINAL, March 22, 1995); and Terry Hagen, October 30, 1995 letter, M:EC:95-0071, titled "Hazardous Waste Management Unit/CERCLA Constituents of Concern" and its attached table entitled "RCRA COCs for Active and Inactive Units to be Closed Under CERCLA/RCRA Integrated Process (October 17, 1995)".

(3) Source: HWMU Release History, T. Spradlin to M. Strimbu Memorandum, June 24, 1997; based upon retrieval from Release History file.

(4) Source: Construction Remediation Area Project Boundaries identified by the OU5 Near Term Restoration Projects drawing, April 7, 1997; File /USR1/RES/RES3256/SKGB.DGN.

(5) Source: Table 9-3, Final Remediation Levels for Soil, OU5 ROD (FEMP-05ROD-6 FINAL, December 15, 1995).

(6) Source: Table 4-1, On-Site Disposal Facility Waste Acceptance Criteria (WAC), FEMP OSDF Impacted Materials Placement Plan (IMPP, 20100-PL-007, Rev. G, October 1996); else, "(by TCLP)" means by concern for RCRA Toxicity Characteristic (TC), where TCLP is the Toxicity Characteristic Leaching Procedure.

(7) TBD refers to RCRA-listed wastes having been stored in those HWMUs but specific constituents are yet to be determined based upon documented waste codes managed/stored.

(8) Potential for waste constituent to be present in soil is low. Source: Table 4-68, Hazardous Constituents in (Hazardous Waste Management Units (HWMUs) and Soil, OU5 RI (FINAL, March 17, 1995); supported by Terry Hagen, October 30, 1995 letter, M:EC:95-0071, titled "Hazardous Waste Management Unit/CERCLA Constituents of Concern" and its attached table entitled "RCRA COCs for Active and Inactive Units to be Closed Under CERCLA/RCRA Integrated Process (October 17, 1995)".

Table 4-4
(Continued)

UNDERGROUND STORAGE TANKS TO BE CLOSED UNDER CERCLA

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
TANKS REMOVED - ADDITIONAL ACTION REQUIRED TO DEMONSTRATE ATTAINMENT OF SOIL FRLs				
UST-1	**Remediation Area:** 5 **Location:** Centerline approx. 51 ft. E of Garage (Bldg. 31) - buried approx. 18 inches beneath a 6 inch concrete slab (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 1,500 gal. **Size:** 8 ft. diameter spherical tank **Material:** Fiberglass **Accessories:** Piping from top of UST 1 to aboveground gasoline pumps and a 2 inch vent line from UST 1 to UST 2 and to Bldg. 31 (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Material:** Gasoline (unleaded) **COCs:** Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) **Reference MEFs:** 181, 60053	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** USTs 1, 2, 8, 9, 10 removed in concert. Soil excavated to maximum depth of 11 ft within footprint of the 5 tank cluster. Horizontal excavation continued until a physical constraint was encountered. Final excavation covered approx. 6,000 sf. of surface area. Excavated volume estimated at 2,500 cy. of soil. 9 soil samples (based on highest PID levels) were collected in 1990 when the tanks were removed but prior to final soil excavation. Results: TPH (656 ppm), Benzene (1,210 ppb), Toluene (382 ppb), Ethyl benzene (1,190 ppb), Xylene (1,1300 ppb) and Lead (35.6 ppm). Concentrations are below FRLs for BTEX and Lead, no FRL established for TPH. *No samples were collected during excavation; no post-excavation samples were collected.* 6/93 UST 1,2,8,9 and 10 Closure Report concluded that only minor residual petroleum contamination remained after excavation. Since USTs were located in an area with significant U contamination and further excavation was impractical, any additional remediation would be conducted under CERCLA. State Fire Marshal approved UST closure on 12/3/93.

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-2	**Remediation Area:** 5 **Location:** Centerline approx. 51 ft. E of Garage (Bldg. 31) - buried approx. 18 inches beneath a 6 inch concrete slab (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 1,500 gal. **Size:** 8 ft. diameter spherical tank **Material:** Fiberglass **Accessories:** Piping from top of tank to aboveground gasoline pumps and 2 inch vent line from UST 2 to UST 1 (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Material:** Gasoline (Unleaded) **COCs:** Benzene . . . . (FRL; no OSDF WAC) Ethylbenzene . . . . (FRL; no OSDF WAC) Toluene . . . . (FRL; no OSDF WAC) Xylene . . . . (FRL; no OSDF WAC) Barium . . . . (FRL; no OSDF WAC) Lead . . . . (FRL; no OSDF WAC) Mercury . . . . (FRL; OSDF WAC) **Reference MEFs:** 181, 60053	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** See entry for UST-1.

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Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-8	**Remediation Area:** 5 **Location:** 12 ft. NE of Garage (Bldg. 31) Tank buried under 8 inch concrete slab with 2 ft. x 2 ft. 8 in. concrete dispensing pump foundation extending above pavement at N end of tank. (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 1,000 gal. **Size:** 4 ft. diameter x 12 ft. length **Material:** Steel **Accessories:** Remote fill line runs from tank to 10 ft. W of tank	**Material:** Leaded Gasoline **COCs:** Acetone . . . . (FRL; no OSDF WAC) Benzene . . . . (FRL; no OSDF WAC) Ethylbenzene . . . . (FRL; no OSDF WAC) Methyl Ethyl Ketone . . . (no FRL; no OSDF WAC) Toluene . . . . (FRL; no OSDF WAC) Xylene . . . . (FRL; no OSDF WAC) Arsenic . . . . (FRL; no OSDF WAC) Selenium . . . . (FRL; no OSDF WAC) **Reference MEFs:** 183, 487	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** See entry for UST-1.

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Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-9	**Remediation Area:** 5 **Location:** 8 ft. 6 in. from NE corner of Garage (Bldg. 31) 3/4 of tank was buried under an 8 inch concrete pad (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 1,000 gal. **Size:** 4 ft. diameter x 12 ft. length **Material:** Steel **Accessories:** Remote fill line - tank to E wall of garage	**Material:** Diesel Fuel **COCs:** Acetone .... (FRL; no OSDF WAC) Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Methyl Ethyl Ketone ... (no FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Arsenic .... (FRL; no OSDF WAC) Selenium .... (FRL; no OSDF WAC) **Reference MEFs:** 131, 487, 60331	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** See entry for UST-1.
UST-10	**Remediation Area:** 5 **Location:** Centerline approx. 43 ft. 6 in. E of Garage (Bldg. 31) - buried beneath 2 gas pumps on concrete pad. (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 3,000 gal. **Size:** 5.5 ft. diameter x 18 ft. length **Material:** Steel **Accessories:** Concrete pump island w/ 2 pumps directly over tank	**Material:** Leaded Gasoline **COCs:** Acetone .... (FRL; no OSDF WAC) Methylene Chloride ..... (FRL; no OSDF WAC) Trichlorofluoromethane . (no FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Lead .... (FRL; no OSDF WAC) **Reference MEFs:** N/A; See MSDS	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** See entry for UST-1.

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-3	**Remediation Area:** 3 **Location:** 25 ft. NE of Railroad Engine House (Bldg. 24B)	**Volume:** 12,500 gal. **Size:** 10 ft. diameter x 21 ft. length **Material:** Steel **Accessories:** Pump located immediately S of tank	**Material:** Diesel Fuel **COCs:** Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) **Reference MEFs:** 203, 584	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** Tank removed; clean-closed under Subtitle I; received letter for no further action from State Fire Marshal on 5/15/92. Soil samples taken during tank removal had elevated conc. BTEX, TPH and Lead. An additional 530 cu. yds. of soil was removed from the UST 3 pit based on visual staining, petroleum odors and headspace analysis vs. background. Hydrocarbon contamination also found under train tracks in upper 3 ft. of soil (tracks ran to W side of pit to engine house and E side pit) and soil was excavated to headspace criteria. Excavation was backfilled with clean gravel. Results from post-excavation soil sampling conducted at 20 ft. intervals indicated Lead conc. - < 4.7 to 12 ppm, which is below the FRL. BTEX constituents were not detected. TPH conc. - 28 to 112 ppm (no established FRL). (Source: 4/92 Tank Closeout Report).

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-5	**Remediation Area:** 5 **Location:** Approx. 10 ft. east of Garage (Bldg. 31)	**Volume:** 200 gal. **Size:** 2.5 ft. diameter x 6 ft. length **Material:** Steel **Accessories:** N/A	**Material:** Wastewater from Oil/Water Separator - contained hydraulic oil, motor oil, gasoline, diesel fuel and cleaning solvents such as 1,1,1-trichloroethane (5/95 Closeout Report: Tank contents - 6.3 - 6.9 ppm 1,1,1 -Trichloroethane) **COCs:** Acetone .... (FRL; no OSDF WAC) Aroclors/PCBs .... (FRL; no OSDF WAC) Benzene .... (FRL; no OSDF WAC) Carbon Tetrachloride .... (FRL; no OSDF WAC) Cyclohexanone ...... (no FRL; no OSDF WAC) 1,2-Dichloroethane ...... (FRL; no OSDF WAC) 1,1-Dichloroethene .... (FRL; OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Ethyl Ether .... (no FRL; no OSDF WAC) Methylene Chloride ..... (FRL; no OSDF WAC) Methyl Ethyl Ketone ..... (FRL; no OSDF WAC) Methyl Isobutyl Ketone . (no FRL; no OSDF WAC) Tetrachloroethene .... (FRL; OSDF WAC) Toluene .... (FRL; no OSDF WAC) 1,1,1-Trichloroethane .. (no FRL; no OSDF WAC) Trichloroethene .... (FRL; OSDF WAC) Trifluorochloromethane . (no FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Arsenic .... (FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Cadmium .... (FRL; no OSDF WAC) Chromium .... (FRL as VI; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) Selenium .... (FRL; no OSDF WAC) Silver .... (FRL; no OSDF WAC) **Reference MEFs:** 386, 1616, 1618, 1672, 1832, 10026, 10031, 30046, 60115, 60329, 60342	**REMOVED — UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** Tank reclassified from HWMU to SWMU (based on Waste Water Treatment Unit exemption); tank removed; soil removed during tank excavation was placed back into hole because no visibly contaminated soils were present (5/95 UST Closeout Report) Soil samples were collected on 3/90 after rainwater flowed into the tank after it had been uncovered. These sampling results were erroneously summarized in 8/93 RSE and 5/95 UST 5, 7, 14 and 17 Closeout Report. Review of analytical data indicates that results for rain water in tank and soil were switched in Table 1 of RSE (and carried over into Closeout Report). As a result, these reports state that 1,1,1-Trichloroethane was detected in soils when the analytical data from the laboratory reports (included as Attachment 1 of the RSE) indicates that it was not detected. Xylene (32 ppb), Barium (100 ppm), Arsenic (5.50 ppm), Cadmium (0.285 ppm), Chromium (20.7 ppm), Lead (11.1 ppm), and Silver (0.119 ppm) (all totals) were detected but are all below FRLs. Benzene, Ethyl benzene and Toluene were not detected. Methanol (195 ppb) was detected but has no established FRL. No other semi-volatile or volatile organic compounds were detected in the soil.

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-6	**Remediation Area:** 3 **Location:** 1 foot north of Maintenance Shop (Bldg. 12)	**Volume:** 1,000 gal. **Size:** 4 ft. diameter x 12 ft. length **Material:** Steel **Accessories:** N/A	**Material:** Gasoline **COCs:** Acetone .... (FRL; no OSDF WAC) Benzene .... (FRL; no OSDF WAC) Carbon Tetrachloride .... (FRL; no OSDF WAC) 1,2-Dichloroethane ...... (FRL; no OSDF WAC) 1,1-Dichloroethene .... (FRL; OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Methyl Chloride ...... (no FRL; no OSDF WAC) Methyl Ethyl Ketone ... (no FRL; no OSDF WAC) Tetrachloroethene .... (FRL; OSDF WAC) Toluene .... (FRL; no OSDF WAC) 1,1,1-Trichloroethane .. (no FRL; no OSDF WAC) Trichloroethene .... (FRL; OSDF WAC) Xylene .... (FRL; no OSDF WAC) Arsenic .... (FRL; no OSDF WAC) Cadmium .... (FRL; no OSDF WAC) Chromium .... (FRL as VI; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) Selenium .... (FRL; no OSDF WAC) **Reference MEFs:** 501, 1616, 1618, 1672, 2746, 10026	**REMOVED – UST Removal Action appears to meet FRL criteria; Additional Sampling Required to Demonstrate FRL Attainment.** Tank removed; clean-closed under Subtitle I; received letter for no further action from State Fire Marshal on 4/7/92. Analytical results from 3 soil samples collected (selected based on highest PID levels) from the excavation indicated elevated levels of Lead (5.98-8.85 ppm), Toluene (5.4 ppb) and Xylene (11.8 ppb); however, the concentrations of these 3 constituents are below FRLs. Benzene (< 5.0 ppb), Ethyl benzene (<5.0 ppb) and TPH conc. (< 10.0 ppm) were below detection limits, and below established FRLs. (Source: 1/22/91 Closure Assessment Report for Petroleum USTs).

