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**STRU 100  
PRECONCEPTUAL STUDY TO IDENTIFY SHORT-  
AND LONG-TERM STORAGE NEEDS FOR  
TRANSURANIC MIXED WASTE**

**FINAL**

September 27, 1994

Submitted in partial fulfillment of the  
requirement of the Federal Facility  
Compliance Agreement addressing hazardous  
and mixed waste under the Resource  
Conservation and Recovery Act

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## PREFACE

This *Preconceptual Study to Identify Short- and Long-Term Storage Needs for Transuranic Mixed Waste (TRU-MW) (STRU 100)* is being submitted to the United States Environmental Protection Agency (EPA) by the Department of Energy (DOE) and Los Alamos National Laboratory (LANL) in fulfillment of DOE's commitment to EPA under the Federal Facility Compliance Agreement (FFCA) developed pursuant to the Land Disposal Restrictions (LDR) requirements of the Resource Conservation and Recovery Act (RCRA), as promulgated in 40 CFR Part 268. This report is provided in compliance with Milestone STRU 100 in Appendix B of the FFCA.

The purpose of the preconceptual study is to identify storage needs for TRU-MW in order to maintain conformance with 40 CFR Part 264 Subpart I. This study describes the permit status for TRU-MW and considers the impacts of the transuranic (TRU) waste retrieval project on forecasted TRU and TRU-MW storage capacity needs. Future (forecasted) TRU-MW generation due to routine LANL operations is also evaluated and considered in estimating future storage capacity needs. This study also includes target dates for construction of new storage facilities.

The following table discusses the LDR FFCA milestones that relate to STRU 100 and the nature of those interrelationships.

<b>PRIMARY MILESTONE</b>	<b>RELATED MILESTONE</b>	<b>NATURE OF INTERRELATIONSHIP</b>
STRU 100	HW 300	The RCRA MW permit application reflects the requirements of the NMED Compliance Order for remediating TRU Pads 1, 2, and 4. These requirements will be incorporated into the preconceptual study for short and long-term storage of TRU-MW.
	TRU 100	Information developed for the preconceptual study will be used in the TRU Work-Off Plan.
	STRU 200	Measures implemented to maintain compliance with 40 CFR Part 264, Subpart I will be used to demonstrate compliance.

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## LIST OF ACRONYMS

ACIS	Automated Chemical Inventory Systems
AET	Applied Environmental Technologies
ALARA	As Low As Reasonably Achievable
ATLAS	Advanced Testing for Actinide Separations
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
BEJ	Best Engineering Judgment
BIF	Boiler and Industrial Furnace
CAI	Controlled Air Incinerator
CAMs	Continuous Air Monitors
CFC	Chlorinated Solvents
CFR	Code of Federal Regulations
CLS	Analytical Chemistry Group
CWM	Chemical Waste Management, Inc.
CWDR	Chemical Waste Disposal Request
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOT	Department of Transportation
DSSI	Diversified Scientific Services, Inc.
EPA	U.S. Environmental Protection Agency
ERC	Earth Resources Corporation
ES&H	Environmental Safety, And Health
FERC	Federal Energy Regulation Commission
FFCA	Federal Facility Compliance Agreement
FHA	Fire Hazard Analysis
FY	Fiscal Year
GCP	Gas Cylinder Project
GSA	General Services Administration
HEPA	High Efficiency Particulate Air Filter
HSWA	Hazardous and Solid Waste Amendments
HWFP	Hazardous Waste Facility Permit
HWTF	Hazardous Waste Treatment Facility
ICP	Inductively Coupled Plasma
IPC	Industrial Partnership Center
JCI	Johnson Control Incorporated
KOP	Knowledge of Process
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LAO	LANL Assessment Office
LDR	Land Disposal Restriction
LLMW	Low-Level Mixed Waste
LLW	Low-Level Radioactive Waste
LP	LANL Procedures
MSDS	Material Safety Data Sheets
MWRSF	Mixed Waste Receiving and Storage Facility
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMED	New Mexico Environmental Department
NPDES	National Pollutant Discharge Elimination System

