ATTACHMENT B

WASTE ANALYSIS PLAN

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ATTACHMENT B

WASTE ANALYSIS PLAN

Introduction and Attachment Highlights

This waste analysis plan (**WAP**) has been prepared for management, storage, or disposal activities to be conducted at the Waste Isolation Pilot Plant (**WIPP**) facility to meet requirements set forth in 20.4.1.500 NMAC (incorporating 40 CFR §264.13). Guidance in the most recent U.S. Environmental Protection Agency (**EPA**) manual on waste analysis has been incorporated into the preparation of this WAP (EPA, 1994). This WAP includes test methods, details of planned waste sampling and analysis, a description of the waste shipment screening and verification process, and a description of the quality assurance (**QA**)/quality control (**QC**) program. Before the Permittees manage, store, or dispose transuranic (**TRU**) mixed waste from a generator/storage site (**site**), the Permittees shall require that site to implement the applicable requirements of this WAP.

TRU mixed waste that may be stored or disposed at WIPP are or were generated at DOE generator/storage sites by various specific processes and activities. Examples of the major types of operations that generate this waste include:

- Production of Nuclear Products—Production of nuclear products includes reactor operation, radionuclide separation/finishing, and weapons fabrication and manufacturing. The majority of the TRU mixed waste was generated by weapons fabrication and radionuclide separation/finishing processes. More specifically, wastes consist of residues from chemical processes, air and liquid filtration, casting, machining, cleaning, product quality sampling, analytical activities, and maintenance and refurbishment of equipment and facilities.

- Plutonium Recovery—Plutonium recovery wastes are residues from the recovery of plutonium-contaminated molds, metals, glass, plastics, rags, salts used in electrorefining, precipitates, firebrick, soot, and filters.

- Research and Development (**R&D**)—R&D projects include a variety of hot cell or glovebox activities that often simulate full-scale operations described above, producing similar TRU mixed wastes. Other types of R&D projects include metallurgical research, actinide separations, process demonstrations, and chemical and physical properties determinations.

- Decontamination and Decommissioning—Facilities and equipment that are no longer needed or usable are decontaminated and decommissioned, resulting in TRU mixed wastes consisting of scrap materials, cleaning agents, tools, piping, filters, Plexiglas™, gloveboxes, concrete rubble, asphalt, cinder blocks, and other building materials. These materials are expected to be the largest category by volume of TRU mixed waste to be generated in the future.

TRU mixed waste contains both TRU radioactive and hazardous components, as defined in 20.4.1.800 NMAC (incorporating 40 CFR, §268.35(d)), and in the Federal Facility Compliance Act, Public Law 102- 386, Title 1, §3021(d). It is designated and separately packaged as either contact-handled (**CH**) or remote-handled (**RH**), based on the radiological dose rate at the surface of the waste container. RH TRU mixed wastes will not be received and disposed at the WIPP facility.

The hazardous components of the TRU mixed waste to be managed at the WIPP facility are designated in the Permittees' RCRA Part A Permit Application (Permit Attachment O). Some of the waste may also be identified by unique state hazardous waste codes. These wastes are acceptable at WIPP as long as the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) in Module II are met. This WAP describes the measures that will be taken to assure that the TRU mixed wastes received at the WIPP facility are within the scope of the RCRA Part A Permit Application (Permit Attachment O) as established by 20.4.1.500 NMAC (incorporating 40 CFR §264), and that they comply with unit-specific requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.600), Miscellaneous Units.

Some TRU mixed waste is retrievably stored at the DOE generator/storage sites. Additional TRU mixed waste will be generated and packaged into containers at these generator/storage sites in the future. TRU mixed waste will be retrieved from storage areas at a DOE generator/storage site. Retrievably stored waste is defined as TRU mixed waste generated after 1970 and before NMED notifies the Permittees, by approval of the final audit report, that the characterization requirements of the WAP at a generator/storage site have been implemented. Newly generated waste is defined as TRU mixed waste generated after NMED approves the final audit report for a generator/storage site. Retrievably stored TRU mixed waste will be characterized on an ongoing basis, as the waste is retrieved. Newly generated TRU mixed waste shall be characterized as it is generated. Waste characterization requirements for retrievably stored and newly generated TRU mixed wastes differ, as discussed in Sections B-3d(1) and B-3d(2).

Characterization requirements for individual containers of TRU mixed waste are specified on a waste stream basis. A waste stream is defined as waste material generated from a single process or from an activity that is similar in material, physical form, and hazardous constituents. Waste streams are grouped by Waste Matrix Code Groups related to the physical and chemical properties of the waste. Generator/storage sites shall use the characterization techniques described in this WAP to assign appropriate Waste Matrix Code Groups for WIPP disposal. The Waste Matrix Code Groups are solidified inorganics, solidified organics, salt waste, soils, lead/cadmium metal, inorganic nonmetal waste, combustible waste, graphite, filters, heterogeneous debris waste, and uncategorized metal. Waste Matrix Code Groups can be grouped into three Summary Category groups: Homogenous Solids (Summary Category S3000), Soil/Gravel (Summary Category S4000), and Debris Waste (Summary Category S5000).

TRU mixed wastes are initially categorized into the three broad Summary Category Groups that are related to the final physical form of the wastes. Waste characterization requirements for these groups are specified separately in Section B-2 of this WAP. Each of the three groups is described below.

S3000 - Homogeneous Solids

Homogeneous solids, or solid process residues, are defined as solid materials, excluding soil, that do not meet the NMED criteria for classification as debris (20.4.1.800 NMAC (incorporating 40 CFR §268.2[g] and [h])). Included in the series of solid process residues are inorganic process residues, inorganic sludges, salt waste, and pyrochemical salt waste. Other waste streams are included in this Summary Category Group based on the specific waste stream types and final waste form. This Summary Category Group is expected to contain toxic metals and spent solvents. This category includes wastes that are at least 50 percent by volume solid process residues.

S4000 - Soils/Gravel

This Summary Category Group includes S4000 waste streams that are at least 50 percent by volume soil/gravel. This Summary Category Group is expected to contain toxic metals. Soils/gravel are further categorized by the amount of debris included in the matrix.

S5000 - Debris Wastes

This Summary Category Group includes heterogenous waste that is at least 50 percent by volume materials that meet the criteria specified in 20.4.1.800 NMAC (incorporating 40 CFR §268.2 (g)). Debris means solid material exceeding a 2.36 inch (in.) (60 millimeter) particle size that is intended for disposal and that is:

1. a manufactured object, or
2. plant or animal matter, or
3. natural geologic material.

Particles smaller than 2.36 inches in size may be considered debris if the debris is a manufactured object and if it is not a particle of S3000 or S4000 material.

If a waste does not include at least 50 percent of any given category by volume, characterization shall be performed using the waste characterization process required for the category constituting the greatest volume of waste for that waste stream (see Section B-3d).

The most common hazardous constituents in the TRU mixed waste to be managed in the WIPP facility consist of the following:

Metals

Some of the TRU mixed waste to be emplaced in the WIPP facility contains metals for which 20.4.1.200 NMAC (incorporating 40 CFR §261.24), toxicity characteristics were established (EPA hazardous waste codes D004 through D011). Cadmium, chromium, lead, mercury, selenium, and silver are present in discarded tools and equipment, solidified sludges, cemented laboratory liquids, and waste from decontamination and decommissioning activities. A large percentage of the waste consists of lead-lined gloveboxes, leaded rubber gloves and aprons, lead bricks and piping, lead tape, and other lead items. Lead, because of its radiation-shielding applications, is the most prevalent toxicity-characteristic metal present.

Halogenated Volatile Organic Compounds

Some of the TRU mixed waste to be emplaced in the WIPP facility contains spent halogenated volatile organic compound (**VOC**) solvents identified in 20.4.1.200 NMAC (incorporating 40 CFR, §261.31) (EPA hazardous waste numbers F001 through F005). Tetrachloroethylene; trichloroethylene; methylene chloride; carbon tetrachloride; 1,1,1-trichloroethane; and 1,1,2-trichloro-1,2,2-trifluoroethane (EPA hazardous waste codes F001 and F002) are the most prevalent halogenated organic compounds identified in TRU mixed waste that may be managed at the WIPP facility during the Disposal Phase. These compounds are commonly used to clean metal surfaces prior to plating, polishing, or fabrication; to dissolve other compounds; or as coolants. Because they are highly volatile, only small amounts typically remain on equipment after cleaning or, in the case of treated wastewaters, in the sludges after clarification and flocculation. Radiolysis may also generate halogenated volatile organic compounds.

Nonhalogenated Volatile Organic Compounds

Xylene, methanol, and n-butanol are the most prevalent nonhalogenated VOCs in TRU mixed waste that may be managed at the WIPP facility during the Disposal Phase. Like the halogenated VOCs, they are used as degreasers and solvents and are similarly volatile. The same analytical methods that are used for halogenated VOCs are used to detect the presence of nonhalogenated VOCs. Radiolysis may also generate non-halogenated volatile organic compounds.

All waste characterization activities specified in this WAP and associated Permit Attachments shall be carried out at generator/storage sites and, as applicable, at the WIPP facility in accordance with this WAP. The Permittees will audit generator/storage site waste characterization programs and activities as described in Section B-3. Waste characterization activities at the generator/storage sites include the following, although not all these techniques will be used on each container, as discussed in Section B-3:

- Radiography, which is an x-ray technique to determine physical contents of containers

- Visual examination of opened containers as an alternative way to determine their physical contents or to verify Radiography results

- Headspace-gas sampling to determine VOC content of gases in the void volume of the containers

- Sampling and analysis of waste forms that are homogeneous and can be representatively sampled to determine concentrations of hazardous waste constituents and toxicity characteristic contaminants of waste in containers

- Compilation of acceptable knowledge documentation into an auditable record[1]

Once the required waste characterization is complete, the generator/storage site will complete a Waste Stream Profile Form (**WSPF**) to document the results of their characterization activities (Section B-1d). The WSPF and the Characterization Information Summary for the waste stream resulting from waste characterization activities shall be transmitted to the Permittees, reviewed for completeness, and screened for acceptance prior to loading any TRU mixed waste into the Transuranic Package Transporter (**TRUPACT-II**) at the generator facility, as described in Section B-4. Only TRU mixed waste and TRU waste that has been characterized in accordance with this WAP and that meets the **TSDF-WAC** specified in this Permit will be accepted at the WIPP facility for disposal in a permitted Underground Hazardous Waste Disposal Unit (**HWDU**).

In the event the Permittees request detailed information on a waste stream, the site will provide a Waste Stream Characterization Package (Section B3-12b(2)). For each waste stream, this package will include the WSPF, the Characterization Information Summary, and the complete AK summary. The Waste Stream Characterization Package will also include specific Batch Data Reports and raw analytical data associated with waste container characterization as requested by the Permittees.

B-1 Identification of TRU Mixed Waste to be Managed at the WIPP Facility

B-1a Waste Stream Identification

TRU mixed waste destined for disposal at WIPP will be characterized on a waste stream basis. Generator/storage sites will delineate waste streams using acceptable knowledge. Required acceptable knowledge is specified in Section B-3b and Permit Attachment B4. If acceptable knowledge for retrievably stored waste does not comply with these requirements (i.e., heterogenous Debris Waste in Summary Category S5000), the Permittees will reexamine (and characterize) the waste in the same manner as newly generated waste.

All of the waste within a waste stream may not be available for sampling and analysis at one time. In these instances, generator/storage sites may divide waste streams into waste stream lots based on staging, transportation, or handling issues. Characterization activities shall then be undertaken on a waste stream lot basis. A WSPF need not be submitted for subsequent waste stream lots unless warranted by the characterization information.