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-11	**Remediation Area:** 4b **Location:** Buried under gravel approx. 6 ft. E of Plant 1 Truck Dock and S of Bldg. 1. Also 2 ft. N of UST 12 and 2 ft. S of Plant 1 cyclone fence. (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 3,000 gal. **Size:** 5.5 ft. diameter x 18 ft. length **Material:** Steel **Accessories:** Tank piping runs N under cyclone fence, then approx. 10 ft. to gas pump.	**Material:** Kerosene, Gasoline **COCs:** Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Methyl Isobutyl Ketone . (no FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) 1,1,1-Trichloroethane . . (no FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Arsenic .... (FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Chromium .... (FRL as VI; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) Selenium .... (FRL; no OSDF WAC) **Reference MEFs:** 345, 492, 1408	**REMOVED — Sampling Required to Demonstrate FRL Attainment.** Tank in poor condition upon removal (3/91 UST RSE) - No further action required under Subtitle I (11/1/93 State Fire Marshal's letter). Soils surrounding Tanks 11, 12, and 13 were sampled in 1990 upon completion of tank removal. Results: Benzene - 342 ppb, Toluene - 519 ppb, Ethylbenzene - 2,920 ppb, Xylene - 11,400 ppb, Lead - 19.7 ppm; all conc. below FRLs. Maximum TPH conc. was 1,810 ppm (no FRL established). In 1991, excavation extended to approx. 11 ft. deep and horizontally until structural constraints or non-petroleum hydrocarbon contamination discovered - 5,000 sf. with est. vol. of 2,000 cu. yds. of soil. *No soil sampling conducted following 1991 excavation.* (8/93 UST Closure Report). The following is from 2/11/92 letter to BUSTR: During 1991 excavation, pocket of fly ash and rubble found approx. 50 ft. E of tank cluster at 9 ft. depth. Inconsistent organic vapor reading led to soil sampling. Results indicated presence of acetone and methanol (could not find results in file) (NOTE: Acetone—FRL; no OSDF WAC; Methanol—no FRL; no OSDF WAC). Also evidence of petroleum-contaminated soils underneath Plant 1 Truck Dock.

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-12	**Remediation Area:** 4b **Location:** Approx. 6 ft. E of Plant 1 Truck Dock and S of Bldg. 1. Also 2 ft. S of UST 11). (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 3,000 gal. **Size:** 5.5 ft. diameter x 18 ft. length **Material:** Steel **Accessories:** Tank piping runs across UST 11, under cyclone fence, then approx. 10 ft. to gas pump.	**Material:** Gasoline **COCs:** Benzene .... (FRL; no OSDF WAC) Lead .... (FRL; no OSDF WAC) **Reference MEFs:** 492, 6055	**REMOVED — Sampling Required to Demonstrate FRL Attainment.** Tank in poor condition upon removal (3/91 UST RSE) - No further action required under Subtitle I (11/1/93 State Fire Marshal's letter). See UST 11 entry for information on soil contamination.
UST-13	**Remediation Area:** 4b **Location:** Approx. 25 ft. E of Plant 1 Truck dock and 40 ft. S of Bldg. 1 cyclone fence. (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 3,000 gal. **Size:** 5.5 ft. diameter x 18 ft. length **Material:** Steel **Accessories:** Pump and remote fill at N end of paved road S of tank	**Material:** Kerosene, Gasoline **COCs:** Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Methyl Isobutyl Ketone . (no FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) 1,1,1-Trichloroethane .... (FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) Arsenic .... (FRL; no OSDF WAC) Barium .... (FRL; no OSDF WAC) Chromium .... (FRL; no OSDF WAC) Lead .... (FRL; no OSDF WAC) Mercury .... (FRL; OSDF WAC) Selenium .... (FRL; no OSDF WAC) **Reference MEFs:** 345, 492, 1408	**REMOVED — Sampling Required to Demonstrate FRL Attainment.** Tank in poor condition upon removal (3/91 UST RSE) - No further action required under Subtitle I (11/1/93 State Fire Marshal's letter). See UST 11 entry for information on soil contamination.

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
UST-17	**Remediation Area:** 5 **Location:** Approx. 10 ft. N of Heavy Equipment Building (Bldg. 46) (Per UST Program Evaluation Report, 11/92)	**Volume:** 200 gal. **Size:** 2.5 diameter x 6 ft. length **Material:** Steel **Accessories:** N/A	**Material:** Waste Oil from Oil/Water Separator **COCs:** Acetone .... (FRL; no OSDF WAC) 1,1,1-Trichloroethane .... (FRL; no OSDF WAC) *Barium* .... (FRL; no OSDF WAC) Selenium .... (FRL; no OSDF WAC) **Reference MEFs:** 123, 124, 60035 **SWMU - Not regulated by BUSTR**	**REMOVED — Sampling Required to Demonstrate FRL Attainment.** Tank and concrete slab above tank was removed (slab was at 8 ft. depth) - tank was in very poor condition and, upon removal, water inside tank emptied into the excavation (water accumulated after tank was emptied of its contents). Water in excavation was immediately removed and drummed. Soils that came into contact with water or that were discolored were excavated — 3 drums w/ Lot code W050-741-P011-0395. (Source: May 1995 UST 5,7,14 and 17 Closeout Report). Soil samples were collected prior to excavation: Xylene (27 ppb) and Lead (29.7 ppm) were detected but at conc. below FRLs. Benzene, Toluene and Ethylbenzene were not detected. Note that one soil sample collected prior to excavation did contain 12.9 ppm Chromium (EP Tox); the total conc. of Chromium in this sample was 10.9 ppm (conc. is below Chromium VI FRL of 300 mg/kg or ppm). Concentrations of other metals analyzed in soil samples (Barium, Mercury, Arsenic, Cadmium, Selenium and Silver) were below FRLs. 1,1,1- Trichloroethane was detected in the oil-separator (1,050 ppb) but was not detected in the soil (no FRL established). The maximum TPH conc. in the soil was 3,300 ppm (no FRL established). No other volatile or semi-volatile organic compounds were detected in the soil samples. *No post-excavation soil samples were collected.* (Source: May 1995 UST 5,7,14 and 17 Closeout Report; 7/93 UST 17 RSE)
Kerosene Tank	**Remediation Area:** 3 **Location:** Tank Farm	**Volume:** 13,525 gal. **Size:** Unspecified **Material:** Steel **Accessories:** N/A	**Material:** Kerosene **COCs:** (estimated) Benzene .... (FRL; no OSDF WAC) Ethylbenzene .... (FRL; no OSDF WAC) Toluene .... (FRL; no OSDF WAC) Xylene .... (FRL; no OSDF WAC) **Reference MEFs:** N/A; See MSDS	**REMOVED — Sampling Required to Demonstrate FRL Attainment.** Tank removed from service and excavated in 1988 prior to effective date of state and federal regs (so not included in list of tanks registered with State Fire Marshal).

Table 4-4
(Continued)

TANK ID	LOCATION	SPECIFICATIONS	CONTENTS	STATUS & DESCRIPTION OF CLOSURE ACTIVITIES
TANK HAS NOT BEEN REMOVED - TO BE REMEDIATED UNDER CERCLA				
UST-14	**Remediation Area:** 4a **Location:** Buried under concrete floor in former scrap melting area (S end) of Plant 6 (Source: 6/90 UST Content Removal Task Specific Health and Safety Plan)	**Volume:** 3,000 gal. **Size:** 5.5 diameter x 18 ft. length **Material:** Steel **Accessories:** N/A	**Material:** Waste Soluble Machining Oil - a heavy napthenic petroleum oil. COCs: Methanol .... (no FRL; no OSDF WAC) **Reference MEFs:** N/A; see MSDS Analysis of tank residues: Methanol conc. - 40 ppm. No other volatile or semi-volatile compounds or metals were detected. (Source UST 14 Closure Report, 6/92).	**ABANDONED IN PLACE — UST to be removed and Sampling Required to Demonstrate Closure and FRL Attainment.** Removed perched water from tank, disconnected process piping and filled tank with grout. To sample the soil beneath the UST, a hole was cut in the bottom of the tank. Perched water began flowing into the tank. *The presence of water precluded the sampling of underlying soils.* (Source: 5/95 UST 14 Closeout Report). Two soil samples were collected at a total depth of 2 ft. below the base of the oil supply line - BTEX not detected, Lead conc. (17.8 ppm) was below the FRL, TPH conc. was 139 - 174 mg/kg (no FRL established). (Source: 6/92 UST 14 Closure Report). An inspector from the State Fire Marshal's office inspected and approved tank abandonment in place on March 16, 1995 (5/95 UST 14 Closeout Report).

Table 4-5
Items Included in Each 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 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

TABLE 4-6

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 (Figure 4-2; Section 4.1)	1, 2, 6, and 7 (Figures 4-1 and 4-3)
B: Excavation in Waste Storage/Management Areas Outside the Former Production Area (Figure 4-4; Section 4.2)	2, 3, 6, 7, LSP, and SWL (Figures 4-1 and 4-5)
C: Excavation of Existing Soil Stockpiles in the Former Production Area and Remediation Area 1, Phase I (Figure 4-6; Section 4.3)	1, 3 and 5 (Figures 4-1 and 4-7)
D: Excavation Following D&D in the Former Production Area STP, and FTP (Figure 4-8; Section 4.4)	3, 4a, 4b, 5, 7, FTF, and STP (Figures 4-1 and 4-9)
E: Off-Property and Nonimpacted, On-Property Area Certification (Figure 4-10; Section 4.5)	1, 8, and off site areas (Figures 4-1 and 4-11)
F: Non-HDPE Pipeline Excavation Outside the Former Production Area (Figure 4-13; Section 4.6)	(Figures 4-1 and 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 4-7

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-Technetium-99, WAC Scan		x	x			x
	Non-Technetium-99, WAC-Driven, Excavation/Confirmation (Search and Remove)	x	x	x			x
	Real-Time, Non-Technetium-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 and Scan	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

Table 4-8
FEMP, EPA and OEPA Independent Oversight

	Remedial Action	Documentation	FEMP Oversight	EPA/OEPA Oversight
Pre-Excavation	Identify area to be remediated	• Area map	• WAOP - Verify area against Soil Excavation Plan.	• Remediation sequence provided to EPA/OEPA in Soil Excavation Plan.
Pre-Excavation	Review SED data. • ID area-specific constituents of concern • ID characterization requirements Prepare Project Sampling Plan (PSP)	• Project Sampling Plan	• WAOP - Sign-off PSP	
Pre-Excavation	Execute field radiological surveys and sampling.	• Survey records • Sample Log • Chain of Custody	• QA - 5 percent survey oversight. • QA - 5 percent split samples.	• Monthly remediation schedule provided to EPA/OEPA to coordinate oversight and split sampling.
Pre-Excavation	Enter characterization data into SED	• Data validation records	• QA - Data Validation	
Pre-Excavation	Interpret characterization data. Prepare Integrated Remedial Design Package.	• Integrated Remedial Design Package	• WAOP - Sign-off Integrated Remedial Design Package • WAOP - Prepare Material Profiles • WAOP Establish Material Transfer Locations	• Integrated Remedial Design Packages submitted to EPA/OEPA for review and approval.
Excavation	Excavate soil. Survey to assure above-WAC soil removed.	• Integrated Remedial Design Package • Material Profiles • Project Waste Identification and Disposition form	• WAOP - Prepare Project Waste Identification and Disposition Form • QA - 5 percent excavation and survey oversight	• Monthly remediation schedule provided to EPA/OEPA to coordinate excavation and survey oversight.
Post-Excavation	Transfer soil to interim stockpile, Waste Management, Waste Pits Remedial Action Project, or OSDF.	• Field Transfer Logs	• WAOP - Reconcile FTLs • WAOP- Verify MTL contents periodically • QA - 5 percent check of truck contents against FTLs	• MTL inspection schedule provided to EPA and OEPA to coordinate oversight • FTLs and IIMS reports maintained on-site for EPA/OEPA inspection

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

Pre-Excavation

Identify areas containing above-WAC concentrations of area-specific constituents of concern.

