Department of Energy
Carlsbad Area Office
P.O. Box 3090
Carlsbad, New Mexico 88221

October 7, 1996

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NM ENVIRONMENT DEPARTMENT
OFFICE OF THE SECRETARY

Mr. Mark Weidler, Secretary
New Mexico Environment Department
P. O. Box 26110
Santa Fe, NM 87502

Dear Mr. Weidler:

Enclosed is the National Transuranic (TRU) Waste Management Plan, dated September 30, 1996. This document was designed to identify a recommended TRU waste management configuration for the disposal of TRU waste at the WIPP. The configuration described within the plan was developed in concert with representatives from the TRU Waste Steering Committee and the TRU Waste Executive Committee.

This document does represent the current plans, and as such, is subject to revision. Updates are planned to be produced as needed. Please provide feedback from your review as necessary.

If you have any questions, please call me at (505) 234-7478 or Amber Clay at (505) 234-7432. Please call 1-800-336-WIPP to request additional copies.

Sincerely,

George E. Dials
Manager
Carlsbad Area Office

Enclosure

cc w/o enclosure:
P. Kilgore, CAO
C&C File

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DOE/NTP-96-1204
Revision 0

The National Transuranic Waste Management Plan

Prepared by the
U.S. Department of Energy, Carlsbad Area Office
September 30, 1996

DOE/NTP-96-1204
Revision 0

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George E. Dials
Manager, Carlsbad Area Office

Date: September 30, 1996

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Executive Summary

The Department of Energy (DOE) Carlsbad Area Office (CAO) has undertaken an aggressive initiative to create a National Transuranic (TRU) Waste Management Plan (the Management Plan or Plan) for integrating TRU waste management activities throughout the DOE complex. Extensive analysis of independently developed site-specific waste management plans and programmatic goals identified performance issues pertaining to risk reduction, WIPP disposal efficiency, and life-cycle cost. To resolve these issues, the CAO, in concert with TRU waste stakeholders and the sites, developed the system-wide configuration described in the Management Plan. The Plan, when combined with adequate funds and commitment to waste processing schedules, will fulfill the CAO vision of an integrated TRU waste management system that assures the efficient, sustained, and cost-effective disposal of TRU waste.

> ***VISION***
> ***An efficient, sustained, and cost-effective TRU waste disposal system supported by adequate funds and a commitment from the sites to support waste shipments.***

This Plan represents a significant improvement over previous independently developed site waste management plans. It accelerates the disposal of TRU waste such that waste is removed from most sites by the end of Fiscal Year (FY) 2006, thereby reducing potential hazards and the perceptions of risks by the local population, while maximizing waste handling and disposal efficiencies at the WIPP. In addition, the Plan provides a management tool to monitor progress, reassess assumptions, and focus and prioritize resources.

This Plan reconciles multiple TRU waste system performance goals established by the CAO. These goals are to:

- maintain compliance with FFCAct consent orders, unilateral orders, and regulatory agreements;
- accelerate reduction of risk and mortgage by coordinating TRU waste management programs and accelerating site projects;
- create an integrated TRU waste management system that maximizes disposal of TRU waste by the end of FY06, in support of the DOE Office of Environmental Management (EM) Ten-Year Plan goals; and
- maximize the WIPP waste handling and disposal efficiency.

The features of the Management Plan are highly interdependent and rely on the careful integration of existing and future resources. Individually, these features include: coordinating and accelerating facility construction and waste processing schedules; utilization of multiple-shift operations; eliminating redundant waste processing capability; coordinating waste handling operations and transportation availability;

deploying select mobile capability; utilizing centralized intrusive characterization; coordinating waste workoff campaigns with maintenance of transportation corridors; and utilizing regional waste treatment.

The resulting benefits of the Plan include: **regulatory compliance**, with each site achieving compliance with current requirements and many sites in a position to accelerate compliance activities; **risk reduction**, by achieving an accelerated TRU waste disposal; **mortgage reduction** and privatization support, by ensuring waste is shipped to the WIPP at maximum process capacities, thus enabling facilities to be closed earlier, and by providing specific performance measures for projects to be privatized in the waste management system; and **effective WIPP utilization**, by ensuring waste shipments closely match the waste handling and disposal capacities of the WIPP, resulting in the maximum possible disposal of stored and newly generated TRU waste within the next ten years.

Collectively, the features and resulting benefits of the Management Plan provide an integrated TRU waste management system that complements the DOE-EM's current ten-year planning effort. The Plan greatly increases waste workoff and maximizes the disposal capacity of the WIPP. As a result, risk and mortgage reduction are accelerated and compliance is maintained. In addition, the Management Plan provides a defensible basis upon which to prioritize TRU waste management projects and activities throughout the DOE complex.

A significant initial financial investment is required with this Plan to improve the waste management system infrastructure in order to produce meaningful quantities of WIPP-ready TRU waste. However, this early investment doubles the volume of TRU waste disposed at the end of FY06 relative to previous planning, thus removing the TRU waste inventory from most sites, with a commensurate reduction in the associated risk and mortgage. This early investment also increases the waste handling utilization of the WIPP through FY06 from 65% to 96%.

Though the Management Plan minimizes many programmatic issues, there remains a need to secure the funding necessary for implementation. Approximately $1.8 billion has been invested since the early 1980s to construct and license the nation's designated permanent TRU waste disposal site. Thus, it is the position of the CAO that the only fiscally responsible action is to support TRU waste disposal projects as a priority across the complex commensurate with the guidance provided in this Management Plan. The Plan advocates broad budgetary and programmatic support for a focused and integrated TRU waste disposal strategy. The CAO recommends that the National Transuranic Waste Management Plan be implemented and that site-specific budgets be developed in support of this Plan.

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List of Acronyms

ANL-E ..... Argonne National Laboratory - East
CAO ..... Carlsbad Area Office
CH ..... contact handled
DOE ..... Department of Energy
EM ..... Office of Environmental Management
EPA ..... Environmental Protection Agency
FFCAct ..... Federal Facility Compliance Act
FY ..... Fiscal Year
INEL ..... Idaho National Engineering Laboratory
LANL ..... Los Alamos National Laboratory
LLNL ..... Lawrence Livermore National Laboratory
NTS ..... Nevada Test Site
ORNL ..... Oak Ridge National Laboratory
RCRA ..... Resource Conservation and Recovery Act
RFETS ..... Rocky Flats Environmental Technology Site
RH ..... remote handled
SQS ..... small quantity site
SRS ..... Savannah River Site
TRU ..... transuranic
TRUPACT-II ..... Transuranic Package Transporter Model II
WIPP ..... Waste Isolation Pilot Plant

1. INTRODUCTION

Transuranic (TRU) waste has been generated and placed in storage as a consequence of the nation's nuclear defense, research, and production activities. Figure 1-1 shows the locations where TRU waste is currently stored, along with designated shipping routes for transporting waste from the storage sites to the Waste Isolation Pilot Plant (WIPP), which is located near Carlsbad, New Mexico. Table 1-1 lists the volumes of TRU waste currently in storage and projected to be generated during the life of the WIPP.

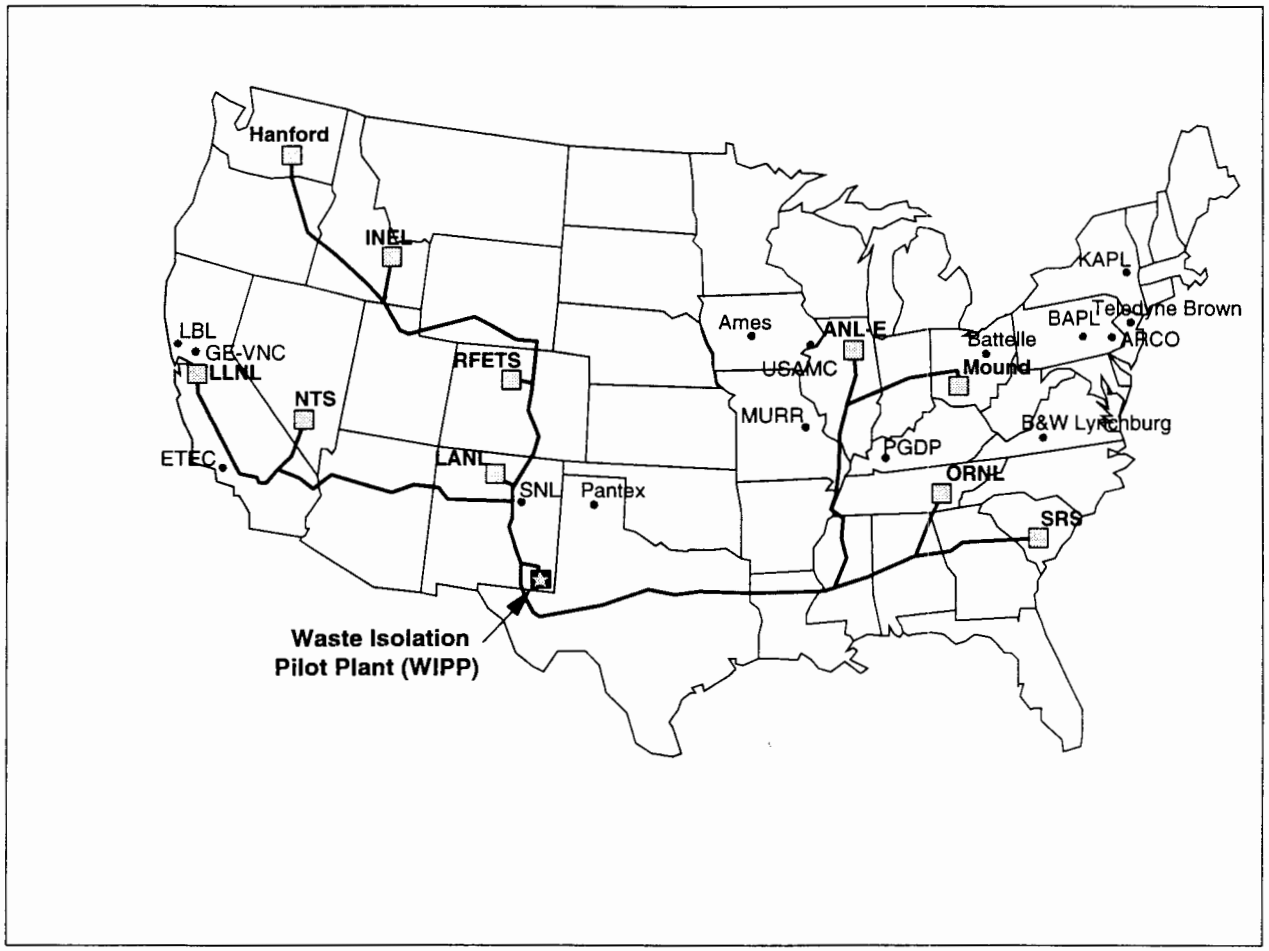

Figure 1-1 TRU Waste Storage Locations and Shipping Routes

In recognition of the potential environmental, health, and safety problems posed by continued storage of TRU waste, the U.S. Congress passed the National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164) authorizing the Department of Energy (DOE) to develop the WIPP to demonstrate the safe disposal of radioactive waste resulting from defense activities. The DOE Carlsbad Area Office (CAO) was established to manage the nation's TRU waste disposal efforts and operate the WIPP. Disposal operations are scheduled to begin in November 1997, pending receipt of regulatory approvals from the U.S.

Environmental Protection Agency (EPA) and the State of New Mexico. The demonstration of compliance with the Resource Conservation and Recovery Act (RCRA) has been revised by the September 1996 amendments to the Land Withdrawal Act, which exempt waste disposed at the WIPP from the requirement to meet the "no migration" standard.

