

**OPERABLE UNIT 3 REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN
FOR INTERIM REMEDIAL ACTION VOLUME 2 OF 2 SUPPORT
DOCUMENTS FINAL MARCH 1995**

03/16/95

**DOE-0718-95
DOE-FN EPAS
100
WORK PLAN**

OPERABLE UNIT 3

REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN FOR INTERIM REMEDIAL ACTION



VOLUME 2 OF 2
SUPPORT DOCUMENTS

MARCH 1995

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

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**OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
SAMPLING AND ANALYSIS PLAN**

**OU3 Remedial Design/Remedial Action
Sampling and Analysis Plan**

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NOTATION

Abbreviations, Acronyms, and Initials

AA	atomic absorption
ACA	Amended Consent Agreement
ACM	asbestos containing material(s)
AEA	Atomic Energy Act of 1954, as amended
ARAR(s)	applicable or relevant and appropriate requirement(s)
ASL(s)	analytical support level(s)
CCW	constituent concentration in the waste
CCWE	constituent concentration in the waste extracts
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CPID	Closure Plan Information and Data
CRDL(s)	contract required detection limit(s)
CRQL(s)	contract required (reliable) quantitation limit(s)
CVAA	cold vapor atomic absorption
CWA	Clean Water Act of 1977, as amended
DF&O	Director's Findings & Orders
DOE	United States Department of Energy
DOT	United States Department of Transportation
DQO(s)	data quality objective(s)
ERMA	Environmental Resource Management and Analysis
FAA	furnace atomic absorption
FACTS	Fernald Analytical Computerized Tracking System
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FFCA	Federal Facilities Compliance Act
FID	flame ionizing detector
FIDLER	field investigation for the detection of low energy radiation
FMPC	Feed Materials Production Center
GC	gas chromatography
GM	Geiger-Müller
HASP	health and safety plan
HEPA	high-efficiency particulate air filter
HSL	hazardous substance list
HWMU(s)	hazardous waste management unit(s)

ICP	inductively coupled plasma
IOW	investigative derived waste
LDR	land disposal restriction
LLW	low-level waste
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDL	method detection limits
MEF(s)	material evaluation form(s)
MS	mass spectrometry
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NIST	National Institute for Standards and Technology
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NVO	Nevada Operations
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
OU3	Operable Unit 3
OU5	Operable Unit 5
OVA	organic vapor analyzers
PCB(s)	polychlorinated biphenyl(s)
PIC	pressurized ion chamber
PID	photo-ionization detector
PL	public law
POX	purgeable organic halides
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RAWP(s)	remedial action work plans
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCQ	FEMP Sitewide CERCLA Quality Assurance Project Plan

SDCR(s)	Sampling and Analysis Plan document change request(s)
SED	sitewide environmental database
SOW	statement of work
SPAVR(s)	Sampling Plan Addendum variance report(s)
SPL	sample processing lab
SSOP	site-wide standard operating procedure
SVOC(s)	semivolatile organic compound(s)
SVR(s)	Sampling and Analysis Plan variance report(s)
TAL	target analyte list (per Contract Laboratory Program)
TBC(s)	to be considered
TBD	to be determined
TCL	target compound list (per Contract Laboratory Program)
TCLP	toxic characteristics leaching procedure
TRU	transuranic
TSCA	Toxic Substance Control Act of 1976, as amended
USC	United States Code
USEPA	United States Environmental Protection Agency
UV	ultraviolet
VOC(s)	volatile organic compounds(s)
WAC	waste acceptance criteria
WPA	OU3 RI/FS Work Plan Addendum
WMCO	Westinghouse Materials Company of Ohio
XRF	X-Ray Fluorescence

GLOSSARY

Component -

The smallest physically distinct unit of OU3 that is considered separately in the development and implementation of this Work Plan including, but not limited to, buildings, pads, roads, piping/utilities, and ponds/basins.

Free-release -

Release of materials from the DOE complex or in an uncontrolled environment that meet the release criteria established by NRC regulation 1.86 and DOE Order 5400.5.

Interim remedial action -

Course of action that may be pursued in the short-term, before a final Record of Decision, in order to quickly reduce existing risks at a Superfund site. Also refers to the OU3 interim remedial action to decontaminate and dismantle all OU3 components.

Interim storage facility -

On-site area for temporary storage of material or debris generated during the interim remedial action.

Material -

Solids and liquids generated from decontamination and dismantlement operations; includes non-recoverable/non-recyclable material (waste) and recoverable/recyclable material.

Operable Unit -

A discrete action that comprises an incremental step toward comprehensively addressing site problems. The five FEMP operable units, as defined by the Amended Consent Agreement (ACA), have been specified based on specific site problems. Each of the units are summarized as follows: OU1 - waste pits; OU2 - ash pile, sanitary landfill, and lime sludge ponds; OU3 - all buildings and associated facilities (roads, railroads, drummed waste, inventory, fences, telephone poles, electrical and sewage lines, etc.); OU4 - four large storage silos and associated facilities; OU5 -contaminated environmental media. Refer to section 2.1 for a more detailed description of each operable unit.

Process Knowledge -

Information available about a process from documentation of past operations or information from individuals who participated in the operation. This information includes, but is not limited to, process chemistry, history of accidents/spills, maintenance chemicals/materials, and other uses of the process vessels or workspace.

GLOSSARY

Program -

Refers to the overall OU3 Remedial Design/Remedial Action process which encompasses all specific decontamination and dismantlement projects governed by this work plan.

Project -

A specific decontamination and dismantlement remedial design and remedial action effort; beginning with pre-design scoping activities and ending with the submittal of a remedial action report to the regulatory agencies.

Project-specific HASP -

Facilitates coordination and communication of health and safety issues among personnel by providing the mechanisms to minimize the risks of employee exposure to hazardous substances and other unsafe conditions associated with a specific project. This document evaluates a project on a task by task basis, identifying potential hazards and mitigators.

Remedial action -

An action that is consistent with the final remedy following a formal examination of the nature and extent of the release, or threat of release, assessment of the risk, and selections of the final remedy based on an evaluation of possible alternatives.

Remedial design -

The technical analysis and procedures which follow the selection of a site remedy resulting in a set of plans and specifications for implementation of the remedial action.

Remediation subcontractor -

The group, or groups, subcontracted to FERMCO that will be responsible for implementation of the remedial action.

Removal action -

Any action necessary to abate an immediate threat to health and the environment, including actions necessary to monitor, assess, or evaluate the threat.

Secondary waste -

Waste other than primary waste associated with a remedial action generated as a result of occupying a jobsite, conducting decontamination and dismantlement activities, utilizing PPE, and demobilization activities.

GLOSSARY

Surface decontamination -

The reduction of existing surface contamination levels, thereby reducing direct exposure potential, as well as reducing available sources for air-borne or water-borne contamination.

Transite -

Common construction material used as sheeting for walls and roofs for many OU3 components. It consists of a mixture of asbestos and cement.

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) was prepared to support the activities described within the *Operable Unit*¹ 3 (OU3) Remedial Design/Remedial Action (RD/RA) Work Plan for Interim Remedial Action. This section provides an introduction to the OU3 sampling program for the *interim remedial action*. After a brief discussion of the purpose and scope of the SAP, a brief description of the site background is provided. This section also discusses the planned approach of developing SAP addenda to identify sampling requirements for each of the decontamination and dismantlement projects.

1.1 Purpose and Scope

This SAP contains the guidance and requirements necessary to support the data collection needed for the OU3 interim remedial action. The data collection strategy presented in this SAP is intended to aid in various aspects of the decontamination and dismantlement process, including the storage and disposition of *material* during the *interval period* pursuant to all known material acceptance criteria and for potential treatment and/or disposition under the OU3 final remedial action. The purpose of this document is to define the strategies for the acquisition of data to support material management activities (material handling, off-site disposition, and interim storage), closure of hazardous waste management units, and environmental monitoring during the interval period. The primary data needs stated in this SAP reflect the data required to perform those activities. The secondary data needs also incorporate other potential decisions to be made regarding final disposition determinations to be considered for the OU3 final *remedial action*. It should be noted that the OU3 interim remedial action and final remedial action are both long-term actions that overlap for the majority of their duration, and that after the issuance of the OU3 final remedial action Record of Decision (ROD), both actions will be complimentary of each other.

In addition, the SAP will provide supplemental information on the field sampling program that is necessary to support the interim remedial action. Specific protocols are established in the SAP to implement field activities, including performing instrument measurements and collecting samples for lab analysis as well as specific procedures to perform these duties accurately and efficiently. The means for implementing quality assurance measures are discussed and sample disposition requirements are provided.

Section 1.0 provides an overall introduction into the OU3 interim remedial action sampling program and includes discussions about the purpose and scope of this document. Section 2.0 is a general discussion about data needs and data quality objectives, SAP Addenda which will identify sampling needs to support the implementation of the individual *projects*, and data management. Section 3.0 includes a discussion about the specific sampling and analytical approach as well as the necessity to evaluate process knowledge, existing Material Evaluation Forms (MEFs), and existing analytical data to determine data gaps. Section 3.0 also discusses planned environmental sampling, Hazardous Waste Management Unit (HWMU) sampling, and sampling of decontamination wastes. Section 4.0 identifies sampling techniques and instrumentation. Section 5.0 identifies sampling and analytical procedures that will be used to support the OU3 interim remedial action. Section 6.0 provides a discussion on quality control and quality assurance. Section 7.0 covers sample disposition and shipping. Section

¹ Words that have been italicized are defined in the glossary.

8.0 provides a discussion on the implementation strategy including the sample scheduling approach, laboratory contracting, personnel resources, program management, and a proposed sampling summary.

This SAP does not include a distinct Quality Assurance Project Plan (QAPjP) as a self contained element. At the FEMP, all quality assurance related elements have been compiled in a single document, the Sitewide Comprehensive Environmental Response Compensation Liability Act (CERCLA) QAPjP known as the SCQ. The SCQ addresses all sampling activities at the FEMP, including OU3 sampling activities. All required sampling and analysis procedures are incorporated and approved through this document. The relevant sections of the SCQ are included in the SAP by reference to fulfill the requirements of a QAPjP.

1.2 Site Background Description

OU3, as defined in the Amended Consent Agreement (ACA), consists of the former production area and all production-associated facilities and equipment (including all above- and below-grade improvements) not specifically included in any other operable unit. *Components* within OU3 include all structures, equipment, utilities, drums, tanks, solid waste, waste product, thorium, effluent lines, K-65 transfer line, wastewater treatment facilities, fire training facilities, feedstocks, and coal piles. The former production area covers approximately 136 acres and operated essentially as a uranium refinery and foundry with an extensive array of support and related facilities. The soil and water under OU3 are a part of Operable Unit 5 (OU5), which governs environmental media. Under the terms of the ACA, soil and debris waste piles around the site that resulted from previous waste management practices are also included in OU3. However, any soils beneath these waste piles are considered within OU5.

1.3 Use of Design Package SAP Addenda

This SAP contains a broad range of sampling activities to meet the spectrum of potential data needs which might be encountered during the interim remedial action. Before the characterization activities are started for a specific design package, a SAP Addenda will be prepared based on the particular characteristics of the individual components (i.e., expected media, expected contaminants, depth of contamination, etc.) and the relevant information needs identified in the SAP. The addenda will reference the protocols and procedures specified in the SAP. Development of the SAP and the SAP addenda, and all activities conducted resulting from these documents, will be in accordance with the SCQ. Development of the project-specific SAP addenda is further discussed in Section 2.5.

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2.0 GENERAL SAMPLING AND DATA COLLECTION APPROACH

This section begins with a presentation of the objectives of the OU3 interim remedial action sampling program. Following this, is a discussion of the data needs identified to support the OU3 interim remedial action, including a table summarizing the identified data needs. Based on these data needs and the data quality objectives, the approach to be used to collect the data, along with the proposed Analytical Support Level (ASL), is presented. This section also discusses sample representativeness and sensitivity requirements for sample analysis. Also presented is a discussion on the numbering and tracking system to be utilized for the OU3 interim remedial action sampling program. Based on the global approach defined in the SAP, Section 2.5 describes how SAP addenda will be developed to identify sampling needs for individual *projects*. Finally, this section discusses the data management plan for the sampling data obtained during the OU3 interim remedial action.

2.1 Sampling Program Objectives

The objectives of the OU3 interim remedial action sampling program are to evaluate all existing data and to collect supplemental data, as needed, to support fundamental decision making with regard to the management and disposition of OU3 materials, closure of hazardous waste management units, and environmental monitoring during the OU3 interim remedial action.

The overall objective of any remedial action is to eliminate, reduce, or otherwise mitigate the potential for exposure to contaminants and thus minimize associated risks to public health and the environment. To meet those objectives during the OU3 interim remedial action, the general approach for sampling is as follows:

- characterize radiological and chemical contamination to support completion of the projects within OU3;
- further assess, if necessary, potential risks to human health and the environment that could result from exposure to contaminants;
- identify and mitigate any immediate hazards resulting from existing conditions in OU3; and
- perform additional characterization, if necessary, to fill data gaps through screening and/or sampling efforts to support the interim handling, storage, and disposition activities for OU3 media.

All remedial action activities for OU3 will be conducted in accordance with all Applicable or Relevant and Appropriate Requirements (ARARs) to the extent required by CERCLA.

2.2 Data Needs and Data Quality Objectives

This section introduces the data needs identified for the remedial activities described in the OU3 Remedial Design/Remedial Action (RD/RA) Work Plan for Interim Remedial Action, including information on the intended use of the data and the current availability of the data. The section also discusses the development of data quality objectives based on the identified

needs, and the approach to be utilized to collect the data to meet the objectives for each of the specific data needs.

2.2.1. Data Needs

The data needs of the OU3 interim remedial action are divided into primary data requirements and secondary data requirements. Primary data requirements are those data needs identified throughout the OU3 RD/RA Work Plan, particularly in Section 3, as being necessary to satisfy the specific objectives of the OU3 interim remedial action activities. Specifically, fulfillment of these data needs is necessary for completion of the OU3 interim remedial action as proposed (i.e., to answer all questions relevant to completion of the OU3 interim remedial action). The two categories of primary data requirements include data specifically needed to manage materials in interim storage and qualify materials for off-site disposition. Another category within this group is data needed to assess the impact of releases of particulates, gases, surface water runoff, etc., into the environment as a direct result of the remedial action activities. Other categories of data needs within the primary grouping include data necessary to better define the general nature of contamination on OU3 media and data necessary to support decontamination and dismantlement activities on media within a HWMU.

Secondary data requirements, on the other hand, include data needs not necessarily directly related to the scope of this OU3 interim remedial action. These data needs reflect data necessary to answer questions relating to the treatment/disposition of media in OU3, which is generally within the scope of the OU3 final remedial action ROD. The exception to this is recyclable metals and non-recoverable/non-recyclable materials, which may be disposed of under the scope of this OU3 interim remedial action. This group of data needs is presented here and factored into the sampling approach, as appropriate, since this information will likely be necessary to support eventual treatment/disposition of the material. Specifically, adding a sample, modifying a sampling technique, adding analytes, etc., as a part of the OU3 interim remedial action sampling, may make later decision-making easier and less costly (e.g., by not having to do extensive re-sampling of entire piles of media), without impacting the implementation of the interim remedial action sampling.

Table 2-1 presents a listing of all the specific data needs identified within each of the primary and secondary data categories. For each of those data needs, the table identifies the media which is the subject of the data need, the intended use of the data, and the general availability of the data.

Data availability is a key issue regarding establishment of a sampling program for the OU3 interim remedial action. There is a significant amount of data which has been and continues to be generated on the types and levels of contamination within OU3. The Remedial Investigation (RI) characterization includes a significant effort in identifying the nature of contamination in the major media within most of the components in OU3 (including concrete, steel, masonry, etc.), which should go a long way toward satisfying many data needs. For the major media in most of the components, samples have been taken and analyzed for the United States Environmental Protection Agency (USEPA) Target Analyte List (TAL) for inorganic compounds and a conservative list of radiological parameters. For liquids and loose media, which had previously been uncharacterized or whose characterization was incomplete with respect to the OU3 Remedial Investigation/Feasibility Study (RI/FS) analyte list, samples were taken and analyzed for the TAL list, the radiological list, and the USEPA Target

TABLE 2-1 Summary of Data Needs for the OU3 Interim Remedial Action

Data Need	Media	Data Use	Data Availability
<u>PRIMARY DATA REQUIREMENTS</u>			
I. INTERIM STORAGE (CONTAMINANT SEGREGATION REQUIREMENTS-BASED):			
1. Identification of Resource Conservation and Recovery Act (RCRA) hazardous constituents and characteristics.	All Media.	Used to determine compliance with 40 Code of Federal Regulations (CFR) 261.2 and 262.11 in the interim storage and handling of RCRA contaminated media.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
2. Identification of radiological contamination (Fixed and removable).	All Media.	Used to determine compliance with United States Department of Energy (DOE) Order 5400.5 in the interim storage and handling of radiologically contaminated media.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
3. Identification of constituents and characteristics of mixed-waste contaminated media.	All media.	Used to determine compliance with 40 CFR 262.11, 3004(J) for land disposal restriction, Atomic Energy Act (AEA) in the interim storage and handling of mixed-waste contaminated media.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
4. Identification of the presence of PCB contamination.	All Media.	Used to determine compliance with Fernald Environmental Restoration Management Corporation (FERMCO) PCB site policy in the interim storage and handling of PCB contaminated media.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.

TABLE 2-1 Summary of Data Needs for OU3 Interim Remedial Action (Cont'd)

Data Need	Media	Data Use	Data Availability
5. Identification of petroleum contamination.	Soils only	Used to determine the interim storage and handling of petroleum contaminated soils.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
6. Identification of the presence of asbestos containing materials (ACM).	Regulated ACM material	Used to determine the interim storage and handling of ACM.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
7. <i>Secondary waste</i>		See Section 3.3	

II. ENVIRONMENTAL MONITORING DURING SURFACE DECONTAMINATION AND DISMANTLEMENT:

1. Identification of airborne contaminants to estimate discharges of regulated substances from air emission sources during remediation.	Air	Used to detect on-site releases and determine off-site concentrations of and exposures to airborne contaminants attributable to remedial activities. Also used to assess compliance with the following potential ARARs and To-Be-Considered (TBC)s: Clean Air Act, as amended [42 United States Code (USC) 7401-7642]; National Primary and Secondary Ambient Air Quality Standards [40 CFR 50]; Ohio Air Pollution Control Regulations, Ohio Administrative Code (OAC) 3745-17-02; National Emissions Standards for Hazardous Air Pollutants (NESHAP) compliance.	To be collected during remediation activities.
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TABLE 2-1 Summary of Data Needs for OU3 Interim Remedial Action (Cont'd)

Data Need	Media	Data Use	Data Availability
<p>2. Identification of groundwater contaminants to predict concentrations of various contaminants in groundwater as a consequence of each remedial activity.</p>	<p>Ground-water</p>	<p>Used to determine routine RCRA groundwater requirements (OU5 ground-water monitoring program). Also used to assess compliance with the following potential ARARs and TBCs:</p> <p>Safe Drinking Water Act [42 USC 300G; Public Law (PL) 93-523]; National Primary and Secondary Drinking Water Regulations [40 CFR 141] and [40 CFR 143]; Ohio Drinking Water Regulations; other groundwater regulations.</p>	<p>Data available from OU5: routine property boundary groundwater monitoring program; Removal No. 1, contaminated perched water groundwater monitoring program, which includes annual sampling events of the extraction wells for hazardous substance list (HSL) parameters.</p>
<p>3. Identification of decontamination water (surface water) contaminants to determine treatment requirements and for National Pollutant Discharge Elimination System (NPDES) compliance decisions.</p>	<p>Surface Water</p>	<p>Used to determine surface water requirements. Also used to assess compliance with the following potential ARARs and TBCs:</p> <p>Surface Water Regulations; Clean Water Act, NPDES permit [40 CFR 122], Ohio Water Quality Standards; DOE Order 5400.5</p>	<p>Data to be collected during remediation activities.</p>
<p>III. HWMU COMPONENTS:</p>			
<p>1. Identification of the presence of specific RCRA contaminants on media within an HWMU.</p>	<p>All media in/from an HWMU</p>	<p>Used to determine the criteria to be achieved for the HWMU to be clean, closed, and removed from regulation as an HWMU. Also used to assess compliance with the following ARARs:</p> <p>Closure Performance Standards in OAC 3745-66-11 or 3745-55-11 and 40 CFR 265.111 or 40 CFR 264.111 . Decontamination and clean-up requirements of OAC 3745-66-14 or OAC 3745-55-14 and 40 CFR 265.114 or 264.114 .</p>	<p>FEMP Administrative Record; CERCLA <i>removal action</i> final reports, RCRA Part A and Part B, specifically Part B sections D,J, and I, OAC 3745-49 through 3745-69. RCRA Operating Record; includes Task 2/3 HWMU reviews, ongoing inspections, waste disposition records; Closure Plan Information and Data (CPID) with corresponding sampling and analysis plans, remedial action work plans (RAWPs), and MEFs, and HWMU-specific sampling and analysis results. Screening reports containing data from the vicinity of a given HWMU.</p>

TABLE 2-1 Summary of Data Needs for OU3 Interim Remedial Action (Cont'd)

Data Need	Media	Data Use	Data Availability
IV. OFF-SITE SHIPMENT/DISPOSAL:			
1. Shipment to Nevada Test Site (NTS); characterization of contaminated materials	All approved nonrecyclable/non-recoverable waste streams.	Used to determine the regulatory status of the waste materials and to ensure compliance with NTS requirements outlined in Nevada Operation (NVO)-325 (DOE 1992). Segregation of waste streams/low level wastes.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
<u>SECONDARY DATA REQUIREMENTS</u>			
I. OFF-SITE SHIPMENT/DISPOSAL OPTIONS (LANDFILLS, RECYCLE/REUSE FACILITY, etc.):			
1. Landfill Options:			
1.A. Shipment to municipal solid waste landfill; characterization of material to be sent to an approved landfill.	Material that meets <i>free-release</i> criteria.	Used to determine free release criteria and compliance with landfill requirements, including 40 CFR 261.2, 262.11, 268, and DOE Order 5400.5. Allow for segregation of waste streams determined to be "clean."	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
1.B. Shipment to NTS; characterization of contaminated materials	All approved waste streams.	Used to determine the regulatory status of the waste materials and to ensure compliance with NTS requirements outlined in NVO-325. Segregation of waste streams/low level wastes.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.
1.C. Shipment to Envirocare of Utah; characterization of contaminated materials.	All approved mixed waste streams.	Used to determine the regulatory status of waste materials and to ensure compliance with envirocare waste acceptance criteria specified in their Material Acceptance Process Manual. Segregation of mixed waste streams.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information to identify mixed wastes.

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TABLE 2-1 Summary of Data Needs for OU3 Interim Remedial Action (Cont'd)

Data Need	Media	Data Use	Data Availability
<p>1.D. Shipment to other commercial disposal facilities: Characterization of contaminated materials.*</p> <p>* As other facilities are selected, they will be added to the list of potential facilities to be considered. Disposal facilities are subject to DOE procurement policies and National Environmental Protection Act (NEPA) approval.</p>	<p>All approved waste streams.</p>	<p>Used to determine the regulatory status of the waste materials, including 40 CFR 268, and to ensure compliance with facilities requirements. Segregation of waste streams/all media-separate packaging.</p>	<p>RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.</p>
<p>1.D. On-Property Disposal; Characterization of contaminated materials. Leachability characteristics.</p>	<p>All Media</p>	<p>Used to determine regulatory status of all media, including 40 CFR 261.2, 262.11, 268, and DOE 5400.5, if necessary. To determine if media meets waste acceptance criteria for the potential on-property disposal cell.</p>	<p>RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.</p>
<p>2. Shipment to recycle/reuse facility; characterization of material to be sent to DOE approved facility; surface or bulk contamination.</p>	<p>Concrete, cement block, acid brick, coal, asphalt, exotic metals (Inconel & Monel) non-porous metals: mild steel, copper, aluminum, stainless steel</p>	<p>Used to define the segregation requirements within each media type depending on contaminants. Recycling and reuse as defined by 40 CFR 261.1, 40 CFR 192, Nuclear Regulatory Commission (NRC) Regulatory Guide 1.86 and DOE Order 5400.5 .</p>	<p>RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.</p>

TABLE 2-1 Summary of Data Needs for OU3 Interim Remedial Action (Cont'd)

Data Need	Media	Data Use	Data Availability
II. RETAIN FOR TREATMENT:			
1. Retain for treatment; characterization of potential contaminants of the material to be treated; surface or bulk contamination.	Concrete, cement block, acid brick, exotic metals, non-porous metals, glass and ceramic	Used to define the segregation requirements of each media type depending on potential treatment options and requirements, and to meet on-property waste acceptance criteria, if necessary.	RI data on most major media, other existing analytical data, process knowledge, etc., should provide a significant amount of information. Screening/sampling may be necessary to further define the extent of contamination. Sampling/screening may also be needed where the nature of contamination is unknown.

Compound List (TCL) for organics. Media were also analyzed for the TCL list of Polychlorinated Biphenyls (PCBs), when indicated to be necessary by *process knowledge* and/or screening. Depending on the data available, data needs may be: completely addressed with existing data; addressed through a minimal amount of focused screening; addressed through focused intrusive sampling; etc. On the other hand, an assessment of available data may show that no data exists to fulfill stated data needs. In all cases, however, all available data will be evaluated for each data need for each component to determine the sufficiency of available data. Specifically, results of the OU3 characterization activities conducted during the RI, as well as process knowledge and any other pertinent existing analytical data, will be evaluated to determine any data gaps which would prevent the completion of the specific design package SAP addenda. In addition, sampling for each project will be performed to meet the needs stated in Table 2-1 if existing information is insufficient to meet these needs (e.g., components where no previous data exists).

The areal extent of contamination may be determined during the design phase to delineate and mark materials as to their contaminant type and extent for segregation during staging and interim storage. This activity will be performed when existing data is insufficient to meet required data needs. A determination of aerial extent of contamination may be made during the site walk-down inspection early in the *remedial design* and would be performed at the direction of the design team. The walk-down is performed to accomplish a radiological survey and other appropriate contaminant field screening of the project site area where necessary, visually examine the project area to assess any noticeable signs of contamination, observe site accessibility and boundaries, surrounding physical characteristics, and note any safety concerns. Also during the project walk-down, initial decisions will be made concerning parameters of concern and additional sampling and analysis requirements, if needed. The proposed sampling program outlined in this document, along with process knowledge and other available information is believed to be sufficient to ensure effective segregation. Also, because material is going to interim storage and final disposition is not known, the benefit of pre-dismantlement surveys is uncertain.

2.2.2 Data Quality Objectives

Data quality objectives (DQOs) specify the quality and quantity of data required to fulfill one or more of the purposes or uses for which the data are being collected. DQOs are developed in this document to ensure that all data collected as part of this plan are appropriate to meet OU3 decision-making needs. The level of detail and data quality needed vary depending on the intended use of the data.

All investigative activities for OU3 interim remedial action must be conducted and documented to ensure that sufficient data of known quality are collected to support sound decisions concerning the disposition of materials, and that the uncertainty concerning the decisions is maintained within specified limits. As target values for data quality, the DQO specified is not necessarily criteria for acceptance or rejection of data collected.

The SCQ presents a structured eight-step process for the development of DQOs. This structured process provides the rationale for deciding what data are necessary, what quality and type of data are required, how the data will be technically defensible, and how risk is comprehended and minimized to ensure sound decisions throughout the remediation process. The process will help to identify areas of concern, the selection of equipment, quality assurance requirements, and ASLs. DQO development will include the following steps:

- statement of the problem;
- identification of a decision that addresses the problem;
- identification of data/information that affect the decision;
- specification of the domain of the decision;
- development of a logic statement;
- establishment of constraints on uncertainty;
- optimization of design for obtaining data; and
- DQO summary.

A DQO summary form, intended to provide a quick overview of the major aspects of the data collection effort and the associated objectives, will be generated for each DQO. The summary form translates the development of DQOs into a concise field document that identifies media-specific ASLs and sampling and analysis procedures. The form summarizes the analytical and sampling requirements contained in DOE Orders, environmental regulations, the Federal Facility Compliance Act (FFCA), the Ohio Environmental Protection Agency (OEPA) Director's Findings and Orders (DF&O) (EPA 1993b), and the ACA. A sample DQO summary form is provided in Appendix B of the SCQ.

One of five FEMP-defined ASLs will be assigned to all data to be collected, depending on the intended use of the data and the quality assurance/quality control (QA/QC) methods required

to achieve the desired level of quality. The specific definitions of the five ASLs (A-E) are provided in the SCQ and are summarized in Table 2-2. FEMP ASLs A through E are defined in the SCQ and parallel the USEPA DQO Levels I through V for chemical analysis, but also include analysis of radionuclides, which comprise a large proportion of the analyses supporting the FEMP project. ASLs were designed to maintain consistency with USEPA in the definitions of DQO levels and to avoid confusion between USEPA and DOE programs.

Building upon the information presented in Table 2-1, and the information gained through the process discussed above, an approach to be used for the collection of data to meet the individual data needs can then be defined. Table 2-3 takes each of the previously identified data needs and data uses, and identifies the objectives of the data collection approach for fulfilling the data needs (i.e., specific analytes that need to be identified, levels of detection that are needed, etc.). Based on the identified objectives a data collection approach, with the corresponding proposed ASL, is identified in Table 2-3. This approach identifies, for example, whether screening and/or intrusive sampling is needed, whether sampling should be judgmental or random, and the frequency of data collection, etc. It should be noted that the DQO process has not yet been finalized. All proposed ASLs in this document are based on current waste acceptance criteria and current site practices. The DQOs developed to support the SAP will be general in nature and will be applicable to sampling activities outlined by each SAP addenda. Therefore, DQOs will not need to be developed for each SAP addenda.

The overall sampling approach for each component will be dictated by the specifics of the component. In other words, the media, the types of contaminants found/expected, and the decontamination and dismantlement activities which will take place, will determine the appropriate data needs that will be required, which will then form the basis for the overall sampling approach for the remediation tasks associated with a component.

2.3 Representativeness, Analytical Support Levels, and Sensitivity Requirements

This section discusses requirements for sample representativeness and the resultant sampling approach, including proposed ASLs. This section also presents sensitivity requirements for the sample analysis.

