

CONF-960804--15

**Title:**

GETTING WASTE READY FOR SHIPMENT TO THE WIPP:  
INTEGRATION OF CHARACTERIZATION AND CERTIFICATION  
ACTIVITIES

RECEIVED  
MAY 05 1996  
OSTI

**Author(s):**

B. Sinkule, K. Knudsen, P. Rogers

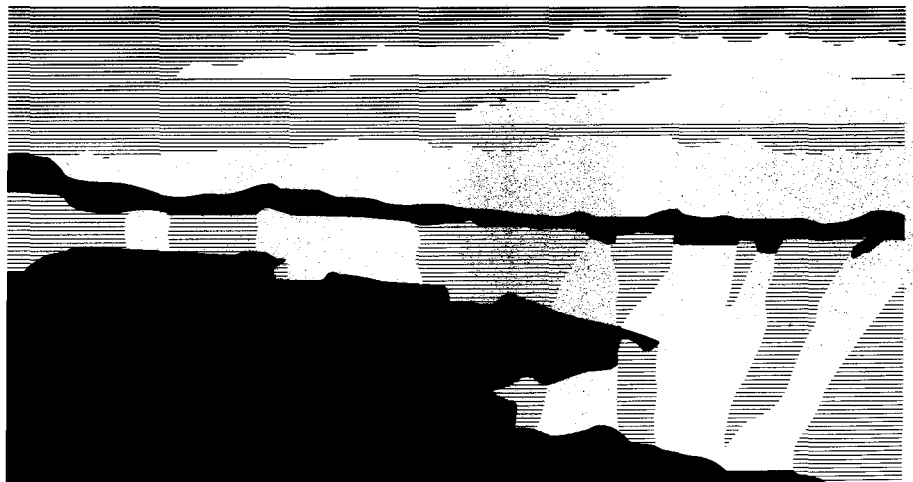
**Submitted to:**

American Nuclear Soc./SPECTRUM '96,  
Seattle, WA, August 1996

**DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**MASTER**



**Los Alamos**  
NATIONAL LABORATORY

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. The Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy.

**DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED**

Form No. 836 R5  
ST 2629 10/91

**DISCLAIMER**

**Portions of this document may be illegible  
in electronic image products. Images are  
produced from the best available original  
document.**

# GETTING WASTE READY FOR SHIPMENT TO THE WIPP: INTEGRATION OF CHARACTERIZATION AND CERTIFICATION ACTIVITIES

Barbara Sinkule  
Los Alamos National Laboratory  
P.O. Box 1663, MS E516  
Los Alamos, New Mexico 87545  
(505)665-7004

Karen Knudtsen  
Benchmark Environmental Corp.  
4501 Indian School Road N.E., Suite 105  
Albuquerque, New Mexico 87110  
(505)262-2694

Pamela Rogers  
Los Alamos National Laboratory  
P.O. Box 1663, MS E516  
Los Alamos, New Mexico 87545  
(505)667-1765

D. Yeaman, J. Harper, E. Derr, S. Bodenstein, and D. Taggart, all from Los Alamos National Laboratory

## ABSTRACT

The Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) serve as the primary directive for assuring the safe handling, transportation, and disposal of transuranic (TRU) waste generated at Department of Energy (DOE) sites. The WIPP WAC address fulfillment of WIPP's operational safety and performance assessment criteria, compliance with Resource Conservation and Recovery Act (RCRA) requirements, and preparation of waste packages that meet all transportation criteria. At individual generator sites, preparation of transuranic waste (including TRU mixed waste) for final disposal at WIPP includes characterizing the waste to meet the requirements of the Transuranic Waste Characterization Quality Assurance Program Plan (QAPP) and certifying waste containers to the WIPP WAC and the *Transuranic Package Transporter-II Authorized Methods for Payload Control* (TRAMPAC) (NRC 1994). This paper compares the quality assurance and quality control requirements specified in the WIPP WAC, QAPP, and TRAMPAC and discusses the potential to consolidate activities to comply with the TRU waste characterization and certification program requirements. Quality assurance requirements necessary to comply with the WIPP WAC are discussed, and examples are provided of integrating waste characterization techniques with waste certification requirements in order to optimize waste management operations. Examples include integration of program elements such as records management, document control, and audits and assessments at Los Alamos National Laboratory. "Lessons learned" through building an integrated TRU waste characterization and certification program at Los Alamos National Laboratory are discussed.