Monthly remediation schedule provided to EPA and OEPA to coordinate oversight and split sampling.

Integrated Remedial Design Packages submitted to EPA and OEPA for review and approval.

Excavation and Segregation

Excavate and segregate soil containing above-WAC concentrations of area-specific constituents of concern.

Monthly remediation schedule provided to EPA and OEPA to coordinate excavation and survey oversight.

Post-Excavation

Maintain segregation of soil containing above-WAC concentrations of area-specific constituents of concern during handling and transport.

Field transfer logs and IIMS reports maintained on-site for EPA and OEPA inspection.

Figure 4-1: Soil Remediation - WAC Attainment Objectives by Phase + Support for EPA and OEPA Oversight Activities

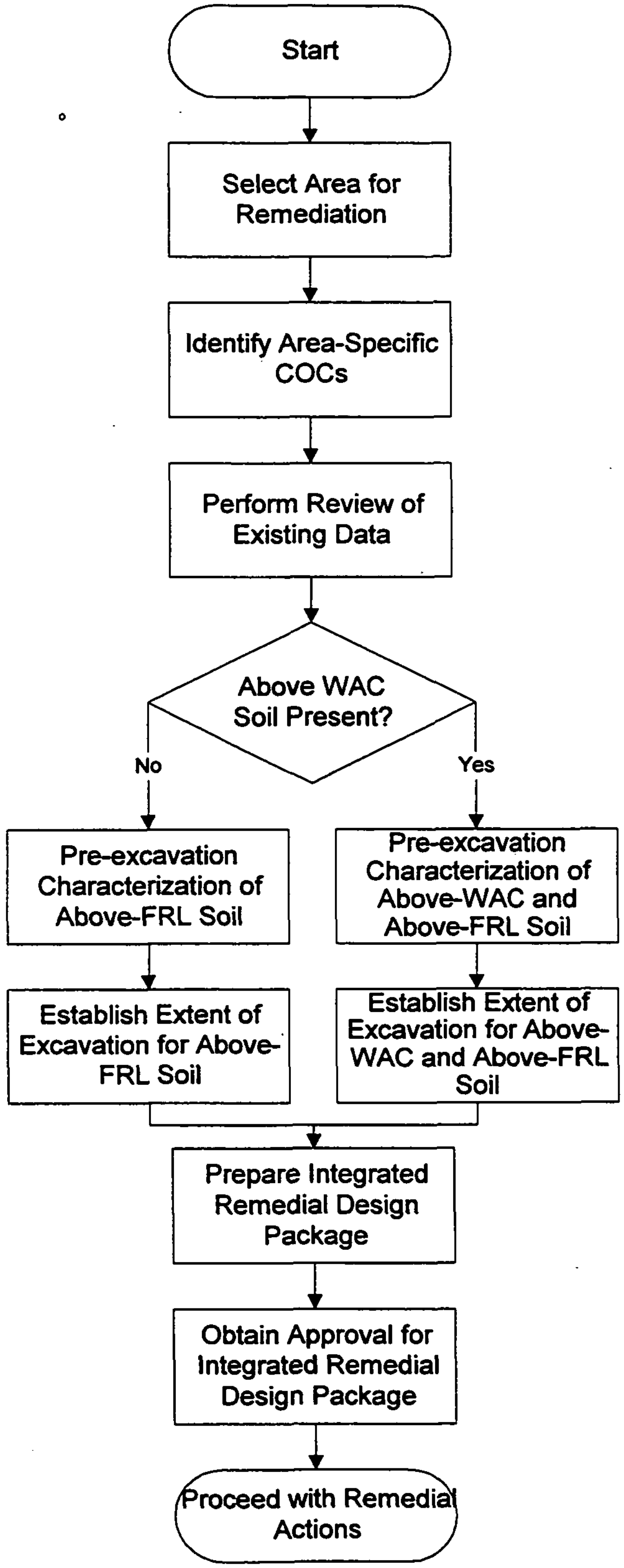


Figure 4-2: Sequence of pre-excavation phase activities.

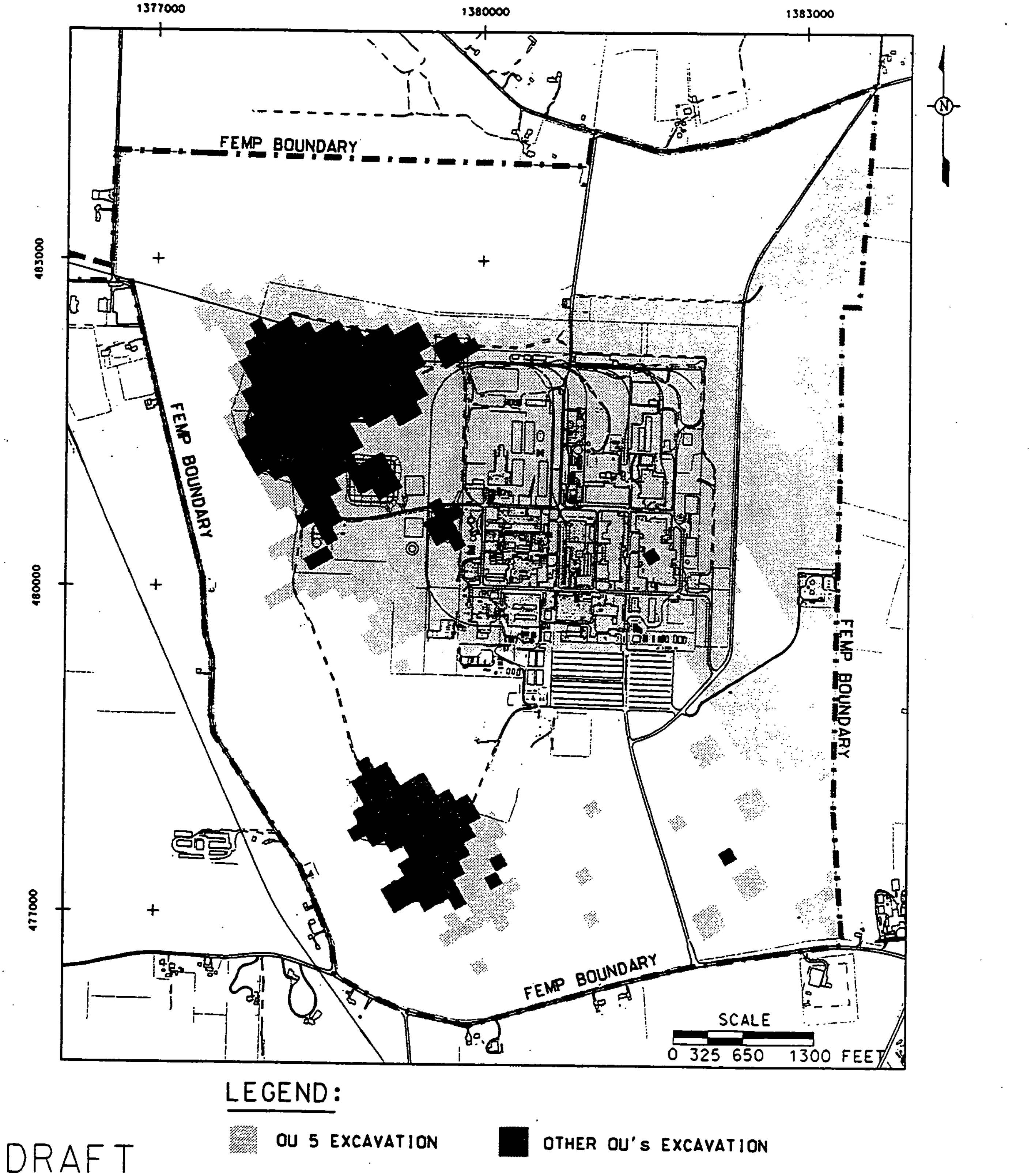
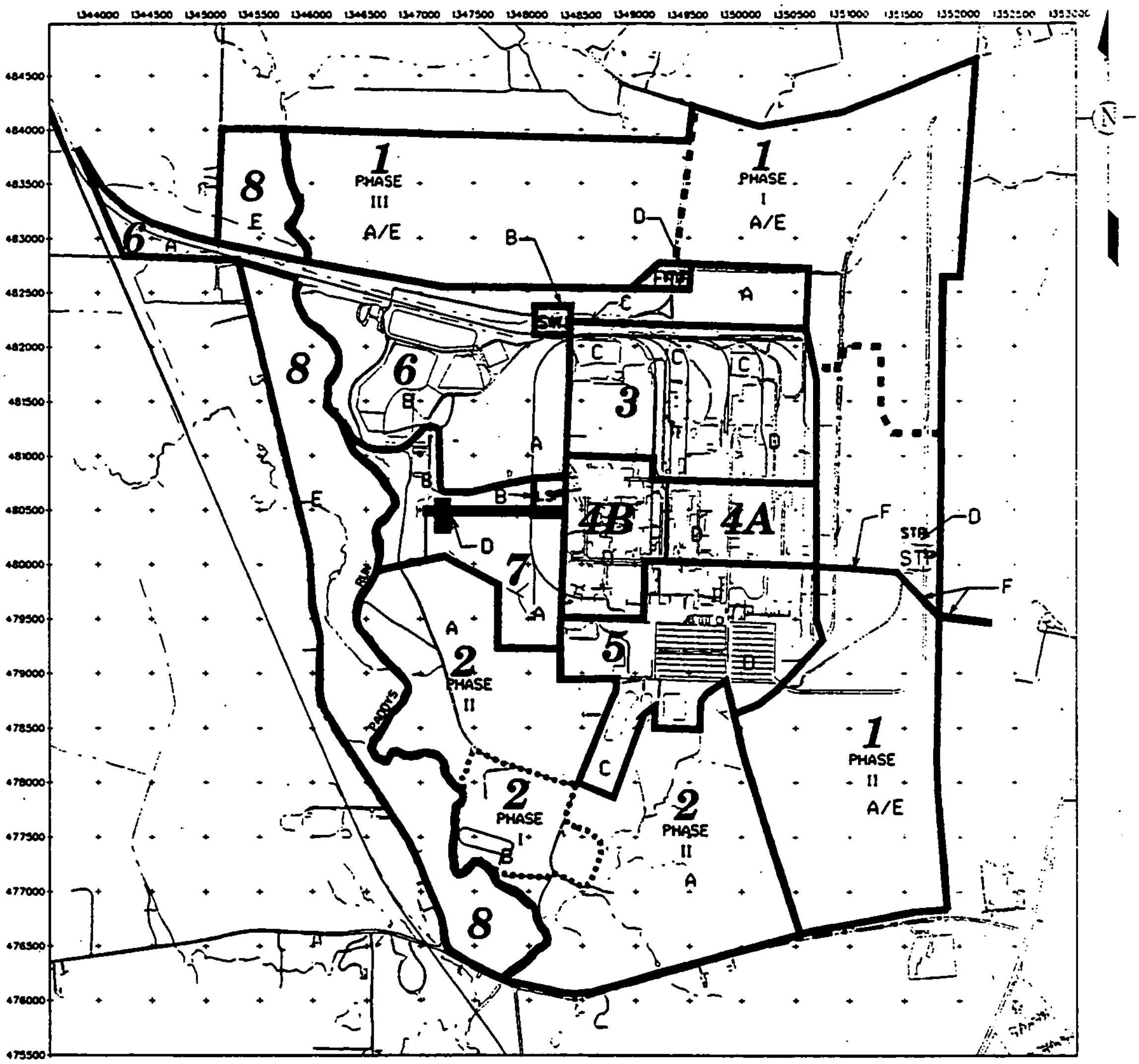


Figure 4-3 FEMP Areas Requiring Soil Remediation



EXCAVATION APPROACH DEFINITION:

A: SHALLOW EXCAVATION OF IMPACTED ON-PROPERTY AREA OUTSIDE OF THE FORMER PRODUCTON AREA AND 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. SEWAGE TREATMENT PLANT AND THE FIRE TRAINING FACILITY.

E: OFF-PROPERTY AND NON-IMPACTED ON-PROPERTY AREA CERTIFICATION.

F: NON-HDPE PIPELINE EXCAVATION OUTSIDE THE FORMER PRODUCTION AREA.