B-1b Waste Summary Category Groups and Hazardous Waste Accepted at the WIPP Facility

Once a waste stream has been delineated, generator/storage sites will assign a Waste Matrix Code to the waste stream based on the physical form of the waste. Waste streams are then assigned to one of three broad Summary Category Groups; S3000-Homogeneous Solids, S4000-Soils/Gravel, and S5000-Debris Wastes. These Summary Category Groups are used to determine further characterization requirements.

[1] "Auditable records" mean those records which allow the Permittees to conduct a systematic assessment, analysis, and evaluation of the Permittees compliance with the WAP and this Permit.

The Permittees will only allow generators to ship those TRU mixed waste streams with EPA hazardous waste codes listed on the Permittees' RCRA Part A Permit Application (Permit Attachment O). Some of the waste may also be identified by unique state hazardous waste codes. These wastes are acceptable at WIPP as long as the TSDF-WAC are met. The Permittees will perform characterization of all waste streams as required by this WAP. If during the characterization process, new EPA hazardous waste codes are identified, those wastes will be prohibited for disposal at the WIPP facility until a permit modification has been submitted to and approved by the NMED for these new EPA hazardous waste codes. Similar waste streams at other generator/storage sites will be examined by the Permittees to ensure that the newly identified EPA hazardous waste codes do not apply to those similar waste streams. If the other waste streams also require new EPA hazardous waste code, shipment of these similar waste streams will also be prohibited for disposal until a permit modification has been submitted to and approved by NMED.

B-1c Waste Prohibited at the WIPP Facility

The following TRU mixed waste are prohibited at the WIPP facility:

- liquid waste (waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container (e.g., 55 gallon drum or standard waste box) may not exceed 1 percent volume of that container)
- non-radionuclide pyrophoric materials, such as elemental potassium
- hazardous wastes not occurring as co-contaminants with TRU mixed wastes (non-mixed hazardous wastes)
- wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes
- wastes containing explosives or compressed gases
- wastes with polychlorinated biphenyl (**PCB**) concentrations equal to or greater than 50 parts per million
- wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)
- RH TRU mixed waste (waste with a surface dose rate of 200 millirem per hour or greater)
- any waste container that does not have VOC concentration values reported for the headspace
- any waste container which has not undergone either radiographic or visual examination

- any waste container from a waste stream which has not been preceded by an appropriate, certified WSPF (see Section B-1d)

Before accepting a container holding TRU mixed waste, the Permittees will ensure, through audit and as part of their Permittee-level data reviews (Section B3-10c), that generator/storage sites examine the radiography or visual examination data records (Section B-4b) to verify that the container holds no unvented compressed gas containers and that residual liquid does not exceed 1 percent volume in any payload container. If discrepancies or inconsistencies are detected during the data review, the generator/storage site will review the radiography video tape or visual examination tape to verify that the observed physical form of the waste is consistent with the waste stream description provided by the generator and to ensure that no prohibited items are present in the waste. Radiography tapes will be selected randomly from at least one percent of containers received at WIPP and will be reviewed and compared to radiographic data forms. All personnel who review radiography video tapes will be trained to the same standard as radiography operators. Section B-4 includes a description of the waste verification process that the Permittees will conduct prior to receiving a shipment at the WIPP facility.

Containers are vented through filters or, allowing any gases that are generated by radiolytic and microbial processes within a waste container to escape, thereby preventing over pressurization or development of conditions within the container that would lead to the development of ignitable, corrosive, reactive, or other characteristic wastes.

To ensure the integrity of the WIPP facility, waste streams identified to contain incompatible materials or materials incompatible with waste containers cannot be shipped to WIPP unless they are treated to remove the incompatibility. Only those waste streams that are compatible or have been treated to remove incompatibilities will be shipped to WIPP.

The VOC concentrations in the headspace of waste containers have been limited to those which when averaged on a room basis, will ensure compliance with the performance standards. These limits are presented in Table B-2 as maximum allowable VOC room-averaged headspace concentration limits. There are no maximum allowable headspace gas concentration limits for individual containers, as some containers can exceed these values as long as container headspace averages in a disposal room do not.

B-1d Control of Waste Acceptance

Every waste stream shipped to WIPP shall be preceded by a WSPF (Figure B-1). The required WSPF information and the Characterization Information Summary elements are found in Section B3-12b(1) and Section B3-12b(2).

Generator/storage sites will provide the WSPF to the Permittees for each waste stream prior to its acceptance for disposal at WIPP. The WSPF and the Characterization Information Summary will be transmitted to the Permittees for each waste stream from a generator/storage site. If continued waste characterization reveal discrepancies that identify different hazardous waste codes or indicates that the waste belongs to a different waste stream, the waste will be redefined to a separate waste stream and a new WSPF submitted.

The Permittees are responsible for the review of WSPFs (Section B3-12b(1)) and Characterization Information Summaries to verify compliance with the restrictions on TRU mixed wastes for WIPP disposal. The Permittees will submit completed WSPFs to NMED prior to waste stream shipment. The Permittees will also be responsible for the review of shipping records (Section B-4b) to verify that each waste container has been prepared and characterized in accordance with applicable provisions of this WAP. Waste characterization data shall confirm the absence of prohibited items specified in Section B-1c.

As stated in the Introduction of this WAP, any time the Permittees request additional information concerning a waste stream, the generator/storage site will provide a Waste Stream Characterization Package (Section B3-12b(2)). The option for the Permittees to request additional information ensures that the waste being offered for disposal is adequately characterized and accurately described on the WSPF.

B-1e Waste Generating Processes at the WIPP Facility

Waste generated as a result of the waste containers handling and processing activities at the WIPP facility is termed “derived” waste. Because derived wastes can contain only those RCRA-regulated materials present in the waste from which they were derived, no additional characterization of the derived waste is required for disposal purposes. In other words, the generator/storage site's characterization data and knowledge of the processes at the WIPP facility will be used to identify and characterize hazardous waste and hazardous constituents in derived waste. The management of derived waste is addressed in Permit Attachment M1.

B-2 Waste Parameters

The following waste analysis parameters shall be characterized at the generator/storage sites:

- Confirmation of physical form and exclusion of prohibited items specified in Section B-1c
- Toxicity characteristic contaminants listed in 20.4.1.200 NMAC (incorporating 40 CFR, §261.24), Table 1 (excluding pesticides), as specified in Permit Attachment O.
- F-listed and P-listed solvents or waste (F001, F002, F003, F004, F005, F006, F007, F009, P015) found in 20.4.1.200 NMAC (incorporating 40 CFR §261.31)
- Hazardous constituents included in 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII as specified in Tables B-1, B-3 and B-4, as well as any other hazardous constituent identified through acceptable knowledge.

Tables B-1, B-3, B-4 and B-5 provide the parameters of interest for the various constituent groupings and analytical methodologies. The following sections provide a description of the acceptable methods to evaluate these parameters for each waste Summary Category Group.

B-3 Characterization Methods

The characterization techniques used by generator/storage sites includes acceptable knowledge, which incorporates confirmation by headspace-gas sampling and analysis, radiography, and homogeneous waste sampling and analysis. All confirmation characterization activities are performed in accordance with the WAP. Table B-6 provides a summary of the characterization requirements for TRU mixed waste.

TRU mixed waste may be characterized in lots (Section B-1a) and/or batches. A sampling batch can be up to 20 samples (excluding field QC samples), all of which shall be collected within 14 days of the first sample in the batch. An analytical batch can be up to 20 samples (excluding laboratory QC samples), all of which shall be received by the laboratory within 14 days of the validated time of sample receipt of the first sample in the batch. For on-line integrated headspace-gas sampling/analytical systems, samples will be collected within a 12-hour period using the same on-line integrated sampling/analysis system. The analytical requirements are specified by the analytical method being used in the on-line system (e.g., FTIR, GC/MS). Refer to Permit Attachment B3 for additional clarification regarding the expected contents of Batch Data Reports.

B-3a Sampling and Analytical Methods

B-3a(1) Headspace Gas Sampling and Analysis

Headspace-gas samples are used to determine the types and concentrations of VOCs in the void volume of waste containers. Measured headspace VOC concentrations in waste containers received at the WIPP facility will be compared routinely and in accordance with requirements of Permit Attachment N to ensure that, on an annual basis, there are no associated adverse worker or public-health impacts. In addition, VOC constituents will be compared to those assigned by acceptable knowledge, and the Permittees will assign hazardous waste codes, as warranted. This comparison may include an analysis of radiolytically derived VOCs. The Permittees may also consider radiolysis when assessing the presence of listed waste, and whether radiolysis would generate wastes which exhibit the toxicity characteristic. Refer to Permit Attachment B4 for additional clarification regarding hazardous waste code assignment and headspace gas results.

Every TRU mixed waste container or statistically selected containers from waste streams that meet the conditions for reduced headspace gas sampling listed in this section will be sampled and analyzed to determine the concentrations of VOCs (presented in Table B-3) in headspace gases. If composite samples are used, containers used in the composite sample must be from the same waste stream with no more than 20 containers being included in a single composite sample. Sampling protocols, equipment, and QA/QC methods for headspace-gas sampling are provided in Permit Attachment B1. In accordance with EPA convention, identification of hazardous constituents detected by gas chromatography/mass spectrometry methods that are not on the list of target analytes shall be reported. These compounds are reported as tentatively identified compounds (**TICs**) in the analytical batch data report and shall be added to the target analyte list if detected in a given waste stream, if they appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, and if they are reported in 25% of the waste

containers sampled from a given waste stream. The headspace gas analysis method Quality Assurance Objectives (**QAOs**) are specified in Permit Attachment B3.

B-3a(1)(I) Reduced Sampling Requirements for Homogeneous Solid or Soil/Gravel Waste Streams with no VOC-Related Hazardous Waste Codes

Headspace gas sampling of homogeneous solid and soil/gravel wastes that have no VOC-related hazardous waste codes assigned may qualify for reduced headspace sampling if they meet the following criteria:

- The waste stream or waste stream lot must consist of more than 10 containers.
- The waste stream must be a homogeneous solid or soil/gravel waste stream that has no VOC-related hazardous waste codes assigned to it.
- The results of the solid sampling and analysis must confirm that no VOC-related hazardous waste codes should be assigned to the waste stream.

If a waste stream meets these conditions for reduced headspace gas sampling, generator/storage sites may choose to randomly select containers for headspace gas sampling and analysis using the statistical approach in Permit Attachment B2, Section B2-2b.

B-3a(1)(ii) Reduced Sampling Requirements for Thermally Treated Waste Streams

Headspace gas sampling of homogeneous solid and soil/gravel wastes that have undergone high-temperature thermal processes may qualify for reduced headspace sampling if they meet the following criteria:

- The waste stream or waste stream lot must consist of more than 10 containers.
- The waste stream must have either been generated using a high-temperature thermal process or been subjected to a high-temperature thermal process after generation that resulted in the reduction of matrix-related VOCs in the headspace to concentrations below the PRQLs in Permit Attachment B3, Table B3-2.
- The site must have documentation demonstrating that high-temperature thermal processes were used.

If a waste stream meets these conditions for reduced headspace gas sampling, generator/storage sites may choose to randomly select containers for headspace gas sampling and analysis using the statistical approach in Permit Attachment B2, Section B2-2b.