## INTRODUCTION

Prior to issuance of the *Transuranic Waste Characterization Quality Assurance Program Plan* (QAPP) in 1995 (DOE 1995), meeting WIPP WAC requirements (DOE 1996) was measured mainly by compliance with site-specific certification plans and relied primarily on process knowledge to determine whether waste containers met the criteria. In contrast, the QAPP is based on characterization through nondestructive testing, including radiography and radioassay, and chemical sampling and analysis for homogeneous waste forms. The QAPP establishes the performance-based requirements for TRU waste characterization to meet the data quality objectives (DQOs) associated with WIPP compliance programs, including the RCRA general waste analysis requirements under 40 CFR 264.13, the RCRA land disposal restrictions under 40 CFR 268.6 and the performance assessment under 40 CFR Parts 191 and 194.

The Waste Isolation Pilot Plant (WIPP) waste acceptance criteria (WAC) serve as the primary directive for assuring the safe handling, transportation, and disposal of TRU waste generated at DOE sites. The WIPP WAC address fulfillment of WIPP's operational safety and performance assessment criteria, compliance with Resource Conservation and Recovery Act (RCRA) requirements, and preparation of waste packages that meet all transportation criteria. The WIPP WAC defines technical requirements that waste packages and waste streams must meet prior to acceptance for disposal at the WIPP and summarizes the transportation requirements for shipping transuranic waste. The WIPP WAC not only defines requirements; it also mandates how the requirements must be met. This involves complying with the requirements spelled out in the *Transuranic Waste Characterization Quality Assurance Program Plan* (DOE 1995) and the *Transuranic Package Transporter-II Authorized Methods for Payload Control*.

To comply with the WIPP WAC, QAPP, and TRAMPAC, individual generator sites (e.g., Los Alamos National Laboratory) prepare site-specific documents. These are: a transuranic waste certification plan, a transuranic waste characterization quality assurance project plan (QAPjP), and a site-specific TRAMPAC document. The relationships between these documents are illustrated in Figure 1. Each generator site must also prepare a quality assurance plan (or plans) that document its quality assurance program(s). Quality affecting processes must be documented and controlled using procedures that meet the quality assurance requirements of the *Quality Assurance Program Description* (QAPD) (DOE 1994) and some additional quality assurance requirements that are found in the QAPP. Quality requirements of the TRAMPAC include those specified in 10 CFR§71, Subpart H.

## EVOLUTION OF TRU WASTE DISPOSAL REQUIREMENTS

Construction of the WIPP was authorized by Public Law 94-187 in 1976. Originally conceived as a "pilot plant" to test and evaluate deep geological disposal of transuranic waste, WIPP has evolved to become the main disposal destination for the Department of Energy's (DOE's) defense-related TRU waste. The regulatory environment in which the WIPP must operate has also undergone considerable change. The responsibility for setting standards for protecting the environment from releases of radioactive materials from nuclear waste repositories was assigned to the U.S. Environmental Protection Agency (EPA). Because WIPP is the first facility of its kind, the standards that EPA developed were largely WIPP-specific. The Land Withdrawal Act of 1992 permanently transferred jurisdiction over the withdrawal area of WIPP to DOE and formally identified EPA Office of Radiation and Indoor Air (ORIA) as responsible for certifying compliance of WIPP with disposal standards under 40 CFR 191 and 194.

In addition to regulations intended specifically for the WIPP, other regulatory changes took place during the 1980's and nineties. Of particular signifi-

cance to the WIPP were the Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA) enacted in 1984. The HSWA established a regulatory program that prohibits land disposal of hazardous waste unless the waste meets or has been treated to meet Land Disposal Restrictions (LDR) standards. The RCRA/HSWA provided EPA Office of Solid Waste (OSW) and the New Mexico Environment Department (NMED) full regulatory authority at WIPP. The only exception allowed is for EPA to determine that meeting LDR is not required to protect human health and the environment. This process requires that a No-Migration Variance Petition (NMVP) be submitted by a particular facility to EPA/ORIA. The DOE is seeking a no-migration variance for the disposal phase at WIPP. The roles of the EPA and state regulatory agencies over enforcing compliance with environmental regulations were strengthened by the Federal Facilities Compliance Act of 1992.

