THE NATIONAL TRANSURANIC WASTE PROGRAM: PREPARING WASTE FOR DISPOSAL AT WIPP

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ABSTRACT

The National Transuranic Waste Program (NTWP) is the Department of Energy's (DOE's) program for managing all transuranic (TRU) waste under DOE's purview. Much of this waste is eligible for disposal at the Waste Isolation Pilot Plant (WIPP); a portion is not. The NTWP integrates TRU-waste system requirements so that all DOE TRU waste is effectively managed from generation to disposal, including characterization, treatment, and transportation. This paper addresses the major actions the NTWP is taking to help ensure the timely delivery of waste to the WIPP as it approaches opening in 1999.

INTRODUCTION

The DOE-owned TRU waste is currently stored at 10 major DOE sites and several small-quantity sites (SQSs); additional TRU waste will be generated during future operations and clean-up activities. Most of the waste is the result of nuclear weapons research, testing, and production, and is divided into two major categories: contact-handled (CH) and remote-handled (RH), depending on the external dose rate of the waste containers. TRU waste is also classified as being mixed or non-mixed. Mixed TRU waste contains hazardous materials regulated under the Resource Conservation and Recovery Act (RCRA). Examples of these hazardous materials are cleaning solvents and heavy metals. TRU waste that originated from defense sources and that meets the *Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (WIPP-WAC) is eligible for disposal at the Waste Isolation Pilot Plant (WIPP), a deep geological repository located in southeastern New Mexico constructed specifically for the disposal of TRU waste.

The DOE Carlsbad Area Office (CAO) manages both the NTWP and the WIPP. Three contractors support it: Westinghouse Waste Isolation Division, Sandia National Laboratories, and the CAO Technical Assistance Contractor (CTAC).

