ATTACHMENT C

WASTE ANALYSIS PLAN

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C-0 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 New Mexico Administrative Code (**NMAC**) (incorporating Title 40 of the Code of Federal Regulations (**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, 2015). This WAP includes test methods and details of planned waste analysis for complying with the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13), 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. Transuranic mixed waste that may be stored or disposed at the WIPP facility are or were generated at U.S. Department of Energy (**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.

Transuranic mixed waste contains both TRU radioactive and hazardous components, as defined in Permit Part 1, Section 1.5.7. It is designated and separately packaged as either

contact-handled (**CH**) waste or remote-handled (**RH**) waste, based on the radiological dose rate at the surface of the waste container.

The hazardous components of the TRU mixed waste to be managed at the WIPP facility are designated in Table C-5. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at the WIPP facility as long as the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) in Permit Part 2 are met. This WAP describes the measures that will be taken to ensure that the TRU mixed wastes received at the WIPP facility are within the scope of Table C-5 as established by 20.4.1.500 NMAC (incorporating 40 CFR Part 264), and that they comply with unit-specific requirements of 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart X, Miscellaneous Units).

Retrievably stored waste is defined as TRU mixed waste generated after 1970 and before the New Mexico Environment Department (**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. Acceptable knowledge (**AK**) information is assembled for both retrievably stored and newly generated waste. Waste characterization of retrievably stored TRU mixed waste is performed on an ongoing basis, as the waste is retrieved. Waste characterization of newly generated TRU mixed waste is typically performed as it is generated, although some characterization occurs post-generation.

Waste characterization is defined in Permit Part 1 as the activities performed by the waste generator to satisfy the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13(a)) before waste containers have been certified for disposal at the WIPP facility. The characterization process for WIPP waste is presented in Figure C-2. Generator/storage site waste characterization programs are first audited by DOE, with NMED approving the final audit report. After this, generator/storage sites determine whether AK alone is sufficient for characterization, or whether radiography or visual examination (**VE**) in conjunction with AK is necessary to adequately characterize wastes. If an AK Sufficiency Determination is sought, information is provided to the Permittees for their review and DOE's provisional approval. An NMED determination of adequacy of the AK information is required before final approval by the DOE. If the radiography or VE route is chosen, sites proceed to perform radiography or VE in conjunction with AK and in accordance with this WAP. Once an AK Sufficiency Determination is obtained, or when required radiography or VE data are obtained, sites then prepare and submit the Waste Stream Profile Form (**WSPF**) for the DOE's approval. Once the WSPF is approved, a site may ship waste to the WIPP facility. The Permittees will perform waste confirmation prior to shipment of the waste from the generator/storage site to the WIPP facility pursuant to Permit Attachment C7, by performing radiography or visual examination of a representative subpopulation of certified waste containers, to ensure that the wastes meet the applicable requirements of the TSDF-WAC.

C-0a Waste Characterization

Characterization requirements for individual containers of TRU mixed waste are specified on a waste stream basis. A waste stream is defined as waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity. Waste streams are assigned to 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 to waste streams 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: Homogeneous Solids (Summary Category S3000), Soil/Gravel (Summary Category S4000), and Debris Waste (Summary Category S5000).

Transuranic mixed wastes are initially categorized into the three broad Summary Category Groups that are related to the final physical form of the wastes. This categorization is based on the Summary Category Group constituting the greatest volume of waste for a waste stream. Waste characterization requirements for these groups are specified in Section C-2 of this WAP. Each of the three groups is described below.

S3000 - Homogeneous Solids

Homogeneous solids 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 homogeneous solids 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 homogeneous solids.

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.

S5000 - Debris Waste

This Summary Category Group includes heterogeneous 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.

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 are established (EPA hazardous waste numbers 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 numbers 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.

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.

The generator/storage sites shall characterize their waste in accordance with this WAP and associated Permit Attachments and ensure that waste proposed for storage and disposal at the WIPP facility meets the applicable requirements of the TSDF-WAC in Permit Part 2, Section 2.3.3. The generator/storage site shall assemble the AK information into an auditable record[1] for the waste stream as described in Permit Attachment C4. For those waste streams with an approved AK Sufficiency Determination (see below), radiography or VE per the methods described in Permit Attachment C1 is not required.

Waste characterization activities specified in this WAP and associated Permit Attachments shall be carried out at generator/storage sites in accordance with this WAP. The DOE will audit generator/storage site waste characterization programs and activities as described in Section C-3. Waste characterization activities at the generator/storage sites include the following, as discussed in Section C-3:

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

[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.

- Visual examination of opened containers as an alternative way to determine their physical contents

- Compilation of AK documentation into an auditable record

C-0b AK Sufficiency Determination

Generator/storage sites may submit a request to the Permittees for an AK Sufficiency Determination (Determination Request) to be exempt from the requirement to perform radiography or VE based on AK. The contents of the Determination Request are specified in Permit Attachment C4, Section C4-3d.

The Permittees shall evaluate the Determination Request for completeness and technical adequacy. This evaluation shall include, but not be limited to, whether the Determination Request is technically sufficient for the following:

- The Determination Request must include information specified in Permit Attachment C4, Section C4-3d

- The AK Summary must identify relevant hazardous constituents, and must correctly identify toxicity characteristic and listed hazardous waste numbers

- Hazardous waste number assignments must be substantiated by supporting data and, if not, whether this lack of substantiation compromises the interpretation

- Resolution of data discrepancies between different AK sources must be technically correct and documented

- The AK Summary must include the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations must be technically correct

- Prohibited items specified in the TSDF-WAC should be addressed, and conclusions drawn must be technically adequate and substantiated by supporting information

- If the AK record includes process control information specified in Permit Attachment C4, Section C4-3b, the information should include procedures, waste manifests, or other documentation demonstrating that the controls were adequate and sufficient

- The site must provide the supporting information necessary to substantiate technical conclusions within the Determination Request, and this information must be correctly interpreted

The Permittees will review the Determination Request for technical adequacy and compliance with the requirements of the Permit, using trained and qualified individuals in accordance with standard operating procedures (**SOP**) that shall, at a minimum, address the technical and procedural requirements listed above. The Permittees shall resolve comments with the generator/storage site.

If the DOE determines that the AK is sufficient, it shall inform the public of the Determination Request, the Permittees' evaluation of it, and the date and time of a public meeting to provide information to and solicit comments from interested members of the public regarding the Determination Request. Notice of the meeting and comment period shall be provided by the following methods:

1. Written notice to individuals on the facility mailing list

2. Public notice in area newspapers, including the Carlsbad Current-Argus, Albuquerque Journal, and Santa Fe New Mexican

3. Notice as specified in Permit Part 1, Section 1.11

4. E-mail notification as specified in Permit Part 1, Section 1.11

The DOE shall take written comment on the Determination Request for at least 30 days following the public meeting. DOE shall compile such comments, including any disagreement between the DOE and commenters.