**LIST OF ACRONYMS  
(Continued)**

NRC	Nuclear Regulatory Commission
PPAC	Pollution Prevention Awareness Campaign
PRD	Program Required Document
PTS	Project Tracking System
PWA	Process Waste Assessment
QA	Quality Assurance
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
R&M	Redistribution and Marketing Center
RES	Rollins Environmental Service
RMMA	Radioactive Material Management Area
RSWD	Radioactive Solid Waste Disposal Record
SOP	Standard Operating Procedures
SSP	Site Specific Plans
SWDA	Solid Waste Disposal Act
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedures
TRU	Transuranic
TSCA	Toxic Substance Control Act
TSDf	Treatment, Storage, or Disposal Facility
UBC	Uniform Building Code
UL	Underwriters Laboratories
ULISSES	Uranium Line for Special Separation Sciences
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure
WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WMPO	Waste Minimization Program Office
WPF	Waste Profile Form

**STRU 100**  
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**FOR TRANSURANIC MIXED WASTE**

## **1.0 INTRODUCTION**

This document is being submitted pursuant to the Federal Facility Compliance Agreement (FFCA) between the U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE), which was signed on March 15, 1994. As part of the agreement, Milestone STRU 100 requires Los Alamos National Laboratory (LANL) to prepare a preconceptual study that will identify short and long term storage needs for transuranic (TRU) mixed waste (TRU-MW) in order to ensure compliance with Resource Conservation and Recovery Act (RCRA) container storage requirements found in 40 CFR 264, Subpart I. This study forecasts the storage capacity needs for newly generated and retrieved legacy TRU and TRU-MW at LANL. These storage needs are based on LANL waste generation forecasts, TRU and TRU-MW retrieval estimates, and on storage capacity of the 4 existing container storage units and eight additional storage units planned for construction between now and fiscal year 2000.

This study is divided into six sections. Section 2.0 provides a brief historical description of TRU and TRU-MW generation and storage practices. Section 3.0 describes the RCRA permit and compliance order status of the TRU-MW container storage units at LANL. Section 4.0 describes the current and planned future storage capacities, and the anticipated waste generation. Section 5.0 provides the report conclusion with a comparison of anticipated storage needs and estimated storage capacities. The references used to produce this document are listed in section 6.0.

## **2.0 HISTORICAL BACKGROUND**

Between 1979 and 1991, LANL stored containers of solid TRU waste under earthen cover at Technical Area (TA) 54, Area G. This type of storage was practiced to comply with a DOE/AEC policy to retrievably store waste for up to twenty years, certify its radiological characteristics, and prepare it for permanent disposal at the Waste Isolation Pilot Plant (WIPP).

Knowledge of the waste-generating processes has indicated that a portion of the stored TRU waste may be mixed waste. Under both federal and state regulation, mixed waste is required to be stored pursuant to 40 CFR Part 265 /264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*, Subpart I, *Use and Management of Containers*. At LANL, compatible TRU and TRU-MW waste streams are collocated together and managed similarly.

Since 1991, solid TRU and TRU-MW have been stored at TA -54, Area G, on Pad 3 (TA-54 Building 48) and in the storage dome (TA-54 Building 153), and at TA-3 (Building SM-29) and TA-55 (Building PF-4). These container storage units are managed pursuant to 40 CFR Part 265, Subpart I and are included in a Part A permit application submitted to New Mexico Environment Department (NMED) on January 24, 1991. At TA-54, the TRU and TRU-MW containers are stored in membrane-covered frame structures (domes) on asphalt pads. Drums are stored on pallets, and the fiberglass-reinforced plastic-covered plywood (FRP) crates are fitted with skids to maintain the containers above the floor. In addition, the asphalt pads have surrounding berms to prevent run-on and run-off. The container storage units at TA-3 and TA-55 are located within permanent structures and are used to support research and nuclear material activities, and are not intended for long-term storage.

## **3.0 PERMIT STATUS**

In the 1991 RCRA Part A permit application to the NMED, LANL identified mixed waste container storage units in TA-3 (Building SM-29, storage vault), TA-55 (Building PF-4), and five units at TA-54 which are TA-54 Building 48 and 153, and Pads 1, 2, and 4. The container storage units identified as Pads 1, 2, and 4, store TRU and TRU-MW under earthen cover on asphalt pads. These pads were designed and constructed before TRU-MW became subject to RCRA regulation, and currently do not meet the requirements of 40 CFR Part 265/264, Subpart

I. Other TRU waste stored in pre-RCRA pits and shafts at TA-54, Area G and TA-21, Area T are not subject to RCRA Section 3004(a).

