

**THE NATIONAL TRANSURANIC WASTE PROGRAM:
PROVIDING SOLUTIONS FOR THE MANAGEMENT OF ALL TRANSURANIC
WASTE**

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ABSTRACT

The mission of the Carlsbad Area Office (CAO) is to support the protection of human health and the environment by opening and operating the Waste Isolation Pilot Plant (WIPP) for the safe disposal of transuranic (TRU) waste and by establishing an effective system for management of TRU waste from its generation to disposal. The CAO develops and directs implementation of the TRU waste program, assesses site compliance with program requirements, and helps ensure the commonality of activities and assumptions among the TRU waste sites.

A number of major events have occurred in the past year that further the accomplishment of the Department's goals to dispose of TRU/TRU-mixed waste and clean up sites for their return to the private sector. They include:

- The opening of the WIPP on March 26, 1999 with the delivery of waste from Los Alamos National Laboratory
- The issuance of the recommendations of the Waste Characterization Task Force in August 1999
- The formation of a complex-wide team in September 1999 to make recommendations for Re-engineering the Pipeline to WIPP
- The issuance of the Hazardous Waste Facility Permit for WIPP on October 27, 1999

This paper addresses these and other major actions being taken to help ensure the timely and efficient characterization and removal of TRU waste from the weapons sites.

INTRODUCTION

U.S. Department of Energy (DOE) TRU waste is currently stored at 10 major DOE sites and a potentially large number of small-quantity sites; additional TRU waste will be generated at these sites during future operations and from clean-up activities. Most of the waste is the result of nuclear weapons production, testing, and research 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) (1) is eligible for disposal at the WIPP, a deep geological repository located in southeastern New Mexico constructed specifically for the disposal of TRU and TRU-mixed waste.

The DOE CAO manages both the National TRU Waste Program (NTWP) and the WIPP facility. Three contractor organizations provide primary support to these programs: Westinghouse Waste Isolation Division (WID), Sandia National Laboratories, and the CAO Technical Assistance Contractor.

WIPP IS OPEN AND OPERATING

On the evening of March 25, 1999, a truck loaded with non-mixed TRU waste rolled out of the gates of the Los Alamos National Laboratory (LANL) on its way to the WIPP: it arrived at 4:00 a.m. on March 26. Shortly after noon the waste was placed underground, thus beginning the 35-year operating life of the world's first geologic repository for the disposal of TRU waste.

Seventeen shipments have been received to date from LANL, four from the Idaho Engineering and Environmental Laboratory (INEEL), and 23 from the Rocky Flats Environmental Technology Site (RFETS). On November 26 the Hazardous Waste Facility Permit became effective and all shipments to the WIPP were halted by the CAO until the waste certification programs at the TRU waste sites are audited and certified to be compliant with the requirements of the permit. The CAO plans to begin receiving *mixed* TRU waste early in 2000 starting with debris waste from RFETS.

WASTE CHARACTERIZATION TASK FORCE RECOMMENDATIONS

The Transuranic Waste Characterization Task Force was formed in May 1998 by the CAO to focus on increasing the efficiency, effectiveness, and regulatory confidence of characterization operations while reducing costs. The task force was composed of representatives from the TRU waste sites who were familiar with waste characterization requirements and procedures; representatives from the CAO waste characterization program; and representatives familiar with transportation, legal, and regulatory requirements.

The task force was chartered to address the following major tasks:

- Investigate current regulatory bases of the waste characterization requirements and waste acceptance criteria for TRU waste
- Identify the system-scale problems that need to be solved in order to increase efficiency of the total waste characterization system
- Identify innovative technologies that can potentially improve waste characterization processes
- Prepare and make recommendations in report format to the CAO on the identified modifications to the waste characterization requirements and new technology developments that may lead to more cost-effective characterization practices.

The report, *Findings and Recommendations of the Waste Characterization Task Force (2)*, was submitted to the CAO Program Manager in August 1999. It summarizes the findings of the task force and contains 40 recommendations on ways to streamline the waste characterization program. Two subgroup reports were also prepared:

- The **Cost Modeling Subgroup** developed an internal report containing a survey of the costs for characterization activities at three TRU waste sites that were used to develop a waste characterization cost model used by the task force to estimate costs associated with modification to the characterization program.
- The **Requirements Mapping Subgroup** conducted a detailed mapping of each waste characterization requirement contained in the *Transuranic Waste Characterization Quality Assurance Program Plan* (QAPP) and the WIPP WAC to its underlying legal, regulatory, technical, or safety basis. Eighteen of the task force recommendations were based on the results of this requirement mapping.

The Waste Characterization Task Force recommendations are under active consideration by the CAO and by the team that has been formed to focus on the characterization and certification aspects of Re-engineering the Pipeline to WIPP.