If the DOE provisionally approves the Determination Request, it may forward it along with relevant information submitted with the Determination Request to NMED for an evaluation that the provisional approval made by DOE is adequate. The DOE shall also provide to NMED, as a separate appendix to the Determination Request, the compilation of comments and DOE's response to each comment. After submitting a Determination Request to the NMED, the Permittees will post a link to the transmittal letter to the NMED as specified in Permit Part 1, Section 1.11. The NMED will evaluate the Determination Request, determine the adequacy of the Determination Request, and notify the DOE as to whether or not it concurs with its provisional approval. Based on the results of NMED's evaluation, the Permittees will notify the generator/storage sites whether the AK information is sufficient and the Determination Request is approved. The DOE will not approve a Determination Request that NMED has determined to be inadequate unless the generator/storage site resolves the inadequacies and provides the resolution to NMED for evaluation of adequacy. Should the inadequacies not be resolved to NMED's satisfaction, the DOE shall not submit a Determination Request for the same waste stream at a later date. The DOE shall not submit a Determination Request if a previous Determination Request is pending evaluation by the NMED.

In the event the DOE disagrees, in whole or in part, with an evaluation performed by the NMED resulting in a determination by the NMED that the DOE's provisional approval for a particular waste stream is inadequate, DOE may seek dispute resolution. The dispute resolution process is specified in Permit Part 1, Section 1.16. The Secretary's final decision under Permit Part 1, Section 1.16.4 shall constitute a final agency action.

By July 1 of each year, the Permittees shall submit to the NMED a list of waste streams that the Permittees may submit for an AK Sufficiency Determination during the upcoming federal fiscal year, only if there are actual plans to seek an AK Sufficiency Determination; otherwise, no action is required. The Permittees will post a link to the transmittal letter to the NMED and announce a public meeting to discuss the list with interested members of the public on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

If a generator/storage site does not submit a Determination Request, or if the DOE does not approve a Determination Request, or if the NMED finds that the DOE's provisional approval of a Determination Request is inadequate, the generator/storage site shall perform radiography or VE on 100% of the containers in a waste stream.

If a generator/storage site submits a Determination Request, the DOE provisionally approves the Determination Request and the NMED finds that the DOE's provisional approval is adequate, neither radiography nor VE of the waste stream is required.

C-0c Waste Stream Profile Form Completion

After a complete AK record has been compiled and either a Determination Request has been approved by the DOE or the generator/storage site has completed the applicable testing requirements specified in Permit Attachments C1, the generator/storage site will complete a WSPF and a Characterization Information Summary (**CIS**). The requirements for the completion of a WSPF and a CIS are specified in Permit Attachment C3, Sections C3-6b(1) and C3-6b(2) respectively.

The WSPF and the CIS for the waste stream resulting from waste characterization activities shall be transmitted to the Permittees, who shall review them for completeness, and screen them for acceptance prior to loading any TRU mixed waste into the CH or RH Packaging at the generator facility, as described in Section C-4. The review and approval process will ensure that the submitted waste analysis information is sufficient to meet the Data Quality Objectives (**DQOs**) for AK in Section C-4a(1) and allow the Permittees to demonstrate compliance with the requirements of this WAP. 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**). The DOE will approve and provide NMED with copies of the approved WSPF and accompanying CIS prior to waste stream shipment. Upon notification of the DOE's approval of the WSPF, the generator/storage site may be authorized to ship waste to the WIPP facility.

In the event the Permittees request detailed information on a waste stream, the site will provide a Waste Stream Characterization Package (Permit Attachment C3, Section C3-6b(3)). For each waste stream, this package will include the WSPF, the CIS, and the complete AK summary. The Waste Stream Characterization Package will also include specific Batch Data Reports (**BDRs**) and raw data associated with waste container characterization as requested by the Permittees.

C-0d Waste Confirmation

The Permittees will perform waste confirmation on a representative subpopulation of each waste stream shipment after certification and prior to shipment pursuant to Permit Attachment C7. The Permittees will use radiography, review of radiography audio/video recordings, VE, or review of VE records (e.g., VE data sheets or packaging logs) to examine at least seven percent of each waste stream shipment to confirm that the waste does not contain ignitable, corrosive, or reactive waste. Waste confirmation will be performed by the Permittees prior to shipment of the waste from the generator/storage site to the WIPP facility.

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

C-1a Waste Stream Identification

Transuranic mixed waste destined for disposal at the WIPP facility will be characterized on a waste stream basis. Generator/storage sites will delineate waste streams using AK. Required AK is specified in Section C-3a and Permit Attachment C4.

C-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 Waste. These Summary Category Groups are used to determine further characterization requirements.

The Permittees will only allow generators to ship those TRU mixed waste streams with EPA hazardous waste numbers listed in Table C-5. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at the WIPP facility as long as the TSDF-WAC are met. The Permittees will require sites to perform characterization of waste streams as required by this WAP. If during the characterization process, new EPA hazardous waste numbers are identified, those wastes will be prohibited for disposal at the WIPP facility until a permit modification has been submitted to and approved by NMED for these new EPA hazardous waste numbers. Similar waste streams at other generator/storage sites will be examined by the Permittees to ensure that the newly identified EPA hazardous waste numbers do not apply to those similar waste streams. If the other waste streams also require new EPA hazardous waste numbers, shipment of these similar waste streams will also be prohibited for disposal at the WIPP facility until a permit modification has been submitted to and approved by the NMED.

C-1c Waste Prohibited at the WIPP Facility

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

- liquid waste is not acceptable at the WIPP facility. Liquid in the quantities delineated below is acceptable:
  - Observable liquid shall be no more than one percent by volume of the outermost container at the time of radiography or visual examination
  - Internal containers with more than 60 milliliters or three percent by volume observable liquid, whichever is greater, are prohibited
  - Containers with Hazardous Waste Number U134 assigned shall have no observable liquid
  - Overpacking the outermost container that was examined during radiography or visual examination or redistributing untreated liquid within the container shall not be used to meet the liquid volume limits

- 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 biphenyls (**PCBs**) not authorized under an EPA PCB waste disposal authorization
- wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)
- waste that has ever been managed as high-level waste and waste from tanks specified in Table C-4, unless specifically approved through a Class 3 permit modification
- any waste container from a waste stream (or waste stream lot) which has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, pursuant to Permit Attachment C7
- any waste container from a waste stream which has not been preceded by an appropriate, certified WSPF (see Section C-1d)

Before accepting a container holding TRU mixed waste, the Permittees will perform waste confirmation activities pursuant to Permit Attachment C7 on each waste stream shipment to confirm that the waste does not contain ignitable, corrosive, or reactive waste and the assigned EPA hazardous waste numbers are allowed for storage and disposal by this Permit. Waste confirmation activities will be performed on at least seven percent of each waste stream shipped, equating to examination of at least one of fourteen containers in each waste stream shipment. If a waste stream shipment contains fewer than fourteen containers, one container will be examined to satisfy waste confirmation requirements. Section C-4 and Permit Attachment C7 include descriptions of the waste confirmation processes the Permittees conduct prior to receiving a shipment at the WIPP facility.

Containers are vented through filters, 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 the WIPP facility 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 the WIPP facility.

C-1d Control of Waste Acceptance

Every waste stream shipped to the WIPP facility shall be preceded by a WSPF (Figure C-1) and a CIS. The required WSPF information and the CIS elements are found in Permit Attachment C3, Section C3-6b(1) and Section C3-6b(2).

