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GUIDANCE FOR WIPP WASTE PROFILE PLANS PREPARATION AND SUBMITTAL

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LIST OF ACRONYMS

DOE	Department of Energy
EPA	Environmental Protection Agency
INEL	Idaho National Engineering Laboratory
HSWA	Hazardous and Solid Waste Amendments
LEL	Lower Explosive Limit
NMD	No-Migration Determination
NMED	New Mexico Environment Department
NMVP	No-Migration Variance Petition
ppmv	parts per million by volume
psig	pounds per square inch gage
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QAPjP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
RTR	Real-Time Radiography
SWEPP	Stored Waste Examination Pilot Plant
TRU	Transuranic
TRUCON	TRUPACT-II Content Codes
TRUPACT-II	Transuranic Package Transporter-II
TRUPACT-II SAR	TRUPACT-II Safety Analysis Report
TSD	Treatment, Storage, or Disposal
VOC	Volatile Organic Compound

LIST OF ACRONYMS
(Continued)

WACCC	Waste Acceptance Criteria Certification Committee
WAP	Waste Analysis Plan
WCPP	Waste Characterization Program Plan for WIPP Experimental Waste
WIPP	Waste Isolation Pilot Plant
WIPP-WAC	WIPP Waste Acceptance Criteria

GUIDANCE FOR WIPP WASTE PROFILE PLANS: PREPARATION AND SUBMITTAL

1.0 INTRODUCTION

This document provides guidance to the Department of Energy (DOE) sites on preparing waste profile plans for transuranic mixed (TRU mixed) waste to be emplaced at the Waste Isolation Pilot Plant (WIPP). These waste profile plans satisfy the Resource Conservation and Recovery Act (RCRA) waste analysis requirements, as specified in the RCRA Part B Permit Application for WIPP (DOE, 1991c).

The objectives of this document are to:

- Describe the methods for complying with the RCRA waste analysis requirements.
- Provide guidance to sites shipping waste to WIPP regarding the preparation and submittal of the required waste analysis documentation.

1.1 RCRA Regulatory Requirements

The Environmental Protection Agency (EPA) has promulgated standards for the management of hazardous waste. These include standards for both hazardous waste generators and owners/operators of Treatment, Storage, or Disposal (TSD) facilities. The responsibilities of the generators and owners/operators of TSDs are summarized below. The process for complying with the RCRA regulatory requirements is discussed in Subsection 1.2.

1.1.1 Requirements of Hazardous Waste Generators

40 CFR Part 261 (EPA, 1990a) defines hazardous wastes, and provides lists of materials that are considered to be hazardous waste. In addition, Subpart B of 40 CFR Part 261 defines the criteria for identifying the characteristics of hazardous waste.

40 CFR Part 262 (EPA, 1990e) provides guidance for the generators of hazardous waste with regard to characterization. Specifically, 40 CFR 262.11 states that a generator must determine if a solid waste is a hazardous waste. This determination can be made based on the list in 40 CFR 261, Subpart D, or if the waste exhibits one of the characteristics discussed in 40 CFR 261, Subpart C. The generator can determine if a waste is a characteristic waste by testing [40 CFR 262.11(c)(1)], or by applying knowledge of the hazardous characteristics of the waste determined by the materials or the processes used to generate the waste [40 CFR 262.11(c)(2)].

Each waste generator/storage site will be responsible for compliance with the requirements of RCRA with regard to the waste managed at their facility.

1.1.2 Requirements of Owners/Operators of TSD Facilities

Standards for the owners/operators of TSD facilities are codified in 40 CFR Part 264 (EPA, 1990f) and 40 CFR Part 265 (EPA, 1990b). An owner/operator must obtain a detailed physical and chemical analysis of a representative sample of the waste. The analysis must contain all of the information needed to safely manage the waste at the facility; it may include documented or existing published data. Owners/operators of TSD facilities are further required to verify that the waste shipped to the facility is the waste specified on the accompanying manifest. Verification can be done by inspection or analysis.

1.1.3 Land Disposal Restrictions

The Hazardous and Solid Waste Amendments (HSWA) of 1984, which amend the RCRA, prohibit the land disposal of hazardous waste, unless the wastes meet treatment standards specified by the EPA. Land disposal of hazardous waste not meeting the treatment standards is permissible if the owner/operator can demonstrate, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit (EPA, 1990c). In response to the No-Migration Variance Petition (NMVP) (DOE, 1990) submitted by the DOE for WIPP, the EPA has granted a Conditional No-Migration Determination (NMD) (55 FR 47700) (EPA, 1990d) for the test phase of the WIPP facility. The NMD identifies specific waste characterization requirements applicable to waste to be used during the test phase of WIPP.

1.1.4 Applicability of Regulations to the WIPP Facility

The three aspects of the regulations discussed under Sections 1.1.1, 1.1.2, and 1.1.3 constitute the RCRA regulations as they apply to the TRU mixed waste to be shipped to WIPP. WIPP has the responsibility to ensure compliance with the standards for the owner/operator of a TSD facility and the NMD requirements.

For the WIPP facility, RCRA waste analysis requirements involving the inspection or sampling of wastes are being satisfied at the generator sites before shipment to WIPP, due to the radioactive nature of the waste and the design of the WIPP facility. The exclusive use of the TRUPACT-II package and associated tracking systems for the transport of TRU waste to WIPP will preclude the need for further verification of waste analysis at the TSD facility. The waste profile plans discussed in this document describe the process used by WIPP to meet the New Mexico State RCRA requirements pertaining to a TSD facility.

1.2 Process of Meeting RCRA Waste Analysis Requirements

Part B of the WIPP RCRA Permit Application includes DOE commitments regarding waste characterization activities. Section C-2 of the permit application, the Waste Analysis Plan (WAP), commits DOE to implementing a process designed to satisfy the EPA and New Mexico Environment Department (NMED) waste analysis requirements, and to obtain NMED and/or EPA concurrence that the process will satisfy the requirements. The WAP was developed to ensure compliance with 40 CFR Parts 264 and 265, and document the methodology of complying with these regulations. The WAP also addresses compliance with conditions and limitations of the NMD.

The content of the WAP is based on process knowledge and any existing analytical data supplied to the WIPP Project Office by the waste generator/storage sites. This information is presented in the WAP in the form of process flow diagrams, accompanied by applicable descriptions. In addition to the process knowledge, the WAP requires each of the generating or shipping sites to provide the WIPP Project Office with waste-category-specific waste characterization plans, which are now being referred to as "waste profile plans". These plans incorporate the information presented in the WAP, and describe the proposed methods for characterization and verification of the process knowledge information. The required content of the waste profile plans is discussed in Section 2.0.

This guidance document provides guidance to the sites concerning the process for implementation and compliance with the EPA and NMED waste analysis requirements. The general process is as follows:

- The generator must develop waste profile plans pursuant to the guidelines established in this document. Waste profile plans are discussed in detail in Section 2.0. The guidelines described in this document are consistent with requirements of the WIPP RCRA Waste Analysis Plan (i.e., Section C-2 of Chapter C of the RCRA permit application). The methods of compliance applicable to these requirements are described in Section 3.0. Specific examples of waste profile plans for Raschig ring waste stored at the Idaho National Engineering Laboratory (INEL), lab glassware waste stored at INEL, and the leaded rubber waste from the Rocky Flats Plant (RFP), are provided in Appendix A.

- Each completed waste profile plan will be submitted to the DOE WIPP Project Office Compliance Section and the Waste Acceptance Criteria Certification Committee (WACCC). Upon their review and approval, the plans will be provided to the NMED and/or the EPA Region VI for their concurrence.

- When NMED and/or EPA Region VI concurrence is obtained on a specific waste profile plan, the waste shipping site will implement the waste profile plan.

- Waste characterization data obtained in accordance with the waste profile plans will be reported in a "waste profile form". Instructions for completing the waste profile forms, and an example of the waste profile form, are provided in Appendices B1 and B2.

- The information reported in the waste profile forms, and supporting data, will be kept on file at the generator site, and on file as part of the WIPP Operating Record.

- Approval of completed waste profile forms will be the responsibility of the DOE WIPP Project Office, and is necessary prior to shipment of waste to WIPP.

1.3 Applicable Documents

The DOE has developed several compliance documents that relate to this guidance document. These documents are listed in Figure 1, which indicates the relationships of the various documents. The function of each document related to the demonstration of compliance with applicable regulatory requirements is described below:

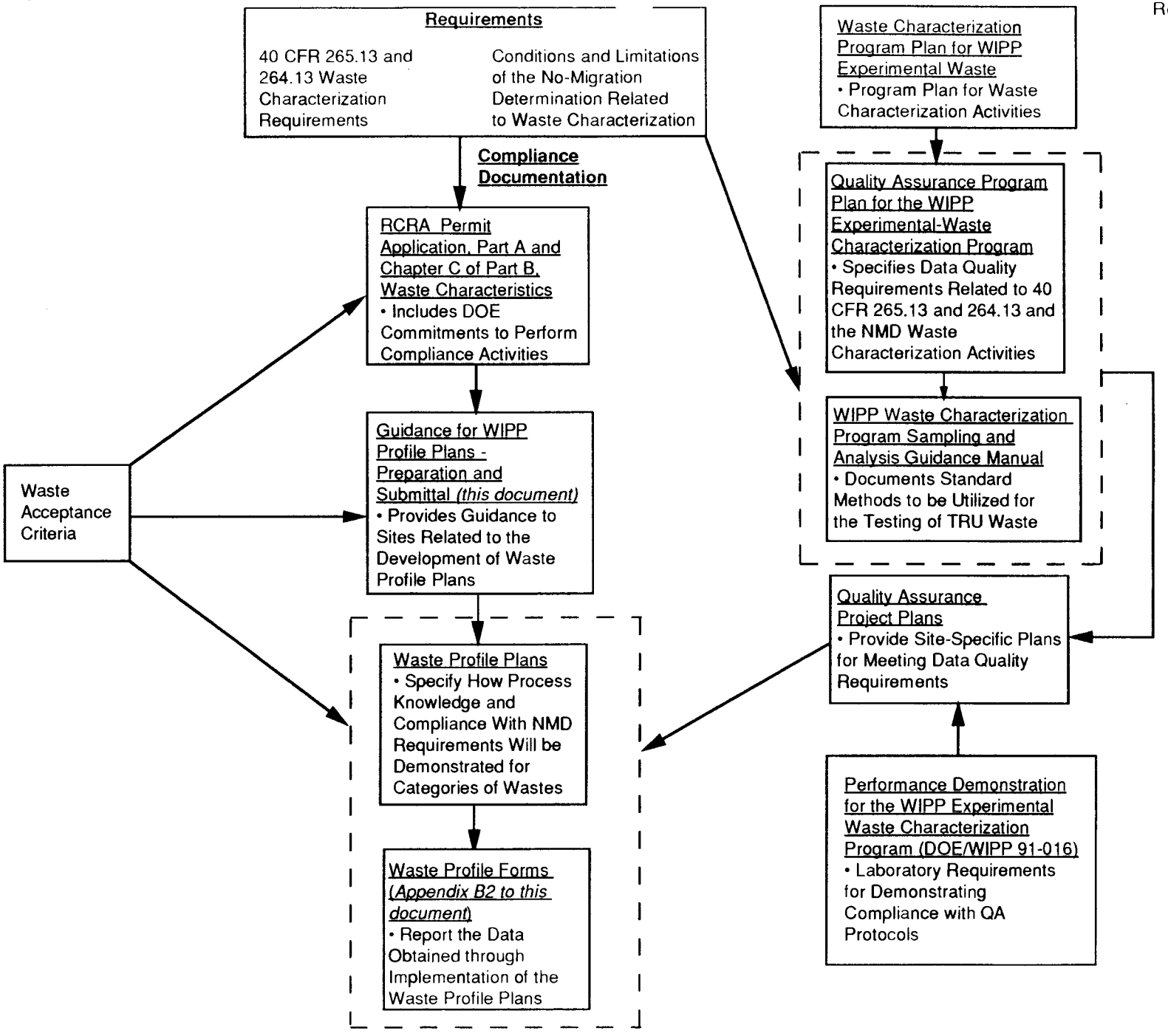

Figure 1. Relationships of Applicable Documents

- RCRA Permit Application - Part A of the permit application lists wastes that can be shipped to the WIPP facility. Chapter C of Part B of the permit application, Waste Characteristics, describes the waste to be emplaced in the WIPP during the Test Phase, and includes DOE commitments to characterize wastes prior to emplacement. The permit application addresses the RCRA waste analysis requirements and waste characterization requirements specified in the WIPP NMD. The permit application commits to the development of waste profile plans for categories of wastes proposed to be emplaced in the WIPP.