Table 1-1 TRU Waste Storage Locations and Volumes (cubic meters)

Site	Location	CH-TRU Waste		RH-TRU Waste	
		Stored*	Projected	Stored*	Projected
Argonne National Laboratory-East (ANL-E)	Argonne, IL	83	12	0	0
Hanford Reservation (Hanford)	Richland, WA	16,407	9,251	200	2,420
Idaho National Engineering Laboratory (INEL)	Idaho Falls, ID	65,102	81	86	53
Lawrence Livermore National Laboratory (LLNL)	Livermore, CA	249	905	0	0
Los Alamos National Laboratory (LANL)	Los Alamos, NM	7,770	9,259	94	136
Mound Plant (Mound)	Miamisburg, OH	239	12	0	0
Nevada Test Site (NTS)	Nevada	623	12	0	0
Oak Ridge National Laboratory (ORNL)	Oak Ridge, TN	1,303	256	962	193
Rocky Flats Environmental Technology Site (RFETS)	Golden, CO	1,043	14,741	0	0
Savannah River Site (SRS)	Aiken, SC	9,165	3,773	0	0
Small Quantity Sites					
Ames Laboratory (Ames)	Ames, IA	0	<1	0	0
ARCO Medical Products Company (ARCO)	West Chester, PA	<1	0	0	0
Babcock & Wilcox - NES (B&W Lynchburg)	Lynchburg, VA	18	0	0	0
Battelle Columbus Laboratories (Battelle)	Columbus, OH	0	0	581	0
Bettis Atomic Power Laboratory (BAPL)	West Mifflin, PA	0	123	0	2
Energy Technology Engineering Center (ETEC)	Santa Susana, CA	2	0	6	1
General Electric-Vallecitos Nuclear Center (GE-VNC)	Pleasanton, CA	5	4	5	8
Knolls Atomic Power Laboratory (KAPL)	Niskayuna, NY	0	0	6	<1
Lawrence Berkeley Laboratory (LBL)	Berkeley, CA	<1	1	0	0
Paducah Gaseous Diffusion Plant (PGDP)	Paducah, KY	2	0	0	0
Pantex Plant (Pantex)	Amarillo, TX	<1	0	0	0
Sandia National Laboratories (SNL)	Albuquerque, NM	7	6	1	2
Teledyne Brown Engineering (Teledyne Brown)	Westwood, NJ	<1	0	0	0
U.S. Army Material Command (USAMC)	Rock Island, IL	3	0	0	0
University of Missouri Research Reactor (MURR)	Columbia, MO	<1	<1	0	0
Total Waste Volumes		102,025	38,437	1,941	2,816

* volumes prior to treatment and repackaging

In response to the Federal Facility Compliance Act (FFCAct), passed by the U.S. Congress in 1992, the DOE developed site-specific waste treatment plans designed to achieve compliance with RCRA restrictions regarding mixed (i.e., hazardous and radioactive) waste. DOE's TRU waste inventories are comprised of both mixed and non-mixed wastes. Planning for facilities to prepare contact-handled (CH) and remote-handled (RH) TRU waste for disposal at the WIPP has been ongoing for several years and were revised in 1995 to reflect the FFCAct compliance process. Although the FFCAct does not require DOE to address disposal, both DOE and the States recognize that disposal is an integral part of mixed waste management. All sites that store or generate mixed TRU waste independently developed site treatment plans, and their respective states issued consent orders or executed other regulatory agreements that (with the exception of LANL) identified disposal at the WIPP as the path to compliance for TRU waste without

treatment to the RCRA Land Disposal Restrictions. The consent orders and agreements typically specify in general terms how, and when, TRU waste is to be retrieved, characterized, treated, certified to meet the WIPP Waste Acceptance Criteria (DOE, 1996a), and then stored or shipped for disposal at the WIPP.

The DOE is committed to managing its TRU waste in an environmentally responsible manner consistent with established regulatory compliance agreements and available funds. In recognition that a more efficient TRU waste management and disposal system could be realized, systems engineering methods were applied to previous independently developed waste management plans, which subsequently identified performance issues pertaining to risk and mortgage reduction and WIPP disposal efficiency. The identification of these issues led the CAO, in concert with TRU waste stakeholders and the sites, to develop this National TRU Waste Management Plan (the Management Plan, or Plan), which profiles a recommended configuration integrating TRU waste management activities across the DOE complex. The Plan provides a management tool with which the CAO can assess progress in implementing the recommended system-wide TRU waste management programs and projects.

The National TRU Waste Management Plan provides a management tool for prioritizing TRU waste management programs and projects.

The National TRU Waste Management Plan sets forth system goals of the CAO and establishes near- and long-term objectives to both meet those goals and integrate waste management activities across the DOE complex. During the process of plan development, the CAO used data from existing information sources, predictions from computer modeling systems, and feedback from DOE stakeholders. In addition, the Plan incorporates a series of CAO initiatives designed to support complex-wide planning and integration.

1.1 National TRU Waste Management Plan Purpose

The National TRU Waste Management Plan has been prepared by the CAO to recommend a TRU waste management configuration which integrates site-specific waste management planning with the waste handling and disposal capacities of the WIPP. As such, the Plan is founded on and fully integrated with the milestones and activities of the WIPP Disposal Decision Plan, and the goals of the DOE Office of Environmental Management (EM) draft Ten-Year Plans.

The purpose of the National TRU Waste Management Plan is to:

- **Integrate site-specific waste management planning across the DOE complex with the WIPP waste handling and disposal capacities;**
- **Integrate the DOE-EM Ten-Year Plans with longer-term waste disposal planning;**
- **Identify a recommended complex-wide waste management configuration;**
- **Identify and prioritize site-specific waste management programs and projects that are necessary to achieve the recommended configuration.**

1.2 National TRU Waste Management System Goals

The Plan, and thus the recommended configuration, was developed to assure that individual site waste management plans were integrated with those of other sites and collectively with the WIPP waste handling, transportation and disposal capacities. To meet this intent, multiple TRU waste system performance goals were established by which the efficacy of various configurations could be judged:

- ***Maintain compliance with FFCAct consent orders, unilateral orders, and regulatory agreements***. Many of the orders and agreements between the state agencies and the TRU waste sites are predicated on the assumption that the WIPP will receive its regulatory approvals and initiate disposal operations no later than April 1998. Most of the consent orders and agreements allow DOE to prepare plans, and construct and operate facilities for shipment of mixed TRU waste to the WIPP, without schedule constraints. In some instances, however, the orders and agreements mandate that site-specific alternative treatment strategies are to be developed should the current WIPP schedule not be met. Thus, timely compliance with orders and agreements must be maintained by any waste management configuration considered.

- ***Accelerate reduction of risk and mortgage by coordinating TRU waste management programs and projects among sites***. The ultimate risk reduction from TRU waste storage is achieved when all waste is permanently disposed and isolated from the accessible environment. In the same light, the treatment, packaging, and shipping of TRU waste relieve the DOE complex of the financial burden of maintaining waste in safe and secure storage. Identifying and implementing a configuration that significantly accelerates preparation and disposal of WIPP-ready waste over previous plans will achieve this goal.

- ***Create an integrated TRU waste management system that maximizes disposal of TRU waste by the end of fiscal year (FY) 2006 in support of the DOE-EM Ten-Year Plan goals***. Previously, site-specific plans for the management of TRU waste were developed independently. This resulted in inefficient use of overall waste management funds, underutilization of the waste handling and disposal capacities of the WIPP, and failure to realize risk and mortgage reduction at the sites. This integrated TRU waste management system overcomes or improves upon these performance shortcomings, and is consistent with complex-wide waste management planning in the near term (i.e., draft DOE-EM Ten-Year Plans).

- ***Maximize the WIPP waste handling and disposal efficiency***. The current planning assumptions for WIPP are that disposal operations will accommodate up to 850 shipments of three Transuranic Package Transporters, Model II (TRUPACT-IIs) each and 500 RH-72B shipments of one cask each on an annual basis. With a scheduled opening in November 1997,

these waste receipt rates must be achieved in FY00 for CH-TRU and FY02 for RH-TRU waste to support waste management system goals.

2. TRU WASTE MANAGEMENT PLANNING & INTEGRATION

Planning for the management and disposal of TRU waste has been under way for many years, most recently with efforts undertaken in compliance with the FFCAct and complex-wide draft DOE-EM Ten-Year Plans. Analysis of prior planning has identified performance shortcomings that, when considered from a system perspective, overlooked opportunities to further reduce mortgage and risk and improve WIPP disposal efficiency. These performance issues will be alleviated with the implementation of the Management Plan configuration. This Plan forms the basis for the final DOE-EM Ten-Year Plans.

Analysis of previous plans identified a number of performance issues that could be improved upon concerning design of the TRU waste management complex – particularly with regard to coordinating and integrating the interrelated activities of the WIPP and the sites. In addition, designing complex-wide plans for managing TRU waste required that diverse regulatory issues and stakeholder concerns be addressed. The number and complexity of issues and concerns can place large and often conflicting demands on the limited resources allocated to environmental management. In designing the Management Plan configuration, these issues and concerns were viewed from a national perspective to assess how resources can best be applied to realize maximum benefit.

2.1 Prior Waste Management Planning

Prior planning is considered by this Management Plan to encompass the existing TRU waste management infrastructure (i.e., Existing Facilities Baseline configuration); the infrastructure that is needed to comply with the consent orders and agreements (i.e., FFCAct Compliance/WIPP Disposal configuration); and the relevant mandates of DOE-EM's draft Ten-Year Plans.

The Existing Facilities Baseline configuration reflects TRU waste management facilities as they currently exist at the sites (i.e., pre-consent orders and agreements), and projects TRU waste management progress as if the configuration were to persist over the life of the WIPP. With this configuration only two sites, RFETS and INEL, have facilities to load and ship CH-TRU waste. Several sites have characterization facilities; however, few sites have capabilities to perform drum coring, sampling, and analysis, or to perform visual exams as required. Treatment and re-packaging capabilities are limited as are waste packaging and transportation resources, and do not increase over time. Under this configuration less than 4% of the total TRU waste inventory is disposed over the WIPP's 35-year operating life. More than 124,000 m^3 would be left in storage at the end of FY33 under current projections.

The FFCAct Compliance/WIPP Disposal configuration reflects TRU waste management facilities and operating schedules consistent with FFCAct consent orders, approved site treatment plans, and other relevant regulatory agreements as of April 1996. In this configuration, sites that store and/or generate large quantities of TRU waste use existing facilities supplemented by new fixed facilities for processing waste in preparation for shipment to the WIPP. With the exceptions of INEL and SRS, where TRU waste will be vitrified, treatment will be limited to the minimum necessary to comply with the WIPP Waste Acceptance Criteria. Under this configuration 85% of CH-TRU and 67% of RH-TRU waste would be disposed in the WIPP by the end of FY33. Based on projected TRU waste generation, the volume remaining at sites across the complex at the end of FY33 would be 15,411 m^3 of CH-TRU and 1,667 m^3 of RH-TRU waste.

The DOE-EM draft Ten-Year Plans, dated July 1996, projected disposal of a greater waste volume than previous plans. No effort was made, however, to coordinate transportation resources or optimize the WIPP waste handling and disposal capacities. As a result, these resources would at times be underutilized.

2.2 Prior System Performance Issues

By design, the FFCAct Compliance/WIPP Disposal configuration achieves compliance with most FFCAct consent orders and other regulatory agreements. The DOE-EM draft Ten-Year Plans assume maximum regulatory flexibility to achieve an infrastructure that complies with site consent orders and agreements, often at an accelerated pace from previous plans. However, by not being fully integrated, these possible configurations have a number of shortcomings:

- **Inefficient use of the WIPP's waste handling capability** – The FFCAct Compliance/WIPP Disposal configuration underutilizes the waste transportation fleet and the WIPP's waste handling and disposal capacity, resulting in significant idle resources; does not dispose of all TRU waste by FY33; and does not maximize mortgage and risk reduction.

- **Increased cost due to duplicative waste processing facilities** – With sites operating independently, there are cases where similar facilities are constructed and operated even though regionalized processing could be advantageously applied.

- **Minimal coordination of waste disposal schedules** – The lack of coordination among sites with regard to disposal schedules could result in a "bottleneck" at the WIPP and in the transportation system. This could manifest itself at the sites in start/stop operating modes in order to accommodate an unpredictable waste receipt capability.

- **Inability to mitigate the impacts to funding profiles resulting from simultaneous infrastructure investments** – Because neither the FFCAct Compliance/WIPP Disposal configuration nor the DOE-EM draft Ten-Year Plans were centrally coordinated, there is limited ability to proactively manage fluctuations in annual budget requirements.

Because of these performance issues, the CAO recognized that a more efficient TRU waste management system could be realized by integrating waste management activities throughout the DOE complex.

2.3 Integration Process

Design of the Management Plan configuration was accomplished using a sequential and iterative process that relied in part on computer-based model simulations that provided CAO the ability to consider various configuration possibilities. For each viable configuration, cost estimates were generated using a companion cost model that paralleled the waste processing model to assess ***relative cost***.

The Integration Process:

- Founded on documented information sources and analysis of current issues
- Iterative refinement built upon previous planning
- Involved stakeholders in the development process

Data supporting model development were taken from published sources whenever possible. Sources included Site Treatment Plans, other FFCAct-related TRU waste planning documents, CAO initiatives and information solicitations, the *TRU Waste Characterization Quality Assurance Program Plan* (DOE, 1995a), published waste management privatization plan studies, and interviews with site waste management personnel. Projected and stored waste inventories were based on the *Transuranic Waste Baseline Inventory Report* (DOE, 1995b) with supplemental information provided by the sites. Regulatory commitments were extracted from FFCAct consent orders, unilateral orders, and other regulatory agreements.

Outputs of the computer simulations (e.g., volume of waste disposed, number of shipments, etc.) were evaluated to determine the extent to which a configuration (e.g., FFCAct Compliance/WIPP Disposal configuration) achieved the waste management system goals. In addition, the output was assessed to identify specific waste processing elements that prevented the configuration from better achieving goals. Based on these analyses, adjustments were made to those waste processing elements identified as impediments to improved performance.

When analysis of a configuration's performance indicated a significant improvement or one of broad-based interest, it was shared with the sites including the TRU Steering Committee and the TRU Executive Committee; Departmental organizations; and the National Governors' Association for review. This provided a forum for proactively managing less quantifiable parameters associated with the configuration selection process, including recognition and reduction of programmatic risk, and future budget uncertainties. Feedback from these review

sessions was considered by CAO in the context of system goals and current issues, improved derivative configurations were developed, and the evaluation/adjustment process was repeated. After several iterations, and evaluation of many configurations, the Management Plan configuration was optimized.

3. MANAGEMENT PLAN CONFIGURATION

The Management Plan configuration offers:

- ***Accelerated compliance with consent orders and regulatory agreements***
- ***Removal of TRU waste inventory from all but five sites by the end of FY06***
- ***Disposal at near waste handling capacity for the first ten years***
- ***Shipping from all sites in the first ten years***

but requires:

- ***Higher initial funding***
- ***Commitment to accelerated schedules***

The Management Plan configuration is founded upon the waste processing capabilities and assumptions reflected in independently developed site waste management plans. However, this configuration improves upon these plans by incorporating features from other possible options that contribute to improved system performance (see Section 3.1).