Generator/storage sites will provide the WSPF to the Permittees for each waste stream prior to its acceptance for disposal at the WIPP facility. The WSPF and the CIS will be transmitted to the Permittees for each waste stream from a generator/storage site. If continued waste characterization reveals discrepancies that identify different EPA hazardous waste numbers 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. Generator/storage sites will develop criteria to determine the specific circumstances under which a WSPF is revised versus when a new WSPF is required. These criteria will be evaluated by DOE during site audits (Attachment C6).

The Permittees are responsible for the review of WSPFs and CISs to verify compliance with the restrictions on TRU mixed wastes destined for disposal at the WIPP facility. The DOE will approve and submit completed WSPFs to the NMED prior to waste stream shipment. The Permittees will be responsible for the review of shipping records (Section C-5) to ensure that each waste container has been prepared and characterized in accordance with applicable provisions of this WAP. Waste characterization data shall ensure the absence of prohibited items specified in Section C-1c.

Any time the Permittees request additional information concerning a waste stream, the generator/storage site will provide a Waste Stream Characterization Package (Permit Attachment C3, Section C3-6b(3)). 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.

The NMED retains the right, under the New Mexico Hazardous Waste Act (HWA) at 74-4-13, which is cited in Permit Part 1, Section 1.1, to take action, such as issuing orders, to address evidence of an imminent and substantial endangerment to human health or the environment, including orders to suspend TRU mixed waste shipments and emplacement at the WIPP facility for cause. Specifically and under the authority in the HWA at 74-4-13, the Secretary reserves the right to prohibit shipment and emplacement of TRU mixed wastes at the WIPP facility for, but not limited to, a determination by the Secretary: (1) that the Permittees have not satisfied or are in violation of any conditions of this Permit that may lead to a threat to human health or the environment; (2) that a TRU mixed waste stream or shipment may pose a threat to human health or the environment; or (3) based on evidence of noncompliance. This attachment also requires that all waste shipped to the WIPP facility is compliant with the WAP contained herein and all shipments arriving at the WIPP facility go through a screening and verification process per Section C-5 before emplacement in a HWDU. NMED retains the right to suspend any and all waste shipments to the WIPP facility associated with noncompliance with the WAP.

C-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 A1.

C-2 Waste Characterization Program Requirements and Waste Characterization Parameters

The Permittees shall require the sites to develop the procedure(s) which specify their programmatic waste characterization requirements. The DOE will evaluate the procedures during audits conducted under the Audit and Surveillance Program (Section C-5a(3)) and may also evaluate the procedures as part of the review and approval of the WSPF. Sites must notify the Permittees and obtain DOE approval prior to making data-affecting modifications to procedures (Permit Attachment C3, Section C3-9). Program procedures shall address the following minimum elements:

- Waste characterization and certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility
- Methods used to ensure prohibited items are documented and managed; these will include procedures for performing radiography, VE, or treatment, if these methods are used to ensure prohibited items are not present in the waste prior to shipment of the waste to the WIPP facility
- Identify the organization(s) responsible for compliance with waste characterization and certification procedures
- Identify the oversight procedures and frequency of actions to verify compliance with waste characterization and certification procedures
- Develop training specific to waste characterization and certification procedures
- Ensure that personnel may stop work if noncompliance with waste characterization or certification procedures is identified
- Develop a nonconformance process that complies with the requirements in Permit Attachment C3 of the WAP to document and establish corrective action.
- As part of the corrective action process, assess the potential time frame of the noncompliance, the potentially affected waste population(s), and the reassessment and recertification of those wastes
- A listing of approved EPA hazardous waste numbers which are acceptable at the WIPP facility are included in Table C-5

For those waste streams or containers that are not amenable to radiography (e.g., RH TRU mixed waste, direct loaded ten-drum overpacks (**TDOPs**)) for waste confirmation by the Permittees pursuant to Permit Attachment C7, generator/storage site VE data may be used for waste acceptance. In those cases, the Permittees will review the generator/storage site VE procedures to ensure that data sufficient for the Permittees' waste acceptance activities pursuant to Permit Attachment C7 will be obtained and the procedures meet the minimum requirements for visual examination specified in Permit Attachment C1, Section C1-2.

The following waste characterization parameters shall be obtained from the generator/storage sites:

- Determination whether TRU mixed waste streams comply with the applicable provisions of the TSDF-WAC
- Determination whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart C)
- Determination whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart D)
- Estimation of waste material parameter weights

Table C-1 provides the parameters of interest for the various constituent groupings and testing methodologies. The following sections provide a description of the acceptable methods to evaluate these parameters for each waste Summary Category Group.

C-3 Generator Waste Characterization Methods

The characterization techniques used by generator/storage sites includes AK and may also include, as necessary, radiography and VE. Characterization activities are performed in accordance with the WAP. Table C-1 provides a summary of the characterization requirements for TRU mixed waste.

C-3a Acceptable Knowledge

Acceptable knowledge is used in TRU mixed waste characterization activities in the following ways:

- To delineate TRU mixed waste streams
- To assess whether TRU mixed wastes comply with the TSDF-WAC
- To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart D)
- To estimate waste material parameter weights

Acceptable knowledge is discussed in detail in Permit Attachment C4, which outlines the minimum set of requirements and DQOs which shall be met by the generator/storage sites in order to use AK. In addition, Section C-5a(3) of this permit attachment describes the assessment of AK through the Audit and Surveillance Program.

C-3b Radiography and Visual Examination

Radiography and VE are nondestructive qualitative and quantitative techniques used to identify and verify waste container contents as specified in Permit Attachment C1. Generator/storage sites shall perform radiography or VE of 100 percent of CH TRU mixed waste containers in waste streams except for those waste streams for which the DOE approves a Determination Request. No RH TRU mixed waste will be shipped to the WIPP facility for storage or disposal without documentation of radiography or VE of 100 percent of the containers as specified in Permit Attachment C1. Radiography and/or VE will be used, when necessary, to examine a waste container to verify the physical form of the waste matches its waste stream description as determined by AK. These techniques can detect observable liquid in excess of TSDF-WAC limits and containerized gases, which are prohibited from disposal at the WIPP facility. The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes. Radiography and/or VE are also able to verify 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 EPA hazardous waste numbers 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 AK characterization, a non-conformance report (**NCR**) will be completed and the inconsistency will be resolved as specified in Permit Attachment C4, and the NCR will be dispositioned as specified in Permit Attachment C3, Section C3-7. The proper waste stream assignment will be determined (including preparation of a new WSPF), the correct hazardous waste numbers will be assigned, and the resolution will be documented. Refer to Permit Attachment C4 for a discussion of AK and its verification process.

For generator/storage sites that use VE, the detection of any liquid in non-transparent internal containers, detected from shaking the internal container, will be handled by assuming that the internal container is filled with liquid and adding this volume to the total liquid in the container being characterized using VE. The container being characterized using VE would be rejected and/or repackaged to exclude the internal container if it is over the TSDF-WAC limits. When radiography is used, or VE of transparent containers is performed, if any liquid in internal containers is detected, the volume of liquid shall be added to the total for the container being characterized using radiography or VE. Radiography, or the equivalent, will be used as necessary 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. Radiographic examination protocols and QA/QC methods are provided in Permit Attachment C1. Radiography and VE shall be subject to the Audit and Surveillance Program (Permit Attachment C6).

