6254 G-000-404 .6

WORK PLAN FOR THE FEASIBILITY STUDY OF THE FMPC

08/15/88

DOE-1295-88
DOE-FN USEPA
250
REPORT

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

6254

August 15, 1988
DOE-1295-88

Mr. William E. Muno
U. S. Environmental Protection Agency
Region V
Hazardous Waste Enforcement Branch,
5HE-12
230 South Dearborn Street
Chicago, IL 60604

Dear Mr. Muno:

WORK PLAN FOR THE FEASIBILITY STUDY OF THE FMPC

This letter transmits a copy of the Work Plan for the Feasibility Study of the Feed Materials Production Center. This Work Plan was completed in accordance with Task 10 of the scope of work of the Remedial Investigation/Feasibility Study, as provided in the Federal Facilities Compliance Agreement. DOE respectfully requests USEPA's review and approval.

Sincerely,

James A. Reafsnyder
Site Manager

DP-84:Stone

Enclosure: As stated

cc w/encl:

Graham Mitchell, OEPA
Margaret Wilson, SE-31, ORO

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

FEED MATERIALS PRODUCTION CENTER

Fernald, Ohio

WORK PLAN FOR THE FEASIBILITY STUDY

August 1988

U. S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS

WORK PLAN FOR THE FEASIBILITY STUDY

Feed Materials Production Center
Fernald, Ohio

Approved by:

T. L. Ellenberger — 11 Aug 88
T. L. Ellenberger — Date
Quality Assurance Officer, IT

Robert M. Dallenbach for — 11 Aug 88
J. G. Yeasted — Date
Technical Manager, IT

R. G. Lonnyk for — 11 Aug 88
R. T. Wilde — Date
Project Director, ASI

C. R. Conner — Date
Project Director, WMCO

6254

WORK PLAN
FOR THE FEASIBILITY STUDY
OF THE
FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

PREPARED FOR

U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS

AUGUST 1988

TABLE OF CONTENTS

	PAGE
LIST OF TABLES	v of vi
LIST OF FIGURES	vi of vi
1.0 INTRODUCTION	1 of 4
1.1 BACKGROUND	1 of 4
1.2 OBJECTIVE	2 of 4
2.0 FEASIBILITY STUDY MANAGEMENT STRATEGY	1 of 15
2.1 OVERVIEW	1 of 15
2.2 SELECTION OF OPERABLE UNITS	2 of 15
2.2.1 Operable Unit No. 1 - Waste Storage Units	3 of 15
2.2.2 Operable Unit No. 2 - Solid Waste Units	3 of 15
2.2.3 Operable Unit No. 3 - Facilities and Suspect Areas	4 of 15
2.2.4 Operable Unit No. 4 - Special Facilities	5 of 15
2.2.5 Operable Unit No. 5 - Environmental Media	5 of 15
2.2.6 Operable Unit No. 6 - Surface Watercourses	6 of 15
2.3 REMEDIAL ACTION OBJECTIVES	6 of 15
2.4 POTENTIAL REMEDIAL ACTION ALTERNATIVES	11 of 15
2.5 POTENTIAL TYPES OF WASTES/CONTAMINANTS	12 of 15
2.6 APPLICATION TO THE FEASIBILITY STUDY MANAGEMENT STRATEGY	14 of 15
3.0 TECHNICAL APPROACH: OVERALL FEASIBILITY STUDY	1 of 18
3.1 INTRODUCTION	1 of 18
3.2 TASK 10 - DESCRIPTION OF CURRENT SITUATION	4 of 18
3.3 TASK 11 - FEASIBILITY STUDY WORK PLAN	5 of 18
3.4 TASK 12 - DEVELOPMENT OF ALTERNATIVES	5 of 18
3.4.1 Activity 12.1 - Finalization of Remedial Action Objectives	6 of 18
3.4.2 Activity 12.2 - Development of General Response Actions	7 of 18
3.4.3 Activity 12.3 - Identification of the Volumes and Areas of Media/Wastes	8 of 18
3.4.4 Activity 12.4 - Identification and Screening of Remedial Technologies and Technology Process Options	8 of 18

TABLE OF CONTENTS
(Continued)

6254

PAGE

3.4.5 Activity 12.5 - Evaluation of Process Options ..... 9 of 18
3.4.6 Activity 12.6 - Assembly of Alternatives ..... 11 of 18
3.5 TASK 13 - INITIAL SCREENING OF ALTERNATIVES ..... 12 of 18
3.5.1 Activity 13.1 - Refinement of Alternative Definition ..... 13 of 18
3.5.2 Activity 13.2 - Preliminary Evaluation of Alternatives ..... 13 of 18
3.5.3 Activity 13.3 - Screening of Alternatives ..... 15 of 18
3.6 TASK 14 - DETAILED ANALYSIS OF ALTERNATIVES ..... 15 of 18
3.6.1 Activity 14.1 - Refinement of Alternative Definition ..... 15 of 18
3.6.2 Activity 14.2 - Comparison of Alternatives with Evaluation Criteria ..... 16 of 18
3.7 TASK 15 - EVALUATION AND SELECTION OF PREFERRED ALTERNATIVES ..... 17 of 18
3.8 TASK 16 - DRAFT FEASIBILITY STUDY REPORT ..... 17 of 18
3.9 TASK 17 - FINAL FEASIBILITY STUDY REPORT ..... 18 of 18
3.10 ADDITIONAL REQUIREMENTS ..... 18 of 18
4.0 TECHNICAL APPROACH: DETAILED EVALUATION OF ALTERNATIVES ..... 1 of 16
4.1 INTRODUCTION ..... 1 of 16
4.2 SHORT-TERM EFFECTIVENESS ..... 3 of 16
4.2.1 Protection of the Community During Remedial Action 3 of 16
4.2.2 Protection of Workers During Remedial Action ..... 4 of 16
4.2.3 Environmental Impacts Associated with Implementation of the Remedial Action ..... 4 of 16
4.2.4 Time Frame for Achievement of Remedial Response Objectives ..... 5 of 16
4.3 LONG-TERM EFFECTIVENESS AND PERMANENCE ..... 5 of 16
4.3.1 Magnitude of Remaining Risk ..... 5 of 16
4.3.2 Adequacy of Controls ..... 6 of 16
4.3.3 Reliability of Controls ..... 7 of 16

6254

TABLE OF CONTENTS
(Continued)

PAGE

4.4 REDUCTION OF TOXICITY, MOBILITY, AND VOLUME ..... 7 of 16
4.4.1 Treatment Process and Remedy ..... 7 of 16
4.4.2 Amount of Hazardous or Radioactive Material Destroyed or Treated ..... 8 of 16
4.4.3 Reduction in Toxicity, Mobility, or Volume ..... 8 of 16
4.4.4 Irreversibility of the Treatment ..... 8 of 16
4.4.5 Type and Quantity of Treatment Residue ..... 8 of 16
4.5 IMPLEMENTABILITY ..... 9 of 16
4.5.1 Technical Feasibility ..... 9 of 16
4.5.2 Administrative Feasibility ..... 10 of 16
4.5.3 Availability of Necessary Services and Materials .. 10 of 16
4.6 COST ..... 12 of 16
4.7 COMPLIANCE WITH ARARs ..... 14 of 16
4.8 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT ... 15 of 16
4.9 STATE ACCEPTANCE ..... 15 of 16
4.10 COMMUNITY ACCEPTANCE ..... 15 of 16
5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ..... 1 of 15
5.1 INTRODUCTION ..... 1 of 15
5.2 PRELIMINARY IDENTIFICATION OF ARARs ..... 3 of 15
5.2.1 Federal ARARs ..... 4 of 15
5.2.2 State of Ohio ARARs ..... 10 of 15
5.2.3 Application to Pit 5 ..... 11 of 15
5.3 APPLICATION OF ARARs TO THE FMPC ..... 12 of 15
5.3.1 Sources of Chemicals and Radionuclides ..... 12 of 15
5.3.2 Pathways to Receptors ..... 13 of 15
5.3.3 Receptor Dose, Exposure, or Risk Levels ..... 14 of 15
6.0 MANAGEMENT PLAN AND SCHEDULE ..... 1 of 2
6.1 MANAGEMENT PLAN ..... 1 of 2
6.2 SCHEDULE ..... 2 of 2
TABLES
FIGURES

6254

LIST OF TABLES

TABLE NO.	TITLE
2.1	Identification of Preliminary Operable Units
2.2	Preliminary Remedial Action Objectives
2.3	Types of Potential Remedial Actions
2.4	Potential Types of Wastes/Contaminants
3.1	Volume and Area Summary for Waste Pit 5
3.2	Initially Screened Technology Types and Technology Process Options for Pit 5
3.3	Site and Waste Characteristics to be Considered to Evaluate Technological Effectiveness
3.4	Example Technology Evaluation Sheet
3.5	Example Technology Evaluation Sheet
3.6	Pit 5 Remedial Alternatives
3.7	Feasibility Study Report Outline (Preliminary)
5.1	Federal Applicable or Relevant and Appropriate Requirements, Contaminant Specific
5.2	State Applicable or Relevant and Appropriate Requirements, Contaminant Specific
5.3	Federal Applicable or Relevant and Appropriate Requirements, Location Specific
5.4	State Applicable or Relevant and Appropriate Requirements, Location Specific
5.5	Federal Applicable or Relevant and Appropriate Requirements, Action Specific
5.6	State Applicable or Relevant and Appropriate Requirements, Action Specific
5.7	Federal ARARs for Pit 5
5.8	State ARARs for Pit 5

6254

LIST OF FIGURES

FIGURE NO.	TITLE
6-1	Feasibility Study Project Management Organization
6-2	RI/FS Schedule

6254

1.0

000010

1.0 INTRODUCTION

6254

1.1 BACKGROUND

On March 9, 1985, the U.S. Environmental Protection Agency (U.S. EPA) issued a Notice of Noncompliance letter to the U.S. Department of Energy (DOE) identifying the U.S. EPA's major concerns over potential environmental impacts associated with past and present operations at the DOE's Feed Materials Production Center (FMPC) in Fernald, Ohio. Between April 1985 and July 1986, conferences were held between DOE and U.S. EPA representatives to discuss the issues and to identify the steps DOE would take to achieve and maintain compliance.

On July 18, 1986, a Federal Facility Compliance Agreement (FFCA) was jointly signed by DOE and U.S. EPA pertaining to environmental impacts associated with the FMPC. The FFCA was entered into pursuant to Executive Order 12088 (42 Code of Federal Regulations [CFR] 47707) to ensure compliance with existing environmental statutes and implementing regulations. In particular, the FFCA is intended to ensure that environmental impacts associated with past and present activities at the FMPC are thoroughly and adequately investigated so that appropriate remedial response actions can be formulated, assessed, and implemented.

In response, a sitewide Remedial Investigation and Feasibility Study (RI/FS) is in progress pursuant to Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The performance of the RI/FS is in conformance with current U.S. EPA guidance and the guidelines, criteria, and considerations set forth in the National Contingency Plan (NCP) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

A Work Plan for the sitewide RI/FS was originally issued to the U.S. EPA in December 1986. After a series of technical discussions and negotiations, Revision 3 of the Work Plan was submitted in March 1988 and received U.S. EPA approval in May 1988. The approved Work Plan included a detailed scope of work only for the RI portion of the study (Tasks 1 through 8). The technical approach to the FS was limited to a general description of nine tasks specified in the "Scope of Work for a Feasibility Study: Feed Materials Production Center," as attached to the FFCA. These tasks include:

6254

- Task 9 - Description of Current Situation
- Task 10 - Work Plan
- Task 11 - Development of Alternatives
- Task 12 - Initial Screening of Alternatives
- Task 13 - Detailed Analysis of Alternatives
- Task 14 - Evaluation and Selection of Preferred Alternatives
- Task 15 - Draft FS Report
- Task 16 - Final FS Report
- Task 17 - Additional Requirements

One reason for the lack of detail on the FS approach was the requirement to prepare a detailed FS work plan (Task 10) at a future point in the RI/FS process. The FS work plan presented herein has been prepared to satisfy this requirement.

In March 1988, subsequent to the submission of the sitewide RI/FS Work Plan, the U.S. EPA issued a new draft guidance document entitled "Draft Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA." A principal focus of this guidance document is the revision of the FS process to better reflect the emphasis and provisions of SARA. Management initiatives designed to streamline the remedial action process within the framework of site-specific needs are also emphasized. In anticipation of the U.S. EPA's adoption of final procedural guidance similar to that contained in the draft guidance document, the FS work plan presented herein has been prepared in accordance with the new procedures. The nine FS tasks identified in both the FFCA and the RI/FS Work Plan have been maintained for consistency; only the technical approach to these tasks has been modified to reflect the procedural changes.

1.2 OBJECTIVE

As stated in the RI/FS Work Plan, the purpose of the FS is to develop and evaluate remedial action alternative(s) to protect public health, public welfare, and the environment from releases or threatened releases of hazardous or radioactive substances from the FMPC. The selection of the remedy or remedies to be implemented will be made by the U.S. EPA, based on the findings of the FS.

While SARA and the March 1988 guidance did not change this basic objective of the FS, many procedural requirements were modified and new ones added. In particular, in addition to the continuing requirement for remedies to be protective of human health and the environment and to be cost-effective, the guidance specifies that remedy selection must now consider:

- A preference for remedial actions that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants as its principal elements.
- The need to assess the use of permanent solutions and alternative treatment technologies or resource recovery technologies and use them to the maximum extent practicable.
- The need to consider off-site transport and disposal without treatment as the least favored alternative where practicable treatment technologies are available.

The principal objective of this work plan is to present the technical approach that will be used to satisfy the overall FS goals, as established by the NCP, SARA, and U.S. EPA guidance. This technical approach is presented in Chapter 3.0. Included in Chapter 3.0 is a case study of the application of the approach to Pit 5 at the FMPC, which was performed concurrent with the preparation of this work plan. The incorporation of the Pit 5 analysis into Chapter 3.0 is for illustrative purposes only and is not intended to represent the final FS for this waste storage unit. Additional analyses will be performed as part of the sitewide FS as the RI and other associated efforts proceed. Pit 5 was considered to be an appropriate example for the FMPC due to its representative waste characteristics, the need to consider both liquid and solid media, and the large number of potentially applicable technologies and remedial action alternatives.

A principal element of any FS is the detailed evaluation of a number of feasible alternatives toward the goal of identifying the preferred alternative(s). The technical approach for this effort has been both expanded and somewhat standardized through the designation of nine specific evaluation criteria in the U.S. EPA's March 1988 guidance document. Due to the critical role of this task in the FS process and the need to recognize significant procedural

changes with respect to the latest guidance, a separate chapter (Chapter 4.0) has been devoted to a more detailed presentation of the proposed technical approach to the detailed analysis of alternatives.

The tasks described and illustrated in Chapters 3.0 and 4.0 provide the baseline technical approach for the FS at the Fernald site. It is expected, however, that the efficacy of a single, multiyear application of this approach on a sitewide basis will be limited by the wide variety of facilities to be considered, the complex technical issues associated with the site, and the widespread institutional pressures for remedial actions to occur at the earliest possible date. The use of operable units, which represent individual facilities or facility groups for which discrete actions may be performed as incremental steps toward a final remedy, can therefore be anticipated.

In response, a second important objective of the FS work plan is to formulate a remedial action management strategy that will optimally proceed to the final remedy. Such a strategy is the subject of Chapter 2.0 and will serve to identify:

- The types of actions that may be required to address site problems
- The most meaningful categorization of the candidates for remedial action at the FMPC into operable units
- The optimal sequence of site actions and site activities
- Procedures that may be used to streamline the RI/FS

A third objective of this work plan is to preliminarily identify the applicable or relevant and appropriate requirements (ARARs) as well as any other requirements to be considered (TBC). This identification of potential ARARs and TBC requirements at the work plan stage will assist in the initial development of alternatives and will facilitate the establishment of final ARARs and TBC requirements in conjunction with involved agencies. A discussion of ARARs and TBC requirements is provided in Chapter 5.0.

Chapter 6.0 presents the management plan and schedule for the FS. The management plan has been developed consistent with the anticipated use of operable units, as discussed in Chapter 2.0.

2.0

6254

2.0 FEASIBILITY STUDY MANAGEMENT STRATEGY

2.1 OVERVIEW

The U.S. EPA's most recent RI/FS guidance, which was issued in March 1988, emphasizes the need for management initiatives designed to streamline the RI/FS process through the consideration of site-specific conditions and needs. Such a site management strategy is to be preliminarily developed as a component of the initial scoping phase of the RI/FS. It is to consider the remedial action objectives, whether interim actions are necessary or appropriate, and whether the site may best be remedied as separate operable units.

The approved RI/FS Work Plan, which predated the new guidance document, pursued the concept of a site management strategy through the development of an RI/FS investigative framework. This framework utilized a dual matrix approach to integrate the potential remedial actions, related informational needs to perform an assessment of the actions, and proposed RI tasks to satisfy the informational needs. Although specific waste management units and other FMPC facilities were individually considered within this framework, no attempt was made to account for the integration of remedial actions or the identification of meaningful operable units.

The objective of the FS management strategy to be presented in this chapter is to extend the previous work to more fully satisfy the scoping strategy proposed by the U.S. EPA's March 1988 guidance document. In particular, a strategy will be developed that incorporates each of the most significant factors affecting the timing and integration of remedial actions at the FMPC.

The development of the FS management strategy will begin with the identification of those units of the FMPC that are being considered as potential candidates for remediation in the FS (Section 2.2). This exercise will be carried forward to the categorization of the individual units into six operable units to form the basis of the overall FS. Reasons for the selection of operable units will be highlighted, with the full justification provided in subsequent sections of this chapter.

Medium-specific remedial action objectives aimed at protecting human health and the environment at and within the vicinity of the FMPC are identified in Section 2.3. The pertinence of each objective to the identified operable units at the FMPC is also addressed in Section 2.3.

Section 2.4 presents a compilation of the types of remedial actions applicable to each unit. Potential interrelationships of actions within operable units are also discussed as an important factor in the FS management strategy. No attempt is made in this section to compile a comprehensive list of remedial technologies and process options for each of the various units. However, such considerations have been incorporated into Chapter 3.0 through the use of the case study on Pit 5.

The types of wastes or contaminants potentially associated with each unit being investigated in the FS management strategy are addressed in Section 2.5. Such site-specific factors could be instrumental in the final determination of remedial actions at the FMPC; their consideration is consistent with the RI/FS scoping process advanced by the U.S. EPA's March 1988 guidance. The integration of these factors into the FS management strategy for the FMPC is the subject of Section 2.6.

2.2 SELECTION OF OPERABLE UNITS

The RI/FS Work Plan identified 27 units of the FMPC to be investigated in the RI/FS. Since that time, several modifications to this list have increased this total to 39 units. Some of this increase can be accounted for by treating the waste pits as individual units rather than as a single, composite unit as was done at the work plan stage. Another significant modification was the progressive identification of additional facility types and suspect areas to be investigated under the facilities testing program.

Table 2.1 identifies the 39 units currently being considered. Descriptions of each of these units have been previously provided in either the RI/FS Work Plan or the Facilities Testing Work Plan and are not repeated herein. For purposes of the FS work plan, these same 39 units can be interpreted as the candidates for potential remedial action at the FMPC. Other units may be

identified as the RI/FS proceeds and any necessary updates to the forthcoming management strategy will be made at that time.

The 39 candidates for remedial action are categorized into six operable units in Table 2.1. Several factors were considered in the selection of operable units; some factors are highlighted in the following descriptions of the operable units while others are discussed in more detail in Sections 2.3 through 2.5. The operable units selected are considered to be consistent with the concept promoted by the U.S. EPA--that operable units represent geographic portions of a site, specific site problems, specific media, etc., that may involve discrete remedial actions comprising incremental steps toward a final remedy.

2.2.1 Operable Unit No. 1 - Waste Storage Units

The first operable unit includes those units established specifically for the on-site, land-based disposal of wastes or production residues at the FMPC. These units represent the principal CERCLA-type units at the FMPC and will at least partially involve Resource Conservation and Recovery Act (RCRA) aspects due to the presence of mixed wastes in some units (e.g., Pit 4).

The categorization of these units into a distinct operable unit was highly dictated by the expected similarities in remedial technologies and the likelihood of multiple interrelationships in the remedial actions at each unit. Any potential actions will focus on source control since the receptor environments are being separately addressed under other operable units. If an action is deemed necessary at any or all of the waste disposal units, the technologies will likely be selected primarily on the specific properties of the waste materials and any associated regulatory requirements. The risk assessment and related cleanup criteria may play only a minor role in such source control actions once it is established that an action is necessary.

2.2.2 Operable Unit No. 2 - Solid Waste Units

Operable Unit No. 2 includes the fly ash piles, the sanitary landfill, the lime sludge ponds, the south field area, and the metal scrap piles. These facilities have been established as disposal areas for solid wastes or

construction debris and are characterized by large volumes of waste materials involving low levels of contamination.

The units included in Operable Unit No. 2 typify the "special sites" designation addressed in the U.S. EPA's newest guidance. The preferential use of treatment technologies may not be practicable for such units and the range of acceptable alternatives could focus on containment options or other types of minimum source control actions.