  The permit application describes physical and chemical properties of the waste which are pertinent to the operation of the WIPP in a manner that is protective of human health and the environment. These properties are consistent with the WIPP Waste Acceptance Criteria (WIPP-WAC) (DOE, 1989). When final action is taken on the permit application, any DOE commitments and NMED requirements related to waste characterization will become conditions of the permit. Compliance with these conditions will be required as terms of the permit.

- Guidance For WIPP Waste Profile Plans (this document) - The waste profile guidance document provides direction to DOE waste generation/storage site operators on the development of waste profile plans that are consistent with commitments made in the RCRA permit application.

- Waste Profile Plans - Waste profile plans will provide detailed information on waste characterization activities to be performed for specific categories of wastes (described in Section 2.2.1). The waste profile plans will describe, for each waste category, a detailed description of the waste generation process, the inspection and sampling methods to be utilized, the frequency of sampling, analytical methods to be employed, the parameters for which analyses will be performed, and the rationale for the selection of the parameters. The activities and methods utilized for the inspection of wastes will be consistent with those used for WAC certification (i.e., visual examination and/or real-time radiography (RTR), and assay). Sampling and analysis methods will be consistent with those described in the Quality Assurance Program Plan for the WIPP Experimental-Waste Characterization Program (QAPP) (DOE, 1991b) and the WIPP Waste Characterization Program Sampling and Analysis Guidance Manual. Waste profile plans will be supported by Quality Assurance Project Plans (QAPjPs) which will describe site-specific plans for meeting data quality objectives. Examples of waste profile plans are presented in Appendix A.

- Waste Profile Forms - Data obtained pursuant to the methods described in the waste profile plans will be reported on the waste profile form. The waste profile form is specific to a waste category. The form will be updated with the sampling of each waste container in that category, since the mean and the variance of the results are noted on the form. Individual data records are not a part of the waste profile form, and will be present elsewhere as part of WIPP's data management system. Instructions for completing waste profile forms, and an example of the form, are presented in Appendices B-1 and B-2.

- Waste Characterization Program Plan (WCPP) for WIPP Experimental Waste (DOE, 1991e) - The WCPP is the program plan that defines the waste characterization tasks that are necessary to meet all applicable requirements and test phase criteria. The WCPP sets the scope of all the documents shown beneath it in Figure 1.

- Quality Assurance Program Plan for the WIPP Experimental-Waste Characterization Program (QAPP) - The QAPP establishes data quality requirements that each DOE site must meet in characterizing wastes to be used during the WIPP Test Phase. Waste profile plans shall be developed to be consistent with the quality requirements of the QAPP.

- WIPP Waste Characterization Program Sampling and Analysis Guidance Manual (DOE, 1991f) - This document describes standard sampling and analysis methods to be utilized for the testing of TRU wastes. These methods, that are used for the sampling and analysis of mixed wastes, shall be referenced in the waste profile plans, as applicable.

- Quality Assurance Project Plans (QAPjPs) - QAPjPs are site-specific documents that address compliance with the quality assurance requirements provided in the QAPP. Waste profile plans shall be consistent with, and shall reference the site-specific QAPjP.

- Performance Demonstration for the WIPP Experimental-Waste Characterization Program (DOE, 1991a) - This document describes performance requirements that laboratories must meet to demonstrate that they can achieve the laboratory quality objectives specified in the QAPP. Waste profile plans shall reference this document.

2.0 WASTE PROFILE PLANS

Each DOE site shipping waste to WIPP is required to prepare waste profile plans which contain the necessary documentation to ensure compliance with the WIPP RCRA waste analysis requirements. A waste profile plan is specific to a unique "waste category" at each site. "Waste categories" represent a classification system for TRU mixed waste, based on compliance with RCRA waste analysis requirements. Guidelines for classifying and grouping wastes into waste categories are provided in Section 2.2.1.

A waste profile plan will include the following information:

- Plan Identifier and Generator Information
- Waste Description
- Criteria for Physical Form and Chemical Properties
- Chemical Composition
- Requirements Identified in WIPP NMD
- RCRA Codes and Basis for Classification.

These parameters are discussed in more detail in the following sections.

2.1 Plan Identifier and Generator Information

Each waste profile plan shall include an identification number to be used for referencing purposes. It is suggested that a two-digit alpha designator (e.g., ID, RF, HF, SR) be included to correlate the waste profile plan with the shipping site, and that this designator precede the sequential numbering for the plans. An example might be: "Waste Profile Plan Number ID-01".

Under this section, each waste profile plan shall include the following generator or shipper data:

- DOE Waste Shipping Site
- Generating Site (If different than Shipping Site)
- Technical Contact and Phone Number
- EPA ID Number for Shipping Location

2.2 Waste Description

A waste profile plan shall include a detailed description of the waste. Specifically, this description should consist of the following information:

- Waste category being profiled
- Waste generation process
- Quantity of waste and time frame of waste generation
- Sources of data documentation for the waste category
- Correlating waste identification numbers or alternate names

Each of these is discussed in detail in the following subsections.

2.2.1 Waste Category

A waste profile plan shall be provided for each category or family of waste. The waste categories shall be defined by the site shipping the waste to WIPP.

The objective for grouping wastes into one category is to enable the use of a single waste profile plan for similar wastes. By definition, all the waste within a waste category shall be capable of being characterized utilizing the same chemical and physical analyses (physical and chemical analysis requirements are discussed in Section 2.3).

The waste categories should be at the level of, or be subsets of, the "waste types" defined in the TRUPACT-II Content Codes (TRUCON) document (DOE, 1991d). These waste types are the following:

Waste Type I	-	Solidified Aqueous or Homogeneous Inorganic Solids
Waste Type II	-	Solid Inorganics
Waste Type III	-	Solid Organics
Waste Type IV	-	Solidified Organics

Waste characteristics related to flammability and comparability must be compared with the EPA criteria specified in the NMD (Section 2.5). These criteria are based on the waste types listed above. Each waste category, established for the purpose of fulfilling RCRA compliance, should belong to one (and only one) of the four waste types listed above. In summary, the relationship between waste categories and waste types is that the waste categories are a subset of the waste types.

Suggested options for further defining waste categories are listed below:

- Similar waste forms (same content codes or IDCs)
- Wastes which are generated, packaged, and certified through similar processes
- Wastes generated during the same time frame
- Any other grouping that would satisfy the RCRA waste analysis requirements
- Combinations of the above.

Each waste category should be identified with an applicable descriptive label (e.g., "leaded rubber gloves"). This label should be consistently used to identify the waste category with any RCRA-related documentation and correspondence.

2.2.2 Waste Generation Process

A waste profile plan should include a detailed description of the waste and the process by which the waste was generated. To the extent possible, this description should consist of the following information:

Physical and chemical description of the waste: An example of this would be lead content (if available) in the leaded rubber glove waste.

Unit operations and processes used: These would consist of components of a process flow analysis that generates the waste. For example, in the case of lab glassware, a glovebox operation.

The primary function of the process generating the waste: An example of this would be Raschig ring waste where the Raschig rings are used to minimize neutron multiplication in liquid storage tanks.

Major constituents used in the process generating the waste: Major constituents used in the process of generating a waste are those that are present in concentrations greater than one percent by weight. These include compounds and materials used in the process, and which are potentially present as discarded materials in the final waste form. For example, Raschig rings used in carbon tetrachloride tanks would consist of Raschig rings (borosilicated glass) residually contaminated with carbon tetrachloride. The waste generation process does not specifically include discarding carbon tetrachloride as waste. An acid and base used in a neutralization process would not be present in the final waste form, if completely neutralized.

The following questions regarding the waste generation process should be considered when providing this information:

- Is the waste generated from single or multiple sources?
- Did the waste component(s) serve a known and consistent function (i.e., Raschig rings)?
- Is there a reason to suspect that toxic metals are present in the waste?
- Is there a reason to suspect that RCRA listed solvents have been discarded with the waste?
- Is there reason to believe that the hazardous material content will vary from container to container? If so, what is the range of variation? (This information should be reflected in the waste profile form, presented in Appendices B1 and B2.)

The basis for this waste characterization information is process knowledge. Process knowledge may include documented procedures, procurement and quality controls, and previous sampling programs. Section 3.0 discusses process knowledge in greater detail.

2.2.3 Quantity of Waste and Time Frame of Waste Generation

The quantity of waste generated and/or the projected generation rate of the waste category being profiled shall be reported in the waste profile plan. The quantity should be reported in drum equivalents for each waste category. Reported quantities of waste should be accompanied with a description of how the quantities are estimated, and assumptions associated with fixed population and generation rate projections. The time frame of waste generation for the waste category being profiled shall also be reported in the profile plan.

2.2.4 Data Sources

If information on the waste category being profiled is documented elsewhere, a cross reference should be provided in the waste profile plan. Waste characterization information has been previously compiled in documents like the WIPP NMVP (DOE, 1990), Part B of the WIPP RCRA Permit Application (DOE, 1991c), and the TRUCON document (DOE, 1991d).

Any other supplemental waste characterization information that has not been previously documented should be included in this section.

2.2.5 Correlating Waste Identification Numbers and/or Alternate Names

The waste profile plan shall document any other names or identification numbers used for this waste category. At a minimum, this should include the following correlating information (previously reported in the TRUCON document):

- Content Code Number(s)
- Internal Code(s)
- Waste Type Number

In addition, any other names or numbers used to identify or designate the waste within a waste category should also be reported on the waste profile plan.

2.3 Criteria for Physical Form and Chemical Properties

The sites are required to show compliance with specific physical form and chemical property criteria. Each criterion is discussed below. The waste profile plan should document the methods of control used to ensure compliance with these criteria. Applicable methods of compliance and documentation requirements are discussed in more detail in Section 3.0.

2.3.1 Criteria

2.3.1.1 Free Liquids

The physical form of the waste shall be restricted to a solid or solidified material. Liquid waste is prohibited in waste containers (drum, experimental bin, or standard waste box), except for residual amounts in well-drained containers. Liquids present in quantities greater than or equal to one percent by volume of the drum or standard waste box disqualify that drum or standard waste box for disposal at WIPP.

The criteria for the acceptance of liquids in waste are as follows:

1. Free liquids are defined as liquid that is not sorbed into a host material such that it could spill or drain from its container.