2.3.1 Representativeness and Sampling Approach

Sample types, locations, and frequencies of samples must be selected in such a manner that the information gained from the samples represents specific properties of the true underlying distribution of contaminants that are of concern for the intended uses of the data. The particular properties of the distribution that are of interest dictate the design of the sampling program. These areas of interest are outlined in Table 2-3, Primary Data Needs. The properties of contaminant distribution of interest are those necessary for determining interim remedial activities, principally the type and depth of surface contamination in large volume materials in OU3. The sampling approach for the OU3 interim remedial action field program is therefore designed to determine these properties when existing information obtained from existing MEFs in conjunction with the RI/FS activities, process knowledge, or when additional analytical data is determined to be insufficient for that purpose. This approach will in turn

TABLE 2-2 Analytical Support Levels for the OU3 Interim Remedial Action RD/RA Work Plan

Support Level	Description	Typical Data Uses
A	<i>Qualitative Field Analysis</i> – This level is characterized by the use of portable instruments that can provide real-time data to assist in the optimization of sampling point locations and in providing health and safety support. Data can be generated regarding the presence or absence of contaminants (e.g., radionuclides, volatiles) at sampling locations. Analogous to EPA analytical level 1.	Site characterization, monitoring during implementation
B	<i>Qualitative, Semi-Quantitative, and Quantitative Analyses</i> – This level may include the use of more sophisticated screening techniques, such as portable analytical instruments that can be used on-site or in mobile laboratories stationed near a site (close-support laboratories). Depending upon the types of contaminants, sample matrix, and QC checks applied, qualitative and quantitative data can be obtained. Analogous to EPA analytical level 2.	Site characterization, evaluation of alternatives, engineering design, monitoring during implementation
C	<i>Quantitative with fully defined QA/QC</i> – Laboratory analyses generated with full QA/QC checks of types and frequencies specified for ASL D according to FEMP-specified analytical protocols for radiological and non-radiological parameters. The analytical methods are identical to ASL D for QA/QC sample analysis and method performance criteria. However, the data package does not typically contain raw instrument output but does include summaries of QA/QC sample results. ASL C may be used when analyses require a rigid, well-defined protocol, but where other information is available, so that a complete raw data package validation effort is not required. Laboratories are required to retain, in the project file, raw instrument data to upgrade ASL C reports to ASL D. Analogous to USEPA analytical level 3.	Risk assessment, site characterization, evaluation of alternatives, engineering design, monitoring during implementation
D	<i>Conformational with complete QA/QC and reporting</i> – Provides data generated with a full complement of QA/QC checks of specified types and frequencies according to FEMP-specified analytical protocols for radiological and non-radiological parameters. The data package includes raw instrument output for validation. These data may be used to confirm data gathered at ASLs B and C, and when full validation of raw data is required. Analogous to USEPA analytical level 4.	Risk assessment, evaluation of alternatives, engineering design
E	<i>Nonstandard</i> – Analyses by nonstandard protocols that often require method development or validation (e.g., when exacting detection limits or analysis of an unusual chemical compound are required). New methods may be developed for ASL E data to allow for parameters or matrices that cannot be analyzed by existing standard methods. Analogous to USEPA analytical level 5.	Site characterization, evaluation of alternatives, engineering design, monitoring during implementation

TABLE 2-3 Data Collection Approach

Data Need	Media	Data Use	Data Objective	Data Collection Approach to Meet Objectives	Proposed ASL
PRIMARY DATA REQUIREMENTS					
I. INTERIM STORAGE (CONTAMINANT SEGREGATION REQUIREMENTS-BASED):					
1. Identification of RCRA hazardous constituents and characteristics.	All Media	Used to determine compliance with 40 CFR 261.2 and 262.11 in the interim storage handling of RCRA contaminated media.	Type and conservative estimate of concentration of RCRA contaminants in media Toxic Characteristics Leaching Procedure (TCLP), X-Ray Fluorescence (XRF).	Judgmental, will be based on existing information and sampling needs.	B
2. Identification of radiological contamination (fixed and removable).	All Media	Used to determine compliance with DOE Order 5400.5 in the interim storage and handling of radiologically contaminated media.	Type and conservative estimate of concentration of radiological contamination in media.	Judgmental, will be based on existing information and sampling needs.	B
3. Identification of constituents and characteristics of mixed-waste contaminated media.	All Media	Used to determine compliance with 40 CFR 262.11, 3004(J) for Land Disposal Restriction (LDR), AEA of 1954, as amended AEA in the interim storage and handling of mixed-waste contaminated media.	Type and conservative estimate of concentration of mixed waste constituents in media (TCLP and radiological screening).	Judgmental, will be based on existing information and sampling needs.	B
4. Identification of the presence of PCB contamination.	All Media	Used to determine compliance with the site PCB policy in the interim storage and handling of PCB contaminated media.	Type and conservative estimate of concentration of PCBs in media. (> 49 ppm) (PCB field test kits).	Judgmental, will be based on existing information and sampling needs.	B
5. Identification of petroleum contamination.	Soils only	Used to determine the interim storage and handling of petroleum contaminated soils.	Type and conservative estimate of concentration of petroleum based contaminants in media.	Judgmental for obvious staining. Screening and/or sampling.	B
6. Identification of the presence of and concentration of asbestos fibers.	Regulated ACM	Used to determine friable vs. non-friable and the interim storage and handling requirements of ACM.	Type and conservative estimates of concentrations of asbestos fibers in media.	Judgmental based on existing information (e.g. process knowledge etc.), for the screening/sampling approach and for dispositional requirements, whether it be per area, per box, or per piece.	E
7. Secondary waste		See Section 3.3			

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TABLE 2-3 Data Collection Approach (Cont'd)

Data Need	Media	Data Use	Data Objective	Data Collection Approach to Meet Objectives	Proposed ASL
II. ENVIRONMENTAL MONITORING DURING SURFACE DECONTAMINATION AND DISMANTLEMENT:					
1. Identification of airborne contaminants; to estimate point source discharges of regulated substances from air emission sources during remediation.	Air	Used to detect on-site releases and determine off-site concentrations of and exposures to airborne contaminants attributable to remedial activities. Also used to assess compliance with the following potential ARARs and TBCs: Clean Air Act, as amended [42 USC 7401-7642]; National Primary and Secondary Ambient Air Quality Standards [40 CFR 50]; Ohio Air Pollution Control Regulations, OAC 3745-17-02; NESHAP compliance.	Maximum concentrations of airborne contaminants at specified locations during remedial activities. Dependent upon established baseline conditions and specific design package needs.	Use of existing monitoring equipment. Air monitoring activities are discussed in Section 3.4.	B
2. Identification of groundwater contaminants; to predict concentrations of various contaminants in groundwater as a consequence of each remediation.	Groundwater	Used to determine routine RCRA groundwater requirements. Also used to assess compliance with the following potential ARARs and TBCs: Safe Drinking Water Act [42 USC 300G; PL 93-523]; National Primary and Secondary Drinking Water Regulations [40 CFR 141] and [40 CFR 143]; Ohio Drinking Water Regulations; other groundwater regulations.	Type and conservative estimate of contaminants in groundwater.	Data collection approach will be per the groundwater routine monitoring program for OU5. See Section 3.4.	B/C
3. Identification of decontamination water (surface water) contaminants; to determine treatment requirements and for NPDES compliance decisions.	Surface Water	Used to determine surface water requirements. Also used to assess compliance with the following potential ARARs and TBCs: Surface Water Regulations; Clean Water Act, NPDES permit [40 CFR 122], Ohio Water Quality Standards; DOE Order 5400.5.	Type and average concentrations of contaminants for surface water collection points (drains, runoff locations).	Judgmental, grab or composite. Collection approach based on routine monitoring.	B

TABLE 2-3 Data Collection Approach (Cont'd)

Data Need	Media	Data Use	Data Objective	Data Collection Approach to Meet Objectives	Proposed ASL
III. HWMU COMPONENTS:					
1. Identification of the presence of specific RCRA contaminants on media within an HWMU.	All Media	Used to determine the criteria to be achieved for the HWMU to be clean closed and removed from regulation as an HWMU. Also used to assess compliance with the following ARARs: Closure Performance Standards in OAC 3745-66-11 or 3745-55-11 and 40 CFR 265.111 or 40 CFR 264.111 Decontamination and clean-up requirements of OAC 3745-66-14 or OAC 3745-55-14 and 40 CFR 265.114 or 264.114.	Type and representative value for each component.	Approach based on each individual units existing data and information.	A, B, or C
IV. OFF-SITE SHIPMENT/DISPOSAL:					
1. Shipment to NTS; characterization of contaminated materials.	All approved non-recyclable/non-recoverable waste streams.	Used to determine the regulatory status of the waste materials and to ensure compliance with NTS requirements outlined in NVO-325. Segregation of waste streams/low level wastes.	Presence/absence of certain contaminants. General levels of radiological contamination as well as other applicable NTS requirements.	Sampling/screening to determine presence below established contamination levels. Sampling requirements per NVO-325.	TBD

TABLE 2-3 Data Collection Approach (Cont'd)

Data Need	Media	Data Use	Data Objective	Data Collection Approach to Meet Objectives	Proposed ASL
SECONDARY DATA REQUIREMENTS					
I. OFF-SITE SHIPMENT/DISPOSAL OPTIONS (LANDFILLS, RECYCLE/REUSE FACILITY, etc.):					
1. Landfill Options:					
1.A. Shipment to Municipal Solid waste landfill; characterization of material to be sent to an approved landfill.	Free release material	Used to determine free release criteria and compliance with landfill requirements, including 40 CFR 261.2, 262.11, and 268. Allow for segregation of waste streams determined to be "clean."	To show absence of contamination above release levels with a very high level of certainty. Levels specified in listed ARARs and in receiving facilities waste acceptance criteria requirements.	Sampling/screening to determine presence below established contamination levels as prescribed by the regulations. Data requirements will be dependent on the receiving facilities waste acceptance criteria.	TBD
1.B. Shipment to NTS; characterization of contaminated materials.	All approved waste streams.	Used to determine the regulatory status of waste materials and to ensure compliance with NTS requirements outlined in NVO-325. Segregation of waste streams/low level wastes.	Presence/absence of certain contaminants. General levels of radiological contamination.	Sampling/screening to determine presence below established contamination levels. Sampling requirements per NVO-325.	TBD
1.C. Shipment to Envirocare of Utah; characterization of mixed waste contaminated materials.	All approved mixed waste streams.	Used to determine the regulatory status of waste materials and to ensure compliance with Envirocare of Utah's waste acceptance criteria. Segregation and packaging of waste streams/all media.	Presence/absence of certain radioactive and hazardous contaminants as defined by Envirocare's Material Acceptance Process Manual.	Sampling/screening to determine presence below established contamination levels as prescribed by LDRs and other applicable regulations. Specific data requirements are stipulated in Envirocare of Utah's Material Acceptance Process Manual.	B
1.D. Shipment to other commercial disposal facilities; Characterization of contaminated materials.*	All approved waste streams.	Used to determine the regulatory status of the waste materials, including 40 CFR 268, and to ensure compliance with facilities requirements. Segregation of waste streams/all media-separate packaging.	Presence/absence of certain contaminants. Criteria to be determined based on facility being considered.	Sampling/screening to determine presence below established contamination levels as prescribed by the regulations. Data requirements will be dependent on the receiving facilities waste acceptance criteria.	TBD

* As other facilities are selected, they will be added to the list of potential facilities to be considered. Disposal facilities are subject to DOE procurement policies and NEPA approval.

TABLE 2-3 Data Collection Approach (Cont'd)

Data Need	Media	Data Use	Data Objective	Data Collection Approach to Meet Objectives	Proposed ASL
1. E. On-property disposal; what are characteristics of the contaminants.	All Media	Determine regulatory status of all media, including 40 CFR 261.2, 262.11, 268, and DOE 5400.5, if necessary.	Presence/absence of certain contaminants. General levels of radiological, TCLP contaminants, etc. Leachability characteristics.	Sampling/screening to determine presence below established contamination levels as prescribed by the regulations to determine interim storage disposition. Further sampling needs to be determined by the OU3 final action ROD.	TBD
2. Shipment to recycle/reuse facility; characterization of material to be sent to DOE approved facility; surface or bulk contamination.	Concrete, cement block, acid brick, coal, asphalt, exotic metals (Inconel and Monel) non-porous metals: mild steel, copper, aluminum, stainless steel.	Used to define the segregation requirements within each media type depending on contaminants. Recycling, reusable as defined by 40 CFR 268.45, 40 CFR 192, NRC Regulatory Guide 1.86 and DOE Order 5400.5.	Presence/absence of certain contaminants. General levels of Radiological TCLP contaminants, etc. Screening to determine presence below a certain level.	Sampling/screening to determine presence below established contamination levels as prescribed by the regulations to determine interim storage disposition. Further sampling needs to be determined by the final action ROD.	B or C
II. RETAIN FOR TREATMENT:					
1. Retain for treatment; characterization of potential contaminants of the material to be treated; surface or bulk contamination.	Concrete, cement block, acid brick, exotic metals, non-porous metals, glass and ceramic.	Used to define the segregation requirements of each media type depending on potential treatment options and requirements.	Type and conservative estimates of concentrations of potential contaminants in wastes and materials as well as the depth of contamination.	Sampling requirements will be dependent on media treatment options. To be determined during the design phase.	B or C

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assist in determining handling, storage, and disposition of the material during the OU3 interim remedial action.

An approach was devised that is essentially selective, assuring that data needs are met through purposeful sampling. The devised approach is based on some important underlying assumptions regarding representativeness:

- the composition of contaminants is uniform within a given medium within a given "process area";
- in most cases the maximum surface level and/or depth of contamination in a given medium will dictate the handling, storage, and disposition options for the entire extent of the medium in a given process area; and
- the types of contaminants present place further constraints on handling, storage, and disposal options.

The fundamental organizational unit under this approach is the "process area." Process areas are defined on the basis of function. For example, a component within OU3 that houses a single operation may be broken down into several process areas, each involving a distinct set of materials and equipment. On the basis of this definition and assumption number one, a process area is an organizational unit representative of a particular type of contamination.

The quantitative aspect of representativeness is addressed in assumption number two. The extent of interest in the investigation relates to the quantity of each major material from a given process area that will fall into various waste categories. As stated in the assumption, the maximum surface level and/or depth of contamination represents the entire extent of the contaminated medium within the process area for interim storage purposes. Assumption number two also mentions handling and disposition of OU3 materials, however, further discussion is deferred to the OU3 RD/RA Work Plan. This assumption assures a conservative estimate of waste volumes, guarding against the possibility of a false negative outcome, or underestimate, which is consistent with the goals of the uncertainty constraints.

Identifying representative contaminants is challenging since potential contaminants are derived from the process materials themselves, reagents added to the process, and ancillary materials used in general OU3 interim remedial action activities. Such potential contaminant sources represent a fairly large number of both radiological and chemical contaminants as outlined in Table 2-3 Primary Data Requirements. The possibility of mixed radiological and hazardous waste is clearly present and will certainly affect handling, storage, and disposition options for affected materials. By identifying the Primary Data Requirements, this information may supplement the Secondary Data Requirements for Off-Site shipment and disposal options.

Data acquired from the sampling and analysis effort must be as complete as possible so that the information gained from this data represents specific properties of the true underlying distribution of contaminants that are of concern for the intended uses of the data. The data collection/sampling approach for the RD/RA field program is designed to determine these properties when existing information obtained from the RI activities, process knowledge, or additional analytical data is insufficient. It is not anticipated that the RD/RA field sampling

program will be of a major scope due to the information that is, or will be, available. However, the possibility does exist that sampling and analysis on a large scale would be necessary for areas or components within OU3 which have no existing analytical data and where process knowledge is lacking or insufficient.

Applying the three assumptions, the following sampling approach was devised:

If existing MEFs, used in conjunction with RI/FS data, process knowledge and/or other analytical data are sufficient to meet the data needs outlined in Table 2-3, no sampling activity will be conducted. The environmental monitoring programs, however, will remain in effect during all remedial activities. As Waste Acceptance Criteria (WACs) become available for on-property and off-site disposition options, as outlined in Table 2-3, Secondary Data Requirements, it will be determined whether or not process knowledge and existing data will meet these WAC prior to initiating additional sampling and analysis efforts.

If process knowledge or previous analytical data exists but is insufficient to meet the contaminant determination needs for a particular component, then supplemental (additional) intrusive and/or non-intrusive sampling will be performed to meet the data needs as well as determine the general extent of the contamination. Types and frequency of sampling will be outlined in the SAP addenda for a particular project.

Upon media dismantlement, further screening/sampling may be performed to support any additional interim storage and/or disposal criteria. This approach would satisfy the characterization of in situ media (as shown in Figure 2-1).

If any additional characterization of the media in question is needed, then supplemental screening/sampling will be undertaken to further complete the design. The type and frequency of sampling and the parameters to be analyzed will be determined on a case-by-case basis in this situation, depending on each individual project. The defined sampling approach will be outlined in the specific SAP addenda for this sampling event. Upon media dismantlement, further screening/sampling will be performed, if needed, to support any interim storage and/or disposal criteria that may not have been previously met. See Section 3.7 for a more detailed discussion on implementation of the sampling approach.

2.3.2 Analytical Support Levels

The ASLs provide a connection between project DQOs and appropriate analytical options for meeting them. Table 2-3 assigns the proposed ASL to each of the identified data uses for the OU3 interim remedial action. The QA/QC requirements for ASLs are provided in Volume II, Appendix A, Table 2-2 of the SCQ. Analytical methods and/or performance based criteria to be used for each ASL are also defined in Appendix G of the SCQ. Various analytical options for each ASL are, in turn, identified in Table 2-4. This table limits the selection of analytical options for each measurement type to ensure that the quality of the measurements achieved will support the intended data uses.

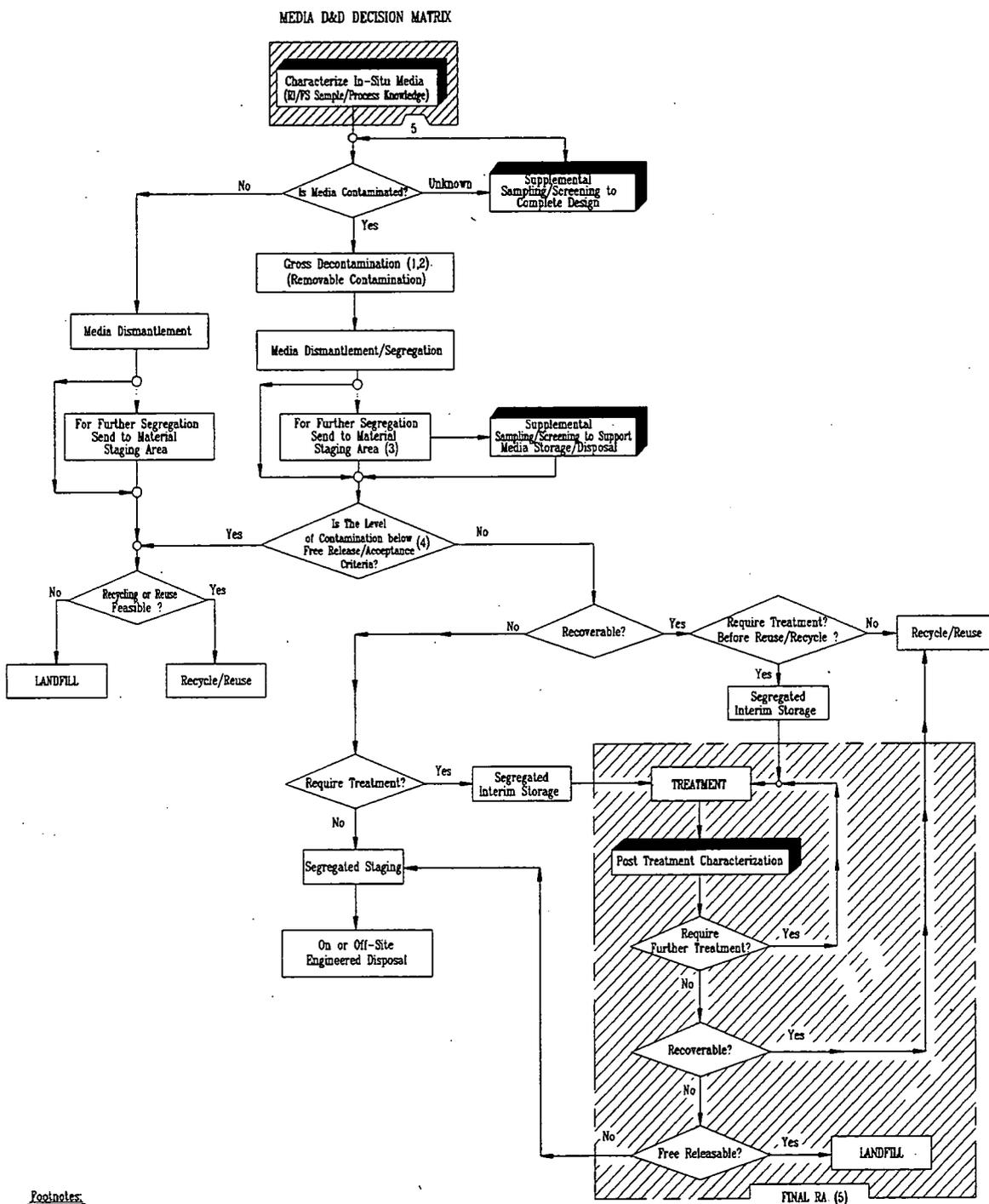


FIGURE 2-1 Media Decision Matrix

2.3.3 Sensitivity Requirements

Sensitivity goals for sample analysis are necessary to ensure that contaminants are detected at sufficiently low levels to be meaningful for the intended uses of the data. Sensitivity requirements are set for each type of measurement, including field and laboratory measurements. Table 2-5 presents a listing of all the major laboratory and field parameters to be considered in the OU3 interim remedial action and gives the corresponding analytical technique, source protocol or method, method detection limits, and the basis for the selection of the method in terms of sensitivity requirements. Analytical data exceeding the sensitivity requirements will be retained and utilized as supplemental information to analytical data that meets the sensitivity requirements and/or process knowledge for the respective area.

Appendix G of the SCQ contains the methods and performance criteria for all analyses performed for the FEMP. For organic and inorganic analytes, standard methods such as USEPA's statement of work for the contract laboratory program (CLP), as well as SW-846, are listed. For radiological analyses, performance-based standards are employed. The field method procedures have been developed specifically for environmental monitoring at the FEMP and are currently in the SCQ or have been submitted for inclusion. New field method procedures may be utilized prior to inclusion into the SCQ if they are approved prior to use.

The detection limits listed for both the radiological and chemical laboratory analyses are the required detection limits in Appendix G of the SCQ. In the case of Volatile Organic Compounds (VOCs) and semi-volatile organic compounds (SVOCs), the limits in the table are actually contract required quantitation limits (CRQLs). Detection limits for these analytes would actually be somewhat lower.

The basis for requiring the sensitivity of the selected methods is given in the last column of Table 2-5. In the case of analysis of specific radionuclides or chemicals (listed as VOCs, SVOCs, PCBs and metals), a separate basis is provided for either solid or liquid media. For solid and liquid media, all sensitivity requirements listed are currently based on either USEPA methods (SW-846 methods) or current SCQ performance specifications. Actual sensitivity requirements will be dependent on unrestricted (free) release criteria or WAC at the time of sampling.

Required detection limits for field radiological procedures are based on the corresponding NRC surface contamination limits for release without radiological restrictions (NRC 1974). For field screening for PCBs, the required detection limits are based on the requirements of the Toxic Substances Control Act (TSCA) for bulk and surface contamination spill cleanup levels. The detection limit set for organic vapor detection by photoionization detector (PID) or portable gas chromatography is based on general background levels found in industrial buildings and is readily achieved with commercial instruments.

TABLE 2-4 Analytical Options Under Various ASLs

ASL	Parameters	Analytical Options	Media to be Sampled
A	Alpha surface contamination screening	• Thin ZnS (Ag) scintillator	• Surface of major media
		• Gas flow proportional counter	• Bulk media and beach areas
		• Thin-face Geiger-Mueller (GM) detector	• Sediments, uncharacterized solids/loose media
	Beta and gamma surface contamination screening	• GM detector • Gas flow proportional counter • Beta scintillator • Plastic scintillator	• Surface of major media • Bulk media and beach areas • Sediments, uncharacterized solids/loose media
Removable alpha surface contamination	• Low background counting (Tennelec)	• Surfaces of major media or supplemental sampling locations	
	• Low background counting (Tennelec)	• Surfaces of major media or supplemental sampling locations	
Total organic vapors	• PID	• Bulk media and beach areas	
	• Flame ionization detector (FID)	• Sediments, uncharacterized solids/loose media	
	• Field investigation for the detection of low energy radiation (FIDLER) scintillator • NaI (TI) scintillator	• Surfaces of major media or supplemental sampling locations	
Low-level gamma screening	• Gamma-compensated GM probe • Ionization chamber	• Surfaces of major media or supplemental sampling locations	
	Higher-level beta and gamma screening		

TABLE 2-4 Analytical Options Under Various ASLs (Cont'd)

ASL	Parameters	Analytical Options	Media to be Sampled
B (Cont'd)	Gamma exposure rates	<ul style="list-style-type: none"> Pressurized ionization chamber Nal (TI) scintillator Plastic scintillator 	<ul style="list-style-type: none"> At locations of elevated gamma activity where individuals may be exposed
	Metals	<ul style="list-style-type: none"> Portable XRF spectrometer 	<ul style="list-style-type: none"> Surfaces of major media or supplemental sampling locations Bulk media and beach areas Sediments, uncharacterized solids/loose media, liquids
	Polychlorinated biphenyls (PCBs)	<ul style="list-style-type: none"> Field test kit Immunoassay field test kit 	<ul style="list-style-type: none"> Sediments, uncharacterized solids/loose media, liquids (field test kits) Surfaces (immunoassay test kit)
	Organic vapors	<ul style="list-style-type: none"> Portable Gas Chromatography (GC) 	<ul style="list-style-type: none"> General component air sampling
B/C/D	Toxicity Characteristics Leaching Procedure (TCLP)	<ul style="list-style-type: none"> SCQ protocol based on standard RCRA procedure 	<ul style="list-style-type: none"> Suspected hazardous waste materials not previously identified and managed at the site Suspected mixed waste containing both radiological and chemical contaminants Used for determining leaching potential of materials subject to weathering
	<u>Radiological Suite</u>		
	U, Th, Pu isotopes	<ul style="list-style-type: none"> Radiochemistry by SCQ performance based criteria 	<ul style="list-style-type: none"> Intrusive samples from major media and supplemental sampling locations
	Cs-137	(Applies to entire radiological suite)	<ul style="list-style-type: none"> Bulk media and beach areas
	Ra-226		<ul style="list-style-type: none"> Sediments, uncharacterized solids/loose media, liquids

TABLE 2-4 Analytical Options Under Various ASLs (Cont'd)

ASL	Parameters	Analytical Options	Media to be Sampled
B/C/D (Cont'd)	Sr-90, Tc-99, Pb-210 Po-210, Ra-228, Np-237, Pu-241, Am-241	(All apply to entire radiological suite)	
	<u>Chemical Suite</u>		
	Volatile organic compounds (VOCs)	<ul style="list-style-type: none"> Gas chromatography/mass spectrometry (GC/MS) by SCQ protocol 	<ul style="list-style-type: none"> Intrusive samples of sediments, uncharacterized solids/loose media, liquids
	Semi-volatile organic compounds (SVOCs)	<ul style="list-style-type: none"> GC/MS by SCQ protocol 	<ul style="list-style-type: none"> Intrusive samples of sediments, uncharacterized solids/loose media, liquids
	PCBs	<ul style="list-style-type: none"> GC by SCQ protocol 	<ul style="list-style-type: none"> Intrusive samples from major media and supplemental sampling locations Intrusive samples of sediments, uncharacterized solids/loose media, liquids
	Trace metals	<ul style="list-style-type: none"> Furnace Atomic Absorption spectrometry (FAA), inductively coupled plasma atomic emission spectrometry (ICP) by SCQ protocol and Cold Vapor Atomic Absorption (CVAA) 	<ul style="list-style-type: none"> Intrusive samples from major media and supplemental sampling locations Intrusive samples of sediments, uncharacterized solids/loose media, liquids

TABLE 2-5 Analytical Sensitivity Requirements

Parameter	Technique	Protocol/Method	Method Detection Limits		Basis for Method Selection	
			Solids (pCi/g)	Liquids (pCi/L)	Solids	Liquids
Isotopic U	Radiochemistry	SCQ	0.2	0.5		WAC
Isotopic Th	Radiochemistry	SCQ	0.2	0.5		WAC
Isotopic Pu	Radiochemistry	SCQ	0.2	0.5		WAC
Cs-137	Radiochemistry	SCQ	1.0	4.0		WAC
Sr-90	Radiochemistry	SCQ	0.5	1.0		WAC
Tc-99	Radiochemistry	SCQ	10	30		WAC
Pb-210	Radiochemistry	SCQ	1.0	3.0		WAC
Po-210	Radiochemistry	SCQ	0.5	1.0		WAC
Ra-226	Radiochemistry	SCQ	0.2	1.0		WAC
Ra-228	Radiochemistry	SCQ	0.5	3.0		WAC
Np-237	Radiochemistry	SCQ	0.2	0.5		WAC
Pu-241	Radiochemistry	SCQ	0.5	1.0		WAC
Am-241	Radiochemistry	SCQ	1.0	4.0		WAC

TABLE 2-5 Analytical Sensitivity Requirements (Cont'd)

Parameter	Technique	Protocol/Method	Method Detection Limits		Basis for Method Selection		
			Solids (µg/kg)	Liquids (µg/L)	Solids	Liquids	
VOCs	GC/MS	CLP/SW-846/SCQ	10	10		WAC	
SVOCS	GC/MS	CLP/SW-846/SCQ	330	10		WAC	
PCBs	GC	CLP/SW-846/SCQ	33	1		WAC	
Metals	FAA/ICP	CLP/SW-846/SCQ	(TAL contract required detection limits (CRDLs))				WAC
TCLP	ICP and GC/MS	SW-846/SCQ	(See Note 1)				WAC
Removable alpha	Low-background counting	SCQ		20 dpm		NRC limits	
Removable beta-gamma	Low-background counting	SCQ		1,000 dpm		NRC limits	
Organic vapors	PID or portable GC	SCQ		1 ppm		Background	
PCB screen	Field test kits	SCQ		50 ppm (bulk)		TSCA	
	Immunoassay Field Kit			10 ug/100 cm ² (surface)			
Metals screen	XRF	SCQ		100-200 ppm		Instrument performance	
<u>Maximum Allowable Total Surface Contamination²</u>							
Total alpha	Thin Window Scintillation Probe	SCQ		300 dpm/100cm ²		NRC limits	
Total beta-gamma	GM	SCQ		15,000 dpm/100 cm ²		NRC limits	
Low-level gamma	Nal (TI)	SCQ		background		Background	
Gamma exposure rate	PIC	SCQ		background + 20 µR/h		DOE Order 5400.5	

Note 1: Should be equal to total analyses method detection forms (MDLs) for water matrices, unless there is matrix interference.
 Note 2: MDLs do not apply to field equipment. The operational efficiency of field equipment is very instrument specific.

2.4 Sample Numbering and Tracking System

In order to facilitate sample management, sample numbers, which will be used by field crews to track samples and their data, consist only of the component alpha-numeric designation, as shown in Table A-1 of the final OU3 RI/FS Work Plan Addendum (WPA), followed by a sequential number. For example, the ninth sample taken from the Incinerator Building (39A) would have the corresponding sample number 39A-009. This unique number, along with all pertinent data and sampling information, will be entered into a project-specific database (see Section 2.6) to support tracking of the samples.

The sample numbers will be predetermined at the time of the SAP addenda development to the extent possible; however, field crews will be equipped to add to the list of samples. Additionally, the database will be pre-loaded with sample numbers to the extent practical to allow for automated sample label and form printing.

Sample labels will include all necessary cross references to correlate them to daily field activity logs, requests for analysis forms, and chain-of-custody records described in the SCQ. Additional requirements dealing with various media and specific types of samples that may affect the information included on the sample labels are also contained in the SCQ.

Sample numbers will not be applied to field screening (i.e., radiological swipes, radiological screening, XRF screening, etc.). A screening tracking system currently in use for radiological screening will be employed, using area maps to number and mark the locations of sequential screening and cross-references to describe each.

2.5 Design Package SAP Addenda

This section discusses the SAP addenda which will be developed for each project utilizing the global approach described in this SAP applied against the particulars (i.e., expected media, expected contaminants, etc.) of the components which comprise the project.

2.5.1 Description

Section 3.0 is devoted to a general discussion of the design of a sampling approach for the OU3 interim remedial action. A SAP addenda will be completed for each project based upon the data needs for the components contained therein, and the application of the general sampling approach to media, contaminants, etc., relevant to each process area within the components. SAP addenda will be prepared during the pre-design or early design phase of a design package subsequent to the establishment of the initial data needs. At this time (early design), the SAP addenda may be utilized to obtain any sample data required for the completion of design. The SAP addenda will be supplemented as necessary throughout the remedial design/remedial action process, to reflect the progression of sampling throughout the entire process.

The primary function of the SAP addenda is to document sampling activity plans associated with each project (and the components therein) and to obtain site approval for the activity. The SAP addenda also reiterates component descriptions and process divisions for the benefit of field sampling personnel and further provides a systematic method of identifying procedures

(see Sections 5.2 and 5.3) to be employed and equipment requirements. A schedule is also prepared to serve as a flag for logistics coordinators.

The SAP addenda specifies sample numbers to be utilized for sample locations identified in the component inspection activities per the OU3 interim remedial action sample numbering system described above. Total sample volume needs are discussed relative to laboratory requirements to perform the relevant analyses for each location and media.

The outline for the SAP addenda is as follows:

Signature/Authorization Block: This includes authorizations from site management to implement the proposed field activity. The preparer, the project supervisor, and the manager of the OU3 interim remedial action will authorize the document.

Section 1 - Introduction: This section provides a short description of the components, within the project. This section will also highlight any logistical issues or special requirements for field crews.

Section 2 - QA/QC Requirements: This section includes a signature block for the QA/QC lead for the project to verify that the identified plan for field QA samples in the component meet the intent and requirements of the SCQ. It also contains information pertaining to the frequency at which each field QA sample should be taken.

Section 3 - Sample Locations: This section describes the sampling locations to be determined, as well as intrusive sampling analytical data. This section also breaks down the sampling into the non-intrusive field screening and intrusive (i.e., core sampling, chips, etc.) sampling requirements for the project.

Section 4 - Sampling Activities, Sample Handling, and Procedures: This section references the procedures to be followed during OU3 sampling activities and sample handling. It also outlines which type of sample containers and lids are required during the SAP addenda sampling event.

Section 5 - Equipment Needed: A standard table is marked to correspond to the specific sampling needs of the component. Additional special requirements are also addressed.

Attachment 1 - Summary of Non-Intrusive Sampling: This table, which will be used by the sampling technicians, summarizes radiological and chemical screening, as well as air and swipe samples. It states the sample identification numbers, media type and matrix code, sample location, sample type, sampling procedures, ASL, requested analyses, chain of custody codes for analyses, weight and volumes of samples, hold times, and preservatives for all non-intrusive samples planned for that component.

Attachment 2 - Summary of Intrusive Sampling: This table, to be used by the sampling technicians, summarizes the major media and supplemental intrusive samples. It states the sample identification numbers, media type and matrix code, sample location, sample type, sampling procedures, ASL, requested analyses, chain of custody codes for analyses, weight and volumes of samples, hold times, and preservatives for all intrusive samples planned for that component including field QA samples.

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Attachment 3 - Sample Containers Needed per Media Type: This is a chart that gives the total number of sample containers required for the component sampling event based upon the requested analyses, media types, and sample volumes required. It is to be used by the sample technicians as a reference to ensure they have the correct sample container types and quantities for the component sampling event.

Attachment 4 - Map(s): This is an updated map showing the exact sampling locations based upon available radiological and chemical screening data.

Attachment 5 - Equipment Requirements: This is to be used by the lead technician as a reference prior to field screening and sampling to ensure the sampling crews are adequately prepared for the daily tasks.

Attachment 6 - Health and Safety Plan Addenda/Matrix: This is an addenda to the OU3 RD/RA health and safety plan (HASP), and matrix specific to the activities to be undertaken through the SAP addenda.

2.5.2 Procedure for Preparing SAP Addenda

A SAP addenda will be prepared according to a review of the information discussed in Section 3.1. The following steps are provided as guidelines for preparing a SAP addenda:

- review the RI/FS Field Work Package for that component and associated radiological and chemical screening data as well as any analytical data generated through the RI/FS sampling effort. Upon completion of the RI report, such information will be found in Section 4.0 "Nature and Extent of Contamination";
- determine data needs and/or data gaps based on screening and analytical data available and the requirements of the remedial action to be utilized for the specific matrices within the components of the project;
- evaluate component changes during the OU3 interim remedial action which may impact sampling plans;
- perform a visual inspection of the component to verify that the available information records on the component are correct;
- update records and component maps;
- develop text sections of the SAP addenda from information and requirements contained in the SAP and SCO;
- provide initial SAP addenda draft for program internal review;
- revise SAP addenda per review comments;
- route SAP addenda for formal review/signature;

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- provide finalized document for training and logistics purposes;
- perform logistics walk-down before non-intrusive screening begins;
- determine if non-intrusive screening locations and numbers are correct;
- review field screening results to determine if intrusive sampling locations and numbers are correct; and
- revise SAP addenda and/or map to reflect final intrusive sampling locations.

The SAP addenda is to be used by field personnel. Any deviations or additions to the SAP addenda will be maintained in field logs. Finalized information related to sample numbers, sample quantities, and sample locations will also be detailed in the logs to be used in the sample tracking database.

2.6 Changes to Documents

Changes to this SAP may be required during the course of project implementation as a result of new findings, variations found in the field, or unanticipated events. In an attempt to create a flexible document, an internal procedure has been established based on procedures in the SCQ to make modifications or additions to both the existing SAP and the SAP addenda while maintaining the intent of the OU3 interim remedial action. It should be noted that these procedures for making document changes apply only to this SAP and its corresponding SAP addenda.

