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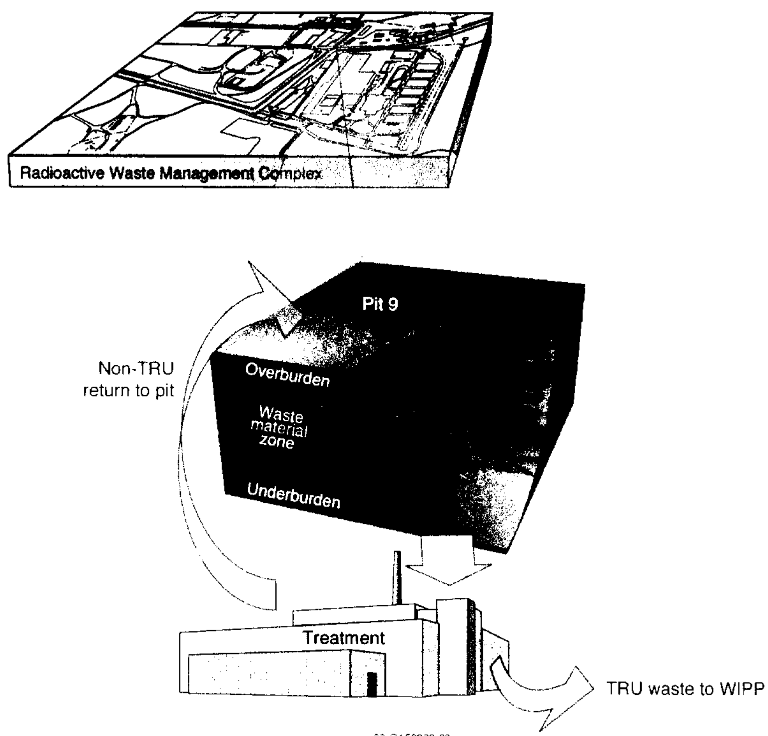
U.S. Department of Energy
Idaho Operations Office

Mission Need Statement: Pit 9 Remediation Project



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Mission Need Statement: Pit 9 Remediation Project

Major Acquisition Project

September 17, 2003

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Prepared for the
U.S. Department of Energy
Idaho Operations Office

Mission Need Statement:
Pit 9 Remediation Project

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EXECUTIVE SUMMARY

Department of Energy (DOE) commitments to the state of Idaho and the United States Environmental Protection Agency contained in the April 2002 Agreement to Resolve Dispute (ARD) establish the enforceable deadlines for the Idaho National Engineering and Environmental Laboratory (INEEL) Pit 9 buried transuranic (TRU) waste remediation. These enforceable deadlines require that the analysis work to determine compliant remediation commence in parallel with the preparation of the Subsurface Disposal Area (SDA) Comprehensive ROD.

The Pit 9 site was a subsurface disposal facility for containerized radioactive and mixed waste from November 1967 to June 1969. These wastes, which included buried TRU from the DOE Rocky Flats Plant, now present a potential risk to the Snake River Plain Aquifer due to vapor phase and subsurface aqueous transport of contaminants. Reducing this risk is the basis for the *Mission Need Statement: Pit 9 Remediation Project*.

Pit 9 remediation must be accomplished to comply with federal statutes, agreements, and the 2002 ARD mandated enforceable deadlines (see Figure ES-1) that form the legal basis for waste retrieval; treatment to meet disposal requirements; and dispositioning of approximately 500,000 ft^3 of Pit 9 buried TRU waste and interstitial soil. The federal statute that drives this

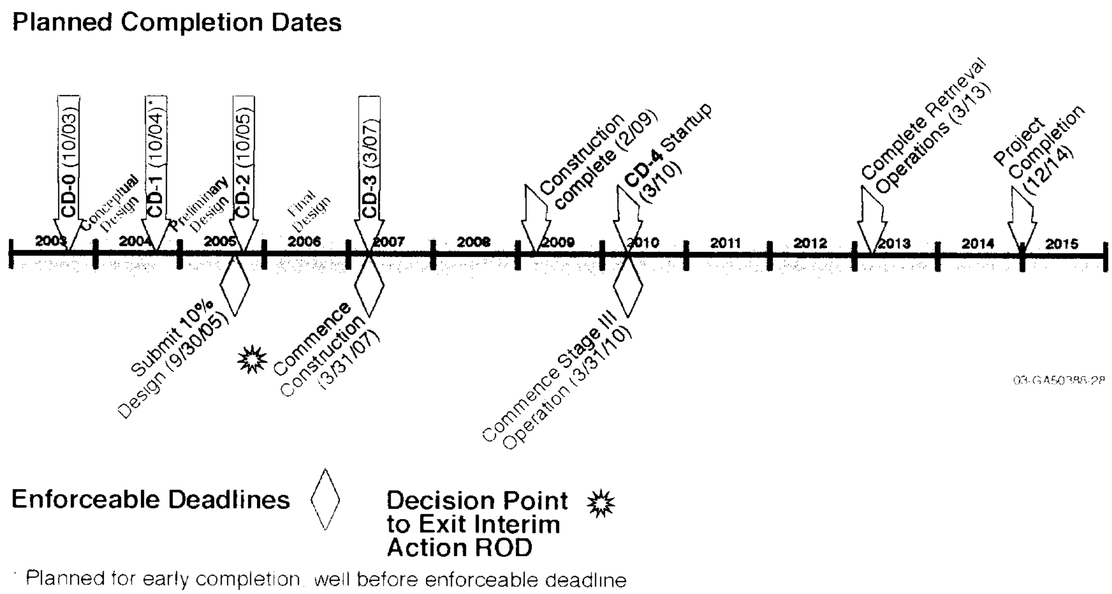

Figure ES-1. Timeline assumes a low complexity, compaction only treatment approach to meet the enforceable deadlines

remediation is the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 120. This section tasks DOE with compliance with and implementation of CERCLA. The section also establishes that DOE must negotiate with the EPA on all remediation actions. Pit 9 remediation is also mandated by Executive Order 12580. In this executive order the President delegated to the Secretary of DOE cleanup of federal facilities including DOE facilities. The FFA/CO, an interagency agreement, embodies the statute and the executive order; includes the state of Idaho as a negotiating party; enables implementation of enforceable deadlines; and establishes fines and stipulated penalties. A 1993 Record of Decision (ROD) formally implemented CERCLA for Pit 9 buried waste remediation and established its implementation under the FFA/CO. Modifications to the ROD established remediation sequencing and penalties. In 2001 a request to extend deadlines resulted in the 2002 ARD pursuant to the FFA/CO. This ARD establishes the current enforceable deadlines for Pit 9 remediation and includes submittals and deadlines for the remedy of the remaining pits and trenches in the subsurface disposal area (SDA). Additionally, the 2002 ARD allows for the coordination of the SDA remediation with the Pit 9 remediation.

The consequences of failing to execute Pit 9 remediation in compliance with the agreements and court orders are:

- The ARD signed by the DOE agreed to penalties of $10,000 per week for missing Stage III milestones. The resulting fines will divert cleanup funds to pay fines rather than remove waste and reduce risk.
- DOE-EM will fail to meet *DOE Environmental Management Performance Management Plan for the Accelerated Cleanup of the Idaho National Engineering and Environmental Laboratory* (PMP) accelerated cleanup risk reduction objectives.
- Health and environmental risk reduction will not be addressed through the Pit 9 Remediation Project.

Analysis has shown that new facilities and equipment are needed for retrieving, treating, and dispositioning buried TRU waste to comply with enforceable deadlines. While needed technologies are likely to be available, development will be needed to apply them to this first-of-a-kind, large-scale, buried TRU waste remediation.

Several alternatives have been identified for waste retrieval and treatment. Due to the pending SDA Comprehensive ROD, alternative analyses include transferability to other pits and trenches that may require similar remediation. Initial planning identified several viable alternatives and eliminated alternatives that were too complex, ineffective, or inefficient. Potential alternatives for retrieval and treatment, provided in this document, will be evaluated in detail and compared to each other so that the most effective and efficient alternative can be selected for Pit 9 remediation. The selected alternative will be presented at the end of fiscal year 2004 in a conceptual design report.

CONTENTS

FIGURES

TABLES

ACRONYMS

AMWTP	Advanced Mixed Waste Treatment Project
ARD	Agreement to Resolve Disputes
CD	critical decision
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DD&D	deactivation, decontamination, and decommissioning
DOE	U.S. Department of Energy
EM	Environmental Management
EPA	Environmental Protection Agency
ESD	explanation of significant differences
FFA/CO	Federal Facility Agreement and Consent Order
HQ	Headquarters
ICDF	INEEL CERCLA Disposal Facility
ICP	Idaho Completion Project
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory
LMAES	Lockheed Martin Advanced Environmental Systems
NCP	National Contingency Plan
NE-ID	Department of Energy, Idaho Operations Office
OU	Operable Unit
PEP	project execution plan
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
TRU	transuranic
VOC	volatile organic compound
WAC	waste acceptance criteria
WBS	Work Breakdown Structure
WIPP	Waste Isolation Pilot Plant

Mission Need Statement: Pit 9 Remediation Project

1. STATEMENT OF MISSION NEED

Department of Energy (DOE) commitments to the state of Idaho and the United States Environmental Protection Agency (EPA) contained in the April 2002 Agreement to Resolve Dispute (ARD) establish the enforceable deadlines that drive the analysis of the need to remediate buried transuranic (TRU) waste at the Idaho National Engineering and Environmental Laboratory (INEEL). Buried TRU waste is located in the Subsurface Disposal Area (SDA) portion of the Radioactive Waste Management Complex (RWMC), shown in Figure 1.

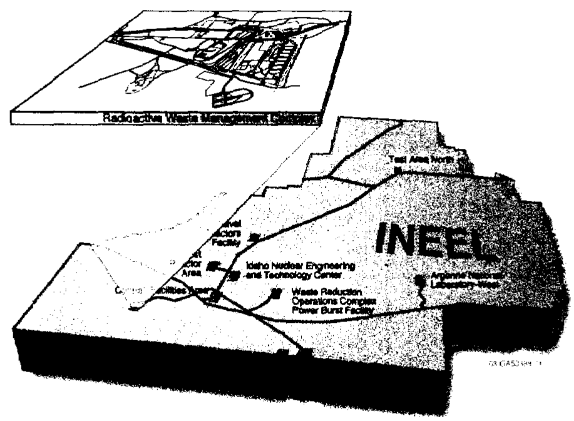

Figure 1. RWMC is located in the southwestern portion of the INEEL.

Within the SDA there are 20 pits, 58 trenches, 21 soil vaults, Pad A, and the Acid Pit. Enforceable ARD deadlines require that analysis to determine compliant remediation alternatives for one SDA pit, Pit 9, commence, and those ARD deadlines are such that the Pit 9 analysis must be conducted concurrent with preparation of the SDA Comprehensive ROD.

Pit 9, also known as Operable Unit 7-10 (OU 7-10), is located in the northeast corner of the SDA. It was operated as a waste disposal pit for containerized radioactive materials and sludge from the DOE Rocky Flats Plant and low-level radioactive waste generated at the INEEL from November 1967 to June 1969. These buried wastes now present a potential risk to the Snake River Plain Aquifer due to vapor phase and subsurface aqueous transport of contaminants.

Thus, the *Mission Need Statement: Pit 9 Remediation Project* document aligns with DOE's 413.3 guidance for CERCLA projects, identifies a need that cannot be met through other than material means, and addresses a mandated DOE Environmental Management (EM) remediation project. The mandated full remediation of 500,000 ft^3 of Pit 9 buried waste and interstitial soil includes retrieval, treatment, and disposition. This large-scale remediation of buried waste allows DOE to:

- Reduce risks to human health and the environment
- Comply with laws
- Comply with binding agreements
- Ensure good environmental stewardship
- Support EM's accelerated clean up initiatives.

Additionally, the remediation supports the overarching DOE-EM goal of risk reduction described in the *DOE Environmental Management Performance Management Plan for the Accelerated Cleanup of the Idaho National Engineering and Environmental Laboratory* (PMP). In the PMP, buried waste remediation is listed as an element of Strategic Initiative 4.8, "Remediate Buried Waste at the Radioactive Waste Management Complex." The retrieval and treatment technology developed to remediate Pit 9 will provide a technical approach to remediate other SDA pits and trenches, and it is a critical component of the Idaho Completion Project (ICP) RWMC completion strategy.

1.1 Background

General knowledge about Pit 9 contents has been gained from activities conducted in earlier work—Stages I and II—as well as examination of historical records of pit contents (based on shipping records). In Stage I, subsurface exploration investigated buried waste at selected locations in the pit using probes and obtained logging data. These data supported the siting of Stage II, a small-scale waste material retrieval project. The construction phase of Stage II, also called the Glovebox Excavator Method, was completed in May 2003, and the facility has been turned over to operations. The small-scale retrieval activities are scheduled to start in the fall of 2003 and be completed within three months thereafter. The Glovebox Excavator Method will demonstrate safe TRU waste retrieval and storage. Part of the Pit 9 Remediation Project work scope includes treatment and disposal of retrieved waste from the Glovebox Excavator Method activities. Pit 9 remediation planning will use lessons learned from Stages I and II to ensure transferability of the remediation approach to other SDA pits and trenches, as well as to provide DOE with a buried waste remediation technology to reduce risk across the DOE complex.