NAS/NRC Board on Radioactive Waste Management

The WIPP TRU Subcommittee is engaged in a three-month study to review, evaluate, and make recommendations on (i) future geotechnical research activities to improve understanding of the capability of WIPP to isolate radioactivity from the environment and (ii) technical options to safely streamline the system of characterizing, treating, and transporting TRU waste from DOE storage sites to the WIPP repository. An interim report is expected this spring.

Activities of the subcommittee can be tracked at:

<http://www4.nationalacademies.org/cp.nsf/44e62dffa1918a852565550058c1a1/ecf7cfb6f4f703708525680b000b17f5?OpenDocument>

RE-ENGINEERING THE PIPELINE TO WIPP

In September 1999, the CAO and DOE headquarters launched a major initiative to assess and modify as necessary the TRU waste *system* to accommodate its multitude of needs and requirements. In launching this effort, CAO Manager Dr. Inés Triay and Mark Frei, who had been the Headquarters WIPP lead for many years, wrote, "... the time has come to re-examine how we are doing business and to take a holistic, system-wide view to re-engineer the TRU waste program....[T]o accomplish these objectives, a multi-disciplinary, multi-site team will be formed that reports to the CAO Manager. Clearly this effort, for it to be truly successful, depends on the full cooperation from all sites and an attitude/mentality that we can--working together-- find ways to streamline and improve today's program at each and every site." This multi-site effort, known as "re-engineering the pipeline," has been fueled by congressional interest. In an August 4, 1999 letter to Energy Secretary Bill Richardson, U.S. Senator Pete Domenici advised, "...it is critical that the facility be effectively utilized to its capacity to accept waste."

The Re-engineering the Pipeline initiative has been chartered to help develop and maintain a production process capable of characterizing, certifying, loading, shipping, unloading, and disposing of 30,000 drums of TRU waste per year. The specifics are to be defined in a revised National TRU Waste Management Plan that is integrated with firm commitments; better aligned with environment, health, and safety requirements; and more cost effective.

The recommendations made under the re-engineering initiative can be viewed at:

<http://www.wipp.carlsbad.nm.us/mozart/>

The full set of recommendations are scheduled to be presented at the TRU Waste Steering Committee meeting that will be held in Carlsbad in mid-May. The Re-engineering the Pipeline initiative will have completed its work at that time and will be disbanded.

ISSUANCE OF THE HAZARDOUS WASTE FACILITY PERMIT FOR WIPP

On October 27, 1999, the Secretary of the New Mexico Environment Department (NMED) signed the final order granting a Hazardous Waste Facility Permit (HWFP) to the DOE and WID for the Waste Isolation Pilot Plant; US EPA No. NM 4890139088 (3). The WIPP HWFP conforms to the NMED Proposed Final Permit of June 25, 1999, with an amendment to Permit Condition IV.B.2.b as set forth in the final order. The permit became effective on November 27, 1999. WIPP will now only receive mixed and non-mixed TRU waste that has been characterized in accordance with the HWFP Waste Analysis Plan and the other authorization documents discussed in the next section. The WIPP HWFP and related regulatory documents are available at the NMED download site at <http://www.nmenv.state.nm.us/wipp/download.html>

CHANGES TO THE WIPP REQUIREMENTS DOCUMENTS

As of November 26, 1999, the effective date of the HWFP for WIPP, the WIPP authorization documents for TRU waste sites consist of the following:

- *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-069, **Revision 7**
- *Quality Assurance Program Document (QAPD)*, CAO-94-1012, **Revision 3** (4)
- *Hazardous Waste Facility Permit Issued to the Waste Isolation Pilot Plant*; US EPA No. 4890139088 and associated modifications and clarifications
- *Safety Analysis Report for the TRUPACT-II Shipping Package*, Appendix 1.3.7 (TRAMPAC), **Revision 17** (5)

The first three of these documents can be accessed at the following site:

<http://www.wipp.carlsbad.nm.us/rcradox/menu.htm>

The TRAMPAC is available at:

http://www.wipp.carlsbad.nm.us/library/t2sar/tiisar/01/1_3_7.pdf

With the recent issuance of the HWFP by the NMED, it was decided to cancel the QAPP and have the TRU waste sites work directly with the Waste Analysis Plan (WAP) of the permit.

Because the WIPP is presently not permitted by NMED to dispose of RH-TRU waste, this latest revision of the WIPP WAC covers CH-TRU waste only. An RH-WAP and associated RH-WAC addressing this type of waste are being prepared by the CAO and will be issued as separate documents. In addition, a companion document to this CH-WAC is also being prepared to provide guidance to the sites about how to demonstrate compliance.