B-3a(2) Homogeneous Waste Sampling and Analysis

Sampling of homogeneous and soil/gravel wastes shall result in the collection of a sample that is used to confirm hazardous waste code assignment by acceptable knowledge. Sampling is accomplished through core or other EPA approved sampling, which is described in Permit

Attachment B1.For those waste streams defined as Summary Category Groups S3000 or S4000 on page B-3, debris that may also be present within these wastes need not be sampled. The waste containers for sampling and analysis are to be selected randomly from the population of containers for the waste stream. The random selection methodology is specified in Permit Attachment B2.

Totals or TCLP analyses for PCBs, VOCs, SVOCs, and RCRA-regulated metals are used to determine waste parameters in soils/gravels and solids that may be important to the performance within the disposal system (Tables B-4 and B-5). To determine if a waste exhibits a toxicity characteristic for compounds specified in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C), TCLP may be used instead of total analyses. The generator will use the results from these analyses to determine if a waste exhibits a toxicity characteristic. The mean concentration of toxicity characteristic contaminants are calculated for each waste stream such that it can be reported with an upper 90 percent confidence limit (**UCL_{90}**). The UCL_{90} values for the mean measured contaminant concentrations in a waste stream will be compared to the specified regulatory levels in 20.4.1.200 NMAC (incorporating 40 CFR 261 Subpart C), expressed as total/TCLP values, to determine if the waste stream exhibits a toxicity characteristic. A comparison of total analyses and TCLP analyses is presented in Appendix C3 of the WIPP RCRA Part B Permit Application (DOE, 1997), and a discussion of the UCL_{90} is included in Permit Attachment B2. If toxicity characteristic (**TC**) wastes are identified, these will be compared to those determined by acceptable knowledge and TC waste codes will be revised, as warranted. Refer to Permit Attachment B4 for additional clarification regarding hazardous waste code assignment and homogeneous solid and soil/gravel analytical results.

B-3a(3) Laboratory Qualification

The Permittees will ensure that generator/storage sites conduct analyses using laboratories that are qualified through participation in the Performance Demonstration Program (DOE, 1995c, d). Required QAOs are specified in Permit Attachment B3. In addition, methods and supporting performance data demonstrating QAO compliance shall be ensured by the Permittees during the annual certification audit.

Analytical methods used by the laboratories shall: 1) satisfy all of the appropriate QAOs, and 2) be implemented through laboratory-documented standard operating procedures. These analytical QAOs are discussed in detail in Permit Attachment B3.

B-3b Acceptable Knowledge

Acceptable knowledge (**AK**) is used in TRU mixed waste characterization activities in three ways:

- To delineate TRU mixed waste streams
- ~~To establish drum age criteria scenarios and waste packaging configurations~~
- To assess whether TRU mixed heterogenous debris wastes exhibit a toxicity characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261.24)

- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261.31)

Acceptable knowledge is discussed in detail in Permit Attachment B4, which outlines the minimum set of requirements which shall be met by the generator/storage sites in order to use acceptable knowledge. In addition, Section B-4b(1) of this permit attachment describes the verification of acceptable knowledge through sampling and analysis and the Permittees' Audit and Surveillance Program.

B-3c Radiography and Visual Examination

Radiography is a nondestructive qualitative and quantitative technique that involves X-ray scanning of waste containers to identify and verify waste container contents. Visual examination (**VE**) constitutes opening a container and physically examining its contents. Radiography and/or visual examination will be used to examine every waste container to verify its physical form ~~and shall be used in conjunction with acceptable knowledge to determine and/or verify an appropriate packaging configuration for specifying the container-specific drum age criterion (**DAC**)~~. These techniques can detect liquid wastes and containerized gases, which are prohibited for WIPP disposal. The prohibition of liquids and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes. Radiography and/or VE will also be able to confirm that the physical form of the waste matches its waste stream description (i.e. Homogeneous Solids, Soil/Gravel, or Debris Waste [including uncategorized metals]). If the physical form does not match the waste stream description, the waste will be designated as another waste stream and assigned the preliminary hazardous waste codes associated with that new waste stream assignment. That is, if radiography and/or VE indicates that the waste does not match the waste stream description arrived at by acceptable knowledge characterization, a non-conformance report will be completed and the inconsistency will be resolved as specified in Permit Attachment B4. The proper waste stream assignment will be determined (including preparation of a new WSPF), the correct hazardous waste codes will be assigned, and the resolution will be documented. Refer to Permit Attachment B4 for a discussion of acceptable knowledge and its confirmation process.

Generator/storage sites may conduct visual examination of waste containers in lieu of radiography. For generator/storage sites that choose to use visual examination in lieu of radiography, the detection of any liquid waste in non-transparent inner containers, detected from shaking the container, will be handled by assuming that the container is filled with liquid and adding this volume to the total liquid in the payload container (e.g., 55 gallon drum or SWB). The payload container would be rejected and/or repackaged to exclude the container if it is over the TSDF-WAC limits. When radiography is used, or visual examination of transparent containers is performed, if any liquid in inner containers is detected, the volume of liquid shall be added to the total for the payload container. Radiography, or the equivalent, will be used on the existing/stored waste containers to verify the physical characteristics of the TRU mixed waste correspond with its waste stream identification/waste stream Waste Matrix Code and to identify prohibited items. The results of radiography are verified through visual examination of a statistically selected subpopulation of TRU mixed waste containers in each TRU mixed waste summary category group as specified in Permit Attachment B2. Radiographic examination protocols and QA/QC methods are provided in Permit Attachment B1.

B-3d Characterization Techniques and Frequency for Newly Generated and Retrievably Stored Waste

Generator/storage sites will use acceptable knowledge to delineate all TRU mixed waste containers into waste streams for the purposes of grouping waste for further characterization. The analyses performed will not differ based on the waste stream, only on the physical form of the waste (i.e., heterogenous debris waste cannot be sampled for totals analyses). Both retrievably stored and newly generated wastes will be delineated in this fashion, though the types of acceptable knowledge used may differ. Section B-3b discusses the use of acceptable knowledge, sampling, and analysis in more detail. Acceptable knowledge is discussed more completely in Permit Attachment B4. Every waste stream will be assigned hazardous waste codes based upon acceptable knowledge, and the Permittees will confirm these designations using headspace gas (all Summary Category Groups) and solid sampling and analysis (Summary Category Groups S3000 and S4000 only).

Radiography and/or VE will be used to verify the physical form of retrievably stored TRU mixed waste. For newly generated waste, physical form and prohibited items will be verified during packaging (using the VE technique). Radiography and/or VE will also be used in conjunction with acceptable knowledge to characterize heterogenous debris wastes. Radiography and/or VE, and the associated information compiled from acceptable knowledge (e.g., age of the waste, generating process) will be used to determine the RCRA-regulated constituents present in the waste.

All waste containers (retrievably stored and newly generated) or randomly selected containers from waste streams that meet the conditions for reduced headspace gas sampling listed in Section B-3a(1) are sampled and analyzed for VOCs in the headspace gas. A statistically selected portion of each homogeneous solids and soil/gravel waste stream is sampled and analyzed for RCRA-regulated total VOCs, SVOCs, and metals (see Permit Attachment B2). Sampling and analysis methods used for waste characterization are discussed in Section B-3a. In the process of performing organic headspace and solid sample analyses, nontarget compounds may be identified. These compounds will be reported as TICs. TICs reported in 25% of the samples and listed in 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, will be compared with acceptable knowledge data to determine if the TIC is in a listed hazardous waste in the waste stream. TICs identified through headspace gas analyses that meet the Appendix VIII list criteria and the 25 percent reporting criteria for a waste stream will be added to the headspace gas waste stream target list, regardless of the hazardous waste listing associated with the waste stream. TICs subject to inclusion on the target analyte list that are toxicity characteristic parameters shall be added to the target analyte list regardless of origin because the hazardous waste designation for these codes is not based on source. However, for toxicity characteristic and non-toxic F003 constituents, the site may take concentration into account when assessing whether to add a hazardous waste code. TICs reported from the Totals VOC or SVOC analyses may be excluded from the target analyte list for a waste stream if the TIC is a constituent in an F-listed waste whose presence is attributable to waste packaging materials or radiolytic degradation from acceptable knowledge documentation. If the TIC associated with a total VOC or SVOC analysis cannot be identified as a component of waste packaging materials or as a product of radiolysis, the Permittees will add these TICs to the list of hazardous constituents for the waste stream (and assign additional EPA listed hazardous waste codes, if appropriate). A permit modification will be submitted to

NMED for their approval to add these constituents (and waste codes), if necessary. For toxicity characteristic compounds and non-toxic F003 constituents, the Permittees may consider waste concentration when determining whether to change a hazardous waste code. Refer to Permit Attachment B3 for additional information on TIC identification.

Waste characterization solid sampling and analysis activities will differ for retrievably stored waste and newly generated waste. The waste characterization data collection design for each type of waste is described in the following sections. Table B-1 provides a summary of hazardous waste characterization requirements for all TRU mixed waste by waste characterization parameters.

Table B-6 summarizes the parameters, methods, and rationales for stored and newly generated CH TRU mixed wastes according to their waste forms.

WIPP may accept TRU mixed waste that has been repackaged or treated. Repackaged waste shall undergo characterization required of newly generated waste. Repackaged waste shall also undergo headspace gas analysis, and payload container headspace shall be sampled after repackaging, as long as the criteria specified in Permit Attachment B1-1 are met. Treated waste shall be considered newly generated waste, and shall retain the original waste stream's listed hazardous waste code designation.

B-3d(1) Newly Generated Waste

The RCRA-regulated constituents in newly generated wastes will be documented and verified at the time of generation based on acceptable knowledge for the waste stream. Newly generated TRU mixed waste characterization will begin with verification that processes generating the waste have operated within established written procedures. Waste containers are delineated into waste streams using acceptable knowledge. Verification that the physical form of the waste (Summary Category Group) corresponds to the physical form of the assigned waste stream is accomplished during packaging (using the VE technique). This process is different than the process described in Attachment B1-3b(3) and consists of the operator confirming that the waste is assigned to a waste stream that has the correct Summary Category Group for the waste being packaged. If a confirmation cannot be made, corrective actions[2] will be taken as specified in Permit Attachment B3. Instead of using a video/audio tape as required with VE in support of radiography in Attachment B1-3b(3), the VE technique for newly generated waste (or repackaged retrievably stored waste) uses a second operator, who is equally trained to the requirements stipulated in Permit Attachment B1, to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. If the second operator cannot provide concurrence, corrective actions will be taken as specified in Permit Attachment B3. The subsequent waste characterization activities depend on the assigned Summary Category Group, since waste within the Homogeneous Solids and Soils/Gravel Summary Category Groups will be characterized using different techniques than the waste in the Debris Waste Summary Category Group. The packaging configuration, type and number of filters, and rigid liner vent hole presence and diameter necessary to determine the appropriate drum age criteria

[2] "Corrective action" as used in this WAP and its attachments does not mean corrective action as defined under HWA, RCRA, and their implementing regulations.

(**DAC**) in accordance with Permit Attachment B1, Section B1-1, shall be documented as part of the characterization information collected during the packaging of newly generated waste or repackaging of retrievably stored waste ~~process. This characterization information does not require subsequent verification~~.

All containers of newly generated waste or newly generated waste containers randomly selected from waste streams that meet the conditions for reduced headspace gas sampling listed in Section B-3a(1) will undergo headspace-gas analysis for VOC concentrations prior to shipment. If the Permittees believe the frequency can be reduced in the future based on trends in analytical results, they may provide technical arguments for such a reduction and request a permit modification from NMED. The headspace-gas sampling method is provided in Permit Attachment B1. Headspace gas data will be used to confirm acceptable knowledge waste characterization, as specified in Permit Attachment B4.