The Management Plan configuration is assessed in terms of short-term (through FY06) and long-term (FY33) performance measures, such as volumes of waste removed from sites and disposed at the WIPP, equity among sites regarding TRU waste disposal, and utilization of the WIPP's waste handling capacity (see Section 3.2). The configuration also is described in terms of the facilities, capabilities, and waste processing activities that will take place at each site throughout the DOE complex (see Section 3.3).

3.1 Features and Benefits of the Management Plan Configuration

The Management Plan configuration employs a waste management approach that is primarily "decentralized." Each of the ten TRU waste sites that store and/or generate large quantities of TRU waste operates independent waste management facilities to process and package waste for shipment to the WIPP. Facilities and additional features that expand upon previous waste management plans are incorporated. The Management Plan configuration:

- ***Coordinates and accelerates facility construction and waste processing schedules, including utilization of multiple-shift operations***

  The Management Plan configuration relies on more aggressive and prioritized waste processing schedules than those used in previous plans. At several sites, facilities previously scheduled to operate with one eight-hour shift are now required to operate

two such shifts, thus increasing the waste processing rate. At some sites, implementation of the Management Plan configuration requires accelerating facility start dates and operating longer to process additional TRU waste.

In addition, sites are required to prioritize their waste management activities so that more easily processed CH-TRU waste types (e.g. waste that can be characterized using mobile units or existing facilities) are given the highest priority. Sites that do not have existing facilities for treatment or repackaging are to process certifiable waste first, while facilities are being built. Thus, the Management Plan configuration targets for early disposal CH-TRU waste types that are more easily processed.

Sites also are to prioritize their waste management activities to increase certification of RH-TRU waste for disposal starting in FY02. The disposal design of the WIPP requires that RH-TRU waste be emplaced in the walls of the underground rooms at a rate commensurate with CH-TRU waste disposal. Implementation of the Management Plan configuration therefore requires that RH-TRU waste processing be advanced so as to remain commensurate with the greater CH-TRU waste disposal rate. Thus, the Management Plan configuration also targets for early disposal RH-TRU waste types that can be processed in existing facilities and accelerates development of needed new facilities.

- ***Eliminates redundant waste processing capability***

  Prior to the integration of site facility construction and waste processing schedules, redundant capabilities were identified across the DOE complex. For example, by coordinating shipping and disposal schedules and accelerating waste processing capability, the need for the Waste Characterization Facility at INEL and the continued use of the Transuranic Storage and Assay Facility at Hanford are avoided and overall cost is lowered.

- ***Coordinates the WIPP waste handing operations and transportation availability***

  Integrating the preparation of certified waste at the sites with the WIPP operations and transportation schedule allows the maximum use of the WIPP waste handling and disposal capacities and avoids underutilization of resources. The Management Plan configuration proposes an aggressive schedule for transporting waste to, and disposing of waste at, the WIPP. The WIPP is scheduled to receive CH-TRU waste in November 1997, at which time five truck sets (a set consists of a truck, trailer, and three TRUPACT-IIs) are in service. Starting in mid-FY98, truck sets are added until the fleet size reaches 20 sets during FY00. The WIPP CH-TRU waste handling capacity starts at 250 shipments per year in FY98 and increases to 850 shipments per year starting in FY00. RH-TRU waste is received at a rate of 500 shipments per year beginning in FY02 using 15 truck sets (i.e., a truck, trailer, and one RH cask).

- ***Deploys select mobile capability***

  Mobile characterization and loading units are included in the Management Plan configuration to meet the aggressive processing schedules and waste processing rate demand. In the Management Plan configuration, a number of mobile characterization (real-time radiography, radioassay, headspace gas sampling/drum venting) and TRUPACT-II loading and unloading units are provided to process stored and newly generated 55-gallon drums and standard waste boxes of CH-TRU waste. Mobile TRUPACT-II loading facilities at RFETS, SRS, Mound, ANL-E, ORNL, LLNL, the NTS, and the small quantity sites are required during their peak shipping times. A mobile loading facility will be employed at INEL to receive waste from RFETS. Mobile characterization facilities having radioassay, real-time radiography, and headspace gas sampling/drum venting capabilities are needed at ANL-E, LANL, LLNL, Mound, SRS, and the small quantity sites.

- ***Centralizes statistical intrusive characterization***

  Statistical intrusive waste characterization (visual examination, coring) is required under the current *Quality Assurance Program* Plan (DOE, 1995a). By utilizing available capacity at one existing waste characterization facility, the need to construct additional facilities at some sites is eliminated. The LANL characterization facility has sufficient capacity to accommodate waste from the small quantity sites, ANL-E, and Mound for intrusive waste characterization and will service the statistical characterization needs of these sites.

- ***Coordinates waste workoff campaigns with maintenance of transportation corridors***

  Previous planning called for maintaining open transportation corridors with minimal waste transportation traffic. Regardless of the expected traffic, the corridors would incur ongoing costs such as emergency response training and institutional payments to state governments. Designating waste workoff campaigns for some sites allows idle corridors to be closed and thus avoids these associated costs. For example, the shipping corridors from LLNL and NTS will open in FY99 to ship all stored waste, after which time the corridors would close. Thereafter, dedicated waste shipments would occur intermittently, or the corridor could be opened periodically, to work off newly generated waste.

- ***Utilizes regional waste treatment***

  New treatment facilities are needed at different sites across the DOE complex. By utilizing a regional treatment facility (the Advanced Mixed Waste Treatment Facility at INEL), RFETS is able to avoid building its own treatment facility.

3.2 Management Plan Configuration Performance

The performance of the recommended Management Plan configuration offers a number of important benefits including assuring regulatory compliance, accelerating mortgage and risk reduction, and increasing the WIPP waste handling and disposal utility.

Under the Management Plan configuration, many sites will be in a position to accelerate compliance activities. The waste handling and disposal capacities of the WIPP are almost fully utilized during the first ten years. The potential hazards to nearby populations are reduced, primarily due to early disposal of waste from the small quantity sites. Expenditures associated with long-term storage are eliminated in some cases.

The Management Plan configuration results in a greater volume of TRU waste being disposed in the WIPP than previous planning at a lower total system life cycle cost. Implementation of this Plan does, however, require a significant early financial investment in a TRU waste management infrastructure (e.g., construction/modification of facilities, development of new technologies).

3.2.1 Regulatory Compliance Performance

Under this configuration, many sites can achieve regulatory compliance earlier than previously planned.

The most relevant regulatory compliance requirements result from efforts to meet provisions of the FFCAct. The FFCAct required DOE to prepare plans for developing treatment capacities and technologies for all mixed waste, including mixed TRU waste. The DOE has submitted site-specific treatment plans, and consent orders or agreements have been reached with the states and the EPA regarding how mixed waste inventories will be processed and/or disposed.

Under the Management Plan configuration all sites comply with current regulatory requirements, consent orders, and agreements. Though compliance was the fundamental basis for previous TRU waste management planning, the integration of waste management efforts provided by the Management Plan configuration benefits many sites by enabling the sites to accelerate activities necessary for compliance.

Most of the agreements between the state regulatory agencies and the DOE sites are predicated on the assumption that mixed and non-mixed TRU waste will be disposed at the WIPP, without treatment to the RCRA Land Disposal Restrictions. With a few exceptions, the consent orders and agreements allow the sites flexibility to prepare plans for the construction and operation of facilities to enable waste to be shipped to the WIPP. The agreements for INEL, LANL, ORNL, and RFETS, however, establish specific requirements that must be addressed.

- The consent order for INEL specifies that all TRU waste at INEL must be shipped to the WIPP or another such facility no later than December 31, 2018. The aggressive processing schedule set for INEL in the Management Plan configuration results in all TRU waste being shipped from the site by mid-FY16.

- The Unilateral Order issued to LANL requires DOE to complete treatment of mixed TRU waste to applicable regulatory standards by December 31, 2010 (the order assumes that the WIPP would not be operable for disposal). The Management Plan configuration is based on the WIPP opening in November 1997, with LANL waste shipments concurrent with the WIPP's opening, therefore eliminating the need for treatment.

- By September 30, 2023, ORNL must complete shipment of stabilized RH-TRU sludges and CH- and RH-TRU solids to the WIPP. Following the recommendations of the Management Plan configuration, all waste onsite at ORNL through the end of FY06 will be shipped to the WIPP by mid-FY07.

- At RFETS, newly generated mixed TRU waste cannot be stored for longer than two years once the WIPP begins accepting mixed TRU waste from RFETS. Since the shipping rate for RFETS under the Management Plan configuration is well above the projected generation rate, storage of newly generated mixed TRU waste is not required.

3.2.2 Risk and Mortgage Reduction Performance

By FY06, 94% of the affected population will no longer be exposed to the potential hazards.

Risk, in terms of populations living within the proximity of stored TRU waste inventories, is ultimately reduced by removing waste from the accessible environment and disposing of it in the WIPP. A fundamental component of the Management Plan configuration is that the rate at which waste is retrieved from storage, processed, and shipped for disposal is maximized. This is accomplished by focusing on easily processed waste types and on sites having relatively small inventories in storage. By the end of FY06, only Hanford, INEL, and SRS maintain CH-TRU waste in storage; RH-TRU waste remains at Hanford, INEL, ORNL, and Battelle (a small quantity site) (Table 3-1).

The Draft *Waste Management Programmatic Environmental Impact Statement* (DOE, 1995c) reports that the populations within 50 miles of each of the TRU waste sites total approximately 60.9 million (1990 census). By removing TRU waste from most sites by the end of FY06, 94% of this population will no longer be exposed to potential hazards associated with stored TRU waste. Implementation of previous site waste management plans would have resulted in only a 22% reduction.

Table 3-1 TRU Waste Disposal Summary

Site	CH-TRU Waste				RH-TRU Waste			
	FY06		FY33		FY06		FY33	
	m^3 *	%**	m^3 *	%**	m^3 *	%**	m^3 *	%**
ANL-E	95	100%	113	100%	n/a	n/a	n/a	n/a
Hanford	4,579	45%	23,009	100%	180	48%	2,659	100%
INEL	10,242	35%	33,234	100%	0	0	363	100%
LANL***	10,520	100%	16,957	100%	135	100%	230	100%
LLNL	490	100%	1,122	100%	n/a	n/a	n/a	n/a
Mound	259	100%	259	100%	n/a	n/a	n/a	n/a
NTS	667	100%	667	100%	n/a	n/a	n/a	n/a
ORNL	1,258	100%	1,432	100%	1,762	92%	1,985	100%
RFETS	14,633	100%	14,633	100%	n/a	n/a	n/a	n/a
SQS	101	100%	250	100%	132	22%	610	100%
SRS	1,450	27%	11,507	100%	n/a	n/a	n/a	n/a
Total	44,296	51%	103,184	100%	2,209	63%	5,846	100%

*Disposal volumes after treatment and repackaging.
** Percentage of total pre-treated waste existing at the end of FY06 or FY33.
*** Figures are exclusive of 125 m^3 that are not certifiable to the WIPP Waste Acceptance Criteria.
n/a - not applicable

The Management Plan configuration maximizes the rate at which waste is taken out of storage, processed, and shipped to the WIPP for disposal, thus maximizing the rate of risk reduction. Volumes of CH- and RH-TRU waste remaining in the complex over the life of the WIPP are shown in Figures 3-1 and 3-2.

The Management Plan configuration also is expected to yield the maximum benefit toward reducing the mortgage associated with TRU waste. While initial expenditures are expected to be higher to support aggressive schedules demanded by the Management Plan configuration, this will decrease, at an earlier time, the financial burden associated with maintaining long-term storage of waste.

The process and facility performance measures used in this configuration will prove useful in establishing and assessing the inherent value of privatized projects at the site-specific and complex-wide levels, as well as facilitate identification of other opportunities for privatization. Privatization is expected to lessen peak annual expenditures by amortizing project costs over the life of the project.