Pit 9 supports the purpose of the Idaho Completion Project: to reduce or eliminate the **risks posed by contamination and waste left at the INEEL from past missions, while protecting our workers, the public, future generations, and the environment.**

1.1.1 Achieving Pit 9 Enforceable Deadlines

To achieve the enforceable deadlines, the Pit 9 team is evaluating alternatives to retrieve, treat, and disposition the waste material and interstitial soil. In fiscal year 2003, retrieval and treatment alternative planning was initiated. Selection of the preferred retrieval, treatment, and disposition alternatives will be the focus of fiscal year 2004 planning.

The final Pit 9 alternative will allow RWMC to reduce risk, not only at the Pit 9 site, but also at other pits and trenches in the SDA. The developed alternative will be capable of remediating other buried waste sites, thus, further accelerating the completion of RWMC remediation.

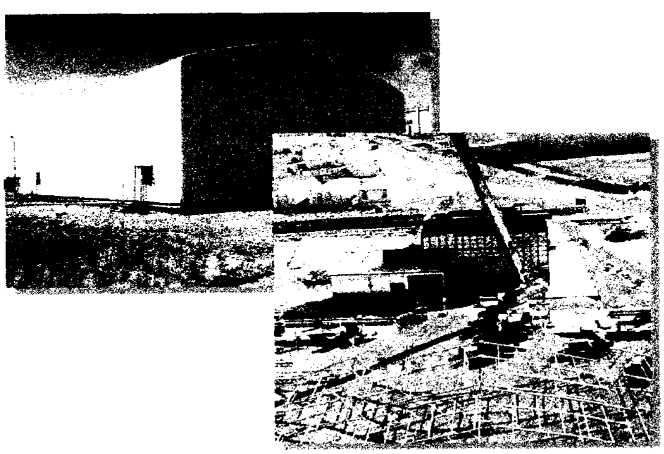

Figure 2. Glovebox Excavator Method project (Stage II) completed the construction phase in May 2003.

1.1.2 Value of Full-scale Remediation Capabilities

Remediating Pit 9 requires large-scale retrieval and treatment capabilities currently not available in the DOE complex or the commercial sector (see Section 2 for details). Using knowledge gained from previously acquired subsurface characterization data (Stage I) and from the small-scale Glovebox Excavator Method activities, (completed Stage II structure is shown in Figure 2)—the Pit 9 team can evaluate the functional, technical, operational, and financial constraints of potential retrieval and treatment alternatives.

1.2 Review of Regulatory Drivers for Pit 9

Federal statutes, agreements, and enforceable deadlines drive Pit 9 remediation, and are the legal basis for waste retrieval; treatment to meet disposal requirements; and dispositioning of approximately 500,000 ft^3 of Pit 9 buried waste and interstitial soil. The federal statute that drives this remediation is CERCLA, Section 120. This section tasks DOE with compliance with and implementation of CERCLA. The section also establishes that DOE must negotiate with the EPA on all remediation actions. Pit 9 remediation is also mandated by Executive Order 12580. In this executive order, the President delegated to the Secretary of Energy to carry out cleanup of federal facilities, including DOE facilities. The Federal Facility Agreement and Consent Order (FFA/CO), an interagency agreement, embodies the statute and the executive order, includes the state of Idaho as a negotiating party, enables implementation of enforceable deadlines, and establishes fines and stipulated penalties (see Figure 3). A 1993 Record of Decision (ROD) formally implemented CERCLA for Pit 9 buried waste remediation and established its implementation under the FFA/CO. Modifications to the ROD established remediation sequencing and penalties. In 2001 a request to extend deadlines resulted in a 2002 ARD pursuant to the FFA/CO. This ARD establishes the current enforceable deadlines for Pit 9 remediation, and includes submittals and deadlines for the remedy of the remaining pits and trenches in the SDA. Additionally, the 2002 ARD allows coordination of the SDA remediation with the Pit 9 remediation.

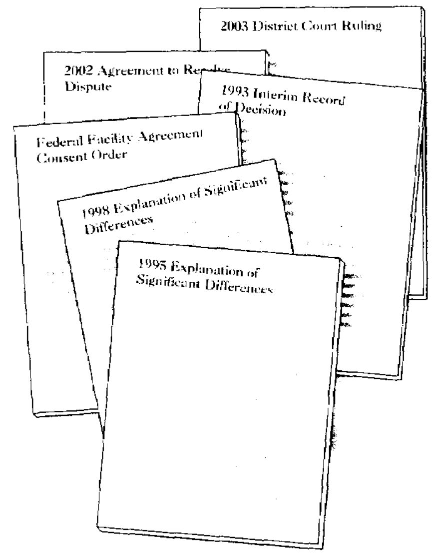

Figure 3. Numerous legally binding documents have established the Pit 9 work scope and deadlines.

On March 31, 2003, a U.S. District Court ruling confirmed that all TRU waste must be removed from the INEEL, including TRU buried in pits and trenches. Although DOE is currently appealing this decision, remediation planning for Pit 9 includes transferability of retrieval and treatment designs for possible use in remediating other SDA TRU pits and trenches (i.e., Pits 1-6 and 10-12 and Trenches 1-10). This design transferability is important. If the appeal of the March 2003 ruling is denied, it may result in a decision to remediate SDA TRU pits and trenches other than Pit 9. Also, design transferability is important because a comprehensive remedial investigation/feasibility study currently being developed may drive retrieval and treatment of additional pits and trenches or those that pose a greater risk than Pit 9. The remediation approach for Pit 9 is being developed for transferability to a pit of equivalent size—one-acre retrieval.

Table 1 provides the chronology of the drivers for Pit 9 remediation and the resulting actions. Appendix A provides further explanation of these drivers.

Table 1. Chronology of key regulatory and planning documents for Pit 9 and the resulting actions.

Date	Document	Requirement Description	Resulting Action(s)
1991	Federal Facilities Agreement and Consent Order	Implements selected response actions under the Action Plan; establishes schedule for Pit 9 Interim Action ROD	Interim Action ROD completed; incorporates the state of Idaho in addition to EPA as a party in the FFA/CO formal decision to remediate Pit 9 under CERCLA
1993	Interim Action ROD for Pit 9	Selects retrieval, ex-situ treatment, and disposal as the remedy for remediation of Pit 9, a demonstration project	Committed DOE to perform Interim ROD subcontract with Lockheed Martin Advanced Environmental Systems (LMAES) for Pit 9 remediation
1995	Explanation of significant differences (ESD) to Interim Action ROD	Revises cost estimates for the Pit 9 site remediation activities	LMAES defaulted on subcontract on June 1, 1998
1997	Agreement to Resolve Dispute	Establishes a modification to the precise sequence of Pit 9 remediation	Work sequence modified, penalties for noncompliance established
1998	ESD to Interim Action ROD	Implements the three-stage approach for remediation of the Pit 9 site in accordance with the 1997 Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan	Stage I work initiated; Stage II design completed in December 2000; request for schedule extension due to the complexity of the design
2001	Deadline extension request	Request make to EPA and the Idaho Department of Environmental Quality (IDEQ) for extension of established deadlines	EPA and IDEQ declined to accept the extension request resulting in an agreement to resolve dispute
2002	Agreement to Resolve Dispute	Amended the FFA/CO and established revised enforceable deadlines for Stage II, Pit 9 full remediation, and the OU 7-13/14 comprehensive ROD	Glovebox Excavator Method (Stage II) alternative continued with modified deadlines and Pit 9 remediation planning was initiated; remediation of the balance of the SDA pits and trenches coordinated with Pit 9 full remediation; establishes enforceable deadlines

1.3 Support of the DOE-EM Mission

Pit 9 remediation supports the DOE complex-wide accelerated cleanup approach to remediate DOE-EM owned facilities to reduce risk to human health and the environment. This complex-wide approach resulted from a DOE-EM top-to-bottom review (DOE-HQ 2002) of its cleanup program, which concluded that significant change was required in DOE's approach to risk reduction.

To that end, DOE and the INEEL prime contractor met with the IDEQ and EPA Region X—referred to as the agencies—to discuss an INEEL accelerated cleanup and completion approach. A letter of intent signed between the agencies in May 2002 documents their intent to pursue accelerated risk reduction and cleanup at the INEEL, and it establishes a focused vision for the accelerated cleanup strategy.

The DOE PMP structures cleanup activities around strategic initiatives to support the letter of intent. The INEEL then developed the *Environmental Management Accelerated Cleanup Project Plan* to align ICP work execution processes with the PMP. Currently the ICP management team is developing the ICP Project Execution Plan (PEP), explaining the ICP methodology to reduce or eliminate the risks posed by contamination and waste left at the INEEL from past missions. To accomplish this purpose, the management team is making a significant change—a new, one-project approach, focused on reducing the risk of contaminating the Snake River Plain aquifer, as well as reducing risk to human health and the environment by accelerating completion of cleanup tasks related to all DOE PMP initiatives. Additionally, the RWMC Cleanup Project PEP, to be developed following issuance of the ICP PEP, will provide execution details for all RWMC activities, including the full remediation of Pit 9. Figure 4 illustrates the interconnection of the letter of intent and the *Mission Need Statement: Pit 9 Remediation Project*.

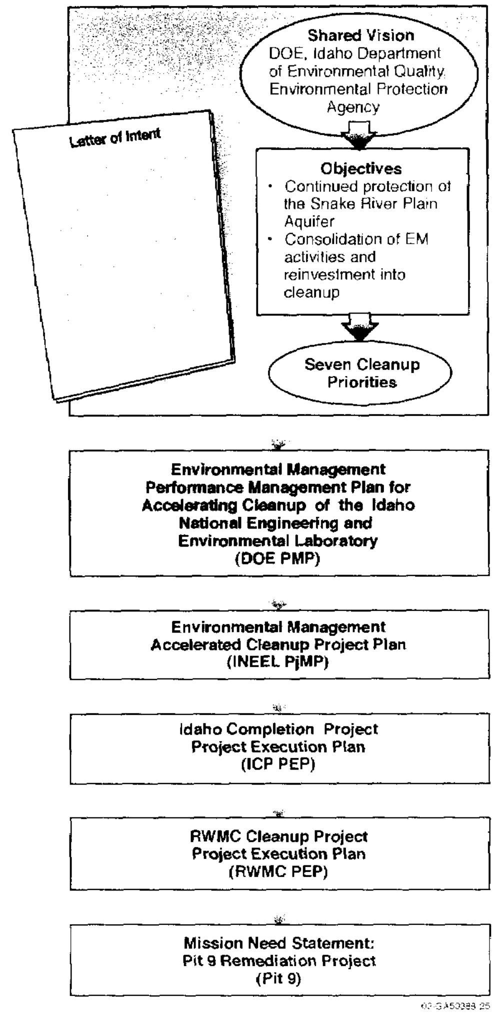

Figure 4. Pit 9 supports the DOE PMP to accelerate ICP completion activities.

Thus, Pit 9 remediation supports PMP strategic initiative 4.8 by fulfilling two RWMC strategic objectives:

- Submit 10% conceptual design for the remediation of the remainder of Pit 9 by September 2005
- Complete the remedial design for Pit 9 and initiate construction by March 31, 2007.

2. ANALYSIS TO SUPPORT THE MISSION NEED

At present, there are no large-scale subsurface retrieval processes in place at the INEEL or elsewhere in the DOE complex that can remediate the large Pit 9 volumes of TRU waste material and interstitial soil and meet the enforceable deadlines. Thus, there is an identified technology shortfall between the current DOE complex remediation capabilities and needed capabilities to remediate Pit 9 in compliance with enforceable deadlines. A new retrieval and treatment design is needed for the remediation of large volumes of Pit 9 TRU waste material and interstitial soil. Determination of this new remediation alternative, that includes retrieval and treatment, is the basis of this mission need statement.

2.1 Retrieval Alternative Assessment

Preliminary retrieval alternatives for Pit 9, explained in *Operable Unit 7-13/14 Evaluation of Soil and Buried Transuranic Waste Retrieval Technologies*, considered similar activities performed, both within the DOE complex and within the commercial and international sectors. The investigated activities were small-scale retrieval operations that involved various equipment options, enclosed and unenclosed retrieval operations, manually operated equipment with various approaches to ensure worker safety, remotely operated equipment, or manually completed retrievals. Lessons learned from these retrieval studies are being incorporated into Pit 9 retrieval planning.

Currently, no commercial companies provide retrieval services for large volumes of TRU waste consisting of heterogeneously mixed waste forms and soils that include chemical and radiation hazards. Based on the lack of a commercial vendor to remediate Pit 9, the large scale of Pit 9 remediation, the presence of TRU waste in Pit 9, and knowledge gained from Stages I and II (described in Section 1), Pit 9 retrieval requires a new design. To understand the magnitude of the large-scale Pit 9 operation, Figure 5 compares the volume of the Stage II retrieval activities with the volume of full Pit 9 remediation activities.