B-3d(1)(a) Sampling of Newly Generated Homogeneous Solids

Newly generated mixed waste streams of homogeneous solids will be randomly sampled a minimum of once per year for total PCBs, VOCs, SVOCs and metals. An initial ten-sample set, however, will be collected to develop the baseline control chart. Sampling frequency of once per year is only allowed if a process has operated within procedurally established bounds without any process changes or fluctuations which would result in either a new waste stream or the identification of a new hazardous waste constituent in that waste stream. Otherwise, the waste shall be considered as process batches and each batch will undergo sampling and analysis. Process changes and process fluctuations will be determined using statistical process control charting techniques; these techniques require the ten-sample baseline and historical data for determining limits for indicator species and subsequent periodic sampling to assess process behavior relative to historical limits. If the limits are exceeded, the waste stream shall be recharacterized, and the characterization shall be performed according to procedures required for retrievably stored waste (i.e., waste sampling frequency will be increased). The process behind this control charting technique is described in Permit Attachment B2.

Also, as another control of waste generated from a particular process, the bounds for a waste generating process will be established by specific written procedures for that process. Examples of parameter bounds that could affect a waste generated by a process are volumes of input material, change in the input material, and any other changes that would change the output of that process.

To ensure that the generator/storage site procedures for waste generating processes include controls of the waste stream, these procedures will consist of sections containing the following information:

- Responsible organizations for implementing the requirements of the procedure
- Material inputs
- Waste streams generated

- Process controls and range of operation (bounds) that affect final hazardous waste determinations
- Rate and quantity of hazardous waste generated
- List of applicable operating procedures relevant to the hazardous waste determination

Events where procedurally established bounds are exceeded or any condition of normal operation is not being met could trigger an increased sampling frequency of a waste stream. As long as a process does not change outside of established bounds within a year, the waste generated by that process will have the same characteristics, and therefore, a minimum of one sample will be collected annually to verify the lack of variability of that waste stream. Compliance with process procedures and the maintenance of the parameters specified by those procedures will be verified by the Permittees during the Permittees' Audit and Surveillance Program (Permit Attachment B6).

The records generated by the process procedures will be examined weekly for indications of process changes or limits being exceeded that would change the hazardous constituents identified in the waste stream or add relevant prohibited materials. If these changes are discovered, the Permittees will notify NMED and will not manage, store or dispose the waste stream until a follow-up sample of process waste is collected and analyzed to assess whether the container contents are within those identified on the WSPF. If the second analysis is not consistent with the WSPF information, all waste containers in question will be segregated and a WSPF and waste generation procedures/bounds will be established. Records of that analysis will be available for examination by the auditors and will be provided to NMED upon request. If records of the analysis are not available, the Permittees will not accept the waste stream at the WIPP facility for disposal. If a generator/storage site changes a process but determines that increased sampling is not required because the change will not affect waste generated by that process, the Permittees and NMED shall be notified in the form of a memorandum to the DOE's Carlsbad Field Office (**CBFO**) Waste Characterization Manager. The Permittees shall concur with the decision to not increase the sampling frequency before any additional waste from that process is shipped, and NMED will be notified of the Permittees' decision.

The toxicity characteristics of newly generated homogeneous solids and soils/gravel waste streams will be determined using total analysis of toxicity characteristic contaminants or TCLP. To determine if a waste exhibits a toxicity characteristic for compounds specified in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C), TCLP may be used instead of total analyses. The sampling methods for homogeneous solids and soil/gravel wastes are provided in Permit Attachment B1.

B-3d(1)(b) Sampling of Newly Generated Soils/Gravels

Newly generated soils/gravel waste will be generated primarily by remediation or decontamination and decommissioning (**D&D**) activities. Process controls for these types of waste cannot readily be defined and, therefore, sampling cannot follow that used for newly generated homogeneous waste. The number of newly generated soils/gravel waste containers to be sampled will be determined using the procedure specified in Section B-3a(2), wherein a

statistically selected portion of the waste will be sampled. The generators shall estimate the number of containers to be sampled within the waste stream based on the expected volume of the waste stream and whether SWB or 55-gallon drum containers will be used. Refer to Permit Attachment B2 for additional information.

B-3d(2) Retrievably Stored Waste

All retrievably stored waste containers will first be delineated into waste streams using acceptable knowledge. All retrievably stored waste containers will be examined using radiography to confirm the physical waste form (Summary Category Group), to verify the absence of prohibited items, and to determine the waste characterization techniques to be used based on the Summary Category Groups (i.e., S3000, S4000, S5000). Repackaged retrievably stored waste, or any retrievably stored waste with inadequate acceptable knowledge, will be characterized using either the retrievably stored or newly generated waste characterization process, whichever results in greater sampling requirements. Radiographic results will be compared to acceptable knowledge results to ensure correct Waste Matrix Code assignment and identification of prohibited items. If radiographic analysis do not confirm the physical waste form, waste will be reassigned as specified in Section B-3c. Generator/storage sites may elect to substitute visual examination for radiographic analysis.

To confirm the results of radiography, a statistically selected number of the TRU mixed waste container population will be visually examined by opening containers to inspect waste contents to verify radiography results. Permit Attachment B2 contains the approach used to statistically select the number of drums to be visually examined. For homogeneous waste and soils/gravels selected for sampling, the containers opened for sampling may be used to help fulfill the visual examination requirements.

All retrievably stored containers or retrievably stored containers randomly selected from waste streams that meet the conditions for reduced headspace gas sampling listed in Section B-3a(1) will undergo headspace gas analysis for VOC concentrations. Retrievably stored waste that is repackaged will be subject to the DAC determination specified in Section B-3d(1). The headspace gas sampling method is provided in Permit Attachment B1. All headspace gas data will be used to confirm acceptable knowledge waste characterization, as specified in Permit Attachment B4.

A statistically selected portion of retrievably stored homogeneous solids and soil/gravel wastes will be sampled and analyzed for total VOCs, SVOCs, and metals. The approach used to statistically select drums for homogeneous solids and soil/gravel wastes is different than the method used to select waste containers for visual examination. This method is also included in Permit Attachment B2. The sampling methods for these wastes are provided in Permit Attachment B1.

The toxicity characteristic of retrievably stored homogeneous solids and soil/gravel wastes will be determined using total analysis of toxicity characteristic parameters or TCLP. To determine if a waste exhibits a toxicity characteristic for compounds specified in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C), TCLP may be used instead of total analyses. Appendix C3 of the WIPP RCRA Part B Permit Application (DOE, 1997) discusses comparability of totals analytical results to those of the TCLP method.

Representativeness of containers selected for visual examination and waste subjected to homogeneous solids and soil/gravel sampling and analysis will be validated by the generator/storage site and by the Permittees during an audit (Permit Attachment B6) via examination of documentation that shows that true random samples were collected. (Because representativeness is a quality characteristic that expresses the degree to which a sample or group of samples represent the population being studied, the random sampling of waste streams ensures representativeness.)

B-4 Data Verification and Quality Assurance

The Permittees will assure that waste characterization by generator/storage sites sending TRU mixed waste to the WIPP for disposal meets WAP requirements through data validation, usability and reporting controls. Verification occurs at three levels: 1) the data generation level, 2) the project level, and 3) the Permittee level. The validation and verification process and requirements at each level is described in Section B3-10.

B-4a Data Generation and Project Level Verification Requirements

B-4a(1) Data Quality Objectives

The waste characterization data obtained through WAP implementation will be used to ensure that the Permittees meet regulatory requirements with regard to both regulatory compliance and to ensure that all TRU mixed wastes are properly managed during the Disposal Phase. To satisfy the RCRA regulatory compliance requirements, the following DQOs are established by this WAP:

- Headspace-Gas Sampling and Analysis
  - To identify VOCs and quantify the concentrations of VOC constituents in the total waste inventory to ensure compliance with the environmental performance standards of 20.4.1.500 NMAC (incorporating 40 CFR, §264.601(c)), and to confirm hazardous waste identification by acceptable knowledge.
- Homogeneous Waste Sampling and Analysis
  - To compare UCL_{90} values for the mean measured contaminant concentrations in a waste stream with specified toxicity characteristic levels in 20.4.1.200 NMAC (incorporating 40 CFR §261), to determine if the waste is hazardous, and to confirm hazardous waste identification by acceptable knowledge.
  - To report the average concentration of hazardous constituents in a waste stream, as specified in 20.2.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, with a 90 percent confidence interval, with all averages greater than PRQL considered a detection and subsequent assignment of the waste (if an adequate explanation for the constituent cannot be

determined) as a hazardous waste, and to confirm hazardous waste identification by acceptable knowledge.

- Radiography
  - To verify the TRU mixed waste streams by Waste Matrix Code for purposes of physical waste form identification and determination of sampling and analytical requirements, to identify prohibited items~~, to determine waste packaging configurations, to determine presence and diameter of rigid polyliner vents~~, and to confirm the waste stream delineation by acceptable knowledge.
- Visual Examination
  - To verify the TRU mixed waste streams by Waste Matrix Code for purposes of physical waste form identification, determination of sampling and analytical requirements, and to identify prohibited items.
  - To provide a process check on a sample basis by verifying the information determined by radiography~~, to determine waste packaging configurations, to determine presence and diameter of rigid polyliner vents~~, and to confirm the waste stream delineation by acceptable knowledge.

Reconciliation of these DQOs by the Generator/Storage Site Project Manager is addressed in Permit Attachment B3. Reconciliation requires determining whether sufficient type, quality, and quantity of data have been collected to ensure the DQO's cited above can be achieved.

B-4a(2) Quality Assurance Objectives

The generator/storage sites shall demonstrate compliance with each QAO associated with the various characterization methods as presented in Permit Attachment B3. Generator/Storage Site Project Managers are further required to perform a reconciliation at the project level of the data sets submitted by the various organizations at the generator/storage site with the DQOs established in this WAP. The Generator/Storage Site Project Manager shall conclude that all of the DQOs have been met for the characterization of the waste stream prior to submitting a WSPF to the Permittees for approval (Permit Attachment B3). The following QAO elements shall be considered for each technique, as a minimum:

- Precision
  - Precision is a measure of the mutual agreement among multiple measurements.
- Accuracy
  - Accuracy is the degree of agreement between a measurement result and the true or known value.

- Completeness
  - Completeness is a measure of the amount of valid data obtained from a method compared to the total amount of data obtained that is expressed as a percentage.
- Comparability
  - Comparability is the degree to which one data set can be compared to another.

A more detailed discussion of the QAOs, including a mathematical representation, where appropriate, can be found in Permit Attachment B3, which describes the QAOs associated with each method of sampling and analysis.

B-4a(3) Sample Control

The generator/storage sites will implement a sample handling and control program that will include the maintenance of field documentation records, proper labeling, and a chain of custody (**COC**) record. The generator/storage site Quality Assurance Project Plan (**QAPjP**) or procedures referenced in the QAPjP will document this program and include COC forms to control the sample from the point of origin to the final analysis result reporting. The Permittees will review and approve the QAPjP, including their determination that the sample control program is adequate. The approved QAPjP will be provided to NMED prior to shipment of TRU mixed waste and before the generator/storage site audit, as specified in Permit Attachment B5. Details of this sample control program are provided in Permit Attachment B1 and are summarized below to include:

- Field Documentation of samples including: point of origin, date of sample, container ID, sample type, analysis requested, and COC number.
- Labeling and/or tagging including: sample numbering, sample ID, sample date, sampling conditions, and analysis requested.
- COC control including: name of sample relinquisher, sample receiver, and the date and time of the sample transfer.
- Proper sample handling and preservation.