Depending on the nature of a requested change pertaining to this SAP, either a SAP Variance Request (SVR) or a SAP Document Change Request (SDCR) would be initiated. Changes made in the field will be documented on a SAP Addenda Variance Report (SPAVR).

A variance would be an approved variation to a strategy, approach, procedure, or stated requirement that would not alter the results intended by this document. SVRs should contain alternative methods to perform the tasks described in this SAP. In this manner, SVRs should not significantly differ from the tasks described in this document. SVRs could be specific (e.g., change in field instrumentation for collection of samples) or general (e.g., an adjustment to a strategy, approach, procedure, or stated requirement in the SAP as a result of new developments). The principal rule-of-thumb is that an SVR should not require a revision to this SAP. An SVR will be approved internally and documented on an SVR form before the variance is implemented.

A SDCR will be a means of initiating a revision to the approved SAP if substantive changes need to be made regarding programmatic issues or sampling strategies documented in this SAP. Internal review and approval of the SDCR will be conducted before implementing the document change to ensure that the content of the SDCR is in accordance with the intent of the OU3 interim remedial action.

SPAVRs will be written for instances when the SAP addenda cannot be followed to collect samples in the field or to correct field paperwork (e.g., logbooks, chain of custody forms).

Examples will include change in sample location due to inaccessibility of sampling point, cancellation of a scheduled sample due to insufficient media for collection, or corrections to be made to chain of custody form due to transcription error.

2.7 Data Management Plan

The overall FEMP data management plan is described in Appendix F of the SCQ. The following discussion is to summarize the data management plan with respect to important interfaces with the field sampling program. The major elements of the data management system will be discussed in this regard, along with the aspects of the system important to planning field sampling efforts and the tracking of material for disposition.

As described in Section F.1.2 of the SCQ, there are seven steps, or activities, in the life cycle of environmental data after the approval of a project-specific plan, as follows:

- collection of samples (or field measurements);
- transfer and handling of samples;
- laboratory analysis and reporting;
- data verification and validation;
- data repository;
- data analysis; and
- data archiving and storage.

There are three main system elements of the data management system developed to support these activities: Fernald Analytical Computerized Tracking System (FACTS); Environmental Resource Management and Analysis (ERMA); and the Sitewide Environmental Database (SED). The centerpiece of the system is the Oracle-based SED, which includes the site-wide environmental database and is the central repository for all FEMP environmental data. The other systems interface with the SED to support data input/output, sample tracking and scheduling, and graphical representations and mapping, among other activities.

FACTS is the main sample data entry system, as well as the main sample tracking system, and is therefore important to field sampling teams. FACTS contains a subsystem for sample tracking that issues sample identification numbers unique to each analytical sample generated. This identification number is used in all other FEMP environmental data base systems to cross reference sample analysis results data. The SED and ERMA systems are primarily involved in data storage and access and data analysis, respectively.

3.0 SPECIFIC SAMPLING PROGRAMS

Section 3.1 discusses the need to first assess all available information (e.g., sampling data, process knowledge, etc.) to identify data gaps appropriate to the components of a particular project. Section 3.2 discusses sampling required to fulfill interim storage and disposition requirements. Section 3.3 discusses secondary waste stream sampling (i.e., decontamination water and wastes). Section 3.4 discusses the approach to assessing potential environmental sampling needs for a specific project. Section 3.5 discusses the evaluation of sampling associated with monitoring necessary for operation of the *interim storage facility*. Section 3.6 discusses how to address sampling specific to HWMUs. Section 3.7 discusses how the sampling approach discussed within the above sections will be implemented throughout the duration of the interim action.

3.1 Available Data/RI/FS Sampling Data/Process Knowledge

One major aspect of the sampling approach for the interim remedial action is to assess whether existing data and process knowledge are sufficient to meet data needs. Most existing data and process knowledge will be obtained from the OU3 RI/FS field sampling program, radiation surveys, and data that is generated from the completion of removal actions (Asbestos Removals, Safe Shutdown, Removal of Waste Inventories). During remedial design, data and process knowledge will be collected by the project-specific DEC team which will then be evaluated for completeness in meeting data needs. If the evaluation determines that the data is sufficient to meet data needs, then no additional sampling will be proposed. If the data is insufficient, a SAP addenda will be generated to fill data gaps.

To develop a specific sampling approach for each SAP addenda, data gaps will be determined through a review of available information on the components contained in the design package against the data needs specific to the particulars of the components involved (e.g., types of media, types of contaminants, depth of contamination, presence of HWMUs, etc. - refer to Table 2-1). Available information takes many forms. For example, there is a significant amount of information on quantities of materials used in components in RCRA reports, spill logs, incident reports, process knowledge, materials distribution information which in itself may not fulfill data needs as identified in Table 2-1, but will provide support to other analytical results. Various information is available in the form of sampling results, including waste characterization information and sampling performed for removal actions, HWMU activities, and other such activities.

The information with the largest potential for fulfilling data needs during design is that information gathered through the OU3 RI/FS sampling program defined in the WPA. It is important to understand that the basic sampling approach used in the RI/FS sampling program involves the taking of a single sample from the location of maximum contamination level and/or depth for each major medium (concrete, masonry or steel) in each process area, plus supplemental samples of liquids and loose media. The data represents non-intrusive and intrusive sampling (chemical and radiological) of materials as described in the WPA. The data will be available from the following sources:

- The SED, which contains all radiological and chemical field survey data and all analytical data from the laboratory analyses of intrusive samples gathered for the OU3 RI/FS data needs;

- Section 4.0 of the OU3 RI report, will summarize the component-specific nature of contamination. The summaries will be compiled from the OU3 RI/FS analytical data information in the SED; and
- Hard copies of the data from component-specific radiological and chemical field screening which is available via completed field screening forms and the accompanying field logbook information compiled during the RI/FS field characterization.

The information gathered through review of all above sources will be compared against the data needs for the component(s) in the design package, data gaps will be identified, and a SAP addenda generated.

3.2 Interim Storage and Disposition Sampling

All media considered within a design package must be characterized to identify potential contaminants. By identifying these contaminants, interim remedial activities, interim storage, and disposition considerations will be taken into account. One of the decisions needed to complete a design package will be based on the character and volume of contaminated materials (e.g., concrete, steel, *transite*, etc.) in the operable unit. It is assumed and expected that all media within a process area contain the same types of contaminants, although the level of contamination will probably vary. This was the crux of the RI/FS sampling program proposed in the WPA. This section discusses the sampling approach as it will be applied to satisfying these needs for interim storage and disposition.

3.2.1 Material Evaluation Form

For the purposes of this document, the term MEF is used generically to describe the current process of assessing the hazardous and radiological nature of material/debris at the FEMP. The process of evaluating and assessing the nature of the material/debris will continue through the interim remedial action, although the actual documentation process (e.g., completing MEFs) may change as the project progresses, due to changes in procedures, potential for streamlining, etc..

Before a remedial action begins which may generate material/debris that potentially contains hazardous and/or radioactive contamination, an MEF may be generated for the material of concern. Existing MEFs will be used when possible. The FEMP is required to conduct an assessment of the contaminants that are contained within the material/debris to complete the MEF, which is used to make the determination between hazardous (RCRA) and non-hazardous (non-RCRA) as well as classifying materials for specific waste streams to ensure proper segregation. A list of existing MEFs and their corresponding waste stream classifications may be found in Attachment B of safety procedure requirement SSOP-0044. The assessment will include a review of existing analytical data and a review of historical and process operation knowledge to identify potential constituents of concern. It should be noted that pre-1989 analytical data may not include analyses of toxicity characteristic organics such as benzene (for more information see 40 CFR 261.24). If these constituents are present in the material at concentrations that exceed regulatory levels, the materials are classified as hazardous waste and must be managed according to the RCRA hazardous waste regulations. This

possibility should be noted when reviewing existing data. Sampling and analysis will be performed for potential contaminants that are identified in the assessment but are not included in an existing analytical database. A contaminant assessment will be completed and documented prior to disposition of materials into storage.

3.2.2 Sampling Determinations

The paragraphs below describe the basic analytical sampling requirements to complete the following determinations: hazardous, radiological, PCB, and asbestos.

Determination of Hazardous Waste Characteristics

To determine the extent of contamination of hazardous constituents in OU3 media, the TCLP may be performed. TCLP is designed to determine the mobility of both organic and inorganic contaminants present in liquid, solid, and multi-phasic wastes and is used to determine whether a material is hazardous waste under RCRA and whether it is subject to land disposal restrictions. The TCLP analyte list consists of 8 metals, 10 volatile organics, 13 semi-volatile organics, 7 pesticides, and 2 herbicides for a total of 40 analytes. USEPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (USEPA 1987) methods are implemented for TCLP determinations (see Table 5.2 for list of specific method numbers).

Instead of the analysis of the constituent concentrations in the waste extracts (CCWE), the constituent concentration in the solid waste (CCW) may be analyzed and the results compared to 20 times the regulatory limits as specified in 40 CFR 261.24. The multiplier compensates for the dilution of the samples during the TCLP extraction procedure. If the CCW exceeds 20 times the regulatory limits, then an additional sample may be collected and analyzed for the CCWE.

Depending on the contaminants of concern in the component being sampled, the analytes being sampled may include as many as all 40 listed in the TCLP method or may be as few as a single analyte (e.g., lead or trichloroethane). The analyte list to be sampled will be determined when all previous analytical data and process knowledge are evaluated. The sampling will be used to fill data gaps needed to complete a RCRA determination.

When intrusive data is not required by the WAC of the disposal facility, field screening using XRF, PID, FID, and/or GC may be utilized. Descriptions of these field instruments may be found in Section 4.1.

If necessary, other SW-846 methods may be used to determine the ignitability, corrosivity, and/or reactivity of OU3 media. These analyses will be added to a SAP addenda when process knowledge indicates the necessity.

Determination of Radiological Characteristics

To determine the extent of radiological contamination in OU3 media, characterization may be completed using field screening methods or intrusive sampling and analysis. This decision will depend on the intended uses of the data.

Radiological screening measurements and instrumentation are discussed in section 4.1.1. Action levels for radiological parameters can be found in the DOE Radiological Control Manual

(Table 2-2) (DOE 1992) and in DOE Order 5400.5 (DOE 1990b). Action levels are listed for removable (dpm/100 cm²) and total, fixed and removable contamination, (dpm/100 cm²).

Intrusive sampling will be required in instances when the WAC of a prospective disposal site will not accept field screening data. The radionuclides to be analyzed will depend on the requirements of the WAC. Examples of radionuclide determinations routinely required include: total and isotopic uranium, and total and isotopic thorium. All radioanalytical determinations shall be performed to meet the SCQ performance based specifications in Appendix G of the SCQ.

The discussion on air monitoring for radionuclides is found in Section 3.4.1.

PCB Determination

To determine the extent of PCB contamination in potentially contaminated media, field screening and/or intrusive sampling may be required. Again, this decision will depend on the intended use of this data.

Field screening test kits for soil, oil, and surfaces are currently being used at the FEMP. These kits provide qualitative and semi-quantitative data that may be best used to determine the presence or absence of PCBs. Further descriptions can be found in Section 4.1.2.2.

Intrusive sampling will be required in instances when the WAC of a prospective disposal site will not accept field screening data or the field screening kits do not offer enough sensitivity. All analytical determinations in such instances are to be performed at ASL B and are to follow the SW-846 methods and performance criteria outlined in Appendix G of the SCQ.

Asbestos Determination

Some asbestos containing material (transite, pipe insulation, etc.) may be removed from the components as part of remedial action. When required, sampling for asbestos in media will be performed following 40 CFR 763 for bulk asbestos. Asbestos greater than 1% by volume in a media will require special handling and segregation.

3.2.3 Analytical Requirements for Off-Site Disposition Options

The utilization of off-site disposition options depends largely on the WACs of the receiving facilities. The flow charts in Figure 3-1 and Figure 3-2 illustrate the decision process for assessing data needs and data collection requirements to meet material disposition requirements for municipal landfills, recycling facilities, NTS, or other commercial disposal facilities. Data generated through this data collection approach is not expected to provide all the pertinent data that may be required for these off-site facilities. Since each facility has its own WAC, specific materials that will be accepted are decided on a case-by-case basis. During the interval period, it is planned that most waste material will be shipped off-site to NTS immediately after generation since most OU3 material is classified as low-level radioactive waste. Small quantities of mixed waste and unrestricted waste may be generated during the interval period. Mixed waste will be disposed of at Envirocare of Utah (Envirocare), and unrestricted waste will be disposed of at local municipal landfills, both as soon as possible after generation. The remaining materials (recoverable/reusable, material requiring treatment), however, is expected to be placed in interim storage prior to determining the final disposition under the final remedial action ROD, unless vendor-specific WACs for receipt of

recyclable/reusable materials allow for shipment of that category of material. Proper segregation is essential to minimize the need for re-characterization during the OU3 final action.

Shipment to NTS

Currently known material acceptance criteria for waste streams expected to be generated during the interval period are stated, or referenced, in Appendix A of the OU3 RD/RA Work Plan for Interim Remedial Action. As stated in that appendix, waste acceptance criteria for NTS is stipulated by The Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO-325). NVO-325 establishes procedures, requirements, and criteria for sampling, containerization, RCRA determination, certification, and safe transfer of low-level and mixed waste, and storage of transuranic and transuranic mixed waste at the NTS. At this time, however, the FEMP only has acceptance approved for shipment and disposal of low-level radioactive waste (LLW) at NTS. Mixed waste, transuranic (TRU) and transuranic mixed waste is excluded. NVO-325 requirements include making radiological and RCRA determinations. For TRU waste, the NTS license application for the FEMP states that contaminated construction/removal action wastes may exhibit a TRU concentration of less than 100 nCi/g (i.e., shall not be regulated as TRU waste). Material Control and Accountability (MC&A) records at the FEMP indicate there are no materials at the FEMP with TRU concentrations above the 100 nCi/g level. All wastes are considered mixed waste until the generator can document through process knowledge or analysis that the LLW contains no hazardous waste as identified through the RCRA determination process. At this time, the FEMP is required to report the following radioactive constituents from dry solid demolition materials from maintenance, construction, remedial and/or removal actions which generate soils, gravel, concrete, scrap wood, scrap metal, plastic, paper, glass and asphalt:

- U-238: 0.1% to 1.0% total U
- U-235: 0.2% to 1.0% on a total U basis
- U-234: 0.001% to 0.01% on a total U basis

The chemical forms of these radionuclides at the FEMP are Uranium oxides and salts (typically UO_3 , U_3O_8 , and UF_4).

PCBs are not allowed in the waste stream for NTS unless the concentration meets the municipal solid waste disposal levels of 50 ppm or less. All regulated (friable) asbestos waste must be segregated into a separate stream and meet all requirements on regulated asbestos (see 40 CFR 61.140 through §61.157). However, at this time, NTS is not accepting asbestos materials from the FEMP. This discussion does not provide a complete list of all waste acceptance data requirements but only highlights specific criteria from NVO-325 that are of most concern for OU3 materials. All waste streams considered for shipment to NTS must have a SAP generated for that waste stream, and it must be submitted to and approved by DOE Nevada Field Office (DOE-NV) prior to sampling the waste stream. Supporting information/data obtained during this interim remedial action will ensure that proper material segregation is performed to facilitate future disposition at NTS.

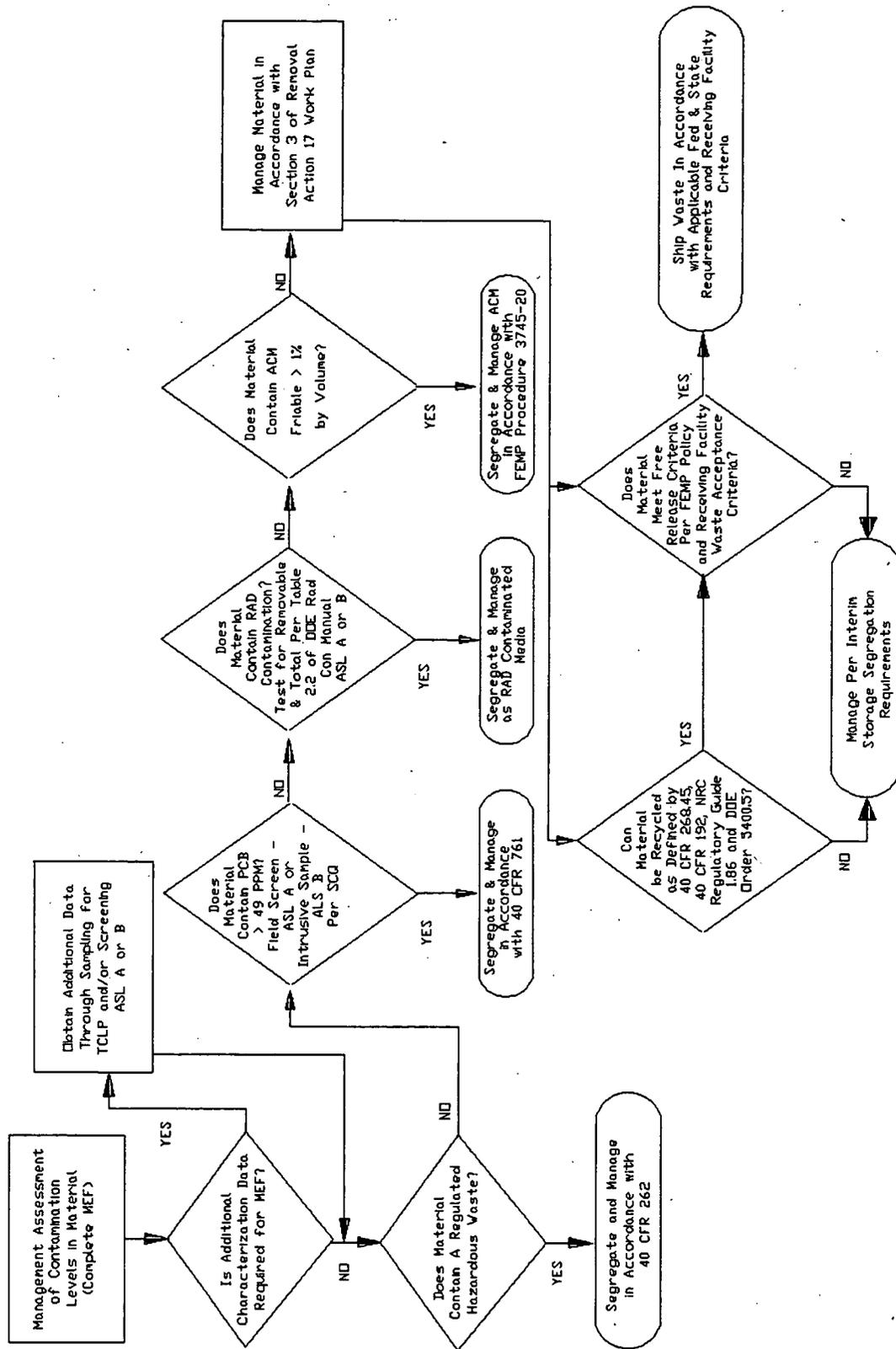


FIGURE 3-1 Criteria for Off-Site Shipment of Material to a Municipal Solid Waste Landfill or Recycle Facility

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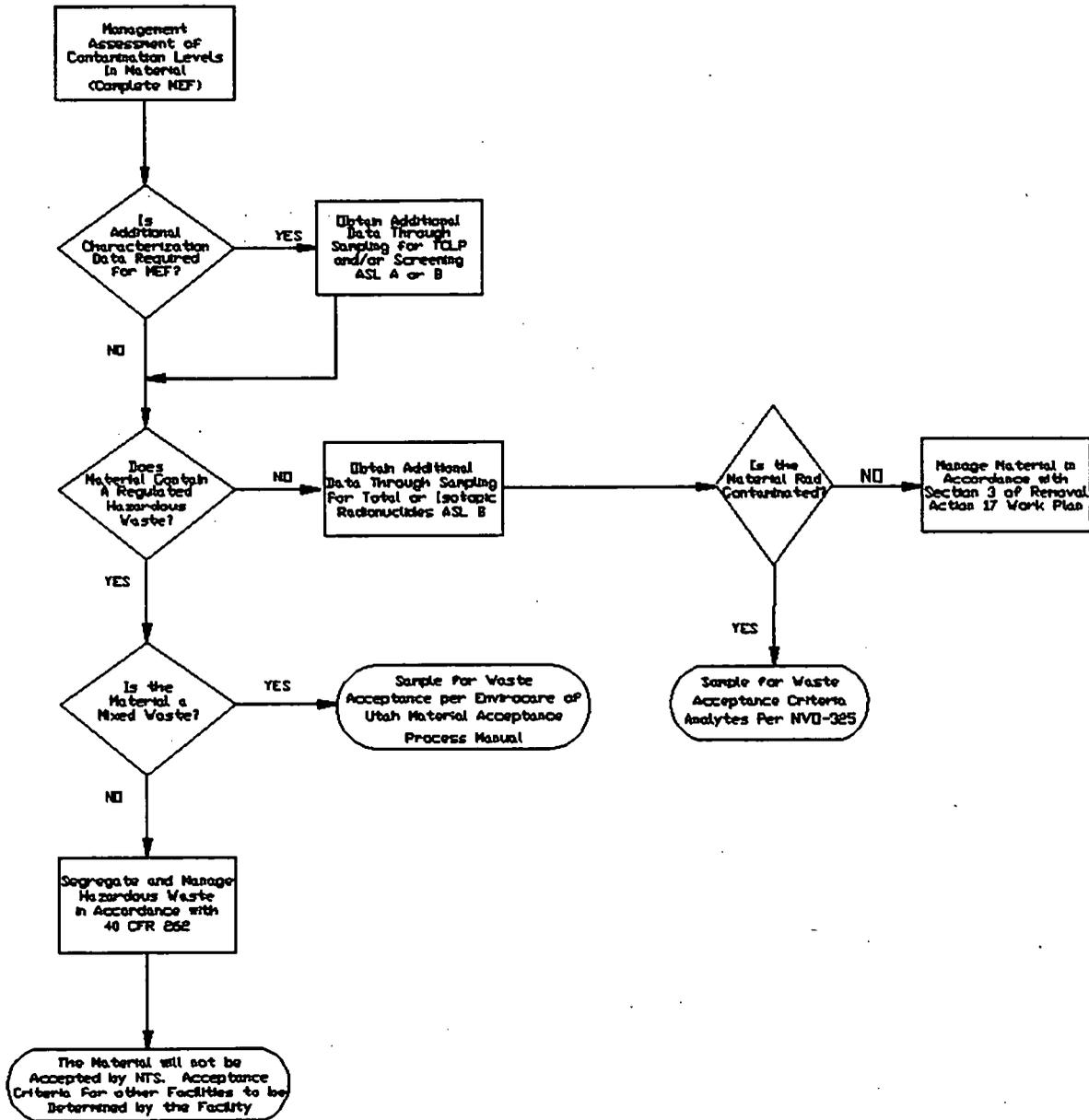


FIGURE 3-2 Criteria for Off-Site Shipment of Material to the Nevada Test Site and/or Other Commercial Facilities

Per the NTS license application for the FEMP, NTS requires a one percent confirmatory sampling events for each waste stream. Waste streams are categorized in this license application along with the corresponding specific radiological and RCRA determination requirements. For example, if a design package generates a total of 475 containers, at three waste streams of 158 containers per waste stream, one percent confirmatory is two (2) sampling events per waste stream, three (3) samples per container. This would require a total of 18 samples required for NTS confirmatory. Total number of containers will be determined in the development of each design package.

Shipment to Other Commercial Disposal Facilities

For other commercial facilities, as with NTS, the data collection approach will depend on each facilities' waste acceptance criteria. Figure 3-1 illustrates the general decision process used to determine basic information needed for disposal at other commercial disposal facilities. At this time, Envirocare of Utah has been identified the only commercial disposal facility for OU3 material disposition during the interval period. As noted in the introduction to this section, Envirocare has been contracted (under a nationwide DOE contract) to receive mixed waste from DOE complexes that meet the waste acceptance criteria established under Envirocare of Utah's Material Acceptance Process Manual (Appendix A of the OU3 RD/RA Work Plan summarizes the basic waste acceptance criteria for Envirocare).

The Envirocare Material Acceptance Process Manual establishes procedures, requirements, and criteria for safe transfer and disposal of naturally occurring radioactive material/low activity radioactive waste (NORM/LARW) and mixed waste material. Envirocare's Material Acceptance Process Manual requirements set forth specific radiological and RCRA determinations. Envirocare will not accept material that is classified only as hazardous waste.

To initiate Envirocare's acceptance and shipment process, per the Material Acceptance Process Manual, the FEMP must send all results of required lab analyses for each waste stream, completed forms, and pre-shipment samples of each waste stream to Envirocare. Analytical requirements for pre-shipment samples and information required for completion of the Mixed Waste Profile Form are outlined in the above-referenced manual.

All RCRA analysis must be performed by a Utah Certified laboratory. Pre-shipment analysis includes, but is not limited to the following parameters: full TCLP, Metals, VOCs, SVOAs, PCBs, Herbicides, and Pesticides. RCRA data obtained from the OU3 RI effort, process knowledge, etc. can only be used for the FEMP's need to characterize the material for on-site material management only. OU3 RI data and process knowledge are not applicable for waste acceptance qualification.

For radiological analyses required by the manual, FEMP analyses may be used if the FEMP on-site lab and the Utah certified lab are identical in their procedures, instrumentation, and DOE Quality Assurance Program requirements. The on-site lab must be involved in the selection of a Utah-certified Laboratory. All waste streams require gamma spectral analysis for evaluation of all naturally occurring and all man-made radionuclides. It is not necessary to report concentration of the daughters of Th-232, Ra-226, and Ru-106. If a waste stream cannot be readily quantified by gamma spectral analysis, for example, Sr-90 or Th-232, it must also be analyzed by radiochemical analysis for the radionuclides expected. Radiological analysis can be performed on-site at the FEMP if at least 10% of the samples are sent to a Utah-certified Laboratory for quality assurance purposes.

Pre-shipment samples to be sent to Envirocare will consist of one 50-pound (5 gallon) representative sample for soil and two 5-pound grab samples. These preliminary samples will be analyzed at the Envirocare site, and the results of these analyses will be used to establish the range of tolerances for the future shipments of that particular waste stream to Envirocare.

These tolerances are based on current LDRs per 40 CFR 268. If a shipment of the waste stream arrives and the results of the analysis for that sample is beyond the pre-shipment tolerance range (as determined by Envirocare), the shipment may be returned. Additional characterization may be required before the waste may be accepted.

After Envirocare approves shipment of material and before unloading, Envirocare will inspect the incoming shipments and take samples for "fingerprinting" and independent third party analysis. Once "fingerprint" parameters are verified, unloading takes place and material is placed in the disposal cell.

Shipment to a Municipal Landfill

The shipment of material considered for release to a municipal landfill currently depends on the Material Release Policy for the FEMP, which is based on DOE Order 5400.5, and the waste acceptance requirements of the receiving facility. Office trash shipments to the local municipal landfill (Rumpke) are currently released by radiological screening. Completion of the MEF, radiological determinations, and any other testing deemed necessary (per the facilities requirements), will be performed to identify all potential contaminants of concern. Though it is not intended to supply all essential information, the data collected through identification of contaminants by following the flow charts in Figure 3-1, and by completion of the above-outlined contaminant determinations will provide sufficient supporting information for material segregation purposes and potentially for future disposition at municipal landfills.

Shipment to Recycle/Reuse Facility

Material considered for recycle/reuse will largely depend on the material acceptance criteria of the receiving facility. For example, the scrap metal from the first phase of Removal No. 15, was sent to an off-site recycling firm on a contract basis. All material acceptance criteria was determined prior to off-site shipment of scrap metal. Also to be taken into account when considering whether specific materials may be recycled/reused is the intended end use of the product. If a material is potentially a hazardous waste, the regulations concerning recycling of material need to be followed specifically according to its intended end-use to determine whether or not that material is regulated as a hazardous waste.

Since the scrap metal could contain RCRA regulated metals, a question arises as to how much information is necessary to adequately characterize the recycled scrap metal. Specifically, the question regards whether or not the TCLP extraction procedure should be performed if RCRA hazardous waste constituent concentrations in wastes exceed 20 times the Toxicity Characteristic (TC) concentrations. At present, the regulations do not require TCLP analysis to be performed. However, guidance from both USEPA and OEPA (Risk Assessment Guidance on Closures) indicate that the agencies expect TCLP analysis in some situations (e.g., soils from closure activities) where concentrations in wastes exceed the TC concentrations by a factor of 20. However, as long as the material is being recycled for reuse within the DOE complex, the concern over hazardous constituents is deferred. If, at some time, the material is no longer considered recyclable, the recycling exemption under RCRA will no longer apply to any remaining portion of the material. The remaining material will from that point on be handled in accordance with appropriate RCRA Subtitle C hazardous waste requirements.

As outlined in the regulations, specific data is required for potential recyclable material. Identification of contaminants by following the short path flow chart contained in Figure 3-2, and completion of the previously outlined contaminant determinations should provide sufficient supporting information for material segregation purposes and for future disposal considerations at a recycle/reuse facility.

3.3 Secondary Waste Stream Sampling

This section discusses the sampling needed to assess methods for handling secondary waste streams (e.g., Investigative Derived Waste (IDW)) generated during the RD/RA activities, in order to maintain compliance with regulatory requirements. The subsections which follow this Section present the approach for sampling of the following secondary waste stream materials:

- decontamination waters/solids from sampling equipment and *surface decontamination* of the components;
- contact wastes;
- excess field sample material;
- waste returned from contract laboratories; and
- miscellaneous.

3.3.1 Decontamination Water/Solids

Decontamination water/solids may be generated as a result of decontaminating sampling equipment or during the surface decontamination phase of the remedial action.

The decontamination water generated from the decontamination and dismantlement activities will be collected through the existing sump of the component, if available, or other collection means and transferred United States Department of Transportation (DOT)-approved container with the capacity for containing discharged water for at least one week. Wash waters will be filtered through 20 micron and 5 micron filters respectively prior to being transferred to these storage tanks. Since it is assumed that it will take approximately 20 days to obtain wastewater sampling results, sufficient temporary collection capacity will be needed so as to allow a full tank to be inoperable for up to 20 days while testing is being performed and not shutdown cleaning operations. This way, as one container is being sent to the contaminated side of the Plant 8 Sump or the FEMP general sump pending analytical results, another container is being moved into place. In general, such sampling will consist of a grab sample being collected from the wastewater in the holding tank and analyzed for, at a minimum: pH; lead; copper; nickel; chromium; and total uranium all at ASL B. Additional analytical requirements may be added due to contaminants expected to be present at a particular component. Liquid waste generated during the decontamination and dismantlement process will need to comply with site wastewater treatment requirements, NPDES, Clean Water Act (CWA), and the requirements specified in the final remedial action ROD when it is implemented.

For planning purposes, it will be assumed that one (1) decontamination washwater sample will be taken per component during the decontamination washdown activities. Assuming one (1) sample per component, approximately 194 liquid decontamination water samples will be taken. However, this assumption may apply differently as each component is grouped within a design package, i.e., several components of similar characteristics may be combined as one during decontamination washdown activities therefore the number would decrease. If components were segregated based on dissimilar characteristics, the number would increase.

For those decontamination solids for which an approved MEF does not already exist or cannot be completed based on process knowledge or existing data, the solids will be containerized and placed in a centralized location for interim storage until the containers can be sampled to complete a hazardous determination (e.g., TCLP metals and/or organics) and the MEF completed. For those components where PCBs and/or asbestos are expected, the decontamination solids may be sampled for these analytes also. All sampling will be performed at ASL A (e.g., radiological screening) or ASL B (e.g., TCLP metals). For decontamination water/solids collected from an HWMU, this centralized storage location should fulfill requirements for a Satellite Accumulation Area and/or a permitted storage area under RCRA.

Final disposition of the solids and liquids will be based on the final characterization of the material and are described below:

Hazardous or Out-of-Compliance with NPDES Permit

Any liquid decontamination waste that is initially characterized to be out of compliance with current NPDES effluent limits, will be sent through the Plant 8 Sump for pre-treatment by vacuum filtration prior to being discharged to the FEMP general sump.

Any decontamination solid waste that is found to be hazardous per the MEF process, will be transferred for storage to a RCRA storage facility.

Non-hazardous or in compliance with NPDES permit

Any liquid decontamination waste that is found to meet current NPDES effluent limits, the water will be discharged to the FEMP general sump.

Any solid decontamination waste that is found to be non-hazardous (non-RCRA), the solid waste will be disposed of as low level radioactive waste.

PCBs

Any decontamination solid waste found to be contaminated with PCBs will be transferred to a pre-determined storage location, which is currently Building 81.

Asbestos Containing Material

Decontamination water/solids involving an ACM is added to the double plastic bag containing the contact waste generated from that activity. Decontamination water must be used sparingly to avoid generating a large quantity of water. The materials are combined to allow the ACM to remain damp when being handled. The ACM contact wastes are consolidated in a double plastic bag and taped closed. The bag is labeled with the date and sample location name, name and phone number of the project supervisor and marked "DANGER-ASBESTOS".

The waste is maintained in a predetermined location (identified in the SAP addenda) until transfer is made.

3.3.2 Contact Wastes

Contact waste is defined as personal protective equipment, gloves, wipes, plastic, etc. generated during the OU3 interim remedial action, and may be potentially contaminated as a result of coming in contact with material handled during that activity. Contact waste will be collected in a plastic bag and sealed with tape. The bag will be labeled with the name and phone number of the project supervisor and the name of the person placing the bag in the centralized location. For those wastes for which an existing MEF does not apply or cannot be completed based on process knowledge or existing data, the contact waste may be sampled to complete a hazardous determination (e.g., TCLP metals and/or organics) and the MEF completed. For those components where PCBs and/or asbestos are expected, the decontamination solids may be sampled for these analytes also. All sampling will be performed at either ASL A (e.g., radiological screening) or ASL B (e.g., TCLP metals). For decontamination water/solids collected from an HWMU, this centralized storage location should fulfill requirements for a Satellite Accumulation Area and/or a permitted storage area under RCRA.