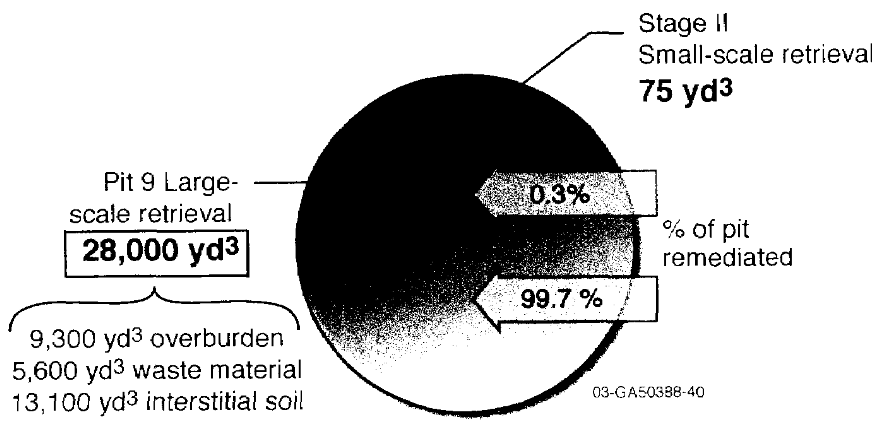

Figure 5. Comparison of Stage II small-scale and Pit 9 large-scale retrieval volumes.

2.2 Treatment Alternative Assessment

As part of the Pit 9 treatment alternative selection process, the team is performing analyses to establish overall treatment requirements that consider potential risks to human health and the environment for each alternative. As these requirements are needed before the start of the Pit 9 conceptual design planning process, the treatment team continues to dialogue with IDEQ and EPA Region X to establish the basis for the treatment requirements.

A range of treatment alternatives has been identified in feasibility studies conducted during fiscal year 2003. The studies identified three TRU and two non-TRU alternatives that span the range of the CERCLA threshold, balancing, and modifying criteria. These treatment alternatives include a simple, low-complexity compaction and certification for disposal at the Waste Isolation Pilot Plant (WIPP) process to a high-complexity process of physical and chemical separation and volume reduction using high temperature oxidation processes. Treatment alternative selection also must consider the potential quantity of material to be remediated based on the SDA Comprehensive ROD and the Idaho Settlement Agreement, the total ICP contact-handled TRU space allocation at WIPP, and the life cycle costs of remediation as well as WIPP transportation, space, and disposal costs.

To some extent, the Advanced Mixed Waste Treatment Project (AMWTP) facility provides existing treatment capabilities. The extent to which this facility can be used and the level of pre-treatment and characterization needed before transferring waste to the AMWTP facility will be evaluated as part of the Pit 9 conceptual design process.

3. IMPORTANCE OF NEED AND IMPACT IF NOT APPROVED

Approval of the *Mission Need Statement: Pit 9 Remediation Project* enables the design planning of critical large-scale retrieval and treatment alternatives not currently available within the DOE complex. This planning allows DOE to implement remediation actions defined in the 1993 Interim Action ROD and allows compliance with the 2002 ARD-mandated enforceable deadlines.

As DOE-complex large-scale remediation technologies are not available for Pit 9, retrieval and treatment planning is needed to:

- Reduce risks to human health and the environment
- Develop a retrieval concept for the remaining SDA TRU pits and trenches
- Provide treatment facilities for the remaining SDA TRU pits and trenches
- Reduce the life-cycle cost of SDA surveillance and maintenance as the function becomes part of long-term stewardship
- Facilitate shipments of buried TRU waste from Idaho.

3.1 Consequences of Noncompliance

The consequences of failing to remediate Pit 9 in compliance with statutes, agreements, and enforceable deadlines are:

- Health and environmental risks will go unmitigated
- DOE will incur penalties of $10,000 per week beginning September 30, 2005, if the Pit 9 conceptual (i.e., 10%) design document is not submitted to the agencies
- The DOE-EM completion approach will be slowed as funds are diverted to pay fines rather than remove waste and reduce risk
- DOE-EM will fail to meet PMP accelerated cleanup objectives
- Stakeholders will lose confidence in DOE's ability, as well as the ability of the involved state and federal administrative bodies, to meet legally binding commitments.

3.2 Risk Assessment and Contaminants of Concern

To address the need to comply with statutes and agreements and meet enforceable deadlines, risk assessments—which consist of hazard identification, toxicity assessment, exposure assessment, and risk characterization—and uncertainty analyses have been conducted. In addition to the TRU removal mandated by the Interim Action ROD, Pit 9 remediation planning includes SDA contaminants of concern as part of the treatment and disposition alternative selection. Inclusion of the contaminants of concern in retrieval and treatment planning should result in cost avoidance for future SDA remedial activities.

During the initial Pit 9 remediation risk analysis, consideration was given to contaminants of concern in Pit 9, as well as the SDA. Three contaminants of concern—TRU, uranium, and organic contaminants—are considered in retrieval and treatment planning.

- TRU waste—category of material considered to pose the highest long-term risk[1] and is classified as a special case contaminant of concern to acknowledge uncertainties about plutonium mobility in the environment.

Pit 9 remediation removes TRU waste from Pit 9 and Idaho, and it safely dispositions that waste at WIPP.

SDA Subproject Contaminants of Concern

In addition to buried TRU waste, uranium and organics are of concern for the SDA:

- Uranium—concentrations in several lysimeter wells have been increasing since 1997 and are an aquifer contamination concern.

The remediation process will remove uranium from Pit 9 and place it in storage, thus, removing an environmental risk aligned with the cleanup and completion of RWMC activities.

- Organic contaminants—migration from buried waste material into the vadose zone is currently being remediated by another ICP subproject. This remediation will continue, since sampling wells indicate that aquifer concentrations of carbon tetrachloride, a carcinogen, have occasionally exceeded maximum contamination limits since 1987.

Removal of organic contaminants allows for the safe disposition of treated soil, either shipped to WIPP or returned to the pit, based on the TRU content.

As part of the FY04 planning process and the Glovebox Excavator Method activities, additional contaminants of concern may be identified in the SDA Baseline Risk Assessment, and they will be included in Pit 9 remediation planning.

3.3 Benefits of Remediating Pit 9

The remediation technology complies with enforceable deadlines and provides the following benefits:

- All CERCLA remediation of the Pit 9 site is completed reducing risks to human health and the environment
- Pit 9 remediation reduces DOE-EM life-cycle costs by reducing the RWMC footprint and allows funds to be applied to other ICP risk reduction activities.
- Approved mission need statement enables conceptual planning to start in FY 04 enabling the preparation of the 10% design document in advance of September 30, 2005 to ensure commencement of construction by the 2007 enforceable deadline, but depends on use of the low-complexity, baseline treatment alternative.
- No fines will be incurred, allowing the use of those funds to accelerate ICP cleanup as directed by the DOE PMP.

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[1] From statement of Jessie Roberson Assistant Secretary for Environmental Management before the Subcommittee on Strategic Forces, Committee on Armed Forces, US Senate, April 2, 2003

- Pit 9 facilities dispositioned in accordance with the final remedy for the SDA, thus, avoiding the cost of potential fines or economic impact and building stakeholder confidence in DOE commitment to risk reduction.

4. CONSTRAINTS AND ASSUMPTIONS

Programmatic and technical risks, assumptions, and constraints focus the work scope required for remediation of buried TRU waste in Pit 9. Project planning has been initiated to identify technical, functional, financial, environmental, and stakeholder constraints. Initial assumptions that affect retrieval, treatment, and disposition planning have also been established and are summarized in Section 4.4. A complete list of the project assumptions is available in the *Mission Analysis and Definition for the Operable Unit 7-10 Stage III Project*.

4.1 Enforceable Deadline Considerations

Time is a constraint on the full remediation of Pit 9. Using a low complexity, compaction treatment option, all the enforceable deadlines can be achieved, as shown in Figure 6. Those deadlines, established by the 2002 ARD, mandate the submittal of the 10% design by September 30, 2005, commencement of construction by March 31, 2007, and commencement of operation by March 31, 2010. Before requesting approval to initiate final design, a ROD decision point (shown in Figure 6), per the SDA Comprehensive ROD, is reached. This decision will determine whether to pursue the Interim Action ROD directed remediation of Pit 9 or defer to the SDA Comprehensive ROD per the ARD.

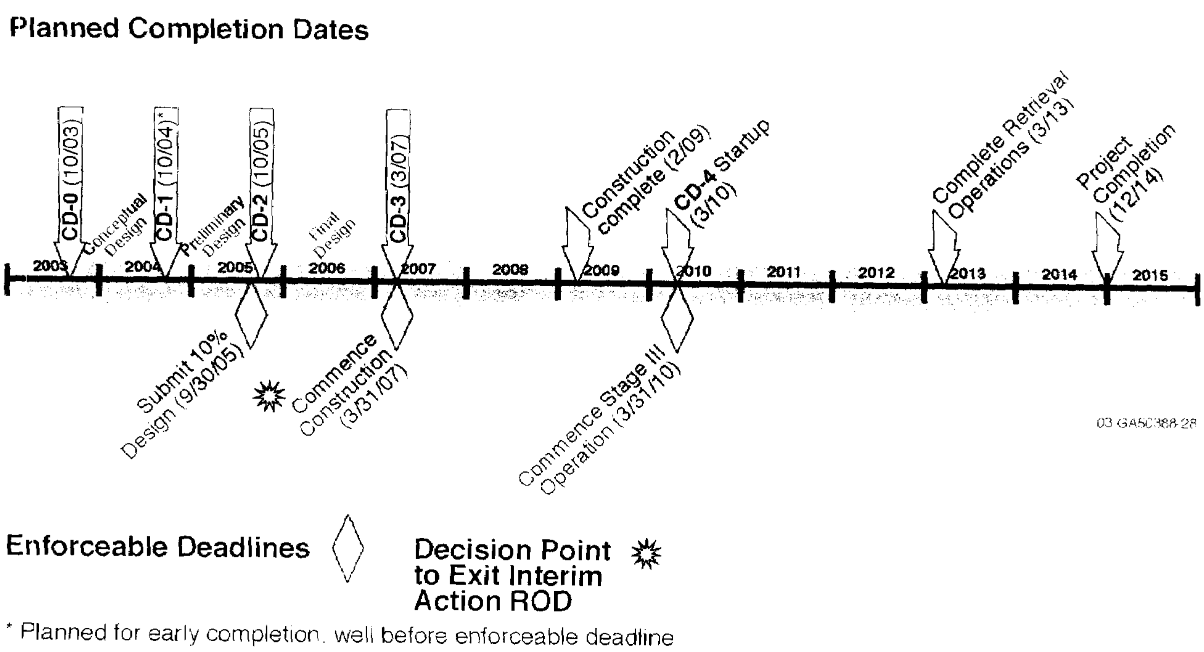

Figure 6. Target dates and enforceable deadlines over the life of the Pit 9 Project for a **low-complexity** treatment alternative.

If a high complexity treatment alternative is selected, two of the three enforceable deadlines - commencement of construction and commencement of operations - are not met, as shown in Figure 7.

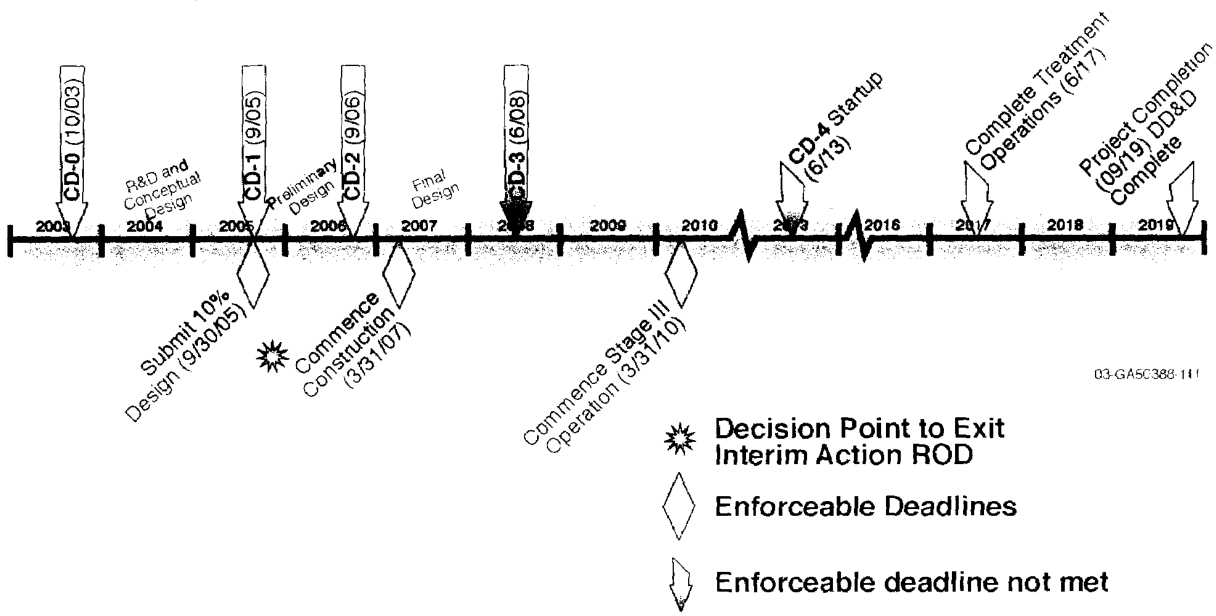

Figure 7. Target dates and enforceable deadlines over the life of the Pit 9 Project for a **high-complexity** treatment alternative.