B-4a(4) Data Generation

Batch Data Reports, in a format approved by the Permittees, will be used by each generator/storage site for reporting waste characterization data. This format will be included in the generator/storage site QAPjP, controlled electronic databases, or procedures referenced in the QAPjP (Permit Attachment B5) and will include all of the elements required by this WAP for Batch Data Reports (Permit Attachment B3).

The Permittees shall perform audits of the generator/storage site waste characterization programs, as implemented by the generator/storage site QAPjP, to verify compliance with the WAP and the DQOs in this WAP (See Permit Attachment B6 for a discussion of the content of the audit program). The primary functions of these audits are to review generator/storage sites' adherence to the requirements of this WAP and assure adherence to the WAP characterization program. The Permittees shall provide the results of each audit to NMED. If audit results indicate that a generator/storage site is not in compliance with the requirements of this WAP, the Permittees will take appropriate action as specified in Permit Attachment B6.

The Permittees shall further require all analytical laboratories analyzing WIPP waste characterization samples for the generator/storage sites to have established, documented QA/QC programs. The Permittees annually evaluate these laboratories and their QA/QC programs as part of their participation in the Permittees' Performance Demonstration Program (**PDP**) laboratory performance program. The Permittees' audits cover the requirements of the lab's QA/QC program, as well as compliance with this WAP. Continued compliance with these parameters will be verified by ongoing audits by the Permittees at the generator/storage sites as specified in Permit Attachment B6. The Permittees' audits of the generator/storage sites will verify that the laboratories analyzing waste have been properly audited by the generator/storage sites. The laboratory's QA/QC program shall include the following:

- Facility organization
- A list of equipment/instrumentation
- Operating procedures
- Laboratory QA/QC procedures
- Quality assurance review
- Laboratory records management

B-4a(5) Data Verification

Batch Data Reports will document the testing, sampling, and analytical results from the required characterization activities, and document required QA/QC activities. Data validation and verification at both the data-generation level and the project level will be performed as required by this Permit before the required data are transmitted to the Permittees (Permit Attachment B3). NMED may request, through the Permittees, copies of any Batch Data Report, and/or the raw data validated by the generator/storage sites, to check the Permittees' audit of the validation process.

B-4a(6) Data Transmittal

Batch Data Reports will include the information required by Section B3-10 and will be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the project level.

The generator/storage site will transmit waste container information electronically via the WIPP Waste Information System (**WWIS**). Data will be entered into the WWIS in the exact format required by the database. Refer to Section B-4b for WWIS reporting requirements and the *WIPP Waste Information System User's Manual for Use by Shippers/Generators* (DOE, 2001) for the WWIS data fields and format requirements.

Once a waste stream is fully characterized, the Site Project Manager will also submit to the Permittees a WSPF (Figure B-1) accompanied by the Characterization Information Summary for that waste stream which includes reconciliation with DQOs (Section B3-12b(1)). The WSPF, the Characterization Information Summary, and information from the WWIS will be used as the basis for acceptance of waste characterization information on TRU mixed wastes to be disposed of at the WIPP.

B-4a(7) Records Management

Records related to waste characterization activities at the generator/storage sites will be maintained in the testing, sampling, or analytical facility files or generator/storage site project files. Contract laboratories will forward testing, sampling, and analytical records along with Batch Data Reports, to the generator/storage site project office for inclusion in the generator/storage site's project files. Raw data obtained by testing, sampling, and analyzing TRU mixed waste in support of this WAP will be identifiable, legible, and provide documentary evidence of quality.

Records inventory and disposition schedule (**RIDS**) or an equivalent system shall be prepared and approved by generator/storage site personnel. All records relevant to an enforcement action under this Permit, regardless of disposition, shall be maintained at the generator/storage site until NMED determines they are no longer needed for enforcement action, and then dispositioned as specified in the approved RIDS. All waste characterization data and related QA/QC records in the generator/storage site project files for TRU mixed waste to be shipped to the WIPP facility are designated as either Lifetime Records or Non-Permanent Records. Records that are designated as Lifetime Records shall be maintained for the life of the waste characterization program at a participating generator/storage site plus six years, then offered to the Permittees for permanent archival of information of these records in the appropriate form, or transferred to the appropriate Federal Records Center (**FRC**). Waste characterization records designated as Non-Permanent Records shall be maintained for ten years from the date of (record) generation and then dispositioned according to their approved RIDS. If a generator/storage site ceases to operate, all records shall be transferred before closeout. Table B-7 provides a listing of records designated as Lifetime Records and Non-Permanent Records.

At the Permittee Level, all waste characterization data for each TRU mixed waste container transmitted to WIPP shall be maintained by the Permittees for the active life of the WIPP facility plus two years. The active life of the WIPP facility is defined as the period from the initial receipt of TRU mixed waste at the facility until NMED receives certification of final closure of the facility. After their active life, the records shall be retired to the FRC and maintained for 30 years. These records will then be offered to the National Archives. However, this disposition requirement does not preclude the inclusion of these records in the permanent marker system or other requirements for institutional control.

B-4b Permittee Level: Waste Screening and Verification of TRU Mixed Waste

Permittee waste screening is a two-phased process. Phase I will occur prior to transporting the TRU mixed waste to the WIPP facility. Phase II will occur after the TRU mixed waste shipment arrives but before it is emplaced. Figure B-5 presents the waste shipment screening process.

B-4b(1) Phase I Waste Stream Screening and Verification

The first phase of the waste screening and verification process will occur before TRU mixed waste is shipped to the WIPP facility. Before the Permittees begin the process of accepting TRU mixed waste from a generator/storage site, an initial audit of that generator/storage site will be conducted as part of the Permittees' Audit and Surveillance Program (Permit Attachment B6). The RCRA portion of the generator/storage site audit program will provide on-site verification of characterization procedures; Batch Data Report preparation; and recordkeeping to ensure that all applicable provisions of the WAP requirements are met. Another portion of the Phase I verification is the WSPF approval process. At the WIPP facility, this process includes verification that all of the required elements of the WSPF and the Characterization Information Summary are present (Permit Attachment B3) and that the waste characterization information meet acceptance criteria required for compliance with the WAP (Section B3-12b(1)).

Once a generator/storage site has prepared a QAPjP which includes applicable WAP requirements, it is submitted to the Permittees for review and approval (Permit Attachment B5). Once approved, a copy of the QAPjP is provided to NMED for examination. The generator/storage site will implement the specific parameters of the QAPjP after it is approved. The initial generator/storage site RCRA audit will be performed at some point after this implementation has taken place, but prior to shipment of TRU mixed waste from that generator/storage site to WIPP. Additional audits, focusing on the results of waste characterization, will be performed at least annually. The Permittees have the right to conduct unannounced audits and to examine any records that are related to the scope of the audit.

When the required waste stream characterization data have been collected by a generator/storage site and the initial generator/storage site audit has been successfully completed, the generator/storage Site Project Manager will verify that waste stream characterization meets the applicable WAP requirements as a part of the project level verification (Section B3-10b). If the waste characterization does not meet the applicable requirements of the WAP, the mixed waste stream cannot be managed, stored, or disposed at WIPP until those requirements are met. The Site Project Manager will then complete a WSPF and submit it to the Permittees, along with the accompanying Characterization Information Summary for that waste stream (Section B3-12b(1)). All data necessary to check the accuracy of the WSPF will be transmitted to the Permittees for verification. This provides notification that the generator/storage site considers that the waste stream (identified by the waste stream identification number) has been adequately characterized for disposal prior to shipment to WIPP. The Permittees will compare headspace gas, radiographic, visual examination and solid sampling/analysis data obtained subsequent to submittal and approval of the WSPF (and prior to submittal) with characterization information presented on this form. If the Permittees determine (through the data comparison) that the characterization information is adequate, the WSPF will be approved. Prior to the first shipment of containers from the approved waste stream, the approved WSPF and accompanying Characterization Information Summary will be

provided to NMED. If the data comparison indicates that analyzed containers have hazardous wastes not present on the WSPF, or a different Waste Matrix Code applies, the WSPF is in error and shall be resubmitted. Ongoing WSPF examination is discussed in detail in Section B-4b(1)(ii).

As part of the waste characterization data submittal, the generator/storage site will also transmit the data on a container basis via the WWIS. This data submittal can occur at any time as the data are being collected, but will be complete for each container prior to shipment of that container. The WWIS will conduct internal edit/limit checks as the data are entered, and the data will be available to the Permittees for review as supporting information for WSPF review. NMED will have read-only access to the WWIS as necessary to determine compliance with the WAP. The initial WSPF check performed by the Permittees will include WWIS data and the Characterization Information Summary. The Permittees will compare ongoing sampling/analysis characterization data obtained and submitted via the WWIS to the approved WSPF. If this comparison shows that containers have hazardous wastes not reported on the WSPF, or a different Waste Matrix Code applies, the data are rejected and the waste containers are not accepted for shipment.

If discrepancies arise as a result of the Phase I review, the generator/storage sites will be contacted by the Permittees and required to provide the necessary additional information to resolve the discrepancy before that waste stream is approved for disposal at the WIPP facility. If the discrepancy is not resolved, the waste stream will not be approved. The Permittees will notify NMED in writing of any discrepancies identified during WSPF review and the resulting discrepancy resolution prior to waste shipment. The Permittees will not manage, store, or dispose the waste stream until this discrepancy is resolved in accordance with this WAP.

B-4b(1)(I) WWIS Description

All generator/storage sites planning to ship TRU mixed waste to WIPP will supply the required data to the WWIS. The Permittees will use the WWIS to verify that all of the supplied data meet the edit and limit checks prior to the shipment of any TRU mixed waste to WIPP. The WWIS automatically will notify the generator/storage site if any of the supplied data fails to meet the requirements of the edit and limit checks via an appropriate error message. The generator/storage site will be required to correct the discrepancy with the waste or the waste data and re-transmit the corrected data prior to acceptance of the data by the WWIS. The Permittees will review data reported for each container of each shipment prior to providing notification to the shipping generator/storage site that the shipment is acceptable. Read-only access to the WWIS will be provided to the NMED. Table B-8 contains a listing of the data fields contained in the WWIS that are required as part of this Permit.

The WWIS will generate the following:

- Waste Emplacement Report

  This report will be added to the operating record to track the quantities of waste, date of emplacement, and location of authorized containers or container assemblies in the repository. The Permittees will document the specific panel room or drift that an individual waste container is placed in as well as the row/column/height coordinates

location of the container or containers assembly. This report will be generated on a weekly basis. Locations of containers or container assemblies will also be placed on a map separate from the WWIS. Reports and maps that are included as part of the operating record will be retained at the WIPP site, for the life of the facility.

- Shipment Summary Report

This report will contain the container IDs of every container in the shipment, listed by TRUPACT-II number and by assembly number (for seven packs), for every assembly in the TRUPACT-II. This report is used by the Permittees to verify containers in a shipment and will be generated on a shipment basis.

- Waste Container Data Report

This report will be generated on a waste stream basis and will be used by the Permittees during the WSPF review and approval process. This report will contain the data listed in the Characterization Module on Table B-8. This report will be generated and attached to the WSPF for inclusion in the facility operating record and will be kept for the life of the facility.