2. TRU waste certified for shipment to WIPP shall contain as little residual liquid as is reasonably achievable, but in no case shall the liquid equal or exceed one percent by volume of the external waste container. Residual liquids are free liquids in quantities of less than one percent by volume of the waste container that result from remaining liquid residues in well-drained bottles, jars, or other similar containers, condensation, and sludge/resin settling and liquid separation.

3. Bottles, cans, or other similar containers in certified TRU waste forms may contain residual quantities of liquids. However, all internal containers must be well-drained, and the total quantity of liquid shall not equal or exceed one percent by volume of the external waste container (drum, bin, or standard waste box).

4. Liquids in internal containers that are not well drained are not currently certifiable and will be set aside, subject to future guidance.

Based on the above criteria, sampling requirements for free liquids present in waste containers, are as follows:

- Liquids present in the sludge waste do not have to be sampled, because sludge sampling will sufficiently characterize any associated liquids.

- It is not necessary to sample and analyze residual liquids associated with well-drained containers, based on Items 3 and 4, above.

- Liquids which can be identified by process knowledge or by physical location within a waste container do not require sampling. For example, liquids present between the rigid drum liner and a drum, known to form by condensation, do not require sampling.

The waste profile plans should include a discussion of how compliance with the restriction on free liquids is ensured for the waste category being profiled. If the waste category has the potential for the presence of liquids, the plan should identify which of the above descriptions applies to the waste.

2.3.1.2 Explosives and Compressed Gases

Explosives and compressed gases are prohibited from the waste. A pressurized vessel is defined, by the WIPP-WAC, as a vessel that contains greater than seven pounds per square inch gage (psig) pressure, which is not acceptable at WIPP. In addition, ignitable (D001) compressed gases, as defined in 40 CFR 261.21(a)(3), are not acceptable at WIPP. A waste profile plan should describe, for each waste category, how these criteria are satisfied.

2.3.1.3 Pyrophoric Materials

Nonradionuclide pyrophorics are prohibited from the waste. Pyrophoric materials shall be rendered safe by mixing them with chemically stable materials (e.g., concrete, glass) or shall be processed to remove their hazardous properties. Not more than one percent by weight of the waste in each waste container may be pyrophoric forms of radionuclides, and these shall be generally dispersed in the waste. A waste profile plan should describe, for each waste category, how these criteria are satisfied.

2.3.1.4 Reactives, Ignitables and Corrosive Materials

Reactive wastes (D003), as defined in 40 CFR 261.23, and ignitable (D001) materials, as defined in 40 CFR 261.21, are not acceptable at WIPP. Corrosive materials (D002), as defined in 40 CFR 261.22, are not acceptable at WIPP. These materials should either be excluded from the payload container or processed in a such a manner that the resultant waste form does not exhibit these characteristics. A waste profile plan should describe, for each waste category, how these criteria are satisfied. If these materials are identified as potential waste constituents, the process-specific operating procedures should be described, and the specific actions taken to ensure compliance with the prohibition of reactive, ignitable, and/or corrosive characteristics for the waste should also be described.

2.3.1.5 Incompatible Wastes

Chemical compatibility shall be ensured for all wastes within each individual payload container. A chemical compatibility evaluation has already been performed for all the waste described in the TRUCON document. The basis for evaluating chemical compatibility was the Environmental Protection Agency (EPA) document, "A Method for Determining the Compatibility of Hazardous Wastes" (EPA-600/2-80-076) (Hatayama, et. al, 1980). This method provides a systematic means of analyzing the chemical compatibility for specific combinations of chemical compounds and materials. The EPA method classifies individual chemical compounds into chemical groups, and identifies the potential adverse reactions resulting from incompatible group combinations. A reference to the TRUCON document should be made when addressing chemical compatibility in the waste profile plans.

2.4 Composition of the Waste Reported in Ranges

The composition of the waste category that is being profiled shall be reported as ranges of content for each component. It is important that 100 percent of the material be accounted for. An example of this information is provided in the TRUPACT-II Chemical Lists. While this description will generally be based on a knowledge of the generating process, it should be supported wherever possible with supplemental data. The basis for the chemical composition determination and any plans for obtaining verification data should be described in the waste profile plans.

2.5 WIPP No-Migration Determination Requirements

Requirements applicable to the Test Phase are specifically identified in the WIPP's Conditional No-Migration Determination (EPA, 1990d). Target compounds for analyses are listed in the waste profile forms (Appendix B2 to this document) which will record the mean and variance of these results by waste category. These requirements include:

- Limits on the concentrations of potentially flammable gases in the headspace of the waste containers.
- Limits on the maximum concentration of selected Volatile Organic Compounds (VOCs) in the headspace of waste containers.
- Limits on the mean concentration of selected VOCs in the headspace of the waste containers.
- Sampling requirements for selected VOCs in the headspace gases, and VOCs and metals in the sludges.

2.6 RCRA Hazardous Waste Codes and Basis for Classification

The RCRA codes shall be reported on the waste profile plans for each category of waste. The basis for classification as a RCRA-regulated waste should be documented in the waste profile plans (i.e., knowledge of the materials or processes generating the waste, sampling and analysis of the waste or an equivalent). It is important to document the logic flow pattern utilized in determining the RCRA code classification. In general, the RCRA code classifications for the different waste categories are made conservatively.

3.0 METHODS OF COMPLIANCE WITH RCRA WASTE CHARACTERIZATION REQUIREMENTS

3.1 Summary of Waste Analysis Requirements

This section describes the applicable methods that can be used by the sites to comply with the RCRA waste characterization requirements. The regulations defining these requirements were discussed in Section 1.1. The specific requirements were discussed in Section 2.0, and are briefly summarized below:

- A description of each waste category, including details of the waste generation process, major constituents used in the process generating the waste, and the unit operations and processes used to generate the waste in the waste category (Section 2.2).

- A description of the physical and chemical properties of the waste, demonstrating compliance with specific restrictions on the physical form and chemical form of the waste category (Section 2.3).

- A description of the composition of the waste, with estimates of the percentages of chemical constituents in the waste category (Section 2.4).

- Requirements from the NMD, addressing issues related to flammable gas concentrations and hazardous constituents in the waste container (Section 2.5).

- A listing of the RCRA codes applicable to the waste, and the basis for applying these codes to the waste (Section 2.6).

3.2 Methods of Compliance

The following methods are applicable to meeting the RCRA waste analysis requirements discussed in Section 2.0, and outlined in Section 3.1. Where applicable, the specific procedures to implement these methods are provided in the QAPP (DOE, 1991b).

- Process Knowledge
- Real-Time Radiography (RTR)
- Visual Examination
- Headspace Gas Analysis
- Sludge Analysis

Each of these methods is discussed below.

3.2.1 Process Knowledge

The TRU mixed wastes generated at the DOE facilities are generated from specific processes used for the manufacture of weapons, laboratory activities, or other defense-related activities. The knowledge of these processes, accompanying records and documentation, the administrative, procurement, and quality controls associated with these processes, and any available sampling and analytical data, constitute "process knowledge".

Process knowledge is the primary basis for the information describing the waste. For example, all of the TRU mixed waste generated at the DOE sites is either in solid or solidified form, with the processes generating these wastes being relatively unchanged over the years. Specific procedures exist at the sites to regulate and control these waste generation processes. Administrative and procurement controls are used by the sites to ensure the absence of prohibited items such as explosives and pyrophorics in the waste. Quality controls act as an additional check on routine site procedures.

Process knowledge also serves as the basis for assigning applicable RCRA hazardous waste codes to a given waste. In addition to identifying the hazardous materials used in a process, a knowledge of that process can also be used to determine if the resulting waste is a hazardous waste, and requires specific RCRA hazardous waste codes. As outlined in Section 2.6, the specific information regarding the RCRA hazardous waste codes of each waste, and the basis for assigning these codes, will be presented in the waste profile plans. Site-specific process knowledge information will be provided in the waste profile plans for each waste category from a given site.

Existing process knowledge information from the DOE sites has been summarized in a number of documents, including the TRUPACT-II Safety Analysis Report (TRUPACT-II SAR) (NuPac, 1989), the TRUCON document, the NMVP, and Part B of the WIPP RCRA Permit Application. This information includes any previous, and several ongoing, sampling programs aimed at providing waste characterization data. An example is the SWEPP Sampling Program (Watson, 1987), in place at INEL. As outlined in Section 2.2.4, the waste profile plans for each waste category will cross-reference the specific information provided in these documents. The waste profile plans will also include any process knowledge information that has not been previously documented. In summary, process knowledge can be used by the sites to address the following specific RCRA waste analysis requirements:

- Descriptions of the waste categories
- Description and control of the physical form and chemical properties of the waste
- Description of the composition of the waste
- Listing of the RCRA codes applicable to the waste, and the basis for these codes.

Process knowledge is generally supplemented with the other methods of compliance described below.

3.2.2 Real-Time Radiography (RTR)

RTR is a non-destructive examination technique that can be used to verify certain waste characteristics related to the RCRA requirements. The operational features of RTR systems, and their use at the DOE sites, have been described in detail in a number of documents (NuPac, 1989; DOE, 1990). With respect to the RCRA waste analysis requirements, RTR can be used to verify compliance with the following parameters:

- Waste Category Classification and Identification - RTR can be used to verify that the waste has been labeled with the correct content code or identification code. For example, mislabeling of a sludge drum, as a drum with solid inorganic waste, can be detected by RTR. The content code or waste identification codes are important factors in assigning RCRA hazardous waste codes to the waste.

- Physical Form and Chemical Properties of the Waste - RTR is used by the sites to verify the presence or absence of free liquids and, if applicable, to estimate the amount of liquids present in the waste. The physical form of the waste (solid or solidified), and the absence of prohibited items such as sealed or pressurized containers, can also be verified by RTR.

3.2.3 Visual Examination

Visual examination involves the opening of waste containers to inspect and characterize the waste contents. Visual examination also consists of in-process inspection during waste generation. In the SWEPP sampling program, for example, visual examination of a statistical population of waste containers certified for shipment to WIPP, is used to provide quality control for the waste certification process. Visual examination can be used to verify compliance with the following RCRA-related parameters:

- Physical and chemical properties of the waste, including the waste form, presence of free liquids, and the absence of prohibited items such as compressed gases (sealed containers), pyrophorics, explosives, ignitables, corrosives and reactive materials.
- Proper identification and labeling of containers, with respect to RCRA properties.
- Any potential incompatibilities present in a waste container.

Visual examination, performed as part of the waste characterization work at the sites, shall follow the procedures specified in the QAPP. As noted in the Waste Characterization Program Plan (DOE, 1991e), all of the waste to be used for the bin-scale tests will be visually examined. Data used from this testing will be used to develop a basis for the characterization of a statistical population of the remaining waste inventory.

3.2.4 Headspace Gas Analysis

Headspace gas analysis is required as specified in the NMD (EPA, 1990d). This analysis includes sampling for potentially flammable gases (hydrogen and methane, etc.), as well as sampling for volatile hazardous constituents (carbon tetrachloride, etc.).

Headspace gas analysis performed as part of the waste characterization for the WIPP Test Phase shall follow the procedures specified in the QAPP (DOE, 1991b). The data obtained in support of the NMD will be added to a database that will be analyzed statistically to determine the mean and variance of containers as they are examined. As described in Appendix B-1, this mean and variance shall be reported in the waste profile forms for each waste category. Thus, a confidence limit can be formed to demonstrate representativeness across waste categories, so that eventually less testing may be required.