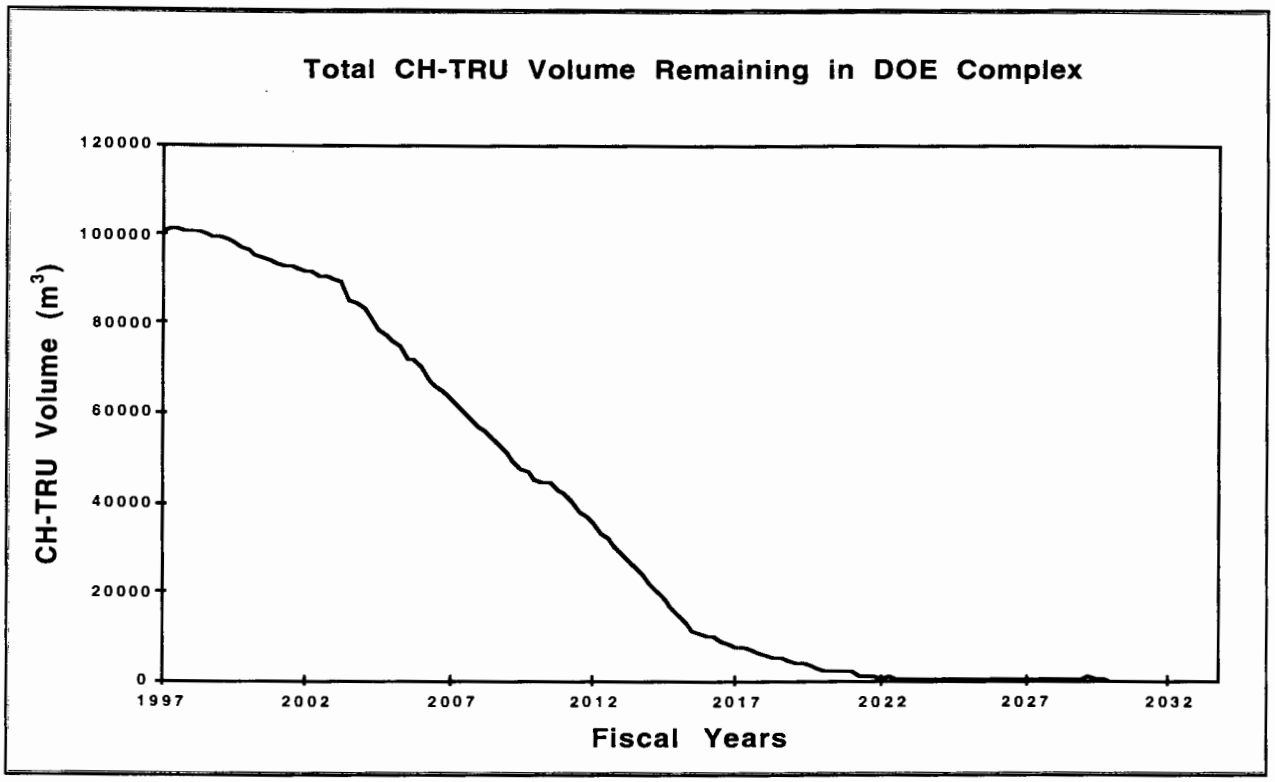

Figure 3-1 Volume of CH-TRU Waste Located at the Sites

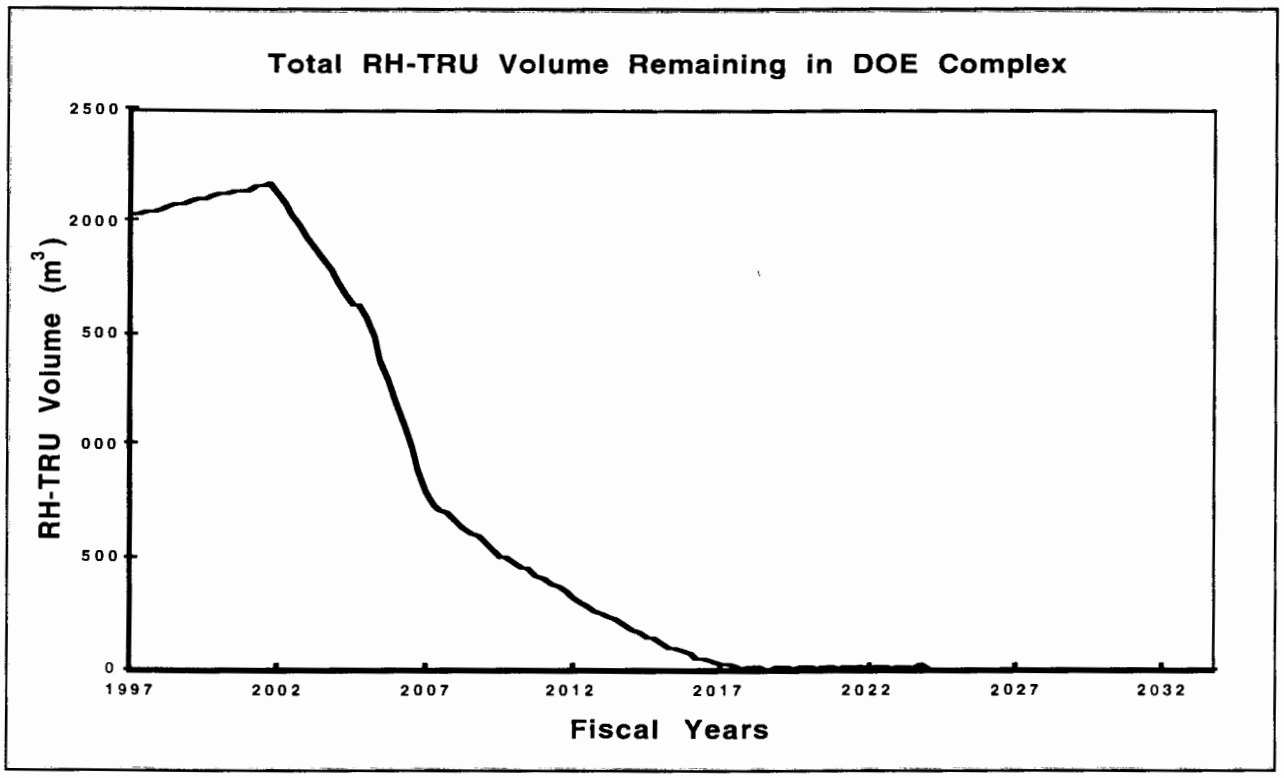

Figure 3-2 Volume of RH-TRU Waste Located at the Sites

3.2.3 WIPP Waste Handling and Disposal Performance

Coordinating system-wide TRU waste management efforts makes increased efficiency of waste processing activities and higher utilization of transportation and disposal resources. Ensuring coordination of these resources begins in advance of disposal operations as the sites must fulfill prerequisites prior to certifying, processing, or shipping TRU waste for disposal. Before waste can be processed for disposal at the WIPP, the waste preparation process at each site must be certified by the CAO. Prior to shipping waste to the WIPP, the shipping corridor between the site and the WIPP must be "opened" (i.e., informing and coordinating with communities along the shipping route). Table 3-2 provides dates associated with these events for sites and also lists first waste shipment dates for CH- and RH-TRU waste.

Through FY06, 93% of the WIPP's CH-TRU waste handling capacity is utilized.

Table 3-2 Site Certification, Corridor Opening, and First Waste Shipment Dates

Site	Site Certified	Corridor Open	First CH-TRU Waste Shipment	First RH-TRU Waste Shipment
ANL-E	April 2002	September 2003	October 2003	n/a
Hanford	August 1998	September 1998	October 1998	January 2006
INEL	May 1997	October 1997	November 1997	January 2007
LANL	August 1997	October 1997	November 1997	October 2001
LLNL	August 1999	September 1999	October 1999	n/a
Mound	April 2002	September 2003	October 2003	n/a
NTS	August 1999	September 1999	October 1999	n/a
ORNL	August 1998	September 1998	October 1998	October 2001
RFETS	September 1997	October 1997	November 1997	n/a
SRS	March 1998	April 1998	May 1998	n/a
Small Quantity Sites	–	–	October 2003	October 2003

n/a not applicable

Shipments of CH-TRU waste to the WIPP through FY06 closely match the waste handling and disposal capabilities of the WIPP (Figure 3-3). During this time, the WIPP can accept 6,887 shipments of CH-TRU waste, and 6,432 shipments are made, resulting in a 93% utilization of waste handling capability. By the end of FY06, all sites except Hanford, INEL, and SRS have completely disposed of all CH-TRU waste onsite. CH-TRU waste handling capacity utilization decreases after FY06 but then remains steady until FY16 when INEL completes shipping to the WIPP. From FY16, only those sites still generating TRU waste continue to ship to the WIPP.

Shipments of RH-TRU waste begin in FY02 at 500 shipments per year (Figure 3-4). The disposal rate continues at near capacity until mid-FY07 when ORNL has shipped all of its stored RH-TRU waste inventory. From FY02 through FY06, the WIPP can accept a total of 2,500 RH-TRU waste shipments and 2,468 shipments are made, resulting in an 82% utilization of waste handling capacity. RH-TRU waste handling capacity utilization decreases in mid-FY07, ranging from 200 to 300 shipments per year, until FY24, when only Hanford and LANL continue to ship newly generated waste.

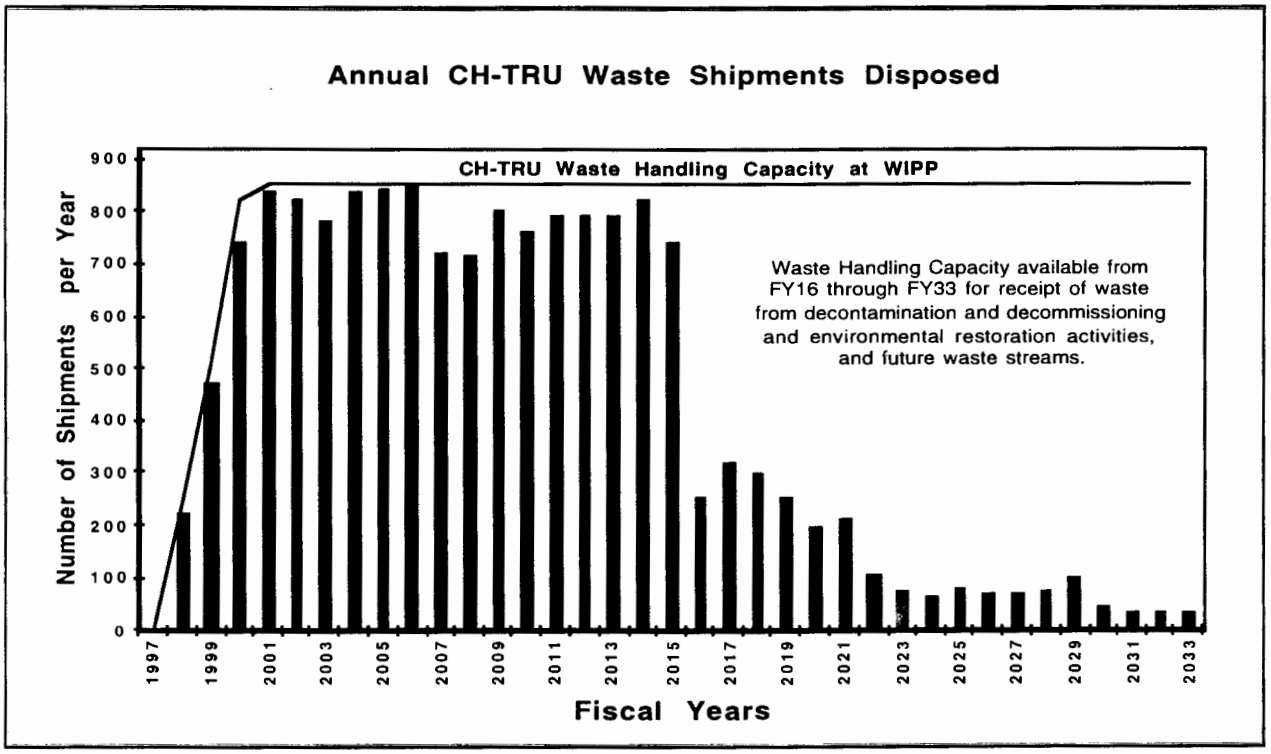

Figure 3-3 Projected Annual CH-TRU Waste Shipments Disposed — WIPP Operating Life

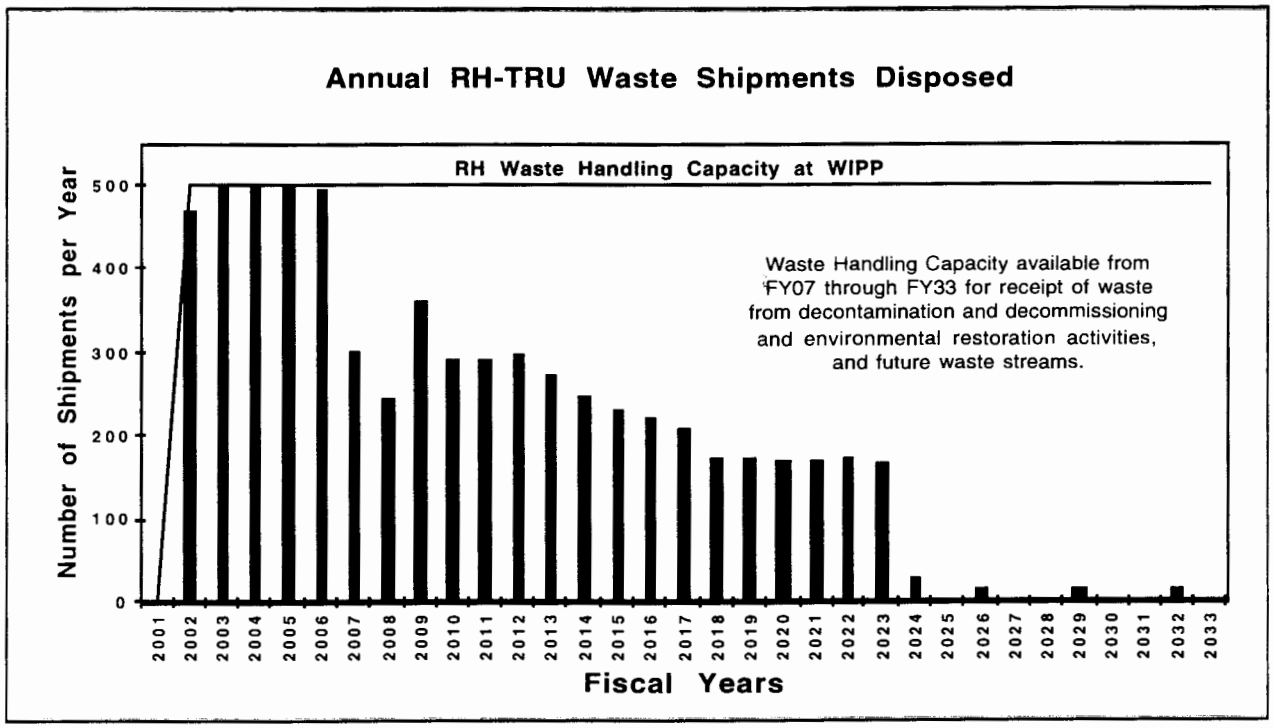

Figure 3-4 Projected Annual RH-TRU Waste Shipments Disposed — WIPP Operating Life

The Management Plan configuration results in the disposal of 103,184 m^3 of CH-TRU waste and 5,846 m^3 of RH-TRU waste over the 35-year disposal period. These disposal volumes result in a 61% CH-TRU utilization and an 83% RH-TRU utilization of the WIPP waste volume capacity statutory limits (Figure 3-5). Although it appears as though disposal capacity is underutilized, these projections do not yet account for waste that is expected to occur from Departmental environmental restoration projects, facility decontamination and decommissioning activities, or future waste streams. CH-TRU waste disposal from these sources can be accommodated beginning in mid-FY16 when INEL completes shipping. RH-TRU waste disposal from these sources can begin in mid-FY07.