4.2 Risk Considerations

Part of the constraint/assumption process included identifying programmatic and technical risks and establishing mitigation strategies for handling these risks. The risk management process to be used during execution of the Pit 9 Remediation Project follows the general risk management process described in DOE Manual 413.3-1, Chapter 14, "Risk Management." However, the general risk management process has been tailored to suit the size, complexity, and unique attributes of Pit 9 remediation and is performed at each project phase to support the critical decision approvals.

At this stage of the project, the emphasis is placed on planning and risk identification. The planning phase of the risk management process has been accomplished with the release of the Risk Management Plan (PLN-1358, Risk Management Plan for the OU 7-10 Stage III Project, Rev. 1). The risk identification process is currently underway. The major risk areas that would significantly affect the project performance, if they were not resolved, are provided in Table 2. These risks are divided into three categories (i.e., programmatic, technical - retrieval, and technical - treatment) and include the expected risk response strategy for each risk item.

Table 2. Pit 9 remediation risks.

Risk Type	*Major Risk Concern Areas*	*Risk Handling Strategy*
Programmatic	The agencies may not approve the proposed change to the TRU action level.	Reduce
	The agencies may not approve the proposed change to the volume reduction goal.	Reduce
	The agencies may not approve the proposed changes to the treatment technologies to be used for the OU 7-10 remediation (as specified in OU 7-10 Record of Decision).	Reduce
	An alternate TRU pit or trench may be selected for Stage III retrieval.	Mitigate
	The Stage III remedial action objectives will not be finalized until late into the design phase.	Mitigate
	There is a significant likelihood that one or more ARD deadlines will be missed for the low-complexity, baseline treatment alternative due to a lack of schedule buffer, a multi-path critical path (with many near-critical paths), and the inherent variability of activity durations. It is a near certainty that the ARD operations commencement deadline will be missed given the adoption of a high-complexity treatment alternative (e.g., chemical leaching).	Reduce
Technical – Retrieval	The agencies may not approve the proposed exemption from retrieving remote-handled waste items in the pit.	Reduce
	The agencies may not approve the proposed exemption from retrieving "large-object" waste items in the pit.	Reduce
	The retrieval approach could change significantly if the condition of the buried waste, as determined by the Glovebox Excavator Method Project, indicates high container integrity.	Mitigate
Technical – Treatment	The agencies may not approve the proposed exemption from retrieving remote-handled waste items in the pit or a remote-handled waste item is inadvertently passed to treatment.	Reduce and mitigate
	Volume fraction estimates and timing assumptions for TRU waste, soil contaminated to TRU-waste levels, non-TRU waste, and non-TRU soil entering treatment, over time, may prove inadequate as a basis for scaling the treatment unit operations.	Reduce
	The agencies make a determination that the waste receiving and preparation function, as defined in the preconceptual design, constitutes Resource Conservation and Recovery Act (RCRA) placement, thereby, triggering land disposal restriction requirements to be met for all waste to be returned to the pit.	Reduce and avoid
	The nondestructive assay technology(ies) selected for use in Stage III may not be capable of meeting WIPP accuracy and certification requirements.	Reduce

4.3 Constraints

An overarching constraint that impacts Pit 9 retrieval and treatment alternatives is the ROD that dictates retrieval and **ex situ treatment** of waste material. Other constraints are explained in this section.

4.3.1 Operational Limitations

Some performance objectives (shown in Table 3) defined in the 1993 Interim Action ROD pose significant technical risks related to implementing the large-scale Pit 9 retrieval and treatment processes necessary to meet enforceable deadlines and anticipated cost constraints using commercially available equipment to remediate to 10 nCi/g. The requested modification of the performance objective defining TRU as >100 nCi/g is based on acceptable residual risk to the SDA and aligns with the 1984 DOE modification of the TRU definition.

Table 3. Pit 9 performance objectives with proposed resolutions.[2]

Functional constraints based on the original ROD		Proposed ROD Modifications	
Description of performance objective	Current ROD requirement	Proposed change to current ROD requirement	Justification for modifying performance objective
TRU action level for triggering waste removal from the pit (and acceptability of materials to be returned to pit)	Action level of 10 nCi/g	Action level of 100 nCi/g	Waste and soils containing ≤100 nCi/g TRU is thought to be protective of human health and the environment. This position to be validated in assessment of residual risk. Characterization of waste at 10 nCi/g TRU vs. 100 nCi/g would significantly increase costs with only a slight corresponding decrease in risk.
Volume reduction goal	90% reduction for materials undergoing treatment	Reduction of toxicity, mobility, and/or volume consistent with the National Contingency Plan (NCP) to the extent necessary to ensure cost effective risk reduction.	90% volume reduction as originally required in the ROD requires a technology to clean TRU contamination from soils. "Soil washing" has not been proven on this type of clay-rich soil.
Treatment approach	Physical separation, chemical extraction, and/or stabilization of materials containing > 10 nCi/g TRU	Treatment of materials containing > 100 nCi/g TRU to meet WIPP waste acceptance criteria (WAC)	As of the signing of the ROD, WIPP had not opened and final disposition of TRU waste was uncertain. Now that WIPP can accept mixed TRU, treatment need only ensure acceptability under the WIPP WAC.
		Treatment of materials containing ≤ 100 nCi/g TRU for VOCs only and based on residual risk	Cost-effective treatment for non-TRU waste to be returned to the pit will likely need to include removal (i.e., segregation) of uranium-bearing waste for alternate disposal and volatile organic compound (VOC) treatment prior to return to pit to ensure that these contaminants do not exceed risk-based levels. Other treatment, as defined in the ROD, is not required to achieve acceptable residual risk due to minimal inventory levels in the Pit 9 site.

[2] Final resolutions require agreement by stakeholders and appropriate documentation in the Administrative Record.

Table 3 provides proposed resolutions to identified issues for negotiation and agreement with the agencies allowing the Pit 9 team to develop a feasible set of large-scale design solutions. These negotiations will, most likely, focus on establishing objectives for TRU waste removal, including verification of acceptable CERCLA residual risk, and criteria relating to material that can remain in or be returned to the pit. All Pit 9 alternatives considered as feasible design solutions will:

- Protect human health and the environment by meeting applicable or relevant and appropriate requirements (ARARs) and to-be-considered guidance documents
- Achieve the modified 1993 Interim Action ROD performance objectives (as agreed on through agency negotiations [see Table 3 for proposed changes])
- Meet the enforceable deadlines identified in the 2002 ARD, using the low-complexity, baseline treatment alternative.

4.3.2 Standardization and Standards Requirements

Design of retrieval and treatment systems and facilities is constrained by various national codes and standards. The requirement to conform to the codes and standards comes from laws, regulations, and DOE orders. For example, the facilities will be required to conform to the natural phenomena design requirements of the International Building Code or DOE-STD-1020, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*. The fact that the facilities and systems will be retrieving and treating TRU or mixed waste means that the more stringent requirements from the national codes and standards are likely to be imposed.

Construction, operations, and deactivation, decontamination, and decommissioning (DD&D) are also constrained by standards, regulations, and DOE orders. For example DOE O 430.1A, *Life Cycle Asset Management*, regulates how facilities are planned, designed, constructed, operated, and deactivated. The hazards to human health and the environment that are present for this project, plus the cost of the project, ensure that more standards, rules, regulations, and laws are applicable than for a smaller project with less hazard.

The early design stages of the project will identify the applicable laws, regulations, standards, and codes. The design and safety analysis will also determine the extent to which DOE standards and guides for nuclear facilities are applicable to the project. The safety and nuclear classifications will impose more stringent requirements than are normal for other environmental remediation projects that do not contain nuclear facilities.

4.3.3 Environmental, Safety, and Health Requirements

Retrieval and treatment systems must comply with applicable regulations, e.g., 10 CFR 835, dealing with radiological protection of workers.

4.3.4 Safeguards and Security Considerations

Facility designs will incorporate requirements for protection of government property and personnel. A security plan will be developed and implemented for identification and management of potential classified items. A contingency plan will be developed, if classified items are identified, to compliantly manage and disposition those items.

4.3.5 Interfaces with Existing and Planned Acquisitions

The existing contract between DOE and BNFL allows modifications for processing additional waste. The Pit 9 waste is not typical of INEEL stored waste, the AMWTP design basis. Thus for AMWTP treatment of Pit 9 waste, operating concepts and interfaces agreements will have to be developed and evaluated to determine the applicability of existing AMWTP systems, to identify and estimate additional facilities and systems needed, and to obtain modifications to existing permits and operating bases for AMWTP processing of Pit 9 waste.

4.3.6 Financial Consideration

The preliminary total project cost range is $658-865M. The baseline estimate assumes remote retrieval and a low complexity compaction treatment alternative for TRU waste, generating minimal secondary waste and resulting in minimal volume reduction. The $865M estimate assumes chemical leaching treatment that significantly increases treatment complexity, but provides approximately 90% volume reduction.

4.3.7 Stakeholder Consideration

Stakeholders are concerned about contamination of the Snake River Aquifer, airborne contamination—particularly from any thermal treatment technique—and generation of untreatable or unshippable secondary waste. Stakeholders for Pit 9 remediation include NE-ID, IDEQ, EPA Region X, the Idaho congressional staff, the Idaho state and local governments, the Shoshone-Bannock Tribes, the INEEL Citizens Advisory Board, environmental advocacy groups (e.g., Snake River Alliance, Keep Yellowstone Nuclear Free, Coalition 21, INEEL Research Bureau, and Environmental Defense Initiative), and the general public. To promote stakeholder involvement and inform stakeholders, there will be coordinated communications using the FFA/CO processes, including press releases, editorial boards, presentations to civic organizations, and the ICP website.

4.3.8 Limitations Associated with the Program Structure, Competition and Contracting, Streamlining, and the Use of Development Prototypes or Demonstrations

In July 2001, as part of the Stage II planning, the INEEL began comparing alternate methods of accomplishing a small-scale waste retrieval demonstration. The selected alternative, the Glovebox Excavator Method, provides a schedule- and cost-effective approach for retrieving 75 yd^3 of waste in early fiscal year 2004. But the Stage II demonstration design only permits retrieval of a small portion of the Pit 9 site, and lacks the needed design flexibility to retrieve the balance of Pit 9 with the throughput needed to meet enforceable deadlines. Also, the Glovebox Excavator Method, only a retrieval activity, does not provide any design insight for waste treatment and disposition.

4.3.9 Competition

The preliminary acquisition strategy is to contract this work to the management and operating contractor for the INEEL with appropriate performance based incentives. A complete acquisition strategy will be submitted with the CD-1 package for approval and will be based on the planned restructuring of the INEEL.

4.4 Assumptions

Initial planning for the Pit 9 remediation is based on the following major assumptions. A complete list of the project assumptions is available in the *Mission Analysis and Definition for the Operable Unit 7-10 Stage III Project.*

Remediation level and actions "triggered" for TRU contamination: The agencies and stakeholders will agree, and appropriately document in the Administrative Record, that the TRU radionuclide concentration action level for determining acceptability of materials to be returned to the Pit 9 site is changed from 10 nCi/g TRU (as identified in the 1993 Interim Action ROD) to $\leq$100 nCi/g TRU (average concentration for decision-unit volumes).

Treatment of TRU waste: Retrieved waste zone material that measures > 100 nCi/g TRU will be treated to meet WIPP WAC, and for volume reduction, as economically achievable.

Objective for volume reduction: The volume reduction objective is to minimize overall life-cycle costs for materials undergoing treatment. Volume reduction is retained only as a balancing criterion to be used when selecting treatment methods for materials that require disposal outside of the INEEL. This means: (a) there is no required specific numerical volume reduction value that must be achieved, (b) the actual amount of volume reduction (or volume increase minimization) will be established by the selected treatment technology, and (c) no specific treatment technologies are imposed for achieving volume reduction.

Segregation and characterization of material to be returned to the pit does not invoke RCRA regulations: In addition, characterization activities in the area of contamination and temporary staging of waste zone materials containing ≤ 100 nCi/g of TRU to be returned to the pit in the area of contamination do not constitute RCRA placement. Thus, land disposal restrictions are not triggered by these activities for the materials to be returned to the pit.

Minimum closure elements of the pending SDA subproject comprehensive ROD remedy: The RWMC overall remedial investigation/feasibility study includes the SDA. Remediation of the entire area will include cleanup, installation of an engineered surface barrier, and transfer to long-term stewardship for monitoring in perpetuity.

Design life and throughput of the Pit 9 system: The Pit 9 system will implement retrieval elements of any future SDA Comprehensive ROD. Therefore, the Pit 9 design will include structures, systems, and components that have a design life and throughput capacity consistent with RWMC life-cycle baseline retrieval of 50% of the buried TRU waste.

