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**Title:** WIPP WAC REV. 5 Applicability

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### ABSTRACT

The Department of Energy (DOE) is preparing for disposal operations at the Waste Isolation Pilot Plant (WIPP) in 1998. WIPP is a deep geological repository designed for the safe and efficient disposal of transuranic (TRU) wastes. The Waste Acceptance Criteria (WAC) for WIPP were initially developed by a DOE steering committee in 1980. Revision 5 reflects the latest negotiations and permit requirements from the Environmental Protection Agency (EPA), the State of New Mexico Environment Department (NMED), and the Nuclear Regulatory Commission (NRC). The regulatory requirements are combined with the requirements derived from the WIPP safety analysis performed for disposal operations and the original criteria established for safe waste handling operations.

The WIPP WAC provides a comprehensive overview of the requirements and basis for developing waste acceptance criteria to meet today's rules and regulations for transportation and disposal of TRU wastes. The authors believe that it is a comprehensive criteria and a guidance manual for generator/storage sites who must characterize and certify TRU waste for disposal at WIPP. It also provides valuable insight to future projects that may develop their own waste acceptance criteria.

The WIPP WAC presents the requirements from the following sources:

- 1) Resource Conservation and Recovery Act (RCRA) Permit Application
- 2) Land Disposal No-migration Variance Petition
- 3) 40 CFR 191 Draft Compliance Certification Application
- 4) Certificate of Compliance (C of C) from the NRC for a Type B shipping container
- 5) Federal Land Withdrawal Act for WIPP

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- 6) WIPP Safety Analysis Report
- 7) WIPP System Design Descriptions (SDDs)

The WIPP WAC combines operations and nuclear safety requirements with transportation and hazardous waste regulatory requirements to provide a comprehensive set of criteria and requirements that ensure the safe disposal of TRU waste.

## INTRODUCTION

In 1978 and 1979, the WAC for the Waste Isolation Pilot Plant were initially developed by a U.S. Department of Energy Steering Committee. The WAC Steering Committee generated a May 1980 report, DOE/WIPP-069, titled "Report of the Steering Committee on TRU Waste Acceptance Criteria for the Waste Isolation Pilot Plant." The purpose of the original WAC was to provide performance requirements to ensure public health and safety as well as the safe handling of TRU waste at WIPP.

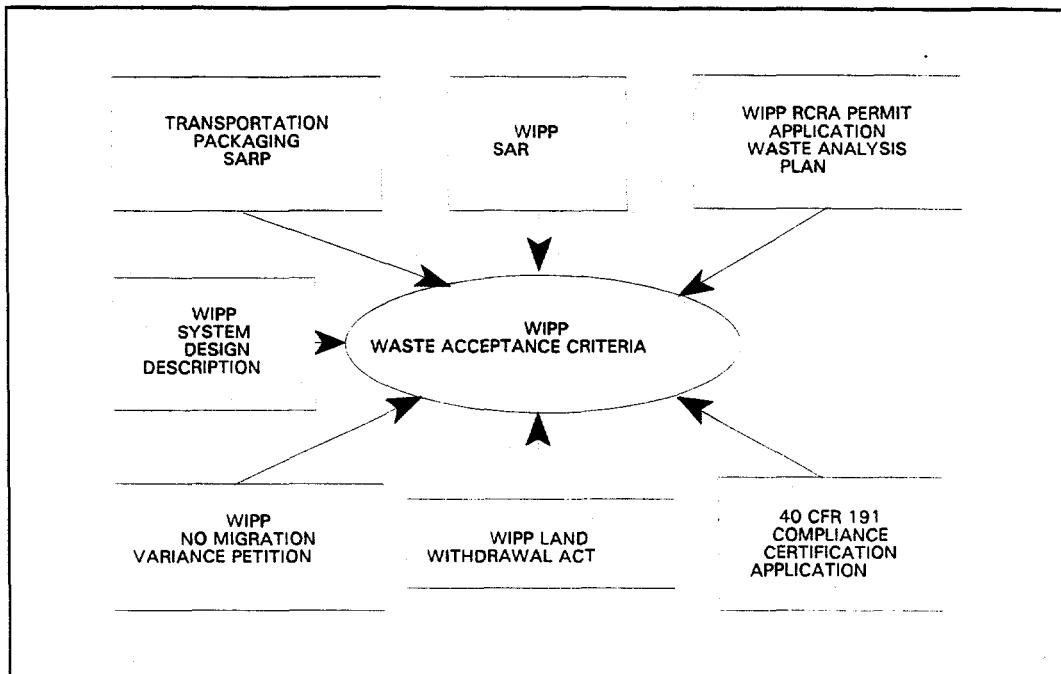
A series of revisions consistent with the intent of the original DOE/WIPP-069 were subsequently published to incorporate the results of ongoing project activities and the comments and suggestions from others. Revision 1, September 1981, reflects consultations between the Environmental Evaluation Group (EEG) and the Albuquerque Operations Office WIPP Project. Revision 2, September 1985, reflected continued interactions with the EEG and other TRU program participants. Revision 3, January 1989, incorporated other requirements such as those in the Resource Conservation and Recovery Act (RCRA) and the TRansUranic PACkage Transporter-II (TRUPACT-II) Certificate of Compliance (C of C) from the U.S. Nuclear Regulatory Commission (NRC). Revision 4, December 1991, added specific requirements for the Test Phase. Revision 5 of the WAC reflects the organizational restructuring of the DOE, deletes the Test Phase requirements and updates other requirements instituted since the issuance of Rev. 4.