On January 28, 1993, NMED issued Compliance Order HMHWA 93-03. The order states that LANL failed to comply with Hazardous Waste Management Regulation (HWMR-6). In response to the Compliance Order, LANL initiated the TRU Waste Inspectable Storage Project (TWISP). The purpose of this project is to retrieve TRU-MW containers from Pads 1, 2, and 4, and place them into an inspectable storage configuration at TA-54 until the waste is accepted at WIPP. TRU Waste will also be removed as part of the project. All of the retrieved waste will be stored, managed, and inspected in accordance with 40 CFR Part 264, Subpart I, in compliance with the requirements of the Consent Agreement dated December 10, 1993.

On September 30, 1993, LANL submitted a RCRA Part B permit application in response to Compliance Order 93-03. This permit application provides for six storage domes to be constructed at Area G as part of the TWISP. By April 1995, LANL will submit another Part B permit application to address TA-54 Building 48 and 153. Additional Part B permit applications will be submitted in the future to address TA-3 and TA-55.

#### **4.0 CURRENT AND ANTICIPATED STORAGE CAPACITY**

At this time, both TA-54 Building 48 and 153 are at full capacity storing 680 m<sup>3</sup> and 710 m<sup>3</sup>, respectively, or a total of 1390 m<sup>3</sup> of TRU and TRU mixed waste. These two storage buildings are located within the larger Part A TRU-MW storage area. Plans are now being made to temporarily store waste on the pad, outside the dome at TA-54 Building 153 while construction of TA-54 Building 224 and 283 proceeds. The storage outside the building will not cause LANL to exceed the storage capacity of 3960 m<sup>3</sup> for the Part A storage area.

According to the Part A permit application, the container storage units at TA-3 and TA-55 have capacities of 82 m<sup>3</sup> and 136 m<sup>3</sup>, respectively. However, these units are not intended to store mixed waste for an extended period of time. The storage unit at TA-3 is for special use only in support of research activities. The operator at TA-55 intends to hold TRU materials temporarily until plutonium can be reprocessed and recovered from the waste. Currently, there are no plans to expand the storage areas at TA-3 and TA-55.

#### **4.1 Anticipated Waste Generation**

Projections of TRU and TRU-MW generation rates are available for Fiscal Year (FY) 94, and the next five years (LANL, 1994c). These projections were obtained from a survey of LANL TRU waste generators. For FY94, the amount of newly-generated TRU and TRU-MW is anticipated to be 210 m<sup>3</sup>. Between FY95 and FY2000, 1440 m<sup>3</sup> are anticipated to be generated, with 190 m<sup>3</sup> generated in FY95, and 250 m<sup>3</sup> generated annually from FY96 through FY2000.

In addition to newly-generated waste, approximately 5020 m<sup>3</sup> of TRU and TRU-mixed waste will be retrieved from Pads 1, 2, and 4 at Area G as part of the TWISP (LANL 1994). The TRU and TRU-MWs at Pads 1, 2, and 4 are the only legacy wastes scheduled to be retrieved for RCRA compliant inspectable storage at this time. Other TRU wastes stored in pre-RCRA pits and shafts at TA-54, Area G, and at TA-21, Area T are not subject to RCRA Section 3004 (a).

Long-term projections beyond FY2000 were not obtained in the generator survey. However, projections made in the DOE Integrated Database for 1992 indicate that the total volume of TRU waste to be generated by LANL through 2018 will be 3270 m<sup>3</sup> (DOE 1992). Combining the DOE Integrated Database estimates and the 1994 survey projections suggests that approximately 1350 m<sup>3</sup> of TRU waste may be generated from FY2001 through FY2018.