Major changes to the WIPP WAC include the following:

- All references to RH-TRU waste acceptance criteria for transportation and disposal have been deleted; hence, all waste acceptance criteria addressed in this document are specific to CH-TRU waste.
- The WIPP WAC has been modified, as necessary, to reflect the language contained in the WIPP final HWFP issued by the NMED.
- Transuranic Package Transporter Model II (TRUPACT-II) requirements are summarized as transportation safety requirements. These requirements have been updated to align with changes in the Safety Analysis Report for the TRUPACT-II Shipping Package (TRUPACT-II SARP), revision 17.
- A new subsection entitled "Radionuclide Composition" has been added to the Radiological Properties section. "Thermal Power Criteria" has been deleted from the Radiological Properties section, and the 10 kW per acre repository limit has been consolidated into the Decay Heat subsections.
- The use of alternative shipping category notation for payload container transport has been incorporated. A method for mixing payload containers of different shipping categories within a single TRUPACT-II has been incorporated. Refer to section 3.6.1.
- A new appendix to address the requirements for radioassay has been added.
- The Waste Stream Profile Form and the instructions for its completion have been removed. Refer to the WAP in the final HWFP for a copy of the form.
- PE-Ci limits for 55-gallon drums overpacked in a standard waste box or a ten-drum overpack have been lowered to 1,100 PE-Ci.

Changes in QAPD Revision 3 were limited to those necessary to achieve full compliance with the WAP in the WIPP HWFP and to incorporate certain TRU waste QA requirements contained in the QAPP, which has been cancelled.

The CAO no longer routinely distributes paper copies of the authorization documents; rather, it posts them on the WIPP home page at the following Internet address:

<http://www.wipp.carlsbad.nm.us/library/opdocs/opdocs.htm>

The letter notifying the TRU waste sites of the CAO's plans for implementation of the WAP may be reviewed at <http://www.wipp.carlsbad.nm.us/rcradox/final/memorandum.pdf>.

DOE Order 435.1

In July 1999, DOE Order 435.1, *Radioactive Waste Management* (6), was issued, replacing DOE Order 5820.2A for the management of DOE high-level waste, transuranic waste, low-level waste, and the radioactive component of mixed waste. This order was issued to help ensure that all DOE elements and contractors continue to manage DOE's radioactive waste in a manner that protects workers, public health, and the environment. DOE Order 435.1 can be accessed at the following Web site:

http://www.explorer.doe.gov:1776/cgi-bin/w3vdkhgw?qryYJBZQi_9_;doe-452

CAO Support to TRU Waste Sites

With the last element of WIPP regulatory framework firmly established with the issuance of the HWFP, the CAO sent teams of technical and quality assurance staff to RFETS and Hanford from September through November to assist them with revising their certification documents (QAPjP, waste certification plan, TRAMPAC, etc.) and procedures so that they could establish compliance with the HWFP as soon as possible and begin shipping TRU mixed waste at an early date.

During the same period, technical and QA staff at the CAO and TRU waste sites were identifying provisions of the permit that were unnecessarily conservative or that added limited to no value to the information known about the waste that was useful for its management. These areas were raised and discussed daily with the sites and were dispositioned in the following ways:

- Clarifications: Many requirements in the permit are confusing and contradictory. In addition, a number of the requirements force the sites to perform expensive characterization activities that do not enhance safety to the workers, public, or the environment. CAO, in conjunction with the sites, has developed a number of permit clarifications and modifications to enable the sites to more cost effectively and efficiently characterize and certify waste for disposal.
- Class 1 modifications to the permit were identified and issued: such modifications are considered minor and can be implemented quickly.
- Class 2 modifications to the permit were identified and issued: such modifications are substantive and require about four months to put in place.

A Web site has been established which contains the final clarifications and the permit modifications that have been sent to NMED for action. It can be accessed at

<http://torreon/rcradox/menu.htm>

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 Environmental Protection Agency (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 has instituted a similar certification process in the effective RCRA permit.

TRU waste is certified by meeting the requirements of the WIPP WAC (1) and its supporting documents. In order to ship TRU waste to the WIPP, sites also must meet the requirements of the TRAMPAC (5). Site QA activities must conform to the CAO QAPD (4). The operative versions of these documents are available at the WIPP home page at

<http://www.wipp.carlsbad.nm.us/library/opdocs/opdocs.htm>

To assist the TRU waste sites with their site certification programs, the CAO developed the *Carlsbad Area Office Guide for Site Certification* (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:

- A waste certification plan, which documents how the site complies with each requirement of the WIPP WAC
- A 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
- A quality assurance project plan (QAPjP), which explains in detail the procedures and methods that the site intends to use for waste characterization
- A 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
- A packaging quality assurance plan, which describes the site's QA program for TRU waste packaging