The final disposition of the contact wastes depends on the characterization of the material and is described below:

Hazardous (RCRA)

Any contact waste that is found to be hazardous per the MEF, will be transferred for storage to a RCRA Storage Facility.

Non-hazardous (Non-RCRA)

Any contact waste that is found to be non-hazardous (non-RCRA) will be disposed of in a designated dumpster which would be sent to a trash baler, where it is compacted and boxed for subsequent shipment from the site as low level radioactive waste.

PCBs

Any contact waste found to be contaminated with PCBs will be transferred to a pre-determined storage location, which is currently Building 81.

Asbestos Containing Material

At the present time, a limited number of ACM samples are being collected for the RI/FS, and therefore limited quantities of ACM contact waste is being generated. This limited quantity of ACM contact waste will be handled in the same waste stream as ACM waste from the asbestos removal program.

3.3.3 Excess Field Sample Material

Sampling personnel are expected to obtain only the amount of sample material required to fill the sample containers. Generation of excess sample material in the field will be limited. Excess sample material will be returned to the original sample location, provided it can be contained without causing a potential environmental hazard. If the material cannot be returned to the original location, it will be containerized. The characterization of the excess

material will be completed using the analytical data obtained from the sample collected at this location. No additional data should need to be collected.

Excess field sample material such as sediment from sumps, soil, liquids from ponds, etc. are examples of material which can be disposed of by returning the excess sample material to the original sample location. Excess sample material from concrete will be placed in the original sample location and covered with concrete, or an alternate suitable cover.

PCBs and Asbestos Containing Material

Excess PCB contaminated material or ACM will be containerized and an MEF will be generated. The material will then be transferred to a pre-determined storage location, currently Building 81 or the KC-2 warehouse.

Paint Chips

Excess paint chips that contain lead will be containerized in glass jars under MEF 817 and transferred to Building 80, where the paint will be consolidated in a larger container and stored. Excess paint chips that do not contain lead will be containerized under MEF 1919 and transferred to the Plant 1 Pad.

3.3.4 Waste Returned From Contract Analytical Laboratories

During laboratory analysis of FEMP samples by contract analytical laboratories, several forms of waste will be produced. The extracts, leachates, acid digests, excess sample materials and contact wastes will be returned to the FEMP, governed by the Fernald Environmental Management Project Waste Acceptance Criteria for Off-Site Generators (DOE 1994). The materials will be returned to the FEMP under Chain-of-Custody. The Chain-of-Custody form will contain the FEMP laboratory sample number assigned by FACTS, prior to shipping the sample to the laboratory. The laboratory sample number will also be included on the sample container label which will serve as a tracking mechanism between the sample waste being returned and the previously received analytical results performed on that sample.

Prior to returning the wastes to the FEMP, the contract analytical laboratory must first sample the wastes generated, analyze the sample, and submit the results along with a packing list. Low level radioactive waste (non-RCRA) or mixed waste (containing RCRA hazardous waste properties) determinations will be made before the waste is returned. A letter will be sent to the contract analytical laboratory indicating the decision when approval is given to return the wastes to the FEMP.

Upon receipt of the waste at the FEMP, non-RCRA waste will be transferred to the Plant One Pad for storage as low level waste. RCRA waste will be sent to a designated RCRA warehouse, on-site.

The portion of the samples not used during the analysis, will be returned to the FEMP and sent to KC-2 warehouse and separated by project (component). As the buildings are being dismantled, the samples will be packed in with the waste from the corresponding project (component), in the drums/boxes designated for disposal.

3.3.5 Miscellaneous

Glass containers

All emptied glass containers (less than three percent of material remaining) are to be drummed under MEF 1284 and shipped to the Plant 1 Pad as low level waste.

Vacuum Filter Bags

Vacuum filter bags that are generated, and cannot be disposed of under an existing MEF, shall be containerized and stored until analyses can be completed and a MEF is approved. Non-hazardous vacuum filter bag containers shall be transferred to the Plant 1 Pad for storage. Hazardous vacuum filter bag containers shall be transferred to a RCRA Storage Facility.

3.4 Decontamination & Dismantlement Environmental Sampling

This section discusses the sampling approach as it applies to environmental monitoring sampling (i.e., of the air, groundwater, and surface water) during the OU3 interim remedial action. In part, the discussion focuses on the ability to utilize existing environmental monitoring programs to support the sampling needs. The approaches described below are subject to change over the course of the OU3 interim remedial action based on the development of new technologies (e.g., real-time monitoring devices), changes in FEMP policies concerning environmental monitoring, trending from data obtained from decontamination and dismantlement of early components, and new or updated EPA and/or DOE requirements.

3.4.1 Air Monitoring

The following sections discuss the basic approach to meeting environmental and occupational air monitoring needs during the OU3 interim remedial action. Environmental air monitoring will be implemented to monitor project-specific remedial activities. Occupational air monitoring addresses methods to assess personal exposure to airborne radioactivity. The basis for establishing environmental and occupational air monitoring requirements is an evaluation, performed during remedial design, of existing data and process knowledge for each component being remediated. Data/information that is used during this evaluation will come from past and ongoing radiological surveys performed during routine maintenance of components, the OU3 RI/FS sampling effort, and results from sampling that support completion of safe shutdown activities.

Environmental Air Monitoring

Environmental air monitoring during the OU3 interim remedial action will consist of air monitoring efforts from two programs: the current site-wide monitoring program; and project-specific air monitoring particular to a specific design/bid package. In conjunction with the current site-wide program, the project specific supplemental environmental air monitoring program will provide remedial action specific air monitoring support to primarily determine effectiveness of project-specific control measures. Individual project specific air monitoring plans will be developed during the remedial design and implemented to support remediation activities associated with each design/bid package. The supplemental program will be implemented if the maximum release estimates exceed 0.1 mrem/year, if the potential exists for radiological air emissions for a given operation within a facility or to address stakeholders concerns. See Section 3.7.3 of the OU3 RD/RA work plan for determining the requirements

for the project-specific air monitoring program. Air monitoring requirements for radionuclides will be determined for each well-defined activity within a design package. Each activity (e.g., surface decontamination and dismantlement of a building, etc.) will be evaluated for number and location of sampling devices using such factors as wind direction, size of components in package, etc.

The project-specific environmental air sampling for asbestos is anticipated to be based on the following information:

- For interior decontamination and dismantlement activities (within an enclosed environment), four (4) exterior perimeter monitoring stations will be placed with a sampling event of four (4) samples collected per week.
- For exterior decontamination and dismantlement activities, six (6) exterior perimeter monitoring stations will be placed with a sampling event of seven (7) samples collected per week (including one (1) background sample).

Any resulting sample indicating greater than (>) .01 fibers/cc will be sent to an off-site laboratory for analysis. The number and location of perimeter stations may be based on a per component basis or per design package, depending on building locations. The numbers stated above were modeled after the Plant 7 decontamination and dismantlement activity.

The project-specific environmental air sampling for radiological emissions is anticipated to be based on the following information:

- An average of 8 - 10 exterior perimeter stations per package, with a sampling event of 9 - 11 samples collected per week (including background). Depending on the design package, this scenario may apply on a per component basis. However, this may depend on several factors such as component groupings, size, type, and former function of the component. Components not within the main location of a specific design package may have fewer, if any stations. These components may rely on the FEMP site-wide monitoring program monitoring stations, depending on their locations.

The numbers stated above for number of stations and samples, were modeled after the Plant 7 decontamination and dismantlement activity.

Under the current site-wide program, the FEMP off-site ambient air quality is monitored by sixteen high-volume air samplers. Three of these samplers are located on-site, six are located along the site fenceline, and seven are located off-site in nearby schools and industries. Two of the off-site locations are 10 km or more from the site in non-prevalent wind directions; these two locations serve as background air sampling locations. The criteria for this evaluation will be to comply with DOE Order 5400.1 (DOE 1990a).

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Occupational Air Monitoring

Occupational air monitoring needs will be determined for each design package. Occupational air monitoring, addressed by the *project-specific HASP* for the design package, will be performed using a combination of Personal Air Sampling, Breathing Zone, and General Area sampling methods to assess personal exposure to airborne radioactivity. Initial counts will be performed to evaluate raw count data, anomalies from historical "base-line" samples, and to ensure containment of airborne radioactivity to the immediate worker area. Seven-day decay analysis (retrospective air sampling) of the collected filters will be used for formal documentation of occupational exposures to airborne radioactivity. Project perimeter air samples may be collected on a daily basis for the purpose of ensuring proper area posting and control.

It is anticipated that thirty percent of the workforce for a specific design package will be monitored per day, at four (4) breathing zone samples collected per day. This will be based on the work zone, which may include one or more components at any given time.

In order to verify that control measures adequately minimize fugitive emissions, samplers will be installed in the vicinity of the facility being decontaminated or dismantled. Samplers will be placed on the perimeter boundary of each project area. The sample filters from these samplers will be removed and analyzed at a minimum for gross alpha and beta activity.

Due to current technology limitations, "real-time" monitoring for airborne uranium and thorium will not be performed anytime in the near future at the FEMP. This is due to naturally occurring and/or process enhanced radon and thoron (short-lived) daughters that are present in ambient air. These short-lived daughters have been found to interfere with the spectra in the specified region of interest for long-lived uranium and thorium, when utilizing state-of-the-art alpha spectroscopy Continuous Air Monitors.

For the reason noted above regarding occupational air monitoring for airborne radioactivity, all air samples collected for long-lived uranium and thorium must be "decay counted" for a period long enough to ensure that all radon and thoron daughters are no longer present on the air sample filter when the sample count analysis is performed. Counting is performed on a laboratory alpha/beta low background counter, analyzed for gross alpha and beta, corrected for background and system efficiency, and the results recorded in microcuries per cubic centimeter. Verification of radionuclide(s) present is performed by alpha or gamma spectral analysis, after the decay count is performed, but only when there is reason to believe that isotopes other than uranium may be present. Uranium is the primary radiological airborne hazard at the FEMP.

Asbestos air monitoring will be used for work that will potentially release asbestos fibers from non-friable asbestos. A thirty-minute breathing zone air sample will be collected where the potential for releasing asbestos fibers is greatest. General area air samplers will be collected outside the asbestos work area to evaluate the effectiveness of control measures used during asbestos work activities. See Section 4.1.3 for further information on asbestos air monitoring. The proposed sampling for project-specific occupational asbestos monitoring is an average of 6 - 10 breathing zone samples collected and analyzed daily. This may be per component or per group of components, depending on the established work zone. Samples are sent to off-site labs for analysis or to the on-site lab if available.

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3.4.2 Groundwater Monitoring

Groundwater sampling beyond routine monitoring is not necessary and will not be conducted under normal activities during the OU3 interim remedial action. However, if an event occurs during the OU3 interim remedial action that results in a potential release to the soil and groundwater and could potentially affect the groundwater quality, then groundwater sampling may be necessary and will be coordinated with OU5. If a release occurs, two on-going groundwater sampling programs may provide sufficient data to determine if the release has affected the groundwater. If these programs are not sufficient, then other existing wells can be sampled instead. OU5 will be responsible for implementing additional groundwater monitoring during above-, at-, and below-grade remediation if it is determined to be necessary.

Continual groundwater sampling is conducted by OU5 under two programs: Removal No. 1; and routine monitoring at the downgradient property boundary. Additional wells that are not routinely sampled exist from various CERCLA-related studies.

Removal No. 1

The seventeen wells that comprise Removal No. 1 are located near Plants 6, 8, 9, and the Plant 2/3 complex and are installed at a depth of 10 to 20 feet within the perched groundwater zone in the till. The wells are sampled annually for HSL parameters, total uranium, and total radiological parameters. Extracted perched water batches are sampled constantly for total VOCs, total uranium, and purgeable organic halides (POX). The purpose of the sampling is to identify the effectiveness of pumping the perched zone.

Removal No. 1 is described in four plans: Plant 6 Contaminated Perched Water Modified Removal Action Work Plan (Westinghouse Materials Company of Ohio (WMCO) 1990c); Plant 2/3 Contaminated Perched Water Removal Action Work Plan (WMCO 1990b); Plant 9 Contaminated Perched Water Removal Action Work Plan (WMCO 1990d); and the Work Plan Addendum to the Perched Water Removal Actions Feed Materials Production Center (FMPC) Recovery Well Installation and System Water Sampling Support (Advanced Sciences Inc./International Technology (ASI/IT) 1991).

RCRA Routine Monitoring

The routine monitoring system consists of thirty-three monitoring wells (as shown in Figure 3-3 and identified in Table 3-1) installed within the upper, middle, and lower zones of the Great Miami Aquifer at the downgradient property boundary of the FEMP. The wells are sampled quarterly for metals, radionuclides, VOCs, and water quality parameters, which are listed in Table 3-2. The purpose of sampling is to fulfill hazardous waste monitoring requirements through the CERCLA process per an agreement with OEPA in the September 10, 1993, Director's Findings and Orders.

Routine monitoring is conducted for OU5, and data from the monitoring wells are compiled in RCRA Annual Reports for Ground Water Monitoring. The routine monitoring program is described in the Project Specific Plan for the Routine Groundwater Monitoring Program Along the Downgradient Boundary of the FEMP (WBS No. 50.03.20).

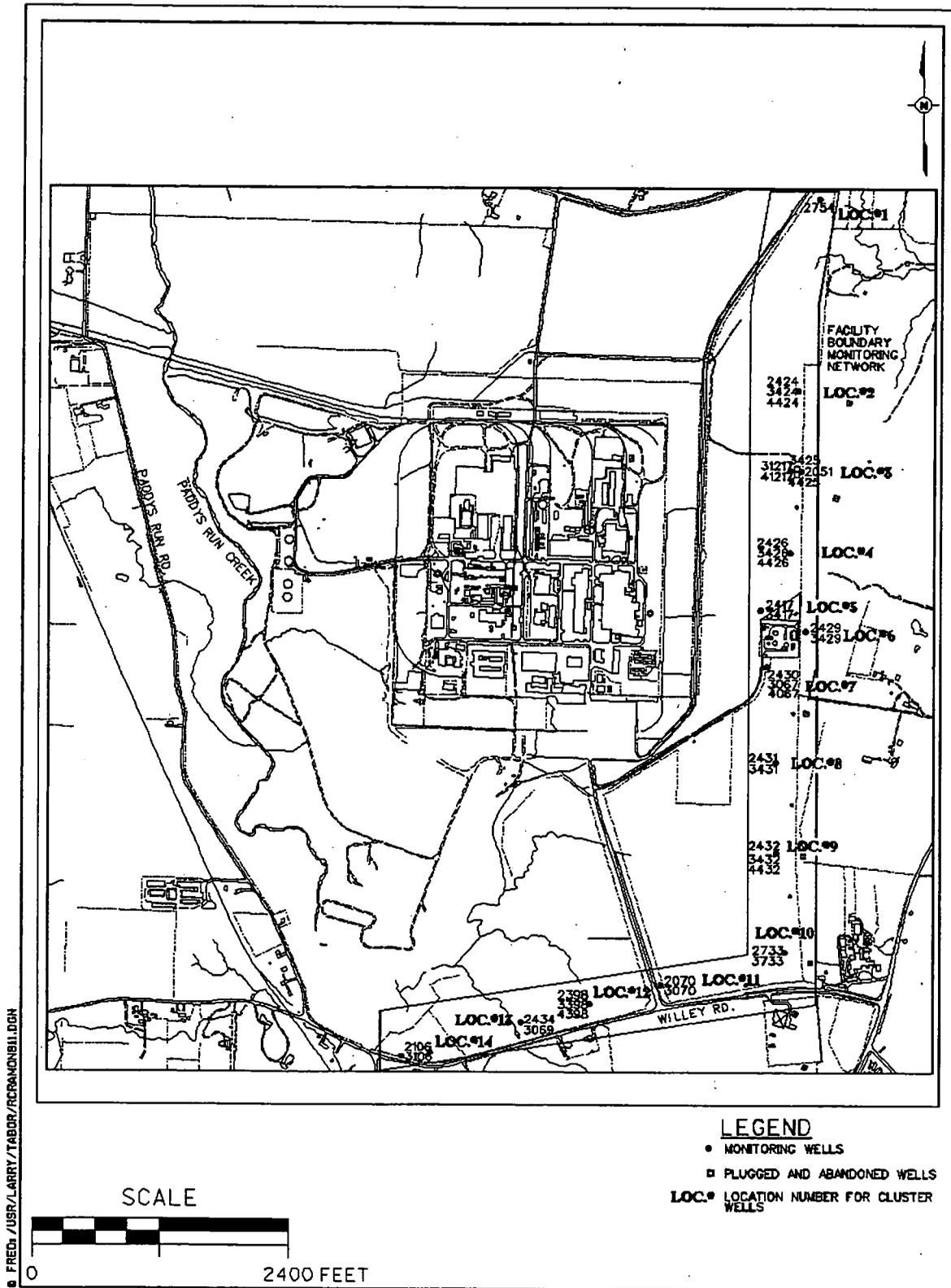


FIGURE 3-3 Routine Monitoring Program Wells

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TABLE 3-1 Routine Monitoring Program Well Numbers

Location	2000 Series Wells	3000 Series Wells	4000 Series Wells
1	2754		
2	2424	3424	4424
3	2051	3425*, 31217	4425*, 41217
4	2426	3426	4426
5	2417	3417	
6	2429	3429	
7	2430	3067	4067
8	2431	3431	
9	2432	3432	4432
10	2733	3733	
11	2070	3070	
12	2398	3398	4398
13	2434	3069	
14	2106	3106	

* Plugged and abandoned

3.4.3 NPDES Monitoring

An NPDES permit will remain in effect for the duration of site remediation. The permit establishes wastewater monitoring locations, required pollutant monitoring, and any necessary effluent limitations to ensure the Great Miami River water quality is maintained. The NPDES permit will be modified during the life of remediation activities to reflect the changing needs during different remedial actions. NPDES permits are issued for a maximum of five (5) years. NPDES monitoring is a routine program. This monitoring will ensure that wastewater management activities are sufficient to meet the requirements of the NPDES permits. All decontamination water or discharge waters from decontamination and dismantlement activities will be evaluated based on process knowledge for constituents of concern. As necessary, water will be sampled for compliance with the current NPDES permits prior to discharge to the general sump. Any water that does not comply with these permit levels shall be treated at the Plant 8 Sump prior to discharge to the general sump. This water will, at a minimum, be analyzed for pH, lead, copper, nickel, chromium, and total uranium. Additional analytes may be added due to contaminants expected to be present in the component(s) being decontaminated. Following initial characterization of wastewaters by OU3 for contaminants

of concern, OU5 will be responsible for monitoring, treatment (if necessary), and discharge of wastewaters that are generated during above-, at-, and below-grade remediation.

3.5 Interim Storage Facility Monitoring

There is not any apparent need for additional monitoring of the environment around interim storage facilities with respect to air, groundwater, and surface water monitoring, as existing programs should be sufficient. Existing ambient monitoring stations will meet the necessary monitoring requirements. All groundwater monitoring programs are to be managed through existing activities for OU5. In addition, pursuant to Removal No. 17, Section 3.4, no soil monitoring should be necessary as part of any ongoing interim storage facility monitoring.

All containerized water will be handled on a case-by-case basis. Wastewater handling decisions will be made from analytical data. Data will be generated from a "contaminants of concern" list. These contaminants will be selected from a master list of pollutants including radionuclides, heavy metals, VOCs and SVOCs. The "contaminants of concern" list will be generated based on the source of wastewater and should be included in any sampling plans.

3.6 Hazardous Waste Management Units

The OU3 interim remedial action sampling approach for HWMUs would be on a case-by-case basis, and sampling details would be outlined in the SAP addenda. The sampling of these units would have to be in accordance with 40 CFR 264.111, 264.114, 265.111, 265.114 as well as OAC 3745-66-11 or 3745-55-11 and OAC 3745-66-14 or 3745-55-14. All contaminants must be identified for each HWMU, including listed and characteristic wastes. Characterizations of residues should be consistent with the Site Waste Determination Plan (DOE 1990c). Characterization of material/debris from demolition of HWMUs should be performed according to the "Material/Debris Rule" for Land Disposal Restrictions (LDR) (i.e. clean material/debris surface, physical extraction techniques, etc.). The standards are specified in the Closure Plan Review Guidance (OEPA 1993a). Specifically, HWMU sampling and analysis plans must follow LDR restrictions and waste characterization requirements.

3.6.1 Soil Sampling

All units where there is evidence of potential for leaks or spills or potential for waste constituent migration (40 CFR 261 Appendix VIII or 40 CFR 264 Appendix IX) must include sampling to determine the nature and full extent of soil contamination. Such sampling will however be identified by the OU5 RD/RA work plan.

3.6.2 Background Soil Sampling

Background samples are used to compare the natural condition of soils to the potentially contaminated area. Background samples are needed when the hazardous waste constituent of interest naturally occurs in soil, such as heavy metals. For these constituents, evidence must be provided that the hazardous constituents are naturally occurring. Situations will exist where the surrounding area or matrix (i.e., groundwater, air, soil) has historically been affected by sources outside of the site under investigation. As indicated above, however, the sampling of soils adjacent to HWMUs and any sampling needs in these areas will be addressed by the OU5 RD/RA work plan.

TABLE 3-2 Routine Monitoring Program Parameter List

Inorganics:

Aluminum	Antimony	Arsenic
Barium	Beryllium	Cadmium
Calcium	Chromium	Cobalt
Copper	Cyanide	Iron
Lead	Magnesium	Manganese
Mercury	Nickel	Potassium
Selenium	Silver	Sodium
Thallium	Vanadium	Zinc

General Chemistry:

Alkalinity	Ammonia	Chloride
Fluoride	Nitrate	pH
Phenols	Phosphorus (total)	Specific conductance
Sulfate	Temperature	Total Organic Carbon (TOC)
Total Organic Halogens (TOX)	Total Organic Nitrogen (TON)	

Volatile Organics:

1,1-Dichloroethane	1,1-Dichloroethene	1,1,1-Trichloroethane
1,1,2-Trichloroethane	1,1,2,2-Tetrachloroethane	1,2-Dichloroethane
1,2-Dichloroethene(Total)	1,2-Dichloropropane	2-Butanone
2-Hexanone	4-Methyl-2 Pentanone	Acetone
Benzene	Bromodichloromethane	Bromoform
Bromomethane	Carbon disulfide	Carbon tetrachloride
Chlorobenzene	Chloroethane	Chloroform
Chloromethane	cis-1,3-Dichloropropene	Dibromochloromethane
Ethylbenzene	Methylenechloride	Styrene
Tetrachloroethene	Toluene	Total xylenes
trans-1,3-Dichloropropene	Trichloroethene	Vinyl acetate
Vinyl chloride		

Radiological:

Gross Alpha	Gross Beta	Radium 226
Radium-228	Technetium-99	Thorium-228
Thorium-230	Thorium-232	Total thorium*
Total Uranium	Uranium-234	Uranium-235/236
Uranium-238		

* Total Thorium Calculated

3.6.3 Sampling Methods

Sampling methods and equipment will follow guidance in SW-846 (see 40 CFR 260.11 and OAC 3745-50-11). Volume II of SW-846 provides guidance on many areas of environmental and waste sampling. Field sampling methods, including soil sampling, not included in SW-846 must be acceptable to OEPA before they are used in conjunction with an HWMU. When available, standard procedures, as defined by USEPA or OEPA, will be followed.

3.6.4 Analytical Methods

Analytical methods from SW-846 will be used and cited, unless no SW-846 method exists, in which case the FEMP will propose and justify a method. Combustible gas indicators, calorimetric indicator tubes, and photoionization detectors commonly used as field instruments are not acceptable substitutes for SW-846 methods; they may be used to suggest the presence, but not the absence, of hazardous constituents. If portable field instruments are used, they will be confirmed by SW-846 methods.

3.6.5 Verification Sampling

OEPA discourages the use of wipe samples for verification of decontamination unless rinsate sampling or other means of decontamination are impractical or dangerous (e.g., electrical equipment). An independent engineer will certify the methods used and that the minimum amount of residue remains in accordance with OEPA's rinsate standards. The following rinsate standards must be met before the surface of a storage pad or other structure of an HWMU could be considered "clean":

- Fifteen times the public drinking water maximum contaminant level (MCL) for hazardous constituents as promulgated in 40 CFR 141.11 and OAC 3745-81-11 for inorganics and 40 CFR 141.12 and OAC 3745-81-12 for organics;
- If an MCL is not available for a particular contaminant, then fifteen times the maximum contaminant level goal (MCLG) as promulgated in 40 CFR 141.50 shall be used as the clean standard; and
- If the product of fifteen times the MCL or MCLG exceeds 1 mg/l or if neither an MCL nor an MCLG is available for a particular contaminant, 1 mg/l shall be used as the clean standard.

Reusable equipment (e.g., earth moving equipment and stainless steel soil samplers) may be decontaminated by brushing or scraping material/debris from the exposed surfaces followed by at least three separate rinses. Although no chemical or physical analysis of the rinsate is required, rinsate must be managed as hazardous waste unless sampling results demonstrate that the rinsate is "non-hazardous." The solid material/debris should be managed as solid or hazardous waste or decontaminated soil depending on the wastes in the HWMU and the sampling results. In the absence of analytical data, material/debris is presumed to be hazardous waste.

All rinsates containing concentrations of hazardous constituents, including decay products, derived from listed waste(s) and exceeding the standards previously listed, shall be managed

as listed hazardous wastes. For characteristic wastes, the rinsate need not be managed as hazardous waste unless it continues to exhibit one of the characteristics specified in 40 CFR 261 and OAC 3745-51. Rinsates may be managed as a wastewater as long as such activity is managed in strict compliance with the Clean Water Act and Ohio Water Pollution Control Law.

3.6.6 Responsibilities for Integration of OEPA Substantive Closure Requirements

Decontamination Effort of HWMUs

Decontamination of the structures and equipment within HWMUs will be conducted under the OU3 RD/RA work plan for interim action. Details will be outlined in the design packages. Activities concerning soils and groundwater will be conducted under the OU5 RD/RA work plan.

Sampling and Analysis Plan for HWMUs

The OU5 RI Report will describe the nature and extent of soil contamination with the OU5 RD/RA fulfilling any data gaps identified in the OU5 RI. The OU5 FS will offer options for treatability efforts. Verification of cleanup through sampling and analyses will be through OU5 RD/RA as well as OU3 RD/RA. This may be implemented by supplemental (additional) sampling for OU3 to support media interim storage and dispositional requirements.

3.7 Sampling Approach Implementation

As discussed throughout the SAP, once a remediation project is defined, a SAP addenda will be generated to identify the sampling needs reflective of the particulars of the components of which the package is comprised. Specifically, development of the SAP will take into consideration available information, as discussed in Section 3.1, identify data gaps, and establish a sampling approach to be undertaken to satisfy those data gaps. In actuality, the SAP addenda will be a living document in that it will need to cover sampling which could potentially take place at various stages in the design/remediation process, sampling that may not easily be defined in its entirety at the beginning, and which may change as additional data gaps arise through the process. As shown in Figure 2-1, sampling may be needed prior to the design, during design, during the OU3 interim remedial action, and/or after the OU3 interim remedial action (i.e., as part of the remedial action for the final action ROD). Sampling which is to take place during this last stage of the process will not be discussed herein, since it will occur as a part of the sampling associated with the final action ROD. Although the timing of some of the sampling identified in Sections 3.2 through 3.6 may be certain at the beginning of the project, uncertainties/unknowns/resampling may result in the need to supplement the SAP addenda as the project progresses through the various stages, to address these changes.

The following paragraphs take the sampling identified in Sections 3.2 through 3.6 and show how this sampling is expected to fit into the stages of the design/remediation process identified above. For the purposes of the discussion which follows, the term sampling is used to identify field screening and/or intrusive sampling. Specifics as to the actual type of sampling proposed to be employed can be obtained from the discussion in Sections 3.2 through 3.6.

Pre-Design

Efforts will be made early on in the design process (i.e., during pre-design) to identify as much of the needed sampling as possible. In this way, the process will facilitate the performance of sampling as early as possible to fulfill as many data needs as possible. This early sampling not only reduces coordination efforts (e.g., having to coordinate sampling activities with those activities of the *remediation subcontractor*), but more importantly places a higher degree of certainty on the information presented in the design package. Specifically, the more information that is available at the early stages of design, the more specific the current situation can be presented to the remediation subcontractor in the bid package, and the less chance that there will be for delays/changes necessitated by uncertainties.

It is anticipated that a limited amount of sampling will be required to support HWMU closure activities. HWMU closure verification sampling, if required, (discussed in Section 3.6) should be defined at this stage of design. It is also anticipated, and highly likely that sampling needed to support interim storage of the OU3 media generated through the decontamination and dismantlement efforts, can be defined during the pre-design stage. As discussed in Section 3.2, this applies to sampling which may also be economically feasible to fulfill data needs for potential treatment/disposition. If any baseline monitoring is needed to support assessment of the environmental monitoring during decontamination and dismantlement, as discussed in Section 3.4, this sampling could possibly be included at this stage.

During Design

During design, sampling will most likely consist of efforts to supplement data needs addressed through the pre-design. Specifically, sampling during design will generally consist of re-sampling to fill data gaps which arise in addressing the data needs upon which the pre-design sampling is based. Causes of such data gaps could include invalid data, unknown conditions, etc. The primary purpose of this sampling is, as with the pre-design sampling, to minimize uncertainties in the design.

During the OU3 interim remedial action

During the actual decontamination and dismantlement, there are various data needs which will need to be addressed through sampling, which could not have been addressed through earlier sampling efforts, as well as any additional sampling which might be needed to further supplement previously initiated sampling efforts (particularly with respect to interim storage requirements). During the decontamination and dismantlement, the environmental monitoring discussed in Section 3.4 will be performed. In addition, the characterization of secondary waste streams generated through the decontamination and dismantlement efforts will be addressed. If HWMU cleanup is not completed under the Safe Shutdown efforts, verification sampling associated with any cleanup efforts to be undertaken by the remediation subcontractor need to be addressed.

Sampling during the OU3 interim remedial action will also include sampling not specifically associated with the decontamination and dismantlement of components. For instance, for the portion of the OU3 materials which can be dispositioned through the OU3 interim remedial action, sampling to support these disposition efforts will probably take place at this stage. Specifically, as discussed in Section 3.2, such sampling efforts would include sampling of non-recoverable/non-recyclable materials for shipment to NTS and/or sampling to support shipment of recyclable materials to a recycle/reuse facility.

4.0 FIELD SAMPLING PROTOCOLS

The purpose of the following protocols are to provide guidance on the appropriate collection of samples to support the OU3 interim remedial action, consistent with the identified data needs, objectives, and sampling approach discussed in Sections 2.1, 2.2, and 3.0. The types of intrusive samples to be collected and the means of extraction are determined on the basis of potential contaminant penetration.

4.1 Field Measurements

The following sections discuss the various radiological and chemical screening instruments which may be employed as a part of the OU3 interim remedial action sampling program to assist in fulfilling the data needs. Also discussed is the instrumentation to be utilized for both radiological and asbestos air monitoring. Finally, this section provides a brief discussion on health and safety and physical measurement instruments.

4.1.1 Radiological Screening Measurements and Instrumentation

Radiological monitoring of surface contamination includes both total and removable alpha and beta-gamma measurements. Total activity is measured directly, while removable activity is measured on material used to swipe a contaminated surface.

Total surface contamination measurements will be taken with ZnS(Ag) alpha scintillation detectors and "pancake" thin-window (2 mg/cm²) GM beta-gamma detectors.

Alpha Scintillation Detectors

The alpha scintillation detectors respond very selectively to alpha-emitting contaminants. Instrument response to a given alpha particle energy is relatively constant, so response to different alpha emitters is comparable. Instrument backgrounds are typically low, and sensitivity, in the scaler mode, is adequate to meet the most restrictive limits.

G-M Beta-Gamma Detectors

The thin-window G-M beta-gamma detector response to beta particles is energy dependent. Potential contaminants represent a range of average beta particle energies (e.g., 85 keV from Tc-99 to 935 keV from the Y-90 daughter of Sr-90). The isotopic composition of the contaminants must be known to interpret instrument response. This response may be indeterminate with a variable mix of beta-emitting contaminants. Response to gamma rays is also a function of energy, and similarly it may be impossible to interpret response with a mix of gamma emitters. A mixture of beta emitters further complicates interpretation. In addition, the thin window allows some limited response to alpha emitters that may be present. One approach for qualifying G-M measurements would be calibration to a single contaminant species that may be present. Even though response may be nonspecific, the G-M detector is the most reasonably sensitive tool for beta-gamma emitter monitoring. Relative count rates can be used for screening and for selecting intrusive sampling locations.

Because these measurements are not radionuclide specific, proper assessment requires applying process knowledge or laboratory analyses of surface samples to identify the sources of the radioactivity. Field instrument response can only be interpreted in absolute terms when the underlying radionuclide mix is known.

Removable surface contamination is determined by swiping potentially contaminated surfaces. All swipes are assessed with low-background alpha-beta counting instruments. The efficiency of the counter for alpha and beta particles depends upon the energy of the radiation. Alpha particle counting efficiency varies less with energy compared with the beta particle energies that might be present in contaminants. The counting data are interpreted in relation to the isotopic mix assumed, expected, or known, and the calibration of the low-background counter.

4.1.2 Chemical Screening Measurements and Instrumentation

This section discusses the various chemical screening instruments which may be employed as a part of the OU3 interim remedial action sampling program to assist in fulfilling the data needs.

Organic Vapor Detection

A variety of types of organic vapors can be detected with a hand-held PID at levels as low as 0.1 ppm by volume (ppmv). The PID uses an ultraviolet (UV) light source to ionize and thereby detect organic vapors. The PID responds to a wide variety of chemical classes, particularly to aromatics, including benzene, toluene and xylene, and olefins, such as chlorinated ethenes (e.g., trichloroethene). Fuels can be detected primarily because of their aromatic content (aliphatic hydrocarbons give poor response). The identity of the detected organic vapor must be determined by a selective method, usually GC/MS. PIDs are useful for determining the areal extent of contamination and for locating "hot spots". Data obtained utilizing a PID may be enhanced by employing an FID in conjunction with the PID. The FID provides a greater range of contaminant detection since its ionizing capability is not limited to the specific energy output of the UV light source as with a PID. Another advantage utilizing an FID is that the operational efficiency is not as susceptible to immediate meteorological conditions (i.e., humidity and temperature) as the PID. Relatively high humidity conditions may produce vapor condensation on the PID UV lamp surface. Low air temperatures may also reduce the efficiency of the PID.