C-4 Data Verification and Quality Assurance

The Permittees will ensure that applicable waste characterization processes performed by generator/storage sites sending TRU mixed waste to the WIPP facility 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 are described in Permit Attachment C3, Section C3-4. The validation and verification process at the Permittee level is also described in Section C-5.

C-4a Data Generation and Project Level Verification Requirements

C-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 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:

- Acceptable Knowledge
  - To delineate TRU mixed waste streams
  - To assess whether TRU mixed wastes comply with the applicable requirements of the TSDF-WAC
  - To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart C)
  - To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR Part 261, Subpart D)
  - To estimate waste material parameter weights
- Radiography and VE
  - To verify the TRU mixed waste streams contain no prohibited items and to verify that physical form of the waste matches the waste stream description as determined by AK

Reconciliation of these DQOs by the Generator/Storage Site Project Manager, as applicable, is addressed in Permit Attachment C3. Reconciliation requires determining whether sufficient type, quality, and quantity of data have been collected to ensure the DQOs cited above can be achieved.

C-4a(2) Quality Assurance Objectives

The generator/storage sites shall demonstrate compliance with each Quality Assurance Objective (**QAO**) associated with the characterization methods as presented in Permit Attachment C3. Generator/Storage Site Project Managers are further required to perform a reconciliation of the data with the DQOs established in this WAP. The Generator/Storage Site Project Manager shall conclude that the DQOs have been met for the characterization of the waste stream prior to submitting a WSPF to DOE for approval (Permit Attachment C3). 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
- Representativeness
  - Representativeness expresses the degree to which data represent characteristics of a population

A more detailed discussion of the QAOs can be found in Permit Attachment C3, which describes the QAOs associated with each test method.

C-4a(3) Data Generation

Batch data reports (**BDRs**), in a format approved by DOE, will be used by each generator/storage site for reporting waste characterization data. This format will be included in the generator/storage site Quality Assurance Project Plan (**QAPjP**), controlled electronic databases, or procedures referenced in the QAPjP (Permit Attachment C5) and will include the elements required by this WAP for BDRs (Permit Attachment C3).

The DOE 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 C6 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 ensure adherence to the WAP characterization program. The DOE 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 DOE will take appropriate action as specified in Permit Attachment C6.

C-4a(4) Data Verification

Batch data reports will document the testing 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 C3). The NMED may request, through the Permittees, copies of any BDR, and/or the raw data validated by the generator/storage sites, to check the DOE's audit of the validation process.

C-4a(5) Data Transmittal

Batch data reports will include the information required by Permit Attachment C3, Section C3-4 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 transmits 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 C-5a(1) for WWIS reporting requirements and the *Waste Data System User's Manual* for the WWIS data fields and format requirements.

Once a waste stream is characterized, the Site Project Manager will also submit to the Permittees a WSPF (Figure C-1) accompanied by the CIS for that waste stream which includes reconciliation with DQOs (Permit Attachment C3, Sections C3-6b(1) and C3-6b(2)). The WSPF, the CIS, 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 facility.

C-4a(6) Records Management

Records related to waste characterization activities performed by the generator/storage sites will be maintained in the testing facility files or generator/storage site project files, or at the WIPP Records Archive facility. Raw data obtained by testing TRU mixed waste in support of this WAP will be identifiable, legible, and provide documentary evidence of quality. Transuranic mixed waste characterization records submitted to the Permittees shall be maintained in the WIPP facility Operating Record and be available for inspection by the NMED.

Records inventory and disposition schedule (**RIDS**) or an equivalent system shall be prepared and approved by generator/storage site personnel. Records relevant to an enforcement action under this Permit, regardless of disposition, shall be maintained at the generator/storage site until the NMED determines they are no longer needed for enforcement action, and then dispositioned as specified in the approved RIDS. Waste characterization data and related QA/QC records 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 or transferred for permanent archival storage to the WIPP Records Archive facility.

Waste characterization records include historical characterization records (i.e., headspace gas sampling/analysis and homogeneous solids and soil/gravel sampling/analysis) generated through implementation of previous requirements in this WAP. Those waste characterization records designated as Non-Permanent Records shall be maintained for ten years from the date of (record) generation at the participating generator/storage site or at the WIPP Records Archive facility and then dispositioned according to their approved RIDS. If a generator/storage site ceases to operate, records shall be transferred before closeout to the Permittees for management at the WIPP Records Archive facility. Table C-2 is a listing of records designated as Lifetime Records and Non-Permanent Records. Classified information will not be transferred to the WIPP facility. Notations will be provided to the Permittees indicating the absence of classified information. The approved generator/storage site RIDS identify appropriate disposition of classified information. Nothing in this Permit is intended to, nor should it be interpreted to,

require the disclosure of any U.S. Department of Energy classified information to persons without appropriate clearance to view such information.

C-5 Permittee Level Waste Screening and Verification of TRU Mixed Waste

Permittee waste screening is a two-phased process. Phase I will occur prior to configuring shipments of TRU mixed waste. Phase II will occur after configuration of shipments of TRU mixed waste but before it is disposed at the WIPP facility. Figure C-3 presents Phase I and a portion of Phase II of the TRU mixed waste screening process. Permit Attachment C7 presents the TRU mixed waste confirmation portion of Phase II activities.

C-5a 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. The RCRA portion of the generator/storage site audit program will provide on-site verification of characterization procedures; BDR preparation; and recordkeeping to ensure that 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 the required elements of the WSPF and the CIS are present (Permit Attachment C3, Section C3-6b(1)) and that the waste characterization information meets acceptance criteria required for compliance with the WAP .

A generator/storage site must first prepare a QAPjP, which includes applicable WAP requirements, and submit it to DOE for review and approval (Permit Attachment C5). 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. An initial audit will be performed after QAPjP implementation and prior to the generator/storage site being certified for shipment of waste to the WIPP facility. Subsequent audits, focusing on the results of waste characterization, will be performed as specified in Permit Attachment C6, Section C6-1. The DOE has the right to conduct unannounced audits and to examine any records that are related to the scope of the audit. See Section C-5a(3) and Permit Attachment C6 for further information regarding audits.

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 (Permit Attachment C3, Section C3-4b). If the waste characterization does not meet the applicable requirements of the WAP, the mixed waste stream cannot be managed, stored, or disposed at the WIPP facility until those requirements are met. The Site Project Manager will then complete a WSPF and submit it to the Permittees, along with the accompanying CIS for that waste stream (Permit Attachment C3, Section C3-6b(1)). 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 the WIPP facility. The Permittees will compare radiographic and visual examination 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 DOE will approve the WSPF. Prior to the first shipment of containers from the approved waste stream, the approved

WSPF and accompanying CIS will be provided to the 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 C-5a(2).

Audits of generator/storage sites will be conducted as part of the Audit and Surveillance Program (Permit Attachment C6). The RCRA portion of the generator/storage site audit program will provide on-site verification of waste characterization procedures; BDR preparation; and record keeping to ensure that applicable provisions of the WAP requirements are met. 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 as supporting information for WSPF review. The 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 submitted by the generator/storage site for each waste container submitted for the WSPF review and the CIS. The Permittees will compare ongoing 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 until a new or revised WSPF is submitted to the Permittees and approved by the DOE.