LEGEND:

- - - - - - PHASE BOUNDARY
— · — · — FEMP BOUNDARY
——— EXCAVATION APPROACH BOUNDARY
4b REMEDIATION AREA
B EXCAVATION APPROACH

SCALE
1500 750 0 1500 FEET

DRAFT

Figure 4-4 FEMP Remediation Areas and Sequence of Remediation

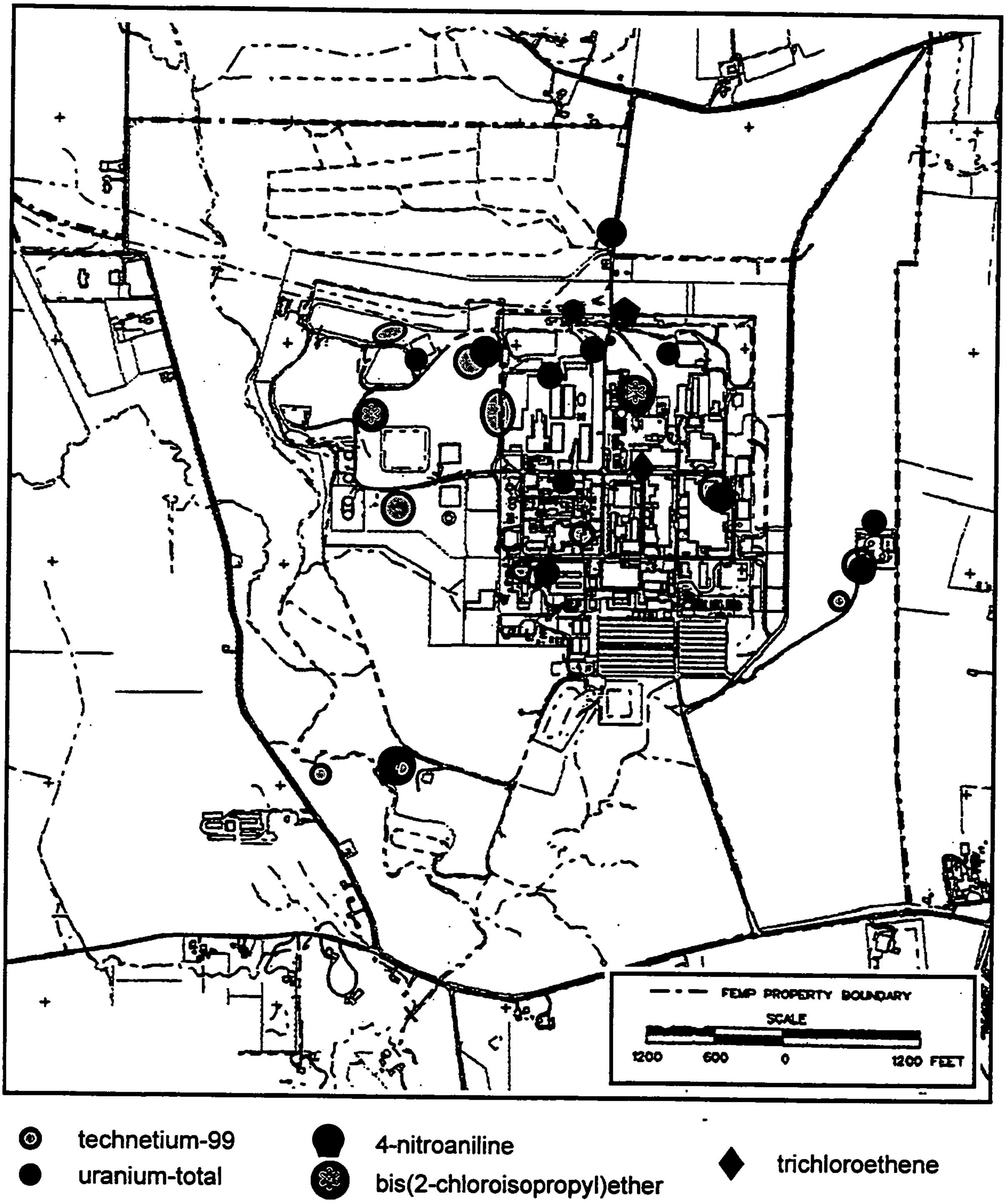
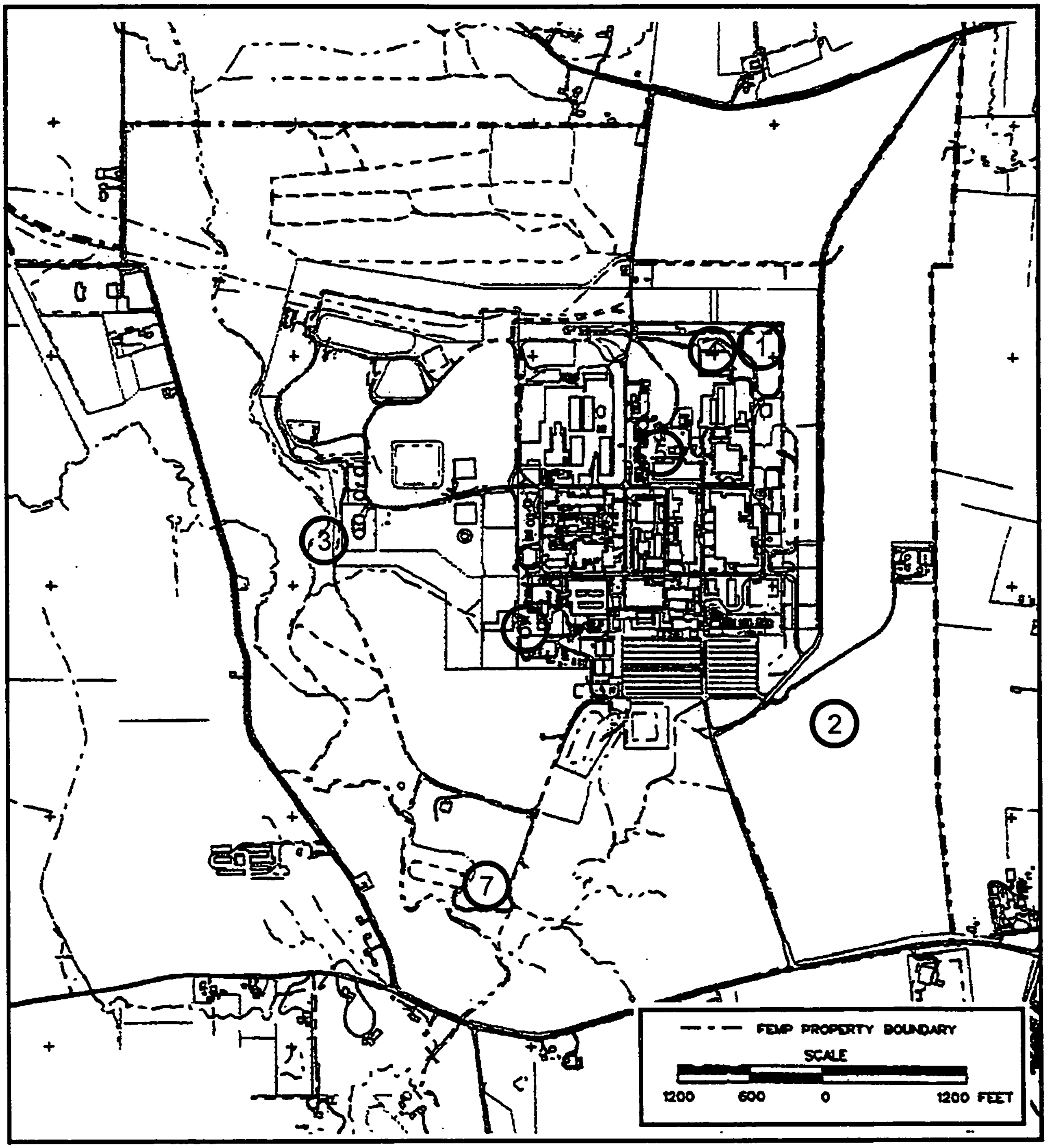


Figure 4-5: WAC COC in Concentrations Exceeding the WAC



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 4-6 Areas Containing RCRA Characteristic Waste that Qualifies for Treatment

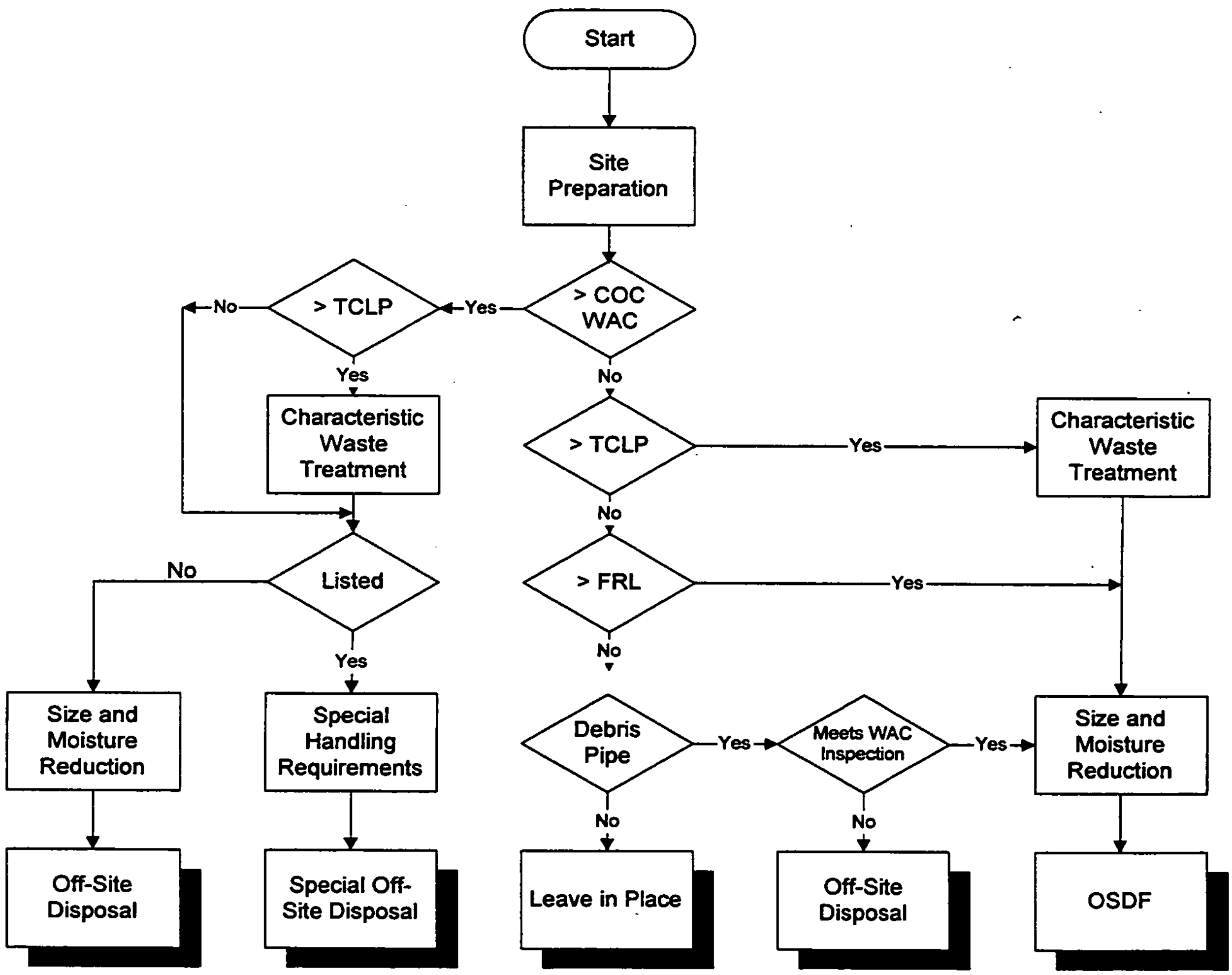


Figure 4-7: Sequence for Soil Excavation and Disposal.