An alternative method for characterizing organic vapors is the use of a portable GC. Advantages of this method are the ability to identify and quantify specific vapors in air, with proper calibration. A further advantage is that with the use of various detectors, including a PID, a portable GC will respond to a greater variety of vapors than will a hand-held PID detector. Disadvantages include greater difficulty in calibration and use, larger size, and cost, as compared with the PID.

Detection of PCBs by Field Test Kits

Field test kits are available for detecting PCB contamination in the field. PCBs can be detected at the low-to-mid ppm range in a variety of media, including soils, waters, and loose solids. The test kits use a chemical reagent to strip chlorine atoms, as chloride ions, from PCB molecules. The chloride ion concentration generated, determined with a chloride-specific electrode, is proportional to the concentration of PCB in the original sample.

Immunoassay field test kits are also available for detecting PCB contamination in both soils and surfaces. The test kit for soil conforms to proposed USEPA Method 4020 for immunoassay-based field screening for PCBs in soil. The test kit can be customized for specific action levels and is designed to provide semi-quantitative results (i.e., indicate the

presence/absence of PCBs, with estimated levels of contamination provided if PCBs are present). The immunoassay test kit for surfaces can be used to measure PCBs at 10 ug/100 cm² and also provides semi-quantitative results. The immunoassay wipe kit consists of small "cloths" that are used to wipe a 100 cm² area. Following a sample wipe, the cloth is extracted in methanol. The methanol is then filtered and an immunoassay is performed to detect the presence of PCBs. Both test kits are specific to PCBs and have very little sensitivity to potential interferences such as chlorinated benzenes and phenols.

The speed and low cost make the field test kit a useful screening tool for selecting laboratory samples. These tests will be used at locations determined by process knowledge or visual inspection to be suspected of PCB contamination.

Field Screening of Metals by X-Ray Fluorescence

The field portable XRF is a technology which is rapidly emerging in the field of environmental remediation. The greatest value of field portable XRF is its use as a qualitative/semi-quantitative screening technique for field identification of "hot spots" of metallic contamination on structural surfaces or in soil, identification of lead based paint, and sorting of ferrous and non-ferrous metals and alloys.

However, XRF, whether a simple portable unit used in the field or a more sophisticated laboratory installation, is very matrix dependent and is potentially subject to errors caused by variations (chemical and physical) between samples. In a laboratory, physical matrix effects are controlled by sample preparation techniques developed specifically to minimize these effects. Chemical matrix effects are controlled by using "site-specific" standards and by extensive calibration. Site specific standards are actual samples generated on-site which contain varied concentrations of analytes and interfering elements of interest. Concentrations of analytes/interferences are independently established by Atomic Absorption (AA) and/or ICP analyses. Using such standards and computerized calibration data reduction, a laboratory installed XRF facility provides analytical data meeting requirements of ASL B. With the field portable XRF unit, chemical matrix effects will be controlled by calibration as described above for the laboratory XRF. However, extensive sample preparation in the field is impractical and is not planned. Consequently, the physical matrix effects such as particle size, and moisture content will not be mitigated. Applied as described above, field portable XRF will provide a valuable screening tool producing qualitative and semi-quantitative analyses meeting requirements of ASL B.

4.1.3 Air Monitoring Measurements and Instrumentation

The following section discusses the various air monitoring instruments which may be employed as a part of the OU3 interim remedial action sampling program to assist in fulfilling the data needs.

Radiological Air Monitoring

Radiological air monitoring will be conducted using multiple general area particulate air samplers to determine the concentration of longer half-lived airborne particulate radionuclides. The general area samplers operate at a flow rate of 60 Liters (L)/minute and use an 47 mm diameter, glass fiber filter. The filters will be analyzed by "decay counting" procedures. A decay period, seven days, long enough to ensure that all short-lived daughters (radon and thoron) are no longer present on the sample filter media is required. Samples will be counted

on a laboratory alpha/beta low background counter, analyzed for gross alpha and beta, corrected for background and system efficiency, and the results recorded in the preferred units. Normal operating procedures call for long-lived activities to be recorded in microcuries per cubic centimeter. Verification of radionuclide(s) present will be performed by alpha or gamma spectral analysis, after a decay count has been performed, but only when there is reason to believe that other unknown isotopes may be present.

High volume grab sampling will be performed on the perimeter of each decontamination and dismantling project to ensure adequacy of radiological controls. The monitors will be a high volume air sampling system designed for continuous operation in an outdoor, all weather, year round environment. The system will be a complete air monitoring station for the collection of suspended particulate matter with precise measurement capability and will be capable of being recalibrated in the field. The air pump shall be brushless for long term operation, contained in an all-weather housing, and capable of producing an air flow which covers a range from 40 cfm to 50 cfm inclusive, with the air filter in place. The system shall be capable of providing permanent records of air flow rates over a seven-day period and will be equipped with a timing device to record actual pump operating time, at least to the tenth of an hour. These air samplers will continually draw air through 20 cm x 25 cm (8" x 10") glass fiber air filters. However, the use of paper filters is currently being reviewed since the use of paper filters would minimize the sample preparation time required for standard fiberglass filters. The filters are anticipated to be collected weekly, and are held at least three days prior to analysis to allow for decay of short-lived radionuclides. However, other sampling scenarios (i.e., twice weekly, two week composite, etc.) are being considered for specific remedial activities that would not typically have a potential for contaminant release. Bi-weekly composites from each air sampler are analyzed for total uranium content. Annual composites are analyzed for isotopic uranium, isotopic thorium, and other nuclides that may be emitted from the site.

Stacks or vents requiring continuous monitoring will be equipped with air sampling systems that use either 2" or 4" diameter glass fiber sample filters. Samples will be extracted isokinetically and at multiple locations on the same plane of the stack as required by the guidance methods referenced by the regulation.

Asbestos Air Monitoring

Asbestos air monitoring will be used for work that will potentially release asbestos fibers from non-friable asbestos (e.g., asbestos-cement, floor tiles, etc.), using methods that involve sawing, grinding, or drilling, the tools will be equipped with a local exhaust system or a water spray. If the tools are not equipped with these controls, High-Efficiency Particulate Air (HEPA) filtration or a water spray will be provided at the point of operation. A 30-minute breathing zone air sample will be collected where the potential for releasing asbestos fibers is greatest. Results from this 30-minute period shall not exceed the Occupational Safety and Health Administration (OSHA) excursion limit of 1.0 fibers per cubic centimeter (f/cc). When the potential for releasing asbestos fibers may exceed the excursion limit, several 30-minute excursion samples must be collected. General area air samplers will be collected outside the asbestos work area to evaluate the effectiveness of control measures used during asbestos work activities.

When asbestos removal activities are performed inside an enclosure, general area clearance air samples shall be collected after final cleanup is complete. Results of this clearance air

sampling must be less than 0.01 f/cc. When the results of this sampling exceed 0.01 f/cc, the result shall not be greater than the results of air sampling conducted outside the enclosure. When the results of clearance air sampling fail to meet this criteria, the area must be re-cleaned and resampled.

Health and Safety and Physical Measurement Instruments

The following instruments will be used for industrial hygiene monitoring and for physical property measurements when conditions warrant:

- oxygen percent meters;
- combustible gas indicators;
- photoionization detectors (PID);
- organic vapor analyzers (OVA);
- indicator tubes (e.g., Draeger — NH₃ vapors);
- temperature measurement devices;
- conductivity meters; and
- pH meters.

Descriptions of these devices and instructions for their use are provided in the SCQ. The previously described radiological measurements will also be used for health physics monitoring and controls. Other monitoring is provided at the FEMP, including external radiation dosimetry and both direct and indirect radiobioassay.

4.2 Intrusive Sampling Approach

A list of SCQ approved sampling procedures, the means of extraction, and the applicable media are given in Table 4-1. The following discussion addresses application of selected sampling procedures and the associated sampling tools for the collection of the specified samples.

4.2.1 Sampling Concrete, Cement Blocks, and Masonry

Intrusive sampling of media such as concrete, cement blocks, and masonry will be collected using surface chips. Chips will be collected using any of the sample extraction options that will produce a sample consisting of surface (top ¼ inch) chips may be used, including use of a jackhammer, chisel, or hammer drill. Where depth of contamination is to be determined, chips will be collected from the specified intervals (e.g., surface to ½ inch, ½ inch to 1 inch, etc.). Media surfaces will be screened with appropriate screening instruments for the types of contamination known or suspected to be present in the area. All readings are to be recorded, along with the sample identification.

4.2.2 Sampling Structural Steel

Structural steel samples, generally in the form of "scrapings," will be obtained using a needle scaler or chisel. A rinse or smear sample from the outer surface of the steel beam may also be collected for gross alpha/beta analysis.

4.2.3 Sampling Ductwork and Other Thin Metals

If ductwork is to be sampled, shears are used to cut the sheet metal. Care must be taken in removing cut portions of ductwork to avoid falling deposits of loose media. Loose media within the ductwork may be collected as a supplemental sample.

4.2.4 Sampling Liquids

For sampling existing shallow sumps or floor drains, grab samples will be collected using dippers or ladles. For sampling deeper sumps or tanks, grab samples will be collected using coliwasas or bailers.

4.2.5 Sampling Loose Media

Loose media collected from floor drains, bottom of containers, or other loose material (i.e., floor sweepings) using trowels, shovels, or scoops.

4.3 Decontamination Approach

The following section provides a discussion of specifics related to minimizing contamination to personnel, and the decontamination of sampling equipment.

4.3.1 Personnel

To protect the samplers from contamination during sampling, personal protective equipment shall be designated in both the radiation work permit and the health and safety plan. This equipment may include coveralls, hard hat, gloves, safety glasses, and/or respirators. Samplers will put on new clean plastic gloves prior to each sampling event. Any other protective clothing worn by the sampler (such as tyvek) will be replaced between sampling events if there is visible evidence of contamination that may affect the sample.

4.3.2 Sampling Devices

Equipment shall be decontaminated for the following reasons:

- to prevent transfer of contaminants from equipment to sampled media;
- to limit cross-contamination between sampling points; and
- to protect worker health and safety.

TABLE 4-1 Liquid and Solid Intrusive Sampling Methods

SCQ Section/ Applicable Media	Sampling Devices or Methods	Items Sampled
Liquid Sampling Methods		
K.4.3 Shallow or standing liquids	Ladle, scoop, dipper, or container	Standing liquids on or in roofs, floors, tanks, drums, sumps, ducts, process equipment, wet scrubbers, surface skins from impoundments
K.5.5.4c, K.5.5.5 Deeper liquids	Grab Sampler, Coliwasa, Teflon bailer, or weighted bottle	Retention basins, larger drums, tanks, and vessels
K.5.5.4c, K.5.5.5 Contained liquids	Valves, disconnects, or penetrations	Tanks, process lines and pipes, other containerized liquids
Solid Sampling Methods		
K.5.5.4, K.5.7 Removable solids	Dipper, scoop, trowel, or shovel	Process residues, wastes, solids in tanks, vessels, dry sumps, scrubbers, lines, and conduits
K.5.5.4, K.5.7 Firm solids	Auger or probe	Stiffer materials from above
K.5.5.4, K.5.1 Surface and Sub-surface soil	Auger, probe, coring tool, or split-spoon sampler, top soil cutter, scoop	Dirt storage piles and impoundment beaches
K.5.5.4, K.5.2 Sub-liquid sediments	Dredge	Impoundments, process and waste sumps, tanks and vessels
K.8.1, K.8.2, K.8.9 Soft surfaces	Rasp, plane, scraper, or rotary hammer drill	Wood, drywall, coatings, laminates, paint, tiles, oxides on metals
K.8.3, K.8.5, K.8.6 Hard surfaces	Jackhammer, chisel, or rotary hammer drill, needle scaler	Concrete, asphalt, masonry
K.8.8 Metals	Shears and scoop or trowel	Thin walled, tanks, equipment, scrap metal
K.8.7 Shreddable solids	Shears	Heating, ventilating, or air conditioning filters, curtains, drapes, fabric, ducts, siding
K.5.5.4, K.7 Solids in lines	Bottle and steel brushes, scoop, rod, and hammer	Pipes, conduits, lines

Decontamination procedures can be found in Appendix K of the SCQ. Use of improperly decontaminated equipment is prohibited. Non-dedicated sampling equipment shall be cleaned between each use and each sampling point except as described in Appendix K of the SCQ. Dedicated equipment shall be cleaned as necessary.

Equipment shall be decontaminated at a central decontamination area where a water source and a means of containing decontamination solutions are available. If decontamination must be conducted in the field, the circumstances dictating this action shall be documented as specified in Appendix K of the SCQ.

4.4 Sample Handling, Packaging, and Shipment

In the field, samples shall be kept cool and away from direct sunlight. As soon as samples requiring refrigeration are collected, filtered as necessary, and preserved, they shall be stored in chests packed with artificial icing material to maintain a temperature range of two to six degrees centigrade. Field personnel shall be responsible for ensuring that sample container lids are secure and custody-sealed before storing them in the ice chest. Samples shall be shipped promptly to the Sample Processing Lab (SPL) in accordance with chain-of-custody requirements so that holding times are not exceeded.

The SPL shall package and ship samples to off-site laboratories (when necessary) according to DOT regulations and Section 6.7 of the SCQ.

5.0 PROCEDURES

This section identifies the procedures that support the OU3 interim remedial action. These procedures address health and safety, instrument measurement, field sampling, and laboratory analysis. All procedures included in this section can be found in the SCQ Appendices.

Currently, the following source documents have been identified and examined for information on sources of procedures:

- FEMP SCQ (September 22, 1992 version);
- Standard Operating Procedures and Quality Assurance Manual (USEPA 1991);
- Environmental Investigations and Site Characterization Manual (DOE 1989);
- Environmental Restoration Program, Standard Operating Procedures (DOE 1988);

• Fernald Site Environmental Monitoring Plan (Rev. I, May 1993).

5.1 Health and Safety Procedures

The following procedures have been identified as applicable to OU3 field activities and will be included in a health and safety plan covering the interim remedial action sampling program as necessary:

- evaluation of work areas;
- health and safety planning;
- access control;
- confined space entry;
- heat stress;
- cold stress;
- equipment decontamination;
- sampling media, chemicals storage; and
- personnel monitoring.

5.2 Field Instrument Measurement Procedures

Procedures for the use of the following field instruments have been identified as applicable for OU3 remediation activities:

Radiological

- NaI detector (cylindrical and FIDLER);
- MicroR meter;
- Pressurized Ion Chamber (PIC);
- alpha scintillation detector;
- Pancake GM (Geiger-Müller) detector;
- gas flow proportional detector;
- radon/thoron monitor;
- particulate air sampler - Personal Air Monitor;
- particulate air sampler - Breathing Zone Monitor;
- particulate air sampler - General Area Monitor;
- track etch cups (radon and thoron);
- special grab sampling techniques (radon and thoron);
- work level monitors (radon and thoron);
- other scintillation detectors (radon and thoron);

Chemical

- combustible gas indicator;
- Photovac MicroTIP (PID) monitor;
- Sensidyne portable flame-ionization detector;
- Photovac 10-S Plus portable gas chromatograph;
- Millipore PCB field test kit;
- colorimetric indicator tubes (e.g., Draeger - NH₃ vapors);

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- Spectrace-9000 XRF analyzer; and
- water quality measurement instruments.

5.3 Field Sampling Procedures

The required sampling procedures are identified in Table 5-1 and are organized by component categories. Potential media in each category are identified and the status of existing procedures is given.

5.4 Analytical Procedures

This section identifies the required analytical procedures for the expected sample matrices and analytes. Table 5-2 lists the analytical method selection for organic, inorganic and conventional parameters to be analyzed for OU3 samples and are based on those listed in the SCQ. Radiological methods will be chosen by laboratories based on their ability to meet the performance based criteria listed in the SCQ. Copies of the performance criteria for all OU3 radionuclides are found in Appendix G of the SCQ.

TABLE 5-1 Potential Sample Media and Required Sampling Procedures

Sampling Procedure	Potential Media	Procedure Identification	
		SCQ Sec. No.	Procedure No.
Samples from Shallow or Standing Liquids	Aqueous Liquids	K.4.3	EP-CRU3-001
Samples from Structural Components	Wood	K.8.2	EP-CRU3-019
	Concrete	K.8.3	EP-CRU3-020
	Asphalt	K.8.5	EP-CRU3-020
	Masonry	K.8.6	EP-CRU3-020
	Shreddable Solids	K.8.7	EP-CRU3-022
	Sheet Metal	K.8.8	EP-CRU3-021
	Structural Steel	-	EP-CRU3-019
	Oxide and Coatings	K.8.9	EP-CRU3-019
	Transite	K.8.10	SP-P-41-052
	Air Samples - Particulate	Filter Media	K.6.3; K.6.4.5
Air Samples - Radon	Detection Film	K.6.2.1	EM-RM-001
Uncharacterized Liquid Samples	In Drums or Tanks	K.5.5.4c, K.5.5.5	EP-CRU3-009, 010
Uncharacterized Solid Samples from Storage Drums	Sediments	K.5.5.4, K.5.2	EP-CRU3-011
	Sludge	K.5.5.4, K.5.6	EP-CRU3-011
	Residues	K.5.5.4, K.5.7	EP-CRU3-016
	Soils/Sand/Gravel	K.5.5.4, K.5.1	EP-CRU3-018, 016
Uncharacterized Solid Samples from Tanks	Sludge	K.5.6	EP-CRU3-011
	Residues	K.5.7	EP-CRU3-016
Surface Samples	Soil/Sand/Gravel	K.5.1	EP-CRU3-018
Sub-Surface Samples	Soil/Sand/Gravel Piles	K.5.3	EP-CRU3-018
Samples from Waste Piles	Soil/Sand/Gravel	K.5.1	EP-CRU3-018
	Paint Chips	K.8.1	EP-CRU3-019
	Wood	K.8.2	EP-CRU3-019
	Concrete	K.8.3	EP-CRU3-020
	Asphalt	K.8.5	EP-CRU3-020
	Masonry	K.8.6	EP-CRU3-020
	Shreddable Solids	K.8.7	EP-CRU3-022
	Sheet Metal	K.8.8	EP-CRU3-021
	Structural Steel	K.8.9	EP-CRU3-028
	Oxide and Coatings	K.8.9	EP-CRU3-019
	Sub-Liquid Solid Samples	Sludge	K.5.6
Residues		K.5.7	EP-CRU3-011

TABLE 5-2 CRU3 Analytical Methods Selection for Organic and Inorganic Parameters

Analyte or Class of Analytes	ASL	Matrices and Methods			
		Water and Wastewater		Soil and Solids	
		Prep Method ^(a)	Analytical Method	Prep Method ^(a)	Analytical Method
Total Metals by ICP	B	SW 846-3010	SW 846-6010	SW 846-3050	SW 846-6010
	C/D	W	CLP	W	CLP
Total Metals by GFAAS	B	SW 846-3020	SW 846-7000	SW 846-3050	SW 846-7000
	C/D	W	CLP	W	CLP
Total Volatile Organics	B	W	SW 846-8260	W	SW 846-8260
	C/D	W	CLP	W	CLP
Total Semi-Volatile Organics	B	SW 846-3520	SW846-8270	SW846-3550	SW846-8270
PCBs	B	SW 846-3520	SW 846-8080	SW 846-3550	SW 846-8080
TCLP Metals	B	SW 846-1311	SW 846-6010 or 7000	SW 846-1311	SW 846-6010 or 7000
TCLP Volatile Organics	B	SW 846-1311	SW 846-8260	SW 846-1311	SW 846-8260
TCLP Semi-Volatile Organics	B	SW 846-1311	SW846-8270	SW 846-1311	SW846-8270

^(a) "W" signifies that preparation is contained within the analytical method.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

The OU3 interim remedial action sampling and analysis plan will be performed in accordance with the overall quality assurance program at the FEMP as described in the SCQ. Basic requirements for the development of DQOs, sampling, sample handling and storage, chain-of-custody records, and laboratory and field analyses are specified in the sections and appendices of the SCQ. The following is a summary of sections of the SCQ applicable to the work plan for the OU3 interim remedial action, much of which is included by reference, with emphasis on any enhancements/deviations specifically related to the remedial activities identified in the OU3 RD/RA work plan.

6.1 General Quality Assurance/Quality Control Requirements

A successful QA/QC program must establish positive controls over planning, implementation, and assessment of all sampling and analysis activities. Because of the breadth and complexity of the media found in OU3, it is essential that all these controls be applied from the initiation of the OU3 interim remedial action. The SCQ establishes a framework for control of the various sampling and analysis activities, with general variances to this framework addressed below.

6.2 Elements of Quality Assurance/Quality Control

The following section discusses the various sections of the SCQ as they apply to the work plan for the OU3 interim remedial action and this SAP, with an emphasis on any enhancements/deviations to the SCQ specifically related to the remedial activities identified in those plans.

6.2.1 Project Description

The FEMP project description is as defined in Section 2 of the SCQ. The schedule for the OU3 interim remedial action is presented in Section 6 of the OU3 RD/RA work plan.

6.2.2 Role of the SCQ

The general FEMP project organization and responsibilities are described in Section 3 of the SCQ. The organization and responsibilities relative to the OU3 interim remedial action sampling program are specifically discussed in Section 8.2 of this SAP.

Section 3.3 of the SCQ discusses the necessity for preparing project-specific DQOs and a project-specific plan. The development of DQOs for the OU3 interim remedial action is discussed in Section 2.2.2. This section provides such items as the project background, project organization, data needs identification, and sampling approach identification. The potential for using a technology, procedure, or method that is not already described in the SCQ is discussed in Section 3.3 of the SCQ.

6.2.3 Quality Assurance Objectives

Section 4 of the SCQ presents FEMP-specific objectives for the level of quality control effort, accuracy, precision, and sensitivity of analytical data, and data completeness,

representativeness, and comparability. The key elements necessary for attaining these QA objectives are briefly discussed here.

The first key element is that data must demonstrate that appropriate quality assurance was implemented. As discussed in Section 4.1.1 of the SCQ, appropriate field and laboratory quality assurance samples must be taken or prepared including, as required, field and laboratory duplicates, method blanks, matrix spikes, and equipment rinsate samples. The definitions for the frequency of various quality assurance samples are in Table 2-2 and Table 2-4, Appendix A of the SCQ.

Other key elements are that analytical accuracy, precision, and sensitivity requirements be determined and will be discussed in appropriate appendices. These elements are discussed in Section 4.3 of the SCQ.

The remaining key elements are as follows: the need to provide and document required site- and job-specific training; the need to provide for proper records administration, preparation, control, and retention; and the need to follow required documentation and drawing change control procedures. These elements will be completed in accordance with the appropriate portions of Section 4.4 of the SCQ.

6.2.4 Field Activities and Sampling Requirements

All field activities/sampling for the OU3 interim remedial action will be performed in accordance with the general policies/procedures of Sections 5 and 6 of the SCQ. All field activities will be documented in a daily log as stated in Section 5.1 and Appendix J of the SCQ. Other sampling activities, including the collection of aqueous, solid matrix, gaseous, and miscellaneous samples, will be conducted in accordance with Sections 6.2, 6.3, 6.4, and 6.6 of the SCQ, as well as Appendix K of the SCQ. Procedures for the field storage and shipment of samples, as well as decontamination of equipment, will be in accordance with Sections 6.7 and 6.8, respectively, of the SCQ.

6.2.5 Sample Custody

Sample custody will be in accordance with Section 7 of the SCQ. An example of a sample chain-of-custody form which may be used is SCQ Form 7-1 (Appendix A of the SCQ).

6.2.6 Sample Container Requirements

Sample volume, sample containers, preservatives, and sample holding times will be in accordance with Section 6 of the SCQ and SCQ Table 6-1 (Appendix B of the SCQ).

6.2.7 Calibration Procedures and Frequency

Calibration procedures, frequency of calibration, and the associated documentation requirements are covered by Section 8 and Appendix I of the SCQ. Before any instrument is used for making measurements at the FEMP, it must be documented that the particular instrument has been calibrated against standards traceable to the National Institute for Standards and Technology (NIST), EPA-certified standards, or if neither are available, the best

quality standard that is obtainable. Additional details on instrument calibration are provided in approved site procedures.

6.2.8 Analytical Procedures

Whenever available, standard analytical procedures and methods for inorganic and organic analysis (e.g., SW-846, EPA-600 methods, SOW for the Contract Laboratory Program, etc.) will be followed during the OU3 interim remedial action. These procedures and methods will be in accordance with the performance based criteria listed in Appendix G of the SCQ. When standard analytical methods do not exist or for analytes that are not currently covered under the SCQ (e.g., asbestos), vendor specific methods may be used. The vendors must be able to confirm that their vendor specific methods will be sufficient to meet the data needs and DQOs.

6.2.9 Internal Quality Control Checks and Frequency

Field and analytical QA/QC checks and frequencies will be in accordance with Section 4 of the SCQ and will be defined in approved sampling procedures. Required frequencies for these QA/QC checks are found in SCQ Tables 2-2 and 2-4 (Appendix A of the SCQ).

6.2.10 Data Reduction, Validation, and Reporting

Data reduction, validation and reporting will be in accordance with requirements specified in Section 11 of the SCQ and the data validation plan located in Appendix D of the SCQ.

6.2.11 Performance and System Audits

Self assessments and independent assessments (e.g., surveillances, audits, data validation, etc.) of the OU3 interim remedial action and data will be in accordance with requirements specified in Section 12 of the SCQ.

6.2.12 Preventative Maintenance

Preventative maintenance will be performed on instruments and equipment used for the OU3 interim remedial action, in accordance with Section 13 of the SCQ. Additional details on preventative maintenance will be provided in approved site procedures.

6.2.13 Corrective Actions

Corrective actions will follow the guidance contained in Section 15 of the SCQ.

7.0 SAMPLE DISPOSITION

The following section discusses the various requirements and site procedures pertaining to sample disposition.

7.1 Analytical Requirements/Request for Analysis

Requests for analysis shall be handled according to Section 7.1.4 of the SCQ. Specifically, analysis requests shall be prepared to specify the testing or analyses program required for collected samples using Form 7-1 (Appendix B) of the SCQ.

7.2 Shipping

Shipment of samples to off-site laboratories will be according to Section 7.1.5 of the FEMP SCQ as well as SAM-SS-002; the procedure for shipping samples to off-site laboratories.

7.3 Sample Holding and Disposal

The laboratory manager is responsible for assigning priorities to samples to ensure that holding times will not be exceeded during the time needed to process the samples through the laboratory work stream. All sample holding and disposal will be according to Section 7.2.3 of the SCQ.

8.0 IMPLEMENTATION STRATEGY

The following section provides a discussion on the implementation strategy for the OU3 interim remedial action sampling program, including the sample scheduling approach, program management, personnel resources, and laboratory contracting.

8.1 Sample Approach

The approach to implementing a sampling strategy for the OU3 interim remedial action involves three potential sampling activities to be considered:

- a preliminary evaluation of design packages for samples and of general issues related to completing existing data gaps;
- supplemental screening and/or sampling, if the preliminary evaluation of components does not fulfill all data requirements of the project; and
- supplemental screening and/or sampling to support all media interim handling, storage and disposition.

For the preliminary development/identification of the remedial design package, all existing data (process knowledge, RI/FS data, etc.) will be obtained and evaluated to determine data needs. Sampling requirements for each design package are a direct result of interpretation of information and actual data needs for each package. Sampling is intended to complement the preliminary evaluation in that this sampling will fill in any existing data gaps which would be required to complete the remedial design package. Other factors to be considered at this stage of design development are identified below.

OU3 Removal Actions

When the OU3 interim remedial action sampling activities for OU3 are scheduled, the effects of removal actions will be considered from the following perspectives:

- possible changes in level of contamination or contents related to the removal action;
- the accessibility of a component or part of a component. Parts of a component may not be accessible because of stored waste, product inventory, drums, or equipment to be disposed by a removal action. To the extent practical, the sampling schedules for OU3 interim remedial action will be integrated with the schedules for the removal actions. For information on the impact of OU3 removal actions on the OU3 interim remedial action, see Section 3.5 of the OU3 RD/RA work plan for the OU3 interim remedial action.

Other Site Activities

Site activities other than removal actions (e.g., RCRA activities) may influence the OU3 interim remedial action sampling activities. These activities will be accommodated to the extent practical without adversely affecting the OU3 interim remedial action schedule. In some instances, these activities may provide data to fill some of the identified OU3 interim remedial action data gaps.

Level of Effort Required to Perform Sampling

Estimates of the number of samples to be taken for each package and the amount of time required to take and analyze the samples will be based on the amount and quality of the available data at the time of the preliminary design stage. The duration, in terms of days required to take and analyze samples, will also be estimated at this time.

Available Resources

Available resources (the number of workers available to collect and analyze the samples) and budget estimates will be determined at the time of the preliminary design stage, based on available data and data needs.

During remediation activities, the existing FEMP monitoring programs for air, groundwater, and NPDES will be in effect. Air monitoring requirements, for each remedial activity, will be evaluated for the number and location of sampling devices. Groundwater monitoring will be conducted for OU5 (see Table 2-3). A NPDES permit will remain in effect for the duration of the remedial action. The permit will establish wastewater monitoring locations, required pollutant monitoring, and any necessary effluent limitations to ensure the Great Miami River water quality is maintained.

To support the interim storage and disposition of materials generated during dismantlement, supplemental sampling may be required to fill existing data gaps. Supplemental sampling requirements will be specified in a SAP addenda to support this activity. The quantity and quality of the existing data will determine the extent of the sampling activity. Through sampling during the design, additional sampling to support interim storage and disposition may not be required. To maximize efficiency, sampling efforts will be planned so that all sampling data generated during the design stage will be sufficient to supply the data needs for interim handling and storage, to the extent practical, the data needed to support treatment/disposition (see Section 3.7).

8.2 Proposed Sampling Summary

Table 8-1 is a summary of the various types of sampling anticipated throughout the remediation activities for each component. The sample types and numbers were developed based on the data needs discussed in Section 2.2 as well as the following assumptions:

- further sampling per RI results/existing data/process knowledge;
- one sample of decontamination liquids per component;
- for components that remain unsampled - one sample at both radioactive and chemical hot spot;
- environmental monitoring sampling for the supplemental or project-specific monitoring for each component;
- potential for sampling several HWMUs for closure under RCRA/CERCLA integration process;
- one percent confirmatory sampling for NTS. Sample quantity will vary per design package. This category is not included in Table 8-1 (See Section 3.2.3 for further reference to NTS sample requirements); and

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all sampling is on a component-by-component basis. This approach may vary due to component size, original function, and the grouping of components for the decontamination and dismantlement activities.

Explanation of the Table 8-1 footnotes are as follows:

1) Characterization Screening : The sample estimates provided are based on the assumption that the RI characterization data and process knowledge will be sufficient for the characterization of media within the components. The only components that will need to be characterized are those not characterized during the RI. The sample quantity represents one intrusive sample at both the radioactive and chemical hot spots located through the use of screening techniques. The need for a PCB sample is also indicated where existing data, process knowledge, etc., reflects the need for such sampling. The sample represents a confirmatory intrusive sample based on PCB surveying.

2) Asbestos : This category represents samples needed to verify whether certain ACM are regulated or non-regulated.

3) Secondary Waste (Decon) : The sample numbers listed in the table are based on the assumption that one sample of washdown water will be needed per component. The total number of samples in this category may increase if areas within a component are segregated, or decrease if washdown water for components with similar characteristics is combined.

4) HWMUs : The sample numbers represent potential sampling numbers for the listed HWMUs, including verification, for cleanup of these areas. These numbers could vary. If sampling is deemed necessary, sample numbers can be determined at the pre-design stage.

5,6) Asbestos Air Monitoring : Environmental sample numbers represent the number of samples to be taken per period of time over the duration of the asbestos removal activity. Interior decontamination and dismantlement samples represent perimeter monitoring during interior asbestos removal activities. Occupational sample numbers represent breathing zone samples to be taken during interior asbestos removal within enclosed components. There may be situations where asbestos removal is required and was not originally accounted for in these assumptions. Therefore, some components may require asbestos air monitoring sampling. Refer to Section 3.4.1 for further information on asbestos air monitoring.

7,8) Rad Air Monitoring : Environmental sample numbers for the interior decontamination and dismantlement of components represent samples to be taken from general air samplers during remediation activities in an enclosed environment. The numbers may increase if activities are performed within distinct areas of a component (e.g., on multiple floors). Environmental sample numbers for exterior decontamination and dismantlement of components represent samples from six to nine air monitoring stations around the perimeter of the work zone, and one background air monitoring station (possibly from an existing monitoring station). The exterior sampling is expected to begin at least one month prior to the onset of remediation activities within the complex, in order to establish a baseline concentration level, and continue through the expected duration of the decontamination and dismantlement activities. The actual number of air monitoring stations may vary due to size and grouping of the components. The occupational air monitoring represents the need for monitoring thirty percent of the work force per day, and is based on experience from the Plant 7 decontamination and dismantlement activities.