If discrepancies regarding hazardous waste number assignment or Waste Matrix Code designation 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 DOE will notify the 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.

C-5a(1) WWIS Description

All generator/storage sites planning to ship TRU mixed waste to the WIPP facility will supply the required data to the WWIS. The WWIS Data Dictionary includes the data fields, the field format and the limits associated with the data as established by this WAP. These data will be subjected to edit and limit checks that are performed automatically by the database, as defined in the *Waste Data System User's Manual*.

The Permittees will coordinate the data transmission with each generator/storage site. Actual data transmission will use appropriate technology to ensure the integrity of the data transmissions. The Permittees will require sites with large waste inventories and large databases to populate a data structure provided by the Permittees that contains the required data dictionary fields that are appropriate for the waste stream (or waste streams) at that site. The Permittees will access these data via the Internet to ensure an efficient transfer of this data. Small quantity sites will be given a similar data structure by the Permittees that is tailored to their types of waste. Sites with very small quantities of waste will be provided with the ability to assemble the data interactively to this data structure on the WWIS.

The Permittees will use the WWIS to verify that the supplied data meet the edit and limit checks prior to the shipment of any TRU mixed waste to the WIPP facility. 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. Table C-3 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 by the Permittees, for the life of the facility.

- Shipment Summary Report

  This report will contain the container identification numbers (**IDs**) of every container in the shipment, listed by Shipping Package number and by assembly number (for seven-packs, four-packs, three-packs, two-packs, and single units), for every assembly in the Shipping Package. 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 DOE approval process. This report will contain the data listed in the Characterization Module on Table C-3. 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.

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. Training for the WWIS

Data Administrator job position will be in accordance with the WWIS Retrieval Characterization Transportation Data Administrator Task Card on file at the WIPP facility.

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 an 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 changes made to previously approved data.

C-5a(2) Examination of the Waste Stream Profile Form and Container Data Checks

The Permittees verify the completeness and accuracy of the Waste Stream Profile Form (Section C3-6b(1)). Figure C-2 includes the waste characterization and waste stream approval process. The assignment of the waste stream description, Waste Matrix Code Group, and Summary Category Groups; the acceptable knowledge summary documentation; the methods used for characterization; the DOE certification, and the appropriate designation of EPA hazardous waste number(s) will be examined by the Permittees. If the WSPF is inaccurate, efforts will be made to resolve discrepancies by contacting the generator/storage site in order for the waste stream to be eligible for shipment to the WIPP facility. 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 C3).

The WSPF shall pass verification checks by the Permittees in order for the waste stream to be approved by DOE for shipment to the WIPP facility. The WSPF check against waste container data will occur during the initial WSPF approval process (Section C-5a).

The EPA hazardous waste numbers for the wastes that appear on the Waste Stream Profile Form will be compared to those in Table C-5 to ensure that only approved wastes are accepted for management, storage, or disposal at the WIPP facility. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at WIPP as long as the TSDF-WAC are met. The CIS will be reviewed by the Permittees to verify that the waste has been classified correctly with respect to the assigned EPA hazardous waste numbers. The Permittees will verify that the applicable requirements of the TSDF-WAC have 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 from an approved hazardous waste stream with a description different from its WSPF will not be managed, stored, or disposed at the WIPP facility.

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: 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 CIS will indicate if the waste has been checked for the characteristics of ignitability, corrosivity, and reactivity. Chemical compatibility will be evaluated pursuant to Permit Part 2, Section 2.3.3.4 (as applicable), on a waste stream basis based on guidance provided in the 1980 EPA method, EPA 600/2-80-076. The evaluation will be documented (e.g., in a chemical compatibility evaluation memorandum).

Any container with unresolved discrepancies associated with hazardous waste characterization will not be managed, stored, or disposed at the WIPP facility until the discrepancies are resolved. If the discrepancies cannot be resolved, DOE will revoke the approval status of the waste stream, suspend shipments of the waste stream, and notify the NMED. Waste stream approval will not be reinstated until the generator/storage site demonstrates that corrective actions have been implemented and the generator/storage site waste characterization program is reassessed by the Permittees.

C-5a(3) Audit and Surveillance Program

An important part of the Permittees' verification process is the Audit and Surveillance Program. The focus of this audit program is compliance with this WAP and the Permit. This audit program addresses AK implementation and testing activities, from waste stream classification assignment through waste container certification, and ensures compliance with SOPs and the WAP. Audits will ensure that containers and their associated documentation are adequately tracked throughout the waste handling process. Operator qualifications will be verified, and implementation of 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.

The DOE will perform an initial audit 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. Subsequent audits will be performed 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 DOE. More detail on this audit process is provided in Permit Attachment C6.

C-5b Phase II Waste Shipment Screening and Verification

As presented in Figure C-3, Phase II of the waste shipment screening and verification process begins with confirmation of the waste pursuant to Permit Attachment C7 after waste shipments are configured. After the waste shipment has arrived, the Permittees will screen the shipments to determine the completeness and accuracy of the EPA Hazardous Waste Manifest and the land disposal restriction notice completeness. The Permittees will verify there are no waste shipment irregularities and the waste containers are in good condition. Only those waste containers that are from shipments that have been confirmed pursuant to Permit Attachment C7

and that pass Phase II waste screening and verification 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 up to six state and/or federal hazardous waste numbers in each line item
- Listing of shipping container IDs (Shipping Package serial number)
- Signature of authorized generator representative

Specific Waste Container information:

- Waste Stream Identification Number
- List of Hazardous Waste Numbers 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 described in Section C-5a(1), 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 the WIPP facility 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.

C-5b(1) 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. For CH TRU mixed waste, the Permittees will then make a determination of waste shipment completeness by checking the unique, bar-coded identification number found on waste containers holding TRU mixed waste against the WWIS database after opening the Shipping Package.

The WWIS links the bar-coded identification numbers of containers in a specific waste shipment to the waste assembly (for seven-packs, four-packs, three-packs , two-packs, single units, and five-drum carriages) and to the shipment identification number, which is also written on the EPA Hazardous Waste Manifest.

For shipments in the RH-TRU 72B cask, the identification number of the single payload container is read during cask-to-cask transfer in the Transfer Cell and then checked against the WWIS database. For shipments in the CNS 10-160B cask, the Permittees will make a determination of waste shipment completeness by checking the unique identification number

found on each container holding TRU mixed waste in the Hot Cell against the WWIS database after unloading the cask.

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 cask or container (or one container in a bound seven-pack, four-pack, three-pack, two-pack, or single unit) 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:

- Package Inner Containment Vessel **(ICV**) or shipping cask closure date
- Package (container or canister) receipt date
- Overpack identification number (if appropriate)
- Container or canister emplacement date
- Container or canister emplacement location

Manifest 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 Permittees actually receive. 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 package or shipping cask, the waste will be retained in the parking area. If the discrepancy is identified after the waste containers are removed from the package or cask, 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 Permittees at the WIPP facility with a verbal (followed by a mandatory written) concurrence by the generator/storage site technical contact. Discrepancies that are unresolved within twenty (20) days of receiving the waste will be reported to the e-Manifest system pursuant to 40 CFR §264.72(c)(2). If the manifest discrepancies have not been resolved within sixty (60) days of waste receipt, the shipment will be returned to the generator/storage facility, pursuant to 40 CFR §264.72(d)(1). 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.