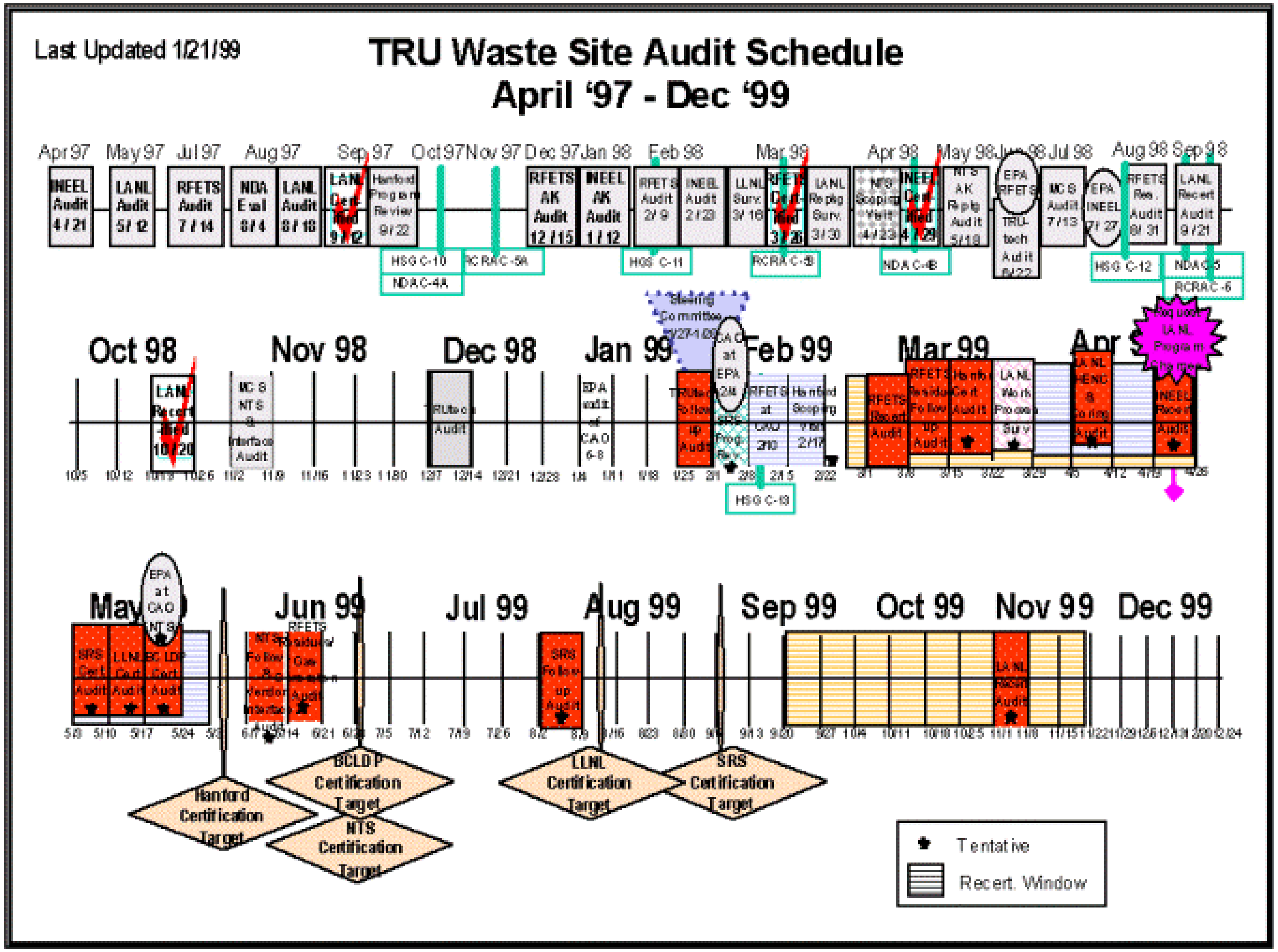
START-UP SCHEDULE

In May 1998 the U.S. Environmental Protection Agency (EPA) certified WIPP to receive TRU waste. Before the WIPP can receive hazardous (mixed) waste, it must have a RCRA permit, which is issued by the New Mexico Environment Department (NMED). The NMED issued a draft RCRA permit in May 1998 and a revised draft in November 1998, and is proceeding with the process that will lead to a decision on the final permit in the next few months. To optimize waste disposal until a permit is received, the NTWP has shifted its emphasis toward the early certification of non-mixed TRU waste at Los Alamos National Laboratory (LANL), the Rocky Flats Environmental Technology Site (RFETS), and Idaho National Engineering and

Environmental Laboratory (INEEL). Depending on the outcome of a WIPP lawsuit in the U.S. District Court in Washington, D.C., the DOE plans to open the WIPP for disposal of non-mixed transuranic waste in 1999. The court date has not yet been scheduled. The DOE is optimistic about a favorable outcome because of the recent sampling results from a Los Alamos National Laboratory (LANL) waste stream that the NMED has agreed is non-mixed.

By having a significant amount of non-mixed waste certified and ready for disposal, shipments of non-mixed waste can proceed until the WIPP RCRA Part B permit is approved.

At the end of 1998, three TRU waste sites have been certified by the CAO to ship their waste to the WIPP for disposal: LANL, RFETS, and INEEL. An aggressive audit schedule is being followed to enable the certification of other sites to begin shipping to the WIPP (see Audit Schedule, below.)


Last Updated 1/21/99
TRU Waste Site Audit Schedule
April '97 - Dec '99
INEEL Audit 4/21
LANL Audit 5/12
RFETS Audit 7/14
NDA Eval 8/4
LANL Audit 8/18
Hanford Program Review 9/22
RFETS AK Audit 12/15
INEEL AK Audit 1/12
RFETS Audit 2/9
INEEL Audit 2/23
LANL Surv. 3/16
LANL Repkg Surv. 3/30
NTS AK Repkg Audit 5/18
MCS Audit 7/13
RFETS Rec. Audit 8/31
LANL Recert Audit 9/21
HSG C-10
NDA C-4A
RCRA C-5A
HSG C-11
RCRA C-5B
NDA C-4B
HSG C-12
NDA C-5
RCRA C-6
HSG C-13
Oct 98
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Hanford Certification Target
BCLDP Certification Target
NTS Certification Target
LLNL Certification Target
SRS Certification Target
Tentative
Recert. Window