2.2.3 Operable Unit No. 3 - Facilities and Suspect Areas

Operable Unit No. 3 involves the largest number of individual units and includes active production facilities, abandoned facilities, and suspect areas. Releases or potential releases of hazardous substances from active facilities within the production area at the FMPC are being investigated in the RI/FS. Several abandoned facilities at the FMPC could remain as continuing sources of environmental release due to the residual materials within or near the facilities. Although at one time linked to waste management operations, such facilities cannot be classified as waste disposal or storage units. Several areas of the FMPC have been associated with activities that could lead to the past or continued environmental release of radiological or hazardous chemical substances. These areas have been termed "suspect areas" and are being investigated under the facilities testing program. The search for additional suspect areas continues and is accounted for by the "other suspect areas" unit designation in Table 2.1.

There are several reasons why these multiple units have been assigned to a single operable unit. First, any action at such facilities or areas will be local to that facility or area and will not be expected to impact the FS process for any other operable unit. Second, any such actions will likely involve straightforward, widely practiced technologies. Examples would include soil removal from suspect areas and replace/modify operating units. Third, each type of facility or area is being investigated under the facilities testing program, which already provides for a unit-specific FS if deemed appropriate. Fourth, many of the facilities may eventually become "suspect areas" if past releases are found to have caused environmental impacts in adjacent

areas. The common basis of each type of unit would, in such a case, become more evident. Finally, depending on the type of remedial actions being considered for these units and their interrelationship with other actions at the FMPC, the evaluation of remedial actions may be performed under the subject FS or could be dealt with under ongoing facility upgrade and capital improvement programs.

2.2.4 Operable Unit No. 4 - Special Facilities

Several units under investigation in the RI/FS are not easily classified. The K-65 and metal oxide silos contain large quantities of waste raffinate, the properties of which will require special technological and regulatory considerations in any upcoming FS evaluations. A second type of special facility is the thorium inventory currently being stored at the FMPC. Each of these facilities is undergoing interim actions but the final disposition will require further analysis in the FS.

The analysis of final disposition for the associated materials and the selection of a final remedy will be highly driven by the risk assessment due to the relationship between the action taken and the potential short-term and long-term exposures. Any type of stabilization or treatment technology will be highly specific to the unit being remediated and will likely require extensive laboratory and bench-scale testing to confirm its applicability and effectiveness.

2.2.5 Operable Unit No. 5 - Environmental Media

The various types of environmental media potentially impacted by the FMPC have been categorized as Operable Unit No. 5. These include ground water, soils, air, and flora and fauna. Although each will involve separate types of remedial action technologies, they have been grouped together for the following reasons: (1) the need for and degree of remedial action will be highly dependent on the risk assessment, (2) the "no-action" scenario could be progressively changing as source control measures are committed to for other operable units, (3) specific environmental and/or public health standards will be applicable to each media, and (4) agency policies may influence the final remedy selection. In short, the development of the FS may be more influenced

by the definition of cleanup levels than by the evaluation and selection of technologies.

Based on the four points presented above, it is expected that Operable Unit No. 5 will be the last unit to be decided upon in the FS process. Not only are the issues more complex (and possibly changing with time), but the results of all other facets of the RI/FS will play an important role in the FS for this operable unit. Interim actions will be considered if deemed necessary by the progressive findings of the RI.

2.2.6 Operable Unit No. 6 - Surface Water Courses

The Great Miami River, Paddys Run, and the storm water outfall ditch have been designated as a separate operable unit since the associated FS could take on many facets for a variety of reasons. These surface water courses could be found to have been impacted as environmental receptors for which localized actions (e.g., contaminated sediment removal) would be appropriate. Source controls associated with other operable units would also have to be considered. The same water courses also serve as potential environmental pathways of contaminants to ground water, which would be associated with a different FS focus. Under some risk analysis scenarios (e.g., ingestion of water and sediments), the water bodies will be evaluated as direct exposure pathways to humans. In such a case, the need for and degree of remedial action will be highly dependent upon the associated risk.

An additional reason for keeping the three surface water courses in a separate operable unit is the similarities of technologies that would be associated with any potential action. The technologies would likely be established, widely practiced removal or containment processes.

2.3 REMEDIAL ACTION OBJECTIVES

Remedial action objectives can generally be defined as the site-specific goals for protecting human health and the environment. The objectives are preferably established on a medium-specific basis although consideration of the critical contaminants, exposure routes, and receptors is eventually required to set specific cleanup goals (i.e., target concentrations).

In this section, each medium-specific objective pertinent to at least one of the 39 units being investigated in the FS will be identified. The establishment of the contaminants of concern, as well as the critical exposure routes and receptors, is not appropriate at this time since the final selection of indicator parameters and the determination of exposure scenarios are continuing activities of the companion risk assessment. A supporting document will be prepared and submitted for U.S. EPA approval once the indicator parameters and exposure scenarios are established in the risk assessment. The ARARs and TBC requirements that will be utilized to establish the final remediation goals are discussed in Chapter 4.0 of this work plan.

Medium-specific objectives for the FMPC are described below. The sequential numbering of the objectives is for subsequent use in the translation of these medium-specific objectives into general remedial action objectives for the 39 individual units and corresponding operable units at the FMPC.

Solid Wastes, Liquid Wastes, and Sludges

1. Prevent the ingestion of or direct contact with solid wastes, liquid wastes, and sludges having carcinogens or noncarcinogens at concentrations such that ingestion or contact would cause the exceedance of established acceptance levels or risks. (Public Health Protection)

2. Prevent the ingestion of or direct contact with solid wastes, liquid wastes, or sludges having radionuclides at concentrations (activity levels) such that the dose associated with ingestion or contact would exceed acceptable dose rates. (Public Health Protection)

3. Prevent the release of airborne contaminants from solid wastes, liquid wastes, or sludges that would pose an unacceptable risk or cause the exceedance of acceptable dose rates via inhalation at receptor locations. (Public Health Protection)

4. Prevent the release of radon gas from solid wastes that could result in unacceptable levels of exposure. (Public Health Protection)

5. Prevent the migration of chemical or radiological substances to ground water, surface water, or other environmental media that would result in the exceedance of acceptable risk levels or radiation doses through exposure modes involving those media (e.g., ingestion of contaminated ground water). (Public Health Protection)

6. Prevent the migration of chemical and radiological substances that would result in the exceedance of established quality standards for ground water, surface water, or other environmental receptors. (Environmental Protection)

Ground Water

7. Prevent the ingestion of ground water having carcinogens at concentrations that exceed established standards (e.g., maximum contaminant levels [MCLs]) and represent a cancer risk above an established acceptance level. (Public Health Protection)

8. Prevent the ingestion of ground water having noncarcinogens or radionuclides at concentrations that exceed established standards and represent an exceedance of established acceptance levels (e.g., acceptable daily intakes [ADIs]) or doses. (Public Health Protection)

9. Restore the ground water aquifer to concentrations below established ground water quality standards, where applicable and appropriate. (Environmental Protection)

Surface Water

10. Prevent the ingestion of surface water having carcinogens at concentrations that exceed established standards and represent a cancer risk above an established acceptance level. (Public Health Protection)

11. Prevent the ingestion of surface water having noncarcinogens or radionuclides at concentrations that exceed established acceptance levels or doses. (Public Health Protection)

12. Restore surface water quality to concentrations below established water quality standards, where applicable and appropriate. (Environmental Protection)

13. For those contaminants not controlled by established standards, restore surface water quality to concentrations that would not adversely impact aquatic species through biomagnification and bioaccumulation. (Environmental Protection)

Sediment

14. Prevent the ingestion of or direct contact with sediment having carcinogens, noncarcinogens, or radionuclides at concentrations such that ingestion or contact would cause the exceedance of acceptable levels, risks, or doses. (Public Health Protection)

6254

15. Prevent the release of contaminants from sediments that would result in water column concentrations in excess of ambient water quality criteria (AWQC). (Environmental Protection)

Air

16. Prevent the inhalation of carcinogens at concentrations that would cause the exceedance of established acceptance levels. (Public Health Protection)

17. Prevent the inhalation of radionuclides at concentrations that would cause the exceedance of acceptable dose rates. (Public Health Protection)

18. Prevent the inhalation of noncarcinogens at concentrations that would cause the exceedance of established acceptance levels. (Public Health Protection)

Soils

19. Prevent the ingestion of or direct contact with soils having carcinogens, noncarcinogens, or radionuclides at concentrations such that ingestion or contact would cause the exceedance of acceptable levels, risks, or doses. (Public Health Protection)

20. Prevent the release of airborne contaminants from soil that would pose an unacceptable risk or cause the exceedance of acceptable dose rates via inhalation at receptor locations. (Public Health Protection)

21. Prevent the leaching of chemical or radiological substances from soils to ground water that would result in ground water concentrations in excess of established quality standards. (Environmental Protection)

22. Prevent the movement of soil particles with elevated levels of chemicals or radionuclides to surface waters that would result in surface water or sediment concentrations in excess of established quality standards. (Environmental Protection)

Structures

23. Prevent direct contact with structures containing elevated levels of chemicals or radionuclides that would cause an exposure level exceeding established risk levels or dose rates. (Public Health Protection)

24. Correct and prevent structural conditions that could result in the sudden or chronic release of chemical or radiological substances to

both local and regional pathways and receptors. (Public Health Protection; Environmental Protection)

Flora and Fauna

25. Prevent the ingestion of or contact with flora or fauna having carcinogens, noncarcinogens, or radionuclides at concentrations such that ingestion or contact would cause the exceedance of acceptable levels, risks, or doses. (Public Health Protection)

26. Prevent the uptake of chemicals and radionuclides by flora or fauna that would cause unacceptable levels within the flora and fauna. (Environmental Protection)

To translate these medium-specific objectives to individual units of the FMPC, the environmental medium or media associated with each of the 39 FS units must be identified. Table 2.2 has been prepared for this purpose, with any nonzero entry indicating the association of an individual unit with the corresponding environmental medium. The cross-referencing of the information provided in Table 2.2 with the medium-specific objectives listed above is accomplished by the numerical entries in the table. These entries indicate which of the specific objectives are pertinent to a given medium and unit. This initial screening of objectives was based on the specific characteristics of the contaminants, exposure scenarios, and site conditions associated with each unit. For example, the objective of preventing direct contact and ingestion of waste is not appropriate for waste units that are currently covered.

Those objectives that have been retained in the table represent a very conservative interpretation of the current understanding of site conditions so as not to eliminate any potentially applicable objectives. It is expected, therefore, that several of the objectives given in Table 2.2 will eventually be eliminated from consideration as the source-pathway-receptor characteristics and relationships are further defined in the RI risk assessment.

With reference to Table 2.2, the remedial action objectives are shown to generally correspond to the designated operable units. This is expected given the basic similarities in the types of units selected for inclusion in the respective operable units and is appropriate within the context of operable

6254

units in the RI/FS process. Two exceptions are Operable Unit No. 3, which includes a wide variety of facilities and suspect areas associated with multiple objectives, and Operable Unit No. 5, for which each type of unit is necessarily matched with a different environmental media and thus a different set of objectives.

2.4 POTENTIAL REMEDIAL ACTION ALTERNATIVES

All aspects of an RI/FS are ultimately directed toward the collection and evaluation of information relevant to the selection of a remedial action. Consequently, the FS management strategy for the FMPC must incorporate the types of remedial actions potentially applicable to the specific units being investigated. The latter information is contained in Table 2.3, with each nonzero entry representing a type of remedial action potentially applicable to the corresponding unit. The technical features and general applicability of each type of action identified in Table 2.3 were previously described in the RI/FS Work Plan. Such information is not of direct significance to the FS management strategy and is not repeated herein.

The determination of which type of remedial action is most appropriate for a given unit, although a principal objective of the FS process, is not of central concern to the FS management strategy. What is of interest is how an individual action at a certain unit will affect the development and evaluation of remedial action alternatives at another unit. Some actions can be taken independently while others can be highly constrained by the actions at other units. Only if these interdependencies are understood and accounted for within the operable units can appropriate remedial actions be identified and an integrated, sitewide FS strategy be developed.

An example of a totally independent action is the removal or in-place closure of abandoned underground storage tanks. An example of interdependency is the economy of scale afforded by a central disposal or treatment facility for which a prior remedial action decision for <u>all</u> contributing units should be made before the conceptual design is initiated. The potential lack of temporary on-site storage space is another example of an issue that could constrain the feasibility or timing of actions at a number of units.

6254

Although preliminary and subject to change, the numerical entries given in Table 2.3 can be used to account for this important distinction. In particular, a "0" indicates that an action is not appropriate for a given unit, a "1" indicates that the action is potentially appropriate and can be implemented independently, and a "2" indicates that a given action is potentially appropriate but would influence (or be influenced by) the decisions for other operable units. In some cases (e.g., on-site permanent storage), a series of "2" in a given column represents the aforementioned need to consider central disposal or treatment systems. In other cases (e.g., subsurface flow control), a series of "2" indicates that the technical feasibility and performance of an action in one area could be impacted by actions in a different area.

Of special note in Table 2.3 is the large number of actions that can be implemented without affecting the technical decisions at other units. Such cases are represented by entire columns that contain only "0" and "1" entries. On the other hand, remedial actions at only about one-half of the units can be evaluated and implemented without considering the effects on other units. The latter case corresponds to entire rows with only "0" and "1" entries.

Since the technical approach for the FS will be separately applied to each operable unit, a preferred condition is that the types of potential remedial actions for the individual units comprising each operable unit be closely matched. This is shown to be the case in Table 2.3, with the few exceptions easily explained. More importantly, the interdependencies of actions across various units should be fully accounted for, or at least maximized, within a single operable unit. (Significant interdependencies of actions across operable units would inhibit the potential need to accelerate or sequentially perform the FSs for the interdependent operable units.) This condition has been satisfactorily achieved by the operable units selected, as indicated by the groupings of the "2" entries in Table 2.3.

2.5 POTENTIAL TYPES OF WASTES/CONTAMINANTS

Section 2.3 addressed the eventual need to consider individual chemical or radiological substances in the establishment of unit-specific remedial action objectives. For purposes of the FS management strategy, however, a more basic

need is the differentiation of the wastes/contaminants into general categories that could influence the remedial action process. The major implications of waste type on the FS decision process include differences in regulatory requirements, the corresponding primacy among federal agencies, and special technological requirements.

Six major categories of wastes/contaminants are identified in Table 2.4, as follows:

- Hazardous Chemicals - Any organic or inorganic substance that poses a potential health risk and is currently regulated as a hazardous substance has been categorized as a hazardous chemical. An exception is radionuclides, which are separately accounted for under the "radiological substances" category. Note that only wastes or process residuals are accounted for in this category; process chemicals are dealt with separately.

- Radiological Substances - Wastes in which the only regulated substances are radionuclides are termed radiological substances. Some elements (e.g., uranium) are maintained as radiological substances even though their chemical toxicity will also be evaluated in the RI/FS.

- Mixed Wastes - Mixed wastes are those wastes involving both radiological components and hazardous chemicals, as defined by RCRA. Such wastes are regulated by both DOE and the U.S. EPA and require special consideration. For example, approved low-level radioactive disposal sites are not currently permitted to accept RCRA wastes, whereas approved RCRA sites cannot accept low-level radioactive wastes.

- Solid Wastes with Contaminants - Several FMPC waste units were established for the disposal of large volumes of solid wastes or other residual waste materials. Historic practices, however, have caused low levels of radiological and/or chemical contamination of these large-volume wastes. The need to treat such units as special cases in the development, evaluation, and selection of remedial actions has been recognized by the U.S. EPA; the introduction of a distinct waste type to account for such special cases will promote their consideration within the FS strategy.

- Special Wastes - The waste raffinates in the K-65 and metal oxide silos, as well as the thorium stored on site, represent special cases that will require separate evaluations within the remedial action program.

- Process Chemicals - Several of the units being investigated under the facilities testing program involve only chemicals used in active production operations. For this reason, a distinction was made between

hazardous chemical wastes and process chemicals. Units involving process chemicals require consideration under the FFCA and RI/FS due to their potential as environmental release points.

The numerical entries in Table 2.4 represent a preliminary designation of waste/contaminant type for each of the 39 units being investigated in the RI/FS. Some changes to these entries can be expected as the RI data are generated and analyzed. Several units are shown to correspond to more than one type of waste or contaminant. In some cases, this dual entry reflects an uncertainty in the type(s) of wastes or contaminants involved until confirmatory field data become available. Suspect areas generally represent this situation. A second reason for dual entries is that both chemical and radiological substances are known to be present at some units but a designation of mixed waste is not appropriate since the chemical component does not qualify as a RCRA waste. Finally, multiple-unit cases such as the sumps could involve some units that contain only hazardous chemicals and some units that contain only radiological substances.

The potential types of wastes/contaminants in Table 2.4 are shown to be generally consistent within each operable unit. Numerous exceptions do exist, however, and further resolution would require a reassignment of the problematical units to different operable units. Such changes are not recommended at this time since other, previously discussed factors are considered more important to the separation of units for purposes of performing multiple FSs. One possible outcome of the inclusion of multiple types of wastes/contaminants within a given operable unit would be a need to overdesign a remedy to account for the "worst-case" condition. For example, an on-site storage facility may have to be designed to RCRA standards even if some units contributing wastes to that facility do not involve hazardous or mixed wastes.

2.6 APPLICATION TO THE FEASIBILITY STUDY MANAGEMENT STRATEGY

The information provided in Sections 2.2 through 2.5 supports the selection of operable units for the overall FS management strategy. The final outcome--a series of FSs and possibly Records of Decision (RODs) logically developed and spread over a multiyear period--is not only favored for budgeting purposes but

also allows for the incremental start-up of remedial actions prior to the eventual completion of the sitewide RI/FS. Such a strategy is fully consistent with the U.S. EPA's most recent guidance, as indicated by the following quote from the March 1988 guidance document:

> "The Agency's experience to date in the Superfund program has clearly shown that there is a need for flexibility in the RI/FS process, and that the wide variety of Superfund sites requires that the process be tailored to meet site-specific needs. For example, large, complex sites will generally require a greater level of effort with intermediate deliverables necessary for each phase of the RI/FS process, whereas less complicated sites may not. Therefore, the lead agency's remedial project manager and the RI/FS contractor must thoroughly consider the site conditions, scheduling, constraints, budget limitations, and support agency input, when developing site-specific work plans to ensure that the RI/FS provides sufficient information to support the evaluation of remedial alternatives and the selection of a remedy, and at the same time is as streamlined as possible."

The recommended FS management strategy for the FMPC, consisting of the selection of operable units and the sequencing of corresponding FSs as the supporting RI data, model results, and risk assessment findings become available, will proceed in accordance with this work plan and the overall RI/FS schedule. Although the intent and commitments of this management strategy are clear, the programmatic and institutional complexities associated with the FMPC must be recognized so that adequate flexibility can be maintained. Among the complicating factors are the active plant operations, multiple regulatory programs, existing compliance agreements, and the DOE budget process.

The technical approach for the conduct of an FS is described in Chapters 3.0 and 4.0. Within the context of the proposed FS management strategy, it is expected that this technical approach will be applied to each of the resultant operable units rather than to each of the 39 individual units or to the FMPC as a whole. It is anticipated, however, that minor adjustments to the general technical approach will be required for some operable units due to the wide variety of underlying conditions.

6254

3.0

3.0 TECHNICAL APPROACH: OVERALL FEASIBILITY STUDY

6254

3.1 INTRODUCTION

This chapter of the work plan provides the technical approach that will be used to identify, evaluate, and select remedial action alternatives for the FMPC. The FS procedures are based on those required under CERCLA and SARA. The general components of an FS were initially outlined in the NCP (40CFR300.68) and further clarified in the April 1985 U.S. EPA document, "Guidance on Feasibility Studies Under CERCLA." The initial RI/FS Work Plan and subsequent revisions (through Revision 3, dated March 1, 1988) for the FMPC were based primarily on the specifications of the NCP and the 1985 U.S. EPA guidance document, in accordance with the scope of work attached to the FFCA. In March 1988, the U.S. EPA issued a new draft guidance document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA." This document has not yet been formally released; however, the significant changes it contains are expected to be adopted as the U.S. EPA's final guidance and have been incorporated into this FS work plan for the FMPC.

In the completion of an RI/FS for any site, the FS is to be performed in accordance with an overall project framework that is developed at the beginning of the project and periodically updated based on the progressive findings of the RI/FS. This project framework usually includes the development of overall remedial action objectives as well as remedial action strategies which are formulated to address site-specific conditions, circumstances, and requirements. Chapter 2.0 of this work plan discussed the framework, termed the FS management strategy, for the FMPC. A more formal strategy is necessary for the FMPC site than for typical FS efforts at other, less complex sites because of the larger number (approximately 40) of specific candidates for remedial action which must be addressed in the FS.

The remedial action planning strategy for the FMPC is essentially a working strategy that will be reviewed, reconsidered, and updated as the FS proceeds to take into consideration new developments in the project. It will focus to a large degree upon the characterization of media-based remedial actions in

6254

combination with the individual physical units to identify and delineate "operable units" for the development and evaluation of the final remedial action alternatives. Additionally, the streamlining options provided in the latest FS guidance document will be evaluated and incorporated, as appropriate, into the project. Certain components of the work that are used as a basis for completion of the FS, such as the development of the project-specific ARARs, are currently underway.