The quantitative results required in the waste profile forms (Sections C-2 and C-3 of Appendix B-2) can be accumulated as each sample is analyzed. While specific responses shall apply for any given sample, all of the results shall be gathered and analyzed statistically so that overall population descriptions can be drawn.

3.2.5 Sludge Analysis

Sludge analysis is required of applicable wastes as part of the NMD requirements. This analysis includes sampling for metals and VOCs. Sludge analysis performed as part of the waste characterization for the WIPP Test Phase shall follow the procedures to be specified in the QAPP. As with headspace gas analyses, the waste profiling process requires the reporting of mean and variance values for the sampled wastes on the waste profile form.

3.3 Documentation Requirements

As discussed earlier in Section 1.3, the Waste Analysis Plan of the RCRA permit application for WIPP requires the development of the waste profile plans as part of meeting the documentation requirements for RCRA. The sites should identify and report, in each of the waste profile plans, the method(s) used or planned to be used for demonstrating compliance with the RCRA waste analysis criteria described in Section 2.0. The rationale and justification for method selection should also be included in the waste profile plan. If applicable, the frequency at which the method is implemented should be reported. Data obtained from implementing the methods described in the waste profile plans will be reported (mean and variance) on a waste profile form. Instructions for completing a waste profile form, and an example of a waste profile form, are provided in Appendices B1 and B2. The waste profile forms are a checklist for the RCRA waste analysis requirements for each waste category. The purpose of the waste profile form is to describe the waste category in its entirety, based on a sample size which is completely characterized. Since the waste profile form is meant to characterize a waste category, the data required in the form are mean and variance values for the quantitative data. Since these values change with new data, the form will be updated with new data each time a bin is prepared, until the sample size has been achieved that will provide a level of confidence to the generator and WIPP that the waste has been adequately described. A brief discussion of this statistical analysis is presented below.

3.4 Statistical Analysis and Confidence Intervals

There are several sections in the waste profile forms where specific data will be available from the analysis process. The objective will be to determine, within the limits of statistical analysis, the expected values of selected parameters in the waste category with a predetermined level of confidence. This does not imply that every container of waste will meet these expected values. It only implies, for a specific confidence level, that the population of waste containers, as a whole, will be adequately described by these parameters and values.

The first task will be to determine what a representative sample will be for each waste category. There are two cases when considering this determination for a waste category:

- A fixed population
- An increasing population

In the first case, a fixed sample size can be determined, and once the established level of confidence is reached, further testing or sampling will not be required because the population has been adequately defined. The second case requires ongoing sampling and analysis, with constant updating of the data to detect changes in the waste generation process.

The statistical justification for the selection of the type and number of waste content codes for the bin-scale tests is provided in the document, "Rationale for Revised WIPP Bin-Scale Gas-Generation Test with Contact-Handled Transuranic Wastes at the Waste Isolation Pilot Plant," (Lappin, et al., 1991). Analytical methods for sampling, and required confidence levels, are defined in the QAPP for the WIPP Experimental Program (DOE, 1991b).

4.0 QUALITY ASSURANCE

Waste characterization activities performed at generator/storage sites will be in conformance with requirements specified in the QAPP (DOE, 1991b). The QAPP addresses quality assurance objectives and data quality objectives which support the methods used to comply with RCRA waste characterization requirements (Section 3.0).

The QAPP specifies quality assurance objectives for measurement of data in terms of precision, accuracy, representativeness, completeness, and comparability. The quality assurance objectives provide definition, control, and verification of waste characterization. Four of the five methods of compliance applicable to RCRA waste characterization, described in Section 3.2 of this document, are itemized below with a summary of their quality assurance objectives, as specified in the QAPP. Also itemized below are the data quality objectives, specified in the QAPP, for headspace gas analysis. Further details associated with these objectives are available in the QAPP.

Real-Time Radiography (RTR):

- Quality Assurance Objectives - Data obtained by RTR must be evaluated in terms of precision, accuracy, completeness, and comparability.

- Data Quality Objectives - Real-Time Radiography results will be used to identify and estimate the weight of the waste material categories that can influence the potential and rate for gas generation, and verify existing waste characterization information that is based on the knowledge of the process and materials which generated the waste and the RTR results.

Visual Examination:

- Quality Assurance Objectives - Data obtained by visual examination must be evaluated in terms of precision, accuracy, completeness, and comparability.

- Data Quality Objectives - Visual examination results will be used to identify and estimate the weight of the waste material categories that can influence the potential and rate for gas generation, and verify existing waste characterization information that is based on knowledge of the process and materials which generated the waste, and the RTR results.

Headspace Gas Analysis:

- Quality Assurance Objectives - Data obtained by gas and VOC analysis, and flammability testing must be evaluated in terms of accuracy, precision, completeness, comparability, and representativeness.

- Data Quality Objectives - Gas and VOC analysis data will be used to determine the concentrations of gases and VOCs in the headspace of waste containers at generator/storage facilities. These data will be reported with concentrations at a confidence level of 80 percent.

  In support of the NMD, these gas analysis data will be used to demonstrate that hydrogen and methane mixtures in waste containers do not exceed 50 percent of the LEL, at a confidence level of 80 percent.

The QAPP requires the generator/storage facilities to determine the concentrations of VOCs in the headspace of waste containers to demonstrate that: (1) headspace concentrations of the VOCs, listed in Table 1-3 of the QAPP, do not exceed two times the maximum concentrations specified in the NMD, at a confidence level of 80 percent; (2) headspace concentrations of the VOCs, listed in Table 1-4 of the QAPP, do not exceed ten times the mean concentrations specified in the NMD, at a confidence level of 80 percent; and (3) the value of the summed headspace concentrations of the flammable VOCs, listed in Table 1-5 of the QAPP, does not exceed 500 ppmv at a confidence level of 80 percent.

Flammability testing data will be used to demonstrate that bin headspace samples with concentrations of flammable VOCs exceeding 500 ppmv at a confidence level of 80 percent are not flammable using an explicit flame test.

Sludge Analysis:

A future revision of the QAPP will establish quality assurance objectives and data quality objectives for sludge analysis.

5.0 REFERENCES

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EPA - See U. S. Environmental Protection Agency

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U. S. Environmental Protection Agency, 1990e, "Standards Applicable to Generators of Hazardous Waste", Title 40, Code of Federal Regulations, Part 262 (40 CFR 262), U. S. Environmental Protection Agency, Washington, D. C.

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6.0 GLOSSARY

CH-TRU Waste - Contact-Handled TRansUranic waste, packaged TRU waste for which the external dose rate does not exceed 200 mrem per hour.

Code of Federal Regulations (CFR) - A documentation of the regulations implemented by the executive departments of the federal government. The code is divided into 50 titles that represent broad areas subject to federal regulation. Each title is divided into chapters that usually bear the name of the issuing agency. Each chapter is further subdivided into parts covering specific regulatory areas.

Conditional No-Migration Determination (NMD) - Notice published by the EPA in Federal Register Vol. 55, No. 220, that allows the Department of Energy to place a limited amount of mixed waste at WIPP for the purposes of testing, subject to the conditions imposed in the determination.

Content Code - A uniform system applied to waste forms to group those with similar characteristics for purposes of shipment in TRUPACT-II containers, defined and described in the TRUPACT-II Content Codes (TRUCON) document.

Drum equivalent - The volume of waste that is equivalent to that present in a 55-gallon drum.

Hazardous Waste - Solid waste is regulated as hazardous waste if it is a listed waste as defined by 40 CFR Part 261, or equivalently, New Mexico Hazardous Waste Management Regulations (HWMR-6), Part II, Subpart D; or is mixed with or derived from a listed waste; or it exhibits a characteristic as defined by HWMR-6 Part II, Subpart C.

Interim Status - Period until a RCRA permit becomes effective.

Land Disposal Restrictions - Regulatory prohibition of the placement of untreated hazardous waste in or on the land, as defined by 40 CFR Part 268.

Le Chatelier's Law - The explosion (flammable) limits of a mixture of several flammable gases and vapors may be estimated if the explosion limits of the components are known. If P_i is the volume fraction of component "i" in the mixture, the lower explosion (flammable) limit (LEL) for the mixture is:

$$\text{LEL (mixture)} = \Sigma P_i / \Sigma (P_i / \text{LEL}_i)$$

and the upper explosion (flammable) limit (UEL) for the mixture is:

$$\text{UEL (mixture)} = \Sigma P_i / \Sigma (P_i / \text{UEL}_i)$$

Mixed waste - Mixed wastes are defined as a mixture of hazardous wastes regulated under Subtitle C of RCRA, and radioactive wastes regulated under the Atomic Energy Act.

Process Knowledge - The TRU mixed wastes generated at the DOE facilities are generated from specific processes used for the manufacture of weapons, laboratory activities, or other defense-related activities. The knowledge of these processes, accompanying records and documentation, the administrative, procurement, and quality controls associated with these processes, and any available sampling and analytical data, constitute "process knowledge".

Quality Assurance (QA) - All those planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily and safely in service. The goal of quality assurance is to ensure that: research, development, demonstration, scientific investigation, and production activities are performed in a controlled manner; that components, systems, and processes are designed, developed, constructed, tested, operated, and maintained according to engineering standards, quality practices, and Technical Specifications/Operational Safety Requirements; and that resulting technology data are valid and retrievable. Quality assurance includes quality control, which comprises all those actions necessary to control and verify the features and characteristics of material, process, product, or service to specified requirements.

Quality Assurance Plan - A document that contains or references the quality assurance elements established for an activity, group of activities, a scientific investigation or a project and describes how conformance with such requirements is to be ensured for structures, systems, computer software, components, and their operation commensurate with (1) the scope, complexity, duration, and importance to satisfactory performance; (2) the potential impact on environment, safety and health; and (3) requirements for reliability and continuity of operation.

Quality Control (QC) - A routine application of procedures for controlling the monitoring process. Quality Control is the responsibility of all those performing the hands-on operations in the field, in the office, and in the laboratory.

Radioactive Waste - Solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities.

Real-Time Radiography (RTR) - A non-destructive, semiquantitative technique that involves X-ray scanning of waste containers to identify and verify their contents.

Solid Waste - Discarded material as defined in 40 CFR 261.2 is solid waste. Solid waste includes garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials, including solid, liquid, semi-solid, or contained gaseous materials resulting from industrial, commercial or other processes.

Transuranic Radioactive Waste (TRU Waste) - Radioactive waste that, without regard to source or form, is contaminated with more than 100 nCi per gram of waste of alpha-emitting transuranic isotopes with atomic numbers greater than 92 and half-lives greater than 20 yr, except for: (1) High Level Waste (HLW); (2) wastes that the DOE has determined, with the concurrence of the EPA Administrator, do not need the degree of isolation required by 40 CFR Part 191; or (3) wastes that the Nuclear Regulatory Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61. Heads of DOE field organizations can determine that other alpha-contaminated wastes, peculiar to a specific site, must be managed as TRU waste.

TRU Mixed Waste - Radioactive transuranic waste that contains hazardous constituents (as defined by 40 CFR Part 261).

Waste Category - A classification of TRU mixed waste for the purpose of grouping waste with similar characteristics with respect to RCRA waste characterization. A single waste profile plan can be developed for each waste category, documenting the methodology of complying with the RCRA waste analysis requirements. A waste category must be a subset (or be equal to) a waste type.

Waste Profile Form - A form that each waste generator or shipping facility must develop that documents, for each waste category, the qualitative and quantitative data gathered for the waste in that category. The waste profile form is specific to a waste category. The form should be updated with the sampling of each waste container in that category, since the mean and the variance of the results are noted on the form. Individual data records are not a part of the waste profile form, and will be present elsewhere as part of WIPP's data management system. Instructions for completing waste profile forms, and an example of the form, are presented in Appendices B1 and B2 of this document.