Whereas in 1976 the WIPP was an experimental facility operating within the self-regulating environment of DOE with some federal regulations designed specifically for the WIPP, in 1996 the WIPP is now a radioactive and hazardous waste disposal facility that must meet federal and state regulatory requirements and respond to a host of outside regulators and stakeholders. In order to satisfy regulatory requirements, the WIPP must prepare and sub-

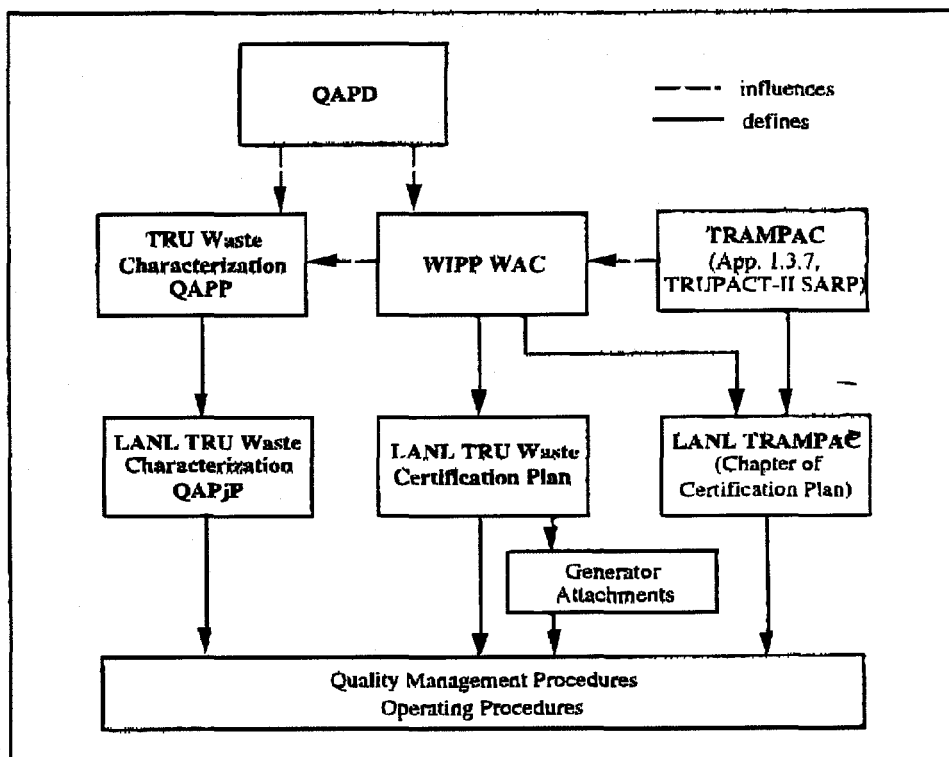


Fig. 1. LANL Waste Characterization, Certification, and Transportation Document Hierarchy

mit many documents, including a RCRA permit application (to the NMED), an NMVP (EPA/OSW), and a certification package (EPA/ORIA). Satisfying these and other requirements has not only affected the WIPP facility, but has had dramatic—and costly—impacts on the DOE generator sites that intend to dispose of waste at the WIPP. The changes in requirements for generators are reflected in the WIPP WAC and associated characterization, certification, transportation, and quality assurance requirements.

#### CHARACTERIZATION, CERTIFICATION, AND TRANSPORTATION REQUIREMENTS

The WIPP WAC consolidates and summarizes requirements and criteria that must be met for TRU waste transport to and disposal at the WIPP facility. The WIPP WAC references the controlling documents, such as the TRUPACT-II Certificate of Compliance, RCRA waste analysis plan, and QAPP, for detailed information regarding compliance.