TABLE 8-1 Proposed Sampling Summary

Component Number	Characterization Screening (1)			Asbestos (2)	Secondary Waste (Decon)(3)	HWMUs(4)		Asbestos Air Monitoring (5)			Radiological Air Monitoring (8)		
	Rad	Chem	PCB			Active	Inactive	Interior D&D	Exterior D&D	Occupational Breathing Zone (6)	Environmental D&D	Interior D&D	Occupational Breathing Zone (8)
1A	0	1	1	0	1	N/A	to be closed under RCRA	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
1B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	N/A	4/day
2A	0	0	0	0	1	N/A	-50	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
2B	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
2C	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
2D	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
3A	0	0	?	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
3B	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
3E	0	1	0	0	1	N/A	-15-20	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
3G	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
3L	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
4A	0	1	0	0	1	N/A	unk.	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
4B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
4C	0	0	1	1	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
5A	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
5B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
5C	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
5D	1	1	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
5E	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
5F	1	1	0	1	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
5G	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
6A	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
6B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
6C	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
6E	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
6F	0	0	0	0	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
6G	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
7A	7	7	0	unk.	1	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
8A	0	0	0	0	1	N/A	-20	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
8B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day

Footnotes (1) through (8): Refer to text that follows Table 8-1; unk. = unknown number of samples; N/A = not applicable; wk = week

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TABLE 8-1 Proposed Sampling Summary (Cont'd)

Component Number	Characterization Screening(1)			Asbestos (2)	Secondary Waste (Decon)(3)	HWMUs(4)		Asbestos Air Monitoring			Radiological Air Monitoring			
	Rad	Chem	PCB			Active	Inactive	Environmental(5)		Occupational (6)		Environmental	Occupational (8)	
								Interior D&D	Exterior D&D	Interior D&D	Breathing Zone		Interior D&D	Breathing Zone
8C	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
8D	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
9A	0	0	0	0	1	N/A	N/A	7/day	6-10/day	6-10/day	6-10/wk	1/day	4/day	
9B	0	0	0	0	1	N/A	N/A	7/day	6-10/day	6-10/day	6-10/wk	1/day	4/day	
9D	0	0	1	0	1	N/A	N/A	7/day	6-10/day	6-10/day	6-10/wk	1/day	4/day	
9E	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
9F	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
10A	1	1	0	0	1	N/A	N/A	7/day	6-10/day	6-10/day	6-10/wk	1/day	4/day	
10B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	7/day	
10C	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	?	?	
12A	0	0	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
12B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
12C	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
13A	0	0	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
13B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
13C	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
15	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
16B	0	0	1?	?	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
16D	0	0	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
18D	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
18G	1	1	0	0	1	N/A	N/A	N/A	N/A	?	6-10/wk	1/day	4/day	
18H	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
19C	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
20A	1	1	0	1?	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
20B	1	1	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
20E	1	1	0	1?	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
20F	1	1	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
20G	1	1	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
22A	1	1	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	
22B	1	1	0	0	1	N/A	N/A	4/wk	6-10/day	6-10/day	6-10/wk	1/day	4/day	

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Footnotes (1) through (8): Refer to text that follows Table 8-1; unk. = unknown number of samples; N/A = not applicable; wk = week

TABLE 8-1 Proposed Sampling Summary (Cont'd)

Component Number	Characterization Screening(1)			Asbestos (2)	Secondary Waste (Decon)(3)	HWMUs(4)		Asbestos Air Monitoring			Radiological Air Monitoring			
	Rad	Chem	PCB			Active	Inactive	Environmental(6)		Occupational (6)		Environmental	Occupational (8)	
								Interior D&D	Exterior D&D	Breathing Zone	Interior D&D		Exterior D&D	Breathing Zone
22C	1	1	1	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
22D	1	1	0	0	1	N/A	N/A	N/A	7/day	6-10/day	N/A	N/A	N/A	
24A	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
24B	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
25A	1	1	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
25B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
25C	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
25D	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
25E	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
26A	1	1	7	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
26C	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
28D	1	1	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
30A	0	1-2	1	7	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
30B	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
31A	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
32A	1	1	1	1	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
32B	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
37	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
38A	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
39A	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
39B	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
39C	1	1	0	0	1	N/A	N/A	N/A	7	?	6-10/wk	1/day	4/day	
45B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
46	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
51	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
54A	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
54B	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	
54C	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
55A	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day	
55B	0	0	0	0	1	N/A	N/A	N/A	4/wk	6-10/day	6-10/wk	1/day	4/day	

Footnotes (1) through (8): Refer to text that follows Table 8-1; unk. = unknown number of samples; N/A = not applicable; wk = week

TABLE 8-1 Proposed Sampling Summary (Cont'd)

Component Number	Characterization Screening(1)			Asbestos (2)	Secondary Waste (Decon)(3)	HWMUs(4)		Asbestos Air Monitoring Environmental(5)			Radiological Air Monitoring			
	Rad	Chem	PCB			Active	Inactive	Interior D&D	Exterior D&D	Occupational Breathing Zone	Environmental	Interior D&D	Occupational Breathing Zone	Occupational (8)
56A	0	0	0	0	1	2-3	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
56B	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
56C	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
60	1	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
61	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
62	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
63	0	0	0	0	1	unk.	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
64	?	?	?	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
65	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
66	0	0	0	0	1	N/A	N/A	unk.	N/A	N/A	N/A	6-10/wk	1/day	4/day
67	0	0	0	0	1	N/A	N/A	unk.	N/A	N/A	N/A	6-10/wk	1/day	4/day
68	0	0	0	0	1	2-3	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
69	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
71	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
72	0	0	0	0	1	N/A	N/A	N/A	4/wk	7/day	6-10/day	6-10/wk	1/day	4/day
77	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
78	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
79	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
80	0	0	0	0	1	unk.	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
81	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
82	1	1	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
TS-004	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
TS-005	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day
TS-006	0	0	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	6-10/wk	1/day	4/day

Footnotes (1) through (8): Refer to text that follows Table B-1; unk. = unknown number of samples; N/A = not applicable; wk = week

8.3 Program Management

This section describes the overall management structure for implementation of sampling activities to support the OU3 interim remedial action. The following organizations and their responsibilities are based on those currently established by FEMP management and are presented in a generalized manner which sets forth the functional requirements necessary to support field sampling activities for the OU3 interim remedial action. Sampling activities have been established in the previous sections of the SAP and will not be repeated in this section. Although DOE responsibilities are not specifically identified in the following subsections, it should be noted that DOE will be represented and involved at all levels during the management of sampling activities as a result of their participation on the DEC team. Section 7 of the OU3 RD/RA work plan further describes responsibilities of organizations involved in the project management of RD/RA activities. The following subsections include only the primary organizations that will be involved in sampling activities and purposely does not include many of the administrative organizations which support the organizations identified.

8.3.1 Environmental Department for OU3

The overall planning, integration, execution, and support of the OU3 interim remedial action sampling program is the primary responsibility of the OU3 Environmental Department (Environmental). Environmental will be responsible for the following items: evaluation of available data including RI/FS characterization data and radiological and chemical field screening data to determine data needs; development and implementation of this SAP and the SAP addenda; assessment of the need for additional sampling and preparation of supplemental sampling plans if data gaps remain; and management and approval of SVRs and SDCRs when variances in the sampling program are necessary. Environmental will direct the implementation of sampling activities. Sampling support, as required, will be coordinated with other departments and divisions at the FEMP identified in Section 8.3.3, including Health and Safety, Data Validation, QA/QC, Regulatory and Recycling Divisions, Maintenance, Waste Characterization, OU5 Management Divisions, Radiological Control, and Environmental Monitoring.

8.3.2 Other Support Organizations

This section identifies and briefly describes the responsibilities of various organizations that will support Environmental during sampling activities for the OU3 interim remedial action.

Health & Safety Division for OU3

Health and Safety Division for OU3 will develop project-specific Health and Safety Plans to address health and safety requirements for sampling activities to ensure that the requirements established in the plans are followed in the field.

Data Validation

Data validation will validate field characterization data, as necessary, in accordance with the approved SCQ data validation procedures.

QA/QC

The QA/QC lead for the project will verify that all field QA samples for the SAP addenda meet the intent and requirements of the SCQ.

Regulatory and Recycling Divisions

Regulatory status and recycling potential of remediation materials will be determined through Regulatory and Recycling Divisions.

Maintenance

Waste materials from sampling activities will remain in a pre-determined location (identified in the SAP addenda) until transfer is arranged with Maintenance.

A limited number of ACM samples may be collected during sampling activities and therefore ACM contact waste may be generated. Maintenance will handle a limited quantity of ACM contact waste in the same waste stream as ACM waste from the asbestos removal program with prior arrangements.

Regulatory & Waste Characterization

The Waste Characterization Department will declare extracts, leachates, acid digests, excess sample materials, and contact wastes returning from off-site laboratories after analytical procedures have been conducted as low-level radioactive waste (non-RCRA) or mixed waste (containing RCRA hazardous waste properties) before wastes are returned to the FEMP. Waste Characterization will notify contract analytical laboratories when approval is given to return wastes to the FEMP.

OU5 Management Divisions

OU5 Management Divisions (OU5) will be responsible for all groundwater and soil sampling requirements. Several sources are available for obtaining results from OU5 sampling activities including the OU5 RI Report and RCRA Annual Reports for Groundwater Monitoring. OU3 will be responsible for assessing routine groundwater and soil sampling results from OU5, as needed. If an event occurs during the OU3 interim remedial action that results in a potential release to the soil or groundwater and could potentially affect the groundwater quality, then groundwater sampling may be necessary and should be coordinated with OU5.

Radiological Control

Radiological Control will determine occupational air monitoring needs for each project.

Environmental Monitoring

Environmental Monitoring will determine the locations of environmental air samplers on the perimeter boundary of each project area.

8.4 Personnel Resources

The support staff resources for implementation of OU3 interim remedial action sampling activities may include any or all of the following:

- sample point location crews;
- daily operations unit;
- field program administration;
- SAP addenda development;

- data validation;
- data entry;
- training development; and
- training support.

The actual number of support personnel will be estimated during the pre-remedial design stage. Before sampling of a component outlined in the remedial design begins, the detailed plans for the sampling will be finalized in the package-specific SAP addenda. The actual number of support personnel cannot be estimated at this time due to the uncertainty of what the actual OU3 interim remedial action will require.

8.5 Laboratory Contracting

The laboratory contract for inorganic and organic analyses references the standard USEPA methods currently in Appendix G of the SCQ. The radioanalytical laboratory services task order subcontract references the performance based criteria currently in Appendix G of the SCQ. Task orders will be placed for radioanalytical services on an as needed basis.

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**OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
HEALTH AND SAFETY PLAN**

OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
HEALTH AND SAFETY PLAN
FINAL
March 1995

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Fernald Environmental Restoration
Management Corporation
P.O. BOX 398704
CINCINNATI, OHIO 45239-8704

PREPARED FOR THE
U.S. DEPARTMENT OF ENERGY
FERNALD SITE OPERATIONS OFFICE
UNDER CONTRACT DE-AC05-880R21734

Authorized By:

Steven Houser
CRU3 Project Director

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Manager of Compliance for Occupational Safety and Health

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**OU3 Interim Remedial Action
Health and Safety Plan**

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NOTATION

Abbreviations, Acronyms, and Initials

AEDO	Assistant Emergency Duty Officer
ALARA	as low as reasonably achievable
BZ	Breathing Zone
CGI	Combustible Gas Indicator
CFR	Code of Federal Regulations
CRU3	CERCLA/RCRA Unit 3
DOE	United States Department of Energy
EMT	emergency medical technician
ES&H	environmental safety & health
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
GA	General Area
GET	general employee training
GFCI	ground fault circuit interrupters
GM	Geiger-Müller
HASP	health and safety plan
HEPA	High Efficiency Particulate Air
MSDS	material safety data sheets
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OU3	Operable Unit 3
PAS	personal air sampling
PCB(s)	polychlorinated biphenyl(s)
PCM	Personnel Contamination Monitor
PEL	permissible exposure limit
PID	photo-ionization detector
PPE	personal protective equipment
PSHSP	Project-Specific HASP
RCT	Radiological Control Technician
RD/RA	OU3 Remedial Design/Remedial Action
RWP	Radiation Work Permit

TLD Thermoluminescent Dosimeter
TLV(s) threshold limit value(s)

UNH uranyl nitrate

WBGT wet bulb globe temperature index
WLM Working Level Monitors

GLOSSARY

Airborne Radioactivity Area -

Area where the measured concentration of airborne radioactivity, above natural background, exceeds either: (1) 10 percent of the Derived Air Concentration (DAC) averaged over 8 hours; or (2) a peak concentration of 1 DAC. DAC values are contained in Appendix A of 10 CFR 835.

Asbestos abatement containment area -

An enclosed area maintained under negative pressure to prevent or minimize the spread of asbestos fibers. Often a plastic enclosure with HEPA-filtered ventilation. Also referred to as Asbestos Abatement regulated areas.

Complex -

A set of components grouped by location, scope of work required, and/or cost of dismantlement to be remediated under one or more design document(s).

Component -

The smallest physically distinct unit of OU3 that is considered separately in the development and implementation of this Work Plan including, but not limited to, buildings, pads, roads, piping/utilities, and ponds/basins.

Contamination Area -

Any area, room, or enclosure where removable contamination levels exceeds applicable limits, but are less than 100 times these values.

Controlled Area -

A controlled area is any area, room, or enclosure to which access is controlled to protect individuals from exposure to radiation or radioactive materials, or where radioactive materials may be present. Surface contamination, radiation, and airborne contaminants are less than applicable limits for further posting. Personnel exposure is not expected to exceed 100 mrem in one year while working in a Controlled Area. The following radiological areas are found within Controlled Areas. Limits mentioned are from Table 2-2 of DOE/EH-0256T.

Design package -

Detailed set of plans and specifications for implementation of the interim remedial action in manageable portions of the entire work scope. Refer to section 4.5 for a more detailed description of a design package.

Fixed Contamination Area -

Any area, room, or enclosure where fixed contamination exists greater than limits, but removable contamination is less than the limits. These areas may be outside of a Controlled Area.

High Contamination Area -

Any area, room, or enclosure where removable surface contamination exceeds 100 times the applicable limit.

GLOSSARY

High Radiation Area -

An area, accessible to personnel, in which radiation levels could result in a person receiving a dose equivalent in excess of 0.1 rem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Interim remedial action -

Course of action that may be pursued in the short-term, before a final Record of Decision, in order to quickly reduce existing risks at a Superfund site. Also refers to the OU3 interim remedial action to decontaminate and dismantle all OU3 structures.

Interim storage facility -

On-site area for temporary storage of material or debris generated during the interim remedial action.

Material -

Solids and liquids generated from decontamination and dismantlement operations; includes non-recoverable/non-recyclable material (waste) and recoverable/recyclable material.

Operable Unit -

A discrete action that comprises an incremental step toward comprehensively addressing site problems. The five FEMP operable units, as defined by the Amended Consent Agreement (ACA), have been specified based on specific site problems. Each of the units are summarized as follows: OU1 - waste pits; OU2 - ash pile, sanitary landfill, and lime sludge ponds; OU3 - all buildings and associated facilities (roads, railroads, drummed waste, inventory, fences, telephone poles, electrical and sewage lines, etc.); OU4 - four large storage silos and associated facilities; OU5 -contaminated environmental media. Refer to section 2.1 for a more detailed description of each operable unit.

Plant 4 Complex -

A group of OU3 components that, by design, were to be decontaminated and dismantled as one remediation project, including: Green Salt Plant (4A), Plant 4 Warehouse (4B), and Plant 4 Maintenance Building (4C). Building 4B will be included in the scope of a future remediation project, and Building 4C has been removed under the Plant 7 Dismantling project (Removal No. 19).

Process knowledge -

Information available about a process from documentation of past operations or information from individuals who participated in the operation. This information includes, but is not limited to, process chemistry, history of accidents/spills, maintenance chemicals/materials, and other uses of the process vessels or workspace.

GLOSSARY

Project -

A specific decontamination and dismantlement remedial design and remedial action effort; beginning with pre-design scoping activities and ending with the submittal of a remedial action report to the regulatory agencies.

Project-specific HASP -

Facilitates coordination and communication of health and safety issues among personnel by providing the mechanisms to minimize the risks of employee exposure to hazardous substances and other unsafe conditions associated with a specific project. This document evaluates a project on a task-specific basis, identifying potential hazards and mitigators.

Radiation Area -

An area, accessible to personnel, in which radiation levels could result in a person receiving a dose equivalent in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Remedial action -

An action that is consistent with the final remedy following a formal examination of the nature and extent of the release, or threat of release, assessment of the risk, and selections of the final remedy based on an evaluation of possible alternatives.

Remedial design -

The technical analysis and procedures which follow the selection of a site remedy resulting in a detailed set of plans and specifications for implementation of the remedial action.

Remediation subcontractor -

The group, or groups, subcontracted to FERMCO that will be responsible for implementation of the remedial action.

Transite -

Common construction material used as sheeting for walls and roofs for many OU3 components. It consists of a mixture of asbestos and concrete.

1.0 BACKGROUND INFORMATION

1.1 FEMP Site History

The Fernald Environmental Management Project (FEMP) is located in Southwestern Ohio, approximately 17 miles northwest of downtown Cincinnati near the communities of Miamitown and Ross, Ohio. Of the total site area of 1,050 acres, 850 acres are in Crosby Township of Hamilton County and 200 acres are in Ross and Morgan Townships of Butler County, Ohio.

The FEMP is owned by the United States Department of Energy (DOE) and currently managed by the Fernald Environmental Restoration Management Corporation (FERMCO).

The FEMP was built in 1951 and full operation began in 1953. The purpose of the facility was to establish an in-house integrated production complex for processing uranium and its compounds from natural uranium ore concentrates for use in government defense programs. A wide variety of chemical and metallurgical process steps were used. The present mission focuses on waste management and environmental restoration.

1.2 Operable Unit 3 History

Operable Unit 3 (OU3) encompasses all structures, utilities, roads, railroads, fences, etc. located above- and below-grade at the FEMP. The production area contained all of the buildings and machinery used to produce uranium and its products from the raw materials. Processes conducted included conversion of Uranyl Nitrate to Uranium Tetrafluoride and conversion of Uranium Hexafluoride to Uranium Tetrafluoride. The Uranium Tetrafluoride was then reduced by heating it in the presence of Magnesium. Uranium metal resulted. The metal was then cast and machined into the shapes which were used by the Department of Defense and DOE.

Because of the similarities in general activities, original construction materials and processes at the FEMP, a base group of potential contaminants applicable to all process-related components has been identified: uranium, asbestos, lead, polychlorinated biphenyls (PCBs), and mercury. The same base group of potential contaminants applies to most non-process related components also. However, administrative buildings are not expected to contain significant levels of hazardous substances.

1.3 OU3 Interim Remedial Action Health and Safety Plan

The OU3 Interim Remedial Action Health and Safety Plan (HASP) complies with the United States Occupational Safety and Health Administration (OSHA) requirements of 29 Code of Federal Regulations (CFR) 1910.120 as it discusses the general health and safety issues related to performance of remedial design/remedial action activities. This plan supplements and expands upon the OU3 HASP. Specifically, this plan provides the following:

- controls for the prevention of occupational accidents and injuries;
- communication to all employees involved with the project with regard to foreseeable safety and/or health hazards; and

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- the mechanism(s) necessary for minimization of exposure risk to hazardous substances and unsafe conditions.

For the OU3 interim remedial action, activity-specific health and safety information will be contained within a Project-Specific HASP (PSHSP) and health and safety requirements matrices developed for each PSHSP. Attachment A provides the PSHSP Table of Contents for the Pilot Plant complex decontamination and dismantlement project. The health and safety requirements matrix for the remediation of the Pilot Plant complex is included with this HASP as Attachment B. For illustrative purposes, Attachment B provides only the first two pages of the health and safety requirements matrix.

1.4 Scope of OU3 Interim Remedial Action

The activities included in the scope of the OU3 interim remedial action are as follows:

- sampling for pre-design, design-support, and remediation;
- surface decontamination;
- dismantlement of components;
- removal of all above and below-grade components within OU3;
- size reduction of materials;
- Transportation of materials to on-site interim storage facilities and off-site disposal facilities.

2.0 HEALTH AND SAFETY RESPONSIBILITIES

2.1 Manager of Compliance for Occupational Safety and Health

The Manager of Compliance for Occupational Safety and Health is responsible for overall health and safety-related activities and issues for the site.

2.2 CRU3 Health and Safety Manager

The CERCLA/RCRA Unit 3 (CRU3) Health and Safety Manager is responsible for implementation and audit of all OU3 interim remedial action safety programs and acts as the single point contact for all environmental, safety, industrial health, fire, and radiological issues.

2.3 Remedial Design and Remedial Action Health and Safety Personnel

The health and safety representatives assigned to the project-specific remedial design and remedial action activities will oversee project activities associated with remedial design and remedial action (RD/RA), respectively. Their responsibilities are to ensure compliance with all regulations, standards and requirements as they affect the project.

2.4 Interim Remedial Action Personnel

Personnel that perform tasks under the OU3 interim remedial action will be responsible for the following:

- knowing and understanding the OU3 Interim Remedial Action HASP, as is evidenced by the signing of the "compliance sign-off" contained in Section 13, and sign-off sheets contained within each PSHSP;
- complying with all safety requirements necessary to protect themselves, other workers, and the environment as directed by the CRU3 Health and Safety Manager; and
- seeking guidance from their immediate supervisor or field lead in the event there is any question or uncertainty about the safety of a remediation activity.

3.0 GENERAL SAFETY REQUIREMENTS

3.1 Permits and Postings

3.1.1 Permits

Permits shall be posted in accordance with policies Radiological Performance Requirements (RPR) 3-1 and Safety Performance Requirements (SPR) 2-13, both found in ESH-1-1000, Comprehensive Environmental Occupational Safety and Health Program.

Prior to the implementation of project-specific work, issuance of any one or a combination of the following site permits may be required:

- Site Work Permit (Form FS-F-2939);
- Construction Excavation/Penetration Permit (Form FSF-F-2711);
- Radiological Work Permit (RWP) (Form FMPC-ES&H-1372);
- Confined Space Evaluation/Permit and Chemical Hazardous Materials Work Permit (FS F-2745); and
- Asbestos Work Permit (Form FS-F-2940).

Permits required for specific Interim Remedial Action activities will be identified within the PSHSP developed for each design package.

3.1.2 Postings

The following areas shall be clearly defined and posted:

- Radiological Control Area(s);

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- Exclusion area(s); and
- Confined Space(s).

The following areas shall be clearly defined and posted by the subcontractor according to site procedures:

- asbestos abatement area(s);
- construction area(s);
- hazardous noise area(s); and
- lead work areas.

Entrances to, and perimeters of, radiological areas are defined by yellow and magenta rope or, where practical, are defined by physical structures, such as fences or buildings. All radiological areas can be identified by signs having the standard radiation symbol, the trefoil, on a yellow background. Signs state the type of area and general entry requirements. Radiological area boundaries may change at any time based on changing work activities and posting requirements.

Anyone entering a Controlled Area of the FEMP are required to wear a Thermoluminescent Dosimeter (TLD) as directed by Radiological Control.

Posting of radiological areas is based primarily on contamination and airborne limits for uranium. However, limited amounts of more restrictive radionuclides, most notably thorium, are present at the FEMP. Table 2-2 of DOE/EH-0256T, Radiological Control Manual, contains posting limits for the various radionuclides. Documented contamination, radiation, and airborne radioactivity measurements, or the potential to meet or exceed the values listed in Tables 2-2, 2-3, and 2-4 of the DOE Radiological Control Manual, and Appendix A of 10 CFR 835, are the basis for posting Contamination, Radiation, and Airborne Radioactivity Areas.

Step-off-pads are used at each control point to radiological areas, for the purpose of contamination control. Control points are also equipped with whole-body Personnel Contamination Monitors (PCMs). Short duration work areas may be equipped with hand-held portable instruments for personnel to perform whole-body survey. PPE donning/doffing areas are established for each control point and are maintained with the proper amounts and types of PPE or anti-contamination garments.

3.2 Safety Equipment List

In addition to standard personal equipment (e.g., dosimeters) the safety equipment to be available for use in the interim remedial action may include, but not be limited to, any of the following: gloves made of latex, nylon, natural rubber, nitrile, neoprene, viton, cotton or leather; latex shoe covers; caution tape; back belts; safety glasses, cover goggles, face shields; hard hats; cool vests; Saranex anti-contamination clothing (or equivalent); coated Tyvek and/or other types of disposable coveralls (if conditions permit use); eye wash stations; ear plugs; winter coveralls; steel toed boots; fire extinguishers; safety harnesses; respirators; shin guards; one piece leather aprons; Ground Fault Circuit Interrupter (GFCI) extension and

equipment cords; dust containment cloth; men working signs; traffic cones; and radiation survey equipment and industrial hygiene survey equipment.

3.3 Material Safety Data Sheets (MSDS) Locations

Material Safety Data Sheets (MSDSs) shall be available to employees according to SPR 5-6 in the Comprehensive Environmental Safety and Health Program Manual (ESH-1-1000). Industrial Hygiene keeps a copy of all site MSDSs in a centralized location. MSDSs for building-specific chemicals and compounds are kept in binders in the respective buildings. The location of such manuals and identification of potential chemical hazards for each activity during interim remedial action will be reviewed with the field team prior to initiation of activity.

MSDSs for all products or chemicals to be used during the job by the subcontractors shall comply with the subcontractor's written hazard communication program and shall be provided to the FEMP Industrial Hygiene Department (Industrial Hygiene) for review prior to the product or chemical arriving on-site. Submittal of MSDSs are to be at least one week prior to planned use. A complete set of MSDSs for all chemicals used shall be maintained by the subcontractor in a central location on FEMP property. Additional FEMP MSDSs are available through the CRU3 Health and Safety Manager as needed.

3.4 Illumination

The illumination standards of 29 CFR 1910.120 shall be adhered to as described in Table 3-1.

In areas of suspected insufficient lighting, Industrial Hygiene shall be contacted prior to implementation of work activities and temporary lighting will be provided as needed.

TABLE 3-1 Minimum Illumination Intensities in Foot-Candles (29 CFR 1910.120)

Foot-candles	Area or Operation
5	General site areas
3	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and fuel maintenance areas.
5	Indoors: warehouses, corridors, hallways, and exits.
5	Tunnels, shafts, and general underground work areas: (exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau of Mines approved cap lights shall be acceptable for use in the tunnel heading).
10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms, barracks, or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms).
30	First aid stations, infirmaries and offices.

3.5 Sanitation at Temporary Worksites

For this project, portable toilets may not be available in some locations. Personnel shall be provided a means to travel to a toilet facility when required. The sanitation requirements found in ESH-1-1000, SPR 5-4 shall be followed. The PSHSP will specify the requirements for subcontractors to provide additional sanitation facilities. An adequate supply of potable water shall be provided on the site. The containers used to dispense drinking water shall be capable of being closed and equipped with a tap. Any container used to distribute water shall be clearly marked for this purpose and not used for any other purpose. Site Radiological Control Department shall approve all drinking water locations within a Radiologically Controlled area and shall post approved locations as designated break areas.

3.6 Operating Procedures and Other Requirements

All work conducted on-site shall comply with all the safety and health procedures in the FERMCO COMPREHENSIVE SAFETY AND HEALTH PROGRAM MANUAL ESH-1-1000 and those proposed by the subcontractor and approved by FEMP project managers.

4.0 SITE ACCESS CONTROL

4.1 FEMP Requirements

Each activity of the OU3 interim remedial action area will be clearly identified by barrier tape, (or more substantial barriers if deemed necessary by the CRU3 Health and Safety Manager), and signs. Visitors to the areas will be restricted to outside of the work area unless the CRU3 Health and Safety Manager determines that access is necessary and allowed and proper escort is maintained.

The FEMP requirements for access to a controlled area are as follows:

- a thermoluminescent dosimeter shall be worn;
- a respirator shall be worn when required in all areas of known or areas which have the potential for airborne contamination;
- medical requirements (bioassay and general physical) shall be met as determined by FEMP Medical Services; and
- any component-specific requirements as defined in this Health and Safety Plan and PSHSP shall be adhered to.

4.2 Defining Exclusion Zones

An exclusion zone is defined as follows:

An exclusion zone or radiological contamination area (based on survey results) is a pre-established area of high potential hazard due to physical, radiological, or chemical dangers. Access to an exclusion zone or radiological contamination area is restricted to employees who are required to enter in order to perform their job functions. An exclusion zone or radiological contamination area will

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be marked with easily recognizable devices such as ropes, tape or fence. Signs posted indicating the type of exclusion zone or radiological contamination areas may be expanded or upgraded as airborne hazards, contamination, or radiation levels increase due to work activities. Radiological areas will be established, controlled and marked as required by the Radiological Control Manual (DOE 1992d). For OU3 Remedial Design/Remedial Action (RD/RA) activities, each activity area will be an exclusion zone.

Exclusion zones shall be defined by Industrial Hygiene or Radiological Control on a changing schedule to be determined by survey results. Exclusion zones will be delineated at the time of project initiation. Each area will have a designated entrance and exit, as determined by Industrial Hygiene and Radiological Control. All such areas will have their own decontamination lines.

5.0 TRAINING

5.1 Required Training For Entry To Site

To conduct work in an area not designated as a radiological controlled area or an exclusion zone, the employee will receive the following: 4-Hour General Employee Training (GET), and if necessary Four-Hour FEMP Respirator Training and quantitative fit test (Five-hour for Asbestos Workers).

In order to meet the requirements of OSHA 1910.120, occasional site workers will also complete the following training: 12-Hour Site Worker Training, and 8-Hour Radiation Worker I Training.

All site and subcontractor personnel assigned to the various tasks associated with the OU3 interim remedial action will require the following additional training requirements:

- 24-Hour Radiation Worker II (in place of Radiation Worker I Training);
- Three (3) days supervised field experience; and
- Subcontractors with proof of successful completion of current OSHA 29 CFR 1910.120 (e)(3)(i) training are required to take GET, Site Worker and Radiation Worker I or II as determined by the site training department on a case-by-case basis to comply with site requirements.

Supervisors will, in addition to the training requirements listed above, receive the following training:

- 8-Hour Training for Supervisors involved in the project required by OSHA 29 CFR 1910.120 (e) (4)

Note: In the event that subcontractors are used for the OU3 RD/RA, each subcontractor shall be responsible for certifying that their employees meet the requirements of pre-assignment training and all OSHA training.

Additional health and safety training required may include the following:

- confined space training required to enter permit-required confined spaces;
- asbestos training to comply with OSHA and Ohio Department of Health requirements necessary for any personnel working with asbestos; and
- lead worker training as required by 29 CFR 1962.62 for any personnel with potential for exposure to airborne lead.

5.2 Required Training To Work In The Defined Work Zones

All procedure training for the various RD/RA tasks and equipment associated with the work will comply with site requirements for training. The training must cover job analysis and task assignment as required to develop and implement job and task-specific training. The training department will maintain records indicating successful completion of training.

All personnel will be trained to the information contained within this plan. The Health and Safety Compliance Sign-off Sheet will document this training and understanding of the plan provisions.

Special training requirements for each design package will be identified in the PSHSP and the health and safety requirements matrix contained within it. The Health and Safety Compliance Sign-off Sheet contained within each PSHSP will document the design package-specific training and understanding of the PSHSP.

5.3 Required Safety Meetings

Remediation personnel will be required to attend short safety ("tailgate") meetings on a regular basis. These meetings may be conducted daily during field operations, when there is a change in scope of work, or when individuals not previously briefed on the activities join the field team. These meetings will be conducted by the CRU3 Health and Safety Manager or designee and will be documented on form FSF-F-470 ("Minutes of Safety Meeting"). Documentation of all health and safety meetings will be maintained by the CRU3 Health and Safety Manager and will become part of the permanent file. Such meetings will include but not be limited to:

- review of potential chemical/radiological/health hazards;
- review of applicable material safety data sheets (MSDSs);
- briefing on other activities which will be underway in the same area (e.g. safe shutdown);

- review of the governing OU3 Interim Remedial Action HASP and information contained within each PSHSP;
- signing of the Health and Safety Compliance Sign-off Sheet by the sampling personnel;
- signing of the Health and Safety Compliance Sign-off Sheet contained within each PSHSP; and
- health and safety issues for subcontractors and construction personnel.

6.0 MEDICAL MONITORING AND SURVEILLANCE

In accordance with 29 CFR 1910.120, all site and subcontractor personnel assigned to the Site and performing actual interim remedial action field tasks, will participate in the FEMP's medical monitoring program which includes:

- a baseline medical examination;
- periodic medical examination (within one year of previous exam);
- respirator medical approval;
- medical-bioassay examinations (may be required after potential exposures);
- exit (from project) medical examination; and
- any required monitoring denoted in the PSHSP.

If examinations conducted by medical personnel other than FEMP personnel are planned, then the subcontractor must receive prior authorization relative to protocols and a list of providers must be obtained from FEMP Medical Services.

All personnel who enter contamination or airborne radioactivity areas must participate in the bioassay program. The radiation surveillance must be conducted by the FEMP according to the following frequency:

- baseline;
- periodic;
- following an incident;
- upon an individual's request; and
- exit (end of project or termination).

Bioassay urine samples are required once every 60 days for class W soluble uranium, which is the predominant occupational radiation hazard at the FEMP. Uranyl Nitrate (UNH), which is class D soluble (more soluble than class W), requires monthly urine sampling and will be required on a task-specific basis (UNH handling activities). Fecal sampling is required when thorium is the isotope of concern as outlined by the task-specific information.

Personnel medical records will be maintained by the site medical department. Personnel involved in a contamination event will report to bioassay at the end of their shift, or as directed by the personnel performing the decontamination. A follow-up evaluation may be required depending on the type of contamination.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIREMENTS

Protective clothing and equipment will be tailored to the specific task(s) being performed. The equipment requirements will be determined by the Radiological Control, Industrial Hygiene, and Fire & Safety departments. Personal protective equipment will be worn in accordance with SPR 2-14 and RPR 3-3 in ESH-1-1000.

Personal protective equipment specific to activities of each design package will be identified in the PSHSP and health and safety matrices.

8.0 REQUIRED MONITORING AND ACTION LIMITS

It is the policy of the FEMP to maintain radiation exposures and exposures to toxic substances and combustible gases As Low As Reasonably Achievable (ALARA). Air monitoring will be performed to ensure that contaminant concentrations in the breathing zone do not exceed established exposure levels. Personnel will be monitored when appropriate in compliance with the radiation protection standards, in order to estimate the dose equivalents received from external and internal sources of radiation.

Personnel dosimetry programs will be adequate to demonstrate compliance with the radiation protection standards and will be performed by the Dosimetry Department personnel. Personnel dosimeters will be routinely calibrated and maintained by the FEMP dosimetry Department.

External radiation hazards are identified by site personnel as they perform the survey required for a radiation work permit. Stay times will be measured and assigned for all activities by a Radiological Control Technician. Measures such as increasing shielding, increasing distance, or reducing exposure time will be taken to minimize exposures.

8.1 Air Monitoring

Air monitoring will be conducted in accordance with SPR 5-1 (see ESH-1-1000).