## DOCUMENT LAYOUT

WAC Rev 5 defines current criteria and requirements for characterization, certification and acceptance of TRU and TRU mixed waste at the WIPP. The derivation of the criteria defined in this WAC is shown in Figure 1.

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## DERIVATION OF WAC CRITERIA

FIGURE 1

As depicted by figure 1 the WAC now has its basis or justification in a new set of documents that were not previously published. Because the WAC criteria can now be referenced to WIPP-specific requirements documents the justification section of each criterion was deleted from the current revision.

The criteria and associated requirements needed to ensure safety and compliance are listed in Table 1 "TRU Waste Acceptance Criteria Summary". The "CRITERIA" column lists the individual criterion addressed in the WAC and the "REQUIREMENTS" columns list the limits or controls applied to each criterion.

### TRU WASTE Acceptance Criteria Summary

CRITERIA	CH <sup>(1)</sup> REQUIREMENTS	RH <sup>(2)</sup> REQUIREMENTS
Container Description	DOT <sup>(3)</sup> Type A 55-gal Drum or SWB <sup>(4)</sup>	DOT Type A Canister
Container Weight	≤ 1000lbs/Drum ≤ 4000lbs/SWB	≤ 8000 lbs

CRITERIA	CH <sup>(1)</sup> REQUIREMENTS	RH <sup>(2)</sup> REQUIREMENTS
Surface Contamination	≤ 20 dpm/100cm <sup>2</sup> alpha, & ≤ 200 dpm/100cm <sup>2</sup> beta, gamma	Same as CH
Container Marking	Bar Code, & Shipping Category	Canister ID
Dunnage	Empty Drums or SWBs	Empty Drums
Filter Vents	Payload Containers Vented	Canister Vented
Liquids	No Liquid Wastes < 1% residual liquids	Same as CH
Nuclear Criticality (Pu-239 FGE <sup>(5)</sup> )	< 200 g/55-gal Drum < 325 g/SWB < 325/TRUPACT-II	< 325 g/Cask
Pu-239 Equiv. Activity (PE-Ci <sup>(6)</sup> )	≤ 80 PE-Ci/55-gal Drum or ≤ 130 PE-Ci/ SWB	≤ 1000 PE-Ci/Canister
Contact Dose Rate	≤ 200mrem/hr	≤ 1000 rem/hr
Thermal Power	< 40 Watts/TRUPACT-II	300 Watts/Canister
TRU Alpha Activity	> 100nCi/g	Same as CH
Pyrophoric Materials	< 1% Radionuclides & No Non-radionuclides	Same as CH
Mixed Waste	Characterized per QAPP <sup>(7)</sup>	Same as CH
Chemical Compatibility	Chemicals must be allowable per CH TRAMPAC <sup>(8)</sup>	Same as CH
Hazardous Constituents	Limited to those in RCRA Part A Permit	Same as CH
Explosives, Corrosives, & Compressed Gases	No Compressed Gases, & No Ignitable, Reactive or Corrosive wastes	Same as CH
PCB <sup>(9)</sup> Concentration	< 50 ppm	Same as CH
Decay Heat	≤ Wattages in CH TRUCON Tables	≤ Wattages in RH TRAMPAC <sup>(10)</sup>
Flammable VOCs <sup>(11)</sup>	≤ 500 ppm in Payload Container Headspace	≤ 500 ppm in Canister Headspace
VOC Concentrations	Limits on Five VOCs	Same as CH
Aspiration	Per CH TRUCON <sup>(12)</sup> Tables	None Currently Identified
Shipping Category	Per CH TRUCON Tables, & one category per TRUPACT-II	None Currently Identified

CRITERIA	CH <sup>(1)</sup> REQUIREMENTS	RH <sup>(2)</sup> REQUIREMENTS
Confinement Layers	Per CH TRAMPAC & CH TRUCON	None Currently Identified
Acceptance Data	WWIS <sup>(13)</sup> & Certification Statement	Same as CH
RCRA Data	Waste Stream Profile Form, Uniform Hazardous Waste Manifest & LDR notification	Same as CH
Shipping Data	Payload Certification	Same as CH