Waste Profile Plan - A plan each generator or shipping facility must develop that documents the methodology of complying with the RCRA waste analysis requirements. The contents of a waste profile plan should follow the guidance presented in this document.

Waste Type - A classification of CH-TRU waste for the purpose of grouping waste with similar gas generation characteristics. CH-TRU waste is classified into four waste types: I-Solidified Aqueous and Homogeneous Inorganic Solids; II-Solid Inorganics; III-Solid Organics; IV-Solidified Organics. These waste types are defined and described in the TRUPACT-II Content Codes (TRUCON) document.

APPENDIX A

EXAMPLES OF WASTE PROFILE PLANS

PRELIMINARY

HAZARDOUS WASTE PROFILE PLAN

PLAN NUMBER: _____

SECTION A - GENERATOR DATA

1. DOE Waste Shipping Site: Idaho National Engineering Laboratory
   P.O. Box 1625, Mail Stop 3950
   Idaho Falls, Idaho 83415

2. Generating Site (If Different than Shipping Site): Rocky Flats Plant

3. Technical Contact: T.L. Clements

4. Telephone Number: (208) 526-0664

5. EPA ID Number for Shipping Site: ID 4890008952

   This information will be included in Section A - Generator Data of the RCRA Waste Profile Form for Raschig rings.

PRELIMINARY

SECTION B - WASTE DESCRIPTION

6. Waste Category: Raschig Rings

7. Waste Generation Process:

   Physical and Chemical Description: Raschig rings are borated-glass used to minimize neutron multiplication in liquid storage tanks. The boron in the Raschig rings is a strong neutron absorber or "poison." Raschig rings are approximately 1.75 inches high, 1.50 inches in diameter, and have a wall thickness of 0.25 inch. The rings contain 11.8 to 13.8 weight percent of B_2O_3. Raschig rings are fabricated from a structurally sound, heat- and chemical-resistant type of borosilicate glass with a density of 2.2 g/cm^3 at 25°C or greater. Raschig rings are classed as a homogeneous solid.

   Processes: Raschig rings were generated at the Rocky Flats Plant, and are stored at the Idaho National Engineering Laboratory (INEL). The Raschig ring wastes were generated prior to the development of the WIPP Waste Acceptance Criteria; they are WAC-certified at INEL. Raschig rings are generated at Rocky Flats, in Buildings 371, 559, 707, 771, and 777.

   Raschig rings are used in storage tanks that may contain a variety of spent solvents, nitric acid or aqueous solutions. The solvents are predominantly spent 1,1,1-trichloroethane and spent carbon tetrachloride, with lesser amounts of coolant/oil and methylene chloride. The chlorinated solvents are generated from plutonium production operations, and the aqueous and nitric solutions are predominantly generated during plutonium recovery operations.

Several thousand Raschig rings may be used in each tank. The volume of the rings displaces a proportionate volume of solution, and is configured in the tanks in a manner that prevents nuclear criticality incidents. Routine inspection and testing of the Raschig rings involves removing several rings from a tank and evaluating them for neutron absorption capability, durability, strength, and chemical resistance. When tests indicate that the integrity and performance specifications of the Raschig rings are not met, all of the Raschig rings within the tank are replaced.

Prior to the removal of the Raschig rings from a tank, the tank is drained and then flushed with plutonium-free solutions similar to that removed from the tank. All liquids are drained from the tanks prior to removal of the rings.

Raschig rings contaminated with plutonium in concentrations above the economic discard limits are further processed by leaching with nitric acid or water. After leaching, the rings are rinsed with water and allowed to dry before packaging.

The Raschig rings are typically packaged in polyethylene or polyvinyl chloride plastic bags and placed in Fibre-pak containers. In some cases, the Raschig rings are packaged in plastic bags and placed directly in the drums. Leaded tape may have been used in packaging the waste. Although the Raschig rings are dried prior to packaging, it is required by standard procedures to add absorbent material as a precautionary method.

8. Quantity of Waste and Time Frame of Waste Generation: There are an estimated ___ drums of this waste expected to be available for the Test Phase. This waste was generated from about 1970 to 1987; the processes used, and the composition of the waste, are not expected to vary significantly across this time period.

9. RCRA Codes and Basis for Classification:

   F001, F002, and D008

   These EPA codes have been assigned to this waste based on information supplied by the generator of the materials and processes. The Raschig rings may have residual contamination of spent nitric acid, 1,1,1-trichloroethane, and spent carbon tetrachloride, with lesser amounts of coolant/oil and methylene chloride, and other occasional trace contaminants. Leaded tape may have been used in packaging the waste.

10. Data Sources:

    - TRUPACT-II Content Codes [1]
    - WIPP No-Migration Variance Petition [2]
    - Part B of the WIPP RCRA Permit Application [3]
    - Content Code Assessment for INEL Contact-Handled Transuranic Waste [4]
    - TRU Waste Sampling Program, Volumes I & II [5]
    - Rocky Flats Plan (generator) supplied information

PRELIMINARY

11. Correlating Waste Identification Numbers and/or Alternate Names:

    TRUPACT-II Content Code: ID 118 and 218
    Item Description Code: 442
    Waste Type: II, Solid Inorganics

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES

Items 12 through 16 are binary rejection criteria. A negative response disqualifies the container from being part shipped to WIPP. Data on these criteria will be accumulated on the sampled drums for an estimate of a rejection rate, if any.

12. Free Liquids: The Raschig rings were dried or drained of free liquids and absorbents were added as a precautionary measure. 100 percent RTR examination of the closed drums or boxes will be performed to verify that no free liquids are present in excess of one volume percent. In addition, Raschig ring waste used in the experimental bins prepared for the WIPP Test Phase will be visually examined to verify the absence of free liquids. Any free liquids present in quantities greater than or equal to one percent by volume in a waste container constitutes a rejection of that waste drum or standard waste box. Liquids potentially present with the Raschig rings can be identified through process knowledge or RTR.

13. Explosives and Compressed Gases: No explosives have been identified in this waste by visual examination in any previous sampling programs [5,6]. One-hundred percent RTR examination of the waste containers is used to identify pressurized containers.

14. Pyrophoric Materials: Letters of agreement with waste generators and the INEL Waste Acceptance Criteria have historically prohibited the inclusion of pyrophoric materials in waste packages. Waste generator compliance with this requirement has been substantiated by the absence of any problems during handling and interim storage operations at INEL. Waste sampling programs have not identified any instances of noncompliance with the restrictions on pyrophoric materials.

15. Reactive Wastes and Corrosive Materials: Reactives, ignitables, or corrosives have not been identified in this waste in any previous sampling programs [5,6]. All corrosive materials are neutralized or removed from the waste prior to packaging.

16. Chemical Compatibility: A chemical compatibility study has been performed on this waste category; all waste is chemically compatible for materials in quantities greater than one percent by weight. The results of this study are documented in the Part B of the WIPP RCRA Permit Application [3].

17. Visual Examination

    Visual examination will be performed on all waste used in the experimental bins prepared for the Test Phase, to verify that prohibited items such as explosives, compressed gases, pyrophoric materials, reactives, ignitables and corrosives are not present in the waste.

PRELIMINARY

Visual examination will also be used to detect any incompatible reactions that may have taken place in the waste container. Any container not complying with the restrictions on these items will be rejected from being part of the WIPP Test Phase.

18. Sampling Frequency

The population of drums required from waste belonging to this content code has been determined by Sandia National Laboratories for the bin-scale experiments [7]. All of the waste containers from this waste category to be used in the bin-scale experiments will be characterized by inspection and sampling.

Data will be accumulated for the waste in this waste category, with additional waste containers being characterized, if necessary. After the test phase, sampling of waste in this waste category will cease once this fixed population has been adequately defined, and the criteria are shown to be met within specified confidence limits (see Section 3.3.1).

The sample will be randomly selected drums for the bin-scale test as determined by Sandia. If more drums are required, the random selection without replacement will be continued until the sufficient sample size has been achieved to meet the statistical requirements to characterize the entire population. A new mean value and range will be calculated each time a new set of data becomes available, and reported on the waste profile plans.

19. Composition of the Waste Reported in Ranges:

Constituent	Weight Percent
Raschig Rings (Glass)	0 - 100 percent
Lead	0 - 10 percent
Polyethylene (packaging)	0 - 10 percent
Polyvinyl Chloride (packaging)	0 - 10 percent
Paper (Packaging)	0 - 1 percent
Nitric Acid	0 - 1 percent
1,1,1-Trichloroethane	0 - 1 percent
Carbon Tetrachloride	0 - 1 percent
Other Trace Contaminants	0 - 1 percent

PRELIMINARY

No-Migration Determination Requirements

20. Flammability Testing: Compliance with this condition of the No-Migration Determination will be demonstrated by the sampling and analysis of headspace gases in waste containers supporting the WIPP Test Phase. The performance of headspace gas sampling and analyses to demonstrate the absence of flammable atmospheres in waste containers will comply fully with all relevant requirements of the Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization (QAPP) [8]. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Idaho National Engineering Laboratory, prior to performance of the tests.

The data obtained from the flammability testing will be accumulated on the waste profile form, Section C-2, Item 1, Flammability Criteria, to track the expected mean and variance values of hydrogen, methane and potentially flammable VOC concentrations. Data accumulation will take place for both drum and inner containment layer headspace.

21. Comparability Testing: Compliance with these conditions of the No-Migration Determination will be demonstrated by the sampling and testing of headspace gases in waste containers supporting the WIPP Test Phase. Gas samples taken from waste containers will be analyzed for the parameters of interest and results will be compared to the comparability criteria. All analysis will comply fully with all relevant requirements of the QAPP [8]

    The data obtained from the comparability testing will be accumulated on the waste profile form, Section C-2, Item 2, Comparability Criteria, and Item 3, Verification Criteria, to track the expected mean and variance values for applicable VOCs. Data accumulation will take place for both drum and inner containment layer headspace. As specified under Item 18, these data will be used in characterizing the entire waste category.

22. Other Analytical Data Needs for the No-Migration Determination: In addition to the evaluation of headspace gases for flammability and comparability, the presence and concentrations of parameters listed by the EPA in the No-Migration Determination must be determined (Section C-3 of the waste profile form). The mean and variance of these analyses will be reported on the waste profile form, Section C-3, Other Analytical Data Collected for the No-Migration Determination. All analysis will comply fully with all relevant requirements of the QAPP. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Idaho National Engineering Laboratory, prior to performance of the tests.

PRELIMINARY

REFERENCES

1. U. S. Department of Energy, 1991, "TRUPACT-II Content Codes (TRUCON)," WIPP/DOE 89-004, Rev. 5, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

2. U. S. Department of Energy, 1990, "Waste Isolation Pilot Plant No-Migration Variance Petition," DOE/WIPP 89-003, Rev. 1, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

3. U. S. Department of Energy, 1991, "Resource Conservation and Recovery Act Part B Permit Application," DOE/WIPP 91-005, U. S. Department of Energy, Carlsbad, New Mexico, February 1991.

4. Clements, T. L., Jr., "Content Code Assessments for INEL Contact-Handled Stored Transuranic Wastes," WM-F1-82-021, EG&G, Idaho, Inc., Idaho Falls, Idaho, October, 1982.