Occupational air monitoring needs will be determined for each project. Occupational air monitoring, addressed by the PSHSP for the project, will be performed using a combination of Personal Air Sampling, Breathing Zone, and General Area sampling methods to assess personal exposure to airborne radioactivity. Initial counts will be performed to evaluate raw

count data, anomalies from historical "base-line" samples, and to ensure containment of airborne radioactivity to the immediate worker area. Seven-day decay analysis (retrospective air sampling) of the collected filters will be used for formal documentation of occupational exposures to airborne radioactivity. Project perimeter air samples may be collected on a daily basis for the purpose of ensuring proper area posting and control.

In order to verify that control measures adequately minimize fugitive emissions, samplers will be installed in the vicinity of the facility being decontaminated or dismantled. Samplers will be placed on the perimeter boundary of each project area. The sample filters from these samplers will be removed and analyzed at a minimum for gross alpha and beta activity.

Due to current technology limitations, "real-time" monitoring for airborne uranium and thorium will not be performed any time in the near future at the FEMP. However, DOE is committed to continually seek more reliable, real-time air monitoring methods. The problem which results in the FEMP's inability to use real-time monitoring is due to naturally occurring and/or process enhanced radon and thoron (short-lived) daughters that are present in ambient air. These short-lived daughters have been found to interfere with the spectra in the specified region of interest for long-lived uranium and thorium, when utilizing state-of-the-art alpha spectroscopy Continuous Air Monitors.

For the reason noted above regarding occupational air monitoring for airborne radioactivity, all air samples collected for long-lived uranium and thorium must be "decay counted" for a period long enough to ensure that all radon and thoron daughters are no longer present on the air sample filter when the sample count analysis is performed. Counting is performed on a laboratory alpha/beta low background counter, analyzed for gross alpha and beta, corrected for background and system efficiency, and the results recorded in microcuries per cubic centimeter. Verification of radionuclide(s) present is performed by alpha or gamma spectral analysis, after the decay count is performed, but only when there is reason to believe that isotopes other than uranium may be present. Uranium is the primary radiological airborne hazard at the FEMP.

Asbestos air monitoring will be used for work that will potentially release asbestos fibers from non-friable asbestos. A thirty-minute breathing zone air sample will be collected where the potential for releasing asbestos fibers is greatest. General area air samplers will be collected outside the asbestos work area to evaluate the effectiveness of control measures used during asbestos work activities. See Section 4.1.3 of the OU3 RD/RA Sampling and Analysis Plan for further information on asbestos air monitoring. The proposed sampling for project-specific occupational asbestos monitoring is an average of 6 - 10 breathing zone samples collected and analyzed daily. This may be per component or per group of components, depending on the established work zone. Samples are sent to off-site labs for analysis or to the on-site lab if available.

Personal Air Sampling (PAS) for airborne radioactivity will be emphasized for monitoring personnel per the guidelines listed below. Personal air sampling shall be conducted whenever the work permit specifies personal respiratory protection be worn, or when personnel are expected to perform any of the following activities:

- the opening or breaching of any closed system which has the potential for containing radioactive materials or uranyl nitrate solution;
- drum/waste container sampling, filling, or dumping activities associated with construction activities;
- miscellaneous waste material compaction, crushing, or shredding in support of construction activities;
- decontamination and/or demolition activities; and
- burning, welding, or weld cutting on contaminated surfaces which contain levels greater than either of the values (removable or total) specified in Table 2-2 of DOE Radiological Control Manual.

At least twenty-five percent of the individuals present in those areas where the above work activities are being performed will be equipped with a PAS sampling device.

General Area (GA) and Breathing Zone (BZ) high volume "grab" samples will be collected at select locations of each project area to supplement the collected PAS air data and monitor ambient and work area airborne concentrations.

A Photoionization Detector (PID) may be used periodically to test for organic vapors and measure breathing zone contaminants. Its use as well as monitoring frequency will be based upon recommendation of the Industrial Hygiene Section. If organic vapors are detected, process knowledge will be used to identify them; when process knowledge is not available, organics will be treated as unknowns. Calorimetric indicating detector tubes may be used to measure levels of specific organic vapors as well as inorganic vapors, such as NO₂, Nitric Acid, etc. The MIE RAM-1 may be used to monitor for airborne particulates.

Combustible Gas Indicator (CGI)/Oxygen meters will be used to check the atmosphere of confined spaces prior to entry. Personnel working in these spaces will be required to wear the appropriate PPE, as directed by Industrial Hygiene.

Personal air monitors may be used to determine employee exposures to airborne contaminants in the work area.

8.2 Radiation Monitoring

8.2.1 Contamination

Radiological Control Technicians (RCT) will perform routine surface contamination surveys in the affected work areas to confirm the effectiveness of contamination control practices and to ensure proper area posting. Measurements are taken with field portable alpha and beta-gamma instruments to assess total (fixed plus removable) contamination levels. Swipes samples are collected to determine removable (or transferable) levels of contamination present. The swipes are analyzed on a low background gas proportional alpha/beta-gamma counting system.

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8.2.2 Radiation

The RCT will perform radiation surveys of the work area and determine maximum allowable stay times for the workers to remain in the affected project areas. This information will be documented and posted on the Radiation Work Permit (RWP). A copy of the radiation survey will also be posted, along with the RWP, at access control points to each of the project areas.

Routine radiation surveys will be performed to ensure proper area posting, to confirm radiological conditions have not changed, and to ensure compliance with ALARA principles. Tissue equivalent air ionization chambers are used to determine external radiation exposure rates.

8.2.3 Airborne Radioactivity

Occupational air monitoring, specific to a particular project, will be performed as specified in each Project Specific Health and Safety Plan. A combination of PAS, BZ, and GA sampling methods will be used to assess personnel exposure to airborne radioactivity. Working Level Monitors (WLMs), track etch cups, scintillation detectors, and special grab sampling techniques have been used to assess and characterize radon and thoron gas/progeny concentrations in all affected project areas.

8.2.4 Radiological Work Permits

The RWP is an administrative mechanism used to establish radiological controls, document radiological conditions, and to communicate special radiological work requirements for each work activity.

The function of an RWP is:

- to limit exposure to workers
- to prevent the spread of contamination
- to provide for augmented monitoring and surveillance
- to inform workers of radiological conditions and entry requirements
- to provide a mechanism for relating worker exposure to individual work activities

RWPs will be posted for all work activities and general entries at the project area control points. PPE requirements, driven by the RWP, will be integrated with Industrial Hygiene and Safety PPE requirements and will be clearly posted at all access control points to the project area.

8.2.5 Routine Area Monitoring

Routine monitoring of the work area will be performed to ensure that radiological conditions have not changed and that the current controls are adequate. The frequency of radiological surveys in the individual work areas will depend on the degree of hazard as determined by Radiological Control personnel. If surface contamination, dose-rates, or airborne radioactivity levels indicate that radiological conditions have changed to the point that controls are deemed inadequate, Radiological Control Technicians will issue a verbal stop work order and notify the

Manager of Radiological Control (or designee). Posted RWPs place limiting values on radiological conditions and if those values are equalled or exceeded, work shall not resume until proper controls are in place and a new RWP is issued.

8.2.6 Personnel Monitoring

All personnel entering the Controlled Area will require a TLD and will be required to participate in site medical and bioassay programs.

Personnel shall exit radiologically controlled work areas through established control points. Upon exit from the controlled work area, each individual is required to perform a personal whole-body contamination survey through an automated PCM. Additional survey requirements may apply, depending on area configuration at a specific control point. Personnel found to be contaminated above the levels specified in Table 2-2 of the DOE Radiological Control Manual will be detained until Radiological Control personnel investigate the source of personnel contamination and perform appropriate measures for containment and isolation of the contamination. If emergency or other hazardous conditions are present which put individuals at risk, or immediate medical treatment is required, personnel monitoring will be waived until such time affected individuals can be monitored safely.

8.2.7 Equipment and Material Monitoring

All materials and equipment that is removed from radiologically controlled areas shall be monitored by a RCT before it is removed from the controlled work zone. Direct frisk with a field portable Geiger-Mueller (GM) probe, and swipes for removable contamination, will be used to release materials and equipment from affected project areas. All equipment and materials and will be limited to the surface contamination and release guidelines given in DOE Order 5400.5

Criteria for free release of materials and equipment from the project areas (for unrestricted use) are based primarily on the potential presence of uranium and uranium daughters.

8.3 Action Limits

The action limits, or levels, for activities conducted under each design package will be determined by Industrial Hygiene and/or Radiological Control and will be presented in the PSHSP and on the radiological work permit for each activity.

9.0 DECONTAMINATION

9.1 Equipment and Area Decontamination

Asbestos-contaminated clothing is removed and placed in plastic bags labelled as asbestos-contaminated. Respirators have their cartridges discarded with other labelled asbestos contaminated wastes. The respirator face pieces are bagged with asbestos labels so that the FEMP Laundry can identify them during washing.

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Area/equipment decontamination of radiological, and some chemical contaminants, may be done with a combination of High Efficiency Particulate Air (HEPA) filtered vacuum units and wet-wiping techniques (using non-hazardous detergents or soaps). In most cases for radiological contamination, low to high pressure wash with water is all that is needed to remove surface contamination. All water and rinseates generated from decontamination activities within a project area are collected and treated through the existing water treatment facilities. The use of sealants, fixatives, wrapping, and/or area specific controls is used if immediate decontamination is not feasible or practical.

Equipment for decontamination of radiological and chemical contaminants will be kept available in the immediate work area exclusion zone, or at contamination reduction zone, as appropriate. Decontamination equipment or agents utilized for radioactive surface contamination will be kept near the radiological control point.

If additional decontamination methods are required (for removing radioactive surface contamination), affected items are to be wrapped in plastic (of 2-mil thickness or greater) for transport to the FEMP Decontamination Facility.

9.2 Personnel Decontamination

In case of body contact with an acid or caustic stream, non-permeable (moisture resistant) PPE should be doffed with extreme caution to prevent cross-contamination of the skin when doffing PPE. Contaminated inner clothing shall be removed and the affected body area shall be washed thoroughly (15 minutes, minimum) in a safety shower or eye bubbler. Involved personnel shall report immediately to Medical Services or summon aid (phone 738-6511, fire alarm or radio 202/303 or CONTROL) as needed. Notification shall also be made to the appropriate supervisor as soon as possible.

When performing a personal survey, radioactive contamination detected by an alarming PCM or hand-held instrument ("frisker") shall be reported to a Radiological Control Technician (RCT) immediately. Incidents involving personnel contamination on the skin, "clean" company issued clothing, or personal clothing, shall be reported by the RCT to the Assistant Emergency Duty Officer (AEDO) (Radio 202, Radio F2, as soon as practical) to initiate investigation of source of contamination and to report the levels and contaminated locations on the affected individual. Personnel are limited to 1,000 DPM/100 cm² of total (fixed plus removable) activity on their person when exiting radiological areas controlled for uranium contamination.

FERMCO ES&H procedure SP-P-35-017, Procedure for Personnel Contamination, is to be used in cases when simple decontamination methods (i.e. removing contaminated clothing article, or using mild soap and water for contaminated skin) are not adequate.

When personnel exit a lead regulated area, they shall wash their face and hands prior to breaks/lunch, and shall shower at the end of their shift.

For some asbestos jobs where potential for skin contact is high, a mandatory shower is specified.

9.3 Asbestos Decontamination Requirements

A shower facility will be available for the asbestos abatement work covered by this HASP. All personnel performing asbestos abatement activities and individuals who enter an asbestos regulated area will be required to exit the area through the shower facility.

When personnel exit an asbestos regulated area, they will vacuum their disposable coveralls with a HEPA filtered vacuum cleaner prior to entering the equipment room of the shower facility.

When workers enter the equipment room, they will remove their disposable coveralls, shoe covers, and gloves, and place them in a labeled waste container located in the equipment room. They will remove their safety shoes and hard hat and leave them in a staging area in the equipment room. Any washable clothing that is removed will be placed in a separate labeled container for delivery to the laundry. After all clothing has been removed and the workers are still wearing their respirators, the worker will proceed to the shower.

In the shower they will rinse off the respirator, remove it, and then remove the respirator cartridges which will be disposed of as asbestos waste. Workers will shower before entering the clean change area. Respirators must be dry before being placed into a respirator recycling receptacle. Any towels used by workers will be sent to the laundry in labeled bags/containers.

The shower must be drained through a filtration system with a minimum of 5 micron final filter. If waste water is inadvertently released outside the shower area, it will be cleaned up using a wet vacuums or wet mops to prevent any asbestos in the water from drying and becoming airborne in areas outside the work area. After clean up, the waste water will be processed through the asbestos waste water filtration system, as described above.

10.0 HAZARD ASSESSMENT

Specific hazard assessment and identification for each design package will be presented in the PSHSP and health and safety requirements matrices.

The following sections provide a general overview of potential hazards for the project:

10.1 Industrial Hygiene Issues

10.1.1 Chemical Contaminants

Asbestos

Asbestos can be found in transite siding and pipe insulation. Asbestos is a human carcinogen which mainly affects the respiratory system. Only trained personnel with proper personal protective equipment (PPE), respiratory protection, and an Asbestos Work Permit, will work with asbestos-containing materials.

Carcinogens

A carcinogen is a chemical substance that causes or is suspected of causing cancer. When work with a carcinogen is conducted, the requirements found in SPR 5-12 of ESH-1-1000 will be followed.

Chemical Contaminants

A variety of chemicals used in remediation activities may present a potential hazard to employees. Copies of all chemical MSDSs will be maintained by Industrial Hygiene for review and determination of PPE requirements.

Inorganic Lead

Paints containing lead oxide pigments have been used in many locations at the FEMP. Lead has also been used in its metallic form in some construction applications (e.g. building flashings, plumbing work, transite fasteners, and shielding blocks). Inorganic lead is harmful if ingested, or when dust or vapors containing lead are inhaled.

Uranium

Uranium contamination can be found in many of the buildings and the soil on site. Uranium is a radioactive material and in its soluble form is also toxic. Soluble uranium is absorbed through the skin and affects the kidneys. Non-soluble uranium is an inhalation and radiation hazard. When working in areas where uranium contamination is present, proper PPE, respiratory protection, and a radiological work permit (RWP) will be required.

10.1.2 Physical Hazards

Noise

Operations being performed may present a potential noise hazard. Excessive noise can occur during the operation of drilling equipment, pneumatic tools, generators, and other machinery. The CRU3 Health and Safety Manager will request that the site industrial health department evaluate suspect hazardous noise operations.

Confined Space

A "confined space" is an area not designed for continuous human occupancy, is large enough for a human to bodily enter, and has limited means for entry and exit. All such operations which involve entry and work in a confined space are required to be evaluated by the site industrial hygiene department prior to entry to determine if a Confined Space Entry Permit is required for the work task. See ESH-1-100, SPR 5-13.

As part of the evaluation, all confined spaces will be monitored, as a minimum, for oxygen, carbon monoxide, hydrogen sulfide, and explosive atmosphere. If a hazardous atmosphere or safety hazard exists within the space, the space will be classified as a permit-required confined space and a Confined Space Entry Permit will be required.

Heat Stress

Heat stress threshold limit values (TLVs) refer to conditions under which it is believed that nearly all OU3 RD/RA personnel may be repeatedly exposed without adverse health effects. Possible heat stress causes include hard physical work and work under extra layers of personal protection equipment.

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Heat Stress TLVs are based on the assumption that nearly all acclimated, fully clothed workers with adequate water and salt intake should be able to function effectively under given working conditions without exceeding a deep body temperature of 100.4°F (38°C).

Acclimatization can occur after just a few days of exposure to a hot environment. The National Institute for Occupational Safety and Health (NIOSH) recommends a progressive six-day acclimatization period before allowing personnel to do full work on a hot job. Under this regimen, the first day of work on the site is begun using only 50 percent of the anticipated workload and exposure time, and 10 percent is added to each day through day six. With fit or trained individuals, the acclimatization period may be shortened to two or three days.

Because measurement of deep body temperature is impractical for monitoring the site personnel's heat load, the measurement of environmental factors required must most nearly correlate with deep body temperature and other physiological responses to heat. A Wet Bulb Globe Temperature Index (WBGT) is the simplest and most suitable technique to measure the environmental factors.

The heat stress requirements and guidelines found in SPR 5-5 of ESH-1-1000 will be followed. Furthermore, it is the policy of FEMP personnel to contact Industrial Hygiene to conduct a heat stress evaluation for a given project, whenever the ambient temperature exceeds 80°F.

Cold Stress

The cold stress TLVs are intended to protect workers from the most severe effects of cold stress (hypothermia) and cold injury, and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse effects. The TLV objective is to prevent the deep body temperature from falling below 35°C (95°F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body). In cold weather personnel will wear several light layers of clothing that can be removed or added as the weather changes. Cold weather clothes (coats, sweaters, etc.) will be worn under anti-contamination clothing. Because extremities must be protected in cold weather, gloves and hats are most important. Shoes should be kept dry. As in the case of heat stress, the requirements and guidelines cited in SPR 5-5 of ESH-1-1000 will be followed at all times.

Remediation management will contact Industrial Hygiene for protective measures when the equivalent chill temperature (or "wind chill" temperature) falls below 0°C (32°F). Provisions for additional total body protection for work that is performed in an environment at or below 4°C (39.2°F) will be administered by Industrial Hygiene.

10.2 Radiological Safety Issues

Uranium/thorium and uranium/thorium-bearing materials are stored or have been processed in almost all parts of the former production area, waste storage area and laboratory building. Uranium-bearing materials have been found buried at several locations outside the former production area, and the potential for contamination should be considered before digging into any surface or soils on the FEMP property by arranging for Industrial Hygiene to obtain an excavation/penetration permit.

Worker training, contamination control practices, and personal protective equipment are used to control inhalation and ingestion of radioactive particles. ALARA principles are used to control worker exposure to radiation fields in all radiation areas. At the FEMP, policies and objectives for controlling personnel exposure to ionizing radiation are implemented through the issuance of RWPs.

10.3 Industrial Safety Issues

10.3.1 Electric Power

GFCIs are required on all 15 and 20 ampere, 120 volt circuits at all work sites. The GFCI will be placed at the source of the electrical service to protect both the cord and the devices connected.

All flexible cords (extension cords) will be approved (UL listed) cord sets and rated for hard usage and damp location. Only purchased cord assemblies will be permitted; field made cord sets are not permitted. All cords will run overhead to avoid damage from being on the ground.

All temporary wiring and lighting will conform to the requirements of the latest edition of the National Electric Code (see ESH-1-1000), except Article 305-4(B) which will not apply.

No work will be permitted within 10 feet of any live exposed electrical device, unless approved by the CRU Health and Safety Manager or the personnel involved are qualified for such work.

10.3.2 Fall Protection

A positive means of fall protection is required for any fall of six feet or more. This can be accomplished using appropriate barricades, full body harnesses, lanyards, etc. All work tasks will have 100 percent fall protection. All work requiring fall protection will be performed in accordance with OSHA requirements. See ESH-1-1000 SPR 2-17 for additional information.

10.3.3 Heavy Equipment

The number of people working around heavy equipment will be minimized at all times. All mobile equipment will be supplied with an electronic back-up alarm. All operators will be qualified to operate their machine. Equipment will be inspected at the beginning of each shift by the equipment operator, prior to use, and the inspection results will be recorded on a daily check sheet to ensure that all safety equipment and devices are fully operational. See ESH-1-1000 SPR 2-36, 2-38 and 2-39.

10.3.4 Hidden and Underground Utilities

Project activities involving digging/excavation into the surrounding earth, roof, floors and walls of the facility will require a site permit. Due to serious injury potential from contacting or breaching existing utilities, a site Excavation/Penetration Permit with a complete

mapping/drawing of all utilities and other potential hazards is required prior to start of excavation.

10.3.5 Lifting

Lifting is the most common task associated with lower back pain. Many injuries do not result from a single incident, but develop over a period of time. This type of injury may result from repetitive lifting. Personnel should know their lifting limits, the proper way(s) to lift, and the object to be lifted should be limited by factors such as; the route and distance to be traveled, the amount of time required and the center of gravity necessary to handle the load safely.

A person will not lift more than 50 pounds without assistance from another person or mechanical help.

10.3.6 Lockout and Tagout

Subcontractor personnel working at the FEMP will follow and be fully trained for the FEMP Energy Control Plan. Before commencing work on any energized system or circuit, a lockout/tagout is to be completed in accordance with the FEMP Energy Control Procedures. See EHS-1-1000 SPR 2-24.

10.3.7 Material Handling Equipment

All equipment used for hoisting and rigging operations will be tested, inspected, and tagged with current annual test dates. All operators will be qualified to operate the equipment. Equipment will be inspected at the beginning of each shift by the equipment operator, prior to use, to ensure it is in proper operating condition and all safety equipment is in place and functional. The inspection results will be recorded on a daily check list.

All material handling equipment, mobile personnel lifts (both powered and manual), and specialized hand-operated powered equipment will have the factory operator safety manual for use by the operator. This manual will be either with the equipment at the time of use or will be on file, available for reference when requested. All material handling equipment will only be used as the manufacturer intended and with the loading limits defined by the manufacturer. Safety requirements within the manual will be followed.

All rigging operations will be performed only by qualified persons. The supervisor in charge will evaluate the training of all personnel involved in rigging operations and provide a letter to the FEMP Construction Manager and CRU3 Health and Safety Manager, stating who has been verified to be a competent rigger.

Any critical lift will have an approved lift plan prior to the start of the lift. This plan will be written by the remediation subcontractor and approved by the remedial action project manager and the CRU3 Health and Safety Manager. See the "Hoist and Rigging Manual," DOE/ID-10500-Section 12.0 (see ESH-1-1000), for additional information on the Critical Lift Requirements.

10.3.8 Overhead Hazards

Before any activity is to take place, all overhead obstructions must be identified by the supervisor in charge. Where possible, the activity should be moved away from the obstruction. If the site cannot be moved and the obstruction contains electrical lines, then the overhead lines should be moved, de-energized, or guarded so as to protect against contact.

10.3.9 Power Tools

All power tools will be inspected before use, and personnel will wear proper eye and face protection during operation. Only the proper tools and those of the proper strength will be used for each job. Handle extenders or cheater bars are prohibited.

Tools and machines will be unplugged before making adjustments or attachment changes. Guards or safety devices will not be removed. All fuel powered tools will be shut off before refueling. Air powered tools must have safety clips or retainers on all hose connections. All portable electrically connected power equipment will be protected by GFCIs (ESH 1-1000 SPR 2-23).

10.3.10 Slips, Trips, and Falls

All personnel should always walk where firm footing is assured, taking short steps in slippery places. Carrying anything bulky that will obstruct vision will be avoided. Personnel will be aware of falling, slipping and tripping hazards. Climbing over equipment to get to other items and falling off/down steep slopes can cause serious and sometimes fatal accidents.

All work paths and work areas will be kept clear of slip and trip hazards. If workers must work in or near areas where these hazards exist and the hazard cannot be removed, then proper barricades and signs will be used to route personnel away from the hazards.

10.4 Fire Protection Issues

The potential for fires and explosions may occur during tasks. Explosions and fires can result in intense heat, open flames, smoke inhalation, flying objects and release of toxic chemicals. To protect against explosion and fires, the environment will be monitored for explosive atmospheres and flammable vapors; all potential ignition sources will be kept away from areas where explosive or flammable environments may occur; and work practices that will minimize the agitation or release of chemicals will be used.

Storage, use or transfer of flammable and/or combustible liquids will be in accordance with National Fire Protection Act (NFPA) 30, Flammable and Combustible Code (see ESH-1-1000), or approved by the site fire protection department.

Any task that involves impairment of a sprinkler system or fire alarm system requires an Outage Permit issued by site fire and safety inspectors and signed-off by the fire protection department.

10.5 Natural Occurrence Issues (Weather)

Natural occurrences thought to affect the interim remedial action include, but are not limited to: extreme temperatures, snow, rain, thunderstorms, earthquakes, tornados, etc.

11.0 EMERGENCY/CONTINGENCY PLANS

According to the OU3 Health and Safety Plan, in the event of injuries, site personnel will try to reduce or eliminate the consequences whenever possible. The process of determining what is appropriate requires that each situation be evaluated on a case-by-case basis. All injuries will be reported immediately to the site medical department for treatment/evaluation. The injured employee's supervisor will be notified as soon as possible and must accompany the employee to the site medical department. The CRU3 Health and Safety Manager will be notified as soon as possible. Minor injuries (sprains, strains, and cuts) are to be controlled by on-site medical personnel using standard first-aid practices.

Injuries complicated by chemical contamination will be evaluated after hazards associated with contamination are considered. Injuries of persons contaminated with acutely toxic chemicals will be treated so as to minimize the hazard to both the rescuer and the victim. Refer to Section 11.4.4 for more information on employee contamination by chemical agents. Note: In all cases, if a worker cannot safely attempt rescue, the rescue shall not be attempted.

All injuries within the process area will be assumed to involve radioactive contamination until proven otherwise. The injury is to be given the highest priority and the contamination reduced as soon as practical. See Section 11.4.5 for more information on employee contamination by radiological agents.

The nearest medical facility is the site medical facility and is the primary choice for on-site injuries. The site ambulance will transport the injured employee to the nearest hospital, if necessary. The site maintains an emergency response capability which includes an ambulance and Emergency Medical Technician (EMT) personnel.

11.1 Reporting

Table 11-1 lists the emergency phone, radio, and pager numbers to be used in the event of an on-site emergency.

TABLE 11-1 Emergency Numbers

Name	Phone	Radio	Pager
Ambulance/Hospital/Fire	738-6511	N/A	N/A
Communication Center	738-6511	Control/202	N/A
AEDO	738-6431/6295	Control/202	N/A
Industrial Hygiene	738-6207	357	N/A
Radiation Safety	738-6889	355	N/A
Fire & Safety	738-6235	303	N/A
Medical	738-6217	N/A	N/A
Dosimetry	738-6290	N/A	N/A
CRU3 Health and Safety Manager	738-9216	N/A	554-5034
Manager of Compliance for Occupational Safety and Health	738-8692	N/A	820-1320
Utility Engineer	738-6295	Control/202	N/A
Bioassay	738-6226	N/A	N/A

11.1.1 Site Notification Procedure

Site notification will be consistent with ED-0001 - Event Notification and Reporting (see ESH-1-1000) and DOE Order 5000.3B - Occurrence Reporting and Processing of Operations Information.

11.1.2. What/How to Report

In case of an emergency the FEMP Communication Center shall be notified of the following:

- known chemical and/or radiologic involvement;
- extent of injuries;
- treatment that has been performed (including decontamination);
- number of victims;
- names and badge numbers of the victims;

- location of the accident; and
- telephone number.

Events that must be reported are as follows:

- serious injury;
- injury complicated by contamination;
- chemical / Radiological release;
- chemical splash (Eye & Skin);
- any fire; and
- major property damage.

It is important to remember to stay on the phone until the Communications Officer hangs up. The Communications Officer is trained to be calm and ask for the appropriate information in the order that it appears on the form. Additional information such as cross streets or an escort from the entrance to the site, may be required.

11.2 Evacuation Routes / Plant Wide Accountability

During a Plant Wide Accountability all personnel will either report to their Rally Points or report to their supervisor as per directions from the Emergency Notification System.

11.2.1 Rally Point Accountability

Eight rally points are located around the FEMP for assembly of and communication with personnel during an evacuation. After personnel have assembled, the rally point coordinator, designated by an orange vest, will take a head count. The coordinator will then forward the results of the accountability to the Accountability Center using the rally point telephone.

The building-specific emergency plans give details as to the location of primary and alternate rally points in addition to the evacuation route. Rally points specific to each design package operation will be identified within the PSHSP.

When assembled at a rally point, personnel will report their name, badge number and anything observed that they would consider unusual.

In the event of a building evacuation alarm or direction from the emergency message system, alerted personnel will report to their assigned rally points.

11.2.2 In-Place Accountability

During an in-place accountability, all employees will report to their immediate supervisor in person or by radio or phone. These supervisors will then communicate the names and badge numbers through departmental channels ultimately to the Accountability Center.

11.3 Available Emergency Equipment

11.3.1 Site-Wide Equipment

Fire and rescue equipment at the FEMP includes several vehicles with forcible entry tools, communication equipment, electric lights and generators, portable pumps, and protective equipment.

11.3.2 Plant Equipment

Fire protection and extinguishing equipment at the FEMP includes building sprinkler systems (both wet-pipe and dry-pipe), fire and smoke alarm systems, hand-held fire extinguishers, and fire hydrants.

The plant also has the following safety/emergency systems:

- Radiation Detection Alarm (RDA) - an oscillating train airhorn sounded in the case of a nuclear criticality accident;
- Evacuation System - a siren sounding alarm;
- Plant Alarm System - short tones distinguished by repeated signals (i.e., 2-2 for emergency events; 3-3 for supervisory alerts; and 4-1 for carbon monoxide alerts); and
- Manual Fire Alarm System - silent alarm.

Upon activation of any one of these systems, personnel are to respond according to instructions provided by their supervisor.

11.4 Emergency Response

11.4.1 Confined Spaces

At no time will any personnel enter an unknown atmosphere in a confined space without proper respiratory equipment, even to rescue a person who has collapsed. Co-workers may perform non-entry rescues (removing victim by means of a safety line, etc.) if such rescues can be performed without endangering the rescuers or further endangering the victim. Co-workers should be familiar with SPR-5-13, Rescue Requirements for Confined Spaces (see ESH-1-1000).

11.4.2 Medical Emergencies

The site medical facility maintains an emergency life squad crew and ambulance for all shifts, seven days a week. Immediately notify the Communication Center by phone at 738-6511 or radio (call CONTROL) to contact them of any serious injury. The RD/RA personnel may (if trained) use standard first aid procedures to stabilize the injury pending arrival of response personnel. The Communication Center should be immediately notified by phone, or radio, in case of any serious injury.

11.4.3 Fire Emergencies

Resources such as water, a fire extinguisher, and soil may be used to contain or extinguish small fires.

11.4.4 Chemical Emergencies

Release

If a release in the form of a spill, leak or vapor cloud is observed, personnel should immediately move at least 300 feet upwind and immediately notify authorities. Radio to CONTROL or call 738-6511. CONTROL will dispatch the necessary personnel to handle the situation.

Employee Contamination

In case of employee contamination, the victim should be moved into an uncontaminated area and perform a preliminary decontamination. A more thorough decontamination can be performed later. Radio to CONTROL or call 738-6511 for assistance. Preliminary decontamination generally consists of flushing with water to dilute and remove most of the chemical or contamination using such devices as a safety shower. Contaminated clothing should be removed and the affected skin areas flushed for 15-30 minutes. The employee should then report immediately to the site medical department. Minimize the spread of contaminant run off by use of dikes and other engineered controls. As soon as the chemical hazard has been reduced to an acceptable level, the victim should be stabilized.

In the event of chemical contamination to the eyes, the victim should be moved to an uncontaminated area if possible. The victim's eyes should be held open and flushed for fifteen minutes with water (or isotonic saline solution). Flushing solution should be maintained near body temperature because it can cause extreme discomfort if it is too hot or too cold.

11.4.5 Radiologic Emergencies

Release

If any release is suspected to contain radiological components, personnel should immediately leave the area and travel at least 300 feet upwind. From there, they should radio to CONTROL or call 738-6511 and report the event according to ED-0001, Event Notification and Reporting (see ESH-1-1000).

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Employee Contamination

Follow the guidelines under Section 9.1 (Site Decontamination Requirements) and 11.4.4 (Employee Contamination-Chemical).

11.4.6 Weather Limitations / Adverse Conditions

Weather guidelines and warnings will be followed as given by the Emergency Message System. In the event of severe weather, supervision will contact the Health and Safety representatives of the FEMP Industrial Safety Department in order to obtain direction on appropriate response(s) to the situations and/or to obtain any special operating requirements during severe weather.

11.4.7 Occurrence Investigation

Accidents will be investigated according to Event Notification and Reporting, ED-0001, in ESH-1-1000.

12.0 CHANGES/AMENDMENTS TO HEALTH AND SAFETY PLAN

This Health and Safety Plan is based on information available at the time of preparation. Remedial design/remedial action-specific information will be routinely reassessed by supervision and the CRU3 Health and Safety Manager. In addition, unexpected conditions/events may arise which require reassessment of the health and safety issues. Upgrading or downgrading of precautions, personal protective equipment, etc. identified in this plan must be approved by the CRU3 Health and Safety Manager, or designee, and can be implemented without an amendment.

Unplanned activities and/or changes in work scope will require a review and may require an amendment to this Health and Safety Plan. All amendments must be approved by the CRU3 Health and Safety Manager.

The PSHSP and health and safety requirements matrices developed for each project under the OU3 interim remedial action can be changed in response to changing worksite conditions by the Environmental Safety and Health divisions which are responsible for the change with the written approval of the CRU3 Health and Safety Manager. The divisions are Radiological Control, Fire and Safety, Industrial Hygiene and Industrial Safety.

**PROJECT-SPECIFIC HEALTH & SAFETY PLAN
(TABLE OF CONTENTS)
FOR THE DECONTAMINATION AND DISMANTLEMENT
FOR THE PLANT 4 COMPLEX**

JUNE 1994

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ATTACHMENT B

**HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: DECONTAMINATION AND DISMANTLEMENT OF THE PLANT 4 COMPLEX**

The requirements listed in Section 1.0 of this matrix apply to all activities addressed in this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
1.0 Pre-mobilization minimum requirements to access work site.	Uranium contamination. General construction/demolition hazards. Not all hazards are specified on this summary.	Thermoluminescent Dosimeter (TLD)	FERMCO issued clothing, steel-toed safety shoes. Personal clothing is permitted, but only for inspections and observations in Controlled Areas. Subcontractor supplies hard hat, safety glasses w/rigid side shields. Entry into contamination areas require a minimum smock, shoe covers, and gloves.	<ul style="list-style-type: none"> Construction Rules/Regulations Site GET Training Site Worker Training Rad Worker II Training 24 Hr. Supervised Field Experience 8 Hr. Supervisor's Training for supervisory personnel Orientation on the PSHSP Orientation on Project H&S Requirements Matrix. Orientation on Project Specific MSDSs. Site NVO-325 Training required for supervisor required to load waste boxes 	FERMCO must have proof of physical examination signed by a physician. Initial, annual, termination and as required by FERMCO ES&H in-vivo exam (whole body count). Initial every 90 days incident termination and special in-vivo per RWP initial visit.	Provide warning signs and safety fencing to establish construction area. One access control point for personnel entering such work area.	FERMCO Work Permit Radiation Work Permit RWP	Personnel and material monitoring required to exit Contamination Area and Controlled Areas. FERMCO supplied bags and containers for disposition of contaminated smocks, shoe covers, anti-Cs. Dispose of all contaminated waste per subcontract section 6 of SOW.
1.0 Pre-mobilization minimum requirements to access work site.			Upgrade of PPE requirements to full anti-Cs will be necessary for hands-on work within Contamination Areas. Tyvek, MarMac paper or launderable anti-Cs required for dry working Contamination Areas. Water resistant anti-Cs required for wet work conditions in contamination areas.					