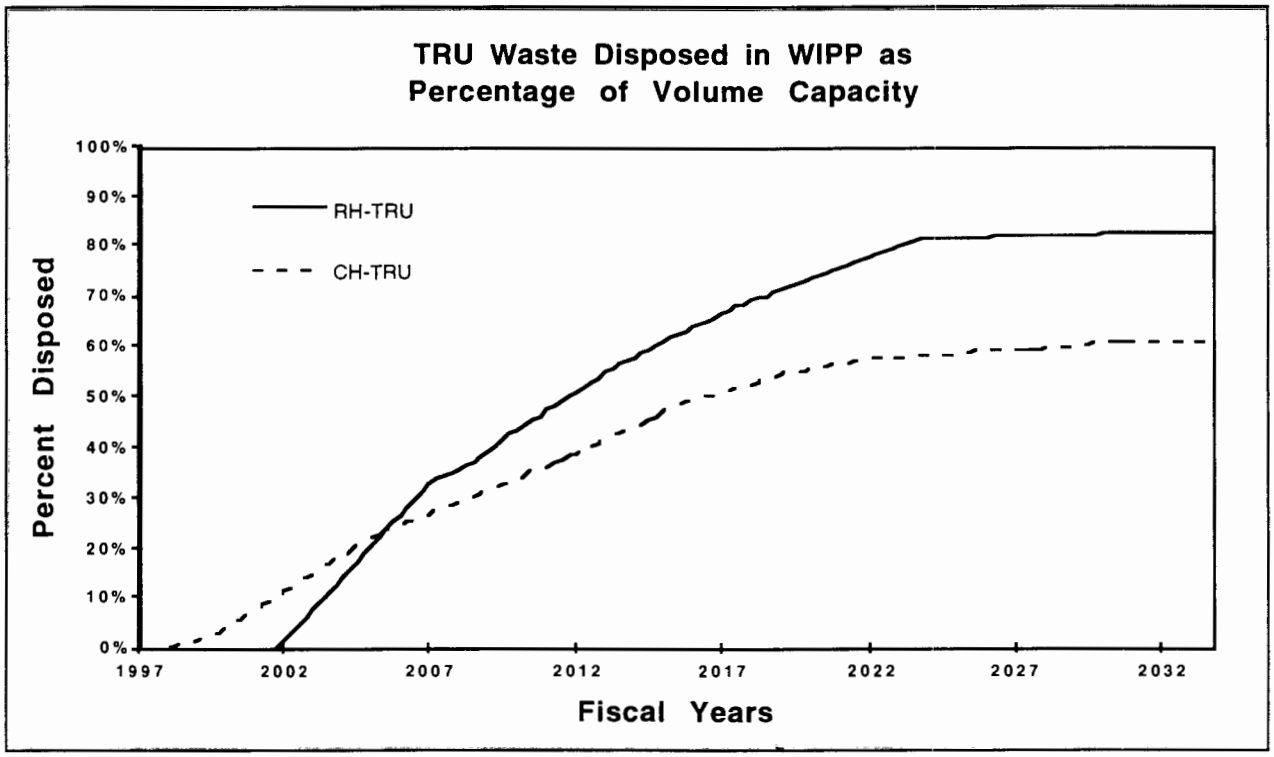

Figure 3-5 Waste Disposed in the WIPP as Percentage of Volume Capacity – WIPP Operating Life

3.3 Management Plan Configuration Site Descriptions

Facilities and schedules of the Management Plan configuration are described below by site. Significant infrastructure components, both physical and administrative, that must be in place to realize the benefits of this plan are tabulated. Waste processing logic is discussed relative to the facilities and schedules. The status of the facilities and activities are noted as being either:

Completed (Facility/Activity has been completed or is in place for operation),
In-Process (Funding is allocated and the facility/activity will be operational on date shown), or
Planned (Facility/Activity is not yet funded; plans call for operations to begin on date shown).

3.3.1 Argonne National Laboratory - East (ANL-E)

The Management Plan configuration requires that ANL-E use non-intrusive mobile characterization capabilities to meet waste processing and shipping schedules (Table 3-3). These services will be complemented by statistical intrusive characterization to be performed at a centralized characterization facility at LANL. The combination of mobile capabilities on site plus the statistical characterization at LANL will encompass all activities required for characterization and loading of TRU waste for disposal at the WIPP. The schedule calls for waste processing to begin in FY02, and for waste shipments to begin in FY04.

Table 3-3 Waste Management Facilities and Activities at ANL-E

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	Mobile Characterization			4/02
Transportation	Mobile Loading Unit			10/03
Certification	Site Certification			4/02
Transportation	Open Transportation Corridor			9/03

3.3.2 Hanford Reservation (Hanford)

The Management Plan configuration calls for CH-TRU waste to be retrieved from the burial grounds in two phases as indicated in Table 3-4. Phase I operations begin in FY02; Phase II operations begin in FY07. Retrieval of RH-TRU waste will also begin in FY07. The majority of CH-TRU waste will be characterized and repackaged in the Waste Receiving and Process I facility. Large boxes containing CH- and RH-TRU waste will be repackaged in the Large Box Facility which will begin operations in FY06. Operations in the Processing Facility for RH-TRU waste will also start in FY06. The TRUPACT-II loading facility will begin operations in FY99 as waste is shipped to the WIPP, and the RH-TRU waste shipments will be initiated in FY06.

Table 3-4 Waste Management Facilities and Activities at Hanford

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Retrieval	Phase I and II Retrieval (CH)			10/01, 10/06
Retrieval	Alpha Caisson Retrieval (RH)			10/06
Characterization	Waste Receiving and Processing I (CH)	✓		
Repackaging	CH/RH Large Box Facility (CH/RH)			10/05
Characterization	Processing Facility (RH)			10/05
Transportation	Loading Facility (CH)	✓		
Transportation	Loading Facility (RH)			1/06
Certification	Site Certification			8/98
Transportation	Open Transportation Corridor			9/98

3.3.4 Lawrence Livermore National Laboratory (LLNL)

The Management Plan configuration requires that LLNL utilize mobile capabilities for waste processing to accommodate its shipping schedules (Table 3-6). Mobile waste processing units will support all activities required for the characterization and loading of TRU waste for disposal at the WIPP, with the exception of waste receiving statistical sampling. This waste will be processed through the Assay/Visual Examination Facility for drum assay, visual examination, and innermost bag sampling. Processing of waste in drums and standard waste boxes will begin in FY98. Repackaging of non-standard boxed waste will begin in the planned Decontamination and Waste Treatment Facility starting in FY01. LLNL will initiate shipments of TRU waste to the WIPP in FY00.

Table 3-6 Waste Management Facilities and Activities at LLNL

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	Assay/Visual Examination (Building 332)	✓		
Characterization	Mobile Characterization		4/98	
Treatment Repackaging	Decontamination and Waste Treatment Facility			10/00
Transportation	Mobile Loading			10/99
Certification	Site Certification			8/99
Transportation	Open Transportation Corridor			9/99

3.3.5 Los Alamos National Laboratory (LANL)

The Management Plan configuration requires that LANL utilize both mobile and fixed facilities, as indicated in Table 3-7, to accommodate required waste processing rates. Waste stored on Pads 1, 2, and 4 will be retrieved and placed in RCRA-approved storage before undergoing characterization. All stored drums will be characterized using both mobile units and the Radioassay and Nondestructive Testing Facility. Waste requiring size reduction or repackaging will be processed through the Waste Characterization, Reduction, and Repackaging Facility. A portion of this facility will also be used for centralized intrusive characterization of CH-TRU waste from ANL-E, Mound, and small quantity sites that require these services. Radioassay of standard waste boxes will be performed in an alternate box assay facility, scheduled to begin operation in FY99. Loading and shipping of CH-TRU waste will be performed in the Radioassay and Nondestructive Testing Facility beginning in FY98. RH-TRU waste retrieval, processing, and preparation for shipment will begin in FY02 in a planned facility.

3.3.3 Idaho National Engineering Laboratory (INEL)

The Management Plan configuration requires that INEL first target the waste from the Air Support Building for characterization and shipment to the WIPP in order to meet the 15,000-drum milestone specified in INEL's Settlement Agreement with the State of Idaho, as shown in Table 3-5. Waste from the Air Support Building will be characterized at the Stored Waste Examination Pilot Plant and at ANL-West beginning in FY97. The majority of INEL's waste will be treated in the Advanced Mixed Waste Treatment Facility, a vitrification facility to be financed and operated by the private sector. This facility is scheduled to become operational in FY03, all CH-TRU waste will be processed at this facility, and waste characterization at the Stored Waste Examination Pilot Plant and ANL-W will cease. The majority of RH-TRU waste will be characterized and processed in the Chemical Processing Plant, which will start operations in FY07.

Other TRU waste and alpha-contaminated waste (TRU and low-level) from within the DOE complex will be treated at the Advanced Mixed Waste Treatment Facility, resulting in WIPP-acceptable waste. TRU waste currently stored at RFETS that requires treatment (rather than repackaging) to meet the WIPP Waste Acceptance Criteria will be shipped to INEL for vitrification. In addition, alpha-low-level waste at INEL and from other sites can be accommodated at the Advanced Mixed Waste Treatment Facility and disposed of as TRU waste at the WIPP.

Drums of waste from the Advanced Mixed Waste Treatment Facility will be loaded into Halfpacks (a shorter version of the TRUPACT-II for transporting higher density wastes). The INEL existing loading facility will be supplemented in FY03 with two facilities operating multiple shifts, and with a mobile unit to receive and unload waste from the complex. Initial CH-TRU waste shipments will begin during the first quarter of FY98.

Table 3-5 Waste Management Facilities and Activities at INEL

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Storage	Type II Storage Modules (CH)	✓		
Retrieval	Air Support Building Waste Retrieval (CH)		10/94-1/98	
Characterization	Stored Waste Examination Pilot Plant (CH)	✓		
Characterization	Waste Characterization at ANL-West (CH)	✓		
Characterization	Chemical Processing Plant (RH)	✓		
Treatment	Advanced Mixed Waste Treatment Facility (CH)			4/03
Transportation	Loading Facility 1 (CH)	✓		
Transportation	Loading Facilities 2 and 3 (CH)			4/03 5/03
Transportation	Loading Facility (RH)	✓		
Certification	Site Certification			5/97
Transportation	Open Transportation Corridor		10/97	

Table 3-7 Waste Management Facilities and Activities at LANL

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Retrieval	Retrieval from Pads 1, 2, and 4 (CH)		10/95 - 9/03	
Characterization	Mobile Waste Characterization (CH)	✓		
Characterization	Radioassay and Non-Destructive Testing (CH)	✓		
Characterization Repackaging	Waste Characterization, Reduction, and Repackaging Facility (CH)	✓		
Characterization	Intrusive Central Characterization Capability (CH)	✓		
Characterization	Box Characterization (CH)			10/98
Characterization Repackaging	Multipurpose RH Facility (RH)			10/01
Certification	Site Certification			8/97
Transportation	Open Transportation Corridor			10/97

3.3.6 Mound Plant (Mound)

Mobile waste characterization units will be employed at Mound for non-intrusive waste characterization requirements as shown in Table 3-8. These activities will be complemented by intrusive characterization activities to occur at a central characterization facility located at LANL. Mobile capabilities are to include all activities required for non-intrusive characterization and loading of TRU waste for disposal at the WIPP with the exception of repackaging, which will be performed in a refurbished existing facility. The Management Plan configuration calls for repackaging of waste to begin in FY99 and mobile units to begin operation in FY02. Shipments from Mound are scheduled to start in FY04.

Table 3-8 Waste Management Facilities and Activities at Mound

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	Mobile Characterization			4/02
Repackaging	Repackaging Facility			4/99
Transportation	Mobile Loading Unit			10/03
Certification	Site Certification			4/02
Transportation	Open Transportation Corridor			9/03

3.3.7 Nevada Test Site (NTS)

The Management Plan configuration requires that NTS construct a TRU Waste Examination Facility for characterizing and repackaging CH-TRU waste inventories and utilize a mobile loading unit to accommodate shipping needs (Table 3-9). The TRU Waste Examination Facility will perform all activities required for the processing of TRU waste and will begin operations in FY98. Initial shipments from NTS will start in FY00.