5. Clements, T. L., Jr., and D. E. Kudera, 1985, "TRU-Waste Sampling Program: Volume I: Waste Characterization, and Volume II: Gas Generation Studies," EGG-WM-6503, Idaho National Engineering Laboratory, Idaho Falls, Idaho.

6. Watson, L. E., "EG&G Sampling Program Results," December 1987, RFP 4251.

7. Lappin, A. R., C. A. Gotway, M. A. Molecke, R. L. Hunter, and E. N. Lorusso, 1991, "Rationale for Revised WIPP Bin-Scale Gas-Generation Test with Contact-Handled Transuranic Wastes at the Waste Isolation Pilot Plant," SAND 90-2481, Sandia National Laboratories, Albuquerque, New Mexico.

8. U. S. Department of Energy, "Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program," DOE/EM/48063-1, Rev. 0, U. S. Department of Energy, Washington, D. C., April 1991.

PRELIMINARY

HAZARDOUS WASTE PROFILE PLAN

PLAN NUMBER: _____

SECTION A - GENERATOR DATA

1. DOE Waste Shipping Site: Idaho National Engineering Laboratory
   P.O. Box 1625, Mail Stop 3950
   Idaho Falls, Idaho 83415

2. Generating Site (If Different than Shipping Site): Rocky Flats Plant

3. Technical Contact: T.L. Clements

4. Telephone Number: (208) 526-0664

5. EPA ID Number for Shipping Site: ID 4890008952

   This information will be included in Section A - Generator Data of the RCRA Waste Profile Form for glass waste.

PRELIMINARY

SECTION B - WASTE DESCRIPTION

6. Waste Category: Glass Waste

7. Waste Generation Process:

   Physical and Chemical Description: Glass waste consists of glass sample vials, bottles, miscellaneous equipment such as ion exchange columns and dissolver pots, laboratory glassware, and glass equipment.

   Processes: These glass wastes were generated at the Rocky Flats Plant and are stored at the Idaho National Engineering Laboratory (INEL). These wastes were generated prior to the development of the WIPP Waste Acceptance Criteria (WIPP-WAC); they are WAC certified at INEL.

   This glass waste was generated in Buildings 371, 559, 707, 771, 777, and 779 at Rocky Flats. Waste sources include the following:

   - Line-generated glass from gloveboxes
   - Glass film plates used in emission spectroscopy
   - Glass bottles and pipes used in distillation and titration processes in tritium analyses
   - Glass vials used in carbon analyses and plutonium casting analyses
   - Discarded glass pipettes, tubes and vials from uranium analyses

- Glass sample containers and miscellaneous lab glassware from non-routine chemical analyses
- Glass fragments and broken pieces from glovebox cleaning
- Glass wire mesh glovebox windows
- Glass chemistry equipment and broken glovebox windows.

This glass waste was packaged in several different ways. Whole or broken glass may have been packaged, initially, in one-gallon polyethylene bottles, Fibre-Paks (containing glass that is either loose of contained in plastic bags), double-contained plastic bags, or simply taped together before it is removed from the glovebox. Waste was then double-contained in plastic when it was removed from the glovebox, regardless of the initial packaging.

8. Quantity of Waste and Time Frame of Waste Generation: There are an estimated ___ drums of this waste expected to be available for the Test Phase. This waste was generated from about 1970 to 1987; the processes used, and the composition of the waste, are not expected to vary across that time period.

9. RCRA Codes and Basis for Classification:

   F001, F002, and D008

   These EPA codes have been assigned to this waste based on knowledge of the materials and processes generating the waste. Hazardous materials that may be present on the glass waste in residual quantities include spent nitric acid, 1,1,1-trichloroethane, and carbon tetrachloride. Lead may also be present, primarily from leaded glovebox windows.

10. Data Sources:

    - WIPP No-Migration Variance Petition [1]
    - TRUPACT-II Content Codes [2]
    - Part B of the WIPP RCRA Permit Application [3]
    - Content Code Assessment for INEL Contact-Handled Transuranic Waste [4]
    - TRU Waste Sampling Program, Volumes I & II [5]

11. Correlating Waste Identification Numbers and/or Alternate Names:

    TRUPACT-II Content Code: ID 118 and 218
    Item Description Code: 440
    Waste Type: II, Solid Inorganics

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES

Items 12 through 16 are binary rejection criteria. A negative response disqualifies the container from being shipped to WIPP. Data on these criteria will be accumulated on the sampled drums for an estimate of a rejection rate, if any.

12. Free Liquids: Glass waste was usually well drained or dried from free liquids as required by waste packaging procedures. Absorbents may have been added to immobilize residual carryover liquids or condensation. One-hundred percent RTR examination of the sealed drums or standard waste boxes will be performed to verify that no free liquids in excess of one percent by volume are present. In addition, glass waste used in the experimental bins prepared for the WIPP Test Phase will be visually examined to verify the absence of free liquids. Any free liquids present in greater than one percent by volume in a waste container constitutes a rejection of that waste drum or standard waste box. Waste containers that have unidentified detectable liquids will be segregated until they can be sampled using a QAPP-approved method.

13. Explosives and Compressed Gases: No explosives have been identified in this waste by visual examination in any previous sampling programs. One-hundred percent radiographic examination of the waste containers is used to identify pressurized containers.

14. Pyrophoric Materials: Letters of agreement with waste generators and the INEL Waste Acceptance Criteria have historically prohibited the inclusion of pyrophoric materials in waste packages. Waste generator compliance with this requirement has been substantiated by the absence of any problems during handling and interim storage operations at INEL. Waste sampling programs have not identified any instances of noncompliance with the restrictions on pyrophoric materials.

15. Reactive Wastes and Corrosive Materials: Reactives, ignitables, or corrosives in this waste are not present based on a knowledge of the generating process, and have not been identified in previous sampling programs [5,6].

16. Chemical Compatibility: A chemical compatibility study has been performed on this waste category; all waste is chemically compatible for materials in quantities greater than one percent by weight. The results of this study are documented in the Part B of the WIPP RCRA Permit Application [3].

17. Visual Examination

    Visual examination will be performed on all waste used in the experimental bins prepared for the Test Phase to verify the absence of explosives, compressed gases, pyrophoric materials, reactives, ignitables and corrosives. Visual examination will also be used to identify incompatible reactions that may have taken place in the waste container.

PRELIMINARY

18. Sampling Frequency

The population of drums required from waste belonging to this content code has been determined by Sandia National Laboratories for the bin-scale experiments [7]. All of the waste containers from this waste category to be used in the bin-scale experiments will be characterized by inspection and sampling.

Data will be accumulated for the waste in this waste category, with additional waste containers being characterized, if necessary. After the test phase, sampling of waste in this waste category will cease once this fixed population has been adequately defined, and the criteria are shown to be met within specified confidence limits (see Section 3.3.1).

The sample will be randomly selected drums for the bin-scale test as determined by Sandia. If more drums are required, the random selection without replacement will be continued until the sufficient sample size has been achieved. A new mean value and range will be calculated each time a new set of data becomes available, and reported on the waste profile plans.

19. Composition of the Waste Reported in Ranges:

Constituent	Weight Percent
Glass	0 - 100 percent
Lead	0 - 10 percent
Polyethylene (packaging)	0 - 10 percent
Polyvinyl Chloride (packaging)	0 - 10 percent
Paper	0 - 1 percent
Nitric Acid	0 - 1 percent
1,1,1-Trichloroethane	0 - 1 percent
Carbon Tetrachloride	0 - 1 percent

PRELIMINARY

No-Migration Determination Requirements

20. Flammability Testing: Compliance with this condition of the No-Migration Determination will be demonstrated by the sampling and analysis of headspace gases in waste containers supporting the WIPP Test Phase. The performance of headspace gas sampling and analyses to demonstrate the absence of flammable atmospheres in waste containers will comply fully with all relevant requirements of the Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization (QAPP) [8]. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Idaho National Engineering Laboratory, prior to performance of the tests.

The data obtained from the flammability testing will be accumulated on the waste profile form, Section C-2, Item 1, Flammability Criteria, to track the expected mean and variance values of hydrogen, methane and potentially flammable VOC concentrations. Data accumulation will take place for both drum and inner containment layer headspace.

21. Comparability Testing: Compliance with these conditions of the No-Migration Determination will be demonstrated by the sampling and testing of headspace gases in waste containers supporting the WIPP Test Phase. Gas samples taken from waste containers will be analyzed for the parameters of interest and results will be compared to the comparability criteria. All analysis will comply fully with all relevant requirements of the QAPP [8]

    The data obtained from the comparability testing will be accumulated on the waste profile form, Section C-2, Item 2, Comparability Criteria, and Item 3, Verification Criteria, to track the expected mean and variance values for applicable VOCs. Data accumulation will take place for both drum and inner containment layer headspace. As specified under Item 18, these data will be used in characterizing the entire waste category.

22. Other Analytical Data Needs for the No-Migration Determination: In addition to the evaluation of headspace gases for flammability and comparability, the presence and concentrations of parameters listed by the EPA in the No-Migration Determination must be determined (Section C-3 of the waste profile form). The mean and variance of these analyses will be reported on the waste profile form, Section C-3, Other Analytical Data Collected for the No-Migration Determination. All analysis will comply fully with all relevant requirements of the QAPP. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Idaho National Engineering Laboratory, prior to performance of the tests.

PRELIMINARY

REFERENCES

1. U. S. Department of Energy, 1991, "TRUPACT-II Content Codes (TRUCON)," WIPP/DOE 89-004, Rev. 5, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

2. U. S. Department of Energy, 1990, "Waste Isolation Pilot Plant No-Migration Variance Petition," DOE/WIPP 89-003, Rev. 1, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

3. U. S. Department of Energy, 1991, "Resource Conservation and Recovery Act Part B Permit Application," DOE/WIPP 91-005, U. S. Department of Energy, Carlsbad, New Mexico, February 1991.

4. Clements, T. L., Jr., "Content Code Assessments for INEL Contact-Handled Stored Transuranic Wastes," WM-F1-82-021, EG&G, Idaho, Inc., Idaho Falls, Idaho, October, 1982.

5. Clements, T. L., Jr., and D. E. Kudera, 1985, "TRU-Waste Sampling Program: Volume I: Waste Characterization, and Volume II: Gas Generation Studies," EGG-WM-6503, Idaho National Engineering Laboratory, Idaho Falls, Idaho.

6. Watson, L. E., "EG&G Sampling Program Results," December 1987, RFP 4251.

7. Lappin, A. R., C. A. Gotway, M. A. Molecke, R. L. Hunter, and E. N. Lorusso, 1991, "Rationale for Revised WIPP Bin-Scale Gas-Generation Test with Contact-Handled Transuranic Wastes at the Waste Isolation Pilot Plant," SAND 90-2481, Sandia National Laboratories, Albuquerque, New Mexico.

8. U. S. Department of Energy, "Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program," DOE/EM/48063-1, Rev. 0, U. S. Department of Energy, Washington, D. C., April 1991.

PRELIMINARY

HAZARDOUS WASTE PROFILE PLAN

PLAN NUMBER: _____

SECTION A - GENERATOR DATA

1. DOE Waste Shipping Site: Rocky Flats Plant

2. Generating Site (If Different than Shipping Site): N/A

3. Technical Contact: G. A. O'Leary, EG&G, Rocky Flats Plant

4. Telephone Number: (303) 966-3268

5. EPA ID Number for Shipping Site: CO 789010526

SECTION B - WASTE DESCRIPTION

6. Waste Category: Leaded Rubber Waste

7. Waste Generating Process:

Physical and Chemical Description: The waste consists of discarded leaded waste comprised of Hypalon rubber and lead-oxide-impregnated neoprene. The leaded rubber typically contains up to 50 percent by weight lead.