The FS for the FMPC is ultimately to be completed in accordance with the FFCA. The FS technical procedures specified in the FFCA are generally consistent with those described in the U.S. EPA's 1985 guidance document in effect at the time of FFCA signing. As indicated in Chapter 1.0, however, it is considered necessary to update the technical approach to achieve consistency with U.S. EPA's March 1988 draft guidance document. This document divides the procedures required for completion of the FS into the following broad categories: Development of Alternatives, Screening of Alternatives, and Detailed Analysis of Alternatives. These are further divided into the following activities:

- Development of Alternatives
  - Identify potential treatment technologies and containment/disposal requirements for residuals or untreated waste
  - Screen technologies
  - Assemble technologies into alternatives
  - Identify action-specific ARARs
- Screening of Alternatives
  - Screen alternatives as necessary to reduce the number that will be subjected to detailed analysis
  - Preserve an appropriate range of remedial action options
- Detailed Analysis of Alternatives
  - Further refine alternatives, as necessary
  - Analyze alternatives against nine defined criteria
  - Compare alternatives against each other

6254

An outline and technical specifications for nine tasks associated with the FS were specifically identified in the FFCA, including:

- Task 9 - Description of Current Situation (now Task 10)
- Task 10 - FS Work Plan (now Task 11)
- Task 11 - Development of Alternatives (now Task 12)
- Task 12 - Initial Screening of Alternatives (now Task 13)
- Task 13 - Detailed Analysis of Alternatives (now Task 14)
- Task 14 - Evaluation and Selection of Preferred Alternatives (now Task 15)
- Task 15 - Draft FS Report (now Task 16)
- Task 16 - Final FS Report (now Task 17)
- Task 17 - Additional Requirements (accounted for in RI Tasks 8 and 9)

To remain consistent with the FFCA, the approved RI/FS Work Plan, and the new guidance document, the tasks presented in this FS work plan will follow the same format and task breakdown as shown above. (Note that the recent change in task numbering was for accounting convenience and does not affect the sequencing or performance of the FS.) Appropriate technical modifications will, however, be incorporated into each appropriate task among those specified above to reflect the new guidance. The remainder of this chapter will describe the modified technical approach on a task-by-task basis. The specific elements to be included in the FS, the rationale for their inclusion, the level of anticipated detail, and the documentation that will accompany the FS report will be discussed.

A focused FS for Pit 5 at the FMPC was initiated concurrent with the preparation of this work plan, in part to apply the proposed technical approach to a representative waste disposal unit as a case example. This effort has been incorporated into the appropriate sections of this chapter as an example of the technical approach to be used in the forthcoming FS at the FMPC. Three

exceptions are noteworthy. First, since the change in U.S. EPA guidance documents just recently occurred, the screening of technologies and the development of alternatives for Pit 5 were accomplished more in line with the 1985 guidance, as reflected in the FFCA. All future work will apply the new technical requirements throughout the FS process. Second, because the designation of operable units occurred subsequent to the case study and approval of the operable units has not yet been attained, the case study involved only a single waste storage unit. The preliminary work completed on Pit 5 will eventually be incorporated into the FS for the corresponding operable unit, with appropriate modifications. Third, because the detailed evaluation of alternatives will be highly dependent on all waste disposal units within the operable unit, no detailed evaluation of alternatives was attempted for Pit 5 at this time.

3.2 TASK 10 - DESCRIPTION OF CURRENT SITUATION

Information on the FMPC, the volume of wastes and extent of the problem, and the response activities presented in Task 1 of the FMPC RI/FS Work Plan (Revision 3, dated March 1, 1988) will be updated to reflect RI findings in terms of FS needs. Any changes in the original project understanding, as described in the Task 1 report, will be discussed and justified based on the results of the RI. The description of the current situation will provide an updated summary of information relative to the following:

- Site Background Information
  - Facility location, size, structure
  - Site developmental history

- Nature and Extent of Problems
  - Hazardous substances on site (type, physical state, quantity)
  - Special waste considerations
  - Present condition of materials and structures
  - Type of contaminant releases (leachate, runoff, airborne particles)
  - Contaminant migration pathways
  - Affected media
  - Potentially affected receptors
  - Known effects on receptors
  - Mitigative actions to date and results

In addition to a presentation of the current situation, this task will be used to formally incorporate the FS management strategy described in Chapter 2.0 of

this work plan into the FS and overall remedial action program for the FMPC. A site-specific statement of the purpose(s) for response activities will be presented based on the results of the RI. The statement of purpose will identify the remedial action objectives and the actual or potential exposure pathways that will be addressed by remedial alternatives.

3.3 TASK 11 - FEASIBILITY STUDY WORK PLAN

The work plan described herein, which includes a technical approach, personnel requirements, and schedule for the FS for the FMPC, fulfills the requirements of Task 10 (now Task 11) of the approved RI/FS Work Plan for the FMPC (Revision 3, dated March 1, 1988).

3.4 TASK 12 - DEVELOPMENT OF ALTERNATIVES

This task will consist of the development of remedial action alternatives for each operable unit at the FMPC. These alternatives will be selected to protect human health and the environment and will include a range of appropriate waste management options such as source control, off-site remedial action, and on-site remedial action, as appropriate. The development of alternatives will be accomplished by the completion of activities specific to each operable unit, which include the following:

- Finalization of remedial action objectives
- Development of general response actions
- Identification of the volumes and areas of media/wastes
- Identification and screening of remedial technologies and technology process options
- Evaluation of technology process options
- Assembly of alternatives

Each of these activities, including the underlying development of operable units for application of remedial actions, will be accomplished within the framework of the previously discussed FS management strategy. The following are brief discussions of the technical scope of work associated with the above six activities.

3.4.1 Activity 12.1 - Finalization of Remedial Action Objectives

Remedial action objectives in the form of media-specific or operable unit-specific goals for protecting human health and the environment will be finalized based on public health and environmental concerns, the nature of the current problem as defined by RI findings, and applicable guidance and regulatory standards. The remedial action objectives specific to each operable unit will be developed in consultation with the U.S. EPA and will be specified on the basis of the following:

- Contaminant(s) of concern
- Exposure pathway(s) and receptor(s)
- Acceptable contaminant level or range of levels for each exposure route

The objectives will also be formulated to achieve consistency with contaminant-specific, location-specific, and action-specific ARARs. Acceptable contaminant levels will be principally determined on the basis of contaminant-specific ARARs and the companion risk assessment. The risk assessment process will be particularly important for contaminants for which no ARARs exist. The following factors could also require consideration in the specification of an acceptable exposure level for the contaminants of concern:

- Reduction in total risk from multiple chemical exposure
- Adequacy of protection of the environment
- Adequacy of protection with respect to all significant pathways

The preliminary remedial action objectives for Pit 5, as previously identified in Table 2.2, are generally those associated with waste disposal sites involving both solid and liquid wastes. These objectives include the prevention of direct contact with or ingestion of the waste materials but, more importantly, they focus on the prevention of contaminant releases to ground water and possibly air. Because of the "source control" nature of the preliminary FS for Pit 5, and without a detailed consideration of the degree of associated impacts from any releases, no contaminant-specific cleanup standards had to be incorporated into the remedial action objectives for Pit 5 at this time. If

6254

technologies involving incomplete removal or treatment of the wastes are eventually considered for Pit 5, the degree of continuing release and associated impacts on environmental receptors will require quantification in accordance with the ARARs.

3.4.2 Activity 12.2 - Development of General Response Actions

This activity consists of the identification of general response actions that will satisfy the remedial action objectives. General response actions will be designated on a media-specific or contaminant-specific basis to address one or more of the following types of potential problems at the FMPC:

- Waste sources (solids, liquids, sludges)
- Leachate generation and release
- Ground water contamination
- Surface water contamination and infiltration or release
- Air releases and effects
- Contaminated sediments and soils
- Facilities representing a potential environmental release

General response actions represent broad categories of responses that may be taken with respect to a contaminant or media and may include the following:

- No action/institutional controls
- Treatment
- Containment
- Removal
- Disposal
- Combination of the above

In subsequent activities associated with this task, specific technology types and technology process options will be identified and evaluated for the above types of general response activities.

As an example, the following general response actions were identified for the purpose of technology identification and selection for Pit 5:

- No action
- Containment (In Situ Stabilization)
- Removal
- Treatment
- Disposal

6254

3.4.3 Activity 12.3 - Identification of the Volumes and Areas of Media/Wastes

This activity focuses on the development of information on areas or volumes of media to which general response actions may be applied. The information will be developed from data generated during the RI and during the development of the current situation document. The information will be developed, as appropriate, on an operable-unit basis in accordance with the FS management strategy. The tabulations will include the identification of media and the documentation of areas or volumes. Characterizations (e.g., types and properties of materials, concentration levels, etc.) of the media will also be provided, as appropriate, with respect to the ARARs and remedial response objectives. An example of the volumes and/or areas of media to which general response actions may be applied for Pit 5 is provided in Table 3.1.

3.4.4 Activity 12.4 - Identification and Screening of Remedial Technologies and Technology Process Options

The intent of technology screening is to identify and evaluate a large universe of potentially applicable technologies such that a preferred set of technologies can be logically and justifiably selected for incorporation into more broad-based remedial alternatives. A list of potentially applicable technology types (e.g., chemical treatment) and technology process options (e.g., precipitation and ion exchange as a subset of chemical treatment) must first be identified based on the established remedial response objectives (Task 12, Activity 12.1), appropriate general response actions (Task 12, Activity 12.2), and the volume/area and characteristics of the media (Task 12, Activity 12.3).

For illustrative purposes, a preliminary list of potentially applicable technology types and technology process options for Pit 5 is given in Table 3.2. Similar lists will be developed for each type of operable unit at the FMPC. Certain types of units (e.g., the K-65 silos) will likely require a specialized list of applicable technologies, as will intended actions on a specific environmental media if such actions do not directly correspond to a distinct operable unit.

After a master list of potentially applicable technology types and technology process options has been developed, an initial screening of the technologies will be completed to reduce the number of technologies that will undergo a more formal and detailed screening in the next activity. The screening level that will be completed during this activity will be a broad-based evaluation of whether or not a technology type and/or technology process option can be "effectively implemented." Effectiveness will be evaluated in terms of technology capabilities as related to site conditions. For example, the absence of inorganic contaminants will eliminate certain chemical treatment process options from further consideration or bedrock contamination will eliminate certain containment technology types from further consideration. Table 3.3 identifies numerous site and waste characteristics that will be used in determining whether or not a technology type or process option can be effectively implemented.

The result of this broad-based screening will be the refinement of the master list of potentially applicable technologies to a smaller list, including both technology types and technology process options that can be effectively used at the site. At least one process option from each effective technology type, as well as a no-action response, will survive the screening.

The results of the initial screening of technologies for Pit 5 are also presented in Table 3.2. From this information, the applicability (or nonapplicability) of each technology type or process option to various types of general response actions for Pit 5 is readily apparent. This initial screening was accomplished through a focused review of available literature on each technology as well as from discussions with knowledgeable engineers, scientists, and equipment suppliers. Any necessary documentation of the initial screening decisions will be provided in the FS report for each operable unit.

3.4.5 Activity 12.5 - Evaluation of Process Options

This activity involves the evaluation of those technologies which remain under consideration following the broad screening which occurs in Activity 12.4. As indicated, the remaining technologies will include at least one representative process option from each effective technology type and a no-action response.

The goal of the second level of technology evaluation is to eliminate additional technology types that are deficient on a comparative basis as well as to pinpoint the most appropriate process option for each remaining technology type.

Prior to the evaluation, additional information on the technologies will be developed as a basis for the more detailed evaluation. The information will be developed in sufficient detail to allow an evaluation of each technology with respect to the following criteria:

- Effectiveness
- Implementability
- Cost

The evaluation will once again focus on the general response actions for the corresponding operable unit rather than on the sitewide FMPC remediation. The evaluation will emphasize the effectiveness factors, with less effort toward both implementability and cost, and will be completed in a relatively qualitative form. The following paragraphs discuss the considerations that will be included in these evaluations.

Effectiveness Evaluation

The evaluation of effectiveness, which will receive the most emphasis, will include consideration of the following:

- Potential effectiveness of technology types or technology process options in handling the estimated areas or volumes of media and in meeting the contaminant reduction goals identified in the general response actions

- Effectiveness of the technology in protecting human health and the environment during the construction and implementation phase

- Reliability of the technology with respect to the contaminants and conditions at the site

Implementability Evaluation

The implementability evaluation will focus primarily on institutional issues related to implementability, such as the ability to obtain permits and the availability of disposal facilities. Technical implementability will also be

considered, but with less emphasis since this criterion was already considered in the initial screening of technologies (Activity 12.4) and somewhat overlaps with the previous evaluation of effectiveness.

Cost Evaluation

Estimates of relative capital and operation and maintenance costs will be developed. The cost estimates will be qualitatively developed (high, medium, or low) on the basis of comparisons among the technologies.

A summary sheet for each of the technology types and technology process options will be developed at the completion of the evaluations. Tables 3.4 and 3.5 are examples of technology evaluation sheets developed for Pit 5.

3.4.6 Activity 12.6 - Assembly of Alternatives

The last activity in the development of alternatives is the assembly of technology types and/or technology process options into alternatives for the entire operable unit. In this process, general response actions and technology process options representative of various technology types for each medium or individual unit will be combined to form alternatives for the operable unit. Alternatives developed will include representatives of at least the following, including combinations thereof:

- Appropriate treatment alternative(s)
- Appropriate containment alternative(s)
- No-action alternative

One specific technology process option may be used to represent several similar process options within certain alternatives. The representative process option in the alternative will be used as the basis for subsequent screening of the alternatives. If the alternative remains an option after the alternative screening, further differentiation of the process options will occur as a part of the detailed evaluation of alternatives for the FS.

After the full set of alternatives is assembled, a description of each will be prepared. This documentation will include information necessary to adequately

describe the alternative and to document the logic behind the assembly of general response actions into specific remedial action alternatives. Information such as the following will be provided:

- Location and type of activities, including specific technologies
- Quantities involved
- Identification of technology process options which are used to represent similar process options in the alternative, if appropriate
- Management options for handling of residuals

Table 3.6 is a listing of remedial alternatives developed for Pit 5 as part of the example FS for that unit.

3.5 TASK 13 - INITIAL SCREENING OF ALTERNATIVES

The initial screening of alternatives will consist of the identification of a reduced list of alternatives for remedial action at the FMPC site. The initiation point for the task will be the list of remedial alternatives assembled as part of Task 12. The screening of alternatives will be accomplished by the completion of the following three specific activities:

- Refinement of alternative definition
- Preliminary evaluation of alternatives
- Screening of alternatives

The refinement of the definition and description of alternatives will be an expansion of the descriptions prepared as part of the assembly of alternatives (Activity 12.6). The preliminary evaluation will be the process in which the initial comparison of technical performance and cost is made among the alternatives. Alternative screening will be the process of deciding which alternatives are preferential, thereby reducing the number to be retained for detailed analysis. Streamlining provisions incorporated into the most recent U.S. EPA RI/FS guidance document, upon which this work plan is largely based, will be appropriately incorporated into the screening of alternatives. For example, if it is determined during the technology screening and alternative formulation process that only one or very few feasible alternatives exist for some medium or operable unit at the FMPC, the alternative screening process

for that medium or operable unit will be omitted and the detailed analysis (Task 14) will be initiated. 0254

Each of the three principal activities of the initial screening of alternatives is further discussed in the following paragraphs.

3.5.1 Activity 13.1 - Refinement of Alternative Definition

The refinement of the definition of alternatives will focus on providing more detailed information on the volumes and areas of the media of interest and on the sizes and capacities of the technology process options that comprise the various alternatives. The interactions of potentially contaminated media will also be more closely evaluated as part of this activity since an understanding of these relationships will be necessary for preparing the refined definition of alternatives.

The following specific information will be developed, as appropriate, for each of the various alternatives:

- Volumes and/or areas of the media of interest and the potential interrelationships of the media
- Size and configuration of removal, treatment, or containment systems
- Flow rates for treatment options
- Spatial requirements for construction of treatment/containment technologies, including staging requirements for materials
- Distances for disposal options (e.g., transport distances to off-site treatment/disposal facilities and distances for discharge pipelines)
- Required permits and imposed limitations (e.g., emission control requirements)
- Time frame for achievement of treatment, containment, or removal goals

3.5.2 Activity 13.2 - Preliminary Evaluation of Alternatives

In the screening evaluation, the alternatives characterized by the refined definition will be evaluated in terms of the following:

6254

- Short- and long-term effectiveness
- Short- and long-term implementability
- Short- and long-term cost

Within this framework, short-term refers to the construction and implementation period and long-term refers to the time after the remedial action is complete.

The purpose of this screening is to further reduce the number of alternatives that will be subjected to detailed analysis as part of the next task. While the alternative screening is more general than the subsequent detailed analysis, it will be sufficiently detailed to distinguish significant advantages and disadvantages among the alternatives. A key distinction between the screening and the subsequent detailed analysis of alternatives is that during screening, the emphasis in comparison will be between similar alternatives, with the most promising carried forward for further analysis, while the detailed analysis will be used for comparisons among all alternatives.

The effectiveness of each alternative will be evaluated based on the effectiveness in protecting human health and the environment and in reducing the toxicity, mobility, or volume of the contaminants involved.

The implementability of each alternative will be evaluated on the basis of the following:

- Technical feasibility - Ability to construct, reliably operate, and meet technology-specific regulations until a remedial action is complete

- Administrative feasibility - Ability to obtain regulatory approvals, availability of off-site treatment/disposal capacity, and availability of specific equipment and specialists, if necessary

The cost evaluation will include consideration of both capital and operation and maintenance costs and will be based on generic unit costs, vendor information, typical cost curves, cost estimating guides, and other appropriate information. Cost estimates will be similar to those to be developed for the detailed analysis (Task 14) but will be less detailed and for the purpose of relative comparisons of the various alternatives.

3.5.3 Activity 13.3 - Screening of Alternatives

The screening of alternatives will be a comparison of the evaluation data among the alternatives and the identification for further consideration of those alternatives with the most favorable composite evaluations. Alternatives retained will represent, as appropriate, the range of treatment/containment technologies developed. The elimination of alternatives based on a screening level evaluation of costs will occur only if the costs of a given alternative are significantly greater (e.g., an order of magnitude) than the costs of another alternative that provides similar effectiveness and protection. Alternatives with greater costs but greater public health and environmental benefits will not be eliminated on the basis of the higher costs alone.

3.6 TASK 14 - DETAILED ANALYSIS OF ALTERNATIVES

Those alternatives that survive the alternative screening in Task 13 can be considered as the preferred candidates for implementation at the FMPC. Task 14 will consist of the development of specific detailed evaluations of each of these alternatives. The detailed analysis of alternatives will be accomplished by the completion of two specific activities, as follows:

- Refinement of alternative definition
- Comparison of each alternative with established evaluation criteria

Each activity is described below.

3.6.1 Activity 14.1 - Refinement of Alternative Definition

Definitions of alternatives will be refined to the extent necessary to complete the detailed analysis of alternatives. Specifically, refinements to definitions will be made to allow for the consistent application of evaluation criteria to the alternatives and for the development of cost estimates with an accuracy of plus 50 percent to minus 30 percent. Information to be developed will include the following, as appropriate:

- Preliminary design calculations
- Process flow diagrams
- Sizing of key process components
- Preliminary site layouts
- Development of assumptions, limitations, and uncertainties

3.6.2 Activity 14.2 - Comparison of Alternatives with Evaluation Criteria 6254

In accordance with the March 1988 RI/FS guidance document, each alternative will be evaluated on the basis of (i.e., compared against) the following nine criteria:

- Short-term effectiveness
- Long-term effectiveness and performance
- Reduction of toxicity, mobility, and volume
- Implementability
- Cost
- Compliance with ARARs
- Protection of human health and the environment
- State acceptance
- Community acceptance

The first five criteria (i.e., short-term effectiveness; long-term effectiveness and performance; reduction of toxicity, mobility, and volume; implementability; and cost) are the primary criteria for the evaluation of alternatives. These criteria encompass the principal technical, cost, institutional, and risk concerns. In the evaluation of alternatives, these criteria will be considered as a group, even though evaluations will be developed individually for each criteria.

Two of the remaining criteria (i.e., compliance with ARARs and protection of human health and the environment) represent a second group of criteria that relate to the statutory findings that must be included in the ROD for the site. These are threshold criteria which are evaluated for each alternative on the basis of whether or not the alternative meets the established criteria. The evaluation of the effectiveness of protection with respect to human health and the environment will be based on a composite of factors assessed under other criteria, particularly long-term effectiveness and performance, short-term effectiveness, and compliance with ARARs.

The last two criteria (state acceptance and community acceptance) reflect regulatory agency and public concerns and apparent preferences for certain alternatives. During the performance of Task 14, alternatives may not be thoroughly evaluated with respect to the community acceptance criteria since available information is often limited until the time that the FS report is

issued for public comment. Additionally, a separate, formal evaluation of state acceptance may not be necessary. The Ohio Environmental Protection Agency (OEPA) has been and remains an active participant in the review of RI/FS findings and reports. Consequently, the concerns of the state are being addressed as the project progresses. This is more fully discussed in Chapter 4.0.

A detailed discussion of the procedures for the detailed evaluation of each alternative is given in Chapter 4.0. The analysis of individual alternatives will be documented in the form of narrative discussions and supporting tabulations and figures, as necessary. The discussion for each alternative will include a description of the alternative and the detailed assessment relative to each criterion.