Table 3-9 Waste Management Facilities and Activities at NTS

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	TRU Waste Examination Facility			1/98
Transportation	Mobile Loading Unit			10/99
Certification	Site Certification			8/99
Transportation	Open Transportation Corridor			9/99

3.3.8 Oak Ridge National Laboratory (ORNL)

Initial shipments of CH-TRU waste from ORNL will begin in FY99 with 822 CH-TRU certifiable drums currently in storage. These drums will be characterized and certified for disposal in the existing Waste Examination and Assay Facility starting in FY98 as shown in Table 3-10. The Management Plan configuration assumes that the remaining CH-TRU waste and all RH-TRU waste at ORNL will be processed and packaged at a privately operated repackaging and characterization facility. RH-TRU sludges will be processed first, beginning in FY02, followed by CH-TRU waste processing in FY03, and then RH-TRU debris waste starting in FY05. A planned RH-TRU waste loading facility is scheduled to begin operations in FY02 to support RH-TRU waste shipments to the WIPP.

Table 3-10 Waste Management Facilities and Activities at ORNL

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	Waste Examination and Assay Facility (CH)	✓		
Characterization/ Repackaging	Privatized RH/CH Repackaging and Characterization Facility (CH/RH)			10/01
Transportation	Mobile Loading Unit (CH)			10/98
Transportation	Waste Loading Facility (RH)			10/01
Certification	Site Certification			8/98
Transportation	Open Transportation Corridor			9/98

3.3.9 Rocky Flats Environmental Technology Site (RFETS)

The majority of RFETS TRU waste can be processed to meet the WIPP Waste Acceptance Criteria using characterization facilities that currently exist as indicated in Table 3-11. A portion of the waste at RFETS requires additional treatment prior to disposal in the WIPP. This waste will be shipped to INEL for processing in the Advanced Mixed Waste Treatment Facility beginning in FY03. After treatment, the waste will be shipped to the WIPP. Initial waste shipments from RFETS to the WIPP will occur in FY98 using an existing TRUPACT-II loading facility. An additional mobile loading unit is necessary to support shipments of residues to the WIPP beginning in FY99.

Table 3-11 Waste Management Facilities and Activities at RFETS

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization	Waste Characterization (Buildings 371, 776, 569,)	✓		
Repackaging	Repackaging (Building 776)	✓		
Transportation	Loading Facility	✓		
Transportation	Mobile Loading Unit (for residues)			10/98
Certification	Site Certification			9/97
Transportation	Open Transportation Corridor			10/97

3.3.10 Savannah River Site (SRS)

Initial shipments of waste from SRS will be supplied from an inventory of certifiable drummed waste located in weather-covered storage and culverts. This waste will be characterized and certified for disposal using mobile characterization units and a planned visual examination facility starting in FY98 as shown in Table 3-12. Shipments to the WIPP will be supported with a mobile TRUPACT-II loading unit starting in FY98. Waste inventories located in earthen covered storage, large boxes, and other non-standard containers will be characterized and repackaged in the TRU Waste Characterization and Processing Building which is scheduled to become operational in FY09.

Table 3-12 Waste Management Facilities and Activities at SRS

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Retrieval	Retrieve/Unload Culverts			10/08
Retrieval	Retrieval Facility			10/97
Characterization	Mobile Characterization			4/98
Characterization	Visual Sampling Facility			4/98
Characterization Repackaging	TRU Waste Characterization and Processing Building			10/08
Transportation	Mobile Loading Unit			5/98
Certification	Site Certification			3/98
Transportation	Open Transportation Corridor			4/98

3.3.11 Small Quantity Sites

Mobilizing CH-TRU waste for disposal from the small quantity sites will rely largely on a suite of mobile waste characterization units as indicated in Table 3-13. This suite will be deployed to serially service various sites around the complex. Services provided by these mobile non-intrusive units will be complemented by a central intrusive characterization facility located at LANL where statistical samples of waste will be inspected. The Management Plan configuration calls for CH-TRU waste processing to begin operation in FY02 supported by mobile TRUPACT-II loading facilities. Shipments to the WIPP will begin in FY04. The Management Plan configuration requires the use of fixed facilities for the characterization and loading of RH-TRU waste. Characterization and shipping activities for RH-TRU waste are to begin in FY04.

Table 3-13 Waste Management Facilities and Activities at the Small Quantity Sites

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Characterization Repackaging	Retrieval, Repackaging, and Characterization Facility (RH)			10/03
Characterization	Mobile Characterization (CH)			4/02
Transportation	Mobile Loading Unit (CH)			10/03
Transportation	Loading Facility (RH)			10/03

3.3.12 Carlsbad Area Office/Waste Isolation Pilot Plant

The Management Plan configuration requires that the WIPP begin waste receipt operations in November 1997 for CH-TRU and in FY02 for RH-TRU waste as indicated in Table 3-14. The initial disposal rate of CH-TRU waste at the WIPP will be 5 shipments per week starting in FY98, increasing to 17 shipments per week in FY00. Five CH-TRU waste transport sets (5 trucks, 5 trailers, and 15 TRUPACT-IIs) will be required in FY98, and deployment of 20 transport sets is required in FY00. Additional equipment is required at the WIPP to support sustained RH-TRU waste disposal operations at the projected waste receipt rate of ten shipments per week. RH-TRU waste transport operations will begin in FY02, employing 15 RH-TRU waste transport systems, each consisting of a truck, trailer, and packaging cask. Additional administrative and operational readiness requirements prerequisite to waste receipt are listed in Table 3-14.

Table 3-14 Waste Management Facilities and Activities at CAO/WIPP

Function	Facility/Capability/Activity	Completed	In-Process	Planned
Disposal	Receive RCRA Part B Permit		✓	
Disposal	Submit Compliance Certification Application to EPA			10/96
Disposal	Disposal Phase Supplemental Environmental Impact Statement Record of Decision			3/97
Disposal	Operational Readiness Declaration			9/97
Disposal	EPA Certification			10/97
Disposal	Secretary of Energy Decision to Operate the WIPP as Disposal Facility			10/97
Transportation	Transportation Carrier Operational (CH)	✓		
Transportation	Initial TRUPACT-IIs available (CH)	✓		
Disposal	Begin Disposal Operations (CH)			11/97
Transportation	Entire TRUPACT-II fleet available (CH)			10/99
Transportation	Initial 72-Bs available (RH)			8/00
Transportation	Transportation Carrier Operational (RH)			8/00
Disposal	Complete facility modification for RH-TRU waste			4/01
Transportation	Entire 72-B fleet available (RH)			8/01
Disposal	Begin Disposal Operations (RH)			10/01

4. TEN-YEAR PLANNING GUIDANCE

The ten-year planning effort currently underway offers a challenge to the DOE complex to demonstrate significant progress towards disposal of TRU waste within ten years, and to accomplish the strategic vision of managing the TRU waste program in an efficient and cost-effective manner. The CAO's responsibility is to identify and recommend programs and projects that will achieve waste management system goals as rapidly as possible. In response to this charge, the CAO has recommended a Management Plan configuration for implementation that will guide the ten-year planning process consistent with the strategic vision, as well as achieve the overall TRU waste management goals. The facilities and activities described in Section 3.3, combined with the disposal-ready waste preparation schedules of Section 4.1, summarize current guidance to support development of site Ten-Year plans.

4.1 Disposal-Ready Waste Processing Schedule

Achieving the ten-year strategic vision requires that TRU waste management at the sites be integrated with the WIPP waste handling and disposal capacities. The Management Plan configuration identifies site-specific waste processing rates that then are coordinated with an optimal shipping fleet to complement the WIPP's waste handling and disposal capacities (Tables 4-1 through 4-4; Figures 4-1 and 4-2). Under the Management Plan configuration about 44,000 m^3 of CH-TRU and 2,200 m^3 of RH-TRU waste will be processed by the sites and shipped to the WIPP, resulting in about 8,900 shipments to the WIPP through FY06.

Table 4-1 Volume of CH-TRU Waste Processed Annually (cubic meters)

Site/FY	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
ANL-E	0	0	0	0	0	0	95	0	0	95
Hanford	0	554	585	562	585	585	562	562	585	4,579
INEL	501	659	686	686	686	275	1,717	2,411	2,621	10,242
LANL	624	1,051	1,358	1,373	1,389	1,381	1,393	1,561	392	10,520
LLNL	0	0	218	175	15	15	38	15	15	490
Mound	0	0	0	0	0	0	131	128	0	259
NTS	0	0	667	0	0	0	0	0	0	667
ORNL	0	165	0	0	0	374	479	225	15	1,258
RFETS	552	936	2,059	3,340	3,370	3,175	973	187	41	14,633
SRS	79	210	210	210	210	175	166	131	61	1,450
SQS	0	0	0	0	0	0	66	24	12	101
Total	1,755	3,574	5,783	6,345	6,254	5,979	5,619	5,243	3,742	44,296

Table 4-2 Volume of RH-TRU Waste Processed Annually (cubic meters)

Site/FY	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Hanford	0	0	0	0	0	0	0	0	180	180
INEL	0	0	0	0	0	0	0	0	0	0
LANL	0	0	0	0	45	45	39	4	4	135
ORNL	0	0	0	0	388	401	364	397	213	1,762
SQS	0	0	0	0	0	0	43	45	45	132
Total	0	0	0	0	433	445	446	445	441	2,209

Table 4-3 Number of Annual CH-TRU Waste Shipments (three TRUPACT-IIs per shipment)

Site/FY	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
ANL-E	0	0	0	0	0	0	16	0	0	16
Hanford	0	74	74	75	76	75	69	71	84	598
INEL	72	96	100	100	100	41	346	515	673	2,043
LANL	74	133	174	175	176	175	162	165	67	1,301
LLNL	0	0	27	16	2	2	4	2	2	55
Mound	0	0	0	0	0	0	22	22	0	44
NTS	0	0	75	0	0	0	0	0	0	75
ORNL	0	22	0	0	0	50	62	32	2	168
RFETS	69	125	273	446	450	423	133	20	10	1,949
SRS	9	24	24	24	24	20	17	15	9	166
SQS	0	0	0	0	0	0	11	4	2	17
Total	**224**	**474**	**747**	**836**	**827**	**786**	**842**	**846**	**849**	**6,432**
WIPP Capacity	250	687*	850	850	850	850	850	850	850	6,887

*ramp-up period

Table 4-4 Number of Annual RH-TRU Waste Shipments (one cask per shipment)

Site/FY	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Hanford	0	0	0	0	0	0	0	0	195	195
INEL	0	0	0	0	0	0	0	0	0	0
LANL	0	0	0	0	48	50	46	4	3	151
ORNL	0	0	0	0	424	450	407	446	248	1,975
SQS	0	0	0	0	0	0	47	50	50	147
Total	**0**	**0**	**0**	**0**	**472**	**500**	**500**	**500**	**496**	**2,468**
WIPP Capacity	0	0	0	0	500	500	500	500	500	2500