Processes: Leaded rubber gloves are typically attached to gloveboxes and are used for handling plutonium and plutonium contaminated equipment within the gloveboxes. The gloves are worn for personnel protection and shielding from radiation exposure and contamination, as well as chemical protection, while working in gloveboxes. The gloves are replaced at scheduled intervals, or as needed.

All buildings that manage plutonium and plutonium contaminated materials use gloveboxes for containment and control of the plutonium environment (Buildings 371, 374, 55, 707, 771, 774, 776, 777, and 779). Plutonium processing requires the operators to use different process operations within gloveboxes. Lead-lined gloves are used on the gloveboxes to keep radiation exposure to personnel at a minimum. All gloves are routinely inspected for rips, tears, contamination, and excessive wear. Gloves which do not meet the safety inspection criteria are replaced with new gloves. The old gloves are discarded as waste.

Information regarding the processes which generate leaded rubber gloves was obtained from a draft version of the "Waste Stream and Residue Identification and Characterization Program" (WSRIC)[1]. WSRIC was undertaken to identify and characterize the waste streams and residues generated or stored at the Rocky Flats Plant (RFP) and to determine which streams and residue should be characterized as land disposal restricted (LDR) material.

PRELIMINARY

The draft reports and companion draft reports have been prepared in fulfillment of requirements contained in the Agreement in Principle between the United States Department of Energy and the State of Colorado signed June 28, 1989, the Settlement Agreement and Compliance Order on Consent No. 89-10-30-01 between the United States Department of Energy and the Colorado Department of Health signed November 3, 1989, and Federal Facility Compliance Agreement and Compliance Order on Consent, [Docket No. RCRA (3008) VIII-89-25] between the United States Department of Energy, the United States Environmental Protection Agency, and the State of Colorado.

8. Quantity of Waste and Time Frame of Waste Generation: _____ drum equivalents of leaded rubber waste are in storage at RFP. The projected generation rate for leaded rubber waste is ____ drums/year.

9. RCRA Codes and Basis for Classification: Leaded rubber gloves have been characterized by process knowledge and limited analytical data. Process knowledge indicates the only potential RCRA constituent is lead (D008). Analysis was performed on new (manufacturer specification) gloves utilizing the Extraction Procedure Toxicity test. The analytical results indicated leachate concentrations below the regulatory threshold. However, due to the more stringent requirements of the TCLP test, and due to the fact that used gloves will experience somewhat more degradation from process applications than would be evidenced by the brand new gloves, the determination has been made that leaded rubber gloves would be managed as a RCRA hazardous waste.

10. Data Sources: Information regarding the characteristics of leaded rubber waste from RFP has been reported in the following documents:

    - WIPP No-Migration Variance Petition [2]
    - TRUPACT-II Content Codes [3]
    - Part B of the WIPP RCRA Permit Application [4]
    - Waste Stream and Residue Identification and Characterization Report [5]
    - FFCA Inventory Report [6]

11. Correlating Waste Identification Numbers and/or Alternate Names:

    TRUPACT-II Content Code: RF 123
    Item Description Code: 339
    Waste Type: III, Solid Organics

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES

Items 12 through 16 are binary rejection criteria. A negative response disqualifies the container from being shipped to WIPP. Data on these criteria will be accumulated on the sampled drums for an estimate of a rejection rate.

12. Free Liquids: Leaded rubber is well drained or dried from free liquids as required by waste packaging procedures. Absorbent may be added to immobilize residual carryover liquids or condensation. 100 percent RTR examination of the closed drum or standard waste box is performed to verify that no free liquids are present. In addition, leaded rubber waste used in the experimental bins (prepared for the WIPP Test Phase) will be visually examined to verify the absence of free liquids. Any free liquids found in a waste container constitutes a rejection of that waste drum or standard waste box.

13. Explosives/Compressed Gases: Explosives at RFP are administratively controlled through procurement and health and safety policies. Additionally, waste-generating processes are assessed for safety hazards such as potential explosion hazards and potential inadvertent production of explosive materials. Waste packaging procedures strictly prohibit explosives from the packaged wastes. In-process inspections during waste generation and packaging provide verification that no explosives are present in the packaged wastes.

    Waste packaging procedures include provisions to ensure that pressure vessels and airtight containers are prohibited from the waste, unless they are vented and emptied. RTR is performed on 100 percent of the waste to verify that compressed gases are not present in the sealed waste drum or standard waste box.

14. Pyrophoric Materials: Waste packaging procedures prohibit all pyrophoric materials from being packaged with the waste. Operating procedures require that pyrophoric materials be rendered chemically safe by processing before being placed in a waste container. These materials are controlled and monitored very closely under RFP health and safety policies. In-process inspections during waste generation and packaging provide verification that no pyrophoric materials are present in the packaged wastes.

    The washing of leaded gloves which have been exposed to nitric acid removes the nitric acid and any pyrophoric lead nitrated that may have formed through the reaction of the nitric acid with lead. No other pyrophorics have been identified for this waste category.

15. Reactives, Ignitables and Corrosives: Leaded rubber waste does not contain reactives, ignitables or corrosives. All corrosive materials are neutralized or removed from the waste prior to packaging. In-process inspections during waste generation and packaging provide verification that no reactives, ignitables, and corrosives are present in the packaged wastes.

16. Chemical Compatibility: Chemical compatibility study has been performed on this waste category, and all waste is chemically compatible for materials in quantities greater than one percent by weight. The results of this study are documented in the Part B of the WIPP RCRA Permit Application. The chemicals and materials found in leaded rubber gloves are provided in the next section.

PRELIMINARY

17. Visual Examination

Visual examination will be performed on all waste used in the experimental bins (prepared for the WIPP Test Phase) to verify the absence of explosives, compressed gases, pyrophoric materials, reactives, ignitables, and corrosives. Visual examination will also be used to identify incompatible reactions that may have taken place in the waste container.

18. Sampling Frequency

The population of drums required from waste belonging to this content code has been determined by Sandia National Laboratories for the bin-scale experiments [7]. All of the waste containers from this waste category to be used in the bin-scale experiments will be characterized by inspection and sampling.

Data will be accumulated for the waste in this waste category, with additional waste containers being characterized, if necessary. After the test phase, the sampling frequency of waste in this waste category will be established once this ongoing population has been adequately defined, and the criteria are shown to be met within specified confidence limits (see Section 3.3.1).

The sample will be randomly selected drums for the bin-scale test as determined by Sandia. If more drums are required, the random selection without replacement will be continued until the sufficient sample size has been achieved. A new mean value and range will be calculated each time a new set of data becomes available, and reported on the waste profile plans.

PRELIMINARY

19. Composition of the Waste Reported in Ranges:

Constituent	Weight Percent
Rubber Gloves	0 - 100 percent
Lead (Rubber Gloves)	0 - 100 percent
Polyethylene (Packaging)	0 - 1 percent
Polyvinyl Chloride (Packaging)	0 - 1 percent

No-Migration Determination Requirements

20. Flammability Testing: Compliance with this condition of the No-Migration Determination will be demonstrated by the sampling and analysis of headspace gases in waste containers supporting the WIPP Test Phase. The performance of headspace gas sampling and analyses to demonstrate the absence of flammable atmospheres in waste containers will comply fully with all relevant requirements of the Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization (QAPP) [8]. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Rocky Flats Plant, prior to performance of the tests.

The data obtained from the flammability testing will be accumulated on the waste profile form, Section C-2, Item 1, Flammability Criteria, to track the expected mean and variance values of hydrogen, methane and potentially flammable VOC concentrations. Data accumulation will take place for both drum and inner containment layer headspace.

21. Comparability Testing: Compliance with these conditions of the No-Migration Determination will be demonstrated by the sampling and testing of headspace gases in waste containers supporting the WIPP Test Phase. Gas samples taken from waste containers will be analyzed for the parameters of interest and results will be compared to the comparability criteria. All analysis will comply fully with all relevant requirements of the QAPP [8]

    The data obtained from the comparability testing will be accumulated on the waste profile form, Section C-2, Item 2, Comparability Criteria, and Item 3, Verification Criteria, to track the expected mean and variance values for applicable VOCs. Data accumulation will take place for both drum and inner containment layer headspace. As specified under Item 18, these data will be used in characterizing the entire waste category.

22. Other Analytical Data Needs for the No-Migration Determination: In addition to the evaluation of headspace gases for flammability and comparability, the presence and concentrations of parameters listed by the EPA in the No-Migration Determination must be determined (Section C-3 of the waste profile form). The mean and variance of these analyses will be reported on the waste profile form, Section C-3, Other Analytical Data Collected for the No-Migration Determination. All analysis will comply fully with all relevant requirements of the QAPP. In addition, a Quality Assurance Project Plan (QAPjP), consistent with the requirements of the QAPP, will be developed to address, specifically, testing operations performed at the Rocky Flats Plant, prior to performance of the tests.

PRELIMINARY

REFERENCES

1. "Waste Stream and Residue Identification and Characterization Program" (WSRIC).

2. U. S. Department of Energy, 1990, "Waste Isolation Pilot Plant No-Migration Variance Petition," DOE/WIPP 89-003, Rev. 1, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

3. U. S. Department of Energy, 1991, "TRUPACT-II Content Codes (TRUCON)," WIPP/DOE 89-004, Rev. 5, U. S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

4. U. S. Department of Energy, 1991, "Resource Conservation and Recovery Act Part B Permit Application," DOE/WIPP 91-005, U. S. Department of Energy, Carlsbad, New Mexico, February 11.

5. Waste Stream and Residue Identification and Characterization Report

6. FFCA Inventory Report

7. U. S. Environmental Protection Agency, 1990, "No-Migration Determination," Federal Register, Vol. 55, No. 220, November 1990, 47700-47721.

8. U. S. Department of Energy, "Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program," DOE/EM/48063-1, Rev. 0, U. S. Department of Energy, Washington, D. C., April 1991.

PRELIMINARY

APPENDIX B-1

RCRA WASTE PROFILE FORM INSTRUCTIONS

PRELIMINARY

APPENDIX B-1
RCRA WASTE PROFILE FORM INSTRUCTIONS

Page 1 - RCRA Waste Profile Form

Section A - Generator Data

1. Space is provided on the form for insertion of the site name, mailing address, and technical contact name and phone number. The designated technical contact should be a person able to address questions pertaining to the data presented on the form.

2. The EPA Identification Number entered on this form should be that of the facility which ships the waste.

Section B - Waste Description

1. Give the designated name for your waste category (e.g., Raschig Rings; ID 222; combustibles,------,-----). How the wastes are categorized is at the discretion of the generator. See Section 2.2.1 of the guidance document for a description of waste categorization methods.

2. Enter the document number assigned to the Waste Profile Plan.

NOTE: The Shipper EPA Identification Number (Item 2 under Section A) and the Waste Category (Item 1 under Section B) should be repeated on every page of the Waste Profile Form.

PRELIMINARY

Page 2 - RCRA Waste Profile Form

Section C - Physical and Chemical Properties

Subsection C-1 - Qualitative Data

1. Any free liquids in the waste must be less than one percent of the waste container volume. Using the columns provided indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

2. Pyrophoric materials, other than radionuclides, must be rendered safe by mixing them with chemically stable materials or processed to remove their hazardous properties. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

3. Compressed gases must not be present in the waste. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

4. Chemical incompatibilities must not occur within the waste. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

5. The waste must not exhibit the characteristic of ignitability. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

6. The waste must not exhibit the characteristic of corrosivity. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

7. The waste must not exhibit the characteristic of reactivity. Indicate if the criterion is satisfied by checking the appropriate space and selecting the method or methods utilized to make the determination.