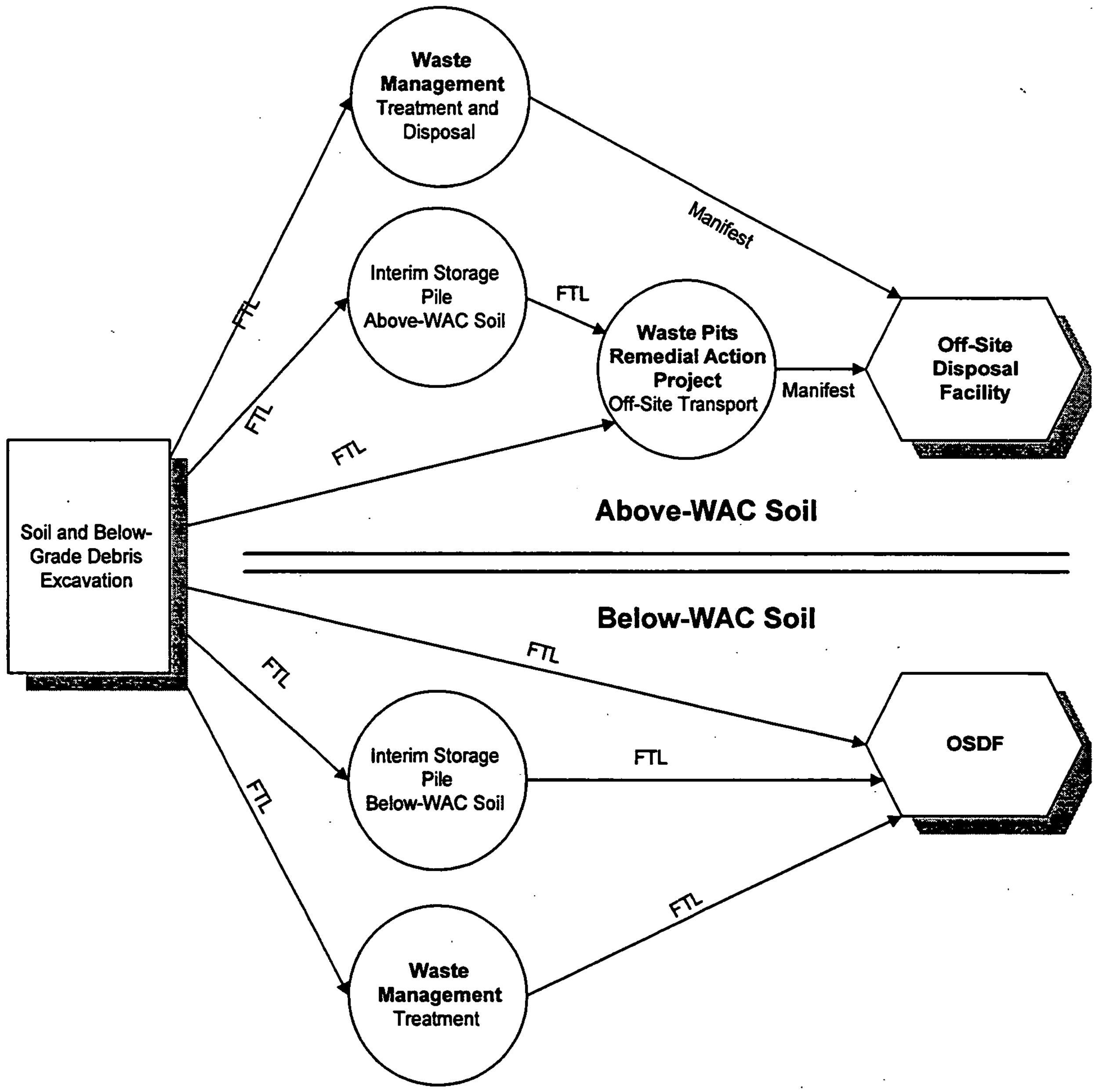


Figure 4-8: Material Destination Decisions and Organizational Hand-Off

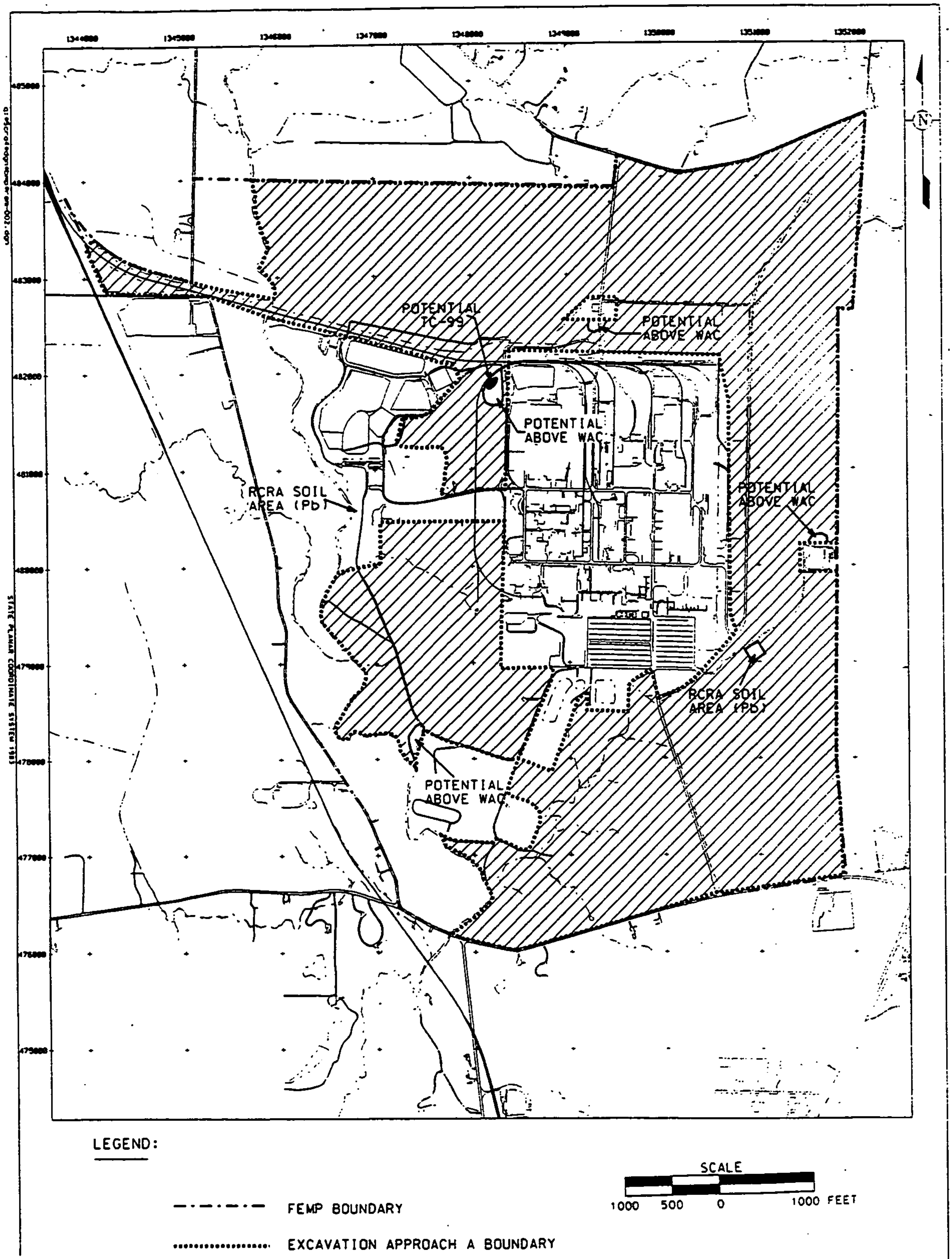


Figure 4-9: Estimated Excavation Areas for Excavation Approach A

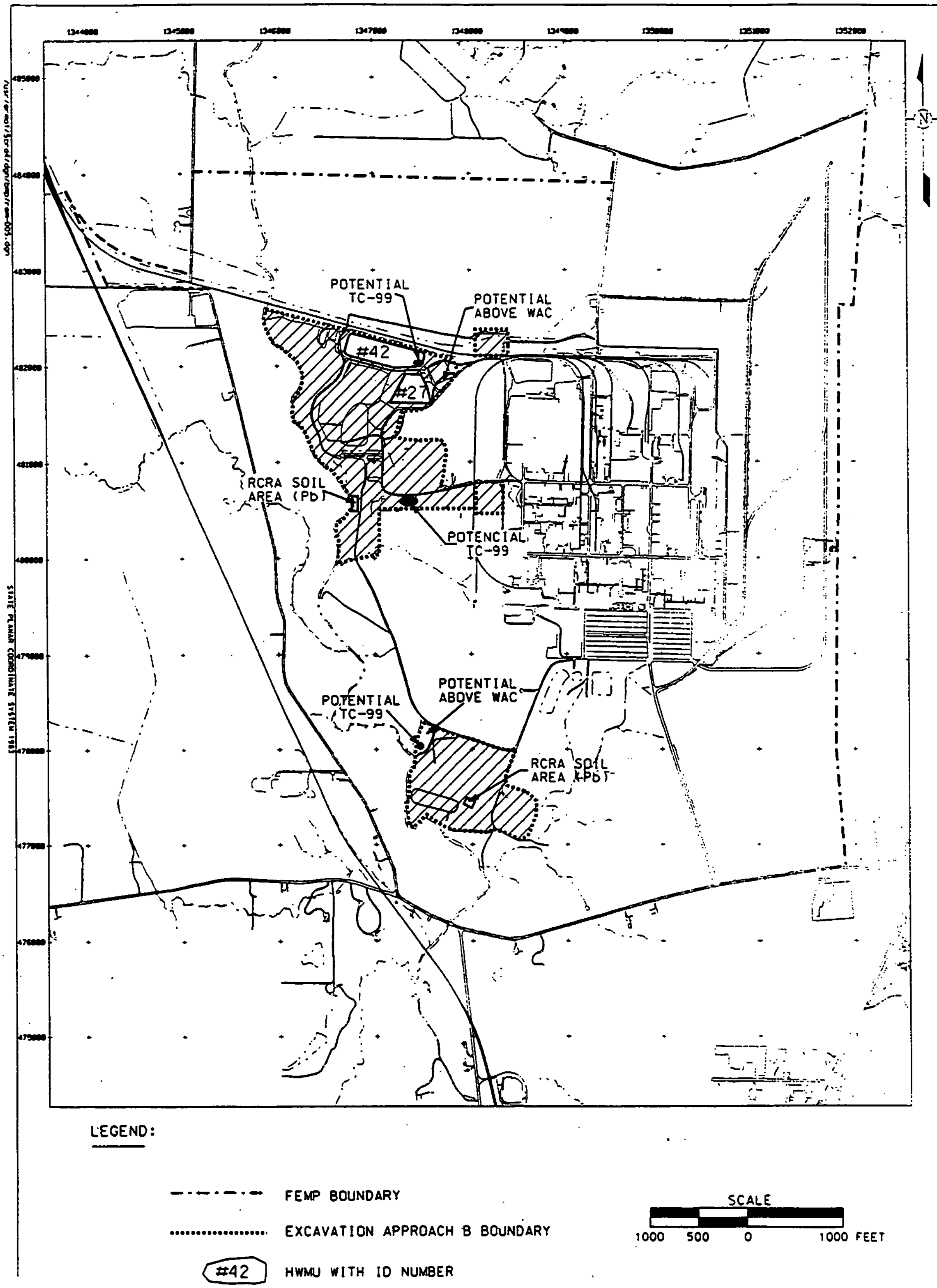


Figure 4-10: Estimated Excavation Areas for Excavation Approach B

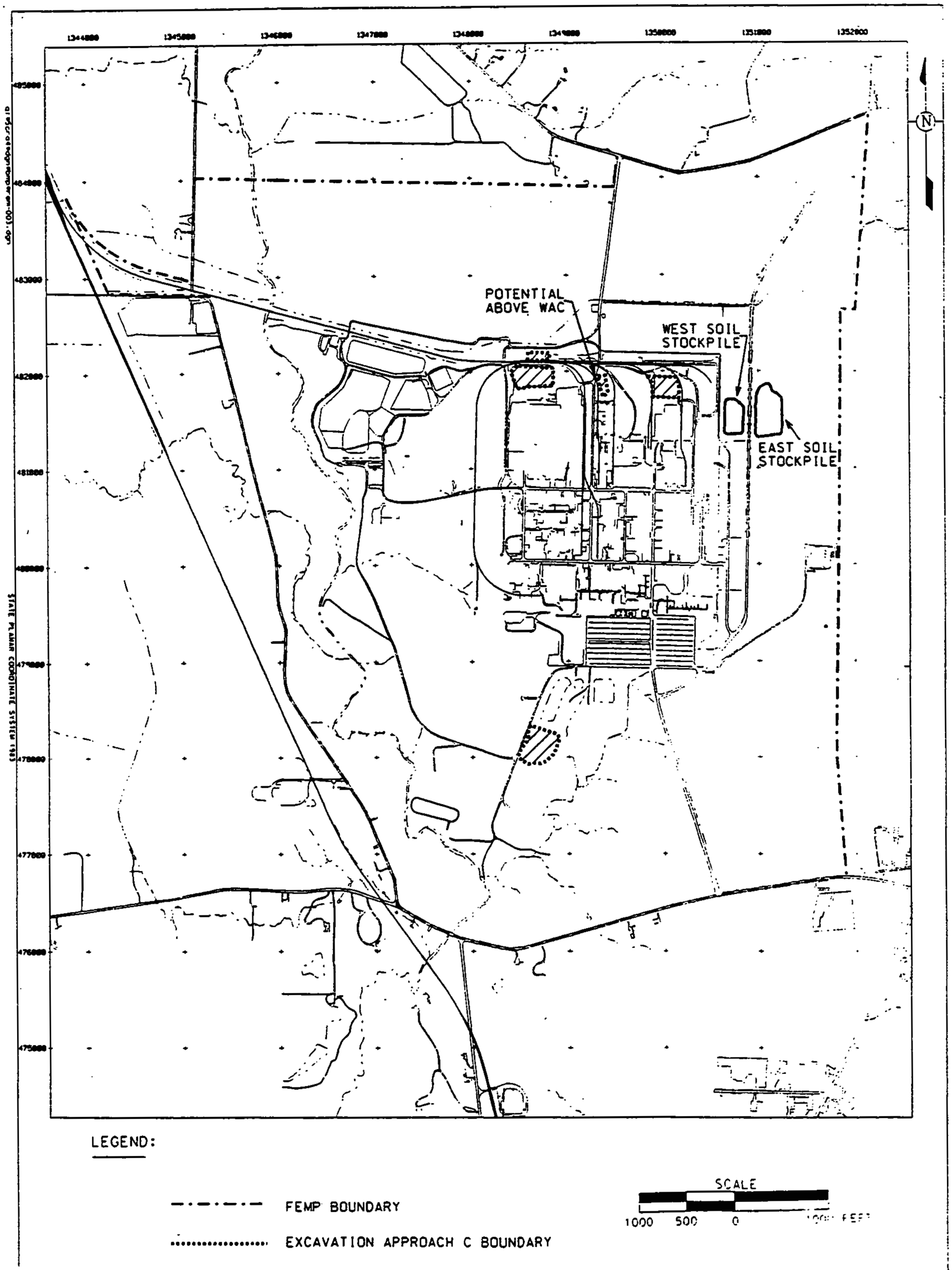


Figure 4-11: Estimated Excavation Areas for Excavation Approach C

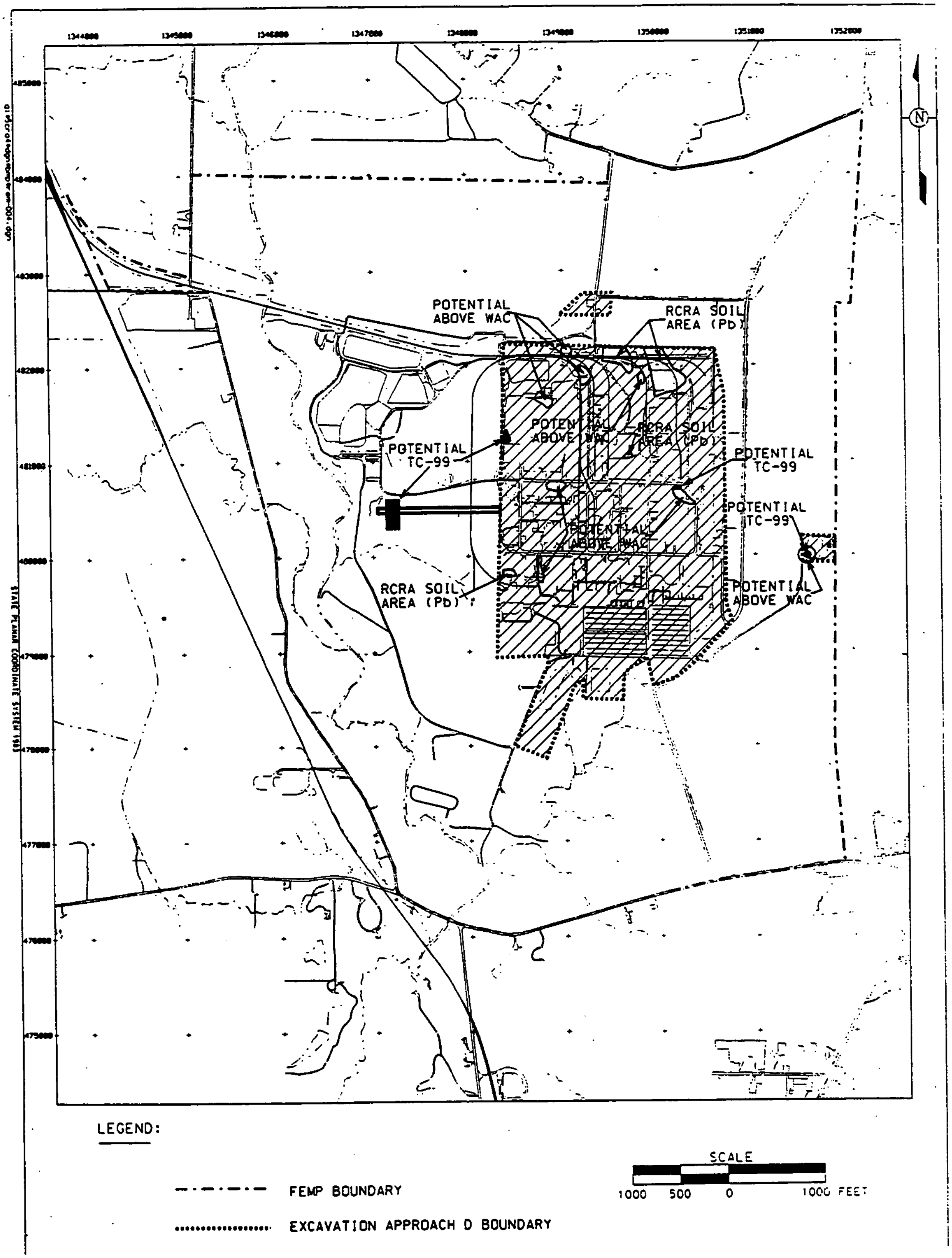


Figure 4-12: Estimated Excavation Areas for Excavation Approach D

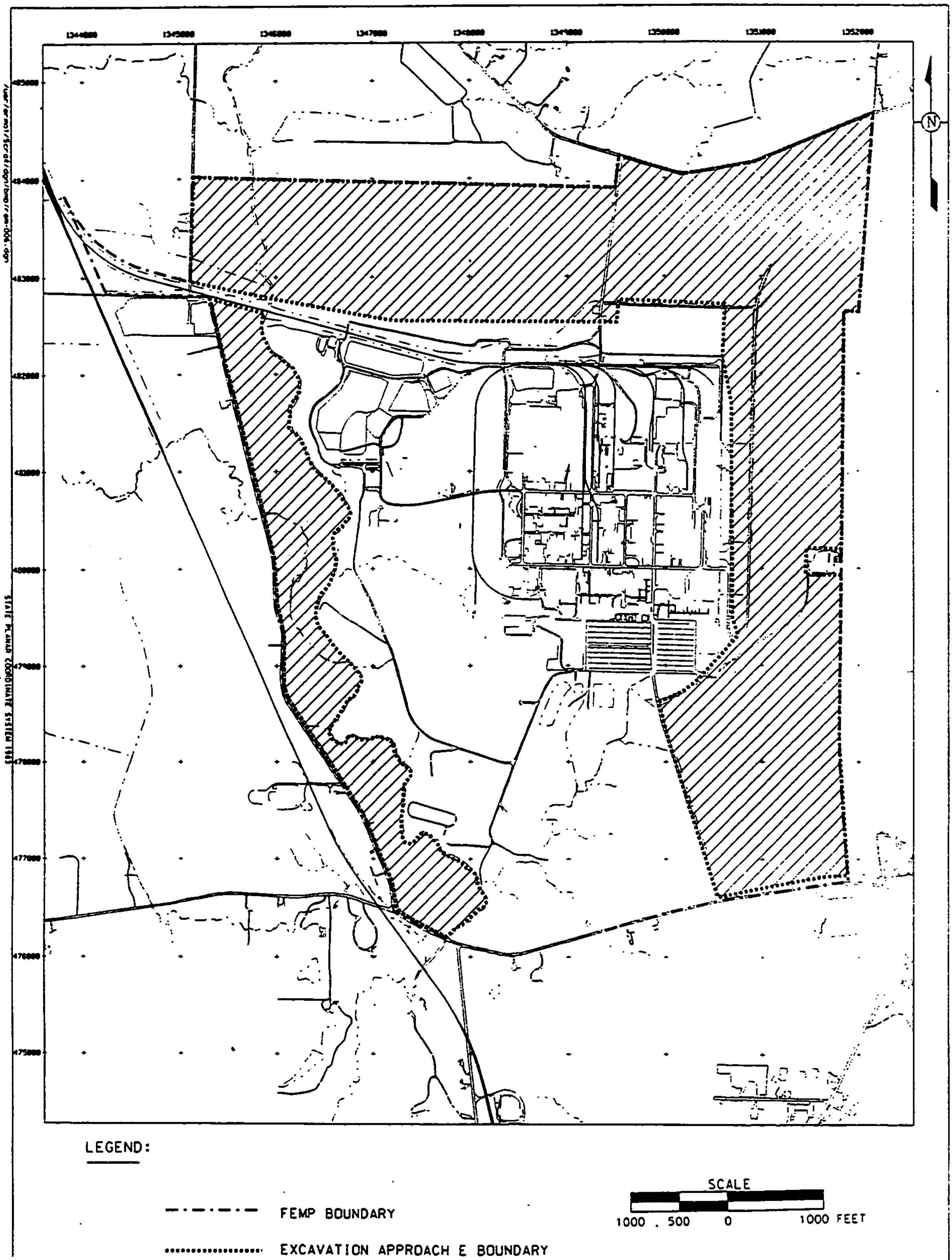


Figure 4-13: Estimated Excavation Areas for Excavation Approach E

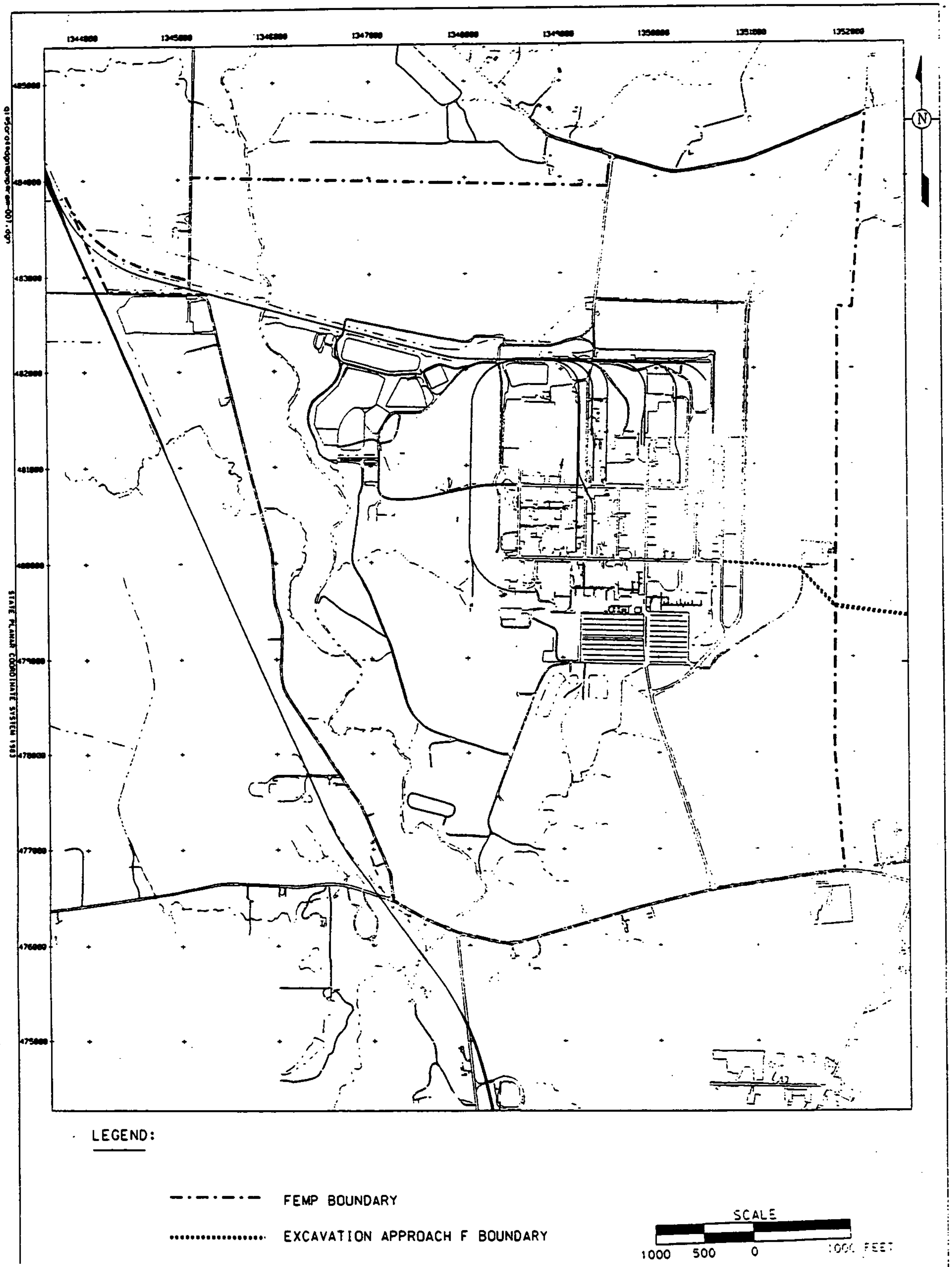


Figure 4-14: Estimated Excavation Areas for Excavation Approach F

5.0 WAC ATTAINMENT PLAN FOR DEBRIS

The Operable Unit 3 final remedial action addresses treatment and final disposition of debris resulting from above-grade building dismantlement and at- and below-grade excavation. 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.

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.

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.

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.

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 above-WAC 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.

Materials will be field-certified by Operable Unit 3 for OSDF disposal 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 Tc-99) are disposed of off-site, then all remaining Operable Unit 3 materials could be disposed of in the OSDF, provided that they satisfy the OSDF WAC. The Operable Unit 3 ROD also imposes the requirement that potentially mixed wastes (with the exception of those debris streams listed above) may be disposed in the OSDF provided that those materials are treated to meet OSDF WAC and that any identified RCRA characteristic waste is appropriately addressed.

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 that RCRA characteristic hazardous waste streams not be disposed in the OSDF, 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 Tc-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.

The preferred disposal route for debris associated with RCRA-defined hazardous waste management units being closed as part of a D&D complex, under the integrated RCRA/CERCLA approach, is on-site disposal, provided that the debris meets the OSDF WAC. For hazardous waste units where RCRA characteristic waste was involved, process knowledge and/or appropriate decontamination methods will be used to verify that the debris satisfies the OSDF WAC.

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.

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.

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

TABLE 5-1

CROSSWALK BETWEEN DEBRIS CATEGORIES AND OSDF CATEGORIES

Debris Category		OSDF Category
A	Accessible Metals	2/3
	Oversize Debris	5
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

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.

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.

As indicated in the footnote on Table 5-2, a small quantity of specific materials (i.e., structural steel up to 20 feet long, mill rolls, mill housings, and machine stands) can be treated as oversize debris under OSDF Category 5 (Specially Handled Materials). For these materials only, size constraints can be waived. Oversize debris is discussed in more detail in Section 3.4.