Retrieval of classified objects: No classified objects are expected to be retrieved, based on shipping records. If classified objects are encountered during Pit 9 retrieval activities, the security organization will develop a comprehensive security plan to protect government property and personnel.

Space availability at WIPP: Sufficient space is available at WIPP and can be reserved for receiving all TRU waste to be generated by the Pit 9 Project.

DD&D of former retrieval method equipment and facilities: Equipment and facilities constructed by LMAES prior to June 1, 1998, will undergo DD&D, including removal of resultant waste and materials from the SDA, before the start of Pit 9 construction. The LMAES DD&D effort is not within the scope of the Pit 9 remediation.

Treatment of non-TRU waste: Given the identified risk of VOCs to human health via groundwater transfer, non-TRU waste material that exceeds a trigger level of VOC contamination will be treated to reduce the VOC concentration to acceptable levels, based on risk analyses, before returning the material to the pit. See Section 3.2 for other non-TRU issues.

5. APPLICABLE CONDITIONS AND INTERFACES

Successful remediation of Pit 9 will require implementing designs for waste retrieval, treatment, and disposition that provide a waste form acceptable for disposal at a DOE-designated waste disposition location, such as WIPP, near Carlsbad, New Mexico.

5.1 Compatibility Requirements with Existing or Future Systems

Pit 9 retrieval designs will benefit from lessons learned during the Glovebox Excavator Method retrieval demonstration. These lessons learned will help achieve the enforceable deadlines and the PMP goals of risk reduction to human health and the environment by providing insight needed for design choices. Pit 9 designs, technologies, and equipment will be planned to include potential use at the other SDA TRU pits and trenches to facilitate implementation of the pending SDA Comprehensive ROD.

It is possible that the SDA Comprehensive ROD will supersede the 1993 Interim Action ROD, in which case, retrieval and treatment of Pit 9 might be replaced by an alternative remediation of TRU pits and trenches. Being able to relocate equipment and transfer remediation designs and technologies is highly desirable so that the Pit 9 retrieval and treatment approach can be effectively integrated with other SDA remediation actions.

It is possible that the SDA Comprehensive ROD will supersede the 1993 Interim Action ROD, in which case, retrieval and treatment of Pit 9 might be replaced by an alternative remediation of TRU pits and trenches.

The Pit 9 remediation will be designed to include features and functions, where practical, to promote transferability to the other TRU pits and trenches in the SDA. However, the performance of such follow-on actions—including additional design or redesign, facility and equipment modifications or relocations, or new construction beyond that planned for Pit 9—is outside the scope of this document and is wholly dependent on the content of the SDA Comprehensive ROD.

5.2 WIPP Certification Program Integration

Material that is contaminated with TRU (> 100 nCi/g) resulting from full Pit 9 remediation and Glovebox Excavator Method activities will be dispositioned at WIPP. This will require compliance with the WIPP waste acceptance criteria. The Pit 9 remediation will support WIPP certification by supplying:

- WIPP approved visual examination and sampling
- Packaging waste in WIPP certifiable containers[3]
- Headspace sampling[3]
- Assaying containers[3]
- Waste certification official compliance[3]
- Transportation certification official compliance[3]
- TRUPACT loading.[3]

Currently, the WIPP waste acceptance criteria allow the >100 nCi/g TRU criteria to apply to the disposal container. In the case of a standard waste box, drummed waste containing >100 nCi/g TRU can be packaged with drums of waste containing ≤100 nCi/g TRU contaminants as long as: (1) the >100 nCi/g criteria is met for the combined standard waste box, (2) the drums are from the same waste stream, and (3) all other WIPP WAC requirements are met. The INEEL 3100 m^3 Project disposed of a few waste drums that nominally did not meet the >100 nCi/g TRU cutoff in this manner. AMWTP assumptions indicate that such packaging, termed "matching," is available to dispose of drums not meeting the TRU waste cutoff. The Pit 9 project intends to use this avenue, if still available, on a case-by-case basis for disposing of waste drums that would otherwise have no clear disposition path—provided the WIPP WAC requirements are fully satisfied and the approach can be demonstrated to be cost effective. Additionally, the approach, referred to as "blending up," mixes non-TRU waste with TRU waste prior to packaging to minimize waste with no clear disposition path—provided the WIPP WAC requirements are fully satisfied and the approach can be demonstrated to be cost effective. Generally the "blending up" approach would not be cost-effective for non-TRU waste with no path for disposal.

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[3] Scope possibly performed by AMWTP.

5.3 On-Site Project Interfaces

5.3.1 Advanced Mixed Waste Treatment Project Interfaces

The AMWTP, built and operated by BNFL, is available as an option for characterization and treatment requirements (e.g., assay, sorting, sizing, specialized treatment, and packaging) for some of the retrieved waste zone material, including combustibles and debris. The Pit 9 team will consider purchasing and using existing process and certification program services available from AMWTP, based on available capacity and cost-effectiveness. The volume of waste retrieved from Pit 9 could, along with existing throughput obligations, exceed AMWTP's current treatment throughput. The goal is to retrieve waste, treat it, and disposition that waste in a timely manner, rather than storing waste on site awaiting treatment. Additionally, the ability for AMWTP to "blend up" and "match" is important to minimize the quantity of waste that must be retained at RWMC. To address treatment issues, a memorandum of understanding will be developed to define the roles and responsibilities associated with any services to be provided by the BNFL AMWTP facility.

5.3.2 INEEL Interface

The Pit 9 team will establish needed interfaces to procure, at a minimum, the following INEEL-provided services:

- Maintenance Coordination
- Financial Operations
- Supply Chain Management
- Radiological Controls
- Laboratory Analysis Support.

Also research and development support is anticipated for the following technology needs:

- Assay capability to measure 100 nCi/g distributed contamination in heterogeneous matrices
- Demonstration of low temperature thermal desorption technology on simulated organic sludge to assess process viability and VOC removal efficacy.

5.3.3 RWMC Interface

Needed utilities, such as electrical power, fire and potable water, and sanitary sewer, as well as site access for Pit 9 construction and operation will be negotiated with RWMC project director and RWMC project operations manager.

5.3.4 INEEL CERCLA Disposal Facility (ICDF) Interface

Disposition of Pit 9 DD&D structures and equipment, as well as other secondary wastes resulting from Pit 9 processes, may use ICDF resources. During conceptual design, the level of ICDF usage will be established and the necessary interface negotiated, based on that level of usage.

5.3.5 LMAES Facility and Equipment Issues

LMAES equipment and structures, part of current litigation, must be removed prior to commencing Pit 9 construction activities. Removing the LMAES material is not part of the Pit 9 scope.

6. RESOURCE REQUIREMENTS AND SCHEDULE

The schedule for completing full remediation of Pit 9 aligns with the enforceable deadlines and depends on the use of a low-complexity, compaction treatment alternative. The treatment alternatives' complexity and volume reduction capability drives the range of preliminary costs, as well as the schedule. Success measures for scope, schedule, and cost align with deliverables supporting enforceable deadlines.

6.1 Timeline for Enforceable and Major Deadlines

Appendix B provides the summary schedules for both a low-complexity and a high-complexity treatment alternative. These schedules align with the Pit 9 enforceable deadlines defined in the April 2002 ARD **only if the low-complexity treatment alternative is selected.**

6.2 Total Project Cost Range and Profile of Required Funding

The preliminary total project costs of $658-865M provide a range based on the treatment alternative complexity and volume reduction. The baseline estimate assumes a remote retrieval option and a low-complexity, compaction treatment alternative for TRU waste, as well as minimal volume reduction and secondary waste generation. While the other estimate assumes a chemical leaching treatment that significantly increases complexity, the alternative does provide approximately 90% volume reduction. Only the low complexity baseline estimate aligns with the timeline to achieve the enforceable deadlines shown in Figure 6. In the chemical leaching treatment estimate, additional research and development is required prior to initiating the conceptual design. Also, addition time is required to complete a trial burn. Appendix C provides the cost estimate data for both the low-complexity baseline and the high-complexity treatment alternatives.

The total project cost, which includes the costs for design, construction, and startup, is a risk adjusted project support estimate. This estimate should be considered a rough order of magnitude estimate intended to support CD-0. A risk-based Monte Carlo model was used to calculate contingency at an 85% confidence level.

6.3 Measures to Determine Project Success

Performance metrics have been established for scope and major deliverables that are driven by enforceable deadlines, as well as schedule and cost.

6.3.1 Measure of Schedule Success

Progress based on defined deliverables will be used to establish schedule success. The project will measure schedule performance using an earned value system to measure quantifiable work accomplishments with respect to completed deliverables. Engineering and procurement deliverables (i.e., drawings, specifications, material requisitions, etc.) will be tracked using the progress and performance measurement tools, which use identifiable trigger points. Trigger points will have an associated performance value or will be based on milestone completion, engineering standard, or equivalent units. True level-of-effort tasks are based on a calculation of productive hours for the period, as identified in the appropriate fiscal year accounting calendar. Construction schedule progress will be determined based on quantities installed against the plan using quantity unit rate reporting tools. Contract earned-value will be determined on a regular basis to support the reporting responsibilities of the RWMC project director to the ICP integrated management team. Variances from planned schedule performance will be reviewed and dispositioned by project management and corrective action will be taken.

6.3.2 Measuring Cost Success

The Pit 9 management team will effectively track cost performance using control tools that facilitate cost tracking and monitoring using the Work Breakdown Structure (WBS) The WBS subdivides the total project into manageable units of work, which are then subdivided into successive lower levels of detail. ICP Planning and Controls will provide tools to collect costs in alignment with the WBS and DOE requirements. Weekly, monthly, and year-to-date actual cost reports will be generated for both hours and dollars. Change control management and trend reporting will be used to report variances from the baseline planned progress. Variances from planned cost performance will be reviewed and dispositioned by project management, documented monthly, and corrective actions identified and implemented. Monthly estimates at completion will be developed based on actual performance and identified trends.

6.3.3 Scope and Major Deliverables Success

Work scope and major deliverables, driven by enforceable deadlines (see Table 4), directly link a success criterion and a definition of success for the low-complexity, baseline treatment alternative only

Table 4. Pit 9 success criteria.

Pit 9 Success Criterion	Definition of Success
By September 30, 2004 deliver a technically feasible and cost-effective conceptual design.	A technically feasible and cost-effective conceptual design is delivered to the agencies before the enforceable deadline date The conceptual design is subsequently reviewed and verified by the agencies to support the agreed-upon objectives for Pit 9 remediation, including safe and timely retrieval of buried TRU waste from the Pit 9 site The design reflects the resolution of issues with performance objectives (see Table 3) and the selected means through which NE-ID plans to satisfy the obligations for conducting the interim remedial action. Agreed-upon resolutions to issues with the original Pit 9 performance objectives are appropriately reflected in the Administrative Record.
By March 31, 2007, start construction of the completed and approved design for Pit 9 remediation.	A completed remedial design for the Pit 9 system (i.e., a system of temporary facilities, structures, and equipment, as well as associated personnel and material resources) is completed and construction of the system starts before the enforceable deadline date.
36 months after the start of construction, operations commence for Pit 9 waste material retrieval, treatment, and disposition (no later than March 31, 2010).	Waste removed from the pit is segregated into TRU waste and non-TRU waste, treated (as necessary), packaged, and either (a) in the process of being certified and loaded for shipment to WIPP for final disposal, or (b) returned to the pit. Waste packages not meeting the WIPP WAC or the return-to-pit criteria are disposed through blending, matching, or acceptance at an alternative disposal site Stored waste from the Glovebox Excavator Method Project is similarly processed and dispositioned.
Interim Pit 9 site remediation is performed March 31, 2013 through December 31, 2014.	Pit 9 excavation site backfilled with return-to-pit waste and fill. Pit 9 facilities dispositioned in accordance with the final remedy for the SDA.
☐ enforceable deadline	
☐ early submittal required to meet March 31, 2007 enforceable deadline	

7. DEVELOPMENT PLAN

Pit 9 retrieval and planning activities to date have involved evaluation of retrieval and treatment system requirements. This evaluation has included a review of available INEEL, DOE complex, and commercial technologies and capabilities, as well as potential new technical approaches. Applicability of the technologies to Pit 9 was determined using value engineering principles, the engineering judgment of the Pit 9 team, criteria relating to protection of human health and the environment, and transferability of Pit 9 approach to the other SDA TRU pits and trenches.

Figure 8 depicts the steps used in fiscal year 2003 to evaluate Pit 9 retrieval and treatment alternatives. The analysis considered a wide range of design options and narrowed them down through objective evaluation of benefits and risks. First, key performance requirements were developed and documented in the *Mission Analysis and Definition for the Operable Unit 7-10 Stage III Project* document. Next, technology research and brainstorming were used to identify applicable options for accomplishing the Pit 9 objectives. These options were screened on a gross scale, and the remaining viable options were evaluated based on performance criteria. Preconceptual designs were developed for each proposed alternative. Simultaneously, the Pit 9 team agreed on a set of evaluation criteria and weighting factors, including technical, cost, schedule, and risk. Each alternative was then rated relative to each evaluation criterion, and weighting factors were applied to the criterion-specific ratings. The sum total of these weighted evaluation ratings yielded a total score for each alternative. In fiscal year 2004, a remediation alternative will be established and a conceptual design report will be prepared.