NATIONAL PLAN

The National Transuranic Waste Management Plan (1) recommends a TRU waste management configuration that integrates site-specific waste management planning with the waste-handling and disposal capabilities of WIPP. The plan provides an integrated TRU waste management system that complements and supports the Department of Energy-Environmental Management's (DOE-EM's) planning efforts. The performance goals of the plan are to:

- Provide for TRU-waste site compliance with site-specific commitments, agreements, and orders
- Accelerate reduction of risk and mortgage by coordinating programs among sites
- Maximize disposal of TRU waste by the end of fiscal year (FY) 06
- Maximize WIPP waste-handling and disposal efficiency

Disposal of CH-TRU waste will begin in FY99: disposal of RH-TRU waste will begin in FY02. Table I presents the current schedule for site certification and shipment of TRU waste. Table II presents the latest estimated volumes of TRU waste by category at the major TRU-waste sites and small-quantity sites.

TABLE I
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	TBD	TBD	TBD	n/a
Hanford	May 1999	October 1999	October 2001	January 2006
INEEL	February 1998	July 1998	October 1999	February 2007
LANL	September 1997	July 1998	1999	January 2002
LLNL	August 1999	October 2001	October 2001	n/a
Mound	TBD	TBD	TBD	n/a
NTS	June 1999	October 2001	October 2001	n/a
ORNL	March 2002	June 2002	October 2002	June 2003
RFETS	March 1998	July 1998	1999	n/a
SRS	September 1999	September 1998	October 2000	October 2003*
SQS	June 1999	TBD	October 2003	October 2003

Table based on Carlsbad Area Office FY2000-2006 Program Assumptions; August 27, 1998.
n/a - not applicable
*The RH shipments sent from SRS will be shipped to ORNL for processing, **not** directly to the WIPP.

TABLE II
TRU Waste Storage Locations and Pretreatment Volumes (in cubic meters)

Site	Location	Contact-handled TRU Waste		Remote-handled TRU Waste	
		Stored*	Projected through 2033‡	Stored*	Projected through 2033‡
Major Sites:					
Argonne National Laboratory-East (ANL-E)	Argonne, IL	152	120	<1.0	0
Hanford Reservation (HR)	Richland, WA	11,100	6,320	2.8	1690
Idaho National Engineering and Environmental Laboratory (INEEL)	Idaho Falls, ID	62,800	15,009	66	0
Lawrence Livermore National Laboratory (LLNL)	Livermore, CA	281	589	0	0
Los Alamos National Laboratory (LANL)	Los Alamos, NM	8,850	9,490	93	160
Mound Plant (MD)	Miamisburg, OH	240	6	0	0
Nevada Test Site (NTS)	Nevada	618	53	0	0
Oak Ridge National Laboratory (ORNL)	Oak Ridge, TN	906	180	1,259	100
Rocky Flats Environmental Technology Site (RFETS)	Golden, CO	1,504	8,650	0	0
Savannah River Site (SRS)	Aiken, SC	6,480	10.100	<1	21
Small-Quantity Sites:					
Ames Laboratory	Ames, IA	0	<1	0	0
ARCO Medical Products Company	West Chester, PA	<1	<1	0	0
Babcock & Wilcox - NES	Lynchburg, VA	20	0	0	0
Batelle Columbus Laboratories	Columbus, OH	0	0	0	50
Bettis Atomic Power Laboratory	West Mifflin, PA	0	123	0	3.3
Energy Technology Engineering Center	Santa Susana, CA	2.3	0	0	1
General Electric-Vallecitos Nuclear Center	Pleasanton, CA	6	3	8	5
Knolls Atomic Power Laboratory	Niskayuna, NY	3.14	0	0	<1

Lawrence Berkeley Laboratory	Berkeley, CA	<1	1.4	0	0
Paducah Gaseous Diffusion Plant	Paducah, KY	4.5	0	0	0
Sandia National Laboratories	Albuquerque, NM	5.4	44	<1	3
U.S. Army Material Command	Rock Island, IL	2.5	0	0	0
University of Missouri Research Reactor	Columbia, MO	<1	1	0	0
Total Waste Volumes§		**93,000**	**50,700**	**1,430**	**2,030**

Table taken from TRU Waste Inventory data reported for 1998
*Volumes prior to treatment and repackaging.
‡Projected volumes include estimates from environmental restoration, decontamination and decommissioning, and potential new Departmental missions; estimates will change based upon future compliance actions under environmental law.
§Totals reflect rounding of numbers.