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′

Note: These size constraints may be exceeded only by mill rolls, mill stand housings, machine stands, and structural steel.

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 Debris Tracking and Routing Sheets (DTRS), 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 staging area. The generation, transportation, and delivery of debris to the OSDF will be tracked by SWIFTS.

5.1.4 Material Evaluation and Tracking Documentation

Proper documentation of material segregation, storage, transportation, and disposition is essential to ensuring WAC are met. 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 Project Waste Identification and Disposition (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

The PWID is used for planning and disposal of soil, debris, and waste from a project. This form identifies all material that will be generated during a D&D project and the determination of material management. It is prepared during remedial design to prequalify material based on new and existing data for future containerization, segregation, 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.

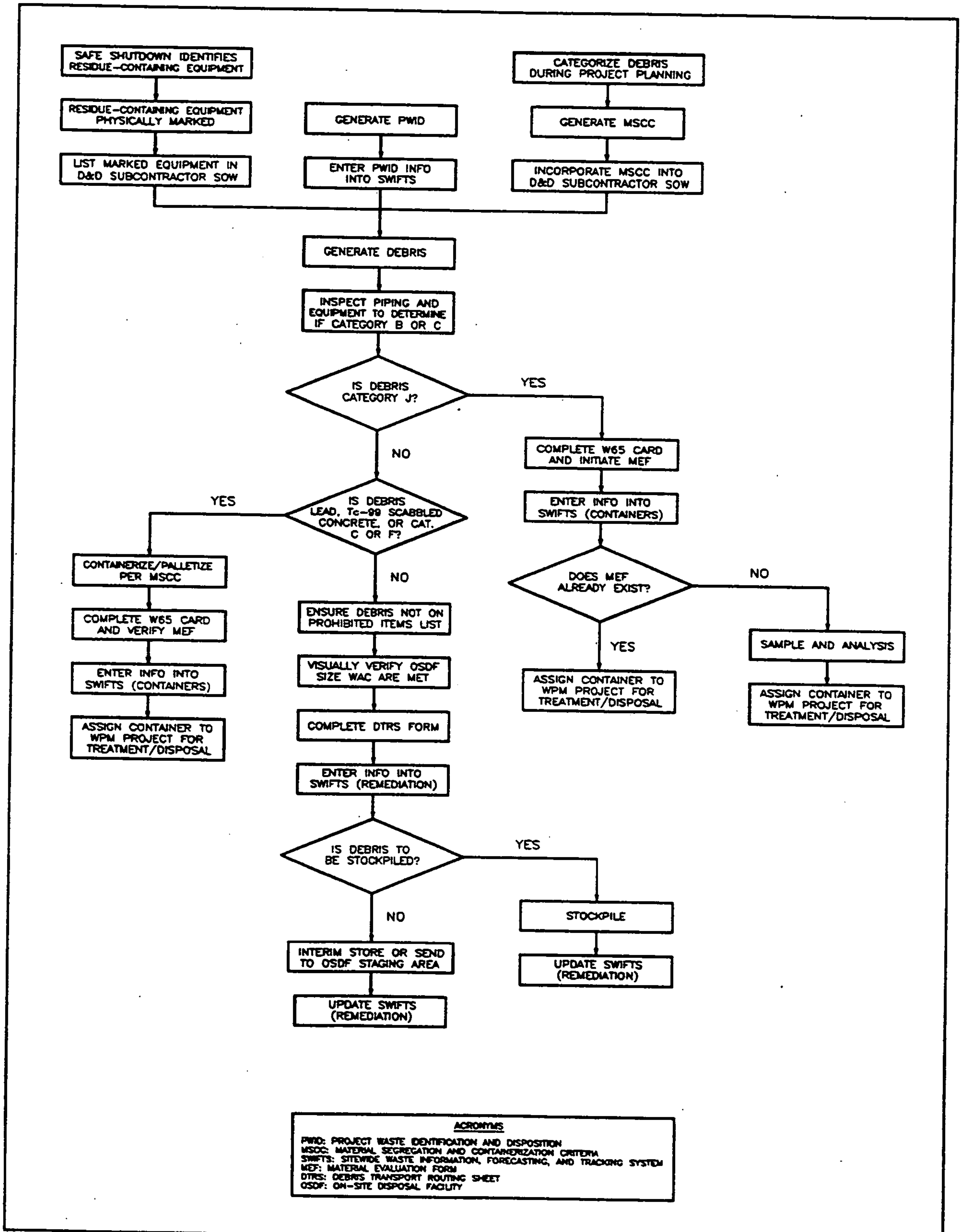
Material Segregation and Containerization Criteria Form

The MSCC is used to document the Operable Unit 3 debris category that a particular material 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 includes the material segregation categories and information contained in the PWID as a basis for determining the containerization and other management of the material.

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

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. A primary focus of the procedure is above-grade debris tracking, which is pictorially summarized in Figure 5-1.



DEBRIS HANDLING AND TRACKING APPROACH

FIGURE 5-1

000128

Debris Transport Routing Sheet

The primary document used to track above-grade debris is the DTRS. The DTRS form (Figure 5-2) has three sections that are completed during three different stages of material handling. Section I (Containerization) is filled out at the point of generation and contains the following information: the D&D project number (which is the same as the PWID number); serial and inventory number of the container; container type; date that the container was filled; Operable Unit 3 debris category; and signature of the appropriate FEMP representative to document certification.

Section II (Material Verification and Destination) documents whether the container is to be sent to interim storage, dumped into an interim debris pile, or sent directly to the OSDF for its contents to be dumped and placed. This section is signed by the person sending the container and the date sent.

Section III (Material Volume and Placement) contains the weight of the tare, gross, and net weights of the container. This section also provides information regarding the current location of the debris based on its destination given in Section II. If the container is sent to interim storage, the corresponding area, row, stack, and level of that container is listed in Section III. Similarly, if the container is dumped into a debris stockpile, the identification number of the stockpile is documented. Finally, when the debris is sent to the OSDF, the location of debris placement in the OSDF is documented.