Notes:

- 1. CH - Contact Handled
- 2. RH - Remote Handled
- 3. DOT - Department of Transportation
- 4. SWB - Standard Waste Box
- 5. FGE - Fissile Gram Equivalent
- 6. PE-Ci - Plutonium Equivalent Curies
- 7. QAPP - TRU Waste Characterization Quality Assurance Program Plan
- 8. CH TRAMPAC - TRUPACT-II Authorized Methods for Payload Control
- 9. PCB - polychlorinated biphenyls
- 10. RH TRAMPAC - TRU Methods for Payload Control
- 11. VOC - Volatile Organic Compound
- 12. CH TRUCON - TRUPACT-II CONTENTS document
- 13. WWIS - WIPP Waste Information System

Table 1

In the WAC document the criteria and requirements for waste certification and acceptance are subdivided into 3 areas, WIPP Operations and Safety Requirements, Transportation Requirements, and Environmental Compliance Requirements. Each subsection lists its own requirements for each criterion. The WIPP Operations and Safety Requirements ensures TRU waste is received and disposed in a manner which protects the public and WIPP personnel. The requirements that limit criteria under this area are derived from the WIPP Safety Analysis Report (SAR) and the WIPP System Design Description (SDD) for waste handling. The Transportation Requirements ensure no release of the payload contents from the packaging, if and when subjected to extreme accident abuse. The requirements under this area are derived from the TRUPACT-II and draft RH 72B Cask Safety Analysis Reports for Packaging (SARPs). Environmental Compliance Requirements ensure that wastes comply with the limits set by the Environmental Protection Agency (EPA), New Mexico Environmental Department (NMED) and Congress. The requirements under this area are promulgated in several documents. These documents are the:

- WIPP RCRA Permit Application
- draft No-Migration Variance Petition
- Waste Isolation Pilot Plant Land Withdrawal Act, Public Law 102-579

It is the generators responsibility to ensure that the waste meets all of the WAC requirements. For ease of understanding and displaying the criteria they were grouped into five categories. The categories are:

- Container and Physical Properties
- Nuclear Properties
- Chemical Properties
- Gas Generation, and
- Data

The WAC requirements have in the past caused some confusion for generator sites because of the number of requirements required for each criterion and the concept of most limiting condition. In WAC, Rev 5, the requirements have been combined in a summary table which lists the minimum requirements which must be met to demonstrate full compliance with each criterion. To further help the generator/storage site a compliance description section is written for each criterion. The compliance section describes the activities or actions that must be taken to demonstrate full compliance with each criterion. In addition to the organization of the criteria and requirements, the contact-handled (CH) criteria are presented separately from the remote-handled (RH) criteria.

## TECHNICAL CONTENTS

WAC, Rev 5 has several technical changes from the Rev 4 version. Some of the more extensive changes are as follows:

- The criterion for particulate size and quantity was deleted. This criterion was based on reducing the severity of a dropped drum accident. The latest analysis in the WIPP SAR concluded that accident results are not dependent upon the amount of particulate in the waste form. Neither the TRUPACT-II SARP nor RCRA addressed particulate in the waste, so the criterion was discontinued.
- The requirements for liquids was rewritten to clarify the position on free liquids detected in the payload containers. The criteria now clearly states that it is acceptable to have up to 2 liters of liquid total in a 55 gallon drum (~1% of the drum volume). This is not a change from Rev 4, but a clarification of what has always been the intent of the criterion
- The ten year life of the bar code labels on drums has been deleted. The requirement for WIPP operations is that it is readable at the time of receipt at WIPP.