- Reports of Change Log

This will consist of a short report that lists the user ID and the fields changed. The report will also include a reason for the change. A longer report will list the information provided on the short report and include a before and after image of the record for each change, a before-record for each deletion, and the new information for added records. These reports will provide an auditable trail for the data in the database.

The WWIS shall have data available for export so that the Permittees and NMED can summarize headspace gas concentrations for the open room being loaded. This is required to allow calculations of average room headspace gas concentrations to ensure they do not exceed the limits specified in Table B-2.

Access to the WWIS will be controlled by the Permittees' Data Administrator (**DA**) who will control the WWIS users based on approval from management personnel.

The TRU mixed waste generator/storage sites will only have access to data that they have supplied, and only until the data have been formally accepted by the Permittees. After the data have been accepted, the data will be protected from indiscriminate change and can only be changed by a authorized DA.

The WWIS has a Change Log that requires a reason for the change from the DA prior to accepting the change. The data change information, the user ID of the authorized DA making the change, and the date of the change will be recorded in the data change log automatically. The data change log cannot be revised by any user, including the DA. The data change log will be subject to internal and external audits and will provide an auditable trail for all changes made to previously approved data.

B-4b(1)(ii) Examination of the Waste Stream Profile Form and Container Data Checks

The Permittees will be responsible for the verification of completeness and accuracy of the Waste Stream Profile Form (Section B3-12b(1)). The assignment of the waste stream description, Waste Matrix Code Group, and Summary Category Groups; the results of waste analyses; the acceptable knowledge summary documentation; the methods used for characterization; the Carlsbad Field Office (**CBFO**) certification, and appropriate designation of EPA hazardous waste code(s) will be examined. If the WSPF is inaccurate, efforts will be made to resolve discrepancies by contacting the generator/storage site. If discrepancies in the waste stream are detected at the generator/storage site, the generator/storage site will implement a non-conformance program to identify, document, and report discrepancies (Permit Attachment B3).

The WSPF shall pass all verification checks by the Permittees in order for the waste stream to be approved for shipment to the WIPP facility. The WSPF check against waste container data will occur during the initial WSPF approval process (Section B-4b(1)).

The EPA hazardous waste codes for the wastes that appear on the Waste Stream Profile Form will be compared to those in the Permittees' RCRA Part A Permit Application (Section XIV of Permit Attachment O) to ensure that only wastes that contain constituents listed Section XIV are approved for management, storage, or disposal at WIPP. Some of the waste may also be identified by unique state hazardous waste codes. These wastes are acceptable at WIPP as long as the TSDF-WAC are met. The Characterization Information Summary will be reviewed by the Permittees to verify that the waste has been classified correctly with respect to the assigned EPA hazardous waste codes. The analytical method used will be compared to those listed in Tables B-3, B-4, and B-5 to assure that only approved analytical methods were used for analysis of the waste. The Permittees will verify that TSDF-WAC compliance has been met by the generator/storage site.

Waste data transferred via the WWIS after WSPF approval will be compared with the approved WSPF. Any container with a hazardous waste stream description different from its WSPF will not be managed, stored, or disposed at WIPP.

The Permittees will also verify that three different types of data specified below are available for every container holding TRU mixed waste before that waste is managed, stored, or disposed at WIPP. The following three verifications will be performed on data from the following determinations: 1) an assignment of the waste stream's waste description (by Waste Matrix Codes) and Waste Matrix Code Group; 2) a determination of ignitability, reactivity, and corrosivity; and 3) a determination of compatibility. The verification of waste stream description will be performed by reviewing the WWIS for consistency in the waste stream description and WSPF. The Characterization Information Summary will indicate if the waste has been checked for the characteristics of ignitability, corrosivity, and reactivity. The final verification of waste compatibility will be performed using Appendix C1 of the WIPP RCRA Part B Permit Application (DOE, 1997), the compatibility study.

B-4b(1)(iii) Permittees' Audit and Surveillance Program

An important part of the Permittees' verification process is the Permittees' Audit and Surveillance Program. The focus of this audit program is compliance with this WAP and the Permit. This audit program addresses all waste sampling and analysis activities, from waste stream classification assignment through final loading of the TRUPACT-II, and ensures compliance with SOPs and the WAP. Audits will assure that containers and their associated documentation are adequately tracked throughout the waste handling process. Operator qualifications will be verified, and QA/QC procedures will be surveyed. A final report that includes generator/storage site audit results and applicable WAP-related corrective action report (**CAR**) resolution will be provided to NMED for approval, and will be kept in the WIPP facility operating record until closure of the WIPP facility.

An initial audit will be performed at each generator/storage site performing waste characterization activities prior to the formal acceptance of the WSPFs and/or any waste characterization data supplied by the generator/storage sites. Audits will be performed at least annually thereafter, including the possibility of unannounced audits (i.e., not a regularly scheduled audit). These audits will allow NMED to verify that the Permittees have implemented the WAP and that generator/storage sites have implemented a QA program for the characterization of waste and meet applicable WAP requirements. The accuracy of physical waste description and waste stream assignment provided by the generator/storage site will be verified by review of the radiography results, and visual examination of data records and radiography images (as necessary) during audits conducted by the Permittees. More detail on this audit process is provided in Permit Attachment B6.

B-4b(2) Phase II Waste Shipment Screening and Verification

Phase II of the waste shipment screening and verification process includes examination of a waste shipment after the waste shipment has arrived. The Phase-II determinations are: 1) a determination of the completeness and accuracy of the EPA Hazardous Waste Manifest; 2) a determination of waste shipment completeness; 3) a determination of land disposal restriction notice completeness; and 4) an identification and resolution of waste shipment irregularities. Only those waste containers that pass all Phase II waste screening determinations will be emplaced at WIPP. For each container shipped, the Permittees shall ensure that the generator/storage sites provide the following information:

Hazardous Waste Manifest Information:

- Generator/storage site name and EPA ID
- Generator/storage site contact name and phone number
- Quantity of waste
- List of the hazardous waste codes in the shipment
- Listing of all shipping container IDs (TRUPACT-II serial number)

- Signature of authorized generator representative

Specific Waste Container information:

- Waste Stream Identification Number
- List of Hazardous Codes per Container
- Certification Data
- Shipping Data (Assembly numbers, ship date, shipping category, etc.)

This information shall also be supplied electronically to the WWIS. The container-specific information will be supplied electronically as part of the Level 3 Phase I Screening, and shall be supplied prior to the Permittees' management, storage, or disposal of the waste.

The Permittees will verify each approved shipment upon receipt at WIPP against the data on the WWIS shipment summary report to ensure containers have the required information. A Waste Receipt Checklist will be used to document the verification.

B-4b(2)(I) Examination of the EPA Uniform Hazardous Waste Manifest and Associated Waste Tracking Information

Upon receipt of a TRU mixed waste shipment, the Permittees will make a determination of EPA Uniform Hazardous Waste Manifest completeness and sign the manifest to allow the driver to depart. The Permittees will then make a determination of waste shipment completeness by checking the unique, bar-coded identification number found on each container holding TRU mixed waste against the WWIS database after opening the TRUPACT-II.

The WWIS links the bar-coded identification numbers of all containers in a specific waste shipment to the waste assembly (for 7-packs) and to the shipment identification number, which is also written on the EPA Hazardous Waste Manifest. Generators electronically transmit the waste shipment information to the WWIS before the TRU mixed waste shipment is transported. Once a TRU mixed waste shipment arrives, the Permittees verify the identity of each container using the data already in the WWIS.

The WWIS will maintain waste container receipt and emplacement information provided by the Permittees. It will include, among other items, the following information associated with each container of TRU mixed waste:

- TRUPACT-II inner containment vessel closure date
- Package (container) receipt date
- Overpack identification number (if appropriate)
- Package (container) emplacement date
- Package (container) emplacement location

The WWIS links the bar-coded identification numbers of all containers in a specific TRU mixed waste shipment to the waste assembly (for 7-packs) and to the shipment identification number,

which is also written on the EPA Hazardous Waste Manifest. Generators electronically transmit the waste shipment information to the WWIS before the TRU mixed waste shipment is transported. Once a TRU mixed waste shipment arrives, the Permittees verify the identity of each container (or one container in a bound 7-pack) using the data already in the WWIS.

Discrepancies will be identified during manifest examination and container bar-code WWIS data comparison. A manifest discrepancy is a difference between the quantity or type of hazardous waste designated on the manifest and the quantity or type of hazardous waste the WIPP facility actually receives. The generator/storage site technical contact (as listed on the manifest) will be contacted to resolve the discrepancy. If the discrepancy is identified prior to the containers being removed from the TRUPACT-II, the waste will be retained in the parking area. If the discrepancy is identified after the waste containers are removed from the TRUPACT-II, the waste will be retained in the Waste Handling Building (**WHB**) until the discrepancy is resolved. Errors on the manifest can be corrected by the WIPP facility with a verbal (followed by a mandatory written) concurrence by the generator/storage site technical contact. All discrepancies that are unresolved within fifteen (15) days of receiving the waste will be immediately reported to the NMED in writing. Notifications to the NMED will consist of a letter describing the discrepancies, discrepancy resolution, and a copy of the manifest. If the manifest discrepancies have not been resolved within thirty (30) days of waste receipt, the shipment will be returned to the generator/storage facility. If it becomes necessary to return waste containers to the generator/storage site, a new EPA Uniform Hazardous Waste Manifest may be prepared by the Permittees.

Documentation of the returned containers will be recorded in the WWIS. Changes will be made to the WWIS data to indicate the current status of the container(s) The reason for the WWIS data change and the record of the WWIS data change will be maintained in the change log of the WWIS, which will provide an auditable record of the returned shipment.

The Permittees will be responsible for the resolution of discrepancies, notification of the NMED, as well as returning the original copy of the manifest to the generator/storage site.

B-4b(2)(ii) Examination of the Land Disposal Restriction (**LDR**) Notice

TRU mixed waste is exempt from the LDRs by the Land Withdrawal Act Amendment (Public Law 104-201). This amendment states that WIPP "Waste is exempted from treatment standards promulgated pursuant to section 3004(m) of the Solid Waste Disposal Act (42 U.S. C. 6924(m)) and shall not be subjected to the Land Disposal prohibitions in section 3004(d), (e), (f), and (g) of the Solid Waste Disposal Act." Therefore, with the initial shipment of a TRU mixed waste stream, the generator shall provide the Permittees with a one time written notice. The notice must include the information listed below:

Land Disposal Restriction Notice Information:

- EPA Hazardous Waste Number(s) and Manifest Numbers of first shipment of a mixed waste stream
- Statement: this waste is not prohibited from land disposal

- Date the waste is subject to prohibition

This information is the applicable information taken from column "268.7(a)(4)" of the "Generator Paperwork Requirements Table" in 20.4.1.800 NMAC (incorporating 40 CFR 268.7(a)(4)). Note that item "5" from the "Generator Paperwork Requirements Table" is not applicable since waste analysis data are provided electronically via the WWIS and item "7" is not applicable since WIPP waste is exempted from the treatment standards.

The Permittees will review the LDR notice for accuracy and completeness. The generator will prepare this notice in accordance with the applicable requirements of 20.4.1.800 NMAC (incorporating 40 CFR §268.7(a)(4)).