AUTHORITY TO SHIP WASTE TO WIPP

Before a TRU-waste site begins shipping waste to WIPP, it receives waste certification authority and transportation authority from the CAO Manager after extensive reviews and audits verify that the site complies with all of WIPP's requirements. Each site is recertified annually.

Once the CAO is satisfied that a site has met all of the program requirements, the EPA conducts a certification audit. The EPA inspects the site QA program and waste certification processes that are relevant to repository performance. This process includes a 30-day public comment period. The EPA is interested in inspecting all of the processes used to characterize a particular waste stream at a particular site. The State of New Mexico is expected to institute something similar to the EPA certification process in the final RCRA permit.

TRU waste is certified by meeting the requirements of the WIPP-WAC (2) and its supporting documents, the *Transuranic Waste Characterization Quality Assurance Program Plan* (QAPP) (3) and the *Transuranic Waste Characterization Sampling and Analysis Methods Manual* (4). In order to ship TRU waste to the WIPP, sites also must meet the requirements of the *TRUPACT-II Authorized Methods for Payload Control* (TRAMPAC) (5), and site QA activities must conform to the *CAO Quality Assurance Program Document* (QAPD) (6). (The operative versions of some of these documents are available at the NTWP Home Page at http://www.wipp.carlsbad.nm.us.)

To assist the TRU-waste sites with their site certification programs, the CAO developed the *Generator Site Certification Guide* (7). This guide describes the actions to be taken by the CAO and the TRU-waste sites to ensure that all NTWP requirements are met before TRU waste is shipped to the WIPP. The guide contains references to those requirements documents that the TRU-waste sites must meet and against which they will be audited in order for the CAO to grant

authority to certify and transport waste to the WIPP. The following documents prepared by the TRU-waste sites are required for site certification:

- The *TRU Waste Certification Plan*, which documents how the site complies with each requirement of the WIPP-WAC

- The *Certification Quality Assurance Plan*, which documents how compliance with each quality requirement in the WIPP-WAC is assessed by the site; this plan may be separate or included in the site's Certification Plan

- The *Waste Characterization Quality Assurance Project Plan* (QAPjP), which explains in detail the procedures and methods that the site intends to use for waste characterization

- The *Site-Specific TRAMPAC*, which describes in detail how the site complies with Appendix 1.3.7 of the TRUPACT-II Safety Analysis Report for Packaging (SARP) as reflected in the WIPP-WAC

- The *Packaging Quality Assurance Plan*, which describes the site's QA program for TRU waste packaging

- The *Sampling Plan*, required by the QAPP, which supports the site's QAPjP and defines how waste containers are chosen for sampling on a waste stream basis.

LESSONS LEARNED

A series of certification audits have been performed at TRU-waste sites (LANL, INEEL, and RFETS). Lessons learned so far include:

- Early and regular contact between CAO and the sites is essential; site effort can be wasted if it is not closely aligned with CAO direction.

- Sites should consider submitting their certification documents to CAO early in their development for informal review. This will facilitate the formal review.

- During pre-audit activities, CAO will review site procedures to determine if all CAO requirements have been addressed. This is called an "adequacy review" or "flow-down analysis" and is very labor intensive. It is during this phase that "disconnects" between the site TRU program and the affected site operations groups are found. Sites (especially the larger ones) should expect and plan for extensive internal coordination among affected groups.

- Audits are delayed if, in CAO's judgment, the site is not ready and functioning. CAO requires a minimum of 30 days operational experience using revised procedures prior to conducting the audit.