3.7 TASK 15 - EVALUATION AND SELECTION OF PREFERRED ALTERNATIVES

This task will consist of the comparative evaluation of alternatives based on the detailed evaluation of each alternative with respect to the nine specific criteria. The advantages and disadvantages of each alternative relative to other alternatives will be identified and summarized. The summary will include documentation of relative strengths and weaknesses of each alternative, effects of variations in key uncertainties, and key differences (qualitative and/or quantitative) among alternatives. This analysis will be used as a basis to evaluate the tradeoffs among alternatives. The results of this evaluation will be used to identify the "preferred alternative" for remediation of each operable unit at the FMPC site, subject to the concurrence and approval of the U.S. EPA.

3.8 TASK 16 - DRAFT FS REPORT

A draft FS report presenting the methods and results of Tasks 12 through 15, including the identification of a "preferred remedial action alternative," will be prepared. To the degree practical, the report will be prepared in a format similar to that outlined in the U.S. EPA's guidance document. This outline is presented in Table 3.7. The report will be provided for distribution to the U.S. EPA and the OEPA for their review and comment.

3.9 TASK 17 - FINAL FS REPORT

A final FS report will be prepared which incorporates the comments of the U.S. EPA and the OEPA. The final report will be provided for final agency review and approval as well as public review and comment. Included in Task 17 will be the preparation of a responsiveness summary to respond to all comments received from the general public.

3.10 ADDITIONAL REQUIREMENTS

The FS scope of work, as defined in the FFCA and the RI/FS Work Plan, called for an additional task to account for management reporting, community relations support, and any other support activities. Because similar tasks have already been administratively established in support of the RI efforts that remain in progress, it is proposed that these same tasks be maintained for this purpose and the corresponding FS task be deleted. In particular, Task 7 accounts for project management, quality assurance, and health and safety activities, while Task 8 has been established for community relations support. An additional task (Task 9) has also been set up to allow for the performance of other types of technical functions that are not strictly RI/FS activities but that may provide additional data for the RI/FS.

6254

4.0

4.0 TECHNICAL APPROACH: DETAILED EVALUATION OF ALTERNATIVES 6254

4.1 INTRODUCTION

Chapter 3.0 presented a review of nine tasks that represent the technical approach for the FS portion of the sitewide RI/FS at the FMPC. A principal element of the FS is Task 14 - Detailed Analysis of Alternatives, which was summarily addressed in Section 3.6. Due to the critical role of this task in the FS process, however, as well as the need to recognize significant procedural changes with respect to the latest U.S. EPA guidance, a separate chapter (Chapter 4.0) has been devoted to a more thorough presentation of the proposed technical approach to the detailed analysis of alternatives.

The detailed evaluation of alternatives will be completed in a fashion that demonstrates and documents the capacity of each alternative to satisfy the statutory requirements that must be addressed in the ROD. These include the requirements of CERCLA and SARA to:

- Protect human health and the environment
- Attain ARARs or support grounds for a waiver
- Be cost-effective
- Apply permanent solutions to the extent practical
- Preferentially select treatment that reduces toxicity, mobility, or volume

Additional statutory considerations relative to the recent emphasis on evaluating long-term effectiveness and related considerations include the following:

- Long-term uncertainties associated with land disposal
- Requirements of the Solid Waste Disposal Act (SWDA)
- Persistence, toxicity, and mobility of hazardous substances and constituents and their propensity to bioaccumulate
- Short- and long-term potential for adverse health effects and human exposure

6254

- Long-term maintenance costs
- Potential for future remedial action costs if the action implemented fails
- Potential threat to human health and the environment associated with excavation, transportation, and redisposal of contaminated materials

To promote a systematic approach to the evaluation of alternatives in terms of these statutory requirements, the following nine evaluation criteria are expected to be adopted by the U.S. EPA for use in the detailed evaluation of alternatives:

- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Cost
- Compliance with ARARs
- Overall protection of human health and the environment
- State acceptance
- Community acceptance

As indicated in Section 3.6.2, the first five criteria are the primary evaluation criteria for each alternative. These five criteria represent the principal technical effort of Task 14 in that technical feasibility and reliability must be comprehensively addressed while considering cost, institutional, and risk concerns. The compliance with ARARs and the protection of human health and the environment criteria relate to statutory findings that must be addressed in the ROD. These are threshold criteria that draw from the findings of the evaluation of the previous five criteria. The state and community acceptance criteria reflect agency and public concerns and preferences for alternatives. These are typically accounted for in the final selection process but do not significantly influence the evaluation of alternatives in terms of the other seven criteria.

The extent (level of detail) of analysis of the alternatives will be based on the extensiveness of the available data base, the number and types of alternatives remaining from the screening step (Task 13), and the level of developmental analysis completed as part of the FS prior to this activity. The

results of treatability studies completed as part of the RI will be incorporated into this detailed analysis.

The following sections discuss the pertinent considerations relative to each of the nine evaluation criteria that form the technical approach to Task 14. The considerations and specifications are based largely on those presented in the March 1988 RI/FS guidance document.

4.2 SHORT-TERM EFFECTIVENESS

Short-term effectiveness is a measure of the technical effectiveness of the alternative to protect human health and the environment over the short-term. The short-term effectiveness assessment will consider the effectiveness of each alternative in protecting human health and the environment from the initiation of remedial action activities up to the time when the response objectives are achieved. The short-term effectiveness of each alternative will be evaluated on the basis of the following four analysis factors:

- Protection of the community during remedial action
- Protection of workers during remedial action
- Environmental impacts associated with implementation of the remedial action
- Time frame for achievement of the remedial response objectives

4.2.1 Protection of the Community During Remedial Action

The evaluation for this factor will be based on the identification and assessment of the risks posed to the community and will include consideration of the following:

- Type and magnitude of risk (e.g., spill during waste transport)
- Nature and location of potential receptors
- Controllability of the risk
- Availability and effectiveness of mitigative measures

Risks will be qualitatively and quantitatively assessed as appropriate. At the FMPC, the risks posed to the community could vary considerably depending

on the types of actions being evaluated. Any action involving off-site transport and disposal would likely represent the greatest potential impact to the community. For on-site activities, airborne releases would have the most direct potential impact on the community in the short-term, with any work involving the K-65 silos representing the greatest concern. Short-term risks associated with soils, surface water, or ground water would be less likely and could be more easily mitigated before the community was affected.

4.2.2 Protection of Workers During Remedial Action

The evaluation for this factor will be based on the identification and assessment of risks posed to personnel involved in the supervision and completion of the remedial action effort. It will include consideration of the following:

- Type and magnitude of risk (e.g., exposure to radioactive or hazardous compounds)
- Number of exposed workers and duration of exposure
- Controllability of the risk
- Availability and effectiveness of mitigative measures

Risks will be qualitatively and quantitatively assessed as appropriate. The presence of radiological waste materials at the FMPC requires special consideration when evaluating worker protection. In particular, the "as low as reasonably achievable" (ALARA) goals will be evaluated as a critical determinant of the relative acceptability of a given alternative. For purposes of the FS at the FMPC, DOE, and Westinghouse Materials Company of Ohio (WMCO) plant personnel will be considered under the category of "worker protection" to distinguish these individuals from the community as a whole.

4.2.3 Environmental Impacts Associated with Implementation of the Remedial Action

The evaluation for this factor will be based on the identification and assessment of the environmental impacts associated with implementation of each alternative and will include consideration of the following:

- Nature and extent of the impact
- Magnitude of the impact

6254

- Duration of the impact
- Avoidability/reversibility of the impact
- Availability and effectiveness of mitigative measures

Impacts will be qualitatively and quantitatively assessed as appropriate.

4.2.4 Time Frame for Achievement of Remedial Response Objectives

The evaluation for this factor will be based on the determination of the time required to achieve protection for the entire site or individual operable units associated with specific site areas or threats. It will include consideration of the time frame for achievement of the following:

- Protection against public health or environmental threats being addressed by a specific action
- The overall remedial response objectives for the specific operable unit associated with the alternative being evaluated

4.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Long-term effectiveness is a measure of the technical effectiveness of the alternative to protect human health and the environment after achievement of the remedial response objectives. The long-term effectiveness assessment will focus on the effectiveness of each alternative in protecting human health and the environment from residuals or untreated materials remaining on site. The long-term effectiveness and permanence of each alternative will be evaluated on the basis of the following three analysis factors:

- Magnitude of remaining risk
- Adequacy of controls
- Reliability of controls

4.3.1 Magnitude of Remaining Risk

The evaluation for this factor will be based on the identification and assessment of risks posed to the community and the environment by untreated waste or treatment residuals remaining after the achievement of the remedial response objectives. The evaluation of remaining risk will include consideration of the following:

6254

- Nature of residuals

  - Type
  - Quantities
  - Characteristics (radioactivity, toxicity, mobility, and bioaccumulation potential)
  - Location

- Nature of potential receptors

  - Type (human or environmental)
  - Characteristics (numbers and locations)

- Potential risks and impacts

  - Expected exposure levels compared to acceptable levels
  - Cumulative doses compared to acceptable limits

The magnitude of remaining risk will be qualitatively and quantitatively assessed as appropriate. A distinction will be made between on-site workers and the community as a whole. The methodology for this assessment will be consistent with that formulated for the risk assessment in Task 4 of the RI.

4.3.2 Adequacy of Controls

The evaluation for this factor will be based on an assessment of the adequacy and suitability of controls (physical, institutional, or other) that will be used to manage residuals or untreated waste at the site in protecting human health and the environment. The evaluation of the adequacy of controls will include consideration of the following:

- Nature and type of long-term management required (e.g., containment, monitoring, and maintenance)

- Time frame necessary for individual management practices to be implemented

- Ability of management practices to meet performance specifications of the alternative

- Difficulties and uncertainties associated with the individual management practices

4.3.3 Reliability of Controls

The evaluation for this factor will be based on an assessment of the long-term reliability of any physical, institutional, or other controls implemented to provide continued protection from residuals and untreated wastes at the FMPC. The evaluation of the reliability of controls will include consideration of the following:

- Potential need for replacement components
- Maintenance requirements for control systems
- Risks to human health and the environment posed by the need for replacement of systems or components

The final disposition of the FMPC site and any related institutional controls will also be addressed under this criterion.

4.4 REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

CERCLA, through the promulgation of SARA, includes a statutory preference for the application of those technologies that reduce the toxicity, mobility, or volume of wastes and contaminated materials. This portion of the detailed evaluation is designed to assess the characteristics of each alternative with respect to this statutory requirement. The evaluation will include consideration of the following:

- Treatment process and remedy
- Amount of hazardous or radioactive material destroyed or treated
- Reduction in toxicity, mobility, or volume
- Irreversibility of the treatment
- Type and quantity of treatment residue

4.4.1 Treatment Process and Remedy

The treatment processes for each alternative will be evaluated with respect to their ability to address the principal chemical or radiological threats posed by the operable unit. Any special requirements associated with the process to achieve this capability will be considered. The presence of radioactive and mixed wastes at the FMPC will require the consideration of several innovative technologies, thereby underscoring the importance of this criterion.

6254

4.4.2 Amount of Hazardous or Radioactive Material Destroyed or Treated

This evaluation will include the quantitative determination of the amount (volume or mass) of contaminated material that would be destroyed and/or treated as a result of implementing each alternative. The potential need to consider both radionuclides and hazardous chemicals will introduce additional complexity into this determination.

4.4.3 Reduction in Toxicity, Mobility, or Volume

This evaluation will include qualitative and quantitative determinations, as appropriate, of the reduction in toxicity, mobility, and/or volume of contaminants that could be achieved through the implementation of each alternative. Radioactive wastes can be directly evaluated in terms of reducing mobility and volume. In terms of toxicity, the evaluation will be influenced by the importance of the chemical toxicity associated with each radionuclide. For example, uranium toxicity is expected to be an important consideration in the risk assessment and, therefore, in the evaluation of remedial actions.

4.4.4 Irreversibility of the Treatment

This evaluation will focus on the determination of the extent to which effects of treatment (i.e., reduction in toxicity, mobility, or volume) are irreversible. The evaluation will also identify and consider those conditions which affect irreversibility.

4.4.5 Type and Quantity of Treatment Residue

The residuals associated with the treatment process in each alternative will be evaluated with respect to the following:

- Nature of residuals
- Quantities and characteristics (radiological, chemical, and physical) of residuals
- Human health and environmental risks posed by residuals (Section 4.3.1)

The completion of this technology-based factor will provide the key input to the evaluation of long-term effectiveness, as discussed in Section 4.3.

4.5 IMPLEMENTABILITY

The implementability assessment will evaluate the technical and administrative feasibility of implementing each alternative. The implementability of each alternative will be evaluated on the basis of three principal factors: technical feasibility, administrative feasibility, and the availability of necessary services and materials.

4.5.1 Technical Feasibility

The technical feasibility of each alternative will be evaluated on the basis of each of the following:

- Ability to construct technology
- Reliability of technology
- Ease of undertaking additional remedial actions (if necessary)
- Monitoring considerations

Ability to Construct Technology

The ability to construct the technology will be evaluated on the basis of both the difficulties and uncertainties related to construction. This factor will consider not only the developmental status of any physical process units but also any site-specific constraints such as subsurface conditions, space limitations, etc.

Reliability of Technology

Technological reliability will be evaluated based on the ability of a given technology to meet specified efficiencies or performance goals and on the probability that technical problems will result in nonperformance and schedule delays. As mentioned previously, the emphasis on permanent solutions and the presence of radioactive and mixed wastes will likely require consideration of numerous technologies that are still in a developmental phase. Existing information will be used to the extent practical, with the results of any laboratory- or bench-scale studies to be completed in Task 5 providing additional performance data.

Ease of Undertaking Additional Remedial Actions

The ease of undertaking additional remedial actions will be evaluated on the basis of the difficulty of implementing future remedial actions, if necessary. In the case of the FMPC, the importance of this factor depends on how the operable units have been selected within the FS management strategy described in Chapter 2.0. Since the interdependencies of various actions were given primary consideration in the formulation of operable units (i.e., the operable units were selected so as to best achieve an independence of actions across operable units), the importance of this evaluation factor has been significantly reduced.

Monitoring Considerations

The ability to monitor the effectiveness of each alternative will be evaluated. The evaluation will consider the exposure pathways that exist and the ability to adequately monitor these individual pathways. The evaluation will also consider the risks of exposure that exist should monitoring be inadequate to detect the failure of various components of each alternative.

4.5.2 Administrative Feasibility

The administrative feasibility of implementing each alternative will be evaluated on the basis of the coordination requirements with local, state, and federal regulatory agencies from whom permits, approvals, and/or notifications are necessary for the implementation of the alternative. The evaluation will consider the following:

- Number of agencies involved and the specific requirements
- Potential permitting requirements for on-site and off-site activities, if necessary
- Long-term reporting or other requirements

4.5.3 Availability of Necessary Services and Materials

The availability of services and materials will consider several issues, including the availability of off-site treatment, storage, or disposal capacity; availability of necessary on-site equipment and specialists; and availability of the proposed technologies for each alternative.

Availability of Treatment, Storage, or Disposal Services

The availability of off-site treatment/storage/disposal services will be evaluated on the basis of the following:

- Availability of services
- Locations of services
- Capacities of available services relative to FMPC needs with respect to each alternative
- Effects of lack of availability on implementation

The evaluation will include consideration of all necessary off-site services for each alternative. Those alternatives associated with mixed waste will likely be severely constrained by the lack of off-site treatment, storage, and disposal services.

Availability of Necessary Equipment and Specialists

Certain alternatives may be developed which include the need for specialized equipment and possibly specialized technical personnel. Each alternative will be evaluated with respect to the equipment requirements and the availability of equipment as well as the need for specially trained or experienced personnel to set up or operate the equipment or to implement a specific component of an alternative. The anticipated need to consider innovative and possibly unproven technologies for some operable units at the FMPC could exacerbate the need for specialized equipment and experts.

Availability of Proposed Technologies

The current or projected availability of technologies that are included in each alternative will be evaluated as well as their status (e.g., proven, pilot scale only, etc.) with respect to the proposed application. The evaluation will also consider the nature of future technological developments required before full-scale application is possible, the time frame for full-scale availability, and the ability to obtain the technology on a competitive-bid basis.

4.6 COST

Capital costs, both direct (construction) and indirect (nonconstruction and overhead), and operation and maintenance (postconstruction) costs will be considered in the detailed evaluation of alternatives, as appropriate. Costs will be developed within an accuracy of plus 50 percent to minus 30 percent. The following is a listing of the types of costs to be included in the evaluation:

- Capital costs (direct)
  - Construction costs (materials, labor, and equipment needed to construct all facilities associated with an alternative)
  - Equipment costs (primary and secondary equipment needed to enact the remedy; these remain until the remediation is complete)
  - Land and site development costs (land purchase and site preparation)
  - Buildings and services costs (process and nonprocess buildings, utility connections, and purchased services)
  - Relocation expenses (temporary or permanent accommodations for affected nearby residents--not expected at Fernald)
  - Disposal costs (transportation and disposal of waste and construction materials)
  - Expenses associated with any necessary, temporary shutdown of FMPC plant operations to accommodate construction activities
- Capital costs (indirect)
  - Engineering expenses (administration, design, construction supervision, drafting, and treatability testing)
  - Legal fees and license or permit costs (administrative and technical costs of obtaining licenses and/or permits to install and operate)
  - Start-up and shakedown costs (costs incurred during remedial action start-up)
  - Contingency allowance (funds to cover unforeseen circumstances)
- Operation and maintenance costs (annual costs)
  - Operating labor costs - Wages, salaries, training, overhead, and fringe benefits of labor needed for postconstruction operations

- Maintenance materials and labor costs - Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment

- Auxiliary materials and energy - Costs of such items as chemicals and electricity for treatment plant operations, water and sewer services, and fuel

- Disposal of residues - Costs to treat or dispose of residuals from treatment processes

- Purchased services - Sampling costs, laboratory fees, and professional fees for activities such as monitoring that may be necessary

- Administrative costs - Administrative costs not included under other categories:

- Insurance, taxes, and licensing costs - Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs

- Maintenance reserve and contingency funds - Annual payments into escrow funds to cover costs of anticipated replacement or rebuilding of equipment and any large unanticipated operation and maintenance costs

- Rehabilitation costs - Costs for maintaining equipment or structures that wear out over time

- Costs of periodic site review - Costs for site reviews conducted at least every five years if wastes above health-based levels remain at the site

In addition to the development of cost estimates, the cost evaluation will include a present-worth analysis. The present-worth analysis for each alternative will be used to evaluate expenditures that accumulate over different time periods by discounting all future costs to a common base year. The following assumptions will be used in the completion of the analysis:

- Base year will be the current year

- Discount rate of 5 percent (before taxes and after inflation)

- 30-year period of performance, unless a more appropriate period is stipulated for a given action

If necessary and appropriate, the present-worth analysis for a remedial alternative will be subjected to a cost sensitivity analysis. The need for a sensitivity analysis will be based upon the degree of uncertainty concerning the assumptions used to develop the present-worth analysis for each alternative. Particular attention will be given to the identification of factors in alternatives for which small changes in the cost values of the factors may result in significant changes in overall costs of the alternative. If a cost sensitivity analysis is completed for an alternative(s), the following factors will be used as sensitivity parameters, as appropriate:

- Effective life of the alternative
- Operation and maintenance costs
- Duration of cleanup in terms of both project duration and the time to achieve the cleanup goals
- Alternative design assumptions and parameters
- Discount rate

4.7 COMPLIANCE WITH ARARs

The evaluation for this factor will be based on an assessment of whether or not each alternative complies with federal and state ARARs and other TBC requirements. During the evaluation of each alternative, the pertinent ARARs will be identified and the ability of the alternative to fulfill the requirement will be assessed. The March 1988 guidance document defines the following four general categories of ARARs:

- Contaminant specific - These define acceptable exposure levels and are to be used in establishing remedial action objectives.
- Action specific - These typically set controls or restrictions for particular treatment or disposal activities and include such requirements as the RCRA minimum technology standards.
- Location specific - These typically set restrictions within specific locations such as wetlands, floodplains, historic sites, etc.
- Other appropriate criteria, advisories, and guidance - These involve consideration of federal and state guidelines that are not ARARs but that have been identified by the involved regulatory agencies as TBC requirements (issues which need to be considered).

Chapter 5.0 of this work plan provides more detailed information on ARARs that have been tentatively identified as applicable to the FMPC project.

4.8 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The evaluation of overall protection of human health and the environment will consider the degree to which each alternative protects and maintains the protection of human health and the environment. The evaluation will be completed based on the composite results of alternative evaluations against the following other criteria:

- Short-term effectiveness
- Long-term effectiveness and permanence
- Compliance with ARARs

The analysis will indicate how each alternative achieves protection and reduces risk as well as the time frame necessary to achieve these levels of protection. The evaluation will also indicate how risks are reduced (e.g., waste destruction, reduction in mobility, etc.).

4.9 STATE ACCEPTANCE

The evaluation of state acceptance is designed to address the technical and administrative issues and concerns of the State of Ohio regarding the alternatives under consideration. In the case of the RI/FS at the FMPC, the OEPA is an active participant in project reviews along with the U.S. EPA. The OEPA is provided with work plans, data reports, and other project deliverables for review and comment. Periodic technical information exchange meetings are also held to promote the timely input of OEPA in the RI/FS process. Therefore, state concerns regarding the RI/FS have been and will continue to be incorporated into the project as it develops. The evaluation of state acceptance should, therefore, be a straightforward criterion to satisfy throughout the FS and ROD processes.