B-4b(2)(iii) Verification

The Permittees will make a determination of TRU mixed waste shipment irregularities. The following items will be inspected for each TRU mixed waste shipment arriving at the WIPP facility:

- Whether the number and type of containers holding TRU mixed waste match the information in the WWIS
- Whether there are any container defects

The Permittees will verify that the containers (as identified by their container ID numbers) are the containers for which accepted data already exists in the WWIS. A check will be performed by the Permittees comparing the data on the WWIS Shipment Summary Report for the shipment to the actual shipping papers (including the EPA Hazardous Waste Manifest). This check also verifies that the containers included in the shipment are those for which approved shipping data already exist in the WWIS Transportation Data Module (Table B-8). For standard waste boxes (**SWBs**) and ten drum overpacks (**TDOPs**), this check will include comparing the barcode on the container with the container number on the shipping papers and the data on the WWIS Shipment Summary Report. For 7-pack assemblies, one of the seven container barcodes will be read by the barcode reader and compared to the assembly information for this container on the WWIS Shipment Summary Report. This will automatically identify the remaining six containers in the assembly. This process enables the Permittees to identify all of the containers in the assembly with minimum exposure. If all of the container IDs and the information on the shipping papers agree with the WWIS Shipment Summary Report, the containers will be approved for disposal at the WIPP facility.

B-4b(2)(iv) Waste Shipment Screening QA/QC

Waste shipment screening QA/QC ensures that TRU mixed waste received is that which has been approved for shipment during the Phase I screening. This is accomplished by maintaining QA/QC control of the waste shipment screening process. The screening process will be controlled by administrative processes which will generate records documenting waste receipt that will become part of the waste receipt record. The waste receipt record documents that container identifications correspond to shipping information and approved TRU mixed waste

streams. The Permittees will extend QA/QC practices to the management of all records associated with waste shipment screening determinations.

B-4b(2)(v) Records Management and Reporting

As part of the WIPP facility's operating record, data and documents associated with waste characterization data are managed in accordance with standard records management practices. The storage of the Permittees' copy of the manifest, LDR information, waste characterization data, WSPFs, and other related records will be identified on the appropriate records inventory and disposition schedule.

Waste characterization data and documents related to waste characterization that are part of the WIPP facility operating record are managed in accordance with the following guidelines:

B-4b(2)(vi) General Requirements

- Records shall be legible
- Corrections shall be made with a single line through the incorrect information, and the date and initial of the person making the correction shall be added
- Black ink is encouraged, unless a copy test has been conducted to ensure the other color ink will copy
- Use of highlighters on records is discouraged
- Records shall be reviewed for completeness
- Records shall be validated by the cognizant manager or designee

B-4b(2)(vii) Records Storage

- Active records shall be stored when not in use
- Quality records shall be kept in a one-hour (certified) fire-rated container or a copy of a record shall be stored separately (sufficiently remote from the original) in order to prevent destruction of both copies as a result of a single event such as fire or natural disaster
- Unauthorized access to the records is controlled by locking the storage container or controlling personnel access to the storage area

The following records will be maintained for waste characterization purposes as part of the WIPP facility operating record:

- Completed WIPP WSPFs and accompanying Characterization Information Summary, including individual container data as transferred on the WWIS (or received as hard-copy) and any discrepancy-related documentation as specified in Section B-4b(1)

- Completed Waste Receipt Checklists and discrepancy-related documentation as specified in Section B-4b(2)

- WIPP WWIS Waste Emplacement Report as specified in Section B-4b(1)(I)

- Audit reports and corrective action reports from the Permittees' Audit and Surveillance Program audits as specified in Section B-4b(1)(iii) and Permit Attachment B6

These records will be maintained for each TRU mixed waste container managed at the WIPP facility.

B-4b(2)(viii) Reporting

The Permittees will provide a biennial report in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.75) to NMED that includes information on actual volume and waste descriptions received for disposal during the time period covered by the report.

B-5 List of References

U.S. Department of Energy (DOE), 2001, “WIPP Waste Information System User’s Manual for Use by Shippers/Generators”, DOE/CAO 97-2273, U.S. Department of Energy.

U.S. Department of Energy (DOE), 1997, Resource Conservation and Recovery Act Part B Permit Application for the Waste Isolation Pilot Plant”, Revision 6.5, U.S. Department of Energy.

U.S. Department of Energy (DOE), 1995c, “Performance Demonstration Program Plan for the Analysis of Simulated Headspace Gases for the TRU Waste Characterization Program,” CAO-95-1076, Current Revision, Carlsbad, New Mexico, Carlsbad Field Office, U.S. Department of Energy.

U.S. Department of Energy (DOE), 1995d, “Performance Demonstration Program Plans for Analysis of Solid Waste Forms,” CAO-95-1077, Current Revision, Carlsbad, New Mexico, Carlsbad Field Office, U.S. Department of Energy.

U.S. Environmental Protection Agency (EPA), April 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, a Guidance Manual," OSWER 9938.4-03, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), April 1980. "A Method for Determining the Compatibility of Hazardous Wastes," EPA-600/2-80-076, California Department of Health Services and the U.S. Environmental Protection Agency, Office of Research and Development.

U.S. Environmental Protection Agency (EPA), 1996. "Test Methods for Evaluating Solid Waste," Laboratory Manual Physical/Chemical Methods, SW-846, 3rd ed., U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

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TABLES

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TABLE B-1
SUMMARY OF HAZARDOUS WASTE CHARACTERIZATION REQUIREMENTS FOR TRANSURANIC MIXED WASTE [a]

Parameter	Techniques and Procedure
Physical Waste Form Summary Category Names S3000 Homogeneous Solid S4000 Soil/Gravel S5000 Debris Wastes	**Waste Inspection Procedures** Radiography Visual Examination (Permit Attachment B1-3)
Headspace Gases **Volatile Organic Compounds** Benzene Bromoform Carbon tetrachloride Chlorobenzene Chloroform 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene (cis)-1,2-Dichloroethylene (trans)-1,2-Dichloroethylene Ethyl benzene Ethyl ether Formaldehyde[b] Hydrazine[c] Methylene chloride 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane Trichloroethylene 1,1,2-Trichloro-1,2,2-trifluoroethane Xylenes Alcohols and Ketones Acetone Butanol Methanol Methyl ethyl ketone Methyl isobutyl ketone	**Gas Analysis** Gas Chromatography /Mass Spectroscopy (GC/MS), EPA TO-14 or modified SW-846 8240/8260 (Permit Attachment B3) GC/Flame Ionization Detector (FID), for alcohols and ketones, SW-846 8015 (Permit Attachment B3) Fourier Transform Infrared Spectroscopy (FTIRS), SW-846
Total Volatile Organic Compounds Acetone Benzene Bromoform Butanol Carbon disulfide Carbon tetrachloride Chlorobenzene Chloroform 1,4-Dichlorobenzene[d] 1,2-Dichlorobenzene[d] 1,2-Dichloroethane 1,1-Dichloroethylene Ethyl benzene Ethyl ether Formaldehyde[b] Hydrazine[c] Isobutanol Methanol Methyl ethyl ketone Methylene chloride Pyridine[d] 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,2-Trichloro-1,2,2-trifluoroethane Trichlorofluoromethane 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Vinyl chloride Xylenes (trans)-1,2-Dichloroethylene	**Total Volatile Organic Compound Analysis** TCLP, SW-846 1311 GC/MS, SW-846 8260 or 8240 GC/FID, SW-846 8015 (Permit Attachment B3) Acceptable Knowledge for Summary Category S5000 (Debris Wastes)

TABLE B-1
SUMMARY OF HAZARDOUS WASTE CHARACTERIZATION REQUIREMENTS FOR TRANSURANIC MIXED WASTE [a]

Parameter		Techniques and Procedure
Total Semivolatile Organic Compounds		**Total Semivolatile Organic Compound Analysis**
Cresols		
1,4-Dichlorobenzene[e]		TCLP, SW-846 1311
1,2-Dichlorobenzene[e]		GC/MS, SW-846 8250 or 8270
2,4-Dinitrophenol		GC/ECD for PCBs , SW-846 8082
2,4-Dinitrotoluene		(Permit Attachment B3)
Hexachlorobenzene		
Hexachloroethane		Acceptable Knowledge for Summary Category S5000 (Debris Wastes)
Nitrobenzene		
Polychlorinated biphenyls		
Pentachlorophenol		
Pyridine[e]		
Total Metals		**Total Metals Analysis**
Antimony	Mercury	TCLP, SW-846 1311
Arsenic	Nickel	ICP- MS, SW-846 6020 ,
Barium	Selenium	ICP Emission Spectroscopy, SW-846 6010
Beryllium	Silver	Atomic Absorption Spectroscopy , SW-846 7000
Cadmium	Thallium	(Permit Attachment B3)
Chromium	Vanadium	
Lead	Zinc	Acceptable Knowledge for Summary Category S5000 (Debris Wastes)

[a] Permit Attachment B
[b] Required only for homogeneous solids and soil/gravel waste from Los Alamos National Laboratory and Savannah River Site.
[c] Required only for homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site.
[d] Can also be analyzed as a semi-volatile organic compound.
[e] Can also be analyzed as a volatile organic compound.

TABLE B-2
MAXIMUM ALLOWABLE VOC ROOM-AVERAGED HEADSPACE CONCENTRATION LIMITS (PPMV)

COMPOUND	VOC HEADSPACE CONCENTRATION LIMITS[a] (PPMV)
Carbon Tetrachloride	9625
Chlorobenzene	13000
Chloroform	9930
1,1-Dichloroethene	5490
1,2-Dichloroethane	2400
Methylene Chloride	100000
1,1,2,2-Tetrachloroethane	2960
Toluene	11000
1,1,1-Trichloroethane	33700

[a] There are no headspace limits for other VOCs.

TABLE B-3
HEADSPACE TARGET ANALYTE LIST AND METHODS

Parameter	EPA Specified Analytical Method
Benzene Bromoform Carbon tetrachloride Chlorobenzene Chloroform 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene (cis)-1,2-Dichloroethylene (trans)-1,2-Dichloroethylene Ethyl benzene Ethyl ether Formaldehyde[b] Hydrazine[c] Methylene chloride 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane Trichloroethylene 1,1,2-Trichloro-1,2,2-trifluoroethane Xylenes	EPA: Modified TO-14[a]; Modified 8240/8260 EPA - Approved FTIRS
Acetone Butanol Methanol Methyl ethyl ketone Methyl isobutyl ketone	EPA: Modified TO-14[a]; Modified 8240/8260 Method 8015 EPA - Approved FTIRS

[a] U.S. Environmental Protection Agency (EPA), 1988, "Compendium Method TO-14, the Determination of Volatile Organic Compounds (VOC) in Ambient Air Using SUMMA® Passivated Canister Sampling and Gas Chromatographic Analysis," in Compendium of Methods for the Determination of Toxic Organic Compounds on Ambient Air. Research Triangle Park, North Carolina, Quality Assurance Division, Monitoring System Laboratory, U.S. EPA. The most current revision of the specified methods may be used.

[b] Required only for containers of homogeneous solids and soil/gravel waste from Los Alamos National Laboratory and Savannah River Site.

[c] Required only for containers of homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site.