NATIONAL PLAN

The National Transuranic Waste Management Plan (8) is scheduled to be updated and issued this spring. It describes 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 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 began 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	Corridor Open	First CH-TRU Waste Shipment	First RH-TRU Waste Shipment
ANL-E	October 2003	October 2003	N/A
Hanford	January 2000	May 2000	September 2006
INEEL	Open	April 1999	February 2007
LANL	Open	March 1999	January 2002
LLNL	September 2004	October 2004	N/A
Mound	October 2003	October 2003	N/A
NTS	October 2001	November 2001	N/A
ORNL	December 2002	October 2004	January 2003
RFETS	Open	June 1999	N/A
SRS	Open	September 2000	October 2003**
SQS	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*

Site	Location	Total Waste Volumes (m ³)	
		Contact-Handled TRU Waste	Remote-Handled TRU Waste
Major Sites:			
Argonne National Laboratory-East (ANL-E)	Argonne, IL	150	0
Hanford Reservation (HR)	Richland, WA	16,070	2,808
Idaho National Engineering and Environmental Laboratory (INEEL)	Idaho Falls, ID	37,967	228
Lawrence Livermore National Laboratory (LLNL)	Livermore, CA	971	0
Los Alamos National Laboratory (LANL)	Los Alamos, NM	14,025	443
Mound Plant (MD)	Miamisburg, OH	247	0
Nevada Test Site (NTS)	Nevada	670	0
Oak Ridge National Laboratory (ORNL)	Oak Ridge, TN	534	572
Rocky Flats Environmental Technology Site (RFETS)	Golden, CO	14,817	0
Savannah River Site (SRS)	Aiken, SC	19,872	20 (1)
Small-Quantity Sites:			
Ames Laboratory	Ames, IA	<1	0
ARCO Medical Products Company	West Chester, PA	<1	0
Babcock & Wilcox - NES	Lynchburg, VA	20	0
Battelle Columbus Laboratories	Columbus, OH	0	31
Bettis Atomic Power Laboratory	West Mifflin, PA	407	4.5
Energy Technology Engineering Center	Santa Susana, CA	2.3	19.6
General Electric-Vallecitos Nuclear Center	Pleasanton, CA	9	13
Knolls Atomic Power Laboratory	Niskayuna, NY	7.4	<1
Lawrence Berkeley Laboratory	Berkeley, CA	0	0
Paducah Gaseous Diffusion Plant	Paducah, KY	(2)	0
Sandia National Laboratories	Albuquerque, NM	14.8	0
U.S. Army Material Command	Rock Island, IL	2.5	0
University of Missouri Research Reactor	Columbia, MO	1	0
Total Waste Volumes (rounded)		105,800	4120

Table derived from the Analysis and Visualization System

*All volumes are prior to treatment and repackaging

(1) Approximately 20 m³ to be shipped to ORNL for processing

The *National TRU Waste Management Plan* was last issued in December 1997 and can be accessed at the following site: <http://www.wipp.carlsbad.nm.us/library/ntpmp/MPFront.pdf>

WASTE NOT ELIGIBLE FOR WIPP

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 that 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, the NTWP continues to keep track of these wastes and will recommend strategies for their management and disposal.

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 members communicate continually, meet three times a year, and have monthly conference calls.

REFERENCES

1. U. S. DEPARTMENT OF ENERGY, "Waste Acceptance Criteria for the Waste Isolation Pilot Plant," DOE/WIPP-069, Revision 7, (November 1999).
2. U.S. DEPARTMENT OF ENERGY, "Findings and Recommendations of the Transuranic Waste Characterization Task Force," Final Report (August 1999).
3. NEW MEXICO ENVIRONMENT DEPARTMENT, "Hazardous Waste Facility Permit Issued to the Waste Isolation Pilot Plant." EPA No. NM4890139088 (October 1999).
4. U. S. DEPARTMENT OF ENERGY, "Quality Assurance Program Document," CAO-94-1012, Revision 3, Carlsbad Area Office (November 1999).
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), Revision 17 (January 1999).
6. U. S. DEPARTMENT OF ENERGY, DOE Order 435.1 "Radioactive Waste Management," (July 1999).

WM'00 Conference, February 27-March 2, 2000, Tucson, AZ

7. U. S. DEPARTMENT OF ENERGY, "Carlsbad Area Office Guide for Site Certification," DOE/CAO-Draft-3128, Revision 0, Carlsbad Area Office (in press).

8. U. S. DEPARTMENT OF ENERGY, "The National Transuranic Waste Management Plan," DOE/NTWP-96-1204, Revision 1, Carlsbad Area Office (December 1997).