Whenever the debris is containerized, moved, weighed, staged, etc., the new information is documented on the DTRS and the form is signed with the date that the action took place. The relevant information from the DTRS is then entered into the SWIFTS database (discussed further below).

Field Tracking Log/On-Site Manifest

The DTRS has been the primary tracking document for debris generated from above-grade D&D projects, but, in its current form, does 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 Field Tracking Log/On-Site Manifest (FTL/OSM), is the process of being finalized and translated into a site operating procedure. The FTL/OSM contains the same information as the DTRS and also includes the OSDF placement category, the volume of soil or debris generated, and the corresponding material

Debris Transport Routing Sheet

Section I - Containerization

1. SWIFTS Project # ______________ 2. Container Inventory # ______________ Serial # __________

3. Container Type: ☐ ROB ☐ ISO ☐ Top Load MB ☐ WMB ☐ ½ high WMB ☐ Other: ______________

4. Packaging Completion Date: ______________

5. Category (Choose One)

☐ A: Accessible Metals	MEF 2241		☐ G: Non-Regulated ACM	MEF 1961	
☐ B: Inaccessible Metals	MEF 2844		☐ H: Regulated ACM, friable	MEF 1340	
★ C: Process Related Metals	MEF 779	(note a)	☐ I: Miscellaneous	MEF(s) ______	(note c)
☐ D: Light Gauge Metals	MEF 2852				
★ D: Lead	MEF 874	(note b)	______	______	______
☐ E: Concrete	MEF 2007				
★ F: Acid Brick	MEF 2188	(note b)	● Z: Hazardous Waste	MEF(s) from PWID	(note b)

Notes

a. Not acceptable per OSDF WAC. Do not use this form. Use PT-0011 and process area checklists.

b. Not acceptable per OSDF WAC. Do not use this form. Use EW-0001 (MEF with verification) per PWID.

c. OSDF bound materials from PWID only. Fill in the MEF number(s). For non-OSDF, use MEF with Verification per PWID.

6. ☐ Thorium contaminated waste

7. Certification Signature: (Project generation only)

Name: ______________ Signature: ______________ Date: __________

Section II Material Verification and Destination

1. Destination:

☐ Interim Container Staging: ______________ ☐ Interim Debris Pile: ______________ ☐ OSDF (direct)

2. Packaging Support Verification:

Name: ______________ Signature: ______________ Date: __________

*Copy 1 to MC&A; Copy 2 to Project Certifier

Section III Material Volume and Placement

1. Package Volume:

Tare: __________ lbs. Gross: __________ lbs. Net: __________ lbs.

Scale Operator:

Name: ______________ Signature: ______________ Date: __________

2. Interim Container Staging Receipt (if required): Location __________ Area ______ Row ___ Stack ___ Level ___

Name: ______________ Signature: ______________ Date: __________

*Copy 3 to MC&A (with weight tickets attached)

3A. Interim Debris Storage Receipt (Stockpile): Stockpile Identification Number: ______________

Name: ______________ Signature: ______________ Date: __________

*Copy 4 & Original to MC&A

3B. OSDF Receipt: OSDF Placement Location: ______________

Name: ______________ Signature: ______________ Date: __________

*Copy 4 to OSDF records; Original to MC&A

FS-F-4669 (05-23-96) ORIGINAL TO MC&A

FIGURE 5-2
DEBRIS TRANSPORT
ROUTING SHEET (FRONT)

000130

Instructions for Completing Section I - Containerization

1. Enter SWIFTS Project #. This number is a unique number assigned to each project and can be found on both the PWID and MSCC.