- The criterion for removable surface contamination on payload containers has been revised to bring it in line with the DOE Rad Con Manual. This is actually a reduction in allowable surface contamination from the Rev 4 requirements. It is not expected that this lower requirement will impose a hardship on generators because the limits are the same as are currently by the DOE Rad Con Manual.
- The requirements for the payload container (i.e. 55-gallon drum, etc.) has been rewritten to reflect the current configuration of WIPP waste handling operations equipment, the TRUPACT-II and what has been described in the RCRA permit application. There are numerous other payload configurations, but currently, the only containers that can be characterized, shipped in a TRUPACT-II or RH 72B cask and have been described in the permit applications are the DOT Type A 55-gallon drum, TRUPACT-II Standard waste Box (SWB) and the RH canister described in the RH 72B Cask SARP.
- The CH TRU drum loading limit for acceptance at the WIPP was reduced from 1000 to 80 Plutonium Equivalent Curies (PE-Ci). The allowable drum loading activity of 80 PE-Ci resulted from a recent reanalysis of the TRU waste inventory and calculated off-site dose from postulated waste handling accidents. The new drum loading limit of 80 PE-Ci was determined using acceptance criteria for off-site doses to the general public at the WIPP exclusion area boundary rather than at the WIPP Land Withdrawal boundary. Drums exceeding 80 PE-Ci may still be accepted for disposal at the WIPP; however, additional analysis will be required to determine if additional safe guards are necessary to protect the public, workers and environment.
- New requirements limiting the levels of Drum headspace VOC concentrations was added. The new limits are based on Back-Calculations from the Health-based levels in the Draft No-Migration Variance Petition.
- New requirements for waste characterization and documenting the characterization techniques was added to the data requirements. This caused a new form called the Waste Stream Profile Form to be added to the WAC. The new form will provide WIPP with documentation of actions taken to characterize waste for disposal in the WIPP. This completed form and selected reports from the WIPP waste information system will be part of records for waste characterization that will be kept at the WIPP.

## CERTIFICATION

WAC Rev 5 furnishes guidance for the preparation of deliverables necessary for implementation of site and waste certification. Site certification and waste

certification are imposed on TRU waste generators in lieu of sampling waste at the WIPP. This is because sampling waste at WIPP is neither practical nor economical. Site certification involves generator sites developing written programs that ensure wastes are properly characterized and certified to the requirements required for transportation and disposal of TRU wastes at the WIPP. Site certification is the written acknowledgment by the DOE/Carlsbad Area Office (CAO) that a generator site has the capability to meet the requirements of the TRU Waste Characterization Quality Assurance Program Plan (QAPP) and the WIPP WAC. The CAO ensures these programs are in place and functioning properly by reviewing and approving key generator site documents and performing periodic (at least annually) audits of the generator sites for evidence that the programs are functioning as described in the site specific documents. Waste certification involves determining and documenting that the waste meets the requirements of the QAPP and the WAC. Waste Certification is the generator sites written assurance that waste containers shipped to and disposed of in the WIPP meet the requirements for transportation and disposal. The WIPP periodically reviews characterization, certification and shipping data maintained by generator sites to verify compliance.

Generator/storage sites (sites) must characterize their waste on a waste stream basis to site specific and WIPP approved plans. After characterization of individual payload containers a TRU waste data package is transmitted to the WIPP via the WIPP Waste Information System (WWIS). WIPP personnel review the data package for completeness and acceptability and provide appropriate notification to the Site. When sufficient data from a particular waste stream have been submitted, the site prepares a summary of the waste stream information and reconciliation with the Data Quality Objectives (DQOs) defined in the TRU Waste Characterization Quality Assurance Program Plan (QAPP). This summary is compiled in a Waste Stream Profile Form. The form is completed by the generator/storage site and approved and maintained on file by the WIPP for acceptance information on future waste shipments waste. Waste in payload containers from approved waste streams are certified for disposal in the WIPP in accordance with the WIPP WAC. When enough payload containers have been assembled to form a shipment they are certified for shipment in the TRUPACT-II for the CH wastes or the RH 72B Cask for RH wastes. The disposal and shipping certification data is transmitted to the WIPP for approval using the WWIS.

## SUMMARY

The WIPP WAC is a comprehensive document containing the latest criteria and requirements for TRU mixed waste transportation and disposal. The WAC provides comprehensive operational safety, transportation and RCRA requirements presented in a simple user friendly format. In addition to the waste acceptance criteria and requirements, generator/storage site certification, characterization and data

reporting requirements are established.

REFERENCES:

1. U.S. Department of Energy/Westinghouse Electric Corporation. Waste Isolation Pilot Plant Resource Conservation and Recovery Application, DOE/WIPP 91-005.
2. U.S. Department of Energy. Draft No-Migration Variance Petition, DOE/CAO-95-2043.
3. U.S. Department of Energy. Draft 40 CFR 191 Compliance Certification Application, Draft-DOE/CAO-2056.
4. U.S. Department of Energy. Transuranic Waste Characterization Quality Assurance Program Plan, CAO-94-1010.
5. Westinghouse Waste Isolation Division. Waste Isolation Pilot Plant Safety Analysis Report, DOE/WIPP-95-2065. Safety Analysis Report
6. U.S. Department of Energy. Safety Analysis Report for the TRUPACT-II Shipping Package (SARP), U.S. NRC Docket No. 71-9218.
7. U.S. Department of Energy. Draft Safety Analysis Report for the RH-TRU 72B Shipping Package.
8. Westinghouse WID. System Design Description, Waste Handling, SDD-WHOO
9. U.S. Congress. Waste Isolation Pilot Plant Land Withdrawal Act, Public Law 102-579.

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