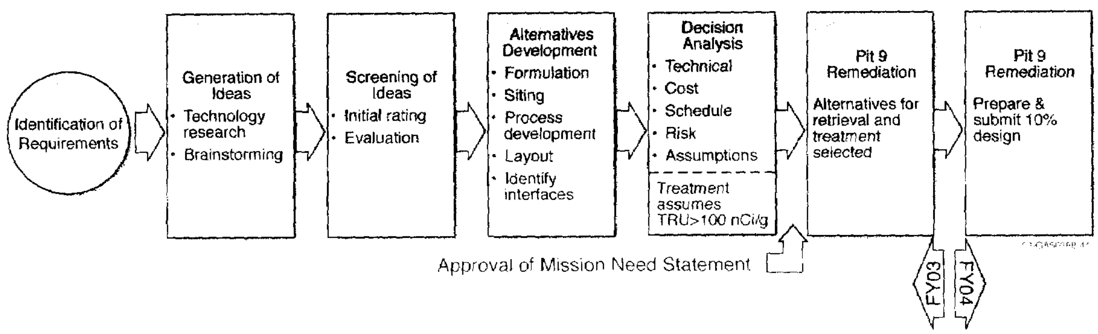

Figure 8. Retrieval and treatment alternative selection process.

For additional information on the fiscal year 2003 retrieval and treatment alternative activities completed in support of this mission need statement, see Appendix D.

8. SUMMARY

Approval of the Pit 9 Remediation Project mission need statement is the critical first step in acceleration of the Pit 9 site remediation as stated in the DOE PMP and mandated by enforceable deadlines. The retrieval and treatment alternatives put forward in this mission need statement require further evaluation and conceptual design planning to establish the preferred Pit 9 remediation approach. Additionally, to meet the enforceable deadline of commencing construction of Pit 9 facilities by March 31, 2007, the conceptual design must be submitted and approved in fiscal year 2004 to allow sufficient time for preliminary and final design, procurement of long lead time items, site preparation, and dialogue with regulatory agencies and stakeholders.

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Appendix A

Regulatory Drivers

Appendix A

Regulatory Drivers

The following chronological summary of regulatory actions regarding Pit 9 includes the Explanation of Significant Differences (ESDs) for historical completeness.

On December 9, 1991, EPA Region X, the state of Idaho, and DOE entered into an FFA/CO4 for the investigation and cleanup of INEEL (then INEL) pursuant to CERCLA, the Resource Conservation and Recovery Act (RCRA), and the Hazardous Waste Management Act, Idaho Code.

The FFA/CO requires DOE to remediate the SDA. The decision to remediate OU 7-10 is reflected in the Pit 9 Interim Action ROD signed in 1993, which requires mixed TRU waste within the Pit 9 site to be retrieved, treated, and dispositioned. The 1993 ROD presents the initial, selected, interim remedial action for Pit 9, which was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act. This is consistent, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan.

An associated *Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan: Operable Unit OU 7-10 (Pit 9 Project Interim Action)* documented the schedule and approach for implementing the 1993 ROD. The management and operating contractor for the INEEL subcontracted with Lockheed Martin Advanced Environmental Systems (LMAES) to perform the work.

The INEEL revised the scope of work in 1995 to address details for design, construction, and operation. This resulted in significant changes in the original ROD cost estimates, which in turn required the issuance of an ESD document.

DOE prepared a contingency plan to address the possibility that LMAES might not fulfill the terms of the scope of work of the revised scope of work. This contingency plan (in Appendix A of the 1995 scope of work) developed the staged interim action approach that was formalized in a revised scope of work issued in 1997. The revised 1997 scope of work identified performance objectives, deadlines, and deliverables in the event that the LMAES contract was not completed. The LMAES contract was subsequently terminated on June 1, 1998, and the INEEL began work on the Staged Interim Action Project.

The 1998 ESD to the ROD launched the Staged Interim Action Project and formalized adoption of the three-stage approach to satisfying the ROD requirements. The third stage of this action, which comprises a full-scale remediation of Pit 9, must comply with the enforceable deadline dates identified in the April 2002 ARD.

The 2002 ARD addressed a DOE request to extend the submittal dates of primary documents for Stage II and Pit 9 full remediation, and it amended the FFA/CO as it relates to Pit 9 and SDA remediation. The agreement set new enforceable deadlines, stipulated penalties for untimely submittals, and established a revised path forward.

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[4] In the FFA/CO, RWMC is designated was Waste Area Group 7 (DOE-ID 1991).

The revised path forward in this ARD affirmed the staged project approach. Pit 9 enforceable deadlines require a 10% conceptual design submission by September 2005; completion of a remedial design and start of construction by March 31, 2007; and operations to be initiated no later than thirty-six months after commencement of construction. Deadlines for the SDA remediation were extended accordingly.

On March 31, 2003, a U.S. District Court ruling confirmed that all TRU waste is to be removed from the INEEL, including that buried in the SDA TRU pits and trenches considered to pose the highest risk.[5]

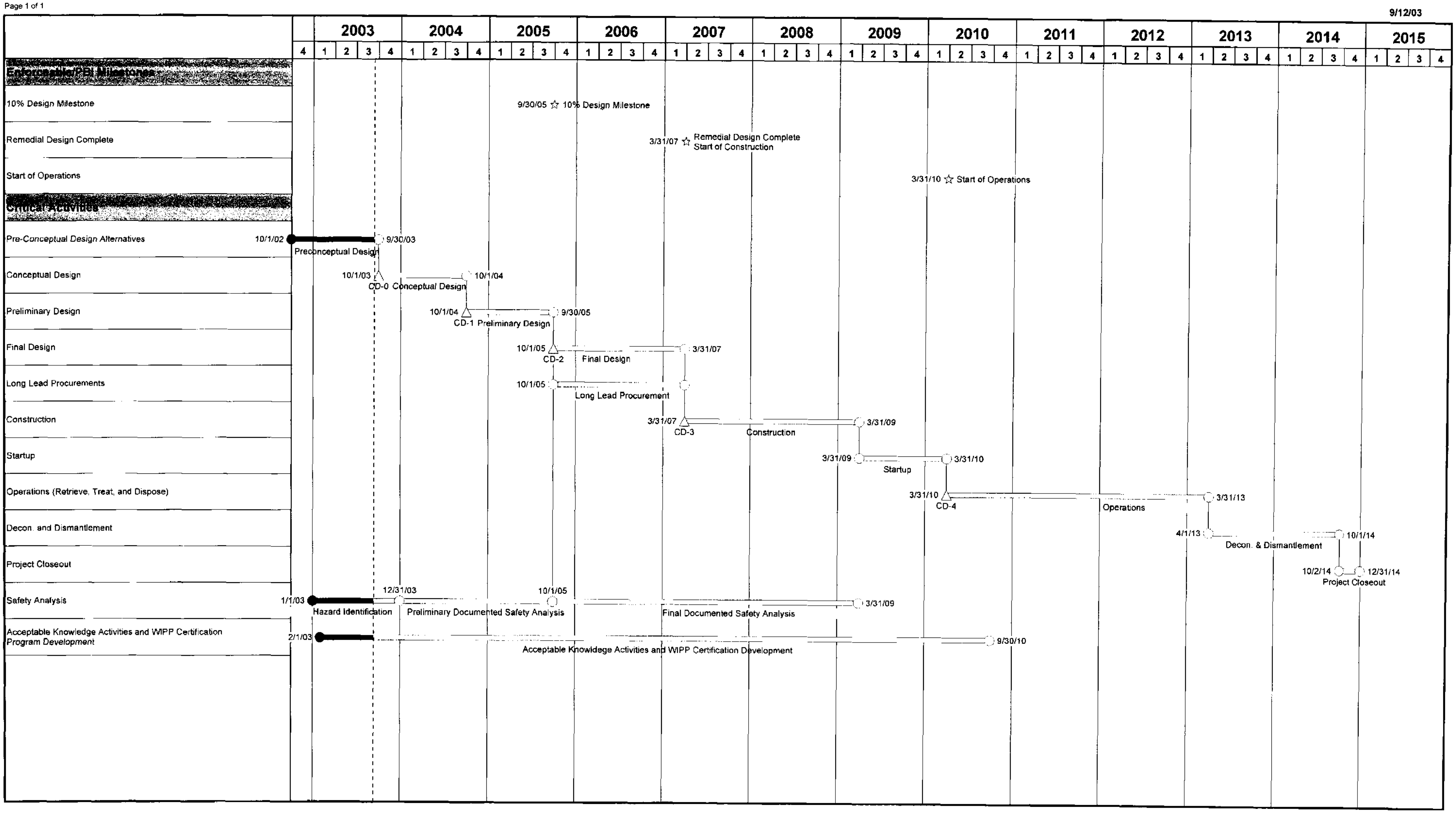
[5] Statement of Jessie Roberson Assistant Secretary for Environmental Management before the Subcommittee on Strategic Forces, Committee on Armed Forces. US Senate. April 2, 2003

Appendix B

Summary Schedules

OU 7-10 Stage-III
Pit 9 Reduction Project Summary Schedule
Baseline Case Minimum Volume Reduction

9/12/03



△ Milestone
▲ Milestone Completed

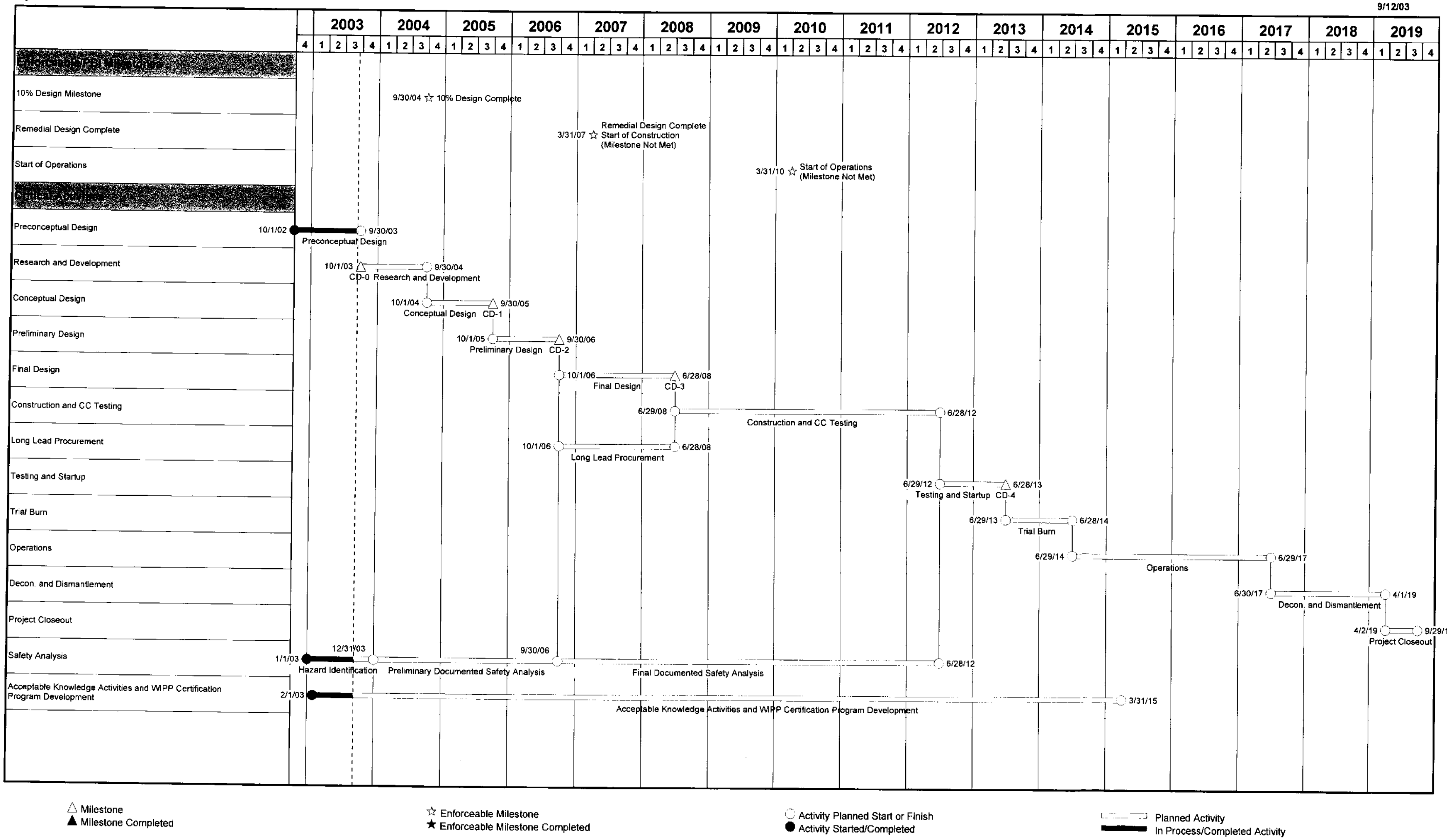
☆ Enforceable Milestone
★ Enforceable Milestone Completed