C-5b(2) Examination of the Land Disposal Restriction (**LDR**) Notice

Transuranic mixed waste designated by the Secretary of Energy for disposal at the WIPP facility is exempt from the LDRs by the WIPP 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 waste designated by the Secretary of Energy for disposal at the WIPP facility 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)).

C-5b(3) 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 the containers are in good condition

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 C-3). For standard waste boxes (**SWBs**) and 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 seven-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 the containers in the assembly with minimum radiological exposure. If the container IDs and the information on the shipping papers agree with the WWIS Shipment Summary Report, and the shipment was subject to waste confirmation by the Permittees prior to shipment to the WIPP facility pursuant to Permit Attachment C7, the containers will be approved for storage and disposal at the WIPP facility.

C-6 Permittees' 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 and Phase II 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 records associated with waste shipment screening determinations.

C-7 Records Management and Reporting

As part of the Operating Record, data and documents associated with waste characterization and waste confirmation are managed in accordance with standard records management practices.

Waste characterization data for each TRU mixed waste container transmitted to the WIPP facility 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 WIPP Records Archive facility 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.

The storage of the Permittees' copy of the manifest, LDR information, waste characterization data, WSPFs, waste confirmation activity records, and other related records will be identified on the appropriate RIDS.

The following records will be maintained for waste characterization and waste confirmation purposes as part of the Operating Record:

- Completed WIPP WSPFs and accompanying CIS, including individual container data as transferred on the WWIS (or received as hard-copy) and any discrepancy-related documentation as specified in Section C-5a

- Radiography and visual examination records (data sheets, packaging logs, and video and audio recordings) of waste confirmation activities

- Completed Waste Receipt Checklists and discrepancy-related documentation as specified in Section C-5b
- WIPP WWIS Waste Emplacement Report as specified in Section C-5a(1)
- Audit reports and corrective action reports from the Audit and Surveillance Program audits as specified in Section C-5a(3) and Permit Attachment C6
- Corrective action reports and closure information for corrective actions taken due to nonconforming waste being identified during waste confirmation by the Permittees

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

Waste characterization and waste confirmation data and documents related to waste characterization that are part of the Operating Record are managed in accordance with the following guidelines:

C-7a 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

C-7b 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

C-8 Reporting

The Permittees will provide a biennial report in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.75) on EPA Form 8700-13 A/B to the NMED that includes information on TRU mixed waste volume and waste descriptions received for disposal during the previous year.

C-9 List of References

U.S. Department of Energy (DOE), , “Waste Data System User’s Manual,” DOE/WIPP 09-3427, Current Revision, 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. Environmental Protection Agency (EPA), April 2015, EPA 530-R-12-001, “Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes - Final, A Guidance Manual,” 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.

TABLES

Table C-1
Summary of Parameters, Characterization Methods, and Rationale for Transuranic Mixed Waste

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
S3000-Homogeneous Solids	• Solidified inorganics • Salt waste • Solidified organics	Physical waste form	Acceptable knowledge, radiography and/or visual examination	• Determine waste matrix • Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)
S4000-Soil/Gravel	• Contaminated soil/debris			
S5000–Debris Waste	• Uncategorized metal (metal waste other than lead/cadmium) • Lead/cadmium waste • Inorganic nonmetal waste • Combustible waste • Graphite waste • Heterogeneous debris waste • Composite filter waste	Hazardous constituents • Listed • Characteristic	Acceptable knowledge	• Determine assignment of EPA hazardous waste numbers

Table C-2
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 • 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 (including revisions) • Calibration documentation • Analytical raw data • Procurement documentation • QA procedures (including revisions) • Technical implementing procedures (including revisions) • Audio/video recording (radiography, visual, etc.)

Table C-3
WIPP Waste Information System Data Fields[a]

Characterization Module Data Fields [b]	
Container ID [c] Generator EPA ID Generator Address Generator Name Generator Contact EPA Hazardous Waste Number Layers of Packaging Liner Exists Liner Hole Size Filter Model Number of Filters Installed Item Description Code Hazardous Waste Manifest Number NDE Complete [e]	Transporter EPA ID Transporter Name Visual Exam Container [e] Waste Material Parameter [d] Waste Material Weight [d] Waste Matrix Code Waste Matrix Code Group Waste Stream Profile Number
Certification Module Data Fields	
Container ID [c] Container type Container Weight Contact Dose Rate Container Certification date Container Closure Date	Handling Code
Transportation Data Module	
Contact-Handled Package Number Assembly Number[f] Container IDs [c,d] ICV Closure Date	Ship Date Receive Date
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 recurring field for each waste material parameter, nuclide, etc.

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

[f] Required for seven-packs of 55-gal drums, four-packs of 85-gal drums, or three-packs of 100-gal drums to tie the drums in that assembly together. This facilitates the identification of waste containers in a shipment without need to break up the assembly.

Table C-4
Waste Tanks Subject to Exclusion

Hanford Site - 177 Tanks	
A-101 through A-106	C-201 through C-204
AN-101 through AN-107	S-101 through S-112
AP-101 through AP-108	SX-101 through SX-115
AW-101 through AW-106	SY-101 through SY-103
AX-101 through AX-104	T-101 through T-112
AY-101 through AY-102	T-201 through T-204
B-101 through B-112	TX-101 through TX-118
B-201 through B-204	TY-101 through TY-106
BX-101 through BX-112	U-101 through U-112
BY-101 through BY-112	U-201 through U-204
C-101 through C-112	
Savannah River Site - 51 Tanks	
Tank 1 through 51	
Idaho National Engineering and Environmental Laboratory - 15 Tanks	
WM-103 through WM-106	WM-180 through 190

Table C-5
Listing of Permitted EPA Hazardous Waste Numbers

EPA Hazardous Waste Numbers			
F001	D019	D043	U079
F002	D021	P015	U103
F003	D022	P030	U105
F004	D026	P098	U108
F005	D027	P099	U122
F006	D028	P106	U133*
F007	D029	P120	U134*
F009	D030	U002*	U151
D004	D032	U003*	U154*
D005	D033	U019*	U159*
D006	D034	U037	U196
D007	D035	U043	U209
D008	D036	U044	U210
D009	D037	U052	U220
D010	D038	U070	U226
D011	D039	U072	U228
D018	D040	U078	U239*

* Acceptance of U-numbered wastes listed for reactivity, ignitability, or corrosivity characteristics is contingent upon a demonstration that the wastes no longer exhibit the characteristic of reactivity, ignitability, or corrosivity.