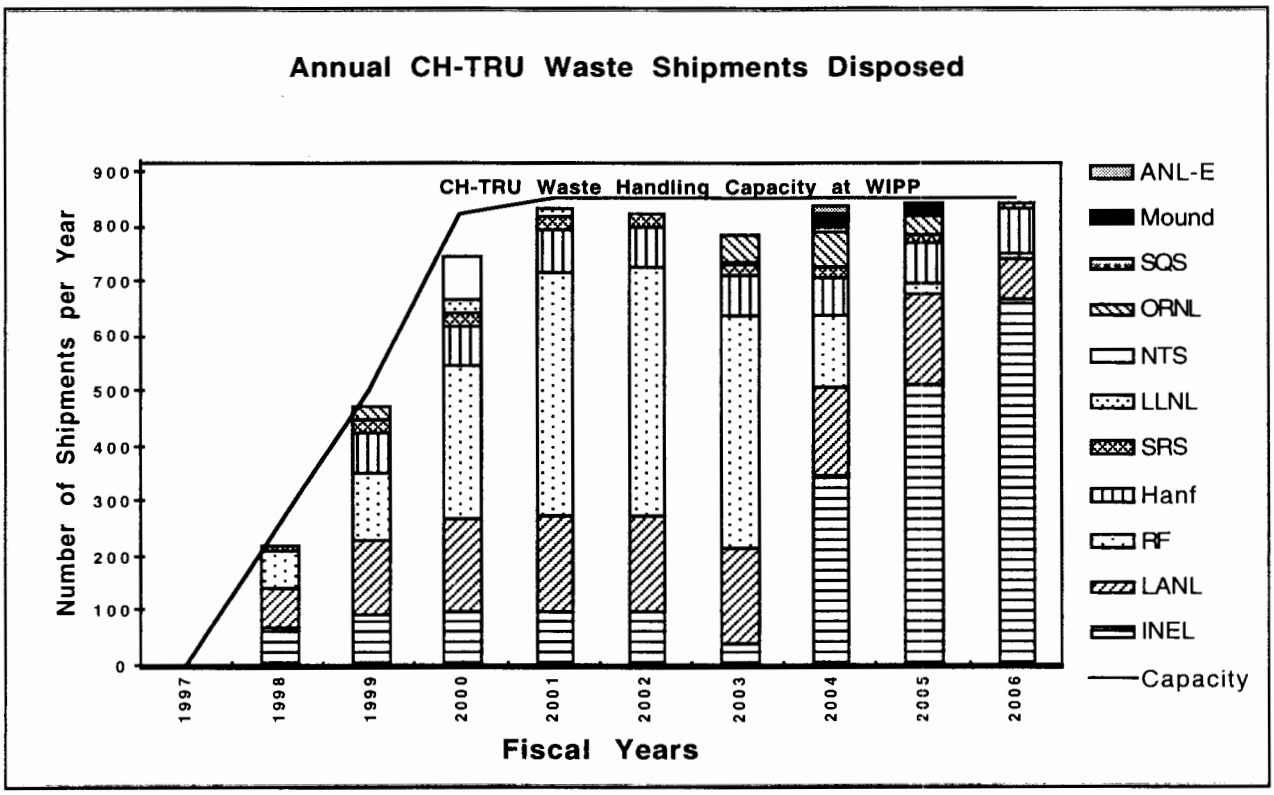

Figure 4-1 Projected Annual CH-TRU Waste Shipments Disposed Through FY06

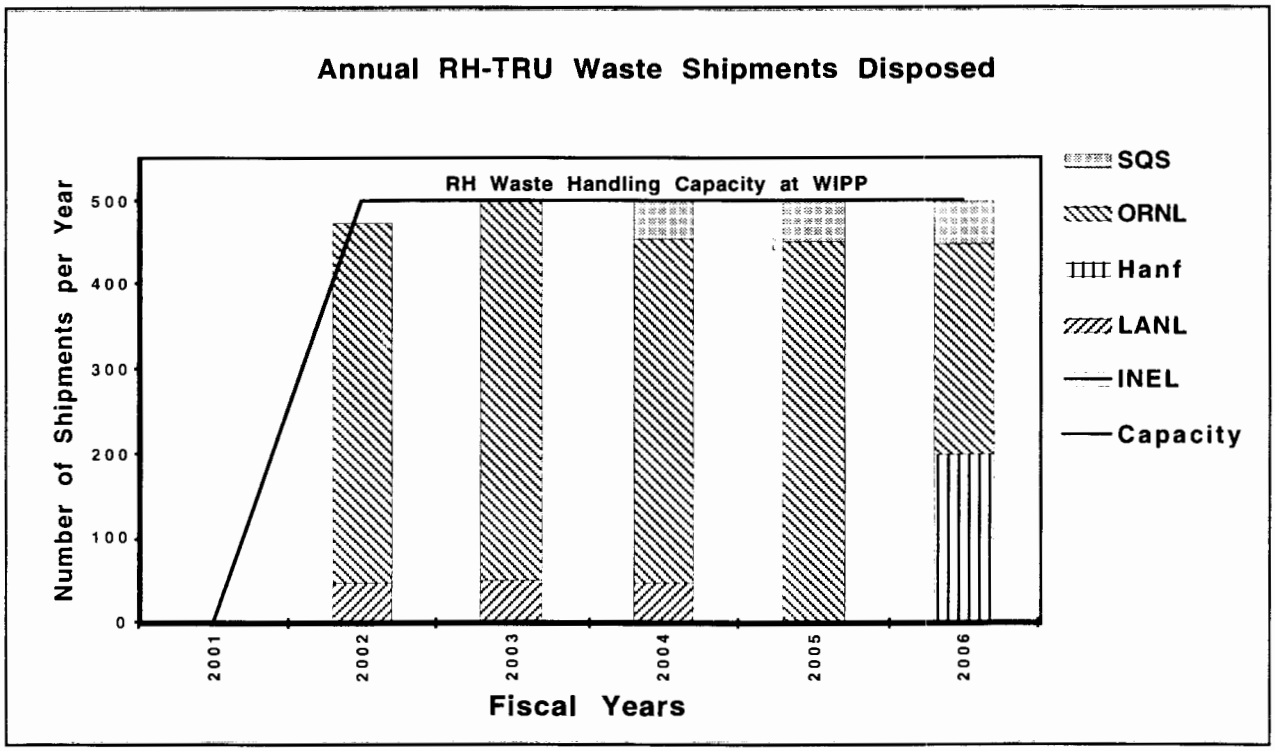

Figure 4-2 Projected Annual RH-TRU Waste Shipments Disposed Through FY06

4.2 Mortgage Reduction

For purposes of ten-year planning, mortgage reduction is defined as any effort undertaken to reduce life cycle costs by implementing strategies (e.g., acceleration) to achieve the strategic vision of managing the TRU waste program in an efficient and cost-effective manner. The Management Plan configuration was developed in recognition that the acceleration of waste processing to enable earlier and more efficient disposal will reduce the financial burden on the entire complex, because closure of TRU waste management facilities also can be accelerated.

Implementing the Management Plan configuration requires a substantial initial financial investment to construct the necessary waste management infrastructure, but will reduce the life-cycle cost for disposal of TRU waste in the DOE complex. This mortgage reduction primarily results from closing sites more quickly and from savings attributable to maximizing the waste handling and disposal efficiency at the WIPP.

To accomplish this, the Management Plan configuration targets waste at several sites for early disposal; thus the number of sites storing TRU waste will rapidly decrease. By the end of FY06, only five sites will continue to store TRU waste. Closing sites sooner reduces overall costs by reducing the time landlords and other required support activities would be required. These are generally fixed costs related to safe and secure waste storage. The 1995 *Baseline Environmental Management Report* (DOE, 1995d) presented two case studies in which environmental management activities accelerated site closure. For RFETS, accelerating site closure by 20 years led to an estimated savings of $2.4 billion, and at the K-25 facility at ORNL, accelerating closure by 30 years led to an estimated savings of approximately $2 billion. Closing smaller TRU waste sites would result in smaller, but still significant, savings.

Maximizing the waste handling and disposal efficiency of the WIPP results in lowering its life-cycle cost. The disposal costs at the WIPP are fixed for throughput rates from one to seventeen CH-TRU waste shipments or one to ten RH-TRU waste shipments per week. Also, most of the infrastructure cost that is required for safe operation does not vary with waste quantities within the same operational range. Therefore, as called for by the ten-year planning, the Management Plan configuration provides maximum benefit from WIPP expenditures by providing waste volumes from throughout the complex that match the waste handling capacity and achieve the maximum disposal utility at the WIPP.

4.3 Risk Reduction

The ten-year planning guidance defines risk reduction as the decrease in risk that occurs over the life of a project. The Management Plan configuration represents the greatest risk reduction by eliminating any potential hazards to the public, workers and the environment by means of permanently disposing of TRU waste in a deep underground repository. The Management Plan configuration also accelerates the removal of TRU waste from most sites, so that by the end of FY06, 94% of the population living near these sites will no longer be subject to the potential hazards of TRU waste formerly in storage. Much of the reduction comes from the early removal of waste from small quantity sites, which generally are located near large population centers. Therefore, early investment in waste management infrastructure capable of producing WIPP-ready TRU waste will result in significant risk reduction.

4.4 Budget Estimates

The strategic vision for the ten-year planning calls for managing TRU waste in an efficient and cost-effective manner in an era of stable budgets. This can be accomplished through the use of privatized facilities, innovative technologies, shared use of waste treatment facilities, and other means. The Management Plan configuration has employed some of these approaches to accelerate waste processing and disposal. Table 4-5 provides preliminary budget estimates to manage TRU waste at the sites from FY97 through FY06, as projected in the draft Ten-Year plans. The budget estimates complement the programs and projects called for by the Management Plan configuration; however, they do not, as yet, reflect those costs necessary to implement the Management Plan configuration over the 35-year disposal period. The next annual update to this Management Plan will provide the framework for developing subsequent budgets for TRU waste management that are based on realizing maximum benefit from centralized planning and coordinated resource allocation.

Table 4-5 Budget Estimates ($M) for TRU Waste from Draft Ten-Year Plans

Site/FY	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
ANL-E	1	1	1	1	1	1	1	1	1	1	10
Hanford	3	3	3	3	3	3	8	7	14	33	79
INEL	45	42	106	38	34	44	62	63	62	68	563
LANL	15	20	22	24	24	24	24	24	20	20	217
LLNL	4	5	4	3	3	2	2	2	2	2	29
Mound	1	3	1	2	2	2	2	1	2	0	16
NTS	3	2	0	0	0	0	0	0	0	0	5
ORNL	8	8	7	6	4	51	51	51	51	35	272
RFETS	1	10	16	9	8	5	3	4	2	2	60
SRS	19	18	18	16	14	15	17	11	13	25	166
WIPP	166	215	241	233	238	246	246	246	246	246	2,323
Total	267	327	419	334	331	393	415	411	412	432	3,739

4.5 Privatization Opportunities

The DOE has issued guidance for the development of waste management privatization projects for the Ten-Year Plans. The guidance addresses requirements and priority areas for considering privatization, budget scoring and cost effectiveness requirements, and project selection criteria (i.e., cost effectiveness, compliance agreement requirements, mortgage reduction, schedule acceleration). Consistent with this guidance and during the development of this Plan, several TRU waste management activities that are amenable to development and implementation by the private sector were identified: TRU waste processing at ORNL, waste treatment at INEL, mobile TRU waste processing systems, and TRU waste transportation services.

The ORNL is in the process of requesting proposals from the private sector for the processing of CH-TRU waste and RH-TRU debris waste, and for the solidification of RH-TRU waste sludges. If DOE determines this privatization initiative to be practical and cost-effective, ORNL will avoid the need to construct a one-time-use facility or refurbish existing facilities to process this waste. In addition, the inclusion of privatized facilities in the Management Plan configuration allows an acceleration in the TRU waste processing rates and in the initiation of waste shipments over previous planning. Privatized operations can be effected on a shorter schedule than comparable government operations.

The INEL plans to privatize the construction and operation of its Advanced Mixed Waste Treatment Facility. This facility will process TRU waste and low-level alpha waste (which becomes TRU waste after treatment). Privatization of the Advanced Mixed Waste Treatment Facility will produce WIPP-ready waste at significantly higher rates at a schedule commensurate with regulatory agreements, thus, risk reduction is enhanced over previous planning. Consequently, this privatized facility has become an instrumental component of the Management Plan configuration.

Private sector development of mobile TRU waste management systems would involve a fixed unit price contract(s) to provide and operate mobile equipment to characterize TRU waste. The selected vendor would be required to furnish all required personnel, equipment, and facilities to complete the needed waste management operations. Evaluations relative to the DOE-EM Ten-Year Plan privatization selection criteria are incomplete. The yearly update to the Management Plan configuration will include the results of this ongoing evaluation.

Privatizing all aspects of the transportation system also are being evaluated. These include the carrier contract; procurement of additional TRUPACT-IIs; the procurement of the RH-72B cask; and the design, fabrication, testing, licensing, and procurement of new packaging (i.e., the Halfpack). Additional privatization activities under consideration include maintenance on trucks, trailers, and packagings, as well as providing education programs and emergency response training. Evaluation of this privatization opportunity is incomplete, but will be evaluated in the yearly update to the Management Plan configuration.

5. Implementation of the Management Plan Configuration

Successful implementation of the Management Plan configuration requires a DOE-wide integrated effort dedicated to realizing the timely development and operation of waste management facilities at the sites and the achievement of efficient waste handling and disposal operations at the WIPP.

Successful implementation depends on

- **Acceptance of the Management Plan configuration by stakeholders.**
- **Maintaining compliance with consent orders and regulatory agreements throughout the DOE complex.**
- **Effectively utilizing available TRU waste management funds.**
- **Identifying and resolving programmatic and technical issues.**

The identification of immediate actions in the implementation process, as well as resolving programmatic and technical issues that may form impediments to execution are vital steps toward successful implementation of the Management Plan configuration.

5.1 Immediate Actions for Implementation

The Plan configuration can best be implemented by issuing this National TRU Waste Management Plan to the sites as a foundation for their final DOE-EM Ten-Year Plans. Initially, the Management Plan configuration must be disseminated by the DOE-EM as a directive to be implemented by the Field Offices. The relevant waste management elements and schedules of the Management Plan configuration should then be integrated into the site-specific DOE-EM Ten-Year Plans. On this basis, the sites can (1) determine whether additional unplanned facilities or modifications to planned or in-process facilities are necessary, (2) determine the extent to which budget estimates for facilities require adjustment, and (3) complete the budget process.

As a further validation step, the CAO also recommends that the sites compare the specific details of consent orders and regulatory agreements with the waste processing facilities and schedules of the Management Plan configuration. If this comparison finds that implementing the Plan configuration is at variance with regulatory agency expectations, discussions with the affected state agencies and the EPA, under the auspices of the National Governors' Association, should be undertaken.

Successful implementation of the Management Plan configuration also requires the CAO to execute, in an accelerated manner, its previously planned and ongoing TRU waste management efforts. The CAO will need to ensure that an appropriately sized shipping fleet will be available, and that emergency response and preparedness requirements are met to enable shipping corridors to be opened in a timely manner. The CAO will proceed with site certifications and audits on schedules established by the Management Plan configuration. Activities to ensure compliance with the waste handling and disposal capacities set forth in the Management Plan configuration will be undertaken and budgetary planning and funding requests will be modified accordingly.