The requirements of this document are based upon current conditions and/or operations in areas near the planned construction zone. This document is to be used as an aid in conjunction with the Project Specific Health and Safety Plan and assist the contractor in understanding the requirements of the project. The PSHSP will provide more detail for certain aspects of this document. This document does not relieve the contractor of planning for or providing a safe work site. This document does not relieve the contractor from recognizing and complying with other appropriate state, federal and FEMP regulations.

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REFERENCES

U.S. Department of Energy, 1992, *Radiological Control Manual*, prepared by Fernald Environmental Restoration Management Corporation, Cincinnati, Ohio.

U.S. Department of Energy, 1993, *Occurrence Reporting and Processing of Operations Information*, DOE Order 5000.3B, Office of Nuclear Energy, Washington, D.C.

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**OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
OPERATIONS AND MAINTENANCE PLAN**

**OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
OPERATIONS AND MAINTENANCE PLAN
FINAL
MARCH 1995**

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NOTATION

Abbreviations, Acronyms, and Initials

DOE	United States Department of Energy
FEMP	Fernald Environmental Management Project
IROD	Operable Unit 3 Record of Decision for Interim Remedial Action
NEPA	National Environmental Policy Act
OU3 O&M	Operable Unit 3 operations and maintenance
QA	Quality Assurance
RDRA ROD	Remedial Design/Remedial Action Record of Decision
SOP	Standard Operating Procedure
SP	Storage Procedure
SSOP	Site Standard Operating Procedure

GLOSSARY

Bid package -

Documents which includes the technical Statement of Work, legal, commercial, safety, environmental, and quality requirements of the work to provide guidance to potential bidders.

Component -

The smallest physically distinct unit of OU3 that is considered separately in the development of the OU3 interim remedial action, and implementation of this Work Plan including, but not limited to, buildings, pads, roads, piping/utilities, and ponds/basins.

Hold-up material -

Includes all material (both liquid and solid) within any process equipment or reservoir. Essentially hold-up includes bulk material other than residuals which are clinging to the walls of the various pumps, piping, vessels, or other components.

Interim Remedial Action -

Course of action that may be pursued in the short-term, before a final Record of Decision, in order to quickly reduce existing risks at a Superfund site.

Interim storage facility -

On-site area for temporary storage of material or debris generated during the OU3 interim remedial action.

Interval period -

The period between the issuance of the OU3 Record of Decision for Interim Remedial Action and the execution of the OU3 final remedial action Record of Decision.

Lay-down area -

A cleared area located near a jobsite that is used to place materials from dismantlement operations for immediate further handling.

Material -

Solids and liquids generated from decontamination and dismantlement operations; includes non-recoverable/non-recyclable material (waste) and recoverable/recyclable material.

Operable Unit -

A discrete action that comprises an incremental step toward comprehensively addressing site problems. The five FEMP operable units, as defined by the Amended Consent Agreement (ACA), have been specified based on specific site problems. Each of the units are summarized as follows: OU1 - waste pits; OU2 - ash pile, sanitary landfill, and lime sludge ponds; OU3 - all buildings and associated facilities (roads, railroads, drummed waste, inventory, fences, telephone poles, electrical and sewage lines, etc.); OU4 - four large storage silos and associated facilities; OU5 - contaminated environmental media. Refer to section 2.1 for a more detailed description of each operable unit.

GLOSSARY

Project -

A specific decontamination and dismantlement remedial design and remedial action effort; beginning with pre-design scoping activities and ending with the submittal of a remedial action report to the regulatory agencies.

Remedial action -

An action that is consistent with the final remedy following a formal examination of the nature and extent of the release, or threat of release, assessment of the risk, and selections of the final remedy based on an evaluation of possible alternatives.

Remedial design -

The technical analysis and procedures which follow the selection of a site remedy resulting in a set of plans and specifications for implementation of the remedial action.

Remediation subcontractor -

The group, or groups, subcontracted to FERMCO that will be responsible for implementation of the remedial action.

Removal action -

Any action necessary to abate an immediate threat to human health and the environment, including actions necessary to monitor, assess, or evaluate the threat.

Safe Shutdown -

Program designated as Removal No. 12 at the FEMP which provides planning, engineering, and program control for the proper disposition of all uranium product and in-process residue materials, excess supplies, chemicals, and associated process equipment. The program also is intended to ensure the proper characterization, emptying, and isolation of utilities for the majority of existing previously-operated, production-related equipment.

Secondary waste -

Waste generated as a result of occupying a jobsite, conducting D&D activities, utilizing PPE, and demobilization activities.

Staging area -

A temporary holding area established within the construction boundary by the remediation subcontractor for the transfer of containers and containerized material.

Surface decontamination -

The reduction of existing surface contamination levels, thereby reducing direct exposure potential, as well as reducing available sources for air-borne or water-borne contamination.

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1.0 INTRODUCTION AND OVERVIEW

This Operations and Maintenance (O&M) plan outlines the O&M-related activities that will be needed to support the decontamination and dismantlement operations as identified in the *Operable Unit*¹ 3 (OU3) Remedial Design/Remedial Action (RD/RA) Work Plan for the Interim Remedial Action. This plan does not provide a list of specific O&M activities that will be performed, rather it identifies site procedures that apply to the various phases of remediation described in Section 3.3 of the work plan. O&M activities addressed by this plan include various activities that will be performed by on-site personnel in support of the primary remedial tasks of the OU3 *interim remedial action*. These primary tasks include facility preparation, *surface decontamination*, *material* dismantlement/segregation, material staging, handling and storage of recoverable and non-recoverable debris, and other material storage and disposition activities.

2.0 DELINEATION OF RESPONSIBILITIES

As discussed in the OU3 RD/RA work plan, the bulk of the decontamination and dismantlement activities will be implemented by *remediation subcontractors* through the performance requirements contained within *bid packages*. The remediation subcontractors will be responsible for O&M activities which are required to perform those activities, including remediation jobsite preparation, maintenance of the jobsite and equipment, surface decontamination, initial material size reduction, and initial debris segregation and packaging. Fernald Environmental Management Project (FEMP) personnel will be responsible for overseeing these activities and assuring that the subcontractors comply with all site policies, procedures, state and federal regulations that are required by the remediation contract. During remediation, FEMP personnel will be responsible for any secondary size reduction, additional containerization of debris, transportation of containerized material, placement of material into the *interim storage facility/area*, and management of the interim storage facility/area. FEMP personnel will also be responsible for the management of *secondary waste* generated during decontamination and dismantlement activities (e.g., treatment and disposal of decontamination wastewaters) after such waste is removed from the jobsite.

3.0 FACILITY PREPARATIONS

As noted in Section 3.3 of the OU3 RD/RA work plan, the remediation strategy is to have site personnel complete preparatory actions under Removal No. 9 and Removal No.12, Removal of Waste Inventories and *Safe Shutdown*, respectively, before implementation of decontamination and dismantlement activities. These preparatory actions are addressed in the following site procedures (as referenced in current site procedure manuals).

- isolation of electrical/mechanical/civil utilities throughout all *components* associated with a bid package, Site-wide Standard Operating Procedure (SSOP)-0719;
- general clearing/cleaning of exterior work areas around building and removal of materials required for the transfer of stored inventories, Standard Operating Procedure (SOP) 46-C-203, and SSOP-0053;
- removal of existing inventories from all components, SOP 20-C-100, and SOP 20-C-017;

¹ Words that have been italicized are defined in the glossary.

- removal of miscellaneous stored materials, SSOP-0039;
- inspection of equipment and process lines for *hold-up material*, SOP 20-C-612;
- removal of hold-up material from equipment and process lines, SOP-20-C-014; and
- removal of specific equipment as required, SSOP-1044, SSOP-0034, and Storage Procedure (SP)-P-35-010.

To support these *removal actions*, separate maintenance crews under the Safe Shutdown program have been tasked with independent responsibilities to achieve completion of the above-listed items for a component scheduled for remediation before remediation begins.

4.0 SURFACE DECONTAMINATION AND DISMANTLEMENT MONITORING

During surface decontamination and dismantlement operations, the remediation subcontractor(s) will be responsible for O&M activities such as jobsite preparation, contamination control (e.g., decontamination of construction equipment and vehicles leaving the project area), and transportation of material to a *lay-down area*. The requirement to perform these activities will be specified by the contract for remediation. Under the Quality Assurance (QA) Audit Program (SSOP-0049) and QA Stop Work Authority (SSOP-1019), the FEMP Construction Division will have the responsibility for overseeing that the above-listed O&M tasks are performed adequately. For example, the remediation subcontractor must stage a work zone with control points to minimize contamination of personnel and equipment, while FEMP personnel perform monitoring to assure that site health and safety and contamination control requirements are being met.

5.0 MATERIAL HANDLING ACTIVITIES

To support material handling during the OU3 interim remedial action, FEMP personnel will be involved in a variety of material handling activities. FEMP personnel will deliver empty containers, and container preparation materials (as specified in SSOP-0078 and SSOP-0079) to a designated container *staging area*. After containers are filled by the remediation subcontractor and returned to the staging area, FEMP personnel will pick up the containers and transport them to a predetermined interim storage or secondary staging area. To support media storage and disposition of materials during the interval period, segregation activities may be conducted by FEMP personnel once the debris has been transported from the jobsite to the interim storage/staging area if additional segregation is necessary. The goal of debris segregation is to separate materials according to predetermined contaminant and media types (described in Section 3.4 and Appendix A of the OU3 RD/RA work plan). Segregation according to the material classifications listed in Appendix A of the OU3 RD/RA work plan will be accomplished primarily by following the procedures required by SSOP-0044 which incorporates by reference procedures for characterization (SSOP-0022) and containerization (SSOP-0002). Prior to containerizing material, to the extent practical, size reduction of materials will be performed to maximize storage/shipment efficiency. Secondary size reduction will be completed by FEMP personnel if necessary, according to site procedures SSOP-0075, SSOP-0078, and SSOP-0079.

O&M activities that will likely be provided to support the segregation of recoverable and non-recoverable material are listed below:

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- establish sufficient lay-down areas for material to be segregated;
- dedicate personnel and equipment to segregation activities;
- preventative maintenance for segregation equipment;
- maintain a program for tool and equipment control and storage; and
- support engineering design and analysis for repair of real property.

Following the segregation of material, containers will be marked specific to a lot and color coded per site procedure RM-0005, "Lot Marking and Color Coding System". This system is used to maintain control and accountability of all materials stored at the FEMP and will be the primary system for tracking material from dismantlement through interim storage and/or final disposition during the interval period. Once material is containerized, marked, and coded, it will be transferred to an available interim storage facility or staging area to await disposition.

6.0 INTERIM STORAGE

Equipment and facilities/areas used for interim storage will be managed and operated by FEMP personnel in accordance with the FEMP Preventative Maintenance Program. As noted in Section 3.4 and Appendix A of the work plan, segregation of materials will be done according to the Material Segregation and Packaging Criteria established during the design of each decontamination and dismantlement *project*. Typical operation and maintenance of a storage facility/area include, but are not limited to, the following activities: container movement; container inspection; facility inspection; grounds keeping; preventative and corrective maintenance of equipment and storage facilities; and material tracking in accordance with established site procedures which address those activities. Existing site procedures (SP-20-C-620, SP-20-C-630, SSOP-0035, and SSOP-0023) apply to daily operation of the interim storage facility/area.

Also incorporated into the operations and maintenance of the interim storage area is the existing FEMP Maintenance Operating System. The Maintenance Operations System is used as a vehicle for issuing, tracking, and collecting information from preventative and corrective maintenance work and for controlling material inventory. FEMP Operations Management personnel will generate maintenance work orders resulting from daily inspections and general use of the facility and equipment.

7.0 DISPOSITION

The disposition of material that is not disposed of off-site during the interval period (i.e. before the implementation of the OU3 final remedial action Record of Decision (ROD)), will depend on applicable requirements provided by the OU3 final remedial action ROD; however, until that time, disposition options for material generated during the interval period include those allowed under the OU3 Record of Decision for the Interim Remedial Action (IROD): off-site disposal by an accepting National Environmental Policy Act (NEPA)-approved facility, recycle/reuse by an accepting facility, or temporary storage in designated interim storage facilities/area(s) located on-site.

For materials remaining on-site following implementation of the OU3 final remedial action ROD, treatment (if appropriate) and disposition will occur according to that document. During the interval period, material determined to be non-recoverable (not economically feasible to

recycle/reuse) may be taken to either an interim storage facility/area or an accepting and NEPA-approved commercial disposal facility. Off-site disposal will be the primary disposition for non-recoverable (low-level) radiologically contaminated debris during the interval period. Materials will be packaged and shipped according to the existing FEMP procedures established under Removal No. 9. FEMP personnel will manage all off-site shipments of material generated during the OU3 interim remedial action to ensure compliance with all state and federal regulations.

8.0 OTHER O&M ACTIVITIES

Preventative maintenance work will be performed consistent with the remedial strategies developed to implement the OU3 interim remedial action. In order for certain OU3 facilities to be used as remediation support facilities (e.g., wastewater treatment facilities, existing structures used for interim storage, etc.), operation and maintenance functions of the site will continue on a daily basis as needed to support the OU3 interim remedial action. Listed below are some of the O&M activities which will be continued during the interim action:

- preventative and corrective maintenance of active equipment;
- safe shutdown activities related to disconnection of utility lines on equipment;
- maintenance and operation of the power plant, potable water treatment, and waste water treatment;
- groundskeeping tasks (mowing, snow and ice removal, etc.);
- preventative and corrective maintenance of safety equipment; and
- maintenance and operation of site vehicles (including emergency vehicles).

Other O&M activities will follow the "Graded Approach" which reviews the depth of detail required and the availability of resources to support the remediation of OU3. Safety of personnel, compliance with site procedures, state and federal regulations, site safety requirements, security, and other applicable requirements will be considered in this approach. The Graded Approach supports United States Department of Energy (DOE) Order 5480.19 - Conduct of Operations Requirements (DOE 1992a), and DOE Order 4330.4A - Maintenance Management Program (DOE 1992b).

REFERENCES

U.S. Department of Energy, 1992a, *Conduct of Operations Requirements*, DOE Order 5480.19, Office of Nuclear Energy for DOE Facilities, Washington, D.C., May 18.

U.S. Department of Energy, 1992b, *Maintenance Management Program*, DOE Order 4330.4A, Office of Administration and Human Resources, Washington, D.C., May 18.

**OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
CONSTRUCTION QUALITY ASSURANCE PLAN**

CONSTRUCTION QUALITY ASSURANCE PLAN

MARCH 1995 - FINAL

U.S. DEPARTMENT OF ENERGY

FERNALD FIELD OFFICE

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERNALD, OHIO

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OPERABLE UNIT 3
INTERIM REMEDIAL ACTION
CONSTRUCTION QUALITY ASSURANCE PLAN
FINAL
MARCH 1995

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NOTATION

Abbreviations, Acronyms, and Initials

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CQAP	Construction Quality Assurance Plan
CRU(s)	CERCLA/RCRA Unit(s)
CRU1	CERCLA/RCRA Unit 1
CRU2	CERCLA/RCRA Unit 2
CRU3	CERCLA/RCRA Unit 3
CRU4	CERCLA/RCRA Unit 4
CRU5	CERCLA/RCRA Unit 5
DOE	United States Department of Energy
FEMP	Fernald Environmental Management Project
NVO	Nevada Operations
OSHA	Occupational Safety and Health Administration
OU(s)	operable unit(s)
OU3	Operable Unit 3
QA	Quality Assurance
QAPD	Quality Assurance Program Description
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
VP	Vice President

GLOSSARY

Administrative controls -

Ensure protection against hazards by management, procedures, record keeping, and assessment; these controls do not stop individuals or remove hazards.

Interim remedial action -

Course of action that may be pursued in the short-term, before a final Record of Decision, in order to quickly reduce existing risks at a Superfund site.

Operable Unit -

A discrete action that comprises an incremental step toward comprehensively addressing site problems. The five FEMP operable units, as defined by the Amended Consent Agreement (ACA), have been specified based on specific site problems. Each of the units are summarized as follows: OU1 - waste pits; OU2 - ash pile, sanitary landfill, and lime sludge ponds; OU3 - all buildings and associated facilities (roads, railroads, drummed waste, inventory, fences, telephone poles, electrical and sewage lines, etc.); OU4 - four large storage silos and associated facilities; OU5 -contaminated environmental media. Refer to section 2.1 for a more detailed description of each operable unit.

Project -

A specific decontamination and dismantlement remedial design and remedial action effort; beginning with pre-design scoping activities and ending with the submittal of a remedial action report to the regulatory agencies.

Remedial design -

The technical analysis and procedures which follow the selection of a site remedy resulting in a detailed set of plans and specifications for implementation of the remedial action.

Remediation subcontractor -

The group, or groups, subcontracted to the FEMP environmental restoration management contractor that will be responsible for implementation of the remedial action.

1.0 INTRODUCTION AND SCOPE

The United States Department of Energy (DOE) is committed to the safe and least cost cleanup of the Fernald Environmental Management Project (FEMP) in compliance with all regulations, DOE Orders, and agreements. An integral part of successfully pursuing this mission is to ensure that the required levels of quality in all site activities is achieved. The success of the FEMP depends on the required level of quality being achieved by every functional area.

This Construction Quality Assurance Plan (CQAP) has been prepared to describe the policies and practices by which quality levels for remediation activities for *Operable Unit*¹ 3 (OU3) will be achieved or exceeded. The policies and practices described in this CQAP incorporate the requirements outlined in DOE Order 5700.6C (DOE 1991) and the FERMCO Quality Assurance Program Description (QAPD), RM-0012, Revision 2, dated 1993. This CQAP also describes the functional responsibilities and authorities at the FEMP to perform remediation activities for OU3 as well as the program elements and actions.

The policies and practices described in this CQAP apply to all remediation and remediation related activities for OU3. However, this document has been prepared as a standard, comprehensive CQAP that will be applied to all FEMP Operable Units (OUs).

The *project-specific* Quality Assurance/Quality Control (QA/QC) requirements will be contained in the project-specific work plan (also referred to as the *remediation subcontractor's* work plan). Remediation subcontractors will be required to prepare and submit a project-specific QA/QC plan to the FEMP Construction Division (Construction) in accordance with the requirements in the project work plan and other subcontract documents. Construction will distribute it to appropriate reviewers, such as DOE, FEMP QA Division, *remedial design* subcontractor, etc., for review and approval. The subcontractor will incorporate comments, as needed, and submit the final plan for approval.

The following sections very briefly outline the ten criteria from the QAPD, and indicate how they were incorporated into the Construction Departmental Procedures Manual. The remediation subcontractors QA/QC plans will also address these ten criteria and how they will incorporate them into their work activities.

2.0 CONSTRUCTION QA PROGRAM ORGANIZATION AND RESPONSIBILITIES

2.1 Purpose and Scope

This section describes the organizational structure, functional responsibilities, levels of authority, and divisional interfaces for managing, performing, and assessing the adequacy of remediation work performed during the OU3 *interim remedial action*.

Also described in this section are the functional responsibilities, levels of authority, and divisional interfaces outlined that apply to all remediation and remediation related activities, including subcontracted services, for OU3.

¹ Words that have been italicized are defined in the glossary.

2.2 Responsibilities

2.2.1 Construction Division

The Vice President (VP) of Construction, reporting to the Executive VP of CERCLA/RCRA Unit (CRU) Projects, has overall responsibility and authority for directing and managing all remediation activities at the FEMP. The Vice President of Construction is responsible for ensuring that the QAPD, RM0012 (latest revision) is implemented and used throughout all remediation activities, including remediation subcontractor activities, and directly supervising the Manager of Decontamination and Demolition Field Activities, the Field Support Construction Manager, the Construction Engineering Manager, and the CRU Construction managers. The VP of construction is the principal interface on remediation related matters with the CRU Directors; VPs of Engineering, Remediation Support Operations, Environmental Health and Safety; the Director of QA; and the heads of other FEMP Divisions that would have cause to interface with Construction. This person also has primary responsibility and authority for assessing the adequacy of Construction management and performance, including subcontractor performance, for CRU3. The authority for directing and managing Construction activities at the FEMP may be delegated to department or section managers; however, the responsibility for the activity remains with the VP Construction Division.

2.2.2 CERCLA/RCRA Units

The CRU Director, reporting to the Executive Vice President of CRU Projects, has overall responsibility and authority for directing and managing the CRU. There are currently five CRUs (CRU1, CRU2, CRU3, CRU4 and CRU5) which make up the management organizations for the respective operable units. Each CRU is staffed by personnel from within three associated CRUs, with personnel matrixed from various administrative departments, and the CRU is structured to include functional groups including Engineering, Health & Safety, Construction, QA, Remediation Support, Procurement, Environmental and various administrative groups, as necessary.

2.2.3 Engineering Division

The VP of Engineering, reporting to the Executive VP of CRU Projects, has overall responsibility and authority for directing and managing environmental remedial design activities performed for the FEMP. The VP of the Engineering Division (Engineering) is responsible for making sure that the QAPD, RM0012 (latest revision) is incorporated into the design documents and that the remediation subcontractor's QA/QC plan requirements are also contained within the documents. This position also has responsibility for treatability development and demonstration, special investigations and reports, engineering discipline capability, computer assisted design drafting and drawing control, engineering support during peak demands, operational readiness and start-up, engineering oversight, and the matrixing of support engineers to CRU3. Additionally, an active interface will be established between Engineering, Construction, QA, and CRU3.

2.2.4 Contracts and Acquisitions

The VP of Contracts and Acquisitions, reporting to the Executive VP of Contracts and Acquisitions, has overall responsibility and authority for directing and managing the procurement of materials, items, and services at the FEMP. This position also has the

responsibility for coordinating all procurement activities for OU3. An active interface shall be established between Acquisitions & Finance, Construction, QA, and the CRUs.

2.2.5 Quality Assurance

The Director of Quality Assurance, reporting to the President, has overall responsibility and authority for reviewing and concurring with this CQAP and for independently assessing the adequacy of CQAP implementation and the FEMP QAPD by all FEMP divisions and subcontractors, performing work for CRU3. An active interface will be established between QA and all FEMP Divisions performing activities for CRU3.

2.3 Program

In accordance with the QAPD and other applicable guidance documents, Construction has developed a Construction Departmental Procedures Manual that addresses the following:

- the organizational structure, functional responsibilities, levels of authority, and interfaces for Construction personnel whose responsibility it is to perform, manage, and assess the adequacy of work performed for CRU3;
- the organizational elements and interfaces for reviewing, approving, and controlling subcontractor QA programs; and
- the organizational elements and interfaces for assessing the adequacy of QA Program implementation by labor hour contract personnel.

Department and Section Managers within the Construction shall:

- ensure the implementation of the FEMP QA Program and the Construction Division procedures;
- ensure the achievement of quality in the projects, services, and work activities that they perform, direct, or manage;
- evaluate the structures, systems, components, items, and processes which they perform, direct, or manage relative to their importance to safety, reliability, and other quality considerations;
- prepare, implement, and maintain division procedures to assure compliance with this CQAP and the FEMP QAPD; and
- provide their personnel with the necessary orientation and training to ensure compliance with existing, new, and revised procedures.

3.0 PERSONNEL TRAINING AND QUALIFICATION

3.1 Purpose and Scope

This section describes the requirements for Construction personnel to be trained and qualified to ensure they are capable of performing their assigned work and for providing continuing training to ensure job proficiency is maintained.

3.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses personnel training and qualifications:

- Construction and matrixed personnel shall receive all required Resource Conservation and Recovery Act (RCRA) and Occupational Safety and Health Administration (OSHA)-required site training;
- personnel shall be capable of performing their assigned tasks and qualification requirements shall be established for specific job categories at all levels;
- training shall provide the workers with an understanding of the processes and tools required for the jobs and the sources of variability in the processes and tools;
- training shall emphasize the employees' ownership of the FEMP Quality Program; the idea of "no fault" identification of problems, and Continuous Process Improvement;
- personnel performing work requiring special skills or processes, or legally required training or certification shall be identified; and
- training requirements and the implementing program shall be periodically reviewed to determine applicability and effectiveness, and upgraded as required.

4.0 QUALITY IMPROVEMENT

4.1 Purpose and Scope

This section describes the requirements and responsibilities for Construction in establishing and implementing processes to detect, control, correct, and prevent quality problems, and to promote quality improvement.

4.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses quality improvements as follows:

- the focus of quality improvement is to improve the quality of items and processes performed at the FEMP;
- items, activities, and processes that do not meet specified requirements will be identified, controlled, and corrected to prevent their inadvertent installation, test, or use;
- control of identified deviations will include identification, documentation, evaluation, segregation (where practical), and notification to affected organizations;
- evaluation of identified deviations will be reviewed by qualified personnel and the justification for the disposition shall be documented;
- disposition/corrective action for identified deviations shall include determination and identification of the root causes and the actions to be taken to preclude a recurrence;
- reliability, process implementation, and work performance will be reviewed and analyzed to identify opportunities for improvement;
- reworked and replacement items, or alternate processes shall be inspected and tested in accordance with specified alternatives to the original requirements; and
- responsibilities and authorities are defined.

5.0 RECORDS AND DOCUMENTATION

5.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing a system to control the preparation, review, distribution, use and revision of remediation related documentation. It also describes the requirements and responsibilities of Construction for the handling, collection, storage, and retrieval of quality records generated by and for Construction.

5.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses records and documentation as follows:

- Construction Division documents that establish policy, prescribe work or work practices, specify requirements or establish/revise design are prepared, reviewed, approved, issued, used and revised in a controlled manner;
- the scope of the document control system will be defined;

- controlled documents are distributed to prescribed locations and made available for use by the personnel performing work. Timeliness guidelines will be established for the distribution of new or revised controlled documents;
- superseded or canceled documents are removed from the workplace, and record copies are clearly denoted as "superseded" or "cancelled";
- Construction Division records are specified, prepared, reviewed, approved, and maintained to accurately reflect completed work;
- Construction Division procedures include records maintenance provisions for retention, protection, preservation, traceability, accountability, and retrievability;
- QA records will not be erased or obliterated when revised, rather a single line shall be drawn through the error or item to be deleted and the new information entered above or bubbled in the margin. The individual making the revision will initial and date the revision. Revisions require the same review as the original; and
- if records require special processing and control, such as computer codes or data on high density media or optical disks, the hardware or software required to access or maintain the records shall be controlled to prevent inadvertent use, and to ensure the records are useable and retrievable.

6.0 WORK PROCEDURES

6.1 Purpose and Scope

This section describes the requirements and responsibilities for Construction for establishing and implementing a system to prepare, distribute, and implement procedures to control work performed by Construction and supporting FEMP Divisions.

6.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses work procedures as follows:

- the identification, control, and maintenance of items and materials used for remediation activities that require special handling, shipping, or storage requirements, or have a limited shelf life;
- the identification and control of items and materials to ensure appropriate traceability and proper use;

- the handling, storage, cleaning, preservation, and shipping of items to prevent damage, loss, or deterioration. This will include appropriate labeling and marking;
- establishing controls to ensure that low-level radioactive waste intended for shipment to the DOE Nevada Test Site disposal facility is packaged and documented in accordance with the requirements of NVO-325, Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (DOE 1992);
- the control, calibration, and maintenance of measuring and test equipment used to verify construction work activities. This will include provisions to assure that measuring and test equipment is suitable for its intended use;
- the maintenance of calibration and maintenance records, and the traceability of methods or standards be traceable to national standards where appropriate. Calibration tolerances will be specified; and
- the tagging of overdue equipment or instruments to prevent their inadvertent use, and the evaluation of requirements for items found out of calibration tolerances.

7.0 DESIGN CHANGE CONTROL

7.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing a system to assure that changes to FEMP design documents arising from remediation or remediation related activities are reviewed and approved by technically qualified personnel familiar with the design prior to the work being performed.

7.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses design change control as follows:

- design documents assigned to Construction or subcontractors will be maintained current, and superseded or revised documents removed;
- design documents will be reviewed for constructability by qualified Construction personnel or subcontractors, including verification of existing field conditions when practicable. Existing or potential discrepancies will be identified and documented;
- identified discrepancies between approved design documents and field conditions will be documented when they preclude the performance of remediation work in conformance with the design documents. These documented discrepancies will then be evaluated by technically qualified

personnel and if changes to the design are required, the changes will be reviewed and approved by technically qualified personnel familiar with the original design;

- work will not proceed on an item or process when a design discrepancy is identified, until a documented resolution to the discrepancy is made; and
- reviewed and approved design changes will be reflected on the Design Change Request, and made available to Construction, and sub-contractors, until such time as the original design document can be revised.

8.0 PROCUREMENT

8.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing a system to assure that procured materials, items, and services meet established requirements and perform as expected.

8.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses procurement as follows:

- Construction Division requisitioners will adequately identify the materials, items, or services required including the performance requirements, acceptance criteria, and tolerances;
- Procurement Requisition packages will include any necessary design documents, performance specifications, or drawings;
- the Requisitioner will identify the appropriate Quality Level for the procurement, and the criteria by which acceptance of the item, material or service can be made;
- prospective suppliers be evaluated as required by the Quality Level and the design specification to ensure that they qualified to accomplish contractual requirements. Evaluation of prospective suppliers will, if required, include an evaluation beyond the first tier supplier;
- methods are implemented commensurate with the Quality Level to assure that approved suppliers and subcontractors continue to provide acceptable products and services;
- before an item is used or placed in service, the procurement, inspection, and test requirements are satisfied and documented. When deficiencies

are identified, they will be documented and resolved before the item is used or placed in service;

- the actual performance of items or services is compared against specified performance criteria;
- the quality of procured items and services be evaluated at intervals and to a depth consistent with the complexity, quality level, and procurement frequency of the item or service; and
- reporting cases where there are indications that suppliers knowingly supplied items or services of substandard quality, and providing supporting information to the DOE Office of Inspector General.

9.0 INSPECTION AND ACCEPTANCE TESTING

9.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing a system to assure that inspection and acceptance testing of remediation work activities are performed.

9.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses inspection and acceptance testing as follows:

- *administrative controls* and status indicators will be used to preclude the inadvertent bypassing of required inspections and to prevent inadvertent operation of the item or process;
- the independence of the inspection personnel will be maintained, such that when an organization performs its own inspections, the personnel within the organization shall not inspect their own work;
- the level of inspection or test be graded to the complexity and importance of the item or process being evaluated;
- inspection planning takes into account inspection characteristics, inspection techniques, acceptance criteria (including allowable tolerances) and the qualifications of the personnel performing the inspection;
- inspection "hold points," beyond which no further work shall be performed until inspections are completed, be specified in the appropriate work performance instructions, procedures or drawings;

- deficiencies identified by inspection personnel are promptly documented, and that reworked items are reinspected to the same criteria as the original;
- acceptance testing shall include, as appropriate, bench or proof tests before installation, pre-operational tests, post maintenance tests, post modification tests, and operational tests;
- test procedures be developed which will include as appropriate, prerequisites to perform the test, test configuration, test equipment required, test acceptance or performance criteria (including allowable tolerances), test hold points, the required test data, and the methods for review and acceptance of results;
- deficiencies in test results are promptly documented and reported, and that corrected areas are retested to the same criteria as the original;
- procedure(s) address the calibration, maintenance, accountability, and use of equipment used to perform inspections and acceptance testing;
- measuring and test equipment used to perform inspection and acceptance testing be calibrated at specified intervals on the basis of the items required accuracy, intended use, and stability characteristics.
- measuring and test equipment be labeled, tagged or otherwise controlled to indicate its calibration status and ensure traceability to the calibration data; and
- personnel performing inspection and test activities are suitably trained and qualified.

10.0 MANAGEMENT ASSESSMENT

10.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing a system to periodically assess the integrated Quality Program and its performance, and to identify and correct problems that hinder the division from achieving its quality objectives.

10.2 Program

In accordance with the QAPD and other applicable guidance documents, the Construction Departmental Procedures Manual addresses management assessment as follows:

- direct participation of all management levels within the division including the essential participation of senior management;

- system for documenting the objective evidence gathered during management self assessments;
- mechanisms for promptly responding to and acting on problems or recommendations arising from these management self assessments; and
- mechanisms for follow-up which shall include documented evaluations of the effectiveness of managements actions.

11.0 INDEPENDENT ASSESSMENT

11.1 Purpose and Scope

This section describes the requirements and responsibilities of Construction for establishing and implementing an independent assessment coordination system to ensure that the independent assessments performed of Construction, and subcontracted organizations are coordinated to allow for their timely performance, and to assure timely response and corrective action.

The requirements described in this section shall apply to Construction activities including the activities of matrixed and subcontracted individuals performing work for the Construction Division.

11.2 Program

The Construction Division has developed a procedure for coordinating the performance of all independent assessments performed of Construction and subcontracted organizations by the FEMP QA Division, DOE, United States Environmental Protection Agency and Ohio Environmental Protection Agency. The procedure also addresses the mechanisms for responding to assessment deviations, including corrective actions to be taken and actions taken to preclude recurrence.

REFERENCES

U.S. Department of Energy, 1991, *Quality Assurance*, DOE Order 5700.6C, Office of Nuclear Energy and Office of Environmental Safety and Health, Washington, D.C.

U.S. Department of Energy, 1992, *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO-325)*, prepared by U.S. DOE Nevada Field Office and Reynolds Electrical & Engineering Co., Inc., June.

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