○ Activity Planned Start or Finish
● Activity Started/Completed

Planned Activity
In Process/Completed Activity

OU 7-10 Stage-III
Pit 9 Remediation Project Summary Schedule
Maximum Volume Reduction

9/12/03



Appendix C

Cost Estimates

Appendix C

Low-Complexity Treatment Option

OU 7/10 STAGED INTRIM ACTION STAGE III PROJECT

(Baseline Case Miniumum Volume Reduction) Mission Need Cost Spread (All Costs Shown are in $K)

Description	Totals	FY-03	FY-04	FY-05	FY-06	FY-07	FY-08	FY-09	FY-10	FY-11
Facility Costs (TEC)										
Project Engineering/Design/TRIPS (PED)	$56,783			$14,718	$17,765	$7,402	$5,632	$5,633	$5,633	
PED Contingency	$25,959			$6,728	$8,122	$3,384	$2,575	$2,575	$2,575	
Total PED	$82,742			$21,446	$25,887	$10,786	$8,207	$8,208	$8,208	
Project Mangement	$22,584		$3,226	$3,226	$3,226	$3,226	$3,226	$3,226	$3,226	
PM Contingency	$8,942		$1,277	$1,278	$1,278	$1,278	$1,278	$1,278	$1,277	
Total PM	$31,526		$4,503	$4,504	$4,504	$4,504	$4,504	$4,504	$4,503	
Construction/Procurement/CM	$293,939				$36,732	$110,216	$110,236	$36,753		
Construction/Procurement/CM Contingency	$148,422				$18,547	$55,653	$55,664	$18,558		
Total Construction	$442,361				$55,279	$165,869	$165,902	$55,311		
Total TEC Contingency	$183,323		$1,277	$8,006	$27,946	$60,314	$59,516	$22,411	$3,852	
Total TEC w/out Contingency	$373,306		$3,226	$17,944	$57,724	$120,845	$119,097	$45,612	$8,859	
Total TEC	$556,629		$4,503	$25,950	$85,670	$181,150	$178,613	$68,023	$12,711	
Other Project Costs (OPC)										
Pre-Conceptual Design (actuals)	$3,701	$3,701								
Conceptual Design	$9,303		$9,303							
CD Contingency	$4,619		$4,619							
Total CD	$13,922		$13,922							
ESH&Q	$31,665		$463	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	
ESH&Q Contingency	$14,842		$217	$2,438	$2,438	$2,438	$2,438	$2,438	$2,437	
Total ESH&Q	$46,507		$680	$7,638	$7,638	$7,638	$7,638	$7,638	$7,637	
Testing & Turnover	$22,975							$11,487	$11,488	
Testing & Turnover Contingency	$13,912							$6,956	$6,956	
Total Testing & Turnover	$36,887							$18,443	$18,444	
Total OPC Contingency	$33,373	$0	$4,836	$2,438	$2,438	$2,438	$2,438	$9,393	$9,393	
Total OPC w/o Contingency	$67,644	$3,701	$9,766	$5,200	$5,200	$5,200	$5,200	$16,688	$16,688	
Total OPC	$101,017	$3,701	$14,602	$7,638	$7,638	$7,638	$7,638	$26,081	$26,081	
Total Project Costs (TPC)										
Total Project Costs w/o Contingency	$440,950	$3,701	$12,992	$23,145	$62,924	$126,045	$124,297	$62,300	$25,546	
TPC Contingency 49.56%	$216,696	$0	$6,113	$10,443	$30,384	$62,752	$61,954	$31,804	$13,246	
Total Project Costs (TPC)	$657,646	$3,701	$19,105	$33,588	$93,308	$188,797	$186,251	$94,104	$38,792	

*** All costs are escalated to the R. Daniels 3-16-03 (1:04 p.m.) schedule**

9/16/2003

High-Complexity Treatment Option

OU 7/10 STAGED INTRIM ACTION STAGE III PROJECT
(Maximum Volume Reduction) Re-escalated Mission Need Cost Spread (All Costs Shown are in $K)

Description	Totals	FY-03	FY-04	FY-05	FY-06	FY-07	FY-08	FY-09	FY-10	FY-11	FY-12	FY-13	FY-14	FY-15	FY-16
Facility Costs (TEC)															
Project Engineering/Design/TRIPS (PED)	$62,974				$15,624	$15,237	$11,427	$4,138	$4,138	$4,137	$4,137	$4,137			
PED Contingency	$55,741				$13,829	$13,486	$10,115	$3,662	$3,662	$3,662	$3,662	$3,662			
Total PED	$118,715				$29,453	$28,723	$21,542	$7,800	$7,800	$7,799	$7,799	$7,799			
Project Mangement	$26,350		$1,708	$2,899	$2,899	$2,899	$2,900	$2,900	$2,900	$2,899	$2,899	$1,449			
PM Contingency	$15,899		$1,030	$1,749	$1,749	$1,749	$1,749	$1,749	$1,749	$1,749	$1,749	$875			
Total PM	$42,249		$2,738	$4,648	$4,648	$4,648	$4,649	$4,649	$4,649	$4,648	$4,648	$2,324			
Construction/Procurement/CM	$332,733					$27,668	$45,329	$87,308	$87,308	$52,765	$32,354				
Construction/Procurement/CM Contingency	$196,951					$16,378	$26,831	$51,680	$51,680	$31,232	$19,151				
Total Construction	$529,684					$44,046	$72,160	$138,988	$138,988	$83,997	$51,505				
Total TEC Contingency	$268,591		$1,030	$1,749	$15,578	$31,613	$38,695	$57,091	$57,091	$36,643	$24,562	$4,536			
Total TEC w/out Contingency	$422,057		$1,708	$2,899	$18,523	$45,804	$59,656	$94,346	$94,346	$59,801	$39,390	$5,587			
Total TEC	$690,648		$2,738	$4,648	$34,101	$77,417	$98,351	$151,437	$151,437	$96,444	$63,952	$10,123			
Other Project Costs (OPC)															
Pre-Conceptual Design (actuals)	$3,701	$3,701													
Conceptual Design	$23,025		$6,519	$16,506											
CD Contingency	$21,102		$5,975	$15,127											
Total CD	$44,127		$12,494	$31,633											
ESH&Q	$36,067			$2,835	$5,539	$5,539	$5,538	$5,538	$5,539	$5,539					
ESH&Q Contingency	$21,750			$1,710	$3,340	$3,340	$3,340	$3,340	$3,340	$3,340					
Total ESH&Q	$57,817			$4,545	$8,879	$8,879	$8,878	$8,878	$8,879	$8,879					
Testing & Turnover	$36,113										$7,849	$24,727	$3,536		
Testing & Turnover Contingency	$32,842										$7,139	$22,488	$3,216		
Total Testing & Turnover	$68,955										$14,988	$47,215	$6,752		
Total OPC Contingency	$75,694	$0	$5,975	$16,837	$3,340	$3,340	$3,340	$3,340	$3,340	$3,340	$7,139	$22,488	$3,216		
Total OPC w/o Contingency	$98,906	$3,701	$6,519	$19,341	$5,539	$5,539	$5,538	$5,538	$5,539	$5,539	$7,849	$24,727	$3,536		
Total OPC	$174,600	$3,701	$12,494	$36,178	$8,879	$8,879	$8,878	$8,878	$8,879	$8,879	$14,988	$47,215	$6,752		
Total Project Costs (TPC)															
Total Project Costs w/o Contingency	$520,963	$3,701	$8,227	$22,240	$24,061	$51,343	$65,194	$99,884	$99,884	$65,339	$47,239	$30,314	$3,536		
TPC Contingency 66%	$344,285	$0	$7,005	$18,586	$18,919	$34,953	$42,035	$60,431	$60,432	$39,984	$31,701	$27,024	$3,216		
Total Project Costs (TPC)	$865,248	$3,701	$15,232	$40,826	$42,980	$86,296	$107,229	$160,315	$160,316	$105,323	$78,940	$57,338	$6,752		

*** All costs are escalated to the 9-16-03 (12:52 p.m.) R. Daniels sche**

9/16/2003

Appendix D

Summary of Remediation Alternatives

Appendix D

Summary of Remediation Alternatives

Several retrieval and treatment alternatives are being considered for full remediation of Pit 9. Alternative considerations include transferability of retrieval and treatment designs for possible use in remediating other SDA TRU pits and trenches

Retrieval Alternatives

Based on these initial evaluations, a large enclosure housing various retrieval equipment options emerged as the preferred retrieval facility approach. Treatment, packaging, and disposition of retrieved material will be accomplished using some combination of existing and new capabilities. Planning activities currently focus on the selection of retrieval and treatment alternatives and will be presented in *Analysis of Alternatives Summary for the Pit 9 Remediation Project* document. The document supports the mission need statement, documents potential alternatives, provides the results of the decision analysis performed for high potential retrieval and treatment alternatives, and provides the selection criteria for the proposed alternatives to be carried forward into conceptual design. Tradeoff studies will be performed, as needed, to decide among alternative concepts.

Initially, 21 retrieval facility alternatives and 60 equipment excavation and transport alternatives were considered. As part of the selection process the factors of cross contamination, contamination spread, implementability, and schedule were considered. Independent of the facility and retrieval equipment alternative selected, the team established that contamination spread within the retrieval facility would be minimized with water spray, water mists, dust-suppressant sprays, humidity control, directed airflow, and filtration, as well as operating retrieval equipment in a fashion to minimize dust generation. Additionally, all retrieval alternatives evaluations assumed that:

- Large objects will be handled on a case-by-case basis and may be left in place if the retrieval system cannot safely handle the object
- Inaccessible soil beneath large objects will remain in the pit without treatment
- Containers returned to the pit will be grouted for future subsidence mitigation
- Any waste requiring remote handling (> 200mR) will be left in the pit.

The retrieval process also assumes that the excavated pit will be filled as is shown in Figure D-1.

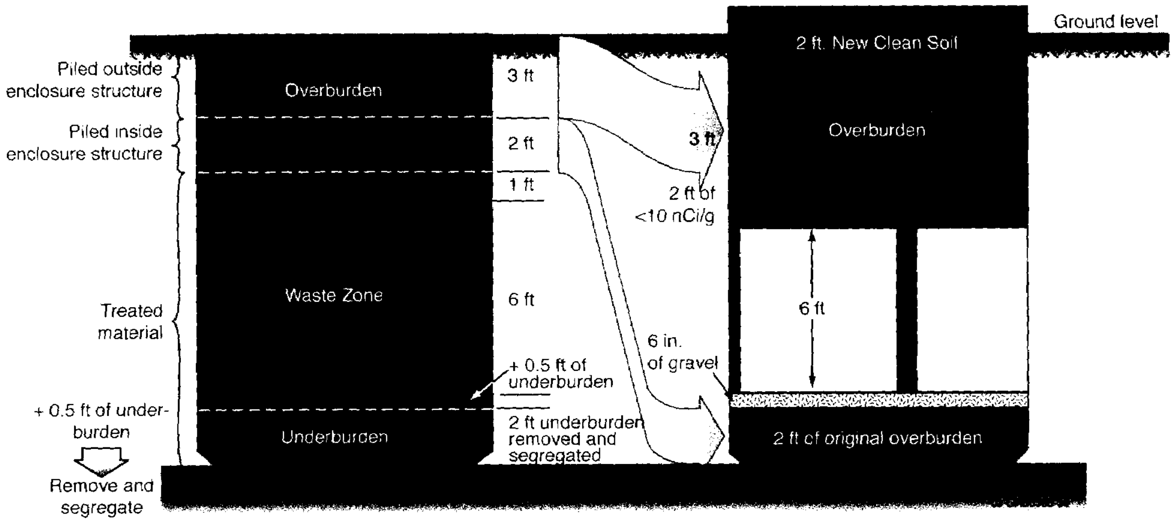


Figure D-1. Cross-sectional view of the excavation site, both before and after retrieval.

Retrieval alternatives were developed after considering retrieval and disposition activities performed in the DOE complex and in the commercial and international sectors, dating back to 1972. "Operable Unit 7-13/14 Evaluation of Soil and Buried Transuranic Waste Retrieval Technologies" provides a summary of these retrieval and disposal activities. All of the prior retrievals researched were small-scale efforts, but they provide insight and lessons learned that are incorporated into the three Pit 9 retrieval alternatives evaluated.

Using the retrieval and treatment alternative selection process and assessing the commercial availability of retrieval service vendors established that no commercial companies provide retrieval services for TRU waste. Based on the lack of commercial vendors to remediate the Pit 9 site, the large scale of the Pit 9 remediation, the presence of TRU waste at the Pit 9 site, and knowledge gained from Stages I and II, Pit 9 requires a new retrieval approach.

A large, single frame structure will support primary and secondary confinement. This structure—covering all of the Pit 9 site—was selected as a preferred confinement alternative because the structure could be more easily sealed around the perimeter, be built using standard construction materials and methods, accommodate a larger number of standard-sized retrieval equipment options, and allow for retrieval rates to meet the enforceable deadlines for Pit 9. Although the facility will not be assigned a preliminary hazard category until conceptual design, it is anticipated that the facility will be a hazard category II nuclear facility. Based on similar projects (Glovebox Excavator Method), the use of a primary confinement with either a weather enclosure or secondary confinement structure is likely to be required.