NOTE: For the Test Phase, data should be collected by the visual examination methods until it can be demonstrated that the criteria will be satisfied within a specified confidence level for a given waste category.

Page 3 - RCRA Waste Profile Form

Section C - Physical and Chemical Properties (Continued)

Subsection C-2 - No-Migration Determination Criteria

PRELIMINARY

1. Flammability Criteria

The No-Migration Determination requires that there be no layer of confinement having flammable mixtures of gases and vapors or mixtures of gases and vapors that could become flammable when mixed with air for each waste container emplaced underground at WIPP. EPA has defined any mixture of gases or vapors that exceeds 50 percent of the LEL of the mixture in air as potentially flammable. The analytical methods for determining the concentrations of hydrogen, methane and VOCs are described in the QAPP. If the headspace gas analysis indicates that the flammable VOCs are less than 500 ppm, then the Le Chatelier formula should be applied to demonstrate that the hydrogen and methane mixture do not exceed 50 percent of the LEL. If the headspace gas analysis indicates that the amount of flammable VOCs listed in Subsection C-3 is greater than 500 ppm, then a flame test must be performed to determine if the flammable mixture criterion is satisfied. If the mixture is found to be not flammable by the flame test, the Le Chatelier formula should be applied to demonstrate that the hydrogen, methane, and VOC mixture do not exceed 50 percent of the LEL.

The flammable VOC concentration must be determined to be either above or below 500 ppm for each container within a waste category. If the VOC concentration of the container is above 500 ppm, the container must be added to the cumulative count for this result in the space marked "Count Above". The container must then be determined to be either flammable or non-flammable by the applicable method specified in the QAPP, and the conclusion reported in the cumulative count for the appropriate result. If the VOC concentration is below 500 ppm, the container must be added to the cumulative count for this result in the space marked "Count Below". The mean and variance must then be calculated for hydrogen concentration (C_1), methane concentration (C_2), and for the LEL of the mixture ($C_1/4 + C_2/5$). The results should be reported in the designated space for this data.

This data will be used to reduce the frequency of sampling based on statistical analysis of the data. The statistical analysis will consider a 90 percent confidence interval to demonstrate that the requirements are met for a given waste category.

Page 4 - RCRA Waste Profile Form

WASTE TYPE: The TRUCON document specifies four waste types, I - Solidified aqueous or homogeneous inorganic solids; II - Solid inorganics; III - Solid organics; IV - Solidified organics. Enter the waste type applicable to the waste category, in the space provided.

2. Comparability Criteria

The No-Migration Determination requires that DOE demonstrate, by waste type, that the composition of hazardous constituents in the headspace of containers is similar to those concentrations reported in the Petition. EPA has chosen the five major hazardous constituents reported by DOE to use as the basis of comparison.

In the appropriate space, report the mean and variance for each of the five constituents listed for a specific waste category. This information should be taken from the cumulative results of the waste containers sampled in this waste category. This data will be used to reduce the frequency of sampling based on statistical analysis of the data. The statistical analysis will consider a specified confidence interval to demonstrate that the requirements are met for a given waste category.

Page 5 - RCRA Waste Profile Form

<u>Section C - Physical and Chemical Properties (Continued)</u>

Subsection C-2 - No-Migration Determination Criteria (Continued)

WASTE TYPE: The TRUCON document specifies four waste types, I - Solidified aqueous or homogeneous inorganic solids; II - Solid inorganics; III - Solid organics; IV - Solidified organics. Enter the waste type applicable to the category, in the space provided.

3. Verification Criteria

The No-Migration Determination, in support of the no-migration finding, requires that the headspace concentration for each of three specific hazardous constituents does not exceed ten times the mean concentration for each constituent by waste type as reported in the Petition.

In the appropriate space, report the mean and variance for the constituents listed for a specific waste category. This information should be taken from the cumulative results of the waste containers sampled in this waste category. This data will be used to reduce the frequency of sampling based on statistical analysis of the data. The statistical analysis will consider a specified confidence interval to demonstrate that the requirements are met for a given waste category.

PRELIMINARY

Pages 6 and 7 - RCRA Waste Profile Form

Subsection C-3 - Other Analytical Data Requirements for the No-Migration Determination

1. In the No-Migration Determination, the EPA suggests that at a minimum the wastes should be analyzed for the constituents listed on this form. Testing for these constituents should include headspace gas analysis of all waste types for the organic compounds, and total analysis of the sludges for both the organic compounds and the metals.

   In the appropriate space, report the mean and variance for the constituents listed for a specific waste category. This information should be taken from the cumulative results of the waste containers sampled in this waste category. This data will be used to reduce the frequency of sampling based on statistical analysis of the data. The statistical analysis will consider a specified confidence interval to demonstrate that the requirements are met for a given waste category.

Page 8 - RCRA Waste Profile Form

Section D - Waste Composition

1. Enter, in this space, estimates for the major chemical constituents and materials present in this waste category. An example of this type of information can be obtained from the TRUPACT-II Chemical Lists.

Page 9 - RCRA Waste Profile Form

Section E - RCRA Data

1. Only waste with the EPA hazardous waste codes listed in this section may be shipped to WIPP. Circle those codes specific to your waste category.

Page 10 - RCRA Waste Profile Form

Section F - Comments and Certification

1. This section is provided for the generator site to supply supporting comments pertinent to the information or justification for information provided on this form.

2. The DOE official at the generator site, responsible for waste management activities, must certify the form.

PRELIMINARY

APPENDIX B-2

RCRA WASTE PROFILE FORM

PRELIMINARY

APPENDIX B-2

RCRA WASTE PROFILE FORM

SECTION A - GENERATOR DATA

1. DOE Site: _____

   Mailing Address: _____

   Technical Contact: _____ Phone No: _____

2. Shipper EPA ID Number: _____

PRELIMINARY

SECTION B - WASTE DESCRIPTION

1. Waste Classified As (Category): _____

2. RCRA Waste Profile Plan Reference: Document No. _____

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES

WASTE CATEGORY: _____ SHIPPER EPA ID NO:_____

SUBSECTION C-1 QUALITATIVE DATA					
CRITERION	CRITERION MET	METHOD OF COMPLIANCE			
		Process Knowledge	Real-Time Radiography	Visual Examination	Other (Specify)
(1) LESS THAN 1% FREE LIQUIDS					
(2) NO PYROPHORICS					
(3) NO EXPLOSIVES AND NO COMPRESSED GASES					
(4) NO INCOMPATIBLES					
(5) NO IGNITABLES					
(6) NO CORROSIVES					
(7) NO REACTIVES					

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES (Cont.)

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

SUBSECTION C-2 NO-MIGRATION DETERMINATION CRITERIA (Applicable Test Phase Waste Only)							
1. FLAMMABILITY CRITERIA							
FLAMMABLE VOC CONCENTRATION ABOVE OR BELOW 500 PPM							
COUNT ABOVE: _____		COUNT BELOW: _____					
FLAME TEST COUNT		HYDROGEN (C_1)		METHANE (C_2)		$\frac{C_1}{4} + \frac{C_2}{5}$	
FLAMMABLE	NOT FLAMMABLE	MEAN	VARIANCE	MEAN	VARIANCE	MEAN	VARIANCE

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES (Cont.)

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

WASTE TYPE: _____

SUBSECTION C-2 NO-MIGRATION DETERMINATION CRITERIA
(Applicable Test Phase Waste Only)

2. COMPARABILITY CRITERIA

COMPARABILITY	METHOD	MEAN	VARIANCE
Maximum Concentration of VOCs			
Carbon Tetrachloride	Headspace Analysis		
Methylene Chloride	Headspace Analysis		
1,1,1 Trichloroethane	Headspace Analysis		
Trichloroethylene	Headspace Analysis		
1,1,2-Trichloro-1,2,2-trifluoroethane	Headspace Analysis		

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES (Cont.)

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

WASTE TYPE: _____

SUBSECTION C-2 NO-MIGRATION DETERMINATION VERIFICATION CRITERIA
(Applicable Bin-Scale Test Waste Only)

3. VERIFICATION CRITERIA

VERIFICATION CRITERIA	METHOD	MEAN	VARIANCE
Mean Values of VOCs			
Carbon Tetrachloride	Headspace Analysis		
Methylene Chloride	Headspace Analysis		
Trichloroethylene	Headspace Analysis		

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES (Cont.)

WASTE CATEGORY:_____ SHIPPER EPA ID NO: _____

SUBSECTION C-3 OTHER ANALYTICAL DATA COLLECTED FOR THE NO-MIGRATION DETERMINATION

PARAMETER/COMPOUND	METHOD			
	Headspace Analysis		Sludge Analysis	
	MEAN	VARIANCE	MEAN	VARIANCE
Acetone				
Benzene				
Bromoform				
Butanol				
Nitrobenzene (site-specific waste only)				
1,1,2,2-Tetrachloroethane				
Tetrachloroethylene				
Toluene				
2-Butanone				
Carbon Tetrachloride				
Chloroform				
Chlorobenzene				
Cyclohexane				
1,1-Dichloroethane				
1,2-Dichloroethane				
1,1-Dichloroethene				
cis-1,2-Dichloroethene				
Ethyl Benzene				
Ethyl ether				
Formaldehyde (site-specific waste only)				
Hydrazine (site-specific waste only)				
Methanol				
4-Methyl-2-pentanone				
Methylene Chloride				
1,3,5-Trimethylbenzene				
1,2,4-Trimethylbenzene				

PRELIMINARY

SECTION C - PHYSICAL AND CHEMICAL PROPERTIES (Cont.)

WASTE CATEGORY:_____ SHIPPER EPA ID NO: _____

SUBSECTION C-3 OTHER ANALYTICAL DATA COLLECTED FOR THE NO-MIGRATION DETERMINATION
(Continued)

PARAMETER/COMPOUND	METHOD			
	Headspace Analysis		Sludge Analysis	
	MEAN	VARIANCE	MEAN	VARIANCE
1,1,1 Trichloroethane				
Trichloroethylene				
1,1,2-Trichloro-1,2,2-trifluoroethane				
m-Xylene				
o-Xylene				
p-Xylene				
Arsenic				
Barium				
Cadmium				
Chromium				
Lead				
Mercury				
Selenium				
Silver				

PRELIMINARY

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

SECTION D - WASTE COMPOSITION

1. List all components of the waste, by percentage. Account for 100 percent of waste in the "Typical %" column.

COMPONENT	TYPICAL %	RANGE %

PRELIMINARY

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

SECTION E - RCRA DATA

EPA hazardous waste code(s). Only wastes having the following EPA hazardous waste codes may be shipped to the WIPP (circle the codes that are applicable):

F001	D012	D026	D040
F002	D013	D027	D041
F003	D014	D028	D042
F004	D015	D029	D043
F005	D016	D030	
	D017	D031	P015
D004	D018	D032	
D005	D019	D033	
D006	D020	D034	
D007	D021	D035	
D008	D022	D036	
D009	D023	D037	
D010	D024	D038	
D011	D025	D039	

PRELIMINARY

WASTE CATEGORY: _____ SHIPPER EPA ID NO: _____

SECTION F - COMMENTS AND CERTIFICATION

COMMENTS: _____

PRELIMINARY

Certified By: _____ Date: _____