The DOE facilities managing nuclear materials must establish and implement a quality assurance program in accordance with 10 CFR§830.120. In addition, each site planning to sent TRU waste to the WIPP is also responsible for developing and implementing site-specific plans and associated quality assurance programs and procedures that address all activities pertaining to TRU waste characterization, certification, and transportation. Each program element addressed by the WIPP WAC specifies quality assurance requirements for conducting compliance activities and obtaining the required information and data. The required site-specific documents are a TRU Waste Certification Plan, a TRUPACT-II Authorized Methods for Payload Control (TRAMPAC), and a TRU Waste Characterization Quality Assurance Project Plan. These plans, which may be one document or separate documents addressing each subject, must be reviewed and approved by the DOE Carlsbad Area Office (CAO). After approval of these plans, the CAO will perform audits of the sites to assess the implementation of, and compliance with, the approved plans. Based upon acceptable results of the audits, the CAO will grant TRU waste certification authority and transportation authority to the generator site. The criteria and requirements are organized under five major headings: physical properties, nuclear properties, chemical properties, flammable gas generation, and data package. Under each heading, sites must address all requirements for WIPP operational and safety, transportation, and environmental compliance. To demonstrate compliance with each criterion, sites will use a combination of administrative controls (e.g., acceptable knowledge), nondestructive techniques (e.g., radiography), and destructive techniques (e.g., sampling and chemical analysis).

#### LANL SITE-SPECIFIC DEVELOPMENT AND IMPLEMENTATION

The Los Alamos National Laboratory is the third largest generator of TRU waste in the DOE complex. The Laboratory currently generates approximately 200 m<sup>3</sup> of TRU waste per year. While LANL continues to generate transuranic waste, called newly generated transuranic waste, the existing inventory of retrievably stored waste of over 10,000 m<sup>3</sup> presents the largest burden for characterization and certification work off and transportation to the WIPP. Not only does retrievably stored waste represent the largest portion of inventory; the characterization processes for these wastes are also more involved and costly. For example, the QAPP requires sampling and analysis of retrievably-stored homogeneous waste streams on a statistical basis, whereas newly generated waste only requires sampling once per year or once per batch.

The Los Alamos National Laboratory has developed a TRU waste characterization and certification program to obtain data necessary to support WIPP compliance activities as well as to ensure the readiness of a certifiable inventory of waste for shipment to the WIPP beginning in 1998. In addition, the State of New Mexico has issued a compliance order to the DOE and the University of California (the current Maintenance and Operations contractor for operations at LANL) that establishes a schedule for the retrieval of TRU mixed waste currently in earthen-covered storage and a Federal Facilities Compliance Order that specifies a schedule for the treatment of TRU mixed waste.

A challenge at LANL, like at all DOE TRU waste generator and storage sites, is to ensure compliance with the increasing TRU waste management requirements with decreasing DOE funding. To meet this challenge, LANL has developed and implemented efficient programs to address all WIPP WAC and LANL TRU waste management requirements. The first step involved consolidating waste characterization and waste certification roles and responsibilities, re-evaluating existing procedures to consolidate overlapping operations, and centralizing program reporting and oversight functions. All required operations were assessed and the cost of program implementation evaluated to identify additional program needs and establish plans for their development.

This process was initiated when program documents, including the QAPP, Sampling Plan, Certification Plan, and TRAMPAC were still under development. Decisions were made early on to follow the same format for all of these documents, to adopt the same quality management procedures, and to combine the Certification Plan and TRAMPAC in order to take advantage of utilizing one

quality assurance plan and reduce repetition of overlapping WIPP WAC requirements.

After review of site-specific controlling documents for consistency, opportunities to consolidate procedures were identified. The TRU waste characterization, certification, and transportation programs were streamlined by consolidating related criteria where possible prior to development of implementing procedures. Through this process, the procedure for each assay or analytical technique could address all applicable requirements, thereby reducing duplication of effort both in performing the technique and in managing associated records. For example, radiography may be used to verify the waste matrix code as specified in the QAPP, to verify the TRUCON code and payload controls as specified in the TRAMPAC, and to verify WIPP operational and safety criteria, such as the absence of free liquids and compressed gases established by the WIPP Safety Analysis Report. The time and cost associated with compliance can be decreased by preparing procedures and training staff to operate the radiography equipment to verify and document all applicable criteria. Radiography can also be used to obtain waste information in support of other aspects of the TRU waste characterization and certification program, such as radioassay measurements and waste sampling. By coordinating various waste characterization activities, the Los Alamos National Laboratory is able to more effectively meet program requirements.