4.10 COMMUNITY ACCEPTANCE

Information on community acceptance of each alternative for the FMPC will likely be fragmentary and incomplete during the detailed evaluation of alternatives for each operable unit. The designated forum for public input is the

public comment period that will occur upon issuance of the FS report. At that time, public concerns will be fully addressed. For purposes of Task 14, the evaluation of community acceptance of each alternative will be based solely on community positions on specific alternatives that have been documented during the FS process.

6254

5.0

5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

5.1 INTRODUCTION

One of the major concerns in the development of remedial action alternatives for sites which are being investigated under CERCLA guidelines is the degree of human health and environmental protection afforded by each alternative. U.S. EPA policy states that in the process of the development and selection of remedial action alternatives, primary consideration should be given to alternatives that attain or exceed the ARARs as defined by the NCP and amended by SARA. The purpose of this requirement is to make CERCLA remedial actions consistent with pertinent federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. Also included is the provision that state ARARs must be met if they are more stringent than federal requirements.

SARA defines an ARAR as:

- Any standard, requirement, criterion, or limitation under federal environmental law
- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation

Applicable requirements are those federal and state requirements that would be legally applicable to a remedial action if that action was not undertaken pursuant to CERCLA. Federal statutes that are specifically cited in CERCLA include the SWDA, the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Air Act (CAA), the Clean Water Act (CWA), and the Marine Protection Research and Sanctuaries Act (MPRSA). Relevant and appropriate requirements are those federal and state human health and environmental requirements that apply to circumstances sufficiently similar to those encountered at CERCLA sites wherein their application would be appropriate although not legally required. Relevant and appropriate requirements are intended to carry the same weight as applicable requirements.

U.S. EPA has also indicated that other federal and state criteria, advisories, and guidance, as well as local ordinances, be considered as appropriate in the development of remedial action alternatives. These types of requirements have been termed factors to be considered and are assigned on a site-specific basis.

ARARs can be categorized into three broad classifications, as follows:

- Contaminant Specific - These ARARs define acceptable exposure levels for specific chemicals and, therefore, should be used in establishing preliminary cleanup goals. Such ARARs may be actual concentration-based cleanup levels or they may provide the basis for calculating such levels.

- Location Specific - These ARARs may set restrictions on activities within specific locations, such as floodplains or wetlands.

- Action Specific - These ARARs may set controls or restrictions for particular treatment and disposal activities related to the management of radiological or hazardous wastes. Examples include monitoring requirements, effluent discharge limitations, hazardous waste manifesting requirements, and occupational health and safety requirements.

Section 121 of SARA identifies six circumstances under which ARARs may be waived:

- The remedial action is only a part of a total remedial action where the final remedy will attain the ARAR upon completion.

- Compliance with the ARAR will result in a greater risk to human health and the environment than alternative options.

- Compliance with the ARAR is technically impracticable from an engineering perspective.

- An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach.

- The ARAR is a state requirement that the state has not consistently applied (or demonstrated the intent to apply consistently) in similar circumstances.

- Compliance with the ARAR will not provide a balance between protecting human health and the environment and the availability of Superfund money for response at other facilities. (This does not directly apply to the FMPC but could be related to the availability of DOE

funds that must be distributed across all DOE facilities undergoing environmental remediation.)

In this chapter, the ARARs for the FMPC are presented for purposes of establishing a baseline for further discussions among involved agencies. The presentation is preliminary and has been completed to the extent practical without the consideration of risk-based issues that will be addressed in the forthcoming risk assessment.

5.2 PRELIMINARY IDENTIFICATION OF ARARs

The establishment of final federal and state ARARs for the evaluation of remedial action alternatives for each operable unit at the FMPC will be a progressive, multistep process involving interactive discussions among DOE, U.S. EPA, and OEPA. The purpose of this section is to identify a comprehensive, preliminary list of ARARs to initiate the communications among involved agencies at an early stage in the FS process. Many of the identified ARARs may eventually be found not to be applicable or appropriate to certain operable units at the FMPC; others may be added based on subsequent discussions or regulatory changes.

Tables 5.1 through 5.6 present the federal and state ARARs that have been preliminarily identified for the FMPC. The ARARs have been broken down into their respective groupings, as follows:

- Table 5.1 - Federal, Contaminant Specific
- Table 5.2 - State, Contaminant Specific
- Table 5.3 - Federal, Location Specific
- Table 5.4 - State, Location Specific
- Table 5.5 - Federal, Action Specific
- Table 5.6 - State, Action Specific

Other federal and state criteria, advisories, and guidance have also been included in Tables 5.1 through 5.6 and have been delineated as TBC factors. A brief statement of the rationale for preliminarily selecting each entry is also provided in the tables. More extensive descriptions of the ARARs and TBC factors are presented in the following sections.

5.2.1 Federal ARARs

Federal ARARs and TBC factors include the following:

- NCP 40CFR300 - Originally developed under the CWA, provides the framework for cleanup and remedial action of environmental releases of pollutants.

- SARA - Amendments to CERCLA.

- RCRA of 1976 (Amended 1984) - Governs the generation, transportation, storage, and disposal of hazardous wastes. RCRA 40CFR264 standards are used for remedial actions, including off-site hauling and disposal of hazardous wastes, on-site capping and landfilling, and ground water monitoring. Potentially applicable sections include:

  - Section 261 - Identification and listing of hazardous waste

  - Section 262 - Standards applicable to generators of hazardous waste

  - Section 263 - Standards applicable to transporters of hazardous waste

  - Section 264 - Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities

  - Section 265 - Interim status standards for owners and operators of hazardous waste treatment, storage, and disposal facilities

  - Section 267 - Interim standards for owners and operators of new hazardous waste land disposal facilities

  - Section 268 - Land disposal restrictions

  - Section 270 - The U.S. EPA-administered hazardous waste permit program

  - Subtitle C - Regulations for tanks for the storage or treatment of hazardous wastes

  - Subtitle I - Proposed regulations for the storage of petroleum and hazardous substances.

- SDWA - Establishes standard MCLs which are enforceable standards for contaminants in public drinking water supply systems. They not only consider health factors but also the economic and technical feasibility of removing a contaminant from a water supply system. The U.S. EPA has recently proposed MCL goals (MCLGs) for several organic and inorganic compounds in drinking water. MCLGs are nonenforceable guidelines that do not consider the technical feasibility of contaminant removal.

- TSCA - Provides authority to require testing of chemical substances entering the environment and the regulation of the substances, where necessary. Polychlorinated biphenyls (PCBs) regulation and enforcement are important aspects of TSCA. 40CFR761 established regulations for manufacturing, processing, distribution in commerce, and use prohibitions for PCBs.

- U.S. EPA Health Advisories - Provides nonenforceable guidelines, developed by the U.S. EPA Office of Drinking Water, for chemicals that may be intermittently encountered in public water supply systems. Health advisories are available for short-term, longer-term, and lifetime exposures for a 10-kilogram child and/or a 70-kilogram adult.

- CWA (as amended) - Governs point-source discharges through the National Pollutant Discharge Elimination System (NPDES), discharges of dredged or fill materials, and oil and hazardous spills to U.S. waters.

- AWQC - Established criteria for 64 pollutants in 1980 (45CFR231) pursuant to Section 304(a)(1) of the CWA. In 1983, U.S. EPA revised nine criteria which are not legally enforceable but have been used by many states to develop enforceable water quality standards. AWQC are available for the protection of human health from exposure to contaminants in drinking water, from ingestion of aquatic biota, and for the protection of fresh water and salt water aquatic life.

- CAA - Governs air emissions resulting from remedial actions. The CAA promulgated the National Ambient Air Quality Standards (NAAQS) (40CFR50). NAAQS are available for six chemicals or groups of chemicals and for airborne particulates. The sources of the contaminant and the route of exposure were considered in the formulation of the standards. These standards do not consider the costs of achievement or the feasibility of implementation. The NAAQS allow for a margin of safety to account for unidentified hazards and effects.

- Guideline for Specification of Disposal Sites for Dredged or Fill Material (40CFR230) - Establishes guidelines applicable to the dredge and fill of wetland environments (Section 404(b)(1)).

- Rivers and Harbors Act of 1899 (33CFR320 through 33CFR327) - Requires permits for construction work that may affect navigable waters.

- Dredged Material Disposal Sites Denial or Restriction Procedures (40CFR231) - Establish procedures for prohibiting or withdrawing the specification, or denying, restricting, or withdrawing the use for specification, of any defined area as a disposal site for dredged or fill material pursuant to Section 404(c) of the CWA (Section 404 procedures).

- Regulation of Activities Affecting Water of the U.S. (33CFR320 through 33CFR329) - U.S. Army Corps of Engineers regulations that are applicable to wetlands and navigable waters.

- Occupational Health and Safety Act (29CFR1910, 29CFR1926, and 29CFR1904) - Provides occupational safety and health requirements applicable to workers engaged in on-site field activities.

- Federal Floodplain Executive Order (11988) - Provides for consideration of floodplains during remedial actions. This Executive Order is to be considered as implemented by the U.S. EPA's August 6, 1985 Policy on Floodplains and Wetlands Assessments for CERCLA actions (CERCLA Compliance Policy).

- Federal Wetlands Executive Order (11990) - Provides for consideration of wetlands during remedial actions. The Executive Order is to be considered as implemented by U.S. EPA's August 6, 1985 Policy on Floodplains and Wetlands Assessments for CERCLA actions (CERCLA Compliance Policy).

- U.S. Department of Transportation (DOT) Regulations for Hazardous Materials Transport (49CFR107 and 49CFR171.1 through 49CFR171.500) - Regulate the transport of hazardous waste materials, including packaging, shipping equipment, and placarding. These requirements are considered applicable to any wastes shipped off site for laboratory analysis, treatment, or disposal.

- Endangered Species Act of 1978 (16USC153) - Provides for consideration of the impacts on endangered and threatened species.

- Fish and Wildlife Coordination Act (16USC661) - Provides for consideration of the impacts on wetlands and protected habitats.

- Fish and Wildlife Improvement Act of 1978 (16USC742a) - Provides for consideration of the impacts on wetlands and protected habitats.

- Health Effects Assessments - Present toxicity data for specific chemicals for use in public health assessments. Also considered applicable are Carcinogenic Potency Factors and Reference Doses provided in the Superfund Public Health Evaluation Manual (U.S. EPA, October 1986).

- Ground Water Protection Strategy - Documents U.S. EPA's policy to protect ground water for its highest present or potential beneficial use. This policy will be incorporated into future regulatory amendments. The strategy designates three categories of ground water:

  - Class 1 - Special Ground Waters: Waters that are highly vulnerable to contamination and are either irreplaceable or ecologically vital sources of drinking water.

  - Class 2 - Current and Potential Sources of Drinking Water and Waters Having Other Beneficial Uses: Waters that are currently used or that are potentially available for use.

- Class 3 - Ground Water Not a Potential Source of Drinking Water and of Limited Beneficial Use: Class 3 ground water units are further subdivided into the following two subclasses:

  a. Subclass 3A includes ground water units that are highly to intermediately interconnected to adjacent ground water units of a higher class and/or surface waters. They may, as a result, be contributing to the degradation of the adjacent waters. They may be managed at a similar level as Class 2 ground waters, depending upon the potential for producing adverse effects on the quality of adjacent waters.

  b. Subclass 3B is restricted to ground water units characterized by a low degree of interconnection to adjacent surface waters or other ground water units of a higher class within the Classification Review Area. These ground waters are naturally isolated from sources of drinking water in such a way that there is little potential for producing adverse effects on quality. They have low resource value outside of mining or waste disposal.

- National Environmental Policy Act (NEPA) of 1969 - Promotes consideration of environmental concern by federal agencies. Declares a national environmental policy and goals and provides a method for accomplishing these goals.

- U.S. Nuclear Regulatory Commission (NRC) Regulations for Standards for Protection Against Radiation (10CFR20) - Establishes standards for protection against radiation hazards arising out of activities under licenses issued by the NRC and is issued pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974.

- NRC Regulations for Licensing Requirements for Land Disposal of Radioactive Waste (10CFR61) - Establish the procedures, criteria, and terms and conditions upon which the commission issues licenses for the land disposal of radioactive wastes containing by-product source and special nuclear material.

- NRC Regulations for Packaging and Transportation of Radioactive Material (10CFR71) - Reestablish (1) requirements for packaging, preparation for shipment, and transportation of licensed material and (2) procedures and standards for NRC approval of packaging and shipping procedures for fissile material and for a quantity of other licensed material in excess of Type A quantity.

- U.S. EPA Regulations for Environmental Radiation Protection Standards for Nuclear Power Operations (40CFR190) - Applies to radiation doses received by members of the public in the general environment and to radioactive materials introduced into the general environment as a result of operations which are part of the nuclear fuel cycle.

6254

- U.S. EPA Regulations for Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes (40CFR191) - Apply to radiation doses received by members of the public as a result of the management and storage of spent nuclear fuel or high-level or transuranic wastes at any disposal facility that is operated by the DOE and that is not regulated by the NRC or by agreement states.

- U.S. EPA Regulations for Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40CFR192) - Applies to the control of residual radioactive material at designated processing or depository sites under Section 108 of the Uranium Mill Tailings Radiation Control Act of 1978 and to restoration of such sites following any use of subsurface minerals under Section 104(h) of the above-referenced act.

- U.S. EPA Regulations for National Emission Standards for Radionuclide Emissions from DOE Facilities (40CFR61) - Applies to all facilities that are owned and operated by the DOE, except any facility regulated under 40CFR190, 40CFR191, or 40CFR192.

- DOT Regulations for Licensed Material Transport (49CFR170 through 49CFR198) - Regulates the transport of licensed material, including packaging, marking and labeling placarding, monitoring, etc.

- DOE Order for General Environmental Protection Requirements (5400.1) (Draft - April 17, 1988) - Proposes environmental protection program requirements, authorities, and responsibilities for DOE operations.

- DOE Order for Environmental Compliance Issue Coordination (5400.2) (August 13, 1987) - Sets forth policy, direction, and procedures for coordinating environmental issues that are of significance to DOE.

- DOE Order for Radiation Protection of the Public and the Environment (5400.3) (Draft) - Establishes a program and standards for radiation protection.

- DOE Order for Radiological Effluent Monitoring and Environmental Surveillance (5400.xy) (Draft) - Establishes procedures for radiological monitoring and environmental surveillance for DOE facilities.

- DOE Order for CERCLA Program (5400.4) (Draft) - Provides direction for DOE to implement a CERCLA program.

- DOE Order for NEPA (5440.1C) (April 9, 1985) - Establishes DOE policy for implementation of NEPA.

- DOE Order for Environmental, Safety, and Health Program for DOE Operations (5480.1B) (September 23, 1986) - Outlines environmental, safety, and health protection policies and responsibilities.

6254

- DOE Order for Radiation Protection of the Public and the Environment (5480.xx) - Establishes standards and requirements with respect to protection of the public and the environment against radiation.

- DOE Order for Hazardous and Radioactive Mixed Waste Management (5480.2) - Establishes hazardous waste management procedures for facilities operated under authority of the Atomic Energy Act of 1954, as amended.

- DOE Order for General Environmental Protection Program Requirements (5480.12) - Has been developed to integrate, consolidate, and update DOE environmental requirements for field organizations and to identify roles and authorities for headquarters and field organizations.

- DOE Order for Environment, Safety, and Health Appraisal Program (5482.1B) (September 23, 1986) - Establishes the DOE environmental protection, safety, and health protection appraisal program.

- DOE Order for Environmental Protection, Safety, and Health Protection Information Reporting Requirements (5484.1) (February 24, 1981) - Establishes the requirements and procedures for reporting and investigating matters of environmental protection, safety, and health protection significant to DOE operations.

- DOE Order for Quality Assurance (5700.6B) (September 23, 1986) - Establishes DOE's quality assurance program.

- DOE Order for Radioactive Waste Management (5820.2) (February 6, 1984) - Establishes policies and guidelines for the management of radioactive waste and contaminated facilities.

- The Atomic Energy Act of 1954 (42USC2011) (as amended) - Authorizes the conduct of atomic energy activities.

- The DOE Organization Act (42USC7101) - Establishes the statutory responsibility to ensure incorporation of national environmental protection goals in the formulation of energy programs and to advance the goal of restoration, protection, and enhancement of environmental quality and assuring public health and safety.

- NEPA of 1969 (42USC4341) (as amended) - Establishes broad national environmental policy.

- Federal Compliance with Pollution Control Standards Executive Order (12088) (October 13, 1978) - Requires that all federal facilities and activities comply with applicable pollution control standards.

- Superfund Implementation Executive Order (12580) (January 12, 1987) - Delegates to various federal officials the responsibilities vested in the President for implementing CERCLA, the Superfund amendments, and SARA. (The order delegates most of these responsibilities to the Administrator of the U.S. EPA but several are delegated to the heads of federal agencies, including DOE.)

5.2.2 State of Ohio ARARs

State ARARs and other TBC factors include the following:

- Antidegradation Policy (OAC 3745-1-05[A]) - Existing in-stream water uses shall be maintained and protected. No degradation of the present water quality designation is allowed.

- Antidegradation Policy (OAC 3745-1-05[B]) - The most stringent statutory and regulatory controls for waste treatment will be required for all new and existing point sources.

- Fugitive Emissions (OAC 3745-17-08) - Fugitive dust control from grading.

- Permit to Install (OAC 3745-31-05[A][3]) - Any installation of a new source of pollution must meet best available technology requirements.

- NPDES Permits (OAC 3745-33-04) - Criteria for issuing NPDES permits.

- NPDES permits (OAC 3745-33-04[A][6, 8, and 9]) - General NPDES permit conditions.

- Hazardous Waste Transport (OAC 3745-53-11) - Regulates the transport of hazardous waste within the state of Ohio.

- Air Pollution Control (OAC 3745-15-07) - Air pollution nuisance prohibition. Prohibits the release into the open air from any source of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, or any other substances in such a manner or amount as to endanger the health, safety, or welfare of the public or cause unreasonable injury or damage to property.

- Air Pollution Control (OAC 3745-21-05) - Nondegradation policy, ambient air quality standards.

- Air Pollution Control (OAC 3745-21-07) - Control of emissions of organic materials from stationary sources.

- Air Pollution Control (OAC 3745-21-07[B]) - All new stationary sources of emissions of photochemically reactive materials shall minimize such emissions by use of the latest available control techniques and operating practices in accordance with best current technology.

- Air Pollution Control (OAC 3745-21-07[C]) - Alternate means of abatement of emissions can be used if approved by the Director.

- Air Pollution Control (OAC 3745-11-05) - Nondegradation policy, particulate matter standards.

- Air Pollution Control (OAC 3745-17-07) - Control of visible particulate emissions from stationary sources.

- Siting Criteria (OAC 3734-05[C][6][6]) - Active areas within a new hazardous waste facility where acute hazardous waste, as listed in 40CFR261.33(e), as amended, or organic waste that is toxic and is listed under 40CFR261, as amended, is being stored, treated, or disposed, and where the aggregate of the storage design capacity and the disposal design capacity of all hazardous waste in those areas is greater than 250,000 gallons, cannot be located or operated within:

  - Two thousand feet of any residence, school, hospital, jail, or prison.

  - Any naturally occurring wetland.

  - Any flood hazard area if the applicant cannot show that the facility will be designed, constructed, operated, and maintained to prevent washout by a 100-year flood or that procedures will be in effect to remove the waste before flood waters can reach it.

- Solid Waste (OAC 3745-27-06) - Except by means of a waiver granted under OAC 3745-27-11, the Director shall not approve plans for a sanitary landfill under any of the following conditions:

  - The sanitary landfill will be located in a regulatory floodplain outside of the floodway.

  - The sanitary landfill will be located in a sand or gravel pit.

  - The sanitary landfill will be located in a limestone or a sandstone quarry.

  - Those portions of the sanitary landfill where waste materials are to be deposited will be located within 1,000 feet of a water well in existence on the date the plans were received by the OEPA.

  - Those portions of the sanitary landfill where waste materials are to be deposited will be within 200 feet of a stream or lake.

  - The seasonal high ground water table and lowest level of waste materials in the sanitary landfill will be separated by less than five feet of soil of low permeability.

  - The seasonal high ground water table will be less than five feet below the existing surface of the site.

5.2.3 Application to Pit 5

The lists of ARARs presented in Tables 5.1 through 5.6 are comprehensive in relation to the overall remedial action program for the FMPC. Each action or

series of actions at any individual facility or operable unit is not, however, expected to be governed by the full set of ARARs. To illustrate this point, the subset of federal and state ARARs potentially applicable to Pit 5 has been differentiated and is shown in Tables 5.7 and 5.8, respectively. These tables include several specific citations from various ARARs, thereby masking the significant reduction in the number of ARARs actually reported when compared to Tables 5.1 through 5.6. Also illustrated in Tables 5.7 and 5.8 is the fact that some ARARs are applicable only to specific alternatives within the Pit 5 remedial action scenario. The applicability of specific citations from a given ARAR is also shown to be dependent on the alternative being considered.

5.3 APPLICATION OF ARARs TO THE FMPC

Many of the potential ARARs identified in Section 5.2 will principally apply to the construction and operational aspects of a remedial action. For some operable units, however, a more critical application of ARARs will be for the determination of whether an action is necessary and, if so, the cleanup levels that would be required to adequately protect public health and the environment at the FMPC. This determination requires a consideration of the complete source-pathway-receptor framework and will ultimately be accomplished within the context of the forthcoming risk assessment.