2. Enter the Container Inventory #. This is the W number found on the container.
Enter the Serial #, if available.

3. Check off box which is applicable for that container.

4. Enter the date when the packaging of the container was completed.

5. Category (Choose One). Check off one of the boxes identifying which category of debris is contained. SHADED CATEGORIES ARE NOT COVERED BY THIS FORM. Below are examples of debris for each category. PLEASE NOTE: The categories listed below, include but are not limited to, the examples provided.

A	Accessible Metals	Structural steel and steel decking having large accessible surface areas and thicknesses which are greater than one-quarter inch. The surface of accessible metals can be easily decontaminated using physical surface decontamination techniques and subsequently surveyed prior to disposition.
B	Inaccessible Metals	Non-process piping, equipment in non-process areas, decontaminated process equipment, conduit/wire, electrical fixtures, miscellaneous electrical items, doors, and other miscellaneous metals are included in this category. These debris have surfaces which cannot be easily decontaminated or surveyed, and thus are considered inaccessible.
C	Process-Related Metals	Process equipment, electrical equipment not included in category B, and process piping which are assumed to be highly contaminated. Treatment of these debris is not expected to be cost-effective. DO NOT USE THIS FORM; SEE NOTE A ON FRONT OF FORM.
D	Painted, Light-Gauge Metals	Ductwork, louvers, metal wall and roof panels, and sheet metal (painted metals less than one-eighth inch thick) are included in this category. Metals in this category are assumed to be painted with lead-based paint.
D	Lead	Lead, lead flashing, and lead debris. DO NOT USE THIS FORM; SEE NOTE B ON FRONT OF FORM.
E	Concrete	Concrete, concrete block, masonry, asphalt, and clay piping are all porous construction debris.
F	Acid Brick	Acid brick was used extensively to line floors, drain areas, and trenches in the process areas utilizing corrosive chemicals, and thus is expected to be highly contaminated. DO NOT USE THIS FORM; SEE NOTE B ON FRONT OF FORM.
G	Non-Regulated Asbestos Containing Materials	Transite walls and roofs, refractory (fire brick and insulating brick) debris, ceiling demolition, floor tile, and feeder cable are debris which are non-friable.
H	Regulated Asbestos Containing Material	Piping insulation, ductwork insulation, and personal protective equipment (PPE), which are also classified as regulated ACM because either the debris matrix is potentially friable ACM, or in the case of PPE, contaminated with asbestos fibers during asbestos abatement activities.
I	Miscellaneous Debris	Other miscellaneous items present in the structures and buildings including windows, wood, build-up roofing, building insulation (non-ACM), drywall, process area and non-process area trailers, polyvinyl chloride (PVC) pipe, fabric roofs and walls, PPE, and other miscellaneous debris. SEE NOTE C ON FRONT OF FORM.
Z	Hazardous Waste	Hazardous waste will be those wastes that exhibit any characteristic of or listed as hazardous waste based on process knowledge and/or sampling and analytical data. DO NOT USE THIS FORM; SEE NOTE B ON FRONT OF FORM.

6. Check the box indicating that Thorium contaminated waste is packaged within this container, if applicable.

7. Project Certifier shall print name, sign name, and date this line. This signifies acknowledgment that the category which is identified on the front of the form is contained within that container and meets the criteria shown above for that category.

Any questions, please contact a WPM representative or consult procedure EW-0006, "Management of Debris"

FIGURE 5-2 (continued)
DEBRIS TRANSPORT
ROUTING SHEET (BACK)

profile number for the soil or debris stream. The FTL/OSM will replace the DTRS form as an integrated, site-wide manifest for disposal of material in the OSDF. Until this form is finalized and approved and the procedure implemented sitewide, the DTRS will continue to be used for tracking above-grade debris.

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, once finalized). 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 (i.e., quality control) 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 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 on-site manifest (i.e., DTRS or FTL/OSM). An independent oversight organization (presented in Section 8.0) 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 manifest will accompany the shipment. Upon receipt at the OSDF, the shipment will be checked against the 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 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. Both EPA and OEPA are welcome to inspect the dismantlement, segregation, interim storage, and disposal process at their convenience. The file of executed DTRSs and FTL/OSMs and SWIFTS reports will be maintained on site to support inspection by EPA and OEPA.

5.2 BELOW-GRADE DEBRIS

In general, at- and below-grade debris will be removed in 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.

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 Tc-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 Tc-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 Tc-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 Tc-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 Tc-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 Tc-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) all 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

The bulk of the debris anticipated to be encountered during excavation 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 not expected to be encountered. Similarly, once the designated process areas of concrete have been scabbled to ensure the Tc-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 Tc-99 radiological WAC.

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, any remaining clumps of excess soil will be knocked or scraped off of the exterior of the pipes prior to OSDF disposition.

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 in accordance with OSDF placement categories. 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 debris 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 (i.e., quality control) 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 Quality Control

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 (i.e., FTL/OSM). An independent oversight organization (presented in Section 8.0) 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 manifest will accompany the shipment. Upon receipt at the OSDF, the shipment will be checked against the 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 lot of debris.

5.2.6.2 EPA and OEPA Oversight

Upon approval of the area-specific IRDPs, the schedule for excavation of the corresponding soil and debris will be finalized. 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.

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. 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

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 will be managed for disposal in the OSDF.

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 multiple waste streams are sent through the facility to be dewatered. The sludge is taken out of the filter press and containerized for disposal. 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.

Based on the type of material being processed, the specific chemical reactions that produce the SDF sludge, and available sampling results, an evaluation was performed of the potential likelihood of the 18 soil WAC constituents of concern (listed in Table 3-1) occurring in the sludge. Because of the prevalence of uranium in the waste streams coming into the SDF, total uranium will be an area-specific constituent of concern for SDF sludge. Likewise, the results from a sample of the sludge that was analyzed for Tc-99 showed a concentration of 15 pCi/g, which is slightly more than half of the soil WAC limit of 29.1 pCi/g. As a result, Tc-99 will also be an area-specific constituent of concern for this AWWT Facility waste stream. The WAC for neptunium-237 and strontium-90 are, respectively, eight and nine orders of magnitude higher than the highest detected level in soil at the FEMP. Due to the large difference between detected concentrations and the radiological WAC, these two radionuclides are not area-specific constituents of concern for the SDF sludge.

Since the SDF sludge ranges between 50-80 percent moisture, and organic compounds will tend to stay dissolved in the water, one would expect a portion of the organics to be retained in the SDF sludge. The only organic waste stream sent to the AWWT Facility, however, is the perched water from the former production area. When a comparison was done using the worst case concentrations of contaminants from the perched water systems from Plants 2/3, 6, 8, and 9 and assuming a worst case scenario of the sludge having a 99 percent moisture content (i.e., almost no sludge), the concentrations of organics in the sludge were four to five orders of magnitude lower than the WAC limits. The organic compounds with numerical WAC, therefore, are not area-specific constituents of concern for the SDF sludge.

There are no incoming waste streams that are expected to contain boron or mercury (the two metals with numerical WAC). If a miscellaneous waste stream with boron and/or mercury were sent to the AWWT Facility for treatment, a Waste Water Discharge Request Form would have to be filled out to notify the facility operators of the presence of these contaminants. A decision could then be made as to whether to sample the resultant sludge for these additional constituents or to send the sludge off site for disposal. Under current operations, however, boron and mercury are not area-specific constituents of concern for the SDF sludge.

For WAC attainment demonstration, one sample from each container of sludge generated will be analyzed for total uranium and Tc-99 to determine whether the material can be disposed of in the OSDF. Currently, a uranium grab sample is routinely taken of each box of SDF sludge and the information obtained to date from this sampling indicates that approximately 50 percent of the sludge will meet the WAC (and can therefore be disposed of at the OSDF) and 50 percent will need to be sent off site for disposal. Off-site disposal of all of this material remains an option in the future if it is found to be more cost effective to dispose of the sludge at an off-site disposal facility than at the OSDF. Also, if the WAC attainment data demonstrates that Tc-99 is not observed at concentrations above the OSDF WAC, the frequency of Tc-99 sampling may be reevaluated.

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 is 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. A sample will be taken from each batch removal of spent resin and spent carbon and analyzed for the full list of 18 soil radiological/chemical WAC (provided in Section 3.4). If any WAC is exceeded by the spent resin or the spent carbon, the waste batch will be sent off site for disposal. The spent resin and spent carbon will be homogeneous for each batch removal, so one sample from each batch is representative of the waste stream.

6.1.3 Material Tracking and Documentation

Above-WAC and below-WAC containers of SDF sludge will be segregated and controlled prior to final disposal. Because the AWWT residuals are soil-like materials, the containers will be managed for on-site disposal by the organization responsible for excavation and management of the soil. The waste generators at the AWWT Facility will fill out a Request for Disposition form and the material will then be tracked by the system described in Section 4.0.

6.2 ANALYTICAL SAMPLE RESIDUE RETURNS

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 and there is no inventory of these wastes currently being stored at the

FEMP. If, at some time in the future, this policy is changed so that analytical sample residues are being returned, a WAC attainment strategy will be developed at that time.

6.3 PERSONAL PROTECTIVE EQUIPMENT

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.

6.4 FUTURE ANCILLARY WASTE STREAMS

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 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 (i.e., quality control) oversight activities which will be performed by FEMP personnel and the opportunity for external (i.e., EPA and OEPA) oversight during above-grade debris generation, handling, and disposition.

6.5.1 Quality Control

FEMP personnel 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

EPA and OEPA are welcome to inspect the 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

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, regardless of the organizational structure ultimately established, will assure 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 ensure 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 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. However, certain typical 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
- Utilize validated site characterization data 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 document (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

- Arrange with the responsible FEMP organization for the staging and treatment of waste material prior to disposal, as necessary

- Record and maintain sufficient documented objective evidence to establish the basis for certification that the waste material meets the off-site WAC

- 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.

- Provide all required information on below-WAC material to Waste Acceptance Operations (WAO) personnel for input to IIMS

- 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 each organization's 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 current organizational structure provides for a WAO project team reporting directly to the Vice President for Soil and Water Projects.

The responsibilities assigned to the WAO are as follows:

- Oversee initial RA planning, scope development, characterization data recovery, contaminant of concern mapping, sampling determination, and confirmatory sample planning

- Verify remediation area definition is consistent with SEP

- Provide documented review of all project-specific plans for confirmatory sampling

- Randomly monitor sampling, analysis, and data validation activities for compliance with 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, 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 battery limit
- 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 (currently the OSDF project organization). The role of this organization is to manage the construction of the OSDF, placement of accepted waste within its boundaries, compaction and capping of waste material after placement, mapping of the final OSDF cell configuration, and coordination of 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 battery limit
- 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 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 Sitewide CERCLA Quality Assurance Plan (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 generators organization prior to input of the resulting confirmatory data into the Sitewide Environmental Database (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.

Changes to the design resulting from or created by unanticipated field conditions that do not represent a change to the functional design requirements will not require WAO review and approval, but such changes will be performed in accordance with FEMP design change procedures with the appropriate change documentation provided to WAO in a controlled manner.

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 generators WAC compliance certification documentation which must be accepted by WAO before receipt of the material at the OSDF. WAO will routinely review the generators 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 on a daily basis. 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 to provide 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 shall 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 battery limits. 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 shall also be identified. Documented records of each waste transfer shall be input to the IIMS such that an immediate electronic record of the transfer of any certified waste material will be entered. A hard-copy record (the FTL/OSM) will also be maintained. The electronic record will be reconciled with the hard copy records so that the electronic record can serve as a waste transport scheduling and inventory management tool. Monthly reviews will be performed by WAO to verify that the electronic record accurately reflects 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 as noted earlier. 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 battery limit. If receipt criteria are met, WAO personnel will stamp the FTL/OSM "ACCEPTED" and the truck will be released to OSDF for routing. A final FTL/OSM will be issued to the OSDF organization to track accepted waste material to it 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

WAO personnel will provide documented review of the design document, witness and provide independent concurrence of the generators 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 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 generators 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.

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."

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.

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