In addition to assessing and streamlining the administrative, technical and quality assurance components of characterization and certification, efficiencies related to the configuration of the LANL's transuranic waste inventory were also sought. The existing TRU waste inventory database was evaluated to define waste streams and decrease the required number of samples by minimizing waste stream variability and maximizing waste stream populations where possible. By compiling acceptable knowledge information, waste retrieval and statistical sampling procedures for visual examination and solidified waste sampling were established that included contingencies for the rejection of wastes requiring additional processing or treatment. In addition, the schedules for sampling and analysis were established to ensure the maximum number of samples per batch, which resulted in a decrease in the number of quality control samples required.

## CONCLUSIONS

While substantial progress has been made in getting waste ready for shipment to the WIPP, much remains to be done. Revising the generator attachments to meet the requirements of WIPP WAC Revision 5 will be phased in during 1996 and 1997. Meeting Revision 5 requirements

presents challenges in assessing and changing processes, and additional expenses for generators within the Laboratory that continue to generate transuranic waste. Generators and waste management personnel are working together to develop streamlined programs for newly generated and retrievably stored transuranic waste. For example, integrating databases and adopting common procedures where practical are being explored. The Laboratory is also developing an electronic tracking system for waste, samples, and data to reduce costs associated with records management, data validation, and reporting.

The requirements for getting waste to WIPP are numerous and complex due to the variety of regulatory entities involved and their differing needs. Consolidating and/or reducing the number and complexity of these requirements certainly deserves attention. The Los Alamos experience thus far shows that it is possible to work within the existing requirements, and sharing between sites and with Carlsbad will help the entire program to evolve in a direction that considers both regulatory needs and cost efficiency.

The implementation of the Los Alamos National Laboratory's TRU waste characterization and certification program currently supports the characterization of several waste streams of homogeneous solids representing several hundred drums of TRU waste stored in domes at the Laboratory, the implementation of a newly-generated waste characterization and certification program, and the initiation of earthen-covered waste retrieval operations. The data from this program will be used to support WIPP compliance documents, and evaluation of these data will also determine to what extent they can also be used to represent TRU waste stored at other DOE sites. If current plans are fully funded, the Los Alamos National Laboratory will be ready to ship 4000 to 7000 drums of TRU waste to the WIPP facility in 1998.

## REFERENCES

40 CFR 191, "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes." *Code of Federal Regulations*, Washington, D.C., Office of the Federal Register National Archives and Records Administration.

40 CFR 194, "Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance With the 40 CFR Part 191 Disposal Regulations." *Code of Federal Regulations*, Washington, D.C., Office of the Federal Register National Archives and Records Administration.

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities." *Code of Federal Regulations*, Washington, D.C., Office of the Federal Register National Archives and Records Administration.

40 CFR 268, "Land Disposal Restrictions." *Code of Federal Regulations*, Washington, D.C., Office of the Federal Register National Archives and Records Administration.

DOE. 1994. *Quality Assurance Program Description*. CAO-94-1012. Carlsbad, New Mexico, U.S. Department of Energy, Carlsbad Area Office.

DOE. 1995. *Transuranic Waste Characterization Quality Assurance Program Plan*. CAO-94-1010, Revision 0, Carlsbad, New Mexico, U.S. Department of Energy, Carlsbad Area Office.

DOE. 1996. *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, Revision 5. WIPP-DOE-069. Carlsbad, New Mexico, U.S. Department of Energy, Carlsbad Area Office.

LANL. 1995a. *Los Alamos National Laboratory Transuranic Waste Characterization Quality Assurance Project Plan*. CSTDO-PLAN-002, R.O. Los Alamos, New Mexico, Los Alamos National Laboratory.

LANL. 1995b. *Los Alamos National Laboratory Transuranic Waste Characterization Sampling Plan*. CSTDO-PLAN-003, R.O. Los Alamos, New Mexico, Los Alamos National Laboratory.

NRC. 1994. *Transuranic Package Transporter-II Authorized Methods for Payload Control (TRAMPAC)*, Appendix 1.3.7 of the *Safety Analysis Report for the TRUPACT-II Shipping Package*. Docket 9218, Washington, D.C., U.S. Nuclear Regulatory Commission.