TRU-WASTE SITE PARTICIPATION

The CAO and DOE Headquarters co-chair the TRU Waste Steering Committee, which is made up of representatives from all the major TRU-waste sites. The committee provides leadership, vision, and support in developing a strong, systematic approach to managing the NTWP and integrates each site program into one national program. It identifies issues, shares lessons learned, and presents the status of activities at each site. The committee meets three times a year and has monthly conference calls.

EM INTEGRATION OF TRU WASTE PROGRAMS

DOE has established a "corporate board" to plan, direct, facilitate, and evaluate program integration efforts across the DOE complex for EM programs. An Integration Executive Committee, composed of senior DOE managers, oversees the overall operations of the EM integration process, and twelve Program Area Integration Teams use an "integrated product management" approach to identify, evaluate, and (where appropriate) implement integration recommendations. Two Program Area Integration Teams have been formed to address TRU waste: TRU Storage and Treatment (Lori Fritz ID, Team Leader) and TRU Transportation and Disposal (Butch Stroud CAO, Team Leader).

ACCEPTANCE OF NON-MIXED WASTE IS A NEAR-TERM PRIORITY

As the expected opening date for WIPP draws near, it has become evident that the *WIPP RCRA Part B Permit* (8) may not be approved by the State of New Mexico before WIPP opens. Consequently, NTWP has shifted its emphasis toward the early certification of non-mixed TRU waste at the three lead sites. If a significant amount of non-mixed waste is certified and ready for disposal, it can be shipped immediately upon WIPP's opening. Final certification and disposal of mixed TRU waste will be deferred until the *WIPP RCRA Part B Permit* is approved.

DEFENSE WASTE: TRACING THE ORIGIN OF RADIOACTIVE WASTE

Interim guidance has been developed and distributed to assist the TRU-waste sites in establishing and demonstrating through "acceptable knowledge" (AK) documentation that only TRU waste generated by atomic energy defense activities is certified for disposal at the WIPP (9). It contains specific guidance on documenting the sources of waste streams to ensure that they were generated by defense activities and to ensure that they meet the definition of transuranic waste and are not high-level waste or spent nuclear fuel. The bases for this guidance include legislative requirements and the U.S. DOE General Counsel's interpretation of defense waste as it applies to the WIPP.

WASTE NOT ELIGIBLE FOR WIPP: THE COMPREHENSIVE DISPOSAL RECOMMENDATION

The laws that apply to WIPP require that the waste disposed there be TRU waste that was generated by defense activities. There are, however, TRU wastes that were generated under commercial or civilian programs and non-defense programs or that don't meet the technical definition of TRU waste; they are not currently eligible for disposal at WIPP. Many of these wastes exist at TRU-waste sites and their volumes and characteristics are collected in response to the TRU waste data calls. No disposal system has yet been planned for such wastes; however, NTWP continues to keep track of these wastes and will recommend strategies for their management and disposal. Their final disposition will be addressed in the Comprehensive Disposal Recommendation, a report which is in preparation.

WASTE INVENTORY: THE BASELINE INVENTORY REPORT

The *Transuranic Waste Baseline Inventory Report* (10) summarizes the DOE TRU waste inventory, projections, and characteristics. The report provided the data used in the performance assessment calculations that support the CCA. It includes the total DOE TRU waste inventory including non-defense, commercial and buried TRU waste. The latest revision was issued in June 1996.

MOBILE WASTE CHARACTERIZATION: A GIANT STEP FORWARD IN PRODUCTIVITY

The NTWP investigated current mobile technologies that can be used to characterize and certify TRU waste. Small-quantity sites without facilities need mobile systems, which can be quickly set up at TRU-waste sites, to meet characterization and handling requirements; larger sites need mobile systems while permanent facilities are being constructed or augmented. Two mobile systems vendor teams, MCS and TRUtech, were elected through a competitive solicitation process, were deployed, and are mobilized at the Nevada Test Site, where they are undergoing the CAO approval process. The MCS Team has successfully completed this approval process and a letter of approval has been prepared. The TRUtech Team is nearing completion of the approval process and is expected to receive their letter of approval early this year.