FIGURES

WASTE STREAM PROFILE FORM

Waste Stream Profile Number: _____
Generator/Storage Site Name: _____ Technical Contract: _____
Generator/Storage Site EPA ID: _____ Technical Contact Phone Number: _____
Date of audit report approved by NMED: _____
Title, version number and date of documents used for WAP Certification _____
_____
Did your facility generate this waste? ☐ Yes ☐ No
If no, provide the name and EPA ID of the original generator: _____
_____
WIPP ID: _____ Summary Category Group _____
Waste Stream Name: _____
Description from the WTWBIR: _____
_____
Defense Waste: ☐ Yes ☐ No Check one: ☐ CH ☐ RH
Number of SWBs _____ Number of Drums _____ Number of Canisters _____
Batch Data Report numbers supporting this waste stream characterization: _____
List applicable EPA Hazardous Waste Numbers (2) _____
Applicable TRUCON Content Numbers: _____

Acceptable Knowledge Information(1)
(for the following, enter supporting documentation used (i.e., references and dates))

Required Program Information
Map of site: _____
Facility mission description: _____
Description of operations that generate waste: _____
_____
Waste Identification/categorization schemes: _____
Types and quantities of waste generated: _____
Correlation of waste streams generated from the same building and process, as applicable _____
_____
Waste certification procedures: _____

Required Waste Stream Information
Area(s) and building(s) from which waste stream was generated: _____
Waste stream volume and time period of generation: _____
Waste generating process description for each building: _____
Waste process flow diagrams: _____
_____
Material inputs or other information identifying chemical/radionuclide content and physical waste form: _____
_____
Waste material parameter estimates per unit of waste: _____
Which Defense Activity generated the waste (check all that apply)

- ☐ Weapons activities including defense inertial confinement fusion
- ☐ Naval reactors development
- ☐ Verification and control technology
- ☐ Defense research and development
- ☐ Defense nuclear waste and material by products management
- ☐ Defense nuclear material production
- ☐ Defense nuclear waste and materials security and safeguards and security investigations

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

WASTE STREAM PROFILE FORM

Supplemental Documentation
Process design documents: _____
Standard operating procedures: _____
Safety Analysis Reports: _____
Waste packaging logs: _____
Test plans/research project reports: _____
Site data bases: _____
Information from site personnel: _____
Standard industry documents: _____
Previous analytical data: _____
Material safety data sheets: _____
Sampling and analysis data from comparable/surrogate waste: _____
Laboratory notebooks: _____

Confirmation Information(2)
(for the following, when applicable, enter procedure title(s), number(s), and date(s))

Radiography: _____

Visual Examination: _____

Waste characterization procedures used (procedure number, revision number, date): _____

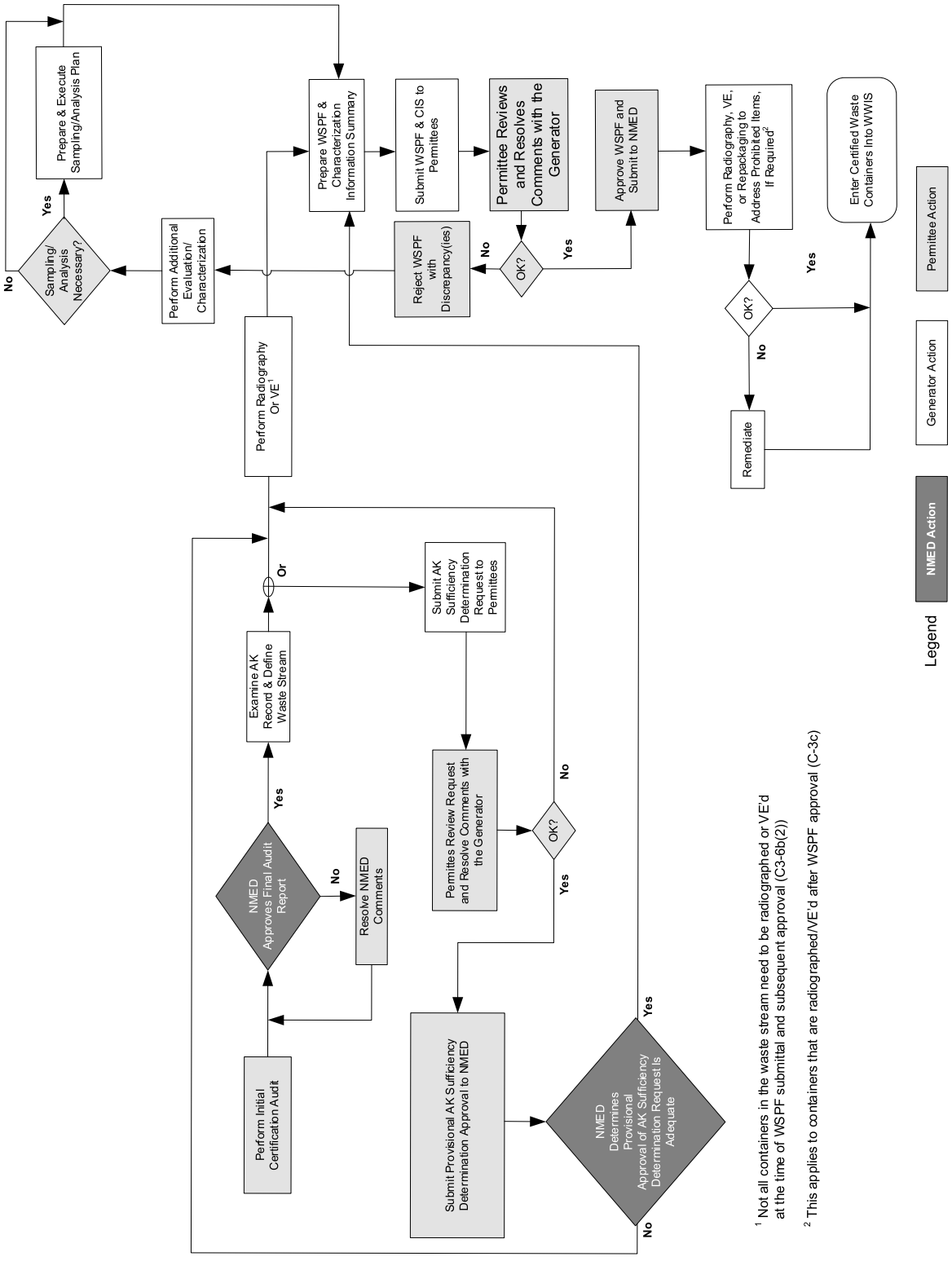
Waste Stream Profile Form Certification

I hereby certify that I have reviewed the information in this Waste Stream Profile Form, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

_____	_____	_____
Signature of Site Project Manager	Printed Name and Title	Date

NOTE: (1) Use back of sheet or continuation sheets, if required.
(2) If, radiography, visual examination were used to confirm EPA Hazardous Waste Numbers, attach signed Characterization Information Summary documenting this determination.