#### **4.2 Planned Storage Units**

Current design plans exist for construction of eight new storage domes at TA-54, Area G by FY2000. These domes will have the same structural design and operational capabilities as the storage domes currently in use at TA-54. Two of the eight domes are scheduled to be constructed and completed in FY95 (TA-54 Building 224 and

283) and will be used for storage of newly generated TRU and TRU-MW. The dome at TA-54 Building 224 will have an estimated design storage capacity of 260 m<sup>3</sup> and will be used for storing cemented sludges. Building 224 will also incorporate special containment using high-density polyethylene (HDPE). The other dome, TA-54 Building 283, will have a capacity of approximately 590 m<sup>3</sup>.

The remaining six domes are scheduled to be constructed in support of the TWISP. The six domes for TWISP will have a storage capacity equivalent to the retrieved waste, approximately 5,020 m<sup>3</sup>. The storage volume estimates for TWISP and TA-54 Buildings 224 and 283 are based on an aisle space of 3 feet.

## 5.0 CONCLUSION

Estimates of anticipated TRU and TRU-MW to be generated over the next 6 years, including retrieved legacy waste, are greater than the currently planned capacity available in FY2000. Table 1 compares the capacity of the planned additional storage units (TA-54 Building 224 and 283) with the anticipated generation rate for newly generated TRU and TRU-MW over the next 6 years. It is important to note that the projected need and planned capacity values do not include need and capacity associated with TWISP or with TA-54 Buildings 48 and 153. As explained in Section 4.0, TA-54 Buildings 48 and 153 currently are full. In addition, as explained in Section 4.1, the planned TWISP storage areas will be designed to meet the storage requirement of the retrieved waste from Pads 1, 2, and 4, and will not be available for other newly generated waste. Table 1 demonstrates that the currently planned additional storage capacity (850 m<sup>3</sup>) in FY2000 is less than the anticipated volume of newly-generated TRU and TRU-MW (1450 m<sup>3</sup>) by 41 percent. The values in Table 1 also reflect that there are no planned expansions to the storage facilities after FY95 for newly generated TRU and TRU-MWs.

New fire prevention standard's may reduce the storage capacity at TA-54 Building 48 and 153 due to the increase in the required aisle space width of 3 feet (instead of the 28 inches now used). Presently, the applicability of the new requirement is being evaluated to determine if the configuration will have to be changed. If so, the storage capacity inside these building will be reduced.

No provisions have been made for waste generated after FY2000, or for waste resulting from decommissioning projects, or environmental restoration activities. In addition, no schedule for off-site shipment of TRU waste to the WIPP has been established. Based upon current plans, WIPP may be available to receive waste from TRU waste generators and storage sites as early as FY98. However, no determination has been made as to when WIPP will be able to begin accepting LANL wastes.

**TABLE 1**  
**Storage Capacity Forecast for Newly Generated TRU and TRU-MW**

	FY95	FY96	FY97	FY98	FY99	FY00
Total Projected Need <sup>a</sup> (m <sup>3</sup> )	200 <sup>b</sup>	450	700	950	1200	1450
Total Planned Capacity <sup>c</sup> (m <sup>3</sup> )	850	850	850	850	850	850
Total Excess Capacity <sup>d</sup> (m <sup>3</sup> )	650	400	150	-100	-350	-600

<sup>a</sup>Projected Need includes newly-generated TRU and TRU-MW, and excludes waste generated by TWISP.

<sup>b</sup>This estimate includes the waste not yet generated for storage in FY94.

<sup>c</sup>This estimate reflects the total available storage capacity for each FY for TA-54 Building 224 and TA-54 Building 283 only.

<sup>d</sup>Total Excess Capacity is Total Projected Need less Total Planned Capacity.

## 6.0 REFERENCES

- 40 CFR Part 264, Subpart I. 1991. "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Use and Management of Containers." *Code of Federal Regulations*, Washington, D.C., Office of the National Archives and Records Administration.
- 40 CFR Part 265, Subpart I. 1991. "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Use and Management of Containers." *Code of Federal Regulations*, Washington, D.C., Office of the National Archives and Records Administration.
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- LANL. 1994c. *Volumes of TRU Waste Accepted at TA-54, Pad 3, Anticipated in FY 94-2000*. Telephone communication to Julie Minton-Hughes, Benchmark Environmental Corporation from Monika Kinker.