PLUTONIUM RESIDUES: PARTNERSHIP WITH THE TRU-WASTE SITES

More than 120 metric tons of plutonium residues have been identified as potential TRU waste to be disposed of at WIPP. Residues are plutonium-bearing solids with plutonium concentrations below 50 weight percent. Ninety-five percent of these residues are stored at Hanford, LANL, RFETS, and Savannah River Site (SRS). Due to recent congressional actions, only residues with plutonium concentrations less than 20 weight percent may be shipped to the WIPP once they have been declared "waste" and removed from safeguards accountability.

In 1992, the CAO began working with RFETS on the Residues Efficiencies Working Group to evaluate options for safe, cost-effective disposal of residues at the WIPP if they are declared

waste. The group developed the pipe overpack container concept, which has been tested and approved for use in the TRUPACT-II by the U. S. Nuclear Regulatory Commission (NRC). The leak-tight pipe container and spacer is placed inside of the TRUPACT-II containment vessel, providing geometry control for criticality concerns, shielding, and immobilization of high-activity residues in the pipe.

TRANSPORTATION CORRIDOR STRATEGY

The NTWP continues to determine the best possible routes to transport waste to the WIPP. Last year's modification to the routing scheme reduced any potential exposure risk to approximately four million people. This modification removed about 1,400 road miles and will save the DOE about $54 million over the life of the WIPP. The DOE continues to optimize the transportation corridors: the results are an important feature of the National Transuranic Waste Management Plan.

CONCLUSION

As WIPP prepares to open in 1999, the NTWP is poised to begin shipping TRU waste immediately from the three major TRU waste sites: INEEL, LANL, and RFETS. Initially, non-mixed TRU waste will be accepted until WIPP's RCRA permit is issued, allowing mixed waste to be accepted. The NTWP is ensuring that additional sites are slated for full certification in FY99–02, followed by RH-TRU waste certification and, in time, a Comprehensive Disposal Recommendation for all TRU waste in the federal inventory.

REFERENCES

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2. U. S. DEPARTMENT OF ENERGY, "Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WAC)," DOE/WIPP-069, Waste Isolation Pilot Plant (December 1996).

3. U. S. DEPARTMENT OF ENERGY, "Transuranic (TRU) Waste Characterization Quality Assurance Program Plan (QAPP)," CAO-94-1010, Revision 1, Carlsbad Area Office (December 1998).

4. U. S. DEPARTMENT OF ENERGY, "Transuranic Waste Characterization Sampling and Analysis Methods Manual," DOE/WIPP-91-043, Revision 2, Carlsbad Area Office (November 1997).

5. U. S. NUCLEAR REGULATORY COMMISSION, "TRUPACT-II Safety Analysis Report for Packaging (SARP)," Appendix 1.3.7 TRUPACT-II Authorized Methods For Payload Control (TRAMPAC), NRC Docket No. 71-9218, Office of Regulatory Procedures (1998).

6. U. S. DEPARTMENT OF ENERGY, “Quality Assurance Program Document (QAPD),” CAO-94-1012, Revision 2, Carlsbad Area Office (December 1998).

7. U. S. DEPARTMENT OF ENERGY, “Generator Site Certification Guide,” DOE/CAO-95-2119, Revision 1, Carlsbad Area Office (August 1997).

8. NEW MEXICO ENVIRONMENT DEPARTMENT. "Waste Isolation Pilot Plant Hazardous Waste Permit," (Draft). NM4890139088-TSDF, Santa Fe, NM (November 1998).

9. U. S. DEPARTMENT OF ENERGY, "Carlsbad Area Office Interim Guidance on Ensuring that Waste Qualifies for Disposal at the Waste Isolation Pilot Plant," CAO:NTWP:MRB 97-0238 UFC 5822, Carlsbad Area Office (February 1997).

10. U. S. DEPARTMENT OF ENERGY, “Transuranic Waste Baseline Inventory Report,” DOE/CAO-95-1121, Revision 3, Carlsbad Area Office (June 1996). (Note that the values that appear in Table 1 are taken from the TRU Waste Inventory Data reported for 1998.)