TABLE B-4
REQUIRED ORGANIC ANALYSES AND TEST METHODS ORGANIZED BY ORGANIC ANALYTICAL GROUPS

Organic Analytical Group	Required Organic Analyses	EPA Specified Analytical Method[a,e]
Nonhalogenated Volatile Organic Compounds (VOCs)	Acetone Benzene n-Butanol Carbon disulfide Ethyl benzene Ethyl ether Formaldehyde Hydrazine[b] Isobutanol Methanol Methyl ethyl ketone Toluene Xylenes	8015 8240 8260
Halogenated VOCs	Bromoform Carbon tetrachloride Chlorobenzene Chloroform 1,2-Dichloroethane 1,1-Dichloroethylene (trans)-1,2-Dichloroethylene Methylene chloride 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,1,2-Trichloroethane 1,1,1-Trichloroethane Trichloroethylene Trichlorofluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane Vinyl Chloride	8015 8240 8260
Semivolatile Organic Compounds (SVOCs)	Cresols (o, m, p) 1,2-Dichlorobenzene[c] 1,4-Dichlorobenzene[c] 2,4-Dinitrophenol 2,4-Dinitrotoluene Hexachlorobenzene Hexachloroethane Nitrobenzene Polychlorinated biphenyls (PCB)[d] Pentachlorophenol Pyridine[c]	8250 8270 8082 (for PCBs only)

TABLE B-4 (CONTINUED)
REQUIRED ORGANIC ANALYSES AND TEST METHODS
ORGANIZED BY ORGANIC ANALYTICAL GROUPS

[a] U.S. Environmental Protection Agency (EPA), 1996, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Third Edition.
[b] Generator/Storage Sites will have to develop an analytical method for hydrazine. This method will be submitted to the Permittees for approval.
[c] These compounds may also be analyzed as VOCs by SW-846 Methods 8240 and 8260.
[d] Transformer oils containing PCBs have been identified in a limited number of waste streams included in the organic sludges waste matrix code. Therefore, only waste streams included in the solidified organics final waste form shall be analyzed for PCBs.
[e] TCLP (SW-846 1311) may be used to determine if compounds in 20.4.1.200 NMAC (incorporating 40 CFR 261, Subpart C) exhibit a toxicity characteristic.

TABLE B-5
SUMMARY OF SAMPLE PREPARATION AND ANALYTICAL METHODS FOR METALS

Parameters	EPA-Specified Analytical Methods[a,b]
Sample Preparation	3051, or equivalent, as appropriate for analytical method
Total Antimony	6010, 6020, 7040, 7041, 7062
Total Arsenic	6010, 6020, 7060, 7061, 7062
Total Barium	6010, 6020, 7080, 7081
Total Beryllium	6010, 6020, 7090, 7091
Total Cadmium	6010, 6020, 7130, 7131
Total Chromium	6010, 6020, 7190, 7191
Total Lead	6010, 6020, 7420, 7421
Total Mercury	7471
Total Nickel	6010, 6020, 7520, 7521
Total Selenium	6010, 7740, 7741, 7742
Total Silver	6010, 6020, 7760, 7761
Total Thallium	6010, 6020, 7840, 7841
Total Vanadium	6010, 7910, 7911
Total Zinc	6010, 6020, 7950, 7951

[a] U.S. Environmental Protection Agency (EPA), 1996. "Test Methods for Evaluating Solid Waste," Laboratory Manual Physical/Chemical Methods, SW-846, 3rd ed., U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
[b] TCLP (SW-846 1311) may be used to determine if compounds in 20.4.1.200 NMAC (incorporating 40 CFR 261, Subpart C) exhibit a toxicity characteristic.

TABLE B-6
SUMMARY OF PARAMETERS, CHARACTERIZATION METHODS, AND RATIONALE FOR CH TRANSURANIC MIXED WASTE (STORED WASTE)

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
S3000-Homogeneous Solids S4000-Soil/Gravel	C Solidified inorganics C Salt waste C Solidified organics C Contaminated soil/debris	Physical waste form	100% radiography or visual examination	C Verify waste matrix C Demonstrate compliance with waste acceptance criteria (e.g., no free liquids, no incompatible wastes, no compressed gases)
		Headspace gases C Gas volatile organic compounds (VOC)	100% gas sampling and analysis or statistical sampling[a, b] (see Table B-3)	C Quantify concentration of flammable VOCs C Determine potential flammability of transuranic (TRU) mixed waste headspace gases C Quantify concentrations of VOC constituents in headspace of containers C Ensure that environmental performance standards are not exceeded
		Hazardous constituents C TCLP/total metals C TCLP/total VOCs C TCLP/total semi-VOCs	Statistical sampling[a] (see Tables B-4 and B-5)	C Determine characteristic metals and organics C Determine total quantity of metals, VOCs, and semi-VOCs

TABLE B-6 (CONTINUED)
SUMMARY OF PARAMETERS, CHARACTERIZATION METHODS, AND RATIONALE FOR CH TRANSURANIC MIXED WASTE (STORED WASTE)

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
S5000–Debris Waste	C Uncategorized metal (metal waste other than lead/cadmium) C Lead/cadmium waste C Inorganic nonmetal waste C Combustible waste C Graphite waste C Heterogeneous waste C Composite filter waste	Physical waste form	100% Radiography Visual examination (statistical sample)[a] or visual examination	C Verify waste matrix C Demonstrate compliance with waste acceptance (e.g., no free liquids, no incompatible wastes, no compressed gases)
		Headspace gases C Gas VOCs	100% gas sampling and analysis (see Table B-3)	C Quantify concentration of flammable VOCs C Determine potential flammability of TRU mixed waste headspace gases C Quantify concentrations of VOC constituents in headspace of containers C Ensure that environmental performance standards are not exceeded C Verify acceptable knowledge
		Hazardous constituents C TCLP/total metals C TCLP/total VOCs C TCLP/total semi-VOCs	Acceptable knowledge	C Determine characteristic metals and organics C Determine total quantity of metals, VOCs, and semi-VOCs

TABLE B-6 (CONTINUED)
SUMMARY OF PARAMETERS, CHARACTERIZATION METHODS, AND RATIONALE FOR CH TRANSURANIC MIXED WASTE (NEWLY GENERATED WASTE)

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
S3000-Homogeneous Solids S4000-Soil/Gravel	C Solidified inorganics C Salt waste C Solidified organics C Contaminated soil/debris	Physical waste form	Documentation and verification[b]	C Verify waste matrix C Demonstrate compliance with waste acceptance criteria (e.g., no free liquids, no incompatible wastes, no compressed gases)
		Headspace gases C Gas VOCs (VOCs)	100% gas sampling and analysis or statistical sampling[a, b] (see Table B-3)	C Quantify concentration of flammable VOCs C Determine potential flammability of TRU mixed waste headspace gases C Quantify concentrations of VOC constituents in headspace of containers C Ensure that environmental performance standards are not exceeded
		Hazardous constituents C TCLP/total metals C TCLP/total VOCs C TCLP/total semi-VOCs	Statistical sampling[a] (see Tables B-4 and B-5)	C Determine characteristic metals and organics C Determine total quantity of metals, VOCs, and semi-VOCs

TABLE B-6 (CONTINUED)
SUMMARY OF PARAMETERS, CHARACTERIZATION METHODS, AND RATIONALE FOR CH TRANSURANIC MIXED WASTE (NEWLY GENERATED WASTE)

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
S5000–Debris Waste	C Uncategorized metal (metal waste other than lead/cadmium) C Lead/cadmium waste C Inorganic nonmetal waste C Combustible waste C Graphite waste C Heterogeneous waste C Composite filter waste	Physical waste form	Documentation and verification[b]	C Verify waste matrix C Demonstrate compliance with waste acceptance (e.g., no free liquids, no incompatible wastes, no compressed gases)
		Headspace gases C Gas VOCs	100% gas sampling and analysis (see Table B-3)	C Quantify concentration of flammable VOCs C Determine potential flammability of TRU mixed waste headspace gases C Quantify concentrations of VOC constituents in headspace of containers C Ensure that environmental performance standards are not exceeded C Verify acceptable knowledge
		Hazardous constituents C TCLP/total metals C TCLP/total VOCs C TCLP/total semi-VOCs	Acceptable knowledge	C Determine characteristic metals and organics C Determine total quantity of metals, VOCs, and semi-VOCs

[a] Applies to certain waste streams that meet the conditions in Section B-3a(1).
[b] Number determined as specified in Permit Attachment B2.
[c] See discussion in Permit Attachment B4.

TABLE B-7
REQUIRED PROGRAM RECORDS MAINTAINED IN GENERATOR/STORAGE SITE PROJECT FILES

Lifetime Records • Field sampling data forms • Field and laboratory chain-of-custody forms • Test facility and laboratory batch data reports • Waste Stream Characterization Package • Sampling Plans • Data reduction, validation, and reporting documentation • Acceptable knowledge documentation • Data reconciliation report • Waste Stream Profile Form and Characterization Information Summary
Non-Permanent Records • Nonconformance documentation • Variance documentation • Assessment documentation • Gas canister tags • Methods performance documentation • Performance Demonstration Program documentation • Sampling equipment certifications • Calculations and related software documentation • Training/qualification documentation • QAPjPs (generator/storage sites) documentation (all revisions) • Calibration documentation • Analytical raw data • Procurement documentation • QA procedures (all revisions) • Technical implementing procedures (all revisions) • Audio/video recording (radiography, visual, etc.)

TABLE B-8
WIPP WASTE INFORMATION SYSTEM DATA FIELDS[a]

Characterization Module Data Fields [b]	
Container ID [c]	Total VOC Sample Date
Generator EPA ID	Total VOC Analysis Date
Generator Address	Total VOC Analyte Name [d]
Generator Name	Total VOC Analyte Concentration [d]
Generator Contact	Total Metal Sample Date
Hazardous Code	Total Metal Analysis Date
Headspace Gas Sample Date	Total Metal Analyte Name [d]
Headspace Gas Analysis Date	Total Metal Analyte Concentration [d]
Layers of Packaging ~~(i.e., confinement)~~	Semi-VOC Sample Date
Liner Exists	Semi-VOC Analysis Date
~~Drum~~ Liner Hole Size	Semi-VOC Analyte Name [d]
Filter Model	Semi-VOC Concentration [d]
Number of Filters Installed	Transporter EPA ID
Headspace Gas Analyte [d]	Transporter Name
Headspace Gas Concentration [d]	Visual Exam Container [e]
Headspace Gas Char. Method [d]	Waste Material Parameter [d]
Total VOC Char. Method [d]	Waste Material Weight [d]
Total Metals Char. Method [d]	Waste Matrix Code
Total Semi-VOC Char. Method [d]	Waste Matrix Code Group
Item Description Code	Waste Stream Profile Number
Haz. Manifest Number	
NDE Complete [e]	
PCB Concentration	

Certification Module Data Fields	
Container ID [c]	Handling Code
Container type	
Container Weight	
Contact Dose Rate	
Container Certification date	
Container Closure Date	

Transportation Data Module	
TRUPACT Number	Ship Date
Assembly Number[f]	Receive Date
Container IDs [c,d]	
ICV Closure Date	

TABLE B-8
WIPP WASTE INFORMATION SYSTEM DATA FIELDS[a]

Disposal Module Data
Container ID [c]
Disposal Date
Disposal Location

[a] This is not a complete list of the WWIS data fields.

[b] Some of the fields required for characterization are also required for certification and/or transportation.

[c] Container ID is the main relational field in the WWIS Database.

[d] This is a multiple occurring field for each analyte, nuclide, etc.

[e] These are logical fields requiring only a yes/no.

[f] Required for 7-Packs of 55 gal drums to tie all of the drums in that assembly together. This facilitates the identification of waste containers in a shipment without need to breakup the assembly.

FIGURES

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Figure B-1
WIPP Waste Stream Profile Form (Example Only)

Figure B-1
WIPP Waste Stream Profile Form (Example Only - Continued)

Figure B-2
Data Collection Design for Characterization of Newly Generated Waste

Figure B-3
Data Collection Design for Characterization of Retrievably Stored Waste

Figure B-5
TRU Mixed Waste Screening Flow Diagram