Office of Environmental Management

- **Issues Plan as a directive to be implemented.**

Each Site

- **Integrates elements and schedules into Ten-Year Plan.**
- **Evaluates ability to achieve compliance.**

CAO

- **Accelerates waste management efforts.**
- **Resolves outstanding technical and programmatic issues.**

The CAO also intends to utilize the Plan as a management tool to reassess implementation of the Management Plan configuration elements, monitor progress, and focus resources. On a quarterly basis, progress against the milestones (i.e., programs and projects) identified in the Management Plan configuration will be assessed, the site-specific waste process logic will be re-evaluated, and the computer-based model will be modified, as necessary, and re-run. The results of the simulation will be analyzed and specific recommendations will be provided by CAO to the sites for implementation. The Plan will be updated coincident with DOE's annual program planning cycle.

5.2 Programmatic and Technical Issues

Implementing the Management Plan configuration requires resolution of outstanding programmatic and technical issues that, if unresolved, tend to impede TRU waste management progress. The CAO will direct its resources to enhance its ongoing support to the TRU waste management complex to ensure that these issues (discussed below) are resolved in a manner commensurate with the Management Plan configuration.

Many elements of the Management Plan configuration are relatively mature (e.g., characterization of CH-TRU waste) and the uncertainty associated with them is small. Other aspects, however, are relatively immature and have greater uncertainty. It is these issues that need to be recognized early in the implementation process and adequately addressed to maximize success.

5.2.1 Issues of Broad Implication

Increased funding in the near term will decrease costs associated with long-term storage of TRU waste.

The single most important programmatic issue having complex-wide consequence is the level of funding available for TRU waste management. Funding for environmental management is allocated to all environmental management programs consistent with contemporary priorities. Much of the TRU waste management budget is currently allocated to maintaining TRU waste in safe and secure storage. The Management Plan configuration proposes many and significant new activities and facilities, often with aggressive construction and operation schedules, to process TRU waste. Successful achievement of the Management Plan configuration will require an increase in TRU waste management funds above current levels for several years. The primary benefit of increased funding over the next several years is that many of the sites will be relieved of the financial burden of maintaining TRU waste in storage beyond FY06.

Delays may result in noncompliance with consent orders and agreements at many sites.

A second programmatic issue is the potential for delays in waste processing and disposal schedules. The Management Plan configuration is predicated on the initiation of CH-TRU waste disposal operations at the WIPP in November 1997 followed by initial receipt of RH-TRU waste in FY02. Efficient disposal operations, defined as the ability to receive up to 850 CH-TRU and 500 RH-TRU waste shipments annually, must be achieved by FY00 for CH-TRU and FY02 for RH-TRU. The risk of not realizing these disposal requirements has been minimized to date by ensuring that all regulatory, technical, and operational milestones established by the WIPP Disposal Decision Plan have been met.

The primary implication of a delay in the initiation of disposal operations or in achieving operational objectives is that some of the sites would no longer be in compliance with provisions of their FFCAct consent orders, unilateral orders, and regulatory agreements. Noncompliance would mean that orders and agreements may require renegotiation, DOE may be subject to financial penalties, and mixed TRU waste may require treatment to meet Land Disposal Restrictions prior to continued storage.

5.2.2 Issues Regarding TRU Waste

The Management Plan configuration requires innovative waste processing facility procurement strategies, the availability of facilities of appropriate size and processing technologies, and broad acceptance of as-yet-untried regulatory approaches. Key examples include privatized operations, mobile waste processing, reliance on the use of acceptable knowledge and statistical sampling, and "production-level" waste characterization and treatment facilities.

Privatizing Waste Management Operations Experience in the use of the private sector to characterize, treat, and package radioactive waste on a large scale is limited in the DOE complex. The private sector, however, offers the promise of financing large, capital-intensive projects by amortizing capital expenses over the life of the project. Such financial approaches provide DOE with enhanced flexibility to implement its waste management programs rather than using a standard government procurement process. The magnitude of planned privatization projects as contemplated by the Management Plan configuration for the Advanced Mixed Waste Treatment Facility at INEL and the facility for TRU waste processing at ORNL is unprecedented. Thus, there are considerable uncertainties, particularly regarding the extent to which facility construction, operation schedules, and waste processing rates required by the Management Plan configuration can be maintained.

Mobile Waste Characterization/Certification The use of mobile waste characterization/certification units promises to expedite TRU waste processing operations and has been factored into the Management Plan configuration accordingly. Evidence suggests that mobile characterization units will be less expensive than comparable fixed facilities, will require less time to field, and can be used at many sites over their operating life, thus allocating the cost over several applications. The use of mobile units on a broad scale is unprecedented and attendant with uncertainties related principally to administrative issues such as certification of equipment operating procedures; approval of facility safety analyses; compliance with relevant environment, safety, and health requirements; and identification and satisfaction of quality assurance and operating requirements.

Acceptable Knowledge TRU waste characterization requires a combination of acceptable knowledge, radioassay, real-time radiography, headspace gas sampling and analysis, visual examination, and core sampling and analysis. Developing and applying an acceptable knowledge approach to meet characterization requirements for newly generated waste and some existing waste streams will facilitate waste characterization and offer significant cost advantages to the TRU waste management program.

The Management Plan configuration relies on the regulatory assumption that sufficient quality records will be developed and maintained as newly generated TRU waste is produced and packaged. In addition, but on a more limited scale, characterization of select stored waste inventories also will be accomplished by demonstrating knowledge of the generation process and resulting waste stream.

Statistical Intrusive Characterization To satisfy TRU waste characterization regulatory requirements, the Management Plan configuration relies on a combination of non-intrusive examination (e.g., radioassay) of all waste containers and intrusive sampling (e.g., visual examination) of a representative sample of waste containers. Results from representative samples are used in conjunction with statistical analysis to demonstrate that the larger population of waste falls within acceptable limits of uncertainty with regard to its physical, chemical, and radiological makeup. The Management Plan configuration

takes this approach because intrusive characterization of all waste containers is not practical and tends to limit facility throughput rates. In addition, intrusive sampling results in higher costs due to the level of effort involved and the cost of facilities necessary to conduct such large-scale operations.

The CAO establishes TRU waste characterization requirements to be implemented by the sites based on its application to the State of New Mexico for a RCRA Part B Permit and its certification application to EPA to dispose of TRU waste. These regulatory agencies have not yet granted the necessary permits, determinations and certifications; thus, final characterization requirements remain uncertain. Though not expected, waste characterization requirements may change pending issuance of regulatory permits.

Waste Characterization and Treatment Rates

Implementation of the Management Plan configuration requires the sites to process, at "production-level" rates, waste that complies with the WIPP Waste Acceptance Criteria. CH-TRU waste is required to be certified at an average rate of more than 500 drum equivalents per week continuously for the nine years ending in FY06; nearly ten RH-TRU waste canisters must be certified every week continuously between FY02 and FY06. Certification of TRU waste at these rates has not been previously demonstrated in the DOE complex. Limited experience suggests, however, that certification rates of this magnitude are viable. CH-TRU waste treatment technologies and waste characterization techniques have been developed and continue to evolve, although RH-TRU waste characterization methods and, to a lesser extent treatment technologies, are yet to be developed.

5.2.3 Issues Regarding CH-TRU Waste

Successful implementation of the Management Plan configuration requires adherence to construction schedules, processing rates, and funding profiles.

The Management Plan configuration fundamentally relies on (1) the Advanced Mixed Waste Treatment Facility at INEL; (2) production-level facilities to characterize, repackage, and load waste at RFETS and LANL; and (3) initiation of waste processing at Hanford and SRS in FY98. These facilities and operational start-ups contribute more than 95% of all WIPP-ready waste up to mid-FY16, at which time the disposal capacity of the WIPP becomes available for disposal of waste from decontamination and decommissioning, and environmental restoration activities.

As noted previously, many facilities able to process TRU waste at the rates called for by the Management Plan configuration have not been constructed and may require more than a decade to become effective. CH-TRU waste shipping schedules identified in the Management Plan configuration lack flexibility up to mid-FY16, and operational start-ups require accelerated and expanded funding levels. Adherence to the construction schedules, shipping rates, and funding profiles must be maintained to facilitate the Department's ability to meet its regulatory agreements and to maximize the waste volume disposed in the WIPP.

5.2.4 Issues Regarding RH-TRU Waste

The RH-TRU waste elements of the Management Plan configuration rely on programmatic and technical methods and approaches that are not as developed as those of CH-TRU waste. Waste acceptance criteria for RH-TRU waste have not been finalized, and the corresponding Quality Assurance Program Plan supplement has not been published. The transport cask for waste disposal canisters has not been licensed by the Nuclear Regulatory Commission. Non-destructive assay and examination techniques, while successfully demonstrated in some cases, require additional development. Further, site-specific implementation of the programmatic criteria has not yet occurred and the design/procurement of RH-TRU waste characterization and packaging facilities has not begun. Although the uncertainties surrounding RH-TRU waste management operations are significant, lessons learned from similar CH-TRU waste activities, projects, and facilities will help overcome these deficiencies prior to the initiation of disposal operations in FY02.

Technologies must be developed and processing facilities constructed in order to meet the schedules identified in the Management Plan configuration.

Development and implementation of the appropriate technologies and processing facilities for RH-TRU waste to satisfy the schedules of the Management Plan configuration carry significant uncertainty. However, the use of commercial entities to construct and operate the necessary facilities is expected to increase flexibility and reduce associated uncertainties.

5.2.5 Issues Management

The CAO has instituted various initiatives to manage programmatic and technical issues under its direct purview. Projects and activities are in place that address mobile waste characterization, the use of acceptable knowledge and statistical sampling techniques, and others. Involving organizational units, such as the TRU Waste Steering Committee and the TRU Waste Executive Committee, are key components of CAO's overall approach to issues management. In addition, CAO supports the sites in the management of their specific issues by providing funding, integrating multi-site and similar TRU waste programs and projects, and providing information in support of budget requests. Further, CAO assists the DOE-EM in the management of broad issues by participating in the site treatment planning and overall budgetary processes.

Directing additional resources towards issues management promotes successful implementation.

5.3 Long-Term Implications

Beyond FY06, when much of the TRU waste in storage has been disposed, the DOE will refocus its resources to ensure that:

- the inventory of TRU waste remaining in storage has been characterized and disposed,
- characterization and disposal capacity exists for TRU waste as it is generated,
- facilities that no longer have significant roles are decontaminated and decommissioned, and
- contaminated lands have been isolated or restored as required.

For those sites that continue to process TRU waste over longer periods of time, the Department will continue to adhere to the Management Plan configuration.

Over the longer term, implementation of the Management Plan configuration will result in a viable complex-wide waste processing infrastructure. As TRU waste is retrieved and processed by the sites, facilities become available for other site programs or missions. In addition, in these outyears, the disposal capacity of the WIPP will be underutilized. TRU waste that comes into the waste management system via environmental restoration actions, decontamination and decommissioning of facilities, or other Departmental activities will be amenable to treatment and packaging for disposal. Thus, in the long term, DOE will be able to redirect its current TRU waste management resources to focus on activities that prepare additional TRU waste for disposal in the WIPP.

6. Conclusion

The Management Plan configuration represents a significant improvement over the independently developed waste management plans. Risk and mortgage reduction are accelerated, the WIPP waste handling and disposal capacities are more fully utilized, and the process that leads to compliance with consent orders and agreements is accelerated (Table 6-1).

Table 6-1 Configuration Comparison

	Management Plan Configuration	*FFCAct Compliance / WIPP Disposal Configuration*	*DOE-EM Draft Ten-Year Plans***
WIPP Waste Handling Utilization*	FY06 96%	FY06 65%	FY06 90%
Volume of Waste Disposed (CH- and RH-TRU)	FY06 46,505 m^3 FY33 109,030 m^3	FY06 22,076 m^3 FY33 91,404 m^3	FY06 42,803 m^3 FY33 -------
Population Exposed	94% reduction by FY06	10% reduction by FY06	4% reduction by FY06

*Waste handling utilization refers to shipment receipt, not volume.
**Percentages for Ten-Year Plan data are normalized to configuration storage and generation volumes.

Implementing the Management Plan configuration requires a greater initial financial investment to create a waste management system infrastructure capable of producing WIPP-ready TRU waste in meaningful quantities. This early investment accelerates disposal of CH-TRU waste such that waste is removed by the end of FY06 from most sites, and the populations around these sites would no longer be subject to potential hazards from TRU waste. This early investment also maximizes the waste handling and disposal efficiency of the WIPP.

VISION

An efficient, sustained, and cost-effective TRU waste disposal system supported by adequate funds and a commitment from the sites to support waste shipments.

Though the Management Plan configuration was designed to minimize programmatic issues, the most fundamental issue inherent to the recommended configuration is the need to secure funding necessary for implementation. This Management Plan configuration, when combined with adequate funds and commitment to waste processing schedules, will successfully fulfill the CAO vision of an integrated TRU waste management system that assures the efficient, sustained, and cost-effective disposal of TRU waste. It is the position of the CAO that, having invested approximately $1.8 billion since the early 1980s to construct and license the nation's designated permanent TRU waste disposal site, the only fiscally responsible action is to support TRU waste disposal projects as a priority across the complex commensurate with the guidance provided in this Plan. Therefore as part of the implementation process, ***the CAO recommends that site-specific budgets be developed in accordance with this National TRU Waste Management Plan configuration.***

7. REFERENCES

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