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



[1] Not all containers in the waste stream need to be radiographed or VE'd at the time of WSPF submittal and subsequent approval (C3-6b(2))

[2] This applies to containers that are radiographed/VE'd after WSPF approval (C-3c)

Figure C-2
Waste Characterization Process

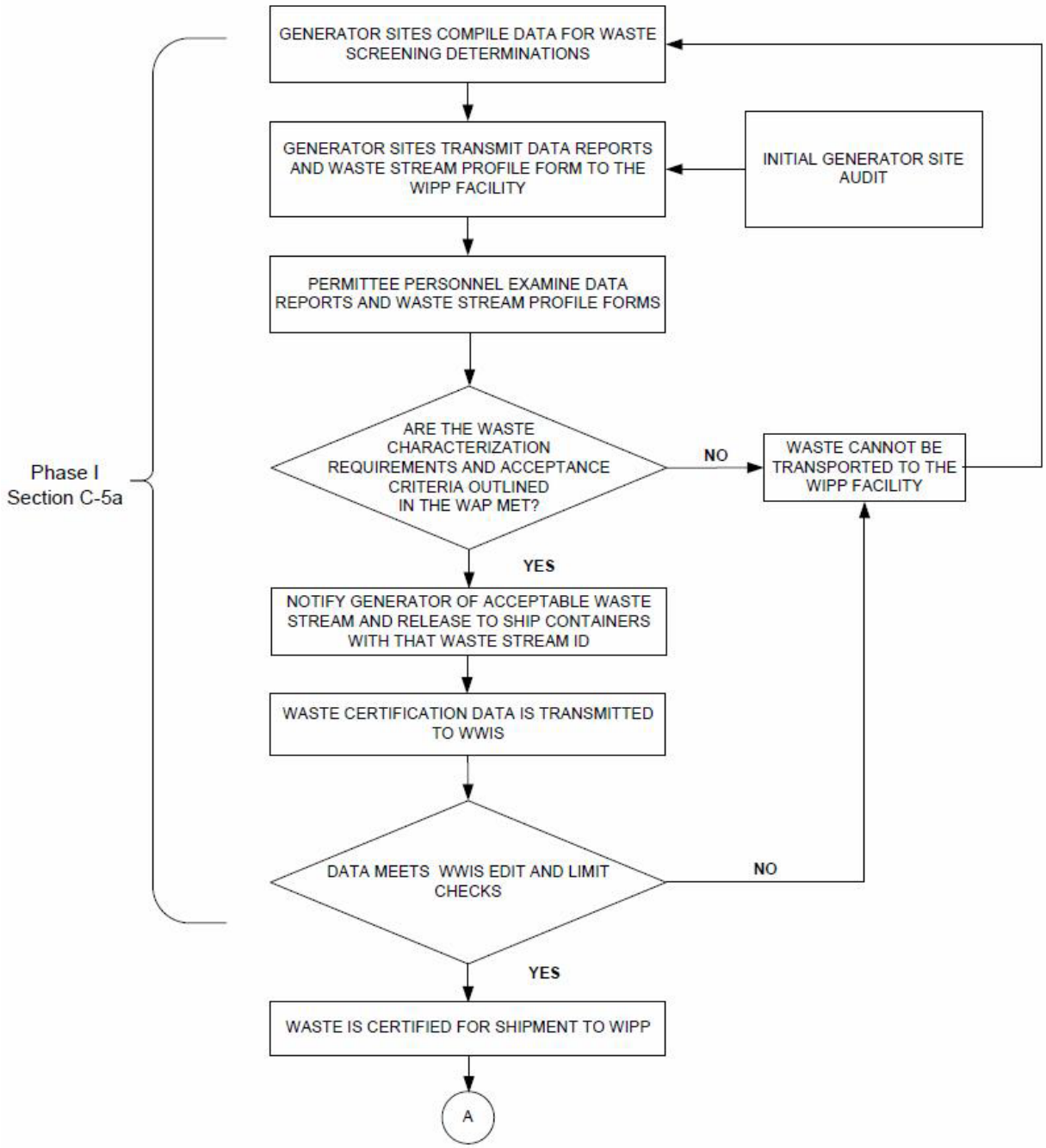


Figure C-3
TRU Mixed Waste Screening and Verification

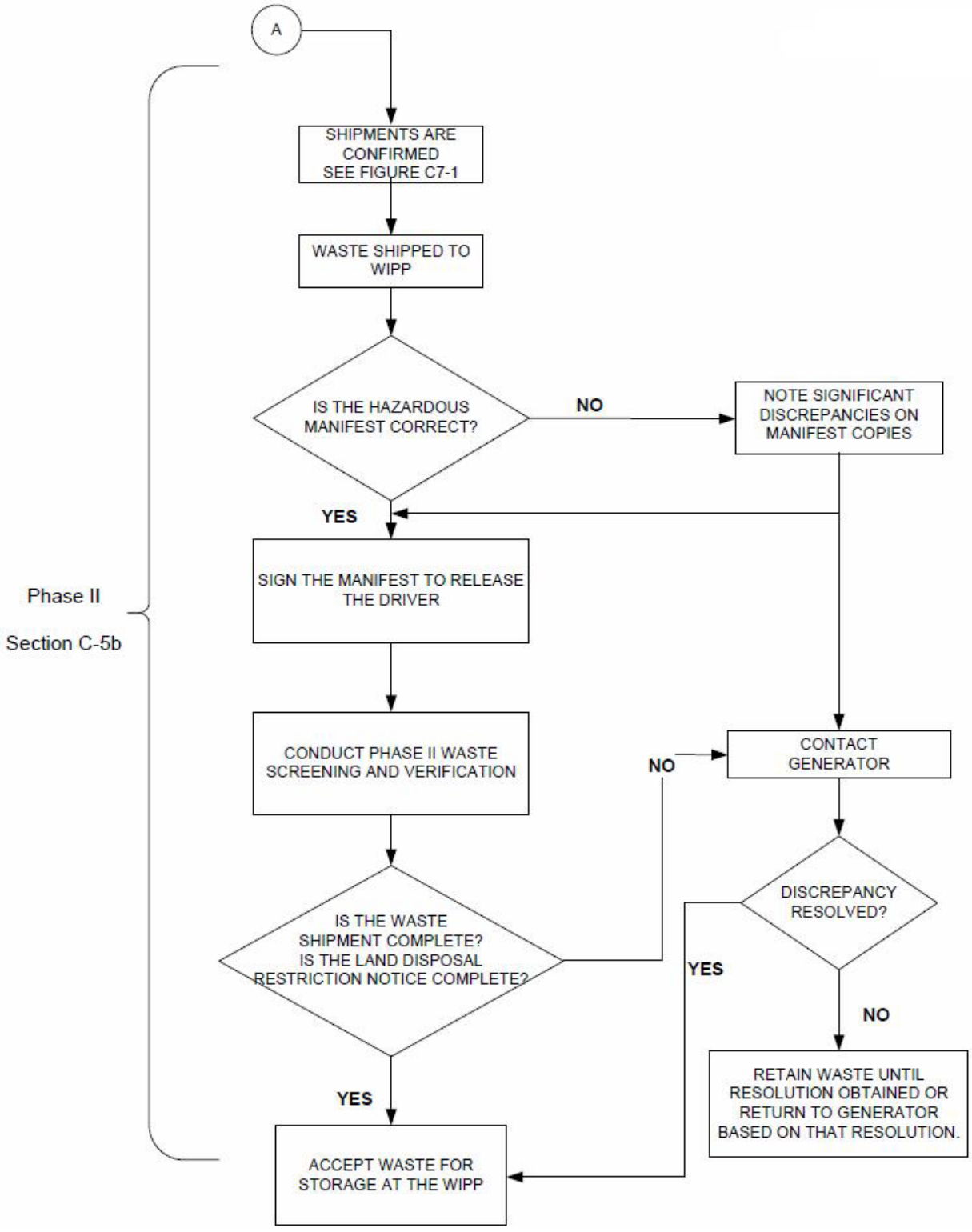


Figure C-3
TRU Mixed Waste Screening and Verification (Continued)