The presence of both hazardous chemicals and radionuclides (i.e., mixed wastes) at the FMPC, as well as the lack of specifically applicable precedent cases, introduce particular complexities to the application of ARARs to the FMPC. Considerable interpretation of ARARs and their applicability can be expected, with each of the three components of an exposure scenario requiring careful, site-specific analyses as part of the risk assessment.

5.3.1 Sources of Chemicals and Radionuclides

For purposes of this discussion, the sources of hazardous chemicals and radionuclides represent those sites or environmental units that are potential candidates for remedial action at the FMPC--that is, those units for which specific cleanup levels may be established. If site-specific conditions warrant such an approach, applicable requirements may be directly applied to the source unit. A case in point would be the need to attain MCL standards for ground water used as a potable water supply.

In most cases, however, the acceptable levels of residual contamination at the source will be dictated by the corresponding, site-specific impacts on public health or the environment. The controlling factors become the acceptable levels of dose, exposure, or risk. In such cases, the application of either ARARs or an approach employing specific advisory levels will center on the exposure point concentrations rather than the source terms. It is this approach that will require the most rigorous technical and institutional interpretation and justification for the FMPC and is discussed further in Section 5.3.3.

5.3.2 Pathways to Receptors

The levels of allowable exposure at a receptor location can only be related back to a cleanup level at the source if each component of the exposure scenario is identified and analyzed. These components include migration pathways, exposure pathways, exposure frequency, and exposure duration.

No applicable requirements exist for pathway definition but numerous agency guidances and precedent cases can be interpreted as relevant and appropriate requirements. Considerable uncertainty in the pathways analysis remains, however, due to the following:

- Potential differences in the pathways of key concern to radionuclide exposure versus hazardous chemical exposure
- The dual primacy of DOE and the U.S. EPA for mixed wastes and differences in the two agencies' technical guidance on pathway analysis
- Inconsistencies in approach used in previous applications at other sites that are generally similar to, though critically different from, the FMPC

An example of the latter two points is the determination of the pathway boundary. U.S. EPA guidance would typically establish the most critical receptor at the controlled boundary of the site--a scenario that would appear to be appropriate for the FMPC. DOE guidelines for deriving residual soil contamination levels at DOE facilities, however, assume the most conservative "unrestricted access" scenario that considers a hypothetical receptor to reside at the source location itself. Such an unrestricted access condition does

not seem appropriate for the FMPC. The eventual decision on such a pathway scenario will greatly influence the risk assessment and related cleanup levels and may require considerations that extend beyond published guidance documents and previous work at other sites.

A related issue is the potential for different exposure pathways for radionuclides and hazardous chemicals that may result in inappropriate pathway scenarios. For example, the use of an unrestricted access scenario may be appropriate for an analysis of exposure to long-lived radionuclides resulting from cattle grazing. It may not, however, be reasonable for the assessment of chemical toxicity via the ingestion of ground water. The latter case could result in an MCL cleanup standard for all ground water underlying the FMPC.

The preceding examples reveal the need to derive the most appropriate pathway scenarios that can be consistently applied to both radionuclide dose assessments and chemical exposure analyses. The resolution of this and related issues is proceeding and a recommended strategy will be proposed for U.S. EPA review at an early stage of the FS process.

5.3.3 Receptor Dose, Exposure, or Risk Levels

Within the context of the source-pathway-receptor framework, the principal ARARs are those associated with the establishment of acceptable receptor dose, exposure, or risk levels. In the case of hazardous chemicals, if no applicable requirements are available, relevant and appropriate requirements (as defined by the U.S. EPA) will be identified. These may include (but are not limited to) national primary drinking water standards, MCLs, NAAQS, state water quality standards, and federal AWQC.

For chemicals for which ARARs are not available, the U.S. EPA has provided guidance on the use and application of other chemical-specific advisory levels, such as carcinogenic potency factors for carcinogens or reference doses for noncarcinogens. While not actually ARARs, such reference levels will be used to determine risk-based cleanup levels in a site-specific approach. In choosing criteria appropriate for the estimation of potential site-related health risks, variations in duration and frequency of exposure will be considered.

In the case of radionuclides, the DOE has prepared guidelines for residual radioactivity at formerly utilized sites to be used to derive site-specific ALARA concentration levels in environmental media. Site-specific source concentrations can be derived for individual isotopes by conducting a pathway analysis to calculate appropriate source-to-dose conversion factors. These factors are applied to a basic dose limit of 100 millirem per year committed effective dose equivalent. The DOE limit is determined for a dose commitment for an individual for a 50-year period. This approach is recommended by the International Commission on Radiation Protection and the National Council on Radiation Protection and Measurements. It represents the most appropriate quantity to use for specifying radiation doses to individuals in the vicinity of the FMPC.

Other dose limits have been promulgated that are not considered to be appropriate for the RI/FS at the FMPC. These apply to unrestricted exposure of individual members of the public and include: (1) the NRC's specification for maximum permissible dose (10CFR20); (2) the U.S. EPA's Uranium Fuel Cycle dose limits (40CFR190); and (3) the U.S. EPA CAA standards (40CFR61). A final determination of receptor limits appropriate to the site-specific conditions and needs at the FMPC will be made as part of the risk assessment. The recommended dose, exposure, and/or risk criteria, along with supporting justification, will be provided to the U.S. EPA for review early in the FS process.

In addition to radiation dose limits, radionuclide concentration limits have been promulgated for specific radionuclides in specific media. In 40CFR192, the U.S. EPA has set forth limits for radium-226 and radium-228 concentrations in soil for inactive uranium and thorium processing sites. Similarly, for radium-226 and radium-228 in drinking water, a concentration limit has been specified by the U.S. EPA. The appropriateness of these concentration limits for radionuclides in specific media, and for other radionuclides for which concentration limits can be derived, will be evaluated with respect to the site-specific pathways and receptors at the FMPC.

6254

6.0

6.0 MANAGEMENT PLAN AND SCHEDULE

6.1 MANAGEMENT PLAN

As discussed in Chapters 1.0 and 3.0 of this work plan, the FS for the FMPC will be performed as Tasks 10 through 17 of the sitewide RI/FS. The management plan previously developed and periodically updated for the management, control, and staffing of the sitewide RI/FS will, therefore, be appropriate for the FS portion of the work.

The project management organization for the FS is shown in Figure 6-1. The overall technical direction and integration of the FS on a sitewide basis will be the responsibility of the RI/FS Technical Manager. The day-to-day operations of the FS, including staffing and schedule and budget control, will be the responsibility of the FS Task Manager. A single FS Task Manager has been assigned for all eight tasks of the FS and will functionally report to the RI/FS Technical Manager. The quality assurance and health and safety aspects of the FS will be the responsibility of the RI/FS Quality Assurance and Health and Safety officers, respectively.

The technical staff carrying out the individual work elements of the FS will be segregated by operable unit, with each team being led by a senior engineer or scientist with an appropriate expertise. The reasons for this staffing strategy are multifold and include (1) the capacity to perform several concurrent FSs for different operable units; (2) the opportunity to staff the FS for each operable unit with engineers and scientists with the most relevant expertise; (3) the ability to assign separate FSs to an individual company or office, thereby allowing for the availability of additional resources; and (4) the allowance for each team to attain a comprehensive knowledge of the data base and issues related to the corresponding operable unit. Technology transfer and integration across teams will be achieved by the RI/FS Technical Manager, the FS Task Manager, and a Technical Advisory Group. The latter group will work across the FS teams and will consist of senior personnel in the most relevant technical areas, including civil engineering, chemical/process engineering, nuclear engineering, risk assessment, and regulatory compliance.

The engineers and scientists performing the individual FS tasks will be qualified, experienced individuals in each principal technical area (e.g., environmental engineers, chemical engineers, civil engineers, environmental scientists, regulatory specialists, etc.). It is important to note that any supporting technical efforts (e.g., ground water flow/solute transport modeling and risk assessment) will be performed by the same individuals involved in the corresponding RI efforts.

All monthly reports required for the FS will be accomplished through the current RI/FS reporting process. Community relations activities will also be performed as part of the overall RI/FS function, in accordance with the Community Relations Plan.

6.2 SCHEDULE

Figure 6-2 reproduces the schedule for the sitewide RI/FS that was submitted and approved as part of Revision 3 of the RI/FS work plan. The FS deliverables and the corresponding submission dates shown in the figure currently remain in effect. Any future changes in this schedule will require the concurrence of the U.S. EPA, in accordance with the FFCA and approved change procedures.

The schedule shown in Figure 6-2 reflects the original strategy that a single, sitewide FS will be pursued at the FMPC. It is likely, however, that several FSs (and possibly RODs) will actually be performed on distinct operable units once the FS management strategy is finalized and approved. Parallel schedules will be necessary in such a case and will be negotiated as part of the review and approval process for the FS management strategy. The FS for some operable units may be completed prior to the FS completion date shown in Figure 6-2; others will likely extend beyond this date due to the associated technical complexities and the anticipated need for additional field data.

6254

TABLES

TABLES

TABLE 2.1

IDENTIFICATION OF PRELIMINARY OPERABLE UNITS

OPERABLE UNIT NO. 1: WASTE STORAGE UNITS

Pit 1-3
Pit 4
Pit 5
Pit 6
Clear Well
Burn Pit

OPERABLE UNIT NO. 2: SOLID WASTE UNITS

Lime Sludge Ponds
Fly Ash Piles
Sanitary Landfill
Metal Scrap Piles
South Field Area

OPERABLE UNIT NO. 3: FACILITIES AND SUSPECT AREAS

Above-Grade Tanks
Above-Grade Lines
USTs
Sumps
Below-Grade Lines
Effluent Lines
Diked Areas
Storage Pads
Oil Burner Area
Graphite Burner Area
PCB Transformer Area
Fire Training Area
Incinerator Area
Stored Waste Inventory
Storm Water System
Air Emissions
Other Suspect Areas

OPERABLE UNIT NO. 4: SPECIAL FACILITIES

K-65 Silos
Metal Oxides Silo
Thorium Inventory

OPERABLE UNIT NO. 5: ENVIRONMENTAL MEDIA

Soils
On-Site Ground Water
Flora and Fauna
Regional Aquifer
Ambient Air

OPERABLE UNIT NO. 6: SURFACE WATER COURSES

Paddy's Run
Great Miami River
Storm Water Outfall Ditch

TABLE 2.2

PRELIMINARY REMEDIAL ACTION OBJECTIVES

OPERABLE UNIT	UNIT	SOLID WASTES	LIQUID WASTES	SLUDGES	GROUND WATER	SURFACE WATER	SEDIMENT	AIR	SOILS	STRUC-TURES	FLORA & FAUNA
1	PITS 1 - 3	5,6	0	5,6	0	0	0	0	0	0	0
1	PIT 4	1,2,3,5,6	1,2,3,5,6	1,2,3,5,6	0	0	0	0	0	0	0
1	PIT 5	1,2,3,5,6	1,2,3,5,6	1,2,3,5,6	0	0	0	0	0	0	0
1	PIT 6	5,6	0	5,6	0	0	0	0	0	0	0
1	CLEAR WELL	0	1,2,3,5,6	1,2,3,5,6	0	0	0	0	0	0	0
1	BURN PIT	5,6	0	5,6	0	0	0	0	0	0	0
2	LIME SLUDGE PONDS	0	1,5,6	1,5,6	0	0	0	0	0	0	0
2	FLY ASH PILES	1,2,3,5,6	0	0	0	0	0	0	0	0	0
2	SANITARY LANDFILL	1,2,3,5,6	0	0	0	0	0	0	0	0	0
2	METAL SCRAP PILES	5,6	0	0	0	0	0	0	0	0	0
2	SOUTH FIELD AREA	2,5,6	0	0	0	0	0	0	0	0	0
3	ABOVE-GRADE TANKS	0	0	0	0	0	0	0	19,21,22	0	0
3	ABOVE-GRADE LINES	0	0	0	0	0	0	0	0	24	0
3	UST'S	0	0	0	0	0	0	0	0	24	0
3	SUMPS	0	0	0	0	0	0	0	21	24	0
3	BELOW-GRADE LINES	0	0	0	0	0	0	0	21	24	0
3	EFFLUENT LINES	0	0	0	0	0	0	0	21	24	0
3	DIKED AREAS	0	0	0	0	0	0	0	21	24	0
3	STORAGE PADS	0	0	0	0	0	0	0	21	24	0
3	OIL BURNER AREA	0	0	0	0	0	0	0	21,22	24	0
3	GRAPHITE BURNER AREA	0	0	0	0	0	0	0	21,22	23	0
3	PCB TRANSFORMER AREA	0	0	1,5,6	0	0	0	0	21,22	23	0
3	FIRE TRAINING AREA	0	1,2,3,5,6	0	0	0	0	0	21	24	0
3	INCINERATOR AREA	0	0	0	0	0	0	0	19,21,22	24	0
3	STORED WASTE INVENTORY	0	0	0	0	0	0	0	21,22	23	0
3	STORM WATER SYSTEM	0	0	0	0	0	0	0	0	24	0
3	OTHER SUSPECE AREAS	---	---	---	---	---	---	---	21	24	0
3	AIR EMISSIONS	0	0	0	0	0	0	16,17,18	0	0	0
4	THORIUM INVENTORY	0	0	0	0	0	0	0	0	23,24	0
4	K-65 SILOS	4,5,6	0	0	0	0	0	0	0	23,24	0
4	SILO 3 (METAL OXIDE)	4,5,6	0	0	0	0	0	0	0	23,24	0
5	SOILS	0	0	0	0	0	0	0	19,20,21,22	0	0
5	ON-SITE GROUND WATER	0	0	0	9	0	0	0	0	0	0
5	FLORA AND FAUNA	0	0	0	0	0	0	0	0	0	25,26
5	REGIONAL AQUIFER	0	0	0	7,8,9	0	0	0	0	0	0
5	AMBIENT AIR	0	0	0	0	0	0	16,17,18	0	0	0
6	STORM WATER OUTFALL DIT.	0	0	0	0	0	0	0	21,22	0	0
6	PADDY'S RUN	0	0	0	0	12,13	14,15	0	0	0	0
6	GREAT MIAMI RIVER	0	0	0	0	10,11,12,13	14,15	0	0	0	0

680000

TABLE 2.3 TYPES OF POTENTIAL REMEDIAL ACTIONS

OPERABLE UNIT	UNIT	IN-PLACE STABILIZATION	INFILTRATION CONTROL	SURFACE WATER DIVERSN	SUBSURFACE FLOW CON.	ON-SITE TEMP. STORAGE	ON-SITE PERM. STORAGE	OFF-SITE DISPOSAL	WASTE/SLUDGE TREAT.	PARTICULATE EMS. CON.	EMS. COLLECTN/TREAT.	REPLACE/MODIFY UNITS	WASTE MINIMIZATION	WASTE STREAM SEG.	CHANNEL LINING	SOIL/SEDIMENT REMOVAL	GW PUMP/TREATMENT	CLEAN SOIL COVER	PLANT/ORGANISM REML	WATER TREATMENT	ALTERNATE WATER SUP.	TREATMENT AT TAP	ACCESS/DOE RESTRICTN	RADON EMISSIONS CONTL	FREE PRODUCT RECOVERY
1	PITS 1 - 3	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	PIT 4	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
1	PIT 5	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
1	PIT 6	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
1	CLEAR WELL	0	0	1	0	2	2	1	2	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0
1	BURN PIT	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	LIME SLUDGE PONDS	1	1	0	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2	FLY ASH PILES	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2	SANITARY LANDFILL	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2	METAL SCRAP PILES	0	1	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2	SOUTH FIELD AREA	0	1	1	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3	ABOVE-GRADE TANKS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	ABOVE-GRADE LINES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	UST'S	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	SUMPS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	BELOW-GRADE LINES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	EFFLUENT LINES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
3	DIKED AREAS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	STORAGE PADS	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	OIL BURNER AREA	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	GRAPHITE BURNER AREA	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	PCB TRANSFORMER AREA	0	1	1	0	0	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
3	FIRE TRAINING AREA	0	1	1	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3	INCINERATOR AREA	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
3	STORED WASTE INVENTORY	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3	STORM WATER SYSTEM	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
3	OTHER SUSPECT AREAS	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3	AIR EMISSIONS	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	THORIUM INVENTORY	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	K-65 SILOS	1	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	SILO 3 (METAL OXIDE)	1	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	SOILS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
5	ON-SITE GROUND WATER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0
5	FLORA AND FAUNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5	REGIONAL AQUIFER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0
5	AMBIENT AIR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	PADDY'S RUN	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
6	GREAT MIAMI RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6	STORM WATER OUTFALL DITCH	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

000090

6254

TABLE 2.4

POTENTIAL TYPES OF WASTES/CONTAMINANTS

OPERABLE UNIT	UNIT	HAZARDOUS CHEMICALS	RADIOLOGICAL SUBSTANCES	MIXED WASTE	SOLID WASTES WITH CONTAMINANTS	SPECIAL WASTES	PROCESS CHEMICALS
1	PITS 1 - 3	/	/	0	0	0	0
1	PIT 4	0	0	/	0	0	0
1	PIT 5	/	/	0	0	0	0
1	PIT 6	/	/	0	0	0	0
1	CLEAR WELL	/	/	0	0	0	0
1	BURN PIT	/	/	0	0	0	0
2	LIME SLUDGE PONDS	0	0	0	/	0	0
2	FLY ASH PILES	0	0	0	/	0	0
2	SANITARY LANDFILL	0	0	0	/	0	0
2	METAL SCRAP PILES	0	0	0	/	0	0
2	SOUTH FIELD AREA	0	0	0	/	0	0
3	ABOVE-GRADE TANKS	0	0	0	0	0	/
3	ABOVE-GRADE LINES	0	0	0	0	0	/
3	UST'S	0	0	0	0	0	/
3	SUMPS	/	/	0	0	0	/
3	BELOW-GRADE LINES	0	0	0	0	0	/
3	EFFLUENT LINES	/	/	0	0	0	0
3	DIKED AREAS	0	0	0	0	0	/
3	STORAGE PADS	/	/	0	0	0	/
3	OIL BURNER AREA	/	/	0	0	0	0
3	GRAPHITE BURNER AREA	/	/	0	0	0	0
3	PCB TRANSFORMER AREA	/	0	0	0	0	0
3	FIRE TRAINING AREA	/	/	0	0	0	0
3	INCINERATOR AREA	/	/	0	0	0	0
3	STORED WASTE INVENTORY	0	/	/	0	0	0
3	STORM WATER SYSTEM	0	/	0	0	0	0
3	OTHER SUSPECT AREAS	/	/	0	0	0	0
3	AIR EMISSIONS	/	/	0	0	0	0
4	THORIUM INVENTORY	0	0	0	0	/	0
4	K-65 SILOS	0	/	0	0	/	0
4	SILO 3 (METAL OXIDE)	0	/	0	0	/	0
5	SOILS	/	/	0	0	0	0
5	ON-SITE GROUND WATER	/	/	0	0	0	0
5	FLORA AND FAUNA	/	/	0	0	0	0
5	REGIONAL AQUIFER	/	/	0	0	0	0
5	AMBIENT AIR	/	/	0	0	0	0
6	PADDY'S RUN	/	/	0	0	0	0
6	GREAT MIAMI RIVER	/	/	0	0	0	0
6	STORM WATER OUTFALL DITCH	0	/	0	0	0	0

POTENT

TABLE 3.1

VOLUME AND AREA SUMMARY FOR WASTE PIT 5

ITEM NO.	DESCRIPTION	QUANTITIES AND UNITS	REFERENCES AND REMARKS/COMMENTS
1.	Area	165,200 sf (3.79 acres)	Ref. 1
2.	Sludge		
	a. Sludge Volume	102,500 cy	Ref. 2
	b. Sludge Solids	75×10^6 lbs 37,500 short tons)	Ref. 2
	c. Sludge Solids Bulk volume	48,000 cy (@ 57.5 lbs/ft^3)	Ref. 2
	d. Sludge Water	142×10^6 lbs	Ref. 2 (entrained water)
3.	Surface Water	75×10^6 gal (6.25×10^6)	Ref. 1 - Estimated quantity. This volume directly related to precipitation and evaporation.
4.	Volatile Inorganics Arsenic (As)	139 to 2,800 mg/kg (30,000 to 600,000 lbs)	Ref. 1
	Mercury (Hg)	1.9 to 6.2 mg/kg (400 to 1,300 lbs)	Ref. 1
	Technetium (Tc-99)	423 to 2,990 pcI/g (16,000 to 112,000 curies)	Ref. 1 (dry basis)

TABLE 3.1
(Continued)

ITEM NO.	DESCRIPTION	QUANTITIES AND UNITS	REMARKS/COMMENTS
5.	Radioactive Materials		
	Uranium Total	50,309 kg (510 ppm sludge basis)	Ref. 1
	Thorium Total	17,000 kg (172 ppm sludge basis)	Ref. 1
	Total Radiochemistry	4,527 to 27,200 pcI/g (154,000 to 925,000 curies)	Ref. 1 (dry basis)
6.	Organics	900 to 2,700 ug/kg (280 to 600 lbs)	Ref. 1 (very variable)
7.	Liner	197,500 sf 1,030 cu/ft	Blend of butyl rubber and ethylene-propylene-diene-monomer. Royal Seal Membrane Compound No. 5617 as manufactured by Uniroyal Mishawaka India Ref. 4 and 6
		76,000 lbs	
8.	Redwood	77 cf	1" x 4" along perimeter of pit for holding down/key in of liner.
9.	Steel (Effluent Tower)	4.0 short tons	Ref. 5
10.	Concrete (Effluent Tower)	32 short tons	Ref. 5

TABLE 3.1
(Continued)

REFERENCES

1. Characterization Investigation Study Volume 2: Chemical and Radiological Analyses of the Waste Storage Pits, Roy F. Weston Inc., November 1987. (FMPC/SUB 008 Vol. 2, VC-70)

2. Geotechnical Evaluation of Feed Properties Material Properties of Waste Pit Materials at the Feed Materials Production Center. Fernald, Ohio, Roy F. Weston Inc., March 1988.