The retrieval team also evaluated movable buildings to retrieve half acre or larger portions of the pit but established that the increased complexity of building system designs, decontamination preceding each move, confirmation of enclosure seal integrity prior to recommencing retrieval operations, potential damage to structure and ancillary equipment with each move, and the size limitations placed on equipment selection would not allow retrieval operations to achieve the needed retrieval rates at an affordable cost. Another option investigated involved the use of a large confinement building with separate cells to minimize contamination and allow for simultaneous retrieval and backfilling processes.

But the moveable walls, or curtains, forming the separate cells presented concerns about the ability to seal edges, adequacy of the wall or curtain as a confinement boundary, limitations on retrieval equipment size, and the potential need to disassemble the walls when large objects are left in place. Lastly, a ground level structure was also considered, with all excavation processes performed below grade, but technical complexity, equipment access, safety concerns, and overall costs eliminated this alternative.

The excavation equipment alternatives evaluated both above grade equipment located on overburden with waste brought up from the dig face, and below grade equipment located on the floor of the pit. In either excavation orientation, retrieval equipment alternatives involved remote equipment operation. Most mining equipment, such as draglines and rotating earth cutters, was eliminated due to size and high production rates, coupled with the potential for generating excessive dust. After evaluating the available and applicable equipment options, three retrieval alternatives were initially selected.

Retrieval Equipment Alternatives:
• Alternative 1: Backhoe and overhead crane
• Alternative 2: Front-end loader, backhoe, and forklift
• Alternative 3: Front-end loader, backhoe, and automatic guided vehicle

To ensure safe retrieval processes, all retrieval operations will be performed remotely to protect human health and the environment from possible airborne TRU contamination. In addition, in all three alternatives, redundant design is required for equipment that might fail, thus minimizing the need for worker entry into the containment enclosure.

The initial concepts for these equipment alternatives housed in the large enclosure structure use commercially available equipment. For all three alternatives, the retrieved material is delivered to the north end of the building. This fixed delivery location impacts the retrieval direction. Alternatives 1 and 3 retrieve from south to north while alternative 2 retrieves from north to south.

Retrieval Alternative 1—Backhoe/Crane Method

In alternative 1 (shown in Figure D-2), a remotely operated backhoe, bridge crane, and forklift are used to move the overburden, waste zone material, and underburden material. In general, the backhoe loads material into the boxes, the bridge crane, with an attached box handler, lifts the material and moves it to the end of the structure, and a forklift moves the material to its destination. All equipment is operated remotely, and there are no personnel within the enclosure, which minimizes the possibility of worker exposure. Redundant design is used for critical or high-wear equipment, so personnel entries into the enclosure for equipment maintenance are minimized, as well.

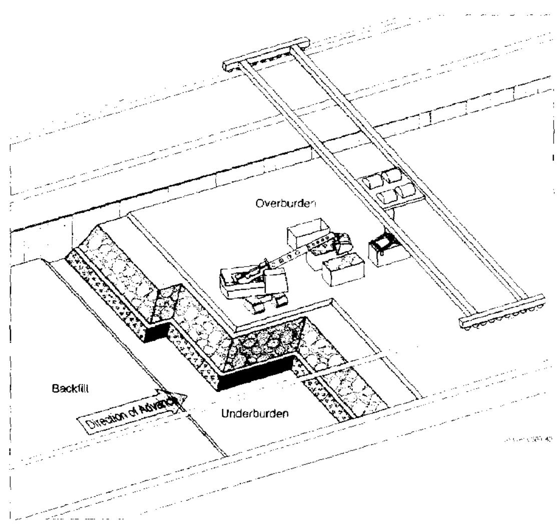


Figure D-2. Alternative 1 uses a retrieval enclosure with remotely operated crane, backhoe, and forklift.

Retrieval Alternative 2—Front-End Loader Method

In alternative 2 (shown in Figure D-3), a remotely operated front-end loader is used to move the overburden, waste zone material, and underburden material. In general, the front-end loader loads overburden material and delivers it to an outside clean overburden pile. A backhoe is used to dig and pile the next two feet of overburden, and the front-end loader moves it to the inside pile for slightly contaminated soil.

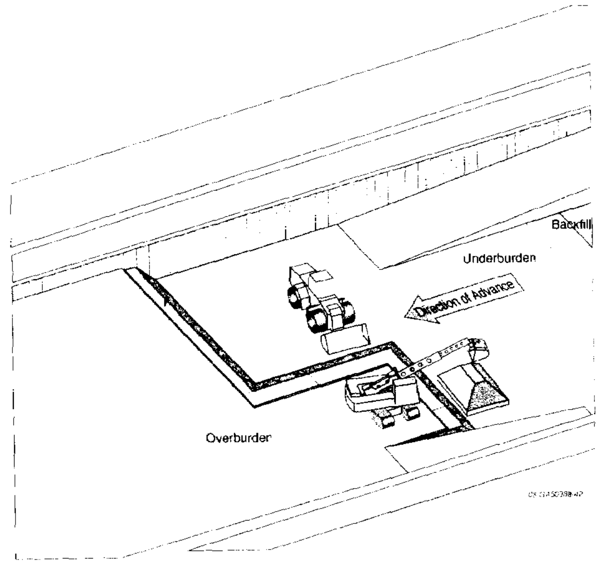


Figure D-3. Alternative 2 uses an enclosure with remotely operated front-end loader and backhoe.

Once the overburden is moved, the front-end loader digs an access ramp to the base of the waste material zone, then digs and hauls the waste material and 6 inches of underburden material to the sorting deck, where it is emptied, sorted, and sent to characterization. While the front-end loader is removing waste, the backhoe, which is sitting on top of the 1-foot thick overburden, excavates the 1-foot thick overburden and piles it on the exposed underburden. The loader scoops up the piled overburden and delivers it directly to the sorting deck, where the contents are emptied, sorted, and sent to characterization. As the excavation advances, gravel is spread on the pit floor to harden the surface for wheel traffic. The backhoe is used to excavate the remaining 2 feet of underburden and the front-end loader transports it to the sorting deck for sorting and subsequent characterization. Again, all equipment is operated remotely, and redundant systems are employed to minimize personnel entries into the enclosure.

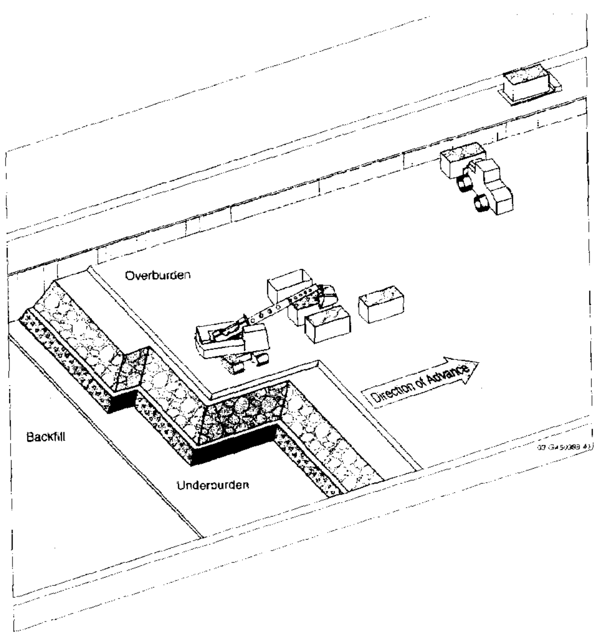


Figure D-4. Alternative 3 uses an enclosure with remotely operated backhoe, forklift, and automatic guided vehicle.

Retrieval Alternative 3—Backhoe/Forklift/ Automatic Guided Vehicle Method

In alternative 3 (shown in Figure D-4), a remotely operated backhoe is used to excavate material, just as in alternative 1. However, instead of using a bridge crane to move the material, a remotely operated forklift moves the material to an automatic guided vehicle that transports the material to its destination. As in the other methods, remote operation and redundant systems are used to minimize personnel exposure.

During fiscal year 2004, the retrieval team will evaluate alternatives and develop a conceptual design for the enclosure structure and chosen equipment and retrieval alternatives. For additional details on the selection process, see "Technology Search for the OU 7-10 Stage III Waste Retrieval Process" and "Technological Evaluation of the Retrieval Options for the OU 7-10 Stage III Project."

Treatment and Disposition Alternatives

Fourteen treatment alternatives for TRU waste were evaluated, along with three alternatives for treatment of non-TRU waste. The treatment team selected treatment alternatives based on engineering judgment and extensive experience obtained through conducting DOE-EM Mixed Low-Level Waste program activities. One TRU alternative considered, but not evaluated, used biodegradation of TRU, but the alternative was not considered viable due to the time required to bioremediate the waste and the resulting volume of secondary waste.

As part of evaluating the seventeen alternatives, flow sheets and spreadsheets for each concept were developed to provide an estimate of the volume of waste material—both primary and secondary waste—resulting from each alternative. The volume estimates used the initial volume of waste material and interstitial soil received from the pit as the unit volume for comparison. From these spreadsheets, a summary of the process concept performance statistics was developed, based on reduction in TRU waste volume to be shipped to WIPP, secondary wastes, and the relative volume to be returned to the SDA. After the volumes were estimated from the spreadsheets, the Pit 9 treatment alternatives were screened.

Initial screening criteria focused on volume reduction, required by the current ROD, and the amount of material returned to the pit. From that evaluation, three alternatives for TRU waste and two alternatives for non-TRU waste were chosen for further evaluation. The treatment team selected these five alternatives using the criteria of volume reduction, implementibility, and cost.

TRU Treatment Alternatives
• Alternative 1: Segregate and Compact
• Alternative 2: Melt All
• Alternative 3: Segregate, Incinerate, Thermal Desorption, and Chemical Leach
Non-TRU Treatment Alternatives
• Alternative 1: Thermal All
• Alternative 2: Thermal Desorption

A single treatment facility housing both the selected TRU and non-TRU treatment processes is planned. Within this facility, the assay, sorting, segregation, shredding, treatment, and dispositioning of material occurs. All treatment alternatives receive waste material and interstitial soil from the retrieval activity. Each treatment alternative involves segregation of the material into waste and soil fractions to support assay of the material establishing the action level—TRU (> 100 nCi/g) or non-TRU (≤ 100 nCi/g). Figure D-5 shows the relationship of the assay followed by treatment and disposition.

TRU treatment alternatives: Alternative 1, segregate and compact, results in no significant volume reduction but does provide a low technical risk option that meets Pit 9 schedule constraints with a minimum of secondary waste. The segregate and compact alternative also provides a baseline alternative similar to AMWTP waste processing. Alternative 2, melt all, provides an approach that achieves approximately a 50% reduction in waste volume and involves no chemical leaching, thus eliminating potential technical risk faced in alternative 3. The final volume of material using the melt all alternative fits in the Pit 9 site. Alternative 3, segregate, incinerate, thermal desorption, and leach, provides a volume reduction of retrieved waste material—approximately 90%—meeting the ROD volume reduction performance criterion. But alternative 3 includes a complex, high-risk, chemical leaching process and produces a significant amount of secondary waste.

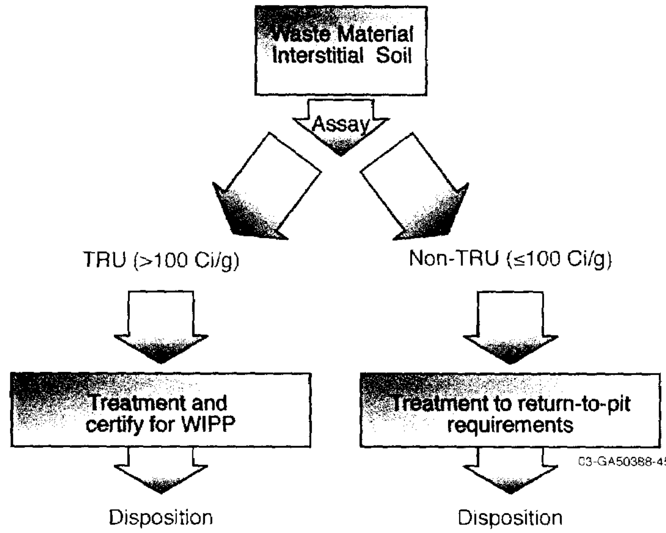


Figure D-5 TRU and non-TRU treatment process flow.

Non-TRU treatment alternatives: The selection of non-TRU treatment alternatives focused on low technical risk options. Alternative 1, thermal all, uses a heat treatment process—either incineration, steam reformation, or hydrogenation—as well as maximum achievable control technology off-gas treatment. All residuals from alternative 1 will be stabilized as required in the ROD to meet SDA waste acceptance criteria. Alternative 2, segregate and thermal desorption, involves the use of a granular activated carbon system. This alternative assumes that 99% of the organics are sent off-site for disposal, and the residuals of thermal desorption will be stabilized as required in the ROD to meet SDA waste acceptance criteria.

The fiscal year 2004 treatment study will establish the optimum TRU and non-TRU treatment alternative from the three TRU and two non-TRU treatment options based on residual risk. Additional evaluation details are provided in the "Treatment Technology Screening for OU 7-10 Stage III Project."