3. Dwg. No.: 21A-5500-G-00196, Rev. 1, Titled Scrap Pit Area - Wet Chemical Scrap Pit (Pit No. 5), Pit Layout and Details.

4. Dwg. No.: C-6116, Titled Royal Seal Lining of Wet Chemical Scrap Pit, Pit No. 5, National Lead Comp. Fernald, Ohio, Sheet Layout, Details and Materials.

5. Dwg. No.: 21A-5500-S-00200, Rev. 2, Titled Scrap Pit Area Wet Chemical Scrap Pit (Pit No. 5) Effluent Tower.

6. Liner Specifications, Titled Specifications for Subcontract No. S-868. Wet Chemical Scrap Pit No. 5 Lining Installation CP-68-13, June 7, 1968.

TABLE 3.2

INITIALLY SCREENED TECHNOLOGY TYPES AND TECHNOLOGY PROCESS OPTIONS FOR PIT 5

Technology	Potential Applicability					
	Control and Containment	On-Site Treatment	Off-Site Treatment	On-Site Disposal	Off-Site Disposal	If Mixed Waste
No Action	S, W	--	--	--	--	--
Limited Action-Monitoring	S, W	--	--	--	--	--
Control and Containment						
Temporary Storage	S, W	--	--	--	--	--
Surface Impoundment	S, W	--	--	--	--	--
Vertical Containment Barriers:						
Soil-bentonite slurry wall	S, W	--	--	--	--	--
Cement-bentonite slurry wall	S, W	--	--	--	--	--
Grout curtain	S, W	--	--	--	--	--
Steel sheet piling	S, W	--	--	--	--	--
Horizontal Containment Barriers:						
Block displacement	S, W	--	--	--	--	--
Grout injection	S, W	--	--	--	--	--
Capping	S	--	--	S	S	--
Floating Covers	S	--	--	S	S	--
Surface Water Management System	S, W	--	--	S	S	--
Grading	S, W	--	--	S	S	--
Revegetion	S, W	--	--	S	S	--
Diversion and Collection	S, W	--	--	S	S	--
Ground Water Control	S, W	--	--	S	S	--
Pumping	S, W	--	--	S	S	--
Subsurface Drains	S, W	--	--	S	S	--

TABLE 3.2
(Continued)

Technology	Potential Applicability					
	Control and Containment	On-Site Treatment	Off-Site Treatment	On-Site Disposal	Off-Site Disposal	If Mixed Waste
Removal/Relocation						
Sludge Packaging	--	S	--	--	S	S
Excavation and Removal:						
Mechanical removal	--	S	S	S	S	S
Hydraulic removal	--	S	S	S	S	S
Pneumatic removal	--	S	S	S	S	S
Thermal Treatments						
Thermal Desorption	--	S, W	S, W	--	--	S, W
Drying/Calcination						
Incineration	--	S	S	--	--	S
Solidification/Stabilization/Fixation						
In Situ Dewatering	S	S	S	S	S	--
Solidification and Stabilization	--	S, W	S, W	S, W	S, W	S, W
Vitrification	--	S	S	S	S	S

TABLE 3.2
(Continued)

Technology	Potential Applicability					
	Control and Containment	On-Site Treatment	Off-Site Treatment	On-Site Disposal	Off-Site Disposal	If Mixed Waste
Physical Treatments						
Air Stripping	--	--	--	--	--	--
Steam Stripping	--	--	--	--	--	--
Evaporation	--	W	--	W	--	--
Flocculation	--	W	--	--	--	--
Air Flotation	--	--	--	--	--	--
Solid/Liquid Separation						
Clarification	--	W	--	W	--	--
Filtration	--	W	--	W	--	W
Centrifugation	--	S, W	S, W	--	--	--
Reverse Osmosis	--	W	--	W	--	W
Electrodialysis	--	W	W	--	--	--

000097

6254A

TABLE 3.2
(Continued)

Technology	Potential Applicability					
	Control and Containment	On-Site Treatment	Off-Site Treatment	On-Site Disposal	Off-Site Disposal	If Mixed Waste
Carbon Adsorption	--	W	--	W	--	W
Liquid/liquid Extraction	--	--	--	--	--	--
Oil/water Separation	--	--	--	--	--	--
Soil Washing	--	--	--	--	--	S
Chemical Treatments						
Neutralization	S, W	S, W	S, W	--	--	S, W
Precipitation	--	W	W	--	--	W
Ion Exchange	--	W	--	W	--	W
Selective Ion Removal	--	W	--	W	--	W
Chemical Oxidation/Ozonation/Photolysis		--	--	--	--	S, W
Biological Treatments						
Biodenitrification	--	W	--	W	--	--
Biological Detoxification	--	--	--	--	--	S, W
Disposal Methods						
Landfill	--	--	--	S	S	--
Packaged Burial	--	--	--	S	S	S
Bulk Burial	--	--	--	--	S	--

TABLE 3.2
(Continued)

Technology	Potential Applicability					
	Control and Containment	On-Site Treatment	Off-Site Treatment	On-Site Disposal	Off-Site Disposal	If Mixed Waste
Disposal Methods (continued)						
Deep Well Injection	--	--	--	--	W	--
LLRW Disposal	--	--	--	--	S	--

Note: Some technologies are (steps) integrated into a total remedial action.
S = sludge; W = water; -- = not applicable.

TABLE 3.3

SITE AND WASTE CHARACTERISTICS TO BE CONSIDERED TO EVALUATE TECHNOLOGICAL EFFECTIVENESS

SITE CHARACTERISTICS:

- Site Volumes
- Site Area
- Site Configuration
- Climate
- Disposal Methods
- Soil Characteristics
- Topography
- Vegetation
- Geology
- Hydrogeology
- Surface Waters
- Potable Wells
- Receptors
- Ecological Areas
- Existing Land Use
- Future Land Use

WASTE CHARACTERISTICS:

- Quantity/ Concentration
- Chemical Composition
- Acute Toxicity
- Persistence
- Radiogradability
- Radioactivity
- Ignitability
- Reactivity/Corrosivity
- Infectiousness
- Solubility
- Volatility
- Density
- Partition Coefficient
- Compatibility
- Treatability

TABLE 3.4

EXAMPLE TECHNOLOGY EVALUATION SHEET

SOIL-BENTONITE SLURRY WALLS (VERTICAL CONTAINMENT BARRIER)

Slurry walls are the most commonly used subsurface barriers. Slurry walls are constructed in a vertical trench that is excavated under a slurry. The slurry (which is usually a mixture of bentonite and water) assists in shoring the trench to prevent collapse and forms a filter cake on the trench walls that prevents fluid loss to surrounding ground.

Backfilling, performed with soil materials mixed with a bentonite and water slurry, results in this type of slurry wall. There is a work area requirement for on-site slurry preparation to be effective; this work area should be located adjacent to the slurry wall installation site.

Overall Assessment

For slurry walls to be effective for Pit 5, it is necessary to use them in conjunction with a suitable cap. The slurry wall should extend to the least permeable underlying layer and extend to a predetermined design depth below the bottom of the waste. A detailed predesign investigation characterizing the subsurface conditions and materials is required. Permeabilities of the subsurface layer (to which the slurry wall extends) and the soil-bentonite wall itself are critical elements in the design. Based upon the investigation results, suitable design and support activities can be recommended.

Screening Factor Summary

Soil-bentonite slurry walls can be designed and constructed to isolate the waste materials in Pit 5. A well-designed cap, in conjunction with other suitable support technologies, would be required for remediation. The effectiveness of the system depends on the relative impermeability of the subsurface materials below the Pit 5 bottom liner.

TABLE 3.4
(Continued)

Screening Factor Ranking

Adequacy of Environmental Protection	Moderate
Potential for Adverse Environmental Effects	Low/Moderate
Ease of Implementation and Degree of Reliability	High/Moderate
Cost	Moderate

Conclusion

Soil-bentonite slurry wall applicability is dependent on subsurface data. Based on information currently available, and when used in conjunction with suitable capping and other support measures, a soil-bentonite slurry wall is a viable technology for Pit 5.

TABLE 3.5

EXAMPLE TECHNOLOGY EVALUATION SHEET

NO ACTION

No action would mean no additional remediation, monitoring, or security activities at the site to further minimize risk to the environment or public health.

Overall Assessment

Implementing no action will result in no changes to the existing site environment.

Screening Factor Summary

The no-action alternative does not have an associated technology. The integrity of the bottom liner in Pit 5 questionable, especially at the joints. There is a potential risk of contaminating the soil and the ground water.

Screening Factor Ranking

Adequacy of environmental protection	Low
Potential for adverse environmental effects	High
Ease of implementation and degree of reliability	High/Low
Cost (monitoring costs only)	Low

Conclusion

No action is not an acceptable option for Pit 5. Since monitoring wells have been installed around Pit 5 and a security fence currently exists, the no-action alternative is for all practical purposes, already a limited-action alternative.

TABLE 3.6

PIT 5 REMEDIAL ALTERNATIVES

Option A1

Option A1 is sludge removal followed by drying and bulk transport to an off-site disposal facility.

Option A2

Option A2 is sludge removal followed by drying and packaged transport to an off-site disposal facility.

Option A5

Option A5 is sludge removal followed by solid-liquid separation, drying, and packaged transport to an off-site disposal facility.

Option A6

Option A6 is sludge removal followed by solid-liquid separation, drying, and packaged transport to an off-site disposal facility.

Option A8

Option A8 is sludge removal followed by solidification and transport to an off-site disposal facility.

Option A9

Option A9 is sludge removal followed by vitrification and transport to an off-site disposal facility.

Option B2

Option B2 is sludge removal followed by solidification and disposal in an on-site engineered facility.

Option B3b

Option B3b is sludge removal and vitrification into an on-site engineered facility.

Option C3

Option C3 is sludge removal followed by back pumping to the existing Plant 8 treatment system.

Option E

Option E is no action.

TABLE 3.7

FEASIBILITY STUDY REPORT OUTLINE
(PRELIMINARY)

EXECUTIVE SUMMARY

1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF REPORT

1.2 BACKGROUND INFORMATION (Summarized from RI Report)

1.2.1 Site Description

1.2.2 Site History

1.2.3 Nature and Extent of Contamination

1.2.4 Contaminant Fate and Transport

1.2.5 Baseline Risk Assessment

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

2.1 INTRODUCTION

2.2 REMEDIAL ACTION OBJECTIVES -
Identifies and characterizes remedial action objectives for each medium of interest (i.e., ground water, soil, surface water, air, etc.). For each medium, the following should be discussed:
- Contaminants of interest
- Allowable exposure based on risk assessment
- Allowable exposure based on ARARs
- Development of remedial action objective

2.3 GENERAL RESPONSE ACTIONS -
For each medium of interest, describes the areas or volumes to which treatment, containment, or other responses may be applied.

2.4 IDENTIFICATION AND SCREENING OF TECHNOLOGY TYPES AND PROCESS OPTIONS -
2.4.1 Identification and Screening of Technologies
2.4.2 Evaluation of Technologies and Selection of Representative Technologies

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

3.1 DEVELOPMENT OF ALTERNATIVES
Describes rationale for combination of technologies/media into alternatives. This discussion may be on a medium specific basis or for the site as a whole.

3.2 SCREENING OF ALTERNATIVES
3.2.1 Introduction

TABLE 3.7
(Continued)

3.2.2 Alternative 1
- Description
- Evaluation
- Effectiveness
- Implementability
- Cost

3.2.3 Alternative 2
- Description
- Evaluation

3.2.4 Alternative 3

3.2.5 Summary of Screening

4.0 DETAILED ANALYSIS OF ALTERNATIVES

4.1 INTRODUCTION

4.2 ALTERNATIVE ANALYSIS

4.2.1 Alternative 1

4.2.1.1 Description

4.2.1.2 Assessment
- Short-Term Effectiveness
- Long-Term Effectiveness and Permanence
- Reduction of Mobility, Toxicity, and Volume
- Implementability
- Cost
- Compliance with ARARs
- Overall Protection
- State Acceptance
- Community Acceptance

4.2.2 Alternative 2

4.2.2.1 Description

4.2.2.2 Assessment

4.2.3 Alternative 3

4.2.4 Summary of Alternative Analysis

4.3 COMPARISON AMONG ALTERNATIVES

4.3.1 Short-Term Effectiveness

4.3.2 Long-Term Effectiveness and Permanence

4.3.3 Reduction of Toxicity, Mobility, and Volume

4.3.4 Implementability

TABLE 3.7
(Continued)

4.3.5 Cost

4.3.6 Compliance with ARARs

4.3.7 Overall Protection

4.3.8 State Acceptance

4.3.9 Community Acceptance

4.3.10 Summary of Comparisons Among Alternatives

4.4 SUMMARY OF DETAILED ANALYSIS

5.0 IDENTIFICATION OF PREFERRED REMEDIAL ACTION ALTERNATIVE

BIBLIOGRAPHY

APPENDICES

TABLE 5.1

FEDERAL APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
CONTAMINANT SPECIFIC

REQUIREMENT	RATIONALE
1. Hazardous Waste Requirements (RCRA), Subtitle C, 40CFR264	Standards applicable to treating, storing, and disposing of hazardous waste
2. Safe Drinking Water Act	
a. Maximum Contaminant Levels (MCLs)	Remedial actions may provide cleanup to the MCLs
b. Maximum Contaminant Level Goals (MCLGs)	SARA Section 121(d)(2)(A)(ii)
3. Toxic Substances Control Act (15USC2601)	
a. TSCA health data, chemical advisories, and Compliance Program policy	Considered in the public health evaluation
4. Health Advisories, U.S. EPA Office of Drinking Water[a]	RI activities identified presence of chemical for which health advisories are listed
5. Clean Water Act (PL92-500)	
Federal ambient water quality criteria (AWQC)	Remedial actions may provide ground water remediation and discharge to surface waters
6. Reference Doses (RfD), U.S. EPA Office of Research and Development[a]	Considered in the public health evaluation
7. Health Effects Assessments[a]	Considered in the public health evaluation

See footnote at end of table.

TABLE 5.1
(Continued)

REQUIREMENT	RATIONALE
8. Carcinogenic Potency Factors, U.S. EPA Environmental Criteria and Assessment Office, U.S. EPA Carcinogen Assessment Group[a]	Considered in the public health assessment
9. Clean Air Act (42USC4701)	
a. National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (40CFR50)	Remedial alternatives may include incineration or ground water volatilization technologies
b. Public health basis to list pollutants as hazardous under Section 112 of the Clean Air Act[a]	Remedial alternatives may include incineration or ground water volatilization technologies
c. U.S. EPA Regulations for National Dmission Standards for Radionuclide Emissions from DOE Facilities (40CFR61)	DOE Feed Materials Production Center Facility
10. U.S. EPA Regulations for Environmental Radiation Protection Standards for Nuclear Power Operations	DOE Feed Materials Protection Center Facility

[a]Denotes TBC - Factors to be considered.

TABLE 5.2

STATE APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
CONTAMINANT SPECIFIC

REQUIREMENT	RATIONALE
1. Fugitive Emissions, OAC 3745-17-08	Remedial alternatives may include removal of waste materials for on-site or off-site disposal
2. Air Pollution Control a. OAC 3745-15-07 b. OAC 3745-21-05 c. OAC 3745-21-07 d. OAC 3745-21-07(B) e. OAC 3745-21-07(C) f. OAC 3745-17-05 g. OAC 3745-17-07 h. OAC 3745-17-08	Remedial alternatives may include incineration or ground water volatilization technologies

TABLE 5.3

FEDERAL APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
LOCATION SPECIFIC

REQUIREMENT	RATIONALE
1. Rivers and Harbors Act of 1899 (33CFR320-327)	Remedial alternatives at site may affect Great Miami River
2. Dredged Material Disposal Sites Denial or Restriction Procedures (404[c]; 40CFR231)	Remedial alternatives at site may include dredging and filling in wetlands
3. Regulation of Activities Affecting Water of the U.S. (33CFR320-329)	Corps of Engineers regulations apply to both wetlands and navigable waters (Section 10, Waters)
4. Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40CFR230)	Remedial alternatives at site may include dredging and filling in wetlands
5. Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands)	Both floodplain and wetland resources may be affected by the site remedial alternatives
6. U.S. EPA's Ground Water Protection Strategy	Remedial alternatives must consider U.S. EPA classification of ground water at the site
7. Endangered Species Act of 1978 (16 USC 1531)	Considered in the public health and environmental assessment
8. Fish and Wildlife Coordination Act (16 USC 661)	Remedial alternatives may affect wetlands and protected habitats
9. Fish & Wildlife Improvement Act of 1978 (16 USC 742)	Remedial alternatives may affect wetlands and protected habitats

TABLE 5.4

STATE APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
LOCATION SPECIFIC

REQUIREMENT	RATIONALE
1. Siting Criteria OAC 3734.04(c)(6)(g)	Remedial alternatives may include locating, storing, or disposing on-site of hazardous wastes
2. Solid Waste: a. Sanitary Landfill Criteria OAC 3745-27-06 b. Waiver Criteria OAC 3745-27-11	Remedial alternatives may include design of a sanitary landfill

TABLE 5.5

FEDERAL APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
ACTION SPECIFIC

REQUIREMENT	RATIONALE
1. OSHA Requirements (29CFR1910, 1926, and 1904)	Required for workers engaged in on-site remedial activities
2. DOT Regulations for Hazardous Materials Transport (49CFR107, 171.1-171.500)	Remedial alternatives may include off-site treatment and disposal
3. Safe Drinking Water Act	
a. Underground Injection Control Regulations (40CFR144, 145, 146, and 147)	May be applicable to on-site ground water recirculation systems
4. Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites, U.S. EPA Office of Emergency and Remedial Response[a]	Appropriate guidance for aquifer restoration
5. Clean Water Act	
a. NPDES Permit Requirements	Remedial alternatives may include discharge to surface waters
b. Federal Ambient Water Quality Criteria	Remedial alternatives may include discharge to surface waters
6. Threshold Limit Values, American Conference of Governmental Industrial Hygienists	Appropriate requirements for air concentrations during remedial activities
7. NRC Regulations for Licensing Requirements for Land Disposal of Radioactive Waste (10CFR61)	Remedial alternatives may include on-site disposal
8. NRC Regulations for Packaging and Transportation of Radioactive Material (10CFR71)	Remedial alternatives may include off-site treatment and disposal

See footnote at end of table.

TABLE 5.5
(Continued)

	REQUIREMENT	RATIONALE
9.	U.S. EPA Regulations for Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes (40CFR191)	Remedial alternatives may include on-site and/or off-site treatment and disposal
10.	NRC Regulations for Standards for Protection Against Radiation (10CFR20)	DOE Feed Materials Production Center
11.	U. S. EPA Regulations for Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40CFR192)	DOE Feed Materials Production Center
12.	DOT Regulations for Licensed Material Transport (49CFR170-189)	Remedial alternatives may include off-site treatment and disposal
13.	DOE Order for General Environmental Protection Requirements (5400.1)	DOE Feed Materials Production Center Facility
14.	DOE Order for Environmental Compliance Issue Coordination (5400.2)	DOE Feed Materials Production Center Facility
15.	DOE Order for Radiation Protection of the Public and the Environment (5400.3)	DOE Feed Materials Production Center Facility
16.	DOE Order for Radiological Effluent Monitoring and Environmental Surveillance (5400.xy)	DOE Feed Materials Production Center Facility
17.	DOE Order for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program (5400.4)	DOE Feed Materials Production Center Facility
18.	DOE Order for National Environmental Policy Act (NEPA) (5440.1C)	DOE Feed Materials Production Center Facility

[a]See footnote at end of table.

TABLE 5.5
(Continued)

	REQUIREMENT	RATIONALE
19.	DOE Order for Radiation Protection of the Public and the Environment (5480.XX)	DOE Feed Materials Production Center Facility
20.	DOE Order for Hazardous and Radioactive Mixed Waste Management (5480.2)	DOE Feed Materials Production Center
21.	DOE Order for General Environmental Protection Requirements (5480.12)	DOE Feed Materials Production Center
22.	DOE Order for Environment, Safety, and Health Appraisal Program (5482.1B)	DOE Feed Materials Production Center Facility
23.	DOE Order for Environmental Protection, Safety, and Health Protection Information Reporting Requirements (5484.1)	DOE Feed Materials Production Center Facility
24.	DOE Order for Quality Assurance (5700.6B)	DOE Feed Materials Production Center Facility
25.	DOE Order for Radioactive Waste Management (5820.2)	DOE Feed Materials Production Center Facility
26.	The Atomic Energy Act of 1954 (42USC2011)	DOE Feed Materials Production Center Facility
27.	The DOE Organization Act (42USC7101)	DOE Feed Materials Production Center Facility
28.	The National Environmental Policy Act of 1969 (42USC4341)	DOE Feed Materials Production Center Facility
29.	Federal Compliance with Pollution Control Standards Executive Order (12088)	DOE Feed Materials Production Center Facility
30.	Superfund Implementation Executive Order (12580)	DOE Feed Materials Production Center Facility

[a]Denotes TBC - Factors to be considered.

TABLE 5.6

STATE APPLICABLE OR RELEVANT
AND APPROPRIATE REQUIREMENTS
ACTION SPECIFIC

REQUIREMENT	RATIONALE
1. Ohio Pollutant Discharge Elimination System (NPDES) Regulations: a. OAC 3745-33-04 b. OAC 3745-33-05(A)(6)(8) and (9)	Remedial alternatives may include discharge to surface waters
2. Antidegradation Policy: a. OAC 3745-1-05(A) b. OAC 3745-1-05(B)	Remedial alternatives may include discharge to surface waters
3. Hazardous Waste Transport, OAC 3745-53-11	Remedial alternatives may include off-site treatment and disposal

TABLE 5.7

FEDERAL ARARs FOR PIT 5

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Contaminant Specific					
10CFR61.41 (NRC) Protection of the General Population from Releases of Radioactivity	A[a]	A	A	A	NA[b]
10CFR71.47 (NRC) External Radiation Standards for all Packages	A	A	A	NA	NA
49CFR173.441 (DOT) Radioactive Level Limitations	A	A	A	NA	NA
Safe Drinking Water Act - Maximum Contaminant Levels (MCLs)	A	A	A	A	A
Safe Drinking Water Act - Maximum Contaminant Level Goals (MCLGs)	A	A	A	A	A
Health Advisories - U.S. EPA Office of Drinking Water	A	A	A	A	A
Clean Water Act - Federal Ambient Water Quality Criteria (AWQC)	A	A	A	A	A
40 CFR 61 Subpart H National Emission Standards for Radionuclide Emissions from DOE Facilities	A	A	A	A	A

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Location Specific					
33CFR320-327 Rivers and Harbors Act of 1899	A	A	A	A	A
33CFR320-329 Regulations of Activities Affecting Waters of the U.S.	A	A	A	A	A
Executive Order 11990 Protection of Wetlands	NA	NA	NA	A	A
16USC1531 Endangered Species Act of 1978	NA	NA	NA	A	A
16USC661 Fish and Wildlife Coordination	NA	A	NA	A	NA
16USC742 Fish and Wildlife Improvement Act of 1978	NA	A	NA	A	NA
Action Specific					
10CFR61.7(a) (NRC) Disposal Facility Criteria	NA	NA	NA	A	A
10CFR61.7(b) (NRC) Waste Classification and Near-Disposal Criteria	NA	NA	NA	A	A
10CFR61.7(c) (NRC) Licensing Process Criteria	NA	NA	NA	A	A

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR61.12 (NRC) Specific Terminal Information	NA	NA	NA	A	A
10CFR61.13 (NRC) Technical Analyses	NA	NA	NA	A	A
10CFR61.13 (NRC) Standard for Issuance of License	NA	NA	NA	A	A
10CFR61.42 (NRC) Protection of Individuals from Inadvertent Intrusion	NA	NA	NA	A	A
10CFR61.42 (NRC) Protection of Individuals During Operation	NA	NA	NA	A	A
10CFR61.42 (NRC) Stability of Disposal Site After Closure	NA	NA	NA	A	A
10CFR61.50 (NRC) Disposal Site Suitability Requirements for Land Disposal	NA	NA	NA	A	A
10CFR61.51 (NRC) Disposal Land Design for Land Disposal	NA	NA	NA	A	A

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR61.52 (NRC) Land Disposal Facility Operation and Disposal Site Closure	NA	NA	NA	A	A
10CFR61.53 (NRC) Environmental Monitoring	NA	NA	NA	A	A
10CFR61.54 (NRC) Alternate Requirements for Design and Operations	NA	NA	NA	A	A
10CFR61.55 (NRC) Waste Classification	NA	NA	NA	A	A
10CFR61.56 (NRC) Waste Characteristics	NA	NA	NA	A	A
10CFR61.80 (NRC) Records, Reports, Tests, and Inspections	NA	NA	NA	A	A
10CFR61.81 (NRC) Tests at Land Disposal Facilities	NA	NA	NA	A	A
10CFR61.82 (NRC) Commission Inspections of Land Disposal Facilities	NA	NA	NA	A	A
10CFR71.5 (NRC) Transportation of Licensed Material	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR71.10 (NRC) Exemption for Low-Level Materials	A	A	A	NA	NA
10CFR71.12 (NRC) General License - NRC-Approved Package	A	A	A	NA	NA
10CFR71.13 (NRC) Previously Approved Type B Package	A	A	A	NA	NA
10CFR71.14 (NRC) General License - DOT Specification Container	A	A	A	NA	NA
10CFR71.18 (NRC) General License - Type A, Fissile Class II Package	A	A	A	NA	NA
10CFR71.22 (NRC) General License - Type A Package, Fissile Class III Shipment	A	A	A	NA	NA
10CFR71.24 (NRC) General License - Restricted, Fissile Class III Shipment	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR71.41 (NRC) Package Approval Standards - Demonstration of Compliance	A	A	A	NA	NA
10CFR71.43 (NRC) General Standards for all Packages	A	A	A	NA	NA
10CFR71.45 (NRC) Lifting and Tie Down for all Packages	A	A	A	NA	NA
10CFR71.51 (NRC) Additional Requirements for Type B Packages	A	A	A	NA	NA
10CFR71.52 (NRC) Exemptions for Low Specific Activity Packages (LSA)	A	A	A	NA	NA
10CFR71.53 (NRC) Fissile Material Exemptions	A	A	A	NA	NA
10CFR71.55 (NRC) General Requirements for all Fissile Material Packages	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR71.57 (NRC) Specific Standards for Fissile Class I Package	A	A	A	NA	NA
10CFR71.59 (NRC) Specific Standards for a Fissile Class II Package	A	A	A	NA	NA
10CFR71.61 (NRC) Specific Standards for a Fissile Class III Shipment	A	A	A	NA	NA
10CFR71.65 (NRC) Additional Requirements	A	A	A	NA	NA
10CFR71.81 (NRC) Applicability of Operating Controls and Procedures	A	A	A	NA	NA
10CFR71.83 (NRC) Assumptions as to Unknown Properties	A	A	A	NA	NA
10CFR71.85 (NRC) Preliminary Determinations	A	A	A	NA	NA
10CFR71.87 (NRC) Routine Determinations	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
10CFR71.91 (NRC) Records	A	A	A	NA	NA
10CFR71.93 (NRC) Inspections and Tests	A	A	A	NA	NA
10CFR71.95 (NRC) Reports	A	A	A	NA	NA
10CFR71.97 (NRC) Advance Notification of Shipment of Nuclear Waste	A	A	A	NA	NA
49CFR173.412 (DOT) Additional Design Requirements for Type A Packages	A	A	A	NA	NA
49CFR173.413 (DOT) Requirements for Type B Packages	A	A	A	NA	NA
49CFR173.415 (DOT) Authorized Type A Packages	A	A	A	NA	NA
49CFR173.416 (DOT) Authorized Type B Packages	A	A	A	NA	NA
49CFR173.417 (DOT) Authorized Packaging - Fissile Materials	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
49CFR173.421 (DOT) Limited Quantities of Radioactive Materials	A	A	A	NA	NA
49CFR173.421-1 (DOT) Additional Requirements for Excepted Radioactive Materials	A	A	A	NA	NA
49CFR173.421-2 (DOT) Requirements for Multiple Hazard, Limited Quantity Radioactive Materials	A	A	A	NA	NA
49CFR173.425 (DOT) Transport Requirements for Low-Specific Activity (LSA) Radioactive Materials	A	A	A	NA	NA
49CFR173.431 (DOT) Activity Limits for Type A and Type B Packages	A	A	A	NA	NA
49CFR173.442 (DOT) Thermal Limitations	A	A	A	NA	NA
49CFR173.443 (DOT) Contamination Control	A	A	A	NA	NA
49CFR173.444 (DOT) Labeling Requirements	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
49CFR173.446 (DOT) Placarding Requirements	A	A	A	NA	NA
49CFR173.447 (DOT) Storage Incident to Transportation - General Requirements	A	A	A	NA	NA
49CFR173.448 (DOT) General Transportation Requirements	A	A	A	NA	NA
49CFR173.451 (DOT) Fissile Material - General Requirements	A	A	A	NA	NA
49CFR173.453 (DOT) Fissile Material Exceptions	A	A	A	NA	NA
49CFR173.455 (DOT) Classification of Fissile Material Packages	A	A	A	NA	NA
49CFR173.457 (DOT) Transportation of Fissile Class III Shipment - Specific Requirements	A	A	A	NA	NA

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
49CFR173.459 (DOT) Mixing of Fissile Material Packages	A	A	A	NA	NA
29CFR1910, 1926, and 1904 OSHA Requirements	A	A	A	A	A
Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites, U.S. EPA Office of Emergency and Remedial Response	A	A	A	A	A
Clean Water Act - NPDES Requirements	A	A	A	A	A
Clean Water Act - Federal Ambient Water Quality Criteria	A	A	A	A	A
DOE5400.1 General Environmental Protection Requirements	A	A	A	A	A
DOE5400.2 Environmental Compliance Issue Coordination	A	A	A	A	A
DOE5400.3 Radiation Protection of the Public and the Environment	A	A	A	A	A

See footnote at end of table.

000126

6254

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
DOE5400.xy Radiological Effluent Monitoring and Environmental Surveillance	A	A	A	A	A
DOE5400.4 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program	A	A	A	A	A
DOE5440.1C National Environmental Policy Act (NEPA)	A	A	A	A	A
DOE5480.1B Environmental, Safety, and Health Program for DOE Operations	A	A	A	A	A
DOE5482.1B Environment, Safety, and Health Appraisal Program	A	A	A	A	A
DOE5484.1 Environmental Protection, Safety, and Health Protection Information Reporting Requirements	A	A	A	A	A

See footnotes at end of table.

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
DOE5700.6B Quality Assurance	A	A	A	A	A
DOE5820.2 Radioactive Waste Management	A	A	A	A	A
42USC2011 The Atomic Energy Act of 1954	A	A	A	A	A
42USC7101 The Department of Energy Organization Act	A	A	A	A	A
42USC4341 The National Environmental Policy Act of 1969 (NEPA)	A	A	A	A	A
Executive Order 12088 Federal Compliance with Pollution Control Standards	A	A	A	A	A
Executive Order 12580 Superfund Implementation	A	A	A	A	A
DOE 5400.xx Radiation Protection of the Public and Environment	A	A	A	A	A
NRC Regulations for Standards for Protection Against Radiation (10CFR20)	A	A	A	A	A

See footnotes at end of table.

000128

5254-1

TABLE 5.7
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific (Cont.)					
U.S. EPA Regulations for Environmental Radiation Protection Standards for Nuclear Power Operations (40CFR190)	A	A	A	A	A
DOE 5480.xx Radiation Protection of the Public and the Environment	A	A	A	A	A
DOE 5480.2 Hazardous and Radioactive Mixed Waste Management	A	A	A	A	A
DOE 5480.12 General Environmental Protection Requirements	A	A	A	A	A

[a]A = applicable requirement.

NA = not applicable requirement.

000129

TABLE 5.8

STATE ARARs FOR PIT 5

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Contaminant Specific					
OAC 2745-15-07 Air Pollution Control - Air Pollution Nuisance Prohibition	A[a]	A	A	A	A
OAC 3745-21-05 Air Pollution Control - Nondegradation Policy, Ambient Air Quality Standards	A	A	A	A	A
OAC 3745-17-05 Air Pollution Control - Nondegradation Policy, Particulate Matter Standards	A	A	A	A	A
OAC 3745-17-07 Air Pollution Control - Control of Visible Particulate Emissions	A	A	A	A	A
OAC 3745-17-08 Air Pollution Control - Fugitive Dust Restrictions	A	A	A	A	A
OAC 3745-31-05(A)(3) Air Pollution Control - Installation Permit, Best Available Technology Requirements	NA[b]	NA	NA	NA	NA

See footnotes at end of table.

TABLE 5.8
(Continued)

ARAR	ALTERNATIVE 1 OPTIONS: A1 AND A2	ALTERNATIVE 2 OPTIONS: A5, A6, AND C3	ALTERNATIVE 3 OPTIONS: A8 AND A9	ALTERNATIVE 4 OPTIONS: B2 AND B3b	ALTERNATIVE 5 OPTION: E
Action Specific					
OAC 3745-1-05(A) Water Pollution Control - Antidegradation Policy	A	A	A	A	A
OAC 3745-1-05(B) Water Pollution Control - Antidegradation Policy	A	A	A	A	A
OAC 3745-33-04 Water Pollution Control - NPDES Permit, Issuing Criteria	A	A	A	A	A
OAC 3745-33-05(A) Water Pollution Control - NPDES Permit, General Conditions	A	A	A	A	A

[a]A = applicable requirement.

[b]NA = Not applicable requirement.

FIGURES

FIGURES

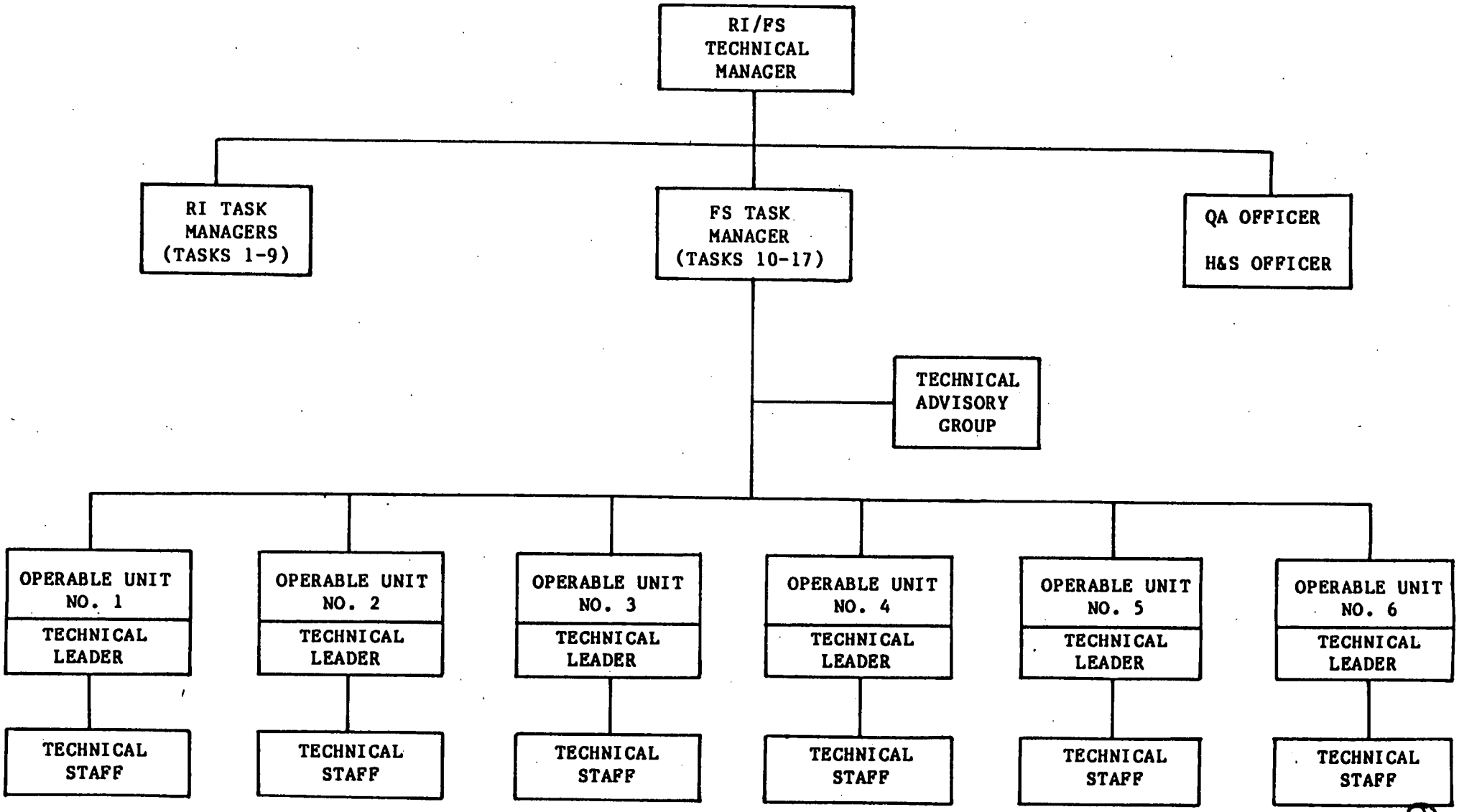
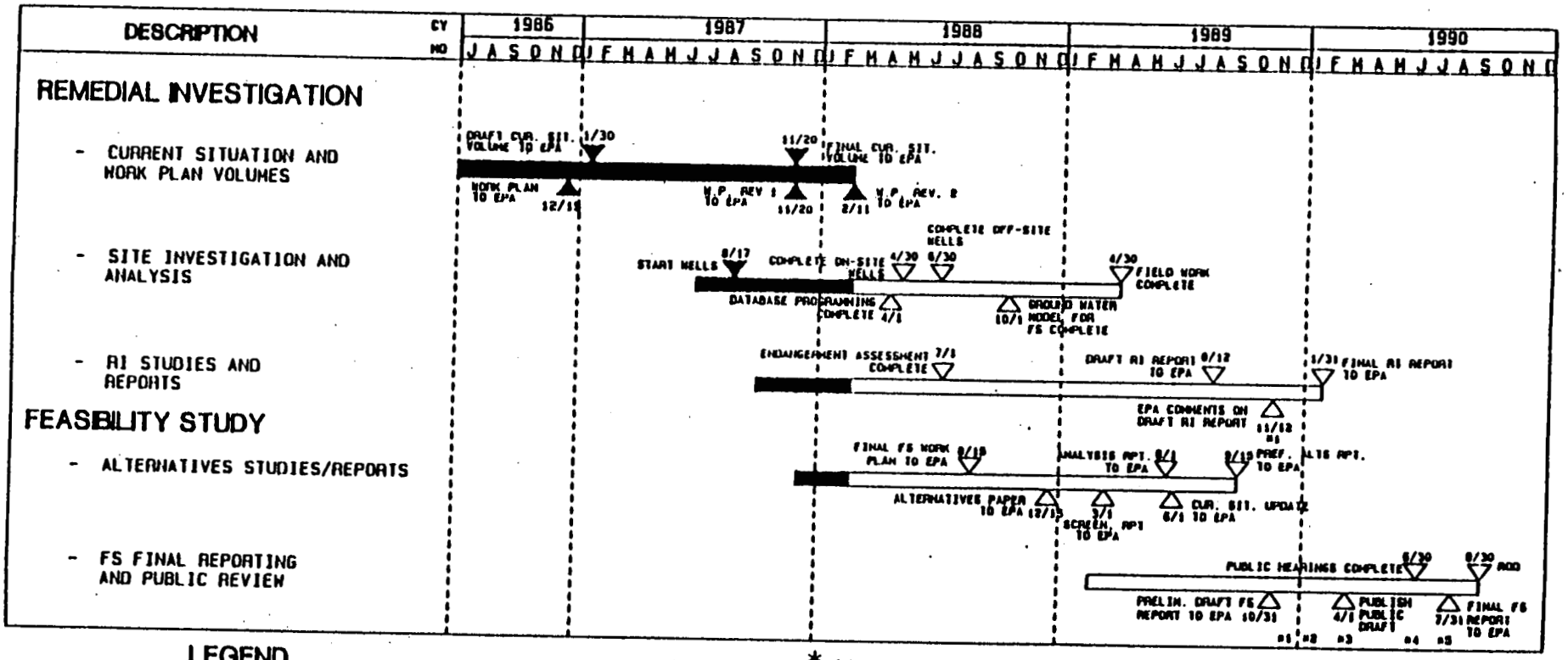


FIGURE 6-1

FEASIBILITY STUDY PROJECT MANAGEMENT ORGANIZATION

FIGURE 6-2

RI/FS SCHEDULE



LEGEND

MILESTONE-PLANNED ▽-----◇ FORECAST-LATE

MILESTONE-ACTUAL ▼-----◆ ACTUALLY LATE

* NOTES

1. EPA REVIEW AND COMMENT PERIOD FOR DRAFT RI REPORT AND FS PRELIM. DRAFT NOT TO EXCEED 90 CALENDAR DAYS.
2. SIXTY CALENDAR DAYS ASSUMED TO INCORPORATE EPA COMMENTS TO PRELIM. DRAFT FS.
3. EPA REVIEW AND COMMENT PERIOD FOR PUBLIC DRAFT FS NOT TO EXCEED 60 CALENDAR DAYS.
4. THIRTY DAY PUBLIC REVIEW PERIOD, THIRTY DAYS FOR CONDUCT OF PUBLIC HEARINGS.
5. SCHEDULE IMPACTS MAY OCCUR DUE TO SCOPING CHANGES OR LONGER THAN PLANNED REVIEW TIMES.

REVISION STATUS

REV	DATE	REFERENCE
0	8/26/87	BASELINE SCHEDULE
1	2/11/88	WORK PLAN, REV.0

PAGE 1 OF 1

000135

6254